

FLIGHT DATA FILE WORKBOOK FDF 2102

Advanced Training Series

**For Training Purposes Only
Training Division
Training Integration Branch
August 24, 1981**



National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center
Houston, Texas 77058

FLIGHT DATA FILE WORKBOOK

FDF 2102

Prepared by

Training Division
Training Integration Branch

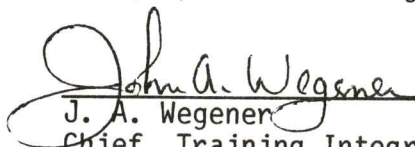
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Table of Contents

Segment 1	Introduction
Segment 2	FDF Abbreviations
Segment 3	FDF Article Use
Segment 4	Procedure Structures
Segment 5	Format Differences
Segment 6	FDF Symbols

FOREWORD

Data for examples in this workbook was taken from early Shuttle Transportation System flight information. This should not detract from its training value for later STS flights.

The last two pages of the workbook are forms.

- A. Lesson Critique Sheet. This page is used to obtain the student's comment on the workbook. It is to be filled out and mailed to Ground Systems Training Supervisor, CG-3, JSC when the workbook is completed. Neither an envelope nor signature is required.
- B. Training Report. Personnel assigned to the Flight Operations Directorate (FOD) are required to submit this report so that they may receive credit on their training report. Other personnel may also be required to submit this report when specifically requested. Return completed report to CG3.

HOW TO USE THIS WORKBOOK:

This book is organized into segments. You should proceed through the segments in the order they are presented. Within the segment, however, you control your own progress. You should begin each segment by reading the objective and the learning material. The learning material is set apart in a box. This is the central information to be learned. Supporting data, following the learning material, is provided as additional information to aid you in learning. If you are already familiar with the material presented in the learning material, skip right to the practice. For other segments with which you are somewhat familiar, you may want to read the objective, learning material, and some of the supporting data, then go on to the practice. If the material is totally new to you, most of the supporting data should be very helpful.

Before proceeding, you should always make certain that you understand the correct answers to each of the practice items. The feedback explains the correct response and is particularly helpful for items you missed. Practice items are usually on the right-hand page and feedback on the left-hand page so that you can fold the page over to compare your answer with the correct answer.

All the acronyms and abbreviations used in this lesson are discussed wherever first used in the Supporting Data section of a segment.

This workbook is provided for your use. You may make notes or write comments anywhere you like. You may retain the text for later reference.

SEGMENT 1

FLIGHT DATA FILE (FDF) WORKBOOK INTRODUCTION

OBJECTIVE

Define the FDF and preview the rest of the segments.

INTRODUCTION

This segment will define the FDF and explain the other segments in the workbook. The Flight Data File (FDF) is the total onboard complement of documentation and related aids available to the crew for flight execution. It is developed, validated, and fabricated for flight by different sections, branches, and divisions within the Flight Operations Directorate (FOD). The FDF includes procedural checklists, integrated timelines, malfunction and reference data books and crew activity plans, as well as decals, photos, pencils, clamps, and other specialized articles such as Earth maps, special photos, or star charts. Onboard stowage is in one of several fixed and portable containers and/or cloth bags in such a manner as to be readily available to the crew on the flight deck, middeck, or during airlock/cargo bay EVA operations. The Space Shuttle Crew Procedures Management Plan (JSC 08969) provides direction for procedures change control and validation. The reader should see the above referenced document for more information on the FDF.

To determine who is responsible for a given document, go to title page for that book. The person listed as the book manager is the person to contact for more information on the book.

SEGMENT 2
FDF ABBREVIATIONS

OBJECTIVE

Given an FDF abbreviation, identify the root word.

SEGMENT INTRODUCTION

This segment contains a list of standard FDF acronyms and abbreviations that are common to all the Orbiter systems. Some or all of these abbreviations can be found in most any FDF checklist procedure. Knowing these abbreviations is a necessity in order to be able to read and understand a checklist procedure.

Learning Statement

Segment 2

FDF ABBREVIATIONS

The following acronyms and abbreviations must be known in order to be able to read and understand a checklist procedure.

bp	Barber pole
BYP	Bypass
C	Commander
cb	Circuit breaker
CL	Close
CMD	Command
CNTL	Control
CTR	Center
DN	Down
ENA	Enable
EXEC	Execute
FWD	Forward
GND	Ground
HTR	Heater
IND	Indicator
INH	Inhibit(ed)
Lt	Light
MAN	Manual
MNA	Main A
MNB	Main B
MNC	Main C
MS	Mission Specialist
OP	Open
P	Pilot
pb	Pushbutton
PS	Payload Specialist
PWR	Power
STBY	Standby
tb	Talkback
TK	Tank
tw	Thumbwheel
VLV	Valve

Practice

Segment 2

Match the following abbreviations with their definitions by writing the number of the abbreviation next to its definition.

- | | | |
|----------|-------|--------------------|
| 1. bp | _____ | Enable |
| 2. BYP | _____ | Forward |
| 3. C | _____ | Ground |
| 4. cb | _____ | Standby |
| 5. CL | _____ | Talkback |
| 6. CMD | _____ | Valve |
| 7. CNTL | _____ | Power |
| 8. CTR | _____ | Pushbutton |
| 9. DN | _____ | Open |
| 10. ENA | _____ | Manual |
| 11. EXEC | _____ | Inhibit |
| 12. FWD | _____ | Execute |
| 13. GND | _____ | Circuit breaker |
| 14. HTR | _____ | Bypass |
| 15. IND | _____ | Down |
| 16. INH | _____ | Center |
| 17. Lt | _____ | Control |
| 18. MAN | _____ | Command |
| 19. MNA | _____ | Close |
| 20. MNB | _____ | Barber pole |
| 21. MNC | _____ | Commander |
| 22. MS | _____ | Indicator |
| 23. OP | _____ | Tank |
| 24. P | _____ | Heater |
| 25. pb | _____ | Light |
| 26. PS | _____ | Mission Specialist |
| 27. PWR | _____ | Thumbwheel |
| 28. STBY | _____ | Pilot |
| 29. tb | _____ | Payload Specialist |
| 30. TK | _____ | Main A |
| 31. tw | _____ | Main B |
| 32. VLV | _____ | Main C |

Practice Feedback

Segment 2

Match the following abbreviations with their definitions by writing the number of the abbreviation next to its definition.

1. bp	10	Enable
2. BYP	12	Forward
3. C	13	Ground
4. cb	28	Standby
5. CL	29	Talkback
6. CMD	32	Valve
7. CNTL	27	Power
8. CTR	25	Pushbutton
9. DN	23	Open
10. ENA	18	Manual
11. EXEC	16	Inhibit
12. FWD	11	Execute
13. GND	4	Circuit breaker
14. HTR	2	Bypass
15. IND	9	Down
16. INH	8	Center
17. Lt	7	Control
18. MAN	6	Command
19. MNA	5	Close
20. MNB	1	Barber pole
21. MNC	3	Commander
22. MS	15	Indicator
23. OP	30	Tank
24. P	14	Heater
25. pb	17	Light
26. PS	22	Mission Specialist
27. PWR	31	Thumbwheel
28. STBY	24	Pilot
29. tb	26	Payload Specialist
30. TK	19	Main A
31. tw	20	Main B
32. VLV	21	Main C

SEGMENT 3

FLIGHT DATA FILE ARTICLE USE

OBJECTIVES

1. Name the FDF document that identifies all other FDF articles.
2. Select from a FDF flow chart the FDF article(s) needed to support any specified flight phase or situation.

SEGMENT INTRODUCTION

One of the FDF articles, known as the Crew Activity Plan (CAP), contains an FDF flow chart that identifies all of the other FDF articles and shows when they are used during the flight. This segment will explain how to use this FDF flow chart to identify which FDF article is needed to support only given flight phase or situation.

The four types of FDF documents are control articles, support articles, off nominal articles and reference articles. The control articles have a timeline incorporated in them for a nominal flight. They tell the crew what to do and when to do it. The support documents contain specific information and detailed procedures that support nominal operations. The cue cards are procedures that are displayed (Velcored) in the vicinity where they are used. They permit crew members to perform normal and/or malfunction procedures during ascent or reentry without the encumbrance of a hand held checklist. Off nominal articles are used when the nominal/control documents do not cover a specific situation. The EVA procedures are an exception because they are nominal but because an EVA is not planned the EVA procedures are off nominal. Reference articles are not normally used but in rare cases can be used by the crew and ground controllers to look at the same document during a special air ground discussion.

FDF Article Use
Control Articles

CONTROL ARTICLES

The four control articles are the primary FDF documents. Each control article has the procedures which cover a specific phase of the flight.

ASC C/L

The Ascent Checklist is the primary control document from crew ingress through the OMS insertion burns.

PDP

The Post-Insertion Deorbit Preparation procedure is the control document used, initially, to prepare for on-orbit operations and used again, later, to prepare for the deorbit burn.

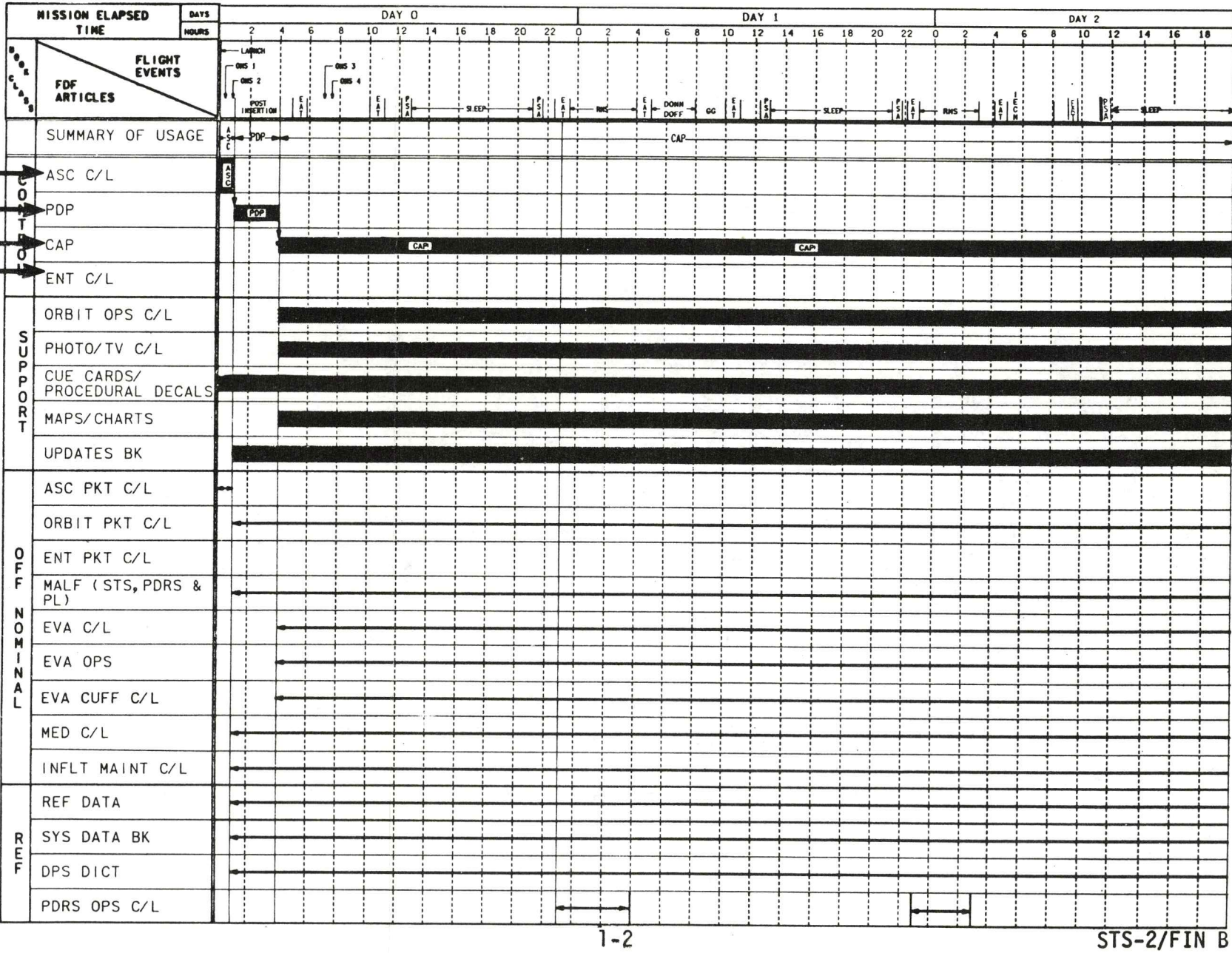
CAP

The Crew Activity Plan is the control document for on-orbit operations. It has a timeline that schedules the on-orbit activities and also references support documents for detailed procedures. The CAP is the document that identifies all the other FDF articles. The FDF flow chart, pictured here, is located in the CAP.

ENT C/L

The Entry Checklist is the primary control document from deorbit burn through landing.

FLIGHT DATA FILE FLOW CHART



FDF Article Use
Support Articles

SUPPORT ARTICLES

Support articles are the procedures and documents required to support nominal activities.

ORB OPS C/L

The Orbital Operations checklist has procedures used to accomplish CAP scheduled activities on orbit.

PHOTO/TV C/L

The Photo/Television checklist is the set of procedures used to accomplish PHOTO and TV operations scheduled in the CAP.

CUE CARDS/PROCEDURAL DECALS

The Cue Cards are short forms of procedures that are mounted with velcro on the displays and controls where they are used. They are used in all phases of the flight and there are specific sets of cue cards for each flight phase. Procedural decals are also added to the control panels and apply to all flight phases. During powered flight, only the cue cards are available to the crew because they don't have time to reference the other documents.

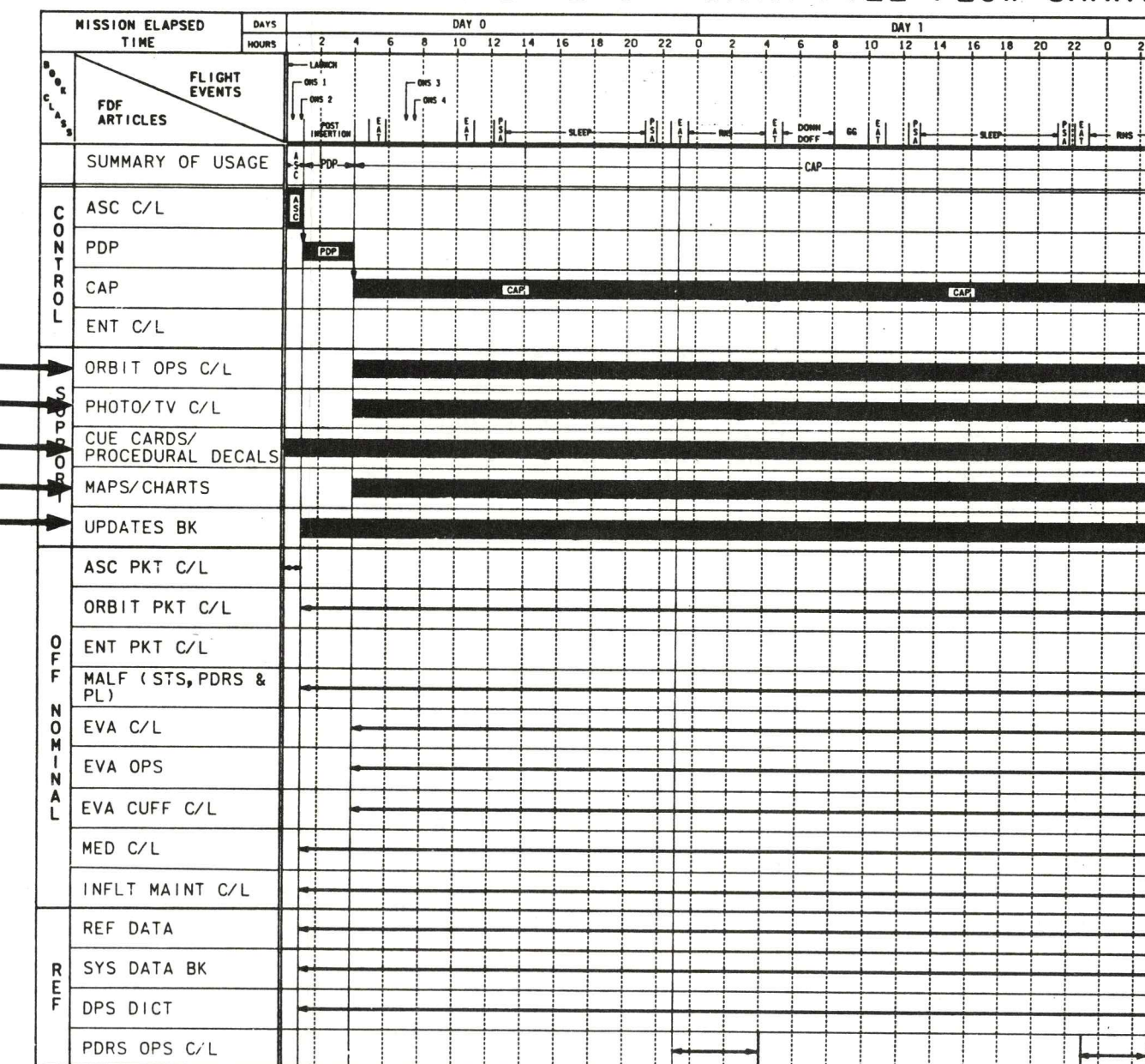
MAPS/CHARTS

The Maps and Charts are used to locate geographical features and star targets.

UPDATES BK

The Updates Book contains blank forms for the crew to copy uplinked data (via voice).

STS-2 FLIGHT DATA FILE FLOW CHART



OFF NOMINAL ARTICLES

The Off Nominal Articles are the procedures and documents required to support operations in the event of abnormal conditions that force a change to the planned flight operations.

ENTRY PKT C/L

Pocket Checklists are prepared for ascent, orbit and entry. Each contains procedures unique to that phase and time critical (5 minutes or less) for their execution.

MALF (STS, PDRS & PL)

The Malfunction Procedures consist of flow charts that are used to trouble-shoot and isolate the cause of any system malfunction. These procedures are not time critical.

EVA C/L

The Extra Vehicular Activity Checklist consists of procedures to be used during a contingency EVA situation.

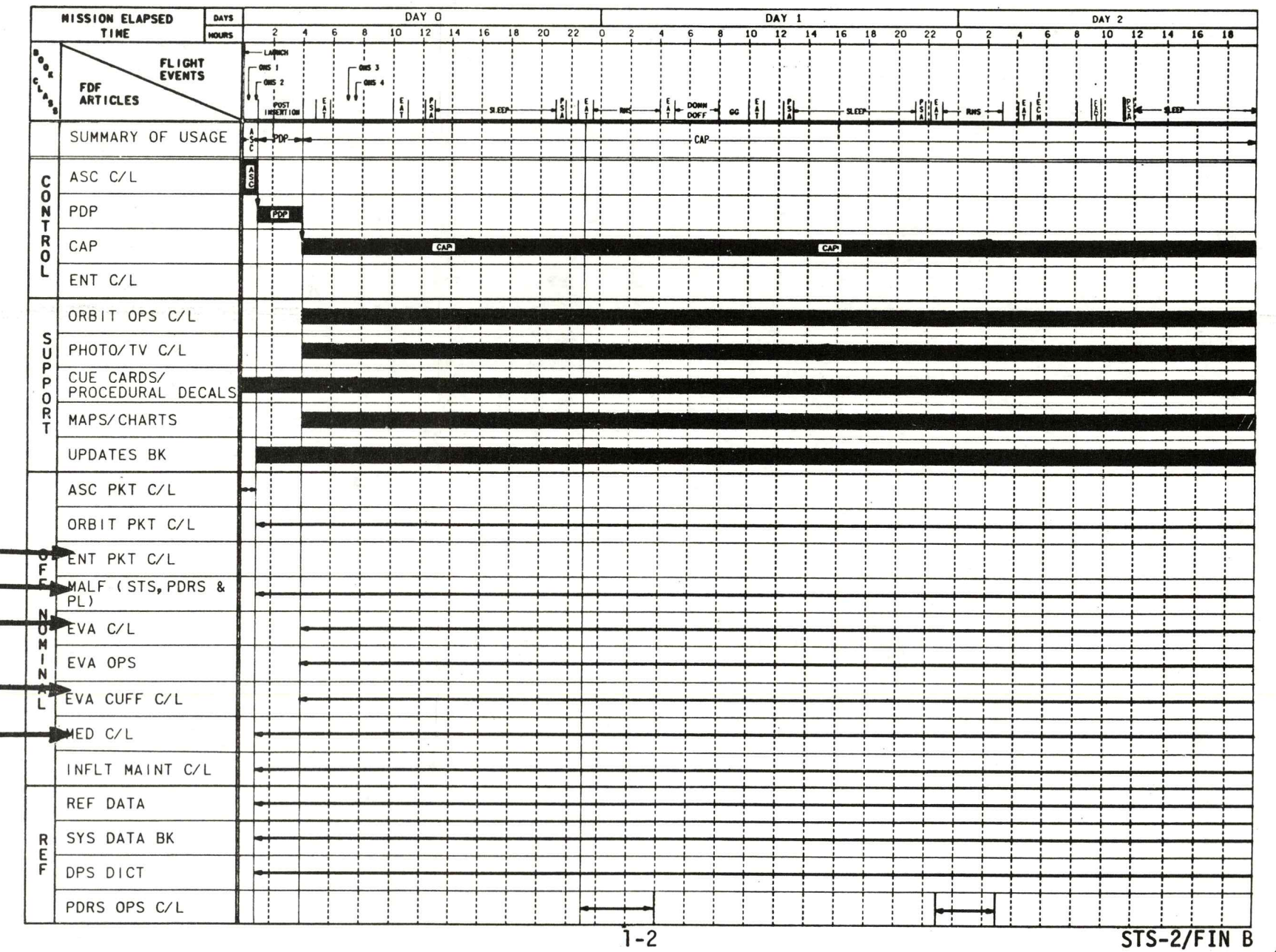
EVA CUFF C/L

The Extra Vehicular Activity Cuff checklist is a short form procedure for use by the crewman in the airlock and payload bay.

MED C/L

The Medical Checklist provides procedures for medical emergencies.

FLIGHT DATA FILE FLOW CHART



FDF Article Use
Reference Articles

FLIGHT DATA FILE FLOW CHART

REFERENCE ARTICLES

The Reference Articles consist of data and schematics that can be used for additional reference material.

REF DATA

The REF Data Book contains DC Bus loss critical equipment down tables, MDM failure analysis, and dedicated signal condition or failure analysis.

SYS DATA BK

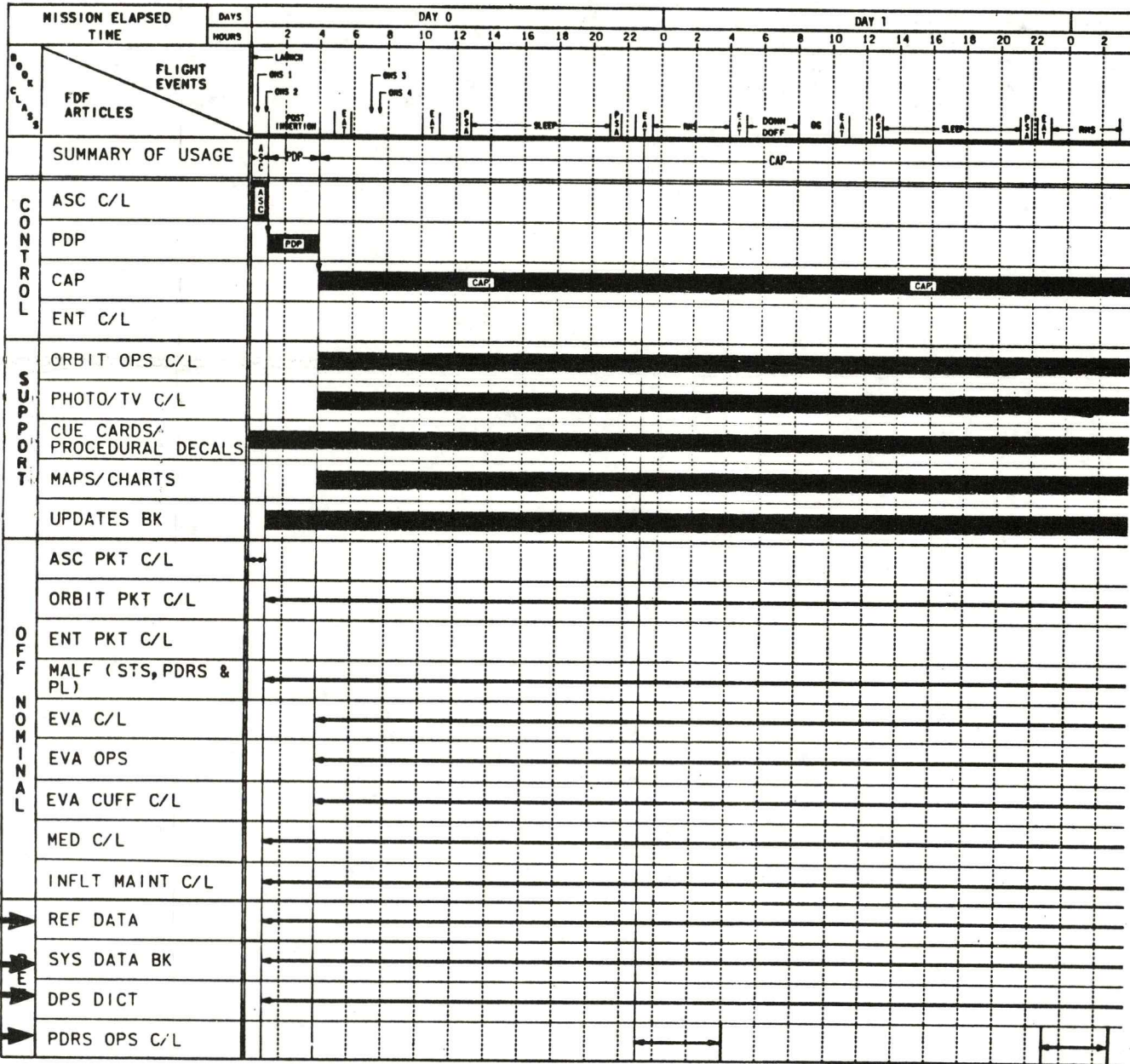
The Systems Data Book contains Orbiter systems performance data, schematics and external figures, and equipment bay and payload photos.

DPS DICT

The Data Processing System Dictionary contains reference data on the DPS major modes, CRT displays and program notes.

PDRS OPS C/L

The Payload Deployment and Retrieval System Operations Checklist contains the procedure for the operations of the PDRS.



FDF Article Use

SEGMENT 3

FDF ARTICLE USE

USAGE CHART

STS-2 FLIGHT DATA FILE FLOW CHART



1-2

STS-2/FIN B

Answer the following questions using the flow chart shown on the left.

- Which document contains the FDF flow chart? _____
- Name the control FDF article used during prelaunch. _____
- What is the only FDF article available to the crew during powered flights?

- Name the Control Document for on-orbit operations. _____
- Name the article(s) the crew would require to do a contingency EVA.

- What type of documents would the crew use in the event of an interruption to the nominal flight?

- Name the reference articles the crew could use to get additional information on systems.

- Which FDF article would the crew use in the event of a medical emergency?

- During what parts of the flight are cue cards in use?

- Name the procedure used to support photo operations scheduled in the CAP.

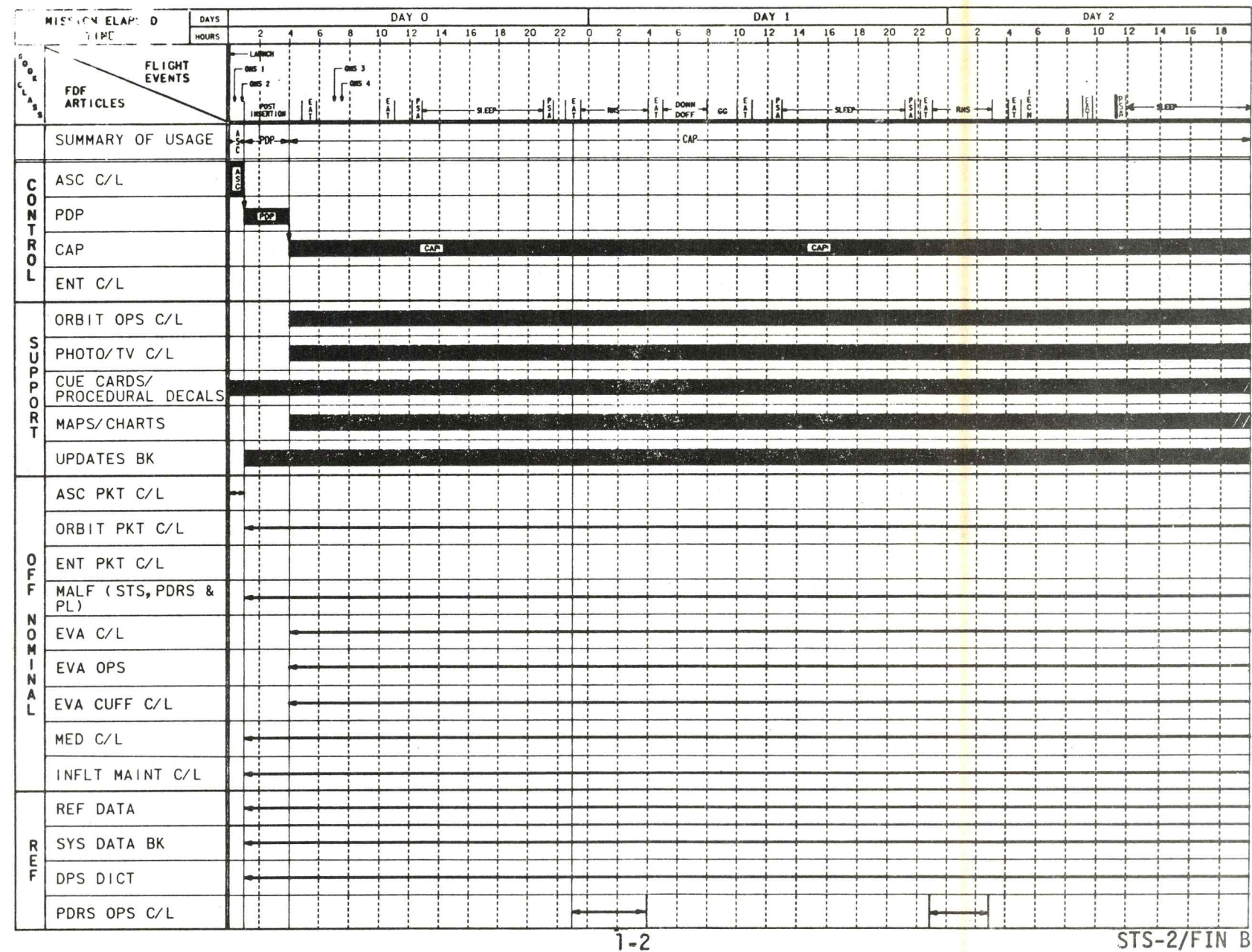
- Which article would the crew use to locate a star? _____
- The PDP is used during post-insertion and _____.
- What is the Control Document used from deorbit burn thru landing?

FDF Article Use

SEGMENT 3

FDF ARTICLE USE

FLIGHT DATA FILE FLOW CHART



Answer the following questions using the flow chart shown on the left.

1. Which document contains the FDF flow chart? CAP
2. Name the control FDF article used during prelaunch. ASC C/L
3. What is the only FDF article available to the crew during powered flights?
CUE CARDS
4. Name the Control Document for on-orbit operations. CAP
5. Name the article(s) the crew would require to do a contingency EVA.
EVA C/L, EVA CUFF C/L
6. What type of documents would the crew use in the event of an interruption to the nominal flight?
OFF NOMINAL
7. Name the reference articles the crew could use to get additional information on systems.
SYS DATA BK
8. Which FDF article would the crew use in the event of a medical emergency?
MED C/L
9. During what parts of the flight are cue cards in use?
ALL
10. Name the procedure used to support photo operations scheduled in the CAP.
PHOTO/TV C/L
11. Which article would the crew use to locate a star? MAPS/CHARTS
12. The PDP is used during post-insertion and DEORBIT PREP.
13. What is the Control Document used from deorbit burn thru landing?
ENT C/L

SEGMENT 4
PROCEDURES STRUCTURE

OBJECTIVE

Be able to match page/line structures to their definitions.

SEGMENT INTRODUCTION

The FDF procedures conform to a standard format. In this segment the student is given the basic format or structure for all procedures.

Procedure Structure

Procedure titles are in all capital letters either in boldface type or underlined for easy identification. Subtitles are written with initial caps and underlines. Titles are to be BOLDFACE type when possible: when this method is used, underlines are omitted.

Switch Identifier - the procedural language prior to the dash (-) identifies the name of the switch, valve, circuit breaker, etc.

Crew Designation - identifies which crewmember will perform the task.

- C - Commander
- P - Pilot
- MS - Mission Specialist
- PS - Payload Specialist

Panel Location - to the right of the crew designator is the panel number on which the switch is located. A colon (:) followed by a letter designator indicates the row in which the switch is located.

RCS, OMS SAFING

C	C3	✓ OMS ENG (two) - OFF
	014:F	RJD (six) - OFF
		✓ L OMS ENG VLV - OFF
	015:F	RJD (four) - OFF
	016:F	RJD (six) - OFF
		✓ R OMS ENG VLV - OFF
P	07	AFT L, R RCS
		MANF ISOL (ten) - CL (tb-CL)
		TK ISOL (six) - OP (tb-OP)
		He PRESS (four) - CL (tb-CL)
		XFEED (four) - CL (tb-CL)
		✓ MSTR RCS XFEED - OFF
	08	L, R CMS
		✓ He PRESS/VAP ISOL (four) - CL
		✓ TK ISOL (four) - OP (tb-OP)
		XFEED (four) - OP (tb-OP)

Required Action - the procedural language following the dash (-) indicates the action to be taken or the position in which to place the switch, valve, circuit breaker, etc.

NOTE

Symbols such as ✓ are explained in Segment 6

Practice

Segment 4

RCS, OMS SAFING

- C C3 ✓ OMS ENG (two) - OFF
014:F RJD (six) - OFF
 ✓ L OMS ENG VLV - OFF
015:F RJD (four) - OFF

016:F RJD (six) - OFF
 ✓ R OMS ENG VLV - OFF
- P 07 AFT L, R RCS
 MANF ISOL (ten) - CL (tb-CL)
 TK ISOL (six) - OP (tb-OP)
 He PRESS (four) - CL (tb-CL)
 XFEED (four) - CL (tb-CL)
 ✓ MSTR RCS XFEED - OFF
- 08 L, R CMS
 ✓ He PRESS/VAP ISOL (four) - CL
 ✓ TK ISOL (four) - OP (tb-OP)
 XFEED (four) - OP (tb-OP)

Use the above procedure to answer the following questions:

1. What is the title of this procedure? _____
2. Which crewmember performs the first step of this procedure? _____
3. Draw a rectangle around the first portion of the procedure that identifies the switches, valves, circuit breakers, etc., for the pilot.
4. Circle the first switch row designation in the procedure.
5. Which panel has the first switches the pilot takes action on? _____
6. Draw a line under the action for the first line of the commanders portion of the procedure.

Practice Feedback

Segment 4

RCS, OMS SAFING

C C3 ✓ OMS ENG (two) - OFF
014: (F) RJD (six) - OFF
 ✓ L OMS ENG VLV - OFF
015:F RJD (four) - OFF

016:F RJD (six) - OFF
 ✓ R OMS ENG VLV - OFF

P 07 AFT L, R RCS
 MANF ISOL (ten) - CL (tb-CL)
 TK ISOL (six) - OP (tb-OP)
 He PRESS (four) - CL (tb-CL)
 XFEED (four) - CL (tb-CL)
 ✓ MSTR RCS XFEED - OFF

08 L, R CMS
 ✓ He PRESS/VAP ISOL (four) - CL
 ✓ TK ISOL (four) - OP (tb-OP)
 XFEED (four) - OP (tb-OP)

Use the above procedure to answer the following questions:

1. What is the title of this procedure? RCS, OMS SAFING
2. Which crewmember performs the first step of this procedure? Commander
3. Draw a rectangle around the first portion of the procedure that identifies the switches, valves, circuit breakers, etc., for the pilot.
4. Circle the first switch row designation in the procedure.
5. Which panel has the first switches the pilot takes action on? 07
6. Draw a line under the action for the first line of the commanders portion of the procedure.

Line Structure
(Switches)

Learning Statement

SWITCHES

The basic standard for describing switch operations is as follows:

PNL NO.	SWITCH TITLE	Type of (quantity) switch	dash	POSITION OR ACTION DESIRED	(clarifying comment)
------------	-----------------	------------------------------	------	----------------------------------	-------------------------

PANEL NUMBERS

When panels also have placarded row identification, the row (as shown in the example) is also to be identified in the procedure.

Switch titles for the Orbiter can be found in the OV102 D&C Procedural Nomenclature document. This nomenclature is to be used to identify single switches.

Type of switch (other than standard switches) must be specifically identified using lower case letters after the switch title for all of the following:

- pushbuttons - pb
- thumbwheels - tw
- valves - vlv
- display select switches - sel

Note that if 'VLV' appears in the switch title, the crew is operating a mechanical valve. There are several cases where the crew operates a switch which electrically or pneuamatically operates a valve. In this case the switch has a switch name.

016:A	BRAKES MNC - ON
F6	HSI SEL MODE - ENTRY
C3	MAIN ENG LIMIT SHUTDOWN - AUTO
	AIR DATA PROBE (two) - STOW
C2	TIMER SET tw (four) - as req'd
WCS	COMMODE CNTL - CFF (down)
C3	SRB SEP pb - SEP
F6	LDG GEAR ARM pb - ARM

Quantity is to be identified in lower case letters whenever switches are grouped into one statement. The number of switches to be operated is spelled out in parentheses. No designation of quantity is made if only one switch is operated.

Clarifying comments can be added in parentheses after the position or action statement. This type of comment can be a catch-all for almost any additional information.

Position or action desired is normally the placarded title of the position (ON, OFF, A, PRI, etc.). This applies to most switches.

Learning Statement

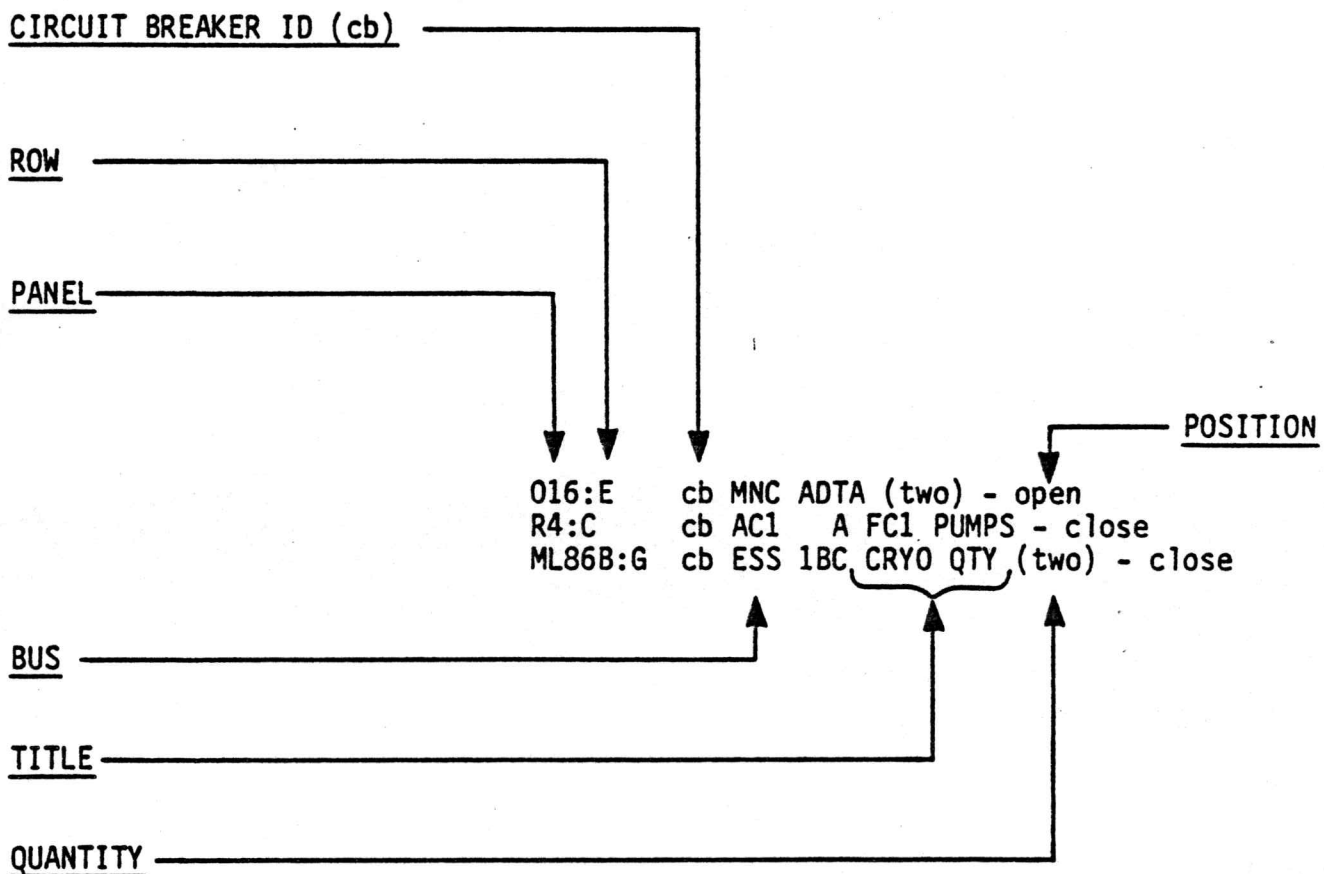
Segment 4 Part 3

CIRCUIT BREAKERS

All shuttle circuit breakers are of the push/pull type. The standard for describing operations is shown below:

PNL # AND ROW	cb	BUS	CIRCUIT BREAKER TITLE	(quantity)	dash	POSITION OR ACTION DESIRED	(clarifying comments)
------------------	----	-----	-----------------------------	------------	------	----------------------------------	--------------------------

EXAMPLES



Note: The panel row must be identified.
 The lower case letters 'cb' must always precede the callout.
 The bus must be identified.
 The action is either 'open' or 'close' and is written in lower case letters.

Learning Statement

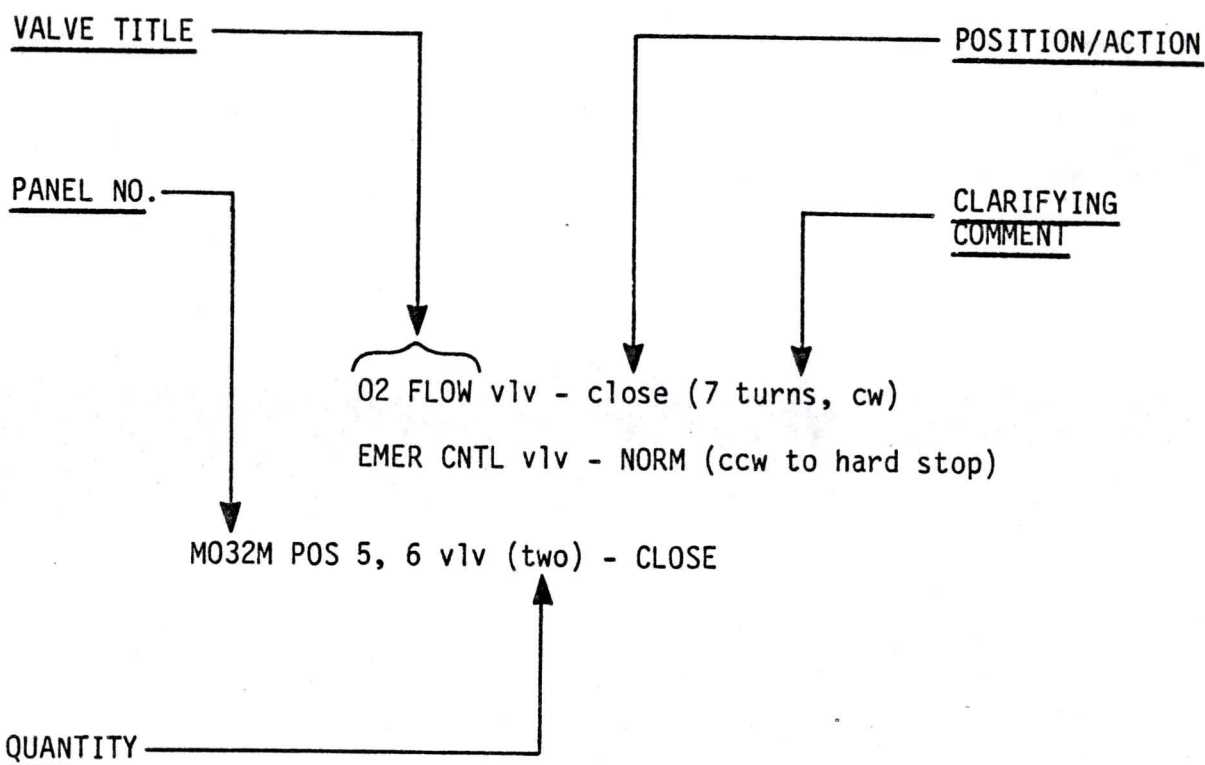
Segment 4 Part 4

VALVES

Valves come in two basic forms, lever valves and rotary valves. The basic standard for describing operations with valves is almost identical to that used for switches.

VALVE	vlv	(quantity)	dash	POSITION OR ACTION DESIRED	(clarifying comments)
-------	-----	------------	------	----------------------------------	--------------------------

EXAMPLES



Learning Statement

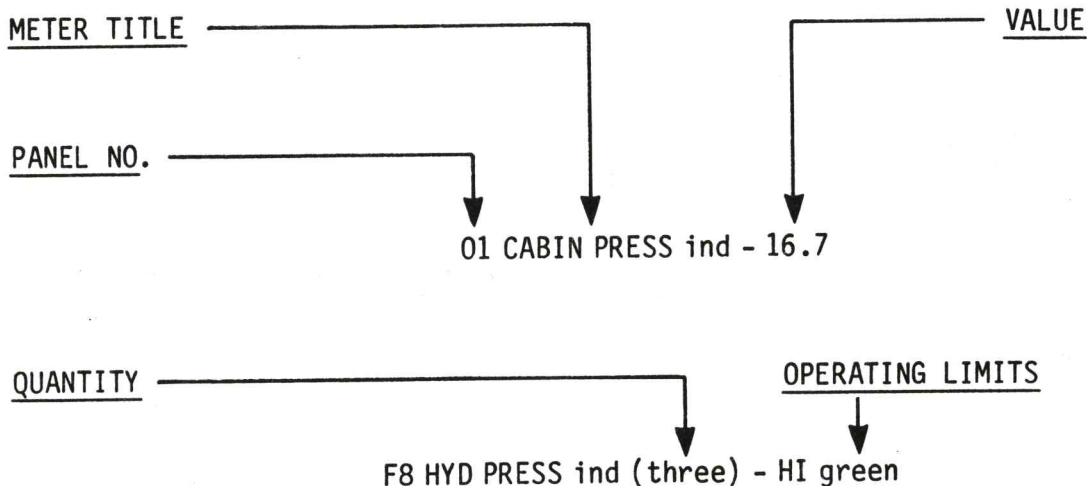
Segment 4 Part 5

METERS

There are three basic types of meters - bar, digital, and 'gas gage' (rotational needle indication). The standard for describing operations with meters is shown below:

PNL NO.	METER TITLE	ind	(quantity)	-	VALUE OR RANGE	(clarifying comments)
---------	----------------	-----	------------	---	-------------------	--------------------------

EXAMPLES



Tape is often installed on the spacecraft panels to indicate operating limits. The operating band is then referred to instead of a numerical value.

Practice

Segment 4

Below are 5 procedure fragments followed by questions about the procedure.

1.

016:A BRAKES MNC - ON
F6 HSI SEL MODE - ENTRY
C3 MAIN ENG LIMIT SHUT DN - AUTO
AIR DATA PROBE (two) - STOW

4.

02 FLOW vlv - close (7 turns, cw)

2.

C2 TIMER SET tw (four) - as reqd
WCS COMMODE CNTL - OFF (down)
C3 SRB SEP pb - SEP
F6 LDG GEAR ARM pb - ARM

5.

01 CABIN PRESS ind - 16.7

3.

016:E cb MNC ADTA (two) - open
R4:C cb AC1 A FC1 PUMPS - close
ML86B:G cb ESS 1BC CRYO QTY (two) - close

1. From fragment 1, write what type of control device is found in row A.

2. From fragment 2, write the panel name for the panel that has the first push button on it.

3. From fragment 3, on panel R4 what kind of control device is called out and what position is requested.

4. From fragment 4, what kind of control device is called out and what position is asked for.

5. From fragment 5, what kind of control device is called for and what is asked for.

6. From fragment 4, write the clarifying comment.

Practice Feedback

Segment 4

Below are 5 procedure fragments followed by questions about the procedure.

1.

016:A BRAKES MNC - ON
F6 HSI SEL MODE - ENTRY
C3 MAIN ENG LIMIT SHUT DN - AUTO
AIR DATA PROBE (two) - STOW

4.

02 FLOW vlv - close (7 turns, cw)

2.

C2 TIMER SET tw (four) - as reqd
WCS COMMODE CNTL - OFF (down)
C3 SRB SEP pb - SEP
F6 LDG GEAR ARM pb - ARM

5.

01 CABIN PRESS ind - 16.7

3.

016:E cb MNC ADTA (two) - open
R4:C cb AC1 A FC1 PUMPS - close
ML86B:G cb ESS 1BC CRYO QTY (two) - close

1. From fragment 1, write what type of control device is found in row A.

SWITCH

2. From fragment 2, write the panel name for the panel that has the first push button on it.

C3

3. From fragment 3, on panel R4 what kind of control device is called out and what position is requested.

CB, CLOSED

4. From fragment 4, what kind of control device is called out and what position is asked for.

VALVE, CLOSED

5. From fragment 5, what kind of control device is called for and what is asked for.

Meter, A pressure reading of 16.7

6. From fragment 4, write the clarifying comment.

7 turns, CW

Learning Statement

Segment 4 Part 6

DISCRETE EVENT INDICATORS

The main types of discrete event indicators are pushbutton indicators, annunciator lights, talk backs, and 'OFF' flags. They provide a positive confirmation of an event taking place. The callout of an individual indicator takes the following form:

PNL NO.	INDICATOR TITLE	type of indicator	(quantity)	dash	indicator state	(clarifying comments)
---------	--------------------	----------------------	------------	------	--------------------	--------------------------

EXAMPLES

TYPE INDICATOR

pushbutton	- pb (for switch callouts)
	- pb lt (for state verification)
annunciator lights	- lt
talkbacks	- tb
OFF flags	- flag

INDICATOR TITLE

F6 LDG GEAR ARM pb - ARM
F7 C/W lt - 02 PRESS

INDICATOR STATE

F6 LDG GEAR ARM pb lt - off
F7 C/W 02 PRESS lt - off

CLARIFYING COMMENT

08 FWD RCS MANF ISOL 1 - OPEN (tb-OP)

Learning Statement

Segment 4 Part 7

TONES

Annunciating tones emanate from alert systems (Caution & Warning, Systems Management, etc.), navigation aids (TACAN), and the intercom/communications system. If a tone occurs concurrently with other indications (meter, light), the tone is always announced first in the series. Annunciating tones always result from some event that is either crew, ground, or vehicle initiated.

ACTION CAUSING TONE

For this procedure, the crew set a timer which resulted in a tone 30 minutes later

NOTE OF EXPECTED TONE

CLARIFYING NOTE EXPLAINING TONES

Set portable timer for 30 min
WATER DUMP vlv - OPEN (ccw)
CONDENSATE Tk press - decr
Portable timer tone - on
WATER DUMP vlv - CLOSE (cw)

C/W TEST - 1 (W tone, C tone
MASTER ALARM lt - on)

Learning Statement

Segment 4 Part 8

CREW LOOSE EQUIPMENT

A procedure may require the crewman to use tools and other equipment that are stowed in various locations. So that all such equipment is at hand when needed, all required support equipment is to be identified early in the procedure.

PROCEDURE STEP
USUALLY "OBTAIN"
OR "UNSTOW"

PROCEDURE STEP NO.

LOCATION

This is a stowage
location explained in
"LOC Code 2102
Workbook".

CLARIFICATION NOTE

1 Obtain:
E621 Long Strap (2)
E623 Red Tape (one 12' piece)
E624 11/16 Wrench
Ratchet Handle
3/8 Std Socket

2 Loosen MDM captive fasteners (8-in. extension

3/8 socket)

TOOL USE NOTE

Practice

Segment 4

Below are 4 procedure fragments followed by questions about the fragments.

1.

Set portable timer for 30 min
WATER DUMP vlv - OPEN (ccw)
CONDENSATE Tk press - decr
Portable timer tone - on
WATER DUMP vlv - CLOSE (cw)

C/W TEST - 1 (W tone, C tone
MASTER ALARM lt - on)

3.

F6 LDG GEAR ARM pb - ARM
F7 C/W lt - 02 PRESS

F6 LDG GEAR ARM pb lt - off
F7 C/W 02 PRESS lt - off

2.

1 Obtain:
E621 Long Strap (2)
E623 Red Tape (one 12' piece)
E624 11/16 Wrench
Ratchet Handle
3/8 Std Socket

2 Loosen MDM captive fasteners (8-in. extension, 3/8 socket)

4.

08 FWD RCS MANF ISOL 1 -OPEN (tb-OP)

1. From fragment 1, write the step that causes a tone.

2. From fragment 1, write the note that a tone is expected.

3. From fragment 2, name where the long strap comes from and how many there are.

4. From fragment 2, write which tools are required to do step 2.

5. From fragment 3, write the panel number for the push button light turned off.

6. From the fragment 4 clarifying comment write the type of indicator and what its condition should be.

Practice Feedback

Segment 4

Below are 4 procedure fragments followed by questions about the fragments.

1.

Set portable timer for 30 min
WATER DUMP vlv - OPEN (ccw)
CONDENSATE Tk press - decr
Portable timer tone - on
WATER DUMP vlv - CLOSE (cw)

C/W TEST - 1 (W tone, C tone
MASTER ALARM lt - on)

2.

1 Obtain:
E621 Long Strap (2)
E623 Red Tape (one 12' piece)
E624 11/16 Wrench
Ratchet Handle
3/8 Std Socket

2 Loosen MDM captive fasteners (8-in. extension, 3/8 socket)

3.

F6 LDG GEAR ARM pb - ARM
F7 C/W lt - 02 PRESS

F6 LDG GEAR ARM pb lt - off
F7 C/W 02 PRESS lt - off

4.

08 FWD RCS MANF ISOL 1 -OPEN (tb-OP)

1. From fragment 1, write the step that causes a tone.

Set Portable Timer

2. From fragment 1, write the note that a tone is expected.

Portable Timer Tone - on

3. From fragment 2, name where the long strap comes from and how many there are.

E621, Two (2)

4. From fragment 2, write which tools are required to do step 2.

8 in. extension, 3/8 socket

5. From fragment 3, write the panel number for the push button light turned off.

F6

6. From the fragment 4 clarifying comment write the type of indicator and what its condition should be.

talkback, OP

SEGMENT 5
FORMAT DIFFERENCES

OBJECTIVE

The student shall be able to identify the major components of different FDF page formats.

SEGMENT INTRODUCTION


There are three primary page formats used in the FDF. The first is the standard procedure format covered in segment 4. The second format type is the summary timeline page as used in the PDP and CAP. The third type is the detailed timeline as used in the PDP and CAP. There are also 2 secondary procedures formats. They are the pocket checklist format and the malfunction procedure format.

Timescales: Two time references are presented in this section of the summary timeline format. The two time references used are Central Daylight Time (CDT) and Mission Elapsed Time (MET). MET is referenced to liftoff beginning at 00/00:00:00 (days, hours, minutes and seconds). The upper left GMT/MET/CDT is the time starting point for this page.

DAY/NIGHT and ORBIT

Day/Night - The orbital day/night intervals are delineated with black bars indicating when the Orbiter is in darkness.

Orbit - Indicates which orbit the spacecraft is in by numerical sequence. The beginning of an orbit occurs when the Orbiter crosses the earth's equator going from the southern to the northern hemisphere (ascending node). The succession of orbits is numbered in this column starting with Orbit 1 for launch.

EARTH TRACE W/SAA - This is a display of the groundtrack of the Orbiter and when it passes over the South Atlantic Anomaly (SAA) (indicated by a )

GSTDN COVERAGE - The GSTDN communication coverage periods are indicated in this area with a horizontal line indicating when communication is available; the GSTDN site is identified to the right of the line.

PAYLOAD ACTIVITIES - Times are identified in these areas for referenced experiment data-takes.

OPS - The GPC software configuration in use at this time during the flight is indicated in this area.

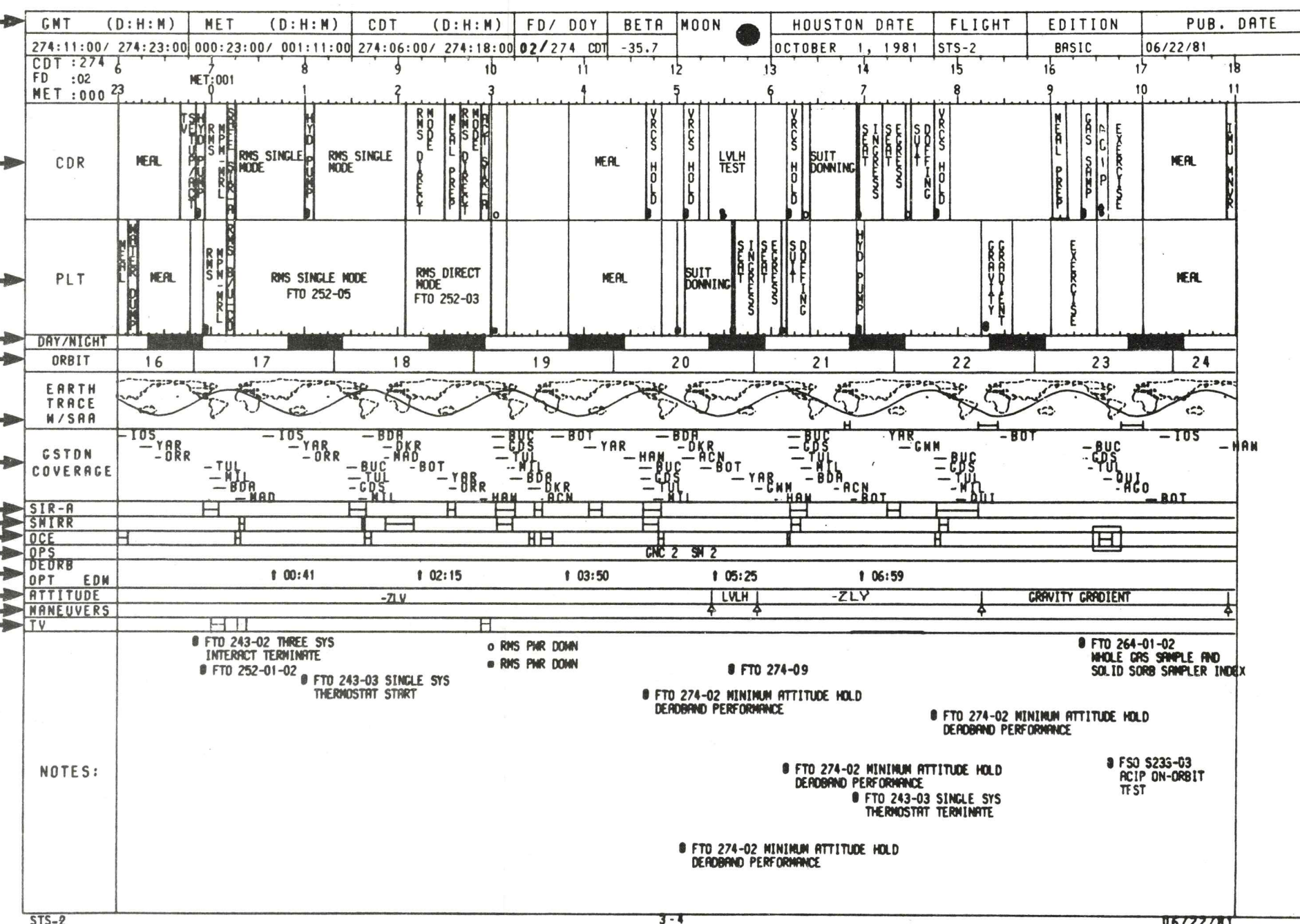
DEORBIT OPT - Times are identified in this area when deorbit burn opportunities exist for Edwards AFB (EDW).

ATTITUDE AND MANEUVERS

Attitude - The current attitude of the vehicle is identified in this area, i.e., IMU, -ZLV.

Manuevers - An ↑ is placed at the time an attitude maneuver occurs.

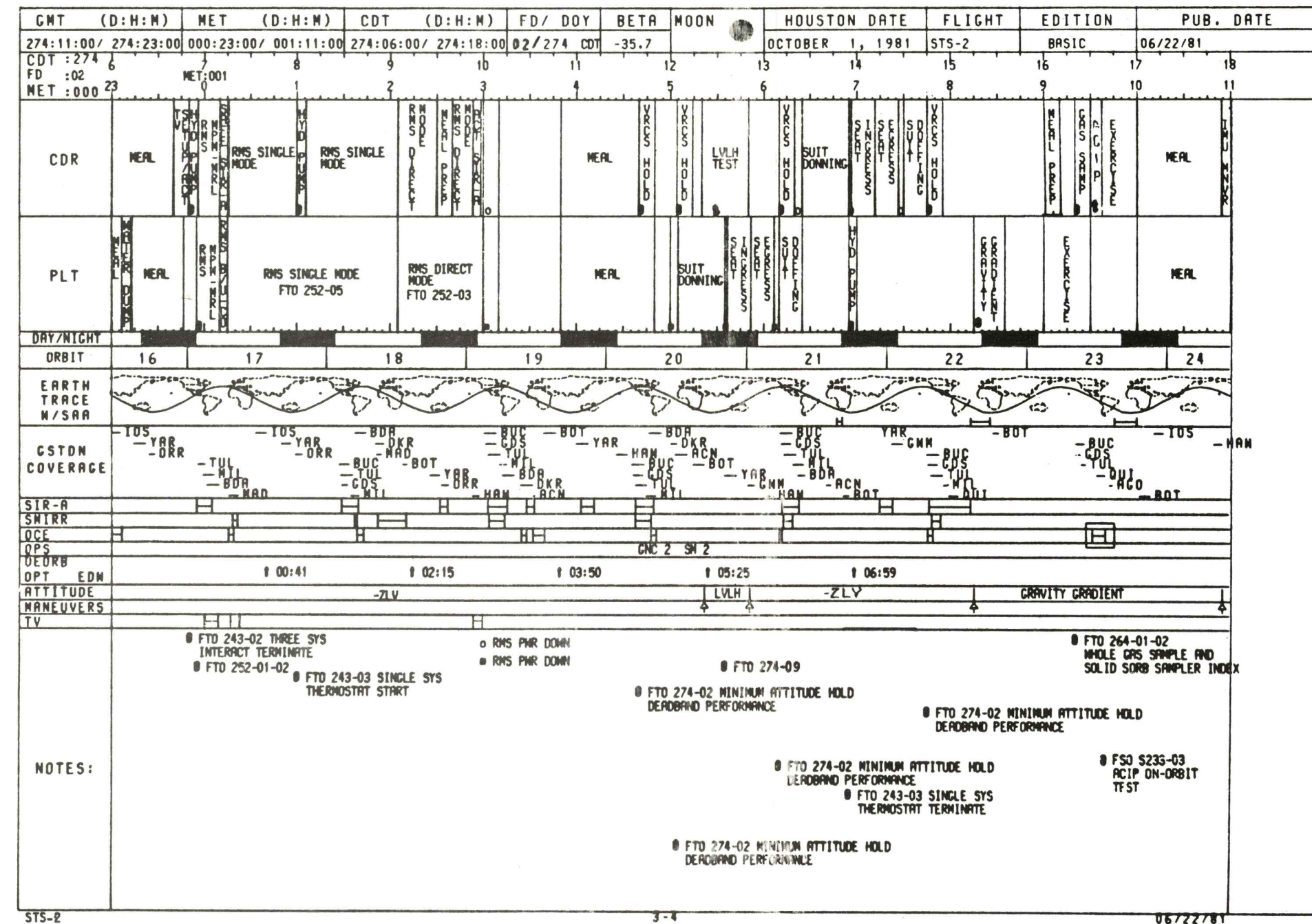
TV - TV is indicated in this area with a '—'.



Practice

Draw a line to the format area that corresponds to the data asked for in the question.

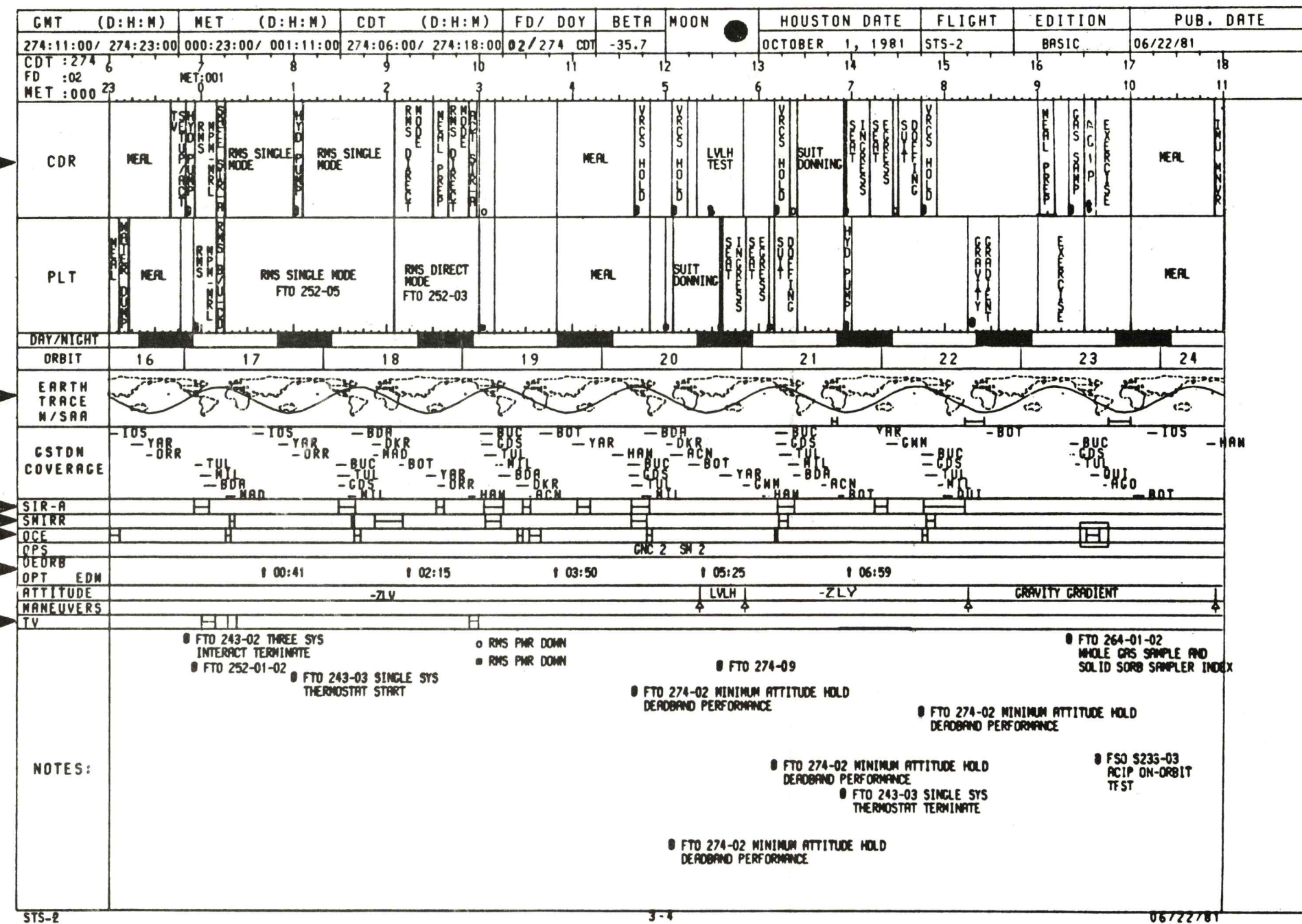
1. The area where the commanders activities are scheduled.
2. The ground track trace.
3. The areas reserved for scheduling experiment data takes.
4. The area where deorbit burn opportunities exist.
5. The area where TV operations are scheduled.
6. What is the MET at which this page starts?



Draw a line to the format area that corresponds to the data asked for in the question.

1. The area where the commanders activities are scheduled.
2. The ground track trace. _____
3. The areas reserved for scheduling experiment data takes
4. The area where deorbit burn opportunities exist. _____
5. The area where TV operations are scheduled. _____
6. What is the MET at which this page starts?

000:23:00



GSTDN Coverage - In this column the GSTDN sites and their acquisition periods are identified. Each site acquisition period is annotated by a solid line, a dashed line or a dotted line. The different annotations indicate the following:

- A site that has S-Band, UHF voice and TV capabilities (GDS, HAW, MAD, MIL, MLX, GDX, MAX)
- A site with S-Band and UHF voice capabilities (BDA, GWM, ACN, BUC, TUL)
- ... A site with only S-Band (no UHF or TV) capabilities (AGO, IOS, ORR, QUI)
- ... A site with only UHF (no S-band or TV) capabilities (BOT, YAR, DKR)

MET Timescale - This format is a one hour format with minute tick marks on the vertical timescale referenced to Mission Elapsed Time (MET) with liftoff occurring at 0/00:00:00.

DAY/NIGHT CYCLE - In this column a solid bar indicates the period when the Orbiter and earth are in darkness. A slashed line indicates when the Orbiter is in daylight but the earth beneath the Orbiter is still in darkness (terminator).

ORBIT - Indicates which orbit the spacecraft is in by numerical sequence. Orbit one begins at liftoff with subsequent orbits starting when the earth's equator is crossed (ascending node).

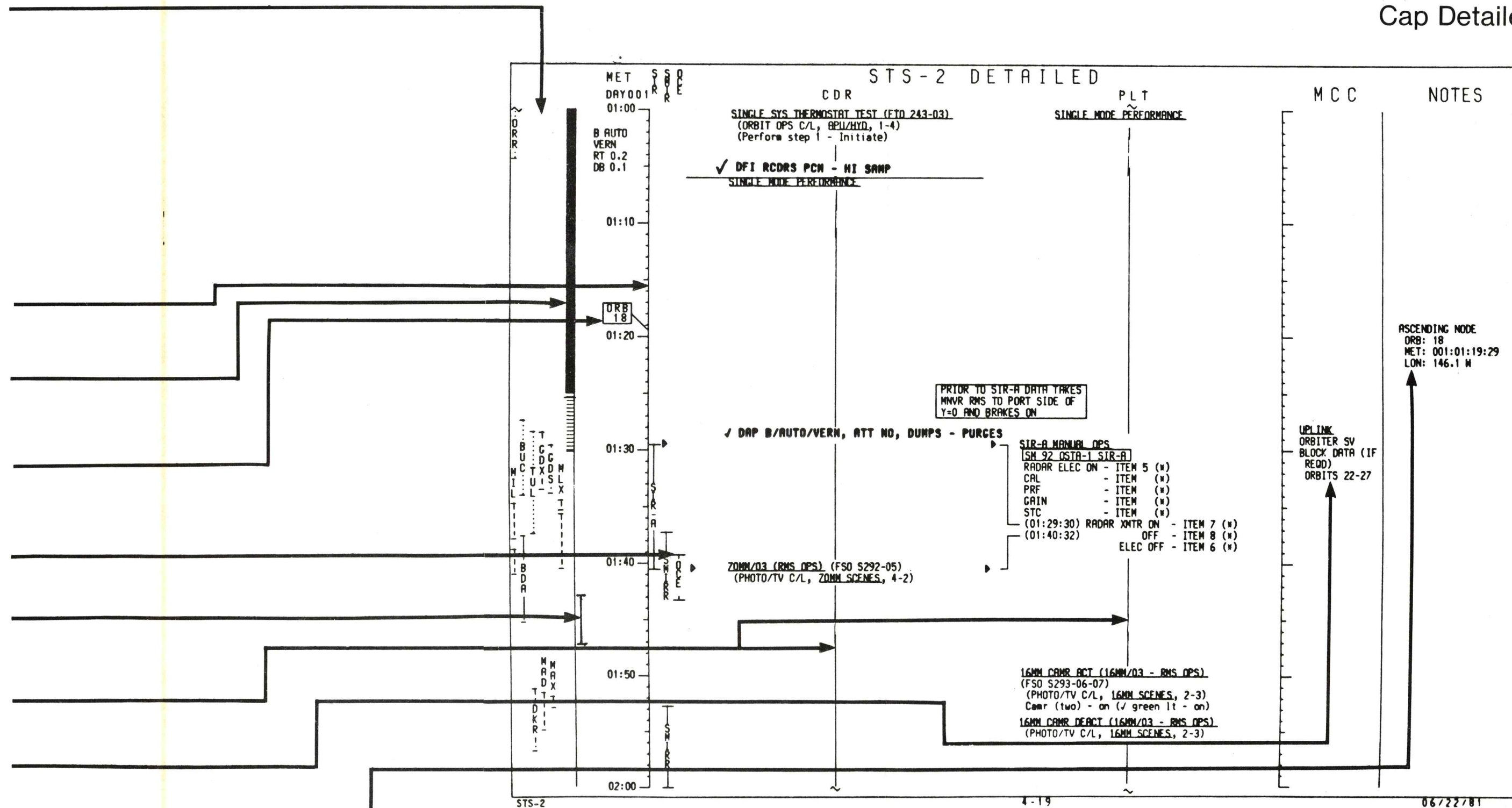
PAYLOAD OPS - These columns define referenced experiment data-takes.

South Atlantic Anomaly (SAA) - This bar defines those periods when the Orbiter passes through the SAA.

CREWMAN columns - The activities for the CDR and PLT are scheduled in this area.

MCC column - Any uplinks, commands or updates required are scheduled at the appropriate time in this column. A vertical line is also used to indicate TV coverage.

NOTES - This area will be used for location of pads, times of star availability, time and longitude of the ascending node, TV and photography scenes, and any other supplemental information required.

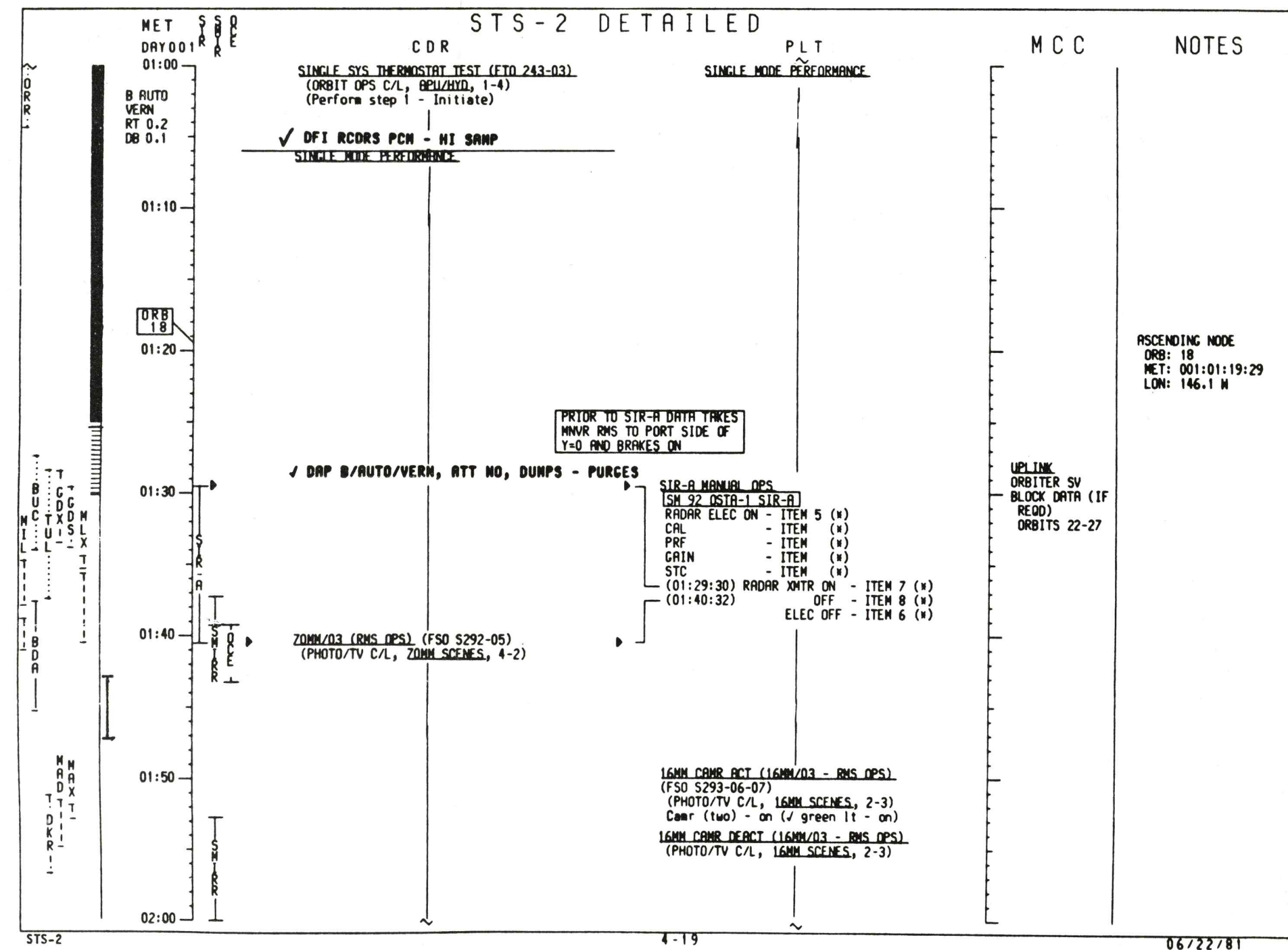
Format Differences
Cap Detailed

Practice

Segment 5

Draw a line to the format area or feature that corresponds to the data asked for in the question.

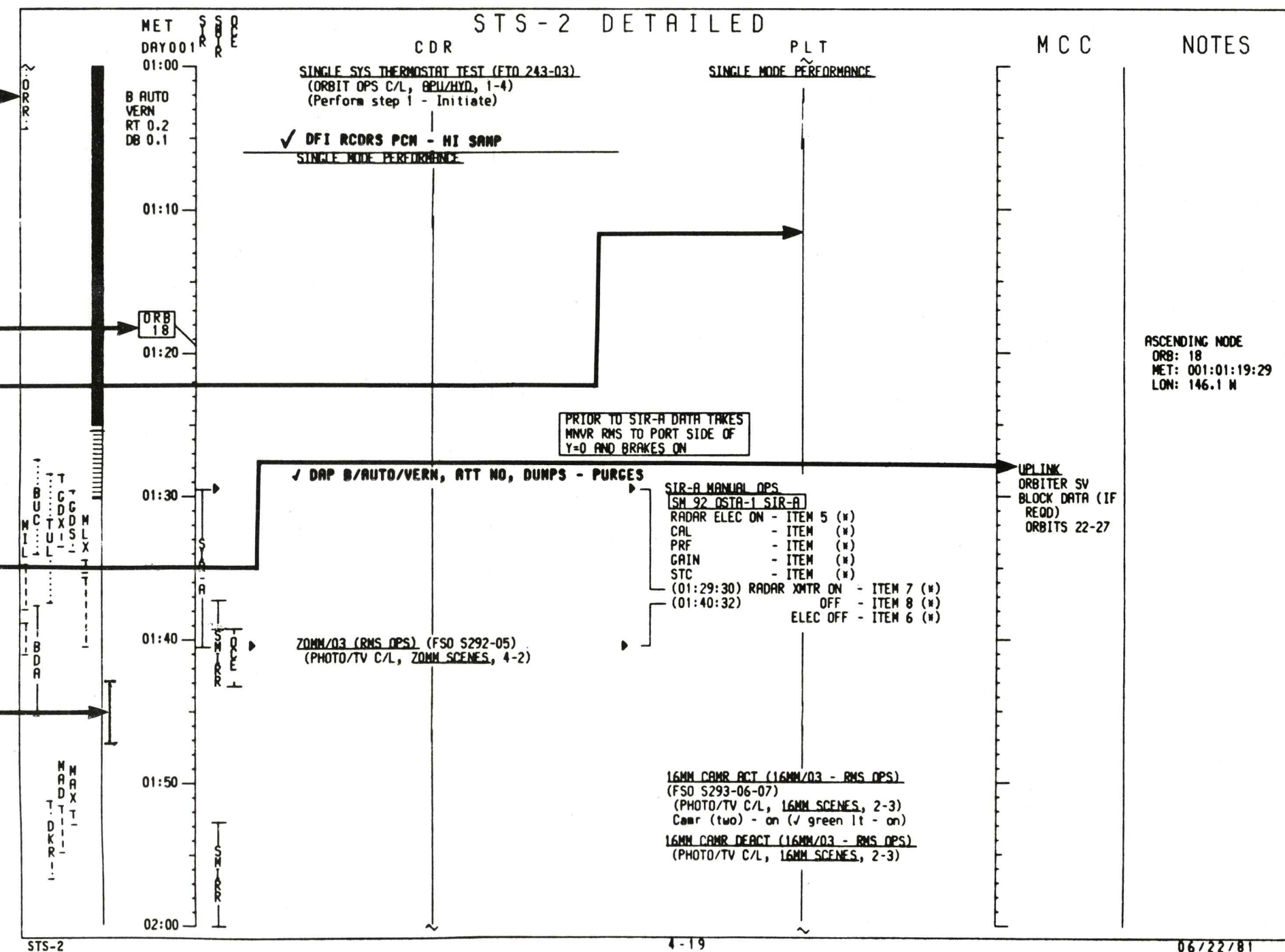
1. The first S-Band only site on the time line.
2. The South Atlantic Anomaly indication.
3. The orbit indication.
4. The area where the pilots activities are scheduled.
5. The MCC uplink note.
6. On which hour of the day does this page start?



Draw a line to the format area or feature that corresponds to the data asked for in the question.

1. The first S-Band only site on the time line.
2. The South Atlantic Anomaly indication.
3. The orbit indication.
4. The area where the pilots activities are scheduled.
5. The MCC uplink note.
6. On which hour of the flight does this page start?

01:00



NOTE

This format differs from the CAP summary in that less information is presented and it covers only a small part of the flight timeline. The experiment data takes are eliminated because there are none.

Timescales: Three time references are presented in the summary timeline format: Mission Elapsed Time (MET), Greenwich Mean Time (GMT) and TIG Minus Time (TIG). The MET and GMT are shown on every page. TIG appears on the pages when deorbit preparations are performed on Rehearsal day and Entry day. This format on one of its timelines uses minus time to count down to a time of ignition for Launch or deorbit burn.

CREWMEN (CDR & PLT): Titles of those scheduled activities for the Commander (CDR) and Pilot (PLT) are shown in their designated column at the appropriate times during the flight.

DAY/NIGHT and ORBIT

Day/Night = The orbital day/night intervals are delineated with black bars indicating when the Orbiter is in darkness.

Orbit - The orbit designation indicates which orbit the spacecraft is on by numerical sequence. An orbit begins when the Orbiter crosses the earth's equator traveling from the southern to the northern hemisphere (ascending node). The succession of orbits is numbered beginning with Orbit 1 at launch.

GSTDN COVERAGE: The GSTDN communication coverage periods are indicated with a horizontal line indicating when communication is available; the GSTDN is identified to the right of the line.

OPS and TRACKING

Ops - Indicated in this area is the GPC software configuration in use during the flight.

Tracking - The primary ground tracking interval for deorbit targeting data is indicated with a horizontal line.

DEORBIT OPT: As applicable, times when deorbit burn opportunities exist (with a crossrange less than 710 nm) for EDW (Edwards AFB), NOR (Northrup Strip), KSC (Kennedy Space Center), ROT (Rota, Spain) HIC (Hickam AFB), and KAD (Kadena AB, Ryuku Islands) are identified.

ATTITUDE and MANEUVERS

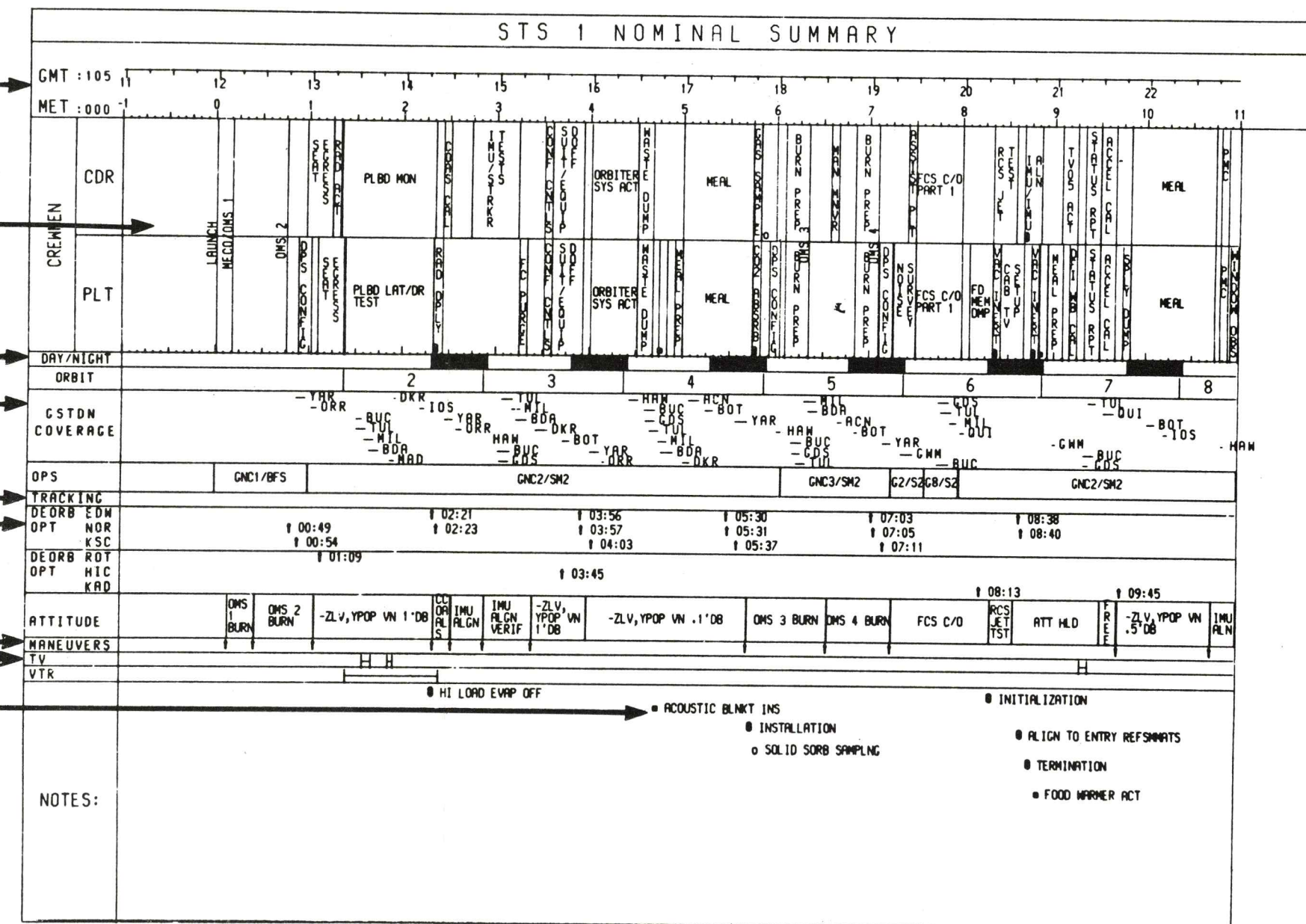
Attitude - The current attitude of the vehicle is identified, e.g., PTC, IMU, -ZLV.

Maneuvers - An '↑' is placed at the time an attitude maneuver occurs.

TV and VTR: Live TV or recorded (VTR) is indicated with a horizontal line.

NOTE

This section of the format is used for additional information needed to supplement activities scheduled in the crewman columns. Bullets are used to reference these data.

Format Differences
PDP Summary

Practice

Segment 5

Draw a line to the part of the format corresponding to the data asked for below.

1. Where the commanders activities are scheduled.
2. Where the day/night indications are.
3. Where the crew can tell what the GSTDN coverage times are.
4. The area where the orbiter attitude is defined.
5. The GMT time where TIG time reaches 0.

STS 1 NOMINAL SUMMARY																							
GMT : 105		11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
MET : 000		-1	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
CREWMEN	CDR																						
	PLT																						
DAY/NIGHT																							
ORBIT																							
GSTDN COVERAGE																							
OPS																							
TRACKING																							
DEORB EDW																							
OPT NOR																							
DEORB ROT																							
OPT HIC																							
ATTITUDE																							
MANEUVERS																							
TV																							
VTR																							
NOTES:																							

1-2

DATE 03/02/81

Draw a line to the part of the format corresponding to the data asked for below.

- 1. Where the commanders activities are scheduled.
- 2. Where the day/night indications are.
- 3. Where the crew can tell what the GSTDN coverage times are.
- 4. The area where the orbiter attitude is defined.
- 5. The GMT time where TIG time reaches 0.

1200

STS 1 NOMINAL SUMMARY																							
GMT : 105		11	12	13	14	15	16	17	18	19	20	21	22										
MET : 000		-1	0	1	2	3	4	5	6	7	8	9	10	11									
CREWMEN	CDR				PLBD MON					MEAL													
	PLT				PLBD LAT/DR TEST					MEAL													
DAY/NIGHT ORBIT					2	3	4	5	6	7	8												
GSTDN COVERAGE																							
DPS																							
TRACKING																							
DEORB EDM																							
OPT NOR																							
DEORB ROT																							
OPT MIC																							
ATTITUDE																							
MANEUVERS																							
TV																							
VTR																							
NOTES:																							

The PDP detailed procedure format is self contained (the crew does not normally have to refer to other documents) and is read much as a computer runs a program. The main program is run through until a call to a subprogram is encountered then the computer jumps to the subprogram and executes it. After the subprogram is complete the computer returns to the main program and continues to execute the main program. Similarly the crew proceeds down the timeline until a circled number "1" is encountered then the crew jumps to the corresponding "1" in the supporting data which is either on the right half of the page or the facing page.

PDP EXAMPLE To execute the example procedure to the right the crew would execute the procedures on the time line until the 1 is reached at which time the crew would follow arrow a to supporting procedure 1. Then execute procedure 1. After completion the crew would follow arrow b to the timeline and continue to execute it until 2 is encountered when arrow c would be followed to procedure 2. Then procedure 2 would be executed and arrow d followed back to the timeline.

FUNCTION	PLBD CONTROL						PLBD DISPLAY PL MDM			
	Ref MA73C:C&D for MCA cbs									
	MTR 1			MTR 2			C C O O	C R R R	O	
	AC/MCA	CNTL	MDM	AC/MCA	CNTL	MDM	A B A B	A B C		
LATCH										
5-8	1/MID3	AB3	PL1	3/MID2	CA3	PL2	1 2 1 2			
9-12	1/MID1	AB3	PL1	3/MID4	CA3	PL2	1 2 1 2			
1-4	1/MID3	AB3	PL1	3/MID2	CA3	PL2	1 2 1 2			
13-16	3/MID4	CA3	PL2	2/MID2	BC3	PL1	2 1 2 1			
S FWD	1/MID1	AB3	PL1	2/MID4	BC3	PL2	1 2 1 2			
S AFT	3/MID4	CA3	PL2	2/MID2	BC3	PL1	2 1 2 1			
S DOOR	1/MID1	AB3	PL1	2/MID4	BC3	PL2			1 1 2 2 1	
									2 1 2 2 2	
P FWD	1/MID1	AB3	PL1	2/MID4	BC3	PL2	1 2 1 2			
P AFT	1/MID3	AB3	PL1	3/MID2	CA3	PL2	1 2 1 2			
P DOOR	3/MID4	CA3	PL2	2/MID2	BC3	PL1			2 1 1 2 2	
									1 1 1 2 1	

70mm/01 PAD

SUBJ: c/1 Defl vs Latch Config
LENS: 80mm MAG: CH 01 (yellow)
FOCUS: ~20 ft

APERTURE/SHUTTER SPEED:

CONDITION	APERTURE	SHUTTER SPEED
Both doors closed or night	F/4	1/60
Sunlit PLBD	F/22	1/500

Detailed PDP Format

RAD HEAT SINK FTR 63VV02 1

NOTE
Delete if NH3 anomalies

C C3 DFI RCDRS PCM - CONT RCD (tb-gray)

C L2 RAD BYP VLV MODE (two) - AUTO
CNTLR LOOP (two) - AUTO A

After ~ 90 sec:
✓RAD BYP VLV (two) tb - RAD

Wait 4 min, then
RAD BYP VLV MODE (two) - MAN
MAN SEL (two) - BYP (after ~ 3 sec, tb-BYP)

Wait ~ 90 sec:
RAD CNTLR LOOP (two) - OFF

C3 DFI RCDRS PCM - HI SAMP

MET: 02:58 (HH:MM) TIG

1: GNC DEORB MNVR COAST 4: BFS, SM 63 PL BAY DOORS

2: BFS, GNC DEORB MNVR COAST

C ✓TOP SUN ATT +20; DAP: AUTO

B CLOSE c/1 LATCH GROUPS (1-4 & 13-16) (70mm/01),
then (5-8 & 9-12) (70mm/01)

C RAD HEAT SINK FTR 63VV02 1

B POST CLOSING CONFIG
CRT4 AC POWER OFF - ITEM 2 EXEC
R12L CRT4 PWR - OFF
A3 MON 1,2 PWR (two) - OFF
A7U PL BAY FLOOD (all) - OFF
TV CAMR PWR BAY (three) - OFF (tb-OFF)
PWR CNTL - PNL
CONTR UNIT - OFF
CNTL - CMD

L12 VTR pb - STOP, wait 5 sec
PWR - OFF

A17 Stow VTR Cassette

A16 Stow 70mm Camr

C PREL DEORB UPDATE/UPLINK 2

C C3 UPLK BLK - NONE
1: GNC DEORB MNVR COAST
✓3: BFS, GNC DEORB MNVR COAST

MCC Update:
OMS PRPLT PAD/DEL PAD (ENT C/L, PRPLT/DEL PADS, 2-1)
IMU ALIGN PAD, if reqd
TOP SUN ATT, 3-37

MCC Uplink:
PRIME SV
BFS SV
PRIME TGT
BFS TGT

On MCC GO:
LOAD - ITEM 39 EXEC
ST CRT TMR - ITEM 40 EXEC

CRT1

CRT1/ ✓PRIME & BFS TGTs per DEL PAD:
3 BURN ATT
HA HP
ΔV TOT
TGO

2: GNC 50 HORIZ SIT
3: BFS, GNC 50 HORIZ SIT

C CRT2/3 ALTM - ITEM 1 + (ref pad)

PASS ITEM BFS ITEM

RWY 1 ✓ 1 ✓

GLD SLOPE 2 ✓ 2 ✓

XEP (DEL PAD) (M=LH TURN) 5 ✓ 5 ✓

TAC 7 EXEC 7 EXEC

DRAG H INH 18 ✓ INH 18 ✓

ADTA H AUT 20 ✓ AUT 20 ✓

ADTA TO G&C INH 24 ✓ INH 24 ✓

TAC INH 27 EXEC AUT 26 ✓

DES any failed TACANS DELTA 33 EXEC

GSTDN Coverage: The GSTDN sites and their acquisition periods are identified in this column. Each period is annotated by either a solid line, dash line, dotted line or dash/dot line that indicates the following:

- A site that has S-Band, UHF voice and TV capabilities, e.g., GDS, GDX (alt GDS antenna), HAW, MAD, MAX (alt MAD antenna), MIL, MLX (alt MIL antenna)
- - - A site with S-Band and UHF voice capabilities, e.g., BDA, GWM, ACN, BUC, TUL, IOS
- ... A site with only S-Band (no UHF or TV) capabilities, e.g., AGO, ORR, QUI
- . - A site with UHF voice capabilities, e.g., YAR, DKR, BOT

Timescales: The time reference used during deorbit prep is TIG Minus Time (TIG) with cross reference to the corresponding Mission Elapsed Time (MET) shown at the top of each page. For the Post Insertion and Post Rehearsal phase, MET is used as the time reference.

Day/Night Cycle: In this column a solid bar indicates the period when the Orbiter and Earth are in darkness. A dashed line indicates when the Orbiter is in daylight but the Earth beneath the Orbiter is still in darkness.

DAP Configuration: At the top of each page the active DAP configuration is identified for that MET time. When the active DAP configuration is changed in mid-page, the new configuration will be documented adjacent to the point where the change was made. The following is identified: DAP (A or B), MODE (AUTO or MAN) Jets (NORM or VERN), Rotation Discrete Rate (RT), and Attitude Deadband (DB).

◀: This symbol is used to indicate a time critical event.

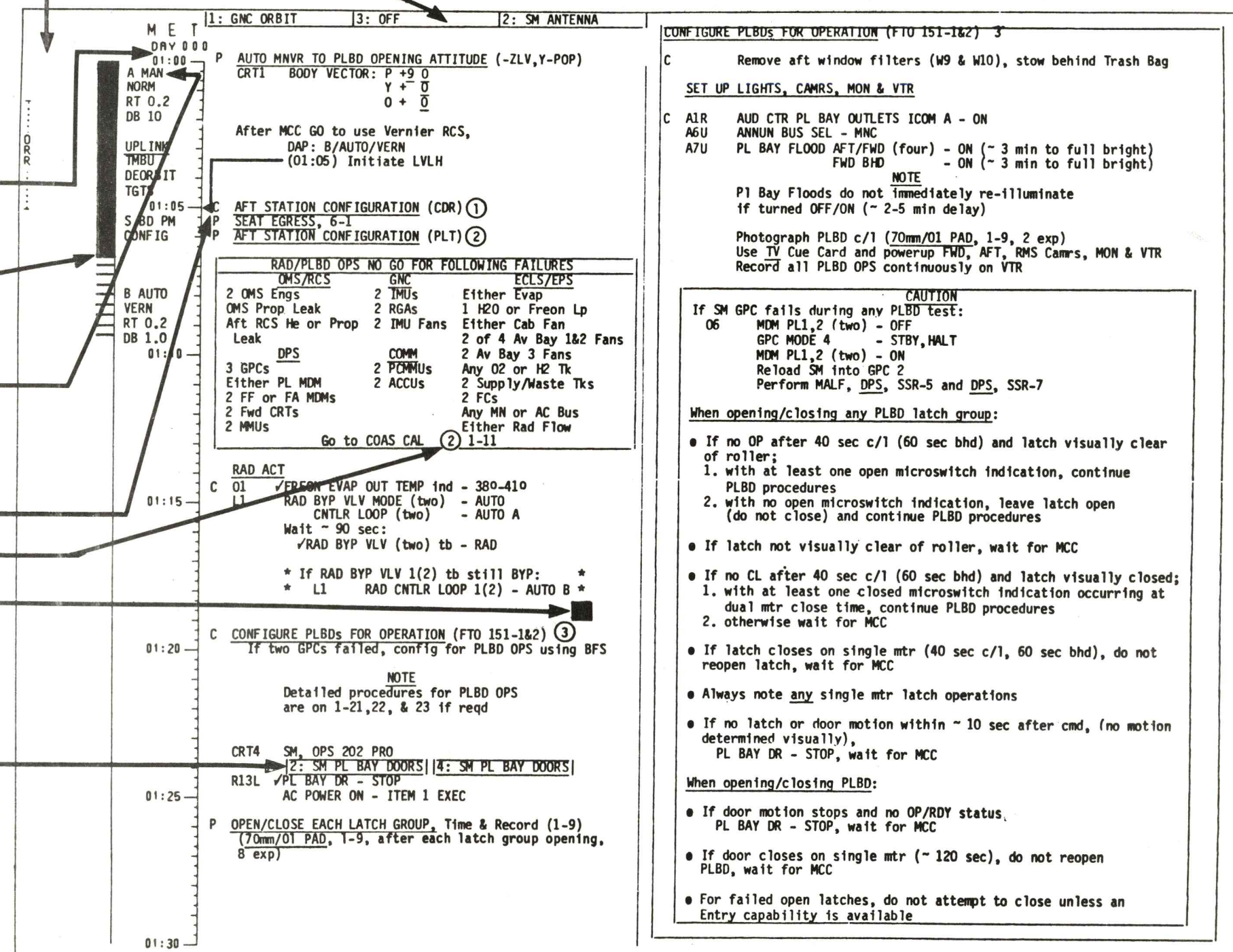
①: Circled numbers are used to reference a detailed procedure.

■: This symbol indicates non-critical deorbit prep activities that may be deleted by the crew if behind the nominal timeline, or if attempting preparation for a one orbit early entry.

CRT Configuration Changes - Called out at the proper time in the timeline are any changes to the CRT configuration.

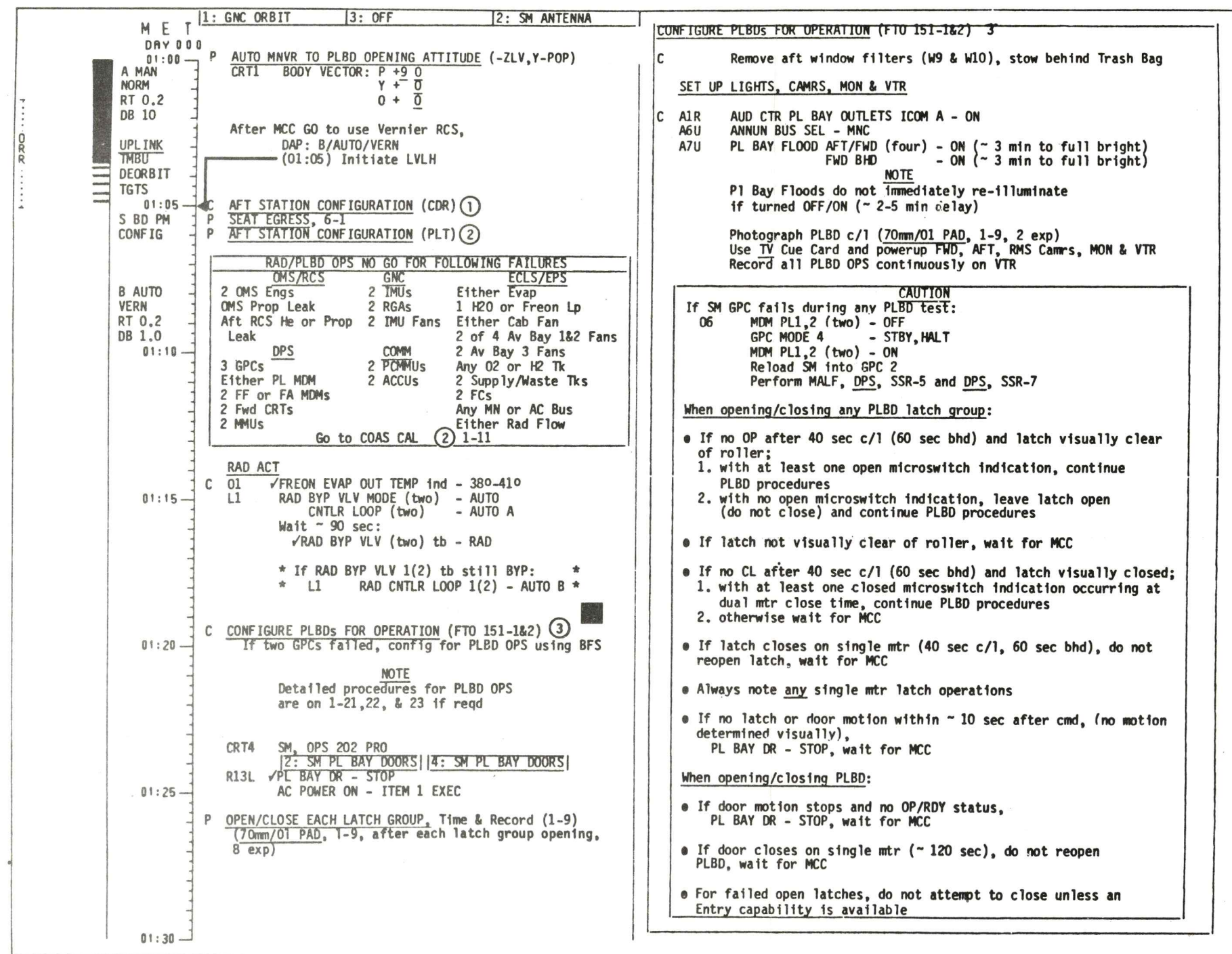
Format Differences PDP Detailed

This three part box provides the CRT display set up at the time when this page starts; changes are called out below.



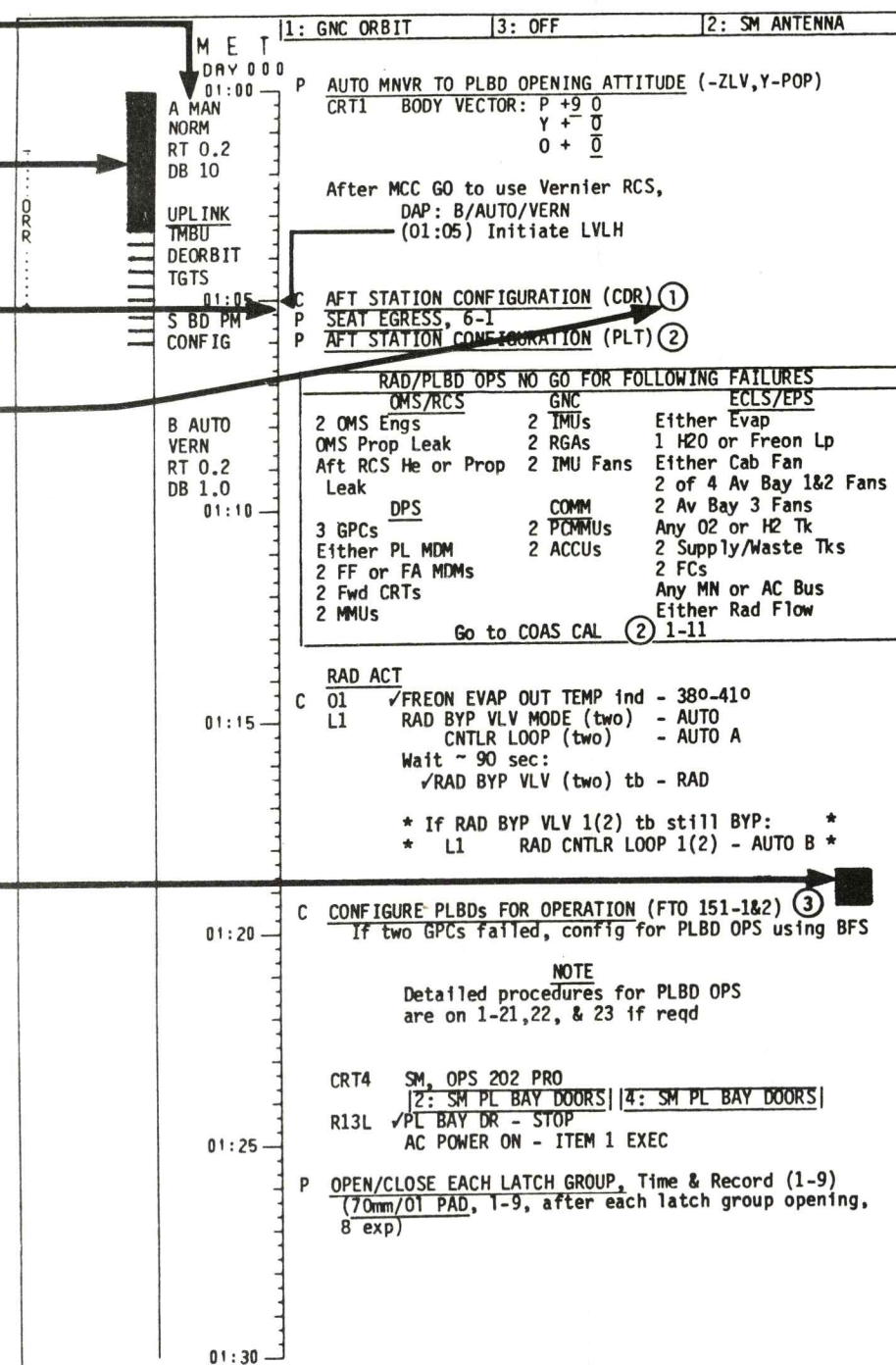
Draw a line to the area or feature defined in each statement below.

1. The DAP configuration for this page.
2. The night indication.
3. The time critical event symbol.
4. A reference to another procedure.
5. To the symbol that indicates the item can be deleted if the crew is behind in the timeline.



Draw a line to the area or feature defined in each statement below.

1. The DAP configuration for this page.
2. The night indication.
3. The time critical event symbol.
4. A reference to another procedure.
5. To the symbol that indicates the item can be deleted if the crew is behind in the timeline.



CONFIGURE PLBDS FOR OPERATION (FTO 151-1&2) 3

C Remove aft window filters (W9 & W10), stow behind Trash Bag

SET UP LIGHTS, CAMRS, MON & VTR

C AIR AUD CTR PL BAY OUTLETS ICOM A - ON

A6U ANNUN BUS SEL - MNC

A7U PL BAY FLOOD AFT/FWD (four) - ON (~ 3 min to full bright)

FWD BHD - ON (~ 3 min to full bright)

NOTE

P1 Bay Floods do not immediately re-illuminate if turned OFF/ON (~ 2-5 min delay)

Photograph PLBD c/1 (70mm/01 PAD, 1-9, 2 exp)

Use TV Cue Card and powerup FWD, AFT, RMS Camrs, MON & VTR

Record all PLBD OPS continuously on VTR

CAUTION

If SM GPC fails during any PLBD test:

06 MDM PL1,2 (two) - OFF

GPC MODE 4 - STBY, HALT

MDM PL1,2 (two) - ON

Reload SM into GPC 2

Perform MALF, DPS, SSR-5 and DPS, SSR-7

When opening/closing any PLBD latch group:

- If no OP after 40 sec c/1 (60 sec bhd) and latch visually clear of roller;
 1. with at least one open microswitch indication, continue PLBD procedures
 2. with no open microswitch indication, leave latch open (do not close) and continue PLBD procedures
- If latch not visually clear of roller, wait for MCC
- If no CL after 40 sec c/1 (60 sec bhd) and latch visually closed;
 1. with at least one closed microswitch indication occurring at dual mtr close time, continue PLBD procedures
 2. otherwise wait for MCC
- If latch closes on single mtr (40 sec c/1, 60 sec bhd), do not reopen latch, wait for MCC
- Always note any single mtr latch operations
- If no latch or door motion within ~ 10 sec after cmd, (no motion determined visually),
 1. PL BAY DR - STOP, wait for MCC

When opening/closing PLBD:

- If door motion stops and no OP/RDY status,
 1. PL BAY DR - STOP, wait for MCC
- If door closes on single mtr (~ 120 sec), do not reopen PLBD, wait for MCC
- For failed open latches, do not attempt to close unless an Entry capability is available

SEGMENT 6
FDF SYMBOL USE

OBJECTIVE

The student will be able to match the standard FDF symbols to their definitions.

SEGMENT INTRODUCTION

There are many different symbols that are used in the FDF checklist procedures to minimize the amount of words that have to be written. The meaning of each of these symbols must be understood in order to read and execute a checklist procedure. This segment will explain the meaning of these symbols.

Learning Statement

Segment 6 Part 1

HEADER BOXES

FDF SYMBOL USE

When it is desired to manage the use of CRT's, such as in the Ascent Checklist, Entry Checklist or PDP, header boxes will appear at the top of each page to define the display configuration. CRT boxes appearing in the body of these procedures will be aligned with the same numbered CRT box in the header.

Wide Format Pages:

1:	3:	2:
----	----	----

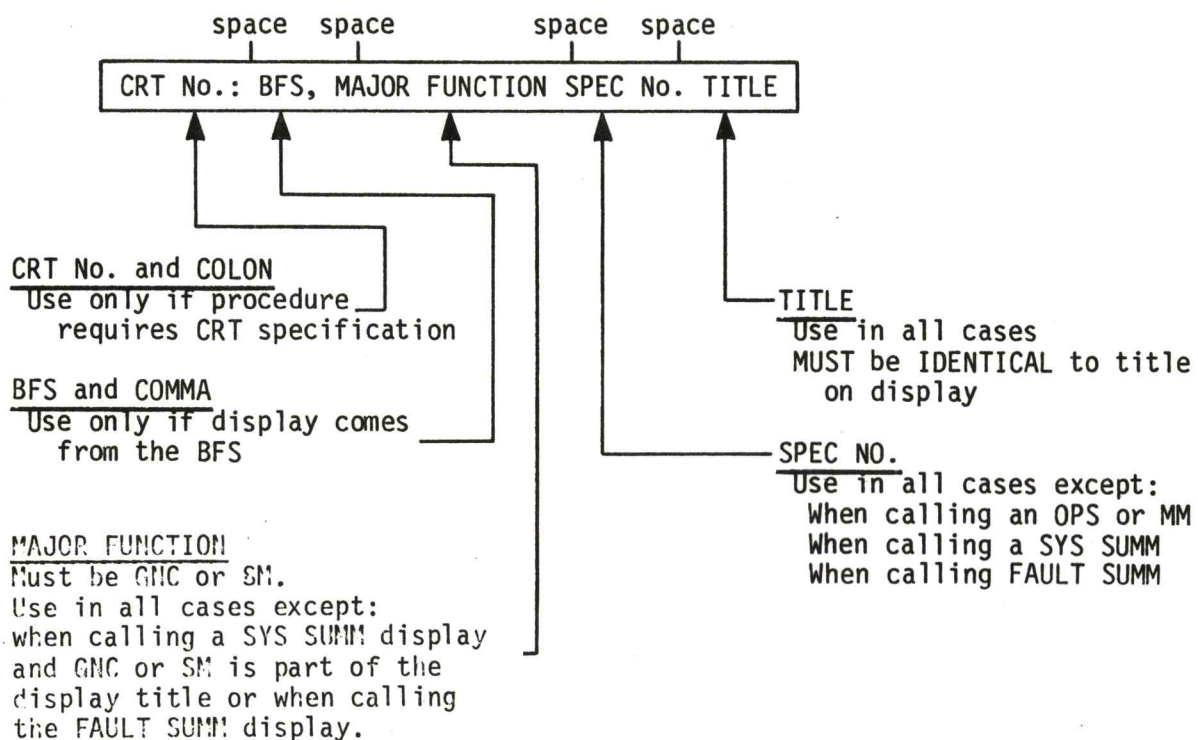
Narrow Format Pages:

1:	2:
3:	

BOXES WITHIN THE TEXT

1:
3:
2:

BOX CONTENT FORMAT



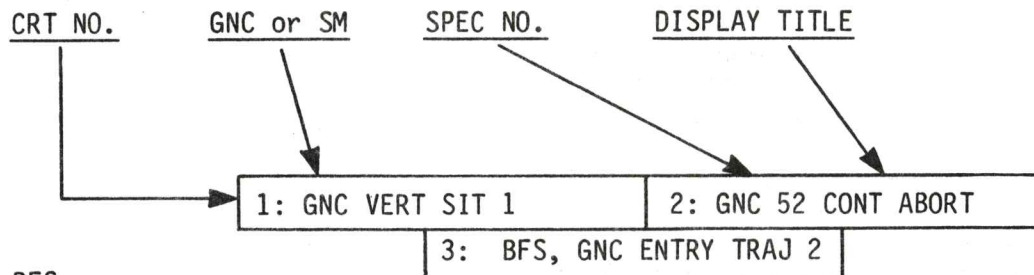
Learning Statement

Segment 6 Part 2

HEADER BOXES

FDF SYMBOL USE

At the top of a procedure page the configuration for each CRT is called out with CRT No., BFS (if it is), GNC or SM, SPEC No. (if applicable), and the exact display title.



BFS

P

Pitch to = 500
MPS PNEU He ISOL - CL
ET UMB DR - CL
SBTC - full fwd
SPD BK pb - MAN
✓ BDY FLP - AUTO

2: GNC 52 CONT ABORT

CRT2 DUMP STOP - ITEM 2 EXEC

$\dot{H} = -250$ C

Roll right to target energy
Reduce to 400
Fly Traj line for \dot{H} control
Use HSI for Roll reversals

P

2: GNC 50 HORIZ SIT

CRT2 SELECT ROTA
RWY AOG - ITEM 5 EXEC
TACAN CH tw (three) - 023

M = 10

SPD BK = 80%
Incorporate TACANS

H = 120K C

✓ NH3 CNTLR A - PRI/GPC
LG HYD ISOL VLV tb (three) - OP
MPS PNEU He ISOL - OP

M = 5 P

M = 4

2: GNC 51 OVERRIDE

DISPLAY CHANGE CALLOUT

If a display is changed to support a procedure it is called out in the body of the procedure.

Learning Statement

Segment 6 Part 3

FDF SYMBOL USE

SPECIAL SYMBOLS

The following special symbols are also used in the FDF procedures.

✓ This symbol stands for the instruction check or verify. It implies that the crew will verify the switch position and if not as expected place it in the proper position.

ET SEP (MECO + 18)

✓ MN ENG STATUS 1t (three) - off

* If 'SEP INH', check rates:
* For rates < .7, .7, .7
* (FEEDLINE FAIL)
* GNC, OPS 104 PRO

* 1: GNC OMS 1 MNVR EXEC
* ET SEP - MAN
* Go to DELAYED OMS 1
* For rates > .7, .7, .7 wait for
* rates to damp

* This symbol is used to set off backup procedures that are integrated into the normal procedure.

COAS VERIFICATION (FTO 273-02 and 06), GNC 201

01 1 COAS CALIBRATION PREP
(019) COAS - ON
COAS ✓ Barrel Index - FW (OW)
GNC 20 DAP CONFIG
CRT DAP A(B) COMP VERN - ITEM 7(21) +.0 0 3 EXEC

. The dot or period is used to box in alternate procedures. The crew must select the proper box to use

..... IF +X COAS WITH PRCS
• Select Tail only control
• DAP A(B) JET OPT P - ITEM 12(26) +3 EXEC
• Y - ITEM 13(27) +3 EXEC
.....

= This symbol is used in the pocket C/L to denote that this information is in the Cue Cards.

GNC OMS 1(2) MNVR EXEC

OMS GIMBAL

>> This symbol is used to indicate that the pocket C/L procedure is complete.

If first failure:
| Affected gimbal - sel SEC >>
If second failure:
Yaw: No action reqd
Pitch: Affected OMS ENG - OFF

Practice

Answer the questions about an example procedure located below the questions.

1. What is the display title for CRT 2? _____
2. Which symbol indicates integrated back up procedures? _____
3. What is the symbol that indicates the line is covered in the cue cards? _____

1: GNC ASCENT TRAJ	2: GNC SYS SUMM 1
3: BFS, GNC SYS SUMM 1	

MET

08:28 Throttle down to 65%

* If MAN THROT and $V_I = 25,550(\text{Nom})$,	*	=
* 25,620(Abort)	*	=
* C3 MN ENG SHUT DN pb (three) - push	*	=

4. What is the symbol that indicates the crew is to verify a condition? _____

5. Draw a line to the alternate procedure.

COAS ✓ Barrel Index - FW(OW)

GNC 20 DAP CONFIG

CRT DAP A(B) COMP VERN - ITEM 7(21) + .0 0 3 EXEC

```

..... IF +X COAS WITH PRCS .....
.   Select Tail only control      .
.   DAP A(B) JET OPT  P - ITEM 12(26) +3 EXEC  .
.                                   Y - ITEM 13(27) +3 EXEC  .
.....

```

6. What is the symbol that indicates that a pocket checklist procedure is complete? _____

If time to TIG > 2 hrs:

51. Perform CONTINGENCY COOLING - SUIT OR CABIN/CO2 CONTROL (IFM,24) (If TIG <14 hr, omit CO2 CONTROL), then:

52. Perform CONTINGENCY COOLING - FLT DECK AVIONICS (IFM, 22) (power vac cleaner during long periods of flight deck avionics use), then:

or

For deorbit prep:

53. Go to PDP, LOSS OF 2 CABIN FANS, 13-1 >>

If time to TIG < 2 hrs:

54. Doff suits

55. Don harness

56. go to PDP, LOSS OF 2 CABIN FANS, 13-1

Practice Feedback

Answer the questions about an example procedure located below the questions.

1. What is the display title for CRT 2? SYS SUMM 1
2. Which symbol indicates integrated back up procedures? *
3. What is the symbol that indicates the line is covered in the cue cards?
=

1: GNC ASCENT TRAJ	2: GNC SYS SUMM 1
3: BFS, GNC SYS SUMM 1	

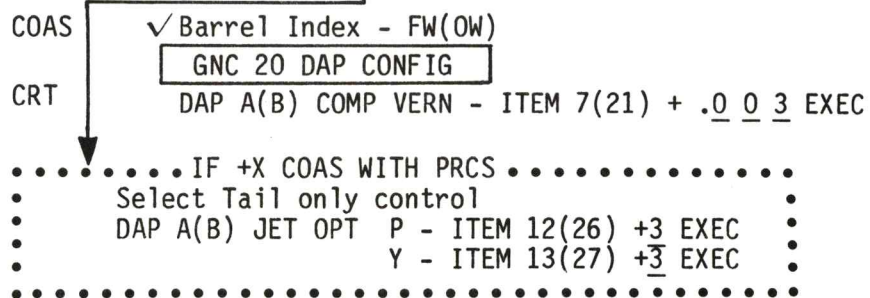
MET

08:28 Throttle down to 65%

* If MAN THROT and $V_I = 25,550(\text{Nom})$,	*	=
* 25,620(Abort)	*	=
* C3 MN ENG SHUT DN pb (three) - push	*	=

4. What is the symbol that indicates the crew is to verify a condition?
✓

5. Draw a line to the alternate procedure.



6. What is the symbol that indicates that a pocket checklist procedure is complete? >>

If time to TIG > 2 hrs:

51. Perform CONTINGENCY COOLING - SUIT OR CABIN/CO2 CONTROL (IFM,24) (If TIG <14 hr, omit CO2 CONTROL), then:

52. Perform CONTINGENCY COOLING - FLT DECK AVIONICS (IFM, 22) (power vac cleaner during long periods of flight deck avionics use), then:

or

For deorbit prep:

53. Go to PDP, LOSS OF 2 CABIN FANS, 13-1>>

If time to TIG < 2 hrs:

54. Doff suits

55. Don harness

56. go to PDP, LOSS OF 2 CABIN FANS, 13-1

Learning Statement

Segment 6 Part 3

	CROSSREFERENCE	FDF
	SINGLE ENG PRESS - MCC Report	
Reference to different document	<ul style="list-style-type: none"> * If 2 OMS PRPLT TKS FAIL: * Manual MECO Overspeed (AOA) * VI=20K Manual throttle & CSS * MECO target VI = 26,050 H = 550 * VI=25,950 MN ENG SHUT DN pb (three) - push Auto ET SEP, -Z xlation OMS ENG (two) - OFF Perform Manual <u>MPS DUMP</u> Cue Card Abort = AOA Go to <u>POST OMS 1</u> 	<ul style="list-style-type: none"> * = * = * = * = * = * = * = * = * =
Reference to same document		
	07:40 3-g Throttling	
	<ul style="list-style-type: none"> * If > 3 g's and throttle and not decreasing: * Manual throttle 	<ul style="list-style-type: none"> * * *
	08:54 ET SEP (MECO + 18)	=
	✓ MN ENG STATUS 1t (three) - off	
Reference to same document	<ul style="list-style-type: none"> * If 'SEP INH', check rates: * For rates ≤ .7, .7, .7 (FEEDLINE FAIL) * GNC, OPS 104 PRO * 1: GNC OMS 1 MNVR EXEC * ET SEP - MAN * Go to <u>DELAYED OMS 1</u> * For rates > .7, .7, .7 wait for rates to damp 	<ul style="list-style-type: none"> * = * = * = * = * = * = * = * =
	F9 ✓ FC AMPS (three) < 350	
Reference to different document	<ul style="list-style-type: none"> * If any FC AMPS > 350, go to * ORBIT PKT C/L, <u>PRIOR PWRDN</u>, * 11-4. Power down group 1 as required (except for GPC's) * to get AMPS < 350, then: 	<ul style="list-style-type: none"> * * * *
	R12U FC PURGE VLV (three) - GPC	
	HTR - GPC	
	FC GPC PURGE SEQ - START	
	(Hold 3 sec after tb - gray)	

Learning Statement

Segment 6 Part 4

FDF SYMBOL USE

PROCEDURAL NOTES

Operations often require clarification or identification of special conditions. Three different forms of information may appear in a procedure: warnings, cautions, and general notes.

02(N2) FLOW HIGH/CAB P LOW/dP/dT SM SYS SUMM 1

WARNINGS

Warnings are related to crew safety and are identified by the word warning a double outline box.

WARNING

If, after alarm, 02(N2) flow reading is 2.5 - 3.0, assume flow rate exceeds 30pph

1. 14.5 CAB REG INLET vlv (two) - CL (pn1 M010W)
2. VAC VENT ISOL VLV MODE - MN A (pn1 ML31C)
CNTL - CL (tb-CL)

FUEL CELL PURGE - AUTO, SM2

CAUTIONS

Cautions are associated with hardware and are used to alert the crewman to peculiarities that could result in hardware damage or malfunction.

CAUTION

Do not initiate within 3 hours of deorbit. If any FC AMPS > 350, do not purge that FC

NOTE

The FC auto purge capability exists only in SM OPS 2

F9

✓ FC AMPS (three) < 350,

GENERAL NOTES

Notes provide general information or clarify a certain point in the operation.

- * If any FC AMPS > 350, go to *
- * ORBIT PKT C/L, PRIOR PWRDN, *
- * 11-4. Power down group I as *
- * required (except for GPC's) *
- * to get AMPS < 350, then: *

R12U

FC PURGE VLV (three) - GPC
HTR - GPC
FC GPC PURGE SEQ - START
(Hold 3 sec after tb - gray)

Practice

Segment 6

1. What is the document crossreferenced to below? _____
2. Draw a line from 2. to the procedural note (general)
3. Draw a line to the caution note below from the 3.
4. Draw a line to the warning note below from the 4.

02(N2) FLOW HIGH/CAB P LOW/dP/dT SM SYS SUMM 1

WARNING

If, after alarm, 02(N2) flow reading is 2.5 - 3.0, assume flow rate exceeds 30pph

1. 14.5 CAB REG INLET vlv (two) - CL (pn1 M010W)
2. VAC VENT ISOL VLV MODE - MN A (pn1 ML31C)
CNTL - CL (tb-CL)

Equalization vlv - OFF (hatch)

If $dP/dT \geq 0$:

3. Go to MALF, ECLS, 6.2b(c) 1 >>

If $dP/dT \leq 0$, BFS, SM SYS SUMM :

4. Log dP/dT BU _____; CAB P _____; MET _____ : _____
5. CAB RELIEF (two) - CLOSE (tb-CL)

IF dP/dT still < 0 , assume cabin leak:

6. Use nomograph to find latest possible TIG:
Time leak check made _____ : _____ : _____ MET
(+) T max to TIG (nomog) _____ : _____ : _____ MET
(=) Latest possible TIG _____ : _____ : _____ MET

NOTE

If $T_{max} < 1$ hr, PLT go to PDP,
EMERGENCY DEORBIT PREP, 10-1;
CDR continue

7. 02 SYS 1,2 SPLY (two) - OP (tb-OP)
XOVR (two) - OP
02/N2 CNTLR VLV SYS 1 - OP
2 - CL
8. 02 EMER vlv - CL (pn1 M010W)
14.5 CAB REG INLET SYS 2 - OP
02 REG INLET SYS 1 vlv - CL

CAUTION

Donn POS when PP02 = 2.50

- 02 XOVR SYS 2 - CL
- 02 EMER vlv - OP

Practice Feedback

Segment 6

1. What is the document crossreferenced to below? PDP

2. Draw a line from 2. to the procedural note (general)

3. Draw a line to the caution note below from the 3.

4. Draw a line to the warning note below from the 4.

02(N2) FLOW HIGH/CAB P LOW/dP/dT SM SYS SUMM 1

WARNING

If, after alarm, 02(N2) flow reading is 2.5 - 3.0, assume flow rate exceeds 30pph

1. 14.5 CAB REG INLET vlv (two) - CL (pn1 M010W)
2. VAC VENT ISOL VLV MODE - MN A (pn1 ML31C)
CNTL - CL (tb-CL)

Equalization vlv - OFF (hatch)

If $dP/dT \geq 0$:

3. Go to MALF, ECLS, 6.2b(c) **1** >>

If $dP/dT \leq 0$, BFS, SM SYS SUMM :

4. Log dP/dT BU _____; CAB P _____; MET _____ : _____ :

5. CAB RELIEF (two) - CLOSE (tb-CL)

IF dP/dT still < 0 , assume cabin leak:

6. Use nomograph to find latest possible TIG:

Time leak check made _____ : _____ : _____ MET

(+) T max to TIG (nomog) _____ : _____ : _____ MET

(=) Latest possible TIG _____ : _____ : _____ MET

NOTE

If $T_{max} < 1$ hr, PLT go to PDP,
EMERGENCY DEORBIT PREP, 10-1;
CDR continue

7. 02 SYS 1,2 SPLY (two) - OP (tb-OP)
XOVR (two) - OP
02/N2 CNTLR VLV SYS 1 - OP
2 - CL
8. 02 EMER vlv - CL (pn1 M010W)
14.5 CAB REG INLET SYS 2 - OP
02 REG INLET SYS 1 vlv - CL

CAUTION

Donn POS when PP02 = 2.50

- 02 XOVR SYS 2 - CL
- 02 EMER vlv - OP

MAIL TO: D. E. Holkan CG3

LESSON CRITIQUE SHEET

LESSON CODE _____ DATE OF HANDOUT _____

Please explain any negative answers to the questions below in specific terms.
Use the back of the sheet if required.

1. Was the lesson material presented in a logical manner?
2. Comments on handout organization:
3. Were the figures and diagrams optimum to understanding the material?
4. Did the lesson start from your entry level?
5. In your opinion, was the level of detail about right?
6. Additions or deletions from the lesson?
7. Prior Knowledge: Considerable _____ Some _____ Very Little _____
8. Other comments (or questions):

MAIL TO: CG3/TRAINING COORDINATOR

WORKBOOK TRAINING REPORT

INSTRUCTIONS:

When you have completed this lesson, please fill this sheet out and return it to the Training Coordinator (CG3) in order to have completion entered on your record.

STUDENT _____ STUDENT NAME _____

MAIL CODE

--	--	--

1 2 3

LAST NAME

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6 7 8 9 10 11 12 13 14 15 16 17 18

INITIALS

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20 21

LESSON CODE _____

PART 1

F	D	F											
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25 26 27 28 29 30 31 32 33 34 35 36

PART 2

2	1	0	2
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37 38 39 40

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41

ENTER TIME TO COMPLETE THIS LESSON

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47 48 49 50

HR:MIN

DATE COMPLETED (M/D/Y)

		/			/		
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52 53 54 55 56 57 58 59

WORKBOOK DATE (M/D/Y)

0	8	/	2	4	/	8	1
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61 62 63 64 65 66 67 68

I certify that I have completed the above described lesson.

STUDENT SIGNATURE _____

NASA-JSC

KH/78/001 27 Nov.