

EDUCATIONAL SERVICES DEVELOPMENT AND PUBLISHING UPDATE NOTICE

Communications Options Minireference Manual

EK-CMINI-RM-CN1

June 1982

Insert this Update Notice in the manual, directly following the Title Page, as a means of maintaining an up-to-date record of changes to the manual.

NEW AND CHANGED INFORMATION

This package updates the manual to include information on DEC Modem Products.

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INSTRUCTIONS

The following pages are to be placed in the *Communications Options Minireference Manual* as replacements for, or additions to, current pages. Change bars (■) in the margins indicate updated material.

Old Page	New Page
Title Page	Title Page
iii to vi	iii to vi
1-1	1-1
—	Chapter 2 Thumb Tab Indexes (Place behind page 2-1)
DH-1, DH-2	DH-1, DH-2
DH-13, DH-14	DH-13, DH-14
DH-17, DH-18	DH-17, DH-18
DPV-7, DPV-8	DPV-7, DPV-8
DZ-15, DZ-16	DZ-15, DZ-16
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5-1, 5-2	5-1, 5-2
8-1 to 8-8	8-1 to 8-8
—	CHAPTER 9
Old Tab	New Tab
Modem Options	Vendor Modem Options
—	DEC Modem Products
Appendices	Appendices

This CN1 update has already been integrated into this manual. Keep this Update Notice here to remind you that this manual contains updated material.

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CHAPTER 1 INTRODUCTION

The Communications Minireference manual provides Field Service Personnel, *trained* in DIGITAL's communications options, with an easy-to-use manual that zeros in on essential installation and maintenance considerations concerning some of the more popular options.

To effectively use this reference manual, it is important that the user understand the organization and format in order to quickly locate the desired information. For example, Chapter 2 contains option specific installation and maintenance data on selected options. In this first printing, six options are included: DH11, DMC11, DMR11, DPV11, DUP11, and DZ11. More options will be added through periodic updates and new releases.

Note that the option specific data of Chapter 2 is placed in alphabetic order, by option designation; that is, DH11 followed by DMC11, DMR11 through DZ11. Note also, that the page numbering system, as well as table numbers, are consecutively numbered using the option designation as a prefix (for example, DH-1, DH-2, and so on, to the end of the section).

Edge tabs identified by option designation and running headers at the top of each page (identifying INSTALLATION, CABLING, DIAGNOSTICS, MAINTENANCE AIDS, and so on) provide the user with a means to quickly locate the desired option – by edge tab, and the specific data – by the major headings.

Also, for consistency and familiarity, the material contained in each option specific section is organized and presented in the same format and sequence; installation data (which includes module outline drawing, device/vector address selections, and various other switch/jumper selectable options) is presented first. This material is followed by cabling diagrams, diagnostics (PDP-11, VAX-11 or both), maintenance aids, register bit assignments, and a Tech-Tips/FCO index.

The remaining chapters of this manual contain generic information dealing with more than one option. For example, Chapters 3 and 4 contain a variety of cables and test connectors used in communications configurations. The cross reference Where Used Tables at the beginning of chapters 3 and 4 quickly identify which cables or test connectors are used with each option. Outline drawings of each cable or test connector are also placed in alphanumeric order, by part number, for easy reference.

CHAPTER 2 COMMUNICATIONS DEVICES

2.1 INTRODUCTION

This chapter contains all information needed to configure, install, and test a number of DIGITAL's communications devices.

The purpose of this chapter is to provide Field Service personnel, trained in servicing communications devices, with a quick reference guide, highlighting the important factors concerning installation and maintenance. The information contained in these sections, therefore, is short and to the point. If more detailed information is needed, reference should be made to the Microfiche, Technical Manual, or other reference material concerning that particular device.

Each device specific section contained in this chapter is organized in alphanumeric order. Edge tabs, identified by the device mnemonic, are also provided for easy reference.

DH11

DMC11

DMR11

DM^uP11

DMV11

DPV11

DUP11

DZ11

DZ32

DH11 OPTION

DH11 General Description

The DH11 is a 16 line asynchronous multiplexer that interfaces the PDP-11 UNIBUS to up to 16 serial lines, each operating with individual parameters.

The DH11 features:

- Program selectable speeds up to 9600 b/s;
- Programmable character lengths, stop bits, and parity;
- Half- or full-duplex;
- Full modem control; and
- EIA RS-232-C, and/or 20 mA operation.

DH11 Reference Documentation

Refer to following documents if the level of content in this section is insufficient:

- *DH11 Technical Manual* – EK-0DH11-TM
- *DM11-BB Modem Control, User's Manual* – EK-DM11B-OP
- *DH11 Engineering Prints* – B-D-DH11-O-N.

DH11 INSTALLATION

■ DH11 Components List

■ Table DH-1 Components List

Option	Description
DH11-AA	Programmable 16 line asynchronous serial line multiplexer and distribution panel for 115 VAC, 60 Hz.
DH11-AB	Same as DH11-AA, except for no level conversion/distribution panel and power supply. Cable is provided to connect to DC08 Telegraph interface.
DH11-AC	Same as DH11-AA, except for 230 VAC, 60 Hz operation.
DH11-AD	Programmable 16 line asynchronous multiplexer and distribution panel containing level conversion for EIA/CCITT compatible lines and modem control.
DH11-AE	Same as DH11-AD, except for no modem control.
DM11-BB	16 line modem control option. Used on DH11-AA or DH11-AC.
DM11-DA	TTL to 20 mA level converter. Used on DH11-AA or DH11-AC (does not require DM11-BB).
DM11-DB	TTL to EIA level converter. Used on DH11-AA or DH11-AC with private lines (does not require DM11-BB).
DM11-DC	TTL to EIA level converter. Used on DH11-AA or DH11-AC with switched lines (requires DM11-BB).

Power/UNIBUS Loading

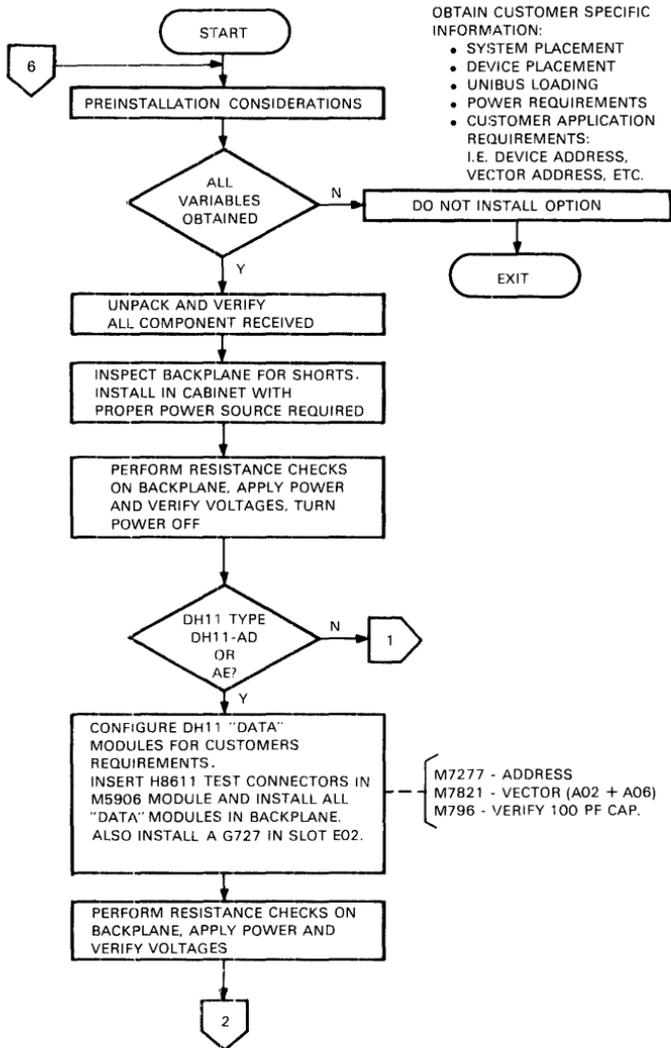
Table DH-2 Power/UNIBUS Loading

Option	Voltage Rating (Approximate Values)	Maximum Voltage	Minimum Voltage	Back-plane Pin No.	UNIBUS Loading
DH11-AA, AB, AC Without DM11-BB With DM11-BB	+5vdc @8.4 A * +5vdc @11.2 A * -15vdc @240 mA	+5.25 +5.25 -15.75	+5.0 +5.0 -14.75	C9A2 C9A2 C9B2	3 UNIBUS Loads (2 UNIBUS Loads without DM11-BB)
DH11-AD With Modem Control	+5vdc @10.8 A * +15vdc @400 mA -15vdc @645 mA	+5.25 +15.75 -15.75	+5.0 +14.75 -14.75	C9A2 A7B1 C9B2	3 UNIBUS Loads
DH11-AE Without Modem Control	+5vdc @8.6 A * +15vdc @100 mA -15vdc @340 mA	+5.25 +15.75 -15.75	+5.0 +14.75 -14.75	C9A2 A7B1 C9B2	2 UNIBUS Loads
DM11-AA Distribution Panel	+5vdc @4.0 A +15vdc @2.0 A -15vdc @2.0 A	+5.25 +15.75 -15.75	+5.0 +14.75 -14.75	A4A2 A4N2 A4B2	NO UNIBUS Loads

*Add 0.2 A if last option on UNIBUS (UNIBUS Terminator consumes 0.2 A).

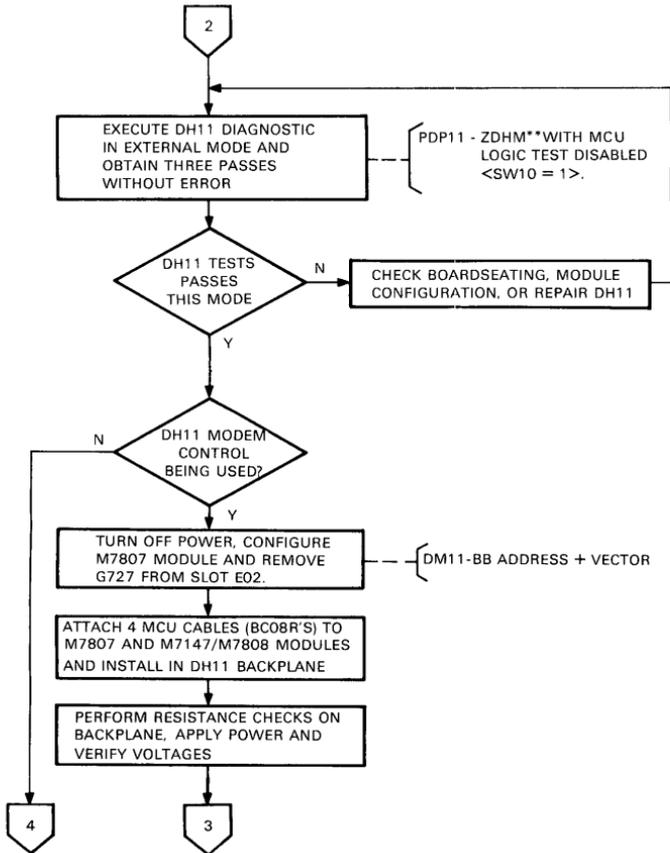
DH11 INSTALLATION

DH11 INSTALLATION FLOWCHART



MK 2804A

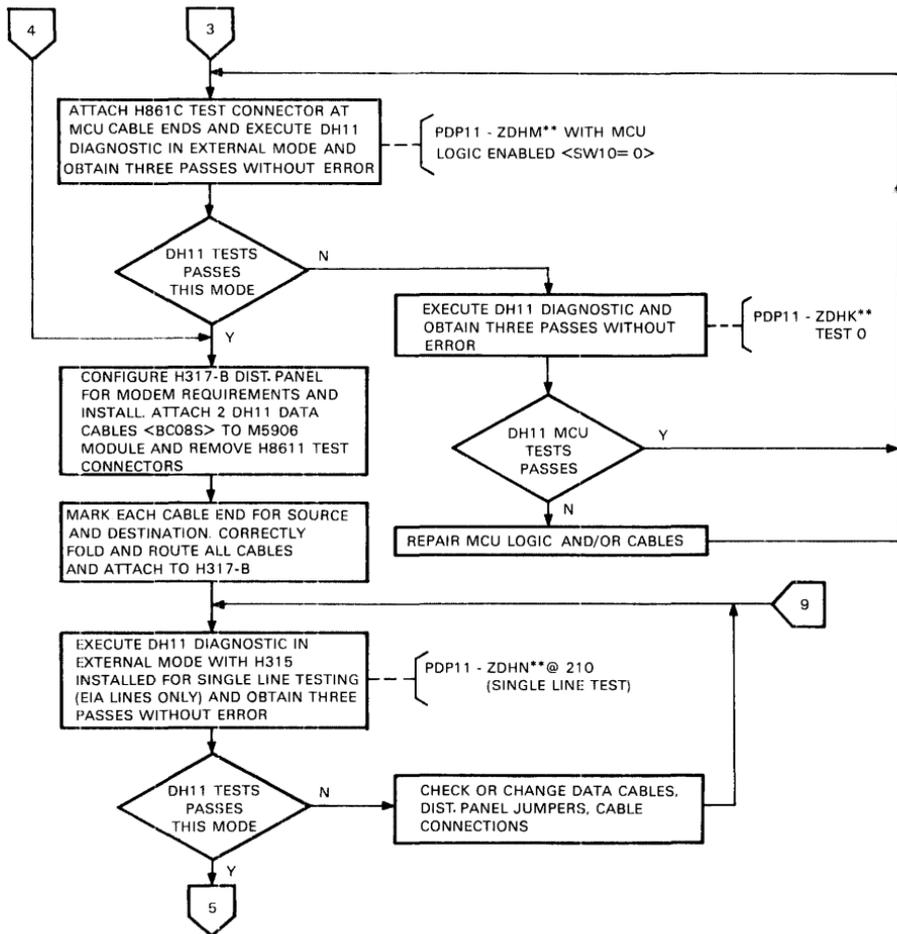
DH11 INSTALLATION FLOWCHART (CONT)



MK-2804B

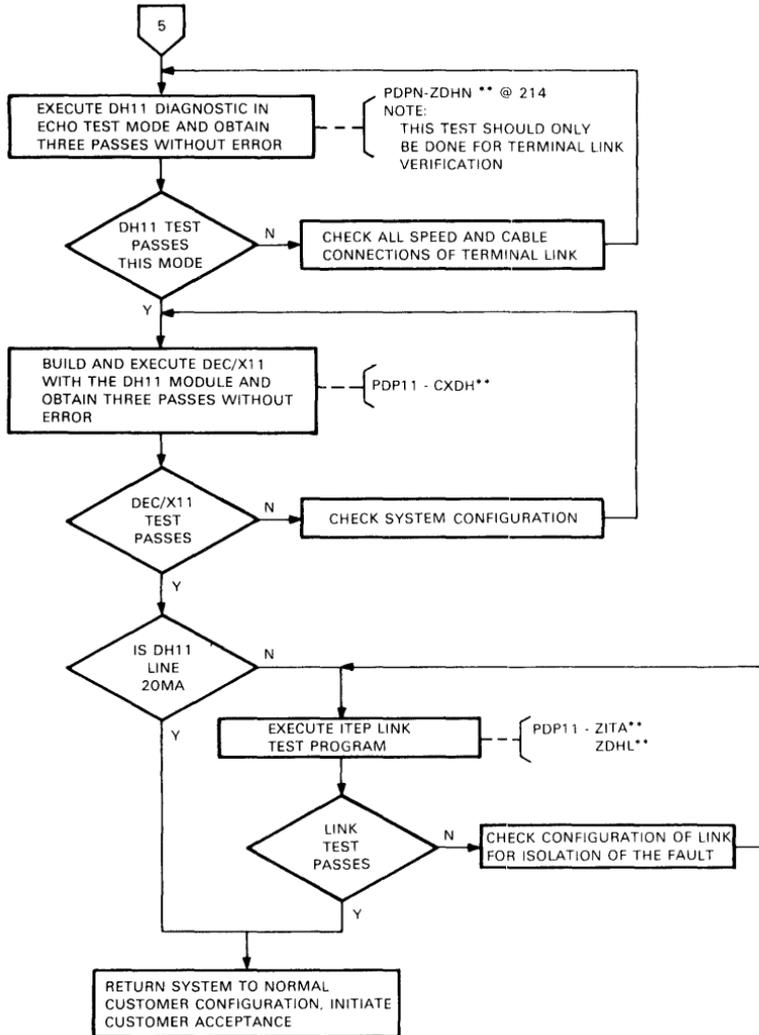
DH11 INSTALLATION

DH11 INSTALLATION FLOWCHART (CONT)



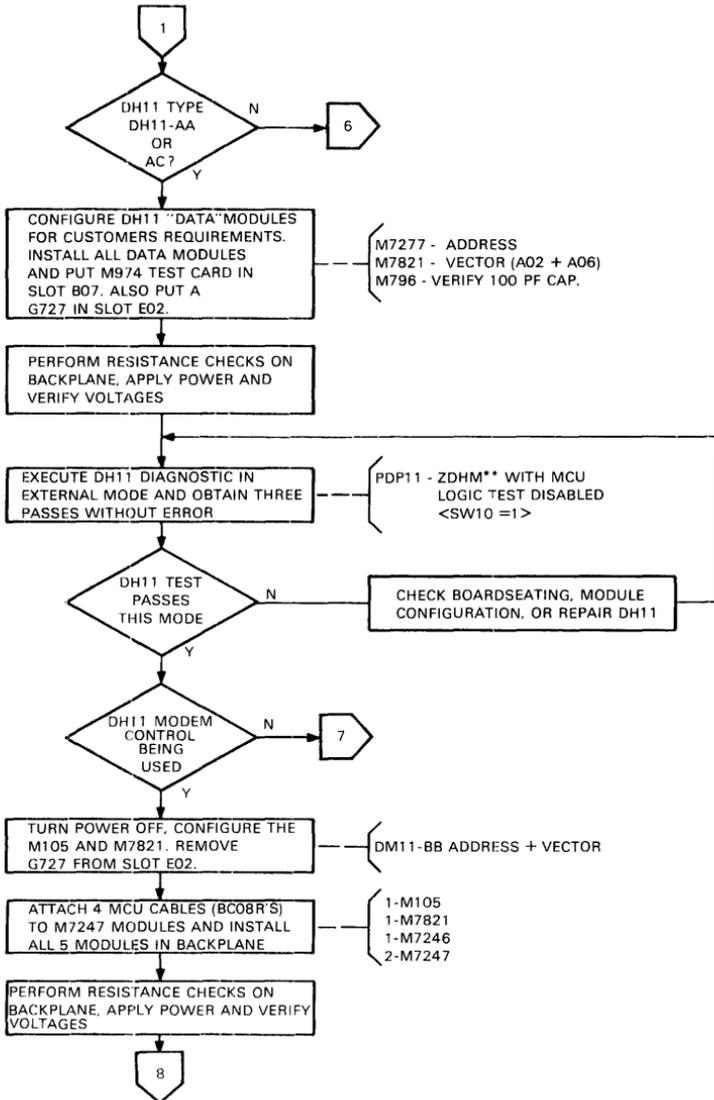
MK-2804C

DH11 INSTALLATION FLOWCHART (CONT)



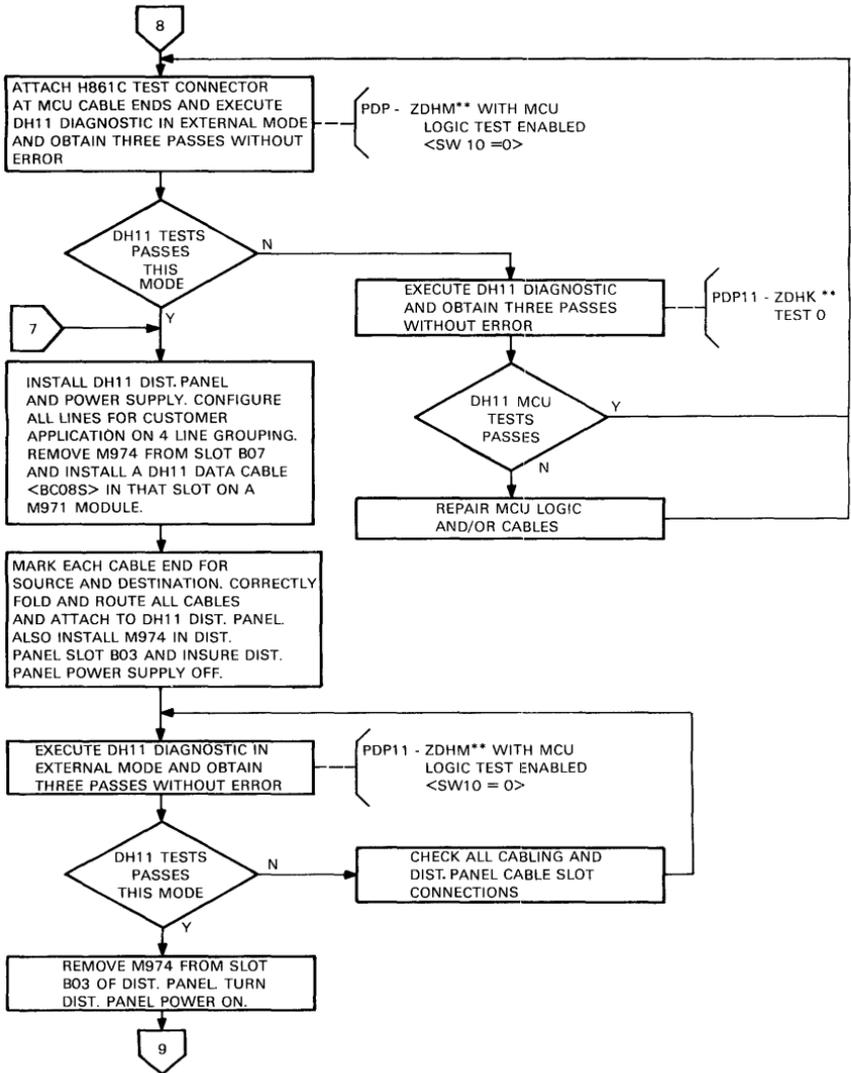
DH11 INSTALLATION

DH11 INSTALLATION FLOWCHART (CONT)



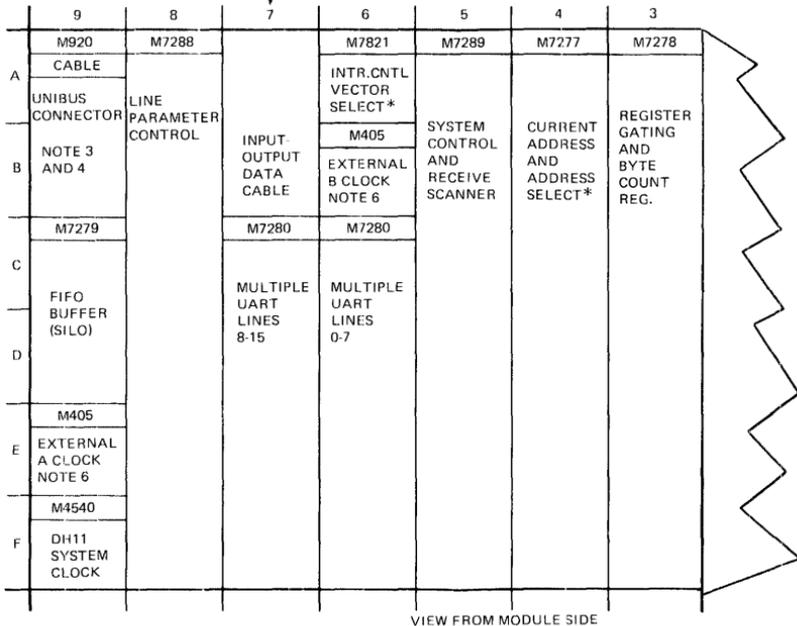
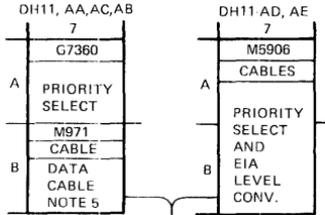
MR-7804D

DH11 INSTALLATION FLOWCHART (CONT)



DH11 INSTALLATION

DH11 BACKPLANE MODULE PLACEMENT



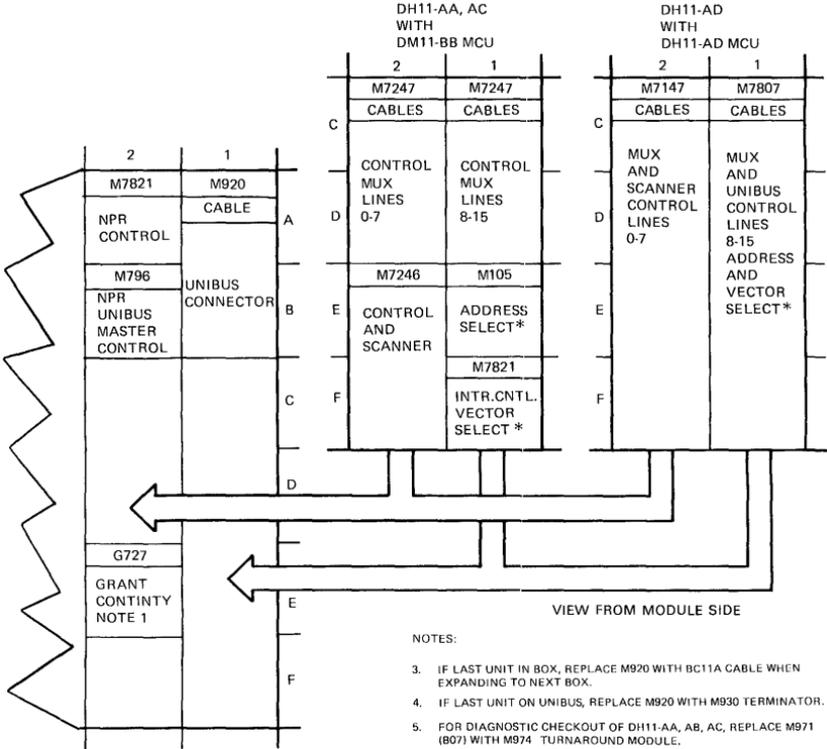
* REQUIRES JUMPER SELECTION

MC 2017

DH11 BACKPLANE MODULE PLACEMENT (CONT)

NOTES:

1. BACKPLANE SHOWN WITH G727 INSTALLED AS WOULD BE THE CASE IF IT WERE A DH11-AA, AC, OR AE WITHOUT MODEM CONTROL.
2. IF FIRST UNIT IN EXPANDER BOX, REPLACE M920 WITH BC11A CABLE.



*REQUIRES JUMPER SELECTION

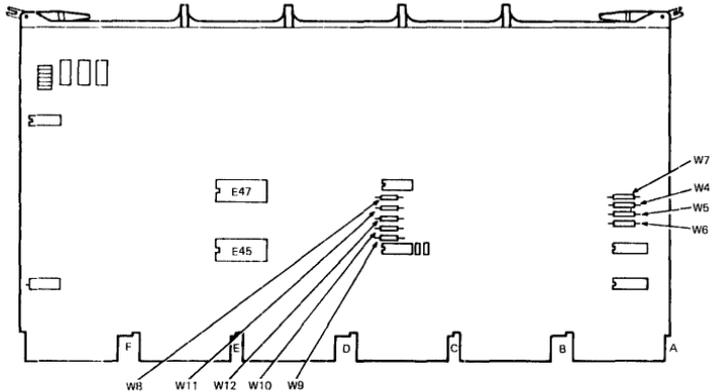
MM 2612

DH11 INSTALLATION

DH11 DATA CONTROL DEVICE ADDRESS JUMPER SELECTION

M7277 MODULE:

- SLOT 4



- RESIDES IN FLOATING ADDRESS SPACE (SEE APPENDIX A).
- DEVICE ADDRESS RANKS 7.

MSB															LSB
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
1	1	1	← JUMPERS →									0	0	0	0

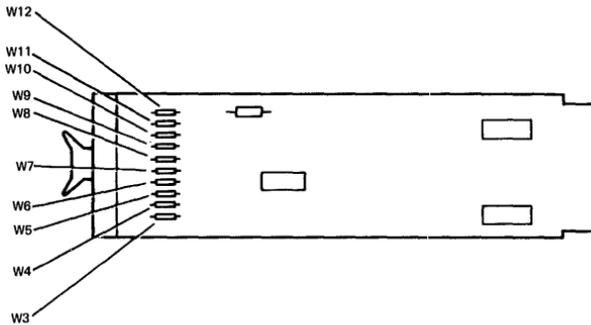
JUMPER NUMBERS	W12	W11	W10	W9	W8	W7	W6	W5	W4	DEVICE ADDRESS
										760000
									OUT	760020
									OUT	760040
									OUT	760060
									OUT	760100
									OUT	760120
									OUT	760140
									OUT	760160
									OUT	760200
									OUT	760220
									OUT	760240
									OUT	760260
									OUT	760300
									OUT	760400
									OUT	760500
									OUT	760600
									OUT	760700
									OUT	761000

NOTE: JUMPER OUT RESPONDS TO LOGICAL ONE ON THE ADDRESS.

DM11-BB MODEM CONTROL DEVICE ADDRESS JUMPER SELECTION

M105 MODULE:

- SLOT E1
- THE DM11-BB RESIDES IN FIXED ADDRESS SPACE STARTING AT 770500



MK-2803

JUMPER SELECTION

MSB											LSB				
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
1	1	1	JUMPERS									0	0	0	

JUMPER NUMBER	W12	W11	W10	W9	W8	W7	W6	W5	W4	W3	DEVICE ADDRESS	NUMBER OF UNIT
	OUT				OUT		OUT			OUT	770500	1ST
	OUT				OUT		OUT			OUT	770510	2ND
	OUT				OUT		OUT		OUT	OUT	770520	3RD
	OUT				OUT		OUT		OUT	OUT	770530	4TH
	OUT				OUT		OUT	OUT		OUT	770540	5TH
	OUT				OUT		OUT	OUT		OUT	770550	6TH
	OUT				OUT		OUT	OUT	OUT	OUT	770560	7TH
	OUT				OUT		OUT	OUT	OUT	OUT	770570	8TH
	OUT				OUT	OUT	OUT			OUT	770600	9TH
	OUT				OUT	OUT	OUT			OUT	770610	10TH
	OUT				OUT	OUT	OUT		OUT	OUT	770620	11TH
	OUT				OUT	OUT	OUT		OUT	OUT	770630	12TH
	OUT				OUT	OUT	OUT	OUT		OUT	770640	13TH
	OUT				OUT	OUT	OUT	OUT		OUT	770650	14TH
	OUT				OUT	OUT	OUT	OUT	OUT	OUT	770660	15TH
	OUT				OUT	OUT	OUT	OUT	OUT	OUT	770670	16TH
												MAX #/SYS.

NOTE: JUMPER OUT RESPONDS TO LOGICAL ONE ON THE UNIBUS.

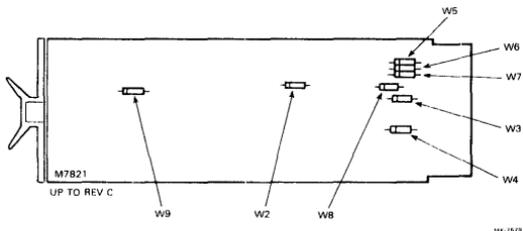
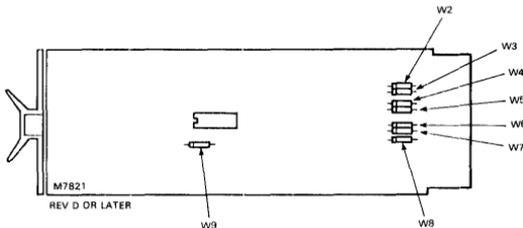
MK-2804

DH11 INSTALLATION

DH11 DATA CONTROL/DM11-BB MODEM CONTROL VECTOR ADDRESS JUMPER SELECTION

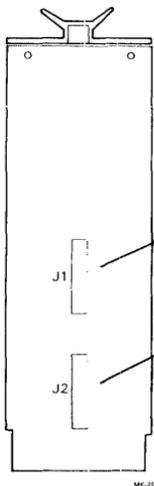
M7821:

- SLOT A6 FOR DATA CONTROL
- SLOT F1 FOR DM11-BB MODEM CONTROL
- W9 — NORMALLY IN, EXCEPT FOR PDP11/15s or 20s.

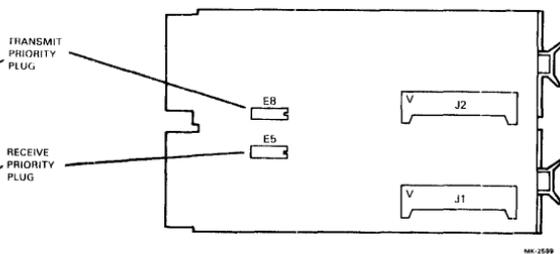


PRIORITY PLUG PLACEMENT

DH11-AA, AB OR AC – G7360 MODULE, SLOT A 7



DH11-AD, AE – M5906 MODULE, SLOT AB 7



DH11 DATA CONTROL/DM11-BB MODEM CONTROL VECTOR ADDRESS JUMPER SELECTION (CONT)

DATA CONTROL VECTOR SELECTION

MSB								LSB							
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0	0	0	0	0	0		← JUMPERS →					1/0	0	0	

M7821 MODULE,
SLOT A6

JUMPER NUMBER	W8	W7	W6	W5	W4	W3	W2	VECTOR ADDRESS
	IN	300						
	IN	310						
	IN	320						
	IN	330						
	IN	340						
	IN	350						
	IN	360						
	IN	370						
	IN	400						
	IN	500						
	IN	600						
	IN	700						

* W2 MUST ALWAYS BE IN: XX0 = RECEIVE / XX4 = TRANSMIT
NOTE: JUMPER INSTALLED PRODUCES LOGICAL ONE ON THE UNIBUS.

DM11-BB MODEM CONTROL VECTOR SELECTION

MSB								LSB							
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0	0	0	0	0	0	0	← JUMPERS →					0	0		

M7821 MODULE,
SLOT F

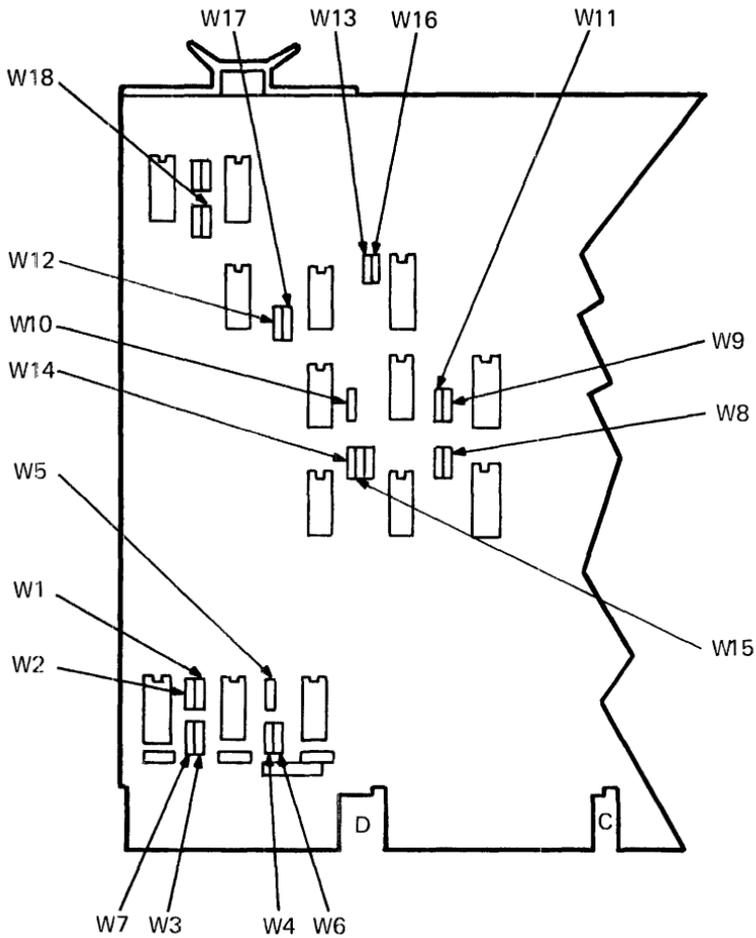
JUMPER NUMBER	W8	W7	W6	W5	W4	W3	W2	VECTOR ADDRESS
	IN	300						
	IN	304						
	IN	310						
	IN	314						
	IN	320						
	IN	324						
	IN	330						
	IN	334						
	IN	340						
	IN	344						
	IN	350						
	IN	354						
	IN	360						
	IN	364						
	IN	370						
	IN	374						
	IN	400						
	IN	500						
	IN	600						
	IN	700						

NOTE: JUMPER INSTALLED PRODUCES LOGICAL ONE ON THE UNIBUS.

DH11 INSTALLATION

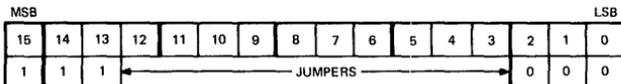
DH11-AD MODEM CONTROL DEVICE/VECTOR ADDRESS JUMPER SELECTION

M7807 MODULE, SLOT CDEF 1



MK-2600

DH11-AD MODEM CONTROL DEVICE/VECTOR ADDRESS JUMPER SELECTION (CONT)

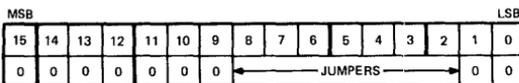


JUMPER NUMBER	W8	W14	W11	W9	W10	W17	W16	W13	W12	W15	DEVICE ADDRESS	NUMBER OF UNIT
	OUT				OUT		OUT			OUT	770500	1ST
	OUT				OUT		OUT			OUT	770510	2ND
	OUT				OUT		OUT		OUT	OUT	770520	3RD
	OUT				OUT		OUT		OUT	OUT	770530	4TH
	OUT				OUT		OUT	OUT		OUT	770540	5TH
	OUT				OUT		OUT	OUT		OUT	770550	6TH
	OUT				OUT		OUT	OUT	OUT	OUT	770560	7TH
	OUT				OUT		OUT	OUT	OUT	OUT	770570	8TH
	OUT				OUT		OUT	OUT	OUT	OUT	770600	9TH
	OUT				OUT	OUT	OUT			OUT	770610	10TH
	OUT				OUT	OUT	OUT		OUT	OUT	770620	11TH
	OUT				OUT	OUT	OUT		OUT	OUT	770630	12TH
	OUT				OUT	OUT	OUT	OUT		OUT	770640	13TH
	OUT				OUT	OUT	OUT	OUT		OUT	770650	14TH
	OUT				OUT	OUT	OUT	OUT	OUT	OUT	770660	15TH
	OUT				OUT	OUT	OUT	OUT	OUT	OUT	770670	16TH
												MAX #/SYS.

NOTE: JUMPER OUT RESPONDS TO LOGICAL ONE ON THE UNIBUS.

MC-2002

DH11-AD MODEM CONTROL DEVICE/VECTOR ADDRESS JUMPER SELECTION



JUMPER NUMBER	W1	W5	W4	W6	W7	W3	W2	VECTOR ADDRESS
		IN	IN					300
		IN	IN				IN	304
		IN	IN			IN	IN	310
		IN	IN			IN	IN	314
		IN	IN			IN	IN	320
		IN	IN			IN	IN	324
		IN	IN			IN	IN	330
		IN	IN			IN	IN	334
		IN	IN	IN			IN	340
		IN	IN	IN			IN	344
		IN	IN	IN		IN	IN	350
		IN	IN	IN		IN	IN	354
		IN	IN	IN	IN		IN	360
		IN	IN	IN	IN	IN	IN	364
		IN	IN	IN	IN	IN	IN	370
		IN	IN	IN	IN	IN	IN	374
	IN							400

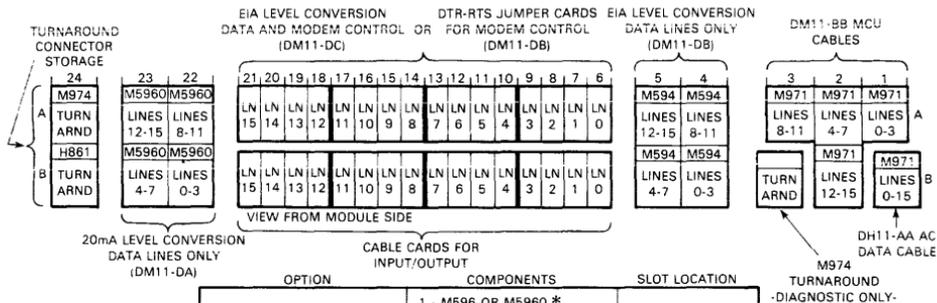
	IN		IN					500

	IN	IN						600

	IN	IN	IN					700

NOTE: JUMPER INSTALLED PRODUCES LOGICAL ONE ON THE UNIBUS.

DM11-AA DISTRIBUTION PANEL MODULE PLACEMENT



OPTION	COMPONENTS	SLOT LOCATION
DM11-DA 20mA LEVEL CONVERSION 4 LINES DATA ONLY	1 - M596 OR M5960 * 20mA LEVEL CONVERTER 4 - M973 20mA MATE-N-LOK CABLE CARDS	B22, B23, A22, A23 B6 THRU B21
DM11-DB EIA LEVEL CONVERSION 4 LINES DATA ONLY	1 - M594 EIA LEVEL CONVERTER 4 - W404 DTR-RTS PULL UP CARDS 4 - BC01R * EIA CABLE CARD ASSEMBLY OR 4 - M970 * CABLE CARDS 4 - BC05C EIA CABLES	B4, B5, A4, A5 A6 THRU A21 B6 THRU B21 B6 THRU B21 ONTO M970
DM11-DC EIA LEVEL CONVERSION 4 LINES DATA AND MODEM CONTROL (DM11-BB MCU REQD)	4 - M594 EIA LEVEL CONVERTER 4 - BC01R * EIA CABLE CARD ASSEMBLY OR 4 - M970 * CABLE CARDS 4 - BC05C EIA CABLES	A6 THRU A21 B6 THRU B21 B6 THRU B21 ONTO M970

*REQUIRES JUMPER SELECTION

MK-2593

M596/M5960 JUMPER SELECTIONS

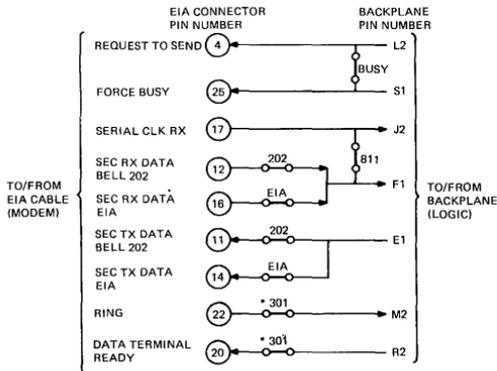
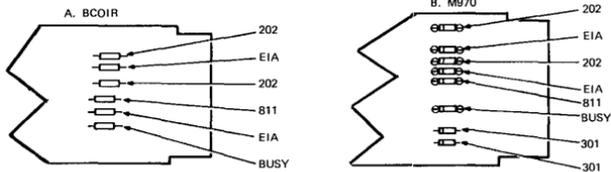


	SLOTS				JUMPERS	
	B22	B23	A22	A23	M596	M5960
LINES	0	4	8	12	W4	W2
	1	5	9	13	W2	W4
	2	6	10	14	W1	W3
	3	7	11	15	W3	W1

REMOVE JUMPER FOR SPEEDS ABOVE 150 BPS ON THE ASSOCIATED LINE

MK-2008

BC01R/M970 MODEM CONTROL JUMPER SELECTION



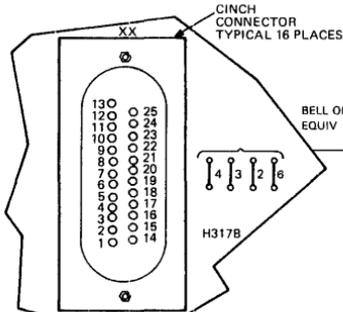
JUMPER	DM11-DB	DM11-DC
BUSY	OUT	OUT
EIA	OUT	OUT
EIA	OUT	OUT
811	OUT	IN
202	IN	IN
202	IN	IN
301*	IN	IN
301*	IN	IN

* 301 JUMPERS ARE NOT USED ON M9700 CARD (BC01R)

MK-2009

DH11 INSTALLATION

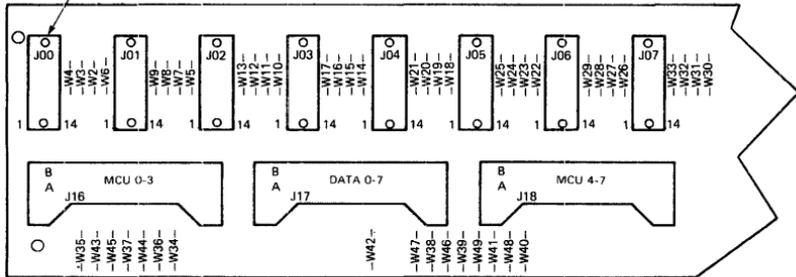
H317-B DISTRIBUTION PANEL JUMPER CONFIGURATION



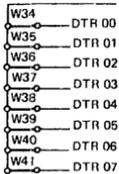
MODEM TYPE	DESCRIPTION	JUMPERS			
		6	2	3	4
103A	300 BAUD FULL DUP	*	*	*	*
103E, G, H	300 BAUD FULL DUP	IN	*	*	*
103F	300 BAUD FULL DUP	*	*	*	*
113A	300 BAUD ORIGINATE ONLY	*	*	*	*
202C, D	1800 BAUD 1/2 DUP	*	*	*	*
B11B	LOW SPEED TWX	*	*	*	*
EIA	RS232 - C (SEE BELOW)	OUT	IN	IN	OUT

- JUMPERS PIN 25 TO 4
- JUMPERS PIN 11 TO 14
- JUMPERS PIN 12 TO 16
- JUMPERS PIN 12 TO 17

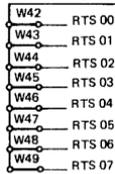
JUMPER CONFIGURATIONS ARE TYPICAL FOR ALL 16 LINES. ONLY THE JUMPER NUMBERS VARY (SEE TABLE DH-3)



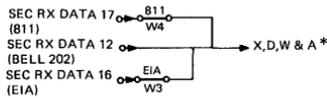
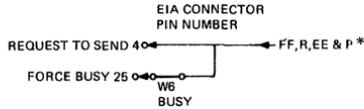
DTR COMMON (+5V)



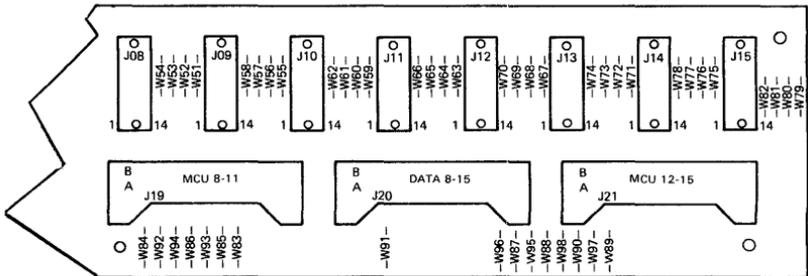
RTS COMMON (+5V)



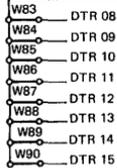
H317-B DISTRIBUTION PANEL JUMPER CONFIGURATION (CONT)



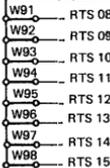
* CONNECTOR/PINNINGS
VARY, DEPENDING ON
LINE NUMBER
(SEE TABLE DH-3)



DTR COMMON (+5V)



RTS COMMON (+5V)



DH11 INSTALLATION

H317-B MODEM SIGNAL JUMPER SELECTION

Table DH-3 H317-B Modem Signal Jumper Reference

MODEM SIGNAL	REQUEST TO SEND (PIN 4)		EIA SECONDARY RECEIVE (PIN 16)		DISTRIBUTION PANEL CONNECTOR
	CONNECTOR PIN NO.	JUMPER NO.	CONNECTOR PIN NO.	JUMPER NO.	
00	FF	W6	X	W3	J16
01	R	W5	D	W8	
02	EE	W10	W	W12	
03	P	W14	A	W16	
04	FF	W18	X	W20	J18
05	R	W22	D	W24	
06	EE	W26	W	W28	
07	P	W30	A	W32	
10	FF	W51	X	W53	J19
11	R	W55	D	W57	
12	EE	W59	W	W61	
13	P	W63	A	W65	
14	FF	W67	X	W69	J21
15	R	W71	D	W73	
16	EE	W75	W	W77	
17	P	W79	A	W81	

Table DH-3 H317-B Modem Signal Jumper Reference (Cont)

MODEM SIGNAL	BELL 811 CONTROL SERIAL CLK RX (PIN 17)		EIA SECONDARY TRANSMIT (PIN 14)		DISTRIBUTION PANEL PANEL CONNECTOR
LINE #	CONNECTOR PIN NO.	JUMPER NO.	CONNECTOR PIN NO.	JUMPER NO.	
00 01 02 03	X D W A	W4 W9 W13 W17	Z B Y C	W2 W7 W11 W15	J16
04 05 06 07	X D W A	W21 W25 W29 W33	Z B Y C	W19 W23 W27 W31	J18
10 11 12 13	X D W A	W54 W58 W62 W66	Z B Y C	W52 W56 W60 W64	J19
14 15 16 17	X D W A	W70 W74 W78 W82	Z B Y C	W68 W72 W76 W80	J21

DH11 CABLING

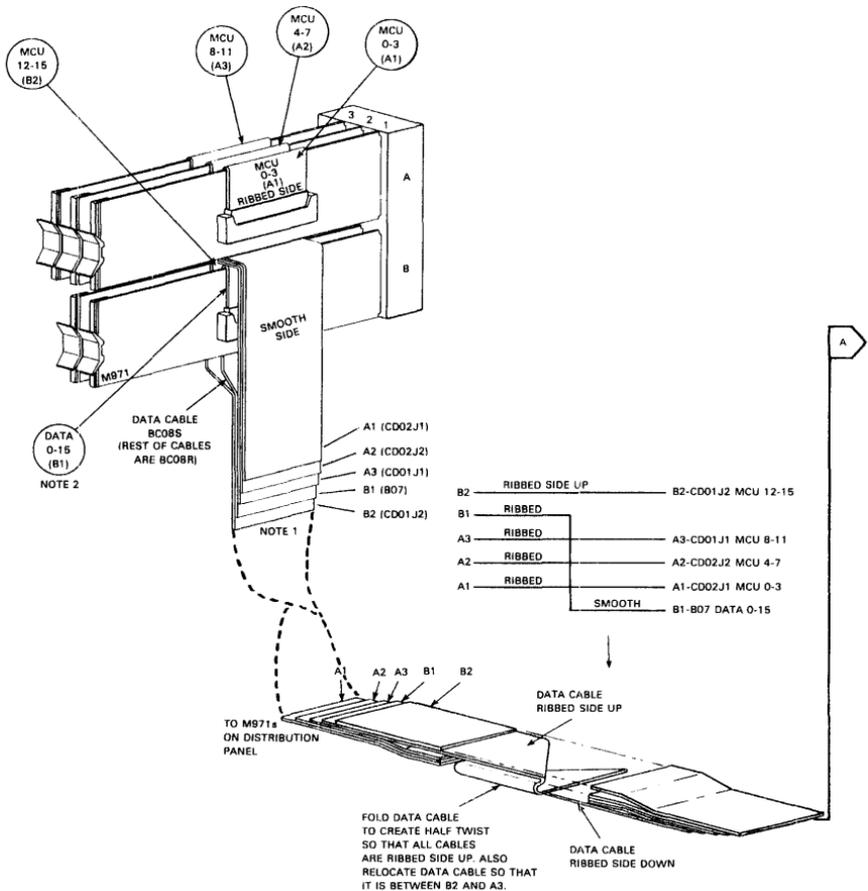
DH11 Cabling

This section contains cabling diagrams for DH11-AA or AC with DM11-BB Modem Control and the DH11-AD, AE with DH11-AD Modem Control. These diagrams also show correct test connector placement. Details of each DH11 cable are provided in Chapter 3; test connector information is included in Chapter 4.

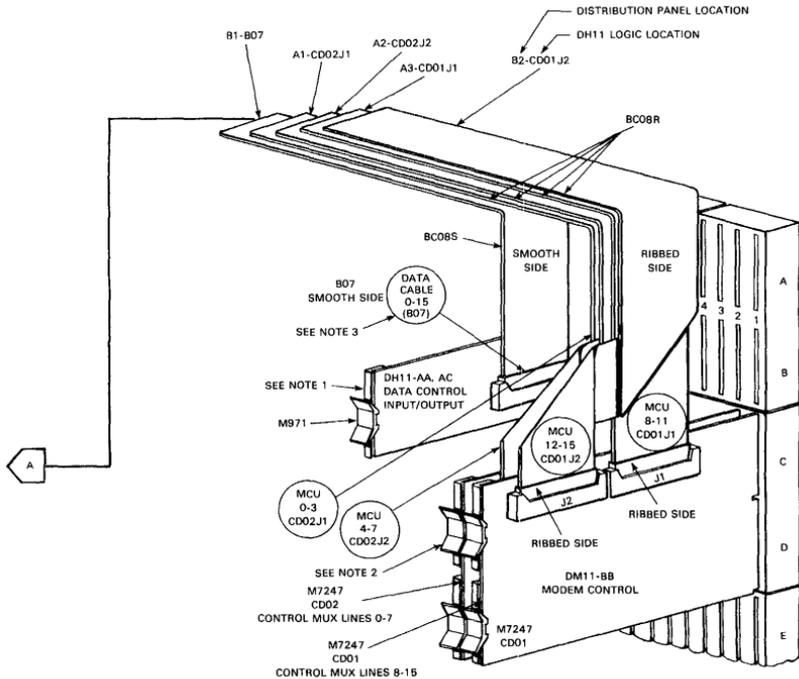
NOTE

Refer to Tech-Tip #11 for Diagnostic testing and cabling.

DH11-AA, AC/DM11-BB CABLING



DH11-AA, AC/DM11-BB CABLING (CONT)



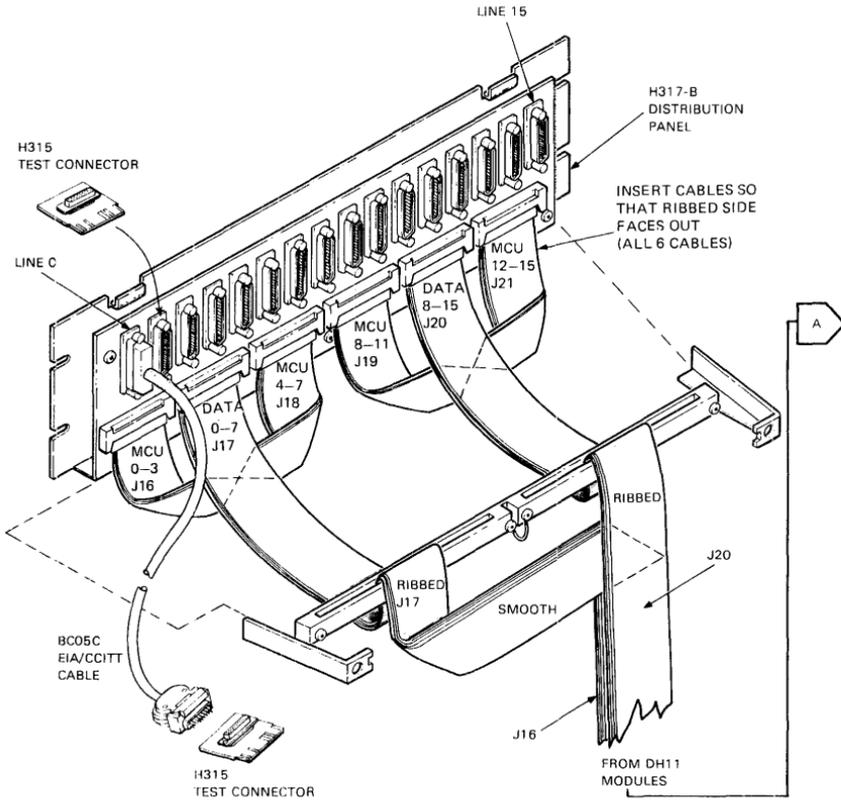
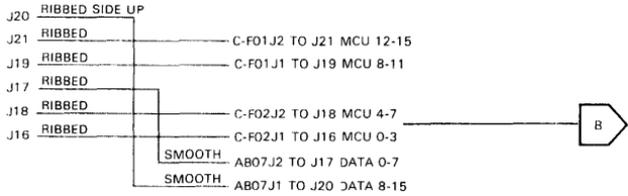
MK-2824

NOTES:

1. TO INSTALL BC08S CABLE TO M971-B07:
 - a) REMOVE G7360-A07 AND M7821-A06.
 - b) ROUTE CABLE DOWN THRU MODULES
 - c) CONNECT CABLE TO MODULE WIRE SIDE AGAINST BOARD.
 - d) REINSTALL MODULES REMOVED.
2. TO INSTALL BC08R CABLES TO M7247'S CD01 & CD02:
 - a) REMOVE M7821-A02 & M796-B02.
 - b) ROUTE CABLES DOWN THRU MODULES.
 - c) CONNECT CABLES TO MODULES. SHIELD SIDE AGAINST BOARD.
 - d) REINSTALL MODULES REMOVED.
3. CIRCLED ITEMS INDICATE LABELS WHICH MUST BE ATTACHED AT CABLE END.

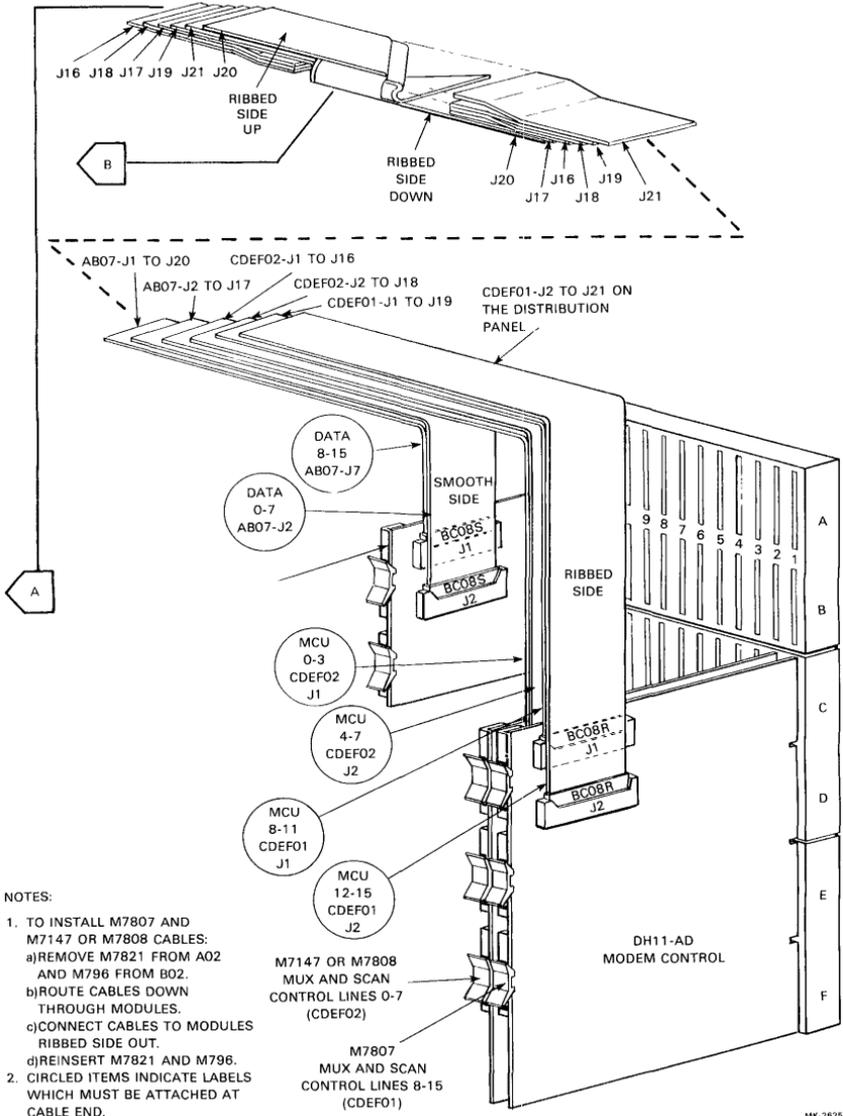
DH11 CABLING

DH11-AD, AE/DH11-AD MODEM CONTROL CABLING



WK 26119

DH11-AA, AE/DH11-AD MODEM CONTROL CABLING (CONT)



DH11 DIAGNOSTICS

DH11 Diagnostics

Four diagnostic programs are available to support the DH11 in PDP-11 systems. These diagnostics are listed in Table DH-4.

Table DH-4 DH11 Diagnostics

Diagnostic Function	Diagnostic Name	PDP-11 Systems
Checks DH11 Functional Logic	DH11 Diagnostic	(C)ZDHM**
Checks DH11 Line Logic	Data Reliability Test	(C)ZDHN**
Checks DH11 Modem Control	Modem Control Diagnostic	(D)ZDHK**
DH11 Link Testing	Interprocessor Test Program (ITEP) ITEP Monitor DH11 Overlay	(D)ZITA ** (D)ZDHL**

CZDHM Diagnostic Summary – The CZDHM includes 44 tests to verify all of the functional logic and 4 additional tests for limited modem control testing. Each line may be tested separately, up to a total of 256 lines. Comprehensive error reports are available for complete fault isolation (see program document).

CZDHN Diagnostic Summary – The CZDHN is a general purpose test and exerciser that consists of the following three independent subprograms:

- Subprogram 1 – Data Reliability Test (Starting Address 200). Checks up to 16 DH11s, all lines one at a time, using various combinations of line parameters.
- Subprogram 2 – Single Line Echo Test (Starting Address 214). Provides the capability to compose messages sent to an attached terminal or messages echoed from the terminal.
- Subprogram 3 – Data Patterns/Cable Tests (Starting Address 220). Provides a variety of data patterns to be transmitted and turned around using an H315 Test Connector at the cable end.

NOTE

To use default parameters, start at address 204.

DZDHK Diagnostic Summary – The DZDHK is a Modem Control diagnostic that consists of the following four test groups:

- Group 0 – Tests all scanner and line multiplexer functions.
- Group 1 – Tests a single line using modem cable and H315 test connector.
- Group 2 – Connect-Disconnect test for 103A modems.
- Group 3 – Connect-Disconnect test for 202C modems.

Running DH11 Diagnostics

Two procedures (One for running CZDHM and CZDHN: one for DZDHK) for running DH11 diagnostics are provided as follows.

CZDHN and CZDHM diagnostics can be executed automatically using the internal autosizer routine by setting SWR Bit 0=0. These diagnostics can also be executed manually (where operator intervention is needed to enter correct parameters), by setting SWR 0=1. CZDHM can also be executed without the modem control tests by setting SWR 10=1.

Running CZDHM and CZDHN Diagnostics – The following summarizes running DH11 diagnostics. Tables DH-5 through DH-8 provide descriptions of the parameter inputs for each of the diagnostics.

DH11 DIAGNOSTICS

Table DH-5 Typical CZDHM/CZDHN Diagnostic Parameters

Parameter Question	Description
Type No. of addresses (octal) between vectors (10 or 20) <u>10</u> <CR>	Enter 10 or 20 followed by <CR>. If modem control vectors are interleaved with DH11 vectors, CZDHN only enter 20. For standard DH11 contiguous vectors enter 10.
Type SCR address for first DH11. _____<CR>	Enter the device address in DH11 octal of first device followed by <CR>.
Type Vector Address for first DH11. _____<CR>	Enter the Vector address for the first DH11 followed by <CR>.
Type device selection parameter _____<CR>	Enter octal number encoded as follows. Bit00=1 Test DH11 #00 Bit01=1 Test DH11 #01 Bit02=0 Do not test DH11 #02 “ ” Bit15=1 Test DH11 #15 Examples: 177777<CR> Test all 16 DH11's 100000<CR> Test only DH11 #17(8) 000005<CR> Test DH11 #00 and 02 If a <CR> only is entered the program will default to the last device select parameter entered. If this is the initial load it will default to 000003 (DH11 #00 and 01).
Type Line Selection Parameter _____<CR>	Enter line number(s) in octal (same format as device selection above). If a <CR> return only is typed the program will default to 16. Lines for all programs except CZDHN subprograms 2 and 3, which default to line 00. If more than one DH11 is tested, the same combination of lines will be tested on all DH11's selected.

Table DH-6 Additional Parameter Inputs for CZDHN Subprograms 2 and 3

Parameter Question	Description
Do you want to change "LPR" (Y or N)? _____<CR>	Enter Y for YES or N for NO
TRANSMITTER SPEED? _____<CR> RECEIVER SPEED? _____<CR>	If this is the first pass and NO is entered, the program will default to: 9600 baud, 8 bit characters, 1 stop bit and odd parity; otherwise it will default to the previous LPR selection and the program proceeds with FILLER CHARACTER prompt below. If yes, program proceeds with next prompt.
CHAR LENGTH (6, 7, or 8)? _____<CR>	Enter desired number followed by <CR>.
NO. OF STOP BITS (1 or 2)? _____<CR>	Enter desired number followed by <CR>.
PARITY SELECTION (E, O, OR <CR>)? _____<CR>	Enter desired condition O followed by <CR>=ODD E followed by <CR>=EVEN Enter just <CR> for NO parity
FILLER CHARACTER ? _____<CR>	Enter desired filler character followed by <CR>. For NULL filler just enter <CR>.
FILLER COUNT ? _____<CR>	Enter 1, 2, 3 or 4 followed by <CR>. Enter just <CR> for 0.

For additional parameters for Subprogram 2, refer to Table DH-9; for Subprogram 3, refer to Table DH-10.

DH11 DIAGNOSTICS

Table DH-7 Additional Parameter Inputs for CZDHN Subprogram 2

Parameter Question	Description
<p>NOTE The following parameter questionnaire applies only to subprogram 2. Refer to Table DH-9 for continued subprogram 3 parameters.</p>	
SEND MODE – (Y OR N) Y <CR>	<p>Enter Y for yes or just <CR> for no. If yes, the following prompt appears. If no, the program assumes ECHO mode (see below).</p>
TYPE SEND BUFFER – TERMINATE WITH CONTROL-C	<p>At the console, type in any characters you wish to send to the test terminal. Always start the buffer with CR, LF.</p> <p>Example:</p> <p>CR, LF</p> <p>THE QUICK BROWN ... DOGS BACK CONTROL-C</p> <p>Remember to end the buffer with CONTROL-C. Once the buffer is sent, the program will repeat the procedure beginning with the prompt TYPE LINE # (00-17 OCTAL)_____<CR></p>
SEND MODE – (Y OR N) N <CR>	<p>Program assumes ECHO mode.</p>
<p>Testing Line 00 – Go type in on test line TYPE:[CONTROL-C TO EXIT] [CONTROL-E TO ECHO BUFFER]</p>	<p>At the test terminal, type in any characters you wish to echo through the DH11 back to the terminal.</p> <ol style="list-style-type: none"> 1. To echo complete message, terminate with CONTROL E. 2. To return to console, type CONTROL-C. <p>At the test terminal verify that the echoed characters match the original.</p>

Table DH-8 Additional Parameter Inputs for CZDHN Subprogram 3

Parameter Question	Description
BUFFER SIZE (1-512)____<CR>	Enter decimal number of buffer size. Enter <CR> only for default buffer size of 256.
PATTERN TYPE? (A, V, D, R, S, B or <CR>?)	Enter the desired data pattern described below.
SET SR7=1 TO LOCK ON PATTERN	<p>A ALTERNATING 1/0 U BINARY UP COUNT D BINARY DOWN COUNT R RANDOM DATA B TYPED IN BUFFER S SINGLE CHARACTER <CR> SEQUENCE OF A, U, D, AND B</p> <p>If A, U, D, R or <CR> is entered, the program will transmit, receive and data check the selected pattern. If SR7=1 the program will loop on the selected pattern, otherwise the program returns to the:</p>
TYPE IN TEST BUFFER – TERMINATE WITH CONTROL-C	<p>BUFFER SIZE (1-512) prompt.</p> <p>If B is selected, the following prompt appears.</p> <p>Enter any characters that you wish to use as the data pattern followed by CONTROL-C. The program begins when CONTROL-C is entered.</p>
TYPE SINGLE TEST CHAR____<CR>	<p>If S is selected as the pattern type, the following prompt appears.</p> <p>Enter any single character followed by <CR>. The program will fill the buffer with the selected character and begin execution.</p>

Running DZDHK Diagnostics – The DZDHK diagnostic is used to check various functions of DH11 Modem Control. Typical parameter selections are provided in Table DH-9. Start program at address 002 with SWR0=1.

DH11 DIAGNOSTICS

Table DH-9 DZDHK Diagnostic/Parameters

Parameter Question	Description
VECTOR ADDRESS _____<CR>	Enter the correct vector address followed by <CR>. If entry is incorrect, program will type “?” and repeat prompt. If entry is not the device under test, program halts.
CONTROL REGISTER ADDRESS _____<CR>	Enter the correct 6 digit control register address followed by <CR>. If entry is incorrect, program will type “?” and repeat prompt. If register address is non-existent, the program halts.
LINE SELECT PARAMETER _____<CR>	<p>Enter line number in octal followed by <CR>.</p> <p>BIT00=1 Test line #00 BIT01=1 Test line #01 BIT02=0 Do not test line #02 ⋮ BIT15=1 Test line #15</p> <p>Examples:</p> <p>177777<CR> Test all 16 lines 100000<CR> Test line 17(8) only 000005<CR> Test lines 00 and 02</p> <p>Enter 3 digit number for the Test Group desired followed by <CR></p> <p>Test Group 0=000 Test Group 1=001 Test Group 2=002 Test Group 3=003</p> <p>Refer to examples of each selected test and additional parameter as required.</p>
TEST - _____CR	<p>Enter 3 digit number for the Test Group desired followed by <CR></p> <p>Test Group 0=000 Test Group 1=001 Test Group 2=002 Test Group 3=003</p> <p>Refer to examples of each selected test and additional parameter as required.</p>
SINGLE CABLE TEST LINE NUMBER _____<CR>	Enter the correct line number being tested followed by a <CR>. An H313 test connector must be attached to the Modem Cable for the selected line.

For Test-000 <CR> - The program prints the title; “16 LINE SCANNER TEST” and begins testing. Turnaround test connectors are not needed for this test.

For TEST-001 <CR> - The program prints the title followed by one additional parameter prompt;

Table DH-9 DZDHK Diagnostic/Parameters (Cont)

Parameter Question	Description
For Test-002 <CR> and Test 003 <CR> – The program prints the title and the following parameter prompts.	
103A or 202C Connect-Disconnect Test	Enter the line number that will originate the call (0-17 octal) followed by <CR>.
ANSWER LINE – _____<CR>	Enter the line number that will answer the call (0-17 octal) followed by <CR>.
DIAL ANSWERING DATA SET	You have about 5 minutes to make connection between the two data sets. Follow the procedure below.

Procedure for line connection:

1. Place answering data set in AUTO-ANSWER mode.
2. Place originate data set in TALK mode.
3. Dial answering data set from originate data set.
4. Wait for tone, then press DATA button. Data indicator should light on both data sets.

NOTE

The program now waits for interrupts from the modem control. If the connection was properly established the program will print the following prompts.

TYPE TTY KEY TO DISCONNECT	Press any key at the terminal. This causes the program to begin the disconnect sequence. When the sequence is completed, the following message is printed, indicating successful completion.
103A or 202C TEST COMPLETE	Indicates DONE, no errors.

SPECIAL CONTROL FUNCTIONS:

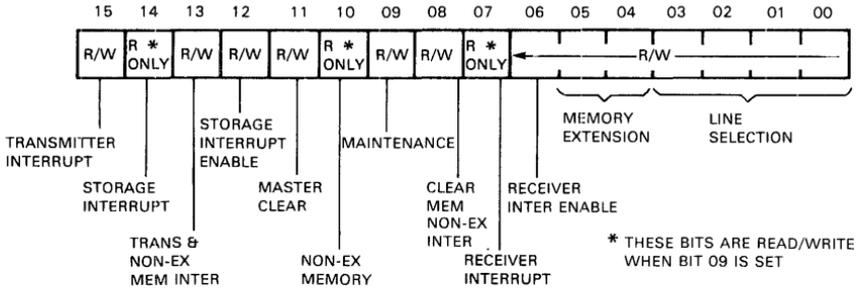
- CONTROL-C – Escape from current test and select a new test.
- CONTROL-V – Changes vector and register address.
- CONTROL-D – Changes line number.

DH11 MAINTENANCE AIDS

DH11 Register Bit Assignments

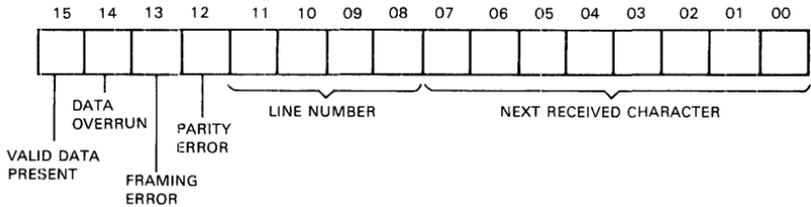
Register bit assignments for the DH11 are shown below.

SYSTEM CONTROL REGISTER 00 (READ/WRITE)



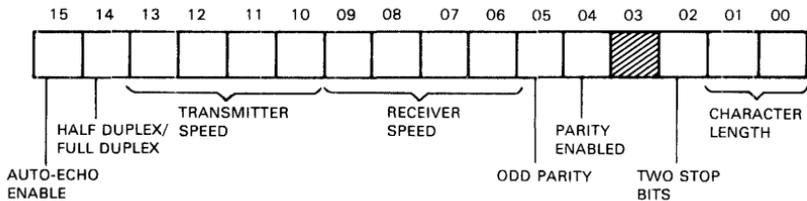
MK-2831

NEXT RECEIVED CHARACTER REGISTER 02 (READ ONLY)



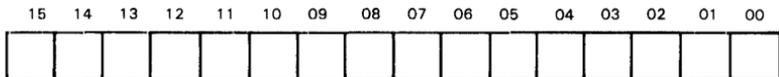
MK-2832

LINE PARAMETER REGISTER 04 (WRITE ONLY)



MK-2833

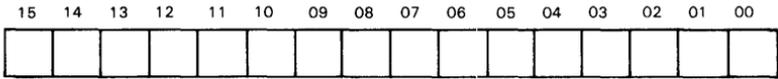
CURRENT ADDRESS REGISTER 06 (READ/WRITE)



WHEN WRITTEN = LOADS RAM
WHEN READ = CURRENT ADDRESS OF TRANSMIT BUFFER

MK-2834

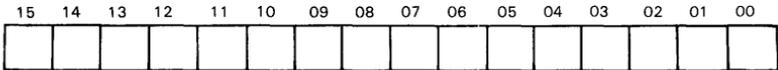
BYTE COUNT REGISTER 10 (READ/WRITE)



CONTAINS THE TWO'S COMPLEMENT OF THE NUMBER OF CHARACTERS TO BE TRANSMITTED

MK-2835

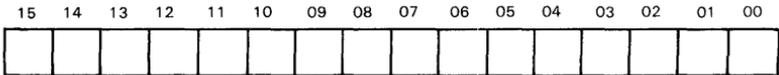
BUFFER ACTIVE REGISTER 12 (READ/WRITE)



SET ONE BIT FOR EACH LINE = TRANSMIT GO

MK-2836

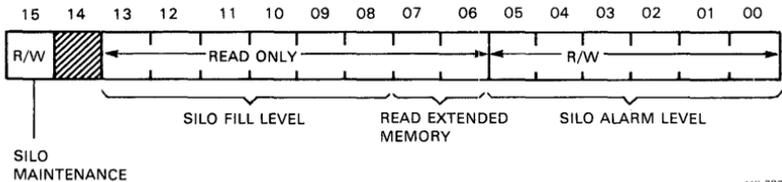
BREAK CONTROL REGISTER 14 (READ/WRITE)



SET ONE BIT FOR EACH LINE = BREAK CHARACTER

MK-2837

SILO STATUS REGISTER 16 (READ/WRITE)



MK-2838

DH11 MAINTENANCE AIDS

DH11 Tech Tips/FCO Index

This section provides tabulated listings of all Tech-Tips and FCOs issued to date on the DH11 option.

Table DH-10 Tech Tip Index

Tech Tip No.	Title	Speed Bulletin No.
1	Erroneous Clearing or RTS	
2	DH11 UNIBUS Loads	
3	DH11 Parity Errors	
4	DH11 Parity Operation	
5	DM11/DH11 Installation	
6	H739 Loss of Output Voltage	
7	M5960 or M596 Used Above 150 Baud	
8	DM11/DH11 Glitches on INIT	
9	DH11 Peripherals Handbook Error	
10	Modem Control Programming	
11	DH11 Revised Checkout Procedure	
12	Power Up Problem with M7838 (DH11-AE)	
13	Power Short Circuit in DH11/M7821	
14	DM11-BB Byte Instructions	105
15	DHS11/CSS Ext. Clock Option Cabling Error	105
16	DH11 Power Harness Shorting	105
17	Program Difference with M7147 vs. M7808	160
18	Data Tester/Turnaround	173

Table DH-11 DH11 FCO History Chart

Module	FCO No.	Date	Reason	Quick Check
M7821	C0001	APR 72	Eliminates ground noise.	
M7278	D0002	JUN 73	Parity always enabled.	Etch trimmed.
	D0003	JUN 73	By etch from E74, pin 8 to FF2 touching E74, pin 7.	Between E74, pin 7 and pin 8.
M7277	B0003	FEB 74	INIT timing with MOS or solid state memory may fail DZDHC on PDP-11/45, or PDP-11/50s.	E66 is 7440.
M7821	S0005	JUL 75	Grant line reflections cause double grants.	Added 180 ohm R11 & R12 by E1.
M7277	R0006	DEC 75	INIT timing with solid state memory may fail DZDHC on PDP-11/70.	E8 is 74121 C89 is 100 mfd.
DH11	S0008	SEP 76	Bus data to B INIT line cross talk.	Added wire D08U1 to F02D1.
DH11	S0011	SEP 76	Unused inputs & A02E1 grounded on A02 (M7821).	Wiring A02H2-to-A02C2 & A02E1-to A03C2.
M7277	R0008	NOV 76	Required when DH11 used on PDP-11/34s.	9602 added at E2.
M7807	R0004	APR 78	Lines 8-16 Line Status unstable.	R34, thru R37 are removed and R24=10K ohm.
M7808	R0005	MAY 78	± 10V regulator failure.	R6 thru R9 deleted.
DH11	S0012	DEC 78	Transitions on Modem lines	M7147 installed in backplane slot. C-F2.

DMC11 OPTION

DMC11 General Description

The DMC11 is a single line, microprocessor controlled synchronous controller. It provides Direct Memory Access or Non-Processor Request capability, and is supported on both PDP-11 and VAX-11 systems.

DMC11 features:

- Remote applications up to 56K b/s,
- Local applications up to 1M b/s,
- Compatibility with RS-232-C/CCITT V.24/V.28/ISO 2110 and CCITT V.35/ISO 2593.

DMC11 Reference Documentation

Refer to the following list of documents if the level of content in this section is insufficient:

- *DMC11 Microprocessor Technical Manual* – EK-DMCMP-TM
- *DMC11 Microfiche* – EP-DMCMP-TM
- *DMC11 Print Set* – MP00076
- *M8201/02 Line Unit Manual* – EK-DMCLU-MM
- *M9301-YJ Bootstrap Technical Manual* – EK-M9301-TM
- *M9312 Technical Manual* – EK-M9312-TM

DMC11 INSTALLATION

DMC11 Components List

Table DMC-1 DMC11 Components

Option/Parts List	Description
DMC11-AR	Basic Remote Subsystem containing:
M8200-YA	Microprocessor with DDCMP microcode for remote applications Used with M8201 line unit only
BC08S-1	Cable to interconnect microprocessor and line unit
DMC11-DA	
M8201	Line unit for remote applications – up to 19.2K b/s
BC05C-25	Cable for EIA RS-232-C/CCITT V.24 interface
H325	Modem test connector
DMC11-FA	
M8201	Line unit for remote applications up to 56K b/s
BC05Z-25	Cable for CCITT V.35/DDS interface
H3250	Cable test connector
DMC11-AL	Basic Local Subsystem containing:
M8200-YB	Microprocessor with DDCMP microcode for local applications Used with M8202-XX line units only
BC08S-1	Cable to interconnect microprocessor and line unit
DMC11-MA	
M8202-YA	Line unit with 1 MEG b/s integral modem
12-12528-00	Cable test connector
DMC11-MD	
M8202-YD	Line unit with 56K b/s integral modem
12-12528-00	Cable test connector

OPTIONS MATRIX

REMOTE EIA RS-232-C	CCITT V.35	LOCAL	
		56K B/S	1M B/S
DMC11-AR and DMC11-DA	DMC-AR and DMC11-FA	DMC-AL and DMC11-MD	DMC-AL and DMC-MA

Device Placement

High-speed DMC11s of 1M b/s must be placed before all devices on the UNIBUS (including UNIBUS repeaters), except for unbuffered NPR devices such as RK11s.

Remove NPG jumper from selected M8200 slot (pins CA1 to CB1).

NOTE

In configurations where both DMC11s and DMR11s are used, DMCs must be physically placed before DMRs.

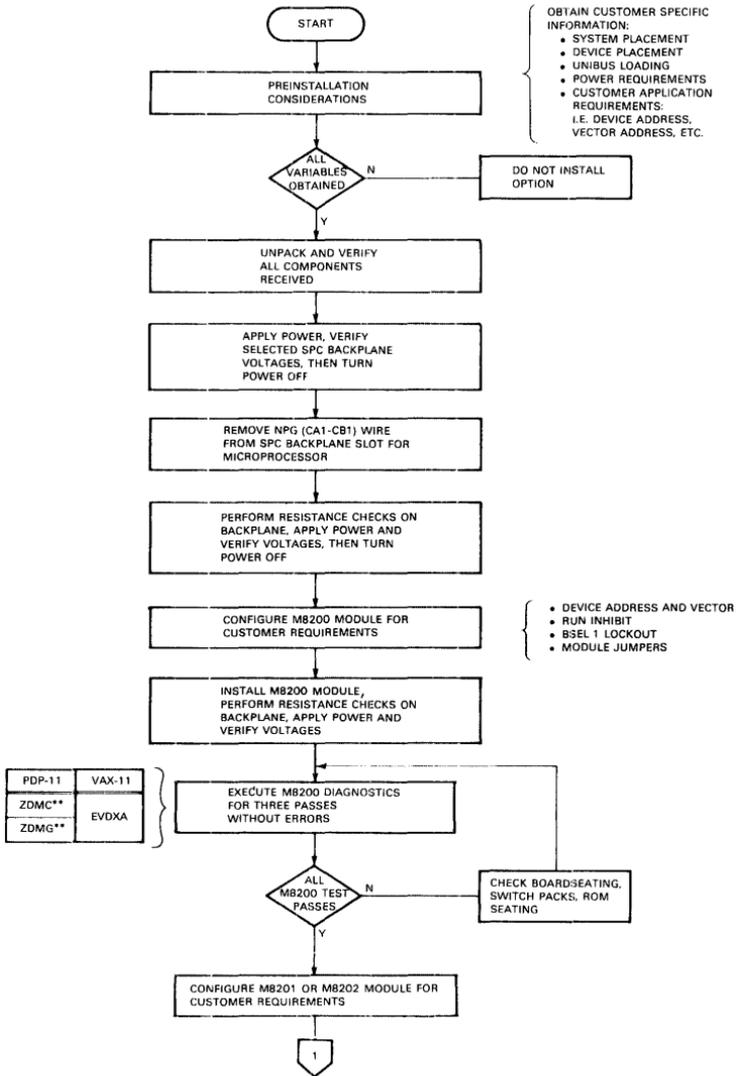
Power/UNIBUS Loading

Table DMC-2 DMC11 Power Chart

Module	Voltage Rating (Approximate Values)	Maximum Voltage	Minimum Voltage	Backplane Pin No.	UNIBUS Loading
M8200	+ 5 V @ 5.0 A	+ 5.25	+ 4.75	C1A2	1 UNIBUS dc load 3 UNIBUS ac loads
M8201	+ 5 V @ 3.0 A	+ 5.25	+ 4.75	C1A2	No UNIBUS loads
	+15 V @ .3 A	+15.75	+14.25	C1U1	
	-15 V @ .3 A	-15.75	-14.25	C1B2	
M8202	+ 5 V @ 3.0 A	+ 5.25	+ 4.75	C1A2	No UNIBUS loads
	+15 V @ .18 A	+15.75	+14.25	C1U1	
	-15 V @ .46 A	-15.75	-14.25	C1B2	

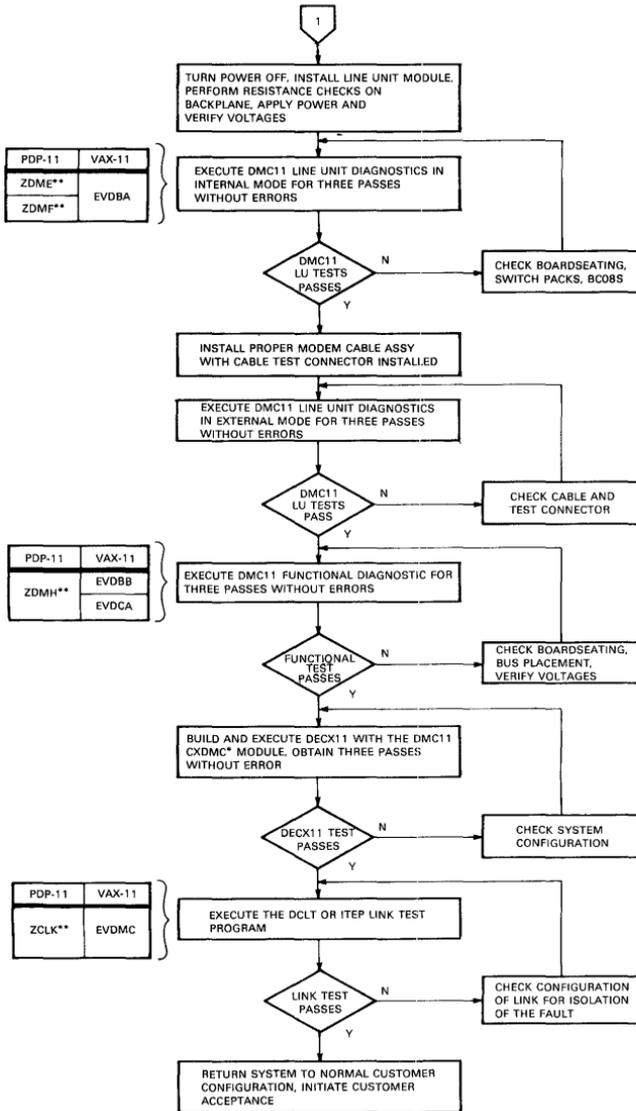
DMC11 INSTALLATION

DMC11 INSTALLATION FLOWCHART



MX-2808A

DMC11 INSTALLATION FLOWCHART (CONT)



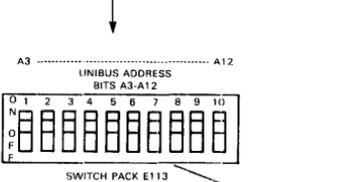
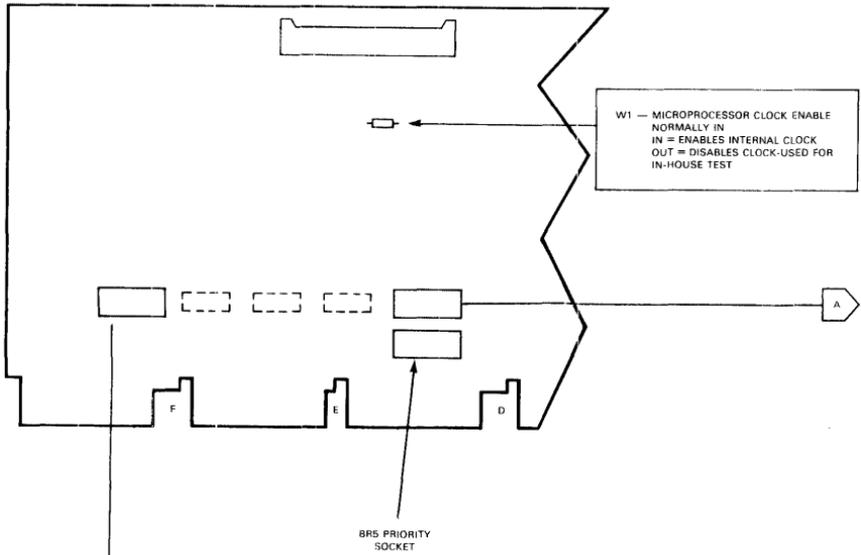
MX-2008

DMC11 INSTALLATION

M8200 Switch Packs/Jumpers

(THE DMC11 RESIDES IN FLOATING ADDRESS SPACE (SEE APPENDIX A).)

- DEVICE ADDRESS RANKS 7
- VECTOR ADDRESS RANKS 28



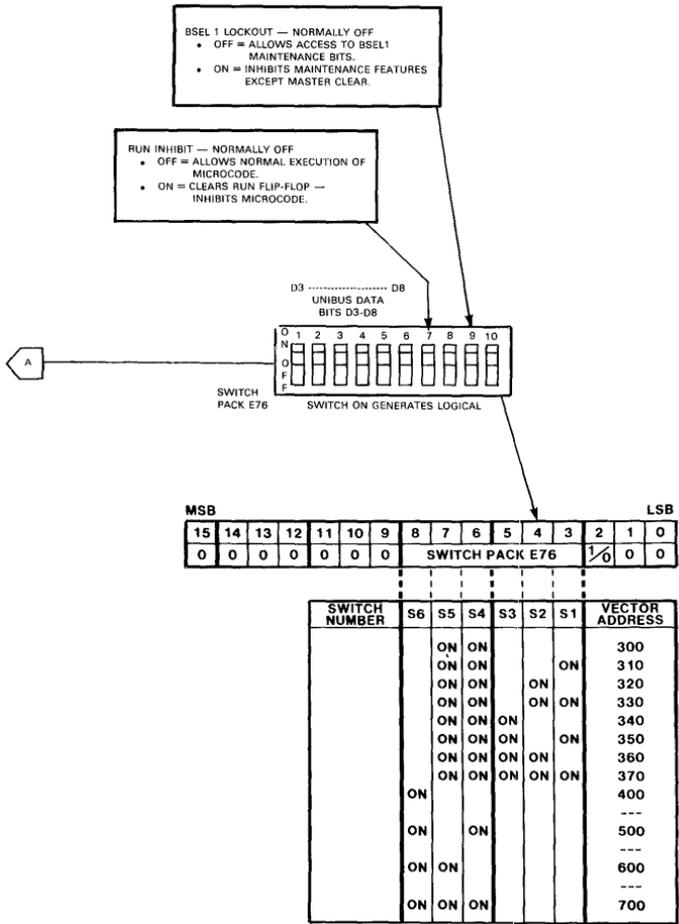
MSB											LSB					
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
1	1	1												0	0	0

SWITCH NUMBER	S10	S9	S8	S7	S6	S5	S4	S3	S2	S1	DEVICE ADDRESS
								OFF	OFF	OFF	760010
								OFF	OFF	OFF	760020
								OFF	OFF	OFF	760030
								OFF	OFF	OFF	760040
								OFF	OFF	OFF	760050
								OFF	OFF	OFF	760060
								OFF	OFF	OFF	760070
								OFF	OFF	OFF	760100

								OFF	OFF	OFF	760200
								OFF	OFF	OFF	760300
								OFF	OFF	OFF	760400
								OFF	OFF	OFF	760500
								OFF	OFF	OFF	760600
								OFF	OFF	OFF	760700
								OFF	OFF	OFF	761000
								OFF	OFF	OFF	762000
								OFF	OFF	OFF	763000
								OFF	OFF	OFF	764000

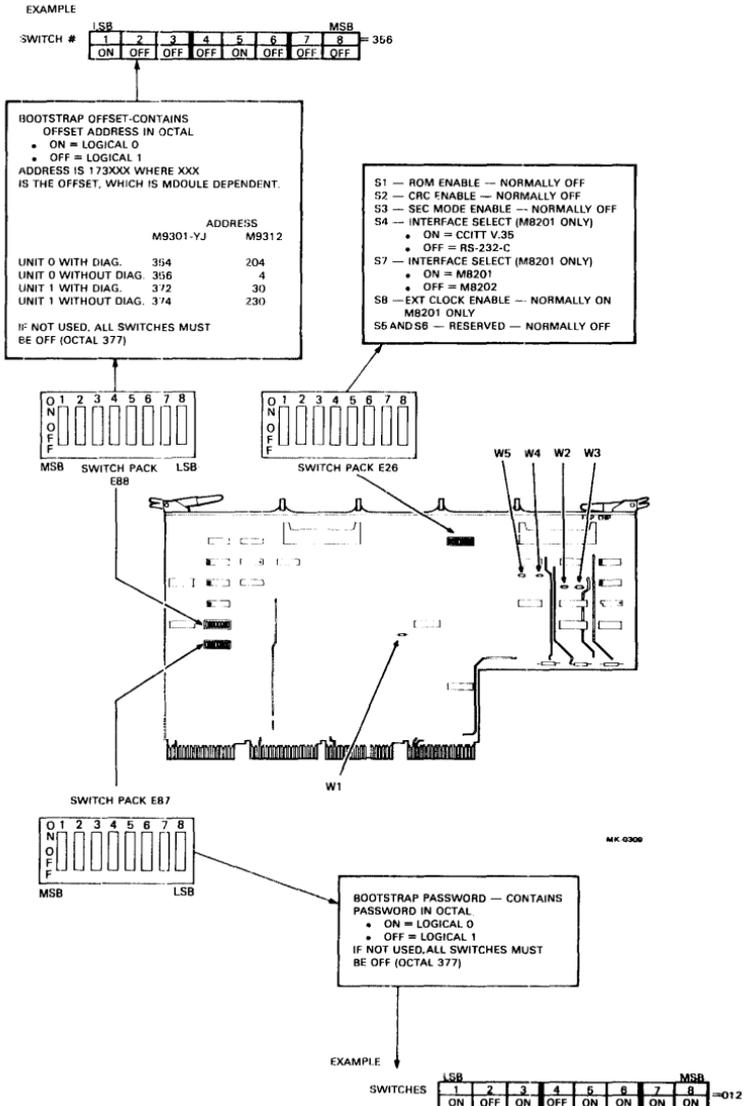
NOTE: SWITCH OFF RESPONDS TO LOGICAL ONE ON THE UNIBUS.

DMC11 INSTALLATION



DMC11 INSTALLATION

M8201 Switch Packs/Jumpers

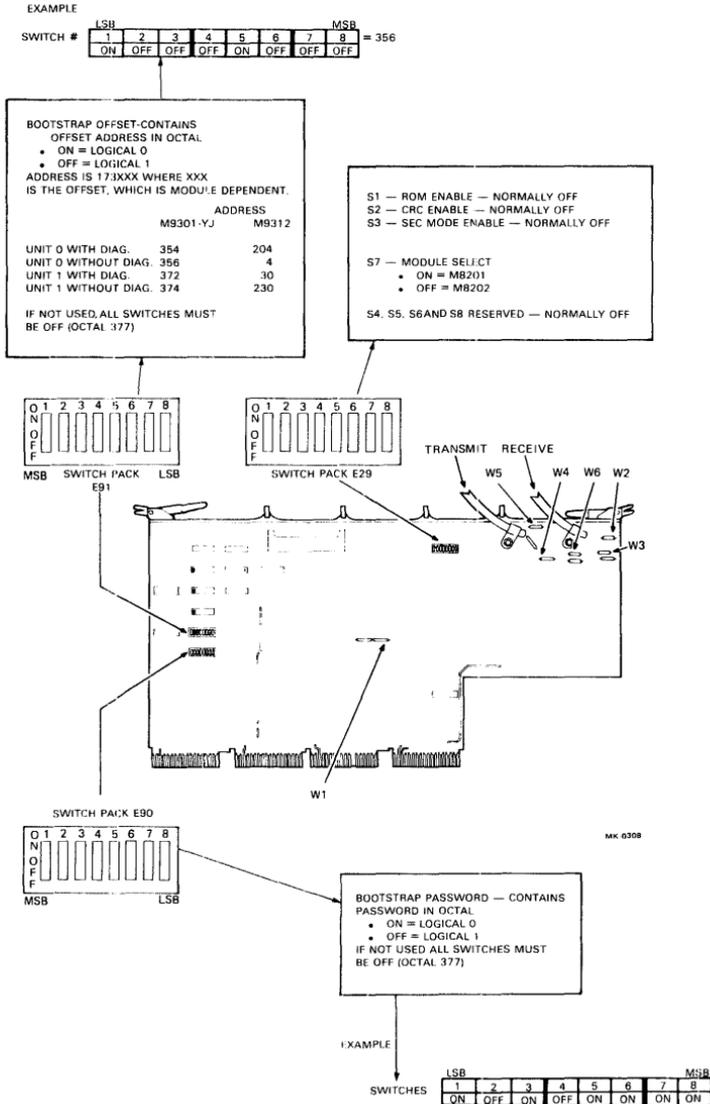


M8201 JUMPERS

Jumper Number	Normal Configuration	Function
W1	IN	CRC character output inversion:
W2 W3	IN OUT	<p>W2 and W3 used together for modem ready:</p> <ul style="list-style-type: none"> • W2 IN/W3 OUT – Modem Signal data set ready controls signal modem ready • W2 OUT/W3 IN – Modem Ready signal always ON
W4 W5	IN OUT	<p>W4 and W5 used together for request to send:</p> <ul style="list-style-type: none"> • W4 IN/W5 OUT – Request to send controlled via program • W4 OUT/W5 IN – Request to send Always ON

DMC11 INSTALLATION

M8202 Switch Packs/Jumpers



M8202 JUMPERS

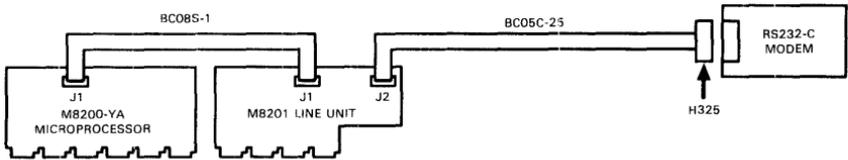
Jumper Number	Normal Configuration	Function
W1	IN	CRC character output inversion:
W2 W3	OUT OUT	Modem receiver transformer protection: (Installation not recommended)
W4 W5	OUT OUT	Modem transmitter transformer protection: (Installation not recommended)
W6	OUT = FDX IN = HDX	Half-duplex enable <ul style="list-style-type: none">• OUT = Full-duplex (FDX)• IN = Half-duplex (HDX) (Ties transmitter to receiver)

DMC11 CABLING

DMC11 Cabling

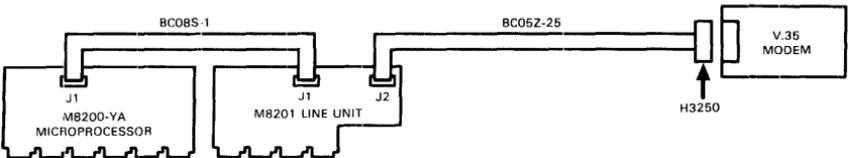
This section contains cabling diagrams for each DMC11 configuration. These diagrams also show test connector placement. Details of each DMC11 cable are provided in Chapter 3; test connector data is included in Chapter 4.

DMC11-AR and DMC11-DA



RS-423-A INTERFACE

DMC11-AR and DMC11-FA



V.35 INTERFACE

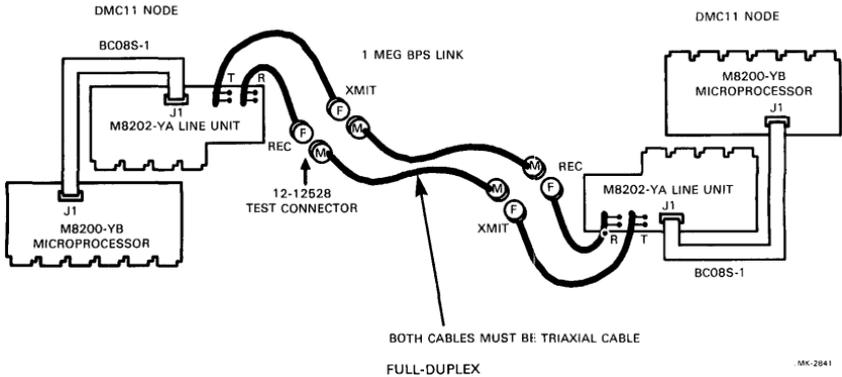
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DMC11-TO-DMC11 INTEGRAL MODEM CABLING

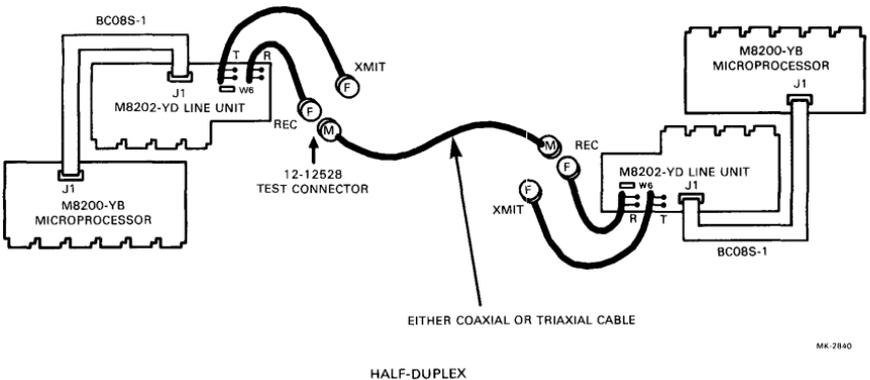
NOTE

If DMC connects to DMR, see DMR section.

DMC11-AL and DMC11-MA



DMC11-AL and DMC11-MA



Cables are checked using the test connector only when W6 is removed (FDX mode). Otherwise, loopback is through the W6 jumper.

DMC11 DIAGNOSTICS

DMC11 Diagnostics

Table DMC-3 DMC11 Diagnostics

Diagnostic Function	Diagnostic Name	PDP11 Systems	VAX11/7XX Systems
Microprocessor M8200-YA/YB Tests	Microprocessor tests CROM and Jump tests Comm Microprocessor Repair Level (Level 3)	(C)ZDMC** (C)ZDMG** -	- - EVDXA REV**
Line Unit M8201/2 Tests	Line Unit DDCMP tests Line Unit Bit Stuff tests M8201/2 Repair Level Diagnostic (Level 3)	(C)ZDME** (C)ZDMF** -	- - EVDBA REV**
DMC11 Functional Test	DMC11 Functional Diagnostic VAX DMC11 Exerciser Link (Level 3) VAX Synchronous Link Diagnostic (Level 2)	(C)ZDMH** - -	- EVDBB REV** EVDCA REV**
System Exerciser (PDP11 Only)	DECX11 System Exerciser DMC11/DMR11 Module	(C)XDMC**	N/A
DMC11 Link Testing	Interprocessor Test Program (ITEP) ITEP Monitor DMC11/DMR11 Overlay	(D)ZITA** (D)ZDMO**	Not Supported
	Data Comm Link Test (DCLT) DMC11/DMR11 Module	(C)ZCLK**	EVDMC REV**

Running PDP-11/DMC11 Diagnostics – The following summarizes running PDP-11/DMC11 diagnostics:

- Start program at address 000200 and set SWR as desired.
 - Bit 0 = 0 for auto sizing,
 - Bit 0 = 1 for manual input, or
 - Bit 7 = 1 to use existing parameters.
- For other switch register selections, see the respective program document.

Table DMC-4 Typical PDP-11/DMC11 Diagnostic Parameters (Manual Input)

Parameters	Description
1. HOW MANY DMC11s TO BE TESTED?	;Enter amount <CR> Program prints response to question 1 for each device being tested.
01	;Device number
2. CSR ADDRESS?	;Enter device address <CR>
3. VECTOR ADDRESS?	;Enter vector address <CR>
4. BR PRIORITY LEVELS (4,5,6,7)?	;Standard: 5<CR>
5. IF DMC HAS CRAM (M8204) TYPE "Y", IF CROM (M8200) TYPE "N" ?	;For DMC11 enter N<CR>
6. DMC11-AR (REMOTE, LOW SPEED) OR DMC11-AL (LOCAL, HIGH SPEED) TYPE "R" OR "L" ?	;Enter R<CR> or L<CR>
7. WHICH LINE UNIT? IF NONE TYPE "N", IF M8201 TYPE "1", IF M8202 TYPE "2" ?	;Enter N<CR>, 1<CR>, or 2<CR>
8. IS THE LOOP BACK CONNECTOR ON?	;If test connector is connected (external loop) type Y<CR> or if test connector is not connected (internal loop) type N<CR>

PDP-11/DMC11 DIAGNOSTICS

Table DMC-4 Typical PDP-11/DMC11 Diagnostic Parameters (Manual Input) (Cont)

Parameters	Description
9. WHICH MODEM TYPE, TYPE D FOR DMC11-DA (RS-232C), OR TYPE F FOR DMC11-FA (V.35)?	;This question will only occur for Diagnostics CZDME and CZDMF and only if M8201 line unit is selected and loopback is connected.
10. SWITCH PAC# 1 (DDCMP LINE #) ?	;Enter the octal contents of switch pack 2 (E87 for M8201 or E90 for M8202) SW1-8 for bootstrap password; normal response for nonbootstrap mode is 377 <CR>
11. SWITCH PAC# 2 (BM873) BOOT ADD) ?	;Enter the octal contents of switch pack 3 (E88 for M8201 or E91 for M8202) SW1-8 for bootstrap offset address; normal response for nonbootstrap mode is 377 <CR>

Program types Status Table following manual input (or immediately if auto sizing is selected in the procedure).

DMC11 STATUS TABLE

PC	CSR	STAT1	STAT2	STAT3
001500	160120	025360	177777	000002

STATUS TABLE LEGEND

- STAT1:
- BITS 00-08 is the DMC11 vector address
 - BIT 15 = 1 Microprocessor has a CROM (KMC11)
 - BIT 15 = 0 Microprocessor has a CROM (DMC11)
 - BIT 14 = 1 Test connector on
 - BIT 14 = 0 No test connector
 - BIT 13 = 0 Line unit is an M8201
 - BIT 13 = 1 Line unit is an M8202
 - BIT 12 = 1 No line unit present
 - BITS 09-11 DMC11 BR priority
- STAT2:
- Low byte = contents of SP #1 (SP #2 PASSWORD)
 - High byte = contents of SP #2 (SP #3 BOOT OFFSET)

- STAT3: BIT 0=1 Run Free Running Test on KMC11
 BIT 1=0 DMC11-AR (low speed)
 BIT 1=1 DMC11-AL (high speed)
 BIT 2=0 DMC11-DA (only for diagnostic CZDME and
 CZDMF).
 BIT 2=1 DMC11-FA (only for diagnostic CZDME and
 CZDMF).

Running VAX-11/DMC11 Diagnostics — The following summarizes running VAX-11/DMC11 diagnostics.

Table DMC-5 Typical VAX-11/DMC11 Program Operation

Command Function	Example
1. ATTACH the UNIBUS interface (UBA or UBI) to the system bus.	DS> ATT DW780 SBI DW0 3, 4 or DS> ATT DW750 CMI DW0
2. Load appropriate diagnostic.	DS> LOAD EVDXA
3. ATTACH the device to the system.	DS> ATT DMC11

NOTE

This command now enters the hardware parameter information for the device (refer to the following Table DMC-6 for Typical Hardware Parameters). When the various hardware parameters are entered, the program returns to the supervisor level of operation and the following steps must be followed:

4. SELECT the devices that have been attached to the system.	DS> SELECT ALL or DS> SELECT DW0 and DS> SELECT XM0
5. SET the appropriate event.	DS> SET EVENT Flag (s) n,n,n
6. If a printout of the tests being executed is desired, the SET TRACE command can be used, if applicable. Now the program may be started by the START command.	DS> SET TRACE DS> START

VAX-11/DMC-11 DIAGNOSTICS

Table DMC-6 Typical VAX-11/DMC11 Hardware Parameters

Questions	Description
1. DEVICE LINK ?	;Link the option to the UNIBUS interface by entering the logical name of the interface (for example, DW0).
2. DEVICE NAME ?	;Establish a logical device name (for example, XM0). The logical name is generally the same one used by the operating system and the actual unit number (for example, 0-7 or A-Z).
3. CSR ?	;Enter the device CSR address.
4. VECTOR ?	;Enter the device Vector address.
5. BR ?	;Enter the correct device priority level (normally BR 5).

NOTE

The Command Line Interpreter (CLI) format for the device also can be linked together on one line as shown in the attach command for the UNIBUS interface above.

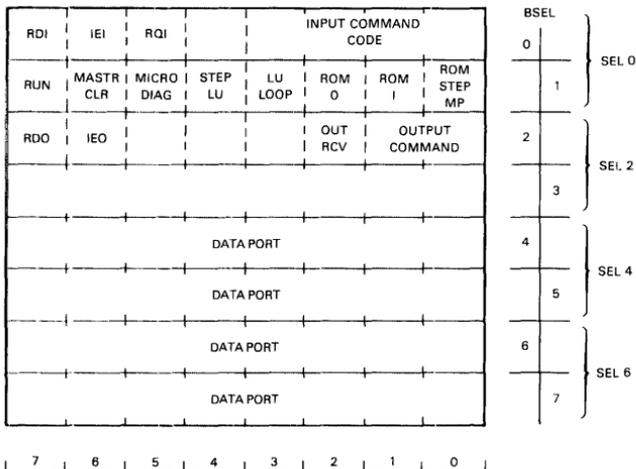
Table DMR-7 VAX-11 Diagnostic Event Flag Summary

Diagnostic	Event Flag	Function
EVDXA COMM Microprocessor Repair Level (Level 3)	1	M8200-YA Module Installed
	2	M8200-YB Module Installed
	3	M8200-YC Module Installed
	4	M8204 Module Installed
	6	M8207-YA Module Installed
	7	M8207-RA Module Installed
	8	M8201 Module Installed
	9	M8202 Module Installed
	10	M8203 Module Installed
	EVDBA M8201/2 Repair Level Diagnostic (Level 3)	1
2		M8200YB
3		M8200YC
4		M8201
5		M8202
6		M8203
7		M8204 1K
8		M8204 4K
9		DMP-11
10		Turnaround Connector
11		DMC11-FA option installed
EVDMC DMC/DMR DCLT Module	1	Set for Half-Duplex; Clear for Full-Duplex

DMC11 MAINTENANCE AIDS

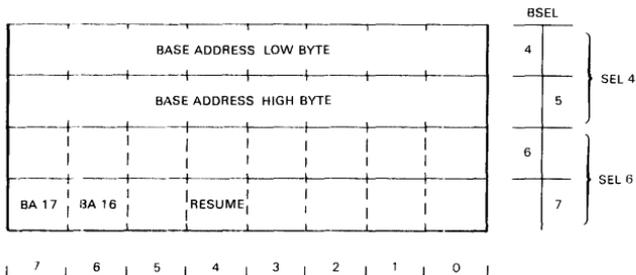
DMC11 Register Bit Assignments

Register bit assignments are shown in the following diagrams. Bit assignments for SEL4 and SEL6 vary depending on the command. Refer to the following separate diagrams for each command dependent condition.



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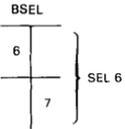
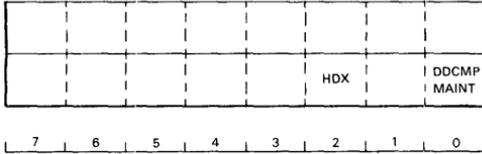
BASE IN (11)



MK 2222

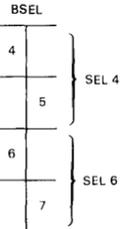
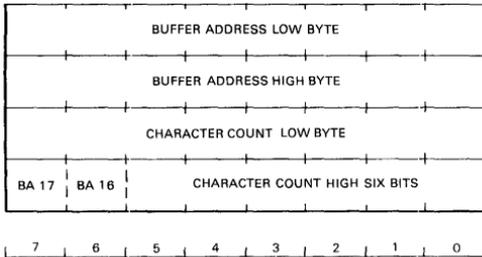
DMC11 MAINTENANCE AIDS

CONTROL IN (01)



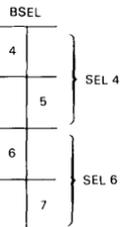
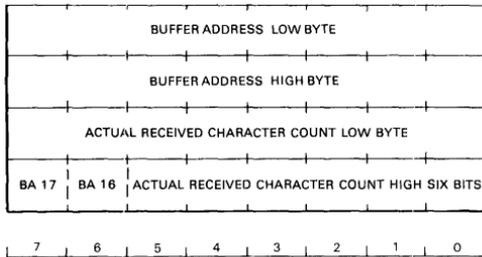
MK-2223

RECEIVE BA/CC IN (100) OR TRANSMIT BA/CC IN (000)



MK-2225

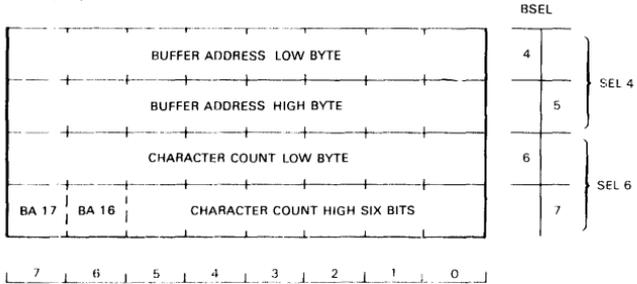
RECEIVE BA/CC (100)



MK-2227

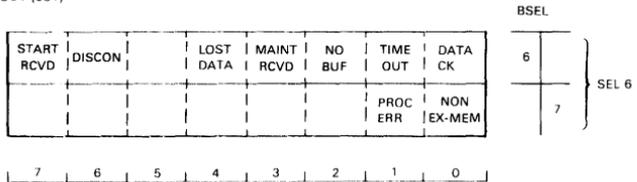
DMC11 MAINTENANCE AIDS

TRANSMIT BA/CC (000)



MK 2228

CONTROL OUT (001)



MK 2229

DMC11 Tech-Tips/FCO Index

Table DMC-8 DMC Tech-Tip Index

Tech Tip No.	Title	Speed Bulletin No.
1	DMC11-AR and AL CROM Caution	
2	DMC11 Basic Microprocessor Diagnostic Failure	
3	Addressing DMC11 for Use with M9301-YJ	
4	DMC11 Line Unit Setup for Use with M9301-YJ	
5	Software Initialization Consideration	
6	Remote Satellite Initialization Problem	
7	DMC11 Down Line Load Using ITEP	
8	DMC11 Table Update Starting at Address 000000	
9	DMC11 UNIBUS Hang Problem	
10	DMC11 M8202 Line Unit Failures	
11	DMC11 Basic W/R and Microprocessor Diagnostic Failure	148
12	DZDME Test #56 or DXDMF Test #36 May Fail on a PDP11/10	148
13	Down Line RLD with M9312	162
14	Swapping DMR11 for Existing DMC11	163

DMC11 MAINTENANCE AIDS

Table DMC-9 DMC FCO History Chart

Module	FCO No.	Date	Reason	Quick Check
M8200	R0006	AUG 77	11/70 Bus INIT glitches as a result of DMC asserting AC LO.	C123 added between E86 and E87.
M8200	M0010	MAY 78	Microcode change for M8200-YA and YB.	YA-E6 is 23-630A9 YB-E6 is 622A9.
M8201	S0006	OCT 80	M8201 idles spaces instead of MARKs.	Wire add from PTH adjacent to E16 pin 1 to E33 to pin 9.
BC05Z	R0004	SEP 80	V.35 data inverted.	Presence of adhesive label on cable.

DMP11 OPTION

To be supplied. Preparation of this material is planned for the near future.

DMR11 OPTION

DMR11 General Description

The DMR11 is designed to be used in a network link for high performance interconnection of VAX-11 or PDP-11 computers. It is a microprocessor-based, intelligent synchronous communications controller which employs the DIGITAL Data Communications Message Protocol (DDCMP). The DMR11 is program compatible with DMC11 and line compatible with DMC11 and line compatible with either DMC11 or any device that uses DDCMP Version 4.0.

DMR Features:

- Internal Microdiagnostics,
- Speeds up to 1M b/s (local or remote),
- Extensive error reporting,
- Modem control features,
- Compatibility with RS-232-C/V.28/ISO 2110, RS-422-A/ V.11/ISO 4902, RS-423-A/V.10/ISO 4902, and CCITT V.35/ISO 2593, and
- Compatibility with DMC11 software.

DMR11 Reference Documentation

Refer to the following documents if the level of content in this section is insufficient:

- *DMR11 Technical Manual* – EK-DMR11-TM
- *DMR11 Microfiche* – EP-DMR11-TM
- *DMR11 Print Set* – MP00911
- *M8207 Technical Manual* – EK-M8207-TM
- *M8203 Technical Manual* – EK-M8203-TM
- *M9301-YJ Bootstrap Technical Manual* – EK-M9301-TM
- *M9312 Technical Manual* – EK-M9312-TM

DMR11 INSTALLATION

DMR11 Components List

Table DMR-1 DMR11 Components List

Option/Parts List	Description
DMR11-AD M8203 M8207-RA BC08S-1 H3254 H3255	DMR11 basic subsystem unit containing: Line unit module Microprocessor module with DMR11 microcode ROMS Module interconnect cable V.35 and integral module test connector RS-232-C/RS-422-A/RS-423-A module test connector
DMR11-AA DMR11-AD BC55C-10 H3251 H325	RS-232-C/RS-423-A interface (RS-232-C for speeds up to 19.2K b/s and RS-423-A for speeds up to 56K* b/s) configuration containing: Basic DMR11 unit EIA RS-232-C/RS-423-A cable RS-423-A cable turnaround test connector RS-232-C cable turnaround test connector
DMR11-AB DMR11-AD BC05Z-25 H3250	CCITT V.35 interface (for speeds up to 1M b/s) configuration containing: Basic DMR11 unit CCITT V.35 cable Cable turnaround test connector
DMR11-AC DMR11-AD BC55A-10 H3257 & H3258	Integral modem interface (for speeds up to 1M b/s) configuration containing: Basic DMR11 unit Integral modem cable BC55A terminators
DMR11-AE DMR11-AD BC55B-10 H3251	RS-422-A interface (for speeds up to 1M b/s) configuration containing: Basic DMR11 unit RS-422-A cable RS-422-A cable turnaround test connector

* Limited to 20K by RS-449 and 9600 b/s by ISO 4902.

DMR11 INSTALLATION

Device Placement

The DMR11 requires two hex-height, small peripheral controller (SPC) backplane slots (preferably two adjacent slots). Any SPC backplane [DD11-B(REV E) or later] can accept the DMR11. The DD11-D can accommodate a maximum configuration of three DMR11s.

Applications using speeds greater than 250K b/s require UNIBUS placement before all UNIBUS repeaters and before all devices that have a lower NPR rate on the UNIBUS.

REMOVE NPG JUMPER FROM SELECTED M8207 SLOT (PINS CA1 TO CB1).

NOTE

In configuration where both DMC11s and DMR11s are used, DMCs must be placed before DMRs (since they share the same rank).

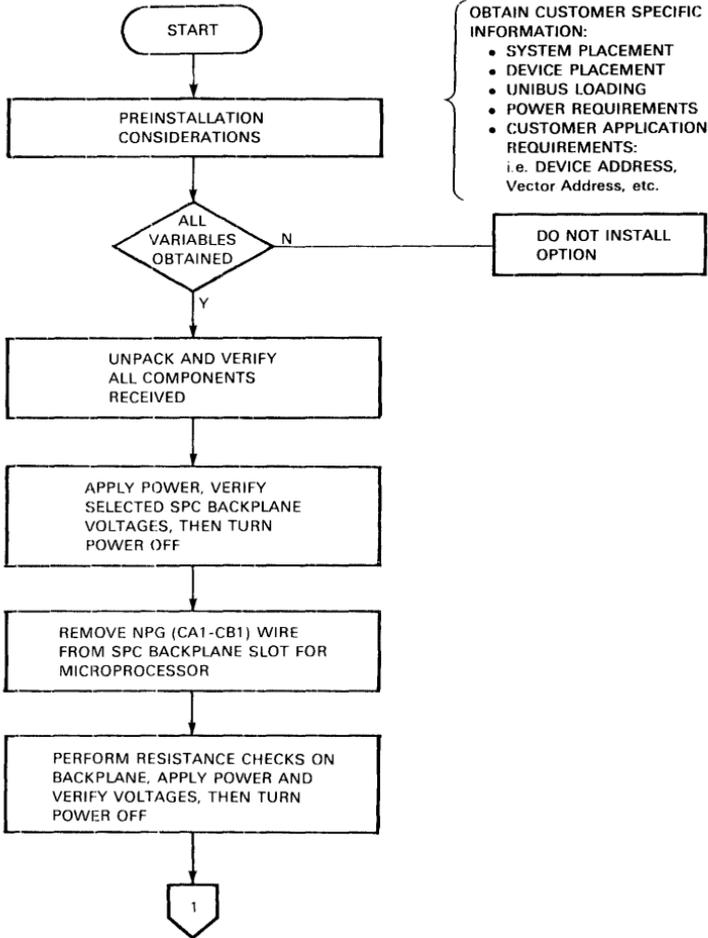
Power/UNIBUS Loading

Table DMR-2 DMR11 Power Chart

Module	Voltage Rating (Approximate Values)	Maximum Voltage	Minimum Voltage	Backplane Pin No.	UNIBUS Loading
M8207-RA	+ 5 V @ 5.0 A	+ 5.25	+ 5.0	C1A2	1 UNIBUS dc load 5 UNIBUS ac loads
M8203	+ 5 V @ 3.0 A	+ 5.25	+ 5.0	C1A2	No UNIBUS loads
	+15 V @ .1 A	+15.75	+14.25	C1U1	
	-15 V @ .2 A	-15.75	-14.25	C1B2	

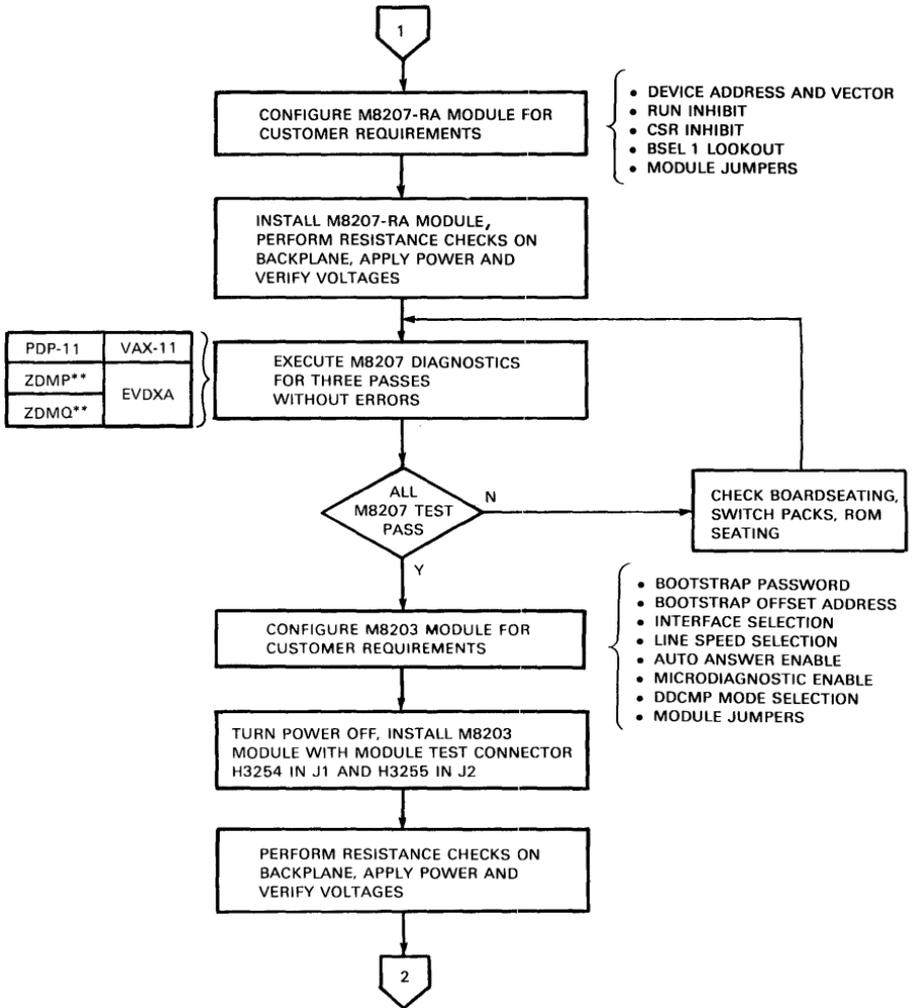
DMR11 INSTALLATION

DMR11 INSTALLATION FLOWCHART



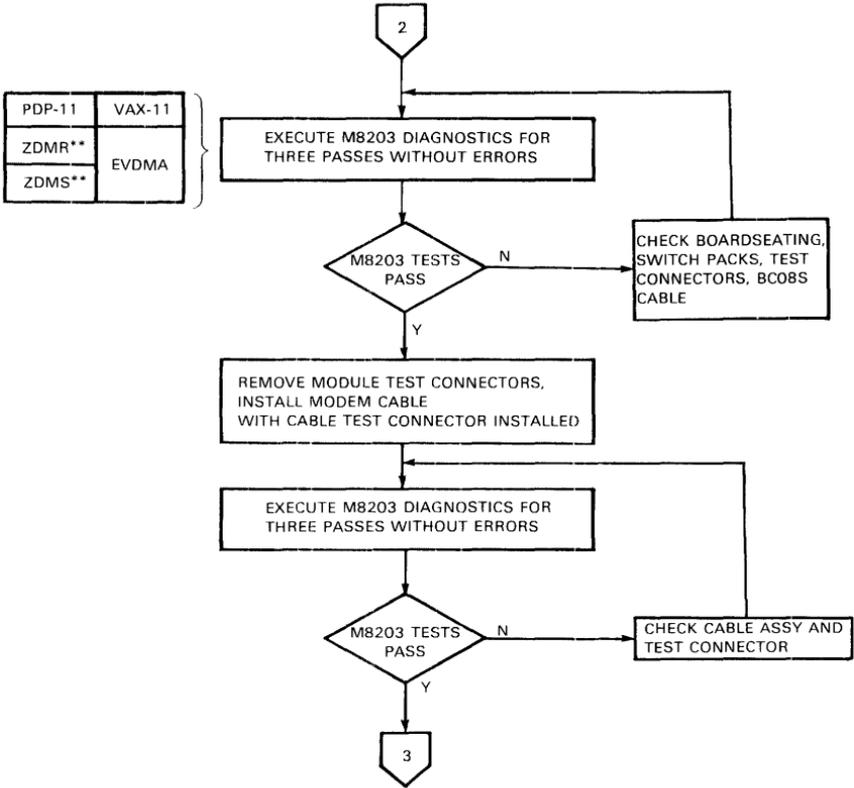
MK 2809A

DMR11 INSTALLATION FLOWCHART (CONT)



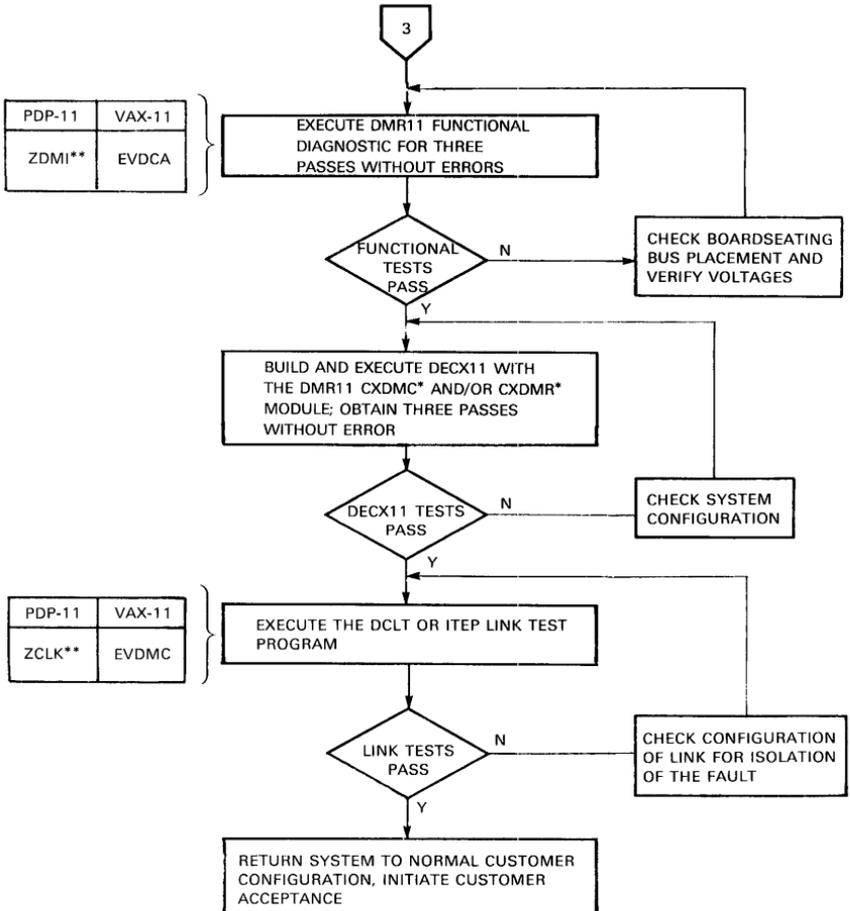
DMR11 INSTALLATION

DMR11 INSTALLATION FLOWCHART (CONT)



MK 2809C

DMR11 INSTALLATION FLOWCHART (CONT)



MK-2800D

DMR11 INSTALLATION

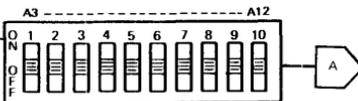
M8207 Switch Packs/Jumpers

MSB											LSB				
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
1	1	1	SWITCH PACK E127									0	0	0	

SWITCH NUMBER	S10	S9	S8	S7	S6	S5	S4	S3	S2	S1	DEVICE ADDRESS
									OFF	OFF	76010
									OFF	OFF	76020
									OFF	OFF	76030
									OFF	OFF	76040
									OFF	OFF	76050
									OFF	OFF	76060
									OFF	OFF	76070
									OFF	OFF	76080
									OFF	OFF	76090
									OFF	OFF	76100
									OFF	OFF	76200
									OFF	OFF	76300
									OFF	OFF	76400
									OFF	OFF	76500
									OFF	OFF	76600
									OFF	OFF	76700
									OFF	OFF	76800
									OFF	OFF	76900
									OFF	OFF	76A00
									OFF	OFF	76B00
									OFF	OFF	76C00
									OFF	OFF	76D00
									OFF	OFF	76E00
									OFF	OFF	76F00
									OFF	OFF	77000
									OFF	OFF	77100
									OFF	OFF	77200
									OFF	OFF	77300
									OFF	OFF	77400
									OFF	OFF	77500
									OFF	OFF	77600
									OFF	OFF	77700
									OFF	OFF	77800
									OFF	OFF	77900
									OFF	OFF	77A00
									OFF	OFF	77B00
									OFF	OFF	77C00
									OFF	OFF	77D00
									OFF	OFF	77E00
									OFF	OFF	77F00
									OFF	OFF	78000

NOTE: SWITCH OFF RESPONDS TO LOGICAL ONE ON THE UNIBUS.

SWITCH PACK E127
DEVICE ADDRESS
SELECTION



THE DMR11 RESIDES IN
FLOATING ADDRESS SPACE
(SEE APPENDIX A).

- DEVICE ADDRESS RANKS 7
- VECTOR ADDRESS RANKS 26

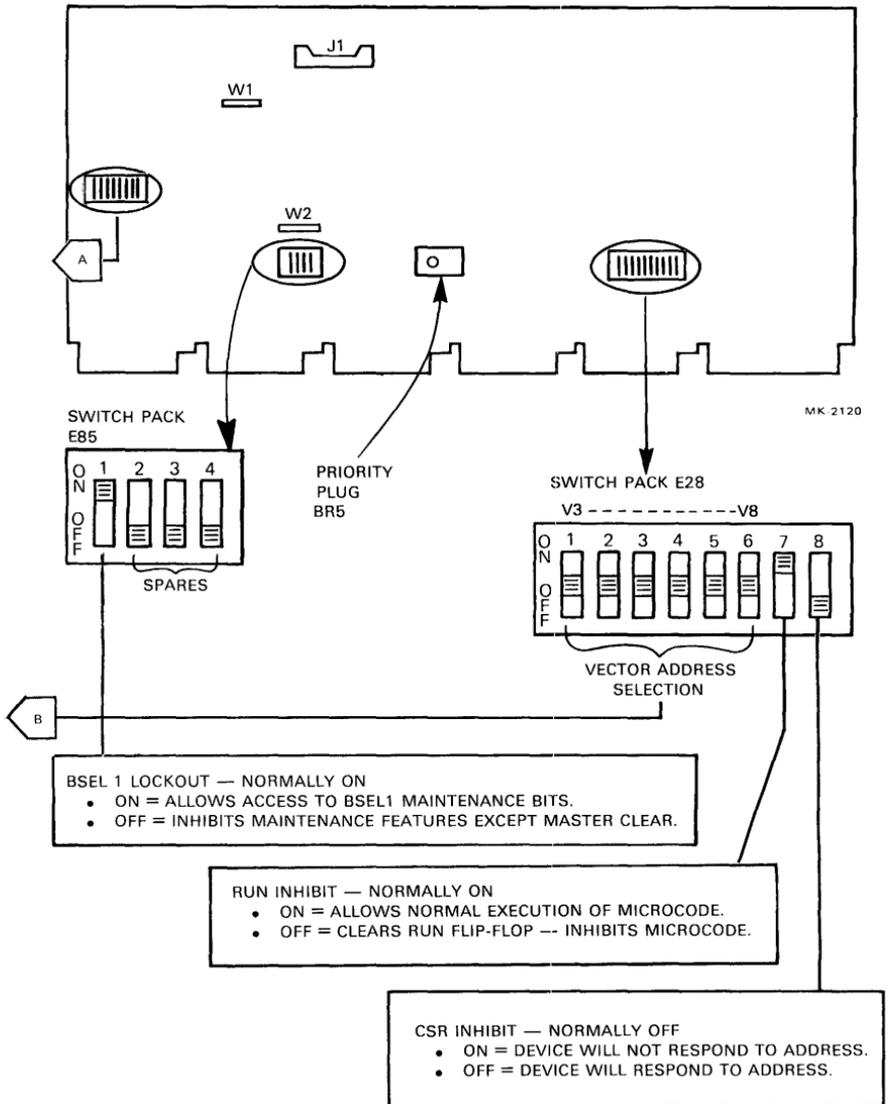
MSB											LSB				
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0	0	0	0	0	0	0	SWITCH PACK E28					1	0	0	

SWITCH NUMBER	S6	S5	S4	S3	S2	S1	VECTOR ADDRESS
	ON	ON					300
	ON	ON				ON	310
	ON	ON			ON		320
	ON	ON			ON	ON	330
	ON	ON	ON				340
	ON	ON	ON	ON			350
	ON	ON	ON	ON	ON		360
	ON	ON	ON	ON	ON	ON	370
	ON						400
	ON		ON				500
	ON	ON					600
	ON	ON	ON				700

NOTE: SWITCH ON PRODUCES LOGICAL ONE ON THE UNIBUS.

JUMPER	NORMAL CONFIGURATION	FUNCTION
W1	ALWAYS IN	Microprocessor Clock Enable – When removed disables the microprocessor clock.
W2	ALWAYS IN	Bus ac Low Enable – When removed disables a program asserted ac low signal.

DMR11 INSTALLATION



DMR11 INSTALLATION

M8203 Switch Packs/Jumpers

BOOTSTRP PASSWORD — CONTAINS PASSWORD IN OCTAL

- ON = LOGICAL 0
- OFF = LOGICAL 1

EXAMPLE OF A PASSWORD OF OCTAL 012.

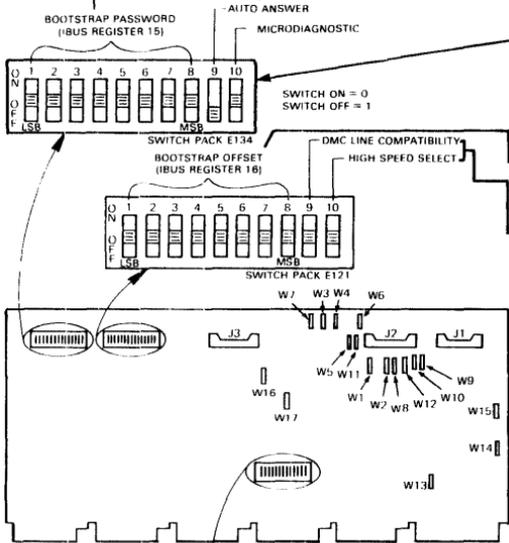
SWITCHES	1	2	3	4	5	6	7	8
	ON	OFF	ON	OFF	ON	ON	ON	ON

SEE TECH — TIP #1 (SB #162)

AUTO-ANSWER — NORMALLY OFF

- ON = DISABLES AUTO-ANSWER
- OFF = ENABLES AUTO-ANSWER

SEL 0 BIT 13	SW10 AT E134 ON M8203	EXECUTION OF MICRODIAGNOSTICS
CLEAR	ON	NO MICRODIAGNOSTICS IS RUN
CLEAR	OFF	RUN MICRODIAGNOSTICS
SET	ON	RUN MICRODIAGNOSTICS
SET	OFF	NO MICRODIAGNOSTICS IS RUN



* WHEN USING DMC11 SOFTWARE, SWITCH 10 MUST BE ON.

	SW5	SW6	SW7
RS-232-C OR RS-423-A OR INTEGRAL**	OFF	OFF	OFF
V.35	ON	OFF	OFF
RS-422	OFF	OFF	ON

** INTEGRAL MODEM IS SELECTED BY BC55A CABLE WHEN INSTALLED IN J1 OF THE M8203 LINE UNIT. MODULE CONNECTOR J2 MUST NOT HAVE ANY CABLE OR TEST CONNECTOR INSTALLED.

BOOTSTRAP OFFSET — CONTAINS OFFSET ADDRESS IN OCTAL

- ON = LOGICAL 0
- OFF = LOGICAL 1

ADDRESS IS 713XXX WHERE XXX IS OFFSET WHICH IS MODULE DEPENDENT.

	M9301-YJ	M9312
UNIT 0 WITH DIAG.	354	204
UNIT 0 WITHOUT DIAG.	356	4
UNIT 1 WITH DIAG.	372	30
UNIT 1 WITHOUT DIAG.	374	230

Switch #

LSB				MSB			
1	2	3	4	5	6	7	8
ON	OFF	OFF	OFF	ON	OFF	OFF	OFF

 = 356

SEE TECH-TIP #1 (SB #162)

A

B

SW 9	SW10	CONFIGURATION
ON	ON	DDCMP VERSION 4.0 (NOT CONNECTED TO DMC11) WITH LINE SPEED LESS THAN 1M B/S.
ON	OFF	DDCMP VERSION 4.0 (NOT CONNECTED TO DMC11) WITH LINE SPEED AT 1M B/S
OFF	ON	CONNECTED TO LOW SPEED DMC11-DA (M8200 YA)
OFF	OFF	CONNECTED TO HIGH SPEED DMC11-AL (M8200 YB)

C

Speed	Switch			Speed	Switch		
	8	9	10		8	9	10
1 MEG	ON	ON	ON	19.2K †	ON	ON	OFF
500K	OFF	ON	ON	9.6K	OFF	ON	OFF
250K	ON	OFF	ON	4.8K	ON	OFF	OFF
56K	OFF	OFF	ON	2.4K	OFF	OFF	OFF

† Normal switch setting unless the Integral Modem or Null Modem clock features are used.

DMR11 INSTALLATION

M8203 JUMPER DESCRIPTIONS

DMR11 M8203 Jumpers

Jumper	Normal Configuration	Function (Note 1)
W1	OUT	Clear to Send – EIA/V.35
W2	OUT	Data Mode – EIA/V.35
W3	OUT	Receive Data – EIA
W4	OUT	Receive Clock – EIA
W5	OUT	Receive Ready – EIA
W6	OUT	Transmit Clock – EIA
W7	IN	Signal Rate Indicate – EIA
W8	IN	Data Mode – RS422-A/RS423-A
W9	IN	Null Modem Clock
W10	IN	Terminal Ready – RS422-A/RS423-A
W11	OUT	Receiver Ready
W12	IN	Terminal in Service (Make Busy)
W13	IN	Oscillator Enable
W14	OUT	56K b/s only Bandpass Filter (Not Used in DMR11)
W15	OUT	Switched RTS-CTS Enable (Note 2)
W16	OUT	Half-Duplex Lockout Enable (Note 2)
W17	OUT	

NOTES

1. Similar jumpers for these functions are provided on the BC55C cable panel (see Chapter 3). When using this cable, make the appropriate jumper selections at the BC55C panel and not on the M8203.
2. Jumpers W16 and W17 are mutually exclusive. Only one or the other may be installed, not both. Also, these jumpers are provided only on M8203 modules etch REV E or higher. For modules up to etch REV D, refer to ECO-M8203-MK-003 for details of similar jumpers. (See Tech-Tip No. 4.)

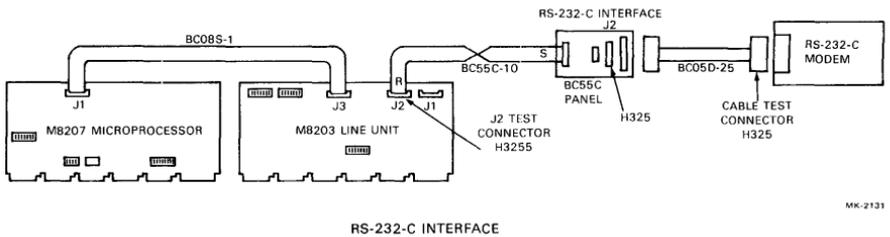
DMR11 Cabling

This section contains cabling diagrams for each DMR11 configuration. These diagrams also show correct test connector placement. Details of each DMR11 cable are provided in Chapter 3; test connector information is included in Chapter 4.

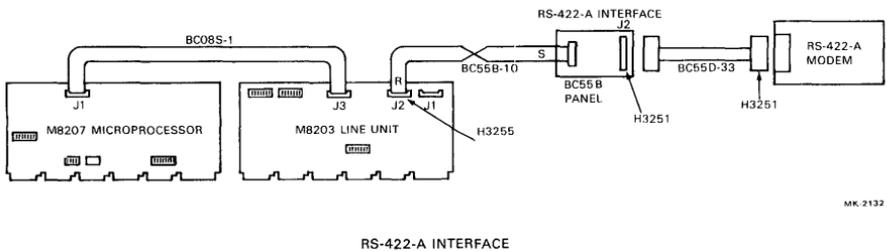
NOTE

Cable panels BC55C and BC55B both contain jumper options for special applications. Refer to Chapter 3 for details.

DMR11-AA

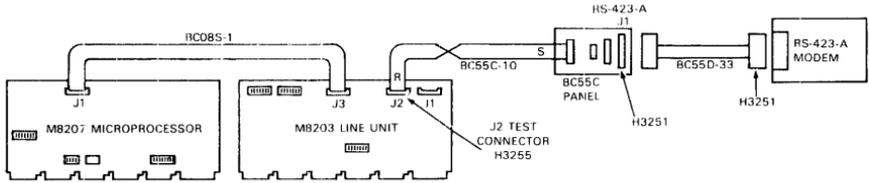


DMR11-AE



DMR11 CABLING

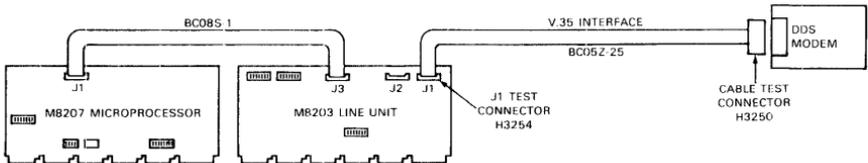
DMR11-AA



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RS-423-A INTERFACE

DMR11-AB

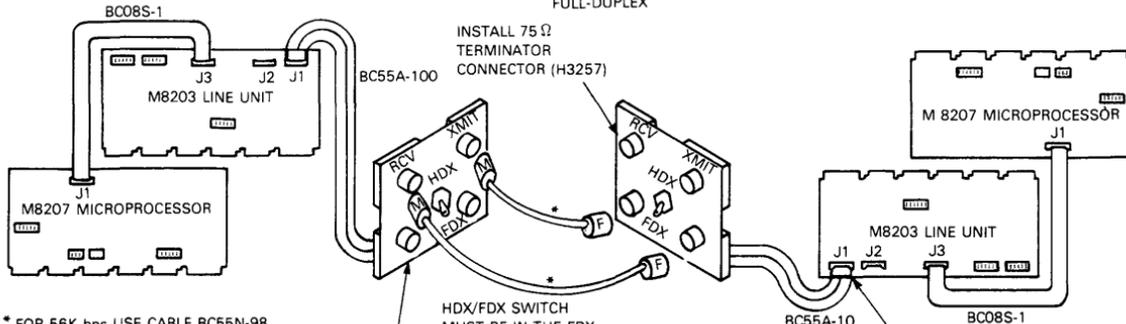


MK-2134

V.35 INTERFACE

DMR11-to-DMR11 INTEGRAL MODEM CABLING (DMR11-AC)

FULL-DUPLEX

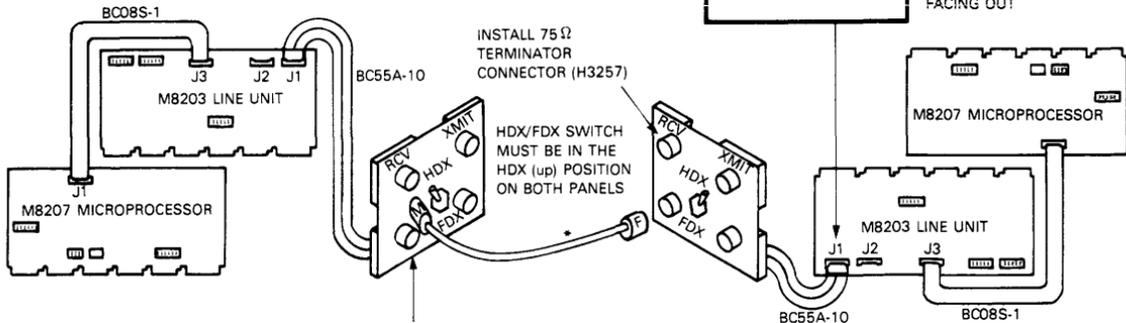


* FOR 56K bps USE CABLE BC55N-98
FOR 250K bps to 1 M bps
USE CABLE BC55M-98

INSTALL 75
TERMINATOR
CONNECTOR
(H3258)

HDX/FDX SWITCH
MUST BE IN THE FDX
(down) POSITION ON
BOTH PANELS

HALF-DUPLEX



INSTALL 75 TERMINATOR
CONNECTOR (H3258)

INSTALL 75 Ω
TERMINATOR
CONNECTOR (H3257)

HDX/FDX SWITCH
MUST BE IN THE
HDX (up) POSITION
ON BOTH PANELS

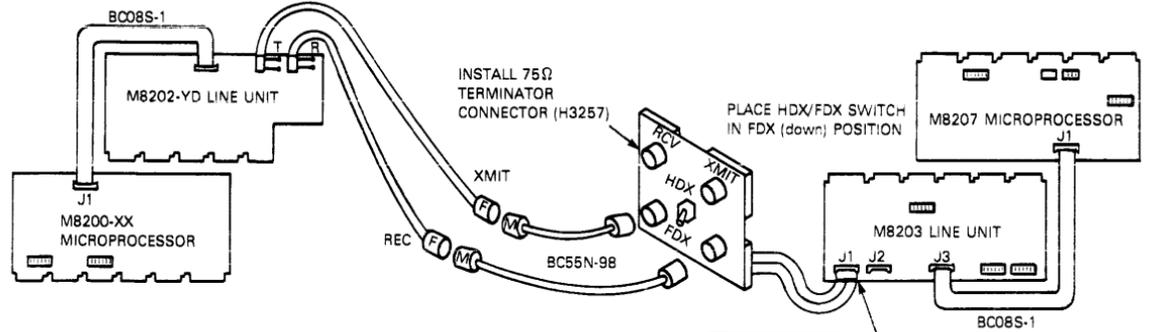
CABLE STRAIN
RELIEF TAB
FACING OUT

DMR-15

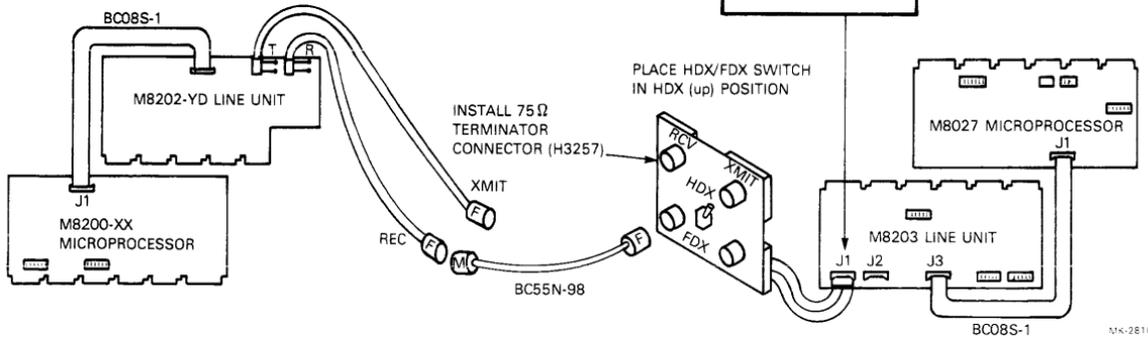
DMR11 CABLING

DMC11-to-DMR11 INTEGRAL MODEM CABLING (DMR11-AC)

FULL-DUPLEX



HALF-DUPLEX



DMR-16

DMR11 Diagnostics

Table DMR-3 DMR11 Diagnostics

Diagnostic Function	Diagnostic Name	PDP11 Systems	VAX11/7XX Systems
Microprocessor M8207-RA Tests	M8207 Static Test 1 M8207 Static Test 2 Comm Microprocessor Repair level (Level 3)	(C)ZDMP** (C)ZDMQ**	EVDXA REV**
Line Unit M8203 Tests	M8203 Static Diagnostic 1 M8203 Static Diagnostic 2 M8203 Repair Level Diagnostic Level (Level 3)	(C)ZDMR** (C)ZDMS**	EVDMA REV**
DMR11 Functional Test	DMR11 Functional Diagnostic VAX Synchronous Link Diagnostic (Level 2)	(C)ZDMI**	EVDCA REV**
System Exerciser (PDP11 Only)	DECX11 System Exerciser DMC11/DMR11 Module DMR11 Module	(C)XDMC** (C)XDMR**	N/A
DMR11 Link Testing	Interprocessor Test Program (ITEP) ITEP Monitor DMC11/DMR11 Overlay	(D)ZITA** (D)ZDMO**	Not Supported
	Data Comm Link Test (DCLT) DMC11/DMR11 Module	(C)ZCLK**	EVDMC REV**

DMR11 DIAGNOSTICS

Running PDP-11/DMR11 Diagnostics – The following summarizes running DMR11 diagnostics:

- Load and start diagnostic at 000200.

Table DMR-4 Typical PDP-11/DMR11 Diagnostic Parameters

PROMPT DR> Operator must respond by typing one or more commands; for example, STA/PASS:NNNN/TEST: NNNN—

Parameters	Description
DR> STA	
CHANGE HW (L) ? Y	The program will ask if any hardware changes are required and the number of units to test.
# UNITS (D) ? 1	;Number of units on the system to be tested.
UNIT 0	
WHICH MICRO-PROCESSOR: (O) 7?	;Enter one of the following: 0 = M8200, 4 = M8204, or 7 = M8207
MICRO-PROCESSOR:	
CSR ADDRESS: (O) 160170 ?	
VECTOR ADDRESS: (O) 300 ?	;Enter appropriate value.
PRIORITY LEVEL: (O) 5 ?	

NOTE

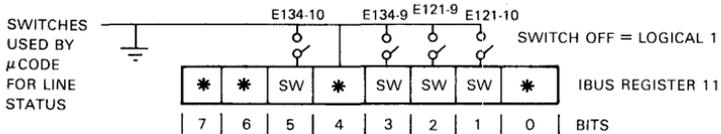
The dialog for diagnostics CZDMQ and CZDMR vary slightly and finish with the following question.

Table DMR-4 Typical PDP-11/DMR11 Diagnostic Parameters (Cont)

Parameters	Description
MICROPROCESSOR RUN SWITCH - TYPE 0 IF OFF, 1 IF ON: (O) 0?	;The RUN switch (E28 SW7: is normally ON. ON = enable, OFF = disable.

The typical dialog questionnaire format for CZDMS diagnostic is presented as follows.

Parameters	Description
M8203 REG11 (E134 SW10,9; E121 SW9,10): 0?	;Enter in octal the actual switch settings for REG11 as listed below:



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E134-10:	Microdiagnostics enabled <5> (with SEL 0 bit 13 clear: ON=disable, OFF=enable; with SEL 0 bit 13 set: ON=enable, OFF=disable).
E134-9:	Auto-Answer enables <3> (ON = disable, OFF = enable).
E121-9:	DMC line compatible <2> (ON=DMR to DMR, OFF=DMC compatible).
E121-10:	High Speed Select <1> (ON=speed less than 1M b/s, OFF=1M b/s).

* Register Bit Assignments

PDP-11/DMR11 DIAGNOSTICS

Table DMR-4 Typical PDP-11/DMR Diagnostic Parameters (Cont)

Parameters	Description
M8203 REG 15 (E134 SW1-8): (O) 0?	;Enter the octal contents of switch pack E134, SW1-8 for bootstrap password; normal response for nonbootstrap mode is 377 <CR>
M8203 REG 16 (E121 SW1-8): (O) 0?	;Enter the octal contents of switch pack E121, SW1-8 for bootstrap offset address; normal response for nonbootstrap mode is 0 <CR>
TURNAROUND TYPE - : (O) 0? 0 = H3254 or H3255 1 = Cable 2 = Mod Loc 3 = Mod Rem 4 = None (Internal)	;Select the proper turnaround connector: Do not select type 2 or 3 unless your modem has these features. Mod Loc = program selection of analog loopback. Mod Rem = program selection of digital loopback.
PLEASE SELECT BAUD RATE; TYPE: (O) 4? 0 = 2.4K 1 = 4.8K 2 = 9.6K 3 = 19.2K 4 = 56K 5 = 250K 6 = 500K 7 = 1M	;Select same speed that is configured in the line unit by E39, SW8, 9, and 10 1 = 4.8K.
CHANGE SW (L) :	;Used to change software parameters.
IS MAN. INTERVEN. DESIRED TO MOUNT TEST CONNECTOR(S) (L) N?	;Allows program intervention by typing <CR> when test connector is changed.
SHOULD SWITCH PACK AND AX3-15 PRINTOUT BE ALLOWED (L) N?	;Allows the testing of interface selection register AX3-15.
SHOULD SWITCH PACK TESTS BE ALLOWED (L) N?	;Allows testing of switch packs E121 and E134.
MSG TIMER VALUE (0-177777), 0=LONGEST TIME-OUT: (O) 0?	;Allows program time-out timer to be modified.

Running VAX-11/DMR11 Diagnostics – The following summarizes running VAX-11/DMR11 diagnostics.

Table DMR-5 Typical VAX-11/DMR11 Program Operation

Command Function	Example
1. ATTACH the UNIBUS interface (UBA or UBI) to the system bus.	DS> ATT DW780 SBI DW0 3, 4 or DS> ATT DW750 CMI DW0
2. Load appropriate diagnostic.	DS> LOAD EVDXA Example shown is DMC/DMR
3. ATTACH the device to the system.	DS> ATT DMR11*

NOTE

This command now enters the hardware parameter information for the device (refer to the following Table DMR-6 for Typical Hardware Parameters). When the various hardware parameters are qualified, the program returns to the supervisor level of operation and the following steps must be followed:

4. SELECT the devices that have been attached to the system.	DS> SELECT ALL or DS> SELECT DW0 and DS> SELECT XM0
5. SET the appropriate event.	DS> SET EVENT FLAG(s) n,n,n.
6. If a printout of the tests being executed is desired, then the trace flag can be set by SET TRACE command for the program (if applicable). Now the program may be started by the START command.	DS> SET TRACE DS> START

* For EVDMC and EVDCA, you must attach DMC11.

VAX-11/DMR11 DIAGNOSTICS

Table DMR-6 Typical VAX-11/DMR11 Hardware Parameters

Questions	Description
1. DEVICE LINK ?	: Link the option to the UNIBUS interface by entering the logical name of the interface (e.g., DW0).
2. DEVICE NAME ?	: Establish a logical device name (e.g., XM0). The logical name is generally the same one used by the operating system and the actual unit number (e.g., 0-7 or A-Z).
3. CSR ?	: Enter the device CSR address.
4. VECTOR ?	: Enter the device Vector address.
5. BR ?	: Enter the proper device priority level (normally BR 5).
6. SW PAK 1 (REG11) ?	: Enter in octal the actual switch settings for REGISTER 11. Refer to DCM11 section for details.
7. SW PAK 2 (REG15) ?	: Enter the octal contents of switch pack E134, SW1-8 for bootstrap password; normal response for non-bootstrap mode is 377 <CR>.
8. SW PAK 3 (REG16) ?	: Enter the octal contents of switch pack E121, SW1-8 for bootstrap offset address; normal response for non-bootstrap mode is 0 <CR>.
9. LOOPBACK TYPE ?	: Select the proper turnaround connector: 0 = H3254 & H3255 1 = Cable Turnaround (External H325, H3251, or H3250) 2 = Modem Local 3 = Modem Remote 4 = None (Internal) Do not select type 2 or 3 unless your modem has these program controlled features.

Table DMR-6 Typical VAX-11/DMR11 Hardware Parameters (Cont)

Questions	Description
10. BAUD RATE ?	; Select proper speed that is configured in the line unit by E39, SW8-10.
11. RUN SWITCH ?	; Type 1 if RUN switch is ON (normal) type 0 if switch is off; ON = Enabled OFF = Disabled

NOTE

The Command Line Interpreter (CLI) format for the device also can be linked together on one line as shown in the attach command for the UNIBUS interface above.

VAX-11 DMR11 DIAGNOSTICS

Table DMR-7 VAX-11 Diagnostic Event Flag Summary

Diagnostic	Event Flag	Function
EVDXA COMM Microprocessor Repair Level	1	M8200-YA Module Installed
	2	M8200-YB Module Installed
	3	M8200-YC Module Installed
	4	M8204 Module Installed
	6	M8207-YA Module Installed
	7	M8207-RA Module Installed
	8	M8201 Module Installed
	9	M8202 Module Installed
	10	M8203 Module Installed
	EVDMA	1
M8203 Repair Level	2	Allow Switch Pack and AX3-15 Register printout
	3	Allows Switch Pack contents to be verified
EVDCA VAX Synchronous Link	1	Do not test for DSR
	8	Do not test for CTS
EVDMC DMC/DMR DCLT Module	1	Set for Half-Duplex Clear for Full-Duplex

Run Microdiagnostics

- When correctly enabled, testing is automatically executed during power up or initialization at Master Clear time.
- Two methods are available to enable microdiagnostics as shown in the following table.

SELO BIT 13*	SW10 at E134 on M8203	Execution of Microdiagnostics
Clear	ON	No Microdiagnostics Run (Disabled)
Clear	OFF	Run Microdiagnostics (Enabled)
Set	ON	Run Microdiagnostics (Enabled)
Set	OFF	No Microdiagnostics Run (Disabled)

* At Master Clear time.

- Run bit will be asserted:
 1. In about 240 μ s if testing is disabled.
 2. In about 6.4 ms if testing is enabled.
- Test results (listed below) are available to the user in BSEL3.

BSEL1	BSEL3	Indication
Run bit	200 _g	Test Complete
Run bit	100 _g	Test Inhibited
No Run bit	001 _g or XXX	M8207 Test Failed
No Run bit	002 _g	M8203 Test Failed

Programming Example:

```

MOV #40000,SELO ;SET MASTER CLEAR

1$ BIT SELO ;TEST RUN BIT

BPL 1$ ;BRANCH IF NOT READY YET
;CHECK BSEL3 FOR MICRODIAGNOSTIC
;STATUS
;PROCEED WITH BASE IN
    
```

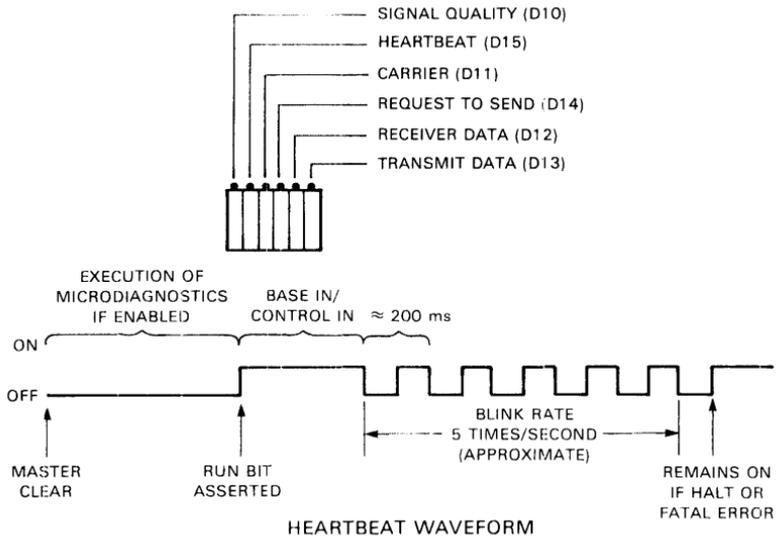
NOTE

If the Run bit is not asserted within 6.4 ms, either the M8207 or the M8203 test may have failed and the user should check BSEL3.

DMR11 MAINTENANCE AIDS

DMR11 Maintenance LEDs

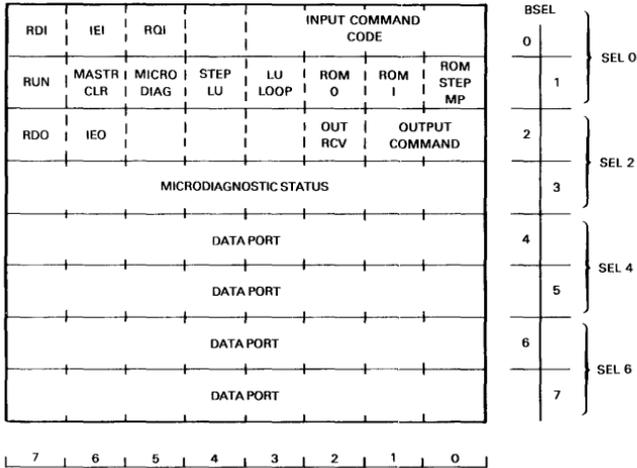
Diode Designation	Signal Name	Description
D10	Signal Quality	Follows the presence or absence of carrier
D11	Carrier	ON indicates carrier is present at the receiver
D12	Receive Data	ON indicates a marking state (1) at the receiver
D13	Transmit Data	ON indicates a marking state (1) is being transmitted
D14	Request to Send	ON indicates USYRT is ready to transmit when clear to send is detected
D15	Heartbeat	<p>Microcode status:</p> <ul style="list-style-type: none"> ● OFF at master clear time ● ON at DDCMP halt state ● Blinking at DDCMP, ISTRT, ASTRT, or RUN state



MK-32/00

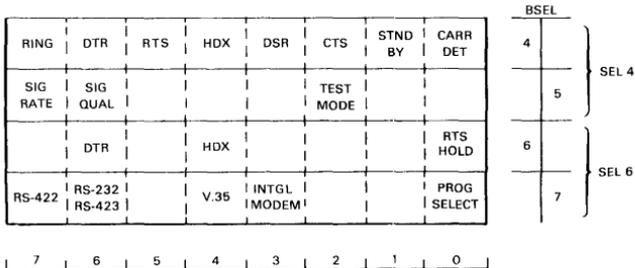
DMR Register Bit Assignments

Register bit assignments for the DMR11 are shown in the following diagrams. Bit assignments for SEL4 and SEL6 vary depending on the command or function. Refer to separate diagrams of SEL4 and SEL6 below for each command dependent condition.



MK 2221

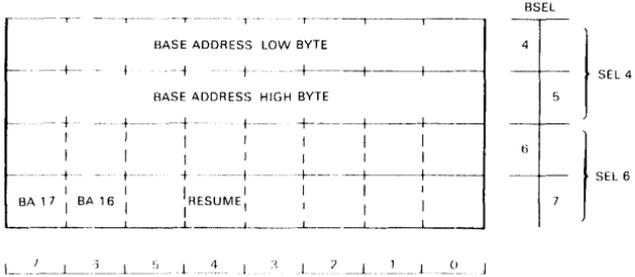
MODEM STATUS READ



MK 2247

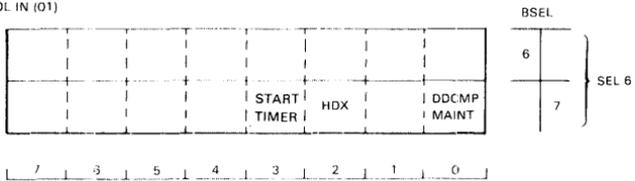
DMR11 MAINTENANCE AIDS

BASE IN (11)



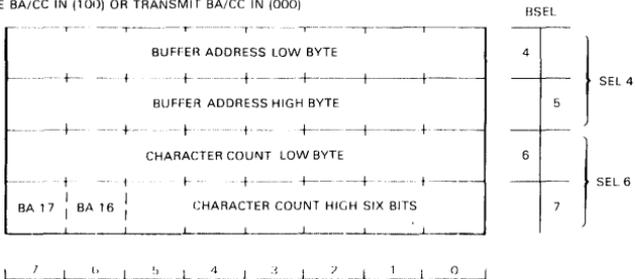
MK 2222

CONTROL IN (01)



MK 2223

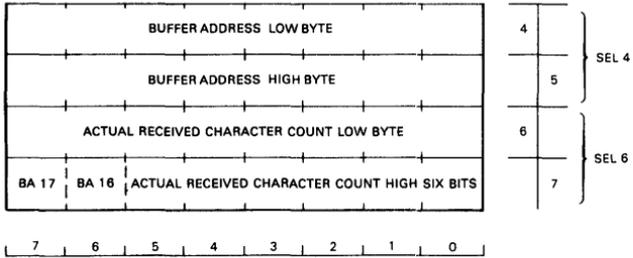
RECEIVE BA/CC IN (100) OR TRANSMIT BA/CC IN (000)



MK 2225

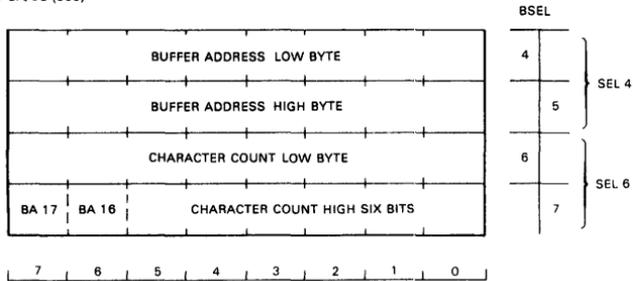
DMR11 MAINTENANCE AIDS

RECEIVE BA/CC (100)



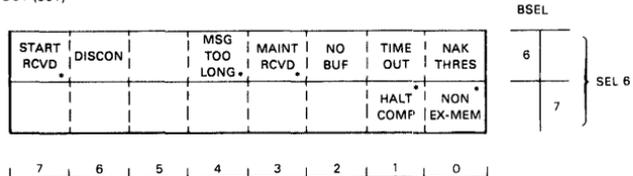
MK 2227

TRANSMIT BA/CC (000)



MK 2228

CONTROL OUT (001)



MK 2229

*FATAL ERRORS

DMR11 MAINTENANCE AIDS

DMR11 Tech-Tips/FCO Index

Table DMR-8 DMR Tech Tip Index

Tech Tip No.	Title	Speed Bulletin No.
1	Down Line Load/RLD with M9312	162
2	Swapping a DMR11 for an Existing DMC11	163
3	M8203 Switch Setting	183
4	W16 & W17 on M8203 Etch Rev. "D" Module	185

NOTE

At present, there have been no FCOs issued on the DMR11. However, one DMC11 FCO does apply. Refer to BC05Z, R0004 SEP 80, DMC section.

DMV11 OPTION

To be supplied. Preparation of this material is planned for the near future.

DPV11 OPTION

DPV11 General Description

The DPV11 is a serial synchronous, single line device interfacing an LSI-11 bus to an RS-232-C, RS-423-A, or RS422-A modem (DIGITAL does not supply RS-449 compatible cable).

DPV11 features:

- Half-or full-duplex,
- Full (Category I) modem control,
- Partial (Category II) modem control,
- Program interrupt on modem transitions,
- Operating speeds up to 56 K b/s,
- RS-232-C compatibility,
- Electrical compatibility with RS-422-A and RS-423-A, and
- Ability to support bit/byte-oriented protocols.

DPV11 Reference Documentation

Refer to the following documents if the level of content in this section is insufficient:

- *DPV11 Technical Manual* – EK-DPV11-TM
- *DPV11 Microfiche* – EP-DPV11-TM
- *DPV11 Print Set* – MP00919
- *PDP-11/03 User Manual* – EK-LSI11-TM
- *LSI-11 Installation Guide* – EK-LSI11-IG

DPV11 INSTALLATION

DPV11 Components List

Table DPV-1 DPV Components List

Option	Parts List	Description
DPV11-DA	M8020 EK-DPV11-CG	Device module DPV11 Maintenance Reference Card for LSI-11s
DPV11-DB	M8020 BC26L-25 H3259	Device module RS232-C 25-pin Berg-to-Cinch modem cable Cable turnaround test connector
DPV11-DC	M8020 7018209 BC05D-25* H3259 EK-DPV11-UG ZJ 314-RB MP00919	Device module Cable/filter assembly RS232-C 25-pin Cinch-to-Cinch modem cable Cable turnaround test connector <i>DPV11 User's Guide</i> DPV11 Diagnostic Library Kit DPV11 Field Maintenance Print Set
DPV11 support items (may be purchased separately)	H3260 EK-DPV11-TM	On-board test connector <i>DPV11 Technical Manual</i>

*Must be ordered separately.

Device Placement

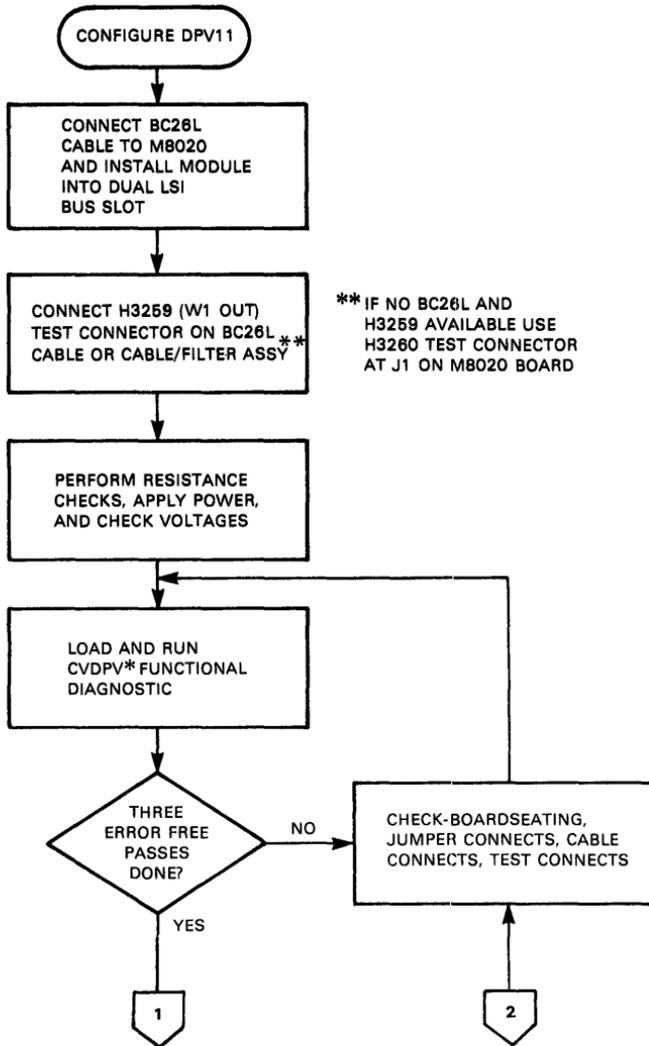
The DPV11 (M8020) can be mounted in any LSI-11 bus compatible backplane such as H9270. LSI-11 configuration conventions apply and must be followed.

Power/LSI Bus Loading

Table DPV-2 Power/LSI Bus Loading

Module	Voltage Rating (Approximate Values)	Maximum Voltage	Minimum Voltage	Backplane Pin No.	Bus Loading
M8020	+ 5 V @ 1.2 A MAX	+ 5.25	+ 4.75	AA2	1 dc Load
	+12 V @ 0.3 A MAX	+12.75	+11.25	AD2	

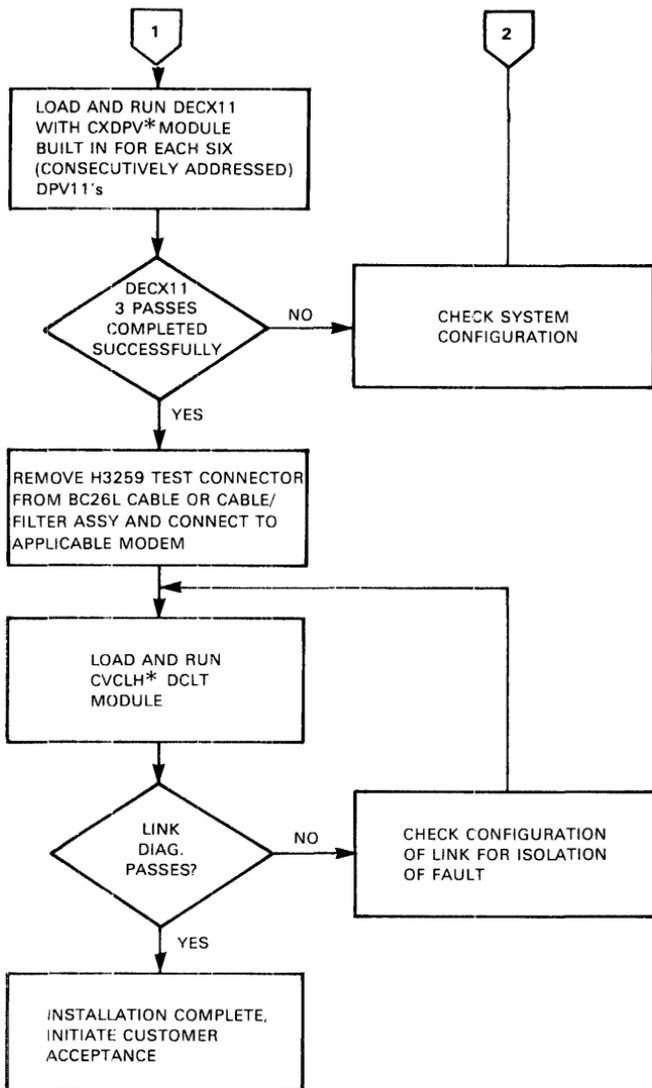
DPV11 INSTALLATION FLOWCHART



MK-1552

DPV11 INSTALLATION

DPV11 INSTALLATION FLOWCHART (CONT)

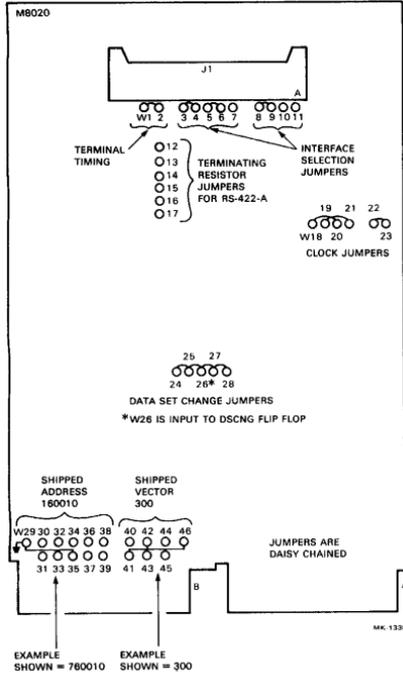


*INDICATES LATEST REVISION OF DIAGNOSTIC

MK-1552

DPV11 INSTALLATION

DPV11 Jumper Options



DEVICE ADDRESS SELECTION

MSB											LSB					
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
1	1	1	← JUMPERS →											0	0	0

JUMPER NUMBER	W31	W30	W36	W33	W32	W39	W38	W37	W34	W35	DEVICE ADDRESS
									X	X	760010
									X	X	760020
									X	X	760030
									X	X	760040
									X	X	760050
									X	X	760060
									X	X	760070
									X	X	760100
											760200
								X	X	X	760300
								X	X	X	760400
								X	X	X	760500
								X	X	X	760600
								X	X	X	760700
								X	X	X	761000
								X	X	X	762000
								X	X	X	763000
								X	X	X	764000

*X INDICATES A CONNECTION TO W29. W29 IS TIED TO GROUND. JUMPERS ARE DAISY CHAINED.

MK-1338

VECTOR ADDRESS SELECTION

MSB											LSB									
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0					
0	0	0	0	0	0	0	← JUMPERS →											1/0	0	0

JUMPER NUMBER	W43	W42	W41	W40	W44	W45	VECTOR ADDRESS
		X	X				300
		X	X			X	310
		X	X			X	320
		X	X			X	330
		X	X	X			340
		X	X	X		X	350
		X	X	X	X		360
		X	X	X	X	X	370
							400
	X			X			500
	X	X					600
	X	X	X				700
							...

*X INDICATES A CONNECTION TO W46. W46 IS THE SOURCE JUMPER FOR THE VECTOR ADDRESS. JUMPERS ARE DAISY CHAINED.

MK-1341

THE DPV11 RESIDES IN LSI FLOATING ADDRESS SPACE:

- DEVICE ADDRESS RANKS 4
- VECTOR ADDRESS RANKS 22

DPV11 INSTALLATION

(W1-W2) Driver Attenuation Jumper

Driver	Normal Configuration (RS-232-C/RS-423-A)	Alternate Option (RS-422-A)	Description
Terminal Timing	W1 to W2	Not connected	Bypasses attenuation resistor. Jumper must be removed for certain modems to operate properly.

(W3-W11) Interface Selection Jumpers

Input Signals	Normal Configuration (RS-232-C/RS-423-A)	Alternate Option (RS-422-A)	Description
SQ/TM (PCSCR-5)	W5 to W6	W7 to W6	Signal quality Test mode
DM (DSR) (RXCSR-9)	Not connected	W10 to W9	Data mode return for RS-422-A
Output Signals	Normal Configuration (RS-232-C/RS-423-A)	Alternate Option (RS-422-A)	Description
SF/RL (RXCSR-01)	W3 to W4	W5 to W3	Select frequency Remote loopback
Local Loopback	W8 to W9	Not connected	Local loopback
	Not connected	W8 to W11	Local loopback (alternate pin)

(W12-W17) Receiver Termination Jumpers

Receiver	Normal Configuration (RS-232-C/RS-423-A)	Alternate Option	Description
Receive Data	Not connected	W12 to W13	Connects terminating resistor for RS-422-A compatibility.
Send Timing	Not connected	W14 to W15	
Receive Timing	Not connected	W16 to W17	

(W18-W23) Clock Jumpers

Function	Normal Configuration (RS-232-C/RS-423-A)	Alternate Option (RS-422-A)	Description
NULL MODEM CLK	W20 to W18	W21 to W18	Sets (RS-423-A) NULL MODEM CLK to 2KHZ. Sets (RS-423-A) NULL MODEM CLK to 50KHZ
Clock Enable	W19 to W21 W22 to W23	W19 to W21 W22 to W23	Always installed except for factory testing.

(W24-W28) Data Set Change Jumpers

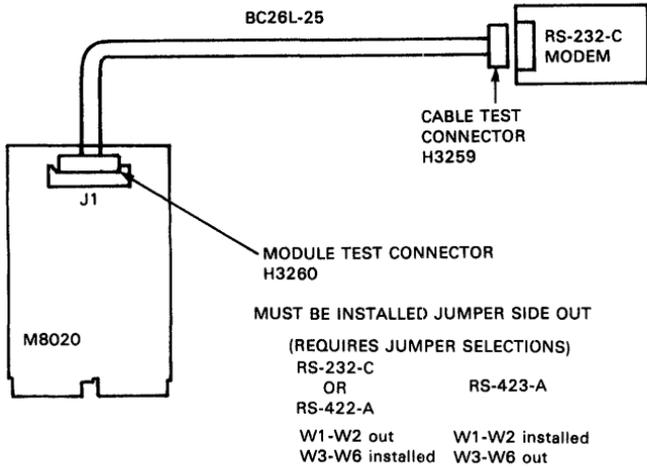
Modem Signal Name	Normal Configuration (RS-232-C/RS-423-A)	Alternate Option (RS-422-A)	Description
Data Mode (DSR)	W26 to W24	Not connected	Connects the DSCNG flip-flop to the respective modem status signal for transition detection.
Clear to Send W25	W26 to W25	Not connected	
Clear to Send W25	W26 to W25	Not connected	
Incoming Call	W26 to W27	Not connected	Note: W26 is input to DSCNG flip-flop.
Receiver Ready (Carrier Detect)	W26 to W28	Not connected	

NOTE

The Jumper Configuration Guide (above) shows the recommended jumpering scheme (both normal and alternate). Any deviation from these will cause diagnostics to fail and require restrapping for full testing and variation. It is recommended that customer configurations that vary this scheme not be contractually supported.

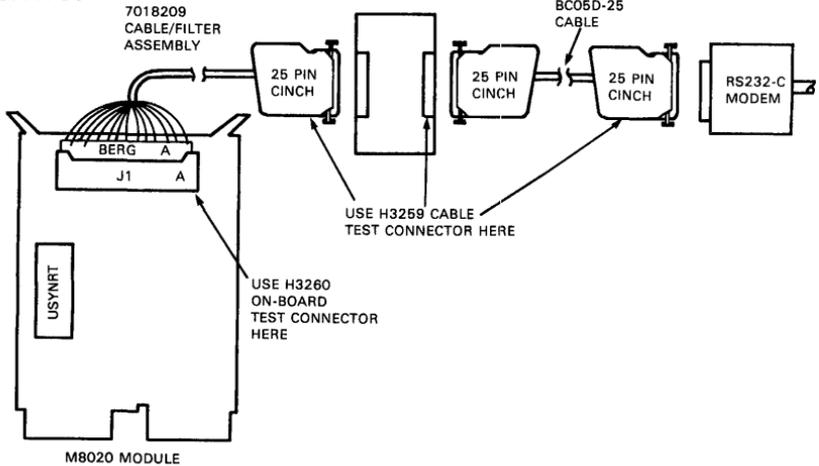
DPV11 Cabling

DPV11-DA



MK-2828

DPV11-DC



MK-2846

DPV11 DIAGNOSTICS

DPV11 Diagnostics

Two diagnostic programs are available to support the DPV11 in PDP-11 systems. Refer to Table DPV-3.

Table DPV-3 DPV11 Diagnostics

Function	Diagnostic Name	PDP-11 Systems
DPV11 Functional Test	DPV Functional Diagnostic	(C)VDPV**
DPV11 Link Test	DCLT	(C)VCLH**

Running PDP-11/DPV11 Diagnostics – The following summarizes running DPV11 Diagnostics.

- Load and start diagnostics at address 000200.
- At DR> prompt, enter one or more commands, for example, STA/PASS:MNN/TEST, and so on. The following parameter questions must be answered.

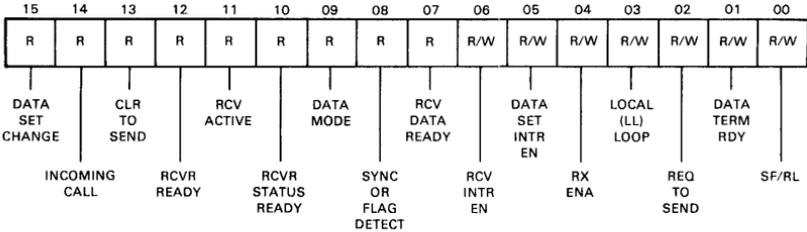
Table DPV-4 Typical PDP-11/DPV11 Diagnostic Parameters

Parameters	Description
CHANGE HW(L) ? _____	Enter Y for yes.
# UNITS (D) ? _____	Enter number of units on the system to be tested (decimal from 1-16)
ADDRESS: (0) 160010? _____ VECTOR: (0) 300? _____ LOOPBACK - 0=INTERNAL 1=RS423, 2=RS422, 3=LOCAL MODEM, 4=REMOTE MODEM LOOP (0) ?	Enter appropriate value in each case. Address and Vector values shown are default, if appropriate, put <CR> only. For loopback selection, be sure proper test connector is installed or proper modem is available.

DPV11 Register Bit Assignments

RXCSR
16XXX0
 READ/WRITE

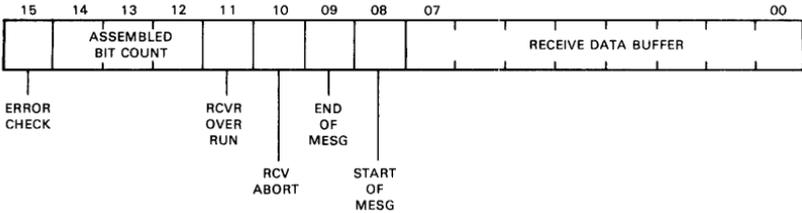
THE RXCSR CAN BE READ IN EITHER WORD OR BYTE MODE. HOWEVER, READING EITHER BYTE RESETS CERTAIN STATUS BITS IN BOTH BYTES.



MK-1504

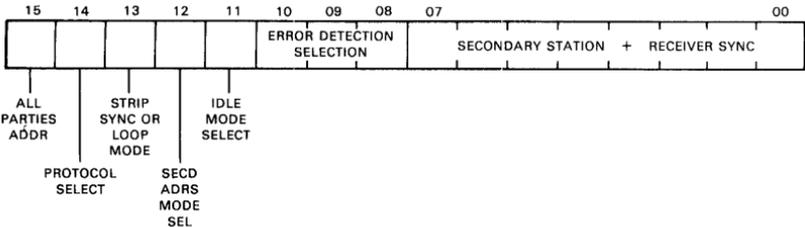
RDSR
16XXX2
 READ ONLY

THE RDSR CAN BE READ IN EITHER WORD OR BYTE MODE. HOWEVER, READING EITHER BYTE RESETS DATA AND CERTAIN STATUS BITS IN BOTH BYTES OF THIS REGISTER AS WELL AS BITS 7 AND 10 OF THE RXCSR.



MK-1505

PCSAR
16XXX2
 WRITE ONLY



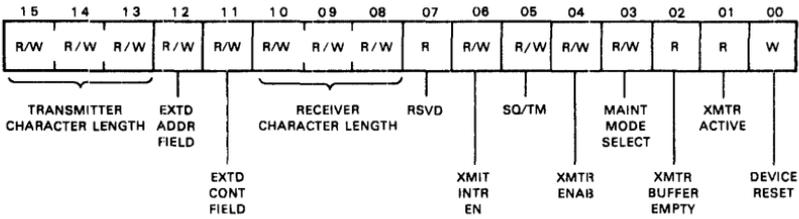
MK-1506

DPV11 MAINTENANCE AIDS

DPV11 Register Bit Assignments (Cont)

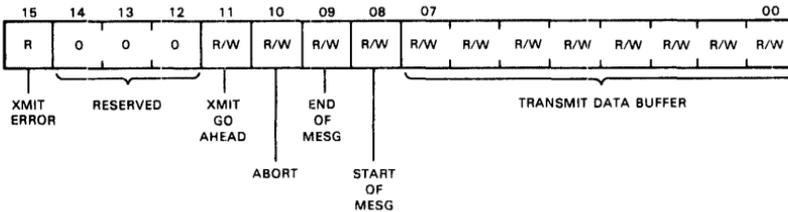
BIT SET (BIS) AND BIT CLEAR (BIC) INSTRUCTIONS CANNOT BE EXECUTED ON THE PCSCR, SINCE THEY EXECUTE USING A READ-MODIFY-WRITE SEQUENCE.

PCSCR
16XXX4
READ/WRITE



MK-1507

TDSR
16XXX6
READ/WRITE



MK-1508

DPV11 Tech-Tips/FCO Index

No Tech Tips or FCOs have been issued for the DPV11.

DUP11 OPTION

DUP11 General Description

The DUP11 is a single-line, program-controlled, double-buffered communications device interfacing the PDP-11/VAX-11 family of processors to a serial synchronous line. The DUP11 is capable of handling byte-oriented protocols, such as DDCMP and BISYNC, and bit-oriented protocols, such as SDLC (SNA), HDLC (X.25), and ADCCP.

The DUP11 features:

- RS-232-C compatibility at speeds up to 9600 b/s,
- Full modem control,
- Ability to support bit/byte-oriented protocols,
- Single hex module,
- Auto-Answer capability,
- Half- or full-duplex, and
- Program interrupt on modem transitions.

DUP11 Reference Documents

- *DUP11 Maintenance Manual* – EK-DUP11-MM
- *DUP11 Microfiche* – EP-DUP11-MM
- *DUP11 Print Set* – (Number to be assigned)

DUP11 Components List

Table DUP-1 Components List

ITEM	PART NO.	DESCRIPTION
	DUP11-DA	DUP11 Option consisting of:
1	M7867	Synchronous Interface Module
2	BC02C-10	Interface Cable
3	BC05C-25	Modem Cable
4	H325	Test Connector

Device Placement

The DUP11 mounts in any hex height slot DD11-B SPC backplane or the equivalent.

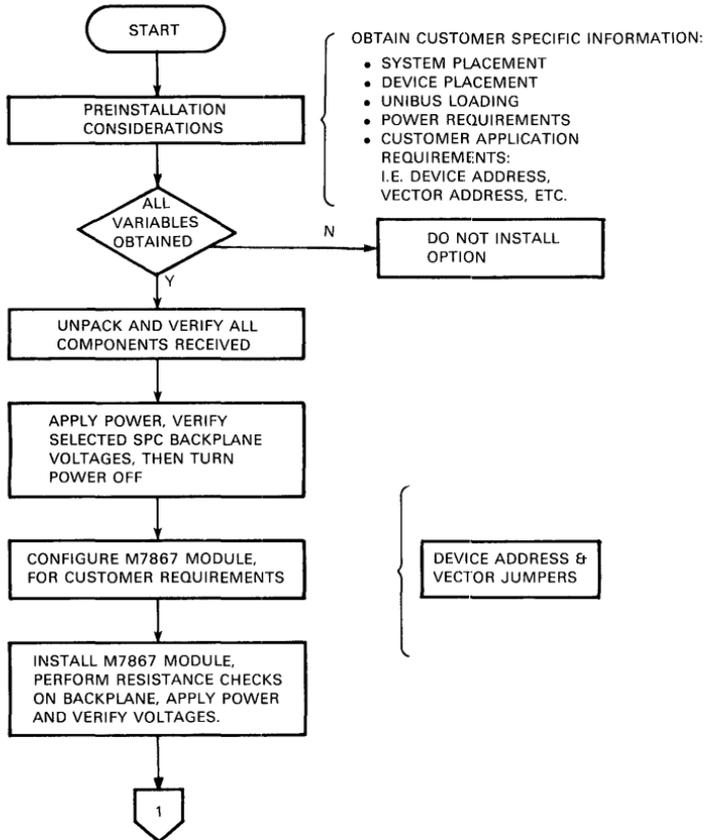
DUP11 INSTALLATION

Power/UNIBUS Loading

Table DUP-2 Power/UNIBUS Loading

Module	Voltage Rating (Approximate Values)	Maximum Voltage	Minimum Voltage	Backplane Pin No.	UNIBUS Loading
M7867	+ 5 V @ 3.6 A	+ 5.25	+ 5.0	C1A2	1 UNIBUS dc load
	+15 V @ 0.325 A	+15.75	+14.25	C1U1	
	- 15 V @ 0.6 A	-15.75	- 14.25	C1B2	

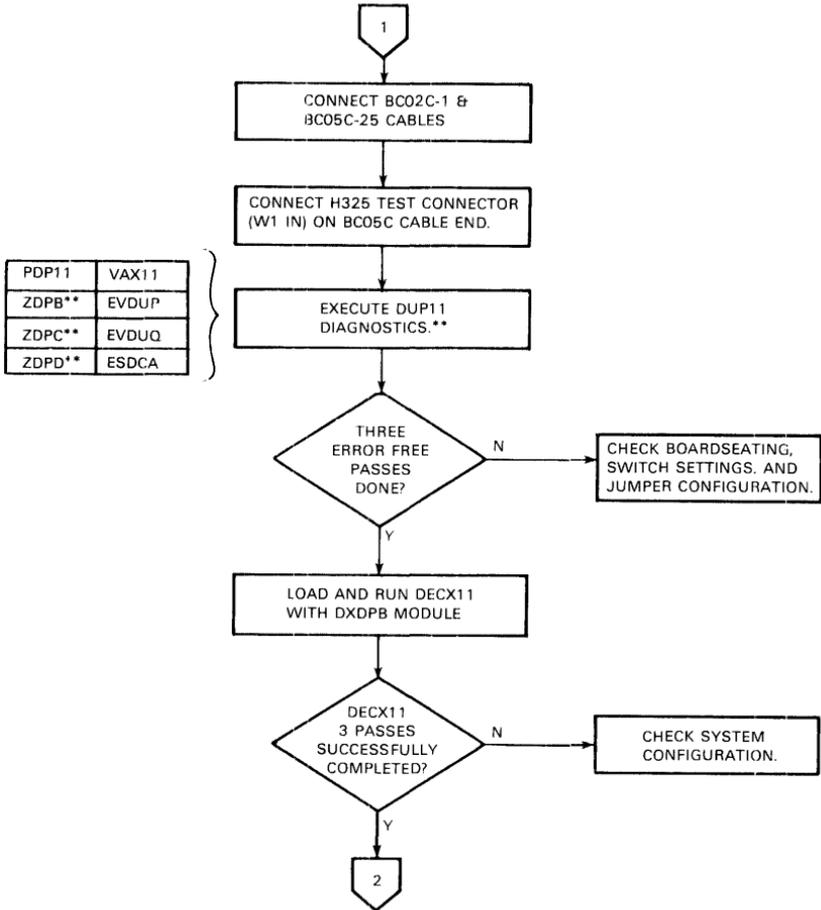
DUP11 INSTALLATION FLOWCHART



MK-2806A

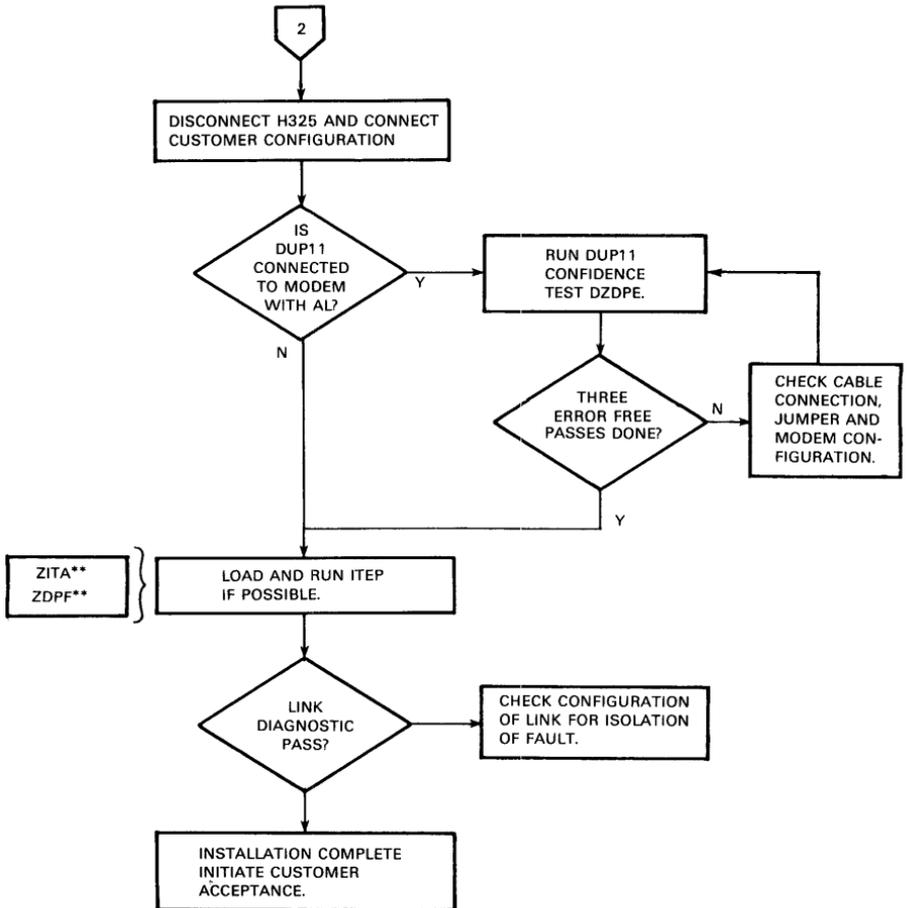
DUP11 INSTALLATION

DUP11 INSTALLATION FLOWCHART (CONT)



MK-2808B

DUP11 INSTALLATION FLOWCHART (CONT)



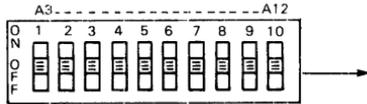
MK-2808C

DUP11 INSTALLATION

M7867 Switch Packs/Jumpers

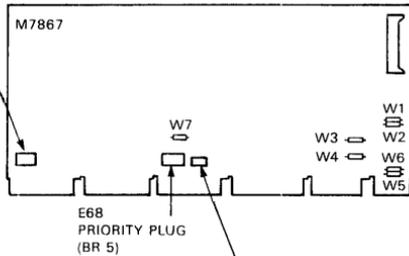
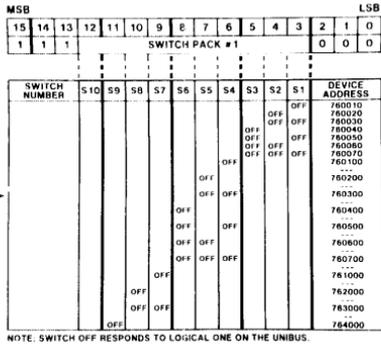
The DUP11 resides in floating address space (see Appendix A).

- Device Address ranks 5
- Vector Address ranks 22

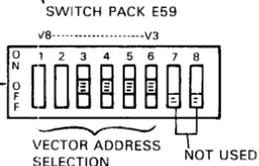
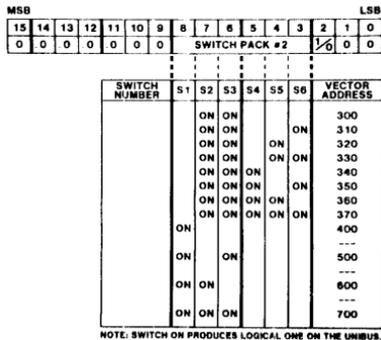


SWITCH PACK E113
DEVICE ADDRESS
SELECTION

DUP11-DA (M7867) DEVICE ADDRESSING



DUP11-DA (M7867) VECTOR ADDRESSING



SWITCH PACK E59
VECTOR ADDRESS
SELECTION

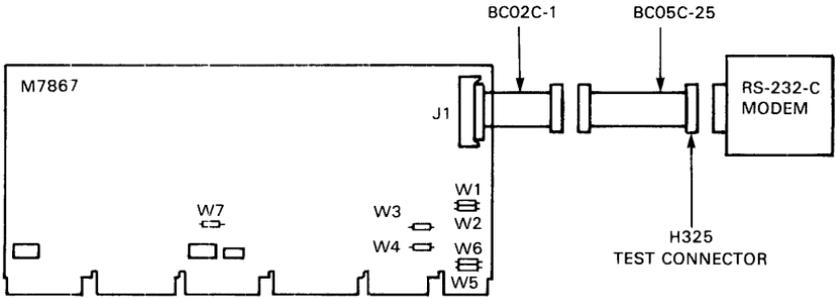
MK-2825

Table DUP-3 M7867 Jumpers

Jumper Number	Normal Configuration	Function
W1	IN	Secondary Receive Enable (W2 must be out).
W2	OUT	Secondary Receive Disable. If W2 is installed, W1 must be OUT.
W3	IN	Clear option when removed, SEC XMIT DATA, RTS & DTR are not cleared by Device Reset or INIT.
W4	IN	Secondary Transmit Enable.
W5	OUT	Disables carrier, DSR and SEC RCV data from causing an interrupt.
W6	IN	Enables detection of transitions CARRIER, DSR, and SEC RCV data.
W7	IN	Bus Control Grant.

DUP11 CABLING

DUP11 Cabling



MK-2829

DUP11 Diagnostics

Table DUP-4 DUP11 Diagnostics

Diagnostic Function	Diagnostic Name	PDP-11 Systems	VAX-11 Systems
Transmitter Test	DUP11 basic off-line SDLC transmitter tests DUP11 Repair Level Diagnostic (level 3) Part 1	(D)ZDPB**	EVDUP REV**
Receiver/Modem Control/Interrupt Tests	DUP11 Off-Line SDLC Receiver and Modem Control and Interrupt Tests DUP11 Repair Level Diagnostic (level 3) Part 2	(D)ZDPC**	EVDUQ REV**
Data/Function Tests	DUP11 Off-Line SDLC/DECMODE Data and Function Tests DUP11 Level 2	(D)ZDPD**	EVDCA REV**
Quick Verify	DUP11 Confidence Test	(D)ZDPE**	
Link Testing	Interprocessor Test Program ITEP Monitor DUP11 Overlay	(D)ZITA** (D)ZDPF**	
	DCLT	(C)ZDCL**	

Running PDP-11/DUP11 Diagnostics – The following summarizes running PDP-11/DUP11 diagnostics.

If started at address 200 with switch register SW0=0, program prints the diagnostic name, followed by the DUP status table.

Example of DUP11 Status Map

```

1500 160050 CSR OF FIRST DUP11
1502 000300 VECTOR OF FIRST DUP11
1504 140026 STATUS AND SYNC FOR FIRST DUP11
1506 160060 CSR OF SECOND DUP11
1510 000310 VECTOR OF SECOND DUP11
1512 140026 STATUS AND SYNC FOR SECOND DUP11

```

PDP-11/DUP11 DIAGNOSTICS

If started at address 200 with switch register SW0=1, the program prints the diagnostic name, followed by the parameter questions, and then the status map.

Table DUP-5 Typical DUP11 Diagnostic Parameters

Parameters	Description
REC CSR ADDRESS? _____	Enter device address <CR>
VECTOR ADDRESS? _____	Enter vector address <CR>
IS A MODEM WITH ANALOG LOOPBACK ENABLED CONNECTED? (Y OR N) _____	
IS H325 CONNECTOR ON? (Y OR N) _____	
ARE THE DEFAULT JUMPERS IN? (Y OR N) _____	Enter Y for Yes or N for No in all cases
IS OPTIONAL CLR JMPR IN? (Y OR N) _____	
SEC TX JMPR IN? (Y OR N) _____	
SEC RX JMPR IN? (Y OR N) _____	
ARE DSC1 AND 2 BOTH IN? (Y OR N) _____	

Running VAX-11/DUP11 Diagnostics – The following summarizes running VAX-11/DUP11 diagnostics.

Table DUP-6 Typical VAX-11/DUP11 Program Operation

Command Function	Example
1. Load appropriate diagnostic	DS> LOAD EVDUP or EVDUQ
2. ATTACH the UNIBUS interface (UBA or UBI) to the system bus.	DS> ATT DW780 SBI DW0 3, 4, or DS> ATT DW750 CMI DW0
3. ATTACH the device to the system.	DS> ATT DUP11

NOTE

This command now enters the hardware parameter information for the device (refer to the following Table DUP-7 for Typical Hardware Parameters). When the various hardware parameters are qualified, the program returns to the supervisor level of operation and the following steps must be followed:

4. SELECT the devices that have been attached to the system.	DS> SELECT ALL or DS> SELECT DW0 and DS> SELECT XM0
5. SET the appropriate event.	DS> SET EVENT FLAG(s) a,n,n. (EVDUQ only)
6. If a printout of the tests being executed is desired then the trace flag can be set by SET TRACE command for the program, if applicable. Now the program may be started by the START command.	DS> SET TRACE DS> START

VAX-11/DUP11 DIAGNOSTICS

Table DUP-7 Typical VAX-11/DUP11 Hardware Parameters

Questions	Description
1. DEVICE LINK ?	; Link the option to the UNIBUS interface by entering the logical name of the interface (e.g., DW0).
2. DEVICE NAME ?	; Establish a logical device name (e.g. XM0). The logical name is generally the same one used by the operating system and the actual unit number (e.g., 0-7 or A-Z).
3. CSR ?	; Enter the device CSR address.
4. VECTOR ?	; Enter the device Vector address.
5. BR ?	; Enter the proper device priority level (normally BR 5).

Table DUP-8 VAX-11 Diagnostic Event Flag Summary

Diagnostic	Flag	Function
EVDUQ	1	Set, if H325 not connected.
	2	Set, if Secondary XMIT Jumper (W4) is not installed.
	3	Set, if Secondary RCVR Jumper (W1) is not installed.

DUP11 Register Bit Assignments

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DATA SET CHANGE A	RING	CLR TO SEND	CARRIER	RCV ACTIVE	SECD RCV DATA	DATA SET READY	STRIP SYNC	RCV DONE	RCV INTR EN	DATA SET INTR EN	RCVEN	SECD TRANS DATA	REQ TO SEND	DATA TERM RDY	DATA SET CHANGE B
R	R	R	R	R	R	R	R/W	R	R/W	R/W	R/W	R/W	R/W	R/W	R

RXCSR 76XXXX
READ/WRITE

15	14	12	10	09	08	07	00
RCV DATA ERR	OVER RUN ERR	CRC PAR ERR	RCV ABORT	END OF MESS	START OF MESS	RXDBUF DATA	
							RXDBUF 76XXXX READ ONLY

15	12	09	07	00
DEC MODE	SECD ADRS MODE SEL	CRC PAR INH	SECONDARY STATION ADDRESS + RECEIVER SYNC	
				PARCSR 76XXXX WRITE ONLY

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
TX DATA LATE	MAINT TX OUT DATA	MAINT S/S CLK	MAINT MODE SELB	MAINT MODE SELA	MAINT INPUT DATA	TX ACTIVE	DEVICE RESET	TX DONE	TXDNE INTR EN	SEND	HALF DUPLX				
R	R	R/W	R/W	R/W	R/W	R	W	R	R/W		R/W	R/W			

TXCSR 76XXXX
READ/WRITE

15	14	13	12	10	09	08	07	00
RCRC IN	TCRC TIN	MAINT TIMER	ABORT	END OF MESS	START OF MESS	TXDBUF DATA		
R	R	R	R	R/W	R/W	R/W		TXDBUF 76XXXX READ/WRITE

DUP11 MAINTENANCE AIDS

DUP11 Tech-Tips/FCO Index

Table DUP-9 DUP11 Tech Tip Index

Tech. Tip No.	Title	Speed Bulletin No.
1	H325 Test Connector used with DUP11	N/A
2	M7867 ECO 3/Rev. B Diagnostics	N/A
3	Cables Install for DUP11-DA	114
4	Incorrect Register Value on Ext. CLK Lead	114

Table DUP-10 DUP11/FCO History Chart

Module	FCO No.	Date	Reason	Quick Check
M7867	R0001	JUL 76	Allows module installation in a DD11-D and similar backplanes.	Jumper wire on CB2
M7867	R0002	JAN 77	TX done setting at the beginning of the CRC character.	E48 is ROM 23-345A2
M7867	S0003	MAY 78	TX and RX may hang after abort sequence.	E12 is ROM 23-422A2
M7867	S0005	AUG 78	Error status lost when running Comm. IOP DUP	Wire ADD at E54 pin 1

DZ11 OPTIONS

DZ11 General Description

The DZ11 asynchronous multiplexer provides an interface between a PDP-11/VAX-11 family of processors and up to 8 asynchronous serial lines, capable of up to 9600 b/s using either an RS-232-C interface or 20 mA current loop signaling.

The DZ11 features:

- Program control of data rate, character length, stop bits, parity,
- RS-232-C compatibility or 20 mA current loop,
- Local or remote configurations, and
- Limited modem control – carrier, ring, and DTR.

DZ11 Reference Documentation

Refer to the following documents if the level of content in this section is insufficient:

- *DZ11 Technical Manual* – EK-DZ110-TM
- *DZ11 Microfiche* – EP-DZ110-TM
- *DZ11 Print Set* – MP00253 for 20 mA applications and MP00132 for EIA applications

DZ11 INSTALLATION

DZ11 Components List

Table DZ-1 DZ11 Components List

Item	Parts List	Description
	DZ11-A	Basic 8-line, RS-232-C compatible unit containing:
1	1 M7819	Single hex SPC/EIA Control module
2	1 H7004C	EIA Static Filter
3	1 H3271	Staggered Turnaround Test Connector
4	1 BC06L-OJ	EIA Filter Cable
5	1 H317-E	EIA Distribution Panel
6	1 H325	Test Connector
7	1 BC05W-15	Cable
8	1 MP00132	Print Set
9		Panel and Static filter Mounting Hardware
10	1-54-08778	Priority plug (BR 5)
11	1 EK-DZ110-OP	DZ11 User's Manual
	DZ11-B	Same as DZ11-A, described above, except: Delete items 3, 5, 6, and 9
	DZ11-E	Combination of DZ11-A and DZ11-B described above
	DZ11-C	Basic 8-line, 20 mA current loop unit containing:
1	1 M7814	Single hex SPC/20 mA Control Module
2	1 H7004B	20 mA Static Filter
3	1 BC08S	Cable
4	1 BC06K-OJ	Filter Cable
5	1 H317-F	20 mA Distribution Panel
6	1 MP00253	Print Set
7	1 H3190	20 mA Test Connector
8		Panel and Static Filter Mounting Hardware
9	1-54-08778	Priority Plug (BR 5)
10	EK-DZ110-OP	DZ11 User's Manual
	DZ11-D	Same as DZ11-C described above, except: Delete items 5, 8, and 9
	DZ11-F	Combination of DZ11-C and DZ11-D as described above

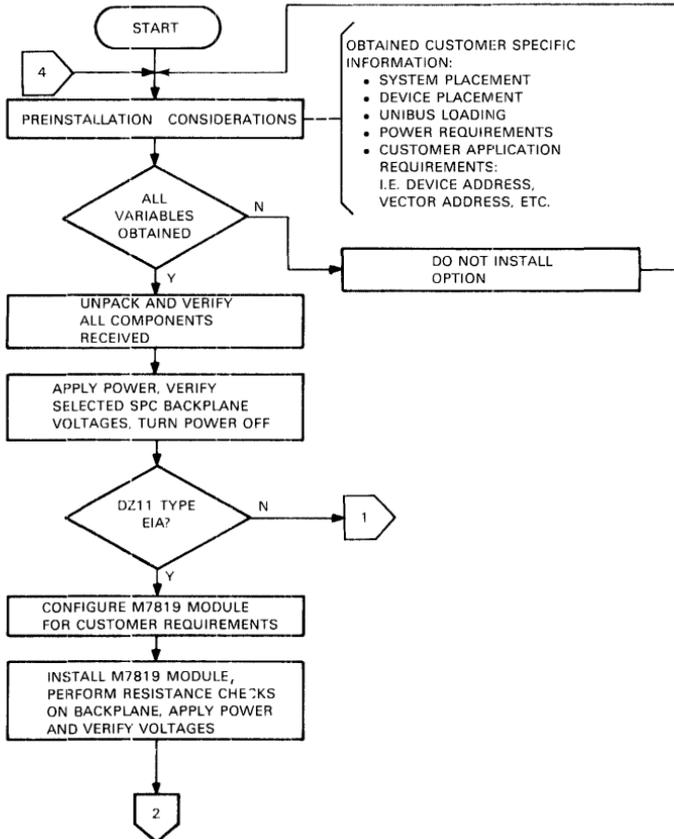
Power/UNIBUS Loading

Table DZ-2 Power Chart

Option	Voltage Rating (Approximate Values)	Maximum Voltage	Minimum Voltage	Backplane Pin No.	UNIBUS Loading
DZ11-A, -B	+ 5 vdc @ 2.5 A MAX +15 vdc @ 0.13 A MAX -15 vdc @ 0.15 A MAX	+ 5.25 +15.75 -15.75	+ 5.0 +14.25 -14.75	C1A2 C1U1 C1B2	1 UNIBUS load each
DZ11-E	+ 5 vdc @ 5.0 A MAX +15 vdc @ 0.26 A MAX -15 vdc @ 0.30 A MAX	+ 5.25 +15.75 -15.75	+ 5.0 +14.75 -14.75		2 UNIBUS loads
DZ11-C, -D	+ 5 vdc @ 2.3 A MAX +15 vdc @ 0.15 A MAX -15 vdc @ 0.42 A MAX	+ 5.25 +15.75 -15.75	+ 5.0 +14.75 -14.75	C1A2 C1U1 C1B2	1 UNIBUS load each
DZ11-F	+ 5 vdc @ 4.6 A MAX +15 vdc @ 0.30 A MAX -15 vdc @ 0.84 A MAX	+ 5.25 +15.75 -15.75	+ 5.0 +14.75 -14.75		2 UNIBUS loads

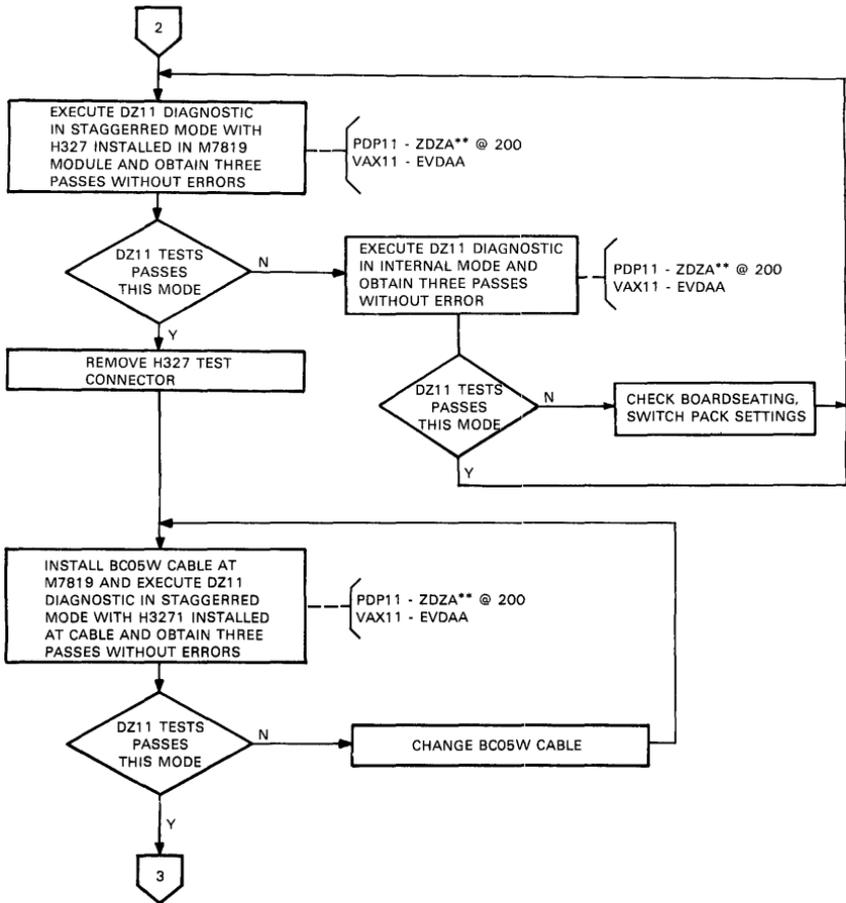
DZ11 INSTALLATION

DZ11 INSTALLATION FLOWCHART



MK-2802A

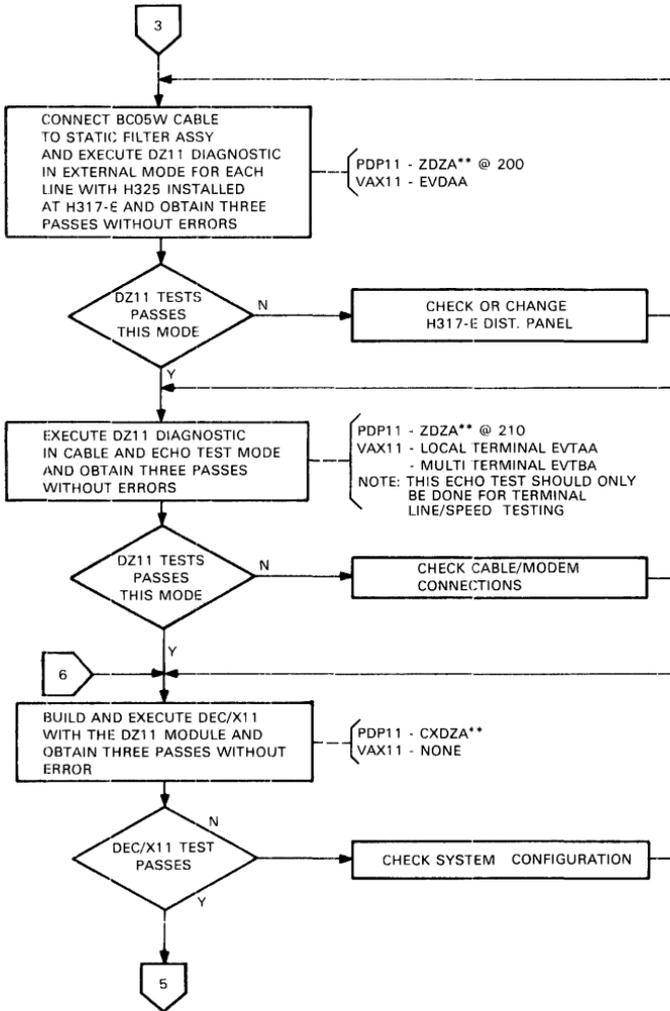
DZ11 INSTALLATION FLOWCHART (CONT)



MK-2802B

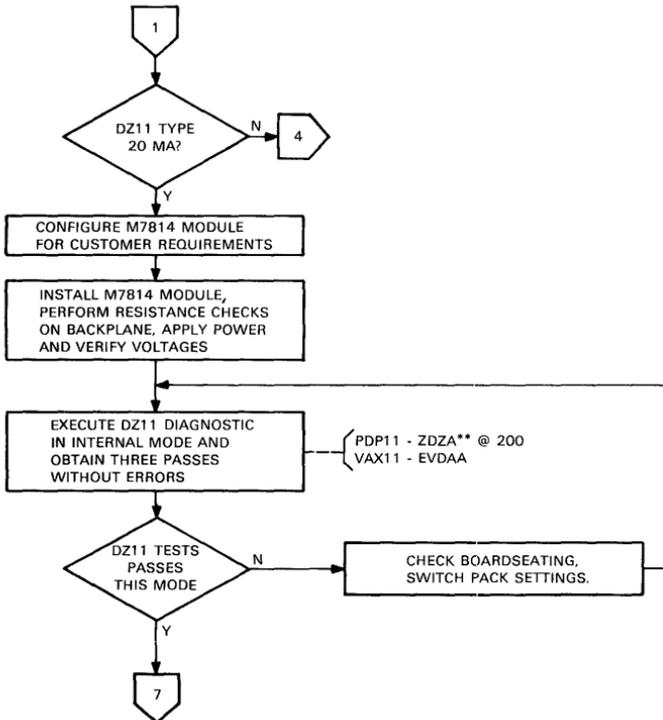
DZ11 INSTALLATION

DZ11 INSTALLATION FLOWCHART (CONT)



MK-2802C

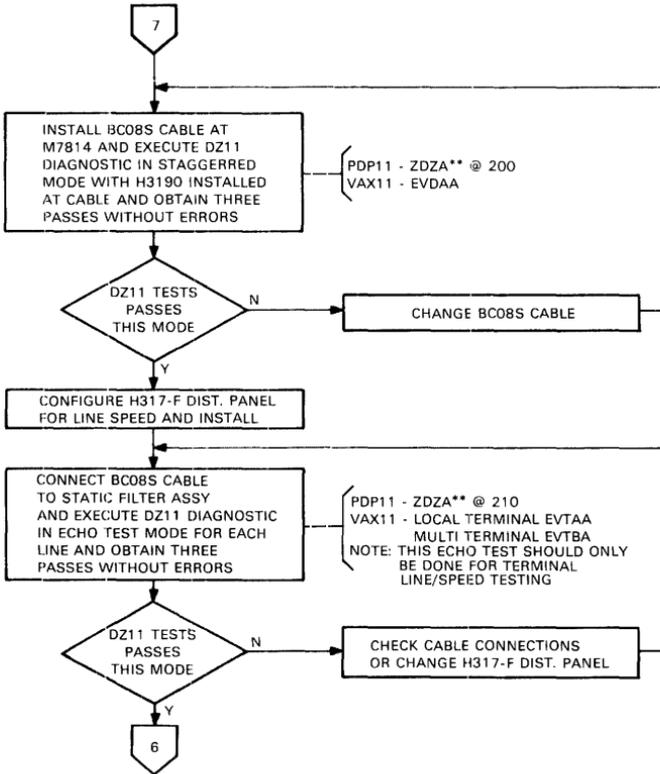
DZ11 INSTALLATION FLOWCHART (CONT)



MK-2802D

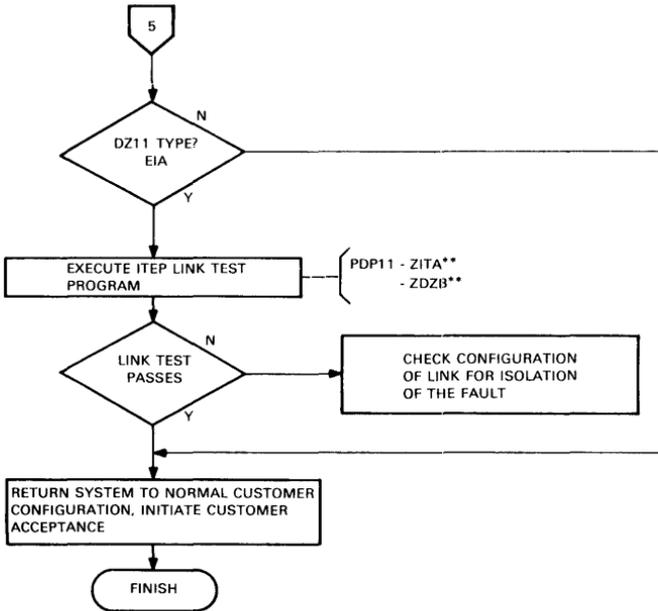
DZ11 INSTALLATION

DZ11 INSTALLATION FLOWCHART (CONT)



MK-2802E

DZ11 INSTALLATION FLOWCHART (CONT)



MK-2802F

DZ11 INSTALLATION

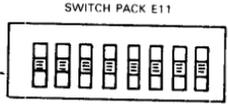
M7819 Switch Packs/Jumpers

MSB												LSB					
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0		
0	0	0	0	0	0	0	0	SWITCH PACK E11						1	0	0	0

SWITCH NUMBER	S7	S6	S5	S4	S3	S2	VECTOR ADDRESS
	OFF	OFF					300
	OFF	OFF				OFF	310
	OFF	OFF			OFF	OFF	320
	OFF	OFF			OFF	OFF	330
	OFF	OFF		OFF		OFF	340
	OFF	OFF		OFF	OFF		350
	OFF	OFF		OFF	OFF	OFF	360
	OFF	OFF		OFF	OFF	OFF	370
	OFF						400
	OFF		OFF				---
							500

	OFF	OFF					600

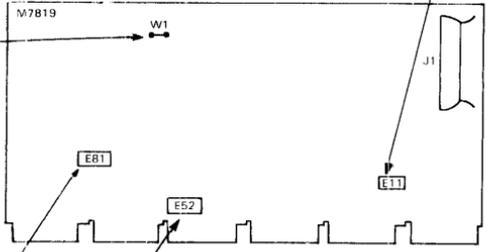
	OFF	OFF	OFF				700



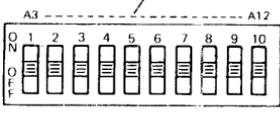
VECTOR ADDRESS SELECTION

NOTE: SWITCH OFF PRODUCES LOGICAL ONE ON THE UNIBUS.

W1--NORMA LY IN
 • OUT DISABLES MASTER CLK FOR FACTORY TESTING.



MSB																LSB			
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0				
1	1	1												0	0	0			



SWITCH PACK E81
 DEVICE ADDRESS SELECTION

SWITCH NUMBER	S10	S9	S8	S7	S6	S5	S4	S3	S2	S1	DEVICE ADDRESS
									ON	ON	760010
									ON	ON	760020
									ON	ON	760030
									ON	ON	760040
									ON	ON	760050
									ON	ON	760060
									ON	ON	760070
									ON	ON	760100
											760200
											760300

							ON				760400
							ON				760500
							ON	ON			760600
							ON	ON	ON		760700

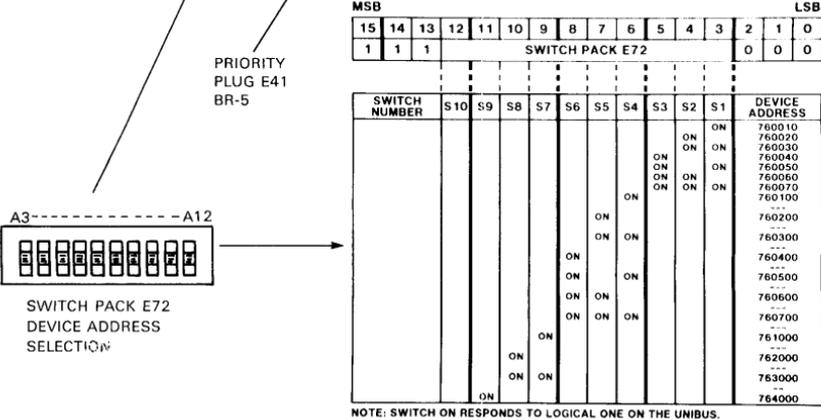
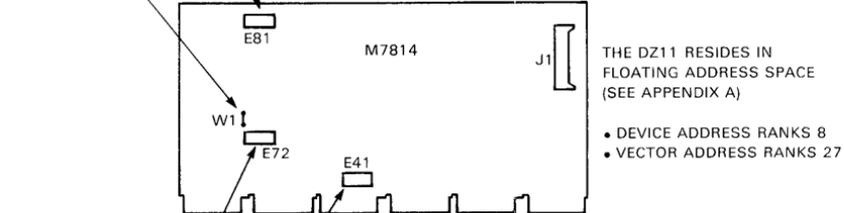
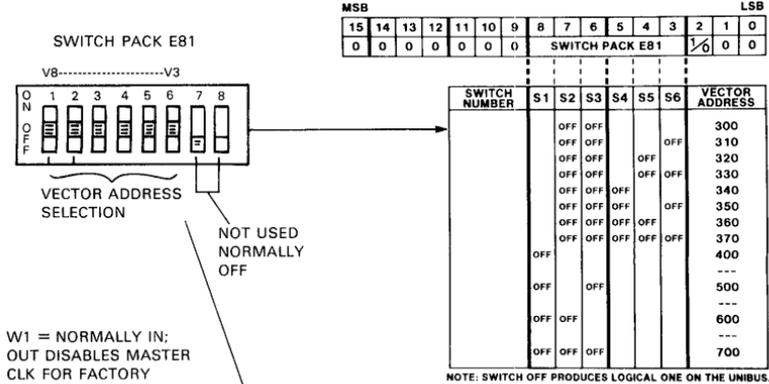
								ON			761000
								ON			762000
								ON			---
								ON			763000
								ON			---
								ON			764000

NOTE: SWITCH ON RESPONDS TO LOGICAL ONE ON THE UNIBUS.

THE DZ11 RESIDES IN FLOATING ADDRESS SPACE (SEE APPENDIX A).

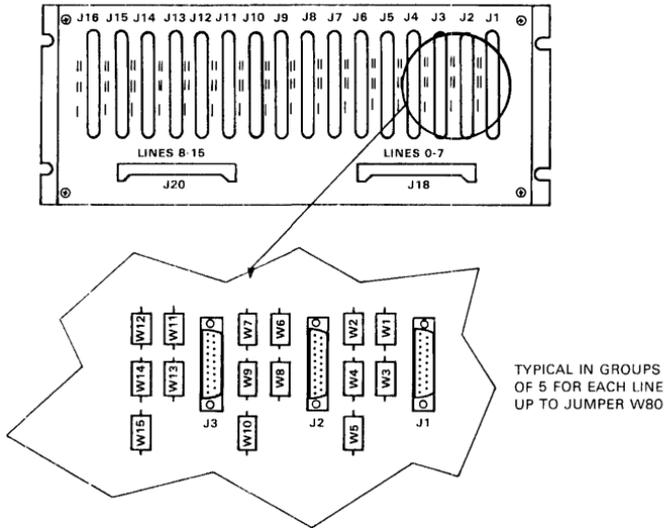
- DEVICE ADDRESS RANKS 8
- VECTOR ADDRESS RANKS 27

M7814 Switch Packs/Jumpers



DZ11 INSTALLATION

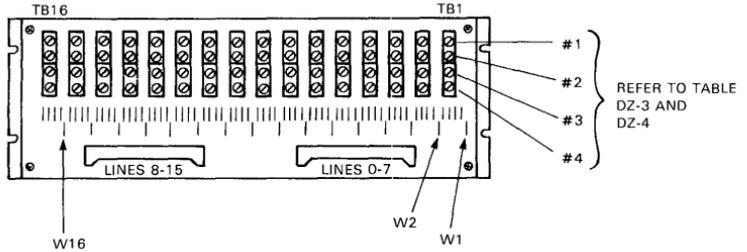
H317-E (EIA) Distribution Panel Jumper Configuration



ALL JUMPERS FOR NORMAL CONFIGURATION MUST BE INSTALLED EXCEPT FOR FORCE BUSY (W2, W7, W12, W17, W22, W27, W32, W37, W42, W47, W52, W57, W62, W67, W72 AND W77: THESE JUMPERS MUST BE REMOVED.

MK-2822

H317-F (20 mA) Distribution Panel Jumper Configuration



THE APPROPRIATE JUMPERS W1-W16 (ONE FOR EACH LINE) MUST BE INSTALLED IF THAT LINE IS OPERATING BELOW 300 B/S. JUMPER MUST BE REMOVED FOR LINES OPERATING HIGHER THAN 300 B/S

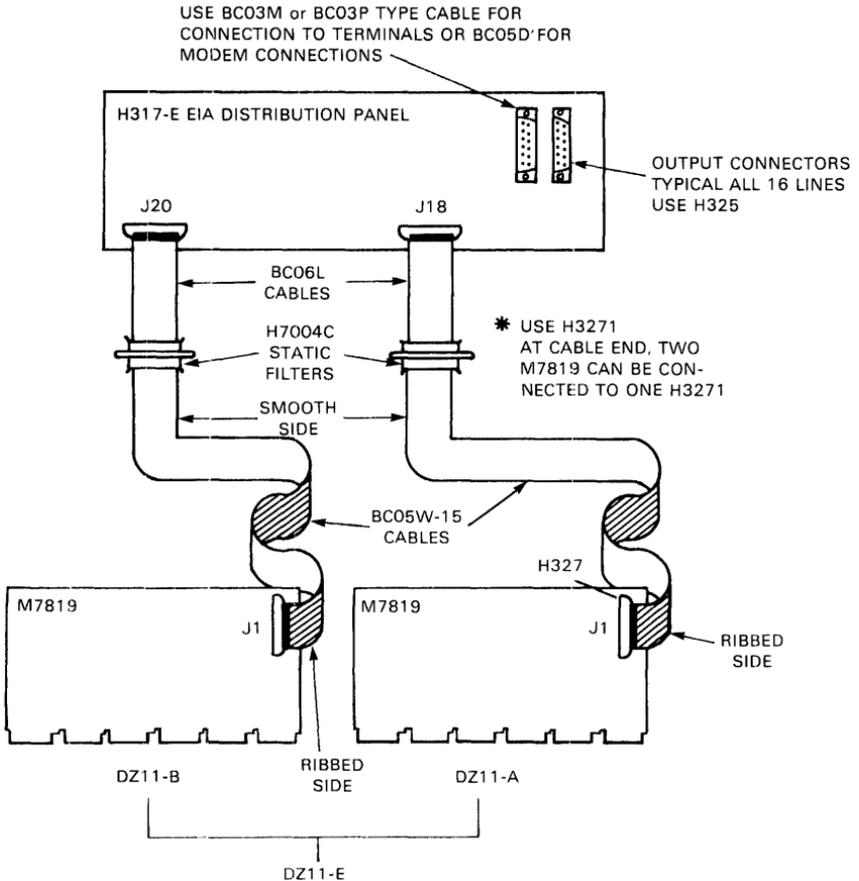
MK-2823

DZ11 CABLING

DZ11 Cabling

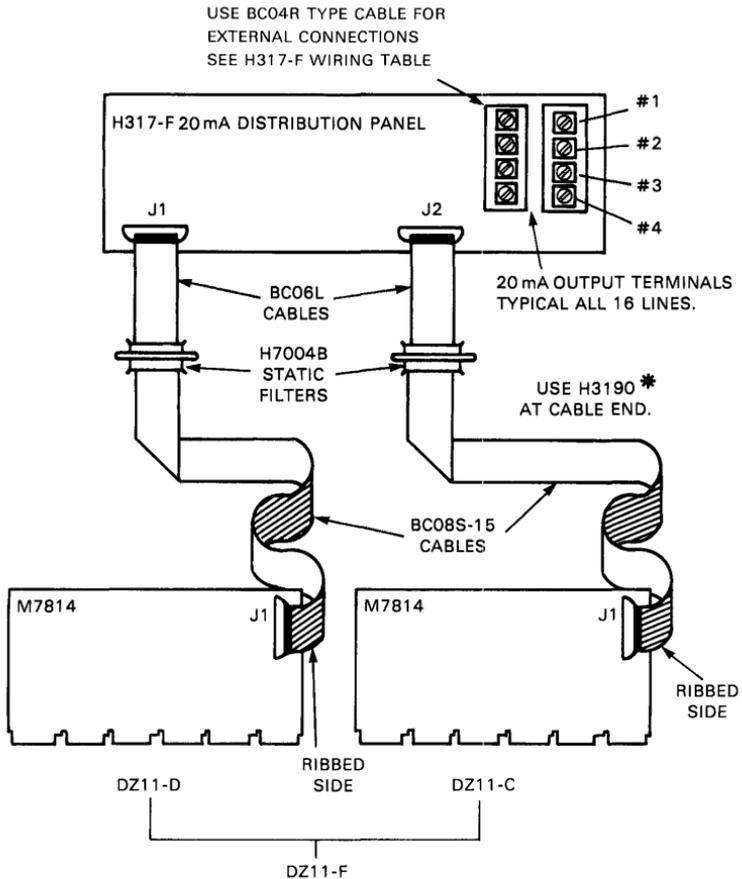
Cabling drawings for each of the DZ11 configurations are provided in this section. These drawings also identify test connector placement. For more information, refer to Chapter 3 for cables and Chapter 4 for test connectors.

DZ11-A, B, and E EIA Cabling Configuration



* WHEN CONNECTING CABLE TO H3271, BE SURE THAT RIBBED SIDE FACES OUT.

DZ11-C, D, and F 20 mA Cabling Configuration



* WHEN CONNECTING CABLE TO H3190, BE SURE THAT SMOOTH SIDE FACES OUT.

MK-2820

DZ11 CABLING

H317-F 20 mA Wiring Tables (Typical)

Examples shown: Connection to VT05, LA30, and LA36.

Table DZ-3 VT05 Wiring

Mate-N-Lok Connector Pin	VT05 Signal	BC04R Color Code	H317-F Terminal No.
5	Terminal +RCV	Black	4 (XMIT+)
2	Terminal -RCV	White	3 (XMIT-)
3	Terminal -XMIT	Green	2 (REC-)
7	Terminal +XMIT	Red	1 (REC+)

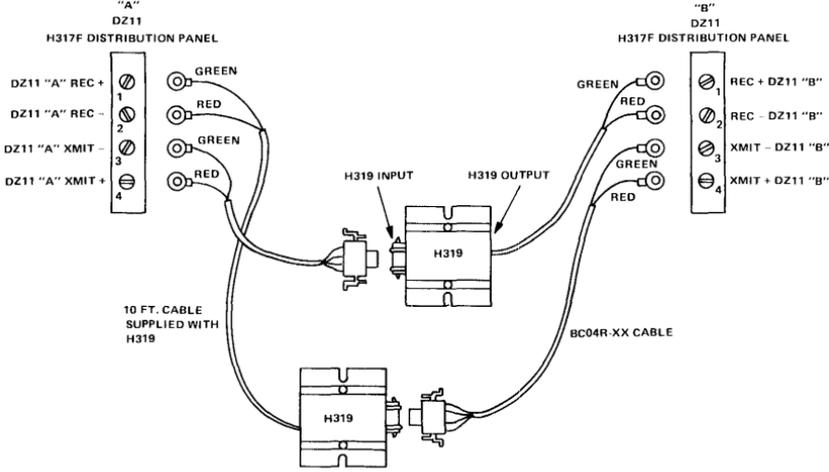
Table DZ-4 LA30, LA36 Wiring

Mate-N-Lok Connector Pin	LA30, LA36 Signal	BC04R Color Code	H317-F Terminal No.
5	Terminal +XMIT	Black	1 (REC+)
2	Terminal -XMIT	White	2 (REC-)
3	Terminal -REC	Green	3 (XMIT-)
7	Terminal + REC	Red	4 (XMIT+)

NOTE

The terminal REC signal is always connected to the H317-F XMIT terminal post and the terminal XMIT signal is always connected to the H317-F REC terminal post. Also, be sure to keep the polarity the same, plus-to-plus and minus-to-minus.

M7814 Cable Configuration with Another M7814 – When a 20 mA DZ11 is connected to another 20 mA DZ11, two H319 current loop receivers must be used.



11-5639

NOTE: THE CABLE ATTACHED TO THE H319 SHOULD HAVE THE CONNECTOR REMOVED AND RING LUGS ATTACHED TO THE RED AND GREEN LEADS AS SHOWN. THE BLACK AND WHITE LEADS IN THE H319 CABLE AND BC04R CABLE ARE NOT USED.

PDP-11/DZ11 DIAGNOSTICS

DZ11 Diagnostics

Table DZ-5 DZ11 Diagnostics

Diagnostic Function	Diagnostic Name	PDP11 Systems	VAX-11 Systems
Checks DZ11 Functional Logic	DZ11 8 Line Async Mux Tests	(D)ZDZA**	EVDAA REV**
	Terminal Functional Tests		EVTAA REV** EVTBA REV**
DZ11 Link Testing	Interprocessor Test Program (ITEP) ITEP Monitor DZ11 Overlay	(D)ZITA** (D)ZDZB**	

Running PDP-11/DZ11 Diagnostics — The following summarizes running DZ11 diagnostics.

Start program:

- At address 000200 for normal testing, or
- At address 000210 for ECHO/CABLE testing.

Set Switch Registers:

For 000200

- SW0 = 0 Auto Size
- SW0 = 1 Initial start (manual input)
- SW7 = 1 No auto size (uses previous parameters)

For 000210

- SW0=1 Manual input
- SW1=1 Invokes ECHO/CABLE parameters

If program is started at address 200 with SW0 = 1, the program prints the diagnostic name, followed by the parameter functions, and then the status map.

Example of DZ11 Status Map

```
1500 160100 = CSR Address
1502 000300 = Vector Address
1504 000005 = Priority Level
1506 000377 = Lines Being Tested
1510 017470 = Line Parameter Data
1512 000000 = Turnaround Mode
      000000 = Internal
      000200 = External
      100000 = Staggered
```

Table DZ-6 Typical PDP-11/DZ11 Diagnostic Parameters for Normal Testing (000200)

Parameter	Description
"1st CSR ADDRESS (160000:163700):"	Enter CSR address where testing is to start followed by <CR>.
"1st VECTOR ADDRESS (300:770):"	Enter Vector address <CR>.
"BR LEVEL (4:7):"	Enter the correct priority level for the device being tested <CR>.
"TYPE "A" FOR EIA MODULE OR "B" FOR 20 MA (A:B):"	Enter A for DZ11-A, B, or E or B for DZ11-C, D, or F <CR>. Entering <CR> only defaults to EIA selection.
"MAINTENANCE MODE [EXTERNAL <H325> - EIA ONLY (E)] [INTERNAL <DZCSR03=1> (I)] [STAGGRED <H32717-EIA ONLY (S)] [STAGGERED <H3190> - 20 MA ONLY (S)]:"	Enter E, I, or S depending on which mode is desired <CR>.
"# OF DZ11s <IN OCTAL> (1:20):"	Enter total number of DZ11's to be tested <CR>.

Table DZ-7 Typical PDP11/DZ11 Diagnostic Parameters for ECHO/CABLE Testing (000210)

Parameters	Description
"VECTOR ADDRESS"	Enter correct vector address followed by <CR>.
"CONTROL REGISTER ADDRESS"	Enter device address <CR>.
"WHICH TEST? ECHO OR CABLE (E OR C)"	Enter desired selection <CR>.
"BAUD RATE"	NOTE
	Cable test (C) is only valid on EIA version. Enter the correct rate <CR>.

PDP-11/DZ11 DIAGNOSTICS

Table DZ-7 Typical PDP-11/DZ11 Diagnostic Parameters for ECHO/CABLE Testing (000210) (Cont)

Parameters	Description
<p>“LINE:”</p> <p>If CABLE test is selected, the program prints:</p> <p>“CABLE TEST”</p>	<p>Enter the line number with the H325 connector installed for CABLE test or the line number to which the terminal is connected for ECHO test <CR>.</p> <p style="text-align: center;">NOTE</p> <p>Only one line can be entered at one time.</p> <p>If the selected line is working correctly, the program will print:</p> <p>“PASS DONE,”</p> <p>To change lines, press any printable key at the console terminal, the program returns to the “LINE” prompt. Change H325 test connector to new line, enter new line number followed by <CR>. Cable test will continue. Repeat for all lines.</p>
<p>If echo test is selected, the program prints:</p> <p>“TERMINAL ECHO TEST”</p> <p>If the SWR is not set to 377, the program prints the following prompt:</p>	<p>The program then prints “THE QUICK BROWN FOX JUMPED OVER THE LAZY DOGS BACK 0123456789” on the test terminal connected to the test line. For continuous transmission of this message, set SWR to 377 while the message is being transmitted or at the LINE prompt level.</p>

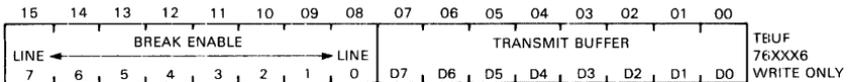
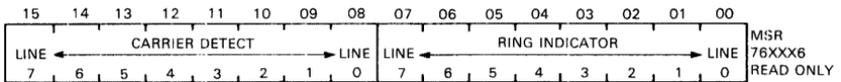
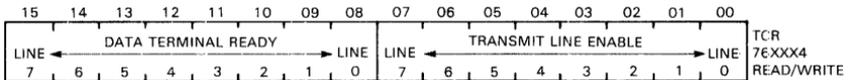
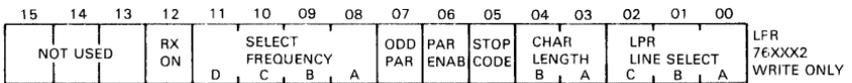
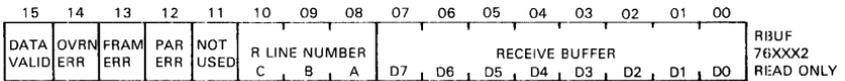
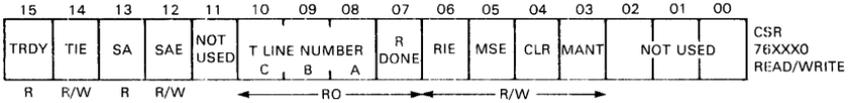
Table DZ-7 Typical PDP-11/DZ11 Diagnostic Parameters for ECHO/CABLE Testing (000210) (Cont)

Parameters	Description
"TYPE A CHAR. ON DZ11 TERMINAL"	Enter any printable key at the test terminal. All characters entered at the test terminal should be ECHOED back to the test terminal. Typing a CONTROL C at the test terminal causes the program to print "PASS DONE". The test message "THE QUICK BROWN ..." will then be sent. Typing any printable key at the CONSOLE terminal returns the program to the "LINE" prompt level.

DZ11 MAINTENANCE AIDS

DZ11 Register Bit Assignments

Register bit assignments for the DZ11 are shown below.



MK-1851

DZ11 Tech-Tips/FCO Index

Table DZ-8 DZ11 Tech-Tip Index

Tech Tip No.	Title	Speed Bulletin No.
1	DZ11 – (EIA) on a 103J or 113 Modem	N/A
2	DZ11 in Comm IOP Systems	N/A
3	20 mA Distribution Panel Connections	N/A
4	DZ11 Installation Notes	N/A

Table DZ-9 DZ11 FCO History Chart

Option/Module	FCO No.	Date	Reason	Quick Check
M7819	R0002	NOV 76	Detect DATIP and prevent the RD REC BUFF from a character	E84 is 74LS32
M7814	R0001	JUN 78	Race condition between TRDY and transmit select lines	R162 = 100 ohm and C67 = 470 pF ADD'ed at E88 pin 6
DZ11	R0004	AUG 78	Prevent cable abrasion	Cable protector on back of module
M7819	R0004	SEP 78	Character transmitted on wrong line	C123 470 pF ADD'ed between feed thru below and to the right of E96 pin 7 and E85 pin 7

DZ32 OPTION

To be supplied. Preparation of this material is planned for the near future.

CHAPTER 3 CABLES

3.1 GENERAL

This chapter contains an outline drawing of each of the cables needed to configure any of the device options contained in this manual.

The following Where Used cross reference chart quickly identifies which cables are used with each option.

Cables are placed in alphanumeric order for easy reference.

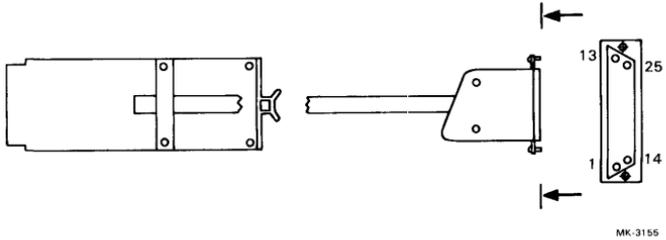
Table 3-1 Communication Options Cable (Where Used) Chart

CABLES	OPTIONS																	
	DH11	DL1E	DL1W	DLV11	DMC11V	DMP11	DMR11	DMV11	DPV11	DQ11	DUI11	DUPII	DUVII	DVII	DZ11	DZ11-X	DZ32	DZVII
BC01R-XX	X								X									
BC01W-XX									X	X								
BC02C-XX											X							
BC02D-XX											X							
BC03M-XX					X								X		X	X		
BC03N-XX				X		X												
BC03P-XX													X				X	
BC04R-XX													X					
BC05C-XX	X	X	X	X	X				X	X	X	X						
BC05D-XX	X				X	X	X	X					X	X		X		
BC05M-XX			X															
BC05W-XX													X		X			
BC05Z-XX				X	X	X	X											
BC06K-XX													X					
BC06L-XX													X					
BC08R-XX	X												X					
BC08S-XX	X												X					
BC08S-1				X	X	X	X		X									
BC11U-XX																		X
BC20R-XX															X			
BC20S-XX															X			
BC26L-XX								X										
BC55A-XX					X	X	X											
BC55B-XX					X	X	X											
BC55C-XX					X	X	X											
BC55D-XX					X	X	X											
BC55F							X											
BC55H							X											
BC55M-XX				X	X	X	X											
BC55N-XX				X	X	X	X											
7008360		X	X															
7008423	X																	
7008519		X	X															
7016428															X			
7018209								X										

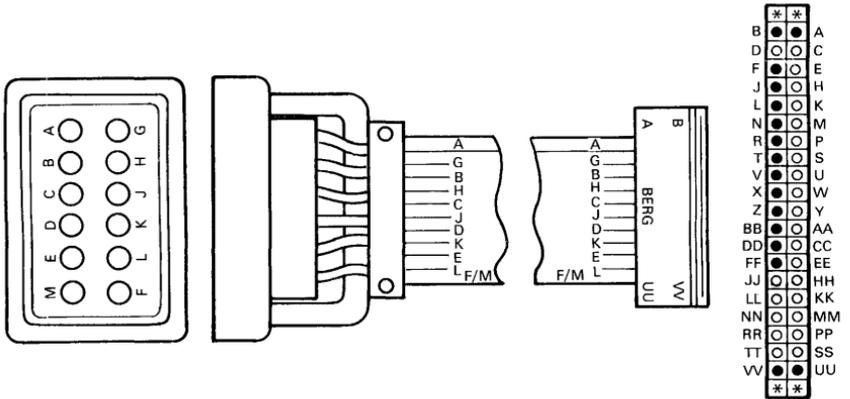
BC01R

M970 CONNECTOR

RS232
MALE CONNECTOR



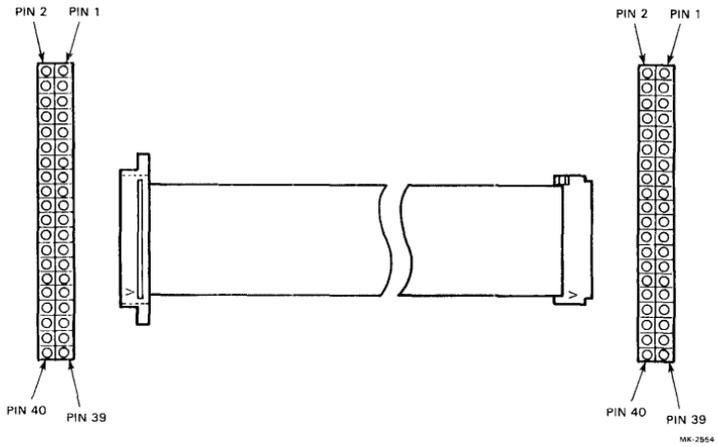
BC01W



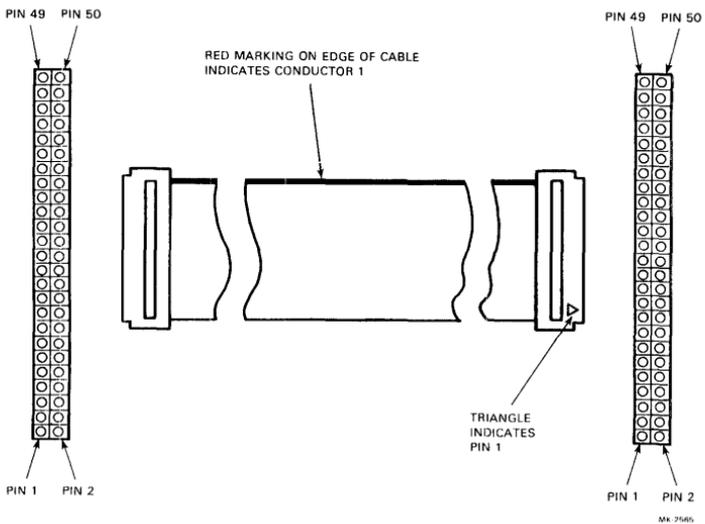
* INDICATES CAVITIES
ARE NOT USED

MK-2549

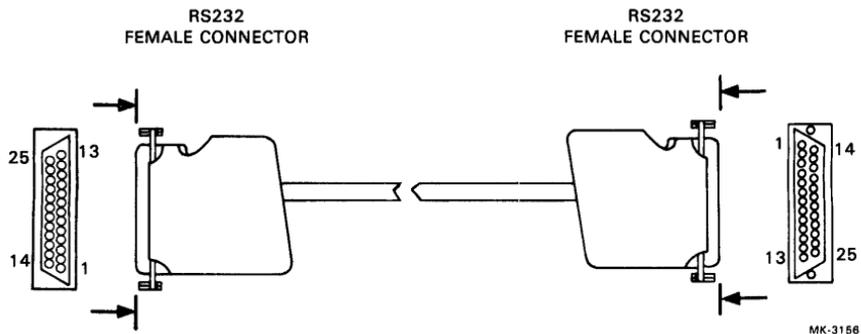
BC02C



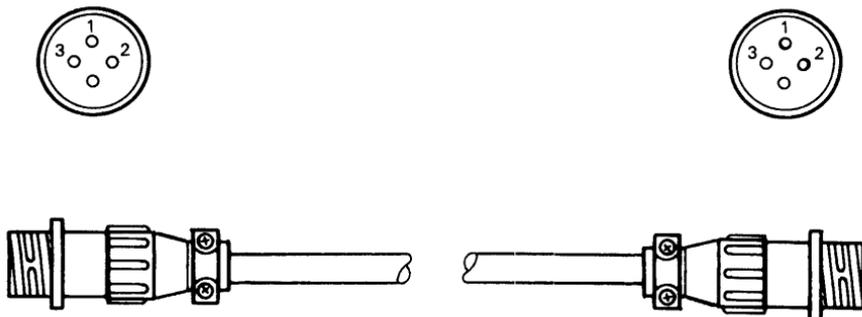
BC02D



BC03M



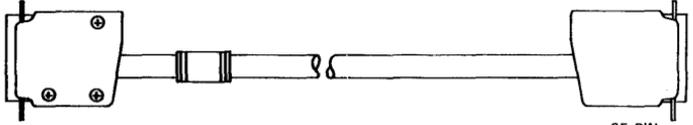
BC03N



BC05D



25 PIN
CINCH



BC05D-25 (RS-232-C INTERFACE) MODEM CABLE

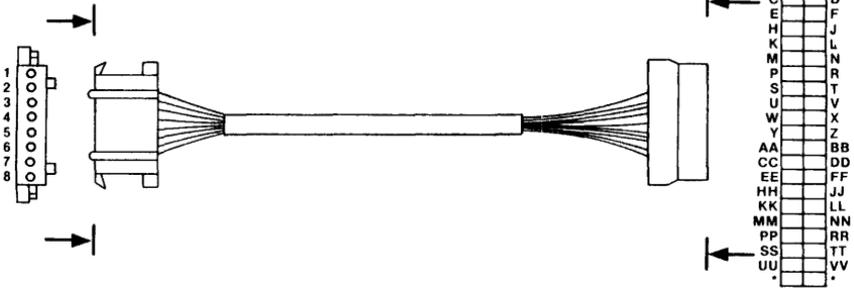
25 PIN
CINCH

MK-2139

BC05M

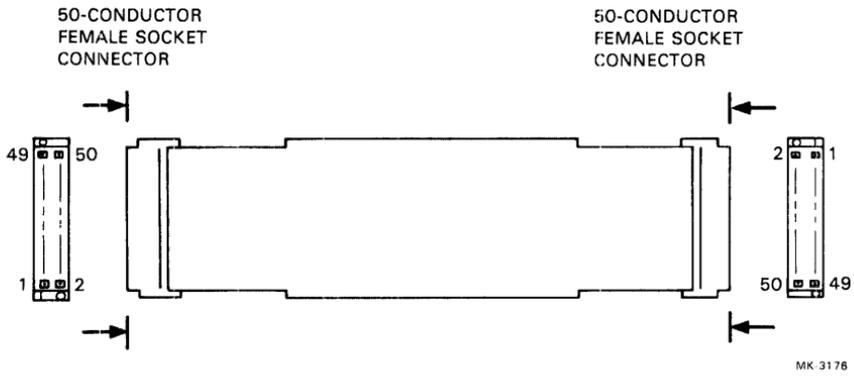
MATE-N-LOK
CONNECTOR

H856 CONNECTOR

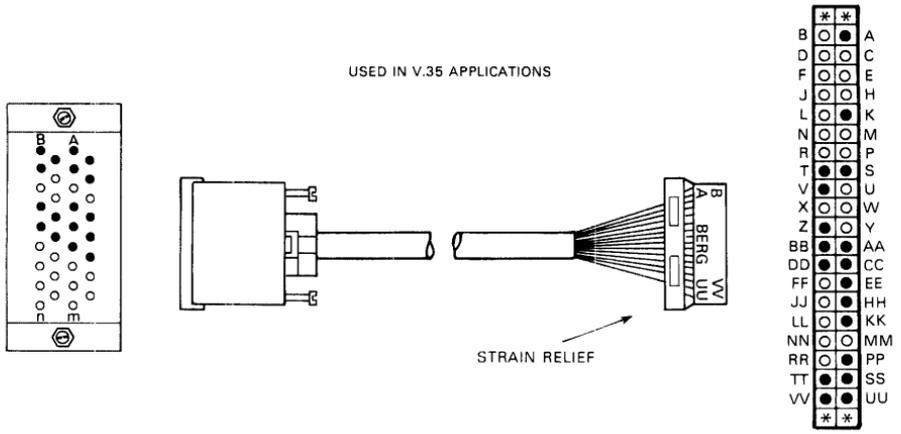


MK-3177

BC05W



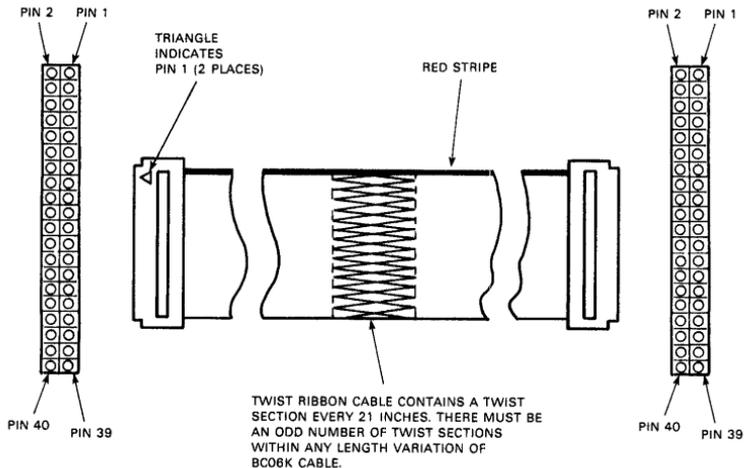
BC05Z



* INDICATES CAVITIES USED TO MOUNT STRAIN RELIEF

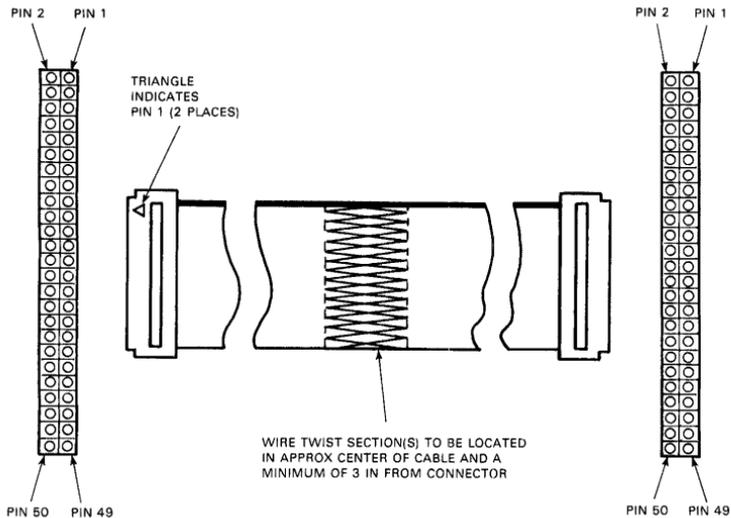
MK-2550

BC06K



MK-2867

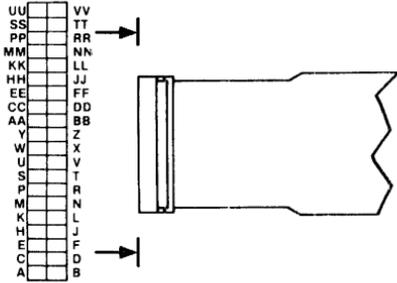
BC06L



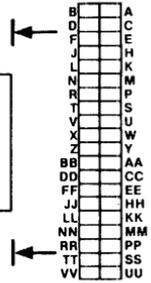
MK-2568

BC08R

H856 CONNECTOR



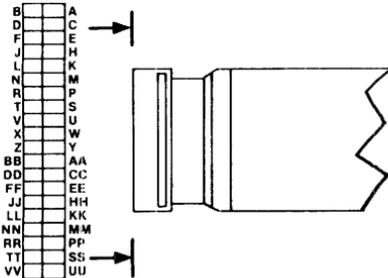
H856 CONNECTOR



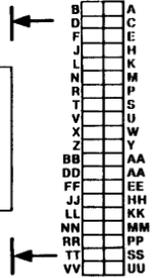
MK-3159

BC08S

40-PIN SOCKET

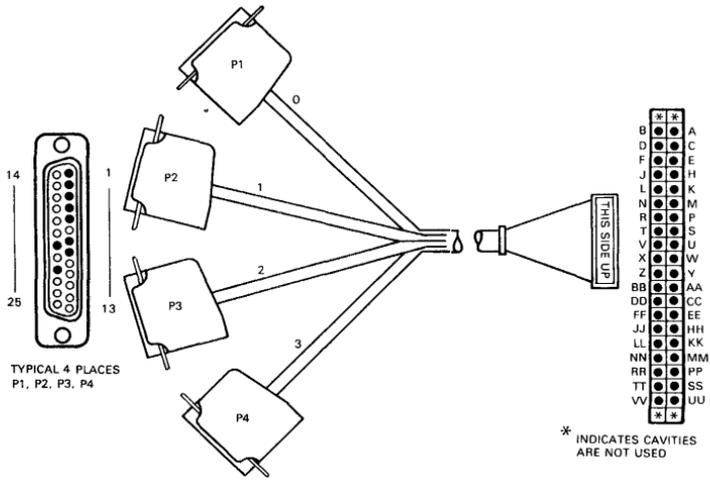


40-PIN SOCKET



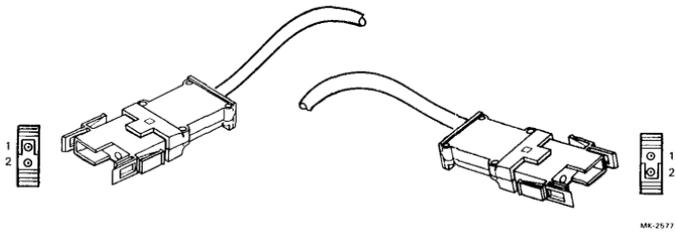
MK-3158

BC11U



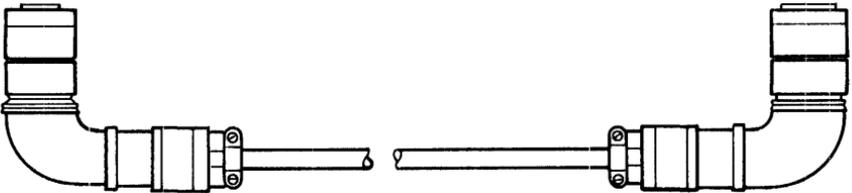
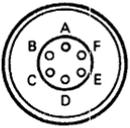
MK-2552

BC20R



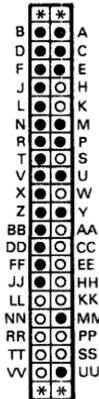
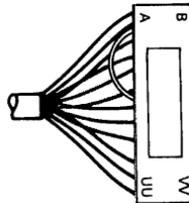
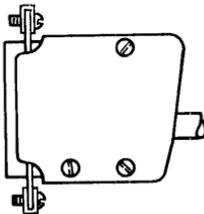
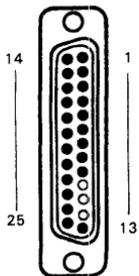
MK-2577

BC20S



MK-2870

BC26L

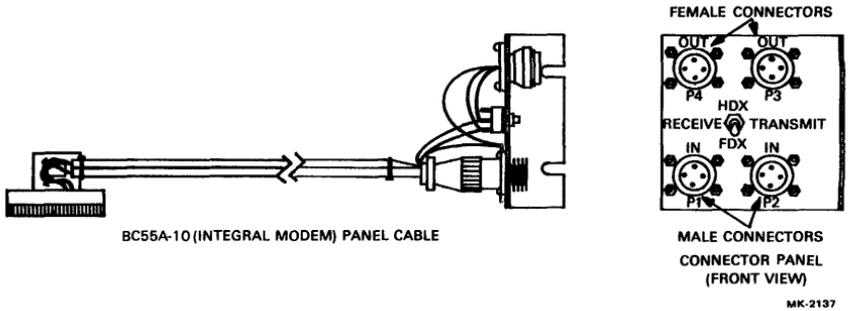


* INDICATES CAVITIES ARE NOT USED

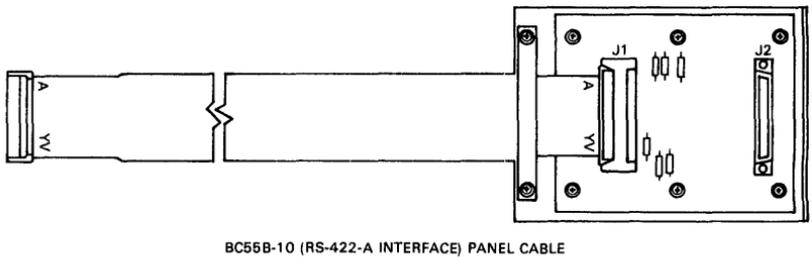
MK-2851

BC55A

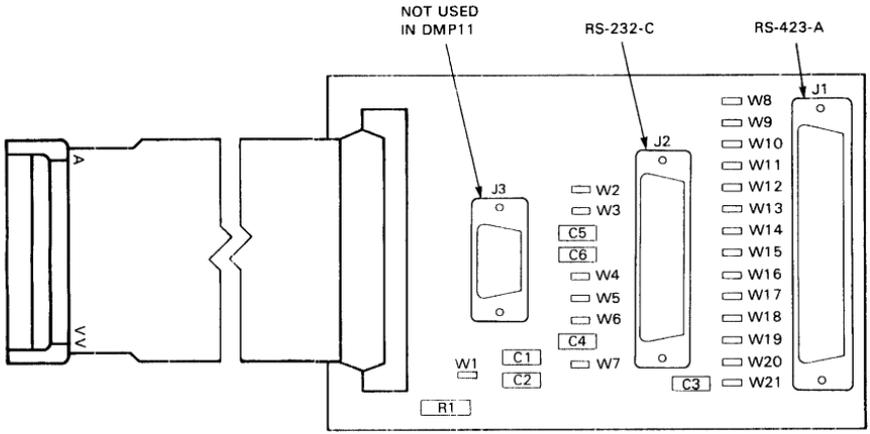
Appropriate terminator connectors H3257 or H3258 must be used.



BC55B



BC55C



BC55C-10(RS-232-C/RS-423-A) INTERFACE PANEL CABLE

MK-1571

BC55C

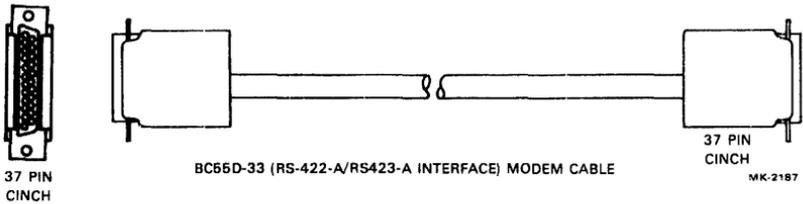
Table 3-2 Modem Option Jumper Functions

J2 Pin	Jumper	RS-232C	Bell 208B	Bell 209	Data 2400	Data 4800	CCITT V.23	CCITT V.26 BIS	CCITT V.27 TER	ISO 2110-1972 Future D	EIA RS-232	EIA RS-449	CCITT V.24
1	W1	IN	IN	IN	IN	IN				IN	AA		101
	W7												
2											BA	SD	103
3											BB	RD	104
4	W19	IN	IN	IN	IN	IN	IN	IN	IN		CA	RS	105
5											CB	CS	106
6											CC	DM	107
7											AB	SG	102
8											CF	RR	109
9													
10													
11	W14								IN†			SF	126
12	W3	IN			IN	IN	IN	IN	IN		SCF	SRR	122
13	W2	IN			IN		IN	IN	IN		SCB	SCS	121
14	W6	IN			IN	IN	IN	IN	IN		SBA	SSD	110
15	W20	IN	IN	IN	IN	IN	IN	IN	IN		DB	ST	114
16	W5	IN			IN	IN	IN	IN	IN		SBB	SRD	119
17	W18	IN	IN	IN	IN	IN	IN	IN	IN		DD	RT	115
18	W17											LL	141
19	W4	IN			IN	IN	IN	IN	IN		SCA	SRS	120
20											CD	TR	108
21	W16	IN		IN							CG	SQ	110
	W13											RL	140
22											CE	IC	125
23	W21	IN*			IN	IN	IN	IN	IN		CH	SR	111
	W12	*									CI	SF	112
24	W15				IN							SS	116
	W10	IN	IN	IN	IN		IN	IN			DA	TT	113
25	W11				IN							SB	117
	W9											TM	142
	W8												Make Busy

*RS-232-C defines both signals for this pin

† CCITT modem A only

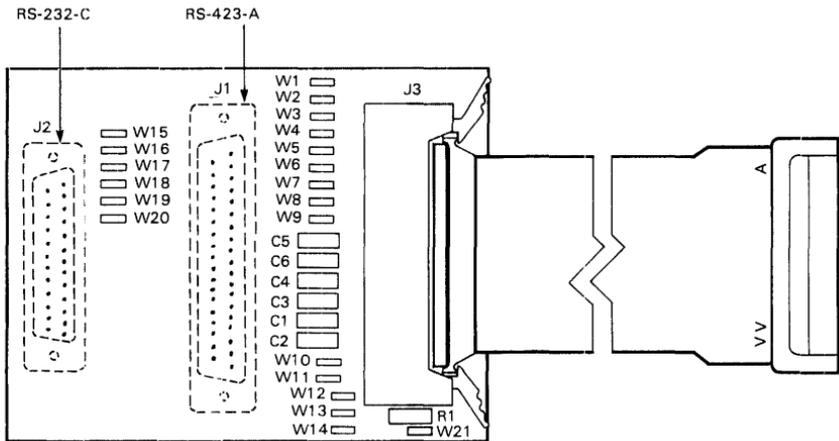
BC55D



BC55H

NOTE

The BC55F cable is very similar to the BC55A. The only difference is in the connector panel configuration (see BC55A).



BC55H-3 (RS-232-C/RS-423-A) INTERFACE PANEL CABLE

MK-2666

BC55H

Table 3-3 BC55H Modem Option Jumper Functions

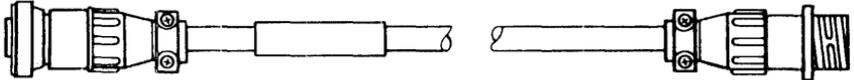
W2 PIN	JUMPER	RS-232-C	BELL 103J	BELL 208B	BELL 209	DATTEL 200	DATTEL 800	DATTEL 2400	DATTEL 4800	CCITT V.21	CCITT V.23	CCITT V.26B	CCITT V.27T	ISD2110-1972	ISD2110.2	ISD3110.2	EIA RS-232-C	EIA RS-449	CCITT V.24	FUTURE D	X.21 BIS	X.20 BIS		
23	W1	IN				IN	IN	IN		IN	IN	IN	IN	IN			CH	SR	111					
21	W2	IN															CG	SQ	110					
11	W3				IN									IN				CI	SF	112				
23	W4									IN														
16	W5	IN					IN	IN	IN		IN	IN	IN	IN	IN	IN	SBB	SRD	119					
14	W6	IN					IN	IN	IN		IN	IN	IN	IN	IN	IN	SBA	SSD	118					
12	W7	IN					IN	IN	IN		IN	IN	IN	IN	IN	IN	SCF	SRR	122					
21	W8								IN						IN	IN		RL	140					
4	W9	IN	IN	IN	IN	IN	IN	IN	IN	IN	IN	IN	IN	IN	IN	IN	CA	RS	105					
15	W10	IN	IN	IN				IN	IN		IN	IN	IN	IN	IN	IN	DB	ST	114					
17	W11	IN	IN	IN				IN	IN		IN	IN	IN	IN	IN	IN	DD	RT	115					
18	W12									IN					IN	IN		LL	141					
19	W13	IN					IN	IN	IN		IN	IN	IN	IN	IN	IN	SCA	SRS	121					
	W14									NOT NORMALLY INSTALLED														
25	W15									IN					IN	IN			TM	142				
24	W16	IN	IN	IN					IN			IN	IN		IN	IN	DA	TT	113					
25	W17							IN										SB	117					
24	W18							IN										SS	116					
13	W19	IN					IN	IN	IN		IN	IN	IN	IN	IN	IN	SCB	SCS	121					
25	W20																	MAKE BUSY						
1	W21	IN	IN	IN	IN	IN	IN	IN	IN					IN			AA	101						
2																	BA	SD	103					
3																	BB	RD	104					
5																	CB	CS	106					
6																	CC	DM	107					
7																	AB	SG	102					
8																	CF	RR	109					
20																	CD	TR	108					
22																	CE	IC	125					

MK-2725

BC55M

Cable is used for the same purpose as the BC55N, but for data rates above 56K b/s.

USES: BELDEN 8232 – UP TO 4.3 KM (14K FEET)*
BELDEN 8233 – UP TO 6.0 KM (18K FEET)*



BC55M TRIAX CABLE

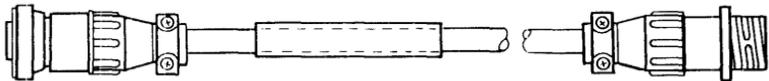
*MAXIMUM DISTANCE IS DEPENDENT ON SPEED.
REFER TO M8203 TECHNICAL MANUAL, EK-M8203-TM FOR DETAILS.

MK-3605

BC55N

Cable is used to interconnect local (integral) configurations for a selected data rate of 56K b/s.

USES: BELDEN 9272



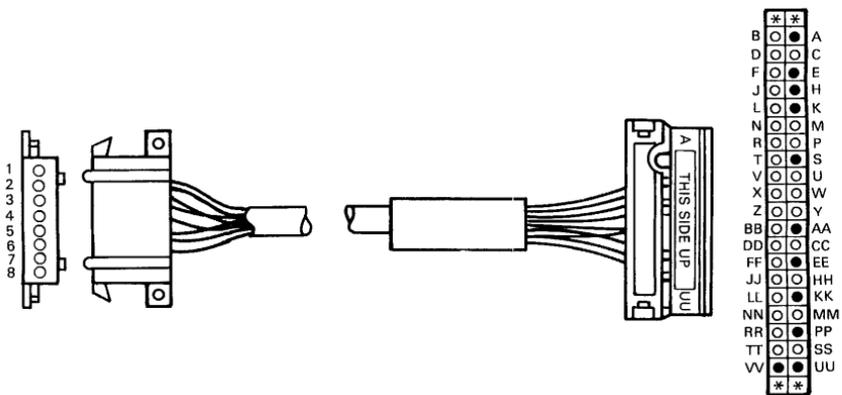
BC55N TWINAX CABLE

MK-3606

Recommended connector hardware for building BC55 type cables in excess of 30 m (98 feet):

Component	DIGITAL Part Number	AMP Part No.
Small cable clamp	12-11430-00	206062-1
Large cable clamp	12-11430-01	206358-1
Male housing	12-12527	206153-1
Male pin	12-12001	66589-2
Female housing	12-12526	206060-1
Female pin	12-12000	66590-2
14 ga male pin	12-12001-1	66587-2

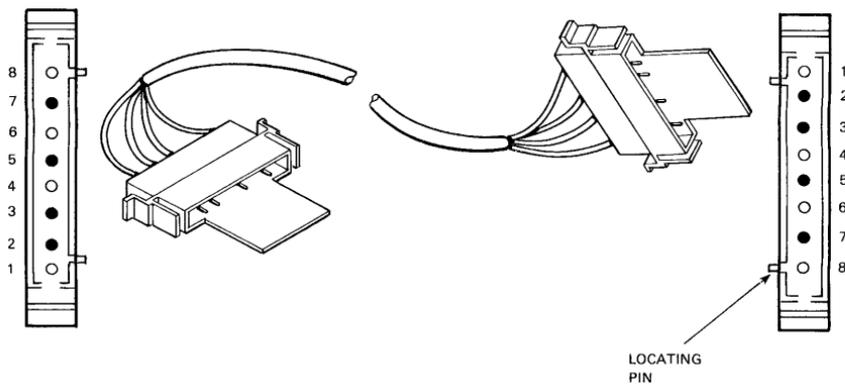
7008360



* INDICATES CAVITIES ARE NOT USED

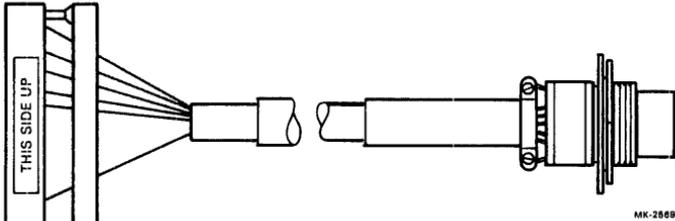
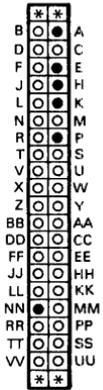
MK-2583

7008519



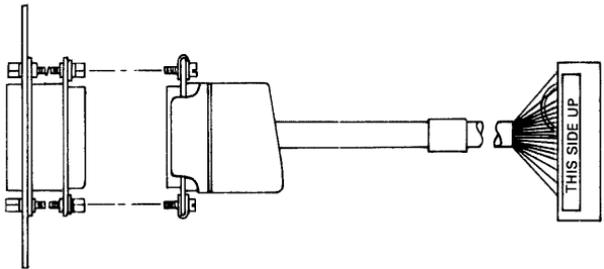
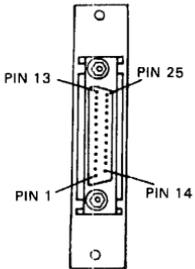
MK-2573

7016428



* INDICATES CAVITIES ARE USED TO MOUNT STRAIN RELIEF

7018209



MK-2807

CHAPTER 4 TEST CONNECTORS AND TERMINATORS

4.1 GENERAL

This chapter contains outline drawings and turnaround signal flow diagrams of each of the test connectors needed to test any of the device options contained in this manual. The following Where Used cross reference chart quickly identifies which test connector (or terminator) is used with each device option.

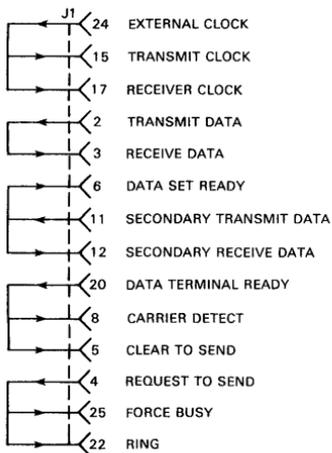
Test connectors are included in this chapter in alphanumeric order for easy reference. Note that some of these test connectors are used in more than one application.

Table 4-1 Communication Options Test Connectors/Terminators (Where Used) Chart

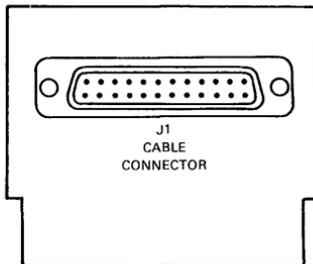
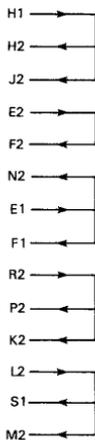
CONNECTORS	OPTIONS	DL11	DL11E	DL11W	DLV11	DMC11	DMP11	DMR11	DMV11	DPV11	DQ11	DU11	DUPT11	DUV11	DV11	DZ11	DZ11-X	DZ32	DZV11
		H315		X	X	X	X					X	X		X				
H325						X	X	X	X	X		X		X	X				X
H327															X				
H329																			X
H861C		X												X					
H3190															X				
H3250						X	X	X	X										
H3251						X	X	X											
H3254						X	X	X											
H3255						X	X	X											
H3259										X									X
H3260										X									
H3271															X	X			
H3272																			X
H3273																			X
H3274																			X
H8611		X																	
H8612														X					
M974		X																	
12-12528						X													
TERMINATORS																			
H3257						X	X	X											
H3258						X	X	X											

H315

CABLE
CONNECTOR



BACKPLANE
CONNECTOR

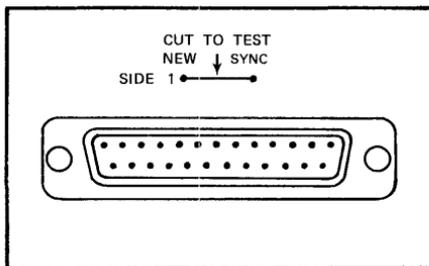
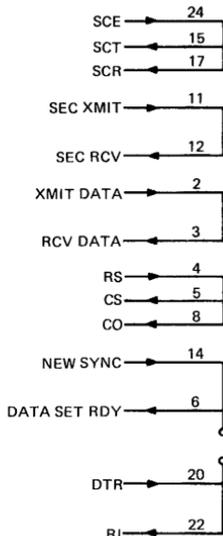


BACKPLANE
CONNECTOR

MK-2529

H325

H325

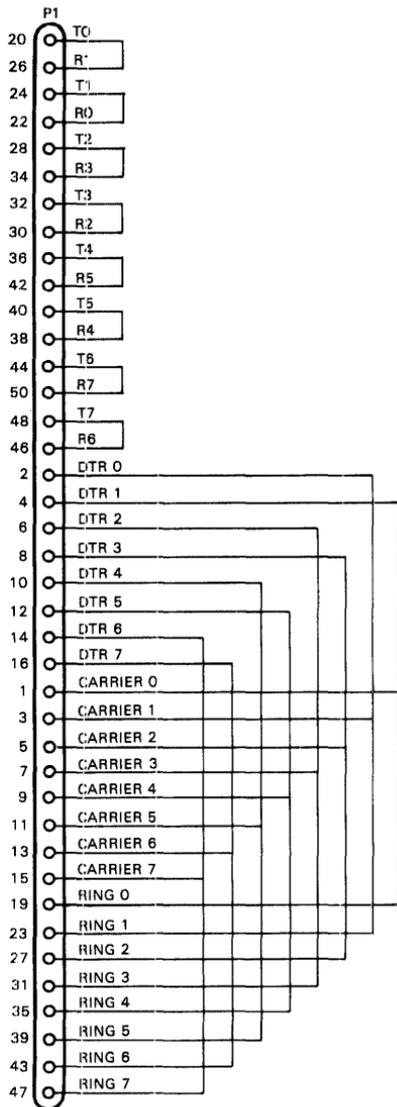
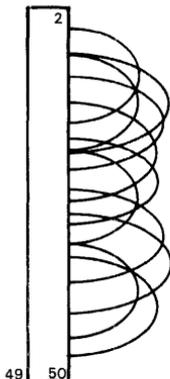
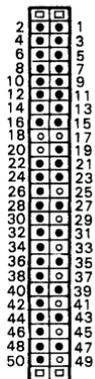


H325

VIEW E

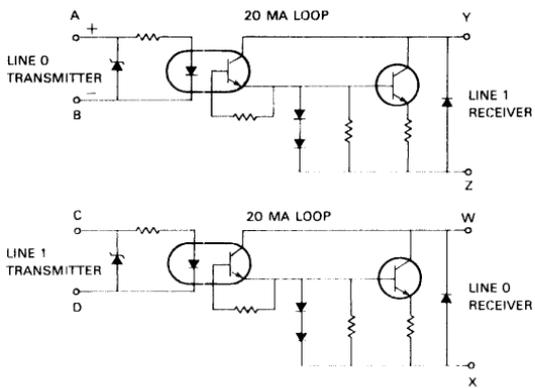
MK-2124

H327

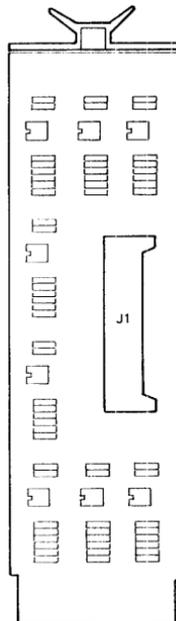


MK-2632

H3190

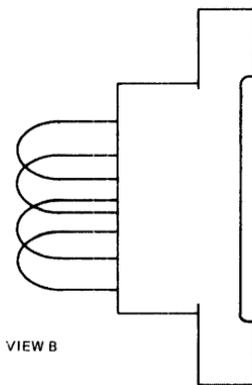
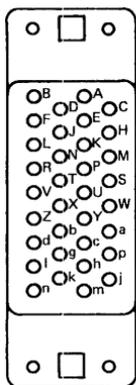


LINES 2&3, 4&5 AND 6&7 ARE STAGGERED THE SAME WAY



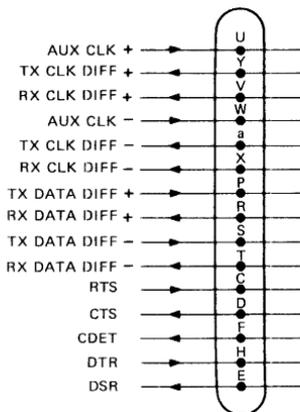
MK-254/

H3250



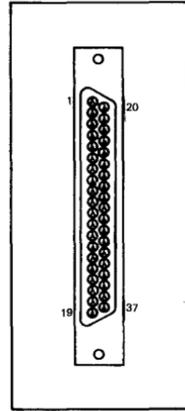
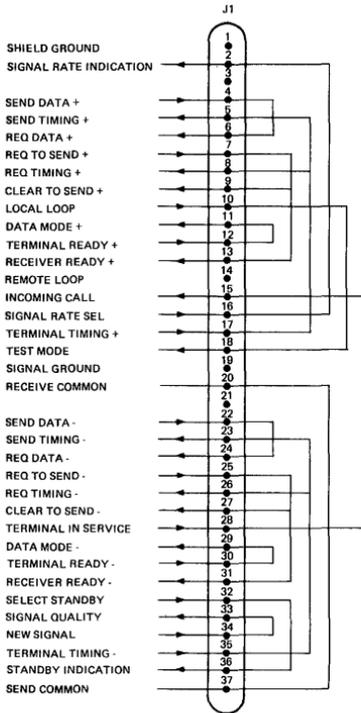
VIEW B

H3250



MK-2123

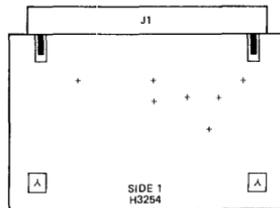
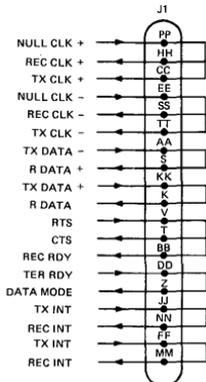
H3251



H3251

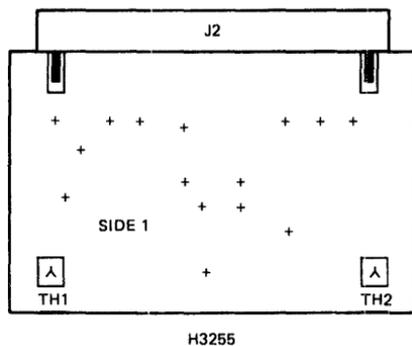
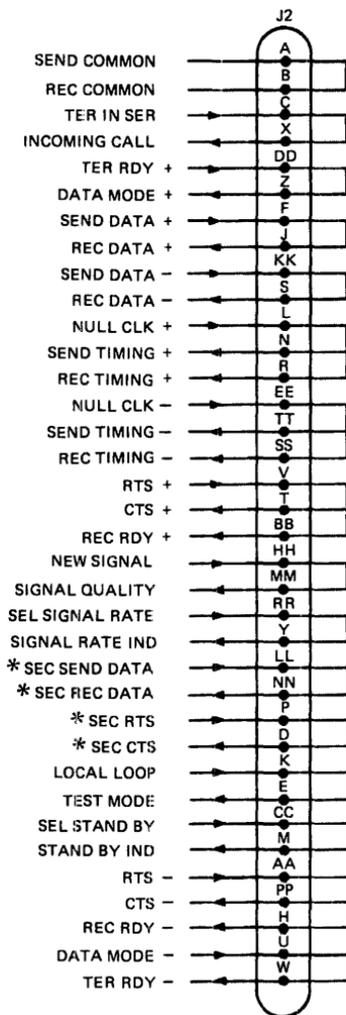
MK 2121

H3254



MK 2143

H3255

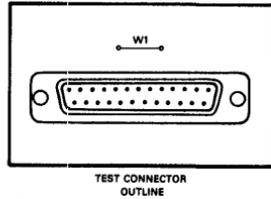
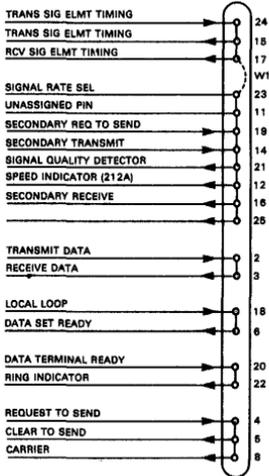


* NOT REQUIRED FOR DMP11

MK-2122

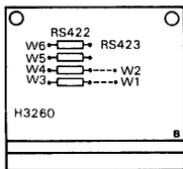
H3259

SIGNAL FLOW

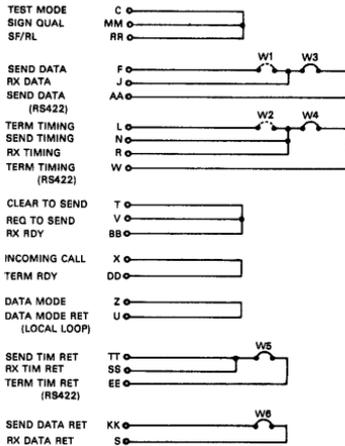


MO-1833

H3260

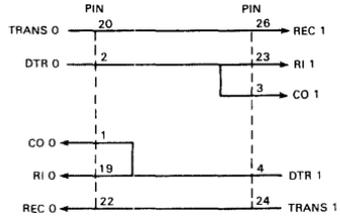
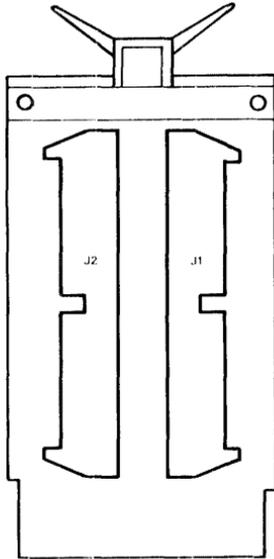


NOTE: 1. W1 & W2 IN } RS-423-A TESTING
 W3-W6 OUT
 2. W1 & W2 OUT } RS-422-A TESTING
 W3-W6 IN



MO-1484

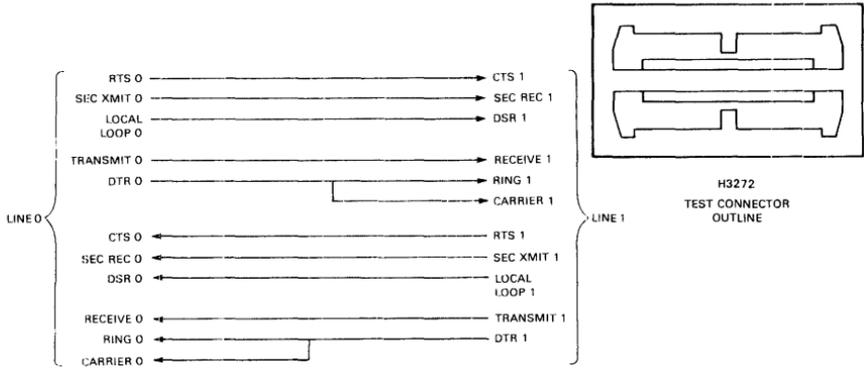
H3271



NOTE
LINES 2 & 3, 4 & 5 AND 6 & 7 ARE
STAGGERED THE SAME WAY

MX 2548

H3272

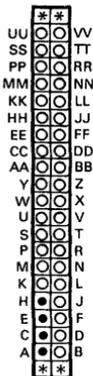


NOTE: LINES 2 & 3, 4 & 5, 6 & 7 ARE STAGGERED IN THE SAME WAY.

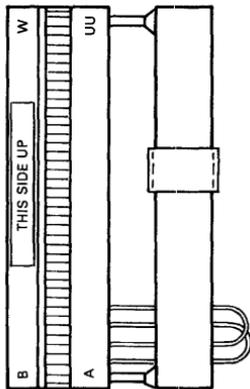
SIGNAL FLOW

MX 1924

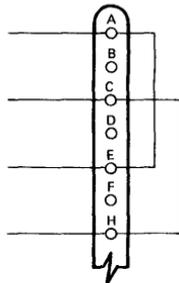
H3273



* INDICATE CAVITIES USED TO MOUNT STRAIN RELIEF

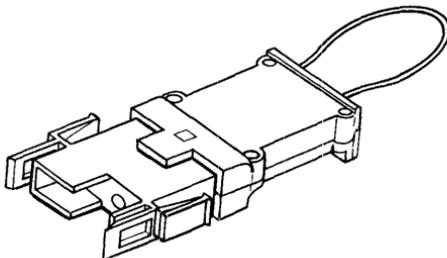


STRAIN RELIEF

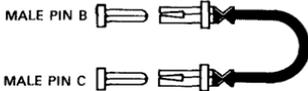


MK-2642

H3274

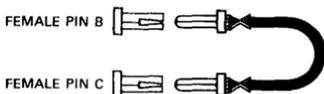


70-17028



- 1 70-17028-00 IS INSTALLED ONTO PINS B AND C OF THE MIL188 I/O CONNECTOR ON THE VT100 XA OR XB
- 2 ALSO INSTALLED ONTO PINS B AND C OF 70-16428 CABLE

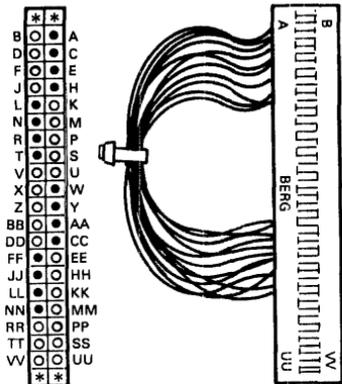
70-17029



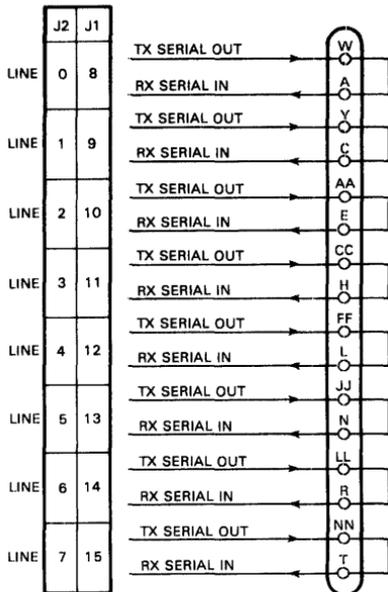
70-17029-0-0 IS INSTALLED INTO PINS B AND C OF THE BC20S CABLE

MK-2674

H8611

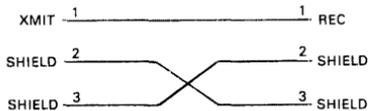
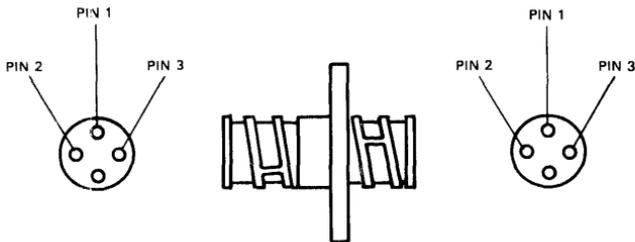


* INDICATES CAVITIES ARE NOT USED



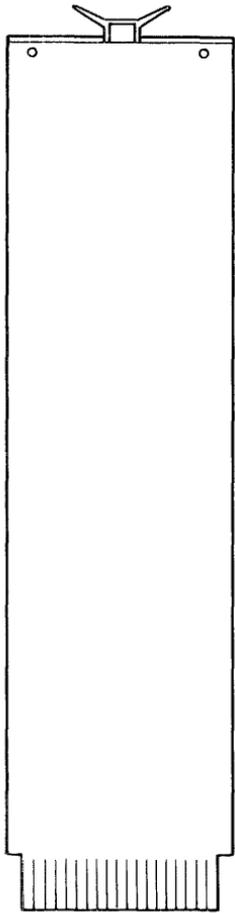
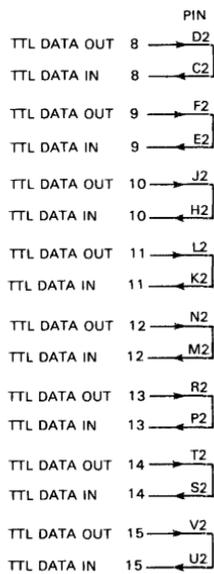
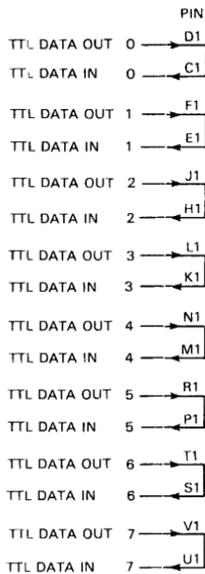
MK-2544

12-12528



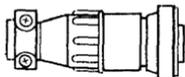
MK-2543

M974

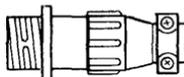


H3257/H3258

MK 2531



H3258
TERMINATOR



H3257
TERMINATOR

MK 2244

5.1 INTRODUCTION

This section includes a brief description of the diagnostic packages that typically test inter-system communication links such as the Data Communications Link Test (DCLT) and the Interprocessor Test Program (ITEP).

Both DCLT and ITEP contain special expanded command features which are device dependent (for example, printing the base table under DMR/DCLT). Other variations in features and functionality (such as the HELP files for each specific DCLT) are also device dependent.

5.2 DATA COMMUNICATIONS LINK TEST (DCLT)

DCLT programs provide Field Service personnel with a tool to verify communications links for many of the options contained in this mini reference manual. DCLT programs also provide the coverage necessary to isolate faults in the following areas:

- Communications interface program functionality,
- Communication modem,
- Communication cabling and installation, and
- Physical link/network.

DCLT programs allow testing between nodes with different hardware interfaces implementing the same or compatible protocol. The DCLT program can be exercised under normal maintenance loopback tests:

- Internal TTL loopback,
- Hardware loopbacks:
 - module test connectors, or
 - cable test connectors,
- Manual controlled local modem analog and digital loopback functions (full-duplex mode),
- Programmable controlled local modem analog loopback (RS-449 only and full-duplex mode), or
- Programmable controlled remote modem digital loopback (full-duplex mode).

5.2.1 Hierarchy Prerequisites

Before using DCLT to test the communications link it is important to verify that the CPU's line clocks are operational. In addition, it is important to verify that the devices at each end of the link have previously been tested by device specific diagnostics and found to be in working order.

Prior to analyzing any data, the user should have a thorough understanding of the protocol formats applicable to the system under test.

5.2.2 System Requirements

To run the DCLT program, the following minimum hardware/software is required:

- PDP-11 or VAX-11 CPU,
- Minimum memory requirements:
 - 28K words for PDP-11 systems,
 - 256K bytes for VAX-11 systems,
- Any supported XXDP+ load media,
- A working line or real-time clock,
- Diagnostic supervisor, and
- A communications device to test.

5.2.3 Program Structure

The DCLT program is written to be used with the diagnostic supervisor. Some communications options are supported by a DCLT program designed to test the communications link for that option. For each individual program, hardware and/or software P (Parameters) Tables are available to establish certain conditions. All DCLT programs use a command line interpreter (CLI) that may utilize any one of three DCLT command types:

- Run Commands – (detailed in Tables 5-1 and 5-2),
- Message Commands – (detailed in Table 5-3), or
- Statistical/Utility Commands – (detailed in Table 5-4).

Any DCLT command may be followed by its associated switch and/or qualifier. In the event of an illegal command, the program will output an error message to the console.

Six sequential subroutines are normally performed during the normal DCLT run command operation:

- Device Initialization,
- Mode Set-Up (set FLAG word),
- Receive Buffer QUE/START,
- Transmit Buffer Que/START,

- Data Comparison (only if data check has been enabled), and
- Program PASS Completion.

Along with these six subroutines the DCLT program can also perform special routines which may be device specific:

- DCLT down-line load test (only if supported by the device being tested), and
- Talk/Listen Mode
 - Talk/Listen mode is used for operator communication requiring line turnaround in half duplex.
 - Talk mode allows the user to type his own message of up to 72 characters.
 - Listen mode allows the user to look for receive data and display up to 72 characters on the console.
 - If the first four characters of message are “EXIT”, the program will switch to the other mode automatically at both ends of the link.

Table 5-1 RUN Command

RUN COMMAND

Function – Command name RUN (R) – used to execute the DCLT program. The run command requires a mandatory mode (M) type; it may use optional qualifiers.

Command Format: R M= Run Mode

where: R M=Mode Type/Optional Qualifiers

Check (CH); No Check (NOCH) Status (S); No Status (NOS) Echo (E); No Echo (NOE) Modem (M); No Modem (NOM) Pass (P)=# Loopback (L) = type See Table 5-2 for detailed description.
--

Type	Description	Default Qualifiers
Active (A)	Transmit one message from list; monitors receiver for incoming data until list is empty. For full-duplex and local testing.	/NoEcho/NoLooping
Passive (P)	Monitors receiver for incoming messages; then transmits a message from the list until the list is empty. For half-duplex testing, one node must be active; the other passive.	/NoLooping
Transmit (TR)	Transmit one message from the list; repeats until list is empty.	/NoEcho/NoLooping /NoCheck
Receive (R)	Receive incoming messages; repeat, unless checking is enabled. Compares receive data to expect list data.	/No Echo/NoLooping
Talk (TA)	Prints a prompt TLK on the console allowing operator to input up to 72 characters transmission. Receive node must be in Listen mode. Program will switch to Listen mode if first four characters are EXIT.	/No Echo/NoLooping /NoCheck

Table 5-1 RUN Command (Cont)

Type	Description	Default Qualifiers
Listen (L)	Prints a prompt LIS> and monitors receiver for data. Message is printed on the console when it is received. If first four received characters are EXIT, the program switches to Talk mode.	/NoEcho/NoLooping /NoCheck
Downline (D) Load	Issues Maintenance Oriented Protocol (MOP) sequences for devices that support this feature.	/NoEcho/NoLooping /NoCheck

RUN Command Examples:

Format	Description
1. R M=A/S/CH/L=C/P=5	Program runs in Active mode, allows status printouts, does data comparisons, loop data at cable (test connector required), and does 5 complete passes before completing test.
2. R M=A/S/M/L=I/P=2	Program runs in Active mode, allows status printouts, loops data internally, and makes 2 passes.
3. R M=P/NOCH/S/NOE/NOM/ L=C/P=2*	For half-duplex, one node must be active and the other passive. Set the passive node first as shown in the example. The active node can then be set up, as shown above.
4. R M=A/S/CH/L=C/P=-1	Program runs in active mode, allows status printouts, does data comparisons, loops data at the cable (test connector required), and makes continuous passes until a control C is typed by the user.

If no entry is made for a certain qualifier function (such as NO CHECK qualifier in Example 3) in the command string, the default is the previously-entered qualifier for that function. In Example 2, data comparisons would be done because the CHECK function (as opposed to NOCHECK) was previously established in Example 1. When that qualifier function is changed, it becomes the default entry for subsequent command strings when no entry is made.

* Command strings must be single line.

Table 5-2 DCLT Run Command Optional Qualifiers

Type	Description	Format
Check (CH)	<p>Enables byte by byte comparison of receive buffer against list buffer. If CHECK is enabled, the following receive error messages are possible:</p> <p>Data Comparison Error (CMD);</p> <p>Data Comparison Error total mismatches;</p> <p>Data Comparison Late Error (CML).</p>	
No Check (NOCH)	Disables data checking.	
Status (S)	<p>Enables printing of operator status messages on console such as:</p> <pre>TXQ MSC TXC CMP RXQ CML ERR CMD INI EOP</pre>	Refer to Table 5-6 DCLT Event Log Messages
No status (NOS)	Disables printing of operator status messages.	
Echo (E)	Used in passive mode only; forces transmit list to be the same as received data.	
No Echo (NOE)	Disables Echo.	
PASS (P=)		<p>PASS=N, where:</p> <p>N=Total number of passes desired before returning to DCLT prompt:</p> <p>Enter -1 = infinite loop until CNTL C</p>

Table 5-2 DCLT Run Command Optional Qualifiers (Cont)

Type	Description	Format
Loopback Type (L=)	<p>Allows program selection of various maintenance loopback test configurations in active mode only.</p> <p>4 Loopback Types:</p> <p>TTL Loopback within module</p> <p>External cable test (Any external loopback including test connector, manual modem loopback or remote system-to-system loopback).</p> <p>Program selection of local loopback (analog loopback) in RS-449 modems.</p> <p>Program selection of remote loopback (digital loopback) in RS-449 modems.</p>	<p>L = Type, where N=</p> <p>I for INTERNAL</p> <p>C for CABLE</p> <p>L for LOCAL MODEM</p> <p>R for REMOTE MODEM</p>
MODEM (M)	<p>Enables modem interrupt testing, but only on devices that support modem transition interrupts.</p>	
NO MODEM (NOM)	<p>Disables modem interrupt testing.</p>	

Table 5-3 Message Commands

MESSAGE COMMANDS

Function – Allows the user to assign, clear, or show transmit or expect (data comparison) messages within each transmit or expect list buffer area. Maximum buffer area for each is 512 bytes.

Message Command Types:

1. Clear Command (C). Used to clear associated buffer area and preset the list with an ITEP message.

Command Format: C T = Clear Transmit List and
C E = Clear Expect List

Examples:

Simply enter C E or C T at the DCLT> prompt.

DCLT> C E

2. Set Command (SE). Used to assign transmit or expect messages.

Command Format: SE T for Set Transmit and
SE E for Set Expect
or
SE E = T for Set Expect equal to Transmit

where:

SE T or

SE E = Message Type/Optional Qualifier

Table 5-3 Message Commands (Cont)

Message Type/Optional Qualifier

Name	Description
SIZE(S) SXXX	XXX = MSG size from 1 to 512 Bytes
COPY(C) CXXX	XXX = copies MSG from 0-14 additional times

MSG Type	Default Buffer Length (Bytes)	Description
(Z) ZEROS	64	All zeros (000_____)
(0) ONES	64	All ones (1111_____)
(1) 1ALT	64	Alternating one/zero (101010_____)
(0) 0ALT	64	Alternating zero/one (010101_____)
(C) CCITT	64	512 CCITT Bit Pattern (Random)
(A) ALPHA	65	ALPHA/Numerics (#\$!* &'()*E H+,-.0123456789;<=>? @ABCDEFGHIJKLMN O PQRSTU VWXYZ/[]\^_`%`
(I) ITEP	58	”Interprocessor Test Program (ITEP)“ message 1(DP1): (<177><177>/\$A THE QUICK BROWN FOX JUMPED OVER THE LAZY DOG.<15><12><001> <177><177><177><177>
MSG Data	72	Operator typed data to include only A-Z, 0-9, SPACES,TABS” delimited by quotes; Example: “HELLO”

Table 5-3 Message Commands (Cont)

EXAMPLE OF SET COMMAND:

Examples:

Format	Description
SE T=I/S=50/C=4	Assigns 5 copies (original + 4 copies) of ITEP message (size = 50 bytes each) to the transmit buffer list (250 bytes now assigned).
SE E=Z/S=30/C=4	Assigns 5 copies (original + 4 copies) of all ZEROS. MSG size is 30 bytes.
SE T=A/S=64	Assigns 1 message, 64 bytes long.

A typical command string would be:

```
DCLT> (A) ? C E }      Clear Expect Buffer
DCLT> (A) ? C T }      Clear Transmit Buffer
```

```
DCLT> (A) ? SE T=Z/S=30/C=2
```

```
DCLT> (A) ? SE T=C/S=64/C=2
```

```
DCLT> (A) ? SE T=A/S=128
```

```
DCLT> (A) ? SE T=I/S=45/C=1
```

```
DCLT> (A) ? SE E=Z/S=30/C=2
```

```
DCLT> (A) ? SE E=C/S=64/C=2
```

```
DCLT> (A) ? SE E=A/S=128
```

```
DCLT> (A) ? SE E=I/S=45/C=1
```

or

```
DCLT> (A) ? SE E = T
```

Table 5-3 Message Commands (Cont)

3. Show Command (SH).

Used to print out the status of associated buffer area.

Command Format:

SH T to Show Transmit List and
SH E to Show Expect List

Examples:

DCLT> (A) ? SH T

```
MSG: TYPE=ZEROES/SIZE= 30
MSG: TYPE=ZEROES/SIZE= 30
MSG: TYPE=ZEROES/SIZE= 30
MSG: TYPE=CCITT/SIZE= 64
MSG: TYPE=CCITT/SIZE= 64
MSG: TYPE=CCITT/SIZE= 64
MSG: TYPE=ALPHA/SIZE=128
MSG: TYPE=ITEP/SIZE= 45
MSG: TYPE=ITEM/SIZE= 45
      MODE=ACTIVE/PASS=00000
          /STATUS/CHECK/NOECHO/NOMODEM
```

DCLT> (A) ? SH E

```
MSG: TYPE=ZEROES/SIZE= 30
MSG: TYPE=ZEROES/SIZE= 30
MSG: TYPE=ZEROES/SIZE= 30
MSG: TYPE=CCITT/SIZE= 64
MSG: TYPE=CCITT/SIZE= 64
MSG: TYPE=CCITT/SIZE= 64
MSG: TYPE=ALPHA/SIZE=128
MSG: TYPE=ITEP/SIZE= 45
MSG: TYPE=ITEP/SIZE= 45
      MODE=ACTIVE/PASS=00000
          /STATUS/CHECK/NOECHO/NOMODEM
```

Table 5-4 Statistical/Utility Commands**Command Functions:**

Allows special utility routines to be executed. Four basic commands are available, listed as follows for both PDP-11 and VAX-11 unless otherwise noted.

Command Types	Description																						
HELP (H or ?)	Used to print a summary of DCLT commands on the console.																						
PRINT (P)*	Enters a DCLT sub-level routine called REPORT (RPT>) where various commands are available to print statistical data. Some commands are common to all devices, others are device specific (see Table 5-5). <table border="0" style="width: 100%; margin-top: 10px;"> <tr> <td style="padding-left: 20px;">HELP OR ?</td> <td>Prints HELP information for RPT>.</td> </tr> <tr> <td style="padding-left: 20px;">LOG</td> <td>Prints the DCLT event log.</td> </tr> <tr> <td style="padding-left: 20px;">BASE/FULL</td> <td>Prints entire base table.</td> </tr> <tr> <td style="padding-left: 20px;">BASE/ERROR</td> <td>Prints only error counters in base table.</td> </tr> <tr> <td style="padding-left: 20px;">BASE/OFFSET=NNN</td> <td>Prints single location (NNN) in base table.</td> </tr> <tr> <td style="padding-left: 20px;">EXIT</td> <td>Returns to the previous level (DCLT> or DR>/DS>).</td> </tr> <tr> <td style="padding-left: 20px;">TRIBUTARY STATUS SLOT NNN/SW</td> <td>Prints tributary status slot data where NNN is the decimal tributary address and SW is one of the following switches: <table border="0" style="width: 100%; margin-top: 10px;"> <tr> <td style="padding-left: 20px;">ERROR</td> <td>Only error slots are printed.</td> </tr> <tr> <td style="padding-left: 20px;">FULL</td> <td>All tributary status slots are printed.</td> </tr> <tr> <td style="padding-left: 20px;">OFFSET = NN</td> <td>Only tributary status slot whose offset is NN is printed.</td> </tr> </table> </td> </tr> <tr> <td style="padding-left: 20px;">GLOBAL STATUS/SW</td> <td>Prints global status information. Switches are the same as for TSS.</td> </tr> </table>	HELP OR ?	Prints HELP information for RPT>.	LOG	Prints the DCLT event log.	BASE/FULL	Prints entire base table.	BASE/ERROR	Prints only error counters in base table.	BASE/OFFSET=NNN	Prints single location (NNN) in base table.	EXIT	Returns to the previous level (DCLT> or DR>/DS>).	TRIBUTARY STATUS SLOT NNN/SW	Prints tributary status slot data where NNN is the decimal tributary address and SW is one of the following switches: <table border="0" style="width: 100%; margin-top: 10px;"> <tr> <td style="padding-left: 20px;">ERROR</td> <td>Only error slots are printed.</td> </tr> <tr> <td style="padding-left: 20px;">FULL</td> <td>All tributary status slots are printed.</td> </tr> <tr> <td style="padding-left: 20px;">OFFSET = NN</td> <td>Only tributary status slot whose offset is NN is printed.</td> </tr> </table>	ERROR	Only error slots are printed.	FULL	All tributary status slots are printed.	OFFSET = NN	Only tributary status slot whose offset is NN is printed.	GLOBAL STATUS/SW	Prints global status information. Switches are the same as for TSS.
HELP OR ?	Prints HELP information for RPT>.																						
LOG	Prints the DCLT event log.																						
BASE/FULL	Prints entire base table.																						
BASE/ERROR	Prints only error counters in base table.																						
BASE/OFFSET=NNN	Prints single location (NNN) in base table.																						
EXIT	Returns to the previous level (DCLT> or DR>/DS>).																						
TRIBUTARY STATUS SLOT NNN/SW	Prints tributary status slot data where NNN is the decimal tributary address and SW is one of the following switches: <table border="0" style="width: 100%; margin-top: 10px;"> <tr> <td style="padding-left: 20px;">ERROR</td> <td>Only error slots are printed.</td> </tr> <tr> <td style="padding-left: 20px;">FULL</td> <td>All tributary status slots are printed.</td> </tr> <tr> <td style="padding-left: 20px;">OFFSET = NN</td> <td>Only tributary status slot whose offset is NN is printed.</td> </tr> </table>	ERROR	Only error slots are printed.	FULL	All tributary status slots are printed.	OFFSET = NN	Only tributary status slot whose offset is NN is printed.																
ERROR	Only error slots are printed.																						
FULL	All tributary status slots are printed.																						
OFFSET = NN	Only tributary status slot whose offset is NN is printed.																						
GLOBAL STATUS/SW	Prints global status information. Switches are the same as for TSS.																						

*The PRINT command is also available on PDP-11s at the DR> level. Also, a similar command called SUMMARY (SUM) is available on VAX-11s at the DS> level. SUM performs the same function as PRINT, accessing the RPT> sub-level routine.

Table 5-4 Statistical/Utility Commands (Cont)

Command Types	Description
DUMP (D) PDP-11 ONLY	Prints contents of memory locations specified on console from starting address (SSSSSS) up to ending address (EEEEEE). Optional switch /B may be used to print in BYTE format.
EXIT (E)	Returns to previous program level.

Examples of Statistical Commands

DCLT> (A) ? H or (?) Prints HELP information for DCLT>.

COMMAND HELP FILE

DCLT CMDS:

CLEAR OR SHOW EXPECTLIST OR TRANSMITLIST

PRINT

DUMP START-END/B

EXIT

SET EXPECTMSG OR TRANSMITMSG=TYPE/SIZE=N OR /COPY=N

SET EXPECT=TRANSMIT

 TYPE=ONES,ZEROES,1ALT,0ALT,ITEP,CCITT,ALPHA

 OR "OPR SPCD=A-Z,SP,TAB,0-9 IN QUOTES"

RUN MODE=MTYP/LOOP=LTYP/CHECK,STATUS,ECHO,PASS=N

 MTYP=TRAN,REC,ACT,PAS,TAL,LIS,DOWN

 LTYP=INT,CAB,LOC,REM

DCLT> (A) ? P

TYPE H OR ? FOR HELP

RPT> (A) ? B/E

LOCATION CONTENTS DESCRIPTION

7373 004 NAKS-MSG NO BUFFERS CUMUL

 . .
 . .
 . .
17402 007 REPS RECD CUMUL

Table 5-4 Statistical/Utility Commands (Cont)

RPT> (A) ? B/O=27

LOCATION	CONTENTS	DESCRIPTION
17417	006	STREAMING TIME OUT COUNT

RPT> (A) ? H

DCLT REPORT CMDS:
 LOG – PRINT DCLT EVENT LOG
 EXIT – EXIT REPORT LEVEL
 HELP – PRINT THIS MESSAGE
 BASE/ERROR – PRINT ONLY ERRORS
 BASE/FULL – PRINT ENTIRE TABLE
 BASE/OFFSET=NNN – PRINT SINGLE LOCATION

The command list is device dependent. Example shown is for DMC/DMR.

DCLT> (A) ? D (DUMP) 17420-17430

┌──────────┐ STARTING ADDRESS
 └──────────┘ ENDING ADDRESS

017420 004000 000000 004000 000000 000000

NOTE

This command is for PDP-11s only. For VAX-11 use SET BASE or EXAMINE commands.

Table 5-5 REPORT Commands/Device Matrix

RPT> COMMAND	COMMON	DMC	DMR	DMP	DMV	DPV
LOG (L)	X					
EXIT (E)	X					
HELP (H or ?)	X					
BASE/ERROR (B/E)		X	X			
BASE/FULL (B/F)		X	X			
BASE/OFFSET=NNN (B/O=NNN)		X	X			
TRIBUTARY STATUS SLOT NNN/SW (TSS NNN/SW)				X	X	
GLOBAL STATUS/SW (GSS/SW)				X	X	

5.2.4 Event Log Overview

Significant events that occur during program execution are logged into the EVENT LOG. The most recent 45 events can be printed by executing a PRINT command at the DCLT> prompt level. For VAX-11 it is also possible to obtain the error log at the DS> prompt level by typing SUMMARY (SUM). Typical event log messages are shown in Table 5-6.

Table 5-6 DCLT Event Log Messages

Type	Example Format
TXQ	<pre> [Time of Event] [Name] [Number of Bytes] 0:01:27 TRANSMIT MSG QUEUED ADDR OF MSG=004312 BYTE COUNT= 12 MODEM STATUS: CTS DSR DCD RTS RI SQD TM 1 1 1 1 1 0 0 [First Byte Address] [Current Modem Status] </pre>
TXC	Same format as TXQ, except for name change: Transmit Message Complete.
RXQ	Same as above, except for name change: Receive Space Queued.
RXC	Same as above, except for name change: Receive Message Complete.
CMP	<pre> [Time of Event] [Name] 0:01:02 DATA COMPARISON STARTED ADDR OF MSG=004326 RX BYTES= 512 COMPARE BYTES=512 [First Byte Address][Number of Bytes][Bytes Expected] </pre>
CML	Same format as CMP, except for name change: Data Comparison Length Error
CMD	<pre> [Time of Event] [Name] 0:14:44 DATA COMPARISON DATA ERROR ADDR OF MSG=004604 BYTE COUNT= 58 NO. OF CMP ERRS=50 [First Byte Address][Number of Bytes][Number of Errors] </pre>

Table 5-6 DCLT Event Log messages (Cont)

Type	Example Format																																
ERR	<div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid black; padding: 2px;">Time of Event</div> <div style="border: 1px solid black; padding: 2px;">Name</div> </div> <pre> 1:01:01 DEVICE ERROR TIME OUT WAITING FOR OUTPUT INTERRUPT SEL0 SEL2 100100 100100 </pre> <div style="border: 1px solid black; padding: 2px; margin-top: 10px; width: fit-content; margin-left: auto; margin-right: auto;">Register Contents</div>																																
EOP	<div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid black; padding: 2px;">Time of Event</div> <div style="border: 1px solid black; padding: 2px;">Name</div> </div> <pre> 0:01:03 END OF PASS PASS= 4 ERRORS= 0 NOBUFFS= 0 </pre> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="border: 1px solid black; padding: 2px;">Pass Count</div> <div style="border: 1px solid black; padding: 2px;">Error Count</div> </div> <div style="border: 1px solid black; padding: 2px; margin-top: 10px; width: fit-content; margin-left: auto; margin-right: auto;">Number of Control Outs with NO BUFFER set. *</div>																																
INI	<div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid black; padding: 2px;">Time of Event</div> <div style="border: 1px solid black; padding: 2px;">Name</div> </div> <pre> 00:00:00 DEVICE INIT AND SETUP MODE = ACTIVE/LOOP=CABLE/PASS=00001 /STATUS/CHECK/NOECHO/MODEM </pre> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="border: 1px solid black; padding: 2px;">Mode-Type of Loopback and pass count</div> <div style="border: 1px solid black; padding: 2px;">Run Parameters</div> </div>																																
MSC	<div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid black; padding: 2px;">Time of Event</div> <div style="border: 1px solid black; padding: 2px;">Name</div> <div style="border: 1px solid black; padding: 2px;">Old Status</div> </div> <pre> 0.00:00 MODEM STATUS CHANGE MODEM STATUS HARD ERROR </pre> <table style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <tr> <td style="width: 20%;">MODEM STATUS:</td> <td style="width: 5%;">CTS</td> <td style="width: 5%;">DSR</td> <td style="width: 5%;">DCD</td> <td style="width: 5%;">RTS</td> <td style="width: 5%;">RI</td> <td style="width: 5%;">SQD</td> <td style="width: 5%;">TM</td> </tr> <tr> <td></td> <td style="text-align: center;">1</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> </tr> </table> <p style="margin-top: 10px;">CHANGED TO:</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">MODEM STATUS:</td> <td style="width: 5%;">CTS</td> <td style="width: 5%;">DSR</td> <td style="width: 5%;">DCD</td> <td style="width: 5%;">RTS</td> <td style="width: 5%;">RI</td> <td style="width: 5%;">SQD</td> <td style="width: 5%;">TM</td> </tr> <tr> <td></td> <td style="text-align: center;">1</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> </tr> </table> <div style="border: 1px solid black; padding: 2px; margin-top: 10px; width: fit-content; margin-left: auto; margin-right: auto;">New Status</div>	MODEM STATUS:	CTS	DSR	DCD	RTS	RI	SQD	TM		1	1	1	1	1	0	0	MODEM STATUS:	CTS	DSR	DCD	RTS	RI	SQD	TM		1	1	1	1	1	0	0
MODEM STATUS:	CTS	DSR	DCD	RTS	RI	SQD	TM																										
	1	1	1	1	1	0	0																										
MODEM STATUS:	CTS	DSR	DCD	RTS	RI	SQD	TM																										
	1	1	1	1	1	0	0																										

* The NOBUFFS function is for DMC/DMR only. This feature is device dependent and varies.

5.2.5 Running PDP-11/DCLT

When the DCLT program is started, the diagnostic supervisor will prompt the user for hardware information by typing:

CHANGE HW (L) ?

The "L" in brackets indicates the type of response required, "L" indicates that a logical answer ("Y" for yes or "N" for no) is needed. In this case, the user must respond with a "Y" after a start command unless the hardware information has been "preloaded" using the SETUP utility. Next, the supervisor will prompt:

UNITS (D) ?

The "D" indicates that a decimal response is needed. The DCLT program will not use more than one unit and therefore will not accept any response greater than "1." Typical PDP-11/DCLT procedures are provided in Table 5-7.

This example is typical for DMC/DMR; however, P table questions are option-dependent and may differ. Refer to option specific section in Chapter 2 for details.

Table 5-7 Typical PDP-11/DCLT Diagnostic Parameters

Question	Description
CHANGE HW (L)?	Enter Y
# UNITS (D)?	Enter 1
UNIT FULL DUPLEX OPERATION: (L) Y?	Enter <CR> for Full-Duplex; Enter NO followed by <CR> if Half-Duplex. To use default values, enter Control Z (↑ Z).
DEVICE CSR ADDRESS: (O) 160170?	Requires OCTAL response; input correct CSR address followed by <CR>.
INTERRUPT VECTOR ADDRESS: (O) 300?	Enter <CR> if vector is 300. If different, enter correct vector followed by <CR>.
INTERRUPT PRIORITY: (O) 5?	Enter <CR> for BR5. If different, enter correct value followed by <CR>.
DEVICE OPTION TYPE: (if applicable)	Input correct octal number corresponding to the user's application followed by CR

END OF DCLT P TABLE QUESTIONS – START DCLT RUN MODE

THIS IS DCLT. TYPE "H" OR "?" FOR DETAILS

MODE=ACTIVE/PASS00001

/NOSTATUS/CHECK/NOECHO/NOMODEM

DCLT> (A) ?

5.2.6 Running VAX-11/DCLT

The VAX-11 Data communication Link Test (DCLT) Programs are level 2 programs that execute either under VMS (on-line) or in standalone mode. The DCLT programs require the standard VAX-11 system attaching for the device to be tested. Table 5-8 details typical VAX-11 DCLT program operation. Hardware device parameters are requested after the device is attached (refer to the Typical VAX-11 DCLT Hardware parameters, Table 5-9). The event flags utilized by the DCLT program help to describe the internal configuration of the hardware and/or special program functions. These event flags are dependent on the specific device and are listed in a device specific DCLT table.

NOTE

The prompt DS> indicates a VAX-11 Diagnostic Supervisor Command is required.

Table 5-8 Typical VAX-11 DCLT Program Operation

Command Function	Example
1. ATTACH the UNIBUS interface (UBA or UBI) to the system	DS> ATT DW780 SBI DW0 3 4 or DS> ATT DW750 CMI DW0 bus.
2. Load appropriate DCLT program.	DS> LOAD EVDMC } (Example shown is DS> ATT DMC11 } DMC/DMR)
3. ATTACH the device to the system.	

NOTE

This command now enters the hardware parameter information for the device (refer to Table 5-9 for Typical Hardware Parameters). When the various hardware parameters are qualified, the program returns to the supervisor level of operation and the following steps must be followed:

4. SELECT the devices that have been attached to the system.	DS> SELECT ALL or DS> SELECT DW0 and DS> SELECT XM0
5. SET the appropriate event flags	DS> SET EVENT 1
6. Now the program may be started by the START command.	DS> START

Table 5-9 Typical VAX-11 DCLT Hardware Parameters

Questions	Description
1. DEVICE LINK ?	; Link the option to the UNIBUS interface by entering the logical name of the interace (e.g., DW0).
2. DEVICE NAME ?	; Establish a logical device name (e.g., XM0). The logical name is generally the same one used by the operating system and the actual unit number (e.g., 0-7 or A-Z).
3. CSR ?	; Enter the device CSR address.
4. VECTOR ?	; Enter the device Vector address.
5. BR ?	; Enter the correct device priority level (normally BR 5).

NOTE

The Command Line Interpreter (CLI) format for the device also can be linked together on one line as shown in the attached command for the UNIBUS interface above.

5.2.7 Interfacing DCLT Node-to-ITEP Node

When DCLT is used to communicate with ITEP, both nodes must be in compatible modes as listed in Table 5-10.

Table 5-10 DCLT-to-ITEP Compatible Mode

ITEP NODE	DCLT NODE
ONE-WAY-OUT	RECEIVE OR LISTEN
ONE-WAY-IN	TRANSMIT OR TALK
INTERNAL LOOP	ACTIVE
EXTERNAL LOOP	ACTIVE OR PASSIVE

The following conditions also apply:

- Be sure to set the Tx Buffer at both nodes to the same value.
- Do not send ITEP message 3 to the DCLT node if it is in the LISTEN mode.
- Be sure to set the ITEP node SWR 4=0.

5.3 INTERPROCESSOR TEST PROGRAM (ITEP)

ITEP is a software tool to test the communications link between two devices. To run ITEP on any of the supported devices, the ITEP Monitor DZITA must be loaded along with the correct ITEP overlay (device specific).

ITEP features:

- Communications between two devices over remote or local links.
- Interfaces with the Merrimack turnaround system.
- Uses programmed or operator generated messages.
- Monitors transmitted and/or received messages with optional print capability.
- Operates in one of four basic modes:

One Way In	Receive only
One Way Out	Transmit only
Internal Loopback	Receive followed by Transmit
External Loopback	Transmit then idle Receive

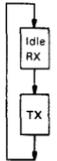
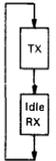
Table 5-11 lists each of the overlays currently available to support the options indicated. Table 5-12 details the switch register options which select specific operational variations available with ITEP.

Table 5-11 ITEP Overlays

Program Designation	Description
MAINDEC-11-DZITA MAINDEC-11-DZDCO MAINDEC-11-DZDHL MAINDEC-11-DZDJJ	ITEP Monitor DC11 Overlay DH11 Overlay DJ11 Overlay
MAINDEC-11-DZDLO MAINDEC-11-DZDPO MAINDEC-11-DZDQO MAINDEC-11-DZDUO	DL11 Overlay DP11 Overlay DQ11 Overlay DU11 Overlay
MAINDEC-11-DZDVO MAINDEC-11-DZDPF MAINDEC-11-DZDZB MAINDEC-11-DZDMO	DV11 Overlay DUP11 Overlay DZ11 Overlay DMC11/DDMR11 Overlay
MAINDEC-11-CZKMO	KMC11/DMC11 L/U Overlay

Table 5-12 ITEP Switch Register Selections

ITEP Operational Switch Settings

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Halt on Error	Single Pass :Has no effect if SW4=0. See SW4)	Inhibit Error Typeouts	Inhibit All Typeouts Except Errors If SW12=0 SW4=1, then: End Pass is typed. 2. TXed/RXed Data is Typed	Use previously specified data	Data Select: 10 9 0 0 = Get data from operator (enter your own message) 0 1 = Test MSG/1 SA Quick Brown Fox 1 0 = Test MSG/2 SB 01234 56789 1 1 = Test MSG/3 SC *In this case: The program will type a request for data. Data may be entered as: 1. ASCII <CR> 2. Octal code <CR> (000-377) For example: ABCD 1000 123 3771 EFG <CR>		Send RXed DATA (Internal Loopback Mode) <u>Note:</u> Overrides SW 10,9 in Internal loopback mode	DO NOT TEST RXed Data (Test RXed data against pre-selected data from SW10, 9)	Monitor TXed Data on Console TTY <u>Note</u> In many cases, not all data will appear on console TTY. This is especially true when the comm interface is running at faster baud than the console. Even at equal or slower bauds, all characters may not appear on the console.	Monitor RXed Data on Console TTY	Return to Monitor for End Pass If SW4=0 (SW14 no effect) program loops in the overlay never returning to monitor and conference to TX/RX data. If SW4=1 and SW14=0, the overlay will return to the monitor and type "End Pass" If SW4=1 and SW14=1, the program will require new interface params after one pass of the selected test mode.	Internal Loopback Mode 	External Loopback Mode 	One-Way in Mode 	One-Way Out Mode 

5.3.1 Using ITEP

- SW parameters must be identical in both systems.
- Load/Start receive system first.
- Enable modem auto answer (if available).
- Load/Start transmit system.

Table 5-13 Typical Load/Parameter Input Procedure

Procedure/Parameter	Description
.L ZITAD ?	Load ITEP monitor
.R XXXX ?	Enter and run selected overlay where: XXXX = overlay mnemonic Example: DH11 = ZDHL
INTERFACE TYPE XXX ?	Enter <CR> (except for DN11 or DH11), see program document for details. XXX = OPTION SELECTED
BUS ADDRESS = 176510 ?	Enter <CR> for default or appropriate address followed by <CR>.
VECTOR ADDRESS = 000300 ?	Enter <CR> for default or appropriate address followed by <CR>.
PRIORITY = 000200 ?	Enter <CR> for default or appropriate value followed by <CR>. 000200 = BR4 (DEFAULT) 000240 = BR5 000300 = BR6
PARAMS #1 000000 ? PARAMS #2 000000 ? PARAMS #3 000000 ?	Enter <CR> for default value or enter desired parameter value in each case, followed by <CR>. Refer to Table 5-14 for parameter summary. Some parameters are not used on some options.
SET SWITCHES ..	Set up Switch Registers as desired (see Table 5-12) followed by <CR>.
PLEASE MAKE CONNECTION (DIAL NUMBER)	Confirm that link is established.

Table 5-14 ITEP Parameter Summary

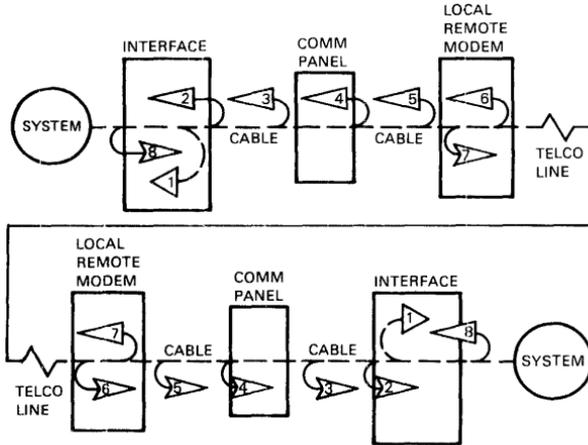
Interface	PARAMETER #1	PARAMETER #2	PARAMETER #3	Comments
DN11	Not used	Not used	Phone number the DN will Dial	Must terminate the # with end of number CHAR (1) If no auto-handshaking feature in modem.
DM11-BB	Loaded into CSR of DMB PARAM #1<3,0> = Line select in octal* PARAM #1<15,4> Must be 0s	Not used	Not used	
DH11	Loaded into SCR <3,0> = Line select Line 0;(0000)	Loaded into LPR <p style="text-align: right;"><u>Default</u></p> <1,0> = CHAR length 8 bits (11) <2> = Stop Bits 2 stop bits (1, <4> = Parity ENAB (1) No (0)** <5> = Odd Parity (1) No (0)** <9,6> = RCVer Speed 110 Baud (0011) <13,10> = Xmitter Speed 110 Baud (0011) <14> = HDX (1) FDX (0) Typically (Note FDX:00 6307 (Default)) <pre> 0 0 6 3 0 7 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 0 0 0 0 1 1 0 0 1 1 0 0 0 0 1 1 1 1 FDX 110 baud 110 baud NO 8 bits (TX speed) (RX speed) Parity 2 stop </pre>	Not used (177777)	DH11 Restrictions: if DM11-BB is in the system with DH11 being tested, but modem control not desired and UWB not initialized by ITEP, the program (ISR) will hang in the DM11 TX INIT routine. <u>Correction</u> <u>Location</u> <u>Load</u> DMBB An ADDR that will time out in CREFF (012722) (No SSYNC response);
DL11	PARAM #1 = Must be all 0s	<0> = HDX FDX = 1 FDX = 0 HDX HDX (0) <15,1> = must be 0 Typically: Set to 1 (FDX) (Bell 103)	Not used (177777)	
DU11	<7,0> (Lowbyte) loaded into TXCSR <3> = HDX(1) <u>Default</u> <15,8> Highbyte loaded into RXCSR <8> = STRIP sync (1) <u>Default</u> Typically: 000410 (Default) (HDX)	Loaded into PARCSR <p style="text-align: right;"><u>Default</u></p> <7,0> = Sync CHAR 26 (26) <8> = Parity sense select No (0) <11,10> = Word length 8 bits (11) <13,12> = Mode select Internal sync (11) Typically: 036026 (Default)	Not used (177777)	
DZ11	Loaded into the DZLPR register <p style="text-align: right;"><u>Default</u></p> <2,0> = Line used 000 (Line 0) <4,3> = CHAR length 11 (8 bits) <5> = STOP bit count 1 (2 stops) <7,6> = Parity Enab/Set 00 (no parity) <11,8> = Speed Select 0010 (110 baud) <12> = RCVer ON 1 (always)	Not used at this time	Not used (177777)	

Table 5-14 ITEP Parameter Summary (Cont)

Interface	PARAMETER #1	PARAMETER #2	PARAMETER #3	Comments
DUPI1	<p>PARAM #1 (Low byte) loaded into the TXCSR: <3> = 1 HDX (Default) 0 FDX</p> <p>PARAM #1 (Highbyte) loaded into the RXCSR: <8> = 1 Strip synch (default)</p>	<p>PARAM #2 loaded into the TXDBUF: <7:0> = Sync char, default = 26 <8> = TSOM, default = 1</p>	<p>PARAM #3 loaded into the PARCSR <7:0> = Sync char, default = 26 <15> = DECmode select, default = 1 <9> = CRC inhibit, default = 1</p>	
DMC11	<p>1. Link Test: Not used (0).</p> <p>2. Secondary Mode Test: Not used (0).</p> <p>3. Bootstrap Test: <8> = 1 Bootstrap test <10> <9> Mode and station select</p> <p>0 0 Originating station – Automatic mode 0 1 Boot station – Automatic mode 1 0 Originating station – Manual mode 1 1 Boot station – Manual mode</p> <p><7:0> – Switch PAC setting of boot station DMC-11 DDCMP line # (Used as Password in MOP message)</p>	<p>FDX/HDX Selection: <0> = 1 FDX (Default) = 0 HDX</p> <p>Secondary mode test selection: <0> = 0 HDX (Must be 0 for this test) <1> = 1 Secondary mode test (Must be 1) <2> = 0 Primary station = 1 Secondary station Not used (0).</p> <p>Must watch SW PAC #2 which cannot contain 377 for this bootstrap test.</p>	<p>Not used (177777).</p> <p>Not used (177777).</p> <p>Not used (177777).</p>	<p>1. DMC ITEP is an on-line link test only between two DMCs.</p> <p>2. DMC is a DMA device and therefore the TX and RX data cannot be monitored on a per character basis. Thus, SWG and SWS have no effect.</p>
DQ11	<p>Not used (0).</p>	<p>PARAM #2 (Low byte): <0> = 0 HDX (Default) = 1 FDX <1> = 0 Normal (Default) = 1 HI-Baud</p> <p>PARAM #2 (High byte) loaded into the Sync register: <15:8> = Synch char, default = 26</p> <p>Only Software flags (Not loaded into DQ registers)</p>	<p>Not used (177777).</p>	
DV11	<p>PARAM #1 is used to determine the line numbers for TX and RX.</p> <p><11:8> = RX line number, default = 0 <3:0> = TX line number, default = 0</p>	<p>PARAM #2 contains specific line information</p> <p><15:8> = Sync code, default = 26 <1> = 0 Use sync A (Default) = 1 Use sync B <0> = 0 HDX (Default) = 1 FDX</p>	<p>Not used.</p>	<p>If a DM11-BB is in the system with DV11 being tested, but modem control not desired and DM11-BB not initialized by ITEP, the program will hang in the DV11 TX INIT routine.</p> <p>Correction: Location Load "DMBB" An address that will time out. (In CREF) (No SSVNCH response)</p>

5.4 LINK TESTING

The following figure provides a graphic overview of a general application flowchart for link testing.



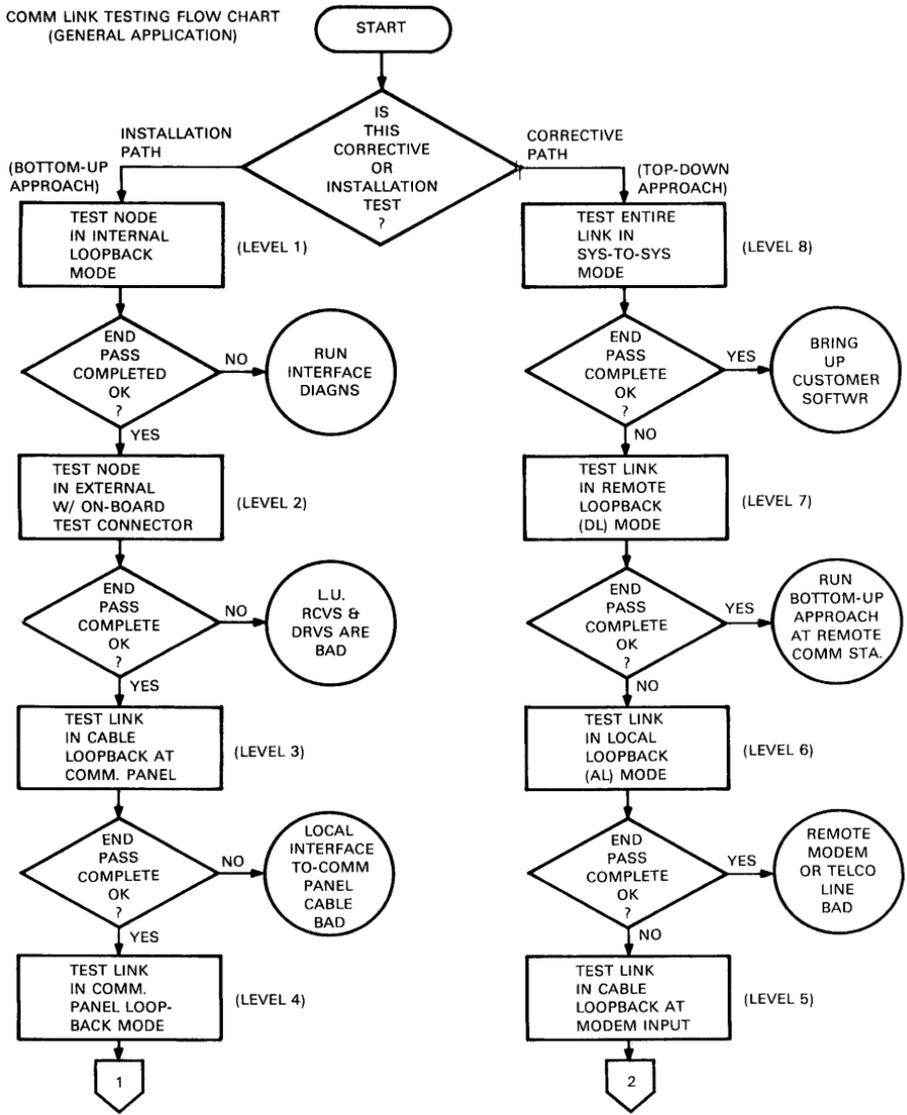
POINT-TO-POINT LINK

1. INTERNAL (MAINTENANCE) LOOPBACK LEVEL
2. ON-BOARD LOOPBACK W/ PORT TEST CONNECTOR
3. CABLE LOOPBACK PRIOR TO COMM PANEL
4. COMM. PANEL LOOPBACK
5. CABLE LOOPBACK AT MODEM INPUT
6. ANALOG LOOPBACK MODE IN LOCAL MODEM
7. DIGITAL LOOPBACK MODE IN REMOTE MODEM
8. SYSTEM LOOPBACK FROM END NODE

MK-2803A

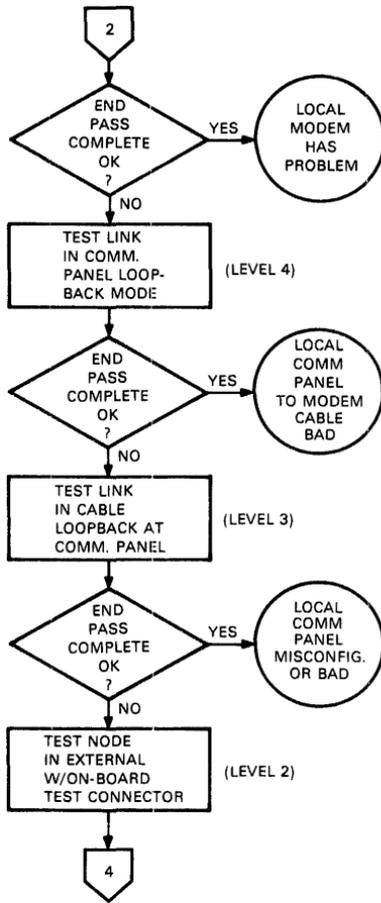
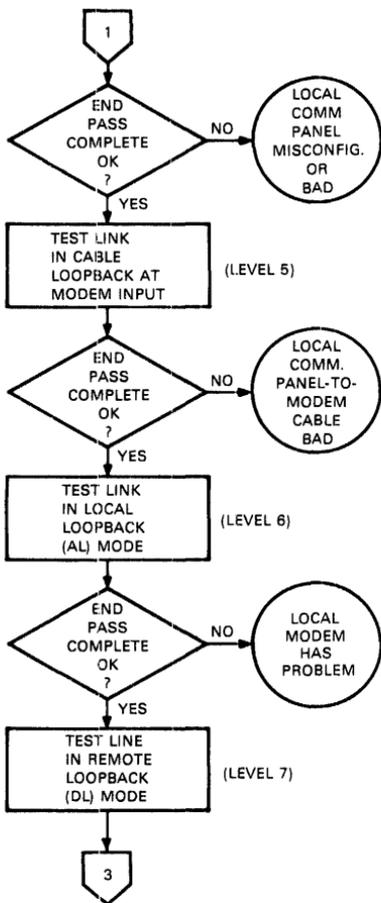
Link Testing Flowchart (Sheet 1 of 4)

COMM LINK TESTING FLOW CHART
(GENERAL APPLICATION)



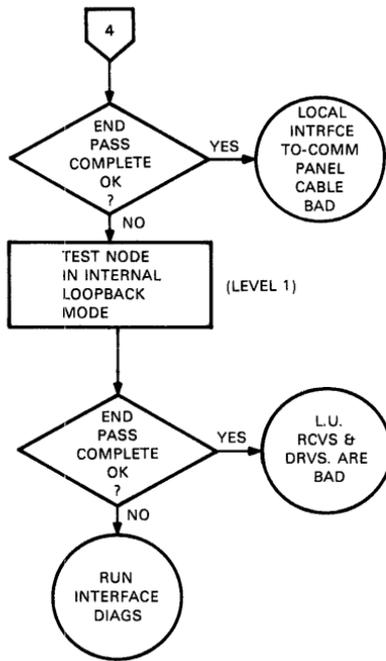
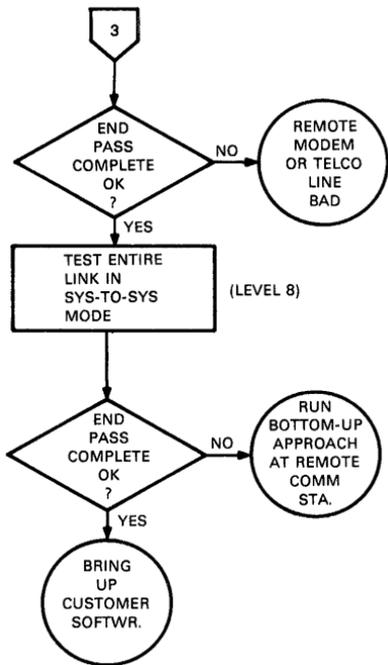
MK-2803B

Link Testing Flowchart (Sheet 2 of 4)



MK-2803C

Link Testing Flowchart (Sheet 3 of 4)



MK-2803D

Link Testing Flowchart (Sheet 4 of 4)

CHAPTER 6

SPECIAL TOOLS AND EQUIPMENT

6.1 INTRODUCTION

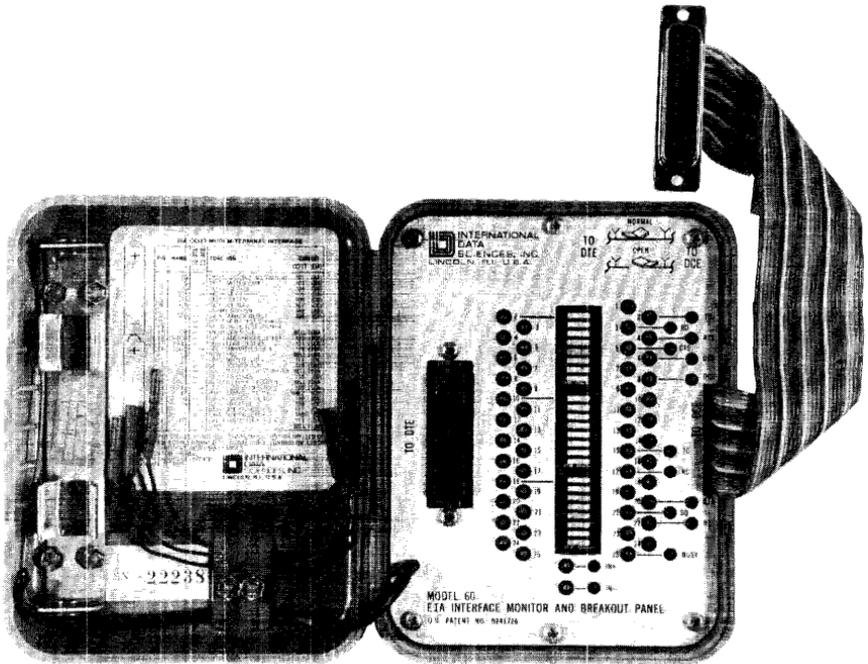
This chapter provides brief descriptions of various special tools and test equipment available to aid in troubleshooting and testing DIGITAL's Communications configurations. The following are presently available and being used:

- IDS Model #60 Interface Monitor/Breakout panel,
- Astrocom, Minicheck Data Transmission Test Set, and
- DIGITAL's Communication Turnaround System.

6.2 BREAKOUT PANEL

The Model 60 Breakout Panel is a multipurpose tester that provides access to RS-232-C signals. It features:

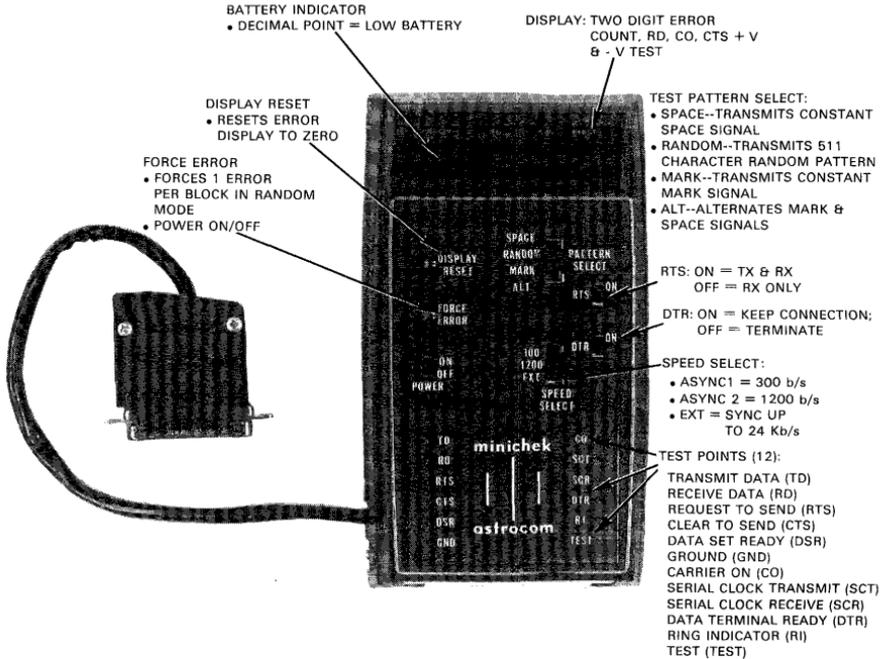
- Switch packs and patchable jumper pins (one for each line) allowing signal interruption and/or rerouting;
- 12 LEDs to monitor certain key functions; and
- Two additional LEDs to check voltage levels greater than ± 3.5 V at any line (jumper selectable).



Model 60 Breakout Box

6.3 MINICHECK

The Minicheck tester generates four patterns, checks for errors, displays number of errors, and displays the status of the RS232 interface signals.



Minicheck Tester

6.3.1 Operational Tests

There are three basic test configurations and one Minicheck self-test procedure, specified as follows:

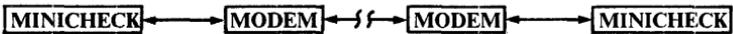
1. Testing one modem with one Minicheck



2. Testing two modems with one Minicheck



3. Testing two modems using two Minichecks



Test Procedure

- Step 1 Disconnect modem from operating device and connect Minicheck tester to modem.
- Step 2 Apply power to Minicheck and modem, and set Minicheck speed to the same speed as the modem. For test configuration 3, make sure that both Minicheck tests are set to the modem speed.
- Step 3 Set RTS and DTR to the ON position. For test configuration 3 place one tester RTS to ON and the other to OFF. To test the opposite direction, reverse the RTS settings and repeat the test procedure.
- Step 4 For test configuration 1, place modem in analog loop, if available. In test configuration 2, place the remote modem (one without tester) in REMOTE TEST. For test 3, go to step 5.
- Step 5 Select the desired test pattern in test configuration 3, the test pattern must be the same at both testers.

6.3.2 Test Results

Configuration 1 and 2

1. CO and CTS indicators should be ON.
2. RD indicator should be:
 - a. ON for MARK pattern,
 - b. OFF for SPACE pattern,
 - c. Dimly lighted for ALT pattern,
 - d. Flickering for RANDOM pattern.
3. Error count after initial synch should be stable.

4. Check status of interface leads by:
 - a. Using an Oscilloscope, or
 - b. Connecting the TEST lead to the desired interface lead. Results are indicated in the + TEST - area of the displays (plus sign lighted for MARK: minus sign lighted for SPACE).

Configuration 3

1. Minicheck with RTS ON:
 - a. CTS and RD indicators ON,
 - b. CO indicator OFF,
 - c. Error count free running unless SPACE pattern selected,
 - d. Check interface signal status (see test results, configuration 1 and 2, step 4).
2. Minicheck with RTS OFF:
 - a. CTS indicator OFF,
 - b. CO indicator ON,
 - c. RD indicator should be:
 1. ON for MARK pattern
 2. OFF for SPACE pattern
 3. Dimly lighted for ALT pattern
 4. Flickering for RANDOM pattern.
 - d. Error count after initial sync should be stable.
 - e. Check interface signal status (see test results, configuration 1 and 2, step 4).

6.3.3 Minicheck Self-Test Procedure

1. Connect test points RD to TD, DTR to CO and RTS to CTS.
2. Apply power to the tester and place RTS and DTR to the ON position.
3. Set speed-select to 1200 (ASYNCR 2).
4. Select desired test pattern.

Test Results:

Same as Configuration 1 and 2, steps 1 through 3.

6.4 DIGITAL'S COMMUNICATION TURNAROUND SYSTEM

The communications turnaround system consists of a PDP-11/20 which offers three separate dial-up line capabilities for remote turnaround testing. These include:

- DL11-E operating at 300 or 1200 b/s connected to a 212A Asynchronous Modem.
- DL11-E operating at 1200 b/s connected to a 202S Asynchronous Modem, and
- DU11-DA operating at 2400 b/s connected to a 201C Synchronous Modem.

Telephone numbers for these lines are all included below.

MODEM	SPEED (b/s)	MODE	PHONE
212A	300/1200	ASYNC	(603) 884-1561*
202S	1200	ASYNC	(603) 884-1559*
201C	2400	SYNC	(603) 884-1560*

* Telephone numbers do tend to change often – as of this printing, these are the most recent telephone numbers. If there is any question about the number, refer to the latest Tech-Tips for updated numbers.

The turnaround system features:

- Auto-Answer on three modem lines;
- Retransmission of three standard messages, if error free;
- Report message errors, if any of the standard messages are received;
- Nonstandard messages retransmitted exactly as received;
- Automatic disconnect if carrier is lost for more than one second.

Standard Messages:

\$A THE QUICK BROWN FOX JUMPED OVER THE LAZY DOG

\$B 0123456789

\$C COM-TEST MAYNARD THE QUICK BROWN FOX JUMPED OVER THE LAZY

DOG 0123456789

7.1 INTRODUCTION

This chapter provides a summary listing of each of the signal functions associated with each of the EIA and/or CCITT standards which are supported by the communications devices contained in this manual. The connector pin assignments (at the modem) for each signal are also included. Table 7-5 provides a cross reference showing the relationship between each of the supported standards.

Table 7-1 RS-232-C Interface Pin/Signal Designations

Pin	Circuit	Direction	Function	CCITT Circuit Equivalent
1	AA	_____	Protective Ground	101
2	BA	To Modem	Transmitted Data	103
3	BB	From Modem	Received Data	104
4	CA	To Modem	Request to Send	105
5	CB	From Modem	Clear to Send	106
6	CC	From Modem	Data Set Ready	107
7	AB	_____	Signal Ground	102
8	CF	From Modem	Data Carrier Detector	109
9	-	(From Modem)	(Positive DC Test Voltage)	
10	-	(From Modem)	(Negative DC Test Voltage)	
11	-	_____	Unassigned	
12	SCF	From Modem	Secondary Carrier Detector	122
13	SCB	From Modem	Secondary Clear to Send	121
14	SBA	To Modem	Secondary Transmitted Data	118
15	DB	From Modem	Transmitter Clock (Internal)	114
16	SBB	From Modem	Secondary Received Data	119
17	DD	From Modem	Receiver Clock	115
18	-	To Modem	Receiver Dibit Clock	
19	SCA	To Modem	Secondary Request to Send	120
20	CD	To Modem	Data Terminal Ready	108.2
21	CG	From Modem	Signal Quality Detector	110
22	CE	From Modem	Ring Indicator	125
23	CH/CI	To Modem	Data Rate Selector	111/112
24	DA	To Modem	External Transmitter Clock	113
25	CN	To Modem	Force Busy	

Table 7-1 RS232-C Interface Pin/Signal Designations (Cont)

RS-232-C Voltage Standards

Measured at the Receiver Circuit:

Data:

-25V < LOGICAL 1 < -3V (MARK)

+25V > LOGICAL 0 > +3V (SPACE)

Control:

-25V < LOGICAL 0 < -3V (NEGATION)

+25V > LOGICAL 1 > +3V (ASSERTION)

Table 7-2 RS-422-A/RS-423-A Interface Pin/Signal Designations

Pin	Circuit	Direction	Function	Circuit Equivalents	
				RS-232	CCITT
1	SHIELD	-	Protective Ground		
2	SI	From Modem	Signal Rate Indicator	CI	112
3	SPARE				
4	SD	To Modem	Send Data (+)	BA	103
5	ST	From Modem	Send Timing (+)	DB	114
6	RD	From Modem	Receive Data (+)	BB	104
7	RS	To Modem	Request to Send (+)	CA	105
8	RT	From Modem	Receive Timing (+)	DD	115
9	CS	From Modem	Clear to Send (+)	CB	106
10	LL	To Modem	Local Loop		141
11	DM	From Modem	Data Mode (+)	CC	107
12	TR	To Modem	Terminal Ready (+)	CD	108.2
13	RR	From Modem	Receiver Ready (+)	CF	109
14	RL	To Modem	Remote Loop		140
15	IC	From Modem	Incoming Call	CE	125
16	SF/SR	To Modem	Select Frequency Signal Rate Select	CH	126 111
17	TT	To Modem	Terminal Timing (+)	DA	113
18	TM	From Modem	Test Mode		142
19	SG	To Modem	Signal Ground	AB	102
20	RC	From Modem	Receive Common		102b
21	SPARE	-	-		
22	SD	To Modem	Send Data (-)		
23	ST	From Modem	Send Timing (-)		
24	RD	From Modem	Receive Data (-)		
25	RS	To Modem	Request to Send (-)		
26	RT	From Modem	Receive Timing (-)		
27	CS	From Modem	Clear to Send (-)		
28	IS	To Modem	Terminal in Service		
29	DM	From Modem	Data Mode (-)		
30	TR	To Modem	Terminal Ready (-)		
31	RR	From Modem	Receiver Ready (-)		
32	SS	To Modem	Select Standby		116
33	SQ	From Modem	Signal Quality	CG	110
34	NS	To Modem	New Signal		
35	TT	To Modem	Terminal Timing (-)		
36	SB	From Modem	Standby Indication		117
37	SC	To Modem	Send Common		102a

Table 7-3 CCITT/V.35 Interface Pin/Signal Designations

Pin	CCITT Circuit	Direction	Function	Circuit Equivalents	
				RS-232	RS-449
A	101	To Modem From Modem	Protective Ground	AB CA CB	SG RS CS
B	102		Signal Ground		
C	105		Request to Send		
D	106		Ready for Sending		
E	107	From Modem	Data Set Ready	CC	DM
F	109	From Modem	RCV Line Signal Det	CF	RR
H	108/1	To Modem	Connect Data Set	CD CE	TR IC
J	108/2	To Modem	Data Terminal Ready		
	125	From Modem	Calling Indicator		
R	104	From Modem	Received Data A	BB	RD RD
T	104	From Modem	Received Data B		
V	115	From Modem	Receive Timing A	DD	RT RT
X	115	From Modem	Receive Timing B		
Y	114	From Modem	Transmit Timing A	DB	ST ST
AA	114	From Modem	Transmit Timing B		
P	103	To Modem	Transmit Data A	BA	SD SD
S	103	To Modem	Transmit Data B		
U	113	To Modem	Terminal Timing A	DA	TT
W	113	To Modem	Terminal Timing B		

Table 7-4 RS-366 ACU Interface Pin/Signal Designations

Pin	Direction	ACU Designation	Function
1		FGD	Frame Ground
2	To ACU	DPR	Digit Present
3	From ACU	ACR	Abandon Call, Retry
4	To ACU	CRQ	Call Request
5	From ACU	PND	Present Next Digit
6	From ACU	PW1	Power Indicator
7		SGD	Signal Ground
8			Not Used
9	From ACU		+ DC Test Voltage
10	From ACU		- DC Test Voltage
11			Not Used
12			Not Used
13	From ACU	DSS	Data Set Status
14	To ACU	NB1	Number Bit Weight 1
15	To ACU	NB2	Number Bit Weight 2
16	To ACU	NB4	Number Bit Weight 4
17	To ACU	NB8	Number Bit Weight 8
18			Not Used
19			Not Used
20			Not Used
21			Not Used
22	From ACU	DLO	Data Line Occupied
23			Not Used
24			Not Used
25			Not Used

Table 7-5 EIA/CCITT Standards Equivalency

EIA Electrical Characteristic Standard	EIA Interchange Circuit Definition Standard (DCE to DTE) with Connector	CCITT Electrical Characteristic Standard	CCITT Interchange Circuit Definition Standard (DCE to DTE) Without Connector	Recommended CCITT Interchange Connector
RS232-C	RS232-C	CCITT V.28	CCITT V.24	ISO 2110
RS423-A	RS449	CCITT V.10/X.26	CCITT V.24	ISO 4902
RS422-A	RS449	CCITT V.11/X.27	CCITT V.24	ISO 4902
N/A	N/A	CCITT V.35	CCITT V.24	ISO 2593

8.1 INTRODUCTION

This chapter contains a summary of the operational characteristics of some of the more commonly used modems and the option variations available with each of them.

Also included is the DIGITAL recommendation for configuring each of the options for optimum performance.

Table 8-1 Characteristic Summary for Selected Modems

Device Type	Speed	Auto		Remote Testing	Line	Operation
		Answer	Dial			
103J	0-300 b/s (ASYNCR)	Yes	With 801 ACU	Yes	Switched	Half-Duplex or Full-Duplex (2 Wire)
108	0-300 b/s (ASYNCR)	No	No	No	Series 2000 or 3002	Full-Duplex (2 Wire)
113	0-300 b/s (ASYNCR)	Yes	No	Yes	Switched	Half-Duplex or Full-Duplex (2 Wire)
113A	0-300 b/s (ASYNCR)	No	No	Yes	Switched	Manual Originate Full- Duplex (2 Wire)
201C	2400 b/s (SYNCR)	Yes	With 801 ACU	Yes	Switched or 3002 Private Channel	Half-Duplex (2 Wire) Full-Duplex (4 Wire)
202S	1200 b/s NO CONDITION- ING 1800 Bits/S C2 CONDITIONING (ASYNCR)	Yes	With 801 ACU	Yes	Switched Series 2000 or Private Line Series 3000	HDX (2 Wire)

Table 8-1 Characteristic Summary for Selected Modems (Cont)

Device Type	Speed	Auto		Remote Testing	Line	Operation
		Answer	Dial			
202T	Same as 202S	No	No	Yes	2 or 4 Wire Series 3000 Private Line	HDX (2 Wire) FDX (4 Wire)
208A	4800 b/s (SYNC)	No	No	Yes	4 Wire 3002 Private Line	FDX (4 Wire)
208B	4800 b/s (SYNC)	Yes	With 801 ACU	Yes	Switched	HDX (2 Wire)
209A	1-9600 b/s Channel, or 1-7200 b/s and 1-2400 b/s Channels or 2-4800 b/s Channels or 4-2400 b/s Channels (SYNC)	No	No	Yes	3002 with D1 Conditioning	FDX (4 Wire)
212A	0-300 Bits/S ASYNC or 1200 Bits/S CHAR ASYNC or 1200 Bits/S Bit SYNC	Yes	With 801 ACU	Yes		FDX (2 Wire)
402C	0-600 Bits/S	Yes	With 801 ACU	Yes	Switched 2000 or 3002 Private Line	HDX (2 Wire) or FDX (4 Wire)
500A DSU	2.4K, 4.8K 9.6K, 56K SYNC	No	No	Yes	4 Wire DDS	FDX,HDX
501A DSU	9.6K, 56K SYNC	Yes	Yes	Yes	4 Wire DDS	FDX,HDX

Table 8-1 Characteristic Summary for Selected Modems (Cont)

Device Type	Speed	Auto		Remote Testing	Line	Operation
		Answer	Dial			
510A DSU	2.4K, 4.8K 9.6K	No	No	Yes	4 Wire DDS Multiport	FDX,HDX
550A CSU	56K SYNC	No	No	N/A	4 Wire DDS	ANALOG
551A CSU	56K SYNC	No	No	N/A	4 Wire DDS	ANALOG

Table 8-2 Modem Options

Modem	Option	Designation	DIGITAL Recommendation
103J	Receive Space Disconnect	V	Yes
	Send Space Disconnect	T	Yes
	Loss of Carrier Disconnect	R	No
	CC Indication	ZD	Early
	CB and CF Indications	B	Separate
	CC Indication for Analog Loop	ZF	On
	Auto Answer	ZH	Yes
	Failsafe State of CN Circuit	J	Off
	Tip/Ring Make Busy	E	No
Ground	Q	Common	

Table 8-2 Modem Options (Cont)

Modem	Option	Designation	DIGITAL Recommendation
108	To Be Supplied		
113B	Common Ground	V	In
	CB/CF Indication	W	Out
	CN Control	X	In
	Tip/Ring Force Busy	Y	Out
	Data Terminal Control of Disconnect	Z	In
201C	Ground	YK	Common
	Transmitter Timing	YC	Internal
	Auto Calling	By ACU	As required
	Auto-Answer	YF	Under DTR control
	Ring Indication	YG	EIA RS232 on pin 22
	Line Interface	XA	4 wire private (FDX)
	Carrier Control	XA	Switched, 7 ms delay
	New Sync	YA	Not used
	Carrier Detector Sensitivity	ZU ZV	- 24 dbm private wire - 44 dbm switched net
	202S	Receive Data Squelch	R
Soft Carrier Turnoff		R	24 ms
Clear to Send Delay		G	180 ms
Fast Carrier Detection		N	Out (23 ms)
Received Data Clamp		F	In (required)
Local Copy Primary Channel		ZB	Out
Reverse Channel		ZC ZD	As required (In or out)

Table 8-2 Modem Options (Cont)

Modem	Option	Designation	DIGITAL Recommendation
202T	Local Copy Reverse Channel	ZF	Out
	Auto-Answer	B	In
	Transmit Only	YH	Out
	CC Indicator In Analog Loopback	YJ	Off
	Ground	ZG	Common
	801 ACU	-	As required
	4 Wire Full-Duplex	ZK	Full-duplex
	2 Wire Half-Duplex	See Reverse Channel Below	Half-duplex only recommended with controller with full modem with 2780 software package.
	Receive Data Squelch	R	156 ms
	Soft Carrier Turnoff	R	24 ms
	Clear to Send Delay	G	180 ms
	Fast Carrier Detection	N	Out (23 ms)
	Received Data Clamp	F	In (required)
	Local Copy Primary Channel	ZB	Out
	Reverse Channel	ZC ZD ZK	In (as required) Out 4 Wire operation
	Local Copy Reverse Channel	ZF	Out
Carrier Detector Reset	ZM	Out	

Table 8-2 Modem Options (Cont)

Modem	Option	Designation	DIGITAL Recommendation
208A	Continuous Carrier	ZO	Out
	Compromise Equalization	ZU	Maximum (determined by installer)
		ZV	Minimum (to match channel characteristics)
	Ground	ZG	Common
	Alternate Voice	A	Out (as required)
		B	In
	Transmitter Timing	YC	Modem provides transmitter clock
	Carrier Control	XB	Continuous carrier (as required)
		XA	Switched carrier
	Request to Send	YS	Continuous RTS (as required)
		YT	Switched RTS
	One Second Holdover	YX	Enabled (recommended for use with continuous carrier, selected above)
		YW	Disabled (recommended for use with multi-point master station)
	New Sync	YA	Not used
	CC Condition in Analog Loopback	YM	DSR asserted in Analog loopback
	Alternate Voice	YI	Data auxiliary set installed
		YJ	No data auxiliary set
Automatic Retrain	YU	Must be installed	
Compromise Equalizer	YQ	Must be disabled	

Table 8-2 Modem Options (Cont)

Modem	Option	Designation	DIGITAL Recommendation
208B	Transmitter Timing		Internal
	Auto Call		As required
	CC Condition in Analog Loopback		CC on when analog loopback button is pressed
	Auto Answer		Yes
209A	Transmitter Timing Provided		Internal
	Carrier Control		Switched
	Request to Send Control		Switched
	Elastic Store		Out
	Slaved Transmitter Timing		Out
	Data Set Ready (CC) Condition in AL Mode (Form Use in Test 4)		CC On
	Grounding		AA not connected to AB
212	Tip/Ring Make Busy	E	Out
	CC Indication Analog Loop	ZF	On
	CN Circuit	YF	Out
	Transmitter Timing	YC	Internal
	1200 Baud Operation	YG	ASYNC/Start-Stop
	Character Length	YJ	10 Bit
	Receiver Respond Digital Loop	YK	In

Table 8-2 Modem Options (Cont)

Modem	Option	Designation	DIGITAL Recommendation
	Loss of Carrier Disconnect	S	Out
	Receive Space Disconnect	V	In
	CB and CF Indications	B	Separate
	Send Space Disconnect	T	In
	Auto-Answer	ZH	In
	Answer Mode Indication	W	Off
	Speed Mode	YP	Dual
	Interface Speed Indication	YQ	In
	Signal Ground to Frame Connect	Q	In

801-C AUTO CALLING UNIT

TYPE: DUAL FREQUENCY (TOUCH TONE) OR DIAL PULSE
LINE: VOICE GRADE SWITCHED
CONDITIONING: ANY
SPEED: DIALS AT UP TO 10 DIGITS/SECOND
INTERFACE: RS366

Table 8-3 801-C ACU Options

Option	Designation	DIGITAL Recommendation
Call Termination	Z or A G or ZD	After DSS via CRQ or After DSS via data set
ACR Timer	R	Stop timer when DSS sets
DSS Transfer	B	Answer tone detection or at 'EON' code
Answer Detection	W X S T	Detect end of answer tone Detect beginning of answer tone Detect 2025 tone Detect 2225 tone
Ground Start	V Y	In Out
Data Set Answer Detection	E	Without 'EON'
Circuit	ZH ZJ ZK	2 wire 4 wire loop start 4 wire ground start
DLO Lead	ZM ZL	801 only control 801 and dataset control

9.1 INTRODUCTION

This chapter contains information needed to configure, install, and test a number of DIGITAL's modem products. Currently, there are two products included in this chapter; the DF02 and DF03 modems. As new modem products are developed, this chapter will be revised to include support for those products.

The purpose of this chapter is to provide Field Service personnel, trained in servicing modem devices, with a quick reference guide that highlights the important factors concerning installation and maintenance. The information contained in this chapter, therefore, is short and to the point. If more detailed information is needed, reference should be made to the microfiche, technical manual, or other reference material concerning that particular device.

The options presently contained in this chapter are:

- DF02-AA
- DF02-AC
- DF03-AA
- DF03-AC
- DF Series Rack Mount (to be supplied)

DF02/DF03 OPTION

DF02/DF03 General Description

The DF-series modems provide full duplex, asynchronous or synchronous, binary serial data communications. This is accomplished over two-wire, switched, telephone network facilities. Low-speed operation [0 to 300 bits per second (b/s)] is asynchronous, binary frequency shift keyed (FSK). High-speed (1200 b/s) operation (DF03 only) can be either character-asynchronous or bit-synchronous, quaternary differential phase shift keyed (QDPSK).

These modems are compatible with EIA-RS-232-C/CCITT V.24 and are equivalent to 103/113/212A modem series.

DF02/DF03 Standard Modem Features

The features below apply to both DF02 and DF03 modems unless otherwise specified.

- 300/1200 b/s asynchronous (DF03) 0-300 b/s asynchronous (DF02);
- 1200 b/s synchronous (DF03 only);
- Full-duplex operation on public switched telephone network (PSTN);
- Manual originate/answer and automatic answer for DF03-AA/AC;
- Automatic originate for DF03-AC only;
- Uses standard RJ11C telephone rack;
- FCC approved for direct connect;
- Diagnostic test switches;
- EIA RS232-C interface; and
- DATA/TALK HIGH/LOW speed select switch.

DF02/DF03 Auto Call Features

For both DF02 and DF03:

- Single EIA RS232-C port (shared with modem port);
- Asynchronous ASCII data;
- Data rates – 110, 300, 1200 b/s; and
- Pulse code dialing.

DF02/DF03 INSTALLATION

DF02/DF03 Modem Specifications

The specifications below also apply to both DF02 and DF03 modems unless otherwise specified.

- Power requirements – 120 Vac (90-128 Vac), 57-63 Hz.

- Physical characteristics

Width – 69 mm (2.7 in)

Height – 143 mm (5.6 in)

Depth – 277 mm (10.9 in)

Weight – Approximately 2.7 kg (6 lbs)

- Environment requirements

Temperature 5° to 50°C (41° to 122°F)

Relative humidity 0% to 95% noncondensing

Convection cooling

- FCC registration number

DF02: A0994Q-67693-DM-R

DF03: A0994Q-69391-DM-R

DF02/DF03 Reference Documentation

Refer to the following if the level of content in this section is insufficient.

- Pocket service guides:

DF02: EK-ODF02-PS

DF03: EK-ODF03-PS

- User's guides:

DF02: EK-ODF02-UG

DF03: EK-ODF03-UG

DF02/DF03 Components List

Table DF-1 DF02 Components List

Option/Parts List	Description
DF02-AA	Basic modem (no ACU module)
70-17211 54-12498	Telephone line interface board Modem board
DF02-AC	Same as above, plus:
M7177-YA	Automatic call unit (ACU) board

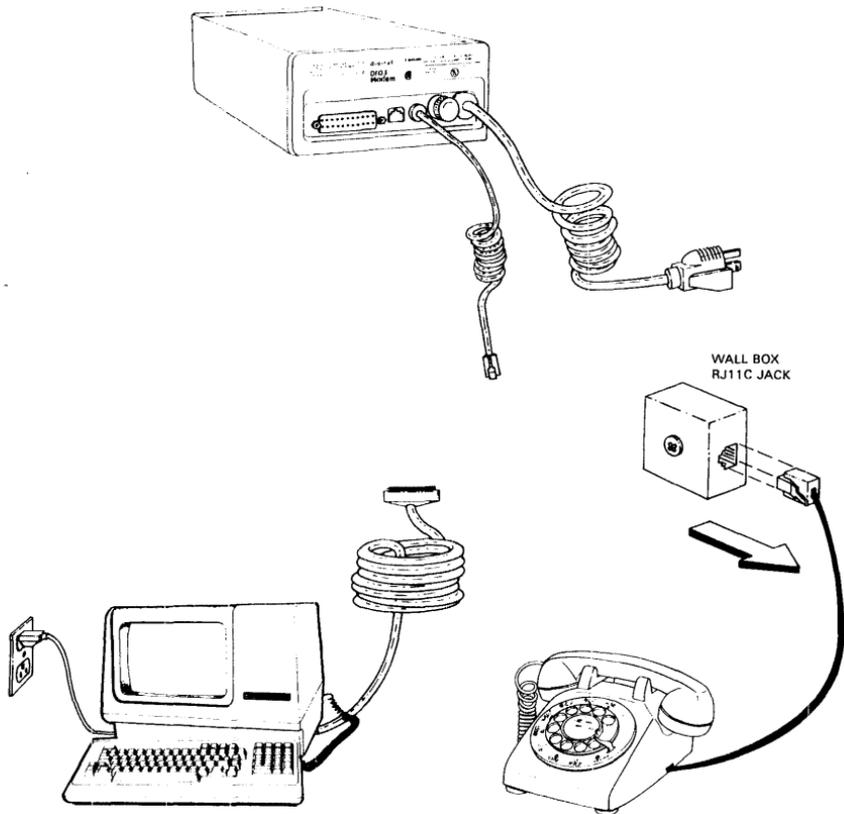
Table DF-2 DF03 Components List

Option/Parts List	Description
DF03-AA	Basic modem (no ACU board)
70-17298 M5800	Telephone line interface board Modem board
DF03-AC	Same as above, plus:
M7177-YA	Automatic call unit (ACU) board

DF02/DF03 INSTALLATION

Installation Procedure

STEP 1. UNPLUG TELEPHONE FROM WALL BOX.

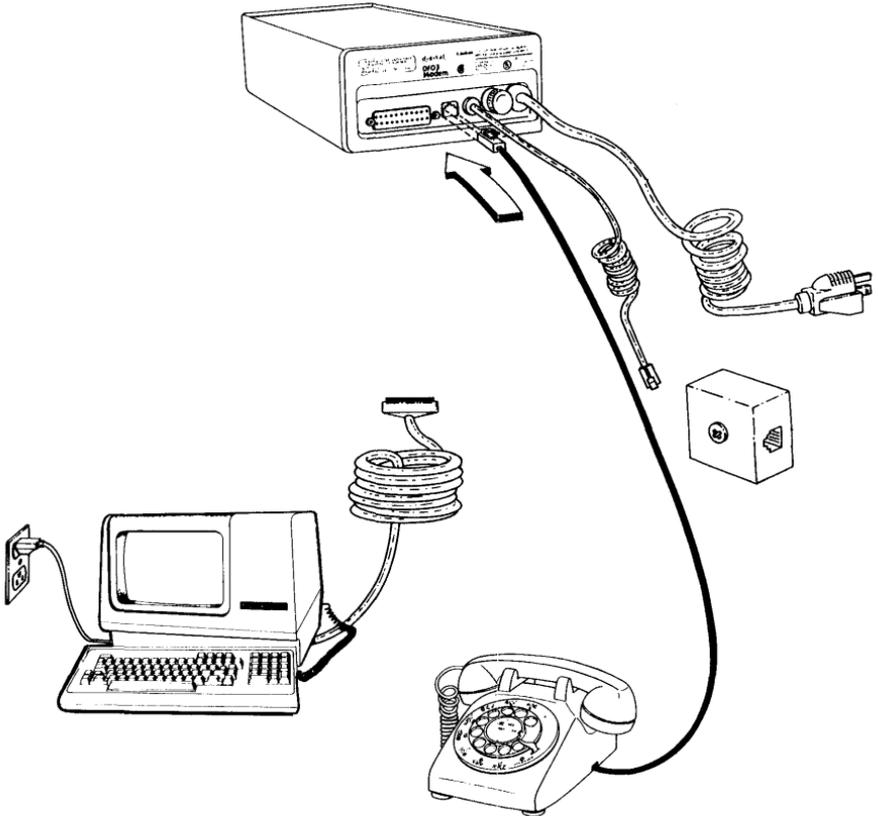


MX-3440

DF02/DF03 INSTALLATION

Installation Procedure (Cont)

STEP 2. PLUG TELEPHONE INTO JACK ON MODEM.

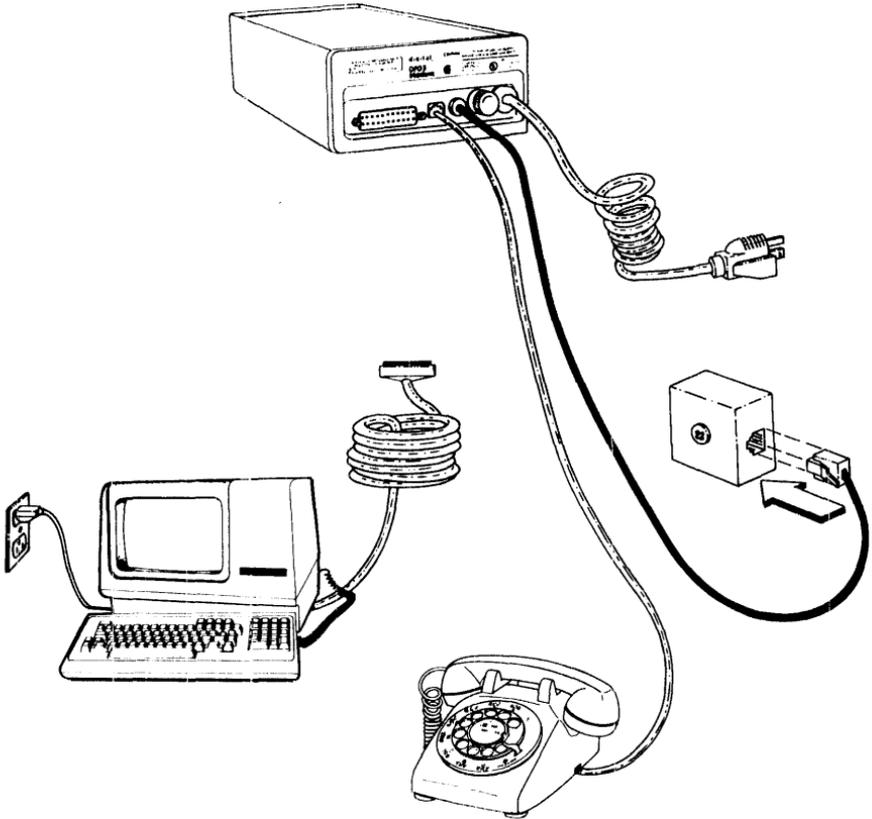


MC-3441

DF02/DF03 INSTALLATION

Installation Procedure (Cont)

STEP 3. PLUG MODEM MODULAR JACK INTO WALL BOX.



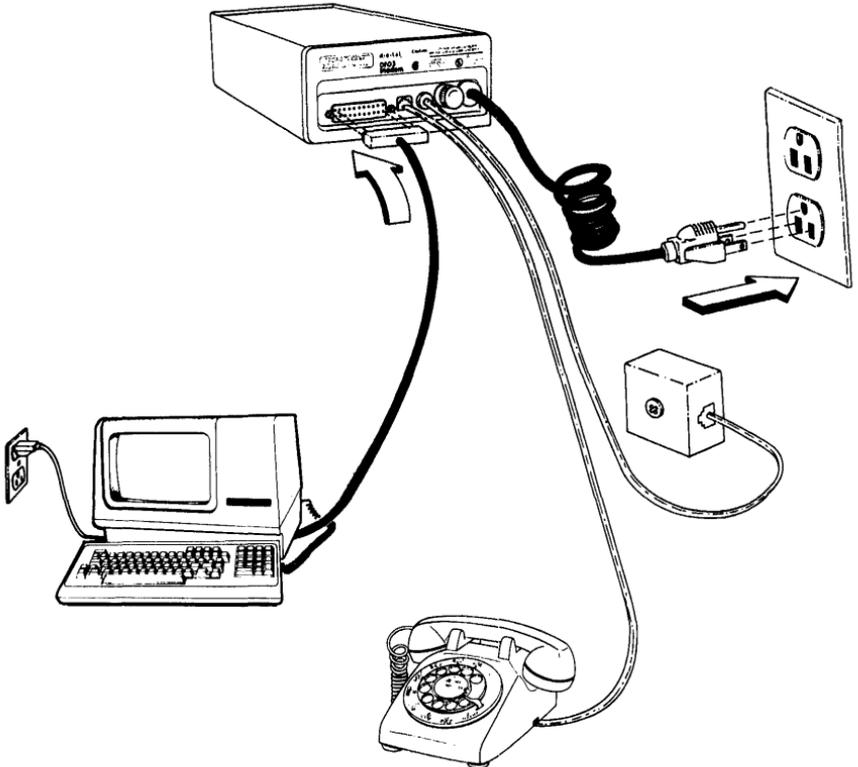
MC-3442

DF02/DF03 INSTALLATION

Installation Procedure (Cont)

STEP 4. PLUG TERMINAL CABLE INTO MODEM EIA CONNECTOR.

STEP 5. PLUG MODEM A.C. CORD INTO WALL OUTLET.

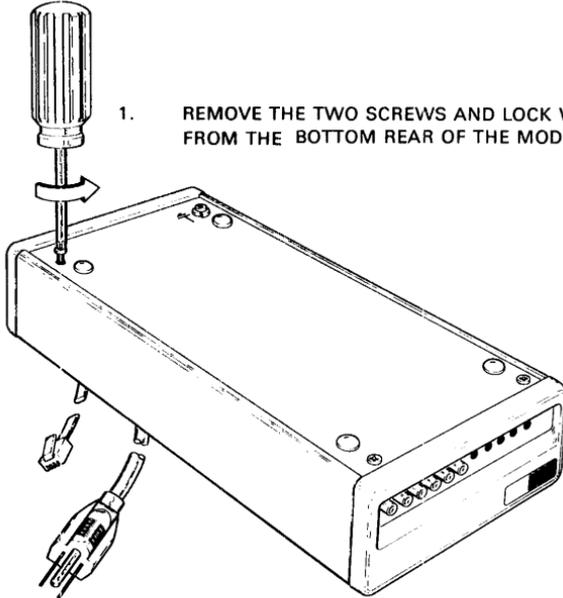


MF-2443

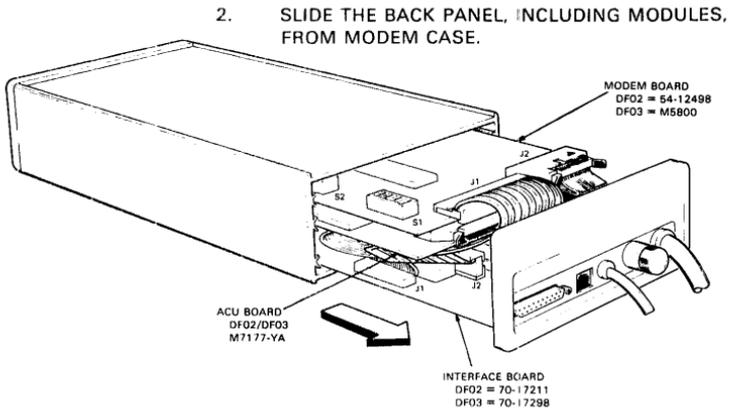
DF02/DF03 INSTALLATION

Modem Options

TO ACCESS DF02 OR DF03 MODULES, PERFORM THE FOLLOWING:



1. REMOVE THE TWO SCREWS AND LOCK WASHERS FROM THE BOTTOM REAR OF THE MODEM CASE.



2. SLIDE THE BACK PANEL, INCLUDING MODULES, FROM MODEM CASE.

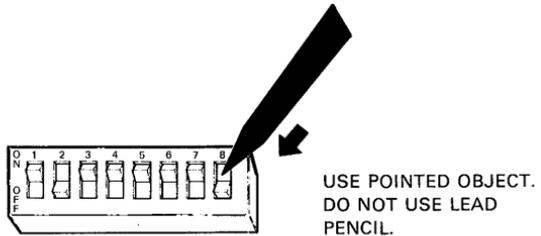
MX-3518

Modem Options (Cont)

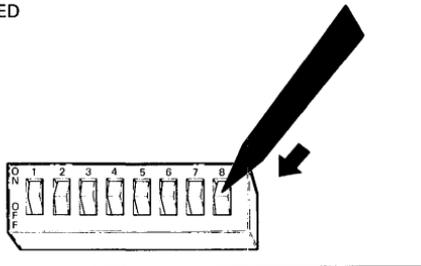
MODULE SWITCH PACKS

DF02/DF03 modules may be equipped with one of three types of switch packs as shown below. On early versions of DF03, jumpers are used to select options. On later versions, beginning with serial # ASA 3500 for DF03-AA and serial # ASA 6400 for DF03-AC, switch packs are used to select options.

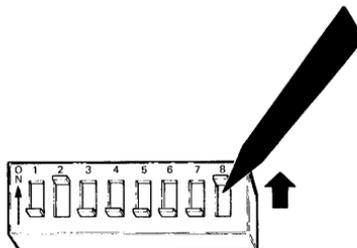
RAISED



RECESSED



SLIDE

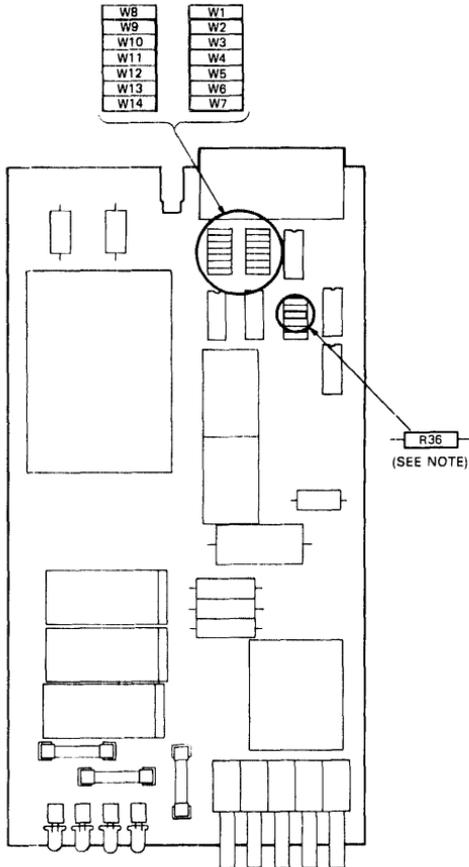


TK-7906

DF02/DF03 INSTALLATION

Modem Options (Cont)

DF02 INTERFACE BOARD (70-17211)



NOTE:
THE DF02 IS FACTORY SHIPPED
WITHOUT R36 DISABLING
REQUEST TO SEND.

MK-3444

Modem Options (Cont)

Table DF-3 DF02 TLI Interface Board Option Jumpers

Jumper Options		W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	W14
CB Indication	Normal* Forced	OUT* IN													
Grounds	Common* Separate		IN* OUT												
CB CF Indication	Common* Separate			IN* OUT											
DF02-AA/AC Configuration	AA (STD) AC (ACU)				OUT IN					OUT IN	OUT IN	IN OUT		OUT IN	
CC Indication	Early* Delayed Forced					IN* OUT OUT			IN* IN OUT				OUT* IN OUT		
Make Busy	Enabled Disabled*						IN OUT*								
CD Indication	Normal* Forced							OUT* IN							
CC Indication Analog Loop	ON* OFF														OUT* IN

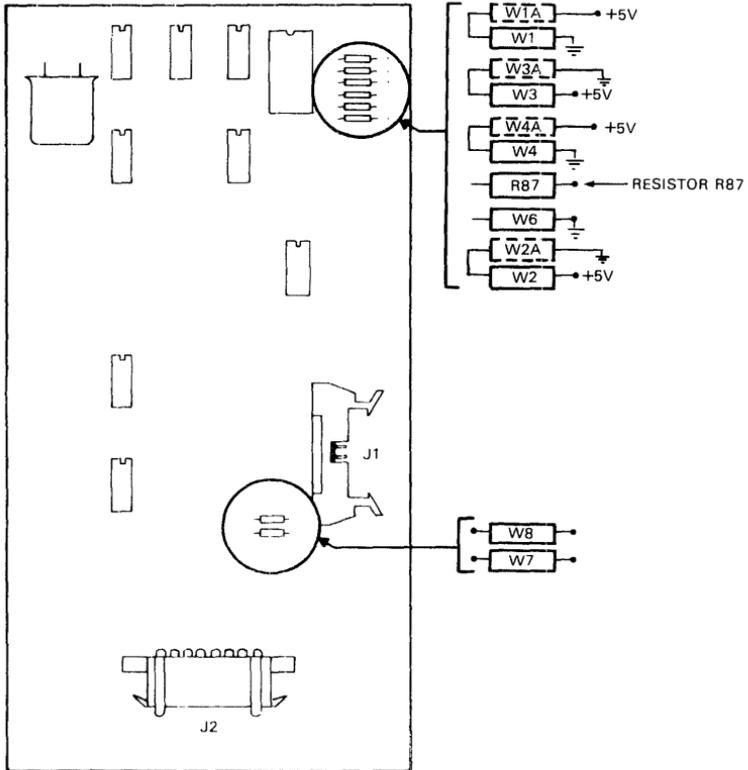
NOTE: Equipment with full modem control may need CB and CC indication forced for DF02-AC.
As a fail-safe feature, make busy is permanently off (no option).

*Standard factory configuration

DF02/DF03 INSTALLATION

Modem Options (Cont)

DF02 MODEM BOARD (54-12498)



MK 3445

Modem Options (Cont)

Table DF-4 DF02 Modem Board Jumper Options

Jumper Options		W1	W1A	W2	W2A	W3	W3A	W4	W4A
Send Space Disconnect	Enable* Disable	IN OUT	OUT IN						
Receive Data Rate	0 to 300 b/s* 9 to 600 b/s			IN OUT	OUT IN				
Receive Space Disconnect	≈ 1.5 Sec (Long)* ≈ 0.3 Sec (Short)					IN OUT	OUT IN	IN OUT	OUT IN

NOTE 1: The automatic answer feature is permanently enabled (no option). Loss of carrier disconnect is permanently enabled (no option).

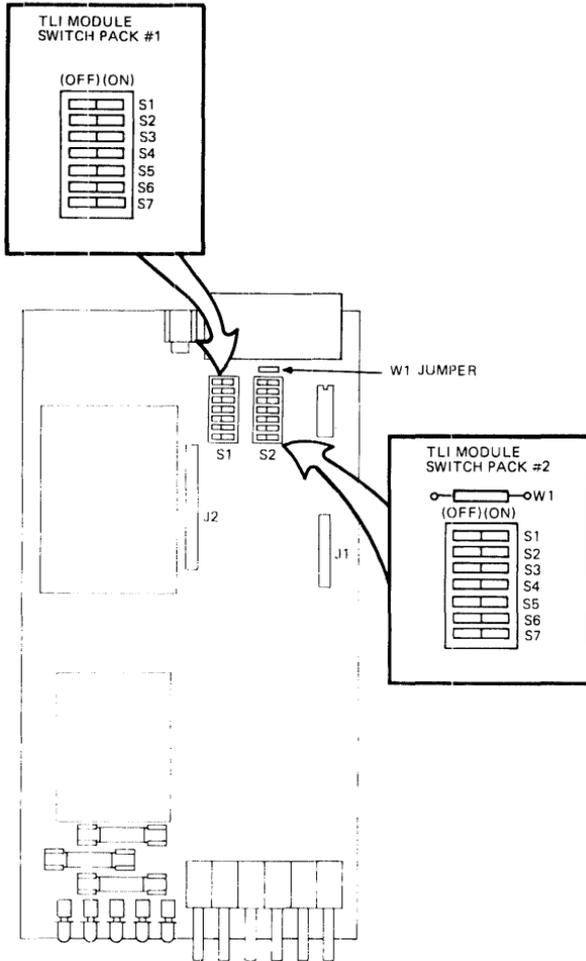
NOTE 2: W6, W7, and W8 are factory installed and are not used for any application of DF02.

*Standard factory configuration.

DF02/DF03 INSTALLATION

Modem Options (Cont)

DF03 TLI INTERFACE BOARD (70-17298)



70-17298

Modem Options (Cont)

Table DF-5 TLI Module Switch Pack 1 Options

Option	Switch Jumper**	S1-2 W12	S1-3 W13	S1-4 W14	S1-5 W15	S1-6 W16	S1-7 W17
DF03-AA/AC Configuration (Also Switch) Pack #2	AA (STD)* AC (ACU)	OFF ON	OFF ON	ON OFF		OFF ON	
Interface Terminal Timing	Enabled Disabled*				ON OFF		
Interface Speed Select	Enabled Disabled*						ON OFF

NOTE: S1-1 is not used.

*Standard factory configuration.

**On earlier versions, jumpers replace switches in same location.

Table DF-6 TLI Module Switch Pack 2 Options

Option	Switch Jumper**	S2-1 W21	S2-2 W22	S2-3 W23	S2-4 W24	S2-5 W25	S2-6 W26	S2-7 W27
Interface Ring Indicate	Enabled* Disabled	ON OFF						
Interface ANL Control	Enabled Disabled*		ON OFF					
Interface RDL Control	Enabled Disabled*			ON OFF				
DF03-AA/AC Configuration (Also Switch) Pack #1	AA (STD)* AC (ACU)				OFF ON			
Interface Speed Indicate	Normal Enabled* Alternate Enabled Disabled					ON OFF OFF		OFF ON OFF
Interface Test Mode Indicate	Enabled Disabled*						ON OFF	

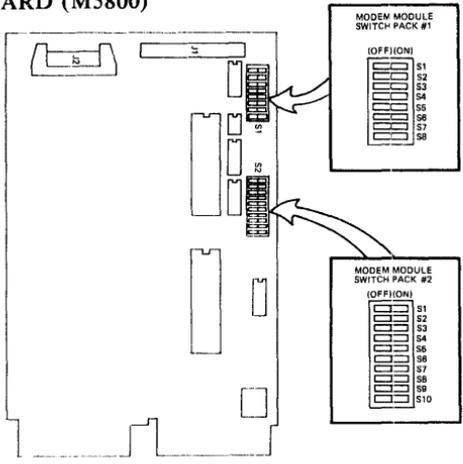
*Standard factory configuration.

**On earlier versions, jumpers replace switches in same location.

DF02/DF03 INSTALLATION

Modem Options (Cont)

DF03 MODEM BOARD (M5800)



REV. 2011

Table DF-7 Modem Module Switch Pack 1 Options

Option	Switch Jumper**	S1-1 W11	S1-2 W12	S1-3 W13	S1-4 W14	S1-5 W15	S1-6 W16	S1-7 W17	S1-8 W18
Receiver Timing	Enabled Disabled*	ON OFF							
Transmitter Timing	Enabled Disabled*		ON OFF						
Interface Speed Indicate	Enabled* Disabled			ON OFF					
Terminal Timing	Enabled* Disabled Slave				OFF OFF ON	ON OFF OFF			
Mode	ASYNC* SYNC						OFF ON		
Character Length	9 Bits 10 Bits*							OFF ON	
Receiver Responds To RDL	Enabled* Disabled								OFF ON

*Standard factory configuration.

**On earlier versions, jumpers replace switches in same location.

Table DF-8 Modem Module Switch Pack 2 Options

Option	Switch Jumper**	S2-1 W21	S2-2 W22	S2-3 W23	S2-4 W24	S2-5 W25	S2-6 W26	S2-7 W27	S2-8 W28	S2-9 W29	S2-10 W30
Loss of Carrier Disconnect	Enabled* Disabled	ON OFF									
Send Space Disconnect	Enabled* Disabled		ON OFF								
Auto Answer	Enabled* Disabled			OFF ON							
Speed	Dual* High Only				OFF ON						
DSR Indication in ANL	Enabled* Disabled					ON OFF					
Long Space Disconnect	Enabled* Disabled						ON OFF				
CTS, CAR Detect Interface Indication	Common Separate*							ON OFF			
CAR Detect Interface Indication	Normal* Forced								ON OFF		
DSR Interface Indication	Normal* Forced									OFF ON	
CTS Interface Indication	Normal* Forced										OFF ON

NOTE: When selecting options on the modem board, the DSR indication in ANL cannot be selected with DSR interface indication.

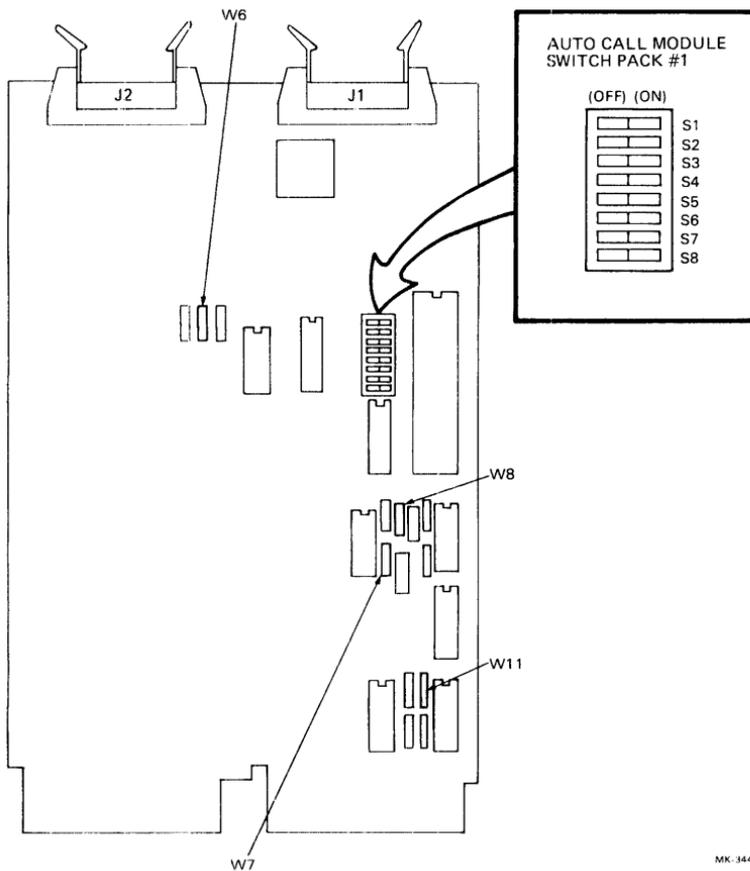
*Standard factory configuration.

**On earlier versions, jumpers replace switches in same location.

DF02/DF03 INSTALLATION

Modem Options (Cont)

AUTO CALL UNIT (M7177)



Modem Options (Cont)

Table DF-9 Jumper Options on the Automatic Call Unit (DF02/03-AC)

Jumper Options		W6	W7	W8	W11
Local Copy	Enable Disable*	IN OUT			
Dialer Speed	10 Pulses/s* 20 Pulses/s		IN OUT	OUT IN	
Answer Tone Abort Timer	27 Sec* 52 Sec				IN OUT

*Standard factory configuration.

Table DF-10 Switch Options on the Automatic Call Unit (DF02/03-AC)

Switch Option		S1	S2	S3	S4	S5	S6	S7	S8
Parity	Enable Inhibit*					ON OFF			
Parity	Even Enable Odd Enable*	OFF ON							
Character Length	7 Bits 8 Bits*		ON OFF	OFF OFF					
Stop Bit Select	2 Stop Bits 1 Stop Bit*				OFF ON				
Communication Bit Rate	110 b/s 300 b/s* 1200 b/s*						ON OFF OFF	OFF ON OFF	OFF OFF ON

*Standard factory configuration. For DF02; 300 b/s. For DF03; 1200 b/s.

DF02/DF03 INSTALLATION

Modem Options (Cont)

Table DF-11 Detailed Modem Options

Option Function	Option/Description	Factory Configuration
Interface Terminal Timing	When enabled, allows external transmit timing (EIA Pin 24) to control internal modem clock. In slave mode, receiver clock controls transmit clock.	Disabled
Receiver Timing	When enabled, allows receiver timing signal on EIA Pin 17. This option must be enabled for synchronous operation.	Disabled*
Transmit Timing	When enabled, allows transmit timing signal on EIA Pin 15. This option must be enabled for synchronous operation.	Disabled*
Mode Select	Selects asynchronous or synchronous operation. This option must be set to sync for synchronous operation.	Async*
Character Length	Selects data character length of nine or ten bits.	10 Bits
Receiver Responds to Remote Digital Loopback	When disabled, the receiver logic will not allow remote digital loopback testing.	Enabled
Loss of Carrier Disconnect	When enabled, the modem terminates the call if carrier is lost for more than 350 ms.	Enabled
Send Space Disconnect	When enabled, the modem transmits three seconds of spacing signal at end of a call. Used with long space disconnect option. This option must be disabled for synchronous operation.	Enabled*
Long Space Disconnect	When enabled, the modem will terminate a call upon receiving about 1.6 seconds of spacing signal. This option must be disabled for synchronous operation.	Enabled*

*These options must be modified for synchronous operation.

Modem Options (Cont)

Table DF-11 Detailed Modem Options (Cont)

Option Function	Option/Description	Factory Configuration
Auto Answer	When enabled, the auto answer circuitry allows the modem to respond to ring indicate.	Enabled
Terminal Timing	<p>Allows for three possible transmitter timing sources.</p> <ol style="list-style-type: none"> 1. Internal (Enable) – Transmit clock from master oscillator. 2. External (Disable) – Transmit clock from external oscillator source through EIA Pin 24 3. Slave – Transmit clock is derived from receive clock. 	Enabled
Speed Mode	When in dual mode, both low and high speed data circuits work. In high only, the 1200 b/s speed is operative.	Dual
Interface Speed Selection	When enabled, the terminal can select modem speed by controlling EIA Pin 23. When Pin 23 is active, 1200 b/s operation is selected and when inactive, 300 b/s speed is selected.	Disabled
Interface Speed Indication	When enabled, the modem provides an indication of modem speed to the terminal on EIA Pin 12. When Pin 12 is active, 1200 b/s operation is selected and when inactive, 300 b/s speed is selected.	Enabled
Interface Speed Pin Indication	In normal, the speed indicator is on EIA Pin 12. In alternate, the speed indicator is on EIA Pin 11. Disabled, there is no interface speed indication.	Normal
Interface RDL Control	When enabled, a positive voltage on EIA Pin 21 selects RDL mode.	Disabled

DF02/DF03 INSTALLATION

Modem Options (Cont)

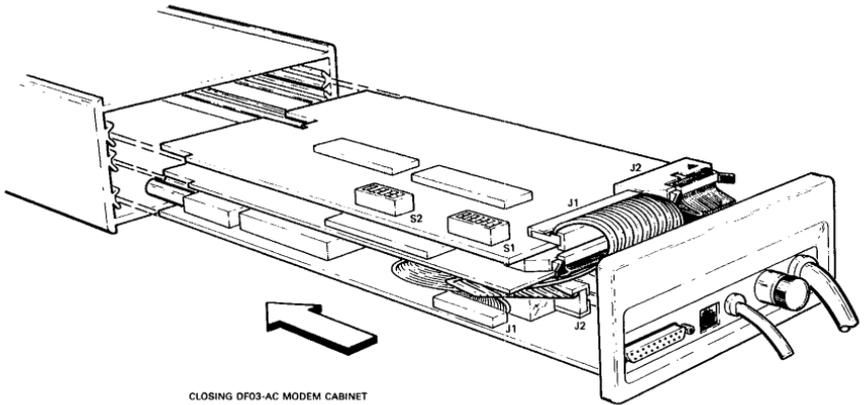
Table DF-11 Detailed Modem Options (Cont)

Option Function	Option/Description	Factory Configuration
Interface ANL Control	When enabled, a positive voltage on EIA Pin 18 selects modem analog loopback. Disabled, opens Pin 18 to modem.	Disabled
Interface Ring Indication	When enabled, allows ring indicate signal out to EIA Pin 22. When disabled, prevents ring indicate from going to the interface.	Enabled
Interface Test Mode Indicate	When enabled, a positive voltage will appear on EIA Pin 25 when the modem enters any test mode.	Disabled
DSR Indication in ANL	When enabled, data set ready comes on in analog loopback test mode.	Enabled
CTS, CAR Detect Interface Indication	When common, the CTS lead is forced off whenever the CAR detect lead goes off. Separate, both signals are independent of each other.	Separate
CAR Detect Interface Indication	When normal, carrier detect (EIA Pin 8) follows the modem carrier signal. Forced, makes EIA Pin 8 high all the time.	Normal
DSR Interface Indication	When normal, data set ready (EIA Pin 6) follows the modem signal. Forced, makes EIA Pin 6 high all the time.	Normal
CTS Interface Indication	When normal, clear to send (EIA Pin 5) follows the modem signal. Forced, makes EIA Pin 5 high all the time.	Normal

Modem Options (Cont)

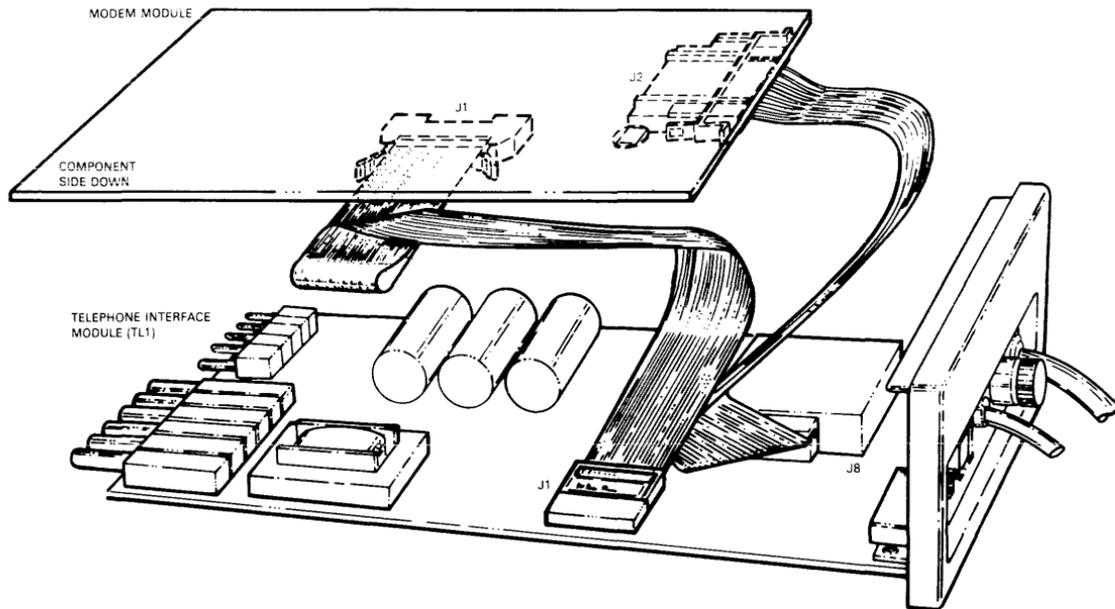
REASSEMBLY PROCEDURE:

1. Insert modem board in top guide.
2. Insert ACU board in center guide.
3. Insert interface board in bottom guide.
4. Slide all boards into case. Secure with screws and lock washers removed earlier.

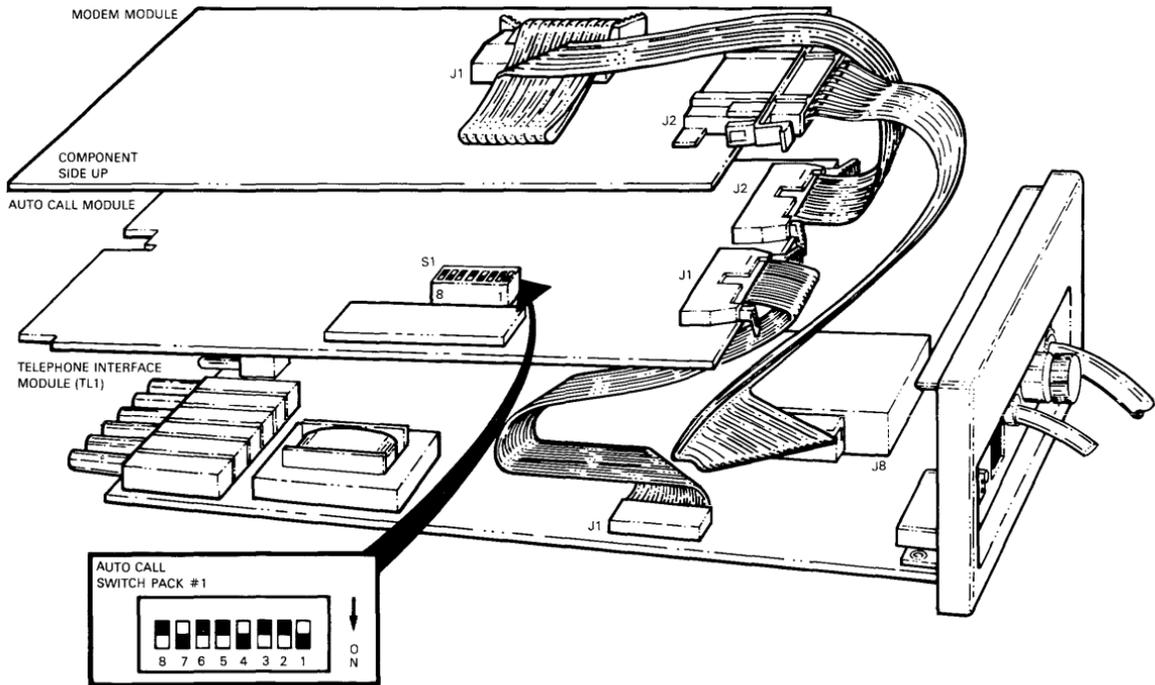


MI-2449

DF02-AA Cabling



DF02-AC Cabling



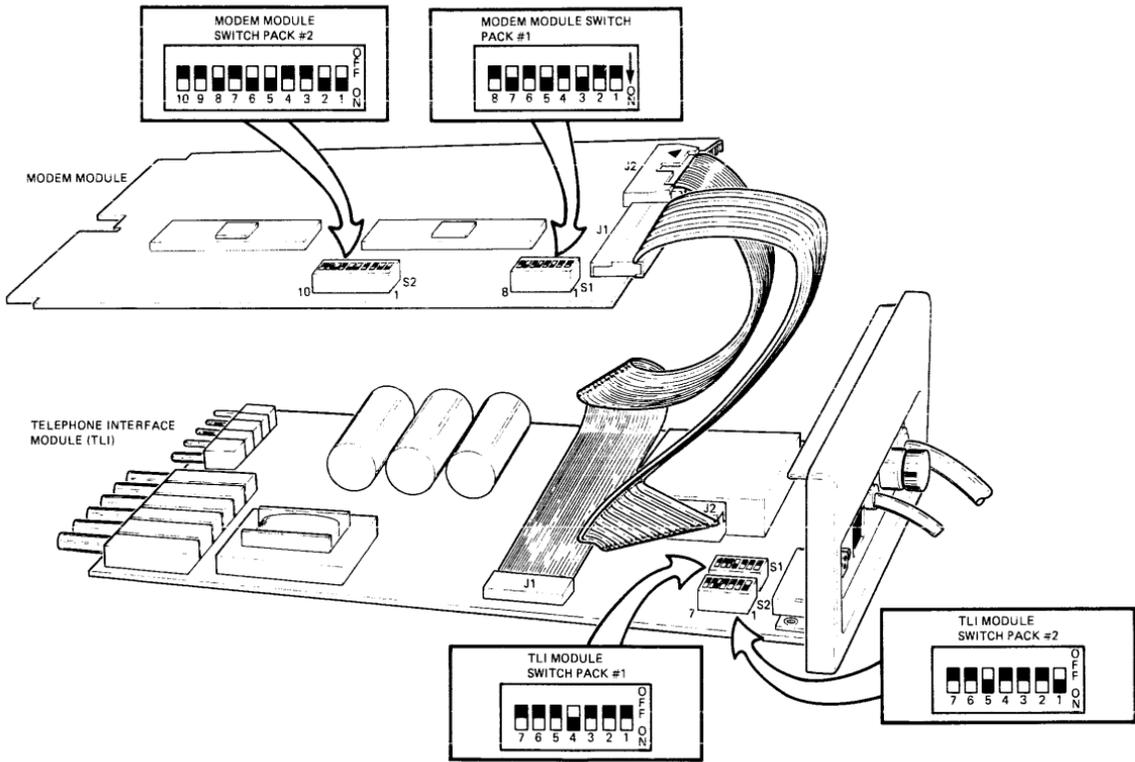
DF-25

June 1982

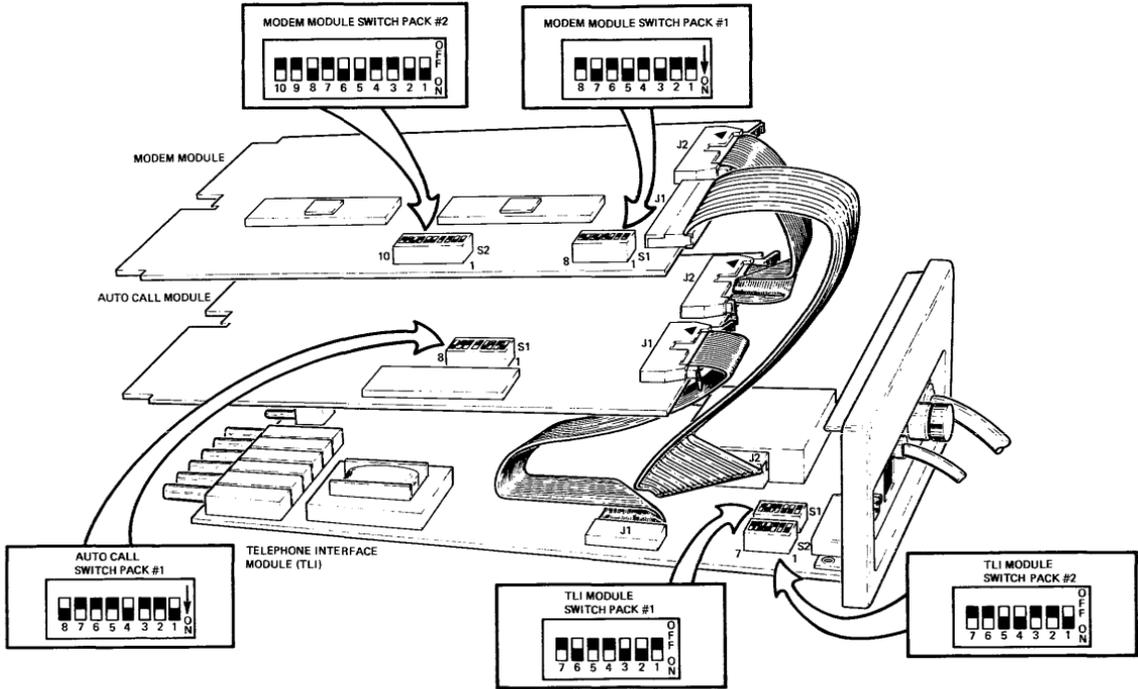
DF02/DF03 CABLING

MK-2525

DF03-AA Cabling



DF03-AC Cabling



DF-27

June 1982

TX-1900

DF02/DF03 CABLING

DF02/DF03 MAINTENANCE AIDS

DF02/DF03 Test Procedures

GENERAL

This section provides modem checkout procedures to help isolate data communication problems related to DF02 and DF03 modems. All test functions have simplified diagrams representing the test features. In test features where a terminal is used, a computer system (interface) could also be used.

The correct procedure to test and verify a modem communications link is shown in Figure 1. The five modem test areas will be discussed in the next section.

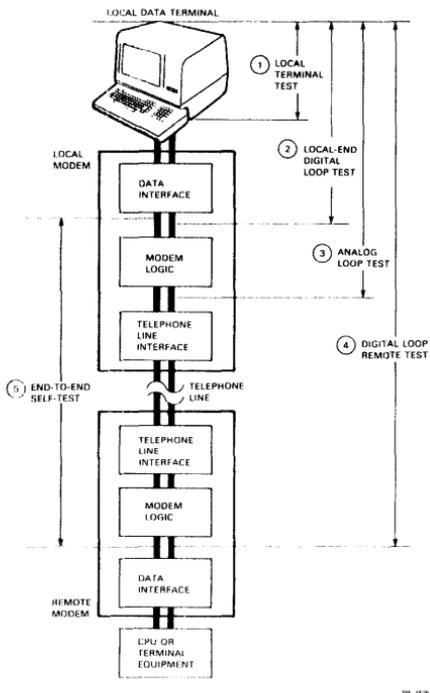


Figure 1 Data Path Acceptance Test Sequence

DF02/DF03 Test Procedures (Cont)

TEST AREA 1 – LOCAL TERMINAL TEST (FIGURE 2)

These tests determine if the terminal or computer interface is working correctly. To verify the terminal or computer interface, perform the following:

- Terminal Test
 - Set terminal to off-line local test and type test message. Verify that correct message is received.
 - Set terminal to on-line and install EIA cable loopback connector (that is, H325) and repeat test message verification.
- Computer Interface Test
 - Execute a test message with the communication interface set to internal loopback mode and verify that correct message is received.
 - Set the communication interface to normal mode and install an EIA cable loopback connector (that is, H325). Send test message and verify.

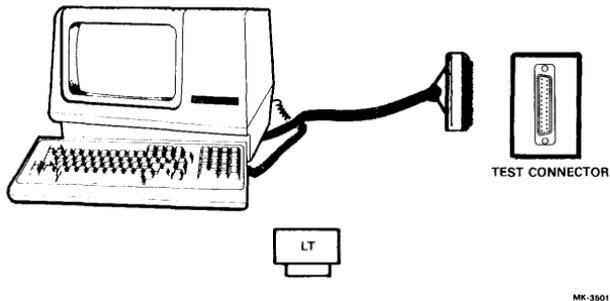


Figure 2 Local Terminal Test

DF02/DF03 MAINTENANCE AIDS

DF02/DF03 Test Procedures (Cont)

TEST AREA 2 - LOCAL-END DIGITAL LOOPBACK TEST (DF02 ONLY, SEE FIGURE 3)

This test area determines if the modem EIA data-level converters are working correctly. This test requires a terminal or computer to input the test message. This test is not supported on DF03.

PROCEDURE:

1. Verify that the DTR LED is ON.
2. Configure the following test switches:
 - a. Set DATA/TALK switch to DATA position (OUT).
 - b. Set DTL/ANL switch to DTL position (OUT).
 - c. Set OPER/TEST switch to TEST position (IN).
3. Verify that the TEST LED comes ON. (For DF02-AA, go to Step 5.)
4. For DF02-AC, press the ANS switch to force modem off hook (OH). Verify that the OH LED comes ON. Perform Step 5 while OH LED is ON. OH LED will go OFF in 17 seconds and disable test.
5. Type a test message and verify that the message is received.
6. To terminate, release the OPER/TEST switch to OPER position (OUT).

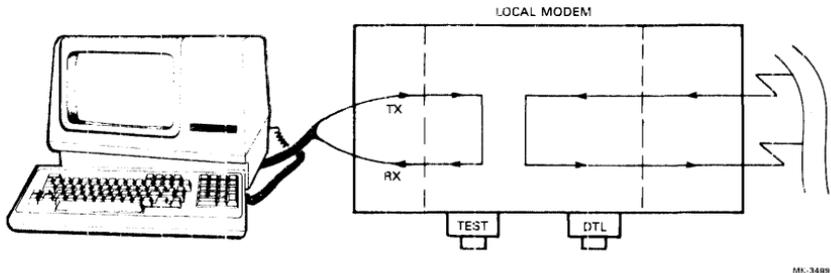


Figure 3 Local-End Digital Loopback Test (DF02 Only)

DF02/DF03 Test Procedures (Cont)

TEST AREA 3 – ANALOG LOOPBACK TEST (FIGURES 4 & 5)

Test area 3 generally has two separate tests; one called analog loopback self-test and the other called analog loopback. Both tests verify that the modem can transmit and receive data at the local modem with no errors. Each of these tests are discussed below.

Analog Loopback Self-Test (DF03 Only) (Figure 4)

This test uses an internal test generator for data transmission and a test comparator on the receiver to detect errors. If errors occur, the modem carrier LED flashes ON and OFF after the test begins. It is normal for the carrier LED to flash once or twice at the beginning of the test. This test is not supported on DF02.

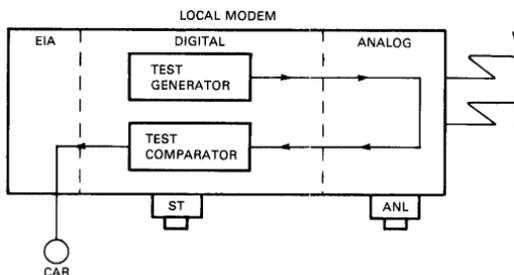


Figure 4 Analog Loopback Self-Test (DF03 Only)

PROCEDURE:

1. Verify that the CAR and DSR LEDs are OFF.
2. Configure the following test switches:
 - a. Set the HIGH/LOW speed switch to the desired speed – low speed (OUT), high speed (IN).
 - b. Set the ANL switch to the IN position.
 - c. Set the ST switch to the IN position.
3. Verify that the TEST LED comes ON. If high speed was selected, the HS LED will also come ON.

DF02/DF03 MAINTENANCE AIDS

DF02/DF03 Test Procedures (Cont)

4. Observe that the CAR LED comes ON and stays ON. This may take up to three seconds. It may flash once or twice at the beginning. Verify that the CAR LED never flashes again or goes OFF. If it does, the DF03 modem is defective.
5. To check the other modem speed, just change the position of the HS switch from its present position. The CAR LED again flashes at first, then should remain ON as in Step 4.
6. To terminate, release the ANL and ST switches to the OUT position.

Analog Loopback Test (Figure 5)

This test uses a data terminal or computer interface to input the test message. To verify the data, the operator must observe that the received data is correct. This test is a very useful test, checking both the terminal and the modem. The following describes the test procedures for each modem.

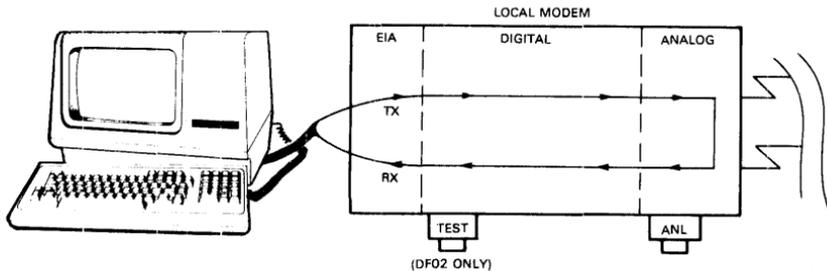


Figure 5 Analog Loopback Test

DF02 Analog Loopback Test –

PROCEDURE:

1. Verify that the DTR LED is ON.
2. Configure the following test switches:
 - a. Set DATA/TALK switch to DATA position (OUT).
 - b. Set DTL/ANL switch to ANL position (IN).
 - c. Set OPER/TEST switch to TEST position (IN).
3. Verify that the TEST LED comes ON.

DF02/DF03 Test Procedures (Cont)

4. Press and hold the ANS switch for one second, then release.
5. Verify that the OH LED comes ON.
6. Verify that the CAR LED comes ON.
7. Type a test message on the terminal and verify that the correct data is received. This verifies the modem's answer data channel.
8. Press and hold the ORG switch for one second, then release.
9. Verify that the CAR LED remains ON.
10. Type and verify the test message as in Step 7. This verifies the modem's originate data channel.
11. To terminate, set the DTL/ANL and OPER/TEST switches to the OUT position. The CAR LED goes OFF followed by the OH LED in approximately 17 seconds.

DF03 Analog Loopback Test –**PROCEDURE:**

1. Verify that the DTR LED is ON and the CAR and DSR LEDs are OFF.
2. Configure the following test switches:
 - a. Set the HIGH/LOW speed switch to the desired speed – low speed (OUT), high speed (IN).
 - b. Set the ANL switch to the IN position.
3. Verify that the TEST LED comes ON. If the high speed was selected, the HS LED will also come ON.
4. Observe that the CAR LED comes ON within three seconds and stays ON.
5. Type a test message on the terminal and verify that the correct data is received. Incorrect data indicates a defective modem or wrong terminal speed.
6. To terminate, set the ANL switch to the OUT position.

TEST AREA 4 – DIGITAL LOOPBACK TESTS (FIGURES 6-9)

Test area 4 also has two separate tests (similar to test area 3) except that the test function is digital loopback with either a self-test mode or terminal/computer test. The digital loopback tests allow the complete network to be checked including the remote modem logic. This test verifies the telephone line and the receiver/transmit logic of the remote modem. This test does not verify any EIA level conversion at the remote modem.

DF02/DF03 MAINTENANCE AIDS

DF02/DF03 Test Procedures (Cont)

The DF03 modem also has three other tests that are associated with digital loopback. These tests are associated with the self-test logic which uses a special switch called remote digital loopback (RDL). The RDL function only works in the high-speed mode. This RDL switch allows the operator at the local modem to cause the remote modem to automatically switch to digital loopback without pressing the remote modem's DTL switch. No operator is needed at the remote site. The following describes these various modem tests.

DF02 and DF03 Digital Loopback Tests (Figure 6)

PROCEDURE:

1. Verify that the DTR LED is ON.
2. Configure the following test switches:
 - a. Set DATA/TALK switch to TALK position (IN).
 - b. At remote DF02 modem, have someone set the DTL/ANL switch to the DTL position (OUT). The OPER/TEST switch must also be pressed to the TEST position (IN).
 - c. At remote DF03 modem, have someone press the DTL switch to the IN position. Set the HIGH/LOW speed switch to the desired speed – low speed (OUT), high speed (IN).
3. Remove telephone handset from cradle and dial the remote modem. For DF02 modems, observe that the OH LED comes ON.
4. When answer tone is heard, set the DATA/TALK switch to the DATA position (OUT). Place the telephone handset back on the cradle.
5. Verify the following LEDs:
 - a. DF02 – the CAR LED is ON.
 - b. DF03 – the CAR and DSR LEDs are ON.
6. Type a test message on the terminal and verify that the correct data is received.
7. To terminate, press the DATA/TALK switch to the TALK position (IN).
8. If test is performed at computer end, repeat the above procedure. The computer modem now becomes the local modem and the terminal modem is the remote. The computer end will now have to generate the test message and verify the results.
9. Return the DATA/TALK switch to DATA position (OUT) to allow automatic answer for incoming calls.

DF02/DF03 Test Procedures (Cont)

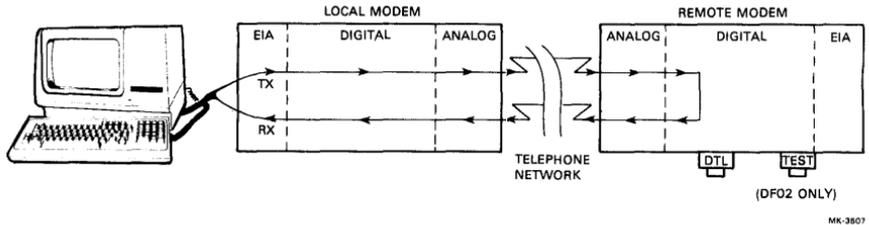


Figure 6 Digital Loopback

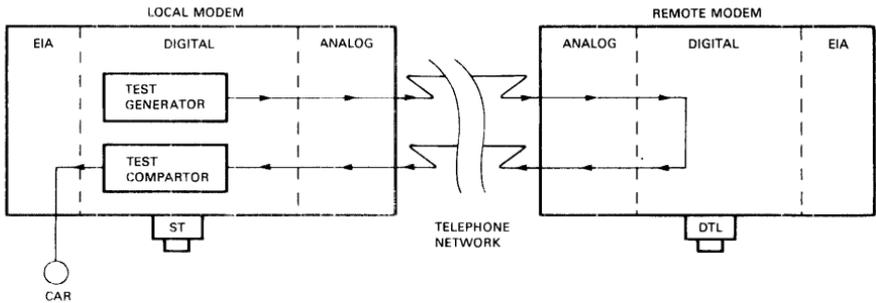
DF03 Digital Loopback Self-Test (Figure 7)

PROCEDURE:

1. Verify that the DTR LED is ON.
2. Configure the following test switches:
 - a. Set DATA/TALK switch to TALK position (IN).
 - b. Set ST switch to IN position.
 - c. At remote DF03 modem, have someone press the DTL switch to the IN position. Set the HIGH/LOW speed switch to the desired speed – low speed (OUT), high speed (IN).
3. Remove telephone handset from cradle and dial the remote modem.
4. When answer tone is heard, set the DATA/TALK switch to the DATA position (OUT). Place the telephone handset back on the cradle.
5. Verify that the CAR LED is ON. Observe that the CAR LED never flashes ON and OFF except at the very beginning of the test. If it does, then one of the modems or the telephone network is receiving errors. Return to local analog modem testing or end-to-end self-test to verify modems before suspecting the telephone network.
6. To terminate, release the ST switch and press the DATA/TALK switch to the IN position.
7. Return the DATA/TALK switch to DATA position (OUT) to allow automatic answer for incoming calls.

DF02/DF03 MAINTENANCE AIDS

DF02/DF03 Test Procedures (Cont)



MX-3504

Figure 7 Digital Loopback Self-Test (DF03 Only)

DF03 Remote Digital Loopback (Figure 8)

PROCEDURE:

1. Verify that the DTR LED is ON.
2. Configure the following test switches:
 - a. Set DATA/TALK switch to TALK position (IN).
 - b. Set HS switch to IN position.
 - c. Set RDL switch to IN position.
3. Remove telephone handset from cradle and dial remote modem.
4. When answer tone is heard, set the DATA/TALK switch to the DATA position (OUT). Place the telephone handset back on the cradle.
5. Observe that the CAR, DSR, HS, and TEST LEDs are all ON.
6. Type a test message on the terminal and verify that the correct data is received.
7. To terminate, press the DATA/TALK switch to TALK position (IN).

DF02/DF03 Test Procedures (Cont)

8. If test is performed at computer end, repeat the above procedure. The computer modem now becomes the local modem and the terminal modem is the remote. The computer end will now have to generate the test message and verify the results.
9. Return the DATA/TALK switch to the DATA position (OUT) to allow automatic answer for incoming calls.

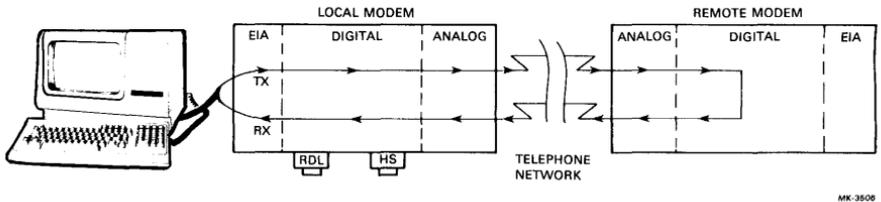


Figure 8 Remote Digital Loopback (DF03 Only)

DF03 Remote Digital Loopback Self-Test (Figure 9)

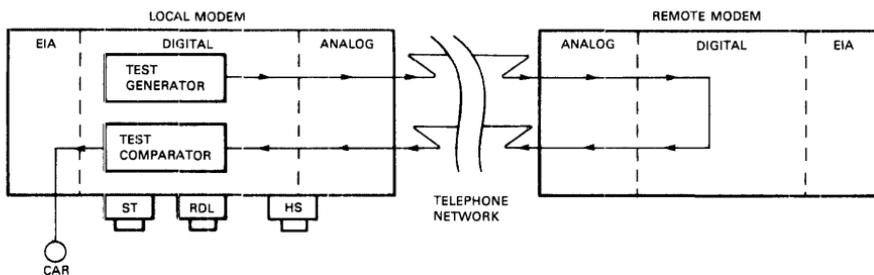
PROCEDURE:

1. Verify that the DTR LED is ON.
2. Configure the following test switches:
 - a. Set DATA/TALK switch to TALK position (IN).
 - b. Set HS switch to IN position.
 - c. Set RDL switch to IN position.
 - d. Set ST switch to IN position.
3. Remove telephone handset from cradle and dial remote modem.
4. When answer tone is heard, set the DATA/TALK switch to the DATA position (OUT). Place telephone handset back on the cradle.
5. Verify that the CAR, HS, and TEST LEDs are all ON. Observe that the CAR LED never flashes ON and OFF except at the very beginning of the test. If it does, then one of the modems or telephone networks is receiving errors. Return to local modem testing or go to end-to-end self-testing to help isolate the problem.

DF02/DF03 MAINTENANCE AIDS

DF02/DF03 Test Procedures (Cont)

6. To terminate, release the ST switch and press the DATA/TALK switch to the IN position.
7. Return the DATA/TALK switch to DATA position (OUT) to allow automatic answer for incoming calls.



MX-2803

Figure 9 Remote Digital Loopback Self-Test (DF03 Only)

TEST AREA 5 – END-TO-END SELF-TEST (DF03 ONLY, SEE FIGURE 10)

Test area 5 allows the local and remote modem to be verified over the telephone network. It separates the transmit and receive logic of both modems. This separation permits better problem isolation. A local modem may check out in the analog loopback test but fail in the digital loopback test. With this test, if the problem is not the telephone network, the failing transmitter or receiver should be located.

DF03 Modem End-to-End Self-Test (Figure 10)

PROCEDURES:

1. Configure the following test switches at both modems. This requires a second person at the remote site to set the same switches.
 - a. Set the HIGH/LOW speed switch to the desired speed – low speed (OUT), high speed (IN).
 - b. Set the ST switch to the IN position.
 - c. Set DATA/TALK switch at remote modem to the DATA position (OUT).
 - d. Set DATA/TALK switch at local modem to TALK position (IN) to allow dialing remote modem.

DF02/DF03 Test Procedures (Cont)

2. Remove telephone handset from cradle on local modem and dial the remote modem.
3. When answer tone is heard, set the DATA/TALK switch to the DATA position (OUT). Place the telephone handset back on the cradle.
4. Verify that the CAR and TEST LEDs are all ON. If in high-speed mode, the HS LED is also ON. Observe that the CAR LED never flashes ON and OFF except at the very beginning. Be sure to have the remote operator verify the LEDs on the remote modem. Any flashing of the CAR LED indicates data errors and distortion. Repeat this test more than once to rule out a defective telephone line before determining which modem is defective.
5. To terminate, release the ST switch and press the DATA/TALK switch to the IN position at both modems.
6. Return the DATA/TALK switch to DATA position (OUT) to allow automatic answer for incoming calls.

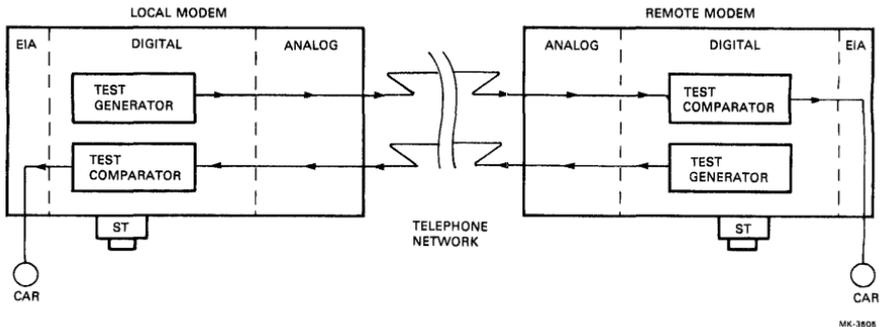


Figure 10 End-to-End Self-Test (DF03 Only)

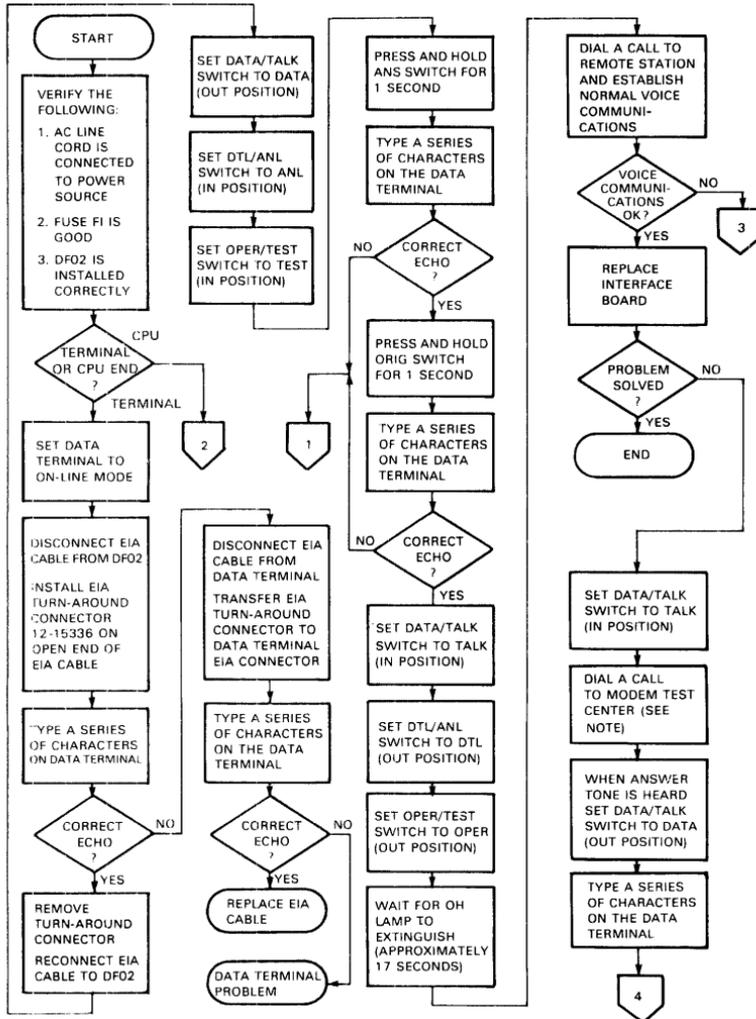
DF02 AND DF03 AUTO CALL TESTING

The testing of a DF02-AC or DF03-AC for auto call functions can easily be performed by doing any digital loopback test functions with the DATA/TALK switch in the DATA position (OUT), and dialing the remote modem by using the auto call message format. If the call is initiated via a terminal, when the modem receives the answer tone back, a character "A" will be returned to the terminal acknowledging that the call has been completed.

The test message may now be sent and the received data verified. If the DF03 self-test mode is used with digital loopback, then the CAR LED must be observed.

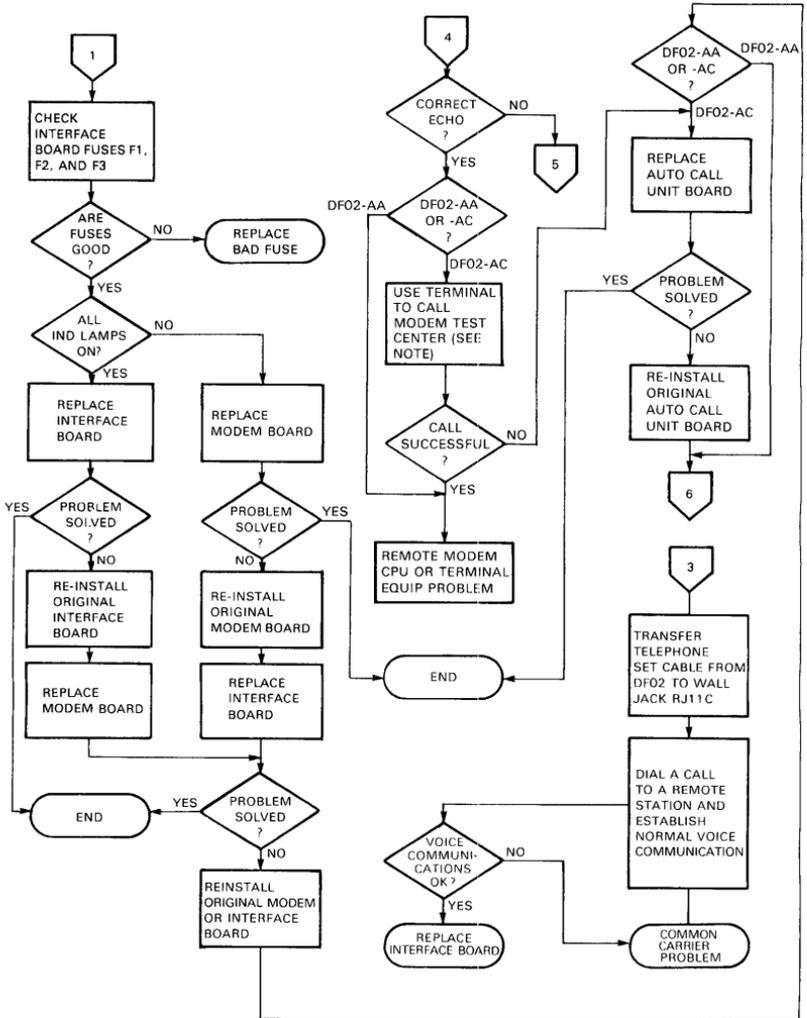
DF02/DF03 MAINTENANCE AIDS

DF02 Troubleshooting Procedures



MX-3432

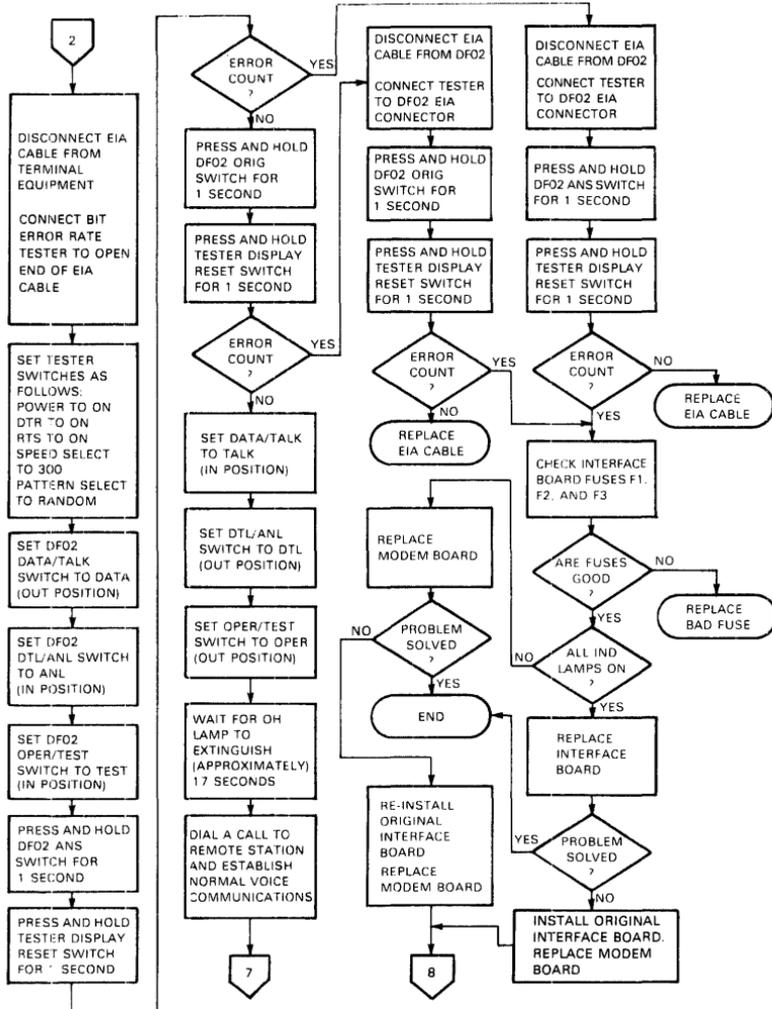
DF02 Troubleshooting Procedures (Cont)



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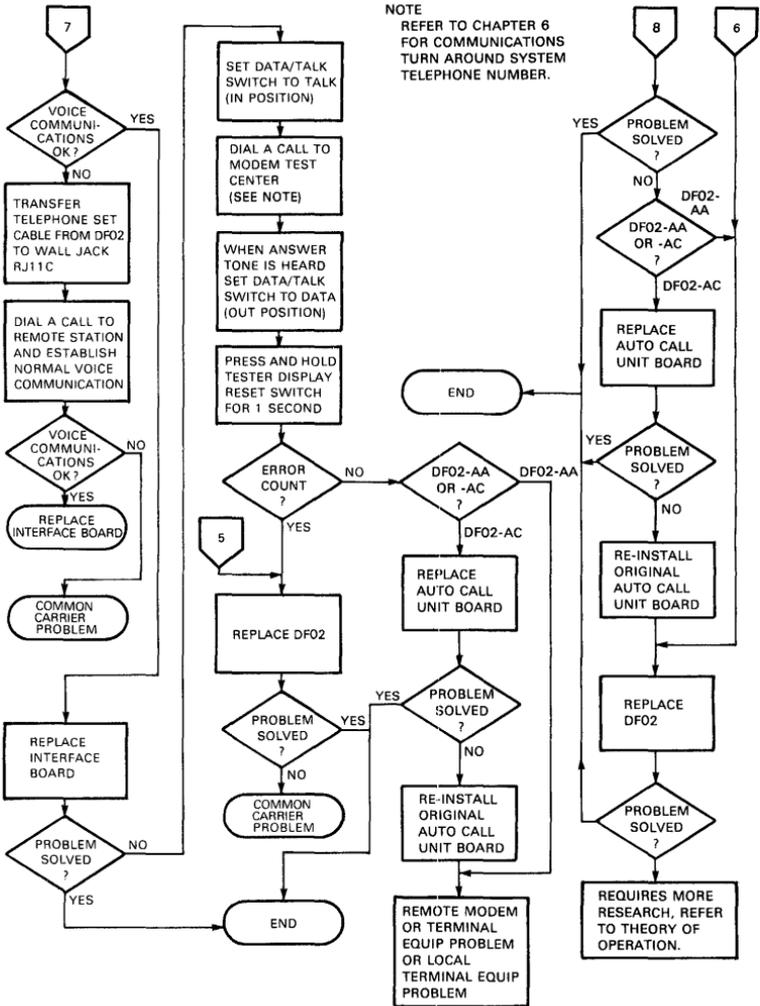
DF02/DF03 MAINTENANCE AIDS

DF02 Troubleshooting Procedures (Cont)



MK-3439

DF02 Troubleshooting Procedures (Cont)

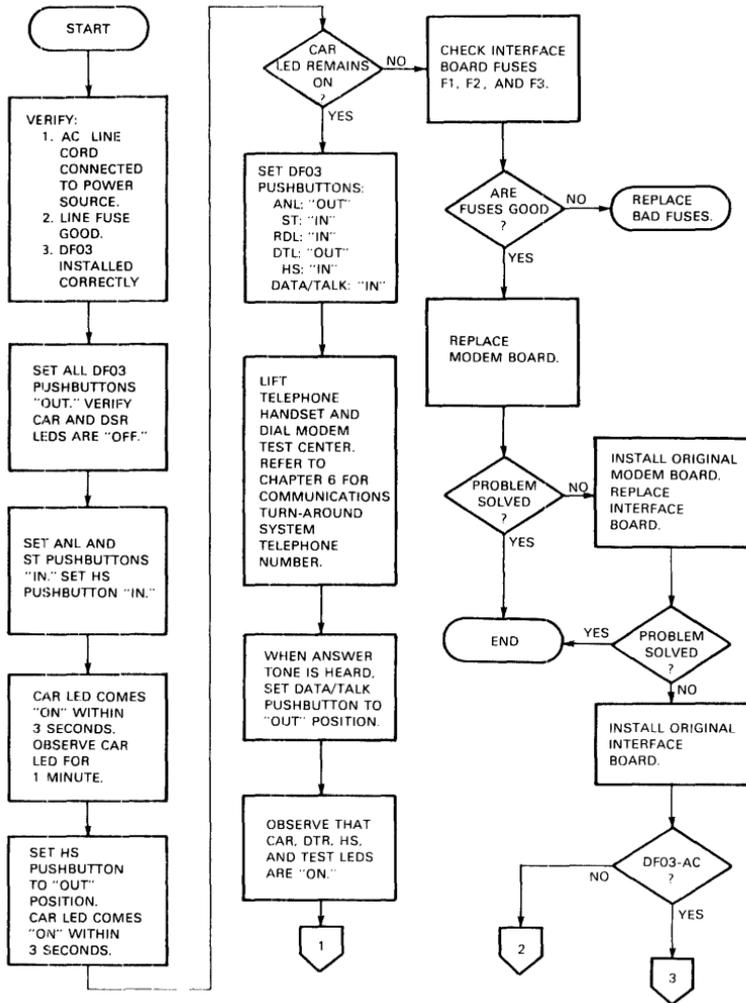


NOTE
REFER TO CHAPTER 6
FOR COMMUNICATIONS
TURN AROUND SYSTEM
TELEPHONE NUMBER.

MK-3431

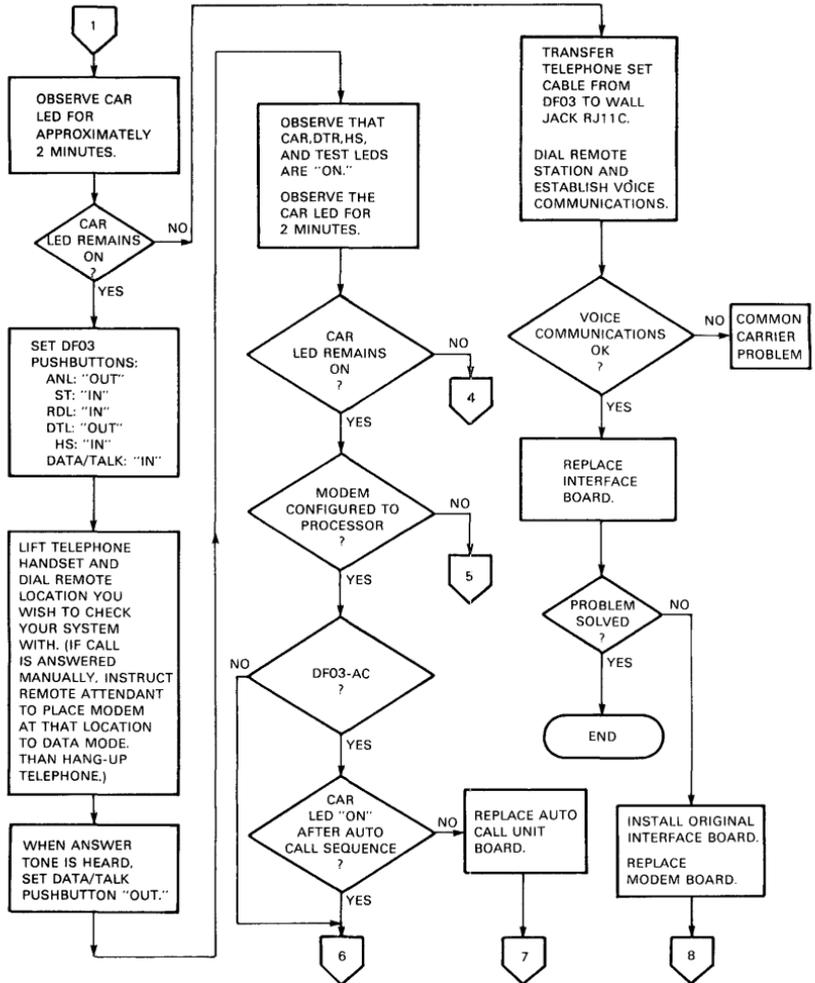
DF02/DF03 MAINTENANCE AIDS

DF03 Troubleshooting Procedures



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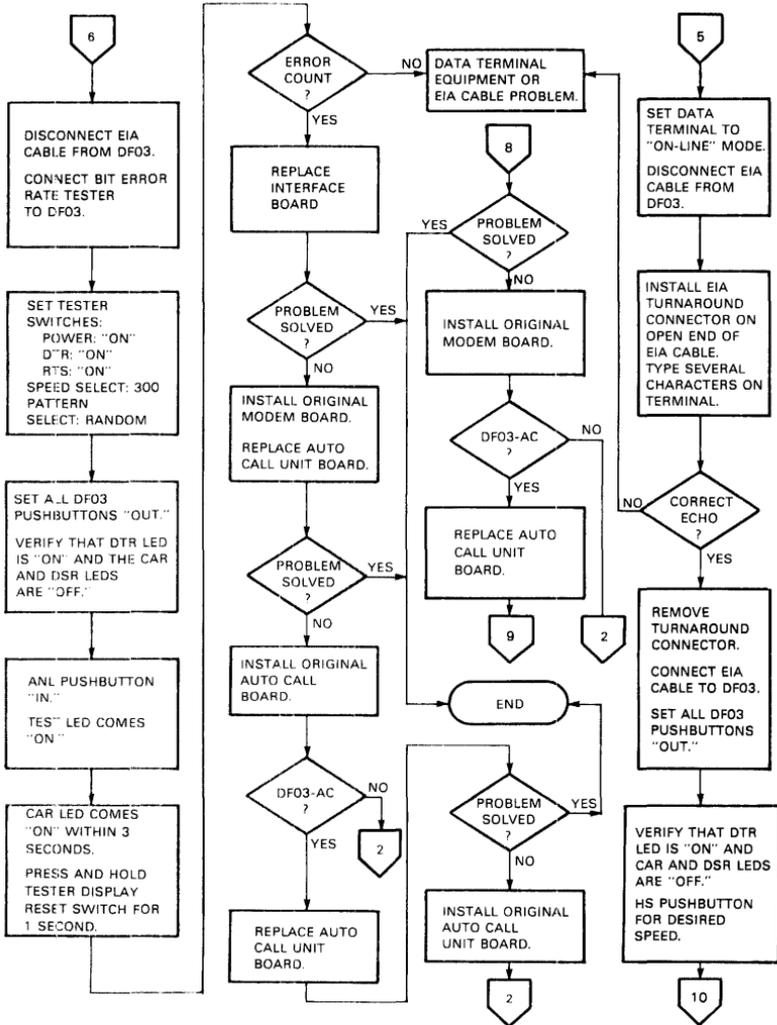
DF03 Troubleshooting Procedures (Cont)



MK-3437

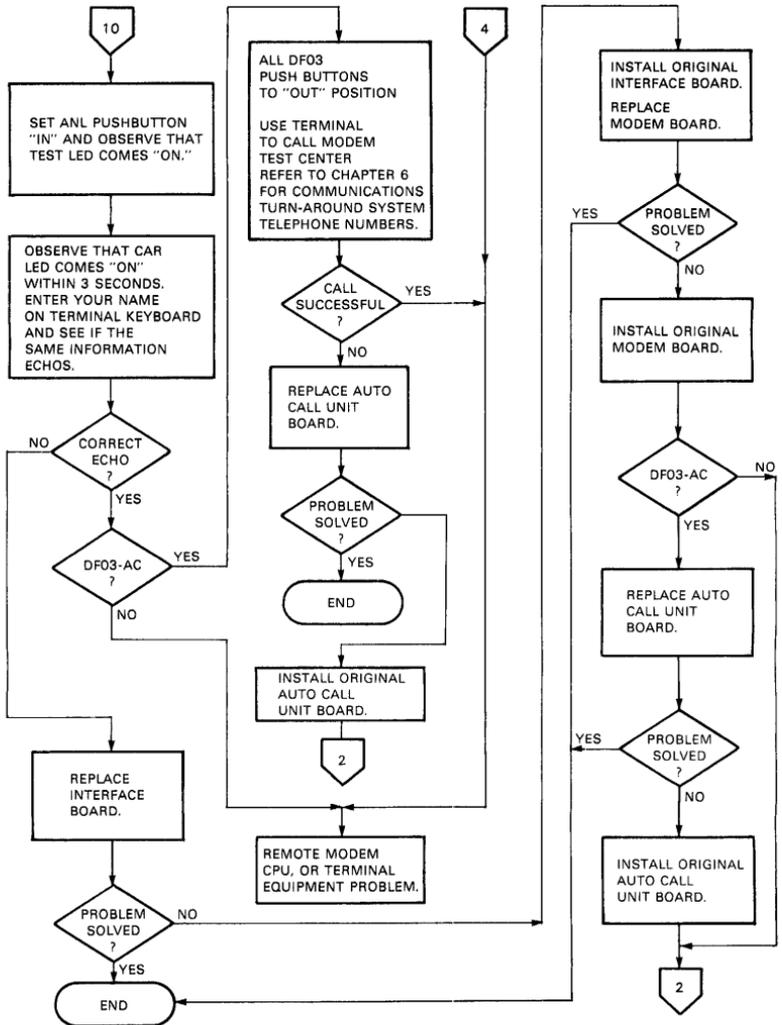
DF02/DF03 MAINTENANCE AIDS

DF03 Troubleshooting Procedures (Cont)



MK-3424

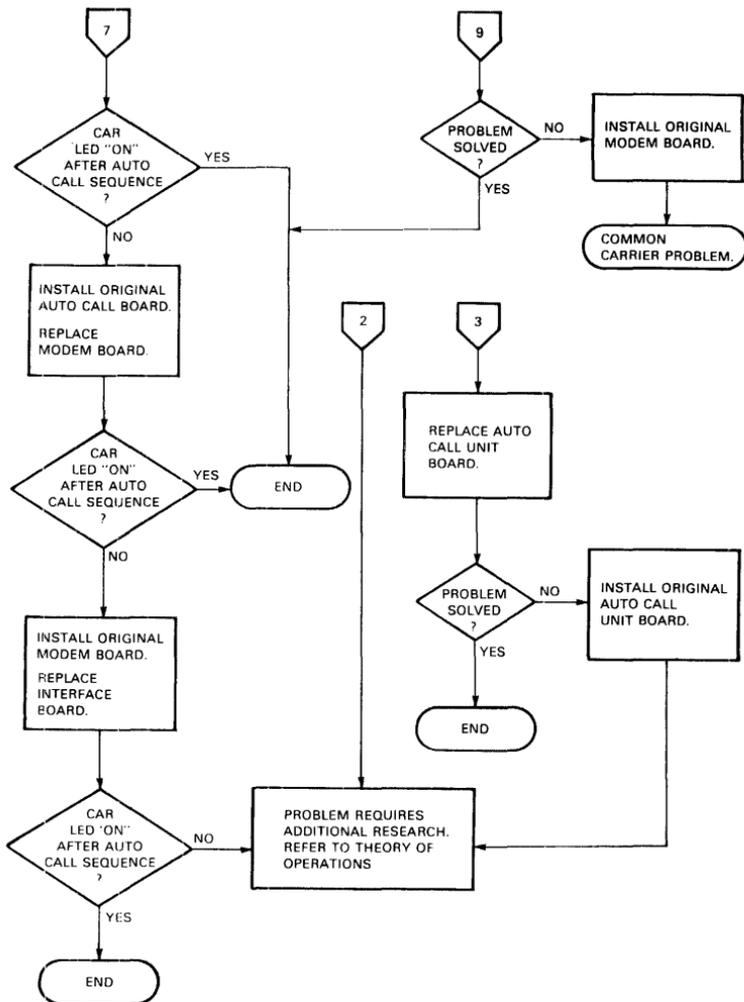
DF03 Troubleshooting Procedures (Cont)



MK-3436

DF02/DF03 MAINTENANCE AIDS

DF03 Troubleshooting Procedures (Cont)



MX-3435

DF02/DF03 Tech-Tips/FCO Index

Table DF-12 DF02 Tech Tip Index

Tech Tip No.	Title	Speed Bulletin No.
1	DF02 Breaking Dial Tone Problem	None

Table DF-13 DF03 Tech Tip Index

Tech Tip No.	Title	Speed Bulletin No.
1	PIN 23 Asserted on VT1XX Terminals	201

NOTE

At present, there have been no FCOs issued on the DF02 or DF03.

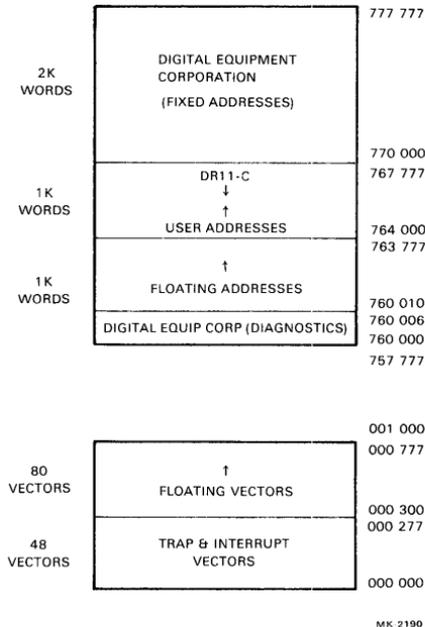
APPENDIX A FLOATING DEVICE ADDRESSES AND VECTORS

A.1 FLOATING DEVICE ADDRESSES

UNIBUS addresses 760010 (160010) through 763776 (163776) are designated as floating device addresses (see the following figure). These are used as register addresses for communications and other devices interfacing with the PDP-11, LSI-11, and VAX-11.

NOTE

Some devices are not supported by LSI-11 and VAX-11; however, the same scheme applies – that is, gaps are provided as appropriate. The convention for assigning these addresses is as follows:



UNIBUS Address Map

A gap of 10g must be left between the last address of one device type and the first address of the next device type. The first address of the next device type must start on a module 10g boundary. The gap of 10g must also be left for devices that are not installed but are skipped over in the priority ranking list. Multiple devices of the same type must be assigned contiguous addresses. Reassignment of device types already in the system may be required to make room for additional ones.

Table A-1 Floating CSR Address Devices

Rank	UNIBUS Option	LSI-11 Bus Option	Decimal Size	Octal Modulus
1	DJ11		4	10
2	DH11		8	20
3	DQ11		4	10
4	DU11	DUV11	4	10
5	DUP11		4	10
6	LK11A		4	10
7	DMC11/DMR11*		4	10
8	DZ11**	DZV11	4	10
9	KMC11		4	10
10	LPP11		4	10
11	VMV21		4	10
12	VMV31		8	20
13	DWR70		4	10
14	RL11	RLV11	4	10†
15	LPA11-K		8	20†
16	KW11-C		4	10
17	Reserved		4	10
18	RX11		4	10†
19	DR11-W		4	10
20	DR11-B		4	10††
21	DMP11		4	10
22		DVP11	4	10
23	ISB11		4	10
24		DMV11	8	20

* DMC11 before DMR11
 ** DZ11E and DZ11F are dual DZ11s and are treated by the algorithm as two DZ11s.
 † Extra devices only.
 †† After second device.

A.2 FLOATING VECTOR ADDRESSES

Vector addresses, 300 through 777, are designated as floating vectors. These are used for communications and other devices that interface with the PDP-11, LSI-11, and VAX-11. The LSI-11 floating vector area is limited to a starting address of 300 through 376. The area from 400 to 450 is reserved for LSI-11 devices ADV11-A, IBV11-A, and KWV11-A with additional space available above 450 to 777.

NOTE

Some devices are not supported by LSI-11 and VAX-11; however, the same scheme applies. Vector size is determined by the device type.

There are no gaps in floating vectors unless required by physical hardware restrictions (in data communications devices, the receive vector must be on a zero boundary and the transmit vector must be on a 4g boundary).

Multiple devices of the same type would be assigned vectors sequentially. Table A-2 shows the assignment sequence.

Table A-2 Floating Interrupt Vector Devices

Rank	UNIBUS Option	LSI-11 Bus Option	Decimal Size	Octal Modulus
1	DC11		4	10
1	TU58***		4	10
2	KL11 (extra)		4	10*
2	DL11-A (extra)	DVL11-F	4	10*
2	DL11-B (extra)	DLV11-J	4	10
3	DP11		4	10
4	DM11-A		4	10*
5	DN11		2	4
6	DM11-BB		2	4
7	DH11 modem control		2	4
8	DR11-A	DRV11-B	4	10*
9	DR11-C	DRV11	4	10*
10	PA611 (reader)		2	10*
10	PA611 (punch)		2	10*
11	LPD11		4	10
12	DT11		4	10*
13	DX11		4	10*
14	DL11-C		4	10*
14	DL11-D		4	10*
14	DL11-E	DLV11-E	4	10*
15	DJ11		4	10*
16	DH11		4	10†
17	GT40		8	10
17	VSV11		8	10

Table A-2 Floating Interrupt Vector Devices (Cont)

Rank	UNIBUS Option	LSI-11 Bus Option	Decimal Size	Octal Modulus
18	LPS11		12	30*
19	DQ11		4	10†
20	KW11-W	KWV11	4	10
21	DU11	DUV11	4	10*
22	DUP11		4	10*
23	DV11		4	10*
23	DV modem control		2	4
24	LK11-A		4	10
25	DWUN		4	10
26	DMC11/DMR11		4	10*
27	DZ11	DZV11	4	10*
28	KMC11		4	10
29	LPP11		4	10
30	VMV21		4	10
31	VMV31		4	10
32	VTV01		4	10
33	DWR70		4	10*
34	RL11	RLV11	2	4††
35	RX02		2	4
36	TS11		2	4††
37	LPA11-K		4	10
38	IP11/IP300		2	4
39	KW11-C		4	10
40	RX11		2	4††
41	DR11-W		2	4
42	DR11-B		2	4††
43	DMP11		4	10
44		DPV11	4	10
45	ML11		2	4**
46	ISB		4	10
47		DMV11	4	10

* The vector for the device of this type must always be on a 10g boundary.

** MASSBUS device.

*** There is no standard configuration for systems with both DC11 and TU58

† These devices can have either a M7820 or M7821 interrupt control module. However, it should always be on a 10g boundary.

†† After the first.

APPENDIX B
DIAGNOSTIC SUMMARY CHARTS

Table B-1 Link Test/DECX11 Diagnostic Index

Device Option	DCLT		ITEP Overlay	DEC X11
	PDP-11	VAX-11		
DH11	N/A	N/A	DZDHL	CXDHA
DL11-E	N/A	N/A	N/A	CXDLA
DL11-W	N/A	N/A	N/A	CXDLA
DLV11	N/A	N/A	N/A	CXDLA
DMC11	CZCLK	EVDMC	DZDMO	CXDMC
DMP11	CZCLM	EVDMD †	N/A	CXDMD, CXDME
DMR11	CZCLK	EVDMC	DZDMO	CXDMR
DMV11	CZCLM	N/A	N/A	CXDMD, CXDME
DPV11	CZCLH	N/A	N/A	CXDPV
DQ11	N/A	N/A	DZDQO	CXDQA
DU11	N/A	N/A	DZDUO	CXDUA
DUP11	CZDCL †	N/A	DZDPF	CXDPA
DUV11	N/A	N/A	N/A	N/A
DV11	N/A	N/A	DZDVO	CXDVA
DZ11	N/A	N/A	DZDZB	CXDZA
DZ11-X	N/A	N/A	DZDZB	CXDZA
DZ32	N/A	N/A	N/A	N/A
DZV11	N/A	N/A	N/A	CXDZB

N/A = Not available

† = Planned future programs

Table B-2 General Purpose/Functional Diagnostic Index

Option	PDP-11 Systems	VAX-11 Systems
DH11 DL11-E DL11-W DLV11 DMC11	CZDHM, CZDHN, DZDHK DZDLA DZDLD-A DVDVA, DVDVC CZDMC, CZDME-CZDMH	None None None None EVDXA, EVDBA, EVDBB, EVDCA, EVDMC
DMP11 DMR11	CZDMP-CZDMT CZDMP-CZDMS-CZDMI	EVDXA, EVDMA, EVDMB EVDXA, EVDCA EVDMC, EVDMA
DMV11 DPV11 DQ11 DU11 DUP11 DUV11 DV11 DZ11 DZ11-X DZ32 DZV11	CVDMA-CVDME, CVDMT CVDPV DZDQA-DZDQF DZDUA-DZDUF DZDPB-DZDPF DZDUQ-DZDUV DZDVA-DZDVF DZDZA DZDZA None DVDZA, DVDAB	EVDCA, EVDUP, EVDUQ ESDEB-ESDEE EVDAA,EVTAA,EVTAB None EVDAB,EVDAC