

Telemetry Applications Workbook Ground Systems User Tools

TLM APPL 2102

**Space Transportation System
For Training Purposes Only**

**Training Division
Flight Training Branch**

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FOREWORD

This training material is part of a series of lectures, handouts, and workbooks for instruction of ground systems. This training package should be studied before attending any classroom session on this material or taking any lesson for which this is a prerequisite.

The ground systems lesson sequence chart shows where this lesson fits in the series, the prerequisites for each lesson and the optimum presentation order. The lesson sequence charts are located in the Shuttle Training Program Catalog.

This material is for training purposes only. It should not be used as a source of operational data.

This workbook is part of the advanced training series. Data for examples is not mission specific, but is representative. This should not detract from its training value for later STS flights.

The last two pages of the workbook are comprised of these 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 when the workbook is completed. Neither an envelope or a signature is required for this.
- B. Training Report. This provides a means to enter this training in the student's training record. It is applicable to Flight Operations Directorate (FOD) personnel only. Complete the Training Report and mail to CG3 to receive credit for this workbook.

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LESSON CRITIQUE SHEET
WORKBOOK TRAINING REPORT

HOW TO USE THIS WORKBOOK:

This book is organized into sections and segments. Each section contains a number of segments dealing with a common subject. The segments contain the specific learning material. 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 by a ruled border. 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 learning material, skip right to the practice. For other segments somewhat familiar to you, 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, the supporting data should be read carefully.

Before proceeding, you should 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 righthand 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 defined when introduced. You can also find them listed in Appendix B.

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 or cut the procedures from the right side of the Learning Statements so that you can use them while working a terminal position.

NOTE

Most MSK displays shown in this workbook have the display number shown twice, once for foreground and once for background. Changes at some later date will overlay the two numbers, therefore, these will appear as one number.

LESSON INTRODUCTION

The Telemetry Data Flow Workbook, GND TM 2102A, explains the transmission of telemetry data on the data links and the routing of the data to various equipment. This Telemetry Applications Workbook provides detailed procedures which allow the flight controller to modify the MCC processing of the incoming telemetry data.

Your discipline may not require that you perform all of the tasks presented in this document. You may skip the segments covering those tasks if you desire.

1. IDENTIFYING TELEMETRY MENU MED CODES
2. CHANGING OPERATIONAL LIMIT VALUES FOR INDIVIDUAL PARAMETERS
3. ENABLING, DISABLING, AND CHANGING CRITICAL LIMIT VALUES FOR INDIVIDUAL PARAMETERS
4. INHIBITING OFFSCALE HIGH/LOW LIMIT SENSING FOR INDIVIDUAL PARAMETERS
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12. DELETING/CHANGING A REFERENCE LINE ON UNIVERSAL PLOT
13. UNIVERSAL PLOT REFERENCE LINE AND CONTROL DATA INTERACTIONS
14. CHANGING SPECIAL COMPUTATION-CONSTANT ENGINEERING UNIT VALUES
15. CHANGING SPECIAL COMPUTATION TIME CONSTANTS
16. SELECTING MAJOR FUNCTION FOR DISPLAY 1350
17. CHANGING VARIABLE PARAMETER ID
18. USING MCC CALIBRATION DATA BOOK
19. CHANGING THE CALIBRATION CURVE
20. THRIFTS
21. SPECIAL AND SUPER THRIFT PRODUCT REQUEST
22. RECONFIGURATION OF THRIFTS

SEGMENT 1

IDENTIFYING TELEMETRY MENU MED CODES

OBJECTIVES:

- a. State the MED code number, which provides a listing of all predefined TLM MED menus available from the Mission Operations Computer (MOC).
- b. State the name of the document and section therein which lists MED codes authorized for flight controller use.

SEGMENT INTRODUCTION:

There are many telemetry MED menus; however, it is not necessary for you to memorize the MED codes if you know how to obtain a telemetry MED menu listing on the Megadata terminal. From this listing you can determine the MED code for the menu you are seeking.

This segment explains how to obtain a MED menu listing and how to identify those menus you may be authorized to use to change data.

Learning Statement

Telemetry MED Code Locations

- MED code number V00 must be input to the MOC via the Megadata terminal to request the listing of all MOC predefined TLM MED menus.
- The authorized TLM MED menu listing for each position can be found in the COMPUTER OPERATIONS-ON-LINE section of the Flight Control Operations Handbook (FCOH) under MOC MED Access and Use.

NOTE

Not all TLM MED menus listed
are authorized for use from
all operator locations.

Supporting Data

The selection list of all predefined TLM MED menus is produced on a Megadata terminal display by entering the MED code number V00 to the MOC. The TLM MED Selection List Menu, as shown below, lists menu numbers and titles used to make changes to processing constraints, program control parameters, parameter limit values, table and plots, and other display information. Entering the menu number to the MOC in real time with a Megadata terminal results in a blank menu being displayed on the terminal.

V00# 003/RT

TLM MED SELECTION LIST MENU

V01? FUNCTION LIST	V41? UNIVERSAL PLOT (NOMINAL DATA)
V02? STREAM SELECT/DESELECT	V43? UNIVERSAL DIGITAL DISPLAY
V03? TLM/CMD INTERFACE E/D	V51? PARAMETER READOUT DISPLAY
V04? DTE UPDATE RATE	V53? PARAMETER CHARACTERISTIC DISPLAY
V05? TPC AUTHORIZATION	V60? THRIFT RUN CONTROL
V07? THRIFT RECONFIGURATION	V61? THRIFT CYCLE TIME/INIT OVERRIDE
V10? PARAMETER OVERRIDE	V63? THRIFT TAB RECONFIGURATION
V11? CAL CHANGE (SCALE)	V64? THRIFT BILEVEL RECONFIGURATION
V12? CAL CHANGE (POLYNOMIALS)	V65? THRIFT PLOT RECONFIGURATION
V13? CAL CHANGE (DATA POINTS)	V66? THRIFT HISTORY DATA LOAD
V16? SUSPECT DATA VAL (PAIRS)	V67? THRIFT DISPLAY TO MICROFICHE CTL
V17? SUSPECT DATA VAL (BITS)	V68? THRIFT UPDATE RATE/DELOG CONTROL
V18? SUSPECT DATA VAL (OUTPUTS)	V69? THRIFT INDIVIDUAL FORMAT CONTROL
V19? CAL OVERRIDE PRINT	V70? THRIFT PLAYBACK/NO PLAYBACK CTL
V20? SPEC COMP CONSTANT CHANGE (EU)	V71? THRIFT GMTSORT CONTROL
V21? SPEC COMP CONSTANT CHANGE (TIME)	V73? THRIFT TAPE PRODUCT SUMMARY
V22? HEXADECIMAL MASK CHANGE	V74? THRIFT RUN SUMMARY DISPLAY
V23? SPEC COMP RTXT INPUT	V76? THRIFT HISTORY DATA BLOCK DELETE
V30? OPERATIONAL LIMITS	V80? RECORDER MANAGEMENT
V31? OFFSCALE LIMIT SENSE CONTROL	V85? DATA TRACKING & MGMT (HIST RPT)
V33? CRITICAL LIMITS	V86? DATA TRACKING & MGMT (TAPE GEN)
V40? UNIVERSAL PLOT (CONTROL DATA)	V87? DATA TRACKING & MGMT (CMNTS/TAPE)
	V88? DATA TRACKING & MGMT (RATES)

Supporting Data

Flight controllers are not authorized to use all menus listed on the TLM MED Selection List Menu.

The MOC MED access and use procedures in the FCOH contains the Authroized MED List. The telemetry menu portion of this list follows:

AUTHORIZED MED LIST

F/C FUNCTION	MED MENU NO.	TITLE
EPS, MECH, SENSORS, CONTROL, ME, MPS, OMS/RCS, DPS SUPPORT, PAYDAT	V00 V07 V10 ^c V20 ^a V21 V22 ^a V23 V30 V31 ^a V33 ^a V40 ^a V41 ^a V43 ^a V63 ^b V64 ^b V65 ^b	TLM Med Selection List Menu TLM THRIFT Reconfiguration TLM Parameter Override TLM Special Comp Constant Change (EU) TLM Special Comp Constant Change (Time) TLM Hexidecimal Mask Change TLM Special Comp RTXT Parameter TLM Operational Limit Change TLM Offscale Limit Sense Control TLM Critical Limits Change TLM Universal Plot (Control Data) Universal Plot (Nominal Data) Universal Digital Display TLM Thrift TAB Reconfiguration Control TLM Thrift Bilevel Reconfiguration Control TLM Thrift Plot Reconfiguration Control

^aMED entries which may be required during critical phases (L -45 minutes through OMS-2 completion and EI -35 minutes through landing.) These require FD approval.

^bMED menu callup only, no entries from MOCR or F/C SSR's.

^cAdvise computer TM on parameter override.

Practice

1. State the MED code number which must be input to the MOC via the Megadata terminal to request the listing of all MOC predefined TLM MED menus.
2. State the document name and the section which contains authorized MED menu list.

Practice Feedback

1. State the MED code number which must be input to the MOC via the Megadata terminal to request the listing of all MOC predefined TLM MED menus.

V00

2. State the document name and the section which contains authorized MED menu list.

Flight Control Operations Handbook, (FCOH)
Computer Operations-on-Line Section

1. IDENTIFYING TELEMETRY MENU MED CODES
2. CHANGING OPERATIONAL LIMIT VALUES FOR INDIVIDUAL PARAMETERS
3. ENABLING, DISABLING, AND CHANGING CRITICAL LIMIT VALUES FOR INDIVIDUAL PARAMETERS
4. INHIBITING OFFSCALE HIGH/LOW LIMIT SENSING FOR INDIVIDUAL PARAMETERS
5. CHANGING HEXADECIMAL LIMITS
6. OVERRIDING TELEMETRY PARAMETER VALUES
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13. UNIVERSAL PLOT REFERENCE LINE AND CONTROL DATA INTERACTIONS
14. CHANGING SPECIAL COMPUTATION-CONSTANT ENGINEERING UNIT VALUES
15. CHANGING SPECIAL COMPUTATION TIME CONSTANTS
16. SELECTING MAJOR FUNCTION FOR DISPLAY 1350
17. CHANGING VARIABLE PARAMETER ID
18. USING MCC CALIBRATION DATA BOOK
19. CHANGING THE CALIBRATION CURVE
20. THRIFTS
21. SPECIAL AND SUPER THRIFT PRODUCT REQUEST
22. RECONFIGURATION OF THRIFTS

SEGMENT 2

CHANGING OPERATIONAL LIMIT VALUES FOR INDIVIDUAL PARAMETERS

OBJECTIVES:

- a. Change operational limit values using Megadata terminal.
- b. Change operational limit values using JSC Form 480.
- c. State three ways used to change operational limit values for individual parameters during real time flight operations.

SEGMENT INTRODUCTION:

Many downlinked analog telemetry parameters have operational limits. You may recall from the UT SMEK 2102 workbook that any one of up to five sets of parameters may be activated for operation limit sense processing. These parameters and related limits must be defined premission; however, these limit values can be changed in real time.

This segment presents the three methods for changing operational limits for individual parameters in real time.

This procedure allows changes to operational limit values of individual parameters in an active set. Parameter numbers and values are input to MOC via the Megadata terminal using the V30 menu.

<u>MSK</u>	<u>Discipline</u>
2105-2107	BOOSTER
2120-2125	AVIONICS
2149-2151	EMESB1
2161-2173	EMESB2
2179-2183	PROP

ASSUMPTION

This procedure assumes that the appropriate operational limit set has been selected with the SMEK and the parameter values to be changed have been verified.

PROCEDURE

1. Call a menu V30 menu from MOC or your diskette.
2. Enter parameter number(s) for which values are to be changed.
3. Enter desired low and/or high values(s) for parameter.
4. Repeat steps 2 and 3 for desired parameters.
5. Hard copy old values if desired.
6. Transmit to MOC.
7. Verify limit values are changed.

V308		
001/RT		
TLM OPERATIONAL LIMIT CHANGE MENU		
PARAMETER NUMBER	LOW VALUE	HIGH VALUE
/ V41T1161A_ ,	-20_____ ,	100_____,
V41T1171A_ ,	200.00_____ ,	500.00_____ ,
V41T1251A_ ,	-325_____ ,	_____ ,
V41T1261A_ ,	_____ ,	100_____ ,
_____ ,	_____ ,	_____ ,
_____ ,	_____ ,	_____ ,
_____ ,	_____ ,	_____ ,
_____ ,	_____ ,	_____ ,
_____ ,	_____ ,	_____ ,
_____ ,	_____ ,	_____ ,
_____ ,	_____ ,	_____ ,
_____ ,	_____ ,	_____ ,
_____ ,	_____ ,	_____ ,
_____ ,	_____ ,	_____ ,
_____ ,	_____ ,	_____ ,
_____ ,	_____ ,	_____ ,
_____ ,	_____ ,	_____ ,
_____ ,	_____ ,	_____ / \$
ENTER PM FOR PERMANENT MED		

FLT		SET		BSTR		OPER		LIM		DSP		3		2107B	
PARAMETER	LOW	L	HIGH	H	D	PARAMETER	LOW	L	HIGH	H	D				
V41T1161A	-20.00		100.00												
V41T1171A	200.00		500.00												
V41T1251A	-325.00		300.00												
V41T1261A	-20.00		100.00												
V41T1271A	200.00		500.00												
V41T1351A	-325.00		300.00												
V41T1361A	-20.00		100.00												
V41T1371A	200.00		500.00												
V41T1601A	-325.00		300.00												
V98P1740C	240.00		450.00												
V92P1741C	240.00		450.00												
V98P2100C	1450.00		3275.00												
V98P2110C	1450.00		3275.00												
V98P2120C	1450.00		3275.00												
V98P2140C	41.00		44.00												
V98P2155C	2500.00		4300.00												
V98P2156C	2500.00		4300.00												
V98P2157C	2500.00		4300.00												

Supporting Data

There are three ways to change operational limits. These are;

- a. By using the Megadata terminal with the V30 menu
- b. By using JSC Form 480
- c. By contacting the computer telemetry console operator via the voice loop and request change. A maximum of only three parameters can be changed using this method.

Normally, you should use the Megadata terminal; however, if you don't have a terminal or your terminal is inoperative, use the form. The voice loop procedure should only be used as a back up.

A discipline can have up to five operational limit sets. A parameter can be any one or more of these sets. The low and high limit values of the parameters may be the same or different in each of these sets. These values may only be changed when the set has been activated by the SMEK module.

Fill out the V30, MED menu below to change the operational limit values for the following parameters from the old values to the new values.

<u>PARAMETER NO.</u>	<u>OLD VALUES</u>		<u>NEW VALUES</u>	
	<u>LOW</u>	<u>HIGH</u>	<u>LOW</u>	<u>HIGH</u>
V61T2635A	0	65	10	75
V45P1100A	100	150	85	--
V45T1107A	-325	350	--	-200
V61P2405A	14.00	16.40	17.40	25

[illegible]

Fill out the V30, MED menu below to change the operational limit values for the following parameters from the old values to the new values.

<u>PARAMETER NO.</u>	<u>OLD VALUES</u>		<u>NEW VALUES</u>	
	<u>LOW</u>	<u>HIGH</u>	<u>LOW</u>	<u>HIGH</u>
V61T2635A	0	65	10	75
V45P1100A	100	150	85	--
V45T1107A	-325	350	--	-200
V61P2405A	14.00	16.40	17.40	25

2-5

JSC Form 480 is a multipurpose form. The remaining sections will be covered in the following segments.

4. Verify limit values are changed.

NASA-JSC

Supporting Data

Only those parameter values in an active set, as indicated on the SMEK module, can be changed. These parameters and related current limit values are displayed on the operational limit displays for the controlling discipline. While a parameter can reside in as many as five different sets and the limit value(s) can be the same, or different, in each set, a change only effects the limit values in the current active set.

Practice

1. List the three ways operational limit values can be changed during real-time flight operations.
 - a.
 - b.
 - c.
2. How do you verify that operational limit value changes have been entered into the MOC?

Practice Feedback

1. List the three ways operational limit values can be changed during real-time flight operations.
 - a. By using V30 menu via the Megadata terminal
 - b. By written instruction to Computer TM using JSC Form 480
 - c. By verbal instructions to Computer TM on DP TLM Voice Loop.
2. How do you verify that operational limit value changes have been entered into the MOC?

Using the MSK or DRK, call the applicable operational limit display for your F/C discipline to the console CRT and compare limit values with values entered.

Practice

3. Assume you are at the EPS console on October 31, 1981 at 08:30. You are monitoring Flight 2 in real time and your Megadata terminal is not working. Also, all other Megadata terminals are being used, and you have parameters that need changing. Fill out JSC Form 480 to submit the following limit change values to Computer TM for input to MOC.

OPERATIONAL LIMIT CHANGE

<u>PARAMETER NO.</u>	<u>LOW</u>	<u>HIGH</u>
V45P1100A	600	950
V45P1200A	600	950
V45P2100A	125	250
V45P2200A	76.50	270.75
V45T1007A	-325	325
V45T109A 15.00	100	

LIMIT CHANGE

FROM: _____ TO: COMPUTER TM
DATE: _____ P-TUBE STA: 2-54
TIME: _____

V30#
FLT/DT / TLM OPERATIONAL LIMIT CHANGE MENU

[illegible]

ENTER PM FOR PERMANENT MED _____

V31#
FLT/DT ____/____ TLM OFFSCALE LIMIT SENSE CONTROL MENU

[illegible]

ENTER PM FOR PERMANENT MED. _____

V33#
FLT/DT ____/____ TLM CRITICAL LIMITS CHANGE MENU

[illegible]

ENTER PM FOR PERMANENT MED _____
JSC Form 480 (Aug 78)

NASA-JSC

Practice Feedback

3. Assume you are at the EPS console on October 31, 1981 at 08:30. You are monitoring Flight 2 in real time and your Megadata terminal is not working. Also, all other Megadata terminals are being used, and you have parameters that need changing. Fill out JSC Form 480 to submit the following limit change values to Computer TM for input to MOC.

OPERATIONAL LIMIT CHANGE

<u>PARAMETER NO.</u>	<u>LOW</u>	<u>HIGH</u>
V45P1100A	600	950
V45P1200A	600	950
V45P2100A	125	250
V45P2200A	76.50	270.75
V45T1007A	-325	325
V45T109A 15.00	100	

LIMIT CHANGE

FROM: EPS
DATE: 10/31/81
TIME: 0830

TO: COMPUTER TM
P-TUBE STA: 2-54

V30#

FLT/DT 2 / RT

TLM OPERATIONAL LIMIT CHANGE MENU

[illegible]

ENTER PM FOR PERMANENT MED

V31#

V31#
FLT/DT / TLM OFFSCALE LIMIT SENSE CONTROL MENU

PARAMETER NUMBER	CONTROL CODE
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10
11	11
12	12
13	13
14	14
15	15
16	16
17	17
18	18
19	19
20	20
21	21
22	22
23	23
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74	74
75	75
76	76
77	77
78	78
79	79
80	80
81	81
82	82
83	83
84	84
85	85
86	86
87	87
88	88
89	89
90	90
91	91
92	92
93	93
94	94
95	95
96	96
97	97
98	98
99	99
100	100

NOTE: CONTROL CODE
DEFINITIONS
H=OFFSCALE HIGH
L=OFFSCALE LOW
R=OFFSCALE RESET

ENTER PM FOR PERMANENT MED _____

V33#

V33#
FLT/DT /

TLM CRITICAL LIMITS CHANGE MENU

[illegible]

ENTER PM FOR PERMANENT MED _____
JSC Form 480 (Aug 78)

NASA-JSC

1. IDENTIFYING TELEMETRY MENU MED CODES
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22. RECONFIGURATION OF THRIFTS

SEGMENT 3

ENABLING, DISABLING, AND CHANGING CRITICAL LIMIT VALUES FOR INDIVIDUAL PARAMETERS

OBJECTIVES:

- a. Enabling, disabling, and changing critical limit values using Megadata terminal
- b. Enabling, disabling, and changing critical limit values using JSC Form 480
- c. State the three ways used to change critical limit values for individual parameters during real-time flight operations.

SEGMENT INTRODUCTION:

Many downlinked analog telemetry parameters have critical limits. Just as with operational limits, critical limits must be defined premission and the limit values (points) can be changed in real time.

This segment presents the two methods for changing critical limits for individual parameters in real time.

Enabling, Disabling and Changing Critical Limit Values for Individual Parameters

ASSUMPTION

This procedure assumes that the critical limit set has been selected with the SMEK and the parameter values to be changed have been verified.

CONTROL CODE (E/D)

This single character field must either be blank, D, E, A or D will cause limit sensing to be disabled for the associated parameter; whereas, an E will cause processing to be re-enabled.

All other data fields are self explanatory.

CRITICAL LIMIT DISPLAYS

<u>MSK</u>	<u>Discipline</u>
2115	AVIONICS
2127	CCE
2145	EMESB1
2158	EMESB2
2195	PROP

[illegible]

FLT 2		PROP CRIT LIM DSP 1		RT2195A A	
PARAMETER	LOW L	HIGH H	D	PARAMETER	LOW L HIGH H
M01G2603C	5109.00	6000.00		V90X0643X	
M01G2604C	95.00	105.00			
M02G2603C	5511.00	6000.00			
M02G2604C	95.00	105.00			
M06G2603C	3021.00	4000.00			
M06G2604C	3264.00	4000.00			
V42P1110C	2500.00	4001.00			
V42P1111C	2500.00	4001.00			
V42P1115C	225.00	300.00			
V42P1116C	225.00	300.00			
V42P2110C	2500.00	4001.00			
V42P2111C	2500.00	4001.00			
V42P2115C	225.00	300.00			
V42P2116C	225.00	300.00			
V42P3110C	2500.00	4001.00			
V42P3112C	2500.00	4001.00			
V42P3113C	2500.00	4001.00			
V42P3115C	225.00	300.00			
V42P3116C	225.00	300.00			
V43P4121C	3500.00	4000.00			
V43P4221C	242.00	285.00			
V43P4321C	242.00	285.00			
V43P4547C	1600.00	2600.00			
V43P4549C	300.00	390.00			
V43P4645C	170.00	300.00			
V43P4646C	170.00	300.00			
V43P5121C	3530.00	4020.00			
V43P5221C	242.00	285.00			
V43P5321C	242.00	285.00			
V43P5547C	1600.00	2600.00			
V43P5549C	300.00	390.00			
V43P5645C	170.00	300.00			
V43P5646C	170.00	300.00			
V43T4643A	-30.00	250.00			
V43T6643A	-30.00	250.00			
M10G2607E					
M21G2606E					
M21G2607E					

1. Call a blank V33 menu from MOC or diskette.
2. Enter parameter number(s) for which values are to be changed.
3. Enter desired low and/or high value(s) for parameter.
4. Enter E or D for parameters to be enabled or disabled.
5. Repeat steps 2 through 4 for desired parameters.
6. Hard copy if desired.
7. Transmit to MOC.

NOTE:

Entry during critical phases of flight (L-45 min. through OMS-2 and EI-35 min. through landing) requires Flight Director's (FD) approval.

8. Verify change(s) or appropriate critical limit display.

NOTE:

Parameters are disabled when:

- a. An asterisk appears in the D column of critical limit displays.
- b. An asterisk appears to the left of parameter high value on SMEK history tab display.

Fill out the V33, TLM Critical Limits Change Menu below to do the following.

a. Disable limit sensing for these parameters:

	<u>LOW</u>	<u>HIGH</u>
V76V0100A	100	
V76V0200A	.2	3.7
V76V0103A		
V76V0230A	57	103

b. Enable limit sensing for these parameters:

	<u>LOW</u>	<u>HIGH</u>
V45C0101A	6.975	8.42
V45C0201A		
V45C0301A		

V338			
001/RT			
TLM CRITICAL LIMITS CHANGE MENU			
PARAMETER NUMBER	LOW LIMIT	HIGH LIMIT	CONTROL CODE(E/D)
/ _____ , _____ , _____ , - ,			
_____ , _____ , _____ , - ,			
_____ , _____ , _____ , - ,			
_____ , _____ , _____ , - ,			
_____ , _____ , _____ , - ,			
_____ , _____ , _____ , - ,			
_____ , _____ , _____ , - ,			
_____ , _____ , _____ , - ,			
_____ , _____ , _____ , - ,			
_____ , _____ , _____ , - ,			
_____ , _____ , _____ , - ,			
_____ , _____ , _____ , - ,			
_____ , _____ , _____ , - ,			
_____ , _____ , _____ , - ,			
_____ , _____ , _____ , - ,			
_____ , _____ , _____ , - ,			
_____ , _____ , _____ , - ,			
_____ , _____ , _____ , - ,			
_____ , _____ , _____ , - / \$			
ENTER PM FOR PERMANENT MED			

Practice Feedback

Fill out the V33, TLM Critical Limits Change Menu below to do the following.

a. Disable limit sensing for these parameters:

	<u>LOW</u>	<u>HIGH</u>
V76V0100A	100	
V76V0200A	.2	3.7
V76V0103A		
V76V0230A	57	103

b. Enable limit sensing for these parameters:

	<u>LOW</u>	<u>HIGH</u>
V45C0101A	6.975	8.42
V45C0201A		
V45C0301A		

[illegible]

Learning Statement

FUNCTION

JSC Form 480

Used to submit written instructions to the Computer TM to change operational and/or critical limit values.

LIMIT CHANGE			
FROM: <u>6/6</u> DATE: <u>1/20/81</u> TIME: <u>1501</u>	}	TO: COMPUTER TM P-TUBE STA: <u>2-54</u>	

V30#
FLT/DT 2/R TLM OPERATIONAL LIMIT CHANGE MENU

PARAMETER NUMBER	LOW VALUE	HIGH VALUE
/ _____ ,	_____ ,	_____ ,
_____ ,	_____ ,	_____ ,
_____ ,	_____ ,	_____ ,
_____ ,	_____ ,	_____ ,
_____ ,	_____ ,	_____ ,
_____ ,	_____ ,	_____ ,
_____ ,	_____ ,	_____ ,
_____ ,	_____ ,	_____ ,
_____ ,	_____ ,	_____ ,
_____ ,	_____ ,	_____ ,
_____ ,	_____ ,	_____ / \$

ENTER PM FOR PERMANENT MED _____

V31#
FLT/DT ____/____ TLM OFFSCALE LIMIT SENSE CONTROL MENU

PARAMETER NUMBER	CONTROL CODE	NOTE:
/ _____ ,	_____ ,	CONTROL CODE DEFINITIONS H=OFFSCALE HIGH L=OFFSCALE LOW R=OFFSCALE RESET
_____ ,	_____ ,	
_____ ,	_____ ,	
_____ ,	_____ ,	
_____ ,	_____ ,	
_____ ,	_____ ,	
_____ ,	_____ ,	
_____ ,	_____ ,	
_____ ,	_____ ,	
_____ ,	_____ ,	
_____ ,	_____ ,	
_____ ,	_____ / \$	

ENTER PM FOR PERMANENT MED _____

V33#
FLT/DT ____/____ TLM CRITICAL LIMITS CHANGE MENU

PARAMETER NUMBER	LOW LIMIT	HIGH LIMIT	CONTROL CODE(E/D)
/ V45P1100A,	<u>700</u>	<u>1000</u>	<u>E</u>
V45P1200A,	_____	<u>300</u>	<u>R</u>
V45P2100A,	<u>150.2</u>	<u>325</u>	<u>E</u>
V45P2200A,	<u>-350</u>	<u>325</u>	<u>R</u>
_____ ,	_____ ,	_____ ,	_____ ,
_____ ,	_____ ,	_____ ,	_____ ,
_____ ,	_____ ,	_____ ,	_____ ,
_____ ,	_____ ,	_____ ,	_____ ,
_____ ,	_____ ,	_____ ,	_____ ,
_____ ,	_____ ,	_____ ,	_____ ,
_____ ,	_____ ,	_____ ,	_____ ,
_____ ,	_____ ,	_____ ,	_____ / \$

ENTER PM FOR PERMANENT MED _____

Enabling, Disabling and Changing Critical Limit Values for Individual Parameters

ASSUMPTION

This procedure assumes that the critical limit set has been selected with the SMEK and the parameter values to be changed have been verified.

PROCEDURE

1. Obtain JSC Form 480 from computer TM, room 313 (SDP TM voice loop).
2. Enter your console position, date and time.
3. Enter flight and data type.
4. Enter the following on part III:
 - Parameter number (s) for which values are to be changed.
 - Low and/or high limit value(s) for applicable parameter numbers.
 - Enter E or D for parameters to be enabled or disabled.
5. Hard copy if desired.
6. Using P tube system, send JSC Form 480 to computer TM P-tube station 2-54
7. Verify change(s) on appropriate critical limit display.

Practice

Assume you are at the EPS console on October 31, 1981 at 0830. You are monitoring Flight 2 in real time and your Megadata terminal is not working. Also, all other Megadata terminals are being used, and you have parameters that need changing. Fill out JSC Form 480, to submit the following limit change values to Computer TM for input to MOC.

CRITICAL LIMIT CHANGE

<u>PARAMETER NO.</u>	<u>LOW</u>	<u>HIGH</u>	<u>CONTROL CODE</u>
V45P1100A	500	1000	ENABLE
V45P1200A	500	1000	
V45P2100A	100		
V45P2200A	50	300	DISABLE
V45T1007A	-350	350	DISABLE
V45T109A	12.50	120	ENABLE

LIMIT CHANGE

FROM: _____
DATE: _____
TIME: _____

TO: COMPUTER TM
P-TUBE STA: 2-54

V30#

FLT/DT

TLM OPERATIONAL LIMIT CHANGE MENU

PARAMETER
NUMBER

LOW
VALUE

**HIGH
VALUE**

ENTER PM FOR PERMANENT MED

V31#

FLT/DT

TLM OFFSCALE LIMIT SENSE CONTROL MENU

PARAMETER
NUMBERCONTROL
CODE

NOTE: CONTROL CODE
DEFINITIONS
H=OFFSCALE HIGH
L=OFFSCALE LOW
R=OFFSCALE RESET

ENTER PM FOR PERMANENT MED

V33#

FLT/DT

TLM CRITICAL LIMITS CHANGE MENU

PARAMETER
NUMBER

LOW
LIMIT

**HIGH
LIMIT**

CONTROL
CODE (E/D)

ENTER PM FOR PERMANENT MED _____
JSC Form 480 (Aug 78)

NASA-JSC

Assume you are at the EPS console on October 31, 1981 at 0830. You are monitoring Flight 2 in real time and your Megadata terminal is not working. Also, all other Megadata terminals are being used and you have parameters that need changing. Fill out JSC Form 480, to submit the following limit change values to Computer TM for input to MOC.

<u>PARAMETER NO.</u>	<u>LOW</u>	<u>HIGH</u>	<u>CONTROL CODE</u>
V45P1100A	500	1000	ENABLE
V45P1200A	500	1000	
V45P2100A	100		
V45P2200A	50	300	DISABLE
V45T1007A	-350	350	DISABLE
V45T109A	12.50	120	ENABLE

FROM: _____
DATE: _____
TIME: _____

TO: COMPUTER TM
P-TUBE STA: 2-54

V30#

FLT/DT 2 /RT

TLM OPERATIONAL LIMIT CHANGE MENU

[illegible]

ENTER PM FOR PERMANENT MED

V31#

FLT/DT /

TLM OFFSCALE LIMIT SENSE CONTROL MENU

[illegible]

NOTE: CONTROL CODE
DEFINITIONS
H=OFFSCALE HIGH
L=OFFSCALE LOW
R=OFFSCALE RESET

ENTER PM FOR PERMANENT MED

V33#

FLT/DT /

TLM CRITICAL LIMITS CHANGE MENU

[illegible]

ENTER PM FOR PERMANENT MED _____
JSC Form 480 (Aug 78)

NASA-JSC

Practice

1. List the two ways that critical limit values can be changed during real-time flight operations.
 - a.
 - b.
2. How do you verify that operational limit value changes are entered into the MOC?

Practice Feedback

1. List the two ways that critical limit values can be changed during real-time flight operations.
 - a. By using V33 MED menu via the Megadata terminal
 - b. By written instruction to Computer TM using JSC Form 480
2. How do you verify that operational limit value changes are entered into the MOC?

Using the MSK or DRK, call the applicable critical limit display for your F/C discipline to the console CRT and compare limit values with the values entered.

1. IDENTIFYING TELEMETRY MENU MED CODES
2. CHANGING OPERATIONAL LIMIT VALUES FOR INDIVIDUAL PARAMETERS
3. ENABLING, DISABLING, AND CHANGING CRITICAL LIMIT VALUES FOR INDIVIDUAL PARAMETERS
4. INHIBITING OFFSCALE HIGH/LOW LIMIT SENSING FOR INDIVIDUAL PARAMETERS
5. CHANGING HEXADECIMAL LIMITS
6. OVERRIDING TELEMETRY PARAMETER VALUES
7. DEFINING PARAMETERS ON A UNIVERSAL DIGITAL DISPLAY
8. DELETING PARAMETER(S) FROM, OR CLEARING, AN ENTIRE UNIVERSAL DIGITALS DISPLAY
9. RECONFIGURING UNIVERSAL PLOT
10. DELETING PARAMETER(S) FROM A UNIVERSAL PLOT
11. DRAWING REFERENCE LINE ON UNIVERSAL PLOT USING V41, TLM UNIVERSAL PLOT (NOMINAL DATA) MENU
12. DELETING/CHANGING A REFERENCE LINE ON UNIVERSAL PLOT
13. UNIVERSAL PLOT REFERENCE LINE AND CONTROL DATA INTERACTIONS
14. CHANGING SPECIAL COMPUTATION-CONSTANT ENGINEERING UNIT VALUES
15. CHANGING SPECIAL COMPUTATION TIME CONSTANTS
16. SELECTING MAJOR FUNCTION FOR DISPLAY 1350
17. CHANGING VARIABLE PARAMETER ID
18. USING MCC CALIBRATION DATA BOOK
19. CHANGING THE CALIBRATION CURVE
20. THRIFTS
21. SPECIAL AND SUPER THRIFT PRODUCT REQUEST
22. RECONFIGURATION OF THRIFTS

SEGMENT 4

INHIBITING OFFSCALE HIGH/LOW LIMIT SENSING FOR INDIVIDUAL PARAMETERS

OBJECTIVES:

- a. Complete a V31 MED menu to inhibit and reset offscale high and low PCM limit sensing.
- b. State the effects of inhibiting off scale limit sensing, on DTE displays, limit lights and alarms.

SEGMENT INTRODUCTION:

A check is made on all uncalibrated TM data received from the Orbiter to determine if the pulse code modulation (PCM) count is within predefined limits. TM parameters found to be out of limits are said to be offscale high or low. This process is called TM offscale limit sensing.

This segment discusses the methods and effects of inhibiting offscale limit sensing. In addition the segment discusses the method for resetting normal limit sensing.

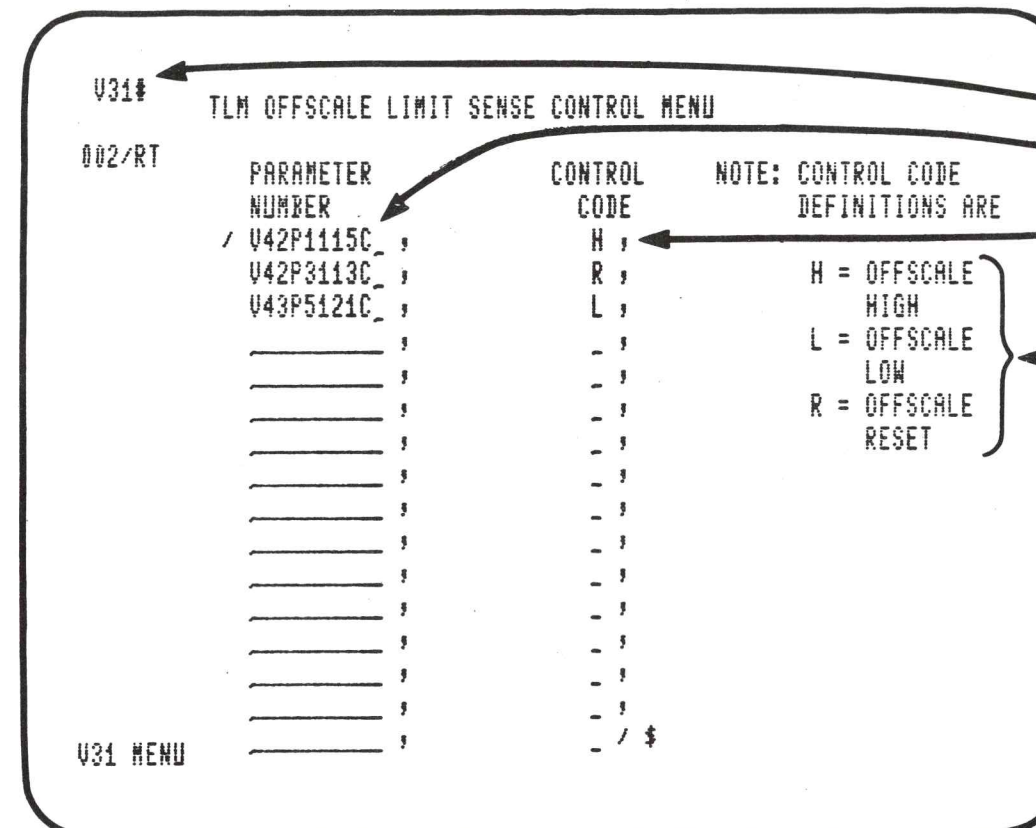
Inhibiting Offscale High/Low Limit Sensing For Individual Parameters

PROCEDURE

The following matrix shows the result of entering an H for a parameter number on the V31 menu.

	BEFORE PCM OUT-OF-TOLERANCE CONDITION	AFTER PCM OUT-OF-TOLERANCE CONDITION
HIGH SPEED DISPLAY	NO CHANGE	
PARAMETER LIMIT LIGHTS	DISABLED	
OP/CRITICAL LIMIT DISPLAY	H DISPLAYED IN ERROR COLUMN	
CRITICAL EVENT ALARMS	DISABLED	

The parameter number data field is self-explanatory.



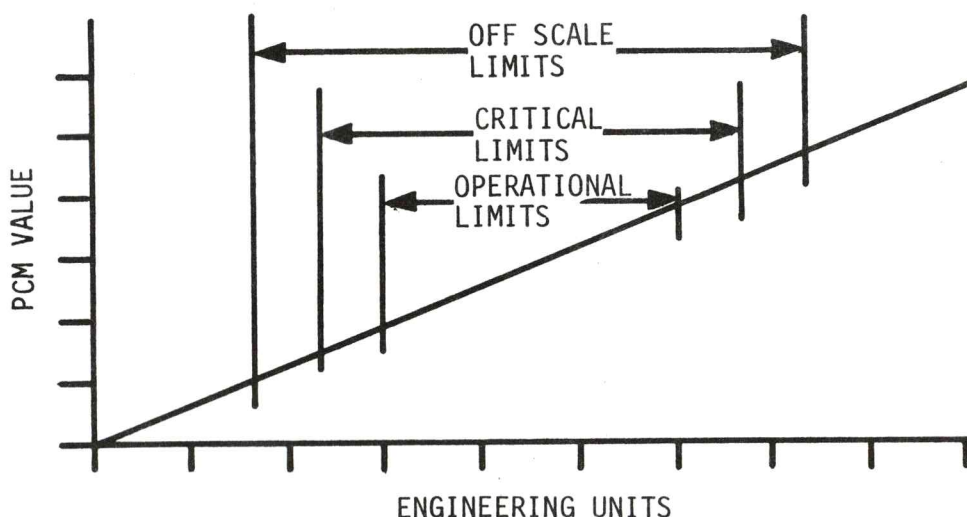
1. Call a blank V31 from the MOC or diskette.
2. Enter number of parameters to be inhibited
3. Enter either H, L, or R in CONTROL CODE data field:
4. Repeat steps 2 and 3 for desired parameters.
5. Hard copy if desired.
6. Transmit to MOC.
7. Verify changes are indicated on console CRT.

NOTE

Written instructions can also be submitted using JSC Form 480. Except for header information, this form is identical to the V31 menu format.

Supporting Data

Onboard the Orbiter, sensors provide signals that are proportional to the magnitude of the stimulus being measured. These signals are processed onboard, converted to PCM form, downlinked, and finally routed to the MCC. As part of the processing that takes place in the MCC, the PCM signal is checked to verify that its value is within predefined limits. Should the PCM value fall outside these limits, either an off scale high or low condition exists, depending on which end of the scale falls outside of limits. An off scale condition will cause an event light to be driven and the parameter data to be replaced by an H or L on the high-speed display. The high-speed display will continue to display an H or L until the PCM count returns to within limits. In addition, the operational and critical limit indications will also be driven if their limit values fall within the off scale limit values. The following illustration shows the relationship of operational, critical and off scale limit values.



High and low off scale limit sensing can be inhibited by appropriate entries on the V31 menu (H for high, L for low). When off scale limit sensing is inhibited for a parameter, all event lights and alarms for the condition (high or low) are disabled. On any display where operational or critical limits for a parameter are shown, the values will be followed by an H or L to indicate that off scale limit sensing has been inhibited for that parameter. This indication will remain until limit sensing is restored by an appropriate V31 menu entry.

Supporting Data

The DTE displays on the following pages illustrate the status of several parameters both before and after offscale limit sensing is inhibited.

Mask 1 determines which bits of the parent word are to be compared to the parent configuration. Mask 2 contains the actual bit value to be used in the bit-by-bit comparison that is performed after the parameter has been processed against Mask 1.

Mask 1 and Mask 2 can be changed via V22, TLM Hexadecimal Mask Change Menu. A detailed discussion on OMS/RCS hexadecimal limit sensing can be found in BOOSTER/PROPULSION CONSOLE HANDBOOK JSC-12827, Rev. A. This book gives all the parameters, their mask number and the predefined hexadecimal unit values for each mission phase and configuration.

The displays on this page show the effects of inhibiting off scale limit sensing prior to the occurrence of an offscale PCM condition. You may recall that an up arrow (↑)

indicates an operational out of limits high condition and that a down arrow (↓) shows an out of limits low condition.

Data in the following displays has been modified to more clearly illustrate the effects of inhibiting limit sensing and in some instances may not be realistic.

[illegible]

Notice, there is no change in the high speed display after limit sensing is inhibited.

F/V / 102 ECLSS SUMMARY 0701J

OGMT 103:19:55:00 ONET 103:19:55:00 SITE MIL OI 016 00 GN 000 22 SM 024 00 BF

RGNT 103:19:55:00 ALARMS PFS BFS MMODE D 140K

1 D 2 D 3 D 4 120K

•CAB •PCS 1 D 2 -CRYO 3 4 120K

•IMU FAN ΔP 0.11 FAN ON

ARS H2O 1 2 ATCS 1 2

•ACC Q 48 55 GPC PMPB -- --

•PMP OP 27 65 •ACC Q 31 20

•PMP IP 0.0 36.7 PMP IP 86 100

•PMP ΔP 26.6 28.0 FLOW TOT 2565 2610

TOT F 1355 1342 ICH 2054 2097

•ICH F 14 1043 •PL HX 225 2034

•PMP OT 69 84 •CP 207 318

•RHXOT 757 82 •RAD IT 103 101

•ALCPT 89 87 PNL OT D D

•A2HXOT 82 96 •CNTL OT 62 64

•A2CPT 89 40 •EVAP OT 37.1 36.1

•A3HXOT 76 72 ICH IT 38.0

•A3CPT 74 75 •AV6 OT D D

•ICH IT 68 82 •AV5 OT D D

•ICH OT 58 41 •AV4 OT D D

•CHX IT 49 42 K-BTU 42.5 42.7

K-BTU 0.1 42.3

•DFI 1 2 3

•FEN ΔP 0.15 0.11 0.14

•OT 102 105 30

•FLUIDT +19 +21

•HTR T +111 +115

•MANF P 28 28

•FLASH EVAP

•CNTL PRA

•PRB

•SEC

•HI LD ENBL

•HL DCT T

•Y-89 TB 209

•Y-91 OB 251

•NOZ 190

•TOP T

•X1390 F 1664

•X1464 A 244

•Y-89 L 151

•NOZ L 103

•Y+89 R

•NOZ R

•FOLNT

•X746 F 0

•X918 M1 37

•X1058 M2 33

•X1326 A 32

•A B

•80 80

•37 84

•33 92

•32 85

•PRESS 115

•TEMP +80

•Q-LB 41.0

•CNTL 66

•SPLY IP

•MST LIQP

•TK QTY

•A 99.3

•B 01.1

•C 59.5

•D 63.3

•E 52.0

•F 46.4

•TOT 175

•MST 147

•DUMP T

•SPLY

•MST

•4 67

•1187 1137

•NOZ B 1207 1107

•A B

•115 25

•+80 +81

•41.0 72.0

•66

•PCT

•LB

•167

•136

•1804

•1864

•87

•70

•175

•147

•67

•1137

•1107

•25

•81

•72.0

•66

•02 FL

LIMIT SENSE DISPLAYS

FLT				EMESB2 CRIT LIM DSP1				2158B			
PARAMETER	LOW	L	HIGH	H	D	PARAMETER	LOW	L	HIGH	H	D
V45P1100A	700.00		1000.00			V61R2401A	0.00		0.05		
V45P1200A	700.00		1000.00			V61R2403A	0.00		0.05		
V45P1300A	700.00		300.00			V61R2405A	0.00		0.05		
V46P0253A	5.00		300.00			V61R2407A	0.00		5.00		
V46P0253A	5.00		325.00			V61R2409A	0.00		5.00		
V46P0353A	5.00		300.00			V61R2411A	0.00		5.00		
V46R0135A	80.00		129.00			V63R1100A	1200.00		2600.00		
V46R0235A	80.00		129.00			V63R1300A	1200.00		2600.00		
V46R0335A	80.00		129.00			V63T1207A	32.00		50.00		
V46T0142A	950.00		1260.00			V63T1407A	32.00		50.00		
V46T0242A	950.00		1260.00			V63T1810A	80.00		190.00		
V46T0342A	950.00		1260.00			V63T1879A	20.00		170.00		
V55T1108A	14.00		26.60								
V55T1208A	14.00		26.60								
V55T1308A	14.00		26.60								
V61P2511A	2.80		3.60								
V61P2513A	2.80		3.60								
V61P2515A	2.80		3.60								
V61P2556A	0.05		0.35								
V61P2557A	0.05		0.35								
V61P2558A	0.05		0.35								
V61P2600A	58.00		75.00								
V61P2700A	58.00		75.00								
V61P2800A	58.00		75.00								
V61R2105A	-1.00		5.00								
V61R2205A	-1.00		5.00								
V61R2305A	-1.00		5.00								

Off Scale Limit Sensing Disabled

In the lower display, when an H appears in the error column beside a parameter high limit value, off scale high limit sensing is inhibited for that parameter. Likewise, an L beside the low limit value inhibits off scale low limit sensing.

FLT				EMSB2 CRIT LIM DSP1				2158B			
PARAMETER	LOW	L	HIGH	H	D	PARAMETER	LOW	L	HIGH	H	D
V45P1100A	700.00		1000.00			V61R2401A	0.00		0.05		
V45P1100A	700.00		1000.00			V61R2401A	0.00		0.05		
V45P1100A	700.00		300.00			V61R2401A	0.00		0.05		
V45P1100A	700.00		300.00			V61R2401A	0.00		5.00		
V45P1100A	700.00		300.00			V61R2401A	0.00		5.00		
V46P0253A	5.00		129.00			V61T2650A	0.00		0.05		
V46P0253A	5.00		129.00			V61T2661A	0.00		0.05		
V46P0353A	5.00		129.00			V63R1100A	1200.00		2600.00		
V46R0135A	80.00		129.00			V63R1300A	1200.00		2600.00		
V46R0235A	80.00		129.00			V63T1207A	32.00		50.00		
V46R0335A	80.00		129.00			V63T1407A	32.00		50.00		
V46T0142A	950.00		1260.00			V63T1810A	80.00		190.00	H	
V46T0242A	950.00		1260.00			V63T1879A	20.00	L	170.00		
V46T0342A	950.00		1260.00								
V55T1108A	14.00		26.60								
V55T1208A	14.00		26.60								
V55T1308A	14.00		26.60								
V61P2511A	2.80		3.60								
V61P2513A	2.80		3.60								
V61P2515A	2.80		3.60								
V61P2556A	0.05		0.35								
V61P2557A	0.05		0.35								
V61P2558A	0.05		0.35								
V61P2600A	58.00		75.00								
V61P2700A	58.00		75.00								
V61P2800A	58.00		75.00								
V61R2105A	-1.00		5.00								
V61R2205A	-1.00		5.00								
V61R2305A	-1.00		5.00								

F/V 1/102		V63 ATCS FLASH EVAP						0735E	
OMET 103:19:55:00		01 016 00 GN 022 00 SM 024 00 BF						PAGE 1	
SITE		HAM	GDS	MIL	ACN	BOT	ISD	LOW	HIGH
--FLASH EVAPORATORS--									
X0725	140K CMD	10	12	10	11	12	10	10	14
S1600	CMD	104	106	111	103	104	104	100	120
S1610	CMD	15	16	16	16	17	15	18	18
X1390	TOP X1390	35	37	158	268	268	36	40	40
X1435	TOP X1435				321	334			
T1802	TOP X1464 ♦ AFT			270	267	273	264		
T9216	TOP X1467	264	265	262	270	254			205
T9211	L TOP Y-69	160	156	160	160	163	164	125	250
T1800	L TOP Y-89 ♦ L	167	158	166	159	160	150	100	250
T9212	L TOP Y-116	151	147	149	144	143	143	100	260
T1878	L TOP NOZ ♦ LNOZ	61	61	60	62	66	67	35	125
T9213	R TOP Y+59	132	189	184	192	195	190	125	250
T1810	R TOP Y+89 ♦ R	185	185	157	160	157	159	90	175
T9214	R TOP Y+116	135	139	135	137	135	136	50	200
T1879	R TOP NOZ ♦ RNOZ	25	25	59	64	69	71	40	150
X1751	A SPLY ACCUM	ON	ON	ON	ON	ON	ON		
X1761	B SPLY ACCUM	ON	ON	ON	ON	ON	ON		

OGMT D:H 103:19

:M:S :55:00

RGMT D:H 103:19

:M:S :55:00

Note that the left column remains unchanged as it did in the high speed display and that the last two columns are changed the same as these were in the limit sense display.

F/V		1/102		V63 ATCS FLASH EVAP							0735E	
OMET 103:19:55:00		OI 016 00 GN 022 00 SM 024 00 BF							PAGE 1			
SITE		HAW	GDS	MIL	ACN	BOT	TOSO	LOW	HIGH			
--FLASH EVAPORATORS--												
X0725 148K CMD		10	12	10	11	12	10	10	14			
X1600 CMT A-GPC		104	106	111	103		104	100	120			
X1610 CMT		15	16	16			17	15	18			
X1619 TOP X1398		35	37			268		36	40			
X1819 TOP X1435			158		321	334		147				
T1802 TOP X1464 + AFT				270	267	273	264					
T9216 TOP X1467		264	262	265	262	270	254	171	205			
T9211 L TOP Y-69		160	156	160	160	163	164	125	250			
T1800 L TOP Y-89 + L		167	158	166	159	160	150	100	250			
T9212 L TOP Y-116		151	147	149	144	143	143	100	260			
T1878 L TOP NOZ +LNOZ		61	61	60	62	66	67	35	125			
T9213 R TOP Y+59		132	189	184	192	195	190	125	250			
T1810 R TOP Y+89 + R		185	185	157	160	157	159	90	175H			
T9214 R TOP Y+116		135	139	135	137	135	136	50	200			
T1879 R TOP NOZ +RNOZ		25	25	59	64	69	71	40L	150			
X1751 A SPLY ACCUM		ON	ON	ON	ON	ON	ON					
X1761 B SPLY ACCUM		ON	ON	ON	ON	ON	ON					

OGMT D:H 103:19

:M:S :55:00

RGMT D:H 103:19

:M:S :55:00

Supporting Data

The displays on this page show the effect on two parameters of an off scale PCM count and the result of disabling off scale limit sensing on these parameters under the same condition. The data has been modified for the purpose of clarity.

HIGH SPEED DISPLAYS

F/V 102 ECLSS SUMMARY 0701J
 OGHT 103:19:55:00 ONET 103:19:55:00 SITE MIL 01 016 00 GN 000 22 SM 024 00 BF
 RGHT 103:19:55:00 ALARMS PFS BFS MMODE D 140K
 *CAB *PCS 1 D 2 *CRYO 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250 251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300 301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350 351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400 401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450 451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500 501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550 551 552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575 576 577 578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597 598 599 600 601 602 603 604 605 606 607 608 609 610 611 612 613 614 615 616 617 618 619 620 621 622 623 624 625 626 627 628 629 630 631 632 633 634 635 636 637 638 639 640 641 642 643 644 645 646 647 648 649 650 651 652 653 654 655 656 657 658 659 660 661 662 663 664 665 666 667 668 669 670 671 672 673 674 675 676 677 678 679 680 681 682 683 684 685 686 687 688 689 690 691 692 693 694 695 696 697 698 699 700 701 702 703 704 705 706 707 708 709 710 711 712 713 714 715 716 717 718 719 720 721 722 723 724 725 726 727 728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749 750 751 752 753 754 755 756 757 758 759 760 761 762 763 764 765 766 767 768 769 770 771 772 773 774 775 776 777 778 779 780 781 782 783 784 785 786 787 788 789 790 791 792 793 794 795 796 797 798 799 800 801 802 803 804 805 806 807 808 809 810 811 812 813 814 815 816 817 818 819 820 821 822 823 824 825 826 827 828 829 830 831 832 833 834 835 836 837 838 839 840 841 842 843 844 845 846 847 848 849 850 851 852 853 854 855 856 857 858 859 860 861 862 863 864 865 866 867 868 869 870 871 872 873 874 875 876 877 878 879 880 881 882 883 884 885 886 887 888 889 890 891 892 893 894 895 896 897 898 899 900 901 902 903 904 905 906 907 908 909 910 911 912 913 914 915 916 917 918 919 920 921 922 923 924 925 926 927 928 929 930 931 932 933 934 935 936 937 938 939 940 941 942 943 944 945 946 947 948 949 950 951 952 953 954 955 956 957 958 959 960 961 962 963 964 965 966 967 968 969 970 971 972 973 974 975 976 977 978 979 980 981 982 983 984 985 986 987 988 989 990 991 992 993 994 995 996 997 998 999 1000 1001 1002 1003 1004 1005 1006 1007 1008 100

Notice that the parameter value is replaced by an H for an off-scale high condition and by an L for an off scale low condition in both displays.

F/V /102 ECLSS SUMMARY 0701J

OGHT 103:19:55:00 ONET 103:19:55:00 SITE MIL 01 016 00 GN 000 22 SN 024 00 BF

RGHT 103:19:55:00 ALARMS PFS BFS MMODE D 140K

120K

PCB 1 D 2 CRYO 2 3 4 TOT

02 FLOW SPLY P 71.4 19 21 111 115

THU FAN ΔP 0.11 FAN ON

ARS H2O 1 2 ATCS 1 2 FLASH EVAP SPLY/MST H2O

ACC Q 48 55 GPC PMPB -- -- CNTL PRA -- -- SPLY IP

PMP OP 27 65 ACC Q 31 20 PRB -- -- MST LIQP

PMP IP 0.8 36.7 PMP IP 86 100 SEC -- -- TK QTY

PMP ΔP 26.6 28.0 FLOW TOT 2565 2610 HI LD ENBL

TOT F 1355 1342 ICH 2054 2097 HL DCT I

ICH F 14 1043 PL HX 225 2034 Y-89 IB 209

PMP OT 69 84 CP 207 318 Y-91 OB 251

A1HXOT 75† 82 RAD IT 103 101 NOZ 190

A1PCOT 89 87 PNL OT D D TOP T

A2HXOT 82 96 CNTL OT 62 64 X1390 F 1664

A2COT 89 40 EVAP OT 37.1 36.1 X1464 A 244

A3HXOT 76 72 ICH IT 38.0 Y-89 L 151

A3COT 74 75 AV6 OT D D NOZ L 103

ICH IT 68 82 AV5 OT D D Y+89 R

ICH OT 58 41 AV4 OT D D NOZ R

CHX IT 49 42 K-BTU 42.5 42.7 FOLN T

K-BTU 0.1 42.3 OFI FLOW 453

AV BAY 1 2 3 PKG2 OT D

FN ΔP 0.15 0.11 0.14 PKG3 IT D

OT 102 105 30

PCB 1 D 2 CRYO 2 3 4 TOT

02 FLOW SPLY P 71.4 19 21 111 115

THU FAN ΔP 0.11 FAN ON

ARS H2O 1 2 ATCS 1 2 FLASH EVAP SPLY/MST H2O

ACC Q 48 55 GPC PMPB -- -- CNTL PRA -- -- SPLY IP

PMP OP 27 65 ACC Q 31 20 PRB -- -- MST LIQP

PMP IP 0.8 36.7 PMP IP 86 100 SEC -- -- TK QTY

PMP ΔP 26.6 28.0 FLOW TOT 2565 2610 HI LD ENBL

TOT F 1355 1342 ICH 2054 2097 HL DCT I

ICH F 14 1043 PL HX 225 2034 Y-89 IB 209

PMP OT 69 84 CP 207 318 Y-91 OB 251

A1HXOT 75† 82 RAD IT 103 101 NOZ 190

A1PCOT 89 87 PNL OT D D TOP T

A2HXOT 82 96 CNTL OT 62 64 X1390 F 1664

A2COT 89 40 EVAP OT 37.1 36.1 X1464 A 244

A3HXOT 76 72 ICH IT 38.0 Y-89 L 151

A3COT 74 75 AV6 OT D D NOZ L 103

ICH IT 68 82 AV5 OT D D Y+89 R

ICH OT 58 41 AV4 OT D D NOZ R

CHX IT 49 42 K-BTU 42.5 42.7 FOLN T

K-BTU 0.1 42.3 OFI FLOW 453

AV BAY 1 2 3 PKG2 OT D

FN ΔP 0.15 0.11 0.14 PKG3 IT D

OT 102 105 30

Off Scale Limit Sensing Enabled

LIMIT SENSE DISPLAYS

FLT				EMESB2 CRIT LIM DSP1				2158B			
PARAMETER	LOW	H	D	PARAMETER	LOW	H	D				
V45P1100A	700.00	1000.00		V61R2401A	0.00	0.05					
V45P1200A	700.00	1000.00		V61R2403A	0.00	0.05					
V45P1300A	700.00	300.00		V61R2405A	0.00	0.05					
V46P0153A	5.00	300.00		V61R2407A	0.00	5.00					
V46P0253A	5.00	725.00		V61R2409A	0.00	5.00					
V46P0353A	5.00	725.00		V61R2411A	0.00	5.00					
V46R0135A	80.00	1200.00		V63R1100A	1200.00	2600.00					
V46R0235A	80.00	129.00		V63R1300A	1200.00	2600.00					
V46R0335A	80.00	129.00		V63T1207A	32.00	50.00					
V46T0142A	950.00	1260.00		V63T1407A	32.00	50.00					
V46T0242A	950.00	1260.00		V63T1810A	80.00	190.00					
V46T0342A	950.00	1260.00		V63T1879A	20.00	170.00					
V55T1100A	14.00	26.60									
V55T1200A	14.00	26.60									
V55T1300A	14.00	26.60									
V61P2511A	2.80	3.60									
V61P2513A	2.80	3.60									
V61P2515A	2.80	3.60									
V61P2556A	0.05	0.35									
V61P2557A	0.05	0.35									
V61P2558A	0.05	0.35									
V61P2600A	58.00	75.00									
V61P2700A	58.00	75.00									
V61P2800A	58.00	75.00									
V61R2105A	-1.00	5.00									
V61R2205A	-1.00	5.00									
V61R2305A	-1.00	5.00									

Off Scale Limit Sensing Disabled

In the lower display, when an H appears in the error column beside a parameter high limit value, off scale high limit sensing is inhibited for that parameter. Likewise, an L beside the low limit value inhibits off scale low limit sensing.

EMESB2 CRIT LIM DSP1				2158B			
PARAMETER	LOW	HIGH	PARAMETER	LOW	HIGH		
V45P1100A	700.00	1000.00	V61R2401A	0.00	0.05		
V45P1100A	700.00	1000.00	V61R2401A	0.00	0.05		
V45P1100A	700.00	300.00	V61R2401A	0.00	0.05		
V45P1100A	700.00	300.00	V61R2401A	0.00	5.00		
V45P1100A	700.00	300.00	V61R2401A	0.00	5.00		
V46P0253A	5.00	125.00	V61T2661A	0.00	5.00		
V46P0353A	5.00	125.00	V63R1100A	1200.00	2600.00		
V46R0135A	80.00	129.00	V63R1300A	1200.00	2600.00		
V46R0235A	80.00	129.00	V63T1207A	32.00	50.00		
V46R0335A	80.00	129.00	V63T1407A	32.00	50.00		
V46T0142A	950.00	1260.00	V63T1810A	80.00	190.00		
V46T0242A	950.00	1260.00	V63T1879A	20.00	170.00		
V46T0342A	950.00	1260.00					
V55T1108A	14.00	26.60					
V55T1208A	14.00	26.60					
V55T1308A	14.00	26.60					
V61P2511A	2.80	3.60					
V61P2513A	2.80	3.60					
V61P2515A	2.80	3.60					
V61P2556A	0.05	0.35					
V61P2557A	0.05	0.35					
V61P2558A	0.05	0.35					
V61P2600A	58.00	75.00					
V61P2700A	58.00	75.00					
V61P2800A	58.00	75.00					
V61R2105A	-1.00	5.00					
V61R2205A	-1.00	5.00					
V61R2305A	-1.00	5.00					

HIGH SPEED SMEK DISPLAYS

F/V		V63 ATCS FLASH EVAP					0735E		
1/202		01 016 00 GN 022 00 SM 024 00 BF							
ONET 103:19:55:00		PAGE 1							
SITE		HAM	GDS	MIL	ACN	BOT	IOSD	LOW	HIGH
--FLASH EVAPORATORS--									
X8725 148K CMD		10	12	10	11	12	10	10	11
S1600 CH 101 A-GPC		104	106	111	103		104	100	120
S1610 CH 101 A-GPC		15	16	16			17	15	18
Y2109 TOP X1395		35	37			268		36	40
Y2109 TOP X1435			158		321	334		147	
T1802 TOP X1464 ♦ AFT				270	267	273	264		
T9216 TOP X1467		264	265	265	262	270	254		205
T9211 L TOP Y-69		160	156	160	160	163	164	125	250
T1800 L TOP Y-89 ♦ L		167	158	166	159	160	150	100	250
T9212 L TOP Y-116		151	147	149	144	143	143	100	260
T1878 L TOP NOZ ♦ LNOZ		61	61	60	62	66	67	35	125
T9213 R TOP Y+59		132	189	184	192	195	190	125	250
T1810 R TOP Y+89 ♦ R		H	185	157	160	157	159	90	175
T9214 R TOP Y+116		135	139	135	137	135	136	50	200
T1879 R TOP NOZ ♦ RNOZ		L	25	59	64	69	71	40	150
X1751 A SPLY ACCUM		ON	ON	ON	ON	ON	ON		
X1761 B SPLY ACCUM		ON	ON	ON	ON	ON	ON		

OGMT D:H 103:19

:M:S 55:00

RGMT D:H 103:19

:M:S 55:00

Note that the left column contains an H or L in place of data for the parameter that is off scale and that the last two columns are changed the same as these were in the limit sense display.

F/V

I/102

V63 ATCS FLASH EVAP

0735E

OMET 103:19:55:00

01 016 00 GN 022 00 SM 024 00 BF

PAGE 1

SITE	HAM	GDS	MIL	ACN	BOT	TOSO	LON	HIGH
--FLASH EVAPORATORS--								
X0725 140K CMD	10	12	10	11	12	10	10	14
S1600 CM A-GPC	104	106	111	103		104	100	120
S1610	15	16	16			17	15	18
X1390 TOP X1390	35	37			268		36	40
T1802 TOP X1435		158		321	334		447	
T1802 TOP X1464 * AFT			270	267	273	264		
T9216 TOP X1467	264		265	262	270	254		205
T9211 L TOP Y-69	160	156	160	160	163	164	125	250
T1800 L TOP Y-89 * L	167	158	166	159	160	150	100	250
T9212 L TOP Y-116	151	147	149	144	143	143	100	260
T1878 L TOP NOZ *LNOZ	61	61	60	62	66	67	35	125
T9213 R TOP Y+59	132	189	184	192	195	190	125	250
T1810 R TOP Y+89 * R		185	157	160	157	159	90	175M
T9214 R TOP Y+116	135	139	135	137	135	136	50	200
T1879 R TOP NOZ *RNOZ		25	59	64	69	71	40L	150
X1751 A SPly ACCUM	ON	ON	ON	ON	ON	ON		
X1761 B SPly ACCUM	ON	ON	ON	ON	ON	ON		

OGMT D: H 103: 19

: M: S : 55: 00

RGMT D: H 103: 19

: M: S : 55: 00

1. Fill out V31 menu below to inhibit and then resume processing functions as listed.

INHIBIT LOW LIMIT

V45C0201A
V76C3076A

RESET PROCESSING

V41P1605A
V41P1154C

INHIBIT HIGH LIMITS

V41P1254C
V41P1305C

V31#	TLM OFFSCALE LIMIT SENSE CONTROL MENU		
001/RT	PARAMETER NUMBER	CONTROL CODE	NOTE: CONTROL CODE DEFINITIONS ARE
/	_____ ,	- ,	H = OFFSCALE
	_____ ,	- ,	HIGH
	_____ ,	- ,	L = OFFSCALE
	_____ ,	- ,	LOW
	_____ ,	- ,	R = OFFSCALE
	_____ ,	- ,	RESET
	_____ ,	- ,	
	_____ ,	- ,	
	_____ ,	- ,	
	_____ ,	- ,	
	_____ ,	- ,	
	_____ ,	- ,	
	_____ ,	- ,	
	_____ ,	- / \$	
	_____ ,	-	

ENTER PM FOR PERMANENT MED

Practice Feedback

1. Fill out V31 menu below to inhibit and then resume processing functions as listed.

INHIBIT LOW LIMIT

V45C0201A
V76C3076A

RESET PROCESSING

V41P1605A
V41P1154C

INHIBIT HIGH LIMITS

V41P1254C
V41P1305C

V31#

001/RT

TLM OFFSCALE LIMIT SENSE CONTROL MENU

PARAMETER NUMBER	CONTROL CODE	NOTE: CONTROL CODE DEFINITIONS ARE
/V45C0201A ,	L ,	H = OFFSCALE HIGH L = OFFSCALE LOW R = OFFSCALE RESET
V76C3076A ,	L ,	
V41P1605A ,	R ,	
V41P1154C ,	R ,	
V41P1254C ,	H ,	
V41P1305C ,	H ,	
_____ ,	- ,	
_____ ,	- ,	
_____ ,	- ,	
_____ ,	- ,	
_____ ,	- ,	
_____ ,	- ,	
_____ ,	- ,	
_____ ,	- ,	
_____ ,	- ,	
_____ ,	- ,	
_____ ,	- / \$	

ENTER PM FOR PERMANENT MED

Practice

2. Complete the following chart to indicate the effects of inhibiting off scale limit sensing.

	BEFORE PCM OUT-OF-TOLERANCE CONDITION	AFTER PCM OUT-OF-TOLERANCE CONDITION
HIGH SPEED DISPLAY		
PARAMETER LIMIT LIGHTS		
OP/CRITICAL LIMIT DISPLAYS		
CRITICAL EVENT ALARMS		

Practice Feedback

2. Complete the following chart to indicate the effects of inhibiting off scale limit sensing.

	BEFORE PCM OUT-OF-TOLERANCE CONDITION	AFTER PCM OUT-OF-TOLERANCE CONDITION
HIGH SPEED DISPLAY	NO CHANGE	H OR L REMOVED EV VALUE DISPLAYED ALARM/ERROR INDICATIONS DISPLAYED
PARAMETER LIMIT LIGHTS	DISABLED	
OP/CRITICAL LIMIT DISPLAYS	H OR L DISPLAYED IN ERROR COLUMN	
CRITICAL EVENT ALARMS	DISABLED	

1. IDENTIFYING TELEMETRY MENU MED CODES
2. CHANGING OPERATIONAL LIMIT VALUES FOR INDIVIDUAL PARAMETERS
3. ENABLING, DISABLING, AND CHANGING CRITICAL LIMIT VALUES FOR INDIVIDUAL PARAMETERS
4. INHIBITING OFFSCALE HIGH/LOW LIMIT SENSING FOR INDIVIDUAL PARAMETERS
5. CHANGING HEXADECIMAL LIMITS
6. OVERRIDING TELEMETRY PARAMETER VALUES
7. DEFINING PARAMETERS ON A UNIVERSAL DIGITAL DISPLAY
8. DELETING PARAMETER(S) FROM, OR CLEARING, AN ENTIRE UNIVERSAL DIGITALS DISPLAY
9. RECONFIGURING UNIVERSAL PLOT
10. DELETING PARAMETER(S) FROM A UNIVERSAL PLOT
11. DRAWING REFERENCE LINE ON UNIVERSAL PLOT USING V41, TLM UNIVERSAL PLOT (NOMINAL DATA) MENU
12. DELETING/CHANGING A REFERENCE LINE ON UNIVERSAL PLOT
13. UNIVERSAL PLOT REFERENCE LINE AND CONTROL DATA INTERACTIONS
14. CHANGING SPECIAL COMPUTATION-CONSTANT ENGINEERING UNIT VALUES
15. CHANGING SPECIAL COMPUTATION TIME CONSTANTS
16. SELECTING MAJOR FUNCTION FOR DISPLAY 1350
17. CHANGING VARIABLE PARAMETER ID
18. USING MCC CALIBRATION DATA BOOK
19. CHANGING THE CALIBRATION CURVE
20. THRIFTS
21. SPECIAL AND SUPER THRIFT PRODUCT REQUEST
22. RECONFIGURATION OF THRIFTS

SEGMENT 5

CHANGING HEXADECIMAL LIMITS

OBJECTIVES:

- a. Be able to change limit sensing for those OMS, RCS, and MPS parameters requiring hexadecimal mask.
- b. Be able to recognize the definitions of parent words and masks.

SEGMENT INTRODUCTION:

Some discrete parameter values are represented in hexadecimal. These are limit sensed, as are other parameter values. These limit values are changed for certain mission phases, mission configurations, or whenever a value is out of limits.

This segment gives the procedure for changing the limit values of those parameters represented in hexadecimal using V22, TLM Hexadecimal Mask Change Menu.

PURPOSE

This procedure allows propulsion flight controllers to select and monitor the status of individual bits of specific telemetry parameters; additionally the procedure allows for changes in the desired status of the bits to be monitored.

FUNCTION OF MENU DATA FIELDS

Parameter Number Columns

These two columns are used to specify mask names. The down-linked parameters associated with this procedure are comprised of numerous discrete event signals. Each of these multidiscrete parameters, called parent words, has two masks associated with it. Each mask has an alpha numeric identifier called a mask name.

Input Value Columns

These two columns are used to specify the bit values of the mask. These values must be entered in hexadecimal.

MASK DEFINITIONS:

Mask 1 is used to specify which bits of the parent word are to be examined (compared). Mask 2 is used to specify the desired value of the bits that are to be compared with the parent word. When a bit does not compare, the event is considered out of limits.

HEXADECIMAL DISPLAYS

<u>MSK</u>	<u>TITLE</u>
1118	OMS HEX PG1
1119	OMS HEX PG2
1142	FWD RCS HEX PG1
1143	FWD RCS HEX PG2
1144	AFT RCS HEX PG1
1145	AFT RCS HEX PG2

Changing Hexadecimal Limits

PROCEDURE

1. Call a blank V22 Menu from MOC or diskette.
2. Enter applicable Mask name in the parameter number column.

NOTE

A listing of the GPC parameters (parent word) and the MED Mask names is located in MCC LEVEL B&C REQUIREMENTS FOR SHUTTLE OFT, VOLUME 1, SDPC, and BOOSTER/PROPULSION CONSOLE HANDBOOK, JSC 12827.

NOTE

A brief discussion of hexadecimal/numeric conversion is in Appendix A. A more detailed discussion of this and hexadecimal/binary conversions is in CSI-2102, CREW SOFTWARE INTERFACE WORKBOOK.

4. Repeat steps 2 and 3 for additional masks
5. Transmit to MOC

NOTE

Entry during critical phases of flight (L-45 min. through OMS-2 and ET-35 min.) through landing requires Flight Director's (FD) approval.

NOTE

Changes may also be submitted using HEX Mask Change JSC Form 440. Except for header information, this form is identical to V-22 menu format.

U22#

002/RT TLM HEXADECIMAL MASK CHANGE MENU

PARAMETER NUMBER	INPUT VALUE	PARAMETER NUMBER	INPUT VALUE
/ M16G2900M	A5A0	M18G2900M	AAAC
M25G2900M	FFF0		

NOTE: THE INPUT VALUE FIELD SHOULD BE A HEXADECIMAL REPRESENTATION OF A NUMBER

U22 MENU

F/V 3/102		AFT RCS HEXIDECIMAL				RT1144B		PAGE 1	
OMET 0:01:50:14		QI	51	GM	51	SM	0	BF	51
SITE		LOW HIGH							
RO&F M1 X3/4/5 HVA									
V72M8695P A RCS	WD 1	A5A0							
M15G2900M	M 1	FFF0							
M16G2900M	M 2	A5A0							
LO&F M1 I1/2 HVA	M5								
V72M8702P A RCS	WD 2	AAAC							
M17G2900M	M 1	FFFF							
M18G2900M	M 2	AAAC							
RO&F M3 X3/4/5									
V72M8719P A RCS	WD 3	AAAC							
M19G2900M	M 1	FFFF							
M20G2900M	M 2	AAAC							
LO&F M3 X/3/4/5									
V72M8722P A RCS	WD 4	A500							
M21G2900M	M 1	FF00							
M22G2900M	M 2	A500							
RO&F M2 I3/4/5A LX1/2									
V72M8739P A RCS	WD 5	AA50							
M23G2900M	M 1	FFF0							
M24G2900M	M 2	AA50							
LO&F M2 I3/4/5A HVB									
V72M8742P A RCS	WD 6	AAAA							
M25G2900M	M 1	FFF0							
M26G2900M	M 2	AAAA							
RO&F M4 I3/4/5B									
V72M8759P A RCS	WD 7	AA00							
M27G2900M	M 1	FF00							
M28G2900M	M 2	AA00							
LO&F M4 I3/4/5B RX1/2									
V72M8762P A RCS	WD 8	AA50							
M29G2900M	M 1	FFF0							
M30G2900M	M 2	AA50							

OGMT D:H 273:11
M:S :52:00
RGMT D:H 273:11
M:S :52:00

Supporting Data

The following is an example of how masks are used to select and monitor specific discrete parameters imbedded within parent words. These masks are normally specified as a hexadecimal value; however, to simplify the following example, the hexadecimal values have been converted to binary values.

A parent word consists of 16 bits, with each bit assignable to a specific discrete event. A 1 in a bit position indicates that the assigned event has occurred. The following is a description of parent word V76M6606P.

PARENT WORD
V76M6606P

BIT	DESCRIPTION
MSB 0	FCS CHANNEL 1 RESET/OVERRIDE B
1	LM + PITCH TRIM A
2	LM - PITCH TRIM A
3	LM + ROLL TRIM A
4	LM - ROLL TRIM A
5	LM + YAW TRIM A
6	LM - YAW TRIM A
7	F RCS OXIDIZER MANF 1 OP
8	F RCS OXIDIZER MANF CL
9	F He PRESS VA OP
10	F He PRESS VA CL
11	F OX TK ISOV 3/4/5 OP
12	F OX TK ISOV 3/4/5 CL
13	RDR ALT DISP SEL 1
14	RDR ALT DISP SEL 2
LSB15	LM HSI MSBLS SEL

Assume that at a given moment in time the downlink data for the parent word is as follows:

BIT NO.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
SETT-ING	0	0	0	1	0	0	0	1	0	0	1	0	1	0	0	0

Supporting Data

By referring to the description of the parent word, we see that the following events have occurred because a 1 appears in these bit positions.

- LM + ROLL TRIM A (bit 3)
- F RES OXIDIZER MANF 1 OP (bit 7)
- F He PRESS VA CL (bit 10)
- F OX TK ISOPV 3/4/5 CL (bit 12)

Assume now that we are only interested in examining the condition of the F RCS OXIDIZER MAN 1 OP/CL, F He PRESS VA OP/CL, and the F OX TK ISOV 3/4/5 OP/CL values (bits 7 through 12 of parent word). Therefore, we wish to ignore all data in the parent word except bits 7 through 12. This can be thought of as being accomplished by overlaying a mask on the parent word. The mask also consists of a 16-bit word, with a 1 in those bit positions we wish to examine. This mask, known as Mask 1, would appear as follows for our example if we represent a 0 by shading the bit position and a 1 by a blank bit position.

MASK 1	BIT NO.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	SETT-ING																

Now if we overlay the parent word with Mask 1, we have the following:

BIT NO.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
SETT-ING	0	0	0	0	0	0	0	1	0	0	1	0	1	0	0	0

To continue, assume that we are not interested in whether an event has occurred or not, but only in whether the present state of the values represents a normal condition. This is accomplished by comparing the composite of the parent word and Mask 1 against a second mask called Mask 2. For the purpose of this example, assume the following for Mask 2.

MASK 2	BIT NO.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	SETT-ING	0	0	0	0	0	0	0	1	0	1	0	0	1	0	0	0

Supporting Data

Now when we compare the composite of the parent word and Mask 1 against Mask 2, we have the following:

BIT NO.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
COMPOSITE WORD	0	0	0	0	0	0	0	1	0	0	1	0	1	0	0	0
MASK 2	0	0	0	0	0	0	0	1	0	1	0	0	1	0	0	0

As shown in the example, bits 9 and 10 of the composite word do not agree with those in Mask 2. The result of a noncompare is that an up arrow will appear adjacent to the parent word value on the appropriate hexadecimal history tab display. In addition, an indication of a hexadecimal value out of limits may be illuminated.

As previously mentioned, the mask values as well as the parent word value, are normally expressed as a hexadecimal number. Therefore, the parent word in this example would be 1128 as shown below.

BIT NO.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
SETTING	0	0	0	1	0	0	0	1	0	0	1	0	1	0	0	0
HEX VALUE	1				1				2				8			

Likewise, Masks 1 and 2 would be expressed in hexadecimal form as follows.

MASK 1	BIT NO.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	SETTING	0	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0
	HEX VALUE	0				1				F				8			

MASK 2	BIT NO.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	SETTING	0	0	0	0	0	0	0	1	0	1	0	0	1	0	0	0
	HEX VALUE	0				1				4				8			

The hex mask change JSC Form 440, as shown following, is identical to the V22 TLM hexadecimal mask change menu, except for header information.

Supporting Data

HEX MASK CHANGE

FROM: _____
DATE: _____
TIME: _____

TO: COMPUTER TM
P-TUBE STA: 2-54

V22#

FLT/DT ____/____

TLM HEXADECIMAL MASK CHANGE MENU

PARAMETER NUMBER	INPUT VALUE	PARAMETER NUMBER	INPUT VALUE
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

NOTE: THE INPUT VALUE FIELD SHOULD BE A HEXADECIMAL PRESENTATION
OF A NUMBER

ENTER PM FOR PERMANENT MED _____

Practice

Fill out V22, TLM Hexadecimal Mask Change Menu below to change the mask values of the parent word. Use the chart to enter V72M8758P Mask 2, V72M8741P Mask 1 and 2 and V72M8761P Mask 2.

PARENT WORD MASK NAME 1 MASK NAME 2	MASK VALUE
V72M8741P M41G2900M M42G2900M	--- 3C00 2000
V72M8758P M43G2900M M44G2900M	--- 3F00 2000
V72M8761P M45G2900M M46G2900M	--- 3C00 2000

V22#

002/RT TLM HEXADECIMAL MASK CHANGE MENU

PARAMETER NUMBER	INPUT VALUE	PARAMETER NUMBER	INPUT VALUE
/ _____	, _____ ,	_____	, _____ ,
_____	, _____ ,	_____	, _____ ,
_____	, _____ ,	_____	, _____ ,
_____	, _____ ,	_____	, _____ ,
_____	, _____ ,	_____	, _____ ,
_____	, _____ ,	_____	, _____ ,
_____	, _____ ,	_____	, _____ ,
_____	, _____ ,	_____	, _____ ,
_____	, _____ ,	_____	, _____ ,
_____	, _____ ,	_____	, _____ ,
_____	, _____ ,	_____	, _____ / \$

NOTE: THE INPUT VALUE FIELD SHOULD BE A HEXADECIMAL REPRESENTATION OF A NUMBER

V22 MENU

Practice Feedback

Fill out V22, TLM Hexadecimal Mask Change Menu below to change the mask values of the parent word. Use the chart to enter V72M8758P Mask 2, V72M8741P Mask 1 and 2 and V72M8761P Mask 2.

PARENT WORD MASK NAME 1 MASK NAME 2	MASK VALUE
V72M8741P M41G2900M M42G2900M	--- 3C00 2000
V72M8758P M43G2900M M44G2900M	--- 3F00 2000
V72M8761P M45G2900M M46G2900M	--- 3C00 2000

V22

002/RT

TLM HEXADECIMAL MASK CHANGE MENU

PARAMETER NUMBER	INPUT VALUE	PARAMETER NUMBER	INPUT VALUE
/ M44G2900M	: 2000	M41G2900M	: 3C00
M42G2900M	: 2000	M46G2900M	: 2000
_____	: _____	_____	: _____
_____	: _____	_____	: _____
_____	: _____	_____	: _____
_____	: _____	_____	: _____
_____	: _____	_____	: _____
_____	: _____	_____	: _____
_____	: _____	_____	: _____
_____	: _____	_____	: _____
_____	: _____	_____	: _____

NOTE: THE INPUT VALUE FIELD SHOULD BE A HEXADECIMAL REPRESENTATION OF A NUMBER

V22 MENU

Practice

2. Match the following terms with these definitions (Note: not all definitions will be used).

a. Parent Word _____

b. Mask 1 _____

c. Mask 2 _____

1) Used to specify the desired value of the bits that are to be compared with the parent word.

2) Used to specify which bits of the parent word are to be examined.

3) Hexadecimal representation of an analog value.

4) Composed of multidiscrete parameters.

Practice Feedback

2. Match the following terms with these definitions (Note: not all definitions will be used).

a. Parent Word 4

b. Mask 1 2

c. Mask 2 1

1) Used to specify the desired value of the bits that are to be compared with the parent word.

2) Used to specify which bits of the parent word are to be examined.

3) Hexadecimal representation of an analog value.

4) Composed of multidiscrete parameters.

1. IDENTIFYING TELEMETRY MENU MED CODES
2. CHANGING OPERATIONAL LIMIT VALUES FOR INDIVIDUAL PARAMETERS
3. ENABLING, DISABLING, AND CHANGING CRITICAL LIMIT VALUES FOR INDIVIDUAL PARAMETERS
4. INHIBITING OFFSCALE HIGH/LOW LIMIT SENSING FOR INDIVIDUAL PARAMETERS
5. CHANGING HEXADECIMAL LIMITS
6. OVERRIDING TELEMETRY PARAMETER VALUES
7. DEFINING PARAMETERS ON A UNIVERSAL DIGITAL DISPLAY
8. DELETING PARAMETER(S) FROM, OR CLEARING, AN ENTIRE UNIVERSAL DIGITALS DISPLAY
9. RECONFIGURING UNIVERSAL PLOT
10. DELETING PARAMETER(S) FROM A UNIVERSAL PLOT
11. DRAWING REFERENCE LINE ON UNIVERSAL PLOT USING V41, TLM UNIVERSAL PLOT (NOMINAL DATA) MENU
12. DELETING/CHANGING A REFERENCE LINE ON UNIVERSAL PLOT
13. UNIVERSAL PLOT REFERENCE LINE AND CONTROL DATA INTERACTIONS
14. CHANGING SPECIAL COMPUTATION-CONSTANT ENGINEERING UNIT VALUES
15. CHANGING SPECIAL COMPUTATION TIME CONSTANTS
16. SELECTING MAJOR FUNCTION FOR DISPLAY 1350
17. CHANGING VARIABLE PARAMETER ID
18. USING MCC CALIBRATION DATA BOOK
19. CHANGING THE CALIBRATION CURVE
20. THRIFTS
21. SPECIAL AND SUPER THRIFT PRODUCT REQUEST
22. RECONFIGURATION OF THRIFTS

SEGMENT 6

OVERRIDING TELEMETRY PARAMETER VALUES

OBJECTIVES:

- a. Complete a V10 MED menu to enable and disable fixed values for specific telemetry parameters.
- b. State the number of the form which can be used to input parameter override changes.
- c. Select from a group of analog parameters those which can be overridden.
- d. State how the PCM value of an overridden parameter can be obtained.

SEGMENT INTRODUCTION:

There may be times when downlinked data will need to be overridden with a fixed value. This segment discusses primary and alternate procedures for overriding a parameter value with a fixed value for use in displays and special computations.

Supporting Data

Downlinked analog (floating point) parameter values can be manually overridden with fixed values using the Megadata terminal.

The EU (engineering unit) value normally computed from the incoming PCM is replaced with the fixed value. However, the downlinked parameter PCM value continues to be updated and can be obtained from the computer TM. Limit sensing and offscale checking for an overridden parameter is inhibited, and the fixed value is used for displays and special computations.

Analog parameters to be overridden must have an E for power, a D for vibration or a T for temperature in the fourth character position of the parameter number as shown.

V45T2222A



Fourth Character Position

A discrete bit downlinked in a parent word can be overridden only if it has been assigned a parameter number. A one or zero is substituted for the actual bit value and the substitute value is used in all subsequent processing. An X in the fourth character position indicates a discrete value.

The Parameter Override Form, JSC Form 557, which can also be used to change parameters, is shown on the following page.

PARAMETER OVERRIDE

FROM: _____
DATE: _____
TIME: _____

TO: COMPUTER TM

P-TUBE STA: 2-54

V10#

FLT/DT DT / TLM PARAMETER OVERRIDE MENU

[illegible]

NOTE: FOR PARM FORMAT FIELD - ENTER P1 FOR ANALOG VALUE; ENTER P2 FOR TIME VALUE. P1/P2 FOR DISCRETE VALUE.

ENTER PM FOR PERMANENT MED

Practice

1. Complete V10 menu below to perform specified operations for supplied parameters.

<u>PARAMETER</u>	<u>FIXED VALUE</u>	<u>OPERATION</u>
V99W8801C	258:08:30:45:201	Substitute Value
V45T0230A	139	Substitute Value
V76X1828E	1	Substitute Value
V76W3617D	258:12:00:04:000	Resume Processing
V61T2650A	1200	Resume Processing
V76X1852E	1	Resume Processing

U10
002/RT

PARM	PARAMETER	I	N	P	U	T	V	A	L	U	E	ENABLE/DISABLE
FORMAT	NUMBER	ANALOG/TIME					OR DISCRETE		ACTION CODE (E/D)			
/	U99W8801C	,					,					
	U45T0230A	,					,					
	U76X1828E	,					,					
	U76W3617D	,					,					
	U61T2650A	,					,					
	U76X1852E	,					,					
		,					,					
		,					,					
		,					,					
		,					,					
		,					,					
		,					,					
		,					,					
		,					,					
		,					,					
		,					,					

NOTE: FOR PARM FORMAT FIELD - ENTER P1 FOR ANALOG VALUE; ENTER P2 FOR TIME
VALUE; ENTER P1/P2 FOR DISCRETE VALUE
ENTER PM FOR PERMANENT MED

2. State number of form used to submit parameter override values to computer TM.

Practice Feedback

1. Complete V10 menu below to perform specified operations for supplied parameters.

<u>PARAMETER</u>	<u>FIXED VALUE</u>	<u>OPERATION</u>
V99W8801C	258:08:30:45:201	Substitute Value
V45T0230A	139	Substitute Value
V76X1828E	1	Substitute Value
V76W3617D	258:12:00:04:000	Resume Processing
V61T2650A	1200	Resume Processing
V76X1852E	1	Resume Processing

U10

002/RT

PARAM	PARAMETER	I N P U T	V A L U E	ENABLE/DISABLE
FORMAT	NUMBER	ANALOG/TIME	OR DISCRETE	ACTION CODE (E/D)
/ P2	U99W8801C	258:08:30:45:201	-	D
P1	U45T0230A	139	-	D
P1	U76X1828E		1	D
P2	U76W3617D		-	E
P1	U61T2650A		-	E
P1	U76X1852E		-	E
-			-	-
-			-	-
-			-	-
-			-	-
-			-	-
-			-	-
-			-	-
-			-	-
-			-	-
-			-	-
-			-	-

NOTE: FOR PARAM FORMAT FIELD - ENTER P1 FOR ANALOG VALUE; ENTER P2 FOR TIME VALUE; ENTER P1/P2 FOR DISCRETE VALUE
ENTER PM FOR PERMANENT MED

2. State number of form used to submit parameter override values to computer TM.
JSC Form 557

Practice

3. Where can you get the PCM count for an overridden analog parameter?

4. From the following list of analog parameters, select those that can be overridden with fixed values.

V43T5215A

V71M4540P

V46D0181A

V74E4080A

V71T9056A

V95H4910C

Practice Feedback

3. Where can you get the PCM count for an overridden analog parameter?

Computer TM

4. From the following list of analog parameters, select those that can be overridden with fixed values.

✓ V43T5215A

V71M4540P

✓ V46D0181A

✓ V74E4080A

✓ V71T9056A

V95H4910C

1. IDENTIFYING TELEMETRY MENU MED CODES
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19. CHANGING THE CALIBRATION CURVE
20. THRIFTS
21. SPECIAL AND SUPER THRIFT PRODUCT REQUEST
22. RECONFIGURATION OF THRIFTS

SEGMENT 7

DEFINING PARAMETERS ON A UNIVERSAL DIGITAL DISPLAY

OBJECTIVE:

Complete a V43 MED menu to cause various floating point, bilevel, hexadecimal remote text and time parameters to be displayed on a Universal Digital Display (UDD).

SEGMENT INTRODUCTION:

There are seven high speed displays that can be configured to display the value of any parameter. A single MED menu is used to define the parameters to be displayed as well as those to be deleted. This segment discusses procedures for defining parameters to be displayed on a Universal Digital Display (UDD).

PURPOSE

Allows operator to build a display of telemetry parameters, computations, trajectory parameters, and site status data.

FUNCTION OF MENU DATA FIELDS

MSK NUMBER

Defines DTE display on which parameter values will appear. Only MSK numbers in the range 2021 through 2027 are valid.

CLEAR DISPLAY

Function of this data field is covered in the next segment.

PARAMETER NUMBER

Self-explanatory.

LINE NO

Specifies line on DTE display where parameter value will appear. Line numbers 01-80 are valid. Numbers 1-9 require leading zero.

COMMENTS

This 15 character field is used to enter a parameter identifier that will appear on DTE display. Data in this field may be omitted if a parameter name is not desired.

PARAMETER FORMAT

This field is used only for floating point and time parameters.

- a. Discrete, Remote Text, and Hexidecimal Parameters. This field is left blank.
- b. Floating Point Parameters. A blank field results in the number and 5 decimal places displayed on one line of the Universal Digitals Display (UDD). If other than 5 decimal places are desired, two numeric digits must be specified (00 for none, 01 for 1,.....,10). The number and specified decimal places will be displayed on one line of the UDD.

NOTE

If the total number of digits exceeds 12 digits (including decimal point) the most significant digit(s) will be truncated and a T will be displayed in the least significant digit position.

The parameter value, with from one to 10 decimal places can be split and displayed on two lines. This is accomplished by entering an S and the number of decimal places. S0 equals 10. The whole number is displayed on the first line and the decimal values on the second line.

- c. Time Parameters. A blank field results in time being displayed on one line. Entering the letters ST will display time on two lines: days and hours on line one, minutes and seconds on the second line.
- d. Clear PARM. Function of this data field is covered in the next segment.

Defining Parameters On A Universal Digital Display

PROCEDURE

- 1. Call a blank V43 menu from MOC or diskette.
- 2. Enter MSK No. assigned to your F/C position.
- 3. Enter PARAMETER NUMBER to be displayed.
- 4. Enter LINE NO. on which parameter is to be displayed.

NOTE

When split format is used, a line must be skipped to allow room for data display.

- 5. Enter name of parameter in COMMENTS data field (optional step).
- 6. Enter PARAMETER FORMAT.
- 7. Repeat steps 3 through 6 for desired number of parameters.
- 8. Transmit to MOC.
- 9. Verify CRT monitor display.

V43#

003/RT

TLM UNIVERSAL DIGITAL DISPLAY MENU

MSK NO. 2026

CLEAR DISPLAY	PARAMETER NUMBER	LINE NO	COMMENTS	PARAMETER FORMAT	CLEAR PARM	PARAMETER FIELD OPTIONS ARE:
	U98P3117C	01	QBAR BFS	03		
	U95P3011C	02	PASS			NN = NO OF DECIMAL PLACES(00-10)
	U95H3001C	03	HPC PASS	S7		
	U95H0175C	05	ALT NAV	00		SN = NO OF DECIMAL PLACES(S1-S0)
	M08G0501R	10	BARO A-I-F			SPLIT ON 2 LINES - S1 IS ONE DECIMAL PLACE; S0 IS TEN DECIMAL PLACES
	U92T3711C	14	SP LED			ST = TIME SPLIT ON 2 LINES
	U98X0561X	41	ADTA 1 SEL=1			NOTE: FORMAT WILL ONLY BE USED FOR TIME AND FLOATING POINT PARMS.
	M40H0107J	42	GNT-C			

UNIVERSAL DIGITALS 6 RT2026B

1	V98P3117C	QBAR BFS	D 41	V98X0561X	ADTA 1 SEL=1	D
2	V95P3011C	PASS	-999999.0000TG	42	M40H0107J	GNT-C
3	V95H3001C	HPC PASS	-05	43		1:03:05:51
4			.00000000	44		
5	V95H0175C	ALT NAV	00	45		
6				46		
7				47		
8				48		
9				49		
10	M08G0501R	BARO A-I-F	M	50		
11				51		
12				52		
13				53		
14	V92T3711C	SP LED	D	54		
15				55		
16				56		
17				57		
18				58		
19				59		
20				60		
21				61		
22				62		
23				63		
24				64		
25				65		
26				66		
27				67		
28				68		
29				69		
30				70		
31				71		
32				72		
33				73		
34				74		
35				75		
36				76		
37				77		
38				78		
39				79		
40				80		

Supporting Data

The Universal Digitals displays, MSK 2021 through 2027, are configurable in realtime via the Megadata terminal using V43 menu. Parameters are placed on this display by line number. Lines 1-40 are on the left side and lines 41-80 are on the right.

To place parameters on a Universal Digitals display, V43 menu must contain MSK number of the display to be configured. Only MSK numbers 2021 through 2027 can be used. The assignment of these numbers is specific to each F/C position as shown below.

<u>MSK NO.</u>	<u>F/C POSITION</u>
2021, 2022	GSDS/Computer TM
2023, 2024	CF6/Guidance & Prop SSR
2025, 2026	CF7/EMES SSR
2027	CH3/Payloads

In the example on the previous learning statement, the V43 menu causes six parameters to be placed on Universal Digitals display 2024. Parameter V41P1250C (L HE TKP) is displayed on line one as designated on the menu. The format description S0 causes the parameter value to be split on two lines. The whole number is on line one, and 10 decimal places are displayed on line two. Parameter V41P1600A is displayed on line 3 as designated on the menu. Notice that line two could not be specified because the data value for parameter 1 is displayed on this line. The format description 07 causes the value to be displayed in seven decimal places. Parameter M40H0121J (time) is displayed on line 4. The format description ST splits the time value on two lines. On the first line, the days and hours are displayed. On the second line, the minutes and seconds are displayed. The remaining parameters are defined to be displayed on lines 41, 42, 43 respectively, with a format description of 05. This causes the value to be displayed to five decimal places in engineering units.

The formal description is only used for floating point and time parameters. All parameters that are not floating point or remote text will be displayed in hexadecimal. For time parameters displayed on one line, the format description should be left blank.

Practice

Complete the blank V43 menu provided to enter the parameters listed below on a blank Universal Digital Display; MSK 2027. Each parameter should be entered in the sequence shown and displayed on the first available line.

PARAMETER NO.	TYPE	COMMENT/ NAME	DECIMAL PLACES	ON 1 OR 2 LINES
M01G0800R	REMOTE TEXT	FAULT SUM MSG1	--	1
M40H0107J	TIME	GMT	--	2
V95H8175C	FLT PT	ALT NAV	7	2
V45P1100A	FLT PT	--	6	1
V98U3431C	HEX	ADTA H AIF	--	--
V41P1250C	FLT PT	LHE TKP	5	2
V98X0409X	DISCRETE	USE IMU=1	--	--
V98L3115C	FLT PT	TAS BFS	0	1
M40H0121J	TIME	--	--	1
V41P1600A	FLT PT	NEU TKP	5	1

V43#

002/RT

TLM UNIVERSAL DIGITAL DISPLAY MENU

MSK NO.

CLEAR. PARAMETER LINE COMMENTS PARAMETER CLEAR PARAMETER FORMAT
DISPLAY NUMBER NO FIELD OPTIONS ARE:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39
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Practice Feedback

Complete the blank V43 menu provided to enter the parameters listed below on a blank Universal Digital Display; MSK 2027. Each parameter should be entered in the sequence shown and displayed on the first available line.

PARAMETER NO.	TYPE	COMMENT/ NAME	DECIMAL PLACES	ON 1 OR 2 LINES
M01G0800R	REMOTE TEXT	FAULT SUM MSG1	--	1
M40H0107J	TIME	GMT	--	2
V95H8175C	FLT PT	ALT NAV	7	2
V45P1100A	FLT PT	--	6	1
V98U3431C	HEX	ADTA H AIF	--	--
V41P1250C	FLT PT	LHE TKP	5	2
V98X0409X	DISCRETE	USE IMU=1	--	--
V98L3115C	FLT PT	TAS BFS	0	1
M40H0121J	TIME	--	--	1
V41P1600A	FLT PT	NEU TKP	5	1

V43#

002/RT

TLN UNIVERSAL DIGITAL DISPLAY MENU

MSK NO. 2027,

CLEAR DISPLAY	PARAMETER NUMBER	LINE NO	COMMENTS	PARAMETER FORMAT	CLEAR PARN	PARAMETER FIELD	FORMAT OPTIONS ARE:
C	/ M01G0800R	01	FAULT SUM MSG1	--	-		
	M40H0107J	02	GMT	ST	-		NN = NO OF DECIMAL PLACES(00-10)
	V95H8175C	04	ALT NAV	SZ	-		SN = NO OF DECIMAL PLACES(S1-S0)
	V45P1100A	06		Q6	-		SPLIT ON 2
	V98U3431C	07	ADTA H AIF		-		LINES - S1 IS ONE
	V41P1250C	08	LHE TKP	S5	-		DECIMAL PLACE; S0
	V98X0409X	10	USE IMU=1		-		IS TEN DECIMAL
	V98L3115C	11	TAS BFS	Q0	-		PLACES
	M40H0121J	12			-		ST = TIME SPLIT
	V41P1600A	13	NEU TKP	Q5	-		ON 2 LINES
					-		NOTE: FORMAT WILL ONLY BE USED FOR TIME AND FLOATING POINT PARNS.
					-		
					-		
					-		
					-		
					-		
					-		

1. IDENTIFYING TELEMETRY MENU MED CODES
2. CHANGING OPERATIONAL LIMIT VALUES FOR INDIVIDUAL PARAMETERS
3. ENABLING, DISABLING, AND CHANGING CRITICAL LIMIT VALUES FOR INDIVIDUAL PARAMETERS
4. INHIBITING OFFSCALE HIGH/LOW LIMIT SENSING FOR INDIVIDUAL PARAMETERS
5. CHANGING HEXADECIMAL LIMITS
6. OVERRIDING TELEMETRY PARAMETER VALUES
7. DEFINING PARAMETERS ON A UNIVERSAL DIGITAL DISPLAY
8. DELETING PARAMETER(S) FROM, OR CLEARING, AN ENTIRE UNIVERSAL DIGITALS DISPLAY
9. RECONFIGURING UNIVERSAL PLOT
10. DELETING PARAMETER(S) FROM A UNIVERSAL PLOT
11. DRAWING REFERENCE LINE ON UNIVERSAL PLOT USING V41, TLM UNIVERSAL PLOT (NOMINAL DATA) MENU
12. DELETING/CHANGING A REFERENCE LINE ON UNIVERSAL PLOT
13. UNIVERSAL PLOT REFERENCE LINE AND CONTROL DATA INTERACTIONS
14. CHANGING SPECIAL COMPUTATION-CONSTANT ENGINEERING UNIT VALUES
15. CHANGING SPECIAL COMPUTATION TIME CONSTANTS
16. SELECTING MAJOR FUNCTION FOR DISPLAY 1350
17. CHANGING VARIABLE PARAMETER ID
18. USING MCC CALIBRATION DATA BOOK
19. CHANGING THE CALIBRATION CURVE
20. THRIFTS
21. SPECIAL AND SUPER THRIFT PRODUCT REQUEST
22. RECONFIGURATION OF THRIFTS

SEGMENT 8

DELETING PARAMETERS(S) FROM, OR CLEARING, AN ENTIRE UNIVERSAL DIGITALS DISPLAY

OBJECTIVE:

Delete individual parameter(s) from Universal Digital Display and clear the entire display using V43, TLM Universal Digital Display Menu.

SEGMENT INTRODUCTION:

In the previous segment, the student learned how to configure Universal Digital Displays (UDD's) using the V43 MED menu. This menu can also be used to delete selected parameters or clear all parameters from UDD's.

This segment contains three parts. Each presents a procedure for deleting parameters using the V43 MED menu.

Learning Statement

PURPOSE

The purpose of this procedure is to clear specific parameters from Universal Digitals Displays with a blank V43 MED menu.

FUNCTION OF MENU DATA FIELDS

CLEAR DISPLAY

Function of this data field will be covered in part 3 of this segment.

CLEAR PARM

Any nonblank alphabetic character in this data field will cause all data for the parameter associated with the specified line number to be cleared from the display.

All other data fields have been previously covered.

Clearing Parameter(s)
Using Undefined Menu

PROCEDURE

1. Call/verify appropriate Universal Digitals Display.
2. Call blank V43 menu.
3. Enter MSK number of display to be modified.
4. Enter LINE NO. of parameter to be cleared.
5. Enter C in CLEAR PARM data field.
6. Repeat steps 3 and 5 for desired number of parameters.
7. Hard copy Universal Digital Display if desired.
8. Transmit to MOC.
9. Verify parameter(s) cleared on Universal Digitals display.

U43#

002/RT TLM UNIVERSAL DIGITAL DISPLAY MENU MSK NO. 2026

CLEAR DISPLAY	PARAMETER NUMBER	LINE NO	COMMENTS	PARAMETER FORMAT	CLEAR PARM	PARAMETER FIELD OPTIONS ARE:
		43			C	NN = NO OF DECIMAL PLACES(00-10)
						SN = NO OF DECIMAL PLACES(S1-S0)
						SPLIT ON 2
						LINES - S1 IS ONE
						DECIMAL PLACE; S0
						IS TEN DECIMAL PLACES
						ST = TIME SPLIT ON 2 LINES
						NOTE: FORMAT WILL ONLY BE USED FOR TIME AND FLOATING POINT PARMS.

UNIVERSAL DIGITALS 6 RT2026B

1	V98P3117C	QBAR	BFS	D 41	V98X8561X	ROTA 1 SEL=1	D
2	V95P3011C		PASS	-999999.0000TG	42	M40H0107J	GMT-C
3	V95H3001C	HPC	PASS	-05	43		1:03:05:51
4				.00000000	44		
5	V95H0175C	ALT	NAV	05	45		
6					46		
7					47		
8					48		
9					49		
10	H00G0501R	BARO	A-I-F	M	50		
11					51		
12					52		
13					53		
14	V92T3711C	SP	LED	D	54		
15					55		
16					56		
17					57		
18					58		
19					59		
20					60		
21					61		
22					62		
23					63		
24					64		
25					65		
26					66		
27					67		
28					68		
29					69		
30					70		
31					71		
32					72		
33					73		
34					74		
35					75		
36					76		
37					77		
38					78		
39					79		
40					80		

Clearing Parameter(s) Using Defined Menu

PROCEDURE

1. Call/verify appropriate Universal Digital Display.
2. Call/verify appropriate V43 menu from diskette.

NOTE

3. Enter C in CLEAR PARM data field corresponding to parameter(s) being deleted.

4. **Hardcopy UDD if desired.**

5. Transmit to MOC.

6. Verify parameter(s) cleared on Universal Digital's display.

NOTE

In addition to the above procedure, the unused portion of this menu can be used to add or delete parameters as described in the two preceding learning statements.

8-3

Learning Statement

PURPOSE

The purpose of this procedure is to clear all parameters from a Universal Digitals display with a blank V43 MED Menu.

CLEAR DISPLAY

Causes all parameters data on the specified display to cleared.

V43#
002/RT

TLM UNIVERSAL DIGITAL DISPLAY MENU

MSK NO. 2026

CLEAR DISPLAY C , /	PARAMETER NUMBER	LINE NO	COMMENTS	PARAMETER FORMAT	CLEAR PARM	PARAMETER FIELD	FORMAT OPTIONS ARE:
							NW = NO OF DECIMAL PLACES(00-10)
							SW = NO OF DECIMAL PLACES(S1-S0)
							SPLIT ON 2 LINES - S1 IS ONE DECIMAL PLACE; S0 IS TEN DECIMAL PLACES
							ST = TIME SPLIT ON 2 LINES
							NOTE: FORMAT WILL ONLY BE USED FOR TIME AND FLOATING POINT PARMS.
							\$

Clearing Entire Universal
Digitals Display

PROCEDURE

1. Call/verify appropriate Universal Digitals display.
2. Call blank menu V43.
3. Enter MSK number of display to be cleared from Universal Digitals display.
4. Enter C in CLEAR DISPLAY data field.
5. Hardcopy Universal Digitals display if desired.
6. Transmit to MOC.
7. Verify parameter(s) cleared on Universal Digitals display.

NOTE

Entering C in CLEAR display on a defined menu will result in the display being cleared and then redefined with the parameters defined.

NOTE

If the display does not currently contain data the message NO PARAMETERS ON DISPLAY will be located on the lower right corner of the display.

UNIVERSAL DIGITALS 6 RT2026B

1	V98P3117C	QBAR	BFS	D 41	V98X8561X	ADTA 1	SEL=1	D
2	V95P3011C		PASS	-999999.0000TG	42	M40H0107J	GNT-C	1:03:05:51
3	V95H3001C	WPC	PASS	-06	43			
4				.00000000	44			
5	V95H0175C	ALT	NAV	06	45			
6					46			
7					47			
8					48			
9					49			
10	M00G0501R	BARO	A-I-F	N	50			
11					51			
12					52			
13					53			
14	V92T3711C	SP	LED	D	54			
15					55			
16					56			
17					57			
18					58			
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21					61			
22					62			
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38					78			
39					79			
40					80			

Supporting Data

The V43, TLM Universal Digital Display Menu can be used to completely clear an existing Universal Digitals display. The V43 menu can also be used to clear an existing display and to redefine that display at the same time. When the MOC receives the data on a V43 menu, it reads the data from left to right and from top to bottom. The first data field read is the CLEAR DISPLAY data field. If there is a nonblank alphabetic character in this data field, the display assigned to the MSK number (2021-2027) is cleared completely. We recommend using a C for clear or a D for delete. The MOC proceeds to read the next data field. If there is no information in the data field, the display remains clear. If there is data defined in the other data fields, this data is displayed on the console on the Universal Digitals display.

Practice

1. Using the Universal Digital's display given, fill out V43 menu to delete the following parameters from all lines on which they appear.

DELTE

M01G3108C
V41P1250C
E41P2015B

UNIVERSAL DIGITALS 6		RT20262026 01	
1	M01G3100C CPMRLVL	0	41 V41P1250C 1790.00000
2		..000000000	42 V41P1600A 2560.00000
3			43 E41P20150 -660.62417
4			44
5			45
6			46
7			47
8			48
9			49
10			50
11			51
12			52
13			53
14	M40H0121J TIME	0:00	54
15		:03:41	55
16	V71X55260 01 STAT	D	56
17			57
18			58
19			59
20	V41P1250C L ME TKP	1790.0	60
21		..000000000	61
22	V41P1600R NEUTKP	2560.0000000	62
23			63
24	E41P20150 L HPOT ISP P	-660.0	64
25		..524	65
26			66
27			67
28			68
29			69
30			70
31			71
32			72
33			73
34			74
35			75
36			76
37			77
38			78
39			

U43#

002/RT TLM UNIVERSAL DIGITAL DISPLAY MENU MSK NO. _____

CLEAR DISPLAY	PARAMETER NUMBER	LINE NO	COMMENTS	PARAMETER FORMAT	CLEAR PRM	PARAMETER FORMAT FIELD OPTIONS ARE:
— ' /	—	—	—	—	—	NN = NO OF DECIMAL PLACES(00-10)
						SN = NO OF DECIMAL PLACES(S1-S0)
						SPLIT ON 2
						LINES - S1 IS ONE
						DECIMAL PLACE; S0
						IS TEN DECIMAL PLACES
						ST = TIME SPLIT ON 2 LINES
						NOTE: FORMAT WILL ONLY BE USED FOR TIME AND FLOATING POINT PRMS.
						\$

Practice Feedback

1. Using the Universal Digital's display given, fill out V43 menu to delete the following parameters from all lines on which they appear.

DELETE

M01G3108C
V41P1250C
E41P2015B

Remember to always enter MSK number.

UNIVERSAL DIGITALS 6		RT20262026 01	
1	M01G3100C CPMRLVL	0	41 V41P1250C
2		..000000000	42 V41P1600A
3			43 E41P2015B
4			44
5			45
6			46
7			47
8			48
9			49
10			50
11			51
12			52
13			53
14	M40H0121J TIME	0:00	54
15		:03:41	55
16	V71X5526R OI STAT	D	56
17			57
18			58
19			59
20	V41P1250C L ME TKP	1790	60
21		..000000000	61
22	V41P1600R NEUTKP	2560.0000000	62
23			63
24	E41P2015B L HPOT ISP P	-660	64
25		..524	65
26			66
27			67
28			68
29			69
30			70
31			71
32			72
33			73
34			74
35			75
36			76
37			77
38			78
39			79
40			80

V43#

002/RT TLM UNIVERSAL DIGITAL DISPLAY MENU MSK NO. 2026

CLEAR DISPLAY	PARAMETER NUMBER	LINE NO	COMMENTS	PARAMETER FORMAT	CLEAR PARM	PARAMETER FORMAT FIELD OPTIONS ARE:
—	1	01		C	-	NN = NO OF DECIMAL PLACES(00-10)
		20		C	-	SN = NO OF DECIMAL PLACES(S1-S0)
		24		C	-	SPLIT ON 2 LINES - S1 IS ONE DECIMAL PLACE; S0 IS TEN DECIMAL PLACES
		41		C	-	ST = TIME SPLIT ON 2 LINES
		43		C	-	NOTE: FORMAT WILL ONLY BE USED FOR TIME AND FLOATING POINT PARMS.
					/	\$

Practice

2. The Universal Digitals display and V43 menu provided are displayed on your console and Megadata terminal respectively. Change the menu to reflect the best way to delete (clear) parameters M01G3108C and V71X5526B from display 2026.

1
2
3
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UNIVERSAL DIGITALS 6 RT20262026 01

M01G3108C CPWRLVL
..000000000
M01G0121J TIME 0:00
V71X5526B 01 STAT 03:41
V41P1250C L HE TKP 1798
V41P1600R NEUTKP 2568
E41P2015B L HPOT ISP P -668
..524

V41P1250C 1798.00000
V41P1600R 2568.0000000
E41P2015B -668.62417

V43#

002/RT TLM UNIVERSAL DIGITAL DISPLAY MENU MSK NO. 2026

CLEAR DISPLAY	PARAMETER NUMBER	LINE NO	COMMENTS	PARAMETER FORMAT	CLEAR PARN	PARAMETER FIELD	FORMAT OPTIONS ARE:
-	/M01G3108C	01	CPWRLVL	S9	-	-	
	V41P1250C	41		05	-	-	NN = NO OF DECIMAL PLACES(00-10)
	V41P1680A	42		05	-	-	SN = NO OF DECIMAL PLACES(S1-S0)
	V43P2015B	43		05	-	-	SPLIT ON 2 LINES - S1 IS ONE DECIMAL PLACE; S0 IS TEN DECIMAL PLACES
							ST = TIME SPLIT ON 2 LINES
							NOTE: FORMAT WILL ONLY BE USED FOR TIME AND FLOATING POINT PARNS.

Practice Feedback

2. The Universal Digitals display and V43 menu provided are displayed on your console and Megadata terminal respectively. Change the menu to reflect the best way to delete (clear) parameters M01G3108C and V71X5526B from display 2026.

UNIVERSAL DIGITALS 6		RT0262026 01	
1	MOIG3100C CPNRLVL	0	V41P1250C
2		..000000000	V41P1600A
3			E41P2015B
4			
5			
6			
7			
8			
9			
10			
11			
12			
13	MY0H0121J TIME	0:00	
14		:03:41	
15	V71X5526Q OI STAT	0	
16			
17			
18			
19			
20	V41P1250C L ME TKP	1790	
21		..000000000	
22	V41P1600R NEUTKP	2560.0000000	
23			
24	E41P2015B L HPOT ISP P	-660	
25		..524	
26			
27			
28			
29			
30			
31			
32			
33			
34			
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36			
37			
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U43#

002/RT

TLN UNIVERSAL DIGITAL DISPLAY MENU

MSK NO. 2026;

CLEAR DISPLAY	PARAMETER NUMBER	LINE NO	COMMENTS	PARAMETER FORMAT	PARM	PARAMETER FIELD	OPTIONS ARE:
—, /	MOIG3108C	01	CPWRLVL	59	C		
	V4IP1250C	41		05	-	NN	NO OF DECIMAL PLACES(00-10)
	V4IP1680A	42		05	-	SN	NO OF DECIMAL PLACES(S1-S0)
	V43P2015B	43		05	-		
		46			C		SPLIT ON 2
					-		LINES - S1 IS ONE
					-		DECIMAL PLACE; S0
					-		IS TEN DECIMAL
					-		PLACES
					-	ST	TIME SPLIT
					-		ON 2 LINES
					-	NOTE:	FORMAT WILL ONLY
					-		BE USED FOR TIME
					-		AND FLOATING
					-	\$	POINT PARMS.

3. Fill out V43, TLM Universal Digital Display Menu (below) to delete all data from MSK 2027.

002/RT

TLM UNIVERSAL DIGITAL DISPLAY MENU

MSK NO. _____,

CLEAR. DISPLAY	PARAMETER NUMBER	LINE NO	COMMENTS	PARAMETER FORMAT	CLEAR PARN	PARAMETER FORMAT FIELD OPTIONS ARE:
— ' /	—	'	—	'	—	
						NN = NO OF DECIMAL
						PLACES(00-10)
						SN = NO OF DECIMAL
						PLACES(\$1-S0)
						SPLIT ON 2
						LINES - \$1 IS ONE
						DECIMAL PLACE; S0
						IS TEN DECIMAL
						PLACES
						ST = TIME SPLIT
						ON 2 LINES
						NOTE: FORMAT WILL ONLY
						BE USED FOR TIME
						AND FLOATING
					/ \$	POINT PARMS.

Practice Feedback

3. Fill out V43, TLM Universal Digital Display Menu (below) to delete all data from MSK 2027.

V43#

002/RT TLM UNIVERSAL DIGITAL DISPLAY MENU MSK NO.2027,

CLEAR DISPLAY	PARAMETER NUMBER	LINE NO	COMMENTS
C , /		' - '	
		' - '	
		' - '	
		' - '	
		' - '	
		' - '	
		' - '	
		' - '	
		' - '	
		' - '	
		' - '	
		' - '	
		' - '	
		' - '	
		' - '	
		' - '	
		' - '	

CLEAR PARAMETER FORMAT FIELD OPTIONS ARE:

NN = NO OF DECIMAL PLACES(00-10)
SN = NO OF DECIMAL PLACES(S1-S0) SPLIT ON 2 LINES - S1 IS ONE DECIMAL PLACE; SO IS TEN DECIMAL PLACES
ST = TIME SPLIT ON 2 LINES
NOTE: FORMAT WILL ONLY BE USED FOR TIME AND FLOATING POINT PARMS.

(Arrows point from bottom labels to parameter numbers)

Remember! These fields must be left blank, or display will be redefined.

4. Fill out V43, TLM Universal Digital Display Menu (below) to delete all existing data from MSK 2026 and redefine it with these parameters.

V41P1250C	L#HE TKP	(line 1: 7 decimal places)
V71X5526B	OI STAT	(lines 2 and 3: 4 decimal places)
V41P1600A	NEUTKP	(lines 4 and 5: 5 decimal places)
M01G3100C	CPWRLVL	(line 10: no decimal places)

U43#

002/RT

TLM UNIVERSAL DIGITAL DISPLAY MENU

MSK NO. _____,

CLEAR DISPLAY	PARAMETER NUMBER	LINE NO	COMMENTS	PARAMETER FORMAT	CLEAR PARM	PARAMETER FIELD	FORMAT OPTIONS ARE:
------------------	---------------------	------------	----------	---------------------	---------------	--------------------	------------------------

— 9 —

PARAMETER
NUMBER

LINE
NO

COMMENTS

PARAMETER FORMAT

CLEAR
PARK

PARAMETER FORMAT
FIELD OPTIONS ARE:

NN = NO OF DECIMAL
 PLACES(00-10)
 SN = NO OF DECIMAL
 PLACES(S1-S0)
 SPLIT ON 2
 LINES - S1 IS ONE
 DECIMAL PLACE; S0
 IS TEN DECIMAL
 PLACES
 ST = TIME SPLIT
 ON 2 LINES
 NOTE: FORMAT WILL ONLY
 BE USED FOR TIME
 AND FLOATING
 \$ POINT PARMS.

1. IDENTIFYING TELEMETRY MENU MED CODES
2. CHANGING OPERATIONAL LIMIT VALUES FOR INDIVIDUAL PARAMETERS
3. ENABLING, DISABLING, AND CHANGING CRITICAL LIMIT VALUES FOR INDIVIDUAL PARAMETERS
4. INHIBITING OFFSCALE HIGH/LOW LIMIT SENSING FOR INDIVIDUAL PARAMETERS
5. CHANGING HEXADECIMAL LIMITS
6. OVERRIDING TELEMETRY PARAMETER VALUES
7. DEFINING PARAMETERS ON A UNIVERSAL DIGITAL DISPLAY
8. DELETING PARAMETER(S) FROM, OR CLEARING, AN ENTIRE UNIVERSAL DIGITALS DISPLAY
9. RECONFIGURING UNIVERSAL PLOT
10. DELETING PARAMETER(S) FROM A UNIVERSAL PLOT
11. DRAWING REFERENCE LINE ON UNIVERSAL PLOT USING V41, TLM UNIVERSAL PLOT (NOMINAL DATA) MENU
12. DELETING/CHANGING A REFERENCE LINE ON UNIVERSAL PLOT
13. UNIVERSAL PLOT REFERENCE LINE AND CONTROL DATA INTERACTIONS
14. CHANGING SPECIAL COMPUTATION-CONSTANT ENGINEERING UNIT VALUES
15. CHANGING SPECIAL COMPUTATION TIME CONSTANTS
16. SELECTING MAJOR FUNCTION FOR DISPLAY 1350
17. CHANGING VARIABLE PARAMETER ID
18. USING MCC CALIBRATION DATA BOOK
19. CHANGING THE CALIBRATION CURVE
20. THRIFTS
21. SPECIAL AND SUPER THRIFT PRODUCT REQUEST
22. RECONFIGURATION OF THRIFTS

SEGMENT 9

RECONFIGURING UNIVERSAL PLOT

OBJECTIVE:

Reconfigure a Universal Plot (UP) using V40, TLM Universal Plot (Control Data) Menu.

SEGMENT INTRODUCTION:

You may recall from UT DISPLAY 2102 workbook that a Universal Plot (UP) display shows the relationship of telemetry parameters in a plotting format. The control data for the parameters and plotting constants can be changed in real time using V40, TLM Universal Plot (Control Data) Menu. This segment, consisting of two parts, discusses the procedure for reconfiguring the UP using the Megadata terminal.

Learning Statement

PURPOSE

This procedure enables you to configure/reconfigure a universal plot in real-time. Universal plots are capable of plotting four parameters, called Y parameters, with respect to a 5th parameter, the X parameter. The X parameter can be time or an analog. The Y parameters can be either analogs or a discrete.

FUNCTION OF MENU DATA FIELDS

MSK 18__

These two numeric digits from 01 to 50 inclusive specify the DTE display to be reconfigured.

PLOT RATE

This four digit numeric data field, having a range from 1 to 9999 inclusive, defines the number of seconds between plot points.

To calculate a desired plot rate for a specific plot duration:

$$\text{Use: } PR = \frac{T_m}{3}$$

Where: PR = Plot rate in seconds
T_m = Max time of desired plot duration in minutes

COMMENTS

These four alphanumeric data fields, one for each Y parameter, are used for name (identify) the downlinked parameters specified for plotting. Use of these subparameters is optional.

PARAMETER NUM.

These four data fields, one for each Y parameter, specify the downlinked parameters to be plotted.

SCALE POS. (L/R)

These four data fields specify whether the associated Y parameter is to be plotted using left or right scale values. Only an L or an R is valid.

Reconfiguring Universal Plots

PROCEDURE

1. Call a blank V40.
2. Enter MSK number of Universal Plot display to be reconfigured.
3. Enter desired update rate.
4. Enter names of selected Y parameters in COMMENTS data field (optional step).
5. Enter parameter numbers on PARAMETER NUM. data field.
6. Enter desired Y-axis scale in SCALE POS. (L/R).

(See next Learning Statement for continuation of procedure.)

V40# ←

003/RT TLM UNIVERSAL PLOT (CONTROL DATA) MENU MSK 1830

PLOT RATE 3

Y1 Y2 Y3 Y4

COMMENTS / L HE REG P, C HE REG P, R HE REG P, PHE REG P

PARAMETER NUM. / V41P1254C, V41P1154C, V41P1354C, V41P1605A

SCALE POS. (L/R) / L, L, L, L

SCALE VALUES: Y LEFT Y RIGHT

MAXIMUM / 1000, , ,

MINIMUM 500, , ,

NOTE: 1. TO DELETE A PARAMETER PLACE THE WORD DELETE IN THE PARAMETER NUM. FIELD.

2. TO DELETE A COMMENT PLACE THE WORD DELETE IN THE COMMENT FIELD.

CALCULATE (2/3)

INTERIM VALUES: 3

X SCALE INPUTS:

PARAMETER NUM. M40H0121J

SCALE VALUES:

MINIMUM ,

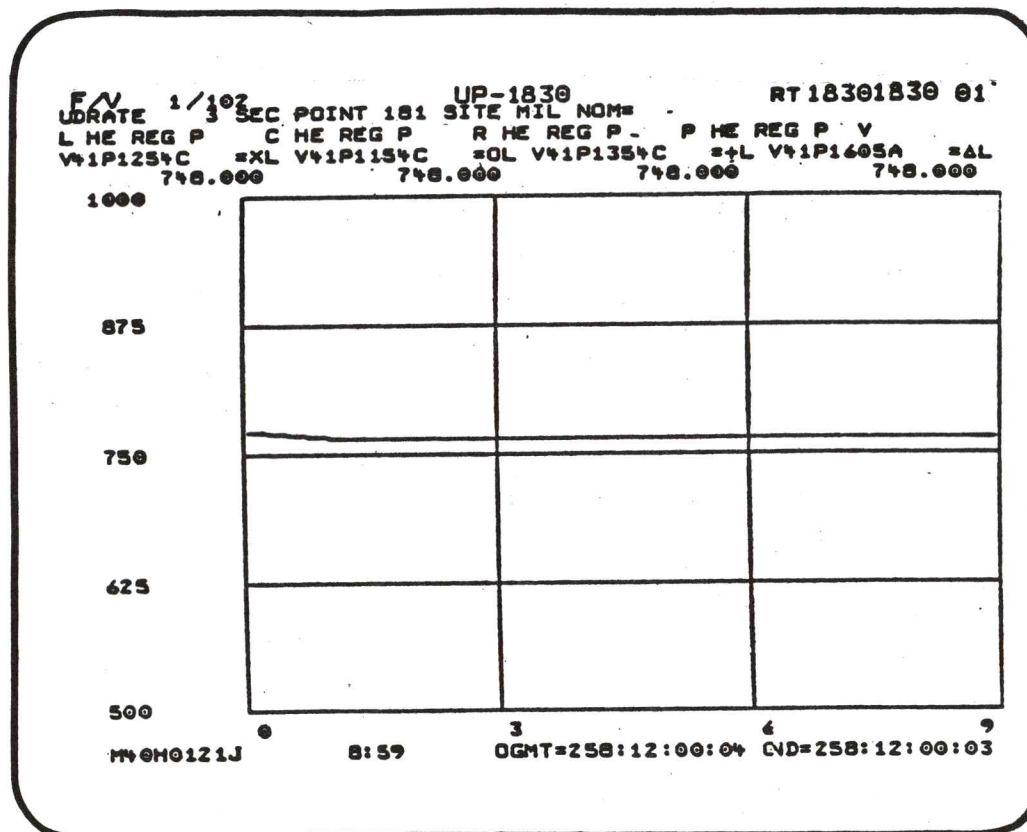
MAXIMUM ,

NOTES:

1. MIN SCALE APPLIES TO NON-TIME PARAMETERS

2. MAX SCALE APPLIES TO NON-TIME PARAMETERS

ENTER PM FOR PERMANENT MED



Learning Statement

FUNCTION OF MENU DATA FIELDS (CONT.)

SCALE VALUES

These four 11-digit data fields are used to specify the minimum and maximum values of the left and right scales on the "Y" axis.

NOTE

If any SCALE POS. data field contains an L or R, a max. and min scale value must be specified for that scale.

CALCULATE (2/3) INTERIM VALUES

This one digit numeric data field must be a 2 or 3 specifying the number of intermediate values to be calculated and displayed on each Y scale.

X SCALE INPUTS:

PARAMETER NUM.

This data field specifies what the Y parameters are to be plotted against.

NOTE

If any Y parameter specified is a discrete the X parameter number must be a time parameter.

SCALE VALUES:

Two data fields used to specify the minimum and maximum values of the "X" parameter to be plotted.

NOTE

Do not specify min and max X scale values if the X parameter number is a time parameter. When a time parameter is specified the X scale values are automatically calculated based on the specified PLOT RATE

U40#

003/RT TLM UNIVERSAL PLOT (CONTROL DATA) MENU MSK 1830 ,

PLOT RATE 3 ,

Y1 Y2 Y3 Y4

COMMENTS / L HE REG P , C HE REG P , R HE REG P , PHE REG P ,

PARAMETER NUM. / U41P1254C , U41P1154C , U41P1354C , U41P1605A ,

SCALE POS.(L/R) / L , L , L , L ,

SCALE VALUES: Y LEFT Y RIGHT

MAXIMUM / 1000 , , , ,

MINIMUM 500 , , , ,

CALCULATE (2/3)

INTERIM VALUES: 3 ,

X SCALE INPUTS:

PARAMETER NUM. M40H0121J ,

SCALE VALUES:

MINIMUM ,

MAXIMUM ,

NOTES:

1. MIN SCALE APPLIES TO NON-TIME PARAMETERS

2. MAX SCALE APPLIES TO NON-TIME PARAMETERS

ENTER PM FOR PERMANENT NED

NOTE: 1. TO DELETE A PARAMETER PLACE THE WORD DELETE IN THE PARAMETER NUM. FIELD.

2. TO DELETE A COMMENT PLACE THE WORD DELETE IN THE COMMENT FIELD.

Reconfiguring Universal Plots

(continued from previous learning statement)

7. Enter MAXIMUM scale value for Y LEFT and RIGHT data field as required.
8. Enter MINIMUM scale value for Y LEFT and RIGHT data field as required.
9. Enter 2 or 3 for number of INTERIM VALUES.
10. Enter X-axis PARAMETER NUM.
11. Enter X-axis MIN and MAX SCALE VALUES if required.

CAUTION

Areas on the menu left blank will utilize existing values on the specific display. If a required data field is blank on both the display and menu will result in an message.

12. Make hardcopy of Universal Plot display if desired.

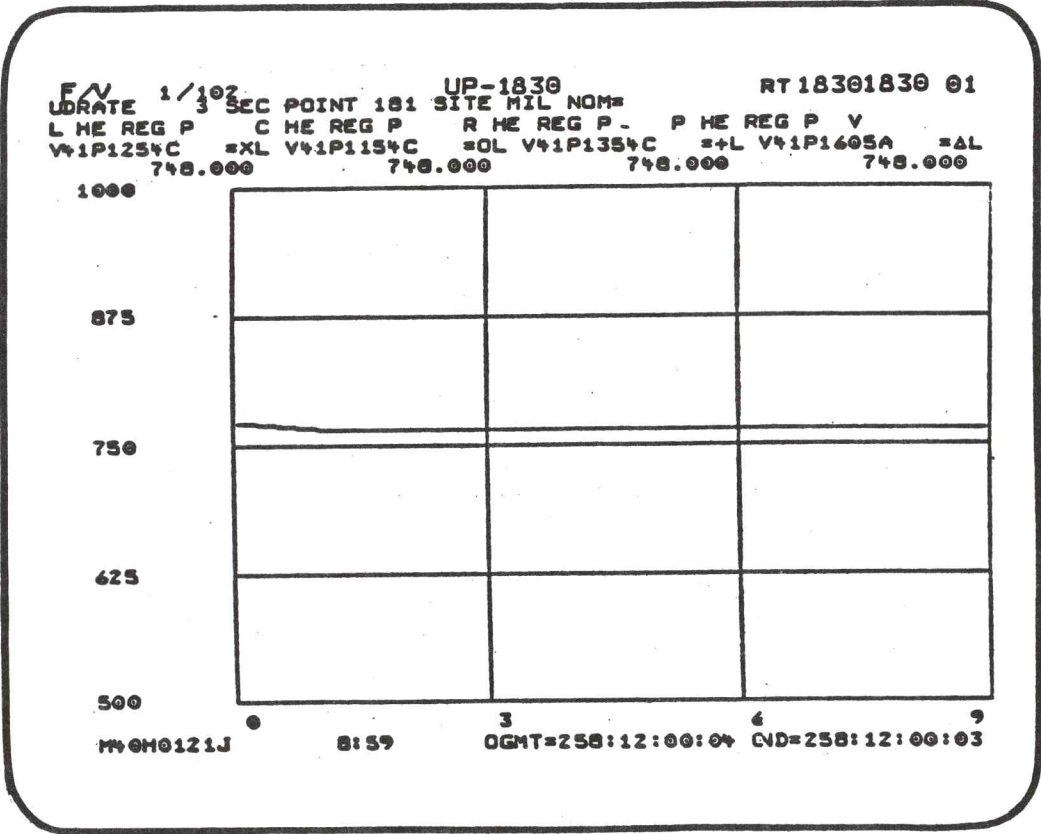
NOTE

When a V40 menu is entered to change any plot data except with COMMENTS the plot will stop, clear, and display the new configuration. The new configuration must then be restarted.

13. Transmit to MOC.
14. Verify TLM Universal Plot on console CRT display.

NOTE

Written instructions can also be submitted using JSC Form 559, to computer TM to reconfigure Universal Plot.



Supporting Data

There are 50 Universal Plots (UP's), each identified by the MSK number on which they are displayed (MSK's 1801-1805 inclusive).

Any telemetry parameter can be plotted, namely; discretes (bilevel), floating point values, and time values. Discretes plot as a 0 or 1 depending on their status. After the initial point(s) is plotted, updates occur only for a change of state, i.e., changing from 0 to 1 or 1 to 0. There are no continuous 0's or 1's plotted for a given bi-level.

Analog parameters (floating point) are plotted as a Δ , +, 0, or X dependent upon the Y¹ three Y⁴ assignment. These symbols are read against the appropriate Y left or right scale as specified.

A maximum of four Y parameters and one X parameter can be plotted per display.

Written instructions, using JSC Form 559 shown on the next page, can be submitted to computer TM to reconfigure Universal Plots.

Supporting Data

UNIVERSAL PLOT

FROM: _____
DATE: _____
TIME: _____

TO: COMPUTER TM
P-TUBE STA: 53

V40#

FLT/DT ____/____ TLM UNIVERSAL PLOT (CONTROL DATA) MENU

MSK 18__

PLOT RATE ____ , Y1 Y2 Y3 Y4
COMMENTS / _____ , _____ , _____ , _____ ,
PARAMETER NUM. / _____ , _____ , _____ , _____ ,
SCALE POS. (L/R) / _____ , _____ , _____ , _____ ,

SCALE VALUES: Y LEFT Y RIGHT
MAXIMUM / _____ , _____ ,
MINIMUM _____ , _____ / ,

NOTE: TO DELETE A PARAMETER
PLACE THE WORD DELETE
IN THE PARAMETER SLOT.

CALCULATE (2/3)
INTERIM VALUES: / _____ ,

X SCALE INPUTS:
PARAMETER NUM. _____ , NOTES:
MIN SCALE VALUE _____ , 1. INPUT ONLY IF X PARM IS A TIME VALUE.
MAX SCALE VALUE _____ \$ 2. APPLICABLE ONLY IF T NOT ENTERED
3. APPLICABLE ONLY IF T NOT ENTERED

ENTER PM FOR PERMANENT MED ____

V41#

FLT/DT ____/____ TLM UNIVERSAL PLOT (NOMINAL DATA) MENU

MSK 18__ ,

SCALE (L/R/D/C) , L/R = ADD NOMINALS; D = DEL NOMINALS; C = CHG NOMINALS
NOTE: IF X PARAMETER IS A TIME, INPUT X POINTS IN MINUTES

DATA POINT PAIRS

NO	X VALUE	Y VALUE	NO	X VALUE	Y VALUE
01 /	_____	_____	02	_____	_____
03	_____	_____	04	_____	_____
05	_____	_____	06	_____	_____
07	_____	_____	08	_____	_____
09	_____	_____	10	_____	_____
11	_____	_____	12	_____	_____
13	_____	_____	14	_____	_____
15	_____	_____			

OR: UP TO 6 COEFFICIENTS FOR 1ST TO 5TH DEGREE POLYNOMIAL.
COEFFICIENT A(0) / _____ , COEFFICIENT A(1) _____ ,
COEFFICIENT A(2) _____ , COEFFICIENT A(3) _____ ,
COEFFICIENT A(4) _____ , COEFFICIENT A(5) _____ /

ENTER PM FOR PERMANENT MED ____

Practice

1. Assume you want to plot two discrete parameters, V45S0604E and V45S0601E in the Y1 and Y1 positions. Additionally, you want to plot two analogs V43T9457A and V43T9456A against a scale with values ranging from 25 to 100 units having three intermediate values.

Use time parameter M40H0107J as the X parameter.

Complete the V40 menu provided to reconfigure Universal Plot 1820 to plot the data for exactly one hour.

V40#

002/RT

TLN UNIVERSAL PLOT (CONTROL DATA) MENU

MSK 18_ ,

PLOT RATE ____ ,

	Y1	Y2	Y3	Y4
COMMENTS	/ _____ ,	/ _____ ,	/ _____ ,	/ _____ ,
PARAMETER NUM.	/ _____ ,	/ _____ ,	/ _____ ,	/ _____ ,
SCALE POS.(L/R)	/ _____ ,	/ _____ ,	/ _____ ,	/ _____ ,

SCALE VALUES:

Y LEFT

Y RIGHT

MAXIMUM

MINIMUM

NOTE: 1. TO DELETE A PARAMETER
PLACE THE WORD DELETE
IN THE PARAMETER NUM.
FIELD.

2. TO DELETE A COMMENT
PLACE THE WORD DELETE
IN THE COMMENT FIELD.

CALCULATE (2/3)

INTERIM VALUES: _ ,

X SCALE INPUTS:

PARAMETER NUM. _____ ,

SCALE VALUES:

MINIMUM

MAXIMUM

NOTES:

1. MIN SCALE APPLIES TO NON-TIME PARAMETERS
2. MAX SCALE APPLIES TO NON-TIME PARAMETERS

ENTER PM FOR PERMANENT MED

Practice Feedback

1. Assume you want to plot two discrete parameters, V45S0604E and V45S0601E in the Y1 and Y4 positions. Additionally, you want to plot two analogs V43T9457A and V43T9456A against a scale with values ranging from 25 to 100 units having three intermediate values.

Use time parameter M40H0107J as the X parameter.

Complete the V40 menu provided to reconfigure Universal Plot 1820 to plot the data for exactly one hour.

U400			
002/RT	TLN UNIVERSAL PLOT (CONTROL DATA) MENU		MSK 1820 ,
PLOT RATE	20 ,		
	Y1	Y2	Y3
COMMENTS	/ , , , ,		
PARAMETER NUM.	V45S0604E	V43T9457A	V43T9456A
SCALE POS.(L/R)	-	L	L
SCALE VALUES:	Y LEFT	Y RIGHT	
MAXIMUM	100		
MINIMUM	25		
CALCULATE (2/3)			
INTERIM VALUES:	3 ,		
X SCALE INPUTS:			
PARAMETER NUM.	M40H0107J		
SCALE VALUES:			
MINIMUM			
MAXIMUM			
NOTE: 1. TO DELETE A PARAMETER PLACE THE WORD DELETE IN THE PARAMETER NUM. FIELD. 2. TO DELETE A COMMENT PLACE THE WORD DELETE IN THE COMMENT FIELD.			
NOTES: 1. MIN SCALE APPLIES TO NON-TIME PARAMETERS 2. MAX SCALE APPLIES TO NON-TIME PARAMETERS			
ENTER PH FOR PERMANENT MED			

NOTE

Remember for discrete values no scale needs to be specified, and for the analog values either the right or left scale could have been used. The plot rate was determined by dividing the plot duration time in minutes by three.

Practice

2. Fill out V40 menu (below) to reconfigure UP1820 with the data supplied.

Discrete

Y1: V45S0604E (right)
Y2: V45S0601E (right)

Floating Point

Y3: V43T9456A (left)
Y4: V43T9457A (left)

Time
M40H0107J

Min: 25
Max: 100

Plot Rate

20

V400

002/RT

TLM UNIVERSAL PLOT (CONTROL DATA) MENU

MSK 18_ ,

PLOT RATE _ ,

	Y1	Y2	Y3	Y4
COMMENTS	/ _____	/ _____	/ _____	/ _____
PARAMETER NUM.	/ _____	/ _____	/ _____	/ _____
SCALE POS.(L/R)	/ _ ,	/ _ ,	/ _ ,	/ _ ,

SCALE VALUES:

MAXIMUM
MINIMUM

Y LEFT

Y RIGHT

/ _____ , _____ ,
/ _____ , _____ ,

NOTE: 1. TO DELETE A PARAMETER
PLACE THE WORD DELETE
IN THE PARAMETER NUM.
FIELD.
2. TO DELETE A COMMENT
PLACE THE WORD DELETE
IN THE COMMENT FIELD.

CALCULATE (2/3)

INTERIM VALUES: _ ,

X SCALE INPUTS:

PARAMETER NUM. _____ ,

SCALE VALUES:

MINIMUM
MAXIMUM

NOTES:
_____, 1. MIN SCALE APPLIES TO NON-TIME PARAMETERS
_____, 2. MAX SCALE APPLIES TO NON-TIME PARAMETERS

ENTER PM FOR PERMANENT MED

Practice Feedback

2. Fill out V40 menu (below) to reconfigure UP1820 with the data supplied.

Discrete

Y1: V45S0604E (right)
Y2: V45S0601E (right)

Floating Point

Y3: V43T9456A (left)
Y4: V43T9457A (left)

Time

M40H0107J

Min: 25

Max: 100

Plot Rate

20

V400

002/RT

TLN UNIVERSAL PLOT (CONTROL DATA) MENU

MSK 1820 ,

PLOT RATE 20 ,

	Y1	Y2	Y3	Y4
COMMENTS	/	/	/	/
PARAMETER NUM.	/ <u>V45S0604E</u> ,	/ <u>V45S0601E</u> ,	/ <u>V43T9456A</u> ,	/ <u>V43T9457A</u> ,
SCALE POS.(L/R)	/ <u>R</u> ,	/ <u>R</u> ,	/ <u>L</u> ,	/ <u>L</u> ,

SCALE VALUES:	Y LEFT	Y RIGHT
MAXIMUM	/ <u>100</u> ,	/ ,
MINIMUM	/ <u>25</u> ,	/ ,

NOTE: 1. TO DELETE A PARAMETER
PLACE THE WORD DELETE
IN THE PARAMETER NUM.
FIELD.

CALCULATE (2/3)

INTERIM VALUES: - ,

2. TO DELETE A COMMENT
PLACE THE WORD DELETE
IN THE COMMENT FIELD.

X SCALE INPUTS:

PARAMETER NUM. M40H0107J ,

SCALE VALUES:

MINIMUM	/ ,	NOTES:
MAXIMUM	/ ,	1. MIN SCALE APPLIES TO NON-TIME PARAMETERS
		2. MAX SCALE APPLIES TO NON-TIME PARAMETERS

ENTER PH FOR PERMANENT MED

1. IDENTIFYING TELEMETRY MENU MED CODES
2. CHANGING OPERATIONAL LIMIT VALUES FOR INDIVIDUAL PARAMETERS
3. ENABLING, DISABLING, AND CHANGING CRITICAL LIMIT VALUES FOR INDIVIDUAL PARAMETERS
4. INHIBITING OFFSCALE HIGH/LOW LIMIT SENSING FOR INDIVIDUAL PARAMETERS
5. CHANGING HEXADECIMAL LIMITS
6. OVERRIDING TELEMETRY PARAMETER VALUES
7. DEFINING PARAMETERS ON A UNIVERSAL DIGITAL DISPLAY
8. DELETING PARAMETER(S) FROM, OR CLEARING, AN ENTIRE UNIVERSAL DIGITALS DISPLAY
9. RECONFIGURING UNIVERSAL PLOT
10. DELETING PARAMETER(S) FROM A UNIVERSAL PLOT
11. DRAWING REFERENCE LINE ON UNIVERSAL PLOT USING V41, TLM UNIVERSAL PLOT (NOMINAL DATA) MENU
12. DELETING/CHANGING A REFERENCE LINE ON UNIVERSAL PLOT
13. UNIVERSAL PLOT REFERENCE LINE AND CONTROL DATA INTERACTIONS
14. CHANGING SPECIAL COMPUTATION-CONSTANT ENGINEERING UNIT VALUES
15. CHANGING SPECIAL COMPUTATION TIME CONSTANTS
16. SELECTING MAJOR FUNCTION FOR DISPLAY 1350
17. CHANGING VARIABLE PARAMETER ID
18. USING MCC CALIBRATION DATA BOOK
19. CHANGING THE CALIBRATION CURVE
20. THRIFTS
21. SPECIAL AND SUPER THRIFT PRODUCT REQUEST
22. RECONFIGURATION OF THRIFTS

SEGMENT 10

DELETING PARAMETER(S) FROM A UNIVERSAL PLOT

OBJECTIVE:

Delete parameters from a Universal Plot display using the V40, TLM Universal Plot (Control Data) Menu.

SEGMENT INTRODUCTION:

As previously discussed, when reconfiguring universal plots, changing a parameter number will cause that parameter to be changed on the display. There may be occasions when you want to remove a parameter from a universal plot. Unlike some other menus, leaving a parameter number blank will not delete a parameter that was previously defined. This segment presents a procedure to delete parameters from a universal display.

FUNCTION OF MENU DATA FIELDS

DELETE

Entering DELETE in parameter NUM data field deletes all data defined for that parameter.

Entering DELETE in COMMENTS data field only deletes alphanumeric name.

All other data fields have been covered in a previous segment.

```

V400
002/RT      TLM UNIVERSAL PLOT (CONTROL DATA) MENU      MSK 1817

PLOT RATE 60_ ,
COMMENTS      / FC 2 AMPS_ , FW 3 AMPS_ , MID 2 AMPS_ , AFT 2 AMPS_ / ,
PARAMETER NUM. / U45C0201A , U76C3076A , DELETE_ , DELETE_ / ,
SCALE POS.(L/R) / L , R , R , R / ,

SCALE VALUES: Y LEFT      Y RIGHT
MAXIMUM      / 500_ , 240_ ,
MINIMUM      100_ , 0_ ,

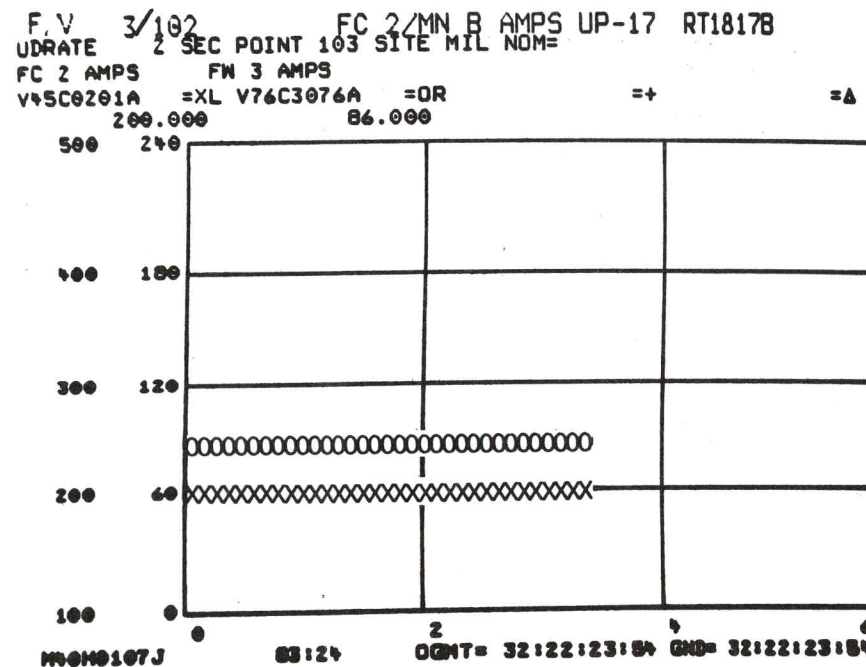
CALCULATE (2/3)
INTERIM VALUES: 3 ,

X SCALE INPUTS:
PARAMETER NUM. M40H01075 ,
SCALE VALUES:
MINIMUM      ,
MAXIMUM      ,

NOTES:
1.MIN SCALE APPLIES TO NON-TIME PARAMETERS
2.MAX SCALE APPLIES TO NON-TIME PARAMETERS

ENTER PM FOR PERMANENT MED

```



Deleting Parameters from Universal Plot Displays

ASSUMPTION

It is assumed that the universal plot has been reviewed to determine if parameter(s) need to be deleted.

PROCEDURE

1. Call a blank V40 menu from MOC or diskette.
- NOTE**
- You may use a blank menu or a data filled menu.
2. Verify/enter MSK number of universal plot display to be altered.
 3. Verify/enter plot rate.
 4. Enter DELETE in PARAMETER NUM. data field under Y parameter(s) to be deleted.

NOTE

When using a data filled menu any parameter(s) or data associated with parameters not being deleted will be displayed as transmitted.

5. Make hardcopy of universal plot display if desired.

NOTE

When a V40 menu is entered to change any plot data except the comments, the plot will stop, clear and display the new configuration. The new configuration must then be restarted.

6. Transmit to MOC.
7. Verify TLM universal plot on console CRT display.

NOTE

Written instructions can also be submitted using JSC Form 559, to computer TM to reconfigure universal plot.

Practice

1. You want to delete parameters V45T0320A and V45T0330A from the Universal Plot shown below. Fill out the V40 menu to delete these parameters.

V40#

002/RT TLM UNIVERSAL PLOT (CONTROL DATA) MENU MSK 18_ ,

PLOT RATE _ ,

Y1 Y2 Y3 Y4

COMMENTS / , , , , ,

PARAMETER NUM. / , , , , ,

SCALE POS.(L/R) / , , , , ,

SCALE VALUES: Y LEFT Y RIGHT

MAXIMUM / , , , ,

MINIMUM , , , , ,

CALCULATE (2/3)

INTERIM VALUES: _ ,

X SCALE INPUTS:

PARAMETER NUM. _ ,

SCALE VALUES:

MINIMUM _ ,

MAXIMUM _ ,

NOTES:

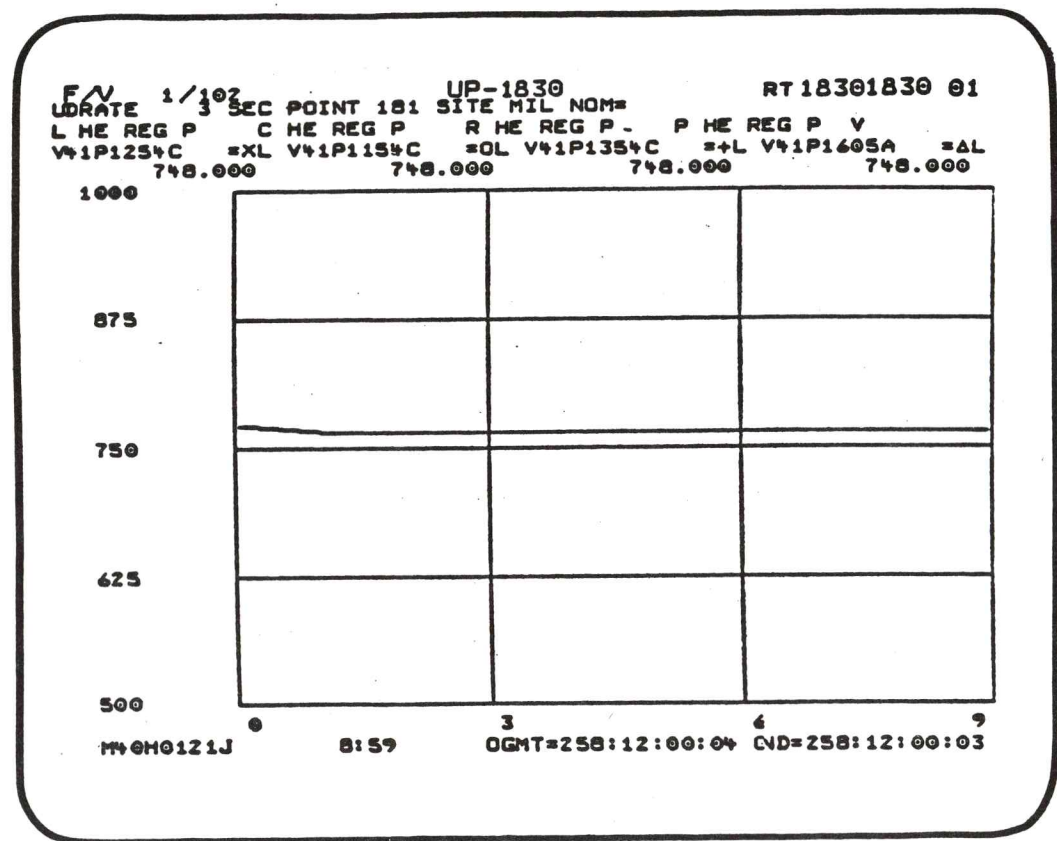
1.MIN SCALE APPLIES TO NON-TIME PARAMETERS

2.MAX SCALE APPLIES TO NON-TIME PARAMETERS

NOTE: 1.TO DELETE A PARAMETER
PLACE THE WORD DELETE
IN THE PARAMETER NUM.
FIELD.

2.TO DELETE A COMMENT
PLACE THE WORD DELETE
IN THE COMMENT FIELD.

ENTER PM FOR PERMANENT MED



Practice Feedback

1. You want to delete parameters V45T0320A and V45T0330A from the Universal Plot shown below. Fill out the V40 menu to delete these parameters.

V400

002/RT. TLN UNIVERSAL PLOT (CONTROL DATA) MENU MSK 1818

PLOT RATE 60

Y1

Y2

Y3

Y4

COMMENTS / / / /

PARAMETER NUM. / DELETE / DELETE / /

SCALE POS.(L/R) / / / /

SCALE VALUES: Y LEFT Y RIGHT

MAXIMUM / / /

MINIMUM / /

CALCULATE (2/3)

INTERIM VALUES:

X SCALE INPUTS:

PARAMETER NUM. /

SCALE VALUES:

MINIMUM /

MAXIMUM /

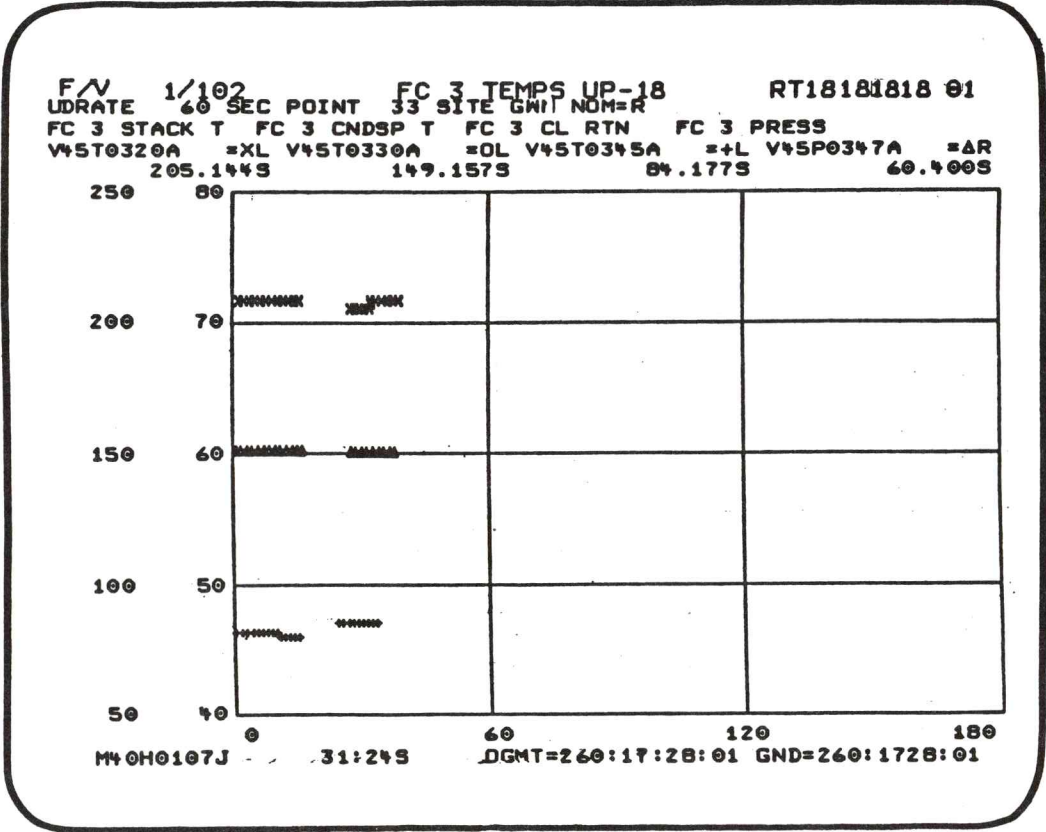
NOTES:

1.MIN SCALE APPLIES TO NON-TIME PARAMETERS

2.MAX SCALE APPLIES TO NON-TIME PARAMETERS

NOTE: 1.TO DELETE A PARAMETER
PLACE THE WORD DELETE
IN THE PARAMETER NUM.
FIELD.

2.TO DELETE A COMMENT
PLACE THE WORD DELETE
IN THE COMMENT FIELD.



Practice

2. You want to delete parameters V45T0320A and V45T0330A from the Universal Plot shown below. Alter the V40 menu to delete these parameters.

```

0408
002/RT          TLM UNIVERSAL PLOT (CONTROL DATA) MENU          MSK 1818 ,

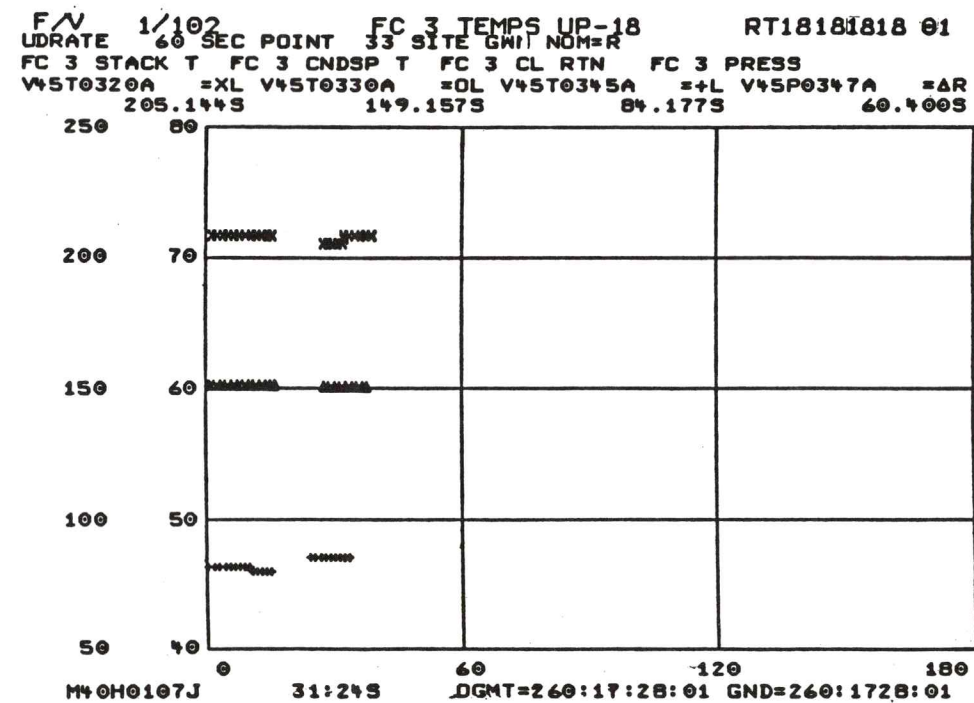
PLOT RATE 60__ ,

COMMENTS        / Y1          Y2          Y3          Y4
PARAMETER NUM.  / FC 3 STACK T , FC 3 CNDST T , FC 3 CL RTM , FC 3 PRESS / ,
SCALE POS.(L/R) / U45T0320A , U45T0330A , U45T0345A , U45P0347A / ,
                / L ,          L ,          L ,          R / ,

SCALE VALUES:  Y LEFT          Y RIGHT
MAXIMUM         / 250_____, 80_____, NOTE: 1.TO DELETE A PARAMETER
MINIMUM         50_____, 40_____, PLACE THE WORD DELETE
                                     IN THE PARAMETER NUM.
                                     FIELD.
CALCULATE (2/3)
INTERIM VALUES: 3 ,           2.TO DELETE A COMMENT
                                     PLACE THE WORD DELETE
                                     IN THE COMMENT FIELD.

X SCALE INPUTS:
PARAMETER NUM.   M40H0107J_- ,
SCALE VALUES:   NOTES:
MINIMUM          _____, 1.MIN SCALE APPLIES TO NON-TIME PARAMETERS
MAXIMUM          _____, 2.MAX SCALE APPLIES TO NON-TIME PARAMETERS

```



Practice Feedback

2. You want to delete parameters V45T0320A and V45T0330A from the Universal Plot shown below. Alter the V40 menu to delete these parameters.

V40#

002/RTTLM UNIVERSAL PLOT (CONTROL DATA) MENUMSK 1818

PLOT RATE 60

Y1

Y2

Y3

Y4

COMMENTS

/ FC 3 STACK T

/ FC 3 CNDSP T

/ FC 3 CL RTN

/ FC 3 PRESS

/

PARAMETER NUM.

/ DELETE

/ DELETE

/ V45T0345A

/ V45P0347A

/

SCALE POS.(L/R)

/ L

/ L

/ L

/ R

SCALE VALUES:

Y LEFT

Y RIGHT

MAXIMUM

/ 250

/ 80

NOTE: 1.TO DELETE A PARAMETER

MINIMUM

50

40

PLACE THE WORD DELETE

CALCULATE (2/3)

INTERIM VALUES:

3

IN THE PARAMETER NUM.

FIELD.

2.TO DELETE A COMMENT

PLACE THE WORD DELETE

IN THE COMMENT FIELD.

X SCALE INPUTS:

PARAMETER NUM.

M40H0107J

SCALE VALUES:

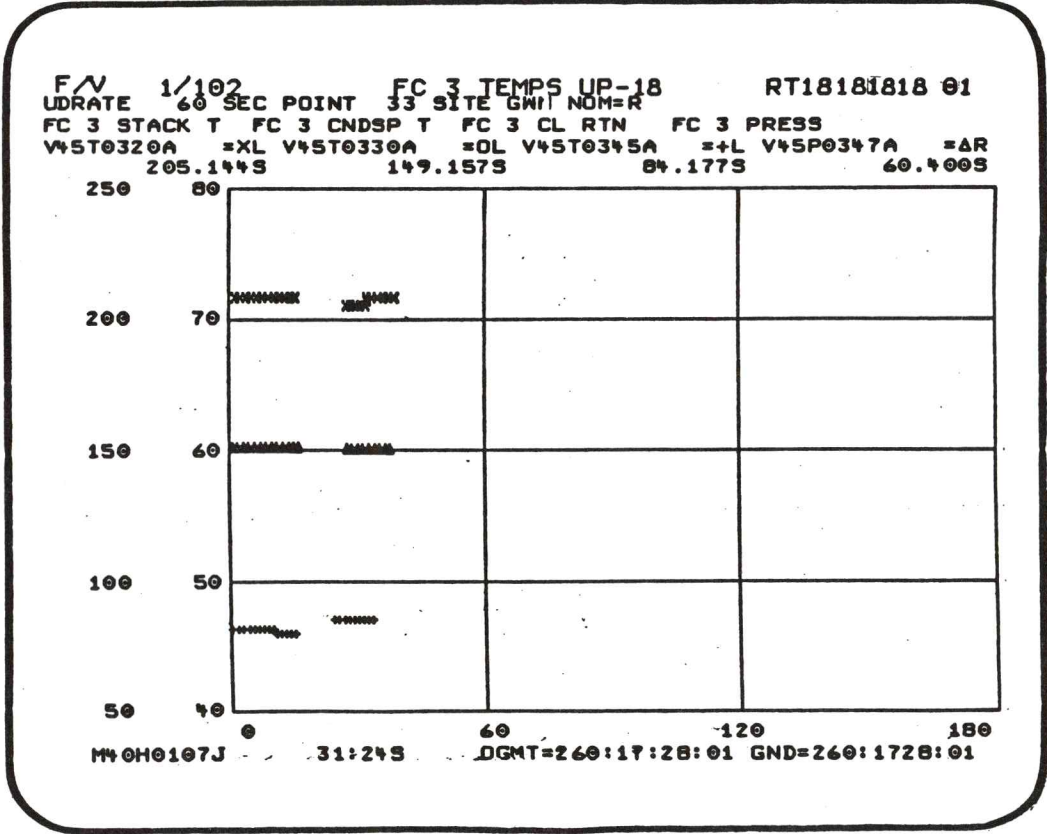
MINIMUM

MAXIMUM

NOTES:

1.MIN SCALE APPLIES TO NON-TIME PARAMETERS

2.MAX SCALE APPLIES TO NON-TIME PARAMETERS



1. IDENTIFYING TELEMETRY MENU MED CODES
2. CHANGING OPERATIONAL LIMIT VALUES FOR INDIVIDUAL PARAMETERS
3. ENABLING, DISABLING, AND CHANGING CRITICAL LIMIT VALUES FOR INDIVIDUAL PARAMETERS
4. INHIBITING OFFSCALE HIGH/LOW LIMIT SENSING FOR INDIVIDUAL PARAMETERS
5. CHANGING HEXADECIMAL LIMITS
6. OVERRIDING TELEMETRY PARAMETER VALUES
7. DEFINING PARAMETERS ON A UNIVERSAL DIGITAL DISPLAY
8. DELETING PARAMETER(S) FROM, OR CLEARING, AN ENTIRE UNIVERSAL DIGITALS DISPLAY
9. RECONFIGURING UNIVERSAL PLOT
10. DELETING PARAMETER(S) FROM A UNIVERSAL PLOT
11. DRAWING REFERENCE LINE ON UNIVERSAL PLOT USING V41, TLM UNIVERSAL PLOT (NOMINAL DATA) MENU
12. DELETING/CHANGING A REFERENCE LINE ON UNIVERSAL PLOT
13. UNIVERSAL PLOT REFERENCE LINE AND CONTROL DATA INTERACTIONS
14. CHANGING SPECIAL COMPUTATION-CONSTANT ENGINEERING UNIT VALUES
15. CHANGING SPECIAL COMPUTATION TIME CONSTANTS
16. SELECTING MAJOR FUNCTION FOR DISPLAY 1350
17. CHANGING VARIABLE PARAMETER ID
18. USING MCC CALIBRATION DATA BOOK
19. CHANGING THE CALIBRATION CURVE
20. THRIFTS
21. SPECIAL AND SUPER THRIFT PRODUCT REQUEST
22. RECONFIGURATION OF THRIFTS

SEGMENT 11

DRAWING REFERENCE LINE ON UNIVERSAL PLOT USING V41, TLM UNIVERSAL PLOT (NOMINAL DATA) MENU

OBJECTIVE:

You will draw a reference line on a Universal Plot display using both data point pairs and polynomial coefficients.

SEGMENT INTRODUCTION:

The V41, TLM Universal Plot (Nominal Data) Menu, is used to define a reference line on a Universal Plot display. This can be done by entering X and Y data point pairs or polynomial coefficients depicting the desired line. This segment discusses the procedure for defining a reference line on the UP using data point pairs.

PURPOSE

The drawing of a reference line/curve can aid you in reading a Universal Plot. The reference line/curve can be drawn to a maximum or minimum value for a parameter, a critical limit, other configuration.

FUNCTION OF MENU DATA FIELDS

MSK 18

These two digits, from 01 to 50 inclusive, specify the DTE DISPLAY on which the reference line is to be plotted.

SCALE (L/R/D/C)

This one character data field is used to specify whether a reference line is to be added, changed or deleted.

- L = Plot the reference line against the Y LEFT scale defined on the universal plot.
- R = Plot the reference line against the Y RIGHT scale defined on the universal plot.

DATA POINT PAIRS

These thirty data fields are used to specify the coordinates or points defining the reference line. Each field can have 1 to 15 digits floating point including both sign and decimal.

If the SCALE field contains an L or R the data points must be paired, with a minimum of two pairs.

COEFFICIENTS

These six data fields are used to specify the coefficient of a polynomial equation defining the reference line.

REFERENCE LINE CHARACTERISTICS

A Universal Plot can have only one reference line/curve. This unbroken line may start and end at any point on the plot. This line may be referenced to either Y scale. The illusion of multiple lines can be achieved by concealing portions of the reference line behind grid lines or itself.

Drawing Reference Line on Universal Plot

PROCEDURE

1. Call blank V41, menu from MOC or diskette.
2. Enter desired MSK number.
3. Enter L or R as desired.
4. Enter DATA POINT PAIRS or COEFFICIENTS.
5. Make hard copy of Universal Plot display if desired.
6. Transmit to MOC.
7. Verify reference line drawn on applicable Universal Plot.

NOTE

Data is entered from left to right. Use of data point pairs and coefficients are mutually exclusive. If both are input only the point pairs will be used.

NOTE

Submit data to computer TM on JSC Form 559 (segment 9) to draw a nominal line on a universal plot.

NOTE

When a V41 menu is entered the plot will stop, clear and display the new reference line. The Universal Plot must then be restarted.

V41

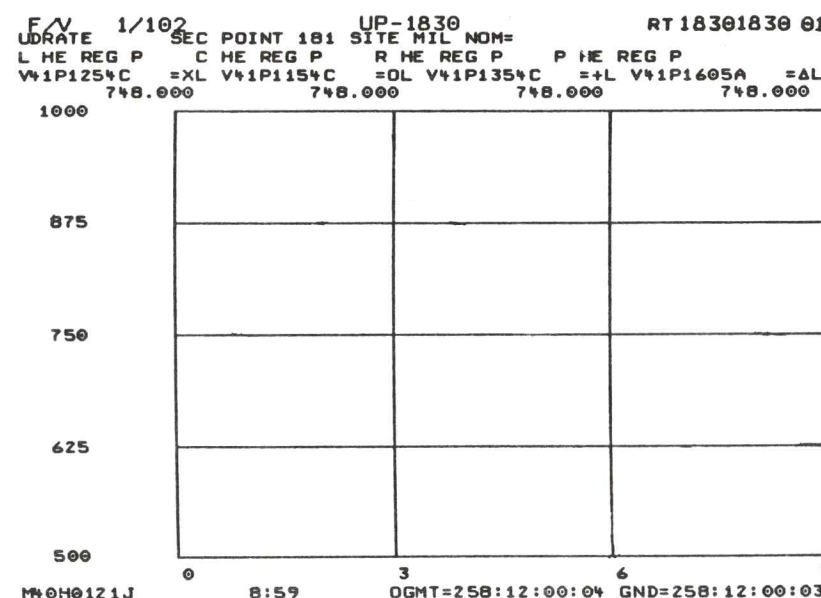
002/RT TLM UNIVERSAL PLOT(NOMINAL DATA) MENU MSK 1830

SCALE (L/R/D/C) L, L/R = ADD NOMINALS; D = DEL NOMINALS; C = CHG NOMINALS
NOTE: IF X PARAMETER IS A TIME; INPUT X POINTS IN MINUTES

DATA POINT PAIRS			
NO	X VALUE	Y VALUE	
01	1	750	
03	3	950	
05	5	750	
07	7	600	
09	9	600	
11			
13			
15			

OR: UP TO 6 COEFFICIENTS FOR A 1ST TO 5TH DEGREE POLYNOMIAL.

COEFFICIENT A(0) / COEFFICIENT A(1) /
COEFFICIENT A(2) / COEFFICIENT A(3) /
COEFFICIENT A(4) / COEFFICIENT A(5) /



Supporting Data

In the X and Y point pairs and coefficients, if you are using a whole number, a decimal point is not needed. Only negative signs need be indicated.

Practice

Given the following UP display, fill out the V41 MED menu below to draw a nominal line depicted by the given data point pairs for MSK 1828. Use the left scale.

	<u>X</u>	<u>Y</u>
(1)	0	2000
(2)	38.57	2160.7
(3)	77.14	2321.43
(4)	115.71	2492.88
(5)	154.28	2642.86
(6)	192.85	2739.86
(7)	231.42	2750.00
(8)	270	2669.64
(9)	308.57	2589.28
(10)	347.14	2455.36

V41#

002/RT

TLN UNIVERSAL PLOT(NOMINAL DATA) MENU

MSK 18_ ,

SCALE (L/R/D/C) _ , L/R = ADD NOMINALS; D =DEL NOMINALS; C = CHG NOMINALS
NOTE: IF X PARAMETER IS A TIME; INPUT X POINTS IN MINUTES

DATA POINT PAIRS					
NO	X VALUE	Y VALUE	NO	X VALUE	Y VALUE
01 /	_____	_____	02	_____	_____
03	_____	_____	04	_____	_____
05	_____	_____	06	_____	_____
07	_____	_____	08	_____	_____
09	_____	_____	10	_____	_____
11	_____	_____	12	_____	_____
13	_____	_____	14	_____	_____
15	_____	_____	/		

OR: UP TO 6 COEFFICIENTS FOR A 1ST TO 5TH DEGREE POLYNOMIAL.

COEFFICIENT A(0) / _____ , COEFFICIENT A(1) _____ ,
COEFFICIENT A(2) _____ , COEFFICIENT A(3) _____ ,
COEFFICIENT A(4) _____ , COEFFICIENT A(5) _____ / \$

ENTER PM FOR PERMANENT MED

Practice Feedback

Given the following UP display, fill out the V41 MED menu below to draw a nominal line depicted by the given data point pairs for MSK 1828. Use the left scale.

	<u>X</u>	<u>Y</u>
(1)	0	2000
(2)	38.57	2160.7
(3)	77.14	2321.43
(4)	115.71	2492.88
(5)	154.28	2642.86
(6)	192.85	2739.86
(7)	231.42	2750.00
(8)	270	2669.64
(9)	308.57	2589.28
(10)	347.14	2455.36

V41#

002/RT

TLM UNIVERSAL PLOT(NOMINAL DATA) MENU

MSK 1828,

SCALE (L/R/D/C) L, L/R = ADD NOMINALS; D = DEL NOMINALS; C = CHG NOMINALS
NOTE: IF X PARAMETER IS A TIME; INPUT X POINTS IN MINUTES

DATA POINT PAIRS					
NO	X VALUE	Y VALUE	NO	X VALUE	Y VALUE
01	0	2000	02	38.57	2160.7
03	77.14	2321.43	04	115.71	2492.88
05	154.28	2642.86	06	192.85	2739.86
07	231.42	2750.00	08	270	2669.64
09	308.57	2589.28	10	347.14	2455.36
11			12		
13			14		
15					

OR: UP TO 6 COEFFICIENTS FOR A 1ST TO 5TH DEGREE POLYNOMIAL.

COEFFICIENT A(0) / _____, COEFFICIENT A(1) _____,
COEFFICIENT A(2) _____, COEFFICIENT A(3) _____,
COEFFICIENT A(4) _____, COEFFICIENT A(5) _____ / \$

ENTER PM FOR PERMANENT MED

1. IDENTIFYING TELEMETRY MENU MED CODES
2. CHANGING OPERATIONAL LIMIT VALUES FOR INDIVIDUAL PARAMETERS
3. ENABLING, DISABLING, AND CHANGING CRITICAL LIMIT VALUES FOR INDIVIDUAL PARAMETERS
4. INHIBITING OFFSCALE HIGH/LOW LIMIT SENSING FOR INDIVIDUAL PARAMETERS
5. CHANGING HEXADECIMAL LIMITS
6. OVERRIDING TELEMETRY PARAMETER VALUES
7. DEFINING PARAMETERS ON A UNIVERSAL DIGITAL DISPLAY
8. DELETING PARAMETER(S) FROM, OR CLEARING, AN ENTIRE UNIVERSAL DIGITALS DISPLAY
9. RECONFIGURING UNIVERSAL PLOT
10. DELETING PARAMETER(S) FROM A UNIVERSAL PLOT
11. DRAWING REFERENCE LINE ON UNIVERSAL PLOT USING V41, TLM UNIVERSAL PLOT (NOMINAL DATA) MENU
12. DELETING/CHANGING A REFERENCE LINE ON UNIVERSAL PLOT
13. UNIVERSAL PLOT REFERENCE LINE AND CONTROL DATA INTERACTIONS
14. CHANGING SPECIAL COMPUTATION-CONSTANT ENGINEERING UNIT VALUES
15. CHANGING SPECIAL COMPUTATION TIME CONSTANTS
16. SELECTING MAJOR FUNCTION FOR DISPLAY 1350
17. CHANGING VARIABLE PARAMETER ID
18. USING MCC CALIBRATION DATA BOOK
19. CHANGING THE CALIBRATION CURVE
20. THRIFTS
21. SPECIAL AND SUPER THRIFT PRODUCT REQUEST
22. RECONFIGURATION OF THRIFTS

SEGMENT 12

DELETING/CHANGING A REFERENCE LINE ON UNIVERSAL PLOT

OBJECTIVE:

Delete or change a nominal line on a UP display using V41, TLM universal plot (nominal data) menu.

SEGMENT INTRODUCTION:

Previous segments discussed procedure for defining a nominal line on a UP display using data point pairs and polynomial coefficients. This segment presents procedures for changing a previously defined nominal line using data point pairs or polynomial coefficients and the procedure for deleting the nominal line entirely.

Learning Statement

FUNCTION OF
MENU DATA FIELDS

SCALE (L/R/D/C)

This one character data field is used to specify whether a reference line is to be added, changed or deleted.

- D = Delete the existing reference line.
- C = Change the existing reference line data point(s) or coefficient(s) as specified.

All other data fields have been covered in a previous segment.

Delete/Change Nominal
Line On UP Display

PROCEDURE

DELETE NOMINAL LINE

1. Call a blank V41 menu from MOC or diskette.

NOTE

Delete can be performed using defined/undefined menu.

2. Enter/verify MSK number of universal plot display to be altered.

3. Enter D in SCALE data field.

4. Make hard copy of present display on console CRT.

NOTE

Any change/deletion transmitted to MOC will reinitialize display.

5. Transmit to MOC.

6. Verify nominal line deleted from universal plot.

U41 ←

002/RT TLM UNIVERSAL PLOT(NOMINAL DATA) MENU MSK 1828

SCALE (L/R/D/C) D ; L/R = ADD NOMINALS; D =DEL NOMINALS; C = CHG NOMINALS
NOTE: IF X PARAMETER IS A TIME; INPUT X POINTS IN MINUTES

DATA POINT PAIRS					
NO.	X VALUE	Y VALUE	NO	X VALUE	Y VALUE
01	0	2000	02	38.57	2160.71
03	77.14	2321.43	04	115.71	2492.88
05	154.28	2642.86	06	192.85	2739.28
07	231.42	2750	08	370	2669.64
09	308.57	2589.28	10	347.14	2455.36
11	424.28	2241	12		
13			14		
15					

OR: UP TO 6 COEFFICIENTS FOR A 1ST TO 5TH DEGREE POLYNOMIAL.
COEFFICIENT A(0) / , COEFFICIENT A(1) ,
COEFFICIENT A(2) , COEFFICIENT A(3) ,
COEFFICIENT A(4) , COEFFICIENT A(5) / \$

ENTER PM FOR PERMANENT MED

Learning Statement

FUNCTION OF MENU DATA FIELDS

All other data fields have been covered in a previous segment.

Delete/Change Nominal Line On UP Display

PROCEDURE

CHANGE NOMINAL LINE

1. Call a blank V41 menu from MOC or diskette.

NOTE

Change can be performed using defined/undefined menu.

2. Enter/verify MSK number of Universal Plot display to be altered.
3. Enter C in SCALE data field.
4. Enter data point pairs or polynomial coefficients to be changed.

NOTE

Data point pairs or polynomial coefficients cannot be entered on same menu.

5. Make hard copy of present display on console CRT.

NOTE

Any change/deletion transmitted to MOC will reinitialize display.

6. Transmit to MOC.

7. Verify nominal line changed from universal plot.

V411
002/RT TLM UNIVERSAL PLOT(NOMINAL DATA) MENU MSK 1828
SCALE (L/R/D/C) C, L/R = ADD NOMINALS; D = DEL NOMINALS; C = CHG NOMINALS
NOTE: IF X PARAMETER IS A TIME; INPUT X POINTS IN MINUTES

DATA POINT PAIRS					
NO	X VALUE	Y VALUE	NO	X VALUE	Y VALUE
01	/		02		
03			04		
05	164.80	2581.02	06		
07			08		
09			10	330.14	2351.79
11			12		
13			14		
15					

OR: UP TO 6 COEFFICIENTS FOR A 1ST TO 5TH DEGREE POLYNOMIAL.
COEFFICIENT A(0) / , COEFFICIENT A(1) ,
COEFFICIENT A(2) , COEFFICIENT A(3) ,
COEFFICIENT A(4) , COEFFICIENT A(5) / \$

ENTER PM FOR PERMANENT MED

Practice

Fill out the V41 menu below to change the following data point pairs on UP MSK 1830.

Change numbers 3 and 4 to:

Number	X	Y
3	140.12	1253.75
4	160.8	1149.25

V41#

002/RT TLM UNIVERSAL PLOT(NOMINAL DATA) MENU MSK 18__ ,

SCALE (L/R/D/C) _ , L/R = ADD NOMINALS; D =DEL NOMINALS; C = CHG NOMINALS
 NOTE: IF X PARAMETER IS A TIME; INPUT X POINTS IN MINUTES

DATA POINT PAIRS					
NO	X VALUE	Y VALUE	NO	X VALUE	Y VALUE
01	_____	_____	02	_____	_____
03	_____	_____	04	_____	_____
05	_____	_____	06	_____	_____
07	_____	_____	08	_____	_____
09	_____	_____	10	_____	_____
11	_____	_____	12	_____	_____
13	_____	_____	14	_____	_____
15	_____	_____	/		

OR: UP TO 6 COEFFICIENTS FOR A 1ST TO 5TH DEGREE POLYNOMIAL.

COEFFICIENT A(0) / _____	COEFFICIENT A(1) _____
COEFFICIENT A(2) _____	COEFFICIENT A(3) _____
COEFFICIENT A(4) _____	COEFFICIENT A(5) _____ / \$

_____ ENTER PM FOR PERMANENT MED

Practice Feedback

Fill out the V41 menu below to change the following data point pairs on UP MSK 1830.

Change numbers 3 and 4 to:

Number	X	Y
3	140.12	1253.75
4	160.8	1149.25

V41#

002/RT TLM UNIVERSAL PLOT(NOMINAL DATA) MENU MSK 1830 ,

SCALE (L/R/D/C)C, L/R = ADD NOMINALS; D =DEL NOMINALS; C = CHG NOMINALS
NOTE: IF X PARAMETER IS A TIME; INPUT X POINTS IN MINUTES

DATA POINT PAIRS					
NO	X VALUE	Y VALUE	NO	X VALUE	Y VALUE
01 /			02		
03	140.12	1253.75	04	160.8	1149.25
05			06		
07			08		
09			10		
11			12		
13			14		
15					

OR: UP TO 6 COEFFICIENTS FOR A 1ST TO 5TH DEGREE POLYNOMIAL.

COEFFICIENT A(0) /		COEFFICIENT A(1)	
COEFFICIENT A(2)		COEFFICIENT A(3)	
COEFFICIENT A(4)		COEFFICIENT A(5)	/ \$

ENTER PM FOR PERMANENT MED

Practice

You want to delete the nominal line on MSK 1827 UP display. Fill out the V41 menu below to do this.

V41#

002/RT

TLN UNIVERSAL PLOT(NOMINAL DATA) MENU

MSK 18__ ,

SCALE (L/R/D/C) _ , L/R = ADD NOMINALS; D = DEL NOMINALS; C = CHG NOMINALS
NOTE: IF X PARAMETER IS A TIME; INPUT X POINTS IN MINUTES

DATA POINT PAIRS					
NO	X VALUE	Y VALUE	NO	X VALUE	Y VALUE
01 /	_____	_____	02	_____	_____
03	_____	_____	04	_____	_____
05	_____	_____	06	_____	_____
07	_____	_____	08	_____	_____
09	_____	_____	10	_____	_____
11	_____	_____	12	_____	_____
13	_____	_____	14	_____	_____
15	_____	_____	/		

OR: UP TO 6 COEFFICIENTS FOR A 1ST TO 5TH DEGREE POLYNOMIAL.

COEFFICIENT A(0) /	_____	COEFFICIENT A(1)	_____
COEFFICIENT A(2)	_____	COEFFICIENT A(3)	_____
COEFFICIENT A(4)	_____	COEFFICIENT A(5)	_____ / \$

ENTER PM FOR PERMANENT MED

Practice Feedback

You want to delete the nominal line on MSK 1827 UP display. Fill out the V41 menu below to do this.

V41#

002/RT

TLN UNIVERSAL PLOT(NOMINAL DATA) MENU

MSK 1827,

SCALE (L/R/D/C) D; L/R = ADD NOMINALS; D = DEL NOMINALS; C = CHG NOMINALS
NOTE: IF X PARAMETER IS A TIME; INPUT X POINTS IN MINUTES

DATA POINT PAIRS					
NO	X VALUE	Y VALUE	NO	X VALUE	Y VALUE
01	/		02		
03			04		
05			06		
07			08		
09			10		
11			12		
13			14		
15					

OR: UP TO 6 COEFFICIENTS FOR A 1ST TO 5TH DEGREE POLYNOMIAL.

COEFFICIENT A(0) / _____ , COEFFICIENT A(1) _____ ,
COEFFICIENT A(2) _____ , COEFFICIENT A(3) _____ ,
COEFFICIENT A(4) _____ , COEFFICIENT A(5) _____ / \$

ENTER PM FOR PERMANENT MED

1. IDENTIFYING TELEMETRY MENU MED CODES
2. CHANGING OPERATIONAL LIMIT VALUES FOR INDIVIDUAL PARAMETERS
3. ENABLING, DISABLING, AND CHANGING CRITICAL LIMIT VALUES FOR INDIVIDUAL PARAMETERS
4. INHIBITING OFFSCALE HIGH/LOW LIMIT SENSING FOR INDIVIDUAL PARAMETERS
5. CHANGING HEXADECIMAL LIMITS
6. OVERRIDING TELEMETRY PARAMETER VALUES
7. DEFINING PARAMETERS ON A UNIVERSAL DIGITAL DISPLAY
8. DELETING PARAMETER(S) FROM, OR CLEARING, AN ENTIRE UNIVERSAL DIGITALS DISPLAY
9. RECONFIGURING UNIVERSAL PLOT
10. DELETING PARAMETER(S) FROM A UNIVERSAL PLOT
11. DRAWING REFERENCE LINE ON UNIVERSAL PLOT USING V41, TLM UNIVERSAL PLOT (NOMINAL DATA) MENU
12. DELETING/CHANGING A REFERENCE LINE ON UNIVERSAL PLOT
13. UNIVERSAL PLOT REFERENCE LINE AND CONTROL DATA INTERACTIONS
14. CHANGING SPECIAL COMPUTATION-CONSTANT ENGINEERING UNIT VALUES
15. CHANGING SPECIAL COMPUTATION TIME CONSTANTS
16. SELECTING MAJOR FUNCTION FOR DISPLAY 1350
17. CHANGING VARIABLE PARAMETER ID
18. USING MCC CALIBRATION DATA BOOK
19. CHANGING THE CALIBRATION CURVE
20. THRIFTS
21. SPECIAL AND SUPER THRIFT PRODUCT REQUEST
22. RECONFIGURATION OF THRIFTS

SEGMENT 13

UNIVERSAL PLOT REFERENCE LINE AND CONTROL DATA INTERACTIONS

OBJECTIVE:

State the effects to the nominal line when a change has been made to the X and Y scale, (on a universal plot) and make corrections as necessary.

SEGMENT INTRODUCTION:

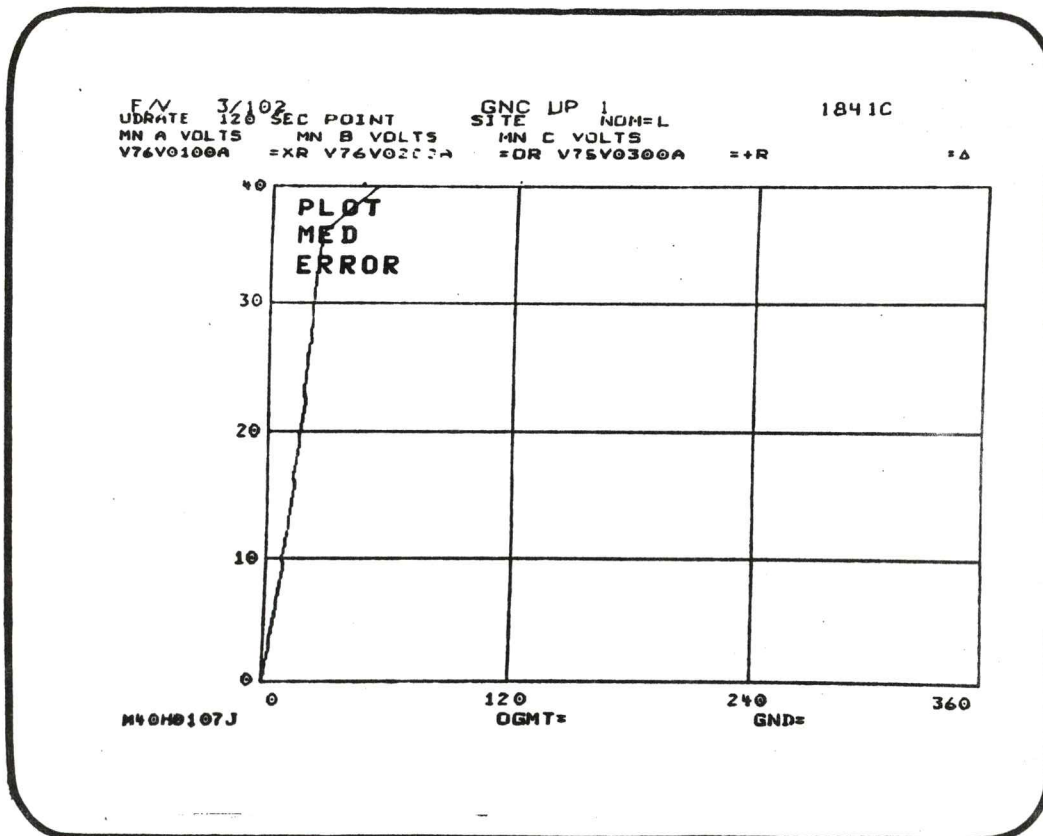
The previous four segments covered inputting data to configure the universal plot, using both the V40 and V41 menus. This segment covers the interactions of the two menus and corrections necessary to be taken to clear problems arising from the inputs.

Effects of Up Control Data Changes on Defined Reference Lines

DESCRIPTION OF V40 MENU INPUT	EFFECT ON REFERENCE LINE	CORRECTIVE ACTION	
		USING V40 MENU	USING V41 MENU
1. Deleting a Y scale against which the nominal line is plotted	Reference line deleted. Display of UP will indicate PLOT MED ERROR. UP cannot be restarted until corrective action has been taken.	Enter new Y scale values with parameter.	Delete reference line. Change scale reference. NOTE Reference line redefining may be necessary.
2. Changing plot rate when the X parameter is time.	If the rate is increased, the reference line will decrease in length. If the rate is decreased, the reference line will increase in length.	Change plot rate back to original value.	Redefine reference line.
3. Changing the Y scale.	Depends on reference line and magnitude of changes made to the Y scale.	Redefine scale as appropriate.	Redefine reference line.
4. Changing the X scale when the X parameter is a floating point parameter.	Change to reference line. Depends on reference line and magnitude of changes made to the X scale.	Redefine scale as appropriate.	Redefine reference line.

Supporting Data

You may recall from the previous segments that the nominal line on the universal plot is input using the V41 menu. The scale selected on the V41 menu is the Y scale input by the V40 menu. If the Y scale input by V40 is deleted, a MED PLOT ERROR, as shown below, will be displayed.

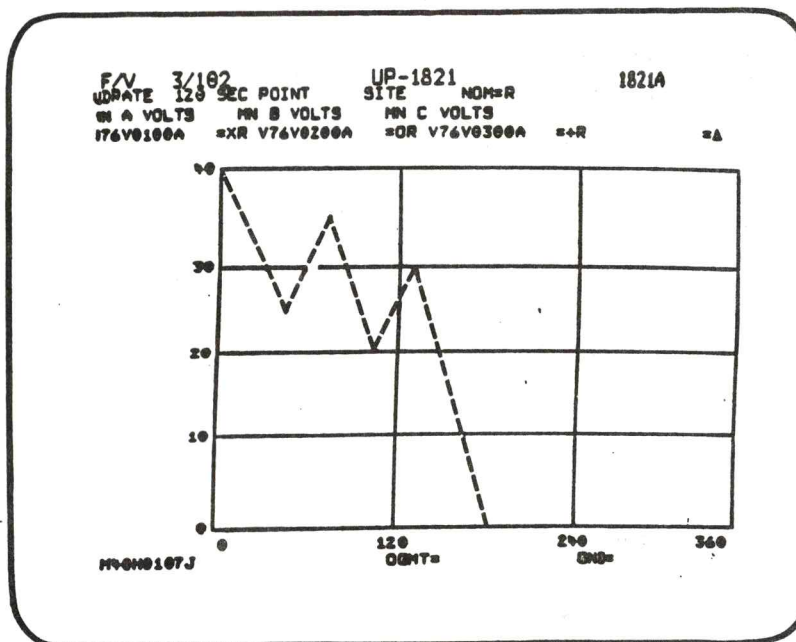
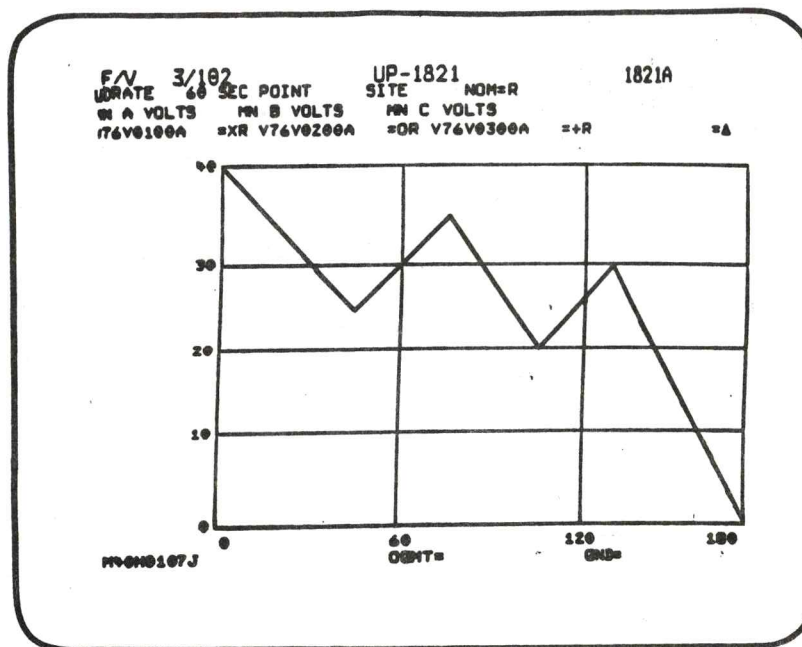


The UP cannot be started or cleared by the SMEK. The scale selected on the V41 menu must be changed or another Y scale must be input on the V40.

If the X or Y scale, or the plot rate input by the V40 menu is changed, the UP nominal line will be distorted. The distortion can be corrected by revising and inputting a new V41 menu.

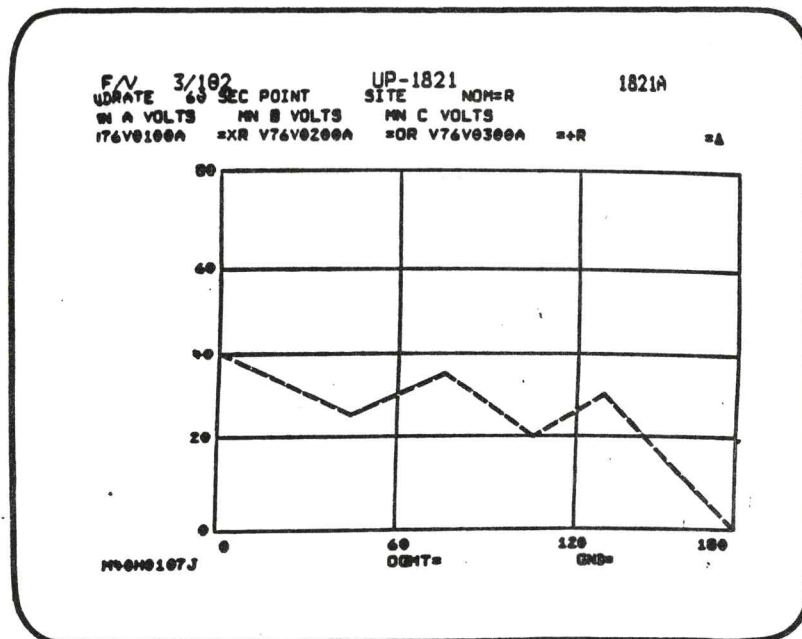
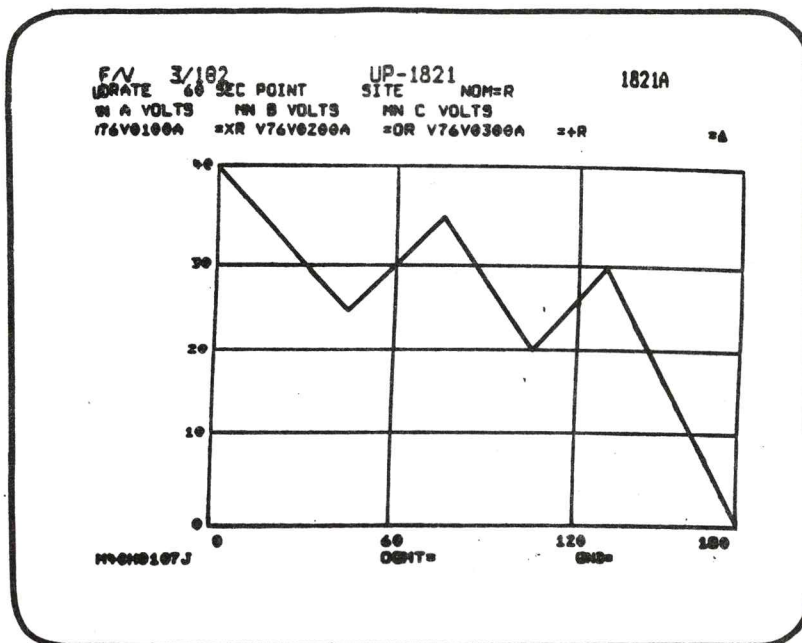
Supporting Data

The display shown below illustrates the effect on the reference line when the plot rate is doubled. The solid line represents the reference line before the plot rate is changed. The broken line represents the reference line after a doubled plot rate has been entered on menu V40.



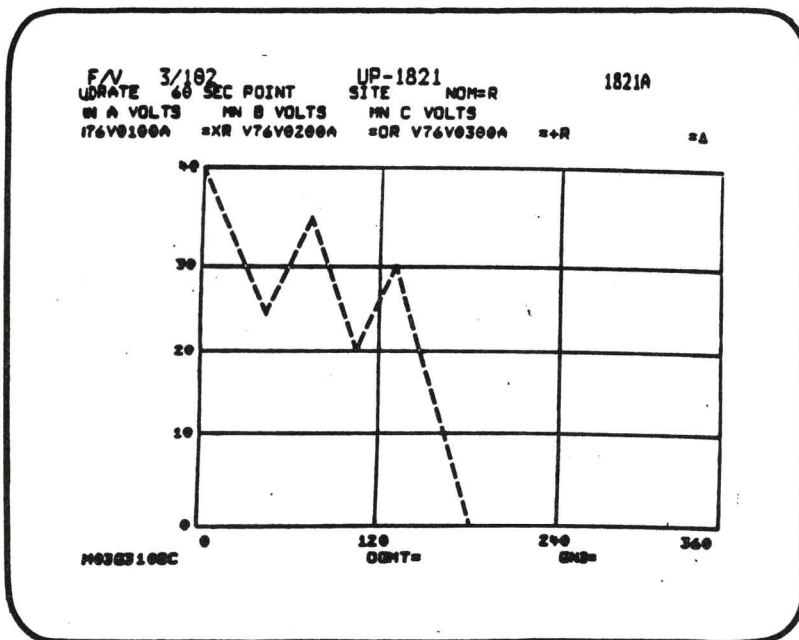
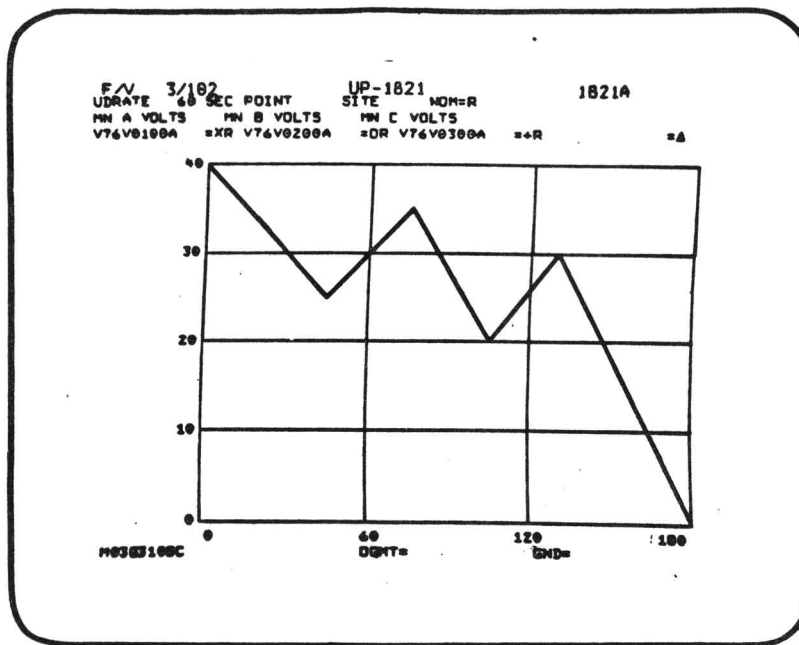
Supporting Data

The display shown below illustrates the effect on the reference line when the Y scale has doubled. The solid line represents the reference line before the Y scale is changed. The broken line represents the reference line after the range of the Y scale has been doubled.



Supporting Data

The display shown below illustrates the effect on the reference line when the X scale has been doubled. The solid line represents the reference line before the X scale has been changed. The broken line represents the reference line after the doubled X scale has been entered on the V40 menu.



Practice

ITEM 1

Use the V40 and MSK 1841 shown below to answer the following questions.

- QUESTIONS:
- 1. Can plot be initiated?
 - 2. State the three ways to correct the above situation.

- ANSWERS:
- 1.
 - 2.

V40

003/RT

TLN UNIVERSAL PLOT (CONTROL DATA) MENU

MSK 1841

PLOT RATE 120

Y1

Y2

Y3

Y4

COMMENTS

/ MN A VOLTS

, MN B VOLTS

, MN C VOLTS

, MID MN A AMP /

PARAMETER NUM.

/ V76V0100A

, V76V0200A

, V76V0300A

, DELETE85A /

SCALE POS.(L/R)

/ R

, R

, R

, L /

SCALE VALUES:

Y LEFT

Y RIGHT

MAXIMUM

/ 100

, 40

, NOTE: 1.TO DELETE A PARAMETER

MINIMUM

0

, 0

, PLACE THE WORD DELETE

CALCULATE (2/3)

INTERIM VALUES:

3

2.TO DELETE A COMMENT

X SCALE INPUTS:

PARAMETER NUM.

M40H0107J

NOTES:

SCALE VALUES:

MINIMUM

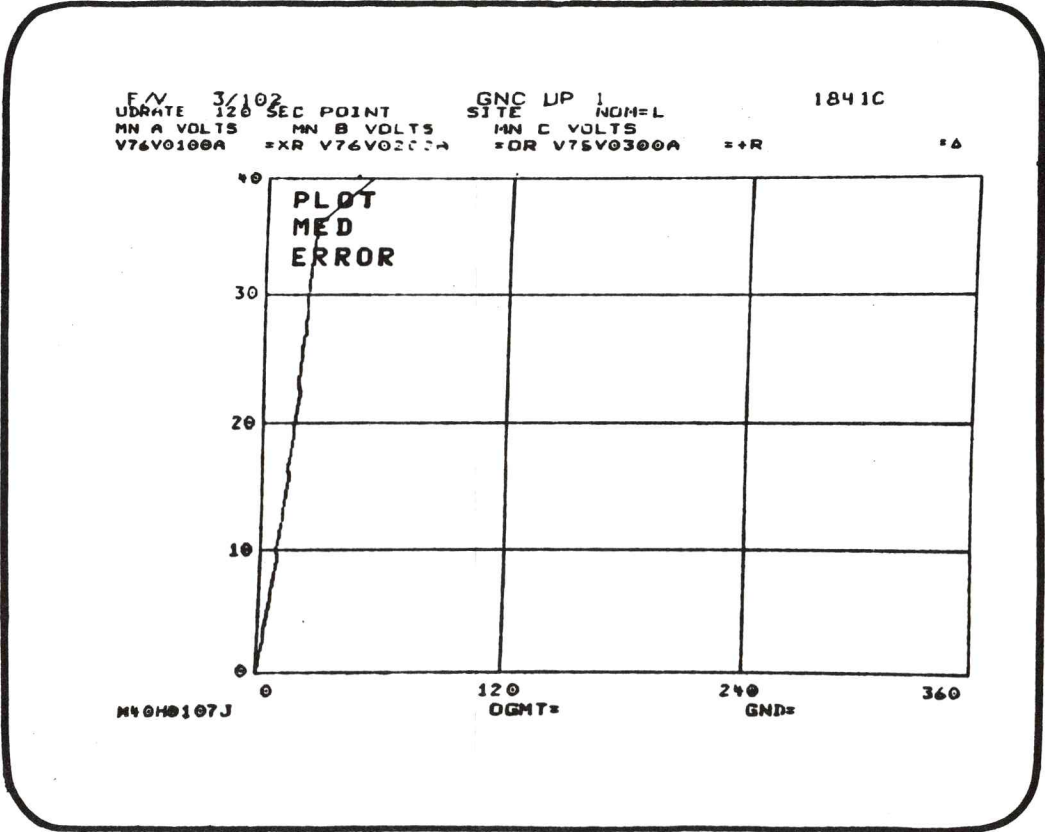
MAXIMUM

1.MIN SCALE APPLIES TO NON-TIME PARAMETERS

2.MAX SCALE APPLIES TO NON-TIME PARAMETERS

V40 (TNMCPMED)MSK NO. 1841

NOMINAL SCALE DOES NOT MATCH Y LEFT/RIGHT



Practice Feedback

ITEM 1

Use the V40 and MSK 1841 shown below to answer the following questions.

- QUESTIONS:
1. Can plot be initiated?
 2. State the three ways to correct the above situation.

- ANSWERS:
1. No, the plot will not start until error situation is corrected.
 2. Three ways to correct situation:
 - a. Delete the reference line using V41 menu.
 - b. Change the scale reference using V41 menu.
 - c. Enter a new parameter and assign it to the Y right/left scale.

V40#

003/RT TLN UNIVERSAL PLOT (CONTROL DATA) MENU MSK 1841 ,

PLOT RATE 120 ,

	Y1	Y2	Y3	Y4
COMMENTS	/ MN A VOLTS	/ MN B VOLTS	/ MN C VOLTS	/ MID MN A AMP /
PARAMETER NUM.	/ U76V0100A	/ U76V0200A	/ U76V0300A	/ DELETE85A /
SCALE POS.(L/R)	/ R	/ R	/ R	/ L /

SCALE VALUES: Y LEFT Y RIGHT

MAXIMUM / 100 , 40 ,

MINIMUM 0 , 0 ,

NOTE: 1. TO DELETE A PARAMETER PLACE THE WORD DELETE IN THE PARAMETER NUM. FIELD.

2. TO DELETE A COMMENT PLACE THE WORD DELETE IN THE COMMENT FIELD.

CALCULATE (2/3)

INTERIM VALUES: 3 ,

X SCALE INPUTS:

PARAMETER NUM. M40H0107J ,

SCALE VALUES:

MINIMUM ,

MAXIMUM ,

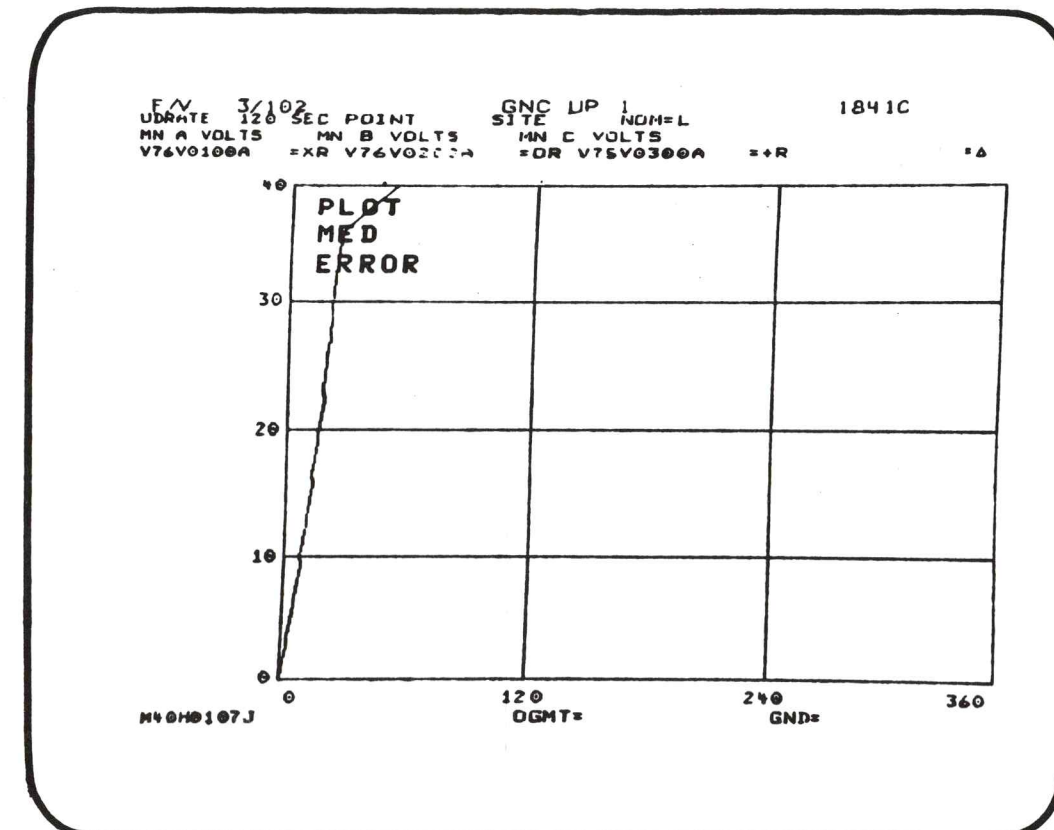
NOTES:

1. MIN SCALE APPLIES TO NON-TIME PARAMETERS

2. MAX SCALE APPLIES TO NON-TIME PARAMETERS

V40 (TMNCPMED)MSK NO. 1841

NOMINAL SCALE DOES NOT MATCH Y LEFT/RIGHT

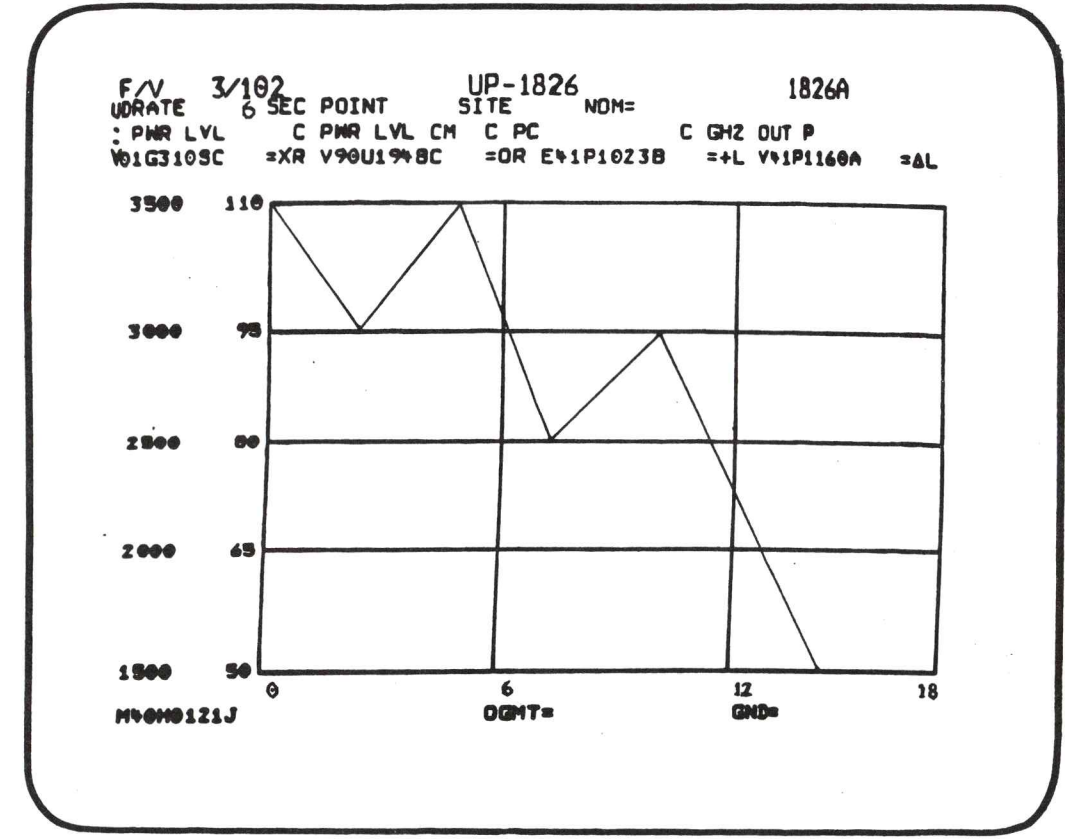
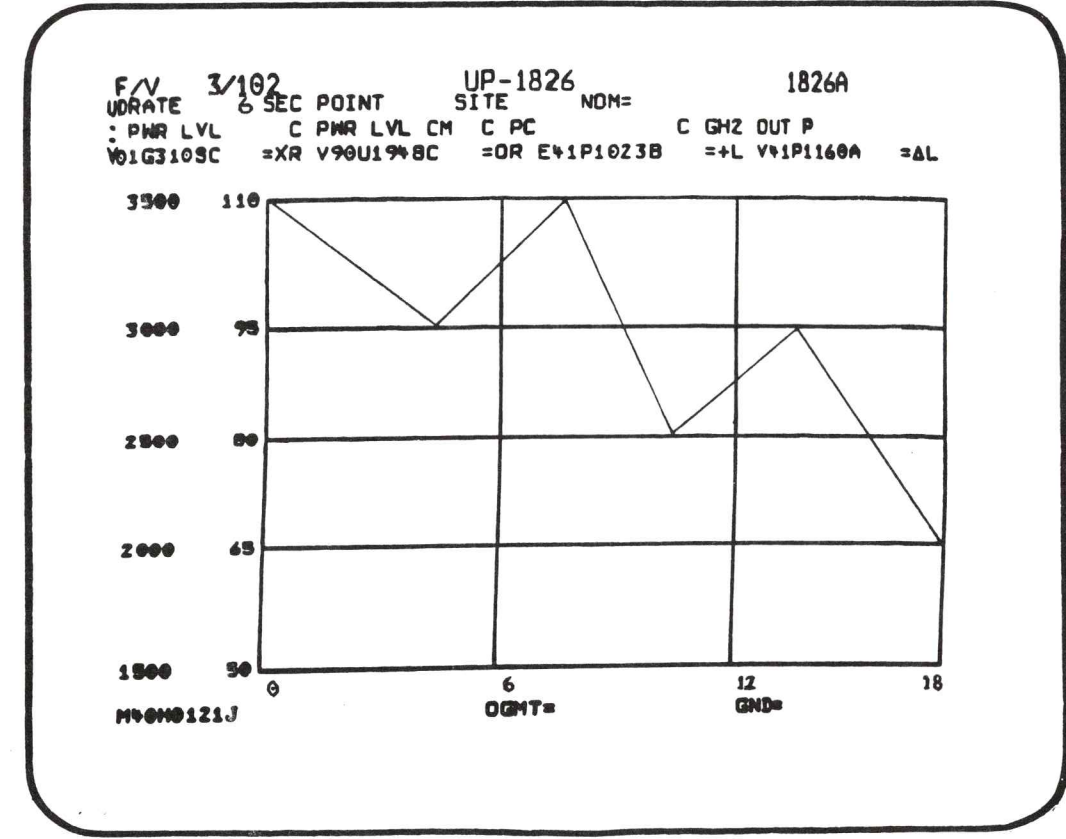
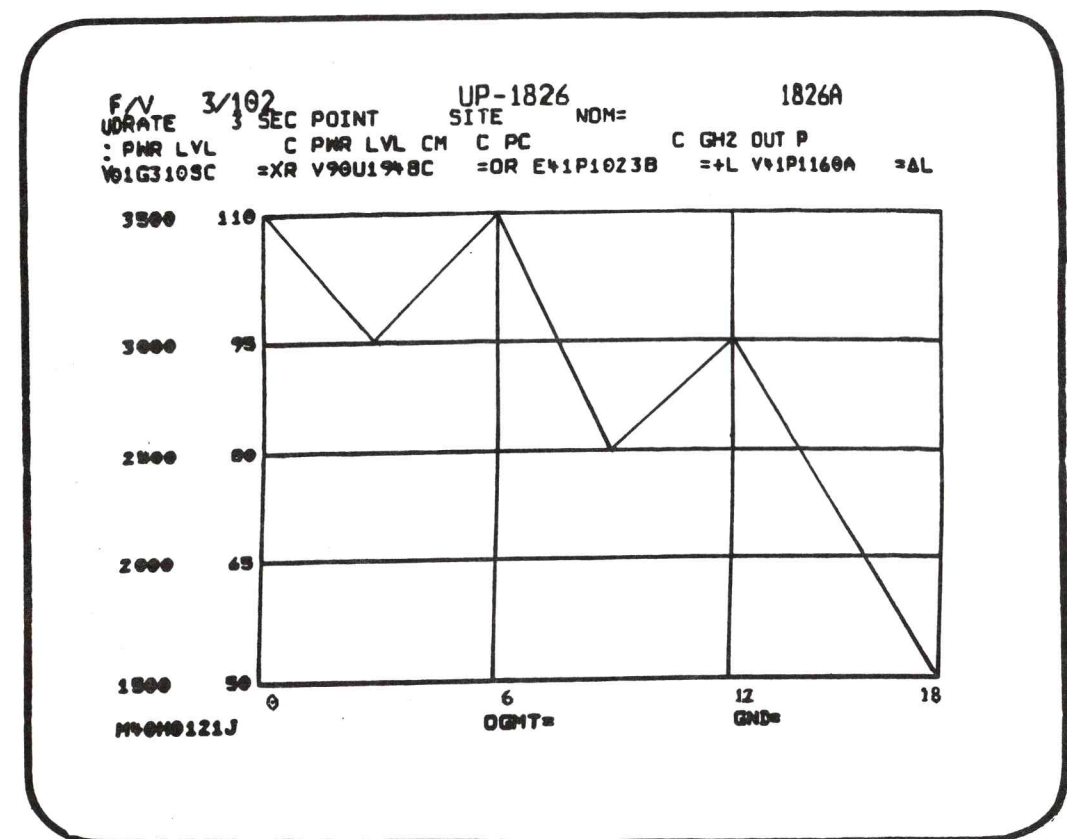
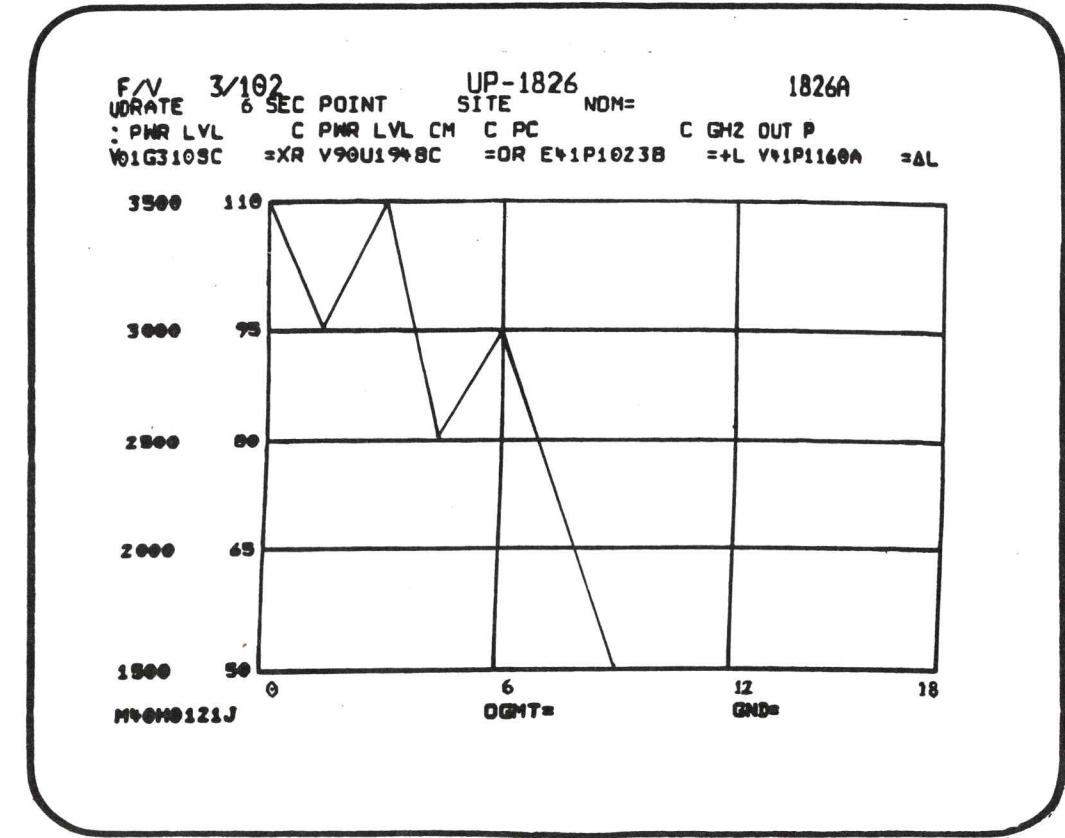
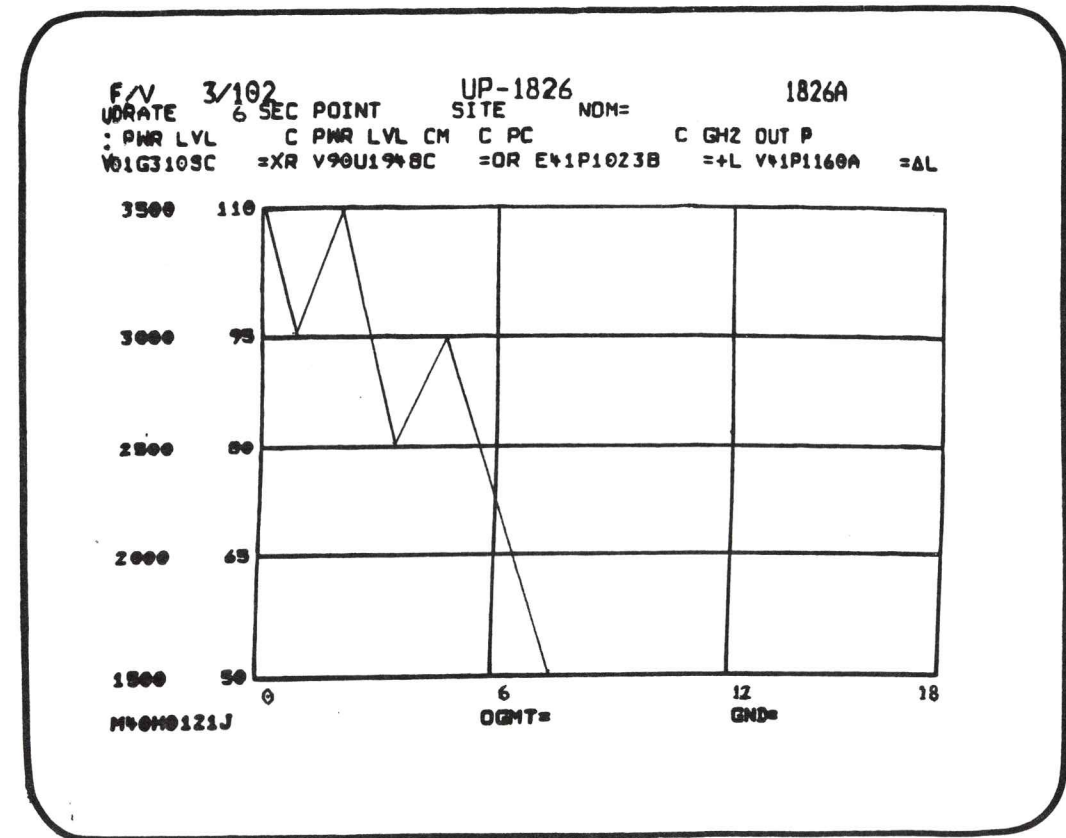


Practice

ITEM 2

- Questions: 1. Assume the plot rate is being changed from 3 to 6 on the UP shown below. Select the example, shown on the right, which most closely illustrates the result?
2. What two ways can be used to correct this situation?

- Answers: 1.
- 2.

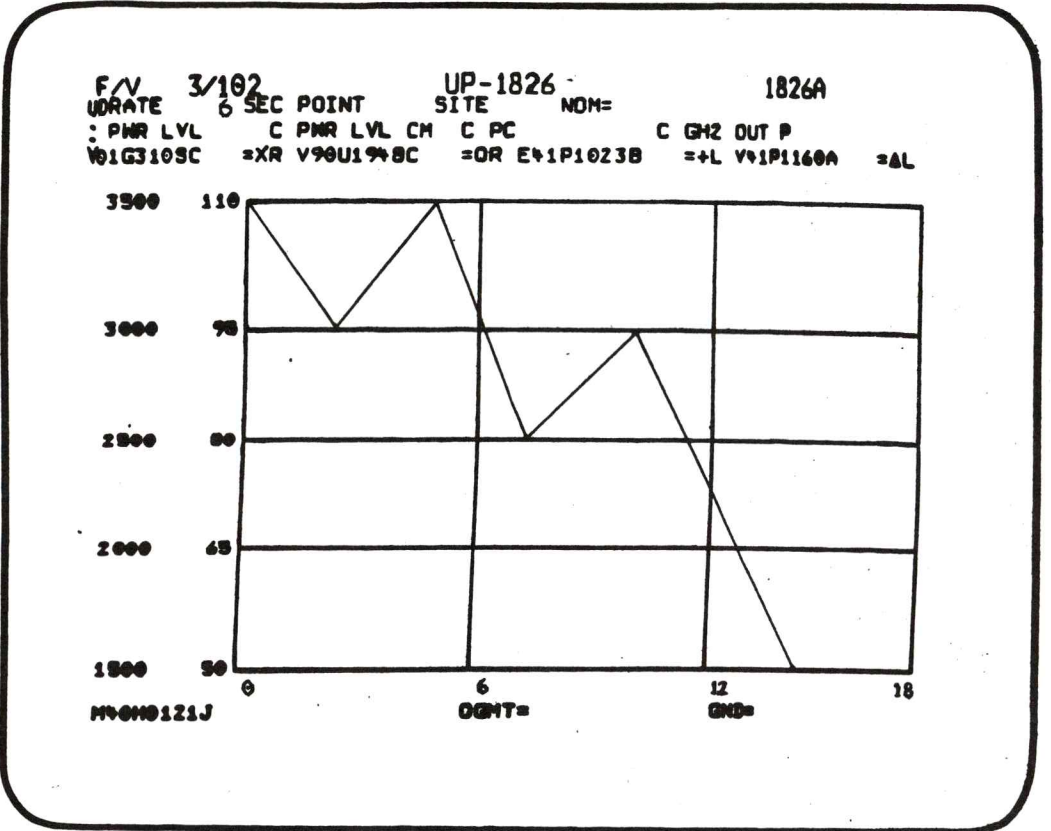
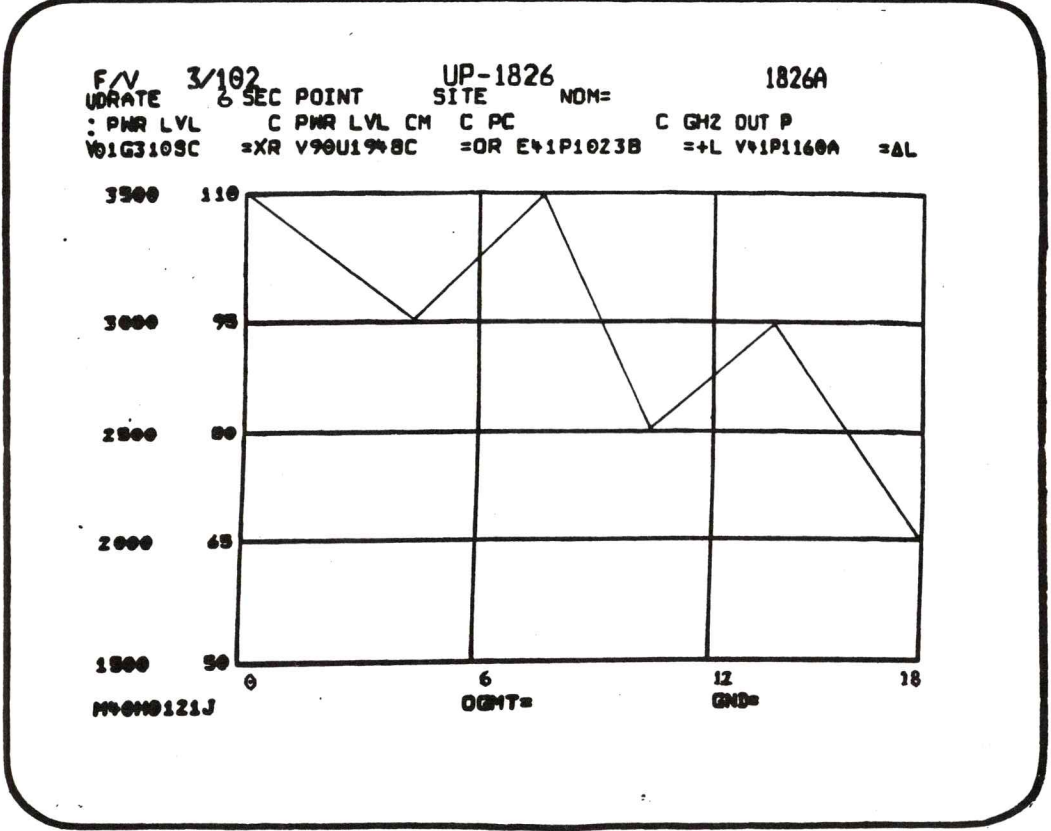
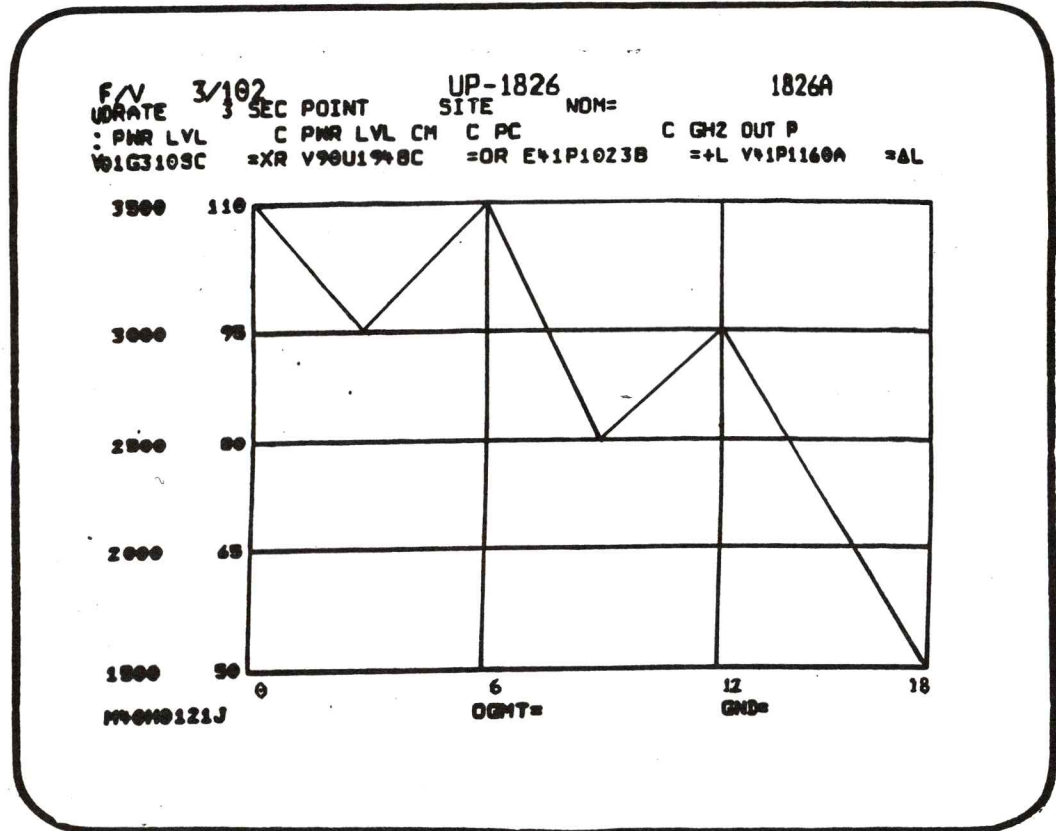
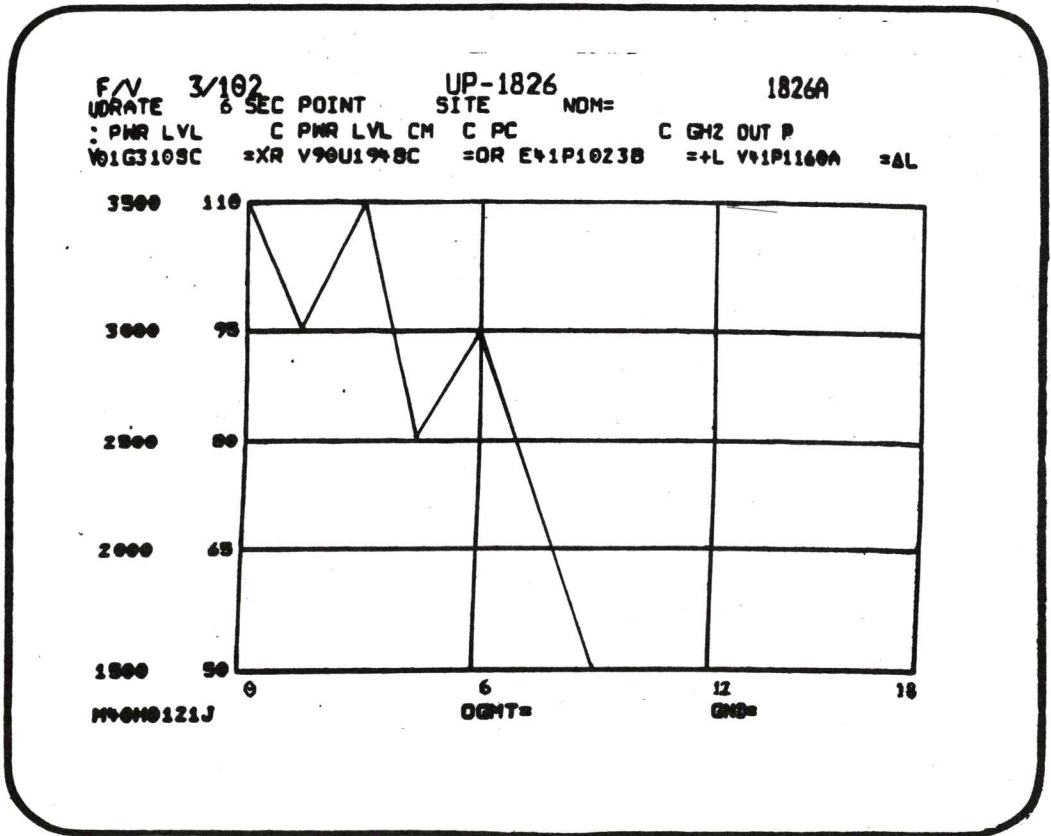
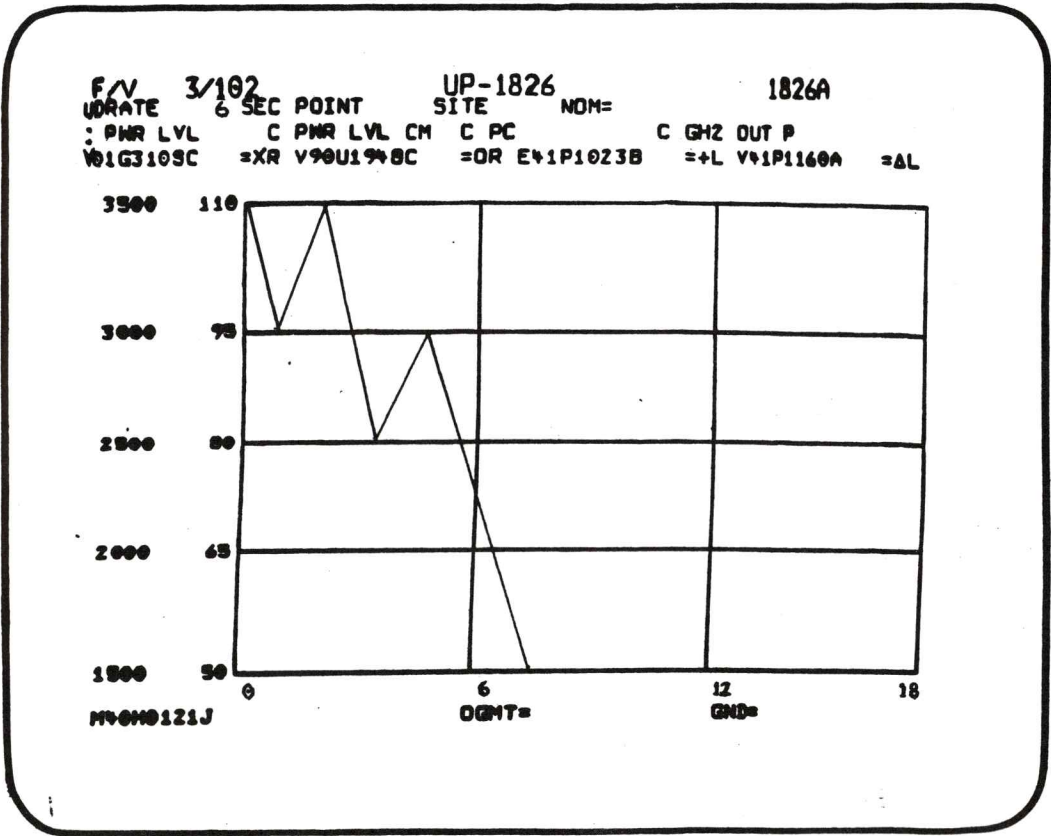


Practice Feedback

ITEM 2

- Questions:
1. Assume the plot rate is being changed from 3 to 6 on the UP shown below. Select the example, shown on the right, which most closely illustrates the result?
 2. What two ways can be used to correct this situation?

- Answers:
1. Change the plot rate back to the original value.
 2. Redefine the reference line.

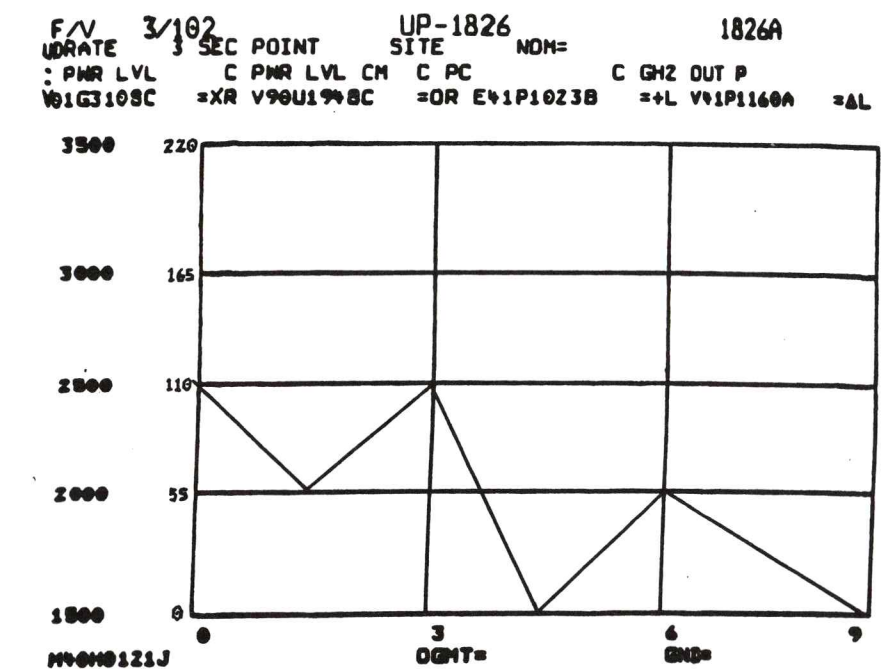
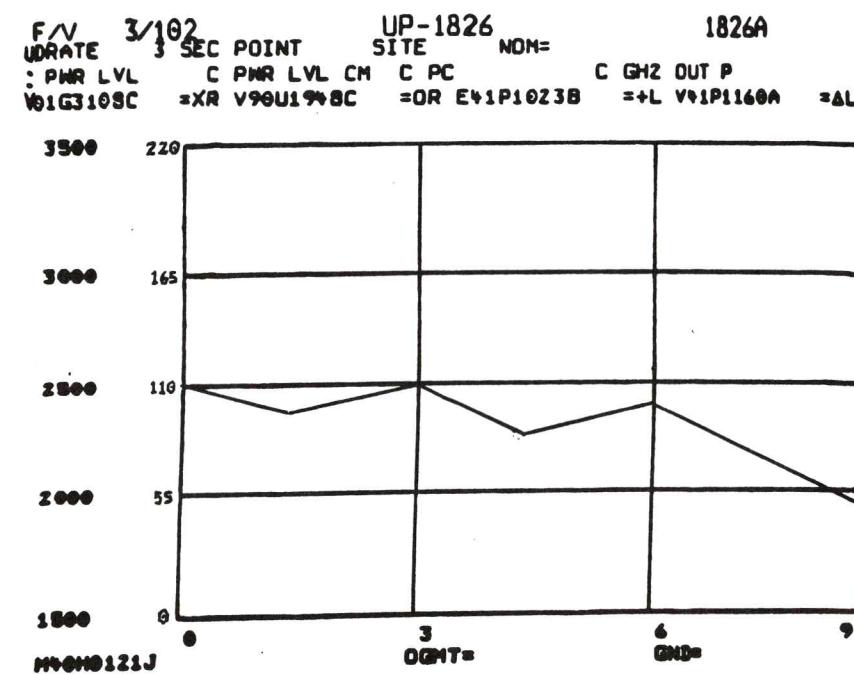
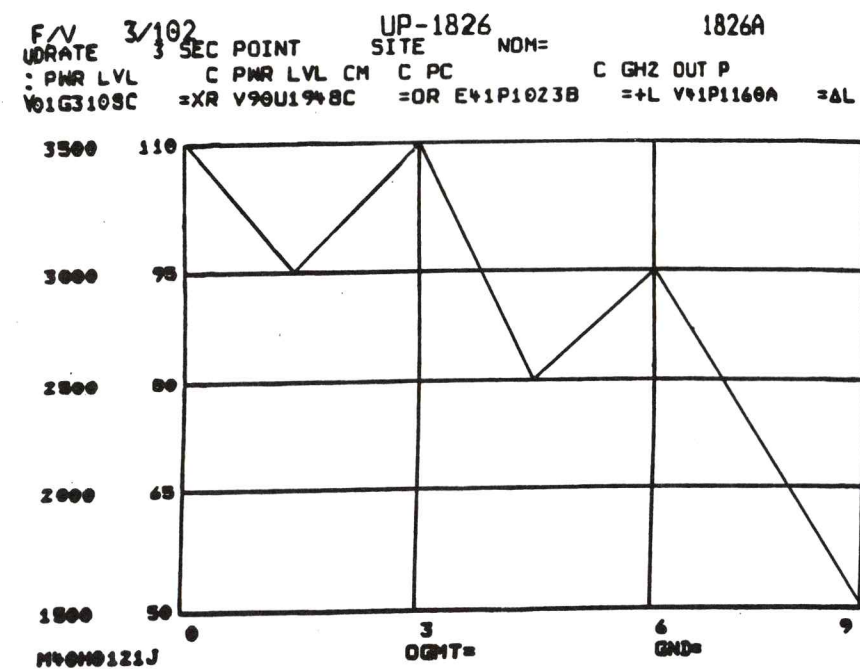
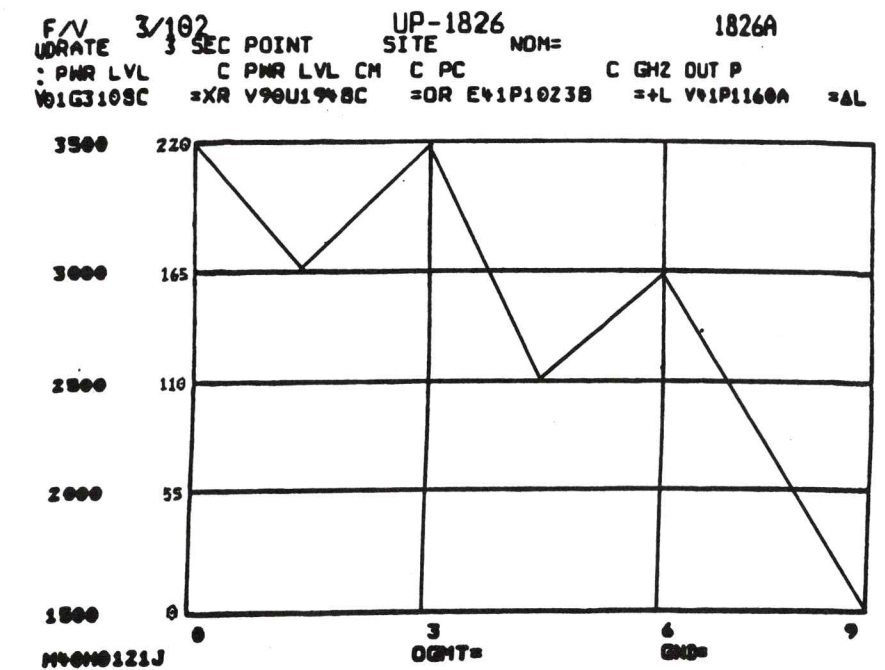
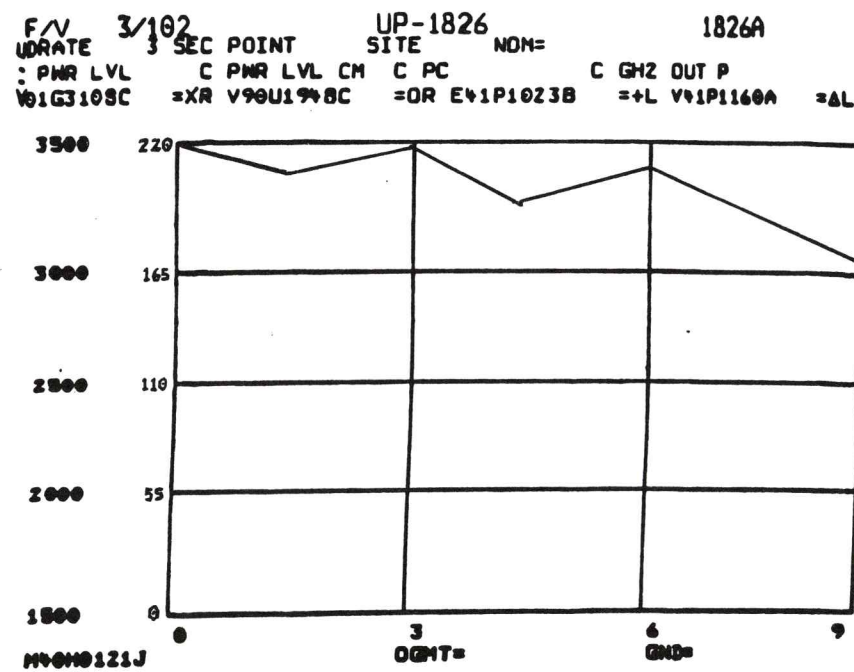


Practice

ITEM 3

- Questions: 1. Assume the Y scale is being changed from 50-110 to 0-220 on the UP shown below. Select the example, shown on the right, which most closely illustrates the result?
2. What two ways can be used to correct this situation?

- Answers: 1.
- 2.



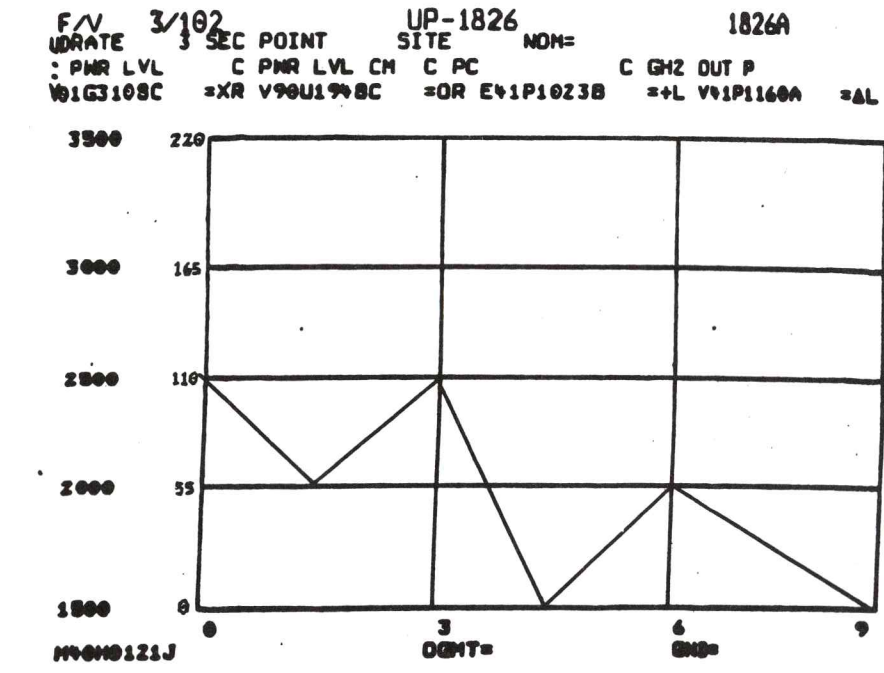
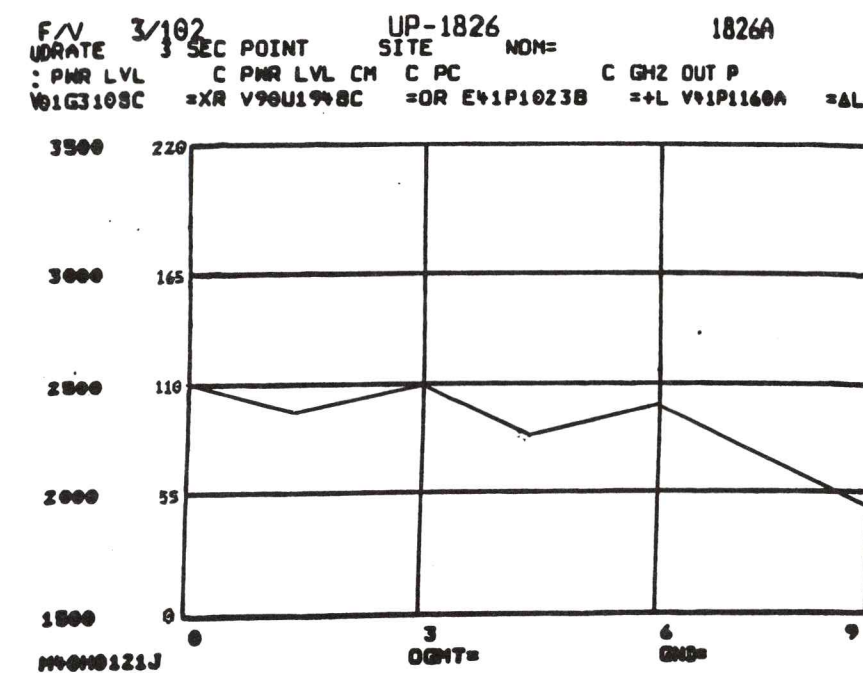
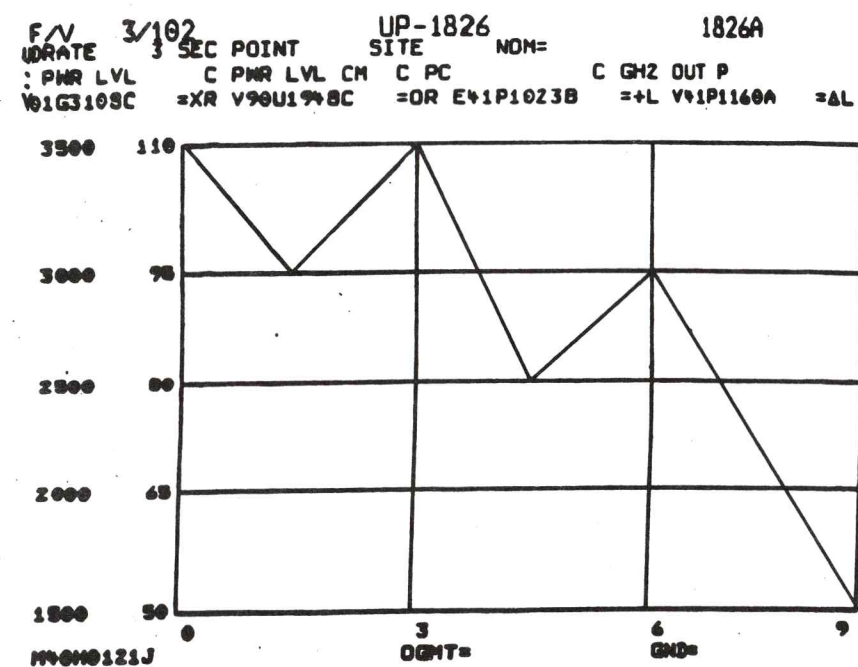
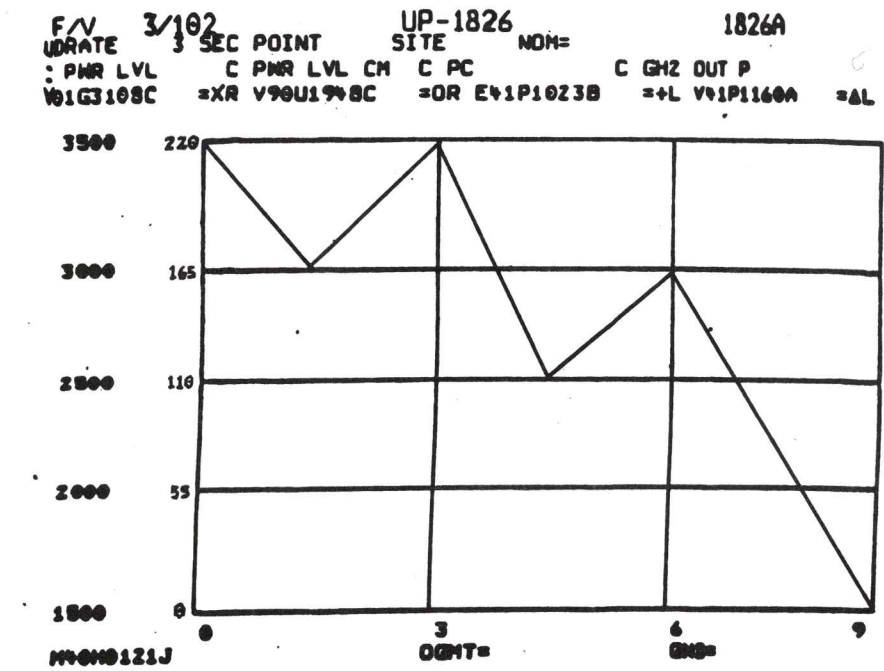
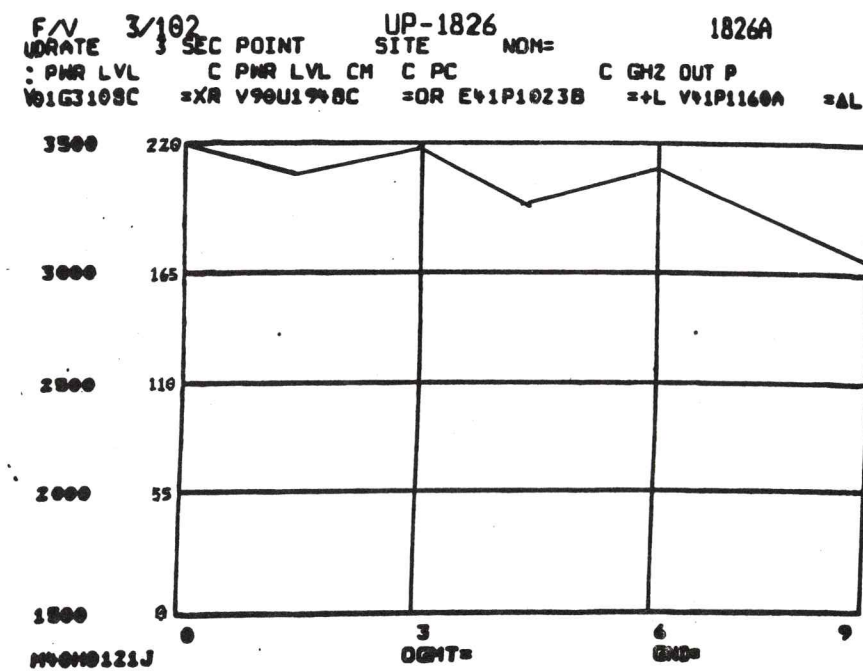
Practice Feedback

ITEM 3

Questions: 1. Assume the Y scale is being changed from 50-110 to 0-220 on the UP shown below. Select the example, shown on the right, which most closely illustrates the result?

2. What two ways can be used to correct this situation?

Answers: 1. Redefine the scale as appropriate.
2. Redefine the reference line.

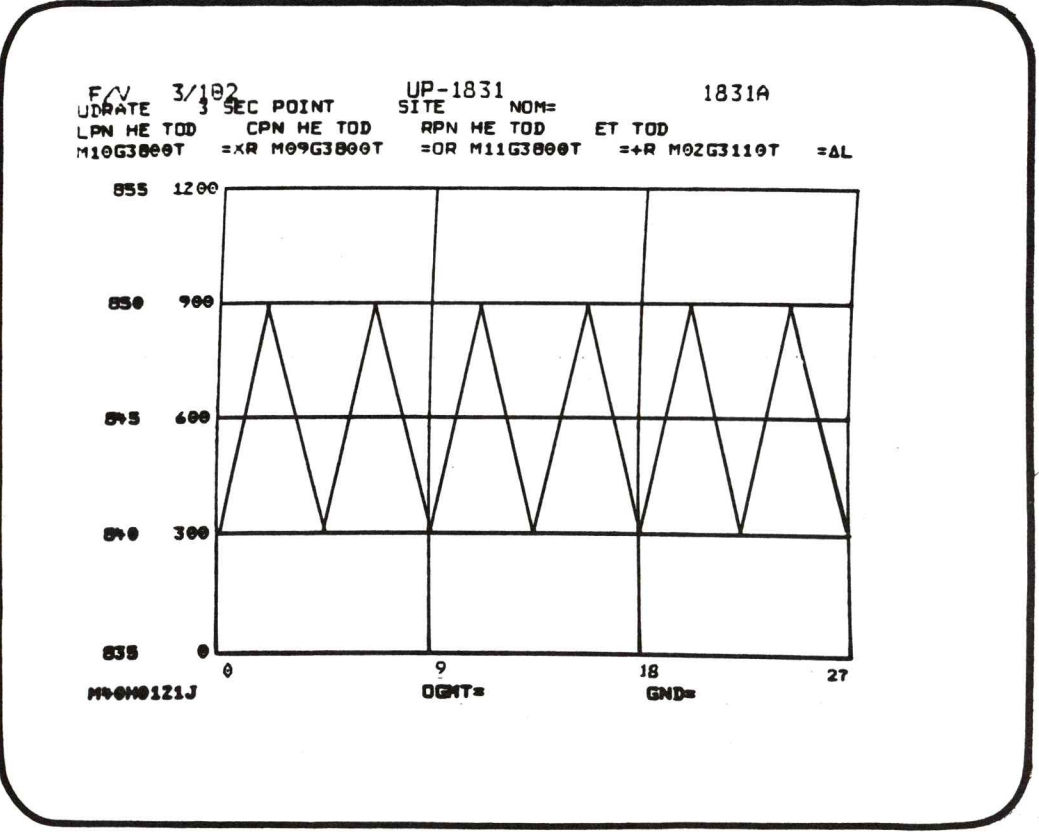
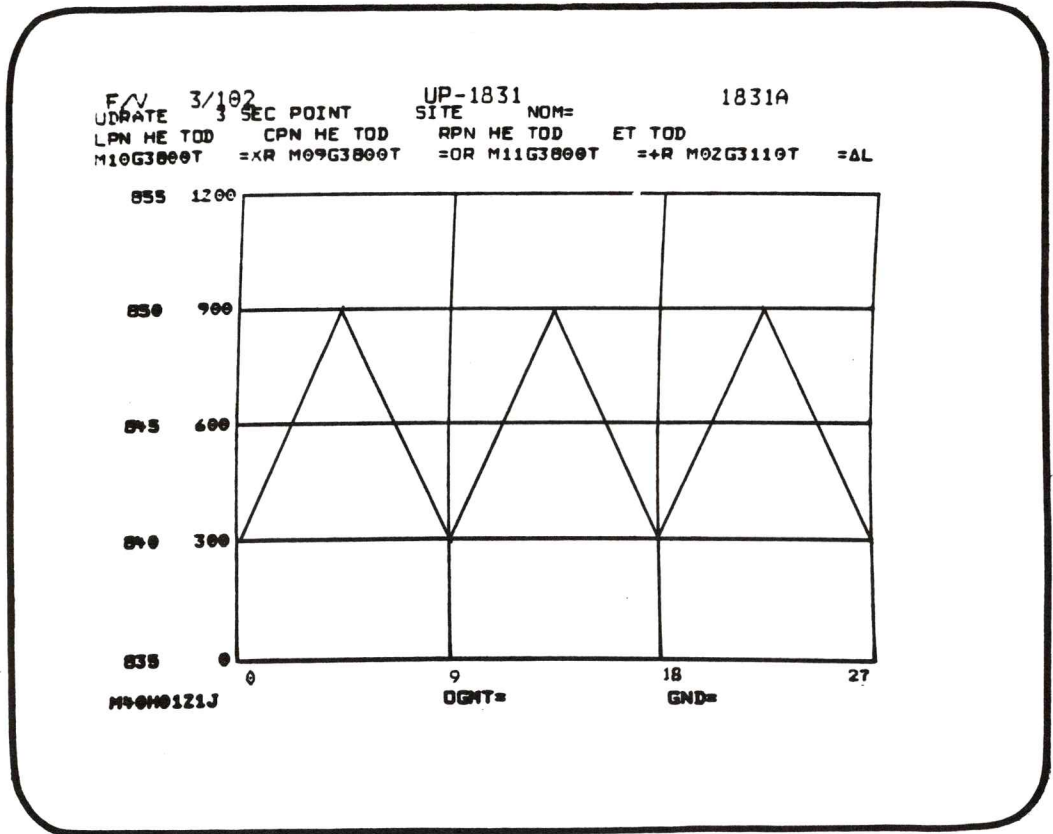
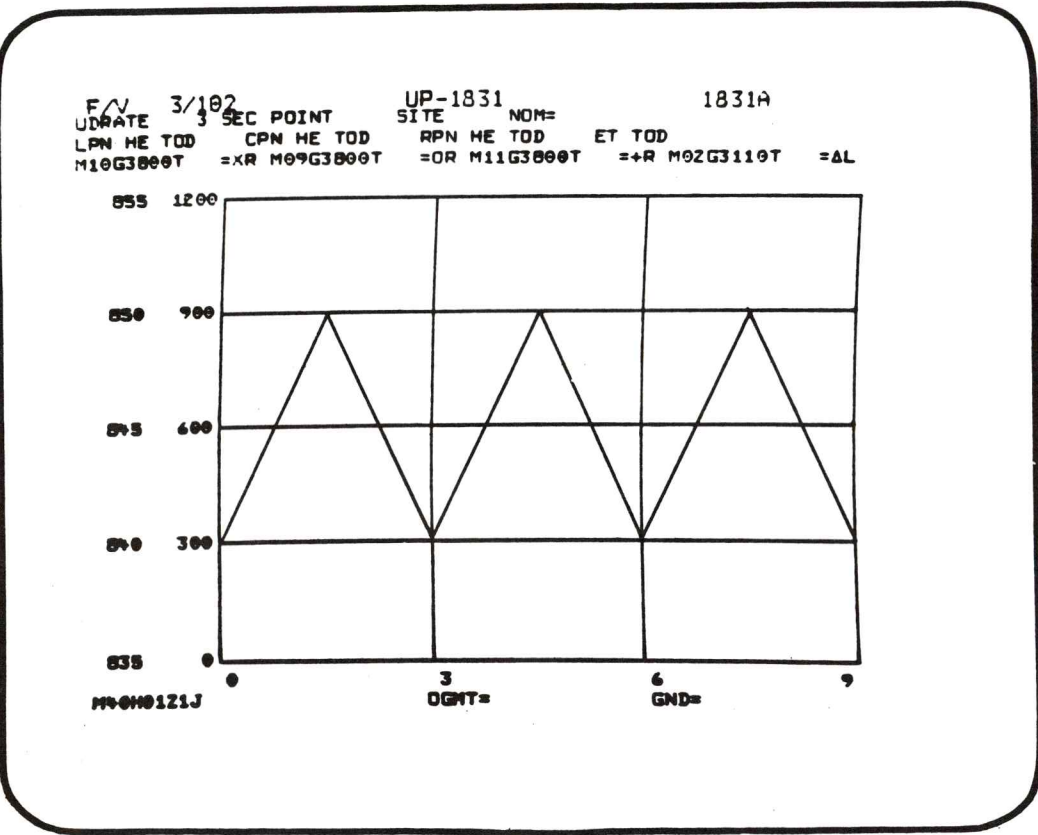
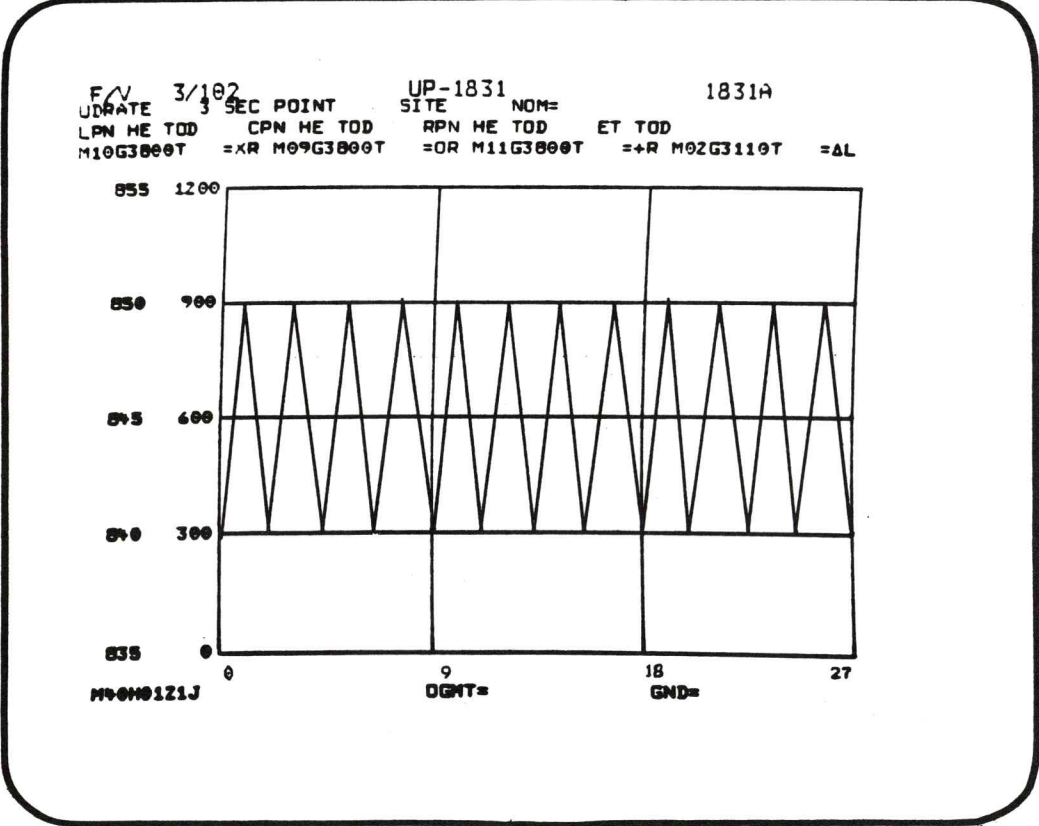
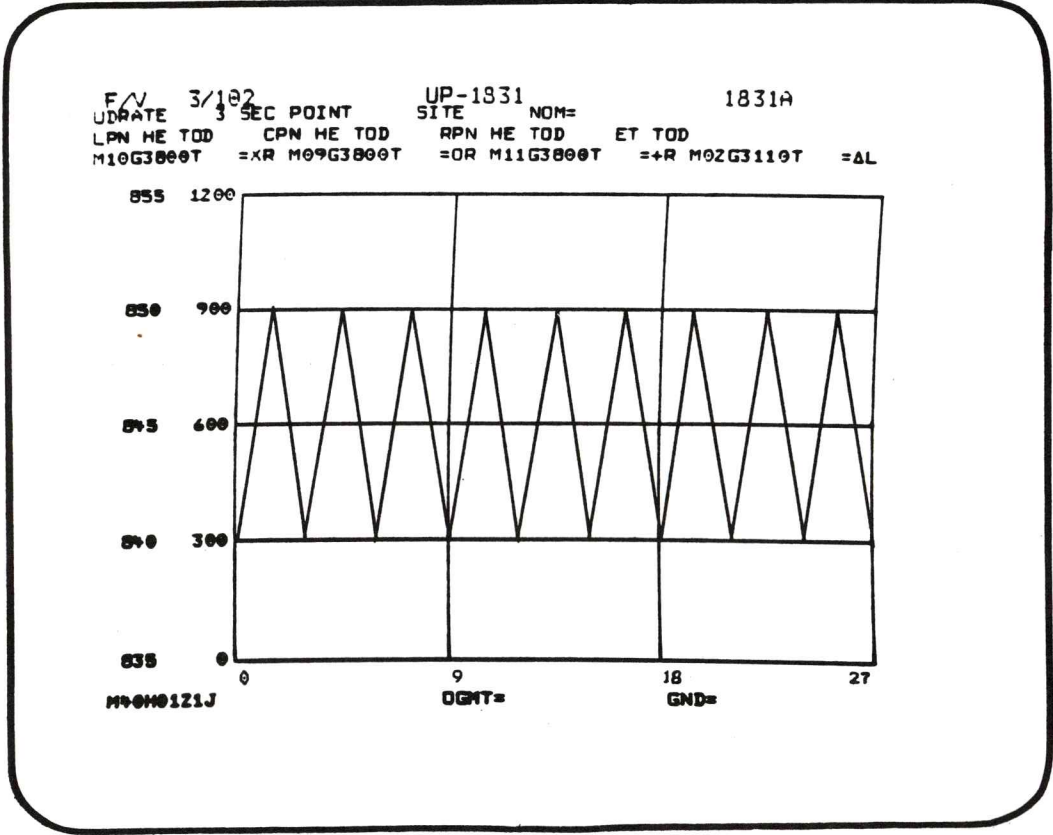


Practice

ITEM 4

- Questions: 1. Assume the X scale is being changed from 0-9 to 0-27 on the UP shown below. Select the example, shown on the right, which most closely illustrates the result?
2. What two ways can be used to correct this situation?

- Answers: 1.
- 2.

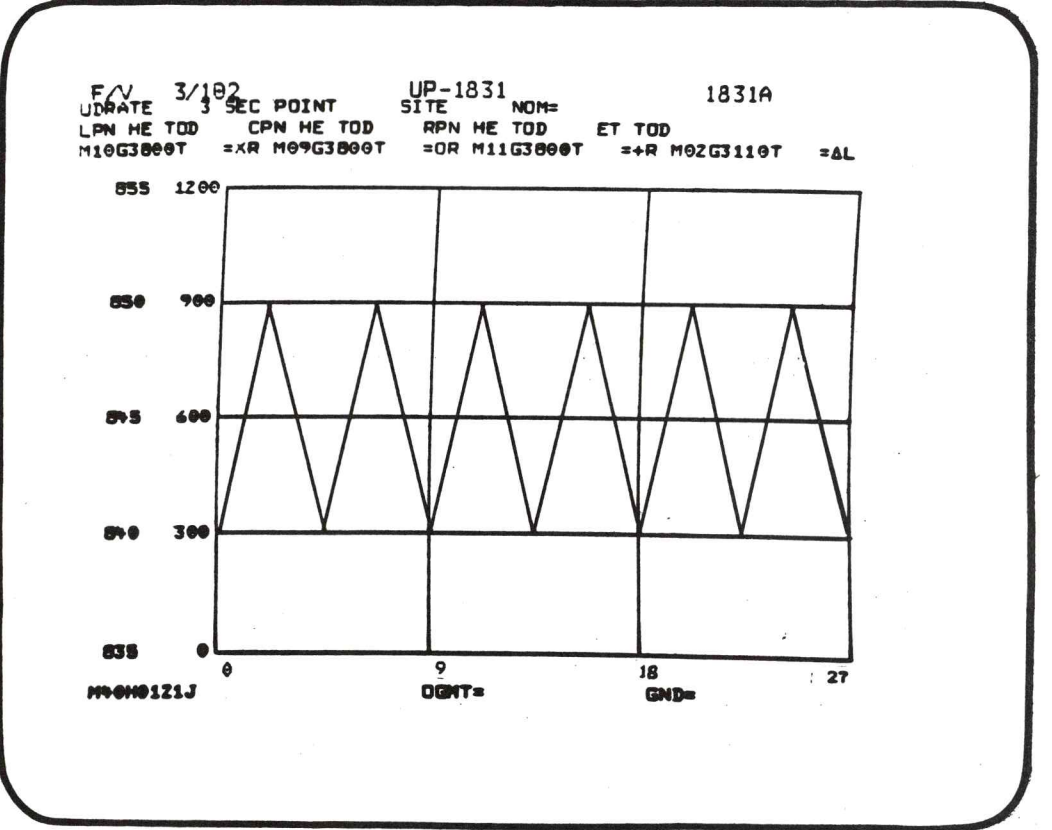
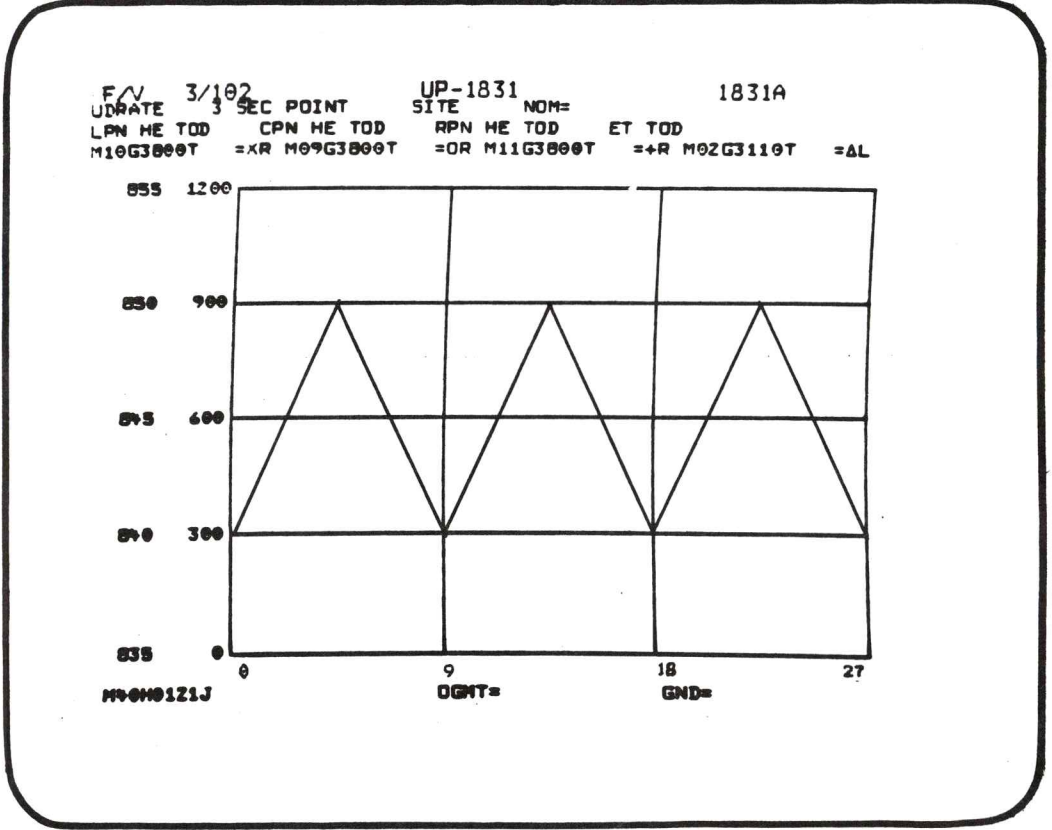
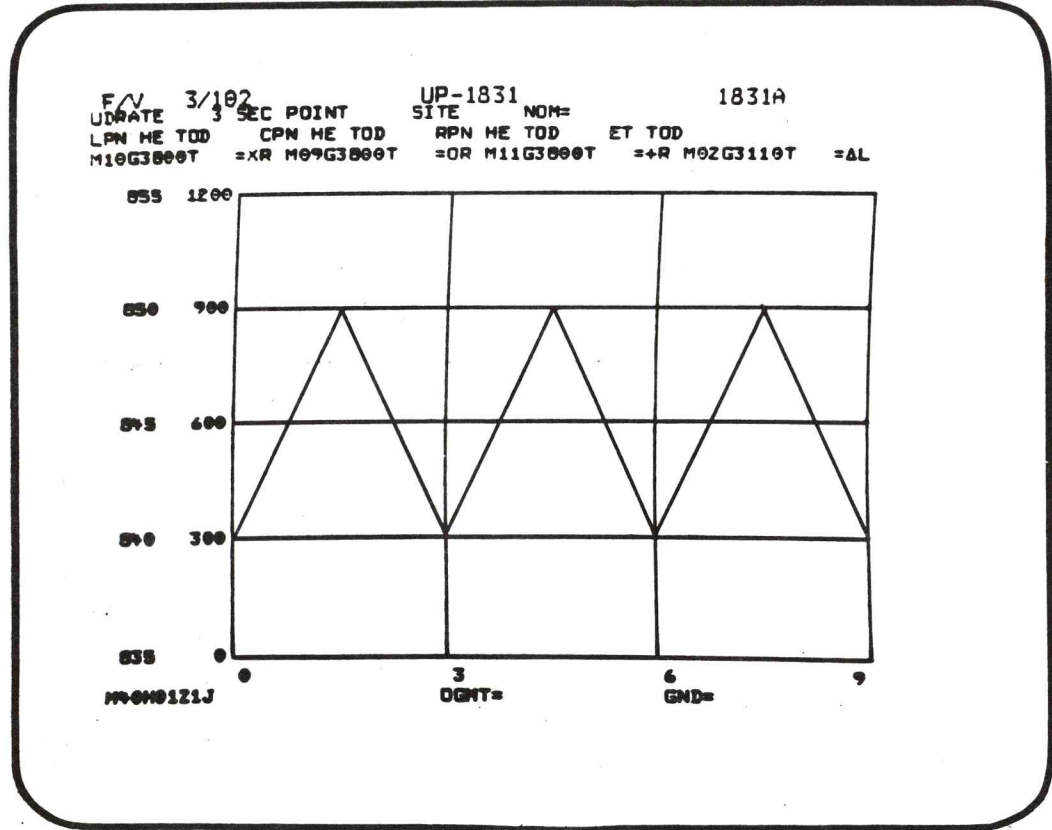
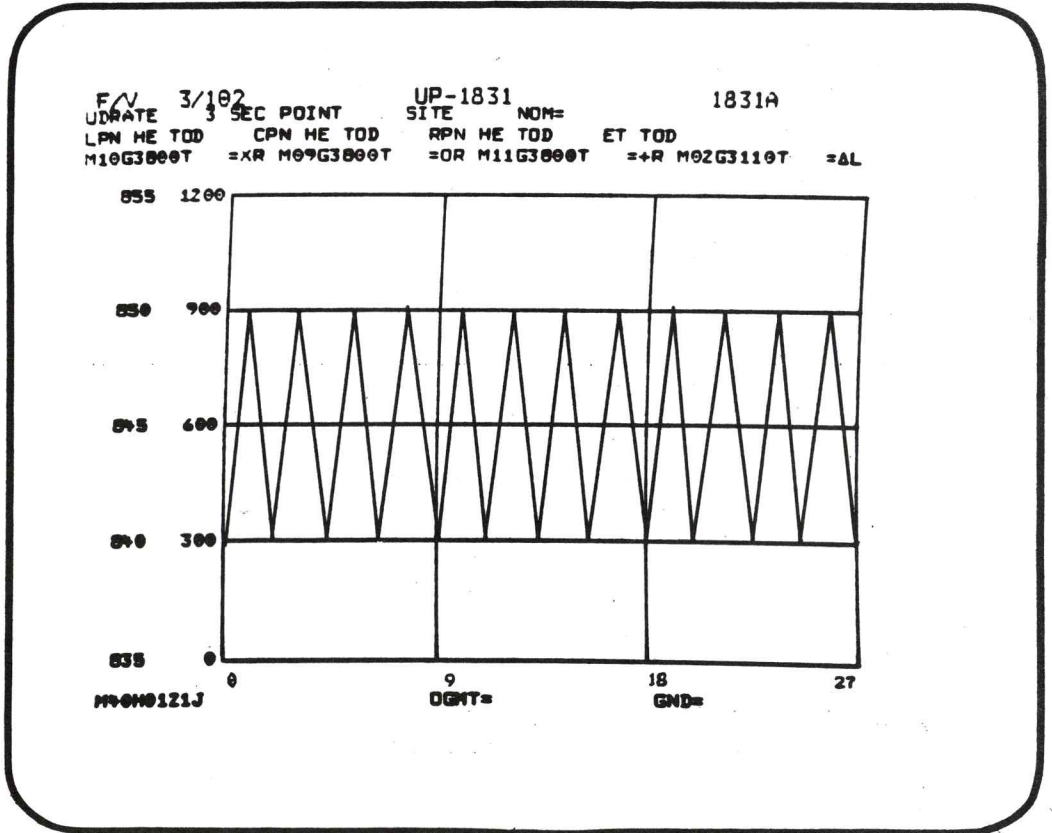
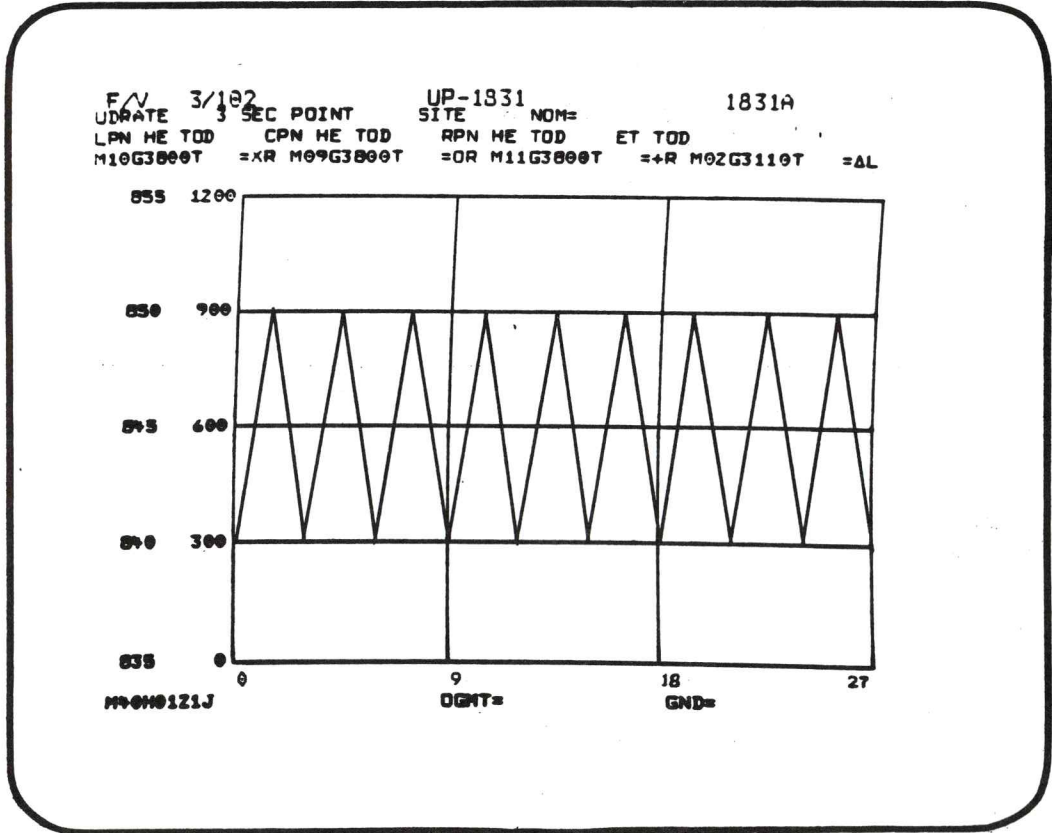


Practice Feedback

ITEM 4

- Questions:
1. Assume the X scale is being changed from 0-9 to 0-27 on the UP shown below. Select the example, shown on the right, which most closely illustrates the result?
 2. What two ways can be used to correct this situation?

- Answers:
1. Redefine the scale as appropriate.
 2. Redefine the reference line.



1. IDENTIFYING TELEMETRY MENU MED CODES
2. CHANGING OPERATIONAL LIMIT VALUES FOR INDIVIDUAL PARAMETERS
3. ENABLING, DISABLING, AND CHANGING CRITICAL LIMIT VALUES FOR INDIVIDUAL PARAMETERS
4. INHIBITING OFFSCALE HIGH/LOW LIMIT SENSING FOR INDIVIDUAL PARAMETERS
5. CHANGING HEXADECIMAL LIMITS
6. OVERRIDING TELEMETRY PARAMETER VALUES
7. DEFINING PARAMETERS ON A UNIVERSAL DIGITAL DISPLAY
8. DELETING PARAMETER(S) FROM, OR CLEARING, AN ENTIRE UNIVERSAL DIGITALS DISPLAY
9. RECONFIGURING UNIVERSAL PLOT
10. DELETING PARAMETER(S) FROM A UNIVERSAL PLOT
11. DRAWING REFERENCE LINE ON UNIVERSAL PLOT USING V41, TLM UNIVERSAL PLOT (NOMINAL DATA) MENU
12. DELETING/CHANGING A REFERENCE LINE ON UNIVERSAL PLOT
13. UNIVERSAL PLOT REFERENCE LINE AND CONTROL DATA INTERACTIONS
14. CHANGING SPECIAL COMPUTATION-CONSTANT ENGINEERING UNIT VALUES
15. CHANGING SPECIAL COMPUTATION TIME CONSTANTS
16. SELECTING MAJOR FUNCTION FOR DISPLAY 1350
17. CHANGING VARIABLE PARAMETER ID
18. USING MCC CALIBRATION DATA BOOK
19. CHANGING THE CALIBRATION CURVE
20. THRIFTS
21. SPECIAL AND SUPER THRIFT PRODUCT REQUEST
22. RECONFIGURATION OF THRIFTS

SEGMENT 14

CHANGING SPECIAL COMPUTATION-CONSTANT ENGINEERING UNIT VALUES

OBJECTIVE:

Change the constants used in special computations involving analog and floating point parameters using the V20, TLM Special Computation Constant Change (EU) Menu.

SEGMENT INTRODUCTION:

Many special computations performed by the MOC use fixed values in the equations. Some of these fixed values, or constants, can be changed by entering new values with the Megadata terminal. This segment discusses the procedure for changing these values.

MENU DATA FIELD FUNCTIONS

PARAMETER NUMBER

These data fields identify the constant being changed. The identifying numbers are listed in each console handbook and/or the level B and C telemetry requirements.

E.U. VALUE

Specifies the new value of constant identified in the preceeding data field.

SPECIAL CONSTANT CHANGE DISPLAYS

MSK NO.	TITLE		
2061	OI	MED	DSP 1
2062	OI	MED	DSP 2
2063	GPC	MED	DSP 1
2064	GPC	MED	DSP 2
2065	GPC	MED	DSP 3

Changing Special
Computation Constant
Engineering Unit Values

PURPOSE

1. Call a blank V20 menu from MOC or diskette.
2. Enter parameter number.
3. Enter new constant value.
4. Repeat steps two and three for applicable number of constants.
5. Transmit to MOC.
6. Verify change on appropriate MSK display.

NOTE

Changes may also be submitted to computer TM on JSC Form 427. Except for header information, this form is identical to the V21 menu format.

V20#

002/RT TLM SPECIAL COMP CONSTANT CHANGE (EU) MENU

PARAMETER NUMBER	EU VALUE	PARAMETER NUMBER	EU VALUE
/	,	,	,
	,	,	,
	,	,	,
	,	,	,
	,	,	,
	,	,	,
	,	,	,
	,	,	,
	,	,	,
	,	,	/ \$

ENTER PM FOR PERMANENT MED

Supporting Data

The MOC performs special internal computations to determine system status. Some constants in various equations can be changed to compensate for variable factors.

For example, APU fuel quantities are derived using several parameters. Some of these parameters come from telemetry, and some are constants which can be changed.

One parameter in the equation is fuel density, which is in itself a calculation using the following equation.

$$RHO = 79.484 - 0.0315(T + TBIAS)$$

Where: RHO = Fuel density

T = APU tank surface temp (telemetry parameter)

TBIAS = Temp bias and conversion factor (changable constant)

T BIAS for APU 1 is M01I1022M which has an initialized value of 459.69.

If this parameter is input using the V20 menu with a value of 465, RHO will become more negative, causing the calculated fuel quantity to increase.

Additional information for parameters that can be modified within the special computational processes is defined in the MCC Level B and C Telemetry Requirements. Constant values can also be changed by submission of JSC Form 427 to Computer TM. JSC Form 427 is shown on the next page.

[illegible]

1. Fill out the V20 MED menu below to change the value of M01I1022M to 529.590 R.
2. Change the value of M07I1022M (APU 1 helium mass loaded) to 0.953261 lbm to account for volume difference.

TD103-3 A112

- 1999

1. IDENTIFYING TELEMETRY MENU MED CODES
2. CHANGING OPERATIONAL LIMIT VALUES FOR INDIVIDUAL PARAMETERS
3. ENABLING, DISABLING, AND CHANGING CRITICAL LIMIT VALUES FOR INDIVIDUAL PARAMETERS
4. INHIBITING OFFSCALE HIGH/LOW LIMIT SENSING FOR INDIVIDUAL PARAMETERS
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16. SELECTING MAJOR FUNCTION FOR DISPLAY 1350
17. CHANGING VARIABLE PARAMETER ID
18. USING MCC CALIBRATION DATA BOOK
19. CHANGING THE CALIBRATION CURVE
20. THRIFTS
21. SPECIAL AND SUPER THRIFT PRODUCT REQUEST
22. RECONFIGURATION OF THRIFTS

SEGMENT 15

CHANGING SPECIAL COMPUTATION TIME CONSTANTS

OBJECTIVE:

Change value of time constant used in telemetry special computations using V21 MED menu.

SEGMENT INTRODUCTION:

Some mathematical computations and/or logical computations use a value of time (time constant) in the computation. This segment discusses the procedure for changing the value of time constants using V21 menu.

FUNCTION OF MENU DATA FIELDS

TIME VALUE

This data field is used to specify GMT time value used in all subsequent processing.

TIME VALUE -- SDDD:HH:MM:SS:THT

SDD. Sign (plus or minus) and three digit days
 HH. Two digit hours
 SS. Two digit seconds
 THT. Tenths, hundredths, and thousandths of second

SPECIAL CONSTANT CHANGE DISPLAYS

<u>MSK NO.</u>	<u>TITLE</u>
2061	OI MED DSP 1
2062	OI MED DSP 2
2063	GPC MED DSP 1
2064	GPC MED DSP 2
2065	GPC MED DSP 3

Changing Special Computation Constant (TIME)

PROCEDURE

1. Call a blank V21 menu from MOC.
2. Enter parameter number assigned to time constant.
3. Enter GMT time value.
4. Repeat steps 2 and 3 for additional parameters.
5. Transmit to MOC.
6. Verify change on appropriate MSK display.

NOTE

Changes may also be submitted using JSC Form 427. Except for header information, this form is identical to the V21 menu format. This form is shown in supporting data in segment 14.

V214

002/RT

TLM SPECIAL COMP CONSTANT/CHANGE (TIME) MENU

PARAMETER NUMBER	TIME VALUE	PARAMETER NUMBER	TIME VALUE
/ M02G1700M	, -010:23:46:12.011		
_____	, ____:__:__:_.	_____	, ____:__:__:_.
_____	, ____:__:__:_.	_____	, ____:__:__:_.
_____	, ____:__:__:_.	_____	, ____:__:__:_.
_____	, ____:__:__:_.	_____	, ____:__:__:_.
_____	, ____:__:__:_.	_____	, ____:__:__:_.
_____	, ____:__:__:_.	_____	, ____:__:__:_.
_____	, ____:__:__:_.	_____	, ____:__:__:_.
_____	, ____:__:__:_.	_____	, ____:__:__:_.
_____	, ____:__:__:_.	_____	, ____:__:__:_. / \$

NOTE: THE ONLY ALLOWABLE TIME FORMAT IS GMT.

Supporting Data

For various mathematical and logical computations it is necessary to use a GMT value. The mission operations computer (MOC), in the process of making these computations, compares the downlinked GPC times with various forms of ground time received from different sources.

For example:

$$\text{GMT(GN) M01G1700T} = \text{M40H0208J} - \text{V91M1999PX} - \text{M01G1700M} - \text{M05G1700M}$$

Where:

M01G1700T = GMT (GN)

M40H0208J = Ground receipt time from GN data set overhead

V91M1999PX = GN GMT from GN downlist

M01G1700M = GN bias 1 initialized to 000:00:00:00.000

M05G1700M = GN bias 2 initialized to 00.00000

If GPC time does not match a particular ground time, adjustments can be input using the V21 special computation constant change (TIME) menu. By entering appropriate parameter values for the bias values to the output time equations, the output GPC times can be adjusted to match the various ground times. Additional information for parameters that can be modified within the special computational processes are defined in the Level B and C Telemetry Requirements.

Fill out the V21 MED menu below to change the time constant, for M01G1700M to GN BIAS 1 to day 63, 9 hours, 40 minutes, 30.00 seconds.

[illegible]

NOTE: THE ONLY ALLOWABLE TIME FORMAT IS GMT.

ENTER PM FOR PERMANENT MED

Practice Feedback

Fill out the V21 MED menu below to change the time constant, for M01G1700M to GN BIAS 1 to day 63, 9 hours, 40 minutes, 30.00 seconds.

V21#

002/RT

TLM SPECIAL COMP CONSTANT CHANGE (TIME) MENU

PARAMETER NUMBER	TIME VALUE	PARAMETER NUMBER	TIME VALUE
/M01G1700M	063:09:40:30.00		

NOTE: THE ONLY ALLOWABLE TIME FORMAT IS GMT.

ENTER PM FOR PERMANENT MED

1. IDENTIFYING TELEMETRY MENU MED CODES
2. CHANGING OPERATIONAL LIMIT VALUES FOR INDIVIDUAL PARAMETERS
3. ENABLING, DISABLING, AND CHANGING CRITICAL LIMIT VALUES FOR INDIVIDUAL PARAMETERS
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15. CHANGING SPECIAL COMPUTATION TIME CONSTANTS
16. SELECTING MAJOR FUNCTION FOR DISPLAY 1350
17. CHANGING VARIABLE PARAMETER ID
18. USING MCC CALIBRATION DATA BOOK
19. CHANGING THE CALIBRATION CURVE
20. THRIFTS
21. SPECIAL AND SUPER THRIFT PRODUCT REQUEST
22. RECONFIGURATION OF THRIFTS

SEGMENT 16

SELECTING MAJOR FUNCTION FOR DISPLAY 1350

OBJECTIVE:

Select/change the major function that provides the fault summary message to the FAULT display, MSK 1350.

SEGMENT INTRODUCTION:

The FAULT display, MSK 1350, shows the twenty most recent fault summary messages downlinked from the GNC, the SM, or the OPS-zero major functions of the Orbiter's general purpose computers.

This segment presents the procedure for selecting the major function supplying messages to the display.

FUNCTION OF MENU DATA FIELDS

RTXT VALVE

This data field is used to specify the desired fault summary message source.

- GNC. Fault summary messages from guidance navigation and control data set.
- SM. Fault summary messages system management data set.
- OPO. Fault summary messages from operational sequence 0 data set.

SELECTING MAJOR FUNCTION FOR DISPLAY 1350

Selecting Major Function for Display 1350

PROCEDURE

1. Call a blank V23 menu from MOC or diskette.
2. Always enter M16G0800M in PARAMETER NUMBER data field.
3. Enter major function code in the RTXT VALUE data field.
4. Transmit to MOC.
5. Call FAULT display, MSK 1350, to console CRT display.
6. Verify that GNC, SM, or OPO is listed in D/L data field.

NOTE

Changes may also be submitted using JSC Form 427. Except for header information, this form is identical to the V21 menu format. This form is shown in supporting data in segment 14.

```
V23#
```

```
002/RT          TLM SPECIAL COMP RTXT INPUT MENU
```

PARAMETER NUMBER	RTXT VALUE			PARAMETER NUMBER	RTXT VALUE	
/ M16G0800M	SH	,	'		,	'
		,	'		,	'
		,	'		,	'
		,	'		,	'
		,	'		,	'
		,	'		,	'
		,	'		,	'
		,	'		,	'
		,	'		,	'
		,	'		,	'

_____ ENTER PM FOR PERMANENT MED \$

```

F/V      1/102
OGMT     92:15:56:56 OMET      1:04:26:56 SITE BDA OI 164      ,GN 023
RGMT     92:15:56:55 D/L      SM      GPC ID 1      SM      BF 013

```

	CRT ID	FAULT	GPC	TIME
1	IMU BITE/T	3	1 345	92:15:18:28.37
2	IMU BITE/T	2	1 345	92:15:18:28.37
3	IMU BITE/T	1	1 345	92:15:18:28.37
4	BCE STRG3	NSP	1 345	92:15:18:26.47
5	IMU BITE/T	3	1 5	92:15:10:06.31
6	IMU BITE/T	2	1 5	92:15:10:06.31
7	IMU BITE/T	1	1 5	92:15:10:06.31
8	BCE STRG3	NSP	1 5	92:15:10:02.40
9	I/O ERROR	MMU	1	92:15:09:32.73
10	TIME	TONE	1 4	92:14:20:00.54
11	S86 APU/HYD	APU	4	92:13:42:32.22
12	I/O ERROR	CRT4	4	92:13:06:31.30
13	IMU BITE/T	3	1	92:13:06:04.40
14	IMU BITE/T	2	1	92:13:06:04.40
15	IMU BITE/T	1	1	92:13:06:04.40
16	I/O ERROR	MMU	1	92:13:05:48.08
17	S86 APU TEMP	1	4	92:12:43:50.96
18	S86 HYD PRESS	1	4	92:12:43:49.98
19	S86 APU TEMP	1	4	92:12:37:11.60
20	S86 APU/HYD	APU	4	92:12:37:10.65

Supporting Data

The Fault Summary Message display shows the twenty most recent fault summary messages downlinked for the GNC, SM, or OPS-00 data set. The choice of data set is made via the V23 MED menu. The V23 MED menu is used to define the data set from which fault summary messages are to be retrieved. These messages are then displayed on the FAULT display.

Practice

1. Fill out the V23 MED menu below to retrieve fault summary messages from the Guidance, Navigation and Control data set.

V23#

002/RT TLM SPECIAL COMP RTXT INPUT MENU

PARAMETER NUMBER	RTXT VALUE	PARAMETER NUMBER	RTXT VALUE
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

_____ ENTER PM FOR PERMANENT MED

-

Practice

2. Fill out the V23 MED menu below to retrieve fault summary messages from the System Management data set.

V23#

002/RT TLM SPECIAL COMP RTXT INPUT MENU

PARAMETER NUMBER	RTXT VALUE	PARAMETER NUMBER	RTXT VALUE
/	,	,	,
	,		,
	,		,
	,		,
	,		,
	,		,
	,		,
	,		,
	,		,
	,		/ \$

ENTER PM FOR PERMANENT MED

- 



Practice

3. Fill out the V23 MED menu below to retrieve fault summary messages from the Operational Sequence 0 data set.

V23#

002/RT TLM SPECIAL COMP RTXT INPUT MENU

PARAMETER NUMBER	RTXT VALUE	PARAMETER NUMBER	RTXT VALUE
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

_____ ENTER PM FOR PERMANENT MED

Practice Feedback

3. Fill out the V23 MED menu below to retrieve fault summary messages from the Operational Sequence 0 data set.

V23#

002/RT TLM SPECIAL COMP RTXT INPUT MENU

PARAMETER NUMBER	RTXT VALUE	PARAMETER NUMBER	RTXT VALUE
/M16G0300M	0PO		

ENTER PH FOR PERMANENT MED

1. IDENTIFYING TELEMETRY MENU MED CODES
2. CHANGING OPERATIONAL LIMIT VALUES FOR INDIVIDUAL PARAMETERS
3. ENABLING, DISABLING, AND CHANGING CRITICAL LIMIT VALUES FOR INDIVIDUAL PARAMETERS
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14. CHANGING SPECIAL COMPUTATION-CONSTANT ENGINEERING UNIT VALUES
15. CHANGING SPECIAL COMPUTATION TIME CONSTANTS
16. SELECTING MAJOR FUNCTION FOR DISPLAY 1350
17. CHANGING VARIABLE PARAMETER ID
18. USING MCC CALIBRATION DATA BOOK
19. CHANGING THE CALIBRATION CURVE
20. THRIFTS
21. SPECIAL AND SUPER THRIFT PRODUCT REQUEST
22. RECONFIGURATION OF THRIFTS

SEGMENT 17
CHANGING VARIABLE PARAMETER ID

OBJECTIVE:

Label or change the parameter ID on the variable parameter display using V23, TLM special comp RTXT input menu.

SEGMENT INTRODUCTION:

Ten word locations are contained in each telemetry downlist associated with the GN, the SM, and the OPS-0 major functions. Any computer word can be output in these word slots as specified by specific DEU inputs or equivalent commands.

The values associated with these parameters are automatically displayed on MSK 1352; however, the names, or labels, identifying the parameters must be input via MED.

This segment presents the procedure to input these identifiers.

PURPOSE

Allows the users of the variable parameter display to change individual parameter identification labels.

FUNCTION OF MENU DATA FIELDS

PARAMETER NUMBER

Must be one of twenty-four specific identifiers as indicated below. These numbers can be found in the MCC Level B and C telemetry requirements, and in the Flight Computer Console Handbook.

RTXT VALUE

This eight digit field is used to input the desired identifier. Valid inputs are the numbers 0-9; characters A-Z, +, -, !, *, ;, /, %, ?, #, @, =, comma, period, and blank (space bar).

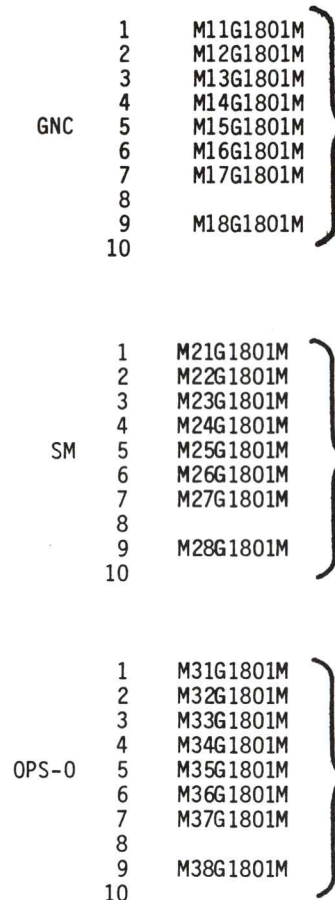
Changing Variable Parameter ID

PROCEDURE

1. Call a blank V23 menu from MOC.
2. Enter PARAMETER NUMBER of name to be changed.
3. Enter name (text) for applicable parameter in RTXT VALUE data field.
4. Repeat steps 2 and 3 for additional parameters.
5. Transmit to MOC.
6. Verify name entered appears in desired location on MSK 1352, variable parameter display.

NOTE

Changes may also be submitted using JSC Form 427. Except for header information, this form is identical to the V23 menu format. This form is shown in supporting data in segment 14.



F/V		3/102		VARI 152F				RT1 352F			
CGMT	10:06:07:16	DMET	7:14:20:20	SITE	HL	01	01	GN	01	GN	01
RGMT	10:06:07:16					OPS	0				
BL ID	PARAM ID	TYPE	HEX	ENG VALUE	SF					BIAS	
ENC	1 11	FMS	4333	0.00000E+00			0.0000E+00	0.0000E+00		0.0000E+00	
SFC	3 12	FMS	4333	0.00000E+00			0.0000E+00	0.0000E+00		0.0000E+00	
	3 13	FMS	4333	0.00000E+00			0.0000E+00	0.0000E+00		0.0000E+00	
	4 14	FMS	4333	0.00000E+00			0.0000E+00	0.0000E+00		0.0000E+00	
	5 15	FMS	4333	0.00000E+00			0.0000E+00	0.0000E+00		0.0000E+00	
	6 16	FMS	4333	0.00000E+00			0.0000E+00	0.0000E+00		0.0000E+00	
	7 17	FLS	4333	0.00000E+00			0.0000E+00	0.0000E+00		0.0000E+00	
	8 18	FLS	4333	0.00000E+00			0.0000E+00	0.0000E+00		0.0000E+00	
	9 19	FLS	4333	0.00000E+00			0.0000E+00	0.0000E+00		0.0000E+00	
	10	FLS	4333	0.00000E+00			0.0000E+00	0.0000E+00		0.0000E+00	
BL ID	PARAM ID	TYPE	HEX	ENG VALUE	SF		K			BIAS	
SH	1 21	FMS	D		N		0.0000E+00	0.0000E+00		0.0000E+00	
SFC	2 22	FMS	D		N		0.0000E+00	0.0000E+00		0.0000E+00	
	3 23	FMS	D		N		0.0000E+00	0.0000E+00		0.0000E+00	
	4 24	FMS	D		N		0.0000E+00	0.0000E+00		0.0000E+00	
	5 L FU REM	FMS	D		N		0.0000E+00	0.0000E+00		0.0000E+00	
	6 26	FMS	D		N		0.0000E+00	0.0000E+00		0.0000E+00	
	7 27	FLS	D		N		0.0000E+00	0.0000E+00		0.0000E+00	
	8	FLS	D								
	9 28	FLS	D		N		0.0000E+00	0.0000E+00		0.0000E+00	
	10	FLS	D								
BL ID	PARAM ID	TYPE	HEX	ENG VALUE	SF		K			BIAS	
OPS 0	1 31	FMS	D		N		0.0000E+00	0.0000E+00		0.0000E+00	
SFC	2 32	FMS	D		N		0.0000E+00	0.0000E+00		0.0000E+00	
	3 33	FMS	D		N		0.0000E+00	0.0000E+00		0.0000E+00	
	4 34	FMS	D		N		0.0000E+00	0.0000E+00		0.0000E+00	
	5 35	FMS	D		N		0.0000E+00	0.0000E+00		0.0000E+00	
	6 36	FMS	D		N		0.0000E+00	0.0000E+00		0.0000E+00	
	7 37	FLS	D		N		0.0000E+00	0.0000E+00		0.0000E+00	
	8	FLS	D								
	9 38	FLS	D		N		0.0000E+00	0.0000E+00		0.0000E+00	
	10	FLS	D								

Supporting Data

Only eight of the ten variable parameter slots for each major function can be labeled with an identifier. This is because six of the parameters are 16-bit words and two are 32-bit words. The following describes this in more detail.

The values shown in the ENG. VALUE column on the variable parameter are computed by the MOC as a first order polynomial of the form $EU = ax + b$.

- Where:
- EU = Engineering unit value.
 - x = Downlinked value converted to EU.
 - a = Value entered by MED using V20 menu and shown in the K column on the display
 - b = Value entered by MED using V20 menu and shown in the BIAS column on the display.

The raw values used to determine the value of x, for parameter slots 1 through 6, are 16-bit words.

The 16-bit words in parameter slots 7 and 8 are combined into a single 32-bit word to determine the value of x for computing the EU value for word slot 7; thus, word slot 8 has no EU value, and cannot be named. Word slots 9 and 10 function in the same way.

F/V		3/102		VARIABLE PARAMETER										RT1352F	
DEAT	30:06:07:16	ONET	7:14:28:20	SITE	NIL	01	51	0	0	0	0	0	0	0	0
RENT	30:06:07:16														
DL ID	PARAM ID	TYPE	HEX	ENG VALUE	SF	K	BIAS								
1	11	FXS	4333	0.00000E+00		0.0000E+00	0.0000E+00								
2	12	FXS	4333	0.00000E+00		0.0000E+00	0.0000E+00								
3	13	FXS	4333	0.00000E+00		0.0000E+00	0.0000E+00								
4	14	FXS	4333	0.00000E+00		0.0000E+00	0.0000E+00								
5	15	FXS	4333	0.00000E+00		0.0000E+00	0.0000E+00								
6	16	FXS	4333	0.00000E+00		0.0000E+00	0.0000E+00								
7	17	FLS	4333	0.00000E+00		0.0000E+00	0.0000E+00								
8		FLS	4333												
9	18	FLS	4333	0.00000E+00		0.0000E+00	0.0000E+00								
10		FLS	4333												
DL ID	PARAM ID	TYPE	HEX	ENG VALUE	SF	K	BIAS								
1	21	FXS	D		M	0.0000E+00	0.0000E+00								
2	22	FXS	D		M	0.0000E+00	0.0000E+00								
3	23	FXS	D		M	0.0000E+00	0.0000E+00								
4	24	FXS	D		M	0.0000E+00	0.0000E+00								
5	L FU REM	FXS	D		M	0.0000E+00	0.0000E+00								
6	26	FXS	D		M	0.0000E+00	0.0000E+00								
7	27	FLS	D		M	0.0000E+00	0.0000E+00								
8		FLS	D												
9	28	FLS	D		M	0.0000E+00	0.0000E+00								
10		FLS	D												
DL ID	PARAM ID	TYPE	HEX	ENG VALUE	SF	K	BIAS								
1	31	FXS	D		M	0.0000E+00	0.0000E+00								
2	32	FXS	D		M	0.0000E+00	0.0000E+00								
3	33	FXS	D		M	0.0000E+00	0.0000E+00								
4	34	FXS	D		M	0.0000E+00	0.0000E+00								
5	35	FXS	D		M	0.0000E+00	0.0000E+00								
6	36	FXS	D		M	0.0000E+00	0.0000E+00								
7	37	FLS	D		M	0.0000E+00	0.0000E+00								
8		FLS	D												
9	38	FLS	D		M	0.0000E+00	0.0000E+00								
10		FLS	D												

MED INPUT NUMBERS FOR PARAMETERS ID AND SCALE FACTORS

GNC

Parameter ID	Scale Factors	
	Constant	Bias
1	M11G1801M	M41G1800M
2	M12G1801M	M42G1800M
3	M13G1801M	M43G1800M
4	M14G1801M	M44G1800M
5	M15G1801M	M45G1800M
6	M16G1801M	M46G1800M
7	M17G1801M	M47G1800M
8		
9	M18G1801M	M48G1800M
10		

SM

Parameter ID	Scale Factors	
	Constant	Bias
1	M21G1801M	M51G1800M
2	M22G1801M	M52G1800M
3	M23G1801M	M53G1800M
4	M24G1801M	M54G1800M
5	M25G1801M	M55G1800M
6	M26G1801M	M56G1800M
7	M27G1801M	M57G1800M
8		
9	M28G1801M	M58G1800M
10		

OPS 0

Parameter ID	Scale Factors	
	Constant	Bias
1	M31G1801M	M61G1800M
2	M32G1801M	M62G1800M
3	M33G1801M	M63G1800M
4	M34G1801M	M64G1800M
5	M35G1801M	M65G1800M
6	M36G1801M	M66G1800M
7	M37G1801M	M67G1800M
8		
9	M38G1801M	M68G1800M
10		

Practice

Complete the menu provided to reflect the input required to enter all of the parameter labels shown on the display below. The table on the facing page, extracted from the Flight Computer Console Handbook, is provided to assist you in this exercise.

U234

002/RT

TLN SPECIAL COMP RTXT INPUT MENU

PARAMETER NUMBER	RTXT VALUE	PARAMETER NUMBER	RTXT VALUE

F/V		1/102		VARIABLE PARAMETER				RT13521352	
GENT 93:10:51:50		GNET 1:20:21:50		SITE 00A 01 129		EN 022		SA	
RENT 93:10:51:50				SPS				SF	
DL ID	PARAM ID	TYPE	HEX	ENS VALUE	SF	K	DIR		
ENC	10X AETH	FMS	41AD	0.0000E+00					
SPC	-2	FMS	41AD	0.0000E+00					
	3	FMS	41AD	0.0000E+00					
	4	FMS	4033	0.0000E+00					
	5	FMS	4033	0.0000E+00					
	6	FMS	4033	0.0000E+00					
	7 FWD MIX	FLS	0000	0.0000E+00					
	8	FLS	0000	0.0000E+00					
	9	FLS	0000	0.0000E+00					
	10	FLS	0000	0.0000E+00					
DL ID	PARAM ID	TYPE	HEX	ENS VALUE	SF	K	DIR		
EN	1	FMS	0		N	0.0000E+00	0.0000E+00		
SPC	-2	FMS	0		N	0.0000E+00	0.0000E+00		
	3	FMS	0		N	0.0000E+00	0.0000E+00		
	4 RES IN P	FMS	0		N	0.0000E+00	0.0000E+00		
	5 RES OT P	FMS	0		N	0.0000E+00	0.0000E+00		
	6	FMS	0		N	0.0000E+00	0.0000E+00		
	7	FLS	0		N	0.0000E+00	0.0000E+00		
	8	FLS	0		N	0.0000E+00	0.0000E+00		
	9	FLS	0		N	0.0000E+00	0.0000E+00		
	10	FLS	0		N	0.0000E+00	0.0000E+00		
DL ID	PARAM ID	TYPE	HEX	ENS VALUE	SF	K	DIR		
SPS 0	1	FMS	0		N	0.0000E+00	0.0000E+00		
SPC	-2	FMS	0		N	0.0000E+00	0.0000E+00		
	3	FMS	0		N	0.0000E+00	0.0000E+00		
	4	FMS	0		N	0.0000E+00	0.0000E+00		
	5	FMS	0		N	0.0000E+00	0.0000E+00		
	6	FMS	0		N	0.0000E+00	0.0000E+00		
	7	FLS	0		N	0.0000E+00	0.0000E+00		
	8	FLS	0		N	0.0000E+00	0.0000E+00		
	9	FLS	0		N	0.0000E+00	0.0000E+00		
	10	FLS	0		N	0.0000E+00	0.0000E+00		

MED INPUT NUMBERS FOR PARAMETERS ID AND SCALE FACTORS

GNC

Parameter ID		Scale Factors	
		Constant	Bias
1	M11G1801M	M11G1800M	M41G1800M
2	M12G1801M	M12G1800M	M42G1800M
3	M13G1801M	M13G1800M	M43G1800M
4	M14G1801M	M14G1800M	M44G1800M
5	M15G1801M	M15G1800M	M45G1800M
6	M16G1801M	M16G1800M	M46G1800M
7	M17G1801M	M17G1800M	M47G1800M
8			
9	M18G1801M	M18G1800M	M48G1800M
10			

SM

Parameter ID		Scale Factors	
		Constant	Bias
1	M21G1801M	M21G1800M	M51G1800M
2	M22G1801M	M22G1800M	M52G1800M
3	M23G1801M	M23G1800M	M53G1800M
4	M24G1801M	M24G1800M	M54G1800M
5	M25G1801M	M25G1800M	M55G1800M
6	M26G1801M	M26G1800M	M56G1800M
7	M27G1801M	M27G1800M	M57G1800M
8			
9	M28G1801M	M28G1800M	M58G1800M
10			

OPS 0

Parameter ID		Scale Factors	
		Constant	Bias
1	M31G1801M	M31G1800M	M61G1800M
2	M32G1801M	M32G1800M	M62G1800M
3	M33G1801M	M33G1800M	M63G1800M
4	M34G1801M	M34G1800M	M64G1800M
5	M35G1801M	M35G1800M	M65G1800M
6	M36G1801M	M36G1800M	M66G1800M
7	M37G1801M	M37G1800M	M67G1800M
8			
9	M38G1801M	M38G1800M	M68G1800M
10			

Practice Feedback

Complete the menu provided to reflect the input required to enter all of the parameter labels shown on the display below. The table on the facing page, extracted from the Flight Computer Console Handbook, is provided to assist you in this exercise.

U230

002/RT

TLN SPECIAL COMP RTXT INPUT MENU

PARAMETER NUMBER	RTXT VALUE	PARAMETER NUMBER	RTXT VALUE
M11G180IM	OX REM	M17G180IM	FWD MIX
M24G180IM	REG IN P	M25G180IM	REG OT P
M29G180IM	%HR.		

F/V		1/102		VARIABLE PARAMETER				RT13521352	
GMT	92:10:51:50	OWET	1:23:21:50	SITE	001 129	EN	022	SH	BF
GMT	92:10:51:50				0P50				
DL ID	PARAM ID	TYPE	HEX	ENS VALUE	SF	K	DIRS		
SHC	1 OX REM	FMS	41A0	0.0000E+00	N	0.0000E+00	0.0000E+00		
SPC	2	FMS	41A0	0.0000E+00	N	0.0000E+00	0.0000E+00		
	3	FMS	41A0	0.0000E+00	N	0.0000E+00	0.0000E+00		
	4	FMS	4033	0.0000E+00	N	0.0000E+00	0.0000E+00		
	5	FMS	4033	0.0000E+00	N	0.0000E+00	0.0000E+00		
	6	FMS	4033	0.0000E+00	N	0.0000E+00	0.0000E+00		
	7 FWD MIX	FLS	0000	0.0000E+00	N	0.0000E+00	0.0000E+00		
	8	FLS	0000	0.0000E+00	N	0.0000E+00	0.0000E+00		
	9	FLS	0000	0.0000E+00	N	0.0000E+00	0.0000E+00		
	10	FLS	0000	0.0000E+00	N	0.0000E+00	0.0000E+00		
DL ID	PARAM ID	TYPE	HEX	ENS VALUE	SF	K	DIRS		
SH	1	FMS	D	0.0000E+00	N	0.0000E+00	0.0000E+00		
SPC	2	FMS	D	0.0000E+00	N	0.0000E+00	0.0000E+00		
	3	FMS	D	0.0000E+00	N	0.0000E+00	0.0000E+00		
	4 REG IN P	FMS	D	0.0000E+00	N	0.0000E+00	0.0000E+00		
	5 REG OT P	FMS	D	0.0000E+00	N	0.0000E+00	0.0000E+00		
	6	FMS	D	0.0000E+00	N	0.0000E+00	0.0000E+00		
	7	FLS	D	0.0000E+00	N	0.0000E+00	0.0000E+00		
	8	FLS	D	0.0000E+00	N	0.0000E+00	0.0000E+00		
	9	FLS	D	0.0000E+00	N	0.0000E+00	0.0000E+00		
	10	FLS	D	0.0000E+00	N	0.0000E+00	0.0000E+00		
DL ID	PARAM ID	TYPE	HEX	ENS VALUE	SF	K	DIRS		
SPS	1	FMS	D	0.0000E+00	N	0.0000E+00	0.0000E+00		
SPC	2	FMS	D	0.0000E+00	N	0.0000E+00	0.0000E+00		
	3	FMS	D	0.0000E+00	N	0.0000E+00	0.0000E+00		
	4	FMS	D	0.0000E+00	N	0.0000E+00	0.0000E+00		
	5	FMS	D	0.0000E+00	N	0.0000E+00	0.0000E+00		
	6	FMS	D	0.0000E+00	N	0.0000E+00	0.0000E+00		
	7	FLS	D	0.0000E+00	N	0.0000E+00	0.0000E+00		
	8	FLS	D	0.0000E+00	N	0.0000E+00	0.0000E+00		
	9 %/HR.	FLS	D	0.0000E+00	N	0.0000E+00	0.0000E+00		
	10	FLS	D	0.0000E+00	N	0.0000E+00	0.0000E+00		

1. IDENTIFYING TELEMETRY MENU MED CODES
2. CHANGING OPERATIONAL LIMIT VALUES FOR INDIVIDUAL PARAMETERS
3. ENABLING, DISABLING, AND CHANGING CRITICAL LIMIT VALUES FOR INDIVIDUAL PARAMETERS
4. INHIBITING OFFSCALE HIGH/LOW LIMIT SENSING FOR INDIVIDUAL PARAMETERS
5. CHANGING HEXADECIMAL LIMITS
6. OVERRIDING TELEMETRY PARAMETER VALUES
7. DEFINING PARAMETERS ON A UNIVERSAL DIGITAL DISPLAY
8. DELETING PARAMETER(S) FROM, OR CLEARING, AN ENTIRE UNIVERSAL DIGITALS DISPLAY
9. RECONFIGURING UNIVERSAL PLOT
10. DELETING PARAMETER(S) FROM A UNIVERSAL PLOT
11. DRAWING REFERENCE LINE ON UNIVERSAL PLOT USING V41, TLM UNIVERSAL PLOT (NOMINAL DATA) MENU
12. DELETING/CHANGING A REFERENCE LINE ON UNIVERSAL PLOT
13. UNIVERSAL PLOT REFERENCE LINE AND CONTROL DATA INTERACTIONS
14. CHANGING SPECIAL COMPUTATION-CONSTANT ENGINEERING UNIT VALUES
15. CHANGING SPECIAL COMPUTATION TIME CONSTANTS
16. SELECTING MAJOR FUNCTION FOR DISPLAY 1350
17. CHANGING VARIABLE PARAMETER ID
18. USING MCC CALIBRATION DATA BOOK
19. CHANGING THE CALIBRATION CURVE
20. THRIFTS
21. SPECIAL AND SUPER THRIFT PRODUCT REQUEST
22. RECONFIGURATION OF THRIFTS

SEGMENT 18

USING MCC CALIBRATION DATA BOOK

OBJECTIVES:

- a. Locate telemetry parameter calibration data table records and curve plot using the calibration index table.
- b. Read and interpret the calibration data table and the applicable curve plot.

SEGMENT INTRODUCTION:

The MCC Calibration Data Book provides a measurement identification number page pertaining to a particular curve, a calibration data table, a curve plot, and a calibration data table index. These contain listings of all calibration curves, the parameters assigned to each one, polynomial coefficients or data point pairs which describe each curve, type of curve, and other descriptive information. A plot for each curve is also included with each listing in this book.

This segment describes the procedure for finding telemetry parameter identification numbers using the calibration data table index. It also instructs you how to read and interpret the calibration table records and curve plot.

For any given quantity sensed in the Shuttle vehicle, an output is generated first in volts (vdc). Calibration curves exist for each sensor (transducer), showing the relationship between the quantity sensed and volts dc (vdc) output. This relationship may also be represented by coefficients of the variable in a polynomial equation up to the 5th order.

The output of the transducer in vdc is converted to PCM counts, which are multiplexed into the composite telemetry signal and downlinked to the ground. At the MOC the data is compared with the calibration curves, converted to PCM counts, and then to engineering units for display.

The curves, which are stored in the MOC, are also published in the MCC Calibration Curve Book. Each telemetry parameter return linked from the Shuttle is contained within this book. Some curves are linear (straight line), while others are nonlinear. The curves and parameters for equipment changes and/or equipment performance changes are updated as required.

Learning Statement

FUNCTION

CALIBRATION DATA TABLE INDEX

Alphanumeric listing of telemetry measurement numbers that are calibrated and the curve number for each measurement.

MSID

Measurement identification number for telemetry data.

Curve Number

Curve number assigned by JSC to all the measurements listed alphanumerically on page.

Using Calibration Data Table Index

PROCEDURE

1. Determine the parameter number for a curve plot.
2. Find the parameter number in the Calibration Data Table Index.
3. Select the assigned curve number.
4. Turn to the page in the MCC Calibration Data Book that has this curve number.

NOTE

The curve number is listed in numerical order on the bottom of each page in the lower right corner.

- CALIBRATION DATA TABLE INDEX -

MSID	CRVE	MSID	CRVE	MSID	CRVE	MSID	CRVE	MSID	CRVE	MSID	CRVE
V58H0808C	0099	V58P0918C	0092	V58P1283A	0091	V58T9188A	0028	V58T9352A	0028	V61T2619A	0038
V58H0809C	0099	V58P0919C	0092	V58P1284A	0091	V58T9192A	0028	V58T9356A	0028	V61T2621A	0038
V58P0812A	0091	V58P0920C	0099	V58P1286A	0091	V58T9160A	0028	V58T9361A	0028	V61T2622A	0038
V58P0813A	0091	V58T0930A	0028	V58P1287A	0091	V58T9165A	0028	V58T9361A	0028	V61T2624A	0038
V58P0814A	0091	V58T0933A	0028	V58P1288A	0091	V58T9178A	0028	V58T9361A	0028	V61T2625A	0038
V58P0815A	0091	V58H0952A	0102	V58P1289A	0091	V58T9183A	0028	V58T9361A	0028	V61T2627A	0038
V58P0816C	0092	V58H0953A	0102	V58H1330A	0113	V58T9186A	0028	V58T9361A	0028	V61T2628A	0038
V58P0817C	0092	V58H0954A	0102	V58T1330A	0028	V58T9188A	0028	V58T9361A	0028	V61T2630A	0038
V58P0818C	0092	V58H0955A	0102	V58T1331A	0028	V58T9189A	0028	V58T9361A	0028	V61T2631A	0038
V58P0819C	0092	V58H0956C	0101	V58H1350A	0115	V58T9190A	0028	V58T9361A	0028	V61T2635A	0120
V58P0820C	0099	V58H0957C	0101	V58H1364C	0110	V58T9191A	0028	V58T9361A	0028	V61T2640A	0038
V58T0830A	0028	V58H0958C	0101	V58H1368C	0112	V58T9194A	0028	V58T9361A	0028	V61T2642A	0120
V58T0833A	0028	V58H0959C	0101	V58P1381A	0091	V58T9195A	0028	V58T9361A	0028	V61T2647A	0246
V58T0841A	0028	V58P0962A	0091	V58P1382A	0091	V58T9197A	0028	V58T9361A	0028	V61T2650A	0120
V58T0842A	0028	V58P0963A	0091	V58P1383A	0091	V58T9200A	0028	V58T9361A	0028	V61T2658A	0245
V58T0845A	0028	V58P0964A	0091	V58P1384A	0091	V58T9208A	0028	V58T9361A	0028	V61T2661A	0120
V58T0846A	0028	V58P0965A	0091	V58P1386A	0091	V58P9216A	0178	V58T9361A	0028	V61T2663A	0038
V58H0852A	0102	V58P0966C	0092	V58P1387A	0091	V58T9220A	0029	V58T9361A	0028	V61T2665A	0038
V58H0853A	0102	V58P0967C	0092	V58P1388A	0091	V58T9222A	0029	V58T9361A	0028	V61T2700A	0230
V58H0854A	0102	V58P0968C	0092	V58P1389A	0091	V58T9223A	0029	V58T9361A	0028	V61T2705A	0228
V58H0855A	0102	V58P0969C	0092	V58T1600A	0028	V58T9229A	0029	V58T9361A	0028	V61T2710A	0250
V58H0856C	0101	V58K0970C	0101	V58T1650A	0028	V58T9230A	0029	V58T9361A	0028	V61T2712A	0037
V58H0857C	0101	V58T0980A	0028	V58T1651A	0028	V58T9230A	0029	V58T9361A	0028	V61T2722A	0257
V58H0858C	0101	V58T0983A	0028	V58T1700A	0028	V58T9231A	0029	V58T9361A	0028	V61T2723A	0038
V58H0859C	0101	V58T1006A	0028	V58T1702A	0028	V58T9231A	0029	V58T9361A	0028	V61T2724A	0038
V58P0862A	0091	V58H1100A	0113	V58T1703A	0028	V58T9233A	0028	V58T9361A	0028	V61T2740A	0038
V58P0863A	0091	V58T1130A	0028	V58T1750A	0028	V58T9236A	0028	V58T9361A	0028	V61T2742A	0258
V58P0864A	0091	V58T1131A	0028	V58T1752A	0028	V58T9242A	0028	V58T9361A	0028	V61T2743A	0038
V58P0865A	0091	V58T1139A	0028	V58T2111A	0028	V58T9244A	0028	V58T9361A	0028	V61T2744A	0038
V58P0866C	0092	V58T1143A	0028	V58T2140A	0028	V58T9252A	0028	V58T9361A	0028	V61T2749A	0149
V58P0867C	0092	V58H1150A	0115	V58T2200A	0028	V58T9255A	0028	V58T9361A	0028	V61T2750A	0029
V58P0868C	0092	V58K1164C	0110	V58T2211A	0028	V58T9258A	0028	V58T9361A	0028	V61T2751A	0029
V58P0869C	0092	V58K1168C	0112	V58T2240A	0028	V58T9259A	0028	V58T9361A	0028	V61T2752A	0029
V58P0870C	0101	V58P1181A	0091	V58T2311A	0028	V58T9261A	0028	V58T9361A	0028	V61T2753A	0029
V58T0880A	0028	V58P1182A	0091	V58T2320A	0028	V58T9262A	0028	V58T9361A	0028	V61T2754A	0029
V58T0883A	0028	V58P1183A	0091	V58T2340A	0028	V58T9263A	0028	V58T9361A	0028	V61T2755A	0029
V58H0902A	0100	V58P1184A	0091	V58T2340A	0028	V58T9264A	0028	V58T9361A	0028	V61T2756A	0029
V58H0903A	0100	V58P1186A	0091	V58T2340A	0028	V58T9265A	0028	V58T9361A	0028	V61T2757A	0029
V58H0904A	0100	V58P1187A	0091	V58T2340A	0028	V58T9266A	0028	V58T9361A	0028	V61T2758A	0029
V58H0905A	0100	V58P1188A	0091	V58T2340A	0028	V58T9267A	0028	V58T9361A	0028	V61T2759A	0029
V58H0906C	0099	V58P1189A	0091	V58T2340A	0028	V58T9268A	0028	V58T9361A	0028	V61T2760A	0029
V58H0907C	0099	V58H1200A	0114	V58T2340A	0028	V58T9269A	0028	V58T9361A	0028	V61T2761A	0029
V58H0908C	0099	V58T1230A	0028	V58T2340A	0028	V58T9270A	0028	V58T9361A	0028	V61T2762A	0029
V58H0909C	0099	V58T1231A	0028	V58T2340A	0028	V58T9271A	0028	V58T9361A	0028	V61T2763A	0029
V58P0912A	0091	V58T1233A	0028	V58T2340A	0028	V58T9272A	0028	V58T9361A	0028	V61T2764A	0029
V58P0913A	0091	V58H1250A	0115	V58T2340A	0028	V58T9273A	0028	V58T9361A	0028	V61T2765A	0029
V58P0914A	0091	V58K1264C	0111	V58T2340A	0028	V58T9274A	0028	V58T9361A	0028	V61T2766A	0029
V58P0915A	0091	V58K1268C	0112	V58T2340A	0028	V58T9275A	0028	V58T9361A	0028	V61T2767A	0029
V58P0916C	0092	V58P1281A	0091	V58T2340A	0028	V58T9276A	0028	V58T9361A	0028	V61T2768A	0029
V58P0917C	0092	V58P1282A	0091	V58T2340A	0028	V58T9277A	0028	V58T9361A	0028	V61T2769A	0029

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FUNCTION

Calibration Data Table

Provides information necessary for complete parameter identification, calibration data history and a curve fit in the form of engineering units versus PCM counts and volts dc.

- DATE - The date that the calibration data table was constructed.
- VEHICLE NUMBER
- DATE CALIB - Date measurement sensor was calibrated.
- CAL RNGE (Lo, Hi) - Expresses low and high range for parameter measurement.
- CALIB COEFF - Coefficients of a polynomial equation that describes calibration data for this measurement. Values range from A(0) to A(5).
- E (Exponent) - Exponent 01 is 10⁻¹
Ordinate Y1 - Data Points of Y1 through Y11
Abscissa - Data points of X1 through X11

NOTE

Data point pairs are used when calibration data cannot be expressed as curve fit.

- UNIPOLAR or BIPOLAR Measurement
- CURVE ORDER - Indicates the curve fit order of polynomial equation where 0, if present, indicates data fit is not by a polynomial equation and 1-5 specifies a first through fifth order equation.
- SER/REV (Series Revision) LEVEL - Expresses the latest calibration revision code associated with the parameter.
- Number of data bits
- PCM COUNT
- VDC - Volts dc associated with PCM count
- EU - Engineering units associated with VDC and PCM
- Curve number

FLIGHT NO. 102
DATE CALIB 09/20/77
CAL RNGE LO 000000
CAL RNGE HI 500.0000

---CALIBRATION DATA TABLE---

DATE 11/19/80
VEHICLE NO. 102
DATE CALIB 09/20/77
CAL RNGE LO 000000
CAL RNGE HI 500.0000

FLIGHT NO. STS-01
DATA RANGE UNITS PSIA
MMOB CURVE NO. 0010

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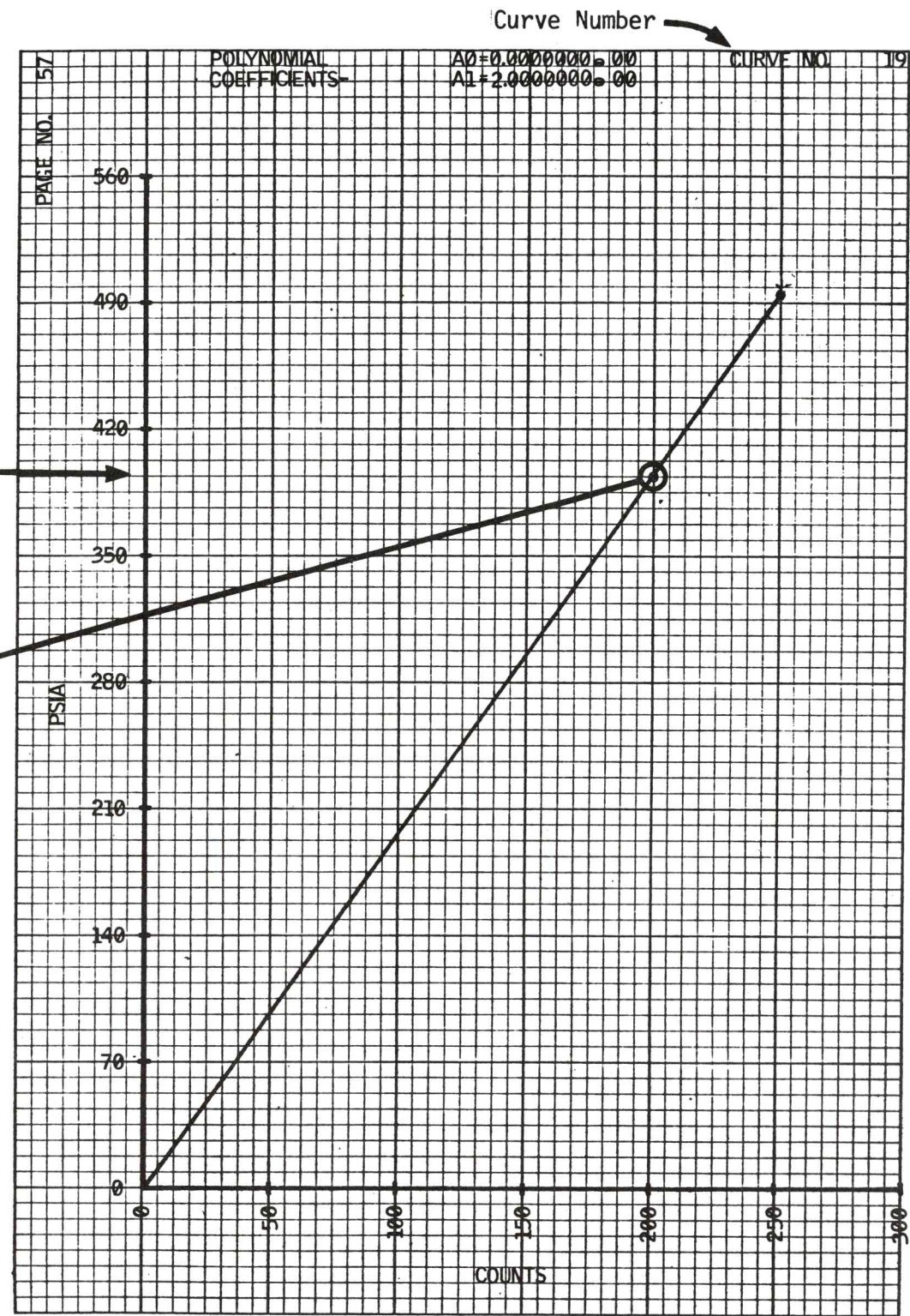
SER/REV LEVEL 01
DATA TYPE AMU
NO. OF BITS 8

CALIB COEFF: A0=+0.000000E+00 A1=+2.000000E+00
ORDINATE Y1= X1= X2= X3= X4= X5= X6= X7= X8= X9= X10= X11=

ABSCISSA X1= X2= X3= X4= X5= X6= X7= X8= X9= X10= X11=

PCM	VDC	EU	PCM	VDC	EU	PCM	VDC	EU	PCM	VDC	EU	PCM	VDC	EU	PCM	VDC	EU
0	0.00	0.000000	43	0.86	86.000000	86	1.72	172.0000	129	2.58	258.0000	173	3.46	346.0000	215	4.30	430.0000
1	0.02	2.000000	44	0.88	88.000000	87	1.74	174.0000	130	2.60	260.0000	174	3.48	348.0000	216	4.32	432.0000
2	0.04	4.000000	45	0.90	90.000000	88	1.76	176.0000	131	2.62	262.0000	175	3.50	350.0000	217	4.34	434.0000
3	0.06	6.000000	46	0.92	92.000000	89	1.78	178.0000	132	2.64	264.0000	176	3.52	352.0000	218	4.36	436.0000
4	0.08	8.000000	47	0.94	94.000000	90	1.80	180.0000	133	2.66	266.0000	177	3.54	354.0000	219	4.38	438.0000
5	0.10	10.000000	48	0.96	96.000000	91	1.82	182.0000	134	2.68	268.0000	178	3.56	356.0000	220	4.40	440.0000
6	0.12	12.000000	49	0.98	98.000000	92	1.84	184.0000	135	2.70	270.0000	179	3.58	358.0000	221	4.42	442.0000
7	0.14	14.000000	50	1.00	100.000000	93	1.86	186.0000	136	2.72	272.0000	180	3.60	360.0000	222	4.44	444.0000
8	0.16	16.000000	51	1.02	102.000000	94	1.88	188.0000	137	2.74	274.0000	181	3.62	362.0000	223	4.46	446.0000
9	0.18	18.000000	52	1.04	104.000000	95	1.90	190.0000	138	2.76	276.0000	182	3.64	364.0000	224	4.48	448.0000
10	0.20	20.000000	53	1.06	106.000000	96	1.92	192.0000	139	2.78	278.0000	183	3.66	366.0000	225	4.50	450.0000
11	0.22	22.000000	54	1.08	108.000000	97	1.94	194.0000	140	2.80	280.0000	184	3.68	368.0000	226	4.52	452.0000
12	0.24	24.000000	55	1.10	110.000000	98	1.96	196.0000	141	2.82	282.0000	185	3.70	370.0000	227	4.54	454.0000
13	0.26	26.000000	56	1.12	112.000000	99	1.98	198.0000	142	2.84	284.0000	186	3.72	372.0000	228	4.56	456.0000
14	0.28	28.000000	57	1.14	114.000000	100	2.00	200.0000	143	2.86	286.0000	187	3.74	374.0000	229	4.58	458.0000
15	0.30	30.000000	58	1.16	116.000000	101	2.02	202.0000	144	2.88	288.0000	188	3.76	376.0000	230	4.60	460.0000
16	0.32	32.000000	59	1.18	118.000000	102	2.04	204.0000	145	2.90	290.0000	189	3.78	378.0000	231	4.62	462.0000
17	0.34	34.000000	60	1.20	120.000000	103	2.06	206.0000	146	2.92	292.0000	190	3.80	380.0000	232	4.64	464.0000
18	0.36	36.000000	61	1.22	122.000000	104	2.08	208.0000	147	2.94	294.0000	191	3.82	382.0000	233	4.66	466.0000
19	0.38	38.000000	62	1.24	124.000000	105	2.10	210.0000	148	2.96	296.0000	192	3.84	384.0000	234	4.68	468.0000
20	0.40	40.000000	63	1.26	126.000000	106	2.12	212.0000	149	2.98	298.0000	193	3.86	386.0000	235	4.70	470.0000
21	0.42	42.000000	64	1.28	128.000000	107	2.14	214.0000	150	3.00	300.0000	194	3.88	388.0000	236	4.72	472.0000
22	0.44	44.000000	65	1.30	130.000000	108	2.16	216.0000	151	3.02	302.0000	195	3.90	390.0000	237	4.74	474.0000
23	0.46	46.000000	66	1.32	132.000000	109	2.18	218.0000	152	3.04	304.0000	196	3.92	392.0000	238	4.76	476.0000
24	0.48	48.000000	67	1.34	134.000000	110	2.20	220.0000	153	3.06	306.0000	197	3.94	394.0000	239	4.78	478.0000
25	0.50	50.000000	68	1.36	136.000000	111	2.22	222.0000	154	3.08	308.0000	198	3.96	396.0000	240	4.80	480.0000
26	0.52	52.000000	69	1.38	138.000000	112	2.24	224.0000	155	3.10	310.0000	199	3.98	398.0000	241	4.82	482.0000
27	0.54	54.000000	70	1.40	140.000000	113	2.26	226.0000	156	3.12	312.0000	200	4.00	400.0000	242	4.84	484.0000
28	0.56	56.000000	71	1.42	142.000000	114	2.28	228.0000	157	3.14	314.0000	201	4.02	402.0000	243	4.86	486.0000
29	0.58	58.000000	72	1.44	144.000000	115	2.30	230.0000	158	3.16	316.0000	202	4.04	404.0000	244	4.88	488.0000
30	0.60	60.000000	73	1.46	146.000000	116	2.32	232.0000	159	3.18	318.0000	203	4.06	406.0000	245	4.90	490.0000
31	0.62	62.000000	74	1.48	148.000000	117	2.34	234.0000	160	3.20	320.0000	204	4.08	408.0000	246	4.92	492.0000
32	0.64	64.000000	75	1.50	150.000000	118	2.36	236.0000	161	3.22	322.0000	205	4.10	410.0000	247	4.94	494.0000
33	0.66	66.000000	76	1.52	152.000000	119	2.38	238.0000	162	3.24	324.0000	206	4.12	412.0000	248	4.96	496.0000
34	0.68	68.000000	77	1.54	154.000000	120	2.40	240.0000	163	3.26	326.0000	207	4.14	414.0000	249	4.98	498.0000
35	0.70	70.000000	78	1.56	156.000000	121	2.42	242.0000	164	3.28	328.0000	208	4.16	416.0000	250	5.00	500.0000
36	0.72	72.000000	79	1.58	158.000000	122	2.44	244.0000	165	3.30	330.0000	209	4.18	418.0000			
37	0.74	74.000000	80	1.60	160.000000	123	2.46	246.0000	166	3.32	332.0000	210	4.20	420.0000			
38	0.76	76.000000	81	1.62	162.000000	124	2.48	248.0000	167	3.34	334.0000	211	4.22	422.0000			
39	0.78	78.000000	82	1.64	164.000000	125	2.50	250.0000	168	3.36	336.0000	212	4.24	424.0000			
40	0.80	80.000000	83	1.66	166.000000	126	2.52	252.0000	169	3.38	338.0000	213	4.26	426.0000			
41	0.82	82.000000	84	1.68	168.000000	127	2.54	254.0000	170	3.40	340.0000	214	4.28	428.0000			
42	0.84	84.000000	85	1.70	170.000000	128	2.56	256.0000	171	3.42	342.0000	215	4.30	430.0000			

Reading and Interpreting
Calibration Data Table
and Applicable Curve



Supporting Data

The MCC Calibration Data Book provides measurement identification numbers pertaining to a particular curve, a Calibration Data Table, a curve plot, and a Calibration Data Table Index. The Calibration Data Table Index contains a listing of all the telemetry parameters, a measurement identification number, and its applicable curve number. This listing is found in the back of the MCC calibration book. To find a curve for a particular parameter, look for the measurement number in the Calibration Data Table Index. The curve number is listed opposite the measurement number. The parameter calibration curve and table are listed by curve number in numerical order in the book. The curve number is found in the lower right hand corner of the page.

The Calibration Data Table contains data describing the calibration curve for applicable telemetry parameter. Calibration curves are described either by a polynomial curve of up to the 5th order or by eleven X and Y data point pairs. The PCM count value and its applicable VDC and EU are listed in this table.

Practice

- Given the following page from the MCC Calibration Data Table Index, list the curve number for the following telemetry parameters.

Measurement Number

Curve No.

V63P1197A
V71T9418A
V63T1878A
V72K1155C
V71H3120B
V72H0913C

- CALIBRATION DATA TABLE INDEX -											
MSID	CRVE	MSID	CRVE	MSID	CRVE	MSID	CRVE	MSID	CRVE	MSID	CRVE
V62T0551A	0028	V63T1810A	0029	V63T9227A	0029	V71K3526B	0173	V71T9420A	0094	V72H1025C	0183
V62T0556A	0033	V63T1820A	0030	V63T9228A	0029	V71K3531B	0173	V72H0910C	0139	V72H1027C	0063
V62T0578A	0033	V63T1821A	0030	V63T9229A	0029	V71R4040B	0054	V72H0911C	0140	V72H1027C	0065
V62Q0590A	0128	V63T1870A	0032	V63T9234A	0027	V71H4060B	0012	V72H0912C	0139	V72H1027C	0066
V62Q0591A	0128	V63T1871A	0032	V63T9236A	0094	V71H4080B	0053	V72H0913C	0140	V72H1027C	0178
V62Q0595A	0128	V63T1872A	0032	V63T9238A	0094	V71H4100B	0013	V72H0914C	0139	V72H1027C	0180
V62Q0608A	0128	V63T1873A	0032	V64P0101A	0084	V71H4120B	0053	V72H0915C	0140	V72H1027C	0184
V62Q0609A	0128	V63T1874A	0032	V64P0102A	0084	V71H4140B	0013	V72R0916C	0177	V72H1029C	0063
V62Q0618A	0128	V63T1875A	0032	V64T0130A	0033	V71H4160B	0053	V72R0916C	0179	V72H1029C	0178
V62Q0619A	0128	V63T1876A	0032	V64T0131A	0033	V71H4180B	0013	V72R0916C	0181	V72H1029C	0180
V62Q0628A	0128	V63T1877A	0032	V64P0201A	0137	V71L4200B	0151	V72R0917C	0177	V72H1029C	0191
V62Q0629A	0128	V63T1878A	0029	V64P0202A	0039	V71L4220B	0151	V72R0917C	0179	V72H1110C	0139
V62T9011A	0029	V63T1879A	0029	V64V0210A	0162	V71L4240B	0151	V72R0917C	0181	V72H1111C	0139
V62T9012A	0029	V63T1890A	0030	V64C0211A	0157	V71H4261B	0173	V72R0918C	0177	V72H1112C	0139
V62T9015A	0029	V63T9126A	0029	V64C0213A	0158	V71H4266B	0173	V72R0918C	0179	V72H1113C	0140
V62T9016A	0029	V63T9128A	0029	V64C0214A	0157	V71H4271B	0173	V72R0918C	0181	V72H1114C	0140
V62T9017A	0029	V63R9159A	0121	V67V0100A	0046	V71K4521B	0173	V72H0925C	0063	V72H1115C	0140
V62T9021A	0029	V63T9161A	0032	V67V0200A	0046	V71K4526B	0173	V72H0925C	0064	V72R1116C	0177
V62T9022A	0029	V63T9162A	0125	V71R2040B	0054	V71K4531B	0173	V72H0925C	0067	V72R1116C	0179
V62T9113A	0029	V63T9163A	0033	V71H2060B	0012	V71Q5029B	0118	V72H0925C	0180	V72R1116C	0181
V62Q9150A	0122	V63T9164A	0033	V71H2080B	0053	V71H5041B	0119	V72H0925C	0183	V72R1117C	0177
V62Q9160A	0122	V63T9166A	0033	V71H2100B	0013	V71H5061B	0119	V72H0927C	0063	V72R1117C	0179
V63R1100A	0226	V63T9167A	0033	V71H2120B	0053	V71Q5529B	0118	V72H0927C	0065	V72R1117C	0181
V63R1103A	0225	V63T9172A	0033	V71H2140B	0013	V71H5541B	0119	V72H0927C	0066	V72R1118C	0177
V63R1105A	0121	V63T9181A	0029	V71H2160B	0053	V71H5561B	0119	V72H0927C	0178	V72R1118C	0179
V63P1108A	0255	V63T9182A	0029	V71H2180B	0013	V71P7040B	0051	V72H0927C	0180	V72R1118C	0181
V63Q11130A	0254	V63T9183A	0029	V71L2200B	0151	V71P7080B	0050	V72H0927C	0184	V72H1125C	0063
V63T1155A	0044	V63T9184A	0029	V71L2220B	0151	V71T7100B	0052	V72H0929C	0063	V72H1125C	0178
V63T1180A	0027	V63T9185A	0029	V71L2240B	0151	V71P7120B	0050	V72H0929C	0178	V72H1125C	0180
V63T1188A	0027	V63T9186A	0029	V71H2261B	0173	V71P7140B	0050	V72H0929C	0180	V72H1127C	0063
V63P1196A	0016	V63T9187A	0029	V71H2266B	0173	V71P7540B	0051	V72H0929C	0191	V72H1127C	0178
V63P1197A	0016	V63T9188A	0029	V71H2271B	0173	V71P7580B	0050	V72H1010C	0067	V72H1127C	0180
V63T1207A	0125	V63T9200A	0029	V71K2521B	0173	V71T7600B	0052	V72H1011C	0068	V72H1129C	0063
V63T1208A	0033	V63T9201A	0029	V71K2526B	0173	V71P7620B	0050	V72H1012C	0067	V72H1129C	0178
V63T1209A	0032	V63T9202A	0029	V71K2531B	0173	V71P7640B	0050	V72H1013C	0068	V72H1129C	0180
V63T1210A	0094	V63T9203A	0029	V71R3040B	0054	V71P8040B	0051	V72H1014C	0067	V72K1155C	0001
V63R1300A	0264	V63T9204A	0029	V71H3060B	0012	V71P8080B	0050	V72H1015C	0068	V72K1156C	0001
V63R1303A	0263	V63T9207A	0029	V71H3080B	0053	V71T8100B	0052	V72R1016C	0177	V72K1157C	0001
V63R1305A	0121	V63T9208A	0029	V71H3100B	0013	V71P8120B	0050	V72R1016C	0179	V72K1170C	0001
V63P1308A	0256	V63T9211A	0030	V71H3120B	0053	V71P8140B	0050	V72R1016C	0181	V72K1171C	0001
V63Q1330A	0253	V63T9212A	0029	V71H3140B	0013	V71P8540B	0051	V72R1017C	0177	V72K1172C	0001
V63T1407A	0125	V63T9213A	0030	V71H3160B	0053	V71P8580B	0050	V72R1017C	0179	V72K1185C	0001
V63T1408A	0033	V63T9214A	0029	V71H3180B	0013	V71T8600B	0052	V72R1017C	0181	V72K1186C	0001
V63T1409A	0032	V63T9215A	0030	V71L3200B	0151	V71P8620B	0050	V72R1018C	0177	V72K1187C	0001
V63T1410A	0094	V63T9216A	0030	V71L3220B	0151	V71P8640B	0050	V72R1018C	0179	V72K1205C	0001
V63T1750A	0125	V63T9219A	0030	V71L3240B	0151	V71T9051A	0032	V72R1018C	0181	V72K1206C	0001
V63T1760A	0125	V63T9221A	0030	V71H3261B	0173	V71T9054A	0126	V72H1025C	0063	V72K1207C	0001
V63T1800A	0029	V63T9222A	0030	V71H3266B	0173	V71T9055A	0126	V72H1025C	0064	V72K1220C	0001
V63T1801A	0030	V63T9225A	0029	V71H3271B	0173	V71T9417A	0032	V72H1025C	0178	V72K1221C	0001
V63T1802A	0030	V63T9226A	0029	V71K3521B	0173	V71T9418A	0032	V72H1025C	0180	V72K1222C	0001

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Practice Feedback

- Given the following page from the MCC Calibration Data Table Index, list the curve number for the following telemetry parameters.

Measurement Number

Curve No.

V63P1197A
V71T9418A
V63T1878A
V72K1155C
V71H3120B
V72H0913C

0016
0032
0029
0001
0053
0140

- CALIBRATION DATA TABLE INDEX -											
MSID	CRVE	MSID	CRVE	MSID	CRVE	MSID	CRVE	MSID	CRVE	MSID	CRVE
V62T0551A	0028	V63T1810A	0029	V63T9227A	0029	V71K3526B	0173	V71T9420A	0094	V72H1025C	0183
V62T0556A	0033	V63T1820A	0030	V63T9228A	0029	V71K3531B	0173	V72H0910C	0139	V72H1027C	0063
V62T0578A	0033	V63T1821A	0030	V63T9229A	0029	V71K4040B	0054	V72H0911C	0140	V72H1027C	0065
V62Q0590A	0128	V63T1870A	0032	V63T9234A	0027	V71H4060B	0012	V72H0912C	0140	V72H1027C	0066
V62Q0591A	0128	V63T1871A	0032	V63T9236A	0094	V71H4080B	0053	V72H0913C	0140	V72H1027C	0178
V62Q0595A	0128	V63T1872A	0032	V63T9238A	0094	V71H4100B	0013	V72H0914C	0140	V72H1027C	0180
V62Q0608A	0128	V63T1873A	0032	V64P0101A	0084	V71H4120B	0053	V72H0915C	0140	V72H1027C	0184
V62Q0609A	0128	V63T1874A	0032	V64P0102A	0084	V71H4140B	0013	V72R0916C	0177	V72H1029C	0063
V62Q0618A	0128	V63T1875A	0032	V64T0130A	0033	V71H4160B	0053	V72R0916C	0179	V72H1029C	0178
V62Q0619A	0128	V63T1876A	0032	V64T0131A	0033	V71H4180B	0013	V72R0917C	0181	V72H1029C	0180
V62Q0628A	0128	V63T1877A	0032	V64P0201A	0137	V71L4200B	0151	V72R0917C	0177	V72H1029C	0191
V62Q0629A	0128	V63T1878A	0029	V64P0202A	0039	V71L4220B	0151	V72R0917C	0179	V72H1110C	0139
V62T9011A	0029	V63T1879A	0029	V64V0210A	0162	V71L4240B	0151	V72R0917C	0181	V72H1111C	0139
V62T9012A	0029	V63T1890A	0030	V64C0211A	0157	V71H4261B	0173	V72R0918C	0177	V72H1112C	0139
V62T9015A	0029	V63T9126A	0029	V64V0213A	0158	V71H4266B	0173	V72R0918C	0179	V72H1113C	0140
V62T9016A	0029	V63T9128A	0029	V64C0214A	0157	V71H4271B	0173	V72R0918C	0181	V72H1114C	0140
V62T9017A	0029	V63R9159A	0121	V67V0100A	0046	V71K4521B	0173	V72H0925C	0063	V72H1115C	0140
V62T9021A	0029	V63T9161A	0032	V67V0200A	0046	V71K4526B	0173	V72H0925C	0064	V72R1116C	0177
V62T9022A	0029	V63T9162A	0125	V71R2040B	0054	V71K4531B	0173	V72H0925C	0178	V72R1116C	0179
V62T9113A	0029	V63T9163A	0033	V71H2060B	0012	V71Q5029B	0118	V72H0925C	0180	V72R1116C	0181
V62Q9150A	0122	V63T9164A	0033	V71H2080B	0053	V71H5041B	0119	V72H0925C	0183	V72R1117C	0177
V62Q9160A	0122	V63T9166A	0033	V71H2109B	0013	V71H5061B	0119	V72H0927C	0063	V72R1117C	0179
V63R1110A	0226	V63T9167A	0033	V71H2120B	0053	V71Q5529B	0118	V72H0927C	0065	V72R1117C	0181
V63R11103A	0225	V63T9172A	0033	V71H2140B	0013	V71H5541B	0119	V72H0927C	0066	V72R1118C	0177
V63R11105A	0121	V63T9181A	0029	V71H2160B	0053	V71H5561B	0119	V72H0927C	0178	V72R1118C	0179
V63P11108A	0255	V63T9182A	0029	V71H2180B	0013	V71P7040B	0051	V72H0927C	0180	V72R1118C	0181
V63Q11130A	0254	V63T9183A	0029	V71L2200B	0151	V71P7080B	0050	V72H0927C	0184	V72H1125C	0063
V63T11155A	0044	V63T9184A	0029	V71L2220B	0151	V71T7100B	0052	V72H0929C	0063	V72H1125C	0178
V63T11180A	0027	V63T9185A	0029	V71L2240B	0151	V71P7120B	0050	V72H0929C	0178	V72H1125C	0180
V63T11188A	0027	V63T9186A	0029	V71H2261B	0173	V71P7140B	0050	V72H0929C	0180	V72H1127C	0063
V63P11196A	0016	V63T9187A	0029	V71H2266B	0173	V71P7540B	0051	V72H0929C	0191	V72H1127C	0178
V63P11197A	0016	V63T9188A	0029	V71H2271B	0173	V71P7580B	0050	V72H1010C	0067	V72H1127C	0180
V63T1207A	0129	V63T9200A	0029	V71K2521B	0173	V71T7600B	0052	V72H1011C	0068	V72H1129C	0063
V63T1208A	0033	V63T9201A	0029	V71K2526B	0173	V71P7620B	0050	V72H1012C	0067	V72H1129C	0178
V63T1209A	0032	V63T9202A	0029	V71K2531B	0173	V71P7640B	0050	V72H1013C	0068	V72H1129C	0180
V63T1210A	0094	V63T9203A	0029	V71R3040B	0054	V71P8040B	0051	V72H1014C	0067	V72K1155C	0001
V63R1300A	0264	V63T9204A	0029	V71K3060B	0012	V71P8060B	0050	V72H1015C	0068	V72K1156C	0001
V63R1303A	0263	V63T9207A	0029	V71H3080B	0053	V71T8100B	0052	V72H1016C	0177	V72K1157C	0001
V63R1305A	0121	V63T9208A	0029	V71H3100B	0053	V71P8120B	0050	V72R1016C	0179	V72K1170C	0001
V63P1308A	0256	V63T9211A	0030	V71H3120B	0053	V71P8140B	0050	V72R1016C	0181	V72K1171C	0001
V63Q1330A	0253	V63T9212A	0029	V71H3140B	0013	V71P8540B	0051	V72R1017C	0177	V72K1172C	0001
V63T1407A	0125	V63T9213A	0030	V71H3160B	0053	V71P8580B	0050	V72R1017C	0179	V72K1185C	0001
V63T1408A	0033	V63T9214A	0029	V71H3180B	0013	V71T8600B	0052	V72R1017C	0181	V72K1186C	0001
V63T1409A	0032	V63T9215A	0030	V71L3200B	0151	V71P8620B	0050	V72R1018C	0177	V72K1187C	0001
V63T1410A	0094	V63T9216A	0030	V71L3220B	0151	V71P8640B	0050	V72R1018C	0179	V72K1205C	0001
V63T1750A	0125	V63T9219A	0030	V71L3240B	0151	V71T9051A	0032	V72R1018C	0181	V72K1206C	0001
V63T1760A	0125	V63T9221A	0030	V71H3261B	0173	V71T9054A	0126	V72H1025C	0063	V72K1207C	0001
V63T1800A	0029	V63T9222A	0030	V71H3266B	0173	V71T9055A	0126	V72H1025C	0064	V72K1220C	0001
V63T1801A	0030	V63T9225A	0029	V71H3271B	0173	V71T9417A	0032	V72H1025C	0178	V72K1221C	0001
V63T1802A	0030	V63T9226A	0029	V71K3521B	0173	V71T9418A	0032	V72H1025C	0180	V72K1222C	0001

PAGE VI

Practice

2. Given the Calibration Data Table below, list the following:

a) Calibration high and low range values

High -

Low -

b) Calibration coefficients

c) Curve order number

--CALIBRATION DATA TABLE--																PAGE 242	
DATE 10/16/80																	
VEHICLE NO. 02																	
DATE CALIB 11/17/78																	
CAL RANGE LO .0000000																	
CAL RANGE HI 3500.000																	
FLIGHT NO. STS-01																	
DATA RANGE UNITS PSIA																	
CURVE ORDER 1																	
MMDB CURVE NO. NO478																	
SER/REV UNIPOLAR																	
DATA TYPE AMU																	
NO. OF BITS 8																	
CALIB COEFF. AO= +0.0000000E+00 A1= +1.4000000E+01																	
ORDINATE Y1= Y2= Y3= Y4= Y5= Y6= Y7= Y8= Y9= Y10= Y11=																	
ABSCISSA X1= X2= X3= X4= X5= X6= X7= X8= X9= X10= X11=																	
PCM	VDC	EU	PCM	VDC	EU	PCM	VDC	EU	PCM	VDC	EU	PCM	VDC	EU	PCM	VDC	EU
1	.00	.0000000	43	.86	602.0000	86	1.72	1204.000	129	2.58	1806.000	172	3.44	2408.000	215	4.30	3010.000
2	.02	14.00000	44	.88	616.0000	87	1.74	1218.000	130	2.60	1820.000	173	3.46	2422.000	216	4.32	3024.000
3	.04	28.00000	45	.90	630.0000	88	1.76	1232.000	131	2.62	1834.000	174	3.48	2436.000	217	4.34	3038.000
4	.06	42.00000	46	.92	644.0000	89	1.78	1246.000	132	2.64	1848.000	175	3.50	2450.000	218	4.36	3052.000
5	.08	56.00000	47	.94	658.0000	90	1.80	1260.000	133	2.66	1862.000	176	3.52	2464.000	219	4.38	3066.000
6	.10	70.00000	48	.96	672.0000	91	1.82	1274.000	134	2.68	1876.000	177	3.54	2478.000	220	4.40	3080.000
7	.12	84.00000	49	.98	686.0000	92	1.84	1288.000	135	2.70	1890.000	178	3.56	2492.000	221	4.42	3094.000
8	.14	98.00000	50	1.00	700.0000	93	1.86	1302.000	136	2.72	1904.000	179	3.58	2506.000	222	4.44	3108.000
9	.16	112.0000	51	1.02	714.0000	94	1.88	1316.000	137	2.74	1918.000	180	3.60	2520.000	223	4.46	3122.000
10	.18	126.0000	52	1.04	728.0000	95	1.90	1330.000	138	2.76	1932.000	181	3.62	2534.000	224	4.48	3136.000
11	.20	140.0000	53	1.06	742.0000	96	1.92	1344.000	139	2.78	1946.000	182	3.64	2548.000	225	4.50	3150.000
12	.22	154.0000	54	1.08	756.0000	97	1.94	1358.000	140	2.80	1960.000	183	3.66	2562.000	226	4.52	3164.000
13	.24	168.0000	55	1.10	770.0000	98	1.96	1372.000	141	2.82	1974.000	184	3.68	2576.000	227	4.54	3178.000
14	.26	182.0000	56	1.12	784.0000	99	1.98	1386.000	142	2.84	1988.000	185	3.70	2590.000	228	4.56	3192.000
15	.28	196.0000	57	1.14	798.0000	100	2.00	1400.000	143	2.86	2002.000	186	3.72	2604.000	229	4.58	3206.000
16	.30	210.0000	58	1.16	812.0000	101	2.02	1414.000	144	2.88	2016.000	187	3.74	2618.000	230	4.60	3220.000
17	.32	224.0000	59	1.18	826.0000	102	2.04	1428.000	145	2.90	2030.000	188	3.76	2632.000	231	4.62	3234.000
18	.34	238.0000	60	1.20	840.0000	103	2.06	1442.000	146	2.92	2044.000	189	3.78	2646.000	232	4.64	3248.000
19	.36	252.0000	61	1.22	854.0000	104	2.08	1456.000	147	2.94	2058.000	190	3.80	2660.000	233	4.66	3262.000
20	.38	266.0000	62	1.24	868.0000	105	2.10	1470.000	148	2.96	2072.000	191	3.82	2674.000	234	4.68	3276.000
21	.40	280.0000	63	1.26	882.0000	106	2.12	1484.000	149	2.98	2086.000	192	3.84	2688.000	235	4.70	3290.000
22	.42	294.0000	64	1.28	896.0000	107	2.14	1498.000	150	3.00	2100.000	193	3.86	2702.000	236	4.72	3304.000
23	.44	308.0000	65	1.30	910.0000	108	2.16	1512.000	151	3.02	2114.000	194	3.88	2716.000	237	4.74	3318.000
24	.46	322.0000	66	1.32	924.0000	109	2.18	1526.000	152	3.04	2128.000	195	3.90	2730.000	238	4.76	3332.000
25	.48	336.0000	67	1.34	938.0000	110	2.20	1540.000	153	3.06	2142.000	196	3.92	2744.000	239	4.78	3346.000
26	.50	350.0000	68	1.36	952.0000	111	2.22	1554.000	154	3.08	2156.000	197	3.94	2758.000	240	4.80	3360.000
27	.52	364.0000	69	1.38	966.0000	112	2.24	1568.000	155	3.10	2170.000	198	3.96	2772.000	241	4.82	3374.000
28	.54	378.0000	70	1.40	980.0000	113	2.26	1582.000	156	3.12	2184.000	199	3.98	2786.000	242	4.84	3388.000
29	.56	392.0000	71	1.42	994.0000	114	2.28	1596.000	157	3.14	2198.000	200	4.00	2800.000	243	4.86	3402.000
30	.58	406.0000	72	1.44	1008.000	115	2.30	1610.000	158	3.16	2212.000	201	4.02	2814.000	244	4.88	3416.000
31	.60	420.0000	73	1.46	1022.000	116	2.32	1624.000	159	3.18	2226.000	202	4.04	2828.000	245	4.90	3430.000
32	.62	434.0000	74	1.48	1036.000	117	2.34	1638.000	160	3.20	2240.000	203	4.06	2842.000	246	4.92	3444.000
33	.64	448.0000	75	1.50	1050.000	118	2.36	1652.000	161	3.22	2254.000	204	4.08	2856.000	247	4.94	3458.000
34	.66	462.0000	76	1.52	1064.000	119	2.38	1666.000	162	3.24	2268.000	205	4.10	2870.000	248	4.96	3472.000
35	.68	476.0000	77	1.54	1078.000	120	2.40	1680.000	163	3.26	2282.000	206	4.12	2884.000	249	4.98	3486.000
36	.70	490.0000	78	1.56	1092.000	121	2.42	1694.000	164	3.28	2296.000	207	4.14	2898.000	250	5.00	3500.000
37	.72	504.0000	79	1.58	1106.000	122	2.44	1708.000	165	3.30	2310.000	208	4.16	2912.000			
38	.74	518.0000	80	1.60	1120.000	123	2.46	1722.000	166	3.32	2324.000	209	4.18	2926.000			
39	.76	532.0000	81	1.62	1134.000	124	2.48	1736.000	167	3.34	2338.000	210	4.20	2940.000			
40	.78	546.0000	82	1.64	1148.000	125	2.50	1750.000	168	3.36	2352.000	211	4.22	2954.000			
41	.80	560.0000	83	1.66	1162.000	126	2.52	1764.000	169	3.38	2366.000	212	4.24	2968.000			
42	.82	574.0000	84	1.68	1176.000	127	2.54	1778.000	170	3.40	2380.000	213	4.26	2982.000			
	.84	588.0000	85	1.70	1190.000	128	2.56	1792.000	171	3.42	2394.000	214	4.28	2996.000			

CURVE NO. 0081

Practice

3. Given the Calibration Data Table below, list the following:

- Curve order
- X and Y data point pairs
- Revision
- Flight

--CALIBRATION DATA TABLE--

PAGE 779

DATE 11/19/80

VEHICLE NO. 1G2
DATE CALIB 09/18/79
CAL RANGE LO -0.2250000
CAL RANGE HI 6.337857

FLIGHT NO. STS-01
DATA RANGE UNITS W
CURVE ORDER 0
MMDB CURVE NO. 00353

BIPOLAR
SER/REV LEVEL Q3
DATA TYPE AMB
NO. OF BITS 8

CALIB COEFF.			ORDINATE Y1= 1.5000 Y2= 2.4000 Y3= 3.8500 Y4= 6.0000 Y5=			Y6=			Y7=			Y8=			Y9=			Y10=			Y11=			
ABSCISSA X1= 93.000 X2= 141.00 X3= 174.00 X4= 244.00 X5=			X6=			X7=			X8=			X9=			X10=			X11=						
PCM	VDC	EU	PCM	VDC	EU	PCM	VDC	EU	PCM	VDC	EU	PCM	VDC	EU	PCM	VDC	EU	PCM	VDC	EU	PCM	VDC	EU	
1	-5.00	-0.2250000	44	-3.31	0.5812500	87	-1.61	1.3875000	130	0.38	2.1937500	173	1.77	3.806061	216	3.46	5.140000	259	5.00	6.337857	302	6.337857	345	6.337857
2	-4.96	-0.2062500	45	-3.27	0.6000000	88	-1.57	1.4062500	131	0.12	2.2125000	174	1.81	3.8500000	217	3.50	5.170714	260	5.04	6.371429	303	6.371429	346	6.371429
3	-4.92	-0.1875000	46	-3.23	0.6187500	89	-1.54	1.4250000	132	0.16	2.2312500	175	1.85	3.885714	218	3.54	5.201429	261	5.08	6.402143	304	6.402143	347	6.402143
4	-4.88	-0.1687500	47	-3.19	0.6375000	90	-1.50	1.4437500	133	0.20	2.2500000	176	1.89	3.911429	219	3.58	5.232143	262	5.12	6.432857	305	6.432857	348	6.432857
5	-4.84	-0.1500000	48	-3.15	0.6562500	91	-1.46	1.4625000	134	0.24	2.2687500	177	1.93	3.942143	220	3.62	5.263571	263	5.16	6.463571	306	6.463571	349	6.463571
6	-4.80	-0.1312500	49	-3.11	0.6750000	92	-1.42	1.4812500	135	0.28	2.2875000	178	1.97	3.972857	221	3.66	5.293571	264	5.20	6.494286	307	6.494286	350	6.494286
7	-4.76	-0.1125000	50	-3.07	0.6937500	93	-1.38	1.5000000	136	0.31	2.3062500	179	2.01	4.003571	222	3.70	5.324286	265	5.24	6.525000	308	6.525000	351	6.525000
8	-4.72	-0.0937500	51	-3.03	0.7125000	94	-1.34	1.5187500	137	0.35	2.3250000	180	2.05	4.034286	223	3.74	5.355000	266	5.28	6.555714	309	6.555714	352	6.555714
9	-4.69	-0.0750000	52	-2.99	0.7312500	95	-1.30	1.5375000	138	0.39	2.3437500	181	2.09	4.065000	224	3.78	5.385714	267	5.32	6.586429	310	6.586429	353	6.586429
10	-4.65	-0.0562500	53	-2.95	0.7500000	96	-1.26	1.5562500	139	0.43	2.3625000	182	2.13	4.095714	225	3.82	5.416429	268	5.36	6.617143	311	6.617143	354	6.617143
11	-4.61	-0.0375000	54	-2.91	0.7687500	97	-1.22	1.5750000	140	0.47	2.3812500	183	2.17	4.126429	226	3.86	5.447143	269	5.40	6.647857	312	6.647857	355	6.647857
12	-4.57	-0.0187500	55	-2.87	0.7875000	98	-1.18	1.5937500	141	0.51	2.4000000	184	2.21	4.157143	227	3.90	5.477857	270	5.44	6.678571	313	6.678571	356	6.678571
13	-4.53	0.0000000	56	-2.83	0.8062500	99	-1.14	1.6125000	142	0.55	2.4187500	185	2.24	4.187857	228	3.94	5.508571	271	5.48	6.709286	314	6.709286	357	6.709286
14	-4.49	0.0187500	57	-2.79	0.8250000	100	-1.10	1.6312500	143	0.59	2.4375000	186	2.28	4.218571	229	3.98	5.539286	272	5.52	6.740000	315	6.740000	358	6.740000
15	-4.45	0.0375000	58	-2.75	0.8437500	101	-1.06	1.6500000	144	0.63	2.4562500	187	2.32	4.249286	230	4.02	5.570000	273	5.56	6.770714	316	6.770714	359	6.770714
16	-4.41	0.0562500	59	-2.71	0.8625000	102	-1.02	1.6687500	145	0.67	2.4750000	188	2.36	4.280000	231	4.06	5.601429	274	5.60	6.801429	317	6.801429	360	6.801429
17	-4.37	0.0750000	60	-2.68	0.8812500	103	-0.98	1.6875000	146	0.71	2.4937500	189	2.40	4.310714	232	4.10	5.631429	275	5.64	6.832143	318	6.832143	361	6.832143
18	-4.33	0.0937500	61	-2.64	0.9000000	104	-0.94	1.7062500	147	0.75	2.5125000	190	2.44	4.341429	233	4.13	5.662143	276	5.68	6.862857	319	6.862857	362	6.862857
19	-4.29	0.1125000	62	-2.60	0.9187500	105	-0.91	1.7250000	148	0.79	2.5312500	191	2.48	4.372143	234	4.17	5.692857	277	5.72	6.893571	320	6.893571	363	6.893571
20	-4.25	0.1312500	63	-2.56	0.9375000	106	-0.87	1.7437500	149	0.83	2.5500000	192	2.52	4.402857	235	4.21	5.723571	278	5.76	6.924286	321	6.924286	364	6.924286
21	-4.21	0.1500000	64	-2.52	0.9562500	107	-0.83	1.7625000	150	0.87	2.5687500	193	2.56	4.433571	236	4.25	5.754286	279	5.80	6.955000	322	6.955000	365	6.955000
22	-4.17	0.1687500	65	-2.48	0.9750000	108	-0.79	1.7812500	151	0.91	2.5875000	194	2.60	4.464286	237	4.29	5.785000	280	5.84	6.985714	323	6.985714	366	6.985714
23	-4.13	0.1875000	66	-2.44	0.9937500	109	-0.75	1.8000000	152	0.94	2.6062500	195	2.64	4.495000	238	4.33	5.815714	281	5.88	7.016429	324	7.016429	367	7.016429
24	-4.09	0.2062500	67	-2.40	1.0125000	110	-0.71	1.8187500	153	0.98	2.6250000	196	2.68	4.525714	239	4.37	5.846429	282	5.92	7.047143	325	7.047143	368	7.047143
25	-4.06	0.2250000	68	-2.36	1.0312500	111	-0.67	1.8375000	154	1.02	2.6437500	197	2.72	4.556429	240	4.41	5.877143	283	5.96	7.077857	326	7.077857	369	7.077857
26	-4.02	0.2437500	69	-2.32	1.0500000	112	-0.63	1.8562500	155	1.06	2.6625000	198	2.76	4.587143	241	4.45	5.907857	284	6.00	7.108571	327	7.108571	370	7.108571
27	-3.98	0.2625000	70	-2.28	1.0687500	113	-0.59	1.8750000	156	1.10	2.6812500	199	2.80	4.617857	242	4.49	5.938571	285	6.04	7.139286	328	7.139286	371	7.139286
28	-3.94	0.2812500	71	-2.24	1.0875000	114	-0.55	1.8937500	157	1.14	2.7000000	200	2.84	4.648571	243	4.53	5.969286	286	6.08	7.170000	329	7.170000	372	7.170000
29	-3.90	0.3000000	72	-2.20	1.1062500	115	-0.51	1.9125000	158	1.18	2.7187500	201	2.88	4.679286	244	4.57	6.000000	287	6.12	7.200714	330	7.200714	373	7.200714
30	-3.86	0.3187500	73	-2.17	1.1250000	116	-0.47	1.9312500	159	1.22	2.7375000	202	2.91	4.710000	245	4.61	6.030714	288	6.16	7.231429	331	7.231429	374	7.231429
31	-3.82	0.3375000	74	-2.13	1.1437500	117	-0.43	1.9500000	160	1.26	2.7562500	203	2.95	4.740714	246	4.65	6.061429	289	6.20	7.262143	332	7.262143	375	7.262143
32	-3.78	0.3562500	75	-2.09	1.1625000	118	-0.39	1.9687500	161	1.30	2.7750000	204	2.99	4.771429	247	4.69	6.092143	290	6.24	7.292857	333	7.292857	376	7.292857
33	-3.74	0.3750000	76	-2.05	1.1812500	119	-0.35	1.9875000	162	1.34	2.7937500	205	3.03	4.802143	248	4.72	6.122857	291	6.28	7.323571	334	7.323571	377	7.323571
34	-3.70	0.3937500	77	-2.01	1.2000000	120	-0.31	2.0062500	163	1.38	2.8125000	206	3.07	4.832857	249	4.76	6.153571	292	6.32	7.354286	335	7.354286	378	7.354286
35	-3.66	0.4125000	78	-1.97	1.2187500	121	-0.28	2.0250000	164	1.42	2.8312500	207	3.11	4.863571	250	4.80	6.184286	293	6.36	7.385000	336	7.385000	379	7.385000
36	-3.62	0.4312500	79	-1.93	1.2375000	122	-0.24	2.0437500	165	1.46	2.8500000	208	3.15	4.894286	251	4.84	6.215000	294	6.40	7.415714	337	7.415714	380	7.415714
37	-3.58	0.4500000	80	-1.89	1.2562500	123	-0.20	2.0625000	166	1.50	2.8687500	209	3.19	4.925000	252	4.88	6.245714	295	6.44	7.446429	338	7.446429	381	7.446429
38	-3.54	0.4687500	81	-1.85	1.2750000	124	-0.16	2.0812500	167	1.54	2.8875000	210	3.23	4.955714	253	4.92	6.276429	296	6.48	7.477143	339	7.477143	382	7.477143
39	-3.50	0.4875000	82	-1.81	1.2937500	125	-0.12	2.1000000	168	1.57	2.9062500	211	3.27	4.986429	254	4.96	6.307143	297	6.52	7.507857	340	7.507857	383	7.507857
40	-3.46	0.5062500	83	-1.77	1.3125000	126	-0.08	2.1187500	169	1.61	2.9250000	212	3.31	5.017143	255	5.00	6.337857	298	6.56	7.538571	341	7.538571	384	7.538571
41	-3.43	0.5250000	84	-1.73	1.3312500	127	-0.04	2.1375000	170	1.65	2.9437500	213	3.35	5.047857				299	6.60	7.569286	342	7.569286	385	7.569286
42	-3.39	0.5437500	85	-1.69	1.3500000	128	0.00	2.1562500	171	1.69	2.9625000	214	3.39	5.078571				300	6.64	7.600000	343	7.600000	386	7.600000
43	-3.35	0.5625000	86	-1.65	1.3687500	129	0.04	2.1750000	172	1.73	2.9812500	215	3.43	5.109286				301	6.68	7.630714	344	7.630714	387	7.630714

CURVE NO. 0261

CURVE NO. 0261

Practice Feedback

3. Given the Calibration Data Table below, list the following:

a) Curve order

Order 0

b) X and Y data point pairs

X₁ = 93.000 X₂ = 141.00 X₃ = 174.00 X₄ = 244.00
Y₁ = 1.5000 Y₂ = 2.4000 Y₃ = 3.8500 Y₄ = 6.0000

c) Revision

Rev. 3

d) Flight - STS-01

DATE 11/19/80

VEHICLE NO. 102

DATE CALIB 09/18/79

CAL RANGE LO -2250000

CAL RANGE HI 6337857

FLIGHT NO. STS-01

DATA RANGE UNITS W

CURVE ORDER 0

MMDB CURVE NO. 00353

PAGE 779

BIPOLAR

SER/REV LEVEL 03

DATA TYPE AMB

NO. OF BITS 8

CALIB COEFF.

ORDINATE Y1= 1.5000 Y2= 2.4000 Y3= 3.8500 Y4= 6.0000 Y5=

ABSCISSA X1= 93.000 X2= 141.00 X3= 174.00 X4= 244.00 X5=

PCM	VDC	EU	PCM	VDC	EU	PCM	VDC	EU	PCM	VDC	EU	PCM	VDC	EU	PCM	VDC	EU
1	-5.00	-2250000	44	-3.31	.5812500	87	-1.61	1.387500	130	.08	2.193750	173	1.77	3.806061	216	3.46	5.140000
2	-4.96	-2362500	45	-3.27	.6100000	88	-1.57	1.406250	131	.12	2.212500	174	1.81	3.850000	217	3.50	5.170714
3	-4.92	-1875000	46	-3.23	.6187500	89	-1.54	1.425000	132	.16	2.231250	175	1.85	3.887714	218	3.54	5.201429
4	-4.88	-1687500	47	-3.19	.6375000	90	-1.50	1.443750	133	.20	2.250000	176	1.89	3.911429	219	3.58	5.232143
5	-4.84	-1500000	48	-3.15	.6562500	91	-1.46	1.462500	134	.24	2.268750	177	1.93	3.942143	220	3.62	5.262857
6	-4.80	-1312500	49	-3.11	.6750000	92	-1.42	1.481250	135	.28	2.287500	178	1.97	3.972857	221	3.66	5.293571
7	-4.76	-1125000	50	-3.07	.6937500	93	-1.38	1.500000	136	.32	2.306250	179	2.01	4.003571	222	3.70	5.324286
8	-4.72	-937500	51	-3.03	.7125000	94	-1.34	1.518750	137	.36	2.325000	180	2.05	4.034286	223	3.74	5.355000
9	-4.69	-750000	52	-2.99	.7312500	95	-1.30	1.537500	138	.39	2.343750	181	2.09	4.065000	224	3.78	5.385714
10	-4.65	-562500	53	-2.95	.7500000	96	-1.26	1.556250	139	.43	2.362500	182	2.13	4.095714	225	3.82	5.416429
11	-4.61	-375000	54	-2.91	.7687500	97	-1.22	1.575000	140	.47	2.381250	183	2.17	4.126429	226	3.86	5.447143
12	-4.57	-187500	55	-2.87	.7875000	98	-1.18	1.593750	141	.51	2.400000	184	2.21	4.157143	227	3.90	5.477857
13	-4.53	0	56	-2.83	.8062500	99	-1.14	1.612500	142	.55	2.418750	185	2.25	4.187857	228	3.94	5.508571
14	-4.49	187500	57	-2.80	.8250000	100	-1.10	1.631250	143	.59	2.437500	186	2.28	4.218571	229	3.98	5.539286
15	-4.45	375000	58	-2.76	.8437500	101	-1.06	1.650000	144	.63	2.456250	187	2.32	4.249286	230	4.02	5.570000
16	-4.41	562500	59	-2.72	.8625000	102	-1.02	1.668750	145	.67	2.475000	188	2.36	4.280000	231	4.06	5.600714
17	-4.37	750000	60	-2.68	.8812500	103	-0.98	1.687500	146	.71	2.493750	189	2.40	4.310714	232	4.10	5.631429
18	-4.33	937500	61	-2.64	.9000000	104	-0.94	1.706250	147	.75	2.512500	190	2.44	4.341429	233	4.14	5.662143
19	-4.29	1125000	62	-2.60	.9187500	105	-0.91	1.725000	148	.79	2.531250	191	2.48	4.372143	234	4.18	5.692857
20	-4.25	1312500	63	-2.56	.9375000	106	-0.87	1.743750	149	.83	2.550000	192	2.52	4.402857	235	4.22	5.723571
21	-4.21	1500000	64	-2.52	.9562500	107	-0.83	1.762500	150	.87	2.568750	193	2.56	4.433571	236	4.26	5.754286
22	-4.17	1687500	65	-2.48	.9750000	108	-0.79	1.781250	151	.91	2.587500	194	2.60	4.464286	237	4.30	5.785000
23	-4.13	1875000	66	-2.44	.9937500	109	-0.75	1.800000	152	.94	2.606250	195	2.64	4.495000	238	4.34	5.815714
24	-4.09	2062500	67	-2.40	1.012500	110	-0.71	1.818750	153	.98	2.625000	196	2.68	4.525714	239	4.38	5.846429
25	-4.06	2250000	68	-2.36	1.031250	111	-0.67	1.837500	154	1.02	2.643750	197	2.72	4.556429	240	4.42	5.877143
26	-4.02	2437500	69	-2.32	1.050000	112	-0.63	1.856250	155	1.05	2.662500	198	2.76	4.587143	241	4.46	5.907857
27	-3.98	2625000	70	-2.28	1.068750	113	-0.59	1.875000	156	1.09	2.681250	199	2.80	4.617857	242	4.50	5.938571
28	-3.94	2812500	71	-2.24	1.087500	114	-0.55	1.893750	157	1.14	2.700000	200	2.84	4.648571	243	4.54	5.969286
29	-3.90	3000000	72	-2.20	1.106250	115	-0.51	1.912500	158	1.18	2.718750	201	2.88	4.679286	244	4.58	6.000000
30	-3.86	3187500	73	-2.17	1.125000	116	-0.47	1.931250	159	1.22	2.737500	202	2.92	4.710000	245	4.62	6.030714
31	-3.82	3375000	74	-2.13	1.143750	117	-0.43	1.950000	160	1.26	2.756250	203	2.96	4.740714	246	4.66	6.061429
32	-3.78	3562500	75	-2.09	1.162500	118	-0.39	1.968750	161	1.30	2.775000	204	2.99	4.771429	247	4.70	6.092143
33	-3.74	3750000	76	-2.05	1.181250	119	-0.35	1.987500	162	1.34	2.793750	205	3.03	4.802143	248	4.74	6.122857
34	-3.70	3937500	77	-2.01	1.200000	120	-0.31	2.006250	163	1.38	2.812500	206	3.07	4.832857	249	4.78	6.153571
35	-3.66	4125000	78	-1.97	1.218750	121	-0.28	2.025000	164	1.42	2.831250	207	3.11	4.863571	250	4.82	6.184286
36	-3.62	4312500	79	-1.93	1.237500	122	-0.24	2.043750	165	1.46	2.850000	208	3.15	4.894286	251	4.86	6.215000
37	-3.58	4500000	80	-1.89	1.256250	123	-0.20	2.062500	166	1.50	2.868750	209	3.19	4.925000	252	4.90	6.245714
38	-3.54	4687500	81	-1.85	1.275000	124	-0.16	2.081250	167	1.54	2.887500	210	3.23	4.955714	253	4.94	6.276429
39	-3.50	4875000	82	-1.81	1.293750	125	-0.12	2.100000	168	1.57	2.906250	211	3.27	4.986429	254	4.98	6.307143
40	-3.46	5062500	83	-1.77	1.312500	126	-0.08	2.118750	169	1.61	2.925000	212	3.31	5.017143	255	5.00	6.337857
41	-3.43	5250000	84	-1.73	1.331250	127	-0.04	2.137500	170	1.65	2.943750	213	3.35	5.047857			
42	-3.39	5437500	85	-1.69	1.350000	128	.00	2.156250	171	1.69	2.962500	214	3.39	5.078571			
43	-3.35	5625000	86	-1.65	1.368750	129	.04	2.175000	172	1.73	2.981250	215	3.43	5.109286			

CURVE NO. 0261

1. IDENTIFYING TELEMETRY MENU MED CODES
2. CHANGING OPERATIONAL LIMIT VALUES FOR INDIVIDUAL PARAMETERS
3. ENABLING, DISABLING, AND CHANGING CRITICAL LIMIT VALUES FOR INDIVIDUAL PARAMETERS
4. INHIBITING OFFSCALE HIGH/LOW LIMIT SENSING FOR INDIVIDUAL PARAMETERS
5. CHANGING HEXADECIMAL LIMITS
6. OVERRIDING TELEMETRY PARAMETER VALUES
7. DEFINING PARAMETERS ON A UNIVERSAL DIGITAL DISPLAY
8. DELETING PARAMETER(S) FROM, OR CLEARING, AN ENTIRE UNIVERSAL DIGITALS DISPLAY
9. RECONFIGURING UNIVERSAL PLOT
10. DELETING PARAMETER(S) FROM A UNIVERSAL PLOT
11. DRAWING REFERENCE LINE ON UNIVERSAL PLOT USING V41, TLM UNIVERSAL PLOT (NOMINAL DATA) MENU
12. DELETING/CHANGING A REFERENCE LINE ON UNIVERSAL PLOT
13. UNIVERSAL PLOT REFERENCE LINE AND CONTROL DATA INTERACTIONS
14. CHANGING SPECIAL COMPUTATION-CONSTANT ENGINEERING UNIT VALUES
15. CHANGING SPECIAL COMPUTATION TIME CONSTANTS
16. SELECTING MAJOR FUNCTION FOR DISPLAY 1350
17. CHANGING VARIABLE PARAMETER ID
18. USING MCC CALIBRATION DATA BOOK
19. CHANGING THE CALIBRATION CURVE
20. THRIFTS
21. SPECIAL AND SUPER THRIFT PRODUCT REQUEST
22. RECONFIGURATION OF THRIFTS

SEGMENT 19

CHANGING THE CALIBRATION CURVE

OBJECTIVE:

List the names of the documents and standard procedures (SOP) used to change the calibration curve for telemetry parameters.

SEGMENT INTRODUCTION:

Calibration curves are used by MOC to convert incoming data from PCM counts to engineering units (EU).

Currently valid curves for all parameters (represented by polynomial coefficients or data point pairs) are stored within MOC just prior to launch. Each parameter is assigned a curve which best represents its characteristics.

It may be necessary during real time to change some of these curves to accommodate prelaunch, late changes in instrumentation, or significant changes (biases) in instrumentation performance after liftoff.

This segment lists the SOP to use for changing a parameter's calibration curve in real time.

Learning Statement

Segment 19

Calibration Curve Change

TLM Calibration Curve Change in the FCOH (Flight Control Operations Handbook) describes the procedure for changing calibration curves in real time.

Practice

List the names of the documents and SOP's to use to change calibration curves for telemetry parameters in the MOC during real time.

Practice Feedback

List the names of the documents and SOP's to use to change calibration curves for telemetry parameters in the MOC during real time.

FCOH

TLM Calibration Curve Change SOP

1. IDENTIFYING TELEMETRY MENU MED CODES
2. CHANGING OPERATIONAL LIMIT VALUES FOR INDIVIDUAL PARAMETERS
3. ENABLING, DISABLING, AND CHANGING CRITICAL LIMIT VALUES FOR INDIVIDUAL PARAMETERS
4. INHIBITING OFFSCALE HIGH/LOW LIMIT SENSING FOR INDIVIDUAL PARAMETERS
5. CHANGING HEXADECIMAL LIMITS
6. OVERRIDING TELEMETRY PARAMETER VALUES
7. DEFINING PARAMETERS ON A UNIVERSAL DIGITAL DISPLAY
8. DELETING PARAMETER(S) FROM, OR CLEARING, AN ENTIRE UNIVERSAL DIGITALS DISPLAY
9. RECONFIGURING UNIVERSAL PLOT
10. DELETING PARAMETER(S) FROM A UNIVERSAL PLOT
11. DRAWING REFERENCE LINE ON UNIVERSAL PLOT USING V41, TLM UNIVERSAL PLOT (NOMINAL DATA) MENU
12. DELETING/CHANGING A REFERENCE LINE ON UNIVERSAL PLOT
13. UNIVERSAL PLOT REFERENCE LINE AND CONTROL DATA INTERACTIONS
14. CHANGING SPECIAL COMPUTATION-CONSTANT ENGINEERING UNIT VALUES
15. CHANGING SPECIAL COMPUTATION TIME CONSTANTS
16. SELECTING MAJOR FUNCTION FOR DISPLAY 1350
17. CHANGING VARIABLE PARAMETER ID
18. USING MCC CALIBRATION DATA BOOK
19. CHANGING THE CALIBRATION CURVE
20. THRIFTS
21. SPECIAL AND SUPER THRIFT PRODUCT REQUEST
22. RECONFIGURATION OF THRIFTS

SEGMENT 20

THRIFTS

OBJECTIVE:

Name the three types of THRIFT products available for the flight controller's use and the attributes of each type.

SEGMENT INTRODUCTION:

THRIFT (Telemetry History Reports In Formatted Tabulations) give a historical record of parameter data values for an entire mission. Data trends are used to support post-mission data analysis and failure analysis. The data can be formatted according to flight controller's needs. This segment discusses the attributes of the different types of THRIFT.

Learning Statement

Segment 20

THRIFTS

THRIFTS TYPES	ATTRIBUTES			
	AVAILABLE OUTPUT PRODUCT	TIME INTERVAL	SAMPLE RATE	COMPUTER UTILIZED
REGULAR	MICROFICHE	EVERY 4 HRS	1 SAMPLE/MIN	MOC (MISSION OPERATIONS COMPUTER)
SPECIAL	MICROFICHE LINE PRINTER	ANY OTHER THAN 4 HRS	UP TO 1 SAMPLE/ SECOND	MOC
SUPER	MICROFICHE LINE PRINTER	ANY OTHER THAN 4 HRS	SAME AS VECHICLE DOWNLINK SAMPLE RATE (HIGHER THAN 1 SAMPLES/ SECOND)	ODRC CYBER 74 COMPUTER

Supporting Data

A regular THRIFT is produced every four hours at a sample rate of 1 sample per minute. They are an automatic support function and do not have to be requested. Special THRIFT's are provided at sample rates of 1 sample per second and are produced at nonstandard time intervals (other than 4 hours). Special THRIFT's can be output to a line printer instead of microfiche. This option is limited to short jobs, i.e., less than 20 pages. Use of this option is restricted to prevent interference with planned utilization of SDP printers.

Super THRIFT products are produced from data which contain all telemetry parameters in the orbiter telemetry downlink at vehicle sample rates. Special and Super THRIFT products are not generated on a planned periodic basis but are provided only on request.

Practice

List the THRIFT products that correspond to the following attributes.

a.

- Sample rate - 15/Min
- Available Output Product - Microfiche
- Time interval - every 4 hours
- Computer utilized - MOC

b.

- Sample rate - vehicle downlink sample rate
- Available output product - Line Printer, Microfiche
- Time interval - other than 4 hours
- Computer utilized - ODRC Cyber 74 Computer

c.

- Sample rate - up to 15/S
- Available output product - Microfiche, Line Printer
- Time interval - other than 4 hours
- Computer utilized - MOC

Practice Feedback

List the THRIFT products that correspond to the following attributes.

a.

REGULAR

- Sample rate - 15/Min
- Available Output Product - Microfiche
- Time interval - every 4 hours
- Computer utilized - MOC

b.

SUPER

- Sample rate - vehicle downlink sample rate
- Available output product - Line Printer, Microfiche
- Time interval - other than 4 hours
- Computer utilized - ODRC Cyber 74 Computer

c.

SPECIAL

- Sample rate - up to 15/S
- Available output product - Microfiche, Line Printer
- Time interval - other than 4 hours
- Computer utilized - MOC

1. IDENTIFYING TELEMETRY MENU MED CODES
2. CHANGING OPERATIONAL LIMIT VALUES FOR INDIVIDUAL PARAMETERS
3. ENABLING, DISABLING, AND CHANGING CRITICAL LIMIT VALUES FOR INDIVIDUAL PARAMETERS
4. INHIBITING OFFSCALE HIGH/LOW LIMIT SENSING FOR INDIVIDUAL PARAMETERS
5. CHANGING HEXADECIMAL LIMITS
6. OVERRIDING TELEMETRY PARAMETER VALUES
7. DEFINING PARAMETERS ON A UNIVERSAL DIGITAL DISPLAY
8. DELETING PARAMETER(S) FROM, OR CLEARING, AN ENTIRE UNIVERSAL DIGITALS DISPLAY
9. RECONFIGURING UNIVERSAL PLOT
10. DELETING PARAMETER(S) FROM A UNIVERSAL PLOT
11. DRAWING REFERENCE LINE ON UNIVERSAL PLOT USING V41, TLM UNIVERSAL PLOT (NOMINAL DATA) MENU
12. DELETING/CHANGING A REFERENCE LINE ON UNIVERSAL PLOT
13. UNIVERSAL PLOT REFERENCE LINE AND CONTROL DATA INTERACTIONS
14. CHANGING SPECIAL COMPUTATION-CONSTANT ENGINEERING UNIT VALUES
15. CHANGING SPECIAL COMPUTATION TIME CONSTANTS
16. SELECTING MAJOR FUNCTION FOR DISPLAY 1350
17. CHANGING VARIABLE PARAMETER ID
18. USING MCC CALIBRATION DATA BOOK
19. CHANGING THE CALIBRATION CURVE
20. THRIFTS
21. SPECIAL AND SUPER THRIFT PRODUCT REQUEST
22. RECONFIGURATION OF THRIFTS

SEGMENT 21

SPECIAL AND SUPER THRIFT PRODUCT REQUEST

OBJECTIVES:

- a. State the names of the forms used to request Special THRIFT and Super THRIFT products.
- b. State the names of the document and Standard Operating Procedures (SOP) used to request Special and Super THRIFT products.

SEGMENT INTRODUCTION:

Special THRIFT and Super THRIFT products are not furnished as a normal mission support function. They must be requested. This segment gives the forms to use and the SOP's to follow to request Special and Super THRIFT products.

Learning Statement

Segment 21

Special and Super THRIFT Product Request

TYPE THRIFT PRODUCTS	FORM	FCOH SOP TITLE
SPECIAL THRIFT	(1) MDRF (MISSION DATA REQUEST FORM)	SOP-STANDARD AND SPECIAL THRIFT SOP-MISSION DATA REQUEST FORM
SUPER THRIFT	(1) MDRF (2) ODRC (ORBITER DATA REDUCTION CENTER) FORM	SOP - SUPER THRIFT SOP- MISSION DATA REQUEST FORM

Practice

1. List the form used to request special THRIFT products.

2. List the form used to request super THRIFT products.

3. List the name of the SOP followed to request Super THRIFT products.

4. List the name of the SOP followed to request Special THRIFT products.

Practice Feedback

1. List the form used to request Special THRIFT products.

MDRF

2. List the form used to request Super THRIFT products.

MDRF, ODRC

3. List the name of the SOP followed to request Super THRIFT products.

SOP-SUPER THRIFT, SOP-MISSION DATA REQUEST FORM

4. List the name of the SOP followed to request Special THRIFT products.

SOP-STANDARD AND SPECIAL THRIFT, SOP-MISSION DATA REQUEST FORM

1. IDENTIFYING TELEMETRY MENU MED CODES
2. CHANGING OPERATIONAL LIMIT VALUES FOR INDIVIDUAL PARAMETERS
3. ENABLING, DISABLING, AND CHANGING CRITICAL LIMIT VALUES FOR INDIVIDUAL PARAMETERS
4. INHIBITING OFFSCALE HIGH/LOW LIMIT SENSING FOR INDIVIDUAL PARAMETERS
5. CHANGING HEXADECIMAL LIMITS
6. OVERRIDING TELEMETRY PARAMETER VALUES
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17. CHANGING VARIABLE PARAMETER ID
18. USING MCC CALIBRATION DATA BOOK
19. CHANGING THE CALIBRATION CURVE
20. THRIFTS
21. SPECIAL AND SUPER THRIFT PRODUCT REQUEST
22. RECONFIGURATION OF THRIFTS

SEGMENT 22
RECONFIGURATION OF THRIFTS

OBJECTIVE:

List the menu used to reconfigure a THRIFT.

SEGMENT INTRODUCTION:

THRIFT products may be reconfigured by submitting a hardcopy of the reconfigured menu (V63, V64 or V65) and an MDRF to the data integrator (DI).

This segment gives an example of a menu used to reconfiguration the THRIFTS.

STANDARD/SPECIAL THRIFT DISTRIBUTION LIST

RECIPIENT	CONSOLE NUMBER	THRIFT FORMAT RANGE
EPS	231	0601-0639
INST	227	0641-0681
LIFE SUPPORT	230	0700-0737
THERMAL	229	0740-0790
MECHANICAL	228	0830-0889
DATA COMM	226	0906-0987
MECHANICAL	228	1021-1050
ME	236	1051-1128
OMS/RCS	235	1151-1194
		1195-1234
		1235-1263
DPS SUPPORT	240	1275-1315
		1316-1356
		1357-1397
CONTROL	239	1420-1474
		1480-1517
		1520-1556
SENSORS	238	1560-1617
		1620-1642
BME	365	1701-1702
PAYLOAD DATA	270	3305-3333
MER	B45/R343A	(ALL)
SDP HISTORY	101	(ALL)

V07#

003/RT

TLM THRIFT RECONFIGURATION MENU

FORMAT
NUMBER
3305

Reconfiguring a THRIFT PROCEDURE

1. Call V07 menu from MOC or diskette.
2. Enter the THRIFT format number.
3. Transmit to the MOC.
4. Verify the THRIFT reconfiguration control menu is on the MED CRT display.

CAUTION

DO NOT PRESS THE TRANSMIT UN-PROTECTED PBI WHILE THIS MENU IS ON THE SCREEN.

5. Press the LOCAL OPER PBI.
6. Enter desired changes on the reconfiguration control menu.
7. Hardcopy the menu.
8. On the MED press the LOCAL OPER PBI and then the ERASE DISPLAY key.
9. Complete a Mission Data Request Form (MDRF).
10. Attach the hardcopy to the MDRF and send to the data integrator (DI) at P-tube station 2-54.

V63#

002/RT

TLM THRIFT TAB RECONFIGURATION CONTROL MENU

RUN NUMBER 0000 , (ENTER 9999 FOR ALL RUN RECONFIGURATION)

```

1 / ' RM215/CONSOLE 270 PALLET '
2 ' M40H0107J P03T P03T P03T P03T P03P P03P P03P P0 '
3 ' 1016V 1030V 1002V 1003V 1026V 1028V 1027V 10 '
4 ' ONBRD GMT PCB T MDN T PAL 2 T PAL 3 T SS DP PHP DP PHP IN P PH '
5 ' XX:XX:XX:XX XXX XXX XXX XXX XXX XXX XXX X '
6 '

1 ' VEH ORB FORMAT 3305 PAGE * '
2 ' 3T P03T P03T P03T P03Q P03C U75W3514D '
3 ' 04V 1021V 1022V 1025V 1011V 1086V '
4 ' P IN T LP IN T LP O T SS O T ACM Q DC PWR ONBRD MET '
5 ' XX XXX XXX XXX X.XX XXX XXX:XX:XX '
6 '
  
```

Supporting Data

As you may recall, THRIFT products containing telemetry are produced periodically. The THRIFT data formats can be changed or reconfigured only by the data integrator (DI) as defined by procedures in the FCOH. In order to reconfigure the data format, a V07 menu is called up on the MED display. After the format number has been entered and transmitted, the MED display will present the configuration of your THRIFT menu (V63, V64, or V65). At this time the MED is put into LOCAL OPER mode to prevent transmitting the menu to the MOC. The FCOH forbids transmitting a reconfiguration menu to the MOC.

A hardcopy of your THRIFT menu, with changes, should be attached to the MDRF and sent to the data integrator (DI). An example of the V63 menu and V63 menu with changes is shown on the next page. The control menu for your console will be either V63, V64, or V65. An example of each is shown on the next page.

Supporting Data

U634

002/RT

TLN THRIFT TAB RECONFIGURATION CONTROL MENU

RUN NUMBER 9999 , (ENTER 9999 FOR ALL RUN RECONFIGURATION)

[illegible]

1			VEH ORB						FORMAT 3305	PAGE	*		
2	'	3T	P03T	P03T	P03T	P03Q	P03X	P03X	P03C	U75W3514D			
3	'	04V	1021V	1022V	1025V	1011V	1070V	1073V	1086V				
4	'	P I N T	L P I N T	L P O T	S S O T	A C H Q	P M P 1	P M P 2	B C P M R	O N B R D M E T			
5	'	XX	XXX	XXX	XXX	X.XX	OFF	OFF	XXX	XXX:XX:XX			
6	'					ON	ON						\$

V63

Supporting Data

V64# 002/RT TLM THRIFT BILEVEL RECONFIGURATION CONTROL MENU
 RUN NUMBER 0000 , (ENTER 9999 FOR ALL RUN RECONFIGURATION)

1 /	AC 1 /	AC 2 /	AC 3	EVENTS	
2	M40H0107J	VA VA	VA VA	VA VA	VA VA
3	0 GMT	7C 7C	7C 7C	7C 7C	7C 7C
4	XXX:XX:XX:XX	6 6	61 61	61 61	61 61
5		X1 X1	SS SS	X X X	X X X
6		1 1	1N 1N	11 11	10 10
7		50 50	SS SS	8N 8N	5A 5B
8		0/ 0U	0R 0R	0V 0V	1V 3 3
9		6L 5/	3A 4M	4 8 2	7B 8B
10		E EV	EU EO	EO EO	EO EU
11		T W	A B C	S S S	T N
1	NEC 1/2 PWR	VEH ORB	SMEK	FORMAT 0608	PAGE
2	VA VA VA	VA VA VA	VA VA VA	VA VA VA	VA VA VA
3	7C 7C 7C	7C 7C 7C	7C 7C 7C	7C 7C 7C	7S 7E 7E
4	62 62 62	62 62 62	6 6	63 63	63 63
5	X X X	X X X	X3 X3	SS SS	X X X
6	11 11 11	10 10 10	1 1	1N 1N	11 11
7	8N 8N 8N	6A 6B 6C	70 70	7S 7S	8N 8N
8	2V 2V 3V	3 3 3	0/ 0U	0R 0R	4V 4V
9	4 8 2	7B 8B 9B	6L 5/	3A 4M	4 8 2
10	EO EO EO	EU EU EU	E EV	EU EO	EO EO
11	A B C	S S S	T W	A B C	S S S

Supporting Data

V65#

002/RT

TLM THRIFT PLOT RECONFIGURATION CONTROL MENU

RUN NUMBER 0000 , ENTER 9999 FOR ALL RUN RECONFIGURATION

FMT/PCL

1 / ' PLOT 0611 VEH ORB

2 ' TITLE MAIN BUS A / FC 1

PARAMETER TITLE

3 ' Y1R MN A VDC :U76V0100A Y2R FC 1 VDC :U45V0100A

4 ' Y3L FC 1 AMPS :U45C0101A Y4 :

5 ' XT 0 GMT :M40H0107J

S C A L E V A L U E S

	RIGHT		LEFT		X
	LOWER	UPPER	LOWER	UPPER	LEFT RIGHT
6 ' YR	24.0	32.0	YL	100.0	400.0 XS

Practice

1. List the menu that is used to reconfigure a THRIFT.

Practice Feedback

1. List the menu that is used to reconfigure a THRIFT.

V07

APPENDIX A
HEXADECIMAL/NUMERIC
CONVERSIONS

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The hexadecimal system is a numbering system consisting of the alphanumeric values, 0-9, and A-F. Each digit of a hexadecimal number represents a power of sixteen:

16^5	16^4	16^3	16^2	16^1	16^0
D	F	0	4	C	6

In decimal notation, these characters have the following values:

0 = 0	8 = 8
1 = 1	9 = 9
2 = 2	A = 10
3 = 3	B = 11
4 = 4	C = 12
5 = 5	D = 13
6 = 6	E = 14
7 = 7	F = 15

Thus, in decimal notation, this number:

$$\begin{aligned}
 D F 0 4 C 6 &= D \times 16^5 + F \times 16^4 + 0 \times 16^3 + 4 \times 16^2 + C \times 16^1 + 6 \times 16^0 \\
 &= D \times 1,048,576 + F \times 65,536 + 0 \times 4096 + 4 \times 256 + C \times 16 + 6 \times 1 \\
 &= 13 \times 1,048,576 + 15 \times 65,536 + 0 \times 4096 + 4 \times 256 + 12 \times 16 + 6 \times 1 \\
 &= 13,631,488 + 983,040 + 0 + 1024 + 192 + 6 \\
 &= 14,615,750
 \end{aligned}$$

For OFT, a full data word is eight hexadecimal digits. A half data word is four hexadecimal digits.

HEXADECIMAL DIGIT POSITION (RIGHT TO LEFT)

HEX	<u>1ST</u> (16 ⁰)	<u>2ND</u> 16 ²)	<u>3RD</u> 16 ³)	<u>4TH</u> (16 ³)	<u>5TH</u> (16 ⁴)	<u>6TH</u> 16 ⁵)	
0	0	0	0	0	0	0	0
1	1	16	256	4,096	65,536	1,048,576	1
2	2	32	512	8,192	131,072	2,097,152	2
3	3	48	768	12,288	196,608	3,145,728	3
4	4	64	1,024	16,384	262,144	4,194,304	4
5	5	80	1,280	20,480	327,680	5,242,880	5
6	6	96	1,536	24,576	393,216	6,291,456	6
7	7	112	1,792	28,672	458,752	7,340,032	7
8	8	128	2,048	32,768	524,288	8,388,608	8
9	9	144	2,304	36,864	589,824	9,437,184	9
A	10	160	2,560	40,960	655,360	10,485,760	A
B	11	176	2,816	45,056	720,896	11,534,336	B
C	12	192	3,072	49,152	786,432	12,582,912	C
D	13	208	3,328	53,248	851,968	13,631,488	D
E	14	224	3,584	57,344	917,504	14,680,064	E
F	15	240	3,840	61,440	983,040	15,728,640	F

HEXIDEIMAL/NUMERIC CONVERSION TABLE

APPENDIX B
ACRONYMS AND ABBREVIATIONS

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APPENDIX B
ACRONYMS AND ABBREVIATIONS

BSTR	Booster
CAL	Calibration
CCE	Computer command engineer
CMD	Command
CMPTR	Computer
COMP	Computation
CRT	Cathode ray tube
CSI	Crew software interface
DDD	Digital display drive
DEU	Display electronics unit
DM	Data management
DPS	Data Processing Support
DRK	Display request keyboard
DT	Data type
DTE	Data transmission equipment
E/D	Enable/disable
EI	Electronic interface
EU	Engineering unit
EPS	Electrical power system
F/C	Flight controller
FCOH	Flight Controller's Operational Handbook
FD	Flight Director
FLT	Flight
GMT	Greenwich mean time
GN	Gain
GNC	Guidance, navigation, and control
GPC	General purpose computer
GSDS	Ground support data system
HIST	History
IDA	Intermediate data array
INIT	Initiate
JSC	Johnson Space Center
L	Lower
LIM	Limit
MCC	Mission Control Center
MDC	Main display console
MDRF	Mission data request form

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ME	Main engine
MECH	Mechanical
MED	Manual entry device
MGMT	Management
MIN	Minimum
MMDB	Master measurement data base
MOC	Mission operations computer
MOCR	Mission Operations Control Room
MPS	Main propulsion system
MSID	Measurement identification
MSK	Manual select keyboard
NOM	Nominal
ODRC	Orbiter Data Reduction Center
OFT	Orbital flight test
OMS	Orbital maneuvering system
OPER	Operate
OPNS	Operational phase
OPO	Operational Sequence ϕ
PARM	Parameter
PBI	Pushbutton indicator
PCM	Pulse code modulation
PM	Permanent Med
POS	Position
P-Tube	Pneumatic tube
RCS	Reaction control system
REV	Reverse
RT	Real Time
RTXT	Remote text
SDP	Shuttle data processor
SDPC	Shuttle data processing complex
SER	Series
SM	Systems management
SMEK	Summary message enable keyboard
SOP	Standard operating procedure
SSR	Staff support room
THRIFT	Telemetry history reports in formattable tabulations
TLM	Telemetry
TM	Telemetry
TPC	Telemetry preprocessing computer
UDD	Universal Digital Display
UP	Universal plot
UT	User Tools
VAL	Valid
VDC	Volt direct current

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LESSON CRITIQUE SHEET

Telemetry Applications Workbook TLM APPL 2102

Please answer the following questions and return to Training Supervisor, Ground Systems CG3. We appreciate your honest response so that we may improve this workbook. Do not include your name.

1. What did you like most about this workbook?
2. What did you dislike most about this workbook?
3. What were the most difficult parts of this workbook?
4. What were the easier parts?
5. What changes would you make?
6. Was the level of detail too little/about right/too much to satisfy your needs?
7. What technical corrections should be made?
8. What is your job assignment?
9. Any other comments?

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

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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

T	M		A	P	P	L							
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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)

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61 62 63 64 65 66 67 68

I certify that I have completed the above described lesson.

STUDENT SIGNATURE _____