

DX11-B ON LINE TEST PROCEDURE

This document provides clarification to the Installation Procedure (Sections 2.12 to 2.14 and 3.3.2 to 3.3.4) of the DX11-B Maintenance Manual.

The manual will be updated in the future to include this information, but in the meantime this document should be referenced during DX11-B on line testing.

Any questions or comments regarding DX11-B installation, maintenance, or this document should be addressed to:

Tom Ritter
DECcomm Product Support
Maynard, Pk3-2/S17
Tel: x3020

SN 07790 755 721 HM-1
BRIAN BICKELL 11-MATL
DIGITAL EQUIP AUSTRALIA P/L
POST OFFICE BOX 491
CROWS NEST NSW 2065 AUSTRALIA

1945

...

...

...

...

...

...

...

...

...

1.0 INTRODUCTION

The following sections provide the information required to test the DX11-B on line. This procedure is intended to replace Sections 2.12 through 2.14 and 3.3.2 through 3.3.4 of the DX11-B Maintenance Manual (DEC-11-HDXBA-B-D).

As part of customer acceptance, the DX11-B's ability to run on line with the IBM system 360/370 must be proven. To demonstrate that data is transferred properly between the 360/370 and the DX11-B, the IBM Friend Diagnostic is run in the IBM 360/370 interactively with DEC supplied software in the PDP-11. The IBM 2848 Diagnostic is then run in the 360/370 interactively with the DEC supplied 2848 responder software in the PDP11. Error free running of this test proves that the DX11-B can emulate an IBM 2848.

As stipulated in the DEC sales agreement, the customer agrees to provide up to 12 hours of 360/370 "stand alone" time for DX11-B installation and acceptance testing. "Stand Alone" means the 360/370 must be dedicated solely to the DX11-B and not occupied in any way with the customer's operating system.

In order to use this time efficiently, the following guidelines should be followed:

1. An F. S. E. untrained in the DX11-B should not use more than one hour of "stand alone" time to diagnose on line failures. An F. S. E. who is trained may use up to two hours. More time should not be used unless instructions to do so are received from Regional or Corporate Support.
2. Regional Support can authorize use of an additional two hours of stand alone before notifying Corporate Support.
3. If Corporate Support cannot resolve the problem within an additional four hours of "stand alone" time, assistance must be obtained from DEC Engineering.
4. During installation and any time thereafter, any unresolved problem should be reported to both Regional and Corporate Support by the local Field Service Office. These problems typically are the type that involve software.

The FRIEND and DME/2848 diagnostic card decks (DZDXD-A-C) are part of the DX11-B Maintenance Kit. This kit (and/or card decks) is available at all regional offices. A DX11-B maintenance kit should be ordered by each branch responsible for a DX11-B.

The on line diagnostics should be run in the following order:

1. Run Friend in the 360/370 with CTP (REV G or later) or DECX11 in the PDP-11, for a minimum of 10 minutes without error.
2. Run Friend in the 360/370 with 2848 Responder in the PDP-11, for a minimum of 10 minutes without error.
3. Run DME/2848 Diagnostic in the 360/370 with 2848 Responder in the PDP-11. Run a minimum of two passes (the cards must be re-loaded for each pass) without errors, except as indicated.

2.0 FRIEND DIAGNOSTIC OPERATOR'S GUIDE

Friend is an IBM Diagnostic Program requiring 16K bytes of memory in the 360/370 and is supplied in the form of a card deck, containing 186 cards. The user must enter channel commands from the console keyboard using the English language. Friend supports the commands for most of the IBM files, drums, printers, card readers, punches, etc. However, only commands related to the DX11-B's emulation of a 2848 will be discussed here.

For additional information, refer to Friend program description documentation. This documentation should be available at most DX11-B installations.

- 2.1 Preparation for requesting stand alone time to run the Friend diagnostic. Prior to requesting "stand alone" time the F. S. E. should:
 - A. Request that the customer's 360/370 operator assist in loading the Friend diagnostic.
 - B. Because Friend is capable of writing on the customer's tapes, drums, disks, etc. if the wrong device address is accidentally typed, request that the customer write protects or disables all such devices.

NOTE: Some 360/370 models (Model 128, 158, 168, and some other systems with a CRT console) may use a different command structure. Check with the customer to determine if the console command structure is standard. If the command structure is not standard the DX11-B can not be tested as described in this procedure. If this is the case, contact Corporate Support for assistance.

2.2 Friend diagnostic utilization procedure. To load and run the Friend diagnostic proceed as follows:

2.2.1 Load one of the following programs into the PDP-11. Refer to the write-up for details on starting the program.

NOTE: DEC/X11 is a replacement program for CTP. CTP should be used until the DEC/X11 is available.

A. 2848 Responder (MAINDEC-11-DZDXC-A)

NOTE: The 2848 Responder is capable of running up to 2 devices simultaneously. The control unit address contained in the PDP-11 Switch Register when the program is started, and that address plus 1. If the DX11-B is to be exercised at any additional control unit addresses, the 2848 responder must be restarted with the new control unit address loaded in the Switch Register.

B. CTP (MAINDEC-11-DZQCA-G). Use only Revision G or later and select the DX11-B for on line operation.

C. DEC/X11. Select the DX11-B on line module.

NOTE: CTP and DEC/X11 are capable of running up to four devices simultaneously. The control unit address contained in the PDP-11 switch register when the program is started, and that address plus 1, 2, and 3. If the DX11-B is to be exercised at any additional control unit addresses, CTP or DEC/X11 must be restarted with the new control unit address loaded in the Switch Register.

When using CTP or DEC/X11, run the first pass with all devices de-selected except the DX11-B.

- 2.2.2 Check the jumpers on the M908YA module in Slot A20. If the module is jumpered for less than 16 devices and the address of the first device to be tested is other than XO, perform Step 2.2.3 to load the CUAR manually. If the first device address is XO proceed to Step 2.2.4.
- 2.2.3 To load the CUAR manually at the PDP-11 console:
- A. Start the 2848 Responder, CTP or DEC/X11.
 - B. Set the ENABLE/HALT switch to HALT.
 - C. Enter 176202 into the Switch Register and depress LOAD ADDRS. Observe the address is displayed in the DATA display.
 - D. Enter lowest control unit address (the same address that was placed in the Switch Register when the program was started) into the Switch Register.
 - E. Lift the DEP switch. Observe the control unit address is displayed in the DATA display and the DXCA in the DX11-B indicator panel.
 - F. For the 2848 Responder, leave the Switch Register set to the address of the lowest control unit. For the CTP and DEC/X11, set the Switch Register to 0.
 - G. Set the ENABLE/HALT switch to ENABLE and depress CONT.
- 2.2.4 Place Friend deck in the 360/370 card reader with the cards face down and Row Nine on the card positioned toward the card reader.
- NOTE: All 360 console inputs are terminated by EOB, obtained by pressing ALT mode and 5 simultaneously on the 360 console. On 370's, press END on the console. This refers to every line entered.
- 2.2.5 Press "Start" and "EOF" (End of File) on the card reader.
- 2.2.6 Wait for the READY indicator on the card reader to illuminate.
- 2.2.7 Refer to Figure 1. Set the 360/370 load unit switches to the card reader address (usually OOC).

- 2.2.8 Press the blue LOAD button on the 360/370.
- 2.2.9 The card deck will now load and the console will print an introductory message. (The introductory message will end with Friend asking for the 360/370 CPU model).

CPU Model XX =

- 2.2.10 Answer by typing 25, 30, 40, 50, 65, or 75 for the correct 360 CPU model. (For all 370 models, reply with 75. For 360/67, replay with 65)
- 2.2.11 Next, Friend will ask for the device address by typing DEV =
- 2.2.12 Answer by typing the Control Unit address (including Channel number) of the DX11-B (in Hexidecimal). This Control Unit address was specified to the PDP-11 when CTP, DEC/X11, or the 2848 Responder were stated.
- 2.2.13 Next, type the channel program using one of the following examples:
- A. Use Example 1 - if the 2848 Responder is running in the PDP-11.
 - B. Use Example 2 if CTP or DEC/X11 is running in the PDP-11.
- 2.2.14 If you wish to change the channel program after example 1 or 2 has been started:
- A. Press REQUEST on the 360/370 console. This will terminate any data transfer in progress.
 - B. Wait for the PROCEED light to illuminate.
 - C. Type the following:
reset (EOB)
 - D. Then, Friend will respond with:
DEV =

- E. Then proceed to type in the DX11-B's address and channel program as per Example 1 or 2.
- 2.3 Figure 2 is a sample of Friend's introductory message and channel program.
- 2.4 Friend should run for a minimum of 10 minutes with the 2848 Responder and a minimum of 10 minutes with CTP or DEC/X11. No errors are allowed.

EXAMPLE 1

In this example FRIEND will write 480 bytes of EBCDIC character 0 (360) from the buffer designated \$a to the DX11-B. FRIEND will then read this data back and store it in the buffer designated \$b. Buffers \$a and \$b will then be compared. Any differences will be printed out on the 360/370 console as a data error. The data transfer will continue until "Request" is pressed on the console. Refer to Figure 2.

NOTE: Program queries are underlined.

DEV = XYX

X = Channel number

YY = Control unit address (in HH)

cmd 01 from \$a (EOB)

DATA = 480c0 (EOB)

cmd 06 into \$b (EOB)

DL = 480 (EOB)

compare \$a, \$b (EOB)

go (EOB)

EXAMPLE 2

In this example FRIEND will write 64 bytes of data each equaling 156AC17E (Hexidecimal) from the 360 buffer designated \$a to the DX11-B. FRIEND will then read this data back and store it in the 360 buffer designated \$b. Buffer \$a and \$b will then be compared. Any differences in the two buffers will be printed out on the 360/370 console as a compare error. The data transfer will continue until the "Request" key is pressed on the 360/370 console.

NOTE: Program queries are underlined.

DEV = XYY

X = Channel number

YY = Control unit address (in HEX)

cmd 01 from \$a (EOB)

DATA = 64x156AC17E - (EOB)

cmd 02 into \$b (EOB)

DL = 256 (EOB)

compare \$a, \$b (EOB)

go (EOB)

3.0 DME/2848 DIAGNOSTIC OPERATOR'S GUIDE

The DME/2848 diagnostic consists of the DME diagnostic monitor card deck and six 2848 diagnostic card decks. The diagnostic is run in conjunction with the 2848 Responder in the PDP-11 system.

The diagnostic and monitor card decks are loaded into the 360/370 through its card reader.

NOTE: A minimum of 64K bytes of storage are required in the 360/370. If it has less than 64K bytes, the DME/2848 diagnostic cannot be run and on line testing of the DX11-B must be limited to running Friend in the 360/370.

3.1 Preparation of requesting 360/370 "stand alone" time to run the DME/2848 diagnostic.

Prior to requesting "stand alone" time, the F. S. E. should perform each of the preparation procedures listed below and request that the customer's 360/370 operator assist in loading the DME/2848 diagnostic.

NOTE: Some 360/370 models (Model 128, 158, 168 & some other systems with CRT console) may use a different command structure. check with the customer to determine if the console command structure is standard. If the command structure is not standard the DX11-B can not be tested as described in this procedure. If this is the case, contact Corporate Support for assistance.

3.1.1. Prep card preparation procedure.

The prep card is an abbreviated version of the DME/2848 diagnostic loading procedure described in Paragraph 3.2. Once completed, the card provides a quick reference when loading this diagnostic. To fill out the prep card (Figure 3A or B), proceed as follows:

- A. Read the entire DME/2848 diagnostic utilization procedure (Paragraph 3.2) and obtain all information required to perform each step of the procedure (such as 360/370 main storage size and model number) from the customer.
- B. Resolve any questions regarding system configuration prior to obtaining "stand alone" time.
- C. Fill out the prep card being careful to fill in all blanks as follows (see Figure 3 for sample Prep Card):
 1. Fill in Line 4 with the parameters described in Step 3.2.12 of the DME/2848 diagnostic utilization procedure.
 2. Fill in Line 7 with the parameters described in Step 3.2.15 of the DME/2848 diagnostic utilization procedure. The sample prep card was filled out for a 370/158 with 1024K bytes of main storage. The DX11-B is jumpered for a control unit address of 2F0 to 2FF (Hex) and is

connected to the selector channel (Channel 1). Figure 4 is a copy of the line printer output for this sample.

3.1.2 Card deck preparation procedure.

Perform the following checks to prepare the card decks for loading:

- A. Check between the decks for blank cards. Blank cards may have been inserted between the decks for ease in separating them. If so, the blank cards must be removed before placing the decks into the reader.
- B. Check that the first and last card in each deck is marked. If they are not already marked, mark them. This makes it easier to separate the decks.
- C. The 2848 diagnostic card decks are usually marked A, B, C, D, E, and F on the side of the decks. If they are not marked A to F, the decks can be identified by the IBM diagnostic number which is punched in columns 73 to 76 of each card. Refer to Table 1.

TABLE 1

<u>DEC DESIGNATION</u>	<u>IBM DESIGNATION</u>	<u>NUMBER OF CARDS</u>
A	7005	137
B	7015	117
C	7025	73
D	7035	69
E	7075	183
F	7085	155
MONITOR (DME)	0404	586

- D. The cards in each deck must be in order. The number of each card is punched in columns 77 to 80.

FIGURE 1
TYPICAL 360/370 SYSTEM CONTROL PANEL

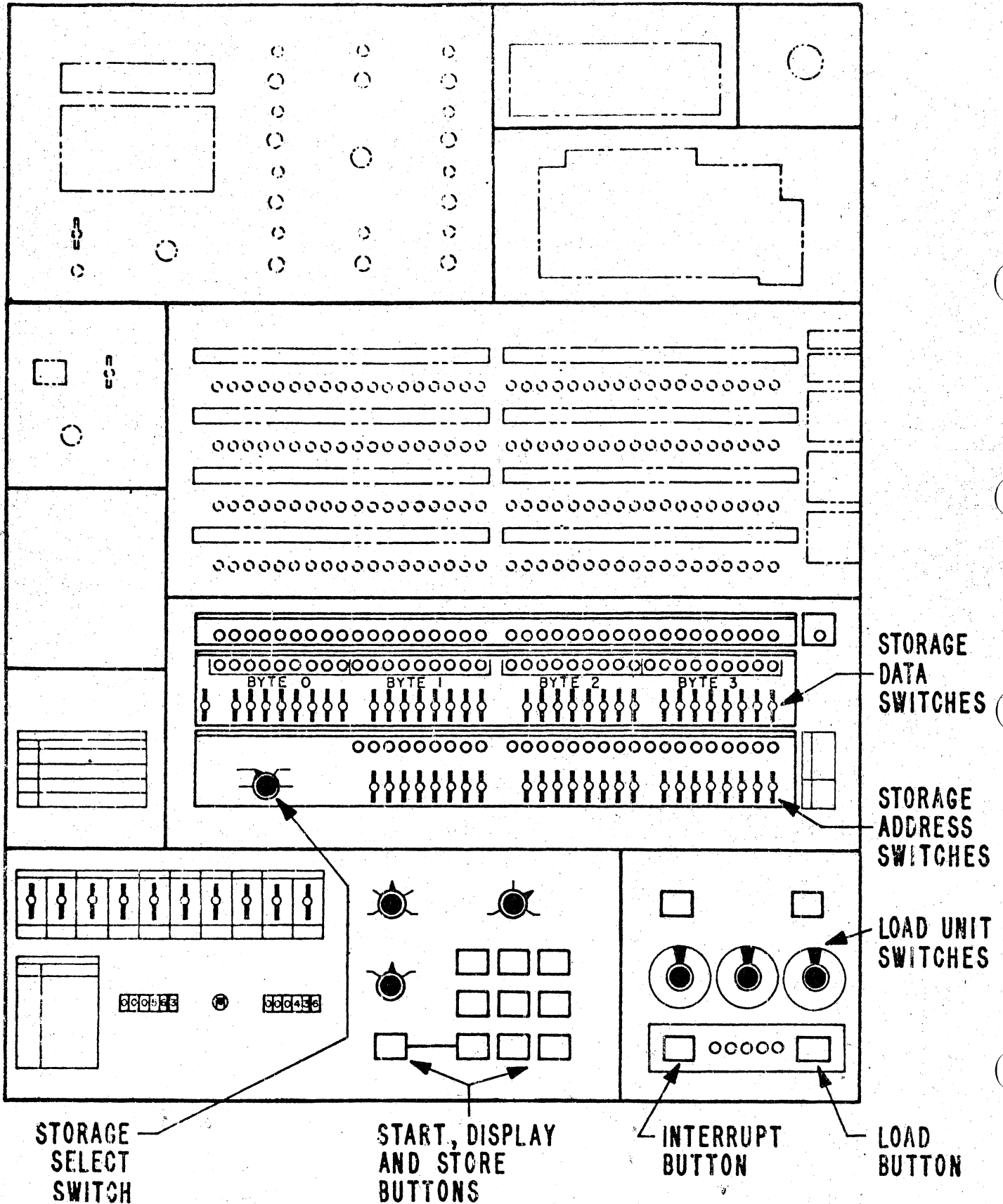


FIGURE 2

SAMPLE FRIEND 360/370 CONSOLE PRINTOUT

```
f
18 F R I E N D -3- DESCRIPTION IN 2841 VOL. A02 OR 2314 VOL. S01
19 *WARNING* WRITE COMMANDS MAY DESTROY DATA
20 ON A CUSTOMER PACK/CELL OR CE TRACKS.
21 INTERPRETIVE PROGRAM TO XEQ CCW COMMANDS
22 THAT YOU ENTER FOR ANY DEVICE(S).
23 AFTER INSTRUCTIONS ARE TYPED, ENTER EACH COMMAND
24 WHEN PROCEED LIGHT TURNS ON.
25 TERMINATE EACH ENTRY WITH AN ALTERNATE CODE 5 (EOB).
26 AFTER CCW CHAIN HAS BEEN ENTERED, TYPE GO.
27 TO ENTER NEXT CCW CHAIN, PRESS REQUEST, TYPE RESET.
28 CPU MODEL XX=75
29 DEV=DEVICE ADDRESS XXX=020
30 ENTER CCW LIST IN ENGLISH
31
32 cmd 01 from $a
33 DATA=480c0
34 cmd 06 into $b
35 DL=480
36 compare $a,$b
37
38 90
```

This sample printout is from a 370/145. The PDP11 was running the 2848 Responder. The DX11-B control unit address is 20 (Hex.), and it is on the multiplexer channel (Channel 0).

FIGURE 3

2848 DIAGNOSTIC PREP CARD

CUSTOMER

SAMPLE

DATE

- 0. Load and start the 2848 responder (MainDec-11-DZDXC) in the PDP-11.
- 1. Load DME monitor into the 360/370.
- 2. Make sure 360/370 line printer is on line.
- 3. Press "Request" on the 360/370 console (Maintenance Console or Console Terminal). Wait for "Proceed".

4. Type the system configuration as follows:

u 6 5 . 0 0 . 0 9 . 0 8 . 0 F F F F F (EOB)*

(Be sure to type the periods)

- 5. System configuration will now be printed on the line printer (if on line) or console.
- 6. Press "Request" on the 360/370 console.
- 7. Type the following:

Note: If the M908 is jumpered for only one device address, omit the second line entry.

a 70, 0 2 F 0 . 1B. 8 000 F 0 (EOB)*

a 70, 0 2 F 1 . 1B. 8 000 F 0 (EOB)*

(Be sure to type the commas and periods)

- 8. Then type: 1/b (EOB)
- 9. The remaining card decks will now load and the DX11-B will be exercised.

*END if a 370

SAMPLE PREP CARD

FIGURE 3A

2848 DIAGNOSTIC PREP CARD

CUSTOMER _____

DATE _____

- 0. Load and start the 2848 responder (MainDec-11-DZDXC) in the PDP-11.
- 1. Load DME monitor into the 360/370.
- 2. Make sure 360/370 line printer is on line.
- 3. Press "Request" on the 360/370 console (Maintenance Console or Console Terminal). Wait for "Proceed".
- 4. Type the system configuration as follows:
u _____ (EOB)*
(Be sure to type the periods)
- 5. System configuration will now be printed on the line printer (if on line) or console.
- 6. Press "Request" on the 360/370 console.
- 7. Type the following:
Note: If the M908 is jumpered for only one device address, omit the second line entry.
a 70, 0 _____ 1B. _____ (EOB)*
a 70, 0 _____ 1B. _____ (EOB)* (Be sure to type the commas and periods)
- 8. Then type: l/b (EOB)
- 9. The remaining card decks will now load and the DX11-B will be exercised.
*END if a 370

FIGURE 3B

2848 DIAGNOSTIC PREP CARD

CUSTOMER _____

DATE _____

- 0. Load and start the 2848 responder (MainDec-11-DZDXC) in the PDP-11.
- 1. Load DME monitor into the 360/370.
- 2. Make sure 360/370 line printer is on line.
- 3. Press "Request" on the 360/370 console (Maintenance Console or Console Terminal). Wait for "Proceed".

4. Type the system configuration as follows:

u _____ (EOB)*

(Be sure to type the periods)

- 5. System configuration will now be printed on the line printer (if on line or console).
- 6. Press "Request" on the 360/370 console.
- 7. Type the following:

Note: If the M908 is jumpered for only one device address, omit the second line entry.

a 70, 0 _____ 1B. 000 _____ (EOB)*

a 70, 0 _____ 1B. 000 _____ (EOB)* (Be sure to type the commas and periods)

- 8. Then type: 1/b (EOB)
- 9. The remaining card decks will now load and the DX11-B will be exercised.

*END if a 370

FIGURE 4

Typical line printer output from the DME/2848 Diagnostic. The 2848 Responder was running in the PDP-11. The parameters for this example are listed on the sample prep card (Figure 3).

WTE DME REVISION LEVEL 4
U65.00.09.08.OFFFFF
A70,02FO.1B.8000FO
A70,02F1.1B.8000FO
L/B
MODEL 65 LAST ADR OFFFFF
TMR

EMULATOR NONE
DM10 1200 80020390 LDR CARD
DM10 1204 8309000E CE OUT
DM10 1208 900A001F CE INP

UT	OP	FEAT	CPU	ADDR	ADDR	ADDR	ADDR
42	02	000000	80	0000			
44	00	000000	80	0100			
44	00	000000	80	0200			
44	00	000000	80	0300			
80	00	000000	80	0000			
81	00	000000	80	000C			
82	00	000000	80	000D			
83	08	000000	80	000E			
83	18	000000	80	000F			

RECOMMENDED SWITCH SETTINGS
CPU AND STORAGE CHECK IN PROCESS
CHANNEL LOG CAN
TIMER ON

S F7005
T
S F7015
T
S F7025
T
S F7035
T
S F7075
*SDO F7075 01 005B98 02F1
NO ATTENTION INTRPT IN 1 MINUTE, SECTION TERMINATED
T

S F7085
*SDO F7085 01 005444 02F1
NO CE MANUAL RESPONSE TO INSTRUCTIONS ON 2260 S WITHIN 60 SECONDS
T
WTE DME 04

3.2 DME/2848 diagnostic utilization procedure.

To load and run the DME/2848 diagnostic proceed as follows:

- 3.2.1 Load and start the 2848 responder, MainDEC-DZDXC, in the PDP-11. Refer to the write-up for details on starting the Program. NOTE: If the DX11-B interrupt vector address is not 300, the MainDEC will have to be patched. For patching, refer to the Write-up.

NOTE: Check the jumpers on the M908YA module in Slot A20. If the module is jumpered for less than 16 devices and the address of the first device is other than XO, perform Step 3.2.2 to load the CUAR manually. If the first device address is XO proceed to Step 3.2.3.

3.2.2 To load the CUAR manually at the PDP-11 console:

- A. Start the 2848 Responder.
- B. Set the ENABLE/HALT switch to HALT.
- C. Enter 176202 into the Switch Register and depress LOAD ADDRS. Observe the address is displayed in the DATA display.
- D. Enter lowest control unit address (the same address that was placed in the Switch Register when the program was started) into the Switch Register.
- E. Lift the DEP switch. Observe the control unit address is displayed in the DATA display and the DXCA in the DX11-B indicator panel.
- F. For the 2848 Responder, leave the Switch Register set to the address of the lowest control unit.
- G. Set the ENABLE/HALT switch to ENABLE and depress CONT.

- 3.2.3 Place the DME monitor deck(largest deck, contains 586 cards) in the 360/370 card reader with the cards face down and row 9 on the cards positioned toward the card reader. Place the 2848 diagnostic decks(A, B, C, D, E, and F) on top of the DME monitor deck in a similar manner.

NOTE: All 360 console inputs are terminated by (EOB), obtained by pressing ALTmode and 5 simultaneously on the 360 console. On 370's, press End on the console. This applies to every line entered.

- 3.2.4 Press "Start" and then "End of File" (EOF) on the card reader.

- 3.2.5 Wait for the Ready indicator on the card reader to illuminate.

- 3.2.6 If a line printer is available, make sure it is on line. All printouts will occur on this printer. If no printer is on line, or if that line printer has a non-standard address, all printouts will occur on the console.

- 3.2.7 Set the 360/370 load unit switches to the card reader address, (usually OOC). (Refer to Figure 1)

- 3.2.8 Press the blue Load button on the 360/370.

- 3.2.9 The monitor card deck only, will now load and "WTE DME" will be printed on the line printer.

- 3.2.10 Press the Request button on the console and wait for the Proceed light.

- 3.2.11 Type the system configuration as follows:

- 3.2.12 uAA. BB. CC. DD. EEEEEEE (EOB)

(Refer to the next page for definitions of A, B, C, D, and E)

Where:

AA is the 360 model number (30, 40, 50, 65, 67, or 75).

For 370's, use the following for "AA"

<u>370 Model</u>	<u>AA</u>
135	40
145	50
155	65
158	65
165	75
168	65

BB=00

CC is as follows for the 360/370 main storage size:

<u>Storage Size (Bytes)</u>	<u>CC</u>
64K	05
128K	06
256K	07
512K	08
768K	08
1024K	09

DD is as follows:

<u>Model</u>	<u>DD</u>
360/30	FA
360/40	FA
360/50	C8
360/65	4B
360/67	4B
360/75	19
370/135	19
370/145	19
370/155	08
370/165	08
370/158	08
370/168	08

EEEEEE is as follows for 360/370 main storage size.

<u>Storage Size (Bytes)</u>	<u>EEEEEE</u>
64K	00FFFF
128K	01FFFF
256K	03FFFF
512K	07FFFF
768K	0BFFFF
1024K	0FFFFFFF

3.2.13 Press Interrupt on the 360/370.

3.2.14 The system configuration will be printed on the line printer (or console, if no line printer). This printout can be ignored (or aborted by pressing Interrupt).

3.2.15 Press Request on the console, wait for the Proceed light. Type the following:

NOTE: If the M908 is jumpered for only one device address, omit the second line.

a 70, 0CDD.1B.X000DD (EOB)

a 70, 0CEE.1B.X000DD (EOB)

where:

c = The Channel number to which the Dx11-B is connected.

DD = The low order DX11-B control unit address (in Hexidecimal).
Equivalent to the address placed in the PDP-11 switch register.
when the 2848 responder was started.

EE = DD + 1

X = 8 - if the DX11-B is on a selector channel.

0 - if the DX11-B is on a multiplexer channel.

3.2.16 Type the following:

1 /b

3.2.17 The remaining 6 card decks will now load, one every few minutes. After each card deck is loaded, the PDP-11 system will be exercised. The line printer will print the following as each deck is loaded and executed without error:

S F70XX

T

Where:

XX = The test number (05, 15, 25, 35, 75, and 85).

3.2.18 Tests F7075 and F7085 will print the following allowable errors:

S F7075
*SDO F7075 C1 005R9R 02F1

No Attention INTRPT in 1 minute, Section terminated.

T

S F7085
*SDO F7085; 01 005444 02F1

No CE Manual Response to Instructions on 2250 S within 60 Seconds.

3.2.19 These are the only allowable errors. Any other errors will be printed in a similar manner to that above.

3.2.20 The 2848 diagnostic will terminate with the following printout:

WTE DME

3.2.21 Two passes are sufficient for DX11-B on-line acceptance.

4.0 HELPFUL HINTS

4.1 Do not attempt on-line operation unless all four of the DX11-B off-line diagnostics (DXDXA, DZDXF, DZDXG, and DZDXH) have successfully run. System exercisers should also run (CTP, GTP, DEC/X11).

NOTE: Make sure all diagnostics are the latest revision.

4.2 Errors with DME/2848 diagnostic.

A. If errors occur, run FRIEND with CTP. Try to create the same error by specifying the same data pattern and device address (on the channel) that failed with the 2848 diagnostic. This information should be available from the error print-out on the 360/370 line printer.

B. If you can't reproduce the failure, try running FRIEND and the 2848 Responder.

C. Most errors are easier to diagnose and scope with FRIEND and CTP.

4.3 IBM BIT 00 to bit 07 are opposite from DEC Bit 00 to 07 (DEC (Bit 00 = IBM Bit 07, etc.)). All channel signals are: +3V = 1 or true, OV, = 0 or false. All channel signals are available for scoping on Rows H and J or the DX11-B. However, this should not be attempted when the 360 is running the customer's software.

4.4 Errors with FRIEND

- A. None of the PDP-11 programs check any data when the DX11-B is on line. All data checking is done in the 360/370 by using the "Compare" command. If CTP halts, the cause is most likely a Unibus problem. If the 2848 Responder halts, make sure you "patched" the program for the correct vector address if the DX11-B does not interrupt to 300 (Load the contents of 300 and 302 into the DX11-B interrupt vector address and that address plus 2). This procedure is listed in MainDEC-11-DZDXC-A-D.
- B. If you are using FRIEND to drive the 2848 responder, make sure Character data is specified. If you typed in a lower case character, (a, b, e, f, etc.), an upper case character (A, B, E, F, etc) will be read by the channel. This would cause a data compare error so always specify an upper case character. This is a software function of the 2848 Responder.
- C. Unit = XXXX Data compare error byte No. 0001 \$a=FF \$b=00. This example of a data compare error contains the following information. Unit = XXXX is the failing address on the channel. This should be the device address you specified to FRIEND.

Byte No. 0001 is the failing data byte number. If this is greater than 0001, the error is intermittent.

FF is the contents of the write buffer (good data).
00 is the contents of the read buffer (bad data).

- D. Unit=XXXX - No DEV END or CUE I/O Intrpt.
This error means the DX11-B never caused an interrupt to present device end or control unit end to the channel. The DX11-B may be "Hung" or the PDP-11 may have halted.

E. Unit=XXXX Start IO not accepted.

CSW=00 000000 XX YY 0000

This error means the DX11-B did not respond to initial "Hand Shaking" on the channel.

XX = Control Unit status (contents of the DXCS).

YY = Channel status - if non-zero indicates a possible channel error.

If XX = 02 (Unit Check) sure the control unit address specified to FRIEND (DEV =) was the address (minus the channel number) placed in the PDP-11 switch register: plus up to 3 for CTP and DEC/X11; or plus 1 for the 2848 responder. NOTE: This address is in HEX.

- 4.5 Anytime the 360/370 Data transfer or error printout is stopped with "Request " or "INTERRUPT" on the 360/370 console; the DX11-B should stop in and remain in Phase 0.
- 4.6 Maintenance (P. M. 's etc.) can be performed while the DX11-B is connected to the channel, however, care must be used. Even though the DX11-B is off line or even powered down, it is possible to crash or hang the customer's 360/370 operating system.
- 4.7 Do not remove any of the following unless the DX11-B is disconnected from the channel or the 360/370 is halted or the 360/370 is dedicated "stand alone" to the DX11-B;

- G890 (slot F01)
- Any M596 or M597
- Coax Cable connector cards (to and from the channel)

All other modules can be removed provided the DX11-B is powered down.