## Space Program Operations Contract

# SPACE SHUTTLE ORBITER OPERATIONAL FLIGHT LEVEL C

# FUNCTIONAL SUBSYSTEM SOFTWARE REQUIREMENTS

# DISPLAYS AND CONTROLS VOLUME 2: SYSTEMS MANAGEMENT

**Prepared by The Boeing Company**
**Space Exploration**

Under Subcontract 6000132079, PDRD P1433q

December 21, 2007

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## FOREWORD

The Space Shuttle Operational Flight Subsystem Software Requirements (FSSR) represent the total computer program that operates the Orbiter general purpose flight computer. The requirements are specified at three levels:

Level A – System Level – Computer Program Development Specification (CPDS)

Level B – Functional Level – Computer Program Development Specification (CPDS)

Level C – Detail Level – Functional Subsystem Software Requirements (FSSR)

Level A specifies system–level constraints and capabilities that are not oriented toward any particular program end item. Levels B and C specify the functional and detailed level requirements and are program end–item oriented. The Level B and C requirements are specified in separate documents for guidance, navigation, and control (GN&C), Systems Management (SM), and Vehicle Utility (VU), data flow, and Payloads (PL). The Level C requirements for the subsystem operating programs (SOPs) are subdivided into five separate volumes. The requirements are described in the following FSSRs:

STS 83 – 0001 Entry guidance
STS 83 – 0002 Ascent/RTLS Guidance
STS 83 – 0003 On–Orbit/Deorbit Guidance
STS 83 – 0004 Entry Navigation
STS 83 – 0005 Ascent/RTLS Navigation
STS 83 – 0006 On–Orbit/Deorbit Navigation
STS 83 – 0007 Entry/GRTLS Digital Autopilot
STS 83 – 0008 Ascent/Transition Digital Autopilot
STS 83 – 0009 On–OrbitDigital Autopilot
STS 83 – 0010 Redundancy Management
STS 83 – 0013 IMU Subsystem Operating Program
STS 83 – 0014 Navigation Aids and Star Tracker Subsystem Operating Program
STS 83 – 0015 Sensor/Controller Subsystem Operating Program
STS 83 – 0016 Effector Subsystem Operating Program
STS 87 – 0017 Remote Manipulator System (RMS)
STS 83 – 0020 Displays and Controls
STS 83 – 0026 Sequencing
* JSC 19478–XXX Payload Management
* JSC 19590–XXX Systems Management

This Level C document is:

| | |
|---|---|
| STS 83–0020V2 | Space Shuttle Orbiter,<br>Operational Flight, Level C,<br>Functional Subsystem Software Requirements,<br>Displays and Controls Volume 2: Systems Management |

* Where XXX = STS Flight Number

The D&C FSSR is comprised of all cathode–ray tube (CRT) or equivalent electronic display formats for the Primary Flight Software (PFS) and the Backup Flight Software (BFS) in support of the Space Shuttle Program. This volume includes information relative to the crew interfaces with the CRT or equivalent electronic display formats and keyboards; and the data required to generate codes with the SM Preprocessor, Display Format Generator or the BFS SAV–D/Avis Processors. Detailed requirements are also included for the processing of CRT or equivalent electronic Messages, GN&C Annunciation (class 2 and 3 faults), GN&C Display Processing, Dedicated Display Processing, GN&C Interfaces, and I–Loads.

The text material describing the CRT or equivalent electronic formats and KEYBOARD ITEM numbers are reference information only for Systems Level, Systems Management and Vehicle Utility PFS displays and are requirements for Guidance, Navigation and Control and BFS displays. See section 3.1 of this FSSR for a general statement about Multifunction Electronic Display Subsystem (MEDS) equivalency. The functional and detail software processing requirements, including those in the various appendices, are under the configuration control management of the Shuttle Avionics Software Control Board (SASCB).

## DOCUMENT CHANGE RECORD

The following tabulation summarizes the change activity associated with this document.

| DOCUMENT CHANGE RECORD | | | |
|---|---|---|---|
| **Issue and Date** | **Change Summary/Effectivity** | | |
| OI-34 Release<br>December 21, 2007 | This baseline release for effectivity OI-34 and subs includes: | | |
| | CR | OI | Title |
| | 93017G | 33 | Baseline RSS99D0100 with Expanded Downlist |
| | 93152A | 33 | OI-33 RMS Documentation Cleanup |
| | 93176 | 34 | Remove Active MPLM Support from BFS |
| | 93190 | 32 | VU Documentation Correction For DR 110815 |

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## CHANGE REQUEST SUMMARY

The following tabulation lists the paragraphs, tables (T), and figures (F) that have been changed as a result of approved change requests for this release. Changes incorporated prior to this release are listed in Appendix R. Changes from approved change requests (CRs) to this document are indicated by a change bar in the outer margin of the changed page.

| CHANGE REQUEST SUMMARY | | | |
|---|---|---|---|
| **Paragraph** | **CR No.** | **OI** | **CR Title** |
| 4.3.12-2.(T) | 93152A | 33 | OI-33 RMS Documentation Cleanup |
| 4.3.12.1 | 93152A | 33 | OI-33 RMS Documentation Cleanup |
| 4.3.25-1.(T) | 93152A | 33 | OI-33 RMS Documentation Cleanup |
| 4.3.25.2 | 93152A | 33 | OI-33 RMS Documentation Cleanup |
| 4.3.26 | 93176 | 34 | Remove Active MPLM Support from BFS |
| 4.3.26-1.(F) | 93176 | 34 | Remove Active MPLM Support from BFS |
| 4.3.26-2.(T) | 93176 | 34 | Remove Active MPLM Support from BFS |
| 4.5.1-5.(T) | 93017G | 33 | Baseline RSS99D0100 with Expanded Downlist |
| 4.5.1-6.(T) | 93017G | 33 | Baseline RSS99D0100 with Expanded Downlist |
| 4.5.2-5.(T) | 93017G | 33 | Baseline RSS99D0100 with Expanded Downlist |
| 4.5.2-6.(T) | 93017G | 33 | Baseline RSS99D0100 with Expanded Downlist |
| 4.5.3-5.(T) | 93017G | 33 | Baseline RSS99D0100 with Expanded Downlist |
| 4.5.3-6.(T) | 93017G | 33 | Baseline RSS99D0100 with Expanded Downlist |
| 4.5.4-5.(T) | 93017G | 33 | Baseline RSS99D0100 with Expanded Downlist |
| 4.5.4-6.(T) | 93017G | 33 | Baseline RSS99D0100 with Expanded Downlist |
| 4.5.5.1 | 93190 | 32 | VU Documentation Correction For DR 110815 |
| 4.5.5.3 | 93190 | 32 | VU Documentation Correction For DR 110815 |
| 4.5.9.1-5.(T) | 93017G | 33 | Baseline RSS99D0100 with Expanded Downlist |
| 4.5.9.2-7.(T) | 93017G | 33 | Baseline RSS99D0100 with Expanded Downlist |
| 4.5.9.2-8.(T) | 93017G | 33 | Baseline RSS99D0100 with Expanded Downlist |

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## 4.3 SYSTEMS MANAGEMENT DISPLAYS

### 4.3.1 SM SYSTEMS SUMMARY 1 (BFS)

TITLE: SM SYS SUMM 1
TYPE: DISP/078 or SYS SUMM Key
AVAILABILITY: BFS SM0

#### 4.3.1.1 Purpose, Operation, and Organization

This display is one of two primary formats for overall monitoring of the system management (SM) systems configuration and operational status. The display parameters were selected to support the Operational Instrumentation (OI) Caution and Warning function (C&W), and the systems information presented allows sufficient detail for the crewman to detect and determine the required response to time–critical failures. Figure 4.3.1 is the SM SYS SUMM 1 Display Format.

The display is formatted with parameters associated with the cabin atmosphere, avionics bay and IMU fans, EPDS and fuel cell parameters.

(1) The SMOKE concentrations for the cabin heat exchanger return air, left and right flight deck, and avionics bays 1, 2 and 3 (A&B) are all Class 1 Alarm/annunciation (Siren) parameters. These parameters also have redundant Class 2 Alarm/annunciation (C&W).

(2) The CABIN area displays the ARS/APCS parameters which are all Class 2 Alarm/annunciation (C&W) except dP/dT which is a Class 1 Alarm/annunciation (Klaxon) parameter, and HX OUT T which is not an Alarm/annunciation parameter. (See paragraph (8) for details concerning the backup dP/dT parameter and the equivalent dP/dT parameter.)

(3) IMU FAN $\Delta$P is displayed in IN. of $H_2O$. Class 3 FDA/annunciation and commfault status is provided.

(4) The DC distribution parameters are displayed as a function of system 1, 2 and 3 with the exception of MAIN bus voltage which is a function of system A, B and C. Also, the CNTL volts are represented as functions of system AB1, 2, 3, BC1, 2, 3, and CA1, 2, 3, with the control bus remote power controller (RPC) trip parameters for each of these buses to identify that the RPC has tripped. Text output for the RPC trip statuses is “*”.

(5) The AC distribution voltage and current parameters are displayed for the individual phase of each AC bus and are a function of system 1, 2 and 3.

(6) The fuel cell measurements, AMPS, REAC VLV, STACK T, EXIT T, COOL P, and PUMP are displayed as a function of fuel cell 1, 2 or 3. The reactant valve (REAC VLV) indicates the position, “OP” or “CL” of both the $O_2$ and $H_2$ reactant valves. PUMP is a discrete which senses delta pressure across the pump, the text output is “$\Delta$P.”

(7) Fuel cell Delta Voltages are generated by the cell performance monitor (CPM). The CPM compares the voltages of each half of a substack, resulting in a voltage Delta value for each fuel cell power–plant (FCP) substack. Delta voltages are used to detect imminent cell problems/failures.

Total fuel cell current (AMPS) and power (KW) output are also displayed.

(8) The computed parameter for backup to the cabin pressure rate of change indicator appears on the display format under the "CABIN" group. "BU dP/dT" (backup delta press/delta time) will provide monitoring capability for the Orbiter Cabin leakage in terms of pressure rate of change in PSI/MIN during the Ascent and Entry flight phases. Display of the parameter shall be initiated at transition to MM 101 and shall be displayed both pre– and post– BFS Engage. A class 3 alarm and CRT message will be generated if the computed cabin pressure rate of change exceeds a K–loaded limit value (V96U9705C). The status indicator shall be displayed as follows:

a. A "↓" will be displayed when the BU dP/dT is less than the K–load limit value.

b. A "H" will be displayed when the BU dP/dT is greater than 0.99 PSI/MIN.

c. A "L" will be displayed when the BU dP/dT is less than –0.99 PSI/MIN.

The computed parameter for the equivalent cabin pressure rate of change indicator appears on the display format under the "CABIN" group. "EQ dP/dT" (equivalent delta press/delta time) will provide monitoring capability for the Orbiter Cabin leakage in terms of pressure rate of change in PSI/MIN during the Ascent and Entry flight phases. Display of the parameter shall be initiated at transition to MM 101 and shall be displayed both pre– and post–BFS Engage. A class 3 alarm and CRT message will be generated if the computed cabin pressure rate of change exceeds a K–loaded limit value (V96U9704C). The status indicator shall be displayed as follows:

a. A "↓" will be displayed when the EQ dP/dT is less than the K–load limit value.

b. A "H" will be displayed when the EQ dP/dT is greater than 0.99 PSI/MIN.

c. A "L" will displayed when the EQ dP/dT is less than –0.99 PSI/MIN.

TABLE 4.3.1–1 SM SYS SUMM 1 Keyboard Processing

Not applicable

### 4.3.1.2 SM SYS SUMM 1 Keyboard Processing Addendum

Not applicable

### 4.3.1.3 SM SYS SUMM 1 CRT Display Processing Addendum

The table below presents the parameter status indicators (PSI) that can be displayed for a parameter. In SM–PL, PSI requirements can be one of two types as follows:

- A PSI which is part of the data words identified by an "X" marked in the STATUS column of Table 4.3.1–2.
- A PSI which is a stand–alone identified by the word "STAT" being inserted in the FORMAT TYPE column of Table 4.3.1–2.

Both PSI types have a numeric code appearing as an entry (right justified) in the ADD REF column of CRT display processing Table 4.3.1–2. The numeric code, corresponding to one of those listed in the table, indicates the specific status processing to be performed. If there is no numeric code entry, the status processing is defined by the default code.

When the "M" PSI is displayed (for Commfault, I/O error resulting in missing data), the last value of the associated parameter will continue to be displayed unless specified otherwise.

| Numeric Code | PSI SYMBOL(S) | | | | | |
|---|---|---|---|---|---|---|
| Default (blank) | ↓ | ↑ | H | L | M | ⌀ |
| 1 | | | | | M | ⌀ |
| 2 | | | H | L | M | ⌀ |
| 3 | ↓ | | | | M | ⌀ |
| 4 | ↓ | | | | | ⌀ |

⌀ = blank

NOTE: The numeric addendum reference codes are for information only. Actual processing requirements are specified in the SM Level B CPDS (SS–P–0002–580) and/or Level C Systems Management FSR (JSC–19590), Payload Management FSR (JSC–19478), or BFS SM/SP&PL PRD MG038119.

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The following alpha code(s) appear (left justified) in the ADD REF column of Table 4.3.1–2 whenever it is necessary to define any special processing requirements not otherwise covered therein:

A. The following logic is required to generate the appropriate RTXT indicating the state of the O2 and H2 REAC VLVS.

O2 OP = 1 CL = 0 H2 OP = 1 CL = 0

| O2<br>V45X1150E<br>V45X1155E<br>V45X1160E | H2<br>V45X2150E<br>V45X2155E<br>V45X2160E | REAC VLV<br>Text Output |
|---|---|---|
| 1 | 1 | OP |
| 0 | 1 | CL |
| 1 | 0 | CL |
| 0 | 0 | CL |

### 4.3.1.4 SM Systems Summary 1 Figure/Table References

Figure 4.3.1–1 SM SYS SUMM 1 Display (BFS)

Table 4.3.1–1 Keyboard Processing Table N/A

Table 4.3.1–2 CRT Display Processing Table

Table 4.3.1–3 CRT Display Processing Background Requirements N/A

Table 4.3.1–4 Mission Design Background Constants N/A

Table 4.3.1–5 Input Functional Parameters N/A

Table 4.3.1–6 Output Functional Parameters N/A

Table 4.3.1–7 I–Loads

Table 4.3.1–8 K–Loads

Table 4.3.1–9 Constants N/A

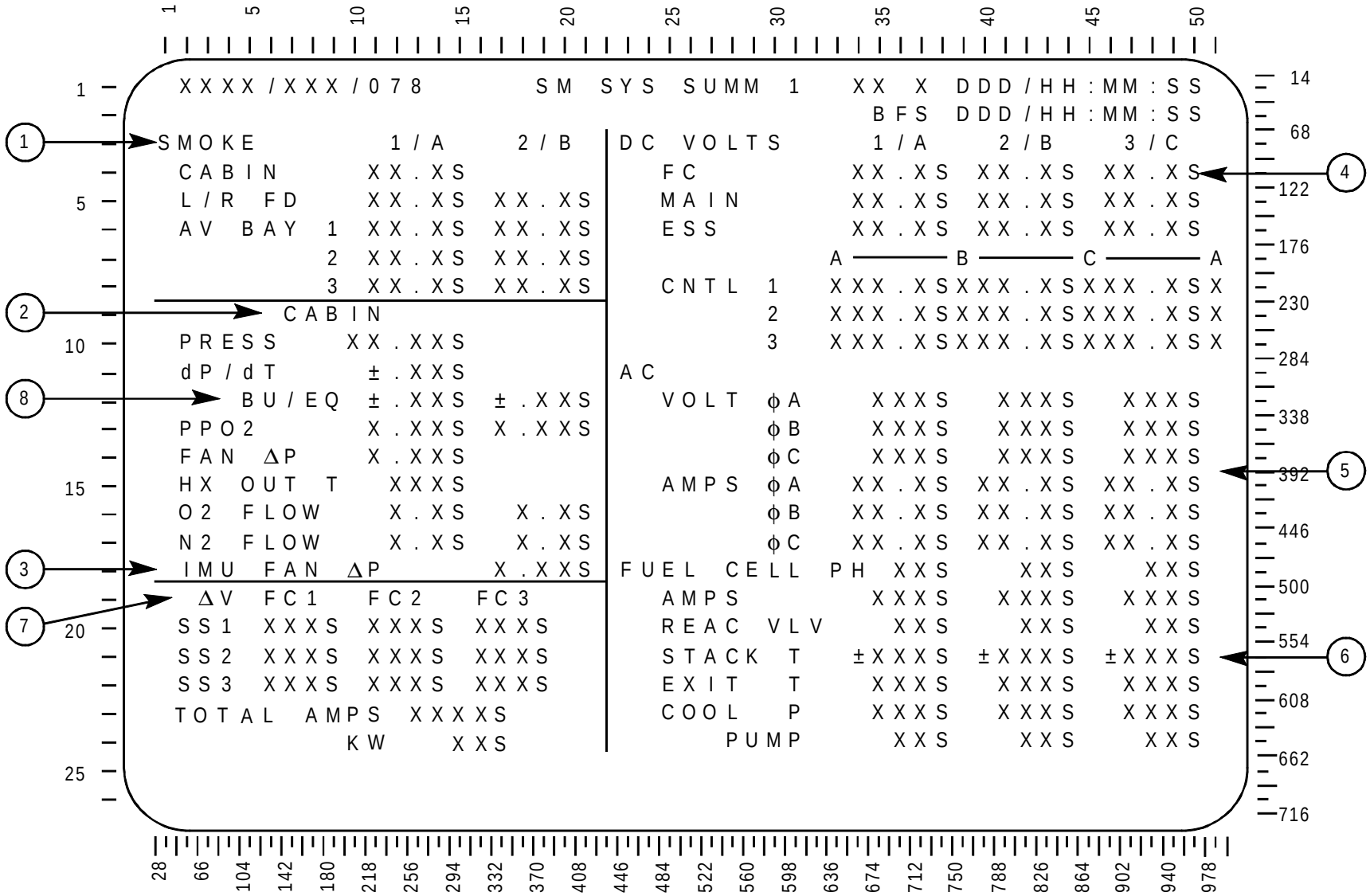


FIGURE 4.3.1-1. SM SYS SUMM 1 Display (BFS)

TABLE 4.3.1-2. SM SYS SUMM 1 (BFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | | | |
| 001 | (OPS) | V93X0040X | 2 | 1 | | 5.0 | | | CHAR | | | | | | | C | | | | | | MI | OPS FUNCTION PAGE | X |
| 002 | (SPEC) | V93X0042X | 7 | 1 | | 4.0 | | | CHAR | | | | | | | E | | | | | | MI | SPEC FUNCTION PAGE | X |
| 003 | (DISP) | V93X0044X | 10 | 1 | | 4.0 | | | DEC | | | | | | | E | | | | | | MI | DISPLAY FUNCTION PAGE | X |
| 004 | (UL) | V92X5032X | 34 | 1 | | 2.0 | UL | | BLVL | | | | | | X | G | | | | | | MI | UPLINK ACTIVITY IND | X |
| 005 | (GPC) | V93X0048X | 36 | 1 | | 2.0 | | | DEC | | | | | | | B | | | | | | MI | GPC DRIVER | X |
| 006 | (MT) | V91W1990C | 39 | 1 | | 12.0 | | | CHAR | DHMS | | | | | | A | | | | | | BOS | MISSION ELAPSED TIME | X |
| 007 | (CRT TIMER) | V91W1988C | 39 | 2 | | 12.0 | | | CHAR | DHMS | | | | | | A | | | | | | BOS | DISPLAY CRT TIME, SM | X |
| 008 | SMOKE CABIN | V62Q0595A | 10 | 4 | | 5.1 | | | DEC | MG/M3 | X | | | | | | | | | | | OI SMM | SMOKE DET CONCN RTN AIR–CAB HX | |
| 009 | SMOKE L FD | V62Q0590A | 10 | 5 | | 5.1 | | | DEC | MG/M3 | X | | | | | | | | | | | OI SMM | SMOKE DET CONCN LEFT–FLIGHT DECK | |
| 010 | SMOKE R FD | V62Q0591A | 16 | 5 | | 5.1 | | | DEC | MG/M3 | X | | | | | | | | | | | OI SMM | SMOKE DET CONCN RIGHT–FLIGHT DECK | |
| 011 | SMOKE A (AV BAY 1) | V62Q0618A | 10 | 6 | | 5.1 | | | DEC | MG/M3 | X | | | | | | | | | | | OI SMM | SMOKE DETECTOR CONCN A–AV BAY 1 | X |
| 012 | SMOKE A (AV BAY 2) | V62Q0608A | 10 | 7 | | 5.1 | | | DEC | MG/M3 | X | | | | | | | | | | | OI SMM | SMOKE DETECTOR CONCN A–AV BAY 2 | X |
| 013 | SMOKE A (AV BAY 3) | V62Q0628A | 10 | 8 | | 5.1 | | | DEC | MG/M3 | X | | | | | | | | | | | OI SMM | SMOKE DETECTOR CONCN A–AV BAY 3 | X |
| 014 | SMOKE B (AV BAY 1) | V62Q0619A | 16 | 6 | | 5.1 | | | DEC | MG/M3 | X | | | | | | | | | | | OI SMM | SMOKE DETECTOR CONCN B–AV BAY 1 | X |
| 015 | SMOKE B (AV BAY 2) | V62Q0609A | 16 | 7 | | 5.1 | | | DEC | MG/M3 | X | | | | | | | | | | | OI SMM | SMOKE DETECTOR CONCN B–AV BAY 2 | X |
| 016 | SMOKE B (AV BAY 3) | V62Q0629A | 16 | 8 | | 5.1 | | | DEC | MG/M3 | X | | | | | | | | | | | OI SMM | SMOKE DETECTOR CONCN B–AV BAY 3 | X |
| 017 | CABIN PRESS | V61P2405A | 9 | 10 | | 6.2 | | | DEC | PSIA | X | | | | | | | | | | | OI SMM | CABIN PRESS | X |
| 018* | CABIN DP/DT | V61R2401A | 11 | 11 | | 4.2 | | | DEC | PSI/M | X | | | | | | X | | | | 2 | OI SMM | CABIN PRESS RATE OF CHANGE IND | X |
| 019 | CABIN PPO2 A | V61P2511A | 10 | 13 | | 5.2 | | | DEC | PSIA | X | | | | | | | | | | | OI SMM | O2 PARTIAL PRESSURE–A | X |
| 020 | CABIN PPO2 B | V61P2513A | 16 | 13 | | 5.2 | | | DEC | PSIA | X | | | | | | | | | | | OI SMM | O2 PARTIAL PRESSURE–B | X |

## TABLE 4.3.1-2. SM SYS SUMM 1 (BFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | | | |
| 021 | CABIN FAN DELTA P | V61P2556A | 10 | 14 | | 5.2 | | | DEC | INH2O | X | | | | | | | | | | | OI SMM | CABIN FAN DELTA PRESS | X |
| 022 | CABIN HX OUT T | V61T2635A | 11 | 15 | | 4.0 | | | DEC | DEG F | X | | | | | | | | | | 2 | OI SMM | CABIN HX OUT–AIR TEMP | X |
| 023 | CABIN FLOW O2 (1) | V61R2105A | 11 | 16 | | 4.1 | | | DEC | LB/HR | X | | | | | | | | | | | OI SMM | SYS 1 O2 FLOWRATE | X |
| 024 | CABIN FLOW O2 (2) | V61R2205A | 17 | 16 | | 4.1 | | | DEC | LB/HR | X | | | | | | | | | | | OI SMM | SYS 2 O2 FLOWRATE | X |
| 025 | CABIN FLOW N2 (1) | V61R2553A | 11 | 17 | | 4.1 | | | DEC | LB/HR | X | | | | | | | | | | | OI SMM | SYS 1 N2 FLOWRATE | X |
| 026 | CABIN FLOW N2 (2) | V61R2554A | 17 | 17 | | 4.1 | | | DEC | LB/HR | X | | | | | | | | | | | OI SMM | SYS 2 N2 FLOWRATE | X |
| 027 | IMU FAN DP | V61P2869A | 16 | 18 | | 5.2 | | | DEC | INH2O | X | | | | | | | | | | | OI SMM | IMU DELTA PRESS | |
| 028 | V SS1 (FC1) | V45V0102A | 5 | 20 | | 4.0 | | | DEC | MVDC | X | | | | | | | | | | | OI SMM | FCP NO 1 SUBSTACK 1 DELTA VOLTAGE | X |
| 029 | V SS1 (FC2) | V45V0202A | 10 | 20 | | 4.0 | | | DEC | MVDC | X | | | | | | | | | | | OI SMM | FCP NO 2 SUBSTACK 1 DELTA VOLTAGE | X |
| 030 | V SS1 (FC3) | V45V0302A | 15 | 20 | | 4.0 | | | DEC | MVDC | X | | | | | | | | | | | OI SMM | FCP NO 3 SUBSTACK 1 DELTA VOLTAGE | X |
| 031 | V SS2 (FC1) | V45V0103A | 5 | 21 | | 4.0 | | | DEC | MVDC | X | | | | | | | | | | | OI SMM | FCP NO 1 SUBSTACK 2 DELTA VOLTAGE | X |
| 032 | V SS2 (FC2) | V45V0203A | 10 | 21 | | 4.0 | | | DEC | MVDC | X | | | | | | | | | | | OI SMM | FCP NO 2 SUBSTACK 2 DELTA VOLTAGE | X |
| 033 | V SS2 (FC3) | V45V0303A | 15 | 21 | | 4.0 | | | DEC | MVDC | X | | | | | | | | | | | OI SMM | FCP NO 3 SUBSTACK 2 DELTA VOLTAGE | X |
| 034 | V SS3 (FC1) | V45V0104A | 5 | 22 | | 4.0 | | | DEC | MVDC | X | | | | | | | | | | | OI SMM | FCP NO 1 SUBSTACK 3 DELTA VOLTAGE | X |
| 035 | V SS3 (FC2) | V45V0204A | 10 | 22 | | 4.0 | | | DEC | MVDC | X | | | | | | | | | | | OI SMM | FCP NO 2 SUBSTACK 3 DELTA VOLTAGE | X |
| 036 | V SS3 (FC3) | V45V0304A | 15 | 22 | | 4.0 | | | DEC | MVDC | X | | | | | | | | | | | OI SMM | FCP NO 3 SUBSTACK 3 DELTA VOLTAGE | X |
| 037 | TOTAL AMPS | V92C0311C | 12 | 23 | | 5.0 | | | DEC | AMPS | X | | | | | | | | | | 2 | OI SMM | TOTAL FUEL CELL CURRENT | X |
| 038 | TOTAL KW | V92E0310C | 14 | 24 | | 3.0 | | | DEC | KW | X | | | | | | | | | | 2 | OI SMM | TOTAL FUEL CELL POWER (KW) | X |
| 039 | DC VOLT FC (1/A) | V45V0100A | 33 | 4 | | 5.1 | | | DEC | VOLTS | X | | | | | | | | | | | OI SMM | FUEL CELL NO 1 VOLTAGE | X |
| 040 | DC VOLT FC (2/B) | V45V0200A | 39 | 4 | | 5.1 | | | DEC | VOLTS | X | | | | | | | | | | | OI SMM | FUEL CELL NO 2 VOLTAGE | X |
| 041 | DC VOLT FC (3/C) | V45V0300A | 45 | 4 | | 5.1 | | | DEC | VOLTS | X | | | | | | | | | | | OI SMM | FUEL CELL NO 3 VOLTAGE | X |

TABLE 4.3.1-2. SM SYS SUMM 1 (BFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | | | |
| 042 | DC VOLT MAIN (1/A) | V76V0100A | 33 | 5 | | 5.1 | | | DEC | VOLTS | X | | | | | A | | | | | | OI SMM | MAIN BUS A VOLTAGE | X |
| 043 | DC VOLT MAIN (2/B) | V76V0200A | 39 | 5 | | 5.1 | | | DEC | VOLTS | X | | | | | A | | | | | | OI SMM | MAIN BUS B VOLTAGE | X |
| 044 | DC VOLT MAIN (3/C) | V76V0300A | 45 | 5 | | 5.1 | | | DEC | VOLTS | X | | | | | A | | | | | | OI SMM | MAIN BUS C VOLTAGE | X |
| 045 | DC CNTL 1 AB | V76V0120A | 33 | 8 | | 5.1 | | | DEC | VOLTS | X | | | | | | | | | | | OI SMM | CONTROL BUS AB1 VOLTAGE | X |
| 046 | DC CNTL 2 AB | V76V0121A | 33 | 9 | | 5.1 | | | DEC | VOLTS | X | | | | | | | | | | | OI SMM | CONTROL BUS AB2 VOLTAGE | X |
| 047 | DC CNTL 3 AB | V76V0122A | 33 | 10 | | 5.1 | | | DEC | VOLTS | X | | | | | | | | | | | OI SMM | CONTROL BUS AB3 VOLTAGE | X |
| 048 | DC CNTL 1 BC | V76V0220A | 39 | 8 | | 5.1 | | | DEC | VOLTS | X | | | | | | | | | | | OI SMM | CONTROL BUS BC1 VOLTAGE | X |
| 049 | DC CNTL 2 BC | V76V0221A | 39 | 9 | | 5.1 | | | DEC | VOLTS | X | | | | | | | | | | | OI SMM | CONTROL BUS BC2 VOLTAGE | X |
| 050 | DC CNTL 3 BC | V76V0222A | 39 | 10 | | 5.1 | | | DEC | VOLTS | X | | | | | | | | | | | OI SMM | CONTROL BUS BC3 VOLTAGE | X |
| 051 | DC CNTL 1 CA | V76V0320A | 45 | 8 | | 5.1 | | | DEC | VOLTS | X | | | | | | | | | | | OI SMM | CONTROL BUS CA1 VOLTAGE | X |
| 052 | DC CNTL 2 CA | V76V0321A | 45 | 9 | | 5.1 | | | DEC | VOLTS | X | | | | | | | | | | | OI SMM | CONTROL BUS CA2 VOLTAGE | X |
| 053 | DC CNTL 3 CA | V76V0322A | 45 | 10 | | 5.1 | | | DEC | VOLTS | X | | | | | | | | | | | OI SMM | CONTROL BUS CA3 VOLTAGE | X |
| 054 | DC CNTL 1 AB/CA (RPC) | V76X0124E | 33 | 8 | | 1.0 | | * | BLVL | | | | | X | | | | | | | | OI SMM | MAIN BUS A CONT BUS AB1/CA1 RPC ON | |
| 055 | DC CNTL 1 AB/CA (RPC) | V76X0124E | 51 | 8 | | 1.0 | | * | BLVL | | | | | X | | | | | | | | OI SMM | MAIN BUS A CONT BUS AB1/CA1 RPC ON | |
| 056 | DC CNTL 2 AB/CA (RPC) | V76X0125E | 33 | 9 | | 1.0 | | * | BLVL | | | | | X | | | | | | | | OI SMM | MAIN BUS A CONT BUS AB2/CA2 RPC ON | |
| 057 | DC CNTL 2 AB/CA (RPC) | V76X0125E | 51 | 9 | | 1.0 | | * | BLVL | | | | | X | | | | | | | | OI SMM | MAIN BUS A CONT BUS AB2/CA2 RPC ON | |
| 058 | DC CNTL 3 AB/CA (RPC) | V76X0126E | 33 | 10 | | 1.0 | | * | BLVL | | | | | X | | | | | | | | OI SMM | MAIN BUS A CONT BUS AB3/CA3 RPC ON | |
| 059 | DC CNTL 3 AB/CA (RPC) | V76X0126E | 51 | 10 | | 1.0 | | * | BLVL | | | | | X | | | | | | | | OI SMM | MAIN BUS A CONT BUS AB3/CA3 RPC ON | |
| 060 | DC CNTL 1 AB/BC (RPC) | V76X0224E | 39 | 8 | | 1.0 | | * | BLVL | | | | | X | | | | | | | | OI SMM | MAIN BUS B CONT BUS AB1/BC1 RPC ON | |
| 061 | DC CNTL 2 AB/BC (RPC) | V76X0225E | 39 | 9 | | 1.0 | | * | BLVL | | | | | X | | | | | | | | OI SMM | MAIN BUS B CONT BUS AB2/BC2 RPC ON | |
| 062 | DC CNTL 3 AB/BC (RPC) | V76X0226E | 39 | 10 | | 1.0 | | * | BLVL | | | | | X | | | | | | | | OI SMM | MAIN BUS B CONT BUS AB3/BC3 RPC ON | |

## TABLE 4.3.1-2. SM SYS SUMM 1 (BFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | | | |
| 063 | DC CNTL 1 BC/CA (RPC) | V76X0324E | 45 | 8 | | 1.0 | | * | BLVL | | | | | X | | | | | | | | OI SMM | MAIN BUS C CONT BUS BC1/CA1 RPC ON | |
| 064 | DC CNTL 2 BC/CA (RPC) | V76X0325E | 45 | 9 | | 1.0 | | * | BLVL | | | | | X | | | | | | | | OI SMM | MAIN BUS C CONT BUS BC2/CA2 RPC ON | |
| 065 | DC CNTL 3 BC/CA (RPC) | V76X0326E | 45 | 10 | | 1.0 | | * | BLVL | | | | | X | | | | | | | | OI SMM | MAIN BUS C CONT BUS BC3/CA3 RPC ON | |
| 066 | DC VOLTS ESS (1/A) | V76V0130A | 33 | 6 | | 5.1 | | | DEC | VOLTS | X | | | | | | | | | | | OI SMM | ESS BUS 1BC VOLTAGE | X |
| 067 | DC VOLTS ESS (2/B) | V76V0230A | 39 | 6 | | 5.1 | | | DEC | VOLTS | X | | | | | | | | | | | OI SMM | ESS BUS 2CA VOLTAGE | X |
| 068 | DC VOLTS ESS (3/C) | V76V0330A | 45 | 6 | | 5.1 | | | DEC | VOLTS | X | | | | | | | | | | | OI SMM | ESS BUS 3AB VOLTAGE | X |
| 069 | AC VOLT OA (1/A) | V76V1500A | 34 | 12 | | 4.0 | | | DEC | VOLTS | X | | | | | A | | | | | | OI SMM | AC BUS 1 PHASE A VOLT | X |
| 070 | AC VOLT OA (2/B) | V76V1600A | 40 | 12 | | 4.0 | | | DEC | VOLTS | X | | | | | A | | | | | | OI SMM | AC BUS 2 PHASE A VOLT | X |
| 071 | AC VOLT OA (3/C) | V76V1700A | 46 | 12 | | 4.0 | | | DEC | VOLTS | X | | | | | A | | | | | | OI SMM | AC BUS 3 PHASE A VOLT | X |
| 072 | AC VOLT OB (1/A) | V76V1501A | 34 | 13 | | 4.0 | | | DEC | VOLTS | X | | | | | A | | | | | | OI SMM | AC BUS 1 PHASE B VOLT | X |
| 073 | AC VOLT OB (2/B) | V76V1601A | 40 | 13 | | 4.0 | | | DEC | VOLTS | X | | | | | A | | | | | | OI SMM | AC BUS 2 PHASE B VOLT | X |
| 074 | AC VOLT OB (3/C) | V76V1701A | 46 | 13 | | 4.0 | | | DEC | VOLTS | X | | | | | A | | | | | | OI SMM | AC BUS 3 PHASE B VOLT | X |
| 075 | AC VOLT OC (1/A) | V76V1502A | 34 | 14 | | 4.0 | | | DEC | VOLTS | X | | | | | A | | | | | | OI SMM | AC BUS 1 PHASE C VOLT | X |
| 076 | AC VOLT OC (2/B) | V76V1602A | 40 | 14 | | 4.0 | | | DEC | VOLTS | X | | | | | A | | | | | | OI SMM | AC BUS 2 PHASE C VOLT | X |
| 077 | AC VOLT OC (3/C) | V76V1702A | 46 | 14 | | 4.0 | | | DEC | VOLTS | X | | | | | A | | | | | | OI SMM | AC BUS 3 PHASE C VOLT | X |
| 078 | AC AMPS OA (1/A) | V76C1540A | 33 | 15 | | 5.1 | | | DEC | AMPS | X | | | | | A | | | | | 2 | OI SMM | AC BUS 1 PHASE A CURRENT | X |
| 079 | AC AMPS OA (2/B) | V76C1640A | 39 | 15 | | 5.1 | | | DEC | AMPS | X | | | | | A | | | | | 2 | OI SMM | AC BUS 2 PHASE A CURRENT | X |
| 080 | AC AMPS OA (3/C) | V76C1740A | 45 | 15 | | 5.1 | | | DEC | AMPS | X | | | | | A | | | | | 2 | OI SMM | AC BUS 3 PHASE A CURRENT | X |
| 081 | AC AMPS OB (1/A) | V76C1541A | 33 | 16 | | 5.1 | | | DEC | AMPS | X | | | | | A | | | | | 2 | OI SMM | AC BUS 1 PHASE B CURRENT | X |
| 082 | AC AMPS OB (2/B) | V76C1641A | 39 | 16 | | 5.1 | | | DEC | AMPS | X | | | | | A | | | | | 2 | OI SMM | AC BUS 2 PHASE B CURRENT | X |
| 083 | AC AMPS OB (3/C) | V76C1741A | 45 | 16 | | 5.1 | | | DEC | AMPS | X | | | | | A | | | | | 2 | OI SMM | AC BUS 3 PHASE B CURRENT | X |
| 084 | AC AMPS OC (1/A) | V76C1542A | 33 | 17 | | 5.1 | | | DEC | AMPS | X | | | | | A | | | | | 2 | OI SMM | AC BUS 1 PHASE C CURRENT | X |
| 085 | AC AMPS OC (2/B) | V76C1642A | 39 | 17 | | 5.1 | | | DEC | AMPS | X | | | | | A | | | | | 2 | OI SMM | AC BUS 2 PHASE C CURRENT | X |
| 086 | AC AMPS OC (3/C) | V76C1742A | 45 | 17 | | 5.1 | | | DEC | AMPS | X | | | | | A | | | | | 2 | OI SMM | AC BUS 3 PHASE C CURRENT | X |
| 087* | FUEL CELL AMPS(1/A) | V45C0101A | 34 | 19 | | 4.0 | | | DEC | AMPS | X | | | | | | | | | | | OI SMM | FUEL CELL NO 1 CURRENT | X |
| 088* | FUEL CELL AMPS(2/B) | V45C0201A | 40 | 19 | | 4.0 | | | DEC | AMPS | X | | | | | | | | | | | OI SMM | FUEL CELL NO 2 CURRENT | X |

TABLE 4.3.1-2. SM SYS SUMM 1 (BFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | | | |
| 089* | FUEL CELL AMPS(3/C) | V45C0301A | 46 | 19 | | 4.0 | | | DEC | AMPS | X | | | | | | | | | | | OI SMM | FUEL CELL NO 3 CURRENT | X |
| 090 | FC REAC VLV O2(1/A) | V45X1150E | 36 | 20 | | 2.0 | | | RTXT | | X | | | | | A | | | | | A 3 | OI SMM | PRSD FCP 1 O2 REAC VLV–OPEN | X |
| 091 | FC REAC VLV H2(1/A) | V45X2150E | 36 | 20 | | 2.0 | | | RTXT | | X | | | | | A | | | | | A 3 | OI SMM | PRSD FCP 1 H2 REAC VLV–OPEN | X |
| 092 | FC REAC VLV O2(2/B) | V45X1155E | 42 | 20 | | 2.0 | | | RTXT | | X | | | | | A | | | | | A 3 | OI SMM | PRSD FCP 2 O2 REAC VLV–OPEN | X |
| 093 | FC REAC VLV H2(2/B) | V45X2155E | 42 | 20 | | 2.0 | | | RTXT | | X | | | | | A | | | | | A 3 | OI SMM | PRSD FCP 2 H2 REAC VLV–OPEN | X |
| 094 | FC REAC VLV O2(3/C) | V45X1160E | 48 | 20 | | 2.0 | | | RTXT | | X | | | | | A | | | | | A 3 | OI SMM | PRSD FCP 3 O2 REAC VLV–OPEN | X |
| 095 | FC REAC VLV H2(3/C) | V45X2160E | 48 | 20 | | 2.0 | | | RTXT | | X | | | | | A | | | | | A | OI SMM | PRSD FCP 3 H2 REAC VLV–OPEN | X |
| 096 | FC STACK T (1/A) | V45T0120A | 34 | 21 | | 4.0 | | | DEC | DEG F | X | | | | | C | X | | | | | OI SMM | FUEL CELL NO 1 STACK COOL OUT TEMP | X |
| 97 | FC STACK T (2/B) | V45T0220A | 40 | 21 | | 4.0 | | | DEC | DEG F | X | | | | | C | X | | | | | OI SMM | FUEL CELL NO 2 STACK COOL OUT TEMP | X |
| 98 | FC STACK T (3/C) | V45T0320A | 46 | 21 | | 4.0 | | | DEC | DEG F | X | | | | | C | X | | | | | OI SMM | FUEL CELL NO 3 STACK COOL OUT TEMP | X |
| 99 | FUEL CELL PUMP(1/A) | V45X0143E | 36 | 24 | | 2.0 | | DP | BLVL | | X | | | | | | | | | | 3 | OI SMM | FUEL CELL NO 1 COOLANT PUMP STATUS | X |
| 100 | FUEL CELL PUMP(2/B) | V45X0243E | 42 | 24 | | 2.0 | | DP | BLVL | | X | | | | | | | | | | 3 | OI SMM | FUEL CELL NO 2 COOLANT PUMP STATUS | X |
| 101 | FUEL CELL PUMP(3/C) | V45X0343E | 48 | 24 | | 2.0 | | DP | BLVL | | X | | | | | | | | | | 3 | OI SMM | FUEL CELL NO 3 COOLANT PUMP STATUS | X |
| 102 | FC EXIT T (1/A) | V45T0130A | 34 | 22 | | 4.0 | | | DEC | DEG F | X | | | | | | | | | | | OI SMM | FUEL CELL NO 1 CONDENSER EXIT TEMP | X |
| 103 | FC EXIT T (2/B) | V45T0230A | 40 | 22 | | 4.0 | | | DEC | DEG F | X | | | | | | | | | | | OI SMM | FUEL CELL NO 2 CONDENSER EXIT TEMP | X |
| 104 | FC EXIT T (3/C) | V45T0330A | 46 | 22 | | 4.0 | | | DEC | DEG F | X | | | | | | | | | | | OI SMM | FUEL CELL NO 3 CONDENSER EXIT TEMP | X |

## TABLE 4.3.1-2. SM SYS SUMM 1 (BFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | | | |
| 105* | FC COOL P (1/A) | V45P0147A | 34 | 23 | | 4.0 | | | DEC | PSIA | X | | | | | | | | | | | OI SMM | FUEL CELL 1 COOLANT PRESSURE | X |
| 106* | FC COOL P (2/B) | V45P0247A | 40 | 23 | | 4.0 | | | DEC | PSIA | X | | | | | | | | | | | OI SMM | FUEL CELL 2 COOLANT PRESSURE | X |
| 107* | FC COOL P (3/C) | V45P0347A | 46 | 23 | | 4.0 | | | DEC | PSIA | X | | | | | | | | | | | OI SMM | FUEL CELL 3 COOLANT PRESSURE | X |
| 108* | CABIN DP/DT BU | V98R0004C | 11 | 12 | | 4.2 | | | DEC | PSI/M | X | | | | | A | X | | | | | OI SMM | BU CABIN PRESS RATE CHG–CMPTD BFS | X |
| 109 | CABIN DP/DT EQ | V98R4549C | 17 | 12 | | 4.2 | | | DEC | PSI/M | X | | | | | A | X | | | | | OI SMM | EQ CABIN PRESS RATE CHG–CMPTD BFS | |
| 110* | FUEL CELL PH (1/A) | V45X0410E | 36 | 18 | | 2.0 | PH | | BLVL | | X | | | | | | | | | | 3 | OI SMM | FUEL CELL NO 1 H2O CONDITION | X |
| 111* | FUEL CELL PH (2/B) | V45X0420E | 42 | 18 | | 2.0 | PH | | BLVL | | X | | | | | | | | | | 3 | OI SMM | FUEL CELL NO 2 H2O CONDITION | X |
| 112* | FUEL CELL PH (3/C) | V45X0430E | 48 | 18 | | 2.0 | PH | | BLVL | | X | | | | | | | | | | 3 | OI SMM | FUEL CELL NO 3 H2O CONDITION | X |
| 113 | (MSG LINE) | V93X0050X | 2 | 25 | | 46.0 | | | CHAR | | | | | | | G | | | | | | MI | MESSAGE LINE | X |
| 114 | (BUFFER MSG) | V93X0054X | 48 | 25 | | 4.0 | | | CHAR | | | | | | | G | | | | | | MI | BUFFER MESSAGE INDICATOR | X |
| 115 | (SPL) | V93X0056X | 2 | 26 | | 49.0 | | | CHAR | | | | | | | G | | | | | | MI | SCRATCH PAD LINE | X |
| 116 | (BFS) | V98X0015X | 35 | 2 | | 3.0 | | | CHAR | | | | | X | | G | | | | | | MI | BFS IDENTIFIER BFS | X |

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TABLE 4.3.1-7. BFS SM SYSTEM SUMMARY 1 (4.3.1) I-LOADS

| BFS NAME | MSID | ENG UNITS | DT | PR | D | S | PARA | MC | CAT | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|---|---|---|
| NO REQUIREMENTS | | | | | | | | | | | |

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE 4.3.1-8. BFS SM SYSTEM SUMMARY 1 (4.3.1) K-LOADS

| BFS NAME DESCRIPTION | MSID | MC | KLOAD VALUE | ENG UNITS | DT | P R | S | PARA | LAST CR | R E V |
|---|---|---|---|---|---|---|---|---|---|---|

NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

### 4.3.2 SM TABLE MAINTENANCE (PFS)

TITLE: SM TABLE MAINT
TYPE: SPEC/060
AVAILABILITY: SM OPS 2 and 4

#### 4.3.2.1 Purpose, Operation, and Organization

This display provides the crew with a user interface with the systems management (SM) software. When the SM Table Maintenance display is called via its SPEC number, all display fields will be blank except CHECKPOINT TIME, FDA ENA, and INH status. Figure 4.3.2–1 is the SM Table Maintenance Display Format.

The utilization and operational description of each item number is provided here for the ALERT and BACKUP C&W parameters.

(1) Item 1 provides the user with the capability to address all systems management parameters contained in the fault detection and annunciation (FDA) tables via a seven–digit parameter ID code. The current value and status of a parameter will appear in the VALUE field. For concurrently limit sensed parameters, the status field will reflect the in–limits or out–of–limits status of the class 0, 3, or 4 limit set.

   a. All seven digits must be entered when specifying a parameter.

   b. The parameter ID code must be input as a decimal quantity.

(2) Item entries (2,3,4,5,6,7) provide the user the capability to change the limit values, LOW and HIGH, respectively, by entering the item number of the limit value to be changed and the new limit value. All limit values will be input as decimal quantities and analog and digital parameter limits will be entered in the units defined for that parameter. The out–of–limit state for a discrete measurement will be entered as a +1 or +0 in the LOW limit field (Item 2). An additional limit state exists for discrete parameters that have multiple limit sets. This limit state (indicated by a +2) causes FDA to be bypassed when that limit set is selected. When this value is selected the discrete will be in limits. If this limit state is entered for a discrete that has only one limit set an “ILLEGAL ENTRY” will be output. The limit set currently in use for the specified parameter will be indicated by an “*” on the display to the right of the LOW limit item numbers (Items 2, 4, 6 or 11) in the ALERT and C&W fields. This use of the asterisk feature removes the ambiguity encountered when multiple limits are used (i.e., APU measurements) or when a single limit is in use. Note: if a precondition is not specified, the limit is flagged by an “*”. For analogs, if the limit value entered is + 99999.99 for the high limit or –99999.99 for the low limit this shall be stored as the max or min PCM count, respectively, effectively disabling FDA for that limit. Otherwise, if the limit value entered is greater than that corresponding to the equivalent of the maximum positive value PCM count or is less than the value corresponding to the equivalent of the minimum negative PCM count, the limit value entered will be rejected and an “ILLEGAL ENTRY” error message will be output to the message line. For analogs, if the limit value entered cannot be exactly represented in PCM counts, it shall be stored in the software using the PCM count that most closely represents the entered value.

For fixed point parameters, if the limit is equivalent of +32767 or is less than the value corresponding to the equivalent of –32768, the limit value entered will be rejected and an "ILLEGAL ENTRY" error message will be output to the message line. For floating point parameters, if the limit value entered is greater than the value corresponding to the equivalent of +99999.99 or is less than the value corresponding to the equivalent of –99999.99, the limit value entered will be rejected and an "ILLEGAL ENTRY" error message will be output to the message line. Upon valid entry of data via Items 2 or 3, the new limit values will be reflected on the display by replacing the original values in the appropriate fields. If a new limit value cannot be exactly represented in the software, the new limit value shall be displayed as entered, but shall be stored in the software using the value closest to the entered limit value. If subsequent processing requires display of the limit value, the value calculated for display shall reflect the stored value and not the entered value.

a. Parameters with only a single set of limits are required to have these limits displayed in the Item 2 and 3 fields; consequently, their limit changes must be effected via inputs to Items 2 and 3.

b. Items 4 and 5 provide the user with the capability to change the second set of limit values, LOW and HIGH, respectively, for a parameter with multiple limit sets. The applicable guidelines described in paragraph (2) should be followed here.

c. Items 6 and 7 provide the user with the capability to change the third set of limit values, LOW and HIGH, respectively, for a parameter with multiple limit sets. The applicable guidelines described in paragraph (2) should be followed here.

d. Item 8 provides the user with the capability to change the noise filter constant value, which specifies the number of consecutive samples (1 through 15) for which the specified parameter must be out–of–limits, before fault annunciation is enabled. Upon entry of data via Item 8, the new noise filter constant value will be reflected on the display by replacing the original value in the appropriate field. (Note: The noise filter constant value will be input as a decimal quantity.)

e. Item 9 provides the user with the capability to enable annunciation of an out–of–limits condition for the specified parameter. Upon execution of the ENABLE function, an "*" will appear next to the item, ENA 9, on the display denoting the current annunciation status.

f. Item 10 provides the user with the capability to inhibit annunciation of an out–of–limits condition for the specified parameter. Upon execution of the INHIBIT function, an "*" will appear next to the item, INH 10, on the display denoting the current annunciation status. The ENABLE and INHIBIT functions are mutually exclusive events; consequently, an "*" may never be tagged to both items, ENA 9 and INH 10, simultaneously.

(3) Items 11 through 15 are basically the same as those presented in paragraph 2 but for BACKUP C&W and consequently, they have been omitted here.

(4) The utilization and operational description of each item number is provided here for the CONSTANTS:

a. Item 16 provides the user with the capability to address all systems management constants via a seven–digit parameter ID code.

1. All seven digits must be entered when specifying a constant.

2. The constant parameter ID code shall be input as a decimal quantity.

b. Item 17 provides the user with the capability to change the constant value specified via Item 16. Upon entry of data via Item 17, the new constant value will be reflected on the display by replacing the original value in the appropriate field. For each constant, the input format will be fixed as a decimal quantity. For integer type constants, if the input value exceeds the range of –32768 to +32767, an “ILLEGAL ENTRY” message shall be issued. SM software constants that can be changed via Items 16 and 17 are those primarily used in special computations. Whenever an attempt is made to change the value of a TM constant using item 17, a check shall be made to see if the parameter to be changed is V96J0184C (ARM SERIAL NUM PORT) or V96J0185C (ARM SERIAL NUM STRBD). If the change is to one of these parameters, and if the changed value is not 201, 202, 301, or 303, the attempted change shall be rejected and an "ILLEGAL ENTRY" message shall be issued.

(5) SM Checkpoint initiation and operational description is as follows: Item 18 (INITIATE) provides the user with the capability to initiate an SM checkpoint of TM constants and current FDA status including limit values, noise filter constants and parameter annunciation constants. The STATUS output indicate the success or failure of the executed item (INITIATE). The legal outputs for STATUS are GOOD or FAIL. The STATUS output shall be blanked upon execution of Item 18. The TIME output is updated to reflect the time that a STATUS GOOD is received following a CHECKPOINT INITIATE execution (Item 18). TIME is MT displayed in DD/HH:MM:SS. Item 23 provides the user with the capability to enable the checkpoint data retrieval from MM. The enabling of the item provides a one–shot process, which terminates upon completion of a single request. An “*” next to the item number is displayed to indicate the enable state, otherwise the display field will be blank. The checkpoint data retrieval enable capability is also on the DPS Utility Display (refer to section 4.1.4, FSSR STS 83-0020V1).

(6) Fault Detection and Annunciation Control is provided as follows: Item 19 (ENA) provides the user the capability of enabling FDA. Item 20 (INH) provides the user with the capability of inhibiting FDA. The display will be initialized with FDA enabled. When Item 19 or 20 is selected, an “*” will be driven next to the item number to indicate this selection; the “*” space next to the item not selected will blank upon this entry.

(7) If inputs from the uplink program in system software are being processed when this display is called by the crew, all keyboard entries shall be prohibited until the uplink data has been processed. To indicate that uplink input are being processed the word UPLINK will flash on the display; otherwise the display field will be blank.

(8) The remote text “RDY” or “BSY” will be displayed to indicate the state of the SM common buffer (SM COM BUFF). If a checkpoint operation is initiated while the common buffer is in use by another process, “BSY” will be displayed flashing.

(9) The assignment of the SM major function (MF) to the two available mass memory units (MMUs) is as follows: Item 21 provides the user with the capability of assigning the SM MF to MMU 1. Item 22 provides the user with the capability of assigning the SM MF to MMU 2. An "*" next to the item number is displayed to indicate the assignment, otherwise the display field will be blank. The remote text "RDY" or "BSY" will be displayed next to the "*" fields to indicate the statuses of MMU 1 and MMU 2. This capability is also on the on the DPS Utility Display (refer to section 4.1.4, FSSR STS 83-0020V1).

(10) OPERATIONAL ERROR CONDITIONS. The Table Maintenance Software tests for violations of any input constraints are described in the SM LVL B.

### 4.3.2.2 SM TABLE MAINT Keyboard Processing Addendum

Not applicable.

### 4.3.2.3 SM TABLE MAINT CRT Display Processing Addendum

The table below presents the parameter status indicators (PSI) that can be displayed for a parameter. In SM–PL, PSI requirements can be one of two types as follows:

- A PSI which is part of the data words identified by an "X" marked in the STATUS column of Table 4.3.2–2.
- A PSI which is a stand–alone identified by the word "STAT" being inserted in the FORMAT TYPE column of Table 4.3.2–2.

Both PSI types have a numeric code appearing as an entry (right justified) in the ADD REF column of CRT display processing Table 4.3.2–2. The numeric code, corresponding to one of those listed in the table, indicates the specific status processing to be performed. If there is no numeric code entry, the status processing is defined by the default code.

When the "M" PSI is displayed (for Commfault, I/O error resulting in missing data), the last value of the associated parameter will continue to be displayed unless specified otherwise.

| Numeric Code | PSI SYMBOL(S) | | | | | |
|---|---|---|---|---|---|---|
| Default (blank) | ↓ | ↑ | H | L | M | ⌀ |
| 1 | | | | | M | ⌀ |
| 2 | | | H | L | M | ⌀ |
| 3 | ↓ | | | | M | ⌀ |
| 4 | ↓ | | | | | ⌀ |

⌀ = blank

NOTE: The numeric addendum reference codes are for information only. Actual processing requirements are specified in the SM Level B CPDS (SS–P–0002–580) and/or Level C Systems Management FSR (JSC–19590), Payload Management FSR (JSC–19478).

The following alpha code(s) appear (left justified) in the ADD REF column of Table 4.3.2–2 whenever it is necessary to define any special processing requirements not otherwise covered therein:

A. The display field for PARAMETER VALUE, HIGH and LOW LIMITS, and CONSTANT VALUE will have a dynamic driven but fixed decimal field for display of analog (decimal) and bilevel data.

Analog (decimal) data will dynamically drive the decimal point in a fixed field with a sign as shown by the following:

±XXXXX.XX for SM parameters
±XXXXXXXXX.XXXX for SM constants

| | | |
|---|---|---|
| VALUE = | COORD (13, 5) | CHAR (9.2) |
| 2 LOW | COORD (4, 9) | CHAR (9.2) |
| 3 HIGH | COORD (17, 9) | CHAR (9.2) |
| 4 LOW | COORD (4, 10) | CHAR (9.2) |
| 5 HIGH | COORD (17, 10) | CHAR (9.2) |
| 6 LOW | COORD (4, 11) | CHAR (9.2) |
| 7 HIGH | COORD (17, 11) | CHAR (9.2) |
| 11 LOW | COORD (29, 9) | CHAR (9.2) |
| 12 HIGH | COORD (43, 9) | CHAR (9.2) |
| 17 VALUE = | COORD (14, 18) | CHAR (15.4) |

Bilevel data will suppress the decimal point and display a “1” or “0” right–justified, as shown by the following:

X CHAR (1.0)

| | | |
|---|---|---|
| VALUE = | COORD (21, 5) | CHAR (1.0) |
| 2 LOW | COORD (12, 9) | CHAR (1.0) |
| 4 LOW | COORD (12, 10) | CHAR (1.0) |
| 6 LOW | COORD (12, 11) | CHAR (1.0) |
| 11 LOW | COORD (37, 9) | CHAR (1.0) |
| 17 VALUE = | COORD (28, 18) | CHAR (1.0) |

An additional value of “2” is legal for items 2, 4 and 6 to indicate that the “bypass FDA” Limit State is selected.

The limit values of the limit set in use for analog, digital, and discrete parameters will be indicated by driving an asterisk (*) adjacent to the LOW limit item number.

B. The checkpoint time in seconds is converted to DAYS:HR:MIN:SEC, and displayed as XXX/XX:XX:XX

C. Whenever the TMBU LOAD IN PROGRESS FLAG (V92X0661X) is set the word "UPLINK" shall be displayed flashing; otherwise the data field will be blank.

D. CHECKPOINT OPERATION STATUS (XXXX). The CHECKPT STATUS shall be displayed in two parts. The first field to be displayed is based on the integer state of the CHECKPOINT R/W STATUS parameter (V92J1090C) as follows:

| CHECKPOINT R/W STATUS (V92J1090C) | DISPLAY REMOTE TEXT |
|---|---|
| 1 | Ø |
| 2 | Ø |
| 3 | GOOD |
| 4 | FAIL |

If "FAIL" is displayed in the first field, the RTXT "BOTH" or "UNIQ" (for unique) shall be displayed in the second field. Otherwise the second field shall be blank.

E. When an illegal PARAM ID is entered, the data fields for the following parameters shall be blanked:

ID
VALUE
LIMITS, ALERT (LOW and HI; 6 display fields)
ALERT (FILTER)
ALERT (ENA)
ALERT (INH)
BACKUP C & W (LOW and HI; 2 display fields)

BACKUP C & W (FILTER)
BACKUP C & W (ENA)
BACKUP C & W (INH)

F. When an illegal CONSTANT ID is entered, the data fields for the ID and VALUE shall be blanked.

#### 4.3.2.4 SM Table Maintenance Figure/Table References

Figure 4.3.2–1 SM Table Maint Display (PFS)

Table 4.3.2–1 Keyboard Processing Table

Table 4.3.2–2 CRT Display Processing Table

Table 4.3.2–3 CRT Display Processing Background Requirements N/A

Table 4.3.2–4 Mission Design Background Constants N/A

Table 4.3.2–5 Input Functional Parameters N/A

Table 4.3.2–6 Output Functional Parameters N/A

Table 4.3.2–7 I–Loads N/A

Table 4.3.2–8 K–Loads N/A

Table 4.3.2–9 Constants N/A

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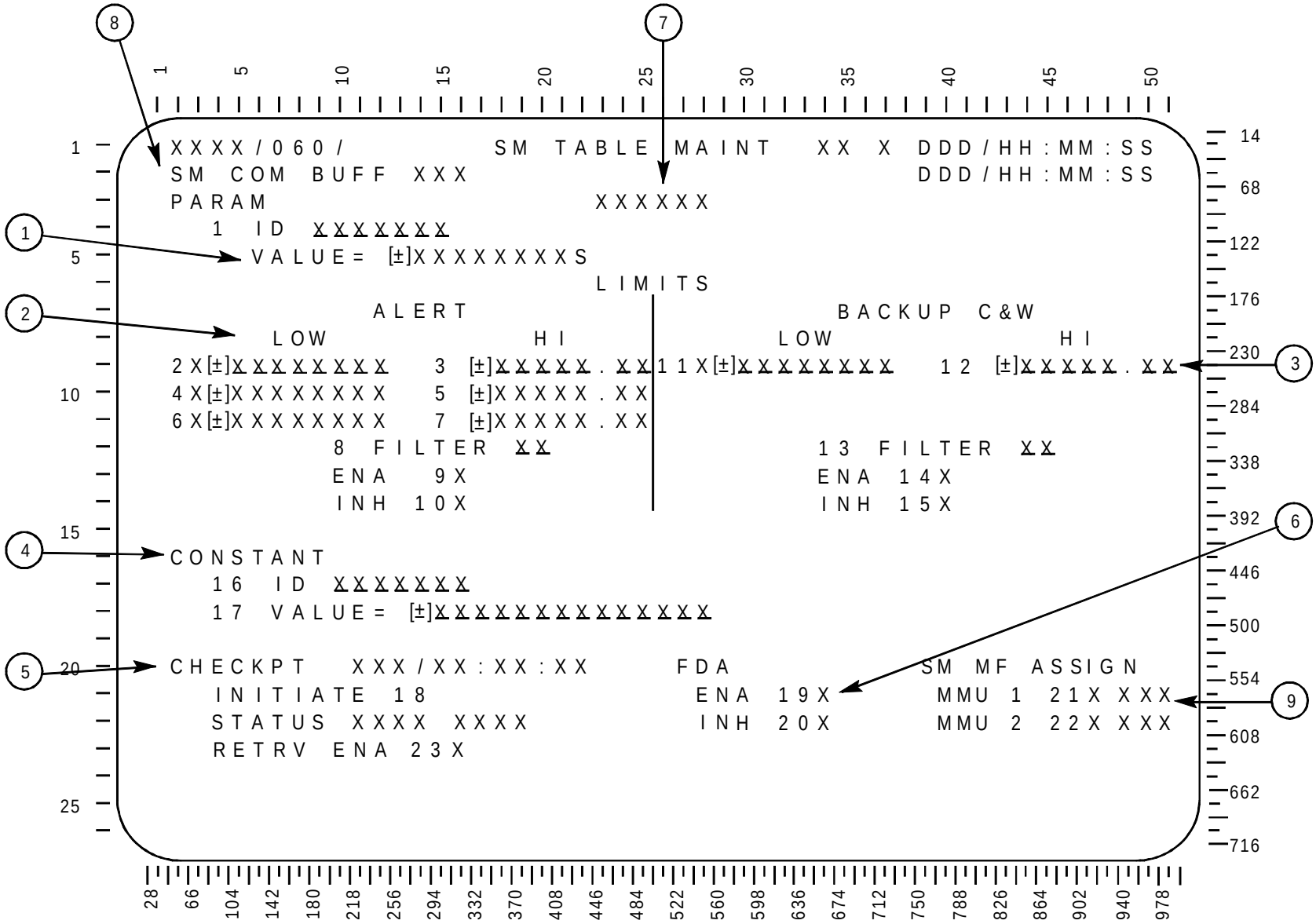


FIGURE 4.3.2-1. SM Table Maint Display (PFS)

TABLE 4.3.2-1. SM TABLE MAINT (PFS) KEYBOARD PROCESSING

| Seq | CRT Signal Name | M/S ID | CHAR | TYPE | UNITS | DK | ITEM | Item No. Limits | | Add Ref | Destination | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | MIN | MAX | | | | |
| 001 | 1 ID | V93Q4800C | 7.0 | DEC | | | 1 | | | | TM SPEC,CRT | TM PARAMETER ID | X |
| 002 | 2 LOW | V93Q4805C | VAR | VAR | VAR | | 2 | | | | TM SPEC,CRT | TM ALERT LIM SET 1–LOW LIMIT/STATE | X |
| 003 | 3 HIGH | V93Q4806C | VAR | VAR | VAR | | 3 | | | | TM SPEC,CRT | TM ALERT LIM SET 1–HIGH LIMIT | X |
| 004 | 4 LOW | V93Q4810C | VAR | VAR | VAR | | 4 | | | | TM SPEC,CRT | TM ALERT LIM SET 2–LOW LIMIT/STATE | X |
| 005 | 5 HIGH | V93Q4811C | VAR | VAR | VAR | | 5 | | | | TM SPEC,CRT | TM ALERT LIM SET 2–HIGH LIMIT | X |
| 006 | 6 LOW | V93Q4815C | VAR | VAR | VAR | | 6 | | | | TM SPEC,CRT | TM ALERT LIM SET 3–LOW LIMIT/STATE | X |
| 007 | 7 HIGH | V93Q4816C | VAR | VAR | VAR | | 7 | | | | TM SPEC,CRT | TM ALERT LIM SET 3–HIGH LIMIT | X |
| 008 | 8 FILTER | V93Q4826C | 2.0 | DEC | | | 8 | | | | TM SPEC,CRT | TM ALERT LIM NOISE FILTER | X |
| 009 | ENA 9 | V93X4830X | 0.0 | CNTL | | | 9 | | | | TM SPEC,CRT | TM ALERT LIM ANNUNCIATION ENABLE | X |
| 010 | INH 10 | V93X4831X | 0.0 | CNTL | | | 10 | | | | TM SPEC,CRT | TM ALERT LIM ANNUNCIATION INHIBIT | X |
| 011* | 11 LOW | V93Q4865C | VAR | VAR | VAR | | 11 | | | | TM SPEC,CRT | TM C&W LIMITS–LOW LIMIT | X |
| 012 | 12 HIGH | V93Q4866C | VAR | VAR | VAR | | 12 | | | | TM SPEC,CRT | TM C&W LIMITS–HIGH LIMIT | X |
| 013 | 13 FILTER | V93Q4876C | 2.0 | DEC | | | 13 | | | | TM SPEC,CRT | TM C&W LIMITS–NOISE FILTER | X |
| 014 | ENA 14 | V93X4880X | 0.0 | CNTL | | | 14 | | | | TM SPEC,CRT | TM C&W LIMITS–ANNUNCIATION ENABLE | X |
| 015 | INH 15 | V93X4881X | 0.0 | CNTL | | | 15 | | | | TM SPEC,CRT | TM C&W LIMITS–ANNUNCIATION INHIBIT | X |
| 016 | 16 ID | V93Q4840C | 7.0 | DEC | | | 16 | | | | TM SPEC,CRT | TM CONSTANT PARAMETER ID | X |
| 017 | 17 VALUE | V93Q4841C | VAR | VAR | VAR | | 17 | | | | TM SPEC,CRT | TM CONSTANT VALUE | X |
| 018 | INITIATE 18 | V93X4885X | 0.0 | CNTL | | | 18 | | | | TM SPEC,CRT | TM CHECKPOINT EXECUTE | X |
| 019 | ENA 19 | V93X4890X | 0.0 | CNTL | | | 19 | | | | TM SPEC,CRT | TM FDA ENABLE | X |
| 020 | INH 20 | V93X4891X | 0.0 | CNTL | | | 20 | | | | TM SPEC,CRT | TM FDA INHIBIT | X |
| 021 | MMU 1 21 | V93X4042X | 0.0 | CNTL | | | 21 | | | | TM SPEC,CRT | SM MMU ASSIGN | X |
| 022 | MMU 2 22 | V93X4042X | 0.0 | CNTL | | | 22 | | | | TM SPEC,CRT | SM MMU ASSIGN | X |
| 023 | RETRV ENA 23 | V93X4095X | 0.0 | CNTL | | | 23 | | | | TM SPEC,CRT | CHECKPT RETRIEVE ENA /INH | X |

## TABLE 4.3.2-2. SM TABLE MAINT (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | BILEVEL | | | | | | | | | | | | | | | | | |
| | | | X | Y | | CHAR | 1 | 0 | TYPE | | | | | | | | | | | | | | | |
| 001 | (OPS) | V93X0040X | 2 | 1 | | 5.0 | | | CHAR | | | | | | | E | | | | | | UI | OPS FUNCTION PAGE | X |
| 002 | (SPEC) | V93X0042X | 7 | 1 | | 4.0 | | | CHAR | | | | | | | E | | | | | | UI | SPEC FUNCTION PAGE | X |
| 003 | (DISP) | V93X0044X | 11 | 1 | | 4.0 | | | DEC | | | | | | | E | | | | | | UI | DISPLAY FUNCTION PAGE | X |
| 004 | (UL) | V92X5032X | 34 | 1 | | 2.0 | UL | | BLVL | | | | | | X | G | | | | | | UI | UPLINK ACTIVITY IND | X |
| 005 | (GPC) | V93X0048X | 36 | 1 | | 2.0 | | | DEC | | | | | | | E | | | | | | UI | GPC DRIVER | X |
| 006 | (MT) | V91W1990C | 39 | 1 | | 12.0 | | | CHAR | DHMS | | | | | | A | | | | | | FCOS | MISSION ELAPSED TIME | X |
| 007 | (CRT TIMER) | V91W1988C | 39 | 2 | | 12.0 | | | CHAR | DHMS | | | | | | A | | | | | | FCOS | DISPLAY CRT TIME, SM | X |
| 008 | 1 ID | V93Q4800C | 8 | 4 | | 8.0 | | | DEC | | | X | | | | E | | | | | E | KYBD | TM PARAMETER ID | X |
| 009 | VALUE= | V93U4889C | R | 5 | | VAR | | | VAR | VAR | X | X | | | | | X | | | | A E | OI SMM | TM PARAMETER VALUE | X |
| 010 | (LIMIT 1) | V93X4807X | 3 | 9 | | 1.0 | * | | BLVL | | | X | | | | | | | | | E | OI SMM | TM ALERT LIMIT SET 1 IN USE | X |
| 011 | 2 LOW | V93Q4805C | R | 9 | | VAR | | | VAR | VAR | | X | | | | E | X | | | | A E | KYBD | TM ALERT LIM SET 1–LOW LIMIT/STATE | X |
| 012 | 3 HIGH | V93Q4806C | 17 | 9 | | 9.2 | | | DEC | | | X | | | | E | X | | | | A E | KYBD | TM ALERT LIM SET 1–HIGH LIMIT | X |
| 013 | (LIMIT 2) | V93X4812X | 3 | 10 | | 1.0 | * | | BLVL | | | X | | | | | | | | | E | OI SMM | TM ALERT LIMIT SET 2 IN USE | X |
| 014 | 4 LOW | V93Q4810C | R | 10 | | VAR | | | VAR | VAR | | X | | | | E | X | | | | A E | KYBD | TM ALERT LIM SET 2–LOW LIMIT/STATE | X |
| 015 | 5 HIGH | V93Q4811C | 17 | 10 | | 9.2 | | | DEC | | | X | | | | E | X | | | | A E | KYBD | TM ALERT LIM SET 2–HIGH LIMIT | X |
| 016 | (LIMIT 3) | V93X4817X | 3 | 11 | | 1.0 | * | | BLVL | | | X | | | | | | | | | E | OISMM | TM ALERT LIMIT SET 3 IN USE | X |
| 017 | 6 LOW | V93Q4815C | R | 11 | | VAR | | | VAR | VAR | | X | | | | E | X | | | | A E | KYBD | TM ALERT LIM SET 3–LOW LIMIT/STATE | X |
| 018 | 7 HIGH | V93Q4816C | 17 | 11 | | 9.2 | | | DEC | | | X | | | | E | X | | | | A E | KYBD | TM ALERT LIM SET 3–HIGH LIMIT | X |
| 019 | 8 FILTER | V93Q4826C | 18 | 12 | | 3.0 | | | DEC | | | X | | | | E | | | | | E | KYBD | TM ALERT LIM NOISE FILTER | X |
| 020 | ENA 9 | V93X4830X | 16 | 13 | | 1.0 | * | | BLVL | | | X | | | | E | | | | | E | KYBD | TM ALERT LIM ANNUNCIATION ENABLE | X |
| 021 | INH 10 | V93X4831X | 16 | 14 | | 1.0 | * | | BLVL | | | X | | | | E | | | | | E | KYBD | TM ALERT LIM ANNUNCIATION INHIBIT | X |
| 022 | (LIMIT B/U) | V93X4867X | 28 | 9 | | 1.0 | * | | BLVL | | | X | | | | | | | | | E | OI SMM | TM BACKUP C&W LIMIT SET IN USE | X |
| 023 | 11 LOW | V93Q4865C | R | 9 | | VAR | | | VAR | VAR | | X | | | | E | X | | | | A E | KYBD | TM C&W LIMITS–LOW LIMITS | X |
| 024 | 12 HIGH | V93Q4866C | 43 | 9 | | 9.2 | | | DEC | | | X | | | | E | X | | | | A E | KYBD | TM C&W LIMITS–HIGH LIMIT | X |
| 025 | 13 FILTER | V93Q4876C | 43 | 12 | | 3.0 | | | DEC | | | X | | | | E | | | | | E | KYBD | TM C&W LIMITS–NOISE FILTER | X |
| 026 | ENA 14 | V93X4880X | 40 | 13 | | 1.0 | * | | BLVL | | | X | | | | E | | | | | E | KYBD | TM C&W LIMITS–ANNUNCIATION ENABLE | X |
| 027 | INH 15 | V93X4881X | 40 | 14 | | 1.0 | * | | BLVL | | | X | | | | E | | | | | E | KYBD | TM C&W LIMITS–ANNUNCIATION INHIBIT | X |
| 028 | 16 ID | V93Q4840C | 9 | 17 | | 8.0 | | | DEC | | | X | | | | E | | | | | F | KYBD | TM CONSTANT PARAMETER ID | X |
| 029 | 17 VALUE = | V93Q4841C | R | 18 | | VAR | | | VAR | VAR | | X | | | | E | X | | | | A F | KYBD | TM CONSTANT VALUE | X |
| 030 | CHECKPT | V93W4887C | 11 | 20 | | 12.0 | | | DEC | DHMS | | | | | | B | | | | | B | OI SMM | TIME OF LAST COMMON CKPT | X |
| 031 | STATUS (XXXX) | V92J1090C | 11 | 22 | | 4.0 | | | RTXT | | | | | | | B | | | | | D | OI SMM | CHECKPOINT R/W STATUS | X |
| 032 | STATUS (XXXX) | V92J1091C | 16 | 22 | | 4.0 | | | RTXT | | | | | | | B | | | | | D | OI SMM | CHECKPOINT FAIL QUALIFIER | |
| 033 | ENA 19 | V93X4890X | 34 | 21 | | 1.0 | * | | BLVL | | | | | | | B | | | | | | KYBD | TM FDA ENABLE | X |
| 034 | INH 20 | V93X4891X | 34 | 22 | | 1.0 | * | | BLVL | | | | | | | B | | | | | | KYBD | TM FDA INHIBIT | X |

TABLE 4.3.2-2. SM TABLE MAINT (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | | | |
| 035 | MMU 1 21 | V91X1706X | 47 | 21 | | 1.0 | * | | BLVL | | | | | | | B | | | | | | FCOS | MMU ASSIGN IND FOR SM | X |
| 036 | MMU 2 22 | V91X1706X | 47 | 22 | | 1.0 | | * | BLVL | | | | | | | B | | | | | | FCOS | MMU ASSIGN IND FOR SM | X |
| 037 | MMU 1 (XXX) | V91X1558X | 49 | 21 | | 3.0 | RDY | BSY | BLVL | | | | | | | B | | | | | | FCOS | MMU 1 STATUS IND | X |
| 038 | MMU 2 (XXX) | V91X1559X | 49 | 22 | | 3.0 | RDY | BSY | BLVL | | | | | | | B | | | | | | FCOS | MMU 2 STATUS IND | X |
| 039 | RETRV ENA 23 | V91X1842X | 16 | 23 | | 1.0 | * | | BLVL | | | | | | | B | | | | | | FCOS | CHECKPT RETRIEVE ENA/INH IND | X |
| 040 | UPLINK (XXXXXX) | V92X0661X | 23 | 3 | | 6.0 | | | CHAR | | | | | | X | E | | | | | C | OI SMM | TMBU LOAD IN PROGRESS | X |
| 041* | SM COM BUFF (BSY) | V92X0077X | 14 | 2 | | 3.0 | BSY | | BLVL | | | | | | X | | | | | | | SMM | SM COMMON BUFFER IN USE | X |
| 042* | SM COM BUFF (RDY) | V92X0077X | 14 | 2 | | 3.0 | | RDY | BLVL | | | | | | | | | | | | | SMM | SM COMMON BUFFER READY | X |
| 043 | (MSG LINE) | V93X0050X | 1 | 25 | | 44.0 | | | CHAR | | | | | | | G | | | | | | UI | MESSAGE LINE | X |
| 044 | (BUFFER MSG) | V93X0054X | 45 | 25 | | 4.0 | | | CHAR | | | | | | | G | | | | | | UI | BUFFER MESSAGE INDICATOR | X |
| 045 | (SPL) | V93X0056X | 2 | 26 | | 49.0 | | | CHAR | | | | | | | G | | | | | | UI | SCRATCH PAD LINE | X |

### 4.3.3 DELETED

### 4.3.4 ANTENNA (PFS)

TITLE: ANTENNA
TYPE: OPS/2011, OPS/4011
AVAILABILITY: SM OPS 2 and 4

#### 4.3.4.1 Purpose, Operation, and Organization

This OPS function display provides control of the GPC automatic antenna management sequence (AM) for the S–band and Ku–band antenna systems. In addition, provisions are made for monitoring the antenna systems and their associated electronics. Figure 4.3.4–1 is the Antenna Display Format.

(1) The crewmen will use this display for initial configuration of the automatic antenna management software and control of the antenna management function for both Ku–band and S–band systems. The crewmen may be directed to view the Antenna display to exercise control functions or simply to monitor antenna management parameters.

(2) This display is formatted with the Ku-band digital data and control to the left and the S-band digital data and control to the right of the AM pointing plot. TDRS State Vector and S-band and Ku-band usage priorities are selected below the plot.

(3) The Ku–band system is monitored by sets of measurements as defined in the following paragraphs.

a. SS (SIG STR) is an analog measurement that represents the uplink received signal strength of the Ku–band system.

b. EL CMD is a serial digital measurement that represents the pitch angle data being supplied by the (AM) sequence to a Ku–band antenna. These data are based on the currently selected TDRS as defined in paragraph 4d.

c. AZ CMD is a serial digital measurement that represents the roll angle data being supplied by the (AM) sequence to Ku–band antenna. The data are based on the currently selected TDRS as defined in paragraph 4d.

d. EL ACT is a serial digital measurement that represents the actual pitch angle position of the Ku–band antenna as measured by the antenna pitch resolvers.

e. AZ ACT is a serial digital measurement that represents the actual roll angle position of the Ku–band antenna as measured by the antenna roll resolvers.

f. TDRS KU will display the remote text “TGT” whenever the Ku-band system is tracking a GNC target. The TDRS KU remote text will be blanked if the GNC angle pointing (KU ANTENNA ENA/INH CMD) is inhibited.

(4) The Ku–band antenna system is controlled by use of Item entries as defined in the following paragraphs.

a. Two mutually exclusive items, Item 16 (AUTO) and Item 17 (MIN) under RDR RNG, control the range estimate value output to the Ku–band Rendezvous Radar/Comm A system. When SM is initialized from Mass Memory the "AUTO" item shall be selected. An asterisk "*" will be displayed opposite the selected function.

b. SELF TEST (ITEM 7) is an item entry that provides the capability to initiate or terminate the radar self test function.

c. I/O RESET KU (Item 8) is an item entry control which provides the capability to initiate the communication between the GPC and the Ku–band system. An asterisk "*" will be displayed adjacent to the function whenever the interface is enabled. An "M" will be displayed whenever the interface is disabled. When SM is initialized from Mass Memory, the Ku–band communications interface will be enabled. However, it will be bypassed shortly afterward since the Ku–band system is not powered on. The Ku–band interface will remain bypassed until the Ku–band system is powered on and the interface subsequently enabled via I/O RESET KU item entry execution or uplink command.

d. Items 9 and 10 are two mutually exclusive items which provide the AM sequence of the Ku-band COMM A antenna with TDRS selection/deselection information. Execution of Item 9 (A PRI) will allow the AM sequence to select the TDRS whose state vector is assigned to TGT-A as the primary satellite for automatic pointing and acquisition. TDRS TGT-A will be selected if it is in view. If TDRS TGT-A is not in view, then TDRS TGT-B will be selected if it is in view. Execution of Item 10 (B PRI) will allow the AM sequence to select the TDRS whose state vector is assigned to TGT-B as the primary satellite for automatic pointing and acquisition. TDRS TGT-B will be selected if it is in view. If TDRS TGT-B is not in view, then TDRS TGT-A will be selected if it is in view. In both the A PRI and the B PRI case, if neither TDRS TGT is in view, then the lowest numbered TDRS SV which is in view and enabled will be utilized for pointing. If no TDRS is in view then the SM will not attempt to automatically command Ku-band antenna pointing. (This will be accomplished by continuing to send the last calculated angles to the Ku-band hardware.) An asterisk (*) will be displayed opposite the selected function. When SM is initialized from Mass Memory, the A PRI item will be selected.

(5) The S–band system is monitored by a set of measurements defined in the following paragraphs. (Note: In cases where GPC is selecting antennas for the S–band system, the output antenna command is compared with actual selected antennas. If after three tries, the two do not compare, an error message will be generated and annunciated to the crew.)

a. SS (SIG STR) is an analog measurement that represents the uplink received signal strength of the active S–band antenna.

b. ANT ELEC are discrete measurements that indicate which antenna switch assembly has had power applied to it. The remote text to be displayed is "1", "2" "OFF" or is blank.

c. ANT PM (also referred to as S-Band Quad Antenna) and FM (also referred to as S-band Hemi Antenna) are discrete measurements that indicate which S–band PM antenna and which S–band FM antenna are currently selected by the AM Processor, the crew manual antenna switch, or the ground uplink command.

The S–band PM antenna status indication is divided into two remote text fields, each having a parameter status. The first is a two character field which will identify the S–band Switch Beam quadrant antenna; upper right (UR), upper left (UL), lower right (LR) and lower left (LL). The parameter status column for this field will be driven with an "M" for missing data or blank. The second is a one character field which identifies forward (F) or aft (A) direction of antenna switch beam. The parameter status column for this field will be driven with a down arrow (↓) for a miscompare between what is selected and what is commanded, an "M" for missing data or is blank. If the discretes for both miscompare and missing data are both set, then both the "M" and (↓) will be displayed simultaneously ( M↓ ).

The S–band FM antenna status indications is a two character remote text field which will identify upper (UP) or lower (LO) antenna. The parameter status column for this field will be driven with a down arrow (↓) for a miscompare between what is selected and what is commanded, an "M" for missing data or is blank. If the discretes for both miscompare and missing data are both set, then both the "M" and (↓) will be displayed simultaneously ( M↓ ).

d. MODE's are discrete measurements that indicate the current mode, TDRS, S–HI (STDN HI), S–LO (STDN LO), or SGLS (DOD SPACE Ground Link System/Station) of the active S–band system. Results of these discretes are displayed in alphanumeric text.

e. STDN are discrete measurements that indicate which STDN/SGLS SITE is presently utilized by the AM sequence for automatic S–band antenna pointing. These data are displayed in alphanumeric text.

(6) The S–band antennas are controlled by use of Item entries as defined in the following paragraphs:

a. SM GPC antenna command (GPC PTG) Items 11 (ENA) and 12 (INH) are two mutually exclusive items used to enable or inhibit the SM GPC AM sequence for the S-band antennas. An asterisk (*) is displayed opposite the selected function. When SM is initialized from Mass Memory, the ENA item will be selected. (Inhibit allows uplink control of the S–band antenna.)

b. TDRS MODE item 13 override (OVRD) is an item entry which provides the capability to force the S–band antenna management software to the TDRS MODE and remain there. An asterisk (*) is displayed after the item number when the override function has been enabled via item execute or uplink. Re–execution of the item will toggle to inhibit the override function, blanking the asterisk. When SM is initialized from Mass Memory, the S–band antenna management TDRS MODE override function shall be inhibited. Thereafter it shall reflect crew input or ground uplink.

c. Items 14 and 15 are two mutually exclusive items which provide the AM sequence of the S-band antennas with TDRS selection/deselection information. Execution of Item 14 (A PRI) will allow the AM sequence to select the TDRS whose state vector is assigned to TGT-A as the primary satellite for automatic pointing and acquisition. TDRS TGT-A will be selected if it is in view. If TDRS TGT-A is not in view, then TDRS TGT-B will be selected if it is in view. Execution of Item 15 (B PRI) will allow the AM sequence to

select the TDRS whose state vector is assigned to TGT-B as the primary satellite for automatic pointing and acquisition. TDRS TGT-B will be selected if it is in view. If TDRS TGT-B is not in view, then TDRS TGT-A will be selected if it is in view. In both the A PRI and the B PRI case, if neither TDRS TGT is in view, then the lowest numbered TDRS SV which is in view and enabled will be utilized for pointing. If no TDRS is in view then the SM will not attempt to automatically select and command the S-band antennas. (This will be accomplished by sending null RESET and SET masks to the S-band antenna hardware.) An asterisk (*) will be displayed opposite the selected function. When SM is initialized from Mass Memory, the A PRI item will be selected.

(7) The antenna management plot provides the crew with the actual target look angle information on the S–band PM and Ku–band antennas relative to orbiter coordinates. The Orbiter –Z axis is located at 0,0 and the +X axis is located at the point 90,0 on the plot. The relative look angle to a given target that is in view and enabled is represented by an "A" for TDRS TGT-A, "B" for TDRS TGT-B, and "S" for a ground (STDN or SGLS) site. If TGT-A is not in view or its associated TDRS SV is inhibited and TGT-B is not in view or its associated TDRS SV is inhibited, then a "1", "2", "3", "4", "5" or "6" will be used to represent the lowest number TDRS SV that is in view and enabled. The scaling of the plot is –90 to +90 degrees elevation, and –180 to +180 degrees azimuth, $\theta$, $\phi$ coordinates for the S–band antennas correspond directly to pitch and roll of the Ku–band antennas. Background lines provide for vehicle blockage information for the Ku–band system. No background data are needed for line–of–sight blockage of the S–band system. In addition to target look angle data, a pointer "□" is provided to indicate the actual antenna position as given by the antenna pitch and roll resolvers for the Ku–band antenna.

(8) The TDRS STATE VECTORS (TDRS SV) monitoring and priority control inputs are defined in the following paragraphs.

a. The data field in the Target (TGT) columns (A and B) indicate the TDRS SV that is in use for TGT-A and TGT-B by placing an asterisk, "*", in the appropriate location opposite item number 1, 2, 3, 4, 5 or 6. The TDRS SV to TGT selection can be performed by item entry or uplink. For example to select TDRS SV 3 for use in TGT-B then an ITEM 3 + B EXEC would be performed. Only one TDRS SV may be selected to a given TGT at a time, however both targets shall be able to be selected to use the same TDRS SV.

b. TDRS Satellite Longitude (SAT LON) is the integer rounded longitude, in degrees, of the TDRS data contained in the six state vectors. The displayed data is referenced as 0 to 360 degrees west longitude. This data is determined from the actual onboard data that has been uplinked to the SM GPC.

c. IN VIEW is a calculation performed by the SM GPC on each of the six vectors to determine if the TDRS is computed to be in a line-of-site view of the Orbiter. If a satellite is IN VIEW then an asterisk, "*", is placed in the appropriate location opposite item number 1, 2, 3, 4, 5 or 6.

d. The GPC K column indicates with an asterisk, "*", which TDRS SV is in use by the GPC for Ku-band antenna pointing commanding.

e. The GPC S column indicates with an asterisk, "*", which TDRS SV is in use by the GPC for S-band antenna pointing commanding.

f. The ground may inhibit use of any TDRS SV by use of the S-band/Ku-band Control Word Uplink. If a TDRS SV is inhibited only the hard coded State Vector Identification Number (1, 2, 3, 4, 5 or 6), that appears in column 19 of the display, will be displayed and all other data for that TDRS SV will be blanked. An attempt to select an inhibited TDRS SV to TGT-A or TGT-B will result in an "ILLEGAL ENTRY" CRT message.

### 4.3.4.2 ANTENNA Keyboard Processing Addendum

A. Keyboard processing for Target A and B Selection of TDRS SV for Use.

Selection of the TDRS SV that is to be used by TGT-A and TGT-B can be performed by either uplink, TEC, or item entry. There are two groups of six MSIDs that define the selection for TGT-A and TGT-B. Within a group, the members are mutually exclusive (e.g., only one MSID may be set equal to one (enabled) at any time). This shall allow only a single TDRS SV to be assigned to TGT-A or TGT-B. There are no restrictions to assigning the same TDRS SV to both TGT-A and TGT-B. The two groups of MSIDs are:

| TGT-A Group | | TGT-B Group | |
|---|---|---|---|
| MSID | Nomenclature | MSID | Nomenclature |
| V93X5652X | TDRS STATE VECTOR 1 TO TGT-A | V93X5656X | TDRS STATE VECTOR 1 TO TGT-B |
| V93X5653X | TDRS STATE VECTOR 2 TO TGT-A | V93X5657X | TDRS STATE VECTOR 2 TO TGT-B |
| V93X5654X | TDRS STATE VECTOR 3 TO TGT-A | V93X5658X | TDRS STATE VECTOR 3 TO TGT-B |
| V93X5655X | TDRS STATE VECTOR 4 TO TGT-A | V93X5659X | TDRS STATE VECTOR 4 TO TGT-B |
| V93X5660X | TDRS STATE VECTOR 5 TO TGT-A | V93X5662X | TDRS STATE VECTOR 5 TO TGT-B |
| V93X5661X | TDRS STATE VECTOR 6 TO TGT-A | V93X5663X | TDRS STATE VECTOR 6 TO TGT-B |

The TDRS STATE VECTOR A/B SELECT MSIDs also form a mutually exclusive group. These MSIDs are:

| TGT A/B Select Group | |
|---|---|
| MSID | Nomenclature |
| V93J1090C | TDRS STATE VECTOR 1 TGT A/B SELECT |
| V93J1091C | TDRS STATE VECTOR 2 TGT A/B SELECT |
| V93J1092C | TDRS STATE VECTOR 3 TGT A/B SELECT |
| V93J1093C | TDRS STATE VECTOR 4 TGT A/B SELECT |
| V93J1051C | TDRS STATE VECTOR 5 TGT A/B SELECT |
| V93J1052C | TDRS STATE VECTOR 6 TGT A/B SELECT |

The display shall use the TDRS SV number as an item entry to allow selection to a given TGT. The possible selections via item entry shall be only “A” and “B”. Any other selection shall annunciate an “ILLEGAL ENTRY” CRT message. When an item entry is performed the TDRS STATE VECTOR X TO TGT-A or the TDRS STATE VECTOR X TO TGT-B for the appropriate SV shall be set to one (1). All other TDRS STATE VECTOR X TO TGT-A (or TGT-B) that are in the same group above, shall be set to zero (0).

Note that “X” can be equal to 1, 2, 3, 4, 5 or 6 above.

For example, if TDRS SV 3 is to be assigned to TGT-B then the item entry would be:

ITEM 3 + B EXEC

This action sets V93X5658X, TDRS STATE VECTOR 3 TO TGT-B, to one (enabled) and resets all other TGT-B group MSIDs to zero (inhibited). This input would have no affect on the TGT-A group of MSIDs. The table below outlines the values set in TDRS STATE VECTOR X TO TGT-A(B) for each of the possible CRT inputs.

| | |
|---|---|
| TDRS STATE VECTOR 1 TO TGT-A | V93X5652X |
| TDRS STATE VECTOR 2 TO TGT-A | V93X5653X |
| TDRS STATE VECTOR 3 TO TGT-A | V93X5654X |
| TDRS STATE VECTOR 4 TO TGT-A | V93X5655X |
| TDRS STATE VECTOR 5 TO TGT-A | V93X5660X |
| TDRS STATE VECTOR 6 TO TGT-A | V93X5661X |
| TDRS STATE VECTOR 1 TO TGT-B | V93X5656X |
| TDRS STATE VECTOR 2 TO TGT-B | V93X5657X |
| TDRS STATE VECTOR 3 TO TGT-B | V93X5658X |
| TDRS STATE VECTOR 4 TO TGT-B | V93X5659X |
| TDRS STATE VECTOR 5 TO TGT-B | V93X5662X |
| TDRS STATE VECTOR 6 TO TGT-B | V93X5663X |

| **VARIABLE** | **CRT INPUT** | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TDRS STATE VECTOR 1 TGT A/B SELECT (V93J1090C) | A | | | | | | | 0 | 0 | 0 | 0 | 0 | 1 |
| | B | 0 | 0 | 0 | 0 | 0 | 1 | | | | | | |
| TDRS STATE VECTOR 2 TGT A/B SELECT (V93J1091C) | A | | | | | | | 0 | 0 | 0 | 0 | 1 | 0 |
| | B | 0 | 0 | 0 | 0 | 1 | 0 | | | | | | |
| TDRS STATE VECTOR 3 TGT A/B SELECT (V93J1092C) | A | | | | | | | 0 | 0 | 0 | 1 | 0 | 0 |
| | B | 0 | 0 | 0 | 1 | 0 | 0 | | | | | | |
| TDRS STATE VECTOR 4 TGT A/B SELECT (V93J1093C) | A | | | | | | | 0 | 0 | 1 | 0 | 0 | 0 |
| | B | 0 | 0 | 1 | 0 | 0 | 0 | | | | | | |
| TDRS STATE VECTOR 5 TGT A/B SELECT (V93J1051C) | A | | | | | | | 0 | 1 | 0 | 0 | 0 | 0 |
| | B | 0 | 1 | 0 | 0 | 0 | 0 | | | | | | |
| TDRS STATE VECTOR 6 TGT A/B SELECT (V93J1052C) | A | | | | | | | 1 | 0 | 0 | 0 | 0 | 0 |
| | B | 1 | 0 | 0 | 0 | 0 | 0 | | | | | | |

### 4.3.4.3 ANTENNA CRT Display Processing Addendum

The table below presents the parameter status indicators (PSI) that can be displayed for a parameter. In SM–PL, PSI requirements can be one of two types as follows:

- A PSI which is part of the data words identified by an "X" marked in the STATUS column of Table 4.3.4–2.
- A PSI which is a stand–alone identified by the word "STAT" being inserted in the FORMAT TYPE column of Table 4.3.4–2.

Both PSI types have a numeric code appearing as an entry (right justified) in the ADD REF column of CRT display processing Table 4.3.4–2. The numeric code, corresponding to one of those listed in the table, indicates the specific status processing to be performed. If there is no numeric code entry, the status processing is defined by the default code.

When the "M" PSI is displayed (for Commfault, I/O error resulting in missing data), the last value of the associated parameter will continue to be displayed unless specified otherwise.

| Numeric Code | PSI SYMBOL(S) | | | | | |
|---|---|---|---|---|---|---|
| Default (blank) | ↓ | ↑ | H | L | M | ⌀ |
| 1 | | | | | M | ⌀ |
| 2 | | | H | L | M | ⌀ |
| 3 | ↓ | | | | M | ⌀ |
| 4 | ↓ | | | | | ⌀ |

⌀ = blank

NOTE: The numeric addendum reference codes are for information only. Actual processing requirements are specified in the SM Level B CPDS (SS–P–0002–580) and/or Level C Systems Management FSR (JSC–19590), Payload Management FSR (JSC–19478).

The following alpha code(s) appear (left justified) in the ADD REF column of Table 4.3.4–2 whenever it is necessary to define any special processing requirements not otherwise covered therein:

A. Current STDN/SGLS Site

A three letter site designator will be displayed in accordance with Antenna Management Special Processing. The following are typical designators and will be controlled by Table Maintenance.

| Site ID No. | Text Output | Site ID NO. | Text Output |
|---|---|---|---|
| 0 | (blank) | 8 | GTS |
| 1 | MIL | 9 | HTS |
| 2 | WLP | 10 | VTS |
| 3 | NHS | 11 | DFR |
| 4 | MAD | 12 | GDX |
| 5 | OTS | 13 | CTS |
| 6 | DGS | 14 | JSC |
| 7 | CAN | 15 | (blank) |
| | | 16 | (blank) |

For further reference, the ground station location tables are defined in the Level C Systems Management FSR (JSC–19590), Section 7.5.

B. S–Band Switch Beam PM and FM Antenna Selected

The following output parameters generated by the SM sequence will enable UI to display the appropriate text in accordance with the selection of PM and FM antennas.

| Inputs to UI | Logic | Text Output |
|---|---|---|
| S–Band Quad Ant Sel =<br>(V92J1057C)<br>(S-Band PM Antennas) | 001<br>010<br>011<br>100 | UR<br>LR<br>LL<br>UL |
| S–Band SW Beam Sel =<br>(V92J1062C)<br>(S-Band PM Antennas) | 01<br>10 | F<br>A |
| S–Band Hemi Ant Sel =<br>(V92J1056C)<br>(S-Band FM Antennas) | 01<br>10 | UP<br>LO |

Computations governing the selection of a Switch Beam PM and FM antenna are defined in the Level B, SM CPDS (SS–P–002–580); Section 6.3.

C. TDRS LOS Roll/Pitch Angles

The principle function of the plotting symbol is to provide a graphic indicator for the roll/pitch line of sight look angle to a TDRS. The TDRS TGT-A, TGT-B, or SV 1, 2, 3, 4, 5 or 6, will be represented by the symbol "A", "B", "1", "2", "3", "4", "5" or "6", respectively. For "A" and "B" a plotting symbol will appear on the display only if the target TDRS is in view of the Orbiter and enabled. If TGT-A is not in view or its associated TDRS SV is inhibited and TGT-B is not in view or its associated TDRS SV is inhibited, then a "1", "2", "3", "4", "5" or "6" will be used to represent the lowest number TDRS SV that is in view and enabled. TGT-A and TGT-B symbols will be plotted based upon the state vector slot that is assigned to that TGT. The symbols are driven by the following parameter outputs computed by the AM sequence:

TGT A - "A" (DEU Symbol 41)

Varies based upon TDRS State Vector assigned to TGT-A

TGT B - "B" (DEU Symbol 42)

Varies based upon TDRS State Vector assigned to TGT-B

SLOT 1 - "1" (DEU Symbol 31)

| | |
|---|---|
| V92H2297C | TDRS STATE VECTOR 1 ROLL ANGLE |
| V92H2298C | TDRS STATE VECTOR 1 PITCH ANGLE |
| V92X2293X | TDRS STATE VECTOR 1 IN VIEW |
| V93X1078X | TDRS STATE VECTOR 1 ENA/INH STATUS |

SLOT 2 - "2" (DEU Symbol 32)

| | |
|---|---|
| V92H2299C | TDRS STATE VECTOR 2 ROLL ANGLE |
| V92H2300C | TDRS STATE VECTOR 2 PITCH ANGLE |
| V92X2294X | TDRS STATE VECTOR 2 IN VIEW |
| V93X1079X | TDRS STATE VECTOR 2 ENA/INH STATUS |

SLOT 3 - "3" (DEU Symbol 33)

| | |
|---|---|
| V92H2301C | TDRS STATE VECTOR 3 ROLL ANGLE |
| V92H2302C | TDRS STATE VECTOR 3 PITCH ANGLE |
| V92X2295X | TDRS STATE VECTOR 3 IN VIEW |
| V93X1080X | TDRS STATE VECTOR 3 ENA/INH STATUS |

SLOT 4 - "4" (DEU Symbol 34)

| | |
|---|---|
| V92H2303C | TDRS STATE VECTOR 4 ROLL ANGLE |
| V92H2304C | TDRS STATE VECTOR 4 PITCH ANGLE |
| V92X2296X | TDRS STATE VECTOR 4 IN VIEW |
| V93X1081X | TDRS STATE VECTOR 4 ENA/INH STATUS |

SLOT 5 - “5” (DEU Symbol 35)

| | |
|---|---|
| V92H2343C | TDRS STATE VECTOR 5 ROLL ANGLE |
| V92H2345C | TDRS STATE VECTOR 5 PITCH ANGLE |
| V92X2341X | TDRS STATE VECTOR 5 IN VIEW |
| V93X5664X | TDRS STATE VECTOR 5 ENA/INH STATUS |

SLOT 6 - “6” (DEU Symbol 36)

| | |
|---|---|
| V92H2344C | TDRS STATE VECTOR 6 ROLL ANGLE |
| V92H2346C | TDRS STATE VECTOR 6 PITCH ANGLE |
| V92X2342X | TDRS STATE VECTOR 6 IN VIEW |
| V93X5665X | TDRS STATE VECTOR 6 ENA/INH STATUS |

D. Actual Angles to TDRS.

The actual pointing angle of the Ku-band antenna will be denoted by the plotting symbol “□” (DEU Symbol 1A). This symbol is driven by the following parameter outputs computed by the AM sequence:

Actual – “□”

| | |
|---|---|
| V74H2618J | Ku–BAND A CH1 ROLL WORD 3 WD3 |
| V74H2619J | Ku–BAND A CH1 PITCH WORD 4 WD4 |

The conversion of the above roll and pitch angles into CRT addressable units will be provided by the Level B, SM CPDS (SS–P–002–580); Section 6.3.

E. Line of Site Angles to STDN or SGLS Site

The symbol “S” (DEU Symbol 53) will represent the roll/pitch line–of–sight angle to a STDN site. This symbol will only appear on the display if the current STDN site is in view. The in view flag signal is V92J1054C when the value is a number other than 0. The symbol is driven by the following parameter outputs computed by the AM sequence.

LOS STDN – “S”

| | |
|---|---|
| (V92H1069C) | CURRENT SITE LOS ROLL ANGLE COMPUTED |
| (V92H1068C) | CURRENT SITE LOS PITCH ANGLE COMPUTED |

The conversion of the above roll and pitch angles into CRT addressable units will be provided by the Level B, SM CPDS (SS–P–002–580); Section 6.3.

F. GCIL–S–Band PM Transponder Mode Commfault Status

The commfault bits on these parameters shall be OR'ed to display an "M" in the parameter status column.

| | |
|---|---|
| V74X4786E | GCIL–S–Band PM XPNDR–TDRS MODE |
| V74X4787E | GCIL–S–Band PM LOW XPNDR STDN |
| V74X4788E | GCIL–S–Band PM HI XPNDR STDN |
| V74X4789E | GCIL–S–Band PM XPNDR–SGLS MODE |

G. S–Band PM Transponder Signal Strength.

The following logic is required to determine the transponder source for the S–band SIGNAL STR (SS) value to be displayed:

| Transponder Source | | |
|---|---|---|
| GCIL–S–Band PM | | |
| XVP7N4DX4 | XVP7N4DX4 | S–BD PM XPNDR AGC SIG STRENGTH Parameter To Be Displayed |
| NO45 1E | NO46 2E | |
| 1 | 0 | V74E4080A |
| 0 | 1 | V74E4081A |
| 0 | 0 | Blank |
| 1 | 1 | N/A |

The Commfault bit of the SIG STRENGTH (SS) Parameter to be displayed shall be used to display the "M" in the parameter status field.

H. GCIL–S–Band Antenna Electronics Status.

The following logic is required to generate the appropriate RTXT for the Antenna Electronics Status.

| Antenna Electronics LOGIC | | |
|---|---|---|
| GCIL–S–BAND ANT SW ASSY PWR ON 1 V74X4782E | GCIL–S–BAND ANT SW ASSY PWR ON 2 V74X4783E | Status Text Output |
| 1 | 0 | 1 |
| 0 | 1 | 2 |
| 0 | 0 | OFF |
| 1 | 1 | BLANK |

The Commfault bits on these parameters shall be OR'ed to display a single "M" in the parameter status field.

I. TDRS SV ENABLE/INHIBIT Capability.

If a state vector is INH for use (TDRS STATE VECTOR X ENA/INH STATUS = 0) then data for longitude or in view status will not be displayed. Since the use of this vector in SM AM is not allowed when this value is set to INH, this will mean that only the hard coded State Vector Identification Number (1, 2, 3, 4, 5, or 6) that appears in column 19 of the display will be displayed.

### 4.3.4.4 Antenna Figure/Table References

Figure 4.3.4–1 Antenna Display (PFS)

Table 4.3.4–1 Keyboard Processing Table

Table 4.3.4–2 CRT Display Processing Table

Table 4.3.4–3 CRT Display Processing Background Requirements

Table 4.3.4–4 Mission Design Background Constants N/A

Table 4.3.4–5 Input Functional Parameters N/A

Table 4.3.4–6 Output Functional Parameters N/A

Table 4.3.4–7 I–Loads N/A

Table 4.3.4–8 K–Loads N/A

Table 4.3.4–9 Constants N/A

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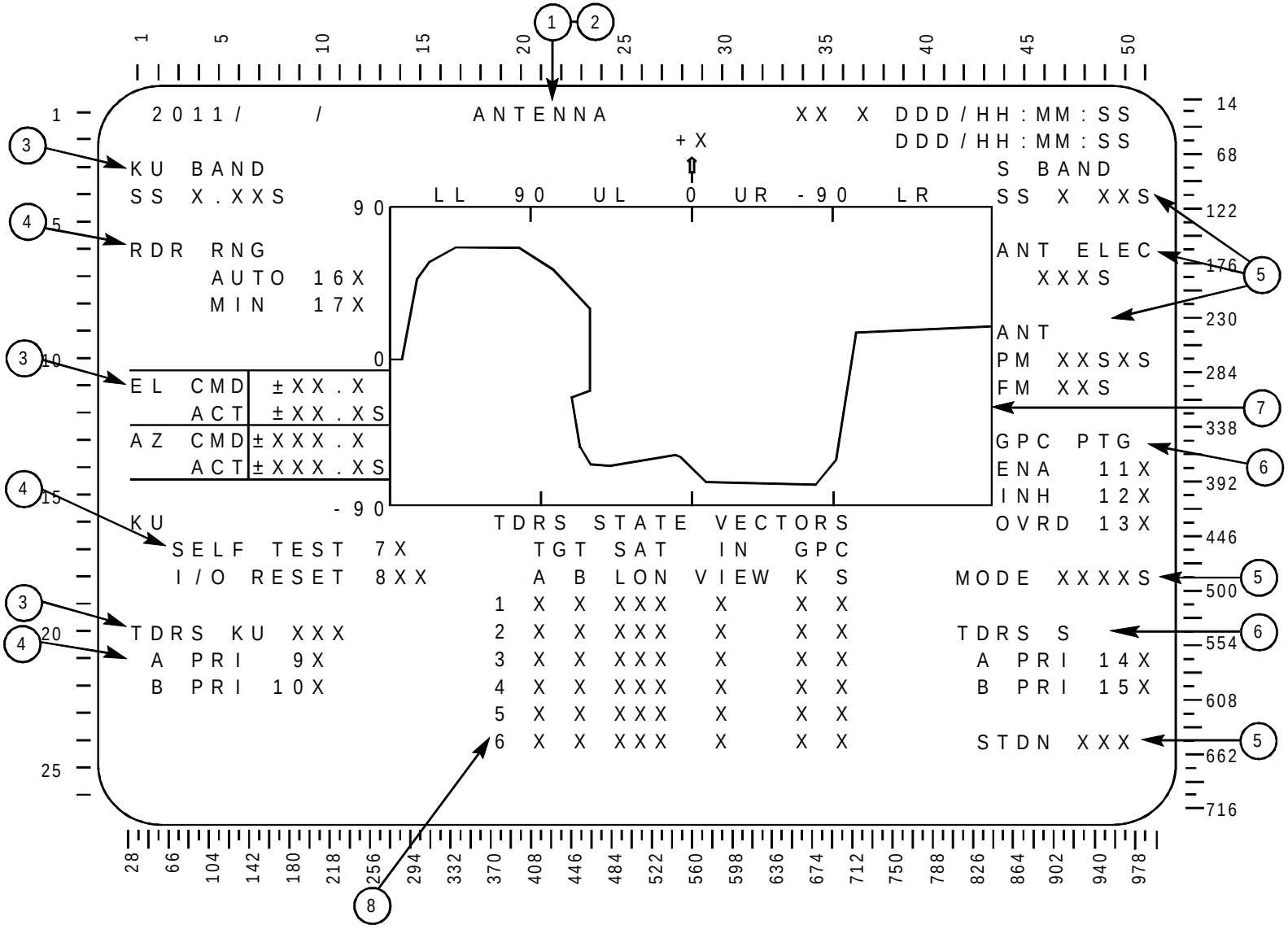


FIGURE 4.3.4-1. Antenna Display (PFS)

TABLE 4.3.4-1. ANTENNA (PFS) KEYBOARD PROCESSING

| Seq | CRT Signal Name | M/S ID | CHAR | TYPE | UNITS | DK | ITEM | Item No. Limits | | Add Ref | Destination | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | MIN | MAX | | | | |
| 001 | TDRS STATE VECTOR 1 TGT A B 1 | V93J1090C | 1.0 | CHAR | | | 1 | | | A | AM SPEC | TDRS STATE VECTOR 1 TGT A/B SELECT | |
| 002 | TDRS STATE VECTOR 2 TGT A B 2 | V93J1091C | 1.0 | CHAR | | | 2 | | | A | AM SPEC | TDRS STATE VECTOR 2 TGT A/B SELECT | |
| 003 | TDRS STATE VECTOR 3 TGT A B 3 | V93J1092C | 1.0 | CHAR | | | 3 | | | A | AM SPEC | TDRS STATE VECTOR 3 TGT A/B SELECT | |
| 004 | TDRS STATE VECTOR 4 TGT A B 4 | V93J1093C | 1.0 | CHAR | | | 4 | | | A | AM SPEC | TDRS STATE VECTOR 4 TGT A/B SELECT | |
| 005 | TDRS STATE VECTOR 5 TGT A B 5 | V93J1051C | 1.0 | CHAR | | | 5 | | | A | AM SPEC | TDRS STATE VECTOR 5 TGT A/B SELECT | |
| 006 | TDRS STATE VECTOR 6 TGT A B 6 | V93J1052C | 1.0 | CHAR | | | 6 | | | A | AM SPEC | TDRS STATE VECTOR 6 TGT A/B SELECT | |
| 007 | SELF TEST 7 | V93X5645X | 0.0 | CNTL | | | 7 | | | | AM SPEC | ANTENNA – RADAR SELF TEST INITIATE | X |
| 008 | I/O RESET KU 8 | V93X5640X | 0.0 | CNTL | | | 8 | | | | AM SPEC | ANTENNA KU I/F ENABLE | X |
| 009 | TDRS KU A PRI 9 | V93X5648X | 0.0 | CNTL | | | 9 | | | | AM SPEC,CRT | ANTENNA KU–BAND TDRS SEL TGT-A PRI | X |
| 010 | TDRS KU B PRI 10 | V93X5649X | 0.0 | CNTL | | | 10 | | | | AM SPEC,CRT | ANTENNA KU–BAND TDRS SEL TGT-B PRI | X |
| 011 | S BAND GPC PTG ENA 11 | V93X5625X | 0.0 | CNTL | | | 11 | | | | AM SPEC,CRT | ANTENNA - AUTO S–BAND ANT SEL ENA | X |
| 012 | S BAND GPC PTG INH 12 | V93X5626X | 0.0 | CNTL | | | 12 | | | | AM SPEC,CRT | ANTENNA - AUTO S–BAND ANT SEL INH | X |
| 013 | S BAND GPC PTG OVRD 13 | V93X5647X | 0.0 | CNTL | | | 13 | | | | AM SPEC,CRT | ANTENNA - TDRS MODE OVERRIDE CMD | X |
| 014 | TDRS S A PRI 14 | V93X5650X | 0.0 | CNTL | | | 14 | | | | AM SPEC,CRT | ANTENNA S-BAND TDRS SEL TGT-A PRI | X |
| 015 | TDRS S B PRI 15 | V93X5651X | 0.0 | CNTL | | | 15 | | | | AM SPEC,CRT | ANTENNA S-BAND TDRS SEL TGT-B PRI | X |
| 016 | RDR RNG AUTO 16 | V93X5642X | 0.0 | CNTL | | | 16 | | | | AM SPEC,CRT | ANTENNA RADAR RANGE ESTIMATE - AUTO | X |
| 017 | RDR RNG MIN 17 | V93X5641X | 0.0 | CNTL | | | 17 | | | | AM SPEC,CRT | ANTENNA RADAR RANGE ESTIMATE - MIN | X |

## TABLE 4.3.4-2. ANTENNA (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | | | |
| 001 | (OPS) | V93X0040X | 2 | 1 | | 5.0 | | | CHAR | | | | | | | E | | | | | | UI | OPS FUNCTION PAGE | X |
| 002 | (SPEC) | V93X0042X | 7 | 1 | | 4.0 | | | CHAR | | | | | | | E | | | | | | UI | SPEC FUNCTION PAGE | X |
| 003 | (DISP) | V93X0044X | 10 | 1 | | 4.0 | | | DEC | | | | | | | E | | | | | | UI | DISPLAY FUNCTION PAGE | X |
| 004 | (UL) | V92X5032X | 34 | 1 | | 2.0 | UL | | BLVL | | | | | | X | G | | | | | | UI | UPLINK ACTIVITY IND | X |
| 005 | (GPC) | V93X0048X | 36 | 1 | | 2.0 | | | DEC | | | | | | | E | | | | | | UI | GPC DRIVER | X |
| 006 | (MT) | V91W1990C | 39 | 1 | | 12.0 | | | CHAR | DHMS | | | | | | A | | | | | | FCOS | MISSION ELAPSED TIME | X |
| 007 | (CRT TIMER) | V91W1988C | 39 | 2 | | 12.0 | | | CHAR | DHMS | | | | | | A | | | | | | FCOS | DISPLAY CRT TIME, SM | X |
| 008 | KU BAND SS | V74E2508A | 3 | 4 | | 5.2 | | | DEC | VOLTS | X | | | | | A | | | | | 2 | SMM | KU–BND A RDR/COMM RCVD SIG STR–AGC | X |
| 009 | RDR RNG AUTO 16 | V93X5642X | 12 | 7 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | SMM | ANTENNA–RADAR RANGE ESTIMATE–AUTO | X |
| 010 | RDR RNG MIN 17 | V93X5641X | 12 | 8 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | SMM | ANTENNA–RADAR RANGE ESTIMATE–MIN | X |
| 011 | SELF TEST 7 | V74X2592J | 14 | 17 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SMM | KU–A CH1 RDR STST IN PROG (R) WD1B09 | X |
| 012 | KU BAND ANT EL CMD | V74H2650J | 8 | 11 | | 5.1 | | | DEC | DEG | | | | | | | X | | | | | SMM | KU–BAND A CH1 DES PITCH WD WD3 | X |
| 013 | KU BAND ANT EL ACT | V74H2619J | 8 | 12 | | 5.1 | | | DEC | DEG | X | | | | | | X | | | | 1 | SMM | KU–BAND A CH1 PITCH WORD 4 WD4 | X |
| 014 | KU BAND ANT AZ CMD | V74H2648J | 7 | 13 | | 6.1 | | | DEC | DEG | | | | | | | X | | | | | SMM | KU–BAND A CH1 DES ROLL WD WD2 | X |
| 015 | KU BAND ANT AZ ACT | V74H2618J | 7 | 14 | | 6.1 | | | DEC | DEG | X | | | | | | X | | | | 1 | SMM | KU–BAND A CH1 ROLL WORD 3 WD3 | X |
| 016 | I/O RESET KU 8 | V91X2943X | 14 | 18 | | 1.0 | | * | BLVL | | | | | | | | | | | | | SMM | PF1 KU BD RDR CD8 CH2 BYPASS (A/F) | X |
| 017 | I/O RESET KU 8 | V91X2943X | 15 | 18 | | 1.0 | M | | BLVL | | | | | X | | | | | | | | SMM | PF1 KU BD RDR CD8 CH2 BYPASS (A/F) | X |
| 018 | (GNC ANGLE PTG ENA) | V93X6859X | 9 | 20 | | 3.0 | TGT | | BLVL | | | | | | | | | | | | | GNC/SM-PLIF | GNC ANGLE POINTING ENA/INH | X |
| 019 | TDRS KU A PRI 9 | V93X5648X | 10 | 21 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | SMM | ANTENNA KU–BAND TDRS SEL TGT-A PRI | X |
| 020 | TDRS KU B PRI 10 | V93X5649X | 10 | 22 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | SMM | ANTENNA KU–BAND TDRS SEL TGT-B PRI | X |
| 021 | TDRS STATE VECTOR 1 - TGT A | V93X5652X | 21 | 19 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SMM | TDRS STATE VECTOR 1 TO TGT-A | X |
| 022 | TDRS STATE VECTOR 2 - TGT A | V93X5653X | 21 | 20 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SMM | TDRS STATE VECTOR 2 TO TGT-A | X |
| 023 | TDRS STATE VECTOR 3 - TGT A | V93X5654X | 21 | 21 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SMM | TDRS STATE VECTOR 3 TO TGT-A | X |
| 024 | TDRS STATE VECTOR 4 - TGT A | V93X5655X | 21 | 22 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SMM | TDRS STATE VECTOR 4 TO TGT-A | X |
| 025 | TDRS STATE VECTOR 5 - TGT A | V93X5660X | 21 | 23 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SMM | TDRS STATE VECTOR 5 TO TGT-A | X |
| 026 | TDRS STATE VECTOR 6 - TGT A | V93X5661X | 21 | 24 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SMM | TDRS STATE VECTOR 6 TO TGT-A | X |
| 027 | TDRS STATE VECTOR 1 - TGT B | V93X5656X | 23 | 19 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SMM | TDRS STATE VECTOR 1 TO TGT-B | X |

TABLE 4.3.4-2. ANTENNA (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | | | |
| 028 | TDRS STATE VECTOR 2 - TGT B | V93X5657X | 23 | 20 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SMM | TDRS STATE VECTOR 2 TO TGT-B | X |
| 029 | TDRS STATE VECTOR 3 - TGT B | V93X5658X | 23 | 21 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SMM | TDRS STATE VECTOR 3 TO TGT-B | X |
| 030 | TDRS STATE VECTOR 4 - TGT B | V93X5659X | 23 | 22 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SMM | TDRS STATE VECTOR 4 TO TGT-B | X |
| 031 | TDRS STATE VECTOR 5 - TGT B | V93X5662X | 23 | 23 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SMM | TDRS STATE VECTOR 5 TO TGT-B | X |
| 032 | TDRS STATE VECTOR 6 - TGT B | V93X5663X | 23 | 24 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SMM | TDRS STATE VECTOR 6 TO TGT-B | X |
| 033 | TDRS STATE VECTOR 1 SAT LON | V92H2308C | 24 | 19 | | 4.0 | | | DEC | DEG | | X | | | | | | | | | I | SMM | TDRS STATE VECTOR 1 LONGITUDE | X |
| 034 | TDRS STATE VECTOR 2 SAT LON | V92H2309C | 24 | 20 | | 4.0 | | | DEC | DEG | | X | | | | | | | | | I | SMM | TDRS STATE VECTOR 2 LONGITUDE | X |
| 035 | TDRS STATE VECTOR 3 SAT LON | V92H2310C | 24 | 21 | | 4.0 | | | DEC | DEG | | X | | | | | | | | | I | SMM | TDRS STATE VECTOR 3 LONGITUDE | X |
| 036 | TDRS STATE VECTOR 4 SAT LON | V92H2311C | 24 | 22 | | 4.0 | | | DEC | DEG | | X | | | | | | | | | I | SMM | TDRS STATE VECTOR 4 LONGITUDE | X |
| 037 | TDRS STATE VECTOR 5 SAT LON | V92H2347C | 24 | 23 | | 4.0 | | | DEC | DEG | | X | | | | | | | | | I | SMM | TDRS STATE VECTOR 5 LONGITUDE | X |
| 038 | TDRS STATE VECTOR 6 SAT LON | V92H2348C | 24 | 24 | | 4.0 | | | DEC | DEG | | X | | | | | | | | | I | SMM | TDRS STATE VECTOR 6 LONGITUDE | X |
| 039 | TDRS VECTOR 1 IN VIEW | V92X2293X | 30 | 19 | | 1.0 | * | | BLVL | | | X | | | | | | | | | I | SMM | TDRS STATE VECTOR 1 IN VIEW | X |
| 040 | TDRS VECTOR 2 IN VIEW | V92X2294X | 30 | 20 | | 1.0 | * | | BLVL | | | X | | | | | | | | | I | SMM | TDRS STATE VECTOR 2 IN VIEW | X |
| 041 | TDRS VECTOR 3 IN VIEW | V92X2295X | 30 | 21 | | 1.0 | * | | BLVL | | | X | | | | | | | | | I | SMM | TDRS STATE VECTOR 3 IN VIEW | X |
| 042 | TDRS VECTOR 4 IN VIEW | V92X2296X | 30 | 22 | | 1.0 | * | | BLVL | | | X | | | | | | | | | I | SMM | TDRS STATE VECTOR 4 IN VIEW | X |
| 043 | TDRS VECTOR 5 IN VIEW | V92X2341X | 30 | 23 | | 1.0 | * | | BLVL | | | X | | | | | | | | | I | SMM | TDRS STATE VECTOR 5 IN VIEW | X |
| 044 | TDRS VECTOR 6 IN VIEW | V92X2342X | 30 | 24 | | 1.0 | * | | BLVL | | | X | | | | | | | | | I | SMM | TDRS STATE VECTOR 6 IN VIEW | X |
| 045 | TDRS STATE VECTOR 1 GPC SEL KU | V93X1082X | 34 | 19 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SMM | TDRS SV 1 GPC SELECT FOR KU-BAND | X |
| 046 | TDRS STATE VECTOR 2 GPC SEL KU | V93X1083X | 34 | 20 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SMM | TDRS SV 2 GPC SELECT FOR KU-BAND | X |
| 047 | TDRS STATE VECTOR 3 GPC SEL KU | V93X1084X | 34 | 21 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SMM | TDRS SV 3 GPC SELECT FOR KU-BAND | X |
| 048 | TDRS STATE VECTOR 4 GPC SEL KU | V93X1085X | 34 | 22 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SMM | TDRS SV 4 GPC SELECT FOR KU-BAND | X |
| 049 | TDRS STATE VECTOR 5 GPC SEL KU | V93X5666X | 34 | 23 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SMM | TDRS SV 5 GPC SELECT FOR KU-BAND | X |
| 050 | TDRS STATE VECTOR 6 GPC SEL KU | V93X5667X | 34 | 24 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SMM | TDRS SV 6 GPC SELECT FOR KU-BAND | X |
| 051 | TDRS STATE VECTOR 1 GPC SEL S | V93X1086X | 36 | 19 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SMM | TDRS SV 1 GPC SELECT FOR S-BAND | X |
| 052 | TDRS STATE VECTOR 2 GPC SEL S | V93X1087X | 36 | 20 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SMM | TDRS SV 2 GPC SELECT FOR S-BAND | X |
| 053 | TDRS STATE VECTOR 3 GPC SEL S | V93X1088X | 36 | 21 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SMM | TDRS SV 3 GPC SELECT FOR S-BAND | X |

## TABLE 4.3.4-2. ANTENNA (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | | | |
| 054 | TDRS STATE VECTOR 4 GPC SEL S | V93X1089X | 36 | 22 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SMM | TDRS SV 4 GPC SELECT FOR S-BAND | X |
| 055 | TDRS STATE VECTOR 5 GPC SEL S | V93X5668X | 36 | 23 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SMM | TDRS SV 5 GPC SELECT FOR S-BAND | X |
| 056 | TDRS STATE VECTOR 6 GPC SEL S | V93X5669X | 36 | 24 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SMM | TDRS SV 6 GPC SELECT FOR S-BAND | X |
| 057* | S BAND SS | ADDENDUM | 46 | 4 | | 5.2 | | | DEC | VOLTS | X | X | | | | A | | | | | G 2 | OI SMM | S-BD XPNDR AGC SIG STRENGTH | X |
| 058* | S BAND ANT ELEC | ADDENDUM | 46 | 7 | | 3.0 | | | RTXT | | X | X | | | | | | | | | H 1 | OI SMM | GCIL S-BAND ANT SW ASSY PWR ON | X |
| 059 | S BAND ANT PM (QUAD) | V92J1057C | 47 | 10 | | 2.0 | | | RTXT | | X | | | | | | | | | | B 1 | OI SMM | S-BAND QUAD ANT SELECTED (CMPTD) | X |
| 060 | S BAND ANT PM (SW) | V92J1062C | 50 | 10 | | 1.0 | | | RTXT | | X | | | | | | | | | | B 1 | OI SMM | S-BAND SW BEAM SELECTED (CMPTD) | X |
| 061 | S BAND ANT PM (S) | V92X1049X | 51 | 10 | | 1.0 | ↓ | | BLVL | | | | | | | | | | | | | OI SMM | S-BAND QUAD ANT VERIF FAIL | X |
| 062 | S BAND ANT FM | V92J1056C | 47 | 11 | | 2.0 | | | RTXT | | X | | | | | | | | | | B 1 | OI SMM | S-BAND HEMI ANT SELECTED (CMPTD) | X |
| 063 | S BAND ANT FM (S) | V92X1050X | 49 | 11 | | 1.0 | ↓ | | BLVL | | | | | | | | | | | | | OI SMM | S-BAND HEMI ANT FAIL | X |
| 064 | S-BD SM AM PTG ENA 11 | V93X5625X | 51 | 14 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | SMM | ANTENNA - AUTO S-BAND ANT SEL ENA | X |
| 065 | S-BD SM AM PTG INH 12 | V93X5626X | 51 | 15 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | SMM | ANTENNA - AUTO S-BAND ANT SEL INH | X |
| 066 | S-BD SM AM PTG OVRD 13 | V93X5647X | 51 | 16 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | SMM | ANTENNA-TDRS MODE OVERRIDE CMD | X |
| 067 | S-BAND MODE (TDRS) | V74X4786E | 47 | 18 | | 4.0 | TDRS | | BLVL | | X | | | | | | | | | | F 1 | OI SMM | GCIL S-BAND PM XPNDR-TDRS MODE | X |
| 068 | S-BAND MODE (S-LO) | V74X4787E | 47 | 18 | | 4.0 | S-LO | | BLVL | | X | | | | | | | | | | F 1 | OI SMM | GCIL S-BAND PM LO XPNDR-STDN | X |
| 069 | S-BAND MODE (S-HI) | V74X4788E | 47 | 18 | | 4.0 | S-HI | | BLVL | | X | | | | | | | | | | F 1 | OI SMM | GCIL S-BAND PM HI XPNDR-STDN | X |
| 070 | S-BAND MODE (SGLS) | V74X4789E | 47 | 18 | | 4.0 | SGLS | | BLVL | | X | | | | | | | | | | F 1 | SMM | GCIL S-BAND PM XPNDR-SGLS MODE | X |
| 071 | TDRS S-BD A PRI 14 | V93X5650X | 51 | 21 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | SMM | ANTENNA S-BAND TDRS SEL TGT-A PRI | X |
| 072 | TDRS S-BD B PRI 15 | V93X5651X | 51 | 22 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | SMM | ANTENNA S-BAND TDRS SEL TGT-B PRI | X |
| 073 | S-BD STDN (CURRENT) | V92J1070C | 48 | 24 | | 3.0 | | | RTXT | | | | | | | | | | | | A | OI SMM | CURRENT STDN/SGLS SITE ID (CMPTD) | X |
| 074 | “A” | ADDENDUM | V | V | | | | | | | | X | | | | | | | | | C | OI SMM | TGT-A TDRS LOS ROLL/PITCH ANGLE | |
| 075 | “B” | ADDENDUM | V | V | | | | | | | | X | | | | | | | | | C | OI SMM | TGT-B TDRS LOS ROLL/PITCH ANGLE | |
| 076 | “S” | ADDENDUM | V | V | | | | | | | | X | | | | | | | | | E | OI SMM | CURRENT STDN/SGLS SITE ID (CMPTD) | |
| 077 | “1” | ADDENDUM | V | V | | | | | | | | X | | | | | | | | | C | OI SMM | TDRS SV 1 LOS ROLL/PITCH ANGLE | |

TABLE 4.3.4-2. ANTENNA (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | BILEVEL | | | | | | | | | | | | | | | | | |
| | | | X | Y | | CHAR | 1 | 0 | TYPE | | | | | | | | | | | | | | | |
| 078 | "2" | ADDENDUM | V | V | | | | | | | | X | | | | | | | | | C | OI SMM | TDRS SV 2 LOS ROLL/PITCH ANGLE | |
| 079 | "3" | ADDENDUM | V | V | | | | | | | | X | | | | | | | | | C | OI SMM | TDRS SV 3 LOS ROLL/PITCH ANGLE | |
| 080 | "4" | ADDENDUM | V | V | | | | | | | | X | | | | | | | | | C | OI SMM | TDRS SV 4 LOS ROLL/PITCH ANGLE | |
| 081 | "5" | ADDENDUM | V | V | | | | | | | | X | | | | | | | | | C | OI SMM | TDRS SV 5 LOS ROLL/PITCH ANGLE | |
| 082 | "6" | ADDENDUM | V | V | | | | | | | | X | | | | | | | | | C | OI SMM | TDRS SV 6 LOS ROLL/PITCH ANGLE | |
| 083 | "□" | ADDENDUM | V | V | | | | | | | | | | | | | | | | | D | OI SMM | ACTUAL ANGLE TO A GIVEN TDRS | |
| 084 | (MSG LINE) | V93X0050X | 1 | 25 | | 44.0 | | | CHAR | | | | | | | G | | | | | | UI | MESSAGE LINE | X |
| 085 | (BUFFER MSG) | V93X0054X | 45 | 25 | | 4.0 | | | CHAR | | | | | | | G | | | | | | UI | BUFFER MESSAGE INDICATOR | X |
| 086 | (SPL) | V93X0056X | 2 | 26 | | 49.0 | | | CHAR | | | | | | | G | | | | | | UI | SCRATCH PAD LINE | X |

Table 4.3.4-3. ANTENNA CRT DISPLAY PROCESSING DESIGN DEPENDENT CONSTANTS

| Vectors | | | | | |
|---|---|---|---|---|---|
| Line Segment | Location | | | | REMARKS |
| | Origin | | Terminal | | |
| | Addressable Units | | | | |
| | X | Y | X | Y | |
| 01 | 275 | 419 | 275 | 122 | Left elevation (±90 degree) |
| 02 | 275 | 122 | 845 | 122 | Top abscissa (±180 degree) |
| 03 | 845 | 122 | 845 | 419 | Right elevation (±90 degree) |
| 04 | 845 | 419 | 275 | 419 | Lower abscissa (±180 degree) |
| 05 | 282 | 272 | 285 | 272 | Blockage pattern of nose and P/L doors (Line 1) |
| 06 | 285 | 272 | 303 | 192 | Blockage pattern of nose and P/L doors (Line 2) |
| 07 | 303 | 192 | 317 | 176 | Blockage pattern of nose and P/L doors (Line 3) |
| 08 | 317 | 176 | 336 | 162 | Blockage pattern of nose and P/L doors (Line 4) |
| 09 | 336 | 162 | 372 | 162 | Blockage pattern of nose and P/L doors (Line 5) |
| 10 | 372 | 162 | 408 | 162 | Blockage pattern of nose and P/L doors (Line 6) |
| 11 | 408 | 162 | 441 | 183 | Blockage pattern of nose and P/L doors (Line 7) |
| 12 | 441 | 183 | 474 | 223 | Blockage pattern of nose and P/L doors (Line 8) |
| 13 | 474 | 223 | 474 | 305 | Blockage pattern of nose and P/L doors (Line 9) |
| 14 | 474 | 305 | 457 | 311 | Blockage pattern of nose and P/L doors (Line 10) |
| 15 | 457 | 311 | 465 | 359 | Blockage pattern of nose and P/L doors (Line 11) |
| 16 | 465 | 359 | 474 | 372 | Blockage pattern of nose and P/L doors (Line 12) |
| 17 | 474 | 372 | 479 | 377 | Blockage pattern of nose and P/L doors (Line 13) |
| 18 | 479 | 377 | 493 | 379 | Blockage pattern of nose and P/L doors (Line 14) |
| 19 | 493 | 379 | 541 | 365 | Blockage pattern of nose and P/L doors (Line 15) |
| 20 | 541 | 365 | 548 | 366 | Blockage pattern of nose and P/L doors (Line 16) |
| 21 | 548 | 366 | 574 | 392 | Blockage pattern of nose and P/L doors (Line 17) |
| 22 | 574 | 392 | 680 | 397 | Blockage pattern of nose and P/L doors (Line 18) |
| 23 | 680 | 397 | 693 | 383 | Blockage pattern of right wing (Line 1) |
| 24 | 693 | 383 | 702 | 372 | Blockage pattern of right wing (Line 2) |
| 25 | 702 | 372 | 721 | 271 | Blockage pattern of right wing (Line 3) |
| 26 | 721 | 271 | 845 | 264 | Blockage pattern of right wing (Line 4) |

Vertical tic marks (DEU Symbol 18) are located at following locations:

X = 417 and Y = 131, Y = 419

X = 560 and Y = 131, Y = 419

X = 702 and Y = 131, Y = 419

### 4.3.5 PCMMU/PAYLOAD COMMUNICATIONS (PFS)

TITLE: PCMMU/PL COMM
TYPE: SPEC/062
AVAILABILITY: SM OPS 2 and 4, GNC OPS 9

#### 4.3.5.1 Purpose, Operation, and Organization

This display allows control and monitoring of the Pulse–Code Modulation Master Unit (PCMMU), Payload Data Interleaver (PDI), and Payload Signal Processor (PSP), and displays Payload parameters (PL INTRG). Figure 4.3.5–1 is the PCMMU/PL COMM Generic Display.

If a request is made to all up this display while a TFL/DFL uplink is in progress, a Class 5 CRT error message shall be output and the request rejected.

(1) PCMMU control and monitoring is accomplished by item entries and measurements described in the following paragraphs.

a. BITE WORD is a hexadecimal display of the BITE status register in the operating PCMMU. The user must refer to the Flight Data File (FDF) to interpret the data.

b. FORMAT (FMT) allows selection (SEL) of either the fixed (FXD) or programmable (PGM) downlink formatter. Selection is via item 1 and 2 entries; designation of selection is indicated by an "*" next to the item number. Selection designation is derived from the BITE status register; missing status data causes an "M" parameter status indicator to be displayed adjacent to the selection indicator "*" field of each item number.

c. Within the FORMAT field is a display of the current format number in each programmable (PGM ID) formatter (64–KBPS and 128–KBPS). Item 3 (SEL ID) allows selection of a programmable format (1 through 127 for the 64–KBPS, and 128 through 254 for the 128–KBPS). Initiation of a selected programmable format is via item 4 (LOAD). While the load is in progress, "RUN" is displayed. Unsuccessful load is shown by "FAIL". Successful load completion is shown by "CPLT", and the format number for the appropriate PGM ID is updated to agree with the item 3 selection. The TFL load status parameter is retained during OPS S2 to S4 or OPS S4 to S2 transitions only, and will be displayed upon SPEC recall. When an OPS transition is initiated during the load process, the process terminates and the status parameter indicates the load was not completed successfully. If the SPEC is terminated by a RESUME or by overlay of another SM SPEC/DISP the load process will continue to completion and the status parameter will be available to indicate the TFL load status when the SPEC is recalled.

The TFL load status parameter is retained during OPS transition, and will be displayed upon SPEC recall.

d. Item 5 I/O RESET PCM provides the capability to enable communication with the PCMMU. An asterisk "*" will be displayed after this item when no BCE bypass exists and will display an "M" if a BCE bypass exists. This item shall be illegal in Memory Configuration GNC 9.

(2) PDI control and monitoring is accomplished by item entries and measurements described in the following paragraphs.

a. Item 8 (PDI I/O RESET) – In SM: provides the capability to restore a bypassed PDI switch matrix read element. When the read element is bypassed an "M" shall be displayed double overbright otherwise an asterisk "*" shall be displayed. In G9: Provides the capability to restore a bypassed PDI Switch Matrix read element or BITE Status Register (BSR) read element. When either of these two read elements are bypassed, a "M" shall be displayed double overbright otherwise an asterisk shall be displayed.

b. BITE WORD is a hexadecimal display of the BITE Status Register (BSR) in the PDI. The user must refer to the Flight Data File (FDF) to interpret the data for determination of malfunction procedure(s) to be followed for isolating the actual problem area. When an I/O error has occured on the BSR READ, an "M" shall be displayed double overbright.

c. Item 9 (SEL DECOM) allows selection of a PDI decommutator channel (1 through 4) or the Fetch Pointer Memory (FPM): entry of 5 designates the FPM. Selection of the FPM is done in conjunction with a selection of a format (Item 10 SEL FMT), while selection of a PDI decommutator is done in conjunction with a selection of a format (item 10 SEL FMT) or input source (Item 12 SEL INPUT). Attempts to load a format or input source without a legal item 9 entry will be rejected as illegal entries.

d. Item 10 (SEL FMT) is used to select a format for a PDI decommutator channel (0 through 31 entered) or for the FPM (1 through 999 entered). Initiation of the format is via item 11 (LOAD). The remote text feedback status displayed is as follows: "RUN" while loading is in progress, "FAIL" if loading is unsuccessful, and "CPLT" upon successful load completion.

e. Item 12 (SEL INPUT) allows selection of an input source for a PDI decommutator channel. Entry of 1 through 5 selects one of five attached payloads; entry of 6 designates the operative PSP as the input source; entry of 0 designates no input. Initiation of the input source is via item 13 (LOAD).

f. The feedback remote text to reflect the selected PDI input source (INPUT) and format (FMT) loaded for each PDI DECOM and FDM (1,2,3,4,5–FPM) is displayed below the item entries and controls. A stand–alone FDA parameter status indicator is provided for the loaded input source to each DECOM 1 through 4 and is displayed after the FMT number. An up arrow indicator will be displayed whenever a DECOM has failed and the loaded format data is lost. Knowing the format number, actual parameters lost from a particular payload can then be identified using a checklist.

g. Items 14 through 17 (DECOM FDA 1,2,3,4 ENA, respectively) provide a flipflop control to enable/disable the FDA (Fault Detection and Annunciation) for the loaded input source to each DECOM 1 through 4. An "*" indicator will be displayed after the item number when FDA has been enabled and is blank when disabled. When SM software is first called, these items will be set to the disable state (i.e., no "*" indicator) and thereafter whenever the display is called will reflect the last crew input. The current state of each PDI DECOM FDA ENA item entry will be maintained across each OPS–transition in which the SM major function base is not overlayed.

   These items (14 through 17) are not supported in Memory Configuration G9. Execution of these items in G9 will result in an "ILLEGAL ENTRY" message.

(3) PSP control and monitoring is accomplished by item entries and measurements described in the following paragraphs.

a. Input/Output reset (I/O RESET) of PSP 1 or 2 is provided through two mutually exclusive item entries 6 and 7 respectively. Execution of the applicable item allows either PSP 1 or 2 to communicate with the payload interrogator and/or attached payloads. If PSP polling is active with either PSP, an attempt to issue an Item 6 or 7 will result in a Class 5 "ILLEGAL ENTRY" error message annunciation (V92X0066X). To terminate PSP polling, the Power switch on the A3 Panel must be cycled to off, causing a bypass of the active PSP.

b. PSP determination of bit and frame synchronization with a payload (SYNC BIT and FRAME) is displayed for the enabled PSP. Display of the remote text feedback status is for both "YES", "NO", or if neither PSP is enabled, the field is blank.

c. PSP LOAD reject/incomplete status is displayed in two dynamic remote text fields after LOAD. The first dynamic status field will display the following: "blank" – to indicate nominal PSP operation, RJCT – to indicate that a PSP command has been rejected, or INCP – to indicate that a PSP command load was incomplete. The second dynamic status field will display a double overbright remote text to identify which of the PSP command issuers is the source of the rejected or incomplete load: TEC (Time Executed Command); TCS (Test Control Supervisor); Item (Cargo Control spec Item entry); U/L (Uplink); GNC (Guidance, Navigation & Control); PORT (variable command source, command rejected due to failed PSP Output Port Mode Reconfiguration request); GPCF (GPC Payload Command Filter); C&W (ORB C&W to ISS); MULT (more than one of the previous seven sources of rejects are true); or "blank" (when operation is normal).

(4) Payload Interrogator parameters display interrogator data for channel selection, phase lock criteria, and power of transmitted and received signals in S2 and S4 only.

a. The Payload Interrogator channel (CHANNEL), selected via thumbwheels on dedicated panel A3, is displayed for the operative interrogator (1 or 2). The display field for an unpowered interrogator is blank. In OPS G9 the parameter data fields will be blanked.

b. Interrogator phase lock (PHASE LOCK) and phase error (PHASE ERR) are displayed in the form of text and numeric data. PHASE LOCK feedback status is displayed as "YES", "NO", or blank if both interrogators are unpowered. PHASE ERR feedback status is displayed in a range between +85 to –85 KHZ; the display field is blank if both interrogators are unpowered.

c. Interrogator transmitted power (XMIT PWR) and received signal strength (PL SIG STR) are displayed in watts and volts respectively. XMIT PWR has a range of 0 to 16 watts; PL SIG STR corresponds to the dedicated panel Al meter range of 0 to 5 volts. If both interrogators are unpowered, the display fields are blank. Voltage presentation is relative (but not proportional) to the measured signal strength received.

(5) The remote text "RDY" or "BSY" will be displayed adjacent to "SM COM BUFF" as an indication of SM Common Buffer status. If the SM Common Buffer is being used for system checks, SM checkpoints, mass memory patches, or format/input source loads of the PCMMU or PDI, "BSY" is displayed flashing. Attempts to change PCMMU format or PDI format/input

source while “BSY” is displayed will be rejected and an “ILLEGAL ENTRY” message generated. “RDY” signifies buffer availability.

(6) Item 18 “TFL GPC SEL” provides the capabilities to select the GPC which is to perform the write to the PCMMU for telemetry format loads. This shall also be the GPC which will perform the TCS 64 and 128 KBPS TM format program read. An “ILLEGAL ENTRY” message shall be enabled if a GPC is selected that is not a member of the redundant set or is not the GPC for a simplex configuration.

Item 18 is only supported in Memory Configuration G9. For Memory Configuration S2 and S4, Item 18 will not be supported or displayed. If this item is executed in S2 or S4 an “ILLEGAL ENTRY” message will result.

(7) Item 19 (DOWNLIST SEL FMT ID) data entry control provides the capability to toggle between the use of downlist format numbers 24 and 26. The item entry shall display the selected operational downlist format number (24 or 26) in S2 only and shall be initialized to 24 upon initialization of S2. In S4, G9, and S2 SM Ground Checkout, the item entry and its background text (DOWNLIST 19 SEL FMT ID XX) shall be blanked. The item entry shall be rejected and a Class 5 “ILLEGAL ENTRY” CRT message output if the format number entered is not one of the valid numbers for S2 (24 or 26) or is requested in S4, G9, or S2 SM Ground Checkout memory configuration. When a format number is requested and validated, that downlist format number shall be enabled and the format number shall be displayed.

(8) Item 20 is a toggle item that enables or inhibits the ISSXFR process. Execution of this item shall toggle the ISSXFR process enabled flag (V92X0791X). Execution of this item to enable the ISSXFR process, while PSP communication is not enabled, shall be rejected with a class 5 error message.

Item 21 requests the execution of an ISSXFR test. Execution of this item shall set the ISSXFR test requested indicator (V92X0798X) to ON. Execution of this item, while the ISSXFR process is not enabled, shall be rejected with a class 5 error message. Execution of this item, while a test is already in progress shall be rejected with a class 5 error message.

Executions of items 20 or 21, while in OPS G9, shall be rejected with a class 5 error message.

Remote text will be displayed adjacent to the “21 TEST” field to indicate the transfer status of the test command. Blank is displayed at SM OPS initialization and when the ISSXFR process becomes enabled. “RUN” is displayed when a test command is initiated. “RJCT” is displayed when an initiated test command is ignored. In this case, the ISSXFR process will remain enabled. “CPLT” is displayed when a test command response is successfully received. “FAIL” is displayed when a test command response is not successfully received. In this case, the ISSXFR process will be inhibited.

#### 4.3.5.2 PCMMU/PL COMM Keyboard Processing Addendum.

Not applicable.

### 4.3.5.3 PCMMU/PL COMM CRT Display Processing Addendum

The table below presents the parameter status indicators (PSI) that can be displayed for a parameter. In SM–PL, PSI requirements can be one of two types as follows:

- A PSI which is part of the data words identified by an "X" marked in the STATUS column of Table 4.3.5–2.
- A PSI which is a stand–alone identified by the word "STAT" being inserted in the FORMAT TYPE column of Table 4.3.5–2.

Both PSI types have a numeric code appearing as an entry (right justified) in the ADD REF column of CRT display processing Table 4.3.5–2. The numeric code, corresponding to one of those listed in the table, indicates the specific status processing to be performed. If there is no numeric code entry, the status processing is defined by the default code.

When the "M" PSI is displayed (for Commfault, I/O error resulting in missing data), the last value of the associated parameter will continue to be displayed unless specified otherwise.

| Numeric Code | PSI SYMBOL(S) | | | | | |
|---|---|---|---|---|---|---|
| Default (blank) | ↓ | ↑ | H | L | M | ⌀ |
| 1 | | | | | M | ⌀ |
| 2 | | | H | L | M | ⌀ |
| 3 | ↓ | | | | M | ⌀ |
| 4 | ↓ | | | | | ⌀ |

⌀ = blank

NOTE: The numeric addendum reference codes are for information only. Actual processing requirements are specified in the SM Level B CPDS (SS–P–0002–580) and/or Level C Systems Management FSR (JSC–19590) or Payload Management FSR (JSC–19478).

The following alpha code(s) appear (left justified) in the ADD REF column of Table 4.3.5–2 whenever it is necessary to define any special processing requirements not otherwise covered therein:

A. PCMMU TFL Format Load Status.

When display is initially called, the load status field (LOAD 4) will be blank. The remote text to be displayed in this field is based on the following binary equivalent of V92J0053C (TFL LOAD SUCCESSFUL/FAIL).

| Binary Equivalent | Display Remote Text |
|---|---|
| 00 | (Blank) |
| 01 | RUN (Load in progress) |
| 10 | CPLT (Load successful) |
| 11 | FAIL (Load fail) |

B. PDI DFL/FPM Format Load Status.

When display is initially called, the load status field for the PDI FMT being loaded will be blank. The remote text to be displayed in this field is based on the following binary equivalent of the PDI LOAD SUCCESSFUL/FAIL parameter (V92J0110C).

| Binary Equivalent | Display Remote Text |
|---|---|
| 00 | (Blank) |
| 01 | RUN (Load in progress) |
| 10 | CPLT (Load successful) |
| 11 | FAIL (Load fail) |

C. PSP LOAD Reject/Incomplete Status and Command Source Logic.

The PSP LOAD reject/incomplete status and command source issuer shall be displayed in two dynamic remote text fields. The following logic is required to determine the RTXT to be displayed in each of the fields:

1. PSP LOAD (RJCT/INCP) XXXX

| PSP LOAD REJECTED (V92X1102X) | PSP CMD LOAD TRANSFER INCOMPLETE (V92X1116X) | DISPLAY REMOTE TEXT |
|---|---|---|
| | | |
| 1 | 0 | RJCT |
| 0 | 1 | INCP |
| 1 | 1 | RJCT |
| 0 | 0 | ⁄ |

2. PSP LOAD (CMD Source) XXXX

| PSP TEC REJECT FLAG V92X1120X | PSP SEQUENCE REJECT FLAG V92X1121X | PSP UPLINK REJECT FLAG V92X1127X | PSP GNC XFER REJECT FLAG V92X1128X | PSP CC SPEC REJECT FLAG V92X1129X | PSP PORT MODE REJECT FLAG V92X1140X | PSP GPCF REJECT FLAG V92X8087X | PSP ISS XFR REJECT FLAG V92X4521X | DISPLAY REMOTE TEXT * |
|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | ~~b~~ |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | TEC |
| 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | TCS |
| 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | U/L |
| 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | GNC |
| 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | ITEM |
| 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | PORT |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | GPCF |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | C&W |
| ALL OTHERS | | | | | | | | MULT |

* The remote text for PSP LOAD (CMD Source) shall be displayed double overbright.

D. Signal Source Selection for PSP Synchronization Parameters.

The following logic is required to determine the signal source for display of PSP bit and frame synchronization parameters:

| PARAMETER STATUS (STATE) | | | |
|---|---|---|---|
| PSP 1 COMM ENABLE ITEM (V93X5584X) | PSP 2 COMM ENABLE ITEM (V93X5585X) | SIGNAL SOURCE FOR | |
| | | PSP SYNC BIT | PSP SYNC FRAME |
| 0 | 0 | NONE (DISPLAY BLANK) | NONE (DISPLAY BLANK) |
| 1 | 0 | V74X6220J | V74X6221J |
| 0 | 1 | V74X6320J | V74X6321J |
| 1 | 1 | N/A | N/A |

E. PL Interrogator 1 Channel Select (Units) Value Logic.

The following logic is required to determine the display for the “units” value of PL Interrogator 1 Channel Select.

| PARAMETER STATUS; S–BAND PL INTEROG 1 CHAN SEL | | | | |
|---|---|---|---|---|
| 1 (V74X5629E) | 2 (V74X5631E) | 4 (V74X5633E) | 8 (V74X5635E) | DISPLAY VALUE |
| 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0 | 1 |
| 0 | 1 | 0 | 0 | 2 |
| 1 | 1 | 0 | 0 | 3 |
| 0 | 0 | 1 | 0 | 4 |
| 1 | 0 | 1 | 0 | 5 |
| 0 | 1 | 1 | 0 | 6 |
| 1 | 1 | 1 | 0 | 7 |
| 0 | 0 | 0 | 1 | 8 |
| 1 | 0 | 0 | 1 | 9 |
| 0 | 1 | 0 | 1 | NONE (Display Blank) |
| 1 | 1 | 0 | 1 | |
| 0 | 0 | 1 | 1 | |
| 1 | 0 | 1 | 1 | |
| 0 | 1 | 1 | 1 | |
| 1 | 1 | 1 | 1 | |

F. PL Interrogator 1 Channel Select (Tens) Value Logic.

The following logic is required to determine the display for the “tens” value of PL Interrogator 1 Channel Select.

| PARAMETER STATUS; S–BAND PL INTEROG 1 CHAN SEL | | | | |
|---|---|---|---|---|
| 10 (V74X5637E) | 20 (V74X5639E) | 40 (V74X5641E) | 80 (V74X5643E) | DISPLAY VALUE |
| 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0 | 1 |
| 0 | 1 | 0 | 0 | 2 |
| 1 | 1 | 0 | 0 | 3 |
| 0 | 0 | 1 | 0 | 4 |
| 1 | 0 | 1 | 0 | 5 |
| 0 | 1 | 1 | 0 | 6 |
| 1 | 1 | 1 | 0 | 7 |
| 0 | 0 | 0 | 1 | 8 |

| PARAMETER STATUS; S–BAND PL INTEROG 1 CHAN SEL | | | | |
|---|---|---|---|---|
| 10 (V74X5637E) | 20 (V74X5639E) | 40 (V74X5641E) | 80 (V74X5643E) | DISPLAY VALUE |
| 1 | 0 | 0 | 1 | 9 |
| 0 | 1 | 0 | 1 | NONE (Display Blank) |
| 1 | 1 | 0 | 1 | |
| 0 | 0 | 1 | 1 | |
| 1 | 0 | 1 | 1 | |
| 0 | 1 | 1 | 1 | |
| 1 | 1 | 1 | 1 | |

G. PL Interrogator 1 Channel Select (Hundreds) Value Logic.

The following logic is required to determine the display for the “hundreds” value of PL Interrogator 1 Channel Select.

| PARAMETER STATUS; S–BAND PL INTEROG 1 CHAN SEL | | | | |
|---|---|---|---|---|
| 100 (V74X5645E) | 200 (V74X5647E) | 400 (V74X5649E) | 800 (V74X5651E) | DISPLAY VALUE |
| 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0 | 1 |
| 0 | 1 | 0 | 0 | 2 |
| 1 | 1 | 0 | 0 | 3 |
| 0 | 0 | 1 | 0 | 4 |
| 1 | 0 | 1 | 0 | 5 |
| 0 | 1 | 1 | 0 | 6 |
| 1 | 1 | 1 | 0 | 7 |
| 0 | 0 | 0 | 1 | 8 |
| 1 | 0 | 0 | 1 | 9 |
| 0 | 1 | 0 | 1 | NONE (Display Blank) |
| 1 | 1 | 0 | 1 | |
| 0 | 0 | 1 | 1 | |
| 1 | 0 | 1 | 1 | |
| 0 | 1 | 1 | 1 | |
| 1 | 1 | 1 | 1 | |

H. PL Interrogator 2 Channel Select (Units) Value Logic.

The following logic is required to determine the display for the "units" value of PL Interrogator 2 Channel Select.

| PARAMETER STATUS; S–BAND PL INTEROG 2 CHAN SEL | | | | |
|---|---|---|---|---|
| 1 (V74X5630E) | 2 (V74X5632E) | 4 (V74X5634E) | 8 (V74X5636E) | DISPLAY VALUE |
| 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0 | 1 |
| 0 | 1 | 0 | 0 | 2 |
| 1 | 1 | 0 | 0 | 3 |
| 0 | 0 | 1 | 0 | 4 |
| 1 | 0 | 1 | 0 | 5 |
| 0 | 1 | 1 | 0 | 6 |
| 1 | 1 | 1 | 0 | 7 |
| 0 | 0 | 0 | 1 | 8 |
| 1 | 0 | 0 | 1 | 9 |
| 0 | 1 | 0 | 1 | NONE (Display Blank) |
| 1 | 1 | 0 | 1 | |
| 0 | 0 | 1 | 1 | |
| 1 | 0 | 1 | 1 | |
| 0 | 1 | 1 | 1 | |
| 1 | 1 | 1 | 1 | |

I. PL Interrogator 2 Channel Select (Tens) Value Logic.

The following logic is required to determine the display for the "tens" value of PL Interrogator 2 Channel Select.

| PARAMETER STATUS; S–BAND PL INTEROG 2 CHAN SEL | | | | |
|---|---|---|---|---|
| 10 (V74X5638E) | 20 (V74X5640E) | 40 (V74X5642E) | 80 (V74X5644E) | DISPLAY VALUE |
| 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0 | 1 |
| 0 | 1 | 0 | 0 | 2 |
| 1 | 1 | 0 | 0 | 3 |
| 0 | 0 | 1 | 0 | 4 |
| 1 | 0 | 1 | 0 | 5 |
| 0 | 1 | 1 | 0 | 6 |
| 1 | 1 | 1 | 0 | 7 |
| 0 | 0 | 0 | 1 | 8 |
| 1 | 0 | 0 | 1 | 9 |
| 0 | 1 | 0 | 1 | NONE (Display Blank) |
| 1 | 1 | 0 | 1 | |
| 0 | 0 | 1 | 1 | |
| 1 | 0 | 1 | 1 | |
| 0 | 1 | 1 | 1 | |
| 1 | 1 | 1 | 1 | |

J. PL Interrogator 2 Channel Select (Hundreds) Value Logic.

The following logic is required to determine the display for the "hundreds" value of PL Interrogator 2 Channel Select.

| PARAMETER STATUS; S–BAND PL INTEROG 2 CHAN SEL | | | | |
|---|---|---|---|---|
| 100 (V74X5646E) | 200 (V74X5648E) | 400 (V74X5650E) | 800 (V74X5652E) | DISPLAY VALUE |
| 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0 | 1 |
| 0 | 1 | 0 | 0 | 2 |
| 1 | 1 | 0 | 0 | 3 |
| 0 | 0 | 1 | 0 | 4 |
| 1 | 0 | 1 | 0 | 5 |
| 0 | 1 | 1 | 0 | 6 |
| 1 | 1 | 1 | 0 | 7 |
| 0 | 0 | 0 | 1 | 8 |
| 1 | 0 | 0 | 1 | 9 |
| 0 | 1 | 0 | 1 | NONE (Display Blank) |
| 1 | 1 | 0 | 1 | |
| 0 | 0 | 1 | 1 | |
| 1 | 0 | 1 | 1 | |
| 0 | 1 | 1 | 1 | |
| 1 | 1 | 1 | 1 | |

K. PL Interrogator Channel Processing.

In addition to the detailed processing described in Addendums "E, F, G, H, I, and J", all data fields for "PL INTRG 1 CHANNEL" shall be blanked when S–BD PL INTEROG 2 input power on (V74X4353E) has a state value of "1". All data fields for "PL INTRG 2 CHANNEL" shall be blanked when S–BD PL INTEROG 1 INPUT POWER ON (V74X4323E) has a state value of "1".

The commfaults for the parameters associated with Addendums "E, F, and G" shall be "OR'ed" to display a single "M" in the associated status parameter indicator field.

The commfaults for the parameters associated with Addendums "H, I, and J" shall be "OR'ed" to display a single "M" in the associated status parameter indicator field.

L. Signal Source Selection For PL Interrogator Parameters.

The following logic is required to determine the signal source for display of PL Interrogator phase lock, phase error, transmitted power, and received signal strength parameters:

| PARAMETER STATUS (STATE) | | | | | |
|---|---|---|---|---|---|
| | | SIGNAL SOURCE FOR | | | |
| S–BD PL INTEROG 1 INPUT POWER ON (V74X4323E) | S–BD PL INTEROG 2 INPUT POWER ON (V74X4353E) | PL INTRG–PHASE LOCK | PL INTRG–PHASE ERR | PL INTRG–XMIT PWR | PL INTRG–PL SIG STR |
| 0 | 0 | NONE (Display Blank) | | | |
| 1 | 0 | V74X5627E | V74B5655A | V74E5625A | V74E5658A |
| 0 | 1 | V74X5628E | V74B5656A | V74E5626A | V74E5659A |
| 1 | 1 | NONE (Display Blank) | | | |

M. Blanking of Item 18.

When this display is being viewed in OPS SM2 or SM4, Item 18, along with its background text will be blanked.

N. Blanking of PL INTRG Data.

When this display is being viewed in OPS G9 these parameters are not supported and the data fields shall be blanked.The background nomenclature will be displayed.

O. Blanking of Item 19.

When this display is being viewed in OPS SM4, GN&C OPS 9 or in OPS SM2 Ground Checkout, Item 19, along with its background text (DOWNLIST 19 SEL FMT ID XX) shall be blanked.

P. PDI I/O Reset (Item 8) Indicator in G9.

In G9 the following logic shall be used to display the bi–level indicator adjacent to item 8:

| PDI BSR Bypass (V91X2797X) | PDI Switch Bypass Ind (V91X2839X) | Status Indicator at XC = 48, YC = 4 | Status Indicator at XC = 49, YC = 4 |
|---|---|---|---|
| 1 | 1 | ~~M~~ | M |
| 1 | 0 | ~~M~~ | M |
| 0 | 1 | ~~M~~ | M |
| 0 | 0 | * | ~~M~~ |

Q. ORB C&W to ISS Test Status

The remote text to be displayed in the test status field (21 TEST) is based on the following binary equivalent of V92J0639C (ISSXFR TEST STATUS)

| Binary Equivalent | Display Remote Text |
|---|---|
| 000 | (Blank) |
| 001 | RUN (Test in progress/waiting for ISS response) |
| 010 | CPLT (Test response received from ISS) |
| 011 | FAIL (Test failed – ISSXFR inhibited |
| 100 | RJCR (Test rejected – ISSXFR remains enabled) |
| 101, 110, 111 | (Not Applicable) |

R. Blanking of ORB C&W to ISS Data

When this display is being viewed in OPS G9, ORB C&W to ISS item entries, text fields, and background data shall be blanked.

### 4.3.5.4 PCMMU/PAYLOAD Communications Figure/Table References

Figure 4.3.5–1 PCMMU/Payload Comm Display (PFS)

Table 4.3.5–1 Keyboard Processing Table

Table 4.3.5–2 CRT Display Processing Table

Table 4.3.5–3 CRT Display Processing Background Requirements N/A

Table 4.3.5–4 Mission Design Background Constants N/A

Table 4.3.5–5 Input Functional Parameters N/A

Table 4.3.5–6 Output Functional Parameters N/A

Table 4.3.5–7 I–Loads N/A

Table 4.3.5–8 K–Loads N/A

Table 4.3.5–9 Constants N/A

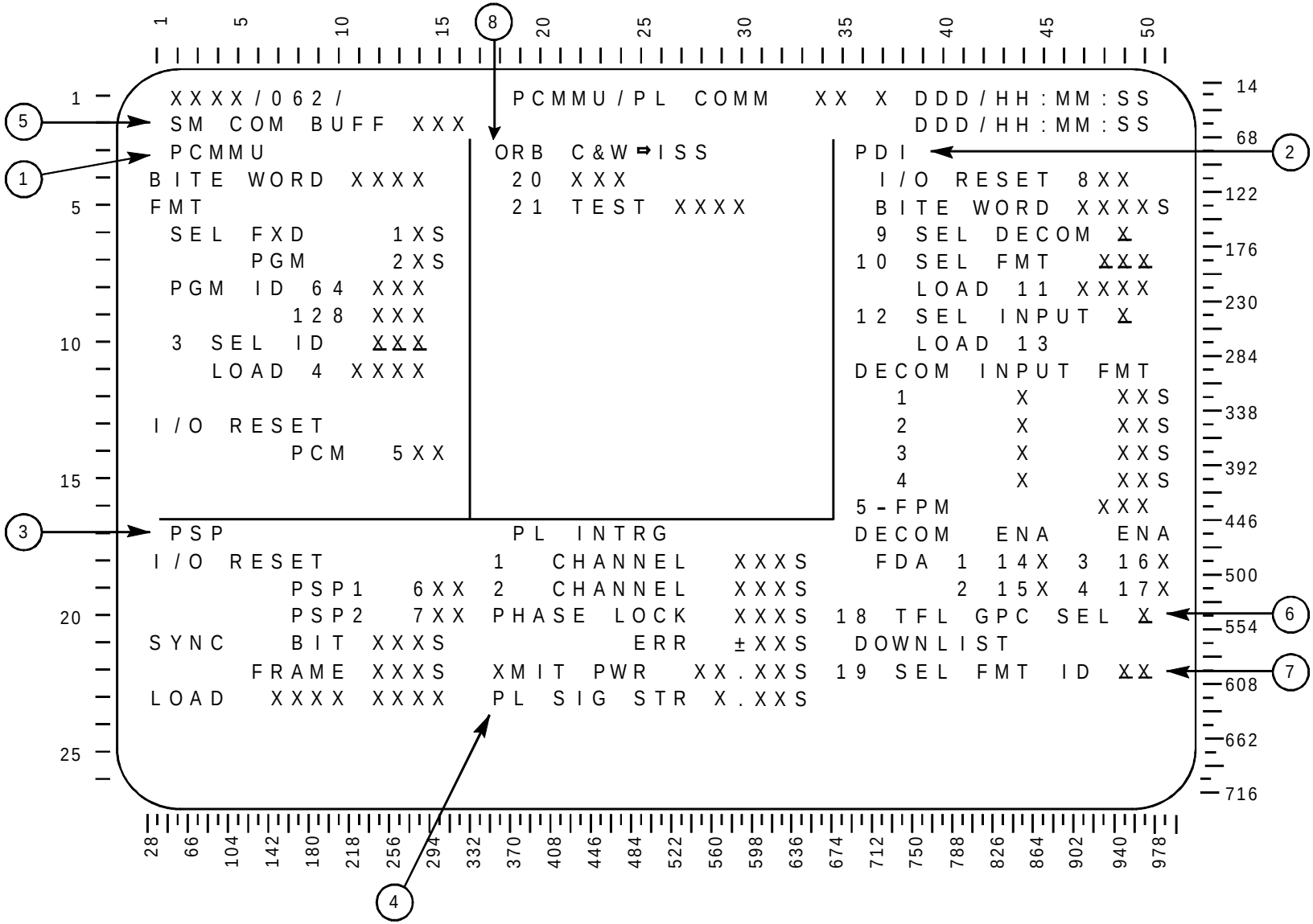


FIGURE 4.3.5-1. PCMMU/Payload Comm Display (PFS)

TABLE 4.3.5-1. PCMMU/PL COMM (PFS) KEYBOARD PROCESSING

| Seq | CRT Signal Name | M/S ID | CHAR | TYPE | UNITS | DK | ITEM | Item No. Limits | | Add Ref | Destination | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | MIN | MAX | | | | |
| 001 | PCMMU FMT SEL FXD 1 | V93X5590X | 0.0 | CNTL | | | 1 | | | | PCM SPEC | PCMMU/PL COMM–FIXED DWNLST FRMT | X |
| 002 | PCMMU FMT SEL PGM 2 | V93X5591X | 0.0 | CNTL | | | 2 | | | | PCM SPEC | PCMMU/PL COMM–PGM DWNLST FRMT | X |
| 003 | PCMMU FMT 3 SEL ID | V93Q5598C | 4.0 | DEC | | | 3 | | | | PCM SPEC,CRT | SELECT TFL FORMAT ID | X |
| 004 | PCMMU FMT LOAD 4 | V93X6332X | 0.0 | CNTL | | | 4 | | | | PCM SPEC | PCMMU/PL COMM–EXEC TFL LOAD | X |
| 005* | I/O RESET PCM 5 | V93X5572X | 0.0 | CNTL | | | 5 | | | | PCM SPEC,CRT | PCMMU I/O ERROR RESET | X |
| 006 | I/O RESET PSP1 6 | V93X5584X | 0.0 | CNTL | | | 6 | | | | PCM SPEC,CRT | PSP 1 COMM ENABLE ITEM | X |
| 007 | I/O RESET PSP2 7 | V93X5585X | 0.0 | CNTL | | | 7 | | | | PCM SPEC,CRT | PSP 2 COMM ENABLE ITEM | X |
| 008 | PDI I/O RESET 8 | V93X5573X | 0.0 | CNTL | | | 8 | | | | PCM SPEC | PDI I/O ERROR RESET | X |
| 009 | PDI 9 SEL DECOM | V93X5596X | 2.0 | DEC | | | 9 | | | | PCM SPEC,CRT | SELECT PDI DECOM/FPM ID | X |
| 010 | PDI 10 SEL FMT | V93X5594X | 4.0 | DEC | | | 10 | | | | PCM SPEC | SELECT DFL/FPM FORMAT ID | X |
| 011 | PDI FMT LOAD 11 | V93X5595X | 0.0 | CNTL | | | 11 | | | | PCM SPEC | EXEC DFL/FPM LOAD | X |
| 012 | PDI 12 SEL INPUT | V93J5580C | 2.0 | DEC | | | 12 | | | | PCM SPEC,CRT | SELECT PDI DECOM INPUT SOURCE | X |
| 013 | PDI INPUT LOAD 13 | V93J5581C | 0.0 | CNTL | | | 13 | | | | PCM SPEC,CRT | EXEC PDI SWITCH MATRIX LOAD | X |
| 014 | PDI DECOM 1 ENA 14 | V93X5576X | 0.0 | CNTL | | | 14 | | | | FDA,CRT | PDI DECOM 1 FDA ENA | X |
| 015 | PDI DECOM 2 ENA 15 | V93X5577X | 0.0 | CNTL | | | 15 | | | | FDA,CRT | PDI DECOM 2 FDA ENA | X |
| 016 | PDI DECOM 3 ENA 16 | V93X5578X | 0.0 | CNTL | | | 16 | | | | FDA,CRT | PDI DECOM 3 FDA ENA | X |
| 017 | PDI DECOM 4 ENA 17 | V93X5579X | 0.0 | CNTL | | | 17 | | | | FDA,CRT | PDI DECOM 4 FDA ENA | X |
| 018 | 18 TFL GPC SEL | V93J6392C | 2.0 | DEC | | | 18 | | | | FCOS,CRT | TFL GPC SELECT | X |
| 019 | DL 19 SEL FMT ID | V93J3654C | 3.0 | DEC | | | 19 | | | | D/L PROC,CRT | DL SM FMT ID SEL/DISP | |
| 020 | ORB –> C&W ISS 20 | V93X1056X | 0.0 | CNTL | | | 20 | | | | PCM SPEC | TOGGLE ISSXFR PROCESS ENA/INH | X |
| 021 | ORB C&W –> ISS 21 TEST | V93X3033X | 0.0 | CNTL | | | 21 | | | | PCM SPEC | REQUEST ISSXFR TEST | X |

## TABLE 4.3.5-2. PCMMU/PL COMM (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | BILEVEL | | | | | | | | | | | | | | | | | |
| | | | X | Y | | CHAR | 1 | 0 | TYPE | | | | | | | | | | | | | | | |
| 001 | (OPS) | V93X0040X | 2 | 1 | | 5.0 | | | CHAR | | | | | | | E | | | | | | UI | OPS FUNCTION PAGE | X |
| 002 | (SPEC) | V93X0042X | 7 | 1 | | 4.0 | | | CHAR | | | | | | | E | | | | | | UI | SPEC FUNCTION PAGE | X |
| 003 | (DISP) | V93X0044X | 10 | 1 | | 4.0 | | | CHAR | | | | | | | E | | | | | | UI | DISPLAY FUNCTION PAGE | X |
| 004 | (UL) | V92X5032X | 34 | 1 | | 2.0 | UL | | BLVL | | | | | | X | G | | | | | | UI | UPLINK ACTIVITY IND | X |
| 005 | (GPC) | V93X0048X | 36 | 1 | | 2.0 | | | DEC | | | | | | | E | | | | | | UI | GPC DRIVER | X |
| 006 | (MT) | V91W1990C | 39 | 1 | | 12.0 | | | CHAR | DHMS | | | | | | A | | | | | | FCOS | MISSION ELAPSED TIME | X |
| 007 | (CRT TIMER) | V91W1988C | 39 | 2 | | 12.0 | | | CHAR | DHMS | | | | | | A | | | | | | FCOS | DISPLAY CRT TIME, SM | X |
| 008 | SM COM BUFF | V92X0077X | 14 | 2 | | 3.0 | BSY | | BLVL | | | | | | X | | | | | | | SMM | SM COMMON BUFFER IN USE | X |
| 009 | SM COM BUFF | V92X0077X | 14 | 2 | | 3.0 | | RDY | BLVL | | | | | | | | | | | | | SMM | SM COMMON BUFFER IN USE | X |
| 010 | PCMMU BITE WORD | V75M2120P | 11 | 4 | | 4.0 | | | HEX | | | | | | | | | X | | | | SMM | PCM MASTER UNIT BITE WORD | X |
| 011 | PCMMU FMT SEL FXD 1 | V75X2136D | 14 | 6 | | 1.0 | | * | BLVL | | X | | | | | | | | | | 1 | SMM | 128KBPS PRGM/FIXED FORMAT PCM–BSR | X |
| 012* | PCMMU FMT SEL PGM 2 | V75X2136D | 14 | 7 | | 1.0 | * | | BLVL | | X | | | | | | | | | | 1 | SMM | 128KBPS PRGM/FIXED FORMAT PCM–BSR | X |
| 013 | PCMMU FMT PGM ID 64 | V92J0052C | 11 | 8 | | 4.0 | | | DEC | | | | | | | | | | | | | SMM | LAST 64 KBPS FORMAT ID | X |
| 014 | PCMMU FMT PGM ID128 | V92J0050C | 11 | 9 | | 4.0 | | | DEC | | | | | | | | | | | | | SMM | LAST 128 KBPS FORMAT ID | X |
| 015 | PCMMU FMT 3 SEL ID | V93Q5598C | 11 | 10 | | 4.0 | | | DEC | | | | | | | | | | | | | SMM | SELECT TFL FORMAT ID | X |
| 016 | PCMMU FMT LOAD4 (S) | V92J0053C | 11 | 11 | | 4.0 | | | RTXT | | | X | | | | A | | | | | A | SMM | TFL LOAD SUCCESSFUL/FAIL | X |
| 017 | I/O RESET PCM 5 | V92X0583X | 14 | 14 | | 1.0 | | * | BLVL | | | | | | | | | | | | | SMM | PCMMU BYPASS FEEDBACK IND | X |
| 018 | I/O RESET PCM 5 | V92X0583X | 15 | 14 | | 1.0 | M | | BLVL | | | | | X | | | | | | | | SMM | PCMMU BYPASS FEEDBACK IND | X |
| 019 | I/O RESET PSP1 6 | V93X5584X | 15 | 19 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SMM | PSP 1 COMM ENABLE ITEM | X |
| 020* | I/O RESET PSP1 6 (S) | V91X2826X | 16 | 19 | | 1.0 | M | | BLVL | | | | | X | | | | | | | | SMM | PF1/PSP1 | X |
| 021 | I/O RESET PSP2 7 | V93X5585X | 15 | 20 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SMM | PSP 2 COMM ENABLE ITEM | X |
| 022* | I/O RESET PSP2 7 (S) | V91X2828X | 16 | 20 | | 1.0 | M | | BLVL | | | | | X | | | | | | | | SMM | PF2/PSP2 | X |
| 023 | PSP SYNC BIT | ADDENDUM | 12 | 21 | | 3.0 | YES | NO | RTXT | | X | X | | | | | | | | | D 1 | SMM | S–BD PL SIG PRCSR1(2)BIT SYNC LOCK | |
| 024 | PSP SYNC FRAME | ADDENDUM | 12 | 22 | | 3.0 | YES | NO | RTXT | | X | X | | | | | | | | | D 1 | SMM | S–BD PL SIG PRCSR1(2)FR SYNC LOCK | |
| 025 | PSP LOAD XXXX | ADDENDUM | 7 | 23 | | 4.0 | | | RTXT | | | | | | | | | | | | C | SMM | PSP LOAD REJECT/INCOMPLETE STATUS | |
| 026 | PSP LOAD XXXX | ADDENDUM | 12 | 23 | | 4.0 | | | RTXT | | | | | X | | | | | | | C | SMM | PSP LOAD SOURCE OF REJECTED CMD | |
| 027 | ORB C&W –> ISS 20 | V92X0791X | 22 | 4 | | 3.0 | ENA | INH | BLVL | | | X | | | | | | | | | R | SMM | ISSXFR PROCESS ENABLED | |
| 028 | ORB C&W –> ISS 21 TEST | V92J0639C | 27 | 5 | | 4.0 | | | RTXT | | | X | | | | | | | | | QR | SMM | ISSXFR TEST STATUS | |
| 029 | PL INTRG 1 CH(UNITS) | ADDENDUM | 31 | 18 | | 2.0 | | | DEC | | X | X | | | | | | | | | EKN1 | SMM | S–BAND PL INTRG 1 CH SEL1(2,4,8) | |
| 030 | PL INTRG 1 CH(TENS) | ADDENDUM | 30 | 18 | | 2.0 | | | DEC | | X | X | | | | | | | | | FKN1 | SMM | S–BAND PL INTRG CH SEL10(20,40,80) | |
| 031 | PL INTRG (HUNDREDS) | ADDENDUM | 29 | 18 | | 2.0 | | | DEC | | X | X | | | | | | | | | GKN1 | SMM | S–BAND PL INTRGSEL100(200,400,800) | |
| 032 | PL INTRG 2 CH(UNITS) | ADDENDUM | 31 | 19 | | 2.0 | | | DEC | | X | X | | | | | | | | | HKN1 | SMM | S–BAND PL INTRG 2 CH SEL 1 (2,4,8) | |

TABLE 4.3.5-2. PCMMU/PL COMM (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | | | |
| 033 | PL INTRG 2 CH(TENS) | ADDENDUM | 30 | 19 | | 2.0 | | | DEC | | X | X | | | | | | | | | IKN1 | SMM | S–BAND PL INTRG 2 CH 10(20,40,80) | |
| 034 | PL INTRG (HUNDREDS) | ADDENDUM | 29 | 19 | | 2.0 | | | DEC | | X | X | | | | | | | | | JKN1 | SMM | S–BAND PL INTRGSEL100(200,400,800) | |
| 035 | PL INTRG PHASE LOCK | ADDENDUM | 30 | 20 | | 3.0 | YES | NO | RTXT | | X | X | | | | | | | | | L,N1 | SMM | S–BD PL INTRG 1(2) PHASE LOCK LOOP | |
| 036 | PL INTRG PHASE ERR | ADDENDUM | 30 | 21 | | 3.0 | | | DEC | KHZ | X | X | | | | | | | | | L,N2 | SMM | S–BD PL INTRG 1(2) LOOP STRESS | |
| 037 | PL INTRG XMIT POWER | ADDENDUM | 27 | 22 | | 6.2 | | | DEC | WATT | X | X | | | | | | | | | L,N1 | SMM | S–BD PL INTRG 1(2) RF PWR OUT | |
| 038 | PL INTRG PL SIG STR | ADDENDUM | 28 | 23 | | 5.2 | | | DEC | VOLT | X | X | | | | | | | | | L,N2 | SMM | S–BAND PAYLOAD INTEROG 1(2) AGC | |
| 039 | PDI I/O RESET 8 | V91X2839X | 48 | 4 | | 1.0 | | * | BLVL | | | | | | | | | | | | P | SMM | PDI SWITCH BYPASS IND | X |
| 040 | PDI I/O RESET 8 | V91X2839X | 49 | 4 | | 1.0 | M | | BLVL | | | | | X | | | | | | | P | SMM | PDI SWITCH BYPASS IND | X |
| 041 | PDI BITE WORD | V75M6420P | 46 | 5 | | 5.0 | | | HEX | | X | | | | | | | X | | | | SMM | PDI BITE WORD 2 | X |
| 042 | G9 PDI BSR COMMFAULT(S) | V91X2796X | 51 | 5 | | 1.0 | | | STAT | | | | | | | | | | | | 1 | SMM | PDI BSR COMMFAULT | |
| 043 | PDI 9 SEL DECOM | V93X5596X | 48 | 6 | | 2.0 | | | DEC | | | | | | | | | | | | | SMM | SELECT PDI DECOM/FPM ID | X |
| 044 | PDI 10 SEL FMT | V93X5594X | 47 | 7 | | 4.0 | | | DEC | | | | | | | | | | | | | SMM | SELECT DFL/FPM FORMAT ID | X |
| 045 | PDI LOAD 11 (STATUS) | V92J0110C | 47 | 8 | | 4.0 | | | RTXT | | | X | | | | A | | | | | B | SMM | PDI LOAD SUCCESSFUL/FAIL | X |
| 046 | PDI 12 SEL INPUT | V93J5580C | 48 | 9 | | 2.0 | | | DEC | | | | | | | | | | | | | SMM | SELECT PDI DECOM INPUT SOURCE | X |
| 047* | PDI DECOM 1 INPUT | V92J0106C | 43 | 12 | | 2.0 | | | DEC | | | | | | | | | | | | | SMM | PDI DECOM 1 INPUT SOURCE | X |
| 048 | PDI DECOM 1 FMT | V92J0111C | 48 | 12 | | 3.0 | | | DEC | | | | | | | | | | | | | SMM | LAST PDI DECOM 1 FORMAT ID | X |
| 049 | PDI DECOM1 INPUT(S) | V92J0106C | 51 | 12 | | 1.0 | | | STAT | | | | | | | | | | | | 3 | SMM | PDI DECOM 1 INPUT SOURCE | X |
| 050* | PDI DECOM 2 INPUT | V92J0107C | 43 | 13 | | 2.0 | | | DEC | | | | | | | | | | | | | SMM | PDI DECOM 2 INPUT SOURCE | X |
| 051 | PDI DECOM 2 FMT | V92J0112C | 48 | 13 | | 3.0 | | | DEC | | | | | | | | | | | | | SMM | LAST PDI DECOM 2 FORMAT ID | X |
| 052 | PDI DECOM2 INPUT(S) | V92J0107C | 51 | 13 | | 1.0 | | | STAT | | | | | | | | | | | | 3 | SMM | PDI DECOM 2 INPUT SOURCE | X |
| 053* | PDI DECOM 3 INPUT | V92J0108C | 43 | 14 | | 2.0 | | | DEC | | | | | | | | | | | | | SMM | PDI DECOM 3 INPUT SOURCE | X |
| 054 | PDI DECOM 3 FMT | V92J0113C | 48 | 14 | | 3.0 | | | DEC | | | | | | | | | | | | | SMM | LAST PDI DECOM 3 FORMAT ID | X |
| 055 | PDI DECOM3 INPUT(S) | V92J0108C | 51 | 14 | | 1.0 | | | STAT | | | | | | | | | | | | 3 | SMM | PDI DECOM 3 INPUT SOURCE | X |
| 056* | PDI DECOM 4 INPUT | V92J0109C | 43 | 15 | | 2.0 | | | DEC | | | | | | | | | | | | | SMM | PDI DECOM 4 INPUT SOURCE | X |
| 057 | PDI DECOM 4 FMT | V92J0114C | 48 | 15 | | 3.0 | | | DEC | | | | | | | | | | | | | SMM | LAST PDI DECOM 4 FORMAT ID | X |
| 058 | PDI DECOM4 INPUT(S) | V92J0109C | 51 | 15 | | 1.0 | | | STAT | | | | | | | | | | | | 3 | SMM | PDI DECOM 4 INPUT SOURCE | X |
| 059 | PDI DECOM 5 FMT | V92J0078C | 47 | 16 | | 4.0 | | | DEC | | | | | | | | | | | | | SMM | LAST PDI FPM FORMAT ID | X |
| 060* | PDI DECOM1 FDA ENA14 | V93X5576X | 45 | 18 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SMM | PDI DECOM 1 FDA ENA | X |
| 061* | PDI DECOM2 FDA ENA15 | V93X5577X | 45 | 19 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SMM | PDI DECOM 2 FDA ENA | X |
| 062* | PDI DECOM3 FDA ENA16 | V93X5578X | 51 | 18 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SMM | PDI DECOM 3 FDA ENA | X |
| 063* | PDI DECOM4 FDA ENA17 | V93X5579X | 51 | 19 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SMM | PDI DECOM 4 FDA ENA | X |
| 064 | 18 TFL GPC SEL | V93J6392C | 49 | 20 | | 2.0 | | | DEC | | | X | | | | | | | | | M | KYBD | TFL GPC SELECT | X |
| 065 | DL 19 SEL FMT ID | V93J3654C | 48 | 22 | | 3.0 | | | DEC | | | X | | | | | | | | | O | KYBD | DL SM FMT ID SEL/DISP | |
| 066 | (MSG LINE) | V93X0050X | 1 | 25 | | 44.0 | | | CHAR | | | | | | | G | | | | | | UI | MESSAGE LINE | X |
| 067 | (BUFFER MSG) | V93X0054X | 45 | 25 | | 4.0 | | | CHAR | | | | | | | G | | | | | | UI | BUFFER MESSAGE INDICATOR | X |
| 068 | (SPL) | V93X0056X | 2 | 26 | | 49.0 | | | CHAR | | | | | | | G | | | | | | UI | SCRATCH PAD LINE | X |

### 4.3.6 ELECTRIC

See JSC–19590, Section 6.2.

### 4.3.7 ENVIRONMENT

See JSC–19590, Section 6.1.

### 4.3.8 APU/HYDRAULIC

See JSC–19590, Section 6.9

### 4.3.9 CRYOGENIC SYSTEM

See JSC–19590, Section 6.3.

### 4.3.10 COMMUNICATION/RECORDER

See JSC–19590, Section 6.5.

### 4.3.11 APU/ENVIRONMENT THERMAL

See JSC–19590, Section 6.11.

### 4.3.12 PDRS CONTROL (PFS)

TITLE: PDRS CONTROL
TYPE: SPEC/094
AVAILABILITY: SM OPS 2 AND 4

#### 4.3.12.1 Purpose, Operation, and Organization

This specialist function provides controls for the crew to input RMS arm (PORT or STBD) initialization data. It also provides the capability to monitor the RMS retention latches to verify that the manipulator is in a stowed or deployed position and to monitor the end effector operation feedback parameters. Figure 4.3.12–1 is the PDRS Control Display Format.

(1) The remote manipulator arm selected for use on D&C panel (A8–A2) is displayed after RMS SEL by driving the following remote text “PORT”, “STBD”, “OFF” or blank (when RMS Software is in suspend mode). In addition, controls (Items 1 and 2) provide the capability to select which RMS arm PORT or STBD is to be initialized. When the display is first called, the PORT arm will be selected and an asterisk will be driven after Item 1. Items 1 and 2 are mutually exclusive and the selection of either one will result in an asterisk being driven after the selected Item number and blanked after the other.

(2) The RMS PWR section displays the status of the RMS PWR switch on D&C panel A8–A2 as PRI, OFF or B/U.

(3) Item 3 (PL ID) provides the capability to select the ID of the payload to be handled by the arm selected via Item 1 or 2. The payload ID is stored when the arm associated with it is inactive and will be recalled and displayed when that arm is reselected via Item 1 or 2. When the display is first called the PL ID will be zero.

(4) Item 4 (END EFF) provides the capability to select the ID of the end effector to be used by the arm selected via Item 1 or 2. The end effector ID is stored when the arm associated with it is inactive and will be recalled and displayed when that arm is reselected via Item 1 or 2. When the display is first called the END EFF ID will be one.

(5) Items 5 and 6 (I/O ON, OFF) provide the capability to initiate (ON) or terminate (OFF) the Input/Output between GPC/MCIU. These items are mutually exclusive and an asterisk will be driven after the selected Item 5 or 6 to indicate its selection. (Note that when the Input/Output between the GPC/MCIU is terminated via Item 6, the RMS software will continue to cyclically acquire data from the MCIU as required in section 4.21.A.8 of STS 87–0017 – the RMS Level C FSSR – but the RMS software will not process the acquired data.) When the display is first called, the I/O will be “OFF”.

(6) Items 9 and 10 (AUTO BRAKE ENA, INH) provide the capability to enable or inhibit the AUTO BRAKE function of the consistency check. Items 9 and 10 are mutually exclusive, and the selection of either one will result in an asterisk being driven after the selected Item number and blanked after the other. The display will be initialized with the AUTO BRAKE function enabled.

(7) Items 7 and 8 (SOFT STOP ENA, INH) provide the capability to enable or inhibit the soft stop limits. These items are mutually exclusive and an asterisk will be driven after the selected Item

7 or 8 to indicate the state of the software stop limit. The display will be initialized with soft stop limit enabled. If inhibit is initiated and a mode change takes place via the dedicated MODE selection switch (Panel A8), other than "SINGLE," the soft stop limit will be enabled.

(8) Items 11 and 12 (POS ENC CK ENA, INH) provide the capability to enable or inhibit the position encoder check. Items 11 and 12 are mutually exclusive, and the selection of either one will result in an asterisk being driven after the selected Item number and blanked after the other. When the display is first called the POS ENC CK will be enabled.

(9) Items 13,14,15 and 16 preprogrammed auto modes (AUTO MODES) provide the capability to select the auto sequence which will be executed in each of the four RMS auto sequence modes for up to 20 programs that may be stored in main memory. When the display is first called, Items 13–16 shall be blank. If a valid item is executed, blanking shall be removed and the valid program number displayed.

(10) Item 17 (START POINT) provides the capability to designate which prestored point in the selected auto sequence should be used as the starting point. When the display is first called, the displayed START PT shall be blank. LAST POINT (LAST PT), a decimal value will be displayed directly under START PT and will represent the stored point number of the last point whose fly by radius was intercepted by the point of resolution or the point at which the point of resolution stopped. When the display is first called, the displayed LAST PT shall be blank.

(11) Items 18 through 20 provide the capability to select the point of resolution position (END POS X, Y, and Z) for the operator commanded auto sequences. The end point position is associated with the arm selected via Items 1 or 2. The position inputs are made in inches with respect to the RMS Orbiter body axis coordinate system as follows:

X -9999.0 to 9999.0 inches

Y -9999.0 to 9999.0 inches

Z -9999.0 to 9999.0 inches

In addition to specifying the translational end point of an operator commanded auto sequence, items 18 through 20 specify the referenced X, Y and Z positions when the "REL" option of item 30 (POR DISPLAY) is selected.

When the display is first called, the displayed END POS X, Y and Z shall be blank. The END POS fields will also be blanked when an arm is selected via Item 1 or 2.

(12) Items 21 through 23 provide the capability to select the point of resolution, rotational attitude (END ATT P, Y, and R) for the operator–commanded auto sequences. The rotational attitude is associated with the arm selected via Item 1 or 2. The rotation inputs as follow are made in degrees with respect to the RMS orbiter rotational axis coordinate system as follows:

Pitch (P) 0 to 359.9998 degrees

Yaw (Y) 0 to 90 and 270 to 359.9998 degrees

Roll (R) 0 to 359.9998 degrees

In addition to specifying the rotational end point of an operator commanded auto sequence, items 21 through 23 specify the referenced Pitch, Yaw and Roll attitudes when the “REL” option of item 30 (POR DISPLAY) is selected. These items also specify the orientation of the command frame when items 32 or 33 are active.

When the display is first called the displayed END ATT P, Y and R shall be blank. The END ATT fields will also be blanked when an arm is selected via Item 1 or 2.

(13) Item 24 payload initiation identification (PL INIT ID) provides the capability to select the point of resolution for the operator commanded auto sequences. Selecting a point of resolution is equivalent to choosing a payload ID (see paragraph 3). When the display is first called, the displayed PL INIT ID shall display “0”.

(14) Item 25 command check (CMD CK) provides the capability to check the end point specified in Items 18 through 23 for an operator–commanded auto trajectory to determine if it is within the reach capability of the RMS selected via Item 1 or 2. If the specified end point is within the reach envelope, “GOOD” will be displayed. If it is not within the reach envelope, “FAIL” will be displayed. The status field is initialized blank and will also be blanked any time data is changed via any Item 18 through 23. The status field will also be blanked when an arm is selected via Item 1 or 2.

(15) The lower left of the display is formatted with parameters associated with the RMS retention latches.

a. XXXX MPM STO/DPLY are discrete outputs from micro switches that indicate the MPM position (stowed or deployed) for the port or starboard manipulator arm. Micro switch outputs displayed are 1 or 0. The field XXXX will display "PORT" when item 1 (PORT) is selected and will display "STBD" when item 2 (STBD) is selected.

b. LAT/REL/RDY are discrete outputs from micro switches providing an indication that the port or starboard FWD, MID, and AFT Latches are in the latched, release or ready–to–latch position. Micro switch outputs displayed are 1 or 0.

(16) Item 26 (WR RANGE) provides the capability to correct the value of the wrist roll angle for the arm selected via Item 1 or Item 2 (PORT or STBD), should the RMS Application software lose track of this value. (This could occur if the wrist roll is moved with the MCIU I/O OFF). The WR RANGE is an integer 1 to 6, and corresponds to the true value of the wrist angle as follows:

| WR RANGE ID | ACTUAL WR ANGLE (Degrees) | | |
|---|---|---|---|
| 1 | –450° | to | –360° |
| 2 | –360° | to | –180° |
| 3 | –180° | to | 0° |
| 4 | 0° | to | +180° |
| 5 | +180° | to | +360° |
| 6 | +360° | to | +450° |

If a WR RANGE of 1 or 6 is entered while the unmodified WR ANGLE is in the range $90 \leq$ unmodified WR ANGLE $< 270$, the item entry shall be rejected with a class 5 “ILLEGAL ENTRY” error message.

The WR RANGE will be updated cyclically by the RMS application software.

When the display is first called WR RANGE shall be initialized to “4”.

(17) Item 27 (AUTO BRAKE CK) allows the ALL_BRAKES_REQ Flag to be turned on independent of the consistency check. An asterisk shall be displayed after Item 27 when this flag is on, otherwise, this field shall be blank indicating that this flag is off. The current method of resetting the auto brakes and this flag remains in effect, i.e., cycling the brake switch ON then OFF. The brake switch and TB should be OFF prior to performing this check and the arm should be in a position hold submode.

(18) Item 30 (POR DISPLAY) provides the capability to display the Point of Resolution (POR) in the orbiter body axis system for positions and in the orbiter rotation axis system for attitudes or relative to a position and attitude which is specified in items 18 through 23. Item 30 will be a toggle item alternating between the orbiter coordinate system (ORB) and the relative coordinate system (REL). When the display is first called, the POR reference will be the orbiter coordinate system (ORB).

(19) Items 28 and 29 (POHS CNTL ENA and INH) provide the capability to enable or inhibit the Position Orientation Hold Select (POHS) controller. The function of the POHS is to reduce steady state uncommanded motion for the nondriven axes. Items 28 and 29 are mutually exclusive and an asterisk will be driven after these items to indicate its selection. When the display is first called, the POHS controller will be “ON” (ENA).

(20) While in the manual augmented orbiter loaded mode, options exist for selecting the desired type of hand controller response. If the normal mode is selected (NORM, item 31), the hand controller commands will be unchanged from their normal mode of operation. If the fly–camera (FLY–CAMR, item 32) control is selected, the directions of the translational and rotational hand controller commands will be associated with the defined fly–camera axis system. The fly–camera axis system is specified by the information contained in items 21 through 23. If the fly–payload (FLY–PL, item 33) option is selected, the directions of the hand controller commands shall be opposite of those of the fly–camera axis system. Items 31, 32 and 33 shall be mutually exclusive. Selection of one of these items shall result in that item being selected and any other item being automatically deselected provided, that selection of these items is legal. Execution of either FLY–CAMR (item 32) or FLY–PL (item 33) while the POR_REF_CHECK is not ON shall be rejected with a class 5 “ILLEGAL ENTRY” message. The POR_REF_CHECK is set ON by the RMS software when item 25 is “GOOD” and item 3 = item 24 and the orbiter loaded mode is selected. One further restriction to this mode of operation is that if the orbiter loaded mode is selected and either item 32 or item 33 has been selected, then no changes can be made to the selected arm (items 1 or 2), the Payload ID (item 3), the specified reference position and attitude (items 18 through 23), the PL INIT ID (item 24) nor can one perform an Operator Command Check (item 25). Attempts to change items 1, 2, 3, 18 through 24 or 25 under these conditions shall be rejected with a class 5 “ILLEGAL ENTRY” message. Each time the manual augmented orbiter loaded mode is entered, the NORM mode (item 31) shall be selected. While not in the manual augmented orbiter loaded mode, items 31, 32 and 33 shall be blank,

and execution of any of these items shall be rejected with a class 5 “ILLEGAL ENTRY” message.

(21) Item 34 (RMS S/N) shall provide the capability to change the serial number of the arm selected for initialization via Item 1 (port) or Item 2 (starboard). From the serial number, the RMS software determines the appropriate joint position encoder biases to be used in processing the encoder outputs. The serial number shall be stored while the associated arm is not selected for initialization and shall be recalled and displayed when that arm is reselected via Item 1 or 2.

### 4.3.12.2 PDRS CONTROL Keyboard Processing Addendum

A. PL ID Data Entry.
The payload identification code to be entered via Item 3 will be an integer value of 0 to 5.

B. END EFF Data Entry.
The end effector identification code to be entered via Item 4 will be an integer value of 1 to 2.

C. AUTO MODES Data Entry.
An integer value of 1 through 20 will be entered via Items 13 through 16 allowing selection of the available auto sequence programs.

D. START PT Data Entry.
An integer value of 1 through 199 will be entered via Item 17 allowing selection of the selected auto sequence starting point.

E. PL/RETEN SEL Data Entry.
The payload initiation identification to be entered via item 24 will be an integer value of 0 to 5.

F. WR Range Data Entry.
An integer value of 1 through 6 will be entered via Item 26 allowing correction of the wrist roll angle. In addition, a WR RANGE of 1 or 6 while the unmodified WR ANGLE is in the range $90 \leq$ unmodified WR ANGLE $< 270$ shall be rejected with a class 5 “ILLEGAL ENTRY” error message.

G. Auto Brake Ck.
Execution of this item shall cause the ALL_BRAKES_REQ Flag (V72X2911J) to be set on.

H. OPR CMD END POS and END ATT Data Entry.
The Operator–commanded auto sequence point of resolution position and rotational attitude data entry for X, Y, Z, P (pitch), Y (yaw), and R (roll), entered via Items 18, 19, 20, 21, 22 and 23, respectively, shall be limited to the following values:

| Item No. | Data Entry Limits | | Units |
|---|---|---|---|
| | MIN | MAX | |
| 18 (X) | -9999.0 | 9999.0 | Inches |
| 19 (Y) | -9999.0 | 9999.0 | Inches |
| 20 (Z) | -9999.0 | 9999.0 | Inches |
| 21 (P) | 0.0 | 359.9998 | Degrees |
| 22 (Y) | 0.0 | 90.0 | Degrees |
| “ | 270.0 | 359.9998 | Degrees |
| 23 (R) | 0.0 | 359.9998 | Degrees |

I. RMS S/N Data Entry.
An integer value of 201, 202, 301, or 303 shall be entered via Item 34. If any other value is entered or if Data Entry is attempted while the RMS Software is in a configuration other than the Suspend or the Temperature Monitor Configuration, then the Data Entry shall be rejected and a class 5 “ILLEGAL ENTRY” error message shall be generated.

### 4.3.12.3 PDRS CONTROL CRT Display Processing Addendum

The table below presents the parameter status indicators (PSI) that can be displayed for a parameter. In SM–PL, PSI requirements can be one of two types as follows:

- A PSI which is part of the data words identified by an “X” marked in the STATUS column of Table 4.3.12–2.
- A PSI which is a stand–alone identified by the word “STAT” being inserted in the FORMAT TYPE column of Table 4.3.12–2.

Both PSI types have a numeric code appearing as an entry (right justified) in the ADD REF column of CRT display processing Table 4.3.12–2. The numeric code, corresponding to one of those listed in the table, indicates the specific status processing to be performed. If there is no numeric code entry, the status processing is defined by the default code.

When the “M” PSI is displayed (for Commfault, I/O error resulting in missing data), the last value of the associated parameter will continue to be displayed unless specified otherwise.

| Numeric Code | PSI SYMBOL(S) | | | | | |
|---|---|---|---|---|---|---|
| Default (blank) | ↓ | ↑ | H | L | M | ⌀ |
| 1 | | | | | M | ⌀ |
| 2 | | | H | L | M | ⌀ |
| 3 | ↓ | | | | M | ⌀ |
| 4 | ↓ | | | | | ⌀ |

⌀ = blank

NOTE: The numeric addendum reference codes are for information only. Actual processing requirements are specified in the SM Level B CPDS (SS–P–0002–580) and/or Level C Systems Management FSR (JSC–19590) or Payload Management FSR (JSC–19478).

The following alpha code(s) appear (left justified) in the ADD REF column of Table 4.3.12–2 whenever it is necessary to define any special processing requirements not otherwise covered therein:

A. RMS SEL Status. The following logic is required to generate RTXT to reflect the selected dedicated RMS switch position status:

| RMS SEL (PORT) V54X2025J | RMS SEL (STBD) V54X2026J | RMS SEL Text Output |
|---|---|---|
| 1 | 0 | PORT |
| 0 | 1 | STBD |
| 0 | 0 | OFF |
| 1 | 1 | N/A (BLANK) |

The RMS SOFTWARE CONFIG. ID (V92U3100C) shall take precedence over the above logic and blank the display field when it has a value of one.

B. RMS PWR Switch Status. The following logic is required to generate RTXT to reflect the dedicated RMS power switch status:

| RMS PWR A (V54S0600E) | RMS PWR B (V54S0601E) | RMS PWR Text Output |
|---|---|---|
| 1 | 0 | PRI |
| 0 | 1 | B/U |
| 0 | 0 | OFF |
| 1 | 1 | (BLANK) |

Channelization constraints for SM reconfigurable discretes used on this display are defined in the following table. Channelization characteristics not defined in this table (such as PMU address, OI MDM, etc.) are not constrained by these requirements. Nomenclature is for information only.

| MSID | PARENT MSID | START BIT (0-15) | NOMENCLATURE (FOR IMFORMATION ONLY) |
|---|---|---|---|
| V54S0600E | V75M3887P | 07 | RMS PWR MCIU MN A/SEL-ENBL ON CMD |
| V54S0601E | V75M3890P | 07 | RMS PWR MCIU MN B/SEL-ENBL ON CMD |

C. OPR CMD CK Status. The following logic is required to generate RTXT to display the status of the OPR CMD CK.

| Binary Equivalent | CMD CK Status Text Output |
|---|---|
| 10 | GOOD |
| 01 | FAIL |
| 00 | (BLANK) upon initialization and when Item 1, 2 or 18 through 23 are executed. |

D. PORT RMS Retention Latch Parameters.
These parameters shall be displayed, in the appropriate display fields when the PORT RMS is selected via item entry (V93X7501X).

Channelization constraints for SM reconfigurable discretes used on this display are defined in the following table. Channelization characteristics not defined in this table (such as PMU address, OI MDM, etc.) are not constrained by these requirements. Nomenclature is for information only.

| MSID | PARENT MSID | START BIT (0-15) | NOMENCLATURE (FOR IMFORMATION ONLY) |
|---|---|---|---|
| V54X0810E | V75M3753P | 10 | PORT RMS SHLD POS MECH DEPL IND 1 |
| V54X0811E | V75M3736P | 04 | PORT RMS SHLD POS MECH DEPL IND 2 |
| V54X0820E | V75M3740P | 10 | PORT RMS SHLD POS MECH STOWED IND1 |
| V54X0821E | V75M3745P | 09 | PORT RMS SHLD POS MECH STOWED IND2 |
| V54X0840E | V75M3751P | 10 | PORT RMS FWD RETNN RDY-FOR-LCH 1 |
| V54X0841E | V75M3752P | 10 | PORT RMS FWD RETNN RDY-FOR-LCH 2 |
| V54X0842E | V75M3865P | 10 | PORT RMS MID RETNN RDY-FOR-LCH 1 |
| V54X0843E | V75M3710P | 02 | PORT RMS MID RETNN RDY-FOR-LCH 2 |
| V54X0844E | V75M3768P | 03 | PORT RMS AFT RETNN RDY-FOR-LCH 1 |

| MSID | PARENT MSID | START BIT (0-15) | NOMENCLATURE (FOR IMFORMATION ONLY) |
|---|---|---|---|
| V54X0845E | V75M3805P | 05 | PORT RMS AFT RETNN RDY-FOR-LCH 2 |
| V54X0860E | V75M3742P | 02 | PORT RMS FWD RETNN LCH-LCH IND 1 |
| V54X0861E | V75M3754P | 11 | PORT RMS FWD RETNN LCH-LCH IND 2 |
| V54X0862E | V75M3871P | 11 | PORT RMS MID RETNN LCH-LCH IND 1 |
| V54X0863E | V75M3716P | 10 | PORT RMS MID RETNN LCH-LCH IND 2 |
| V54X0864E | V75M3771P | 08 | PORT RMS AFT RETNN LCH-LCH IND 1 |
| V54X0865E | V75M3808P | 04 | PORT RMS AFT RETNN LCH-LCH IND 2 |
| V54X0870E | V75M3736P | 11 | PORT RMS FWD RETNN LCH-REL IND 1 |
| V54X0871E | V75M3745P | 00 | PORT RMS FWD RETNN LCH-REL IND 2 |
| V54X0872E | V75M3875P | 09 | PORT RMS MID RETNN LCH-REL IND 1 |
| V54X0873E | V75M3718P | 02 | PORT RMS MID RETNN LCH-REL IND 2 |
| V54X0874E | V75M3783P | 07 | PORT RMS AFT RETNN LCH-REL IND 1 |
| V54X0875E | V75M3812P | 06 | PORT RMS AFT RETNN LCH-REL IND 2 |

E. STBD RMS Retention Latch Parameters. These parameters shall be displayed in the appropriate display fields when the STBD RMS is selected via item entry (V93X7502X).

Channelization constraints for SM reconfigurable discretes used on this display are defined in the following table. Channelization characteristics not defined in this table (such as PMU address, OI MDM, etc.) are not constrained by these requirements. Nomenclature is for information only.

| MSID | PARENT MSID | START BIT (0-15) | NOMENCLATURE (FOR IMFORMATION ONLY) |
|---|---|---|---|
| V54X1010E | V75M3735P | 11 | STBD RMS SHLD POS MECH DEPL IND 1 |
| V54X1011E | V75M3741P | 13 | STBD RMS SHLD POS MECH DEPL IND 2 |
| V54X1020E | V75M3750P | 13 | STBD RMS SHLD POS MECH STOWED IND1 |
| V54X1021E | V75M3753P | 11 | STBD RMS SHLD POS MECH STOWED IND2 |
| V54X1040E | V75M3740P | 12 | STBD RMS FWD RETNN RDY-FOR-LCH 1 |
| V54X1041E | V75M3886P | 12 | STBD RMS FWD RETNN RDY-FOR-LCH 2 |
| V54X1042E | V75M3711P | 03 | STBD RMS MID RETNN RDY-FOR-LCH 1 |
| V54X1043E | V75M3783P | 00 | STBD RMS MID RETNN RDY-FOR-LCH 2 |
| V54X1044E | V75M3808P | 05 | STBD RMS AFT RETNN RDY-FOR-LCH 1 |
| V54X1045E | V75M3745P | 10 | STBD RMS AFT RETNN RDY-FOR-LCH 2 |
| V54X1060E | V75M3751P | 11 | STBD RMS FWD RETNN LCH-LCH IND 1 |

| MSID | PARENT MSID | START BIT (0-15) | NOMENCLATURE (FOR IMFORMATION ONLY) |
|---|---|---|---|
| V54X1061E | V75M3888P | 14 | STBD RMS FWD RETNN LCH-LCH IND 2 |
| V54X1062E | V75M3717P | 10 | STBD RMS MID RETNN LCH-LCH IND 1 |
| V54X1063E | V75M3784P | 04 | STBD RMS MID RETNN LCH-LCH IND 2 |
| V54X1064E | V75M3812P | 07 | STBD RMS AFT RETNN LCH-LCH IND 1 |
| V54X1065E | V75M3742P | 12 | STBD RMS AFT RETNN LCH-LCH IND 2 |
| V54X1070E | V75M3754P | 12 | STBD RMS FWD RETNN LCH-REL IND 1 |
| V54X1071E | V75M3891P | 09 | STBD RMS FWD RETNN LCH-REL IND 2 |
| V54X1072E | V75M3720P | 02 | STBD RMS MID RETNN LCH-REL IND 1 |
| V54X1073E | V75M3785P | 10 | STBD RMS MID RETNN LCH-REL IND 2 |
| V54X1074E | V75M3817P | 02 | STBD RMS AFT RETNN LCH-REL IND 1 |
| V54X1075E | V75M3751P | 13 | STBD RMS AFT RETNN LCH-REL IND 2 |

F. Parameter Initialization Blanking.
The data field for this parameter shall be initialized blank the first time the display is called.

G. WR Range–Port.
This parameter shall be used in the appropriate display field when the PORT RMS is selected via item entry (V93X7501X).

H. WR Range–STBD.
This parameter shall be used in the appropriate display field when the STBD RMS is selected via item entry (V93X7502X).

I. POR DISPLAY Status. The following logic is required to generate RTXT to display the status of the selected POR Reference.

| REL POR REF SEL (V93X0988X) | POR DISPLAY Text Output |
|---|---|
| 0 | ORB |
| 1 | REL |

J. ARM SERIAL NUM PORT.
This parameter shall be used in the appropriate display field when the PORT RMS is selected via item entry (V93X7501X).

K. ARM SERIAL NUM STRBD.
This parameter shall be used in the appropriate display field when the STBD RMS is selected via item entry (V93X7502X).

### 4.3.12.4 PDRS Control Figure/Table References

Figure 4.3.12–1 PDRS Control Display (PFS)

Table 4.3.12–1 Keyboard Processing Table

Table 4.3.12–2 CRT Display Processing Table

Table 4.3.12–3 CRT Display Processing Background Requirements N/A

Table 4.3.12–4 Mission Design Background Constants N/A

Table 4.3.12–5 Input Functional Parameters N/A

Table 4.3.12–6 Output Functional Parameters N/A

Table 4.3.12–7 I–Loads N/A

Table 4.3.12–8 K–Loads N/A

Table 4.3.12–9 Constants N/A

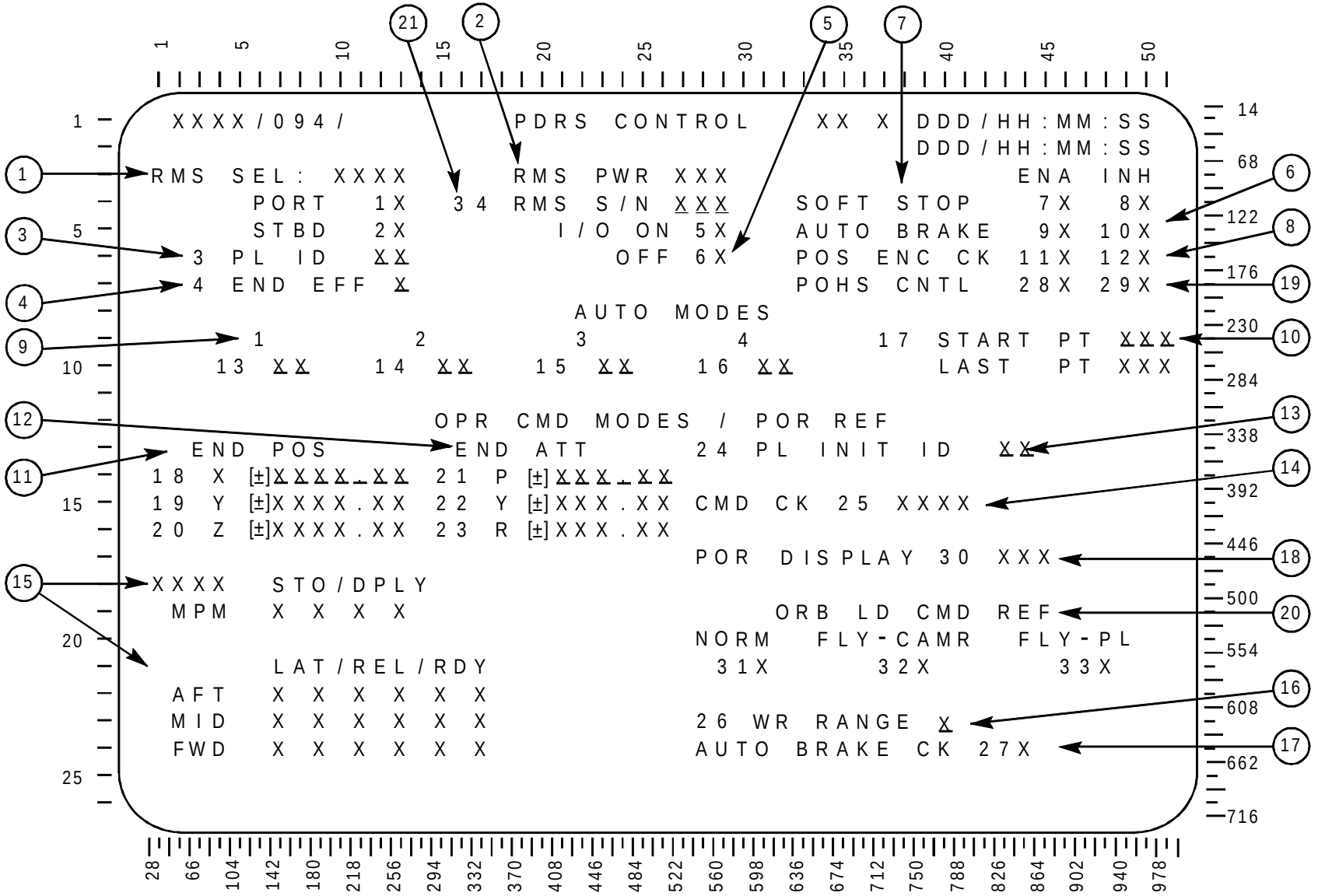


FIGURE 4.3.12-1.PDRS Control Display (PFS)

TABLE 4.3.12-1. PDRS CONTROL (PFS) KEYBOARD PROCESSING

| Seq | CRT Signal Name | M/S ID | CHAR | TYPE | UNITS | DK | ITEM | Item No. Limits | | Add Ref | Destination | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | MIN | MAX | | | | |
| 001 | PORT 1 | V93X7501X | 0.0 | CTRL | | | 1 | | | | RMS CTRL | ARM MANIP SELECT–PORT RMS | X |
| 002 | STBD 2 | V93X7502X | 0.0 | CTRL | | | 2 | | | | RMS CTRL | ARM MANIP SELECT–STBD RMS | X |
| 003 | 3 PL ID | V93J7503C | 3.0 | DEC | | | 3 | 0 | 5 | A | RMS CTRL,CRT | PAYLOAD ID RMS | X |
| 004 | 4 END EFF | V93J7504C | 2.0 | DEC | | | 4 | 1 | 2 | B | RMS CTRL,CRT | EE ID RMS | X |
| 005 | I/O ON 5 | V93X7534X | 0.0 | CTRL | | | 5 | | | | RMS CTRL | MCIU I/O ON SELECT RMS | X |
| 006 | I/O OFF 6 | V93X7535X | 0.0 | CTRL | | | 6 | | | | RMS CTRL | MCIU I/O OFF SELECT RMS | X |
| 007 | SOFT STOP ENA 7 | V93X7538X | 0.0 | CTRL | | | 7 | | | | RMS CTRL | SOFT STOP ENABLE RMS | X |
| 008 | SOFT STOP INH 8 | V93X7539X | 0.0 | CTRL | | | 8 | | | | RMS CTRL | SOFT STOP INHIBIT RMS | X |
| 009 | AUTO BRAKE ENA 9 | V93J7552C | 0.0 | CTRL | | | 9 | | | | RMS CTRL | AUTO BRAKE ON SEL RMS | X |
| 010 | AUTO BRAKE INH 10 | V93J7553C | 0.0 | CTRL | | | 10 | | | | RMS CTRL | AUTO BRAKE OFF SEL RMS | X |
| 011 | POS ENC CK ENA 11 | V93J7558C | 0.0 | CTRL | | | 11 | | | | RMS CTRL,CRT | ENCODER ENABLE | X |
| 012 | POS ENC CK INH 12 | V93J7557C | 0.0 | CTRL | | | 12 | | | | RMS CTRL,CRT | ENCODER INHIBIT | X |
| 013 | 13 AUTO MODE 1 | V93J7510C | 3.0 | DEC | | | 13 | 1 | 20 | C | RMS CTRL,CRT | AUTO SEQ 1 ID RMS | X |
| 014 | 14 AUTO MODE 2 | V93J7511C | 3.0 | DEC | | | 14 | 1 | 20 | C | RMS CTRL,CRT | AUTO SEQ 2 ID RMS | X |
| 015 | 15 AUTO MODE 3 | V93J7512C | 3.0 | DEC | | | 15 | 1 | 20 | C | RMS CTRL,CRT | AUTO SEQ 3 ID RMS | X |
| 016 | 16 AUTO MODE 4 | V93J7513C | 3.0 | DEC | | | 16 | 1 | 20 | C | RMS CTRL,CRT | AUTO SEQ 4 ID RMS | X |
| 017 | 17 START PT | V93J7550C | 4.0 | DEC | | | 17 | 1 | 199 | D | RMS CTRL,CRT | AUTO SEQ START POINT RMS | X |
| 018 | 18 X CMD END POS | V93H2551C | 10.4 | DEC | INS | | 18 | ADD REF | ADD REF | H | RMS CTRL,CRT | OPR DES POR X POS RMS | X |
| 019 | 19 Y CMD END POS | V93H2552C | 10.4 | DEC | INS | | 19 | ADD REF | ADD REF | H | RMS CTRL,CRT | OPR DES POR Y POS RMS | X |
| 020 | 20 Z CMD END POS | V93H2553C | 10.4 | DEC | INS | | 20 | ADD REF | ADD REF | H | RMS CTRL,CRT | OPR DES POR Z POS RMS | X |
| 021 | 21 P CMD END ATT | V93H2554C | 9.4 | DEC | DEG | | 21 | ADD REF | ADD REF | H | RMS CTRL,CRT | OPR DES POR P ATT RMS | X |
| 022 | 22 Y CMD END ATT | V93H2555C | 9.4 | DEC | DEG | | 22 | ADD REF | ADD REF | H | RMS CTRL,CRT | OPR DES POR YAW ATT RMS | X |
| 023 | 23 R CMD END ATT | V93H2556C | 9.4 | DEC | DEG | | 23 | ADD REF | ADD REF | H | RMS CTRL,CRT | OPR DES POR R ATT RMS | X |
| 024 | 24 PL INIT ID | V93J7541C | 3.0 | DEC | | | 24 | 0 | 5 | E | RMS CTRL,CRT | PL INIT ID RMS | X |
| 025 | 25 CMD CK (EXEC) | V93X7530X | 0.0 | CTRL | | | 25 | | | | RMS CTRL | OPR CMD CHECK–EXEC RMS | X |
| 026 | 26 WR RANGE | V93J7509C | 1.0 | DEC | | | 26 | 1 | 6 | F | RMS CTRL,CRT | WRIST ROLL RANGE ID RMS | X |
| 027 | AUTO BRAKE CK 27 | V93X7555X | 0.0 | CTRL | | | 27 | | | G | RMS CTRL | AUTO BRAKE CK CONTROL RMS | |
| 028 | POHS CNTL ENA 28 | V93J7518C | 0.0 | CTRL | | | 28 | | | | RMS CTRL,CRT | POHS CONTROL ENABLE RMS | X |
| 029 | POHS CNTL INH 29 | V93J7519C | 0.0 | CTRL | | | 29 | | | | RMS CTRL,CRT | POHS CONTROL INHIBIT RMS | X |
| 030 | POR DISPLAY 30 | V93X0988X | 0.0 | CTRL | | | 30 | | | | RMS CTRL,CRT | REL POR REF SEL RMS | X |
| 031 | NORM 31 | V93X0989X | 0.0 | CTRL | | | 31 | | | | RMS CTRL,CRT | ORB LD NORM CMD REF SEL RMS | X |
| 032 | FLY–CAMR 32 | V93X0990X | 0.0 | CTRL | | | 32 | | | | RMS CTRL,CRT | ORB LD FLY TO CMD REF SEL RMS | X |
| 033 | FLY–PL 33 | V93X0991X | 0.0 | CTRL | | | 33 | | | | RMS CTRL,CRT | ORB LD FLY FROM CMD REF SEL RMS | X |
| 034 | 34 RMS S/N | V93J1521C | 4.0 | DEC | | | 34 | ADD REF | ADD REF | 1 | RMS CNTL, CRT | SERIAL NUMBER ENTRY RMS | X |

## TABLE 4.3.12-2. PDRS CONTROL (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | BILEVEL | | | | | | | | | | | | | | | | | | |
| | | | X | Y | | CHAR | 1 | 0 | TYPE | | | | | | | | | | | | | | | | |
| 001 | (OPS) | V93X0040X | 2 | 1 | | 5.0 | | | CHAR | | | | | | | E | | | | | | UI | OPS FUNCTION PAGE | | X |
| 002 | (SPEC) | V93X0042X | 7 | 1 | | 4.0 | | | CHAR | | | | | | | E | | | | | | UI | SPEC FUNCTION PAGE | | X |
| 003 | (DISP) | V93X0044X | 10 | 1 | | 4.0 | | | DEC | | | | | | | E | | | | | | UI | DISPLAY FUNCTION PAGE | | X |
| 004 | (UL) | V92X5032X | 34 | 1 | | 2.0 | UL | | BLVL | | | | | | X | G | | | | | | UI | UPLINK ACTIVITY IND | | X |
| 005 | (GPC) | V93X0048X | 36 | 1 | | 2.0 | | | DEC | | | | | | | E | | | | | | UI | GPC DRIVER | | X |
| 006 | (MT) | V91W1990C | 39 | 1 | | 12.0 | | | CHAR | DHMS | | | | | | A | | | | | | FCOS | MISSION ELAPSED TIME | | X |
| 007 | (CRT TIMER) | V91W1988C | 39 | 2 | | 12.0 | | | CHAR | DHMS | | | | | | A | | | | | | FCOS | DISPLAY CRT TIME, SM | | X |
| 008 | RMS SEL (STBD) | V54X2026J | 10 | 3 | | 4.0 | | | RTXT | | | X | | | | | | | | | A | MCIU | STBD ARM POWER ON/OFF | RMS | |
| 009 | RMS SEL (PORT) | V54X2025J | 10 | 3 | | 4.0 | | | RTXT | | | X | | | | | | | | | A | MCIU | PORT ARM POWER ON/OFF | RMS | X |
| 010 | PORT 1 | V92X3830X | 13 | 4 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | SMM | ARM INITIALIZATION FLAG | RMS | X |
| 011* | STBD 2 | V92X3830X | 13 | 5 | | 1.0 | | * | BLVL | | | | | | | E | | | | | | SMM | ARM INITIALIZATION FLAG | RMS | X |
| 012 | RMS PWR (SW STATUS) | ADDENDUM | 27 | 3 | | 3.0 | | | RTXT | | | X | | | | | | | | | B | OI SMM | RMS POWER SW STATUS | | |
| 013 | 3 PL ID | V92J3845C | 11 | 6 | | 3.0 | | | DEC | | | | | | | E | | | | | | SMM | INITIALIZED PAYLOAD ID | RMS | X |
| 014 | 4 END EFF | V92J3846C | 12 | 7 | | 2.0 | | | DEC | | | | | | | E | | | | | | SMM | INITIALIZED EE ID | RMS | X |
| 015* | I/O ON 5 | V92X3835X | 29 | 5 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SMM | MCIU I/O ON/OFF | RMS | X |
| 016 | I/O OFF 6 | V92X3835X | 29 | 6 | | 1.0 | | * | BLVL | | | | | | | | | | | | | SMM | MCIU I/O ON/OFF | RMS | X |
| 017 | SOFT STOP ENA 7 | V92X3120X | 46 | 4 | | 1.0 | * | | BLVL | | | | | | | A | | | | | | SMM | SOFT STOPS ENABLE INHIBIT | RMS | X |
| 018* | SOFT STOP INH 8 | V92X3120X | 50 | 4 | | 1.0 | | * | BLVL | | | | | | | A | | | | | | SMM | SOFT STOPS ENABLE INHIBIT | RMS | X |
| 019 | AUTO BRAKE ENA 9 | V92X3831X | 46 | 5 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | SMM | CONSIS BRAKES ENABLE DISABLE | RMS | X |
| 020* | AUTO BRAKE INH 10 | V92X3831X | 50 | 5 | | 1.0 | | * | BLVL | | | | | | | E | | | | | | SMM | CONSIS BRAKES ENABLE DISABLE | RMS | X |
| 021 | 13 AUTO MODE 1 | V93J7510C | 6 | 10 | | 3.0 | | | DEC | | | X | | | | E | | | | | F | KYBD | AUTO SEQ 1 ID | RMS | X |
| 022 | 14 AUTO MODE 2 | V93J7511C | 14 | 10 | | 3.0 | | | DEC | | | X | | | | E | | | | | F | KYBD | AUTO SEQ 2 ID | RMS | X |
| 023 | 15 AUTO MODE 3 | V93J7512C | 22 | 10 | | 3.0 | | | DEC | | | X | | | | E | | | | | F | KYBD | AUTO SEQ 3 ID | RMS | X |
| 024 | 16 AUTO MODE 4 | V93J7513C | 30 | 10 | | 3.0 | | | DEC | | | X | | | | E | | | | | F | KYBD | AUTO SEQ 4 ID | RMS | X |
| 025 | 17 START PT | V93J7550C | 48 | 9 | | 4.0 | | | DEC | | | X | | | | | | | | | F | SMM | AUTO SEQ START POINT | RMS | X |
| 026 | LAST PT | V92J3241C | 48 | 10 | | 4.0 | | | DEC | | | X | | | | | | | | | F | SMM | AUTO SEQ LAST POINT | RMS | X |
| 027* | END POS 18 X | V93H2551C | 6 | 14 | | 8.2 | | | DEC | INS | | X | | | | E | X | | | | F | KYBD | OPR DES POR X POS | RMS | X |
| 028* | END POS 19 Y | V93H2552C | 6 | 15 | | 8.2 | | | DEC | INS | | X | | | | E | X | | | | F | KYBD | OPR DES POR Y POS | RMS | X |
| 029* | END POS 20 Z | V93H2553C | 6 | 16 | | 8.2 | | | DEC | INS | | X | | | | E | X | | | | F | KYBD | OPR DES POR Z POS | RMS | X |
| 030* | END ATT 21 P | V93H2554C | 20 | 14 | | 7.2 | | | DEC | DEG | | X | | | | E | X | | | | F | KYBD | OPR DES POR P ATT | RMS | X |
| 031* | END ATT 22 Y | V93H2555C | 20 | 15 | | 7.2 | | | DEC | DEG | | X | | | | E | X | | | | F | KYBD | OPR DES POR YAW ATT | RMS | X |
| 032* | END ATT 23 R | V93H2556C | 20 | 16 | | 7.2 | | | DEC | DEG | | X | | | | E | X | | | | F | KYBD | OPR DES POR R ATT | RMS | X |
| 033 | 24 PL INIT ID | V93J7541C | 42 | 13 | | 3.0 | | | DEC | | | | | | | E | | | | | | KYBD | PL INIT ID | RMS | X |
| 034 | 25 CMD CK (STATUS) | V92X3840X | 38 | 15 | | 4.0 | | | RTXT | | | X | | | | | | | | | C | SMM | OPR CMD CHECK STATUS | RMS | X |
| 035 | PORT MPM STO (1) | V54X0820E | 7 | 19 | | 1.0 | 1 | 0 | BLVL | | | | | | | A | | | | | D | OI SMM | PORT RMS SHLD POS MECH STOWED IND1 | | X |

TABLE 4.3.12-2. PDRS CONTROL (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | BILEVEL | | | | | | | | | | | | | | | | | |
| | | | X | Y | | CHAR | 1 | 0 | TYPE | | | | | | | | | | | | | | | |
| 036 | PORT MPM STO (2) | V54X0821E | 9 | 19 | | 1.0 | 1 | 0 | BLVL | | | | | | | A | | | | | D | OI SMM | PORT RMS SHLD POS MECH STOWED IND2 | X |
| 037 | PORT MPM DPLY (1) | V54X0810E | 11 | 19 | | 1.0 | 1 | 0 | BLVL | | | | | | | A | | | | | D | OI SMM | PORT RMS SHLD POS MECH DEPL IND 1 | X |
| 038 | PORT MPM DPLY (2) | V54X0811E | 13 | 19 | | 1.0 | 1 | 0 | BLVL | | | | | | | A | | | | | D | OI SMM | PORT RMS SHLD POS MECH DEPL IND 2 | X |
| 039 | PORT AFT LAT (1) | V54X0864E | 7 | 22 | | 1.0 | 1 | 0 | BLVL | | | | | | | A | | | | | D | OI SMM | PORT RMS AFT RETNN LCH–LCH IND 1 | X |
| 040 | PORT AFT LAT (2) | V54X0865E | 9 | 22 | | 1.0 | 1 | 0 | BLVL | | | | | | | A | | | | | D | OI SMM | PORT RMS AFT RETNN LCH–LCH IND 2 | X |
| 041 | PORT AFT REL (1) | V54X0874E | 11 | 22 | | 1.0 | 1 | 0 | BLVL | | | | | | | A | | | | | D | OI SMM | PORT RMS AFT RETNN LCH–REL IND 1 | X |
| 042 | PORT AFT REL (2) | V54X0875E | 13 | 22 | | 1.0 | 1 | 0 | BLVL | | | | | | | A | | | | | D | OI SMM | PORT RMS AFT RETNN LCH–REL IND 2 | X |
| 043 | PORT AFT RDY (1) | V54X0844E | 15 | 22 | | 1.0 | 1 | 0 | BLVL | | | | | | | A | | | | | D | OI SMM | PORT RMS AFT RETNN RDY–FOR–LCH 1 | X |
| 044 | PORT AFT RDY (2) | V54X0845E | 17 | 22 | | 1.0 | 1 | 0 | BLVL | | | | | | | A | | | | | D | OI SMM | PORT RMS AFT RETNN RDY–FOR–LCH 2 | X |
| 045 | PORT MID LAT (1) | V54X0862E | 7 | 23 | | 1.0 | 1 | 0 | BLVL | | | | | | | A | | | | | D | OI SMM | PORT RMS MID RETNN LCH–LCH IND 1 | X |
| 046 | PORT MID LAT (2) | V54X0863E | 9 | 23 | | 1.0 | 1 | 0 | BLVL | | | | | | | A | | | | | D | OI SMM | PORT RMS MID RETNN LCH–LCH IND 2 | X |
| 047 | PORT MID REL (1) | V54X0872E | 11 | 23 | | 1.0 | 1 | 0 | BLVL | | | | | | | A | | | | | D | OI SMM | PORT RMS MID RETNN LCH–REL IND 1 | X |
| 048 | PORT MID REL (2) | V54X0873E | 13 | 23 | | 1.0 | 1 | 0 | BLVL | | | | | | | A | | | | | D | OI SMM | PORT RMS MID RETNN LCH–REL IND 2 | X |
| 049 | PORT MID RDY (1) | V54X0842E | 15 | 23 | | 1.0 | 1 | 0 | BLVL | | | | | | | A | | | | | D | OI SMM | PORT RMS MID RETNN RDY–FOR–LCH 1 | X |
| 050 | PORT MID RDY (2) | V54X0843E | 17 | 23 | | 1.0 | 1 | 0 | BLVL | | | | | | | A | | | | | D | OI SMM | PORT RMS MID RETNN RDY–FOR–LCH 2 | X |
| 051 | PORT FWD LAT (1) | V54X0860E | 7 | 24 | | 1.0 | 1 | 0 | BLVL | | | | | | | A | | | | | D | OI SMM | PORT RMS FWD RETNN LCH–LCH IND 1 | X |
| 052 | PORT FWD LAT (2) | V54X0861E | 9 | 24 | | 1.0 | 1 | 0 | BLVL | | | | | | | A | | | | | D | OI SMM | PORT RMS FWD RETNN LCH–LCH IND 2 | X |
| 053 | PORT FWD REL (1) | V54X0870E | 11 | 24 | | 1.0 | 1 | 0 | BLVL | | | | | | | A | | | | | D | OI SMM | PORT RMS FWD RETNN LCH–REL IND 1 | X |
| 054 | PORT FWD REL (2) | V54X0871E | 13 | 24 | | 1.0 | 1 | 0 | BLVL | | | | | | | A | | | | | D | OI SMM | PORT RMS FWD RETNN LCH–REL IND 2 | X |
| 055 | PORT FWD RDY (1) | V54X0840E | 15 | 24 | | 1.0 | 1 | 0 | BLVL | | | | | | | A | | | | | D | OI SMM | PORT RMS FWD RETNN RDY–FOR–LCH 1 | X |

## TABLE 4.3.12-2. PDRS CONTROL (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | | | |
| 056 | PORT FWD RDY (2) | V54X0841E | 17 | 24 | | 1.0 | 1 | 0 | BLVL | | | | | | | A | | | | | D | OI SMM | PORT RMS FWD RETNN RDY–FOR–LCH 2 | X |
| 057 | STBD MPM STO (1) | V54X1020E | 7 | 19 | | 1.0 | 1 | 0 | BLVL | | | | | | | A | | | | | E | OI SMM | STBD RMS SHLD POS MECH STOWED IND1 | X |
| 058 | STBD MPM STO (2) | V54X1021E | 9 | 19 | | 1.0 | 1 | 0 | BLVL | | | | | | | A | | | | | E | OI SMM | STBD RMS SHLD POS MECH STOWED IND2 | X |
| 059 | STBD MPM DPLY (1) | V54X1010E | 11 | 19 | | 1.0 | 1 | 0 | BLVL | | | | | | | A | | | | | E | OI SMM | STBD RMS SHLD POS MECH DEPL IND 1 | X |
| 060 | STBD MPM DPLY (2) | V54X1011E | 13 | 19 | | 1.0 | 1 | 0 | BLVL | | | | | | | A | | | | | E | OI SMM | STBD RMS SHLD POS MECH DEPL IND 2 | X |
| 061 | STBD AFT LAT (1) | V54X1064E | 7 | 22 | | 1.0 | 1 | 0 | BLVL | | | | | | | A | | | | | E | OI SMM | STBD RMS AFT RETNN LCH-LCH IND 1 | X |
| 062 | STBD AFT LAT (2) | V54X1065E | 9 | 22 | | 1.0 | 1 | 0 | BLVL | | | | | | | A | | | | | E | OI SMM | STBD RMS AFT RETNN LCH-LCH IND 2 | X |
| 063 | STBD AFT REL (1) | V54X1074E | 11 | 22 | | 1.0 | 1 | 0 | BLVL | | | | | | | A | | | | | E | OI SMM | STBD RMS AFT RETNN LCH- REL IND 1 | X |
| 064 | STBD AFT REL (2) | V54X1075E | 13 | 22 | | 1.0 | 1 | 0 | BLVL | | | | | | | A | | | | | E | OI SMM | STBD RMS AFT RETNN LCH- REL IND 2 | X |
| 065 | STBD AFT RDY (1) | V54X1044E | 15 | 22 | | 1.0 | 1 | 0 | BLVL | | | | | | | A | | | | | E | OI SMM | STBD RMS AFT RETNN RDY-FOR-LCH 1 | X |
| 066 | STBD AFT RDY (2) | V54X1045E | 17 | 22 | | 1.0 | 1 | 0 | BLVL | | | | | | | A | | | | | E | OI SMM | STBD RMS AFT RETNN RDY-FOR-LCH 2 | X |
| 067 | STBD MID LAT (1) | V54X1062E | 7 | 23 | | 1.0 | 1 | 0 | BLVL | | | | | | | A | | | | | E | OI SMM | STBD RMS MID RETNN LCH-LCH-IND 1 | X |
| 068 | STBD MID LAT (2) | V54X1063E | 9 | 23 | | 1.0 | 1 | 0 | BLVL | | | | | | | A | | | | | E | OI SMM | STBD RMS MID RETNN LCH-LCH-IND 2 | X |
| 069 | STBD MID REL (1) | V54X1072E | 11 | 23 | | 1.0 | 1 | 0 | BLVL | | | | | | | A | | | | | E | OI SMM | STBD RMS MID RETNN LCH-REL-IND 1 | X |
| 070 | STBD MID REL (2) | V54X1073E | 13 | 23 | | 1.0 | 1 | 0 | BLVL | | | | | | | A | | | | | E | OI SMM | STBD RMS MID RETNN LCH-REL-IND 2 | X |
| 071 | STBD MID RDY (1) | V54X1042E | 15 | 23 | | 1.0 | 1 | 0 | BLVL | | | | | | | A | | | | | E | OI SMM | STBD RMS MID RETNN RDY-FOR-LCH 1 | X |
| 072 | STBD MID RDY (2) | V54X1043E | 17 | 23 | | 1.0 | 1 | 0 | BLVL | | | | | | | A | | | | | E | OI SMM | STBD RMS MID RETNN RDY-FOR-LCH 2 | X |
| 073 | STBD FWD LAT (1) | V54X1060E | 7 | 24 | | 1.0 | 1 | 0 | BLVL | | | | | | | A | | | | | E | OI SMM | STBD RMS FWD RETNN LCH-LCH-IND 1 | X |
| 074 | STBD FWD LAT (2) | V54X1061E | 9 | 24 | | 1.0 | 1 | 0 | BLVL | | | | | | | A | | | | | E | OI SMM | STBD RMS FWD RETNN LCH-LCH-IND 2 | X |
| 075 | STBD FWD REL (1) | V54X1070E | 11 | 24 | | 1.0 | 1 | 0 | BLVL | | | | | | | A | | | | | E | OI SMM | STBD RMS FWD RETNN LCH-REL-IND 1 | X |
| 076 | STBD FWD REL (2) | V54X1071E | 13 | 24 | | 1.0 | 1 | 0 | BLVL | | | | | | | A | | | | | E | OI SMM | STBD RMS FWD RETNN LCH-REL-IND 2 | X |
| 077 | STBD FWD RDY (1) | V54X1040E | 15 | 24 | | 1.0 | 1 | 0 | BLVL | | | | | | | A | | | | | E | OI SMM | STBD RMS FWD RETNN RDY-FOR-LCH 1 | X |
| 078 | STBD FWD RDY (2) | V54X1041E | 17 | 24 | | 1.0 | 1 | 0 | BLVL | | | | | | | A | | | | | E | OI SMM | STBD RMS FWD RETNN RDY-FOR-LCH 2 | X |
| 079 | XXXX (PORT/STBD) | V92X3830X | 1 | 18 | | 4.0 | PORT | STBD | RTXT | | | | | | | A | | | | | | SMM | ARM INITIALIZATION FLAG RMS | X |
| 080 | POS ENC CK ENA 11 | V92J3867C | 46 | 6 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | SMM | ENCODER CHECK ENA/INH RMS | X |
| 081* | POS ENC CK INH 12 | V92J3867C | 50 | 6 | | 1.0 | | * | BLVL | | | | | | | E | | | | | | SMM | ENCODER CHECK ENA/INH RMS | X |
| 082 | AUTO BRAKE CK 27 | V72X2911J | 44 | 24 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SMM | ALL BRAKES REQUEST RMS | |
| 083 | 26 WR RANGE | V96H4997C | 39 | 23 | | 2.0 | | | DEC | | | | | | | A | | | | | G | SMM | WRR RANGE PORT RMS | X |

TABLE 4.3.12-2. PDRS CONTROL (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | BILEVEL | | | | | | | | | | | | | | | | | |
| | | | X | Y | | CHAR | 1 | 0 | TYPE | | | | | | | | | | | | | | | |
| 084 | 26 WR RANGE | V96H4998C | 39 | 23 | | 2.0 | | | DEC | | | | | | | A | | | | | H | SMM | WRR RANGE STRBD RMS | X |
| 085 | POR DISPLAY 30 | V93X0988X | 43 | 17 | | 3.0 | | | CHAR | | | | | | | E | | | | | I | SMM | REL POR REF SEL RMS | X |
| 086 | NORM 31 | V93X0989X | 31 | 21 | | 1.0 | * | | BLVL | | | | | | | A | | | | | | SMM | ORB LD NORM CMD REF SEL RMS | X |
| 087 | FLY–CAMR 32 | V93X0990X | 39 | 21 | | 1.0 | * | | BLVL | | | | | | | A | | | | | | SMM | ORB LD FLY TO CMD REF SEL RMS | X |
| 088 | FLY–PL 33 | V93X0991X | 48 | 21 | | 1.0 | * | | BLVL | | | | | | | A | | | | | | SMM | ORB LD FLY FROM CMD REF SEL RMS | X |
| 089 | POHS CNTL ENA 28 | V92X3826X | 46 | 7 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | SMM | POHS_ENABLE_DISABLE_FLAG RMS | X |
| 090 | POHS CNTL INH 29 | V92X3826X | 50 | 7 | | 1.0 | | * | BLVL | | | | | | | E | | | | | | SMM | POHS_ENABLE_DISABLE_FLAG RMS | X |
| 091 | 34 RMS S/N | V96J0184C | 26 | 4 | | 4.0 | | | DEC | | | | | | | A | | | | | J | SMM | ARM SERIAL NUM PORT RMS | X |
| 092 | 34 RMS S/N | V96J0185C | 26 | 4 | | 4.0 | | | DEC | | | | | | | A | | | | | K | SMM | ARM SERIAL NUM STRBD RMS | X |
| 093 | (MSG LINE) | V93X0050X | 1 | 25 | | 44.0 | | | CHAR | | | | | | | G | | | | | | UI | MESSAGE LINE | X |
| 094 | (BUFFER MSG) | V93X0054X | 45 | 25 | | 4.0 | | | CHAR | | | | | | | G | | | | | | UI | BUFFER MESSAGE INDICATOR | X |
| 095 | (SPL) | V93X0056X | 2 | 26 | | 49.0 | | | CHAR | | | | | | | G | | | | | | UI | SCRATCH PAD LINE | X |

### 4.3.13 HYDRAULIC THERMAL

See JSC–19590, Section 6.10.

### 4.3.14 PAYLOAD BAY DOORS (PFS/BFS)

TITLE: PL BAY DOORS
TYPE: SM OPS/2021, 4021 (PFS); SPEC 063 (BFS)
AVAILABILITY: PFS SM OPS 2 and 4, BFS SM0

#### 4.3.14.1 Purpose, Operation, and Organization

This SM OPS display provides the capability for the crew to monitor and control the opening and closing of the payload bay doors and associated latches. The payload bay doors (PBD) sequence can be operated in either of two basic modes, auto or manual, selectable at crew option. The auto mode executes all the steps necessary to fully open or close the PBDs. In the manual mode, desired latch group(s) or door(s) are selected individually to be opened or closed. For both operational modes, sequence initiation is controlled either by the three position (OPEN, STOP, CLOSE) PBD dedicated control switch (panel R13) or the PBD SW BYPASS control items on the display. In addition, the display enables the crew to monitor the status of each PBD sequence and micro–switch status associated with each of the latch groups and doors. Figure 4.3.14–1 is the Payload Bay Door Display Format.

The display contains the controls and status information necessary to monitor and control the PBD operation.

(1) The capability to apply and remove ac power (AC POWER) to all PBD latch and door actuator motor control assemblies is provided by Items 1 (ON) and 2 (OFF) controls. An "*" is displayed after the item number of the option currently selected via keyboard entry or via PBD auto mode sequence logic. These items are mutually exclusive, in that, selection of either position causes the other to be deselected. The display is initialized with the OFF item selected. When operation of this OPS major mode is terminated the ac power is selected OFF.

(2) The status of the payload bay doors dedicated control switch (PBD SW) is provided for procedural assistance. The text output displayed for the parameter is "OP", "STOP", "CL" or "FAIL" to indicate the hardware switch contacts position or to indicate a switch failure. An "M" is displayed in the parameter status field whenever the data are missing.

(3) Item 3 provides the crew with the control to select/deselect the auto mode of PBD operation (AUTO MODE SEL). Selection of this mode is illegal if the PBD dedicated control switch is in any position except STOP or PBD SW BYPASS STOP (Item 16) is not selected (when the PBD dedicated control switch has been bypassed by executing Item 14). After execution of Item 3, the PBD auto sequence is initiated when the PBD dedicated control switch is placed in the OPEN/CLOSE position or the PBD SW BYPASS OPEN (Item 15) or CLOSE (Item 17) is selected (after the PBD dedicated control switch has been bypassed by executing Item 14); the latches and doors are then automatically cycled in a predefined sequential order. Each latch group and door in the OPEN/CLOSE sequence is verified prior to initiating the next step in the sequence. The capability exists to stop the PBD auto OPEN/CLOSE sequence at any point by selecting the STOP position of the PBD dedicated control switch or the PBD SW BYPASS STOP (Item 16). The sequence starts from this point when the PBD dedicated control switch or PBD SW BYPASS is returned to either the OPEN or CLOSE position. An "*" is displayed

after the item number to indicate the selection of the PBD auto mode. When the entire PBD OPEN/CLOSE sequence is completed the auto mode is deselected and the "*" is blanked.

(4) The status of the following PBD latch groups, doors and associated micro–switches are provided:

a. Centerline latch groups 5–8, 9–12, 1–4 and 13–16.

b. STBD and PORT door forward/aft bulkhead latch groups.

c. STBD and PORT door open, bulkhead ready–to–latch and close.

These parameters are ordered in the sequence of operation; the open sequence reading from top to bottom and vice versa for the close sequence.

(5) The crew has the option to select/deselect the individual latch group or door sequences to be cycled. This manual mode capability is provided under the manual select column (MAN SEL) by executing Items 4–13, as desired. The selected sequence is initiated when the PBD dedicated control switch is placed in the OPEN/CLOSE position or the PBD SW BYPASS OPEN (Item 15) or CLOSE (ITEM 17) is selected after the PBD dedicated control switch has been bypassed by executing Item 14. In the manual mode, returning the PBD dedicated control switch to the STOP position or executing PBD SW BYPASS STOP (Item 16) halts the selected option. A return to the OPEN or CLOSE position or execution of Item 15 or 17 reenables the option. An "*" is displayed after the item number of the sequence(s) selected for manual mode operation.

In the manual mode the capability exists to select additional individual latch group or door items regardless of the position (OPEN/CLOSE) of the PBD dedicated control switch or PBD SW BYPASS OPEN/CLOSE item selection. However, these items cannot be deselected unless the PBD dedicated control switch is returned to the STOP position or the PBD SW BYPASS STOP (Item 16) is selected.

(6) The display is initialized with neither the auto nor the manual mode selected. When operation of this OPS major mode is terminated, the currently active PBD mode is deselected and the appropriate "*" (s) is blanked.

An "ILLEGAL ENTRY ITEM" CRT message is output to the display for any of the following operator PBD setup errors:

a. If one of individual latch or door items (Items 4–13) is entered while the PBD dedicated control switch is in the OPEN or CLOSE position or the PBD SW BYPASS OPEN or CLOSE item (Item 15 or 17) is selected and the MODE SELECT item (Item 3) is selected, the item entry will be rejected.

b. If one of the individual latch or door items (Items 4–13) is entered while the PBD dedicated control switch is in the OPEN or CLOSE position or the PBD SW BYPASS OPEN or CLOSE item (item 15 or 17) is selected and none of the items are selected, the item entry is rejected.

c. If the PBD AUTO MODE SELECT item (Item 3) is entered while the PBD dedicated control switch is in the OPEN or CLOSE position or the PBD SW BYPASS OPEN or CLOSE item (Item 15 or 17) is selected, the item entry is rejected.

d. If one of the PBD SW BYPASS control items, OPEN (Item 15), STOP (Item 16) or CLOSE (Item 17), is entered while the PBD SW BYPASS (Item 14) is deselected, the item entry is rejected.

e. If termination of this OPS mode is initiated when either the PBD dedicated control switch is not in the STOP position or the PBD SW BYPASS STOP item (Item 16) is not selected, the item entry is rejected.

If the PBD dedicated control switch is in the STOP position or the PBD SW BYPASS STOP (Item 16) is selected, entry of the PBD AUTO MODE SELECT item (Item 3) deselects all the individual latch and door items (Items 4–13) and select the AUTO MODE item. If the PBD dedicated control switch is in the STOP position or the PBD SW BYPASS STOP (Item 16) is selected, entry of any of the individual latch or door items (Items 4–13) will select the desired item(s) and deselect the PBD AUTO MODE SELECT item (Item 3).

(7) For each of the latch groups a text output of "OP" (open), "CL" (close) or "↓" is displayed in the OP/CL status column. During the transient period of latch or door travel between the two positions, the text field is blank. This text output indicates the combinatorial logic status of the associated micro–switches. The "↓" status reflects an off–nominal micro–switch configuration which may be indicative of a failure but does not necessarily prevent completion of the sequence. An "M" is displayed in the status field of the OP/CL column opposite any latch group or door for which any data required to perform the combinatorial logic are missing. If a parameter value required to satisfy a specified criterion has an "M" parameter status indicator enabled, that parameter value will continue to be used.

For each of the latch group and doors, a "↓" is displayed in the auto sequence (AUTO SEQ) column to indicate when a failure of the door drive or latch group to open or close within a specified time period has occurred during the auto mode only. During the auto sequence operation, an out of sequence check is performed. If an improper configuration is identified, a class 3 alarm message is annunciated. Also, the AC Power will be turned off resulting in the asterisk display changing from item 1 (ON) to item 2 (OFF). Any failure to open or close halts the auto sequence and annunciates a Class 3 alarm and CRT message. The value of the fail parameter is reset and the "↓" is blanked when this OPS major mode is terminated or if the PBD auto mode is deselected or if the manual mode is selected.

(8) The status of the individual micro–switches (MICRO–SW STAT) associated with each latch group and door is output as a numeric value, 0 for open and 1 for closed switch contacts. For each latch group under the latches (LATS) column are the four micro–switches indicative of the latch group operation; two closed (CA, CB) and two open (OA, OB). For each door, right and left, under the doors (DOORS) column are the two groups, FWD and AFT, of five each micro–switches indicative of door operations; one CLOSE (C); three bulkhead ready–to–latch (RA, RB, RC) and one open (0) for each group. It is this combinatorial logic that is used to determine the text status to be output in the OP/CL column for the individual latch groups and doors.

(9) The display reflects the current status of the latch groups and doors and associated micro–switches anytime this OPS major mode is called up.

(10) The capability is provided to use item entries to control the payload bay doors sequence in place of the PBD dedicated control switch. The software PBD switch bypass (PBD SW BYPASS) with its three position controls (OPEN, STOP and CLOSE) functions with the same constraints as those defined for the hardware switch when used to operate the PBD modes (auto or manual).

The PBD SW BYPASS, Item 14, provides the crew with the control to select/deselect the software switch which bypasses the dedicated control switch. When the SW BYPASS item is initially selected the STOP item (Item 16) is automatically selected. The OPEN, STOP and CLOSE items (Items 15, 16 and 17, respectively) are mutually exclusive and execution of any of these items without first selecting Item 14 is rejected. A subsequent item entry of the SW BYPASS item deselects all four items. An "*" is displayed after the item numbers of the options currently selected. When SM is initialized from mass memory the PBD switch bypass items are deselected and thereafter reflect crew inputs.

### 4.3.14.2 BFS Supplemental Requirements

(1) An "ILLEGAL ENTRY" CRT message shall be output to the display if an attempt to drop this "SPEC" via the RESUME key is made while either the PBD dedicated control switch is not in the stop position or the PBD SW BYPASS STOP item (ITEM 16) is not selected. The resume attempt will be rejected. Other "DISP" or "SPEC" displays may be called in the SM Major Function while PBD operations are in progress without terminating PBD operations and resumes back to the PBD "SPEC" can be performed without causing an "ILLEGAL ENTRY" CRT message. Also, if the Major Function Switch is moved while PBD operations are in progress the open or close operations will continue.

### 4.3.14.3 PAYLOAD BAY DOORS Keyboard Processing Addendum

Not applicable

### 4.3.14.4 PAYLOAD BAY DOORS CRT Display Processing Addendum

The table below presents the parameter status indicators (PSI) that can be displayed for a parameter. In SM–PL, PSI requirements can be one of two types as follows:

- A PSI which is part of the data words identified by an "X" marked in the STATUS column of Table 4.3.14–2.

- A PSI which is a stand–alone identified by the word "STAT" being inserted in the FORMAT TYPE column of Table 4.3.14–2.

Both PSI types have a numeric code appearing as an entry (right justified) in the ADD REF column of CRT display processing Table 4.3.14–2. The numeric code, corresponding to one of those listed in the table, indicates the specific status processing to be performed. If there is no numeric code entry, the status processing is defined by the default code.

When the "M" PSI is displayed (for Commfault, I/O error resulting in missing data), the last value of the associated parameter will continue to be displayed unless specified otherwise.

| Numeric Code | PSI SYMBOL(S) | | | | | |
|---|---|---|---|---|---|---|
| Default (blank) | ↓ | ↑ | H | L | M | ⌀ |
| 1 | | | | | M | ⌀ |
| 2 | | | H | L | M | ⌀ |
| 3 | ↓ | | | | M | ⌀ |
| 4 | ↓ | | | | | ⌀ |

⌀ = blank

NOTE: The numeric addendum reference codes are for information only. Actual processing requirements are specified in the SM Level B CPDS (SS–P–0002–580) and/or Level C Systems Management FSR (JSC–19590) or Payload Management FSR (JSC–19478).

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The following alpha code(s) appear (left justified) in the ADD REF column of Table 4.3.14–2 whenever it is necessary to define any special processing requirements not otherwise covered therein:

A. PBD SW Indicator. The PBD switch indicator is defined by one signal (V92J0508C) with four states:

| Integer State | Display RTXT |
|---|---|
| 0 | STOP |
| 1 | OP |
| 2 | CL |
| 3 | FAIL |

B. PBD Center Line LCH 5–8 Status.
The PBD center line latches 5–8 status is defined by one signal (V92J0492C) with four states:

| Integer State | Display RTXT |
|---|---|
| 0 | (blank) |
| 1 | OP |
| 2 | CL |
| 3 | ? |

C. PBD Center Line LCH 9–12 Status.
The PBD center line latches 9–12 status is defined by one signal (V92J0493C) with four states:

| Integer State | Display RTXT |
|---|---|
| 0 | (blank) |
| 1 | OP |
| 2 | CL |
| 3 | ? |

D. PBD Center Line LCH 1–4 Status.
The PBD center line latches 1–4 status is defined by one signal (V92J0494C) with four states:

| Integer State | Display RTXT |
|---|---|
| 0 | (blank) |
| 1 | OP |
| 2 | CL |
| 3 | ? |

E. PBD Center Line LCH 13–16 Status.
The PBD center line latches 13–16 status is defined by one signal (V92J0495C) with four states:

| Integer State | Display RTXT |
|---|---|
| 0 | (blank) |
| 1 | OP |
| 2 | CL |
| 3 | ? |

F. PBD Starboard Fwd Bhd LCH Status.
The PBD Starboard forward bulkhead latch status is defined by one signal (V92J0496C) with four states:

| Integer State | Display RTXT |
|---|---|
| 0 | (blank) |
| 1 | OP |
| 2 | CL |
| 3 | ? |

G. PBD Starboard Aft Bhd LCH Status.
The PBD Starboard aft bulkhead latch status is defined by one signal (V92J0498C) with four states:

| Integer State | Display RTXT |
|---|---|
| 0 | (blank) |
| 1 | OP |
| 2 | CL |
| 3 | ? |

H. PBD Starboard Dr Status.
The PBD Starboard door status is defined by one signal (V92J0503C) with five states:

| Integer State | Display RTXT |
|---|---|
| 0 | (blank) |
| 1 | OP |
| 2 | CL |
| 3 | RDY |
| 4 | ? |

I. PBD Port Fwd Bhd LCH Status.
The PBD Port forward bulkhead latch status is defined by one signal (V92J0497C) with four states:

| Integer State | Display RTXT |
|---|---|
| 0 | (blank) |
| 1 | OP |
| 2 | CL |
| 3 | ? |

J. PBD Port Aft Bhd LCH Status.
The PBD Port aft bulkhead latch status is defined by one signal (V92J0499C) with four states:

| Integer State | Display RTXT |
|---|---|
| 0 | (blank) |
| 1 | OP |
| 2 | CL |
| 3 | ? |

K. PBD Port Dr Status.
The PBD Port door status is defined by one signal (V92J0504C) with five states:

| Integer State | Display RTXT |
|---|---|
| 0 | (blank) |
| 1 | OP |
| 2 | CL |
| 3 | RDY |
| 4 | ? |

L. AUTO MODE SEL Signal Source.
The signal for AUTO MODE SEL (V93X5800X) is input from KYBD or SMM.

### 4.3.14.5 PAYLOAD BAY DOORS Figure/Table References

Figure 4.3.14–1 Payload Bay Doors Display (PFS/BFS)

Table 4.3.14–1 Keyboard Processing Table

Table 4.3.14–2 CRT Display Processing Table

Table 4.3.14–3 CRT Display Processing Background Requirements N/A

Table 4.3.14–4 Mission Design Background Constants N/A

Table 4.3.14–5 Input Functional Parameters N/A

Table 4.3.14–6 Output Functional Parameters N/A

Table 4.3.14–7 I–Loads N/A

Table 4.3.14–8 K–Loads N/A

Table 4.3.14–9 Constants N/A

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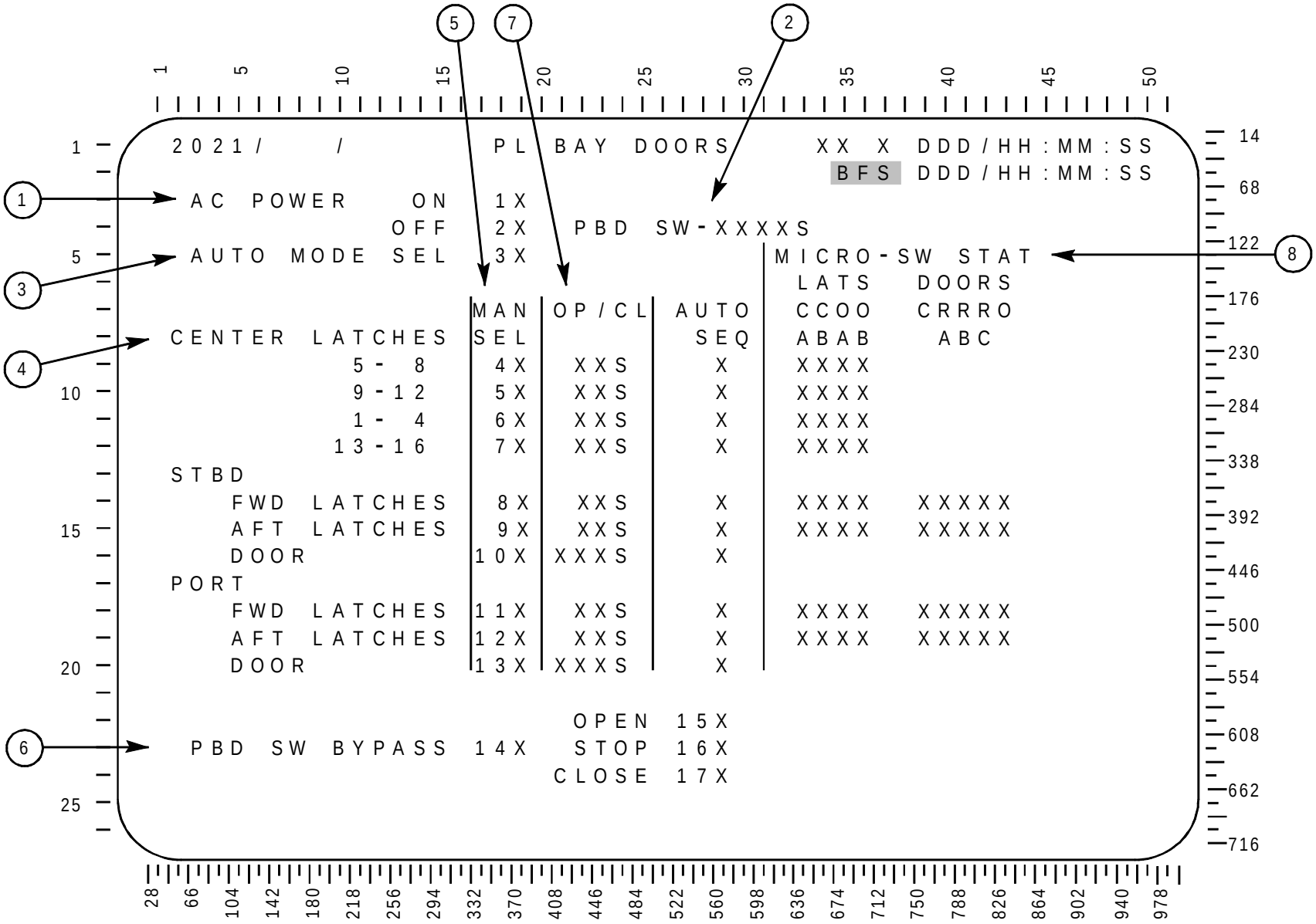


FIGURE 4.3.14-1. Payload Bay Doors Display (PFS/BFS)

TABLE 4.3.14-1. PL BAY DOORS (PFS/BFS) KEYBOARD PROCESSING

| Seq | CRT Signal Name | M/S ID | CHAR | TYPE | UNITS | DK | ITEM | Item No. Limits | | Add Ref | Destination | | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | MIN | MAX | | PFS | BFS | | |
| 001 | 1 AC POWER ON | V93X5830X | 0.0 | CTRL | | | 1 | | | | 5.1.5 | PBD | PBD AC POWER ON | X |
| 002 | 2 AC POWER OFF | V93X5831X | 0.0 | CTRL | | | 2 | | | | 5.1.5 | PBD | PBD AC POWER OFF | X |
| 003 | 3 AUTO MODE SEL | V93X5800X | 0.0 | CTRL | | | 3 | | | | 5.1.5 | PBD | PBD AUTO SEQUENCE | X |
| 004 | 4 CTR LCH 5–8 MAN | V93X5801X | 0.0 | CTRL | | | 4 | | | | 5.1.5 | PBD | PBD CENTERLINE LCH 5–8 SEQ | X |
| 005 | 5 CTR LCH 9–12 MAN | V93X5802X | 0.0 | CTRL | | | 5 | | | | 5.1.5 | PBD | PBD CENTERLINE LCH 9–12 SEQ | X |
| 006 | 6 CTR LCH 1–4 MAN | V93X5803X | 0.0 | CTRL | | | 6 | | | | 5.1.5 | PBD | PBD CENTERLINE LCH 1–4 SEQ | X |
| 007 | 7 CTR LCH 13–16 MAN | V93X5804X | 0.0 | CTRL | | | 7 | | | | 5.1.5 | PBD | PBD CENTERLINE LCH 13–16 SEQ | X |
| 008 | 8 S FWD LCH MAN SEL | V93X5810X | 0.0 | CTRL | | | 8 | | | | 5.1.5 | PBD | PBD RIGHT FWD BHD LCH SEQ | X |
| 009 | 9 S AFT LCH MAN SEL | V93X5811X | 0.0 | CTRL | | | 9 | | | | 5.1.5 | PBD | PBD RIGHT AFT BHD LCH SEQ | X |
| 010 | 10 S DOOR MAN SEL | V93X5812X | 0.0 | CTRL | | | 10 | | | | 5.1.5 | PBD | PBD RIGHT PBD SEQ | X |
| 011 | 11 P FWD LCH MAN SEL | V93X5819X | 0.0 | CTRL | | | 11 | | | | 5.1.5 | PBD | PBD LEFT FWD BHD LCH SEQ | X |
| 012 | 12 P AFT LCH MAN SEL | V93X5820X | 0.0 | CTRL | | | 12 | | | | 5.1.5 | PBD | PBD LEFT AFT BHD LCH SEQ | X |
| 013 | 13 P DOOR MAN SEL | V93X5821X | 0.0 | CTRL | | | 13 | | | | 5.1.5 | PBD | PBD LEFT PBD SEQ | X |
| 014 | 14 PBD SW BYPASS | V93X5814X | 0.0 | CTRL | | | 14 | | | | 5.1.5 | PBD | PBD SWITCH BYPASS CMD | X |
| 015 | 15 PBD SW BYPASS OP | V93X5815X | 0.0 | CTRL | | | 15 | | | | 5.1.5 | PBD | PBD SWITCH BYPASS OPEN CMD | X |
| 016 | 16 PBD SW BYPASS ST | V93X5816X | 0.0 | CTRL | | | 16 | | | | 5.1.5 | PBD | PBD SWITCH BYPASS STOP CMD | X |
| 017 | 17 PBD SW BYPASS CL | V93X5817X | 0.0 | CTRL | | | 17 | | | | 5.1.5 | PBD | PBD SWITCH BYPASS CLOSE CMD | X |

## TABLE 4.3.14-2. PL BAY DOORS (PFS/BFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | PFS | BFS | | |
| 001 | (OPS) | V93X0040X | 2 | 1 | | 5.0 | | | CHAR | | | | | | | E | | | | | | UI | N/S | OPS FUNCTION PAGE | X |
| 002 | (OPS) | V93X0040X | 2 | 1 | | 5.0 | | | CHAR | | | | | | | C | | | | | | N/S | MI | OPS FUNCTION PAGE | X |
| 003 | (SPEC) | V93X0042X | 7 | 1 | | 4.0 | | | CHAR | | | | | | | E | | | | | | UI | MI | SPEC FUNCTION PAGE | X |
| 004 | (DISP) | V93X0044X | 10 | 1 | | 4.0 | | | DEC | | | | | | | E | | | | | | UI | MI | DISPLAY FUNCTION PAGE | X |
| 005 | (UL) | V92X5032X | 34 | 1 | | 2.0 | UL | | BLVL | | | | | | X | G | | | | | | UI | MI | UPLINK ACTIVITY IND | X |
| 006 | (GPC) | V93X0048X | 36 | 1 | | 2.0 | | | DEC | | | | | | | E | | | | | | UI | N/S | GPC DRIVER | X |
| 007 | (GPC) | V93X0048X | 36 | 1 | | 2.0 | | | DEC | | | | | | | B | | | | | | N/S | MI | GPC DRIVER | X |
| 008 | (MT) | V91W1990C | 39 | 1 | | 12.0 | | | CHAR | DHMS | | | | | | A | | | | | | FCOS | BOS | MISSION ELAPSED TIME | X |
| 009 | (CRT TIMER) | V91W1988C | 39 | 2 | | 12.0 | | | CHAR | DHMS | | | | | | A | | | | | | FCOS | BOS | DISPLAY CRT TIME, SM | X |
| 010 | 1 AC POWER ON | V93X5830X | 19 | 3 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | KYBD | KYBD | PBD AC POWER ON | X |
| 011 | 2 AC POWER OFF | V93X5831X | 19 | 4 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | KYBD | KYBD | PBD AC POWER OFF | X |
| 012 | 3 AUTO MODE SEL | V93X5800X | 19 | 5 | | 1.0 | * | | BLVL | | | | | | | E | | | | | L | SMM | SMM | PBD AUTO SEQUENCE | X |
| 013 | PBD SW | V92J0508C | 29 | 4 | | 4.0 | | | RTXT | | X | | | | | | | | | | A 1 | SMM | SMM | PBD SWITCH INDICATOR | X |
| 014 | 4 CTR LCH 5–8 MAN | V93X5801X | 19 | 9 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | KYBD | KYBD | PBD CENTERLINE LCH 5–8 SEQ | X |
| 015 | 5 CTR LCH 9–12 MAN | V93X5802X | 19 | 10 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | KYBD | KYBD | PBD CENTERLINE LCH 9–12 SEQ | X |
| 016 | 6 CTR LCH 1–4 MAN | V93X5803X | 19 | 11 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | KYBD | KYBD | PBD CENTERLINE LCH 1–4 SEQ | X |
| 017 | 7 CTR LCH 13–16 MAN | V93X5804X | 19 | 12 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | KYBD | KYBD | PBD CENTERLINE LCH 13–16 SEQ | X |
| 018 | 8 S FWD LCH MAN SEL | V93X5810X | 19 | 14 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | KYBD | KYBD | PBD RIGHT FWD BHD LCH SEQ | X |
| 019 | 9 S AFT LCH MAN SEL | V93X5811X | 19 | 15 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | KYBD | KYBD | PBD RIGHT AFT BHD LCH SEQ | X |
| 020 | 10 S DOOR MAN SEL | V93X5812X | 19 | 16 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | KYBD | KYBD | PBD RIGHT PBD SEQ | X |
| 021 | 11 P FWD LCH MAN SEL | V93X5819X | 19 | 18 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | KYBD | KYBD | PBD LEFT FWD BHD LCH SEQ | X |
| 022 | 12 P AFT LCH MAN SEL | V93X5820X | 19 | 19 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | KYBD | KYBD | PBD LEFT AFT BHD LCH SEQ | X |
| 023 | 13 P DOOR MAN SEL | V93X5821X | 19 | 20 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | KYBD | KYBD | PBD LEFT PBD SEQ | X |
| 024 | 14 PBD SW BYPASS | V93X5814X | 19 | 23 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | KYBD | KYBD | PBD SWITCH BYPASS CMD | X |
| 025 | 15 PBD SW BYPASS 0P | V93X5815X | 29 | 22 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | KYBD | KYBD | PBD SWITCH BYPASS OPEN CMD | X |

TABLE 4.3.14-2. PL BAY DOORS (PFS/BFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | PFS | BFS | | |
| 026 | 16 PBD SW BYPASS ST | V93X5816X | 29 | 23 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | KYBD | KYBD | PBD SWITCH BYPASS STOP CMD | X |
| 027 | 17 PBD SW BYPASS CL | V93X5817X | 29 | 24 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | KYBD | KYBD | PBD SWITCH BYPASS CLOSE CMD | X |
| 028 | CTR LCH 5–8 OP/CL | V92J0492C | 22 | 9 | | 2.0 | | | RTXT | | X | | | | | | | | | | B 1 | SMM | SMM | PBD CENTERLINE LCH 5–8 STATUS | X |
| 029 | CTR LCH 9–12 OP/CL | V92J0493C | 22 | 10 | | 2.0 | | | RTXT | | X | | | | | | | | | | C 1 | SMM | SMM | PBD CENTERLINE LCH 9–12 STATUS | X |
| 030 | CTR LCH 1–4 0P/CL | V92J0494C | 22 | 11 | | 2.0 | | | RTXT | | X | | | | | | | | | | D 1 | SMM | SMM | PBD CENTERLINE LCH 1–4 STATUS | X |
| 031 | CTR LCH 13–16 OP/CL | V92J0495C | 22 | 12 | | 2.0 | | | RTXT | | X | | | | | | | | | | E 1 | SMM | SMM | PBD CENTERLINE LCH 13–16 STATUS | X |
| 032 | S FWD LATCHES OP/CL | V92J0496C | 22 | 14 | | 2.0 | | | RTXT | | X | | | | | | | | | | F 1 | SMM | SMM | PBD RIGHT FWD BHD LCH STATUS | X |
| 033 | S AFT LATCHES OP/CL | V92J0498C | 22 | 15 | | 2.0 | | | RTXT | | X | | | | | | | | | | G 1 | SMM | SMM | PBD RIGHT AFT BHD LCH STATUS | X |
| 034 | S DOOR OP/CL | V92J0503C | 21 | 16 | | 3.0 | | | RTXT | | X | | | | | | | | | | H 1 | SMM | SMM | PBD RIGHT DOOR STATUS | X |
| 035 | P FWD LATCHES OP/CL | V92J0497C | 22 | 18 | | 2.0 | | | RTXT | | X | | | | | | | | | | I 1 | SMM | SMM | PBD LEFT FWD BHD LCH STATUS | X |
| 036 | P AFT LATCHES OP/CL | V92J0499C | 22 | 19 | | 2.0 | | | RTXT | | X | | | | | | | | | | J 1 | SMM | SMM | PBD LEFT AFT BHD LCH STATUS | X |
| 037 | P DOOR OP/CL | V92J0504C | 21 | 20 | | 3.0 | | | RTXT | | X | | | | | | | | | | K 1 | SMM | SMM | PBD LEFT DOOR STATUS | X |
| 038 | CTR LCH 5–8 AUTO | V92X0555X | 29 | 9 | | 1.0 | @DNA | | BLVL | | | | | X | | | | | | | | SMM | SMM | PBD CL LCH 5–8 REL FAIL | X |
| 039 | CTR LCH 5–8 AUTO | V92X0551X | 29 | 9 | | 1.0 | @DNA | | BLVL | | | | | X | | | | | | | | SMM | SMM | PBD CL LCH 5–8 LCH FAIL | X |
| 040 | CTR LCH 9–12 AUTO | V92X0556X | 29 | 10 | | 1.0 | @DNA | | BLVL | | | | | X | | | | | | | | SMM | SMM | PBD CL LCH 9–12 REL FAIL | X |
| 041 | CTR LCH 9–12 AUTO | V92X0552X | 29 | 10 | | 1.0 | @DNA | | BLVL | | | | | X | | | | | | | | SMM | SMM | PBD CL LCH 9–12 LCH FAIL | X |
| 042 | CTR LCH 1–4 AUTO | V92X0554X | 29 | 11 | | 1.0 | @DNA | | BLVL | | | | | X | | | | | | | | SMM | SMM | PBD CL LCH 1–4 REL FAIL | X |
| 043 | CTR LCH 1–4 AUTO | V92X0550X | 29 | 11 | | 1.0 | @DNA | | BLVL | | | | | X | | | | | | | | SMM | SMM | PBD CL LCH 1–4 LCH FAIL | X |
| 044 | CTR LCH 13–16 AUTO | V92X0557X | 29 | 12 | | 1.0 | @DNA | | BLVL | | | | | X | | | | | | | | SMM | SMM | PBD CL LCH 13–16 REL FAIL | X |
| 045 | CTR LCH 13–16 AUTO | V92X0553X | 29 | 12 | | 1.0 | @DNA | | BLVL | | | | | X | | | | | | | | SMM | SMM | PBD CL LCH 13–16 LCH FAIL | X |

## TABLE 4.3.14-2. PL BAY DOORS (PFS/BFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | BILEVEL | | | | | | | | | | | | | | | | | | |
| | | | X | Y | | CHAR | 1 | 0 | TYPE | | | | | | | | | | | | | PFS | BFS | | |
| 046 | S FWD LCH AUTO SEQ | V92X0531X | 29 | 14 | | 1.0 | @DNA | | BLVL | | | | | X | | | | | | | | SMM | SMM | PBD RIGHT FWD BHD LATCH–REL FAIL | X |
| 047 | S FWD LCH AUTO SEQ | V92X0530X | 29 | 14 | | 1.0 | @DNA | | BLVL | | | | | X | | | | | | | | SMM | SMM | PBD RIGHT FWD BHD LATCH–LCH FAIL | X |
| 048 | S AFT LCH AUTO SEQ | V92X0536X | 29 | 15 | | 1.0 | @DNA | | BLVL | | | | | X | | | | | | | | SMM | SMM | PBD RIGHT AFT BHD LATCH–REL FAIL | X |
| 049 | S AFT LCH AUTO SEQ | V92X0535X | 29 | 15 | | 1.0 | @DNA | | BLVL | | | | | X | | | | | | | | SMM | SMM | PBD RIGHT AFT BHD LATCH–LCH FAIL | X |
| 050 | S DOOR AUTO SEQ | V92X0510X | 29 | 16 | | 1.0 | @DNA | | BLVL | | | | | X | | | | | | | | SMM | SMM | PBD RIGHT DOOR–OPEN FAIL | X |
| 051 | S DOOR AUTO SEQ | V92X0511X | 29 | 16 | | 1.0 | @DNA | | BLVL | | | | | X | | | | | | | | SMM | SMM | PBD RIGHT DOOR–CLOSE FAIL | X |
| 052 | P FWD LCH AUTO SEQ | V92X0516X | 29 | 18 | | 1.0 | @DNA | | BLVL | | | | | X | | | | | | | | SMM | SMM | PBD LEFT FWD BHD LATCH–REL FAIL | X |
| 053 | P FWD LCH AUTO SEQ | V92X0515X | 29 | 18 | | 1.0 | @DNA | | BLVL | | | | | X | | | | | | | | SMM | SMM | PBD LEFT FWD BHD LATCH–LCH FAIL | X |
| 054 | P AFT LCH AUTO SEQ | V92X0521X | 29 | 19 | | 1.0 | @DNA | | BLVL | | | | | X | | | | | | | | SMM | SMM | PBD LEFT AFT BHD LATCH–REL FAIL | X |
| 055 | P AFT LCH AUTO SEQ | V92X0520X | 29 | 19 | | 1.0 | @DNA | | BLVL | | | | | X | | | | | | | | SMM | SMM | PBD LEFT AFT BHD LATCH–LCH FAIL | X |
| 056 | P DOOR AUTO SEQ | V92X0505X | 29 | 20 | | 1.0 | @DNA | | BLVL | | | | | X | | | | | | | | SMM | SMM | PBD LEFT DOOR–OPEN FAIL | X |
| 057 | P DOOR AUTO SEQ | V92X0506X | 29 | 20 | | 1.0 | @DNA | | BLVL | | | | | X | | | | | | | | SMM | SMM | PBD LEFT DOOR–CLOSE FAIL | X |
| 058 | CTR LCH 5–8 M–SW CA | V37X3395Y | 33 | 9 | | 1.0 | 1 | 0 | BLVL | | | | | | | | | | | | | SMM | SMM | PBD CENTERLINE LCH 5–8 LCH 1 | X |
| 059 | CTR LCH 5–8 M–SW CB | V37X3396Y | 34 | 9 | | 1.0 | 1 | 0 | BLVL | | | | | | | | | | | | | SMM | SMM | PBD CENTERLINE LCH 5–8 LCH 2 | X |
| 060 | CTR LCH 5–8 M–SW OA | V37X3390Y | 35 | 9 | | 1.0 | 1 | 0 | BLVL | | | | | | | | | | | | | SMM | SMM | PBD CENTERLINE LCH 5–8 REL 1 | X |
| 061 | CTR LCH 5–8 M–SW OB | V37X3391Y | 36 | 9 | | 1.0 | 1 | 0 | BLVL | | | | | | | | | | | | | SMM | SMM | PBD CENTERLINE LCH 5–8 REL 2 | X |
| 062 | CTR LCH 9–12M–SW CA | V37X3400Y | 33 | 10 | | 1.0 | 1 | 0 | BLVL | | | | | | | | | | | | | SMM | SMM | PBD CENTERLINE LCH 9–12 LCH 1 | X |
| 063 | CTR LCH 9–12M–SW CB | V37X3401Y | 34 | 10 | | 1.0 | 1 | 0 | BLVL | | | | | | | | | | | | | SMM | SMM | PBD CENTERLINE LCH 9–12 LCH 2 | X |

TABLE 4.3.14-2. PL BAY DOORS (PFS/BFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | PFS | BFS | | |
| 064 | CTR LCH 9–12M–SW OA | V37X3405Y | 35 | 10 | | 1.0 | 1 | 0 | BLVL | | | | | | | | | | | | | SMM | SMM | PBD CENTERLINE LCH 9–12 REL 1 | X |
| 065 | CTR LCH 9–12M–SW OB | V37X3406Y | 36 | 10 | | 1.0 | 1 | 0 | BLVL | | | | | | | | | | | | | SMM | SMM | PBD CENTERLINE LCH 9–12 REL 2 | X |
| 066 | CTR LCH 1–4 M–SW CA | V37X3385Y | 33 | 11 | | 1.0 | 1 | 0 | BLVL | | | | | | | | | | | | | SMM | SMM | PBD CENTERLINE LCH 1–4 LCH 1 | X |
| 067 | CTR LCH 1–4 M–SW CB | V37X3386Y | 34 | 11 | | 1.0 | 1 | 0 | BLVL | | | | | | | | | | | | | SMM | SMM | PBD CENTERLINE LCH 1–4 LCH 2 | X |
| 068 | CTR LCH 1–4 M–SW OA | V37X3380Y | 35 | 11 | | 1.0 | 1 | 0 | BLVL | | | | | | | | | | | | | SMM | SMM | PBD CENTERLINE LCH 1–4 REL 1 | X |
| 069 | CTR LCH 1–4 M–SW OB | V37X3381Y | 36 | 11 | | 1.0 | 1 | 0 | BLVL | | | | | | | | | | | | | SMM | SMM | PBD CENTERLINE LCH 1–4 REL 2 | X |
| 070 | CTR LCH13–16M–SW CA | V37X3410Y | 33 | 12 | | 1.0 | 1 | 0 | BLVL | | | | | | | | | | | | | SMM | SMM | PBD CENTERLINE LCH 13–16 LCH 1 | X |
| 071 | CTR LCH13–16M–SW CB | V37X3411Y | 34 | 12 | | 1.0 | 1 | 0 | BLVL | | | | | | | | | | | | | SMM | SMM | PBD CENTERLINE LCH 13–16 LCH 2 | X |
| 072 | CTR LCH13–16M–SW OA | V37X3415Y | 35 | 12 | | 1.0 | 1 | 0 | BLVL | | | | | | | | | | | | | SMM | SMM | PBD CENTERLINE LCH 13–16 REL 1 | X |
| 073 | CTR LCH13–16M–SW OB | V37X3416Y | 36 | 12 | | 1.0 | 1 | 0 | BLVL | | | | | | | | | | | | | SMM | SMM | PBD CENTERLINE LCH 13–16 REL 2 | X |
| 074 | S FWD LCH M–SW CA | V37X3440Y | 33 | 14 | | 1.0 | 1 | 0 | BLVL | | | | | | | | | | | | | SMM | SMM | PBD RIGHT FWD BHD LATCH–LCH 1 | X |
| 075 | S FWD LCH M–SW CB | V37X3441Y | 34 | 14 | | 1.0 | 1 | 0 | BLVL | | | | | | | | | | | | | SMM | SMM | PBD RIGHT FWD BHD LATCH–LCH 2 | X |
| 076 | S FWD LCH M–SW OA | V37X3430Y | 35 | 14 | | 1.0 | 1 | 0 | BLVL | | | | | | | | | | | | | SMM | SMM | PBD RIGHT FWD BHD LATCH–REL 1 | X |
| 077 | S FWD LCH M–SW OB | V37X3431Y | 36 | 14 | | 1.0 | 1 | 0 | BLVL | | | | | | | | | | | | | SMM | SMM | PBD RIGHT FWD BHD LATCH–REL 2 | X |
| 078 | S AFT LCH M–SW CA | V37X3460Y | 33 | 15 | | 1.0 | 1 | 0 | BLVL | | | | | | | | | | | | | SMM | SMM | PBD RIGHT AFT BHD LATCH–LCH 1 | X |
| 079 | S AFT LCH M–SW CB | V37X3461Y | 34 | 15 | | 1.0 | 1 | 0 | BLVL | | | | | | | | | | | | | SMM | SMM | PBD RIGHT AFT BHD LATCH–LCH 2 | X |

## TABLE 4.3.14-2. PL BAY DOORS (PFS/BFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | BILEVEL | | | | | | | | | | | | | | | | | | |
| | | | X | Y | | CHAR | 1 | 0 | TYPE | | | | | | | | | | | | | PFS | BFS | | |
| 080 | S AFT LCH M–SW OA | V37X3450Y | 35 | 15 | | 1.0 | 1 | 0 | BLVL | | | | | | | | | | | | | SMM | SMM | PBD RIGHT AFT BHD LATCH–REL 1 | X |
| 081 | S AFT LCH M–SW OB | V37X3451Y | 36 | 15 | | 1.0 | 1 | 0 | BLVL | | | | | | | | | | | | | SMM | SMM | PBD RIGHT AFT BHD LATCH–REL 2 | X |
| 082 | P FWD LCH M–SW CA | V37X3330Y | 33 | 18 | | 1.0 | 1 | 0 | BLVL | | | | | | | | | | | | | SMM | SMM | PBD LEFT FWD BHD LATCH–LCH 1 | X |
| 083 | P FWD LCH M–SW CB | V37X3331Y | 34 | 18 | | 1.0 | 1 | 0 | BLVL | | | | | | | | | | | | | SMM | SMM | PBD LEFT FWD BHD LATCH–LCH 2 | X |
| 084 | P FWD LCH M–SW OA | V37X3320Y | 35 | 18 | | 1.0 | 1 | 0 | BLVL | | | | | | | | | | | | | SMM | SMM | PBD LEFT FWD BHD LATCH–REL 1 | X |
| 085 | P FWD LCH M–SW OB | V37X3321Y | 36 | 18 | | 1.0 | 1 | 0 | BLVL | | | | | | | | | | | | | SMM | SMM | PBD LEFT FWD BHD LATCH–REL 2 | X |
| 086 | P AFT LCH M–SW CA | V37X3360Y | 33 | 19 | | 1.0 | 1 | 0 | BLVL | | | | | | | | | | | | | SMM | SMM | PBD LEFT AFT BHD LATCH–LCH 1 | X |
| 087 | P AFT LCH M–SW CB | V37X3361Y | 34 | 19 | | 1.0 | 1 | 0 | BLVL | | | | | | | | | | | | | SMM | SMM | PBD LEFT AFT BHD LATCH–LCH 2 | X |
| 088 | P AFT LCH M–SW OA | V37X3350Y | 35 | 19 | | 1.0 | 1 | 0 | BLVL | | | | | | | | | | | | | SMM | SMM | PBD LEFT AFT BHD LATCH–REL 1 | X |
| 089 | P AFT LCH M–SW OB | V37X3351Y | 36 | 19 | | 1.0 | 1 | 0 | BLVL | | | | | | | | | | | | | SMM | SMM | PBD LEFT AFT BHD LATCH–REL 2 | X |
| 090 | S FWD DOOR M–SW C | V37X3302Y | 39 | 14 | | 1.0 | 1 | 0 | BLVL | | | | | | | | | | | | | SMM | SMM | PBD RIGHT CLOSE 1 | X |
| 091 | S FWD DOOR M–SW RA | V37X3435Y | 40 | 14 | | 1.0 | 1 | 0 | BLVL | | | | | | | | | | | | | SMM | SMM | PBD RIGHT FWD BHD READY FOR LCH 1 | X |
| 092 | S FWD DOOR M–SW RB | V37X3436Y | 41 | 14 | | 1.0 | 1 | 0 | BLVL | | | | | | | | | | | | | SMM | SMM | PBD RIGHT FWD BHD READY FOR LCH 2 | X |
| 093 | S FWD DOOR M–SW RC | V37X3437Y | 42 | 14 | | 1.0 | 1 | 0 | BLVL | | | | | | | | | | | | | SMM | SMM | PBD RIGHT FWD BHD READY FOR LCH 3 | X |
| 094 | S FWD DOOR M–SW O | V37X3300Y | 43 | 14 | | 1.0 | 1 | 0 | BLVL | | | | | | | | | | | | | SMM | SMM | PBD RIGHT OPEN 1 | X |
| 095 | S AFT DOOR M–SW C | V37X3303Y | 39 | 15 | | 1.0 | 1 | 0 | BLVL | | | | | | | | | | | | | SMM | SMM | PBD RIGHT CLOSE 2 | X |
| 096 | S AFT DOOR M–SW RA | V37X3455Y | 40 | 15 | | 1.0 | 1 | 0 | BLVL | | | | | | | | | | | | | SMM | SMM | PBD RIGHT AFT BHD READY FOR LCH 1 | X |

TABLE 4.3.14-2. PL BAY DOORS (PFS/BFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | BILEVEL | | | | | | | | | | | | | | | | | | |
| | | | X | Y | | CHAR | 1 | 0 | TYPE | | | | | | | | | | | | | PFS | BFS | | |
| 097 | S AFT DOOR M–SW RB | V37X3456Y | 41 | 15 | | 1.0 | 1 | 0 | BLVL | | | | | | | | | | | | | SMM | SMM | PBD RIGHT AFT BHD READY FOR LCH 2 | X |
| 098 | S AFT DOOR M–SW RC | V37X3457Y | 42 | 15 | | 1.0 | 1 | 0 | BLVL | | | | | | | | | | | | | SMM | SMM | PBD RIGHT AFT BHD READY FOR LCH 3 | X |
| 099 | S AFT DOOR M–SW O | V37X3301Y | 43 | 15 | | 1.0 | 1 | 0 | BLVL | | | | | | | | | | | | | SMM | SMM | PBD RIGHT OPEN 2 | X |
| 100 | P FWD DOOR M–SW C | V37X3307Y | 39 | 18 | | 1.0 | 1 | 0 | BLVL | | | | | | | | | | | | | SMM | SMM | PBD LEFT CLOSE 1 | X |
| 101 | P FWD DOOR M–SW RA | V37X3325Y | 40 | 18 | | 1.0 | 1 | 0 | BLVL | | | | | | | | | | | | | SMM | SMM | PBD LEFT FWD BHD READY FOR LCH 1 | X |
| 102 | P FWD DOOR M–SW RB | V37X3326Y | 41 | 18 | | 1.0 | 1 | 0 | BLVL | | | | | | | | | | | | | SMM | SMM | PBD LEFT FWD BHD READY FOR LCH 2 | X |
| 103 | P FWD DOOR M–SW RC | V37X3327Y | 42 | 18 | | 1.0 | 1 | 0 | BLVL | | | | | | | | | | | | | SMM | SMM | PBD LEFT FWD BHD READY FOR LCH 3 | X |
| 104 | P FWD DOOR M–SW O | V37X3305Y | 43 | 18 | | 1.0 | 1 | 0 | BLVL | | | | | | | | | | | | | SMM | SMM | PBD LEFT OPEN 1 | X |
| 105 | P AFT DOOR M–SW C | V37X3308Y | 39 | 19 | | 1.0 | 1 | 0 | BLVL | | | | | | | | | | | | | SMM | SMM | PBD LEFT CLOSE 2 | X |
| 106 | P AFT DOOR M–SW RA | V37X3355Y | 40 | 19 | | 1.0 | 1 | 0 | BLVL | | | | | | | | | | | | | SMM | SMM | PBD LEFT AFT BHD READY FOR LCH 1 | X |
| 107 | P AFT DOOR M–SW RB | V37X3356Y | 41 | 19 | | 1.0 | 1 | 0 | BLVL | | | | | | | | | | | | | SMM | SMM | PBD LEFT AFT BHD READY FOR LCH 2 | X |
| 108 | P AFT DOOR M–SW RC | V37X3357Y | 42 | 19 | | 1.0 | 1 | 0 | BLVL | | | | | | | | | | | | | SMM | SMM | PBD LEFT AFT BHD READY FOR LCH 3 | X |
| 109 | P AFT DOOR M–SW O | V37X3306Y | 43 | 19 | | 1.0 | 1 | 0 | BLVL | | | | | | | | | | | | | SMM | SMM | PBD LEFT OPEN 2 | X |
| 110 | (MSG LINE) | V93X0050X | 1 | 25 | | 44.0 | | | CHAR | | | | | | | G | | | | | | UI | N/S | MESSAGE LINE | X |
| 111 | (MSG LINE) | V93X0050X | 2 | 25 | | 46.0 | | | CHAR | | | | | | | G | | | | | | N/S | MI | MESSAGE LINE | X |
| 112 | (BUFFER MSG) | V93X0054X | 45 | 25 | | 4.0 | | | CHAR | | | | | | | G | | | | | | UI | N/S | BUFFER MESSAGE INDICATOR | X |
| 113 | (BUFFER MSG) | V93X0054X | 48 | 25 | | 4.0 | | | CHAR | | | | | | | G | | | | | | N/S | MI | BUFFER MESSAGE INDICATOR | X |
| 114 | (SPL) | V93X0056X | 2 | 26 | | 49.0 | | | CHAR | | | | | | | G | | | | | | UI | MI | SCRATCH PAD LINE | X |
| 200 | (BFS) | V98X0015X | 35 | 2 | | 3.0 | | | CHAR | | | | | X | | G | | | | | | N/S | MI | BFS IDENTIFIER BFS | X |

### 4.3.15 PROPELLANT THERMAL

See JSC–19590, Section 6.12.

### 4.3.16 PDRS FAULTS

See JSC–19590, Section 6.13.

### 4.3.17 THERMAL (BFS)

TITLE: THERMAL
TYPE: OPS/0001
AVAILABILITY: BFS ONLY, SM0

#### 4.3.17.1 Purpose, Operation and Organization

This display provides monitoring capability to the crew for hydraulic system thermal conditioning during the surface drive exercise and provides monitoring capability for hydraulic systems brake pressures, critical systems heater operations, ECLSS flash evaporator operations, fuel cell water removal, and landing gear tire pressures during ascent and entry.

Figure 4.3.17–1 is the THERMAL Display Format.

1. a. The hydraulic section (HYD SYS TEMP) displays temperature (in degrees Fahrenheit) of the hydraulic fluid in the pressurization systems of the aerosurface control system. A status symbol is driven adjacent to each temperature such that if that temperature is less than an acceptable level, a down arrow shall appear. As the fluid is warmed during the thermal conditioning exercise of the aerosurface the down arrow shall disappear (replaced by blank) when the temperature becomes acceptable. No fault message or other indication shall be generated. Fluid temperature is shown at 12 points in the pressurization lines for body flap, rudder/speedbrake, and each elevon. The parameters are arranged so the crew can monitor down arrows horizontally across two lines, one line for the active pressurization system, PRIME, and one line for the STBY 1.

   b. The hydraulic brake pressure section (BRAKE PRESS) displays 8 brake pressure measurements in PSIA. The hardware consists of two brake skid/control modules for each of the four main gear tires, left outboard (L OB), left inboard (L IB), right inboard (R IB), and right outboard (R OB) for a total of eight modules. Class 3 FDA/annunciation will provide detection of uncommanded brake pressure in excess of a K–loaded limit value for each of the redundant parameters during entry in an effort to avert brake lock–up at landing touchdown. When the limit value is exceeded a class 3 alert, CRT message and up–arrow(s) are output to direct the crew to malfunction procedures for relieving the pressure. The parameters are arranged in two lines so the crew can monitor and be directed to pressures in hydraulic systems 1 and/or 3 (1/3), 2 and/or 3 (2/3).

2. The heater temperature section (HTR TEMP) provides dedicated character spaces for specific heater related parameters such that when any parameter exceeds its Alarm Class 3 FDA limit value(s) (high and/or low), a parameter status indicator is displayed opposite its nomenclature group. The display is organized such that the presence of a status indicator and the format nomenclature direct the crew to a specific switch (or set of switches) to correct the malfunction. The parameters are categorized into propellant (PRPLT), flash evaporator (EVAP), hydraulic water boiler (HYD BLR/HTR), and auxiliary power units (APU) related temperatures.

3. The FREON LOOP and H2O sections display parameter values necessary to support flash evaporator thermal monitoring and H2O supply pressure used to monitor water flow from the fuel cells to the ECLSS water storage tanks.

4. Deleted.

5. The TIRE PRESS section is used to monitor the pressure in the six Orbiter landing gear tires: main gear (MG) left (LEFT) and right (RIGHT) inboard (IB) and outboard (OB) wheels; nose gear (NG) left and right wheel redundant sensors.

### 4.3.17.2 THERMAL Keyboard Processing Addendum

Not applicable

### 4.3.17.3 THERMAL CRT Display Processing Addendum

The table below presents the parameter status indicators (PSI) that can be displayed for a parameter. In SM–PL, PSI requirements can be one of two types as follows:

- A PSI which is part of the data words identified by an “X” marked in the STATUS column of Table 4.3.17–2.

- A PSI which is a stand–alone identified by the word “STAT” being inserted in the FORMAT TYPE column of Table 4.3.17–2.

Both PSI types have a numeric code appearing as an entry (right justified) in the ADD REF column of CRT display processing Table 4.3.17–2. The numeric code, corresponding to one of those listed in the table, indicates the specific status processing to be performed. If there is no numeric code entry, the status processing is defined by the default code.

When the “M” PSI is displayed (for Commfault, I/O error resulting in missing data), the last value of the associated parameter will continue to be displayed unless specified otherwise.

| Numeric Code | PSI SYMBOL(S) | | | | | |
|---|---|---|---|---|---|---|
| Default (blank) | ↓ | ↑ | H | L | M | ∅ |
| 1 | | | | | M | ∅ |
| 2 | | | H | L | M | ∅ |
| 3 | ↓ | | | | M | ∅ |
| 4 | ↓ | | | | | ∅ |

∅ = blank

NOTE: The numeric addendum reference codes are for information only. Actual processing requirements are specified in the SM Level B CPDS (SS–P–0002–580) and/or Level C Systems Management FSR (JSC–19590) or Payload Management FSR (JSC–19478).

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The following alpha code(s) appear (left justified) in the ADD REF column of Table 4.3.17–2 whenever it is necessary to define any special processing requirements not otherwise covered therein:

Not Applicable

### 4.3.17.4 THERMAL Figure/Table References

Figure 4.3.17–1 Thermal Display (BFS)

Table 4.3.17–1 Keyboard Processing Table N/A

Table 4.3.17–2 CRT Display Processing Table

Table 4.3.17–3 CRT Display Processing Background Requirements N/A

Table 4.3.17–4 Mission Design Background Constants N/A

Table 4.3.17–5 Input Functional Parameters N/A

Table 4.3.17–6 Output Functional Parameters N/A

Table 4.3.17–7 I–Loads

Table 4.3.17–8 K–Loads

Table 4.3.17–9 Constants N/A

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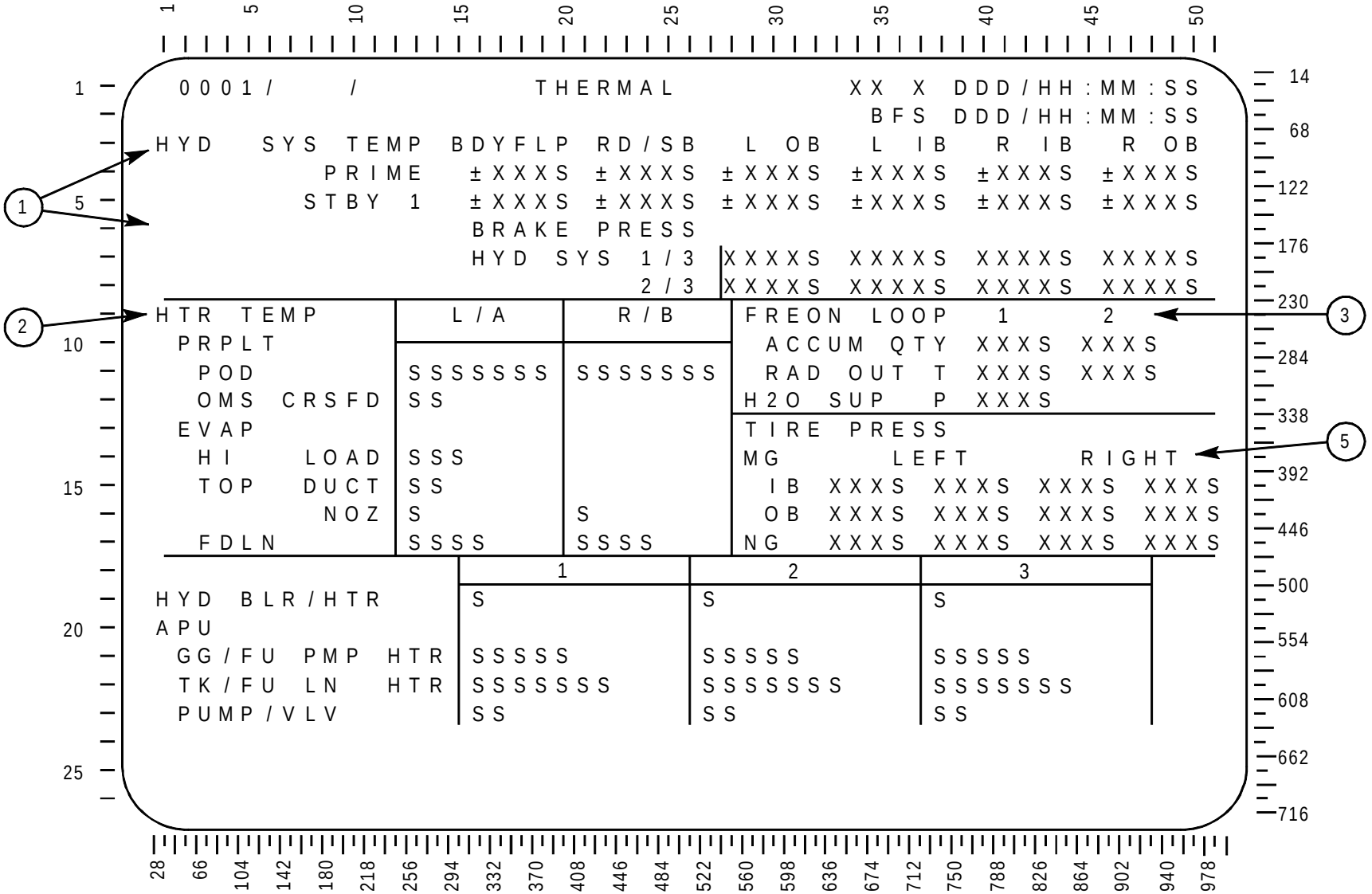


FIGURE 4.3.17-1. Thermal Display (BFS)

TABLE 4.3.17-2. THERMAL (BFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWN LST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | BILEVEL | | | | | | | | | | | | | | | | | |
| | | | X | Y | | CHAR | 1 | 0 | TYPE | | | | | | | | | | | | | | | |
| 001 | (OPS) | V93X0040X | 2 | 1 | | 5.0 | | | CHAR | | | | | | | C | | | | | | MI | OPS FUNCTION PAGE | X |
| 002 | (SPEC) | V93X0042X | 7 | 1 | | 4.0 | | | CHAR | | | | | | | E | | | | | | MI | SPEC FUNCTION PAGE | X |
| 003 | (DISP) | V93X0044X | 10 | 1 | | 4.0 | | | DEC | | | | | | | E | | | | | | MI | DISPLAY FUNCTION PAGE | X |
| 004 | (UL) | V92X5032X | 34 | 1 | | 2.0 | UL | | BLVL | | | | | | X | G | | | | | | MI | UPLINK ACTIVITY IND | X |
| 005 | (GPC) | V93X0048X | 36 | 1 | | 2.0 | | | DEC | | | | | | | B | | | | | | MI | GPC DRIVER | X |
| 006 | (MT) | V91W1990C | 39 | 1 | | 12.0 | | | CHAR | DHMS | | | | | | A | | | | | | BOS | MISSION ELAPSED TIME | X |
| 007 | (CRT TIMER) | V91W1988C | 39 | 2 | | 12.0 | | | CHAR | DHMS | | | | | | A | | | | | | BOS | DISPLAY CRT TIME, SM | X |
| 008* | BDYFLP PRIME TEMP | V58T0169A | 16 | 4 | | 4.0 | | | DEC | DEG F | X | | | | | | X | | | | | OI SMM | HYD SYS 1 BODY FLAP RTN LN T 1 | X |
| 009* | RD/SB PRIME TEMP | V58T1006A | 22 | 4 | | 4.0 | | | DEC | DEG F | X | | | | | | X | | | | | OI SMM | HYD SYS 1 RSB RTN LN TEMP | X |
| 010* | L OB PRIME TEMP | V58T0394A | 28 | 4 | | 4.0 | | | DEC | DEG F | X | | | | | | X | | | | | OI SMM | HYD SYS 3 LOE RTN LN T | X |
| 011* | L IB PRIME TEMP | V58T0257A | 34 | 4 | | 4.0 | | | DEC | DEG F | X | | | | | | X | | | | | OI SMM | HYD 2 LH INBD ELVN ACTR RTN LN T | X |
| 012* | R IB PRIME TEMP | V58T0359A | 40 | 4 | | 4.0 | | | DEC | DEG F | X | | | | | | X | | | | | OI SMM | HYD 3 RH INBD ELVN ACTR RTN LN T | X |
| 013* | R OB PRIME TEMP | V58T0294A | 46 | 4 | | 4.0 | | | DEC | DEG F | X | | | | | | X | | | | | OI SMM | HYD SYS 2 ROE RTN LN T | X |
| 014* | BDYFLP STBY 1 TEMP | V58T0269A | 16 | 5 | | 4.0 | | | DEC | DEG F | X | | | | | | X | | | | | OI SMM | HYD SYS 2 BODY FLAP RTN LN T | X |
| 015 | RD/SB STBY 1 TEMP | V58T0284A | 22 | 5 | | 4.0 | | | DEC | DEG F | X | | | | | | X | | | | | OI SMM | HYD SYS 2 RSB RTN LN T | X |
| 016* | L OB STBY 1 TEMP | V58T0193A | 28 | 5 | | 4.0 | | | DEC | DEG F | X | | | | | | X | | | | | OI SMM | HYD SYS 1 LOE RTN LN T | X |
| 017* | L IB STBY 1 TEMP | V58T0157A | 34 | 5 | | 4.0 | | | DEC | DEG F | X | | | | | | X | | | | | OI SMM | HYD 1 LH INBD ELVN ACTR RTN LN T | X |
| 018* | R IB STBY 1 TEMP | V58T0159A | 40 | 5 | | 4.0 | | | DEC | DEG F | X | | | | | | X | | | | | OI SMM | HYD 1 RH INBD ELVN ACTR RTN LN T | X |
| 019* | R OB STBY 1 TEMP | V58T0194A | 46 | 5 | | 4.0 | | | DEC | DEG F | X | | | | | | X | | | | | OI SMM | HYD SYS 1 ROE RTN LN T | X |
| 020 | BRAKE P 1/3 L OB A | V51P0724A | 27 | 7 | | 5.0 | | | DEC | PSIA | X | | | | | | | | | | | OI SMM | LDG GR LH OUTBD BRAKE PRESS NO.4A | |
| 021 | BRAKE P 1/3 L IB A | V51P0726A | 33 | 7 | | 5.0 | | | DEC | PSIA | X | | | | | | | | | | | OI SMM | LDG GR LH INBD BRAKE PRESS NO.3A | |
| 022 | BRAKE P 1/3 R IB A | V51P0746A | 39 | 7 | | 5.0 | | | DEC | PSIA | X | | | | | | | | | | | OI SMM | LDG GR RH INBD BRAKE PRESS NO.3A | |
| 023 | BRAKE P 1/3 R OB A | V51P0744A | 45 | 7 | | 5.0 | | | DEC | PSIA | X | | | | | | | | | | | OI SMM | LDG GR RH OUTBD BRAKE PRESS NO.4A | |
| 024 | BRAKE P 2/3 L OB A | V51P0722A | 27 | 8 | | 5.0 | | | DEC | PSIA | X | | | | | | | | | | | OI SMM | LDG GR LH OUTBD BRAKE PRESS NO.2A | |
| 025 | BRAKE P 2/3 L IB A | V51P0728A | 33 | 8 | | 5.0 | | | DEC | PSIA | X | | | | | | | | | | | OI SMM | LDG GR LH INBD BRAKE PRESS NO.1A | |
| 026 | BRAKE P 2/3 R IB A | V51P0748A | 39 | 8 | | 5.0 | | | DEC | PSIA | X | | | | | | | | | | | OI SMM | LDG GR RH INBD BRAKE PRESS NO.1A | |
| 027 | BRAKE P 2/3 R OB A | V51P0742A | 45 | 8 | | 5.0 | | | DEC | PSIA | X | | | | | | | | | | | OI SMM | LDG GR RH OUTBD BRAKE PRESS NO.2A | |
| 028* | L PRPLT POD A | V42T2304A | 13 | 11 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | RCS–L AFT HOUSING THERM SW TEMP 1 | X |
| 029* | L PRPLT POD B | V43T4701A | 14 | 11 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | OMS–L POD RCS HSG VERNIER CMPT T 1 | X |
| 030* | L PRPLT POD C | V43T4704A | 15 | 11 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | OMS–L POD OX DRAIN PNL TEMP 1 | X |

## TABLE 4.3.17-2. THERMAL (BFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | | | |
| 031* | L PRPLT POD D | V43T4705A | 16 | 11 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | OMS–L POD OX DRAIN PNL TEMP 2 | X |
| 032* | L PRPLT POD E | V43T4707A | 17 | 11 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | OMS L POD ENG SERVICE PNL TEMP | X |
| 033* | L PRPLT POD F | V43T4216A | 18 | 11 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | OMS–L POD OXDZR ENG INLET TEMP | X |
| 034* | L PRPLT POD G | V43T4642A | 19 | 11 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | OMS L ENG FU FEEDLINE TEMP | X |
| 035* | R PRPLT POD A | V42T3304A | 21 | 11 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | RCS–R AFT HOUSING THERM SW TEMP 1 | X |
| 036* | R PRPLT POD B | V43T5701A | 22 | 11 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | OMS–R POD RCS HSG VERNIER CMPT T 1 | X |
| 037* | R PRPLT POD C | V43T5704A | 23 | 11 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | OMS–R POD OX DRAIN PNL TEMP 1 | X |
| 038* | R PRPLT POD D | V43T5705A | 24 | 11 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | OMS–R POD OX DRAIN PNL TEMP 2 | X |
| 039* | R PRPLT POD E | V43T5707A | 25 | 11 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | OMS R POD ENG SERVICE PNL TEMP | X |
| 040* | R PRPLT POD F | V43T5216A | 26 | 11 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | OMS–R POD OXDZR ENG INLET TEMP | X |
| 041* | R PRPLT POD G | V43T5642A | 27 | 11 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | OMS R ENG FU FEEDLINE TEMP | X |
| 042* | PRPLT OMS CRSFD C | V43T6236A | 13 | 12 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | OMS–AFT FUSLG LOW PT OX DRN LN T–L | X |
| 043* | PRPLT OMS CRSFD D | V43T6237A | 14 | 12 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | OMS–AFT FUSLG LOW PT OX DRN LN T–R | X |
| 044* | EVAP HI LOAD A | V63T1820A | 13 | 14 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | FLASH EVAP HI LOAD DUCT TEMP–HTR A | X |
| 045* | EVAP HI LOAD B | V63T1821A | 14 | 14 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | FLASH EVAP HI LOAD DUCT TEMP–HTR B | X |
| 046* | EVAP HI LOAD C | V63T1890A | 15 | 14 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | FLASH EVAP HI LOAD NOZ TEMP–HTR C | X |
| 047* | EVAP TOP DUCT A | V63T1801A | 13 | 15 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | FLASH EVAP TOPPING DUCT TEMP–HTR D | X |
| 048* | EVAP TOP DUCT B | V63T1802A | 14 | 15 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | FLASH EVAP TOPPING DUCT TEMP–HTR E | X |
| 049 | TIRE P MG IB LEFT 1 | V51P0571A | 32 | 15 | | 4.0 | | | DEC | CTS | X | | | | | | | | | | | OI SMM | MLG LH INBD TIRE PRESS 1 | |
| 050 | TIRE P MG IB LEFT 2 | V51P0573A | 37 | 15 | | 4.0 | | | DEC | CTS | X | | | | | | | | | | | OI SMM | MLG LH INBD TIRE PRESS 2 | |
| 051 | TIRE P MG IB RIGHT 1 | V51P0471A | 42 | 15 | | 4.0 | | | DEC | CTS | X | | | | | | | | | | | OI SMM | MLG RH INBD TIRE PRESS 1 | |
| 052 | TIRE P MG IB RIGHT 2 | V51P0473A | 47 | 15 | | 4.0 | | | DEC | CTS | X | | | | | | | | | | | OI SMM | MLG RH INBD TIRE PRESS 2 | |
| 053* | EVAP A NOZ | V63T1878A | 13 | 16 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | FLASH EVAP TOPPING NOZ LH T–HTR I | X |
| 053* | EVAP B NOZ | V63T1879A | 21 | 16 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | FLASH EVAP TOPPING NOZ RH T–HTR G | X |
| 055 | TIRE P MG OB LEFT 1 | V51P0570A | 32 | 16 | | 4.0 | | | DEC | CTS | X | | | | | | | | | | | OI SMM | MLG LH OUTBD TIRE PRESS 1 | |
| 056 | TIRE P MG OB LEFT 2 | V51P0572A | 37 | 16 | | 4.0 | | | DEC | CTS | X | | | | | | | | | | | OI SMM | MLG LH OUTBD TIRE PRESS 2 | |
| 057 | TIRE P MG OB RIGHT 1 | V51P0470A | 42 | 16 | | 4.0 | | | DEC | CTS | X | | | | | | | | | | | OI SMM | MLG RH OUTBD TIRE PRESS 1 | |
| 058 | TIRE P MG OB RIGHT 2 | V51P0472A | 47 | 16 | | 4.0 | | | DEC | CTS | X | | | | | | | | | | | OI SMM | MLG RH OUTBD TIRE PRESS 2 | |
| 059* | EVAP A FDLN A | V63T1870A | 13 | 17 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | FLASH EVAPORATOR H2O FDLN TEMP 1–L | X |
| 060* | EVAP A FDLN B | V63T1872A | 14 | 17 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | FLASH EVAPORATOR H2O FDLN TEMP 2–L | X |

TABLE 4.3.17-2. THERMAL (BFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWN LST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | | | |
| 061* | EVAP A FDLN C | V63T1874A | 15 | 17 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | FLASH EVAPORATOR H2O FDLN TEMP 3–L | X |
| 062* | EVAP A FDLN D | V63T1876A | 16 | 17 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | FLASH EVAPORATOR H2O FDLN TEMP 4–L | X |
| 063* | EVAP B FDLN A | V63T1871A | 21 | 17 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | FLASH EVAPORATOR H2O FDLN TEMP 1–R | X |
| 064* | EVAP B FDLN B | V63T1873A | 22 | 17 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | FLASH EVAPORATOR H2O FDLN TEMP 2–R | X |
| 065* | EVAP B FDLN C | V63T1875A | 23 | 17 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | FLASH EVAPORATOR H2O FDLN TEMP 3–R | X |
| 066* | EVAP B FDLN D | V63T1877A | 24 | 17 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | FLASH EVAPORATOR H2O FDLN TEMP 4–R | X |
| 067 | TIRE P NG LEFT 1 | V51P0370A | 32 | 17 | | 4.0 | | | DEC | CTS | X | | | | | | | | | | | OI SMM | NLG LH TIRE PRESS 1 | |
| 068 | TIRE P NG LEFT 2 | V51P0372A | 37 | 17 | | 4.0 | | | DEC | CTS | X | | | | | | | | | | | OI SMM | NLG LH TIRE PRESS 2 | |
| 069 | TIRE P NG RIGHT 1 | V51P0371A | 42 | 17 | | 4.0 | | | DEC | CTS | X | | | | | | | | | | | OI SMM | NLG RH TIRE PRESS 1 | |
| 070 | TIRE P NG RIGHT 2 | V51P0373A | 47 | 17 | | 4.0 | | | DEC | CTS | X | | | | | | | | | | | OI SMM | NLG RH TIRE PRESS 2 | |
| 071* | HYD BLR/HTR 1 | V58T0162A | 16 | 19 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | HYDR SYS 1 H2O BLR TEMP NO 1 | X |
| 072* | HYD BLR/HTR 2 | V58T0262A | 27 | 19 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | HYDR SYS 2 H2O BLR TEMP NO 1 | X |
| 073* | HYD BLR/HTR 3 | V58T0362A | 38 | 19 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | HYDR SYS 3 H2O BLR TEMP NO 1 | X |
| 074* | APU GG/FU PMP HTR 1A | V46T0122A | 16 | 21 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | APU 1 GAS GENERATOR BED TEMP | X |
| 075* | APU GG/FU PMP HTR 1B | V46T0174A | 17 | 21 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | APU 1 INJ TUBE TEMP | X |
| 076* | APU GG/FU PMP HTR 1C | V46T0112A | 18 | 21 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | APU 1 FUEL PUMP DISCHARGE TEMP | X |
| 077* | APU GG/FU PMP HTR 1D | V46T1171A | 19 | 21 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | APU 1 GGVM SUPPLY LINE TEMP | X |
| 078* | APU GG/FU PMP HTR 1E | V46T0128A | 20 | 21 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | APU 1 FUEL LINE TEMP NO 3 | X |
| 079* | APU GG/FU PMP HTR 2A | V46T0222A | 27 | 21 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | APU 2 GAS GENERATOR BED TEMP | X |
| 080* | APU GG/FU PMP HTR 2B | V46T0274A | 28 | 21 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | APU 2 INJ TUBE TEMP | X |
| 081* | APU GG/FU PMP HTR 2C | V46T0212A | 29 | 21 | | 10 | | | STAT | | | | | | | | | | | | | OI SMM | APU 2 FUEL PUMP DISCHARGE TEMP | X |
| 082* | APU GG/FU PMP HTR 2D | V46T1271A | 30 | 21 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | APU 2 GGVM SUPPLY LINE TEMP | X |
| 083* | APU GG/FU PMP HTR 2E | V46T0228A | 31 | 21 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | APU 2 FUEL LINE TEMP NO 3 | X |
| 084* | APU GG/FU PMP HTR 3A | V46T0322A | 38 | 21 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | APU 3 GAS GENERATOR BED TEMP | X |
| 085* | APU GG/FU PMP HTR 3B | V46T0374A | 39 | 21 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | APU 3 INJ TUBE TEMP | X |
| 086* | APU GG/FU PMP HTR 3C | V46T0312A | 40 | 21 | | 10 | | | STAT | | | | | | | | | | | | | OI SMM | APU 3 FUEL PUMP DISCHARGE TEMP | X |
| 087* | APU GG/FU PMP HTR 3D | V46T1371A | 41 | 21 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | APU 3 GGVM SUPPLY LINE TEMP | X |
| 088* | APU GG/FU PMP HTR 3E | V46T0328A | 42 | 21 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | APU 3 FUEL LINE TEMP NO 3 | X |
| 089* | APU TK/FU LN HTR 1A | V46T0104A | 16 | 22 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | APU 1 FUEL LINE TEMP NO 2 | X |
| 090* | APU TK/FU LN HTR 1B | V46T0108A | 17 | 22 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | APU 1 FUEL LINE TEMP NO 1 | X |

## TABLE 4.3.17-2. THERMAL (BFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | BILEVEL | | | | | | | | | | | | | | | | | |
| | | | X | Y | | CHAR | 1 | 0 | TYPE | | | | | | | | | | | | | | | |
| 091* | APU TK/FU LN HTR 1C | V46T0183A | 18 | 22 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | APU 1 FUEL TEST LINE TEMP 1 | X |
| 092* | APU TK/FU LN HTR 1D | V46T0184A | 19 | 22 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | APU 1 FUEL SERVICE LINE TEMP | X |
| 093* | APU TK/FU LN HTR 1E | V46T0186A | 20 | 22 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | APU 1 FUEL PUMP DRAIN LINE TEMP 1 | X |
| 094 | APU TK/FU LN HTR 1F | V46T0170A | 21 | 22 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | APU 1 F/P DRN LN TEMP 2 | |
| 095* | APU TK/FU LN HTR 2A | V46T0204A | 27 | 22 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | APU 2 FUEL LINE TEMP NO 2 | X |
| 096* | APU TK/FU LN HTR 2B | V46T0208A | 28 | 22 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | APU 2 FUEL LINE TEMP NO 1 | X |
| 097* | APU TK/FU LN HTR 2C | V46T0283A | 29 | 22 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | APU 2 FUEL TEST LINE TEMP 1 | X |
| 098* | APU TK/FU LN HTR 2D | V46T0284A | 30 | 22 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | APU 2 FUEL SERVICE LINE TEMP | X |
| 099* | APU TK/FU LN HTR 2E | V46T0286A | 31 | 22 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | APU 2 FUEL PUMP DRAIN LINE TEMP 1 | X |
| 100* | APU TK/FU LN HTR 2F | V46T0270A | 32 | 22 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | APU 2 F/P DRN LN TEMP 2 | X |
| 101* | APU TK/FU LN HTR 3A | V46T0304A | 38 | 22 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | APU 3 FUEL LINE TEMP NO 2 | X |
| 102* | APU TK/FU LN HTR 3B | V46T0308A | 39 | 22 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | APU 3 FUEL LINE TEMP NO 1 | X |
| 103* | APU TK/FU LN HTR 3C | V46T0383A | 40 | 22 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | APU 3 FUEL TEST LINE TEMP 1 | X |
| 104* | APU TK/FU LN HTR 3D | V46T0384A | 41 | 22 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | APU 3 FUEL SERVICE LINE TEMP | X |
| 105* | APU TK/FU LN HTR 3E | V46T0386A | 42 | 22 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | APU 3 FUEL PUMP DRAIN LINE TEMP 1 | X |
| 106 | APU TK/FU LN HTR 3F | V46T0370A | 43 | 22 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | APU 3 F/P DRN LN TEMP 2 | |
| 107* | ACUM QTY 1 | V63Q1130A | 39 | 10 | | 4.0 | | | DEC | PCT | X | | | | | | | | | | | OI SMM | FCL 1 ACCUMULATOR QUANTITY | X |
| 108* | ACUM QTY 2 | V63Q1330A | 44 | 10 | | 4.0 | | | DEC | PCT | X | | | | | | | | | | | OI SMM | FCL 2 ACCUMULATOR QUANTITY | X |
| 109* | RAD OUT T 1 | V63T1208A | 39 | 11 | | 4.0 | | | DEC | DEG F | X | | | | | | | | | | | OI SMM | FCL 1 RAD OUTLET TEMP | X |
| 110* | RAD OUT T 2 | V63T1408A | 44 | 11 | | 4.0 | | | DEC | DEG F | X | | | | | | | | | | | OI SMM | FCL 2 RAD OUTLET TEMP | X |
| 111* | H2O SUP P | V62P0430A | 39 | 12 | | 4.0 | | | DEC | PSIA | X | | | | | | | | | | | OI SMM | SUPPLY H2O STORAGE INLET PRESS | X |
| 112* | APU TK/FU LN HTR 1G | V46T0501A | 22 | 22 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | APU H2O LINE TEMP NO 1 | X |
| 113* | APU TK/FU LN HTR 2G | V46T0502A | 33 | 22 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | APU H2O LINE TEMP NO 2 | X |
| 114* | APU TK/FU LN HTR 3G | V46T0503A | 44 | 22 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | APU H2O LINE TEMP NO 3 | X |
| 115* | PUMP/VLV 1A | V46T0192A | 16 | 23 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | APU 1 FUEL PUMP TEMP | X |
| 116* | PUMP/VLV 1B | V46T1172A | 17 | 23 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | APU 1 GGVM HEAT SINK TEMP | X |
| 117* | PUMP/VLV 2A | V46T0292A | 27 | 23 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | APU 2 FUEL PUMP TEMP | X |
| 118* | PUMP/VLV 2B | V46T1272A | 28 | 23 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | APU 2 GGVM HEAT SINK TEMP | X |
| 119* | PUMP/VLV 3A | V46T0392A | 38 | 23 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | APU 3 FUEL PUMP TEMP | X |
| 120* | PUMP/VLV 3B | V46T1372A | 39 | 23 | | 1.0 | | | STAT | | | | | | | | | | | | | OI SMM | APU 3 GGVM HEAT SINK TEMP | X |

TABLE 4.3.17-2. THERMAL (BFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | | | |
| 121 | (MSG LINE) | V93X0050X | 2 | 25 | | 46.0 | | | CHAR | | | | | | | G | | | | | | MI | MESSAGE LINE | X |
| 122 | (BUFFER MSG) | V93X0054X | 48 | 25 | | 4.0 | | | CHAR | | | | | | | G | | | | | | MI | BUFFER MESSAGE INDICATOR | X |
| 123 | (SPL) | V93X0056X | 2 | 26 | | 49.0 | | | CHAR | | | | | | | G | | | | | | MI | SCRATCH PAD LINE | X |
| 124 | (BFS) | V98X0015X | 35 | 2 | | 3.0 | | | CHAR | | | | | X | | G | | | | | | MI | BFS IDENTIFIER BFS | X |

TABLE 4.3.17-7. BFS THERMAL (4.3.17) I-LOADS

| BFS NAME | MSID | ENG UNITS | DT | PR | D | S | PARA | MC | CAT | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|---|---|---|

NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE 4.3.17-8. BFS THERMAL (4.3.17) K-LOADS

| BFS NAME DESCRIPTION | MSID | MC | KLOAD VALUE | ENG UNITS | DT | PR | S | PARA | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|---|---|

NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

### 4.3.18 SM SYSTEMS SUMMARY 2 (PFS)

See JSC–19590, Section 6.8.

### 4.3.19 SM SYSTEMS SUMMARY 2 (BFS)

TITLE: SM SYS SUMM 2
TYPE: DISP/079 or SYS SUMM Key
AVAILABILITY: BFS SM0

#### 4.3.19.1 Purpose, Operation, and Organization

This display is one of two primary formats for overall monitoring of the System Management (SM) systems configuration and status. The displayed parameters to support the Operational Instrumentation (OI) Caution and Warning (C&W) function, and the systems information presented provide sufficient detail for the crewperson to detect and determine the required response to time–critical failures.

Figure 4.3.19–1 is the BFS SM SYS SUMM 2 Display Format.

1. The oxygen and hydrogen heater control pressures (O2 PRESS, H2 PRESS) are displayed for tanks one through five. However, if five tank sets are present on an OV–102 mission, then tanks 4 and 5 share common pressure sensors. The data for the common tank 4 and 5 heater control pressures is displayed as TK 4 O2 & H2 PRESS and the tank 5 pressures will read low range. Oxygen heater temperatures (HTR T1, T2) are displayed for tanks 1 through 5. For flight configurations of less than 5 cryo tank sets, for those sets not flown, the parameter columns will read low range and an (L) may be driven in the status columns for off–scale low.

   The Power Reactant Storage and Distribution (PRSD) hydrogen and oxygen manifold 1 (MANF 1) and 2 (MANF 2) pressures are displayed on the right–hand side of the CRYO area of the format.

2. The following Auxiliary Power Unit (APU) system parameters are displayed as a function of systems 1, 2, and 3, and are basically arranged according to the system flow path: APU turbine exhaust temperatures (TEMP EGT, B/U EGT), gearbox lube oil inlet and outlet temperatures (OIL IN, OUT), gas generator bed temperature (GG BED), injection tube temperature (INJ), turbine speed (SPEED %), fuel tank quantity (FUEL QTY), fuel pump drain line pressures (FUEL PMP LK P), gearbox lube oil outlet pressure (OIL OUT P), and fuel tank isolation valves A&B temperatures (FU TK VLV A T, B T).

3. Avionics bay (AV BAY) parameters for systems 1, 2, and 3 are displayed for avionics bay outlet air temperature (AV BAY TEMP) and fan delta pressure (FAN $\Delta$P).

4. Hydraulic system supply pressure (PRESS), bootstrap accumulator GN2 pressure (ACUM P), reservoir fluid temperature (RSVR T), reservoir fluid volume (RSVR QTY), hydraulic water boiler quantity (W/B H2O QTY), and the hydraulic water boiler bypass valve position indicator (W/B BYP VLV) are parameters associated with the hydraulic systems 1, 2, and 3. PRESS is associated with a Backup C&W alert light. The text displayed for W/B BYP VLV position will be “W/B” (waterboiler) when the valve is closed causing hydraulic loop flow through its waterboiler and “BYP” (Bypass) when the valve is open causing the hydraulic loop flow to bypass its waterboiler. The text will be blank if power to both water boiler controllers is off.

5. Monitoring of thermal control (THERM CNTL) for systems 1 and 2 is provided by the display of water loop pump outlet pressure (H2O PUMP P), freon interchanger flowrate (FREON FLOW), and freon coolant loop evaporater outlet temperature (EVAP OUT T).

Table 4.3.19–1 SM SYS SUMM 2 Keyboard Processing

Not applicable

### 4.3.19.2 SM SYS SUMM 2 (BFS) Keyboard Processing Addendum

Not applicable

### 4.3.19.3 SM SYS SUMM 2 (BFS) CRT Display Processing Addendum

The table below presents the parameter status indicators (PSI) that can be displayed for a parameter. In SM–PL, PSI requirements can be one of two types as follows:

- A PSI which is part of the data words identified by an "X" marked in the STATUS column of Table 4.3.19–2.
- A PSI which is a stand–alone identified by the word "STAT" being inserted in the FORMAT TYPE column of Table 4.3.19–2.

Both PSI types have a numeric code appearing as an entry (right justified) in the ADD REF column of CRT display processing Table 4.3.19–2. The numeric code, corresponding to one of those listed in the table, indicates the specific status processing to be performed. If there is no numeric code entry, the status processing is defined by the default code.

When the "M" PSI is displayed (for Commfault, I/O error resulting in missing data), the last value of the associated parameter will continue to be displayed unless specified otherwise.

| Numeric Code | PSI SYMBOL(S) | | | | | |
|---|---|---|---|---|---|---|
| Default (blank) | ↓ | ↑ | H | L | M | ∅ |
| 1 | | | | | M | ∅ |
| 2 | | | H | L | M | ∅ |
| 3 | ↓ | | | | M | ∅ |
| 4 | ↓ | | | | | ∅ |

∅ = blank

NOTE: The numeric addendum reference codes are for information only. Actual processing requirements are specified in the SM Level B CPDS (SS–P–0002–580) and/or Level C Systems Management FSR (JSC–19590) or Payload Management FSR (JSC–19478).

The following alpha code(s) appear (left justified) in the ADD REF column of Table 4.3.19–2 whenever it is necessary to define any special processing requirements not otherwise covered therein:

A. HYD SYS W/B BYP VLV POSN IND. Each indicator signal source has three states which determine the text to be displayed as follows:

| V92J2128C<br>V92J2129C<br>V92J2130C<br>Signal State | Displayed<br>Remote Text |
|---|---|
| 0 | (blank) |
| 1 | BYP |
| 2 | W/B |

The source of these three signals is the Hydraulic Water Boiler Bypass Valve special process section 3.2.1.2.12 of the flight code. For a description of the logic used to generate these signals see the BFS SM/SP & PL PRD MG038119.

### 4.3.19.4 SM SYSTEM SUMMARY 2 Figure/Table References

Figure 4.3.19–1 SM System Summary 2 Display (BFS)

Table 4.3.19–1 Keyboard Processing Table N/A

Table 4.3.19–2 CRT Display Processing Table

Table 4.3.19–3 CRT Display Processing Background Requirements N/A

Table 4.3.19–4 Mission Design Background Constants N/A

Table 4.3.19–5 Input Functional Parameters N/A

Table 4.3.19–6 Output Functional Parameters N/A

Table 4.3.19–7 I–Loads

Table 4.3.19–8 K–Loads

Table 4.3.19–9 Constants N/A

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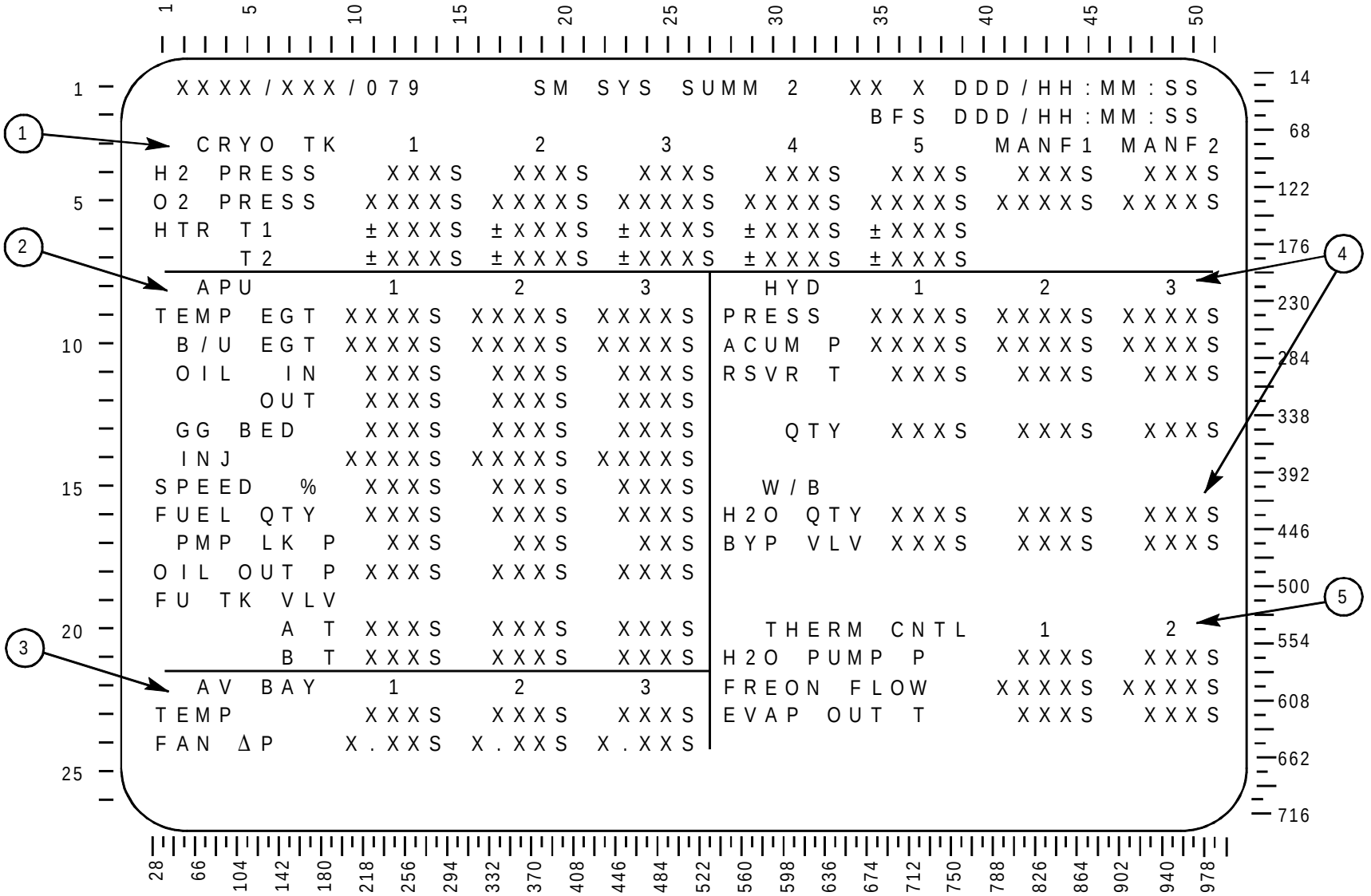


FIGURE 4.3.19-1. SM SYS SUMM 2 Display (BFS)

TABLE 4.3.19-2. SM SYS SUMM 2 (BFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | | | |
| 001 | (OPS) | V93X0040X | 2 | 1 | | 5.0 | | | CHAR | | | | | | | C | | | | | | MI | OPS FUNCTION PAGE | X |
| 002 | (SPEC) | V93X0042X | 7 | 1 | | 4.0 | | | CHAR | | | | | | | E | | | | | | MI | SPEC FUNCTION PAGE | X |
| 003 | (DISP) | V93X0044X | 10 | 1 | | 4.0 | | | DEC | | | | | | | E | | | | | | MI | DISPLAY FUNCTION PAGE | X |
| 004 | (UL) | V92X5032X | 34 | 1 | | 2.0 | UL | | BLVL | | | | | | X | G | | | | | | MI | UPLINK ACTIVITY IND | X |
| 005 | (GPC) | V93X0048X | 36 | 1 | | 2.0 | | | DEC | | | | | | | B | | | | | | MI | GPC DRIVER | X |
| 006 | (MT) | V91W1990C | 39 | 1 | | 12.0 | | | CHAR | DHMS | | | | | | A | | | | | | BOS | MISSION ELAPSED TIME | X |
| 007 | (CRT TIMER) | V91W1988C | 39 | 2 | | 12.0 | | | CHAR | DHMS | | | | | | A | | | | | | BOS | DISPLAY CRT TIME, SM | X |
| 008 | CRYO TK H2 PRESS(1) | V45P2110A | 11 | 4 | | 4.0 | | | DEC | PSIA | X | | | | | A | | | | | | OI SMM | PRSD H2 TK 1 HTR CONTROL PRESS | X |
| 009 | CRYO TK H2 PRESS(2) | V45P2210A | 17 | 4 | | 4.0 | | | DEC | PSIA | X | | | | | A | | | | | | OI SMM | PRSD H2 TK 2 HTR CONTROL PRESS | X |
| 010 | CRYO TK H2 PRESS(3) | V45P2310A | 23 | 4 | | 4.0 | | | DEC | PSIA | X | | | | | A | | | | | | OI SMM | PRSD H2 TK 3 HTR CONT PRESS (MBK) | X |
| 011 | CRYO TK H2 PRESS(4) | V45P2410A | 29 | 4 | | 4.0 | | | DEC | PSIA | X | | | | | A | | | | | | OI SMM | PRSD H2 TK 4(&5) HTR CONT PRESS | X |
| 012 | CRYO TK H2 PRESS(5) | V45P2510A | 35 | 4 | | 4.0 | | | DEC | PSIA | X | | | | | A | | | | | | OI SMM | PRSD H2 TK 5 HTR CONT PRESS | X |
| 013 | CRYO TK O2 PRESS(1) | V45P1110A | 10 | 5 | | 5.0 | | | DEC | PSIA | X | | | | | A | | | | | | OI SMM | PRSD O2 TK 1 HTR CONTROL PRESS | X |
| 014 | CRYO TK O2 PRESS(2) | V45P1210A | 16 | 5 | | 5.0 | | | DEC | PSIA | X | | | | | A | | | | | | OI SMM | PRSD O2 TK 2 HTR CONTROL PRESS | X |
| 015 | CRYO TK O2 PRESS(3) | V45P1310A | 22 | 5 | | 5.0 | | | DEC | PSIA | X | | | | | A | | | | | | OI SMM | PRSD O2 TK 3 HTR CONT PRESS (MBK) | X |
| 016 | CRYO TK O2 PRESS(4) | V45P1410A | 28 | 5 | | 5.0 | | | DEC | PSIA | X | | | | | A | | | | | | OI SMM | PRSD O2 TK 4(&5) HTR CONT PRESS | X |
| 017 | CRYO TK O2 PRESS(5) | V45P1510A | 34 | 5 | | 5.0 | | | DEC | PSIA | X | | | | | A | | | | | | OI SMM | PRSD O2 TK 5 HTR CONT PRESS | X |
| 018 | CRYO TK O2 HTR T1(1) | V45T1107A | 11 | 6 | | 4.0 | | | DEC | DEG F | X | | | | | | X | | | | | OI SMM | PRSD O2 TK 1 HTR ASSY 1 TEMP | X |
| 019 | CRYO TK O2 HTR T1(2) | V45T1207A | 17 | 6 | | 4.0 | | | DEC | DEG F | X | | | | | | X | | | | | OI SMM | PRSD O2 TK 2 HTR ASSY 1 TEMP | X |
| 020 | CRYO TK O2 HTR T1(3) | V45T1307A | 23 | 6 | | 4.0 | | | DEC | DEG F | X | | | | | | X | | | | | OI SMM | PRSD O2 TK 3 HTR ASSY 1 TEMP(MBK) | X |

## TABLE 4.3.19-2. SM SYS SUMM 2 (BFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM | Format | | | | UNITS | STAT US | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | BILEVEL | | | | | | | | | | | | | | | | | |
| | | | X | Y | NO | CHAR | 1 | 0 | TYPE | | | | | | | | | | | | | | | |
| 021 | CRYO TK O2 HTR T1(4) | V45T1407A | 29 | 6 | | 4.0 | | | DEC | DEG F | X | | | | | | X | | | | | OI SMM | PRSD O2 TK 4 HTR ASSY 1 TEMP(MBK) | X |
| 022* | CRYO TK O2 HTR T1(5) | V45T1507A | 35 | 6 | | 4.0 | | | DEC | DEG F | X | | | | | | X | | | | | OI SMM | PRSD O2 TK 5 HTR ASSY 1 TEMP(MBK) | X |
| 023 | CRYO TK O2 HTR T2(1) | V45T1109A | 11 | 7 | | 4.0 | | | DEC | DEG F | X | | | | | | X | | | | | OI SMM | PRSD O2 TK 1 HTR ASSY 2 TEMP | X |
| 024 | CRYO TK O2 HTR T2(2) | V45T1209A | 17 | 7 | | 4.0 | | | DEC | DEG F | X | | | | | | X | | | | | OI SMM | PRSD O2 TK 2 HTR ASSY 2 TEMP | X |
| 025 | CRYO TK O2 HTR T2(3) | V45T1309A | 23 | 7 | | 4.0 | | | DEC | DEG F | X | | | | | | X | | | | | OI SMM | PRSD O2 TK 3 HTR ASSY 2 TEMP(MBK) | X |
| 026 | CRYO TK O2 HTR T2(4) | V45T1409A | 29 | 7 | | 4.0 | | | DEC | DEG F | X | | | | | | X | | | | | OI SMM | PRSD O2 TK 4 HTR ASSY 2 TEMP(MBK) | X |
| 027* | CRYO TK O2 HTR T2(5) | V45T1509A | 35 | 7 | | 4.0 | | | DEC | DEG F | X | | | | | | X | | | | | OI SMM | PRSD O2 TK 5 HTR ASSY 2 TEMP(MBK) | X |
| 028 | H2 PRESS MANF 1 | V45P2140A | 41 | 4 | | 4.0 | | | DEC | PSIA | X | | | | | | | | | | | OI SMM | PRSD H2 MANF 1 PRESSURE | |
| 029 | H2 PRESS MANF 2 | V45P2145A | 47 | 4 | | 4.0 | | | DEC | PSIA | X | | | | | | | | | | | OI SMM | PRSD H2 MANF 2 PRESSURE | |
| 030 | O2 PRESS MANF 1 | V45P1140A | 40 | 5 | | 5.0 | | | DEC | PSIA | X | | | | | | | | | | | OI SMM | PRSD O2 MANF 1 PRESSURE | |
| 031 | O2 PRESS MANF 2 | V45P1145A | 46 | 5 | | 5.0 | | | DEC | PSIA | X | | | | | | | | | | | OI SMM | PRSD O2 MANF 2 PRESSURE | |
| 032 | APU TEMP EGT (1) | V46T0142A | 9 | 9 | | 5.0 | | | DEC | DEG F | X | | | | | A | | | | | 2 | OI SMM | APU 1 TURBINE EXHAUST TEMP NO 1 | X |
| 033 | APU TEMP EGT (2) | V46T0242A | 15 | 9 | | 5.0 | | | DEC | DEG F | X | | | | | A | | | | | 2 | OI SMM | APU 2 TURBINE EXHAUST TEMP NO 1 | X |
| 034 | APU TEMP EGT (3) | V46T0342A | 21 | 9 | | 5.0 | | | DEC | DEG F | X | | | | | A | | | | | 2 | OI SMM | APU 3 TURBINE EXHAUST TEMP NO 1 | X |
| 035 | APU TEMP B/U EGT(1) | V46T0140A | 9 | 10 | | 5.0 | | | DEC | DEG F | X | | | | | A | | | | | | OI SMM | APU 1 TURBINE EXHAUST TEMP NO 2 | X |
| 036 | APU TEMP B/U EGT(2) | V46T0240A | 15 | 10 | | 5.0 | | | DEC | DEG F | X | | | | | A | | | | | | OI SMM | APU 2 TURBINE EXHAUST TEMP NO 2 | X |
| 037 | APU TEMP B/U EGT(3) | V46T0340A | 21 | 10 | | 5.0 | | | DEC | DEG F | X | | | | | A | | | | | | OI SMM | APU 3 TURBINE EXHAUST TEMP NO 2 | X |
| 038 | APU TEMP OIL IN (1) | V46T0150A | 10 | 11 | | 4.0 | | | DEC | DEG F | X | | | | | A | | | | | | OI SMM | APU 1 GEARBOX LUBE OIL RETURN TEMP | X |

TABLE 4.3.19-2. SM SYS SUMM 2 (BFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STAT US | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | BILEVEL | | | | | | | | | | | | | | | | | |
| | | | X | Y | | CHAR | 1 | 0 | TYPE | | | | | | | | | | | | | | | |
| 039 | APU TEMP OIL IN (2) | V46T0250A | 16 | 11 | | 4.0 | | | DEC | DEG F | X | | | | | A | | | | | | OI SMM | APU 2 GEARBOX LUBE OIL RETURN TEMP | X |
| 040 | APU TEMP OIL IN (3) | V46T0350A | 22 | 11 | | 4.0 | | | DEC | DEG F | X | | | | | A | | | | | | OI SMM | APU 3 GEARBOX LUBE OIL RETURN TEMP | X |
| 041 | APU TEMP OIL OUT(1) | V46T0154A | 10 | 12 | | 4.0 | | | DEC | DEG F | X | | | | | A | | | | | | OI SMM | APU 1 GEARBOX LUBE OIL OUT TEMP | X |
| 042 | APU TEMP OIL OUT(2) | V46T0254A | 16 | 12 | | 4.0 | | | DEC | DEG F | X | | | | | A | | | | | | OI SMM | APU 2 GEARBOX LUBE OIL OUT TEMP | X |
| 043 | APU TEMP OIL OUT(3) | V46T0354A | 22 | 12 | | 4.0 | | | DEC | DEG F | X | | | | | A | | | | | | OI SMM | APU 3 GEARBOX LUBE OIL OUT TEMP | X |
| 044* | APU GG BED (1) | V46T0122A | 10 | 13 | | 4.0 | | | DEC | DEG F | X | | | | | | | | | | | OI SMM | APU 1 GAS GENERATOR BED TEMP | X |
| 045* | APU GG BED (2) | V46T0222A | 16 | 13 | | 4.0 | | | DEC | DEG F | X | | | | | | | | | | | OI SMM | APU 2 GAS GENERATOR BED TEMP | X |
| 046* | APU GG BED (3) | V46T0322A | 22 | 13 | | 4.0 | | | DEC | DEG F | X | | | | | | | | | | | OI SMM | APU 3 GAS GENERATOR BED TEMP | X |
| 047 | APU INJ (1) | V46T0174A | 9 | 14 | | 5.0 | | | DEC | DEG F | X | | | | | | | | | | | OI SMM | APU 1 INJ TUBE TEMP | X |
| 048 | APU INJ (2) | V46T0274A | 15 | 14 | | 5.0 | | | DEC | DEG F | X | | | | | | | | | | | OI SMM | APU 2 INJ TUBE TEMP | X |
| 049 | APU INJ (3) | V46T0374A | 21 | 14 | | 5.0 | | | DEC | DEG F | X | | | | | | | | | | | OI SMM | APU 3 INJ TUBE TEMP | X |
| 050 | APU SPEED PCT (1) | V46R0135A | 10 | 15 | | 4.0 | | | DEC | PCT | X | | | | | A | | | | | | OI SMM | APU 1 TURBINE SPEED | X |
| 051 | APU SPEED PCT (2) | V46R0235A | 16 | 15 | | 4.0 | | | DEC | PCT | X | | | | | A | | | | | | OI SMM | APU 2 TURBINE SPEED | X |
| 052 | APU SPEED PCT (3) | V46R0335A | 22 | 15 | | 4.0 | | | DEC | PCT | X | | | | | A | | | | | | OI SMM | APU 3 TURBINE SPEED | X |
| 053 | APU FUEL QTY (1) | V72Q6001V | 10 | 16 | | 4.0 | | | DEC | PCT | X | | | | | A | | | | | | OI SMM | APU 1 FUEL TNK QTY | X |
| 054 | APU FUEL QTY (2) | V72Q6002V | 16 | 16 | | 4.0 | | | DEC | PCT | X | | | | | A | | | | | | OI SMM | APU 2 FUEL TNK QTY | X |
| 055 | APU FUEL QTY (3) | V72Q6003V | 22 | 16 | | 4.0 | | | DEC | PCT | X | | | | | A | | | | | | OI SMM | APU 3 FUEL TNK QTY | X |
| 056 | APU PUMP LK P (1) | V46P0190A | 11 | 17 | | 3.0 | | | DEC | PSIA | X | | | | | A | | | | | | OI SMM | APU 1 FUEL PUMP DRAIN LINE PRESS 1 | X |
| 057 | APU PUMP LK P (2) | V46P0290A | 17 | 17 | | 3.0 | | | DEC | PSIA | X | | | | | A | | | | | | OI SMM | APU 2 FUEL PUMP DRAIN LINE PRESS 1 | X |

## TABLE 4.3.19-2. SM SYS SUMM 2 (BFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STAT US | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | BILEVEL | | | | | | | | | | | | | | | | | |
| | | | X | Y | | CHAR | 1 | 0 | TYPE | | | | | | | | | | | | | | | |
| 058 | APU PUMP LK P (3) | V46P0390A | 23 | 17 | | 3.0 | | | DEC | PSIA | X | | | | | A | | | | | | OI SMM | APU 3 FUEL PUMP DRAIN LINE PRESS 1 | X |
| 059 | APU OIL OUT P (1) | V46P0153A | 10 | 18 | | 4.0 | | | DEC | PSIA | X | | | | | A | | | | | | OI SMM | APU–1 GEARBOX LUBE OIL OUT PRESS | X |
| 060 | APU OIL OUT P (2) | V46P0253A | 16 | 18 | | 4.0 | | | DEC | PSIA | X | | | | | A | | | | | | OI SMM | APU–2 GEARBOX LUBE OIL OUT PRESS | X |
| 061 | APU OIL OUT P (3) | V46P0353A | 22 | 18 | | 4.0 | | | DEC | PSIA | X | | | | | A | | | | | | OI SMM | APU–3 GEARBOX LUBE OIL OUT PRESS | X |
| 062 | APU TK VLV A T (1) | V46T1175A | 10 | 20 | | 4.0 | | | DEC | DEG F | X | | | | | | | | | | | OI SMM | APU 1 ISO VALVE A TEMP 1 | |
| 063 | APU TK VLV A T (2) | V46T1275A | 16 | 20 | | 4.0 | | | DEC | DEG F | X | | | | | | | | | | | OI SMM | APU 2 ISO VALVE A TEMP 1 | |
| 064 | APU TK VLV A T (3) | V46T1375A | 22 | 20 | | 4.0 | | | DEC | DEG F | X | | | | | | | | | | | OI SMM | APU 3 ISO VALVE A TEMP 1 | |
| 065 | APU TK VLV B T (1) | V46T1173A | 10 | 21 | | 4.0 | | | DEC | DEG F | X | | | | | | | | | | | OI SMM | APU 1 ISO VALVE B TEMP 1 | |
| 066 | APU TK VLV B T (2) | V46T1273A | 16 | 21 | | 4.0 | | | DEC | DEG F | X | | | | | | | | | | | OI SMM | APU 2 ISO VALVE B TEMP 1 | |
| 067 | APU TK VLV B T (3) | V46T1373A | 22 | 21 | | 4.0 | | | DEC | DEG F | X | | | | | | | | | | | OI SMM | APU 3 ISO VALVE B TEMP 1 | |
| 068 | AV BAY TEMP (1) | V61T2645A | 10 | 23 | | 4.0 | | | DEC | DEG F | X | | | | | | | | | | | OI SMM | AVNS BAY 1 OUTLET AIR TEMP | X |
| 069 | AV BAY TEMP (2) | V61T2650A | 16 | 23 | | 4.0 | | | DEC | DEG F | X | | | | | | | | | | | OI SMM | AVNS BAY 2 OUTLET AIR TEMP | X |
| 070 | AV BAY TEMP (3) | V61T2661A | 22 | 23 | | 4.0 | | | DEC | DEG F | X | | | | | | | | | | | OI SMM | AVNS BAY 3 OUTLET AIR TEMP | X |
| 071 | AV BAY FAN P (1) | V61P2642A | 9 | 24 | | 5.2 | | | DEC | INH2O | X | | | | | | | | | | | OI SMM | AVIONICS BAY 1 DELTA PRESS | X |
| 072 | AV BAY FAN P (2) | V61P2647A | 15 | 24 | | 5.2 | | | DEC | INH2O | X | | | | | | | | | | | OI SMM | AVIONICS BAY 2 DELTA PRESS | X |
| 073 | AV BAY FAN P (3) | V61P2658A | 21 | 24 | | 5.2 | | | DEC | INH2O | X | | | | | | | | | | | OI SMM | AVIONICS BAY 3 DELTA PRESS | X |
| 074 | HYD PRESS (1) | V58P0115A | 34 | 9 | | 5.0 | | | DEC | PSIA | X | | | | | A | | | | | | OI SMM | HYDR SYS 1 SUPPLY PRESS B | X |
| 075 | HYD PRESS (2) | V58P0215A | 40 | 9 | | 5.0 | | | DEC | PSIA | X | | | | | A | | | | | | OI SMM | HYDR SYS 2 SUPPLY PRESS B | X |
| 076 | HYD PRESS (3) | V58P0315A | 46 | 9 | | 5.0 | | | DEC | PSIA | X | | | | | A | | | | | | OI SMM | HYDR SYS 3 SUPPLY PRESS B | X |
| 077 | HYD ACCUM P (1) | V58P0167A | 34 | 10 | | 5.0 | | | DEC | PSIA | X | | | | | | | | | | | OI SMM | HYD SYS 1 BOOTSTRAP ACCUM GN2 P | X |
| 078 | HYD ACCUM P (2) | V58P0267A | 40 | 10 | | 5.0 | | | DEC | PSIA | X | | | | | | | | | | | OI SMM | HYD SYS 2 BOOTSTRAP ACCUM GN2 P | X |
| 079 | HYD ACCUM P (3) | V58P0367A | 46 | 10 | | 5.0 | | | DEC | PSIA | X | | | | | | | | | | | OI SMM | HYD SYS 3 BOOTSTRAP ACCUM GN2 P | X |
| 080 | HYD RSVR T (1) | V58T0101A | 35 | 11 | | 4.0 | | | DEC | DEG F | X | | | | | | | | | | | OI SMM | HYD SYS 1 RSVR FLUID TEMP | X |

TABLE 4.3.19-2. SM SYS SUMM 2 (BFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STAT US | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | | | |
| 081 | HYD RSVR T (2) | V58T0201A | 41 | 11 | | 4.0 | | | DEC | DEG F | X | | | | | | | | | | | OI SMM | HYD SYS 2 RSVR FLUID TEMP | X |
| 082 | HYD RSVR T (3) | V58T0301A | 47 | 11 | | 4.0 | | | DEC | DEG F | X | | | | | | | | | | | OI SMM | HYD SYS 3 RSVR FLUID TEMP | X |
| 083 | HYD RSVR QTY (1) | V58Q0102A | 35 | 13 | | 4.0 | | | DEC | PCT | X | | | | | | | | | | | OI SMM | HYD SYS 1 RSVR FLUID VOLUME | X |
| 084 | HYD RSVR QTY (2) | V58Q0202A | 41 | 13 | | 4.0 | | | DEC | PCT | X | | | | | | | | | | | OI SMM | HYD SYS 2 RSVR FLUID VOLUME | X |
| 085 | HYD RSVR QTY (3) | V58Q0302A | 47 | 13 | | 4.0 | | | DEC | PCT | X | | | | | | | | | | | OI SMM | HYD SYS 3 RSVR FLUID VOLUME | X |
| 086 | W/B H2O QTY (1) | V72Q6040V | 35 | 16 | | 4.0 | | | DEC | PCT | X | | | | | | | | | | | OI SMM | HYDR SYS 1 H2O BLR FLUID QTY CMPT | X |
| 087 | W/B H2O QTY (2) | V72Q6042V | 41 | 16 | | 4.0 | | | DEC | PCT | X | | | | | | | | | | | OI SMM | HYDR SYS 2 H2O BLR FLUID QTY CMPT | X |
| 088 | W/B H2O QTY (3) | V72Q6044V | 47 | 16 | | 4.0 | | | DEC | PCT | X | | | | | | | | | | | OI SMM | HYDR SYS 3 H2O BLR FLUID QTY CMPT | X |
| 089 | W/B BYP VLV (1) | V92J2128C | 36 | 17 | | 3.0 | | | RTXT | | X | | | | | | | | | | A 1 | OI SMM | HYDR SYS 1 W/B BYP VLV POSN IND | |
| 090 | W/B BYP VLV (2) | V92J2129C | 42 | 17 | | 3.0 | | | RTXT | | X | | | | | | | | | | A 1 | OI SMM | HYDR SYS 2 W/B BYP VLV POSN IND | |
| 091 | W/B BYP VLV (3) | V92J2130C | 48 | 17 | | 3.0 | | | RTXT | | X | | | | | | | | | | A 1 | OI SMM | HYDR SYS 3 W/B BYP VLV POSN IND | |
| 092 | H2O PUMP P (1) | V61P2600A | 41 | 21 | | 4.0 | | | DEC | PSIA | X | | | | | | | | | | | OI SMM | H2O LOOP 1 PUMP OUTLET PRESS | X |
| 093 | H2O PUMP P (2) | V61P2700A | 47 | 21 | | 4.0 | | | DEC | PSIA | X | | | | | | | | | | | OI SMM | H2O LOOP 2 PUMP OUTLET PRESS | X |
| 094 | FREON FLOW (1) | V63R1100A | 40 | 22 | | 5.0 | | | DEC | LB/HR | X | | | | | | | | | | | OI SMM | FCL 1 INTERCHANGER FLOWRATE | X |
| 095 | FREON FLOW (2) | V63R1300A | 46 | 22 | | 5.0 | | | DEC | LB/HR | X | | | | | | | | | | | OI SMM | FCL 2 INTERCHANGER FLOWRATE | X |
| 096 | EVAP OUT T (1) | V63T1207A | 41 | 23 | | 4.0 | | | DEC | DEG F | X | | | | | | | | | | | OI SMM | FCL 1 EVAP OUT TEMP | X |
| 097 | EVAP OUT T (2) | V63T1407A | 47 | 23 | | 4.0 | | | DEC | DEG F | X | | | | | | | | | | | OI SMM | FCL 2 EVAP OUT TEMP | X |

## TABLE 4.3.19-2. SM SYS SUMM 2 (BFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | | | |
| 098 | (MSG LINE) | V93X0050X | 2 | 25 | | 46.0 | | | CHAR | | | | | | | G | | | | | | MI | MESSAGE LINE | X |
| 099 | (BUFFER MSG) | V93X0054X | 48 | 25 | | 4.0 | | | CHAR | | | | | | | G | | | | | | MI | BUFFER MESSAGE INDICATOR | X |
| 100 | (SPL) | V93X0056X | 2 | 26 | | 49.0 | | | CHAR | | | | | | | G | | | | | | MI | SCRATCH PAD LINE | X |
| 101 | (BFS) | V98X0015X | 35 | 2 | | 3.0 | | | CHAR | | | | | X | | G | | | | | | MI | BFS IDENTIFIER BFS | X |

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TABLE 4.3.19-7. BFS SM SYSTEM SUMMARY 2 (4.3.19) I-LOADS

| BFS NAME | MSID | ENG UNITS | DT | PR | D | S | PARA | MC | CAT | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|---|---|---|

NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE 4.3.19-8. BFS SM SYSTEM SUMMARY 2 (4.3.19) K-LOADS

| BFS NAME DESCRIPTION | MSID | MC | KLOAD VALUE | ENG UNITS | DT | P R | S | PARA | LAST CR | R E V |
|---|---|---|---|---|---|---|---|---|---|---|

NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

### 4.3.20 PAYLOAD RETENTION

See JSC–19590, Section 6.14.

### 4.3.21 FUEL CELLS

See JSC–19590, Section 6.4.

### 4.3.22 EVA–MMU/FSS Display

See JSC–19590, Section 6.6.

### 4.3.23 Deleted

### 4.3.24 SM GROUND CHECKOUT (PFS)

TITLE: SM GROUND CHECKOUT
TYPE: SPEC/064
AVAILABILITY: SM OPS 2 and 4

#### 4.3.24.1 Purpose, Operation, and Organization

This display allows the ground checkout user to modify certain Systems Management (SM) processes to enhance vehicle turnaround and test processing. Figure 4.3.24–1 is the SM Ground Checkout Display. All inputs to this spec are rejected when the SM GROUND CHECKOUT ENABLE discrete (See DPS UTILITY display–Section 4.1.4) is disabled and the information displayed will be unreliable.

1. Item entry controls (2 FDA ENA and 3 FDA INH) are provided to enable or inhibit FDA processing. Item entry controls (4 PL ANNUN ENA/INH and 5 SM ANNUN ENA/INH) are also provided to enable or inhibit the annunciation of Orbiter Systems Management (SM) or Payload (PL) CRT messages from the FDA function. An asterisk is displayed to indicate the selected options.

2. Item entry controls (6 SEL FMT and 7 LOAD) allow the selection and loading of downlist formats. This function shall be valid in OPS S2 only. If the Item 6 (SEL FMT) downlist format ID entry is not valid or is requested in OPS S4, the datafield will be blanked, the input rejected and an "ILLEGAL ENTRY" CRT message output. When the format ID is valid the ID will be displayed. Upon execution of Item 7 (LOAD), the selected format will be loaded for downlist code usage as indicated by the display of an asterisk after the item number.

3. Item entry controls (8 TURNAROUND, 9 REINSTALL, and 10 SINGULARITY) are provided to facilitate RMS testing during RMS turn–around, reinstallation or singularity testing. These items provide table limit changes for these parameters to predefined values.

   Items 8 (TURNAROUND) AND 9 (REINSTALL) are mutually exclusive with an asterisk being displayed after the selected item number. Any request to select checkout values for TURNAROUND or REINSTALLATION while the other is in checkout state will be rejected and an "ILLEGAL ENTRY" CRT message output.

   Item 10 (SINGULARITY) is designed to be used only when the RMS software is executing. If item 10 is executed when the RMS software is <u>not</u> executing the input will be rejected and an "ILLEGAL ENTRY" CRT message output. An asterisk appears after the item number when properly executed to indicate that singularity testing has been selected.

4. Item entry control 11 (RATE LIMIT) provides the capability for the selection of the checkout course joint rate limits for the unloaded arm for all six (6) joints. Re–executing this item will restore the original values.

5. Item entry controls 12 (JOINT SEL) and 13 (ATTEN LIM) provide the capability for selection of a joint (1–6) and the input and/or display of the attenuation limit (0–15) for the selected joint. Any attempt to input values outside these ranges will be rejected and an "ILLEGAL ENTRY" CRT message output. If the SM GROUND CHECKOUT ENABLE discrete is enabled, the joint selected (Item 12) will default to a value of "1" upon OPS initialization.

6. Deleted.

7. Item entry control 15 (SP O/P) allows for the enabling or inhibiting of the output from the special processing routine.

8. Item entry control 1 (OPS ACTIVATE) located in the lower center of the format, causes the completion of scheduling of the processing for the SM OPS.

9. A special field in the upper left corner of the format will display the text "INPUTS INHIBITED" double overbright when the SM GROUND CHECKOUT ENABLE discrete is disabled. It will be blank at all other times.

10. IMPLIED ITEM NUMBER. Item 14 is implied on the display format, but is not legal for use on the SM GROUND CHECKOUT display. If the item number is executed, an operator error shall result, the input rejected, and the "ILLEGAL ENTRY" CRT message shall be displayed.

### 4.3.24.2 SM GROUND CHECKOUT Keyboard Processing Addendum

None.

### 4.3.24.3 SM GROUND CHECKOUT CRT Display Processing Addendum

The table below presents the parameter status indicators (PSI) that can be displayed for a parameter. In SM–PL, PSI requirements can be one of two types as follows:

- A PSI which is part of the data words identified by an "X" marked in the STATUS column of Table 4.3.24–2.

- A PSI which is a stand–alone identified by the word "STAT" being inserted in the FORMAT TYPE column of Table 4.3.24–2.

Both PSI types have a numeric code appearing as an entry (right justified) in the ADD REF column of CRT display processing Table 4.3.24–2. The numeric code, corresponding to one of those listed in the table, indicates the specific status processing to be performed. If there is no numeric code entry, the status processing is defined by the default code.

When the "M" PSI is displayed (for Commfault, I/O error resulting in missing data), the last value of the associated parameter will continue to be displayed unless specified otherwise.

| Numeric Code | PSI SYMBOL(S) | | | | | |
|---|---|---|---|---|---|---|
| Default (blank) | ↓ | ↑ | H | L | M | ∅ |
| 1 | | | | | M | ∅ |
| 2 | | | H | L | M | ∅ |
| 3 | ↓ | | | | M | ∅ |
| 4 | ↓ | | | | | ∅ |

∅ = blank

NOTE: The numeric addendum reference codes are for information only. Actual processing requirements are specified in the SM Level B CPDS (SS–P–0002–580) and/or Level C Systems Management FSR (JSC–19590) or Payload Management FSR (JSC–19478).

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The following alpha code(s) appear (left justified) in the ADD REF column of Table 4.3.24–2 whenever it is necessary to define any special processing requirements not otherwise covered therein:

A. When the SM GROUND CHECKOUT ENABLE Discrete (V93X3512X) is set ON, this field shall be blank. When this discrete is off, 'INPUTS INHIBITED' shall be displayed double overbright.

B. The DL SM FMT ID SELECT (DOWNLIST 6 SEL FMT ) data field shall be blanked when the DL FORMAT ID BLANKING FLAG (V92X3106X) is set ON.

C. Deleted.

### 4.3.24.4 SM GROUND CHECKOUT Figure/Table References

Figure 4.3.24–1 SM Ground Checkout Display (PFS)

Table 4.3.24–1 Keyboard Processing Table

Table 4.3.24–2 CRT Display Processing Table

Table 4.3.24–3 CRT Display Processing Background Requirements N/A

Table 4.3.24–4 Mission Design Background Constants N/A

Table 4.3.24–5 Input Functional Parameters N/A

Table 4.3.24–6 Output Functional Parameters N/A

Table 4.3.24–7 I–Loads N/A

Table 4.3.24–8 K–Loads N/A

Table 4.3.24–9 Constants N/A

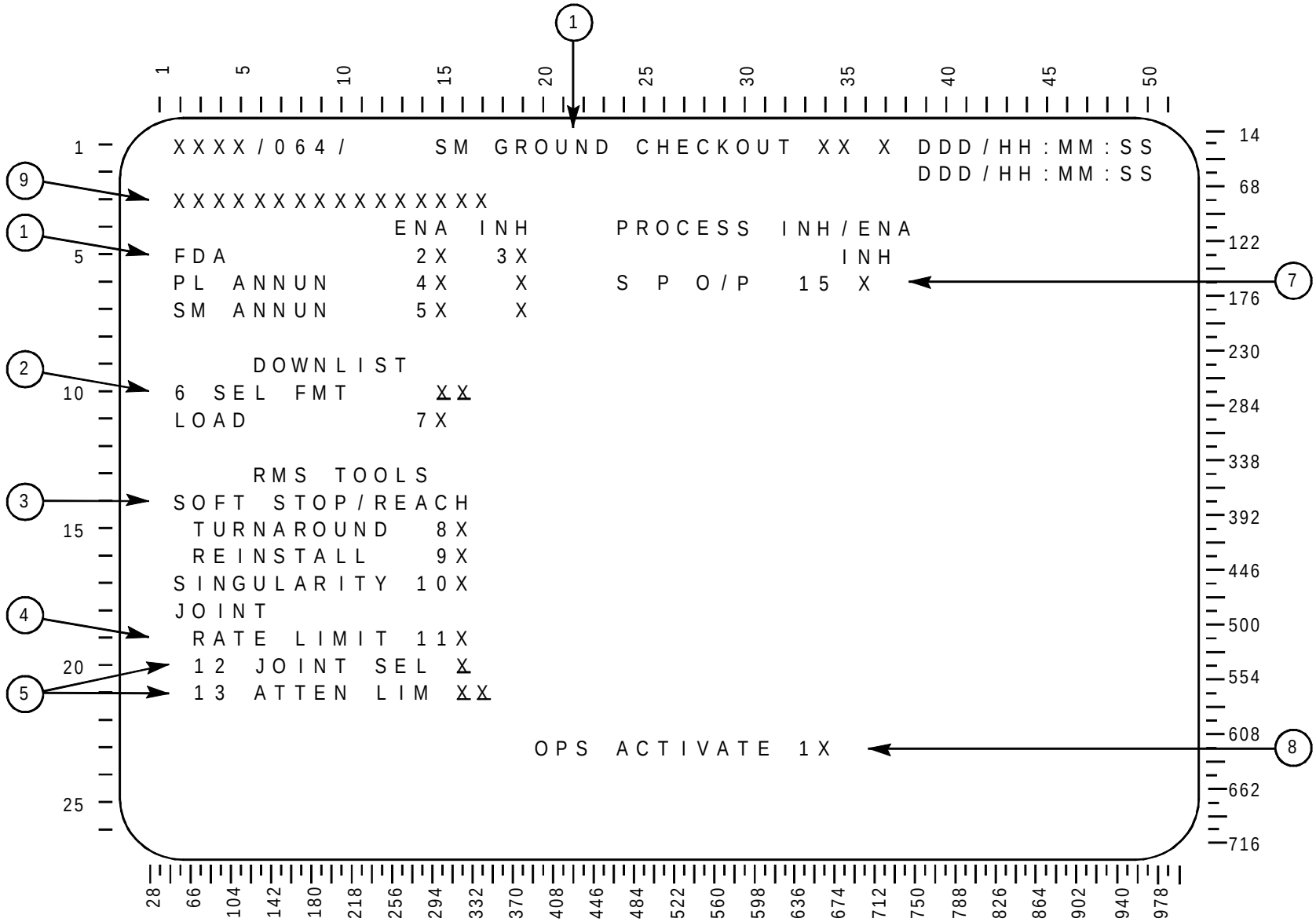


FIGURE 4.3.24-1. SM Ground Checkout Display (PFS)

TABLE 4.3.24-1. SM GROUND CHECKOUT (PFS) KEYBOARD PROCESSING

| Seq | CRT Signal Name | M/S ID | CHAR | TYPE | UNITS | DK | ITEM | Item No. Limits | | Add Ref | Destination | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | MIN | MAX | | | | |
| 001* | OPS ACTIVATE 1 | V93X3511X | 0.0 | CTRL | | | 1 | | | | C/O SPEC,CRT | SM CHECKOUT OPS ACTIVATE | |
| 002* | FDA ENA 2 | V93X4890X | 0.0 | CTRL | | | 2 | | | | FDA PROC,CRT | TM FDA ENABLE | X |
| 003* | FDA INH 3 | V93X4891X | 0.0 | CTRL | | | 3 | | | | FDA PROC,CRT | TM FDA INHIBIT | X |
| 004* | PL ANNUN 4 | V93X3501X | 0.0 | CTRL | | | 4 | | | | FDA PROC,CRT | PAYLOAD ANNUNCIATION ENABLE | |
| 005* | SM ANNUN 5 | V93X3502X | 0.0 | CTRL | | | 5 | | | | FDA PROC,CRT | SM ANNUNCIATION ENABLE | |
| 006* | 6 SEL FMT | V93J3505C | 3.0 | DEC | | | 6 | | | | D/L PROC,CRT | DL SM FMT ID SELECT | |
| 007* | LOAD 7 | V93X3506X | 0.0 | CTRL | | | 7 | | | | D/L PROC,CRT | DL SM FMT ID SELECT EXEC | |
| 008* | TURNAROUND 8 | V93X3507X | 0.0 | CTRL | | | 8 | | | | RMS PROC,CRT | RMS SOFT STOP REACH TURNAROUND | |
| 009* | REINSTALL 9 | V93X3508X | 0.0 | CTRL | | | 9 | | | | RMS PROC,CRT | RMS SOFT STOP REACH REINSTALL | |
| 010* | SINGULARITY 10 | V93X3509X | 0.0 | CTRL | | | 10 | | | | RMS PROC,CRT | RMS SINGULARITY CHECKOUT | |
| 011* | RATE LIMIT 11 | V93X7514X | 0.0 | CTRL | | | 11 | | | | C/O SPEC,CRT | RMS COARSE JOINT RATE LIMIT | |
| 012* | 12 JOINT SEL | V93J7515C | 2.0 | DEC | | | 12 | 1 | 6 | | C/O SPEC,CRT | RMS ATTN LIMIT JOINT SEL C/O | |
| 013* | 13 ATTEN LIM | V93J7517C | 3.0 | DEC | | | 13 | 0 | 15 | | C/O SPEC,CRT | RMS ATTN LIMIT C/O | |
| 014* | S P O/P 15 | V93X3510X | 0.0 | CTRL | | | 15 | | | | SP EXEC,CRT | SPEC PROC OUTPUT INHIBIT | |

## TABLE 4.3.24-2. SM GROUND CHECKOUT (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | BILEVEL | | | | | | | | | | | | | | | | | |
| | | | X | Y | | CHAR | 1 | 0 | TYPE | | | | | | | | | | | | | | | |
| 001 | (OPS) | V93X0040X | 2 | 1 | | 5.0 | | | CHAR | | | | | | | E | | | | | | UI | OPS FUNCTION PAGE | X |
| 002 | (SPEC) | V93X0042X | 7 | 1 | | 4.0 | | | CHAR | | | | | | | E | | | | | | UI | SPEC FUNCTION PAGE | X |
| 003 | (DISP) | V93X0044X | 10 | 1 | | 4.0 | | | DEC | | | | | | | E | | | | | | UI | DISPLAY FUNCTION PAGE | X |
| 004 | (UL) | V92X5032X | 34 | 1 | | 2.0 | UL | | BLVL | | | | | | X | G | | | | | | UI | UPLINK ACTIVITY IND | X |
| 005 | (GPC) | V93X0048X | 36 | 1 | | 2.0 | | | DEC | | | | | | | E | | | | | | UI | GPC DRIVER | X |
| 006 | (MT) | V91W1990C | 39 | 1 | | 12.0 | | | CHAR | DHMS | | | | | | A | | | | | | FCOS | MISSION ELAPSED TIME | X |
| 007 | (CRT TIMER) | V91W1989C | 39 | 2 | | 12.0 | | | CHAR | DHMS | | | | | | A | | | | | | FCOS | DISPLAY CRT TIME, PL | X |
| 008* | OPS ACTIVATE 1 | V93X3511X | 34 | 23 | | 1.0 | * | | BLVL | | | | | | | | | | | | | KYBD | SM CHECKOUT OPS ACTIVATE | |
| 009* | FDA ENA 2 | V93X4890X | 15 | 5 | | 1.0 | * | | BLVL | | | | | | | | | | | | | KYBD | TM FDA ENABLE | X |
| 010* | FDA INH 3 | V93X4891X | 19 | 5 | | 1.0 | * | | BLVL | | | | | | | | | | | | | KYBD | TM FDA INHIBIT | X |
| 011* | PL ANNUN ENA 4 | V93X3501X | 15 | 6 | | 1.0 | * | | BLVL | | | | | | | | | | | | | KYBD | PAYLOAD ANNUNCIATION ENABLE | |
| 012* | PL ANNUN INH 4 | V93X3501X | 19 | 6 | | 1.0 | | * | BLVL | | | | | | | | | | | | | KYBD | PAYLOAD ANNUNCIATION ENABLE | |
| 013* | SM ANNUN ENA 5 | V93X3502X | 15 | 7 | | 1.0 | * | | BLVL | | | | | | | | | | | | | KYBD | SM ANNUNCIATION ENABLE | |
| 014* | SM ANNUN INH 5 | V93X3502X | 19 | 7 | | 1.0 | | * | BLVL | | | | | | | | | | | | | KYBD | SM ANNUNCIATION ENABLE | |
| 015* | 6 SEL FMT | V93J3505C | 14 | 10 | | 3.0 | | | DEC | | | X | | | | | | | | | B | D/L PROC | DL SM FMT ID SELECT | |
| 016* | LOAD 7 | V93X3506X | 15 | 11 | | 1.0 | * | | BLVL | | | | | | | | | | | | | D/L PROC | DL SM FMT ID SELECT EXEC | |
| 017* | TURNAROUND 8 | V93X3507X | 16 | 15 | | 1.0 | * | | BLVL | | | | | | | | | | | | | KYBD | RMS SOFT STOP REACH TURNAROUND | |
| 018* | REINSTALL 9 | V93X3508X | 16 | 16 | | 1.0 | * | | BLVL | | | | | | | | | | | | | KYBD | RMS SOFT STOP REACH REINSTALL | |
| 019* | SINGULARITY 10 | V93X3509X | 16 | 17 | | 1.0 | * | | BLVL | | | | | | | | | | | | | KYBD | RMS SINGULARITY CHECKOUT | |
| 020* | SM (C/O ENA) | V93X3512X | 2 | 3 | | 16.0 | | | RTXT | | | X | | X | | | | | | | A | DPS UTIL SPC | SM GROUND CHECKOUT ENABLE | |
| 021* | RATE LIMIT 11 | V93X7514X | 16 | 19 | | 1.0 | * | | BLVL | | | | | | | | | | | | | KYBD | RMS COARSE JOINT RATE LIMIT | |
| 022* | 12 JOINT SEL | V93J7515C | 15 | 20 | | 2.0 | | | DEC | | | | | | | | | | | | | KYBD | RMS ATTN LIMIT JOINT SEL C/O | |
| 023* | 13 ATTEN LIM | V93J7517C | 15 | 21 | | 3.0 | | | DEC | | | | | | | | | | | | | KYBD,C/O SPC | RMS ATTN LIMIT C/O | |
| 024* | S P O/P INH 15 | V93X3510X | 36 | 6 | | 1.0 | * | | BLVL | | | | | | | | | | | | | KYBD | SPEC PROC OUTPUT INHIBIT | |
| 025 | (MSG LINE) | V93X0050X | 1 | 25 | | 44.0 | | | CHAR | | | | | | | G | | | | | | UI | MESSAGE LINE | X |
| 026 | (BUFFER MSG) | V93X0054X | 45 | 25 | | 4.0 | | | CHAR | | | | | | | G | | | | | | UI | BUFFER MESSAGE INDICATOR | X |
| 027 | (SPL) | V93X0056X | 2 | 26 | | 49.0 | | | CHAR | | | | | | | G | | | | | | UI | SCRATCH PAD LINE | X |

### 4.3.25 PDRS OVERRIDE (PFS)

TITLE: PDRS OVERRIDE
TYPE: SPEC/095
AVAILABILITY: SM OPS 2 AND 4

#### 4.3.25.1 Purpose, Operation, Organization

This specialist function provides the crew with the ability to override a number of RMS switch inputs in the event a major switch fails. In addition, the ability to override the effects of several other non–switch failures is also provided. These capabilities include toggling the loaded rate limit flag and configuring the RMS software for correct operation while the RMS is in the MPM stowed position. Figure 4.3.25–1 is the PDRS OVERRIDE display format.

All inputs to this Spec are rejected with a class 5 “ILLEGAL ENTRY” message when the RMS software (see section 4.4 of STS 87–0017 – the RMS Level C FSSR) is not executing and the information presented on the display shall not be required to be accurate.

(1) The capability shall be provided via the MODE SW OVRD item (1) to override the RMS Mode Select switch and the Mode Enter push–button, as follows. The MODE SW OVRD item (1) shall be implemented as a toggle item initialized to the deselected state.

While the MODE SW OVRD item (1) is deselected, the capability to override the RMS Mode Select Switch and Mode Enter push–button shall be inhibited. Execution of any of the mode select items (2 through 12) or the mode enter item 13) shall be rejected with a class 5 “ILLEGAL ENTRY” message. While deselected, asterisks shall be driven next to the appropriate mode select items (2 through 12) to reflect the actual position of the RMS Mode Select switch as sensed by the FSW. The data in the IND column shall mimic the Mode Selected indicator lights on the RMS Displays and Controls panel (as commanded by the GPC).

While the MODE SW OVRD item (1) is selected, the RMS Mode Select switch and Mode Enter push–button hardware inputs shall be ignored by the FSW and replaced by the mode select and mode enter items. The mode select items (2 through 12), which are all mutually exclusive, shall be used to select the desired mode. Execution of a currently deselected mode select item shall result in that mode select item being selected and all other mode select items being automatically deselected. Execution of an already selected mode select item shall have no effect. (Upon selection of the MODE SW OVRD item (1), the mode select items (2 through 12) shall be automatically deselected.) The mode enter item (13) shall be used to mimic the Mode Enter push–button. The data in the IND column shall mimic the Mode Selected indicator lights on the RMS Displays and Controls panel (as commanded by the GPC). Execution of the mode enter item (13) while none of the mode select items (2 through 12) are selected shall be rejected with a class 5 “ILLEGAL ENTRY” message.

(2) The capability shall be provided via the LOADED RATE item (14) to override the generation of the LOADED_RATE_LIMIT_FLAG (V92X3589X) by the RMS software, as follows. The LOADED RATE item (14) shall be implemented as a toggle item initialized to the deselected state. While the LOADED RATE item (14) is selected, the normal calculation of the LOADED_RATE_LIMIT_FLAG by the RMS software shall be overwritten to be TRUE (loaded rates). While deselected, the LOADED RATE item (14) shall not hinder in any way the normal calculation of the LOADED_RATE_LIMIT_FLAG by the existing RMS software.

(3) The capability shall be provided via the STOWED OPS item (15) to enable or disable RMS stowed operations. The RMS stowed operations capability shall be implemented as a toggle item initialized to the deselected state. When the STOWED_OPS_REQUEST (V93X1713X) is enabled, the RMS software shall use a different set of arm position constants (for the attach point and swingout angle) to calculate the appropriate arm position parameters.

(4) The capability shall be provided via the SIN/DIR SW REASSIGN item (16) to reassign the Single/Direct Drive switch to the Autosequence Stop/Proceed switch. This capability shall be implemented as a toggle item initialized to the deselected state. Execution of this item shall be rejected with a class 5 "ILLEGAL ENTRY" message if the AUTO SW OVRD item (29) has been selected.

(5) The capability shall be provided via the JNT SW OVRD item (17) to override the RMS Joint Select switch as follows. The JNT SW OVRD item (17) shall be implemented as a toggle item initialized to the deselected state.

While the JNT SW OVRD item (17) is deselected, the capability to override the RMS Joint Select Switch shall be inhibited. Execution of any of the joint select items (18 through 25) shall be rejected with a class 5 "ILLEGAL ENTRY" message. While deselected, asterisks shall be driven next to the appropriate joint select items (18 through 25) to reflect the actual position of the RMS Joint Select switch as sensed by the FSW.

While the JNT SW OVRD item (17) is selected, the RMS Joint Select switch hardware inputs shall be ignored by the FSW and replaced by the joint select items. The joint select items (18 through 25), which are all mutually exclusive, shall be used to select the desired joint. Execution of a currently deselected joint select item shall result in that joint select item being selected and all other joint select items being automatically deselected. Execution of an already selected joint select item shall have no effect. (Upon selection of the JNT SW OVRD item (17), the joint select items (18 through 25) shall be automatically deselected.)

(6) The capability shall be provided via the RATE SW OVRD item (26) to override the RMS Rate Select switch, as follows. The RATE SW OVRD item (26) shall be implemented as a toggle item initialized to the deselected state.

While the RATE SW OVRD item (26) is deselected, the capability to override the RMS Rate Select Switch shall be inhibited. Execution of either the VERNIER item (27) or the COARSE item (28) shall be rejected with a class 5 "ILLEGAL ENTRY" message. While deselected, an asterisk shall be driven next to either the VERNIER item (27) or the COARSE item (28) to reflect the actual position of the RMS Rate Select switch as sensed by the FSW.

While the RATE SW OVRD item (26) is selected, the RMS Rate Select switch hardware inputs shall be ignored by the FSW and replaced by the rate select items. The VERNIER item (27) and the COARSE item (28), which are both mutually exclusive, shall be used to select the desired rate. Execution of the VERNIER item (27) or the COARSE item (28) shall result in that item being selected and the other item being automatically deselected. Execution of the VERNIER item (27) or the COARSE item (28) while already selected shall have no effect. (Upon selection of the RATE SW OVRD item (26), the VERNIER item (27) shall be automatically selected and the COARSE item (28) shall be automatically deselected.)

(7) The capability shall be provided via the AUTO SW OVRD item (29) to override the RMS Autosequence Stop/Proceed switch, as follows. The AUTO SW OVRD item (29) shall be implemented as a toggle item initialized to the deselected state.

While the AUTO SW OVRD item (29) is deselected, the capability to override the RMS Autosequence Stop/Proceed switch shall be inhibited. Execution of either the PROCEED item (30) or the STOP item (31) shall be rejected with a class 5 "ILLEGAL ENTRY" message.

While the AUTO SW OVRD item (29) is selected, the RMS Autosequence Stop Proceed switch hardware inputs shall be ignored by the FSW and replaced by the auto select items. The PROCEED item (30) and the STOP item (31) shall be used to initiate the desired operation. Execution of this item shall be rejected with a Class 5 "ILLEGAL ENTRY" error message if the SIN/DIR SW REASSIGN item (16) is enabled.

(8) The capability shall be provided via the HC AXIS CHG item (32) to change the sense of the translational or rotational hand controller, as follows. The HC AXIS CHG item (32), the THC item (33), and the RHC item (34) shall each be implemented as toggle items initialized to the deselected state.

While the HC AXIS CHG item (32) is deselected, the capability to change the sense of the THC or RHC shall be inhibited. Execution of either the THC item (33) or the RHC item (34) shall be rejected with a class 5 "ILLEGAL ENTRY" message.

While the HC AXIS CHG item (32) is selected, the capability to change the sense of the THC and or the RHC shall be enabled. Execution of the THC item (33) shall cause the reassignment of the THC inputs as follows: existing X shall become Y, existing Y shall become Z, and existing Z shall become X. Reexecution of the item shall restore the original sense. Execution of the RHC item (34) shall cause the reassignment of the RHC inputs as follows: existing Pitch shall become Yaw, existing Yaw shall become Roll, and existing Roll shall become Pitch. Reexecution of the item shall restore the original sense. Upon selection or deselection of the HC AXIS CHG item (32), the THC item (33) and the RHC item (34) shall be automatically deselected.

(9) The capability shall be provided to override four Manipulator Controller Interface Unit (MCIU) failures that result in the loss of Computer Supported RMS modes (due to the MCIU application of autobrakes). In the MCIU OVERRIDE area is the format containing the GPC safing cancel item (SAFING CAN 35), and the arm based electronics (ABE) failure override items (ABE OVRD A 36, ABE OVRD B 37, and ABE OVRD C 38). The control item entries shall provide the capability to toggle the state of the associated failure override indicator. These failure override indicators are to be cyclically transmitted to the MCIU. Whenever an item is disabled, the associated failure override indicator shall be set "OFF" and a blank shall be driven next to the item number. Whenever an item is enabled, the associated failure override indicator shall be set "ON" and an asterisk shall be driven next to the item number. Each control item shall be implemented as a toggle item and shall be initialized from Mass Memory.

(10) A special field in the upper center of the format will display the text "INPUTS INHIBITED" double overbright when the RMS software is not executing. It will be blank at all other times.

(11) Vectors are required on several portions of the display to facilitate the readability and clarity of the data. The required vectors are defined below:

| VECTOR NO. | START PT (X, Y) | END PT (X, Y) |
|---|---|---|
| 1 | (341, 68) | (341, 581) |
| 2 | (683, 95) | (683, 527) |
| 3 | (341, 379) | (683, 379) |

### 4.3.25.2 PDRS OVERRIDE (PFS) Keyboard Processing Addendum

A. Execution of any Mode Select item (items 2 through 12) or Mode Enter item (13) when the MODE SW OVRD item (1) is deselected shall result in an operator error, rejection of the input, and display of the "ILLEGAL ENTRY" CRT message.

B. Execution of the SIN/DIR SW REAASIGN item (16) when the AUTO SW OVRD item (29) has been selected shall result in an operator error, rejection of the input, and display of the "ILLEGAL ENTRY" CRT message.

C. Execution of any Joint Select item (items 18 through 25) when the JNT SW OVRD item (17) is deselected shall result in an operator error, rejection of the input, and display of the "ILLEGAL ENTRY" CRT message.

D. Execution of the VERNIER item (27) or the COARSE item (28) when the RATE SW OVRD item (26) is deselected shall result in an operator error, rejection of the input, and display of the "ILLEGAL ENTRY" CRT message.

E. Execution of the AUTO SW OVRD item (29) when the SIN/DIR SW REASSIGN item (16) is selected shall result in an operator error, rejection of the input, and display of the "ILLEGAL ENTRY" CRT message.

F. Execution of the PROCEED item (30) or the STOP item (31) when the AUTO SW OVRD item (29) is deselected shall result in an operator error, rejection of the input, and display of the "ILLEGAL ENTRY" CRT message.

G. Execution of the THC item (33) or the RHC item (34) when the HC AXIS CHG item (32) is deselected shall result in an operator error, rejection of the input, and display of the "ILLEGAL ENTRY" CRT message.

H. Execution of the Mode Enter item (13) when the MODE SW OVRD item (1) is selected but none of the Mode Select items (items 2 through 12) are selected shall result in an operator error, rejection of the input, and display of the "ILLEGAL ENTRY" CRT message.

### 4.3.25.3 PDRS OVERRIDE CRT Display Processing Addendum

The table below presents the parameter status indicators (PSI) that can be displayed for a parameter. In SM–PL, PSI requirements can be one of two types as follows:

- A PSI which is part of the data words identified by an "X" marked in the STATUS column of Table 4.3.25–2.
- A PSI which is a stand–alone identified by the word "STAT" being inserted in the FORMAT TYPE column of Table 4.3.25–2.

Both PSI types have a numeric code appearing as an entry (right justified) in the ADD REF column of CRT display processing Table 4.3.25–2. The numeric code, corresponding to one of those listed in the table, indicates the specific status processing to be performed. If there is no numeric code entry, the status processing is is defined by the default code.

When the "M" PSI is displayed (for Commfault, I/O error resulting in missing data), the last value of the associated parameter will continue to be displayed unless specified otherwise.

| Numeric Code | PSI SYMBOL(S) | | | | | |
|---|---|---|---|---|---|---|
| Default (blank) | ↓ | ↑ | H | L | M | ∅ |
| 1 | | | | | M | ∅ |
| 2 | | | H | L | M | ∅ |
| 3 | ↓ | | | | M | ∅ |
| 4 | ↓ | | | | | ∅ |

∅ = blank

NOTE: The numeric addendum reference codes are for information only. Actual processing requirements are specified in the SM Level B CPDS (SS–P–0002–580) and/or Level C Systems Management FSR (JSC–19590) or Payload Management FSR (JSC–19478).

The following alpha codes appear (left justified) in the ADD REF column of Table 4.3.25–2 whenever it is necessary to define any special processing requirements not otherwise covered therein.

A. ORB UNL Mode Selection.

| MODE SW OVERRIDE ENA/DIS (V93X1700X) | DISPLAYED PARAMETER |
|---|---|
| 0 (DISABLED) | V72K2975J |
| 1 (ENABLED) | V93X1701X |

B. SINGLE Mode Selection.

| MODE SW OVERRIDE ENA/DIS (V93X1700X) | DISPLAYED PARAMETER |
|---|---|
| 0 (DISABLED) | V72K2979J |
| 1 (ENABLED) | V93X1702X |

C. END EFF Mode Selection.

| MODE SW OVERRIDE ENA/DIS (V93X1700X) | DISPLAYED PARAMETER |
|---|---|
| 0 (DISABLED) | V72K2976J |
| 1 (ENABLED) | V93X1703X |

D. ORB LD Mode Selection.

| MODE SW OVERRIDE ENA/DIS (V93X1700X) | DISPLAYED PARAMETER |
|---|---|
| 0 (DISABLED) | V72K2977J |
| 1 (ENABLED) | V93X1704X |

E. PL Mode Selection.

| MODE SW OVERRIDE ENA/DIS (V93X1700X) | DISPLAYED PARAMETER |
|---|---|
| 0 (DISABLED) | V72K2978J |
| 1 (ENABLED) | V93X1705X |

F. OPR CMD Mode Selection.

| MODE SW OVERRIDE ENA/DIS (V93X1700X) | DISPLAYED PARAMETER |
|---|---|
| 0 (DISABLED) | V72K2970J |
| 1 (ENABLED) | V93X1706X |

G. AUTO 1 Mode Selection.

| MODE SW OVERRIDE ENA/DIS (V93X1700X) | DISPLAYED PARAMETER |
|---|---|
| 0 (DISABLED) | V72K2971J |
| 1 (ENABLED) | V93X1707X |

H. AUTO 2 Mode Selection.

| MODE SW OVERRIDE ENA/DIS (V93X1700X) | DISPLAYED PARAMETER |
|---|---|
| 0 (DISABLED) | V72K2972J |
| 1 (ENABLED) | V93X1708X |

I. AUTO 3 Mode Selection.

| MODE SW OVERRIDE ENA/DIS (V93X1700X) | DISPLAYED PARAMETER |
|---|---|
| 0 (DISABLED) | V72K2973J |
| 1 (ENABLED) | V92X1709X |

J. AUTO 4 Mode Selection.

| MODE SW OVERRIDE ENA/DIS (V93X1700X) | DISPLAYED PARAMETER |
|---|---|
| 0 (DISABLED) | V72K2974J |
| 1 (ENABLED) | V93X1710X |

K. TEST Mode Selection.

| MODE SW OVERRIDE ENA/DIS (V93X1700X) | DISPLAYED PARAMETER |
|---|---|
| 0 (DISABLED) | V72K2981J |
| 1 (ENABLED) | V93X1711X |

L. SH Yaw Joint Selection.

| JOINT SW OVERRIDE ENA/DIS (V93X1715X) | DISPLAYED PARAMETER |
|---|---|
| 0 (DISABLED) | V72K3010J |
| 1 (ENABLED) | V93X1716X |

M. SH Pitch Joint Selection.

| JOINT SW OVERRIDE ENA/DIS (V93X1715X) | DISPLAYED PARAMETER |
|---|---|
| 0 (DISABLED) | V72K3011J |
| 1 (ENABLED) | V93X1717X |

N. EL Pitch Joint Selection.

| JOINT SW OVERRIDE ENA/DIS (V93X1715X) | DISPLAYED PARAMETER |
|---|---|
| 0 (DISABLED) | V72K3012J |
| 1 (ENABLED) | V93X1718X |

O. WR Pitch Joint Selection.

| JOINT SW OVERRIDE ENA/DIS (V93X1715X) | DISPLAYED PARAMETER |
|---|---|
| 0 (DISABLED) | V72K3013J |
| 1 (ENABLED) | V93X1719X |

P. WR Yaw Joint Selection.

| JOINT SW OVERRIDE ENA/DIS (V93X1715X) | DISPLAYED PARAMETER |
|---|---|
| 0 (DISABLED) | V72K3014J |
| 1 (ENABLED) | V93X1720X |

Q. WR Roll Joint Selection.

| JOINT SW OVERRIDE ENA/DIS (V93X1715X) | DISPLAYED PARAMETER |
|---|---|
| 0 (DISABLED) | V72K3015J |
| 1 (ENABLED) | V93X1721X |

R. EE TEMP Joint Selection.

| JOINT SW OVERRIDE ENA/DIS (V93X1715X) | DISPLAYED PARAMETER |
|---|---|
| 0 (DISABLED) | V72K3016J |
| 1 (ENABLED) | V93X1722X |

S. CRIT TEMP Joint Selection.

| JOINT SW OVERRIDE ENA/DIS (V93X1715X) | DISPLAYED PARAMETER |
|---|---|
| 0 (DISABLED) | V72K3017J |
| 1 (ENABLED) | V93X1723X |

T. VERNIER Scaling Request.

| RATE SW OVERRIDE ENA/DIS (V93X1724X) | DISPLAYED PARAMETER |
|---|---|
| 0 (DISABLED) | V72K3027J |
| 1 (ENABLED) | Complement of V93X1725X |

U. COARSE Scaling Request.

| RATE SW OVERRIDE ENA/DIS (V93X1724X) | DISPLAYED PARAMETER |
|---|---|
| 0 (DISABLED) | V72K3027J |
| 1 (ENABLED) | V93X1726X |

V. When the RMS software is executing (V92X3841X, RMS Software Enabled, is ON), this field shall be blank. When the RMS software is not executing, (V92X3841X, RMS Software Enabled, is OFF), “INPUTS INHIBITED” shall be displayed double overbright.

### 4.3.25.4 PDRS Override Figure/Table References

Figure 4.3.25–1 PDRS Override Display (PFS)

Table 4.3.25–1 Keyboard Processing Table

Table 4.3.25–2 CRT Display Processing Table

Table 4.3.25–3 CRT Display Processing Background Requirements N/A

Table 4.3.25–4 Mission Design Background Constants N/A

Table 4.3.25–5 Input Functional Parameters N/A

Table 4.3.25–6 Output Functional Parameters N/A

Table 4.3.25–7 I–Loads N/A

Table 4.3.25–8 K–Loads N/A

Table 4.3.25–9 Constants N/A

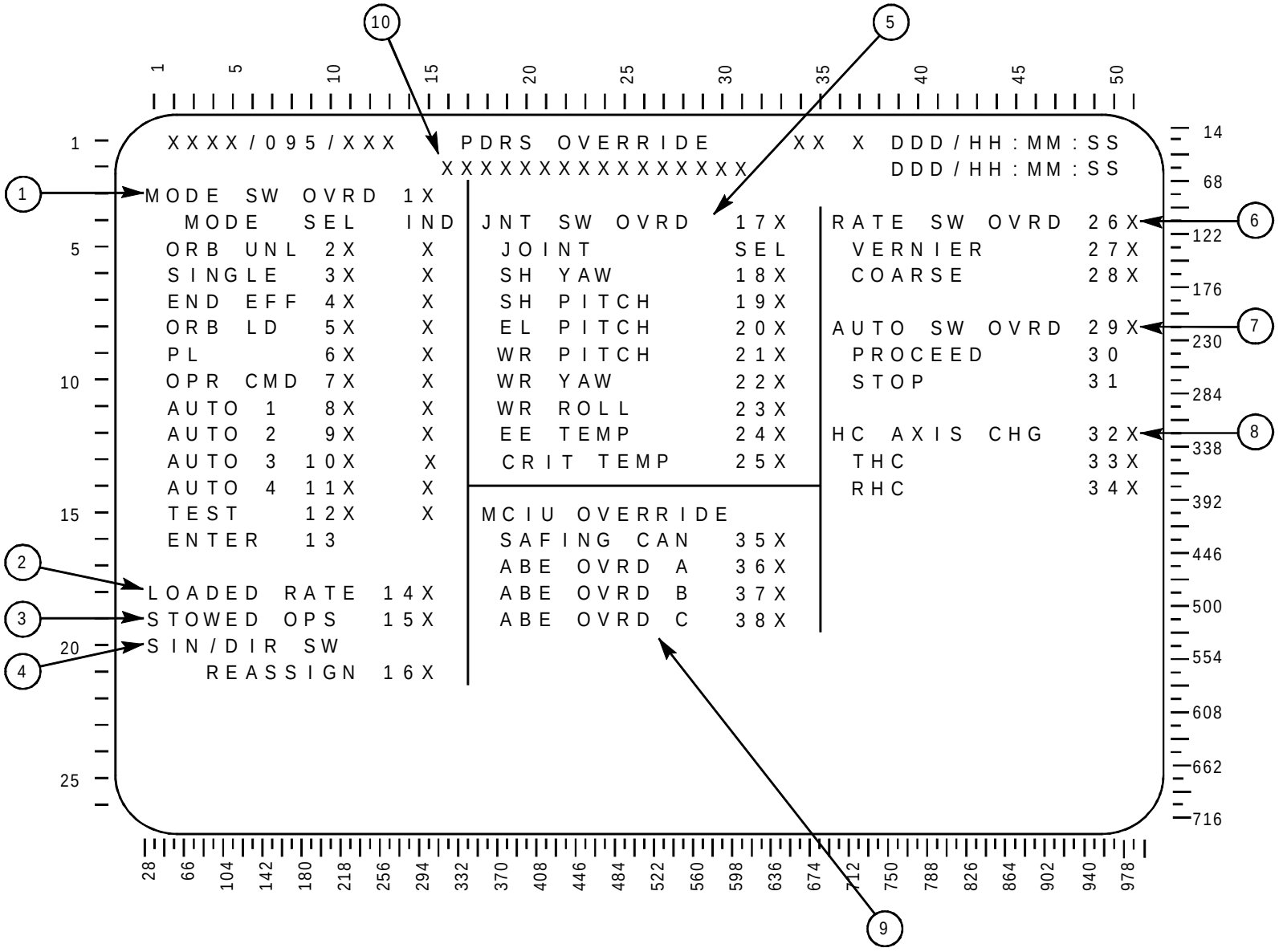


FIGURE 4.3.25-1.PDRS Override Display (PFS)

TABLE 4.3.25-1. PDRS OVERRIDE (PFS) KEYBOARD PROCESSING

| Seq | CRT Signal Name | M/S ID | CHAR | TYPE | UNITS | DK | ITEM | Item No. Limits | | Add Ref | Destination | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | MIN | MAX | | | | |
| 001 | MODE SW OVRD 1 | V93X1700X | 0.0 | CTRL | | | 1 | | | | RMS OVRD | MODE SW OVERRIDE ENA/DIS RMS | |
| 002 | ORB UNL 2 | V93X1701X | 0.0 | CTRL | | | 2 | | | A | RMS OVRD | MODE SW OVERRIDE – ORB UNL RMS | |
| 003 | SINGLE 3 | V93X1702X | 0.0 | CTRL | | | 3 | | | A | RMS OVRD | MODE SW OVERRIDE – SINGLE RMS | |
| 004 | END EFF 4 | V93X1703X | 0.0 | CTRL | | | 4 | | | A | RMS OVRD | MODE SW OVERRIDE – END EFF RMS | |
| 005 | ORB LD 5 | V93X1704X | 0.0 | CTRL | | | 5 | | | A | RMS OVRD | MODE SW OVERRIDE – ORB LD RMS | |
| 006 | PL 6 | V93X1705X | 0.0 | CTRL | | | 6 | | | A | RMS OVRD | MODE SW OVERRIDE – PL RMS | |
| 007 | OPR CMD 7 | V93X1706X | 0.0 | CTRL | | | 7 | | | A | RMS OVRD | MODE SW OVERRIDE – OPR CMD RMS | |
| 008 | AUTO 1 8 | V93X1707X | 0.0 | CTRL | | | 8 | | | A | RMS OVRD | MODE SW OVERRIDE – AUTO 1 RMS | |
| 009 | AUTO 2 9 | V93X1708X | 0.0 | CTRL | | | 9 | | | A | RMS OVRD | MODE SW OVERRIDE – AUTO 2 RMS | |
| 010 | AUTO 3 10 | V93X1709X | 0.0 | CTRL | | | 10 | | | A | RMS OVRD | MODE SW OVERRIDE – AUTO 3 RMS | |
| 011 | AUTO 4 11 | V93X1710X | 0.0 | CTRL | | | 11 | | | A | RMS OVRD | MODE SW OVERRIDE – AUTO 4 RMS | |
| 012 | TEST 12 | V93X1711X | 0.0 | CTRL | | | 12 | | | A | RMS OVRD | MODE SW OVERRIDE – TEST RMS | |
| 013 | ENTER 13 | V93X1712X | 0.0 | CTRL | | | 13 | | | AH | RMS OVRD | MODE SW OVERRIDE – ENTER RMS | |
| 014 | LOADED RATE 14 | V93X1730X | 0.0 | CTRL | | | 14 | | | | RMS OVRD | LOADED RATE LIMIT TOGGLE RMS | |
| 015 | STOWED OPS 15 | V93X1713X | 0.0 | CTRL | | | 15 | | | | RMS OVRD | STOWED OPS REQUEST RMS | |
| 016 | SIN/DIR SW REASSIGN 16 | V93X1714X | 0.0 | CTRL | | | 16 | | | B | RMS OVRD | SINGLE DRIVE SW REASSIGN RMS | |
| 017 | JNT SW OVRD 17 | V93X1715X | 0.0 | CTRL | | | 17 | | | | RMS OVRD | JOINT SW OVERRIDE ENA/DIS RMS | |
| 018 | SH YAW 18 | V93X1716X | 0.0 | CTRL | | | 18 | | | C | RMS OVRD | JOINT SW OVERRIDE – SHY RMS | |
| 019 | SH PITCH 19 | V93X1717X | 0.0 | CTRL | | | 19 | | | C | RMS OVRD | JOINT SW OVERRIDE – SHP RMS | |
| 020 | EL PITCH 20 | V93X1718X | 0.0 | CTRL | | | 20 | | | C | RMS OVRD | JOINT SW OVERRIDE – ELP RMS | |
| 021 | WR PITCH 21 | V93X1719X | 0.0 | CTRL | | | 21 | | | C | RMS OVRD | JOINT SW OVERRIDE – WRP RMS | |
| 022 | WR YAW 22 | V93X1720X | 0.0 | CTRL | | | 22 | | | C | RMS OVRD | JOINT SW OVERRIDE – WRY RMS | |
| 023 | WR ROLL 23 | V93X1721X | 0.0 | CTRL | | | 23 | | | C | RMS OVRD | JOINT SW OVERRIDE – WRR RMS | |
| 024 | EE TEMP 24 | V93X1722X | 0.0 | CTRL | | | 24 | | | C | RMS OVRD | JOINT SW OVERRIDE – EE T RMS | |
| 025 | CRIT TEMP 25 | V93X1723X | 0.0 | CTRL | | | 25 | | | C | RMS OVRD | JOINT SW OVERRIDE – CRIT T RMS | |
| 026 | RATE SW OVRD 26 | V93X1724X | 0.0 | CTRL | | | 26 | | | | RMS OVRD | RATE SW OVERRIDE ENA/DIS RMS | |
| 027 | VERNIER 27 | V93X1725X | 0.0 | CTRL | | | 27 | | | D | RMS OVRD | RATE SW OVERRIDE – VERNIER RMS | |
| 028 | COARSE 28 | V93X1726X | 0.0 | CTRL | | | 28 | | | D | RMS OVRD | RATE SW OVERRIDE – COARSE RMS | |
| 029 | AUTO SW OVRD 29 | V93X1727X | 0.0 | CTRL | | | 29 | | | E | RMS OVRD | AUTO SW OVERRIDE ENA/DIS RMS | |
| 030 | PROCEED 30 | V93X1728X | 0.0 | CTRL | | | 30 | | | F | RMS OVRD | AUTO SW OVERRIDE – PROCEED RMS | |
| 031 | STOP 31 | V93X1729X | 0.0 | CTRL | | | 31 | | | F | RMS OVRD | AUTO SW OVERRIDE – STOP RMS | |

TABLE 4.3.25-1. PDRS OVERRIDE (PFS) KEYBOARD PROCESSING

| Seq | CRT Signal Name | M/S ID | CHAR | TYPE | UNITS | DK | ITEM | Item No. Limits | | Add Ref | Destination | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | MIN | MAX | | | | |
| 032 | HC AXIS CHG 32 | V93X1731X | 0.0 | CTRL | | | 32 | | | | RMS OVRD | AXIS CHANGE ENA/DIS RMS | |
| 033 | THC 33 | V93X1732X | 0.0 | CTRL | | | 33 | | | G | RMS OVRD | AXIS CHANGE – THC RMS | |
| 034 | RHC 34 | V93X1733X | 0.0 | CTRL | | | 34 | | | G | RMS OVRD | AXIS CHANGE – RHC RMS | |
| 035 | SAFING CAN 35 | V93X1734X | 0.0 | CTRL | | | 35 | | | | RMS OVRD | MCIU OVERRIDE – SAFING CAN RMS | |
| 036 | ABE OVRD A 36 | V93X1735X | 0.0 | CTRL | | | 36 | | | | RMS OVRD | MCIU OVERRIDE – ABE OVRD A RMS | |
| 037 | ABE OVRD B 37 | V93X1736X | 0.0 | CTRL | | | 37 | | | | RMS OVRD | MCIU OVERRIDE – ABE OVRD B RMS | |
| 038 | ABE OVRD C 38 | V93X1737X | 0.0 | CTRL | | | 38 | | | | RMS OVRD | MCIU OVERRIDE – ABE OVRD C RMS | |

TABLE 4.3.25-2. PDRS OVERRIDE (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | BILEVEL | | | | | | | | | | | | | | | | | |
| | | | X | Y | | CHAR | 1 | 0 | TYPE | | | | | | | | | | | | | | | |
| 001 | (OPS) | V93X0040X | 2 | 1 | | 5.0 | | | CHAR | | | | | | | E | | | | | | UI | OPS FUNCTION PAGE | X |
| 002 | (SPEC) | V93X0042X | 7 | 1 | | 4.0 | | | CHAR | | | | | | | E | | | | | | UI | SPEC FUNCTION PAGE | X |
| 003 | (DISP) | V93X0044X | 10 | 1 | | 4.0 | | | DEC | | | | | | | E | | | | | | UI | DISPLAY FUNCTION PAGE | X |
| 004 | (UL) | V92X5032X | 34 | 1 | | 2.0 | UL | | BLVL | | | | | | X | G | | | | | | UI | UPLINK ACTIVITY IND | X |
| 005 | (GPC) | V93X0048X | 36 | 1 | | 2.0 | | | DEC | | | | | | | E | | | | | | UI | GPC DRIVER | X |
| 006 | (MT) | V91W1990C | 39 | 1 | | 12.0 | | | CHAR | DHMS | | | | | | A | | | | | | FCOS | MISSION ELAPSED TIME | X |
| 007 | (CRT TIMER) | V91W1989C | 39 | 2 | | 12.0 | | | CHAR | DHMS | | | | | | A | | | | | | FCOS | DISPLAY CRT TIME, PL | X |
| 008 | MODE SW OVRD 1 | V93X1700X | 15 | 3 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | S5.1.11 | MODE SW OVERRIDE ENA/DIS RMS | |
| 009 | ORB UNL 2 | ADDENDUM | 11 | 5 | | 1.0 | * | | BLVL | | | | | | | | | | | | A | S5.1.11 | MODE SW OVERRIDE – ORB UNL RMS | |
| 010 | SINGLE 3 | ADDENDUM | 11 | 6 | | 1.0 | * | | BLVL | | | | | | | | | | | | B | S5.1.11 | MODE SW OVERRIDE – SINGLE RMS | |
| 011 | END EFF 4 | ADDENDUM | 11 | 7 | | 1.0 | * | | BLVL | | | | | | | | | | | | C | S5.1.11 | MODE SW OVERRIDE – END EFF RMS | |
| 012 | ORB LD 5 | ADDENDUM | 11 | 8 | | 1.0 | * | | BLVL | | | | | | | | | | | | D | S5.1.11 | MODE SW OVERRIDE – ORB LD RMS | |
| 013 | PL 6 | ADDENDUM | 11 | 9 | | 1.0 | * | | BLVL | | | | | | | | | | | | E | S5.1.11 | MODE SW OVERRIDE – PL RMS | |
| 014 | OPR CMD 7 | ADDENDUM | 11 | 10 | | 1.0 | * | | BLVL | | | | | | | | | | | | F | S5.1.11 | MODE SW OVERRIDE – OPR CMD RMS | |
| 015 | AUTO 1 8 | ADDENDUM | 11 | 11 | | 1.0 | * | | BLVL | | | | | | | | | | | | G | S5.1.11 | MODE SW OVERRIDE – AUTO 1 RMS | |
| 016 | AUTO 2 9 | ADDENDUM | 11 | 12 | | 1.0 | * | | BLVL | | | | | | | | | | | | H | S5.1.11 | MODE SW OVERRIDE – AUTO 2 RMS | |
| 017 | AUTO 3 10 | ADDENDUM | 11 | 13 | | 1.0 | * | | BLVL | | | | | | | | | | | | I | S5.1.11 | MODE SW OVERRIDE – AUTO 3 RMS | |
| 018 | AUTO 4 11 | ADDENDUM | 11 | 14 | | 1.0 | * | | BLVL | | | | | | | | | | | | J | S5.1.11 | MODE SW OVERRIDE – AUTO 4 RMS | |
| 019 | TEST 12 | ADDENDUM | 11 | 15 | | 1.0 | * | | BLVL | | | | | | | | | | | | K | S5.1.11 | MODE SW OVERRIDE – TEST RMS | |
| 020 | ORB UNL IND | V72X2906J | 15 | 5 | | 1.0 | * | | BLVL | | | | | | | | | | | | | RMS EXEC | ORBITER UNLOADED MODE IND RMS | |
| 021 | SINGLE IND | V72X2910J | 15 | 6 | | 1.0 | * | | BLVL | | | | | | | | | | | | | RMS EXEC | SINGLE MODE IND RMS | |
| 022 | END EFF IND | V72X2907J | 15 | 7 | | 1.0 | * | | BLVL | | | | | | | | | | | | | RMS EXEC | EE MODE IND RMS | |
| 023 | ORB LD IND | V72X2908J | 15 | 8 | | 1.0 | * | | BLVL | | | | | | | | | | | | | RMS EXEC | ORBITER LOADED MODE IND RMS | |
| 024 | PL IND | V72X2909J | 15 | 9 | | 1.0 | * | | BLVL | | | | | | | | | | | | | RMS EXEC | PAYLOAD MODE IND RMS | |
| 025 | OPR CMD IND | V72X2904J | 15 | 10 | | 1.0 | * | | BLVL | | | | | | | | | | | | | RMS EXEC | OPR CMD MODE IND RMS | |
| 026 | AUTO 1 IND | V72X2900J | 15 | 11 | | 1.0 | * | | BLVL | | | | | | | | | | | | | RMS EXEC | AUTO 1 MODE IND RMS | |
| 027 | AUTO 2 IND | V72X2901J | 15 | 12 | | 1.0 | * | | BLVL | | | | | | | | | | | | | RMS EXEC | AUTO 2 MODE IND RMS | |
| 028 | AUTO 3 IND | V72X2902J | 15 | 13 | | 1.0 | * | | BLVL | | | | | | | | | | | | | RMS EXEC | AUTO 3 MODE IND RMS | |
| 029 | AUTO 4 IND | V72X2903J | 15 | 14 | | 1.0 | * | | BLVL | | | | | | | | | | | | | RMS EXEC | AUTO 4 MODE IND RMS | |
| 030 | TEST IND | V72X2905J | 15 | 15 | | 1.0 | * | | BLVL | | | | | | | | | | | | | RMS EXEC | TEST MODE IND RMS | |

## TABLE 4.3.25-2. PDRS OVERRIDE (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | BILEVEL | | | | | | | | | | | | | | | | | |
| | | | X | Y | | CHAR | 1 | 0 | TYPE | | | | | | | | | | | | | | | |
| 031 | LOADED RATE 14 | V93X1730X | 15 | 18 | | 1.0 | * | | BLVL | | | | | | | | | | | | | RMS RDA | LOADED RATE LIMIT TOGGLE RMS | |
| 032 | STOWED OPS 15 | V93X1713X | 15 | 19 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | S5.1.11 | STOWED OPS REQUEST RMS | |
| 033 | SIN/DIR SW REASSIGN 16 | V93X1714X | 15 | 21 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | S5.1.11 | SINGLE DRIVE SW REASSIGN RMS | |
| 034 | JNT SW OVRD 17 | V93X1715X | 33 | 4 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | S5.1.11 | JOINT SW OVERRIDE ENA/DIS RMS | |
| 035 | SH YAW 18 | ADDENDUM | 33 | 6 | | 1.0 | * | | BLVL | | | | | | | | | | | | L | S5.1.11 | JOINT SW OVERRIDE – SHY RMS | |
| 036 | SH PITCH 19 | ADDENDUM | 33 | 7 | | 1.0 | * | | BLVL | | | | | | | | | | | | M | S5.1.11 | JOINT SW OVERRIDE – SHP RMS | |
| 037 | EL PITCH 20 | ADDENDUM | 33 | 8 | | 1.0 | * | | BLVL | | | | | | | | | | | | N | S5.1.11 | JOINT SW OVERRIDE – ELP RMS | |
| 038 | WR PITCH 21 | ADDENDUM | 33 | 9 | | 1.0 | * | | BLVL | | | | | | | | | | | | O | S5.1.11 | JOINT SW OVERRIDE – WRP RMS | |
| 039 | WR YAW 22 | ADDENDUM | 33 | 10 | | 1.0 | * | | BLVL | | | | | | | | | | | | P | S5.1.11 | JOINT SW OVERRIDE – WRY RMS | |
| 040 | WR ROLL 23 | ADDENDUM | 33 | 11 | | 1.0 | * | | BLVL | | | | | | | | | | | | Q | S5.1.11 | JOINT SW OVERRIDE – WRR RMS | |
| 041 | EE TEMP 24 | ADDENDUM | 33 | 12 | | 1.0 | * | | BLVL | | | | | | | | | | | | R | S5.1.11 | JOINT SW OVERRIDE – EE T RMS | |
| 042 | CRIT TEMP 25 | ADDENDUM | 33 | 13 | | 1.0 | * | | BLVL | | | | | | | | | | | | S | S5.1.11 | JOINT SW OVERRIDE – CRIT T RMS | |
| 043 | RATE SW OVRD 26 | V93X1724X | 51 | 4 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | S5.1.11 | RATE SW OVERRIDE ENA/DIS RMS | |
| 044 | VERNIER 27 | ADDENDUM | 51 | 5 | | 1.0 | | * | BLVL | | | | | | | | | | | | T | S5.1.11 | RATE SW OVERRIDE – VERNIER RMS | |
| 045 | COARSE 28 | ADDENDUM | 51 | 6 | | 1.0 | * | | BLVL | | | | | | | | | | | | U | S5.1.11 | RATE SW OVERRIDE – COARSE RMS | |
| 046 | AUTO SW OVRD 29 | V93X1727X | 51 | 8 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | S5.1.11 | AUTO SW OVERRIDE ENA/DIS RMS | |
| 047 | HC AXIS CHG 32 | V93X1731X | 51 | 12 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | S5.1.11 | AXIS CHANGE ENA/DIS RMS | |
| 048 | THC 33 | V93X1732X | 51 | 13 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | S5.1.11 | AXIS CHANGE – THC RMS | |
| 049 | RHC 34 | V93X1733X | 51 | 14 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | S5.1.11 | AXIS CHANGE – RHC RMS | |
| 050 | SAFING CAN 35 | V93X1734X | 33 | 16 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | S5.1.11 | MCIU OVERRIDE – SAFING CAN RMS | |
| 051 | ABE OVRD A 36 | V93X1735X | 33 | 17 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | S5.1.11 | MCIU OVERRIDE – ABE OVRD A RMS | |
| 052 | ABE OVRD B 37 | V93X1736X | 33 | 18 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | S5.1.11 | MCIU OVERRIDE – ABE OVRD B RMS | |
| 053 | ABE OVRD C 38 | V93X1737X | 33 | 19 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | S5.1.11 | MCIU OVERRIDE – ABE OVRD C RMS | |
| 054 | INPUTS INHIBITED | V92X3841X | 16 | 2 | | 16.0 | | | RTXT | | | X | | X | | | | | | | V | R4.21 | RMS SOFTWARE ENABLED RMS | |
| 055 | (MSG LINE) | V93X0050X | 1 | 25 | | 44.0 | | | CHAR | | | | | | | G | | | | | | UI | MESSAGE LINE | X |
| 056 | (BUFFER MSG) | V93X0054X | 45 | 25 | | 4.0 | | | CHAR | | | | | | | G | | | | | | UI | BUFFER MESSAGE INDICATOR | X |
| 057 | (SPL) | V93X0056X | 2 | 26 | | 49.0 | | | CHAR | | | | | | | G | | | | | | UI | SCRATCH PAD LINE | X |

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### 4.3.26 DELETED

### 4.3.27 PDRS STATUS

See JSC–19590, Section 6.19

### 4.3.28 GPCF PL STATUS & Cargo PC Control (PFS)

TITLE: GPCF PL STATUS & Cargo PC Control
TYPE: SPEC/071
AVAILABILITY: SM OPS 2 and 4

#### 4.3.28.1 Purpose, Operation, and Organization

This display allows the crew to initiate the GPCF function and monitor the payload command and data acquisition tables for the GPCF function.

(1) The Payload Application and Cargo PC monitoring is accomplished as described in the following paragraphs. This data shall be blanked whenever V93X2677X (GPCF INITIALIZATION) is off.

a. PL column displays the payload ID number.

b. APP column displays the four character short name of the payload application. The status of the payload application shall be displayed next to the short name.

c. PGSC column displays the four character short name of the CARGO PC in command of the payload in the location opposite the payload number. The status of the CARGO PC shall be displayed next to the short name.

d. DESCRIPTION column displays the fifteen character text description of the payload in the location opposite the payload number.

e. LAST OP column displays the number of the last op code received by GPCF from the CARGO PC for the payload in the location opposite the payload number. The initial values for this field shall be zero. A down arrow shall be displayed next to the op code if it was rejected by GPCF processing.

f. TABL VERSION section displays the current version number for the command and data acquisition tables for the payload.

The CMD column contains the current command table version number. A question mark, “?”, shall appear next to the version number if an update has not been verified by the Cargo PC.

The C&W column contains the current PL data monitoring table version number. A question mark, “?”, shall appear next to the version number if an update has not been verified by the Cargo PC.

(2) The Cargo PC Port Control and Monitoring is described in the following paragraphs:

a. Port 1 shall be controlled by Items 1 and 3. PORT 1 ON (Item 1) is an item entry that provides the capability to initiate I/O to serial port 1. PORT 1 OFF (Item 3) is an item

entry that provides the capability to deactivate I/O to serial port 1. Port 2 shall be controlled by Items 2 and 4. PORT 2 ON (Item 2) is an item entry that provides the capability to initiate I/O to serial port 2. PORT 2 OFF (Item 4) is an item entry that provides the capability to deactivate I/O to serial port 2. Any attempt to initialize a port that is active or deactivate an inactive port shall result in "ILLEGAL ENTRY" CRT message.

b. The status of each port shall be displayed in the CARGO PC graphic to the right of each item entry pair. When port 1 is active, a CARGO PC graphic with a "1" shall appear next to items 1 and 3. When port 1 is inactive, the graphic and number shall be blanked. When port 2 is active, a CARGO PC graphic with a "2" shall appear next to items 2 and 4. When port 2 is inactive, the graphic and number shall be blanked.

(3) Annunciation Control
Item 5 provides the capability to toggle the status of the annunciation for the GPCF Function. When annunciation is disabled a double overbright diagonal line shall appear through the speaker graphic in the lower right portion of the display. When annunciation is enabled the double overbright line shall be blanked. Annunciation shall be initialized to enabled when SM is initialized from MM.

### 4.3.28.2 GPCF PL STATUS & Cargo PC Control Keyboard Processing Addendum

A. All items shall be rejected with an "ILLEGAL ENTRY" CRT message while initialization records are read by the GPC.

### 4.3.28.3 GPCF PL STATUS & Cargo PC Control CRT Display Processing Addendum

The table below presents the parameter status indicators (PSI) that can be displayed for a parameter. In SM-PL, PSI requirements can be one of two types as follows:

- A PSI which is part of the data words identified by an "X" marked in the STATUS column of Table 4.3.28-2.
- A PSI which is a stand-alone identified by the word "STAT" being inserted in the FORMAT TYPE column of Table 4.3.28-2.

Both PSI types have a numeric code appearing as an entry (right justified) in the ADD REF column of CRT display processing Table 4.3.28-2. The numeric code, corresponding to one of those listed in the table, indicates the specific status processing to be performed. If there is no numeric code entry, the status processing is defined by the default code.

When "M" PSI is displayed (for Commfault, I/O error resulting in missing data), the last value of the associated parameter will continue to be displayed unless specified otherwise.

| Numeric Code | PSI SYMBOL(S) | | | | | |
|---|---|---|---|---|---|---|
| Default (blank) | ↓ | ↑ | H | L | M | ⊬ |
| 1 | | | | | M | ⊬ |
| 2 | | | H | L | M | ⊬ |
| 3 | ↓ | | | | M | ⊬ |
| 4 | ↓ | | | | | ⊬ |

NOTE: The numeric addendum reference codes are for information only. Actual processing requirements are specified in the SM Level B CPDS (SS-P-0002-580) and/or Level C Systems Management FSR (JSC-19590), Payload Management FSR (JSC-19478).

The following alpha code(s) appear (left justified) in the ADD REF column of Table 4.3.28-2 whenever it is necessary to define any special processing requirements not otherwise covered therein:

A. Payload Data

Payload data consists of the Payload ID, Payload Status, Payload Application Short Name, CARGO PC short name, CARGO PC status, Payload Description, Last OP Code, Last OP Code rejection indicator, Command Table Version ID, Command Table Update Indication, C&W Table Version ID, and C&W Table Update Indication. Payload data shall be displayed in ascending order based on the Payload Identification number starting on line 5 and continuing until all payloads are displayed. A payload shall be displayed when it becomes active until the payload is scrubbed from the GPCF function. Unused lines shall be blanked.

B. Annunciation

A double overbright line shall appear through the speaker in the lower right portion of the display when annunciation has been disabled via item entry, uplink or GPCF command (V93X2895X, GPCF ANNUN ENA/INH = 0).

C. Inputs Inhibited

“INPUTS INHIBITED” shall appear double overbright beneath the display title while initialization records are read by the GPC (V93X3005X GPCF INIT BUSY = 1).

### 4.3.28.4 GPCF PL Status & Cargo PC Control Figure/Table References

Figure 4.3.28-1 GPCF PL Status & Cargo PC Control Display (PFS)

Table 4.3.28-1 Keyboard Processing Table

Table 4.3.28-2 CRT Display Processing Table

Table 4.3.28-3 CRT Display Processing Background Requirements N/A

Table 4.3.28-4 Mission Design Background Constants N/A

Table 4.3.28-5 Input Functional Parameters N/A

Table 4.3.28-6 Output Functional Parameters N/A

Table 4.3.28-7 I-Loads N/A

Table 4.3.28-8 K-Loads N/A

Table 4.3.28-9 Constants N/A

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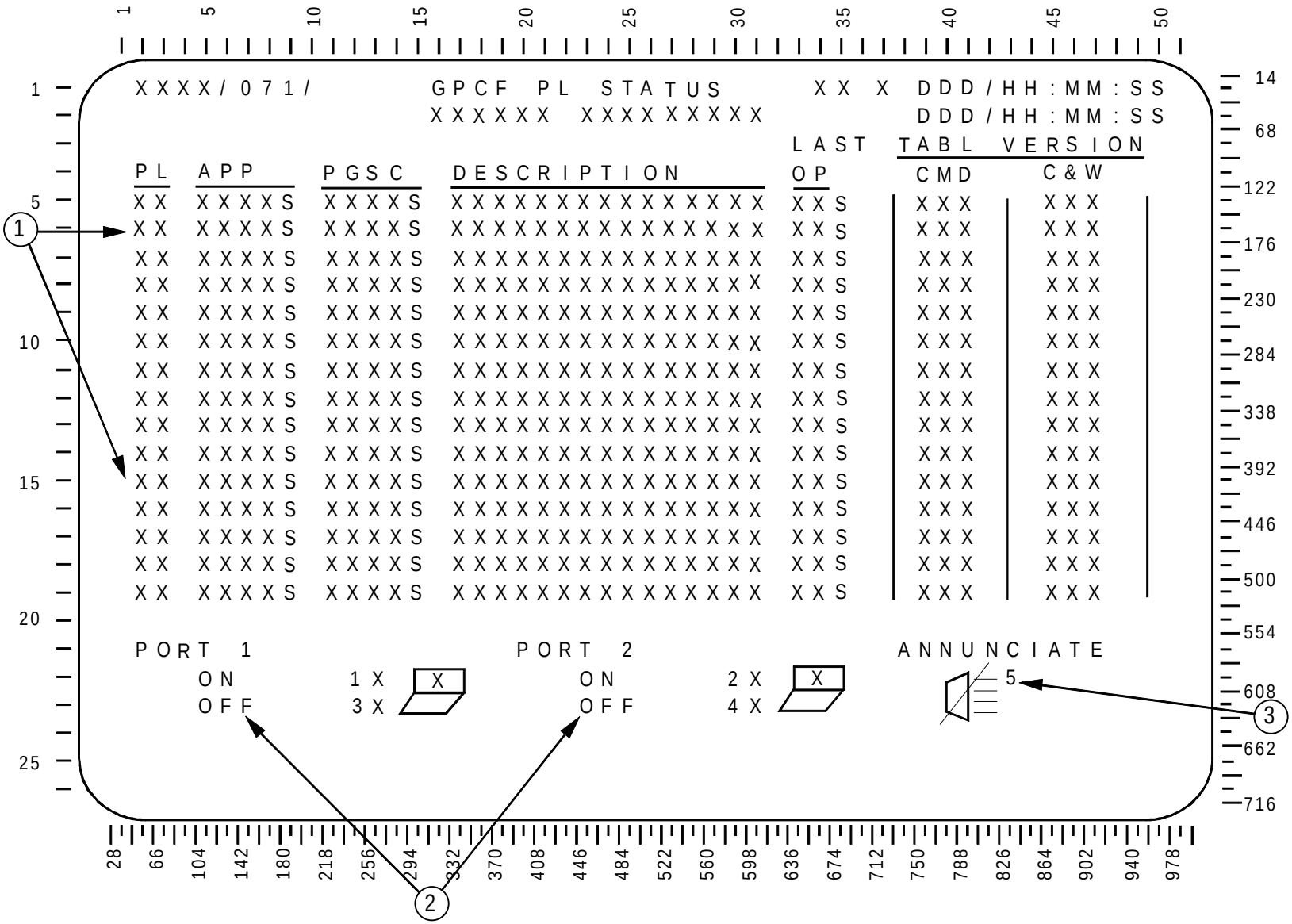


FIGURE 4.3.28-1.GPCF PL Status & Cargo PC Control Display (PFS)

Table 4.3.28-1. GPCF PL STATUS & CARGO PC CONTROL (PFS) KEYBOARD PROCESSING

| Seq | CRT Signal Name | M/S ID | CHAR | TYPE | UNITS | DK | ITEM | Item No. Limits | | Add Ref | Destination | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | MIN | MAX | | | | |
| 001 | PORT 1 ON 1 | V92X8000X | 0.0 | CNTL | | | 1 | | | A | GPCF | CARGO PC PORT 1 ON | X |
| 002 | PORT 2 ON 2 | V92X8002X | 0.0 | CNTL | | | 2 | | | A | GPCF | CARGO PC PORT 2 ON | X |
| 003 | PORT 1 OFF 3 | V92X8001X | 0.0 | CNTL | | | 3 | | | A | GPCF | CARGO PC PORT 1 OFF | X |
| 004 | PORT 2 OFF 4 | V92X8003X | 0.0 | CNTL | | | 4 | | | A | GPCF | CARGO PC PORT 2 OFF | X |
| 005 | ANNUNCIATE 5 | V93X2895X | 0.0 | CNTL | | | 5 | | | A | GPCF | GPCF ANNUN ENA/INH | X |

## Table 4.3.28-2. GPCF PL STATUS & CARGO PC CONTROL (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | BILEVEL | | | | | | | | | | | | | | | | | |
| | | | X | Y | | CHAR | 1 | 0 | TYPE | | | | | | | | | | | | | | | |
| 001 | (OPS) | V93X0040X | 2 | 1 | | 5.0 | | | CHAR | | | | | | | C | | | | | | UI | OPS FUNCTION PAGE | |
| 002 | (SPEC) | V93X0042X | 7 | 1 | | 4.0 | | | CHAR | | | | | | | E | | | | | | UI | SPEC FUNCTION PAGE | |
| 003 | (DISP) | V93X0044X | 10 | 1 | | 4.0 | | | DEC | | | | | | | E | | | | | | UI | DISPLAY FUNCTION PAGE | |
| 004 | (UL) | V93X5032X | 34 | 1 | | 2.0 | UL | | BLVL | | | | | | X | G | | | | | | UI | UPLINK ACTIVITY IND | |
| 005 | (GPC) | V93X0048X | 36 | 1 | | 2.0 | | | DEC | | | | | | | E | | | | | | UI | GPC DRIVER | |
| 006 | (MT) | V91W1990C | 39 | 1 | | 12.0 | | | CHAR | DHMS | | | | | | A | | | | | | FCOS | MISSION ELASPED TIME | |
| 007 | (CRT TIMER) | V91W1988C | 39 | 2 | | 12.0 | | | CHAR | DHMS | | | | | | A | | | | | | FCOS | DISPLAY CRT TIMER SM | |
| 008 | PL 1 | V93J2557C | 1 | 5 | | 3.0 | | | DEC | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 1 NUM | |
| 009 | PL 2 | V93J2558C | 1 | 6 | | 3.0 | | | DEC | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 2 NUM | |
| 010 | PL 3 | V93J2559C | 1 | 7 | | 3.0 | | | DEC | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 3 NUM | |
| 011 | PL 4 | V93J2560C | 1 | 8 | | 3.0 | | | DEC | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 4 NUM | |
| 012 | PL 5 | V93J2561C | 1 | 9 | | 3.0 | | | DEC | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 5 NUM | |
| 013 | PL 6 | V93J2562C | 1 | 10 | | 3.0 | | | DEC | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 6 NUM | |
| 014 | PL 7 | V93J2563C | 1 | 11 | | 3.0 | | | DEC | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 7 NUM | |
| 015 | PL 8 | V93J2564C | 1 | 12 | | 3.0 | | | DEC | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 8 NUM | |
| 016 | PL 9 | V93J2565C | 1 | 13 | | 3.0 | | | DEC | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 9 NUM | |
| 017 | PL 10 | V93J2566C | 1 | 14 | | 3.0 | | | DEC | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 10 NUM | |
| 018 | PL 11 | V93J2567C | 1 | 15 | | 3.0 | | | DEC | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 11 NUM | |
| 019 | PL 12 | V93J2568C | 1 | 16 | | 3.0 | | | DEC | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 12 NUM | |
| 020 | PL 13 | V93J2569C | 1 | 17 | | 3.0 | | | DEC | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 13 NUM | |
| 021 | PL 14 | V93J2570C | 1 | 18 | | 3.0 | | | DEC | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 14 NUM | |
| 022 | PL 15 | V93J2571C | 1 | 19 | | 3.0 | | | DEC | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 15 NUM | |
| 023 | APP 1 | V93U2572C | 5 | 5 | | 4.0 | | | CHAR | | X | X | | | | | | | | | A, 3 | GPCF | GPCF S71 PL LINE 1 APP NAME | |
| 024 | APP 2 | V93U2573C | 5 | 6 | | 4.0 | | | CHAR | | X | X | | | | | | | | | A, 3 | GPCF | GPCF S71 PL LINE 2 APP NAME | |
| 025 | APP 3 | V93U2574C | 5 | 7 | | 4.0 | | | CHAR | | X | X | | | | | | | | | A, 3 | GPCF | GPCF S71 PL LINE 3 APP NAME | |
| 026 | APP 4 | V93U2575C | 5 | 8 | | 4.0 | | | CHAR | | X | X | | | | | | | | | A, 3 | GPCF | GPCF S71 PL LINE 4 APP NAME | |
| 027 | APP 5 | V93U2576C | 5 | 9 | | 4.0 | | | CHAR | | X | X | | | | | | | | | A, 3 | GPCF | GPCF S71 PL LINE 5 APP NAME | |
| 028 | APP 6 | V93U2577C | 5 | 10 | | 4.0 | | | CHAR | | X | X | | | | | | | | | A, 3 | GPCF | GPCF S71 PL LINE 6 APP NAME | |
| 029 | APP 7 | V93U2578C | 5 | 11 | | 4.0 | | | CHAR | | X | X | | | | | | | | | A, 3 | GPCF | GPCF S71 PL LINE 7 APP NAME | |
| 030 | APP 8 | V93U2579C | 5 | 12 | | 4.0 | | | CHAR | | X | X | | | | | | | | | A, 3 | GPCF | GPCF S71 PL LINE 8 APP NAME | |
| 031 | APP 9 | V93U2580C | 5 | 13 | | 4.0 | | | CHAR | | X | X | | | | | | | | | A, 3 | GPCF | GPCF S71 PL LINE 9 APP NAME | |
| 032 | APP 10 | V93U2581C | 5 | 14 | | 4.0 | | | CHAR | | X | X | | | | | | | | | A, 3 | GPCF | GPCF S71 PL LINE 10 APP NAME | |
| 033 | APP 11 | V93U2582C | 5 | 15 | | 4.0 | | | CHAR | | X | X | | | | | | | | | A, 3 | GPCF | GPCF S71 PL LINE 11 APP NAME | |
| 034 | APP 12 | V93U2583C | 5 | 16 | | 4.0 | | | CHAR | | X | X | | | | | | | | | A, 3 | GPCF | GPCF S71 PL LINE 12 APP NAME | |
| 035 | APP 13 | V93U2584C | 5 | 17 | | 4.0 | | | CHAR | | X | X | | | | | | | | | A, 3 | GPCF | GPCF S71 PL LINE 13 APP NAME | |
| 036 | APP 14 | V93U2585C | 5 | 18 | | 4.0 | | | CHAR | | X | X | | | | | | | | | A, 3 | GPCF | GPCF S71 PL LINE 14 APP NAME | |
| 037 | APP 15 | V93U2586C | 5 | 19 | | 4.0 | | | CHAR | | X | X | | | | | | | | | A, 3 | GPCF | GPCF S71 PL LINE 15 APP NAME | |
| 038 | PGSC 1 | V93U2587C | 11 | 5 | | 4.0 | | | CHAR | | X | X | | | | | | | | | A, 3 | GPCF | GPCF S71 PL LINE 1 CARGO PC NAME | |
| 039 | PGSC 2 | V93U2588C | 11 | 6 | | 4.0 | | | CHAR | | X | X | | | | | | | | | A, 3 | GPCF | GPCF S71 PL LINE 2 CARGO PC NAME | |
| 040 | PGSC 3 | V93U2589C | 11 | 7 | | 4.0 | | | CHAR | | X | X | | | | | | | | | A, 3 | GPCF | GPCF S71 PL LINE 3 CARGO PC NAME | |

Table 4.3.28-2. GPCF PL STATUS & CARGO PC CONTROL (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | | | |
| 041 | PGSC 4 | V93U2590C | 11 | 8 | | 4.0 | | | CHAR | | X | X | | | | | | | | | A, 3 | GPCF | GPCF S71 PL LINE 4 CARGO PC NAME | |
| 042 | PGSC 5 | V93U2591C | 11 | 9 | | 4.0 | | | CHAR | | X | X | | | | | | | | | A, 3 | GPCF | GPCF S71 PL LINE 5 CARGO PC NAME | |
| 043 | PGSC 6 | V93U2592C | 11 | 10 | | 4.0 | | | CHAR | | X | X | | | | | | | | | A, 3 | GPCF | GPCF S71 PL LINE 6 CARGO PC NAME | |
| 044 | PGSC 7 | V93U2593C | 11 | 11 | | 4.0 | | | CHAR | | X | X | | | | | | | | | A, 3 | GPCF | GPCF S71 PL LINE 7 CARGO PC NAME | |
| 045 | PGSC 8 | V93U2594C | 11 | 12 | | 4.0 | | | CHAR | | X | X | | | | | | | | | A, 3 | GPCF | GPCF S71 PL LINE 8 CARGO PC NAME | |
| 046 | PGSC 9 | V93U2595C | 11 | 13 | | 4.0 | | | CHAR | | X | X | | | | | | | | | A, 3 | GPCF | GPCF S71 PL LINE 9 CARGO PC NAME | |
| 047 | PGSC 10 | V93U2596C | 11 | 14 | | 4.0 | | | CHAR | | X | X | | | | | | | | | A, 3 | GPCF | GPCF S71 PL LINE 10 CARGO PC NAME | |
| 048 | PGSC 11 | V93U2597C | 11 | 15 | | 4.0 | | | CHAR | | X | X | | | | | | | | | A, 3 | GPCF | GPCF S71 PL LINE 11 CARGO PC NAME | |
| 049 | PGSC 12 | V93U2598C | 11 | 16 | | 4.0 | | | CHAR | | X | X | | | | | | | | | A, 3 | GPCF | GPCF S71 PL LINE 12 CARGO PC NAME | |
| 050 | PGSC 13 | V93U2599C | 11 | 17 | | 4.0 | | | CHAR | | X | X | | | | | | | | | A, 3 | GPCF | GPCF S71 PL LINE 13 CARGO PC NAME | |
| 051 | PGSC 14 | V93U2600C | 11 | 18 | | 4.0 | | | CHAR | | X | X | | | | | | | | | A, 3 | GPCF | GPCF S71 PL LINE 14 CARGO PC NAME | |
| 052 | PGSC 15 | V93U2601C | 11 | 19 | | 4.0 | | | CHAR | | X | X | | | | | | | | | A, 3 | GPCF | GPCF S71 PL LINE 15 CARGO PC NAME | |
| 053 | DESCRIPTION 1 | V93U2602C | 17 | 5 | | 15.0 | | | CHAR | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 1 PL DESCRIPTION | |
| 054 | DESCRIPTION 2 | V93U2603C | 17 | 6 | | 15.0 | | | CHAR | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 2 PL DESCRIPTION | |
| 055 | DESCRIPTION 3 | V93U2604C | 17 | 7 | | 15.0 | | | CHAR | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 3 PL DESCRIPTION | |
| 056 | DESCRIPTION 4 | V93U2605C | 17 | 8 | | 15.0 | | | CHAR | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 4 PL DESCRIPTION | |
| 057 | DESCRIPTION 5 | V93U2606C | 17 | 9 | | 15.0 | | | CHAR | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 5 PL DESCRIPTION | |
| 058 | DESCRIPTION 6 | V93U2607C | 17 | 10 | | 15.0 | | | CHAR | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 6 PL DESCRIPTION | |
| 059 | DESCRIPTION 7 | V93U2608C | 17 | 11 | | 15.0 | | | CHAR | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 7 PL DESCRIPTION | |
| 060 | DESCRIPTION 8 | V93U2609C | 17 | 12 | | 15.0 | | | CHAR | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 8 PL DESCRIPTION | |

## Table 4.3.28-2. GPCF PL STATUS & CARGO PC CONTROL (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | | | |
| 061 | DESCRIPTION 9 | V93U2610C | 17 | 13 | | 15.0 | | | CHAR | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 9 PL DESCRIPTION | |
| 062 | DESCRIPTION 10 | V93U2611C | 17 | 14 | | 15.0 | | | CHAR | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 10 PL DESCRIPTION | |
| 063 | DESCRIPTION 11 | V93U2612C | 17 | 15 | | 15.0 | | | CHAR | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 11 PL DESCRIPTION | |
| 064 | DESCRIPTION 12 | V93U2613C | 17 | 16 | | 15.0 | | | CHAR | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 12 PL DESCRIPTION | |
| 065 | DESCRIPTION 13 | V93U2614C | 17 | 17 | | 15.0 | | | CHAR | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 13 PL DESCRIPTION | |
| 066 | DESCRIPTION 14 | V93U2615C | 17 | 18 | | 15.0 | | | CHAR | | | X | | | | | | | | | A | GPCF | GPCF S71 LINE 14 PL DESCRIPTION | |
| 067 | DESCRIPTION 15 | V93U2616C | 17 | 19 | | 15.0 | | | CHAR | | | X | | | | | | | | | A | GPCF | GPCF S71 LINE 15 PL DESCRIPTION | |
| 068 | LAST OP 1 | V93J2617C | 33 | 5 | | 2.0 | | | HEX | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 1 LAST OP | |
| 069 | LAST OP 2 | V93J2618C | 33 | 6 | | 2.0 | | | HEX | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 2 LAST OP | |
| 070 | LAST OP 3 | V93J2619C | 33 | 7 | | 2.0 | | | HEX | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 3 LAST OP | |
| 071 | LAST OP 4 | V93J2620C | 33 | 8 | | 2.0 | | | HEX | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 4 LAST OP | |
| 072 | LAST OP 5 | V93J2621C | 33 | 9 | | 2.0 | | | HEX | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 5 LAST OP | |
| 073 | LAST OP 6 | V93J2622C | 33 | 10 | | 2.0 | | | HEX | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 6 LAST OP | |
| 074 | LAST OF 7 | V93J2623C | 33 | 11 | | 2.0 | | | HEX | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 7 LAST OP | |
| 075 | LAST OF 8 | V93J2624C | 33 | 12 | | 2.0 | | | HEX | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 8 LAST OP | |
| 076 | LAST OP 9 | V93J2625C | 33 | 13 | | 2.0 | | | HEX | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 9 LAST OP | |
| 077 | LAST OP 10 | V93J2626C | 33 | 14 | | 2.0 | | | HEX | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 10 LAST OP | |
| 078 | LAST OP 11 | V93J2627C | 33 | 15 | | 2.0 | | | HEX | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 11 LAST OP | |
| 079 | LAST OP 12 | V93J2628C | 33 | 16 | | 2.0 | | | HEX | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 12 LAST OP | |
| 080 | LAST OP 13 | V93J2629C | 33 | 17 | | 2.0 | | | HEX | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 13 LAST OP | |
| 081 | LAST OP 14 | V93J2630C | 33 | 18 | | 2.0 | | | HEX | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 14 LAST OP | |
| 082 | LAST OP 15 | V93J2631C | 33 | 19 | | 2.0 | | | HEX | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 15 LAST OP | |
| 083 | CMD 1 | V93J2632C | 38 | 5 | | 3.0 | | | DEC | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 1 CMD TABLE VERSION | |
| 084 | CMD 2 | V93J2633C | 38 | 6 | | 3.0 | | | DEC | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 2 CMD TABLE VERSION | |
| 085 | CMD 3 | V93J2634C | 38 | 7 | | 3.0 | | | DEC | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 3 CMD TABLE VERSION | |
| 086 | CMD4 | V93J2635C | 38 | 8 | | 3.0 | | | DEC | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 4 CMD TABLE VERSION | |
| 087 | CMD 5 | V93J2636C | 38 | 9 | | 3.0 | | | DEC | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 5 CMD TABLE VERSION | |
| 088 | CMD6 | V93J2637C | 38 | 10 | | 3.0 | | | DEC | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 6 CMD TABLE VERSION | |
| 089 | CMD 7 | V93J2638C | 38 | 11 | | 3.0 | | | DEC | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 7 CMD TABLE VERSION | |
| 090 | CMD 8 | V93J2639C | 38 | 12 | | 3.0 | | | DEC | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 8 CMD TABLE VERSION | |

Table 4.3.28-2. GPCF PL STATUS & CARGO PC CONTROL (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | | | |
| 091 | CMD 9 | V93J2640C | 38 | 13 | | 3.0 | | | DEC | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 9 CMD TABLE VERSION | |
| 092 | CMD 10 | V93J2641C | 38 | 14 | | 3.0 | | | DEC | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 10 CMD TABLE VERSION | |
| 093 | CMD 11 | V93J2642C | 38 | 15 | | 3.0 | | | DEC | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 11 CMD TABLE VERSION | |
| 094 | CMD 12 | V93J2643C | 38 | 16 | | 3.0 | | | DEC | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 12 CMD TABLE VERSION | |
| 095 | CMD 13 | V93J2644C | 38 | 17 | | 3.0 | | | DEC | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 13 CMD TABLE VERSION | |
| 096 | CMD 14 | V93J2645C | 38 | 18 | | 3.0 | | | DEC | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 14 CMD TABLE VERSION | |
| 097 | CMD 15 | V93J2646C | 38 | 19 | | 3.0 | | | DEC | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 15 CMD TABLE VERSION | |
| 098 | C&W 1 | V93J2647C | 44 | 5 | | 3.0 | | | DEC | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 1 INPUT TABLE VERSION | |
| 099 | C&W 2 | V93J2648C | 44 | 6 | | 3.0 | | | DEC | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 2 INPUT TABLE VERSION | |
| 100 | C&W 3 | V93J2649C | 44 | 7 | | 3.0 | | | DEC | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 3 INPUT TABLE VERSION | |
| 101 | C&W 4 | V93J2650C | 44 | 8 | | 3.0 | | | DEC | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 4 INPUT TABLE VERSION | |
| 102 | C&W 5 | V93J2651C | 44 | 9 | | 3.0 | | | DEC | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 5 INPUT TABLE VERSION | |
| 103 | C&W 6 | V93J2652C | 44 | 10 | | 3.0 | | | DEC | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 6 INPUT TABLE VERSION | |
| 104 | C&W 7 | V93J2653C | 44 | 11 | | 3.0 | | | DEC | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 7 INPUT TABLE VERSION | |
| 105 | C&W 8 | V93J2654C | 44 | 12 | | 3.0 | | | DEC | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 8 INPUT TABLE VERSION | |
| 106 | C&W 9 | V93J2655C | 44 | 13 | | 3.0 | | | DEC | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 9 INPUT TABLE VERSION | |
| 107 | C&W 10 | V93J2656C | 44 | 14 | | 3.0 | | | DEC | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 10 INPUT TABLE VERSION | |
| 108 | C&W 11 | V93J2657C | 44 | 15 | | 3.0 | | | DEC | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 11 INPUT TABLE VERSION | |
| 109 | C&W 12 | V93J2658C | 44 | 16 | | 3.0 | | | DEC | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 12 INPUT TABLE VERSION | |
| 110 | C&W 13 | V93J2659C | 44 | 17 | | 3.0 | | | DEC | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 13 INPUT TABLE VERSION | |

## Table 4.3.28-2. GPCF PL STATUS & CARGO PC CONTROL (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | BILEVEL | | | | | | | | | | | | | | | | | |
| | | | X | Y | NO | CHAR | 1 | 0 | TYPE | | | | | | | | | | | | | | | |
| 111 | C&W 14 | V93J2660C | 44 | 18 | | 3.0 | | | DEC | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 14 INPUT TABLE VERSION | |
| 112 | C&W 15 | V93J2661C | 44 | 19 | | 3.0 | | | DEC | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 15 INPUT TABLE VERSION | |
| 113 | OP CODE STATUS 1 | V93X2662X | 35 | 5 | | 1.0 | ↓ | | BLVL | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 1 OP CODE STATUS | |
| 114 | OP CODE STATUS 2 | V93X2663X | 35 | 6 | | 1.0 | ↓ | | BLVL | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 2 OP CODE STATUS | |
| 115 | OP CODE STATUS 3 | V93X2664X | 35 | 7 | | 1.0 | ↓ | | BLVL | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 3 OP CODE STATUS | |
| 116 | OP CODE STATUS 4 | V93X2665X | 35 | 8 | | 1.0 | ↓ | | BLVL | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 4 OP CODE STATUS | |
| 117 | OP CODE STATUS 5 | V93X2666X | 35 | 9 | | 1.0 | ↓ | | BLVL | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 5 OP CODE STATUS | |
| 118 | OP CODE STATUS 6 | V93X2667X | 35 | 10 | | 1.0 | ↓ | | BLVL | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 6 OP CODE STATUS | |
| 119 | OP CODE STATUS 7 | V93X2668X | 35 | 11 | | 1.0 | ↓ | | BLVL | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 7 OP CODE STATUS | |
| 120 | OP CODE STATUS 8 | V93X2669X | 35 | 12 | | 1.0 | ↓ | | BLVL | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 8 OP CODE STATUS | |
| 121 | OP CODE STATUS 9 | V93X2670X | 35 | 13 | | 1.0 | ↓ | | BLVL | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 9 OP CODE STATUS | |
| 122 | OP CODE STATUS 10 | V93X2671X | 35 | 14 | | 1.0 | ↓ | | BLVL | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 10 OP CODE STATUS | |
| 123 | OP CODE STATUS 11 | V93X2672X | 35 | 15 | | 1.0 | ↓ | | BLVL | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 11 OP CODE STATUS | |
| 124 | OP CODE STATUS 12 | V93X2673X | 35 | 16 | | 1.0 | ↓ | | BLVL | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 12 OP CODE STATUS | |
| 125 | OP CODE STATUS 13 | V93X2674X | 35 | 17 | | 1.0 | ↓ | | BLVL | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 13 OP CODE STATUS | |
| 126 | OP CODE STATUS 14 | V93X2675X | 35 | 18 | | 1.0 | ↓ | | BLVL | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 14 OP CODE STATUS | |
| 127 | OP CODE STATUS 15 | V93X2676X | 35 | 19 | | 1.0 | ↓ | | BLVL | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 15 OP CODE STATUS | |
| 128 | CMD UPDT 1 | V93X2692X | 41 | 5 | | 1.0 | ? | | BLVL | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 1 CMD TABLE UPDATE | |
| 129 | CMD UPDT 2 | V93X2693X | 41 | 6 | | 1.0 | ? | | BLVL | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 2 CMD TABLE UPDATE | |
| 130 | CMD UPDT 3 | V93X2694X | 41 | 7 | | 1.0 | ? | | BLVL | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 3 CMD TABLE UPDATE | |

Table 4.3.28-2. GPCF PL STATUS & CARGO PC CONTROL (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | | | |
| 131 | CMD UPDT 4 | V93X2695X | 41 | 8 | | 1.0 | ? | | BLVL | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 4 CMD TABLE UPDATE | |
| 132 | CMD UPDT 5 | V93X2696X | 41 | 9 | | 1.0 | ? | | BLVL | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 5 CMD TABLE UPDATE | |
| 133 | CMD UPDT 6 | V93X2697X | 41 | 10 | | 1.0 | ? | | BLVL | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 6 CMD TABLE UPDATE | |
| 134 | CMD UPDT 7 | V93X2698X | 41 | 11 | | 1.0 | ? | | BLVL | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 7 CMD TABLE UPDATE | |
| 135 | CMD UPDT 8 | V93X2699X | 41 | 12 | | 1.0 | ? | | BLVL | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 8 CMD TABLE UPDATE | |
| 136 | CMD UPDT 9 | V93X2700X | 41 | 13 | | 1.0 | ? | | BLVL | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 9 CMD TABLE UPDATE | |
| 137 | CMD UPDT 10 | V93X2701X | 41 | 14 | | 1.0 | ? | | BLVL | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 10 CMD TABLE UPDATE | |
| 138 | CMD UPDT 11 | V93X2702X | 41 | 15 | | 1.0 | ? | | BLVL | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 11 CMD TABLE UPDATE | |
| 139 | CMD UPDT 12 | V93X2703X | 41 | 16 | | 1.0 | ? | | BLVL | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 12 CMD TABLE UPDATE | |
| 140 | CMD UPDT 13 | V93X2704X | 41 | 17 | | 1.0 | ? | | BLVL | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 13 CMD TABLE UPDATE | |
| 141 | CMD UPDT 14 | V93X2705X | 41 | 18 | | 1.0 | ? | | BLVL | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 14 CMD TABLE UPDATE | |
| 142 | CMD UPDT 15 | V93X2706X | 41 | 19 | | 1.0 | ? | | BLVL | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 15 CMD TABLE UPDATE | |
| 143 | C&W UPDT 1 | V93X2896X | 47 | 5 | | 1.0 | ? | | BLVL | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 1 INPUT TABLE UPDATE | |
| 144 | C&W UPDT 2 | V93X2897X | 47 | 6 | | 1.0 | ? | | BLVL | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 2 INPUT TABLE UPDATE | |
| 145 | C&W UPDT 3 | V93X2898X | 47 | 7 | | 1.0 | ? | | BLVL | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 3 INPUT TABLE UPDATE | |
| 146 | C&W UPDT 4 | V93X2899X | 47 | 8 | | 1.0 | ? | | BLVL | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 4 INPUT TABLE UPDATE | |
| 147 | C&W UPDT 5 | V93X2900X | 47 | 9 | | 1.0 | ? | | BLVL | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 5 INPUT TABLE UPDATE | |
| 148 | C&W UPDT 6 | V93X2901X | 47 | 10 | | 1.0 | ? | | BLVL | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 6 INPUT TABLE UPDATE | |
| 149 | C&W UPDT 7 | V93X2902X | 47 | 11 | | 1.0 | ? | | BLVL | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 7 INPUT TABLE UPDATE | |
| 150 | C&W UPDT 8 | V93X2903X | 47 | 12 | | 1.0 | ? | | BLVL | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 8 INPUT TABLE UPDATE | |

## Table 4.3.28-2. GPCF PL STATUS & CARGO PC CONTROL (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | BILEVEL | | | | | | | | | | | | | | | | | |
| | | | X | Y | | CHAR | 1 | 0 | TYPE | | | | | | | | | | | | | | | |
| 151 | C&W UPDT 9 | V93X2904X | 47 | 13 | | 1.0 | ? | | BLVL | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 9 INPUT TABLE UPDATE | |
| 152 | C&W UPDT 10 | V93X2905X | 47 | 14 | | 1.0 | ? | | BLVL | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 10 INPUT TABLE UPDATE | |
| 153 | C&W UPDT 11 | V93X2906X | 47 | 15 | | 1.0 | ? | | BLVL | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 11 INPUT TABLE UPDATE | |
| 154 | C&W UPDT 12 | V93X2907X | 47 | 16 | | 1.0 | ? | | BLVL | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 12 INPUT TABLE UPDATE | |
| 155 | C&W UPDT 13 | V93X2908X | 47 | 17 | | 1.0 | ? | | BLVL | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 13 INPUT TABLE UPDATE | |
| 156 | C&W UPDT 14 | V93X2909X | 47 | 18 | | 1.0 | ? | | BLVL | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 14 INPUT TABLE UPDATE | |
| 157 | C&W UPDT 15 | V93X2910X | 47 | 19 | | 1.0 | ? | | BLVL | | | X | | | | | | | | | A | GPCF | GPCF S71 PL LINE 15 INPUT TABLE UPDATE | |
| 158 | PORT 1 ON | V92X8074X | 13 | 22 | | 1.0 | * | | BLVL | | | | | | | | | | | | | GPCF | CARGO PC PORT 1 STATUS | |
| 159 | PORT 1 OFF | V92X8074X | 13 | 23 | | 1.0 | | * | BLVL | | | | | | | | | | | | | GPCF | CARGO PC PORT 1 STATUS | |
| 160 | PORT 2 ON | V92X8075X | 31 | 22 | | 1.0 | * | | BLVL | | | | | | | | | | | | | GPCF | CARGO PC PORT 2 STATUS | |
| 161 | PORT 2 OFF | V92X8075X | 31 | 23 | | 1.0 | | * | BLVL | | | | | | | | | | | | | GPCF | CARGO PC PORT 2 STATUS | |
| 162 | PGSC 1 | V92X8074X | 16 | 22 | | 1.0 | 1 | | BLVL | | | | | | | | | | | | | GPCF | CARGO PC PORT 1 STATUS | |
| 163 | PGSC 2 | V92X8075X | 34 | 22 | | 1.0 | 2 | | BLVL | | | | | | | | | | | | | GPCF | CARGO PC PORT 2 STATUS | |
| 164 | ANNUNCIATE 5 | V93X2895X | | | | | ADD REF | ADD REF | BLVL | | | X | | X | | | | | | | B | GPCF | GPCF ANNUN ENA/INH | |
| 165 | INPUTS INHIBITED | V93X3005X | 16 | 2 | | 16.0 | ADD REF | ADD REF | BLVL | | | X | | X | | | | | | | C | GPCF | GPCF INIT BUSY | |
| 166 | (MSG LINE) | V93X0050X | 1 | 25 | | 44.0 | | | CHAR | | | | | | | G | | | | | | UI | MESSAGE LINE | |
| 167 | (BUFFER MSG) | V93X0054X | 45 | 25 | | 4.0 | | | CHAR | | | | | | | G | | | | | | UI | BUFFER MESSAGE INDICATOR | |
| 168 | (SPL) | V93X0056X | 2 | 26 | | 49..0 | | | CHAR | | | | | | | G | | | | | | UI | SCRATCH PAD LINE | |

### 4.3.29 GPCF PL COMMANDING (PFS)

TITLE: GPCF PL COMMANDING
TYPE: SPEC/072
AVAILABILITY: SM OPS 2 and 4

#### 4.3.29.1 Purpose, Operation, and Organization

This display allows commanding of payloads using the GPCF function.

Any attempt by the ground or Cargo PC to update the GPCF command tables while this display is up will be rejected. Any attempt to execute an item while GPCF is not running or while initialization records are read by the GPC shall result in an "ILLEGAL ENTRY" CRT message. If GPCF is not running or the payload selected is scrubbed, all payload and command information shall be blanked.

(1) Payload Command Set Loading - Item 16 provides the capability to select a payload command set for display. When the display is first called from SM initialization, the command set information shall be blank. For subsequent calls, the last selected payload shall be displayed. When a payload is selected the payload number and the four character short name of the payload application shall be displayed next to Item 16. An attempt to select a payload that does not have a command table shall result in an "ILLEGAL ENTRY" CRT message.

(2) Items 1 - 15 provide the capability to arm/safe and send a payload command. An attempt to execute a safed hazardous command shall result in an "ILLEGAL ENTRY" CRT message. An attempt to execute or arm an unloaded (i.e. no command associated with that specific item number) command shall result in an "ILLEGAL ENTRY" CRT message. The payload command set information is defined in the following paragraphs. Only the hard coded command number shall be displayed until a command set is loaded using item 16. Any unused command lines shall be blanked with only the hard coded command number being displayed.

a. The HAZ column indicates if the loaded command is hazardous by placing an asterisk, "*", in the location opposite the item number.

b. The ENA INH (88) columns indicate if the command has been enabled or inhibited by placing an asterisk, "*", in the location opposite of the item number.

c. The EXE (99) column indicates if the loaded command has been issued. The current command column indicates if a command has been issued since the payload has been selected or the display called by placing an asterisk, "*", in the C column opposite the command number. The historic command column indicates if a table command has been executed using the GPCF function by placing an asterisk, "*", in the H column opposite the command number. The current command execution indication shall be reset when a new payload is selected or the display called. The historic command execution indication shall be reset when a command table entry is deleted.

d. The DESCRIPTION is a twenty character text field that describes the command.

### 4.3.29.2 GPCF PL COMMANDING Keyboard Processing Addendum

A. Command Enable and Inhibit

The display shall use the command number as an item entry to allow commands to be enabled and inhibited. Execution of the item number plus an index of "88" shall toggle the enable / inhibit status of the selected command.

For example, to toggle the enable / inhibit status of command 3 the item entry would be:

ITEM 3 + 88 EXEC

B. Executing Commands

The display shall use the item number associated with a command as an item entry to execute commands. Execution of the CMD number plus an index of "99" shall execute the selected command.

For example to execute command 4 the item entry would be:

ITEM 4 + 99 EXEC

An attempt to execute an inhibited command shall result in an "ILLEGAL ENTRY" CRT message.

Execution of item numbers 1-15 with any index other than "88" or "99" shall result in an "ILLEGAL ENTRY" CRT message.

### 4.3.29.3 GPCF PL COMMANDING CRT Display Processing Addendum

The following alpha code(s) appear (left justified) in the ADD REF column of Table 4.3.29-2 whenever it is necessary to define any special processing requirements not otherwise covered therein:

A. Payload Identification Number

The GPCF S72 PL ID (V93J2710C) shall be set to the number of the currently selected payload. If no payload is selected this field shall be blank.

B. Payload Short Name

The GPCF S72 PL NAME (V93U2711C) shall be set to the number of the currently selected payload. If no payload is selected this field shall be blank.

C. Command Information

Command information shall consist of the Hazardous Command Marker, Command Enable/Inhibit flag, Current Command Executed Flag, Historic Command Executed Flag, and Command Description. The command information shall be loaded in the line next to the hard coded command number (e.g. command 4's information shall be displayed on the line next to CMD number 4.) The command information shall be reset when a payload is selected. If a command number does not exist for the selected payload its line shall be blanked.

D. Inputs Inhibited

"INPUTS INHIBITED" shall appear double overbright beneath the display title while initialization records are read by the GPC and while GPCF is not running (V93X2677X, GPCF INITIALIZATION = 0).

### 4.3.29.4 GPCF PL Commanding Figure/Table References

Figure 4.3.29-1 GPCF PL Commanding Display (PFS)

Table 4.3.29-1 Keyboard Processing Table

Table 4.3.29-2 CRT Display Processing Table

Table 4.3.29-3 CRT Display Processing Background Requirements N/A

Table 4.3.29-4 Mission Design Background Constants N/A

Table 4.3.29-5 Input Functional Parameters N/A

Table 4.3.29-6 Output Functional Parameters N/A

Table 4.3.29-7 I-Loads N/A

Table 4.3.29-8 K-Loads N/A

Table 4.3.29-9 Constants N/A

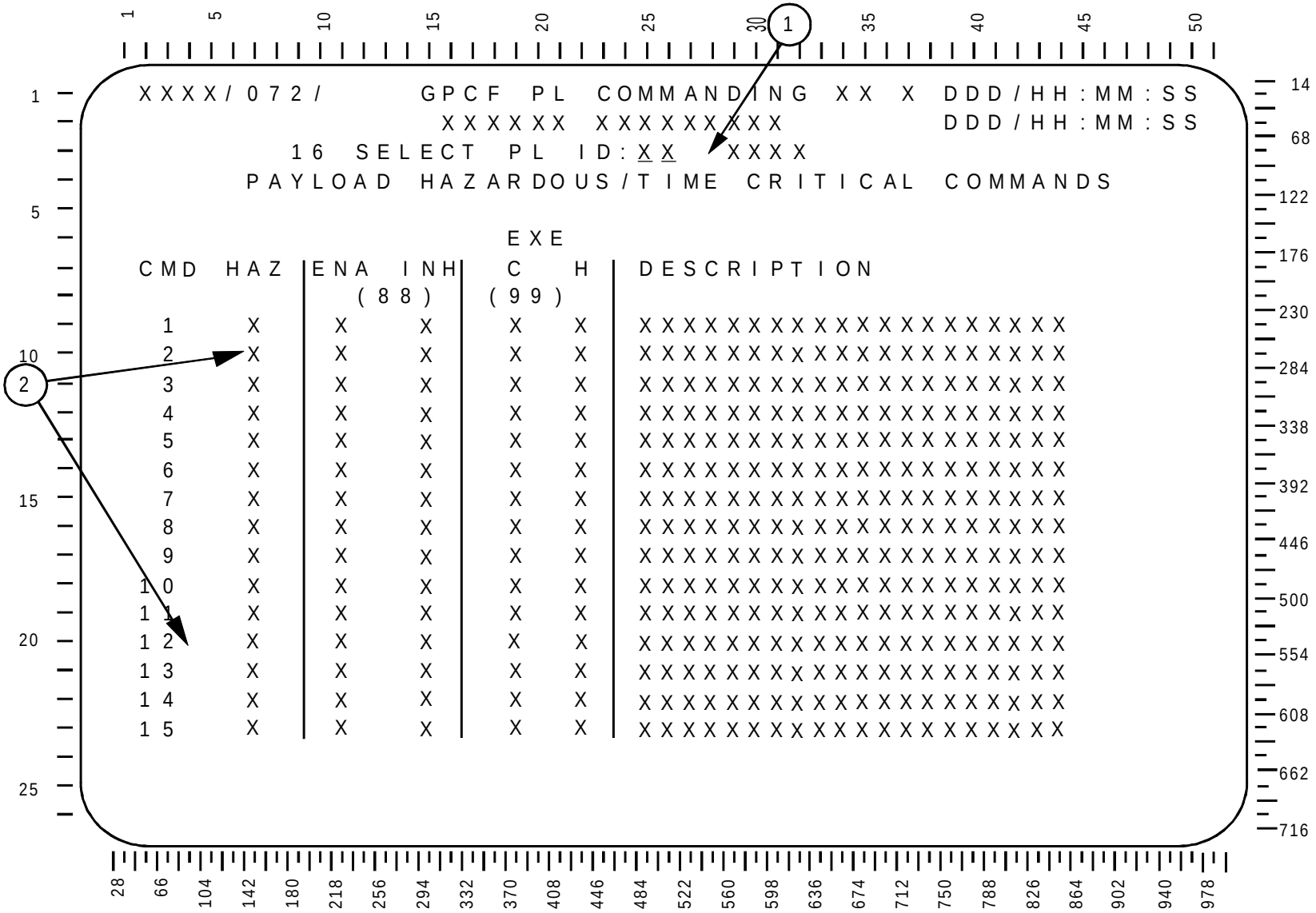


FIGURE 4.3.29-1.GPCF PL Commanding Display (PFS)

Table 4.3.29-1. GPCF PL COMMANDING (PFS) KEYBOARD PROCESSING

| Seq | CRT Signal Name | M/S ID | CHAR | TYPE | UNITS | DK | ITEM | Item No. Limits | | Add Ref | Destination | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | MIN | MAX | | | | |
| 1 | PL CMD 1 | V93J2880C | 3.0 | DEC | | | 1 | 88 | 99 | A, B | GPCF | GPCF S72 ITEM 1 EX | X |
| 2 | PL CMD 2 | V93J2881C | 3.0 | DEC | | | 2 | 88 | 99 | A, B | GPCF | GPCF S72 ITEM 2 EX | X |
| 3 | PL CMD 3 | V93J2882C | 3.0 | DEC | | | 3 | 88 | 99 | A, B | GPCF | GPCF S72 ITEM 3 EX | X |
| 4 | PL CMD 4 | V93J2883C | 3.0 | DEC | | | 4 | 88 | 99 | A, B | GPCF | GPCF S72 ITEM 4 EX | X |
| 5 | PL CMD 5 | V93J2884C | 3.0 | DEC | | | 5 | 88 | 99 | A, B | GPCF | GPCF S72 ITEM 5 EX | X |
| 6 | PL CMD 6 | V93J2885C | 3.0 | DEC | | | 6 | 88 | 99 | A, B | GPCF | GPCF S72 ITEM 6 EX | X |
| 7 | PL CMD 7 | V93J2886C | 3.0 | DEC | | | 7 | 88 | 99 | A, B | GPCF | GPCF S72 ITEM 7 EX | X |
| 8 | PL CMD 8 | V93J2887C | 3.0 | DEC | | | 8 | 88 | 99 | A, B | GPCF | GPCF S72 ITEM 8 EX | X |
| 9 | PL CMD 9 | V93J2888C | 3.0 | DEC | | | 9 | 88 | 99 | A, B | GPCF | GPCF S72 ITEM 9 EX | X |
| 10 | PL CMD 10 | V93J2889C | 3.0 | DEC | | | 10 | 88 | 99 | A, B | GPCF | GPCF S72 ITEM 10 EX | X |
| 11 | PL CMD 11 | V93J2890C | 3.0 | DEC | | | 11 | 88 | 99 | A, B | GPCF | GPCF S72 ITEM 11 EX | X |
| 12 | PL CMD 12 | V93J2891C | 3.0 | DEC | | | 12 | 88 | 99 | A, B | GPCF | GPCF S72 ITEM 12 EX | X |
| 13 | PL CMD 13 | V93J2892C | 3.0 | DEC | | | 13 | 88 | 99 | A, B | GPCF | GPCF S72 ITEM 13 EX | X |
| 14 | PL CMD 14 | V93J2893C | 3.0 | DEC | | | 14 | 88 | 99 | A, B | GPCF | GPCF S72 ITEM 14 EX | X |
| 15 | PL CMD 15 | V93J2894C | 3.0 | DEC | | | 15 | 88 | 99 | A, B | GPCF | GPCF S72 ITEM 15 EX | X |
| 16 | PAYLOAD 16 | V93J2710C | 3.0 | DEC | | | 16 | 1 | 31 | | GPCF | GPCF S72 PL ID | X |

## Table 4.3.29-2. GPCF PL COMMANDING (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | BILEVEL | | | | | | | | | | | | | | | | | |
| | | | X | Y | | CHAR | 1 | 0 | TYPE | | | | | | | | | | | | | | | |
| 001 | (OPS) | V93X0040X | 2 | 1 | | 5.0 | | | CHAR | | | | | | | C | | | | | | UI | OPS FUNCTION PAGE | |
| 002 | (SPEC) | V93X0042X | 7 | 1 | | 4.0 | | | CHAR | | | | | | | E | | | | | | UI | SPEC FUNCTION PAGE | |
| 003 | (DISP) | V93X0044X | 10 | 1 | | 4.0 | | | DEC | | | | | | | E | | | | | | UI | DISPLAY FUNCTION PAGE | |
| 004 | (UL) | V93X5032X | 34 | 1 | | 2.0 | UL | | BLVL | | | | | | X | G | | | | | | UI | UPLINK ACTIVITY IND | |
| 005 | (GPC) | V92X0048X | 36 | 1 | | 2.0 | | | DEC | | | | | | | E | | | | | | UI | GPC DRIVER | |
| 006 | (MT) | V91W1990C | 39 | 1 | | 12.0 | | | CHAR | DHMS | | | | | | A | | | | | | FCOS | MISSION ELAPSED TIME | |
| 007 | (CRT TIMER) | V91W1988C | 39 | 2 | | 12.0 | | | CHAR | DHMS | | | | | | A | | | | | | FCOS | DISPLAY CRT TIMER SM | |
| 008 | 16 SELECT PL ID: | V93J2710C | 24 | 3 | | 3.0 | | | DEC | | | X | | | | E | | | | | A | GPCF | GPCF S72 PL ID | |
| 009 | PAYLOAD | V93U2711C | 29 | 3 | | 4.0 | | | CHAR | | | X | | | | | | | | | B | GPCF | GPCF S72 PL NAME | |
| 010 | HAZ 1 | V93X2712X | 7 | 9 | | 1.0 | * | | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 1 HAZ INDICATOR | |
| 011 | HAZ 2 | V93X2713X | 7 | 10 | | 1.0 | * | | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 2 HAZ INDICATOR | |
| 012 | HAZ 3 | V93X2714X | 7 | 11 | | 1.0 | * | | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 3 HAZ INDICATOR | |
| 013 | HAZ 4 | V93X2715X | 7 | 12 | | 1.0 | * | | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 4 HAZ INDICATOR | |
| 014 | HAZ 5 | V93X2716X | 7 | 13 | | 1.0 | * | | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 5 HAZ INDICATOR | |
| 015 | HAZ 6 | V93X2717X | 7 | 14 | | 1.0 | * | | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 6 HAZ INDICATOR | |
| 016 | HAZ 7 | V93X2718X | 7 | 15 | | 1.0 | * | | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 7 HAZ INDICATOR | |
| 017 | HAZ 8 | V93X2719X | 7 | 16 | | 1.0 | * | | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 8 HAZ INDICATOR | |
| 018 | HAZ 9 | V93X2720X | 7 | 17 | | 1.0 | * | | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 9 HAZ INDICATOR | |
| 019 | HAZ 10 | V93X2721X | 7 | 18 | | 1.0 | * | | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 10 HAZ INDICATOR | |
| 020 | HAZ 11 | V93X2722X | 7 | 19 | | 1.0 | * | | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 11 HAZ INDICATOR | |
| 021 | HAZ 12 | V93X2723X | 7 | 20 | | 1.0 | * | | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 12 HAZ INDICATOR | |
| 022 | HAZ 13 | V93X2724X | 7 | 21 | | 1.0 | * | | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 13 HAZ INDICATOR | |
| 023 | HAZ 14 | V93X2725X | 7 | 22 | | 1.0 | * | | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 14 HAZ INDICATOR | |
| 024 | HAZ 15 | V93X2726X | 7 | 23 | | 1.0 | * | | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 15 HAZ INDICATOR | |
| 025 | ENA 1 | V93X2727X | 11 | 9 | | 1.0 | * | | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 1 COMMAND ENA/INH | |
| 026 | ENA 2 | V93X2728X | 11 | 10 | | 1.0 | * | | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 2 COMMAND ENA/INH | |
| 027 | ENA 3 | V93X2729X | 11 | 11 | | 1.0 | * | | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 3 COMMAND ENA/INH | |
| 028 | ENA 4 | V93X2730X | 11 | 12 | | 1.0 | * | | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 4 COMMAND ENA/INH | |
| 029 | ENA 5 | V93X2731X | 11 | 13 | | 1.0 | * | | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 5 COMMAND ENA/INH | |
| 030 | ENA 6 | V93X2732X | 11 | 14 | | 1.0 | * | | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 6 COMMAND ENA/INH | |
| 031 | ENA 7 | V93X2733X | 11 | 15 | | 1.0 | * | | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 7 COMMAND ENA/INH | |
| 032 | ENA 8 | V93X2734X | 11 | 16 | | 1.0 | * | | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 8 COMMAND ENA/INH | |
| 033 | ENA 9 | V93X2735X | 11 | 17 | | 1.0 | * | | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 9 COMMAND ENA/INH | |
| 034 | ENA 10 | V93X2736X | 11 | 18 | | 1.0 | * | | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 10 COMMAND ENA/INH | |

Table 4.3.29-2. GPCF PL COMMANDING (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | BILEVEL | | | | | | | | | | | | | | | | | |
| | | | X | Y | | CHAR | 1 | 0 | TYPE | | | | | | | | | | | | | | | |
| 035 | ENA 11 | V93X2737X | 11 | 19 | | 1.0 | * | | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 11 COMMAND ENA/INH | |
| 036 | ENA 12 | V93X2738X | 11 | 20 | | 1.0 | * | | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 12 COMMAND ENA/INH | |
| 037 | ENA 13 | V93X2739X | 11 | 21 | | 1.0 | * | | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 13 COMMAND ENA/INH | |
| 038 | ENA 14 | V93X2740X | 11 | 22 | | 1.0 | * | | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 14 COMMAND ENA/INH | |
| 039 | ENA 15 | V93X2741X | 11 | 23 | | 1.0 | * | | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 15 COMMAND ENA/INH | |
| 040 | INH 1 | V93X2727X | 15 | 9 | | 1.0 | | * | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 1 COMMAND ENA/INH | |
| 041 | INH 2 | V93X2728X | 15 | 10 | | 1.0 | | * | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 2 COMMAND ENA/INH | |
| 042 | INH 3 | V93X2729X | 15 | 11 | | 1.0 | | * | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 3 COMMAND ENA/INH | |
| 043 | INH 4 | V93X2730X | 15 | 12 | | 1.0 | | * | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 4 COMMAND ENA/INH | |
| 044 | INH 5 | V93X2731X | 15 | 13 | | 1.0 | | * | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 5 COMMAND ENA/INH | |
| 045 | INH 6 | V93X2732X | 15 | 14 | | 1.0 | | * | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 6 COMMAND ENA/INH | |
| 046 | INH 7 | V93X2733X | 15 | 15 | | 1.0 | | * | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 7 COMMAND ENA/INH | |
| 047 | INH 8 | V93X2734X | 15 | 16 | | 1.0 | | * | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 8 COMMAND ENA/INH | |
| 048 | INH 9 | V93X2735X | 15 | 17 | | 1.0 | | * | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 9 COMMAND ENA/INH | |
| 049 | INH 10 | V93X2736X | 15 | 18 | | 1.0 | | * | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 10 COMMAND ENA/INH | |
| 050 | INH 11 | V93X2737X | 15 | 19 | | 1.0 | | * | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 11 COMMAND ENA/INH | |
| 051 | INH 12 | V93X2738X | 15 | 20 | | 1.0 | | * | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 12 COMMAND ENA/INH | |
| 052 | INH 13 | V93X2739X | 15 | 21 | | 1.0 | | * | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 13 COMMAND ENA/INH | |
| 053 | INH 14 | V93X2740X | 15 | 22 | | 1.0 | | * | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 14 COMMAND ENA/INH | |
| 054 | INH 15 | V93X2741X | 15 | 23 | | 1.0 | | * | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 15 COMMAND ENA/INH | |
| 055 | EXE HISTORIC 1 | V93X2742X | 22 | 9 | | 1.0 | * | | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 1 EXECUTE HISTORY | |
| 056 | EXE HISTORIC 2 | V93X2743X | 22 | 10 | | 1.0 | * | | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 2 EXECUTE HISTORY | |
| 057 | EXE HISTORIC 3 | V93X2744X | 22 | 11 | | 1.0 | * | | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 3 EXECUTE HISTORY | |
| 058 | EXE HISTORIC 4 | V93X2745X | 22 | 12 | | 1.0 | * | | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 4 EXECUTE HISTORY | |
| 059 | EXE HISTORIC 5 | V93X2746X | 22 | 13 | | 1.0 | * | | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 5 EXECUTE HISTORY | |
| 060 | EXE HISTORIC 6 | V93X2747X | 22 | 14 | | 1.0 | * | | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 6 EXECUTE HISTORY | |

## Table 4.3.29-2. GPCF PL COMMANDING (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | BILEVEL | | | | | | | | | | | | | | | | | |
| | | | X | Y | | CHAR | 1 | 0 | TYPE | | | | | | | | | | | | | | | |
| 061 | EXE HISTORIC 7 | V93X2748X | 22 | 15 | | 1.0 | * | | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 7 EXECUTE HISTORY | |
| 063 | EXE HISTORIC 8 | V93X2749X | 22 | 16 | | 1.0 | * | | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 8 EXECUTE HISTORY | |
| 064 | EXE HISTORIC 9 | V93X2750X | 22 | 17 | | 1.0 | * | | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 9 EXECUTE HISTORY | |
| 065 | EXE HISTORIC 10 | V93X2751X | 22 | 18 | | 1.0 | * | | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 10 EXECUTE HISTORY | |
| 065 | EXE HISTORIC 11 | V93X2752X | 22 | 19 | | 1.0 | * | | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 11 EXECUTE HISTORY | |
| 066 | EXE HISTORIC 12 | V93X2753X | 22 | 20 | | 1.0 | * | | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 12 EXECUTE HISTORY | |
| 067 | EXE HISTORIC 13 | V93X2754X | 22 | 21 | | 1.0 | * | | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 13 EXECUTE HISTORY | |
| 068 | EXE HISTORIC 14 | V93X2755X | 22 | 22 | | 1.0 | * | | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 14 EXECUTE HISTORY | |
| 069 | EXE HISTORIC 15 | V93X2756X | 22 | 23 | | 1.0 | * | | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 15 EXECUTE HISTORY | |
| 070 | EXE CURRENT 1 | V93X2757X | 19 | 9 | | 1.0 | * | | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 1 COMMAND EXECUTE | |
| 071 | EXE CURRENT 2 | V93X2758X | 19 | 10 | | 1.0 | * | | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 2 COMMAND EXECUTE | |
| 072 | EXE CURRENT 3 | V93X2759X | 19 | 11 | | 1.0 | * | | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 3 COMMAND EXECUTE | |
| 073 | EXE CURRENT 4 | V93X2760X | 19 | 12 | | 1.0 | * | | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 4 COMMAND EXECUTE | |
| 074 | EXE CURRENT 5 | V93X2761X | 19 | 13 | | 1.0 | * | | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 5 COMMAND EXECUTE | |
| 075 | EXE CURRENT 6 | V93X2762X | 19 | 14 | | 1.0 | * | | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 6 COMMAND EXECUTE | |
| 076 | EXE CURRENT 7 | V93X2763X | 19 | 15 | | 1.0 | * | | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 7 COMMAND EXECUTE | |
| 077 | EXE CURRENT 8 | V93X2764X | 19 | 16 | | 1.0 | * | | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 8 COMMAND EXECUTE | |
| 078 | EXE CURRENT 9 | V93X2765X | 19 | 17 | | 1.0 | * | | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 9 COMMAND EXECUTE | |
| 079 | EXE CURRENT 10 | V93X2766X | 19 | 18 | | 1.0 | * | | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 10 COMMAND EXECUTE | |
| 080 | EXE CURRENT 11 | V93X2767X | 19 | 19 | | 1.0 | * | | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 11 COMMAND EXECUTE | |

Table 4.3.29-2. GPCF PL COMMANDING (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | BILEVEL | | | | | | | | | | | | | | | | | |
| | | | X | Y | | CHAR | 1 | 0 | TYPE | | | | | | | | | | | | | | | |
| 081 | EXE CURRENT 12 | V93X2768X | 19 | 20 | | 1.0 | * | | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 12 COMMAND EXECUTE | |
| 082 | EXE CURRENT 13 | V93X2769X | 19 | 21 | | 1.0 | * | | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 13 COMMAND EXECUTE | |
| 083 | EXE CURRENT 14 | V93X2770X | 19 | 22 | | 1.0 | * | | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 14 COMMAND EXECUTE | |
| 084 | EXE CURRENT 15 | V93X2771X | 19 | 23 | | 1.0 | * | | BLVL | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 15 COMMAND EXECUTE | |
| 085 | DESCRIPTION 1 | V93U2772C | 25 | 9 | | 20.0 | | | CHAR | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 1 COMMAND DESCRIPTION | |
| 086 | DESCRIPTION 2 | V93U2773C | 25 | 10 | | 20.0 | | | CHAR | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 2 COMMAND DESCRIPTION | |
| 087 | DESCRIPTION 3 | V93U2774C | 25 | 11 | | 20.0 | | | CHAR | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 3 COMMAND DESCRIPTION | |
| 088 | DESCRIPTION 4 | V93U2775C | 25 | 12 | | 20.0 | | | CHAR | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 4 COMMAND DESCRIPTION | |
| 089 | DESCRIPTION 5 | V93U2776C | 25 | 13 | | 20.0 | | | CHAR | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 5 COMMAND DESCRIPTION | |
| 090 | DESCRIPTION 6 | V93U2777C | 25 | 14 | | 20.0 | | | CHAR | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 6 COMMAND DESCRIPTION | |
| 091 | DESCRIPTION 7 | V93U2778C | 25 | 15 | | 20.0 | | | CHAR | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 7 COMMAND DESCRIPTION | |
| 092 | DESCRIPTION 8 | V93U2779C | 25 | 16 | | 20.0 | | | CHAR | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 8 COMMAND DESCRIPTION | |
| 093 | DESCRIPTION 9 | V93U2780C | 25 | 17 | | 20.0 | | | CHAR | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 9 COMMAND DESCRIPTION | |
| 094 | DESCRIPTION 10 | V93U2781C | 25 | 18 | | 20.0 | | | CHAR | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 10 COMMAND DESCRIPTION | |
| 095 | DESCRIPTION 11 | V93U2782C | 25 | 19 | | 20.0 | | | CHAR | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 11 COMMAND DESCRIPTION | |
| 096 | DESCRIPTION 12 | V93U2783C | 25 | 20 | | 20.0 | | | CHAR | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 12 COMMAND DESCRIPTION | |
| 097 | DESCRIPTION 13 | V93U2784C | 25 | 21 | | 20.0 | | | CHAR | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 13 COMMAND DESCRIPTION | |
| 098 | DESCRIPTION 14 | V93U2785C | 25 | 22 | | 20.0 | | | CHAR | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 14 COMMAND DESCRIPTION | |
| 099 | DESCRIPTION 15 | V93U2786C | 25 | 23 | | 20.0 | | | CHAR | | | X | | | | | | | | | C | GPCF | GPCF S72 LINE 15 COMMAND DESCRIPTION | |
| 100 | INPUTS INHIBITED | V93X2677X | 16 | 2 | | 16.0 | ADD REF | ADD REF | BLVL | | | | | X | | | | | | | D | GPCF | GPCF INITIALIZATION | |
| 101 | (MSG LINE) | V93X0050X | 1 | 25 | | 44.0 | | | CHAR | | | | | | G | | | | | | | UI | MESSAGE LINE | |
| 102 | (BUFFER MSG) | V93X0054X | 45 | 25 | | 4.0 | | | CHAR | | | | | | G | | | | | | | UI | BUFFER MESSAGE INDICATOR | |
| 103 | (SPL) | V93X0056X | 2 | 26 | | 49.0 | | | CHAR | | | | | | G | | | | | | | UI | SCRATCH PAD LINE | |

### 4.3.30 GPCF PL C&W (PFS)

TITLE: GPCF PL C&W
TYPE: SPEC/073
AVAILABILITY: SM OPS 2 and 4

#### 4.3.30.1 Purpose, Operation, and Organization

This display allows monitoring of GPCF payloads. A primary and secondary payload can be monitored. Fifteen analogs and thirty discretes can be monitored. Any attempt to execute an item while initialization records are read by the GPC or while GPCF is not running shall result in an "ILLEGAL ENTRY" CRT message. All payload information shall be blanked if GPCF is not running.

(1) Items 1 and 2 allow for the selection of primary and secondary payload respectively. A payload number is entered to select a payload. The payload number and the payload application short name shall be displayed next to the item entry. An overflow indicator is provided to indicate when the secondary PL ID's parameter information is truncated. The primary payload identification number and short name shall appear double overbright when a secondary payload is selected. Successful execution of item 1 shall result in the display of monitored data for the selected primary PL ID and shall blank all secondary PL information.

(2) The analog parameters shall be displayed on the right of the display. A ten character description shall be displayed for each parameter. Parameters shall be displayed with a parameter status indictor. Parameters shall be displayed in ascending order based on their payload data monitoring table entry number until all parameters have been displayed. A maximum of fifteen analog parameters may be displayed. A blank line shall separate groups of five parameters. If a secondary payload is selected, its parameters shall be displayed following the primary payloads parameters and the primary payloads parameters shall appear double overbright.

(3) The discrete parameters shall be displayed on the left of the display. A ten character description shall be displayed for each parameter. Parameters shall be displayed with a parameter status indicator. Parameters shall be displayed in ascending order based on their payload data monitoring table entry number until all parameters have been displayed. A maximum of thirty discrete parameters may be displayed in two columns. A blank line shall separate groups of five parameters. If a secondary payload is selected, its parameters shall be displayed following the primary payloads parameters and the primary payloads parameters shall appear double overbright with the exception of the parameter values.

(4) An indication shall be provided in the upper right portion of the screen when a payload data monitoring table is being updated. The indication shall consist of a remote text field indicating the source of the update, a flashing transfer graphic, and the number of the payload whose table is being updated. The graphic shall flash while a transfer is in progress. When transfer is complete the indication shall remain for at least 5 seconds.

#### 4.3.30.2 GPCF PL C&W Keyboard Processing Addendum

(A) Any attempt to select a secondary payload when there is not a primary payload selected shall result in an "ILLEGAL ENTRY" CRT message.

(B) Any attempt to select a payload that does not have a payload data monitoring table shall be rejected with an "ILLEGAL ENTRY" CRT message.

### 4.3.30.3 GPCF PL C&W CRT Display Processing Addendum

The table below presents the parameter status indicators (PSI) that can be displayed for a parameter. In SM-PL, PSI requirements can be one of two types as follows:

- A PSI which is part of the data words identified by an "X" marked in the STATUS column of Table 4.3.30-2.
- A PSI which is a stand-alone identified by the word "STAT" being inserted in the FORMAT TYPE column of Table 4.3.30-2.

Both PSI types have a numeric code appearing as an entry (right justified) in the ADD REF column of CRT display processing Table 4.3.30-2. The numeric code, corresponding to one of those listed in the table, indicates the specific status processing to be performed. If there is not numeric code entry, the status processing is defined by the default code.

When the "M" PSI is displayed (for Commfault, I/O error resulting in missing data), the last value of the associated parameter will continue to be displayed unless specified otherwise.

| Numeric Code | PSI SYMBOL(S) | | | | | |
|---|---|---|---|---|---|---|
| Default (blank) | ↓ | ↑ | H | L | M | Ø |
| 1 | | | | | M | Ø |
| 2 | | | H | L | M | Ø |
| 3 | ↓ | | | | M | Ø |
| 4 | ↓ | | | | | Ø |

NOTE: The numeric addendum reference codes are for information only. Actual processing requirements are specified in the SM Level B CPDS (SS-P-0002-580) and/or Level C Systems Management FSR (JSC-19590), Payload Management FSR (JSC-19478).

The following alpha code(s) appear (left justified) in the ADD REF column of Table 4.3.30-2 whenever it is necessary to define any special processing requirements not otherwise covered therein:

A. The primary payload short name and primary payload ID shall be set to the short name and ID of the payload selected as primary. These fields shall be blank if a primary payload is not selected. These fields shall be double overbright if a secondary payload is selected.

B. The secondary payload short name and secondary payload ID shall be set to the short name and ID of the payload selected as secondary. These fields shall be blank if a secondary payload is not selected.

C. Parameter information includes a ten character parameter description, parameter value, and parameter status indicator. Parameter information shall be displayed in ascending order based on payload data monitoring table entry number. Primary payload parameter in formation shall be displayed followed

by secondary payload information. The first fifteen discrete parameters shall be displayed in the first discrete column and the second fifteen in the second discrete column. Primary payload short name, payload ID, and paramter descriptions shall appear double overbright if a secondary payload is selected. If an analog parameter has a value of 9999.9 or greater 9999.9 shall be displayed for that parameter. If an analog parameter has a value of -9999.9 or less, -9999.9 shall be displayed for that parameter. If less than fifteen analogs or less than thirty discretes are to be displayed the remaining fields shall be blank.

D. The table update in progress information shall be displayed double overbright in a remote text field and a number field. The first field shall contain "PGSC". The number field shall contain the number of the payload being updated. These fields shall be separated by a blinking transfer arrow. When transfer is complete, these fields shall remain for at least five seconds with the transfer arrow static. Otherwise these fields and the transfer arrow shall be blank.

E. Overflow
"OVERFLOW" shall appear next to the secondary payload when the secondary PL ID's parameter information will not fit on the display in its entirety.

F. Inputs Inhibited
"INPUTS INHIBITED" shall appear double overbright beneath the display title when GPCF is not running or while initialization records are being read by the GPC (V93X2677X, GPCF INITIALIZATION = 0).

### 4.3.30.4 GPCF PL C&W Figure/Table References

Figure 4.3.30-1 GPCF PL C&W Display (PFS)

Table 4.3.30-1 Keyboard Processing Table

Table 4.3.30-2 CRT Display Processing Table

Table 4.3.30-3 CRT Display Processing Background Requirements N/A

Table 4.3.30-4 Mission Design Background Constants N/A

Table 4.3.30-5 Input Functional Parameters N/A

Table 4.3.30-6 Output Functional Parameters N/A

Table 4.3.30-7 I-Loads N/A

Table 4.3.30-8 K-Loads N/A

Table 4.3.30-9 Constants N/A

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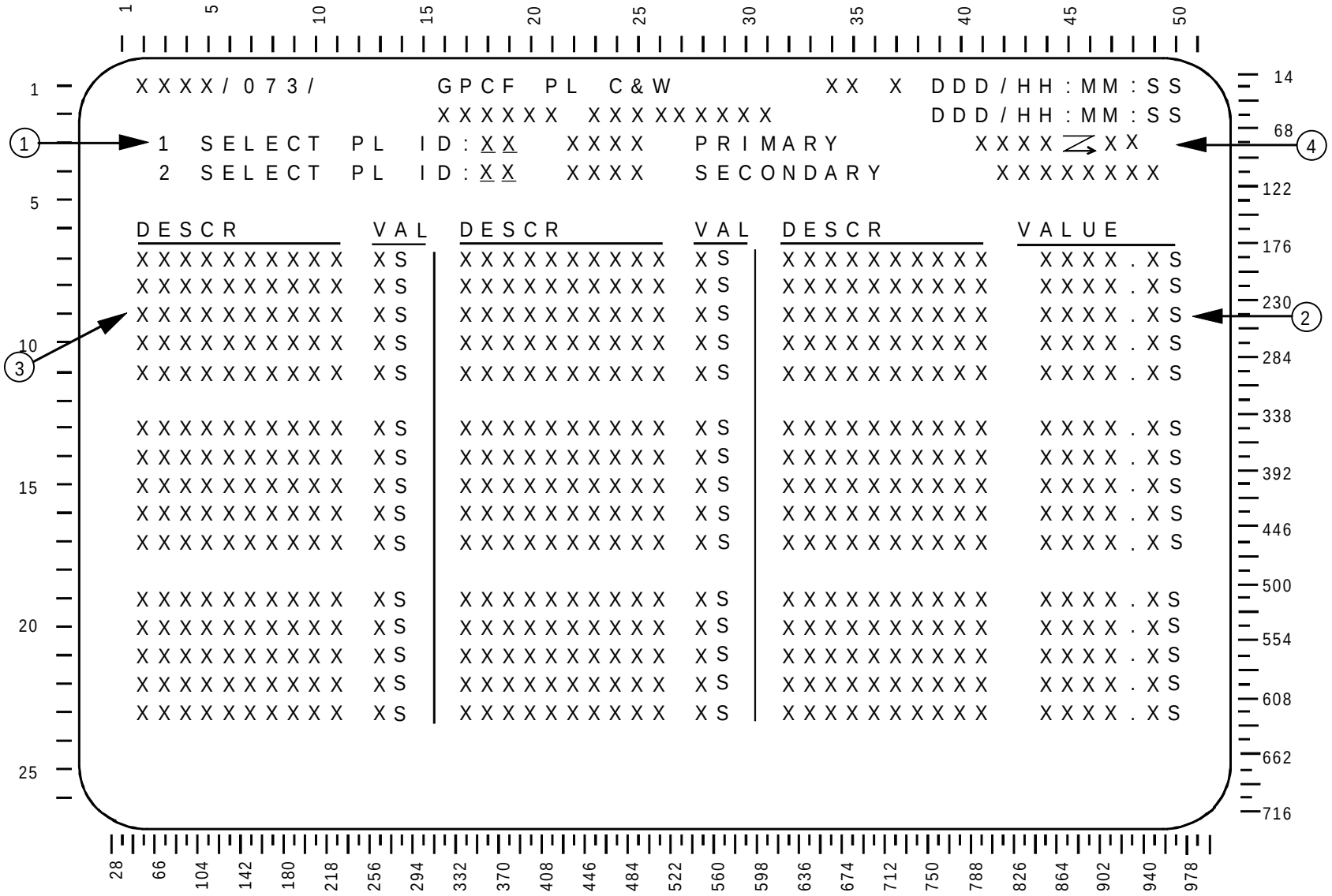


FIGURE 4.3.30-1.GPCF PL C&W Display (PFS)

Table 4.3.30-1. GPCF PL C&W (PFS) KEYBOARD PROCESSING

| Seq | CRT Signal Name | M/S ID | CHAR | TYPE | UNITS | DK | ITEM | Item No. Limits | | Add Ref | Destination | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | MIN | MAX | | | | |
| 001 | SELECT PL ID: 1 PRIMARY | V93J2708C | 3.0 | DEC | | | 1 | 1 | 31 | B | GPCF | GPCF S73 PRIMARY PL ID | X |
| 002 | SELECT PL ID: 2 SECONDARY | V93J2787C | 3.0 | DEC | | | 2 | 1 | 31 | A, B | GPCF | GPCF S73 SECONDARY PL ID | X |

## Table 4.3.30-2. GPCF PL C&W (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | BILEVEL | | | | | | | | | | | | | | | | | |
| | | | X | Y | | CHAR | 1 | 0 | TYPE | | | | | | | | | | | | | | | |
| 001 | (OPS) | V93X0040X | 2 | 1 | | 5.0 | | | CHAR | | | | | | | C | | | | | | UI | OPS FUNCTION PAGE | |
| 002 | (SPEC) | V93X0042X | 7 | 1 | | 4.0 | | | CHAR | | | | | | | E | | | | | | UI | SPEC FUNCTION PAGE | |
| 003 | (DISP) | V93X0044X | 10 | 1 | | 4.0 | | | DEC | | | | | | | E | | | | | | UI | DISPLAY FUNCTION PAGE | |
| 004 | (UL) | V92X5032X | 34 | 1 | | 2.0 | UL | | BLVL | | | | | | X | G | | | | | | UI | UPLINK ACTIVITY IND | |
| 005 | (GPC) | V93X0048X | 36 | 1 | | 2.0 | | | DEC | | | | | | | E | | | | | | UI | GPC DRIVER | |
| 006 | (MT) | V91W1990C | 39 | 1 | | 12.0 | | | CHAR | DHMS | | | | | | A | | | | | | FCOS | MISSION ELASPED TIME | |
| 007 | (CRT TIMER) | V91W1988C | 39 | 2 | | 12.0 | | | CHAR | DHMS | | | | | | A | | | | | | FCOS | DISPLAY CRT TIMER SM | |
| 008 | PRIMARY PL NAME | V93U2707C | 22 | 3 | | 4.0 | | | CHAR | | | X | | X | | | | | | | A | GPCF | GPCF S73 PRIMARY PL NAME | |
| 009 | PRIMARY PL ID | V93J2708C | 17 | 3 | | 3.0 | | | DEC | | | X | | X | | E | | | | | A | GPCF | GPCF S73 PRIMARY PL ID | |
| 010 | SECONDARY PL NAME | V93U2709C | 22 | 4 | | 4.0 | | | CHAR | | | X | | | | | | | | | B | GPCF | GPCF S73 SECONDARY PL NAME | |
| 011 | SECONDARY PL ID | V93J2787C | 17 | 4 | | 3.0 | | | DEC | | | X | | | | E | | | | | B | GPCF | GPCF S73 SECONDARY PL ID | |
| 012 | SECONDARY OVRFLOW | ADDENDUM | 42 | 4 | | 8.0 | | | CHAR | | | X | | | | | | | | | E | GPCF | GPCF S73 SECONDARY OVERFLOW | |
| 013 | ANALOG 1 DESC | V93U2788C | 32 | 7 | | 10.0 | | | CHAR | | | X | | X | | | | | | | C | GPCF | GPCF S73 ANALOG 1 DESC | |
| 014 | ANALOG 2 DESC | V93U2789C | 32 | 8 | | 10.0 | | | CHAR | | | X | | X | | | | | | | C | GPCF | GPCF S73 ANALOG 2 DESC | |
| 015 | ANALOG 3 DESC | V93U2790C | 32 | 9 | | 10.0 | | | CHAR | | | X | | X | | | | | | | C | GPCF | GPCF S73 ANALOG 3 DESC | |
| 016 | ANALOG 4 DESC | V93U2791C | 32 | 10 | | 10.0 | | | CHAR | | | X | | X | | | | | | | C | GPCF | GPCF S73 ANALOG 4 DESC | |
| 017 | ANALOG 5 DESC | V93U2792C | 32 | 11 | | 10.0 | | | CHAR | | | X | | X | | | | | | | C | GPCF | GPCF S73 ANALOG 5 DESC | |
| 018 | ANALOG 6 DESC | V93U2793C | 32 | 13 | | 10.0 | | | CHAR | | | X | | X | | | | | | | C | GPCF | GPCF S73 ANALOG 6 DESC | |
| 019 | ANALOG 7 DESC | V93U2794C | 32 | 14 | | 10.0 | | | CHAR | | | X | | X | | | | | | | C | GPCF | GPCF S73 ANALOG 7 DESC | |
| 020 | ANALOG 8 DESC | V93U2795C | 32 | 15 | | 10.0 | | | CHAR | | | X | | X | | | | | | | C | GPCF | GPCF S73 ANALOG 8 DESC | |
| 021 | ANALOG 9 DESC | V93U2796C | 32 | 16 | | 10.0 | | | CHAR | | | X | | X | | | | | | | C | GPCF | GPCF S73 ANALOG 9 DESC | |
| 022 | ANALOG 10 DESC | V93U2797C | 32 | 17 | | 10.0 | | | CHAR | | | X | | X | | | | | | | C | GPCF | GPCF S73 ANALOG 10 DESC | |
| 023 | ANALOG 11 DESC | V93U2798C | 32 | 19 | | 10.0 | | | CHAR | | | X | | X | | | | | | | C | GPCF | GPCF S73 ANALOG 11 DESC | |
| 024 | ANALOG 12 DESC | V93U2799C | 32 | 20 | | 10.0 | | | CHAR | | | X | | X | | | | | | | C | GPCF | GPCF S73 ANALOG 12 DESC | |
| 025 | ANALOG 13 DESC | V93U2800C | 32 | 21 | | 10.0 | | | CHAR | | | X | | X | | | | | | | C | GPCF | GPCF S73 ANALOG 13 DESC | |
| 026 | ANALOG 14 DESC | V93U2801C | 32 | 22 | | 10.0 | | | CHAR | | | X | | X | | | | | | | C | GPCF | GPCF S73 ANALOG 14 DESC | |
| 027 | ANALOG 15 DESC | V93U2802C | 32 | 23 | | 10.0 | | | CHAR | | | X | | X | | | | | | | C | GPCF | GPCF S73 ANALOG 15 DESC | |
| 028 | ANALOG 1 VALUE | V93J2803C | 43 | 7 | | 7.1 | | | DEC | | X | X | | | | | | | | | C | GPCF | GPCF S73 ANALOG 1 VALUE | |
| 029 | ANALOG 2 VALUE | V93J2804C | 43 | 8 | | 7.1 | | | DEC | | X | X | | | | | | | | | C | GPCF | GPCF S73 ANALOG 2 VALUE | |
| 030 | ANALOG 3 VALUE | V93J2805C | 43 | 9 | | 7.1 | | | DEC | | X | X | | | | | | | | | C | GPCF | GPCF S73 ANALOG 3 VALUE | |
| 031 | ANALOG 4 VALUE | V93J2806C | 43 | 10 | | 7.1 | | | DEC | | X | X | | | | | | | | | C | GPCF | GPCF S73 ANALOG 4 VALUE | |
| 032 | ANALOG 5 VALUE | V93J2807C | 43 | 11 | | 7.1 | | | DEC | | X | X | | | | | | | | | C | GPCF | GPCF S73 ANALOG 5 VALUE | |
| 033 | ANALOG 6 VALUE | V93J2808C | 43 | 13 | | 7.1 | | | DEC | | X | X | | | | | | | | | C | GPCF | GPCF S73 ANALOG 6 VALUE | |
| 034 | ANALOG 7 VALUE | V93J2809C | 43 | 14 | | 7.1 | | | DEC | | X | X | | | | | | | | | C | GPCF | GPCF S73 ANALOG 7 VALUE | |
| 035 | ANALOG 8 VALUE | V93J2810C | 43 | 15 | | 7.1 | | | DEC | | X | X | | | | | | | | | C | GPCF | GPCF S73 ANALOG 8 VALUE | |
| 036 | ANALOG 9 VALUE | V93J2811C | 43 | 16 | | 7.1 | | | DEC | | X | X | | | | | | | | | C | GPCF | GPCF S73 ANALOG 9 VALUE | |
| 037 | ANALOG 10 VALUE | V93J2812C | 43 | 17 | | 7.1 | | | DEC | | X | X | | | | | | | | | C | GPCF | GPCF S73 ANALOG 10 VALUE | |
| 038 | ANALOG 11 VALUE | V93J2813C | 43 | 19 | | 7.1 | | | DEC | | X | X | | | | | | | | | C | GPCF | GPCF S73 ANALOG 11 VALUE | |
| 039 | ANALOG 12 VALUE | V93J2814C | 43 | 20 | | 7.1 | | | DEC | | X | X | | | | | | | | | C | GPCF | GPCF S73 ANALOG 12 VALUE | |
| 040 | ANALOG 13 VALUE | V93J2815C | 43 | 21 | | 7.1 | | | DEC | | X | X | | | | | | | | | C | GPCF | GPCF S73 ANALOG 13 VALUE | |

## Table 4.3.30-2. GPCF PL C&W (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | | | |
| 041 | ANALOG 14 VALUE | V93J2816C | 43 | 22 | | 7.1 | | | DEC | | X | X | | | | | | | | | C | GPCF | GPCF S73 ANALOG 14 VALUE | |
| 042 | ANALOG 15 VALUE | V93J2817C | 43 | 23 | | 7.1 | | | DEC | | X | X | | | | | | | | | C | GPCF | GPCF S73 ANALOG 15 VALUE | |
| 043 | DISCRETE 1 DESC | V93U2818C | 2 | 7 | | 10.0 | | | CHAR | | | X | | X | | | | | | | C | GPCF | GPCF S73 DISCRETE 1 DESC | |
| 044 | DISCRETE 2 DESC | V93U2819C | 2 | 8 | | 10.0 | | | CHAR | | | X | | X | | | | | | | C | GPCF | GPCF S73 DISCRETE 2 DESC | |
| 045 | DISCRETE 3 DESC | V93U2820C | 2 | 9 | | 10.0 | | | CHAR | | | X | | X | | | | | | | C | GPCF | GPCF S73 DISCRETE 3 DESC | |
| 046 | DISCRETE 4 DESC | V93U2821C | 2 | 10 | | 10.0 | | | CHAR | | | X | | X | | | | | | | C | GPCF | GPCF S73 DISCRETE 4 DESC | |
| 047 | DISCRETE 5 DESC | V93U2822C | 2 | 11 | | 10.0 | | | CHAR | | | X | | X | | | | | | | C | GPCF | GPCF S73 DISCRETE 5 DESC | |
| 048 | DISCRETE 6 DESC | V93U2823C | 2 | 13 | | 10.0 | | | CHAR | | | X | | X | | | | | | | C | GPCF | GPCF S73 DISCRETE 6 DESC | |
| 049 | DISCRETE 7 DESC | V93U2824C | 2 | 14 | | 10.0 | | | CHAR | | | X | | X | | | | | | | C | GPCF | GPCF S73 DISCRETE 7 DESC | |
| 050 | DISCRETE 8 DESC | V93U2825C | 2 | 15 | | 10.0 | | | CHAR | | | X | | X | | | | | | | C | GPCF | GPCF S73 DISCRETE 8 DESC | |
| 051 | DISCRETE 9 DESC | V93U2826C | 2 | 16 | | 10.0 | | | CHAR | | | X | | X | | | | | | | C | GPCF | GPCF S73 DISCRETE 9 DESC | |
| 052 | DISCRETE 10 DESC | V93U2827C | 2 | 17 | | 10.0 | | | CHAR | | | X | | X | | | | | | | C | GPCF | GPCF S73 DISCRETE 10 DESC | |
| 053 | DISCRETE 11 DESC | V93U2828C | 2 | 19 | | 10.0 | | | CHAR | | | X | | X | | | | | | | C | GPCF | GPCF S73 DISCRETE 11 DESC | |
| 054 | DISCRETE 12 DESC | V93U2829C | 2 | 20 | | 10.0 | | | CHAR | | | X | | X | | | | | | | C | GPCF | GPCF S73 DISCRETE 12 DESC | |
| 055 | DISCRETE 13 DESC | V93U2830C | 2 | 21 | | 10.0 | | | CHAR | | | X | | X | | | | | | | C | GPCF | GPCF S73 DISCRETE 13 DESC | |
| 056 | DISCRETE 14 DESC | V93U2831C | 2 | 22 | | 10.0 | | | CHAR | | | X | | X | | | | | | | C | GPCF | GPCF S73 DISCRETE 14 DESC | |
| 057 | DISCRETE 15 DESC | V93U2832C | 2 | 23 | | 10.0 | | | CHAR | | | X | | X | | | | | | | C | GPCF | GPCF S73 DISCRETE 15 DESC | |
| 058 | DISCRETE 16 DESC | V93U2833C | 2 | 7 | | 10.0 | | | CHAR | | | X | | X | | | | | | | C | GPCF | GPCF S73 DISCRETE 16 DESC | |
| 059 | DISCRETE 17 DESC | V93U2834C | 17 | 8 | | 10.0 | | | CHAR | | | X | | X | | | | | | | C | GPCF | GPCF S73 DISCRETE 17 DESC | |
| 060 | DISCRETE 18 DESC | V93U2835C | 17 | 9 | | 10.0 | | | CHAR | | | X | | X | | | | | | | C | GPCF | GPCF S73 DISCRETE 18 DESC | |
| 061 | DISCRETE 19 DESC | V93U2836C | 17 | 10 | | 10.0 | | | CHAR | | | X | | X | | | | | | | C | GPCF | GPCF S73 DISCRETE 19 DESC | |
| 062 | DISCRETE 20 DESC | V93U2837C | 17 | 11 | | 10.0 | | | CHAR | | | X | | X | | | | | | | C | GPCF | GPCF S73 DISCRETE 20 DESC | |
| 063 | DISCRETE 21 DESC | V93U2838C | 17 | 13 | | 10.0 | | | CHAR | | | X | | X | | | | | | | C | GPCF | GPCF S73 DISCRETE 21 DESC | |
| 064 | DISCRETE 22 DESC | V93U2839C | 17 | 14 | | 10.0 | | | CHAR | | | X | | X | | | | | | | C | GPCF | GPCF S73 DISCRETE 22 DESC | |
| 065 | DISCRETE 23 DESC | V93U2840C | 17 | 15 | | 10.0 | | | CHAR | | | X | | X | | | | | | | C | GPCF | GPCF S73 DISCRETE 23 DESC | |
| 066 | DISCRETE 24 DESC | V93U2841C | 17 | 16 | | 10.0 | | | CHAR | | | X | | X | | | | | | | C | GPCF | GPCF S73 DISCRETE 24 DESC | |
| 067 | DISCRETE 25 DESC | V93U2842C | 17 | 17 | | 10.0 | | | CHAR | | | X | | X | | | | | | | C | GPCF | GPCF S73 DISCRETE 25 DESC | |
| 068 | DISCRETE 26 DESC | V93U2843C | 17 | 19 | | 10.0 | | | CHAR | | | X | | X | | | | | | | C | GPCF | GPCF S73 DISCRETE 26 DESC | |
| 069 | DISCRETE 27 DESC | V93U2844C | 17 | 20 | | 10.0 | | | CHAR | | | X | | X | | | | | | | C | GPCF | GPCF S73 DISCRETE 27 DESC | |
| 070 | DISCRETE 28 DESC | V93U2845C | 17 | 21 | | 10.0 | | | CHAR | | | X | | X | | | | | | | C | GPCF | GPCF S73 DISCRETE 28 DESC | |
| 071 | DISCRETE 29 DESC | V93U2846C | 17 | 22 | | 10.0 | | | CHAR | | | X | | X | | | | | | | C | GPCF | GPCF S73 DISCRETE 29 DESC | |
| 072 | DISCRETE 30 DESC | V93U2847C | 17 | 23 | | 10.0 | | | CHAR | | | X | | X | | | | | | | C | GPCF | GPCF S73 DISCRETE 30 DESC | |
| 073 | DESCRETE 1 VALUE | V93X2848X | 13 | 7 | | 1.0 | 1 | 0 | BLVL | | X | X | | | | | | | | | C 3 | GPCF | GPCF S73 DISCRETE 1 VALUE | |
| 074 | DESCRETE 2 VALUE | V93X2849X | 13 | 8 | | 1.0 | 1 | 0 | BLVL | | X | X | | | | | | | | | C 3 | GPCF | GPCF S73 DISCRETE 2 VALUE | |
| 075 | DESCRETE 3 VALUE | V93X2850X | 13 | 9 | | 1.0 | 1 | 0 | BLVL | | X | X | | | | | | | | | C 3 | GPCF | GPCF S73 DISCRETE 3 VALUE | |
| 076 | DISCRETE 4 VALUE | V93X2851X | 13 | 10 | | 1.0 | 1 | 0 | BLVL | | X | X | | | | | | | | | C 3 | GPCF | GPCF S73 DISCRETE 4 VALUE | |
| 077 | DISCRETE 5 VALUE | V93X2852X | 13 | 11 | | 1.0 | 1 | 0 | BLVL | | X | X | | | | | | | | | C 3 | GPCF | GPCF S73 DISCRETE 5 VALUE | |
| 078 | DISCRETE 6 VALUE | V93X2853X | 13 | 13 | | 1.0 | 1 | 0 | BLVL | | X | X | | | | | | | | | C 3 | GPCF | GPCF S73 DISCRETE 6 VALUE | |
| 079 | DISCRETE 7 VALUE | V93X2854X | 13 | 14 | | 1.0 | 1 | 0 | BLVL | | X | X | | | | | | | | | C 3 | GPCF | GPCF S73 DISCRETE 7 VALUE | |
| 080 | DISCRETE 8 VALUE | V93X2855X | 13 | 15 | | 1.0 | 1 | 0 | BLVL | | X | X | | | | | | | | | C 3 | GPCF | GPCF S73 DISCRETE 8 VALUE | |

## Table 4.3.30-2. GPCF PL C&W (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | BILEVEL | | | | | | | | | | | | | | | | | |
| | | | X | Y | | CHAR | 1 | 0 | TYPE | | | | | | | | | | | | | | | |
| 081 | DISCRETE 9 VALUE | V93X2856X | 13 | 16 | | 1.0 | 1 | 0 | BLVL | | X | X | | | | | | | | | C 3 | GPCF | GPCF S73 DISCRETE 9 VALUE | |
| 082 | DISCRETE 10 VALUE | V93X2857X | 13 | 17 | | 1.0 | 1 | 0 | BLVL | | X | X | | | | | | | | | C 3 | GPCF | GPCF S73 DISCRETE 10 VALUE | |
| 083 | DISCRETE 11 VALUE | V93X2858X | 13 | 19 | | 1.0 | 1 | 0 | BLVL | | X | X | | | | | | | | | C 3 | GPCF | GPCF S73 DISCRETE 11 VALUE | |
| 084 | DISCRETE 12 VALUE | V93X2859X | 13 | 20 | | 1.0 | 1 | 0 | BLVL | | X | X | | | | | | | | | C 3 | GPCF | GPCF S73 DISCRETE 12 VALUE | |
| 085 | DISCRETE 13 VALUE | V93X2860X | 13 | 21 | | 1.0 | 1 | 0 | BLVL | | X | X | | | | | | | | | C 3 | GPCF | GPCF S73 DISCRETE 13 VALUE | |
| 086 | DISCRETE 14 VALUE | V93X2861X | 13 | 22 | | 1.0 | 1 | 0 | BLVL | | X | X | | | | | | | | | C 3 | GPCF | GPCF S73 DISCRETE 14 VALUE | |
| 087 | DISCRETE 15 VALUE | V93X2862X | 13 | 23 | | 1.0 | 1 | 0 | BLVL | | X | X | | | | | | | | | C 3 | GPCF | GPCF S73 DISCRETE 15 VALUE | |
| 088 | DISCRETE 16 VALUE | V93X2863X | 28 | 7 | | 1.0 | 1 | 0 | BLVL | | X | X | | | | | | | | | C 3 | GPCF | GPCF S73 DISCRETE 16 VALUE | |
| 089 | DISCRETE 17 VALUE | V93X2864X | 28 | 8 | | 1.0 | 1 | 0 | BLVL | | X | X | | | | | | | | | C 3 | GPCF | GPCF S73 DISCRETE 17 VALUE | |
| 090 | DISCRETE 18 VALUE | V93X2865X | 28 | 9 | | 1.0 | 1 | 0 | BLVL | | X | X | | | | | | | | | C 3 | GPCF | GPCF S73 DISCRETE 18 VALUE | |
| 091 | DISCRETE 19 VALUE | V93X2866X | 28 | 10 | | 1.0 | 1 | 0 | BLVL | | X | X | | | | | | | | | C 3 | GPCF | GPCF S73 DISCRETE 19 VALUE | |
| 092 | DISCRETE 20 VALUE | V93X2867X | 28 | 11 | | 1.0 | 1 | 0 | BLVL | | X | X | | | | | | | | | C 3 | GPCF | GPCF S73 DISCRETE 20 VALUE | |
| 093 | DISCRETE 21 VALUE | V93X2868X | 28 | 13 | | 1.0 | 1 | 0 | BLVL | | X | X | | | | | | | | | C 3 | GPCF | GPCF S73 DISCRETE 21 VALUE | |
| 094 | DISCRETE 22 VALUE | V93X2869X | 28 | 14 | | 1.0 | 1 | 0 | BLVL | | X | X | | | | | | | | | C 3 | GPCF | GPCF S73 DISCRETE 22 VALUE | |
| 095 | DISCRETE 23 VALUE | V93X2870X | 28 | 15 | | 1.0 | 1 | 0 | BLVL | | X | X | | | | | | | | | C 3 | GPCF | GPCF S73 DISCRETE 23 VALUE | |
| 096 | DISCRETE 24 VALUE | V93X2871X | 28 | 16 | | 1.0 | 1 | 0 | BLVL | | X | X | | | | | | | | | C 3 | GPCF | GPCF S73 DISCRETE 24 VALUE | |
| 097 | DISCRETE 25 VALUE | V93X2872X | 28 | 17 | | 1.0 | 1 | 0 | BLVL | | X | X | | | | | | | | | C 3 | GPCF | GPCF S73 DISCRETE 25 VALUE | |
| 098 | DISCRETE 26 VALUE | V93X2873X | 28 | 19 | | 1.0 | 1 | 0 | BLVL | | X | X | | | | | | | | | C 3 | GPCF | GPCF S73 DISCRETE 26 VALUE | |
| 099 | DISCRETE 27 VALUE | V93X2874X | 28 | 20 | | 1.0 | 1 | 0 | BLVL | | X | X | | | | | | | | | C 3 | GPCF | GPCF S73 DISCRETE 27 VALUE | |
| 100 | DISCRETE 28 VALUE | V93X2875X | 28 | 21 | | 1.0 | 1 | 0 | BLVL | | X | X | | | | | | | | | C 3 | GPCF | GPCF S73 DISCRETE 28 VALUE | |
| 101 | DISCRETE 29 VALUE | V93X2876X | 28 | 22 | | 1.0 | 1 | 0 | BLVL | | X | X | | | | | | | | | C 3 | GPCF | GPCF S73 DISCRETE 29 VALUE | |
| 102 | DISCRETE 30 VALUE | V93X2877X | 28 | 23 | | 1.0 | 1 | 0 | BLVL | | X | X | | | | | | | | | C 3 | GPCF | GPCF S73 DISCRETE 30 VALUE | |
| 103 | PL UPDATE INDICATOR | V93X2878X | 41 | 3 | | 4.0 | PGSC | | BLVL | | | X | | X | | | | | | | D | GPCF | GPCF S73 PL UPDATE INDICATOR | |
| 104 | UPDATING PL | V93J2879C | 46 | 3 | | 3.0 | | | DEC | | | X | | X | | | | | | | D | GPCF | GPCF S73 UPDATING PL | |
| 105 | INPUTS INHIBITED | V93X2677X | 16 | 2 | | 16.0 | ADD REF | ADD REF | BLVL | | | X | | X | | | | | | | F | GPCF | GPCF INITIALIZATION | |
| 106 | (MSG LINE) | V93X0050X | 1 | 25 | | 44.0 | | | CHAR | | | | | | | G | | | | | | UI | MESSAGE LINE | |
| 107 | (BUFFER MSG) | V93X0054X | 45 | 25 | | 4.0 | | | CHAR | | | | | | | G | | | | | | UI | BUFFER MESSAGE INDICATOR | |
| 108 | (SPL) | V93X0056X | 2 | 26 | | 49.0 | | | CHAR | | | | | | | G | | | | | | UI | SCRATCH PAD LINE | |

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## 4.4 PAYLOAD MANAGEMENT DISPLAYS

See JSC–19478

## 4.5 ON-ORBIT VEHICLE UTILITY (VU) DISPLAYS

* NOTE: Unless otherwise specifically stated, displays (OPS, SPECs, or DISPs) may or may not reflect LDB or Uplink initiated inputs (and their associated outputs).

### 4.5.1 FCS DEDICATED DISPLAYS CHECKOUT (PFS)

TITLE: FCS/DED DIS C/O
TYPE: OPS/8011
AVAILABILITY: GNC OPS 8

#### 4.5.1.1 Purpose, Operation, and Organization

(1) FCS/DED DIS C/O

This display is used to control and monitor testing of the dedicated displays and the aerosurfaces. Figure 4.5.1–1 is the FCS Dedicated Displays Checkout (PFS).

When the OPS is initialized or reinitialized all asterisks (*'s) are blank except Items 1 and 20 indicating that the forward dedicated displays are selected for testing. At all times when the display is present the surface position values are continuously displayed and updated.

If the OPS is overlaid with a SPEC, any tests that are active continue. When the overlays are removed through keyboard entry of RESUME, the continuing activity of any of the tests is reflected on the display as if it had not been interrupted. When the OPS is terminated by calling another OPS, all tests under way are terminated in an orderly fashion.

(2) DED DIS

Items 1 through 6 control the dedicated display tests. Items 1 and 2 control selection of which dedicated displays are subject to the tests controlled by Items 3 through 6. Execution of Item 1 or 2 causes an asterisk (*) to appear beside the selected item and (if there was one present) to be removed from beside the other one. The displays to be exercised by Items 3, 4, and 5 are partitioned by means of Items 1 and 2 as indicated in Table 4.5.1.1–1. Execution of Item 3 causes the selected displays (See Table 4.5.1.1–1) to be driven with predefined high values. Execution of Item 4 causes the selected displays to be driven with predefined low values. Execution of Item 5 causes all flags on the selected displays except the HSI Power Flag to be driven to visibility. Execution of Item 6 terminates any of these dedicated display tests. Initially there is no asterisk (*) beside any of these four items; however, execution of one of the Items from 3 through 6 causes an asterisk (*) to appear beside the selected item, deletes any other asterisk (*) that may be present beside another of these items, and terminates the dedicated display test that may have been in progress.

(3) MODE LT

Items 7 and 8 control testing of the GPC interface to the mode lamps. Execution of Item 7 initiates illumination outputs to the left and right FCS mode lights. For each side, lamps are illuminated simultaneously. These include AUTO and CSS lamps for the pitch and roll/yaw control axis, and the AUTO/MAN lamps for the speed brake and body flap. Execution of Item 8 causes extinguish outputs to all the lamps. Initially a blank is displayed beside either of these two items; later an asterisk (*) appears beside Item 7 or 8, whichever was executed last, to show that the lights have been illuminated or extinguished, respectively.

(4) AVG G

Item 9 turns the powered flight navigation (AVG G) on or off. Turning the switch ON results in an asterisk (*) being displayed after Item 9. The display will be initialized with AVG G ON and thereafter reflects crew inputs.

(5) SURF

The controls for the aerosurface drive test allow the START and STOP (Items 10 and 11) of the aerosurface alternating drive function. Execution of Item 10 causes the output of drive commands to the left inboard and outboard elevons, right inboard and outboard elevons, rudder, speed brake, and body flap. The commands are generated to position the aerosurfaces in a triangular wave fashion. Execution of Item 11 terminates the alternating drive test and issues commands to position the surfaces for entry. Initially there is no asterisk (*) beside either Item 10 or 11. Following execution of either of these items, there will always be an asterisk (*) beside one of them, indicating which one was executed last. Item 11 may be executed without first executing Item 10; this will cause the aerosurfaces to be positioned for entry without first being exercised in a triangular wave fashion. Item 10 is mutually exclusive with items 15 through 18. Execution of item 11 while an item 15–18 is concurrently selected shall cause an "ILLEGAL ENTRY" message to be displayed.

SURF CMD/POS

The output command (CMD) and selected position feedback (POS) are displayed for each aerosurface. The output values for the elevons and rudder are displayed in degrees. The output values for the speed brake are displayed in percent of full deflection. For the body flap, the output value for CMD is displayed as remote text indicating direction of commanded deflection. CMD is blank if there is no drive. Otherwise CMD is UP or DN (down). The body flap POS value is displayed in percent of full deflection. The signs of the deflections of the elevons and rudder are displayed as U, D, L, and R as presented in Table 4.5.1.1–2. When the 801 mode is active and the secondary actuator channel 1 test is not selected, a comparison is made between the command and position feedback for all aerosurfaces except the body flap. If the difference exceeds a pre–defined tolerance, the condition will be annunciated by a down arrow (↓) beside the position output. After Item 11 has been executed (see paragraph 3), the crew can confirm final positioning by monitoring the POS outputs.

(6) BODY FLP DES

The controls and status of the body flap pilot valves (BODY FLP VLV 1, 2, 3) are presented above the secondary actuator controls. For a pilot valve, an "ENA" or "INH" shall be displayed corresponding to the state of each body flap enable command. Initially, all pilot

valves will be enabled. Each pilot valve may be selectively inhibited by executing the appropriate deselect (DES) Item (Item 12, 13, or 14). When the DES item is active, an asterisk (*) is displayed to the right of the item number. Execution of the DES item for an inhibited pilot valve will reenable the valve. The current deselect state of each body flap pilot valve is maintained across any OPS transition, except for a transition back to OPS 8.

(7) SEC ACT CK

Additional controls for the aerosurface drive test allow selective initiation of the secondary actuator checks. A control is provided for each actuator channel, CH1 through CH4 (Items 15 through 18). Execution of one of these items will cause a hardover command to be issued on the corresponding actuator channel to the appropriate aerosurfaces. An asterisk (*) will appear beside the item executed. The hardover command will remain until crew action removes it. If another channel is selected, the asterisk (*) on the previously executed Item (from 15 through 18) is removed. Item 19 may be executed to terminate the check and remove the asterisk (*) from Items 15 through 18. An asterisk (*) then appears beside Item 19 and remains until (and unless) one of the Items from 15 through 18 is executed. If an Item from 15 through 18 is executed even though an asterisk (*) is beside it, another hardover command is issued and remains for the same brief period as previously. Items 15 through 18 are mutually exclusive with item 10. Execution of items 15–18 shall be illegal until aerosurface movement from a previous Item 11 has completed.

The port status for each channel on all appropriate aerosurfaces is displayed to the right of the controls. The output values will be blank (no bypass), a down arrow (↓) (bypass), or M (data invalid). If the crew observes that not all ports bypass in response to selection of the corresponding channel (see paragraph 5), the appropriate FCS CHANNEL switch (S1, S2, S3, or S4) on subpanel A2 of panel C3 may be placed in the OFF position. This should cause all ports in that channel to bypass and show a down arrow (↓) on the display. With the FCS channel switch in the OFF position, the down arrows (↓'s) will remain displayed even though another secondary actuator check selection is made. The only way the down arrows (↓'s) (which were displayed as a result of an FCS channel switch being in the OFF position) can be made to disappear is to place the FCS channel switch back in the auto position.

(8) POS STIM

Item 20 defines whether a positive or negative polarity secondary actuator check is performed when Items 15–18 are executed. Item 20 acts as a "flip–flop" changing the polarity of the secondary actuator check with each subsequent entry. An asterisk (*) will indicate positive polarity; a "blank" will indicate negative polarity. The display is initialized each time it is called from Mass memory with positive polarity selected.

(9) SEC ACT

Item 21 XY enters the ID of an aerosurface secondary actuator channel and causes a command to be issued to bypass that channel. The channel ID is defined as "XY" where "X" is the desired aerosurface, and "Y" is the actuator channel number according to Table 4.5.1.1–3.

Entry of a first digit other than 1–6 or entry of a second digit other than 1–4 shall generate an operator error.

Item 22 XY enters the ID of an aerosurface secondary actuator channel and causes a command to be issued to reset that channel. The channel is defined in the same way as for Item 21. The bypasses and resets initiated in GN&C OPS 8 shall be the initialization data for any subsequent OPS cyclic I/O.

The display will be initialized with Items 21 and 22 as zeros.

Table 4.5.1.1-1. Selection of Forward and Aft Dedicated Displays

| Item Selected | Displays Subject to Control of Items 3, 4, 5, and 6 |
|---|---|
| 1 | SDI, Left and Right ADI, AVVI, AMI, HSI |
| 2 | Aft ADI |

Table 4.5.1.1-2. Polarity Indications for Elevon and Rudder Positions

| Surface | Positive Command* Positive Deflection | Negative Command* Negative Deflection |
|---|---|---|
| Rudder | L | R |
| Elevon | D | U |

*Note: Polarity represents actuator reaction; i.e. positive command received results in positive deflection of actuator – L or D indication.

Table 4.5.1.1-3. Secondary Actuator Single Channel Select Identification

| | | Actuator Channel Y | | | |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 |
| AEROSURFACE | X | Item 21/22 Data Entry | | | |
| LOB ELEVON | 1 | 11 | 12 | 13 | 14 |
| LIB ELEVON | 2 | 21 | 22 | 23 | 24 |
| RIB ELEVON | 3 | 31 | 32 | 33 | 34 |
| ROB ELEVON | 4 | 41 | 42 | 43 | 44 |
| RUDDER | 5 | 51 | 52 | 53 | 54 |
| SPEEDBRAKE | 6 | 61 | 62 | 63 | 64 |

### 4.5.1.2 FCS Dedicated Displays Checkout (PFS) Keyboard Processing Addendum

A. Body Flap Valve Command–Signal Destination

THE BODY VALVE DESELECT COMMAND SIGNAL (V93X3978X, V93X3983X, V93X3987X) valve 1, 2, or 3 respectively have multiple destinations as follows; BF CMD FDIR (4.95), ADT (V4.19) and CRT (V5.1.10)

B. AVG G ON/OFF Command

This is a single bilevel signal (V93X5408X); the one state corresponds to AVG G "ON" and the zero state corresponds to AVG G "OFF". This signal is sent to ORB/RND NAV (4.126) and ORB UPP (4.22).

### 4.5.1.3 FCS Dedicated Displays Checkout (PFS) CRT Display Processing Addendum

The Table below presents the stand–alone parameter status indicators (PSI) that can be displayed for a parameter. PSI requirements are identified by the word "STAT" being inserted in the FORMAT TYPE column and a numeric code appearing as an entry (right justified) in the ADD REF column of CRT display processing Table 4.5.1–2. The numeric code, corresponding to one of those listed in the Table indicates the specific status processing to be performed. If there is no numeric code entry, the status processing is defined by the default code.

When the "M" PSI is displayed (for Commfault, I/O error resulting in missing data), the associated parameter value data field shall be blanked unless specified otherwise.

| Numeric Code | PSI SYMBOL(S) | | | | |
|---|---|---|---|---|---|
| Default (blank) | ↓ | | | M | ⊬ |
| 1 | ↓ | ↑ | | M | ⊬ |
| 2 | | ↑ | | M | ⊬ |
| 3 | ↓ | | | | ⊬ |
| 4 | | ↑ | | | ⊬ |
| 5 | ↓ | | ? | | ⊬ |
| 6 | ↓ | ↑ | | | ⊬ |
| 7 | | | | M | ⊬ |
| 8 | ↓ | | ? | M | ⊬ |
| 9 | | | ? | M | ⊬ |

⊬ = blank

The following alpha code(s) appear (left justified) in the ADD REF column of the Table 4.5.1–2 whenever it is necessary to define any special processing requirements not otherwise covered therein:

A. Four feedback signals report the position of each aerosurface. Consider the values of these four signals to be represented by a, b, c, and d and arranged as follows:

$$a \leq b \leq c \leq d$$

If $c - a \leq d - b$, then b is selected as the position value to display and compare with the commanded value; otherwise c is selected.

(The software contractor may use the criterion $c - a < d - b$ instead of $c - d \leq d - b$).

Polarity of the rudder or elevon position feedback value is multiplied by a scale factor of –1 and is indicated as set forth in Table 4.5.1.3–1.

B. Polarity of the displayed command value is multiplied by a scale factor of –1 and is indicated as set forth in Table 4.5.1.3–2.

C. Aerodynamic and Reaction Devices–Controllers and Effectors–Directional Conventions

Rotation Hand Controllers (RHC). The directional signals from the RHC are described in terms of the orientation of the RHC itself–or rather the orientation of the crew member operating the RHC. At the forward stations the orientation is obvious; at the aft crew station the orientation is with respect to the controller and not the vehicle.

Pulling back on the RHC produces a positive (+) pitch signal which is sometimes described as an “up” (U) pitch signal. Pushing forward produces a negative (–) or “down” (D) pitch signal.

Moving the RHC to the right produces a positive (+) roll signal which is sometimes described as a “right” (R) roll signal. Bending the RHC left produces negative (–) or “left” (L) roll signal.

Twisting the handle of the RHC clockwise about its own axis produces a positive (+) yaw signal which is sometimes described as a “right” (R) yaw signal. Twisting the handle counter–clockwise produces a negative (–) or “left” (L) yaw signal.

Rudder Pedal Transducer Assemblies (RPTA). Operating the RPTA is described in terms of the right pedal and the left pedal. This description refers to the right or left pedal of the entire assembly at each crew station; it does not refer to the location of the assembly.

Pushing forward on the right pedal produces a positive (+) or right (R) yaw signal. Pushing forward on the left pedal produces a negative (–) or left (L) yaw signal.

Translation Hand Controllers (THC). As with the RHC, the directional signals from the THC are described in terms of the orientation of the THC itself.

Pushing forward on the THC produces a positive (+) signal in the TX axis.
Pulling backward on the THC produces a negative (–) signal in the TX axis.
Pushing the THC to the right produces a positive (+) signal in the TY axis.
Pushing the THC to the left produces a negative (–) signal in the TY axis.
Pushing the THC down produces a positive (+) signal in the TZ axis.
Pulling the THC up produces a negative (–) signal in the TZ axis.

Reaction Jets. Reaction jets are identified by a three–character code: a letter which identifies the general location, a one–digit identifying number for jets at that location firing in a specific direction, and a letter which identifies the exhaust direction.

General Location (First Character)

F Forward
L Left (aft)
R Right (aft)

Firing Direction (Third Character)

F Jet fires forward (vehicle accelerates backward)
A Jet fires aft (vehicle accelerates forward)
U Jet fires up (vehicle accelerates downward)
D Jet fires down (vehicle accelerates upward)
L Jet fires to left (vehicle accelerates to right)
R Jet fires to right (vehicle accelerates to left)

Aerosurfaces. When the RHC or RPTA is being used to control the aerosurfaces, control is effected by electrical signals from the controllers mediated by the computers and fed through electrical servomechanisms. Surface position feedback transducers then produce electrical signals that also are fed to the servos. The servos continue to drive the aerosurfaces until the sums of the signals reaching each servo are zero. With regard to pitch and yaw, this means that the feedback transducers must produce signals opposite in polarity to the signals from the RHC and RPTA. Roll is effected by the computers sending signals of opposite polarity to the servos for the elevons on opposite sides of the vehicle.

Elevons. When the trailing edge of an elevon (any one of the four) is up, the signal from the feedback transducer is negative (–) and the position is represented on CRT displays as U. When the trailing edge of an elevon is down, the signal from the feedback transducer is positive (+) and the position is represented on CRT displays as D.

Rudder. When the trailing edge of the rudder is to the right, the signal from the feedback transducer is negative (–) and the position is represented in CRT displays as R. When the trailing edge of the rudder is to the left, the signal from the feedback transducer is positive (+) and the position is represented on CRT displays as L.

Ailerons. The aileron function for roll control is provided by differential elevon. When the aileron position is such that the right elevons are positioned with their trailing edges up (negative feedback signals) and the left elevons are positioned with their trailing edges down (positive feedback signals), the aileron position causes right roll and is represented on displays as R. When the right elevons have their trailing edges down (positive feedback signals) and the left elevons have their trailing edges up (negative feedback signals), the aileron position is represented as L and causes left roll.

D. Secondary Actuator Bypass Item Entry Data

When Item 21 is executed, a command to bypass an aerosurface secondary actuator channel will be issued based on the data entered with the item as defined in Table 4.5.1.3–3. If Item 22 is executed after Item 21 has been executed, the data field for Item 21 will display zeroes.

E. Secondary Actuator Reset Item Entry Data

When Item 22 is executed, commands will be issued to reset the bypass discrete and to reset the bypassed secondary actuator channel based on the data entered with the Item as defined in Table 4.5.1.3–4. If Item 21 is executed after Item 22 has been executed, the data field for Item 22 will display zeroes.

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Table 4.5.1.3-1. Polarity Indications for Elevon and Rudder Position Feedback (after applied multiplication factor of -1)

| Surface | Positive Feedback Signal | Negative Feedback Signal |
|---|---|---|
| Rudder | R | L |
| Elevon | U | D |

Table 4.5.1.3-2. Polarity Indications for Elevon and Rudder Command Signals (after applied multiplication factor of -1)

| Surface | Positive Feedback Signal | Negative Feedback Signal |
|---|---|---|
| Rudder | R | L |
| Elevon | U | D |

Table 4.5.1.3-3. Secondary Actuator Bypass Item Entry Data Definitions

| SEC ACT BYPASS ITEM 21 ENTRIES (V93X3973X) | AEROSURFACE ACTUATOR BYPASSED | BYPASS CMD SENT FROM ADT |
|---|---|---|
| 11 | LOB ELEVON ACTR CH 1 | V79K3231X (SET TO 1) |
| 12 | LOB ELEVON ACTR CH 2 | V79K3233X (SET TO 1) |
| 13 | LOB ELEVON ACTR CH 3 | V79K3235X (SET TO 1) |
| 14 | LOB ELEVON ACTR CH 4 | V79K3237X (SET TO 1) |
| 21 | LIB ELEVON ACTR CH 1 | V79K3221X (SET TO 1) |
| 22 | LIB ELEVON ACTR CH 2 | V79K3223X (SET TO 1) |
| 23 | LIB ELEVON ACTR CH 3 | V79K3225X (SET TO 1) |
| 24 | LIB ELEVON ACTR CH 4 | V79K3227X (SET TO 1) |
| 31 | RIB ELEVON ACTR CH 1 | V79K3241X (SET TO 1) |
| 32 | RIB ELEVON ACTR CH 2 | V79K3243X (SET TO 1) |
| 33 | RIB ELEVON ACTR CH 3 | V79K3245X (SET TO 1) |
| 34 | RIB ELEVON ACTR CH 4 | V79K3247X (SET TO 1) |
| 41 | ROB ELEVON ACTR CH 1 | V79K3251X (SET TO 1) |
| 42 | ROB ELEVON ACTR CH 2 | V79K3253X (SET TO 1) |
| 43 | ROB ELEVON ACTR CH 3 | V79K3255X (SET TO 1) |
| 44 | ROB ELEVON ACTR CH 4 | V79K3257X (SET TO 1) |
| 51 | RUD ACTR CH 1 | V79K3365X (SET TO 1) |
| 52 | RUD ACTR CH 2 | V79K3366X (SET TO 1) |
| 53 | RUD ACTR CH 3 | V79K3367X (SET TO 1) |
| 54 | RUD ACTR CH 4 | V79K3368X (SET TO 1) |
| 61 | SPDBK ACTR CH 1 | V79K3375X (SET TO 1) |
| 62 | SPDBK ACTR CH 2 | V79K3376X (SET TO 1) |
| 63 | SPDBK ACTR CH 3 | V79K3377X (SET TO 1) |
| 64 | SPDBK ACTR CH 4 | V79K3378X (SET TO 1) |

Table 4.5.1.3-4. Secondary Actuator Reset Item Entry Data Definitions

| COMMANDS SENT FROM ADT | | | |
|---|---|---|---|
| SEC ACT RESET ITEM 22 ENTRIES (V93X3974X) | AEROSURFACE ACTUATOR RESET | BYPASS RESET CMD | RESET CMD |
| 11 | LOB ELEVON ACTR CH 1 | V79K3231X (SET TO 0) | V79K3230X MOMENTARILY (SET TO 1) |
| 12 | LOB ELEVON ACTR CH 2 | V79K3233X (SET TO 0) | V79K3232X MOMENTARILY (SET TO 1) |
| 13 | LOB ELEVON ACTR CH 3 | V79K3235X (SET TO 0) | V79K3234X MOMENTARILY (SET TO 1) |
| 14 | LOB ELEVON ACTR CH 4 | V79K3237X (SET TO 0) | V79K3236X MOMENTARILY (SET TO 1) |
| 21 | LIB ELEVON ACTR CH 1 | V79K3221X (SET TO 0) | V79K3220X MOMENTARILY (SET TO 1) |
| 22 | LIB ELEVON ACTR CH 2 | V79K3223X (SET TO 0) | V79K3222X MOMENTARILY (SET TO 1) |
| 23 | LIB ELEVON ACTR CH 3 | V79K3225X (SET TO 0) | V79K3224X MOMENTARILY (SET TO 1) |
| 24 | LIB ELEVON ACTR CH 4 | V79K3227X (SET TO 0) | V79K3226X MOMENTARILY (SET TO 1) |
| 31 | RIB ELEVON ACTR CH 1 | V79K3241X (SET TO 0) | V79K3240X MOMENTARILY (SET TO 1) |
| 32 | RIB ELEVON ACTR CH 2 | V79K3243X (SET TO 0) | V79K3242X MOMENTARILY (SET TO 1) |
| 33 | RIB ELEVON ACTR CH 3 | V79K3245X (SET TO 0) | V79K3244X MOMENTARILY (SET TO 1) |
| 34 | RIB ELEVON ACTR CH 4 | V79K3247X (SET TO 0) | V79K3246X MOMENTARILY (SET TO 1) |
| 41 | ROB ELEVON ACTR CH 1 | V79K3251X (SET TO 0) | V79K3250X MOMENTARILY (SET TO 1) |
| 42 | ROB ELEVON ACTR CH 2 | V79K3253X (SET TO 0) | V79K3252X MOMENTARILY (SET TO 1) |
| 43 | ROB ELEVON ACTR CH 3 | V79K3255X (SET TO 0) | V79K3254X MOMENTARILY (SET TO 1) |
| 44 | ROB ELEVON ACTR CH 4 | V79K3257X (SET TO 0) | V79K3256X MOMENTARILY (SET TO 1) |
| 51 | RUD ACTR CH 1 | V79K3365X (SET TO 0) | V79K3345X MOMENTARILY (SET TO 1) |
| 52 | RUD ACTR CH 2 | V79K3366X (SET TO 0) | V79K3346X MOMENTARILY (SET TO 1) |

Table 4.5.1.3-4. Secondary Actuator Reset Item Entry Data Definitions

| COMMANDS SENT FROM ADT | | | | |
|---|---|---|---|---|
| SEC ACT RESET ITEM 22 ENTRIES (V93X3974X) | AEROSURFACE ACTUATOR RESET | BYPASS RESET CMD | RESET CMD | |
| 53 | RUD ACTR CH 3 | V79K3367X (SET TO 0) | V79K3347X | MOMENTARILY (SET TO 1) |
| 54 | RUD ACTR CH 4 | V79K3368X (SET TO 0) | V79K3348X | MOMENTARILY (SET TO 1) |
| 61 | SPDBK ACTR CH 1 | V79K3375X (SET TO 0) | V79K3355X | MOMENTARILY (SET TO 1) |
| 62 | SPDBK ACTR CH 2 | V79K3376X (SET TO 0) | V79K3356X | MOMENTARILY (SET TO 1) |
| 63 | SPDBK ACTR CH 3 | V79K3377X (SET TO 0) | V79K3357X | MOMENTARILY (SET TO 1) |
| 64 | SPDBK ACTR CH 4 | V79K3378X (SET TO 0) | V79K3358X | MOMENTARILY (SET TO 1) |

### 4.5.1.4 FCS Dedicated Displays Checkout Figure/Table References

Figure 4.5.1–1 FCS/DED Displays C/O (PFS)

Table 4.5.1–1 Keyboard Processing Table

Table 4.5.1–2 CRT Display Processing Table

Table 4.5.1–3 CRT Display Processing Background Requirements N/A

Table 4.5.1–4 Mission Design Background Constants N/A

Table 4.5.1–5 Input Functional Parameters

Table 4.5.1–6 Output Functional Parameters

Table 4.5.1–7 I–Loads

Table 4.5.1–8 K–Loads

Table 4.5.1–9 Constants

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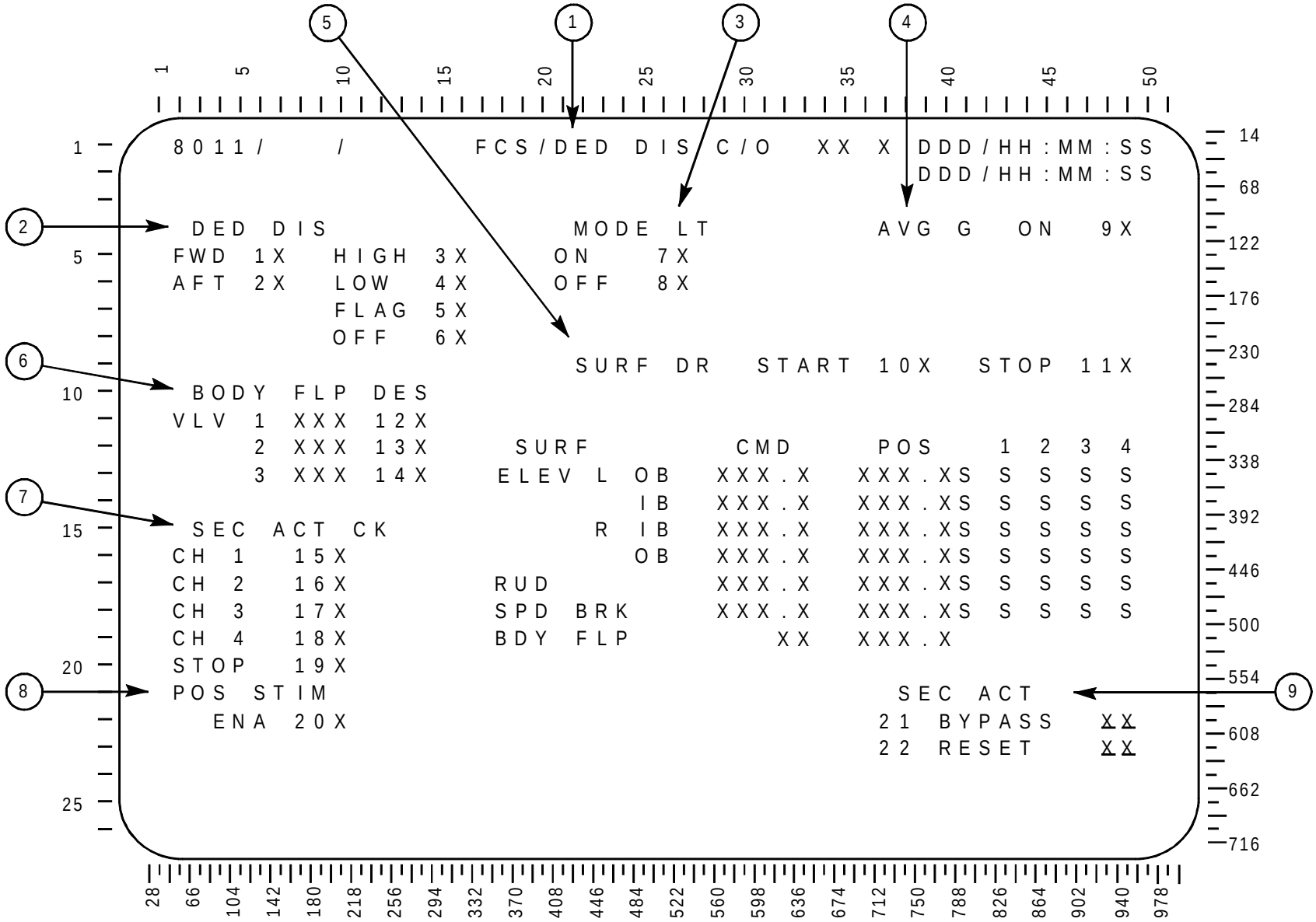


FIGURE 4.5.1-1. FCS/DED Displays C/O Display (PFS)

TABLE 4.5.1-1. FCS/DED DIS C/O (PFS) KEYBOARD PROCESSING

| Seq | CRT Signal Name | M/S ID | CHAR | TYPE | UNITS | DK | ITEM | Item No. Limits | | Add Ref | Destination | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | MIN | MAX | | | | |
| 001 | DED DISP FWD 1 | V93X3971X | 0.0 | CTRL | | | 1 | | | | DDC | DED DISP CKOUT FWD SEL | X |
| 002 | DED DISP AFT 2 | V93X3972X | 0.0 | CTRL | | | 2 | | | | DDC | DED DISP CKOUT AFT SEL | X |
| 003 | DED DISP HIGH 3 | V93X3980X | 0.0 | CTRL | | | 3 | | | | DDC | DED DISP CKOUT HIGH ON | X |
| 004 | DED DISP LOW 4 | V93X3981X | 0.0 | CTRL | | | 4 | | | | DDC | DED DISP CKOUT LOW ON | X |
| 005 | DED DISP FLAG 5 | V93X3982X | 0.0 | CTRL | | | 5 | | | | DDC | DED DISP CKOUT FLAG ON | X |
| 006 | DED DISP OFF 6 | V93X3985X | 0.0 | CTRL | | | 6 | | | | DDC | DED DISP CKOUT TEST OFF | X |
| 007 | MODE LT ON 7 | V93X3988X | 0.0 | CTRL | | | 7 | | | | M LT | MODE/SEQ LTS TEST ENA | X |
| 008 | MODE LT OFF 8 | V93X3989X | 0.0 | CTRL | | | 8 | | | | M LT | MODE/SEQ LTS TEST INH | X |
| 009* | AVG G ON 9 | V93X5408X | 0.0 | CTRL | | | 9 | | | B | ORB/RNDZ NAV | PWR FLT NAV AVG G ON/OFF CMD | X |
| 010 | SURF DR START 10 | V93X3991X | 0.0 | CTRL | | | 10 | | | | ADT | SURF DRIVE TEST START | X |
| 011 | SURF DR STOP 11 | V93X3992X | 0.0 | CTRL | | | 11 | | | | ADT | SURF DRIVE TEST STOP | X |
| 012 | BODY FLP VLV1 DES12 | V93X3978X | 0.0 | CTRL | | | 12 | | | A | ADT | BF VALVE 1 DES CMD | X |
| 013 | BODY FLP VLV2 DES13 | V93X3983X | 0.0 | CTRL | | | 13 | | | A | ADT | BF VALVE 2 DES CMD | X |
| 014 | BODY FLP VLV3 DES14 | V93X3987X | 0.0 | CTRL | | | 14 | | | A | ADT | BF VALVE 3 DES CMD | X |
| 015 | SEC ACT CK CH 1 15 | V93X3995X | 0.0 | CTRL | | | 15 | | | | ADT | CHAN 1 SEC ACT CHECK ENA | X |
| 016 | SEC ACT CK CH 2 16 | V93X3996X | 0.0 | CTRL | | | 16 | | | | ADT | CHAN 2 SEC ACT CHECK ENA | X |
| 017 | SEC ACT CK CH 3 17 | V93X3997X | 0.0 | CTRL | | | 17 | | | | ADT | CHAN 3 SEC ACT CHECK ENA | X |
| 018 | SEC ACT CK CH 4 18 | V93X3998X | 0.0 | CTRL | | | 18 | | | | ADT | CHAN 4 SEC ACT CHECK ENA | X |
| 019 | SEC ACT CK STOP 19 | V93X3999X | 0.0 | CTRL | | | 19 | | | | ADT | SEC ACT CHECK TERMINATE | X |
| 020 | SEC ACT POS ENA 20 | V93X3979X | 0.0 | CTRL | | | 20 | | | | ADT,CRT | POS STIM ENA IND | X |
| 021 | SEC ACT 21 BYPASS | V93J3973C | 3.0 | DEC | | | 21 | | | | ADT,CRT | SEC ACT BYPASS IND | X |
| 022 | SEC ACT 22 RESET | V93J3974C | 3.0 | DEC | | | 22 | | | | ADT,CRT | SEC ACT RESET IND | X |

## TABLE 4.5.1-2. FCS/DED DIS C/O (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | | | |
| 001 | (OPS) | V93X0040X | 2 | 1 | | 5.0 | | | CHAR | | | | | | | E | | | | | | UI | OPS FUNCTION PAGE | X |
| 002 | (SPEC) | V93X0042X | 7 | 1 | | 4.0 | | | CHAR | | | | | | | E | | | | | | UI | SPEC FUNCTION PAGE | X |
| 003 | (DISP) | V93X0044X | 10 | 1 | | 4.0 | | | DEC | | | | | | | E | | | | | | UI | DISPLAY FUNCTION PAGE | X |
| 004 | (UL) | V92X5032X | 34 | 1 | | 2.0 | UL | | BLVL | | | | | | X | G | | | | | | UI | UPLINK ACTIVITY IND | X |
| 005 | (GPC) | V93X0048X | 36 | 1 | | 2.0 | | | DEC | | | | | | | E | | | | | | UI | GPC DRIVER | X |
| 006 | (MT) | V91W1990C | 39 | 1 | | 12.0 | | | CHAR | DHMS | | | | | | A | | | | | | FCOS | MISSION ELAPSED TIME | X |
| 007 | (CRT TIMER) | V91W1987C | 39 | 2 | | 12.0 | | | CHAR | DHMS | | | | | | A | | | | | | FCOS | DISPLAY CRT TIMER,GNC | X |
| 008* | DED DISP FWD 1 | V99X4233X | 7 | 5 | | 1.0 | * | | BLVL | | | | | | | | | | | | | DDC | DED DISP CKOUT FWD SELECT IND | X |
| 009* | DED DISP AFT 2 | V99X4234X | 7 | 6 | | 1.0 | * | | BLVL | | | | | | | | | | | | | DDC | DED DISP CKOUT AFT SELECT IND | X |
| 010 | DED DISP HIGH 3 | V99X4230X | 16 | 5 | | 1.0 | * | | BLVL | | | | | | | | | | | | | DDC | DED DISP CKOUT HI ON IND | X |
| 011 | DED DISP LOW 4 | V99X4231X | 16 | 6 | | 1.0 | * | | BLVL | | | | | | | | | | | | | DDC | DED DISP CKOUT LO ON IND | X |
| 012 | DED DISP FLAG 5 | V99X4232X | 16 | 7 | | 1.0 | * | | BLVL | | | | | | | | | | | | | DDC | DED DISP CKOUT FLAG ON IND | X |
| 013 | DED DISP OFF 6 | V99X4235X | 16 | 8 | | 1.0 | * | | BLVL | | | | | | | | | | | | | DDC | DED DISP CKOUT OFF IND | X |
| 014 | MODE LT ON 7 | V99X4336X | 27 | 5 | | 1.0 | * | | BLVL | | | | | | | | | | | | | M LT | MODE/SEQ LTS TEST ENA INDICATOR | X |
| 015 | MODE LT OFF 8 | V99X4337X | 27 | 6 | | 1.0 | * | | BLVL | | | | | | | | | | | | | M LT | MODE/SEQ LTS TEST INH INDICATOR | X |
| 016 | AVG G ON 9 | V90X1289X | 49 | 4 | | 1.0 | * | | BLVL | | | | | | | | | | | | | ORB/RNDZ NAV | PWR FLT NAV AVG G ON/OFF IND | X |
| 017 | SURF DR START 10 | V99X4338X | 39 | 9 | | 1.0 | * | | BLVL | | | | | | | | | | | | | ADT | AEROSURFACE DRIVE TEST START IND | X |
| 018 | SURF DR STOP 11 | V99X4339X | 49 | 9 | | 1.0 | * | | BLVL | | | | | | | | | | | | | ADT | AEROSURFACE DRIVE TEST STOP IND | X |
| 019 | BDY FLP VLV 1 | V57K0300X | 8 | 11 | | 3.0 | ENA | INH | BLVL | | | | | | | | | | | | | HDWR | BODY FLAP ENABLE CMD 1 | X |
| 020 | BDY FLP VLV 2 | V57K0400X | 8 | 12 | | 3.0 | ENA | INH | BLVL | | | | | | | | | | | | | HDWR | BODY FLAP ENABLE CMD 2 | X |
| 021 | BDY FLP VLV 3 | V57K0500X | 8 | 13 | | 3.0 | ENA | INH | BLVL | | | | | | | | | | | | | HDWR | BODY FLAP ENABLE CMD 3 | X |
| 022 | BODY FLP VLV1 DES12 | V93X3978X | 14 | 11 | | 1.0 | * | | BLVL | | | | | | | | | | | | | KYBD | BF VALVE 1 DES CMD | X |

TABLE 4.5.1-2. FCS/DED DIS C/O (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | | | |
| 023 | BODY FLP VLV2 DES13 | V93X3983X | 14 | 12 | | 1.0 | * | | BLVL | | | | | | | | | | | | | KYBD | BF VALVE 2 DES CMD | X |
| 024 | BODY FLP VLV3 DES14 | V93X3987X | 14 | 13 | | 1.0 | * | | BLVL | | | | | | | | | | | | | KYBD | BF VALVE 3 DES CMD | X |
| 025 | SEC ACT CK CH 1 15 | V99X4401X | 10 | 16 | | 1.0 | * | | BLVL | | | | | | | | | | | | | ADT | CH 1 SEC ACT ITEM ENTRY IND | X |
| 026 | SEC ACT CK CH 2 16 | V99X4402X | 10 | 17 | | 1.0 | * | | BLVL | | | | | | | | | | | | | ADT | CH 2 SEC ACT ITEM ENTRY IND | X |
| 027 | SEC ACT CK CH 3 17 | V99X4403X | 10 | 18 | | 1.0 | * | | BLVL | | | | | | | | | | | | | ADT | CH 3 SEC ACT ITEM ENTRY IND | X |
| 028 | SEC ACT CK CH 4 18 | V99X4404X | 10 | 19 | | 1.0 | * | | BLVL | | | | | | | | | | | | | ADT | CH 4 SEC ACT ITEM ENTRY IND | X |
| 029 | SEC ACT CK STOP 19 | V99X4405X | 10 | 20 | | 1.0 | * | | BLVL | | | | | | | | | | | | | ADT | SEC ACT TERM ITEM ENTRY IND | X |
| 030 | SEC ACT POS ENA 20 | V93X3979X | 10 | 22 | | 1.0 | * | | BLVL | | | | | | | | | | | | | KYBD | POS STIM ENA IND | X |
| 031 | SEC ACT 21 BYPASS | V93J3973C | 47 | 22 | | 3.0 | | | DEC | | | | | | | | | | | | D | KYBD | SEC ACT BYPASS IND | X |
| 032 | SEC ACT 22 RESET | V93J3974C | 47 | 23 | | 3.0 | | | DEC | | | | | | | | | | | | E | KYBD | SEC ACT RESET IND | X |
| 033 | ELEV L OB CMD | V99U4351C | 29 | 13 | | 5.1 | | | DEC | DEG | | | | | | | U | | | | B C | ADT | LOE DRIVE CMD STIMULUS | X |
| 034 | ELEV L IB CMD | V99U4350C | 29 | 14 | | 5.1 | | | DEC | DEG | | | | | | | U | | | | B C | ADT | LIE DRIVE CMD STIMULUS | X |
| 035 | ELEV R IB CMD | V99U4352C | 29 | 15 | | 5.1 | | | DEC | DEG | | | | | | | U | | | | B C | ADT | RIE DRIVE CMD STIMULUS | X |
| 036 | ELEV R OB CMD | V99U4353C | 29 | 16 | | 5.1 | | | DEC | DEG | | | | | | | U | | | | B C | ADT | ROE DRIVE CMD STIMULUS | X |
| 037 | RUD CMD | V99U4354C | 29 | 17 | | 5.1 | | | DEC | DEG | | | | | | | U | | | | B C | ADT | RUD DRIVE CMD STIMULUS | X |
| 038 | SPD BRK CMD | V99U4355C | 28 | 18 | | 6.1 | | | DEC | PCT | | | | | | | | | | | | ADT | SPDBRK DRIVE CMD STIMULUS | X |
| 039 | BDY FLP CMD | V99X4360X | 32 | 19 | | 2.0 | UP | | BLVL | | | | | | | | | | | | | ADT | BF UP CMD STIMULUS | X |
| 040 | BDY FLP CMD | V99X4361X | 32 | 19 | | 2.0 | DN | | BLVL | | | | | | | | | | | | | ADT | BF DN CMD STIMULUS | X |
| 041 | ELEV L OB POS | V99U4371C | 36 | 13 | | 5.1 | | | DEC | DEG | | | | | | | U | | | | A C | ADT | LOE POSN FDBK SELECTED VALUE | X |
| 042 | ELEV L IB POS | V99U4370C | 36 | 14 | | 5.1 | | | DEC | DEG | | | | | | | U | | | | A C | ADT | LIE POSN FDBK SELECTED VALUE | X |
| 043 | ELEV R IB POS | V99U4372C | 36 | 15 | | 5.1 | | | DEC | DEG | | | | | | | U | | | | A C | ADT | RIE POSN FDBK SELECTED VALUE | X |
| 044 | ELEV R OB POS | V99U4373C | 36 | 16 | | 5.1 | | | DEC | DEG | | | | | | | U | | | | A C | ADT | ROE POSN FDBK SELECTED VALUE | X |
| 045 | RUD POS | V99U4363C | 36 | 17 | | 5.1 | | | DEC | DEG | | | | | | | U | | | | A C | ADT | RUD POSN FDBK SELECTED VALUE | X |

## TABLE 4.5.1-2. FCS/DED DIS C/O (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | BILEVEL | | | | | | | | | | | | | | | | | |
| | | | X | Y | | CHAR | 1 | 0 | TYPE | | | | | | | | | | | | | | | |
| 046 | SPD BRK POS | V99U4364C | 35 | 18 | | 6.1 | | | DEC | PCT | | | | | | | | | | | A C | ADT | SPDBRK POSN FDBK SELECTED VALUE | X |
| 047 | BDY FLP POS | V99U4362C | 35 | 19 | | 6.1 | | | DEC | PCT | | | | | | | | | | | A | ADT | BF POSN FDBK SELECTED VALUE | X |
| 048 | ELEV L OB POS (S) | V99X4406X | 41 | 13 | | 1.0 | | | STAT | | | | | | | | | | | | 3 | ADT | LOB ELEV PSI | X |
| 049 | ELEV L IB POS (S) | V99X4407X | 41 | 14 | | 1.0 | | | STAT | | | | | | | | | | | | 3 | ADT | LIB ELEV PSI | X |
| 050 | ELEV R IB POS (S) | V99X4408X | 41 | 15 | | 1.0 | | | STAT | | | | | | | | | | | | 3 | ADT | RIB ELEV PSI | X |
| 051 | ELEV R OB POS (S) | V99X4409X | 41 | 16 | | 1.0 | | | STAT | | | | | | | | | | | | 3 | ADT | ROB ELEV PSI | X |
| 052 | RUD POS (S) | V99X4410X | 41 | 17 | | 1.0 | | | STAT | | | | | | | | | | | | 3 | ADT | RUD ELEV PSI | X |
| 053 | SPD BRK POS (S) | V99X4411X | 41 | 18 | | 1.0 | | | STAT | | | | | | | | | | | | 3 | ADT | SPDBRK PSI | X |
| 054 | ELEV L OB (1) (S) | V79X3265X | 43 | 13 | | 1.0 | | | STAT | | | | | | | | | | | | | ADT | L OTBOARD ELEVON ACTR 1 FAIL | X |
| 055 | ELEV L OB (2) (S) | V79X3266X | 45 | 13 | | 1.0 | | | STAT | | | | | | | | | | | | | ADT | L OTBOARD ELEVON ACTR 2 FAIL | X |
| 056 | ELEV L OB (3) (S) | V79X3267X | 47 | 13 | | 1.0 | | | STAT | | | | | | | | | | | | | ADT | L OTBOARD ELEVON ACTR 3 FAIL | X |
| 057 | ELEV L OB (4) (S) | V79X3268X | 49 | 13 | | 1.0 | | | STAT | | | | | | | | | | | | | ADT | L OTBOARD ELEVON ACTR 4 FAIL | X |
| 058 | ELEV L IB (1) (S) | V79X3260X | 43 | 14 | | 1.0 | | | STAT | | | | | | | | | | | | | ADT | L INBOARD ELEVON ACTR 1 FAIL | X |
| 059 | ELEV L IB (2) (S) | V79X3261X | 45 | 14 | | 1.0 | | | STAT | | | | | | | | | | | | | ADT | L INBOARD ELEVON ACTR 2 FAIL | X |
| 060 | ELEV L IB (3) (S) | V79X3262X | 47 | 14 | | 1.0 | | | STAT | | | | | | | | | | | | | ADT | L INBOARD ELEVON ACTR 3 FAIL | X |
| 061 | ELEV L IB (4) (S) | V79X3263X | 49 | 14 | | 1.0 | | | STAT | | | | | | | | | | | | | ADT | L INBOARD ELEVON ACTR 4 FAIL | X |
| 062 | ELEV R IB (1) (S) | V79X3270X | 43 | 15 | | 1.0 | | | STAT | | | | | | | | | | | | | ADT | R INBOARD ELEVON ACTR 1 FAIL | X |
| 063 | ELEV R IB (2) (S) | V79X3271X | 45 | 15 | | 1.0 | | | STAT | | | | | | | | | | | | | ADT | R INBOARD ELEVON ACTR 2 FAIL | X |
| 064 | ELEV R IB (3) (S) | V79X3272X | 47 | 15 | | 1.0 | | | STAT | | | | | | | | | | | | | ADT | R INBOARD ELEVON ACTR 3 FAIL | X |

TABLE 4.5.1-2. FCS/DED DIS C/O (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | BILEVEL | | | | | | | | | | | | | | | | | |
| | | | X | Y | | CHAR | 1 | 0 | TYPE | | | | | | | | | | | | | | | |
| 065 | ELEV R IB (4) (S) | V79X3273X | 49 | 15 | | 1.0 | | | STAT | | | | | | | | | | | | | ADT | R INBOARD ELEVON ACTR 4 FAIL | X |
| 066 | ELEV R OB (1) (S) | V79X3275X | 43 | 16 | | 1.0 | | | STAT | | | | | | | | | | | | | ADT | R OTBOARD ELEVON ACTR 1 FAIL | X |
| 067 | ELEV R OB (2) (S) | V79X3276X | 45 | 16 | | 1.0 | | | STAT | | | | | | | | | | | | | ADT | R OTBOARD ELEVON ACTR 2 FAIL | X |
| 068 | ELEV R OB (3) (S) | V79X3277X | 47 | 16 | | 1.0 | | | STAT | | | | | | | | | | | | | ADT | R OTBOARD ELEVON ACTR 3 FAIL | X |
| 069 | ELEV R OB (4) (S) | V79X3278X | 49 | 16 | | 1.0 | | | STAT | | | | | | | | | | | | | ADT | R OTBOARD ELEVON ACTR 4 FAIL | X |
| 070 | RUDDER (1) (S) | V79X3331X | 43 | 17 | | 1.0 | | | STAT | | | | | | | | | | | | | ADT | RUDDER ACTR 1 FAIL OUTPUT | X |
| 071 | RUDDER (2) (S) | V79X3332X | 45 | 17 | | 1.0 | | | STAT | | | | | | | | | | | | | ADT | RUDDER ACTR 2 FAIL OUTPUT | X |
| 072 | RUDDER (3) (S) | V79X3333X | 47 | 17 | | 1.0 | | | STAT | | | | | | | | | | | | | ADT | RUDDER ACTR 3 FAIL OUTPUT | X |
| 073 | RUDDER (4) (S) | V79X3334X | 49 | 17 | | 1.0 | | | STAT | | | | | | | | | | | | | ADT | RUDDER ACTR 4 FAIL OUTPUT | X |
| 074 | SPDBRK (1) (S) | V79X3336X | 43 | 18 | | 1.0 | | | STAT | | | | | | | | | | | | | ADT | SPEED BRAKE ACTR 1 FAIL | X |
| 075 | SPDBRK (2) (S) | V79X3337X | 45 | 18 | | 1.0 | | | STAT | | | | | | | | | | | | | ADT | SPEED BRAKE ACTR 2 FAIL | X |
| 076 | SPDBRK (3) (S) | V79X3338X | 47 | 18 | | 1.0 | | | STAT | | | | | | | | | | | | | ADT | SPEED BRAKE ACTR 3 FAIL | X |
| 077 | SPDBRK (4) (S) | V79X3339X | 49 | 18 | | 1.0 | | | STAT | | | | | | | | | | | | | ADT | SPEED BRAKE ACTR 4 FAIL | X |
| 078 | (MSG LINE) | V93X0050X | 1 | 25 | | 44.0 | | | CHAR | | | | | | | G | | | | | | UI | MESSAGE LINE | X |
| 079 | (BUFFER MSG) | V93X0054X | 45 | 25 | | 4.0 | | | CHAR | | | | | | | G | | | | | | UI | BUFFER MESSAGE INDICATOR | X |
| 080 | (SPL) | V93X0056X | 2 | 26 | | 49.0 | | | CHAR | | | | | | | G | | | | | | UI | SCRATCH PAD LINE | X |

TABLE 4.5.1-5. INPUT FUNCTIONAL PARAMETERS FOR FCS/DED DISP C/O DISPLAY (V5.1.10)

| FSSR NAME | M/S ID | NOMENCLATURE | SOURCE | UNITS | DATA TYPE | PREC | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|
| (CRT_TIME) | V91W1987C | DISPLAY CRT TIMER,GNC | FCOS | | SPL | | 93090E | |
| (DISP) | V93X0044X | DISPLAY FUNCTION PAGE | UI | | BD | | 93090E | |
| (GPC) | V93X0048X | GPC DRIVER | UI | | BD | | 93090E | |
| (LINE) | V93X0050X | MESSAGE LINE | UI | | BD | | 93090E | |
| (MSG) | V93X0054X | BUFFER MESSAGE INDICATOR | UI | | BD | | 93090E | |
| (MT) | V91W1990C | DISPLAY MSN TIME | FCOS | S | VAR | | 93090E | |
| (OPS) | V93X0040X | OPS FUNCTION PAGE | UI | | BD | | 93090E | |
| (SPEC) | V93X0042X | SPEC FUNCTION PAGE | UI | | BD | | 93090E | |
| (SPL) | V93X0056X | SCRATCH PAD LINE | UI | | BD | | 93090E | |
| (UL) | V92X5032X | UPLINK ACTIVITY IND | UI | | BD | | 93090E | |
| BF_VLV_1_SEL | V93X3978X | BF VALVE 1 DES CMD | FCS/DED DISP | | BD | | 93017G | * |
| BF_VLV_2_SEL | V93X3983X | BF VALVE 2 DES CMD | FCS/DED DISP | | BD | | 93017G | * |
| BF_VLV_3_SEL | V93X3987X | BF VALVE 3 DES CMD | FCS/DED DISP | | BD | | 93017G | * |
| DOING_PWRD_FLT_NAV | V90X1289X | PWR FLT NAV AVG G ON/OFF IND | ORB/RND NAV SEQ | | BD | | 93017G | * |
| | V93J3973CB | SEC ACT BYPASS ITEM ENTRY | FCS/DED DISP | | | | | |
| | V93J3974CB | SEC ACT RESET ITEM ENTRY | FCS/DED DISP | | | | | |
| | V93X3979XB | NEG STIM ENA ITEM ENTRY | FCS/DED DISP | | | | | |
| | V93X3993X | ILLEGAL ENTRY MSG(VU FCS/DED DISCO | UI | | | | | |

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE 4.5.1-6. OUTPUT FUNCTIONAL PARAMETERS FROM FCS/DED DISP C/O DISPLAY (V5.1.10)

| FSSR NAME | M/S ID | NOMENCLATURE | DESTINATION | UNITS | DATA TYPE | PREC | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|
| BF_VLV_1_SEL | V93X3978X | BF VALVE 1 DES CMD | BF CMD RM<br>DL FMT 32/A<br>FCS/DED DISP | | BD | | 93017G | * |
| BF_VLV_2_SEL | V93X3983X | BF VALVE 2 DES CMD | BF CMD RM<br>DL FMT 32/A<br>FCS/DED DISP | | BD | | 93017G | * |
| BF_VLV_3_SEL | V93X3987X | BF VALVE 3 DES CMD | BF CMD RM<br>DL FMT 32/A<br>FCS/DED DISP | | BD | | 93017G | * |
| PWRD_FLT_NAV | V93X5408XB | PWR FLT NAV AVG G ON/OFF CMD | ORB UPP<br>ORB/RND NAV | | | | | |
| | V93J3973CB | SEC ACT BYPASS ITEM ENTRY | FCS/DED DISP | | | | | |
| | V93J3974CB | SEC ACT RESET ITEM ENTRY | FCS/DED DISP | | | | | |
| | V93M0507P | CVYB_DISP_ITEM_ASTERISK | DL FMT 32/A | | | | 93017G | * |
| | V93X3979XB | NEG STIM ENA ITEM ENTRY | FCS/DED DISP | | | | | |

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

**Rate Codes: (HDR Only) 1 = 1 sample/sec 2 = 5 samples/sec 3 = 12.5 samples/sec 4 = 25 samples/sec 5 = 100 samples/sec**
**(HDR and LDR) A = 1 sample/sec B = 5 samples/sec C = 12.5 samples/sec D = 25 samples/sec E = 100 samples/sec**

TABLE 4.5.1-7. FCS/DED DISP C/O DISPLAY (V5.1.10) I-LOADS

| FSSR NAME | MSID | ENG UNITS | DT | PR | D | S | PR FCTN | MC | CAT | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|---|---|---|

NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE 4.5.1-8. FCS/DED DISP C/O DISPLAY (V5.1.10) K-LOADS

| FSSR NAME DESCRIPTION | MSID | MC | KLOAD VALUE | ENG UNITS | DT | P R | S | PR FCTN | LAST CR | R E V |
|---|---|---|---|---|---|---|---|---|---|---|

NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

## TABLE 4.5.1-9. FCS/DED DISP C/O DISPLAY (V5.1.10) CONSTANTS

| FSSR NAME DESCRIPTION | MSID | MC | CONSTANT VALUE | ENG UNITS | DT | P R | S | PR FCTN | LAST CR | R E V |
|---|---|---|---|---|---|---|---|---|---|---|
| NO REQUIREMENTS | | | | | | | | | | |

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

### 4.5.2 RM CONTROLLERS (PFS)

TITLE: CONTROLLERS
TYPE: SPEC/043
AVAILABILITY: GN&C OPS 8

#### 4.5.2.1 Purpose, Operation, and Organization

(1) CONTROLLERS

This display provides the crew with means to monitor and control the selection filters for all rotation and translation hand controllers (RHC's and THC's), both panel and RHC trim switches, speed brake and rudder pedal controllers, and body flap slew switches. Figure 4.5.2–1 is the RM Controllers Display (PFS). Specific item numbers in the DES column provide the crew with manual control of the RM selection filters. Candidate crew inputs to the CRT display are made on a line string basis; that is, a single transducer parameter string or a single trim switch contact string. An asterisk (*) or blank is driven adjacent to the appropriate DES item number to indicate that the sensor is deselected or selected. In the case of the triply redundant controllers, the asterisk (*) is driven to the appropriate state to indicate either manual or automatic RM selection filter reconfigurations. For the doubly redundant trim switches, the asterisk (*) is driven to the appropriate state only by manual control.

The philosophy for controller redundancy management (RM) is that majority agreement of the filter candidates is required for the selection filter output. For the doubly redundant panel and RHC trim switches, the RM philosophy is to alert the crew whenever any miscompare is detected. It is then the crew's responsibility to select an alternate controller or deselect a switch contact. If the crew decides to deselect one switch contact, then the switch can be fully utilized, but at the sacrifice of only one "good contact" for each function. The RM Controllers display is divided into three parts. The left–hand side of the CRT display contains the necessary data to monitor and perform the RM function for the forward and aft THC's, for the left–hand (LH) and right–hand (RH) speed brake (SPD BK) controllers, and for the LH and RH rudder pedal transducer assemblies (RUD PED). The central section of the display contains the necessary data to monitor and perform the RM function for the body–flap (BDY FLP) switch contact outputs from body–flap position up and down (UP and DN). The right–hand side of the CRT display contains the necessary data to monitor and perform the RM function for the three RHC's; for the roll, pitch, and yaw trim switches mounted on panels L2 and C3; and for the left–hand and right–hand RHC roll and pitch trim switches.

(2) THC

The triply redundant transducer data for each THC are displayed under the headings TX, TY, and TZ corresponding to the commanded translations. A (+) or a (–) character will be displayed indicating the sensed THC command. A blank indicates no sensed THC command for the transducer. When any data component has been isolated by RM as failed, a down arrow (↓) will be displayed next to the failed parameter.

Because of the physical orientation (rotated 90°clockwise from original planned installation), the AFT THC causes crew commands to be displayed as follows:

| | CONTROLLER AXIS (CRT DISPLAY) | | |
|---|---|---|---|
| AFT THC COMMANDS | TX | TY | TZ |
| PUSH | + | | |
| PULL | - | | |
| DOWN | | + | |
| UP | | - | |
| STBD | | | + |
| PORT | | | - |

Software transformations assure that crew commands are correctly input to the flight control system; only data displayed on the CRT display are affected.

(3) SPD BK

The triply redundant transducer data for each speed brake controller are displayed without any column headings. The displayed data represent the sensed controller commands scaled in percent (0 to 99).

(4) RUD PED

The triply redundant transducer data for each rudder pedal assembly are displayed without column headings. The displayed data show the sensed pedal deflections in percent (0 to 99) for left and right commands.

(5) BDY FLP

Closure of the contacts for up and down of the left and right body flap slew switches is shown by asterisks(*'s) in the appropriate columns.

(6) RHC

The triply redundant transducer data for three RHC's are displayed under the headings R, P, and Y, corresponding to the roll, pitch, and yaw rotational commands. The displayed data represent the sensed controller commands scaled in percent (0 to 99) and the direction (U, D, L, or R). When any RHC component has been isolated by RM as failed, the down arrow (↓) is displayed along side all the roll, pitch and yaw parameters for the affected RHC LRU and an asterisk (*) is displayed next to the appropriate DES item.

(7) RHC TRIM

The doubly redundant switch contact data for the two forward RHC roll and pitch trim switches and the L2 and C3 panel roll, pitch, and yaw trim switches are displayed. For the roll and yaw columns, a (R) or (L) character will be displayed, corresponding to a sensed trim right or left command. For the pitch column, a (U) or (D) character will be displayed, corresponding to a sensed trim up or down command. A blank indicates no sensed trim command for the switch contact.

A status discrete is driven with each of the displayed quantities. An (M) is displayed in the status position to indicate missing data. A down arrow (↓) or a question mark (?) may also appear in this location alongside any data component (triply redundant transducer signal) that has been isolated by RM as being failed or in a dilemma. Failure of any RHC data component causes RM to throw out an entire line replaceable unit (LRU), and this action is reflected by an asterisk (*) in the deselect (DES) column. Failure of any THC data component causes this parameter not to be used in the selection filter and a down arrow (↓) is displayed by the failed component. THC deselection is performed only manually and if a THC is deselected down arrows (↓'s) are displayed by all components. RM is not performed in OPS 8 for the doubly redundant data. The data is provided to allow the crew to detect miscompares.

### 4.5.2.2 RM CONTROLLERS (PFS) Keyboard Processing Addendum

A. In addition to the GN&C SW RM (4.180) and the CRT (V5.1.6), the THC OUTPUT DES commands go to GAX (4.110), RM ORBIT (6.45) and RM ORBIT SPEC (5.19). Likewise, the RHC DES commands go to the GAX (4.110), RM ORBIT (6.45) and RM ORBIT SPEC (5.19) as well as to the CRT (V5.1.6) and the RHC FDIR (4.87).

B. The SPDBK DES commands go to the GAX (4.110), SBTC FDIR (4.88), and the CRT (V5.1.6).

### 4.5.2.3 RM CONTROLLERS (PFS) CRT Display Processing Addendum

The Table below presents the stand–alone parameter status indicators (PSI) that can be displayed for a parameter. PSI requirements are identified by the word "STAT" being inserted in the FORMAT TYPE column and a numeric code appearing as an entry (right justified) in the ADD REF column of CRT display processing Table 4.5.2–2. The numeric code, corresponding to one of those listed in the table, indicates the specific status processing to be performed. If there is no numeric code entry, the status processing is defined by the default code.

When the "M" PSI is displayed (for Commfault, I/O error resulting in missing data), the associated parameter value data field shall be blanked unless specified otherwise.

| Numeric Code | PSI SYMBOL(S) | | | | |
|---|---|---|---|---|---|
| Default (blank) | ↓ | | | M | ∅ |
| 1 | ↓ | ↑ | | M | ∅ |
| 2 | | ↑ | | M | ∅ |
| 3 | ↓ | | | | ∅ |
| 4 | | ↑ | | | ∅ |
| 5 | ↓ | | ? | | ∅ |
| 6 | ↓ | ↑ | | | ∅ |
| 7 | | | | M | ∅ |
| 8 | ↓ | | ? | M | ∅ |
| 9 | | | ? | M | ∅ |

∅ = blank

The following alpha code(s) appear (left justified) in the ADD REF column of Table 4.5.2–2 whenever it is necessary to define any special processing requirements not otherwise covered therein:

A. In the displays for rudder pedal, RHC roll, and RHC yaw deflections, the signs are replaced with letters indicating direction. Negative sign is replaced with L, representing “left”; positive sign is replaced with R, representing “right”.

B. In the RHC pitch displays the signs are replaced with letters indicating direction. Negative sign is replaced with D, representing “down”; positive sign is replaced with U, representing “up”.

C. Aerodynamic and Reaction Devices–Controllers and Effectors–Directional Conventions

Rotation Hand controllers (RHC). The directional signals from the RHC are described in terms of the orientation of the RHC itself–or rather the orientation of the crew member operating the RHC. At the forward stations the orientation is obvious; at the aft crew station the orientation is with respect to the controller and not the vehicle.

Pulling back on the RHC produces a positive (+) pitch signal which is sometimes described as an “up” (U) pitch signal. Pushing forward produces a negative (–) or “down” (D) pitch signal.

Moving the RHC to the right produces a positive (+) roll signal which is sometimes described as a “right” (R) roll signal. Moving the RHC left produces negative (–) or “left” (L) roll signal.

Twisting the handle of the RHC clockwise about its own axis produces a positive (+) yaw signal which is sometimes described as a “right” (R) yaw signal. Twisting the handle counter–clockwise produces a negative (–) or “left” (+) yaw signal.

Rudder Pedal Transducer Assemblies (RPTA). Operating the RPTA is described in terms of the right pedal and the left pedal. This description refers to the right or left pedal of the entire assembly at each crew station; it does not refer to the location of the assembly.

Pushing forward on the right pedal produces a positive (+) or right (R) yaw signal. Pushing forward on the left pedal produces a negative (–) or left (L) yaw signal.

Translation Hand Controllers (THC). As with the RHC, the directional signals from the THC are described in terms of the orientation of the THC itself.

Pushing forward on the THC produces a positive (+) signal in the TX axis. Pulling backward on the THC produces a negative (–) signal in the TX axis. Pushing the THC to the right produces a positive (+) signal in the TY axis. Pushing the THC to the left produces a negative (–) signal in the TY axis. Pushing the THC down produces a positive (+) signal in the TZ axis. Pulling the THC up produces a negative (–) signal in the TZ axis.

Reaction Jets. Reaction jets are identified by three characters: a letter which identifies the general location, a one–digit identifying number for jets at that location firing in a specific direction, and a letter which identifies the exhaust direction.

General Location (First Character)

| | |
|---|---|
| F | Forward |
| L | Left (aft) |
| R | Right (aft) |

Firing Direction (Third Character)

| | |
|---|---|
| F | Jet fires forward (vehicle accelerates backward) |
| A | Jet fires aft (vehicle accelerates forward) |
| U | Jet fires up (vehicle accelerates downward) |
| D | Jet fires down (vehicle accelerates upward) |
| L | Jet fires to left (vehicle accelerates to right) |
| R | Jet fires to right (vehicle accelerates to left) |

Aerosurfaces. When the RHC or RPTA is being used to control the aerosurfaces, control is effected by electrical signals from the controllers mediated by the computers and fed through electrical servomechanisms. Surface position feedback transducers then produce electrical signals that also are fed to the servos. The servos continue to drive the aerosurfaces until the sums of the signals reaching each servo are zero. With regard to pitch and yaw, this means/that the feedback transducers must produce signals opposite in polarity to the signals from the RHC and RPTA. Roll is effected by the computers sending signals of opposite polarity to the servos for the elevons on opposite sides of the vehicle.

Elevons. When the trailing edge of an elevon (any one of the four) is up, the signal from the feedback transducer is negative (–) and the position is represented on CRT displays as U by multiplying by a scale factor of –1. When the trailing edge of an elevon is down, the signal from the feedback transducer is positive (+) and the position is represented on CRT displays as D by multiplying by a scale factor of –1.

Rudder. When the trailing edge of the rudder is to the right, the signal from the feedback transducer is negative (–) and the position is represented in CRT displays as R by multiplying by a scale factor of –1. When the trailing edge of the rudder is to the left, the signal from the feedback transducer is positive (+) and the position is represented on CRT displays as L by multiplying by a scale factor of –1.

Ailerons. The aileron function for roll control is provided by using differential elevon. When the aileron position is such that the right elevons are positioned with their trailing edges up (negative feedback signals) and the left elevons are positioned with their trailing edges down (positive feedback signals), the aileron position causes right roll and is represented on displays as R by multiplying by a scale factor of –1. When the right elevons have their trailing edges down (positive feedback signals) and the left elevons have their trailing edges up (negative feedback signals), the aileron position is represented as L by multiplying by a scale factor of –1 and causes left roll.

D. THC Deselect Status

For each THC unit, the deselect signal is set or reset only by crew entry. If it is reset an asterisk(*) is displayed after the DES item number.

If the THC unit is deselected by item entry, in addition to driving an asterisk (*) after the item number, a down arrow (↓) is displayed in the TX, TY and TZ status columns. These status signals are generated in the RM ORBIT SPEC (5.19).

If a component(s) of a THC is (are) failed by RM GN&C SW RM (4.150), it may be reset by deselecting and then reselecting the THC unit (i.e., two item entries to reset the component fail status).

E. RHC Deselect Status

For each RHC unit, the deselect command for driving the asterisk (*) after the DES item number can be reset (i.e., (0) state of the signal) by either crew execution of the deselect item number or when RM RHC FDIR (4.87) declares a failed unit.

When the RHC unit is deselected, in addition to driving an asterisk(*) after the item number, a down arrow (↓) is displayed in the R, P and Y status columns. When deselection has occurred, the crew can reselect by executing the deselect item number. This removes the asterisk (*) after the deselect item number, removes the down arrow (↓) and returns the unit to the selection filter processing which resets the fail status bit, until a component is again declared failed by the status word or the crew deselects again.

F. Deselect Sources

All of the THC and RHC deselect commands may be initialized from the RM ORBIT DISPLAY (G6.45).

### 4.5.2.4 RM CONTROLLERS Figure/Table References

Figure 4.5.2–1 RM Controllers Display (PFS)

Table 4.5.2–1 Keyboard Processing Table

Table 4.5.2–2 CRT Display Processing Table

Table 4.5.2–3 CRT Display Processing Background Requirements N/A

Table 4.5.2–4 Mission Design Background Constants N/A

Table 4.5.2–5 Input Functional Parameters

Table 4.5.2–6 Output Functional Parameters

Table 4.5.2–7 I–Loads

Table 4.5.2–8 K–Loads

Table 4.5.2–9 Constants

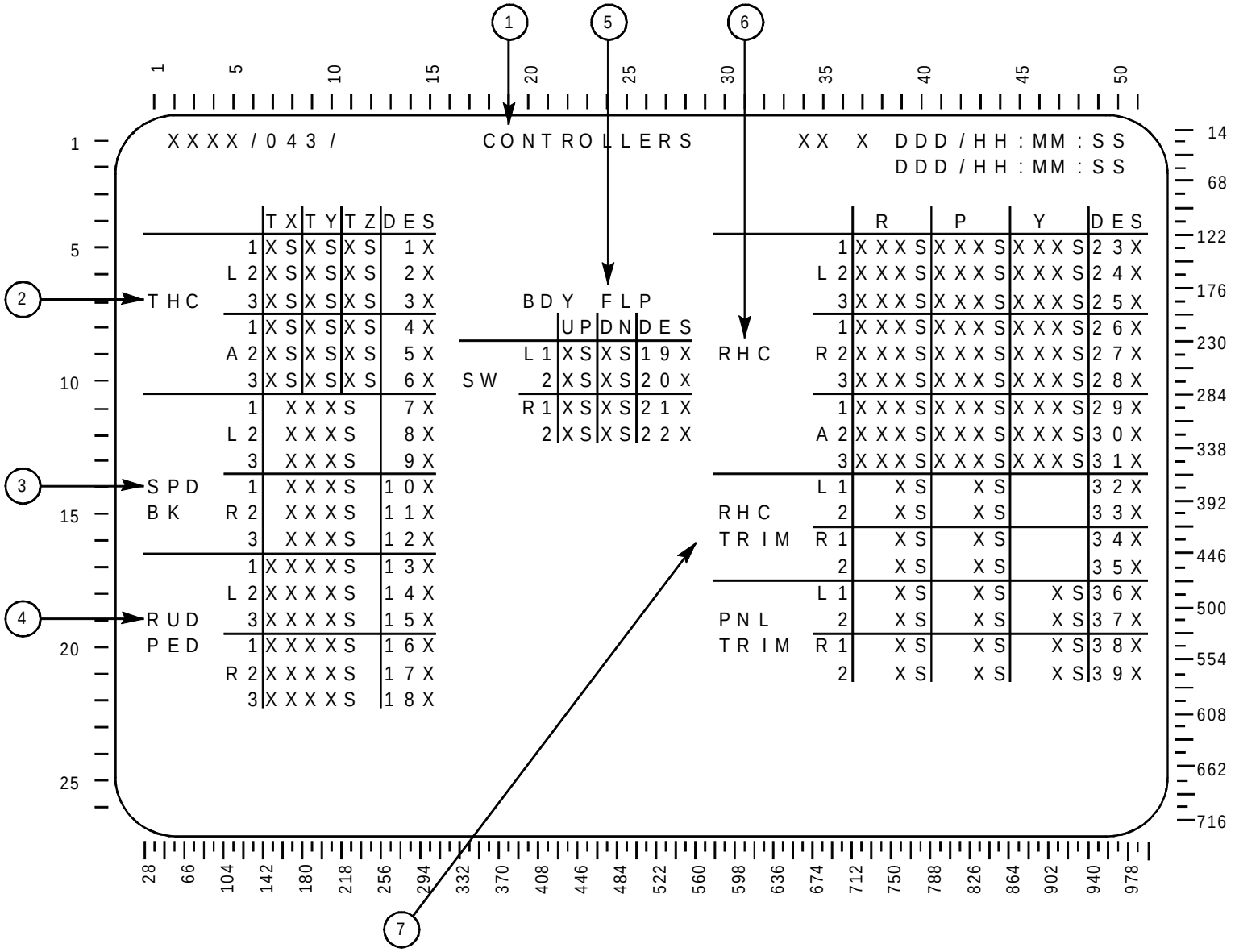


FIGURE 4.5.2-1. RM Controllers Display (PFS)

TABLE 4.5.2-1. RM CONTROLLERS (PFS) KEYBOARD PROCESSING

| Seq | CRT Signal Name | M/S ID | CHAR | TYPE | UNITS | DK | ITEM | Item No. Limits | | Add Ref | Destination | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | MIN | MAX | | | | |
| 001 | THC L1 DES 1 | V93X4207X | 0.0 | CTRL | | | 1 | | | A | SW PROC,CRT | FWD THC X,Y,Z OUT DES A | X |
| 002 | THC L2 DES 2 | V93X4208X | 0.0 | CTRL | | | 2 | | | A | SW PROC,CRT | FWD THC X,Y,Z OUT DES B | X |
| 003 | THC L3 DES 3 | V93X4209X | 0.0 | CTRL | | | 3 | | | A | SW PROC,CRT | FWD THC X,Y,Z OUT DES C | X |
| 004 | THC A1 DES 4 | V93X4237X | 0.0 | CTRL | | | 4 | | | A | SW PROC,CRT | AFT THC X,Y,Z OUT DES A | X |
| 005 | THC A2 DES 5 | V93X4238X | 0.0 | CTRL | | | 5 | | | A | SW PROC,CRT | AFT THC X,Y,Z OUT DES B | X |
| 006 | THC A3 DES 6 | V93X4239X | 0.0 | CTRL | | | 6 | | | A | SW PROC,CRT | AFT THC X,Y,Z OUT DES C | X |
| 007 | SPD BK L1 DES 7 | V93X4211X | 0.0 | CTRL | | | 7 | | | B | SB FDIR,CRT | LH SPD BRK 1 DES CMD | X |
| 008 | SPD BK L2 DES 8 | V93X4213X | 0.0 | CTRL | | | 8 | | | B | SB FDIR,CRT | LH SPD BRK 2 DES CMD | X |
| 009 | SPD BK L3 DES 9 | V93X4215X | 0.0 | CTRL | | | 9 | | | B | SB FDIR,CRT | LH SPD BRK 3 DES CMD | X |
| 010 | SPD BK R1 DES 10 | V93X4241X | 0.0 | CTRL | | | 10 | | | B | SB FDIR,CRT | RH SPD BRK 1 DES CMD | X |
| 011 | SPD BK R2 DES 11 | V93X4243X | 0.0 | CTRL | | | 11 | | | B | SB FDIR,CRT | RH SPD BRK 2 DES CMD | X |
| 012 | SPD BK R3 DES 12 | V93X4245X | 0.0 | CTRL | | | 12 | | | B | SB FDIR,CRT | RH SPD BRK 3 DES CMD | X |
| 013 | RUD PED L1 DES 13 | V93X4221X | 0.0 | CTRL | | | 13 | | | | RP FDIR,CRT | LH RPTA 1 DES CMD | X |
| 014 | RUD PED L2 DES 14 | V93X4223X | 0.0 | CTRL | | | 14 | | | | RP FDIR,CRT | LH RPTA 2 DES CMD | X |
| 015 | RUD PED L3 DES 15 | V93X4225X | 0.0 | CTRL | | | 15 | | | | RP FDIR,CRT | LH RPTA 3 DES CMD | X |
| 016 | RUD PED R1 DES 16 | V93X4251X | 0.0 | CTRL | | | 16 | | | | RP FDIR,CRT | RH RPTA 1 DES CMD | X |
| 017 | RUD PED R2 DES 17 | V93X4253X | 0.0 | CTRL | | | 17 | | | | RP FDIR,CRT | RH RPTA 2 DES CMD | X |
| 018 | RUD PED R3 DES 18 | V93X4255X | 0.0 | CTRL | | | 18 | | | | RP FDIR,CRT | RH RPTA 3 DES CMD | X |
| 019 | BDY FLP SW L1 DES 19 | V93X4276X | 0.0 | CTRL | | | 19 | | | | SW PROC,CRT | LH BF SLEW SW 1 DES CMD | X |
| 020 | BDY FLP SW L2 DES 20 | V93X4277X | 0.0 | CTRL | | | 20 | | | | SW PROC,CRT | LH BF SLEW SW 2 DES CMD | X |
| 021 | BDY FLP SW R1 DES 21 | V93X4278X | 0.0 | CTRL | | | 21 | | | | SW PROC,CRT | RH BF SLEW SW 1 DES CMD | X |
| 022 | BDY FLP SW R2 DES 22 | V93X4279X | 0.0 | CTRL | | | 22 | | | | SW PROC,CRT | RH BF SLEW SW 2 DES CMD | X |
| 023 | RHC L1 DES 23 | V93X4201X | 0.0 | CTRL | | | 23 | | | A | RHC FDIR,CRT | LH RHC 1 DES CMD | X |
| 024 | RHC L2 DES 24 | V93X4203X | 0.0 | CTRL | | | 24 | | | A | RHC FDIR,CRT | LH RHC 2 DES CMD | X |
| 025 | RHC L3 DES 25 | V93X4205X | 0.0 | CTRL | | | 25 | | | A | RHC FDIR,CRT | LH RHC 3 DES CMD | X |
| 026 | RHC R1 DES 26 | V93X4231X | 0.0 | CTRL | | | 26 | | | A | RHC FDIR,CRT | RH RHC 1 DES CMD | X |
| 027 | RHC R2 DES 27 | V93X4233X | 0.0 | CTRL | | | 27 | | | A | RHC FDIR,CTR | RH RHC 2 DES CMD | X |

| TABLE 4.5.2-1. RM CONTROLLERS (PFS) KEYBOARD PROCESSING | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Seq | CRT Signal Name | M/S ID | CHAR | TYPE | UNITS | DK | ITEM | Item No. Limits | | Add Ref | Destination | Nomenclature | CRT |
| | | | | | | | | MIN | MAX | | | | |
| 028 | RHC R3 DES 28 | V93X4235X | 0.0 | CTRL | | | 28 | | | A | RHC FDIR,CRT | RH RHC 3 DES CMD | X |
| 029 | RHC A1 DES 29 | V93X4296X | 0.0 | CTRL | | | 29 | | | A | RHC FDIR,CRT | AFT RHC 1 DES CMD | X |
| 030 | RHC A2 DES 30 | V93X4297X | 0.0 | CTRL | | | 30 | | | A | RHC FDIR,CRT | AFT RHC 2 DES CMD | X |
| 031 | RHC A3 DES 31 | V93X4298X | 0.0 | CTRL | | | 31 | | | A | RHC FDIR,CRT | AFT RHC 3 DES CMD | X |
| 032 | RHC TRIM L1 DES 32 | V93X4287X | 0.0 | CTRL | | | 32 | | | | SW PROC,CRT | LH RHC TRIM 1 DES CMD | X |
| 033 | RHC TRIM L2 DES 33 | V93X4288X | 0.0 | CTRL | | | 33 | | | | SW PROC,CRT | LH RHC TRIM 2 DES CMD | X |
| 034 | RHC TRIM R1 DES 34 | V93X4289X | 0.0 | CTRL | | | 34 | | | | SW PROC,CRT | RH RHC TRIM 1 DES CMD | X |
| 035 | RHC TRIM R2 DES 35 | V93X4290X | 0.0 | CTRL | | | 35 | | | | SW PROC,CRT | RH RHC TRIM 2 DES CMD | X |
| 036 | PNL TRIM L1 DES 36 | V93X4291X | 0.0 | CTRL | | | 36 | | | | SW PROC,CRT | LH PNL TRIM 1 DES CMD | X |
| 037 | PNL TRIM L2 DES 37 | V93X4292X | 0.0 | CTRL | | | 37 | | | | SW PROC,CRT | LH PNL TRIM 2 DES CMD | X |
| 038 | PNL TRIM R1 DES 38 | V93X4293X | 0.0 | CTRL | | | 38 | | | | SW PROC,CRT | RH PNL TRIM 1 DES CMD | X |
| 039 | PNL TRIM R2 DES 39 | V93X4294X | 0.0 | CTRL | | | 39 | | | | SW PROC,CRT | RH PNL TRIM 2 DES CMD | X |

TABLE 4.5.2-2. RM CONTROLLERS (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | BILEVEL | | | | | | | | | | | | | | | | | |
| | | | X | Y | | CHAR | 1 | 0 | TYPE | | | | | | | | | | | | | | | |
| 001 | (OPS) | V93X0040X | 2 | 1 | | 5.0 | | | CHAR | | | | | | | E | | | | | | UI | OPS FUNCTION PAGE | X |
| 002 | (SPEC) | V93X0042X | 7 | 1 | | 4.0 | | | CHAR | | | | | | | E | | | | | | UI | SPEC FUNCTION PAGE | X |
| 003 | (DISP) | V93X0044X | 10 | 1 | | 4.0 | | | DEC | | | | | | | E | | | | | | UI | DISPLAY FUNCTION PAGE | X |
| 004 | (UL) | V92X5032X | 34 | 1 | | 2.0 | UL | | BLVL | | | | | | X | G | | | | | | UI | UPLINK ACTIVITY IND | X |
| 005 | (GPC) | V93X0048X | 36 | 1 | | 2.0 | | | DEC | | | | | | | E | | | | | | UI | GPC DRIVER | X |
| 006 | (MT) | V91W1990C | 39 | 1 | | 12.0 | | | CHAR | DHMS | | | | | | A | | | | | | FCOS | MISSION ELAPSED TIME | X |
| 007 | (CRT TIMER) | V91W1987C | 39 | 2 | | 12.0 | | | CHAR | DHMS | | | | | | A | | | | | | FCOS | DISPLAY CRT TIMER,GNC | X |
| 008 | THC L1 TX (+) | V72K1315X | 7 | 5 | | 1.0 | + | | BLVL | | | | | | | | | | | | C | HDWR | FWD THC POS X OUTPUT–A | X |
| 009 | THC L1 TX (–) | V72K1316X | 7 | 5 | | 1.0 | – | | BLVL | | | | | | | | | | | | C | HDWR | FWD THC NEG X OUTPUT–A | X |
| 010 | THC L1 TY (+) | V72K1320X | 9 | 5 | | 1.0 | + | | BLVL | | | | | | | | | | | | C | HDWR | FWD THC POS Y OUTPUT–A | X |
| 011 | THC L1 TY (–) | V72K1321X | 9 | 5 | | 1.0 | – | | BLVL | | | | | | | | | | | | C | HDWR | FWD THC NEG Y OUTPUT–A | X |
| 012 | THC L1 TZ (+) | V72K1325X | 11 | 5 | | 1.0 | + | | BLVL | | | | | | | | | | | | C | HDWR | FWD THC POS Z OUTPUT–A | X |
| 013 | THC L1 TZ (–) | V72K1326X | 11 | 5 | | 1.0 | – | | BLVL | | | | | | | | | | | | C | HDWR | FWD THC NEG Z OUTPUT–A | X |
| 014 | THC L2 TX (+) | V72K1335X | 7 | 6 | | 1.0 | + | | BLVL | | | | | | | | | | | | C | HDWR | FWD THC POS X OUTPUT–B | X |
| 015 | THC L2 TX (–) | V72K1336X | 7 | 6 | | 1.0 | – | | BLVL | | | | | | | | | | | | C | HDWR | FWD THC NEG X OUTPUT–B | X |
| 016 | THC L2 TY (+) | V72K1340X | 9 | 6 | | 1.0 | + | | BLVL | | | | | | | | | | | | C | HDWR | FWD THC POS Y OUTPUT–B | X |
| 017 | THC L2 TY (–) | V72K1341X | 9 | 6 | | 1.0 | – | | BLVL | | | | | | | | | | | | C | HDWR | FWD THC NEG Y OUTPUT–B | X |
| 018 | THC L2 TZ (+) | V72K1345X | 11 | 6 | | 1.0 | + | | BLVL | | | | | | | | | | | | C | HDWR | FWD THC POS Z OUTPUT–B | X |
| 019 | THC L2 TZ (–) | V72K1346X | 11 | 6 | | 1.0 | – | | BLVL | | | | | | | | | | | | C | HDWR | FWD THC NEG Z OUTPUT–B | X |
| 020 | THC L3 TX (+) | V72K1355X | 7 | 7 | | 1.0 | + | | BLVL | | | | | | | | | | | | C | HDWR | FWD THC POS X OUTPUT–C | X |
| 021 | THC L3 TX (–) | V72K1356X | 7 | 7 | | 1.0 | – | | BLVL | | | | | | | | | | | | C | HDWR | FWD THC NEG X OUTPUT–C | X |
| 022 | THC L3 TY (+) | V72K1360X | 9 | 7 | | 1.0 | + | | BLVL | | | | | | | | | | | | C | HDWR | FWD THC POS Y OUTPUT–C | X |
| 023 | THC L3 TY (–) | V72K1361X | 9 | 7 | | 1.0 | – | | BLVL | | | | | | | | | | | | C | HDWR | FWD THC NEG Y OUTPUT–C | X |
| 024 | THC L3 TZ (+) | V72K1365X | 11 | 7 | | 1.0 | + | | BLVL | | | | | | | | | | | | C | HDWR | FWD THC POS Z OUTPUT–C | X |
| 025 | THC L3 TZ (–) | V72K1366X | 11 | 7 | | 1.0 | – | | BLVL | | | | | | | | | | | | C | HDWR | FWD THC NEG Z OUTPUT–C | X |
| 026 | THC A1 TX (+) | V72K1435X | 7 | 8 | | 1.0 | + | | BLVL | | | | | | | | | | | | C | HDWR | AFT THC POS X OUTPUT–A | X |
| 027 | THC A1 TX (–) | V72K1436X | 7 | 8 | | 1.0 | – | | BLVL | | | | | | | | | | | | C | HDWR | AFT THC NEG X OUTPUT–A | X |
| 028 | THC A1 TY (+) | V72K1440X | 9 | 8 | | 1.0 | + | | BLVL | | | | | | | | | | | | C | HDWR | AFT THC POS Y OUTPUT–A | X |

## TABLE 4.5.2-2. RM CONTROLLERS (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | | | |
| 029 | THC A1 TY (–) | V72K1441X | 9 | 8 | | 1.0 | – | | BLVL | | | | | | | | | | | | C | HDWR | AFT THC NEG Y OUTPUT–A | X |
| 030 | THC A1 TZ (+) | V72K1445X | 11 | 8 | | 1.0 | + | | BLVL | | | | | | | | | | | | C | HDWR | AFT THC POS Z OUTPUT–A | X |
| 031 | THC A1 TZ (–) | V72K1446X | 11 | 8 | | 1.0 | – | | BLVL | | | | | | | | | | | | C | HDWR | AFT THC NEG Z OUTPUT–A | X |
| 032 | THC A2 TX (+) | V72K1451X | 7 | 9 | | 1.0 | + | | BLVL | | | | | | | | | | | | C | HDWR | AFT THC POS X OUTPUT–B | X |
| 033 | THC A2 TX (–) | V72K1455X | 7 | 9 | | 1.0 | – | | BLVL | | | | | | | | | | | | C | HDWR | AFT THC NEG X OUTPUT–B | X |
| 034 | THC A2 TY (+) | V72K1460X | 9 | 9 | | 1.0 | + | | BLVL | | | | | | | | | | | | C | HDWR | AFT THC POS Y OUTPUT–B | X |
| 035 | THC A2 TY (–) | V72K1461X | 9 | 9 | | 1.0 | – | | BLVL | | | | | | | | | | | | C | HDWR | AFT THC NEG Y OUTPUT–B | X |
| 036 | THC A2 TZ (+) | V72K1465X | 11 | 9 | | 1.0 | + | | BLVL | | | | | | | | | | | | C | HDWR | AFT THC POS Z OUTPUT–B | X |
| 037 | THC A2 TZ (–) | V72K1466X | 11 | 9 | | 1.0 | – | | BLVL | | | | | | | | | | | | C | HDWR | AFT THC NEG Z OUTPUT–B | X |
| 038 | THC A3 TX (+) | V72K1475X | 7 | 10 | | 1.0 | + | | BLVL | | | | | | | | | | | | C | HDWR | AFT THC POS X OUTPUT–C | X |
| 039 | THC A3 TX (–) | V72K1476X | 7 | 10 | | 1.0 | – | | BLVL | | | | | | | | | | | | C | HDWR | AFT THC NEG X OUTPUT–C | X |
| 040 | THC A3 TY (+) | V72K1480X | 9 | 10 | | 1.0 | + | | BLVL | | | | | | | | | | | | C | HDWR | AFT THC POS Y OUTPUT–C | X |
| 041 | THC A3 TY (–) | V72K1481X | 9 | 10 | | 1.0 | – | | BLVL | | | | | | | | | | | | C | HDWR | AFT THC NEG Y OUTPUT–C | X |
| 042 | THC A3 TZ (+) | V72K1485X | 11 | 10 | | 1.0 | + | | BLVL | | | | | | | | | | | | C | HDWR | AFT THC POS Z OUTPUT–C | X |
| 043 | THC A3 TZ (–) | V72K1486X | 11 | 10 | | 1.0 | – | | BLVL | | | | | | | | | | | | C | HDWR | AFT THC NEG Z OUTPUT–C | X |
| 044 | THC L1 DES 1 | V93X4207X | 15 | 5 | | 1.0 | | * | BLVL | | | | | | | B | | | | | D F | KYBD | FWD THC X,Y,Z OUT DES A | X |
| 045 | THC L2 DES 2 | V93X4208X | 15 | 6 | | 1.0 | | * | BLVL | | | | | | | B | | | | | D F | KYBD | FWD THC X,Y,Z OUT DES B | X |
| 046 | THC L3 DES 3 | V93X4209X | 15 | 7 | | 1.0 | | * | BLVL | | | | | | | B | | | | | D F | KYBD | FWD THC X,Y,Z OUT DES C | X |
| 047 | THC A1 DES 4 | V93X4237X | 15 | 8 | | 1.0 | | * | BLVL | | | | | | | B | | | | | D F | KYBD | AFT THC X,Y,Z OUT DES A | X |
| 048 | THC A2 DES 5 | V93X4238X | 15 | 9 | | 1.0 | | * | BLVL | | | | | | | B | | | | | D F | KYBD | AFT THC X,Y,Z OUT DES B | X |
| 049 | THC A3 DES 6 | V93X4239X | 15 | 10 | | 1.0 | | * | BLVL | | | | | | | B | | | | | D F | KYBD | AFT THC X,Y,Z OUT DES C | X |
| 050 | SPD BK L1 | V72K1575C | 7 | 11 | | 4.0 | | | DEC | PCT | | | | | | | | | | | | HDWR | LH SBTC CMD–A | X |
| 051 | SPD BK L2 | V72K1578C | 7 | 12 | | 4.0 | | | DEC | PCT | | | | | | | | | | | | HDWR | LH SBTC CMD–B | X |
| 052 | SPD BK L3 | V72K1581C | 7 | 13 | | 4.0 | | | DEC | PCT | | | | | | | | | | | | HDWR | LH SBTC CMD–C | X |
| 053 | SPD BK R1 | V72K1585C | 7 | 14 | | 4.0 | | | DEC | PCT | | | | | | | | | | | | HDWR | RH SBTC CMD–A | X |
| 054 | SPD BK R2 | V72K1588C | 7 | 15 | | 4.0 | | | DEC | PCT | | | | | | | | | | | | HDWR | RH SBTC CMD–B | X |
| 055 | SPD BK R3 | V72K1591C | 7 | 16 | | 4.0 | | | DEC | PCT | | | | | | | | | | | | HDWR | RH SBTC CMD–C | X |
| 056 | SPD BK L1 DES 7 | V93X4211X | 15 | 11 | | 1.0 | | * | BLVL | | | | | | | | | | | | | KYBD | LH SPD BRK 1 DES CMD | X |
| 057 | SPD BK L2 DES 8 | V93X4213X | 15 | 12 | | 1.0 | | * | BLVL | | | | | | | | | | | | | KYBD | LH SPD BRK 2 DES CMD | X |

TABLE 4.5.2-2. RM CONTROLLERS (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | | | |
| 058 | SPD BK L3 DES 9 | V93X4215X | 15 | 13 | | 1.0 | | * | BLVL | | | | | | | | | | | | | KYBD | LH SPD BRK 3 DES CMD | X |
| 059 | SPD BK R1 DES 10 | V93X4241X | 15 | 14 | | 1.0 | | * | BLVL | | | | | | | | | | | | | KYBD | RH SPD BRK 1 DES CMD | X |
| 060 | SPD BK R2 DES 11 | V93X4243X | 15 | 15 | | 1.0 | | * | BLVL | | | | | | | | | | | | | KYBD | RH SPD BRK 2 DES CMD | X |
| 061 | SPD BK R3 DES 12 | V93X4245X | 15 | 16 | | 1.0 | | * | BLVL | | | | | | | | | | | | | KYBD | RH SPD BRK 3 DES CMD | X |
| 062 | RUD PED L1 | V72K1530C | 7 | 17 | | 4.0 | | | DEC | PCT | | | | | | | R | | | | A C | HDWR | LEFT RUDDER PEDAL CMD–A | X |
| 063 | RUD PED L2 | V72K1531C | 7 | 18 | | 4.0 | | | DEC | PCT | | | | | | | R | | | | A C | HDWR | LEFT RUDDER PEDAL CMD–B | X |
| 064 | RUD PED L3 | V72K1532C | 7 | 19 | | 4.0 | | | DEC | PCT | | | | | | | R | | | | A C | HDWR | LEFT RUDDER PEDAL CMD–C | X |
| 065 | RUD PED R1 | V72K1540C | 7 | 20 | | 4.0 | | | DEC | PCT | | | | | | | R | | | | A C | HDWR | RIGHT RUDDER PEDAL CMD–A | X |
| 066 | RUD PED R2 | V72K1541C | 7 | 21 | | 4.0 | | | DEC | PCT | | | | | | | R | | | | A C | HDWR | RIGHT RUDDER PEDAL CMD–B | X |
| 067 | RUD PED R3 | V72K1542C | 7 | 22 | | 4.0 | | | DEC | PCT | | | | | | | R | | | | A C | HDWR | RIGHT RUDDER PEDAL CMD–C | X |
| 068 | RUD PED L1 DES 13 | V93X4221X | 15 | 17 | | 1.0 | | * | BLVL | | | | | | | | | | | | | KYBD | LH RPTA 1 DES CMD | X |
| 069 | RUD PED L2 DES 14 | V93X4223X | 15 | 18 | | 1.0 | | * | BLVL | | | | | | | | | | | | | KYBD | LH RPTA 2 DES CMD | X |
| 070 | RUD PED L3 DES 15 | V93X4225X | 15 | 19 | | 1.0 | | * | BLVL | | | | | | | | | | | | | KYBD | LH RPTA 3 DES CMD | X |
| 071 | RUD PED R1 DES 16 | V93X4251X | 15 | 20 | | 1.0 | | * | BLVL | | | | | | | | | | | | | KYBD | RH RPTA 1 DES CMD | X |
| 072 | RUD PED R2 DES 17 | V93X4253X | 15 | 21 | | 1.0 | | * | BLVL | | | | | | | | | | | | | KYBD | RH RPTA 2 DES CMD | X |
| 073 | RUD PED R3 DES 18 | V93X4255X | 15 | 22 | | 1.0 | | * | BLVL | | | | | | | | | | | | | KYBD | RH RPTA 3 DES CMD | X |
| 074 | BDY FLP SW L1 UP | V72K2077X | 22 | 9 | | 1.0 | * | | BLVL | | | | | | | | | | | | | HDWR | LH BODY FLAP UP A | X |
| 075 | BDY FLP SW L2 UP | V72K2078X | 22 | 10 | | 1.0 | * | | BLVL | | | | | | | | | | | | | HDWR | LH BODY FLAP UP B | X |
| 076 | BDY FLP SW R1 UP | V72K2087X | 22 | 11 | | 1.0 | * | | BLVL | | | | | | | | | | | | | HDWR | RH BODY FLAP UP A | X |
| 077 | BDY FLP SW R2 UP | V72K2088X | 22 | 12 | | 1.0 | * | | BLVL | | | | | | | | | | | | | HDWR | RH BODY FLAP UP B | X |
| 078 | BDY FLP SW L1 DN | V72K2079X | 24 | 9 | | 1.0 | * | | BLVL | | | | | | | | | | | | | HDWR | LH BODY FLAP DOWN A | X |
| 079 | BDY FLP SW L2 DN | V72K2080X | 24 | 10 | | 1.0 | * | | BLVL | | | | | | | | | | | | | HDWR | LH BODY FLAP DOWN B | X |
| 080 | BDY FLP SW R1 DN | V72K2089X | 24 | 11 | | 1.0 | * | | BLVL | | | | | | | | | | | | | HDWR | RH BODY FLAP DOWN A | X |
| 081 | BDY FLP SW R2 DN | V72K2090X | 24 | 12 | | 1.0 | * | | BLVL | | | | | | | | | | | | | HDWR | RH BODY FLAP DOWN B | X |
| 082 | BDY FLP SW L1 DES 19 | V93X4276X | 28 | 9 | | 1.0 | | * | BLVL | | | | | | | | | | | | | KYBD | LH BF SLEW SW 1 DES CMD | X |
| 083 | BDY FLP SW L2 DES 20 | V93X4277X | 28 | 10 | | 1.0 | | * | BLVL | | | | | | | | | | | | | KYBD | LH BF SLEW SW 2 DES CMD | X |
| 084 | BDY FLP SW R1 DES 21 | V93X4278X | 28 | 11 | | 1.0 | | * | BLVL | | | | | | | | | | | | | KYBD | RH BF SLEW SW 1 DES CMD | X |
| 085 | BDY FLP SW R2 DES 22 | V93X4279X | 28 | 12 | | 1.0 | | * | BLVL | | | | | | | | | | | | | KYBD | RH BF SLEW SW 2 DES CMD | X |
| 086 | RHC L1 R | V95H7705C | 37 | 5 | | 3.0 | | | DEC | PCT | | | | | | | R | | | | A C | RM ORB | LH RHC 1 ROLL CMD | X |

## TABLE 4.5.2-2. RM CONTROLLERS (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | | | |
| 087 | RHC L1 P | V95H7702C | 41 | 5 | | 3.0 | | | DEC | PCT | | | | | | | U | | | | B C | RM ORB | LH RHC 1 PITCH CMD | X |
| 088 | RHC L1 Y | V95H7712C | 45 | 5 | | 3.0 | | | DEC | PCT | | | | | | | R | | | | A C | RM ORB | LH RHC 1 YAW CMD | X |
| 089 | RHC L2 R | V95H7706C | 37 | 6 | | 3.0 | | | DEC | PCT | | | | | | | R | | | | A C | RM ORB | LH RHC 2 ROLL CMD | X |
| 090 | RHC L2 P | V95H7703C | 41 | 6 | | 3.0 | | | DEC | PCT | | | | | | | U | | | | B C | RM ORB | LH RHC 2 PITCH CMD | X |
| 091 | RHC L2 Y | V95H7713C | 45 | 6 | | 3.0 | | | DEC | PCT | | | | | | | R | | | | A C | RM ORB | LH RHC 2 YAW CMD | X |
| 092 | RHC L3 R | V95H7707C | 37 | 7 | | 3.0 | | | DEC | PCT | | | | | | | R | | | | A C | RM ORB | LH RHC 3 ROLL CMD | X |
| 093 | RHC L3 P | V95H7704C | 41 | 7 | | 3.0 | | | DEC | PCT | | | | | | | U | | | | B C | RM ORB | LH RHC 3 PITCH CMD | X |
| 094 | RHC L3 Y | V95H7714C | 45 | 7 | | 3.0 | | | DEC | PCT | | | | | | | R | | | | A C | RM ORB | LH RHC 3 YAW CMD | X |
| 095 | RHC R1 R | V95H7686C | 37 | 8 | | 3.0 | | | DEC | PCT | | | | | | | R | | | | A C | RM ORB | RH RHC 1 ROLL CMD | X |
| 096 | RHC R1 P | V95H7683C | 41 | 8 | | 3.0 | | | DEC | PCT | | | | | | | U | | | | B C | RM ORB | RH RHC 1 PITCH CMD | X |
| 097 | RHC R1 Y | V95H7715C | 45 | 8 | | 3.0 | | | DEC | PCT | | | | | | | R | | | | A C | RM ORB | RH RHC 1 YAW CMD | X |
| 098 | RHC R2 R | V95H7687C | 37 | 9 | | 3.0 | | | DEC | PCT | | | | | | | R | | | | A C | RM ORB | RH RHC 2 ROLL CMD | X |
| 099 | RHC R2 P | V95H7684C | 41 | 9 | | 3.0 | | | DEC | PCT | | | | | | | U | | | | B C | RM ORB | RH RHC 2 PITCH CMD | X |
| 100 | RHC R2 Y | V95H7716C | 45 | 9 | | 3.0 | | | DEC | PCT | | | | | | | R | | | | A C | RM ORB | RH RHC 2 YAW CMD | X |
| 101 | RHC R3 R | V95H7688C | 37 | 10 | | 3.0 | | | DEC | PCT | | | | | | | R | | | | A C | RM ORB | RH RHC 3 ROLL CMD | X |
| 102 | RHC R3 P | V95H7685C | 41 | 10 | | 3.0 | | | DEC | PCT | | | | | | | U | | | | B C | RM ORB | RH RHC 3 PITCH CMD | X |
| 103 | RHC R3 Y | V95H7717C | 45 | 10 | | 3.0 | | | DEC | PCT | | | | | | | R | | | | A C | RM ORB | RH RHC 3 YAW CMD | X |
| 104 | RHC A1 R | V95H7725C | 37 | 11 | | 3.0 | | | DEC | PCT | | | | | | | R | | | | A C | RM ORB | AFT RHC 1 ROLL CMD | X |
| 105 | RHC A1 P | V95H7719C | 41 | 11 | | 3.0 | | | DEC | PCT | | | | | | | U | | | | B C | RM ORB | AFT RHC 1 PITCH CMD | X |
| 106 | RHC A1 Y | V95H7722C | 45 | 11 | | 3.0 | | | DEC | PCT | | | | | | | R | | | | A C | RM ORB | AFT RHC 1 YAW CMD | X |
| 107 | RHC A2 R | V95H7726C | 37 | 12 | | 3.0 | | | DEC | PCT | | | | | | | R | | | | A C | RM ORB | AFT RHC 2 ROLL CMD | X |
| 108 | RHC A2 P | V95H7720C | 41 | 12 | | 3.0 | | | DEC | PCT | | | | | | | U | | | | B C | RM ORB | AFT RHC 2 PITCH CMD | X |
| 109 | RHC A2 Y | V95H7723C | 45 | 12 | | 3.0 | | | DEC | PCT | | | | | | | R | | | | A C | RM ORB | AFT RHC 2 YAW CMD | X |
| 110 | RHC A3 R | V95H7727C | 37 | 13 | | 3.0 | | | DEC | PCT | | | | | | | R | | | | A C | RM ORB | AFT RHC 3 ROLL CMD | X |
| 111 | RHC A3 P | V95H7721C | 41 | 13 | | 3.0 | | | DEC | PCT | | | | | | | U | | | | B C | RM ORB | AFT RHC 3 PITCH CMD | X |
| 112 | RHC A3 Y | V95H7724C | 45 | 13 | | 3.0 | | | DEC | PCT | | | | | | | R | | | | A C | RM ORB | AFT RHC 3 YAW CMD | X |
| 113 | RHC L1 DES 23 | V93X4201X | 51 | 5 | | 1.0 | | * | BLVL | | | | | | | | | | | | E F | KYBD | LH RHC 1 DES CMD | X |
| 114 | RHC L2 DES 24 | V93X4203X | 51 | 6 | | 1.0 | | * | BLVL | | | | | | | | | | | | E F | KYBD | LH RHC 2 DES CMD | X |
| 115 | RHC L3 DES 25 | V93X4205X | 51 | 7 | | 1.0 | | * | BLVL | | | | | | | | | | | | E F | KYBD | LH RHC 3 DES CMD | X |

TABLE 4.5.2-2. RM CONTROLLERS (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | | | |
| 116 | RHC R1 DES 26 | V93X4231X | 51 | 8 | | 1.0 | | * | BLVL | | | | | | | | | | | | E F | KYBD | RH RHC 1 DES CMD | X |
| 117 | RHC R2 DES 27 | V93X4233X | 51 | 9 | | 1.0 | | * | BLVL | | | | | | | | | | | | E F | KYBD | RH RHC 2 DES CMD | X |
| 118 | RHC R3 DES 28 | V93X4235X | 51 | 10 | | 1.0 | | * | BLVL | | | | | | | | | | | | E F | KYBD | RH RHC 3 DES CMD | X |
| 119 | RHC A1 DES 29 | V93X4296X | 51 | 11 | | 1.0 | | * | BLVL | | | | | | | | | | | | E F | KYBD | AFT RHC 1 DES CMD | X |
| 120 | RHC A2 DES 30 | V93X4297X | 51 | 12 | | 1.0 | | * | BLVL | | | | | | | | | | | | E F | KYBD | AFT RHC 2 DES CMD | X |
| 121 | RHC A3 DES 31 | V93X4298X | 51 | 13 | | 1.0 | | * | BLVL | | | | | | | | | | | | E F | KYBD | AFT RHC 3 DES CMD | X |
| 122 | RHC TRIM L1 R (+) | V72K1152X | 39 | 14 | | 1.0 | R | | BLVL | | | | | | | | | | | | | HDWR | LH RHC + ROLL TRIM–A | X |
| 123 | RHC TRIM L1 R (–) | V72K1153X | 39 | 14 | | 1.0 | L | | BLVL | | | | | | | | | | | | | HDWR | LH RHC – ROLL TRIM–A | X |
| 124 | RHC TRIM L1 P (+) | V72K1150X | 43 | 14 | | 1.0 | U | | BLVL | | | | | | | | | | | | | HDWR | LH RHC + PITCH TRIM–A | X |
| 125 | RHC TRIM L1 P (–) | V72K1151X | 43 | 14 | | 1.0 | D | | BLVL | | | | | | | | | | | | | HDWR | LH RHC – PITCH TRIM–A | X |
| 126 | RHC TRIM L2 R (+) | V72K1167X | 39 | 15 | | 1.0 | R | | BLVL | | | | | | | | | | | | | HDWR | LH RHC + ROLL TRIM–B | X |
| 127 | RHC TRIM L2 R (–) | V72K1168X | 39 | 15 | | 1.0 | L | | BLVL | | | | | | | | | | | | | HDWR | LH RHC – ROLL TRIM–B | X |
| 128 | RHC TRIM L2 P (+) | V72K1165X | 43 | 15 | | 1.0 | U | | BLVL | | | | | | | | | | | | | HDWR | LH RHC + PITCH TRIM–B | X |
| 129 | RHC TRIM L2 P (–) | V72K1166X | 43 | 15 | | 1.0 | D | | BLVL | | | | | | | | | | | | | HDWR | LH RHC – PITCH TRIM–B | X |
| 130 | RHC TRIM R1 R (+) | V72K1197X | 39 | 16 | | 1.0 | R | | BLVL | | | | | | | | | | | | | HDWR | RH RHC + ROLL TRIM–A | X |
| 131 | RHC TRIM R1 R (–) | V72K1198X | 39 | 16 | | 1.0 | L | | BLVL | | | | | | | | | | | | | HDWR | RH RHC – ROLL TRIM–A | X |
| 132 | RHC TRIM R1 P (+) | V72K1195X | 43 | 16 | | 1.0 | U | | BLVL | | | | | | | | | | | | | HDWR | RH RHC + PITCH TRIM–A | X |
| 133 | RHC TRIM R1 P (–) | V72K1196X | 43 | 16 | | 1.0 | D | | BLVL | | | | | | | | | | | | | HDWR | RH RHC – PITCH TRIM–A | X |
| 134 | RHC TRIM R2 R (+) | V72K1217X | 39 | 17 | | 1.0 | R | | BLVL | | | | | | | | | | | | | HDWR | RH RHC + ROLL TRIM–B | X |
| 135 | RHC TRIM R2 R (–) | V72K1218X | 39 | 17 | | 1.0 | L | | BLVL | | | | | | | | | | | | | HDWR | RH RHC – ROLL TRIM–B | X |
| 136 | RHC TRIM R2 P (+) | V72K1215X | 43 | 17 | | 1.0 | U | | BLVL | | | | | | | | | | | | | HDWR | RH RHC + PITCH TRIM–B | X |
| 137 | RHC TRIM R2 P (–) | V72K1216X | 43 | 17 | | 1.0 | D | | BLVL | | | | | | | | | | | | | HDWR | RH RHC – PITCH TRIM–B | X |
| 138 | RHC TRIM L1 DES 32 | V93X4287X | 51 | 14 | | 1.0 | | * | BLVL | | | | | | | | | | | | | KYBD | LH RHC TRIM 1 DES CMD | X |
| 139 | RHC TRIM L2 DES 33 | V93X4288X | 51 | 15 | | 1.0 | | * | BLVL | | | | | | | | | | | | | KYBD | LH RHC TRIM 2 DES CMD | X |
| 140 | RHC TRIM R1 DES 34 | V93X4289X | 51 | 16 | | 1.0 | | * | BLVL | | | | | | | | | | | | | KYBD | RH RHC TRIM 1 DES CMD | X |
| 141 | RHC TRIM R2 DES 35 | V93X4290X | 51 | 17 | | 1.0 | | * | BLVL | | | | | | | | | | | | | KYBD | RH RHC TRIM 2 DES CMD | X |
| 142 | PNL TRIM L1 R (+) | V72K1506X | 39 | 18 | | 1.0 | R | | BLVL | | | | | | | | | | | | | HDWR | LH + ROLL TRIM A | X |
| 143 | PNL TRIM L1 R (–) | V72K1509X | 39 | 18 | | 1.0 | L | | BLVL | | | | | | | | | | | | | HDWR | LH – ROLL TRIM A | X |
| 144 | PNL TRIM L1 P (+) | V72K1500X | 43 | 18 | | 1.0 | U | | BLVL | | | | | | | | | | | | | HDWR | LH + PITCH TRIM A | X |
| 145 | PNL TRIM L1 P (–) | V72K1503X | 43 | 18 | | 1.0 | D | | BLVL | | | | | | | | | | | | | HDWR | LH – PITCH TRIM A | X |

## TABLE 4.5.2-2. RM CONTROLLERS (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | | | |
| 146 | PNL TRIM L1 Y (+) | V72K1148X | 47 | 18 | | 1.0 | R | | BLVL | | | | | | | | | | | | | HDWR | LH + YAW TRIM–A | X |
| 147 | PNL TRIM L1 Y (–) | V72K1149X | 47 | 18 | | 1.0 | L | | BLVL | | | | | | | | | | | | | HDWR | LH – YAW TRIM–A | X |
| 148 | PNL TRIM L2 R (+) | V72K1507X | 39 | 19 | | 1.0 | R | | BLVL | | | | | | | | | | | | | HDWR | LH + ROLL TRIM B | X |
| 149 | PNL TRIM L2 R (–) | V72K1510X | 39 | 19 | | 1.0 | L | | BLVL | | | | | | | | | | | | | HDWR | LH – ROLL TRIM B | X |
| 150 | PNL TRIM L2 P (+) | V72K1501X | 43 | 19 | | 1.0 | U | | BLVL | | | | | | | | | | | | | HDWR | LH + PITCH TRIM B | X |
| 151 | PNL TRIM L2 P (–) | V72K1504X | 43 | 19 | | 1.0 | D | | BLVL | | | | | | | | | | | | | HDWR | LH – PITCH TRIM B | X |
| 152 | PNL TRIM L2 Y (+) | V72K1163X | 47 | 19 | | 1.0 | R | | BLVL | | | | | | | | | | | | | HDWR | LH + YAW TRIM–B | X |
| 153 | PNL TRIM L2 Y (–) | V72K1164X | 47 | 19 | | 1.0 | L | | BLVL | | | | | | | | | | | | | HDWR | LH – YAW TRIM–B | X |
| 154 | PNL TRIM R1 R (+) | V72K1518X | 39 | 20 | | 1.0 | R | | BLVL | | | | | | | | | | | | | HDWR | RH + ROLL TRIM A | X |
| 155 | PNL TRIM R1 R (–) | V72K1521X | 39 | 20 | | 1.0 | L | | BLVL | | | | | | | | | | | | | HDWR | RH – ROLL TRIM A | X |
| 156 | PNL TRIM R1 P (+) | V72K1512X | 43 | 20 | | 1.0 | U | | BLVL | | | | | | | | | | | | | HDWR | RH + PITCH TRIM A | X |
| 157 | PNL TRIM R1 P (–) | V72K1515X | 43 | 20 | | 1.0 | D | | BLVL | | | | | | | | | | | | | HDWR | RH – PITCH TRIM A | X |
| 158 | PNL TRIM R1 Y (+) | V72K1193X | 47 | 20 | | 1.0 | R | | BLVL | | | | | | | | | | | | | HDWR | RH + YAW TRIM–A | X |
| 159 | PNL TRIM R1 Y (–) | V72K1194X | 47 | 20 | | 1.0 | L | | BLVL | | | | | | | | | | | | | HDWR | RH – YAW TRIM–A | X |
| 160 | PNL TRIM R2 R (+) | V72K1519X | 39 | 21 | | 1.0 | R | | BLVL | | | | | | | | | | | | | HDWR | RH + ROLL TRIM B | X |
| 161 | PNL TRIM R2 R (–) | V72K1522X | 39 | 21 | | 1.0 | L | | BLVL | | | | | | | | | | | | | HDWR | RH – ROLL TRIM B | X |
| 162 | PNL TRIM R2 P (+) | V72K1513X | 43 | 21 | | 1.0 | U | | BLVL | | | | | | | | | | | | | HDWR | RH + PITCH TRIM B | X |
| 163 | PNL TRIM R2 P (–) | V72K1516X | 43 | 21 | | 1.0 | D | | BLVL | | | | | | | | | | | | | HDWR | RH – PITCH TRIM B | X |
| 164 | PNL TRIM R2 Y (+) | V72K1213X | 47 | 21 | | 1.0 | R | | BLVL | | | | | | | | | | | | | HDWR | RH + YAW TRIM–B | X |
| 165 | PNL TRIM R2 Y (–) | V72K1214X | 47 | 21 | | 1.0 | L | | BLVL | | | | | | | | | | | | | HDWR | RH – YAW TRIM–B | X |
| 166 | PNL TRIM L1 DES 36 | V93X4291X | 51 | 18 | | 1.0 | | * | BLVL | | | | | | | | | | | | | KYBD | LH PNL TRIM 1 DES CMD | X |
| 167 | PNL TRIM L2 DES 37 | V93X4292X | 51 | 19 | | 1.0 | | * | BLVL | | | | | | | | | | | | | KYBD | LH PNL TRIM 2 DES CMD | X |
| 168 | PNL TRIM R1 DES 38 | V93X4293X | 51 | 20 | | 1.0 | | * | BLVL | | | | | | | | | | | | | KYBD | RH PNL TRIM 1 DES CMD | X |
| 169 | PNL TRIM R2 DES 39 | V93X4294X | 51 | 21 | | 1.0 | | * | BLVL | | | | | | | | | | | | | KYBD | RH PNL TRIM 2 DES CMD | X |
| 170 | THC L1 TX (S) | V95J7729C | 8 | 5 | | 1.0 | | | STAT | | | | | | | | | | | | 8 | RM ORB | FWD THC X CHANNEL 1 STATUS | X |
| 171 | THC L1 TY (S) | V95J7730C | 10 | 5 | | 1.0 | | | STAT | | | | | | | | | | | | 8 | RM ORB | FWD THC Y CHANNEL 1 STATUS | X |
| 172 | THC L1 TZ (S) | V95J7731C | 12 | 5 | | 1.0 | | | STAT | | | | | | | | | | | | 8 | RM ORB | FWD THC Z CHANNEL 1 STATUS | X |
| 173 | THC L2 TX (S) | V95J7732C | 8 | 6 | | 1.0 | | | STAT | | | | | | | | | | | | 8 | RM ORB | FWD THC X CHANNEL 2 STATUS | X |
| 174 | THC L2 TY (S) | V95J7733C | 10 | 6 | | 1.0 | | | STAT | | | | | | | | | | | | 8 | RM ORB | FWD THC Y CHANNEL 2 STATUS | X |

TABLE 4.5.2-2. RM CONTROLLERS (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | | | |
| 175 | THC L2 TZ (S) | V95J7734C | 12 | 6 | | 1.0 | | | STAT | | | | | | | | | | | | 8 | RM ORB | FWD THC Z CHANNEL 2 STATUS | X |
| 176 | THC L3 TX (S) | V95J7735C | 8 | 7 | | 1.0 | | | STAT | | | | | | | | | | | | 8 | RM ORB | FWD THC X CHANNEL 3 STATUS | X |
| 177 | THC L3 TY (S) | V95J7736C | 10 | 7 | | 1.0 | | | STAT | | | | | | | | | | | | 8 | RM ORB | FWD THC Y CHANNEL 3 STATUS | X |
| 178 | THC L3 TZ (S) | V95J7737C | 12 | 7 | | 1.0 | | | STAT | | | | | | | | | | | | 8 | RM ORB | FWD THC Z CHANNEL 3 STATUS | X |
| 179 | THC A1 TX (S) | V95J7738C | 8 | 8 | | 1.0 | | | STAT | | | | | | | | | | | | 8 | RM ORB | AFT THC X CHANNEL 1 STATUS | X |
| 180 | THC A1 TY (S) | V95J7739C | 10 | 8 | | 1.0 | | | STAT | | | | | | | | | | | | 8 | RM ORB | AFT THC Y CHANNEL 1 STATUS | X |
| 181 | THC A1 TZ (S) | V95J7740C | 12 | 8 | | 1.0 | | | STAT | | | | | | | | | | | | 8 | RM ORB | AFT THC Z CHANNEL 1 STATUS | X |
| 182 | THC A2 TX (S) | V95J7741C | 8 | 9 | | 1.0 | | | STAT | | | | | | | | | | | | 8 | RM ORB | AFT THC X CHANNEL 2 STATUS | X |
| 183 | THC A2 TY (S) | V95J7742C | 10 | 9 | | 1.0 | | | STAT | | | | | | | | | | | | 8 | RM ORB | AFT THC Y CHANNEL 2 STATUS | X |
| 184 | THC A2 TZ (S) | V95J7743C | 12 | 9 | | 1.0 | | | STAT | | | | | | | | | | | | 8 | RM ORB | AFT THC Z CHANNEL 2 STATUS | X |
| 185 | THC A3 TX (S) | V95J7744C | 8 | 10 | | 1.0 | | | STAT | | | | | | | | | | | | 8 | RM ORB | AFT THC X CHANNEL 3 STATUS | X |
| 186 | THC A3 TY (S) | V95J7745C | 10 | 10 | | 1.0 | | | STAT | | | | | | | | | | | | 8 | RM ORB | AFT THC Y CHANNEL 3 STATUS | X |
| 187 | THC A3 TZ (S) | V95J7746C | 12 | 10 | | 1.0 | | | STAT | | | | | | | | | | | | 8 | RM ORB | AFT THC Z CHANNEL 3 STATUS | X |
| 188 | SPD BK L1 (S) | V91X6800X | 11 | 11 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | LH SBTC CMD A COMM FAULT | X |
| 189 | SPD BK L2 (S) | V91X6801X | 11 | 12 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | LH SBTC CMD B COMM FAULT | X |
| 190 | SPD BK L3 (S) | V91X6802X | 11 | 13 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | LH SBTC CMD C COMM FAULT | X |
| 191 | SPD BK R1 (S) | V91X6850X | 11 | 14 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | RH SBTC CMD A COMM FAULT | X |
| 192 | SPD BK R2 (S) | V91X6851X | 11 | 15 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | RH SBTC CMD B COMM FAULT | X |
| 193 | SPD BK R3 (S) | V91X6852X | 11 | 16 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | RH SBTC CMD C COMM FAULT | X |
| 194 | RUD PED L1 (S) | V91X6700X | 11 | 17 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | LH RPTA CMD A COMM FAULT | X |
| 195 | RUD PED L2 (S) | V91X6701X | 11 | 18 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | LH RPTA CMD B COMM FAULT | X |
| 196 | RUD PED L3 (S) | V91X6702X | 11 | 19 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | LH RPTA CMD C COMM FAULT | X |
| 197 | RUD PED R1 (S) | V91X6750X | 11 | 20 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | RH RPTA CMD A COMM FAULT | X |
| 198 | RUD PED R2 (S) | V91X6751X | 11 | 21 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | RH RPTA CMD B COMM FAULT | X |
| 199 | RUD PED R3 (S) | V91X6752X | 11 | 22 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | RH RPTA CMD C COMM FAULT | X |
| 200 | BDY FLP SW L1 UP(S) | V91X5382X | 23 | 9 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | LH BODYFLAP UP A COMMFAULT | X |
| 201 | BDY FLP SW L2 UP(S) | V91X5383X | 23 | 10 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | LH BODYFLAP UP B COMMFAULT | X |
| 202 | BDY FLP SW R1 UP(S) | V91X5452X | 23 | 11 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | RH BODY FLAP UP A COMMFAULT | X |

## TABLE 4.5.2-2. RM CONTROLLERS (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | | | |
| 203 | BDY FLP SW R2 UP(S) | V91X5453X | 23 | 12 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | RH BODY FLAP UP B COMMFAULT | X |
| 204 | BDY FLP SW L1 DN(S) | V91X5380X | 25 | 9 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | LH BODYFLAP DOWN A COMMFAULT | X |
| 205 | BDY FLP SW L2 DN(S) | V91X5381X | 25 | 10 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | LH BODYFLAP DOWN B COMMFAULT | X |
| 206 | BDY FLP SW R1 DN(S) | V91X5450X | 25 | 11 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | RH BODY FLAP DOWN A COMMFAULT | X |
| 207 | BDY FLP SW R2 DN(S) | V91X5451X | 25 | 12 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | RH BODY FLAP DOWN B COMMFAULT | X |
| 208 | RHC L1 R (S) | V95J7747C | 40 | 5 | | 1.0 | | | STAT | | | | | | | | | | | | 8 | RM ORB | L RHC ROLL 1 STATUS | X |
| 209 | RHC L2 R (S) | V95J7748C | 40 | 6 | | 1.0 | | | STAT | | | | | | | | | | | | 8 | RM ORB | L RHC ROLL 2 STATUS | X |
| 210 | RHC L3 R (S) | V95J7749C | 40 | 7 | | 1.0 | | | STAT | | | | | | | | | | | | 8 | RM ORB | L RHC ROLL 3 STATUS | X |
| 211 | RHC L1 P (S) | V95J7750C | 44 | 5 | | 1.0 | | | STAT | | | | | | | | | | | | 8 | RM ORB | L RHC PITCH 1 STATUS | X |
| 212 | RHC L2 P (S) | V95J7751C | 44 | 6 | | 1.0 | | | STAT | | | | | | | | | | | | 8 | RM ORB | L RHC PITCH 2 STATUS | X |
| 213 | RHC L3 P (S) | V95J7752C | 44 | 7 | | 1.0 | | | STAT | | | | | | | | | | | | 8 | RM ORB | L RHC PITCH 3 STATUS | X |
| 214 | RHC L1 Y (S) | V95J7753C | 48 | 5 | | 1.0 | | | STAT | | | | | | | | | | | | 8 | RM ORB | L RHC YAW 1 STATUS | X |
| 215 | RHC L2 Y (S) | V95J7754C | 48 | 6 | | 1.0 | | | STAT | | | | | | | | | | | | 8 | RM ORB | L RHC YAW 2 STATUS | X |
| 216 | RHC L3 Y (S) | V95J7755C | 48 | 7 | | 1.0 | | | STAT | | | | | | | | | | | | 8 | RM ORB | L RHC YAW 3 STATUS | X |
| 217 | RHC R1 R (S) | V95J7756C | 40 | 8 | | 1.0 | | | STAT | | | | | | | | | | | | 8 | RM ORB | R RHC ROLL 1 STATUS | X |
| 218 | RHC R2 R (S) | V95J7757C | 40 | 9 | | 1.0 | | | STAT | | | | | | | | | | | | 8 | RM ORB | R RHC ROLL 2 STATUS | X |
| 219 | RHC R3 R (S) | V95J7758C | 40 | 10 | | 1.0 | | | STAT | | | | | | | | | | | | 8 | RM ORB | R RHC ROLL 3 STATUS | X |
| 220 | RHC R1 P (S) | V95J7759C | 44 | 8 | | 1.0 | | | STAT | | | | | | | | | | | | 8 | RM ORB | R RHC PITCH 1 STATUS | X |
| 221 | RHC R2 P (S) | V95J7760C | 44 | 9 | | 1.0 | | | STAT | | | | | | | | | | | | 8 | RM ORB | R RHC PITCH 2 STATUS | X |
| 222 | RHC R3 P (S) | V95J7761C | 44 | 10 | | 1.0 | | | STAT | | | | | | | | | | | | 8 | RM ORB | R RHC PITCH 3 STATUS | X |
| 223 | RHC R1 Y (S) | V95J7762C | 48 | 8 | | 1.0 | | | STAT | | | | | | | | | | | | 8 | RM ORB | R RHC YAW 1 STATUS | X |
| 224 | RHC R2 Y (S) | V95J7763C | 48 | 9 | | 1.0 | | | STAT | | | | | | | | | | | | 8 | RM ORB | R RHC YAW 2 STATUS | X |
| 225 | RHC R3 Y (S) | V95J7764C | 48 | 10 | | 1.0 | | | STAT | | | | | | | | | | | | 8 | RM ORB | R RHC YAW 3 STATUS | X |
| 226 | RHC A1 R (S) | V95J7765C | 40 | 11 | | 1.0 | | | STAT | | | | | | | | | | | | 8 | RM ORB | AFT RHC ROLL 1 STATUS | X |
| 227 | RHC A2 R (S) | V95J7766C | 40 | 12 | | 1.0 | | | STAT | | | | | | | | | | | | 8 | RM ORB | AFT RHC ROLL 2 STATUS | X |

TABLE 4.5.2-2. RM CONTROLLERS (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | | | |
| 228 | RHC A3 R (S) | V95J7767C | 40 | 13 | | 1.0 | | | STAT | | | | | | | | | | | | 8 | RM ORB | AFT RHC ROLL 3 STATUS | X |
| 229 | RHC A1 P (S) | V95J7768C | 44 | 11 | | 1.0 | | | STAT | | | | | | | | | | | | 8 | RM ORB | AFT RHC PITCH 1 STATUS | X |
| 230 | RHC A2 P (S) | V95J7769C | 44 | 12 | | 1.0 | | | STAT | | | | | | | | | | | | 8 | RM ORB | AFT RHC PITCH 2 STATUS | X |
| 231 | RHC A3 P (S) | V95J7770C | 44 | 13 | | 1.0 | | | STAT | | | | | | | | | | | | 8 | RM ORB | AFT RHC PITCH 3 STATUS | X |
| 232 | RHC A1 Y (S) | V95J7771C | 48 | 11 | | 1.0 | | | STAT | | | | | | | | | | | | 8 | RM ORB | AFT RHC YAW 1 STATUS | X |
| 233 | RHC A2 Y (S) | V95J7772C | 48 | 12 | | 1.0 | | | STAT | | | | | | | | | | | | 8 | RM ORB | AFT RHC YAW 2 STATUS | X |
| 234 | RHC A3 Y (S) | V95J7773C | 48 | 13 | | 1.0 | | | STAT | | | | | | | | | | | | 8 | RM ORB | AFT RHC YAW 3 STATUS | X |
| 235 | RHC TRIM L1 R(+)(S) | V91X5416X | 40 | 14 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | LH RHC+ROLL TRIM–A COMMFAULT | X |
| 236 | RHC TRIM L1 R(–)(S) | V91X5414X | 40 | 14 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | LH RHC–ROLL TRIM–A COMMFAULT | X |
| 237 | RHC TRIM L2 R(+)(S) | V91X5417X | 40 | 15 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | LH RHC+ROLL TRIM–B COMMFAULT | X |
| 238 | RHC TRIM L2 R(–)(S) | V91X5415X | 40 | 15 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | LH RHC–ROLL TRIM–B COMMFAULT | X |
| 239 | RHC TRIM R1 R(+)(S) | V91X5468X | 40 | 16 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | RH RHC+ROLL TRIM–A COMMFAULT | X |
| 240 | RHC TRIM R1 R(–)(S) | V91X5466X | 40 | 16 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | RH RHC–ROLL TRIM–A COMMFAULT | X |
| 241 | RHC TRIM R2 R(+)(S) | V91X5469X | 40 | 17 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | RH RHC+ROLL TRIM–B COMMFAULT | X |
| 242 | RHC TRIM R2 R(–)(S) | V91X5467X | 40 | 17 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | RH RHC–ROLL TRIM–B COMMFAULT | X |
| 243 | RHC TRIM L1 P(+)(S) | V91X5412X | 44 | 14 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | LH RHC+PITCH TRIM–A COMMFAULT | X |
| 244 | RHC TRIM L1 P(–)(S) | V91X5410X | 44 | 14 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | LH RHC–PITCH TRIM–A COMMFAULT | X |
| 245 | RHC TRIM L2 P(+)(S) | V91X5413X | 44 | 15 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | LH RHC+PITCH TRIM–B COMMFAULT | X |
| 246 | RHC TRIM L2 P(–)(S) | V91X5411X | 44 | 15 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | LH RHC–PITCH TRIM–B COMMFAULT | X |

## TABLE 4.5.2-2. RM CONTROLLERS (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | | | |
| 247 | RHC TRIM R1 P(+)(S) | V91X5464X | 44 | 16 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | RH RHC+PITCH TRIM–A COMMFAULT | X |
| 248 | RHC TRIM R1 P(–)(S) | V91X5462X | 44 | 16 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | RH RHC–PITCH TRIM–A COMMFAULT | X |
| 249 | RHC TRIM R2 P(+)(S) | V91X5465X | 44 | 17 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | RH RHC+PITCH TRIM–B COMMFAULT | X |
| 250 | RHC TRIM R2 P(–)(S) | V91X5463X | 44 | 17 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | RH RHC–PITCH TRIM–B COMMFAULT | X |
| 251 | PNL TRIM L1 R(+)(S) | V91X5406X | 40 | 18 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | LH+ROLL TRIM A COMMFAULT | X |
| 252 | PNL TRIM L1 R(–)(S) | V91X5404X | 40 | 18 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | LH–ROLL TRIM A COMMFAULT | X |
| 253 | PNL TRIM L2 R(+)(S) | V91X5407X | 40 | 19 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | LH+ROLL TRIM B COMMFAULT | X |
| 254 | PNL TRIM L2 R(–)(S) | V91X5405X | 40 | 19 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | LH–ROLL TRIM B COMMFAULT | X |
| 255 | PNL TRIM R1 R(+)(S) | V91X5460X | 40 | 20 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | RH+ROLL TRIM A COMMFAULT | X |
| 256 | PNL TRIM R1 R(–)(S) | V91X5458X | 40 | 20 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | RH–ROLL TRIM A COMMFAULT | X |
| 257 | PNL TRIM R2 R(+)(S) | V91X5461X | 40 | 21 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | RH+ROLL TRIM B COMMFAULT | X |
| 258 | PNL TRIM R2 R(–)(S) | V91X5459X | 40 | 21 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | RH–ROLL TRIM B COMMFAULT | X |
| 259 | PNL TRIM L1 P(+)(S) | V91X5402X | 44 | 18 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | LH+PITCH TRIM A COMMFAULT | X |
| 260 | PNL TRIM L1 P(–)(S) | V91X5400X | 44 | 18 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | LH–PITCH TRIM A COMMFAULT | X |
| 261 | PNL TRIM L2 P(+)(S) | V91X5403X | 44 | 19 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | LH+PITCH TRIM B COMMFAULT | X |
| 262 | PNL TRIM L2 P(–)(S) | V91X5401X | 44 | 19 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | LH–PITCH TRIM B COMMFAULT | X |
| 263 | PNL TRIM R1 P(+)(S) | V91X5456X | 44 | 20 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | RH+PITCH TRIM A COMMFAULT | X |
| 264 | PNL TRIM R1 P(–)(S) | V91X5454X | 44 | 20 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | RH–PITCH TRIM A COMMFAULT | X |
| 265 | PNL TRIM R2 P(+)(S) | V91X5457X | 44 | 21 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | RH+PITCH TRIM B COMMFAULT | X |
| 266 | PNL TRIM R2 P(–)(S) | V91X5455X | 44 | 21 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | RH–PITCH TRIM B COMMFAULT | X |
| 267 | PNL TRIM L1 Y(+)(S) | V91X5422X | 48 | 18 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | LH+YAW TRIM–A COMMFAULT | X |
| 268 | PNL TRIM L1 Y(–)(S) | V91X5420X | 48 | 18 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | LH–YAW TRIM–A COMMFAULT | X |
| 269 | PNL TRIM L2 Y(+)(S) | V91X5423X | 48 | 19 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | LH+YAW TRIM–B COMMFAULT | X |
| 270 | PNL TRIM L2 Y(–)(S) | V91X5421X | 48 | 19 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | LH–YAW TRIM–B COMMFAULT | X |
| 271 | PNL TRIM R1 Y(+)(S) | V91X5474X | 48 | 20 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | RH+YAW TRIM–A COMMFAULT | X |
| 272 | PNL TRIM R1 Y(–)(S) | V91X5472X | 48 | 20 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | RH–YAW TRIM–A COMMFAULT | X |

TABLE 4.5.2-2. RM CONTROLLERS (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | | | |
| 273 | PNL TRIM R2 Y(+)(S) | V91X5475X | 48 | 21 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | RH+YAW TRIM–B COMMFAULT | X |
| 274 | PNL TRIM R2 Y(–)(S) | V91X5473X | 48 | 21 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | RH–YAW TRIM–B COMMFAULT | X |
| 275 | (MSG LINE) | V93X0050X | 1 | 25 | | 44.0 | | | CHAR | | | | | | | G | | | | | | UI | MESSAGE LINE | X |
| 276 | (BUFFER MSG) | V93X0054X | 45 | 25 | | 4.0 | | | CHAR | | | | | | | G | | | | | | UI | BUFFER MESSAGE INDICATOR | X |
| 277 | (SPL) | V93X0056X | 2 | 26 | | 49.0 | | | CHAR | | | | | | | G | | | | | | UI | SCRATCH PAD LINE | X |

TABLE 4.5.2-5. INPUT FUNCTIONAL PARAMETERS FOR RM/CONTROLLERS DISPLAY (V5.1.6)

| FSSR NAME | M/S ID | NOMENCLATURE | SOURCE | UNITS | DATA TYPE | PREC | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|
| (CRT_TIME) | V91W1987C | DISPLAY CRT TIMER,GNC | FCOS | | SPL | | 93090E | |
| (DISP) | V93X0044X | DISPLAY FUNCTION PAGE | UI | | BD | | 93090E | |
| (GPC) | V93X0048X | GPC DRIVER | UI | | BD | | 93090E | |
| (LINE) | V93X0050X | MESSAGE LINE | UI | | BD | | 93090E | |
| (MSG) | V93X0054X | BUFFER MESSAGE INDICATOR | UI | | BD | | 93090E | |
| (MT) | V91W1990C | DISPLAY MSN TIME | FCOS | S | VAR | | 93090E | |
| (OPS) | V93X0040X | OPS FUNCTION PAGE | UI | | BD | | 93090E | |
| (SPEC) | V93X0042X | SPEC FUNCTION PAGE | UI | | BD | | 93090E | |
| (SPL) | V93X0056X | SCRATCH PAD LINE | UI | | BD | | 93090E | |
| (UL) | V92X5032X | UPLINK ACTIVITY IND | UI | | BD | | 93090E | |
| DSBCC(1) | V72K1575C | LH SBTC CMD-A | SBTC 1 | VDC | AMB | | 93017G | * |
| DSBCC(2) | V72K1578C | LH SBTC CMD-B | SBTC 1 | VDC | AMB | | 93017G | * |
| DSBCC(3) | V72K1581C | LH SBTC CMD-C | SBTC 1 | VDC | AMB | | 93017G | * |
| DSBCP(1) | V72K1585C | RH SBTC CMD-A | SBTC 2 | VDC | AMB | | 93017G | * |
| DSBCP(2) | V72K1588C | RH SBTC CMD-B | SBTC 2 | VDC | AMB | | 93017G | * |
| DSBCP(3) | V72K1591C | RH SBTC CMD-C | SBTC 2 | VDC | AMB | | 93017G | * |
| LRPTA_CF(1) | V91X6700X | LH RPTA CMD A COMMFAULT | FCOS | | BD | | | |
| LRPTA_CF(2) | V91X6701X | LH RPTA CMD B COMMFAULT | FCOS | | BD | | | |
| LRPTA_CF(3) | V91X6702X | LH RPTA CMD C COMMFAULT | FCOS | | BD | | | |
| LSBTC_CF(1) | V91X6800X | LH SBTC CMD A COMMFAULT | FCOS | | BD | | | |
| LSBTC_CF(2) | V91X6801X | LH SBTC CMD B COMMFAULT | FCOS | | BD | | | |
| LSBTC_CF(3) | V91X6802X | LH SBTC CMD C COMMFAULT | FCOS | | BD | | | |
| RRPTA_CF(1) | V91X6750X | RH RPTA CMD A COMMFAULT | FCOS | | BD | | | |
| RRPTA_CF(2) | V91X6751X | RH RPTA CMD B COMMFAULT | FCOS | | BD | | | |
| RRPTA_CF(3) | V91X6752X | RH RPTA CMD C COMMFAULT | FCOS | | BD | | | |
| RSBTC_CF(1) | V91X6850X | RH SBTC CMD A COMMFAULT | FCOS | | BD | | | |
| RSBTC_CF(2) | V91X6851X | RH SBTC CMD B COMMFAULT | FCOS | | BD | | | |
| RSBTC_CF(3) | V91X6852X | RH SBTC CMD C COMMFAULT | FCOS | | BD | | | |
| | V72K1315X | FWD THC POS X OUTPUT-A | THC FWD | | BD | | 93017G | * |
| | V72K1316X | FWD THC NEG X OUTPUT-A | THC FWD | | BD | | 93017G | * |
| | V72K1320X | FWD THC POS Y OUTPUT-A | THC FWD | | BD | | 93017G | * |
| | V72K1321X | FWD THC NEG Y OUTPUT-A | THC FWD | | BD | | 93017G | * |
| | V72K1325X | FWD THC POS Z OUTPUT-A | THC FWD | | BD | | 93017G | * |
| | V72K1326X | FWD THC NEG Z OUTPUT-A | THC FWD | | BD | | 93017G | * |
| | V72K1335X | FWD THC POS X OUTPUT-B | THC FWD | | BD | | 93017G | * |
| | V72K1336X | FWD THC NEG X OUTPUT-B | THC FWD | | BD | | 93017G | * |
| | V72K1340X | FWD THC POS Y OUTPUT-B | THC FWD | | BD | | 93017G | * |
| | V72K1341X | FWD THC NEG Y OUTPUT-B | THC FWD | | BD | | 93017G | * |
| | V72K1345X | FWD THC POS Z OUTPUT-B | THC FWD | | BD | | 93017G | * |
| | V72K1346X | FWD THC NEG Z OUTPUT-B | THC FWD | | BD | | 93017G | * |
| | V72K1355X | FWD THC POS X OUTPUT-C | THC FWD | | BD | | 93017G | * |
| | V72K1356X | FWD THC NEG X OUTPUT-C | THC FWD | | BD | | 93017G | * |
| | V72K1360X | FWD THC POS Y OUTPUT-C | THC FWD | | BD | | 93017G | * |
| | V72K1361X | FWD THC NEG Y OUTPUT-C | THC FWD | | BD | | 93017G | * |
| | V72K1365X | FWD THC POS Z OUTPUT-C | THC FWD | | BD | | 93017G | * |
| | V72K1366X | FWD THC NEG Z OUTPUT-C | THC FWD | | BD | | 93017G | * |

TABLE 4.5.2-5. INPUT FUNCTIONAL PARAMETERS FOR RM/CONTROLLERS DISPLAY (V5.1.6)

| FSSR NAME | M/S ID | NOMENCLATURE | SOURCE | UNITS | DATA TYPE | PREC | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|
| | V72K1435X | AFT THC POS X OUTPUT-A | THC AFT | | BD | | 93017G | * |
| | V72K1436X | AFT THC NEG X OUTPUT-A | THC AFT | | BD | | 93017G | * |
| | V72K1440X | AFT THC POS Y OUTPUT-A | THC AFT | | BD | | 93017G | * |
| | V72K1441X | AFT THC NEG Y OUTPUT-A | THC AFT | | BD | | 93017G | * |
| | V72K1445X | AFT THC POS Z OUTPUT-A | THC AFT | | BD | | 93017G | * |
| | V72K1446X | AFT THC NEG Z OUTPUT-A | THC AFT | | BD | | 93017G | * |
| | V72K1451X | AFT THC POS X OUTPUT-B | THC AFT | | BD | | 93017G | * |
| | V72K1455X | AFT THC NEG X OUTPUT-B | THC AFT | | BD | | 93017G | * |
| | V72K1460X | AFT THC POS Y OUTPUT-B | THC AFT | | BD | | 93017G | * |
| | V72K1461X | AFT THC NEG Y OUTPUT-B | THC AFT | | BD | | 93017G | * |
| | V72K1465X | AFT THC POS Z OUTPUT-B | THC AFT | | BD | | 93017G | * |
| | V72K1466X | AFT THC NEG Z OUTPUT-B | THC AFT | | BD | | 93017G | * |
| | V72K1475X | AFT THC POS X OUTPUT-C | THC AFT | | BD | | 93017G | * |
| | V72K1476X | AFT THC NEG X OUTPUT-C | THC AFT | | BD | | 93017G | * |
| | V72K1480X | AFT THC POS Y OUTPUT-C | THC AFT | | BD | | 93017G | * |
| | V72K1481X | AFT THC NEG Y OUTPUT-C | THC AFT | | BD | | 93017G | * |
| | V72K1485X | AFT THC POS Z OUTPUT-C | THC AFT | | BD | | 93017G | * |
| | V72K1486X | AFT THC NEG Z OUTPUT-C | THC AFT | | BD | | 93017G | * |
| | V91X5380X | LH BODYFLAP DOWN A COMMFAULT | FCOS | | BD | | | |
| | V91X5381X | LH BODYFLAP DOWN B COMMFAULT | FCOS | | BD | | | |
| | V91X5382X | LH BODYFLAP UP A COMMFAULT | FCOS | | BD | | | |
| | V91X5383X | LH BODYFLAP UP B COMMFAULT | FCOS | | BD | | | |
| | V91X5400X | LH-PITCH TRIM A COMMFAULT | FCOS | | BD | | | |
| | V91X5401X | LH-PITCH TRIM B COMMFAULT | FCOS | | BD | | | |
| | V91X5402X | LH+PITCH TRIM A COMMFAULT | FCOS | | BD | | | |
| | V91X5403X | LH+PITCH TRIM B COMMFAULT | FCOS | | BD | | | |
| | V91X5404X | LH-ROLL TRIM A COMMFAULT | FCOS | | BD | | | |
| | V91X5405X | LH-ROLL TRIM B COMMFAULT | FCOS | | BD | | | |
| | V91X5406X | LH+ROLL TRIM A COMMFAULT | FCOS | | BD | | | |
| | V91X5407X | LH+ROLL TRIM B COMMFAULT | FCOS | | BD | | | |
| | V91X5410X | LH RHC-PITCH TRIM-A COMMFAULT | FCOS | | BD | | | |
| | V91X5411X | LH RHC-PITCH TRIM-B COMMFAULT | FCOS | | BD | | | |
| | V91X5412X | LH RHC+PITCH TRIM-A COMMFAULT | FCOS | | BD | | | |
| | V91X5413X | LH RHC+PITCH TRIM-B COMMFAULT | FCOS | | BD | | | |
| | V91X5414X | LH RHC-ROLL TRIM-A COMMFAULT | FCOS | | BD | | | |
| | V91X5415X | LH RHC-ROLL TRIM-B COMMFAULT | FCOS | | BD | | | |
| | V91X5416X | LH RHC+ROLL TRIM-A COMMFAULT | FCOS | | BD | | | |
| | V91X5417X | LH RHC+ROLL TRIM-B COMMFAULT | FCOS | | BD | | | |
| | V91X5420X | LH-YAW TRIM-A COMMFAULT | FCOS | | BD | | | |
| | V91X5421X | LH-YAW TRIM-B COMMFAULT | FCOS | | BD | | | |
| | V91X5422X | LH+YAW TRIM-A COMMFAULT | FCOS | | BD | | | |
| | V91X5423X | LH+YAW TRIM-B COMMFAULT | FCOS | | BD | | | |
| | V91X5450X | RH BODY FLAP DOWN A COMMFAULT | FCOS | | BD | | | |
| | V91X5451X | RH BODY FLAP DOWN B COMMFAULT | FCOS | | BD | | | |
| | V91X5452X | RH BODY FLAP UP A COMMFAULT | FCOS | | BD | | | |
| | V91X5453X | RH BODY FLAP UP B COMMFAULT | FCOS | | BD | | | |

TABLE 4.5.2-5. INPUT FUNCTIONAL PARAMETERS FOR RM/CONTROLLERS DISPLAY (V5.1.6)

| FSSR NAME | M/S ID | NOMENCLATURE | SOURCE | UNITS | DATA TYPE | PREC | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|
| | V91X5454X | RH-PITCH TRIM A COMMFAULT | FCOS | | BD | | | |
| | V91X5455X | RH-PITCH TRIM B COMMFAULT | FCOS | | BD | | | |
| | V91X5456X | RH+PITCH TRIM A COMMFAULT | FCOS | | BD | | | |
| | V91X5457X | RH+PITCH TRIM B COMMFAULT | FCOS | | BD | | | |
| | V91X5458X | RH-ROLL TRIM A COMMFAULT | FCOS | | BD | | | |
| | V91X5459X | RH-ROLL TRIM B COMMFAULT | FCOS | | BD | | | |
| | V91X5460X | RH+ROLL TRIM A COMMFAULT | FCOS | | BD | | | |
| | V91X5461X | RH+ROLL TRIM B COMMFAULT | FCOS | | BD | | | |
| | V91X5462X | RH RHC-PITCH TRIM-A COMMFAULT | FCOS | | BD | | | |
| | V91X5463X | RH RHC-PITCH TRIM-B COMMFAULT | FCOS | | BD | | | |
| | V91X5464X | RH RHC+PITCH TRIM-A COMMFAULT | FCOS | | BD | | | |
| | V91X5465X | RH RHC+PITCH TRIM-B COMMFAULT | FCOS | | BD | | | |
| | V91X5466X | RH RHC-ROLL TRIM-A COMMFAULT | FCOS | | BD | | | |
| | V91X5467X | RH RHC-ROLL TRIM-B COMMFAULT | FCOS | | BD | | | |
| | V91X5468X | RH RHC+ROLL TRIM-A COMMFAULT | FCOS | | BD | | | |
| | V91X5469X | RH RHC+ROLL TRIM-B COMMFAULT | FCOS | | BD | | | |
| | V91X5472X | RH-YAW TRIM-A COMMFAULT | FCOS | | BD | | | |
| | V91X5473X | RH-YAW TRIM-B COMMFAULT | FCOS | | BD | | | |
| | V91X5474X | RH+YAW TRIM-A COMMFAULT | FCOS | | BD | | | |
| | V91X5475X | RH+YAW TRIM-B COMMFAULT | FCOS | | BD | | | |
| | V93X4201XA | LH RHC 1 DES CMD | RM ORB DISP | | | | 93017G | * |
| | V93X4201XB | LH RHC 1 DES CMD | RM/CNTLR DISP | | | | 93017G | * |
| | V93X4203XA | LH RHC 2 DES CMD | RM ORB DISP | | | | 93017G | * |
| | V93X4203XB | LH RHC 2 DES CMD | RM/CNTLR DISP | | | | 93017G | * |
| | V93X4205XA | LH RHC 3 DES CMD | RM ORB DISP | | | | 93017G | * |
| | V93X4205XB | LH RHC 3 DES CMD | RM/CNTLR DISP | | | | 93017G | * |
| | V93X4207XA | FWD THC X,Y,Z OUT DES A | RM ORB DISP | | | | 93017G | * |
| | V93X4207XB | FWD THC X,Y,Z OUT DES A | RM/CNTLR DISP | | | | 93017G | * |
| | V93X4208XA | FWD THC X,Y,Z OUT DES B | RM ORB DISP | | | | 93017G | * |
| | V93X4208XB | FWD THC X,Y,Z OUT DES B | RM/CNTLR DISP | | | | 93017G | * |
| | V93X4209XA | FWD THC X,Y,Z OUT DES C | RM ORB DISP | | | | 93017G | * |
| | V93X4209XB | FWD THC X,Y,Z OUT DES C | RM/CNTLR DISP | | | | 93017G | * |
| | V93X4211X | LH SPD BRK 1 DES CMD | RM/CNTLR DISP | | BD | | 93017G | * |
| | V93X4213X | LH SPD BRK 2 DES CMD | RM/CNTLR DISP | | BD | | 93017G | * |
| | V93X4215X | LH SPD BRK 3 DES CMD | RM/CNTLR DISP | | BD | | 93017G | * |
| | V93X4221X | LH RPTA 1 DES CMD | RM/CNTLR DISP | | BD | | 93017G | * |
| | V93X4223X | LH RPTA 2 DES CMD | RM/CNTLR DISP | | BD | | 93017G | * |
| | V93X4225X | LH RPTA 3 DES CMD | RM/CNTLR DISP | | BD | | 93017G | * |
| | V93X4231XA | RH RHC 1 DES CMD | RM ORB DISP | | | | 93017G | * |
| | V93X4231XB | RH RHC 1 DES CMD | RM/CNTLR DISP | | | | 93017G | * |
| | V93X4233XA | RH RHC 2 DES CMD | RM ORB DISP | | | | 93017G | * |
| | V93X4233XB | RH RHC 2 DES CMD | RM/CNTLR DISP | | | | 93017G | * |
| | V93X4235XA | RH RHC 3 DES CMD | RM ORB DISP | | | | 93017G | * |
| | V93X4235XB | RH RHC 3 DES CMD | RM/CNTLR DISP | | | | 93017G | * |
| | V93X4237XA | AFT THC X,Y,Z OUT DES A | RM ORB DISP | | | | 93017G | * |
| | V93X4237XB | AFT THC X,Y,Z OUT DES A | RM/CNTLR DISP | | | | 93017G | * |

TABLE 4.5.2-5. INPUT FUNCTIONAL PARAMETERS FOR RM/CONTROLLERS DISPLAY (V5.1.6)

| FSSR NAME | M/S ID | NOMENCLATURE | SOURCE | UNITS | DATA TYPE | PREC | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|
| | V93X4238XA | AFT THC X,Y,Z OUT DES B | RM ORB DISP | | | | 93017G | * |
| | V93X4238XB | AFT THC X,Y,Z OUT DES B | RM/CNTLR DISP | | | | 93017G | * |
| | V93X4239XA | AFT THC X,Y,Z OUT DES C | RM ORB DISP | | | | 93017G | * |
| | V93X4239XB | AFT THC X,Y,Z OUT DES C | RM/CNTLR DISP | | | | 93017G | * |
| | V93X4241X | RH SPD BRK 1 DES CMD | RM/CNTLR DISP | | BD | | 93017G | * |
| | V93X4243X | RH SPD BRK 2 DES CMD | RM/CNTLR DISP | | BD | | 93017G | * |
| | V93X4245X | RH SPD BRK 3 DES CMD | RM/CNTLR DISP | | BD | | 93017G | * |
| | V93X4251X | RH RPTA 1 DES CMD | RM/CNTLR DISP | | BD | | 93017G | * |
| | V93X4253X | RH RPTA 2 DES CMD | RM/CNTLR DISP | | BD | | 93017G | * |
| | V93X4255X | RH RPTA 3 DES CMD | RM/CNTLR DISP | | BD | | 93017G | * |
| | V93X4276X | LH BF SLEW SW 1 DES CMD | RM/CNTLR DISP | | BD | | 93017G | * |
| | V93X4277X | LH BF SLEW SW 2 DES CMD | RM/CNTLR DISP | | BD | | 93017G | * |
| | V93X4278X | RH BF SLEW SW 1 DES CMD | RM/CNTLR DISP | | BD | | 93017G | * |
| | V93X4279X | RH BF SLEW SW 2 DES CMD | RM/CNTLR DISP | | BD | | 93017G | * |
| | V93X4287X | LH RHC TRIM 1 DES CMD | RM/CNTLR DISP | | BD | | 93017G | * |
| | V93X4288X | LH RHC TRIM 2 DES CMD | RM/CNTLR DISP | | BD | | 93017G | * |
| | V93X4289X | RH RHC TRIM 1 DES CMD | RM/CNTLR DISP | | BD | | 93017G | * |
| | V93X4290X | RH RHC TRIM 2 DES CMD | RM/CNTLR DISP | | BD | | 93017G | * |
| | V93X4291X | LH PNL TRIM 1 DES CMD | RM/CNTLR DISP | | BD | | 93017G | * |
| | V93X4292X | LH PNL TRIM 2 DES CMD | RM/CNTLR DISP | | BD | | 93017G | * |
| | V93X4293X | RH PNL TRIM 1 DES CMD | RM/CNTLR DISP | | BD | | 93017G | * |
| | V93X4294X | RH PNL TRIM 2 DES CMD | RM/CNTLR DISP | | BD | | 93017G | * |
| | V93X4296XA | AFT RHC 1 DES CMD | RM ORB DISP | | | | 93017G | * |
| | V93X4296XB | AFT RHC 1 DES CMD | RM/CNTLR DISP | | | | 93017G | * |
| | V93X4297XA | AFT RHC 2 DES CMD | RM ORB DISP | | | | 93017G | * |
| | V93X4297XB | AFT RHC 2 DES CMD | RM/CNTLR DISP | | | | 93017G | * |
| | V93X4298XA | AFT RHC 3 DES CMD | RM ORB DISP | | | | 93017G | * |
| | V93X4298XB | AFT RHC 3 DES CMD | RM/CNTLR DISP | | | | 93017G | * |
| | V95H7683C | RH RHC 1 PITCH CMD | RM ORB DIP | PCT | BSS | | | |
| | V95H7684C | RH RHC 2 PITCH CMD | RM ORB DIP | PCT | BSS | | | |
| | V95H7685C | RH RHC 3 PITCH CMD | RM ORB DIP | PCT | BSS | | | |
| | V95H7686C | RH RHC 1 ROLL CMD | RM ORB DIP | PCT | BSS | | | |
| | V95H7687C | RH RHC 2 ROLL CMD | RM ORB DIP | PCT | BSS | | | |
| | V95H7688C | RH RHC 3 ROLL CMD | RM ORB DIP | PCT | BSS | | | |
| | V95H7702C | LH RHC 1 PITCH CMD | RM ORB DIP | PCT | BSS | | | |
| | V95H7703C | LH RHC 2 PITCH CMD | RM ORB DIP | PCT | BSS | | | |
| | V95H7704C | LH RHC 3 PITCH CMD | RM ORB DIP | PCT | BSS | | | |
| | V95H7705C | LH RHC 1 ROLL CMD | RM ORB DIP | PCT | BSS | | | |
| | V95H7706C | LH RHC 2 ROLL CMD | RM ORB DIP | PCT | BSS | | | |
| | V95H7707C | LH RHC 3 ROLL CMD | RM ORB DIP | PCT | VAR | | | |
| | V95H7712C | LH RHC 1 YAW CMD | RM ORB DIP | PCT | BSS | | | |
| | V95H7713C | LH RHC 2 YAW CMD | RM ORB DIP | PCT | BSS | | | |
| | V95H7714C | LH RHC 3 YAW CMD | RM ORB DIP | PCT | BSS | | | |
| | V95H7715C | RH RHC 1 YAW CMD | RM ORB DIP | PCT | BSS | | | |
| | V95H7716C | RH RHC 2 YAW CMD | RM ORB DIP | PCT | BSS | | | |
| | V95H7717C | RH RHC 3 YAW CMD | RM ORB DIP | PCT | BSS | | | |

TABLE 4.5.2-5. INPUT FUNCTIONAL PARAMETERS FOR RM/CONTROLLERS DISPLAY (V5.1.6)

| FSSR NAME | M/S ID | NOMENCLATURE | SOURCE | UNITS | DATA TYPE | PREC | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|
| | V95H7719C | AFT RHC 1 PITCH CMD | RM ORB DIP | PCT | BSS | | | |
| | V95H7720C | AFT RHC 2 PITCH CMD | RM ORB DIP | PCT | BSS | | | |
| | V95H7721C | AFT RHC 3 PITCH CMD | RM ORB DIP | PCT | BSS | | | |
| | V95H7722C | AFT RHC 1 YAW CMD | RM ORB DIP | PCT | BSS | | | |
| | V95H7723C | AFT RHC 2 YAW CMD | RM ORB DIP | PCT | BSS | | | |
| | V95H7724C | AFT RHC 3 YAW CMD | RM ORB DIP | PCT | BSS | | | |
| | V95H7725C | AFT RHC 1 ROLL CMD | RM ORB DIP | PCT | BSS | | | |
| | V95H7726C | AFT RHC 2 ROLL CMD | RM ORB DIP | PCT | BSS | | | |
| | V95H7727C | AFT RHC 3 ROLL CMD | RM ORB DIP | PCT | BSS | | | |
| | V95J7729C | FWD THC X CHANNEL 1 STATUS | RM ORB DIP | | VAR | | | |
| | V95J7730C | FWD THC Y CHANNEL 1 STATUS | RM ORB DIP | | VAR | | | |
| | V95J7731C | FWD THC Z CHANNEL 1 STATUS | RM ORB DIP | | VAR | | | |
| | V95J7732C | FWD THC X CHANNEL 2 STATUS | RM ORB DIP | | VAR | | | |
| | V95J7733C | FWD THC Y CHANNEL 2 STATUS | RM ORB DIP | | VAR | | | |
| | V95J7734C | FWD THC Z CHANNEL 2 STATUS | RM ORB DIP | | VAR | | | |
| | V95J7735C | FWD THC X CHANNEL 3 STATUS | RM ORB DIP | | VAR | | | |
| | V95J7736C | FWD THC Y CHANNEL 3 STATUS | RM ORB DIP | | VAR | | | |
| | V95J7737C | FWD THC Z CHANNEL 3 STATUS | RM ORB DIP | | VAR | | | |
| | V95J7738C | AFT THC X CHANNEL 1 STATUS | RM ORB DIP | | VAR | | | |
| | V95J7739C | AFT THC Y CHANNEL 1 STATUS | RM ORB DIP | | VAR | | | |
| | V95J7740C | AFT THC Z CHANNEL 1 STATUS | RM ORB DIP | | VAR | | | |
| | V95J7741C | AFT THC X CHANNEL 2 STATUS | RM ORB DIP | | VAR | | | |
| | V95J7742C | AFT THC Y CHANNEL 2 STATUS | RM ORB DIP | | VAR | | | |
| | V95J7743C | AFT THC Z CHANNEL 2 STATUS | RM ORB DIP | | VAR | | | |
| | V95J7744C | AFT THC X CHANNEL 3 STATUS | RM ORB DIP | | VAR | | | |
| | V95J7745C | AFT THC Y CHANNEL 3 STATUS | RM ORB DIP | | VAR | | | |
| | V95J7746C | AFT THC Z CHANNEL 3 STATUS | RM ORB DIP | | VAR | | | |
| | V95J7747C | L RHC ROLL 1 STATUS | RM ORB DIP | | VAR | | | |
| | V95J7748C | L RHC ROLL 2 STATUS | RM ORB DIP | | VAR | | | |
| | V95J7749C | L RHC ROLL 3 STATUS | RM ORB DIP | | VAR | | | |
| | V95J7750C | L RHC PITCH 1 STATUS | RM ORB DIP | | VAR | | | |
| | V95J7751C | L RHC PITCH 2 STATUS | RM ORB DIP | | VAR | | | |
| | V95J7752C | L RHC PITCH 3 STATUS | RM ORB DIP | | VAR | | | |
| | V95J7753C | L RHC YAW 1 STATUS | RM ORB DIP | | VAR | | | |
| | V95J7754C | L RHC YAW 2 STATUS | RM ORB DIP | | VAR | | | |
| | V95J7755C | L RHC YAW 3 STATUS | RM ORB DIP | | VAR | | | |
| | V95J7756C | R RHC ROLL 1 STATUS | RM ORB DIP | | VAR | | | |
| | V95J7757C | R RHC ROLL 2 STATUS | RM ORB DIP | | VAR | | | |
| | V95J7758C | R RHC ROLL 3 STATUS | RM ORB DIP | | VAR | | | |
| | V95J7759C | R RHC PITCH 1 STATUS | RM ORB DIP | | VAR | | | |
| | V95J7760C | R RHC PITCH 2 STATUS | RM ORB DIP | | VAR | | | |
| | V95J7761C | R RHC PITCH 3 STATUS | RM ORB DIP | | VAR | | | |
| | V95J7762C | R RHC YAW 1 STATUS | RM ORB DIP | | VAR | | | |
| | V95J7763C | R RHC YAW 2 STATUS | RM ORB DIP | | VAR | | | |
| | V95J7764C | R RHC YAW 3 STATUS | RM ORB DIP | | VAR | | | |
| | V95J7765C | AFT RHC ROLL 1 STATUS | RM ORB DIP | | VAR | | | |

TABLE 4.5.2-5. INPUT FUNCTIONAL PARAMETERS FOR RM/CONTROLLERS DISPLAY (V5.1.6)

| FSSR NAME | M/S ID | NOMENCLATURE | SOURCE | UNITS | DATA TYPE | PREC | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|
| | V95J7766C | AFT RHC ROLL 2 STATUS | RM ORB DIP | | VAR | | | |
| | V95J7767C | AFT RHC ROLL 3 STATUS | RM ORB DIP | | VAR | | | |
| | V95J7768C | AFT RHC PITCH 1 STATUS | RM ORB DIP | | VAR | | | |
| | V95J7769C | AFT RHC PITCH 2 STATUS | RM ORB DIP | | VAR | | | |
| | V95J7770C | AFT RHC PITCH 3 STATUS | RM ORB DIP | | VAR | | | |
| | V95J7771C | AFT RHC YAW 1 STATUS | RM ORB DIP | | VAR | | | |
| | V95J7772C | AFT RHC YAW 2 STATUS | RM ORB DIP | | VAR | | | |
| | V95J7773C | AFT RHC YAW 3 STATUS | RM ORB DIP | | VAR | | | |

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE 4.5.2-6. OUTPUT FUNCTIONAL PARAMETERS FROM RM/CONTROLLERS DISPLAY (V5.1.6)

| FSSR NAME | M/S ID | NOMENCLATURE | DESTINATION | UNITS | DATA TYPE | PREC | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|
| | V90M2844PB | CGRB_STATUS_2$(8;) | DL FMT 32/A | | | | 93017G | * |
| | V90M2845P | CGRB_STATUS_2$(9;) | DL FMT 32/A | | | | 93017G | * |
| | V90M2846PB | CGRB_STATUS_2$(10;) | DL FMT 32/A | | | | 93017G | * |
| | V90M2847P | CGRB_STATUS_2$(11;) | DL FMT 32/A | | | | 93017G | * |
| | V90M2848PB | CGRB_STATUS_2$(12;) | DL FMT 32/A | | | | 93017G | * |
| | V90M2850PB | CGRB_STATUS_2$(15;) | DL FMT 32/A | | | | 93017G | * |
| | V90M2977P | CGRB_SW_SF$(7:) | DL FMT 32/A | | | | 93017G | * |
| | V90M2978P | CGRB_SW_SF$(8:) | DL FMT 32/A | | | | 93017G | * |
| | V90M2989PB | CGRB_STATUS_2$(18;) | DL FMT 32/A | | | | 93017G | * |
| | V93M0505PB | CGZB_THC_ASTER | DL FMT 32/A | | | | 93017G | * |
| | V93X4201XB | LH RHC 1 DES CMD | DL FMT 32/A<br>GAX<br>RHC FDIR<br>RM ORB DIP<br>RM ORB DISP<br>RM/CNTLR DISP | | | | 93017G | * |
| | V93X4203XB | LH RHC 2 DES CMD | DL FMT 32/A<br>GAX<br>RHC FDIR<br>RM ORB DIP<br>RM ORB DISP<br>RM/CNTLR DISP | | | | 93017G | * |
| | V93X4205XB | LH RHC 3 DES CMD | DL FMT 32/A<br>GAX<br>RHC FDIR<br>RM ORB DIP<br>RM ORB DISP<br>RM/CNTLR DISP | | | | 93017G | * |
| | V93X4207XB | FWD THC X,Y,Z OUT DES A | DL FMT 32/A<br>GAX<br>GN&C SW RM<br>RM ORB DIP<br>RM ORB DISP<br>RM/CNTLR DISP | | | | 93017G | * |
| | V93X4208XB | FWD THC X,Y,Z OUT DES B | DL FMT 32/A<br>GAX<br>GN&C SW RM<br>RM ORB DIP<br>RM ORB DISP<br>RM/CNTLR DISP | | | | 93017G | * |
| | V93X4209XB | FWD THC X,Y,Z OUT DES C | DL FMT 32/A<br>GAX<br>GN&C SW RM<br>RM ORB DIP<br>RM ORB DISP<br>RM/CNTLR DISP | | | | 93017G | * |

TABLE 4.5.2-6. OUTPUT FUNCTIONAL PARAMETERS FROM RM/CONTROLLERS DISPLAY (V5.1.6)

| FSSR NAME | M/S ID | NOMENCLATURE | DESTINATION | UNITS | DATA TYPE | PREC | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|
| | V93X4211X | LH SPD BRK 1 DES CMD | DL FMT 32/A<br>GAX<br>RM/CNTLR DISP<br>SBTC FDIR | | BD | | 93017G | * |
| | V93X4213X | LH SPD BRK 2 DES CMD | DL FMT 32/A<br>GAX<br>RM/CNTLR DISP<br>SBTC FDIR | | BD | | 93017G | * |
| | V93X4215X | LH SPD BRK 3 DES CMD | DL FMT 32/A<br>GAX<br>RM/CNTLR DISP<br>SBTC FDIR | | BD | | 93017G | * |
| | V93X4221X | LH RPTA 1 DES CMD | DL FMT 32/A<br>RM/CNTLR DISP<br>RPTA FDIR | | BD | | 93017G | * |
| | V93X4223X | LH RPTA 2 DES CMD | DL FMT 32/A<br>RM/CNTLR DISP<br>RPTA FDIR | | BD | | 93017G | * |
| | V93X4225X | LH RPTA 3 DES CMD | DL FMT 32/A<br>RM/CNTLR DISP<br>RPTA FDIR | | BD | | 93017G | * |
| | V93X4231XB | RH RHC 1 DES CMD | DL FMT 32/A<br>GAX<br>RHC FDIR<br>RM ORB DIP<br>RM ORB DISP<br>RM/CNTLR DISP | | | | 93017G | * |
| | V93X4233XB | RH RHC 2 DES CMD | DL FMT 32/A<br>GAX<br>RHC FDIR<br>RM ORB DIP<br>RM ORB DISP<br>RM/CNTLR DISP | | | | 93017G | * |
| | V93X4235XB | RH RHC 3 DES CMD | DL FMT 32/A<br>GAX<br>RHC FDIR<br>RM ORB DIP<br>RM ORB DISP<br>RM/CNTLR DISP | | | | 93017G | * |
| | V93X4237XB | AFT THC X,Y,Z OUT DES A | DL FMT 32/A<br>GAX<br>GN&C SW RM<br>RM ORB DIP<br>RM ORB DISP<br>RM/CNTLR DISP | | | | 93017G | * |

TABLE 4.5.2-6. OUTPUT FUNCTIONAL PARAMETERS FROM RM/CONTROLLERS DISPLAY (V5.1.6)

| FSSR NAME | M/S ID | NOMENCLATURE | DESTINATION | UNITS | DATA TYPE | PREC | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|
| | V93X4238XB | AFT THC X,Y,Z OUT DES B | DL FMT 32/A<br>GAX<br>GN&C SW RM<br>RM ORB DIP<br>RM ORB DISP<br>RM/CNTLR DISP | | | | 93017G | * |
| | V93X4239XB | AFT THC X,Y,Z OUT DES C | DL FMT 32/A<br>GAX<br>GN&C SW RM<br>RM ORB DIP<br>RM ORB DISP<br>RM/CNTLR DISP | | | | 93017G | * |
| | V93X4241X | RH SPD BRK 1 DES CMD | DL FMT 32/A<br>GAX<br>RM/CNTLR DISP<br>SBTC FDIR | | BD | | 93017G | * |
| | V93X4243X | RH SPD BRK 2 DES CMD | DL FMT 32/A<br>GAX<br>RM/CNTLR DISP<br>SBTC FDIR | | BD | | 93017G | * |
| | V93X4245X | RH SPD BRK 3 DES CMD | DL FMT 32/A<br>GAX<br>RM/CNTLR DISP<br>SBTC FDIR | | BD | | 93017G | * |
| | V93X4251X | RH RPTA 1 DES CMD | DL FMT 32/A<br>RM/CNTLR DISP<br>RPTA FDIR | | BD | | 93017G | * |
| | V93X4253X | RH RPTA 2 DES CMD | DL FMT 32/A<br>RM/CNTLR DISP<br>RPTA FDIR | | BD | | 93017G | * |
| | V93X4255X | RH RPTA 3 DES CMD | DL FMT 32/A<br>RM/CNTLR DISP<br>RPTA FDIR | | BD | | 93017G | * |
| | V93X4276X | LH BF SLEW SW 1 DES CMD | DL FMT 32/A<br>GN&C SW RM<br>RM/CNTLR DISP | | BD | | 93017G | * |
| | V93X4277X | LH BF SLEW SW 2 DES CMD | DL FMT 32/A<br>GN&C SW RM<br>RM/CNTLR DISP | | BD | | 93017G | * |
| | V93X4278X | RH BF SLEW SW 1 DES CMD | DL FMT 32/A<br>GN&C SW RM<br>RM/CNTLR DISP | | BD | | 93017G | * |
| | V93X4279X | RH BF SLEW SW 2 DES CMD | DL FMT 32/A<br>GN&C SW RM<br>RM/CNTLR DISP | | BD | | 93017G | * |

TABLE 4.5.2-6. OUTPUT FUNCTIONAL PARAMETERS FROM RM/CONTROLLERS DISPLAY (V5.1.6)

| FSSR NAME | M/S ID | NOMENCLATURE | DESTINATION | UNITS | DATA TYPE | PREC | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|
| | V93X4287X | LH RHC TRIM 1 DES CMD | DL FMT 32/A<br>GN&C SW RM<br>RM/CNTLR DISP | | BD | | 93017G | * |
| | V93X4288X | LH RHC TRIM 2 DES CMD | DL FMT 32/A<br>GN&C SW RM<br>RM/CNTLR DISP | | BD | | 93017G | * |
| | V93X4289X | RH RHC TRIM 1 DES CMD | DL FMT 32/A<br>GN&C SW RM<br>RM/CNTLR DISP | | BD | | 93017G | * |
| | V93X4290X | RH RHC TRIM 2 DES CMD | DL FMT 32/A<br>GN&C SW RM<br>RM/CNTLR DISP | | BD | | 93017G | * |
| | V93X4291X | LH PNL TRIM 1 DES CMD | DL FMT 32/A<br>GN&C SW RM<br>RM/CNTLR DISP | | BD | | 93017G | * |
| | V93X4292X | LH PNL TRIM 2 DES CMD | DL FMT 32/A<br>GN&C SW RM<br>RM/CNTLR DISP | | BD | | 93017G | * |
| | V93X4293X | RH PNL TRIM 1 DES CMD | DL FMT 32/A<br>GN&C SW RM<br>RM/CNTLR DISP | | BD | | 93017G | * |
| | V93X4294X | RH PNL TRIM 2 DES CMD | DL FMT 32/A<br>GN&C SW RM<br>RM/CNTLR DISP | | BD | | 93017G | * |
| | V93X4296XB | AFT RHC 1 DES CMD | DL FMT 32/A<br>GAX<br>RHC FDIR<br>RM ORB DIP<br>RM ORB DISP<br>RM/CNTLR DISP | | | | 93017G | * |
| | V93X4297XB | AFT RHC 2 DES CMD | DL FMT 32/A<br>GAX<br>RHC FDIR<br>RM ORB DIP<br>RM ORB DISP<br>RM/CNTLR DISP | | | | 93017G | * |
| | V93X4298XB | AFT RHC 3 DES CMD | DL FMT 32/A<br>GAX<br>RHC FDIR<br>RM ORB DIP<br>RM ORB DISP<br>RM/CNTLR DISP | | | | 93017G | * |

TABLE 4.5.2-6. OUTPUT FUNCTIONAL PARAMETERS FROM RM/CONTROLLERS DISPLAY (V5.1.6)

| FSSR NAME | M/S ID | NOMENCLATURE | DESTINATION | UNITS | DATA TYPE | PREC | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

**Rate Codes: (HDR Only) 1 = 1 sample/sec 2 = 5 samples/sec 3 = 12.5 samples/sec 4 = 25 samples/sec 5 = 100 samples/sec**
**(HDR and LDR) A = 1 sample/sec B = 5 samples/sec C = 12.5 samples/sec D = 25 samples/sec E = 100 samples/sec**

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TABLE 4.5.2-7. RM/CONTROLLERS DISPLAY (V5.1.6) I-LOADS

| FSSR NAME | MSID | ENG UNITS | DT | PR | D | S | PR FCTN | MC | CAT | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|---|---|---|

NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE 4.5.2-8. RM/CONTROLLERS DISPLAY (V5.1.6) K-LOADS

| FSSR NAME DESCRIPTION | MSID | MC | KLOAD VALUE | ENG UNITS | DT | P R | S | PR FCTN | LAST CR | R E V |
|---|---|---|---|---|---|---|---|---|---|---|

NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE 4.5.2-9. RM/CONTROLLERS DISPLAY (V5.1.6) CONSTANTS

| FSSR NAME DESCRIPTION | MSID | MC | CONSTANT VALUE | ENG UNITS | DT | P R | S | PR FCTN | LAST CR | R E V |
|---|---|---|---|---|---|---|---|---|---|---|

NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

### 4.5.3 RM SWITCHES/SURFACES FEEDBACK (PFS)

TITLE: SWITCH/SURF
TYPE: SPEC/042
AVAILABILITY: GN&C OPS 8

#### 4.5.3.1 Purpose, Operation, and Organization

(1) SWITCH SURF

This display provides the crew with indications of the closed contacts sensed in the FCS channel and mode switches and it displays the sensed outputs of the feedback transducers for the aerosurfaces. Figure 4.5.3–1 is the RM Switches/Surfaces Feedback Display (PFS). For all these outputs, an "M" is displayed if the signal is missing. The display provides controls for deselection and selection of sets of switch contacts or switch strings as candidates for the selection filter. Execution of Items 1 through 22 reverses the selection state of the associated contact or string. An asterisk (*) beside the item number indicates that the associated contact sets or switch string is deselected. The candidate configuration is maintained for all OPS transitions.

(2) FCS CH

When any redundant contact of the four FCS channel switches is sensed to be in the override position, an asterisk (*) is shown in the corresponding position under ORIDE. Items 1 through 12 control the deselection and selection of these contacts.

An asterisk (*) will be displayed next to item 1 through 12 whenever the corresponding switch contact is deselected either automatically by RM or manually by execution of Item 1 through 12. If a contact has been deselected, automatically or manually, execution of the appropriate Items (1–12) will reselect that contact and blank the asterisk (*).

(3) FCS MODE

The FCS MODE portion of the display shows the redundant contact outputs from various panel switches. The switches shown are left and right auto pitch (P AUT), CSS pitch (P CSS), auto roll/yaw (R/Y AUT), CSS roll/yaw (R/Y CSS), body flap auto mode switch (BDY FLP AUT), speed brake auto mode (SPDBRK AUT), and takeover button (SPDBRK MAN). Triply redundant contact positions are provided for each switch. Items 13 through 18 control the deselection and selection of the contact strings for these switches.

(4) SURF

At the bottom of the display are the surface position feedback (SURF) data and controls. The outputs of four transducers are displayed for each aerosurface. The surfaces shown are left outboard elevon (L OB), left inboard elevon (L IB), right inboard elevon (R IB), right outboard elevon (R OB), rudder (RUD), speed brake (SPD BRK), and body flap (BDY FLP). Items 19 through 22 control the deselection and selection of the feedback transducer strings for the aerosurfaces.

### 4.5.3.2 RM Switches/Surfaces Feedback (PFS) Keyboard Processing Addendum

A. Destinations for surface deselect item entries are RUD PFB FDIR (4.82), SB PFB FDIR (4.83),BF PFB FDIR (4.84) and CRT (V5.17–1).

### 4.5.3.3 RM Switches/Surfaces Feedback (PFS) CRT Display Processing Addendum

The Table below presents the stand–alone parameter status indicators (PSI) that can be displayed for a parameter. PSI requirements are identified by the word “STAT” being inserted in the FORMAT TYPE column and a numeric code appearing as an entry (right justified) in the ADD REF column of CRT display processing Table 4.5.3–2. The numeric code, corresponding to one of those listed in the Table indicates the specific status processing to be performed. If there is no numeric code entry, the status processing is defined by the default code.

When the “M” PSI is displayed (for Commfault, I/O error resulting in missing data), the associated parameter value data field shall be blanked unless specified otherwise.

| Numeric Code | PSI SYMBOL(S) | | | | | |
|---|---|---|---|---|---|---|
| Default (blank) | ↓ | | | M | ⁄ | ⁄ |
| 1 | ↓ | ↑ | | M | ⁄ | ⁄ |
| 2 | | ↑ | | M | ⁄ | ⁄ |
| 3 | ↓ | | | | ⁄ | ⁄ |
| 4 | | ↑ | | | ⁄ | ⁄ |
| 5 | ↓ | | ? | | ⁄ | ⁄ |
| 6 | ↓ | ↑ | | | ⁄ | ⁄ |
| 7 | | | | M | ⁄ | ⁄ |
| 8 | ↓ | | ? | M | ⁄ | ⁄ |
| 9 | | | ? | M | ⁄ | ⁄ |

⁄ = blank

The following alpha code(s) appear (left justified) in the ADD REF column of the Table 4.5.3–2 whenever it is necessary to define any special processing requirements not otherwise covered therein.

A. In the displays for elevon deflections, the position data are multiplied by a scale factor of –1 and the signs are replaced with letters indicating direction. Positive sign is replaced with U, representing “up”; negative sign is replaced with D, representing “down”.

B. In the displays for rudder deflections, the position data are multiplied by a scale factor of –1 and signs are replaced with letters indicating direction. Positive sign is replaced with R, representing “right”; negative sign is replaced with L, representing “left”.

C. Aerodynamic and Reaction Devices–Controllers and Effectors–Directional Conventions

Rotation Hand Controllers (RHC). The directional signals from the RHC are described in terms of the orientation of the RHC itself–or rather the orientation of the crew member operating the RHC. At the forward stations the orientation is obvious; at the aft crew station the orientation is with respect to the controller and not the vehicle.

Pulling back on the RHC produces a positive (+) pitch signal which is sometimes described as an "up" (U) pitch signal. Pushing forward produces a negative (–) or "down" (D) pitch signal.

Moving the RHC to the right produces a positive (+) roll signal which is sometimes described as a "right" (R) roll signal. Moving the RHC left produces negative (–) or "left" (L) roll signal.

Twisting the handle of the RHC clockwise about its own axis produces a positive (+) yaw signal which is sometimes described as a "right" (R) yaw signal. Twisting the handle counter–clockwise produces a negative (–) or "left" (L) yaw signal.

Rudder Pedal Transducer Assemblies (RPTA). Operating the RPTA is described in terms of the right pedal and the left pedal. This description refers to the right or left pedal of the entire assembly at each crew station; it does not refer to the location of the assembly.

Pushing forward on the right pedal produces a positive (+) or right (R) yaw signal. Pushing forward on the left pedal produces a negative (–) or left (L) yaw signal.

Translation Hand Controllers (THC). As with the RHC, the directional signals from the THC are described in terms of the orientation of the THC itself.

Pushing forward on the THC produces a positive (+) signal in the TX axis. Pushing backward on the THC produces a negative (–) signal in the TX axis. Pushing the THC to the right produces a positive (+) signal in the TY axis. Pushing the THC to the left produces a negative (–) signal in the TY axis. Pushing the THC down produces a positive (+) signal in the TZ axis. Pulling the THC up produces a negative (–) signal in the TZ axis.

Reaction Jets. Reaction jets are identified by a three–character code: a letter which identifies the general location, a one–digit identifying number for jets at that location firing in a specific direction, and a letter which identifies the exhaust direction.

General Location (First Character)

| | |
|---|---|
| F | Forward |
| L | Left (aft) |
| R | Right (aft) |

Firing Direction (Third Character)

| | |
|---|---|
| F | Jet fires forward (vehicle accelerates backward) |
| A | Jet fires aft (vehicle accelerates forward) |
| U | Jet fires up (vehicle accelerates downward) |
| D | Jet fires down (vehicle accelerates upward) |
| L | Jet fires to left (vehicle accelerates to right) |
| R | Jet fires to right (vehicle accelerates to left) |

Aerosurfaces. When the RHC or RPTA is being used to control the aerosurfaces, control is effected by electrical signals from the controllers mediated by the computers and fed through electrical servomechanisms. Surface position feedback transducers then produce electrical signals that also are fed to the servos. The servos continue to drive the aerosurfaces until the sums of the signals reaching each servo are zero. With regard to pitch and yaw, this means that the feedback transducers must produce signals opposite in polarity to the signals from the RHC and RPTA. Roll is effected by the computers sending signals of opposite polarity to the servos for the elevons on opposite sides of the vehicle.

Elevons. When the trailing edge of an elevon (any one of the four) is up, the signal from the feedback transducer is negative (–) and the position is represented on CRT displays as U. When the trailing edge of an elevon is down, the signal from the feedback transducer is positive (+) and the position is represented on CRT displays as D.

Rudder. When the trailing edge of the rudder is to the right, the signal from the feedback transducer is negative (–) and the position is represented on CRT displays as R. When the trailing edge of the rudder is to the left, the signal from the feedback transducer is positive (+) and the position is represented on CRT displays as L.

Ailerons. The Aileron function for roll is provided by using differential elevons. When the aileron position is such that the right elevons are positioned with their trailing edges up (negative feedback signals) and the left elevons are positioned with their trailing edges down (positive feedback signals), the aileron position causes right roll and is represented on displays as R. When the right elevons have their trailing edges down (positive feedback signals) and the left elevons have their trailing edges up (negative feedback signals), the aileron position is represented as L and causes left roll.

### 4.5.3.4 RM Switches/Surfaces Feedback Figure/Table References

Figure 4.5.3–1 RM Switches/Surfaces Feedback Display (PFS)

Table 4.5.3–1 Keyboard Processing Table

Table 4.5.3–2 CRT Display Processing Table

Table 4.5.3–3 CRT Display Processing Background Requirements N/A

Table 4.5.3–4 Mission Design Background Constants N/A

Table 4.5.3–5 Input Functional Parameters

Table 4.5.3–6 Output Functional Parameters

Table 4.5.3–7 I–Loads

Table 4.5.3–8 K–Loads

Table 4.5.3–9 Constants

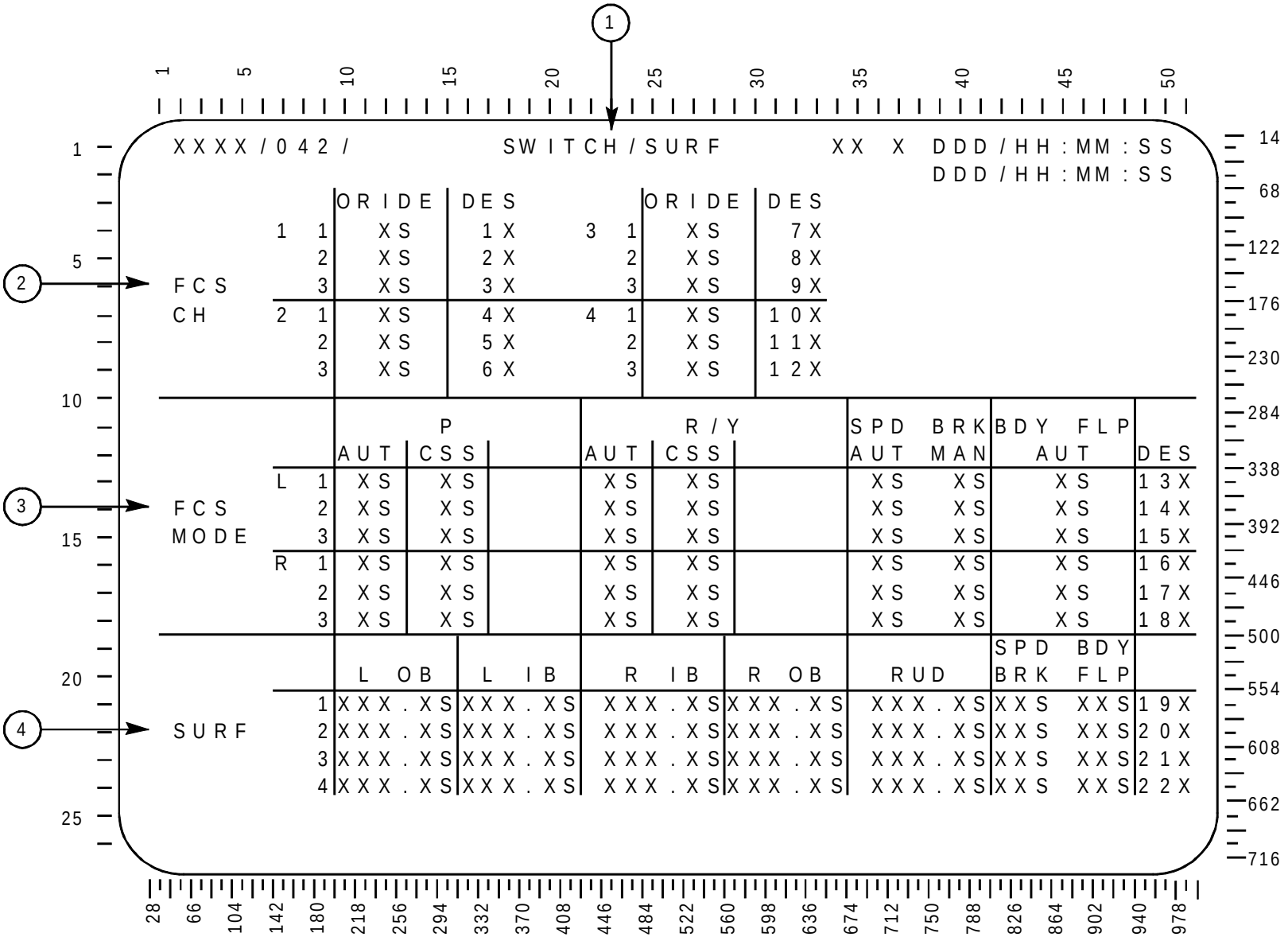


FIGURE 4.5.3-1. RM Switches/Surfaces Feedback Display (PFS)

TABLE 4.5.3-1. SWITCH/SURF (PFS) KEYBOARD PROCESSING

| Seq | CRT Signal Name | M/S ID | CHAR | TYPE | UNITS | DK | ITEM | Item No. Limits | | Add Ref | Destination | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | MIN | MAX | | | | |
| 001 | FCS CH 1 1 DES 1 | V93X4721X | 0.0 | CTRL | | | 1 | | | | SW PROC, CRT | FCS CH 1 SW CON 1 DES CMD | X |
| 002 | FCS CH 1 2 DES 2 | V93X4723X | 0.0 | CTRL | | | 2 | | | | SW PROC, CRT | FCS CH 1 SW CON 2 DES CMD | X |
| 003 | FCS CH 1 3 DES 3 | V93X4725X | 0.0 | CTRL | | | 3 | | | | SW PROC, CRT | FCS CH 1 SW CON 3 DES CMD | X |
| 004 | FCS CH 2 1 DES 4 | V93X4731X | 0.0 | CTRL | | | 4 | | | | SW PROC, CRT | FCS CH 2 SW CON 1 DES CMD | X |
| 005 | FCS CH 2 2 DES 5 | V93X4733X | 0.0 | CTRL | | | 5 | | | | SW PROC, CRT | FCS CH 2 SW CON 2 DES CMD | X |
| 006 | FCS CH 2 3 DES 6 | V93X4735X | 0.0 | CTRL | | | 6 | | | | SW PROC, CRT | FCS CH 2 SW CON 3 DES CMD | X |
| 007 | FCS CH 3 1 DES 7 | V93X4741X | 0.0 | CTRL | | | 7 | | | | SW PROC, CRT | FCS CH 3 SW CON 1 DES CMD | X |
| 008 | FCS CH 3 2 DES 8 | V93X4743X | 0.0 | CTRL | | | 8 | | | | SW PROC, CRT | FCS CH 3 SW CON 2 DES CMD | X |
| 009 | FCS CH 3 3 DES 9 | V93X4745X | 0.0 | CTRL | | | 9 | | | | SW PROC, CRT | FCS CH 3 SW CON 3 DES CMD | X |
| 010 | FCS CH 4 1 DES 10 | V93X4751X | 0.0 | CTRL | | | 10 | | | | SW PROC, CRT | FCS CH 4 SW CON 1 DES CMD | X |
| 011 | FCS CH 4 2 DES 11 | V93X4753X | 0.0 | CTRL | | | 11 | | | | SW PROC, CRT | FCS CH 4 SW CON 2 DES CMD | X |
| 012 | FCS CH 4 3 DES 12 | V93X4755X | 0.0 | CTRL | | | 12 | | | | SW PROC, CRT | FCS CH 4 SW CON 3 DES CMD | X |
| 013 | FCS MODE L1 DES 13 | V93X4701X | 0.0 | CTRL | | | 13 | | | | SW PROC, CRT | LH SW CON 1 DES CMD | X |
| 014 | FCS MODE L2 DES 14 | V93X4703X | 0.0 | CTRL | | | 14 | | | | SW PROC, CRT | LH SW CON 2 DES CMD | X |
| 015 | FCS MODE L3 DES 15 | V93X4705X | 0.0 | CTRL | | | 15 | | | | SW PROC, CRT | LH SW CON 3 DES CMD | X |
| 016 | FCS MODE R1 DES 16 | V93X4711X | 0.0 | CTRL | | | 16 | | | | SW PROC, CRT | RH SW CON 1 DES CMD | X |
| 017 | FCS MODE R2 DES 17 | V93X4713X | 0.0 | CTRL | | | 17 | | | | SW PROC, CRT | RH SW CON 2 DES CMD | X |
| 018 | FCS MODE R3 DES 18 | V93X4715X | 0.0 | CTRL | | | 18 | | | | SW PROC, CRT | RH SW CON 3 DES CMD | X |
| 019 | SURF 1 DES 19 | V93X4761X | 0.0 | CTRL | | | 19 | | | A | CRT | FCS FDBK XDUCER 1 DES CMD | X |
| 020 | SURF 2 DES 20 | V93X4763X | 0.0 | CTRL | | | 20 | | | A | CRT | FCS FDBK XDUCER 2 DES CMD | X |
| 021 | SURF 3 DES 21 | V93X4765X | 0.0 | CTRL | | | 21 | | | A | CRT | FCS FDBK XDUCER 3 DES CMD | X |
| 022 | SURF 4 DES 22 | V93X4767X | 0.0 | CTRL | | | 22 | | | A | CRT | FCS FDBK XDUCER 4 DES CMD | X |

## TABLE 4.5.3-2. SWITCH/SURF (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | BILEVEL | | | | | | | | | | | | | | | | | |
| | | | X | Y | | CHAR | 1 | 0 | TYPE | | | | | | | | | | | | | | | |
| 001 | (OPS) | V93X0040X | 2 | 1 | | 5.0 | | | CHAR | | | | | | | E | | | | | | UI | OPS FUNCTION PAGE | X |
| 002 | (SPEC) | V93X0042X | 7 | 1 | | 4.0 | | | CHAR | | | | | | | E | | | | | | UI | SPEC FUNCTION PAGE | X |
| 003 | (DISP) | V93X0044X | 10 | 1 | | 4.0 | | | DEC | | | | | | | E | | | | | | UI | DISPLAY FUNCTION PAGE | X |
| 004 | (UL) | V92X5032X | 34 | 1 | | 2.0 | UL | | BLVL | | | | | | X | G | | | | | | UI | UPLINK ACTIVITY IND | X |
| 005 | (GPC) | V93X0048X | 36 | 1 | | 2.0 | | | DEC | | | | | | | E | | | | | | UI | GPC DRIVER | X |
| 006 | (MT) | V91W1990C | 39 | 1 | | 12.0 | | | CHAR | DHMS | | | | | | A | | | | | | FCOS | MISSION ELAPSED TIME | X |
| 007 | (CRT TIMER) | V91W1987C | 39 | 2 | | 12.0 | | | CHAR | DHMS | | | | | | A | | | | | | FCOS | DISPLAY CRT TIMER,GNC | X |
| 008 | FCS CH 1 1 ORIDE | V72K3170X | 12 | 4 | | 1.0 | * | | BLVL | | | | | | | | | | | | | HDWR | FCS MON CHAN 1 RESET/OVERRIDE A | X |
| 009 | FCS CH 1 2 ORIDE | V72K3171X | 12 | 5 | | 1.0 | * | | BLVL | | | | | | | | | | | | | HDWR | FCS MON CHAN 1 RESET/ OVERRIDE B | X |
| 010 | FCS CH 1 3 ORIDE | V72K3172X | 12 | 6 | | 1.0 | * | | BLVL | | | | | | | | | | | | | HDWR | FCS MON CHAN 1 RESET/OVERRIDE C | X |
| 011 | FCS CH 2 1 ORIDE | V72K3176X | 12 | 7 | | 1.0 | * | | BLVL | | | | | | | | | | | | | HDWR | FCS MON CHAN 2 RESET/OVERRIDE A | X |
| 012 | FCS CH 2 2 ORIDE | V72K3178X | 12 | 8 | | 1.0 | * | | BLVL | | | | | | | | | | | | | HDWR | FCS MON CHAN 2 RESET/OVERRIDE B | X |
| 013 | FCS CH 2 3 ORIDE | V72K3179X | 12 | 9 | | 1.0 | * | | BLVL | | | | | | | | | | | | | HDWR | FCS MON CHAN 2 RESET/OVERRIDE C | X |
| 014 | FCS CH 1 1 DES 1 | V93X4721X | 18 | 4 | | 1.0 | | * | BLVL | | | | | | | | | | | | | KYBD | FCS CH 1 SW CON 1 DES CMD | X |
| 015 | FCS CH 1 2 DES 2 | V93X4723X | 18 | 5 | | 1.0 | | * | BLVL | | | | | | | | | | | | | KYBD | FCS CH 1 SW CON 2 DES CMD | X |
| 016 | FCS CH 1 3 DES 3 | V93X4725X | 18 | 6 | | 1.0 | | * | BLVL | | | | | | | | | | | | | KYBD | FCS CH 1 SW CON 3 DES CMD | X |
| 017 | FCS CH 2 1 DES 4 | V93X4731X | 18 | 7 | | 1.0 | | * | BLVL | | | | | | | | | | | | | KYBD | FCS CH 2 SW CON 1 DES CMD | X |
| 018 | FCS CH 2 2 DES 5 | V93X4733X | 18 | 8 | | 1.0 | | * | BLVL | | | | | | | | | | | | | KYBD | FCS CH 2 SW CON 2 DES CMD | X |
| 019 | FCS CH 2 3 DES 6 | V93X4735X | 18 | 9 | | 1.0 | | * | BLVL | | | | | | | | | | | | | KYBD | FCS CH 2 SW CON 3 DES CMD | X |
| 020 | FCS CH 3 1 ORIDE | V72K3180X | 27 | 4 | | 1.0 | * | | BLVL | | | | | | | | | | | | | HDWR | FCS MON CHAN 3 RESET/OVERRIDE A | X |
| 021 | FCS CH 3 2 ORIDE | V72K3182X | 27 | 5 | | 1.0 | * | | BLVL | | | | | | | | | | | | | HDWR | FCS MON CHAN 3 RESET/OVERRIDE B | X |

TABLE 4.5.3-2. SWITCH/SURF (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | | | |
| 022 | FCS CH 3 3 ORIDE | V72K3183X | 27 | 6 | | 1.0 | * | | BLVL | | | | | | | | | | | | | HDWR | FCS MON CHAN 3 RESET/OVERRIDE C | X |
| 023 | FCS CH 4 1 ORIDE | V72K3186X | 27 | 7 | | 1.0 | * | | BLVL | | | | | | | | | | | | | HDWR | FCS MON CHAN 4 RESET/OVERRIDE A | X |
| 024 | FCS CH 4 2 ORIDE | V72K3188X | 27 | 8 | | 1.0 | * | | BLVL | | | | | | | | | | | | | HDWR | FCS MON CHAN 4 RESET/OVERRIDE B | X |
| 025 | FCS CH 4 3 ORIDE | V72K3189X | 27 | 9 | | 1.0 | * | | BLVL | | | | | | | | | | | | | HDWR | FCS MON CHAN 4 RESET/OVERRIDE C | X |
| 026 | FCS CH 3 1 DES 7 | V93X4741X | 33 | 4 | | 1.0 | | * | BLVL | | | | | | | | | | | | | KYBD | FCS CH 3 SW CON 1 DES CMD | X |
| 027 | FCS CH 3 2 DES 8 | V93X4743X | 33 | 5 | | 1.0 | | * | BLVL | | | | | | | | | | | | | KYBD | FCS CH 3 SW CON 2 DES CMD | X |
| 028 | FCS CH 3 3 DES 9 | V93X4745X | 33 | 6 | | 1.0 | | * | BLVL | | | | | | | | | | | | | KYBD | FCS CH 3 SW CON 3 DES CMD | X |
| 029 | FCS CH 4 1 DES 10 | V93X4751X | 33 | 7 | | 1.0 | | * | BLVL | | | | | | | | | | | | | KYBD | FCS CH 4 SW CON 1 DES CMD | X |
| 030 | FCS CH 4 2 DES 11 | V93X4753X | 33 | 8 | | 1.0 | | * | BLVL | | | | | | | | | | | | | KYBD | FCS CH 4 SW CON 2 DES CMD | X |
| 031 | FCS CH 4 3 DES 12 | V93X4755X | 33 | 9 | | 1.0 | | * | BLVL | | | | | | | | | | | | | KYBD | FCS CH 4 SW CON 3 DES CMD | X |
| 032 | FCS MODE P AUT L1 | V72K5251X | 11 | 13 | | 1.0 | * | | BLVL | | | | | | | | | | | | | HDWR | FCS LH PITCH AUTO MODE A | X |
| 033 | FCS MODE P AUT L2 | V72K5252X | 11 | 14 | | 1.0 | * | | BLVL | | | | | | | | | | | | | HDWR | FCS LH PITCH AUTO MODE B | X |
| 034 | FCS MODE P AUT L3 | V72K5253X | 11 | 15 | | 1.0 | * | | BLVL | | | | | | | | | | | | | HDWR | FCS LH PITCH AUTO MODE C | X |
| 035 | FCS MODE P AUT R1 | V72K5151X | 11 | 16 | | 1.0 | * | | BLVL | | | | | | | | | | | | | HDWR | FCS RH PITCH AUTO MODE A | X |
| 036 | FCS MODE P AUT R2 | V72K5152X | 11 | 17 | | 1.0 | * | | BLVL | | | | | | | | | | | | | HDWR | FCS RH PITCH AUTO MODE B | X |
| 037 | FCS MODE P AUT R3 | V72K5153X | 11 | 18 | | 1.0 | * | | BLVL | | | | | | | | | | | | | HDWR | FCS RH PITCH AUTO MODE C | X |
| 038 | FCS MODE P CSS L1 | V72K5256X | 15 | 13 | | 1.0 | * | | BLVL | | | | | | | | | | | X | | HDWR | FCS LH PITCH CSS MODE A | X |
| 039 | FCS MODE P CSS L2 | V72K5257X | 15 | 14 | | 1.0 | * | | BLVL | | | | | | | | | | | X | | HDWR | FCS LH PITCH CSS MODE B | X |
| 040 | FCS MODE P CSS L3 | V72K5258X | 15 | 15 | | 1.0 | * | | BLVL | | | | | | | | | | | X | | HDWR | FCS LH PITCH CSS MODE C | X |
| 041 | FCS MODE P CSS R1 | V72K5156X | 15 | 16 | | 1.0 | * | | BLVL | | | | | | | | | | | X | | HDWR | FCS RH PITCH CSS MODE A | X |
| 042 | FCS MODE P CSS R2 | V72K5157X | 15 | 17 | | 1.0 | * | | BLVL | | | | | | | | | | | X | | HDWR | FCS RH PITCH CSS MODE B | X |
| 043 | FCS MODE P CSS R3 | V72K5158X | 15 | 18 | | 1.0 | * | | BLVL | | | | | | | | | | | X | | HDWR | FCS RH PITCH CSS MODE C | X |
| 044 | FCS MODE R/Y AUT L1 | V72K5265X | 23 | 13 | | 1.0 | * | | BLVL | | | | | | | | | | | | | HDWR | FCS LH R–Y AUTO MODE A | X |
| 045 | FCS MODE R/Y AUT L2 | V72K5266X | 23 | 14 | | 1.0 | * | | BLVL | | | | | | | | | | | | | HDWR | FCS LH R–Y AUTO MODE B | X |
| 046 | FCS MODE R/Y AUT L3 | V72K5267X | 23 | 15 | | 1.0 | * | | BLVL | | | | | | | | | | | | | HDWR | FCS LH R–Y AUTO MODE C | X |
| 047 | FCS MODE R/Y AUT R1 | V72K5165X | 23 | 16 | | 1.0 | * | | BLVL | | | | | | | | | | | | | HDWR | FCS RH R–Y AUTO MODE A | X |

## TABLE 4.5.3-2. SWITCH/SURF (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | | | |
| 048 | FCS MODE R/Y AUT R2 | V72K5166X | 23 | 17 | | 1.0 | * | | BLVL | | | | | | | | | | | | | HDWR | FCS RH R–Y AUTO MODE B | X |
| 049 | FCS MODE R/Y AUT R3 | V72K5167X | 23 | 18 | | 1.0 | * | | BLVL | | | | | | | | | | | | | HDWR | FCS RH R–Y AUTO MODE C | X |
| 050 | FCS MODE R/Y CSS L1 | V72K5270X | 27 | 13 | | 1.0 | * | | BLVL | | | | | | | | | | | X | | HDWR | FCS LH R–Y CSS MODE A | X |
| 051 | FCS MODE R/Y CSS L2 | V72K5271X | 27 | 14 | | 1.0 | * | | BLVL | | | | | | | | | | | X | | HDWR | FCS LH R–Y CSS MODE B | X |
| 052 | FCS MODE R/Y CSS L3 | V72K5272X | 27 | 15 | | 1.0 | * | | BLVL | | | | | | | | | | | X | | HDWR | FCS LH R–Y CSS MODE C | X |
| 053 | FCS MODE R/Y CSS R1 | V72K5170X | 27 | 16 | | 1.0 | * | | BLVL | | | | | | | | | | | X | | HDWR | FCS RH R–Y CSS MODE A | X |
| 054 | FCS MODE R/Y CSS R2 | V72K5171X | 27 | 17 | | 1.0 | * | | BLVL | | | | | | | | | | | X | | HDWR | FCS RH R–Y CSS MODE B | X |
| 055 | FCS MODE R/Y CSS R3 | V72K5172X | 27 | 18 | | 1.0 | * | | BLVL | | | | | | | | | | | X | | HDWR | FCS RH R–Y CSS MODE C | X |
| 056 | FCS MODE SPBK AUT L1 | V72K1570X | 36 | 13 | | 1.0 | * | | BLVL | | | | | | | | | | | | | HDWR | LH SPD BK/THROT AUTO/MAN A | X |
| 057 | FCS MODE SPBK AUT L2 | V72K1571X | 36 | 14 | | 1.0 | * | | BLVL | | | | | | | | | | | | | HDWR | LH SPD BK/THROT AUTO/MAN B | X |
| 058 | FCS MODE SPBK AUT L3 | V72K1572X | 36 | 15 | | 1.0 | * | | BLVL | | | | | | | | | | | | | HDWR | LH SPD BK/THROT AUTO/MAN C | X |
| 059 | FCS MODE SPBK AUT R1 | V72K1600X | 36 | 16 | | 1.0 | * | | BLVL | | | | | | | | | | | | | HDWR | RH SPD BK/THROT AUTO/MAN A | X |
| 060 | FCS MODE SPBK AUT R2 | V72K1601X | 36 | 17 | | 1.0 | * | | BLVL | | | | | | | | | | | | | HDWR | RH SPD BK/THROT AUTO/MAN B | X |
| 061 | FCS MODE SPBK AUT R3 | V72K1602X | 36 | 18 | | 1.0 | * | | BLVL | | | | | | | | | | | | | HDWR | RH SPD BK/THROT AUTO/MAN C | X |
| 062 | FCS MODE SPBK MAN L1 | V72K1577X | 40 | 13 | | 1.0 | * | | BLVL | | | | | | | | | | | | | HDWR | LH SBTC TAKEOVER–A | X |
| 063 | FCS MODE SPBK MAN L2 | V72K1580X | 40 | 14 | | 1.0 | * | | BLVL | | | | | | | | | | | | | HDWR | LH SBTC TAKEOVER–B | X |
| 064 | FCS MODE SPBK MAN L3 | V72K1583X | 40 | 15 | | 1.0 | * | | BLVL | | | | | | | | | | | | | HDWR | LH SBTC TAKEOVER–C | X |
| 065 | FCS MODE SPBK MAN R1 | V72K1587X | 40 | 16 | | 1.0 | * | | BLVL | | | | | | | | | | | | | HDWR | RH SBTC TAKEOVER–A | X |
| 066 | FCS MODE SPBK MAN R2 | V72K1590X | 40 | 17 | | 1.0 | * | | BLVL | | | | | | | | | | | | | HDWR | RH SBTC TAKEOVER–B | X |
| 067 | FCS MODE SPBK MAN R3 | V72K1593X | 40 | 18 | | 1.0 | * | | BLVL | | | | | | | | | | | | | HDWR | RH SBTC TAKEOVER–C | X |
| 068 | FCS MODE BF AUT L1 | V72K4993X | 45 | 13 | | 1.0 | * | | BLVL | | | | | | | | | | | X | | HDWR | LH BODY FLAP AUTO/MANUAL A | X |
| 069 | FCS MODE BF AUT L2 | V72K4994X | 45 | 14 | | 1.0 | * | | BLVL | | | | | | | | | | | X | | HDWR | LH BODY FLAP AUTO/MANUAL B | X |
| 070 | FCS MODE BF AUT L3 | V72K4995X | 45 | 15 | | 1.0 | * | | BLVL | | | | | | | | | | | X | | HDWR | LH BODY FLAP AUTO/MANUAL C | X |

TABLE 4.5.3-2. SWITCH/SURF (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | | | |
| 071 | FCS MODE BF AUT R1 | V72K4893X | 45 | 16 | | 1.0 | * | | BLVL | | | | | | | | | | | | | HDWR | RH BODY FLAP AUTO/MANUAL A | X |
| 072 | FCS MODE BF AUT R2 | V72K4894X | 45 | 17 | | 1.0 | * | | BLVL | | | | | | | | | | | | | HDWR | RH BODY FLAP AUTO/MANUAL B | X |
| 073 | FCS MODE BF AUT R3 | V72K4895X | 45 | 18 | | 1.0 | * | | BLVL | | | | | | | | | | | | | HDWR | RH BODY FLAP AUTO/MANUAL C | X |
| 074 | FCS MODE L1 DES 13 | V93X4701X | 51 | 13 | | 1.0 | | * | BLVL | | | | | | | | | | | | | KYBD | LH SW CON 1 DES CMD | X |
| 075 | FCS MODE L2 DES 14 | V93X4703X | 51 | 14 | | 1.0 | | * | BLVL | | | | | | | | | | | | | KYBD | LH SW CON 2 DES CMD | X |
| 076 | FCS MODE L3 DES 15 | V93X4705X | 51 | 15 | | 1.0 | | * | BLVL | | | | | | | | | | | | | KYBD | LH SW CON 3 DES CMD | X |
| 077 | FCS MODE R1 DES 16 | V93X4711X | 51 | 16 | | 1.0 | | * | BLVL | | | | | | | | | | | | | KYBD | RH SW CON 1 DES CMD | X |
| 078 | FCS MODE R2 DES 17 | V93X4713X | 51 | 17 | | 1.0 | | * | BLVL | | | | | | | | | | | | | KYBD | RH SW CON 2 DES CMD | X |
| 079 | FCS MODE R3 DES 18 | V93X4715X | 51 | 18 | | 1.0 | | * | BLVL | | | | | | | | | | | | | KYBD | RH SW CON 3 DES CMD | X |
| 080 | SURF L OB 1 | V58H0856C | 10 | 21 | | 5.1 | | | DEC | DEG | | | | | | | U | | | | A C | HDWR | L OUTBD ELEVON POSN FDBK–1 | X |
| 081 | SURF L OB 2 | V58H0857C | 10 | 22 | | 5.1 | | | DEC | DEG | | | | | | | U | | | | A C | HDWR | L OUTBD ELEVON POSN FDBK–2 | X |
| 082 | SURF L OB 3 | V58H0858C | 10 | 23 | | 5.1 | | | DEC | DEG | | | | | | | U | | | | A C | HDWR | L OUTBD ELEVON POSN FDBK–3 | X |
| 083 | SURF L OB 4 | V58H0859C | 10 | 24 | | 5.1 | | | DEC | DEG | | | | | | | U | | | | A C | HDWR | L OUTBD ELEVON POSN FDBK–4 | X |
| 084 | SURF L IB 1 | V58H0806C | 16 | 21 | | 5.1 | | | DEC | DEG | | | | | | | U | | | | A C | HDWR | L INBD ELEVON POSN FDBK–1 | X |
| 085 | SURF L IB 2 | V58H0807C | 16 | 22 | | 5.1 | | | DEC | DEG | | | | | | | U | | | | A C | HDWR | L INBD ELEVON POSN FDBK–2 | X |
| 086 | SURF L IB 3 | V58H0808C | 16 | 23 | | 5.1 | | | DEC | DEG | | | | | | | U | | | | A C | HDWR | L INBD ELEVON POSN FDBK–3 | X |
| 087 | SURF L IB 4 | V58H0809C | 16 | 24 | | 5.1 | | | DEC | DEG | | | | | | | U | | | | A C | HDWR | L INBD ELEVON POSN FDBK–4 | X |
| 088 | SURF R IB 1 | V58H0906C | 23 | 21 | | 5.1 | | | DEC | DEG | | | | | | | U | | | | A C | HDWR | R INBD ELEVON POSN FDBK–1 | X |
| 089 | SURF R IB 2 | V58H0907C | 23 | 22 | | 5.1 | | | DEC | DEG | | | | | | | U | | | | A C | HDWR | R INBD ELEVON POSN FDBK–2 | X |
| 090 | SURF R IB 3 | V58H0908C | 23 | 23 | | 5.1 | | | DEC | DEG | | | | | | | U | | | | A C | HDWR | R INBD ELEVON POSN FDBK–3 | X |
| 091 | SURF R IB 4 | V58H0909C | 23 | 24 | | 5.1 | | | DEC | DEG | | | | | | | U | | | | A C | HDWR | R INBD ELEVON POSN FDBK–4 | X |
| 092 | SURF R OB 1 | V58H0956C | 29 | 21 | | 5.1 | | | DEC | DEG | | | | | | | U | | | | A C | HDWR | R OUTBD ELEVON POSN FDBK–1 | X |

## TABLE 4.5.3-2. SWITCH/SURF (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | BILEVEL | | | | | | | | | | | | | | | | | |
| | | | X | Y | | CHAR | 1 | 0 | TYPE | | | | | | | | | | | | | | | |
| 093 | SURF R OB 2 | V58H0957C | 29 | 22 | | 5.1 | | | DEC | DEG | | | | | | | U | | | | A C | HDWR | R OUTBD ELEVON POSN FDBK–2 | X |
| 094 | SURF R OB 3 | V58H0958C | 29 | 23 | | 5.1 | | | DEC | DEG | | | | | | | U | | | | A C | HDWR | R OUTBD ELEVON POSN FDBK 3 | X |
| 095 | SURF R OB 4 | V58H0959C | 29 | 24 | | 5.1 | | | DEC | DEG | | | | | | | U | | | | A C | HDWR | R OUTBD ELEVON POSN FDBK–4 | X |
| 096 | SURF RUD 1 | V57H0101C | 36 | 21 | | 5.1 | | | DEC | DEG | | | | | | | R | | | | B C | HDWR | RUDDER POSN FDBK–1 | X |
| 097 | SURF RUD 2 | V57H0102C | 36 | 22 | | 5.1 | | | DEC | DEG | | | | | | | R | | | | B C | HDWR | RUDDER POSN FDBK–2 | X |
| 098 | SURF RUD 3 | V57H0103C | 36 | 23 | | 5.1 | | | DEC | DEG | | | | | | | R | | | | B C | HDWR | RUDDER POSN FDBK–3 | X |
| 099 | SURF RUD 4 | V57H0104C | 36 | 24 | | 5.1 | | | DEC | DEG | | | | | | | R | | | | B C | HDWR | RUDDER POSN FDBK–4 | X |
| 100 | SURF SPD BK 1 | V57H0201C | 41 | 21 | | 3.0 | | | DEC | PCT | | | | | | | | | | | | HDWR | SPEED BRAKE POSN FDBK–1 | X |
| 101 | SURF SPD BK 2 | V57H0202C | 41 | 22 | | 3.0 | | | DEC | PCT | | | | | | | | | | | | HDWR | SPEED BRAKE POSN FDBK–2 | X |
| 102 | SURF SPD BK 3 | V57H0203C | 41 | 23 | | 3.0 | | | DEC | PCT | | | | | | | | | | | | HDWR | SPEED BRAKE POSN FDBK–3 | X |
| 103 | SURF SPD BK 4 | V57H0204C | 41 | 24 | | 3.0 | | | DEC | PCT | | | | | | | | | | | | HDWR | SPEED BRAKE POSN FDBK–4 | X |
| 104 | SURF BDY FLP 1 | V57H0065C | 45 | 21 | | 3.0 | | | DEC | PCT | | | | | | | | | | | | HDWR | BODY FLAP POSN FDBK–1 | X |
| 105 | SURF BDY FLP 2 | V57H0066C | 45 | 22 | | 3.0 | | | DEC | PCT | | | | | | | | | | | | HDWR | BODY FLAP POSN FDBK–2 | X |
| 106 | SURF BDY FLP 3 | V57H0067C | 45 | 23 | | 3.0 | | | DEC | PCT | | | | | | | | | | | | HDWR | BODY FLAP POSN FDBK–3 | X |
| 107 | SURF BDY FLP 4 | V57H0068C | 45 | 24 | | 3.0 | | | DEC | PCT | | | | | | | | | | | | HDWR | BODY FLAP POSN FDBK–4 | X |
| 108 | SURF 1 DES 19 | V93X4761X | 51 | 21 | | 1.0 | | * | BLVL | | | | | | | | | | | | | KYBD | FCS FDBK XDUCER 1 DES CMD | X |
| 109 | SURF 2 DES 20 | V93X4763X | 51 | 22 | | 1.0 | | * | BLVL | | | | | | | | | | | | | KYBD | FCS FDBK XDUCER 2 DES CMD | X |
| 110 | SURF 3 DES 21 | V93X4765X | 51 | 23 | | 1.0 | | * | BLVL | | | | | | | | | | | | | KYBD | FCS FDBK XDUCER 3 DES CMD | X |
| 111 | SURF 4 DES 22 | V93X4767X | 51 | 24 | | 1.0 | | * | BLVL | | | | | | | | | | | | | KYBD | FCS FDBK XDUCER 4 DES CMD | X |
| 112 | FCS CH 1 OVR 1 (S) | V91X5275X | 13 | 4 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | FCS MON CHAN 1 RESET/OVERRIDE A CF | X |
| 113 | FCS CH 1 OVR 2 (S) | V91X5276X | 13 | 5 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | FCS MON CHAN 1 RESET/OVERRIDE B CF | X |
| 114 | FCS CH 1 OVR 3 (S) | V91X5277X | 13 | 6 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | FCS MON CHAN 1 RESET/OVERRIDE C CF | X |
| 115 | FCS CH 2 OVR 1 (S) | V91X5278X | 13 | 7 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | FCS MON CHAN 2 RESET/OVERRIDE A CF | X |

TABLE 4.5.3-2. SWITCH/SURF (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | | | |
| 116 | FCS CH 2 OVR 2 (S) | V91X5279X | 13 | 8 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | FCS MON CHAN 2 RESET/OVERRIDE B CF | X |
| 117 | FCS CH 2 OVR 3 (S) | V91X5280X | 13 | 9 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | FCS MON CHAN 2 RESET/OVERRIDE C CF | X |
| 118 | FCS CH 3 OVR 1 (S) | V91X5281X | 28 | 4 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | FCS MON CHAN 3 RESET/OVERRIDE A CF | X |
| 119 | FCS CH 3 OVR 2 (S) | V91X5282X | 28 | 5 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | FCS MON CHAN 3 RESET/OVERRIDE B CF | X |
| 120 | FCS CH 3 OVR 3 (S) | V91X5283X | 28 | 6 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | FCS MON CHAN 3 RESET/OVERRIDE C CF | X |
| 121 | FCS CH 4 OVR 1 (S) | V91X5284X | 28 | 7 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | FCS MON CHAN 4 RESET/OVERRIDE A CF | X |
| 122 | FCS CH 4 OVR 2 (S) | V91X5285X | 28 | 8 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | FCS MON CHAN 4 RESET/OVERRIDE B CF | X |
| 123 | FCS CH 4 OVR 3 (S) | V91X5286X | 28 | 9 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | FCS MON CHAN 4 RESET/OVERRIDE C CF | X |
| 124 | FCS P AUT L1 (S) | V91X5300X | 12 | 13 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | FCS LH PITCH AUTO MODE A COMMFAULT | X |
| 125 | FCS P AUT L2 (S) | V91X5301X | 12 | 14 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | FCS LH PITCH AUTO MODE B COMMFAULT | X |
| 126 | FCS P AUT L3 (S) | V91X5310X | 12 | 15 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | FCS LH PITCH AUTO MODE C COMMFAULT | X |
| 127 | FCS P AUT R1 (S) | V91X5332X | 12 | 16 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | FCS RH PITCH AUTO MODE A COMMFAULT | X |
| 128 | FCS P AUT R2 (S) | V91X5333X | 12 | 17 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | FCS RH PITCH AUTO MODE B COMMFAULT | X |
| 129 | FCS P AUT R3 (S) | V91X5334X | 12 | 18 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | FCS RH PITCH AUTO MODE C COMMFAULT | X |
| 130 | FCS P CSS L1 (S) | V91X5311X | 16 | 13 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | FCS LH PITCH CSS MODE A COMMFAULT | X |
| 131 | FCS P CSS L2 (S) | V91X5312X | 16 | 14 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | FCS LH PITCH CSS MODE B COMMFAULT | X |

## TABLE 4.5.3-2. SWITCH/SURF (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | BILEVEL | | | | | | | | | | | | | | | | | |
| | | | X | Y | | CHAR | 1 | 0 | TYPE | | | | | | | | | | | | | | | |
| 132 | FCS P CSS L3 (S) | V91X5313X | 16 | 15 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | FCS LH PITCH CSS MODE C COMMFAULT | X |
| 133 | FCS P CSS R1 (S) | V91X5335X | 16 | 16 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | FCS RH PITCH CSS MODE A COMMFAULT | X |
| 134 | FCS P CSS R2 (S) | V91X5336X | 16 | 17 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | FCS RH PITCH CSS MODE B COMMFAULT | X |
| 135 | FCS P CSS R3 (S) | V91X5337X | 16 | 18 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | FCS RH PITCH CSS MODE C COMMFAULT | X |
| 136 | FCS R/Y AUT L1 (S) | V91X5314X | 24 | 13 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | FCS LH R–Y AUTO MODE A COMMFAULT | X |
| 137 | FCS R/Y AUT L2 (S) | V91X5315X | 24 | 14 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | FCS LH R–Y AUTO MODE B COMMFAULT | X |
| 138 | FCS R/Y AUT L3 (S) | V91X5316X | 24 | 15 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | FCS LH R–Y AUTO MODE C COMMFAULT | X |
| 139 | FCS R/Y AUT R1 (S) | V91X5338X | 24 | 16 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | FCS RH R–Y AUTO MODE A COMMFAULT | X |
| 140 | FCS R/Y AUT R2 (S) | V91X5339X | 24 | 17 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | FCS RH R–Y AUTO MODE B COMMFAULT | X |
| 141 | FCS R/Y AUT R3 (S) | V91X5340X | 24 | 18 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | FCS RH R–Y AUTO MODE C COMMFAULT | X |
| 142 | FCS R/Y CSS L1 (S) | V91X5291X | 28 | 13 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | FCS LH R–Y CSS MODE A COMMFAULT | X |
| 143 | FCS R/Y CSS L2 (S) | V91X5292X | 28 | 14 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | FCS LH R–Y CSS MODE B COMMFAULT | X |
| 144 | FCS R/Y CSS L3 (S) | V91X5293X | 28 | 15 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | FCS LH R–Y CSS MODE C COMMFAULT | X |
| 145 | FCS R/Y CSS R1 (S) | V91X5341X | 28 | 16 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | FCS RH R–Y CSS MODE A COMMFAULT | X |
| 146 | FCS R/Y CSS R2 (S) | V91X5302X | 28 | 17 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | FCS RH R–Y CSS MODE B COMMFAULT | X |
| 147 | FCS R/Y CSS R3 (S) | V91X5303X | 28 | 18 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | FCS RH R–Y CSS MODE C COMMFAULT | X |

TABLE 4.5.3-2. SWITCH/SURF (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | | | |
| 148 | FCS SPBK AUT L1 (S) | V91X5317X | 37 | 13 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | LH SPD BK/THROT AUTO/MAN A CF | X |
| 149 | FCS SPBK AUT L2 (S) | V91X5318X | 37 | 14 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | LH SPD BK/THROT AUTO/MAN B CF | X |
| 150 | FCS SPBK AUT L3 (S) | V91X5319X | 37 | 15 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | LH SPD BK/THROT AUTO/MAN C CF | X |
| 151 | FCS SPBK AUT R1 (S) | V91X5367X | 37 | 16 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | RH SPD BK/THROT AUTO/MAN A CF | X |
| 152 | FCS SPBK AUT R2 (S) | V91X5368X | 37 | 17 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | RH SPD BK/THROT AUTO/MAN B CF | X |
| 153 | FCS SPBK AUT R3 (S) | V91X5369X | 37 | 18 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | RH SPD BK/THROT AUTO/MAN C–CF | X |
| 154 | FCS SPBK MAN L1 (S) | V91X5320X | 41 | 13 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | LH SBTC TAKEOVER–A COMMFAULT | X |
| 155 | FCS SPBK MAN L2 (S) | V91X5321X | 41 | 14 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | LH SBTC TAKEOVER–B COMMFAULT | X |
| 156 | FCS SPBK MAN L3 (S) | V91X5322X | 41 | 15 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | LH SBTC TAKEOVER–C COMMFAULT | X |
| 157 | FCS SPBK MAN R1 (S) | V91X5370X | 41 | 16 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | RH SBTC TAKEOVER–A COMMFAULT | X |
| 158 | FCS SPBK MAN R2 (S) | V91X5371X | 41 | 17 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | RH SBTC TAKEOVER–B COMMFAULT | X |
| 159 | FCS SPBK MAN R3 (S) | V91X5372X | 41 | 18 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | RH SBTC TAKEOVER–C COMMFAULT | X |
| 160 | FCS BF AUT L1 (S) | V91X5287X | 46 | 13 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | LH BODY FLAP AUTO/MANUAL A CF | X |
| 161 | FCS BF AUT L2 (S) | V91X5288X | 46 | 14 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | LH BODY FLAP AUTO/MANUAL B CF | X |
| 162 | FCS BF AUT L3 (S) | V91X5289X | 46 | 15 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | LH BODY FLAP AUTO/MANUAL C CF | X |
| 163 | FCS BF AUT R1 (S) | V91X5329X | 46 | 16 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | RH BODY FLAP AUTO/MANUAL A CF | X |

## TABLE 4.5.3-2. SWITCH/SURF (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | | | |
| 164 | FCS BF AUT R2 (S) | V91X5330X | 46 | 17 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | RH BODY FLAP AUTO/MANUAL B CF | X |
| 165 | FCS BF AUT R3 (S) | V91X5331X | 46 | 18 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | RH BODY FLAP AUTO/MANUAL C CF | X |
| 166 | L OB 1 (S) | V91X7050X | 15 | 21 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | LOB ELEVON FDBK 1 COMM FAULT | X |
| 167 | L OB 2 (S) | V91X7051X | 15 | 22 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | LOB ELEVON FDBK 2 COMM FAULT | X |
| 168 | L OB 3 (S) | V91X7052X | 15 | 23 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | LOB ELEVON FDBK 3 COMM FAULT | X |
| 169 | L OB 4 (S) | V91X7053X | 15 | 24 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | LOB ELEVON FDBK 4 COMM FAULT | X |
| 170 | L IB 1 (S) | V91X7000X | 21 | 21 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | LIB ELEVON FDBK 1 COMM FAULT | X |
| 171 | L IB 2 (S) | V91X7001X | 21 | 22 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | LIB ELEVON FDBK 2 COMM FAULT | X |
| 172 | L IB 3 (S) | V91X7002X | 21 | 23 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | LIB ELEVON FDBK 3 COMM FAULT | X |
| 173 | L IB 4 (S) | V91X7003X | 21 | 24 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | LIB ELEVON FDBK 4 COMM FAULT | X |
| 174 | R IB 1 (S) | V91X7100X | 28 | 21 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | RIB ELEVON FDBK 1 COMM FAULT | X |
| 175 | R IB 2 (S) | V91X7101X | 28 | 22 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | RIB ELEVON FDBK 2 COMM FAULT | X |
| 176 | R IB 3 (S) | V91X7102X | 28 | 23 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | RIB ELEVON FDBK 3 COMM FAULT | X |
| 177 | R IB 4 (S) | V91X7103X | 28 | 24 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | RIB ELEVON FDBK 4 COMM FAULT | X |
| 178 | R OB 1 (S) | V91X7150X | 34 | 21 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | ROB ELEVON FDBK 1 COMM FAULT | X |
| 179 | R OB 2 (S) | V91X7151X | 34 | 22 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | ROB ELEVON FDBK 2 COMM FAULT | X |

TABLE 4.5.3-2. SWITCH/SURF (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | BILEVEL | | | | | | | | | | | | | | | | | |
| | | | X | Y | | CHAR | 1 | 0 | TYPE | | | | | | | | | | | | | | | |
| 180 | R OB 3 (S) | V91X7152X | 34 | 23 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | ROB ELEVON FDBK 3 COMM FAULT | X |
| 181 | R OB 4 (S) | V91X7153X | 34 | 24 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | ROB ELEVON FDBK 4 COMM FAULT | X |
| 182 | RUD 1 (S) | V91X3850X | 41 | 21 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | RUDDER FDBK 1 COMM FAULT | X |
| 183 | RUD 2 (S) | V91X3860X | 41 | 22 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | RUDDER FDBK 2 COMM FAULT | X |
| 184 | RUD 3 (S) | V91X3870X | 41 | 23 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | RUDDER FDBK 3 COMM FAULT | X |
| 185 | RUD 4 (S) | V91X3880X | 41 | 24 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | RUDDER FDBK 4 COMM FAULT | X |
| 186 | SPD BRK 1 (S) | V91X3800X | 44 | 21 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | SPEEDBRAKE FDBK 1 COMM FAULT | X |
| 187 | SPD BRK 2 (S) | V91X3810X | 44 | 22 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | SPEEDBRAKE FDBK 2 COMM FAULT | X |
| 188 | SPD BRK 3 (S) | V91X3820X | 44 | 23 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | SPEEDBRAKE FDBK 3 COMM FAULT | X |
| 189 | SPD BRK 4 (S) | V91X3830X | 44 | 24 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | SPEEDBRAKE FDBK 4 COMM FAULT | X |
| 190 | BDY FLP 1 (S) | V91X7900X | 48 | 21 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | BODY FLAP FDBK 1 COMM FAULT | X |
| 191 | BDY FLP 2 (S) | V91X7901X | 48 | 22 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | BODY FLAP FDBK 2 COMM FAULT | X |
| 192 | BDY FLP 3 (S) | V91X7902X | 48 | 23 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | BODY FLAP FDBK 3 COMM FAULT | X |
| 193 | BDY FLP 4 (S) | V91X7904X | 48 | 24 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | BODY FLAP FDBK 4 COMM FAULT | X |
| 194 | (MSG LINE) | V93X0050X | 1 | 25 | | 44.0 | | | CHAR | | | | | | | G | | | | | | UI | MESSAGE LINE | X |
| 195 | (BUFFER MSG) | V93X0054X | 45 | 25 | | 4.0 | | | CHAR | | | | | | | G | | | | | | UI | BUFFER MESSAGE INDICATOR | X |
| 196 | (SPL) | V93X0056X | 2 | 26 | | 49.0 | | | CHAR | | | | | | | G | | | | | | UI | SCRATCH PAD LINE | X |

TABLE 4.5.3-5. INPUT FUNCTIONAL PARAMETERS FOR RM SWITCHES/SURFACES FEEDBACK DISPLAY (V5.1.7)

| FSSR NAME | M/S ID | NOMENCLATURE | SOURCE | UNITS | DATA TYPE | PREC | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|
| (CRT_TIME) | V91W1987C | DISPLAY CRT TIMER,GNC | FCOS | | SPL | | 93090E | |
| (DISP) | V93X0044X | DISPLAY FUNCTION PAGE | UI | | BD | | 93090E | |
| (GPC) | V93X0048X | GPC DRIVER | UI | | BD | | 93090E | |
| (LINE) | V93X0050X | MESSAGE LINE | UI | | BD | | 93090E | |
| (MSG) | V93X0054X | BUFFER MESSAGE INDICATOR | UI | | BD | | 93090E | |
| (MT) | V91W1990C | DISPLAY MSN TIME | FCOS | S | VAR | | 93090E | |
| (OPS) | V93X0040X | OPS FUNCTION PAGE | UI | | BD | | 93090E | |
| (SPEC) | V93X0042X | SPEC FUNCTION PAGE | UI | | BD | | 93090E | |
| (SPL) | V93X0056X | SCRATCH PAD LINE | UI | | BD | | 93090E | |
| (UL) | V92X5032X | UPLINK ACTIVITY IND | UI | | BD | | 93090E | |
| BF_FBK_CF(1) | V91X7900X | BODY FLAP FDBK 1 COMMFAULT | FCOS | | BD | | 79556D | |
| BF_FBK_CF(2) | V91X7901X | BODY FLAP FDBK 2 COMMFAULT | FCOS | | BD | | 79556D | |
| BF_FBK_CF(3) | V91X7902X | BODY FLAP FDBK 3 COMMFAULT | FCOS | | BD | | 79556D | |
| BF_FBK_CF(4) | V91X7904X | BODY FLAP FDBK 4 COMMFAULT | FCOS | | BD | | 79556D | |
| LIB_FBK_CF(1) | V91X7000X | LIB ELEVON FDBK 1 COMMFAULT | FCOS | | BD | | 79556D | |
| LIB_FBK_CF(2) | V91X7001X | LIB ELEVON FDBK 2 COMMFAULT | FCOS | | BD | | 79556D | |
| LIB_FBK_CF(3) | V91X7002X | LIB ELEVON FDBK 3 COMMFAULT | FCOS | | BD | | 79556D | |
| LIB_FBK_CF(4) | V91X7003X | LIB ELEVON FDBK 4 COMMFAULT | FCOS | | BD | | 79556D | |
| LOB_FBK_CF(1) | V91X7050X | LOB ELEVON FDBK 1 COMMFAULT | FCOS | | BD | | 79556D | |
| LOB_FBK_CF(2) | V91X7051X | LOB ELEVON FDBK 2 COMMFAULT | FCOS | | BD | | 79556D | |
| LOB_FBK_CF(3) | V91X7052X | LOB ELEVON FDBK 3 COMMFAULT | FCOS | | BD | | 79556D | |
| LOB_FBK_CF(4) | V91X7053X | LOB ELEVON FDBK 4 COMMFAULT | FCOS | | BD | | 79556D | |
| RCO_ENABLE | V93X1112X | RCO INHIBIT/ENABLE CMD | RM SWITCH/SURF FB DISP | | BD | | 93017G | * |
| RIB_FBK_CF(1) | V91X7100X | RIB ELEVON FDBK 1 COMMFAULT | FCOS | | BD | | 79556D | |
| RIB_FBK_CF(2) | V91X7101X | RIB ELEVON FDBK 2 COMMFAULT | FCOS | | BD | | 79556D | |
| RIB_FBK_CF(3) | V91X7102X | RIB ELEVON FDBK 3 COMMFAULT | FCOS | | BD | | 79556D | |
| RIB_FBK_CF(4) | V91X7103X | RIB ELEVON FDBK 4 COMMFAULT | FCOS | | BD | | 79556D | |
| ROB_FBK_CF(1) | V91X7150X | ROB ELEVON FDBK 1 COMMFAULT | FCOS | | BD | | 79556D | |
| ROB_FBK_CF(2) | V91X7151X | ROB ELEVON FDBK 2 COMMFAULT | FCOS | | BD | | 79556D | |
| ROB_FBK_CF(3) | V91X7152X | ROB ELEVON FDBK 3 COMMFAULT | FCOS | | BD | | 79556D | |
| ROB_FBK_CF(4) | V91X7153X | ROB ELEVON FDBK 4 COMMFAULT | FCOS | | BD | | 79556D | |
| RUD_FBK_CF(1) | V91X3850X | RUDDER FDBK 1 COMMFAULT | FCOS | | BD | | | |
| RUD_FBK_CF(2) | V91X3860X | RUDDER FDBK 2 COMMFAULT | FCOS | | BD | | | |
| RUD_FBK_CF(3) | V91X3870X | RUDDER FDBK 3 COMMFAULT | FCOS | | BD | | | |
| RUD_FBK_CF(4) | V91X3880X | RUDDER FDBK 4 COMMFAULT | FCOS | | BD | | | |
| SB_FBK_CF(1) | V91X3800X | SPEEDBRAKE FDBK 1 COMMFAULT | FCOS | | BD | | | |
| SB_FBK_CF(2) | V91X3810X | SPEEDBRAKE FDBK 2 COMMFAULT | FCOS | | BD | | | |
| SB_FBK_CF(3) | V91X3820X | SPEEDBRAKE FDBK 3 COMMFAULT | FCOS | | BD | | | |
| SB_FBK_CF(4) | V91X3830X | SPEEDBRAKE FDBK 4 COMMFAULT | FCOS | | BD | | | |
| | V90X3337X | ENTRY ROLL MODE L GAIN A DES/FAIL | GN&C SW RM | | BD | | 93017G | * |
| | V90X3338X | ENTRY ROLL MODE L GAIN B DES/FAIL | GN&C SW RM | | BD | | 93017G | * |
| | V90X3339X | ENTRY ROLL MODE L GAIN C DES/FAIL | GN&C SW RM | | BD | | 93017G | * |
| | V90X3340X | ENTRY ROLL MODE L GAIN D DES/FAIL | GN&C SW RM | | BD | | 93017G | * |
| | V91X5275XA | FCS MON CHAN 1 RESET/OVERRIDE A CF | FCOS | | | | 90182 | |
| | V91X5276XA | FCS MON CHAN 1 RESET/OVERRIDE B CF | FCOS | | | | 90182 | |

TABLE 4.5.3-5. INPUT FUNCTIONAL PARAMETERS FOR RM SWITCHES/SURFACES FEEDBACK DISPLAY (V5.1.7)

| FSSR NAME | M/S ID | NOMENCLATURE | SOURCE | UNITS | DATA TYPE | PREC | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|
| | V91X5277XA | FCS MON CHAN 1 RESET/OVERRIDE C CF | FCOS | | | | 90182 | |
| | V91X5278XA | FCS MON CHAN 2 RESET/OVERRIDE A CF | FCOS | | | | 90182 | |
| | V91X5279XA | FCS MON CHAN 2 RESET/OVERRIDE B CF | FCOS | | | | 90182 | |
| | V91X5280XA | FCS MON CHAN 2 RESET/OVERRIDE C CF | FCOS | | | | 90182 | |
| | V91X5281XA | FCS MON CHAN 3 RESET/OVERRIDE A CF | FCOS | | | | 90182 | |
| | V91X5282XA | FCS MON CHAN 3 RESET/OVERRIDE B CF | FCOS | | | | 90182 | |
| | V91X5283XA | FCS MON CHAN 3 RESET/OVERRIDE C CF | FCOS | | | | 90182 | |
| | V91X5284XA | FCS MON CHAN 4 RESET/OVERRIDE A CF | FCOS | | | | 90182 | |
| | V91X5285XA | FCS MON CHAN 4 RESET/OVERRIDE B CF | FCOS | | | | 90182 | |
| | V91X5286XA | FCS MON CHAN 4 RESET/OVERRIDE C CF | FCOS | | | | 90182 | |
| | V91X5287X | LH BODY FLAP AUTO/MANUAL A CF | FCOS | | BD | | | |
| | V91X5288X | LH BODY FLAP AUTO/MANUAL B CF | FCOS | | BD | | | |
| | V91X5289X | LH BODY FLAP AUTO/MANUAL C CF | FCOS | | BD | | | |
| | V91X5291X | FCS LH R-Y CSS MODE A COMMFAULT | FCOS | | BD | | | |
| | V91X5292X | FCS LH R-Y CSS MODE B COMMFAULT | FCOS | | BD | | | |
| | V91X5293X | FCS LH R-Y CSS MODE C COMMFAULT | FCOS | | BD | | | |
| | V91X5300X | FCS LH PITCH AUTO MODE A COMMFAULT | FCOS | | BD | | | |
| | V91X5301X | FCS LH PITCH AUTO MODE B COMMFAULT | FCOS | | BD | | | |
| | V91X5302X | FCS RH R-Y CSS MODE B COMMFAULT | FCOS | | BD | | | |
| | V91X5303X | FCS RH R-Y CSS MODE C COMMFAULT | FCOS | | BD | | | |
| | V91X5310X | FCS LH PITCH AUTO MODE C COMMFAULT | FCOS | | BD | | | |
| | V91X5311X | FCS LH PITCH CSS MODE A COMMFAULT | FCOS | | BD | | | |
| | V91X5312X | FCS LH PITCH CSS MODE B COMMFAULT | FCOS | | BD | | | |
| | V91X5313X | FCS LH PITCH CSS MODE C COMMFAULT | FCOS | | BD | | | |
| | V91X5314X | FCS LH R-Y AUTO MODE A COMMFAULT | FCOS | | BD | | | |
| | V91X5315X | FCS LH R-Y AUTO MODE B COMMFAULT | FCOS | | BD | | | |
| | V91X5316X | FCS LH R-Y AUTO MODE C COMMFAULT | FCOS | | BD | | | |
| | V91X5317X | LH SPD BK/THROT AUTO/MAN A CF | FCOS | | BD | | | |
| | V91X5318X | LH SPD BK/THROT AUTO/MAN B CF | FCOS | | BD | | | |
| | V91X5319X | LH SPD BK/THROT AUTO/MAN C CF | FCOS | | BD | | | |
| | V91X5320X | LH SBTC TAKEOVER-A COMMFAULT | FCOS | | BD | | | |
| | V91X5321X | LH SBTC TAKEOVER-B COMMFAULT | FCOS | | BD | | | |
| | V91X5322X | LH SBTC TAKEOVER-C COMMFAULT | FCOS | | BD | | | |
| | V91X5329X | RH BODY FLAP AUTO/MANUAL A CF | FCOS | | BD | | | |
| | V91X5330X | RH BODY FLAP AUTO/MANUAL B CF | FCOS | | BD | | | |
| | V91X5331X | RH BODY FLAP AUTO/MANUAL C CF | FCOS | | BD | | | |
| | V91X5332X | FCS RH PITCH AUTO MODE A COMMFAULT | FCOS | | BD | | | |
| | V91X5333X | FCS RH PITCH AUTO MODE B COMMFAULT | FCOS | | BD | | | |
| | V91X5334X | FCS RH PITCH AUTO MODE C COMMFAULT | FCOS | | BD | | | |
| | V91X5335X | FCS RH PITCH CSS MODE A COMMFAULT | FCOS | | BD | | | |
| | V91X5336X | FCS RH PITCH CSS MODE B COMMFAULT | FCOS | | BD | | | |
| | V91X5337X | FCS RH PITCH CSS MODE C COMMFAULT | FCOS | | BD | | | |
| | V91X5338X | FCS RH R-Y AUTO MODE A COMMFAULT | FCOS | | BD | | | |
| | V91X5339X | FCS RH R-Y AUTO MODE B COMMFAULT | FCOS | | BD | | | |
| | V91X5340X | FCS RH R-Y AUTO MODE C COMMFAULT | FCOS | | BD | | | |
| | V91X5341X | FCS RH R-Y CSS MODE A COMMFAULT | FCOS | | BD | | | |

TABLE 4.5.3-5. INPUT FUNCTIONAL PARAMETERS FOR RM SWITCHES/SURFACES FEEDBACK DISPLAY (V5.1.7)

| FSSR NAME | M/S ID | NOMENCLATURE | SOURCE | UNITS | DATA TYPE | PREC | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|
| | V91X5367X | RH SPD BK/THROT AUTO/MAN A CF | FCOS | | BD | | | |
| | V91X5368X | RH SPD BK/THROT AUTO/MAN B CF | FCOS | | BD | | | |
| | V91X5369X | RH SPD BK/THROT AUTO/MAN C-CF | FCOS | | BD | | | |
| | V91X5370X | RH SBTC TAKEOVER-A COMMFAULT | FCOS | | BD | | | |
| | V91X5371X | RH SBTC TAKEOVER-B COMMFAULT | FCOS | | BD | | | |
| | V91X5372X | RH SBTC TAKEOVER-C COMMFAULT | FCOS | | BD | | | |
| | V91X5504X | ENTRY ROLL MODE L GAIN A CF | FCOS | | BD | | | |
| | V91X5505X | ENTRY ROLL MODE L GAIN B CF | FCOS | | BD | | | |
| | V91X5506X | ENTRY ROLL MODE L GAIN C CF | FCOS | | BD | | | |
| | V91X5507X | ENTRY ROLL MODE L GAIN D CF | FCOS | | BD | | | |
| | V91X5508X | ENTRY ROLL MODE NO Y JET A CF | FCOS | | BD | | | |
| | V91X5509X | ENTRY ROLL MODE NO Y JET B CF | FCOS | | BD | | | |
| | V91X5510X | ENTRY ROLL MODE NO Y JET C CF | FCOS | | BD | | | |
| | V91X5511X | ENTRY ROLL MODE NO Y JET D CF | FCOS | | BD | | | |
| | V93X4701X | LH SW CON 1 DES CMD | RM SWITCH/SURF FB DISP | | BD | | 93017G | * |
| | V93X4703X | LH SW CON 2 DES CMD | RM SWITCH/SURF FB DISP | | BD | | 93017G | * |
| | V93X4705X | LH SW CON 3 DES CMD | RM SWITCH/SURF FB DISP | | BD | | 93017G | * |
| | V93X4711X | RH SW CON 1 DES CMD | RM SWITCH/SURF FB DISP | | BD | | 93017G | * |
| | V93X4713X | RH SW CON 2 DES CMD | RM SWITCH/SURF FB DISP | | BD | | 93017G | * |
| | V93X4715X | RH SW CON 3 DES CMD | RM SWITCH/SURF FB DISP | | BD | | 93017G | * |
| | V93X4721X | FCS CH 1 SW CON 1 DES CMD | RM SWITCH/SURF FB DISP | | BD | | 93017G | * |
| | V93X4723X | FCS CH 1 SW CON 2 DES CMD | RM SWITCH/SURF FB DISP | | BD | | 93017G | * |
| | V93X4725X | FCS CH 1 SW CON 3 DES CMD | RM SWITCH/SURF FB DISP | | BD | | 93017G | * |
| | V93X4731X | FCS CH 2 SW CON 1 DES CMD | RM SWITCH/SURF FB DISP | | BD | | 93017G | * |
| | V93X4733X | FCS CH 2 SW CON 2 DES CMD | RM SWITCH/SURF FB DISP | | BD | | 93017G | * |
| | V93X4735X | FCS CH 2 SW CON 3 DES CMD | RM SWITCH/SURF FB DISP | | BD | | 93017G | * |
| | V93X4741X | FCS CH 3 SW CON 1 DES CMD | RM SWITCH/SURF FB DISP | | BD | | 93017G | * |
| | V93X4743X | FCS CH 3 SW CON 2 DES CMD | RM SWITCH/SURF FB DISP | | BD | | 93017G | * |
| | V93X4745X | FCS CH 3 SW CON 3 DES CMD | RM SWITCH/SURF FB DISP | | BD | | 93017G | * |
| | V93X4751X | FCS CH 4 SW CON 1 DES CMD | RM SWITCH/SURF FB DISP | | BD | | 93017G | * |

TABLE 4.5.3-5. INPUT FUNCTIONAL PARAMETERS FOR RM SWITCHES/SURFACES FEEDBACK DISPLAY (V5.1.7)

| FSSR NAME | M/S ID | NOMENCLATURE | SOURCE | UNITS | DATA TYPE | PREC | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|
| | V93X4753X | FCS CH 4 SW CON 2 DES CMD | RM SWITCH/SURF FB DISP | | BD | | 93017G | * |
| | V93X4755X | FCS CH 4 SW CON 3 DES CMD | RM SWITCH/SURF FB DISP | | BD | | 93017G | * |
| | V93X4761XB | FCS FDBK XDUCER 1 DES CMD | RM SWITCH/SURF FB DISP | | | | 93017G | * |
| | V93X4763XB | FCS FDBK XDUCER 2 DES CMD | RM SWITCH/SURF FB DISP | | | | 93017G | * |
| | V93X4765XB | FCS FDBK XDUCER 3 DES CMD | RM SWITCH/SURF FB DISP | | | | 93017G | * |
| | V93X4767XB | FCS FDBK XDUCER 4 DES CMD | RM SWITCH/SURF FB DISP | | | | 93017G | * |
| | V93X4770X | ENTRY ROLL MODE 1 DES CMD | RM SWITCH/SURF FB DISP | | BD | | 89281B | |
| | V93X4771X | ENTRY ROLL MODE 2 DES CMD | RM SWITCH/SURF FB DISP | | BD | | 89281B | |
| | V93X4772X | ENTRY ROLL MODE 3 DES CMD | RM SWITCH/SURF FB DISP | | BD | | 89281B | |
| | V93X4773X | ENTRY ROLL MODE 4 DES CMD | RM SWITCH/SURF FB DISP | | BD | | 89281B | |

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE 4.5.3-6. OUTPUT FUNCTIONAL PARAMETERS FROM RM SWITCHES/SURFACES FEEDBACK DISPLAY (V5.1.7)

| FSSR NAME | M/S ID | NOMENCLATURE | DESTINATION | UNITS | DATA TYPE | PREC | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|
| BURN_ENABLE_WINDOW | V97U5181C | BURN ENABLE WINDOW | DEORB MNVR DIP<br>ORB MNVR DIP | S | DPL | | 93023D | |
| RCO_ENABLE | V93X1112X | RCO INHIBIT/ENABLE CMD | A/E ATT PROC<br>A/L GUID<br>DL FMT 22/A<br>DL FMT 23/1<br>DL FMT 32/A<br>GN&C/SM-PL IF<br>MSC<br>PRELAND NAV<br>RM SWITCH/SURF FB DISP | | BD | | 93017G | * |
| | V90M2868P | CGRB_ORB_TRIPLE_SF_STAT$(4:) | DL FMT 32/A | | | | 93017G | * |
| | V90M2869P | CGRB_ORB_TRIPLE_SF_STAT$(5:) | DL FMT 32/A | | | | 93017G | * |
| | V90M2870P | CGRB_ORB_TRIPLE_SF_STAT$(6:) | DL FMT 32/A | | | | 93017G | * |
| | V90M2918PA | CGRB_FAIL_ON_AFT_HFE | DL FMT 22/A<br>DL FMT 23/1<br>DL FMT 32/A | | | | 93017G | * |
| | V93M0506P | CGRB_RM_SW_DISPLAY | DL FMT 32/A | | | | 93017G | * |
| | V93X4701X | LH SW CON 1 DES CMD | DL FMT 23/1<br>DL FMT 32/A<br>GN&C SW RM<br>RM SWITCH/SURF FB DISP | | BD | | 93017G | * |
| | V93X4703X | LH SW CON 2 DES CMD | DL FMT 23/1<br>DL FMT 32/A<br>GN&C SW RM<br>RM SWITCH/SURF FB DISP | | BD | | 93017G | * |
| | V93X4705X | LH SW CON 3 DES CMD | DL FMT 23/1<br>DL FMT 32/A<br>GN&C SW RM<br>RM SWITCH/SURF FB DISP | | BD | | 93017G | * |
| | V93X4711X | RH SW CON 1 DES CMD | DL FMT 23/1<br>DL FMT 32/A<br>GN&C SW RM<br>RM SWITCH/SURF FB DISP | | BD | | 93017G | * |
| | V93X4713X | RH SW CON 2 DES CMD | DL FMT 23/1<br>DL FMT 32/A<br>GN&C SW RM<br>RM SWITCH/SURF FB DISP | | BD | | 93017G | * |

TABLE 4.5.3-6. OUTPUT FUNCTIONAL PARAMETERS FROM RM SWITCHES/SURFACES FEEDBACK DISPLAY (V5.1.7)

| FSSR NAME | M/S ID | NOMENCLATURE | DESTINATION | UNITS | DATA TYPE | PREC | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|
| | V93X4715X | RH SW CON 3 DES CMD | DL FMT 23/1<br>DL FMT 32/A<br>GN&C SW RM<br>RM SWITCH/SURF FB DISP | | BD | | 93017G | * |
| | V93X4721X | FCS CH 1 SW CON 1 DES CMD | DL FMT 32/A<br>GN&C SW RM<br>RM SWITCH/SURF FB DISP | | BD | | 93017G | * |
| | V93X4723X | FCS CH 1 SW CON 2 DES CMD | DL FMT 32/A<br>GN&C SW RM<br>RM SWITCH/SURF FB DISP | | BD | | 93017G | * |
| | V93X4725X | FCS CH 1 SW CON 3 DES CMD | DL FMT 32/A<br>GN&C SW RM<br>RM SWITCH/SURF FB DISP | | BD | | 93017G | * |
| | V93X4731X | FCS CH 2 SW CON 1 DES CMD | DL FMT 32/A<br>GN&C SW RM<br>RM SWITCH/SURF FB DISP | | BD | | 93017G | * |
| | V93X4733X | FCS CH 2 SW CON 2 DES CMD | DL FMT 32/A<br>GN&C SW RM<br>RM SWITCH/SURF FB DISP | | BD | | 93017G | * |
| | V93X4735X | FCS CH 2 SW CON 3 DES CMD | DL FMT 32/A<br>GN&C SW RM<br>RM SWITCH/SURF FB DISP | | BD | | 93017G | * |
| | V93X4741X | FCS CH 3 SW CON 1 DES CMD | DL FMT 32/A<br>GN&C SW RM<br>RM SWITCH/SURF FB DISP | | BD | | 93017G | * |
| | V93X4743X | FCS CH 3 SW CON 2 DES CMD | DL FMT 32/A<br>GN&C SW RM<br>RM SWITCH/SURF FB DISP | | BD | | 93017G | * |
| | V93X4745X | FCS CH 3 SW CON 3 DES CMD | DL FMT 32/A<br>GN&C SW RM<br>RM SWITCH/SURF FB DISP | | BD | | 93017G | * |
| | V93X4751X | FCS CH 4 SW CON 1 DES CMD | DL FMT 32/A<br>GN&C SW RM<br>RM SWITCH/SURF FB DISP | | BD | | 93017G | * |

TABLE 4.5.3-6. OUTPUT FUNCTIONAL PARAMETERS FROM RM SWITCHES/SURFACES FEEDBACK DISPLAY (V5.1.7)

| FSSR NAME | M/S ID | NOMENCLATURE | DESTINATION | UNITS | DATA TYPE | PREC | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|
| | V93X4753X | FCS CH 4 SW CON 2 DES CMD | DL FMT 32/A<br>GN&C SW RM<br>RM SWITCH/SURF FB DISP | | BD | | 93017G | * |
| | V93X4755X | FCS CH 4 SW CON 3 DES CMD | DL FMT 32/A<br>GN&C SW RM<br>RM SWITCH/SURF FB DISP | | BD | | 93017G | * |
| | V93X4761XB | FCS FDBK XDUCER 1 DES CMD | BF PFB FDIR<br>DL FMT 32/A<br>ELVN PFB FDIR<br>RM SWITCH/SURF FB DISP<br>RUD PFB FDIR<br>SB PFB FDIR | | | | 93017G | * |
| | V93X4763XB | FCS FDBK XDUCER 2 DES CMD | BF PFB FDIR<br>DL FMT 32/A<br>ELVN PFB FDIR<br>RM SWITCH/SURF FB DISP<br>RUD PFB FDIR<br>SB PFB FDIR | | | | 93017G | * |
| | V93X4765XB | FCS FDBK XDUCER 3 DES CMD | BF PFB FDIR<br>DL FMT 32/A<br>ELVN PFB FDIR<br>RM SWITCH/SURF FB DISP<br>RUD PFB FDIR<br>SB PFB FDIR | | | | 93017G | * |
| | V93X4767XB | FCS FDBK XDUCER 4 DES CMD | BF PFB FDIR<br>DL FMT 32/A<br>ELVN PFB FDIR<br>RM SWITCH/SURF FB DISP<br>RUD PFB FDIR<br>SB PFB FDIR | | | | 93017G | * |
| | V93X4770X | ENTRY ROLL MODE 1 DES CMD | GN&C SW RM<br>RM SWITCH/SURF FB DISP | | BD | | 89281B | |
| | V93X4771X | ENTRY ROLL MODE 2 DES CMD | GN&C SW RM<br>RM SWITCH/SURF FB DISP | | BD | | 89281B | |
| | V93X4772X | ENTRY ROLL MODE 3 DES CMD | GN&C SW RM<br>RM SWITCH/SURF FB DISP | | BD | | 89281B | |

TABLE 4.5.3-6. OUTPUT FUNCTIONAL PARAMETERS FROM RM SWITCHES/SURFACES FEEDBACK DISPLAY (V5.1.7)

| FSSR NAME | M/S ID | NOMENCLATURE | DESTINATION | UNITS | DATA TYPE | PREC | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|
| | V93X4773X | ENTRY ROLL MODE 4 DES CMD | GN&C SW RM<br>RM SWITCH/SURF FB DISP | | BD | | 89281B | |

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

**Rate Codes: (HDR Only) 1 = 1 sample/sec 2 = 5 samples/sec 3 = 12.5 samples/sec 4 = 25 samples/sec 5 = 100 samples/sec**
**(HDR and LDR) A = 1 sample/sec B = 5 samples/sec C = 12.5 samples/sec D = 25 samples/sec E = 100 samples/sec**

TABLE 4.5.3-7. RM SWITCHES/SURFACES FEEDBACK DISPLAY (V5.1.7) I-LOADS

| FSSR NAME | MSID | ENG UNITS | DT | PR | D | S | PR FCTN | MC | CAT | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|---|---|---|

NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE 4.5.3-8. RM SWITCHES/SURFACES FEEDBACK DISPLAY (V5.1.7) K-LOADS

| FSSR NAME DESCRIPTION | MSID | MC | KLOAD VALUE | ENG UNITS | DT | P R | S | PR FCTN | LAST CR | R E V |
|---|---|---|---|---|---|---|---|---|---|---|

NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

## TABLE 4.5.3-9. RM SWITCHES/SURFACES FEEDBACK DISPLAY (V5.1.7) CONSTANTS

| FSSR NAME DESCRIPTION | MSID | MC | CONSTANT VALUE | ENG UNITS | DT | P R | S | PR FCTN | LAST CR | R E V |
|---|---|---|---|---|---|---|---|---|---|---|

NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

### 4.5.4 ON–ORBIT SENSOR SELF–TEST (PFS)

TITLE: SENSOR TEST
TYPE: SPEC/040
AVAILABILITY: GN&C OPS 8

#### 4.5.4.1 Purpose, Operation, and Organization

(1) SENSOR TEST

This SPEC permits self–testing of the Microwave Landing System (MLS), TACAN (TAC), Radar Altimeter (RA), and Accelerometer Assembly (AA) sensors while on orbit. Figure 4.5.4-1 is the On-Orbit Sensor Self Test Display for 3 TACANs Installed and Figure 4.5.4-2 is the On-Orbit Sensor Self Test Display for 3 GPS Receivers Installed. Tests are not individually selected, but are started and stopped all together. For each of the test parameters generated the value is displayed, compared with expected results, and a status indication is driven beside the displayed parameter if it is outside predetermined limits, (up arrow (↑) indicating test value too high, or down arrow(↓) indicating test value too low). An "M" will be displayed beside the last valid data value if data are missing (commfaulted).

(2) MLS

For the Microwave Landing System (MLS) sensors, range (RNG) in nautical miles, azimuth (AZ) in degrees, and elevation (EL) in degrees are displayed. The STAT column will be blank or will show OFF or BITE. BITE will only be displayed for sensed errors, that occur while the test is in progress. If BITE is displayed because of sensed errors, it will remain on the display even if the condition is corrected, until Item 13 is executed or an "OFF" condition is encountered.

(3) TAC

For the TACAN (TAC) sensors, range (RNG) in nautical miles and azimuth (AZ) in degrees are displayed. The STAT column will be blank or will show OFF or BITE. BITE will only be displayed for sensed errors, that occur while the test is in progress. If BITE is displayed because of sensed errors, it will remain on the display even if the condition is corrected, until Item 13 is executed or an "OFF" condition is encountered.

The Tactical Air Navigation (TAC) sensor self-test shall be supported based on the vehicle hardware configuration as determined by I-Loads (one for each GPS receiver). If all three of the I-Loads indicate GPS receivers are installed, then the configuration is GPS. If one or more of the I-Loads indicate that a GPS receiver is not installed, then configuration is TAC. (For a list of sensor self test I-Loads, reference: Table 4.3.6-1 in the SS-P-0002-550).

For configuration GPS, all TAC-specific fields (the "TAC 1 2 3" title field, the DES, STAT, RNG, and AZ heading, data and parameter status indicator fields and Items 4, 5, and 6) shall not be displayed. In this case, any attempt to execute 4, 5, and 6 shall result in the generation of an "ILLEGAL ENTRY" message.

(4) RA

For the Radar Altimeter (RA) sensors, altitude (ALT) in feet is displayed. The STAT column will be blank or will show OFF or BITE. BITE will only be displayed for sensed errors that occur while the test is in progress. If BITE is displayed because of sensed errors, it will remain on the display even if the condition is corrected, until Item 13 is executed or an "OFF" condition is encountered.

(5) AA

For the Accelerometer Assembly (AA) sensors, compensated lateral acceleration (Y) and compensated normal acceleration (Z) in feet per second per second are displayed. There is no STAT column associated with AA.

Whether or not testing is in progress, Items 1 through 12 may be used to reconfigure the corresponding sensors as candidates for the selection filters during the entry phase. Execution of one of these items reverses the selection/deselection for the corresponding sensor. An asterisk (*) beside the item number indicates the corresponding sensor is deselected. For more information on Selection Filtering and its use with Redundancy Management, refer to the GN&C Redundancy Management FSSR, STS 83-0010.

(6) START STOP

Execution of Item 13 blanks the asterisk (*) beside Item 14, blanks the STAT columns, and initiates parallel testing of all the sensors listed on the display. For configuration GPS, execution of Items 13 (START) and 14 (STOP) shall have no effect on TACAN since these are not shown. In all cases, execution of Items 13 and 14 will have no effect on GPS receivers. The self–tests will run to completion regardless of an earlier LRU self–test failure. An asterisk (*) appears next to Item 13 while the test is in progress and is blanked upon test completion. Execution of Item 14 terminates testing, removes all self–test stimuli from the LRU's, clears the PSI's on the display, enables cyclic update of sensor parametric data, and displays the asterisk (*) beside Item 14. Items 13 and 14 are initialized blank anytime the display is called up. Items 13 and 14 may not be selected while a test is in progress (indicated by an * next to Item 13). Item 13 may not be selected after a test has been completed unless Item 14 is entered first.

### 4.5.4.2 On-Orbit Sensor Self-Test (PFS) Keyboard Processing Addendum

A. The destinations for this signal are GAX (4.110), MSBLS FDIR (4.78) and CRT (V5.1.4).

B. The destinations for this signal are GAX (4.110), TACAN RM (4.77) and CRT (V5.1.4).

C. The destinations for this signal are GAX (4.110), AA FDIR (4.76) and CRT (V5.1.4).

D. For configuration GPS, the TACAN-related data field and identifier name and associated background (including the associated Item Entries 4, 5, and 6) are not displayed. Items 4, 5, and 6 are inoperative and an "ILLEGAL ENTRY" message shall result if they are executed.

E. For configuration GPS, execution of Items 13 (START) and 14 (STOP) shall have no effect on TACAN since these are not shown. In all cases, execution of Items 13 and 14 will have no effect on GPS receivers.

### 4.5.4.3 On-Orbit Sensor Self-Test (PFS) CRT Display Processing Addendum

The Table below presents the stand–alone parameter status indicators (PSI) that can be displayed for a parameter PSI requirements are identified by the word “STAT” being inserted in the FORMAT TYPE column and a numeric code appearing as an entry (right justified) in the ADD REF column of CRT display processing Table 4.5.4–2. The numeric code, corresponding to one of those listed in the Table indicates the specific status processing to be performed. If there is no numeric code entry, the status processing is defined by the default code.

When the “M” PSI is displayed (for Commfault, I/O error resulting in missing data), the associated parameter value data field shall be blanked unless specified otherwise.

| Numeric Code | PSI SYMBOL(S) | | | | | |
|---|---|---|---|---|---|---|
| Default (blank) | ↓ | | | M | Ø | Ø = blank |
| 1 | ↓ | ↑ | | M | Ø | |
| 2 | | ↑ | | M | Ø | |
| 3 | ↓ | | | | Ø | |
| 4 | | ↑ | | | Ø | |
| 5 | ↓ | | ? | | Ø | |
| 6 | ↓ | ↑ | | | Ø | |
| 7 | | | | M | Ø | |
| 8 | ↓ | | ? | M | Ø | |
| 9 | | | ? | M | Ø | |

The following alpha code(s) appear (left justified) in the ADD REF column of the Table 4.5.4–2 whenever it is necessary to define any special processing requirements not otherwise covered therein:

A. The STAT column for RA, MLS and TACAN can display the following values:

| | |
|---|---|
| OFF | device off |
| BITE | device has malfunctioned |
| Blank | other |

When the display is called, STAT is initialized blank. If any error is detected during a test execution, BITE is locked on the display until an Item 13 is executed or an “OFF” condition is executed.

In all cases, display of a power off condition shall take precedence over display of a BITE condition.

B. For configuration GPS, the TACAN-related data field and identifier name and associated background (including the associated Item Entries 4, 5, and 6) are not displayed.

### 4.5.4.4 On-Orbit Sensor Self-Test Figure/Table References

Figure 4.5.4–1 On–Orbit Sensor Self–Test Display for 3 TACANs Installed (PFS)

Figure 4.5.4–2 On–Orbit Sensor Self–Test Display for 3 GPS Receivers Installed (PFS)

Table 4.5.4–1 Keyboard Processing Table

Table 4.5.4–2 CRT Display Processing Table

Table 4.5.4–3 CRT Display Processing Background Requirements N/A

Table 4.5.4–4 Mission Design Background Constants

Table 4.5.4–5 Input Functional Parameters

Table 4.5.4–6 Output Functional Parameters

Table 4.5.4–7 I–Loads

Table 4.5.4–8 K–Loads

Table 4.5.4–9 Constants

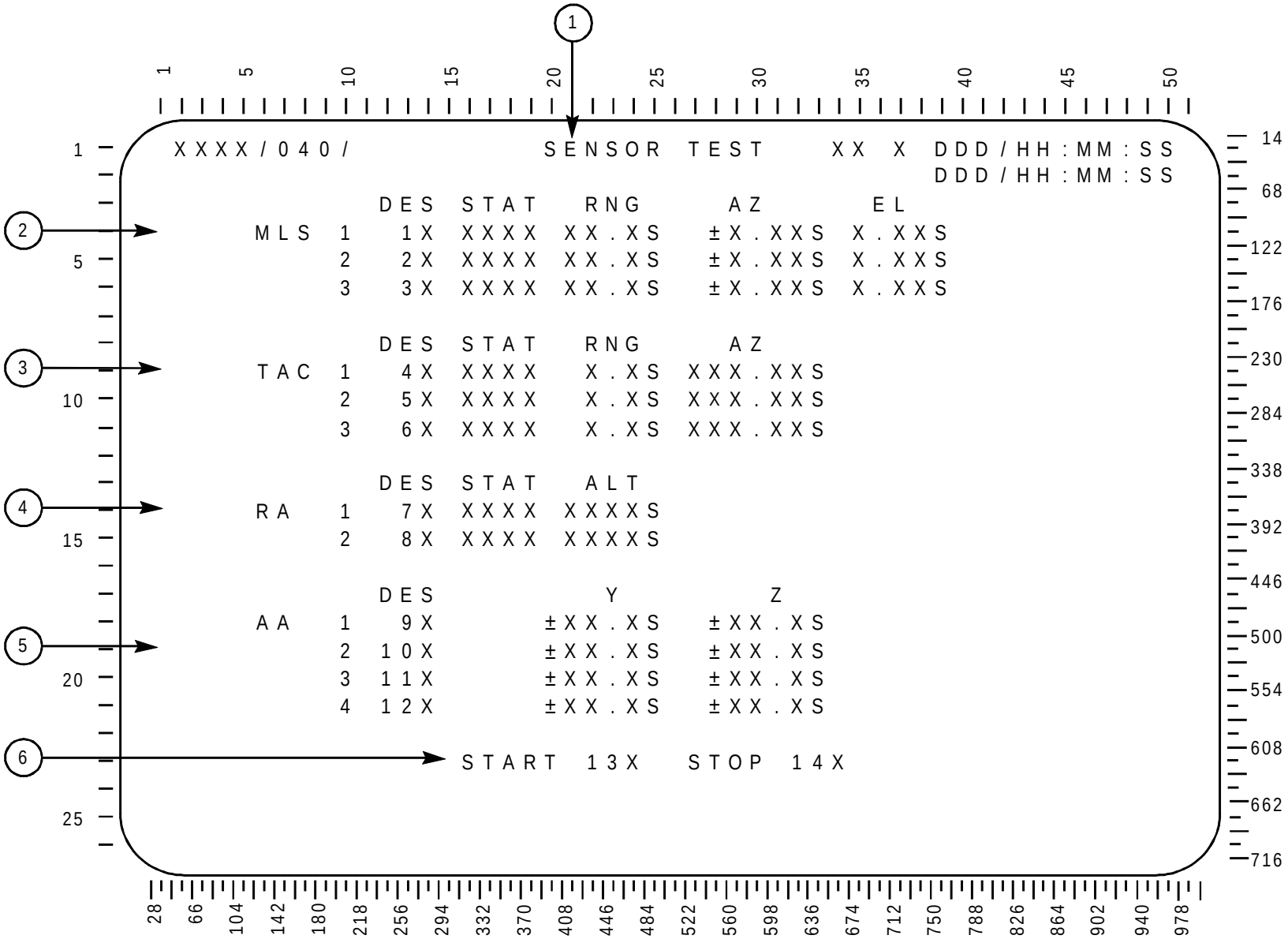


FIGURE 4.5.4-1. On-Orbit Sensor Self-Test Display For 3 TACANs Installed (PFS)

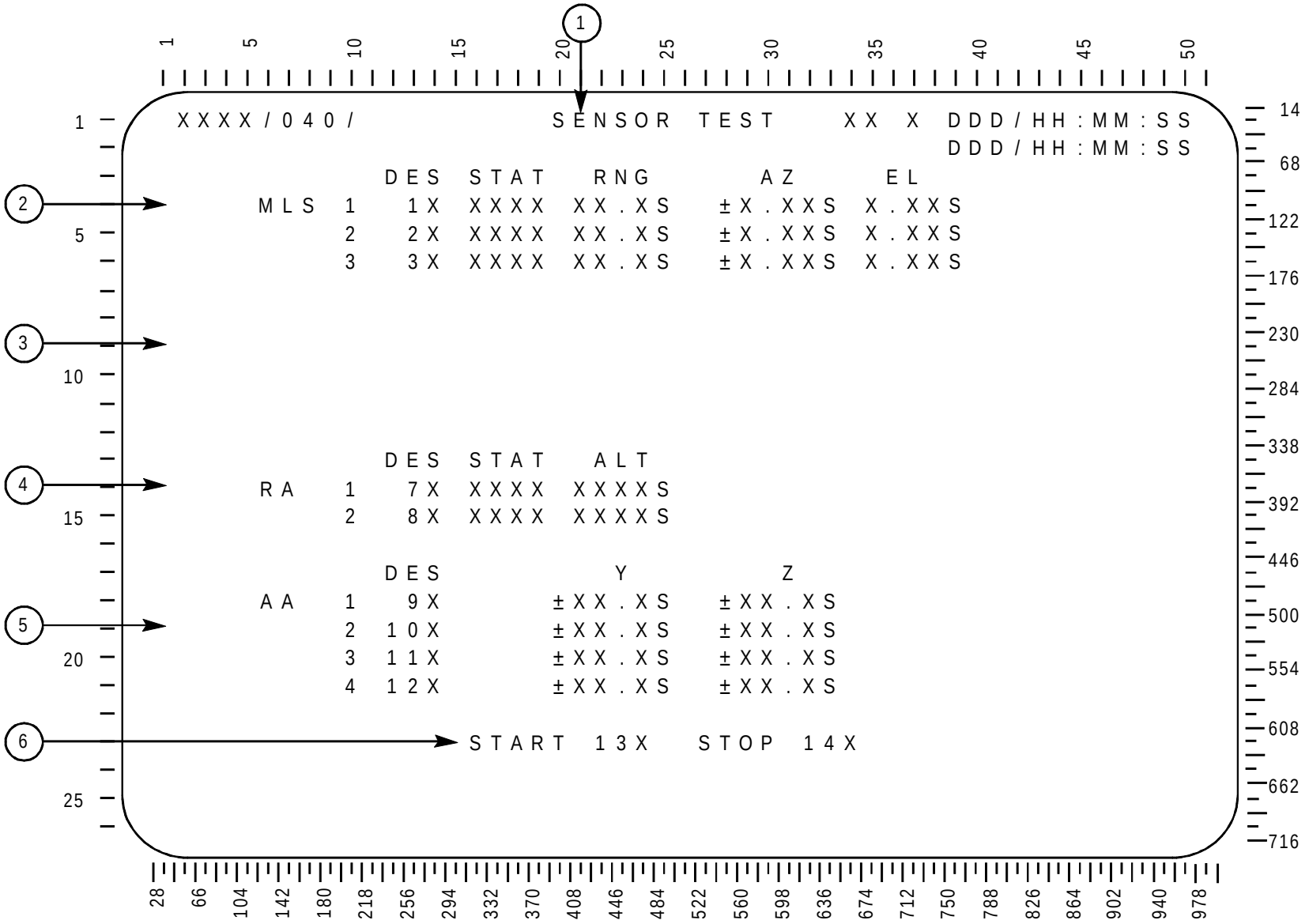


FIGURE 4.5.4-2. On-Orbit Sensor Self-Test Display for 3 GPS Receivers Installed (PFS)

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| TABLE 4.5.4-1. ON ORBIT SENSOR SELF TEST (PFS) KEYBOARD PROCESSING | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Seq | CRT Signal Name | M/S ID | CHAR | TYPE | UNITS | DK | ITEM | Item No. Limits | | Add Ref | Destination | Nomenclature | CRT |
| | | | | | | | | MIN | MAX | | | | |
| 001 | MLS 1 DES 1 | V93X4421X | 0.0 | CTRL | | | 1 | | | A | CRT,GAX | MSBLS 1 DES CMD | X |
| 002 | MLS 2 DES 2 | V93X4423X | 0.0 | CTRL | | | 2 | | | A | CRT,GAX | MSBLS 2 DES CMD | X |
| 003 | MLS 3 DES 3 | V93X4425X | 0.0 | CTRL | | | 3 | | | A | CRT,GAX | MSBLS 3 DES CMD | X |
| 004 | TAC 1 DES 4 | V93X4411X | 0.0 | CTRL | | | 4 | | | B,D | CRT,GAX | TACAN 1 DES CMD | X |
| 005 | TAC 2 DES 5 | V93X4413X | 0.0 | CTRL | | | 5 | | | B,D | CRT,GAX | TACAN 2 DES CMD | X |
| 006 | TAC 3 DES 6 | V93X4415X | 0.0 | CTRL | | | 6 | | | B,D | CRT,GAX | TACAN 3 DES CMD | X |
| 007 | RA 1 DES 7 | V93X4431X | 0.0 | CTRL | | | 7 | | | | SF,CRT | RA 1 DES CMD | X |
| 008 | RA 2 DES 8 | V93X4433X | 0.0 | CTRL | | | 8 | | | | SF,CRT | RA 2 DES CMD | X |
| 009* | AA 1 DES 9 | V93X4435X | 0.0 | CTRL | | | 9 | | | C | CRT,GAX | AA 1 DES CMD/FAIL | X |
| 010* | AA 2 DES 10 | V93X4436X | 0.0 | CTRL | | | 10 | | | C | CRT,GAX | AA 2 DES CMD/FAIL | X |
| 011* | AA 3 DES 11 | V93X4437X | 0.0 | CTRL | | | 11 | | | C | CRT,GAX | AA 3 DES CMD/FAIL | X |
| 012* | AA 4 DES 12 | V93X4438X | 0.0 | CTRL | | | 12 | | | C | CRT,GAX | AA 4 DES CMD/FAIL | X |
| 013 | START 13 | V93X4447X | 0.0 | CTRL | | | 13 | | | E | SST | START SENSOR TEST CMD | X |
| 014 | STOP 14 | V93X4448X | 0.0 | CTRL | | | 14 | | | E | SST | STOP SENSOR TEST CMD | X |

TABLE 4.5.4-2. ON ORBIT SENSOR SELF TEST (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | | | |
| 001 | (OPS) | V93X0040X | 2 | 1 | | 5.0 | | | CHAR | | | | | | | E | | | | | | UI | OPS FUNCTION PAGE | X |
| 002 | (SPEC) | V93X0042X | 7 | 1 | | 4.0 | | | CHAR | | | | | | | E | | | | | | UI | SPEC FUNCTION PAGE | X |
| 003 | (DISP) | V93X0044X | 10 | 1 | | 4.0 | | | DEC | | | | | | | E | | | | | | UI | DISPLAY FUNCTION PAGE | X |
| 004 | (UL) | V92X5032X | 34 | 1 | | 2.0 | UL | | BLVL | | | | | | X | G | | | | | | UI | UPLINK ACTIVITY IND | X |
| 005 | (GPC) | V93X0048X | 36 | 1 | | 2.0 | | | DEC | | | | | | | E | | | | | | UI | GPC DRIVER | X |
| 006 | (MT) | V91W1990C | 39 | 1 | | 12.0 | | | CHAR | DHMS | | | | | | A | | | | | | FCOS | MISSION ELAPSED TIME | X |
| 007 | (CRT TIMER) | V91W1987C | 39 | 2 | | 12.0 | | | CHAR | DHMS | | | | | | A | | | | | | FCOS | DISPLAY CRT TIMER,GNC | X |
| 008 | MLS 1 DES 1 | V93X4421X | 14 | 4 | | 1.0 | | * | BLVL | | | | | | | | | | | | | KYBD | MSBLS 1 DES CMD | X |
| 009 | MLS 2 DES 2 | V93X4423X | 14 | 5 | | 1.0 | | * | BLVL | | | | | | | | | | | | | KYBD | MSBLS 2 DES CMD | X |
| 010 | MLS 3 DES 3 | V93X4425X | 14 | 6 | | 1.0 | | * | BLVL | | | | | | | | | | | | | KYBD | MSBLS 3 DES CMD | X |
| 011 | MLS 1 STAT | V99J4109C | 16 | 4 | | 4.0 | | | RTXT | | | | | | | | | | | | A | SST | MSBLS NO 1 STATUS | X |
| 012 | MLS 2 STAT | V99J4110C | 16 | 5 | | 4.0 | | | RTXT | | | | | | | | | | | | A | SST | MSBLS NO 2 STATUS | X |
| 013 | MLS 3 STAT | V99J4111C | 16 | 6 | | 4.0 | | | RTXT | | | | | | | | | | | | A | SST | MSBLS NO 3 STATUS | X |
| 014 | MLS 1 RNG | V74H1052B | 20 | 4 | | 5.1 | | | DEC | NM | X | | | | | | | | | | 1 | SST | MSBLS NO 1 RANGE DATA | X |
| 015 | MLS 2 RNG | V74H1152B | 20 | 5 | | 5.1 | | | DEC | NM | X | | | | | | | | | | 1 | SST | MSBLS NO 2 RANGE DATA | X |
| 016 | MLS 3 RNG | V74H1252B | 20 | 6 | | 5.1 | | | DEC | NM | X | | | | | | | | | | 1 | SST | MSBLS NO 3 RANGE DATA | X |
| 017 | MLS 1 AZ | V74H1012B | 28 | 4 | | 5.2 | | | DEC | DEG | X | | | | | | X | | | | 1 | SST | MSBLS NO 1 AZIMUTH DATA | X |
| 018 | MLS 2 AZ | V74H1112B | 28 | 5 | | 5.2 | | | DEC | DEG | X | | | | | | X | | | | 1 | SST | MSBLS NO 2 AZIMUTH DATA | X |
| 019 | MLS 3 AZ | V74H1212B | 28 | 6 | | 5.2 | | | DEC | DEG | X | | | | | | X | | | | 1 | SST | MSBLS NO 3 AZIMUTH DATA | X |
| 020 | MLS 1 EL | V74H1032B | 34 | 4 | | 5.2 | | | DEC | DEG | X | | | | | | | | | | 1 | SST | MSBLS NO 1 ELEVATION DATA | X |
| 021 | MLS 2 EL | V74H1132B | 34 | 5 | | 5.2 | | | DEC | DEG | X | | | | | | | | | | 1 | SST | MSBLS NO 2 ELEVATION DATA | X |
| 022 | MLS 3 EL | V74H1232B | 34 | 6 | | 5.2 | | | DEC | DEG | X | | | | | | | | | | 1 | SST | MSBLS NO 3 ELEVATION DATA | X |
| 023 | TAC 1 DES 4 | V93X4411X | 14 | 9 | | 1.0 | | * | BLVL | | | X | | | | | | | | | B | KYBD | TACAN 1 DES CMD | X |
| 024 | TAC 2 DES 5 | V93X4413X | 14 | 10 | | 1.0 | | * | BLVL | | | X | | | | | | | | | B | KYBD | TACAN 2 DES CMD | X |
| 025 | TAC 3 DES 6 | V93X4415X | 14 | 11 | | 1.0 | | * | BLVL | | | X | | | | | | | | | B | KYBD | TACAN 3 DES CMD | X |
| 026 | TAC 1 STAT | V99J4105C | 16 | 9 | | 4.0 | | | RTXT | | | X | | | | | | | | | A,B | SST | TAC NO 1 STATUS | X |
| 027 | TAC 2 STAT | V99J4106C | 16 | 10 | | 4.0 | | | RTXT | | | X | | | | | | | | | A,B | SST | TAC NO 2 STATUS | X |
| 028 | TAC 3 STAT | V99J4107C | 16 | 11 | | 4.0 | | | RTXT | | | X | | | | | | | | | A,B | SST | TAC NO 3 STATUS | X |
| 029 | TAC 1 RNG | V99U4100C | 21 | 9 | | 4.1 | | | DEC | NM | X | X | | | | | | | | | B 1 (1) | SST | TAC NO 1 RNG OUT–TAC RNG 0 | X |

## TABLE 4.5.4-2. ON ORBIT SENSOR SELF TEST (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | | | |
| 030 | TAC 2 RNG | V99U4101C | 21 | 10 | | 4.1 | | | DEC | NM | X | X | | | | | | | | | B 1 | SST | TAC NO 2 RNG OUT–TAC RNG 0 (2) | X |
| 031 | TAC 3 RNG | V99U4102C | 21 | 11 | | 4.1 | | | DEC | NM | X | X | | | | | | | | | B 1 | SST | TAC NO 3 RNG OUT–TAC RNG 0 (3) | X |
| 032 | TAC 1 AZ | V74H1535B | 26 | 9 | | 7.2 | | | DEC | DEG | X | X | | | | | | | | | B 1 | SST | TACAN 1 BEARING DATA WD1B03–14 | X |
| 033 | TAC 2 AZ | V74H1635B | 26 | 10 | | 7.2 | | | DEC | DEG | X | X | | | | | | | | | B 1 | SST | TACAN 2 BEARING DATA WD1B03–14 | X |
| 034 | TAC 3 AZ | V74H1735B | 26 | 11 | | 7.2 | | | DEC | DEG | X | X | | | | | | | | | B 1 | SST | TACAN 3 BEARING DATA WD1B03–14 | X |
| 035 | RA 1 DES 7 | V93X4431X | 14 | 14 | | 1.0 | | * | BLVL | | | | | | | | | | | | | KYBD | RA 1 DES CMD | X |
| 036 | RA 2 DES 8 | V93X4433X | 14 | 15 | | 1.0 | | * | BLVL | | | | | | | | | | | | | KYBD | RA 2 DES CMD | X |
| 037 | RA 1 STAT | V99J4092C | 16 | 14 | | 4.0 | | | RTXT | | | | | | | | | | | | A | SST | RADAR ALT NO 1 STATUS | X |
| 038 | RA 2 STAT | V99J4094C | 16 | 15 | | 4.0 | | | RTXT | | | | | | | | | | | | A | SST | RADAR ALT NO 2 STATUS | X |
| 039 | RA 1 ALT | V74H1804B | 20 | 14 | | 5.0 | | | DEC | FT | X | | | | | | | | | | 1 | SST | RADAR ALT NO 1 ALTITUDE DATA | X |
| 040 | RA 2 ALT | V74H1854B | 20 | 15 | | 5.0 | | | DEC | FT | X | | | | | | | | | | 1 | SST | RADAR ALT NO 2 ALTITUDE DATA | X |
| 041* | AA 1 DES 9 | V93X4435X | 14 | 18 | | 1.0 | | * | BLVL | | | | | | | | | | | | | KYBD | AA 1 DES CMD/FAIL | X |
| 042* | AA 2 DES 10 | V93X4436X | 14 | 19 | | 1.0 | | * | BLVL | | | | | | | | | | | | | KYBD | AA 2 DES CMD/FAIL | X |
| 043* | AA 3 DES 11 | V93X4437X | 14 | 20 | | 1.0 | | * | BLVL | | | | | | | | | | | | | KYBD | AA 3 DES CMD/FAIL | X |
| 044* | AA 4 DES 12 | V93X4438X | 14 | 21 | | 1.0 | | * | BLVL | | | | | | | | | | | | | KYBD | AA 4 DES CMD/FAIL | X |
| 045 | AA 1 Y | V99A4130C | 20 | 18 | | 5.1 | | | DEC | FPS2 | X | | | | | | X | | | | 1 | SST | AA1 LAT ACCELN | X |
| 046 | AA 2 Y | V99A4131C | 20 | 19 | | 5.1 | | | DEC | FPS2 | X | | | | | | X | | | | 1 | SST | AA2 LAT ACCELN | X |
| 047 | AA 3 Y | V99A4132C | 20 | 20 | | 5.1 | | | DEC | FPS2 | X | | | | | | X | | | | 1 | SST | AA3 LAT ACCELN | X |
| 048 | AA 4 Y | V99A4133C | 20 | 21 | | 5.1 | | | DEC | FPS2 | X | | | | | | X | | | | 1 | SST | AA4 LAT ACCELN | X |
| 049 | AA 1 Z | V99A4134C | 28 | 18 | | 5.1 | | | DEC | FPS2 | X | | | | | | X | | | | 1 | SST | AA1 NORM ACCELN | X |
| 050 | AA 2 Z | V99A4135C | 28 | 19 | | 5.1 | | | DEC | FPS2 | X | | | | | | X | | | | 1 | SST | AA2 NORM ACCELN | X |
| 051 | AA 3 Z | V99A4136C | 28 | 20 | | 5.1 | | | DEC | FPS2 | X | | | | | | X | | | | 1 | SST | AA3 NORM ACCELN | X |
| 052 | AA 4 Z | V99A4137C | 28 | 21 | | 5.1 | | | DEC | FPS2 | X | | | | | | X | | | | 1 | SST | AA4 NORM ACCELN | X |

TABLE 4.5.4-2. ON ORBIT SENSOR SELF TEST (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | BILEVEL | | | | | | | | | | | | | | | | | |
| | | | X | Y | | CHAR | 1 | 0 | TYPE | | | | | | | | | | | | | | | |
| 053 | START 13 | V99X4040X | 24 | 23 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SST | SENSOR TEST START ITEM ENTRY IND | X |
| 054 | STOP 14 | V99X4041X | 34 | 23 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SST | SENSOR TEST STOP ITEM ENTRY IND | X |
| 055 | (MSG LINE) | V93X0050X | 1 | 25 | | 44.0 | | | CHAR | | | | | | | G | | | | | | UI | MESSAGE LINE | X |
| 056 | (BUFFER MSG) | V93X0054X | 45 | 25 | | 4.0 | | | CHAR | | | | | | | G | | | | | | UI | BUFFER MESSAGE INDICATOR | X |
| 057 | (SPL) | V93X0056X | 2 | 26 | | 49.0 | | | CHAR | | | | | | | G | | | | | | UI | SCRATCH PAD LINE | X |

TABLE 4.5.4-5. INPUT FUNCTIONAL PARAMETERS FOR ON-ORBIT SENSOR SELF-TEST DISPLAY (V5.1.4)

| FSSR NAME | M/S ID | NOMENCLATURE | SOURCE | UNITS | DATA TYPE | PREC | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|
| (CRT_TIME) | V91W1987C | DISPLAY CRT TIMER,GNC | FCOS | | SPL | | 93090E | |
| (DISP) | V93X0044X | DISPLAY FUNCTION PAGE | UI | | BD | | 93090E | |
| (GPC) | V93X0048X | GPC DRIVER | UI | | BD | | 93090E | |
| (LINE) | V93X0050X | MESSAGE LINE | UI | | BD | | 93090E | |
| (MSG) | V93X0054X | BUFFER MESSAGE INDICATOR | UI | | BD | | 93090E | |
| (MT) | V91W1990C | DISPLAY MSN TIME | FCOS | S | VAR | | 93090E | |
| (OPS) | V93X0040X | OPS FUNCTION PAGE | UI | | BD | | 93090E | |
| (SPEC) | V93X0042X | SPEC FUNCTION PAGE | UI | | BD | | 93090E | |
| (SPL) | V93X0056X | SCRATCH PAD LINE | UI | | BD | | 93090E | |
| (UL) | V92X5032X | UPLINK ACTIVITY IND | UI | | BD | | 93090E | |
| | V93X4411XB | TACAN 1 DES CMD | SENSOR SELF TEST DISP | | | | 93017G | * |
| | V93X4413XB | TACAN 2 DES CMD | SENSOR SELF TEST DISP | | | | 93017G | * |
| | V93X4415XB | TACAN 3 DES CMD | SENSOR SELF TEST DISP | | | | 93017G | * |
| | V93X4421X | MSBLS 1 DES CMD | SENSOR SELF TEST DISP | | BD | | 93017G | * |
| | V93X4423X | MSBLS 2 DES CMD | SENSOR SELF TEST DISP | | BD | | 93017G | * |
| | V93X4425X | MSBLS 3 DES CMD | SENSOR SELF TEST DISP | | BD | | 93017G | * |
| | V93X4431X | RA 1 DES CMD | SENSOR SELF TEST DISP | | BD | | | |
| | V93X4433X | RA 2 DES CMD | SENSOR SELF TEST DISP | | BD | | | |
| | V93X4435XB | AA 1 DES CMD/FAIL | SENSOR SELF TEST DISP | | | | 93017G | * |
| | V93X4436XB | AA 2 DES CMD/FAIL | SENSOR SELF TEST DISP | | | | 93017G | * |
| | V93X4437XB | AA 3 DES CMD/FAIL | SENSOR SELF TEST DISP | | | | 93017G | * |
| | V93X4438XB | AA 4 DES CMD/FAIL | SENSOR SELF TEST DISP | | | | 93017G | * |
| | V93X4516XB | RGA 1 DES CMD/FAIL | SENSOR SELF TEST DISP | EVENT | BD | | 93017G | * |
| | V93X4518XB | RGA 2 DES CMD/FAIL | SENSOR SELF TEST DISP | EVENT | BD | | 93017G | * |
| | V93X4520XB | RGA 3 DES CMD/FAIL | SENSOR SELF TEST DISP | EVENT | BD | | 93017G | * |
| | V93X4522XB | RGA 4 DES CMD/FAIL | SENSOR SELF TEST DISP | EVENT | BD | | 93017G | * |
| | V93X4571XA | ADTA 1 DES CMD | SENSOR SELF TEST DISP | | | | 93017G | * |
| | V93X4573XA | ADTA 2 DES CMD | SENSOR SELF TEST DISP | | | | 93017G | * |
| | V93X4575XA | ADTA 3 DES CMD | SENSOR SELF TEST DISP | | | | 93017G | * |
| | V93X4577XA | ADTA 4 DES CMD | SENSOR SELF TEST DISP | | | | 93017G | * |

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE 4.5.4-6. OUTPUT FUNCTIONAL PARAMETERS FROM ON-ORBIT SENSOR SELF-TEST DISPLAY (V5.1.4)

| FSSR NAME | M/S ID | NOMENCLATURE | DESTINATION | UNITS | DATA TYPE | PREC | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|
| | V90M2885PB | MFE.CGRB_STATUS_2$(2;) | DL FMT 32/A | | | | 93017G | * |
| | V90M2892PB | CGRB_STATUS_2$(21:) | DL FMT 32/A | | | | 93017G | * |
| | V90M2904PB | CGRB_STATUS_2$(24:) | DL FMT 32/A | | | | 93017G | * |
| | V90M2922PB | CGRB_TAC_FAIL$(1:) | DL FMT 32/A | | | | 93017G | * |
| | V93M0510PA | CGRB_ADTA_SEL$(1:) | DL FMT 32/A | | | | 93017G | * |
| | V93M0511PA | CGRB_ADTA_SEL$(2:) | DL FMT 32/A | | | | 93017G | * |
| | V93M0512PA | CGRB_ADTA_SEL$(3:) | DL FMT 32/A | | | | 93017G | * |
| | V93M0513PA | CGRB_ADTA_SEL$(4:) | DL FMT 32/A | | | | 93017G | * |
| | V93X4411XB | TACAN 1 DES CMD | DL FMT 32/A<br>GAX<br>HORIZ SIT DISP<br>HORIZ SIT SPEC<br>SENSOR SELF TEST DISP<br>TACAN RM | | | | 93017G | * |
| | V93X4413XB | TACAN 2 DES CMD | DL FMT 32/A<br>GAX<br>HORIZ SIT DISP<br>HORIZ SIT SPEC<br>SENSOR SELF TEST DISP<br>TACAN RM | | | | 93017G | * |
| | V93X4415XB | TACAN 3 DES CMD | DL FMT 32/A<br>GAX<br>HORIZ SIT DISP<br>HORIZ SIT SPEC<br>SENSOR SELF TEST DISP<br>TACAN RM | | | | 93017G | * |
| | V93X4421X | MSBLS 1 DES CMD | DL FMT 32/A<br>GAX<br>MSBLS FDIR<br>SENSOR SELF TEST DISP | | BD | | 93017G | * |
| | V93X4423X | MSBLS 2 DES CMD | DL FMT 32/A<br>GAX<br>MSBLS FDIR<br>SENSOR SELF TEST DISP | | BD | | 93017G | * |
| | V93X4425X | MSBLS 3 DES CMD | DL FMT 32/A<br>GAX<br>MSBLS FDIR<br>SENSOR SELF TEST DISP | | BD | | 93017G | * |
| | V93X4431X | RA 1 DES CMD | SENSOR SELF TEST DISP<br>SF<br>TLM | | BD | | | |
| | V93X4433X | RA 2 DES CMD | SENSOR SELF TEST DISP<br>SF<br>TLM | | BD | | | |

TABLE 4.5.4-6. OUTPUT FUNCTIONAL PARAMETERS FROM ON-ORBIT SENSOR SELF-TEST DISPLAY (V5.1.4)

| FSSR NAME | M/S ID | NOMENCLATURE | DESTINATION | UNITS | DATA TYPE | PREC | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|
| | V93X4435XB | AA 1 DES CMD/FAIL | AA FDIR<br>DL FMT 32/A<br>GAX<br>SENSOR SELF TEST DISP | | | | 93017G | * |
| | V93X4436XB | AA 2 DES CMD/FAIL | AA FDIR<br>DL FMT 32/A<br>GAX<br>SENSOR SELF TEST DISP | | | | 93017G | * |
| | V93X4437XB | AA 3 DES CMD/FAIL | AA FDIR<br>DL FMT 32/A<br>GAX<br>SENSOR SELF TEST DISP | | | | 93017G | * |
| | V93X4438XB | AA 4 DES CMD/FAIL | AA FDIR<br>DL FMT 32/A<br>GAX<br>SENSOR SELF TEST DISP | | | | 93017G | * |
| | V93X4516XB | RGA 1 DES CMD/FAIL | DL FMT 32/A<br>GAX<br>ORB RG FDIR<br>ORB RGA SMRD RM<br>SENSOR SELF TEST DISP | EVENT | BD | | 93017G | * |
| | V93X4518XB | RGA 2 DES CMD/FAIL | DL FMT 32/A<br>GAX<br>ORB RG FDIR<br>ORB RGA SMRD RM<br>SENSOR SELF TEST DISP | EVENT | BD | | 93017G | * |
| | V93X4520XB | RGA 3 DES CMD/FAIL | DL FMT 32/A<br>GAX<br>ORB RG FDIR<br>ORB RGA SMRD RM<br>SENSOR SELF TEST DISP | EVENT | BD | | 93017G | * |
| | V93X4522XB | RGA 4 DES CMD/FAIL | DL FMT 32/A<br>GAX<br>ORB RG FDIR<br>ORB RGA SMRD RM<br>SENSOR SELF TEST DISP | EVENT | BD | | 93017G | * |
| | V93X4571XA | ADTA 1 DES CMD | ADTA RM<br>DL FMT 32/A<br>GAX<br>OVERRIDE DISP<br>SENSOR SELF TEST DISP | | | | 93017G | * |
| | V93X4573XA | ADTA 2 DES CMD | ADTA RM<br>DL FMT 32/A<br>GAX<br>OVERRIDE DISP<br>SENSOR SELF TEST DISP | | | | 93017G | * |

TABLE 4.5.4-6. OUTPUT FUNCTIONAL PARAMETERS FROM ON-ORBIT SENSOR SELF-TEST DISPLAY (V5.1.4)

| FSSR NAME | M/S ID | NOMENCLATURE | DESTINATION | UNITS | DATA TYPE | PREC | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|
| | V93X4575XA | ADTA 3 DES CMD | ADTA RM<br>DL FMT 32/A<br>GAX<br>OVERRIDE DISP<br>SENSOR SELF TEST DISP | | | | 93017G | * |
| | V93X4577XA | ADTA 4 DES CMD | ADTA RM<br>DL FMT 32/A<br>GAX<br>OVERRIDE DISP<br>SENSOR SELF TEST DISP | | | | 93017G | * |

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

**Rate Codes: (HDR Only) 1 = 1 sample/sec 2 = 5 samples/sec 3 = 12.5 samples/sec 4 = 25 samples/sec 5 = 100 samples/sec**
**(HDR and LDR) A = 1 sample/sec B = 5 samples/sec C = 12.5 samples/sec D = 25 samples/sec E = 100 samples/sec**

TABLE 4.5.4-7. ON-ORBIT SENSOR SELF-TEST DISPLAY (V5.1.4) I-LOADS

| FSSR NAME | MSID | ENG UNITS | DT | PR | D | S | PR FCTN | MC | CAT | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|---|---|---|
| GPS_INSTALLED(1) | V97U2924C | ND | D | | M | X | G4.17<br>G4.20<br>G4.21<br>G4.23<br>G4.24<br>G4.25<br>G6.11<br>G6.21<br>G6.31<br>G6.51<br>V5.1.4 | 00 | GPI | 92292B | |
| GPS_INSTALLED(2) | V97U2831C | ND | D | | M | X | G4.17<br>G4.20<br>G4.21<br>G4.23<br>G4.24<br>G4.25<br>G6.11<br>G6.21<br>G6.31<br>G6.51<br>V5.1.4 | 00 | GPI | 92292B | |
| GPS_INSTALLED(3) | V97U2925C | ND | D | | M | X | G4.17<br>G4.20<br>G4.21<br>G4.23<br>G4.24<br>G4.25<br>G6.11<br>G6.21<br>G6.31<br>G6.51<br>V5.1.4 | 00 | GPI | 92292B | |

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE 4.5.4-8. ON-ORBIT SENSOR SELF-TEST DISPLAY (V5.1.4) K-LOADS

| FSSR NAME DESCRIPTION | MSID | MC | KLOAD VALUE | ENG UNITS | DT | P R | S | PR FCTN | LAST CR | R E V |
|---|---|---|---|---|---|---|---|---|---|---|
| NO REQUIREMENTS | | | | | | | | | | |

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE 4.5.4-9. ON-ORBIT SENSOR SELF-TEST DISPLAY (V5.1.4) CONSTANTS

| FSSR NAME DESCRIPTION | MSID | MC | CONSTANT VALUE | ENG UNITS | DT | P R | S | PR FCTN | LAST CR | R E V |
|---|---|---|---|---|---|---|---|---|---|---|

NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

### 4.5.5 ON–ORBIT RGA/ADTA/RCS TEST (PFS)

TITLE: RGA/ADTA/RCS
TYPE: SPEC/041
AVAILABILITY: GN&C OPS 8

#### 4.5.5.1 Purpose, Operation, and Organization

(1) RGA/ADTA/RCS

This SPEC permits testing of the Rate Gyro Assemblies (RGA), Air Data Transducers Assembly (ADTA), and the Reaction Control System (RCS) while on orbit. Figure 4.5.5–1 is the On–Orbit RGA/ADTA/RCS Test Display (PFS).

(2) RGA

For the RGA's, compensated roll rate (R), pitch rate (P), and yaw rate (Y) are displayed in degrees per second while testing is in progress. A status parameter by each value will be driven with an (M) to indicate missing data, an up arrow (↑) to indicate test data too high, a down arrow (↓) to indicate test data too low, or blank if data are normal. RGA status (STAT) shows SMRD if SMRD detects a malfunction on any axis. If the SMRD indicator is set, the SMRD display will be reset if the error is corrected or upon execution of Item 9 or 10. Whether or not testing is in progress, Items 1 through 4 may be used to deselect or select the corresponding sensor as a candidate for the selection filter during ENTRY (OPS 3). An asterisk (*) beside the item number indicates that the corresponding RGA is deselected.

(3) ADTA

For the ADTA's static pressure (PS), central alpha pressure (P α C), upper alpha pressure (P α U), and lower alpha pressure (P α L) in inches of mercury and total temperature (T) in degrees Celsius are displayed while testing is in progress. A status parameter by each value will be driven with an (M) to indicate missing data an up arrow (↑) to indicate test data too high, a down arrow (↓) to indicate test data too low, or blank if data are normal. ADTA status (STAT) shows BITE, or blank. If BITE is displayed, it will be blanked upon execution of Item 9 or 10. Whether or not testing is in progress, Items 5 through 8 may be used to deselect or select the corresponding sensor as a candidate for the selection filter during ENTRY (OPS 3). An asterisk (*) beside the item number indicates that the corresponding ADTA is deselected. For more information on Selection Filtering (of the RGAs and ADTAs) and its use with Redundancy Management, refer to the GN&C Redundancy Management FSSR, STS 83-0010.

(4) TEST

Execution of Item 9 or 10 blanks an asterisk (*) beside Item 11, clears the STAT columns, and causes the RGA's and ADTA's to be tested with a set of values called the high or low test. The self-tests will run to completion regardless of an earlier LRU self-test failure. An * appears next to Item 9 or 10 when the test is in progress and is blanked upon test completion. Execution of Item 11 causes testing of the RGA's and ADTA's to be terminated, removes all self-test stimuli from the LRU's, clears the PSI's on the display, enables cyclic update of sensor parameter data and displays an asterisk (*) beside Item 11. Items 9, 10, and 11 are initialized blank. Items 9, 10 and 11 may not be selected while a test is in progress (indicated by an * next

to Item 9 or 10). Items 9 and 10 may not be selected after a test has been completed unless Item 11 is entered first.

(5) RJDF/RJDA

The reaction jets are divided into three groups: forward (RJDF), aft group A (RJDA–A), and aft group B (RJDA–B) for testing purposes. When testing is not in progress, one of Items 12, 13, and 14 may be executed to select a group for testing. Asterisks (*'s) beside Items 12, 13, or 14 indicate which group is selected. Deselecting the selected group is accomplished by executing Item 17. Items 12, 13, and 14 may not be selected after a RCS Drivers test has been completed unless Item 17 is entered first. Items 12, 13, and 14 may not be selected if a RCS Drivers test is suspended (indicated by "FAIL" in the TEST field).

(6) TEST EXEC

Testing of the selected group of jet drivers is accomplished by executing Item 15 (which also causes an asterisk (*) to appear beside Item 15). Testing then proceeds through the jet drivers of the group selected until it is completed or a malfunction or a commfault is detected. If a malfunction is detected testing stops, and a thruster "OFF" command shall be issued to any active RCS jet driver being tested. Testing may be resumed or terminated. If testing is resumed, by executing Item 16, checks are performed to see if there are more jets in the jet group to test before continuing. If all jets in the group have been tested, Item 16 shall blank the asterisk (*) beside Item 15 and Item 16 if applicable and end the test. If all jets in the group have not been tested, Item 16 shall cause an asterisk (*) to appear beside Item 16 and shall reinstate the suspended test at a point immediately subsequent to the point where the test was suspended. If testing is terminated, by executing Item 17, termination will be orderly, leaving all jets ready to operate upon activation commands. Executing Item 17 also deselects RCS testing, deletes the asterisk (*) from beside Item 12, 13, or 14, and deletes any asterisk (*) that may be beside Item 15 or 16. Items 15, 16, and 17 may not be selected while a RCS Drivers test is in progress (indicated by "RUN" in the TEST field). Item 16 may not be selected unless a RCS Drivers test is suspended (indicated by "FAIL" in the TEST field). Item 15 may not be selected unless Item 12, 13, or 14 is enabled. Item 15 may not be selected if a RCS Drivers test is suspended (indicated by "FAIL" in the TEST field).

(7) TEST/JET

TEST and JET display values indicate the status of the testing on the reaction jet drivers. (FAIL) is displayed beside TEST when a malfunction or a commfault is detected. At the same time a three character code appears beside JET to identify the failed unit. The first character identifies the manifold: (L) for left, (R) for right, (F) for forward; the second character is a number to identify the jet within the manifold; and the third character identifies the jet exhaust direction of the failed jet: (L) for left, (R) for right, (F) for forward, (A) for aft, (U) for up, (D) for down. (RUN) appears beside TEST while testing is proceeding normally. (CPLT) appears beside TEST when testing has been completed normally. JET is blanked out when Item 16 is executed. After Item 17 is executed, the parameters beside TEST and JET are blanked out.

### 4.5.5.2 On-Orbit RGA/ADTA/RCS Test (PFS) Keyboard Processing Addendum

A. The destinations for this signal are GAX (4.110), ORB RGA FDIR (4.74), ORB RGA SMRD RM (4.257) and CRT (V5.1.12).

B. The destinations for this signal are GAX (4.110), ADTA RM (4.73) and CRT (V5.1.12).

### 4.5.5.3 On-Orbit RGA/ADTA/RCS Test (PFS) CRT Display Processing Addendum

The Table below presents the stand–alone parameter status indicators (PSI) that can be displayed for a parameter. PSI requirements are identified by the word "STAT" being inserted in the FORMAT TYPE column and a numeric code appearing as an entry (right justified) in the ADD REF column of CRT display processing Table 4.5.5–2. The numeric code, corresponding to one of those listed in the Table indicates the specific status processing to be performed. If there is no numeric code entry, the status processing is defined by the default code.

When the "M" PSI is displayed (for Commfault, I/O error resulting in missing data), the associated parameter value data field shall be blanked unless specified otherwise.

| Numeric Code | PSI SYMBOL(S) | | | | |
|---|---|---|---|---|---|
| Default (blank) | ↓ | | | M | ∅ |
| 1 | ↓ | ↑ | | M | ∅ |
| 2 | | ↑ | | M | ∅ |
| 3 | ↓ | | | | ∅ |
| 4 | | ↑ | | | ∅ |
| 5 | ↓ | | ? | | ∅ |
| 6 | ↓ | ↑ | | | ∅ |
| 7 | | | | M | ∅ |
| 8 | ↓ | | ? | M | ∅ |
| 9 | | | ? | M | ∅ |

∅ = blank

The following alpha code(s) appear (left justified) in the ADD REF column of the Table 4.5.5–2 whenever it is necessary to define any special processing requirements not otherwise covered therein:

A. For the RGA's, STAT contains the value SMRD if any one of the spin motor running detectors for the RGA indicates a failure. Otherwise the STAT column is blank. When the display is called, STAT is initialized blank.

B. For each ADTA, the STAT column shows BITE when the built–in test equipment detects an error. During test execution, BITE is locked on the display until Item 9 or 10 is executed. Otherwise the STAT column is blank. When the display is called, STAT is initialized blank.

C. RCS DRIVERS TEST is initially blank. When testing is in progress this field shows RUN; when testing is suspended because of a miscompare it shows FAIL; when testing is completed, it shows CPLT. Execution of Item 17 then blanks this field.

The code following JET (whenever TEST shows FAIL) is three characters of which the first is a letter designating general location as follows:

F for Forward
L for Left (aft)
R for Right (aft)

The second character is a numeral giving the jet manifold number, and the third character describes the jet exhaust direction as follows:

L for Left
R for Right
U for Up
D for Down
F for Forward
A for Aft

### 4.5.5.4 On-Orbit RGA/ADTA/RCS Test Figure/Table References

Figure4.5.5–1 On–Orbit RGA/ADTA/RCS Test Display (PFS)

Table 4.5.5–1 Keyboard Processing Table

Table 4.5.5–2 CRT Display Processing Table

Table 4.5.5–3 CRT Display Processing Background Requirements N/A

Table 4.5.5–4 Mission Design Background Constants N/A

Table 4.5.5–5 Input Functional Parameters N/A

Table 4.5.5–6 Output Functional Parameters N/A

Table 4.5.5–7 I–Loads N/A

Table 4.5.5–8 K–Loads N/A

Table 4.5.5–9 Constants N/A

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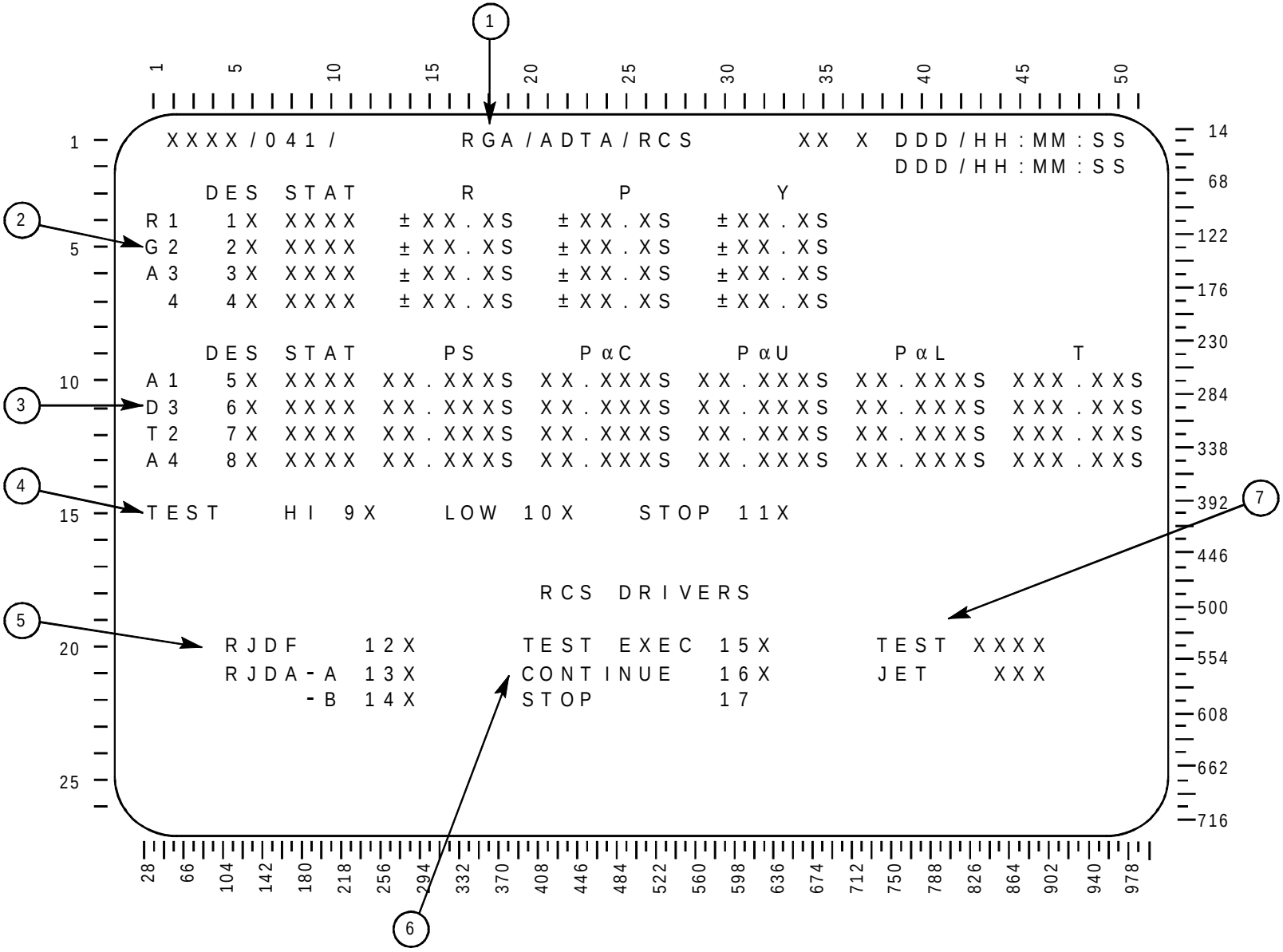


FIGURE 4.5.5-1. On-Orbit RGA/ADTA/RCS Test Display (PFS)

TABLE 4.5.5-1. ON ORBIT RGA/ADTA/RCS TEST (PFS) KEYBOARD PROCESSING

| Seq | CRT Signal Name | M/S ID | CHAR | TYPE | UNITS | DK | ITEM | Item No. Limits | | Add Ref | Destination | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | MIN | MAX | | | | |
| 001* | RGA 1 DES 1 | V93X4516X | 0.0 | CTRL | | | 1 | | | A | CRT,GAX | RGA 1 DES CMD/FAIL | X |
| 002* | RGA 2 DES 2 | V93X4518X | 0.0 | CTRL | | | 2 | | | A | CRT,GAX | RGA 2 DES CMD/FAIL | X |
| 003* | RGA 3 DES 3 | V93X4520X | 0.0 | CTRL | | | 3 | | | A | CRT,GAX | RGA 3 DES CMD/FAIL | X |
| 004* | RGA 4 DES 4 | V93X4522X | 0.0 | CTRL | | | 4 | | | A | CRT,GAX | RGA 4 DES CMD/FAIL | X |
| 005 | ADTA 1 DES 5 | V93X4571X | 0.0 | CTRL | | | 5 | | | B | CRT,GAX | ADTA 1 DES CMD | X |
| 006 | ADTA 3 DES 6 | V93X4575X | 0.0 | CTRL | | | 6 | | | B | CRT,GAX | ADTA 3 DES CMD | X |
| 007 | ADTA 2 DES 7 | V93X4573X | 0.0 | CTRL | | | 7 | | | B | CRT,GAX | ADTA 2 DES CMD | X |
| 008 | ADTA 4 DES 8 | V93X4577X | 0.0 | CTRL | | | 8 | | | B | CRT,GAX | ADTA 4 DES CMD | X |
| 009 | TEST HI 9 | V93X4533X | 0.0 | CTRL | | | 9 | | | | SST | RGA/ADTA TEST HIGH CMD | X |
| 010 | TEST LOW 10 | V93X4535X | 0.0 | CTRL | | | 10 | | | | SST | RGA/ADTA TEST LOW CMD | X |
| 011 | TEST STOP 11 | V93X4537X | 0.0 | CTRL | | | 11 | | | | SST | RGA/ADTA STOP TEST CMD | X |
| 012 | RCS RJDF 12 | V93X4539X | 0.0 | CTRL | | | 12 | | | | SST | RCS RJDF SEL CMD | X |
| 013 | RCS RJDA–A 13 | V93X4541X | 0.0 | CTRL | | | 13 | | | | SST | RCS RJDA(A) SEL CMD | X |
| 014 | RCS RJDA–B 14 | V93X4543X | 0.0 | CTRL | | | 14 | | | | SST | RCS RJDA(B) SEL CMD | X |
| 015 | RCS TEST EXEC 15 | V93X4552X | 0.0 | CTRL | | | 15 | | | | SST | RCS TEST EXEC CMD | X |
| 016 | RCS CONTINUE 16 | V93X4553X | 0.0 | CTRL | | | 16 | | | | SST | RCS TEST CONT CMD | X |
| 017 | RCS STOP 17 | V93X4554X | 0.0 | CTRL | | | 17 | | | | SST | RCS TEST TERM CMD | X |

## TABLE 4.5.5-2. ON ORBIT RGA/ADTA/RCS TEST (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | | | |
| 001 | (OPS) | V93X0040X | 2 | 1 | | 5.0 | | | CHAR | | | | | | | E | | | | | | UI | OPS FUNCTION PAGE | X |
| 002 | (SPEC) | V93X0042X | 7 | 1 | | 4.0 | | | CHAR | | | | | | | E | | | | | | UI | SPEC FUNCTION PAGE | X |
| 003 | (DISP) | V93X0044X | 10 | 1 | | 4.0 | | | DEC | | | | | | | E | | | | | | UI | DISPLAY FUNCTION PAGE | X |
| 004 | (UL) | V92X5032X | 34 | 1 | | 2.0 | UL | | BLVL | | | | | | X | G | | | | | | UI | UPLINK ACTIVITY IND | X |
| 005 | (GPC) | V93X0048X | 36 | 1 | | 2.0 | | | DEC | | | | | | | E | | | | | | UI | GPC DRIVER | X |
| 006 | (MT) | V91W1990C | 39 | 1 | | 12.0 | | | CHAR | DHMS | | | | | | A | | | | | | FCOS | MISSION ELAPSED TIME | X |
| 007 | (CRT TIMER) | V91W1987C | 39 | 2 | | 12.0 | | | CHAR | DHMS | | | | | | A | | | | | | FCOS | DISPLAY CRT TIMER,GNC | X |
| 008* | RGA 1 DES 1 | V93X4516X | 6 | 4 | | 1.0 | | * | BLVL | | | | | | | | | | | | | KYBD | RGA 1 DES CMD/FAIL | X |
| 009* | RGA 2 DES 2 | V93X4518X | 6 | 5 | | 1.0 | | * | BLVL | | | | | | | | | | | | | KYBD | RGA 2 DES CMD/FAIL | X |
| 010* | RGA 3 DES 3 | V93X4520X | 6 | 6 | | 1.0 | | * | BLVL | | | | | | | | | | | | | KYBD | RGA 3 DES CMD/FAIL | X |
| 011* | RGA 4 DES 4 | V93X4522X | 6 | 7 | | 1.0 | | * | BLVL | | | | | | | | | | | | | KYBD | RGA 4 DES CMD/FAIL | X |
| 012 | RGA 1 STAT | V99J4116C | 8 | 4 | | 4.0 | SMRD | | BLVL | | | | | | | | | | | | A | SST | RGA 1 STATUS | X |
| 013 | RGA 2 STAT | V99J4117C | 8 | 5 | | 4.0 | SMRD | | BLVL | | | | | | | | | | | | A | SST | RGA 2 STATUS | X |
| 014 | RGA 3 STAT | V99J4118C | 8 | 6 | | 4.0 | SMRD | | BLVL | | | | | | | | | | | | A | SST | RGA 3 STATUS | X |
| 015 | RGA 4 STAT | V99J4119C | 8 | 7 | | 4.0 | SMRD | | BLVL | | | | | | | | | | | | A | SST | RGA 4 STATUS | X |
| 016 | RGA 1 R | V95R4001C | 14 | 4 | | 5.1 | | | DEC | DPS | X | | | | | | X | | | | 1 | SST | COMPENSATED ROLL RATE 1 | X |
| 017 | RGA 2 R | V95R4002C | 14 | 5 | | 5.1 | | | DEC | DPS | X | | | | | | X | | | | 1 | SST | COMPENSATED ROLL RATE 2 | X |
| 018 | RGA 3 R | V95R4003C | 14 | 6 | | 5.1 | | | DEC | DPS | X | | | | | | X | | | | 1 | SST | COMPENSATED ROLL RATE 3 | X |
| 019 | RGA 4 R | V95R4004C | 14 | 7 | | 5.1 | | | DEC | DPS | X | | | | | | X | | | | 1 | SST | COMPENSATED ROLL RATE 4 | X |
| 020 | RGA 1 P | V95R4031C | 22 | 4 | | 5.1 | | | DEC | DPS | X | | | | | | X | | | | 1 | SST | COMPENSATED PITCH RATE 1 | X |
| 021 | RGA 2 P | V95R4032C | 22 | 5 | | 5.1 | | | DEC | DPS | X | | | | | | X | | | | 1 | SST | COMPENSATED PITCH RATE 2 | X |
| 022 | RGA 3 P | V95R4033C | 22 | 6 | | 5.1 | | | DEC | DPS | X | | | | | | X | | | | 1 | SST | COMPENSATED PITCH RATE 3 | X |
| 023 | RGA 4 P | V95R4034C | 22 | 7 | | 5.1 | | | DEC | DPS | X | | | | | | X | | | | 1 | SST | COMPENSATED PITCH RATE 4 | X |
| 024 | RGA 1 Y | V95R4061C | 30 | 4 | | 5.1 | | | DEC | DPS | X | | | | | | X | | | | 1 | SST | COMPENSATED YAW RATE 1 | X |
| 025 | RGA 2 Y | V95R4062C | 30 | 5 | | 5.1 | | | DEC | DPS | X | | | | | | X | | | | 1 | SST | COMPENSATED YAW RATE 2 | X |
| 026 | RGA 3 Y | V95R4063C | 30 | 6 | | 5.1 | | | DEC | DPS | X | | | | | | X | | | | 1 | SST | COMPENSATED YAW RATE 3 | X |
| 027 | RGA 4 Y | V95R4064C | 30 | 7 | | 5.1 | | | DEC | DPS | X | | | | | | X | | | | 1 | SST | COMPENSATED YAW RATE 4 | X |
| 028 | ADTA 1 DES 5 | V93X4571X | 6 | 10 | | 1.0 | | * | BLVL | | | | | | | | | | | | | KYBD | ADTA 1 DES CMD | X |

TABLE 4.5.5-2. ON ORBIT RGA/ADTA/RCS TEST (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | | | |
| 029 | ADTA 3 DES 6 | V93X4575X | 6 | 11 | | 1.0 | | * | BLVL | | | | | | | | | | | | | KYBD | ADTA 3 DES CMD | X |
| 030 | ADTA 2 DES 7 | V93X4573X | 6 | 12 | | 1.0 | | * | BLVL | | | | | | | | | | | | | KYBD | ADTA 2 DES CMD | X |
| 031 | ADTA 4 DES 8 | V93X4577X | 6 | 13 | | 1.0 | | * | BLVL | | | | | | | | | | | | | KYBD | ADTA 4 DES CMD | X |
| 032 | ADTA 1 STAT | V99J4126C | 8 | 10 | | 4.0 | BITE | | BLVL | | | | | | | | | | | | B | SST | ADTA 1 STATUS | X |
| 033 | ADTA 3 STAT | V99J4128C | 8 | 11 | | 4.0 | BITE | | BLVL | | | | | | | | | | | | B | SST | ADTA 3 STATUS | X |
| 034 | ADTA 2 STAT | V99J4127C | 8 | 12 | | 4.0 | BITE | | BLVL | | | | | | | | | | | | B | SST | ADTA 2 STATUS | X |
| 035 | ADTA 4 STAT | V99J4129C | 8 | 13 | | 4.0 | BITE | | BLVL | | | | | | | | | | | | B | SST | ADTA 4 STATUS | X |
| 036 | ADTA 1 PS | V71P7040B | 12 | 10 | | 7.3 | | | DEC | IN–HG | X | | | | | | | | | | 1 | SST | ADTA 1 STATIC PRESS WD2 | X |
| 037 | ADTA 3 PS | V71P8040B | 12 | 11 | | 7.3 | | | DEC | IN–HG | X | | | | | | | | | | 1 | SST | ADTA 3 STATIC PRESS WD2 | X |
| 038 | ADTA 2 PS | V71P7540B | 12 | 12 | | 7.3 | | | DEC | IN–HG | X | | | | | | | | | | 1 | SST | ADTA 2 STATIC PRESS WD2 | X |
| 039 | ADTA 4 PS | V71P8540B | 12 | 13 | | 7.3 | | | DEC | IN–HG | X | | | | | | | | | | 1 | SST | ADTA 4 STATIC PRESS WD2 | X |
| 040 | ADTA 1 P ALPHA C | V71P7080B | 20 | 10 | | 7.3 | | | DEC | IN–HG | X | | | | | | | | | | 1 | SST | ADTA 1 CTR ALPHA PRESS(PAC) WD3 | X |
| 041 | ADTA 3 P ALPHA C | V71P8080B | 20 | 11 | | 7.3 | | | DEC | IN–HG | X | | | | | | | | | | 1 | SST | ADTA 3 CTR ALPHA PRESS(PAC) WD3 | X |
| 042 | ADTA 2 P ALPHA C | V71P7580B | 20 | 12 | | 7.3 | | | DEC | IN–HG | X | | | | | | | | | | 1 | SST | ADTA 2 CTR ALPHA PRESS(PAC) WD3 | X |
| 043 | ADTA 4 P ALPHA C | V71P8580B | 20 | 13 | | 7.3 | | | DEC | IN–HG | X | | | | | | | | | | 1 | SST | ADTA 4 CTR ALPHA PRESS(PAC) WD3 | X |
| 044 | ADTA 1 P ALPHA U | V71P7140B | 28 | 10 | | 7.3 | | | DEC | IN–HG | X | | | | | | | | | | 1 | SST | ADTA 1 UPR ALPHA PRESS(PAU) WD6 | X |
| 045 | ADTA 3 P ALPHA U | V71P8140B | 28 | 11 | | 7.3 | | | DEC | IN–HG | X | | | | | | | | | | 1 | SST | ADTA 3 UPR ALPHA PRESS(PAU) WD6 | X |
| 046 | ADTA 2 P ALPHA U | V71P7640B | 28 | 12 | | 7.3 | | | DEC | IN–HG | X | | | | | | | | | | 1 | SST | ADTA 2 UPR ALPHA PRESS(PAU) WD6 | X |
| 047 | ADTA 4 P ALPHA U | V71P8640B | 28 | 13 | | 7.3 | | | DEC | IN–HG | X | | | | | | | | | | 1 | SST | ADTA 4 UPR ALPHA PRESS(PAU) WD6 | X |
| 048 | ADTA 1 P ALPHA L | V71P7120B | 36 | 10 | | 7.3 | | | DEC | IN–HG | X | | | | | | | | | | 1 | SST | ADTA 1 LWR ALPHA PRESS(PAL) WD5 | X |
| 049 | ADTA 3 P ALPHA L | V71P8120B | 36 | 11 | | 7.3 | | | DEC | IN–HG | X | | | | | | | | | | 1 | SST | ADTA 3 LWR ALPHA PRESS(PAL) WD5 | X |

## TABLE 4.5.5-2. ON ORBIT RGA/ADTA/RCS TEST (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | | | |
| 050 | ADTA 2 P ALPHA L | V71P7620B | 36 | 12 | | 7.3 | | | DEC | IN–HG | X | | | | | | | | | | 1 | SST | ADTA 2 LWR ALPHA PRESS(PAL) WD5 | X |
| 051 | ADTA 4 P ALPHA L | V71P8620B | 36 | 13 | | 7.3 | | | DEC | IN–HG | X | | | | | | | | | | 1 | SST | ADTA 4 LWR ALPHA PRESS(PAL) WD5 | X |
| 052 | ADTA 1 TT | V71T7100B | 44 | 10 | | 7.2 | | | DEC | DEG C | X | | | | | | | | | | 1 | SST | ADTA 1 TOTAL TEMP WD4 | X |
| 053 | ADTA 3 TT | V71T8100B | 44 | 11 | | 7.2 | | | DEC | DEG C | X | | | | | | | | | | 1 | SST | ADTA 3 TOTAL TEMP WD4 | X |
| 054 | ADTA 2 TT | V71T7600B | 44 | 12 | | 7.2 | | | DEC | DEG C | X | | | | | | | | | | 1 | SST | ADTA 2 TOTAL TEMP WD4 | X |
| 055 | ADTA 4 TT | V71T8600B | 44 | 13 | | 7.2 | | | DEC | DEG C | X | | | | | | | | | | 1 | SST | ADTA 4 TOTAL TEMP WD4 | X |
| 056* | TEST HI 9 | V99X4018X | 12 | 15 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SST | RGA/ADTA HI TEST ITEM ENTRY IND | X |
| 057* | TEST LOW 10 | V99X4017X | 22 | 15 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SST | RGA/ADTA LOW TEST ITEM ENTRY IND | X |
| 058* | TEST STOP 11 | V99X4042X | 33 | 15 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SST | RGA/ADTA STOP ENTRY IND | X |
| 059* | RJDF 12 | V99X4023X | 14 | 20 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SST | RJDF SEL ITEM ENTRY IND | X |
| 060* | RJDA–A 13 | V99X4024X | 14 | 21 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SST | RJDA (A) SEL ITEM ENTRY IND | X |
| 061* | RJDA–B 14 | V99X4025X | 14 | 22 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SST | RJDA (B) SEL ITEM ENTRY IND | X |
| 062* | TEST EXEC 15 | V99X4046X | 32 | 20 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SST | RCS TEST EXEC ITEM ENTRY IND | X |
| 063* | CONTINUE 16 | V99X4047X | 32 | 21 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SST | RCS TEST CONT ITEM ENTRY IND | X |
| 064* | TEST | V99J4048C | 43 | 20 | | 4.0 | | | CHAR | | | | | | | | | | | | C | SST | RCS TEST STATUS | X |
| 065* | JET | V99J4049C | 44 | 21 | | 3.0 | | | CHAR | | | | | | | | | | | | C | SST | RCS DRIVER NO | X |
| 066 | (MSG LINE) | V93X0050X | 1 | 25 | | 44.0 | | | CHAR | | | | | | | G | | | | | | UI | MESSAGE LINE | X |
| 067 | (BUFFER MSG) | V93X0054X | 45 | 25 | | 4.0 | | | CHAR | | | | | | | G | | | | | | UI | BUFFER MESSAGE INDICATOR | X |
| 068 | (SPL) | V93X0056X | 2 | 26 | | 49.0 | | | CHAR | | | | | | | G | | | | | | UI | SCRATCH PAD LINE | X |

### 4.5.6 MASS MEMORY READ/WRITE (PFS)

TITLE: MASS MEMORY R/W
TYPE: SPEC/085/(SM OPS 2 and 4); OPS 9011 (PL OPS 9)
AVAILABILITY: SM OPS 2, 4 AND PL OPS 9

#### 4.5.6.1 Purpose, Operation, and Organization

(1) MASS MEMORY R/W

This display provides a crew interface to read/modify the mass memories based on the concept of a load block. In addition, it allows the crew to dump the selected load block via downlist. The read function requires crew inputs to identify the Mass Memory Unit (MMU) and location of the data to be reviewed. The value can be changed by a three step load function. The desired value is displayed separately as a crew data input. The new value is reviewed/verified, then merged with the actual data column and then written to the appropriate mass memory. Figure 4.5.6–1 is the Mass Memory R/W Display (PFS).

Descriptions of each displayed parameter follow:

(2) DESIRED

The new value desired for the identified location in a Mass Memory (MM) load block. Items 1 through 39 are used to enter the desired contents for the load block starting at the offset defined by Item 45. All changes to Mass Memory will be done in a READ/MERGE/WRITE sequence. This requires the new value to be entered in hexadecimal and verified in the desired column, merged with the actual column and then written to the selected mass memory.

(3) ACTUAL

The actual values are displayed representing the contents of the load block selected. All data are displayed in hexadecimal.

(4) CHECKSUM

This parameter represents the checksum (in hexadecimal) that came with the reading of the load block, and is updated to the new checksum when Item 49 is executed. Leading zeros are displayed.

(5) MMU Status Indicators

An asterisk (*) is displayed adjacent to the selected MMU. Items 40 and 41 select MMU 1 or 2 from which to obtain the load block and perform the writes. These items are mutually exclusive. Change of selection can be made any time Items 48, 49, 50, 51, or 52 are not in progress. Items 40 and 41 also select the MMU status REGISTER A and B parameters for display.

(6) S/W System

Item 42 shall be initialized to zero and is used to enter the desired Software System ID for which the load block is referenced as follows:

| ITEM 42 VALUE | LOAD BLOCK |
|---|---|
| 0 | DISPLAY TEXT and GRAPHICS |
| 1 | PASS 1 |
| 2 | PASS 2 |
| 3 | PASS 3 |
| 4 | BFS |
| 5 | DEU |
| 6 | INVALID |
| 7 | TCS SEQUENCE |

A value of 6 shall be rejected with an ILLEGAL ENTRY message. This item may be changed to allow the user to request that subsequent writes of the phase/load block currently in the load block construction buffer be addressed to alternate system IDs of either MMU. This alternate system ID selection by the user shall be compatible with the system ID chosen for the initial read. System ID compatibility shall be defined as follows:

| User Selected System ID for Read | Compatible System IDs for Write (either MMU) |
|---|---|
| 0 | 0 |
| 1 | 1, 2, 3 |
| 2 | 1, 2, 3 |
| 3 | 1, 2, 3 |
| 4 | 4 |
| 5 | 5 |
| 6 INVALID | 6 INVALID |
| 7 | 7 |

(7) PHASE and LOAD BLOCK

Items 43 and 44 define the phase and load block respectively in decimal. A phase entry of zero causes the Revision Patch Log (RPL) to be retrieved for display. Each time an Item 43 or 44 is entered, data entry fields for Items 1 through 39, 45, 46 and 47 are blanked.

(8) OFFSET

Item 45 defines the offset (in decimal) into the load block for which Items 1 through 39 apply. Each time an offset is entered the desired columns (Item 1 through 39 data field) and item 46 are blanked. The first word in the load block is defined as an offset of zero.

(9) NUMBER

Item 46 defines (in decimal) the (NUMBER) of contiguous changes that are made at the current offset. The maximum is 39 for the SPEC. A corresponding number of desired items (1 through 39) must be made prior to the SPEC acceptance of a merge request. (For example, if NUMBER is equal to 10, then Items 1 through 10 must have data entered before a merge request is honored).

(10) PATCH ID

Item 47, Patch ID, is to be logged on the RPL as part of the write request. Input is hexadecimal. If patch ID is equal to zero, the violation flag is set on the corresponding MMU RPL if a subsequent write is initiated. A patch ID entry must be present prior to honoring a merge request.

(11) VIOLATE

This parameter is displayed by remote text which indicates the following:

| REMOTE TEXT | DESCRIPTION |
|---|---|
| YES | Indicates that a patch ID of zeros is used in the write of a patch or that an unsuccessful patch write was pending when an OPS transition or SPEC termination is processed. |
| NO | Indicates that no violations are present. |

The parameter shall be updated each time the RPL is read from mass memory (i.e., Phase = zero and read, or a write sequence).

(12) READ LOAD BLOCK

Item 48 causes the designated load block to be read from the user selected MMU into the load block construction buffer. The location of the load block to be read from the MMU will be redundantly supported. An asterisk (*) is displayed adjacent to the item when entered and blanked when status is blanked. The status parameter indicates (IP)/(CPLT)/(ERR) while the process is in progress, or when completed or when an error is encountered respectively. Item 48 allows for retry by the user and causes a refresh of the load block construction buffer. If a READ, WRITE or MERGE (Items 48, 49, 50) is attempted with only one MMU selected, the SM common buffer will be latched until an RPL read (PHASE=0) is performed or an OPS transition occurs.

(13) MERGE

Item 49 causes the desired data (Items 1 through 39) to be merged to the Actual Data Column. That is, merge overlays the desired data into the load block construction buffer making the desired and actual columns equal. An asterisk (*) is displayed adjacent to the item when entered and is blanked when the “STATUS” parameter is blanked. Merge is honored only if the number of desired item entries (1 through 39) have been made consistent with the value entered for Item 46. (i.e., if Item 46 equals 10, then desired data must be entered for Items 1 through 10 before the merge request is honored. A merge request with Item 46 equal to zero is honored).

(14) WRITE LOAD BLOCK

Item 50 causes the GPC to write data from the load block construction buffer to the selected MMU. The patch ID is logged on the RPL and written to the same MMU as part of the write sequence. After the write, the GPC reads the load block back from MMU as part of the write sequence and performs a word–by–word compare with what was written. An asterisk (*) is displayed adjacent to the item when entered and is blanked when the status parameter is blanked. Item 50 shall allow data in the load block construction buffer to be applied to other compatible MM areas of either MMU by the reselection of the desired MMU, system ID, and patch ID. If the system ID does not designate a compatible MM area, an error code shall be generated.

The option shall be provided to allow retry by the user in case of errors (on a merge request, (IP) may not be displayed based on display update timing).

(15) COMPARE

Item 51 causes the GPC to perform a word–by–word compare of the specified load block between MMU 1 and MMU 2, (for example, read the selected load block from MMU 1 and MMU 2 and perform a word–by–word compare using MMU 1 as the reference). If a compare error is detected, the error condition is displayed in accordance with error definitions provided for STATUS. Item 51 allows for retries by the user in the event I/O errors are encountered with the MMU. The compare status indicator asterisk (*) is on when a compare function is in progress and is cleared upon completion of the compare process.

(16) STATUS

The status is a remote text character string representing the following conditions:

| REMOTE TEXT | DESCRIPTION |
|---|---|
| IP | Indicates an MMU Write, Read, Compare, or Dump process is in progress. |
| CPLT | Indicates the MMU Read, Write, Compare or Dump process has been completed error free. |
| ERR | Indicates any of the following conditions:<br>Code 1 MM I/O error on read or write<br>Code 2 Unresolved phase/load block (not found)<br>or<br>System ID 1,2 or 3/Phase 1 (Bootstrap Loader)<br>Code 3 Configuration control information incorrect or inconsistent<br>Code 4 Word miscompare<br>Code 5 MM checksum failure<br>Code 6 Incompatible system ID<br>Code 7 Load block length violation (greater than 16384 halfwords in PL 9, or 2048 halfwords in SM 2 or SM 4) |

The text indication (CPLT or ERR) remains until one of Items 40 through 52 is subsequently executed by the user.

(17) ERROR CODE

This parameter displays the error code in decimal. The error code of zero is displayed upon any subsequent Item 40 through 52 entry.

(18) REGISTER A

This parameter displays the last MMU status REGISTER A contents from the systems software COMPOOL. The display is in hexadecimal, and the parameter corresponds to the MMU selected by Item 40 and 41.

(19) REGISTER B

This parameter displays the last MMU status REGISTER B contents from the systems software COMPOOL. The display is in hexadecimal, and the parameter value corresponds to the MMU selected by Item 40 and 41.

(20) MM VERSION

This parameter updates each time the RPL is read to indicate the Mass Memory (MM) version in decimal (word 3 of the RPL). Leading zeros are not displayed. The number prior to the decimal point represents the decimal equivalent of bits 4–10 of word 3 of the RPL. The number after the decimal point indicates the decimal equivalent of bits 11–16 of word 3 of the RPL.

(21) DUMP VIA DL

Item 52 dumps the buffer containing the selected load block via downlist. The application software interfaces with the downlist function to initiate the dump. An asterisk (*) (Item status) is displayed when the dump process is in progress and is blanked when the dump is completed. If the selected load block entered at the time Item 52 is initiated is the same as the load block in GPC memory, a separate MMU I/O is not performed (i.e., allow dumping of the buffer contents at any point during the patch sequence). If the load block is different, then Item 52 causes a MMU read of the load block. The location of the load block to be read from the MMU will be redundantly supported. When the read of the load block is completed, the dump of the load block is initiated. Item 52 is allowed any time a MMU, S/W system ID, phase and load block is present on Items 40–44; otherwise, an "ILLEGAL ENTRY" message is displayed. Item 52 allows for retries in the event I/O errors are encountered with the MMU.

(22) SM COM BUFF

This parameter displays the status of the SM Common Buffer. The bilevel indicator displaying a busy (BSY) flashing or a ready (RDY) remote text is activated by a discrete signal from the Subsystem Measurement & Management (SMM). An attempt to use the buffer while it is in use will be rejected.

The display is initialized with all items deselected and the data entry fields for all item entries blanked except that Item 42 will be initialized to 0 (Text & Graphics). Also, the ACTUAL columns, CHECKSUM, STATUS, ERROR CODE, MM VERSION, VIOLATE, and REGISTER A and B parameter values are initialized blank.

Termination of the SPEC is honored at any time (pending completion of the current ITEM request).

To review the actual value of quantities on mass memory, the user selects an MMU (Item 40 or 41) S/W system ID (Item 42), phase (Item 43), and load block (Item 44). The user then selects an offset (Item 45) and number (Item 46). If the user desires to only read the load block, no patch ID (Item 47) is required. READ LB (Item 48) is then executed.

To patch the mass memory, the user (following the Read Load Block Item Execute) enters a patch ID (Item 47), and makes the required number of Item 1 through 39 entries. When the merge is completed, the user can execute Item 50 to write the Load Block to the selected mass memory and update the RPL. If it is desired to write the same patch to the other mass memory, the user selects the other MMU via Item 40 or 41 and executes Item 50 again.

One error message is available for this display: "ILLEGAL ENTRY". The following actions result in the error message:

a. Any system ID, phase, or load block that is outside of its specified range.

b. Sum of offset and number is greater than or equal to the load block length.

c. Patch ID or desired entry greater than FFFF hex.

d. Merge attempt with the required number of Items 1 through 39 not having data entered.

e. Offset less than 0. The “ILLEGAL ENTRY” check is not made until a subsequent item entry is made.

f. (NUMBER) less than 1 or greater than 39.

g. Merge attempt with PHASE equal to zero.

h. Item entry while previous process is in progress.

i. Entries of desired data for item numbers greater than “NUMBER”.

j. Read, write, merge, compare, or dump without required prerequisite inputs being made.

k. Entry of ITEM 46 (NUMBER) before ITEM 45 (OFFSET).

l. Entry of ITEM 46 (NUMBER) prior to the execution of ITEM 48 (READ) for a new ITEM 43 (PHASE) or ITEM 44 LOAD (BLOCK) entry.

m. Entry of ITEM 45 (OFFSET) prior to the execution of ITEM 48 (READ).

### 4.5.6.2 MASS MEMORY READ/WRITE (PFS) Keyboard Processing Addendum

Not Applicable.

### 4.5.6.3 MASS MEMORY READ/WRITE (PFS) CRT Display Processing Addendum

The Table below presents the stand–alone parameter status indicators (PSI) that can be displayed for a parameter PSI requirements are identified by the word “STAT” being inserted in the FORMAT TYPE column and a numeric code appearing as an entry (right justified) in the ADD REF column of CRT display processing Table 4.5.6–2. The numeric code, corresponding to one of those listed in the Table indicates the specific status processing to be performed. If there is no numeric code entry, the status processing is defined by the default code.

When the “M” PSI is displayed (for Commfault, I/O error resulting in missing data), the associated parameter value data field shall be blanked unless specified otherwise.

| Numeric Code | PSI SYMBOL(S) | | | | | |
|---|---|---|---|---|---|---|
| Default (blank) | ↓ | | | M | ∅ | |
| 1 | ↓ | ↑ | | M | ∅ | |
| 2 | | ↑ | | M | ∅ | |
| 3 | ↓ | | | | ∅ | |
| 4 | | ↑ | | | ∅ | |
| 5 | ↓ | | ? | | ∅ | |
| 6 | ↓ | ↑ | | | ∅ | |
| 7 | | | | M | ∅ | |
| 8 | ↓ | | ? | M | ∅ | |
| 9 | | | ? | M | ∅ | |

∅ = blank

The following alpha code(s) appear (left justified) in the ADD REF column of the Table 4.5.6–2 whenever it is necessary to define any special processing requirements not otherwise covered therein:

A. Remote Text = YES when a patch ID of zeros has been used in the write of a patch or an unsuccessful patch write was pending when an OPS or SPEC termination is processed.

   Remote Text = NO when no violations are present.

   This parameter shall be updated each time the RPL is read from Mass Memory (i.e., Phase = zero and read on a write sequence).

B. The values of status shall be a remote text character string representing the following conditions:

| Remote Text | |
|---|---|
| IP | Mass Memory write, read, or compare is in progress (i.e., read load block, sumcheck/write/compute/update). Revision Patch Log (RPL)/merge. |
| CPLT | Mass Memory read, write or compare process has been completed error free. |
| ERR | Indicates any of the following conditions: |

| | |
|---|---|
| Code 1 | MM I/O error on read or write |
| Code 2 | Unresolved phase/load block (not found)<br>or<br>System ID 1,2 or 3/Phase 1 (Bootstrap Loader) |
| Code 3 | Configuration control information incorrect or inconsistent |
| Code 4 | Word miscompare |
| Code 5 | MM checksum failure |
| Code 6 | Incompatible system ID |
| Code 7 | Load block length violation (greater than 16384 halfwords in PL 9, or 2048 halfwords in SM2 or SM 4) |

The text indication (CPLT or ERR) shall remain until an Item 48, 49, 50, 51, or 52 is subsequently executed by the user.

C. The values used for REGISTER A and REGISTER B shall be determined by which MMU has been selected. The following Table shall be used.

| MMU Selected | REG A | REG B |
|---|---|---|
| MMU l V93J7340C | V72M7320P | V72M7330P |
| MMU 2 V93J7342C | V72M7370P | V72M7380P |

D. Each time an item 43 or 44 is entered, data entry fields for items 1 through 39, 45, 46 and 47 will be blanked.

### 4.5.6.4 MASS MEMORY READ/WRITE Figure/Table References

Figure 4.5.6–1 Mass Memory Read/Write Display (PFS)

Table 4.5.6–1 Keyboard Processing Table

Table 4.5.6–2 CRT Display Processing Table

Table 4.5.6–3 CRT Display Processing Background Requirements N/A

Table 4.5.6–4 Mission Design Background Constants N/A

Table 4.5.6–5 Input Functional Parameters

Table 4.5.6–6 Output Functional Parameters

Table 4.5.6–7 I–Loads

Table 4.5.6–8 K–Loads

Table 4.5.6–9 Constants

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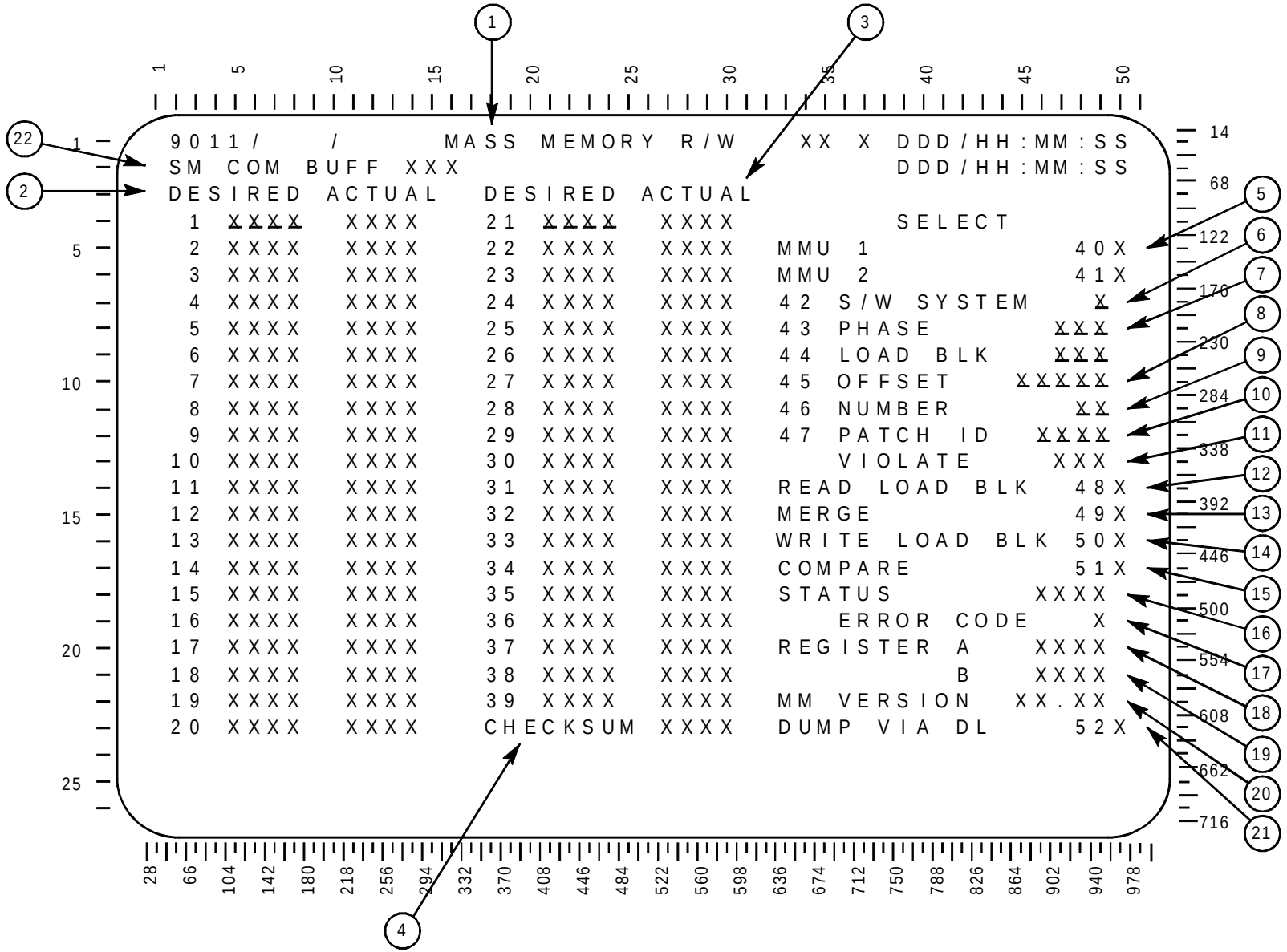


FIGURE 4.5.6-1. Mass Memory Read/Write Display (PFS)

TABLE 4.5.6-1. MASS MEMORY READ/WRITE (PFS) KEYBOARD PROCESSING

| Seq | CRT Signal Name | M/S ID | CHAR | TYPE | UNITS | DK | ITEM | Item No. Limits | | Add Ref | Destination | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | MIN | MAX | | | | |
| 001 | DESIRED 1 | V93J7301C | 4.0 | HEX | | | 1 | | | | MM LDB | DESIRED CONTENTS (WRITE) (1) | X |
| 002 | DESIRED 2 | V93J7302C | 4.0 | HEX | | | 2 | | | | MM LDB | DESIRED CONTENTS (WRITE) (2) | X |
| 003 | DESIRED 3 | V93J7303C | 4.0 | HEX | | | 3 | | | | MM LDB | DESIRED CONTENTS (WRITE) (3) | X |
| 004 | DESIRED 4 | V93J7304C | 4.0 | HEX | | | 4 | | | | MM LDB | DESIRED CONTENTS (WRITE) (4) | X |
| 005 | DESIRED 5 | V93J7305C | 4.0 | HEX | | | 5 | | | | MM LDB | DESIRED CONTENTS (WRITE) (5) | X |
| 006 | DESIRED 6 | V93J7306C | 4.0 | HEX | | | 6 | | | | MM LDB | DESIRED CONTENTS (WRITE) (6) | X |
| 007 | DESIRED 7 | V93J7307C | 4.0 | HEX | | | 7 | | | | MM LDB | DESIRED CONTENTS (WRITE) (7) | X |
| 008 | DESIRED 8 | V93J7308C | 4.0 | HEX | | | 8 | | | | MM LDB | DESIRED CONTENTS (WRITE) (8) | X |
| 009 | DESIRED 9 | V93J7309C | 4.0 | HEX | | | 9 | | | | MM LDB | DESIRED CONTENTS (WRITE) (9) | X |
| 010 | DESIRED 10 | V93J7310C | 4.0 | HEX | | | 10 | | | | MM LDB | DESIRED CONTENTS (WRITE) (10) | X |
| 011 | DESIRED 11 | V93J7311C | 4.0 | HEX | | | 11 | | | | MM LDB | DESIRED CONTENTS (WRITE) (11) | X |
| 012 | DESIRED 12 | V93J7312C | 4.0 | HEX | | | 12 | | | | MM LDB | DESIRED CONTENTS (WRITE) (12) | X |
| 013 | DESIRED 13 | V93J7313C | 4.0 | HEX | | | 13 | | | | MM LDB | DESIRED CONTENTS (WRITE) (13) | X |
| 014 | DESIRED 14 | V93J7314C | 4.0 | HEX | | | 14 | | | | MM LDB | DESIRED CONTENTS (WRITE) (14) | X |
| 015 | DESIRED 15 | V93J7315C | 4.0 | HEX | | | 15 | | | | MM LDB | DESIRED CONTENTS (WRITE) (15) | X |
| 016 | DESIRED 16 | V93J7316C | 4.0 | HEX | | | 16 | | | | MM LDB | DESIRED CONTENTS (WRITE) (16) | X |
| 017 | DESIRED 17 | V93J7317C | 4.0 | HEX | | | 17 | | | | MM LDB | DESIRED CONTENTS (WRITE) (17) | X |
| 018 | DESIRED 18 | V93J7318C | 4.0 | HEX | | | 18 | | | | MM LDB | DESIRED CONTENTS (WRITE) (18) | X |
| 019 | DESIRED 19 | V93J7319C | 4.0 | HEX | | | 19 | | | | MM LDB | DESIRED CONTENTS (WRITE) (19) | X |
| 020 | DESIRED 20 | V93J7320C | 4.0 | HEX | | | 20 | | | | MM LDB | DESIRED CONTENTS (WRITE) (20) | X |
| 021 | DESIRED 21 | V93J7321C | 4.0 | HEX | | | 21 | | | | MM LDB | DESIRED CONTENTS (WRITE) (21) | X |
| 022 | DESIRED 22 | V93J7322C | 4.0 | HEX | | | 22 | | | | MM LDB | DESIRED CONTENTS (WRITE) (22) | X |
| 023 | DESIRED 23 | V93J7323C | 4.0 | HEX | | | 23 | | | | MM LDB | DESIRED CONTENTS (WRITE) (23) | X |
| 024 | DESIRED 24 | V93J7324C | 4.0 | HEX | | | 24 | | | | MM LDB | DESIRED CONTENTS (WRITE) (24) | X |
| 025 | DESIRED 25 | V93J7325C | 4.0 | HEX | | | 25 | | | | MM LDB | DESIRED CONTENTS (WRITE) (25) | X |
| 026 | DESIRED 26 | V93J7326C | 4.0 | HEX | | | 26 | | | | MM LDB | DESIRED CONTENTS (WRITE) (26) | X |
| 027 | DESIRED 27 | V93J7327C | 4.0 | HEX | | | 27 | | | | MM LDB | DESIRED CONTENTS (WRITE) (27) | X |

TABLE 4.5.6-1. MASS MEMORY READ/WRITE (PFS) KEYBOARD PROCESSING

| Seq | CRT Signal Name | M/S ID | CHAR | TYPE | UNITS | DK | ITEM | Item No. Limits | | Add Ref | Destination | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | MIN | MAX | | | | |
| 028 | DESIRED 28 | V93J7328C | 4.0 | HEX | | | 28 | | | | MM LDB | DESIRED CONTENTS (WRITE) (28) | X |
| 029 | DESIRED 29 | V93J7329C | 4.0 | HEX | | | 29 | | | | MM LDB | DESIRED CONTENTS (WRITE) (29) | X |
| 030 | DESIRED 30 | V93J7330C | 4.0 | HEX | | | 30 | | | | MM LDB | DESIRED CONTENTS (WRITE) (30) | X |
| 031 | DESIRED 31 | V93J7331C | 4.0 | HEX | | | 31 | | | | MM LDB | DESIRED CONTENTS (WRITE) (31) | X |
| 032 | DESIRED 32 | V93J7332C | 4.0 | HEX | | | 32 | | | | MM LDB | DESIRED CONTENTS (WRITE) (32) | X |
| 033 | DESIRED 33 | V93J7333C | 4.0 | HEX | | | 33 | | | | MM LDB | DESIRED CONTENTS (WRITE) (33) | X |
| 034 | DESIRED 34 | V93J7334C | 4.0 | HEX | | | 34 | | | | MM LDB | DESIRED CONTENTS (WRITE) (34) | X |
| 035 | DESIRED 35 | V93J7335C | 4.0 | HEX | | | 35 | | | | MM LDB | DESIRED CONTENTS (WRITE) (35) | X |
| 036 | DESIRED 36 | V93J7336C | 4.0 | HEX | | | 36 | | | | MM LDB | DESIRED CONTENTS (WRITE) (36) | X |
| 037 | DESIRED 37 | V93J7337C | 4.0 | HEX | | | 37 | | | | MM LDB | DESIRED CONTENTS (WRITE) (37) | X |
| 038 | DESIRED 38 | V93J7338C | 4.0 | HEX | | | 38 | | | | MM LDB | DESIRED CONTENTS (WRITE) (38) | X |
| 039 | DESIRED 39 | V93J7339C | 4.0 | HEX | | | 39 | | | | MM LDB | DESIRED CONTENTS (WRITE) (39) | X |
| 040 | MM 1 40 | V93J7340C | 0.0 | CTRL | | | 40 | | | | MM LDB | SELECT MASS MEMORY 1 | X |
| 041 | MM 2 41 | V93J7342C | 0.0 | CTRL | | | 41 | | | | MM LDB | SELECT MASS MEMORY 2 | X |
| 042 | 42 S/W SYS | V93U7348C | 4.0 | DEC | | | 42 | | | | MM LDB | S/W SYSTEM SELECT | X |
| 043 | 43 PHASE | V93U7350C | 4.0 | DEC | | | 43 | | | | MM LDB | PHASE | X |
| 044 | 44 LOAD BLK | V93U7355C | 4.0 | DEC | | | 44 | | | | MM LDB | LOAD BLOCK | X |
| 045 | 45 OFFSET | V93U7360C | 6.0 | DEC | | | 45 | | | | MM LDB | LOAD BLOCK OFFSET | X |
| 046 | 46 NUMBER | V93U7362C | 3.0 | DEC | | | 46 | | | | MM LDB | NUM CHANGES AT CURRENT OFFSET | X |
| 047 | 47 PATCH ID | V93U7365C | 5.0 | DEC | | | 47 | | | | MM LDB | PATCH ID | X |
| 048 | READ LOAD BLK 48 | V93J7370C | 0.0 | CTRL | | | 48 | | | | MM LDB | READ LB COMMAND | X |
| 049 | MERGE 49 | V93J7372C | 0.0 | CTRL | | | 49 | | | | MM LDB | MERGE COMMAND | X |
| 050 | WRITE LOAD BLK 50 | V93J7374C | 0.0 | CTRL | | | 50 | | | | MM LDB | WRITE LB COMMAND | X |
| 051 | COMPARE 51 | V93X7378X | 0.0 | CTRL | | | 51 | | | | MM LDB | SELECT COMPARE CMD | X |
| 052 | DUMP VIA DL 52 | V93X7390X | 0.0 | CTRL | | | 52 | | | | MM LDB | BUFFER DUMP INITIATE COMMAND | X |

TABLE 4.5.6-2. MASS MEMORY READ/WRITE (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | | | |
| 001 | (OPS) | V93X0040X | 2 | 1 | | 5.0 | | | CHAR | | | | | | | E | | | | | | UI | OPS FUNCTION PAGE | X |
| 002 | (SPEC) | V93X0042X | 7 | 1 | | 4.0 | | | CHAR | | | | | | | E | | | | | | UI | SPEC FUNCTION PAGE | X |
| 003 | (DISP) | V93X0044X | 10 | 1 | | 4.0 | | | DEC | | | | | | | E | | | | | | UI | DISPLAY FUNCTION PAGE | X |
| 004 | (UL) | V92X5032X | 34 | 1 | | 2.0 | UL | | BLVL | | | | | | X | G | | | | | | UI | UPLINK ACTIVITY IND | X |
| 005 | (GPC) | V93X0048X | 36 | 1 | | 2.0 | | | DEC | | | | | | | E | | | | | | UI | GPC DRIVER | X |
| 006 | (MT) | V91W1990C | 39 | 1 | | 12.0 | | | CHAR | DHMS | | | | | | A | | | | | | FCOS | MISSION ELAPSED TIME | X |
| 007 | (CRT TIMER) | V91W1988C | 39 | 2 | | 12.0 | | | CHAR | DHMS | | | | | | A | | | | | | FCOS | DISPLAY CRT TIME, SM | X |
| 008 | SM COM BUFF | V92X0077X | 14 | 2 | | 3.0 | BSY | | BLVL | | | | | | X | | | | | | | SMM | SM COMMON BUFFER IN USE | X |
| 009 | SM COM BUFF | V92X0077X | 14 | 2 | | 3.0 | | RDY | BLVL | | | | | | | | | | | | | SMM | SM COMMON BUFFER IN USE | X |
| 010 | DESIRED 1 | V93J7301C | 5 | 4 | | 4.0 | | | HEX | | | X | | | | E | | | | | D | MM LDB | DESIRED CONTENTS (WRITE) (1) | X |
| 011 | DESIRED 2 | V93J7302C | 5 | 5 | | 4.0 | | | HEX | | | X | | | | E | | | | | D | MM LDB | DESIRED CONTENTS (WRITE) (2) | X |
| 012 | DESIRED 3 | V93J7303C | 5 | 6 | | 4.0 | | | HEX | | | X | | | | E | | | | | D | MM LDB | DESIRED CONTENTS (WRITE) (3) | X |
| 013 | DESIRED 4 | V93J7304C | 5 | 7 | | 4.0 | | | HEX | | | X | | | | E | | | | | D | MM LDB | DESIRED CONTENTS (WRITE) (4) | X |
| 014 | DESIRED 5 | V93J7305C | 5 | 8 | | 4.0 | | | HEX | | | X | | | | E | | | | | D | MM LDB | DESIRED CONTENTS (WRITE) (5) | X |
| 015 | DESIRED 6 | V93J7306C | 5 | 9 | | 4.0 | | | HEX | | | X | | | | E | | | | | D | MM LDB | DESIRED CONTENTS (WRITE) (6) | X |
| 016 | DESIRED 7 | V93J7307C | 5 | 10 | | 4.0 | | | HEX | | | X | | | | E | | | | | D | MM LDB | DESIRED CONTENTS (WRITE) (7) | X |
| 017 | DESIRED 8 | V93J7308C | 5 | 11 | | 4.0 | | | HEX | | | X | | | | E | | | | | D | MM LDB | DESIRED CONTENTS (WRITE) (8) | X |
| 018 | DESIRED 9 | V93J7309C | 5 | 12 | | 4.0 | | | HEX | | | X | | | | E | | | | | D | MM LDB | DESIRED CONTENTS (WRITE) (9) | X |
| 019 | DESIRED 10 | V93J7310C | 5 | 13 | | 4.0 | | | HEX | | | X | | | | E | | | | | D | MM LDB | DESIRED CONTENTS (WRITE) (10) | X |
| 020 | DESIRED 11 | V93J7311C | 5 | 14 | | 4.0 | | | HEX | | | X | | | | E | | | | | D | MM LDB | DESIRED CONTENTS (WRITE) (11) | X |
| 021 | DESIRED 12 | V93J7312C | 5 | 15 | | 4.0 | | | HEX | | | X | | | | E | | | | | D | MM LDB | DESIRED CONTENTS (WRITE) (12) | X |
| 022 | DESIRED 13 | V93J7313C | 5 | 16 | | 4.0 | | | HEX | | | X | | | | E | | | | | D | MM LDB | DESIRED CONTENTS (WRITE) (13) | X |
| 023 | DESIRED 14 | V93J7314C | 5 | 17 | | 4.0 | | | HEX | | | X | | | | E | | | | | D | MM LDB | DESIRED CONTENTS (WRITE) (14) | X |
| 024 | DESIRED 15 | V93J7315C | 5 | 18 | | 4.0 | | | HEX | | | X | | | | E | | | | | D | MM LDB | DESIRED CONTENTS (WRITE) (15) | X |
| 025 | DESIRED 16 | V93J7316C | 5 | 19 | | 4.0 | | | HEX | | | X | | | | E | | | | | D | MM LDB | DESIRED CONTENTS (WRITE) (16) | X |
| 026 | DESIRED 17 | V93J7317C | 5 | 20 | | 4.0 | | | HEX | | | X | | | | E | | | | | D | MM LDB | DESIRED CONTENTS (WRITE) (17) | X |
| 027 | DESIRED 18 | V93J7318C | 5 | 21 | | 4.0 | | | HEX | | | X | | | | E | | | | | D | MM LDB | DESIRED CONTENTS (WRITE) (18) | X |
| 028 | DESIRED 19 | V93J7319C | 5 | 22 | | 4.0 | | | HEX | | | X | | | | E | | | | | D | MM LDB | DESIRED CONTENTS (WRITE) (19) | X |

## TABLE 4.5.6-2. MASS MEMORY READ/WRITE (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | | | |
| 029 | DESIRED 20 | V93J7320C | 5 | 23 | | 4.0 | | | HEX | | | X | | | | E | | | | | D | MM LDB | DESIRED CONTENTS (WRITE) (20) | X |
| 030 | ACTUAL 1 | V99J4580C | 11 | 4 | | 4.0 | | | HEX | | | X | | | | E | | | | | D | MM LDB | ACTUAL CONTENTS (READ) (1) | X |
| 031 | ACTUAL 2 | V99J4581C | 11 | 5 | | 4.0 | | | HEX | | | X | | | | E | | | | | D | MM LDB | ACTUAL CONTENTS (READ) (2) | X |
| 032 | ACTUAL 3 | V99J4582C | 11 | 6 | | 4.0 | | | HEX | | | X | | | | E | | | | | D | MM LDB | ACTUAL CONTENTS (READ) (3) | X |
| 033 | ACTUAL 4 | V99J4583C | 11 | 7 | | 4.0 | | | HEX | | | X | | | | E | | | | | D | MM LDB | ACTUAL CONTENTS (READ) (4) | X |
| 034 | ACTUAL 5 | V99J4584C | 11 | 8 | | 4.0 | | | HEX | | | X | | | | E | | | | | D | MM LDB | ACTUAL CONTENTS (READ) (5) | X |
| 035 | ACTUAL 6 | V99J4585C | 11 | 9 | | 4.0 | | | HEX | | | X | | | | E | | | | | D | MM LDB | ACTUAL CONTENTS (READ) (6) | X |
| 036 | ACTUAL 7 | V99J4586C | 11 | 10 | | 4.0 | | | HEX | | | X | | | | E | | | | | D | MM LDB | ACTUAL CONTENTS (READ) (7) | X |
| 037 | ACTUAL 8 | V99J4587C | 11 | 11 | | 4.0 | | | HEX | | | X | | | | E | | | | | D | MM LDB | ACTUAL CONTENTS (READ) (8) | X |
| 038 | ACTUAL 9 | V99J4588C | 11 | 12 | | 4.0 | | | HEX | | | X | | | | E | | | | | D | MM LDB | ACTUAL CONTENTS (READ) (9) | X |
| 039 | ACTUAL 10 | V99J4589C | 11 | 13 | | 4.0 | | | HEX | | | X | | | | E | | | | | D | MM LDB | ACTUAL CONTENTS (READ) (10) | X |
| 040 | ACTUAL 11 | V99J4590C | 11 | 14 | | 4.0 | | | HEX | | | | | | | E | | | | | | MM LDB | ACTUAL CONTENTS (READ) (11) | X |
| 041 | ACTUAL 12 | V99J4591C | 11 | 15 | | 4.0 | | | HEX | | | | | | | E | | | | | | MM LDB | ACTUAL CONTENTS (READ) (12) | X |
| 042 | ACTUAL 13 | V99J4592C | 11 | 16 | | 4.0 | | | HEX | | | | | | | E | | | | | | MM LDB | ACTUAL CONTENTS (READ) (13) | X |
| 043 | ACTUAL 14 | V99J4593C | 11 | 17 | | 4.0 | | | HEX | | | | | | | E | | | | | | MM LDB | ACTUAL CONTENTS (READ) (14) | X |
| 044 | ACTUAL 15 | V99J4594C | 11 | 18 | | 4.0 | | | HEX | | | | | | | E | | | | | | MM LDB | ACTUAL CONTENTS (READ) (15) | X |
| 045 | ACTUAL 16 | V99J4595C | 11 | 19 | | 4.0 | | | HEX | | | X | | | | E | | | | | D | MM LDB | ACTUAL CONTENTS (READ) (16) | X |
| 046 | ACTUAL 17 | V99J4596C | 11 | 20 | | 4.0 | | | HEX | | | X | | | | E | | | | | D | MM LDB | ACTUAL CONTENTS (READ) (17) | X |
| 047 | ACTUAL 18 | V99J4597C | 11 | 21 | | 4.0 | | | HEX | | | X | | | | E | | | | | D | MM LDB | ACTUAL CONTENTS (READ) (18) | X |
| 048 | ACTUAL 19 | V99J4598C | 11 | 22 | | 4.0 | | | HEX | | | | | | | E | | | | | | MM LDB | ACTUAL CONTENTS (READ) (19) | X |
| 049 | ACTUAL 20 | V99J4599C | 11 | 23 | | 4.0 | | | HEX | | | | | | | E | | | | | | MM LDB | ACTUAL CONTENTS (READ) (20) | X |
| 050 | DESIRED 21 | V93J7321C | 21 | 4 | | 4.0 | | | HEX | | | | | | | E | | | | | | MM LDB | DESIRED CONTENTS (WRITE) (21) | X |
| 051 | DESIRED 22 | V93J7322C | 21 | 5 | | 4.0 | | | HEX | | | | | | | E | | | | | | MM LDB | DESIRED CONTENTS (WRITE) (22) | X |
| 052 | DESIRED 23 | V93J7323C | 21 | 6 | | 4.0 | | | HEX | | | | | | | E | | | | | | MM LDB | DESIRED CONTENTS (WRITE) (23) | X |
| 053 | DESIRED 24 | V93J7324C | 21 | 7 | | 4.0 | | | HEX | | | | | | | E | | | | | | MM LDB | DESIRED CONTENTS (WRITE) (24) | X |
| 054 | DESIRED 25 | V93J7325C | 21 | 8 | | 4.0 | | | HEX | | | | | | | E | | | | | | MM LDB | DESIRED CONTENTS (WRITE) (25) | X |
| 055 | DESIRED 26 | V93J7326C | 21 | 9 | | 4.0 | | | HEX | | | | | | | E | | | | | | MM LDB | DESIRED CONTENTS (WRITE) (26) | X |
| 056 | DESIRED 27 | V93J7327C | 21 | 10 | | 4.0 | | | HEX | | | | | | | E | | | | | | MM LDB | DESIRED CONTENTS (WRITE) (27) | X |
| 057 | DESIRED 28 | V93J7328C | 21 | 11 | | 4.0 | | | HEX | | | | | | | E | | | | | | MM LDB | DESIRED CONTENTS (WRITE) (28) | X |

TABLE 4.5.6-2. MASS MEMORY READ/WRITE (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | | | |
| 058 | DESIRED 29 | V93J7329C | 21 | 12 | | 4.0 | | | HEX | | | | | | | E | | | | | | MM LDB | DESIRED CONTENTS (WRITE) (29) | X |
| 059 | DESIRED 30 | V93J7330C | 21 | 13 | | 4.0 | | | HEX | | | | | | | E | | | | | | MM LDB | DESIRED CONTENTS (WRITE) (30) | X |
| 060 | DESIRED 31 | V93J7331C | 21 | 14 | | 4.0 | | | HEX | | | | | | | E | | | | | | MM LDB | DESIRED CONTENTS (WRITE) (31) | X |
| 061 | DESIRED 32 | V93J7332C | 21 | 15 | | 4.0 | | | HEX | | | | | | | E | | | | | | MM LDB | DESIRED CONTENTS (WRITE) (32) | X |
| 062 | DESIRED 33 | V93J7333C | 21 | 16 | | 4.0 | | | HEX | | | | | | | E | | | | | | MM LDB | DESIRED CONTENTS (WRITE) (33) | X |
| 063 | DESIRED 34 | V93J7334C | 21 | 17 | | 4.0 | | | HEX | | | | | | | E | | | | | | MM LDB | DESIRED CONTENTS (WRITE) (34) | X |
| 064 | DESIRED 35 | V93J7335C | 21 | 18 | | 4.0 | | | HEX | | | | | | | E | | | | | | MM LDB | DESIRED CONTENTS (WRITE) (35) | X |
| 065 | DESIRED 36 | V93J7336C | 21 | 19 | | 4.0 | | | HEX | | | | | | | E | | | | | | MM LDB | DESIRED CONTENTS (WRITE) (36) | X |
| 066 | DESIRED 37 | V93J7337C | 21 | 20 | | 4.0 | | | HEX | | | | | | | E | | | | | | MM LDB | DESIRED CONTENTS (WRITE) (37) | X |
| 067 | DESIRED 38 | V93J7338C | 21 | 21 | | 4.0 | | | HEX | | | | | | | E | | | | | | MM LDB | DESIRED CONTENTS (WRITE) (38) | X |
| 068 | DESIRED 39 | V93J7339C | 21 | 22 | | 4.0 | | | HEX | | | | | | | E | | | | | | MM LDB | DESIRED CONTENTS (WRITE) (39) | X |
| 069 | ACTUAL 21 | V99J4600C | 27 | 4 | | 4.0 | | | HEX | | | | | | | E | | | | | | MM LDB | ACTUAL CONTENTS (READ) (21) | X |
| 070 | ACTUAL 22 | V99J4601C | 27 | 5 | | 4.0 | | | HEX | | | | | | | E | | | | | | MM LDB | ACTUAL CONTENTS (READ) (22) | X |
| 071 | ACTUAL 23 | V99J4602C | 27 | 6 | | 4.0 | | | HEX | | | | | | | E | | | | | | MM LDB | ACTUAL CONTENTS (READ) (23) | X |
| 072 | ACTUAL 24 | V99J4603C | 27 | 7 | | 4.0 | | | HEX | | | | | | | E | | | | | | MM LDB | ACTUAL CONTENTS (READ) (24) | X |
| 073 | ACTUAL 25 | V99J4604C | 27 | 8 | | 4.0 | | | HEX | | | | | | | E | | | | | | MM LDB | ACTUAL CONTENTS (READ) (25) | X |
| 074 | ACTUAL 26 | V99J4605C | 27 | 9 | | 4.0 | | | HEX | | | | | | | E | | | | | | MM LDB | ACTUAL CONTENTS (READ) (26) | X |
| 075 | ACTUAL 27 | V99J4606C | 27 | 10 | | 4.0 | | | HEX | | | | | | | E | | | | | | MM LDB | ACTUAL CONTENTS (READ) (27) | X |
| 076 | ACTUAL 28 | V99J4607C | 27 | 11 | | 4.0 | | | HEX | | | | | | | E | | | | | | MM LDB | ACTUAL CONTENTS (READ) (28) | X |
| 077 | ACTUAL 29 | V99J4608C | 27 | 12 | | 4.0 | | | HEX | | | | | | | E | | | | | | MM LDB | ACTUAL CONTENTS (READ) (29) | X |
| 078 | ACTUAL 30 | V99J4609C | 27 | 13 | | 4.0 | | | HEX | | | | | | | E | | | | | | MM LDB | ACTUAL CONTENTS (READ) (30) | X |
| 079 | ACTUAL 31 | V99J4610C | 27 | 14 | | 4.0 | | | HEX | | | | | | | E | | | | | | MM LDB | ACTUAL CONTENTS (READ) (31) | X |
| 080 | ACTUAL 32 | V99J4611C | 27 | 15 | | 4.0 | | | HEX | | | | | | | E | | | | | | MM LDB | ACTUAL CONTENTS (READ) (32) | X |
| 081 | ACTUAL 33 | V99J4612C | 27 | 16 | | 4.0 | | | HEX | | | | | | | E | | | | | | MM LDB | ACTUAL CONTENTS (READ) (33) | X |
| 082 | ACTUAL 34 | V99J4613C | 27 | 17 | | 4.0 | | | HEX | | | | | | | E | | | | | | MM LDB | ACTUAL CONTENTS (READ) (34) | X |
| 083 | ACTUAL 35 | V99J4614C | 27 | 18 | | 4.0 | | | HEX | | | | | | | E | | | | | | MM LDB | ACTUAL CONTENTS (READ) (35) | X |
| 084 | ACTUAL 36 | V99J4615C | 27 | 19 | | 4.0 | | | HEX | | | | | | | E | | | | | | MM LDB | ACTUAL CONTENTS (READ) (36) | X |
| 085 | ACTUAL 37 | V99J4616C | 27 | 20 | | 4.0 | | | HEX | | | | | | | E | | | | | | MM LDB | ACTUAL CONTENTS (READ) (37) | X |
| 086 | ACTUAL 38 | V99J4617C | 27 | 21 | | 4.0 | | | HEX | | | | | | | E | | | | | | MM LDB | ACTUAL CONTENTS (READ) (38) | X |

## TABLE 4.5.6-2. MASS MEMORY READ/WRITE (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | BILEVEL | | | | | | | | | | | | | | | | | |
| | | | X | Y | | CHAR | 1 | 0 | TYPE | | | | | | | | | | | | | | | |
| 087 | ACTUAL 39 | V99J4618C | 27 | 22 | | 4.0 | | | HEX | | | | | | | E | | | | | | MM LDB | ACTUAL CONTENTS (READ) (39) | X |
| 088 | CHECKSUM | V99U4517C | 27 | 23 | | 4.0 | | | HEX | | | | | | | E | | | | | | MM LDB | CHECKSUM | X |
| 089 | MM 1 40 | V99J4500C | 50 | 5 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | MM LDB | MASS MEMORY 1 IND | X |
| 090 | MM 2 41 | V99J4501C | 50 | 6 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | MM LDB | MASS MEMORY 2 IND | X |
| 091 | 42 S/W SYS | V93U7348C | 48 | 7 | | 2.0 | | | DEC | | | | | | | E | | | | | | MM LDB | S/W SYSTEM SELECT | X |
| 092 | 43 PHASE | V93U7350C | 46 | 8 | | 4.0 | | | DEC | | | | | | | E | | | | | | MM LDB | PHASE | X |
| 093 | 44 LOAD BLK | V93U7355C | 46 | 9 | | 4.0 | | | DEC | | | | | | | E | | | | | | MM LDB | LOAD BLOCK | X |
| 094 | 45 OFFSET | V93U7360C | 44 | 10 | | 6.0 | | | DEC | | | | | | | E | | | | | | MM LDB | LOAD BLOCK OFFSET | X |
| 095 | 46 NUMBER | V93U7362C | 47 | 11 | | 3.0 | | | DEC | | | | | | | E | | | | | | MM LDB | NUM CHANGES AT CURRENT OFFSET | X |
| 096 | 47 PATCH ID | V93U7365C | 45 | 12 | | 5.0 | | | DEC | | | | | | | E | | | | | | MM LDB | PATCH ID | X |
| 097 | VIOLATE | V99J4515C | 47 | 13 | | 3.0 | | | CHAR | | | | | | | E | | | | | A | MM LDB | MM R/W VIOLATION | X |
| 098 | READ LOAD BLK 48 | V99J4508C | 50 | 14 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | MM LDB | READ LD BLK CMD IND | X |
| 099 | MERGE 49 | V99J4509C | 50 | 15 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | MM LDB | MERGE COMMAND IND | X |
| 100 | WRITE LOAD BLK 50 | V99J4510C | 50 | 16 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | MM LDB | WRITE LD BLK CMD IND | X |
| 101 | COMPARE 51 | V99J4511C | 50 | 17 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | MM LDB | COMPARE COMMAND IND | X |
| 102 | STATUS | V99J4516C | 46 | 18 | | 4.0 | | | CHAR | | | | | | | E | | | | | B | MM LDB | MM READ/WRITE STATUS | X |
| 103* | ERROR CODE | V99U4513C | 48 | 19 | | 2.0 | | | DEC | | | | | | | E | | | | | | MM LDB | ERROR STAT CODE | X |
| 104 | REGISTER A | ADDENDUM | 46 | 20 | | 4.0 | | | HEX | | | | | | | E | | | | | C | MM LDB | MM STATUS REGISTER A | |
| 105 | REGISTER B | ADDENDUM | 46 | 21 | | 4.0 | | | HEX | | | | | | | E | | | | | C | MM LDB | MM STATUS REGISTER B | |
| 106 | MM VERSION | V99U4514C | 44 | 22 | | 6.2 | | | DEC | | | | | | | E | | | | | | MM LDB | RPL VERSION NO | X |
| 107 | DUMP VIA DL 52 | V99J4512C | 50 | 23 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | MM LDB | BUFFER DUMP INITIATE CMD IND | X |
| 108 | (MSG LINE) | V93X0050X | 1 | 25 | | 44.0 | | | CHAR | | | | | | | G | | | | | | UI | MESSAGE LINE | X |
| 109 | (BUFFER MSG) | V93X0054X | 45 | 25 | | 4.0 | | | CHAR | | | | | | | G | | | | | | UI | BUFFER MESSAGE INDICATOR | X |
| 110 | (SPL) | V93X0056X | 2 | 26 | | 49.0 | | | CHAR | | | | | | | G | | | | | | UI | SCRATCH PAD LINE | X |

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TABLE 4.5.6-5. INPUT FUNCTIONAL PARAMETERS FOR MASS MEMORY READ/WRITE (V5.1.12)

| FSSR NAME | M/S ID | NOMENCLATURE | SOURCE | UNITS | DATA TYPE | PREC | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|

NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE 4.5.6-6. OUTPUT FUNCTIONAL PARAMETERS FROM MASS MEMORY READ/WRITE (V5.1.12)

| FSSR NAME | M/S ID | NOMENCLATURE | DESTINATION | UNITS | DATA TYPE | PREC | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|
| NO REQUIREMENTS | | | | | | | | |

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

**Rate Codes: (HDR Only) 1 = 1 sample/sec 2 = 5 samples/sec 3 = 12.5 samples/sec 4 = 25 samples/sec 5 = 100 samples/sec**
**(HDR and LDR) A = 1 sample/sec B = 5 samples/sec C = 12.5 samples/sec D = 25 samples/sec E = 100 samples/sec**

TABLE 4.5.6-7. MASS MEMORY READ/WRITE (V5.1.12) I-LOADS

| FSSR NAME | MSID | ENG UNITS | DT | PR | D | S | PR FCTN | MC | CAT | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|---|---|---|

NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE 4.5.6-8. MASS MEMORY READ/WRITE (V5.1.12) K-LOADS

| FSSR NAME DESCRIPTION | MSID | MC | KLOAD VALUE | ENG UNITS | DT | P R | S | PR FCTN | LAST CR | R E V |
|---|---|---|---|---|---|---|---|---|---|---|

NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

## TABLE 4.5.6-9. MASS MEMORY READ/WRITE (V5.1.12) CONSTANTS

| FSSR NAME<br>DESCRIPTION | MSID | MC | CONSTANT VALUE | ENG UNITS | DT | P<br>R | S | PR FCTN | LAST CR | R<br>E<br>V |
|---|---|---|---|---|---|---|---|---|---|---|

NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

### 4.5.7 SWITCHES (PFS)

TITLE: SWITCHES
TYPE: SPEC/044
AVAILABILITY: GNC OPS 8

#### 4.5.7.1 Purpose, Operation, and Organization

(1.) SWITCHES

This display provides the crew with the capability to monitor and check the status of the switch contacts of the Entry Roll Mode switch. Also, the capability for crew selection of switch contacts to be used as candidates in the switch RM selection filter (SF) is provided.

Figure 4.5.7–1 is the Switches Display (PFS). For each switch contact, an asterisk(*) will be displayed to indicate that the contact closed position has been sensed. Also, for each of the contact parameters, an “M” will be displayed if the signal data is missing. The display control Item numbers 1 through 4 are used to select/deselect a particular set of switch contacts as candidates for use by the RM SF. Execution of an item reverses the selection state of the contacts. An asterisk (*) will be displayed next to the item number to indicate deselection and will be blank when the contacts are selected for use by the SF. The SF is not active during OPS 8, but the SF configuration established by the crew during OPS 8 is maintained for transitions across subsequent configurations.

(2.) ENTRY ROLL MODE switch

The ENTRY ROLL MODE switch has quadruply redundant contact positions. Contact parameters provide the status for the LGAIN, and NO YJET positions. The DES column provides RM selection filter candidate status on the four contact sets. An asterisk (*) in the DES column indicates that either RM has automatically deselected the corresponding LGAIN switch contact or the crew has deselected the complete contact set by executing Item 1, 2, 3 or 4. Execution of Item’s 1 through 4 will set the RM status of the contact set (LGAIN & NO YJET) to the reverse of the RM status of the LGAIN contact at the time of the item execution.

This means that in the case of an automatic RM deselection of a LGAIN contact, two successive item entries are necessary to deselect the corresponding NO YJET contact in the contact set.

(3.) REMOTE CONTROLLED ORBITER

Item 9 provides the capability to inhibit/enable the Remote Controlled Orbiter capability. The default for XXX is INH (RCO is inhibited) and when item 9 is executed XXX is ENA (RCO is enabled and BURN_ENABLE_WINDOW is set to –180.0 seconds). Execution of item 9 will change ENA to INH (BURN_ENABLE_WINDOW is set to –15.0 seconds) and vice versa.

(4.) IMPLIED ITEM NUMBERS

Items 5,6, 7, and 8 are implied on the display format and are not legal to use on the PFS "SWITCHES" display. If any of these items are executed, an operator error shall result, the

input rejected, and the class 5 "ILLEGAL ENTRY" CRT message shall be output and displayed.

### 4.5.7.2 SWITCHES (PFS) Keyboard Processing Addendum

A. These parameters are downlisted under the MSIDs V90X3337X, V90X3338X, V90X3339X and V90X3340X.

### 4.5.7.3 SWITCHES (PFS) CRT Display Processing Addendum

The Table below presents the stand–alone parameter status indicators (PSI) that can be displayed for a parameter. PSI requirements are identified by the word “STAT” being inserted in the FORMAT TYPE column and a numeric code appearing as an entry (right justified) in the ADD REF column of CRT display processing Table 4.5.7–2. The numeric code, corresponding to one of those listed in the Table indicates the specific status processing to be performed. If there is no numeric code entry, the status processing is defined by the default code.

When the “M” PSI is displayed (for Commfault, I/O error resulting in missing data), the associated parameter value data field shall be blanked unless specified otherwise.

| Numeric Code | PSI SYMBOL(S) | | | | |
|---|---|---|---|---|---|
| Default (blank) | ↓ | | | M | ∅ |
| 1 | ↓ | ↑ | | M | ∅ |
| 2 | | ↑ | | M | ∅ |
| 3 | ↓ | | | | ∅ |
| 4 | | ↑ | | | ∅ |
| 5 | ↓ | | ? | | ∅ |
| 6 | ↓ | ↑ | | | ∅ |
| 7 | | | | M | ∅ |
| 8 | ↓ | | ? | M | ∅ |
| 9 | | | ? | M | ∅ |

∅ = blank

The following alpha code(s) appear (left justified) in the ADD REF column of the Table 4.5.7–2 whenever it is necessary to define any special processing requirements not otherwise covered therein:

A. An asterisk (*) will be displayed in the DES column of the Entry Roll Mode switch in response to either of the following:

1.) RM deselection of the corresponding LGAIN switch contact.

RM deselection is indicated by parameters V90X3337X, V90X3338X, V90X3339X and V90X3340X. (Source for these parameters is 4.180 – GN&C SW PROC).

2.) Execution of Item 1, 2, 3 or 4 by the crew when an asterisk (*) is not already present.

Crew deselection is indicated by parameters V93X4770X, V93X4771X, V93X4772X and V93X4773X. (Source for these parameters is V5.1.7 – RM Switches Display).

### 4.5.7.4 SWITCHES Figure/Table References

Figure 4.5.7–1 Switches Display (PFS)

Table 4.5.7–1 Keyboard Processing Table

Table 4.5.7–2 CRT Display Processing Table

Table 4.5.7–3 CRT Display Processing Background Requirements N/A

Table 4.5.7–4 Mission Design Background Constants N/A

Table 4.5.7–5 Input Functional Parameters are contained in Table 4.5.3-5

Table 4.5.7–6 Output Functional Parameters are contained in Table 4.5.3-6

Table 4.5.7–7 I–Loads N/A

Table 4.5.7–8 K–Loads N/A

Table 4.5.7–9 Constants N/A

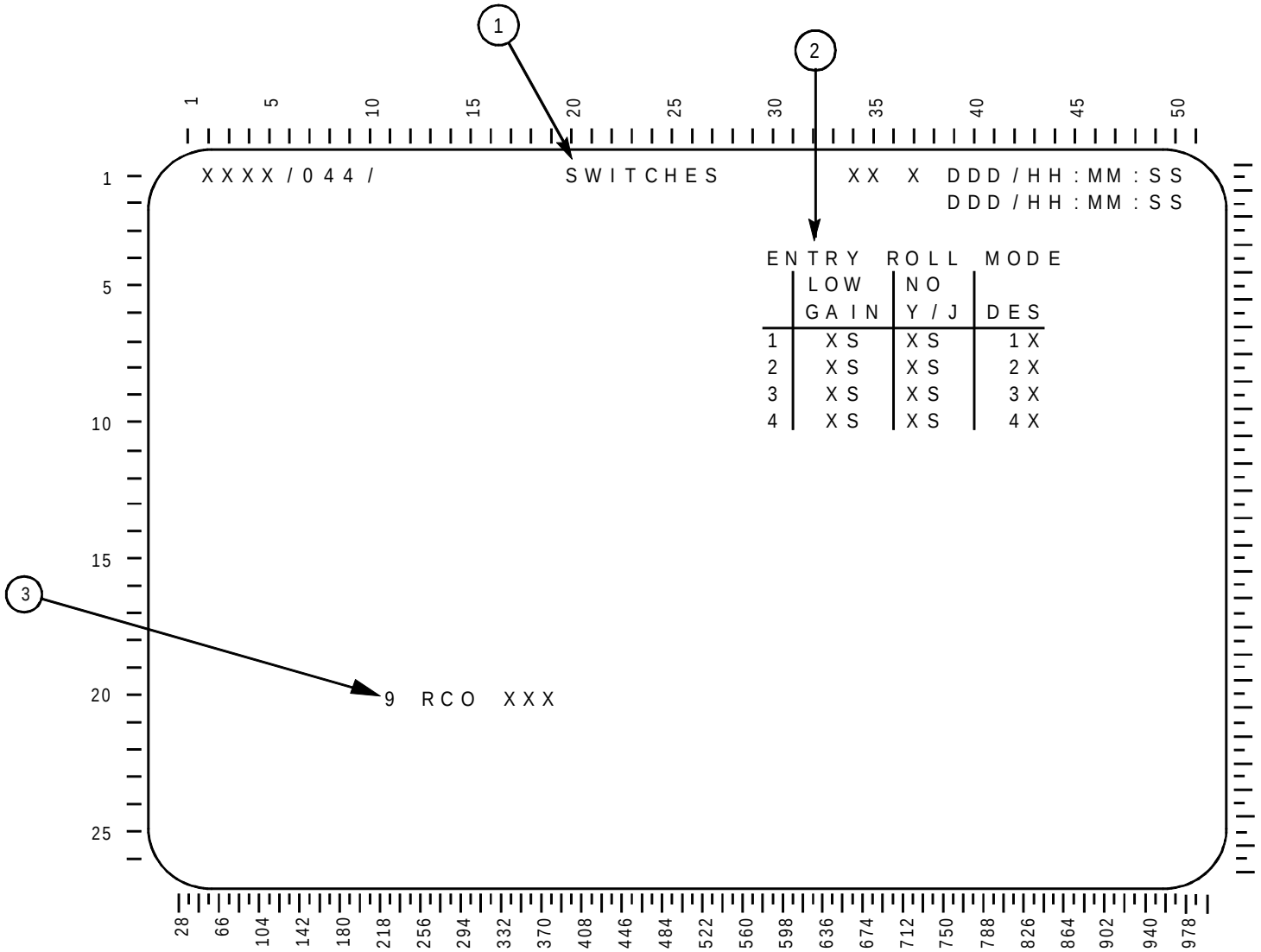


FIGURE 4.5.7-1. Switches Display (PFS)

TABLE 4.5.7-1. SWITCHES (PFS) KEYBOARD PROCESSING

| Seq | CRT Signal Name | M/S ID | CHAR | TYPE | UNITS | DK | ITEM | Item No. Limits | | Add Ref | Destination | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | MIN | MAX | | | | |
| 001 | ENT R MODE 1 DES 1 | V93X4770X | 0.0 | CTRL | | | 1 | | | A | SW PROC,CRT | ENTRY ROLL MODE 1 DES CMD | X |
| 002 | ENT R MODE 2 DES 2 | V93X4771X | 0.0 | CTRL | | | 2 | | | A | SW PROC,CRT | ENTRY ROLL MODE 2 DES CMD | X |
| 003 | ENT R MODE 3 DES 3 | V93X4772X | 0.0 | CTRL | | | 3 | | | A | SW PROC,CRT | ENTRY ROLL MODE 3 DES CMD | X |
| 004 | ENT R MODE 4 DES 4 | V93X4773X | 0.0 | CTRL | | | 4 | | | A | SW PROC,CRT | ENTRY ROLL MODE 4 DES CMD | X |
| 005 | 9 RCO XXX | V93X1112X | 0.0 | CTRL | | | 9 | | | | A/E ATT PROC, CRT, MSC, TLM | RCO INHIBIT/ENABLE CMD | |

## TABLE 4.5.7-2. SWITCHES (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | BILEVEL | | | | | | | | | | | | | | | | | |
| | | | X | Y | | CHAR | 1 | 0 | TYPE | | | | | | | | | | | | | | | |
| 001 | (OPS) | V93X0040X | 2 | 1 | | 5.0 | | | CHAR | | | | | | | E | | | | | | UI | OPS FUNCTION PAGE | X |
| 002 | (SPEC) | V93X0042X | 7 | 1 | | 4.0 | | | CHAR | | | | | | | E | | | | | | UI | SPEC FUNCTION PAGE | X |
| 003 | (DISP) | V93X0044X | 10 | 1 | | 4.0 | | | DEC | | | | | | | E | | | | | | UI | DISPLAY FUNCTION PAGE | X |
| 004 | (UL) | V92X5032X | 34 | 1 | | 2.0 | UL | | BLVL | | | | | | X | G | | | | | | UI | UPLINK ACTIVITY IND | X |
| 005 | (GPC) | V93X0048X | 36 | 1 | | 2.0 | | | DEC | | | | | | | E | | | | | | UI | GPC DRIVER | X |
| 006 | (MT) | V91W1990C | 39 | 1 | | 12.0 | | | CHAR | DHMS | | | | | | A | | | | | | FCOS | MISSION ELAPSED TIME | X |
| 007 | (CRT TIMER) | V91W1987C | 39 | 2 | | 12.0 | | | CHAR | DHMS | | | | | | A | | | | | | FCOS | DISPLAY CRT TIMER,GNC | X |
| 008 | ENT R MODE 1 L GAIN | V72K6314X | 33 | 7 | | 1.0 | * | | BLVL | | | | | | | | | | | | | HDWR | ENTRY ROLL MODE L GAIN A | X |
| 009 | ENT R MODE 2 L GAIN | V72K6315X | 33 | 8 | | 1.0 | * | | BLVL | | | | | | | | | | | | | HDWR | ENTRY ROLL MODE L GAIN B | X |
| 010 | ENT R MODE 3 L GAIN | V72K6316X | 33 | 9 | | 1.0 | * | | BLVL | | | | | | | | | | | | | HDWR | ENTRY ROLL MODE L GAIN C | X |
| 011 | ENT R MODE 4 L GAIN | V72K6317X | 33 | 10 | | 1.0 | * | | BLVL | | | | | | | | | | | | | HDWR | ENTRY ROLL MODE L GAIN D | X |
| 012 | ENT R MODE 1 NO YJET | V72K6320X | 37 | 7 | | 1.0 | * | | BLVL | | | | | | | | | | | | | HDWR | ENTRY ROLL MODE NO Y JET A | X |
| 013 | ENT R MODE 2 NO YJET | V72K6321X | 37 | 8 | | 1.0 | * | | BLVL | | | | | | | | | | | | | HDWR | ENTRY ROLL MODE NO Y JET B | X |
| 014 | ENT R MODE 3 NO YJET | V72K6322X | 37 | 9 | | 1.0 | * | | BLVL | | | | | | | | | | | | | HDWR | ENTRY ROLL MODE NO Y JET C | X |
| 015 | ENT R MODE 4 NO YJET | V72K6323X | 37 | 10 | | 1.0 | * | | BLVL | | | | | | | | | | | | | HDWR | ENTRY ROLL MODE NO Y JET D | X |
| 016* | ENT R MODE 1 DES | V93X4770X | 43 | 7 | | 1.0 | | * | BLVL | | | | | | | | | | | | A | KYBD | ENTRY ROLL MODE 1 DES CMD | X |
| 017* | ENT R MODE 2 DES | V93X4771X | 43 | 8 | | 1.0 | | * | BLVL | | | | | | | | | | | | A | KYBD | ENTRY ROLL MODE 2 DES CMD | X |
| 018* | ENT R MODE 3 DES | V93X4772X | 43 | 9 | | 1.0 | | * | BLVL | | | | | | | | | | | | A | KYBD | ENTRY ROLL MODE 3 DES CMD | X |
| 019* | ENT R MODE 4 DES | V93X4773X | 43 | 10 | | 1.0 | | * | BLVL | | | | | | | | | | | | A | KYBD | ENTRY ROLL MODE 4 DES CMD | X |
| 020 | R MODE 1 L GAIN (S) | V91X5504X | 34 | 7 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | ENTRY ROLL MODE L GAIN A CF | X |
| 021 | R MODE 2 L GAIN (S) | V91X5505X | 34 | 8 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | ENTRY ROLL MODE L GAIN B CF | X |
| 022 | R MODE 3 L GAIN (S) | V91X5506X | 34 | 9 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | ENTRY ROLL MODE L GAIN C CF | X |
| 023 | R MODE 4 L GAIN (S) | V91X5507X | 34 | 10 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | ENTRY ROLL MODE L GAIN D CF | X |
| 024 | R MODE 1 NO YJET (S) | V91X5508X | 38 | 7 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | ENTRY ROLL MODE NO Y JET A CF | X |
| 025 | R MODE 2 NO YJET (S) | V91X5509X | 38 | 8 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | ENTRY ROLL MODE NO Y JET B CF | X |
| 026 | R MODE 3 NO YJET (S) | V91X5510X | 38 | 9 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | ENTRY ROLL MODE NO Y JET C CF | X |
| 027 | R MODE 4 NO YJET (S) | V91X5511X | 38 | 10 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | ENTRY ROLL MODE NO Y JET D CF | X |
| 028 | 9 RCO XXX | V93X1112X | 17 | 20 | | 3.0 | ENA | INH | BLVL | | | | | | | | | | | | | KYBD | RCO INHIBIT/ENABLE CMD | |

TABLE 4.5.7-2. SWITCHES (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | | | |
| 029 | (MSG LINE) | V93X0050X | 1 | 25 | | 44.0 | | | CHAR | | | | | | | G | | | | | | UI | MESSAGE LINE | X |
| 030 | (BUFFER MSG) | V93X0054X | 45 | 25 | | 4.0 | | | CHAR | | | | | | | G | | | | | | UI | BUFFER MESSAGE INDICATOR | X |
| 031 | (SPL) | V93X0056X | 2 | 26 | | 49.0 | | | CHAR | | | | | | | G | | | | | | UI | SCRATCH PAD LINE | X |

### 4.5.8 DELETED.

### 4.5.9 ON–ORBIT NOSE WHEEL STEERING CHECK (PFS)

TITLE: NWS CHECK
TYPE: SPEC/045
AVAILABILITY: GN&C OPS 8

#### 4.5.9.1 Purpose, Operation and Organization

This display allows the crew to perform the Nose Wheel Steering Check in OPS 8. Figure 4.5.9–1 is the NWS CHECK format.

(1) STIMULI. Items 1, 2 and 3 allow selective initiation of the nose wheel steering check. Execution of item 1 (ENABLE) will set the NWS ENABLE discretes true. Execution of item 2 (RIGHT TURN (+)) will cause a positive NWS position command to be issued, and execution of item 3 (LEFT TURN (–)) will cause a negative position command to be issued. An asterisk (*) is displayed next to the item for the selected NWS check. If another check is selected, the previously selected check will terminate and the newly selected check will be executed. The asterisk displayed next to the previously selected check will be blanked, and an asterisk will be displayed next to the newly selected item. Execution of item 4 (STOP) will terminate the check, blank any asterisks displayed for items 1, 2 or 3, and display an asterisk by item 4. The display is initialized with the NWS ENABLE discretes false, the NWS position commands equal to zero volts, items 1 through 3 blanked and item 4 selected.

Items 1 through 4 are mutually exclusive; execution of any item automatically deselects the item previously selected and displays an asterisk next to the new item.

(2) SYS SEL. The position of the NWS mode switch is indicated by one discrete for the NWS1 switch position and one discrete for the NWS2 switch position. For each discrete, an asterisk (*) is displayed when the discrete is true and blank when the discrete is false. A Parameter Status Indicator (PSI) for each discrete displays an “M” when FCOS declares a commfault for that discrete and is blank otherwise.

HYD PRESS HIGH. The status of the hydraulic pressure switch in the actuator is indicated by one discrete for the NWS1 switch position and one discrete for the NWS2 switch position. For each discrete, an asterisk (*) is displayed when the discrete is true and blank when the discrete is false. A Parameter Status Indicator (PSI) for each discrete displays an “M” when FCOS declares a commfault for that discrete and is blank otherwise.

(3) ENABLE. The NWS enable discretes monitor the enable valve driver response to the NWS enable commands. For each discrete, an asterisk (*) is displayed if the discrete is true and blank if the discrete is false. A Parameter Status Indicator (PSI) displays a blank (∅)(good), a down–arrow (↓) (failed) or M (missing data).

(4) CURRENT. The servovalve currents NWS1 and NWS2 are displayed in Milliamperes (MAMP). For each servovalve current, a Parameter Status Indicator (PSI) displays a blank (∅) (good), a down–arrow (↓) (out of tolerance) or M (missing data).

(5) POSITION. The position feedback is displayed in degrees for each nose wheel strut position transducer. For each transducer, a Parameter Status Indicator (PSI) displays a blank (␣) (good), a down–arrow (↓) (out of tolerance) or M (missing data).

### 4.5.9.2 On-Orbit NWS Check Keyboard Processing Addendum

Not Applicable

### 4.5.9.3 On-Orbit NWS Check (PFS) CRT Display Processing Addendum

The table below presents the stand–alone Parameter Status Indicators (PSI) that can be displayed for a parameter. PSI requirements are identified by the word "STAT" being inserted in the FORMAT TYPE column and a numeric code appearing as an entry (right justified) in the ADD REF column of CRT display processing Table 4.5.9–2. The numeric code, corresponding to one of those listed in the table, indicates the specific status processing to be performed. If there is no numeric code entry, the status processing is defined by the default code.

When the "M" PSI is displayed (for Commfault, I/O error resulting in missing data), the associated parameter value data field shall be blanked unless specified otherwise.

| Numeric Code | PSI SYMBOL(S) | | | | |
|---|---|---|---|---|---|
| Default (blank) | ↓ | | | M | ␣ |
| 1 | ↓ | ↑ | | M | ␣ |
| 2 | | ↑ | | M | ␣ |
| 3 | ↓ | | | | ␣ |
| 4 | | ↑ | | | ␣ |
| 5 | ↓ | | ? | | ␣ |
| 6 | ↓ | ↑ | | | ␣ |
| 7 | | | | M | ␣ |
| 8 | ↓ | | ? | M | ␣ |
| 9 | | | ? | M | ␣ |

␣ = blank

The following alpha code(s) appear (left justified) in the ADD REF column of the Table 4.5.9–2 whenever it is necessary to define any special processing requirements not otherwise covered therein:

Not Applicable

### 4.5.9.4 On-Orbit NOSE WHEEL STEERING Check Figure/Table References

Figure 4.5.9–1 On–Orbit Nose Wheel Steering Check Display (PFS)

Table 4.5.9–1 Keyboard Processing Table

Table 4.5.9–2 CRT Display Processing Table

Table 4.5.9–3 CRT Display Processing Background Requirements N/A

Table 4.5.9–4 Mission Design Background Constants N/A

Table 4.5.9.1–5 Input Functional Parameters

Table 4.5.9.1–6 Output Functional Parameters

Table 4.5.9.2–7 Input Functional Parameters

Table 4.5.9.2–8 Output Functional Parameters

Table 4.5.9.2–9 I–Loads

Table 4.5.9–10 K–Loads

Table 4.5.9–11 Constants

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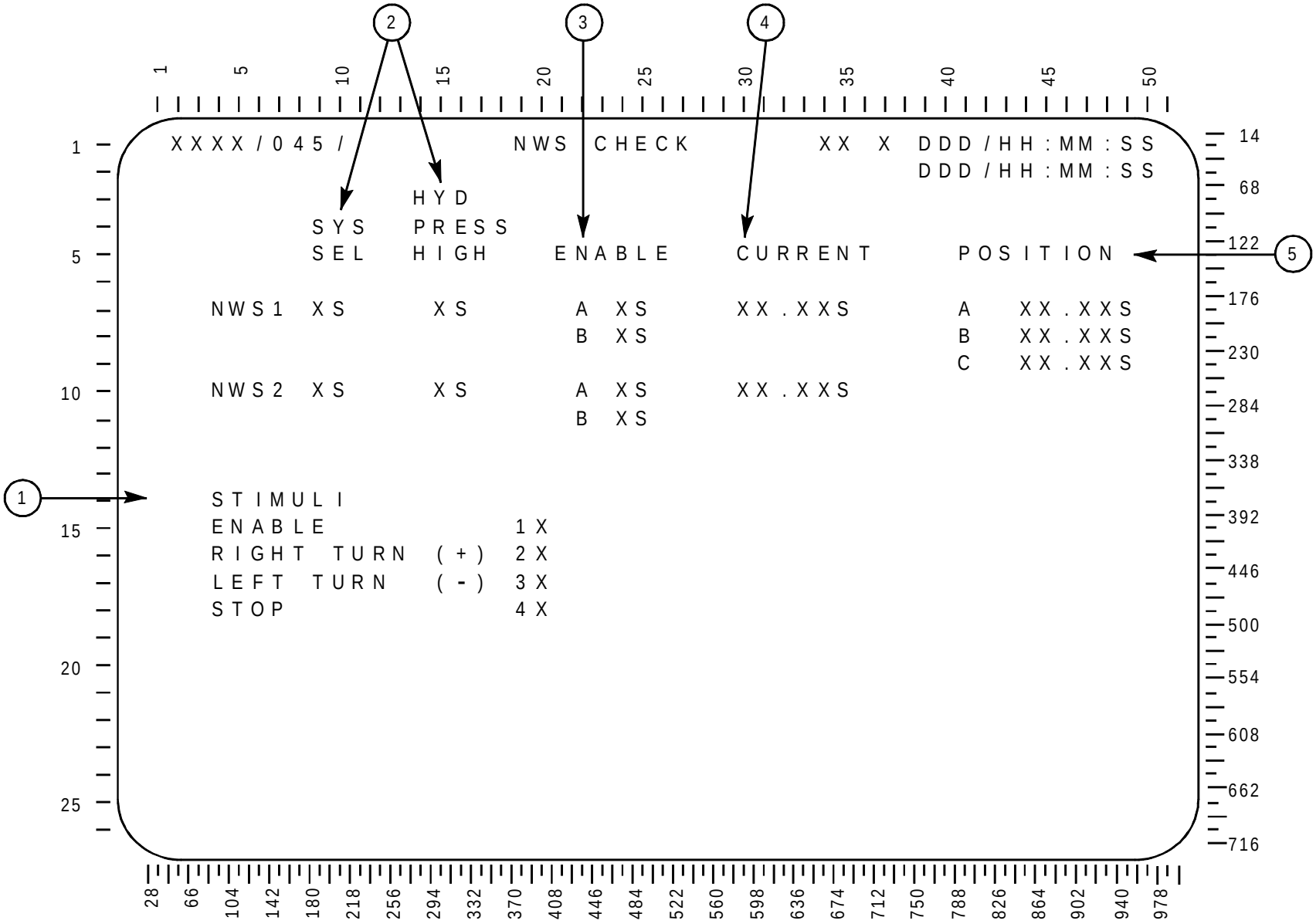


FIGURE 4.5.9-1. On Orbit Nose Wheel Steering Check Display (PFS)

TABLE 4.5.9-1. NWS CHECK (PFS) KEYBOARD PROCESSING

| Seq | CRT Signal Name | M/S ID | CHAR | TYPE | UNITS | DK | ITEM | Item No. Limits | | Add Ref | Destination | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | MIN | MAX | | | | |
| 001 | ENABLE 1 | V93X8400X | 0.0 | CTRL | | | 1 | | | | NWSC,CRT | NWS ENABLE STIM CMD | |
| 002 | RIGHT TURN (+) 2 | V93X8401X | 0.0 | CTRL | | | 2 | | | | NWSC,CRT | NWS RIGHT TURN STIM CMD | |
| 003 | LEFT TURN (–) 3 | V93X8402X | 0.0 | CTRL | | | 3 | | | | NWSC,CRT | NWS LEFT TURN STIM CMD | |
| 004 | STOP 4 | V93X8403X | 0.0 | CTRL | | | 4 | | | | NWSC,CRT | NWS CHECK STOP CMD | |

## TABLE 4.5.9-2. NWS CHECK (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | BILEVEL | | | | | | | | | | | | | | | | | |
| | | | X | Y | | CHAR | 1 | 0 | TYPE | | | | | | | | | | | | | | | |
| 001 | (OPS) | V93X0040X | 2 | 1 | | 5.0 | | | CHAR | | | | | | | E | | | | | | UI | OPS FUNCTION PAGE | X |
| 002 | (SPEC) | V93X0042X | 7 | 1 | | 4.0 | | | CHAR | | | | | | | E | | | | | | UI | SPEC FUNCTION PAGE | X |
| 003 | (DISP) | V93X0044X | 10 | 1 | | 4.0 | | | DEC | | | | | | | E | | | | | | UI | DISPLAY FUNCTION PAGE | X |
| 004 | (UL) | V92X5032X | 34 | 1 | | 2.0 | UL | | BLVL | | | | | | X | G | | | | | | UI | UPLINK ACTIVITY IND | X |
| 005 | (GPC) | V93X0048X | 36 | 1 | | 2.0 | | | DEC | | | | | | | E | | | | | | UI | GPC DRIVER | X |
| 006 | (MT) | V91W1990C | 39 | 1 | | 12.0 | | | CHAR | DHMS | | | | | | A | | | | | | FCOS | MISSION ELAPSED TIME | X |
| 007 | (CRT TIMER) | V91W1987C | 39 | 2 | | 12.0 | | | CHAR | DHMS | | | | | | A | | | | | | FCOS | DISPLAY CRT TIMER,GNC | X |
| 008 | NWS1 SYS SEL | V72K1718X | 9 | 7 | | 1.0 | * | | BLVL | | | | | | | | | | | | | HDWR | NOSE WHEEL STEERING 1 | |
| 009 | NWS2 SYS SEL | V72K1719X | 9 | 10 | | 1.0 | * | | BLVL | | | | | | | | | | | | | HDWR | NOSE WHEEL STEERING 2 | |
| 010 | NWS1 SYS SEL (S) | V91X6331X | 10 | 7 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | NOSE WHEEL STEERING 1 CF | |
| 011 | NWS2 SYS SEL (S) | V91X6333X | 10 | 10 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | NOSE WHEEL STEERING 2 CF | |
| 012 | NWS1 HYD PRESS HIGH | V51X0756X | 15 | 7 | | 1.0 | * | | BLVL | | | | | | | | | | | | | HDWR | NWS1 ACTIVE STATUS | |
| 013 | NWS2 HYD PRESS HIGH | V51X0757X | 15 | 10 | | 1.0 | * | | BLVL | | | | | | | | | | | | | HDWR | NWS2 ACTIVE STATUS | |
| 014 | NWS1HYDPRESSHIGH (S) | V91X6332X | 16 | 7 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | NWS1 ACTIVE STATUS CF | |
| 015 | NWS2HYDPRESSHIGH (S) | V91X6334X | 16 | 10 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | NWS2 ACTIVE STATUS CF | |
| 016 | NWS1 ENABLE A | V51X0762X | 24 | 7 | | 1.0 | * | | BLVL | | | | | | | | | | | | | HDWR | NWS1 ENABLE A | |
| 017 | NWS1 ENABLE B | V51X0764X | 24 | 8 | | 1.0 | * | | BLVL | | | | | | | | | | | | | HDWR | NWS1 ENABLE B | |
| 018 | NWS2 ENABLE A | V51X0766X | 24 | 10 | | 1.0 | * | | BLVL | | | | | | | | | | | | | HDWR | NWS2 ENABLE A | |
| 019 | NWS2 ENABLE B | V51X0768X | 24 | 11 | | 1.0 | * | | BLVL | | | | | | | | | | | | | HDWR | NWS2 ENABLE B | |
| 020 | NWS1 ENABLE A (S) | V99U3700C | 25 | 7 | | 1.0 | | | STAT | | | | | | | | | | | | | NWSC | NWS1 ENABLE A PSI | |
| 021 | NWS1 ENABLE B (S) | V99U3701C | 25 | 8 | | 1.0 | | | STAT | | | | | | | | | | | | | NWSC | NWS1 ENABLE B PSI | |
| 022 | NWS2 ENABLE A (S) | V99U3702C | 25 | 10 | | 1.0 | | | STAT | | | | | | | | | | | | | NWSC | NWS2 ENABLE A PSI | |
| 023 | NWS2 ENABLE B (S) | V99U3703C | 25 | 11 | | 1.0 | | | STAT | | | | | | | | | | | | | NWSC | NWS2 ENABLE B PSI | |
| 024 | NWS1 CURRENT | V99C3709C | 30 | 7 | | 6.2 | | | DEC | MAMP | | | | | | | | | | | | NWSC | SCALED NWS1 SERVO CURRENT | |
| 025 | NWS2 CURRENT | V99C3710C | 30 | 10 | | 6.2 | | | DEC | MAMP | | | | | | | | | | | | NWSC | SCALED NWS2 SERVO CURRENT | |
| 026 | NWS1 CURRENT (S) | V99C3704C | 36 | 7 | | 1.0 | | | STAT | | | | | | | | | | | | | NWSC | NWS1 SERVO CURRENT PSI | |

TABLE 4.5.9-2. NWS CHECK (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | | | |
| 027 | NWS2 CURRENT (S) | V99C3705C | 36 | 10 | | 1.0 | | | STAT | | | | | | | | | | | | | NWSC | NWS2 SERVO CURRENT PSI | |
| 028 | POSITION A | V99H3721C | 43 | 7 | | 6.2 | | | DEC | DEG | | | | | | | | | | | | NWSC | SCALED NWS POSITION A | |
| 029 | POSITION B | V99H3722C | 43 | 8 | | 6.2 | | | DEC | DEG | | | | | | | | | | | | NWSC | SCALED NWS POSITION B | |
| 030 | POSITION C | V99H3723C | 43 | 9 | | 6.2 | | | DEC | DEG | | | | | | | | | | | | NWSC | SCALED NWS POSITION C | |
| 031 | POSITION A (S) | V99H3706C | 49 | 7 | | 1.0 | | | STAT | | | | | | | | | | | | | NWSC | NOSE WHEEL POSITION A PSI | |
| 032 | POSITION B (S) | V99H3707C | 49 | 8 | | 1.0 | | | STAT | | | | | | | | | | | | | NWSC | NOSE WHEEL POSITION B PSI | |
| 033 | POSITION C (S) | V99H3708C | 49 | 9 | | 1.0 | | | STAT | | | | | | | | | | | | | NWSC | NOSE WHEEL POSITION C PSI | |
| 034 | ENABLE 1 | V99X4122X | 20 | 15 | | 1.0 | * | | BLVL | | | | | | | | | | | | | NWSC | ENABLE IND | |
| 035 | RIGHT TURN (+) 2 | V99X4123X | 20 | 16 | | 1.0 | * | | BLVL | | | | | | | | | | | | | NWSC | RIGHT TURN IND | |
| 036 | LEFT TURN (–) 3 | V99X4124X | 20 | 17 | | 1.0 | * | | BLVL | | | | | | | | | | | | | NWSC | LEFT TURN IND | |
| 037 | STOP 4 | V99X4125X | 20 | 18 | | 1.0 | * | | BLVL | | | | | | | | | | | | | NWSC | STOP IND | |
| 038 | (MSG LINE) | V93X0050X | 1 | 25 | | 44.0 | | | CHAR | | | | | | | G | | | | | | UI | MESSAGE LINE | X |
| 039 | (BUFFER MSG) | V93X0054X | 45 | 25 | | 4.0 | | | CHAR | | | | | | | G | | | | | | UI | BUFFER MESSAGE INDICATOR | X |
| 040 | (SPL) | V93X0056X | 2 | 26 | | 49.0 | | | CHAR | | | | | | | G | | | | | | UI | SCRATCH PAD LINE | X |

TABLE 4.5.9.1-5. INPUT FUNCTIONAL PARAMETERS FOR ON-ORBIT NWS CHECK DISPLAY (V5.1.17)

| FSSR NAME | M/S ID | NOMENCLATURE | SOURCE | UNITS | DATA TYPE | PREC | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|
| (CRT_TIME) | V91W1987C | DISPLAY CRT TIMER,GNC | FCOS | | SPL | | 93090E | |
| (DISP) | V93X0044X | DISPLAY FUNCTION PAGE | UI | | BD | | 93090E | |
| (GPC) | V93X0048X | GPC DRIVER | UI | | BD | | 93090E | |
| (LINE) | V93X0050X | MESSAGE LINE | UI | | BD | | 93090E | |
| (MSG) | V93X0054X | BUFFER MESSAGE INDICATOR | UI | | BD | | 93090E | |
| (MT) | V91W1990C | DISPLAY MSN TIME | FCOS | S | VAR | | 93090E | |
| (OPS) | V93X0040X | OPS FUNCTION PAGE | UI | | BD | | 93090E | |
| (SPEC) | V93X0042X | SPEC FUNCTION PAGE | UI | | BD | | 93090E | |
| (SPL) | V93X0056X | SCRATCH PAD LINE | UI | | BD | | 93090E | |
| (UL) | V92X5032X | UPLINK ACTIVITY IND | UI | | BD | | 93090E | |
| NWS1 | V72K1718XA | NOSE WHEEL STEERING 1 | D&C PNL | EVENT | BD | | 93017G | * |
| NWS1_CF | V91X6331XA | NOSE WHEEL STEERING 1 CF | FCOS | | BD | | 90182 | |
| NWS2 | V72K1719XA | NOSE WHEEL STEERING 2 | D&C PNL | EVENT | BD | | 93017G | * |
| NWS2_CF | V91X6333XA | NOSE WHEEL STEERING 2 CF | FCOS | | BD | | 90182 | |
| NWS_ENA_A1_FLG | V51X0762XA | NWS1 ENABLE A | SCB | EVENT | BD | | 93017G | * |
| NWS_ENA_A2_FLG | V51X0766XA | NWS2 ENABLE A | SCB | EVENT | BD | | 93017G | * |
| NWS_ENA_B1_FLG | V51X0764XA | NWS1 ENABLE B | SCB | EVENT | BD | | 93017G | * |
| NWS_ENA_B2_FLG | V51X0768XA | NWS2 ENABLE B | SCB | EVENT | BD | | 93017G | * |
| NW_ACT_1 | V51X0756X | NWS1 ACTIVE STATUS | SCB | | BD | | 93017G | * |
| NW_ACT_1_CF | V91X6332X | NWS1 ACTIVE STATUS CF | FCOS | | BD | | 89890E | |
| NW_ACT_2 | V51X0757X | NWS2 ACTIVE STATUS | SCB | | BD | | 93017G | * |
| NW_ACT_2_CF | V91X6334X | NWS2 ACTIVE STATUS CF | FCOS | | BD | | 89890E | |
| | V93X3943X | ILLEGAL ENTRY MSC(VU G8 NWS CHECK) | UI | | | | 89890E | |
| | V93X8400X | NWS ENABLE STIM CMD | ORB NWS C/O DISP | | BD | | 92354 | |
| | V93X8401X | NWS RIGHT TURN STIM CMD | ORB NWS C/O DISP | | BD | | 92354 | |
| | V93X8402X | NWS LEFT TURN STIM CMD | ORB NWS C/O DISP | | BD | | 92354 | |
| | V93X8403X | NWS CHECK STOP CMD | ORB NWS C/O DISP | | BD | | 92354 | |
| | V99C3704C | NWS 1 SERVO CURRENT PSI | NWSC | | | | 89890E | |
| | V99C3705C | NWS 2 SERVO CURRENT PSI | NWSC | | | | 89890E | |
| | V99C3709C | SCALED NWS1 CURRENT | NWSC | MAMP | AMB | | 89890E | |
| | V99C3710C | SCALED NWS2 CURRENT | NWSC | MAMP | AMB | | 89890E | |
| | V99H3706C | NOSE WHEEL POSITION A PSI | NWSC | | | | 89890E | |
| | V99H3707C | NOSE WHEEL POSITION B PSI | NWSC | | | | 89890E | |
| | V99H3708C | NOSE WHEEL POSITION C PSI | NWSC | | | | 89890E | |
| | V99H3721C | SCALED NWS POSITION A | NWSC | DEG | AMB | | 89890E | |
| | V99H3722C | SCALED NWS POSITION B | NWSC | DEG | AMB | | 89890E | |
| | V99H3723C | SCALED NWS POSITION C | NWSC | DEG | AMB | | 89890E | |
| | V99U3700C | NWS 1 ENABLE A PSI | NWSC | | | | 89890E | |
| | V99U3701C | NWS 1 ENABLE B PSI | NWSC | | | | 89890E | |
| | V99U3702C | NWS 2 ENABLE A PSI | NWSC | | | | 89890E | |
| | V99U3703C | NWS 2 ENABLE B PSI | NWSC | | | | 89890E | |
| | V99X4122X | ENABLE IND | NWSC | | BD | | 89890E | |
| | V99X4123X | RIGHT TURN IND | NWSC | | BD | | 89890E | |
| | V99X4124X | LEFT TURN IND | NWSC | | BD | | 89890E | |
| | V99X4125X | STOP IND | NWSC | | BD | | 89890E | |

TABLE 4.5.9.1-5. INPUT FUNCTIONAL PARAMETERS FOR ON-ORBIT NWS CHECK DISPLAY (V5.1.17)

| FSSR NAME | M/S ID | NOMENCLATURE | SOURCE | UNITS | DATA TYPE | PREC | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE 4.5.9.1-6. OUTPUT FUNCTIONAL PARAMETERS FROM ON-ORBIT NWS CHECK DISPLAY (V5.1.17)

| FSSR NAME | M/S ID | NOMENCLATURE | DESTINATION | UNITS | DATA TYPE | PREC | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|
| | V93X8400X | NWS ENABLE STIM CMD | NWSC<br>ORB NWS C/O DISP | | BD | | 92354 | |
| | V93X8401X | NWS RIGHT TURN STIM CMD | NWSC<br>ORB NWS C/O DISP | | BD | | 92354 | |
| | V93X8402X | NWS LEFT TURN STIM CMD | NWSC<br>ORB NWS C/O DISP | | BD | | 92354 | |
| | V93X8403X | NWS CHECK STOP CMD | NWSC<br>ORB NWS C/O DISP | | BD | | 92354 | |

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

**Rate Codes: (HDR Only) 1 = 1 sample/sec 2 = 5 samples/sec 3 = 12.5 samples/sec 4 = 25 samples/sec 5 = 100 samples/sec**
**(HDR and LDR) A = 1 sample/sec B = 5 samples/sec C = 12.5 samples/sec D = 25 samples/sec E = 100 samples/sec**

TABLE 4.5.9.2-7. INPUT FUNCTIONAL PARAMETERS FOR NOSE WHEEL STEERING CHECK SPEC FUNCTION (V4.30)

| FSSR NAME | M/S ID | NOMENCLATURE | SOURCE | UNITS | DATA TYPE | PREC | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|
| NWP_A | V51V0550C | NOSE WHEEL POSITION A | SPSA | PCM | AMB | | 93017G | * |
| NWP_A_CF | V91X6314X | NOSE WHEEL POSITION A CF | FCOS | | | | 89890E | |
| NWP_B | V51V0551C | NOSE WHEEL POSITION B | SPSA | PCM | AMB | | 93017G | * |
| NWP_B_CF | V91X6315X | NOSE WHEEL POSITION B CF | FCOS | | | | 89890E | |
| NWP_C | V51V0552C | NOSE WHEEL POSITION C | SPSA | PCM | AMB | | 93017G | * |
| NWP_C_CF | V91X6316X | NOSE WHEEL POSITION C CF | FCOS | | | | 89890E | |
| NWS1 | V72K1718XA | NOSE WHEEL STEERING 1 | D&C PNL | EVENT | BD | | 93017G | * |
| NWS1_CF | V91X6331XA | NOSE WHEEL STEERING 1 CF | FCOS | | BD | | 90182 | |
| NWS2 | V72K1719XA | NOSE WHEEL STEERING 2 | D&C PNL | EVENT | BD | | 93017G | * |
| NWS2_CF | V91X6333XA | NOSE WHEEL STEERING 2 CF | FCOS | | BD | | 90182 | |
| NWS_ENA_A1_CF | V91X6335X | NWS1 ENABLE A CF | FCOS | | BD | | 89890E | |
| NWS_ENA_A1_FLG | V51X0762XA | NWS1 ENABLE A | SCB | EVENT | BD | | 93017G | * |
| NWS_ENA_A2_CF | V91X6337X | NWS2 ENABLE A CF | FCOS | | BD | | 89890E | |
| NWS_ENA_A2_FLG | V51X0766XA | NWS2 ENABLE A | SCB | EVENT | BD | | 93017G | * |
| NWS_ENA_B1_CF | V91X6336X | NWS1 ENABLE B CF | FCOS | | BD | | 89890E | |
| NWS_ENA_B1_FLG | V51X0764XA | NWS1 ENABLE B | SCB | EVENT | BD | | 93017G | * |
| NWS_ENA_B2_CF | V91X6338X | NWS2 ENABLE B CF | FCOS | | BD | | 89890E | |
| NWS_ENA_B2_FLG | V51X0768XA | NWS2 ENABLE B | SCB | EVENT | BD | | 93017G | * |
| NWS_SC1 | V51C0752CA | NWS1 SERVO CURRENT | SCB | PCM | AMB | | 93017G | * |
| NWS_SC1_CF | V91X6374X | NWS1 SERVO CURRENT CF | FCOS | | BD | | 89890E | |
| NWS_SC2 | V51C0754CA | NWS2 SERVO CURRENT | SCB | PCM | AMB | | 93017G | * |
| NWS_SC2_CF | V91X6375X | NWS2 SERVO CURRENT CF | FCOS | | BD | | 89890E | |
| | V93X8400X | NWS ENABLE STIM CMD | ORB NWS C/O DISP | | BD | | 92354 | |
| | V93X8401X | NWS RIGHT TURN STIM CMD | ORB NWS C/O DISP | | BD | | 92354 | |
| | V93X8402X | NWS LEFT TURN STIM CMD | ORB NWS C/O DISP | | BD | | 92354 | |
| | V93X8403X | NWS CHECK STOP CMD | ORB NWS C/O DISP | | BD | | 92354 | |

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE 4.5.9.2-8. OUTPUT FUNCTIONAL PARAMETERS FROM NOSE WHEEL STEERING CHECK SPEC FUNCTION (V4.30)

| FSSR NAME | M/S ID | NOMENCLATURE | DESTINATION | UNITS | DATA TYPE | PREC | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|
| DNW(1) | V51K0750CB | NOSE WHEEL STEERING 1 CMD | DL FMT 32/1 SCB | VDC | AMB | | 93017G | * |
| DNW(2) | V51K0751CB | NOSE WHEEL STEERING 2 CMD | SCB TLM | VDC | AMB | | 89890E | |
| NWP_A | V51V0550CA | NOSE WHEEL POSITION A | DL FMT 32/1 | PCM | AMB | | 93017G | * |
| NWP_B | V51V0551CA | NOSE WHEEL POSITION B | DL FMT 32/1 | PCM | AMB | | 93017G | * |
| NWP_C | V51V0552CA | NOSE WHEEL POSITION C | DL FMT 32/1 | PCM | AMB | | 93017G | * |
| NWS1 | V72K1718XC | NOSE WHEEL STEERING 1 | DL FMT 32/B | EVENT | BD | | 93017G | * |
| NWS2 | V72K1719XC | NOSE WHEEL STEERING 2 | DL FMT 32/A | EVENT | BD | | 93017G | * |
| NWS_ENA_A1_CMD | V51K0758XB | NWS1 ENABLE A CMD | DL FMT 32/1 SCB | EVENT | BD | | 93017G | * |
| NWS_ENA_A1_FLG | V51X0762XB | NWS1 ENABLE A | DL FMT 32/1 | EVENT | BD | | 93017G | * |
| NWS_ENA_A2_CMD | V51K0760XB | NWS2 ENABLE A CMD | DL FMT 32/1 SCB | EVENT | BD | | 93017G | * |
| NWS_ENA_A2_FLG | V51X0766XB | NWS2 ENABLE A | DL FMT 32/A | EVENT | BD | | 93017G | * |
| NWS_ENA_B1_CMD | V51K0759XB | NWS1 ENABLE B CMD | SCB | | BD | | 92354 | |
| NWS_ENA_B1_FLG | V51X0764XB | NWS1 ENABLE B | DL FMT 32/A | EVENT | BD | | 93017G | * |
| NWS_ENA_B2_CMD | V51K0761XB | NWS2 ENABLE B CMD | SCB | | BD | | 92354 | |
| NWS_ENA_B2_FLG | V51X0768XB | NWS2 ENABLE B | DL FMT 32/A | EVENT | BD | | 93017G | * |
| NWS_SC1 | V51C0752CB | NWS1 SERVO CURRENT | DL FMT 32/1 | PCM | AMB | | 93017G | * |
| NWS_SC2 | V51C0754CB | NWS2 SERVO CURRENT | DL FMT 32/1 | PCM | AMB | | 93017G | * |
| | V72M6608PC | MDM FF01 DSCR IN CD 12 CH 2 | DL FMT 32/1 | | | | 93017G | * |
| | V72M6624PA | MDM FF01 DSCR OUT SET CD 02 CH 0 | DL FMT 32/1 | | | | 93017G | * |
| | V72M6650PC | MDM FF02 DSCR IN CD 04 CH 0 | DL FMT 32/B | | | | 93017G | * |
| | V72M6658PD | MDM FF02 DSCR IN CD 12 CH 2 | DL FMT 32/A | | | | 93017G | * |
| | V72M6706PD | MDM FF03 DSCR IN CD 12 CH 0 | DL FMT 32/A | | | | 93017G | * |
| | V72M6707PA | MDM FF03 DSCR IN CD 12 CH 1 | DL FMT 32/A | | | | 93017G | * |
| | V72M6724PA | MDM FF03 DSCR OUT SET CD 02 CH 0 | DL FMT 32/1 | | | | 93017G | * |
| | V72M6758PB | MDM FF04 DSCR IN CD 12 CH 2 | DL FMT 32/A | | | | 93017G | * |
| | V99C3704C | NWS 1 SERVO CURRENT PSI | ORB NWS C/O DISP | | | | 89890E | |
| | V99C3705C | NWS 2 SERVO CURRENT PSI | ORB NWS C/O DISP | | | | 89890E | |
| | V99C3709C | SCALED NWS1 CURRENT | ORB NWS C/O DISP | MAMP | AMB | | 89890E | |
| | V99C3710C | SCALED NWS2 CURRENT | ORB NWS C/O DISP | MAMP | AMB | | 89890E | |
| | V99H3706C | NOSE WHEEL POSITION A PSI | ORB NWS C/O DISP | | | | 89890E | |
| | V99H3707C | NOSE WHEEL POSITION B PSI | ORB NWS C/O DISP | | | | 89890E | |
| | V99H3708C | NOSE WHEEL POSITION C PSI | ORB NWS C/O DISP | | | | 89890E | |
| | V99H3721C | SCALED NWS POSITION A | ORB NWS C/O DISP | DEG | AMB | | 89890E | |
| | V99H3722C | SCALED NWS POSITION B | ORB NWS C/O DISP | DEG | AMB | | 89890E | |
| | V99H3723C | SCALED NWS POSITION C | ORB NWS C/O DISP | DEG | AMB | | 89890E | |
| | V99U3700C | NWS 1 ENABLE A PSI | ORB NWS C/O DISP | | | | 89890E | |
| | V99U3701C | NWS 1 ENABLE B PSI | ORB NWS C/O DISP | | | | 89890E | |
| | V99U3702C | NWS 2 ENABLE A PSI | ORB NWS C/O DISP | | | | 89890E | |
| | V99U3703C | NWS 2 ENABLE B PSI | ORB NWS C/O DISP | | | | 89890E | |
| | V99X4122X | ENABLE IND | ORB NWS C/O DISP | | BD | | 89890E | |
| | V99X4123X | RIGHT TURN IND | ORB NWS C/O DISP | | BD | | 89890E | |
| | V99X4124X | LEFT TURN IND | ORB NWS C/O DISP | | BD | | 89890E | |

TABLE 4.5.9.2-8. OUTPUT FUNCTIONAL PARAMETERS FROM NOSE WHEEL STEERING CHECK SPEC FUNCTION (V4.30)

| FSSR NAME | M/S ID | NOMENCLATURE | DESTINATION | UNITS | DATA TYPE | PREC | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|
| | V99X4125X | STOP IND | ORB NWS C/O DISP | | BD | | 89890E | |

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

**Rate Codes: (HDR Only) 1 = 1 sample/sec 2 = 5 samples/sec 3 = 12.5 samples/sec 4 = 25 samples/sec 5 = 100 samples/sec**
**(HDR and LDR) A = 1 sample/sec B = 5 samples/sec C = 12.5 samples/sec D = 25 samples/sec E = 100 samples/sec**

TABLE 4.5.9.2-9. NOSE WHEEL STEERING CHECK SPEC FUNCTION (V4.30) I-LOADS

| FSSR NAME | MSID | ENG UNITS | DT | PR | D | S | PR FCTN | MC | CAT | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|---|---|---|
| NWS_CUR_L_LIM_1 | V97U1472C | MAMP | F | S | D | P | V4.30 | 00 | ZNW | 89890E | |
| NWS_CUR_L_LIM_2 | V97U1474C | MAMP | F | S | D | P | V4.30 | 00 | ZNW | 89890E | |
| NWS_CUR_L_LIM_3 | V97U1476C | MAMP | F | S | D | P | V4.30 | 00 | ZNW | 89890E | |
| NWS_CUR_TOL | V97U1470C | MAMP | F | S | D | P | V4.30 | 00 | ZNW | 89890E | |
| NWS_CUR_U_LIM_1 | V97U1473C | MAMP | F | S | D | P | V4.30 | 00 | ZNW | 89890E | |
| NWS_CUR_U_LIM_2 | V97U1475C | MAMP | F | S | D | P | V4.30 | 00 | ZNW | 89890E | |
| NWS_CUR_U_LIM_3 | V97U1477C | MAMP | F | S | D | P | V4.30 | 00 | ZNW | 89890E | |
| NWS_NEG_CHECK_STIM | V97U1469C | VDC | F | S | D | P | V4.30 | 00 | ZNW | 89890E | |
| NWS_POSN_LIMIT | V97U1478C | DEG | F | S | D | P | V4.30 | 00 | ZNW | 89890E | |
| NWS_POS_CHECK_STIM | V97U1479C | VDC | F | S | D | P | V4.30 | 00 | ZNW | 89890E | |
| NW_CURR_BIAS | V97U1481C | MAMP | F | S | D | P | V4.30 | 00 | ZNW | 89890E | |
| NW_CURR_SF | V97U1480C | MAMP/VDC | F | S | D | P | V4.30 | 00 | ZNW | 89890E | |
| NW_POSN_BIAS | V99U9702C | DEG | F | S | D | C | G4.59<br>V4.30 | 00 | NWS | 90102D | |
| NW_POSN_SF | V99U9701C | VDC/DEG | F | S | D | A | G4.59<br>V4.30 | 00 | NWS | 90102D | |

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE 4.5.9-10. NOSE WHEEL STEERING CHECK SPEC FUNCTION (V4.30) K-LOADS

| FSSR NAME DESCRIPTION | MSID | MC | KLOAD VALUE | ENG UNITS | DT | P R | S | PR FCTN | LAST CR | R E V |
|---|---|---|---|---|---|---|---|---|---|---|
| NO REQUIREMENTS | | | | | | | | | | |

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE 4.5.9-11. NOSE WHEEL STEERING CHECK SPEC FUNCTION (V4.30) CONSTANTS

| FSSR NAME DESCRIPTION | MSID | MC | CONSTANT VALUE | ENG UNITS | DT | P R | S | PR FCTN | LAST CR | R E V |
|---|---|---|---|---|---|---|---|---|---|---|

NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

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## 4.6 PREFLIGHT VEHICLE UTILITY (VU) DISPLAYS*

* NOTE: Unless otherwise specifically stated displays (OPS, SPECs, DISPs) may or may not reflect LDB or Uplink initiated inputs (and their associated outputs).

### 4.6.1 GPC/BTU INTERFACE (PFS)

TITLE: GPC/BTU I/F
TYPE: SPEC/112
AVAILABILITY: GNC OPS 9

#### 4.6.1.1 Purpose, Operation, and Organization

(1) GPC/BTU INTERFACE Figure 4.6.1–1 is the GPC/BTU Interface Display (PFS). This display provides control and monitoring of GPC/BTU interface testing during ground checkout. The GPC/BTU I/F SPEC display is operational in a common/redundant set GPC configuration and all tests are executable in this configuration except the PCMMU which is limited to a GN&C OPS 9 simplex configuration where the GN&C OPS 9 is the only GPC that's running. An attempt to select a test for the PCMMU in a common/redundant set shall result in an ILLEGAL ENTRY message being displayed.

Items 1 through 24 control selection of the BTU's for testing. Items 31 and 32 control selection of MDM ports for testing. Items 25 through 29 control initiation and termination of three testing procedures on selected BTU's (and MDM ports).

(2) BTU SELECTION Item numbers 1 through 10 are used to select individual MDM's for testing. Any one or more of these MDM's may be in the selected state simultaneously. However, it is not permitted to have any MDM selected at the same time one of the non–MDM BTU's (Items 12 through 21) is in the selected state. Items 1 through 10 are mutually exclusive with Items 11 through 21. Selection of an item from 1 through 10 causes an asterisk (*) to appear beside the item number, indicating the MDM selected.

(3) BTU SELECTION Items 12 through 21 are used to select individual BTU's (other than MDM's) for testing. Items 22 and 23 are used to select MDM sets (CMD and SRB, respectively) for testing. Items 12 through 21 are mutually exclusive with each other, and with Items 22 and 23. Selection of one of these item numbers also causes an asterisk (*) to appear beside the item number. If an attempt is made to select one of these items while any test is in progress or suspended, the selection is not accepted and an error message appears on the message line.

(4) ALL MDMs Item 11 is used to select all the individual MDM's listed under BTU selection without having to select Items 1 through 10 individually. Selection of Item 11 causes an asterisk (*) to appear beside Item 11. If an attempt is made to select Item 11 while any test is in progress or suspended, the selection is not accepted and an error message appears on the message line.

(5) DES Item 24 is used to deselect all BTU's. When the display is initialized all BTU's are unselected and all corresponding asterisks (*'s) are blanked out. If one or more BTU's are selected (asterisks (*'s) appear beside the corresponding items), execution of Item 24 deselects all the selected BTU's, removes the corresponding asterisks(*'s), and causes an asterisk(*) to

appear beside Item 24. Execution of Item 24 will not be accepted and will cause an error message to be displayed on the message line if any test is in progress or suspended.

(6) PORT SEL Items 31 and 32 are used to select the port to be used for MDM testing. The display comes up with Item 31 (Port 1) selected and with an asterisk(*) beside the item number to indicate this selection The port selection for MDM testing may be changed whenever no test is either active or suspended. The selection is accomplished by executing Item 31 or Item 32, causing selection of Port 1 or Port 2 respectively, causing an asterisk (*) to appear beside the selected item, and causing deselection of the other port and blanking of the asterisk (*) beside its item. The same port (1 or 2) is selected for all MDM's to be tested. The selection of a port for MDM testing has no effect on the Ports used for other traffic on these MDM's before or after the test.

(7) TEST LEVEL 1 Item 25 is used to initiate level–one testing on the selected BTU's. Any of the BTU's listed on the display are legitimate candidates for level–one testing. Selection of Item 25 initiates level–one testing, causes an asterisk (*) to appear beside Item 25, and causes the word (ACT) to appear under the caption (TEST STATUS) at the upper center of the display. During the test, the item number of the BTU being tested is displayed beside BTU ITEM. If more than one MDM is selected the test progresses from one MDM to another. When the test is completed, (CPLT) appears as TEST STATUS and the last BTU item number is displayed. If no BTU is selected or if a test is in progress or suspended (ACT displayed for TEST STATUS), execution of Item 25 is not accepted but causes an error message to appear on the message line.

(8) TEST LEVEL 2 Item 26 is used to initiate level–two testing on the selected BTU's. Any of the MDM's listed on the display, the active PCMMU, the MEC's, and the EIU's are legitimate candidates for level–two testing. Selection of Item 26 initiates level–two testing, causes an asterisk (*) to appear beside Item 26, and causes (ACT) to appear on the screen as TEST STATUS. During the test, the item number of the BTU being tested is displayed beside BTU ITEM. If more than one MDM is selected, the test progresses from one MDM to another. When the test is completed, (CPLT) appears as TEST STATUS and the last BTU item number is displayed. If no BTU is selected, if a BTU is selected for which level–two testing is not defined, or if a test is in progress or suspended, execution of Item 26 is not accepted but causes an error message to appear on the message line.

(9) TEST MDM OUTPUT Item 27 is used to initiate MDM output testing on the selected MDM (or MDM's). Only the MDM's listed on the display are legitimate candidates for MDM output testing. Selection of Item 27 initiates MDM output testing, causes an asterisk (*) to appear beside Item 27, and causes (ACT) to appear on the screen as TEST STATUS. During the test, the item number of the BTU being tested is displayed beside BTU ITEM. If more than one MDM is selected, the test progresses from one MDM to another. When the test is completed, (CPLT) appears as TEST STATUS and the last BTU item number is displayed. During the test, the module number being tested within the BTU is displayed beside MODULE. Depending on whether the module under test produces analog or discrete outputs, the appropriate outputs are displayed. If no MDM is selected, if a BTU is selected for which this test is not defined, or if a test is in progress or suspended, execution of Item 27 is not accepted but causes an error message to appear on the message line.

(10) CONTROL TERMINATE Item 28 is used to terminate a test in progress or suspended. Selection of Item 28 causes an orderly termination of the current test step whether the test is active or suspended (in either case (ACT) shows on the screen as TEST STATUS). (ACT) is replaced with (CPLT) as TEST STATUS; the last BTU ITEM number being tested continues on the display; and the data displayed for STEP, RDW, BCE STAT RG, MDM OUTPUT TEST MODULE, ANALOG OUTPUTS, DISCRETE OUTPUTS and error messages are blanked. If no test is selected or if the selected test shows (CPLT), execution of Item 28 causes an error message to appear on the message line.

(11) CONTROL CONTINUE Item 29 is used to continue a suspended test or to step through the MDM output test. If a miscompare is detected during level–one or level–two testing, the test is halted, the current test step number is displayed beside (STEP), the miscompared response data word is displayed in four hexadecimal characters beside RDW, and the BCE status register is displayed in eight hexadecimal characters below BCE STAT RG. To continue the test and blank the three data displayed for the miscompare, select Item 29. If an I/O error unrelated to an RDW miscompare is detected, the test is halted, the current step number and BCE status register are displayed (not the response data word), and the following I/O error message is displayed on the message line: TEST HALTED FOR I/O ERROR. To continue the test and blank the three data displayed for the I/O error, select Item 29. During the MDM output test, the outputs of each module are continuously displayed until Item 29 is selected. Then the test steps to the next module with analog or discrete outputs; or if all modules for a particular MDM have been tested, it steps to the next selected MDM; or if all selected MDM's have been tested, it terminates the test. Analog outputs are in signed decimal, representing values in units of volts. The minimum value is –5.12 volts, the maximum value is +5.11 volts, and the increment in values is 0.01 volt. Discrete outputs represent the bit configuration in terms of four hexadecimal digits.

(12) BTU CYCLIC BITE Item 30 is used to Initiate/Terminate the BTU CYCLIC BITE processing. An asterisk(*) is displayed beside the item entry when the process is initiated and a blank is displayed when the process is terminated. Termination is also effected when an OPS transition is requested.

### 4.6.1.2 GPC/BTU Interface (PFS) Keyboard Processing Addendum

Not applicable.

### 4.6.1.3 GPC/BTU Interface (PFS) CRT Display Processing Addendum

The Table below presents the stand–alone parameter status indicators (PSI) that can be displayed for a parameter. PSI requirements are identified by the word "STAT" being inserted in the FORMAT TYPE column and a numeric code appearing as an entry (right justified) in the ADD REF column of CRT display processing Table 4.6.1–2. The numeric code, corresponding to one of those listed in the Table, indicates the specific status processing to be performed. If there is no numeric code entry, the status processing is defined by the default code.

When the "M" PSI is displayed (for Commfault, I/O error resulting in missing data), the associated parameter value data field shall be blanked unless specified otherwise.

| Numeric Code | PSI SYMBOL(S) | | | | |
|---|---|---|---|---|---|
| Default (blank) | ↓ | | | M | ⌀ |
| 1 | ↓ | ↑ | | M | ⌀ |
| 2 | | ↑ | | M | ⌀ |
| 3 | ↓ | | | | ⌀ |
| 4 | | ↑ | | | ⌀ |
| 5 | ↓ | | ? | | ⌀ |
| 6 | ↓ | ↑ | | | ⌀ |
| 7 | | | | M | ⌀ |
| 8 | ↓ | | ? | M | ⌀ |
| 9 | | | ? | M | ⌀ |

⌀ = blank

The following alpha code(s) appear (left justified) in the ADD REF column of Table 4.6.1–2 whenever it is necessary to define any special processing requirements not otherwise covered therein:

A. When no test is selected (Items 25, 26, and 27 all not selected), then TEST STATUS is blank and BTU ITEM is blank.

B. When level–one test or level–two test is selected (Item 25 selected or Item 26 selected) and the selected test is halted for miscompare or I/O error, then STEP and BCE STAT RG are not blank. Under all other conditions, STEP and BCE STAT RG are blank.

C. When level–one test or level–two test is selected (Item 25 selected or Item 26 selected) and the selected test is halted for miscompare, then RDW is not blank. Under all other conditions, RDW is blank.

D. When MDM output test (Item 27) is selected and TEST STATUS is ACT, then MODULE is not blank. Otherwise MODULE is blank.

E. When MODULE is not blank and the module undergoing test is an analog module, then the ANALOG OUTPUTS are not blank. Otherwise all ANALOG OUTPUTS are blank.

F. When MODULE is not blank and the module undergoing test is a discrete module, then the DISCRETE OUTPUTS are not blank. Otherwise all DISCRETE OUTPUTS are blank.

### 4.6.1.4 GPC/BTU Interface Figure/Table References

Figure 4.6.1–1 GPC/BTU Interface Display (PFS)

Table 4.6.1–1 Keyboard Processing Table

Table 4.6.1–2 CRT Display Processing Table

Table 4.6.1–3 CRT Display Processing Background Requirements N/A

Table 4.6.1–4 Mission Design Background Constants N/A

Table 4.6.1–5 Input Functional Parameters

Table 4.6.1–6 Output Functional Parameters

Table 4.6.1–7 I–Loads

Table 4.6.1–8 K–Loads

Table 4.6.1–9 Constants

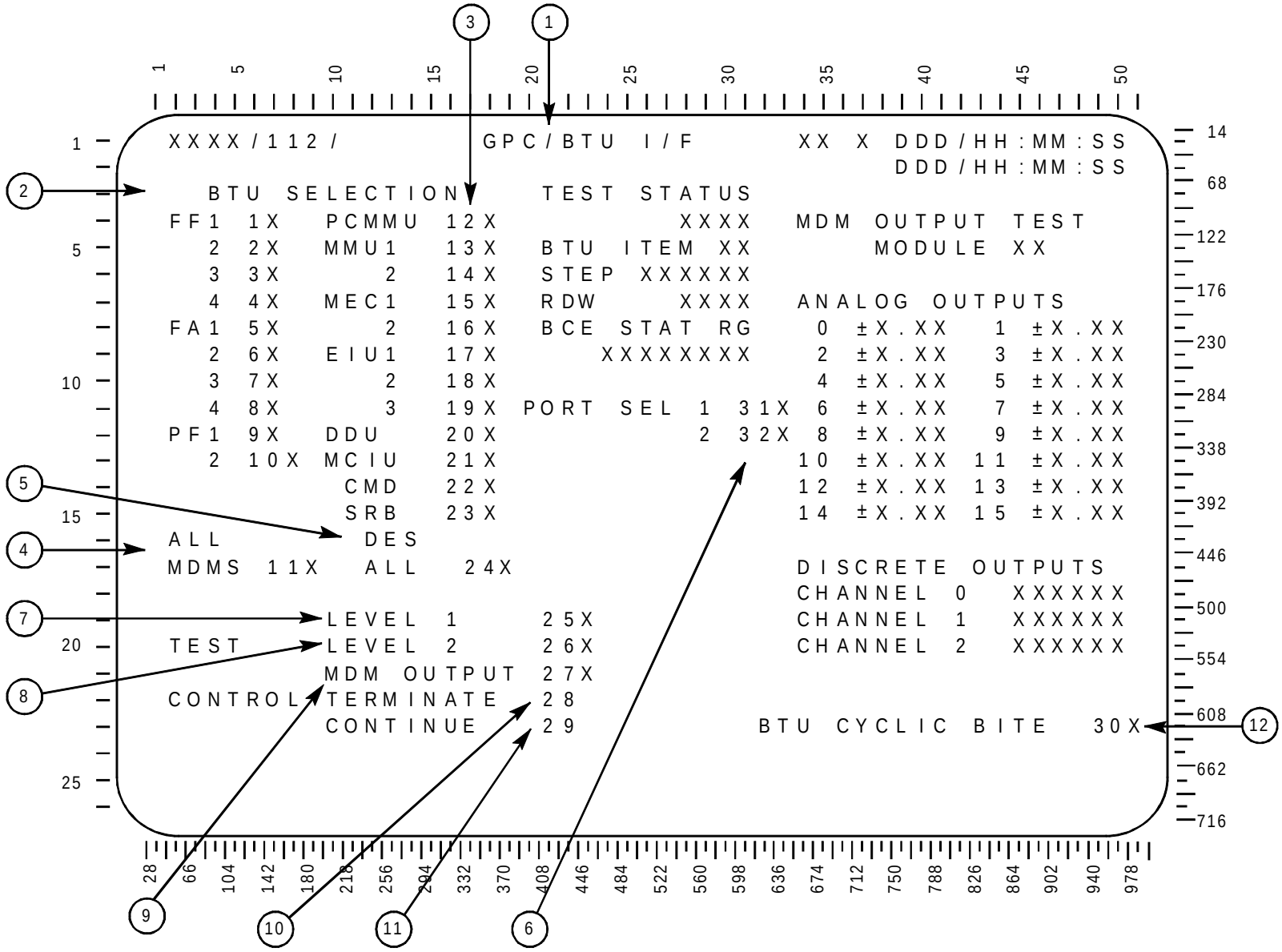


FIGURE 4.6.1-1. GPC/BTU Interface Display (PFS)

## TABLE 4.6.1-1. GPC/BTU INTERFACE (PFS) KEYBOARD PROCESSING

| Seq | CRT Signal Name | M/S ID | CHAR | TYPE | UNITS | DK | ITEM | Item No. Limits | | Add Ref | Destination | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | MIN | MAX | | | | |
| 001 | FF 1 1 | V93X6101X | 0.0 | CTRL | | | 1 | | | | GPC/BTU | BTU FF 1 TEST SELECTOR | X |
| 002 | FF 2 2 | V93X6102X | 0.0 | CTRL | | | 2 | | | | GPC/BTU | BTU FF 2 TEST SELECTOR | X |
| 003 | FF 3 3 | V93X6103X | 0.0 | CTRL | | | 3 | | | | GPC/BTU | BTU FF 3 TEST SELECTOR | X |
| 004 | FF 4 4 | V93X6104X | 0.0 | CTRL | | | 4 | | | | GPC/BTU | BTU FF 4 TEST SELECTOR | X |
| 005 | FA 1 5 | V93X6107X | 0.0 | CTRL | | | 5 | | | | GPC/BTU | BTU FA 1 TEST SELECTOR | X |
| 006 | FA 2 6 | V93X6108X | 0.0 | CTRL | | | 6 | | | | GPC/BTU | BTU FA 2 TEST SELECTOR | X |
| 007 | FA 3 7 | V93X6109X | 0.0 | CTRL | | | 7 | | | | GPC/BTU | BTU FA 3 TEST SELECTOR | X |
| 008 | FA 4 8 | V93X6110X | 0.0 | CTRL | | | 8 | | | | GPC/BTU | BTU FA 4 TEST SELECTOR | X |
| 009 | PF 1 9 | V93X6113X | 0.0 | CTRL | | | 9 | | | | GPC/BTU | BTU PF 1 TEST SELECTOR | X |
| 010 | PF 2 10 | V93X6114X | 0.0 | CTRL | | | 10 | | | | GPC/BTU | BTU PF 2 TEST SELECTOR | X |
| 011 | ALL MDMS 11 | V93X6118X | 0.0 | CTRL | | | 11 | | | | GPC/BTU | ALL MDMS TEST SELECTOR | X |
| 012 | PCMMU 12 | V93X6120X | 0.0 | CTRL | | | 12 | | | | GPC/BTU | BTU PCMMU TEST SELECTOR | X |
| 013 | MMU1 13 | V93X6121X | 0.0 | CTRL | | | 13 | | | | GPC/BTU | BTU MMU 1 TEST SELECTOR | X |
| 014 | MMU2 14 | V93X6122X | 0.0 | CTRL | | | 14 | | | | GPC/BTU | BTU MMU 2 TEST SELECTOR | X |
| 015 | MEC1 15 | V93X6124X | 0.0 | CTRL | | | 15 | | | | GPC/BTU | BTU MEC 1 TEST SELECTOR | X |
| 016 | MEC2 16 | V93X6125X | 0.0 | CTRL | | | 16 | | | | GPC/BTU | BTU MEC 2 TEST SELECTOR | X |
| 017 | EIU1 17 | V93X6128X | 0.0 | CTRL | | | 17 | | | | GPC/BTU | BTU EIU 1 TEST SELECTOR | X |
| 018 | EIU2 18 | V93X6129X | 0.0 | CTRL | | | 18 | | | | GPC/BTU | BTU EIU 2 TEST SELECTOR | X |
| 019 | EIU3 19 | V93X6130X | 0.0 | CTRL | | | 19 | | | | GPC/BTU | BTU EIU 3 TEST SELECTOR | X |
| 020 | DDU 20 | V93X6136X | 0.0 | CTRL | | | 20 | | | | GPC/BTU | BTU DDU TEST SELECTOR | X |
| 021 | MCIU 21 | V93X6132X | 0.0 | CTRL | | | 21 | | | | GPC/BTU | BTU MCIU TEST SELECTOR | X |
| 022 | CMD 22 | V93X6159X | 0.0 | CTRL | | | 22 | | | | GPC/BTU | BTU CMD TEST SELECT | |
| 023 | SRB 23 | V93X6160X | 0.0 | CTRL | | | 23 | | | | GPC/BTU | BTU SRB TEST SELECT | |
| 024* | DES ALL 24 | V93X6138X | 0.0 | CTRL | | | 24 | | | | GPC/BTU | ALL BTU TEST SELECTOR | X |
| 025 | LEVEL 1 25 | V93X6147X | 0.0 | CTRL | | | 25 | | | | GPC/BTU | LEVEL 1 TEST CONTROL SELECTOR | X |

TABLE 4.6.1-1. GPC/BTU INTERFACE (PFS) KEYBOARD PROCESSING

| Seq | CRT Signal Name | M/S ID | CHAR | TYPE | UNITS | DK | ITEM | Item No. Limits | | Add Ref | Destination | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | MIN | MAX | | | | |
| 026 | LEVEL 2 26 | V93X6148X | 0.0 | CTRL | | | 26 | | | | GPC/BTU | LEVEL 2 TEST CONTROL SELECTOR | X |
| 027 | MDM OUTPUT 27 | V93X6150X | 0.0 | CTRL | | | 27 | | | | GPC/BTU | MDM OUTPUT TEST CONTROL SELECTOR | X |
| 028 | TERMINATE 28 | V93X6154X | 0.0 | CTRL | | | 28 | | | | GPC/BTU | TEST TERMINATE SELECTOR | X |
| 029 | CONTINUE 29 | V93X6156X | 0.0 | CTRL | | | 29 | | | | GPC/BTU | TEST CONTINUE SELECTOR | X |
| 030 | BTU CYCLIC BITE 30 | V93X6158X | 0.0 | CTRL | | | 30 | | | | GPC/BTU | BTU CYCLIC BITE SELECT | X |
| 031* | PORT SEL 1 31 | V93X6142X | 0.0 | CTRL | | | 31 | | | | GPC/BTU | BTU PORT 1 SELECTOR | X |
| 032* | PORT SEL 2 32 | V93X6143X | 0.0 | CTRL | | | 32 | | | | GPC/BTU | BTU PORT 2 SELECTOR | X |

## TABLE 4.6.1-2. GPC/BTU INTERFACE (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | BILEVEL | | | | | | | | | | | | | | | | | |
| | | | X | Y | | CHAR | 1 | 0 | TYPE | | | | | | | | | | | | | | | |
| 001 | (OPS) | V93X0040X | 2 | 1 | | 5.0 | | | CHAR | | | | | | | E | | | | | | UI | OPS FUNCTION PAGE | X |
| 002 | (SPEC) | V93X0042X | 7 | 1 | | 4.0 | | | CHAR | | | | | | | E | | | | | | UI | SPEC FUNCTION PAGE | X |
| 003 | (DISP) | V93X0044X | 10 | 1 | | 4.0 | | | DEC | | | | | | | E | | | | | | UI | DISPLAY FUNCTION PAGE | X |
| 004 | (UL) | V92X5032X | 34 | 1 | | 2.0 | UL | | BLVL | | | | | | X | G | | | | | | UI | UPLINK ACTIVITY IND | X |
| 005 | (GPC) | V93X0048X | 36 | 1 | | 2.0 | | | DEC | | | | | | | E | | | | | | UI | GPC DRIVER | X |
| 006 | (MT) | V91W1990C | 39 | 1 | | 12.0 | | | CHAR | DHMS | | | | | | A | | | | | | FCOS | MISSION ELAPSED TIME | X |
| 007 | (CRT TIMER) | V91W1988C | 39 | 2 | | 12.0 | | | CHAR | DHMS | | | | | | A | | | | | | FCOS | DISPLAY CRT TIME, SM | X |
| 008 | FF1 1 | V99X4642X | 7 | 4 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | GPC/BTU | FF1 STATUS INDICATOR | X |
| 009 | FF2 2 | V99X4643X | 7 | 5 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | GPC/BTU | FF2 STATUS INDICATOR | X |
| 010 | FF3 3 | V99X4644X | 7 | 6 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | GPC/BTU | FF3 STATUS INDICATOR | X |
| 011 | FF4 4 | V99X4645X | 7 | 7 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | GPC/BTU | FF4 STATUS INDICATOR | X |
| 012 | FA1 5 | V99X4646X | 7 | 8 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | GPC/BTU | FA1 STATUS INDICATOR | X |
| 013 | FA2 6 | V99X4647X | 7 | 9 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | GPC/BTU | FA2 STATUS INDICATOR | X |
| 014 | FA3 7 | V99X4648X | 7 | 10 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | GPC/BTU | FA3 STATUS INDICATOR | X |
| 015 | FA4 8 | V99X4649X | 7 | 11 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | GPC/BTU | FA4 STATUS INDICATOR | X |
| 016 | PF1 9 | V99X4650X | 7 | 12 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | GPC/BTU | PF1 STATUS INDICATOR | X |
| 017 | PF2 10 | V99X4651X | 8 | 13 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | GPC/BTU | PF2 STATUS INDICATOR | X |
| 018 | ALL MDMS 11 | V99X4652X | 9 | 17 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | GPC/BTU | ALL MDMS STATUS INDICATOR | X |
| 019 | PCMMU 12 | V99X4653X | 18 | 4 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | GPC/BTU | PCMMU STATUS INDICATOR | X |
| 020 | MMU1 13 | V99X4654X | 18 | 5 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | GPC/BTU | MMU 1 STATUS INDICATOR | X |
| 021 | MMU2 14 | V99X4655X | 18 | 6 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | GPC/BTU | MMU 2 STATUS INDICATOR | X |
| 022 | MEC1 15 | V99X4656X | 18 | 7 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | GPC/BTU | MEC 1 STATUS INDICATOR | X |
| 023 | MEC2 16 | V99X4657X | 18 | 8 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | GPC/BTU | MEC 2 STATUS INDICATOR | X |
| 024 | EIU1 17 | V99X4658X | 18 | 9 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | GPC/BTU | EIU 1 STATUS INDICATOR | X |
| 025 | EIU2 18 | V99X4659X | 18 | 10 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | GPC/BTU | EIU 2 STATUS INDICATOR | X |
| 026 | EIU3 19 | V99X4660X | 18 | 11 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | GPC/BTU | EIU 3 STATUS INDICATOR | X |
| 027 | DDU 20 | V99X4663X | 18 | 12 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | GPC/BTU | DDU STATUS INDICATOR | X |
| 028 | MCIU 21 | V99X4661X | 18 | 13 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | GPC/BTU | MCIU STATUS INDICATOR | X |

TABLE 4.6.1-2. GPC/BTU INTERFACE (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | | | |
| 029 | CMD 22 | V99X4699X | 18 | 14 | | 1.0 | | | BLVL | | | | | | | E | | | | | | GPC/BTU | BTU CMD TEST IND | |
| 030 | SRB 23 | V99X4700X | 18 | 15 | | 1.0 | | | BLVL | | | | | | | E | | | | | | GPC/BTU | BTU SRB TEST IND | |
| 031* | DES ALL 24 | V99X4664X | 20 | 17 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | GPC/BTU | DESELECT ALL BTUS STATUS IND | X |
| 032 | TEST STATUS | V99J4668C | 28 | 4 | | 4.0 | CPLT | ACT | BLVL | | | X | | | | | | | | | A | GPC/BTU | TEST STATUS MESSAGE (ACTV/CPLT) | X |
| 033 | BTU ITEM | V99J4669C | 29 | 5 | | 3.0 | | | DEC | | | X | | | | | | | | | A | GPC/BTU | BTU TEST ITEM NUMBER | X |
| 034 | STEP | V99J4670C | 25 | 6 | | 7.0 | | | DEC | | | X | | | | | | | | | B | GPC/BTU | TEST FAIL STEP NUMBER | X |
| 035 | RDW | V99J4671C | 28 | 7 | | 4.0 | | | HEX | | | X | | | | | | | | | C | GPC/BTU | TEST FAIL RESPONSE WORD VALUE | X |
| 036 | BCE STAT RG | V99U4692C | 24 | 9 | | 8.0 | | | HEX | | | X | | | | | | | | | B | GPC/BTU | BCE STAT REG (32 BITS) | X |
| 037* | PORT SEL 1 31 | V99X4693X | 33 | 11 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | GPC/BTU | BTU PORT ONE INDICATOR | X |
| 038* | PORT SEL 2 32 | V99X4694X | 33 | 12 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | GPC/BTU | BTU PORT TWO INDICATOR | X |
| 039 | LEVEL 1 25 | V99X4665X | 23 | 19 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | GPC/BTU | LEVEL 1 TEST STATUS INDICATOR | X |
| 040 | LEVEL 2 26 | V99X4666X | 23 | 20 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | GPC/BTU | LEVEL 2 TEST STATUS INDICATOR | X |
| 041 | MDM OUTPUT 27 | V99X4667X | 23 | 21 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | GPC/BTU | MDM OUTPUT TEST STATUS IND | X |
| 042 | MODULE | V99J4672C | 44 | 5 | | 3.0 | | | DEC | | | X | | | | | | | | | D | GPC/BTU | MDM OUTPUT MODULE NUMBER | X |
| 043* | ANALOG OUTPUTS 0 | V99U4673C | 37 | 8 | | 5.2 | | | DEC | VOLT | | X | | | | | X | | | | E | GPC/BTU | ANALOG CHANNEL 0 VALUE | X |
| 044* | ANALOG OUTPUTS 1 | V99U4674C | 46 | 8 | | 5.2 | | | DEC | VOLT | | X | | | | | X | | | | E | GPC/BTU | ANALOG CHANNEL 1 VALUE | X |
| 045* | ANALOG OUTPUTS 2 | V99U4675C | 37 | 9 | | 5.2 | | | DEC | VOLT | | X | | | | | X | | | | E | GPC/BTU | ANALOG CHANNEL 2 VALUE | X |
| 046* | ANALOG OUTPUTS 3 | V99U4676C | 46 | 9 | | 5.2 | | | DEC | VOLT | | X | | | | | X | | | | E | GPC/BTU | ANALOG CHANNEL 3 VALUE | X |
| 047* | ANALOG OUTPUTS 4 | V99U4677C | 37 | 10 | | 5.2 | | | DEC | VOLT | | X | | | | | X | | | | E | GPC/BTU | ANALOG CHANNEL 4 VALUE | X |
| 048* | ANALOG OUTPUTS 5 | V99U4678C | 46 | 10 | | 5.2 | | | DEC | VOLT | | X | | | | | X | | | | E | GPC/BTU | ANALOG CHANNEL 5 VALUE | X |
| 049* | ANALOG OUTPUTS 6 | V99U4679C | 37 | 11 | | 5.2 | | | DEC | VOLT | | X | | | | | X | | | | E | GPC/BTU | ANALOG CHANNEL 6 VALUE | X |
| 050* | ANALOG OUTPUTS 7 | V99U4680C | 46 | 11 | | 5.2 | | | DEC | VOLT | | X | | | | | X | | | | E | GPC/BTU | ANALOG CHANNEL 7 VALUE | X |
| 051* | ANALOG OUTPUTS 8 | V99U4681C | 37 | 12 | | 5.2 | | | DEC | VOLT | | X | | | | | X | | | | E | GPC/BTU | ANALOG CHANNEL 8 VALUE | X |
| 052* | ANALOG OUTPUTS 9 | V99U4682C | 46 | 12 | | 5.2 | | | DEC | VOLT | | X | | | | | X | | | | E | GPC/BTU | ANALOG CHANNEL 9 VALUE | X |

## TABLE 4.6.1-2. GPC/BTU INTERFACE (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | BILEVEL | | | | | | | | | | | | | | | | | |
| | | | X | Y | | CHAR | 1 | 0 | TYPE | | | | | | | | | | | | | | | |
| 053* | ANALOG OUTPUTS 10 | V99U4683C | 37 | 13 | | 5.2 | | | DEC | VOLT | | X | | | | | X | | | | E | GPC/BTU | ANALOG CHANNEL 10 VALUE | X |
| 054* | ANALOG OUTPUTS 11 | V99U4684C | 46 | 13 | | 5.2 | | | DEC | VOLT | | X | | | | | X | | | | E | GPC/BTU | ANALOG CHANNEL 11 VALUE | X |
| 055* | ANALOG OUTPUTS 12 | V99U4685C | 37 | 14 | | 5.2 | | | DEC | VOLT | | X | | | | | X | | | | E | GPC/BTU | ANALOG CHANNEL 12 VALUE | X |
| 056* | ANALOG OUTPUTS 13 | V99U4686C | 46 | 14 | | 5.2 | | | DEC | VOLT | | X | | | | | X | | | | E | GPC/BTU | ANALOG CHANNEL 13 VALUE | X |
| 057* | ANALOG OUTPUTS 14 | V99U4687C | 37 | 15 | | 5.2 | | | DEC | VOLT | | X | | | | | X | | | | E | GPC/BTU | ANALOG CHANNEL 14 VALUE | X |
| 058* | ANALOG OUTPUTS 15 | V99U4688C | 46 | 15 | | 5.2 | | | DEC | VOLT | | X | | | | | X | | | | E | GPC/BTU | ANALOG CHANNEL 15 VALUE | X |
| 059 | DISCRETE CHANNEL 0 | V99J4689C | 45 | 18 | | 6.0 | | | HEX | | | X | | | | | | | | | F | GPC/BTU | DISCRT CHANNEL 0 VALUE | X |
| 060 | DISCRETE CHANNEL 1 | V99J4690C | 45 | 19 | | 6.0 | | | HEX | | | X | | | | | | | | | F | GPC/BTU | DISCRT CHANNEL 1 VALUE | X |
| 061 | DISCRETE CHANNEL 2 | V99J4691C | 45 | 20 | | 6.0 | | | HEX | | | X | | | | | | | | | F | GPC/BTU | DISCRT CHANNEL 2 VALUE | X |
| 062 | BTU CYCLIC BITE 30 | V99X4696X | 50 | 23 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | GPC/BTU | BTU CYCLIC BITE STATUS IND | X |
| 063 | (MSG LINE) | V93X0050X | 1 | 25 | | 44.0 | | | CHAR | | | | | | | G | | | | | | UI | MESSAGE LINE | X |
| 064 | (BUFFER MSG) | V93X0054X | 45 | 25 | | 4.0 | | | CHAR | | | | | | | G | | | | | | UI | BUFFER MESSAGE INDICATOR | X |
| 065 | (SPL) | V93X0056X | 2 | 26 | | 49.0 | | | CHAR | | | | | | | G | | | | | | UI | SCRATCH PAD LINE | X |

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TABLE 4.6.1-5. INPUT FUNCTIONAL PARAMETERS FOR GPC/BTU INTERFACE (V5.1.3)

| FSSR NAME | M/S ID | NOMENCLATURE | SOURCE | UNITS | DATA TYPE | PREC | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|

NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE 4.6.1-6. OUTPUT FUNCTIONAL PARAMETERS FROM GPC/BTU INTERFACE (V5.1.3)

| FSSR NAME | M/S ID | NOMENCLATURE | DESTINATION | UNITS | DATA TYPE | PREC | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|
| NO REQUIREMENTS | | | | | | | | |

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

**Rate Codes: (HDR Only) 1 = 1 sample/sec 2 = 5 samples/sec 3 = 12.5 samples/sec 4 = 25 samples/sec 5 = 100 samples/sec**
**(HDR and LDR) A = 1 sample/sec B = 5 samples/sec C = 12.5 samples/sec D = 25 samples/sec E = 100 samples/sec**

TABLE 4.6.1-7. GPC/BTU INTERFACE (V5.1.3) I-LOADS

| FSSR NAME | MSID | ENG UNITS | DT | PR | D | S | PR FCTN | MC | CAT | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|---|---|---|

NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE 4.6.1-8. GPC/BTU INTERFACE (V5.1.3) K-LOADS

| FSSR NAME DESCRIPTION | MSID | MC | KLOAD VALUE | ENG UNITS | DT | P R | S | PR FCTN | LAST CR | R E V |
|---|---|---|---|---|---|---|---|---|---|---|

NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE 4.6.1-9. GPC/BTU INTERFACE (V5.1.3) CONSTANTS

| FSSR NAME DESCRIPTION | MSID | MC | CONSTANT VALUE | ENG UNITS | DT | P R | S | PR FCTN | LAST CR | R E V |
|---|---|---|---|---|---|---|---|---|---|---|
| NO REQUIREMENTS | | | | | | | | | | |

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

### 4.6.2 PREFLIGHT SENSOR SELF–TEST (PFS)

TITLE: SENSOR SELF–TEST
TYPE: SPEC/101
AVAILABILITY: GNC OPS 9

#### 4.6.2.1 Purpose, Operation, and Organization

(1) PREFLIGHT SENSOR SELF–TEST Figure 4.6.2-1 is the Preflight Sensor Self Test Display for 3 TACANs Installed and Figure 4.6.2-2 is the Preflight Sensor Self Test Display for 3 GPS Receivers Installed. This display provides the means to enable testing of the LRU's listed in Table 4.6.2.1–1. Table 4.6.2.1–1 also lists, for each LRU tested, the parameters for which resultant test data are displayed. In addition to the listed results, LRU status (STAT) is displayed for MLS, TAC, and RA.

(2) ENABLE (ENA) Execution of Items 1 through 12 enables the respective LRU's for testing and blanks any asterisk (*) beside Item 16. Any number of these sensors may be in the enabled state at once. An asterisk (*) appears beside each item number as it is selected. It is illegal to execute an item from 1 through 12 while testing is in progress (asterisk(*) beside Item 13 or 14), or after testing is completed unless a TERM item is entered first.

The selection of the Tactical Air Navigation (TAC) sensors for self-test shall be supported based on the vehicle hardware configuration as determined by I-Loads (one for each GPS receiver). If all three of the I-Loads indicate GPS receivers are installed, then the configuration is GPS. If one or more of the I-Loads indicate that a GPS receiver is not installed, then configuration is TAC. (For a list of sensor self-test I-Loads, reference: Table 4.3.6-1 in SS-P-0002-550).

For configuration GPS, all TAC-specific fields (the "TAC 1 2 3" title field, the ENA, STAT, RNG, and AZ heading, data and status fields, and Items 4, 5, and 6) shall not be displayed. In this case, any attempt to execute Items 4, 5, or 6 will result in the generation of an "ILLEGAL ENTRY" message.

(3) START Execution of Item 13 blanks any asterisk (*) next to Items 15 or 16, clears the STAT columns and initiates self-testing of all LRU's selected for testing (indicated by asterisks beside the respective item numbers). When Item 13 is selected, an asterisk (*) appears beside the item number. The asterisk (*) blanks when testing is complete. If testing is in progress (indicated by an * next to Item 13 or 14), or after a test has been completed unless a TERM item is entered first, an attempt to execute Item 13 is illegal.

(4) AUTO SEQ Execution of Item 14 blanks any asterisk (*) next to Items 15 or 16, causes an asterisk (*) to appear adjacent to all the LRU's on the display, clears the STAT columns, and initiates self-testing of all LRU's listed on the display. When Item 14 is selected, an asterisk (*) appears beside the item number. The asterisk (*) blanks when testing is complete. If testing is already in progress (indicated by an * next to Item 13 or 14), or after a test has been completed unless a TERM item is entered first, an attempt to execute Item 14 is illegal.

(5) TERM After test results have been displayed for all sensors undergoing test, selection of Item 15 will remove all self-test stimuli from the sensors, clear the PSI's on the display, display an asterisk (*) beside Item 15, and enable cyclic output of dynamic parameter data. If testing is still in progress (indicated by an * next to Item 13 or 14) when Item 15 is executed, or if INH ALL is enabled (indicated by an * next to Item 16), an "ILLEGAL ENTRY" message is displayed.

(6) INH ALL Execution of Item 16 shall cause deselection of all sensors previously selected, remove all asterisks (*) from beside the selected sensors, remove any asterisk (*) beside Item 15, and cause an asterisk (*) to appear beside Item 16. It is illegal to execute Item 16 if testing is in progress (indicated by an * next to Item 13 or 14), or after a test is completed unless a TERM item is entered first.

Table 4.6.2.1-1. LRU's Available for Testing With Preflight Sensor Self-Test Display

| Item | LRU | Resultant Test Data Displayed |
|---|---|---|
| 1–3 | Microwave scan beam | Range (RNG) |
| | Landing system (MLS) | Azimuth(AZ) |
| | | Elevation (EL) |
| 4–6 | Tactical air navigation (TAC)* | Range (RNG) |
| | | Azimuth (AZ) |
| 7–8 | Radar altimeter (RA) | Altitude (ALT) |
| 9–12 | Accelerometer assembly | Lateral acceleration (Y) |
| | (AA) | Normal acceleration (Z) |

* NOTE: Available for configuration TAC only.

### 4.6.2.2 Preflight Sensor Self-Test (PFS) Keyboard Processing Addendum

A. For configuration GPS, the TACAN-related data field and identifier name and associated background (including the associated Item Entries 4, 5 and 6) are not displayed. Items 4, 5, and 6 are inoperative and an "ILLEGAL ENTRY" message results if they are executed.

B. For configuration GPS, execution of Items 13 through 16 will have no effect on TACAN since these are not shown. In all cases, execution of Items 13 through 16 will have no effect on GPS receivers.

### 4.6.2.3 Preflight Sensor Self-Test (PFS) CRT Display Processing Addendum

The Table below presents the stand–alone parameter status indicators (PSI) that can be displayed for a parameter. PSI requirements are identified by the word "STAT" being inserted in the FORMAT TYPE column and a numeric code appearing as an entry (right justified) in the ADD REF column of CRT display processing Table 4.6.2–2. The numeric code, corresponding to one of those listed in the Table, indicates the specific status processing to be performed. If there is no numeric code entry, the status processing is defined by the default code.

When the "M" PSI is displayed (for Commfault, I/O error resulting in missing data), the associated parameter value data field shall be blanked unless specified otherwise.

| Numeric Code | PSI SYMBOL(S) | | | | | |
|---|---|---|---|---|---|---|
| Default (blank) | ↓ | | | M | ∅ | |
| 1 | ↓ | ↑ | | M | ∅ | |
| 2 | | ↑ | | M | ∅ | |
| 3 | ↓ | | | | ∅ | |
| 4 | | ↑ | | | ∅ | |
| 5 | ↓ | | ? | | ∅ | |
| 6 | ↓ | ↑ | | | ∅ | |
| 7 | | | | M | ∅ | |
| 8 | ↓ | | ? | M | ∅ | |
| 9 | | | ? | M | ∅ | |

∅ = blank

The following alpha code(s) appear (left justified) in the ADD REF column of Table 4.6.2–2 whenever it is necessary to define any special processing requirements not otherwise covered therein:

A. The following table describes the LRU status (STAT) displayed for MLS, TAC, and RA:

| | |
|---|---|
| OFF | device is off/has no power |
| BITE | device selected and has malfunctioned during test |
| ∅ | other |

In all cases, display of a power off condition shall take precedence over display of a BITE condition.

When the display is called, STAT is initialized blank. If an error is detected during a test execution, BITE is locked on the display until an Item 13 or 14 is executed or an "OFF" condition is encountered.

B. For configuration GPS, the TACAN-related data field and identifier name and associated background (including the associated Item Entries 4, 5 and 6) are not displayed.

### 4.6.2.4 Preflight Sensor Self-Test Figure/Table References

Figure 4.6.2–1 Preflight Sensor Self–Test Display for 3 TACANs Installed (PFS)

Figure 4.6.2–2 Preflight Sensor Self–Test Display for 3 GPS Receivers Installed (PFS)

Table 4.6.2–1 Keyboard Processing Table

Table 4.6.2–2 CRT Display Processing Table

Table 4.6.2–3 CRT Display Processing Background Requirements N/A

Table 4.6.2–4 Mission Design Background Constants N/A

Table 4.6.2–5 Input Functional Parameters N/A

Table 4.6.2–6 Output Functional Parameters N/A

Table 4.6.2–7 I–Loads N/A

Table 4.6.2–8 K–Loads N/A

Table 4.6.2–9 Constants N/A

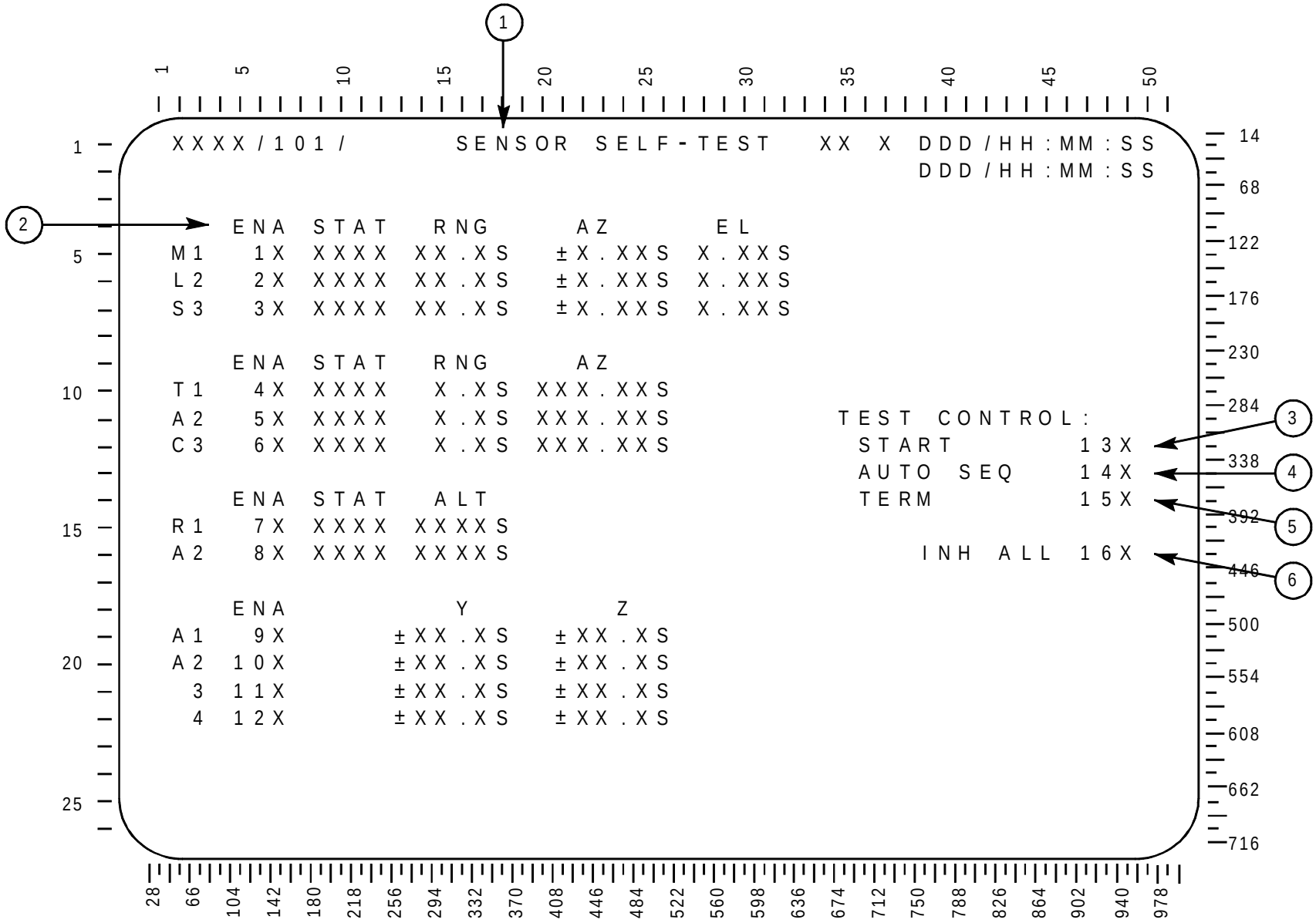


FIGURE 4.6.2-1. Preflight Sensor Self-Test Display for 3 TACANs Installed (PFS)

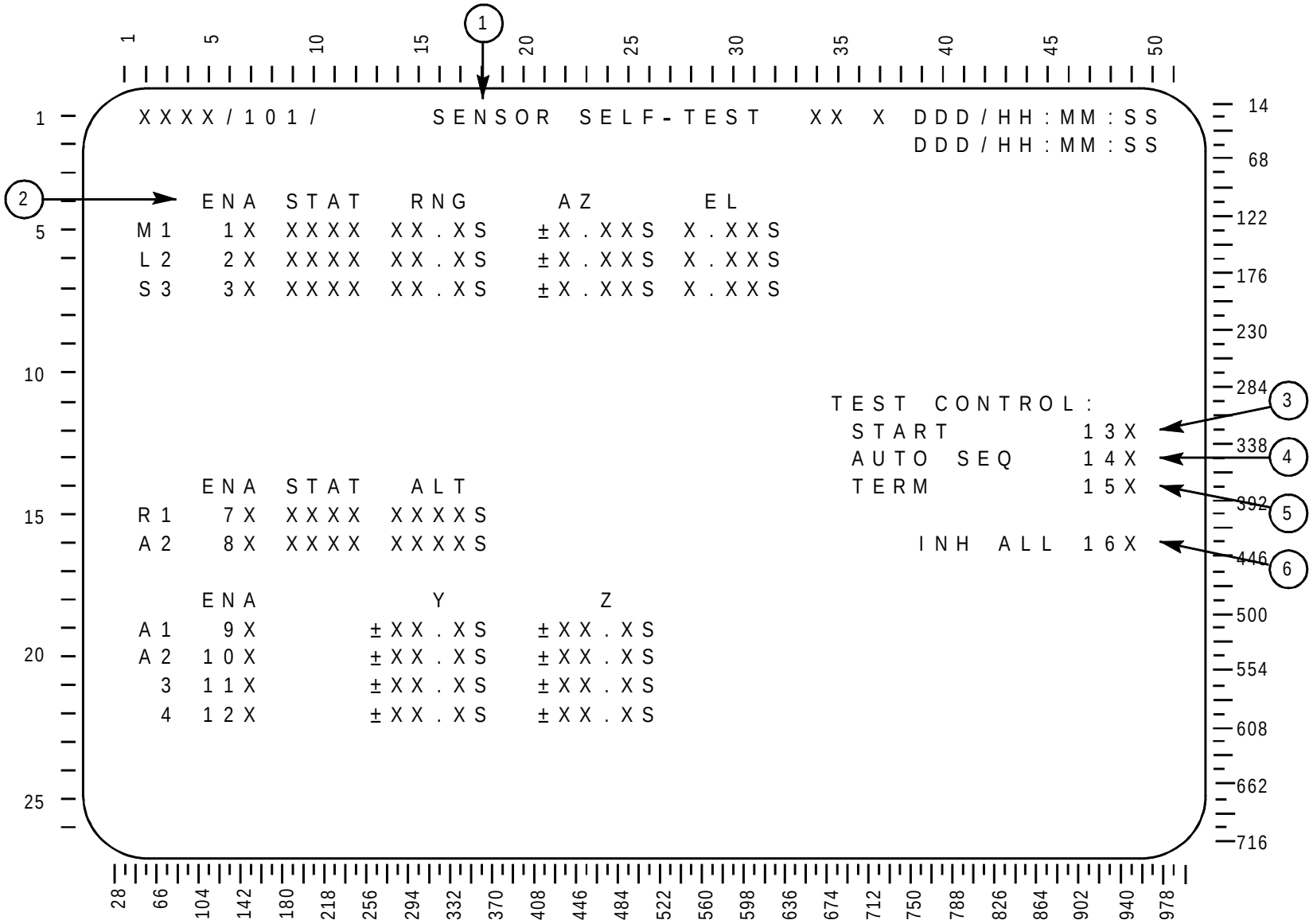


FIGURE 4.6.2-2. Preflight Sensor Self-Test Display for 3 GPS Receivers Installed (PFS)

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TABLE 4.6.2-1. SENSOR SELF TEST (PFS) KEYBOARD PROCESSING

| Seq | CRT Signal Name | M/S ID | CHAR | TYPE | UNITS | DK | ITEM | Item No. Limits | | Add Ref | Destination | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | MIN | MAX | | | | |
| 001 | MLS 1 ENA 1 | V93X5901X | 0.0 | CTRL | | | 1 | | | | SST | MSBLS 1 TEST SEL ITEM ENTRY | X |
| 002 | MLS 2 ENA 2 | V93X5902X | 0.0 | CTRL | | | 2 | | | | SST | MSBLS 2 TEST SEL ITEM ENTRY | X |
| 003 | MLS 3 ENA 3 | V93X5903X | 0.0 | CTRL | | | 3 | | | | SST | MSBLS 3 TEST SEL ITEM ENTRY | X |
| 004 | TAC 1 ENA 4 | V93X5910X | 0.0 | CTRL | | | 4 | | | A | SST | TACAN NO 1 SELF TEST ITEM ENTRY | X |
| 005 | TAC 2 ENA 5 | V93X5911X | 0.0 | CTRL | | | 5 | | | A | SST | TACAN NO 2 SELF TEST ITEM ENTRY | X |
| 006 | TAC 3 ENA 6 | V93X5912X | 0.0 | CTRL | | | 6 | | | A | SST | TACAN NO 3 SELF TEST ITEM ENTRY | X |
| 007 | RA 1 ENA 7 | V93X5926X | 0.0 | CTRL | | | 7 | | | | SST | RADAR ALT NO 1 TEST SEL ITEM ENTRY | X |
| 008 | RA 2 ENA 8 | V93X5927X | 0.0 | CTRL | | | 8 | | | | SST | RADAR ALT NO 2 TEST SEL ITEM ENTRY | X |
| 009 | AA 1 ENA 9 | V93X5920X | 0.0 | CTRL | | | 9 | | | | SST | AA 1 TEST SELECT ITEM ENTRY | X |
| 010 | AA 2 ENA 10 | V93X5921X | 0.0 | CTRL | | | 10 | | | | SST | AA 2 TEST SELECT ITEM ENTRY | X |
| 011 | AA 3 ENA 11 | V93X5922X | 0.0 | CTRL | | | 11 | | | | SST | AA 3 TEST SELECT ITEM ENTRY | X |
| 012 | AA 4 ENA 12 | V93X5923X | 0.0 | CTRL | | | 12 | | | | SST | AA 4 TEST SELECT ITEM ENTRY | X |
| 013 | START 13 | V93X4447X | 0.0 | CTRL | | | 13 | | | B | SST | START SENSOR TEST CMD | X |
| 014 | AUTO SEQ 14 | V93X5933X | 0.0 | CTRL | | | 14 | | | B | SST | SST SEQ AUTO TEST CMD | X |
| 015* | STOP 15 | V93X4448X | 0.0 | CTRL | | | 15 | | | B | SST | STOP SENSOR TEST CMD | X |
| 016 | INH ALL 16 | V93X5940X | 0.0 | CTRL | | | 16 | | | B | SST | SST DESEL ALL CMD | X |

## TABLE 4.6.2-2. SENSOR SELF TEST (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | BILEVEL | | | | | | | | | | | | | | | | | |
| | | | X | Y | | CHAR | 1 | 0 | TYPE | | | | | | | | | | | | | | | |
| 001 | (OPS) | V93X0040X | 2 | 1 | | 5.0 | | | CHAR | | | | | | | E | | | | | | UI | OPS FUNCTION PAGE | X |
| 002 | (SPEC) | V93X0042X | 7 | 1 | | 4.0 | | | CHAR | | | | | | | E | | | | | | UI | SPEC FUNCTION PAGE | X |
| 003 | (DISP) | V93X0044X | 10 | 1 | | 4.0 | | | DEC | | | | | | | E | | | | | | UI | DISPLAY FUNCTION PAGE | X |
| 004 | (UL) | V92X5032X | 34 | 1 | | 2.0 | UL | | BLVL | | | | | | X | G | | | | | | UI | UPLINK ACTIVITY IND | X |
| 005 | (GPC) | V93X0048X | 36 | 1 | | 2.0 | | | DEC | | | | | | | E | | | | | | UI | GPC DRIVER | X |
| 006 | (MT) | V91W1990C | 39 | 1 | | 12.0 | | | CHAR | DHMS | | | | | | A | | | | | | FCOS | MISSION ELAPSED TIME | X |
| 007 | (CRT TIMER) | V91W1987C | 39 | 2 | | 12.0 | | | CHAR | DHMS | | | | | | A | | | | | | FCOS | DISPLAY CRT TIMER,GNC | X |
| 008 | MLS 1 ENA 1 | V99X4010X | 7 | 5 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SST | MSBLS 1 TEST SEL ITEM ENTRY IND | X |
| 009 | MLS 2 ENA 2 | V99X4011X | 7 | 6 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SST | MSBLS 2 TEST SEL ITEM ENTRY IND | X |
| 010 | MLS 3 ENA 3 | V99X4012X | 7 | 7 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SST | MSBLS 3 TEST SEL ITEM ENTRY IND | X |
| 011 | MLS 1 STAT | V99J4109C | 9 | 5 | | 4.0 | | | RTXT | | | | | | | | | | | | A | SST | MSBLS NO 1 STATUS | X |
| 012 | MLS 2 STAT | V99J4110C | 9 | 6 | | 4.0 | | | RTXT | | | | | | | | | | | | A | SST | MSBLS NO 2 STATUS | X |
| 013 | MLS 3 STAT | V99J4111C | 9 | 7 | | 4.0 | | | RTXT | | | | | | | | | | | | A | SST | MSBLS NO 3 STATUS | X |
| 014 | MLS 1 RNG | V74H1052B | 13 | 5 | | 5.1 | | | DEC | NM | X | | | | | A | | | | | 6 | SST | MSBLS NO 1 RANGE DATA | X |
| 015 | MLS 2 RNG | V74H1152B | 13 | 6 | | 5.1 | | | DEC | NM | X | | | | | A | | | | | 6 | SST | MSBLS NO 2 RANGE DATA | X |
| 016 | MLS 3 RNG | V74H1252B | 13 | 7 | | 5.1 | | | DEC | NM | X | | | | | A | | | | | 6 | SST | MSBLS NO 3 RANGE DATA | X |
| 017 | MLS 1 AZ | V74H1012B | 21 | 5 | | 5.2 | | | DEC | DEG | X | | | | | A | X | | | | 6 | SST | MSBLS NO 1 AZIMUTH DATA | X |
| 018 | MLS 2 AZ | V74H1112B | 21 | 6 | | 5.2 | | | DEC | DEG | X | | | | | A | X | | | | 6 | SST | MSBLS NO 2 AZIMUTH DATA | X |
| 019 | MLS 3 AZ | V74H1212B | 21 | 7 | | 5.2 | | | DEC | DEG | X | | | | | A | X | | | | 6 | SST | MSBLS NO 3 AZIMUTH DATA | X |
| 020 | MLS 1 EL | V74H1032B | 27 | 5 | | 5.2 | | | DEC | DEG | X | | | | | A | | | | | 6 | SST | MSBLS NO 1 ELEVATION DATA | X |
| 021 | MLS 2 EL | V74H1132B | 27 | 6 | | 5.2 | | | DEC | DEG | X | | | | | A | | | | | 6 | SST | MSBLS NO 2 ELEVATION DATA | X |
| 022 | MLS 3 EL | V74H1232B | 27 | 7 | | 5.2 | | | DEC | DEG | X | | | | | A | | | | | 6 | SST | MSBLS NO 3 ELEVATION DATA | X |
| 023 | TAC 1 ENA 4 | V99X4007X | 7 | 10 | | 1.0 | * | | BLVL | | | X | | | | | | | | | B | SST | TACAN 1 SELF–TEST ITEM ENTRY IND | X |
| 024 | TAC 2 ENA 5 | V99X4008X | 7 | 11 | | 1.0 | * | | BLVL | | | X | | | | | | | | | B | SST | TACAN 2 SELF–TEST ITEM ENTRY IND | X |
| 025 | TAC 3 ENA 6 | V99X4009X | 7 | 12 | | 1.0 | * | | BLVL | | | X | | | | | | | | | B | SST | TACAN 3 SELF–TEST ITEM ENTRY IND | X |

## TABLE 4.6.2-2. SENSOR SELF TEST (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | | | |
| 026 | TAC 1 STAT | V99J4105C | 9 | 10 | | 4.0 | | | RTXT | | | X | | | | | | | | | A,B | SST | TAC NO 1 STATUS | X |
| 027 | TAC 2 STAT | V99J4106C | 9 | 11 | | 4.0 | | | RTXT | | | X | | | | | | | | | A,B | SST | TAC NO 2 STATUS | X |
| 028 | TAC 3 STAT | V99J4107C | 9 | 12 | | 4.0 | | | RTXT | | | X | | | | | | | | | A,B | SST | TAC NO 3 STATUS | X |
| 029 | TAC 1 RNG | V99U4100C | 14 | 10 | | 4.1 | | | DEC | NM | X | X | | | | A | | | | | B 6 | SST | TAC NO 1 RNG OUT–TAC RNG 0 (1) | X |
| 030 | TAC 2 RNG | V99U4101C | 14 | 11 | | 4.1 | | | DEC | NM | X | X | | | | A | | | | | B 6 | SST | TAC NO 2 RNG OUT–TAC RNG 0 (2) | X |
| 031 | TAC 3 RNG | V99U4102C | 14 | 12 | | 4.1 | | | DEC | NM | X | X | | | | A | | | | | B 6 | SST | TAC NO 3 RNG OUT–TAC RNG 0 (3) | X |
| 032 | TAC 1 AZ | V74H1535B | 19 | 10 | | 7.2 | | | DEC | DEG | X | X | | | | A | | | | | B 6 | SST | TACAN 1 BEARING DATA WD1B03–14 | X |
| 033 | TAC 2 AZ | V74H1635B | 19 | 11 | | 7.2 | | | DEC | DEG | X | X | | | | A | | | | | B 6 | SST | TACAN 2 BEARING DATA WD1B03–14 | X |
| 034 | TAC 3 AZ | V74H1735B | 19 | 12 | | 7.2 | | | DEC | DEG | X | X | | | | A | | | | | B 6 | SST | TACAN 3 BEARING DATA WD1B03–14 | X |
| 035 | RA 1 ENA 7 | V99X4005X | 7 | 15 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SST | RADAR ALT NO 1 TEST SEL ITEM IND | X |
| 036 | RA 2 ENA 8 | V99X4006X | 7 | 16 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SST | RADAR ALT NO 2 TEST SEL ITEM IND | X |
| 037 | RA 1 STAT | V99J4092C | 9 | 15 | | 4.0 | | | RTXT | | | | | | | | | | | | A | SST | RADAR ALT NO 1 STATUS | X |
| 038 | RA 2 STAT | V99J4094C | 9 | 16 | | 4.0 | | | RTXT | | | | | | | | | | | | A | SST | RADAR ALT NO 2 STATUS | X |
| 039 | RA 1 ALT | V74H1804B | 13 | 15 | | 5.0 | | | DEC | FT | X | | | | | A | | | | | 6 | SST | RADAR ALT NO 1 ALTITUDE DATA | X |
| 040 | RA 2 ALT | V74H1854B | 13 | 16 | | 5.0 | | | DEC | FT | X | | | | | A | | | | | 6 | SST | RADAR ALT NO 2 ALTITUDE DATA | X |
| 041 | AA 1 ENA 9 | V99X4001X | 7 | 19 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SST | AA 1 TEST SEL ITEM ENTRY IND | X |
| 042 | AA 2 ENA 10 | V99X4002X | 7 | 20 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SST | AA 2 TEST SEL ITEM ENTRY IND | X |
| 043 | AA 3 ENA 11 | V99X4003X | 7 | 21 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SST | AA 3 TEST SEL ITEM ENTRY IND | X |
| 044 | AA 4 ENA 12 | V99X4004X | 7 | 22 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SST | AA 4 TEST SEL ITEM ENTRY IND | X |
| 045 | AA 1 Y | V95A4101C | 13 | 19 | | 5.1 | | | DEC | FPS2 | X | | | | | A | X | | | | 6 | SST | COMPENSATED LAT ACCELN 1 | X |
| 046 | AA 2 Y | V95A4102C | 13 | 20 | | 5.1 | | | DEC | FPS2 | X | | | | | A | X | | | | 6 | SST | COMPENSATED LAT ACCELN 2 | X |
| 047 | AA 3 Y | V95A4103C | 13 | 21 | | 5.1 | | | DEC | FPS2 | X | | | | | A | X | | | | 6 | SST | COMPENSATED LAT ACCELN 3 | X |
| 048 | AA 4 Y | V95A4104C | 13 | 22 | | 5.1 | | | DEC | FPS2 | X | | | | | A | X | | | | 6 | SST | COMPENSATED LAT ACCELN 4 | X |
| 049 | AA 1 Z | V95A4151C | 21 | 19 | | 5.1 | | | DEC | FPS2 | X | | | | | A | X | | | | 6 | SST | COMPENSATED NORM ACCELN 1 | X |
| 050 | AA 2 Z | V95A4152C | 21 | 20 | | 5.1 | | | DEC | FPS2 | X | | | | | A | X | | | | 6 | SST | COMPENSATED NORM ACCELN 2 | X |

TABLE 4.6.2-2. SENSOR SELF TEST (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | BILEVEL | | | | | | | | | | | | | | | | | |
| | | | X | Y | | CHAR | 1 | 0 | TYPE | | | | | | | | | | | | | | | |
| 051 | AA 3 Z | V95A4153C | 21 | 21 | | 5.1 | | | DEC | FPS2 | X | | | | | A | X | | | | 6 | SST | COMPENSATED NORM ACCELN 3 | X |
| 052 | AA 4 Z | V95A4154C | 21 | 22 | | 5.1 | | | DEC | FPS2 | X | | | | | A | X | | | | 6 | SST | COMPENSATED NORM ACCELN 4 | X |
| 053 | START 13 | V99X4040X | 49 | 12 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SST | SENSOR TEST START ITEM ENTRY IND | X |
| 054 | AUTO SEQ 14 | V99X4045X | 49 | 13 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SST | SST SEQ AUTO ITEM ENTRY IND | X |
| 055* | STOP 15 | V99X4041X | 49 | 14 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SST | SENSOR TEST STOP ITEM ENTRY IND | X |
| 056 | INH ALL 16 | V99X4034X | 49 | 16 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SST | SST DESEL ALL ITEM ENTRY IND | X |
| 057 | (MSG LINE) | V93X0050X | 1 | 25 | | 44.0 | | | CHAR | | | | | | | G | | | | | | UI | MESSAGE LINE | X |
| 058 | (BUFFER MSG) | V93X0054X | 45 | 25 | | 4.0 | | | CHAR | | | | | | | G | | | | | | UI | BUFFER MESSAGE INDICATOR | X |
| 059 | (SPL) | V93X0056X | 2 | 26 | | 49.0 | | | CHAR | | | | | | | G | | | | | | UI | SCRATCH PAD LINE | X |

### 4.6.3 PREFLIGHT RCS/RGA/ADTA TEST (PFS)

TITLE: RCS/RGA/ADTA TEST
TYPE: SPEC/102
AVAILABILITY: GNC OPS 9

#### 4.6.3.1 Purpose, Operation, and Organization

(1) RCS/RGA/ADTA TEST Figure 4.6.3–1 is the Preflight RCS/RGA/ADTA Display (PFS). This display provides the means to enable testing of the LRU's listed in Table 4.6.3.1–1. The Table also lists, for each sensor tested, the parameters for which resultant test data are displayed. In addition to the listed results for sensors (RGA's and ADTA's), LRU status (STAT) is displayed.

(2) RCS DRIVERS Execution of Items 1 through 3 selects one or more of three groups of reaction jet drivers for testing. These items are illegal while a test is executing (indicated by "RUN" in the STAT field), after a test is completed unless the TERM item has been entered first, or if testing is currently suspended (indicated by "FAIL" in the STAT field). An asterisk (*) appears beside each of these three item numbers which is in the selected state.

(3) START TEST Execution of Item 4 initiates testing of those groups of reaction jet drivers selected for testing (Items 1 through 3), and displays an asterisk (*) next to Item 4. This item is illegal while a test is executing (indicated by "RUN" in the STAT field), when no jet groups have been selected for testing, if testing is currently suspended (indicated by "FAIL" in the STAT field), or if the RJD Toggler function is active (for more information on the RJD Toggler function, refer to section 4.6.5.1 of this document, or sections 4.26 and 5.1.5 of the VU Level B Functional Requirements, SS-P-0002-550). The values displayed for RCS DRIVERS STAT and their meanings are listed in Table 4.6.3.1-2. Testing continues, progressing from one jet driver to the next in the selected groups, until a jet driver fails the test or testing of all selected drivers is completed.

(4) STAT When a driver fails the test, STAT shows (FAIL), showing the failed driver, and testing is suspended. The code following JET is three characters of which the first is a letter designating general location as follows:

| | | |
|---|---|---|
| F | for | Forward |
| L | for | Left (aft) |
| R | for | Right (aft) |

The second character is a numeral giving the jet manifold number, and the third character describes the thrust direction as follows:

| | | |
|---|---|---|
| L | for | Left |
| R | for | Right |
| U | for | Up |
| D | for | Down |
| F | for | Forward |
| A | for | Aft |

The number following STEP indicates the step number for which the test failed. Seven steps are performed for each thruster. For more information on these steps, refer to section 4.3.3.11 of the VU Level B Functional Requirements, SS-P-0002-550.

(5) CONT Testing may be continued by executing Item 5. Item 5 checks to see if there are more jets in the current jet group to test before continuing, or if there are other jet groups that have been selected for testing that haven't been tested yet. If all jets in the current jet group have been tested and all selected jet groups have been tested, Item 5 shall blank the asterisk (*) beside Item 4 and Item 5 if applicable and end the test. If all jets in the current jet group or all selected jet groups have not been tested, Item 5 shall cause an asterisk (*) to appear beside Item 5 and shall reinstate the suspended test at a point immediately subsequent to the point where the test was suspended. Item 5 may not be selected unless a RCS Drivers test is suspended (indicated by "FAIL" in the STAT field).

(6) TERM Execution of Item 6 closes out any suspended driver test and blanks all asterisks (*) from beside Items 1 through 5. Item 6 may not be selected while a RCS Drivers test is in progress (indicated by "RUN" in the STAT field).

(7) SENSORS Execution of Items 7 through 14 enables the respective LRU's for testing and blanks any asterisk (*) beside Item 19. Any number of these sensors may be in the enabled state at once. An asterisk (*) appears beside each item number as it is selected. It is illegal to execute an Item from 7 through 14 while testing is selected (asterisk (*) beside Item 15, 16, or 17), or after testing is completed unless a TERM item is entered first.

(8) HIGH START/LOW START Execution of Item 15 or 16 blanks any asterisk (*) next to Items 18 or 19, clears the STAT columns, and initiates the high test or the low test, respectively, of all sensors selected for test (indicated by asterisks (*) beside the respective item numbers). When Item 15 or 16 is selected, an asterisk (*) appears beside the item number. The asterisk (*) blanks when testing is complete. If testing is in progress (indicated by an * next to Items 15, 16, or 17), or if a test has been completed unless TERM has been entered first, an attempt to execute Item 15 or 16 is illegal.

(9) AUTO SEQ Execution of Item 17 blanks any asterisk (*) next to Items 18 or 19, causes an asterisk (*) to appear adjacent to all LRU's on the display, clears the STAT columns, and initiates self-testing of all sensors listed on the display. When Item 17 is selected, an asterisk (*) appears beside the item number. The asterisk (*) blanks when testing is complete. If testing is already in progress (indicated by an * next to Items 15, 16, or 17), or if a test has been completed unless TERM has been entered first, an attempt to execute Item 17 is illegal.

(10) TERM After test results have been displayed for all sensors undergoing test, selection of Item 18 will remove all self-test stimuli from the sensors, clear the PSI's on the display, display an asterisk (*) beside Item 18, and cyclically display the dynamic parameter data associated with the RGA's and ADTA's. If testing is still in progress (indicated by an * next to Items 15, 16, or 17) when Item 18 is executed, or if INH ALL is enabled (indicated by an * next to Item 19), execution of Item 18 is illegal.

(11) INH ALL Execution of Item 19 shall cause deselection of all sensors previously selected, remove all asterisks (*) from beside Items 7 through 14, remove any asterisk (*) beside Item 18, and cause an asterisk (*) to appear beside Item 19. It is illegal to execute Item 19 if testing is in

progress (indicated by an * next to Item 15, 16, or 17) or after a test is completed unless a TERM item is entered first.

Table 4.6.3.1-1. LRU's Available for Testing With Preflight RCS/RGA/ADTA Test

| LRU | Resultant Test Data Displayed |
|---|---|
| Sensors<br>Rate Gyro Assemblies<br>(RGA)<br><br>Air Data Transducer<br>Assemblies (ADTA) | <br>Roll rate (R)<br>Pitch rate (P)<br>Yaw rate (Y)<br>Center alpha pressure (P αC)<br>Static pressure (PS)<br>Upper alpha pressure (P αU)<br>Lower alpha pressure (P αL)<br>Total temperature (TT) |
| Forward reaction jet drivers (RJDF)<br>Aft reaction jet drivers, Group A (RJDA–A)<br>Aft reaction jet drivers, Group B (RJDA–B) | |

Table 4.6.3.1-2. RCS DRIVERS STAT Parameters

| Value | Meaning |
|---|---|
| ∅ | Testing not selected |
| (RUN) | Testing is in progress |
| (FAIL) | A jet driver has failed the test or a commfault has occurred. |
| (CPLT) | Testing of selected jet drivers is complete |

### 4.6.3.2 Preflight RCS/RGA/ADTA Test (PFS) Keyboard Processing Addendum

Not applicable

### 4.6.3.3 Preflight RCS/RGA/ADTA Test (PFS) CRT Display Processing Addendum

The Table below presents the stand–alone parameter status indicators (PSI) that can be displayed for a parameter.PSI requirements are identified by the word “STAT” being inserted in the FORMAT TYPE column and a numeric code appearing as an entry (right justified) in the ADD REF column of CRT display processing Table 4.6.3–2. The numeric code, corresponding to one of those listed in the Table, indicates the specific status processing to be performed. If there is no numeric code entry, the status processing is defined by the default code.

When the “M” PSI is displayed (for Commfault, I/O error resulting in missing data), the associated parameter value data field shall be blanked unless specified otherwise.

| Numeric Code | PSI SYMBOL(S) | | | | |
|---|---|---|---|---|---|
| Default (blank) | ↓ | | | M | ∅ |
| 1 | ↓ | ↑ | | M | ∅ |
| 2 | | ↑ | | M | ∅ |
| 3 | ↓ | | | | ∅ |
| 4 | | ↑ | | | ∅ |
| 5 | ↓ | | ? | | ∅ |
| 6 | ↓ | ↑ | | | ∅ |
| 7 | | | | M | ∅ |
| 8 | ↓ | | ? | M | ∅ |
| 9 | | | ? | M | ∅ |

∅ = blank

The following alpha code(s) appear (left justified) in the ADD REF column of Table 4.6.3–2 whenever it is necessary to define any special processing requirements not otherwise covered therein:

A. The status indication is as follows for RCS:

| | |
|---|---|
| ∅ | Testing not selected |
| RUN | Testing in progress |
| FAIL | A jet driver has failed the test or a commfault has occurred. |
| CPLT | Testing of selected jet drivers is complete |

B. Unless STAT shows (FAIL), JET is blank; otherwise the following is displayed:

| 1ST CHAR | 2ND CHAR | 3RD CHAR Thrust Direction |
|---|---|---|
| F forward | Manifold number | L left |
| L left | | R right |
| R right | | U up |
| | | D down |
| | | F forward |
| | | A aft |

C. STATUS for the RGA's is as follows:

| | |
|---|---|
| ~~0~~ | normal |
| SMRD | spin motor rotation detector error |

D. STATUS for the ADTA's is as follows

| | |
|---|---|
| ~~0~~ | normal |
| BITE | device selected and has malfunctioned during test |

NOTE: BITE is locked on the display until an Item 15, 16, or 17 is executed. When the display is called, STAT is initialized blank.

### 4.6.3.4 Preflight RCS/RGA/ADTA Test Figure/Table References

Figure 4.6.3–1 Preflight RCS/RGA/ADTA Test Display (PFS)

Table 4.6.3–1 Keyboard Processing Table

Table 4.6.3–2 CRT Display Processing Table

Table 4.6.3–3 CRT Display Processing Background Requirements N/A

Table 4.6.3–4 Mission Design Background Constants N/A

Table 4.6.3–5 Input Functional Parameters N/A

Table 4.6.3–6 Output Functional Parameters N/A

Table 4.6.3–7 I–Loads N/A

Table 4.6.3–8 K–Loads N/A

Table 4.6.3–9 Constants N/A

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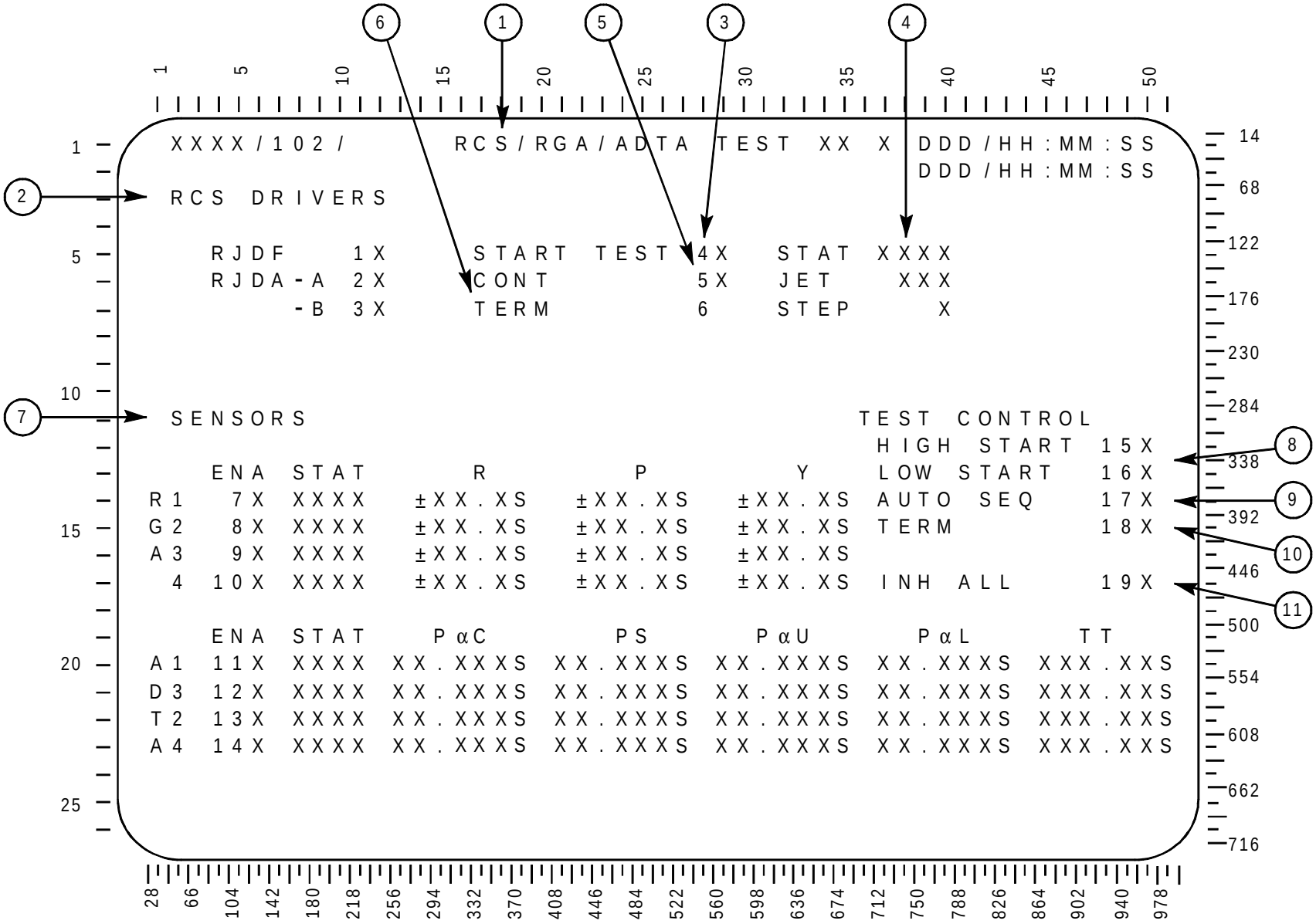


FIGURE 4.6.3-1. Preflight RCS/RGA/ADTA Test Display (PFS)

TABLE 4.6.3-1. RCS/RGA/ADTA TEST (PFS) KEYBOARD PROCESSING

| Seq | CRT Signal Name | M/S ID | CHAR | TYPE | UNITS | DK | ITEM | Item No. Limits | | Add Ref | Destination | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | MIN | MAX | | | | |
| 001* | RCS RJDF 1 | V93X4539X | 0.0 | CTRL | | | 1 | | | | SST | RCS RJDF SEL CMD | X |
| 002* | RCS RJDA–A 2 | V93X4541X | 0.0 | CTRL | | | 2 | | | | SST | RCS RJDA(A) SEL CMD | X |
| 003* | RCS RJDA–B 3 | V93X4543X | 0.0 | CTRL | | | 3 | | | | SST | RCS RJDA(B) SEL CMD | X |
| 004* | RCS START TEST 4 | V93X4552X | 0.0 | CTRL | | | 4 | | | | SST | RCS TEST EXEC CMD | X |
| 005* | RCS CONTINUE 5 | V93X4553X | 0.0 | CTRL | | | 5 | | | | SST | RCS TEST CONT CMD | X |
| 006* | RCS TERM 6 | V93X4554X | 0.0 | CTRL | | | 6 | | | | SST | RCS TEST TERM CMD | X |
| 007 | RGA 1 ENA 7 | V93X4511X | 0.0 | CTRL | | | 7 | | | | SST | RGA 1 TEST SEL ITEM ENTRY | X |
| 008 | RGA 2 ENA 8 | V93X4512X | 0.0 | CTRL | | | 8 | | | | SST | RGA 2 TEST SEL ITEM ENTRY | X |
| 009 | RGA 3 ENA 9 | V93X4513X | 0.0 | CTRL | | | 9 | | | | SST | RGA 3 TEST SEL ITEM ENTRY | X |
| 010 | RGA 4 ENA 10 | V93X4514X | 0.0 | CTRL | | | 10 | | | | SST | RGA 4 TEST SEL ITEM ENTRY | X |
| 011 | ADTA 1 ENA 11 | V93X4561X | 0.0 | CTRL | | | 11 | | | | SST | ADTA1 TEST SEL ITEM ENTRY | X |
| 012 | ADTA 2 ENA 13 | V93X4562X | 0.0 | CTRL | | | 13 | | | | SST | ADTA2 TEST SEL ITEM ENTRY | X |
| 013 | ADTA 3 ENA 12 | V93X4563X | 0.0 | CTRL | | | 12 | | | | SST | ADTA3 TEST SEL ITEM ENTRY | X |
| 014 | ADTA 4 ENA 14 | V93X4564X | 0.0 | CTRL | | | 14 | | | | SST | ADTA4 TEST SEL ITEM ENTRY | X |
| 015* | HIGH START 15 | V93X4533X | 0.0 | CTRL | | | 15 | | | | SST | RGA/ADTA TEST HIGH CMD | X |
| 016* | LOW START 16 | V93X4535X | 0.0 | CTRL | | | 16 | | | | SST | RGA/ADTA TEST LOW CMD | X |
| 017 | AUTO SEQ 17 | V93X4578X | 0.0 | CTRL | | | 17 | | | | SST | RGA/ADTA SEQ AUTO ITEM ENTRY | X |
| 018* | TERM 18 | V93X4537X | 0.0 | CTRL | | | 18 | | | | SST | RGA/ADTA STOP TEST CMD | X |
| 019 | INH ALL 19 | V93X4579X | 0.0 | CTRL | | | 19 | | | | SST | RGA/ADTA DESEL ALL ITEM ENTRY | X |

## TABLE 4.6.3-2. RCS/RGA/ADTA TEST (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | | | |
| 001 | (OPS) | V93X0040X | 2 | 1 | | 5.0 | | | CHAR | | | | | | | E | | | | | | UI | OPS FUNCTION PAGE | X |
| 002 | (SPEC) | V93X0042X | 7 | 1 | | 4.0 | | | CHAR | | | | | | | E | | | | | | UI | SPEC FUNCTION PAGE | X |
| 003 | (DISP) | V93X0044X | 10 | 1 | | 4.0 | | | DEC | | | | | | | E | | | | | | UI | DISPLAY FUNCTION PAGE | X |
| 004 | (UL) | V92X5032X | 34 | 1 | | 2.0 | UL | | BLVL | | | | | | X | G | | | | | | UI | UPLINK ACTIVITY IND | X |
| 005 | (GPC) | V93X0048X | 36 | 1 | | 2.0 | | | DEC | | | | | | | E | | | | | | UI | GPC DRIVER | X |
| 006 | (MT) | V91W1990C | 39 | 1 | | 12.0 | | | CHAR | DHMS | | | | | | A | | | | | | FCOS | MISSION ELAPSED TIME | X |
| 007 | (CRT TIMER) | V91W1987C | 39 | 2 | | 12.0 | | | CHAR | DHMS | | | | | | A | | | | | | FCOS | DISPLAY CRT TIMER,GNC | X |
| 008 | RJDF 1 | V99X4023X | 12 | 5 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SST | RJDF SEL ITEM ENTRY IND | X |
| 009 | RJDA–A 2 | V99X4024X | 12 | 6 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SST | RJDA (A) SEL ITEM ENTRY IND | X |
| 010 | RJDA–B 3 | V99X4025X | 12 | 7 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SST | RJDA (B) SEL ITEM ENTRY IND | X |
| 011 | START TEST 4 | V99X4046X | 29 | 5 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SST | RCS TEST EXEC ITEM ENTRY IND | X |
| 012 | CONT TEST 5 | V99X4047X | 29 | 6 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SST | RCS TEST CONT ITEM ENTRY IND | X |
| 013 | DRIVERS STAT | V99J4048C | 37 | 5 | | 4.0 | | | CHAR | | | | | | | | | | | | A | SST | RCS TEST STATUS | X |
| 014 | DRIVERS JET | V99J4049C | 38 | 6 | | 3.0 | | | CHAR | | | | | | | | | | | | B | SST | RCS DRIVER NO | X |
| 015 | RGA 1 ENA 7 | V99X4013X | 6 | 14 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SST | RGA 1 TEST SEL ITEM ENTRY IND | X |
| 016 | RGA 2 ENA 8 | V99X4014X | 6 | 15 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SST | RGA 2 TEST SEL ITEM ENTRY IND | X |
| 017 | RGA 3 ENA 9 | V99X4015X | 6 | 16 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SST | RGA 3 TEST SEL ITEM ENTRY IND | X |
| 018 | RGA 4 ENA 10 | V99X4016X | 6 | 17 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SST | RGA 4 TEST SEL ITEM ENTRY IND | X |
| 019 | RGA 1 STAT | V99J4116C | 8 | 14 | | 4.0 | SMRD | | BLVL | | | | | | | | | | | | C | SST | RGA 1 STATUS | X |
| 020 | RGA 2 STAT | V99J4117C | 8 | 15 | | 4.0 | SMRD | | BLVL | | | | | | | | | | | | C | SST | RGA 2 STATUS | X |
| 021 | RGA 3 STAT | V99J4118C | 8 | 16 | | 4.0 | SMRD | | BLVL | | | | | | | | | | | | C | SST | RGA 3 STATUS | X |
| 022 | RGA 4 STAT | V99J4119C | 8 | 17 | | 4.0 | SMRD | | BLVL | | | | | | | | | | | | C | SST | RGA 4 STATUS | X |
| 023 | RGA 1 R | V95R4001C | 14 | 14 | | 5.1 | | | DEC | DPS | X | | | | | | X | | | | 6 | SST | COMPENSATED ROLL RATE 1 | X |

TABLE 4.6.3-2. RCS/RGA/ADTA TEST (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | | | |
| 024 | RGA 2 R | V95R4002C | 14 | 15 | | 5.1 | | | DEC | DPS | X | | | | | | X | | | | 6 | SST | COMPENSATED ROLL RATE 2 | X |
| 025 | RGA 3 R | V95R4003C | 14 | 16 | | 5.1 | | | DEC | DPS | X | | | | | | X | | | | 6 | SST | COMPENSATED ROLL RATE 3 | X |
| 026 | RGA 4 R | V95R4004C | 14 | 17 | | 5.1 | | | DEC | DPS | X | | | | | | X | | | | 6 | SST | COMPENSATED ROLL RATE 4 | X |
| 027 | RGA 1 P | V95R4031C | 22 | 14 | | 5.1 | | | DEC | DPS | X | | | | | | X | | | | 6 | SST | COMPENSATED PITCH RATE 1 | X |
| 028 | RGA 2 P | V95R4032C | 22 | 15 | | 5.1 | | | DEC | DPS | X | | | | | | X | | | | 6 | SST | COMPENSATED PITCH RATE 2 | X |
| 029 | RGA 3 P | V95R4033C | 22 | 16 | | 5.1 | | | DEC | DPS | X | | | | | | X | | | | 6 | SST | COMPENSATED PITCH RATE 3 | X |
| 030 | RGA 4 P | V95R4034C | 22 | 17 | | 5.1 | | | DEC | DPS | X | | | | | | X | | | | 6 | SST | COMPENSATED PITCH RATE 4 | X |
| 031 | RGA 1 Y | V95R4061C | 30 | 14 | | 5.1 | | | DEC | DPS | X | | | | | | X | | | | 6 | SST | COMPENSATED YAW RATE 1 | X |
| 032 | RGA 2 Y | V95R4062C | 30 | 15 | | 5.1 | | | DEC | DPS | X | | | | | | X | | | | 6 | SST | COMPENSATED YAW RATE 2 | X |
| 033 | RGA 3 Y | V95R4063C | 30 | 16 | | 5.1 | | | DEC | DPS | X | | | | | | X | | | | 6 | SST | COMPENSATED YAW RATE 3 | X |
| 034 | RGA 4 Y | V95R4064C | 30 | 17 | | 5.1 | | | DEC | DPS | X | | | | | | X | | | | 6 | SST | COMPENSATED YAW RATE 4 | X |
| 035 | ADTA 1 ENA 11 | V99X4019X | 6 | 20 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SST | ADTA 1 TEST SEL ITEM ENTRY IND | X |
| 036 | ADTA 3 ENA 12 | V99X4021X | 6 | 21 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SST | ADTA 3 TEST SEL ITEM ENTRY IND | X |
| 037 | ADTA 2 ENA 13 | V99X4020X | 6 | 22 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SST | ADTA 2 TEST SEL ITEM ENTRY IND | X |
| 038 | ADTA 4 ENA 14 | V99X4022X | 6 | 23 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SST | ADTA 4 TEST SEL ITEM ENTRY IND | X |
| 039 | ADTA 1 STAT | V99J4126C | 8 | 20 | | 4.0 | BITE | | BLVL | | | | | | | | | | | | D | SST | ADTA 1 STATUS | X |
| 040 | ADTA 3 STAT | V99J4128C | 8 | 21 | | 4.0 | BITE | | BLVL | | | | | | | | | | | | D | SST | ADTA 3 STATUS | X |
| 041 | ADTA 2 STAT | V99J4127C | 8 | 22 | | 4.0 | BITE | | BLVL | | | | | | | | | | | | D | SST | ADTA 2 STATUS | X |
| 042 | ADTA 4 STAT | V99J4129C | 8 | 23 | | 4.0 | BITE | | BLVL | | | | | | | | | | | | D | SST | ADTA 4 STATUS | X |
| 043 | ADTA 1 P ALPHA C | V71P7080B | 12 | 20 | | 7.3 | | | DEC | IN–HG | X | | | | | | | | | | 6 | SST | ADTA 1 CTR ALPHA PRESS(PAC) WD3 | X |
| 044 | ADTA 3 P ALPHA C | V71P8080B | 12 | 21 | | 7.3 | | | DEC | IN–HG | X | | | | | | | | | | 6 | SST | ADTA 3 CTR ALPHA PRESS(PAC) WD3 | X |
| 045 | ADTA 2 P ALPHA C | V71P7580B | 12 | 22 | | 7.3 | | | DEC | IN–HG | X | | | | | | | | | | 6 | SST | ADTA 2 CTR ALPHA PRESS(PAC) WD3 | X |

## TABLE 4.6.3-2. RCS/RGA/ADTA TEST (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | BILEVEL | | | | | | | | | | | | | | | | | |
| | | | X | Y | | CHAR | 1 | 0 | TYPE | | | | | | | | | | | | | | | |
| 046 | ADTA 4 P ALPHA C | V71P8580B | 12 | 23 | | 7.3 | | | DEC | IN–HG | X | | | | | | | | | | 6 | SST | ADTA 4 CTR ALPHA PRESS(PAC) WD3 | X |
| 047 | ADTA 1 PS | V71P7040B | 20 | 20 | | 7.3 | | | DEC | IN–HG | X | | | | | | | | | | 6 | SST | ADTA 1 STATIC PRESS WD2 | X |
| 048 | ADTA 3 PS | V71P8040B | 20 | 21 | | 7.3 | | | DEC | IN–HG | X | | | | | | | | | | 6 | SST | ADTA 3 STATIC PRESS WD2 | X |
| 049 | ADTA 2 PS | V71P7540B | 20 | 22 | | 7.3 | | | DEC | IN–HG | X | | | | | | | | | | 6 | SST | ADTA 2 STATIC PRESS WD2 | X |
| 050 | ADTA 4 PS | V71P8540B | 20 | 23 | | 7.3 | | | DEC | IN–HG | X | | | | | | | | | | 6 | SST | ADTA 4 STATIC PRESS WD2 | X |
| 051 | ADTA 1 P ALPHA U | V71P7140B | 28 | 20 | | 7.3 | | | DEC | IN–HG | X | | | | | | | | | | 6 | SST | ADTA 1 UPR ALPHA PRESS(PAU) WD6 | X |
| 052 | ADTA 3 P ALPHA U | V71P8140B | 28 | 21 | | 7.3 | | | DEC | IN–HG | X | | | | | | | | | | 6 | SST | ADTA 3 UPR ALPHA PRESS(PAU) WD6 | X |
| 053 | ADTA 2 P ALPHA U | V71P7640B | 28 | 22 | | 7.3 | | | DEC | IN–HG | X | | | | | | | | | | 6 | SST | ADTA 2 UPR ALPHA PRESS(PAU) WD6 | X |
| 054 | ADTA 4 P ALPHA U | V71P8640B | 28 | 23 | | 7.3 | | | DEC | IN–HG | X | | | | | | | | | | 6 | SST | ADTA 4 UPR ALPHA PRESS(PAU) WD6 | X |
| 055 | ADTA 1 P ALPHA L | V71P7120B | 36 | 20 | | 7.3 | | | DEC | IN–HG | X | | | | | | | | | | 6 | SST | ADTA 1 LWR ALPHA PRESS(PAL) WD5 | X |
| 056 | ADTA 3 P ALPHA L | V71P8120B | 36 | 21 | | 7.3 | | | DEC | IN–HG | X | | | | | | | | | | 6 | SST | ADTA 3 LWR ALPHA PRESS(PAL) WD5 | X |
| 057 | ADTA 2 P ALPHA L | V71P7620B | 36 | 22 | | 7.3 | | | DEC | IN–HG | X | | | | | | | | | | 6 | SST | ADTA 2 LWR ALPHA PRESS(PAL) WD5 | X |
| 058 | ADTA 4 P ALPHA L | V71P8620B | 36 | 23 | | 7.3 | | | DEC | IN–HG | X | | | | | | | | | | 6 | SST | ADTA 4 LWR ALPHA PRESS(PAL) WD5 | X |
| 059 | ADTA 1 TT | V71T7100B | 44 | 20 | | 7.2 | | | DEC | DEG C | X | | | | | | | | | | 6 | SST | ADTA 1 TOTAL TEMP WD4 | X |
| 060 | ADTA 3 TT | V71T8100B | 44 | 21 | | 7.2 | | | DEC | DEG C | X | | | | | | | | | | 6 | SST | ADTA 3 TOTAL TEMP WD4 | X |
| 061 | ADTA 2 TT | V71T7600B | 44 | 22 | | 7.2 | | | DEC | DEG C | X | | | | | | | | | | 6 | SST | ADTA 2 TOTAL TEMP WD4 | X |
| 062 | ADTA 4 TT | V71T8600B | 44 | 23 | | 7.2 | | | DEC | DEG C | X | | | | | | | | | | 6 | SST | ADTA 4 TOTAL TEMP WD4 | X |
| 063 | HIGH START 15 | V99X4018X | 50 | 12 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SST | RGA/ADTA HI TEST ITEM ENTRY IND | X |
| 064 | LOW START 16 | V99X4017X | 50 | 13 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SST | RGA/ADTA LOW TEST ITEM ENTRY IND | X |
| 065 | AUTO SEQ 17 | V99X4043X | 50 | 14 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SST | RGA/ADTA SEQ AUTO ITEM ENTRY IND | X |

TABLE 4.6.3-2. RCS/RGA/ADTA TEST (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | | | |
| 066 | TERM 18 | V99X4042X | 50 | 15 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SST | RGA/ADTA STOP ENTRY IND | X |
| 067 | INH ALL 19 | V99X4044X | 50 | 17 | | 1.0 | * | | BLVL | | | | | | | | | | | | | SST | RGA/ADTA DES ALL ITEM ENTRY IND | X |
| 068 | RCS DRIVERS STEP | V99J4037C | 39 | 7 | | 2.0 | | | DEC | | | | | | | | | | | | | SST | RCS TEST STEP NUMBER | X |
| 069 | (MSG LINE) | V93X0050X | 1 | 25 | | 44.0 | | | CHAR | | | | | | | G | | | | | | UI | MESSAGE LINE | X |
| 070 | (BUFFER MSG) | V93X0054X | 45 | 25 | | 4.0 | | | CHAR | | | | | | | G | | | | | | UI | BUFFER MESSAGE INDICATOR | X |
| 071 | (SPL) | V93X0056X | 2 | 26 | | 49.0 | | | CHAR | | | | | | | G | | | | | | UI | SCRATCH PAD LINE | X |

### 4.6.4 TCS CONTROL (PFS)

TITLE: TCS CONTROL
TYPE: SPEC/105
AVAILABILITY: GNC OPS 9

#### 4.6.4.1 Purpose, Operation, and Organization

(1) Figure 4.6.4–1 is the TCS Control Display (PFS). The test control supervisor (TCS) control display supports the calling, execution, and interactive control of predefined test sequences which are mass memory resident. A mass–memory test sequence directory (MTSD) is defined with up to 64 entries providing access to test sequences. The top portion of the display provides the capability to execute and interactively control TCS sequences. This area also provides sequence status and error condition information.

(2) SELECT Entry of a value, XX (where $1 \leq XX \leq 64$), selects TCS sequence XX. The sequence number (XX) is displayed as the select ID; and the name from the MTSD, which corresponds to the ID, is output next to NAME on the display. All other display foreground locations are blank. An Item 1 entry will not be accepted, and an error message will be displayed on the message line, for any of the following conditions:

XX outside the range of 1 through 64
XX value for which no MTSD entry exists
STATUS shows (RUN)
STATUS shows (SPND) (Suspended)
TCS buffer is not free

(3) MM READ Execution of Item 2 initiates reading of the selected sequence from mass memory. While the test sequence is being read, an asterisk (*) appears to the right of MM READ. When the read operation for the sequence is complete and TCS linkage is resolved, CPLT (complete) is displayed beside MM READ and the sequence immediately begins execution. If TCS linkage cannot be resolved, the appropriate decimal equivalent of the TCS error code is displayed beside ERROR CODE. Execution of Item 2 will not be accepted, and an error message will be displayed on the message line, for any of the following conditions:

SELECT ID is blank
NAME is blank
MM READ displays * (the read command has already been issued)
STATUS is (RUN) Issued on sequence being called
STATUS is (SPND) Issued on sequence being called

While the selected sequence is operating, the current step number is displayed (updated once a second) next to (STEP), and STATUS is (RUN). While the main sequence can execute subsequences, the (STEP) number refers only to the main sequence. If a TCS or ECP error occurs, the sequence is suspended, (SPND) appears as STATUS, the decimal equivalent of the error code appears as ERROR CODE, the GMT (hour:minute:second) shows as TIME (under STATUS), and the hexadecimal equivalent of the TCS/call program error response appears as BITE. The next step number to be executed, if RESUME is entered, is displayed next to (STEP).

(4) STOP Execution of Item 3 causes the TCS processing to stop at the end of the current step. Status will show (SPND), and (STEP) will show the number of the next step to be executed (upon entry of RESUME), if the stop occurs within the main sequence. If the stop occurs within a subsequence, (STEP) will show the number of the main sequence step that initiated execution of the subsequence. Item 3 may be executed only when STATUS is (RUN).

(5) STOP AT Entry of a value, XXXXX, for Item 4, where XXXXX represents a step number in decimal, tags the step numbered XXXXX so that a stop will occur when the execution sequence reaches that step. When the stop occurs, XXXXX will then be displayed as the (STEP) number, STATUS will become (SPND), and the designated step will not be executed, but will become the next step to be executed upon selection of Item 6. Also, the tag will be removed so that a stop will not occur if the same step is encountered again. Only main–sequence steps can be designated via Item 4. Any number of steps can be tagged for stop by entering values for Item 4. Values can be entered for Item 4 whenever STATUS is (RUN) or (SPND). Steps can also be tagged for stop by means of "stop at" operations embedded in the test sequence. The effect will be the same when the execution sequence reaches a step tagged in this manner, except that if the stop occurs within a subsequence, the value shown at (STEP) will be the number of the initiating main sequence step, not the subsequence step to be executed next.

(6) CANCEL Selection of Item 5 terminates and cancels the sequence. (Execution of an (END) operator within the main sequence also terminates and cancels the sequence.) Item 5 can be executed whenever STATUS is (RUN) or (SPND) or when an error code is displayed while MM READ exhibits an asterisk (*) (error in reading the sequence or resolving linkages). Whenever the sequence is terminated, through execution of an (END) operator or entry of Item 5 (the CANCEL operator), the sequence is deleted from the TCS buffer, the MM READ, NAME, TIME (under STATUS), ECP ERROR, ERROR CODE, and BITE fields are blanked, the SELECT ID, STEP, STOP AT, and RSM AT fields are zeroed, and (END) is displayed as STATUS.

(7) RESUME Selection of Item 6 resumes execution of a sequence which is stopped (STATUS shows (SPND), and STEP shows a step number). Operation proceeds with the step identified by the number displayed as (STEP). If this step is an operator that initiates a subsequence and the stop occurred within the subsequence, execution of Item 6 will cause execution to resume with the next step within that subsequence.

(8) RSM AT Entry of a value, XXXXX, for Item 7, where XXXXX represents a step number in decimal, causes execution of a suspended sequence to resume at step number XXXXX. Even if XXXXX is the same as the displayed step number, the results may differ from execution of Item 6. If execution is stopped within a subsequence, execution of Item 6 causes resumption within the subsequence, while entry of Item 7 with the displayed step number causes resumption at the beginning of the subsequence.

(9) CLEAR MSGS Selection of Item 8 clears out all text messages on the display and their associated time tags. Execution of Item 8 is acceptable only when STATUS is (RUN), (SPND), or (END).

(10) TEXT While the selected test sequence is executing, any text operator processed with an on–board destination causes the text message to appear on the display on the top line of the text block below the control items and captions. At the left on the same line, the GMT (in hours:minutes:seconds) of execution of the text operator is displayed. Any previous messages and their corresponding time tags are rolled down one line to make room for the new message at the top. There is room for 15 messages and associated time tags. When all 15 lines are occupied, the message on the bottom line is deleted to make room for a new message at the top.

(11) ECP ERROR The decimal equivalent of the Explicitly–Coded Program (ECP) error code will be displayed when a call program error is encountered. The ECP error code data field will be blanked upon the start of a new ECP or upon the keyboard entry of a “RESUME” or “CANCEL”.

### 4.6.4.2 TCS Control (PFS) Keyboard Processing Addendum

Not applicable.

### 4.6.4.3 TCS Control (PFS) CRT Display Processing Addendum

The table below presents the stand–alone parameter status indicators (PSI) that can be displayed for a parameter. PSI requirements are identified by the word “STAT” being inserted in the FORMAT TYPE column and a numeric code appearing as an entry (right justified) in the ADD REF column of CRT display processing Table 4.6.4–2. The numeric code, corresponding to one of those listed in the Table, indicates the specific status processing to be performed. If there is no numeric code entry, the status processing is defined by the default code.

When the “M” PSI is displayed (for Commfault, I/O error resulting in missing data), the associated parameter value data field shall be blanked unless specified otherwise.

| Numeric Code | PSI SYMBOL(S) | | | | | |
|---|---|---|---|---|---|---|
| Default (blank) | ↓ | | | M | ∅ | ∅ = blank |
| 1 | ↓ | ↑ | | M | ∅ | |
| 2 | | ↑ | | M | ∅ | |
| 3 | ↓ | | | | ∅ | |
| 4 | | ↑ | | | ∅ | |
| 5 | ↓ | | ? | | ∅ | |
| 6 | ↓ | ↑ | | | ∅ | |
| 7 | | | | M | ∅ | |
| 8 | ↓ | | ? | M | ∅ | |
| 9 | | | ? | M | ∅ | |

The following alpha code(s) appear (left justified) in the ADD REF column of Table 4.6.4–2 whenever it is necessary to define any special processing requirements not otherwise covered therein:

A. The parameter to the right of MM READ 2 is initially blank. During the time that a test sequence is being read in from mass memory, an asterisk (*) appears in this position. When the read operation is complete, TCS linkage is resolved, and the sequence begins execution, then this parameter shows as CPLT (complete). When Item 1 is executed, the parameter is blanked again.

B. The STATUS parameter is initially blank. Subsequently, it shows (RUN) whenever there is a test sequence present and running. It shows (SPND) (suspended) if the sequence is stopped for any reason. When Item 1 is executed, the parameter is blanked again.

C. The display CRT time used will depend on whether this display was entered from GNC or SM. The time used is specified below:

| Display Entered From | MSID | Nomenclature |
|---|---|---|
| GNC | V91W1987C | Display CRT time, GNC |
| SM | V91W1988C | Display CRT time, SM |

### 4.6.4.4 TCS Control Figure/Table References

Figure 4.6.4–1 TCS Control Display (PFS)

Table 4.6.4–1 Keyboard Processing Table

Table 4.6.4–2 CRT Display Processing Table

Table 4.6.4–3 CRT Display Processing Background Requirements N/A

Table 4.6.4–4 Mission Design Background Constants N/A

Table 4.6.4–5 Input Functional Parameters

Table 4.6.4–6 Output Functional Parameters

Table 4.6.4–7 I–Loads

Table 4.6.4–8 K–Loads

Table 4.6.4–9 Constants

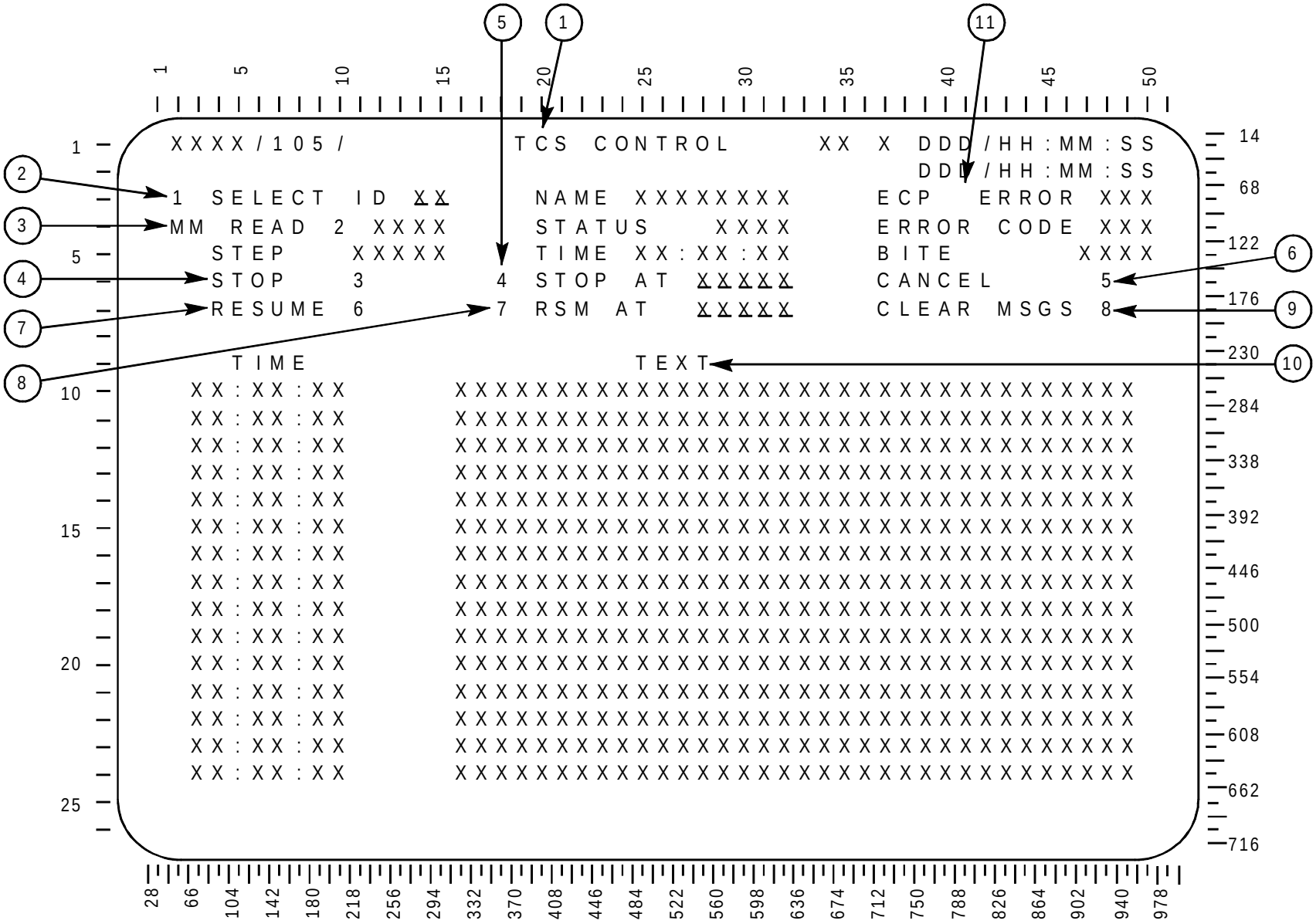


FIGURE 4.6.4-1. TCS Control Display (PFS)

TABLE 4.6.4-1. TCS CONTROL (PFS) KEYBOARD PROCESSING

| Seq | CRT Signal Name | M/S ID | CHAR | TYPE | UNITS | DK | ITEM | Item No. Limits | | Add Ref | Destination | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | MIN | MAX | | | | |
| 001 | 1 SELECT ID | V93J6401C | 3.0 | DEC | | | 1 | | | | TCS | TCS SEQUENCE ID SELECT | X |
| 002 | MM READ 2 | V93X6415X | 0.0 | CTRL | | | 2 | | | | TCS | TCS SEQUENCE MM READ ENABLE | X |
| 003 | STOP 3 | V93X6402X | 0.0 | CTRL | | | 3 | | | | TCS | TCS SEQUENCE STOP CONT | X |
| 004 | 4 STOP AT | V93J6405C | 6.0 | DEC | | | 4 | | | | TCS | TCS SEQUENCE STOP AT CONT | X |
| 005 | CANCEL 5 | V93X6407X | 0.0 | CTRL | | | 5 | | | | TCS | TCS SEQUENCE CANCEL CONT | X |
| 006 | RESUME 6 | V93X6410X | 0.0 | CTRL | | | 6 | | | | TCS | TCS SEQUENCE RESUME CONT | X |
| 007 | 7 RSM AT | V93J6412C | 6.0 | DEC | | | 7 | | | | TCS | TCS SEQUENCE RESUME AT CONT | X |
| 008 | CLEAR MSGS 8 | V93X6419X | 0.0 | CTRL | | | 8 | | | | TCS | TCS SEQUENCE TEXT MESSAGES CLEAR | X |

## TABLE 4.6.4-2. TCS CONTROL (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | BILEVEL | | | | | | | | | | | | | | | | | |
| | | | X | Y | | CHAR | 1 | 0 | TYPE | | | | | | | | | | | | | | | |
| 001 | (OPS) | V93X0040X | 2 | 1 | | 5.0 | | | CHAR | | | | | | | E | | | | | | UI | OPS FUNCTION PAGE | X |
| 002 | (SPEC) | V93X0042X | 7 | 1 | | 4.0 | | | CHAR | | | | | | | E | | | | | | UI | SPEC FUNCTION PAGE | X |
| 003 | (DISP) | V93X0044X | 10 | 1 | | 4.0 | | | DEC | | | | | | | E | | | | | | UI | DISPLAY FUNCTION PAGE | X |
| 004 | (UL) | V92X5032X | 34 | 1 | | 2.0 | UL | | DEC | | | | | | X | G | | | | | | UI | UPLINK ACTIVITY IND | X |
| 005 | (GPC) | V93X0048X | 36 | 1 | | 2.0 | | | DEC | | | | | | | E | | | | | | UI | GPC DRIVER | X |
| 006 | (MT) | V91W1990C | 39 | 1 | | 12.0 | | | CHAR | DHMS | | | | | | A | | | | | | FCOS | MISSION ELAPSED TIME | X |
| 007 | (CRT TIMER) | V91W1987C | 39 | 2 | | 12.0 | | | CHAR | DHMS | | | | | | A | | | | | C | FCOS | DISPLAY CRT TIMER,GNC | X |
| 008 | 1 SELECT ID | V99J4429C | 13 | 3 | | 3.0 | | | DEC | | | | | | | E | | | | | | TCS | TCS SEQUENCE ID SELECT | X |
| 009 | NAME | V99J4433C | 25 | 3 | | 8.0 | | | CHAR | | | | | | | G | | | | | | TCS | TCS SEQUENCE NAME | X |
| 010 | MM READ 2 | V99J4430C | 12 | 4 | | 4.0 | | | CHAR | | | | | | | G | | | | | A | TCS | TCS SEQUENCE MM READ ENABLE | X |
| 011 | STEP | V99J4434C | 10 | 5 | | 6.0 | | | DEC | | | | | | | A | | | | | | TCS | TCS SEQUENCE STEP NUMBER | X |
| 012 | STATUS | V99J4438C | 29 | 4 | | 4.0 | | | CHAR | | | | | | | G | | | | | B | TCS | TCS SEQUENCE STATUS | X |
| 013 | ECP ERROR | V99U2202C | 47 | 3 | | 4.0 | | | DEC | | | | | | | G | | | | | | TCS | TCS CALL PROGRAM ERROR CODE 100 | X |
| 014 | ERROR CODE | V99J4435C | 47 | 4 | | 4.0 | | | DEC | | | | | | | G | | | | | | TCS | TCS ERROR CODE | X |
| 015 | TIME | V99W4437C | 25 | 5 | | 8.0 | | | CHAR | HMS | | | | | | G | | | | | | TCS | GMT TIME OF TCS ERROR | X |
| 016 | BITE | V99J4436C | 47 | 5 | | 4.0 | | | HEX | | | | | | | G | | | | | | TCS | TCS/CALL PRGM ERROR RESPONSE RW8 | X |
| 017 | 4 STOP AT | V99J4431C | 27 | 6 | | 6.0 | | | DEC | | | | | | | E | | | | | | TCS | TCS SEQUENCE STOP AT CNTL | X |
| 018 | 7 RSM AT | V99J4432C | 27 | 7 | | 6.0 | | | DEC | | | | | | | E | | | | | | TCS | TCS SEQUENCE RESUME AT CNTL | X |
| 019* | TIME 1 | V99J4439C | 3 | 10 | | 8.0 | | | CHAR | HMS | | | | | | G | | | | | | TCS | TCS TIME AND TEXT MSG NUMBER 1 | X |
| 020* | TIME 2 | V99J4440C | 3 | 11 | | 8.0 | | | CHAR | HMS | | | | | | G | | | | | | TCS | TCS TIME AND TEXT MSG NUMBER 2 | X |
| 021* | TIME 3 | V99J4441C | 3 | 12 | | 8.0 | | | CHAR | HMS | | | | | | G | | | | | | TCS | TCS TIME AND TEXT MSG NUMBER 3 | X |
| 022* | TIME 4 | V99J4442C | 3 | 13 | | 8.0 | | | CHAR | HMS | | | | | | G | | | | | | TCS | TCS TIME AND TEXT MSG NUMBER 4 | X |

TABLE 4.6.4-2. TCS CONTROL (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | | | |
| 023* | TIME 5 | V99J4443C | 3 | 14 | | 8.0 | | | CHAR | HMS | | | | | | G | | | | | | TCS | TCS TIME AND TEXT MSG NUMBER 5 | X |
| 024* | TIME 6 | V99J4444C | 3 | 15 | | 8.0 | | | CHAR | HMS | | | | | | G | | | | | | TCS | TCS TIME AND TEXT MSG NUMBER 6 | X |
| 025* | TIME 7 | V99J4445C | 3 | 16 | | 8.0 | | | CHAR | HMS | | | | | | G | | | | | | TCS | TCS TIME AND TEXT MSG NUMBER 7 | X |
| 026* | TIME 8 | V99J4446C | 3 | 17 | | 8.0 | | | CHAR | HMS | | | | | | G | | | | | | TCS | TCS TIME AND TEXT MSG NUMBER 8 | X |
| 027* | TIME 9 | V99J4447C | 3 | 18 | | 8.0 | | | CHAR | HMS | | | | | | G | | | | | | TCS | TCS TIME AND TEXT MSG NUMBER 9 | X |
| 028* | TIME 10 | V99J4448C | 3 | 19 | | 8.0 | | | CHAR | HMS | | | | | | G | | | | | | TCS | TCS TIME AND TEXT MSG NUMBER 10 | X |
| 029* | TIME 11 | V99J4449C | 3 | 20 | | 8.0 | | | CHAR | HMS | | | | | | G | | | | | | TCS | TCS TIME AND TEXT MSG NUMBER 11 | X |
| 030* | TIME 12 | V99J4450C | 3 | 21 | | 8.0 | | | CHAR | HMS | | | | | | G | | | | | | TCS | TCS TIME AND TEXT MSG NUMBER 12 | X |
| 031* | TIME 13 | V99J4451C | 3 | 22 | | 8.0 | | | CHAR | HMS | | | | | | G | | | | | | TCS | TCS TIME AND TEXT MSG NUMBER 13 | X |
| 032* | TIME 14 | V99J4452C | 3 | 23 | | 8.0 | | | CHAR | HMS | | | | | | G | | | | | | TCS | TCS TIME AND TEXT MSG NUMBER 14 | X |
| 033* | TIME 15 | V99J4453C | 3 | 24 | | 8.0 | | | CHAR | HMS | | | | | | G | | | | | | TCS | TCS TIME AND TEXT MSG NUMBER 15 | X |
| 034 | TEXT 1 | V99J4439C | 16 | 10 | | 34.0 | | | CHAR | | | | | | | G | | | | | | TCS | TCS TIME AND TEXT MSG NUMBER 1 | X |
| 035 | TEXT 2 | V99J4440C | 16 | 11 | | 34.0 | | | CHAR | | | | | | | G | | | | | | TCS | TCS TIME AND TEXT MSG NUMBER 2 | X |
| 036 | TEXT 3 | V99J4441C | 16 | 12 | | 34.0 | | | CHAR | | | | | | | G | | | | | | TCS | TCS TIME AND TEXT MSG NUMBER 3 | X |
| 037 | TEXT 4 | V99J4442C | 16 | 13 | | 34.0 | | | CHAR | | | | | | | G | | | | | | TCS | TCS TIME AND TEXT MSG NUMBER 4 | X |
| 038 | TEXT 5 | V99J4443C | 16 | 14 | | 34.0 | | | CHAR | | | | | | | G | | | | | | TCS | TCS TIME AND TEXT MSG NUMBER 5 | X |

## TABLE 4.6.4-2. TCS CONTROL (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | | | |
| 039 | TEXT 6 | V99J4444C | 16 | 15 | | 34.0 | | | CHAR | | | | | | | G | | | | | | TCS | TCS TIME AND TEXT MSG NUMBER 6 | X |
| 040 | TEXT 7 | V99J4445C | 16 | 16 | | 34.0 | | | CHAR | | | | | | | G | | | | | | TCS | TCS TIME AND TEXT MSG NUMBER 7 | X |
| 041 | TEXT 8 | V99J4446C | 16 | 17 | | 34.0 | | | CHAR | | | | | | | G | | | | | | TCS | TCS TIME AND TEXT MSG NUMBER 8 | X |
| 042 | TEXT 9 | V99J4447C | 16 | 18 | | 34.0 | | | CHAR | | | | | | | G | | | | | | TCS | TCS TIME AND TEXT MSG NUMBER 9 | X |
| 043 | TEXT 10 | V99J4448C | 16 | 19 | | 34.0 | | | CHAR | | | | | | | G | | | | | | TCS | TCS TIME AND TEXT MSG NUMBER 10 | X |
| 044 | TEXT 11 | V99J4449C | 16 | 20 | | 34.0 | | | CHAR | | | | | | | G | | | | | | TCS | TCS TIME AND TEXT MSG NUMBER 11 | X |
| 045 | TEXT 12 | V99J4450C | 16 | 21 | | 34.0 | | | CHAR | | | | | | | G | | | | | | TCS | TCS TIME AND TEXT MSG NUMBER 12 | X |
| 046 | TEXT 13 | V99J4451C | 16 | 22 | | 34.0 | | | CHAR | | | | | | | G | | | | | | TCS | TCS TIME AND TEXT MSG NUMBER 13 | X |
| 047 | TEXT 14 | V99J4452C | 16 | 23 | | 34.0 | | | CHAR | | | | | | | G | | | | | | TCS | TCS TIME AND TEXT MSG NUMBER 14 | X |
| 048 | TEXT 15 | V99J4453C | 16 | 24 | | 34.0 | | | CHAR | | | | | | | G | | | | | | TCS | TCS TIME AND TEXT MSG NUMBER 15 | X |
| 049 | (MSG LINE) | V93X0050X | 1 | 25 | | 44.0 | | | CHAR | | | | | | | G | | | | | | UI | MESSAGE LINE | X |
| 050 | (BUFFER MSG) | V93X0054X | 45 | 25 | | 4.0 | | | CHAR | | | | | | | G | | | | | | UI | BUFFER MESSAGE INDICATOR | X |
| 051 | (SPL) | V93X0056X | 2 | 26 | | 49.0 | | | CHAR | | | | | | | G | | | | | | UI | SCRATCH PAD LINE | X |

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TABLE 4.6.4-5. INPUT FUNCTIONAL PARAMETERS FOR TCS CONTROL (V5.1.11)

| FSSR NAME | M/S ID | NOMENCLATURE | SOURCE | UNITS | DATA TYPE | PREC | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|

NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE 4.6.4-6. OUTPUT FUNCTIONAL PARAMETERS FROM TCS CONTROL (V5.1.11)

| FSSR NAME | M/S ID | NOMENCLATURE | DESTINATION | UNITS | DATA TYPE | PREC | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|

NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

**Rate Codes: (HDR Only) 1 = 1 sample/sec 2 = 5 samples/sec 3 = 12.5 samples/sec 4 = 25 samples/sec 5 = 100 samples/sec**
**(HDR and LDR) A = 1 sample/sec B = 5 samples/sec C = 12.5 samples/sec D = 25 samples/sec E = 100 samples/sec**

## TABLE 4.6.4-7. TCS CONTROL (V5.1.11) I-LOADS

| FSSR NAME | MSID | ENG UNITS | DT | PR | D | S | PR FCTN | MC | CAT | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|---|---|---|

NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE 4.6.4-8. TCS CONTROL (V5.1.11) K-LOADS

| FSSR NAME<br>DESCRIPTION | MSID | MC | KLOAD VALUE | ENG UNITS | DT | P<br>R | S | PR FCTN | LAST CR | R<br>E<br>V |
|---|---|---|---|---|---|---|---|---|---|---|

NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

## TABLE 4.6.4-9. TCS CONTROL (V5.1.11) CONSTANTS

| FSSR NAME DESCRIPTION | MSID | MC | CONSTANT VALUE | ENG UNITS | DT | P R | S | PR FCTN | LAST CR | R E V |
|---|---|---|---|---|---|---|---|---|---|---|

NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

## 4.6.5 GENERAL TEST SUPPORT (PFS)

TITLE: GTS DISPLAY
TYPE: SPEC/100
AVAILABILITY:PL OPS 9, GNC OPS 9

### 4.6.5.1 Purpose, Operation, and Organization.

(1) GENERAL TEST SUPPORT Figure 4.6.5–1 is the General Test Support Display (PFS). This display is a specialist function used to control housekeeping data acquisition (HDA) (including deselection/selection of the PCMMU data acquisition or PL data acquisition in G9 only), computer status lights (CSL) testing, selection of the elevon position low limits, testing of dedicated displays, the use of critical master events controller (MEC) commands, downlist format selection, the use of the payload serial I/O handler, PASS/BFS transfer, and GSE polling and GPC to Spacelab Computer Communications.

(2) HDA CONTROL Items 1 and 2 are used to enable and inhibit, respectively, HDA, and are mutually exclusive. Selection of Item 1 or 2 causes an asterisk (*) to appear beside the ITEMS. Additionally, selection of Item 1 shall blank the asterisks beside Item 40 in both OPS G9 and P9, and beside Item 41 in OPS G9. Selection of Item 2 shall cause asterisks to be displayed beside Item 40 in both OPS G9 and P9, and beside Item 41 in OPS G9. An asterisk shall always be displayed beside Item 41 in OPS P9.

Items 40 & 41 control the collection of the PCMMU and PL data (respectively) during HDA processing in G9 only. Items 40 & 41 are toggle items and when selected shall cause the associated I/O to cease and an asterisk to appear next to the selected item. The next execution of that item entry shall restart the associated I/O and shall cause the asterisk to be blanked. Additionally, in G9, if items 40 & 41 are attempted and item 2 (HDA Inhibit) is active, an illegal entry message shall be displayed. Upon all transitions to GNC OPS 9, these items shall not be selected and the PCMMU and PL data shall be acquired until an item entry has been made to inhibit the I/O (items 2, 40 or 41).

Items 40 and 41 shall not be supported in PL OPS 9. Attempts to execute either of these items in PL OPS 9 shall result in an illegal entry message being displayed.

(3) CSL/RML TEST Items 3–7 (UF1–5) allow the UFAIL (UF) rows of the COMPUTER ANNUNCIATION MATRIX (CAM) to be selected for fail vote light test. Item 8 (IFA) allows all the Diagonal IFAIL (IF) lights to be selected for testing. Item 9 (FAIL GPC SEL) allows the selection via item entry of 1–5 of the FAIL GPC lights to be driven based on Item 3–7 selection. Item 8 is mutually exclusive with Items 3 through 7 and item 9. Item 10 (TEST EXEC) allows the lights selected in Items 1–9 to be tested. Item 11 (RESET) allows all the lights illuminated by a test to be reset. Item 12 is implied and its execution will result in an operation error.

(4) DED DISP Testing of dedicated displays is controlled by the six items in the upper right corner of the display. The testing procedure is to supply a set of selected values to drive the ADI's, the AMI's, the AVVI's, the HSI's, and the SPI's. The values are specified in Section 4.13 of Level B, Vehicle Utility CPDS. Execution of Item 18 causes the selected test values to be sent to the forward DDU's (1 and 2) while Item 19 causes the selected values to be sent to the aft DDU (3). Selection of Item 20 initiates the high–value test of the dedicated displays, and Item 21 initiates the low–value test. Selection of Item 22 initiates a flag test of the dedicated displays and Item 24 selects the Drive Test Values, and Item 23 terminates whatever dedicated display test may be executing at the time. Items 18 and 19 are mutually exclusive. Items 20 through 23 are mutually exclusive.

(5) CRIT MEC CMDS Items 25 and 26 enable and inhibit, respectively, TCS critical commands to the MEC and are mutually exclusive.

(6) DL FORMAT Downlist format selection starts by the entry of a value, XX, for Item 12, where "XX" is the downlist format ID. Each time SPEC 100 is activated, Item 12 shall be initialized to the current DL Format in use for that OPS and an asterisk (*) shall be displayed next to Item 13. Entry of a valid downlist format ID shall display the format ID next to Item 12 and shall blank the asterisk (*) next to Item 13. Entry of an invalid downlist format ID, for the active OPS, shall cause an "ILLEGAL ENTRY" error message to be enabled for display on the display message line. Following entry of a valid downlist ID, selection of Item 13 shall initiate the downlist format selection process. An OPS transition shall cause selection of the appropriate default downlist format for the OPS.

(7) PASS/BFS XFER Execution of Item 15 enables transmission of initialization data from PASS to BFS.

(8) GSE POLL ENA Execution of Item 14 enables/disables GSE polling by flip/flop action. Once selected the state is carried across OPS transitions until changed by the user or automatically disabled by the GNC software at SRB ignition (provided that GSE polling is supported by the new OPS). An asterisk(*) appears adjacent to the item when the crew has enabled its execution and disappears when it is disabled.

(9) ELEV LMT SEL Item 27 (HORZ), 28 (VERT), or 29 (OWPS) allows selection of the elevon position high/low limits and drive rate limit for a horizontal, vertical, or Orbiter Weather Protection System positioned vehicle to be used by the actuator drive programs. These items are mutually exclusive. The display is initialized with Item 29 selected.

(10) SL COMM Control and Monitoring is accomplished by item entries and measurements described in the following paragraphs.

a. Polling initialization of the SL subsystem and experiment computers is accomplished via Item 30 (CH A ENA) and 31 (CH B ENA) for the Subsystem Computer (SSC) and via Items 35 (CH A ENA) and 36 (CH B ENA) for the Experiment Computer (EXC). Termination of polling is accomplished via Item 32 and 37 (DSBL) for the SSC and EXC respectively. An "*" indicator will be displayed after the names of the selected item controls.

   The display will be initialized with all polling disabled. Items 30, 31 and 32 are mutually exclusive for the SSC. Items 35, 36 and 37 are mutually exclusive for the EXC.

b. Items 33 and 38 (RTRN CHW) allow an MDM return command header word test to be performed on the SSC and EXC, respectively. The result of the test is displayed as "FAIL" or "BLANK" for good.

c. Items 34 and 39 (RTRN MSG) allow an MDM return message test to be performed on the SSC and EXC, respectively. The result of the test is displayed as "FAIL" or "BLANK" for good.

d. The contents of the SL MDM coupler status word (STATE, ERR CD) are displayed to indicate whether communication has been achieved with the SL computers. The remote text displayed for STATE is BUSY, RSET (Reset), HALT, BITE, or CPLT (Complete). The error code outputs are displayed in decimal.

(11) REACTION JET DRIVER (RJD) TOGGLER Items 16 and 17 (RJD TOGGLER ON, OFF) provide the crew with the capability, in GN&C OPS 9, to send an RJD TOGGLER CMD A on or off command to the forty–four reaction control jets simultaneously. An asterisk(*) will be driven next to the item selected. Items 16 and 17 are mutually exclusive.

### 4.6.5.2 General Test Support (PFS) Keyboard Processing Addendum

A. Downlist Format

The following is a list of valid downlist entries of a value, XX, for Item 12, where "XX" is the downlist format ID:

| DOWNLIST FMT ID | NAME |
|---|---|
| 42 | INIT AND CHECKOUT GN&C 9 |
| 43 | INIT AND CHECKOUT GN&C 9 REDUCED BANDWIDTH |
| 44 | GN&C 9 PRECOUNT |
| 45 | GN&C 9 PRECOUNT REDUCED BANDWIDTH |
| 46 | FRT - GENERAL |
| 53 | GN&C FCS CHECKOUT |
| 60 | GN&C 9 PAYLOAD CHECKOUT |
| 97 | PCMMU CHECKOUT-ADDRESS |
| 98 | PCMMU CHECKOUT-052525 (OCTAL) |
| 99 | PCMMU CHECKOUT-125252 (OCTAL) |

### 4.6.5.3 General Test Support (PFS) CRT Display Processing Addendum

The Table below presents the stand–alone parameter status indicators (PSI) that can be displayed for a parameter. PSI requirements are identified by the word "STAT" being inserted in the FORMAT TYPE column and a numeric code appearing as an entry (right justified) in the ADD REF column of CRT display processing Table 4.6.5–2. The numeric code, corresponding to one of those listed in the Table, indicates the specific status processing to be performed. If there is no numeric code entry, the status processing is defined by the default code.

When the "M" PSI is displayed (for Commfault, I/O error resulting in missing data), the associated parameter value data field shall be blanked unless specified otherwise.

| Numeric Code | PSI SYMBOL(S) | | | | | |
|---|---|---|---|---|---|---|
| Default (blank) | ↓ | | | M | ⁄ | ⁄ = blank |
| 1 | ↓ | ↑ | | M | ⁄ | |
| 2 | | ↑ | | M | ⁄ | |
| 3 | ↓ | | | | ⁄ | |
| 4 | | ↑ | | | ⁄ | |
| 5 | ↓ | | ? | | ⁄ | |
| 6 | ↓ | ↑ | | | ⁄ | |
| 7 | | | | M | ⁄ | |
| 8 | ↓ | | ? | M | ⁄ | |
| 9 | | | ? | M | ⁄ | |

The following alpha code(s) appear (left justified) in the ADD REF column of Table 4.6.5–2 whenever it is necessary to define any special processing requirements not otherwise covered therein:

A. The display CRT time used will depend on whether this display was entered from GNC or PL; the time used is specified below:

| Display Entered From | MSID | Nomenclature |
|---|---|---|
| GNC | V91W1987C | Display CRT time, GNC |
| PL | V91W1989C | Display CRT time, PL |

B. SSC Channel Disable Status Indicator

The following logic is required to generate the appropriate indicator for the SSC channel disable:

| Logic | | |
|---|---|---|
| SSC CH A ENA/DIS Status (V92X1348X) | SSC CH B ENA/DIS Status (V92X1349X) | INDICATOR Text Output |
| 0 | 0 | * |
| All Other Combinations | | Blank |

C. SL MDM Coupler State

The following logic is required to define the appropriate remote text to be displayed for the SL SSC and EXC MDM Coupler States Status:

| SL SSC and EXC Coupler Status WD–States (Integer) (V92J1355C & V92J1357C) | Status RTXT Output |
|---|---|
| 0 | BUSY |
| 1 | RSET |
| 2 | HALT |
| 4 | BITE |
| 5 | CPLT |

D. EXC Channel Disable Status Indicator

The following logic is required to generate the appropriate indicator for the EXC channel disable:

| Logic | | |
|---|---|---|
| EXC CH A ENA/DIS Status (V92X1350X) | EXC CH B ENA/DIS Status (V92X1351X) | INDICATOR Text Output |
| 0 | 0 | * |
| All Other Combinations | | Blank |

### 4.6.5.4 General Test Support Figure/Table References

Figure 4.6.5–1 General Test Support Display (PFS)

Table 4.6.5–1 Keyboard Processing Table

Table 4.6.5–2 CRT Display Processing Table

Table 4.6.5–3 CRT Display Processing Background Requirements N/A

Table 4.6.5–4 Mission Design Background Constants N/A

Table 4.6.5–5 Input Functional Parameters

Table 4.6.5–6 Output Functional Parameters

Table 4.6.5–7 I–Loads

Table 4.6.5–8 K–Loads

Table 4.6.5–9 Constants

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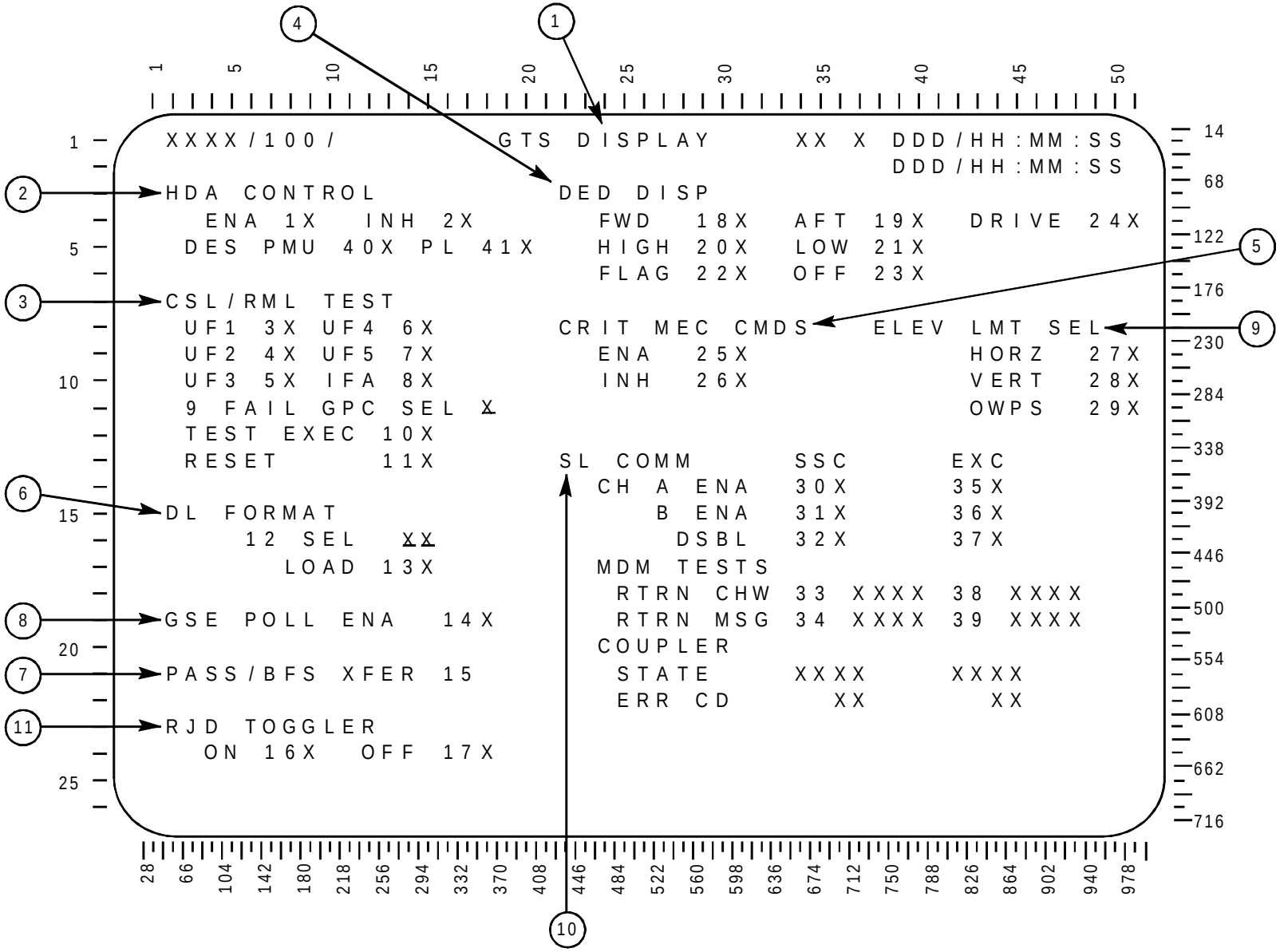


FIGURE 4.6.5-1. General Test Support Display (PFS)

TABLE 4.6.5-1. GENERAL TEST SUPPORT (PFS) KEYBOARD PROCESSING

| Seq | CRT Signal Name | M/S ID | CHAR | TYPE | UNITS | DK | ITEM | Item No. Limits | | Add Ref | Destination | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | MIN | MAX | | | | |
| 001 | HDA ENA 1 | V93X6301X | 0.0 | CTRL | | | 1 | | | | HDA | HDA ENABLE | X |
| 002 | HDA INH 2 | V93X6302X | 0.0 | CTRL | | | 2 | | | | HDA | HDA INHIBIT | X |
| 003 | UF1 3 | V93X6375X | 0.0 | CTRL | | | 3 | | | | CSL/RML | UFAIL 1 ON/OFF | X |
| 004 | UF2 4 | V93X6376X | 0.0 | CTRL | | | 4 | | | | CSL/RML | UFAIL 2 ON/OFF | X |
| 005 | UF3 5 | V93X6377X | 0.0 | CTRL | | | 5 | | | | CSL/RML | UFAIL 3 ON/OFF | X |
| 006 | UF4 6 | V93X6378X | 0.0 | CTRL | | | 6 | | | | CSL/RML | UFAIL 4 ON/OFF | X |
| 007 | UF5 7 | V93X6379X | 0.0 | CTRL | | | 7 | | | | CSL/RML | UFAIL 5 ON/OFF | X |
| 008 | IFA 8 | V93X6382X | 0.0 | CTRL | | | 8 | | | | CSL/RML | IFAIL ALL ON/OFF | X |
| 009 | 9 FAIL GPC SEL | V93J6385C | 2.0 | DEC | | | 9 | | | | CSL/RML | FAIL GPC SEL ID | X |
| 010 | TEST EXEC 10 | V93X6389X | 0.0 | CTRL | | | 10 | | | | CSL/RML | CSL/RML TEST EXEC | X |
| 011 | RESET 11 | V93X6390X | 0.0 | CTRL | | | 11 | | | | CSL/RML | CSL/RML TEST RESET | X |
| 012 | 12 SEL DL FORMAT | V93U6357C | 3.0 | DEC | | | 12 | | | A | D/L PROC | D/L FMT ID SELECT | X |
| 013 | DL LOAD 13 | V93X6360X | 0.0 | CTRL | | | 13 | | | | D/L PROC | D/L FMT ID SELECT EXEC | X |
| 014* | GSE POLL ENA 14 | V93X4062X | 0.0 | CTRL | | | 14 | | | | LDB | GSE POLL ENA CMD | X |
| 015 | PASS/BFS XFER 15 | V93X6372X | 0.0 | CTRL | | | 15 | | | | FCOS | PASS/BFS XFER CMD | X |
| 016 | RJD TOGGLER ON 16 | V93X6303X | 0.0 | CTRL | | | 16 | | | | RJDT,CRT | RJD TOGGLER ON | X |
| 017 | RJD TOGGLER OFF 17 | V93X6304X | 0.0 | CTRL | | | 17 | | | | RJDT,CRT | RJD TOGGLER OFF | X |
| 018* | DED DISP FWD 18 | V93X3971X | 0.0 | CTRL | | | 18 | | | | DDC | DED DISP CKOUT FWD SEL | X |
| 019* | DED DISP AFT 19 | V93X3972X | 0.0 | CTRL | | | 19 | | | | DDC | DED DISP CKOUT AFT SEL | X |
| 020* | DED DISP HIGH 20 | V93X3980X | 0.0 | CTRL | | | 20 | | | | DDC | DED DISP CKOUT HIGH ON | X |
| 021* | DED DISP LOW 21 | V93X3981X | 0.0 | CTRL | | | 21 | | | | DDC | DED DISP CKOUT LOW ON | X |
| 022* | DED DISP FLAG 22 | V93X3982X | 0.0 | CTRL | | | 22 | | | | DDC | DED DISP CKOUT FLAG ON | X |
| 023* | DED DISP OFF 23 | V93X3985X | 0.0 | CTRL | | | 23 | | | | DDC | DED DISP CKOUT TEST OFF | X |
| 024 | DED DISP DRIVE 24 | V93X3986X | 0.0 | CTRL | | | 24 | | | | DDC | DED DISP CKOUT DRIVE CMD | X |
| 025 | MEC ENA 25 | V93X6351X | 0.0 | CTRL | | | 25 | | | | TCS | MEC CMD ENABLE | X |

TABLE 4.6.5-1. GENERAL TEST SUPPORT (PFS) KEYBOARD PROCESSING

| Seq | CRT Signal Name | M/S ID | CHAR | TYPE | UNITS | DK | ITEM | Item No. Limits | | Add Ref | Destination | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | MIN | MAX | | | | |
| 026 | MEC INH 26 | V93X6353X | 0.0 | CTRL | | | 26 | | | | TCS | MEC CMD INHIBIT | X |
| 027 | ELEV LMT SEL HORZ 27 | V93X6394X | 0.0 | CTRL | | | 27 | | | | AI,RMP,FR,MT | ELEVON HORIZ LMT SELECT | X |
| 028 | ELEV LMT SEL VERT 28 | V93X6395X | 0.0 | CTRL | | | 28 | | | | AI,RMP,FR,MT | ELEVON VERT LMT SELECT | X |
| 029 | ELEV LMT SEL OWPS 29 | V93X6393X | 0.0 | CTRL | | | 29 | | | | AI,RMP,FR,MT | ELEVON OWPS LMT SELECT | |
| 030 | SSC CH A ENA 30 | V93X5548X | 0.0 | CTRL | | | 30 | | | | GTS | SSC CHANNEL A ENABLE ITEM | |
| 031 | SSC CH B ENA 31 | V93X5549X | 0.0 | CTRL | | | 31 | | | | GTS | SSC CHANNEL B ENABLE ITEM | |
| 032 | SSC CH DSBL 32 | V93X5552X | 0.0 | CTRL | | | 32 | | | | GTS | SSC INHIBIT POLLING ITEM | |
| 033 | SSC RTRN CHW 33 | V93X5550X | 0.0 | CTRL | | | 33 | | | | GTS | SSC RETURN CHW ITEM | |
| 034 | SSC RTRN MSG 34 | V93X5551X | 0.0 | CTRL | | | 34 | | | | GTS | SSC RETURN MDM MSG ITEM | |
| 035 | EXC CH A ENA 35 | V93X5553X | 0.0 | CTRL | | | 35 | | | | GTS | EXC CHANNEL A ENABLE ITEM | |
| 036 | EXC CH B ENA 36 | V93X5554X | 0.0 | CTRL | | | 36 | | | | GTS | EXC CHANNEL B ENABLE ITEM | |
| 037 | EXC CH DSBL 37 | V93X5557X | 0.0 | CTRL | | | 37 | | | | GTS | EXC INHIBIT POLLING ITEM | |
| 038 | EXC RTRN CHW 38 | V93X5555X | 0.0 | CTRL | | | 38 | | | | GTS | EXC RETURN CHW ITEM | |
| 039 | EXC RTRN MSG 39 | V93X5556X | 0.0 | CTRL | | | 39 | | | | GTS | EXC RETURN MDM MSG ITEM | |
| 040 | DES PMU 40 | V93X6307X | 0.0 | CNTL | | | 40 | | | | BFD, BFM, GTS DISP, AI, RMP, FRT, MAT, HDA | DES/SEL PMU I/O | |
| 041 | DES PL 41 | V93X6308X | 0.0 | CNTL | | | 41 | | | | HDA, GTS DISP | DES/SEL PL I/O | |

## TABLE 4.6.5-2. GENERAL TEST SUPPORT (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | BILEVEL | | | | | | | | | | | | | | | | | |
| | | | X | Y | | CHAR | 1 | 0 | TYPE | | | | | | | | | | | | | | | |
| 001 | (OPS) | V93X0040X | 2 | 1 | | 5.0 | | | CHAR | | | | | | | E | | | | | | UI | OPS FUNCTION PAGE | X |
| 002 | (SPEC) | V93X0042X | 7 | 1 | | 4.0 | | | CHAR | | | | | | | E | | | | | | UI | SPEC FUNCTION PAGE | X |
| 003 | (DISP) | V93X0044X | 10 | 1 | | 4.0 | | | DEC | | | | | | | E | | | | | | UI | DISPLAY FUNCTION PAGE | X |
| 004 | (UL) | V92X5032X | 34 | 1 | | 2.0 | UL | | BLVL | | | | | | X | G | | | | | | UI | UPLINK ACTIVITY IND | X |
| 005 | (GPC) | V93X0048X | 36 | 1 | | 2.0 | | | BLVL | | | | | | | E | | | | | | UI | GPC DRIVER | X |
| 006 | (MT) | V91W1990C | 39 | 1 | | 12.0 | | | CHAR | DHMS | | | | | | A | | | | | | FCOS | MISSION ELAPSED TIME | X |
| 007 | (CRT TIMER) | V91W1987C | 39 | 2 | | 12.0 | | | CHAR | DHMS | | | | | | A | | | | | A | FCOS | DISPLAY CRT TIMER,GNC | X |
| 008 | HDA ENA 1 | V99X4120X | 9 | 4 | | 1.0 | * | | BLVL | | | | | | | | | | | | | CSL/RML | HDA ENABLE INDICATOR | X |
| 009 | HDA INH 2 | V99X4121X | 17 | 4 | | 1.0 | * | | BLVL | | | | | | | | | | | | | CSL/RML | HDA INHIBIT INDICATOR | X |
| 010 | UF1 3 | V99X4243X | 8 | 8 | | 1.0 | * | | BLVL | | | | | | | | | | | | | CSL/RML | UFAIL 1 INDICATOR | X |
| 011 | UF2 4 | V99X4244X | 8 | 9 | | 1.0 | * | | BLVL | | | | | | | | | | | | | CSL/RML | UFAIL 2 INDICATOR | X |
| 012 | UF3 5 | V99X4245X | 8 | 10 | | 1.0 | * | | BLVL | | | | | | | | | | | | | CSL/RML | UFAIL 3 INDICATOR | X |
| 013 | UF4 6 | V99X4246X | 15 | 8 | | 1.0 | * | | BLVL | | | | | | | | | | | | | CSL/RML | UFAIL 4 INDICATOR | X |
| 014 | UF5 7 | V99X4247X | 15 | 9 | | 1.0 | * | | BLVL | | | | | | | | | | | | | CSL/RML | UFAIL 5 INDICATOR | X |
| 015 | IFA 8 | V99X4255X | 15 | 10 | | 1.0 | * | | BLVL | | | | | | | | | | | | | CSL/RML | IFAIL ALL INDICATOR | X |
| 016 | 9 FAIL GPC SEL | V99J4258C | 17 | 11 | | 2.0 | | | DEC | | | | | | | | | | | | | CSL/RML | FAIL GPC SEL ID NUMBER | X |
| 017 | TEST EXEC 10 | V99X4256X | 15 | 12 | | 1.0 | * | | BLVL | | | | | | | | | | | | | CSL/RML | CSL/RML TEST EXEC INDICATOR | X |
| 018 | RESET 11 | V99X4257X | 15 | 13 | | 1.0 | * | | BLVL | | | | | | | | | | | | | CSL/RML | CSL/RML TEST RESET INDICATOR | X |
| 019 | DL SEL FRMT 12 | V99J4236C | 13 | 16 | | 3.0 | | | DEC | | | | | | | | | | | | | D/L PROC | D/L FMT ID SELECTED | X |
| 020 | DL LOAD 13 | V99X4237X | 15 | 17 | | 1.0 | * | | BLVL | | | | | | | | | | | | | D/L PROC | D/L FMT ID SELECT EXEC INDICATOR | X |
| 021* | GSE POLL ENA 14 | V91X1840X | 18 | 19 | | 1.0 | * | | BLVL | | | | | | | | | | | | | LDB | GSE POLL ENA IND | X |
| 022 | RJD TOGGLER ON 16 | V93X6303X | 9 | 24 | | 1.0 | * | | BLVL | | | | | | | | | | | | | KYBD | RJD TOGGLER ON | X |
| 023 | RJD TOGGLER OFF 17 | V93X6304X | 18 | 24 | | 1.0 | * | | BLVL | | | | | | | | | | | | | KYBD | RJD TOGGLER OFF | X |
| 024 | DED DISP FWD 18 | V99X4233X | 31 | 4 | | 1.0 | * | | BLVL | | | | | | | | | | | | | DDC | DED DISP CKOUT FWD SELECT IND | X |

## TABLE 4.6.5-2. GENERAL TEST SUPPORT (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | | | |
| 025 | DED DISP AFT 19 | V99X4234X | 40 | 4 | | 1.0 | * | | BLVL | | | | | | | | | | | | | DDC | DED DISP CKOUT AFT SELECT IND | X |
| 026* | DED DISP HIGH 20 | V99X4230X | 31 | 5 | | 1.0 | * | | BLVL | | | | | | | | | | | | | DDC | DED DISP CKOUT HI ON IND | X |
| 027* | DED DISP LOW 21 | V99X4231X | 40 | 5 | | 1.0 | * | | BLVL | | | | | | | | | | | | | DDC | DED DISP CKOUT LO ON IND | X |
| 028* | DED DISP FLAG 22 | V99X4232X | 31 | 6 | | 1.0 | * | | BLVL | | | | | | | | | | | | | DDC | DED DISP CKOUT FLAG ON IND | X |
| 029* | DED DISP OFF 23 | V99X4235X | 40 | 6 | | 1.0 | * | | BLVL | | | | | | | | | | | | | DDC | DED DISP CKOUT OFF IND | X |
| 030 | DED DISP DRIVE 24 | V99X4240X | 51 | 4 | | 1.0 | * | | BLVL | | | | | | | | | | | | | DDC | DED DISP CKOUT DRIVE IND | X |
| 031 | MEC ENA 25 | V99X4214X | 31 | 9 | | 1.0 | * | | BLVL | | | | | | | | | | | | | TCS | MEC CMD ENA INDICATOR | X |
| 032 | MEC INH 26 | V99X4215X | 31 | 10 | | 1.0 | * | | BLVL | | | | | | | | | | | | | TCS | MEC CMD INH INDICATOR | X |
| 033 | ELEV LMT SEL HORZ27 | V93X6394X | 51 | 9 | | 1.0 | * | | BLVL | | | | | | | | | | | | | KYBD | ELEVON HORIZ LMT SELECT | X |
| 034 | ELEV LMT SEL VERT28 | V93X6395X | 51 | 10 | | 1.0 | * | | BLVL | | | | | | | | | | | | | KYBD | ELEVON VERT LMT SELECT | X |
| 035 | ELEV LMT SEL OWPS 29 | V93X6393X | 51 | 11 | | 1.0 | * | | BLVL | | | | | | | | | | | | | KYBD | ELEVON OWPS LMT SELECT | |
| 036 | SSC CH A ENA 30 | V92X1348X | 36 | 14 | | 1.0 | * | | BLVL | | | | | | | | | | | | | GTS | SSC CHANNEL A ENA/DIS STATUS | |
| 037 | SSC CH B ENA 31 | V92X1349X | 36 | 15 | | 1.0 | * | | BLVL | | | | | | | | | | | | | GTS | SSC CHANNEL B ENA/DIS STATUS | |
| 038 | SSC CH DSBL 32 | ADDENDUM | 36 | 16 | | 1.0 | * | | RTXT | | | | | | | | | | | | B | GTS | SSC CHANNEL DISABLE STATUS | |
| 039* | SSC RTRN CHW 33 | V92X0931X | 37 | 18 | | 4.0 | FAIL | | BLVL | | | | | | | | | | | | | GTS | S/L RETURN CHW FAILURE–SSC | X |
| 040 | SSC RTRN MSG 34 | V92X1365X | 37 | 19 | | 4.0 | FAIL | | BLVL | | | | | | | | | | | | | GTS | RETURN MDM MESSAGE FAILURE–SSC | |
| 041 | SSC COUPLER STATE | V92J1355C | 34 | 21 | | 4.0 | | | RTXT | | | | | | | | | | | | C | GTS | SL MDM COUPLER STATUS WD–STATE–SSC | |
| 042 | SSC COUPLER ERR CD | V92J1359C | 35 | 22 | | 3.0 | | | DEC | | | | | | | | | | | | | GTS | SL MEM COUPLER STATUS WD–ERRCD–SSC | |
| 043 | EXC CH A ENA 35 | V92X1350X | 44 | 14 | | 1.0 | * | | BLVL | | | | | | | | | | | | | GTS | EXC CHANNEL A ENA/DIS STATUS | |
| 044 | EXC CH B ENA 36 | V92X1351X | 44 | 15 | | 1.0 | * | | BLVL | | | | | | | | | | | | | GTS | EXC CHANNEL B ENA/DIS STATUS | |
| 045 | EXC CH DSBL 37 | ADDENDUM | 44 | 16 | | 1.0 | | | RTXT | | | | | | | | | | | | D | GTS | EXC CHANNEL DISABLE STATUS | |

TABLE 4.6.5-2. GENERAL TEST SUPPORT (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | | | |
| 046* | EXC RTRN CHW 38 | V92X0932X | 45 | 18 | | 4.0 | FAIL | | BLVL | | | | | | | | | | | | | GTS | S/L RETURN CHW FAILURE–EXC | X |
| 047 | EXC RTRN MSG 39 | V92X1366X | 45 | 19 | | 4.0 | FAIL | | BLVL | | | | | | | | | | | | | GTS | RETURN MDM MESSAGE FAILURE–EXC | |
| 048 | EXC COUPLER STATE | V92J1357C | 42 | 21 | | 4.0 | | | RTXT | | | | | | | | | | | | C | GTS | SL MDM COUPLER STATUS WD–STATE–EXC | |
| 049 | EXC COUPLER ERR CD | V92J1361C | 43 | 22 | | 3.0 | | | DEC | | | | | | | | | | | | | GTS | SL MDM COUPLER STATUS WD–ERRCD–EXC | |
| 050 | DES PMU 40 | V99X2450X | 13 | 5 | | 1.0 | * | | BLVL | | | | | | | | | | | | | GTS | DES/SEL PMU I/O IND | |
| 051 | DES PL 41 | V99X2451X | 20 | 5 | | 1.0 | * | | BLVL | | | | | | | | | | | | | GTS | DES/SEL PL I/O IND | |
| 052 | (MSG LINE) | V93X0050X | 1 | 25 | | 44.0 | | | CHAR | | | | | | | G | | | | | | UI | MESSAGE LINE | X |
| 053 | (BUFFER MSG) | V93X0054X | 45 | 25 | | 4.0 | | | CHAR | | | | | | | G | | | | | | UI | BUFFER MESSAGE INDICATOR | X |
| 054 | (SPL) | V93X0056X | 2 | 26 | | 49.0 | | | CHAR | | | | | | | G | | | | | | UI | SCRATCH PAD LINE | X |

TABLE 4.6.5-5. INPUT FUNCTIONAL PARAMETERS FOR GENERAL TEST SUPPORT (V5.1.5)

| FSSR NAME | M/S ID | NOMENCLATURE | SOURCE | UNITS | DATA TYPE | PREC | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|

NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE 4.6.5-6. OUTPUT FUNCTIONAL PARAMETERS FROM GENERAL TEST SUPPORT (V5.1.5)

| FSSR NAME | M/S ID | NOMENCLATURE | DESTINATION | UNITS | DATA TYPE | PREC | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|

NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

**Rate Codes: (HDR Only) 1 = 1 sample/sec 2 = 5 samples/sec 3 = 12.5 samples/sec 4 = 25 samples/sec 5 = 100 samples/sec**
**(HDR and LDR) A = 1 sample/sec B = 5 samples/sec C = 12.5 samples/sec D = 25 samples/sec E = 100 samples/sec**

TABLE 4.6.5-7. GENERAL TEST SUPPORT (V5.1.5) I-LOADS

| FSSR NAME | MSID | ENG UNITS | DT | PR | D | S | PR FCTN | MC | CAT | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|---|---|---|

NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE 4.6.5-8. GENERAL TEST SUPPORT (V5.1.5) K-LOADS

| FSSR NAME DESCRIPTION | MSID | MC | KLOAD VALUE | ENG UNITS | DT | P R | S | PR FCTN | LAST CR | R E V |
|---|---|---|---|---|---|---|---|---|---|---|

NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

## TABLE 4.6.5-9. GENERAL TEST SUPPORT (V5.1.5) CONSTANTS

| FSSR NAME<br>DESCRIPTION | MSID | MC | CONSTANT VALUE | ENG UNITS | DT | P<br>R | S | PR FCTN | LAST CR | R<br>E<br>V |
|---|---|---|---|---|---|---|---|---|---|---|

NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

## 4.6.6 GROUND IMU CONTROL/MONITOR (PFS)

TITLE: GND IMU CNTL/MON
TYPE: SPEC/104
AVAILABILITY: GN&C OPS 9

### 4.6.6.1 Purpose, Operation, and Organization

(1) GND IMU CNTL/MON Figure 4.6.6–1 is the Ground IMU Control/Monitor Display (PFS). This display supports IMU ground calibration, attitude determination, platform positioning, gyrocompassing, inertial, and TERM/IDLE functions. In addition, this display provides for a Mass Memory Read or Write of calibration parameters. The display shown in Figure 4.6.6–1 is called by keyboard request for the GND IMU control/monitor SPEC.

(2) IMU The top left portion of the display provides for manual input (Items 1 through 9) of the Euler angles NAV base–to–cluster coordinates for each IMU to support the platform positioning function. The position angles related to the longitudinal (X), lateral (Y), and normal (Z) body axes are required for each IMU, in degrees.

(3) OMI In the middle left portion of the display is output, on a cyclic basis, the outer (O), middle (M), inner (I), and inner roll (IR) gimbal angles (in degrees) for each IMU. Individual delta velocity ($\Delta$VX, $\Delta$VY, $\Delta$VZ) in feet–per–second–per–second in cluster coordinates is displayed for each IMU. Also, the RSS delta velocity ($\Delta$VRSS in feet per second) is displayed for each IMU.

(4) BITE (BIT) Below the gimbal angles and delta velocity, the hardware (HDW), software (S/W), and status (STAT) BITE words are displayed, in hexadecimal.

(5) PWR ON Below the BITE words is an indication (asterisk(*)) for the power–on status of each IMU; a blank indicates power off. There is also an indication of missing data for the I/O for each IMU. (M) indicates missing data; blank indicates either I/O data are present and normal or the data are not expected (IMU off). If a (M) is displayed, the associated IMU I/O data will be blanked.

(6) OPER The lower left portion of the display provides the capability to cause any, or all, of the IMU's to be placed in the operate mode. Execution of Items 10, 11, and 12 places IMU's 1, 2, and 3, respectively, in the standby mode. Execution of Items 13, 14 and 15 places IMU's 1, 2, and 3 respectively, in the operate mode. An asterisk(*) is displayed beside any executed Item.

(7) SEL–IMU The top right portion of the display contains the capability to select the IMU's for submode processing (calibration/alignment and mass memory read/write). Execution of Items 16, 17, and 18 selects IMU's 1, 2, and 3, respectively. An asterisk(*) is displayed next to the executed item. All three IMU's are deselected whenever a calibration/alignment function is terminated either automatically or through execution of Item 27 (see Paragraph 8). Selected IMU's are deselected automatically whenever three commfaults in a row are detected or when a submode is terminated, or when an IMU is placed in STANDBY.

(8) The middle right portion of the display is dedicated to specifying the calibration/alignment function to be executed, and to display the GC alignment goodness and misalignment correction limit test results; either blank or (FAIL) is displayed. (CPLT) is displayed upon completion of the two position gyrocompass alignment.

Execution of Item 19 initiates attitude determination.

Execution of Item 20 initiates Hangar Calibration A.

Execution of Item 21 initiates Hangar Calibration B.

Execution of Item 22 initiates Hangar Calibration C.

Execution of Item 23 initiates preflight calibration.

Execution of Item 24 initiates gyrocompassing processing.

Execution of Item 25 causes the inertial mode processing to be executed. (To be executed only when Item 24 is active; otherwise an "ILLEGAL ENTRY" error message is displayed.)

Execution of Item 26 initiates platform positioning.

Execution of Item 27 causes termination of any processing started by execution of Items 19 through 26 deselects any IMU selected via Items 16 through 18, and blanks any asterisk(*) displayed by Items 16 through 26.

An asterisk(*) is displayed to indicate the active status of the selected Item, 19 through 27. An asterisk(*) is automatically driven beside Item 27 if the IMU software automatically modes to TERM/IDLE.

(9) An "Item 28 + X(1, 2 or 3) EXEC" shall cause IMU calibration data to be written to the MASS MEMORY for all selected IMU's. The data entry (1 to 3) allows a particular area on MASS MEMORY to be updated. The MM write shall be automatically followed by a MM Read back and a comparison of the desired CHECKSUM (snapped in CORE at time of WRITE) to the Read back checksum will be made. If a Miscompare occurs, it shall be indicated by the status parameter defined below. An "Item 29 EXEC" shall cause selected, predefined IMU calibration data to be READ from the MASS MEMORY. The area for retrieval of the READ shall correspond to the selected area for the major function base overlay source. An "Item 28 or 29 EXEC" is valid only when the IMU's are in TERM/IDLE (asterisk (*) beside Item 27). An "ILLEGAL ENTRY" error message shall be displayed if an attempt is made to execute Items 28 or 29 if all IMU's are not in the TERM/IDLE mode.

The MM transaction status shall be indicated by the MM Status parameter as follows:

| OPERATION | TEXT |
|---|---|
| IN PROGRESS | IP |
| CHECKSUM FAIL or I/O FAIL | FAIL |
| COMPLETE ERROR FREE | CPLT |

The status parameter shall be initialized BLANK and reflect the status of last operation until RESET/REINITIALIZATION by Item 28 or 29.

(10) An "Item 30 + (1 to 9) EXEC" shall cause predefined site dependent data from an I–LOADED SITE look–up Table to be utilized by the software. An "Item 30 EXEC" is valid only when the IMU's are in TERM IDLE (asterisk(*) beside Item 27). The selected site and actual site shall be preserved across OPS transitions. An "ILLEGAL ENTRY" error message shall be displayed if an attempt is made to enter a value other than 1 through 9 or execute Item 30 when the IMU's are in any submode except TERM IDLE. The ACTUAL site selected shall be displayed as an alphanumeric character string (I–LOADED) below SITE SELECT once a valid selection has been made.

The actual site, SEL_TEST_ID, is output to the GPS SOP for subsequent GPS display support.

(11) An "ITEM 31 EXEC" shall cause the main memory values of the calibration parameters for the selected IMU(s) to be initialized with predefined generic IMU calibration parameters. An "ITEM 31 EXEC" is valid only when the IMU is in TERM/IDLE (asterisk (*) beside Item 27). An "Illegal Entry" error message shall be displayed if an attempt is made to execute Item 31 and the corresponding IMU is not in the TERM/IDLE mode. An "Illegal Entry" error message shall also be displayed if an attempt is made to execute Item 31 and there are no selected IMU's, otherwise an asterisk (*) shall be displayed beside Item 31 while the parameters are being updated.

### 4.6.6.2 GND IMU CONTROL/MONITOR (PFS) Keyboard Processing Addendum

A. Destination is ATT DET, PP, GC, G CAL, IP and TERM IDLE.

B. These signals are used for both the OPERATE and STBY CMD request and have two states as follows:

| State | CMD Request |
|---|---|
| 0 | STBY |
| 1 | OPER |

C. These signals are used for the SELECT CMD REQUEST OR COMMFAULT initiated DESELECTS and have two states as follows:

| State | CMD Request |
|---|---|
| 0 | DESELECT * |
| 1 | SELECT |

*DESELECT may be caused by entering of the Item TERM/IDLE, by COMMFAULT, or downmoding of the IMU's to standby, or by completing a submode (with the exception of the GC align MODE).

D. Item Entry 30 Site Selection Support for GPS. Please note that this note only addresses actions taken based on Item Entry 30 for GPS unique processing (existing actions to support the IMU principal functions are unchanged).

Legal execution of Item Entry 30 will cause NAVBASE_ALT_ZERO, NAVBASE_LAT_ZERO, NAVBASE_LONG_ZERO, PHI_OUT, PSI_OUT, and THETA_OUT to be updated to the I-Load values as a function of the site index entered via Item Entry 30 per the following table:

| OUTPUT PARAMETERS | | | | | | |
|---|---|---|---|---|---|---|
| SITE SELECT # (ITEM 30) | NAVBASE_ ALT_ZERO V90H3527C | NAVBASE_ LAT_ZERO V90H3528C | NAVBASE_ LONG_ZERO V90H3529C | PHI_OUT V94H6066C | PSI_OUT V94H6067C | THETA_OUT V94H6068C |
| Default Initialization | NAV_ALT(1) V97U5749CA | NAV_LAT(1) V97U5750CA | NAV_LONG(1) V97U5751CA | PAD_PHI(1) V97U2894CA | PAD_PSI(1) V97U2895CA | PAD_THETA(1) V97U2896CA |
| 1 | NAV_ALT(1) V97U5749CA | NAV_LAT(1) V97U5750CA | NAV_LONG(1) V97U5751CA | PAD_PHI(1) V97U2894CA | PAD_PSI(1) V97U2895CA | PAD_THETA(1) V97U2896CA |
| 2 | NAV_ALT(2) V97U5749CB | NAV_LAT(2) V97U5750CB | NAV_LONG(2) V97U5751CB | PAD_PHI(2) V97U2894CB | PAD_PSI(2) V97U2895CB | PAD_THETA(2) V97U2896CB |
| 3 | NAV_ALT(3) V97U5749CC | NAV_LAT(3) V97U5750CC | NAV_LONG(3) V97U5751CC | PAD_PHI(3) V97U2894CC | PAD_PSI(3) V97U2895CC | PAD_THETA(3) V97U2896CC |
| 4 | NAV_ALT(4) V97U5749CD | NAV_LAT(4) V97U5750CD | NAV_LONG(4) V97U5751CD | PAD_PHI(4) V97U2894CD | PAD_PSI(4) V97U2895CD | PAD_THETA(4) V97U2896CD |
| 5 | NAV_ALT(5) V97U5749CE | NAV_LAT(5) V97U5750CE | NAV_LONG(5) V97U5751CE | PAD_PHI(5) V97U2894CE | PAD_PSI(5) V97U2895CE | PAD_THETA(5) V97U2896CE |
| 6 | NAV_ALT(6) V97U5749CF | NAV_LAT(6) V97U5750CF | NAV_LONG(6) V97U5751CF | PAD_PHI(6) V97U2894CF | PAD_PSI(6) V97U2895CF | PAD_THETA(6) V97U2896CF |
| 7 | NAV_ALT(7) V97U5749CG | NAV_LAT(7) V97U5750CG | NAV_LONG(7) V97U5751CG | PAD_PHI(7) V97U2894CG | PAD_PSI(7) V97U2895CG | PAD_THETA(7) V97U2896CG |
| 8 | NAV_ALT(8) V97U5749CH | NAV_LAT(8) V97U5750CH | NAV_LONG(8) V97U5751CH | PAD_PHI(8) V97U2894CH | PAD_PSI(8) V97U2895CH | PAD_THETA(8) V97U2896CH |
| 9 | NAV_ALT(9) V97U5749CI | NAV_LAT(9) V97U5750CI | NAV_LONG(9) V97U5751CI | PAD_PHI(9) V97U2894CI | PAD_PSI(9) V97U2895CI | PAD_THETA(9) V97U2896CI |

Outputs NAVBASE_ALT_ZERO, NAVBASE_LAT_ZERO, NAVBASE_LONG_ZERO, PHI_OUT, PSI_OUT, THETA_OUT and R_REF_OUT shall be in the GN&C major function base to preserve values for carry over into GN&C OPS 1, and from GN&C OPS 3 and OPS 6 into GN&C OPS 9.

Reference state position vector for GPS receivers 1, 2 and 3 shall be computed based on the values of NAVBASE_ALT_ZERO, NAVBASE_LAT_ZERO, and NAVBASE_LONG_ZERO as follows:

$\overline{R}_REF_OUT_j$ = TRANSPOSE (M_WGS84_TO_EF)
GEODETIC_TO_EF(NAVBASE_LAT_ZERO,
NAVBASE_LONG_ZERO, NAVBASE_ALT_ZERO)

for j = 1, 2, and 3.

where the GEODETIC_TO_EF function is defined as

GEODETIC_TO_EF(LAT_GEOD, LON, ALT) = $\overline{R}$_EF

WHERE: $\overline{R}$_EF IS CALCULATED WITHIN THE FUNCTION AS:
CLAT = COS(LAT_GEOD), SLAT = SIN(LAT_GEOD)
DUM = $(1 - ELLIPT)^2$
DUM1 = EARTH_RADIUS_EQUATOR / $(CLAT^2 + SLAT^2\ DUM)^{1/2}$
R_EF_EQUAT = (DUM1 + ALT)CLAT
$\overline{R}$_EF = (R_EF_EQUAT COS(LON), R_EF_EQUAT SIN(LON),
(DUM DUM1 + ALT)SLAT)

$R_REF_OUT_j$ shall be initialized upon entry to GN&C OPS 9 (previous OPS = 0) or on recycling from GN&C OPS 1 (previous OPS = 1). Prior value shall carry over in the GN&C Major Function base for entry into GN&C OPS 9 from GN&C OPS 3 and GN&C OPS 6.

E. Item Entry 31 Generic IMU Calibration Parameters Install Support. Legal execution of Item Entry 31 shall cause the GPC main memory representations of the selected IMU's calibration parameters to be updated with K-loaded values. The assignments shall be made according to the following table:

GENERIC IMU CALIBRATION PARAMETER INSTALL

| MSID - NOMENCLATURE (generic term) | ITEM 31 SHALL UPDATE SELECTED CALIBRATION TERMS (actual terms: x = 1, x = 2, or x = 3) |
|---|---|
| V98U7092C - KIX_G | KIX(x) - V99A2520CC, V99A2521CC, or V99A2522CC |
| V98U7094C - KIY_G | KIY(x) - V99A2523CC, V99A2524CC, or V99A2525CC |
| V98U7096C - KIZ_G | KIZ(x) - V99A2526CC, V99A2527CC, or V99A2528CC |
| V98U7098C - KOX_G | KOX(x) - V99G2530CD, V99G2531CD, or V99G2532CD |
| V98U7100C - KOY_G | KOY(x) - V99G2533CD, V99G2534CD, or V99G2535CD |
| V98U7102C - KOZ_G | KOZ(x) - V99G2536CD, V99G2537CD, or V99G2538CD |
| V98U7093C - KIXH_G | KIXH(x) - V99A2681CC, V99A2682CC, or V99A2683CC |
| V98U7095C - KIYH_G | KIYH(x) - V99A2684CC, V99A2685CC, or V99A2686CC |
| V98U7097C - KIZH_G | KIZH(x) - V99A2687CC, V99A2688CC, or V99A2689CC |
| V98U7099C - KOXH_G | KOXH(x) - V99G2670CC, V99G2671CC, or V99G2672CC |
| V98U7101C - KOYH_G | KOYH(x) - V99G2673CC, V99G2674CC, or V99G2675CC |
| V98U7103C - KOZH_G | KOZH(x) - V99G2676CC, V99G2677CC, or V99G2678CC |
| V98U7107C - KTX_G | KTX(x) - V99G2500CC, V99G2501CC, or V99G2502CC |

GENERIC IMU CALIBRATION PARAMETER INSTALL

| MSID - NOMENCLATURE (generic term) | ITEM 31 SHALL UPDATE SELECTED CALIBRATION TERMS (actual terms: | x = 1, | x = 2, | or | x = 3) |
|---|---|---|---|---|---|
| V98U7108C - KTY_G | KTY(x) | - V99G2503CC, | V99G2504CC, | or | V99G2505CC |
| V98U7109C - KTZ_G | KTZ(x) | - V99G2506CC, | V99G2507CC, | or | V99G2508CC |
| V98U7064C - DFX_G | DFX(x) | - V99R2560CD, | V99R2561CD, | or | V99R2562CD |
| V98U7065C - DFY_G | DFY(x) | - V99R2563CD, | V99R2564CD, | or | V99R2565CD |
| V98U7066C - DFZ_G | DFZ(x) | - V99R2566CD, | V99R2567CD, | or | V99R2568CD |
| V98U7104C - KSX_G | KSX(x) | - V99A2510CC, | V99A2511CC, | or | V99A2512CC |
| V98U7105C - KSY_G | KSY(x) | - V99A2513CC, | V99A2514CC, | or | V99A2515CC |
| V98U7106C - KSZ_G | KSZ(x) | - V99A2516CC, | V99A2517CC, | or | V99A2518CC |
| V98U7116C - RO_G | RO(x) | - V90H7650C, | V90H7651C, | or | V90H7652C |
| V98U7113C - PO_G | PO(x) | - V99H2620CC, | V99H2621CC, | or | V99H2622CC |
| V98U7050C - AZO_G | AZO(x) | - V99H2610CC, | V99H2611CC, | or | V99H2612CC |
| V98U7079C - IRO_G | IRO(x) | - V99H2615CC, | V99H2616CC, | or | V99H2617CC |
| V98U7067C - DIR_G | DIR(x) | - V99U5955C, | V99U5956C, | or | V99U5957C |
| V98U7070C - DOR_G | DOR(x) | - V99U5958C, | V99U5959C, | or | V99U5960C |
| V98U7073C - DSR_G | DSR(x) | - V99U5961C, | V99U5962C, | or | V99U5963C |
| V98U7110C - KXR_G | KXR(x) | - V99U5964C, | V99U5965C, | or | V99U5966C |
| V98U7111C - KYR_G | KYR(x) | - V99U5967C, | V99U5968C, | or | V99U5969C |
| V98U7112C - KZR_G | KZR(x) | - V99U5970C, | V99U5971C | or | V99U5972C |
| V98U7058C - DELTXZ_G | DELTXZ(x) | - V99H2552CC, | V99H2553CC, | or | V99H2554CC |
| V98U7059C - DELTYX_G | DELTYX(x) | - V99H2540CC, | V99H2541CC, | or | V99H2542CC |
| V98U7060C - DELTYZ_G | DELTYZ(x) | - V99H2549CC, | V99H2550CC, | or | V99H2551CC |
| V98U7061C - DELTZX_G | DELTZX(x) | - V99H2543CC, | V99H2544CC, | or | V99H2545CC |
| V98U7062C - DELTZY_G | DELTZY(x) | - V99H2546CC, | V99H2547CC, | or | V90H2548CC |
| V98U7051C - BXY_G | BXY(x) | - V99H2590CC, | V99H2591CC, | or | V99H2592CC |
| V98U7052C - BXZ_G | BXZ(x) | - V99H2593CC, | V99H2594CC, | or | V99H2595CC |
| V98U7053C - BYX_G | BYX(x) | - V99H2596CC, | V99H2597CC, | or | V99H2598CC |
| V98U7054C - BYZ_G | BYZ(x) | - V99H2599CC, | V99H2600CC, | or | V99H2601CC |
| V98U7055C - BZX_G | BZX(x) | - V99H2602CC, | V99H2603CC, | or | V99H2604CC |
| V98U7056C - BZY_G | BZY(x) | - V99H2605CC, | V99H2606CC, | or | V99H2607CC |
| V98U7074C - DSX_G | DSX(x) | - V99U2576CC, | V99U2577CC, | or | V99U2578CC |
| V98U7075C - DSZ_G | DSZ(x) | - V99U2579CC, | V99U2580CC, | or | V99U2581CC |
| V98U7068C - DIX_G | DIX(x) | - V99U2570CC, | V99U2571CC, | or | V99U2572CC |
| V98U7069C - DIZ_G | DIZ(x) | - V99U2573CC, | V99U2574CC, | or | V99U2575CC |
| V98U7071C - DOZ_G | DOZ(x) | - V99U2582CC, | V99U2583CC, | or | V99U2584CC |
| V98U7072C - DP_G | DP(x) | - V99H2660CC, | V99H2661CC, | or | V99H2662CC |
| V98U7063C - DFR_G | DFR(x) | - V99U5952C, | V99U5953C, | or | V99U5954C, |
| V98U7080C - KAX_G | KAX(x) | - V99U5978C, | V99U5979C, | or | V99U5980C, |
| V98U7082C - KAY_G | KAY(x) | - V99U5981C, | V99U5982C, | or | V99U5983C, |
| V98U7084C - KAZ_G | KAZ(x) | - V99U5984C, | V99U5985C, | or | V99U5986C, |
| V98U7086C - KBX_G | KBX(x) | - V99U5987C, | V99U5988C, | or | V99U5989C, |

GENERIC IMU CALIBRATION PARAMETER INSTALL

| MSID - NOMENCLATURE (generic term) | ITEM 31 SHALL UPDATE SELECTED CALIBRATION TERMS (actual terms: x = 1, x = 2, or x = 3) | | | |
|---|---|---|---|---|
| V98U7088C - KBY_G | KBY(x) | - V99U5990C, | V99U5991C, | or V99U5992C, |
| V98U7090C - KBZ_G | KBZ(x) | - V99U5993C, | V99U5994C, | or V99U5995C, |
| V98U7081C - KAXH_G | KAXH(x) | - V98U7927C, | V98U7928C, | or V98U7929C, |
| V98U7083C - KAYH_G | KAYH(x) | - V98U7930C, | V98U7931C, | or V98U7932C, |
| V98U7085C - KAZH_G | KAZH(x) | - V98U7933C, | V98U7934C, | or V98U7935C, |
| V98U7087C - KBXH_G | KBXH(x) | - V98U7936C, | V98U7937C, | or V98U7938C, |
| V98U7089C - KBYH_G | KBYH(x) | - V98U7939C, | V98U7940C, | or V98U7941C, |
| V98U7091C - KBZH_G | KBZH(x) | - V98U7942C, | V98U7943C, | or V98U7944C, |
| V98U7114C - RGAO_G | RGAO(x) | - V99U9559C, | V99U9560C, | or V99U9561C, |
| V98U7115C - RGPO_G | RGPO(x) | - V99U9562C, | V99U9563C, | or V99U9564C, |
| V98U7076C - DU_G | DU(x) | - V99U7545C, | V99U7546C, | or V99U7547C, |
| V98U7057C - DDFR_G | DDFR(x) | - V99U5870C, | V99U5871C, | or V99U5872C, |
| V98U7077C - HSY_G | HSxY | - V96U7072C, | V96U7073C, | or V96U7074C, |
| V98U7078C - HSZ_G | HSxZ | - V96U7069C, | V96U7070C, | or V96U7071C |

### 4.6.6.3 GND IMU CONTROL/MONITOR (PFS) CRT Display Processing Addendum

The table below presents the stand–alone parameter status indicators (PSI) that can be displayed for a parameter. PSI requirements are identified by the word “STAT” being inserted in the FORMAT TYPE column and a numeric code appearing as an entry (right justified) in the ADD REF column of CRT display processing Table 4.6.6–2. The numeric code, corresponding to one of those listed in the table, indicates the specific status processing to be performed. If there is no numeric code entry, the status processing is defined by the default code.

When the “M” PSI is displayed (for Commfault, I/O error resulting in missing data), the associated parameter value data field shall be blanked unless specified otherwise.

| Numeric Code | PSI SYMBOL(S) | | | | | |
|---|---|---|---|---|---|---|
| Default (blank) | ↓ | | | M | ⊬ | |
| 1 | ↓ | ↑ | | M | ⊬ | |
| 2 | | ↑ | | M | ⊬ | |
| 3 | ↓ | | | | ⊬ | |
| 4 | | ↑ | | | ⊬ | |
| 5 | ↓ | | ? | | ⊬ | |
| 6 | ↓ | ↑ | | | ⊬ | |
| 7 | | | | M | ⊬ | |
| 8 | ↓ | | ? | M | ⊬ | |
| 9 | | | ? | M | ⊬ | |

⊬ = blank

The following alpha code(s) appear (left justified) in the ADD REF column of Table 4.6.6–2 whenever it is necessary to define any special processing requirements not otherwise covered therein:

A. Signal sources are PP, GC, ATT DET, IP, G CAL, TERM/IDLE

B. The MM Transaction will be displayed according to the table below:

| MM STATUS | DISPLAY TEXT |
|---|---|
| IN PROGRESS | IP |
| FAIL (CHECKSUM or I/O) | FAIL |
| COMPLETE (ERROR FREE) | CPLT |

C. IMU ACTUAL Current Site Select Displayed.

The alphanumeric character string to be displayed for the IMU ACTUAL current site selected is a function of the SITE SELECT (V93J6061C) number entered (Default is Site number 1). Table 4.6.6.3–1 contains a listing of the I–Load Parameters for each Site number (1–9). The values (Character Strings) for these I–Loads are defined in the JSC–19350 STS Flight Software Initialization Load.

TABLE 4.6.6.3-1. IMU SITE IDENTIFIER PARAMETERS

| SITE SELECT Number (V93J6061C) | SITE SYMBOLIC NAME | I–LOAD MSID |
|---|---|---|
| 1 | TEST_SITE_1 | V96U7504C |
| 2 | TEST_SITE_2 | V96U7505C |
| 3 | TEST_SITE_3 | V96U7506C |
| 4 | TEST_SITE_4 | V96U7507C |
| 5 | TEST_SITE_5 | V96U7508C |
| 6 | TEST_SITE_6 | V96U7509C |
| 7 | TEST_SITE_7 | V96U8510C |
| 8 | TEST_SITE_8 | V96U8511C |
| 9 | TEST_SITE_9 | V96U8512C |

D. Upon entering an “ITEM 31 EXEC” an asterisk (*) shall be displayed for no less than one second.

### 4.6.6.4 GND IMU CONTROL/MONITOR Figure/Table References

Figure 4.6.6–1 GND IMU Control/Monitor Display (PFS)

Table 4.6.6–1 Keyboard Processing Table

Table 4.6.6–2 CRT Display Processing Table

Table 4.6.6–3 CRT Display Processing Background Requirements N/A

Table 4.6.6–4 Mission Design Background Constants N/A

Table 4.6.6–5 Input Functional Parameters

Table 4.6.6–6 Output Functional Parameters

Table 4.6.6–7 I–Loads

Table 4.6.6–8 K–Loads

Table 4.6.6–9 Constants

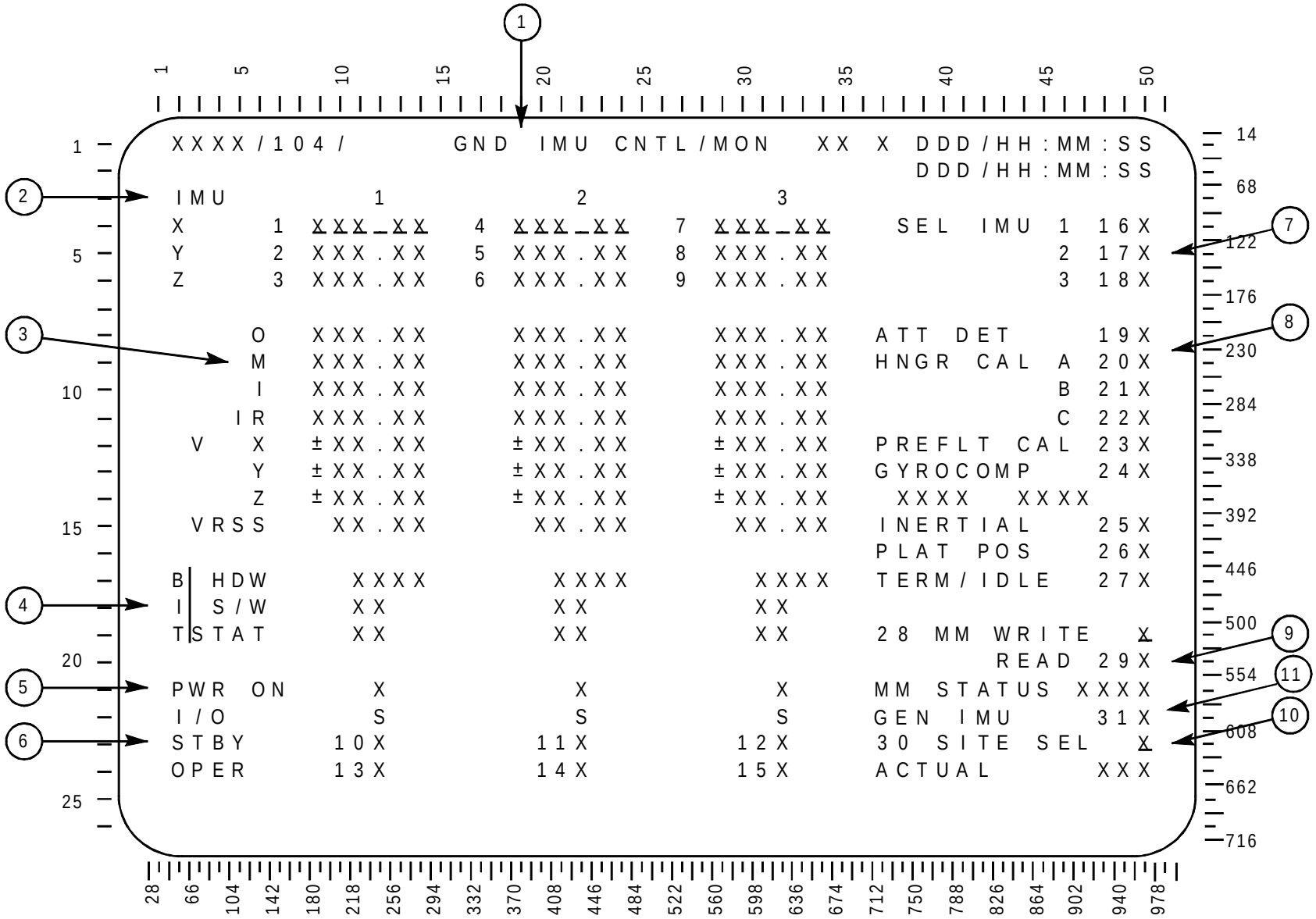


FIGURE 4.6.6-1. Ground IMU Control/Monitor Display (PFS)

TABLE 4.6.6-1. GND IMU CNTL/MON (PFS) KEYBOARD PROCESSING

| Seq | CRT Signal Name | M/S ID | CHAR | TYPE | UNITS | DK | ITEM | Item No. Limits | | Add Ref | Destination | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | MIN | MAX | | | | |
| 001 | IMU 1 X 1 | V93H6001C | 7.2 | DEC | DEG | | 1 | | | | PP,CRT | IMU 1 DSRD CLSTR TO NB ROLL ANGLE | X |
| 002 | IMU 1 Y 2 | V93H6002C | 7.2 | DEC | DEG | | 2 | | | | PP,CRT | IMU 1 DSRD CLSTR TO NB PITCH ANGLE | X |
| 003 | IMU 1 Z 3 | V93H6003C | 7.2 | DEC | DEG | | 3 | | | | PP,CRT | IMU 1 DSRD CLSTR TO NB AZMTH ANGLE | X |
| 004 | IMU 2 X 4 | V93H6007C | 7.2 | DEC | DEG | | 4 | | | | PP,CRT | IMU 2 DSRD CLSTR TO NB ROLL ANGLE | X |
| 005 | IMU 2 Y 5 | V93H6008C | 7.2 | DEC | DEG | | 5 | | | | PP,CRT | IMU 2 DSRD CLSTR TO NB PITCH ANGLE | X |
| 006 | IMU 2 Z 6 | V93H6009C | 7.2 | DEC | DEG | | 6 | | | | PP,CRT | IMU 2 DSRD CLSTR TO NB AZMTH ANGLE | X |
| 007 | IMU 3 X 7 | V93H6013C | 7.2 | DEC | DEG | | 7 | | | | PP,CRT | IMU 3 DSRD CLSTR TO NB ROLL ANGLE | X |
| 008 | IMU 3 Y 8 | V93H6014C | 7.2 | DEC | DEG | | 8 | | | | PP,CRT | IMU 3 DSRD CLSTR TO NB PITCH ANGLE | X |
| 009 | IMU 3 Z 9 | V93H6015C | 7.2 | DEC | DEG | | 9 | | | | PP,CRT | IMU 3 DSRD CLSTR TO NB AZMTH ANGLE | X |
| 010 | IMU 1 STBY 10 | V93X6020X | 0.0 | CTRL | | | 10 | | | AB | PP,GC,IP | IMU 1 OPERATE/STBY REQUEST | X |
| 011 | IMU 2 STBY 11 | V93X6021X | 0.0 | CTRL | | | 11 | | | AB | PP,GC,IP | IMU 2 OPERATE/STBY REQUEST | X |
| 012 | IMU 3 STBY 12 | V93X6022X | 0.0 | CTRL | | | 12 | | | AB | PP,GC,IP | IMU 3 OPERATE/STBY REQUEST | X |
| 013* | IMU 1 OPER 13 | V93X6020X | 0.0 | CTRL | | | 13 | | | AB | PP,GC,IP | IMU 1 OPERATE/STBY REQUEST | X |
| 014* | IMU 2 OPER 14 | V93X6021X | 0.0 | CTRL | | | 14 | | | AB | PP,GC,IP | IMU 2 OPERATE/STBY REQUEST | X |
| 015* | IMU 3 OPER 15 | V93X6022X | 0.0 | CTRL | | | 15 | | | AB | PP,GC,IP | IMU 3 OPERATE/STBY REQUEST | X |
| 016 | SEL IMU 1 16 | V93X6026X | 0.0 | CTRL | | | 16 | | | AC | PP,GC,IP | IMU 1 SELECT | X |
| 017 | SEL IMU 2 17 | V93X6027X | 0.0 | CTRL | | | 17 | | | AC | PP,GC,IP | IMU 2 SELECT | X |
| 018 | SEL IMU 3 18 | V93X6028X | 0.0 | CTRL | | | 18 | | | AC | PP,GC,IP | IMU 3 SELECT | X |
| 019 | ATT DET 19 | V93X6030X | 0.0 | CTRL | | | 19 | | | | TERM IDL | ATT DET COMMAND | X |
| 020 | HNGR CAL A 20 | V93X6040X | 0.0 | CTRL | | | 20 | | | | TERM IDL | HGR CAL A COMMAND | X |

TABLE 4.6.6-1. GND IMU CNTL/MON (PFS) KEYBOARD PROCESSING

| Seq | CRT Signal Name | M/S ID | CHAR | TYPE | UNITS | DK | ITEM | Item No. Limits | | Add Ref | Destination | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | MIN | MAX | | | | |
| 021 | HNGR CAL B 21 | V93X6041X | 0.0 | CTRL | | | 21 | | | | TERM IDL | HGR CAL B COMMAND | X |
| 022 | HNGR CAL C 22 | V93X6042X | 0.0 | CTRL | | | 22 | | | | TERM IDL | HGR CAL C COMMAND | X |
| 023 | PREFLT CAL 23 | V93X6045X | 0.0 | CTRL | | | 23 | | | | TERM IDL | PREFLT CAL COMMAND | X |
| 024 | GYROCOMP 24 | V93X6047X | 0.0 | CTRL | | | 24 | | | | TERM IDL | GYROCOMP COMMAND | X |
| 025 | INERTIAL 25 | V93X6050X | 0.0 | CTRL | | | 25 | | | | GC | INERTIAL COMMAND | X |
| 026 | PLAT POS 26 | V93X6052X | 0.0 | CTRL | | | 26 | | | | TERM IDL | PLAT POS SUBMODE CMD | X |
| 027 | TERM/IDLE 27 | V93X6055X | 0.0 | CTRL | | | 27 | | | A | PP,GC,IP | TERM/IDLE COMMAND | X |
| 028 | 28 MM WRITE | V93J6060C | 2.0 | DEC | | | 28 | 1 | 3 | | FCOS,CRT | IMU MM WRITE COMMAND | X |
| 029 | MM READ 29 | V93X6057X | 0.0 | CTRL | | | 29 | | | | FCOS | IMU MM READ COMMAND | X |
| 030 | 30 SITE SEL | V93J6061C | 2.0 | DEC | | | 30 | 1 | 9 | D | CRT | SITE SELECT | X |
| 031 | GEN IMU 31 | V93X6100X | 0.0 | CTRL | | | 31 | | | E | CRT | GENERIC IMU INSTALL CMD | X |

TABLE 4.6.6-2. GND IMU CNTL/MON (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | | | |
| 001 | (OPS) | V93X0040X | 2 | 1 | | 5.0 | | | CHAR | | | | | | | E | | | | | | UI | OPS FUNCTION PAGE | X |
| 002 | (SPEC) | V93X0042X | 7 | 1 | | 4.0 | | | CHAR | | | | | | | E | | | | | | UI | SPEC FUNCTION PAGE | X |
| 003 | (DISP) | V93X0044X | 10 | 1 | | 4.0 | | | DEC | | | | | | | E | | | | | | UI | DISPLAY FUNCTION PAGE | X |
| 004 | (UL) | V92X5032X | 34 | 1 | | 2.0 | UL | | BLVL | | | | | | X | G | | | | | | UI | UPLINK ACTIVITY IND | X |
| 005 | (GPC) | V93X0048X | 36 | 1 | | 2.0 | | | DEC | | | | | | | E | | | | | | UI | GPC DRIVER | X |
| 006 | (MT) | V91W1990C | 39 | 1 | | 12.0 | | | CHAR | DHMS | | | | | | A | | | | | | FCOS | MISSION ELAPSED TIME | X |
| 007 | (CRT TIMER) | V91W1987C | 39 | 2 | | 12.0 | | | CHAR | DHMS | | | | | | A | | | | | | FCOS | DISPLAY CRT TIMER,GNC | X |
| 008 | IMU 1 X 1 | V93H6001C | 8 | 4 | | 7.2 | | | DEC | DEG | | | | | | | | | | | | KYBD | IMU 1 DSRD CLSTR TO NB ROLL ANGLE | X |
| 009 | IMU 1 Y 2 | V93H6002C | 8 | 5 | | 7.2 | | | DEC | DEG | | | | | | | | | | | | KYBD | IMU 1 DSRD CLSTR TO NB PITCH ANGLE | X |
| 010 | IMU 1 Z 3 | V93H6003C | 8 | 6 | | 7.2 | | | DEC | DEG | | | | | | | | | | | | KYBD | IMU 1 DSRD CLSTR TO NB AZMTH ANGLE | X |
| 011 | IMU 2 X 4 | V93H6007C | 18 | 4 | | 7.2 | | | DEC | DEG | | | | | | | | | | | | KYBD | IMU 2 DSRD CLSTR TO NB ROLL ANGLE | X |
| 012 | IMU 2 Y 5 | V93H6008C | 18 | 5 | | 7.2 | | | DEC | DEG | | | | | | | | | | | | KYBD | IMU 2 DSRD CLSTR TO NB PITCH ANGLE | X |
| 013 | IMU 2 Z 6 | V93H6009C | 18 | 6 | | 7.2 | | | DEC | DEG | | | | | | | | | | | | KYBD | IMU 2 DSRD CLSTR TO NB AZMTH ANGLE | X |
| 014 | IMU 3 X 7 | V93H6013C | 28 | 4 | | 7.2 | | | DEC | DEG | | | | | | | | | | | | KYBD | IMU 3 DSRD CLSTR TO NB ROLL ANGLE | X |
| 015 | IMU 3 Y 8 | V93H6014C | 28 | 5 | | 7.2 | | | DEC | DEG | | | | | | | | | | | | KYBD | IMU 3 DSRD CLSTR TO NB PITCH ANGLE | X |
| 016 | IMU 3 Z 9 | V93H6015C | 28 | 6 | | 7.2 | | | DEC | DEG | | | | | | | | | | | | KYBD | IMU 3 DSRD CLSTR TO NB AZMTH ANGLE | X |
| 017 | IMU 1 O | V95H0054C | 8 | 8 | | 7.2 | | | DEC | DEG | | | | | | | | | | | A | PP,GC,IP | IMU 1 COMP OUTER ROLL RES ANGLE | X |
| 018 | IMU 1 M | V95H0050C | 8 | 9 | | 7.2 | | | DEC | DEG | | | | | | | | | | | A | PP,GC,IP | IMU 1 COMP PITCH RES ANGLE | X |
| 019 | IMU 1 I | V95H0051C | 8 | 10 | | 7.2 | | | DEC | DEG | | | | | | | | | | | A | PP,GC,IP | IMU 1 COMP AZIMUTH RES ANGLE | X |
| 020 | IMU 1 IR | V95H0053C | 8 | 11 | | 7.2 | | | DEC | DEG | | | | | | | | | | | A | PP,GC,IP | IMU 1 COMP INNER ROLL RES ANGLE | X |

## TABLE 4.6.6-2. GND IMU CNTL/MON (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | | | |
| 021 | IMU 1 DELTA V X | V95L0056C | 9 | 12 | | 6.2 | | | DEC | FPS2 | | | | | | | X | | | | A | PP,GC,IP | IMU 1 X AXIS DEL VEL OVER 1 SEC | X |
| 022 | IMU 1 DELTA V Y | V95L0057C | 9 | 13 | | 6.2 | | | DEC | FPS2 | | | | | | | X | | | | A | PP,GC,IP | IMU 1 Y AXIS DEL VEL OVER 1 SEC | X |
| 023 | IMU 1 DELTA V Z | V95L0058C | 9 | 14 | | 6.2 | | | DEC | FPS2 | | | | | | | X | | | | A | PP,GC.IP | IMU 1 Z AXIS DEL VEL OVER 1 SEC | X |
| 024 | IMU 1 DELTA V RSS | V95L0060C | 9 | 15 | | 6.2 | | | DEC | FPS2 | | | | | | | | | | | A | PP,GC,IP | IMU 1 SENSED CHANGE IN VEL(1 SEC) | X |
| 025 | IMU 2 O | V95H1054C | 18 | 8 | | 7.2 | | | DEC | DEG | | | | | | | | | | | A | PP,GC,IP | IMU 2 COMP OUTER ROLL RES ANGLE | X |
| 026 | IMU 2 M | V95H1050C | 18 | 9 | | 7.2 | | | DEC | DEG | | | | | | | | | | | A | PP,GC,IP | IMU 2 COMP PITCH RES ANGLE | X |
| 027 | IMU 2 I | V95H1051C | 18 | 10 | | 7.2 | | | DEC | DEG | | | | | | | | | | | A | PP,GC,IP | IMU 2 COMP AZIMUTH RES ANGLE | X |
| 028 | IMU 2 IR | V95H1053C | 18 | 11 | | 7.2 | | | DEC | DEG | | | | | | | | | | | A | PP,GC,IP | IMU 2 COMP INNER ROLL RES ANGLE | X |
| 029 | IMU 2 DELTA V X | V95L1056C | 19 | 12 | | 6.2 | | | DEC | FPS2 | | | | | | | X | | | | A | PP,GC,IP | IMU 2 X AXIS DEL VEL OVER 1 SEC | X |
| 030 | IMU 2 DELTA V Y | V95L1057C | 19 | 13 | | 6.2 | | | DEC | FPS2 | | | | | | | X | | | | A | PP,GC,IP | IMU 2 Y AXIS DEL VEL OVER 1 SEC | X |
| 031 | IMU 2 DELTA V Z | V95L1058C | 19 | 14 | | 6.2 | | | DEC | FPS2 | | | | | | | X | | | | A | PP,GC,IP | IMU 2 Z AXIS DEL VEL OVER 1 SEC | X |
| 032 | IMU 2 DELTA V RSS | V95L1060C | 19 | 15 | | 6.2 | | | DEC | FPS2 | | | | | | | | | | | A | PP,GC,IP | IMU 2 SENSED CHANGE IN VEL(1 SEC) | X |
| 033 | IMU 3 O | V95H2054C | 28 | 8 | | 7.2 | | | DEC | DEG | | | | | | | | | | | A | PP,GC,IP | IMU 3 COMP OUTER ROLL RES ANGLE | X |
| 034 | IMU 3 M | V95H2050C | 28 | 9 | | 7.2 | | | DEC | DEG | | | | | | | | | | | A | PP,GC,IP | IMU 3 COMP PITCH RES ANGLE | X |
| 035 | IMU 3 I | V95H2051C | 28 | 10 | | 7.2 | | | DEC | DEG | | | | | | | | | | | A | PP,GC,IP | IMU 3 COMP AZIMUTH RES ANGLE | X |
| 036 | IMU 3 IR | V95H2053C | 28 | 11 | | 7.2 | | | DEC | DEG | | | | | | | | | | | A | PP,GC,IP | IMU 3 COMP INNER ROLL RES ANGLE | X |

TABLE 4.6.6-2. GND IMU CNTL/MON (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | | | |
| 037 | IMU 3 DELTA V X | V95L2056C | 29 | 12 | | 6.2 | | | DEC | FPS2 | | | | | | | X | | | | A | PP,GC,IP | IMU 3 X AXIS DEL VEL OVER 1 SEC | X |
| 038 | IMU 3 DELTA V Y | V95L2057C | 29 | 13 | | 6.2 | | | DEC | FPS2 | | | | | | | X | | | | A | PP,GC,IP | IMU 3 Y AXIS DEL VEL OVER 1 SEC | X |
| 039 | IMU 3 DELTA V Z | V95L2058C | 29 | 14 | | 6.2 | | | DEC | FPS2 | | | | | | | X | | | | A | PP,GC,IP | IMU 3 Z AXIS DEL VEL OVER 1 SEC | X |
| 040 | IMU 3 DELTA V RSS | V95L2060C | 29 | 15 | | 6.2 | | | DEC | FPS2 | | | | | | | | | | | A | PP,GC,IP | IMU 3 SENSED CHANGE IN VEL(1 SEC) | X |
| 041 | IMU 1 HYD BITE | V95Q0077C | 11 | 17 | | 4.0 | | | HEX | | | | | | | | | | | | A | PP,GC,IP | IMU 1 HEX MODE/BITE STATUS WORD | X |
| 042 | IMU 1 S/W BITE | V95X0046X | 11 | 18 | | 2.0 | | | HEX | | | | | | | | | | | | A | PP,GC,IP | IMU 1 SW BITE STATUS | X |
| 043 | IMU 1 BITE STAT | V95Q0076C | 11 | 19 | | 2.0 | | | HEX | | | | | | | | | | | | A | PP,GC,IP | IMU 1 HEX DISCRETE WORD | X |
| 044 | IMU 2 HYD BITE | V95Q1077C | 21 | 17 | | 4.0 | | | HEX | | | | | | | | | | | | A | PP,GC,IP | IMU 2 HEX MODE/BITE STATUS WORD | X |
| 045 | IMU 2 S/W BITE | V95X1046X | 21 | 18 | | 2.0 | | | HEX | | | | | | | | | | | | A | PP,GC,IP | IMU 2 SW BITE STATUS | X |
| 046 | IMU 2 BITE STAT | V95Q1076C | 21 | 19 | | 2.0 | | | HEX | | | | | | | | | | | | A | PP,GC,IP | IMU 2 HEX DISCRETE WORD | X |
| 047 | IMU 3 HYD BITE | V95Q2077C | 31 | 17 | | 4.0 | | | HEX | | | | | | | | | | | | A | PP,GC,IP | IMU 3 HEX MODE/BITE STATUS WORD | X |
| 048 | IMU 3 S/W BITE | V95X2046X | 31 | 18 | | 2.0 | | | HEX | | | | | | | | | | | | A | PP,GC,IP | IMU 3 SW BITE STATUS | X |
| 049 | IMU 3 BITE STAT | V95Q2076C | 31 | 19 | | 2.0 | | | HEX | | | | | | | | | | | | A | PP,GC,IP | IMU 3 HEX DISCRETE WORD | X |
| 050 | IMU 1 PWR ON | V95X0020X | 12 | 21 | | 1.0 | * | | BLVL | | | | | | | | | | | | A | PP,GC,IP | IMU 1 POWER ON | X |
| 051 | IMU 1 I/O | V91X2273X | 12 | 22 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | FF1 IMU BYPASS (MFE) | X |
| 052 | IMU 2 PWR ON | V95X1020X | 22 | 21 | | 1.0 | * | | BLVL | | | | | | | | | | | | A | PP,GC,IP | IMU 2 POWER ON | X |
| 053 | IMU 2 I/O | V91X2274X | 22 | 22 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | FF2 IMU BYPASS (MFE) | X |
| 054 | IMU 3 PWR ON | V95X2020X | 32 | 21 | | 1.0 | * | | BLVL | | | | | | | | | | | | A | PP,GC,IP | IMU 3 POWER ON | X |
| 055 | IMU 3 I/O | V91X2275X | 32 | 22 | | 1.0 | | | STAT | | | | | | | | | | | | 7 | FCOS | FF3 IMU BYPASS (MFE) | X |
| 056 | IMU 1 STBY 10 | V71K2576X | 12 | 23 | | 1.0 | | * | BLVL | | | | | | | | | | | | A | PP,GC,IP | IMU–1 OPERATE MODE CMD | X |
| 057 | IMU 2 STBY 11 | V71K3576X | 22 | 23 | | 1.0 | | * | BLVL | | | | | | | | | | | | A | PP,GC,IP | IMU–2 OPERATE MODE CMD | X |
| 058 | IMU 3 STBY 12 | V71K4576X | 32 | 23 | | 1.0 | | * | BLVL | | | | | | | | | | | | A | PP,GC,IP | IMU–3 OPERATE MODE CMD | X |
| 059* | IMU 1 OPER 13 | V71K2576X | 12 | 24 | | 1.0 | * | | BLVL | | | | | | | | | | | | A | PP,GC,IP | IMU–1 OPERATE MODE CMD | X |
| 060* | IMU 2 OPER 14 | V71K3576X | 22 | 24 | | 1.0 | * | | BLVL | | | | | | | | | | | | A | PP,GC,IP | IMU–2 OPERATE MODE CMD | X |

## TABLE 4.6.6-2. GND IMU CNTL/MON (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | | | |
| 061* | IMU 3 OPER 15 | V71K4576X | 32 | 24 | | 1.0 | * | | BLVL | | | | | | | | | | | | A | PP,GC,IP | IMU–3 OPERATE MODE CMD | X |
| 062 | SEL IMU 1 16 | V95X0021X | 50 | 4 | | 1.0 | * | | BLVL | | | | | | | | | | | | A | PP,GC,IP | IMU 1 SELECT STATUS | X |
| 063 | SEL IMU 2 17 | V95X1021X | 50 | 5 | | 1.0 | * | | BLVL | | | | | | | | | | | | A | PP,GC,IP | IMU 2 SELECT STATUS | X |
| 064 | SEL IMU 3 18 | V95X2021X | 50 | 6 | | 1.0 | * | | BLVL | | | | | | | | | | | | A | PP,GC,IP | IMU 3 SELECT STATUS | X |
| 065 | ATT DET 19 | V99X2718X | 50 | 8 | | 1.0 | * | | BLVL | | | | | | | | | | | | | ATT DET | ATT DETERM IN PROGRESS | X |
| 066 | HNGR CAL A 20 | V99X2710X | 50 | 9 | | 1.0 | * | | BLVL | | | | | | | | | | | | | G CAL | HANGER CAL A IN PROGRESS | X |
| 067 | HNGR CAL B 21 | V99X2711X | 50 | 10 | | 1.0 | * | | BLVL | | | | | | | | | | | | | G CAL | HANGER CAL B IN PROGRESS | X |
| 068 | HNGR CAL C 22 | V99X2712X | 50 | 11 | | 1.0 | * | | BLVL | | | | | | | | | | | | | G CAL | HANGER CAL C IN PROGRESS | X |
| 069 | PREFLT CAL 23 | V99X2715X | 50 | 12 | | 1.0 | * | | BLVL | | | | | | | | | | | | | G CAL | PREFLIGHT CAL IN PROGRESS | X |
| 070 | GYROCOMP 24 | V95X0015X | 50 | 13 | | 1.0 | * | | BLVL | | | | | | | | | | | | | GC | GYROCOMPASS ALIGNMENT IN PROGRESS | X |
| 071 | (ALGN GOODNESS TST) | V95X0008X | 38 | 14 | | 4.0 | FAIL | | BLVL | | | | | | | | | | | | | GC | GYROCOMPASS ALIGN FAIL | X |
| 072 | (GYROCOMPASS CPLT) | V95X0010X | 44 | 14 | | 4.0 | CPLT | | BLVL | | | | | | | | | | | | | GC | ALIGN COMPLETE | X |
| 073 | INERTIAL 25 | V95X0780X | 50 | 15 | | 1.0 | * | | BLVL | | | | | | | | | | | | | GC | REFSMAT COMPUTATION COMPLETED | X |
| 074 | PLOT POS 26 | V99X2709X | 50 | 16 | | 1.0 | * | | BLVL | | | | | | | | | | | | | PP | PLATFORM POSITIONING IN PROGRESS | X |
| 075 | TERM/IDLE 27 | V95X0016X | 50 | 17 | | 1.0 | * | | BLVL | | | | | | | | | | | | A | TERM/IDLE | TERM/IDLE IN PROGRESS | X |
| 076 | 28 MM WRITE | V93J6060C | 49 | 19 | | 2.0 | | | DEC | | | | | | | | | | | | | KYBD | IMU MM WRITE COMMAND | X |
| 077 | MM READ 29 | V91X5080X | 50 | 20 | | 1.0 | * | | BLVL | | | | | | | | | | | | | FCOS | IMU MM READ COMPLETE | X |
| 078 | MM STATUS | V91U5084C | 47 | 21 | | 4.0 | | | CHAR | | | | | | | | | | | | B | FCOS | MM STATUS | X |
| 079 | GEN IMU 31 | V93X6100X | 50 | 22 | | 1.0 | * | | BLVL | | | | | | | | | | | | | KYBD | GENERIC IMU INSTALL CMD | X |
| 080 | 30 SITE SEL | V93J6061C | 49 | 23 | | 2.0 | | | DEC | | | | | | | | | | | | | KYBD | SITE SELECT | X |
| 081 | ACTUAL | V91U5085C | 48 | 24 | | 3.0 | | | CHAR | | | | | | | | | | | | C | GROUND IMU DISP | CURRENT SITE SELECT | X |
| 082 | (MSG LINE) | V93X0050X | 1 | 25 | | 44.0 | | | CHAR | | | | | | | | G | | | | | UI | MESSAGE LINE | X |
| 083 | (BUFFER MSG) | V93X0054X | 45 | 25 | | 4.0 | | | CHAR | | | | | | | | G | | | | | UI | BUFFER MESSAGE INDICATOR | X |
| 084 | (SPL) | V93X0056X | 2 | 26 | | 49.0 | | | CHAR | | | | | | | | G | | | | | UI | SCRATCH PAD LINE | X |

TABLE 4.6.6-5. INPUT FUNCTIONAL PARAMETERS FOR GROUND IMU CONTROL MONITOR DISPLAY (V5.1.8)

| FSSR NAME | M/S ID | NOMENCLATURE | SOURCE | UNITS | DATA TYPE | PREC | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|
| (CRT_TIME) | V91W1987C | DISPLAY CRT TIMER,GNC | FCOS | | SPL | | 93090E | |
| (DISP) | V93X0044X | DISPLAY FUNCTION PAGE | UI | | BD | | 93090E | |
| (GPC) | V93X0048X | GPC DRIVER | UI | | BD | | 93090E | |
| (LINE) | V93X0050X | MESSAGE LINE | UI | | BD | | 93090E | |
| (MSG) | V93X0054X | BUFFER MESSAGE INDICATOR | UI | | BD | | 93090E | |
| (MT) | V91W1990C | DISPLAY MSN TIME | FCOS | S | VAR | | 93090E | |
| (OPS) | V93X0040X | OPS FUNCTION PAGE | UI | | BD | | 93090E | |
| (SPEC) | V93X0042X | SPEC FUNCTION PAGE | UI | | BD | | 93090E | |
| (SPL) | V93X0056X | SCRATCH PAD LINE | UI | | BD | | 93090E | |
| (UL) | V92X5032X | UPLINK ACTIVITY IND | UI | | BD | | 93090E | |
| ALIGNCMP | V95X0010X | ALIGN COMPLETE | IMU GC ALIGN | | BD | | 93017G | * |
| ALIGN_FAIL | V95X0008X | GYROCOMPASS ALIGN FAIL | IMU GC ALIGN | | BD | | 92297B | |
| ATT_DET | V99X2718X | ATT DETERM IN PROGRESS | IMU ATT DET | | BD | | 93017G | * |
| AZANG(1) | V95H0051CA | IMU 1 COMP AZIMUTH RES ANGLE | IMU INT PROC | DEG | | | 93017G | * |
| AZANG(1) | V95H0051CB | IMU 1 COMP AZIMUTH RES ANGLE | IMU GND CAL | DEG | | | 93017G | * |
| AZANG(1) | V95H0051CC | IMU 1 COMP AZIMUTH RES ANGLE | IMU GC ALIGN | DEG | | | 93017G | * |
| AZANG(1) | V95H0051CD | IMU 1 COMP AZIMUTH RES ANGLE | IMU ATT DET | DEG | | | 93017G | * |
| AZANG(1) | V95H0051CE | IMU 1 COMP AZIMUTH RES ANGLE | IMU PLAT POS | DEG | | | 93017G | * |
| AZANG(1) | V95H0051CF | IMU 1 COMP AZIMUTH RES ANGLE | IMU TERM/IDLE | DEG | | | 93017G | * |
| AZANG(2) | V95H1051CA | IMU 2 COMP AZIMUTH RES ANGLE | IMU INT PROC | DEG | | | 93017G | * |
| AZANG(2) | V95H1051CB | IMU 2 COMP AZIMUTH RES ANGLE | IMU GND CAL | DEG | | | 93017G | * |
| AZANG(2) | V95H1051CC | IMU 2 COMP AZIMUTH RES ANGLE | IMU GC ALIGN | DEG | | | 93017G | * |
| AZANG(2) | V95H1051CD | IMU 2 COMP AZIMUTH RES ANGLE | IMU ATT DET | DEG | | | 93017G | * |
| AZANG(2) | V95H1051CE | IMU 2 COMP AZIMUTH RES ANGLE | IMU PLAT POS | DEG | | | 93017G | * |
| AZANG(2) | V95H1051CF | IMU 2 COMP AZIMUTH RES ANGLE | IMU TERM/IDLE | DEG | | | 93017G | * |
| AZANG(3) | V95H2051CA | IMU 3 COMP AZIMUTH RES ANGLE | IMU INT PROC | DEG | | | 93017G | * |
| AZANG(3) | V95H2051CB | IMU 3 COMP AZIMUTH RES ANGLE | IMU GND CAL | DEG | | | 93017G | * |
| AZANG(3) | V95H2051CC | IMU 3 COMP AZIMUTH RES ANGLE | IMU GC ALIGN | DEG | | | 93017G | * |
| AZANG(3) | V95H2051CD | IMU 3 COMP AZIMUTH RES ANGLE | IMU ATT DET | DEG | | | 93017G | * |
| AZANG(3) | V95H2051CE | IMU 3 COMP AZIMUTH RES ANGLE | IMU PLAT POS | DEG | | | 93017G | * |
| AZANG(3) | V95H2051CF | IMU 3 COMP AZIMUTH RES ANGLE | IMU TERM/IDLE | DEG | | | 93017G | * |
| BTU_TEST | V93X6004X | BTU TEST IN PROGRESS | GROUND IMU DISP | EVENT | | | 92009 | |
| DVX_1SEC(1) | V95L0056CA | IMU 1 X AXIS DEL VEL OVER 1 SEC | IMU INT PROC | FT/S2 | | | | |
| DVX_1SEC(1) | V95L0056CB | IMU 1 X AXIS DEL VEL OVER 1 SEC | IMU GND CAL | FT/S2 | | | | |
| DVX_1SEC(1) | V95L0056CC | IMU 1 X AXIS DEL VEL OVER 1 SEC | IMU GC ALIGN | FT/S2 | | | | |
| DVX_1SEC(1) | V95L0056CD | IMU 1 X AXIS DEL VEL OVER 1 SEC | IMU ATT DET | FT/S2 | | | | |
| DVX_1SEC(1) | V95L0056CE | IMU 1 X AXIS DEL VEL OVER 1 SEC | IMU PLAT POS | FT/S2 | | | | |
| DVX_1SEC(1) | V95L0056CF | IMU 1 X AXIS DEL VEL OVER 1 SEC | IMU TERM/IDLE | FT/S2 | | | | |
| DVX_1SEC(2) | V95L1056CA | IMU 2 X AXIS DEL VEL OVER 1 SEC | IMU INT PROC | FT/S2 | | | | |
| DVX_1SEC(2) | V95L1056CB | IMU 2 X AXIS DEL VEL OVER 1 SEC | IMU GND CAL | FT/S2 | | | | |
| DVX_1SEC(2) | V95L1056CC | IMU 2 X AXIS DEL VEL OVER 1 SEC | IMU GC ALIGN | FT/S2 | | | | |
| DVX_1SEC(2) | V95L1056CD | IMU 2 X AXIS DEL VEL OVER 1 SEC | IMU ATT DET | FT/S2 | | | | |
| DVX_1SEC(2) | V95L1056CE | IMU 2 X AXIS DEL VEL OVER 1 SEC | IMU PLAT POS | FT/S2 | | | | |
| DVX_1SEC(2) | V95L1056CF | IMU 2 X AXIS DEL VEL OVER 1 SEC | IMU TERM/IDLE | FT/S2 | | | | |
| DVX_1SEC(3) | V95L2056CA | IMU 3 X AXIS DEL VEL OVER 1 SEC | IMU INT PROC | FT/S2 | | | | |
| DVX_1SEC(3) | V95L2056CB | IMU 3 X AXIS DEL VEL OVER 1 SEC | IMU GND CAL | FT/S2 | | | | |

TABLE 4.6.6-5. INPUT FUNCTIONAL PARAMETERS FOR GROUND IMU CONTROL MONITOR DISPLAY (V5.1.8)

| FSSR NAME | M/S ID | NOMENCLATURE | SOURCE | UNITS | DATA TYPE | PREC | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|
| DVX_1SEC(3) | V95L2056CC | IMU 3 X AXIS DEL VEL OVER 1 SEC | IMU GC ALIGN | FT/S2 | | | | |
| DVX_1SEC(3) | V95L2056CD | IMU 3 X AXIS DEL VEL OVER 1 SEC | IMU ATT DET | FT/S2 | | | | |
| DVX_1SEC(3) | V95L2056CE | IMU 3 X AXIS DEL VEL OVER 1 SEC | IMU PLAT POS | FT/S2 | | | | |
| DVX_1SEC(3) | V95L2056CF | IMU 3 X AXIS DEL VEL OVER 1 SEC | IMU TERM/IDLE | FT/S2 | | | | |
| DVY_1SEC(1) | V95L0057CA | IMU 1 Y AXIS DEL VEL OVER 1 SEC | IMU INT PROC | FT/S2 | | | | |
| DVY_1SEC(1) | V95L0057CB | IMU 1 Y AXIS DEL VEL OVER 1 SEC | IMU GND CAL | FT/S2 | | | | |
| DVY_1SEC(1) | V95L0057CC | IMU 1 Y AXIS DEL VEL OVER 1 SEC | IMU GC ALIGN | FT/S2 | | | | |
| DVY_1SEC(1) | V95L0057CD | IMU 1 Y AXIS DEL VEL OVER 1 SEC | IMU ATT DET | FT/S2 | | | | |
| DVY_1SEC(1) | V95L0057CE | IMU 1 Y AXIS DEL VEL OVER 1 SEC | IMU PLAT POS | FT/S2 | | | | |
| DVY_1SEC(1) | V95L0057CF | IMU 1 Y AXIS DEL VEL OVER 1 SEC | IMU TERM/IDLE | FT/S2 | | | | |
| DVY_1SEC(2) | V95L1057CA | IMU 2 Y AXIS DEL VEL OVER 1 SEC | IMU INT PROC | FT/S2 | | | | |
| DVY_1SEC(2) | V95L1057CB | IMU 2 Y AXIS DEL VEL OVER 1 SEC | IMU GND CAL | FT/S2 | | | | |
| DVY_1SEC(2) | V95L1057CC | IMU 2 Y AXIS DEL VEL OVER 1 SEC | IMU GC ALIGN | FT/S2 | | | | |
| DVY_1SEC(2) | V95L1057CD | IMU 2 Y AXIS DEL VEL OVER 1 SEC | IMU ATT DET | FT/S2 | | | | |
| DVY_1SEC(2) | V95L1057CE | IMU 2 Y AXIS DEL VEL OVER 1 SEC | IMU PLAT POS | FT/S2 | | | | |
| DVY_1SEC(2) | V95L1057CF | IMU 2 Y AXIS DEL VEL OVER 1 SEC | IMU TERM/IDLE | FT/S2 | | | | |
| DVY_1SEC(3) | V95L2057CA | IMU 3 Y AXIS DEL VEL OVER 1 SEC | IMU INT PROC | FT/S2 | | | | |
| DVY_1SEC(3) | V95L2057CB | IMU 3 Y AXIS DEL VEL OVER 1 SEC | IMU GND CAL | FT/S2 | | | | |
| DVY_1SEC(3) | V95L2057CC | IMU 3 Y AXIS DEL VEL OVER 1 SEC | IMU GC ALIGN | FT/S2 | | | | |
| DVY_1SEC(3) | V95L2057CD | IMU 3 Y AXIS DEL VEL OVER 1 SEC | IMU ATT DET | FT/S2 | | | | |
| DVY_1SEC(3) | V95L2057CE | IMU 3 Y AXIS DEL VEL OVER 1 SEC | IMU PLAT POS | FT/S2 | | | | |
| DVY_1SEC(3) | V95L2057CF | IMU 3 Y AXIS DEL VEL OVER 1 SEC | IMU TERM/IDLE | FT/S2 | | | | |
| DVZ_1SEC(1) | V95L0058CA | IMU 1 Z AXIS DEL VEL OVER 1 SEC | IMU INT PROC | FT/S2 | | | | |
| DVZ_1SEC(1) | V95L0058CB | IMU 1 Z AXIS DEL VEL OVER 1 SEC | IMU GND CAL | FT/S2 | | | | |
| DVZ_1SEC(1) | V95L0058CC | IMU 1 Z AXIS DEL VEL OVER 1 SEC | IMU GC ALIGN | FT/S2 | | | | |
| DVZ_1SEC(1) | V95L0058CD | IMU 1 Z AXIS DEL VEL OVER 1 SEC | IMU ATT DET | FT/S2 | | | | |
| DVZ_1SEC(1) | V95L0058CE | IMU 1 Z AXIS DEL VEL OVER 1 SEC | IMU PLAT POS | FT/S2 | | | | |
| DVZ_1SEC(1) | V95L0058CF | IMU 1 Z AXIS DEL VEL OVER 1 SEC | IMU TERM/IDLE | FT/S2 | | | | |
| DVZ_1SEC(2) | V95L1058CA | IMU 2 Z AXIS DEL VEL OVER 1 SEC | IMU INT PROC | FT/S2 | | | | |
| DVZ_1SEC(2) | V95L1058CB | IMU 2 Z AXIS DEL VEL OVER 1 SEC | IMU GND CAL | FT/S2 | | | | |
| DVZ_1SEC(2) | V95L1058CC | IMU 2 Z AXIS DEL VEL OVER 1 SEC | IMU GC ALIGN | FT/S2 | | | | |
| DVZ_1SEC(2) | V95L1058CD | IMU 2 Z AXIS DEL VEL OVER 1 SEC | IMU ATT DET | FT/S2 | | | | |
| DVZ_1SEC(2) | V95L1058CE | IMU 2 Z AXIS DEL VEL OVER 1 SEC | IMU PLAT POS | FT/S2 | | | | |
| DVZ_1SEC(2) | V95L1058CF | IMU 2 Z AXIS DEL VEL OVER 1 SEC | IMU TERM/IDLE | FT/S2 | | | | |
| DVZ_1SEC(3) | V95L2058CA | IMU 3 Z AXIS DEL VEL OVER 1 SEC | IMU INT PROC | FT/S2 | | | | |
| DVZ_1SEC(3) | V95L2058CB | IMU 3 Z AXIS DEL VEL OVER 1 SEC | IMU GND CAL | FT/S2 | | | | |
| DVZ_1SEC(3) | V95L2058CC | IMU 3 Z AXIS DEL VEL OVER 1 SEC | IMU GC ALIGN | FT/S2 | | | | |
| DVZ_1SEC(3) | V95L2058CD | IMU 3 Z AXIS DEL VEL OVER 1 SEC | IMU ATT DET | FT/S2 | | | | |
| DVZ_1SEC(3) | V95L2058CE | IMU 3 Z AXIS DEL VEL OVER 1 SEC | IMU PLAT POS | FT/S2 | | | | |
| DVZ_1SEC(3) | V95L2058CF | IMU 3 Z AXIS DEL VEL OVER 1 SEC | IMU TERM/IDLE | FT/S2 | | | | |
| GEN_IMU_INST_CMD | V93X6100X | GENERIC IMU INSTALL CMD | GROUND IMU DISP | EVENT | | | 92068A | |
| GYRO_COMP | V95X0015X | GYROCOMPASS ALIGNMENT IN PROGRESS | IMU GC ALIGN | | | BD | 93017G | * |
| HDW_BITE1(1) | V95Q0076CA | IMU 1 HEX DISCRETE WORD | IMU INT PROC | | | | | |
| HDW_BITE1(1) | V95Q0076CB | IMU 1 HEX DISCRETE WORD | IMU GND CAL | | | | 93017G | * |
| HDW_BITE1(1) | V95Q0076CC | IMU 1 HEX DISCRETE WORD | IMU GC ALIGN | | | | 93017G | * |
| HDW_BITE1(1) | V95Q0076CD | IMU 1 HEX DISCRETE WORD | IMU ATT DET | | | | 93017G | * |

TABLE 4.6.6-5. INPUT FUNCTIONAL PARAMETERS FOR GROUND IMU CONTROL MONITOR DISPLAY (V5.1.8)

| FSSR NAME | M/S ID | NOMENCLATURE | SOURCE | UNITS | DATA TYPE | PREC | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|
| HDW_BITE1(1) | V95Q0076CE | IMU 1 HEX DISCRETE WORD | IMU PLAT POS | | | | 93017G | * |
| HDW_BITE1(1) | V95Q0076CF | IMU 1 HEX DISCRETE WORD | IMU TERM/IDLE | | | | 93017G | * |
| HDW_BITE1(2) | V95Q1076CA | IMU 2 HEX DISCRETE WORD | IMU INT PROC | | | | | |
| HDW_BITE1(2) | V95Q1076CB | IMU 2 HEX DISCRETE WORD | IMU GND CAL | | | | 93017G | * |
| HDW_BITE1(2) | V95Q1076CC | IMU 2 HEX DISCRETE WORD | IMU GC ALIGN | | | | 93017G | * |
| HDW_BITE1(2) | V95Q1076CD | IMU 2 HEX DISCRETE WORD | IMU ATT DET | | | | 93017G | * |
| HDW_BITE1(2) | V95Q1076CE | IMU 2 HEX DISCRETE WORD | IMU PLAT POS | | | | 93017G | * |
| HDW_BITE1(2) | V95Q1076CF | IMU 2 HEX DISCRETE WORD | IMU TERM/IDLE | | | | 93017G | * |
| HDW_BITE1(3) | V95Q2076CA | IMU 3 HEX DISCRETE WORD | IMU INT PROC | | | | | |
| HDW_BITE1(3) | V95Q2076CB | IMU 3 HEX DISCRETE WORD | IMU GND CAL | | | | 93017G | * |
| HDW_BITE1(3) | V95Q2076CC | IMU 3 HEX DISCRETE WORD | IMU GC ALIGN | | | | 93017G | * |
| HDW_BITE1(3) | V95Q2076CD | IMU 3 HEX DISCRETE WORD | IMU ATT DET | | | | 93017G | * |
| HDW_BITE1(3) | V95Q2076CE | IMU 3 HEX DISCRETE WORD | IMU PLAT POS | | | | 93017G | * |
| HDW_BITE1(3) | V95Q2076CF | IMU 3 HEX DISCRETE WORD | IMU TERM/IDLE | | | | 93017G | * |
| HDW_BITE2(1) | V95Q0077CA | IMU 1 HEX MODE/BITE STATUS WORD | IMU INT PROC | | | | | |
| HDW_BITE2(1) | V95Q0077CB | IMU 1 HEX MODE/BITE STATUS WORD | IMU GND CAL | | | | | |
| HDW_BITE2(1) | V95Q0077CC | IMU 1 HEX MODE/BITE STATUS WORD | IMU GC ALIGN | | | | | |
| HDW_BITE2(1) | V95Q0077CD | IMU 1 HEX MODE/BITE STATUS WORD | IMU ATT DET | | | | | |
| HDW_BITE2(1) | V95Q0077CE | IMU 1 HEX MODE/BITE STATUS WORD | IMU PLAT POS | | | | | |
| HDW_BITE2(1) | V95Q0077CF | IMU 1 HEX MODE/BITE STATUS WORD | IMU TERM/IDLE | | | | | |
| HDW_BITE2(2) | V95Q1077CA | IMU 2 HEX MODE/BITE STATUS WORD | IMU INT PROC | | | | | |
| HDW_BITE2(2) | V95Q1077CB | IMU 2 HEX MODE/BITE STATUS WORD | IMU GND CAL | | | | | |
| HDW_BITE2(2) | V95Q1077CC | IMU 2 HEX MODE/BITE STATUS WORD | IMU GC ALIGN | | | | | |
| HDW_BITE2(2) | V95Q1077CD | IMU 2 HEX MODE/BITE STATUS WORD | IMU ATT DET | | | | | |
| HDW_BITE2(2) | V95Q1077CE | IMU 2 HEX MODE/BITE STATUS WORD | IMU PLAT POS | | | | | |
| HDW_BITE2(2) | V95Q1077CF | IMU 2 HEX MODE/BITE STATUS WORD | IMU TERM/IDLE | | | | | |
| HDW_BITE2(3) | V95Q2077CA | IMU 3 HEX MODE/BITE STATUS WORD | IMU INT PROC | | | | | |
| HDW_BITE2(3) | V95Q2077CB | IMU 3 HEX MODE/BITE STATUS WORD | IMU GND CAL | | | | | |
| HDW_BITE2(3) | V95Q2077CC | IMU 3 HEX MODE/BITE STATUS WORD | IMU GC ALIGN | | | | | |
| HDW_BITE2(3) | V95Q2077CD | IMU 3 HEX MODE/BITE STATUS WORD | IMU ATT DET | | | | | |
| HDW_BITE2(3) | V95Q2077CE | IMU 3 HEX MODE/BITE STATUS WORD | IMU PLAT POS | | | | | |
| HDW_BITE2(3) | V95Q2077CF | IMU 3 HEX MODE/BITE STATUS WORD | IMU TERM/IDLE | | | | | |
| HNGR_CAL_A | V99X2710X | HANGER CAL A IN PROGRESS | IMU GND CAL | | BD | | 93017G | * |
| HNGR_CAL_B | V99X2711X | HANGER CAL B IN PROGRESS | IMU GND CAL | | BD | | 93017G | * |
| HNGR_CAL_C | V99X2712X | HANGER CAL C IN PROGRESS | IMU GND CAL | | BD | | 93017G | * |
| IMU_1_SEL_STATUS | V95X0021XA | IMU 1 SELECT STATUS | IMU INT PROC | | | | | |
| IMU_1_SEL_STATUS | V95X0021XB | IMU 1 SELECT STATUS | IMU GND CAL | | | | | |
| IMU_1_SEL_STATUS | V95X0021XC | IMU 1 SELECT STATUS | IMU GC ALIGN | | | | | |
| IMU_1_SEL_STATUS | V95X0021XD | IMU 1 SELECT STATUS | IMU ATT DET | | | | | |
| IMU_1_SEL_STATUS | V95X0021XE | IMU 1 SELECT STATUS | IMU PLAT POS | | | | | |
| IMU_1_SEL_STATUS | V95X0021XF | IMU 1 SELECT STATUS | IMU TERM/IDLE | | | | | |
| IMU_2_SEL_STATUS | V95X1021XA | IMU 2 SELECT STATUS | IMU INT PROC | | | | | |
| IMU_2_SEL_STATUS | V95X1021XB | IMU 2 SELECT STATUS | IMU GND CAL | | | | | |
| IMU_2_SEL_STATUS | V95X1021XC | IMU 2 SELECT STATUS | IMU GC ALIGN | | | | | |
| IMU_2_SEL_STATUS | V95X1021XD | IMU 2 SELECT STATUS | IMU ATT DET | | | | | |
| IMU_2_SEL_STATUS | V95X1021XE | IMU 2 SELECT STATUS | IMU PLAT POS | | | | | |

TABLE 4.6.6-5. INPUT FUNCTIONAL PARAMETERS FOR GROUND IMU CONTROL MONITOR DISPLAY (V5.1.8)

| FSSR NAME | M/S ID | NOMENCLATURE | SOURCE | UNITS | DATA TYPE | PREC | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|
| IMU_2_SEL_STATUS | V95X1021XF | IMU 2 SELECT STATUS | IMU TERM/IDLE | | | | | |
| IMU_3_SEL_STATUS | V95X2021XA | IMU 3 SELECT STATUS | IMU INT PROC | | | | | |
| IMU_3_SEL_STATUS | V95X2021XB | IMU 3 SELECT STATUS | IMU GND CAL | | | | | |
| IMU_3_SEL_STATUS | V95X2021XC | IMU 3 SELECT STATUS | IMU GC ALIGN | | | | | |
| IMU_3_SEL_STATUS | V95X2021XD | IMU 3 SELECT STATUS | IMU ATT DET | | | | | |
| IMU_3_SEL_STATUS | V95X2021XE | IMU 3 SELECT STATUS | IMU PLAT POS | | | | | |
| IMU_3_SEL_STATUS | V95X2021XF | IMU 3 SELECT STATUS | IMU TERM/IDLE | | | | | |
| IMU_BYBASS(1) | V91X2273X | FF1 IMU BYPASS(MFE) | FCOS | | BD | | 93017G | * |
| IMU_BYPASS(2) | V91X2274X | FF2 IMU BYPASS(MFE) | FCOS | | BD | | 93017G | * |
| IMU_BYPASS(3) | V91X2275X | FF3 IMU BYPASS(MFE) | FCOS | | BD | | 93017G | * |
| IRANG(1) | V95H0053CA | IMU 1 COMP INNER ROLL RES ANGLE | IMU INT PROC | DEG | | | 93017G | * |
| IRANG(1) | V95H0053CB | IMU 1 COMP INNER ROLL RES ANGLE | IMU GND CAL | DEG | | | 93017G | * |
| IRANG(1) | V95H0053CC | IMU 1 COMP INNER ROLL RES ANGLE | IMU GC ALIGN | DEG | | | 93017G | * |
| IRANG(1) | V95H0053CD | IMU 1 COMP INNER ROLL RES ANGLE | IMU ATT DET | DEG | | | 93017G | * |
| IRANG(1) | V95H0053CE | IMU 1 COMP INNER ROLL RES ANGLE | IMU PLAT POS | DEG | | | 93017G | * |
| IRANG(1) | V95H0053CF | IMU 1 COMP INNER ROLL RES ANGLE | IMU TERM/IDLE | DEG | | | 93017G | * |
| IRANG(2) | V95H1053CA | IMU 2 COMP INNER ROLL RES ANGLE | IMU INT PROC | DEG | | | 93017G | * |
| IRANG(2) | V95H1053CB | IMU 2 COMP INNER ROLL RES ANGLE | IMU GND CAL | DEG | | | 93017G | * |
| IRANG(2) | V95H1053CC | IMU 2 COMP INNER ROLL RES ANGLE | IMU GC ALIGN | DEG | | | 93017G | * |
| IRANG(2) | V95H1053CD | IMU 2 COMP INNER ROLL RES ANGLE | IMU ATT DET | DEG | | | 93017G | * |
| IRANG(2) | V95H1053CE | IMU 2 COMP INNER ROLL RES ANGLE | IMU PLAT POS | DEG | | | 93017G | * |
| IRANG(2) | V95H1053CF | IMU 2 COMP INNER ROLL RES ANGLE | IMU TERM/IDLE | DEG | | | 93017G | * |
| IRANG(3) | V95H2053CA | IMU 3 COMP INNER ROLL RES ANGLE | IMU INT PROC | DEG | | | 93017G | * |
| IRANG(3) | V95H2053CB | IMU 3 COMP INNER ROLL RES ANGLE | IMU GND CAL | DEG | | | 93017G | * |
| IRANG(3) | V95H2053CC | IMU 3 COMP INNER ROLL RES ANGLE | IMU GC ALIGN | DEG | | | 93017G | * |
| IRANG(3) | V95H2053CD | IMU 3 COMP INNER ROLL RES ANGLE | IMU ATT DET | DEG | | | 93017G | * |
| IRANG(3) | V95H2053CE | IMU 3 COMP INNER ROLL RES ANGLE | IMU PLAT POS | DEG | | | 93017G | * |
| IRANG(3) | V95H2053CF | IMU 3 COMP INNER ROLL RES ANGLE | IMU TERM/IDLE | DEG | | | 93017G | * |
| OPER_CMD(1) | V71K2576XA | IMU-1 OPERATE MODE CMD | IMU INT PROC | | | | 93017G | * |
| OPER_CMD(1) | V71K2576XC | IMU-1 OPERATE MODE CMD | IMU GND CAL | | | | 93017G | * |
| OPER_CMD(1) | V71K2576XD | IMU-1 OPERATE MODE CMD | IMU GC ALIGN | | | | 93017G | * |
| OPER_CMD(1) | V71K2576XE | IMU-1 OPERATE MODE CMD | IMU ATT DET | | | | 93017G | * |
| OPER_CMD(1) | V71K2576XF | IMU-1 OPERATE MODE CMD | IMU PLAT POS | | | | 93017G | * |
| OPER_CMD(1) | V71K2576XG | IMU-1 OPERATE MODE CMD | IMU TERM/IDLE | | | | 93017G | * |
| OPER_CMD(2) | V71K3576XA | IMU-2 OPERATE MODE CMD | IMU INT PROC | | | | 93017G | * |
| OPER_CMD(2) | V71K3576XC | IMU-2 OPERATE MODE CMD | IMU GND CAL | | | | 93017G | * |
| OPER_CMD(2) | V71K3576XD | IMU-2 OPERATE MODE CMD | IMU GC ALIGN | | | | 93017G | * |
| OPER_CMD(2) | V71K3576XE | IMU-2 OPERATE MODE CMD | IMU ATT DET | | | | 93017G | * |
| OPER_CMD(2) | V71K3576XF | IMU-2 OPERATE MODE CMD | IMU PLAT POS | | | | 93017G | * |
| OPER_CMD(2) | V71K3576XG | IMU-2 OPERATE MODE CMD | IMU TERM/IDLE | | | | 93017G | * |
| OPER_CMD(3) | V71K4576XA | IMU-3 OPERATE MODE CMD | IMU INT PROC | | | | 93017G | * |
| OPER_CMD(3) | V71K4576XC | IMU-3 OPERATE MODE CMD | IMU GND CAL | | | | 93017G | * |
| OPER_CMD(3) | V71K4576XD | IMU-3 OPERATE MODE CMD | IMU GC ALIGN | | | | 93017G | * |
| OPER_CMD(3) | V71K4576XE | IMU-3 OPERATE MODE CMD | IMU ATT DET | | | | 93017G | * |
| OPER_CMD(3) | V71K4576XF | IMU-3 OPERATE MODE CMD | IMU PLAT POS | | | | 93017G | * |
| OPER_CMD(3) | V71K4576XG | IMU-3 OPERATE MODE CMD | IMU TERM/IDLE | | | | 93017G | * |

TABLE 4.6.6-5. INPUT FUNCTIONAL PARAMETERS FOR GROUND IMU CONTROL MONITOR DISPLAY (V5.1.8)

| FSSR NAME | M/S ID | NOMENCLATURE | SOURCE | UNITS | DATA TYPE | PREC | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|
| ORANG(1) | V95H0054CA | IMU 1 COMP OUTER ROLL RES ANGLE | IMU INT PROC | DEG | | | 93017G | * |
| ORANG(1) | V95H0054CB | IMU 1 COMP OUTER ROLL RES ANGLE | IMU GND CAL | DEG | | | 93017G | * |
| ORANG(1) | V95H0054CC | IMU 1 COMP OUTER ROLL RES ANGLE | IMU GC ALIGN | DEG | | | 93017G | * |
| ORANG(1) | V95H0054CD | IMU 1 COMP OUTER ROLL RES ANGLE | IMU ATT DET | DEG | | | 93017G | * |
| ORANG(1) | V95H0054CE | IMU 1 COMP OUTER ROLL RES ANGLE | IMU PLAT POS | DEG | | | 93017G | * |
| ORANG(1) | V95H0054CF | IMU 1 COMP OUTER ROLL RES ANGLE | IMU TERM/IDLE | DEG | | | 93017G | * |
| ORANG(2) | V95H1054CA | IMU 2 COMP OUTER ROLL RES ANGLE | IMU INT PROC | DEG | | | 93017G | * |
| ORANG(2) | V95H1054CB | IMU 2 COMP OUTER ROLL RES ANGLE | IMU GND CAL | DEG | | | 93017G | * |
| ORANG(2) | V95H1054CC | IMU 2 COMP OUTER ROLL RES ANGLE | IMU GC ALIGN | DEG | | | 93017G | * |
| ORANG(2) | V95H1054CD | IMU 2 COMP OUTER ROLL RES ANGLE | IMU ATT DET | DEG | | | 93017G | * |
| ORANG(2) | V95H1054CE | IMU 2 COMP OUTER ROLL RES ANGLE | IMU PLAT POS | DEG | | | 93017G | * |
| ORANG(2) | V95H1054CF | IMU 2 COMP OUTER ROLL RES ANGLE | IMU TERM/IDLE | DEG | | | 93017G | * |
| ORANG(3) | V95H2054CA | IMU 3 COMP OUTER ROLL RES ANGLE | IMU INT PROC | DEG | | | 93017G | * |
| ORANG(3) | V95H2054CB | IMU 3 COMP OUTER ROLL RES ANGLE | IMU GND CAL | DEG | | | 93017G | * |
| ORANG(3) | V95H2054CC | IMU 3 COMP OUTER ROLL RES ANGLE | IMU GC ALIGN | DEG | | | 93017G | * |
| ORANG(3) | V95H2054CD | IMU 3 COMP OUTER ROLL RES ANGLE | IMU ATT DET | DEG | | | 93017G | * |
| ORANG(3) | V95H2054CE | IMU 3 COMP OUTER ROLL RES ANGLE | IMU PLAT POS | DEG | | | 93017G | * |
| ORANG(3) | V95H2054CF | IMU 3 COMP OUTER ROLL RES ANGLE | IMU TERM/IDLE | DEG | | | 93017G | * |
| PANG(1) | V95H0050CA | IMU 1 COMP PITCH RES ANGLE | IMU INT PROC | DEG | | | 93017G | * |
| PANG(1) | V95H0050CB | IMU 1 COMP PITCH RES ANGLE | IMU GND CAL | DEG | | | 93017G | * |
| PANG(1) | V95H0050CC | IMU 1 COMP PITCH RES ANGLE | IMU GC ALIGN | DEG | | | 93017G | * |
| PANG(1) | V95H0050CD | IMU 1 COMP PITCH RES ANGLE | IMU ATT DET | DEG | | | 93017G | * |
| PANG(1) | V95H0050CE | IMU 1 COMP PITCH RES ANGLE | IMU PLAT POS | DEG | | | 93017G | * |
| PANG(1) | V95H0050CF | IMU 1 COMP PITCH RES ANGLE | IMU TERM/IDLE | DEG | | | 93017G | * |
| PANG(2) | V95H1050CA | IMU 2 COMP PITCH RES ANGLE | IMU INT PROC | DEG | | | 93017G | * |
| PANG(2) | V95H1050CB | IMU 2 COMP PITCH RES ANGLE | IMU GND CAL | DEG | | | 93017G | * |
| PANG(2) | V95H1050CC | IMU 2 COMP PITCH RES ANGLE | IMU GC ALIGN | DEG | | | 93017G | * |
| PANG(2) | V95H1050CD | IMU 2 COMP PITCH RES ANGLE | IMU ATT DET | DEG | | | 93017G | * |
| PANG(2) | V95H1050CE | IMU 2 COMP PITCH RES ANGLE | IMU PLAT POS | DEG | | | 93017G | * |
| PANG(2) | V95H1050CF | IMU 2 COMP PITCH RES ANGLE | IMU TERM/IDLE | DEG | | | 93017G | * |
| PANG(3) | V95H2050CA | IMU 3 COMP PITCH RES ANGLE | IMU INT PROC | DEG | | | 93017G | * |
| PANG(3) | V95H2050CB | IMU 3 COMP PITCH RES ANGLE | IMU GND CAL | DEG | | | 93017G | * |
| PANG(3) | V95H2050CC | IMU 3 COMP PITCH RES ANGLE | IMU GC ALIGN | DEG | | | 93017G | * |
| PANG(3) | V95H2050CD | IMU 3 COMP PITCH RES ANGLE | IMU ATT DET | DEG | | | 93017G | * |
| PANG(3) | V95H2050CE | IMU 3 COMP PITCH RES ANGLE | IMU PLAT POS | DEG | | | 93017G | * |
| PANG(3) | V95H2050CF | IMU 3 COMP PITCH RES ANGLE | IMU TERM/IDLE | DEG | | | 93017G | * |
| PFLT_CAL | V99X2715X | PREFLIGHT CAL IN PROGRESS | IMU GND CAL | | BD | | 93017G | * |
| PLAT_POS | V99X2709X | PLATFORM POSITIONING IN PROGRESS | IMU PLAT POS | | BD | | 93017G | * |
| PWR_ON(1) | V95X0020XA | IMU 1 POWER ON | IMU INT PROC | | | | | |
| PWR_ON(1) | V95X0020XB | IMU 1 POWER ON | IMU GND CAL | | | | 93017G | * |
| PWR_ON(1) | V95X0020XC | IMU 1 POWER ON | IMU GC ALIGN | | | | 93017G | * |
| PWR_ON(1) | V95X0020XD | IMU 1 POWER ON | IMU ATT DET | | | | 93017G | * |
| PWR_ON(1) | V95X0020XE | IMU 1 POWER ON | IMU PLAT POS | | | | 93017G | * |
| PWR_ON(1) | V95X0020XF | IMU 1 POWER ON | IMU TERM/IDLE | | | | 93017G | * |
| PWR_ON(2) | V95X1020XA | IMU 2 POWER ON | IMU INT PROC | | | | | |
| PWR_ON(2) | V95X1020XB | IMU 2 POWER ON | IMU GND CAL | | | | 93017G | * |

TABLE 4.6.6-5. INPUT FUNCTIONAL PARAMETERS FOR GROUND IMU CONTROL MONITOR DISPLAY (V5.1.8)

| FSSR NAME | M/S ID | NOMENCLATURE | SOURCE | UNITS | DATA TYPE | PREC | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|
| PWR_ON(2) | V95X1020XC | IMU 2 POWER ON | IMU GC ALIGN | | | | 93017G | * |
| PWR_ON(2) | V95X1020XD | IMU 2 POWER ON | IMU ATT DET | | | | 93017G | * |
| PWR_ON(2) | V95X1020XE | IMU 2 POWER ON | IMU PLAT POS | | | | 93017G | * |
| PWR_ON(2) | V95X1020XF | IMU 2 POWER ON | IMU TERM/IDLE | | | | 93017G | * |
| PWR_ON(3) | V95X2020XA | IMU 3 POWER ON | IMU INT PROC | | | | 93017G | * |
| PWR_ON(3) | V95X2020XB | IMU 3 POWER ON | IMU GND CAL | | | | 93017G | * |
| PWR_ON(3) | V95X2020XC | IMU 3 POWER ON | IMU GC ALIGN | | | | 93017G | * |
| PWR_ON(3) | V95X2020XD | IMU 3 POWER ON | IMU ATT DET | | | | 93017G | * |
| PWR_ON(3) | V95X2020XE | IMU 3 POWER ON | IMU PLAT POS | | | | 93017G | * |
| PWR_ON(3) | V95X2020XF | IMU 3 POWER ON | IMU TERM/IDLE | | | | 93017G | * |
| REFS_RDY | V95X0780X | REFSMAT COMPUTATION COMPLETED | IMU GC ALIGN | | BD | | 93017G | * |
| REFS_RDY | V95X0780XA | REFSMAT COMPUTATION COMPLETED | IMU INT PROC | | BD | | 93017G | * |
| S/W_BITE(1) | V95X0046XA | IMU 1 SW BITE STATUS | IMU INT PROC | | | | 92141A | |
| S/W_BITE(1) | V95X0046XB | IMU 1 SW BITE STATUS | IMU GND CAL | | | | 92297B | |
| S/W_BITE(1) | V95X0046XC | IMU 1 SW BITE STATUS | IMU GC ALIGN | | | | 92297B | |
| S/W_BITE(1) | V95X0046XD | IMU 1 SW BITE STATUS | IMU ATT DET | | | | 92297B | |
| S/W_BITE(1) | V95X0046XE | IMU 1 SW BITE STATUS | IMU PLAT POS | | | | 92297B | |
| S/W_BITE(1) | V95X0046XF | IMU 1 SW BITE STATUS | IMU TERM/IDLE | | | | 92297B | |
| S/W_BITE(2) | V95X1046XA | IMU 2 SW BITE STATUS | IMU INT PROC | | | | 92141A | |
| S/W_BITE(2) | V95X1046XB | IMU 2 SW BITE STATUS | IMU GND CAL | | | | 92297B | |
| S/W_BITE(2) | V95X1046XC | IMU 2 SW BITE STATUS | IMU GC ALIGN | | | | 92297B | |
| S/W_BITE(2) | V95X1046XD | IMU 2 SW BITE STATUS | IMU ATT DET | | | | 92297B | |
| S/W_BITE(2) | V95X1046XE | IMU 2 SW BITE STATUS | IMU PLAT POS | | | | 92297B | |
| S/W_BITE(2) | V95X1046XF | IMU 2 SW BITE STATUS | IMU TERM/IDLE | | | | 92297B | |
| S/W_BITE(3) | V95X2046XA | IMU 3 SW BITE STATUS | IMU INT PROC | | | | 92141A | |
| S/W_BITE(3) | V95X2046XB | IMU 3 SW BITE STATUS | IMU GND CAL | | | | 92297B | |
| S/W_BITE(3) | V95X2046XC | IMU 3 SW BITE STATUS | IMU GC ALIGN | | | | 92297B | |
| S/W_BITE(3) | V95X2046XD | IMU 3 SW BITE STATUS | IMU ATT DET | | | | 92297B | |
| S/W_BITE(3) | V95X2046XE | IMU 3 SW BITE STATUS | IMU PLAT POS | | | | 92297B | |
| S/W_BITE(3) | V95X2046XF | IMU 3 SW BITE STATUS | IMU TERM/IDLE | | | | 92297B | |
| SITE | V93J6061C | SITE SELECT | GROUND IMU DISP | ND | HXS | | 93017G | * |
| TERM_IDLE | V95X0016X | TERM/IDLE IN PROGRESS | IMU TERM/IDLE | | BD | | 93017G | * |
| VRSS(1) | V95L0060CA | IMU 1 SENSED CHANGE IN VEL(1 SEC) | IMU INT PROC | FT/S2 | | | | |
| VRSS(1) | V95L0060CB | IMU 1 SENSED CHANGE IN VEL(1 SEC) | IMU GND CAL | FT/S2 | | | 93017G | * |
| VRSS(1) | V95L0060CC | IMU 1 SENSED CHANGE IN VEL(1 SEC) | IMU GC ALIGN | FT/S2 | | | 93017G | * |
| VRSS(1) | V95L0060CD | IMU 1 SENSED CHANGE IN VEL(1 SEC) | IMU ATT DET | FT/S2 | | | 93017G | * |
| VRSS(1) | V95L0060CE | IMU 1 SENSED CHANGE IN VEL(1 SEC) | IMU PLAT POS | FT/S2 | | | 93017G | * |
| VRSS(1) | V95L0060CF | IMU 1 SENSED CHANGE IN VEL(1 SEC) | IMU TERM/IDLE | FT/S2 | | | 93017G | * |
| VRSS(2) | V95L1060CA | IMU 2 SENSED CHANGE IN VEL(1 SEC) | IMU INT PROC | FT/S2 | | | | |
| VRSS(2) | V95L1060CB | IMU 2 SENSED CHANGE IN VEL(1 SEC) | IMU GND CAL | FT/S2 | | | 93017G | * |
| VRSS(2) | V95L1060CC | IMU 2 SENSED CHANGE IN VEL(1 SEC) | IMU GC ALIGN | FT/S2 | | | 93017G | * |
| VRSS(2) | V95L1060CD | IMU 2 SENSED CHANGE IN VEL(1 SEC) | IMU ATT DET | FT/S2 | | | 93017G | * |
| VRSS(2) | V95L1060CE | IMU 2 SENSED CHANGE IN VEL(1 SEC) | IMU PLAT POS | FT/S2 | | | 93017G | * |
| VRSS(2) | V95L1060CF | IMU 2 SENSED CHANGE IN VEL(1 SEC) | IMU TERM/IDLE | FT/S2 | | | 93017G | * |
| VRSS(3) | V95L2060CA | IMU 3 SENSED CHANGE IN VEL(1 SEC) | IMU INT PROC | FT/S2 | | | | |
| VRSS(3) | V95L2060CB | IMU 3 SENSED CHANGE IN VEL(1 SEC) | IMU GND CAL | FT/S2 | | | 93017G | * |

TABLE 4.6.6-5. INPUT FUNCTIONAL PARAMETERS FOR GROUND IMU CONTROL MONITOR DISPLAY (V5.1.8)

| FSSR NAME | M/S ID | NOMENCLATURE | SOURCE | UNITS | DATA TYPE | PREC | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|
| VRSS(3) | V95L2060CC | IMU 3 SENSED CHANGE IN VEL(1 SEC) | IMU GC ALIGN | FT/S2 | | | 93017G | * |
| VRSS(3) | V95L2060CD | IMU 3 SENSED CHANGE IN VEL(1 SEC) | IMU ATT DET | FT/S2 | | | 93017G | * |
| VRSS(3) | V95L2060CE | IMU 3 SENSED CHANGE IN VEL(1 SEC) | IMU PLAT POS | FT/S2 | | | 93017G | * |
| VRSS(3) | V95L2060CF | IMU 3 SENSED CHANGE IN VEL(1 SEC) | IMU TERM/IDLE | FT/S2 | | | 93017G | * |
| X1 | V93H6001C | IMU 1 DSRD CLSTR TO NB ROLL ANGLE | GROUND IMU DISP | DEG | VAR | | | |
| X2 | V93H6007C | IMU 2 DSRD CLSTR TO NB ROLL ANGLE | GROUND IMU DISP | DEG | VAR | | | |
| X3 | V93H6013C | IMU 3 DSRD CLSTR TO NB ROLL ANGLE | GROUND IMU DISP | DEG | VAR | | | |
| Y1 | V93H6002C | IMU 1 DSRD CLSTR TO NB PITCH ANGLE | GROUND IMU DISP | DEG | VAR | | | |
| Y2 | V93H6008C | IMU 2 DSRD CLSTR TO NB PITCH ANGLE | GROUND IMU DISP | DEG | VAR | | | |
| Y3 | V93H6014C | IMU 3 DSRD CLSTR TO NB PITCH ANGLE | GROUND IMU DISP | DEG | VAR | | | |
| Z1 | V93H6003C | IMU 1 DSRD CLSTR TO NB AZMTH ANGLE | GROUND IMU DISP | DEG | VAR | | | |
| Z2 | V93H6009C | IMU 2 DSRD CLSTR TO NB AZMTH ANGLE | GROUND IMU DISP | DEG | VAR | | | |
| Z3 | V93H6015C | IMU 3 DSRD CLSTR TO NB AZMTH ANGLE | GROUND IMU DISP | DEG | VAR | | | |
| | V91U5084C | MM STATUS | FCOS | | VAR | | | |
| | V91U5085C | CURRENT SITE SELECT | FCOS | | VAR | | | |
| | V91X5080X | IMU MM READ COMPLETE | FCOS | | BD | | 92354 | |
| | V91X5081X | IMU MM WRITE COMPLETE | FCOS | | | | 92354 | |
| | V93J6060C | IMU MM WRITE COMMAND | GROUND IMU DISP | EVENT | VAR | | | |

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE 4.6.6-6. OUTPUT FUNCTIONAL PARAMETERS FROM GROUND IMU CONTROL MONITOR DISPLAY (V5.1.8)

| FSSR NAME | M/S ID | NOMENCLATURE | DESTINATION | UNITS | DATA TYPE | PREC | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|
| BTU_TEST | V93X6004X | BTU TEST IN PROGRESS | GROUND IMU DISP<br>IMU TERM/IDLE | EVENT | | | 92009 | |
| GEN_IMU_INST_CMD | V93X6100X | GENERIC IMU INSTALL CMD | GROUND IMU DISP | EVENT | | | 92068A | |
| NAVBASE_ALT_ZERO | V90H3527C | ALTITUDE OF VEHICLE NB AT SEL SITE | ASC NAV SEQ | FT | DPL | | 92214A | |
| NAVBASE_LAT_ZERO | V90H3528C | LATITUDE OF VEHICLE NB AT SEL SITE | ASC BRG SPEC<br>ASC NAV SEQ<br>ASC UPP | RAD | DPL | | 93090E | |
| NAVBASE_LONG_ZERO | V90H3529C | LNGITUDE OF VEHICLE NB AT SEL SITE | ASC BRG SPEC<br>ASC NAV SEQ<br>ASC UPP | RAD | DPL | | 93090E | |
| OPER/STBY(1) | V93X6020X | IMU 1 OPERATE/STBY REQUEST | IMU ATT DET<br>IMU GC ALIGN<br>IMU GND CAL<br>IMU INT PROC<br>IMU PLAT POS<br>IMU TERM/IDLE<br>TLM | EVENT | BD | | | |
| OPER/STBY(2) | V93X6021X | IMU 2 OPERATE/STBY REQUEST | IMU ATT DET<br>IMU GC ALIGN<br>IMU GND CAL<br>IMU INT PROC<br>IMU PLAT POS<br>IMU TERM/IDLE<br>TLM | EVENT | BD | | | |
| OPER/STBY(3) | V93X6022X | IMU 3 OPERATE/STBY REQUEST | IMU ATT DET<br>IMU GC ALIGN<br>IMU GND CAL<br>IMU INT PROC<br>IMU PLAT POS<br>IMU TERM/IDLE<br>TLM | EVENT | BD | | | |
| PHI_OUT | V94H6066C | BODY ROLL EULER ANGLE AT SEL SITE | GPS SOP | DEG | SPL | | 92067D | |
| PSI_OUT | V94H6067C | BODY YAW EULER ANGLE AT SEL SITE | GPS SOP | DEG | SPL | | 92067D | |
| R_REF_OUT(1,1) | V90H3662C | X-COMP OF GPS 1 REF STATE POS VEC | GPS SOP | FT | DPL | | 92067D | |
| R_REF_OUT(1,2) | V90H3663C | Y-COMP OF GPS 1 REF STATE POS VEC | GPS SOP | FT | DPL | | 92067D | |
| R_REF_OUT(1,3) | V90H3664C | Z-COMP OF GPS 1 REF STATE POS VEC | GPS SOP | FT | DPL | | 92067D | |
| R_REF_OUT(2,1) | V90H3665C | X-COMP OF GPS 2 REF STATE POS VEC | GPS SOP | FT | DPL | | 92067D | |
| R_REF_OUT(2,2) | V90H3666C | Y-COMP OF GPS 2 REF STATE POS VEC | GPS SOP | FT | DPL | | 92067D | |
| R_REF_OUT(2,3) | V90H3667C | Z-COMP OF GPS 2 REF STATE POS VEC | GPS SOP | FT | DPL | | 92067D | |
| R_REF_OUT(3,1) | V90H3668C | X-COMP OF GPS 3 REF STATE POS VEC | GPS SOP | FT | DPL | | 92067D | |
| R_REF_OUT(3,2) | V90H3669C | Y-COMP OF GPS 3 REF STATE POS VEC | GPS SOP | FT | DPL | | 92067D | |
| R_REF_OUT(3,3) | V90H3670C | Z-COMP OF GPS 3 REF STATE POS VEC | GPS SOP | FT | DPL | | 92067D | |
| SEL_TEST_ID | V91U5085CA | CURRENT SITE SELECT | GPS SOP | | VAR | | 91051K | |

TABLE 4.6.6-6. OUTPUT FUNCTIONAL PARAMETERS FROM GROUND IMU CONTROL MONITOR DISPLAY (V5.1.8)

| FSSR NAME | M/S ID | NOMENCLATURE | DESTINATION | UNITS | DATA TYPE | PREC | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|
| SITE | V93J6061C | SITE SELECT | DL FMT 44/1<br>DL FMT 45/1<br>DL FMT 60/1<br>GROUND IMU DISP | ND | HXS | | 93017G | * |
| THETA_OUT | V94H6068C | BODY PITCH EULER ANGLE AT SEL SITE | GPS SOP | DEG | SPL | | 92067D | |
| X1 | V93H6001C | IMU 1 DSRD CLSTR TO NB ROLL ANGLE | GROUND IMU DISP<br>IMU PLAT POS | DEG | VAR | | | |
| X2 | V93H6007C | IMU 2 DSRD CLSTR TO NB ROLL ANGLE | GROUND IMU DISP<br>IMU PLAT POS | DEG | VAR | | | |
| X3 | V93H6013C | IMU 3 DSRD CLSTR TO NB ROLL ANGLE | GROUND IMU DISP<br>IMU PLAT POS | DEG | VAR | | | |
| Y1 | V93H6002C | IMU 1 DSRD CLSTR TO NB PITCH ANGLE | GROUND IMU DISP<br>IMU PLAT POS | DEG | VAR | | | |
| Y2 | V93H6008C | IMU 2 DSRD CLSTR TO NB PITCH ANGLE | GROUND IMU DISP<br>IMU PLAT POS | DEG | VAR | | | |
| Y3 | V93H6014C | IMU 3 DSRD CLSTR TO NB PITCH ANGLE | GROUND IMU DISP<br>IMU PLAT POS | DEG | VAR | | | |
| Z1 | V93H6003C | IMU 1 DSRD CLSTR TO NB AZMTH ANGLE | GROUND IMU DISP<br>IMU PLAT POS | DEG | VAR | | | |
| Z2 | V93H6009C | IMU 2 DSRD CLSTR TO NB AZMTH ANGLE | GROUND IMU DISP<br>IMU PLAT POS | DEG | VAR | | | |
| Z3 | V93H6015C | IMU 3 DSRD CLSTR TO NB AZMTH ANGLE | GROUND IMU DISP<br>IMU PLAT POS | DEG | VAR | | | |
| | V93J6060C | IMU MM WRITE COMMAND | FCOS<br>GROUND IMU DISP | EVENT | VAR | | | |
| | V93X6026X | IMU 1 SELECT | IMU ATT DET<br>IMU GC ALIGN<br>IMU GND CAL<br>IMU INT PROC<br>IMU PLAT POS<br>IMU TERM/IDLE<br>TLM | EVENT | BD | | | |
| | V93X6027X | IMU 2 SELECT | IMU ATT DET<br>IMU GC ALIGN<br>IMU GND CAL<br>IMU INT PROC<br>IMU PLAT POS<br>IMU TERM/IDLE<br>TLM | EVENT | BD | | | |
| | V93X6028X | IMU 3 SELECT | IMU ATT DET<br>IMU GC ALIGN<br>IMU GND CAL<br>IMU INT PROC<br>IMU PLAT POS<br>IMU TERM/IDLE<br>TLM | EVENT | BD | | | |

TABLE 4.6.6-6. OUTPUT FUNCTIONAL PARAMETERS FROM GROUND IMU CONTROL MONITOR DISPLAY (V5.1.8)

| FSSR NAME | M/S ID | NOMENCLATURE | DESTINATION | UNITS | DATA TYPE | PREC | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|
| | V93X6030X | ATT DET COMMAND | IMU TERM/IDLE | EVENT | BD | | 92354 | |
| | V93X6040X | HGR CAL A COMMAND | IMU TERM/IDLE | EVENT | BD | | 92354 | |
| | V93X6041X | HGR CAL B COMMAND | IMU TERM/IDLE | EVENT | BD | | 92354 | |
| | V93X6042X | HGR CAL C COMMAND | IMU TERM/IDLE | EVENT | BD | | 92354 | |
| | V93X6045X | PREFLT CAL COMMAND | IMU TERM/IDLE | EVENT | BD | | 92354 | |
| | V93X6047X | GYROCOMP COMMAND | IMU TERM/IDLE | EVENT | BD | | 92354 | |
| | V93X6050X | INERTIAL COMMAND | IMU GC ALIGN TLM | EVENT | BD | | 89986H | |
| | V93X6052X | PLAT POS SUBMODE CMD | IMU TERM/IDLE | EVENT | BD | | 92354 | |
| | V93X6055X | TERM/IDLE COMMAND | IMU ATT DET<br>IMU GC ALIGN<br>IMU GND CAL<br>IMU INT PROC<br>IMU PLAT POS<br>IMU TERM/IDLE TLM | EVENT | BD | | | |
| | V93X6057XA | IMU MM READ COMMAND | FCOS | EVENT | | | | |

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

**Rate Codes: (HDR Only) 1 = 1 sample/sec 2 = 5 samples/sec 3 = 12.5 samples/sec 4 = 25 samples/sec 5 = 100 samples/sec**
**(HDR and LDR) A = 1 sample/sec B = 5 samples/sec C = 12.5 samples/sec D = 25 samples/sec E = 100 samples/sec**

TABLE 4.6.6-7. GROUND IMU CONTROL MONITOR DISPLAY (V5.1.8) I-LOADS

| FSSR NAME | MSID | ENG UNITS | DT | PR | D | S | PR FCTN | MC | CAT | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M_WGS84_TO_EF(1,1) | V97U2927C | ND | F | D | M | P | G4.17<br>G4.20<br>G4.21<br>G4.220<br>G4.23<br>G4.237<br>G4.24<br>G4.25<br>V5.1.8 | 00 | WGS | 92067D | |
| M_WGS84_TO_EF(1,2) | V97U2928C | ND | F | D | M | P | G4.17<br>G4.20<br>G4.21<br>G4.220<br>G4.23<br>G4.237<br>G4.24<br>G4.25<br>V5.1.8 | 00 | WGS | 92067D | |
| M_WGS84_TO_EF(1,3) | V97U2929C | ND | F | D | M | P | G4.17<br>G4.20<br>G4.21<br>G4.220<br>G4.23<br>G4.237<br>G4.24<br>G4.25<br>V5.1.8 | 00 | WGS | 92067D | |
| M_WGS84_TO_EF(2,1) | V97U2930C | ND | F | D | M | P | G4.17<br>G4.20<br>G4.21<br>G4.220<br>G4.23<br>G4.237<br>G4.24<br>G4.25<br>V5.1.8 | 00 | WGS | 92067D | |
| M_WGS84_TO_EF(2,2) | V97U2931C | ND | F | D | M | P | G4.17<br>G4.20<br>G4.21<br>G4.220<br>G4.23<br>G4.237<br>G4.24<br>G4.25<br>V5.1.8 | 00 | WGS | 92067D | |

TABLE 4.6.6-7. GROUND IMU CONTROL MONITOR DISPLAY (V5.1.8) I-LOADS

| FSSR NAME | MSID | ENG UNITS | DT | PR | D | S | PR FCTN | MC | CAT | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M_WGS84_TO_EF(2,3) | V97U2932C | ND | F | D | M | P | G4.17<br>G4.20<br>G4.21<br>G4.220<br>G4.23<br>G4.237<br>G4.24<br>G4.25<br>V5.1.8 | 00 | WGS | 92067D | |
| M_WGS84_TO_EF(3,1) | V97U2933C | ND | F | D | M | P | G4.17<br>G4.20<br>G4.21<br>G4.220<br>G4.23<br>G4.237<br>G4.24<br>G4.25<br>V5.1.8 | 00 | WGS | 92067D | |
| M_WGS84_TO_EF(3,2) | V97U2934C | ND | F | D | M | P | G4.17<br>G4.20<br>G4.21<br>G4.220<br>G4.23<br>G4.237<br>G4.24<br>G4.25<br>V5.1.8 | 00 | WGS | 92067D | |
| M_WGS84_TO_EF(3,3) | V97U2935C | ND | F | D | M | P | G4.17<br>G4.20<br>G4.21<br>G4.220<br>G4.23<br>G4.237<br>G4.24<br>G4.25<br>V5.1.8 | 00 | WGS | 92067D | |
| NAV_ALT(1) | V97U5749CA | FT | F | S | D | P | V5.1.8 | 00 | NVB | 92067D | |
| NAV_ALT(2) | V97U5749CB | FT | F | S | D | P | V5.1.8 | 00 | ADS | 92067D | |
| NAV_ALT(3) | V97U5749CC | FT | F | S | D | P | V5.1.8 | 00 | ADS | 92067D | |
| NAV_ALT(4) | V97U5749CD | FT | F | S | D | P | V5.1.8 | 00 | ADS | 92067D | |
| NAV_ALT(5) | V97U5749CE | FT | F | S | D | P | V5.1.8 | 00 | ADS | 92067D | |
| NAV_ALT(6) | V97U5749CF | FT | F | S | D | P | V5.1.8 | 00 | ADS | 92067D | |
| NAV_ALT(7) | V97U5749CG | FT | F | S | D | P | V5.1.8 | 00 | NVB | 92067D | |
| NAV_ALT(8) | V97U5749CH | FT | F | S | D | P | V5.1.8 | 00 | ADS | 92067D | |
| NAV_ALT(9) | V97U5749CI | FT | F | S | D | P | V5.1.8 | 00 | ADS | 92067D | |
| NAV_LAT(1) | V97U5750CA | RAD | F | D | D | P | V5.1.8 | 00 | NVB | 92067D | |
| NAV_LAT(2) | V97U5750CB | RAD | F | D | D | P | V5.1.8 | 00 | ADS | 92067D | |

TABLE 4.6.6-7. GROUND IMU CONTROL MONITOR DISPLAY (V5.1.8) I-LOADS

| FSSR NAME | MSID | ENG UNITS | DT | PR | D | S | PR FCTN | MC | CAT | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|---|---|---|
| NAV_LAT(3) | V97U5750CC | RAD | F | D | D | P | V5.1.8 | 00 | ADS | 92067D | |
| NAV_LAT(4) | V97U5750CD | RAD | F | D | D | P | V5.1.8 | 00 | ADS | 92067D | |
| NAV_LAT(5) | V97U5750CE | RAD | F | D | D | P | V5.1.8 | 00 | ADS | 92067D | |
| NAV_LAT(6) | V97U5750CF | RAD | F | D | D | P | V5.1.8 | 00 | ADS | 92067D | |
| NAV_LAT(7) | V97U5750CG | RAD | F | D | D | P | V5.1.8 | 00 | NVB | 92067D | |
| NAV_LAT(8) | V97U5750CH | RAD | F | D | D | P | V5.1.8 | 00 | ADS | 92067D | |
| NAV_LAT(9) | V97U5750CI | RAD | F | D | D | P | V5.1.8 | 00 | ADS | 92067D | |
| NAV_LONG(1) | V97U5751CA | RAD | F | D | D | P | V5.1.8 | 00 | NVB | 92067D | |
| NAV_LONG(2) | V97U5751CB | RAD | F | D | D | P | V5.1.8 | 00 | ADS | 92067D | |
| NAV_LONG(3) | V97U5751CC | RAD | F | D | D | P | V5.1.8 | 00 | ADS | 92067D | |
| NAV_LONG(4) | V97U5751CD | RAD | F | D | D | P | V5.1.8 | 00 | ADS | 92067D | |
| NAV_LONG(5) | V97U5751CE | RAD | F | D | D | P | V5.1.8 | 00 | ADS | 92067D | |
| NAV_LONG(6) | V97U5751CF | RAD | F | D | D | P | V5.1.8 | 00 | ADS | 92067D | |
| NAV_LONG(7) | V97U5751CG | RAD | F | D | D | P | V5.1.8 | 00 | NVB | 92067D | |
| NAV_LONG(8) | V97U5751CH | RAD | F | D | D | P | V5.1.8 | 00 | ADS | 92067D | |
| NAV_LONG(9) | V97U5751CI | RAD | F | D | D | P | V5.1.8 | 00 | ADS | 92067D | |
| PAD_PHI(1) | V97U2894CA | DEG | F | S | D | P | V5.1.8 | 00 | NVB | 92067D | |
| PAD_PHI(2) | V97U2894CB | DEG | F | S | D | P | V5.1.8 | 00 | ADS | 92067D | |
| PAD_PHI(3) | V97U2894CC | DEG | F | S | D | P | V5.1.8 | 00 | ADS | 92067D | |
| PAD_PHI(4) | V97U2894CD | DEG | F | S | D | P | V5.1.8 | 00 | ADS | 92067D | |
| PAD_PHI(5) | V97U2894CE | DEG | F | S | D | P | V5.1.8 | 00 | ADS | 92067D | |
| PAD_PHI(6) | V97U2894CF | DEG | F | S | D | P | V5.1.8 | 00 | ADS | 92067D | |
| PAD_PHI(7) | V97U2894CG | DEG | F | S | D | P | V5.1.8 | 00 | NVB | 92067D | |
| PAD_PHI(8) | V97U2894CH | DEG | F | S | D | P | V5.1.8 | 00 | ADS | 92067D | |
| PAD_PHI(9) | V97U2894CI | DEG | F | S | D | P | V5.1.8 | 00 | ADS | 92067D | |
| PAD_PSI(1) | V97U2895CA | DEG | F | S | D | P | V5.1.8 | 00 | NVB | 92067D | |
| PAD_PSI(2) | V97U2895CB | DEG | F | S | D | P | V5.1.8 | 00 | ADS | 92067D | |
| PAD_PSI(3) | V97U2895CC | DEG | F | S | D | P | V5.1.8 | 00 | ADS | 92067D | |
| PAD_PSI(4) | V97U2895CD | DEG | F | S | D | P | V5.1.8 | 00 | ADS | 92067D | |
| PAD_PSI(5) | V97U2895CE | DEG | F | S | D | P | V5.1.8 | 00 | ADS | 92067D | |
| PAD_PSI(6) | V97U2895CF | DEG | F | S | D | P | V5.1.8 | 00 | ADS | 92067D | |
| PAD_PSI(7) | V97U2895CG | DEG | F | S | D | P | V5.1.8 | 00 | NVB | 92067D | |
| PAD_PSI(8) | V97U2895CH | DEG | F | S | D | P | V5.1.8 | 00 | ADS | 92067D | |
| PAD_PSI(9) | V97U2895CI | DEG | F | S | D | P | V5.1.8 | 00 | ADS | 92067D | |
| PAD_THETA(1) | V97U2896CA | DEG | F | S | D | P | V5.1.8 | 00 | NVB | 92067D | |
| PAD_THETA(2) | V97U2896CB | DEG | F | S | D | P | V5.1.8 | 00 | ADS | 92067D | |
| PAD_THETA(3) | V97U2896CC | DEG | F | S | D | P | V5.1.8 | 00 | ADS | 92067D | |
| PAD_THETA(4) | V97U2896CD | DEG | F | S | D | P | V5.1.8 | 00 | ADS | 92067D | |
| PAD_THETA(5) | V97U2896CE | DEG | F | S | D | P | V5.1.8 | 00 | ADS | 92067D | |
| PAD_THETA(6) | V97U2896CF | DEG | F | S | D | P | V5.1.8 | 00 | ADS | 92067D | |
| PAD_THETA(7) | V97U2896CG | DEG | F | S | D | P | V5.1.8 | 00 | NVB | 92067D | |
| PAD_THETA(8) | V97U2896CH | DEG | F | S | D | P | V5.1.8 | 00 | ADS | 92067D | |
| PAD_THETA(9) | V97U2896CI | DEG | F | S | D | P | V5.1.8 | 00 | ADS | 92067D | |

TABLE 4.6.6-7. GROUND IMU CONTROL MONITOR DISPLAY (V5.1.8) I-LOADS

| FSSR NAME | MSID | ENG UNITS | DT | PR | D | S | PR FCTN | MC | CAT | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|---|---|---|

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

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TABLE 4.6.6-8. GROUND IMU CONTROL MONITOR DISPLAY (V5.1.8) K-LOADS

| FSSR NAME DESCRIPTION | MSID | MC | KLOAD VALUE | ENG UNITS | DT | P R | S | PR FCTN | LAST CR | R E V |
|---|---|---|---|---|---|---|---|---|---|---|
| NO REQUIREMENTS | | | | | | | | | | |

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE 4.6.6-9. GROUND IMU CONTROL MONITOR DISPLAY (V5.1.8) CONSTANTS

| FSSR NAME<br>DESCRIPTION | MSID | MC | CONSTANT VALUE | ENG UNITS | DT | P R | S | PR FCTN | LAST CR | R E V |
|---|---|---|---|---|---|---|---|---|---|---|
| EARTH_RADIUS_EQUATOR<br>EARTH EQUATORIAL RADIUS | V97U5324C | 00 | +2.09257414698E+07 | FT | F | D | C | A6.9<br>G4.126<br>G4.127<br>G4.13<br>G4.139<br>G4.144<br>G4.148<br>G4.15<br>G4.158<br>G4.19<br>G4.20<br>G4.205<br>G4.210<br>G4.211<br>G4.213<br>G4.23<br>G4.236<br>G4.238<br>G4.24<br>G4.25<br>G5.26<br>G5.27<br>V5.1.8 | 93090E | |
| ELLIPT<br>EARTH'S ELLIPTICITY CONSTANT | V97U5332C | 00 | +3.352329869 E-03 | ND | F | D | C | A6.9<br>G4.126<br>G4.127<br>G4.139<br>G4.144<br>G4.148<br>G4.15<br>G4.19<br>G4.20<br>G4.205<br>G4.213<br>G4.23<br>G4.236<br>G4.237<br>G4.238<br>G4.24<br>G4.25<br>G5.26<br>G5.27<br>V5.1.8 | 93090E | |

TABLE 4.6.6-9. GROUND IMU CONTROL MONITOR DISPLAY (V5.1.8) CONSTANTS

| FSSR NAME DESCRIPTION | MSID | MC | CONSTANT VALUE | ENG UNITS | DT | P R | S | PR FCTN | LAST CR | R E V |
|---|---|---|---|---|---|---|---|---|---|---|

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

## 4.6.7 MANUAL CONTROLS (PFS)

TITLE: MANUAL CONTROLS
TYPE: DISP/106
AVAILABILITY: GNC OPS 9

### 4.6.7.1 Purpose, Operation, and Organization

(1) MANUAL CONTROLS Figure 4.6.7–1 is the Manual Controls Display (PFS). This display is used to test the switch contacts and transducers associated with the trim switches, body–flap switches, rotation and translation hand controllers, SBTC, and RPTA. When the Manual Controls display page is active, all these switches/and controllers are disengaged from their function of controlling aerosurfaces and the positioning or firing of reaction motors.

(2) RHC The upper left portion of the display shows the signals from each of the three redundant transducers in each axis of the rotation hand controller located at the left hand, right hand, and aft control stations. The signals are displayed as percent of RHC deflection (99 maximum). The direction of controller deflection is displayed in terms of the axis of the controller itself regardless of where the controller is mounted in the vehicle.

(3) SBTC The upper right portion of the display shows the deflections of the three redundant transducers of the speed brake thrust controllers (left and right) and the rudder pedal transducer assemblies (left and right). The deflections of these controls are shown in percent of full scale (99 maximum).

(4) TRIM SW The lower left portion of the display shows the positions of the two redundant contacts for the trim switches. The indications are arranged in columns for roll, pitch, and yaw switches. The positive and negative contacts for a given channel separately drive indications in the same place on the display. If an error condition occurs such that both contacts are closed, the relevant symbols will be overlaid on the screen.

(5) BDY FLP To the right of the trim–switch indication is a display for the body–flap switches. As with the trim switches (paragraph 3), the positive and negative (up and down) indications are in the same place on the screen and appear overlaid if an error condition causes both to be displayed at once.

(6) THC The lower right part of the display contains the triply redundant translation hand controller/switch contact indications, in three columns representing the TX, TY, and TZ axis. As with the RHC's the direction of THC deflection is displayed in terms of the axis of the controller itself. As with the trim switches, the positive and negative contact indications for a given channel drive are in the same place; the symbols are overlaid when an error condition causes both to be displayed.

Because of the physical orientation (rotated 90°clockwise from original planned installation), the AFT THC causes crew commands to be displayed as follows:

| | CONTROLLER AXIS (CRT DISPLAY) | | |
|---|---|---|---|
| AFT THC COMMANDS | TX | TY | TZ |
| PUSH | + | | |
| PULL | - | | |
| DOWN | | + | |
| UP | | - | |
| STBD | | | + |
| PORT | | | - |

Software transformations assure that crew commands are correctly input to the flight control system; only data displayed on the CRT display are affected.

### 4.6.7.2 MANUAL CONTROLS Keyboard Processing Addendum

Not applicable.

### 4.6.7.3 MANUAL CONTROLS CRT Display Processing Addendum

The table below presents the stand–alone parameter status indicators (PSI) that can be displayed for a parameter. PSI requirements are identified by the word “STAT” being inserted in the FORMAT TYPE column and a numeric code appearing as an entry (right justified) in the ADD REF column of CRT display processing Table 4.6.7–2. The numeric code, corresponding to one of those listed in the table, indicate the specific status processing to be performed. If there is no numeric code entry, the status processing is defined by the default code.

When the “M” PSI is displayed (for Commfault, I/O error resulting in missing data), the associated parameter value data field shall be blanked unless specified otherwise.

| Numeric Code | PSI SYMBOL(S) | | | | |
|---|---|---|---|---|---|
| Default (blank) | ↓ | | | M | ⊬ |
| 1 | ↓ | ↑ | | M | ⊬ |
| 2 | | ↑ | | M | ⊬ |
| 3 | ↓ | | | | ⊬ |
| 4 | | ↑ | | | ⊬ |
| 5 | ↓ | | ? | | ⊬ |
| 6 | ↓ | ↑ | | | ⊬ |
| 7 | | | | M | ⊬ |
| 8 | ↓ | | ? | M | ⊬ |
| 9 | | | ? | M | ⊬ |

⊬ = blank

The following alpha code(s) appear (left justified) in the ADD REF column of Table 4.6.7–2 whenever it is necessary to define any special processing requirements not otherwise covered therein:

A. RHC Direction Symbols Processing is required to display the following directional symbols in place of the +/– signs:

| Sign of Signal | RHC Pitch Cmd | RHC Roll Cmd | RHC Yaw Cmd |
|---|---|---|---|
| + | U | R | R |
| 0 | ⊬ | ⊬ | ⊬ |
| – | D | L | L |

B. Rudder Pedal Direction Symbols Processing is required to display the following directional symbols in place of +/– signs:

| Sign of Signal | Rudder Cmd |
|---|---|
| + | R |
| 0 | ⊬ |
| – | L |

C. Scaling The values for $A_1$ and $A_0$ are listed below:

| | | $A_1$ | $A_0$ |
|---|---|---|---|
| RHC | Roll | 0.207 | 0 |
| | Pitch | 0.207 | 0 |
| | Yaw | 0.214 | 0 |
| RPTA | | 0.200 | 0 |
| SPBK | | 0.195 | 0 |

Where:

$A_0$ = Compensation bias percent

$A_1$ = Scale factor percent/count

X = Raw data PCM count

EU = Engr units percent

$EU = A_1 X + A_0$

D. Aerodynamic and Reaction Devices – Controllers and Effectors –Directional Conventions

Rotation Hand Controllers (RHC). The directional signals from the RHC are described in terms of the orientation of the RHC itself – or rather the orientation of the crew member operating the RHC.

At the forward stations the orientation is obvious; at the aft crew station the orientation is with respect to the controller and not the vehicle.

Pulling back on the HC produces a positive (+) pitch signal which is sometimes described as an "up" (U) pitch signal. Pushing forward produces a negative (–) or "down" (D) pitch signal.

Bending the RHC to the right produces a positive (+) roll signal which is sometimes described as a "right" (R) roll signal. Bending the RHC left produces a negative (–) or "left" (L) roll signal.

Twisting the handle of the RHC clockwise about its own axis produces a positive (+) yaw signal which is sometimes described as a "right" (R) yaw signal. Twisting the handle counter–clockwise produces a negative (–) or "left" (L) signal.

Rudder Pedal Transducer Assemblies (RPTA). Operating the RPTA is described in terms of the right pedal and left pedal. This description refers to the right or left pedal of the entire assembly at each crew station; it does not refer to the location of the assembly.

Pressing down on the right pedal produces a positive (+) or right (R) yaw signal. Pressing down on the left pedal produces a negative (–) or left (L) yaw signal.

Translation Hand Controllers (THC). As with the RHC, the directional signals from the THC are described in terms of the orientation of the THC itself.

Pushing forward on the THC produces a positive (+) signal in the TX axis. Pulling backward on the THC produces a negative (–) signal in the TX axis. Pushing the THC to the right produces a positive (+) signal in the TY axis. Pushing the THC to the left produces a negative (–) signal in the TY axis. Pushing the THC down into its housing produces a positive (+) signal in the TZ axis. Pulling the THC up (out of its housing) produces a negative (–) signal in the TZ axis.

Reaction Jets. Reaction jets are identified by a three–character code: a letter which identifies the general location, a one–digit identifying number for jets at that location firing in a specific direction, and a letter which identifies the exhaust direction.

General Location (First Character)

| | |
|---|---|
| F | Forward |
| L | Left (aft) |
| R | Right (aft) |

Firing Direction (Third Character)

| | |
|---|---|
| F | Jet fires forward (vehicle accelerates backward) |
| A | Jet fires aft (vehicle accelerates forward) |
| U | Jet fires up (vehicle accelerates downward) |
| D | Jet fires down (vehicle accelerates upward) |
| L | Jet fires to left (vehicle accelerates to right) |
| R | Jet fires to right (vehicle accelerates to left) |

Aerosurfaces. When the RHC or RPTA is being used to control the aerosurfaces, control is effected by electrical signals from the controllers mediated by the computers and fed through electrical servomechanisms. Surface position feedback transducers then produce electrical signals that are

also fed to the servos. The servos continue to drive the aerosurfaces until the sums of the signals reaching each servo are zero. With regard to pitch and yaw, this means that the feedback transducers must produce signals opposite in polarity to the signals from the RHC and RPTA. Roll is effected by the computers sending signals of opposite polarity to the servos for the elevons on opposite sides of the vehicle.

Elevons. When the trailing edge of an elevon (any one of the four) is up, the signal from the feedback transducer is negative (–) and the position is represented on CRT displays as U by multiplying by a scale factor of –1. When the trailing edge of an elevon is down, the signal from the feedback transducer is positive (+) and the position is represented on CRT displays as D by multiplying by a scale factor of –1.

Rudder. When the trailing edge of the rudder is to the right, the signal from the feedback transducer is negative (–) and the position is represented on CRT displays as R by multiplying by a scale factor of –1. When the trailing edge of the rudder is to the left, the signal from the feedback transducer is positive (+) and the position is represented on CRT displays as L by multiplying by a scale factor of –1.

Ailerons. The vehicle can be rolling and pitching at the same time. The component of the positions of the elevons that causes the vehicle to roll is described in terms of a set of aerosurfaces called the ailerons. When the aileron position is such that the right elevons are positioned with their trailing edges up (negative feedback signals) and the left elevons are positioned with their trailing edges down (positive feedback signals), the aileron position causes right roll and is represented on displays as R. When the right elevons have their trailing edges down (positive feedback signals) and the left elevons have their trailing edges up (negative feedback signals), the aileron position is represented as L and causes left roll.

### 4.6.7.4 MANUAL CONTROLS Figure/Table References

Figure 4.6.7–1 Manual Controls Display (PFS)

Table 4.6.7–1 Keyboard Processing Table N/A

Table 4.6.7–2 CRT Display Processing Table

Table 4.6.7–3 CRT Display Processing Background Requirements N/A

Table 4.6.7–4 Mission Design Background Constants N/A

Table 4.6.7–5 Input Functional Parameters

Table 4.6.7–6 Output Functional Parameters

Table 4.6.7–7 I–Loads

Table 4.6.7–8 K–Loads

Table 4.6.7–9 Constants

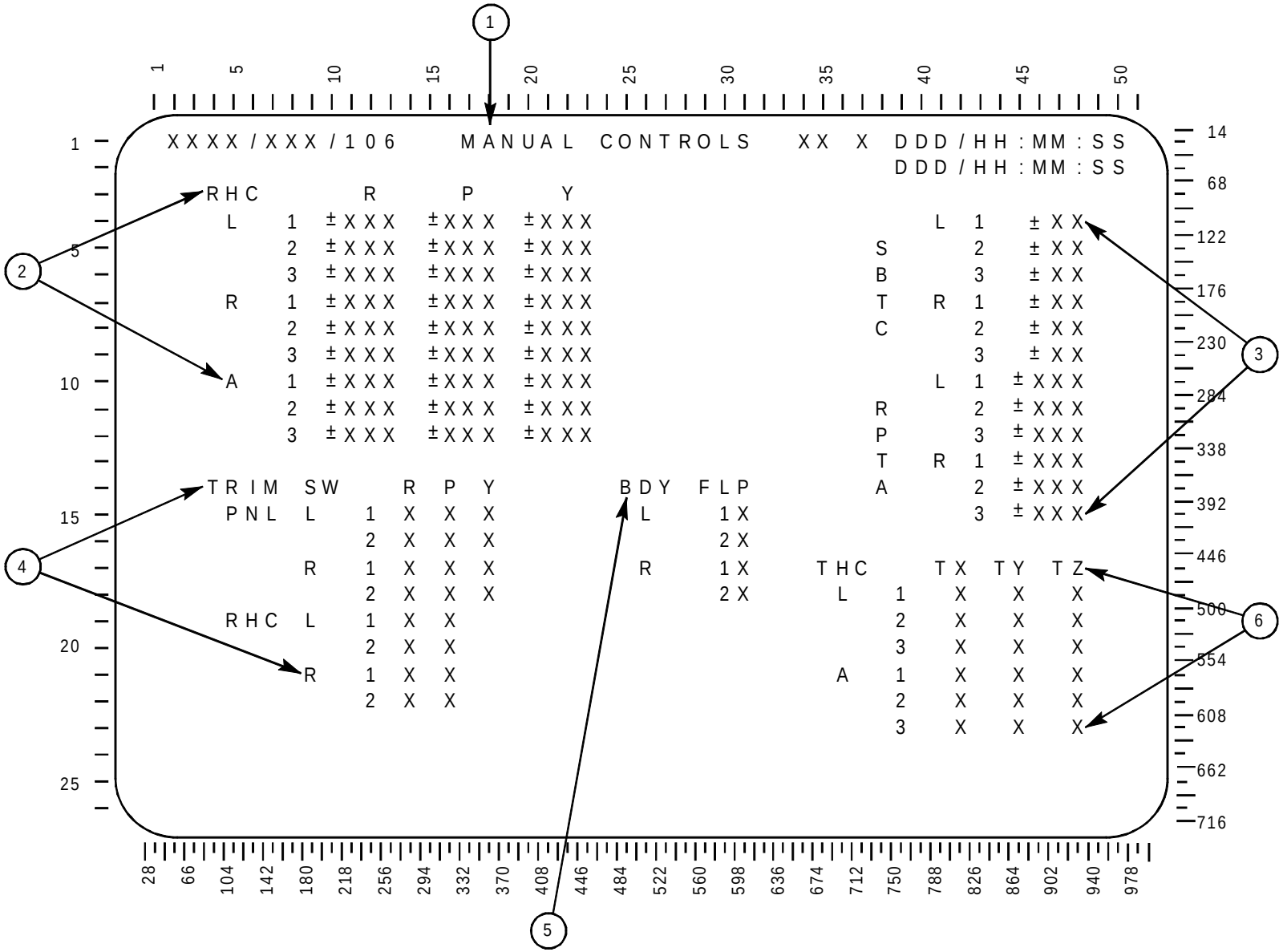


FIGURE 4.6.7-1. Manual Controls Display (PFS)

TABLE 4.6.7-2. MANUAL CONTROLS (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | BILEVEL | | | | | | | | | | | | | | | | | |
| | | | X | Y | | CHAR | 1 | 0 | TYPE | | | | | | | | | | | | | | | |
| 001 | (OPS) | V93X0040X | 2 | 1 | | 5.0 | | | CHAR | | | | | | | E | | | | | | UI | OPS FUNCTION PAGE | X |
| 002 | (SPEC) | V93X0042X | 7 | 1 | | 4.0 | | | CHAR | | | | | | | E | | | | | | UI | SPEC FUNCTION PAGE | X |
| 003 | (DISP) | V93X0044X | 10 | 1 | | 4.0 | | | DEC | | | | | | | E | | | | | | UI | DISPLAY FUNCTION PAGE | X |
| 004 | (UL) | V92X5032X | 34 | 1 | | 2.0 | UL | | BLVL | | | | | | X | G | | | | | | UI | UPLINK ACTIVITY IND | X |
| 005 | (GPC) | V93X0048X | 36 | 1 | | 2.0 | | | DEC | | | | | | | E | | | | | | UI | GPC DRIVER | X |
| 006 | (MT) | V91W1990C | 39 | 1 | | 12.0 | | | CHAR | DHMS | | | | | | A | | | | | | FCOS | MISSION ELAPSED TIME | X |
| 007 | (CRT TIMER) | V91W1988C | 39 | 2 | | 12.0 | | | CHAR | DHMS | | | | | | A | | | | | | FCOS | DISPLAY CRT TIME, SM | X |
| 008 | RHC L1 R | V72K1155C | 10 | 4 | | 4.0 | | | DEC | PCT | | | | | | A | X | | | | ACD | HDA | LH RHC ROLL CMD–A | X |
| 009 | RHC L1 P | V72K1156C | 15 | 4 | | 4.0 | | | DEC | PCT | | | | | | A | X | | | | ACD | HDA | LH RHC PITCH CMD–A | X |
| 010 | RHC L1 Y | V72K1157C | 20 | 4 | | 4.0 | | | DEC | PCT | | | | | | A | X | | | | ACD | HDA | LH RHC YAW CMD–A | X |
| 011 | RHC L2 R | V72K1170C | 10 | 5 | | 4.0 | | | DEC | PCT | | | | | | A | X | | | | ACD | HDA | LH RHC ROLL CMD–B | X |
| 012 | RHC L2 P | V72K1171C | 15 | 5 | | 4.0 | | | DEC | PCT | | | | | | A | X | | | | ACD | HDA | LH RHC PITCH CMD–B | X |
| 013 | RHC L2 Y | V72K1172C | 20 | 5 | | 4.0 | | | DEC | PCT | | | | | | A | X | | | | ACD | HDA | LH RHC YAW CMD–B | X |
| 014 | RHC L3 R | V72K1185C | 10 | 6 | | 4.0 | | | DEC | PCT | | | | | | A | X | | | | ACD | HDA | LH RHC ROLL CMD–C | X |
| 015 | RHC L3 P | V72K1186C | 15 | 6 | | 4.0 | | | DEC | PCT | | | | | | A | X | | | | ACD | HDA | LH RHC PITCH CMD–C | X |
| 016 | RHC L3 Y | V72K1187C | 20 | 6 | | 4.0 | | | DEC | PCT | | | | | | A | X | | | | ACD | HDA | LH RHC YAW CMD–C | X |
| 017 | RHC R1 R | V72K1205C | 10 | 7 | | 4.0 | | | DEC | PCT | | | | | | A | X | | | | ACD | HDA | RH RHC ROLL CMD–A | X |
| 018 | RHC R1 P | V72K1206C | 15 | 7 | | 4.0 | | | DEC | PCT | | | | | | A | X | | | | ACD | HDA | RH RHC PITCH CMD–A | X |
| 019 | RHC R1 Y | V72K1207C | 20 | 7 | | 4.0 | | | DEC | PCT | | | | | | A | X | | | | ACD | HDA | RH RHC YAW CMD–A | X |
| 020 | RHC R2 R | V72K1220C | 10 | 8 | | 4.0 | | | DEC | PCT | | | | | | A | X | | | | ACD | HDA | RH RHC ROLL CMD–B | X |
| 021 | RHC R2 P | V72K1221C | 15 | 8 | | 4.0 | | | DEC | PCT | | | | | | A | X | | | | ACD | HDA | RH RHC PITCH CMD–B | X |
| 022 | RHC R2 Y | V72K1222C | 20 | 8 | | 4.0 | | | DEC | PCT | | | | | | A | X | | | | ACD | HDA | RH RHC YAW CMD–B | X |
| 023 | RHC R3 R | V72K1235C | 10 | 9 | | 4.0 | | | DEC | PCT | | | | | | A | X | | | | ACD | HDA | RH RHC ROLL CMD–C | X |
| 024 | RHC R3 P | V72K1236C | 15 | 9 | | 4.0 | | | DEC | PCT | | | | | | A | X | | | | ACD | HDA | RH RHC PITCH CMD–C | X |
| 025 | RHC R3 Y | V72K1237C | 20 | 9 | | 4.0 | | | DEC | PCT | | | | | | A | X | | | | ACD | HDA | RH RHC YAW CMD–C | X |
| 026 | RHC A1 R | V72K1245C | 10 | 10 | | 4.0 | | | DEC | PCT | | | | | | A | X | | | | ACD | HDA | AFT RHC ROLL CMD–A | X |
| 027 | RHC A1 P | V72K1246C | 15 | 10 | | 4.0 | | | DEC | PCT | | | | | | A | X | | | | ACD | HDA | AFT RHC PITCH CMD–A | X |
| 028 | RHC A1 Y | V72K1247C | 20 | 10 | | 4.0 | | | DEC | PCT | | | | | | A | X | | | | ACD | HDA | AFT RHC YAW CMD–A | X |
| 029 | RHC A2 R | V72K1255C | 10 | 11 | | 4.0 | | | DEC | PCT | | | | | | A | X | | | | ACD | HDA | AFT RHC ROLL CMD–B | X |

## TABLE 4.6.7-2. MANUAL CONTROLS (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | | | |
| 030 | RHC A2 P | V72K1256C | 15 | 11 | | 4.0 | | | DEC | PCT | | | | | | A | X | | | | ACD | HDA | AFT RHC PITCH CMD–B | X |
| 031 | RHC A2 Y | V72K1257C | 20 | 11 | | 4.0 | | | DEC | PCT | | | | | | A | X | | | | ACD | HDA | AFT RHC YAW CMD–B | X |
| 032 | RHC A3 R | V72K1265C | 10 | 12 | | 4.0 | | | DEC | PCT | | | | | | A | X | | | | ACD | HDA | AFT RHC ROLL CMD–C | X |
| 033 | RHC A3 P | V72K1266C | 15 | 12 | | 4.0 | | | DEC | PCT | | | | | | A | X | | | | ACD | HDA | AFT RHC PITCH CMD–C | X |
| 034 | RHC A3 Y | V72K1267C | 20 | 12 | | 4.0 | | | DEC | PCT | | | | | | A | X | | | | ACD | HDA | AFT RHC YAW CMD–C | X |
| 035 | PNL TRIM L1 R (+) | V72K1506X | 14 | 15 | | 1.0 | R | | BLVL | | | | | | | A | | | | | | HDA | LH + ROLL TRIM A | X |
| 036 | PNL TRIM L1 R (–) | V72K1509X | 14 | 15 | | 1.0 | L | | BLVL | | | | | | | A | | | | | | HDA | LH – ROLL TRIM A | X |
| 037 | PNL TRIM L1 P (+) | V72K1500X | 16 | 15 | | 1.0 | U | | BLVL | | | | | | | A | | | | | | HDA | LH + PITCH TRIM A | X |
| 038 | PNL TRIM L1 P (–) | V72K1503X | 16 | 15 | | 1.0 | D | | BLVL | | | | | | | A | | | | | | HDA | LH – PITCH TRIM A | X |
| 039 | PNL TRIM L1 Y (+) | V72K1148X | 18 | 15 | | 1.0 | R | | BLVL | | | | | | | A | | | | | | HDA | LH + YAW TRIM–A | X |
| 040 | PNL TRIM L1 Y (–) | V72K1149X | 18 | 15 | | 1.0 | L | | BLVL | | | | | | | A | | | | | | HDA | LH – YAW TRIM–A | X |
| 041 | PNL TRIM L2 R (+) | V72K1507X | 14 | 16 | | 1.0 | R | | BLVL | | | | | | | A | | | | | | HDA | LH + ROLL TRIM B | X |
| 042 | PNL TRIM L2 R (–) | V72K1510X | 14 | 16 | | 1.0 | L | | BLVL | | | | | | | A | | | | | | HDA | LH – ROLL TRIM B | X |
| 043 | PNL TRIM L2 P (+) | V72K1501X | 16 | 16 | | 1.0 | U | | BLVL | | | | | | | A | | | | | | HDA | LH + PITCH TRIM B | X |
| 044 | PNL TRIM L2 P (–) | V72K1504X | 16 | 16 | | 1.0 | D | | BLVL | | | | | | | A | | | | | | HDA | LH – PITCH TRIM B | X |
| 045 | PNL TRIM L2 Y (+) | V72K1163X | 18 | 16 | | 1.0 | R | | BLVL | | | | | | | A | | | | | | HDA | LH + YAW TRIM–B | X |
| 046 | PNL TRIM L2 Y (–) | V72K1164X | 18 | 16 | | 1.0 | L | | BLVL | | | | | | | A | | | | | | HDA | LH – YAW TRIM–B | X |
| 047 | PNL TRIM R1 R (+) | V72K1518X | 14 | 17 | | 1.0 | R | | BLVL | | | | | | | A | | | | | | HDA | RH + ROLL TRIM A | X |
| 048 | PNL TRIM R1 R (–) | V72K1521X | 14 | 17 | | 1.0 | L | | BLVL | | | | | | | A | | | | | | HDA | RH – ROLL TRIM A | X |
| 049 | PNL TRIM R1 P (+) | V72K1512X | 16 | 17 | | 1.0 | U | | BLVL | | | | | | | A | | | | | | HDA | RH + PITCH TRIM A | X |
| 050 | PNL TRIM R1 P (–) | V72K1515X | 16 | 17 | | 1.0 | D | | BLVL | | | | | | | A | | | | | | HDA | RH – PITCH TRIM A | X |
| 051 | PNL TRIM R1 Y (+) | V72K1193X | 18 | 17 | | 1.0 | R | | BLVL | | | | | | | A | | | | | | HDA | RH + YAW TRIM–A | X |
| 052 | PNL TRIM R1 Y (–) | V72K1194X | 18 | 17 | | 1.0 | L | | BLVL | | | | | | | A | | | | | | HDA | RH – YAW TRIM–A | X |
| 053 | PNL TRIM R2 R (+) | V72K1519X | 14 | 18 | | 1.0 | R | | BLVL | | | | | | | A | | | | | | HDA | RH + ROLL TRIM B | X |
| 054 | PNL TRIM R2 R (–) | V72K1522X | 14 | 18 | | 1.0 | L | | BLVL | | | | | | | A | | | | | | HDA | RH – ROLL TRIM B | X |
| 055 | PNL TRIM R2 P (+) | V72K1513X | 16 | 18 | | 1.0 | U | | BLVL | | | | | | | A | | | | | | HDA | RH + PITCH TRIM B | X |
| 056 | PNL TRIM R2 P (–) | V72K1516X | 16 | 18 | | 1.0 | D | | BLVL | | | | | | | A | | | | | | HDA | RH – PITCH TRIM B | X |
| 057 | PNL TRIM R2 Y (+) | V72K1213X | 18 | 18 | | 1.0 | R | | BLVL | | | | | | | A | | | | | | HDA | RH + YAW TRIM–B | X |
| 058 | PNL TRIM R2 Y (–) | V72K1214X | 18 | 18 | | 1.0 | L | | BLVL | | | | | | | A | | | | | | HDA | RH – YAW TRIM–B | X |
| 059 | RHC TRIM L1 R (+) | V72K1152X | 14 | 19 | | 1.0 | R | | BLVL | | | | | | | A | | | | | | HDA | LH RHC + ROLL TRIM–A | X |

TABLE 4.6.7-2. MANUAL CONTROLS (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | | | |
| 060 | RHC TRIM L1 R (–) | V72K1153X | 14 | 19 | | 1.0 | L | | BLVL | | | | | | | A | | | | | | HDA | LH RHC – ROLL TRIM–A | X |
| 061 | RHC TRIM L1 P (+) | V72K1150X | 16 | 19 | | 1.0 | U | | BLVL | | | | | | | A | | | | | | HDA | LH RHC + PITCH TRIM–A | X |
| 062 | RHC TRIM L1 P (–) | V72K1151X | 16 | 19 | | 1.0 | D | | BLVL | | | | | | | A | | | | | | HDA | LH RHC – PITCH TRIM–A | X |
| 063 | RHC TRIM L2 R (+) | V72K1167X | 14 | 20 | | 1.0 | R | | BLVL | | | | | | | A | | | | | | HDA | LH RHC + ROLL TRIM–B | X |
| 064 | RHC TRIM L2 R (–) | V72K1168X | 14 | 20 | | 1.0 | L | | BLVL | | | | | | | A | | | | | | HDA | LH RHC – ROLL TRIM–B | X |
| 065 | RHC TRIM L2 P (+) | V72K1165X | 16 | 20 | | 1.0 | U | | BLVL | | | | | | | A | | | | | | HDA | LH RHC + PITCH TRIM–B | X |
| 066 | RHC TRIM L2 P (–) | V72K1166X | 16 | 20 | | 1.0 | D | | BLVL | | | | | | | A | | | | | | HDA | LH RHC – PITCH TRIM–B | X |
| 067 | RHC TRIM R1 R (+) | V72K1197X | 14 | 21 | | 1.0 | R | | BLVL | | | | | | | A | | | | | | HDA | RH RHC + ROLL TRIM–A | X |
| 068 | RHC TRIM R1 R (–) | V72K1198X | 14 | 21 | | 1.0 | L | | BLVL | | | | | | | A | | | | | | HDA | RH RHC – ROLL TRIM–A | X |
| 069 | RHC TRIM R1 P (+) | V72K1195X | 16 | 21 | | 1.0 | U | | BLVL | | | | | | | A | | | | | | HDA | RH RHC + PITCH TRIM–A | X |
| 070 | RHC TRIM R1 P (–) | V72K1196X | 16 | 21 | | 1.0 | D | | BLVL | | | | | | | A | | | | | | HDA | RH RHC – PITCH TRIM–A | X |
| 071 | RHC TRIM R2 R (+) | V72K1217X | 14 | 22 | | 1.0 | R | | BLVL | | | | | | | A | | | | | | HDA | RH RHC + ROLL TRIM–B | X |
| 072 | RHC TRIM R2 R (–) | V72K1218X | 14 | 22 | | 1.0 | L | | BLVL | | | | | | | A | | | | | | HDA | RH RHC – ROLL TRIM–B | X |
| 073 | RHC TRIM R2 P (+) | V72K1215X | 16 | 22 | | 1.0 | U | | BLVL | | | | | | | A | | | | | | HDA | RH RHC + PITCH TRIM–B | X |
| 074 | RHC TRIM R2 P (–) | V72K1216X | 16 | 22 | | 1.0 | D | | BLVL | | | | | | | A | | | | | | HDA | RH RHC – PITCH TRIM–B | X |
| 075 | BDY FLP SW L1 UP | V72K2077X | 31 | 15 | | 1.0 | U | | BLVL | | | | | | | A | | | | | | HDA | LH BODY FLAP UP A | X |
| 076 | BDY FLP SW L1 DN | V72K2079X | 31 | 15 | | 1.0 | D | | BLVL | | | | | | | A | | | | | | HDA | LH BODY FLAP DOWN A | X |
| 077 | BDY FLP SW L2 UP | V72K2078X | 31 | 16 | | 1.0 | U | | BLVL | | | | | | | A | | | | | | HDA | LH BODY FLAP UP B | X |
| 078 | BDY FLP SW L2 DN | V72K2080X | 31 | 16 | | 1.0 | D | | BLVL | | | | | | | A | | | | | | HDA | LH BODY FLAP DOWN B | X |
| 079 | BDY FLP SW R1 UP | V72K2087X | 31 | 17 | | 1.0 | U | | BLVL | | | | | | | A | | | | | | HDA | RH BODY FLAP UP A | X |
| 080 | BDY FLP SW R1 DN | V72K2089X | 31 | 17 | | 1.0 | D | | BLVL | | | | | | | A | | | | | | HDA | RH BODY FLAP DOWN A | X |
| 081 | BDY FLP SW R2 UP | V72K2088X | 31 | 18 | | 1.0 | U | | BLVL | | | | | | | A | | | | | | HDA | RH BODY FLAP UP B | X |
| 082 | BDY FLP SW R2 DN | V72K2090X | 31 | 18 | | 1.0 | D | | BLVL | | | | | | | A | | | | | | HDA | RH BODY FLAP DOWN B | X |
| 083 | SPD BK L1 | V72K1575C | 46 | 4 | | 3.0 | | | DEC | PCT | | | | | | A | X | | | | C | HDA | LH SBTC CMD–A | X |
| 084 | SPD BK L2 | V72K1578C | 46 | 5 | | 3.0 | | | DEC | PCT | | | | | | A | X | | | | C | HDA | LH SBTC CMD–B | X |
| 085 | SPD BK L3 | V72K1581C | 46 | 6 | | 3.0 | | | DEC | PCT | | | | | | A | X | | | | C | HDA | LH SBTC CMD–C | X |
| 086 | SPD BK R1 | V72K1585C | 46 | 7 | | 3.0 | | | DEC | PCT | | | | | | A | X | | | | C | HDA | RH SBTC CMD–A | X |
| 087 | SPD BK R2 | V72K1588C | 46 | 8 | | 3.0 | | | DEC | PCT | | | | | | A | X | | | | C | HDA | RH SBTC CMD–B | X |
| 088 | SPD BK R3 | V72K1591C | 46 | 9 | | 3.0 | | | DEC | PCT | | | | | | A | X | | | | C | HDA | RH SBTC CMD–C | X |
| 089 | RUD PED L1 | V72K1530C | 45 | 10 | | 4.0 | | | DEC | PCT | | | | | | A | X | | | | BCD | HDA | LEFT RUDDER PEDAL CMD–A | X |

## TABLE 4.6.7-2. MANUAL CONTROLS (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | | | |
| 090 | RUD PED L2 | V72K1531C | 45 | 11 | | 4.0 | | | DEC | PCT | | | | | | A | X | | | | BCD | HDA | LEFT RUDDER PEDAL CMD–B | X |
| 091 | RUD PED L3 | V72K1532C | 45 | 12 | | 4.0 | | | DEC | PCT | | | | | | A | X | | | | BCD | HDA | LEFT RUDDER PEDAL CMD–C | X |
| 092 | RUD PED R1 | V72K1540C | 45 | 13 | | 4.0 | | | DEC | PCT | | | | | | A | X | | | | BCD | HDA | RIGHT RUDDER PEDAL CMD–A | X |
| 093 | RUD PED R2 | V72K1541C | 45 | 14 | | 4.0 | | | DEC | PCT | | | | | | A | X | | | | BCD | HDA | RIGHT RUDDER PEDAL CMD–B | X |
| 094 | RUD PED R3 | V72K1542C | 45 | 15 | | 4.0 | | | DEC | PCT | | | | | | A | X | | | | BCD | HDA | RIGHT RUDDER PEDAL CMD C | X |
| 095 | THC L1 TX (+) | V72K1315X | 42 | 18 | | 1.0 | + | | BLVL | | | | | | | A | | | | | D | HDA | FWD THC POS X OUTPUT–A | X |
| 096 | THC L1 TX (–) | V72K1316X | 42 | 18 | | 1.0 | – | | BLVL | | | | | | | A | | | | | D | HDA | FWD THC NEG X OUTPUT–A | X |
| 097 | THC L1 TY (+) | V72K1320X | 45 | 18 | | 1.0 | + | | BLVL | | | | | | | A | | | | | D | HDA | FWD THC POS Y OUTPUT–A | X |
| 098 | THC L1 TY (–) | V72K1321X | 45 | 18 | | 1.0 | – | | BLVL | | | | | | | A | | | | | D | HDA | FWD THC NEG Y OUTPUT–A | X |
| 099 | THC L1 TZ (+) | V72K1325X | 48 | 18 | | 1.0 | + | | BLVL | | | | | | | A | | | | | D | HDA | FWD THC POS Z OUTPUT–A | X |
| 100 | THC L1 TZ (–) | V72K1326X | 48 | 18 | | 1.0 | – | | BLVL | | | | | | | A | | | | | D | HDA | FWD THC NEG Z OUTPUT–A | X |
| 101 | THC L2 TX (+) | V72K1335X | 42 | 19 | | 1.0 | + | | BLVL | | | | | | | A | | | | | D | HDA | FWD THC POS X OUTPUT–B | X |
| 102 | THC L2 TX (–) | V72K1336X | 42 | 19 | | 1.0 | – | | BLVL | | | | | | | A | | | | | D | HDA | FWD THC NEG X OUTPUT–B | X |
| 103 | THC L2 TY (+) | V72K1340X | 45 | 19 | | 1.0 | + | | BLVL | | | | | | | A | | | | | D | HDA | FWD THC POS Y OUTPUT–B | X |
| 104 | THC L2 TY (–) | V72K1341X | 45 | 19 | | 1.0 | – | | BLVL | | | | | | | A | | | | | D | HDA | FWD THC NEG Y OUTPUT–B | X |
| 105 | THC L2 TZ (+) | V72K1345X | 48 | 19 | | 1.0 | + | | BLVL | | | | | | | A | | | | | D | HDA | FWD THC POS Z OUTPUT–B | X |
| 106 | THC L2 TZ (–) | V72K1346X | 48 | 19 | | 1.0 | – | | BLVL | | | | | | | A | | | | | D | HDA | FWD THC NEG Z OUTPUT–B | X |
| 107 | THC L3 TX (+) | V72K1355X | 42 | 20 | | 1.0 | + | | BLVL | | | | | | | A | | | | | D | HDA | FWD THC POS X OUTPUT–C | X |
| 108 | THC L3 TX (–) | V72K1356X | 42 | 20 | | 1.0 | – | | BLVL | | | | | | | A | | | | | D | HDA | FWD THC NEG X OUTPUT–C | X |
| 109 | THC L3 TY (+) | V72K1360X | 45 | 20 | | 1.0 | + | | BLVL | | | | | | | A | | | | | D | HDA | FWD THC POS Y OUTPUT–C | X |
| 110 | THC L3 TY (–) | V72K1361X | 45 | 20 | | 1.0 | – | | BLVL | | | | | | | A | | | | | D | HDA | FWD THC NEG Y OUTPUT–C | X |
| 111 | THC L3 TZ (+) | V72K1365X | 48 | 20 | | 1.0 | + | | BLVL | | | | | | | A | | | | | D | HDA | FWD THC POS Z OUTPUT–C | X |
| 112 | THC L3 TZ (–) | V72K1366X | 48 | 20 | | 1.0 | – | | BLVL | | | | | | | A | | | | | D | HDA | FWD THC NEG Z OUTPUT–C | X |
| 113 | THC A1 TX (+) | V72K1435X | 42 | 21 | | 1.0 | + | | BLVL | | | | | | | A | | | | | D | HDA | AFT THC POS X OUTPUT–A | X |
| 114 | THC A1 TX (–) | V72K1436X | 42 | 21 | | 1.0 | – | | BLVL | | | | | | | A | | | | | D | HDA | AFT THC NEG X OUTPUT–A | X |
| 115 | THC A1 TY (+) | V72K1440X | 45 | 21 | | 1.0 | + | | BLVL | | | | | | | A | | | | | D | HDA | AFT THC POS Y OUTPUT–A | X |
| 116 | THC A1 TY (–) | V72K1441X | 45 | 21 | | 1.0 | – | | BLVL | | | | | | | A | | | | | D | HDA | AFT THC NEG Y OUTPUT–A | X |
| 117 | THC A1 TZ (+) | V72K1445X | 48 | 21 | | 1.0 | + | | BLVL | | | | | | | A | | | | | D | HDA | AFT THC POS Z OUTPUT–A | X |
| 118 | THC A1 TZ (–) | V72K1446X | 48 | 21 | | 1.0 | – | | BLVL | | | | | | | A | | | | | D | HDA | AFT THC NEG Z OUTPUT–A | X |
| 119 | THC A2 TX (+) | V72K1451X | 42 | 22 | | 1.0 | + | | BLVL | | | | | | | A | | | | | D | HDA | AFT THC POS X OUTPUT–B | X |

TABLE 4.6.7-2. MANUAL CONTROLS (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | | | |
| 120 | THC A2 TX (–) | V72K1455X | 42 | 22 | | 1.0 | – | | BLVL | | | | | | | A | | | | | D | HDA | AFT THC NEG X OUTPUT–B | X |
| 121 | THC A2 TY (+) | V72K1460X | 45 | 22 | | 1.0 | + | | BLVL | | | | | | | A | | | | | D | HDA | AFT THC POS Y OUTPUT–B | X |
| 122 | THC A2 TY (–) | V72K1461X | 45 | 22 | | 1.0 | – | | BLVL | | | | | | | A | | | | | D | HDA | AFT THC NEG Y OUTPUT–B | X |
| 123 | THC A2 TZ (+) | V72K1465X | 48 | 22 | | 1.0 | + | | BLVL | | | | | | | A | | | | | D | HDA | AFT THC POS Z OUTPUT–B | X |
| 124 | THC A2 TZ (–) | V72K1466X | 48 | 22 | | 1.0 | – | | BLVL | | | | | | | A | | | | | D | HDA | AFT THC NEG Z OUTPUT–B | X |
| 125 | THC A3 TX (+) | V72K1475X | 42 | 23 | | 1.0 | + | | BLVL | | | | | | | A | | | | | D | HDA | AFT THC POS X OUTPUT–C | X |
| 126 | THC A3 TX (–) | V72K1476X | 42 | 23 | | 1.0 | – | | BLVL | | | | | | | A | | | | | D | HDA | AFT THC NEG X OUTPUT–C | X |
| 127 | THC A3 TY (+) | V72K1480X | 45 | 23 | | 1.0 | + | | BLVL | | | | | | | A | | | | | D | HDA | AFT THC POS Y OUTPUT–C | X |
| 128 | THC A3 TY (–) | V72K1481X | 45 | 23 | | 1.0 | – | | BLVL | | | | | | | A | | | | | D | HDA | AFT THC NEG Y OUTPUT–C | X |
| 129 | THC A3 TZ (+) | V72K1485X | 48 | 23 | | 1.0 | + | | BLVL | | | | | | | A | | | | | D | HDA | AFT THC POS Z OUTPUT–C | X |
| 130 | THC A3 TZ (–) | V72K1486X | 48 | 23 | | 1.0 | – | | BLVL | | | | | | | A | | | | | D | HDA | AFT THC NEG Z OUTPUT–C | X |
| 131 | (MSG LINE) | V93X0050X | 1 | 25 | | 44.0 | | | CHAR | | | | | | | G | | | | | | UI | MESSAGE LINE | X |
| 132 | (BUFFER MSG) | V93X0054X | 45 | 25 | | 4.0 | | | CHAR | | | | | | | G | | | | | | UI | BUFFER MESSAGE INDICATOR | X |
| 133 | (SPL) | V93X0056X | 2 | 26 | | 49.0 | | | CHAR | | | | | | | G | | | | | | UI | SCRATCH PAD LINE | X |

TABLE 4.6.7-5. INPUT FUNCTIONAL PARAMETERS FOR MANUAL CONTROLS INTERFACE (V5.2.1)

| FSSR NAME | M/S ID | NOMENCLATURE | SOURCE | UNITS | DATA TYPE | PREC | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|

NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE 4.6.7-6. OUTPUT FUNCTIONAL PARAMETERS FROM MANUAL CONTROLS INTERFACE (V5.2.1)

| FSSR NAME | M/S ID | NOMENCLATURE | DESTINATION | UNITS | DATA TYPE | PREC | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|

NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

**Rate Codes: (HDR Only) 1 = 1 sample/sec 2 = 5 samples/sec 3 = 12.5 samples/sec 4 = 25 samples/sec 5 = 100 samples/sec**
**(HDR and LDR) A = 1 sample/sec B = 5 samples/sec C = 12.5 samples/sec D = 25 samples/sec E = 100 samples/sec**

TABLE 4.6.7-7. MANUAL CONTROLS INTERFACE (V5.2.1) I-LOADS

| FSSR NAME | MSID | ENG UNITS | DT | PR | D | S | PR FCTN | MC | CAT | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|---|---|---|
| NO REQUIREMENTS | | | | | | | | | | | |

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE 4.6.7-8. MANUAL CONTROLS INTERFACE (V5.2.1) K-LOADS

| FSSR NAME DESCRIPTION | MSID | MC | KLOAD VALUE | ENG UNITS | DT | P R | S | PR FCTN | LAST CR | R E V |
|---|---|---|---|---|---|---|---|---|---|---|

NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

## TABLE 4.6.7-9. MANUAL CONTROLS INTERFACE (V5.2.1) CONSTANTS

| FSSR NAME DESCRIPTION | MSID | MC | CONSTANT VALUE | ENG UNITS | DT | P R | S | PR FCTN | LAST CR | R E V |
|---|---|---|---|---|---|---|---|---|---|---|

NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

### 4.6.8 DEU STAND–ALONE SELF–TEST (PFS/BFS)

TITLE: DEU SAST
TYPE: SPEC/IPL
AVAILABILITY: IPL

#### 4.6.8.1 Purpose, Operation, and Organization

Figure 4.6.8–1 is the DEU Stand–Alone Self–Test Display. The display for the DEU stand–alone self–test is nonstandard. "Stand–alone" implies that this test is run independently of other functions. The only contact with the GPC is polling, so that the test may be terminated. The display does not include OPS, SPEC, or DISP page numbers. It does not include the standard title line, the GPC indicator, the mission elapsed time, the event timer, the tutorial line, the fault line, or the scratch–pad line. It cannot be overlain. This display is invoked via the IPL MENU. (See 4.1.7).

The following description pertains mainly to normal operation of the test and describes, for the most part, the patterns to be observed when nothing is malfunctioning. Descriptions of the elements of the equipment being tested and aspects of the normal display not readily apparent to the observer are contained in the specification document, Multifunctional Cathode Ray Tube Display System Self–Test Program Specification, Space Division document MC615–0022, dated 15 October 1975.

Static elements of the display are described in paragraphs 1 through 9, following. Dynamic elements are described in paragraphs 10 through 15. Paragraphs 16 through 18 describe interactive control features of the display.

(1) At the top of the display, the lower–case Roman letters, of normal size (based on upper–case letters 0.125 inch high) and in the bright intensity level, appear in the sentence:

pack my box with five dozen liquor jugs

(2) On the second line, offset 3 spaces to the left under the first line, the upper–case Roman letters, of normal size (0.125 inch high) and in the normal intensity level, appear in the sentence:

PACK MY BOX WITH FIVE DOZEN LIQUOR JUGS

(3) On the third line, offset to the left under the second line, in the bright intensity level and normal size (based on upper–case letters 0.125 inch high), the following figure depicts characters that appear in groups of five separated by spaces:

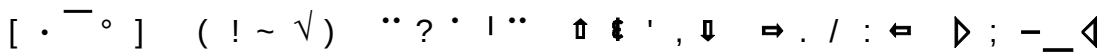

FIGURE 4.6.8-0. Display Character Set - Line 3

The characters in the third line are described as follows:

Left bracket, centered dot, overscore, upper left dot (or degree sign), right bracket; space, left paren, exclamation mark, sinusoid, check mark, right paren; space, upper double dot, query mark, upper centered dot, upper vertical half line, upper double dot; space, up arrow, ampersand, apostrophe, comma, down arrow; space, right arrow, period, slash, colon, left arrow; space, right arrow head, semicolon, right horizontal half line, underscore, left arrow head.

(4) Below the third line of text is a square with sides 0.7383 inch in length, oriented horizontally and vertically and drawn with normal intensity. Within the square is a dynamic display of rotating vectors described in paragraph 15.

(5) At the left side of the display is an arrangement of four concentric circles with respective diameters of 0.2872 inch, 0.8204 inch, 1.7364 inches, and 2.1876 inches. All circles are written with normal intensity. The second smallest (0.8204 inch diameter) is dashed, and the other three are drawn with solid lines. A capital letter X, at normal intensity and 0.125 inch high, is written so its center coincides with the largest circle at the top (0°). Another such capital X is on the largest circle at the right side (90°). Within the arrangement of circles is a dynamic display of rotating and revolving letters described in paragraph 14.

(6) Two parallel lines run diagonally across the screen from the lower left corner to the upper right corner at an angle of 35.54 degrees to the horizontal. The lines are 0.8980 inch apart and each passes 0.4490 inch from the center of the screen. Both lines are of normal intensity, the upper line is dashed, the lower line is solid, and both lines run to the edges of the screen, except that the solid line does not enter a text line at the bottom of the display.

(7) At the left side of the screen, under the array of concentric circles and to the left of the dashed diagonal line, there is an area that should be blank unless the blanking feature is malfunctioning. If the letter writing is working, but the blanking is not, the following legend appears in this area:

BLK
(FAIL)

(8) About the center of the screen is an array of tick marks for checking focus and resolution. The tick marks are short, straight line segments from the symbol generator character matrix. To the left of screen center are 33 vertical tick marks 0.0273 inch apart in a horizontal array. To the right of screen center are 34 marks in such an array. Above the center of the screen are 33 horizontal tick marks 0.0273 inch apart in a vertical array. Below screen center are 34 marks in such a vertical array.

(9) All 128 defined symbol elements of the DEU are displayed. In addition to upper– and lower–case letters in the top two lines and the symbols in the third line, the numerals and other symbols are displayed in the left part of the bottom (scratch–pad) line, as follows:

0 1 2 3 4 5 6 7 8 9 ± + – = # % > < *

These characters are written as normal size (based on 0.125 inch height for capital letters). The numerals are displayed at normal intensity. The mathematical symbols in the bottom line are displayed at bright intensity. The 20 remaining characters are written in an array five characters high and four characters wide below and to the right of the array of resolution marks (see paragraph 8). These 20 characters are various lower– and upper–case Greek letters, del (upside–down capital delta), TACAN symbol (an outline Y with all three arms of equal length and angle), diamond, and plan and elevation outlines of the Space Shuttle.

(10) Below and to the right of the four–by–five array of Greek and special characters is an array of horizontal lines of varying brightness. There are ten horizontal lines, the shortest being 0.0068 inch long and the longest being 3.5000 inches long. Successive lines double in length (0.0068, 0.0137, 0.027 , 0.0547, 0.1094, 0.2188, 0.4375, 0.8750, 1.7500, 3.5000). All ten lines are spaced vertically equidistant, and the right ends are vertically aligned and connected with a vertical line. The five shortest of these ten lines are displayed at normal intensity and flashing. The five longest of these ten lines are displayed with continuously varying intensity from zero to maximum and continuously varying back to zero. This intensity variation occurs with a period of approximately 2.33 seconds.

(11) Above the array of Greek letters and special symbols and the array of flashing and variable–intensity lines there is a small square (from the symbol generator character matrix) which travels continuously back and forth in a horizontal line (between the center and the right edge of the screen). The center–to–center distance of the extreme positions of this square is 3.3975 inches. This square is displayed in normal intensity and travels back and forth at a rate of 0.374 inch per second. A complete cycle requires approximately 18.62 seconds.

(12) From the rightmost position of the horizontally moving square, there is a similar vertically moving square. The extreme positions of the vertically moving square are (1) the rightmost position of the horizontally moving square and (2) a position 0.8613 inch directly above the first position. This square is displayed in normal intensity and travels up and down at a rate of 0.374 inch per second. A complete cycle requires approximately 4.63 seconds. Every fourth cycle, this square coincides at the bottom of its travel with the horizontally moving square at its right most position.

(13) Between the diagonal lines drawn across the screen from lower left to upper right, there is a spinning “bug” consisting of 16 lines in a sunburst array, rotating about a center which moves up and to the right. The lines begin 0.2051 inch from the center of rotation and extend another 0.2051 inch outward. The array of lines rotates at 53.17 degrees per second, while the center moves up and to the right (along an incline of 35.54 degrees to the horizontal) at a rate of 1.536 inches per second. The pattern does not appear to be a rolling wheel, but rather an emblem at the center of a rolling wheel with about four times the diameter. Immediately following the upward transit, the bug reverses direction and appears to roll and slide down the hill at the same rate it moved up. Then it starts up again. The complete cycle takes approximately 26.48 seconds.

(14) In the array of circles at the left of the screen are two patterns revolving about the center within the annulus defined by the two large circles. The first pattern consists of the capital letters AB, with the A having a height of 0.150 inch and the B having a height of 0.125 inch. The A and B each remain upright, while they revolve around their common center at the same rate the pattern revolves about the center of the circles. Thus, the B leads the A around the circle in a clockwise direction. The second pattern consists of the capital letters CD, with the C having a height of 0.150 inch and the D having a height of 0.125 inch. The entire pattern rotates at the same rate, it revolves (clockwise), so that the bottom of the letters is toward the center of the circles and they are read in the order CD when viewed from the center of the circles. There is also a 0.125–inch capital X at the common center of these circles, which rotates about its own center at the same rate the AB and CD patterns revolve. The common rate of revolution and rotation of the AB, CD, and X patterns is approximately 33.84 degrees per second. The rotation cycle takes about 10.64 seconds to complete.

(15) Within the square box described in paragraph 4 is a rotating array of lines (boxed windmill). Two lines intersect at right angles in the center of square. When they are in the horizontal and vertical positions, they bisect the sides of the square. In the 45–degree position, they form the diagonals of the square. At all times, these rotating lines extend to the sides of the square, but not beyond. The array rotates counter clockwise at a variable rate. Near the position as diagonals, the rotation rate is approximately 3.15 degrees per second. Near the position perpendicular to the sides of the square, the rotation rate is approximately 6.30 degrees per second. Every 90 degrees of rotation the pattern repeats. This 90–degree rotation takes approximately 18.2 seconds.

(16) Within the angle defined by the two small squares moving, respectively, left and right, up and down, there is a small block of significant text. The top line of this text block contains the legend KBUA followed initially by two asterisks(*'s). The second line contains the legend KBUB followed initially by two asterisks(*'s). These lines are for checking operation of the keyboard associated with the display. If the display is on the center CRT, one line is used for each of the two keyboards that may be connected to the CRT. The keys are coded from 00 through 31, from left to right and top to bottom. As any key is depressed, its number appears on the display and remains until another key is depressed. This display of key codes goes on right along with key sequences that activate the status test. On the next line an encoding of the position of the major function switch is shown to the right of the letters MF as GNC, SM, or PL. The position of the major function switch may be changed for testing purposes. On the next line is a reminder for activation of the BITE test and an indication of when it is in progress. (See paragraph 17.)

(17) On the right portion of the bottom line of the display, the word STATUS appears, followed by a pattern of four groups of four hexadecimal digits indicating the status of the BITE register. The digits are initially blank while the condition of the DEU is being assessed by the program. The status is then displayed. The normal display is:

8200 8000 8000 0000

If the DEU has just been reloaded, for such reason as initial startup or a power transient, the last group of four digits, instead of being 0000, will be 2000.

The BITE test can be activated by entering the key sequence:

ITEM 1 EXEC

While the test is in progress, an asterisk (*) appears to the right of TEST 1. When the test is completed, the asterisk (*) is removed and the new condition of the BITE registers is shown following the word STATUS in the bottom line of the display. Following Test 1, the STATUS display should be:

8276 8080 A000 0000

The dynamic portions of the display continue uninterrupted while this testing is in progress.

(18) To terminate the DEU stand–alone self–test display, the major function switch must be in the same position it was in when the self–test was initiated while the RESUME key is entered. If the major–function switch is not set properly, the word ERR appears beside the major–function indicator on the display and flashes. ERR remains, flashing, until a key is depressed on the keyboard or until the position of the major–function switch is changed; then the error message disappears.

### 4.6.8.2 DEU Stand-Alone Self-Test Figure/Table Refereences

Figure 4.6.8–1 DEU Stand–Alone Self–Test Display (PFS/BFS)

Table 4.6.8–1 Keyboard Processing Table N/A

Table 4.6.8–2 CRT Display Processing Table N/A

Table 4.6.8–3 CRT Display Processing Background Requirements N/A

Table 4.6.8–4 Mission Design Background Constants N/A

Table 4.6.8–5 Input Functional Parameters N/A

Table 4.6.8–6 Output Functional Parameters N/A

Table 4.6.8–7 I–Loads

Table 4.6.8–8 K–Loads

Table 4.6.8–9 Constants N/A

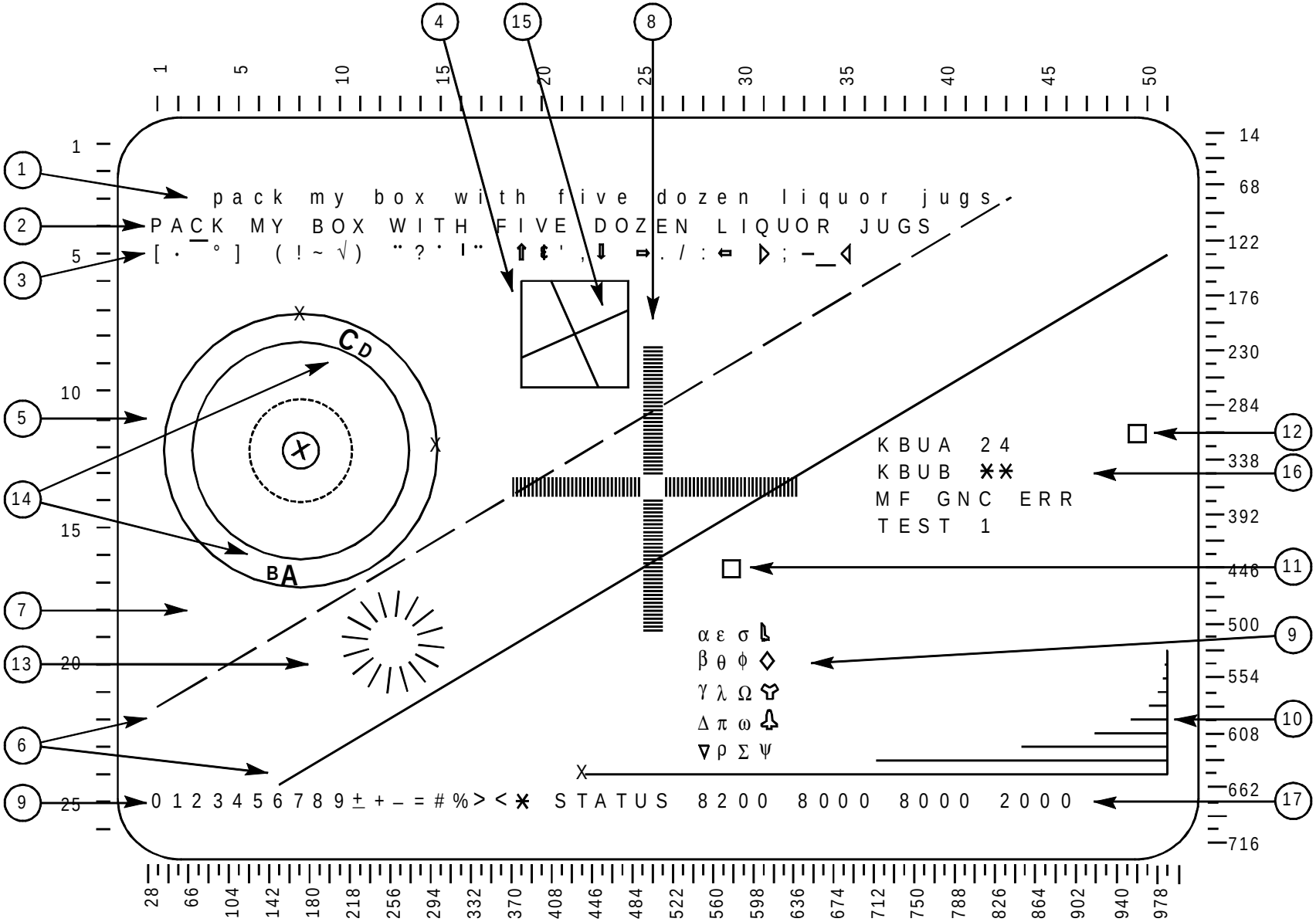


FIGURE 4.6.8-1. DEU Stand-Alone Self-Test Display (PFS/BFS)

TABLE 4.6.8-7. BFS DEU STAND-ALONE SELF TEST (4.6.8) I-LOADS

| BFS NAME | MSID | ENG UNITS | DT | PR | D | S | PARA | MC | CAT | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|---|---|---|
| NO REQUIREMENTS | | | | | | | | | | | |

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

## TABLE 4.6.8-8. BFS DEU STAND-ALONE SELF TEST (4.6.8) K-LOADS

| BFS NAME DESCRIPTION | MSID | MC | KLOAD VALUE | ENG UNITS | DT | P R | S | PARA | LAST CR | R E V |
|---|---|---|---|---|---|---|---|---|---|---|

NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

### 4.6.9 Deleted

### 4.6.10 SPACELAB COMPUTER MEMORY DUMP (PFS)

TITLE: SL MEMORY DUMP
TYPE: SPEC/111
AVAILABILITY: PL OPS 9

#### 4.6.10.1 Purpose, Operation, and Organization

This display allows control and monitoring of the dumping of memory from either the Spacelab Subsystem (SS) or Experiment (EXP) computers during prelaunch checkouts. Figure 4.6.10–1 is the SL MEMORY DUMP DISPLAY Format.

1. Two control items are provided for selecting which Spacelab computer is to be dumped. These items are mutually exclusive and when the display is first called the subsystem (SS) computer shall be selected and an asterisk (*) shall be driven after Item 1. Item 2 allows the selection of the experiment computer and the asterisk(*) shall move from Item 1 to Item 2 when this computer is selected. Execution of these items is legal only when Spacelab Memory is not being loaded into GPC or being dumped from GPC.

2. Two control items are provided for selecting which Spacelab MDM Coupler (A or B) is to be used to communicate with the selected spacelab computer. These items are mutually exclusive and when the display is first called Spacelab MDM Coupler A shall be selected and an asterisk (*) shall be driven after Item 3. Item 4 allows the selection of MDM Coupler B and the asterisk (*) will move from Item 3 to Item 4 when this coupler is selected. Execution of these items is legal only when Spacelab Memory is not being loaded into the GPC or being dumped from the GPC.

3. Item 5 (START ADD) provides the capability to specify the starting address (in Hex) of the selected spacelab computer to be dumped. The value entered shall be restricted to a range of 0000 to FFFF. If the value entered is outside this range or Spacelab Memory is being loaded into the GPC or being dumped from the GPC, the entry shall be rejected and a class 5 error message output.

4. Item 6 (LENGTH) provides the capability to specify the number of words to be dumped in decimal starting at the START ADD for the selected Spacelab computer. The value entered shall be restricted to a range from 1 to 16384. If the valve entered is outside this range or Spacelab Memory is being loaded into the GPC or being dumped from the GPC, the entry shall be rejected and a class 5 error message output.

5. Item 7 (DUMP) provides the control to initiate a Spacelab computer dump from the selected computer thru the selected MDM coupler. This item shall be rejected and a class 5 error message output, if the SM COMMON BUFFER is busy or if the sum of the START ADD plus Length exceeds 65536. Otherwise, the SM COMMON BUFFER IN USE FLAG shall be set on, the number of SLC memory data words acquired (WORDS ACQ), FAIL RHW, FAIL AW and Last Valid Address values shall be set to zeros, and Spacelab Memory shall start being loaded into GPC for dump. The status of a Spacelab dump shall be displayed after Item 7. When the display is first called the status field shall be blank indicating that no dump has yet been requested (inactive state). When Spacelab Memory is being loaded into GPC, the status field shall display “LOAD”. When Spacelab Memory is being dumped from the GPC, the status field shall display “DUMP”. When the Dump is complete, the status field will display

"CPLT". Finally, if the SLC to GPC transfer for the dump request was terminated due to an error, the status field will display "FAIL".

6. Status data is provided below Item 7 (DUMP) to give insight into where in the SLC to GPC transfer, a transaction ERROR OCCURRED.

### 4.6.10.2 SL MEMORY DUMP Keyboard Processing Addendum

Not Applicable.

### 4.6.10.3 SL MEMORY DUMP CRT Display Processing Addendum

The Table below presents the stand–alone parameter status indicators (PSI) that can be displayed for a parameter. PSI requirements are identified by the word "STAT" being inserted in the FORMAT TYPE column and a numeric code appearing as an entry (right justified) in the ADD REF column of CRT display processing Table 4.6.10–2. The numeric code, corresponding to one of those listed in the table, indicate the specific status processing to be performed. If there is no numeric code entry, the status processing is defined by the default code.

When the "M" PSI is displayed (for Commfault, I/O error resulting in missing data), the associated parameter value data field shall be blanked unless specified otherwise.

| Numeric Code | PSI SYMBOL(S) | | | | | |
|---|---|---|---|---|---|---|
| Default (blank) | ↓ | | | M | ⊬ | ⊬ = blank |
| 1 | ↓ | ↑ | | M | ⊬ | |
| 2 | | ↑ | | M | ⊬ | |
| 3 | ↓ | | | | ⊬ | |
| 4 | | ↑ | | | ⊬ | |
| 5 | ↓ | | ? | | ⊬ | |
| 6 | ↓ | ↑ | | | ⊬ | |
| 7 | | | | M | ⊬ | |
| 8 | ↓ | | ? | M | ⊬ | |
| 9 | | | ? | M | ⊬ | |

The following alpha code(s) appear (left justified) in the ADD REF column of Table 4.6.10–2 whenever it is necessary to define any special processing requirements not otherwise covered therein:

A. When the SM COMMON BUFFER is in use the flag is set, and the RTXT "BSY" will be displayed flashing. Otherwise, the RTXT "RDY" will be displayed not flashing.

B. The following RTXT will be displayed depending on the SCMD status value.

| VALUE | RTXT |
|---|---|
| 0 | ⁄ |
| 1 | LOAD |
| 2 | DUMP |
| 3 | CPLT |
| 4 | FAIL |

The initial time the display is called SCMD STATUS VALUE = 0 and thereafter will reflect the status of any dump requested.

C. These signals will be initially set to zero and will be reset to zero anytime a dump is requested and then be cyclically updated while dump is in progress.

### 4.6.10.4 SPACELAB COMPUTER MEMORY DUMP Figure/Table References

Figure 4.6.10–1 Spacelab Memory Dump Display (PFS)

Table 4.6.10–1 Keyboard Processing Table

Table 4.6.10–2 CRT Display Processing Table

Table 4.6.10–3 CRT Display Processing Background Requirements N/A

Table 4.6.10–4 Mission Design Background Constants N/A

Table 4.6.10–5 Input Functional Parameters

Table 4.6.10–6 Output Functional Parameters

Table 4.6.10–7 I–Loads

Table 4.6.10–8 K–Loads

Table 4.6.10–9 Constants

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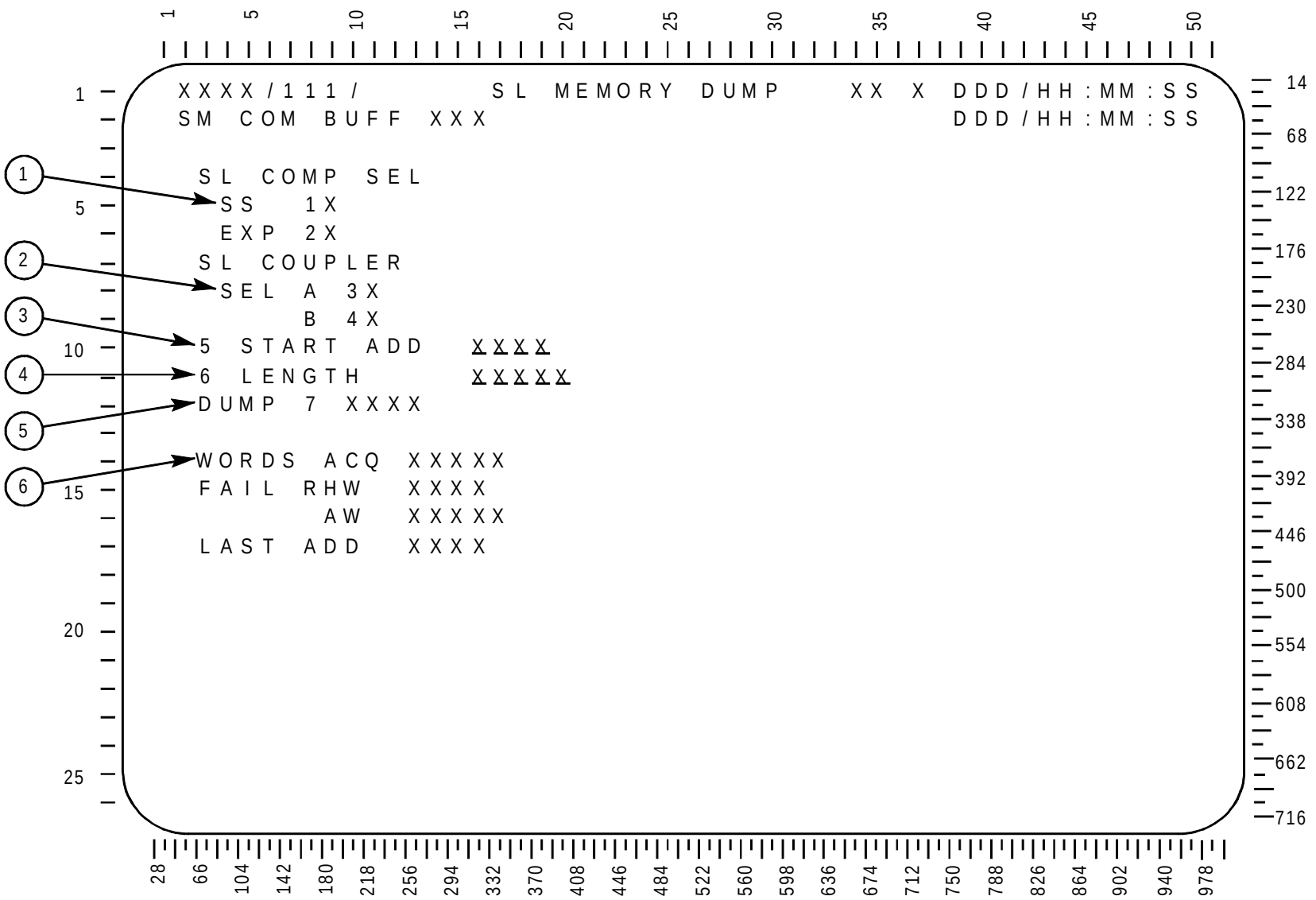


FIGURE 4.6.10-1. Spacelab Memory Dump (PFS)

TABLE 4.6.10-1. SL MEMORY DUMP (PFS) KEYBOARD PROCESSING

| Seq | CRT Signal Name | M/S ID | CHAR | TYPE | UNITS | DK | ITEM | Item No. Limits | | Add Ref | Destination | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | MIN | MAX | | | | |
| 001 | SL COMP SEL SS 1 | V93X7701X | 0.0 | CTRL | | | 1 | | | | SCMD SPEC | SCMD SSC SELECT | X |
| 002 | SL COMP SEL EXP 2 | V93X7702X | 0.0 | CTRL | | | 2 | | | | SCMD SPEC | SCMD EXC SELECT | X |
| 003 | SL COUPLER SEL A 3 | V93X7705X | 0.0 | CTRL | | | 3 | | | | SCMD SPEC | SCMD COUPLER A SELECT | X |
| 004 | SL COUPLER SEL B 4 | V93X7706X | 0.0 | CTRL | | | 4 | | | | SCMD SPEC | SCMD COUPLER B SELECT | X |
| 005 | 5 START ADD | V93U7711C | 4.0 | HEX | | | 5 | 0000 | FFFF | | SCMD SPEC | SCMD START ADDRESS | X |
| 006 | 6 LENGTH | V93J7712C | 6.0 | DEC | | | 6 | 1 | 16384 | | SCMD SPEC | SCMD LENGTH | X |
| 007 | DUMP 7 | V93X7709X | 0.0 | CTRL | | | 7 | | | | SCMD SPEC | SCMD DUMP SL MEMORY CMD | X |

## TABLE 4.6.10-2. SL MEMORY DUMP (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | BILEVEL | | | | | | | | | | | | | | | | | |
| | | | X | Y | | CHAR | 1 | 0 | TYPE | | | | | | | | | | | | | | | |
| 001 | (OPS) | V93X0040X | 2 | 1 | | 5.0 | | | CHAR | | | | | | | E | | | | | | UI | OPS FUNCTION PAGE | X |
| 002 | (SPEC) | V93X0042X | 7 | 1 | | 4.0 | | | CHAR | | | | | | | E | | | | | | UI | SPEC FUNCTION PAGE | X |
| 003 | (DISP) | V93X0044X | 10 | 1 | | 4.0 | | | CHAR | | | | | | | E | | | | | | UI | DISPLAY FUNCTION PAGE | X |
| 004 | (UL) | V92X5032X | 34 | 1 | | 2.0 | UL | | BLVL | | | | | | X | G | | | | | | UI | UPLINK ACTIVITY IND | X |
| 005 | (GPC) | V93X0048X | 36 | 1 | | 2.0 | | | DEC | | | | | | | E | | | | | | UI | GPC DRIVER | X |
| 006 | (MT) | V91W1990C | 39 | 1 | | 12.0 | | | CHAR | DHMS | | | | | | A | | | | | | FCOS | MISSION ELAPSED TIME | X |
| 007 | (CRT TIMER) | V91W1988C | 39 | 2 | | 12.0 | | | CHAR | DHMS | | | | | | A | | | | | | FCOS | DISPLAY CRT TIME, SM | X |
| 008 | SM COM BUFF | V92X0077X | 14 | 2 | | 3.0 | BSY | RDY | BLVL | | | | | | X | | | | | | A | SCMD SPEC | SM COMMON BUFFER IN USE | X |
| 009 | SL COMP SEL SS 1 | V92X1410X | 9 | 5 | | 1.0 | | * | BLVL | | | | | | | E | | | | | | SCMD SPEC | SCMD S/L COMPUTER SELECT | X |
| 010* | SL COMP SEL EXP 2 | V92X1410X | 9 | 6 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | SCMD SPEC | SCMD S/L COMPUTER SELECT | X |
| 011 | SL COUPLER SEL A 3 | V92X1411X | 11 | 8 | | 1.0 | | * | BLVL | | | | | | | E | | | | | | SCMD SPEC | SCMD COUPLER SELECT | X |
| 012* | SL COUPLER SEL B 4 | V92X1411X | 11 | 9 | | 1.0 | * | | BLVL | | | | | | | E | | | | | | SCMD SPEC | SCMD COUPLER SELECT | X |
| 013 | 5 START ADD | V93U7711C | 15 | 10 | | 5.0 | | | HEX | | | | | | | E | | | | | | KYBD | SCMD START ADDRESS | X |
| 014 | 6 LENGTH | V93J7712C | 15 | 11 | | 6.0 | | | DEC | | | | | | | E | | | | | | KYBD | SCMD LENGTH | X |
| 015 | XXXX (STATUS) | V92J1400C | 10 | 12 | | 4.0 | | | RTXT | | | | | | | | | | | | B | SCMD SPEC | SCMD STATUS VALUE | X |
| 016 | WORDS ACQ | V92J1401C | 12 | 14 | | 6.0 | | | DEC | | | | | | | | | | | | C | SCMD SPEC | SCMD NUMBER OF WORDS | X |
| 017 | FAIL RHW | V92U1404C | 12 | 15 | | 5.0 | | | HEX | | | | | | | | | | | | C | SCMD SPEC | SCMD FAIL RHW | X |
| 018 | FAIL AW | V92U1405C | 12 | 16 | | 6.0 | | | HEX | | | | | | | | | | | | C | SCMD SPEC | SCMD FAIL AW | X |
| 019 | LAST ADD | V92U1407C | 12 | 17 | | 5.0 | | | HEX | | | | | | | | | | | | C | SCMD SPEC | SCMD LAST VALID ADD | X |
| 020 | (MSG LINE) | V93X0050X | 1 | 25 | | 44.0 | | | CHAR | | | | | | | G | | | | | | UI | MESSAGE LINE | X |
| 021 | (BUFFER MSG) | V93X0054X | 45 | 25 | | 4.0 | | | CHAR | | | | | | | G | | | | | | UI | BUFFER MESSAGE INDICATOR | X |
| 022 | (SPL) | V93X0056X | 2 | 26 | | 49.0 | | | CHAR | | | | | | | G | | | | | | UI | SCRATCH PAD LINE | X |

TABLE 4.6.10-5. INPUT FUNCTIONAL PARAMETERS FOR SPACELAB COMPUTER MEMORY DUMP (V5.1.15)

| FSSR NAME | M/S ID | NOMENCLATURE | SOURCE | UNITS | DATA TYPE | PREC | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|

NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE 4.6.10-6. OUTPUT FUNCTIONAL PARAMETERS FROM SPACELAB COMPUTER MEMORY DUMP (V5.1.15)

| FSSR NAME | M/S ID | NOMENCLATURE | DESTINATION | UNITS | DATA TYPE | PREC | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|

NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

**Rate Codes: (HDR Only) 1 = 1 sample/sec 2 = 5 samples/sec 3 = 12.5 samples/sec 4 = 25 samples/sec 5 = 100 samples/sec**
**(HDR and LDR) A = 1 sample/sec B = 5 samples/sec C = 12.5 samples/sec D = 25 samples/sec E = 100 samples/sec**

TABLE 4.6.10-7. SPACELAB COMPUTER MEMORY DUMP (V5.1.15) I-LOADS

| FSSR NAME | MSID | ENG UNITS | DT | PR | D | S | PR FCTN | MC | CAT | LAST CR | REV |
|---|---|---|---|---|---|---|---|---|---|---|---|

NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

## TABLE 4.6.10-8. SPACELAB COMPUTER MEMORY DUMP (V5.1.15) K-LOADS

| FSSR NAME<br>DESCRIPTION | MSID | MC | KLOAD VALUE | ENG UNITS | DT | P<br>R | S | PR FCTN | LAST CR | R<br>E<br>V |
|---|---|---|---|---|---|---|---|---|---|---|

NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE 4.6.10-9. SPACELAB COMPUTER MEMORY DUMP (V5.1.15) CONSTANTS

| FSSR NAME<br>DESCRIPTION | MSID | MC | CONSTANT VALUE | ENG UNITS | DT | P<br>R | S | PR FCTN | LAST CR | R<br>E<br>V |
|---|---|---|---|---|---|---|---|---|---|---|

NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

## 4.6.11 ACTUATOR CONTROL (PFS)

TITLE: ACTUATOR CONTROL
TYPE: SPEC/113
AVAILABILITY: GNC OPS 9

### 4.6.11.1 Purpose, Operation, and Organization

1. ACTUATOR CONTROL. Figure 4.6.11–1 is the Actuator Control Display (PFS). This ground checkout display provides control and monitoring of the positioning of aerosurface, SSME, OMS, and body flap actuators by utilizing the capabilities of the ramp function generator (RFG) and body flap drive (BFD) functions. It also supports initiation of all actuator initialization (AI) modes and the body flap monitor (BFM) function; the selective inhibiting of required actuator ECP collision avoidance and interference checks; the inhibiting of OMS power discrete parameter output; the selective replacement of position limit values for SRB, elevon, and speedbrake actuators; the limiting of the multiple actuator test (MAT) plateau segment duration and modification of the RFG rate limit.

2. AEROSURFACE ACTUATOR POSITIONING. Items numbers 1 through 6 are used to select individual aerosurface actuators as follows:

   Item 1: Speedbrake (SB)
   Item 2: Rudder (RUD)
   Item 3: Left inboard elevon (LIE)
   Item 4: Right inboard elevon (RIE)
   Item 5: Left outboard elevon (LOE)
   Item 6: Right outboard elevon (ROE)

3. SSME ACTUATOR POSITIONING. Item numbers 7 through 12 are used to select individual Space Shuttle Main Engine (SSME) actuators as follows:

   Item 7: SSME 1 pitch (1P)
   Item 8: SSME 1 yaw (1Y)
   Item 9: SSME 2 pitch (2P)
   Item 10: SSME 2 yaw (2Y)
   Item 11: SSME 3 pitch (3P)
   Item 12: SSME 3 yaw (3Y)

4. OMS ACTUATOR POSITIONING. Item numbers 13 through 20 are used to select individual Orbital Maneuvering Subsystem (OMS) actuators as follows:

   Item 13: Right OMS pitch active (RPA)
   Item 14: Right OMS pitch standby (RPS)
   Item 15: Right OMS yaw active (RYA)
   Item 16: Right OMS yaw standby (RYS)
   Item 17: Left OMS pitch active (LPA)
   Item 18: Left OMS pitch standby (LPS)
   Item 19: Left OMS yaw active (LYA)
   Item 20: Left OMS yaw standby (LYS)

5. BODY FLAP ACTUATOR POSITIONING. Item 21 is used to select the body flap (BF) actuators (all enables are set and all three actuators are used).

6. ACTUATOR INITIALIZATION MODES. Item numbers 22 through 28 are used to select and start the desired actuator initialization mode (AI MODES) function as follows:

   Item 22: AI Mode zero (0 SAFE) initial position for all actuators, except SRB and nosewheel.
   Item 23: AI Mode one (1 MDM) MDM preconditioning option for all actuators, except SRB and nosewheel.
   Item 24: AI Mode two (2 FERY) ferry positions for all applicable actuators.
   Item 25: AI Mode three (3 RAIN) rain positions for all applicable actuators.
   Item 26: AI Mode four (4 GRAV) gravity positions for all applicable actuators.
   Item 27: AI Mode five (5 NULL) null positions for all applicable actuators.
   Item 28: AI Mode six (6 TURN) turn around positions for all applicable actuators.

   Execution of an AI Mode (Items 22–28) shall cause the Item 31 (START) status indicator(*) to be blanked.

7. ACTUATOR SELECTION. Items 1 through 28 are mutually exclusive. Execution of an item causes an asterisk to appear after the item number indicating it has been selected and blanks the asterisk by the previously selected item.

8. ACTUATOR GIMBALING. Items 29 through 34 are used to control and monitor actuator gimbaling.

   a. For the selected actuator, the rate of movement (RATE 29) in degrees per second shall be displayed (except for body flap and OMS actuators the field will be blanked) upon value entry and execution of the item number.

      The minimum non–zero slope which can result from an item 29 entry is specified in the VU Level B CPDS. The minimum slope value will be used if the non–zero item 29 entry results in a slope of less than the specified minimum. An entry of zero degrees will result in a zero slope.

   b. For the selected actuator, the final position (FIN POS 30) in degrees will be displayed upon value entry and execution of the item number.

      Entry of an item 30 value which would cause an overflow of the ECP call operator final value field will result in this data field being set to its maximum positive or negative value (see VU Level B CPDS).

      After an actuator and a final position have been selected, a direction of movement indicator field for the aerosurfaces, SSMEs, OMS engines, and body flap will be displayed to the right of the asterisk selection indicator. The direction of movement, determined by comparing present position of the selected actuator to the final position selected on the display, shall use an arrow indicator. The direction of the arrow (up, down, left, or right pointing) will reflect aerosurface/engine movement when viewing the Orbiter from the rear. The speedbrake will use both the left and right pointing arrows in combination to reflect opening (← →) or closing (→ ←).

The direction of movement indication field shall be blanked during AI Mode execution and shall be blanked upon actuator selection. It shall momentarily be blanked upon final position selection.

NOTE: The selection of any actuator (items 1 through 21) will cause the actuator rate (item 29) and final position (item 30) data fields to blank on the display.

c. Item 31 (START) is used to initiate positioning of the selected actuator. Upon execution, an asterisk is driven next to the item number indicating its selection.

d. Item 32 (STOP) is used to halt movement of the selected actuator or selected AI mode. Upon execution, an asterisk is driven next to the item number 32 indicating its selection.

If Item 31 was the last item selected, movement of the selected actuator will stop, the asterisk after Item 31 (START) will be blanked (indicating its deselection) and entry of Item 31 will be inhibited until Item 32 is executed a second time. The second execution of Item 32 will remove the inhibit of Item 31 entry, blank the actuator rate (Item 29) and final position (Item 30) data fields, deselect the last actuator selected (Items 1 through 21) and blank the asterisk after Item 32 indicating its deselection.

If an AI mode was the last item selected (an item from Item 22 through Item 28), execution of the selected AI mode will cease and entry of Items 22 through 28 will be inhibited until Item 32 is executed a second time. The second execution of Item 32 will remove the inhibit on Items 22 through 28, remove the asterisk after the selected AI mode and remove the asterisk after Item 32 indicating its deselection.

e. An actuator/AI status field will indicate the state of the last request. The character string status will be as follows:

1. Actuator movement of AI mode

- in progress or executing – RUN
- terminates normally – CPLT (Complete)
- terminates abnormally – STOP

2. Actuator positioning requested while a non–SPEC initiated mutually exclusive ECP is active – BUSY (request reject).

f. An ECP error (ECP ERR) field will display any error code encountered by the TCS call program during actuator movement, AI mode execution, or by body flap monitor.

Execution of any AI MODE (items 22 through 28), actuator gimbaling START (item 31), or BF MON (item 33) selection will cause the ECP ERR data field to be blanked.

g. Item 33 (BF MON) is used to select/deselect the body flap monitor function. When the item is executed, its selection will be indicated by an asterisk being driven after the item number. Upon reexecution of the item, it will be deselected as indicated by blanking of the asterisk.

h. Item 34 (AI SRB/NW) is used to enable commanding of the SRB and nosewheel actuator MDMs in AI modes zero (0 SAFE) and one (1 MDM).

Upon execution, an asterisk is driven next to the item number indicating its selection. Upon a second execution of the item, the actuator MDMs are excluded from AI commanding and the asterisk after the item number is blanked indicating its deselection.

9. FLIGHT CONTROL LIMIT CHANGES. Items 35 through 44 are used to control the selection/deselection of certain check functions and limit value replacements as part of the flight control checkout operations.

   a. Item 35 (R/SB MAT) is used to bypass the rudder/speedbrake interference check in the MAT function. Upon execution, an asterisk is driven next to the item number indicating its selection. Upon a second execution of the item, the interference check is re–enabled and the asterisk after the item number is blanked indicating its deselection.

   b. Item 36 (R/SB RFG/FRT) is used to bypass the rudder/speedbrake interference check in the RFG and FRT (Frequency Response Test) functions. Upon execution, an asterisk is driven next to the item number indicating its selection. Upon a second execution of the item, the interference check is re–enabled and the asterisk is blanked indicating its deselection.

   c. Item 37 (MAT P 40 MS) is used to set the MAT plateau duration at 40 milliseconds. Upon execution, an asterisk is driven next to the item number indicating its selection. Upon a second execution of the item, the plateau duration returns to its original value and the asterisk is blanked indicating its deselection.

   d. Item 38 (NOP CA RFG) is used to bypass the collision avoidance and SSME 1/OMS pods clearance checks in the RFG function. Upon execution, an asterisk is driven next to the item number indicating its selection. Upon a second execution of the item, the avoidance and clearance checks are re–enabled and the asterisk after the item number is blanked indicating its deselection.

   e. Item 39 (NOP CA FRT) is used to bypass the collision avoidance check in the FRT function. Upon execution, an asterisk is driven next to the item number indicating its selection. Upon a second execution of the item, the avoidance check is re–enabled and the asterisk after the item number is blanked indicating its deselection.

      NOTE: Movement of any OMS actuator will be preceded by the setting of both applicable OMS power discretes for the selected actuators when Item 40 is deselected. The slope of the ramp waveform used to drive OMS actuator is defined in the VU Level B CPDS.

   f. Item 40 (NOP OMS) is used to inhibit output of the OMS power discretes by the actuator ECP functions and inhibit the resultant out of tolerance error codes from the AI function for OMS actuators. This item is initialized to the inhibit state during the OPS G9 initialization process and an asterisk is driven next to the item number indicating its selection. Upon a second execution of the item, the output of the OMS power discretes is re–enabled, the AI function error processing returned to normal and the asterisk after the item number is blanked indicating its deselection.

g. Item 41 (SRB S/S LIM) is used to cause the SRB S/S limits to replace the high or low position limits for the SRB actuators. Upon execution, an asterisk is driven next to the item number indicating its selection. Upon a second execution of the item, the limit values are returned to their original values and the asterisk after the item number is blanked indicating its deselection.

h. Item 42 (EL POS LIM) is used to cause the elevon high position limits to be replaced. Upon execution, an asterisk is driven next to the item number indicating its selection. Upon a second execution of the item, the limit values are returned to their original values and the asterisk after the item number is blanked indicating its deselection.

i. Item 43 (S/B POS LIM) is used to cause the speedbrake low position limit to be replaced. Upon execution, an asterisk is driven next to the item number indicating its selection. Upon a second execution of the item, the limit values are returned to their original values and the asterisk after the item number is blanked indicating its deselection.

j. Item 44 (R RATE .5 PCM) is used to set the RFG function rate limit at 0.5 PCM counts. Upon execution, an asterisk is driven next to the item number indicating its selection. Upon a second execution of the item, the limit values are returned to their original values and the asterisk after the item number is blanked indicating its deselection.

10. PARAMETER DATA DISPLAY. The following monitor and status parameter data will be displayed.

a. The capability to monitor (MONITOR) the Channel 1 commanded (CMD) values and actual positions (POS) of aerosurfaces, SSME and OMS actuators in degrees is provided. The middle value will be used when multiple feedbacks are available. The last valid position will be displayed for an actuator if no valid feedbacks are available. The command position for body flap will indicate the direction of the commanded deflection, i.e., up (UP), down (DN), or blank (no drive).

The data fields for the commanded positions will be blanked prior to the initial execution of AI mode 1 (MDM).

b. The capability to identify the aerosurfaces and SSMEs actuator channel failures is provided. Status columns A, B, C, and D under the FAIL block will display a double overbright down arrow (↓) for fail, a double overbright "M" for missing data or will be blank for each actuator channel.

c. The hydraulic supply pressure A (HYD PR) for Orbiter systems 1, 2, and 3 are displayed in PSIA.

d. The position (CLOSE/OPEN) of the main engine/thrust vector control isolation valves (ME ISO V) for Orbiter hydraulic systems 1, 2, and 3 is provided. A single character "C" will be displayed after the number 1, 2, or 3 for each of the isolation valves when they are in the closed position. A blank after the number indicates that the valve is in the open position.

11. ERROR CONDITIONS.

The actuator control display function will test for violations of any input constraints described in the preceding paragraphs. Specifically, the following violations will be detected, the input rejected, and a class 5 “ILLEGAL ENTRY” error message annunciated.

a. All item entries except items 32 (STOP) and 33 (BF MON) are “ILLEGAL” when SPEC initiated actuator positioning is in progress.

b. Entry and execution of Item 29 (RATE) or 30 (FIN POS) without an actuator selected (Items 1 through 21) is “ILLEGAL”.

c. Execution of Item 31 (START) without an actuator selected, (Items 1 through 21), rate entered (Item 29, except for OMS and body flap), and final position entered (Item 30) is “ILLEGAL”.

d. Execution of Item 32 (STOP) without an active process is “ILLEGAL”.

e. Flight control limit changes (FC LIM CHNG) items 35 through 44 are “ILLEGAL” if any ECP is active, except BFM, when the item entry is executed.

12. DISPLAY INITIALIZATION/TERMINATION.

a. SPEC INITIALIZATION.

Upon display initialization the following shall occur:

1. The following item entries will be deselected, i.e., blank–no asterisk:

- Items 1 through 21.
- Items 31 and 32.

2. The following data fields will be blanked:

Actuator Gimbaling
- RATE (Item 29)
- FIN POS (Item 30)
- Direction of movement indicator (after Item 31).

3. The following item entries will indicate selection (asterisk present) or deselection (no asterisk displayed) based on last entry (if any):

- Items 22 through 28.
- Items 33 through 44.

4. The following data fields will reflect current values:

    - Aerosurface, SSME, and OMS actuators command (CMD) and actual (ACT) positions.
    - Aerosurfaces and SSMEs actuator channel failures (FAIL).
    - Actuator Gimbaling ECP ERR and actuator/AI status (STATUS).
    - Orbiter hydraulic supply pressures for systems 1, 2, and 3 (HYD PR 1, 2, 3).
    - Main engine/TVC isolation valves for Orbiter hydraulic systems 1, 2, and 3 (ME ISO V 1, 2, 3).

b. SPEC TERMINATION.

Upon display termination the SPEC function will cause the following actions:

1. Uncompleted positioning of an individually selected actuator will be terminated. SPEC initiated BFD and RFG processes will be cancelled.

2. The BFM or AI processes will be unaffected by SPEC termination.

### 4.6.11.2 ACTUATOR CONTROL (PFS) Keyboard Processing Addendum

Not applicable.

### 4.6.11.3 ACTUATOR CONTROL (PFS) CRT Display Processing Addendum

The table below presents the stand–alone parameter status indicators (PSI) that can be displayed for a parameter. PSI requirements are identified by the word “STAT” being inserted in the FORMAT TYPE column and a numeric code appearing as an entry (right justified) in the ADD REF column of CRT display processing Table 4.6.11–2. The numeric code, corresponding to one of those listed in the table, indicates the specific status processing to be performed. If there is no numeric code entry, the status processing is defined by the default code.

When the “M” PSI is displayed (for Commfault, I/O error resulting in missing data), the associated parameter value data field shall be blanked unless specified otherwise.

| Numeric Code | PSI SYMBOL(S) | | | | | |
|---|---|---|---|---|---|---|
| Default (blank) | ↓ | | | M | ∅ | ∅ = blank |
| 1 | ↓ | ↑ | | M | ∅ | |
| 2 | | ↑ | | M | ∅ | |
| 3 | ↓ | | | | ∅ | |
| 4 | | ↑ | | | ∅ | |
| 5 | ↓ | | ? | | ∅ | |
| 6 | ↓ | ↑ | | | ∅ | |
| 7 | | | | M | ∅ | |
| 8 | ↓ | | ? | M | ∅ | |
| 9 | | | ? | M | ∅ | |

The following alpha code(s) appear (left justified) in the ADD REF column of Table 4.6.11–2 whenever it is necessary to define any special processing requirements not otherwise covered therein:

A. Channel 1 commanded values and actual positions of aerosurfaces, SSME, and OMS actuators in degrees are to be displayed. The middle–value shall be used when multiple feedbacks are available. The last valid position shall be displayed for an actuator if no valid feedbacks are available.

B. The actuator commanded parameter data fields shall be blanked prior to the initial execution of AI MODE 1 (Item 23).

C. Upon execution of any actuator selection item entry 1 through 21 or the second execution of Item 32 (STOP) after Item 31 (START) is enabled, the actuator gimbaling rate (RATE) and final position (FIN POS) data fields shall be blanked.

D. DIRECTION OF MOVEMENT INDICATOR. A two–symbol character string using applicable combination of DEU symbols 00 (Null = ∅), 1C (up pointing arrow ↑), 1D (down pointing arrow ↓), 1E (right pointing arrow →), and 1F (left pointing arrow ←) shall be used to indicate the selected aerosurface, SSME, OMS engine, or speedbrake direction of movement when viewing the Orbiter from the rear.

The direction of movement indicator field shall be displayed after actuator/selection and Item 30 (final position) selection, but prior to Item 31 (Start). The direction of movement indicator field shall be blanked during AI Mode execution and shall be blanked upon actuator selection. It shall momentarily be blanked upon final position selection.

E. ACTUATOR/AI STATUS. A character string status shall be displayed to indicate state of last request as follows:

| CONDITION | DISPLAYED CHAR STRING |
|---|---|
| Actuator movement or AI MODE: | |
| in progress or executing | RUN |
| terminates normally | CPLT |
| terminates abnormally | STOP |
| Actuator positioning requested while a non–SPEC initiated mutually exclusive ECP is active | BUSY |

F. The ECP ERR field shall display any ECP error code encountered by the TCS call program during actuator movement, AI MODE execution or by body flap monitor.

Upon execution of any AI MODE (Items 22 through 28), actuator gimbaling START) (Item 31) or BFD MON (Item 33) selection, the ECP ERR data field shall be blanked.

### 4.6.11.4 ACTUATOR CONTROL Figure/Table References

Figure 4.6.11–1 Actuator Control Display (PFS)

Table 4.6.11–1 Keyboard Processing Table

Table 4.6.11–2 CRT Display Processing Table

Table 4.6.11–3 CRT Display Processing Background Requirements N/A

Table 4.6.11–4 Mission Design Background Constants N/A

Table 4.6.11–5 Input Functional Parameters N/A

Table 4.6.11–6 Output Functional Parameters N/A

Table 4.6.11–7 I–Loads N/A

Table 4.6.11–8 K–Loads N/A

Table 4.6.11–9 Constants N/A

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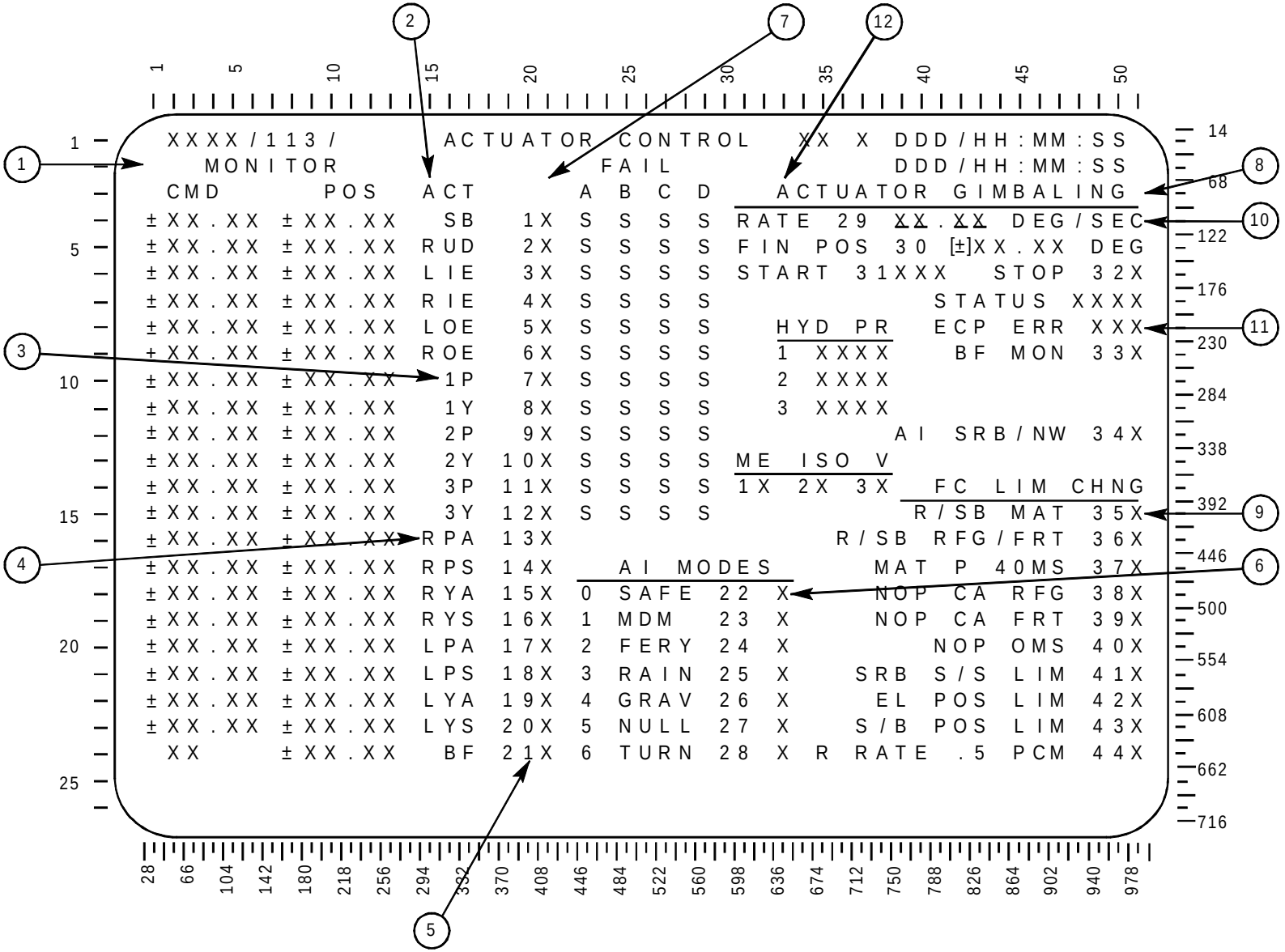



FIGURE 4.6.11-1. Actuator Control Display (PFS)

TABLE 4.6.11-1. ACTUATOR CONTROL (PFS) KEYBOARD PROCESSING

| Seq | CRT Signal Name | M/S ID | CHAR | TYPE | UNITS | DK | ITEM | Item No. Limits | | Add Ref | Destination | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | MIN | MAX | | | | |
| 001* | SB ACT | V93J3610C | 0.0 | CTRL | | | 1 | | | | ACD | ACTR SB SEL | X |
| 002* | RUD ACT | V93J3611C | 0.0 | CTRL | | | 2 | | | | ACD | ACTR RUD SEL | X |
| 003* | LIE ACT | V93J3612C | 0.0 | CTRL | | | 3 | | | | ACD | ACTR LIE SEL | X |
| 004* | RIE ACT | V93J3613C | 0.0 | CTRL | | | 4 | | | | ACD | ACTR RIE SEL | X |
| 005* | LOE ACT | V93J3614C | 0.0 | CTRL | | | 5 | | | | ACD | ACTR LOE SEL | X |
| 006* | ROE ACT | V93J3615C | 0.0 | CTRL | | | 6 | | | | ACD | ACTR ROE SEL | X |
| 007* | 1P ACT | V93J3616C | 0.0 | CTRL | | | 7 | | | | ACD | ACTR 1P SEL | X |
| 008* | 1Y ACT | V93J3617C | 0.0 | CTRL | | | 8 | | | | ACD | ACTR 1Y SEL | X |
| 009* | 2P ACT | V93J3618C | 0.0 | CTRL | | | 9 | | | | ACD | ACTR 2P SEL | X |
| 010* | 2Y ACT | V93J3619C | 0.0 | CTRL | | | 10 | | | | ACD | ACTR 2Y SEL | X |
| 011* | 3P ACT | V93J3620C | 0.0 | CTRL | | | 11 | | | | ACD | ACTR 3P SEL | X |
| 012* | 3Y ACT | V93J3621C | 0.0 | CTRL | | | 12 | | | | ACD | ACTR 3Y SEL | X |
| 013* | RPA ACT | V93J3622C | 0.0 | CTRL | | | 13 | | | | ACD | ACTR RPA SEL | X |
| 014* | RPS ACT | V93J3623C | 0.0 | CTRL | | | 14 | | | | ACD | ACTR RPS SEL | X |
| 015* | RYA ACT | V93J3624C | 0.0 | CTRL | | | 15 | | | | ACD | ACTR RYA SEL | X |
| 016* | RYS ACT | V93J3625C | 0.0 | CTRL | | | 16 | | | | ACD | ACTR RYS SEL | X |
| 017* | LPA ACT | V93J3626C | 0.0 | CTRL | | | 17 | | | | ACD | ACTR LPA SEL | X |
| 018* | LPS ACT | V93J3627C | 0.0 | CTRL | | | 18 | | | | ACD | ACTR LPS SEL | X |
| 019* | LYA ACT | V93J3628C | 0.0 | CTRL | | | 19 | | | | ACD | ACTR LYA SEL | X |
| 020* | LYS ACT | V93J3629C | 0.0 | CTRL | | | 20 | | | | ACD | ACTR LYS SEL | X |
| 021* | BF ACT | V93J3630C | 0.0 | CTRL | | | 21 | | | | ACD | ACTR BF SEL | X |
| 022* | AI MODE 0 SAFE | V93J3631C | 0.0 | CTRL | | | 22 | | | | ACD | AI MODES 0 SAFE SEL | X |
| 023* | AI MODE 1 MDM | V93J3632C | 0.0 | CTRL | | | 23 | | | | ACD | AI MODES 1 MDM SEL | X |
| 024* | AI MODE 2 FERY | V93J3633C | 0.0 | CTRL | | | 24 | | | | ACD | AI MODES 2 FERY SEL | X |
| 025* | AI MODE 3 RAIN | V93J3634C | 0.0 | CTRL | | | 25 | | | | ACD | AI MODES 3 RAIN SEL | X |
| 026* | AI MODE 4 GRAV | V93J3635C | 0.0 | CTRL | | | 26 | | | | ACD | AI MODES 4 GRAV SEL | X |
| 027* | AI MODE 5 NULL | V93J3636C | 0.0 | CTRL | | | 27 | | | | ACD | AI MODES 5 NULL SEL | X |
| 028* | AI MODE 6 TURN | V93J3637C | 0.0 | CTRL | | | 28 | | | | ACD | AI MODES 6 TURN SEL | X |
| 029* | ACT GMBL RATE | V93R3638C | 6.2 | DEC | DEG/S | | 29 | | | | ACD | ACT GIMB RATE SEL | X |
| 030* | ACT GMBL FIN POS | V93H3639C | 6.2 | DEC | DEG | | 30 | | | | ACD | ACT GIMB FINAL POSN SEL | X |
| 031* | ACT GMBL START | V93J3640C | 0.0 | CTRL | | | 31 | | | | ACD | ACT GIMB START SEL | X |
| 032* | ACT GMBL/AI STOP | V93J3641C | 0.0 | CTRL | | | 32 | | | | ACD | ACT GIMB/AI MODE STOP SEL | X |
| 033* | ACT GMBL BF MON | V93J3642C | 0.0 | CTRL | | | 33 | | | | ACD | BF MONITOR SEL | X |

TABLE 4.6.11-1. ACTUATOR CONTROL (PFS) KEYBOARD PROCESSING

| Seq | CRT Signal Name | M/S ID | CHAR | TYPE | UNITS | DK | ITEM | Item No. Limits | | Add Ref | Destination | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | MIN | MAX | | | | |
| 034* | AI SRB/NW | V93J3643C | 0.0 | CTRL | | | 34 | | | | ACD | AI SRB/NW SEL | X |
| 035* | R/SB MAT | V93J3644C | 0.0 | CTRL | | | 35 | | | | ACD | R/SB MAT SEL | X |
| 036* | R/SB RFG/FRT | V93J3645C | 0.0 | CTRL | | | 36 | | | | ACD | R/SB RFG/FRT SEL | X |
| 037* | MAT P 40MS | V93J3646C | 0.0 | CTRL | | | 37 | | | | ACD | MAT P (4OMS) SEL | X |
| 038* | NOP CA RFG | V93J3647C | 0.0 | CTRL | | | 38 | | | | ACD | NO–OP CA RFG SEL | X |
| 039* | NOP CA FRT | V93J3648C | 0.0 | CTRL | | | 39 | | | | ACD | NO–OP CA FRT SEL | X |
| 040* | NOP OMS | V93J3649C | 0.0 | CTRL | | | 40 | | | | ACD | NO–OP OMS SEL | X |
| 041* | SRB S/S LIM | V93J3650C | 0.0 | CTRL | | | 41 | | | | ACD | SRB S/S LIMIT SEL | X |
| 042* | EL POS LIM | V93J3651C | 0.0 | CTRL | | | 42 | | | | ACD | EL POSN LIMIT SEL | X |
| 043* | S/B POS LIM | V93J3652C | 0.0 | CTRL | | | 43 | | | | ACD | S/B POSN LIMIT SEL | X |
| 044* | R RATE .5 PCM | V93J3653C | 0.0 | CTRL | | | 44 | | | | ACD | R RATE (.5) PCM SEL | X |

## TABLE 4.6.11-2. ACTUATOR CONTROL (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | BILEVEL | | | | | | | | | | | | | | | | | |
| | | | X | Y | | CHAR | 1 | 0 | TYPE | | | | | | | | | | | | | | | |
| 001 | (OPS) | V93X0040X | 2 | 1 | | 5.0 | | | CHAR | | | | | | | E | | | | | | UI | OPS FUNCTION PAGE | X |
| 002 | (SPEC) | V93X0042X | 7 | 1 | | 4.0 | | | CHAR | | | | | | | E | | | | | | UI | SPEC FUNCTION PAGE | X |
| 003 | (DISP) | V93X0044X | 10 | 1 | | 4.0 | | | DEC | | | | | | | E | | | | | | UI | DISPLAY FUNCTION PAGE | X |
| 004 | (UL) | V92X5032X | 34 | 1 | | 2.0 | UL | | BLVL | | | | | | X | G | | | | | | UI | UPLINK ACTIVITY IND | X |
| 005 | (GPC) | V93X0048X | 36 | 1 | | 2.0 | | | DEC | | | | | | | E | | | | | | UI | GPC DRIVER | X |
| 006 | (MT) | V91W1990C | 39 | 1 | | 12.0 | | | CHAR | DHMS | | | | | | A | | | | | | FCOS | MISSION ELAPSED TIME | X |
| 007 | (CRT TIMER) | V91W1987C | 39 | 2 | | 12.0 | | | CHAR | DHMS | | | | | | A | | | | | B | FCOS | DISPLAY CRT TIMER,GNC | X |
| 008* | SB CMD MONITOR | V57K0240C | 1 | 4 | | 6.2 | | | DEC | DEG | | X | | | | F | X | | | | AB | ACD | SPDBK CMD 1 | |
| 009* | RUD CMD MONITOR | V57K0140C | 1 | 5 | | 6.2 | | | DEC | DEG | | X | | | | F | X | | | | AB | ACD | RUD CMD 1 | |
| 010* | LIE CMD MONITOR | V58K0820C | 1 | 6 | | 6.2 | | | DEC | DEG | | X | | | | F | X | | | | AB | ACD | L INBD ELVN CMD 1 | |
| 011* | RIE CMD MONITOR | V58K0920C | 1 | 7 | | 6.2 | | | DEC | DEG | | X | | | | F | X | | | | AB | ACD | R INBD ELVN CMD 1 | |
| 012* | LOE CMD MONITOR | V58K0870C | 1 | 8 | | 6.2 | | | DEC | DEG | | X | | | | F | X | | | | AB | ACD | L OUTBD ELVN CMD 1 | |
| 013* | ROE CMD MONITOR | V58K0970C | 1 | 9 | | 6.2 | | | DEC | DEG | | X | | | | F | X | | | | AB | ACD | R OUTBD ELVN CMD 1 | |
| 014* | 1P CMD MONITOR | V58K1164C | 1 | 10 | | 6.2 | | | DEC | DEG | | X | | | | F | X | | | | AB | ACD | MPS ENG 1 P ACTR A CMD | |
| 015* | 1Y CMD MONITOR | V58K1168C | 1 | 11 | | 6.2 | | | DEC | DEG | | X | | | | F | X | | | | AB | ACD | MPS ENG 1 Y ACTR A CMD | |
| 016* | 2P CMD MONITOR | V58K1264C | 1 | 12 | | 6.2 | | | DEC | DEG | | X | | | | F | X | | | | AB | ACD | MPS ENG 2 P ACTR A CMD | |
| 017* | 2Y CMD MONITOR | V58K1268C | 1 | 13 | | 6.2 | | | DEC | DEG | | X | | | | F | X | | | | AB | ACD | MPS ENG 2 Y ACTR A CMD | |
| 018* | 3P CMD MONITOR | V58K1364C | 1 | 14 | | 6.2 | | | DEC | DEG | | X | | | | F | X | | | | AB | ACD | MPS ENG 3 P ACTR A CMD | |
| 019* | 3Y CMD MONITOR | V58K1368C | 1 | 15 | | 6.2 | | | DEC | DEG | | X | | | | F | X | | | | AB | ACD | MPS ENG 3 Y ACTR A CMD | |
| 020* | RPA CMD MONITOR | V43K2016C | 1 | 16 | | 6.2 | | | DEC | DEG | | X | | | | F | X | | | | AB | ACD | OMS R ENG ACTV PITCH ACTR CMD | |
| 021* | RPS CMD MONITOR | V43K2017C | 1 | 17 | | 6.2 | | | DEC | DEG | | X | | | | F | X | | | | AB | ACD | OMS R ENG STBY PITCH ACTR CMD | |
| 022* | RYA CMD MONITOR | V43K2018C | 1 | 18 | | 6.2 | | | DEC | DEG | | X | | | | F | X | | | | AB | ACD | OMS R ENG ACTV YAW ACTR CMD | |
| 023* | RYS CMD MONITOR | V43K2019C | 1 | 19 | | 6.2 | | | DEC | DEG | | X | | | | F | X | | | | AB | ACD | OMS R ENG STBY YAW ACTR CMD | |
| 024* | LPA CMD MONITOR | V43K1016C | 1 | 20 | | 6.2 | | | DEC | DEG | | X | | | | F | X | | | | AB | ACD | OMS L ENG ACTV PITCH ACTR CMD | |

## TABLE 4.6.11-2. ACTUATOR CONTROL (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | BILEVEL | | | | | | | | | | | | | | | | | |
| | | | X | Y | | CHAR | 1 | 0 | TYPE | | | | | | | | | | | | | | | |
| 025* | LPS CMD MONITOR | V43K1017C | 1 | 21 | | 6.2 | | | DEC | DEG | | X | | | | F | X | | | | AB | ACD | OMS L ENG STBY PITCH ACTR CMD | |
| 026* | LYA CMD MONITOR | V43K1018C | 1 | 22 | | 6.2 | | | DEC | DEG | | X | | | | F | X | | | | AB | ACD | OMS L ENG ACTV YAW ACTR CMD | |
| 027* | LYS CMD MONITOR | V43K1019C | 1 | 23 | | 6.2 | | | DEC | DEG | | X | | | | F | X | | | | AB | ACD | OMS L ENG STBY YAW ACTR CMD | |
| 028* | BF CMD MONITOR | V99X4360X | 2 | 24 | | 2.0 | UP | | BLVL | | | | | | | F | | | | | | ACD | BF UP CMD STIMULUS | X |
| 029* | BF CMD MONITOR | V99X4361X | 2 | 24 | | 2.0 | DN | | BLVL | | | | | | | F | | | | | | ACD | BF DN CMD STIMULUS | X |
| 030* | SB POS MONITOR | V57H0201C | 8 | 4 | | 6.2 | | | DEC | DEG | | | | | | F | X | | | | A | ACD | SPEED BRAKE POSN FDBK–1 | X |
| 031* | RUD POS MONITOR | V57H0101C | 8 | 5 | | 6.2 | | | DEC | DEG | | | | | | F | X | | | | A | ACD | RUDDER POSN FDBK–1 | X |
| 032* | LIE POS MONITOR | V58H0806C | 8 | 6 | | 6.2 | | | DEC | DEG | | | | | | F | X | | | | A | ACD | L INBD ELEVON POSN FDBK–1 | X |
| 033* | RIE POS MONITOR | V58H0906C | 8 | 7 | | 6.2 | | | DEC | DEG | | | | | | F | X | | | | A | ACD | R INBD ELEVON POSN FDBK–1 | X |
| 034* | LOE POS MONITOR | V58H0856C | 8 | 8 | | 6.2 | | | DEC | DEG | | | | | | F | X | | | | A | ACD | L OUTBD ELEVON POSN FDBK–1 | X |
| 035* | ROE POS MONITOR | V58H0956C | 8 | 9 | | 6.2 | | | DEC | DEG | | | | | | F | X | | | | A | ACD | R OUTBD ELEVON POSN FDBK–1 | X |
| 036* | 1P POS MONITOR | V58H1100A | 8 | 10 | | 6.2 | | | DEC | DEG | | | | | | F | X | | | | A | ACD | MPS ENG 1 P ACTR POSN | |
| 037* | 1Y POS MONITOR | V58H1150A | 8 | 11 | | 6.2 | | | DEC | DEG | | | | | | F | X | | | | A | ACD | MPS ENG 1 Y ACTR POSN | |
| 038* | 2P POS MONITOR | V58H1200A | 8 | 12 | | 6.2 | | | DEC | DEG | | | | | | F | X | | | | A | ACD | MPS ENG 2 P ACTR POSN | |
| 039* | 2Y POS MONITOR | V58H1250A | 8 | 13 | | 6.2 | | | DEC | DEG | | | | | | F | X | | | | A | ACD | MPS ENG 2 Y ACTR POSN | |
| 040* | 3P POS MONITOR | V58H1300A | 8 | 14 | | 6.2 | | | DEC | DEG | | | | | | F | X | | | | A | ACD | MPS ENG 3 P ACTR POSN | |
| 041* | 3Y POS MONITOR | V58H1350A | 8 | 15 | | 6.2 | | | DEC | DEG | | | | | | F | X | | | | A | ACD | MPS ENG 3 Y ACTR POSN | |
| 042* | RPA POS MONITOR | V43H2550C | 8 | 16 | | 6.2 | | | DEC | DEG | | | | | | F | X | | | | A | ACD | OMS–R ENG ACTV P ACTR POS | |
| 043* | RPS POS MONITOR | V43H2554C | 8 | 17 | | 6.2 | | | DEC | DEG | | | | | | F | X | | | | A | ACD | OMS–R ENG STBY P ACTR POS | |
| 044* | RYA POS MONITOR | V43H2552C | 8 | 18 | | 6.2 | | | DEC | DEG | | | | | | F | X | | | | A | ACD | OMS–R ENG ACTV Y ACTR POS | |
| 045* | RYS POS MONITOR | V43H2556C | 8 | 19 | | 6.2 | | | DEC | DEG | | | | | | F | X | | | | A | ACD | OMS–R ENG STBY Y ACTR POS | |
| 046* | LPA POS MONITOR | V43H2500C | 8 | 20 | | 6.2 | | | DEC | DEG | | | | | | F | X | | | | A | ACD | OMS–L ENG ACTV P ACTR POS | |
| 047* | LPS POS MONITOR | V43H2504C | 8 | 21 | | 6.2 | | | DEC | DEG | | | | | | F | X | | | | A | ACD | OMS–L ENG STBY P ACTR POS | |
| 048* | LYA POS MONITOR | V43H2502C | 8 | 22 | | 6.2 | | | DEC | DEG | | | | | | F | X | | | | A | ACD | OMS–L ENG ACTV Y ACTR POS | |
| 049* | LYS POS MONITOR | V43H2506C | 8 | 23 | | 6.2 | | | DEC | DEG | | | | | | F | X | | | | A | ACD | OMS–L ENG STBY Y ACTR POS | |
| 050* | BF POS MONITOR | V57H0065C | 8 | 24 | | 6.2 | | | DEC | DEG | | | | | | F | X | | | | A | ACD | BODY FLAP POSN FDBK–1 | X |

TABLE 4.6.11-2. ACTUATOR CONTROL (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | | | |
| 051* | SB ACT 1 | V99X1530X | 21 | 4 | | 1.0 | * | | BLVL | | | | | | | | | | | | | ACD | ACTR SB SEL IND | X |
| 052* | RUD ACT 2 | V99X1531X | 21 | 5 | | 1.0 | * | | BLVL | | | | | | | | | | | | | ACD | ACTR RUD SEL IND | X |
| 053* | LIE ACT 3 | V99X1533X | 21 | 6 | | 1.0 | * | | BLVL | | | | | | | | | | | | | ACD | ACTR LIE SEL IND | X |
| 054* | RIE ACT 4 | V99X1532X | 21 | 7 | | 1.0 | * | | BLVL | | | | | | | | | | | | | ACD | ACTR RIE SEL IND | X |
| 055* | LOE ACT 5 | V99X1534X | 21 | 8 | | 1.0 | * | | BLVL | | | | | | | | | | | | | ACD | ACTR LOE SEL IND | X |
| 056* | ROE ACT 6 | V99X1535X | 21 | 9 | | 1.0 | * | | BLVL | | | | | | | | | | | | | ACD | ACTR ROE SEL IND | X |
| 057* | 1P ACT 7 | V99X1536X | 21 | 10 | | 1.0 | * | | BLVL | | | | | | | | | | | | | ACD | ACTR 1P SEL IND | X |
| 058* | 1Y ACT 8 | V99X1537X | 21 | 11 | | 1.0 | * | | BLVL | | | | | | | | | | | | | ACD | ACTR 1Y SEL IND | X |
| 059* | 2P ACT 9 | V99X1538X | 21 | 12 | | 1.0 | * | | BLVL | | | | | | | | | | | | | ACD | ACTR 2P SEL IND | X |
| 060* | 2Y ACT 10 | V99X1539X | 21 | 13 | | 1.0 | * | | BLVL | | | | | | | | | | | | | ACD | ACTR 2Y SEL IND | X |
| 061* | 3P ACT 11 | V99X1540X | 21 | 14 | | 1.0 | * | | BLVL | | | | | | | | | | | | | ACD | ACTR 3P SEL IND | X |
| 062* | 3Y ACT 12 | V99X1541X | 21 | 15 | | 1.0 | * | | BLVL | | | | | | | | | | | | | ACD | ACTR 3Y SEL IND | X |
| 063* | RPA ACT 13 | V99X1542X | 21 | 16 | | 1.0 | * | | BLVL | | | | | | | | | | | | | ACD | ACTR RPA SEL IND | X |
| 064* | RPS ACT 14 | V99X1543X | 21 | 17 | | 1.0 | * | | BLVL | | | | | | | | | | | | | ACD | ACTR RPS SEL IND | X |
| 065* | RYA ACT 15 | V99X1544X | 21 | 18 | | 1.0 | * | | BLVL | | | | | | | | | | | | | ACD | ACTR RYA SEL IND | X |
| 066* | RYS ACT 16 | V99X1545X | 21 | 19 | | 1.0 | * | | BLVL | | | | | | | | | | | | | ACD | ACTR RYS SEL IND | X |
| 067* | LPA ACT 17 | V99X1546X | 21 | 20 | | 1.0 | * | | BLVL | | | | | | | | | | | | | ACD | ACTR LPA SEL IND | X |
| 068* | LPS ACT 18 | V99X1547X | 21 | 21 | | 1.0 | * | | BLVL | | | | | | | | | | | | | ACD | ACTR LPS SEL IND | X |
| 069* | LYA ACT 19 | V99X1548X | 21 | 22 | | 1.0 | * | | BLVL | | | | | | | | | | | | | ACD | ACTR LYA SEL IND | X |
| 070* | LYS ACT 20 | V99X1549X | 21 | 23 | | 1.0 | * | | BLVL | | | | | | | | | | | | | ACD | ACTR LYS SEL IND | X |
| 071* | BF ACT 21 | V99X1550X | 21 | 24 | | 1.0 | * | | BLVL | | | | | | | | | | | | | ACD | ACTR BF SEL IND | X |
| 072* | AI MODE 0 22 | V99X1551X | 33 | 18 | | 1.0 | * | | BLVL | | | | | | | | | | | | | ACD | AI MODE 0 SAFE SEL IND | X |
| 073* | AI MODE 1 23 | V99X1552X | 33 | 19 | | 1.0 | * | | BLVL | | | | | | | | | | | | | ACD | AI MODE 1 MDM SEL IND | X |
| 074* | AI MODE 2 24 | V99X1553X | 33 | 20 | | 1.0 | * | | BLVL | | | | | | | | | | | | | ACD | AI MODE 2 FERY SEL IND | X |
| 075* | AI MODE 3 25 | V99X1554X | 33 | 21 | | 1.0 | * | | BLVL | | | | | | | | | | | | | ACD | AI MODE 3 RAIN SEL IND | X |
| 076* | AI MODE 4 26 | V99X1555X | 33 | 22 | | 1.0 | * | | BLVL | | | | | | | | | | | | | ACD | AI MODE 4 GRAV SEL IND | X |
| 077* | AI MODE 5 27 | V99X1556X | 33 | 23 | | 1.0 | * | | BLVL | | | | | | | | | | | | | ACD | AI MODE 5 NULL SEL IND | X |
| 078* | AI MODE 6 28 | V99X1557X | 33 | 24 | | 1.0 | * | | BLVL | | | | | | | | | | | | | ACD | AI MODE 6 TURN SEL IND | X |
| 079* | ACT RATE 29 | V99R1558C | 38 | 4 | | 6.2 | | | DEC | DEG/S | | X | | | | F | | | | | C | ACD | ACTR GIMB RATE | X |
| 080* | ACT FIN POS 30 | V99J1559C | 42 | 5 | | 6.2 | | | DEC | DEG | | X | | | | F | X | | | | C | ACD | ACTR GIMB FINAL POSN | X |

## TABLE 4.6.11-2. ACTUATOR CONTROL (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | | | |
| 081* | ACT START 31 | V99X1560X | 39 | 6 | | 1.0 | * | | BLVL | | | | | | | | | | | | | ACD | ACTR GIMB START SEL IND | X |
| 082* | ACT START 31 | V99J1565C | 40 | 6 | | 2.0 | | | CHAR | | | X | | | | F | | | | | D | ACD | ACTUATOR DIRECTION | X |
| 083* | ACT GMBL/AI STOP 32 | V99X1561X | 51 | 6 | | 1.0 | * | | BLVL | | | | | | | | | | | | | ACD | ACTR GIMB/AI MODE STOP SEL IND | X |
| 084* | ACT STATUS | V99J1564C | 48 | 7 | | 4.0 | | | CHAR | | | | | | | F | | | | | E | ACD | ACTUATOR/AI STATUS | X |
| 085* | ACT ECP ERR | V99U2202C | 48 | 8 | | 4.0 | | | DEC | | | X | | | | F | | | | | F | ACD | TCS CALL PROGRAM ERROR CODE 100 | X |
| 086* | ACT BF MON 33 | V99X1562X | 51 | 9 | | 1.0 | * | | BLVL | | | | | | | | | | | | | ACD | BF MONITER SEL IND | X |
| 087* | AI SRB/NW 34 | V99X1563X | 51 | 12 | | 1.0 | * | | BLVL | | | | | | | | | | | | | ACD | AI SRB/NW SEL IND | X |
| 088* | R/SB MAT 35 | V99X1572X | 51 | 15 | | 1.0 | * | | BLVL | | | | | | | | | | | | | ACD | R/SB MAT BYPASS SEL IND | X |
| 089* | R/SB RFG/FRT 36 | V99X1568X | 51 | 16 | | 1.0 | * | | BLVL | | | | | | | | | | | | | ACD | R/SB RFL/FRT BYPASS SEL IND | X |
| 090* | MAT P 40MS 37 | V99X1573X | 51 | 17 | | 1.0 | * | | BLVL | | | | | | | | | | | | | ACD | MAT P (40MS) SEL IND | X |
| 091* | NOP CA RFG 38 | V99X1569X | 51 | 18 | | 1.0 | * | | BLVL | | | | | | | | | | | | | ACD | NO–OP CA RFG SEL IND | X |
| 092* | NOP CA FRT 39 | V99X1571X | 51 | 19 | | 1.0 | * | | BLVL | | | | | | | | | | | | | ACD | NO–OP CA FRT SEL IND | X |
| 093* | NOP OMS 40 | V99X1570X | 51 | 20 | | 1.0 | * | | BLVL | | | | | | | | | | | | | ACD | NO–OP OMS SEL IND | X |
| 094* | SRB S/S LIM 41 | V99X1575X | 51 | 21 | | 1.0 | * | | BLVL | | | | | | | | | | | | | ACD | SRB S/S LIMIT SEL IND | X |
| 095* | EL POS LIM 42 | V99X1576X | 51 | 22 | | 1.0 | * | | BLVL | | | | | | | | | | | | | ACD | EL POSN MIT SEL IND | X |
| 096* | S/B POS LIM 43 | V99X1577X | 51 | 23 | | 1.0 | * | | BLVL | | | | | | | | | | | | | ACD | S/B POSN LIMIT SEL IND | X |
| 097* | R RATE.5 PCM 44 | V99X1574X | 51 | 24 | | 1.0 | * | | BLVL | | | | | | | | | | | | | ACD | R RATE (.5) PCM SEL IND | X |
| 098* | SB A ACT FAIL | V79X3336X | 23 | 4 | | 1.0 | | | STAT | | | | | | | F | | | | | | ACD | SPEED BRAKE ACTR 1 FAIL | X |
| 099* | SB B ACT FAIL | V79X3337X | 25 | 4 | | 1.0 | | | STAT | | | | | | | F | | | | | | ACD | SPEED BRAKE ACTR 2 FAIL | X |
| 100* | SB C ACT FAIL | V79X3338X | 27 | 4 | | 1.0 | | | STAT | | | | | | | F | | | | | | ACD | SPEED BRAKE ACTR 3 FAIL | X |
| 101* | SB D ACT FAIL | V79X3339X | 29 | 4 | | 1.0 | | | STAT | | | | | | | F | | | | | | ACD | SPEED BRAKE ACTR 4 FAIL | X |
| 102* | RUD A ACT FAIL | V79X3331X | 23 | 5 | | 1.0 | | | STAT | | | | | | | F | | | | | | ACD | RUDDER ACTR 1 FAIL OUTPUT | X |
| 103* | RUD B ACT FAIL | V79X3332X | 25 | 5 | | 1.0 | | | STAT | | | | | | | F | | | | | | ACD | RUDDER ACTR 2 FAIL OUTPUT | X |
| 104* | RUD C ACT FAIL | V79X3333X | 27 | 5 | | 1.0 | | | STAT | | | | | | | F | | | | | | ACD | RUDDER ACTR 3 FAIL OUTPUT | X |
| 105* | RUD D ACT FAIL | V79X3334X | 29 | 5 | | 1.0 | | | STAT | | | | | | | F | | | | | | ACD | RUDDER ACTR 4 FAIL OUTPUT | X |
| 106* | LIE A ACT FAIL | V79X3260X | 23 | 6 | | 1.0 | | | STAT | | | | | | | F | | | | | | ACD | L INBOARD ELEVON ACTR 1 FAIL | X |

TABLE 4.6.11-2. ACTUATOR CONTROL (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | BILEVEL | | | | | | | | | | | | | | | | | |
| | | | X | Y | | CHAR | 1 | 0 | TYPE | | | | | | | | | | | | | | | |
| 107* | LIE B ACT FAIL | V79X3261X | 25 | 6 | | 1.0 | | | STAT | | | | | | | F | | | | | | ACD | L INBOARD ELEVON ACTR 2 FAIL | X |
| 108* | LIE C ACT FAIL | V79X3262X | 27 | 6 | | 1.0 | | | STAT | | | | | | | F | | | | | | ACD | L INBOARD ELEVON ACTR 3 FAIL | X |
| 109* | LIE D ACT FAIL | V79X3263X | 29 | 6 | | 1.0 | | | STAT | | | | | | | F | | | | | | ACD | L INBOARD ELEVON ACTR 4 FAIL | X |
| 110* | RIE A ACT FAIL | V79X3270X | 23 | 7 | | 1.0 | | | STAT | | | | | | | F | | | | | | ACD | R INBOARD ELEVON ACTR 1 FAIL | X |
| 111* | RIE B ACT FAIL | V79X3271X | 25 | 7 | | 1.0 | | | STAT | | | | | | | F | | | | | | ACD | R INBOARD ELEVON ACTR 2 FAIL | X |
| 112* | RIE C ACT FAIL | V79X3272X | 27 | 7 | | 1.0 | | | STAT | | | | | | | F | | | | | | ACD | R INBOARD ELEVON ACTR 3 FAIL | X |
| 113* | RIE D ACT FAIL | V79X3273X | 29 | 7 | | 1.0 | | | STAT | | | | | | | F | | | | | | ACD | R INBOARD ELEVON ACTR 4 FAIL | X |
| 114* | LOE A ACT FAIL | V79X3265X | 23 | 8 | | 1.0 | | | STAT | | | | | | | F | | | | | | ACD | L OTBOARD ELEVON ACTR 1 FAIL | X |
| 115* | LOE B ACT FAIL | V79X3266X | 25 | 8 | | 1.0 | | | STAT | | | | | | | F | | | | | | ACD | L OTBOARD ELEVON ACTR 2 FAIL | X |
| 116* | LOE C ACT FAIL | V79X3267X | 27 | 8 | | 1.0 | | | STAT | | | | | | | F | | | | | | ACD | L OTBOARD ELEVON ACTR 3 FAIL | X |
| 117* | LOE D ACT FAIL | V79X3268X | 29 | 8 | | 1.0 | | | STAT | | | | | | | F | | | | | | ACD | L OTBOARD ELEVON ACTR 4 FAIL | X |
| 118* | ROE A ACT FAIL | V79X3275X | 23 | 9 | | 1.0 | | | STAT | | | | | | | F | | | | | | ACD | R OTBOARD ELEVON ACTR 1 FAIL | X |
| 119* | ROE B ACT FAIL | V79X3276X | 25 | 9 | | 1.0 | | | STAT | | | | | | | F | | | | | | ACD | R OTBOARD ELEVON ACTR 2 FAIL | X |
| 120* | ROE C ACT FAIL | V79X3277X | 27 | 9 | | 1.0 | | | STAT | | | | | | | F | | | | | | ACD | R OTBOARD ELEVON ACTR 3 FAIL | X |
| 121* | ROE D ACT FAIL | V79X3278X | 29 | 9 | | 1.0 | | | STAT | | | | | | | F | | | | | | ACD | R OTBOARD ELEVON ACTR 4 FAIL | X |
| 122* | 1P A ACT FAIL | V79X1170X | 23 | 10 | | 1.0 | | | STAT | | | | | | | F | | | | | | ACD | MPS ENG 1 P ACTR A FAIL | |
| 123* | 1P B ACT FAIL | V79X1173X | 25 | 10 | | 1.0 | | | STAT | | | | | | | F | | | | | | ACD | MPS ENG 1 P ACTR B FAIL | |
| 124* | 1P C ACT FAIL | V79X1176X | 27 | 10 | | 1.0 | | | STAT | | | | | | | F | | | | | | ACD | MPS ENG 1 P ACTR C FAIL | |

## TABLE 4.6.11-2. ACTUATOR CONTROL (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | BILEVEL | | | | | | | | | | | | | | | | | |
| | | | X | Y | | CHAR | 1 | 0 | TYPE | | | | | | | | | | | | | | | |
| 125* | 1P D ACT FAIL | V79X1178X | 29 | 10 | | 1.0 | | | STAT | | | | | | | F | | | | | | ACD | MPS ENG 1 P ACTR D FAIL | |
| 126* | 1Y A ACT FAIL | V79X1171X | 23 | 11 | | 1.0 | | | STAT | | | | | | | F | | | | | | ACD | MPS END 1 Y ACTR A FAIL | |
| 127* | 1Y B ACT FAIL | V79X1174X | 25 | 11 | | 1.0 | | | STAT | | | | | | | F | | | | | | ACD | MPS ENG 1 Y ACTR B FAIL | |
| 128* | 1Y C ACT FAIL | V79X1177X | 27 | 11 | | 1.0 | | | STAT | | | | | | | F | | | | | | ACD | MPS ENG 1 Y ACTR C FAIL | |
| 129* | 1Y D ACT FAIL | V79X1179X | 29 | 11 | | 1.0 | | | STAT | | | | | | | F | | | | | | ACD | MPS ENG 1 Y ACTR D FAIL | |
| 130* | 2P A ACT FAIL | V79X1270X | 23 | 12 | | 1.0 | | | STAT | | | | | | | F | | | | | | ACD | MPS ENG 2 P ACTR A FAIL | |
| 131* | 2P B ACT FAIL | V79X1273X | 25 | 12 | | 1.0 | | | STAT | | | | | | | F | | | | | | ACD | MPS ENG 2 P ACTR B FAIL | |
| 132* | 2P C ACT FAIL | V79X1276X | 27 | 12 | | 1.0 | | | STAT | | | | | | | F | | | | | | ACD | MPS ENG 2 P ACTR C FAIL | |
| 133* | 2P D ACT FAIL | V79X1278X | 29 | 12 | | 1.0 | | | STAT | | | | | | | F | | | | | | ACD | MPS ENG 2 P ACTR D FAIL | |
| 134* | 2Y A ACT FAIL | V79X1271X | 23 | 13 | | 1.0 | | | STAT | | | | | | | F | | | | | | ACD | MPS ENG 2 Y ACTR A FAIL | |
| 135* | 2Y B ACT FAIL | V79X1274X | 25 | 13 | | 1.0 | | | STAT | | | | | | | F | | | | | | ACD | MPS ENG 2 Y ACTR B FAIL | |
| 136* | 2Y C ACT FAIL | V79X1277X | 27 | 13 | | 1.0 | | | STAT | | | | | | | F | | | | | | ACD | MPS ENG 2 Y ACTR C FAIL | |
| 137* | 2Y D ACT FAIL | V79X1279X | 29 | 13 | | 1.0 | | | STAT | | | | | | | F | | | | | | ACD | MPS ENG 2 Y ACTR D FAIL | |
| 138* | 3P A ACT FAIL | V79X1370X | 23 | 14 | | 1.0 | | | STAT | | | | | | | F | | | | | | ACD | MPS ENG 3 P ACTR A FAIL | |
| 139* | 3P B ACT FAIL | V79X1373X | 25 | 14 | | 1.0 | | | STAT | | | | | | | F | | | | | | ACD | MPS ENG 3 P ACTR B FAIL | |
| 140* | 3P C ACT FAIL | V79X1376X | 27 | 14 | | 1.0 | | | STAT | | | | | | | F | | | | | | ACD | MPS ENG 3 P ACTR C FAIL | |
| 141* | 3P D ACT FAIL | V79X1378X | 29 | 14 | | 1.0 | | | STAT | | | | | | | F | | | | | | ACD | MPS ENG 3 P ACTR D FAIL | |
| 142* | 3Y A ACT FAIL | V79X1371X | 23 | 15 | | 1.0 | | | STAT | | | | | | | F | | | | | | ACD | MPS ENG 3 Y ACTR A FAIL | |
| 143* | 3Y B ACT FAIL | V79X1374X | 25 | 15 | | 1.0 | | | STAT | | | | | | | F | | | | | | ACD | MPS ENG 3 Y ACTR B FAIL | |
| 144* | 3Y C ACT FAIL | V79X1377X | 27 | 15 | | 1.0 | | | STAT | | | | | | | F | | | | | | ACD | MPS ENG 3 Y ACTR C FAIL | |
| 145* | 3Y D ACT FAIL | V79X1379X | 29 | 15 | | 1.0 | | | STAT | | | | | | | F | | | | | | ACD | MPS ENG 3 Y ACTR D FAIL | |
| 146* | HYD PR 1 | V58P0114C | 34 | 9 | | 5.0 | | | DEC | PSIA | | | | | | F | | | | | | ACD | HYDR SYS 1 SUPPLY PRESS A | |
| 147* | HYD PR 2 | V58P0214C | 34 | 10 | | 5.0 | | | DEC | PSIA | | | | | | F | | | | | | ACD | HYDR SYS 2 SUPPLY PRESS A | |
| 148* | HYD PR 3 | V58P0314C | 34 | 11 | | 5.0 | | | DEC | PSIA | | | | | | F | | | | | | ACD | HYDR SYS 3 SUPPLY PRESS A | |
| 149* | ME ISO V 1 | V58X1136E | 32 | 14 | | 1.0 | | C | BLVL | | | | | | | F | | | | | | ACD | HYD SYS 1 ME/TVC ISLN V OP IND | |
| 150* | ME ISO V 2 | V58X1236E | 35 | 14 | | 1.0 | | C | BLVL | | | | | | | F | | | | | | ACD | HYD SUS 2 ME/TVC ISLN V OP IND | |
| 151* | ME ISO V 3 | V58X1336E | 38 | 14 | | 1.0 | | C | BLVL | | | | | | | F | | | | | | ACD | HYD SYS 3 ME/TVC ISLN V OP IND | |

TABLE 4.6.11-2. ACTUATOR CONTROL (PFS) CRT DISPLAY PROCESSING

| Seq | CRT Signal Name | M/S ID | Coord | | ITEM NO | Format | | | | UNITS | STATUS | BLANK | SIZE | INTENS | FLASH | RATE | SIGN | LEADER | BRANCH | DWNLST | Add Ref | Source | Nomenclature | CRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | | CHAR | BILEVEL 1 | BILEVEL 0 | TYPE | | | | | | | | | | | | | | | |
| 152 | (MSG LINE) | V93X0050X | 1 | 25 | | 44.0 | | | CHAR | | | | | | | G | | | | | | UI | MESSAGE LINE | X |
| 153 | (BUFFER MSG) | V93X0054X | 45 | 25 | | 4.0 | | | CHAR | | | | | | | G | | | | | | UI | BUFFER MESSAGE INDICATOR | X |
| 154 | (SPL) | V93X0056X | 2 | 26 | | 49.0 | | | CHAR | | | | | | | G | | | | | | UI | SCRATCH PAD LINE | X |

## 4.7 HEAD UP DISPLAYS

This section describes the requirements related to the Head Up Displays.

### 4.7.1 BLANK

#### 4.7.1.1 Purpose, Operation, and Organization

The BLANK format provides the capability to remove all symbols from the Pilot Display Unit (PDU) even with Head Up Display electronics power on. The BLANK format is displayed whenever format 0 is commanded by the GPC.

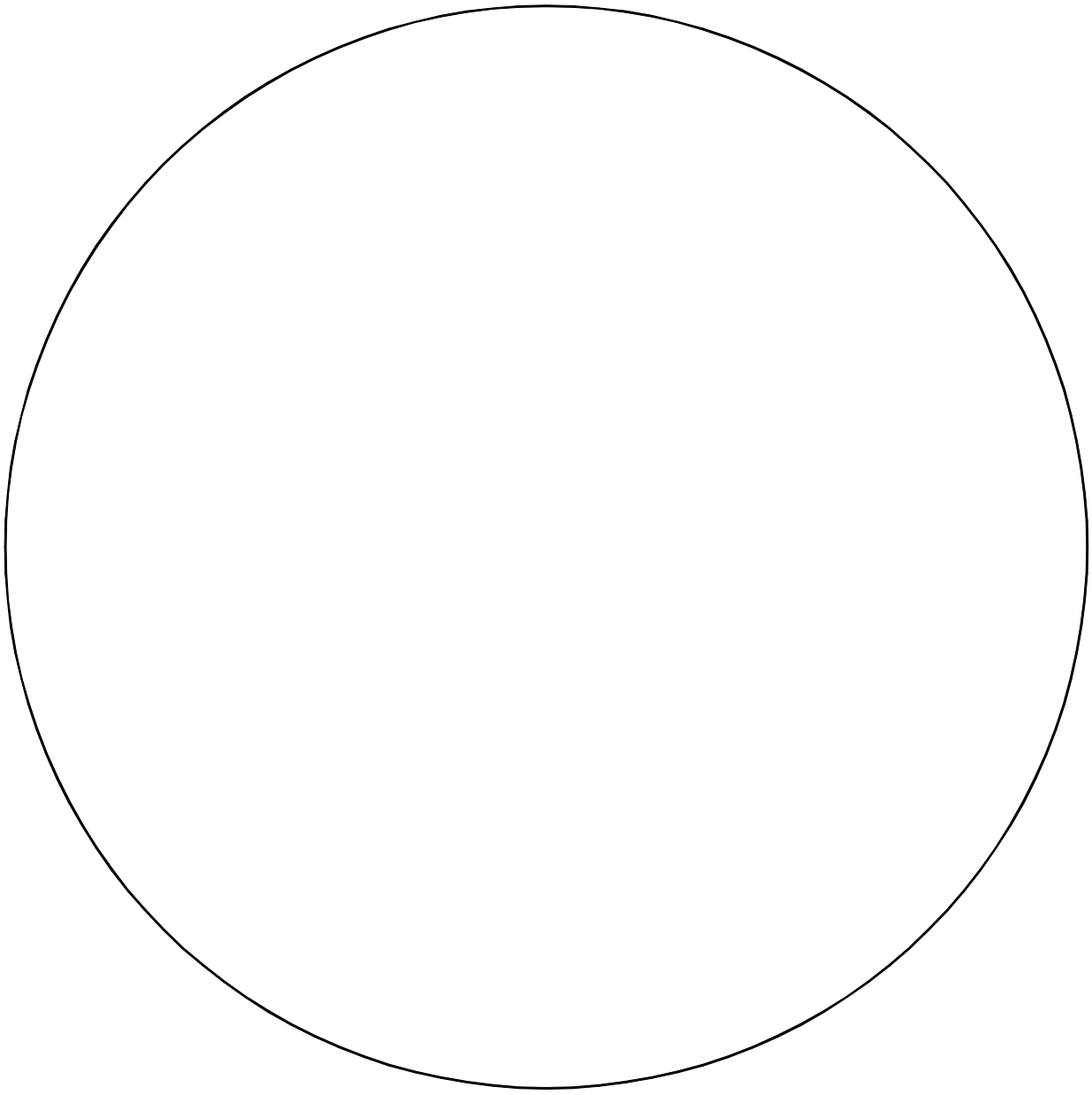


FIGURE 4.7.1-1. Display Format Blank

## 4.7.2 HUD FORMAT 1

### 4.7.2.1 Purpose, Operation, and Organization

The symbology displayed in Format 1 (see Figure 4.7.2–1 and Figure 4.7.2–2) has been designed to provide the pilot with the information required to accomplish precise and repeatable Orbiter approach and landings. Symbology sequencing is used to avoid display clutter and to provide an orderly progression from the TAEM flight phase to post landing rollout. The display integrates the real world scene with parametric information, thereby enhancing information transmittal. Both situation and guidance type information are displayed. Data source commonality between the dedicated displays and the HUD has been maintained where practical. When data sources differ, the source change has been made to acquire data for the HUD at a higher update rate than used by the dedicated displays.

(1) BORESIGHT.

The boresight symbol's position in the display depicts an extension of the Orbiter's X axis. The horizontal bar of the symbol remains parallel to and lies on the Orbiter's Y axis at all times. The symbol is positioned 5° above the center of the HUD field of view (FOV).

(2) RUNWAY.

The runway symbol shown in Figure 4.7.2–1 consists of a four sided representation of a 300 foot wide and no greater than 15,000 feet long runway with a line along the centerline starting at the Steep Glideslope intercept point and ending at the Shallow Glideslope intercept point. The ends of this line have aimpoint circles on them. The runway symbol is a 1:1 representation and appears as soon as any part of the runway is in the FOV. A partial as well as a total runway may be displayed. The symbol is displayed prior to weight on wheels (WOW).

(3) UPPER RIGHT WINDOWS AND SITUATION LINE.

This symbol is composed of two 5 character windows in the upper right corner of the display and a 29 character window at the bottom of the FOV in the center. The upper right windows use large characters while the lower situation line uses small characters. The messages in the upper right windows are left justified. All messages on the Sit Line have a blank space in between them and are left justified. The messages in the upper right windows are used to display Flight Control cues or failures. The Sit Line is used to display items which persist for more than 5 seconds. The Upper Right Windows and Sit Line are blanked at WOW.

(4) DIGITAL ALTITUDE.

This symbol displays altitude to main wheels with respect to the runway in feet. Digits are left justified with no leading zeros or blanks and are of the large character size. A large "R" is displayed one character space to the right of the last digit when the altitude source is radar. Symbol is at a fixed distance from the Flight Director/Velocity Vector and moves with it throughout the FOV. Symbol is driven by Radar Altitude unless unavailable. Symbol replaces Altitude Tape if altitude to the wheels is unavailable but Radar Altitude is available, no matter what the Altitude is. Numbers are scaled as follows:

| | | | | |
|---|---|---|---|---|
| a | Altitude | > | 1000 AND ≤ 32767 ft. | :truncated to two hundreds of feet. |
| b | Altitude | > | 400 AND ≤ 1000 ft. | :truncated to hundreds of feet. |
| c | Altitude | > | 50 AND ≤ 400 ft. | :truncated to tens of feet. |
| d | Altitude | ≥ | 0 AND ≤ 50 ft. | :truncated to feet. |

(5) GLIDESLOPE MONITOR.

This symbol shows the error between the guidance computed reference trajectory altitude and actual altitude. The pointer is referenced to, and moves vertically along the right side of the altitude tape. Symbol is displayed prior to WOW.

(6) ALTITUDE TAPE.

This symbol displays the current Orbiter wheel altitude. The tape is fixed in length and is symmetrical about the HUD horizontal centerline. The tape is made up of alternating numeric strings and tic marks. The numeric strings correspond to altitude values and appear at 10,000 foot increments above 100,000 feet, 1000 foot increments between 1000 and 100,000 feet, 100 foot increments between 100 and 500 feet, and 50 foot increments between 0 and 50 feet. This numeric string represents 1000's of feet (i.e., the last three integers of altitude are not displayed) above 1000 feet. Numerals from 1000 to 100,000 feet have the letter K at every 5000 foot increment. Numerals from 100,000 to 400,000 feet have the letter K at every 50,000 foot increment. A tic mark is centered vertically between adjacent numeric strings except between 0 and 50 where there are four equally spaced tic marks between numeric strings. The displacement between numeric string and tic mark is linear above 500 feet. Below 500 feet the displacement between numeric string and tic mark is non–linear. The altitude pointer consists of a 4 x 9 mr solid rectangle fixed at the vertical center of the tape. The tape range is 0 to 400,000 feet. Radar altitude is represented, when acquired, by a horizontal line extending to the right of the tape and labeled with the large character R. The symbol is displayed prior to WOW and blanked at WOW.

(7) FLIGHT DIRECTOR/VELOCITY VECTOR.

The Flight Director is a square shaped stationary symbol until I_PHASE = 3 when it is automatically uncaged (moved) in the pitch axis. The symbol can then be uncaged/caged in the horizontal axis through a GPC parameter controlled by the crew using the Attitude Reference switch. When uncaged in both axes, the symbol becomes a Velocity Vector, is circular, and is the full representation of the vehicle's flight path. A five second fader is used during uncaging in either axis. This fader causes the movement of the symbol to be gradual as it moves from the caged to uncaged position. Prior to P_MODE = 3, a filter is used to eliminate symbol error. A pitch rate bias is applied to the symbol to influence initial movement of the symbol and then washed out as the reaction between the pitch ladder and the symbol is stabilized.

(8) ATTITUDE REFERENCE.

This symbol displays the current Orbiter pitch angle. Attitude reference lines are displayed relative to the horizon line which is a double width line. The entire symbol is rotated about the center of the HUD field of view the same number of degrees as the Orbiter roll angle, where a positive roll angle will cause the symbol to rotate in a counter–clockwise direction. The symbol is then adjusted so the correct pitch angle is read from the boresight. Each reference line is labeled with a numeric string representing that lines absolute pitch value. The reference lines

range from +180 to –180 degrees with full wrap–around. The symbol is removed from the display when WONG occurs.

(9) SPEEDBRAKE SCALE.

This symbol displays the Orbiter speedbrake actual and commanded positions. The scale is fixed length and has five equally spaced tic marks that are centered vertically about the scale. Speed brake position is represented by a triangular pointer above the scale. Speed brake commanded position is represented by an arrow pointer below the scale. Before touchdown, the speed brake position pointer should flash while the speed brake flag is true. The symbol is displayed during approach and landing.

(10) LOWER LEFT WINDOW.

The Lower Left Window symbol is used to display the guidance mode descriptor until touchdown. Characters are of large size and left justified. The window is to the left and down from the center of the FOV. The symbol is displayed prior to WOW.

(11) OGS/FLARE REFERENCES.

This symbol provides flight path angle reference information after prefinal TAEM for Outer Glideslope (OGS) acquisition and tracking and for the preflare to final flare initiation. The symbol consists of two pairs of opposed triangle indices. They are roll resolved in the same manner as the pitch ladder. The two pairs are free to move vertically, but are laterally tied to the velocity vector when no roll exists. The OGS indices are blanked when the Flare indices cross them.

(12) NORMAL ACCELERATION.

This symbol shows normal acceleration (Nz) of the Orbiter. Range displayed is 9.9 G's to –5.1 G's. The symbol is at a fixed distance from the Flight Director/Velocity Vector. Digits are right justified followed by a small "G" and for values less than one, the leading zero is shown. Values less than zero have a negative sign displayed in front of them. A decimal point separates the whole part from the fractional part. The symbol is displayed prior to I_PHASE equals 3.

(13) AIRSPEED TAPE.

This symbol displays Orbiter equivalent airspeed in the form of a tape. The tape is fixed length and is symmetrical about the HUD horizontal centerline. The tape is made up of alternating numeric strings and tic marks. The numeric strings correspond to airspeed values and appear in 10 knot increments. A tic mark is centered vertically between adjacent numeric strings. The airspeed pointer consists of a 4 x 9 solid rectangle fixed at the vertical center of the tape. The tape range is 0 to 500 knots. The tape is removed from the display when WOW occurs.

(14) DIGITAL AIRSPEED.

This symbol displays Orbiter equivalent airspeed in the form of numeric digits. The digits are right justified with no leading zeros or blanks and are of the larger character size. The symbol is at a fixed distance from the velocity vector and moves with it throughout the FOV. The range of values displayed is 0 to 500 knots in increments of one. After WOW it moves above

the upper left corner of the Boresight. When WONG has occurred, 'G' followed by a space goes in front of the digits to show the change to groundspeed. Before WOW, the symbol is displayed when altitude is less than or equal to 100 feet or Declutter = 2, EAS is available, and the Flight Director/Velocity Vector is displayed.

(15) GUIDANCE.

This symbol is diamond shaped and depicts the directions to which the Orbiter must be flown to satisfy the GPC derived guidance solution. The symbol is constrained to remain in the total field of view and when limited will flash. Symbol is displayed prior to WOW.

(16) UPPER LEFT WINDOW.

The Upper Left Window is used to display gear oriented cues. Characters are left justified and has a maximum of 5 characters (larger of the two sizes). The window is above center FOV and to the left of the vertical center.

(17) DECELERATION RATE.

This symbol displays actual and commanded brake deceleration. The scale is fixed length, with five equally spaced tic marks centered horizontally about the scale. Actual brake deceleration is represented by a triangular pointer on the left side of the scale. Commanded brake deceleration is represented by an arrow pointer on the right side of the scale. The symbol is only displayed when WOW occurs.

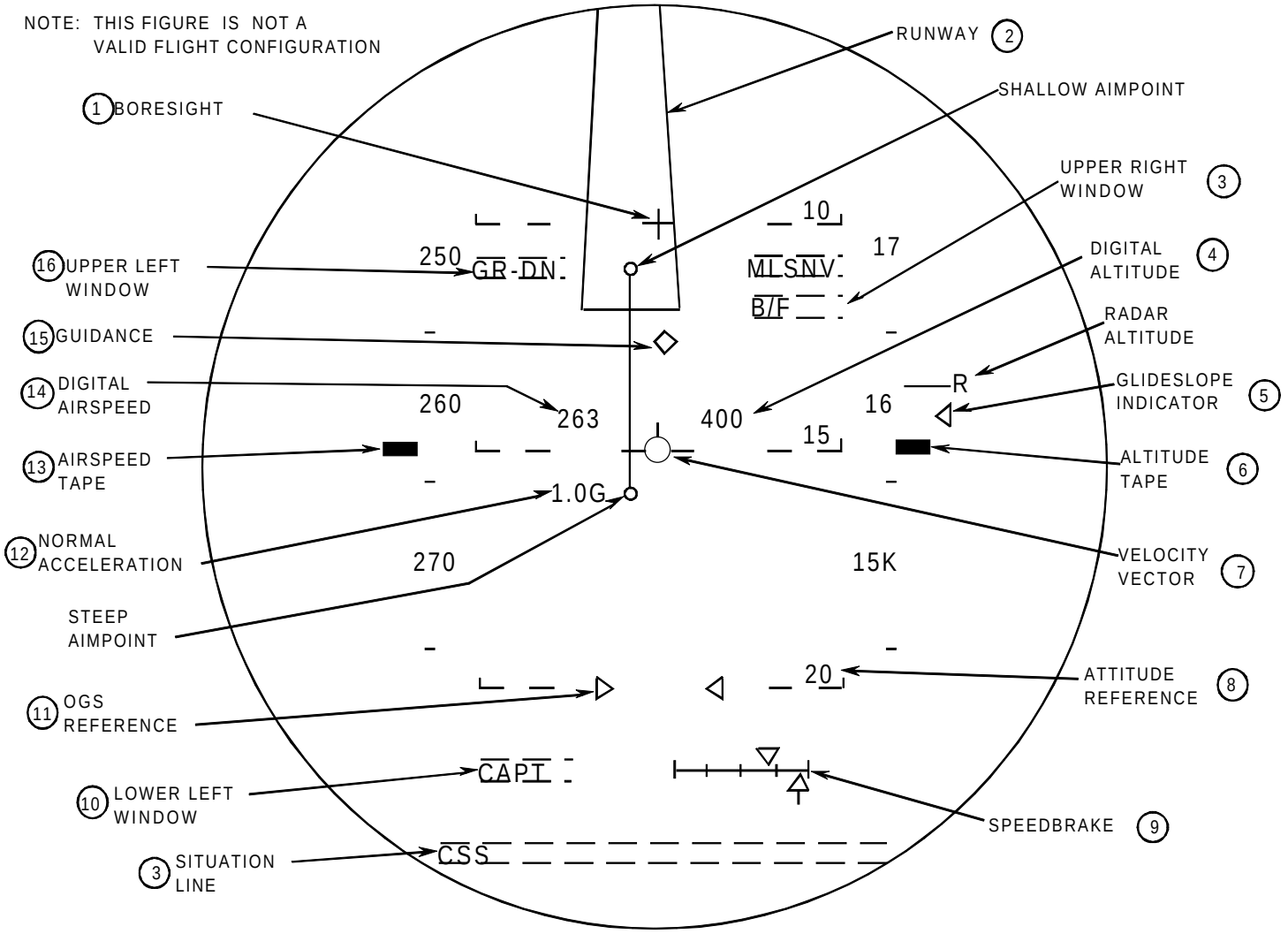



FIGURE 4.7.2-1. Display Format 1 Pre-WOW

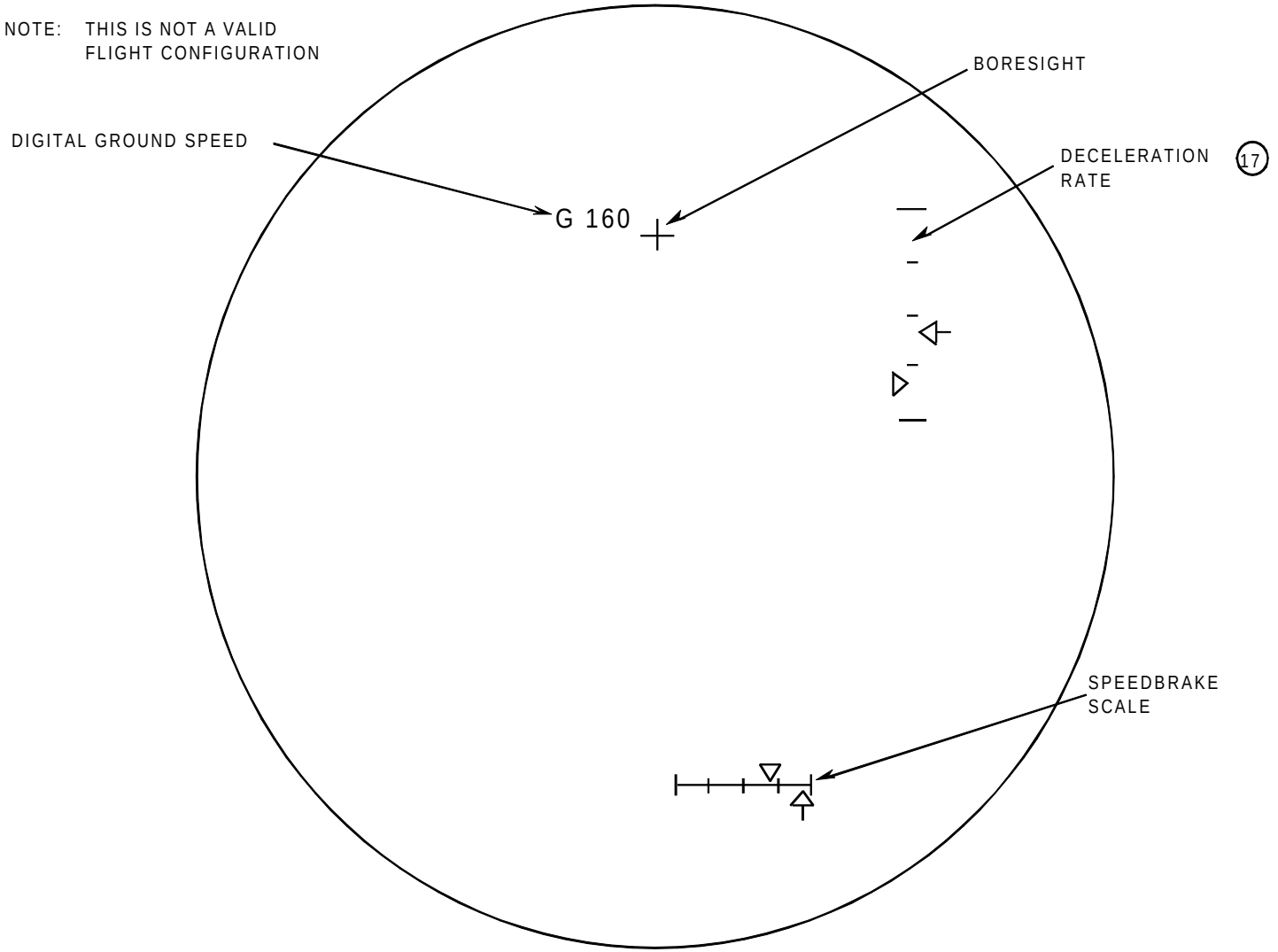



FIGURE 4.7.2-2. Display Format 1 After WOW

### 4.7.3 HUD Format 2 (DELETED)

### 4.7.4 HUD Format 3 (TBD)

Format 3 is undefined and only displays a “FORMAT 3” in the upper region of the display. Refer to Figure 4.7.4–1.

### 4.7.5 HUD Format 4 (TBD)

Format 4 is undefined and only displays a “FORMAT 4” in the upper region of the display. Refer to Figure 4.7.5–1.

### 4.7.6 HUD Format 5 (TBD)

Format 5 is undefined and only displays a “FORMAT 5” in the upper region of the display. Refer to Figure 4.7.6–1.

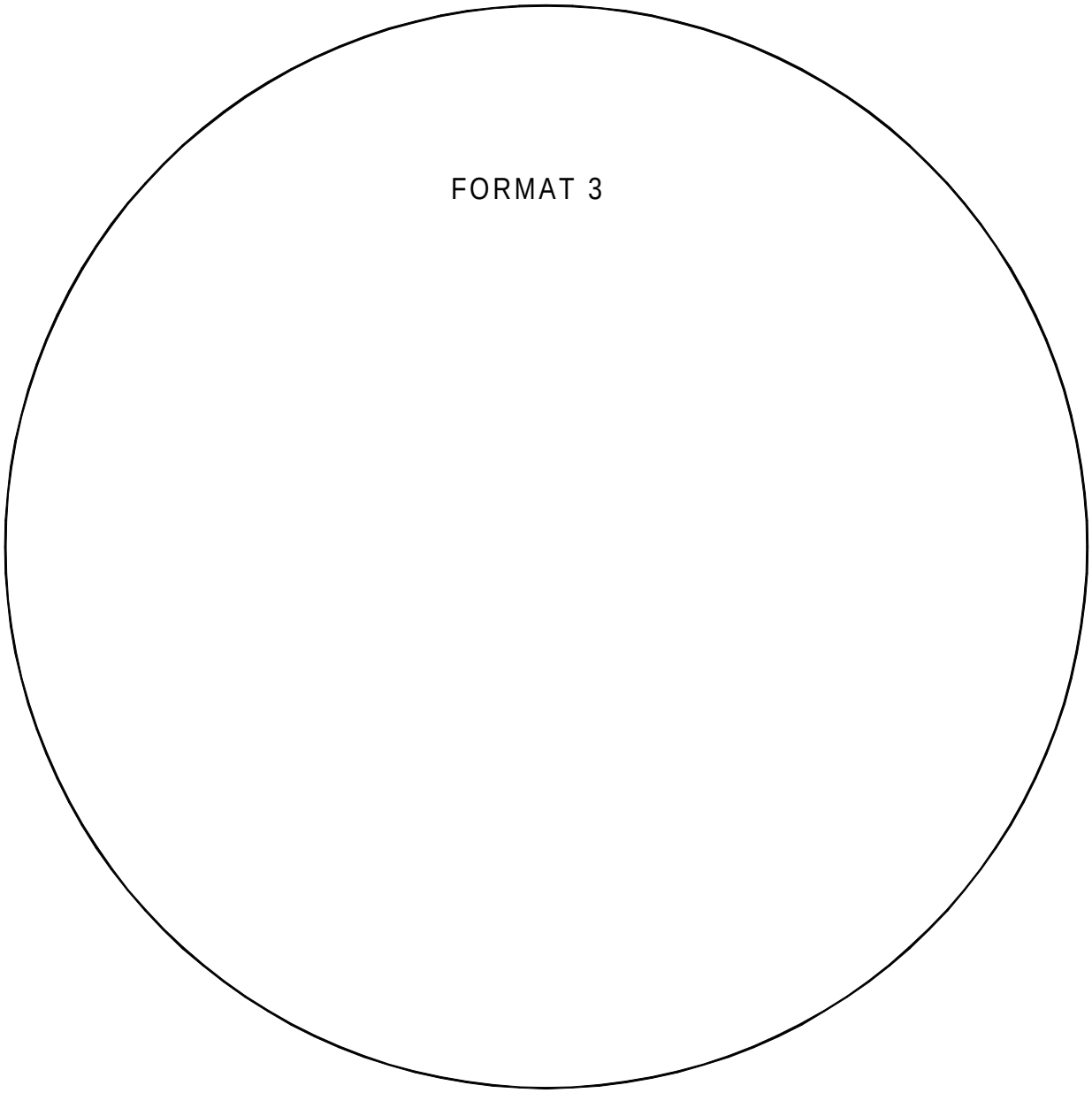



FIGURE 4.7.4-1. Format 3 Display

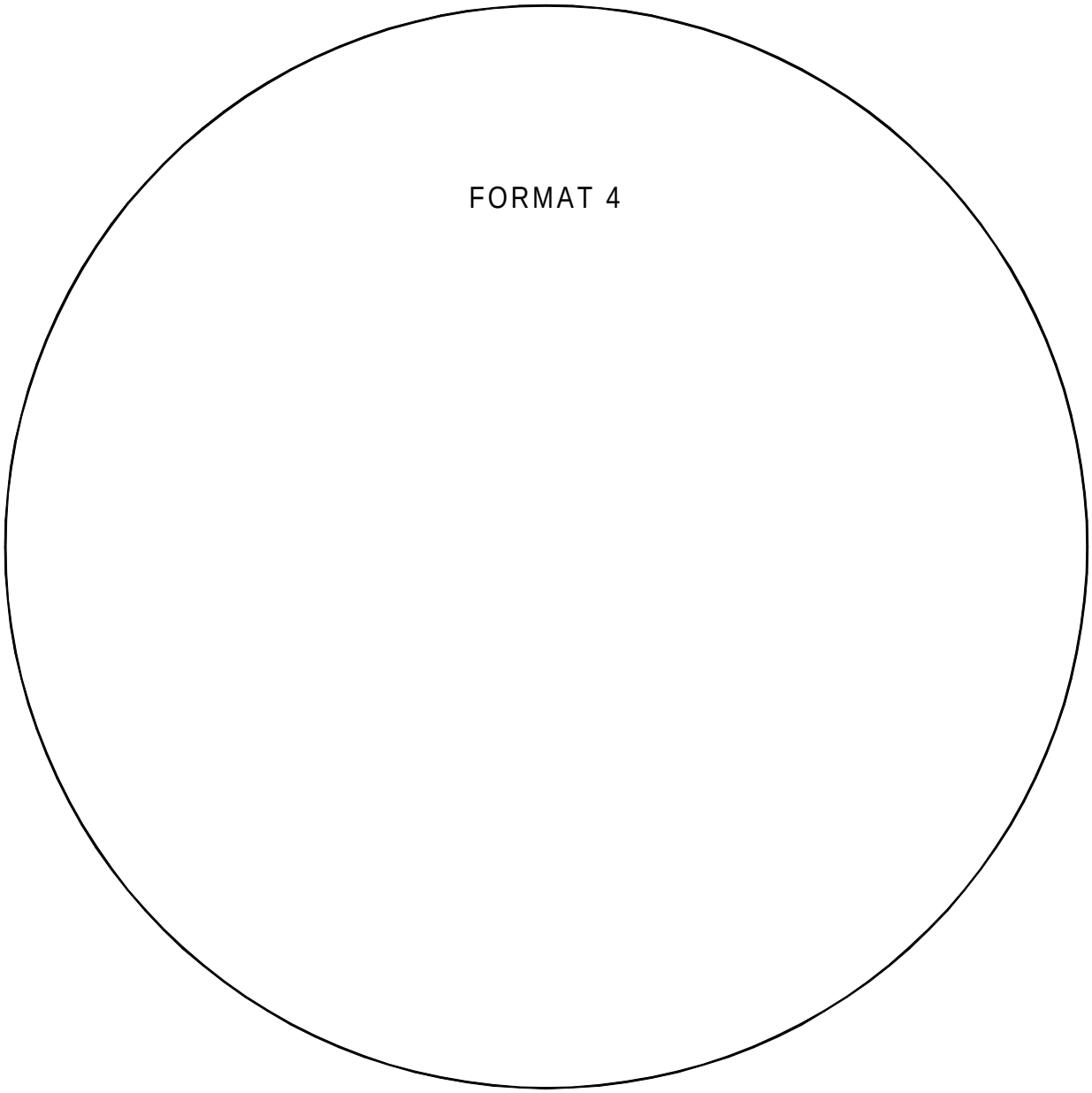



FIGURE 4.7.5-1. Format 4 Display

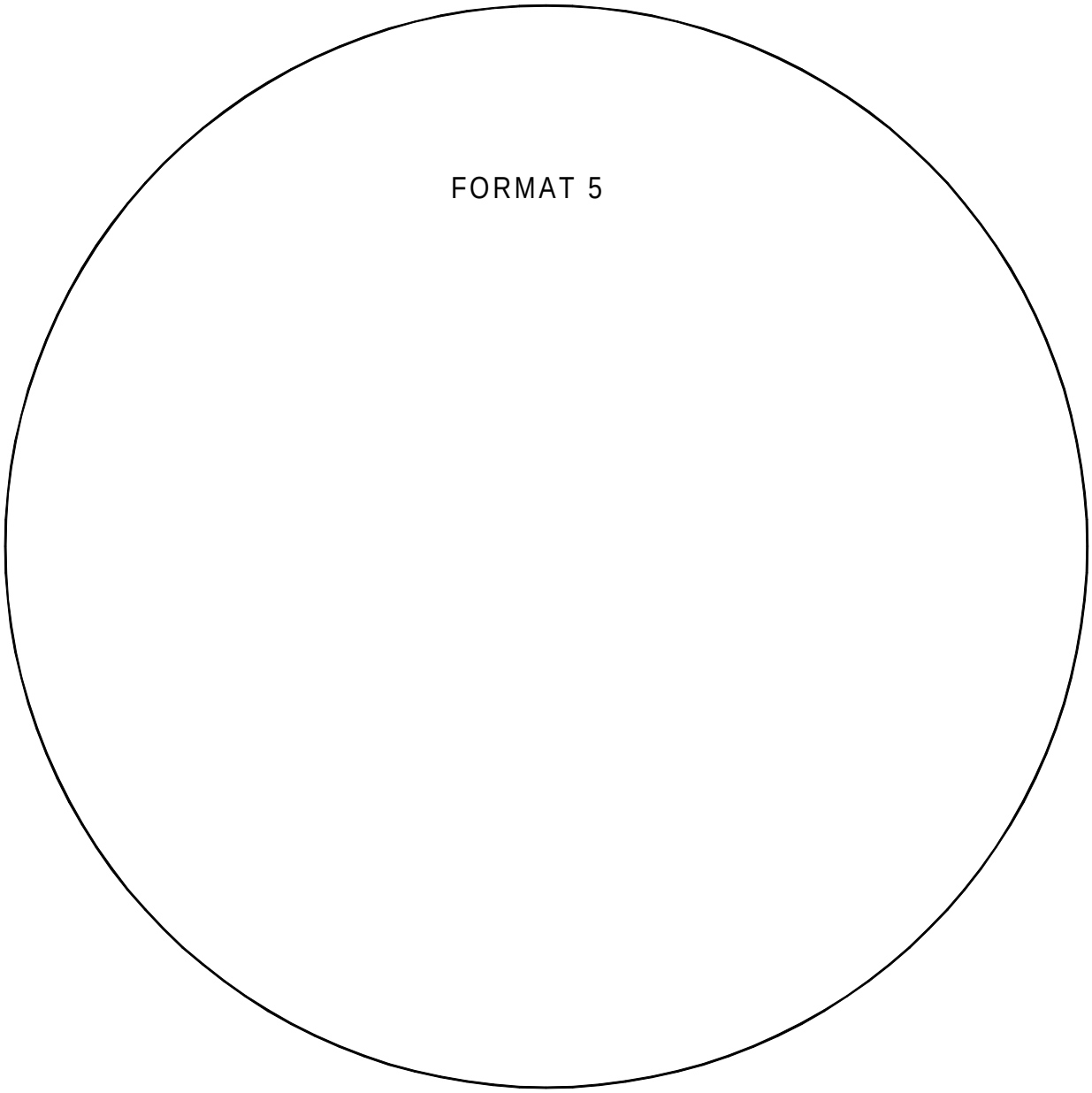



FIGURE 4.7.6-1. Format 5 Display

### 4.7.7 HUD Test Format

#### 4.7.7.1 Purpose, Operation, and Organization

The purpose of the Test Mode is to provide a means for an overall check of the HUD system integrity. This is accomplished by the display of simple, dynamic symbology, moving in a continuous fashion, and in parallel by continued processing of input data and Built In Test (BIT). The entire test takes approximately 5 seconds.

The test symbology has been designed to exercise all PDU electronics required for the display of current Normal Mode symbology. To the extent that an error affects the symbology, a pilot can detect erratic display motion throughout the dynamic display cycle. Should a parity or other BIT error occur, the display will become and remain static and a full screen X will appear over it at the moment of error detection until the Test Mode is exited. The termination indicator, "COMPLETE", will not appear in this case. At the end of the test, the termination indicator appears and the display becomes static. Until the mode is exited, the display will remain static giving the pilot an opportunity to inspect the positional relationships of the symbology for inaccuracies.

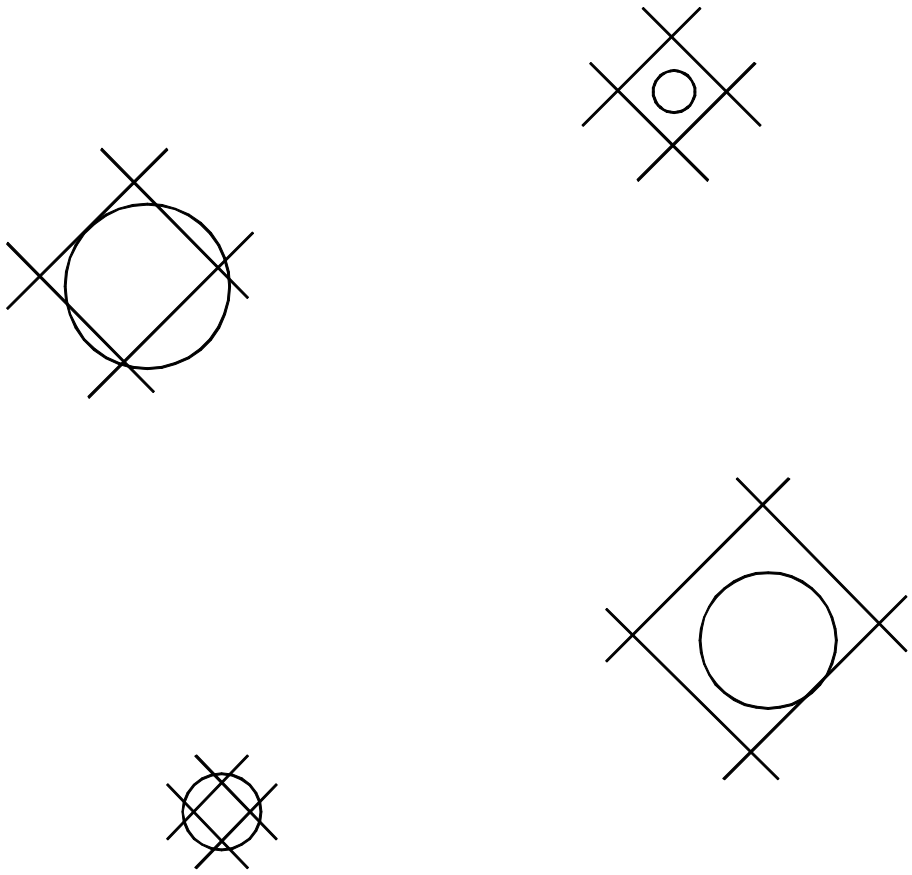
The Test Mode may be entered by activating the 3–position Mode Select switch. The lower, momentary, position selects the Declutter Mode; the middle on position selects the Normal Mode; and, the upper on, position selects the Test Mode. In order to perform the entire test, the Mode Select switch must remain in the upper position until the termination indicator, "COMPLETE" appears.

Figure 4.7.7–1 shows the beginning of the Test Mode display. The symbology contained in the display consists of 4 circles and 4 boxes with overlapping sides.

Figure 4.7.7–2 represents the symbology after about 0.8333 seconds. The boxes immediately begin to break up with two sides of each symbol moving together and maintaining their orthogonal relationship in a circular, counter–clockwise direction. The other two sides move similarly, but in a clockwise direction. The circles remain stationary.

The sides of the boxes continue moving until they have traveled 180° from their initial position. Figure 4.7.7–3 represents the final symbology. Boxes have reformed, enclosing the circles opposite their initial position circles. A brightup window surrounds each symbol. Its effect is to cut off the overlapping portion of each side of the boxes, thus, forming sides corners, but due to hardware limitations and differences a portion of the overlapping may remain on any or all of the corners. This may even cause a corner to be missing. This does not effect the performance or validity of the Test Format. The word "COMPLETE" appears and is positioned so that the lower left hand corner of the "C" is at coordinates (0,0), the CFOV. The dash/gap rectangle around it is drawn so that its lower left corner is at coordinates (–5,–5), the COR. The characters forming "COMPLETE" will be the larger size and centered in the dash/gap rectangle.

TEST FORMAT



NOTE: CENTER OF ROTATION (COR) IS LOCATED AT (-5, -5)

FIGURE 4.7.7-1. Display Format 6

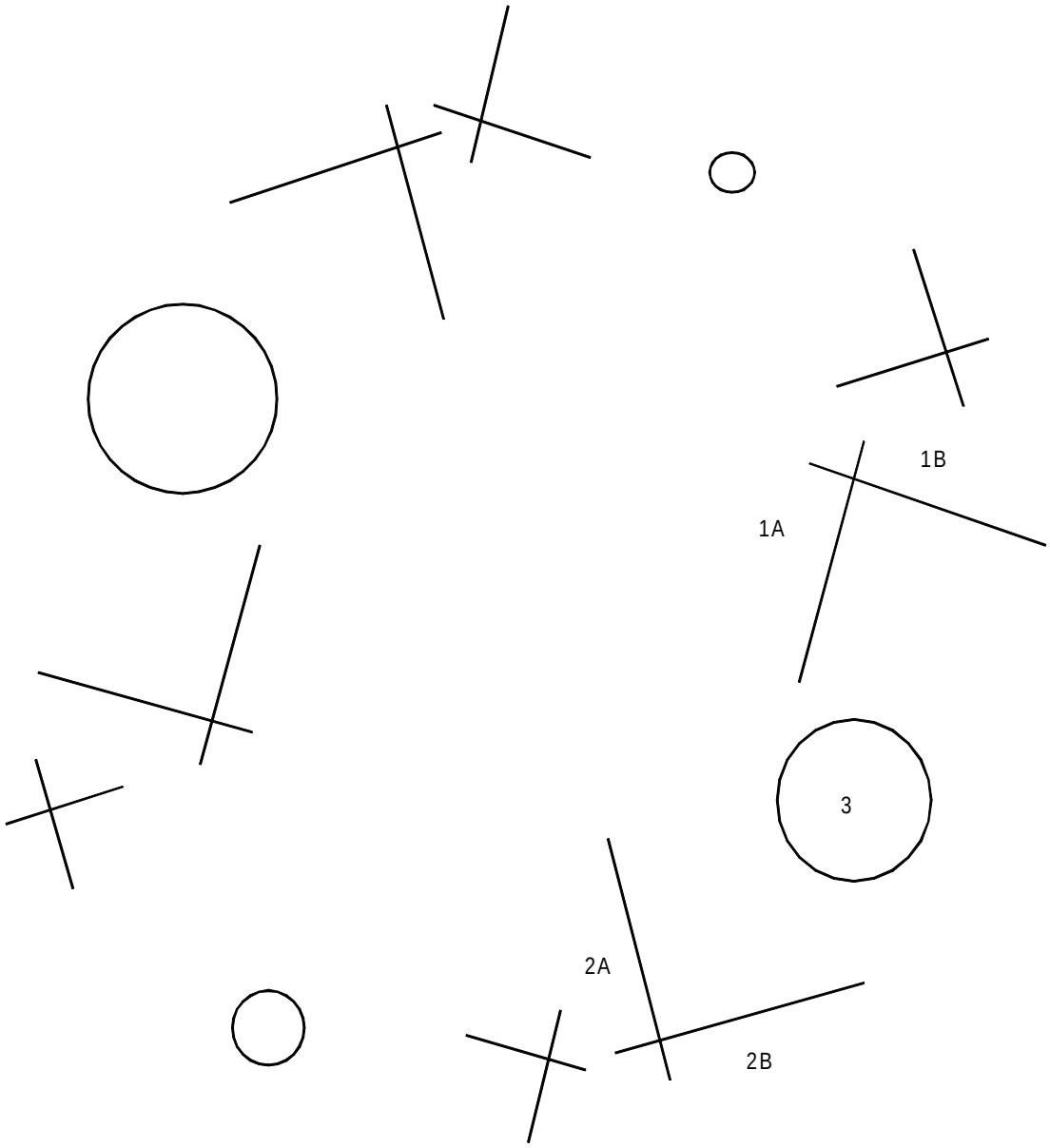
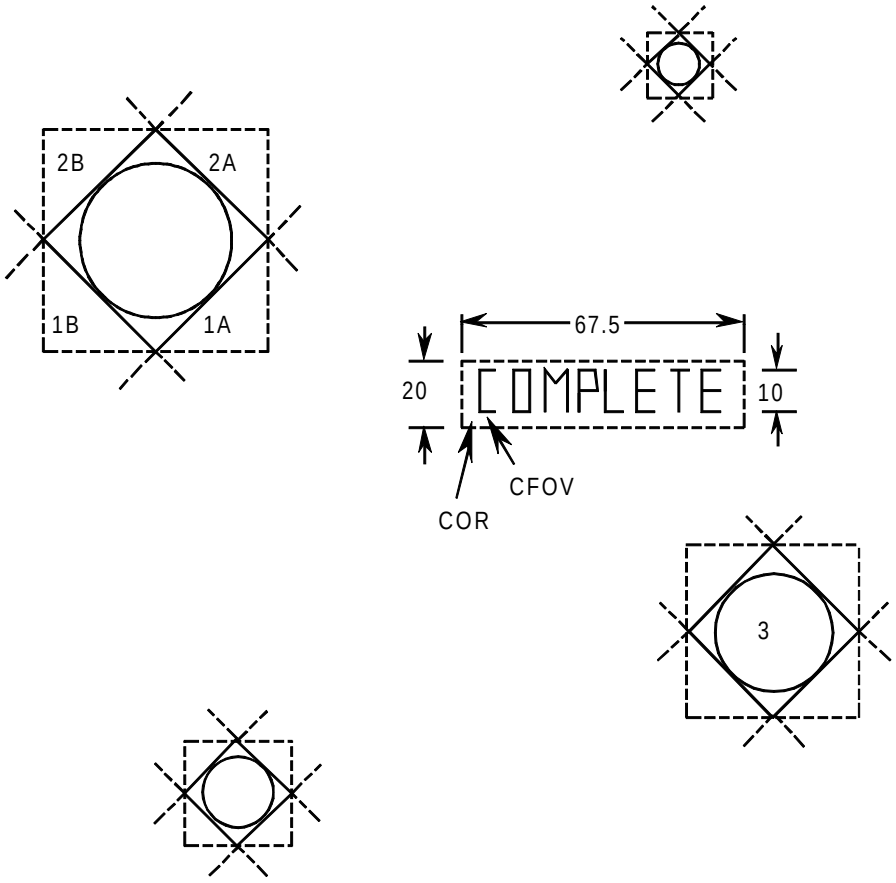



FIGURE 4.7.7-2. Display Format 6 (Cont)

COMPLETE STAGE

5 SECONDS AFTER INITIATION




NOTE: CENTER FIELD OF VIEW (CFOV) IS LOCATED AT (0, 0)

FIGURE 4.7.7-3. Display Format 6 (Cont)

## 4.7.8 VEHICLE UTILITY (VU) OPS 8

### 4.7.8.1 Purpose, Operation, and Organization

An OPS8 on–orbit checkout capability has been provided to drive the display to predefined points. This checkout is accomplished simultaneously with the Dedicated Display Checkout and the requirements to support it are in the Dedicated Display Checkout Spec (4.5.1). When initiated, the checkout function will cyclically output specified test values to the dedicated display unit (DDU), to the head up display electronics (HUDE), and to the surface position indicator (SPI). Selected symbology on the HUD will be forced up in the low test to confirm system operation (refer to Figure 4.7.8–1 for OPS 8 Low symbology). The dedicated display checkout function outputs common data to the DDU and the HUDE which includes the ADI, AVVI, AMI, HSI, and the HUD.

## 4.7.9 VEHICLE UTILITY (VU) OPS 9

### 4.7.9.1 Purpose, Operation and Organization

An OPS9 ground checkout capability has been provided to drive the display to predefined points. This checkout is accomplished simultaneously with the Dedicated Display Checkout and requirements to support it are in the Dedicated Display Checkout Spec (4.6.2). When initiated, the checkout function will cyclically output specified test values to the dedicated display unit (DDU), to the head up display electronics (HUDE), and to the surface position indicator (SPI). Selected symbology on the HUD will be forced up in the low test to confirm system operation (refer to Figure 4.7.9–1 for OPS9 Low symbology). The dedicated display checkout function outputs common data to the DDU and the HUDE which includes the ADI, AVVI, AMI, HSI, and the HUD.

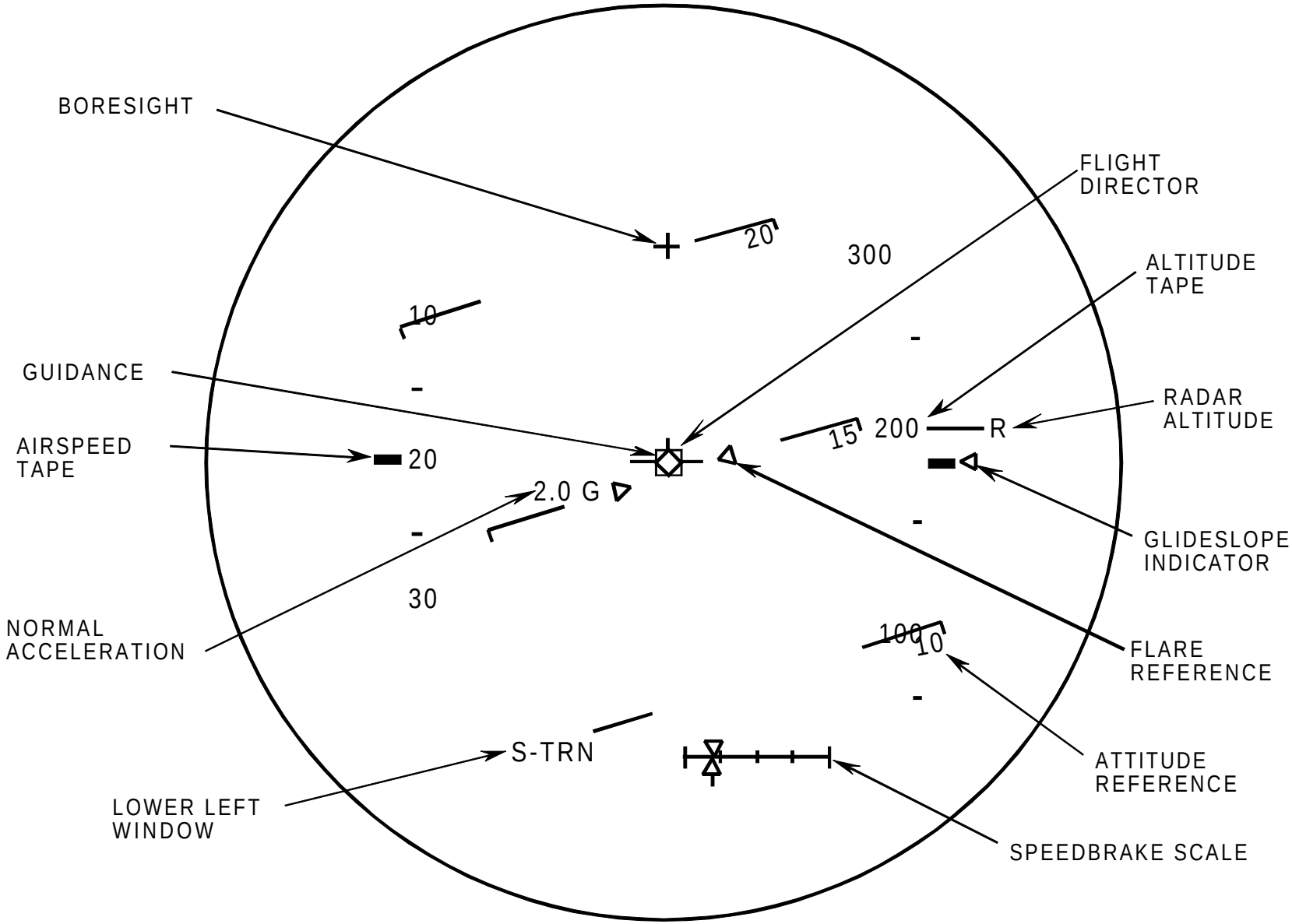



FIGURE 4.7.8-1. VU OPS 8 LOW

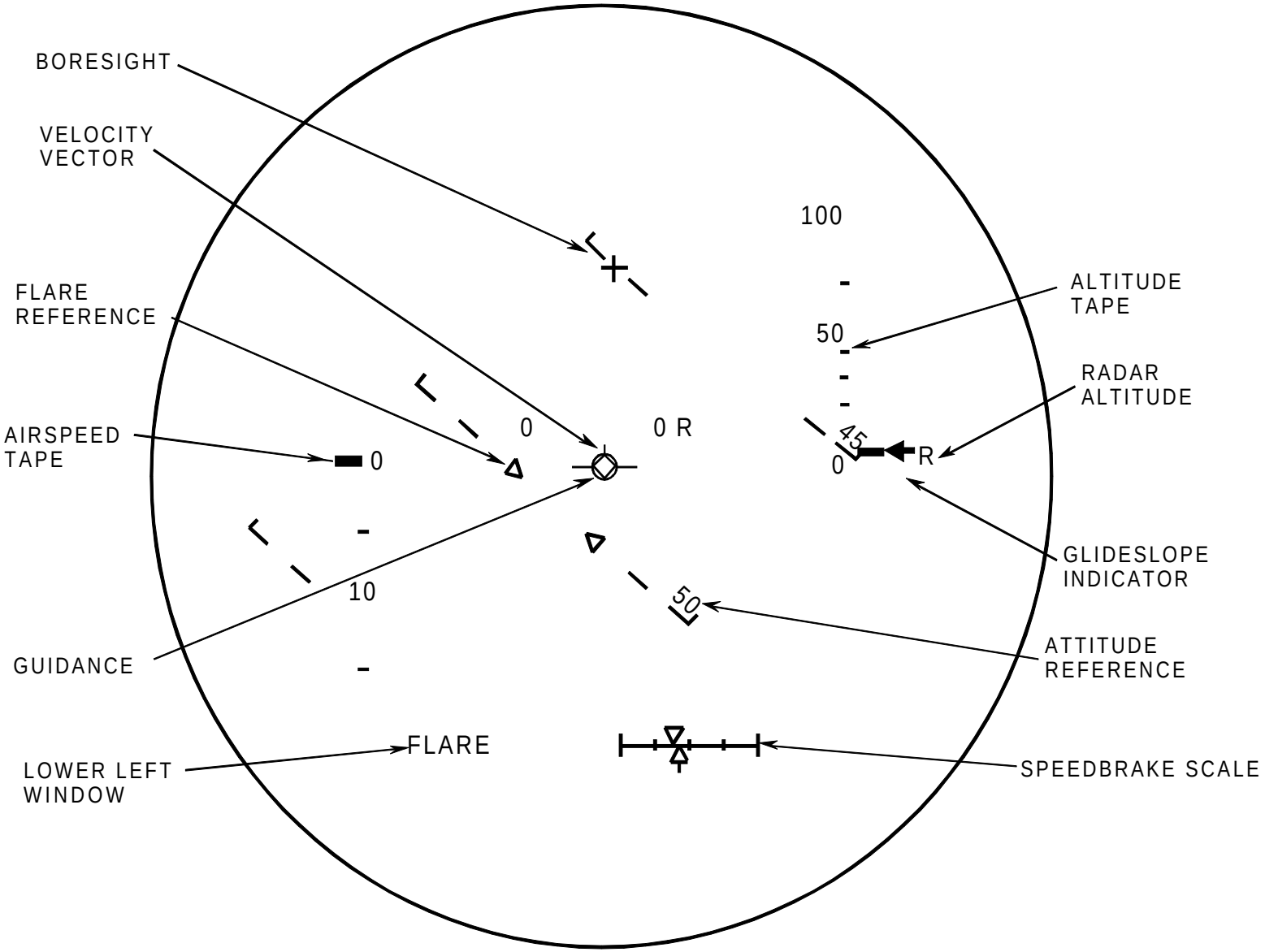



FIGURE 4.7.9-1. VU OPS 9 Low

## 4.7.10 COMMON SYMBOL/ELEMENT DEFINITIONS AND ALGORITHMS

### 4.7.10.1 Purpose, Operation and Organization

This section describes the various symbols and elements used in the flight displays as well as defines the algorithms used to drive the symbols, elements, and parameters on the Head Up Display.

### 4.7.10.2 DISPLAY SMOOTHING.

The HUDE software incorporates provisions for display smoothing so that scale readings and symbols move from one position to another in a continuous manner. The amount of smoothing required is based on the parameters recomputation rates and expected rates of change.

### 4.7.10.3 CORRECTOR/PREDICTOR EXTRAPOLATION.

The Corrector/Predictor algorithm extrapolates lower rate input data to provide parameter data to the display 12.5 times a second. The algorithm determines the average slope for the last four data points and the average magnitude of the last two data points. The algorithm then makes a prediction using the average slope and the average magnitude. A correction term, calculated from the last prediction, is then added to current prediction to obtain the display value.

At Power–On all variables are initialized to zero. On the initial transmission of data from the GPC to HUD, the following initialization is performed.

I = Extrapolation counter
LAST_VAL = INPUT_VAL
AV_YCOOR = INPUT_VAL
CFILT = PFS_DATA_RECOMP_RATE/FOH_RATE

Algorithm:

IF INPUT_VAL < > LAST_VAL OR I = (1/CFILT)
THEN I = 1

PREDCTN = AV_YCOOR + AV_SLOPE
SEC_LAST_VAL = LAST_VAL
LAST_VAL = INPUT_VAL
ERROR = LAST_VAL – PREDCTN
DELTA_VAL = LAST_VAL – SEC_LAST_VAL
IF parameter is a Circular Variable
THEN IF ERROR > 180 THEN ERROR = ERROR – 360
IF ERROR < –180 THEN ERROR = ERROR + 360
IF DELTA_VAL > 180 THEN DELTA_VAL = DELTA_VAL – 360
IF DELTA_VAL < –180 THEN DELTA_VAL = DELTA_VAL + 360
NO ELSE
THETA3 = THETA2
THETA2 = THETA1
THETA1 = Arctan(DELTA_VAL)
SIGMA = (THETA1 + THETA2 + THETA3)/3
INTRM_SLOPE = Tan(SIGMA) * CFILT

```
AV_SLOPE = INTRM_SLOPE
AV_YCOOR = LAST_VAL + SEC_LAST_VAL
IF Parameter is a Circular Variable
THEN IF (Abs(LAST_VAL + SEC_LAST_VAL) > 180)
        THEN AV_YCOOR = AV_YCOOR + 360
                AV_YCOOR = AV_YCOOR/2
                DISPLAY_VAL = INPUT_VAL
        NO ELSE
ELSE I = I + 1
PREDCTN = AV_YCOOR + AV_SLOPE
AV_SLOPE = AV_SLOPE + INTRM_SLOPE
DISPLAY_VAL = PREDCTN + ERROR
If Parameter is a Circular Variable
THEN DISPLAY_VAL = Mod(DISPLAY_VAL, 360)
NO ELSE
```

The following input parameters will be extrapolated using the above algorithm:

| | |
|---|---|
| CR | (Linear) |
| DR | (Linear) |
| HR | (Linear) |
| RALT | (Linear) |
| XDOT | (Linear) |
| YDOT | (Linear) |
| ZDOT | (Linear) |
| PITCHERR | (Linear) |
| ROLLERR | (Linear) |
| HEADING | (Circular) |

Note: Since the display has a refresh rate of 50 HZ (i.e., 20 millisecond frame time), the FOH will only be run every fourth frame.

### 4.7.10.4 EAS SMOOTHER.

EAS is recomputed by the GPC at 1.04 Hz. The HUDE will compute the delta between the last two GPC recomputed values and divide that by 48 (50 Hz HUDE Cycle/1.04 Hz GPC rate). This amount will be incrementally added to the old value of EAS every frame to obtain a 50 Hz update rate to EAS. The output values will be 960 milliseconds late since the old and new GPC values are needed to compute the display value.

### 4.7.10.5 ALTITUDE ALGORITHM.

The following algorithm is used to calculate which altitude source will be used for ALT WHEELS.

Algorithm Constants:

| | | |
|---|---|---|
| XNBWH | = 62.784 | X distance from NAV base to wheel |
| ZNBWH | = 22.405 | Z distance from NAV base to wheels |
| DELTA_TIME | = .08 | Cycle time of Z velocity (ZDOT_FOH) |
| MINALT | = 20000 | Minimum altitude for using H |

Algorithm:

IF (H is available AND H > MINALT) OR HR is unavailable

THEN IF H > 20000

THEN Smooth as follows:
H is recomputed by the GPC at 6.25 Hz. The HUDE computes the delta between the last two GPC recomputed values and divides the results by 8 (50 Hz HUDE cycle/6.25 Hz GPC rate). This amount is then incrementally added to the old value of H each frame to obtain a 50 Hz update rate for H. The displayed values are 160 milliseconds late since both the old and new GPC values are needed to compute the displayed value.
ELSE Display Value = H

ELSE IF HR < > HR_OLD THEN TEMP = HR
TEMP = HR_OLD + (ZDOT_FOH * DELTA_TIME)

Adjust Z Position by the distance the NAV base is from the wheels.
ALT_WHEELS = –TEMP –((XNBWH * PTCHSIN) + (ZNBWH * PTCHOS))
HR_OLD = HR

Note: ZDOT_FOH is Z Velocity (ZDOT) after being updated to 12.5 Hz. HR_OLD is the last HR value.

### 4.7.10.6 DATA VALIDATION.

Each incoming word must satisfy the following validation criteria before the HUD responds to the command or initiates internal processing of the data contained in the word:

a. The word begins with a valid sync field.
b. Each bit is in a valid Manchester II format.
c. Each word contains exactly 28 bits (including sync and parity bits).
d. The total number of “1’s” contained in bits 4 through 28 is an odd number.
e. The HUD MIA address bits in the incoming word agrees exactly with the HUDE address as programmed by means of external jumper wires.
f. The gap between a command word and the first control word, and between subsequent words of the same message shall not exceed 12 microseconds.

Each incoming data word must also satisfy the following additional criteria:

g. A bit pattern check was made to verify that bits 25, 26 and 27 contain a 101 bit pattern.
h. Word 2 and subsequent of each message is considered to be valid only when the corresponding control bit in the data validity word has been sensed in the “true” or “1” state.

Should any incoming word fail to satisfy the validation criteria (a) through (f), then the HUD will not accept any subsequent incoming words until a new command word is received and validated. Should any incoming data word fail to satisfy the validation criteria of (g) or (h), the HUD will reject that word. When an incoming data word is invalid according to the criteria of (a) through (h), the HUD will retain the last valid word for that parameter and display that data even though the display warning flag may be set. Should the data validity word or the command word be invalid due to criteria of (a) through (f), the remaining words of that message will be considered invalid. If an invalid condition exists for a period of 500 plus or minus 100 milliseconds, the HUD will cause the fault indications specified in 4.7.10.7 to appear on the PDU. When valid data is received subsequent to display of a fault indication, the fault indication will be removed within 100 milliseconds.

### 4.7.10.7 FAULT INDICATION.

The following fault indications will be presented on the PDU for the conditions specified.

a. When an incoming command word, data validity or data word fails to meet the validation checks for the time period specified in 4.7.10.6, all scales and symbols that are derived from the data will flash for 2 plus 1, minus 0 seconds and then be removed from the display.
b. In the event of a self–test failure, including one due to the HUD unique test word, a full screen X will be superimposed on the data displayed.
c. When no data is received for 500 plus or minus 100 milliseconds and the normal mode is selected a full screen X only will be displayed.

### 4.7.10.8 DISPLAY FORMATS.

This section defines display requirements for the HUD formats. The following conventions are used:

a. All elements are located via coordinate pairs (X, Y), where X is horizontal and Y is vertical.
b. The center of the HUD Field–of–View (FOV) defines the origin of the coordinate system.
c. X is positive to the right of the Origin, and Y is positive above the Origin.
d. Display units are in milliradians.
e. All alphanumerics in figures will be as shown in Figure 4.7.10–0.
f. All lines specified as two milliradians wide may be constructed using two parallel lines 1 milliradian apart.
g. All symbology will be directly representative of incoming data.
h. All line widths are 1 milliradian plus 0.4, minus 0.2 milliradians unless otherwise specified.
i. All triangles specified as double width shall be drawn using two triangles, one 8 milliradians on a side inside one 9 milliradians on a side.
j. The standard set of HUD variable definitions for the display format algorithms will be as shown in Table 4.7.10–2

### 4.7.10.9 SYMBOLS AND SCALES.

Symbols and scales used in the display formats will be as shown in Figures 4.7.10–2 through 4.7.10–31. The HUD will be capable of constructing all symbols, indices, scale marking and alphanumerics using no more input data than that listed in Figure 4.7.10–0 and information prestored in the HUDE. Scales may be fixed with moving pointers or moving scales with fixed pointers or lubber lines. Scales may be linear, piecewise linear or non–linear. Non–linear scales will be defined by a quadratic equation.

### 4.7.10.10 SYMBOL ELEMENTS.

The HUD will be capable of generating at least 64 symbol elements. The symbol repertoire will be such that it is internally storable in memory that does not require reprogramming each time power is removed and reapplied to the HUD. The character set will include two sizes of characters of the font defined in Figure 4.7.10–0. Small size is 8 mr high by 4 mr wide with 2 mr spacing between characters. Large size is 10 mr high by 5 mr wide with 2.5 mr spacing between characters. The character set also contains a decimal point which is a 1 mr by 1 mr square. Spacing on each side of the decimal will be either 2 mr or 2.5 mr depending on whether small or large characters are being used. While some of the symbols may appear only part of the time, the entire set will be available when needed.

### 4.7.10.11 DECLUTTER.

Successive operations of the declutter switch serially remove and/or add display elements until only minimal symbology exists. The next operation of the switch will then reintroduce the existing format in its entirety and reinitialize the declutter level to zero. Upon format change, the declutter logic will be reset to zero. For specific declutter levels, refer to each Display Format section as the declutter levels are format dependent.

### 4.7.10.12 BLANK FORMAT.

The “Blank” format is not counted as one of the six formats of the HUD, but when requested, the HUDCP will blank the display on the PDU.

### 4.7.10.13 DISPLAY FORMAT 1.

Display Format 1 is the “Approach and Land” format and is defined by Figures 4.7.2–1 and 4.7.2–2 and Figures 4.7.10–1 through 4.7.10–31. The following subsections provide expanded discussion and algorithms in order to fully define the requirements. It is the Contractors responsibility, whatever algorithms are used, to implement these requirements in an optimum manner. Format 1 has three levels of declutter before WOW and two levels after WOW. At WOW the declutter level will be reset to zero. The breakdown of the different levels is shown below.

Declutter levels prior to WOW

| Level | Symbology Added | Symbology Blanked |
|---|---|---|
| 1 | | Runway symbol |
| 2 | Digital EAS and Altitude | Previous level plus Airspeed Tape, Altitude Tape, Glideslope Indicator and Attitude Scales. |
| 3 | | All symbology except boresight. |
| 4 = 0 (Reset) | Reintroduces full display and resets declutter level to 0. | |

Declutter levels after WOW

| Level | Symbology Blanked |
|---|---|
| 1 | Attitude Scales and Horizon. |
| 2 | Previous level plus Deceleration Rate, Digital Air/Groundspeed and Speedbrake. |

Note: Only the Boresight.

3 = 0 (Reset) Reintroduces “After WOW” display and resets declutter level to 0.

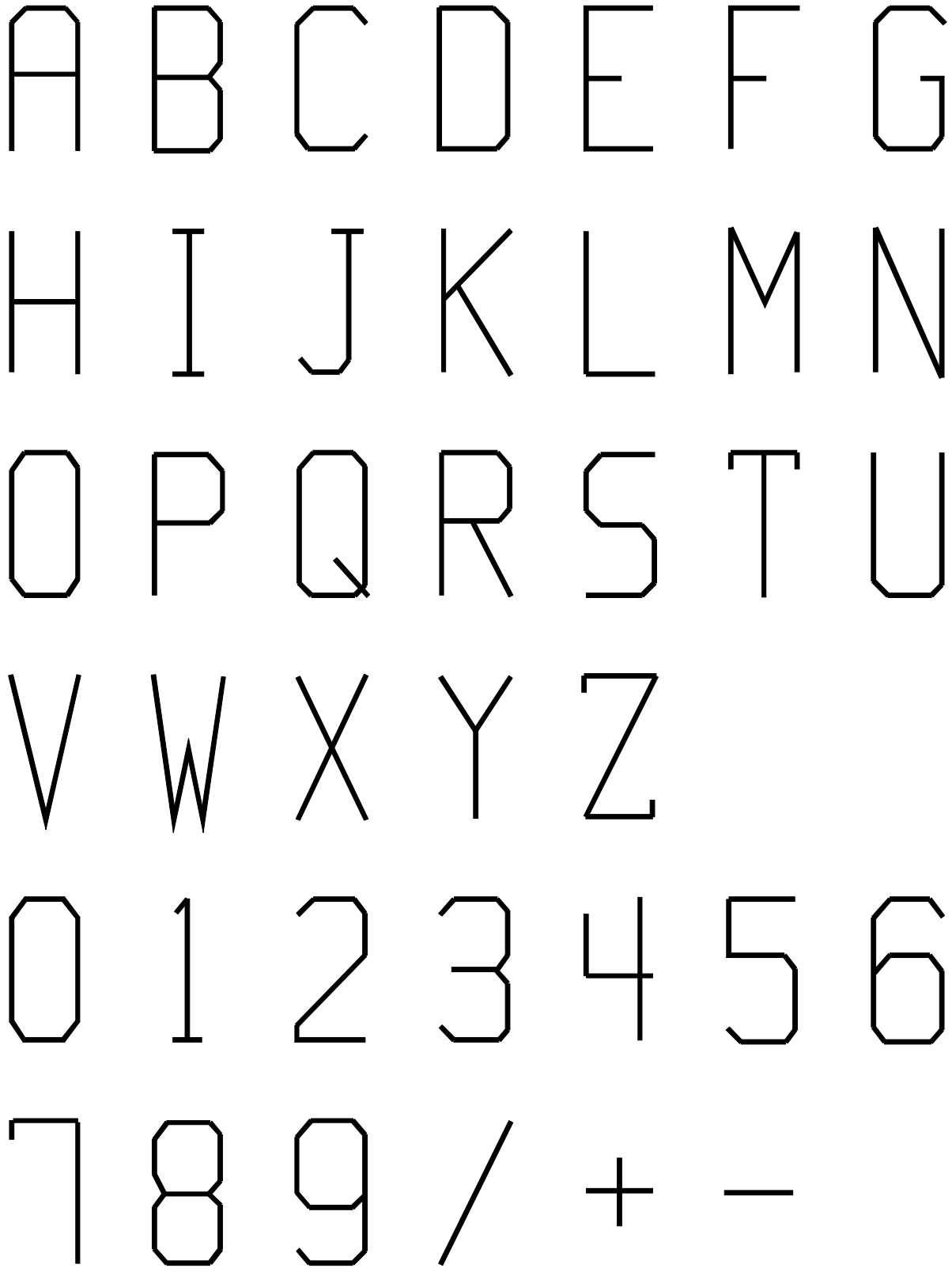



FIGURE 4.7.10-0. HUD Display Alphanumerics

Table 4.7.10-2 Variable Definition Table for Display Format Algorithms

| Name | Description | Word/Bit ADI |
|---|---|---|
| ADI | | |
| ROLLSIN | Roll Sine | 3 |
| ROLLCOS | Roll Cosine | 4 |
| PTCHSIN | Pitch Sine | 5 |
| PTCHCOS | Pitch Cosine | 6 |
| AMI | | |
| EAS | Equivalent Airspeed | 5 |
| VEH_ACC | Vehicle Acceleration | 6 |
| AVVI | | |
| H | Indicated Altitude | 3 |
| RALT | Radar Altitude | 5 |
| HUD MESSAGE 1 | | |
| CAGE | Cage Velocity Vector Flag | 3/9 |
| WOWLON | Weight on Wheels flag | 3/10 |
| WONG | Weight on Nose Gear flag | 3/11 |
| HI_G | Hi G flag | 3/12 |
| SB | Speedbrake warning flag | 3/13 |
| BODY_FLAP | Body flap flag | 3/14 |
| GEAR | Gear warning flag | 3/15 |
| MLSNAV | NAV using/not using MLS data | 3/18 |
| SB_RETRACT | Speedbrake retract signal | 3/20 |
| ELEVON | ELEVON warning flag | 3/21 |
| GR_TR | Gear in Transit flag | 3/22 |
| EASM_INVALID | EAS Monitor Invalid Flag | 3/24 |
| P_MODE | Pitch mode in A/L | 4/12–14 |
| PITCH_CSS | Pitch Axis FCS Mode | 4/19 |
| ROLL_CSS | Roll Axis FCS Mode | 4/20 |
| I_PHASE | Current guidance phase | 4/22–24 |
| SB_POSITION | Actual Speedbrake position | 5 |
| SB_COMMAND | Commanded Speedbrake position | 6 |
| DR | X Position with respect to Runway | 7 |
| CR | Y Position with respect to Runway | 8 |
| HR | Z Position with respect to Runway | 9 |
| XDOT | X Velocity with respect to Runway | 10 |

Table 4.7.10-2 Variable Definition Table for Display Format Algorithms

| | | |
|---|---|---|
| YDOT | Y Velocity with respect to Runway | 11 |
| HUD MESSAGE 1 | | |
| ZDOT | Z Velocity with respect to Runway | 12 |
| HEADING | Heading | 13 |
| ACC_DRAG | Drag Deceleration | 14 |
| FPA_REF2 | Flight Path Reference for Flare | 16 |
| ROLLERR | Roll error term | 17 |
| PITCHERR | Pitch error term | 18 |
| RWHEADING | Runway Heading | 19 |
| FPA_REF1 | Flight Path Reference for OGS | 21 |
| STEEP | X_ZERO (ILOAD) | 22 |
| ALT_ERROR | Altitude error term | 23 |
| PTCH_ADJ | Pitch Adjustment (ILOAD) | 30 |
| VV_FILT_FREQ | VV Filter Frequency (ILOAD) | 31 |
| HUD MESSAGE 2 | | |
| ALM_VALID | Autoland Monitor Validity | 1/16 |
| RW_REM_STP | Runway Remaining to Stop (ILOAD) | 2 |
| RW_TGO_MIN | Runway to go Minimum | 3 |
| DECEL_CMD_MAX | Maximum Deceleration Command (ILOAD) | 4 |
| RW_LNGTH | Runway Length (ILOAD) | 5 |
| ALT_ERR | Autoland Altitude Error | 6 |
| GAMMA_ERR | Autoland Gamma Error | 7 |
| CROSSTRACK_ERR | Autoland Crosstrack Error | 8 |
| EAS_ERR | Autoland Airspeed Error | 9 |
| PDU Switch | | |
| DECLUTTER | Declutter level | DCLT Switch |
| Discrete Inputs | | |
| GR_DWN1 | Hardwire discrete from gear locks | Discrete Input 1 |
| GR_DWN2 | Hardwire discrete from gear locks | Discrete Input 2 |
| GR_DWN3 | Hardwire discrete from gear locks | Discrete Input 3 |

### 4.7.10.13.1 BORESIGHT.

Inputs: None.

Algorithm Constants:

| | | |
|---|---|---|
| X | = 0 | X position of boresight. |
| BSITE | = 87 | Y position of boresight above center FOV in milliradians |
| L | = 6 | Half the length of each crosspiece. |

Algorithm:

Calculate the placement of the boresight.
X_POS1_BS = X + L
X_POS2_BS = X – L
Y_POS1_BS = BSITE + L
Y_POS2_BS = BSITE – L

Now draw vectors between the following two pairs of points.
(X_POS1_BS, BSITE) to (X_POS2_BS, BSITE)
(X,Y_POS1_BS) to (X,Y_POS2_BS)

Smoothing: None.

When Displayed: Symbol is displayed at all times except when the conditions of paragraph 4.7.10.6 have occurred.

### 4.7.10.13.2 Flight Director/Velocity Vector.

Inputs:
PTCHSIN
PTCHCOS
ROLLSIN
ROLLCOS
HEADING
RWHEADING
XDOT
YDOT
ZDOT
WOWLON
DECLUTTER
I_PHASE
P_MODE
CAGE
PTCH_ADJ
VV_FILT_FREQ

Algorithm Constants:

| | | |
|---|---|---|
| BSITE | = 87 | Y position of boresight above center FOV in milliradians. |
| DEG_TO_MR | = 17.453293 | Conversion factor from degrees to milliradians. |
| FADER | = 250 | Time constant for uncaging both axes (5 seconds) |

Algorithm:

Don’t display if WOW has occurred or if symbol has been decluttered.
IF WOWLON = 1 OR DECLUTTER ≥ 3 THEN RETURN
Calculate Pitch, Heading Error and Psi error.
PITCH = Arctan (PTCHSIN/PTCHCOS)
FPA = Arctan (–ZDOT/Sqrt((XDOT**2)+(YDOT**2)))
HDGERR = HEADING – RWHEADING
PSIERR = HDGERR – Arctan(YDOT/XDOT)

Compute adjustment to pitch for Orbiter aerodynamics.

IF first time or reinitialization
THEN OLD PITCH = 0
    PQUICK_OLD = 0
NO ELSE
OLD_PITCH = PITCH(T–1) (i.e., last pitch value)
DELTA_PITCH = PITCH – OLD_PITCH
PQUICK = DELTA_PITCH + (PQUICK_OLD*PTCH_ADJ)
PQUICK_OLD = PQUICK
PADJ = PITCH – PQUICK

Calculate the center of the Velocity Vector.
YB = (PADJ–FPA) * ROLLSIN – PSIERR * ROLLCOS
ZB = –((PADJ–FPA) * ROLLCOS + PSIERR * ROLLSIN)

Here are the equations used to fade the symbol in both lateral and vertical channels when it becomes uncaged.

IF I_PHASE < 3
THEN COUNTERZ = 0
COUNTERY = 0
YB = 0
ZB = 0
IF COUNTERZ < FADER THEN COUNTERZ = COUNTERZ +1
ZB = (COUNTERZ/FADER)*ZB
IF CAGE = 0
THEN IF COUNTERY < FADER THEN COUNTERY = COUNTERY + 1
    YB = (COUNTERY/FADER)*YB
    ELSE COUNTERY = 0
NO ELSE

X_POS_VV and Y_POS_VV are the coordinates of the center of the Flight Director/Velocity Vector symbol in milliradians.

X_POS_VV = YB * DEG_TO_MR
Y_POS_VV = (ZB * DEG_TO_MR) + BSITE

Now filter the symbol position if P_MODE < 3

IF P_MODE ≥ 3
THEN Display Flight Director/Velocity Vector at (X_POS_VV, Y_POS_VV).
ELSE IF First time through here

THEN X_POS_VV_OLD = X_POS_VV
Y_POS_VV_OLD = Y_POS_VV
Display Flight Director/Velocity Vector at (X_POS_VV, Y_POS_VV).
ELSE DELTAX = (X_POS_VV_OLD – X_POS_VV)
DELTAY = (Y_POS_VV_OLD – Y_POS_VV)
X_POS_VV = X_POS_VV + (DELTAX * VV_FILT_FREQ)
Y_POS_VV = Y_POS_VV + (DELTAY * VV_FILT_FREQ)
X_POS_VV_OLD = X_POS_VV
Y_POS_VV_OLD = Y_POS_VV
Display Flight Director/Velocity Vector at (X_POS_VV, Y_POS_VV).

When the calculated Flight Director or Velocity Vector position is out of the total field of view, the symbol will be translated along an imaginary line drawn from the center of the field of view to the calculated position until the entire symbol is back into the field of view. An X is placed over the velocity vector symbol if it has been limited.

Smoothing: HEADING, XDOT, YDOT and ZDOT are updated to 12.5 Hz.

When Displayed: The Flight Director/Velocity Vector routine is executed at all times prior to WOW except when the declutter level is 3 or greater. If any portion of the symbol would be out of view when displayed, an X is placed over the center of the symbol and is restricted to the corresponding edge. The symbol is not displayed when WOW occurs or if the conditions of paragraph 4.7.10.6 have occurred.

#### 4.7.10.13.3 GUIDANCE.

Inputs: ROLLERR
PITCHERR
WOWLON
DECLUTTER
PITCH_CSS
ROLL_CSS
P_MODE

Algorithm Constants:

DEG_TO_MR = 17.453293 Conversion factor from degrees to milliradians

Algorithm:

Guidance symbol is placed with respect to the unlimited velocity vector position. If no error exists in the horizontal or vertical channel then they will have the same center point.
IF WOWLON = 1 OR DECLUTTER = 3 OR (DECLUTTER > 0 AND P_MODE = 4
AND ROLL_CSS = 1 AND PITCH CSS = 1) THEN RETURN
X_POS_GUID = X_POS_VV – (ROLLERR * DEG_TO_MR)
Y_POS_GUID = Y_POS_VV – (PITCHERR * DEG_TO_MR)
Symbol is limited to the total field of view and should flash if limited.

Smoothing: ROLLERR and PITCHERR are updated to 12.5 Hz.

When Displayed: Symbol is displayed prior to WOW. Symbol is blanked when the declutter level is 2 or greater, or the conditions of paragraph 4.7.10.6 have occurred.

### 4.7.10.13.4 HORIZON AND ATTITUDE REFERENCES.

Inputs: PTCHSIN
PTCHCOS
ROLLSIN
ROLLCOS
WOWLON
WONG
DECLUTTER

Algorithm Constants:

| | | |
|---|---|---|
| ATT_INC | = 87 | Distance between reference lines in milliradians. |
| BSITE | = 87 | Boresight's vertical position above center in milliradians. |
| DEG_TO_MR | = 17.453293 | Conversion factor from degrees to milliradians. |
| LOWER_LIMIT | = –109 | Lower placement limit of reference lines. |
| UPPER_LIMIT | = 97.5 | Upper placement of reference lines. |

Algorithm:

IF WONG = 1 THEN RETURN
IF WOWLON = 0 AND DECLUTTER ≥ 3 THEN RETURN
Calculate Y position of horizon.
Adjust pitch so the correct pitch is read from the Boresight after rotation.
ADJ_PITCH should range from +180 to –180 degrees.
ADJ_PITCH = Arctan (PTCHSIN/PTCHCOS) + 5 * (1 – ROLLCOS)
Y_POS_HORIZON = BSITE – (ADJ_PITCH * DEG_TO_MR)
Determine if attitude lines are drawn.
IF DECLUTTER ≥ 2 THEN GO TO ROTATION
IF WOWLON = 1 AND DECLUTTER ≥ 1 THEN RETURN

The bottom reference line position and value are determined.
Adjust pitch so the correct pitch is read from the Boresight after rotation.
ADJ_PITCH should range from +180 to –180 degrees.
ADJ_PITCH = Arctan (PTCHSIN/PTCHCOS) + 5 * (1 – ROLLCOS)
PITCH_RND = ADJ_PITCH rounded up to the nearest multiple of 5
REF_BOTTOM = ((PITCH_RND – ADJ_PITCH) * ATT_INC/ 5) – 174.5
REF_BOTTOM_VALUE = PITCH_RND – 15
All other reference lines are positioned relative to the bottom reference line.
REF_LINE(N) = REF_BOTTOM + (ATT_INC * N)
REF_LINE_VALUE(N) = REF_BOTTOM_VALUE + (5 * N)

Limit values and upper rung positions:

REF_LINE(N) ≤ UPPER LIMIT
–180 ≤ REF_LINE_VALUE(N) ≤ +180

ROTATION:

Completed symbol (reference lines) must be rotated about the center of the HUD field of view.
Limit lower rungs so that no part of a rung extends below LOWER_LIMIT. Partial rungs allowed on lower rungs only.

Smoothing: None.

When Displayed: Symbol is displayed prior to WONG. Symbol is blanked when the declutter level is 1 or greater after WOW. Attitude reference lines are blanked if the declutter level is 2 or greater prior to WOW and the Horizon is blanked if the level is 3 or greater. Symbol is not displayed when the conditions of paragraph 4.7.10.6 have occurred.

### 4.7.10.13.5 DIGITAL AIRSPEED.

Inputs: EAS
RALT (Primary)
ALT_WHEELS (Secondary)
WOWLON
WONG
DECLUTTER

Algorithm Constants:

| | | |
|---|---|---|
| K1 | = 21 | Distance in milliradians used to place leftmost digit the proper distance from Velocity Vector. |
| K2 | = 9 | Vertical distance in milliradians from lower edge of digits to a horizontal line through the center of the Velocity Vector. |
| FLAG | = 0 or 1 | Flag = 0 only if Altitude has never been below MAXALT. |
| DIG_SIZE | = 7.5 | Width of a large digit including space. |
| MAXEAS | = 500 | Maximum EAS displayed. |
| MAXALT | = 100 | Maximum Altitude at which symbol appears if declutter < 2. |
| Y_POS_GS | = 89 | Y distance to Digital Air/Groundspeed after WOW in milliradians. |
| X_POS_GS | = –43 | X distance to Digital Air/Groundspeed after WOW milliradians. |
| K | = –5.5 | Used to place Digital Air/Groundspeed by the Boresight after WOW. |

Algorithm:

IF (WOWLON = 0 AND DECLUTTER > 3) OR (WOWLON = 1 AND DECLUTTTER > 2
AND DECLUTTER ≥ 2) THEN RETURN
ELSE Determine if display has been forced up by declutter = 2.
IF DECLUTTER = 2 THEN GO TO DISPLAY
Determine if Altitude has ever been less than or equal to 100 feet.
IF FLAG = 1 THEN GO TO DISPLAY
Next select which Altitude source to use
IF RALT is available THEN ALT = RALT
IF ALT_WHEELS is available THEN ALT = ALT_WHEELS
ELSE RETURN

Now check if symbol should be displayed due to Altitude.
IF ALT ≤ MAXALT
THEN FLAG = 1; GO TO DISPLAY
ELSE FLAG = 0; RETURN

DISPLAY:

Limit EAS to MAXEAS and then calculate displayed value.
IF EAS > MAXEAS THEN DISPLAYED_EAS = MAXEAS
DISPLAYED_EAS = Integer(EAS)
If WOW has occurred then move symbol up by the Boresight, and if WONG has also occurred, then display a large ‘G’ in front of the value to show that it is Groundspeed. Else display symbol by the Flight Director/Velocity Vector.

IF WOWLON = 1
THEN X_POS_EAS = K – ((# digits displayed) * DIG SIZE)
IF WONG = 1
THEN display a large ‘G’ at (X_POS_GS, Y_POS_GS)
NO ELSE
Display DISPLAYED_EAS starting at (X_POS_EAS, Y_POS_GS)

X_POS_DEAS = X_POS_VV–((# digits displayed * DIG SIZE) + K1)
Y_POS_DEAS = Y_POS_VV + K2
Display DISPLAYED_EAS starting at (X_POS_DEAS, Y_POS_DEAS)

Smoothing: RALT is updated to 12.5 Hz. EAS is smoothed to 50 Hz from 1.04 Hz. ALT_WHEELS is calculated as defined by Section 4.7.10.4.

When Displayed:

1. Displayed before WOW when Altitude ≤ 100 feet or declutter = 2, EAS is available, and the Flight Director/Velocity Vector is being displayed.
2. After WOW it moves up above and to the left of the Boresight.
3. After WONG, a large G followed by a space is displayed in front of the value, to indicate Groundspeed.

Not Displayed:

1. Before WOW if the declutter level is 3 or greater.
2. After WOW if the declutter level is 2 or greater.
3. When the conditions of paragraph 4.7.10.6 have occurred.

### 4.7.10.13.6 DIGITAL ALTITUDE.

Inputs: RALT (Primary)
ALT_WHEELS (Secondary)
WOWLON DECLUTTER

Algorithm Constants:

| | | |
|---|---|---|
| FORALT | = 100 | ; Altitude at which symbol is forced up |
| MAXALT | = 32767 | ; Maximum Altitude displayed |
| ALT1 | = 1000 | ; Scale change at this Altitude |
| ALT2 | = 400 | ; Scale change at this Altitude |
| ALT3 | = 50 | ; Scale change at this Altitude |
| MINALT | = 0 | ; Minimum Altitude Displayed. |
| SCALE 1 | = 200 | ; Scaling for 1000 < Altitude ≤ 32767 |
| SCALE 2 | = 100 | ; Scaling for 400 < Altitude ≤ 1000 |
| SCALE 3 | = 10 | ; Scaling for 50 < Altitude ≤ 400 |
| K2 | = 9 | ; Vertical distance from bottom edge of digits to the; center of Flight Director/Velocity Vector. |
| K3 | = 23.5 | ; Horizontal distance from first digit to the center; of Flight Director/Velocity Vector. |
| FLAG1 | = 0 or 1 | ; FLAG1 = 1 If Radar Altitude is displayed |
| FLAG2 | = 0 or 1 | ; FLAG2 = 1 If Digital RALT replaces Altitude Tape. |

Algorithm:

IF DECLUTTER ≥ 3 OR WOWLON = 1 THEN RETURN
Choose which Altitude source to use for display.
IF RALT is available
THEN ALT = RALT
FLAG1 = 1
IF ALT_WHEELS is unavailable
THEN FLAG2 = 1
ELSE FLAG2 = 0
ELSE IF ALT_WHEELS is available
THEN ALT = ALT_WHEELS
FLAG1 = 0
FLAG2 = 0
ELSE RETURN neither Altitude is available.
Determine if Altitude should be displayed.
IF (DECLUTTER ≠ 2 AND ALT > FORALT AND FLAG2 ≠ 1) OR ALT > MAXALT
THEN RETURN
ELSE Scale Altitude for display
IF ALT ≥ ALT1
THEN DISPLAYED ALT = ALT – Mod(ALT, SCALE1)
ELSE IF ALT > ALT2
THEN DISPLAYED_ALT = ALT – Mod (ALT, SCALE2)
ELSE IF ALT > ALT3
THEN DISPLAYED_ALT = ALT – Mod(ALT, SCALE3)
ELSE IF ALT < MINALT
THEN DISPLAYED_ALT = MINALT
ELSE DISPLAYED_ALT = Integer (ALT)

Now calculate the position of the lower left corner of 1st digit

X_POS_DALT = X_POS_VV + K3
Y_POS_DALT = Y_POS_VV + K2
Display DISPLAYED_ALT left justified at the point
X_POS_DALT, Y_POS_DALT using large digits
IF FLAG1 = 1
THEN Display one large character space and then a large “R” following
DISPLAYED_ALT
NO ELSE

Smoothing: RALT is updated to 2.5 HZ. ALT_WHEELS is calculated as defined by paragraph 4.7.10.4.

When Displayed:

1. If Declutter = 2 and Altitude ≤ 32767 ft. then display symbol.
2. If ALT_WHEELS is not available but Radar Altitude is, then display Radar Altitude followed by a large “R”.
3. If Altitude is < 100 feet, then display symbol.

4. Whenever Radar Altitude is the source, display a large “R” after the value.
5. Not displayed when WOW occurs.
6. Not displayed when the declutter level ≥ 3.
7. Not displayed when conditions of paragraph 4.7.10.6 have occurred.

### 4.7.10.13.7 AIRSPEED SCALE

Inputs: EAS
WOWLON
DECLUTTER

Algorithm Constants:

| | | |
|---|---|---|
| TAPE_LENGTH | = 201 | Vertical scale length in milliradians. |
| MARK_INC | = 30 | Distance between tic marks in milliradians. |

Algorithm:

IF WOWLON = 1 OR DECLUTTER ≥ 2 THEN RETURN
Determine bottom tape mark position and value
EAS_RND = EAS rounded down to the nearest multiple of 5
TAPE_BOTTOM = ((EAS–EAS_RND) * MARK_INC/5) – 150
TAPE_BOTTOM_VALUE = EAS_RND + 25
All other tape marks are positioned relative to the bottom mark:
TAPE_MARK(N) = TAPE_BOTTOM + (MARK_INC * N)
TAPE_MARK_VALUE(N) = TAPE_BOTTOM_VALUE – (5 * N)
Positions are limited to:
–(TAPE_LENGTH/2) ≤ TAPE MARK(N) ≤ (TAPE_LENGTH/2)
0 ≤ TAPE_MARK_VALUE ≤ 500

Note: A tape mark is either a tic mark or numeric string.

Smoothing: EAS is smoothed to 50 Hz from 1.04 Hz.

When Displayed: Symbol is displayed prior to WOW. Symbol is blanked when the declutter level is 2 or greater or if the conditions of paragraph 4.7.10.6 have occurred.

### 4.7.10.13.8 ALTITUDE TAPE.

Inputs: ALT_WHEELS
RALT
WOWLON
DECLUTTER

Algorithm Constants:

TAPE_LENGTH = 201 Vertical tape length in milliradians.

Algorithm:

IF WOWLON = 1 OR DECLUTTER ≥ 2 THEN RETURN
The altitude tape is non–linear, therefore, the scaling (spacing) between tape marks must be determined.

IF ALT_WHEELS ≥ 100000
THEN SPACE(MR) = 30 per 5000 feet

IF 100000 > ALT_WHEELS > 500
THEN SPACE(MR) = 30 per 500 feet

IF ALT_WHEELS ≤ 500
THEN SPACE(MR) = ((–1.1715E–5) * (ALT_WHEELS**2) +
(1.58575E–2) * ALT_WHEELS) * 69.81317

Tape mark positions are limited to:

–(TAPE_LENGTH/2) ≤ TAPE_MARK_POSITION ≤ (TAPE_LENGTH/2)
0 ≤ TAPE_MARK_VALUE ≤ 400000

Note: A tape mark is either a tic mark or numeric string.

Smoothing: RALT is updated to 12.5 Hz. ALT_WHEELS is calculated as defined in paragraph 4.7.10.5

When Displayed: Symbol is displayed prior to WOW. Symbol is blanked when the declutter level is 2 or greater or if the conditions of paragraph 4.7.10.6 have occurred. If Radar Altitude is invalid, only the Radar Attitude indicator is blanked.

### 4.7.10.13.9 GLIDESLOPE INDICATOR.

Inputs: ALT_ERROR
DR
ALT_WHEELS
WOWLON
DECLUTTER

Algorithm Constants:

| | | |
|---|---|---|
| RANGE | = 35 | Range used to compute pointer position. |
| GSI_POS_X | = 102.5 | X distance to Glideslope Indicator. |
| ALT_POS_Y | = 0 | Y position of altitude tape pointer. |
| MAXALT | = 10000 | Scale change at this altitude. |
| MEDALT | = 5000 | Scale change at this altitude. |
| MAXERR | = 1000 | Error for greater than MAXALT. |
| MINERR | = 50 | Error for less than minimum DR. |
| DEL_H1 | = .19 | Constant used in positioning pointer. |
| DEL_H2 | = –900 | Constant used in positioning pointer. |
| H_REF (i), i | = 1,4 | Reference Altitude Error array. |
| DR_REF(i), i | = 1,4 | Reference Downrange array. |

| Index = i | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| H_REF(i) | +50. | +32. | +16. | +16. |
| DR_REF(i) | –5000. | +0 | +1500. | +5000. |

Algorithm:

IF WOWLON = 1 OR DECLUTTER ≥ 2 THEN RETURN
Compute the relative or allowable altitude error for the current Downrange position.
IF ALT_WHEELS > MAXALT
THEN HREF_ERROR = MAXERR
ELSE IF ALT_WHEELS > MEDALT
THEN HREF_ERROR = (DEL_H1 * ALT_WHEELS) + DEL_H2
ELSE IF DR < DR REF(1)
THEN HREF_ERROR = MINERR
ELSE FOR i = 1,3 DO
IF ((DR < DR_REF(i+1)) & (DR ≥ DR_REF(i)))
THEN DR_DIFF1 = DR – DR_REF(i)
DR_DIFF2 = DR_REF(i+1) – DR_REF(i)
HDIFF = H_REF(i+1) – H_REF(i)
HREF_ERROR = H_REF(i) + (DR_DIFF1/DR_DIFF2) * HDIFF
NO ELSE

Using HREF_ERROR calculated above, compute the altitude error ratio.
ALTERR_RATIO = ALT_ERROR/HREF_ERROR
Compute the position of the Glideslope Indicator relative to the Altitude Tape pointer.
GSI_POS_Y = ALT_POS_Y – (RANGE * ALTERR_RATIO/2)

Now place the Glideslope Indicator box center at the following position:
(GSI_POS_X, GSI_POS_Y)

Smoothing DR is updated to 12.5 Hz. ALT_WHEELS is calculated as defined in paragraph 4.7.10.5

When Displayed:
1. Symbol is displayed prior to WOW.
2. Symbol is blanked when the declutter level is 2 or greater.
3. Symbol is not displayed when the conditions of paragraph 4.7.10.6 have occurred.

### 4.7.10.13.10 OGS/FLARE REFERENCES.

Inputs: PTCHSIN
PTCHCOS
ROLLSIN
ROLLCOS
FPA_REF1
FPA_REF2
DECLUTTER
I_PHASE
P_MODE

Algorithm Constants:

| | | |
|---|---|---|
| BSITE | = 87 | Y position of Boresight above center FOV in milliradians. |
| DEG_TO_MR | = 17.453293 | Conversion factor from degrees to milliradians. |

Algorithm:

IF P_MODE = 4 OR DECLUTTER ≥ 3 OR I_PHASE < 3 THEN RETURN
ROLL = Arctan(ROLLSIN/ROLLCOS)
PITCH = Arctan(PTCHSIN/PTCHCOS)
Determine if both sets of indices should be shown and then calculate the position of their centers before proceeding to roll and translate them.

IF FPA_REF2 ≥ FPA_REF1 THEN don't display OGS indices
X_POS_OGS = X_POS_VV
Y_POS_OGS = BSITE – ((PITCH – FPA_REF1) * DEG_TO_MR)
X_POS_FLARE = X_POS_VV
Y_POS_FLARE = BSITE – ((PITCH – FPA_REF2) * DEG_TO_MR)

Rotate and adjust the symbols in the same manner as the Pitch Ladder.

Smoothing: None.

When Displayed: Symbol is displayed after I_PHASE = 3 prior to P_MODE = 4 as long as the Flight Director/Velocity Vector is displayed. It is blanked when the declutter level is 3 or greater. Symbol is not displayed when the conditions of paragraph 4.7.10.6 have occurred.

### 4.7.10.13.11 RUNWAY.

Inputs: PTCHSIN
PTCHCOS
ROLLSIN
ROLLCOS
HEADING
RWHEADING
DR
CR
HR
STEEP
WOWLON
DECLUTTER
RW_LNGTH

Algorithm Constants:

| | | |
|---|---|---|
| BSITE | = 87 | Y position of Boresight above center FOV in milliradians. |
| SHALLOW | = 1000 | Shallow Glideslope intercept value in feet |
| WIDTH | = 150 | Half of the runway width in feet. |
| DEG_TO_MR | = 17.453293 | Conversion for degrees to milliradians. |
| RWAY_MAX | = 15000 | Maximum length of runway. |

Algorithm:

Main Routine:

Determine if WOW has occurred or if symbol should be decluttered, if so then don't display.

IF WOWLON = 1 OR DECLUTTER ≥ 1 THEN RETURN
ROLL = Arctan (ROLLSIN/ROLLCOS)
PITCH = Arctan (PTCHSIN/PTCHCOS)
HDGERR = HEADING – RWHEADING

Determine if runway length is less than 15000 feet.
IF RW_LNGTH > RWAY_MAX
THEN LENGTH = RWAY_MAX
ELSE LENGTH = RW_LNGTH

Calculate Shallow intercept point
CALL RWAY(DR–SHALLOW, CR, –HR)
XSHALL=XPOS
YSHALL=YPOS

Calculate Steep intercept point
CALL RWAY(DR+STEEP, CR, –HR)
XSTEEP=XPOS
YSTEEP+YPOS

```
        Calculate right front corner of runway
        CALL RWAY(DR, CR–WIDTH, –HR)
        XRFRONT=XPOS
        YRFRONT=YPOS

        Calculate left front corner of runway
        CALL RWAY(DR, CR+WIDTH, –HR)
        XLFRONT=XPOS
        YLFRONT=YPOS

        Calculate right back corner of runway
        CALL RWAY(DR–LENGTH, CR–WIDTH, –HR)
        XRBACK=XPOS
        YRBACK=YPOS

        Calculate left back corner of runway
        CALL RWAY(DR–LENGTH, CR+WIDTH, –HR)
        XLBACK=XPOS
        YLBACK=YPOS
```

END of main routine

Subroutine RWAY(X,Y,Z) for transformation calculations.

```
    IF X ≥ 0 THEN X = –.1
    L = Arctan(Y/Z)
    YB = PITCH * ROLLSIN – HDGERR * ROLLCOS – (Arctan
         (Z/Sqrt(X**2+Y**2))/Cos(L)) * Sin(L–ROLL)
    ZB = –(PITCH * ROLLCOS + HDGERR * ROLLSIN +
         (Arctan(Z/Sqrt(X**2+Y**2))/Cos(L)) * Cos(L–ROLL))
    XPOS = YB * DEG_TO_MR
    YPOS = (ZB * DEG_TO_MR) + BSITE
    RETURN
```

END of subroutine

Line segments should then be constructed between the following pairs of points to obtain the runway and glideslope line.

```
(XLBACK,YLBACK) to (XRBACK,YRBACK)
;Back of runway
(XRBACK,YRBACK) to (XRFRONT,YRFRONT)       ;Right edge of runway
(XRFRONT,YRFRONT) to (XLFRONT, YLFRONT)    ;Front of runway
(XLFRONT,YLFRONT) to (XLBACK,YLBACK)       ;Left edge of runway
(XSHALL,YSHALL) to (XSTEEP,YSTEEP)         ;Glideslope line
```

Smoothing: Heading, DR, CR, and HR are updated to 12.5 Hz.

When Displayed: The Runway routine is executed at all times prior to WOW except when the declutter level is 1 or greater. If any portion of the Runway symbol is in the FOV then display that portion (i.e., partial symbol is allowed). Not displayed when the conditions of paragraph 4.7.10.6 have occurred.

### 4.7.10.13.12 SPEEDBRAKE SCALE.

Inputs: SB_POSITION
SB_COMMAND
SB
WOWLON
DECLUTTER

Algorithm Constants:

| | | |
|---|---|---|
| SCALE_LENGTH | = 52 | Horizontal scale length in milliradians. |
| FULL_SCALE | = 98 | Full scale speedbrake value. |

Algorithm:

IF (WOWLON = 0 AND DECLUTTER ≥ 3) OR (WOWLON = 1 AND DECLUTTER ≥ 2) THEN RETURN

Speedbrake position and command are received in degrees. The percentage of full scale is needed to determine the pointer positions with respect to left edge of the scale.

SB_POS_PERCENT = SB_POSITION/FULL_SCALE
SB_CMD_PERCENT = SB_COMMAND/FULL_SCALE

Compute pointer positions on scale:

SB_POS_POSITION = SB_POS_PERCENT * SCALE_LENGTH
SB_CMD_POSITION = SB_CMD_PERCENT * SCALE_LENGTH

Limit pointers to the ends of the scale and then display them at their corresponding positions.

Determine if speedbrake position pointer should flash:

IF SB = 1 AND WOWLON = 0 THEN FLASH SPEEDBRAKE POSITION POINTER.
NO ELSE

Smoothing: None.

When Displayed: Symbol is always displayed except when decluttered. Prior to WOW, if the declutter level is 3 or greater, or after WOW, if the declutter level is 2 or greater, the symbol is blanked. The appropriate pointer is blanked when the conditions of paragraph 4.7.10.6 have occurred, and if both pointers are blanked then the entire symbol is blanked.

### 4.7.10.13.13 DECELERATION RATE.

Inputs: ACC_DRAG
DECEL_CMD_MAX
XDOT
DR
RW_LENGTH
RW_REM_STP
RW_TGO_MIN
WOWLON
DECLUTTER

Algorithm Constants:

BD_SCALE_LENGTH = 88 Scale length in milliradians.

Algorithm:

IF WOWLON = 0 OR (WOWLON = 1 AND DECLUTTER ≥ 2) THEN RETURN
Determine runway to go:
RW_TGO = RW_LNGTH – RW_REM_STP – DR
IF RW_TGO ≤ RW_TGO_MIN THEN RW_TGO = RW_TGO_MIN
Determine percentage of full scale for actual and commanded brake deceleration:
DECEL_ACT_PERCENT = ACC_DRAG/DECEL_CMD_MAX
DECEL_CMD_PERCENT = ((XDOT**2)/(2 * RW_TGO))/DECEL_CMD_MAX
Compute pointer positions on scale:
DECEL_ACT_YPOS = 96 – (DECEL_ACT_PERCENT * BD_SCALE_LENGTH)
DECEL_CMD_YPOS = 96 – (DECEL_CMD_PERCENT * BD_SCALE_LENGTH)
Limit pointers to the end of the scale and then display them.

Smoothing: DR is updated to 12.5 Hz.

When Displayed: The scale is only displayed after WOW occurs. The scale is blanked when the declutter level is 2 or greater. The appropriate pointer is blanked when the conditions of paragraph 4.7.10.6 have occurred, and if both pointers are blanked then the entire symbol is blanked.

### 4.7.10.13.14 UPPER LEFT WINDOW.

Inputs: GEAR
GR_TR
GR_DWN1
GR_DWN2
GR_DWN3
DECLUTTER
WOWLON

Algorithm Constants:

| | | |
|---|---|---|
| START_X | = –70 | X position of first character in mr. |
| START_Y | = 65 | Y position of first character in mr. |

Algorithm:

Check if Gear cues should be displayed.
IF DECLUTTER = 3 OR WOWLON = 1 THEN RETURN
IF GEAR = 1
THEN clear window and display “GEAR” flashing at (START_X, START_Y)
IF GR_TR = 1
THEN clear window and display “//GR//” starting at (START_X, START_Y)
IF GR_DWN1 = 1 AND GR_DWN2 = 1 AND GR_DWN3 = 1
THEN clear window and display “GR–DN” for 5 secs at (START_X, START_Y)

Smoothing: None.

When Displayed: Symbol displays gear cues when those conditions arise. Symbol is blanked when the declutter level is 3 or WOW has occurred. Symbol is not displayed when conditions of paragraph 4.7.10.6 have occurred.

### 4.7.10.13.15 LOWER LEFT WINDOW.

Inputs: WOWLON
P_MODE
I_PHASE
DECLUTTER

Algorithm Constants:

| | | |
|---|---|---|
| START_X | = –70 | X Position of first character in milliradians |
| START_Y | = –122 | Y Position of first character in milliradians |

Algorithm:

IF WOWLON = 1 OR DECLUTTER = 3 THEN RETURN
IF I_PHASE = 0 AND P_MODE = 0
THEN display “S–TRN” starting at (START_X, START_Y)

IF I_PHASE = 1 AND P_MODE = 0
THEN display “ACQ” starting at (START_X, START_Y)

IF I_PHASE = 2 AND P_MODE = 0
THEN display “HDG” starting at (START_X, START_Y)

IF I_PHASE = 3 AND P_MODE = 0
THEN display “PRFNL” starting at (START_X, START_Y)

IF P_MODE = 1
THEN display “CAPT” starting at (START_X, START_Y)

IF P_MODE = 2
THEN display “OGS” starting at (START_X, START_Y)

IF P_MODE = 3
THEN display “FLARE” starting at (START_X, START_Y)

IF P_MODE = 4
THEN display “FNLFL” starting at (START_X, START_Y)

END

Smoothing: None.

When Displayed: Symbol is displayed at all times prior to WOW unless declutter level is 3 except when the conditions of paragraph 4.7.10.6 have occurred.

### 4.7.10.13.16 UPPER RIGHT WINDOWS AND SITUATION LINE.

Inputs: WOWLON
BODY_FLAP
MLSNAV
DECLUTTER
PITCH_CSS
ROLL_CSS

Algorithm Constants: None.

Algorithm:

IF WOWLON = 1 OR DECLUTTER ≥ 3 THEN RETURN
IF PITCH_CSS = 1 AND ROLL_CSS = 1
THEN display "CSS" flashing in uppermost open window for 5 seconds.
If the condition persists then move message to the leftmost open spot on the situation line.
IF MLSNAV = 1
THEN Display "MLSNV" flashing in uppermost open window for 5 seconds.
If the condition persists then move message to the leftmost open spot on the situation line.
IF BODY_FLAP = 1
THEN Display "B/F" flashing in uppermost open window for 5 seconds.
If the condition persists then move message to the leftmost open spot on the situation line.

Note: The above three messages have a priority of "CSS", "MLSNV" and "B/F". If either one of the top 2 priority messages needs to be displayed and the windows are full then replace "B/F" and keep it waiting until an opening occurs.

Smoothing: None.

When Displayed: Upper Right Windows and the Sit line are blanked at WOW or when the declutter level is 3. The corresponding message(s) are blanked when the conditions of paragraph 4.7.10.6 have occurred.

### 4.7.10.13.17 NORMAL ACCELERATION.

Inputs: VEH_ACC
HI_G
I_PHASE
DECLUTTER

Algorithm Constants:

| | | |
|---|---|---|
| DIG_SIZE | = 6 | Width of a small digit including space. |
| K1 | = 42.5 | Horizontal distance between Velocity Vector and start of digits. |
| K2 | = 17 | Distance from Velocity Vector to bottom of digits. |
| MAX_ACC | = 10 | Maximum acceleration displayed. |

Algorithm:

IF I_PHASE = 3 OR DECLUTTER ≥ 3 OR VEH_ACC > MAX_ACC THEN RETURN
DISPLAYED_ACC = Abs(ACC) truncated to tenths
ACC_X = X_POS_VV – K1
ACC_Y = Y_POS_VV – K2
IF ACC < 0
THEN display a minus sign followed by DISPLAYED_ACC
Starting at (ACC_X – DIG_SIZE, ACC_Y)
ELSE display DISPLAYED_ACC
Starting at (ACC_X, ACC_Y)
IF HI_G = 1 THEN flash the symbol

Smoothing: None.

When Displayed: Symbol is displayed prior to I_PHASE = 3 when the Flight Director/Velocity Vector is displayed. It is not displayed when declutter level is 3 or greater or when conditions of paragraph 4.7.10.6 have occurred.

### 4.7.10.14 DISPLAY FORMAT 2.

Display Format 2 is the Autoland Monitor format and is illustrated in Figure 4.7.3–1 and Figures 4.7.10–1 through 4.7.10–31. The following subsections provide expanded discussion and algorithms in order to fully define the requirements.

Format 2 has the same levels of declutter as Format 1 with the following exceptions.

Autoland declutter levels prior to WOW

| Level | Symbology Blanked |
|---|---|
| 2 | Add Autoland Airspeed Monitor Box and Autoland Glideslope Monitor to this level. |
| 3 | Add Autoland Velocity Vector Monitor Box to this level. |

#### 4.7.10.14.1 AUTOLAND AIRSPEED MONITOR BOX.

Inputs: EAS_ERR
EASM_INVALID
SB_RETRACT
I_PHASE
P_MODE
DECLUTTER

Algorithm Constants:

| | | |
|---|---|---|
| EAS_BOX_LEN | = 35 | Length of Airspeed Monitor Box in milliradians. |
| EAS_POS | = 0 | Y position of Airspeed Tape Pointer. |

Algorithm:

IF EASM_INVALID = 1 OR SB_RETRACT = 1 OR I_PHASE $<$ 3 OR DECLUTTER $\geq$ 2 THEN RETURN
Compute Y–position of the center of the Airspeed Monitor Box.
EPSILON_V = EAS_BOX_LEN * (EAS_ERR/2)
EAS_BOX_POS = EAS_POS + EPSILON_V
Determine if box should be dashed or solid.
IF P_MODE $\geq$ 2 THEN SOLID LINES
ELSE DASHED LINES

Smoothing: None.

When Displayed: Symbol is displayed during Format 2 when EAS Monitor is valid and I_PHASE is greater than 2. Symbol is blanked when the speedbrake retract command has been received or when the declutter level is 2 or greater, or the conditions of paragraph 4.7.10.6 have occurred.

### 4.7.10.14.2 AUTOLAND GLIDESLOPE MONITOR.

Inputs: ALT_ERR
ALM_VALID
I_PHASE
WOWLON
DECLUTTER

Algorithm Constants:

| | | |
|---|---|---|
| K | = 35 | Constant used to position pointer. |
| ALT_POS | = 0 | Y position of Altitude Tape pointer. |

Algorithm:

IF I_PHASE < 3 OR ALM_VALID = 0
THEN Use Format 1 Glideslope Indicator algorithm.
ELSE IF WOWLON = 1 OR DECLUTTER ≥ 2 THEN RETURN
Compute Y–position of the center of the Glideslope Indicator.
EPSILON_A = K * (ALT_ERR/2)
GSM_POS_Y = ALT_POS + EPSILON_A

Smoothing: None.

When Displayed: Symbol is displayed during Format 2 when Autoland Monitor is valid and I_PHASE is greater than 2. Symbol is blanked when WOW occurs or when the declutter level is 2 or greater, or if the conditions of paragraph 4.7.10.6 have occurred.

### 4.7.10.14.3 AUTOLAND VELOCITY VECTOR MONITOR BOX.

Inputs: GAMMA_ERR
CROSSTRACK_ERR
ALM_VALID
I_PHASE
P_MODE
WOWLON
DECLUTTER
ALT_WHEELS
ALT_ERR

Algorithm Constants:

| | | |
|---|---|---|
| VVBOX_LEN_MIN | = 70 | Minimum length of Velocity Vector Monitor Box in milliradians. |
| VVBOX_WID_MIN | = 35 | Minimum width of Velocity Vector Monitor Box in milliradians. |
| VVBOX_LEN_MAX | = 105 | Maximum length of Velocity Vector Monitor Box in milliradians. |
| VVBOX_WID_MAX | = 52.5 | Maximum width of Velocity Vector Monitor Box in milliradians. |
| MAX_ALT | = 600 | Altitude at which box starts growing |
| MIN_ALT | = 100 | Altitude at which box stops growing. |

Algorithm:

```
IF ALM_VALID = 0 OR I_PHASE  <  3 OR WOWLON = 1 OR DECLUTTER ≥ 3
THEN RETURN
Determine box size.
Above 600 feet altitude.
IF ALT_WHEELS ≥ MAX_ALT
THEN BOX_LEN = VVBOX_LEN_MIN
        BOX_WID = VVBOX_WID_MIN
ELSE Between 100 and 600 feet altitude.
        IF ALT_WHEELS  >  MIN_ALT
        THEN DELTA_LEN = VVBOX_LEN_MAX – VVBOX_LEN_MIN
                DELTA_WID = VVBOX_WID_MAX – VVBOX_WID_MIN
                DELTA_ALT = MAX_ALT – MIN_ALT
                BOX_LEN = VVBOX_LEN_MIN + (DELTA_LEN/DELTA_ALT)
                                * (MAX_ALT – ALT_WHEELS)
                BOX_WID = VVBOX_WID_MIN + (DELTA_WID/DELTA_ALT)
                                * (MAX_ALT – ALT_WHEELS)
        ELSE Below 100 feet altitude.
                BOX_LEN = VVBOX_LEN_MAX
                BOX_WID = VVBOX_WID_MAX
Determine which error term to use in vertical channel.
IF P_MODE  <  4 THEN  FPA_ERR = ALT_ERR
FPA_ERR = GAMMA_ERR
Determine center position of box.
EPSILON_Y = BOX_LEN * (CROSSTRACK_ERR/2)
EPSILON_H = BOX_WID * (FPA_ERR/2)
X_POS_VVBOX = X_POS_VV + EPSILON_Y
Y_POS_VVBOX = Y_POS_VV + EPSILON_H
Determine if box should be dashed or solid.
IF P_MODE  > = 2 THEN solid lines
ELSE DASHED LINES
```

Smoothing: ALT_WHEELS is calculated as defined in paragraph 4.7.10.4

When Displayed: Symbol is displayed during Format 2 when Autoland Monitor is valid and I_PHASE is greater than 3. Symbol is blanked when WOW occurs or when the declutter level is 3 or greater, or if the conditions of paragraph 4.7.10.6 have occurred.

### 4.7.10.15 DISPLAY FORMAT 3. TBD

### 4.7.10.16 DISPLAY FORMAT 4. TBD

### 4.7.10.17 DISPLAY FORMAT 5. TBD

### 4.7.10.18 DISPLAY FORMAT 6.

The Test Format shall be counted as one of the six format capabilities of the HUD and is pictured in Figures 4.7.7–1 through 4.7.7–3 and Figures 4.7.10–28 through 4.7.10–31. The test format will provide for complete exercise of the display symbology at the PDU. The Test format will be displayed at the PDU if GPC format number received identifies this format or if the mode select switch is set to test. The test format is reserved to the HOS and/or HUS.

### 4.7.10.19 VU OPS 8.

VU OPS 8 on–orbit checkout capability has been provided to drive the display to predefined points as shown by Figure 4.7.8–1. The values for the variables are defined in Table 4.7.10–3.

### 4.7.10.20 VU OPS 9.

VU OPS 9 ground checkout capability has been provided to drive the display to predefined points as shown by Figure 4.7.9–1. The values for the variables are defined in Table 4.7.10–3.

Table 4.7.10-3. Variable Definition Table for Vu Ops 8 And Vu Ops 9

| Variable | OPS 8 Low Values | | OPS 9 Low Values | |
|---|---|---|---|---|
| PITCH[1] | 20.0 | DEG | – 45.0 | DEG |
| ROLL[2] | 20.0 | DEG | – 45.0 | DEG |
| H | 200.0 | FT | –100.0 | FT |
| RALT | 200.0 | FT | 0.0 | FT |
| EAS | 20.0 | KNOTS | 0.0 | KNOTS |
| VEH_ACC | 0 | NA | – 5.0 | G’S |
| GEAR | 0 | NA | 0 | NA |
| GR_TR | 0 | NA | 0 | NA |
| GR_DWN | 0 | NA | 0 | NA |
| I_PHASE | 3 | NA | 3 | NA |
| P_MODE | 2 | NA | 3 | NA |
| SB_POSITION | 20.0 | DEG | 35.0 | DEG |
| SB_COMMAND | 20.0 | DEG | 40.0 | DEG |
| DR | 0.0 | FT | 0.0 | FT |
| CR | 0.0 | FT | 0.0 | FT |
| HR | –200.0 | FT | 0.0 | FT |
| XDOT | 1000.0 | FPS | 1000.0 | FPS |
| YDOT | – 30.0 | FPS | 62.0 | FPS |
| ZDOT | –274.0 | FPS | 1134.0 | FPS |
| FPA_REF2 | 15.0 | DEG | –50.0 | DEG |
| ROLLERR | 0.0 | DEG | 0.0 | DEG |
| PITCHERR | 0.0 | G’S | 0.0 | G’S |
| RWHEADING | 20.0 | DEG | 90.0 | DEG |
| FPA_REF1 | – 20.0 | DEG | –20.0 | DEG |
| STEEP | 6500.0 | FT | 6500.0 | FT |
| ALT_ERROR | 0.0 | FT | 0.0 | FT |

[1] PITCH = ARCTAN (PTCHSIN/PTCHCOS)
[2] ROLL = ARCTAN (ROLLSIN/ROLLCOS)

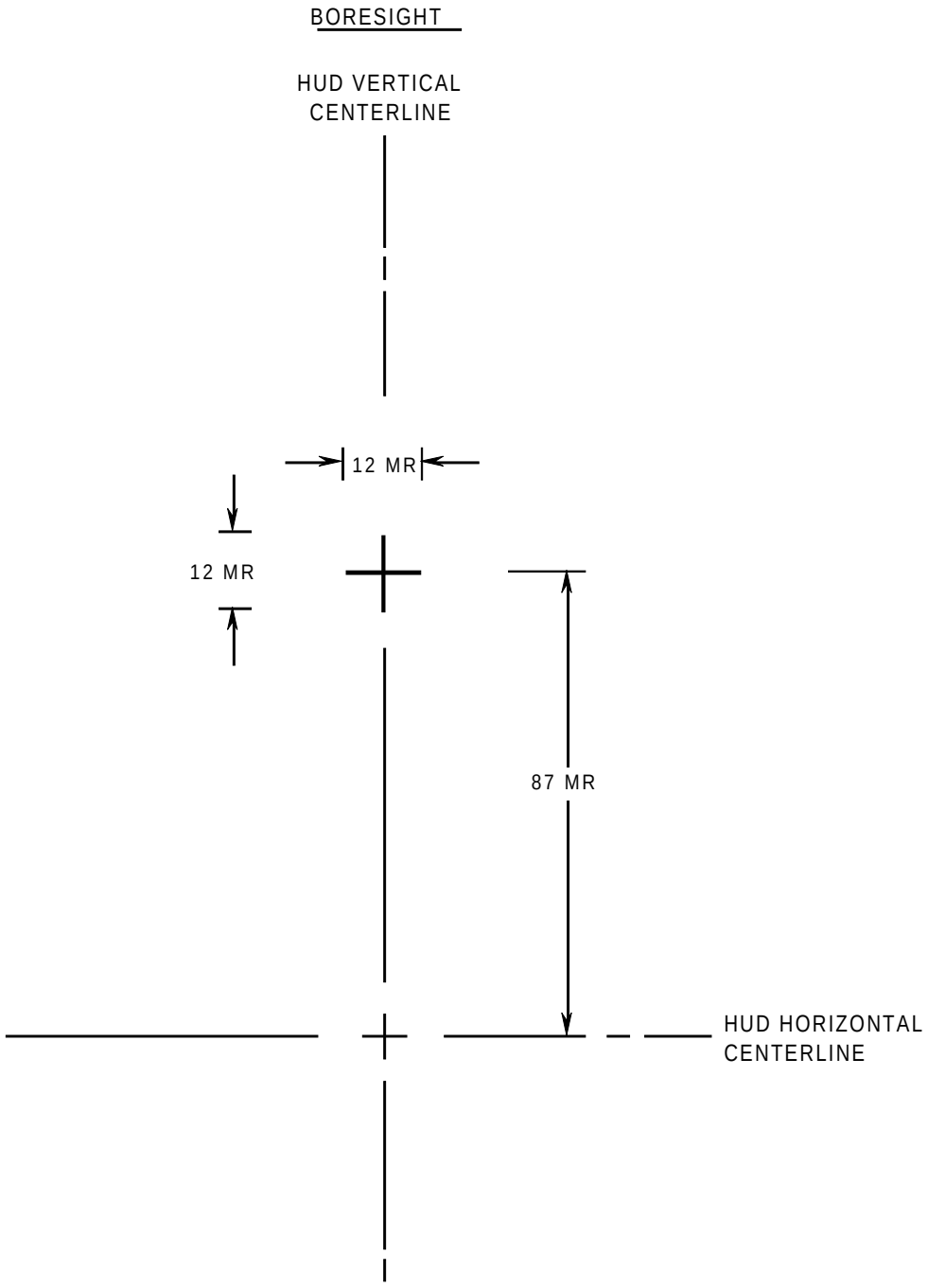



FIGURE 4.7.10-1. Boresight Symbol

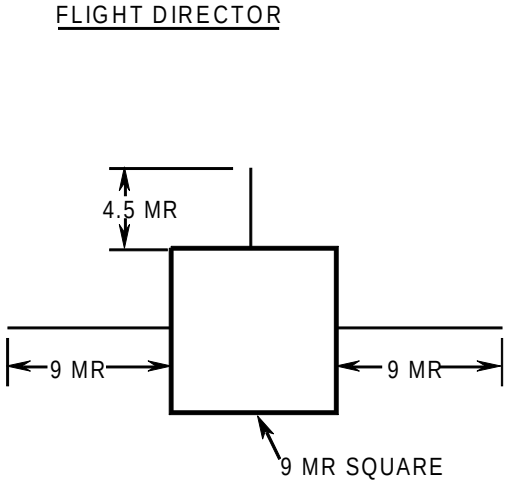



FIGURE 4.7.10-2.Flight Director/Velocity Vector Symbols

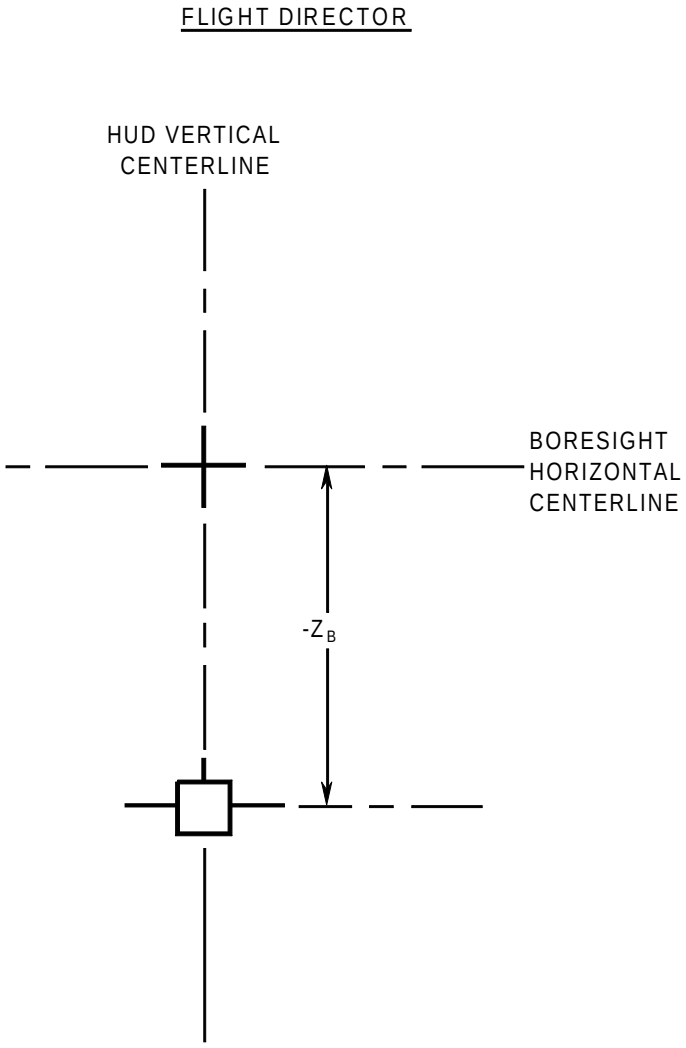



FIGURE 4.7.10-3. Flight Director/Velocity Vector Symbols (Cont'd)

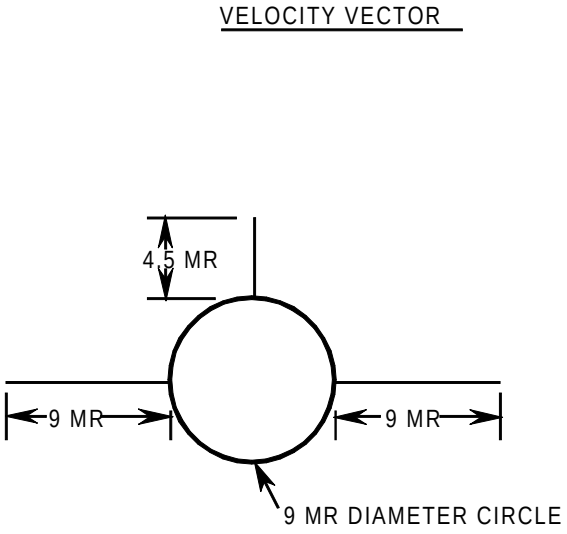



FIGURE 4.7.10-4. Flight Director/Velocity Vector Symbols (Cont'd)

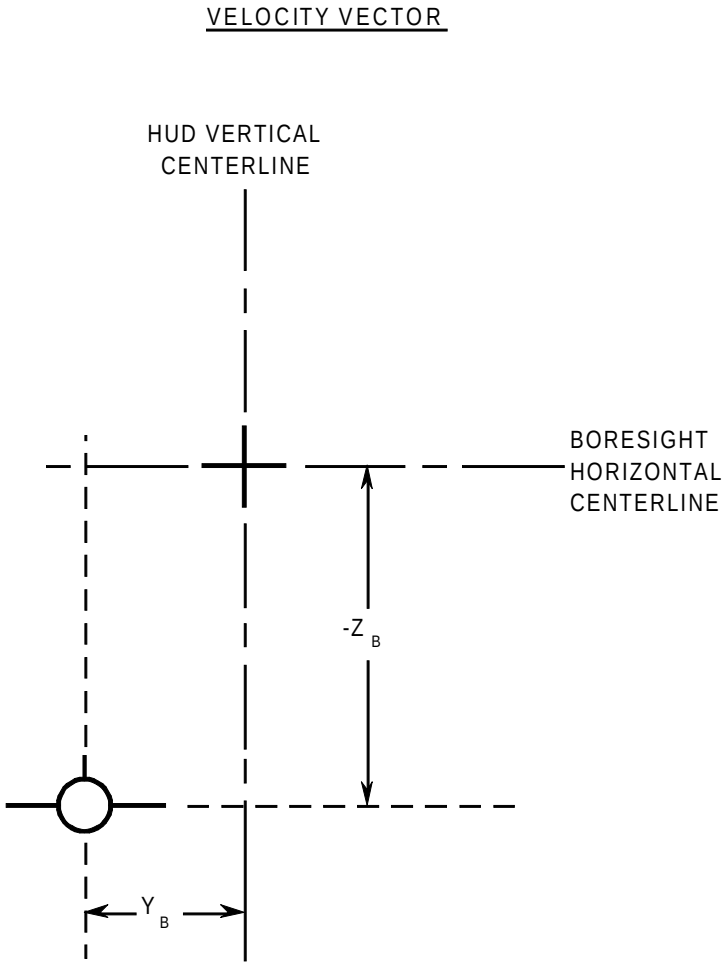
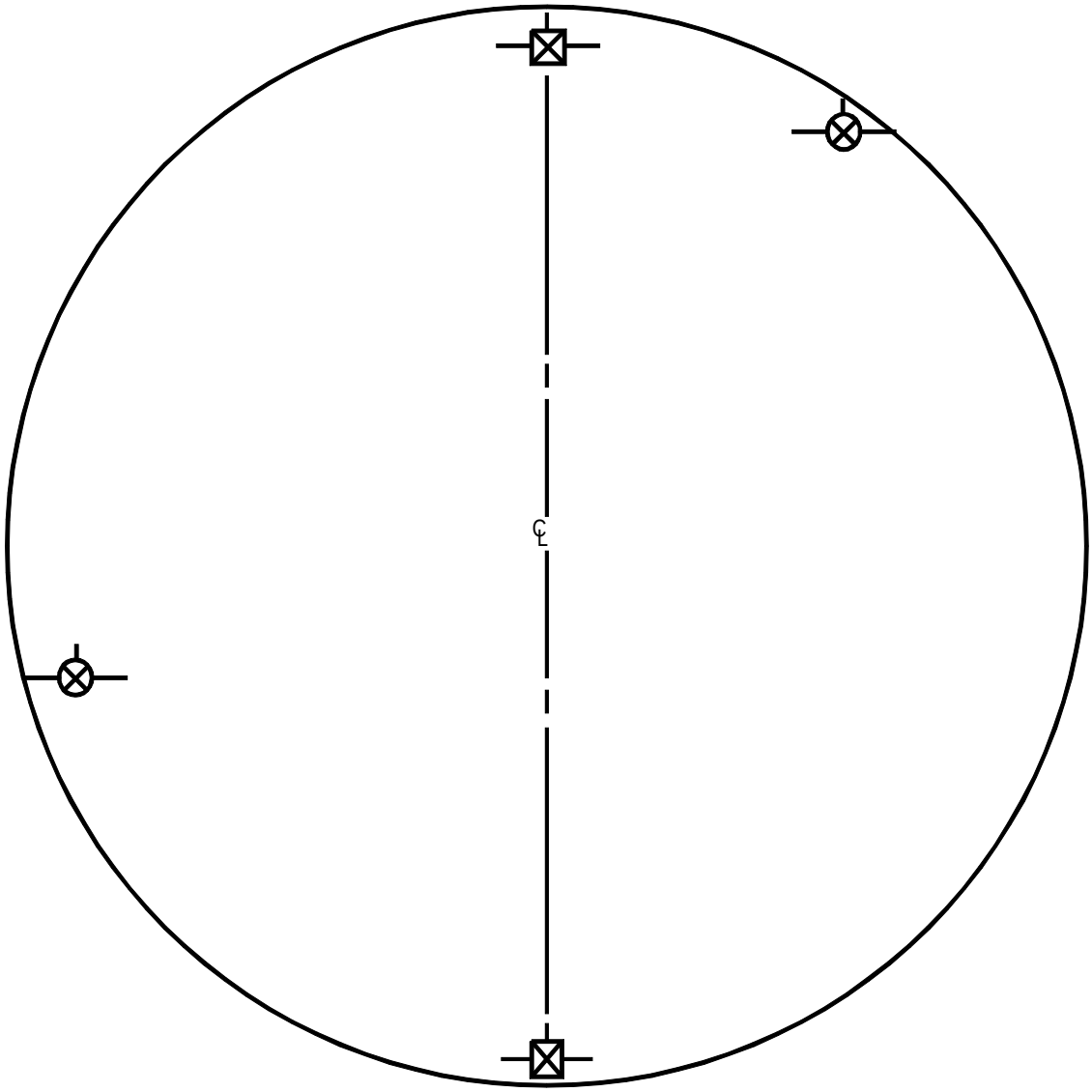



FIGURE 4.7.10-5. Flight Director/Velocity Vector Symbols (Cont'd)

FLIGHT DIRECTOR/VELOCITY VECTOR



NOTE: TWO EXAMPLES OF THE FLIGHT DIRECTOR BEING LIMITED AND TWO EXAMPLES OF THE VELOCITY VECTOR BEING LIMITED TO FOV. SYMBOLS ARE ACTUALLY FARTHER OUT OF FOV BUT ARE RESTRICTED BY DEFINITION TO STAY IN FOV AND HAVE AN X INSIDE THEM.

FIGURE 4.7.10-6. Flight Director/Velocity Vector Symbols (Cont'd)

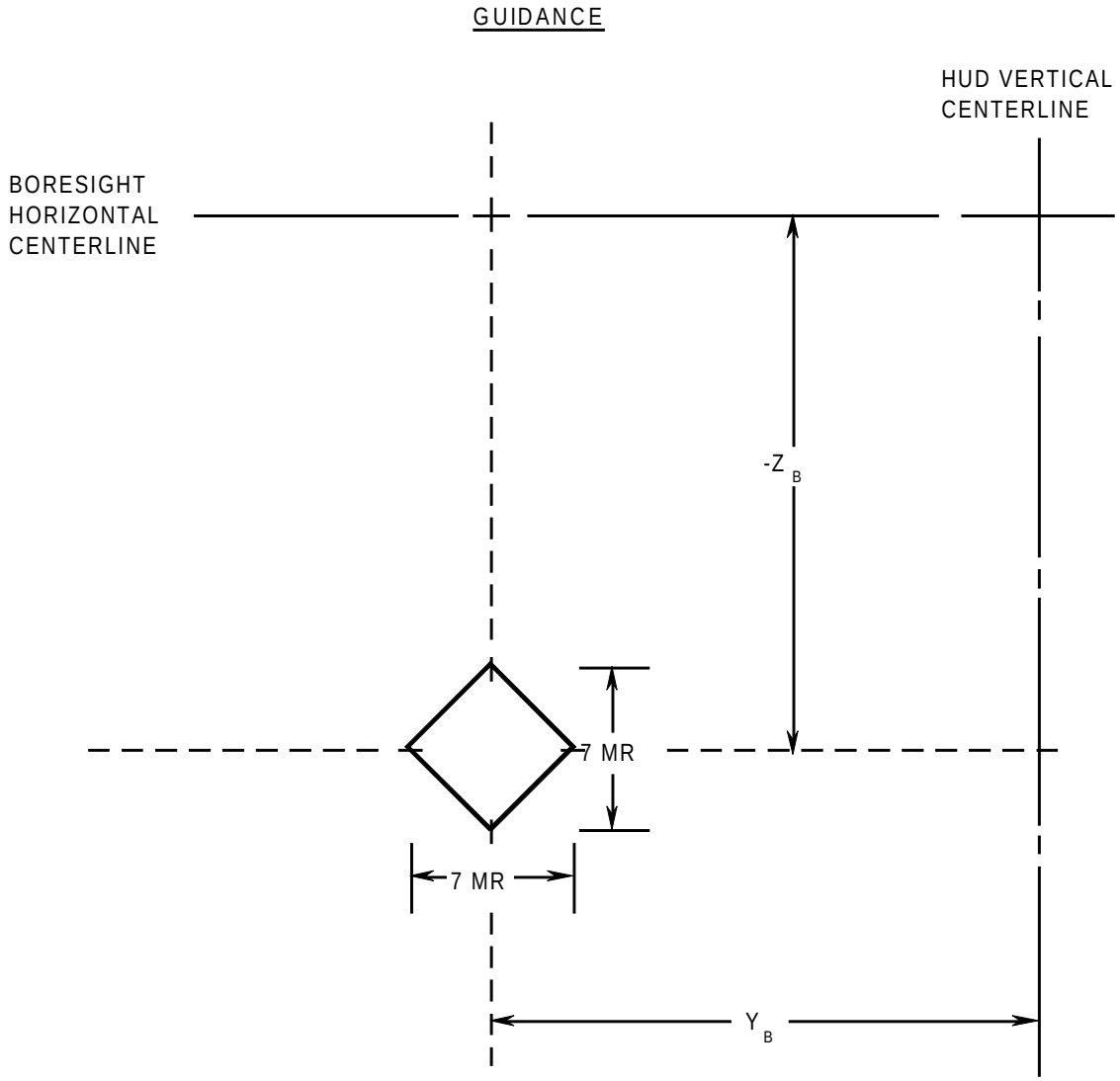



FIGURE 4.7.10-7. Guidance Symbol

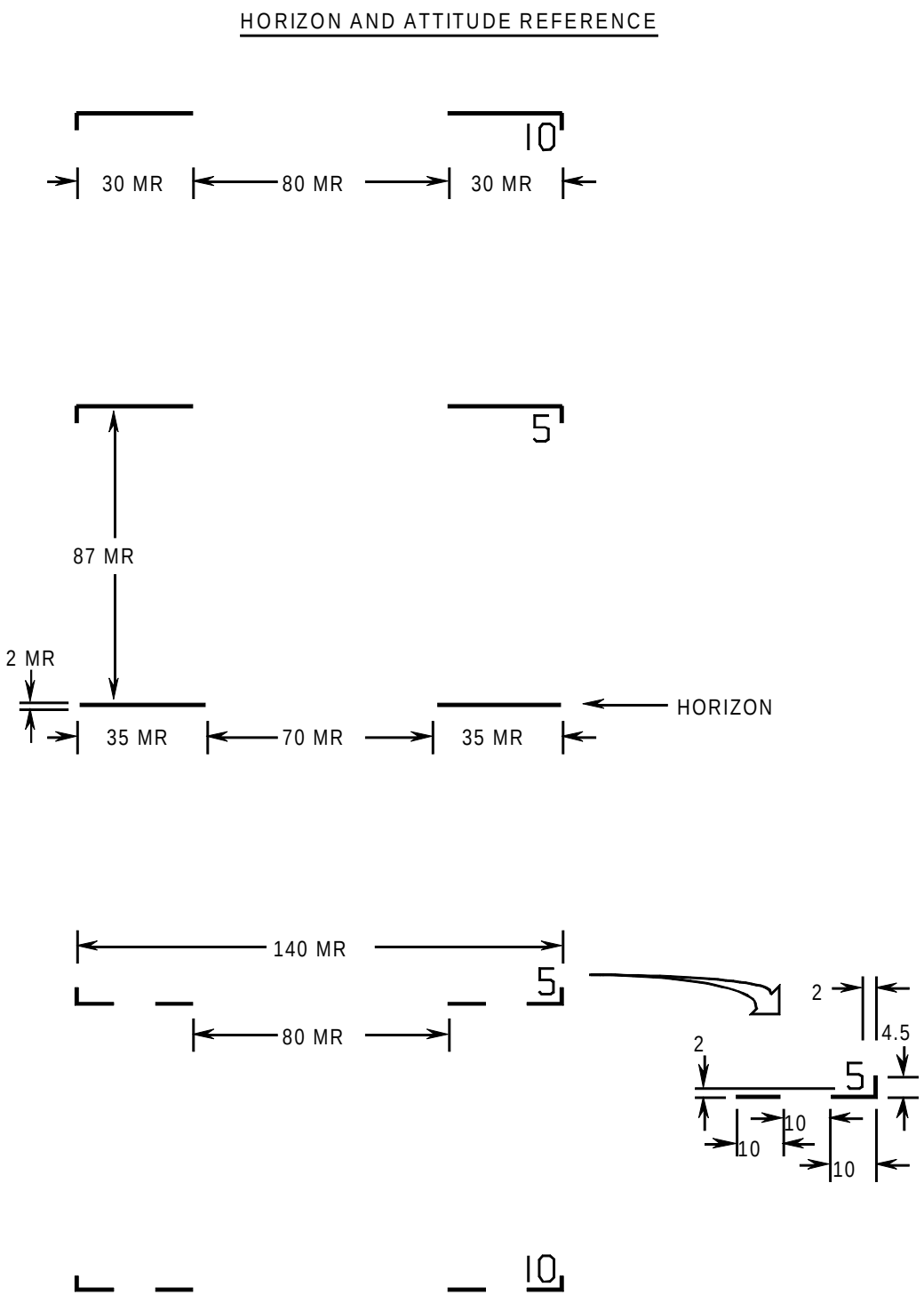



FIGURE 4.7.10-8. Horizon and Attitude Reference Symbol

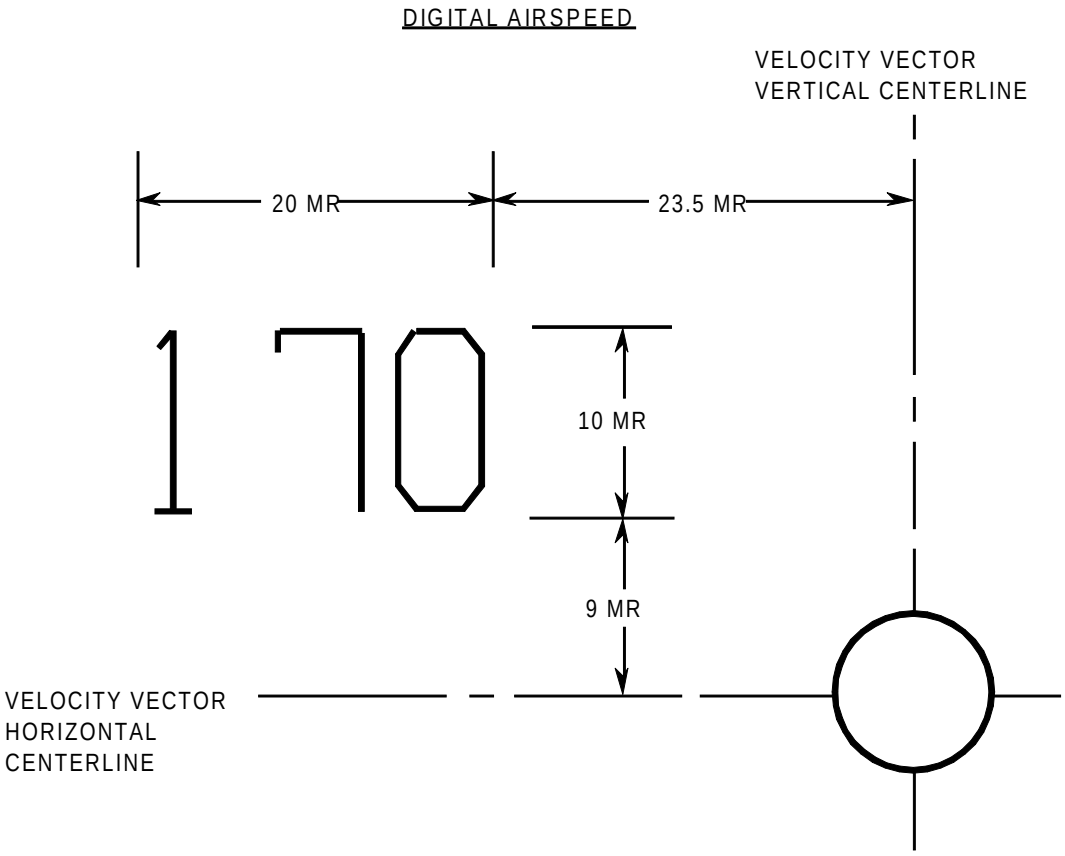



FIGURE 4.7.10-9. Digital Airspeed

DIGITAL GROUNDSPEED

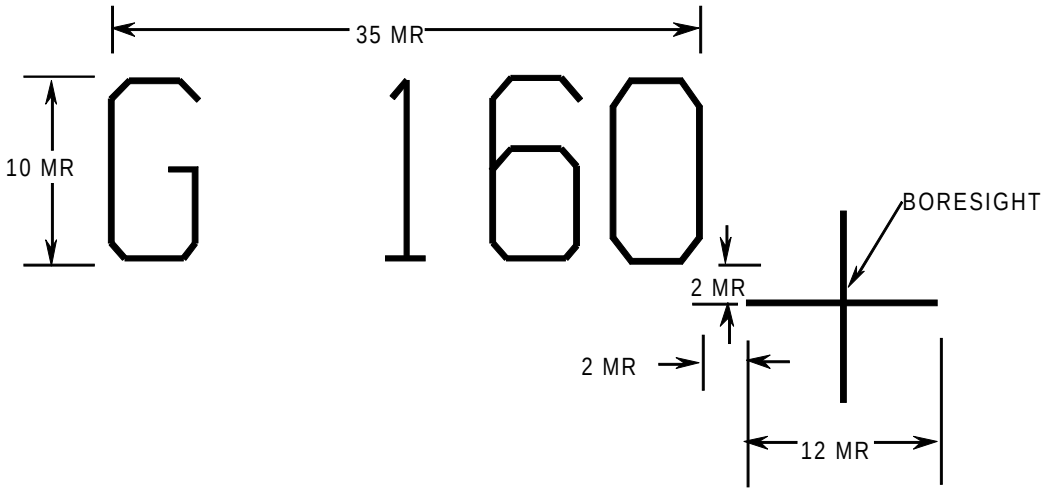



FIGURE 4.7.10-10. Digital Airspeed (Cont'd)

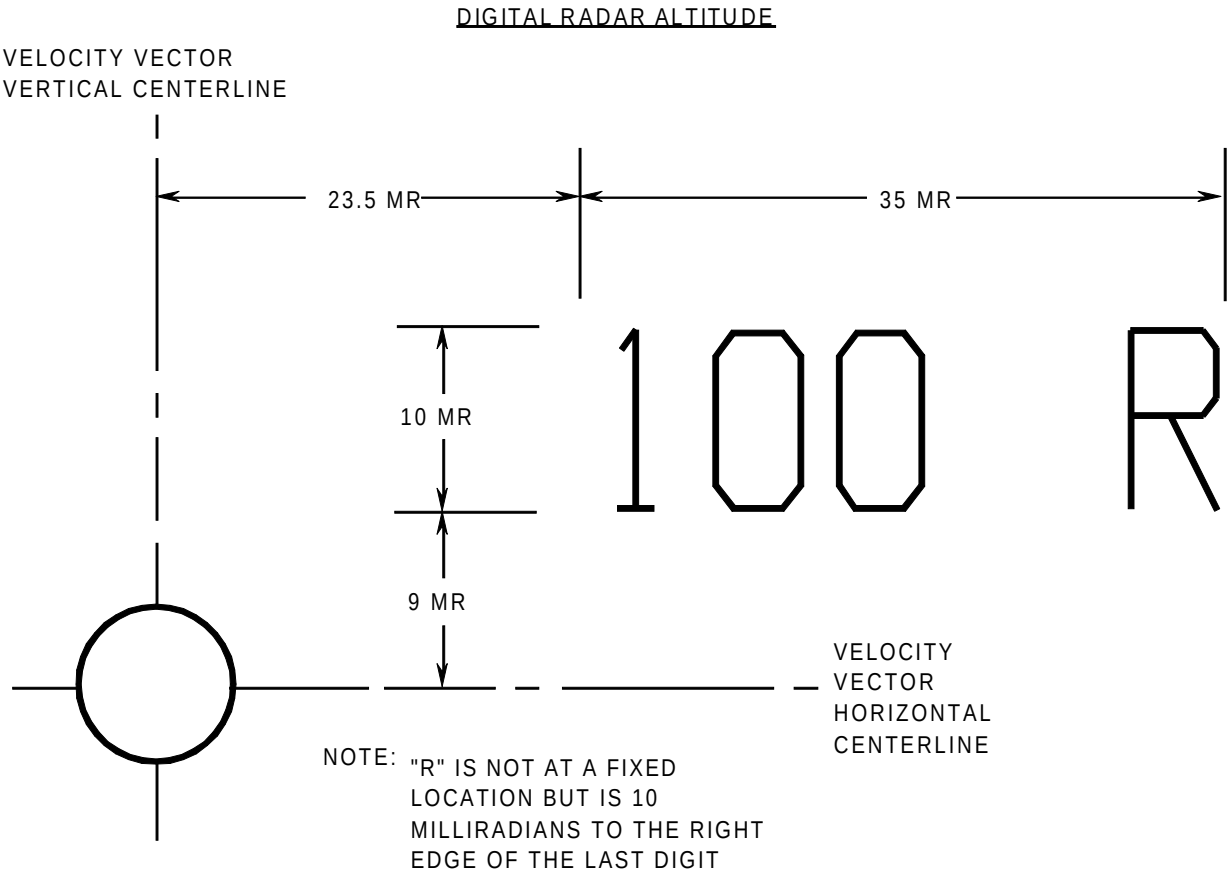



FIGURE 4.7.10-11. Digital Altitude

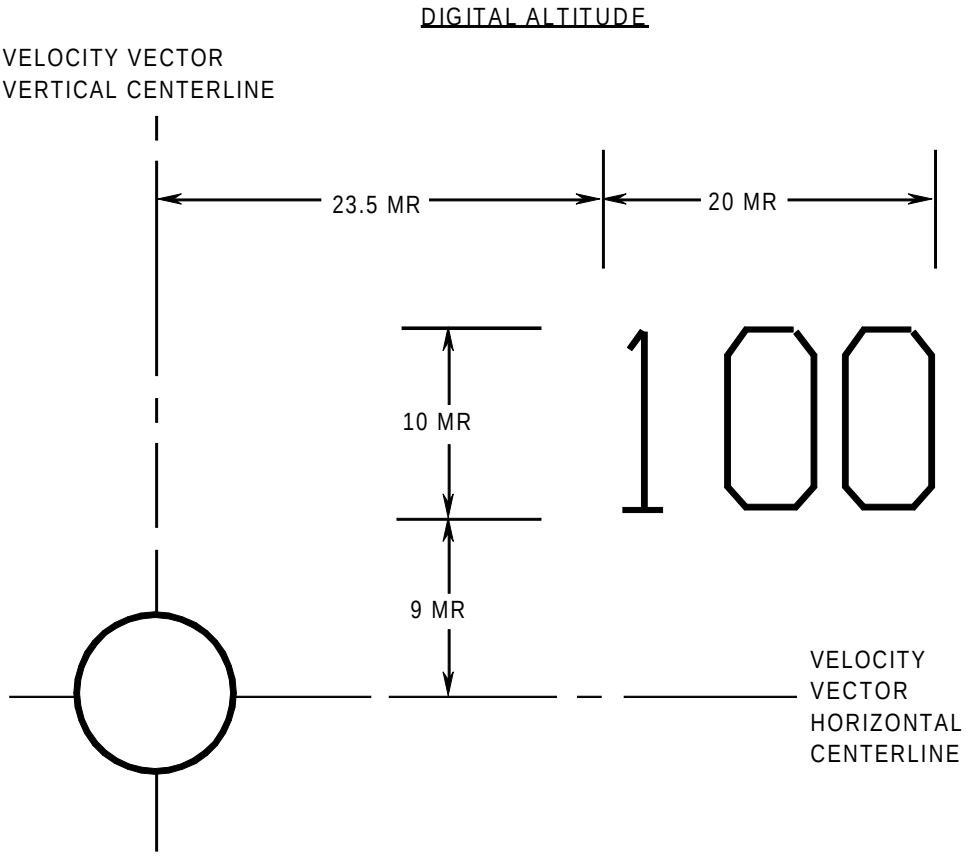
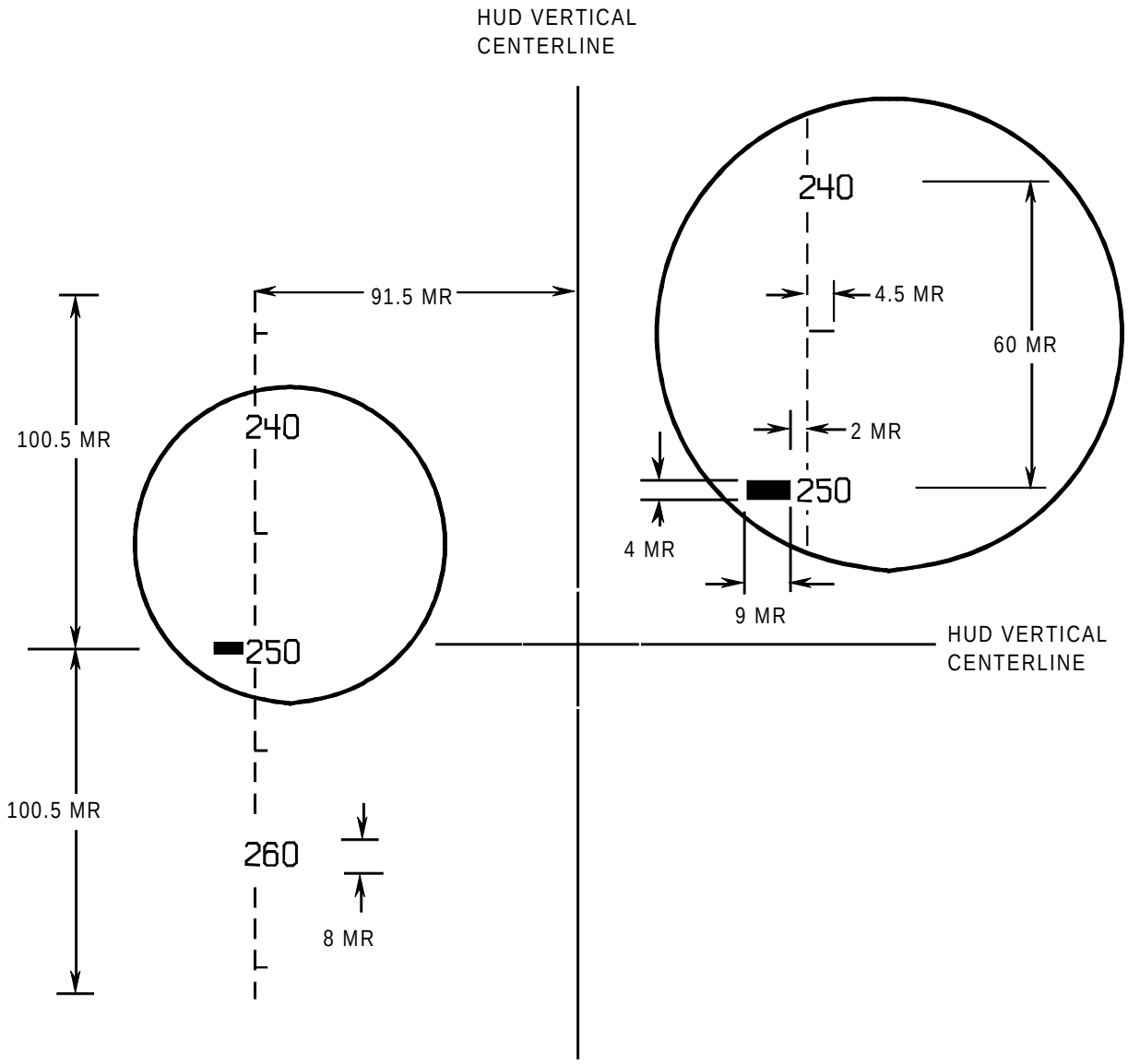



FIGURE 4.7.10-12. Digital Altitude (Cont'd)

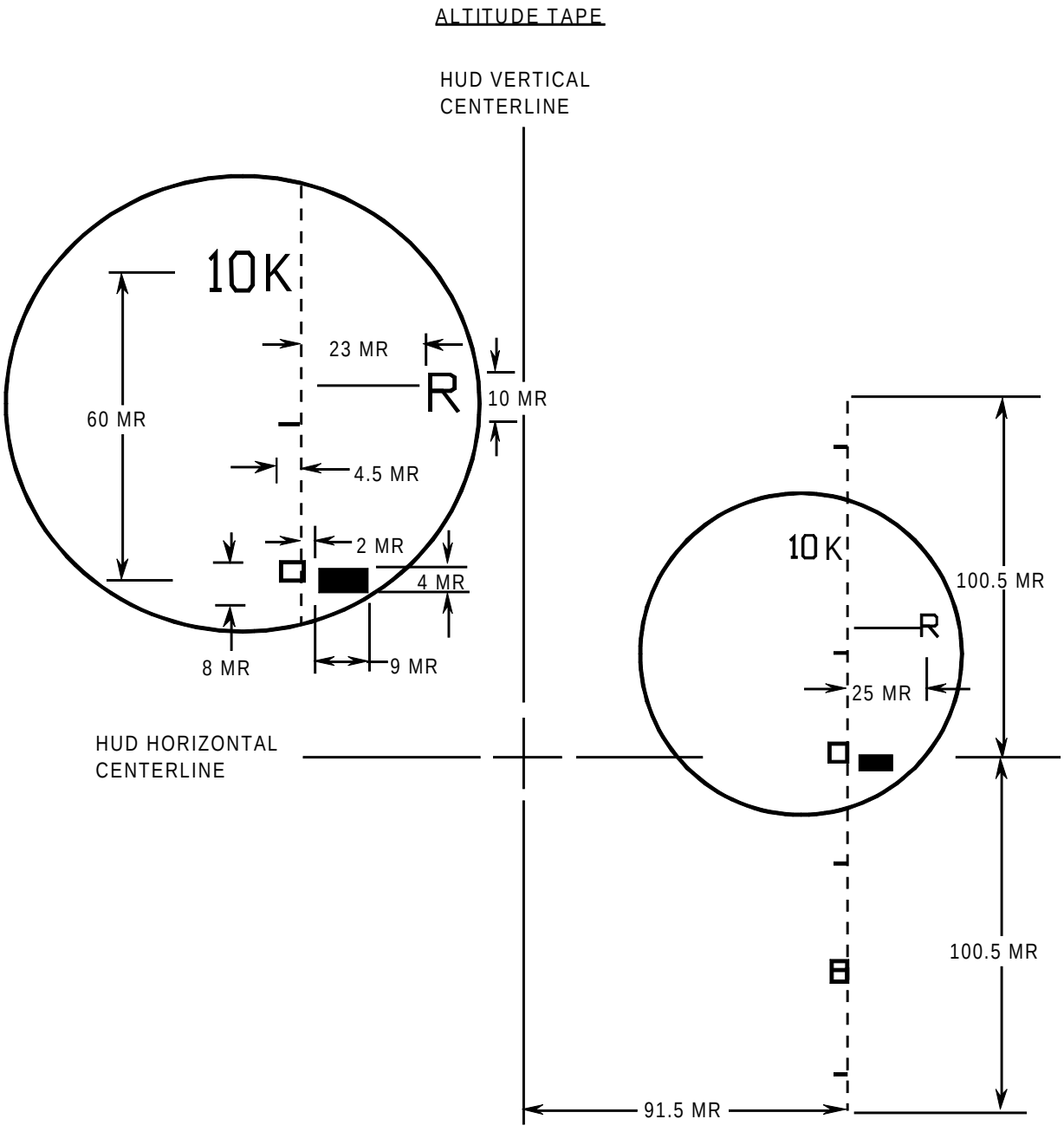
AIRSPEED TAPE




NOTE:

DOTTED LINES ARE ONLY USED FOR DIMENSIONING FIGURE. THEY ARE NOT ON ACTUAL DISPLAY

FIGURE 4.7.10-13. Airspeed Tape




NOTE:
DOTTED LINES ARE ONLY USED FOR DIMENSIONING FIGURE. THEY ARE NOT ON ACTUAL DISPLAY.

FIGURE 4.7.10-14. Altitude Tape

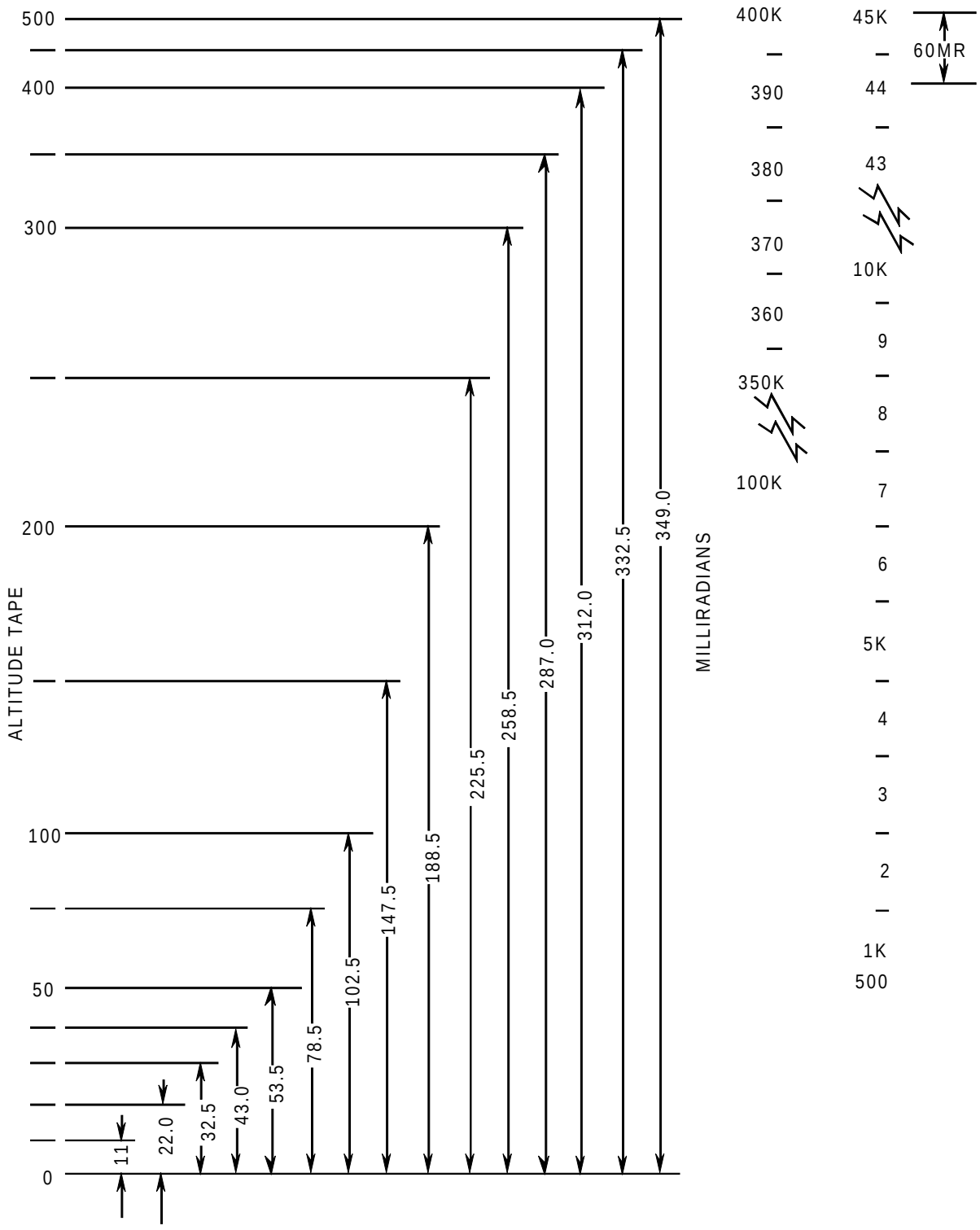



FIGURE 4.7.10-15. Altitude Tape (Cont'd)

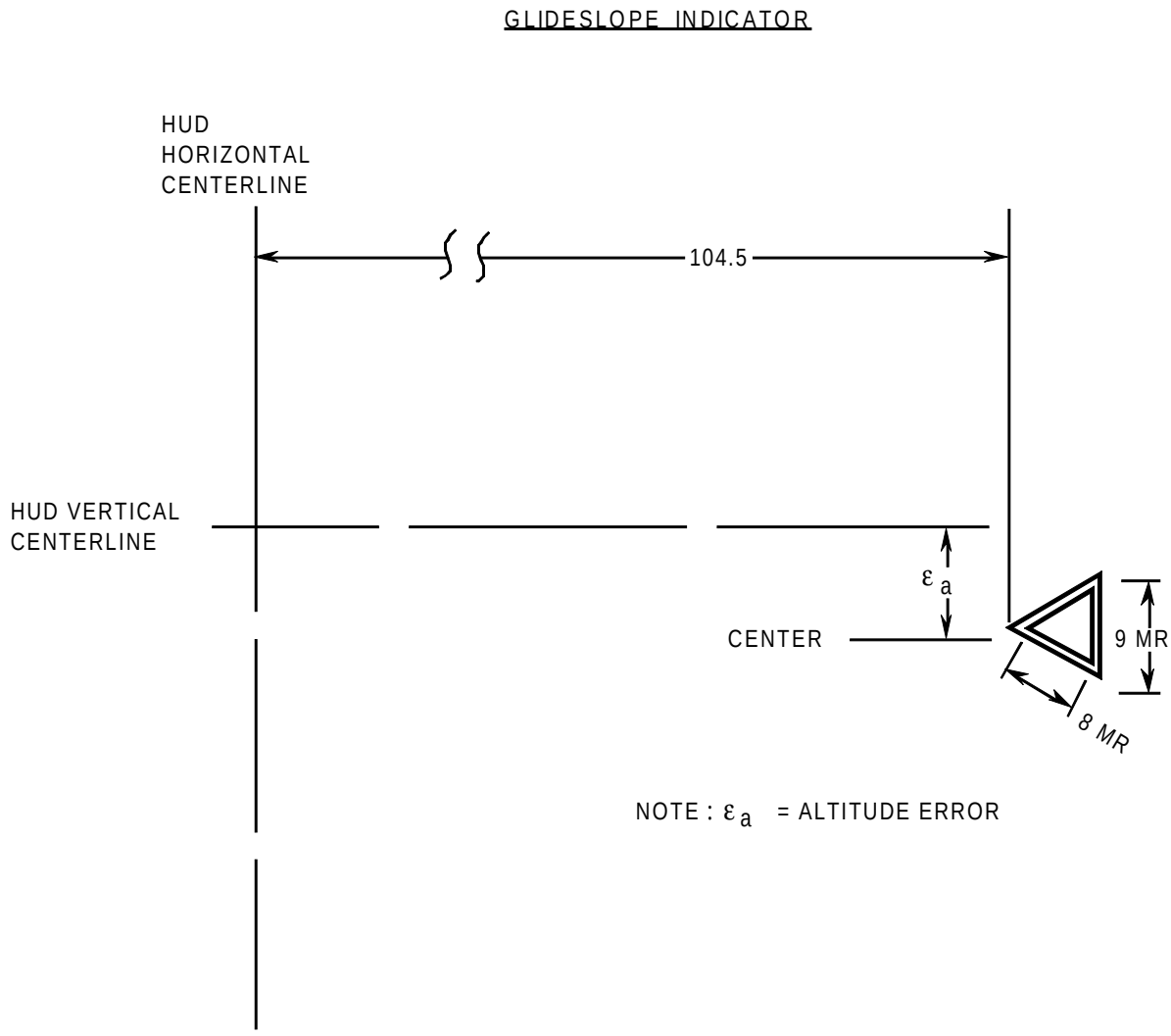



FIGURE 4.7.10-16. Glideslope Indicator

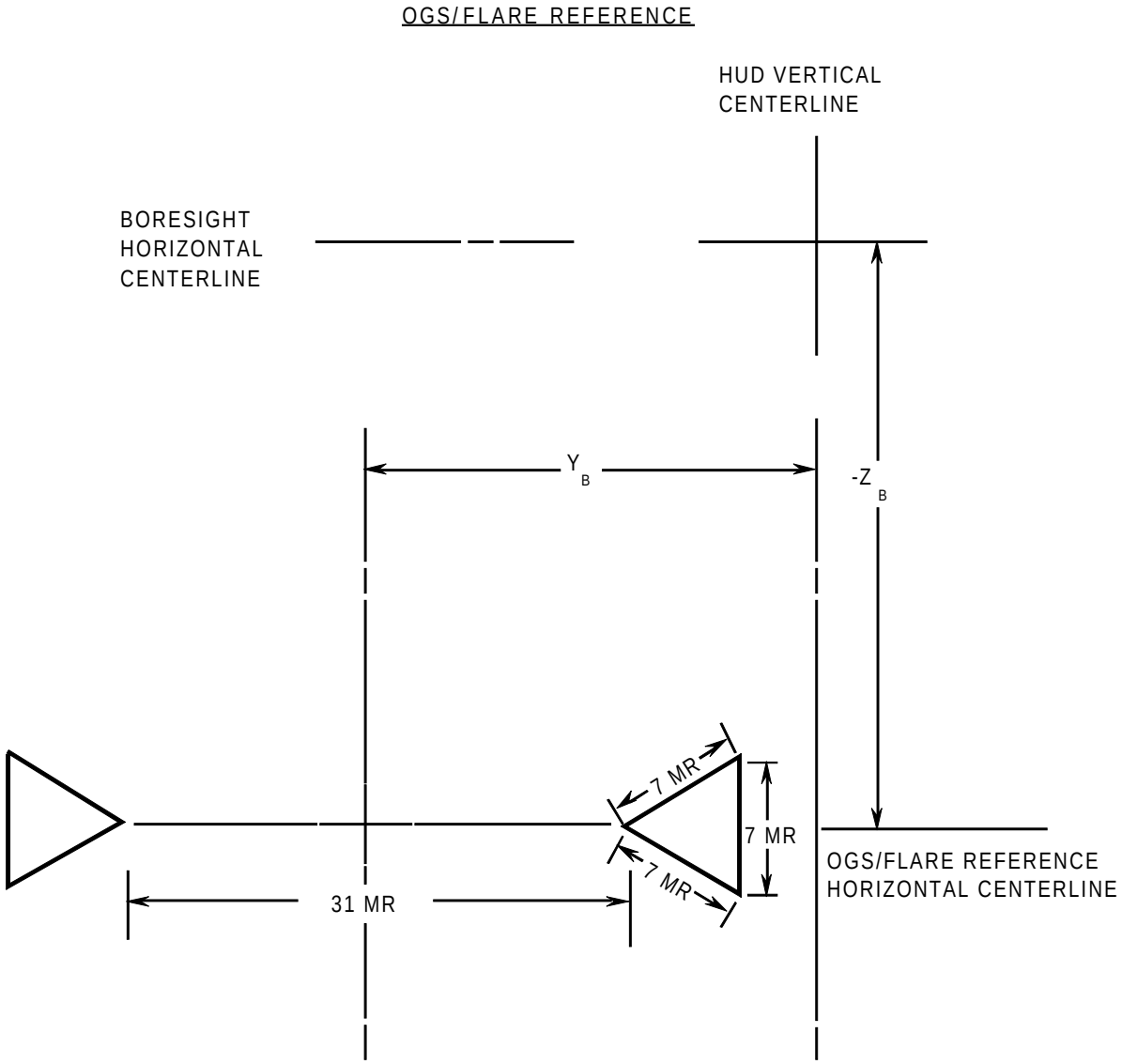



FIGURE 4.7.10-17. Outer Glideslope (OGS)/Flare Reference

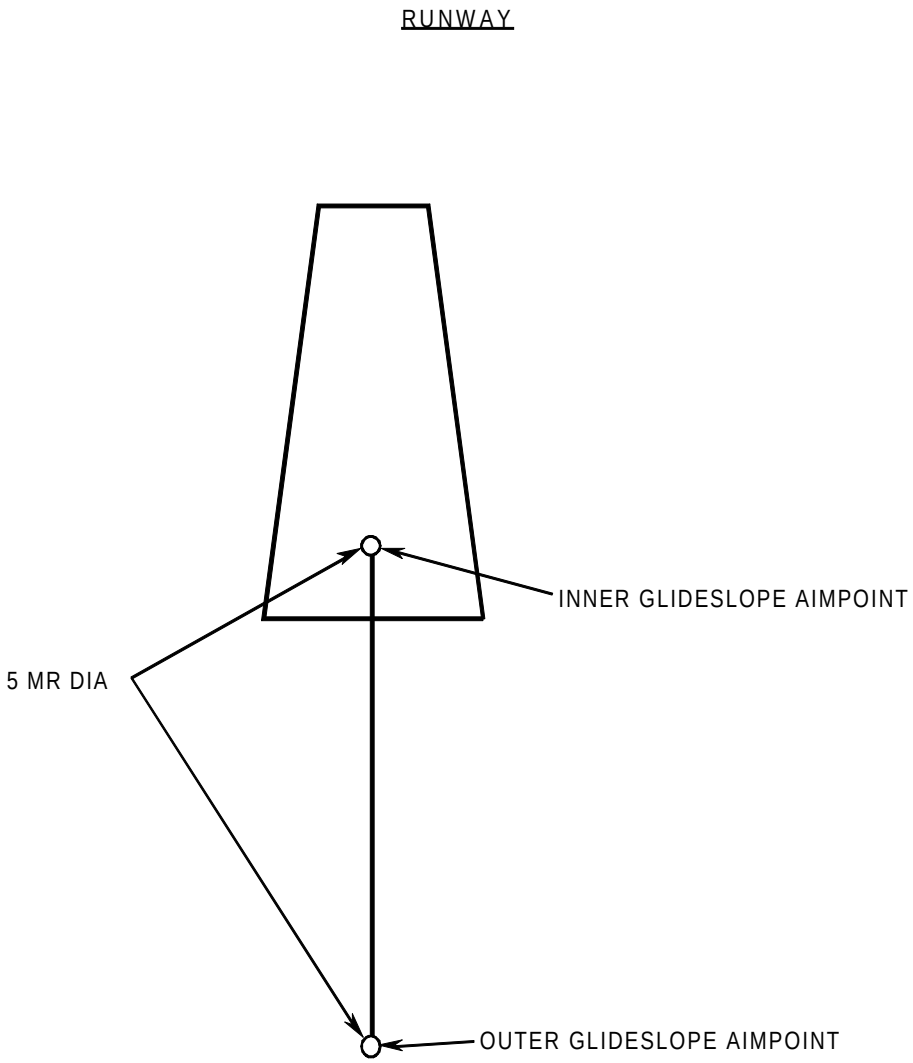



FIGURE 4.7.10-18. Runway

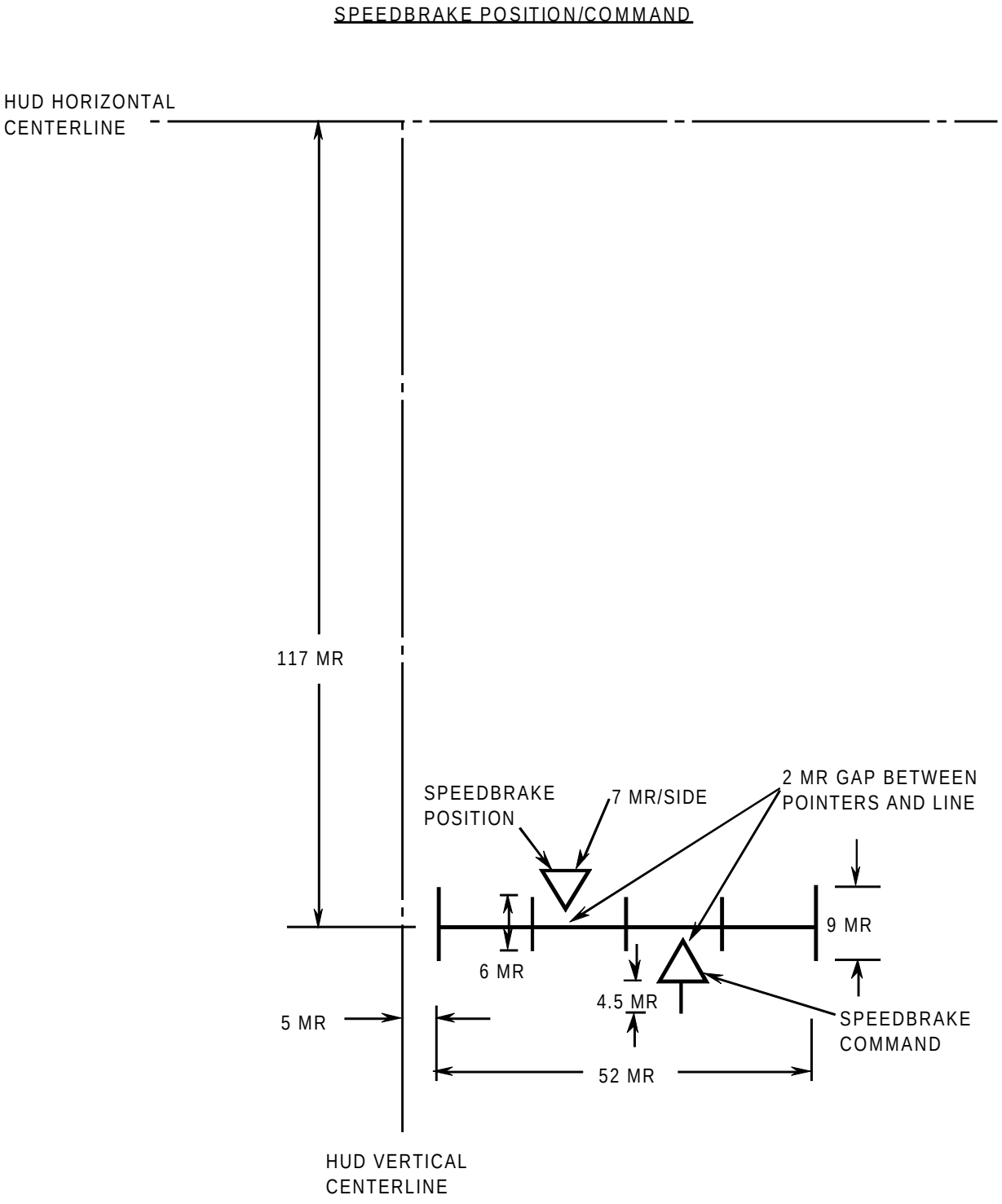



FIGURE 4.7.10-19. Speedbrake Scale

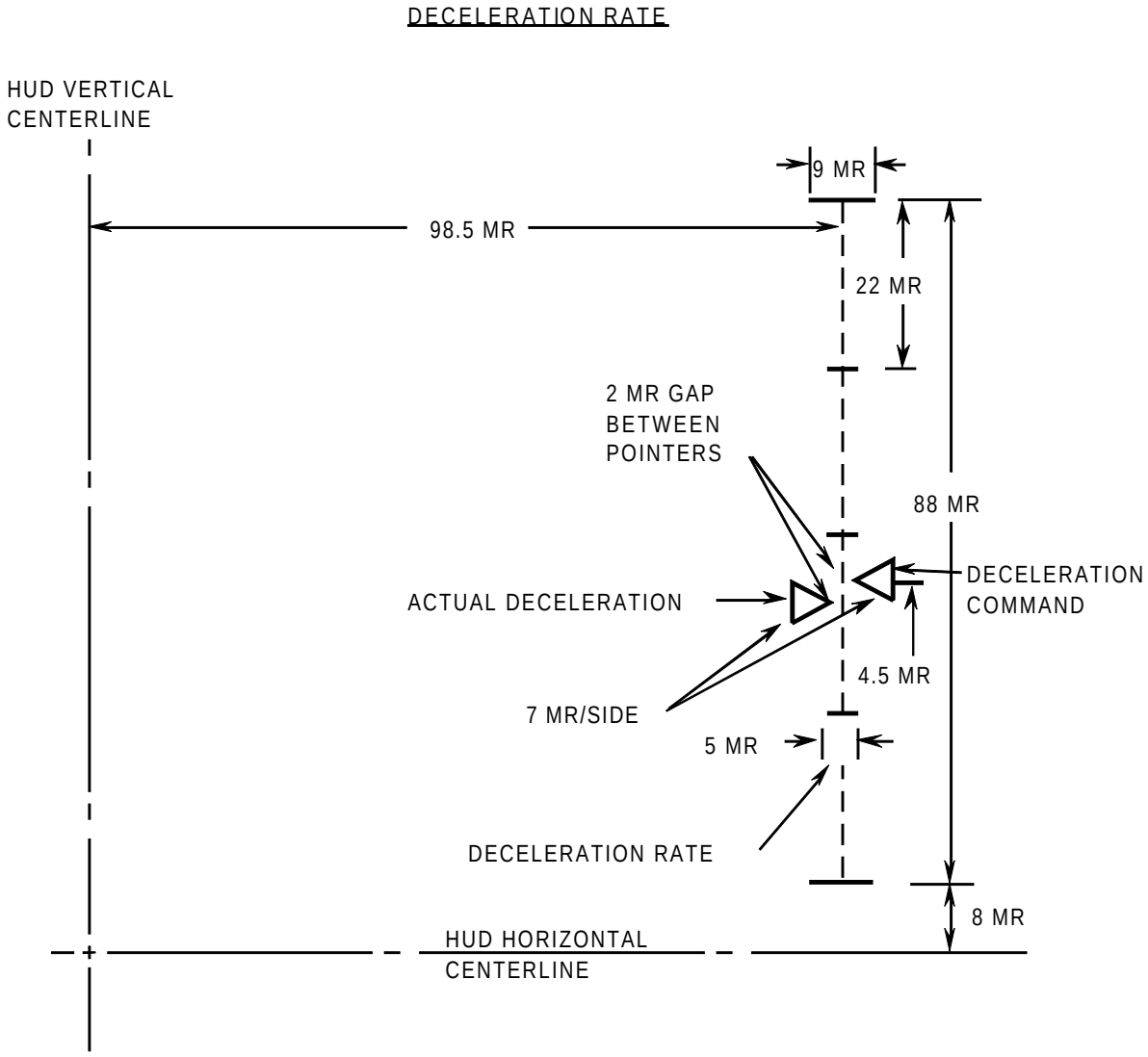
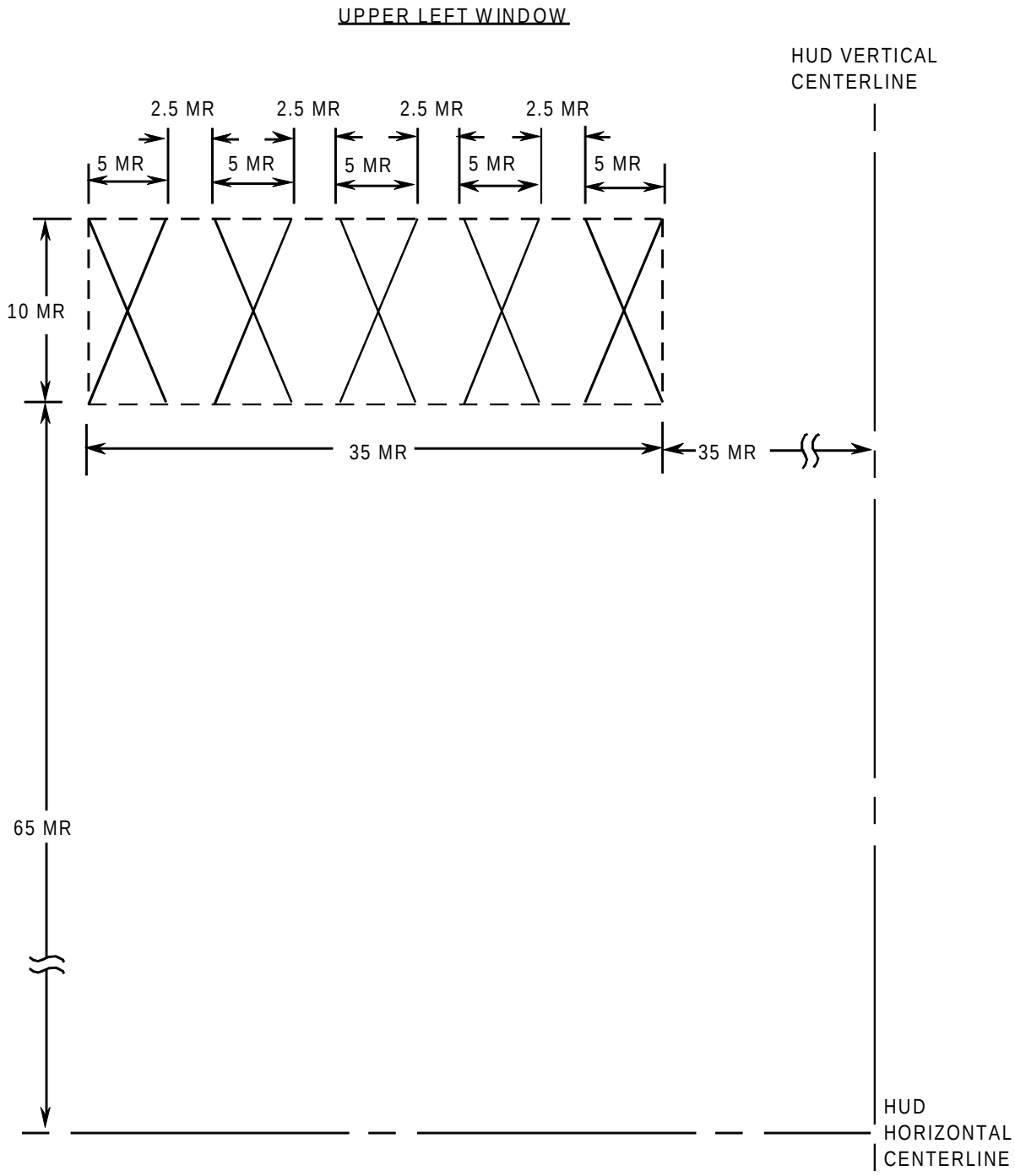


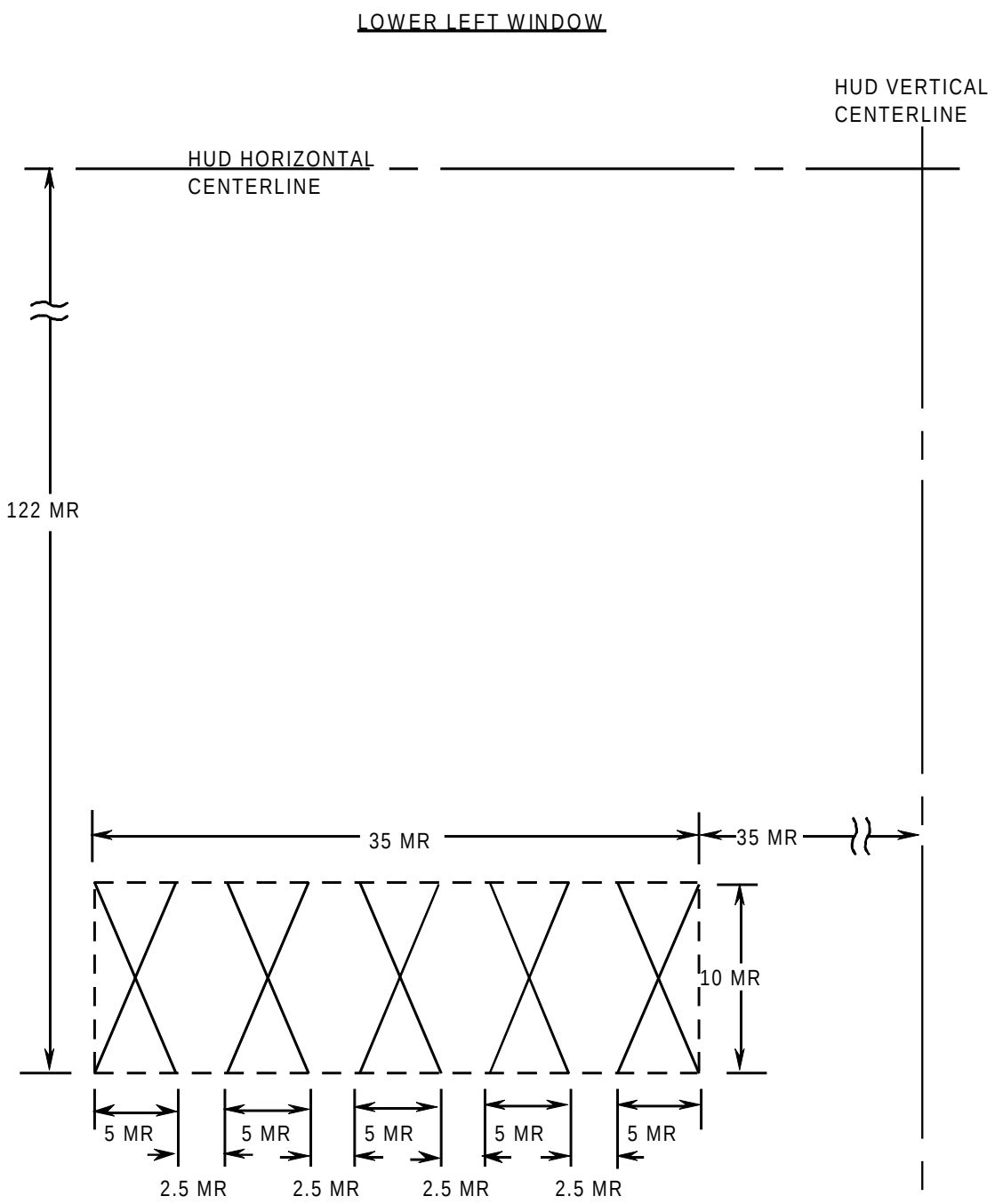

FIGURE 4.7.10-20. Deceleration Rate Scale




NOTE:

WINDOW HAS A MAXIMUM OF 5 CHARACTERS IN IT. WHEN LESS THAN 5 CHARACTERS ARE DISPLAYED, THEY ARE LEFT JUSTIFIED. DOTTED LINES ARE IMAGINARY

FIGURE 4.7.10-21. Upper Left Window




NOTE:

WINDOW HAS A MAXIMUM OF 5 CHARACTERS IN IT. WHEN LESS THAN 5 CHARACTERS ARE DISPLAYED THEY ARE LEFT JUSTIFIED. THE DOTTED LINES ARE IMAGINARY.

FIGURE 4.7.10-22. Lower Left Window

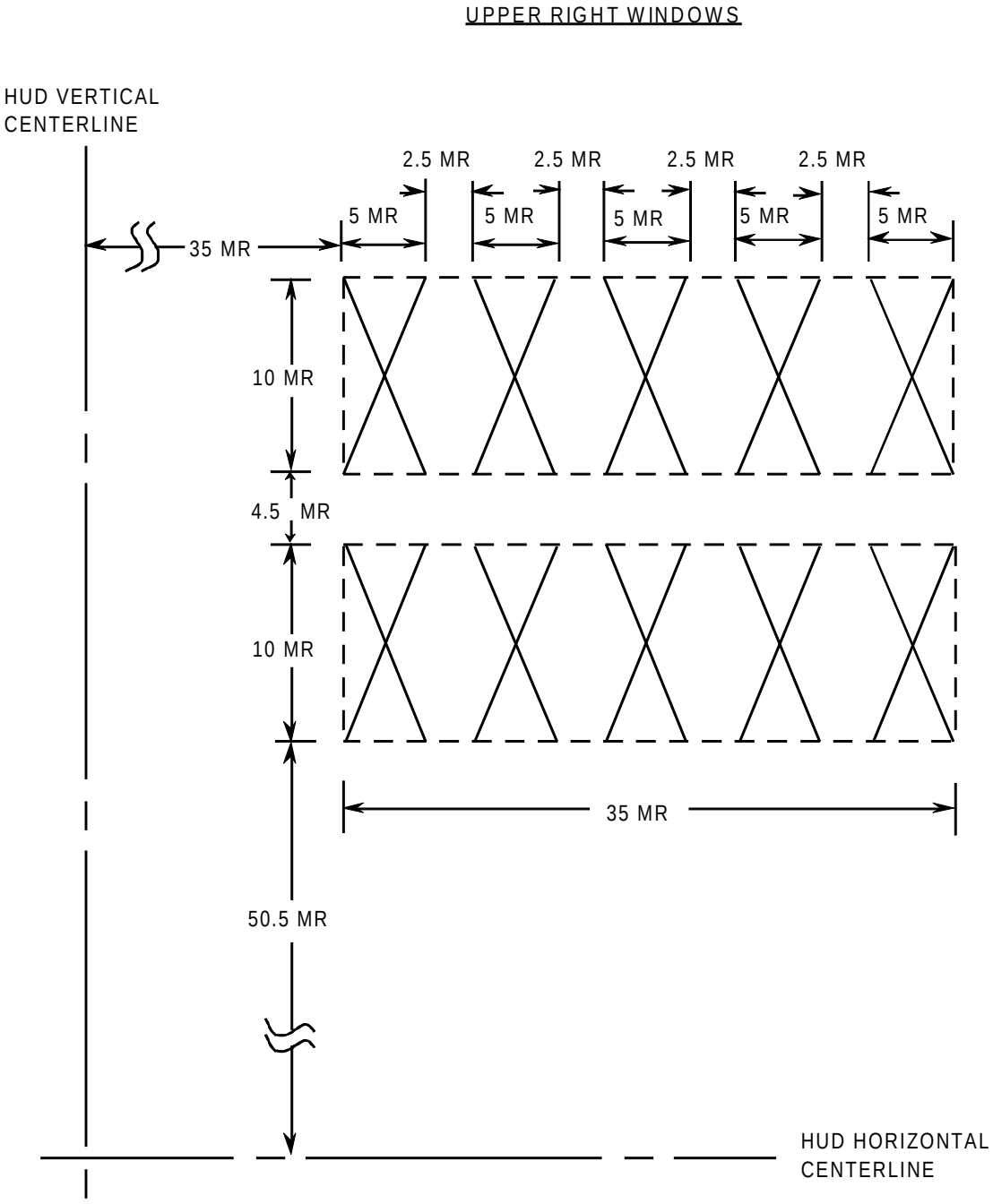
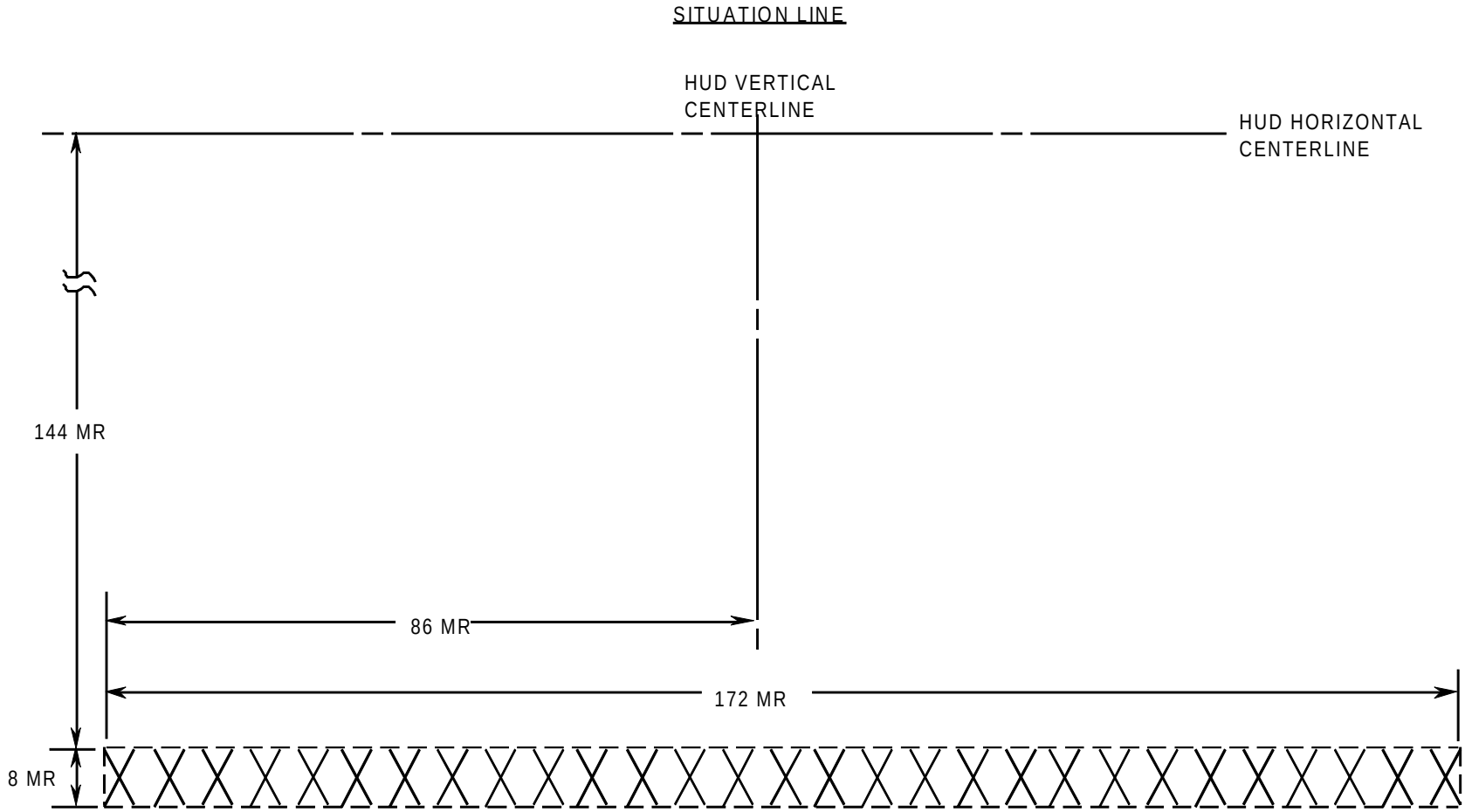



FIGURE 4.7.10-23. Upper Right Windows




NOTE:

MAXIMUM OF 29 CHARACTER SPACES DISPLAYED. CHARACTERS ARE 8 MR X 4 MR WITH 2 MR GAPS BETWEEN THEM. THE DOTTED LINES ARE IMAGINARY.

FIGURE 4.7.10-24. Situation Line

NORMAL ACCELERATION

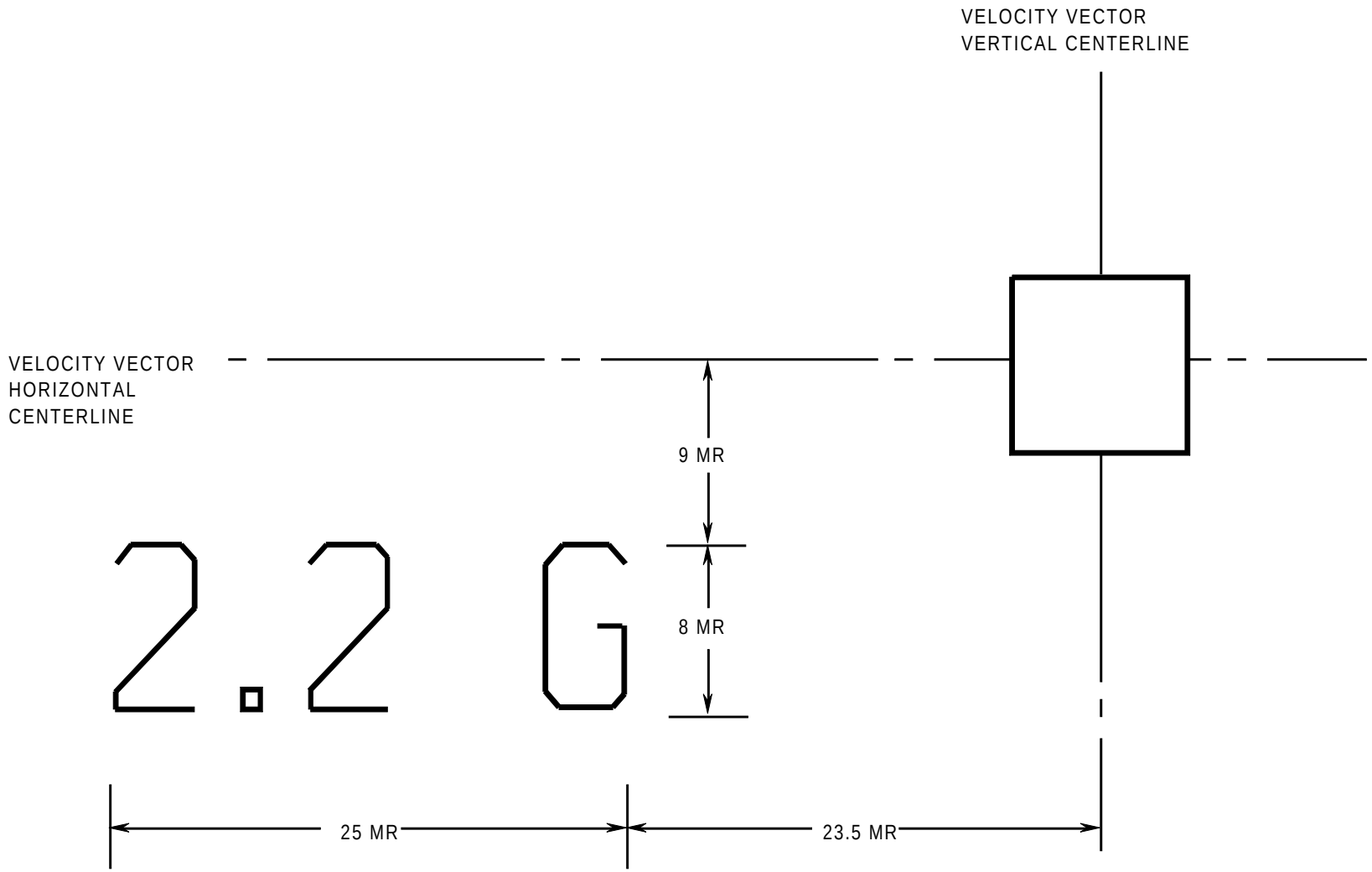



FIGURE 4.7.10-25. Normal Acceleration

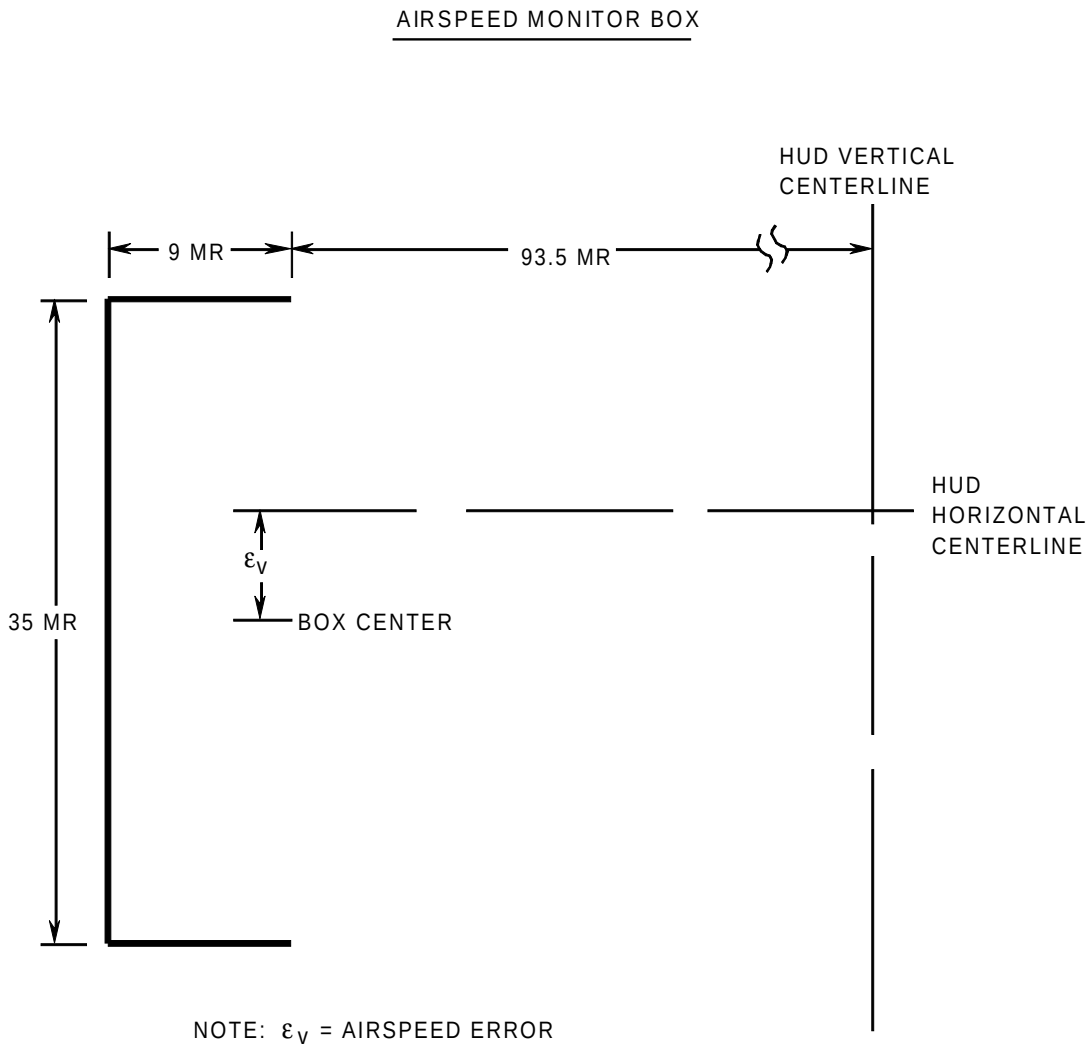
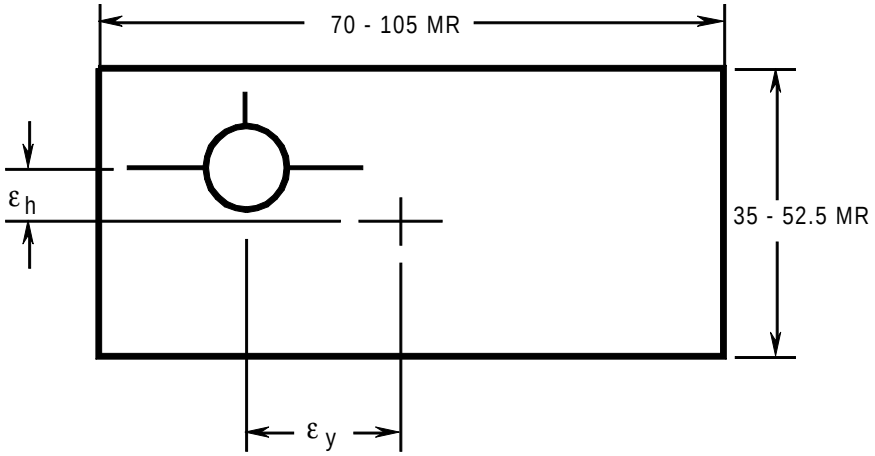



FIGURE 4.7.10-26. Airspeed Monitor Box

VELOCITY VECTOR BOX




$\varepsilon_y$ = CROSSTRACK ERROR

$\varepsilon_h$ = ALTITUDE RATE ERROR

FIGURE 4.7.10-27. Velocity Vector Monitor Box

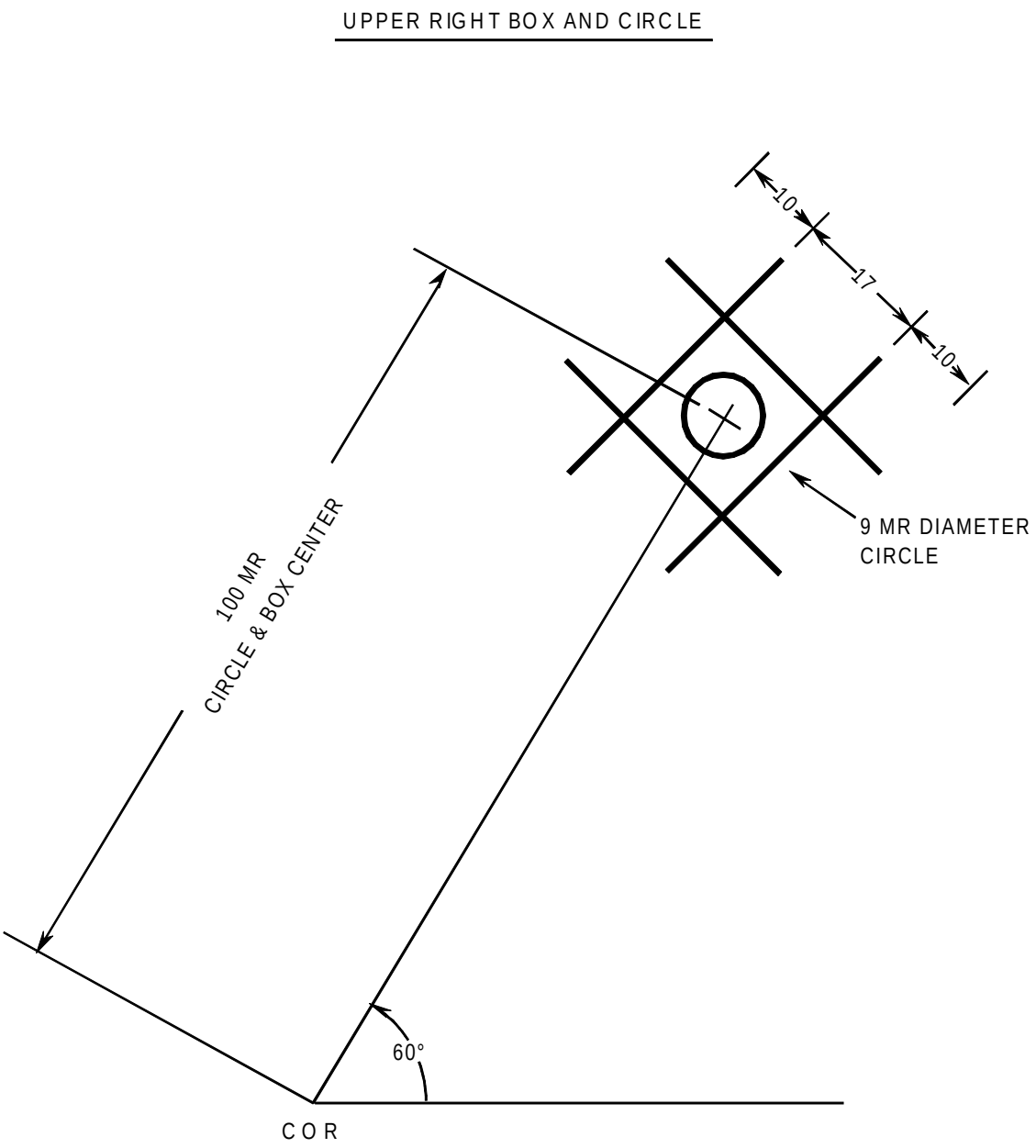



FIGURE 4.7.10-28. Display Format 6

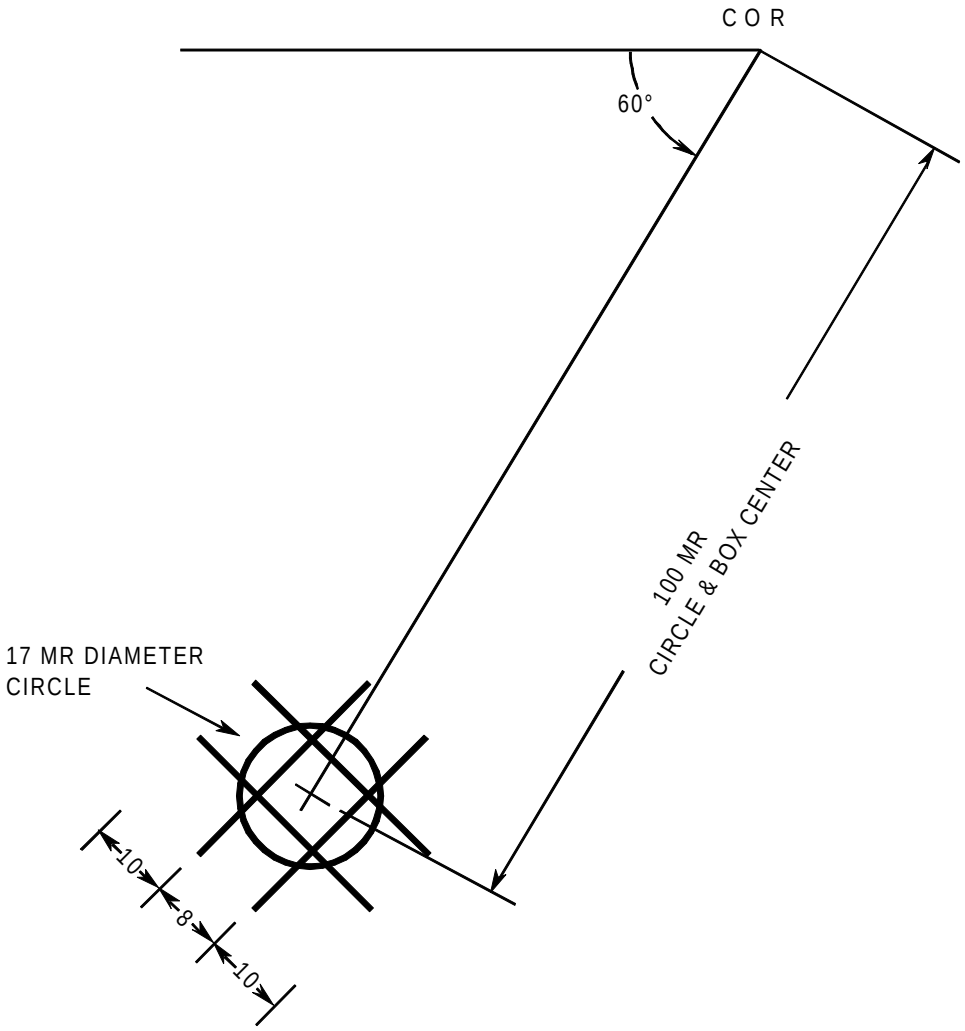



FIGURE 4.7.10-29. Display Format 6 (Cont'd)

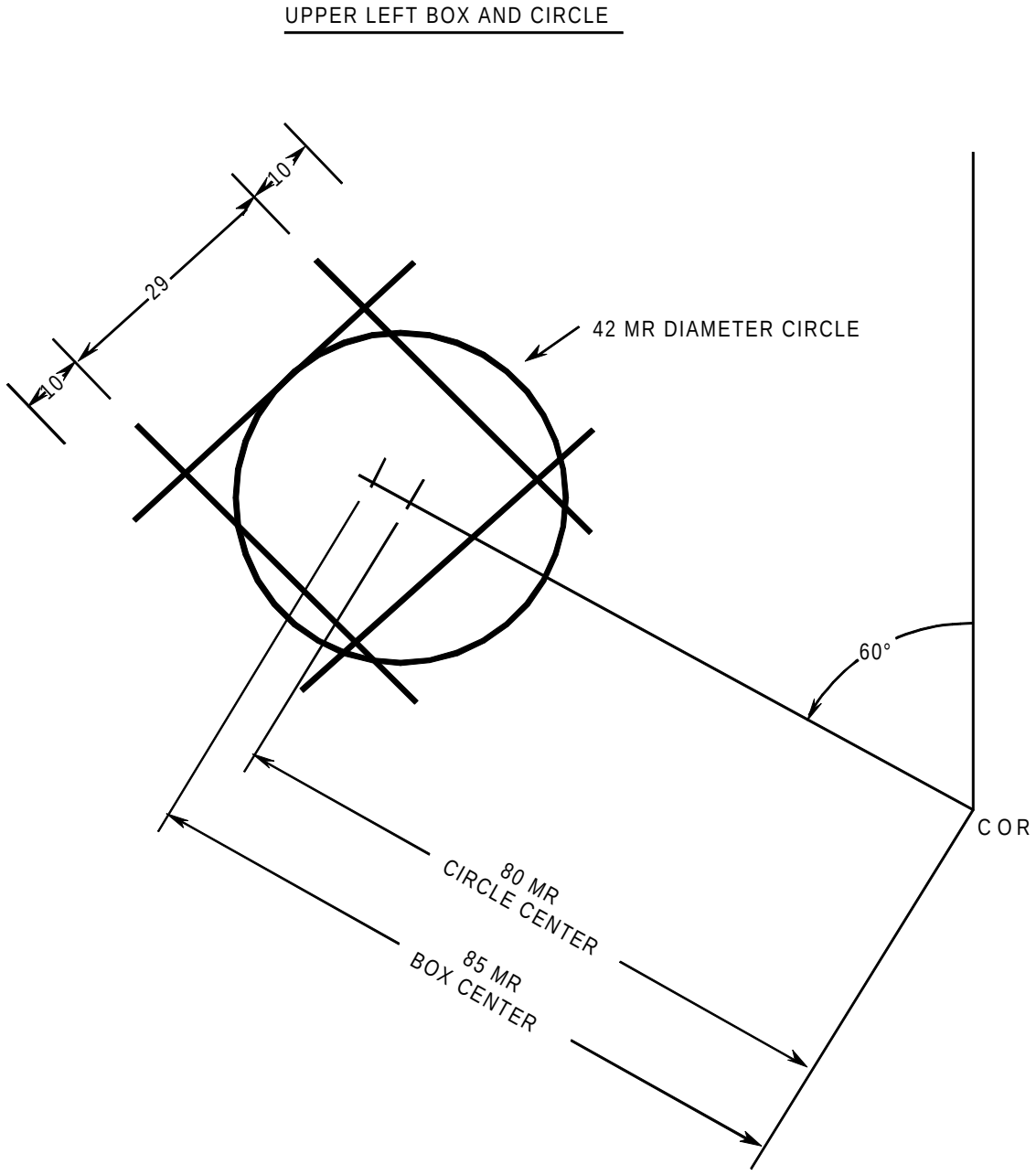



FIGURE 4.7.10-30. Display Format 6 (Cont'd)

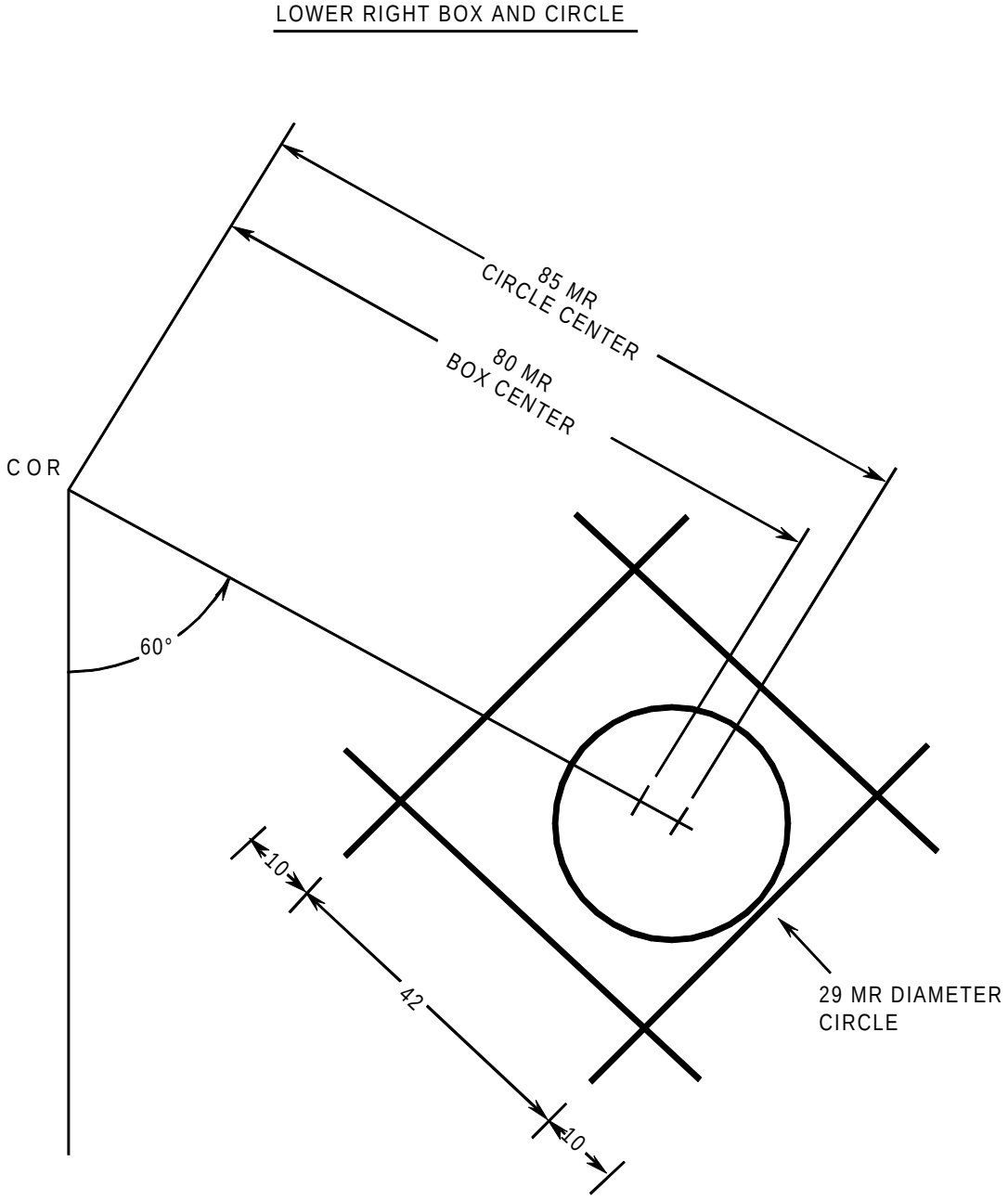



FIGURE 4.7.10-31. Display Format 6