

DISTRIBUTED PLANT MANAGEMENT

DPM diagnostic user guide

digital
INDUSTRIAL PRODUCTS

DPM diagnostic user guide

Copyright © 1981 by Digital Equipment Corporation
All Rights Reserved

The material in this manual is for informational purposes
and is subject to change without notice.

Digital Equipment Corporation assumes no responsibility
for any errors that may appear in this manual.

Printed in U.S.A.

The following are trademarks of Digital Equipment
Corporation, Maynard, Massachusetts.

DEC	DECnet	IAS
DECUS	DECsystem-10	MASSBUS
DIGITAL	DECSYSTEM-20	PDT
Digital Logo	DECwriter	RSTS
PDP	DIBOL	RSX
UNIBUS	EduSystem	VMS
VAX	OMNIBUS	VT
OS/8		

CONTENTS

CHAPTER 1	INTRODUCTION	
1.1	Introduction	1-1
1.2	Requirements	1-1
1.3	Manual Organization	1-1
1.4	Manual Conventions	1-2
CHAPTER 2	MAINTENANCE PROCEDURES	
2.1	DECdataway and the ISB11-A Controller	2-1
2.1.1	General Description	2-1
2.1.2	Diagnostics and Utilities	2-1
2.1.2.1	Standalone Diagnostics	2-2
2.1.2.2	System Diagnostics	2-3
2.1.3	Confidence Checks	2-4
2.1.3.1	Standalone Diagnostics	2-4
2.1.3.2	System Diagnostics	2-4
2.1.4	Troubleshooting Procedures and Flowcharts	2-5
2.2	DPM01 and VT110 Terminal Multiplexers	2-9
2.2.1	General Description	2-9
2.2.2	Diagnostics and Utilities	2-11
2.2.2.1	System Serial Diagnostics	2-11
2.2.2.2	System Level Demonstration Software	2-11
2.2.2.3	Internal Diagnostics	2-11
2.2.3	Confidence Checks	2-12
2.2.4	Troubleshooting Procedures	2-14
2.2.4.1	General Diagnostic Testing	2-14
2.2.4.2	Echo Test (Supervisory Mode 2)	2-15
2.2.4.3	DECdataway Address Verification	2-15
2.3	DPM23 and DPM50 DECdataway Intelligent Subsystems (DIS)	2-19
2.3.1	General Description	2-19
2.3.2	Diagnostics and Utilities	2-19
2.3.2.1	DZKCH – DECdataway Exerciser	2-21
2.3.2.2	CZKClx and the ISV11 ROM-Resident Diagnostics	2-21
2.3.2.3	CZKMPx Diagnostic Monitor	2-21
2.3.3	Troubleshooting Procedures and Flowcharts	2-23
2.4	RT801, RT803, RT805 Terminals	2-29
2.4.1	General Description	2-29
2.4.1.1	RT801 Time and Attendance Station	2-29
2.4.1.2	RT803 Basic Work Station	2-29
2.4.1.3	RT805 Area Work Station	2-29

2.4.2	Diagnostics and Utilities	2-29
2.4.2.1	System Level Diagnostics	2-29
2.4.2.2	Internal Diagnostics	2-30
2.4.3	Confidence Checks	2-30
2.4.4	Troubleshooting Procedures and Flowcharts	2-31
2.4.4.1	Internal Terminal Diagnostics	2-31

CHAPTER 3 DIAGNOSTIC OPERATING PROCEDURES

3.1	Getting Started	3-1
3.1.1	Booting the DPM RSX-11 Test System	3-3
3.1.1.1	General	3-3
3.1.1.2	Booting the Test System	3-3
3.1.2	Installation of Diagnostic Tasks on a Customer's System	3-9
3.1.2.1	General	3-9
3.1.2.2	Creating the Diagnostic Account	3-9
3.1.2.3	Loading the Diagnostics	3-10
3.1.3	Executing the Diagnostic Tasks	3-11
3.1.3.1	Standalone Under the DPM Test System	3-11
3.1.3.2	On-Line Under the Customer's System	3-12
3.2	DZKCH Serial Bus Exerciser	3-13
3.2.1	Description and Scope	3-13
3.2.2	Operating Procedures	3-13
3.2.2.1	DZKCH Loading and Initiation	3-13
3.2.2.2	Specify How Many Units to Exercise	3-16
3.2.2.3	Specify Which Units to Exercise	3-17
3.2.2.4	Terminal Status Report	3-18
3.2.2.5	Program Mapping Function	3-19
3.2.2.6	End of Pass Report	3-19
3.2.2.7	Program Termination	3-19
3.2.2.8	Error Reporting	3-20
3.3	CZKClx Remote Diagnostic Exerciser	3-21
3.3.1	Description and Scope	3-21
3.3.2	Operating Procedures	3-21
3.3.2.1	Loading and Initiating CZKClx	3-21
3.3.2.2	Specify How Many Units to Exercise	3-23
3.3.2.3	Specify Which Units to Exercise	3-23
3.3.2.4	Terminal Status Report	3-25
3.3.2.5	Program Mapping Function	3-25
3.3.2.6	Program Termination	3-26
3.3.2.7	Error Reporting	3-26
3.4	CZKMPx DIS On-Line Diagnostic Monitor	3-29
3.4.1	Description and Scope	3-29
3.4.2	Operating Procedures	3-29
3.4.2.1	Loading and Initiation of CZKMPx	3-30
3.4.2.2	Select Major Operating Mode	3-30
3.4.2.3	DIS Selection Dialogue	3-31
3.4.2.4	Local Diagnostic Mode	3-35
3.4.2.5	Host Diagnostic Mode	3-38
3.4.2.6	Communication Mode	3-41
3.4.2.7	Error Reporting	3-41

CHAPTER 4 HELPFUL MCR, SYSTEM UTILITY AND DEMONSTRATION PROGRAMS

4.1	Introduction	4-1
4.2	Software Routines.	4-1
4.2.1	Informational Routines.	4-1
4.2.2	Demonstration Routines	4-2
4.2.3	Configuration Routine	4-2
4.3	Informational Routines	4-2
4.3.1	Devices	4-2
4.3.2	DDS	4-4
4.3.2.1	DDS Error Messages	4-5
4.3.3	NISTAT.	4-6
4.3.4	PEEK.	4-7
4.3.4.1	Changing the PEEK Display	4-9
4.3.5	Error Log Report (ISBRPT).	4-10
4.4	Demonstration Routines.	4-12
4.4.1	WSDEMO	4-12
4.4.2	FDMTST.	4-15
4.4.3	DPMTST	4-19
4.4.3.1	DPMTST Loopback Testing	4-20
4.4.3.2	DPMTST Terminal Demonstration	4-22
4.5	Configuration Routine.	4-23
4.5.1	CBC	4-23
4.5.1.1	How to Run CBC	4-23
4.5.1.2	Displaying DECdataway Address Assignments.	4-24
4.5.1.3	Removing a DECdataway Address Assignment	4-24
4.5.1.4	Assigning a DECdataway Address	4-25
4.5.1.5	CBC Error Messages	4-25

APPENDIX A DECdataway PORT CONNECTOR ADDRESSES

A.1	General.	4-27
-----	------------------	------

GLOSSARY**FIGURES**

1-1	Test System Configuration.	1-3
2-1	Typical DECdataway Configuration	2-2
2-2	Terminal Problem	2-6
2-3	ISB11-A Problem	2-7
2-4	DECdataway Cable Problem.	2-8
2-5	Typical VT110 Applications.	2-9
2-6	DPM01 Block Diagram.	2-10
2-7	Operator's Troubleshooting Flowchart.	2-15
2-8	DECdataway Address Test Flowchart.	2-16
2-9	DIS Maintenance Software/Firmware Hierarchy.	2-20
2-10	ISV11-A Boards, Edge-on	2-22
2-11	Troubleshooting Flowcharts Chart 1 System Procedures	2-24
2-12	Troubleshooting Flowcharts Chart 2 DPM50 Subsystem Procedure, Part A	2-25

2-13	Troubleshooting Flowcharts	
	Chart 2 DPM50 Subsystem Procedure, Part B	2-26
2-14	Troubleshooting Flowcharts	
	Chart 3 Port Address Checkout.	2-27
2-15	FDC Terminal Internal Diagnostic Tests 11-20.	2-40
2-16	FDC Terminal Internal Diagnostic Test 20.	2-41
2-17	FDC Terminal Internal Diagnostic Test 21.	2-42
2-18	FDC Terminal Internal Diagnostic Test 22.	2-43
2-19	FDC Terminal Internal Diagnostic Test 30.	2-44
2-20	FDC Terminal Internal Diagnostic Test 31.	2-45
2-21	FDC Terminal Internal Diagnostic Test 32.	2-46
2-22	FDC Terminal Internal Diagnostic Test 33.	2-47
2-23	FDC Terminal Internal Diagnostic Test 34.	2-48
2-24	FDC Terminal Internal Diagnostic Test 35.	2-49
2-25	FDC Terminal Internal Diagnostic Test 40.	2-50
2-26	FDC Terminal Internal Diagnostic Test 50.	2-51
2-27	FDC Terminal Internal Diagnostic Test 52.	2-52
2-28	FDC Terminal Internal Diagnostic Test 60.	2-53
2-29	FDC Terminal Internal Diagnostic Test 61.	2-54
2-30	FDC Terminal Internal Diagnostic Test 62.	2-55
2-31	FDC Terminal Internal Diagnostic Test 70.	2-56
2-32	FDC Terminal Internal Diagnostic Test 71.	2-57
2-33	FDC Terminal Internal Diagnostic Test 80.	2-58
2-34	FDC Terminal Internal Diagnostic Test 81.	2-59
2-35	FDC Terminal Internal Diagnostic Test 82.	2-60
3-1	Getting Started Flowchart	3-2
3-2	DZKCH Sample Run	3-14
3-3	CZKCIB Sample Run.	3-22
3-4a	CZKMPB Local Mode Sample Run (Host Printout).	3-32
3-4b	CZKMPB Local Mode Sample Run (DIS Terminal Printout).	3-32
3-5	CZKMPB Host Mode Sample Run	3-33
3-6	CZKMPB Communication Mode Sample Run	3-34
4-1	List of Devices Example	4-3
4-2	Summary Report on All Devices on Controller No. 2.	4-10
4-3	Summary Report on One Device (DEV. No. 5)	4-11
4-4	Full Report on All Controllers and Devices	4-11
4-5	Full Report on One Controller (ISB11 No. 3)	4-12
A-1	DECdataway Pprt Connector	4-27

TABLES

2-1	DPM01 Troubleshooting Chart	2-17
2-2	Diagnostic Mode Indicators.	2-18
2-3	Hardcore Tests	2-22
2-4	Softcore Tests	2-23
2-5	FDC Terminal Internal Diagnostic Tests.	2-34
2-6	Switch Values Displayed by Test 34	2-39
3-1	Monitor Interaction at Local Terminal	3-37
4-1	Summary Report.	4-13
A-1	DECdataway Port Address Selection	4-28

CHAPTER 1 INTRODUCTION

1.1 INTRODUCTION

This manual contains maintenance and diagnostic operating procedures for the following DPM products.

- DECdataway and its ISB11 controller
- DPM01 and VT110 terminal multiplexers
- DPM50 and DPM23 Distributed Intelligent Subsystems (DIS)
- RT801, RT803, and RT805 remote industrial terminals

1.2 REQUIREMENTS

Maintenance personnel must meet the following requirements to use this manual effectively and safely.

- Must be familiar with DPM system operation and maintenance
- Must work closely with the system manager
- Must be experienced in the maintenance of the host computer and LSI-11 systems

It is recommended that maintenance personnel using this manual be familiar with RSX-11M and/or RSX-11M-PLUS operation.

1.3 MANUAL ORGANIZATION

This manual is to be used by maintenance personnel when troubleshooting or verifying the operation of a DPM system. It provides step-by-step instructions for choosing **WHAT** diagnostic to run, **WHEN** to run it, and **HOW** to run it.

Chapter 2 provides the **WHAT** and **WHEN** to run information for each of these DPM products. Each section provides the following.

1. Description of product
2. List and description of each software routine associated with maintaining the product
3. Sequence of what diagnostics to run, how many times and in what order to verify the products usability in the system.

4. Troubleshooting procedures and flowcharts for each product.

Chapter 2 is divided into sections as follows.

- Paragraph 2.1 - DECdataway and its ISB11 Controller
- Paragraph 2.2 - DPM01 and VT110 Terminal Multiplexers
- Paragraph 2.3 - DPM23 and DPM50 DECdataway Intelligent Subsystems (DIS)
- Paragraph 2.4 - RT801, RT803, RT805 Terminals

Chapter 3 contains procedures for **HOW** to do the following.

1. Determine the present state of the system
2. Install the diagnostics into the system
3. Run each of the diagnostics

Before starting work on a system read Paragraph 3.1.

Chapter 4 contains operating procedures and interpretation information for many DPM system utility and demonstration programs. The routines are not classified as diagnostics but are provided in this manual as a convenience. The routines covered are divided into three functional areas: information, demonstration, and configuration routines.

Appendix A contains directions for determining the address wired into a DECdataway port connector.

A Glossary of terms unique to DPM systems is provided.

1.4 MANUAL CONVENTIONS

The following conventions are adhered to throughout this manual.

- A lowercase x following a filename refers to that file's version or revision level on your specific system. Replace the x with the character that identifies the version on your system when specifying the filename.
- **BOLD** lettering in sample runs of the diagnostic programs is the output typed by the computer. Lettering in red represents operator input.
- All sample diagnostic runs shown in Chapter 3 were run on an actual system configured and SYS GEN'ed as shown in Figure 1-1.

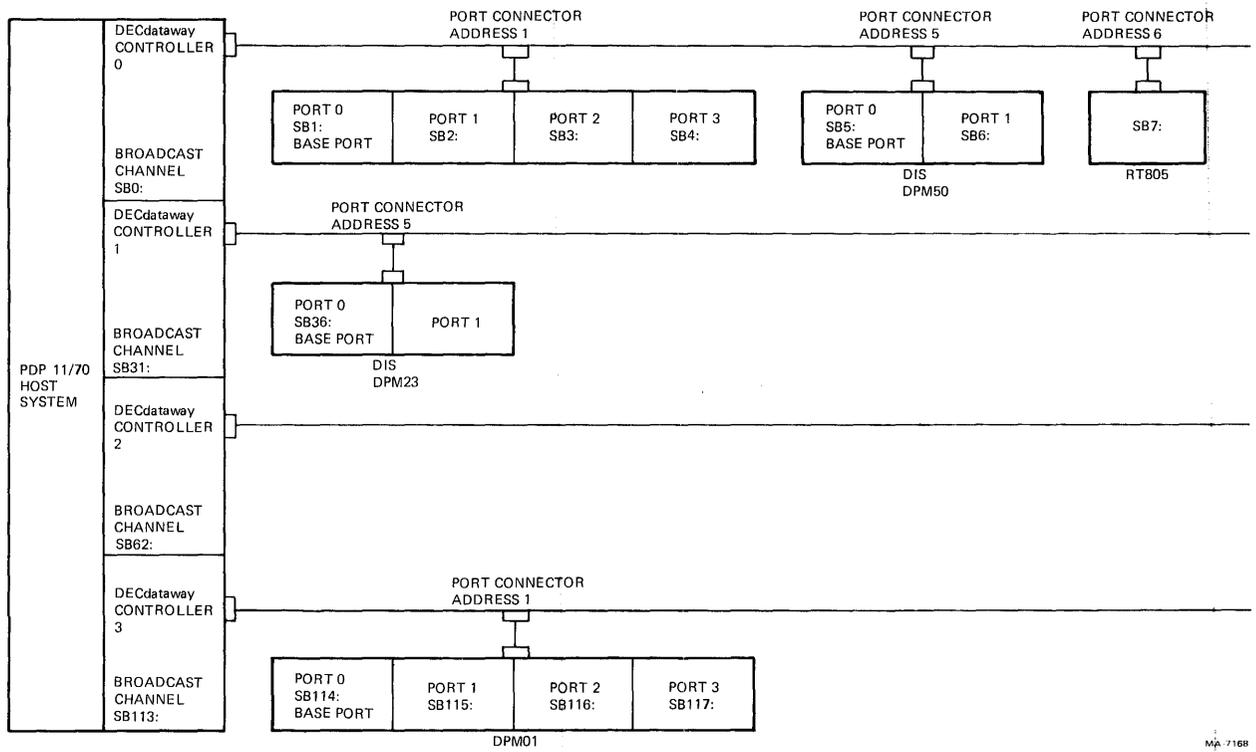


Figure 1-1 Test System Configuration

2.1 DECdataway AND THE ISB11-A CONTROLLER

2.1.1 General Description

The DECdataway consists of an ISB11-A controller interface and a shielded, twisted-pair multidrop cable of up to 15000 feet. The ISB11-A interfaces a PDP-11 computer to a number of terminals, peripherals, and/or processors via a DECdataway cable. Connectors are placed on the DECdataway. These connectors create ports through which messages pass in and out of the remote devices connected at these points. A port connector contains address jumpers. The device connected to a port responds only to commands containing that address. A port can be associated with more than one address. However, these addresses must be contiguous and only the lowest of these is jumpered into the connector. The number of addresses per controller may not exceed 63. The DECdataway cable is linear and free of any branches, stubs, or repeaters. Positioning of the controller is optional. Figure 2-1 shows a block diagram of two typical DECdataway configurations.

The DECdataway has the ability to transfer data between a PDP-11 host computer and up to 63 slaves in a block or message oriented fashion via controller and multidrop cable. Data transfer between the PDP-11 and the controller is accomplished over the UNIBUS; data transfer between the controller and slaves is over the multidrop cable.

The UNIBUS program controlled interface appears as eight bytes of read/write registers in the PDP-11 external page. These registers are used primarily as a one-way port by the CPU to pass information to the controller.

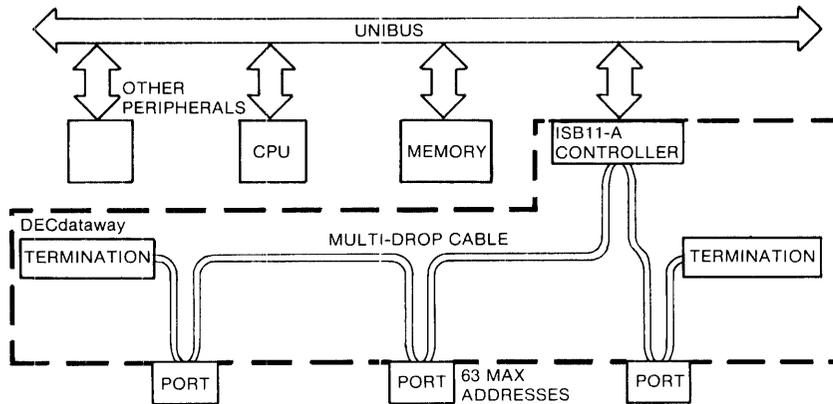
Transfer of data and communication information from the controller to the CPU is done via an area in main memory (buffers and Tumble Table) set aside by the operating system.

The DECdataway (multidrop) cable is a shielded, twisted-pair cable. It provides a path for information transfer between the controller and the ports. Transfers execute sequentially.

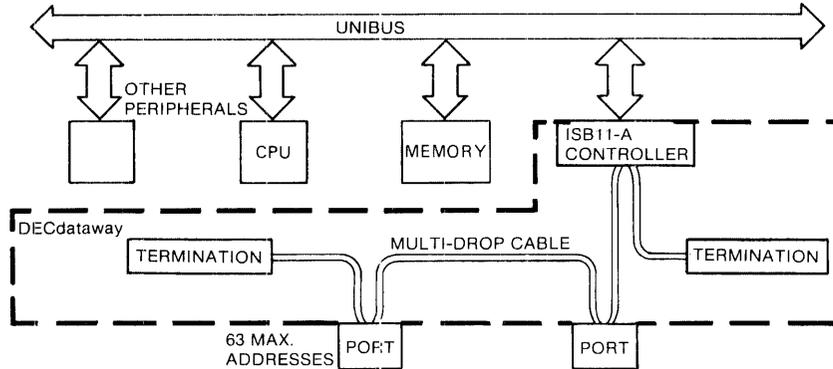
2.1.2 Diagnostics and Utilities

The DECdataway diagnostics consist of eight tests. Running diagnostic tasks at periodic intervals make sure equipment operates with minimum unscheduled downtime.

CONFIGURATION EXAMPLE 1:



CONFIGURATION EXAMPLE 2:



MA 0492A

Figure 2-1 Typical DECdataway Configurations

Detailed discussions of content, use, and interpretation of each diagnostic is provided in Chapter 3. Diagnostics are to be performed in the order given in Paragraphs 2.1.3 and 2.1.4.

The first five tests listed are standalone diagnostics. They must be performed first, and in the order given. For a detailed description for performing MAINDEC tasks, refer to their write-ups and listings available on microfiche and hardcopy.

2.1.2.1 Standalone Diagnostics – The following are descriptions of the standalone diagnostics.

MAINDEC-11-DZKCC – M8204 Module (Part of ISB11) – This diagnostic performs all microprocessor function tests except CRAM and Main Memory. All tests are static or single step.

MAINDEC-11-DZKCD – M8204 Module – This diagnostic performs CRAM, main memory, and jump instruction tests. All tests are static or single step.

MAINDEC-11-DZKCA – M8204 Module (KMC11-A Microdiagnostic) – The host loads test code into CRAM that then free runs in the KMC11-A. Errors then report back to the host. The microtests relocate throughout CRAM.

MAINDEC-11-DZKCE – M8202-YE Module (Part of ISB11) – This diagnostic performs line unit static and free run cable data tests in DDCMP mode. It requires a working M8204 module.

MAINDEC-11-DZKCF – M8202-YE Module – This diagnostic performs line unit static and free run data tests in bitstuff mode. It requires a working M8204 module.

The following three tests are performed on a system level. These tests must be run in the order listed, following the standalone tests.

2.1.2.2 System Diagnostics – The following are descriptions of the three system diagnostics.

MAINDEC-11-DZKMC – M8204 Module – This diagnostic is for M8204 only.

NOTE: The following diagnostics are run on-line under the RSX11-M or RSX11-M-PLUS software operating system. The ISB11-A must be connected to one or more devices via the DECdataway cable.

MAINDEC-11-DZKCH – Serial Bus Exerciser – This diagnostic performs a task that exercises the DECdataway communication facilities of up to 63 ports at one time. It tests only the port's ability to communicate with the host. It does not test any specific terminal functions. Ports are run in loop mode where they return data to the host exactly as received. Errors associated with the received data are reported on the host system console. If this program is to be run on-line and at the same time as the user's software, then the user must use extreme caution. Refer to Chapter 3, Paragraph 3.2.1 for operating procedures and warnings associated with DZKCH.

MAINDEC-11-CZKClx – Remote Terminal Tester – This diagnostic performs a task that runs the internal nonintervention tests of up to 63 FDC terminals at the same time. It also reports the results on the system console that started the test. CZKClx can be used to check the basic operating ability of all DECdataway devices on a DPM system from the host. This diagnostic does not check the operator interface portions of the RT8XX terminals, i.e., displays, keyboards, and readers. As with DZKCH, if this program is to be run on-line and at the same time as the user's software, the user must use extreme caution. Refer to Chapter 3, Paragraph 3.3.1 for operating procedures and warnings associated with CZKClx.

2.1.3 Confidence Checks

2.1.3.1 Standalone Diagnostics – Perform confidence checks by following these procedures.

1. Create a chain under XXDP of the following diagnostics in the order shown.

MAINDEC-11-DZKCC
MAINDEC-11-DZKCD
MAINDEC-11-DZKCA
MAINDEC-11-DZKCF

2. If an RK05 is used for the diagnostic medium, a normal XXDP chain fails to continue properly after DZKCC and DZKCA. This is because these diagnostics test the KMC11-A's ability to force AC LO. Insert several lines of console printing in the chain file immediately following diagnostics DZKCC and DZKCA. This allows the RK05 enough time to recover. Otherwise, the XXDP monitor indicates an RK05 device error.
3. Run each diagnostic for at least three passes, regardless of whether they are run from an XXDP chain file or run separately.
4. Set the switch register to 00000. Each diagnostic auto-sizes the system, reports the ISB11-As at nonstandard floating addresses, and runs all the ISB11-As on the system.

2.1.3.2 System Diagnostics – System diagnostics are divided into two categories: DEC/X11 and user mode. Perform confidence checks by following these procedures.

DEC/X11

1. Load DEC/X11 and run for one half hour.
2. Set the NPR rate for 14 μ s/NPR.
3. Set the NPR/BR rate to 30 NPRs/BR.
4. Set SR1 bits 13 and 12 to 0 for both transmit and receive NPRs.

User Mode

ISB11-A protocol is half-duplex. Therefore, for a full system test the controller must be connected to one or two DECdataway peripherals, and the Serial Bus Exerciser (MAINDEC-11-DZKCH) must be run. The procedure varies according to the type of DPM system used.

The procedures are as follows.

1. Obtain one or two DECdataway peripherals for each ISB11-A to be tested.

2. Make sure they have been checked using their ROM resident diagnostic. Refer to the appropriate section of this chapter for details on the specific device.
3. Connect the peripherals to the controller using the ISB11-A test cable (DEC P/N 70-14152) provided with the host system.

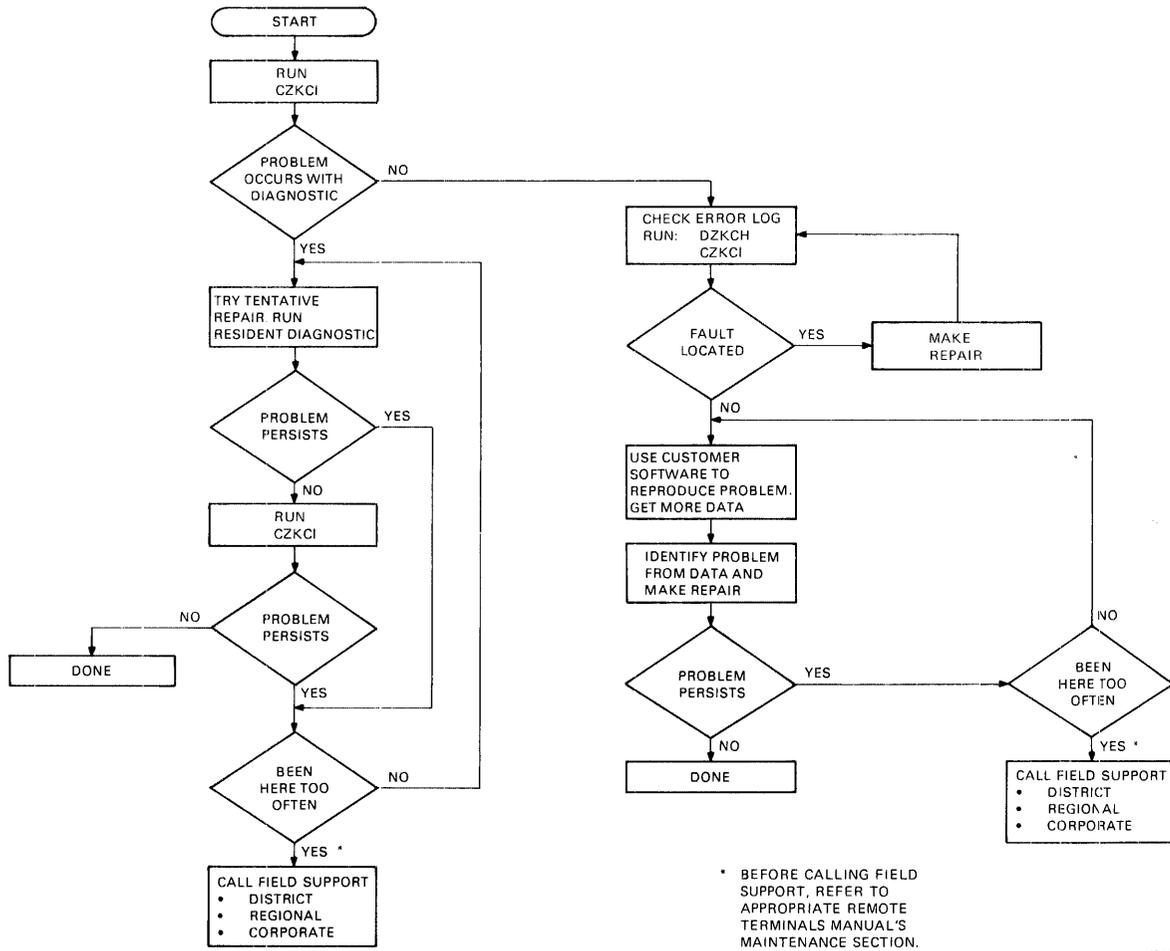
NOTE: The two port connectors of the test cable are wired for addresses 1 and 2.

4. Boot and start RSX11-M using procedures defined in Paragraphs 3.1 to 3.2. Run the serial bus exerciser (MAINDEC-11-DZKCH) for one hour, without errors.

2.1.4 Troubleshooting Procedures and Flowcharts

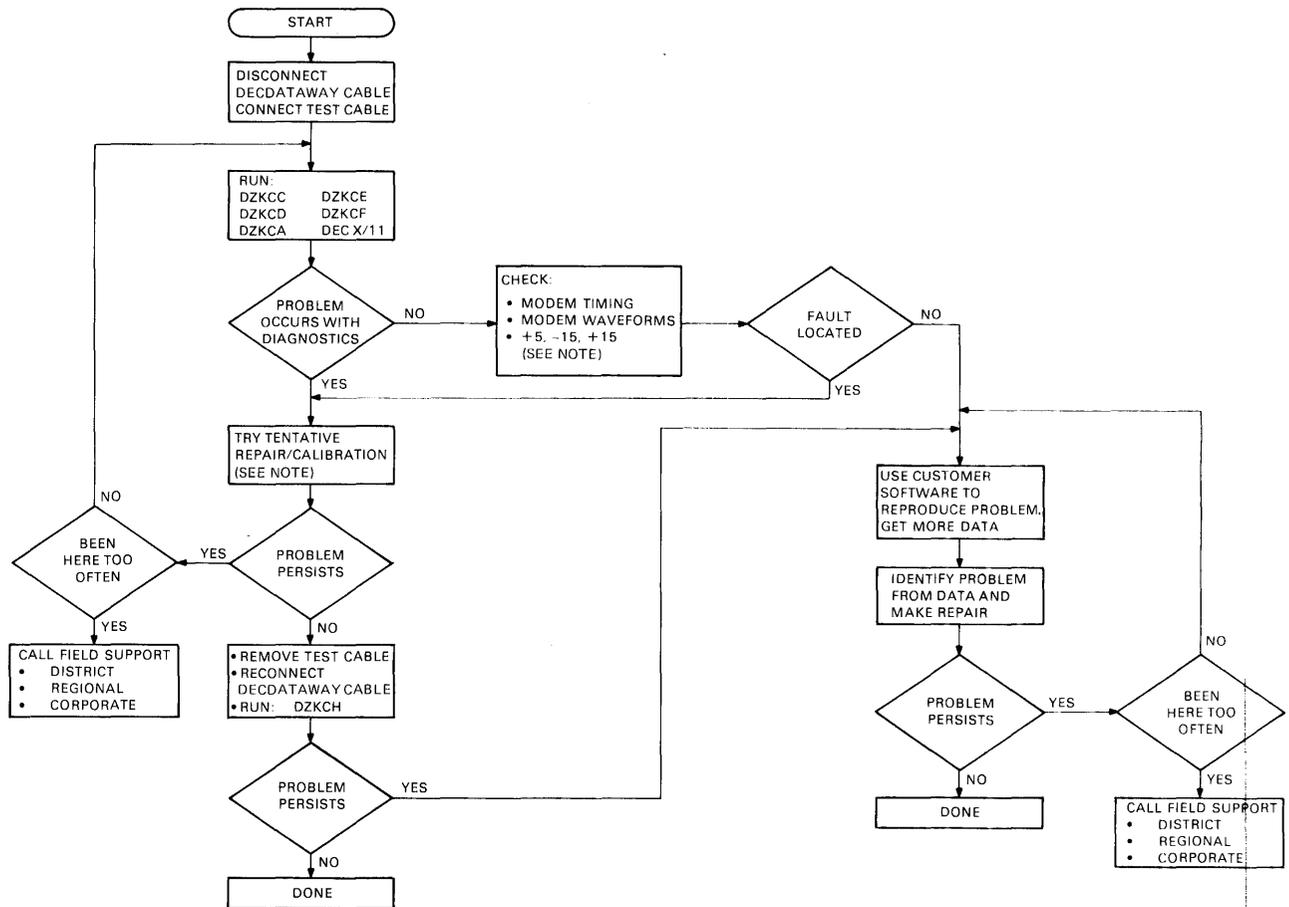
Failures can occur in any of the DECdataway subsystem's three main sections. To locate a failure, isolate it to one of these sections. Possible problem areas are: a terminal or DIS, the ISB11-A controller, or the DECdataway cable itself.

The diagnostic process, in this case, may be used as a guide. Diagnostic tools are available to help maintenance personnel identify the problem and make the appropriate repair. Some software tools are run under RSX11-M/M-PLUS and permit diagnosis on-line with minimum disruption to system operation. First, begin with a statement of the problem. Try to categorize it as a terminal-related problem, an ISB11-A problem, or a DECdataway cable problem. If this can be determined, refer to Figures 2-2, 2-3, or 2-4 and perform the diagnostic troubleshooting procedures indicated by the appropriate flowchart. If the failure cannot be determined at this point, perform a complete diagnostic run in the order listed in Paragraph 2.1.2. Running diagnostics help evaluate and classify the problem. The customer should provide a maintenance area with a maintenance node to be used for repairing defective terminals.



MA 1375

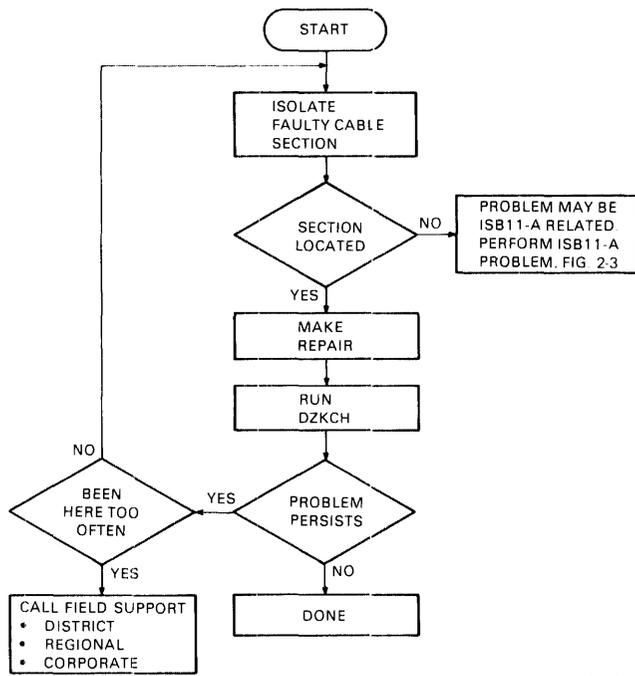
Figure 2-2 Terminal Problem



NOTE:
REFER TO THE DECDATAWAY
TECHNICAL MANUAL #EK-ISB11-TM
FOR WAVEFORM CALIBRATION
AND TIMING INFORMATION.

MA 11/6A

Figure 2-3 ISB11-A Problem



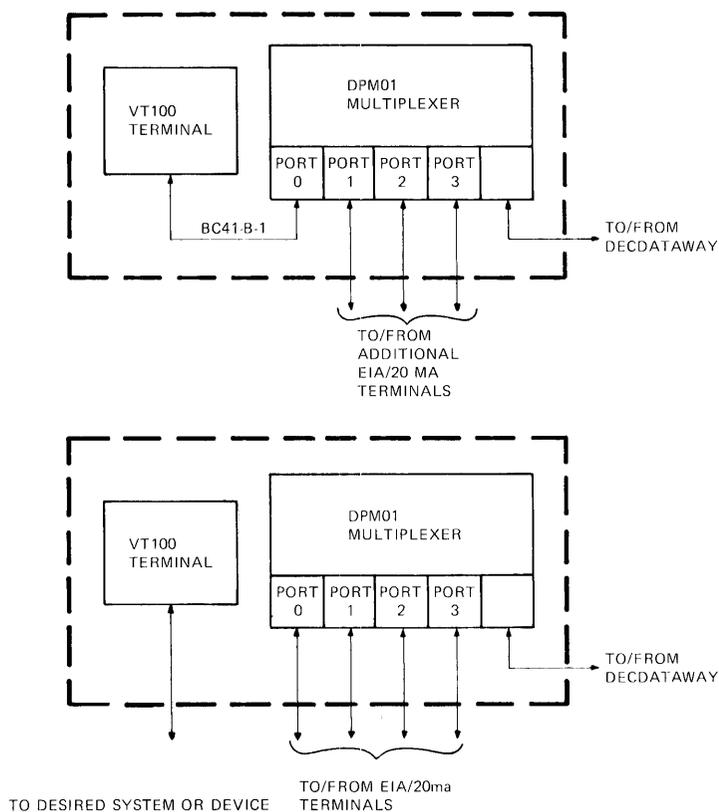
MA 1370A

Figure 2-4 DECdataway Cable Problem

2.2 DPM01 AND VT110 TERMINAL MULTIPLEXERS

2.2.1 General Description

The VT110 consists of a VT100 video terminal and a DPM01 DECdataway terminal multiplexer housed in a common enclosure. The VT100 and the DPM01 are logically separate; they share only a common power supply. The VT100 terminal may be connected to a system via one of the DPM01's I/O ports, or it may be used separately as a standard terminal with no connection to the DPM01. Figure 2-5 shows in block diagram form how the VT110 may be used in either of these configurations. The VT100 video terminal is fully described in the *VT100 User Guide*. The information in that manual is applicable to the VT110 when the video terminal portion is not connected to the DPM01.



MA 2714A

Figure 2-5 Typical VT110 Applications

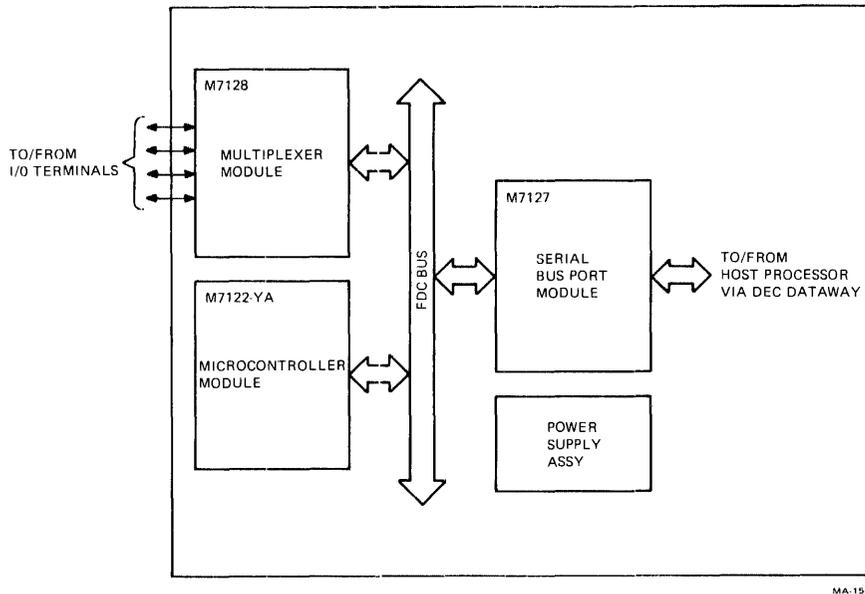


Figure 2-6 DPM01 Block Diagram

The DPM01 is a microprocessor-based peripheral interface device. It provides four logically and physically separate ports for connecting serial I/O devices to a DECdataway. Use either a 20 mA current loop or an EIA RS232-C interface on these ports. As part of a Distributed Plant Management (DPM) system, the DPM01 may be used both as a remote electrical interface and as a data preprocessor for interactive terminals such as LA36, VT52, or VT100. When used as a preprocessor, the DPM01 services character interrupts and performs functions normally done by a software terminal driver. The DPM01 is not limited to ASCII terminals. The DPM01 has transparency modes and many terminal attributes. These allow the DPM01 to function as a data communications interface between a DPM host and many UART-compatible serial data I/O devices. The *DPM Terminals System Applications Programmer's Manual* presents the full range of DPM01 applications.

In keeping with the reliability, availability, and maintainability objectives of DPM systems, the DPM01 has no switches or jumpers that require setting. Unit swapping can be done readily without regard to the DPM system configuration. All necessary information is either in the form of jumpers in the DECdataway, port connectors that attach to the DPM01, or is down-line loaded from the host processor.

The DPM01 block diagram in Figure 2-6 shows a microcontroller module and two interface modules. The microcontroller module contains a microprocessor and the ROM-resident programs that operate DPM01 and perform diagnostic testing when a maintenance mode is selected. The two interface modules handle the communication paths between the DPM01's associated terminals and the host processor.

2.2.2 Diagnostics and Utilities

2.2.2.1 System Serial Diagnostics – The following diagnostics are run from the host computer under the RSX11-M operating system. They are used to check the basic functionality of remote terminals while at the central computing facility (host).

MAINDEC-11-DZKCH – Serial Bus Exerciser – This diagnostic performs a task that exercises the DECdataway communication facilities of up to 63 ports at one time. It tests only the port's ability to communicate with the host. It does not test any specific terminal functions. Ports are run in loop mode where they return data to the host exactly as received. Errors associated with the received data are reported on the host system console. If this program is to be run on-line and at the same time as the user's software, the user must exercise extreme caution. See Chapter 3, Paragraph 3.2 for operating procedures and warnings associated with DZKCH.

MAINDEC-11-CZKClx – Remote Terminal Tester – This diagnostic performs a task that runs the nonintervention tests of up to 63 FDC terminals at the same time, and reports the results on the system console that started the test. CZKClx can be used to verify the basic operating ability of all DECdataway devices on a DPM system from the host. This diagnostic does not check the operator interface portions of the RT8XX terminals, i.e., displays, keyboards, and readers. As with DZKCH, if this program is to be run on-line and at the same time as the user's software, then the user must use extreme caution. Refer to Paragraph 3.3 for operating procedures and warnings associated with CZKClx.

2.2.2.2 System Level Demonstration Software – The following are descriptions of demonstration software at the system level.

DPMTST is the DPM01/VT110 Terminal Tester Task. It supplies an on-line tool for an operator to exercise and test all features of the DPM01/VT110 and to show the capabilities of conventional terminals connected to the DPM01/VT110.

DPMTST contains two tests: demonstration and loopback.

The demonstration test uses one to four terminal devices (e.g., VT52 or LA36) connected to the DPM01/VT110. This test lets operators select various subtests to demonstrate and test the features of terminals connected to the DECdataway through the DPM01/VT110.

A loopback test uses externally connected loopback cables (port-to-port) to test all major features of the DPM01/VT110 and to verify its end-to-end data integrity. Refer to Paragraph 4.4.3 for operating procedures.

2.2.2.3 Internal Diagnostics – The DPM01 and VT110 have an internal series of ROM-resident diagnostics. These diagnostics are run when the device enters its diagnostic mode.

Diagnostic mode is entered whenever the DPM01 or VT110 is powered up or the mode switch is set to MAINT. In this mode, the functions of the following modules are checked.

1. Microprocessor
2. DECdataway communications
3. Terminal interface

The tests are performed by the microprocessor module. LEDs on the rear panel indicate the status and progress of the tests. If the keyswitch remains in MAINT position, the DPM01 or VT110 continues to cycle through the diagnostic routines as long as no errors are detected. If an error is detected, the unit halts or exits to normal mode.

2.2.3 Confidence Checks

To obtain confidence in a DPM01 or VT110 perform the following sequence. Steps not meant for both the DPM01 and the VT110 are so noted.

VT110 only

1. Set the keyboard in front of the terminal. Plug the keyboard coil cord into the receptacle on the rear of the terminal.
2. Set the power selector switch to correspond with the line voltage and the power switch to off (down).
3. Connect the power cord to the receptacle on the rear of the terminal. Plug the other end of the power cord into a nearby power outlet.
4. Turn the power switch on. The VT110 automatically performs the power-up self test and either the ON LINE or LOCAL light on the keyboard illuminates. After approximately one minute the cursor will be visible in the upper-left corner of the screen. If the VT110 does not power up refer to the self-test instructions in Chapter 1, Part 4 of the *VT100 User Guide*.

DPM01 only

5. Connect the power cord to an ac power source.
6. Set the DPM01 mode switch/keyswitch to NORM. Verify that the DPM01 runs a power-up diagnostic. Indicators P0-P2 illuminate in sequence as the diagnostic runs.

Both VT110 and DPM01

7. Set the mode switch/keyswitch to MAINT and verify that the DPM01 restarts the diagnostic.

8. Attach a 20 mA loopback plug (DEC P/N 7015625) to connector P0. Observe that indicator P3 illuminates in sequence, indicating a successful pass through the external loop test.
9. Repeat step 8 with the loopback plug attached to connector P1.
10. Repeat step 8 with the loopback plug attached to connector P2.
11. Repeat step 8 with the loopback plug attached to connector P3.
12. Attach an EIA loopback plug (DEC P/N 7015626) to connector P0. Observe that indicator P3 illuminates in sequence, indicating a successful pass through the external loop test.
13. Repeat step 12 with the loopback plug attached to connector P1.
14. Repeat step 12 with the loopback plug attached to connector P2.
15. Repeat step 12 with the loopback plug attached to connector P3.
16. Set the mode switch/keyswitch to NORM. Connect the VT110/DPM01 to the DPM host system using the DECdataway controller test cable (DEC P/N 7014152). Use either port connector.

NOTE: The user's DECdataway cable may be used instead of the test cable if convenient. If a problem occurs, revert to using the test cable for terminal acceptance.

17. Boot the RSX11-M test system or use the diagnostic tasks with the user's software. Run MAINDEC-11-DZKCH and MAINDEC-11-GZKCI error free for a minimum of five minutes each.
18. Connect the 20 mA port-to-port test cable (DEC P/N 7015627) between P0 and P1. Connect the EIA port-to-port test cable (DEC P/N 7015628) between P2 and P3.
19. Run DPMTST in loopback mode to perform a complete host-to-VT110/DPM01 external loopback system test (about 30 minutes).

VT110 only

20. Attach connector VT COMM to connector P1 on the rear access cover using the BC41-B1 cable supplied with the VT110.
21. Refer to Chapter 1, Part 2 of the *VT100 User Guide*. Set up the terminal attributes as follows.

ANSI/VT52 Mode	VT52
Bits per character	8
Characters per line	80
Parity	Off
Receive speed	300 baud
Transmit speed	300 baud
Tabs	Columns 8, 16, 24, 32, 40, 48, 56, 64, 72
Wraparound	Off

The setting of all other attributes does not affect the operation of the test.

22. Exit from set-up mode and place the terminal on-line.
23. Set the mode switch to MAINT, then immediately to SUPVR. Observe that the DPM01 runs the diagnostic sequence. When the sequence ends a message displays on the screen giving the DECdataway octal address of P0 if a DECdataway connector is installed, or address 77 if no connector is present.
24. Return the mode switch to NORM. The terminal may now be demonstrated on-line using the DPMTST diagnostic in the terminal demonstration mode.

2.2.4 Troubleshooting Procedures

The following paragraphs explain how to isolate problems in a DPM01 or VT110. The primary troubleshooting tool is the built-in diagnostic routines of the DPM01. The procedures in this section describe the operation of the diagnostic tests and how to interpret the results.

2.2.4.1 General Diagnostic Testing – Follow the procedure in Figure 2-7 if there is no obvious reason for a failure. This procedure localizes the problem to one of the DPM01's modules or a terminal. The diagnostic test routine completes within 10 seconds and continues as long as the mode switch is set to MAINT. If only one loopback plug is available, plug it into successive ports for each pass of the diagnostics until all four ports have been tested. The loopback plug may be moved without generating an error during the test as long as the P2 or P3 LED is not lit while the loopback plug is being removed or inserted. If the DPM01 halts during the diagnostic routine, one of the LEDs should be lit, indicating a failure has occurred on the corresponding module (Table 2-1).

Modules are listed in descending order of trouble probability (i.e., the module most likely to have the problem listed first, the next most likely second, and so on). Always check power supply voltages for correct voltage (± 5 percent) and ripple (not greater than 20 mV p-p) prior to swapping any modules. Also, check the unit for any mechanical problems such as bad connections, loose pins, cables, etc.

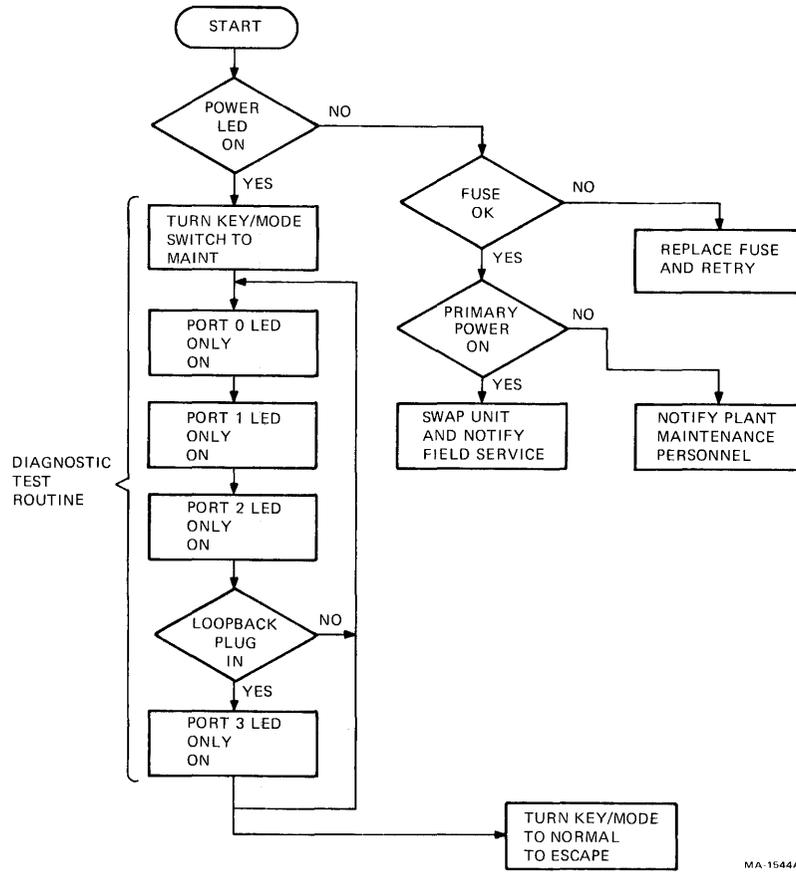


Figure 2-7 Operator's Troubleshooting Flowchart

Table 2-2 shows the function of each indicator when in normal, supervisory, and diagnostic modes.

2.2.4.2 Echo Test (Supervisory Mode 2) – Use the echo test to test the DPM01's terminals and cabling, and the interface module. This test is initiated whenever the mode switch is set to SUPVR while the DPM01 is in normal mode. The DPM01 drops off-line while the echo test is running. All printable characters echo as long as the characteristics of the terminals agree with the characteristics for the port in the DPM01. If the DECdataway cable is disconnected, or the host processor is not running when the DPM01 enters normal mode and then supervisory mode, the default characteristics are set for each port. These are 300 baud, 8-bit characters, and no parity (LA36).

2.2.4.3 DECdataway Address Verification – This test makes sure that the physical device address wired into the DECdataway connector agrees with the assigned device address. The test initiates when the mode switch is set to SUPVR while the DPM01 is in diagnostic mode. At the end of the test routine the octal address of port 0 prints on a terminal con-

nected to port 1, if it is a 300 baud LA36-type terminal. The DECdataway cable connector must be installed for this test. The test results should be address 77 (octal) if the connector is not installed. Refer to Figure 2-8 for a flowchart of this procedure.

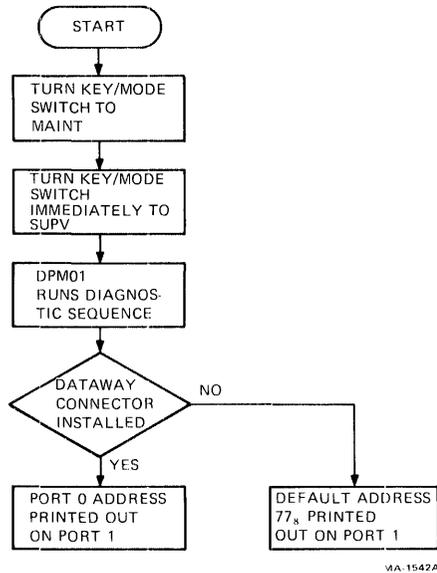


Figure 2-8 DECdataway Address Test Flowchart

Table 2-1 DPM01 Troubleshooting Chart

Symptom	Recommended Action	Item
Power LED on, test 1 does not start	Replace:	a. M7122-YA b. M7128 c. M7127 d. Backplane
Port 0 LED stays on	Replace:	a. M7122-YA b. M7128 c. M7127 d. Backplane
Port 1 LED stays on	Replace:	a. M7127 b. M7122-YA c. M7128 d. Backplane
Port 2 LED stays on	Replace:	a. M7128 b. M7122-YA c. M7127 d. Backplane
Port 3 LED stays on (loopback plug installed on at least one port)	Replace:	a. M7128 b. M7122-YA c. M7127 d. Backplane
Individual port failure (Nonflashing LED(s) indicate(s) failing port(s) after Test 3 or 4)	1. Replace:	a. M7128 b. Port cable c. M7122-YA
	2. Check:	a. Plug connections b. Any connected devices c. Jumper present between pins 1 and 2 on port connector
Diagnostic is correct but unit fails on-line - all ports	1. Check DECdataway connector and address wiring	
	2. Replace:	a. M7127 b. M7122-YA c. M7128
Diagnostic is correct but unit fails on-line - not all ports	1. Check:	a. Terminal b. Terminal attributes c. Connectors
	2. Replace:	a. Port cable b. M7122-YA c. M7127

Table 2-1 DPM01 Troubleshooting Chart (Cont)

Symptom	Recommended Action	Item
Supervisory mode options inoperative	Check and make sure that a 300 baud ASCII terminal is connected to Port 1	
Tests do not sequence properly	Replace:	<ul style="list-style-type: none"> a. M7 122-YA b. M7 127 c. M7 128 d. Backplane

Table 2-2 Diagnostic Mode Indicators

Indicator	Function When Lit
P0	M7 122YA microprocessor test is in process.
P1	M7 127 DECdataway communications module test is in process.
P2	M7 128 terminal multiplexer module test is in process.
P3	M7 128's terminal cable driver and receiver test is in process. At least one loopback test plug must be installed for this test to function.

In normal mode and supervisory 1 mode, each LED indicates that the port is in one of four states.

Off = Reset	Diagnostics have detected an error on that port. It is off-line and the hardware is reset.
On = Active	The port is on-line and an application task is reading or writing on the port.
Mostly off, blinking on = off-line idle	The port has not communicated with the host since entering normal mode.
Mostly on, blinking off = on-line idle	The port has communicated with the host since entering normal mode but no applications task is presently reading or writing on the port.

In supervisory mode 2, the LEDs will be either off or on. Off indicates that a failure has been detected by the diagnostic; on indicates that echoing will occur. No port will go on-line in this mode.

2.3 DPM23 AND DPM50 DECdataway INTELLIGENT SUBSYSTEMS (DIS)

WARNING: Before initiating ANY DIS diagnostic or maintenance software ALWAYS check with local site personnel for any safety precautions or restrictions on the operations to be performed. The DIS can be a remote process controller. Its I/O modules may control very sophisticated and perhaps even dangerous industrial processes.

2.3.1 General Description

There are currently two DECdataway Intelligent Subsystem (DIS) configurations: the DPM50 and the DPM23. A DPM50 has either an LSI-11/03 or an LSI-11/23 processor and always contains an Input/Output Control Module (IOCM) for process control I/O. A DPM23 has an LSI-11/23 processor. An IOCM (and hence, process I/O) is optional for DPM23. Because of a different physical mounting, the DPM23 can have more peripheral options. However, since both devices are based on an LSI-11 microcomputer and both use an ISV11 DECdataway interface, they are treated identically by the diagnostics.

2.3.2 Diagnostics and Utilities

Service personnel must take a system approach to maintaining a DIS with process I/O. This means distinguishing specific faults in the subsystem from system-wide faults, such as problems in the host computer or the DECdataway. It also means taking into account the hierarchical nature of the system (e.g., one cannot troubleshoot an LSI-11 bus device from the host if the ISV11 connecting it to the dataway is not working properly). On the other hand, once the integrity of the system from host to LSI-11 is verified, standard LSI-11 bus diagnostics (MAINDECs) are run on the LSI-11 for troubleshooting the devices and I/O modules. The host plays no role in such troubleshooting except to download the diagnostics and communicate with the operator. (Operating procedures for the individual MAINDEC diagnostics are not presented in this manual. Refer to individual MAINDEC listings for this information.)

Figure 2-9 outlines the hierarchy of the software and firmware used for DIS maintenance. It shows the functional areas associated with each software/firmware routine.

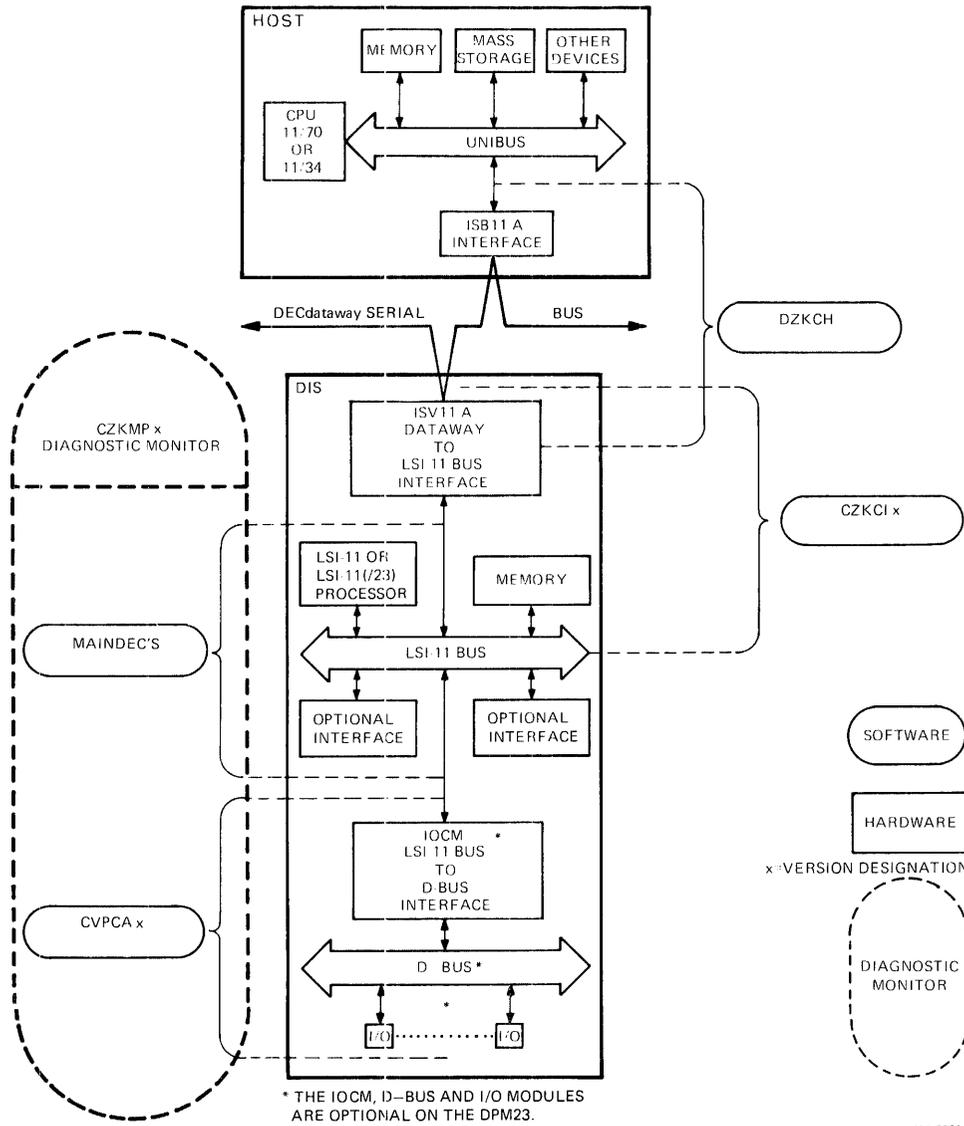


Figure 2-9 DIS Maintenance Software/Firmware Hierarchy

2.3.2.1 DZKCH – DECdataway Exerciser – The host's ability to communicate with a DIS subsystem via the DECdataway must be verified before any valid diagnosis can be performed. DZKCH is a task that runs under RSX11-M/M-PLUS in the host. This task exercises the dataway and verifies the integrity of the communications channel between the host and various devices on the dataway. In the case of a DIS, DZKCH checks communication up to and including the 8-bit microprocessor in the ISV11. It tests whether the 8-bit microprocessor can manage the DECdataway protocol and communicate with the host. Paragraphs 3.2 to 3.3 contain operating procedures for DZKCH.

2.3.2.2 CZKClx and the ISV11 ROM-Resident Diagnostics – CZKClx is a task that runs under RSX11-M/M-PLUS in the host. When run, it starts internal diagnostics on selected devices connected to dataway ports. It receives and displays information on all but catastrophic errors.

In the case of a DIS subsystem, CZKClx starts a series of ROM-resident diagnostics in the ISV11. These tests are also started automatically when the DIS is powered up and can be used as a basic standalone confidence check.

CZKClx can start the ISV11's microprocessor running a series of diagnostic tests contained in its own ROM. As each test executes, its test number is displayed in a set of LEDs mounted on the edge of the ISV11's M8080 board (refer to Figure 2-10). The first nine of these tests (1-11 octal) test basic characteristics confined wholly to the ISV11 and thus are regarded as hardcore. An error in any of these nine tests causes the 8-bit microprocessor to loop within the test, thus continuously displaying the number of the first failed test. Diagnostics 12-14 (octal) check softcore characteristics involving the LSI-11's CPU (processor and memory). Test 13 takes about 11 seconds, but 12 and 14 are so quick their numbers may not be noticed in the lights. Errors in these tests are not allowed to shut down the system. However, if an error occurs, the test number is flashed in the LEDs for 10 seconds and the number is upline loaded to the host for display. Paragraphs 3.3 to 3.4 contain operating procedures for CZKClx.

Tables 2-3 and 2-4 contain a description of the hardcore and software tests, respectively.

2.3.2.3 CZKMPx Diagnostic Monitor – Standalone LSI-11 and I/O Subsystem diagnostics can be run in the DIS subsystem if the following are in working order.

1. ISV11
2. Communications channel between ISV11 and the host

(The ISV11 and the communications channel are working if DZKCH and CZKClx have run correctly.) The diagnostic monitor (CZKMPx) that runs in the host computer downline loads and starts the standalone LSI-11 and

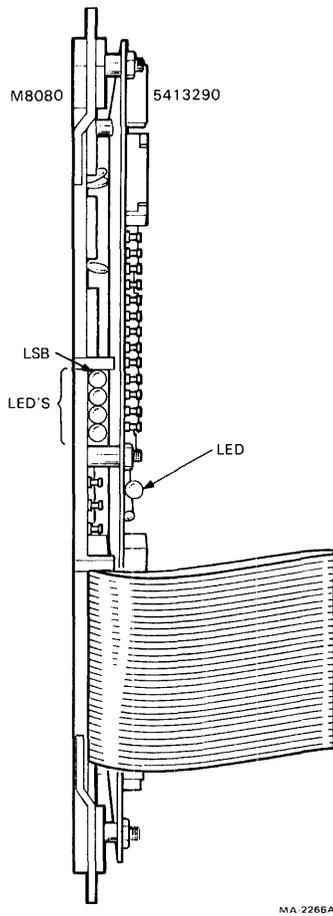


Figure 2-10 ISV11-A Boards, Edge-on

Table 2-3 Hardcore Tests

Test	Module	Description
1	M8080	Checks power-up configuration of 8080 I/O registers 1 and 2, and does basic 8080 instruction test
2	54-13290	Does cyclic redundancy check on each 8080 ROMs individually
3	54-13290	Checks writing and reading in the 8080 RAM and checks out RAM addresses
4	54-13290	Checks transmission and reception in USYNRT communications chip using maintenance mode
5	54-13290	If dataway connector is unplugged (i.e., address 77 is read), this test checks transmission and reception in the USYNRT through the modem, otherwise test is skipped

Table 2-3 Hardcore Tests (Cont)

Test	Module	Description
6	54-13290	Checks ISV11-A interrupt system
7	M8080	Checks 8080 I/O register 2 and 8080 I/O registers (3-5) that are common with LSI-11 control and status registers (CSR2 and 4)
10	M8080	Checks timeout feature of DMA logic for access to LSI-11 memory
11	Both	Checks LSI-11 interrupt circuit in ISV11

Table 2-4 Softcore Tests

Test	Module	Description
12	LSI-11	Loads a program into LSI-11 memory and then boots the LSI-11 - this checks ability of ISV11-A to interrupt the LSI-11 and vice versa
13	MSV11	Runs address and data tests on 28 Kword of LSI-11 memory
14	LSI-11	Runs LSI-11 instruction test by loading it into LSI-11 memory and booting the LSI-11 to run it

the I/O Subsystem diagnostics. This monitor and a set of LSI-11 bus diagnostics are supplied with every DPM system host. The diagnostics are in image format and kept on file at the host. Note that filenames for these are the same as under XXDP but with extension .IMG.

With CZKMPx, service personnel can select various diagnostics for the equipment on the LSI-11 bus in a DIS subsystem. These diagnostics are downline loaded into LSI-11 memory and executed by the LSI-11. The three modes available to carry out this procedure are the host, local, and communications modes. In host mode the operator remains at a host terminal and receives pass/fail and pass count information via upline reporting. In local mode the operator goes to the remote site and operates the diagnostics from a terminal on the LSI-11 bus (connecting a portable terminal if necessary). With this method the operator can call and run diagnostics from the local terminal and receive complete error information. Communication mode is similar to host mode, but with one major advantage. The operator remains at the host terminal and receives not only pass/fail and pass count information at the host, but also error messages generated by the diagnostic running in the DIS. (The diagnostic must be APT compatible for use in this mode.)

2.3.3 Troubleshooting Procedures and Flowcharts

The troubleshooting procedures for DIS subsystems are defined through a series of flowcharts (Figures 2-11 through 2-14).

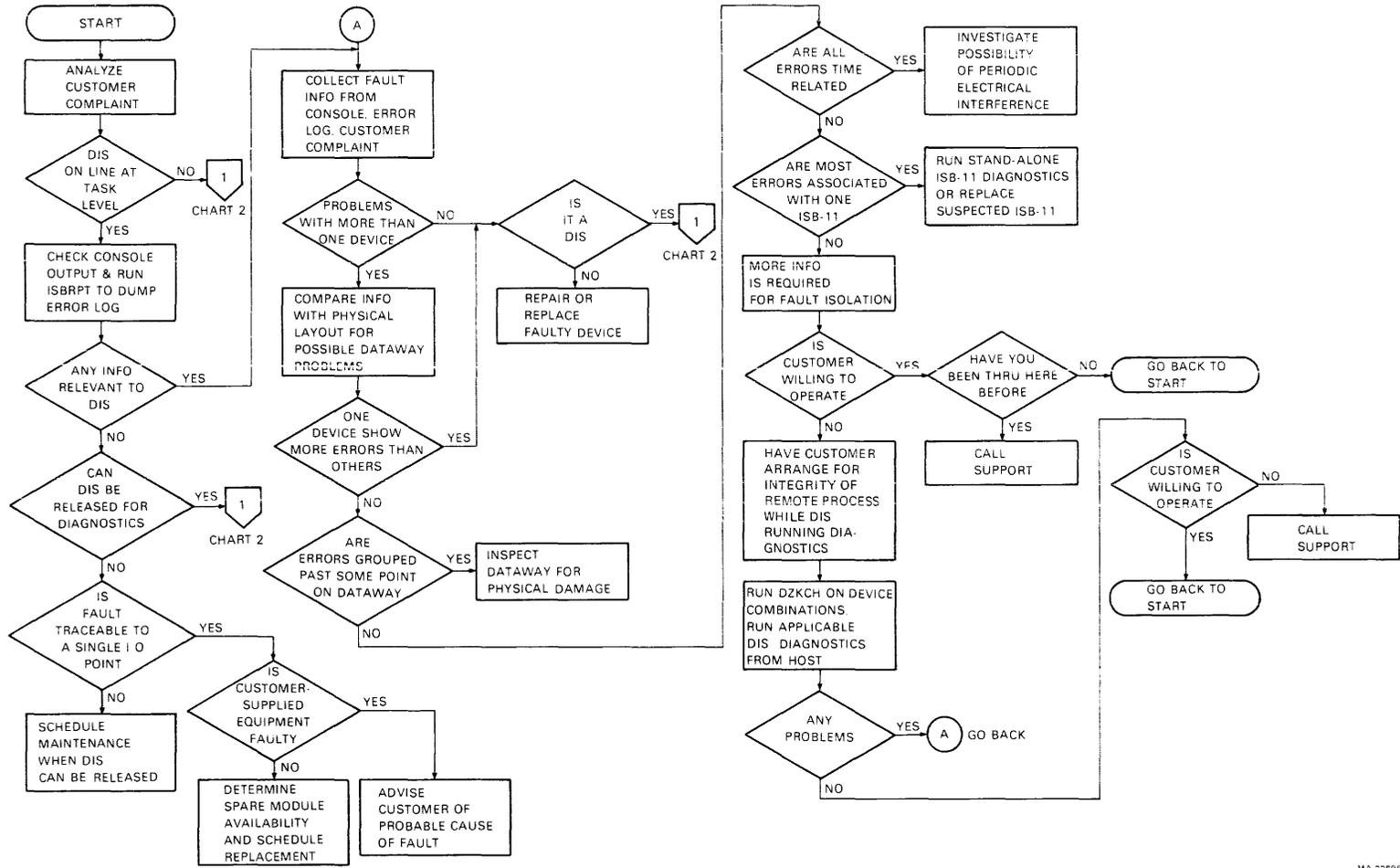


Figure 2-11 Troubleshooting Flowcharts
Chart 1 System Procedure

MA 22896

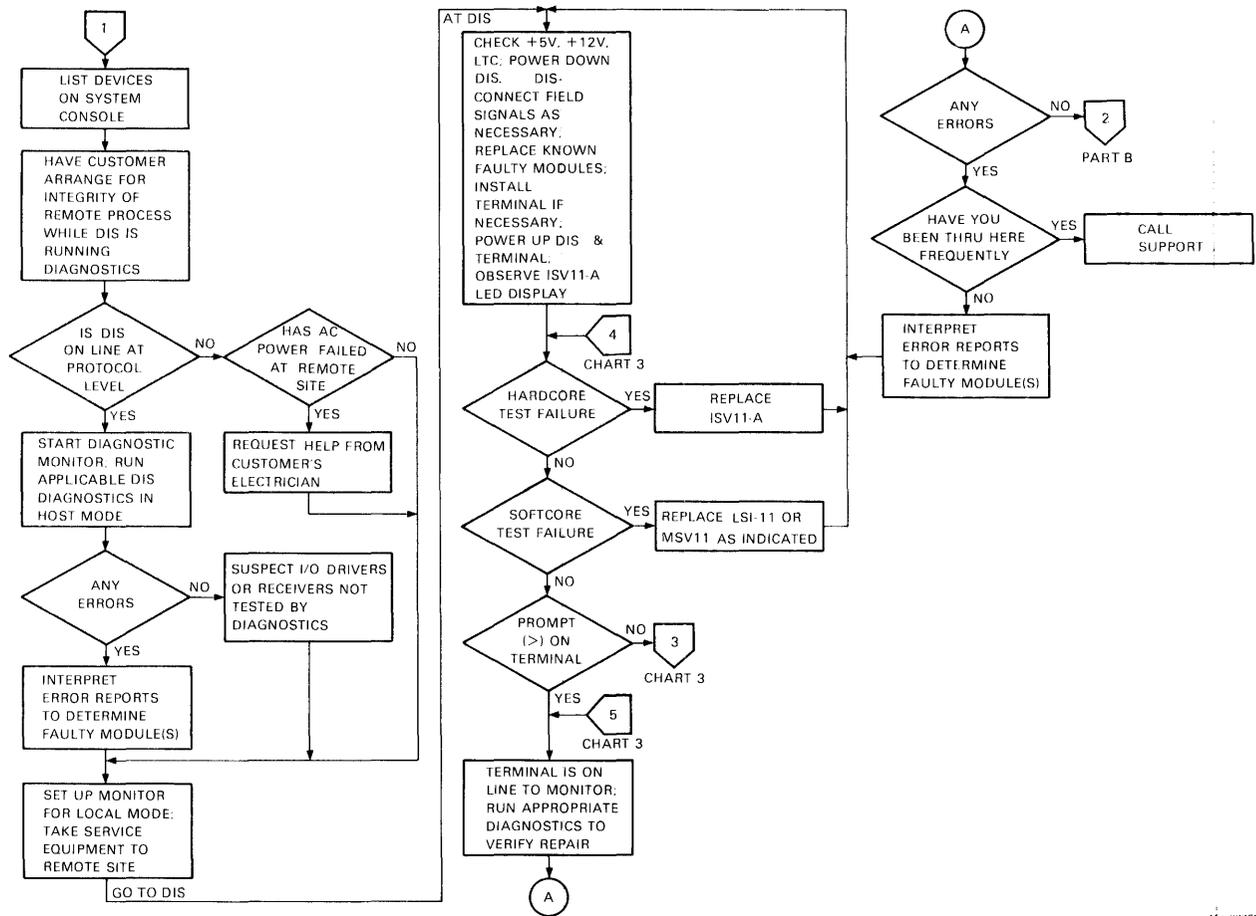
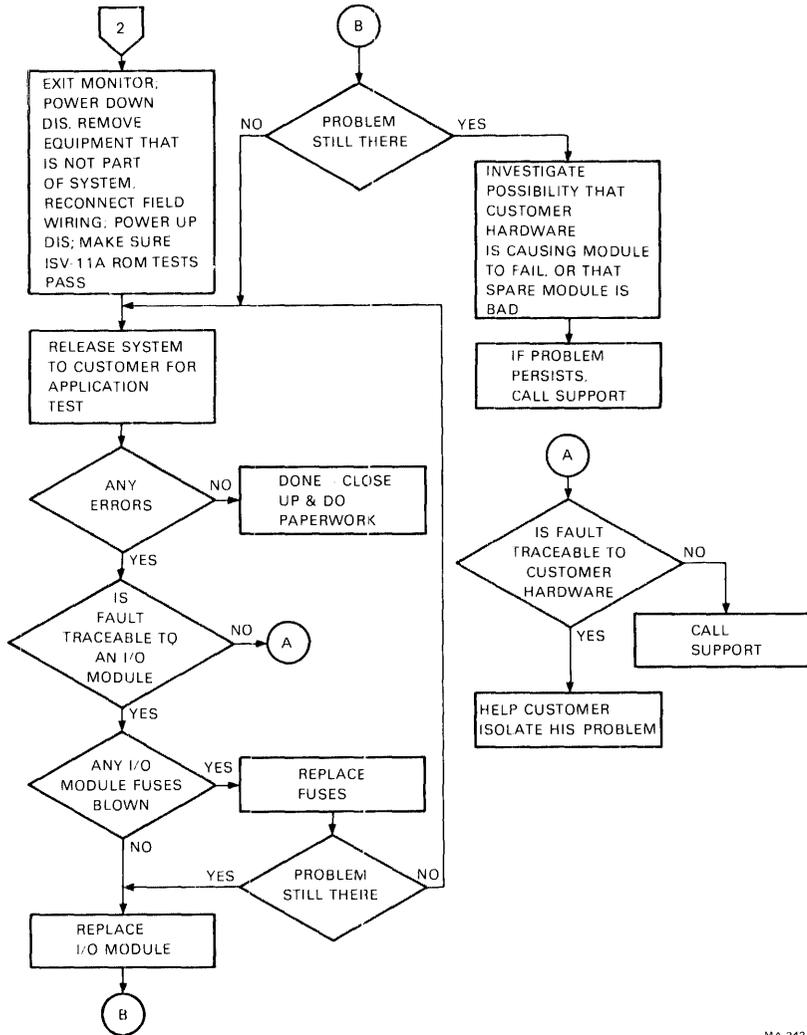


Figure 2-12 Troubleshooting Flowcharts
Chart 2 DPM50 Subsystem Procedure, Part A

WARNING: Before initiating ANY DIS diagnostic or maintenance software ALWAYS check with local site personnel for safety precautions or restrictions. The DIS can be a remote process controller. The I/O modules may control very sophisticated and perhaps even dangerous industrial processes.



MA 2427A

Figure 2-13 Troubleshooting Flowcharts
Chart 2 DPM50 Subsystem Procedure, Part B

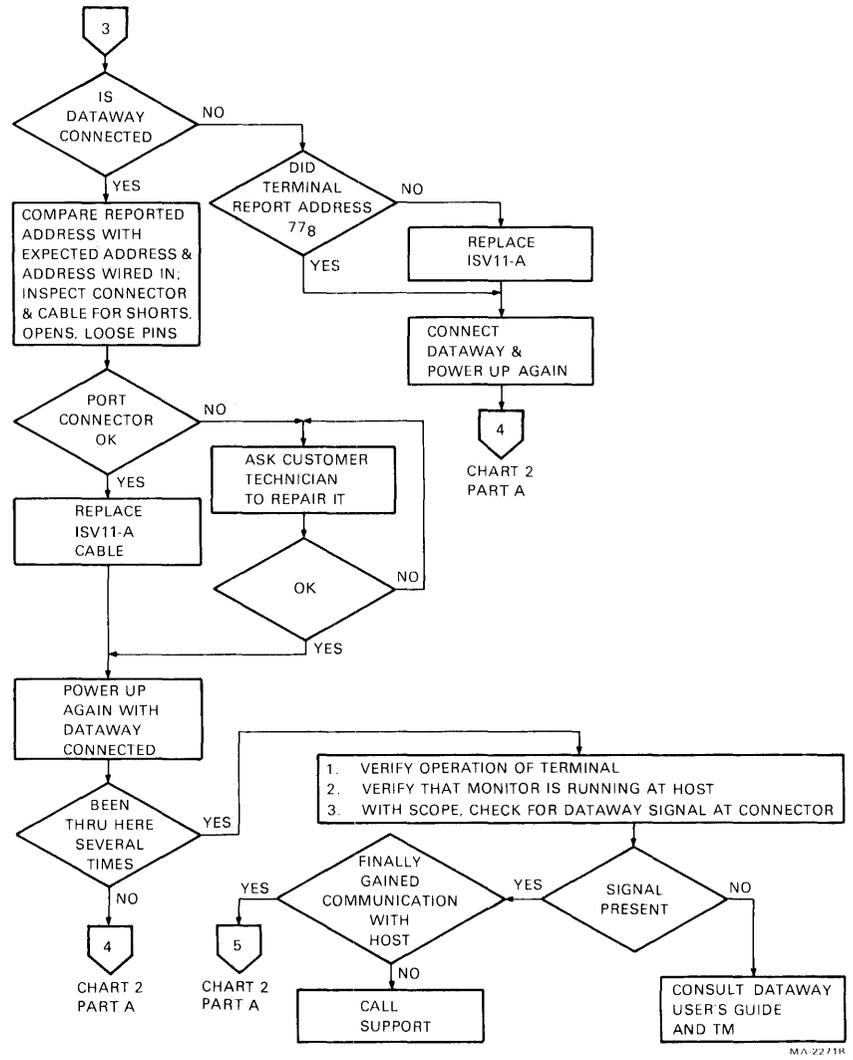


Figure 2-14 Troubleshooting Flowcharts
Chart 3 Port Address Checkout

MA-2271R

2.4 RT801, RT803, RT805 Terminals

2.4.1 General Description

The RT801, RT803, and RT805 terminals are peripheral devices that interface operator-generated data with a Distributed Plant Management (DPM) system. The following are brief introductions to each terminal model.

2.4.1.1 RT801 Time and Attendance Station – The RT801 Time and Attendance Station mounts on a wall in place of the traditional time clock. It is used for applications such as payroll, labor management, and access control. Its two unique components are a time-of-day display and a type 5 badge reader.

2.4.1.2 RT803 Basic Work Station – The RT803 Basic Work Station is used for such applications as material tracking, inventory control, and shop floor data entry. The terminal consists of a combination type 3 badge/80-column card/22-column ticket reader, a 32-character alphanumeric display, a 12-position keypad, nine operator guidance indicator lights, a transaction switch, and five function keys.

2.4.1.3 RT805 Area Work Station – The RT805 Area Work Station is general-purpose. It can be used in any application that is transaction-oriented. This terminal includes all features of the RT803 Basic Work Station, plus several enhancements and options. The enhanced features include seven additional transaction keys, two additional operator guidance indicator lights, plus a type 5 card/badge reader. The RT805 was designed to be used primarily for work station functions and to double as a time and attendance station when needed. RT805 options allow a digital I/O device and a keyboard/printer to be used with the terminal.

2.4.2 Diagnostics and Utilities

2.4.2.1 System Level Diagnostics – The following diagnostics are run from the host computer under the RSX-11M operating system. They are useful for checking the basic usability of remote terminals from the central computing facility (host).

MAINDEC-11-DZKCH – Serial Bus Exerciser – This diagnostic performs a task that exercises the DECdataway communication facilities of up to 63 ports at one time. It only tests the port's ability to communicate with the host. It does not test any specific terminal functions. Ports are run in loop mode where they return data to the host exactly as received. Errors

associated with the received data are reported on the host system console. The program runs under RSX-11M/M-PLUS. The user must use extreme caution if this program is run on-line and at the same time as the user's software. Refer to Paragraphs 3.2 to 3.3 for operating procedures and warnings associated with DZKCH.

MAINDEC-11-CZKClx -- Remote Terminal Tester – This diagnostic performs a task that runs the nonintervention tests of up to 63 FDC terminals at the same time, and reports the results on the system console that started the test. CZKClx can be used to verify the basic operating ability of DECdataway on a DPM system from the host. This diagnostic does not check the operator interface portions of the RT8XX terminals, i.e., displays, keyboards, and readers. As with DZKCH, if this program is run on-line and at the same time as the user's software, the user must use extreme caution. Refer to Chapter 3 for operating procedures and warnings associated with CZKClx.

2.4.2.2 Internal Diagnostics -- Each RT801, RT803, and RT805 terminal contains an internal self-test program. The self-test sequence is initiated when power is applied to the terminal, when the keyswitch is set to the MAINT position, or in response to commands from the host computer when MAINDEC-11-CZKClx is being run.

2.4.3 Confidence Checks

Perform the following procedures to verify the basic usability of the unit.

1. After the terminal has been unpacked and checked for physical damage, verify items shipped per shipping list.
2. Connect the power cord to an ac power source and check whether the terminal runs a power-up diagnostic sequence.

NOTE: Refer to Paragraphs 2.4.4 to 2.4.5 for use of internal terminal diagnostics.

3. Insert the key into the keyswitch and turn it to MAINT. Check that the terminal restarts the diagnostic and runs without error.

NOTE: For RT801 terminals, nonintervention tests exit to badge reader test 40; read 15 type 5 test badges to complete the test. For RT803 or RT805 terminals, nonintervention tests exit to a mode of operator-selected tests (00 displayed); select and run all selectable tests in any order. For badge and card reader tests (which cycle indefinitely until cancelled) read at least ten test documents of each type.

4. After all tests have been run at least once, perform the following to lock the terminal into the nonintervention tests for an extended run.
 - a. Turn the keyswitch to NORMAL.

- b. Turn the keyswitch to MAINT (to start the diagnostics).
 - c. Turn the keyswitch immediately to SUPVR to lock the terminal into the nonintervention diagnostics.
5. Allow the terminal to cycle for at least 0.5 hour to allow internal temperature stabilization while performing confidence check procedures on other terminals.
 6. Repeat step 3.
 7. Turn the keyswitch to NORMAL and connect the terminal to the DPM host system using the DECdataway controller test cable (DEC P/N 7014152).
 8. Boot the RSX-11M test disk pack (Paragraph 3.1.1), or use the diagnostic tasks with the user's software. Run MAINDEC-11-DZKCH and MAINDEC-11-CZKClx, error free for a minimum of 15 minutes each.

NOTE: The user's DECdataway cable may be used in place of the test cable, if convenient. If any problems occur, revert to using the test cable.

2.4.4 Troubleshooting Procedures and Flowcharts

The primary troubleshooting tools for RT80X terminals are the internal diagnostics. System level diagnostics MAINDEC-11-DZKCH and MAINDEC-11-CZKClx are useful to detect errors, but internal diagnostics are needed to isolate a problem to a faulty subassembly.

2.4.4.1 Internal Terminal Diagnostics – Internal diagnostics are initiated in three different ways: on power-up, by CZKClx, and setting the keyswitch to MAINT.

1. Upon power-up, each terminal runs a predetermined sequence of tests. The operator must check the terminal to detect a failure.
2. The diagnostic task CZKClx starts the same sequence of nonintervention tests from the DPM host system. Failures are reported on the system console terminal that initiated the task.
3. Setting the keyswitch to MAINT starts the internal diagnostics. The same preselected sequence of nonintervention tests execute. The operator must check the terminal to detect a failure.

If the keyswitch is set to the SUPVR position before the basic test sequence finishes, the diagnostic loops on the basic nonintervention test sequence until the keyswitch is returned to NORMAL. At that time, the diagnostic exits to normal on-line operation if the terminal is connected to a host system.

If the keyswitch is left in the MAINT position, the terminals exit to manual intervention tests.

The normal sequence of events is as follows:

1. An internal alarm beeps twice when the diagnostic test starts. Then the terminal seems to do nothing for about 15 seconds. During this time the terminal executes basic tests 11, 12, 13, and 14.
2. After 15 seconds test 20 will be displayed, followed immediately by a 2-digit terminal designation code, where

01 = RT801,
02 = RT803, and
03 = RT805.

3. If the terminal is an RT801, a predetermined sequence of tests executes and basic tests 11 through 80 are run, followed by these pre-selected sequences of advanced/peripheral tests.

Test 22 - One pass (check relay).

Test 33 - One pass (check display).

Test 40 - Fifteen test badges must be inserted and read correctly to complete this test.

Test 81 - Disconnect the DECdataway for this test, or the terminal will induce line errors on the DECdataway.

Test 82 - Reconnect the DECdataway for this test. When 90000 flags have been counted, the RT801 exits to normal on-line mode.

4. If the terminal is an RT803 or RT805, the extended basic tests execute. When complete, the terminal will display 00. The operator then uses the keypad to select valid test, or sets the keyswitch to NORMAL and selects 99 on the keypad to return to normal on-line mode.
5. When test 80 executes, 80 is displayed, followed immediately by the port address. If the DECdataway is connected to the terminal, the actual port address (decimal number) is displayed (01-63). If the DECdataway is not connected, the number 63 is displayed.
6. At completion of the test, the terminals return to normal on-line operation if the keyswitch is in the NORMAL position. If the keyswitch is left in the MAINT position, manual intervention tests can be performed as explained in steps 3 and 4.

7. If 00 is displayed, and keyswitch is in NORMAL position, 99 entered on the keypad returns an RT803 or RT805 to on-line mode.

Alarm – The alarm beeps twice when the diagnostics start, and once at the beginning of each test.

Error Detection – If test fails, the test number flashes in the display once each second for 10 seconds, accompanied by an alarm beep. Some manual intervention tests have additional error reporting. Refer to the test descriptions in Table 2-5 for details. Figures 2-15 through 2-35 are a series of block diagrams. Solid lines in the diagrams indicate the circuitry affected by a particular FDC terminal internal diagnostic test. The FRUs being tested are enclosed in a heavy lined box. Broken lines indicate unaffected circuitry.

Cancelling A Test – All tests, except 22 and 35, can be cancelled by pressing the CANCEL key. To cancel 22 and 35, turn the keyswitch to NORMAL and back to MAINT to restart the diagnostics.

Lamp Test – The lamp test switch lights all terminal lamps at reduced illumination. If the keyswitch is in MAINT mode, the lamp test switch also turns on the card/badge reader in reverse to clear a jammed document.

Test Cards and Badges– Packages of test documents are shipped with each system.

Table 2-5 FDC Terminal Internal Diagnostic Tests

Test Number	Type	Module Assembly Tested	Test Description
11	Basic	M7 122	This is a basic test of CPU time states, registers, and basic instructions.
12	Basic	M7 122	This is a complete CPU test of complex instructions.
13	Basic	M7 122	This test calculates ROM checksums and compares them to stored checksums.
14	Basic	M7 122	This test is a check on the RAM comprised of a sequence of pattern tests.
20	Basic	M7 125	This test checks M7 125 module. It also checks alarm, time update, and one-shots. This test displays terminal type for 1.5 seconds.
21	Basic	M7 125 / Badge and Card Reader Interface	For RT801 display 01 For RE803 display 02 For RT805 display 03 This test checks M7 125 and badge / card reader interface.
22	Advanced/ Peripheral	M7 125 / Alarm/ External control circuit	This test checks the one-shot. It also checks the DISPLAY TIME-OUT one-shot is functioning (approximately 45 seconds). This test also checks the sound alarm and toggle relay once per second for 45 seconds. This test can be used for ohmmeter monitoring of the relay functions at the RELAY connector. Any external control circuit must be disconnected before this test is selected.

Table 2-5 FDC Terminal Internal Diagnostic Tests (Cont)

Test Number	Type	Module Assembly Tested	Test Description
			The cancel key will not cancel this test. To stop the test before it finishes, turn the keyswitch to NORMAL and then back to MAINT.
30	Basic	M7125/Display interface	This test checks display interface.
31	Extended basic RT803, RT805	M7126	This test checks operation of ENTRY ACCEPTED one-shot.
32	Extended basic RT803, RT805	M7126/Front panel assembly	This test checks the front panel switch scanner on the M7126.
33	Advanced/ Peripheral RT801, RT803, RT805	M7125/Display assembly	This test on the RT801 displays numbers 0 through 9, then exits to next test. This test on the RT803/RT805 displays a full screen of incrementing alphanumeric characters continuously until cancelled (via CANCEL key).
34	Advanced/ Peripheral RT803, RT805	M7126/ Front panel	This test echos to the display the octal value of the switch being pressed. This test ends when CANCEL key is pressed. Refer to Table 2-6 for switch values.
35	Advanced/ Peripheral RT803, RT805	M7126/ Front panel	This test checks for interaction between front panel elements by setting a known value in the switch scanner, exercising the front panel lamps, and then reading the switch scanner. Operating the keypad during this test could cause a false failure, therefore CANCEL cannot be used

Table 2-5 FDC Terminal Internal Diagnostic Tests (Cont)

Test Number	Type	Module Assembly Tested	Test Description
35 (Cont)	Advanced/ Peripheral RT803, RT805	M7126/ Front panel	to exit this test. To exit this test, the keyswitch must be turned to NORMAL and then to MAINT, which then will restart diagnostics.
40	Advanced/ Peripheral	M7125/Type 5 reader assembly	This test reads type 5 test badges. Badges must be inserted with the index square in first and the data pattern to the operator's left. Functional failures are reported as an ERROR. Data comparison failures are displayed. The first number displayed is the 2-digit decimal column number. The second number displayed is the 4-digit octal representation of the data which failed comparison.
50	Advanced/ Peripheral RT803, RT805	M7125/Type 3 reader	This test reads 22-column tickets and badges. The test data is a sliding ones pattern starting with a 9-row punch in column 1. The test badge must be inserted with the corner cut in first and to the right. Functional failures are reported as an ERROR. Data comparison failures are reported as in test 40.
51	Advanced/ Peripheral RT803, RT805	M7125/Type 3 reader	This test reads 80-column marked cards. The test data is a sliding ones pattern starting with a 9-row punch in column 1. The

Table 2-5 FDC Terminal Internal Diagnostic Tests (Cont)

Test Number	Type	Module Assembly Tested	Test Description
			card must be inserted with the corner cut in first, and to the right. Failures are reported as in test 40.
52	Advanced/ Peripheral RT803, RT805	M7125/Type 3 reader	This test reads 80-column punched cards. Data format and error reporting are the same as test 51.
60	Advanced/ Peripheral RT805	M7123, (RT805-XC option)	This test is the basic interface check of RT805-XC option. It loops data internally through use of a maintenance loop feature.
61	Advanced/ Peripheral RT805	M7123 (RT805-XC option)	This test continuously outputs lines of 132 characters in an incrementing sequence, beginning with a line of spaces and ending with a line of brackets. It repeats until CANCEL is pressed.
62	Advanced/ Peripheral RT805	M7123 (RT805-XC option)	This test echoes any keyboard key to both the RT805 display and the output device (if present). Control characters such as carriage return and line feed will not echo properly to the RT805 display, but should echo correctly to the output device. This test repeats until CANCEL is pressed.
70	Advanced/ Peripheral RT805	M7124 (RT805-XD option)	This test loops the eight outputs back through the 24 inputs internally, using a maintenance function on the M7124. The

Table 2-5 FDC Terminal Internal Diagnostic Tests (Cont)

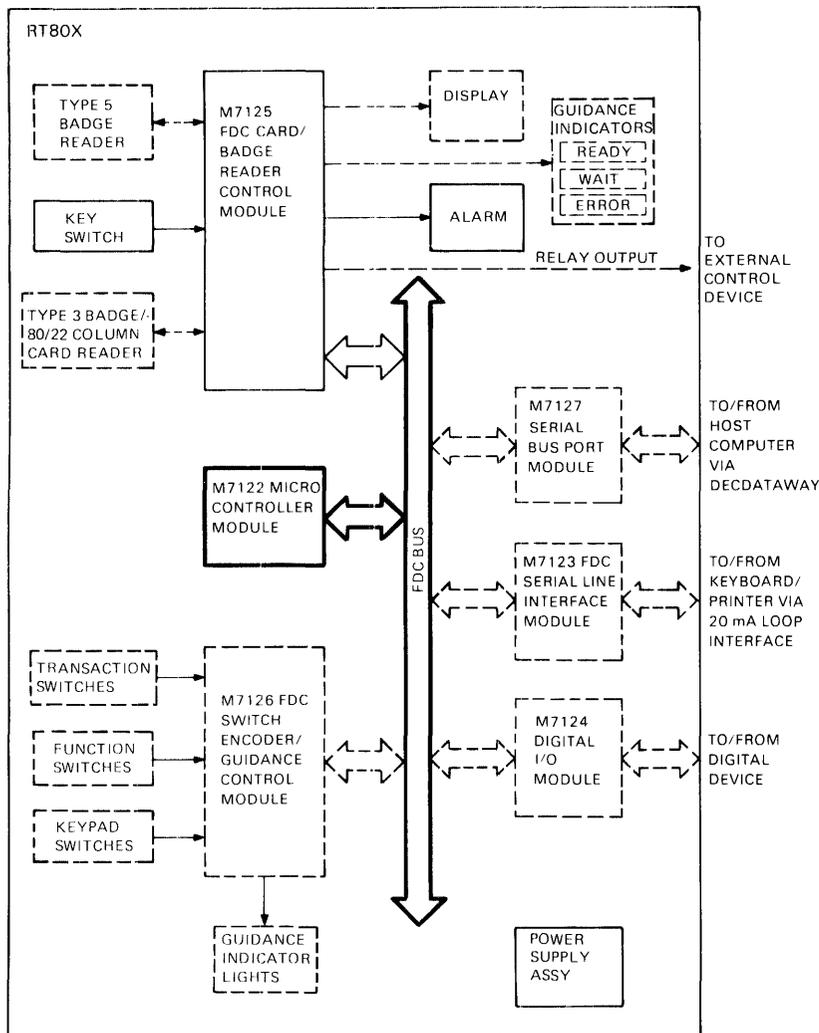
Test Number	Type	Module Assembly Tested	Test Description
70 (Cont)	Advanced/ Peripheral RT805	M7 124 (RT805-XD option)	customer's external digital I/O circuits must be disconnected before this test is selected.
71	Advanced/ Peripheral RT805	M7 124 (RT805-XD option)	This test functions the same as test 70 except that the RT805-XD loopback plug (DEC P/N 7015213-00) must be connected to the digital I/O connector on the RT805 in place of the customer's connector. The data loopback is done through the connector instead of internally.
80	Basic RT801 RT803 RT805	M7 127	This test checks basic usability of DECdataway port interface. It also displays port address.
81	Advanced/ Peripheral RT803	M7 127	This test loops all possible data patterns through the DECdataway interface. It also exercises the complete DECdataway interface up to the transformer connection to the line.
CAUTION: <i>The DECdataway must be disconnected before selecting this test.</i>			
82	Advanced/ Peripheral RT801 RT803 RT805	M7 127	This test is the DECdataway monitor. It monitors line activity and displays a running count of message flags and data flags detected (only message flags for RT801). For normal line activity both counts will increment rapidly. The DECdataway must be connected for this test to function. If not, the test will display a count of 0 until the

Table 2-5 FDC Terminal Internal Diagnostic Tests (Cont)

Test Number	Type	Module Assembly Tested	Test Description
			connection is made. For RT801, the test will exit after 90000 flags. For RT803 and RT805, the test will exit when CANCEL is pressed.
99	RT803 RT805		When 00 is displayed on an RT803 or RT805, selecting 99 will return the terminal to normal on-line operation, regardless of the keyswitch position. To restart diagnostics, cycle the keyswitch to NORMAL and then to MAINT.
00	RT803, RT805		When 00 is displayed on an RT803 or RT805, any of the tests labelled Extended Basic, or Advanced /Peripheral can be selected through use of the keypad. Valid test numbers are: 22, 33, 34, 35, 40, 50, 51, 52, 60, 61, 62, 70, 71, 81, 82, 99.

Table 2-6 Switch Values Displayed by Test 34

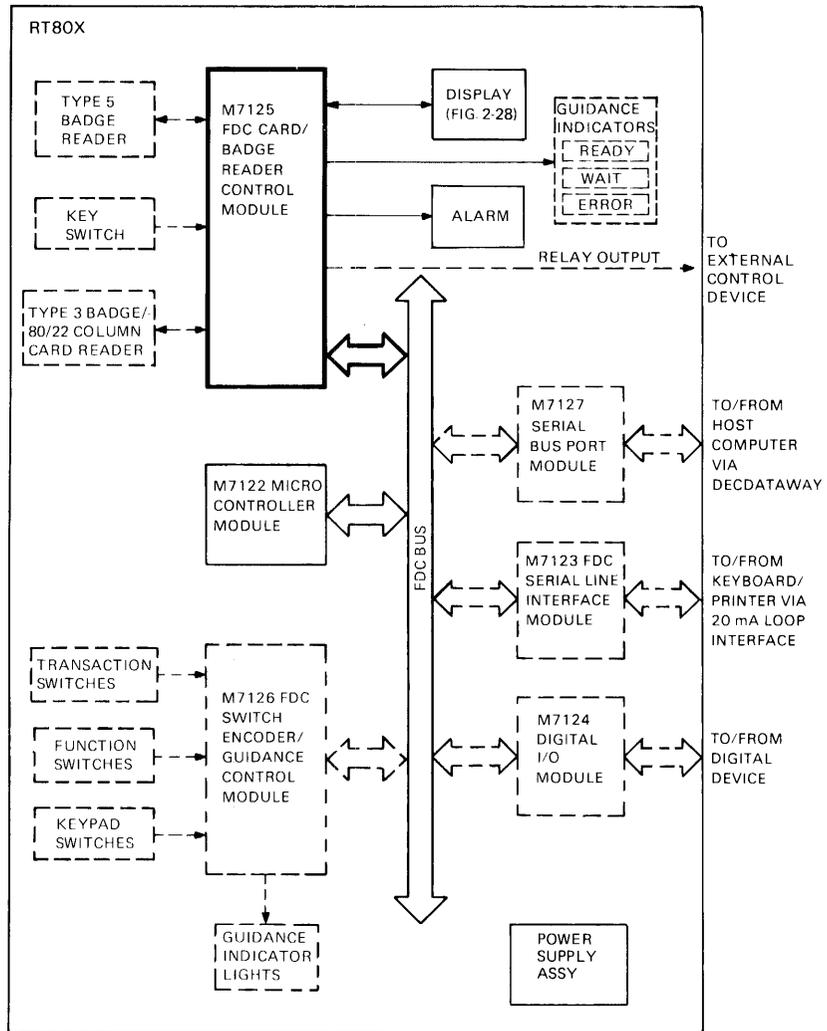
Value	Switch	Value	Switch
1	RT805 Transaction Switch 1	21	ERASE ENTRY
2	RT805 Transaction Switch 2	23	KEY PAD -
3	RT805 Transaction Switch 3	24	
4	RT805 Transaction Switch 4	25	0
5	RT805 Transaction Switch 5	26	1
6	RT805 Transaction Switch 6	27	2
7	RT805 Transaction Switch 7	30	3
10	RT805 Transaction Switch 8	31	4
11	RT805 Transaction Switch 9	32	5
15	SEND	33	6
16	CANCEL (also cancels test)	34	7
17	RESET ERROR	35	8
20	ERASE CHAR	36	9



MA 2179A

- Test Level:** Basic
- FRUs Tested:** M7122
- Description:**
- Test 11 - Basic test of CPU time states, registers, and basic instructions
 - Test 12 - Complete CPU test of complex instructions / states
 - Test 13 - Calculates ROM checksums and compares to stored checksums
 - Test 14 - Tests RAM using complementing data patterns

Figure 2-15 FDC Terminal Internal Diagnostic Tests 11-14



MA 2180A

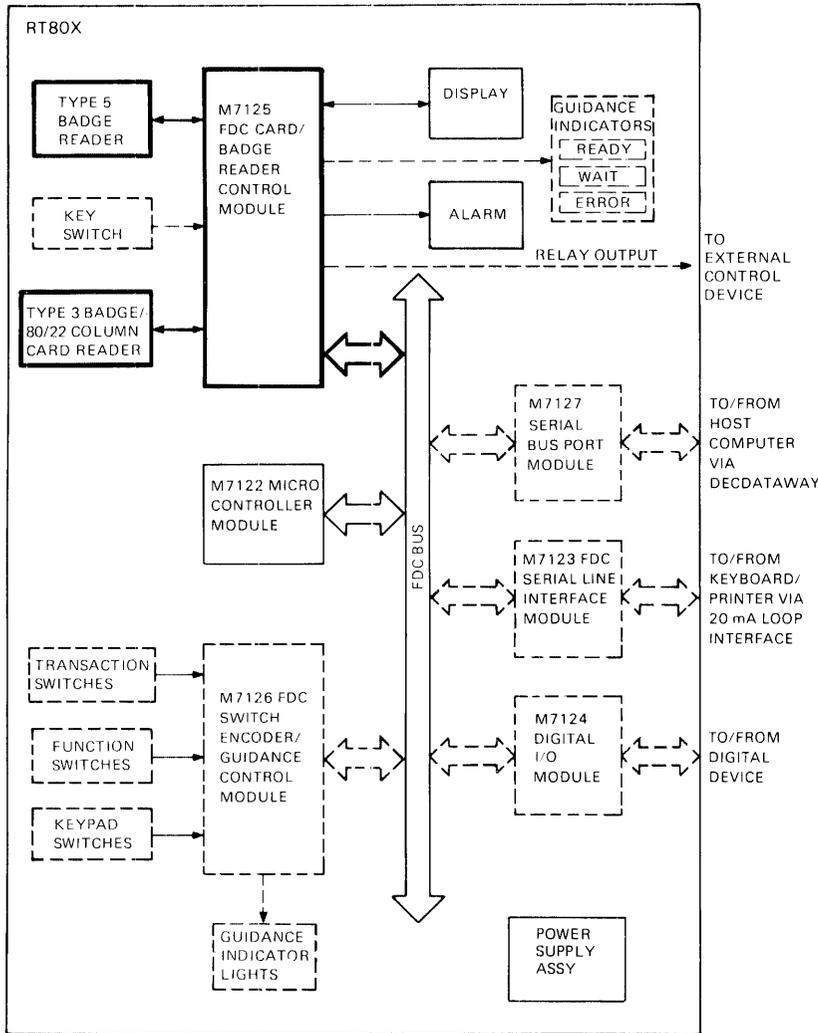
Test Level: Basic

FRUs Tested: M7125

Description: Test 20 checks M7125 addressing capability. It checks alarm and time update one-shots. It displays terminal type for 1.5 seconds. Terminal type is read from S1 and S2 on M7125.

- For RT801 display 01
- For RT803 display 02
- For RT805 display 03

Figure 2-16 FDC Terminal Internal Diagnostic Test 20



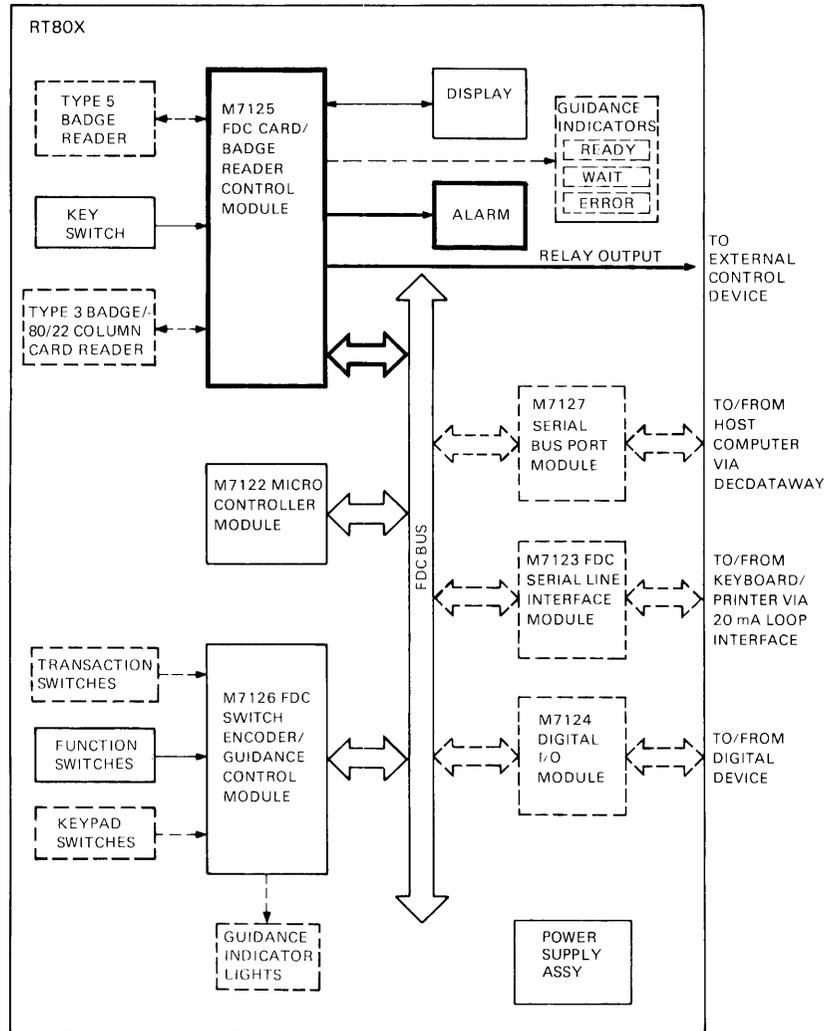
MA-2101A

Test Level: Basic

FRUs Tested: M7125, Type 3 Badge / 80 / 20 Column Card Reader, Type 5 Badge Reader

Description: Test 21 checks M7125 badge reader interface, and card reader interface motor control and timing

Figure 2-17 FDC Terminal Internal Diagnostic Test 21



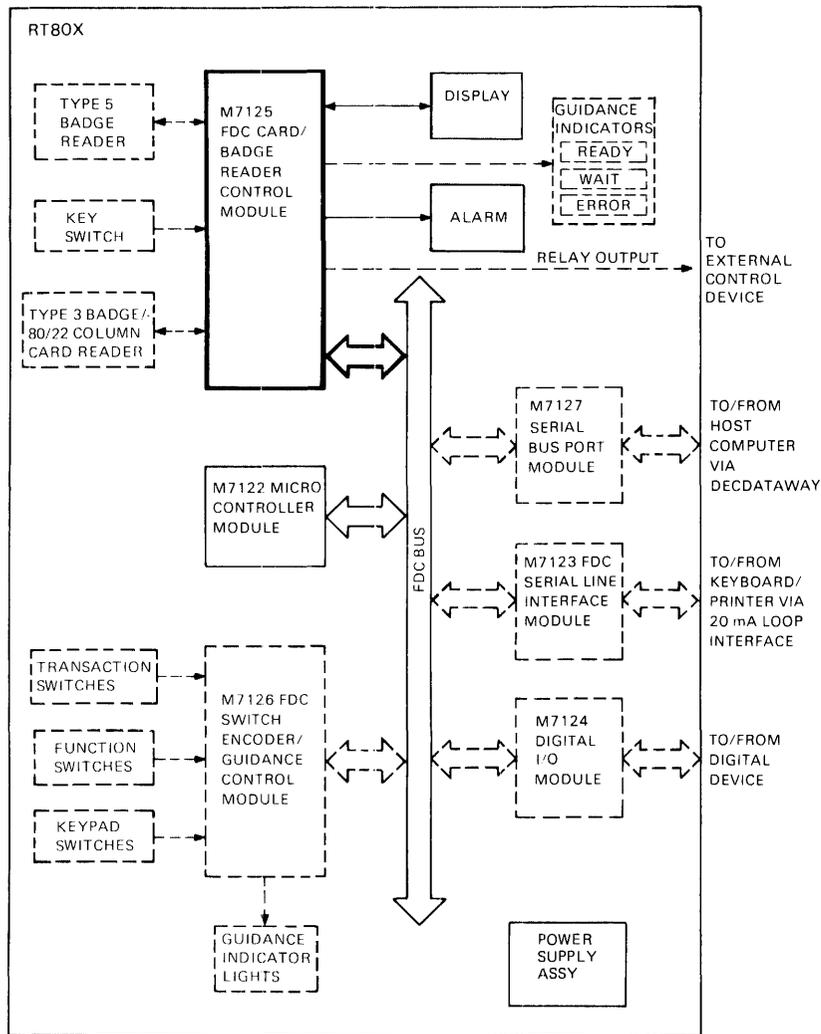
MA-2112A

Test Level: Advanced / Peripheral

FRUs Tested: M7125, Alarm, External Control Circuit

Description: Test 22 checks that DISPLAY TIME OUT one-shot is functioning (approximately 45 seconds). It sounds alarm and toggles relay once per second for 60 seconds. This test can be used for ohmmeter monitoring of the relay functions at the relay connector. Any external control circuit must be disconnected before this test is selected. To stop the test before completion turn the keyswitch to NORMAL and then to MAINT. The CANCEL function switch will terminate this test only after a complete pass (approximately 60 seconds).

Figure 2-18 FDC Terminal Internal Diagnostic Test 22



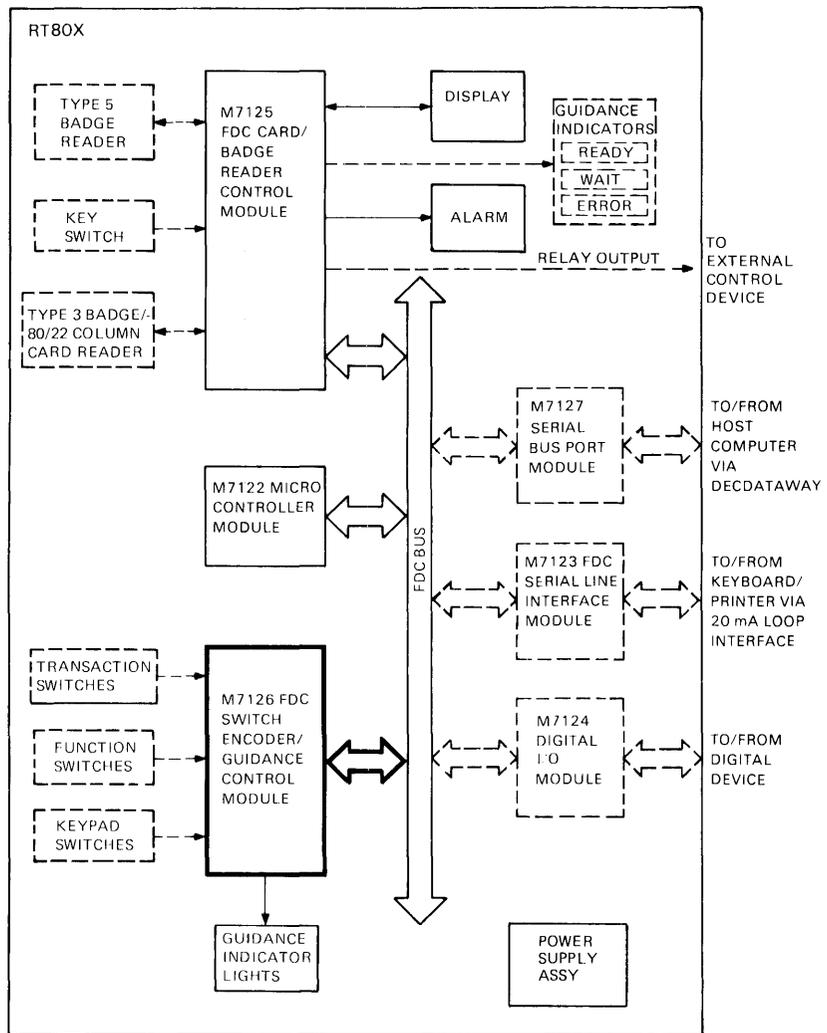
MA 2183A

Test Level: Basic

FRUs Tested: M7 125, display interface

Description: Checks display interface

Figure 2-19 FDC Terminal Internal Diagnostic Test 30



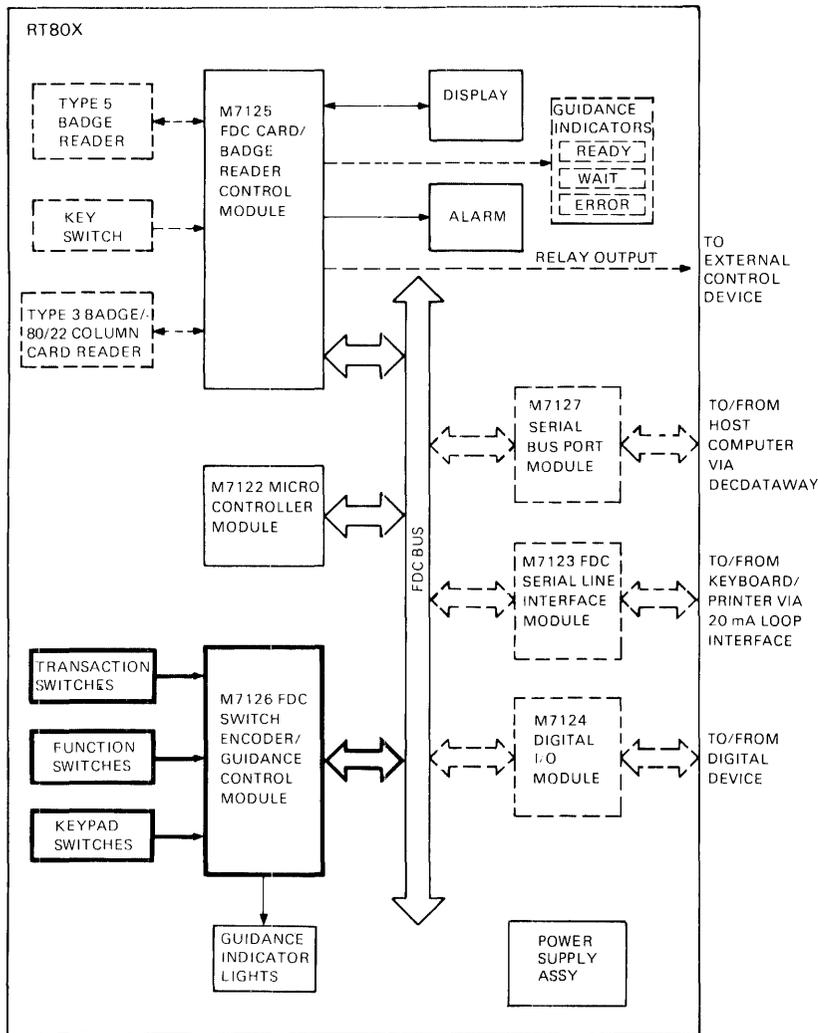
MA 2184A

Test Level: Extended Basic RT803, RT805

FRUs Tested: M7 126

Description: Checks operation of ENTRY ACCEPTED one-shot

Figure 2-20 FDC Terminal Internal Diagnostic Test 31



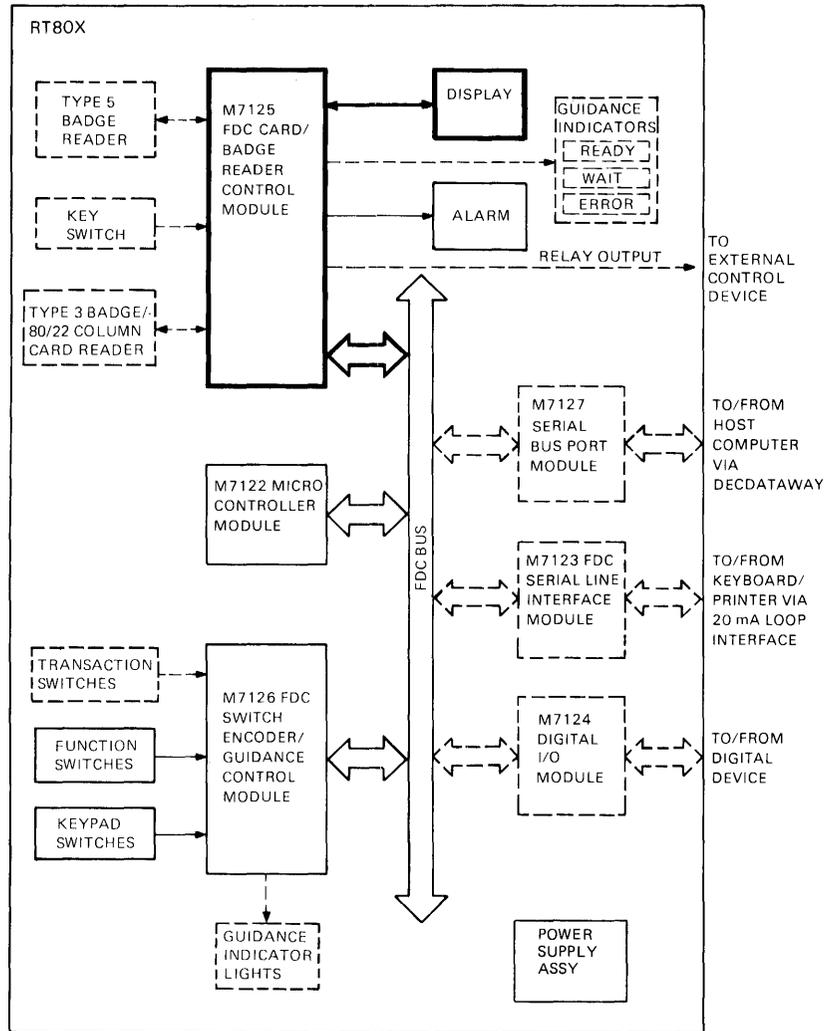
MA 2185A

Test Level: Extended Basic RT803, RT805

FRUs Tested: M7126, Front Panel Assembly

Description: Checks the M7126 front panel switch scanner

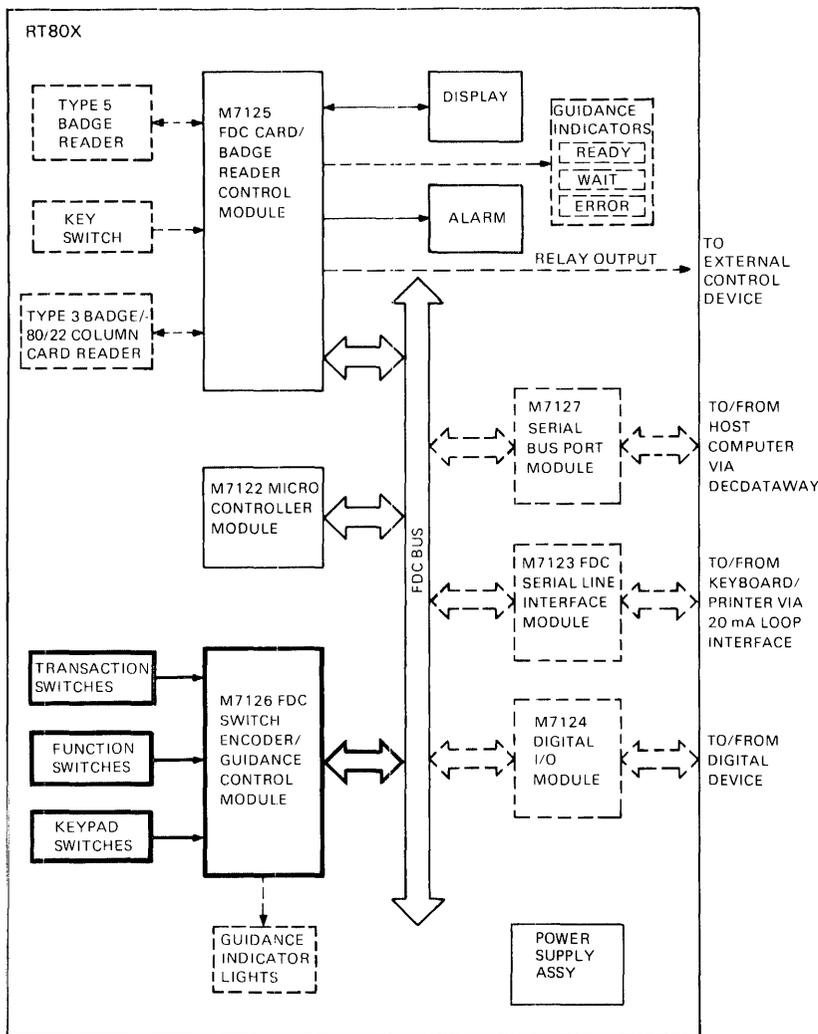
Figure 2-21 FDC Terminal Internal Diagnostic Test 32



MA-2186A

- Test Level:** Advanced Peripheral RT801, RT803, RT805
- FRUs Tested:** M7125, Display Assembly
- Description:** RT801 - displays numbers 0 through 9, then exits to next test
 RT803 - displays a full screen of incrementing alphanumeric characters continuously until cancelled (via CANCEL key)

Figure 2-22 FDC Terminal Internal Diagnostic Test 33



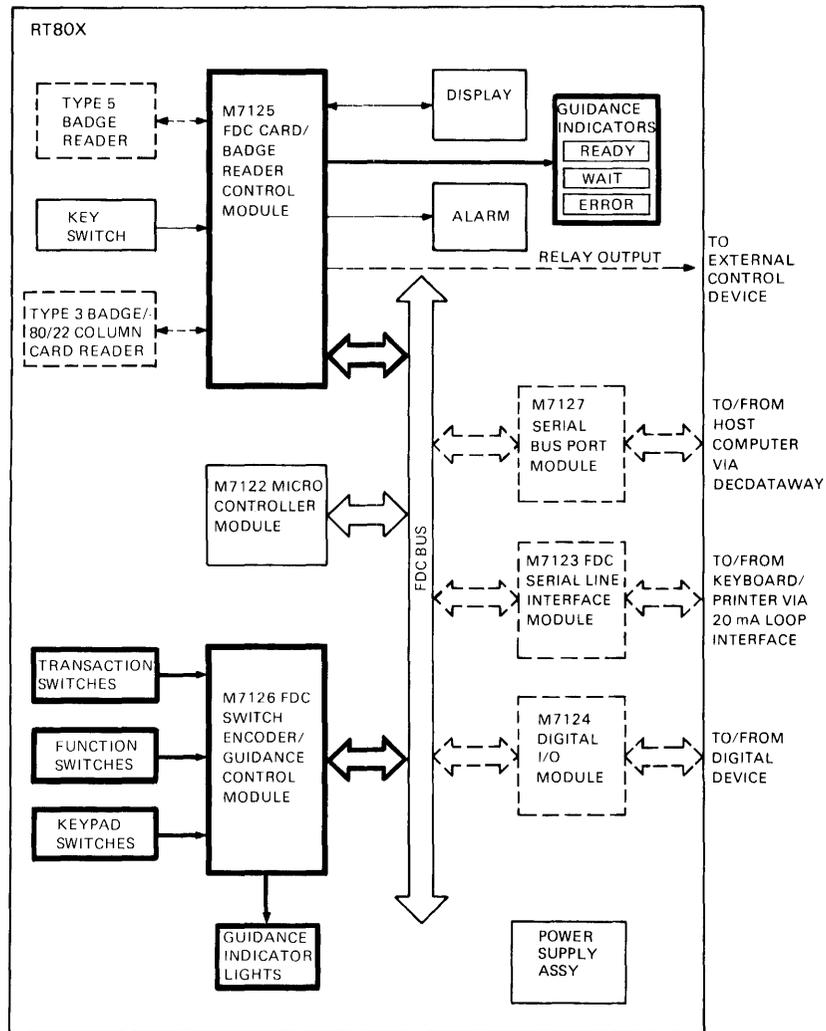
MA-2187A

Test Level: Advanced/Peripheral RT803, RT805

FRUs Tested: M7126, Front Panel

Description: Test 34 echoes the octal value of the switch being pressed to the display. The text exits when CANCEL is pressed. Refer to Table 2-6 for switch values.

Figure 2-23 FDC Terminal Internal Diagnostic Test 34



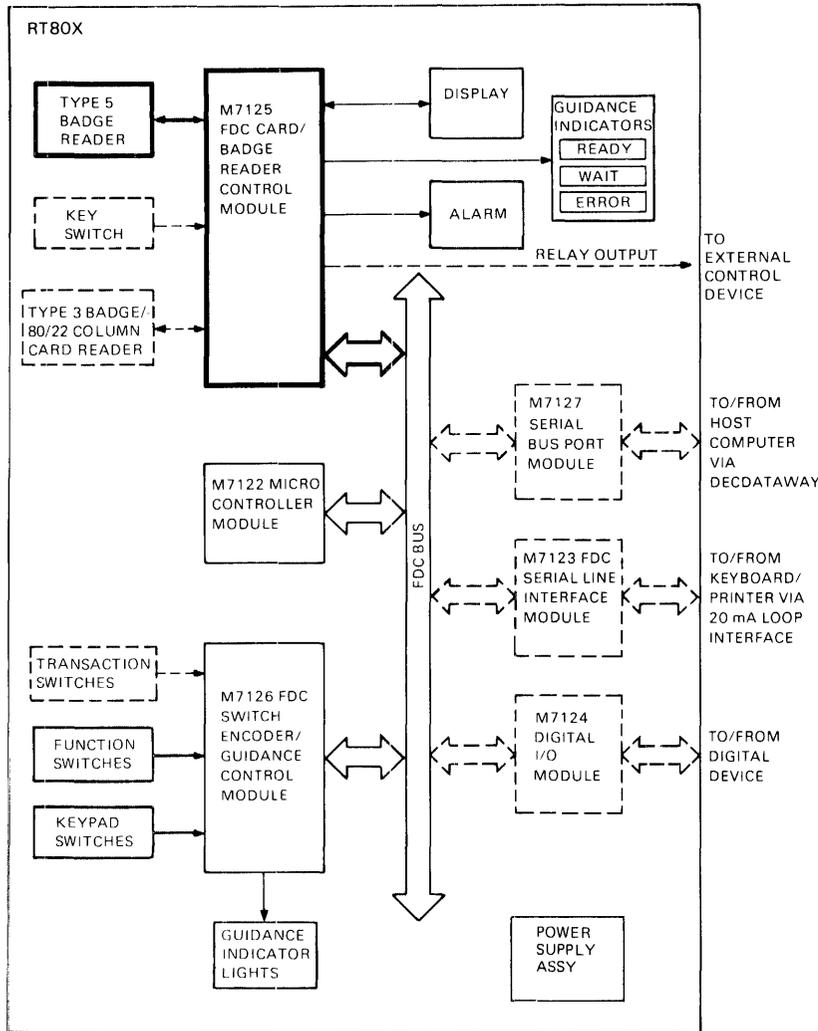
MA-2188A

Test Level: Advanced / Peripheral RT803, RT805

FRUs Tested: M7125, M7126, Front Panel

Description: Test 35 checks for interaction between front panel elements by setting a known value in the M7126 switch scanner, exercising the front panel lamps, and then reading the switch scanner. Operating the keypad during this test could cause a false failure, therefore CANCEL cannot be used to exit this test. To exit this test, the keyswitch must be set to NORMAL and then to MAINT, which then will restart diagnostics.

Figure 2-24 FDC Terminal Internal Diagnostic Test 35



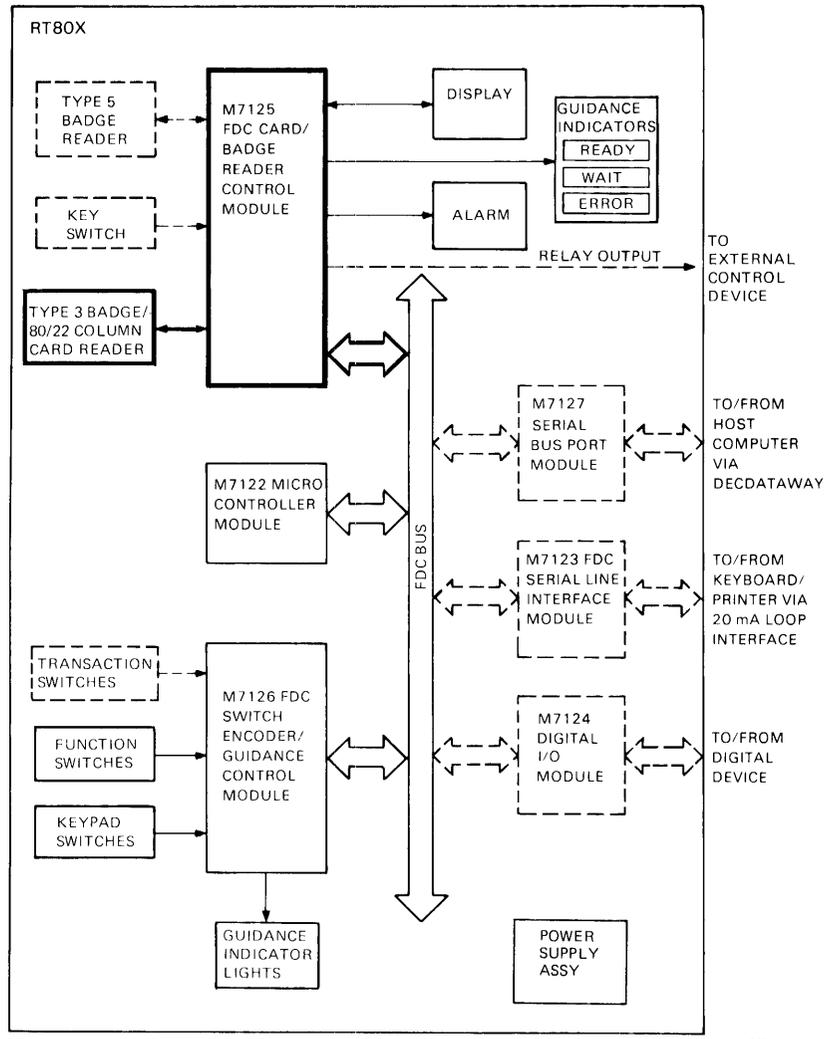
MA 2189A

Test Level: Advanced /Peripheral

FRUs Tested: M7125, Type 5 Badge Reader

Description: Test 40 reads type 5 test badges. Badges must be inserted with the index square in first and the data pattern to the operator's left. Functional failures are reported as an ERROR. Data comparison failures are displayed. The first number displayed is the 2-digit decimal column number. The second number displayed is the 4-digit octal representation of the data which failed comparison.

Figure 2-25 FDC Terminal Internal Diagnostic Test 40

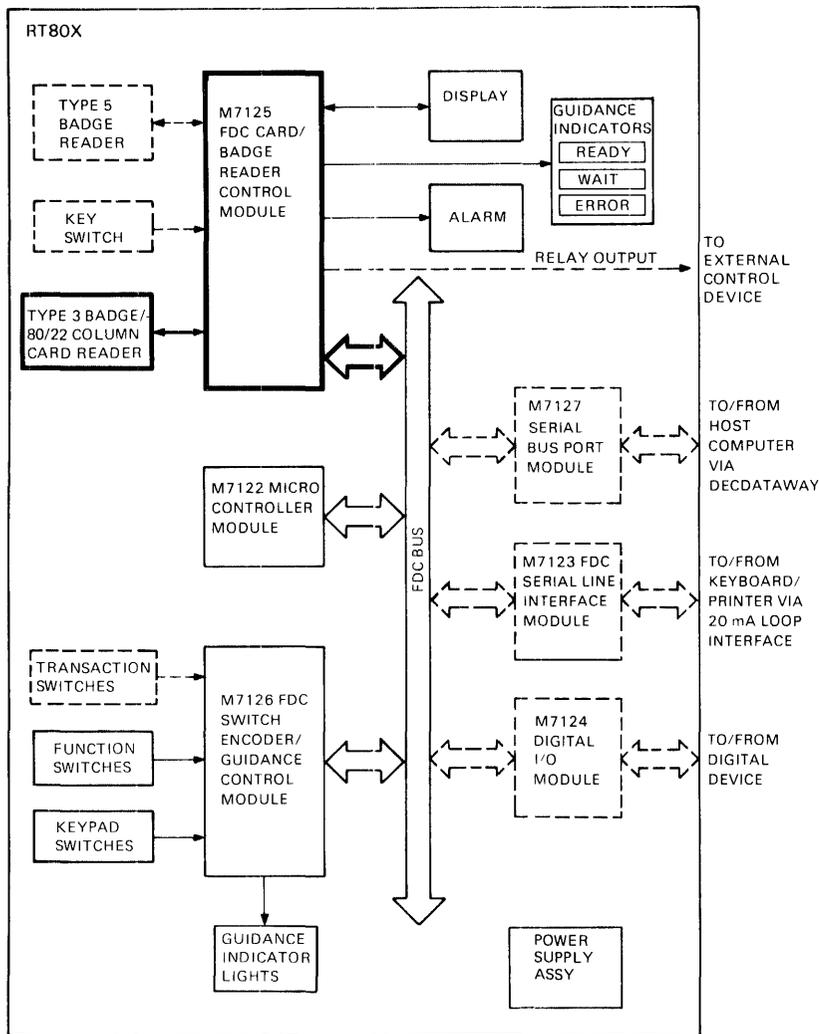


Test Level: Advanced / Peripheral RT803, RT805

FRUs Tested: M7 125, Type 3 Badge /80/ 22 Column Card Reader and Cable

Description: Test 50 reads 22-column tickets and badges. The test data is a sliding ones pattern, starting with a 9-row punch in column 1. The test badge must be inserted with the cut corner in first and to the right. Functional failures are reported as an ERROR. Data comparison failures are reported as in test 40 (Figure 2-25).

Figure 2-26 FDC Terminal Internal Diagnostic Test 50

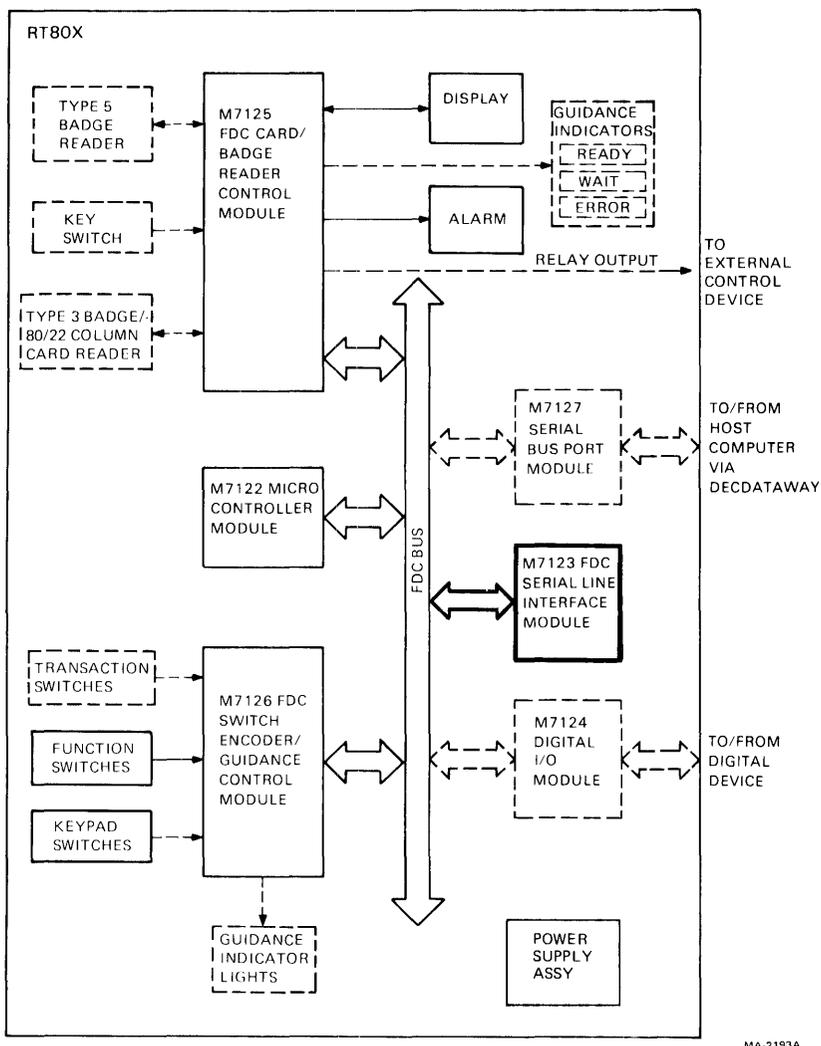


Test Level: Advanced / Peripheral RT803, RT805

FRUs Tested: M7125, Type 3 Badge / 80 / 20 Column Card Reader and Cable

Description: Test 52 reads 80-column punched cards. The test data is a sliding ones pattern starting with a nine-row punch in column 1. The card must be inserted with cut corner in first and to the right. Failures are reported as in test 40 (Figure 2-25).

Figure 2-27 FDC Terminal Internal Diagnostic Test 52



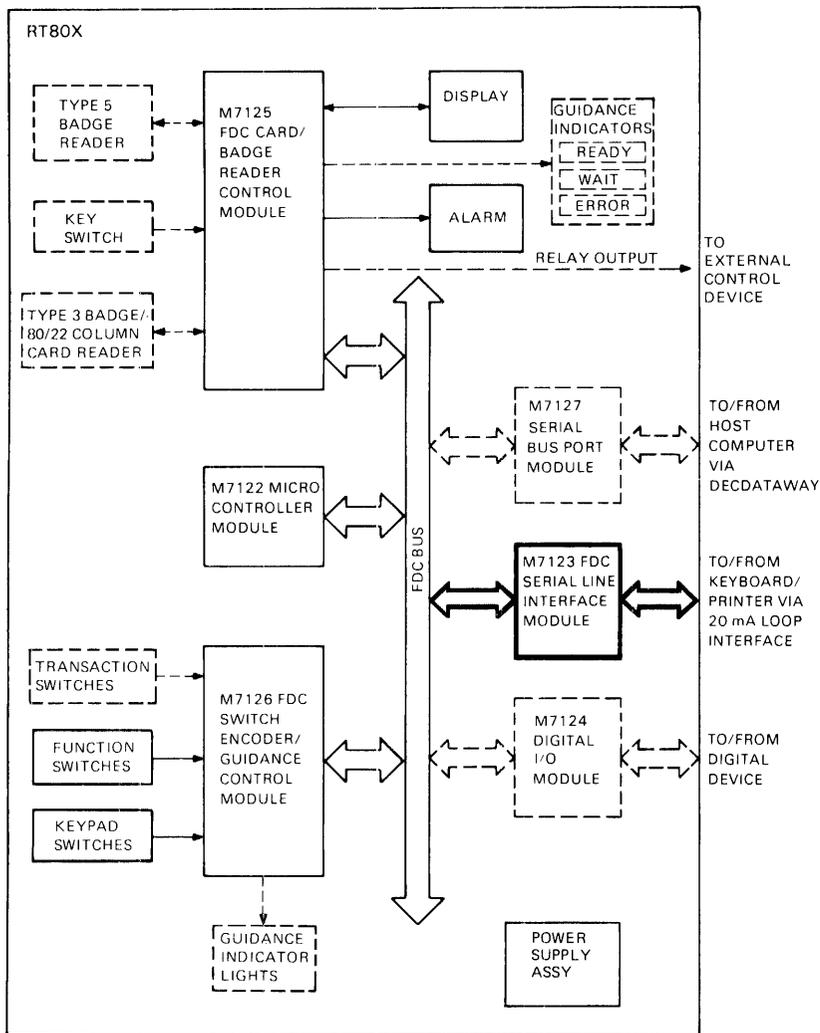
MA-2193A

Test Level: Advanced / Peripheral RT805

FRUs Tested: M7123 (RT805-XC Option)

Description: Test 60 is a basic interface check of RT805-XC option. It loops data internally through use of a maintenance loop feature.

Figure 2-28 FDC Terminal Internal Diagnostic Test 60



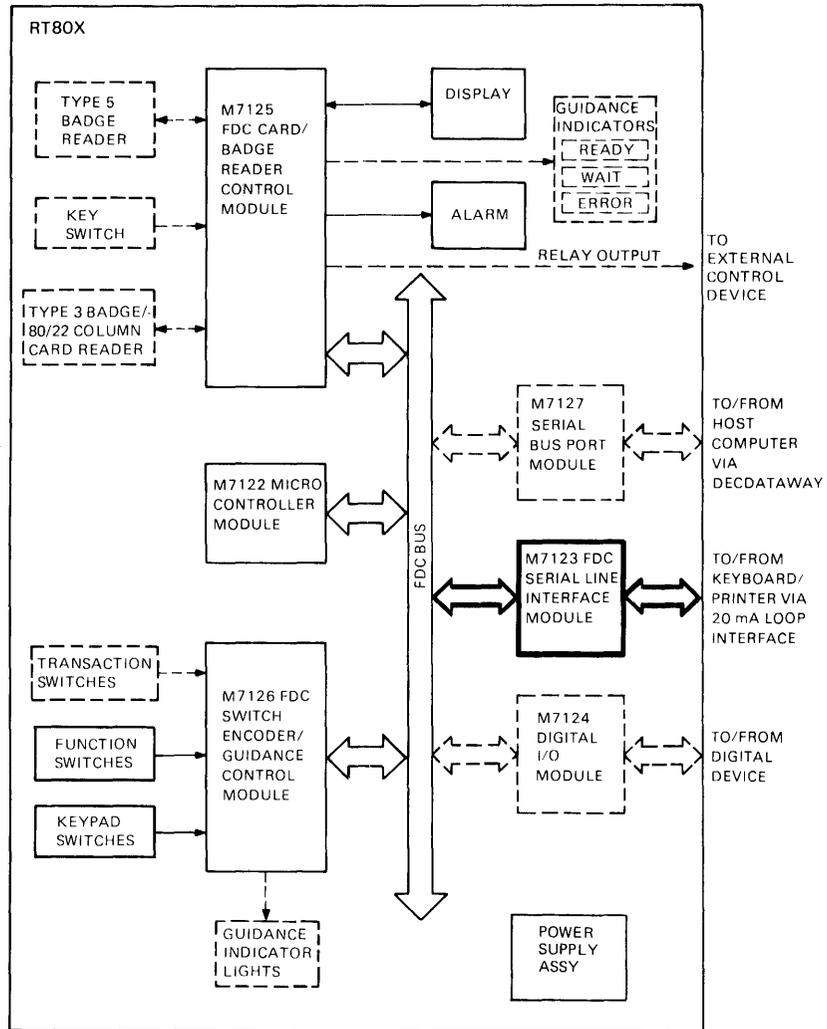
MA 2194A

Test Level: Advanced / Peripheral RT805

FRUs Tested: M7 123 (RT805-XC Option)

Description: Test 61 continuously outputs lines of 132 characters in an incrementing sequence, beginning with a line of brackets. It repeats until CANCEL is pressed.

Figure 2-29 FDC Terminal Internal Diagnostic Test 61

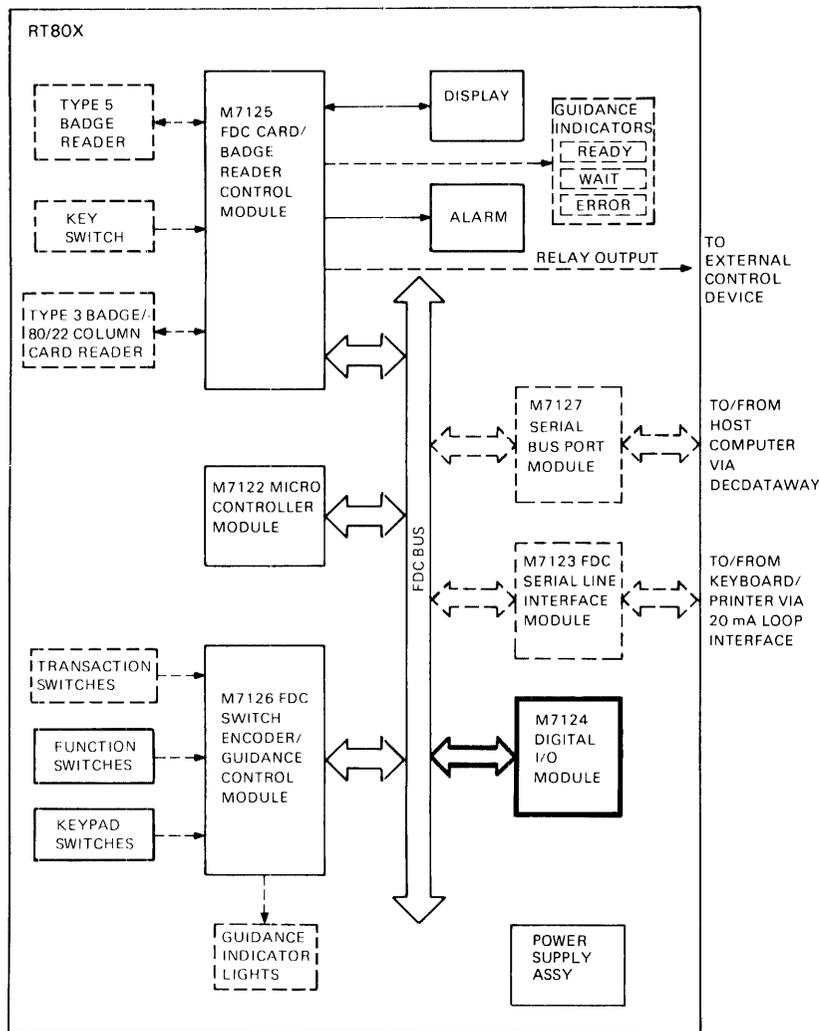


Test Level: Advanced / Peripheral RT805

FRUs Tested: M7123 (RT805-XC Option)

Description: Test 62 echoes any keyboard key to both the RT805 display and the output device (if present). Control characters such as carriage return and line feed will not echo properly to the RT805 display, but should echo correctly to the output device. It repeats until CANCEL is pressed.

Figure 2-30 FDC Terminal Internal Diagnostic Test 62



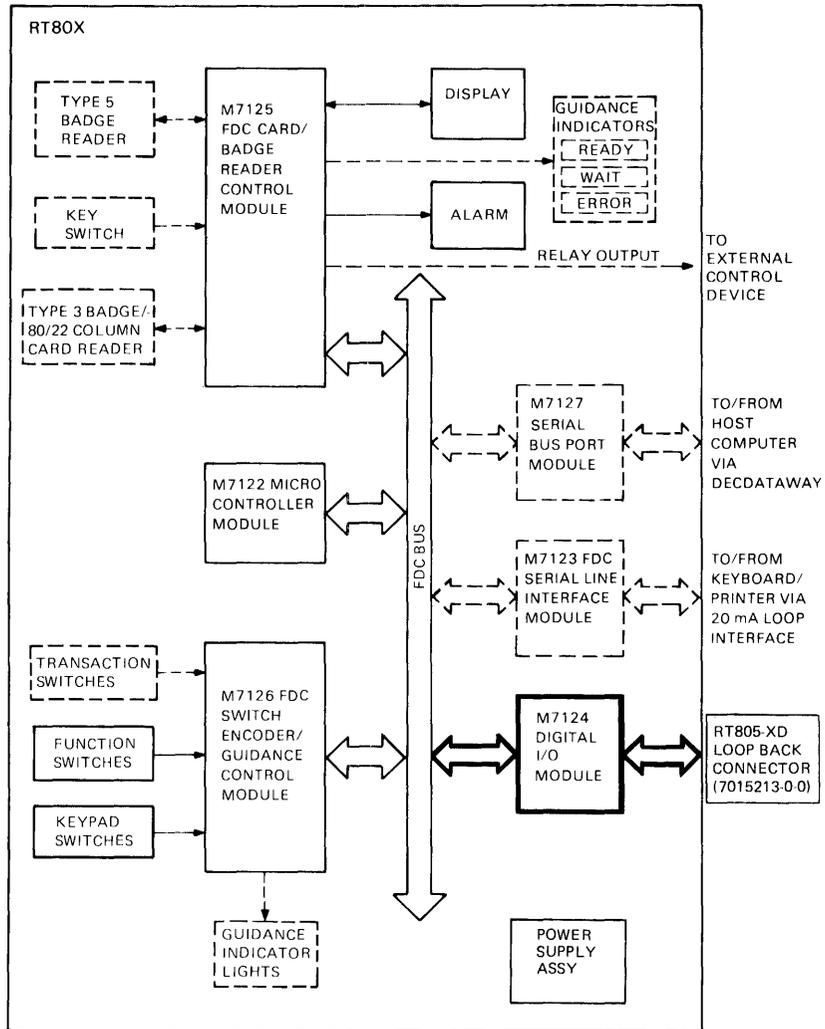
MA 2196A

Test Level: Advanced / Peripheral RT805

FRUs Tested: M7124 (RT805-XD Option)

Description: Test 70 loops the eight outputs back through the 24 inputs internally, using a maintenance function on the M7124. The customer's external digital I/O circuits must be disconnected before this test is selected.

Figure 2-31 FDC Terminal Internal Diagnostic Test 70



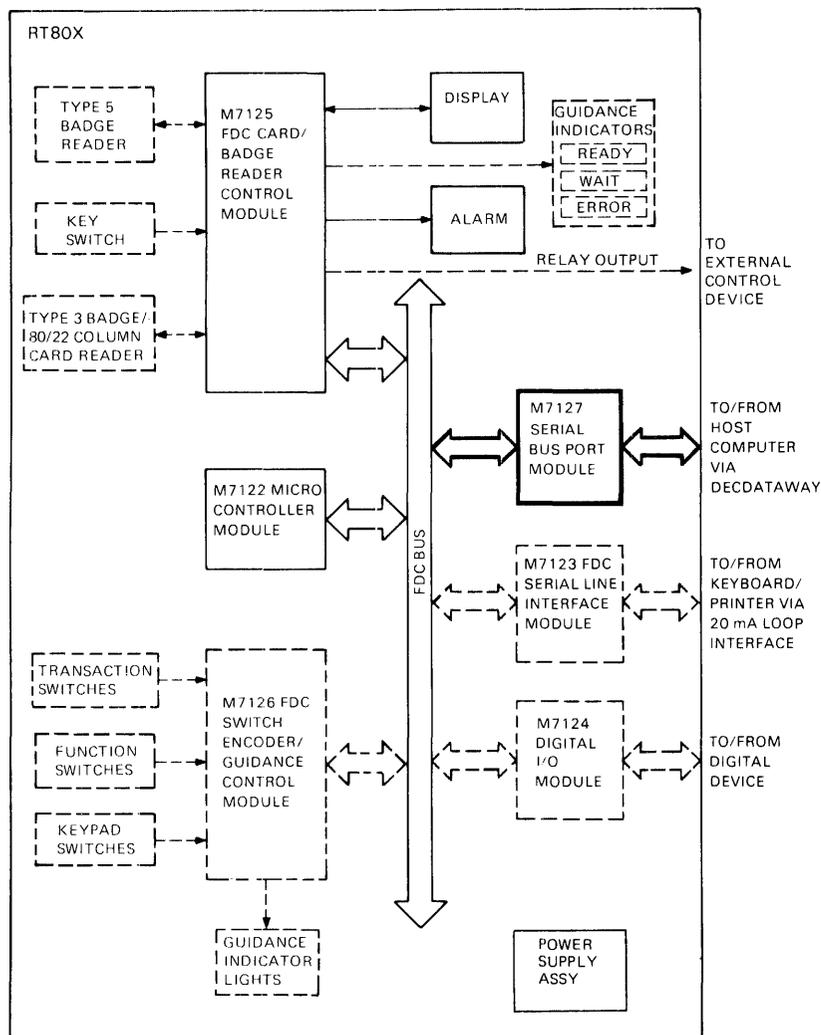
MA-2197A

Test Level: Advanced/Peripheral RT805

FRUs Tested: M7124 (RT805-XD Option)

Description: Test 71 functions the same as test 70 (Figure 2-31) except that the RT805-XD loopback plug (DEC P/N 7015213) must be connected to the digital I/O connector on the RT805 in place of the customer's connector. The data loopback is done through the connector instead of internally.

Figure 2-32 FDC Terminal Internal Diagnostic Test 71



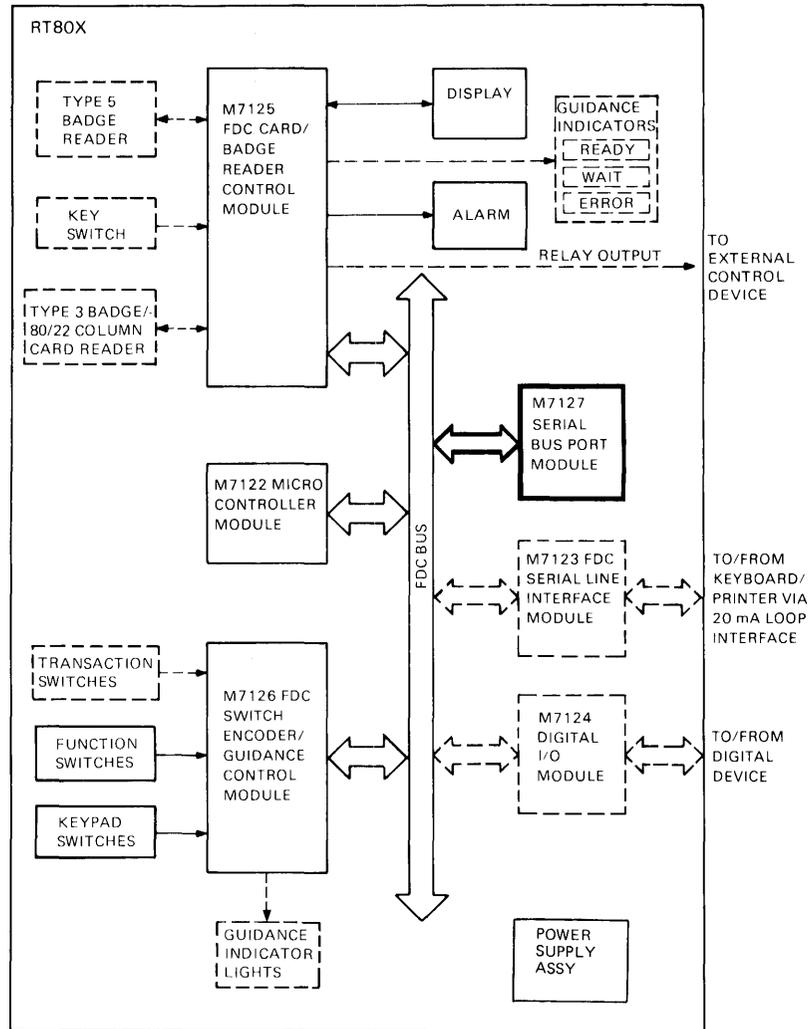
MA 2198A

Test Level: Basic RT801, RT803, RT805

FRUs Tested: M7127

Description: Test 80 checks basic usability of DECdataway port interface. It displays the port address in decimal. It checks M7127 addressing.

Figure 2-33 FDC Terminal Internal Diagnostic Test 80



MA 2199A

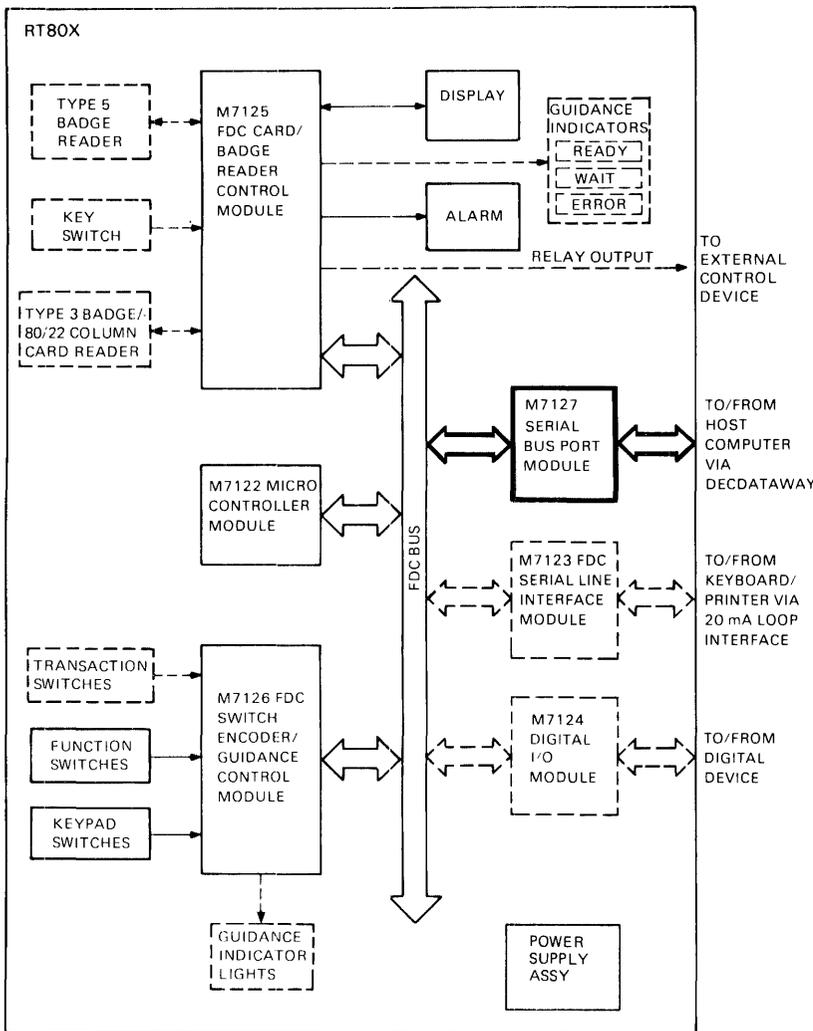
Test Level: Advanced/Peripheral RT801, RT803, RT805

FRUs Tested: M7127

Description: Test 81 loops all possible data patterns through the DECdataway interface. Exercises the M7127 modem up to the transformer connection to the DECdataway. Several of the receive/transmit ROM states cannot be checked during this test. Therefore, the on-line diagnostics (MD-11-DZKCH, MD-11CZKCI) must be used for a complete test.

CAUTION: The DECdataway must be disconnected before selecting this test. The test data may interfere with other data on the DECdataway.

Figure 2-34 FDC Terminal Internal Diagnostic Test 81



MA-2200A

Test Level: Advanced/Peripheral RT801, RT803, RT805

FRUs Tested: M7127

Description: This test is the DECdataway monitor. It monitors line activity and displays a running count of message flags and data flags detected by system interrupts (only message flags for RT801). For normal line activity both counts increments rapidly. The DECdataway must be connected for this test to function. If not, the test displays a count of 0 until the connection is made. For RT801, the test exits after 9999 flags. For RT803 and RT805, the test exits when CANCEL is pressed.

Figure 2-35 FDC Terminal Internal Diagnostic Test 82

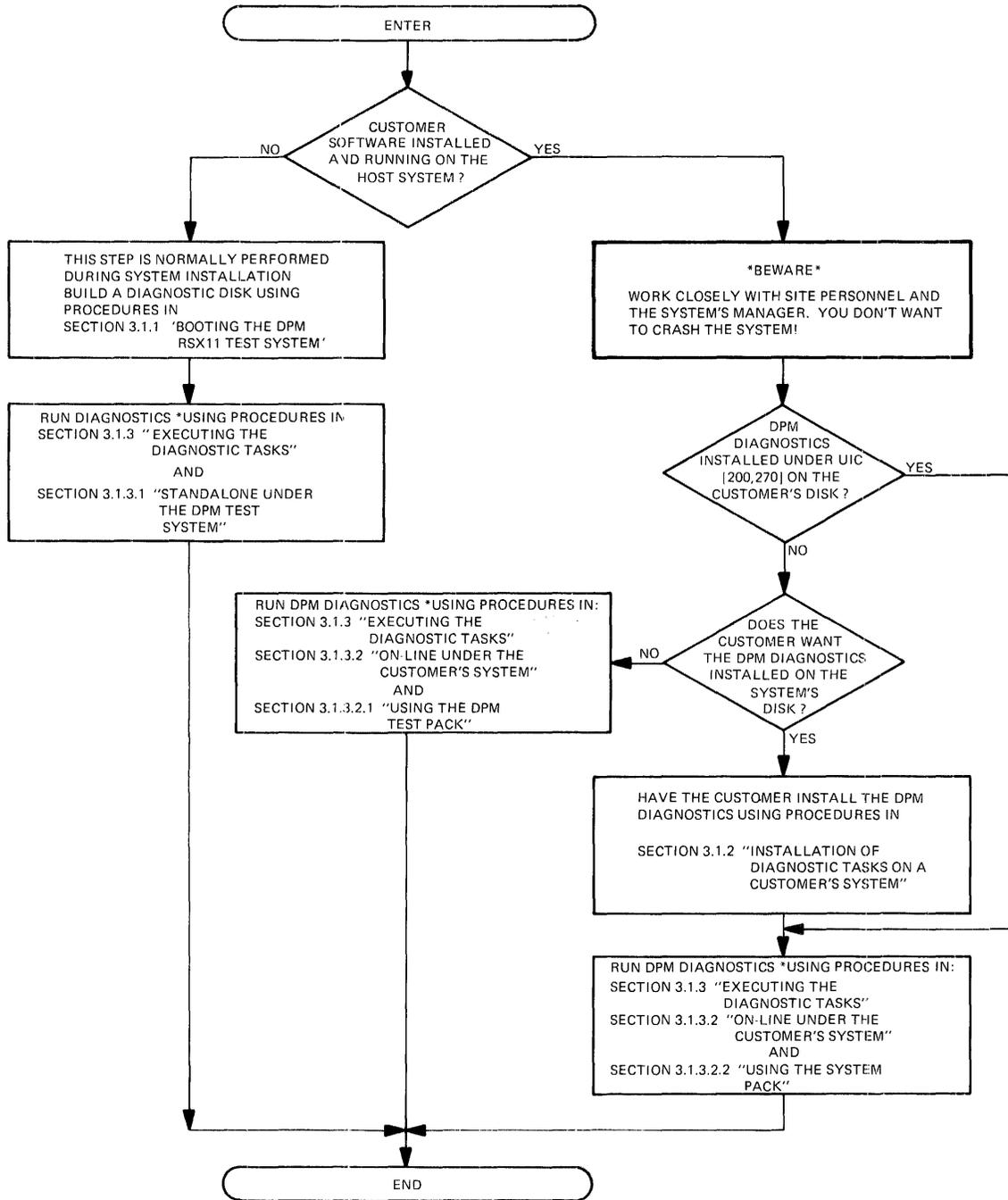
CHAPTER 3 DIAGNOSTIC OPERATING PROCEDURES

3.1 GETTING STARTED

This chapter contains operating procedures for the DPM system diagnostics DZKCH (Paragraphs 3.2 to 3.3) CZKClx (Paragraphs 3.3 to 3.4) and CZKMPx (Paragraph 3.4 to 3.5). These diagnostics have the unique ability to run under the user's RSX-11M/M-PLUS operating system at the same time the user's application software is running. They also have the more conventional ability of running on a host system running no other software.

The operating procedures presented in this chapter are written around actual sample runs of the diagnostics. These sample runs were executed on the DPM system shown in Figure 1-1. The system was running an RSX-11M-PLUS operating system, the diagnostics were located in UIC [200,270] on the system disk, and the operator was logged into the system under UIC [200,270].

Not all DPM systems will be in the state just described when first approached by maintenance personnel. For such cases, procedures to be performed prior to running the diagnostics are presented in the following paragraphs. The procedures to be performed will vary, depending on the state of the system. Figure 3-1 is a Getting Started Flowchart. It will direct you to the proper set of procedures based on the current state of the DPM system in question.



MA 7167

Figure 3-1 Getting Started Flowchart

3.1.1 Booting the DPM RSX-11 Test System

3.1.1.1 General – The RSX-11 Test System is supplied on either magnetic tape or RL02 media. Three RSX-11 Test System kits are available.

- ZP126 Contains eight 800 BPI magnetic tapes and associated documents
- ZQ127 Contains an RL02 disk pack and associated documents
- ZP128 Contains nine 1600 BPI magnetic tapes and associated documents

In the magnetic tape kits, ZP126 and ZP128, one of the tapes is a copy of the RSX-11 standalone Disk, Save, and Compress (DSC) utility; another is the DPM diagnostics; the remaining tapes are system tapes, one for each supported disk type.

The target system must be at least a minimum DPM system configuration. A blank disk pack of the appropriate type should be provided to hold the test system and the diagnostics when booting from magnetic tape.

3.1.1.2 Booting the Test System – The DPM RSX-11M Test Systems supplied on magnetic tape (ZP126 and ZP128) require two separate procedures to start up.

1. Using standalone DSC, move an RSX-11M system from a system tape to the system disk and boot it
2. During the RSX system startup procedure move the diagnostics from the diagnostics tape to the system disk.

Use the following procedures to load DPM diagnostic software into a system with no other software; i.e., no customer software is installed or running.

The following is the complete startup procedure. If booting from the RL02 disk supplied with kit ZP127, skip to step 11.

1. Load the DSC tape on magtape drive 0.
2. Boot the magtape using the standard hardware bootstrap. The console prints the following message.

RSX-11S V2.1 BL22 DISK SAVE AND COMPRESS UTILITY

DSC>

3. Remove the DSCSYS tape.
4. Select a system tape based on the following tables.

ZP126 800 BPI

System Disk	System Tape
RK05	AP-F146A-MC CZQRBA0 TEST SYS FOR RK05
RK06	AP-F147A-MC CZQRCA0 TEST SYS FOR RK06
RK07	AP-F148A-MC CZQRDA0 TEST SYS FOR RK07
RL01	AP-F151A-MC CZQRGA0 TEST SYS FOR RL01
RM03	AP-F150A-MC CZQRFA0 TEST SYS FOR RM03
RP06	AP-F149A-MC CZQREA0 TEST SYS FOR RP06
RM02	AP-S181A-MC CZQRSA0 TEST SYS FOR RM02

ZP128 1600 BPI

System Disk	System Tape
RK05	BB-S175A-MC CZQRMA0 TST SYS RL05 1600 BPI
RK06	BB-S176A-MC CZQRNA0 TST SYS RK06 1600 BPI
RK07	BB-S177A-MC CZQROA0 TST SYS RK07 1600 BPI
RP06	BB-S178A-MC CZQRPA0 TST SYS RP06 1600 BPI
RM03	BB-S179A-MC CZQRQA0 TST SYS RM03 1600 BPI
RL01	BB-S180A-MC CZQRRRA0 TST SYS RL01 1600 BPI
RM02	BB-S173A-MC CZQRKA0 TST SYS RM02 1600 BPI

5. Load the tape selected in step 4 on tape drive 0.
6. Load a blank disk pack on drive 0.
7. Check the magtape drive. If it is a TS03, TE10, or TU10, then type the following on the console.

MT0:/VEC=224 <CR>

If it is a TS11 or TS04 then type on the console:

MS0:/VEC=224 <CR>

The console returns with the prompt

DSC>.

8. Check the disk drive. If it is an RM03 or RM02, then type the following on the console.

DR:/VEC=254 <CR>

If it is an RL01, then type the following on the console.

DL:/VEC=160 <CR>

The console will return with prompt

DSC>.

9. Transfer the system tape to the target disk using DSC. The command line format is

DISK TO TAPE

devout/VE=devin

where devout is the target system device mnemonic and devin is the magtape drive device mnemonic. Obtain the mnemonics from the following list.

Disk	devout	Tape	devin
RK05	DK:	TS03	MT:
RK06	DM:	TU10	MT:
RK07	DM:	TE10	MT:
RP06	DB:	TU16	MM:
RL01	DL:	TU45	MM:
RM03	DR:	TS11:	MS:
		TS04:	MS:

Once the command is entered, DSC may type out a warning message.

DSC - 'WARNING' 59 - devout

This indicates that the target disk does not have a bad block file. After the tape has been read once, DSC types the following.

DSC - 45 START VFY PASS

It then rewinds the tape and rereads it to verify that the transfer was made correctly. If a verification error occurs, repeat the operation. If after repeated tries the transfer fails to rectify, there may be a bad block on the disk. At this point, trying another disk is justified.

When DSC is finished, it prints its prompt.

DSC>

10. Halt the processor. Remove the system tape from the magtape drive and mount the diagnostics tape (AP-F152A-MC CZQRHA0 RSX11M

TEST SYSTEM DIAGNOSTIC for 800 BPI drives and BB-S174A-MC CZQRLA0 RSX-11M TEST SYSTEM DIAGNOSTICS for 1600 BPI drives).

11. Boot the target disk using the standard hardware bootstrap.
12. This step is divided into three parts. The parts correspond to the RSX-11M Test Kit being used.
 - a. ZP126 800 BPI Kit
 - b. ZP127 RL02 Kit
 - c. ZP128 1600 BPI Kit

ZP126 800 BPI Kit

- a. The system comes up and prints the following messages.

DEVICE DB00: NOT IN CONFIGURATION

(One or more messages may be printed, depending on the system configuration.)

RSX-11M V3.1 BL22 124K MAPPED

>**RED devout: =SY0:**
>**RED devout: =LB0:**
>**[1,2]STARTUP**
>***PLEASE ENTER TIME AND DATE:**

Enter the time and date in the format.
HH:MM DD-MMM-YR

>**TIM**
 16:47:40 18-JUL-79
>**INS \$ISBRPT**
>**INS \$ISBERR**
>**INS \$ISBONL**
>**INS \$ISBINI**
>**INS [7,7]FDCTIM**
>**FIX FDCTIM**
>**LOA SB:/PAR=GEN**
>**RUN FDCTIM M/RSI=20S**
>**INS \$PIP**
>**INS \$FLX**
>***DO YOU WANT TO LOAD IPG DIAGNOSTICS FROM MAG-TAPE?**

Enter Y here if the diagnostics are to be loaded.
An answer of N or carriage return terminates the startup procedure and produces the message *<EOF>.

> *DO YOU HAVE A TU16 OR TU45 MAGTAPE?

Enter Y if you do. A Y answer will print this line.

>LOA MM:

An N answer will print this line.

>LOA MT:

>;MOUNT TAPE NUMBER 3 ON THE MAGTAPE DRIVE 0

Tape number three is the diagnostics tape.

> *IS THE DRIVE READY?

Enter Y when the tape is mounted and the drive is on-line. An N answer will repeat the query.

>SET /UIC=[200,270]

>FLX /CO/BL:60=MMO:*.TSK

>FLX=MMO:*.IMG/IM=248

> * <EOF >

ZP127 RL02 Kit

- b. The system comes up and prints the following messages.

(One or more messages may be printed, depending on the system configuration.)

RSX-11M V3.2 BL26 124K MAPPED

>RED DK:=SY:

>RED DK:=LB:

>MOU DK:DPMDIAGKIT

>@DK:[1,2]STARTUP

> * PLEASE ENTER TIME AND DATE (HR:MN DD-MMM-YY) [\$]:

Enter the time and date in the format.

HR:MN DD-MM-YR

>TIM 5-AUG-80 09:15

>ACS SY:/BLKS=150.

>INS \$PIP

>INS \$FLX

>INS \$ISBRPT

>INS \$ISBERR

>INS \$ISBINI

>INS \$FDCTIM

>FIX FDCTIM

>LOA SB:/HIGH

>RUN FDCTIM M/RSI=20S

>SET /UIC=[200,270]

>

ZP128 1600 BPI Kit

- c. The system comes up and prints the following message.

(One or more messages may be printed, depending on the system configuration.)

RSX-11M V3.2 BL26 124K MAPPED

```
>RED DK:=SY:
>RED DK:=LB:
>MOU DK:DPMDIAGKIT
>@DK:[1,2]STARTUP
>* PLEASE ENTER TIME AND DATE (HR:MN DD-MMM-YY) [S]:
```

Enter the time and date in the format.

HR:MM DD-MMM-YR

```
>TIM 5-AUG-80 09:15
>ACS SY:/BLKS= 150.
>INS $PIP
>INS $FLX
>INS $ISBRPT
>INS $ISBERR
>INS $ISBINI
>INS $FDCTIM
>FIX FDCTIM
>LOA SB:/HIGH
>RUN FDCTIM M/RSI= 20S
>SET /UIC=[200,270]
>* DO YOU WANT TO LOAD DPM DIAGNOSTICS FROM MAG-
TAPE? [Y/N]:
```

Enter Y here if the diagnostics are to be loaded.

An answer of N or carriage return terminates the startup procedure and produces the message *<EOF>.

```
>;
>;          Valid magtape devices
>;
>;
>;
>; MT - TE10, TU10, TS03 (800 BPI)
>; MM - TE16, TU16, TU45, TU77 (800 BPI)
>; MS - TS11 (1600 BPI)
>;
>* DRIVE TYPE (MT,MM,MS) [S]:
```

Enter the appropriate response, that is

```

MT <CR>
MM <CR>
OR
MS <CR>.

```

```

>LOA MT:/PAR=GEN
>
>
>; Mount the diagnostics tape on drive 0.
>
>;
>* IS THE DRIVE READY? [Y/N]:

```

Enter Y when the tape is mounted and the drive is on-line. An N answer will repeat the query.

```

>FLX /CO/BL:80.=MT:*.TSK/DNS:800
>FLX =MT:*.IMG/IM:248./DNS:800

```

13. At this point the diagnostics are on the diagnostic disk in account [200,270]. To obtain a listing of the diagnostics account, type the following command line.

```
>PIP [200,270]/LI
```

3.1.2 Installation of Diagnostic Tasks on a Customer's System

CAUTION: The procedures in Paragraphs 3.1.2 to 3.1.3 MUST be performed ONLY by an experienced system operator with the knowledge and consent of the system's manager. These procedures are not intended or recommended for use by maintenance personnel.

3.1.2.1 General – The three diagnostic tasks, DZKCH, CZKCI, and CZKMP require services provided by the RSX-11M operating system. They can, therefore, run on the customer's system during normal operation. They test only terminals and subsystems that are not attached to customer tasks. The test aborts if the operator tries to test an attached terminal. To determine whether the terminal or subsystem is attached to a customer's tasks, refer to the Informational Routines, in Chapter 4 for that device.

The following paragraphs describe how to install the diagnostic tasks on the customer's system.

3.1.2.2 Creating the Diagnostic Account (Refer to Paragraph 3.1.2) – Perform this procedure to create an account under [200,270] in which the on-line diagnostic tasks and the remote LSI-11 diagnostics will reside.

1. Log onto the system under a privileged account.
2. Run the account program: >RUN \$ACNT
3. Select option A.

4. Enter new account 200,270.
5. Create new password, DIAGB.
6. Enter the system device default code SY.
7. Enter the maintenance person's first name ().
8. Enter the maintenance person's last name ().
9. Type CONTROL Z to exit the program (●Z).

3.1.2.3 Loading the Diagnostics (Refer to Paragraph 3.1.2) – Perform this procedure to load the diagnostic tasks and remote LSI-11 diagnostics from tape 3 on the RL02 to the system device in account [200,270].

1. Load tape 3 on drive 0.
2. Log into the diagnostic account.

```
>HEL
ACCOUNT OR NAME: 200,270
PASSWORD: DIAGB
```

The password does not print.

3. Allocate the tape drive or RL02. For magnetic tape, type the following.

```
>ALL MM0: (or ALL MT0: for TS03, TE10, TU10 drivers; or ALL MS0:
for TS11 or TS04 drivers)
For the RL02, type the following.
```

```
>ALL DLI:
```

4. Transfer the diagnostic tasks from tape 3 or the RL02 to the disk. For magnetic tape, type the following.

```
>FLX/CO/BL:60=MM0:*.TSK
```

For the RL02, type the following.

```
>PIP =DLI: [200,270]*.TSK;*
```

5. Transfer the remote diagnostic images from tape 3 to the disk.

For magnetic tape, type the following.

```
>FLX=MM0:*.IMG/IM=248
```

For the RL02, type the following.

```
>PIP =DLI: [200,270]*.IMG;*
```

6. Deallocate the magtape or RL02.

For magnetic tape, type the following.

>DEA MM0: (or MT0:or MS0:)

For the RL02, type the following.

>DEA DLI:

The diagnostic tasks are now ready to run. Refer to Paragraph 3.1.3 for starting instructions.

3.1.3 Executing the Diagnostic Tasks

WARNING: *Because RSX-11M/M-PLUS are intricate operating systems and a DPM system is distributed by nature, maintenance personnel MUST adhere to the following guidelines.*

- *Maintain close contact with the system's manager. Make sure the manager is aware of what you are doing.*
- *Get help from a system operator who is aware of the system's configuration and has a working knowledge of the system's utility programs.*
- *Before running diagnostics on a process I/O subsystem, make sure that appropriate personnel on the factory floor have been notified. The subsystem may be controlling sophisticated and dangerous industrial processes. Always check for safety precautions and restrictions on the operations that can be performed.*

3.1.3.1 Standalone Under the DPM Test System – This mode is similar to the traditional diagnostic operation in that no customer's tasks run concurrently with the diagnostics.

NOTE: *All names and devices in parentheses are alternatives depending on the test run or the DPM test pack used.*

1. Boot the DPM Test System, which was created from tape in Paragraph 3.1.1.
2. Run the task.

>RUN DZKCH (CZKCI, CZKMP)

3. Refer to the specific section of this chapter for diagnostic run instructions.

Paragraph 3.2.3 for DZKCH

Paragraph 3.3.3 for CZKCI

Paragraph 3.4.3 for CZKMP

Check the device descriptions in Chapter 2 if you are not sure which diagnostic to run.

3.1.3.2 On-Line Under the Customer's System

CAUTION: These procedures are used on a system running customer software. Therefore, they must be performed by an experienced system operator with the knowledge and consent of the system's manager.

3.1.3.2.1 Using the DPM Test Pack – Follow this procedure to use the DPM Test Pack.

1. Load the DPM Test Pack on drive n.
2. Log onto the Customer's system.

```
>HEL  
ACCOUNT OR NAME: 200,270  
PASSWORD: DIAGB
```

The password does not print.

3. Allocate and mount the DPM Test Pack.

```
> ALL DKn:(DRn:,DBn:,DMn:,DLn:)  
> MOU DKn:(DRn:,DBn:,DMn:,DLn:) SYSTEM
```

4. Run the task.

```
> RUN DKn:(DRn:,.etc.) DZKCH (CZKCI, CZKMP)
```

NOTE: When using CZKMP, prefix the MAINDEC image filename every time it is entered. The prefix must be the name of the device that contains the DPM Test Pack (e.g., DK0:VKAAB0, or DR1:VKAAB0).

5. Refer to the specific section of this chapter for diagnostic run instructions.

Paragraph 3.2.3 for DZKCH

Paragraph 3.2.3 for CZKCI

Paragraph 3.4.3 for CZKMP

Check the device description in Chapter 2 if you are not sure which diagnostic to run.

3.1.3.2.2 Using the Customer's System Pack – Perform the following procedures when using the customer's system pack.

1. Log onto the customer's system (step 2 of Paragraph 3.1.3.2.1).
2. Run the task.

>RUN DZKCH (CZKCIx, CZKMP)

NOTE: The diagnostics do not detach or disturb any terminal or sub-system attached to another task in the customer's system. Therefore, any terminal to be tested must be detached before any of the diagnostics can be run. Detaching a device from a task must be performed ONLY by an experienced system operator with the knowledge and consent of the system manager. In the case of a DPM01 terminal, all four of the DPM01 addresses must be unattached to run either diagnostic.

3.2 DZKCH SERIAL BUS EXERCISER

3.2.1 Description and Scope

DZKCH is a serial bus (DECdataway) exerciser. It shows the host's ability to establish error-free two-way communication over the DECdataway with selected FDC/DPM terminal/subsystems. As an exerciser, DZKCH's purpose is to identify problem areas, not to isolate specific problems.

The basic operation of this exerciser is as follows.

1. All selected terminals/subsystems (maximum of 63) are sent a LOOP maintenance command. This causes an addressed terminal to return data to the host exactly as it was received.
2. The host sends messages to the selected terminals/subsystems. It then compares the original message to the one that is echoed back. Data patterns and message length are varied to thoroughly exercise the serial bus system (i.e., ISB11-A controllers, DECdataway and the DECdataway interface circuitry of up to 63 terminals/subsystems).
3. All errors are reported at the operator's terminal.

This exerciser allows the selection of up to 63 (decimal) terminals/subsystems connected via DECdataways on up to four controllers.

3.2.2 Operating Procedures

The following paragraphs contain procedures for running the DZKCH Serial Bus Exerciser. Sample responses to prompts shown correspond with the responses in the sample run (Figure 3-2). Paragraphs explaining sections of the sample run are indicated to the left of the figure.

These procedures assume that DZKCH is located in UIC [200,270] on the system disk. It also assumes that you are operating under UIC [200,270]. If either of these assumptions are not true, refer to Paragraph 3.1, *Getting Started* before proceeding.

3.2.2.1 DZKCH Loading and Initiation – Load DZKCH into main memory by typing the following in response to the MCR prompt (>).

```
MCR> RUN DZKCH
```

The program now enters the diagnostic supervisor command mode. This will also happen if a CONTROL A is typed during program execution.

```

Para.  |>RUN DZKCH
3.2.2.1 |DCP-A>STA

Para.  |
3.2.2.2 |# UNITS (D) ? 7

        |UNIT 1
        |ENTER CONTROLLER NUMBER : (0) 0 ? <CR>
        |ENTER TERMINALS ON THAT CONTROLLER : (0) 1 ? 1,5,7

Para.  |
3.2.2.3 |UNIT 4
        |ENTER CONTROLLER NUMBER : (0) 0 ? 1
        |ENTER TERMINALS ON THAT CONTROLLER : (0) 7 ? 1,5

        |UNIT 6
        |ENTER CONTROLLER NUMBER : (0) 1 ? 3
        |ENTER TERMINALS ON THAT CONTROLLER : (0) 5 ? 1,50

Para.  |CONTROLLER 3, TERMINAL 050 IS NOT SYSGENED IN.
3.2.2.4 |TERMINAL 32 CANNOT BE ATTACHED-IO STAT=375
        |TERMINAL 36 CANNOT BE ATTACHED-IO STAT=361
        |TERMINAL 14 CANNOT BE ATTACHED-IO STAT=361

        |NUMBER OF ENTERED TERMINALS= 3

Para.  |UNIT ** CONTROLLER ** LOGICAL SB ** LUN **
3.2.2.5 |001          000          001          011
        |005          000          005          012
        |007          000          007          013

Para.  |TOTAL ACTIVE PASSES= 12, ACTIVE TERMINALS= 3, TIME=16:08
3.2.2.6 |TOTAL ACTIVE PASSES= 24, ACTIVE TERMINALS= 3, TIME=16:09
Para.  |<CONTROL A>
3.2.2.1 |DCP-A>CON

Para.  |CONTROLLER 3, TERMINAL 050 IS NOT SYSGENED IN.
3.2.2.4 |TERMINAL 32 CANNOT BE ATTACHED-IO STAT=375

```

MA-7142

Figure 3-2 DZKCH Sample Run (Sheet 1 of 2)

```

Para.3.2.2.4 | TERMINAL 36 CANNOT BE ATTACHED-IO STAT=361
                | TERMINAL 14 CANNOT BE ATTACHED-IO STAT=361
                |
                | NUMBER OF ENTERED TERMINALS= 3
                |
                | UNIT ** CONTROLLER ** LOGICAL SB ** LUN **
Para.3.2.2.5 | 001          000          001          011
                | 005          000          005          012
                | 007          000          007          013
Para.3.2.2.6 | TOTAL ACTIVE PASSES=    13, ACTIVE TERMINALS=  3, TIME=16:11
Para.3.2.2.1 | <CONTROL A>
                | DCP-A>RES

                |
                | CONTROLLER 3, TERMINAL 050 IS NOT SYSGENED IN.
Para.3.2.2.4 | TERMINAL 32 CANNOT BE ATTACHED-IO STAT=375
                | TERMINAL 36 CANNOT BE ATTACHED-IO STAT=361
                | TERMINAL 14 CANNOT BE ATTACHED-IO STAT=361
                |
                | NUMBER OF ENTERED TERMINALS= 3
                |
                | UNIT ** CONTROLLER ** LOGICAL SB ** LUN **
Para.3.2.2.5 | 001          000          001          011
                | 005          000          005          012
                | 007          000          007          013
Para.3.2.2.6 | TOTAL ACTIVE PASSES=    13, ACTIVE TERMINALS=  3, TIME=16:12
                | <CONTROL A>
Para.3.2.2.7 | DCP-A><CONTROL C>
                |
                | >
    
```

MA-7143

Figure 3-2 DZKCH Sample Run (Sheet 2 of 2)

The program responds with the prompt DCP-A>. Any of the following diagnostic supervisor commands can be entered.

```
DCP-A> STA
DCP-A> RES
DCP-A> CON
DCP-A> CONTROL C
```

These diagnostic supervisor commands are described below.

Start Program (STA) – The Start Program command initiates the execution of the program currently in main memory, including the dialogue portions.

Restart Program (RES) – The Restart Program command is similar to the start command. The difference is that dialogue portions of the program do not execute. It is assumed that configuration parameters have been loaded previously after a STA command.

Return to Program (CON) – The Return To Program command allows the execution of the diagnostic program to resume at the first instruction after the current supervisor call. This command is useful if the operator needs to continue executing the program where it was interrupted by a CONTROL A.

Return to MCR (CONTROL C) -- Activating a CONTROL C gets the operator back to MCR and aborts the program.

Each one of the preceding supervisor commands is demonstrated in the sample run (Figure 3-2).

3.2.2.2 Specify How Many Units to Exercise – At start up, the program enters a dialogue with the operator to determine how many units are to be exercised. (The term UNIT refers to any device on a DECdataway, i.e., terminal, multiplexer, or subsystem.)

```
#UNITS (D) ?
```

The question is how many physical devices (in decimal) are to be exercised, NOT how many port addresses. That is, if a DPM01 (4 port addresses) and a DPM50 (2 port addresses) are to be exercised, the operator responds with the number 2.

In the sample (Figure 3-2), the operator specified 7 units as follows.

```
#UNITS (D) ? 7
```

The (D) indicates that the program expects a response in decimal.

3.2.2.3 Specify Which Units to Exercise – Once the program knows how many units to exercise, it needs to know which units to exercise. For purposes of this program, each unit (terminal, multiplexer, subsystem, etc.) is identified by its controller number (0-3 octal) and its base port address (1-77 octal). A base port address is the address wired into the device's DECdataway port connector, i.e., the lowest numbered address assigned to the device.

The program asks for the controller number of the first devices to be exercised. Then it asks for the terminal numbers (base port addresses) of the devices to be exercised on that controller. If the number of terminals entered is less than the response to the UNITS prompt, the program repeats these two questions until the required number of terminals is entered (i.e., #UNITS = the number of terminals entered).

The following example specifies seven terminals that are distributed among three separate controllers.

NOTE: Both CZKClx and DZKCH ask the next series of questions to determine which devices to exercise. However, the operator must be aware of the difference between the two.

DZKCH requests a response in octal (O), whereas CZKClx requests a response in decimal (D).

UNIT 1

ENTER CONTROLLER NUMBER: (O) () ? <CR>

Operator's response is to type in the controller number to be exercised, or use the default (carriage return). The default is controller number 0.

In the above example controller number 0 has been entered to the program.

ENTER TERMINALS ON THAT CONTROLLER: (O) 1 ? 1, 5, 7

The operator types in the terminals to be exercised, on the selected controller (0). The numbers entered are the base port addresses of the devices to be exercised. They may be entered in the following formats.

1,3 (1 and 3)

1-5 (1 through 5)

1-5, 7-12 (1 through 5 and 7 through 12)

UNITS keeps a sequential count of the number of devices entered, and points to the next sequential device. It does not point to the physical terminal number. At this time some of the seven units to be exercised have not been entered. Thus, the program assumes the remaining devices are on different controllers, and continues with the following dialogue.

UNIT 4

ENTER CONTROLLER NUMBER: (O) ? 1<CR>

The program asks what other controller is to be used. The operator specified controller number 1.

ENTER TERMINALS ON THAT CONTROLLER: (O) 4 ? 1, 5

The program asks for terminals to be entered, and the operator enters two terminals on the previously selected controller. Since only some of the seven specified units have been entered, the program again questions the operator.

UNIT 6

ENTER CONTROLLER NUMBER : (O) ? 2<CR>

The operator selects controller number 2.

ENTER TERMINALS ON THAT CONTROLLER: () 7 ? 1, 50

The seven requested units have now been entered and the program continues.

3.2.2.4 Terminal Status Report – For DZKCH to communicate with a selected terminal/subsystem, that device must meet the following conditions.

1. SYS GEN'ed into the system – The operating system must know that the device and its controller exist.
2. ONLINE – The device is connected to a DECdataway and ready to operate.
3. UNATTACHED – The device is not under the control of another task.

If the device has not been SYS GEN'ed, the following message prints.

“CONTROLLER X, TERMINAL Y IS NOT SYSGENED IN

When devices cannot be assigned or attached, because they are offline or already attached, the following message prints.

TERMINAL X CANNOT BE ASSIGNED – IO STAT = Y
TERMINAL X CANNOT BE ATTACHED – IO STAT = Y

Where X = a number assigned to the device at SYS GEN time. The operator relies on site personnel to relate a terminal number (SB number) to its controller and port address. The system utility, PEEK (refer to Chapter 4), supplies this information.

The error codes Y are returned by the RSX11-M/M-PLUS operating system. They are I/O Status Error Codes. Three of these codes are of special interest to the operator.

361 = device is attached to another program

375 or 277 = device is off-line

NOTE: Maintenance personnel must rely on site personnel for help when running maintenance software on a device that is attached or assigned to a task. Any change to system status must be performed by an experienced operator with the system manager's knowledge and consent.

3.2.2.5 Program Mapping Function – DZKCH determines which units are unavailable for testing and then informs the operator which units are actually being tested. It does so in the following manner.

NUMBER OF ENTERED TERMINALS = X

Where X is the total number of legal devices entered to the program.

**UNIT **	CONTROLLER **	LOGICAL SB **	LUN **
XX	YY	ZZ	%

Where **XX** is the physical port address entered on controller **YY**. **ZZ** is the logical SB unit number assigned to each terminal by RSX during SYSGEN, and % is the Logical Unit Number the program assigns to each unit **XX**.

3.2.2.6 End of Pass Report – An end of pass report is given every minute in the following format.

TOTAL ACTIVE PASSES = X, ACTIVE TERMINALS = Y, TIME = 00:00

where: **X** = the number of passes completed
Y = the number of terminals exercised

To inhibit the printout type the following switch in addition to the diagnostic supervisor command after receiving the DCP-A> (Paragraph 3.2.2.1) prompt.

DCP-A> STA/FLA:IXE

3.2.2.7 Program Termination – This program cycles until a CONTROL A or a CONTROL C is typed on the console that initiated the exerciser. If a CONTROL A is typed, the program returns to the supervisor command mode (Paragraph 3.2.2.1). If CONTROL C is typed the program aborts and exits to the monitor (MCR).

Example:

```
<CONTROL C>  
MCR>
```

or

```
<CONTROL A>  
DCP-A>
```

3.2.2.8 Error Reporting – The errors reported by DZKCH can be categorized into three major groups.

1. Hard errors and unit off/on-line transition reporting
2. Soft errors (recoverable)
3. Data errors

The errors are collected and stored during each complete pass of DZKCH and dumped at the end of the pass. All errors reference the failing unit by SB number only. Therefore, use the map issued by the exerciser at the beginning of the test to correlate a failing SB to a specific controller and unit number.

As its name implies, DZKCH is an exerciser. Its purpose is to identify problem areas; not to isolate specific problems. Hence, this manual does not present in-depth error interpretation information. This information can be found in the MAINDEC-11-DZKCH-B-D, FA Serial Bus Exerciser Write-up.

3.3 CZKClx REMOTE DIAGNOSTIC EXERCISER

3.3.1 Description and Scope

CZKClx lets maintenance personnel at the host computer initiate internal (ROM-resident) diagnostics. These diagnostics are in selected FDC/DPM terminals/subsystems connected to the DECdataway. When applicable, CZKClx reports all diagnostic errors encountered in the device(s). CZKClx can be used to check basic functionality of all devices (up to 63 at a time) on a DPM system from the host.

CZKClx does not check the operator interface portions of FDC terminals (RT80x), i.e., displays, keypads, and card readers. Extended internal terminal diagnostics must be run locally at the terminal to check those functions (refer to Chapter 2).

In DIS subsystems (DPM50, DPM23, etc.) CZKClx initiates a self test within the subsystem. The self test tests the DECdataway interface and the LSI-11's processor and memory for basic usability.

3.3.2 Operating Procedures

Use the procedures in the following paragraphs to run the CZKClx Remote Diagnostic Exerciser. Sample responses to prompts shown in these procedures correspond with the responses in a sample run (Figure 3-3). Paragraphs explaining sections of the sample run are indicated to the left of the figure.

These procedures assume that CZKClx is located under UIC [200,270] on the system disk. They also assume that the operator is logged in under UIC [200,270]. If either of these assumptions is not true, refer to Paragraph 3.1 to 3.2.

3.3.2.1 Loading and Initiating CZKClx – Load CZKClx into main memory by typing the following in response to the MCR prompt (>).

```
MCR> RUN CZKClx<CR>
```

where x = the revision level of CZKClx available on your system. If the revision level is unknown, obtain a listing of the diagnostic accounts directory as follows.

```
> PIP [200,270]*.TSK;*/LI <CR>
```

```

Para.  |>RUN CZKCIB
3.3.2.1 |DCP-A>STA

Para.  |I# UNITS (D) ? 7
3.3.2.3 |
      |UNIT 1
      |ENTER CONTROLLER NUMBER : (0) 0 ? <CR>
      |
      |ENTER TERMINALS ON THAT CONTROLLER : (D) 1 ? 1,5,7
      |
      |UNIT 4
Para.  |ENTER CONTROLLER NUMBER : (0) 0 ? 1
3.3.3.3 |
      |ENTER TERMINALS ON THAT CONTROLLER : (D) 7 ? 1,5
      |
      |UNIT 6
      |ENTER CONTROLLER NUMBER : (0) 1 ? 3
      |ENTER TERMINALS ON THAT CONTROLLER : (D) 5 ? 1,50

Para.  |CONTROLLER 3, TERMINAL 50 IS NOT SYSGENED IN.
3.3.2.4 |TERMINAL 036 CANNOT BE ATTACHED
      |TERMINAL 114 CANNOT BE ATTACHED
      |SELECTED SERIAL LINE PORTS

Para.  |UNIT ** CONTROLLER ** LOGICAL SB ** LUN ** TYPE
3.3.2.5 |1      0      001      9      DPM01 - PORT  0
      |5      0      005      10     DPM50 - PORT  0
      |7      0      007      11     805
      |1      1      032      12     OFF LINE

      |START OF TESTING

Para.  |TERMINAL      001 IS NOT RESPONDING
3.3.2.7 |TERMINAL      007 IS NOT RESPONDING
      |END OF PASS  1  TIME=16:16

Para.  |TERMINAL      001 IS NOW RESPONDING
3.3.2.7 |TERMINAL      001 IS NOT RESPONDING
      |TERMINAL      007 IS NOW RESPONDING
      |TERMINAL      007 IS NOT RESPONDING

Para.  |<CONTROL C>
3.3.2.6 |>

```

MA 7144

Figure 3-3 CZKCIB Sample Run

A listing of all programs in your UIC with the extension .TSK prints. Scan the list for CZKClx to find the value of X.

CZKCIB is the version used in the sample run in Figure 3-3.

The program now enters the diagnostic supervisor command mode. This point can also be reached if the operator types a CONTROL A combination during program execution.

In either case the program responds with the prompt **DCP-A>**. Any one of the diagnostic supervisor commands can be entered. For example:

```

DCP-A> STA
DCP-A> RES
DCP-A> CON
DCP-A> CONTROL C

```

These are descriptions of the diagnostic supervisor commands.

START PROGRAM (STA) – The Start Program command initiates the execution of the program currently contained in main memory, including the dialogue portions.

RESTART PROGRAM (RES) – The Restart Program command is similar to the Start Program command. The difference is that dialogue portions of the program are not executed. It is assumed that configuration parameters have already been loaded following a STA command.

RETURN TO PROGRAM (CON) – The Return To Program command allows the diagnostic program to resume execution at the first instruction after the current supervisor call. This command is useful if the operator needs to continue execution of the program at the point where it was interrupted by a CONTROL A.

RETURN TO MCR (CONTROL C) – Activating a CONTROL C gets the operator back to MCR and aborts the program.

3.3.2.2 Specify How Many Units to Exercise – At start up, the program enters a dialogue with the operator to determine how many units are to be exercised. (The term UNIT refers to any device on a DECdataway, i.e., terminal, multiplexer, or subsystem).

#UNITS (D) ?

The question is how many physical devices (in decimal) are to be exercised, not how many port addresses. That is, if a DPM01 (4 port addresses) and a DPM50 (2 port addresses) are to be exercised, the operator should respond with the number 2.

In the sample (Figure 3-3), the operator specified 7 units as follows.

#UNITS (D) ? 7<CR>

The (D) indicates that the program expects a response in decimal.

3.3.2.3 Specify Which Units to Exercise – Once the program knows how many units to exercise, it needs to know which units to exercise. Each unit (terminal, multiplexer, subsystem, etc.) is identified by its controller number (0-3 octal) and its base port address (1-63 decimal). A base port address is the address wired into the device's DECdataway port connector, i.e., the lowest numbered address assigned to the device.

The program asks for the controller number of the first devices to be exercised. Then it asks for the terminal numbers (base port addresses) of the devices to be exercised on that controller. If the number of terminals entered is less than the number of units selected earlier in response to the UNITS prompt, the program repeats these two questions until the required number is entered (i.e., #UNITS = the number of terminals entered).

The following example specifies seven terminals that are distributed among three separate controllers.

NOTE: Both CZKClx and DZKCH ask the next series of questions to determine which devices to exercise. However, the operator must be aware of the difference between the two.

DZKCH requests a response in octal (O), whereas CZKClx requests a response in decimal (D).

UNIT 1

ENTER CONTROLLER NUMBER: (O) () ? <CR>

Operator's response is to type in the controller number to be exercised, or use the default (carriage return). The default is controller number 0.

In the above example controller number 0 has been selected.

ENTER TERMINALS ON THAT CONTROLLER: (O) 1 ? 1,5,7

The operator types in the terminals to be exercised, on the selected controller (O). The numbers entered are the base port addresses of the devices to be exercised. They may be entered in the following formats.

1,3 (1 and 3)

1-5 (1 through 5)

1-5, 7-12 (1 through 5 and 7 through 12)

UNITS keeps a sequential count of the number of devices entered, and points to the next device. It does not point to the physical terminal number. At this time some of the seven units to be exercised have not been entered. Thus, the program assumes the remaining devices are on different controllers, and continues with the following dialogue.

UNIT 4

ENTER CONTROLLER NUMBER: (O) ? 1 <CR>

The program asks what other controller is to be used. The operator specified controller number 1.

ENTER TERMINALS ON THAT CONTROLLER: (D) 7 ? 1,5

The program asks for terminals to be entered, and the operator enters two terminals on controller 1. Since only some of the seven specified units have been entered, the program continues to question the operator.

UNIT 6

ENTER CONTROLLER NUMBER : (O) ? 3 <CR>

The operator selects controller number 3.

ENTER TERMINALS ON THAT CONTROLLER: (D) 5 ? 1, 50 <CR>

At this point, the seven requested terminals have been entered and the program continues.

3.3.2.4 Terminal Status Report – For CZKCH to communicate with a selected terminal/subsystem, that device must meet the following conditions.

1. SYS GEN'ed into the system – The operating system must know that the device and its controller exist.
2. ONLINE – The device is connected to a DECdataway and ready to operate.
3. UNATTACHED – The device is not under the control of another task.

If the device has not been SYS GEN'ed, the following message prints:

”CONTROLLER X, TERMINAL Y IS NOT SYSGENED IN

When devices cannot be assigned or attached, the following message prints.

**TERMINAL X CANNOT BE ASSIGNED
TERMINAL X CANNOT BE ATTACHED**

Where **X** = a number assigned to the device at SYS GEN time. The operator must rely on site personnel to relate the terminal number (SB number) to its controller and port address. The system utility, PEEK (refer to Chapter 4), supplies this information.

If a device is OFFLINE, it will be reported as such by the program's mapping function.

NOTE: Maintenance personnel must rely on site personnel for help when running maintenance software on a device that is attached or assigned to a task. Any changes to system status must be performed only by an experienced system operator with the system manager's knowledge and consent.

3.3.2.5 Program Mapping Function – After discarding selected devices found to be not SYS GEN'ed, already attached, or assigned, the following information is printed.

SELECTED SERIAL LINE PORTS

UNIT **	CONTROLLER **	LOGICAL SB **	LUN **	TYPE
XX	YY	ZZ	%	\$

Where **XX** is the physical terminal entered on controller **YY**. **ZZ** is the logical SB unit number assigned to each terminal by RSX during SYSGEN. % is the logical unit number the program assigns to each unit **XX**. \$ will either be the name of the type of device, i.e., DPM01, RT801, etc., or a message indicating that the device is OFF-LINE. If during the test the device comes ON-LINE, the ON-LINE message prints and testing will be performed on that device.

The program continues and displays the following.

START OF TESTING

Other than error messages, START OF TESTING is the last printout received from CZKClx. The program loops indefinitely until terminated.

3.3.2.6 Program Termination – This program cycles until a CONTROL A or a CONTROL C is typed on the console that initiated the exerciser. If a CONTROL A is typed, the program returns to the supervisor command mode within 120 seconds (Paragraph 3.3.2.1). If CONTROL C is typed the program aborts and exits to the monitor (MCR).

Example:

```
<CONTROL C>
MCR>
```

or

```
<CONTROL A>
DCP-A>
```

3.3.2.7 Error Reporting – At the end of every pass, major errors in the terminals are reported as follows.

“TERMINAL DIAGNOSTIC ERRORS ON PASS 1”

“SB”	TERMINAL-TYPE	FAILING-TEST
1	801	21

The report indicates diagnostic errors have occurred during pass 1, in SB terminal unit 1, on terminal-type RT-801, and the test which failed is test 21.

Failing test numbers relate to the test numbers of the device’s internal diagnostics. Refer to Chapter 2 for their meaning.

Anytime a terminal does not respond ON-LINE, the following is printed.

TERMINAL X IS NOT RESPONDING

When a terminal comes back ON-LINE, the following is printed.

TERMINAL X IS NOW RESPONDING

When a terminal goes OFF-LINE during diagnostic tests, the following is printed.

TERMINAL X DID NOT COME BACK ON LINE FROM DIAGNOSTIC TESTS

The following messages report DIS errors.

SB#	TERMINAL TYPE	FAILING TEST
3	DPM50	HARDCORE
5	DPM50	SOFTCORE - XX YY ZZ

Where XX = 01 If failed softcore Test 1 (ISV11 Interface Test)
 YY = 02 If failed softcore Test 2 (Memory Test)
 ZZ = 03 If failed softcore Test 3 (CPU Test)

When all terminals go OFF-LINE, the following is printed.

NO ACTIVE TERMINALS ON THE BUS !!!!

For an end of pass report, the following is printed.

END OF PASS 1, TIME=8:15

To inhibit the end of pass report type the following switches in addition to the diagnostic supervisor command after receiving the DCP-A> prompt.

DCP-A>STA/FLA:IXE

3.4 CZKMPx DIS ON-LINE DIAGNOSTIC MONITOR

3.4.1 Description and Scope

CZKMPx is a diagnostic monitor that runs as a task under RSX11-M and M-PLUS. As a monitor, it controls the downline loading and execution of MAINDEC LSI-11 diagnostics in a remote DIS subsystem, such as a DPM50 or DPM23.

CZKMPx can operate in three modes. They are the host, the local and communications (version CZKMPB and later) modes. In host mode the operator remains at a host terminal and receives pass/fail and pass count information via upline reporting. Local mode allows the operator to go to the remote site and operate the diagnostics from a terminal connected to the DIS's LSI-11 bus (connecting a portable terminal if necessary). Using this method, the operator can call and run MAINDEC diagnostics from this local terminal and receive complete error information. Communication mode is similar to host mode with one major advantage. The operator remains at the host terminal and receives not only pass/fail and pass count information but also error messages generated by the diagnostic running in the DIS.

A more complete description of each operating mode is presented in Paragraph 3.4.2.2.

3.4.2 Operating Procedures

NOTE: Obtain a listing of UIC [200,270]'s directory on hardcopy prior to running CZKMPx. It is helpful as a reference when selecting and specifying the MAINDEC diagnostics to be run.

Use the procedures in the following paragraphs to run the CZKMPx DIS On-line Diagnostic Monitor. As a diagnostic monitor, it is used to facilitate the downline loading of MAINDEC diagnostics into a remote Distributed Intelligent Subsystem (DIS). The following two MAINDEC diagnostics have been selected to be used as examples in the following procedures.

1. CVPCAEO Process Control Subsystem - This diagnostic is the sole diagnostic program for the process I/O portion (IOCM and D-bus) of a DIS.

2. CVDLAB0 DLV11-J OFFLINE TEST - This MAINDEC is representative of the XXDP diagnostics that operate on an LSI-11 bus option contained in a DIS. It was chosen because it requires a patch to operate properly in a DIS. Hence, it will be used to demonstrate the PATCH capabilities of CZKMPx.

These procedures assume that CZKMPx and associated MAINDEC diagnostics are located under UIC [200,270] on the system disk. They also assume that the operator is operating under UIC [200,270]. If either of these assumptions is not true, refer to Paragraphs 3.1 to 3.2.

Examples shown in the following paragraphs are from sample runs of version CZKMPB.

3.4.2.1 Loading and Initiation of CZKMPx - Load CZKMPx by typing the following command in response to the MCR prompt (>).

```
MCR> RUN CZKMPB<CR>
```

This loads CZKMPB into main memory and initiates program execution. The program responds by printing its version number as follows.

```
CZKMPB Version 2.2
```

3.4.2.2 Select Major Operating Mode

```
SELECT MODE:  
LOCAL, HOST, AUTO-MAP, COMMUNICATION OR EXIT (L,H,A,C,E)
```

The mode query enables the user to select the mode of operation to be used or to exit the task. The AUTO-MAP feature is planned for future development. After each iteration HOST mode returns the user to this mode query for additional input and it must be used as the exit medium. A CNTL Z input to any HOST mode query returns the user to this mode query. The user terminates local mode from the remote DIS. COMMUNICATION mode is like the HOST but it uploads more information than the quick verify of HOST mode.

All input values are in octal unless otherwise specified as decimal. The same is true of numbers used in printed statements.

The following is a brief description of each mode of operation.

LOCAL DIAGNOSIS MODE (L)

NOTE: Figure 3-4a is a sample run of LOCAL MODE at the host terminal. Figure 3-4b* is a sample run LOCAL MODE at the DIS console terminal.*

*Paragraphs explaining sections of the sample runs are indicated to the left of the figure.

In local mode, the operator selects a DIS subsystem while at the host computer. The operator then proceeds to the remote DIS site and (if necessary) connects a portable console terminal to its LSI-11 bus. From this local terminal, the operator downline loads XXDP diagnostics (in image format) from the host. Once a diagnostic is loaded into the DIS subsystem, its execution is controlled by the operator using ODT commands on the local terminal.

HOST DIAGNOSIS MODE (H)

NOTE: Figure 3-5 is a HOST MODE sample run.*

HOST mode verifies from the host computer the operation of individual components in several DIS subsystems at the same time. While in HOST mode, the operator is only provided basic pass/fail error reporting. Hence, it is not as comprehensive or flexible a testing process as that conducted in LOCAL mode at the DIS site. However, it is an efficient way to verify the basic usability of a number of remote subsystems scattered over a large area along DECdataways at the same time.

COMMUNICATION DIAGNOSTIC MODE (C)

NOTE: Figure 3-6 is a COMMUNICATION MODE sample run.*

COMMUNICATION mode is used in much the same manner as the HOST mode. However, the COMMUNICATION mode provides the operator with more detailed error information. In HOST mode, the operator receives only pass/fail error messages. If a diagnostic should fail while running under the COMMUNICATION mode, any error messages normally generated by the diagnostic will be upline loaded to the host for display at the operator's terminal.

NOTE: Upline loading of error messages in COMMUNICATIONS MODE is possible only if the MAINDEC diagnostic is fully APT compatible and uses the APT winder to pass messages.

If you select mode L, H or C, proceed to Paragraph 3.4.2.3.

Selecting mode A returns you to this same query.

Selecting mode E exits the program and returns the operator to the MCR monitor prompt>.

3.4.2.3 DIS Selection Dialogue – The following dialogue is common to the LOCAL (L), HOST (H) and COMMUNICATION (C) modes of operation.

ENTER NUMBER OF TERMINALS [D] =

*Paragraphs explaining sections of the sample runs are indicated to the left of the figure.

```

Para. 3.4.2.1 |>RUN CZKMPB
                CZKMPB VERSION 2.2
Para. 3.4.2.2 |SELECT MODE: LOCAL, HOST, AUTO-MAP, COMMUNICATION OR EXIT (L,H,A,C,E) L
                ENTER NUMBER OF TERMINALS [D] = 1
                ENTER CONTROLLER NUMBER [O] = 0
Para. 3.4.2.3 |ENTER TERMINAL NUMBERS [O] = 5
                NUMBER OF ENTERED TERMINALS = 1
                UNIT ** CONTROLLER ** LOGICAL SB **
                5          0          5
    
```

MA 7141

Figure 3-4a CZKMPB Local Mode Sample Run (Host Printout)

```

>VPCAE0
157776
0200G
MDC PROCESS CONTROL I/O SUBSYSTEM TEST CVPCAE-0

TURN ON LINE TIME CLOCK.

WHICH TEST OPTION (H=HELP)? H

TEST OPTIONS:
S SYSTEM TEST
A MODULE TEST
B CHANGE BASE ADDRESS
M MAP OF DBUS INTERFACES
I IOCM TEST
T SET SWREG
F FIELD TEST
W LOOP TEST
L LOAD ITERATION COUNT
H HELP

WHICH TEST OPTION (H=HELP)? S

NO INTERRUPT

PC      TST#    MODULE  ADDR    PASS
042254  000017  005011  171105  000000

000001 PASSES COMPLETED

END OF AUTO TEST

WHICH TEST OPTION (H=HELP)? <BREAK>
017620
0760144/000000 2
>VPCAE0
157776
0
MDC PROCESS CONTROL I/O SUBSYSTEM TEST CVPCAE-0

TURN ON LINE TIME CLOCK.

WHICH TEST OPTION (H=HELP)? H

TEST OPTIONS:
S SYSTEM TEST
A MODULE TEST
B CHANGE BASE ADDRESS
M MAP OF DBUS INTERFACES
I IOCM TEST
T SET SWREG
F FIELD TEST
W LOOP TEST
L LOAD ITERATION COUNT
H HELP

WHICH TEST OPTION (H=HELP)? I.
NUMBER OF ITERATIONS (OCT? = 20

WHICH TEST OPTION (H=HELP)? S

END OF AUTO TEST

WHICH TEST OPTION (H=HELP)? <BREAK>
017620
0760144/000000 1
@EX
    
```

MA 7140

Figure 3-4b CZKMPB Local Mode Sample Run (DIS Terminal Printout)

```

Para. 3.4.2.1 >RUN CZKMPB
CZKMPB VERSION 2.2
Para. 3.4.2.2 ISELECT MODE: LOCAL, HOST, AUTO-MAP, COMMUNICATION OR EXIT (L,H,A,C,E) H
ENTER NUMBER OF TERMINALS [D] = 2
ENTER CONTROLLER NUMBER [O] = 0
ENTER TERMINAL NUMBERS [O] = 5
ENTER CONTROLLER NUMBER [O] = 1
Para. 3.4.2.3 ENTER TERMINAL NUMBERS [O] = 5
TERMINAL 5 ALREADY ATTACHED
NUMBER OF ENTERED TERMINALS = 1
UNIT ** CONTROLLER ** LOGICAL SB **
5 0 5
STARTING HARDWARE DIAGS--TERMINAL 5 WILL GO OFFLINE
TERMINAL 5 IS OFFLINE
TERMINAL 5 IS BACK ONLINE
SYS ID ** PORT ** MEM SIZE
400 5 377776
PRINT ROM ID'S (Y,N) ?Y
ID'S IN OCTAL ROM0= 2 ROM1= 22 ROM2= 41 ROM3= 61 ROM4= 102
ENTER S OR A FOR SCRIPT OR AUTO-SCRIPT = <CR>
ENTER FILE NAME = VDLAB0
HOW MANY PASSES? 1
Para. 3.4.2.5 ANY PATCHES (Y OR N)? Y
OPTIONS ARE:
1 = LOAD AND SAVE
2 = LOAD AND GO
3 = PATCH ONLY
ENTER OPTION CODE = 3
ENTER PATCHES
72000/25
<CR>
PATCH TABLE LOADED
CZKMPB ... END OF DIAGNOSTIC
ANOTHER DIAGNOSTIC ON THE SAME TERMINAL IN HOST MODE? (Y OR N) N
Para. 3.4.2.2 ISELECT MODE: LOCAL, HOST, AUTO-MAP, COMMUNICATION OR EXIT (L,H,A,C,E) H
ENTER NUMBER OF TERMINALS [D] = 1
ENTER CONTROLLER NUMBER [O] = 0
Para. 3.4.2.3 ENTER TERMINAL NUMBERS [O] = 5
NUMBER OF ENTERED TERMINALS = 1
UNIT ** CONTROLLER ** LOGICAL SB **
5 0 5
STARTING HARDWARE DIAGS--TERMINAL 5 WILL GO OFFLINE
TERMINAL 5 IS OFFLINE
TERMINAL 5 IS BACK ONLINE
SYS ID ** PORT ** MEM SIZE
400 5 377776
Para. 3.4.2.5 PRINT ROM ID'S (Y,N) ?N
ENTER S OR A FOR SCRIPT OR AUTO-SCRIPT = S
TO SAVE SCRIPT, ENTER NAME = ARRGGH
ENTER FILE NAMES TO BE SCRIPTED AND NUMBER OF PASSES
FILE NAME = VDLAB0
PASSES = 1
FILE NAME = VPCAE0
PASSES = 1
FILE NAME = <CR>
DOWNLOADING DIAGNOSTIC VDLAB0.IMG;5
ON TERMINAL 5
PASSES COMPLETED = 1 ON TERMINAL 5
CZKMPB ... END OF DIAGNOSTIC
DOWNLOADING DIAGNOSTIC VPCAE0.IMG;1
ON TERMINAL 5
PASSES COMPLETED = 1 ON TERMINAL 5
ANOTHER SCRIPT? (Y OR N) Y
ENTER S OR A FOR SCRIPT OR AUTO-SCRIPT = A
ENTER SCRIPT NAME = ARRGGH
DOWNLOADING DIAGNOSTIC VDLAB0.IMG;5
ON TERMINAL 5
PASSES COMPLETED = 1 ON TERMINAL 5
CZKMPB ... END OF DIAGNOSTIC
DOWNLOADING DIAGNOSTIC VPCAE0.IMG;1
ON TERMINAL 5
PASSES COMPLETED = 1 ON TERMINAL 5
ANOTHER SCRIPT? (Y OR N) N
Para. 3.4.2.2 ISELECT MODE: LOCAL, HOST, AUTO-MAP, COMMUNICATION OR EXIT (L,H,A,C,E) E
>

```

MA-7165

MA-7166

Figure 3-5 CZKMPB Host Mode Sample Run

```

Para.3.4.2.1 >RUN CZKMPB
CZKMPB VERSION 2.2
Para.3.4.2.2 |SELECT MODE: LOCAL, HOST, AUTO-MAP, COMMUNICATION OR EXIT (L,H,A,C,E) C
ENTER NUMBER OF TERMINALS [D] = 2
ENTER CONTROLLER NUMBER [O] = 0
ENTER TERMINAL NUMBERS [O] = 5
ENTER CONTROLLER NUMBER [O] = 1
ENTER TERMINAL NUMBERS [O] = 5
TERMINAL 5 ALREADY ATTACHED
NUMBER OF ENTERED TERMINALS = 1
UNIT ** CONTROLLER ** LOGICAL SB **
5 0 5
STARTING HARDWARE DIAGS--TERMINAL 5 WILL GO OFFLINE
TERMINAL 5 IS OFFLINE
TERMINAL 5 IS BACK ONLINE
SYS ID ** PORT ** MEM SIZE
400 5 377776
Para.3.4.2.5 |PRINT ROM ID'S (Y,N) ?Y
ID'S IN OCTAL ROM0= 2 ROM1= 22 ROM2= 41 ROM3= 61 ROM4= 102
ENTER FILE NAME = VPCAE0
HOW MANY PASSES? 1
ANY PATCHES (Y OR N)? N
DOWNLOADING DIAGNOSTIC VPCAE0.IMG;1
ON TERMINAL 5
MDC PROCESS CONTROL I/O SUBSYSTEM TEST CVPCAE-0
ADDRESS 171000 M0010 NONISOLATED 32 BIT DC OUTPUT
ADDRESS 171004 M0010 NONISOLATED 32 BIT DC OUTPUT
Para.3.4.2.6 |ADDRESS 171010 M0010 NONISOLATED 32 BIT DC OUTPUT
ADDRESS 171014 M0010 NONISOLATED 32 BIT DC OUTPUT
ADDRESS 171020 M0010 NONISOLATED 32 BIT DC OUTPUT
ADDRESS 171024 M0010 NONISOLATED 32 BIT DC OUTPUT
ADDRESS 171030 M0010 NONISOLATED 32 BIT DC OUTPUT
PASSES COMPLETED = 11 ON TERMINAL 5
Para.3.4.2.5 |CZKMPB ... END OF DIAGNOSTIC
ANOTHER DIAGNOSTIC ON THE SAME TERMINAL IN COMMUNICATION MODE? (Y OR N) N
Para.3.4.2.2 |SELECT MODE: LOCAL, HOST, AUTO-MAP, COMMUNICATION OR EXIT (L,H,A,C,E) E
>

```

MA-7145

Figure 3-6 CZKMPB Communication Mode Sample Run

Enter the total number of terminals (DIS subsystems) to be diagnosed. This number is compared against the number of terminals selected later and generates an error if they are not equal. As indicated, this is a decimal number.

When in LOCAL mode of operation, only one terminal (DIS) may be selected.

ENTER CONTROLLER NUMBER [O] =

Enter the controller number in a range from 0 - 3 octal.

ENTER TERMINAL NUMBERS [O] =

Enter the terminal numbers (base port addresses) of the DIS subsystems within a range from 0 - 77 octal. They may be entered in the following formats.

- 1,3 (1 and 3)
- 1-5 (1 through 5)
- 1-5, 7-12) (1 through 5 and 7 through 12)

These numbers are the base addresses of the DIS subsystems to be tested. Base address is defined as the address wired into the device's DEC-dataway port connector.

If the number of terminal numbers entered is less than the number of terminals specified in response to the ENTER NUMBER OF TERMINALS [O] = query, the program will loop through the last two prompts until the selected number of terminals has been entered.

TERMINAL 5 ALREADY ATTACHED

If a DIS is already attached to a task, a message will be printed. CZKMPx will ignore the request to run diagnostics on it.

NUMBER OF ENTERED TERMINALS = 1

This statement prints out the number of requested terminals that were successfully attached to the task. If both port addresses of a DIS were specified as input, only the base port address will be included in the count. The count is the number of subsystems, not addresses. Both DIS addresses are attached to the task.

UNIT **	CONTROLLER **	LOGICAL SB **
5	0	5

A table of the successfully attached subsystems prints. The number of entries matches the number of terminals printed in the statement above.

NOTE: Proceed to Paragraph 3.4.2.4 if operating in the LOCAL (L) mode.

Proceed to Paragraph 3.4.2.5 if operating in the HOST (H) mode.

Proceed to Paragraph 3.4.2.6 if operating in the COMMUNICATIONS (C) mode.

3.4.2.4 Local Diagnostic Mode

WARNING: Use extreme caution when running the CVPCAx Process Control Subsystem diagnostic in LOCAL mode. Certain CVPCAx test options have the ability to change I/O module outputs that may be connected to the customer's equipment. These outputs may be controlling sophisticated or dangerous processes. Of special concern are the:

*F - Field Test option
and
W - Loop Test option.*

These options should be used ONLY with customer permission. Options are to be used only by personnel with an intimate knowledge and understanding of the particular DIS under test. For a thorough operating instruction refer to the CVPCAx Process Control Subsystem listing; Product Code AC-A959D-MC.

The Line Time Clocks (LTC) switch on the DIS must be in the OFF position during the downline loading of diagnostics into the DIS. After the diagnostics are downline loaded, the LTC switch can be placed in either position depending upon the requirement of the particular diagnostic. The following prints on the terminal connected to the LSI-11 bus in the DIS being diagnosed.

>FILENAME <CR>

Enter any LSI-11/IP300 diagnostic filename for which there is an image file on disk. (Refer to a copy of UIC's [200,270] directory for filenames.) Whenever the prompt character > is printed, enter a filename or a CONTROL Z. The CONTROL Z will allow entry of the program's termination code. After the filename has been entered, the following response prints on the terminal.

157776
@200G

The memory size and an "at sign" will be printed when the diagnostic has been successfully downloaded into LSI memory. The system is now in ODT mode and the diagnostic can be started by entering 200G (the standard XXDP diagnostic start-up). The diagnostic operates the same as as in standalone XXDP mode and prints any messages or errors on the terminal.

To halt the diagnostic and reenter ODT mode, press the BREAK key. The current PC register contents (R7) prints followed by the ODT prompt (@) as follows.

017312
@

As the subsystem reenters ODT mode, the address at which the break was made will be printed and an "at sign" will be printed (the ODT prompt). Disregard the address.

@760144/**000000**

Open location 760144 (CSR4) and enter either of the following.

- 1 - Terminate the task
- 2 - Request another diagnostic

Termination (1) will print EX. At the same time CZKMPB terminates on the host computer. Return the LTC switch to ON. Alternately in response to (2), a prompt character (>) will be issued for another filename.

NOTE: The task must be terminated in this manner. It cannot be successfully terminated from the host computer.

Table 3-1 is a summary of the prompts, inputs and outputs that occur during monitor interaction at the local LSI-11 console terminal.

Table 3-1 Monitor Interaction at Local Terminal

Prompts	Function or Description
>	Operator may enter filename to call next diagnostic, or type control Z to put LSI-11 in ODT mode.
@	If following 157776 after a filename has been entered, indicates the diagnostic is in the LSI-11 and the operator may communicate with it via ODT. If following End pass and the current PC, indicates the operator may give further instructions in ODT. Giving 760144 reestablishes communication with local monitor.
Inputs	Function or Description
Filenames	Used following > to call diagnostics
200G	Starts diagnostic if LSI-11 is in ODT (local to SLI-11 only)
Break	Stops diagnostic (local to LSI-11 only)
760144/	Reestablishes communication with local monitor if LSI-11 is in ODT
	2 Following 000000 tells monitor in host that operator wishes to run another diagnostic
	1 Follow 000000 aborts monitor in host, and is the last input by the operator
Control Z	Following > puts LSI-11 in ODT.
Outputs	Function or Description
15776	Following filename entry indicates the diagnostic has been downloaded
NX	Requested file cannot be found
BOLD	Downloading the diagnostic was unsuccessful
END PASS	Diagnostic pass completed
Current PC	Following break indicates diagnostic stopped at address printed
000000	Following 760144 indicates operator may input further instructions to local monitor (1 or 2)
EX	Monitor has terminated at host.

3.4.2.5 Host Diagnostic Mode – Before running XXDP diagnostics on selected DIS subsystems, CZKMPx initiates internal self tests on the devices. Devices go off-line for the duration of their self-tests and the following message prints.

STARTING HARDCORE DIAG – TERMINAL X WILL GO OFFLINE

This message warns the user that the terminal will go off-line during these tests.

TERMINAL X IS OFFLINE
TERMINAL X IS BACK ONLINE

where X = the base address of the DIS.

These messages indicate that the terminal went off-line and returned successfully to an on-line status. If the hardcore diagnostics fail, the DIS will not come back on-line and an error message indicates this condition. If the softcore tests (last three tests of the hardcore diagnostics) fail, the unit will return on-line but error messages indicating the softcore failures will be printed.

SYS ID **	PORT **	MEM SIZE
400	5	377776

This printout gives the system ID, base port address, and the memory size of the DIS on which hardcore diagnostics were run.

PRINT ROM ID'S (Y,N) ?

A Y indicates that you wish the ROM IDs typed. In each ROM a hexadecimal number in each ROM is read. This number contains the ROM number in the upper byte and the version number in the lower byte. The number is printed in octal on the host terminal. The least significant digit printed for each ROM is the version number. The following is an example for a Y response.

ID'S IN OCTAL ROM0=2 ROM1=22 ROM2=41 ROM3=61
ROM4=102

If an N is typed, the program continues with the following.

ENTER S OR A FOR SCRIPT OR AUTO-SCRIPT =

A carriage return skips over the script mode and allows individual input of diagnostic filenames. Use an A for autoscript operation when the desired script exists. Use an S when a script is to be created and then executed.

When an A is input, the following message will be printed.

ENTER SCRIPT NAME =

Enter the name of the created script that is to be executed.

When an S is input, the following is printed.

TO SAVE SCRIPT, ENTER NAME =

To save the script on disk for future use, enter the name (maximum of six characters) to be used to recall it later. If the script is not to be saved, enter a carriage return and after the script is executed it will be destroyed.

ENTER FILE NAMES TO BE SCRIPTED AND NUMBER OF PASSES

FILE NAME =

Enter any KDF11/LSI11/IP300 diagnostic for which there is an image file on disk. To terminate a script, type a carriage return after this query.

PASSES =

Enter the decimal number of passes to be executed of the above diagnostic. The maximum is 32768.

These two queries repeat until the script is terminated by a carriage return. The script then executes.

After the execution of a script, the following query will be printed.

ANOTHER SCRIPT? (Y OR N)

To run another script, enter Y and the task returns to the script query. Otherwise the task returns to the mode query.

If script mode is skipped, the task jumps to this point.

ENTER FILE NAME =

Enter any KDF11/LSI11/IP300 diagnostic for which there is an image file on the disk.

HOW MANY PASSES?

Enter the number of diagnostic passes to be run, up to a maximum of 32768. However, unlimited iterations of the diagnostic may be run by entering a carriage return. The diagnostic continues to execute until the

RSX task is aborted. If unlimited iterations are to be run, the following query is printed. For a specified number of passes, the pass count is printed as often as it is uploaded from the diagnostic.

ENTER NUMBER OF PASSES BETWEEN PRINT STATEMENTS =

Enter any decimal number to a maximum of 32768. A carriage return causes a default to 1000.

ANY PATCHES (Y OR N)?

Enter yes if patches to the diagnostic are to be made before it is downloaded.

OPTIONS ARE:

1 = LOAD AND SAVE

This option patches the diagnostic, saves the new version on disk, and executes the patched version.

2 = LOAD AND GO

This option patches the diagnostic, executes it, but does not save it.

3 = PATCH ONLY

This option patches the diagnostic, saves it, but does not execute it.

ENTER OPTION CODE =

Enter the option code selected from the preceding list.

ENTER PATCHES

Enter the patches by typing the address to be patched followed by a slash / and then the new value to be stored. Enter all addresses to be patched in any order. A line feed does NOT retrieve the next address. (Do not confuse this mode with ODT.) Each entry must be on a separate line and the list is terminated by a line with a carriage return as the only input.

PATCH TABLE LOADED

This indicates the patches have been successfully accepted.

**DOWNLOADING DIAGNOSTIC XXXXXX.IMG;1
ON TERMINAL X**

where X = the device's base port address; NOT its SB#.

Since there is a slight pause as the diagnostic is being downloaded and started, this message indicates what is happening. After the diagnostic starts, the pass count continuously prints as follows.

PASSES COMPLETED = 9999 ON TERMINAL X

where X = the device's base port address; NOT its SB#.

A pass count does not print after every pass since more than one diagnostic pass may be completed between uploads from the diagnostic. For this reason, the last pass count may be greater than the specified number of passes.

CZKMPB ... END OF DIAGNOSTIC

This message indicates the diagnostic has completed the required number of passes.

ANOTHER DIAGNOSTIC ON THE SAME TERMINAL IN HOST MODE? (Y OR N)

If yes, the program returns to the filename query shown in Paragraph 3.4.2.2. If no, it will return to the mode query.

3.4.2.6 Communication Mode – This mode has the same dialogue as HOST mode, however, it does not allow scripting.

There is a major difference in error reporting between HOST and COMMUNICATIONS mode. Differences are spelled out in Paragraph 3.4.2.7.

3.4.2.7 Error Reporting – Except for the two errors returned under LOCAL mode on the local terminal, all errors are reported on the host terminal. The two exceptions are:

BD = Bad load and

NX = Non-existent file.

When LSI11/IP300 diagnostics are run in LOCAL mode errors are reported on the local terminal (as stated earlier).

The errors reported on the host terminal fall into four categories.

1. RSX
2. Hardcore diagnostic
3. KDF11/LSI11/IP300 errors in host mode
4. KDF11/LSI11/IP300 errors in communication mode

RSX Errors

A knowledge of the RSX operating system is helpful in interpreting these errors. However, the most common I/O Status error code will be a -65, which indicates the DIS is off-line.

Controller X Terminal XX is not SYSGENed In
Terminal XX Cannot be Assigned - I/O STAT =
Terminal XX Cannot be Attached - I/O STAT =
Lun 99 Cannot be Assigned -- DSW =
Download Error on Terminal X - DSW =
Upload Error on Terminal X - DSW =
File Name in Error is XXXXXX
CZKMPB ... Directive Failure During (operation listed below)
CZKMPB ... I/O Error During (operation listed below)

OPERATIONS

Terminal Assign Logical Unit Number (ALUN)
Console Prompt
Console Reply
Attach Serial Bus (SB)
Detach SB
CSI (Command String Interpreter)
File Open
File Read
File Write
Kill Attach
SB ALUN
SB GLUN
SB Already Attached

Mark Time

Clear Mark Time

INPUT DATA ERRORS

CZKMPB ...	Invalid Controller Number
CZKMPB ...	Invalid Terminal Numbers
CZKMPB ...	Invalid Response
CZKMPB ...	Terminal Input Exceeds Total
CZKMPB ...	Multiple Terminals Cannot be Diagnosed in Local Mode
	Terminal X is the Upper Port of a DIS (Warning Only)
CZKMPB ...	Bad Data on the Script File

Hardcore Diagnostic Errors -- Hardcore errors in a DIS are those errors that are so catastrophic that the device cannot communicate with the host via the DECdataway.

Terminal X Remained Offline (Hardcore Failed)

where X = the devices base port address; NOT its SB#:

Softcore Failure – The following are DIS software errors.

Terminal X Softcore Error 1**Terminal X Softcore Error 2: Memory Error****Terminal X Softcore Error 3: CPU Error**

The user can ignore these errors by answering the query generated by the errors.

OVERRIDE SOFTCORE ERROR? (Y OR N)

A yes answer will generate the following warning.

WARNING – TESTING MAY GENERATE UNPREDICTABLE RESULTS**KDF11/LSI11/IP300 Errors in HOST Mode**

These errors are reported via the APT window.

Diagnostic Failed on Terminal X – Fatal Error 99**Diagnostic Hung on Terminal X – No Activity****KDF/LSI11/IP300 Errors in COMMUNICATION Mode**

The full error messages prints out on the host terminal. The error messages print exactly as they would on the local terminal when running the KDF11/LSI11/IP300 diagnostics under LOCAL mode.

NOTE: This is done only if the diagnostic being run is fully APT compatible and uses the APT window to pass messages.

CHAPTER 4 HELPFUL MCR, SYSTEM UTILITY, AND DEMONSTRATION PROGRAMS

4.1 INTRODUCTION

A Distributed Plant Management (DPM) system is a network of computers and terminals. Application programs running in a host PDP-11/34, 11/44, or 11/70 computer control the DPM system. The host's operating system may be either RSX-11M (DPM) or RSX-11M-PLUS (DPM-PLUS).

NOTE: This chapter uses DPM as a general term when it is not important to distinguish between the two systems.

To successfully run maintenance diagnostics on a DPM system, the operator must be aware of the status and configuration of the system. Within each operating DPM system there is a variety of software routines that can be used to determine or change the status of the system.

CAUTION: Some software routines are extremely powerful and, if improperly used, can crash or drastically impair the system.

The procedures outlined in this chapter are intended to be used only as a reference guide by experienced RSX-11M (-PLUS) operators. These procedures should be run when instructed to do so by the procedures outlined in Chapters 1 through 3.

NOTE: Changes to the system's status MUST be made with the knowledge and consent of the system manager.

4.2 SOFTWARE ROUTINES

The software routines in this chapter are grouped into three major categories; information, demonstration, and configuration.

4.2.1 Informational Routines

The following informational routines are discussed in Paragraph 4.1.

Devices (DEV)

(Paragraph 4.3.1) An MCR command which displays the symbolic names of all devices on the entering terminal or, optionally, all of a particular device type known to the system

DDS

(Paragraph 4.3.2) A system utility that reports the current status of DECdataway devices

NISTAT	(Paragraph 4.3.3) A system utility that reports open DIS nodes and their logical connections
PEEK	(Paragraph 4.3.4) A system utility that dynamically monitors DECdataway status, one port at a time
Error Log Report (ISBRPT)	(Paragraph 4.3.5) a system utility that generates a report of the ISB11-A Error Log

4.2.2 Demonstration Routines

The following demonstration programs are discussed in Section 4.4.

WSDEMO	(Paragraph 4.4.1) Verifies and demonstrates RT803 and RT805 terminal operation
FDMTST	(Paragraph 4.4.2) Tests both RT80x and DPM01/VT110-connected terminals
DPMTST	(Paragraph 4.4.3) Verifies and demonstrates DPM01/VT110 multiplexer and its terminals

4.2.3 Configuration Routine

The following configuration routine is discussed in Section 4.5.

CBC	(Paragraph 4.5.1) A system utility which displays and changes DECdataway address assignments
-----	--

4.3 INFORMATIONAL ROUTINES

4.3.1 DEVICES

DEVICES is an informational Monitor Console Routine (MCR) command provided under RSX-11 M/M-PLUS operating systems. The DEVICES command displays the symbolic names of all devices on the entering terminal. It also has the option to list all of a particular device type known to the system. The device names appear in one column; second and subsequent columns contain additional information (when necessary) about each device. Figure 4-1 illustrates a sample run of DEVICES on an RSX-11M system.

```

SYMBOLIC STATUS
NAMES     ENTRY

> DEV
DK0:      MOUNTED
DK1:
DK2:
DK3:
LP0:      OFFLINE UNLOADED
SB0:      LOADED
SB1:      OFFLINE LOADED
SB2:      LOADED
SB3:      OFFLINE LOADED
SB4:      OFFLINE LOADED
SB5:      LOADED
SB6:      OFFLINE LOADED
SB7:      OFFLINE LOADED
SB10:     OFFLINE LOADED
SB11:     OFFLINE LOADED
SB12:     OFFLINE LOADED
SB13:     OFFLINE LOADED
SB14:     OFFLINE LOADED
SB15:     OFFLINE LOADED
SB16:     OFFLINE LOADED
SB17:     OFFLINE LOADED
SB20:     OFFLINE LOADED
SB21:     OFFLINE LOADED
SB22:     OFFLINE LOADED
SB23:     OFFLINE LOADED
SB24:     OFFLINE LOADED
SB25:     OFFLINE LOADED
SB26:     OFFLINE LOADED
SB27:     OFFLINE LOADED
SB30:     OFFLINE LOADED
SB31:     OFFLINE LOADED
SB32:     OFFLINE LOADED
SB33:     OFFLINE LOADED
SB34:     OFFLINE LOADED
SB35:     OFFLINE LOADED
SB36:     OFFLINE LOADED
SB37:     OFFLINE LOADED
SB40:     OFFLINE LOADED
SB41:     OFFLINE LOADED
SB42:     OFFLINE LOADED
SB43:     OFFLINE LOADED
SB44:     OFFLINE LOADED
SB45:     OFFLINE LOADED
SB46:     OFFLINE LOADED
SB47:     OFFLINE LOADED
TT0:      [1,6] - LOGGED ON
TT1:      OFFLINE
NLO:
TIO:
COO:      TTO:
CLO:      TTO:
SYO:      DKO:
>
>
>
>

```

MA-1369A

Figure 4-1 List of Devices Example

Format:

```

DEV[ICES] [dd:1]
DEV[ICES] [/LOG]

```

where:

- dd: - The device unit name to be displayed
- /LOG - Displays all logged on terminals

When you specify /LOG in an RSX-11M-PLUS system, the display includes the login and default UICs. Also, if CPU accounting is running, the display includes the date and time of login, the number of tasks currently active, and the first initial and last name of each logged in user.

The following are the messages that appear. More than one message can appear on the same line.

MOUNTED - The device is mounted.

PUBLIC - indicates that the device has been set public.

MARKED FOR DISMOUNT - indicates that a mountable device has been requested to be dismounted, but the dismount operation has not yet been completed.

OFFLINE - indicates that, although the system tables contain entries for this device, the host configuration does not contain the related device.

[uic] LOGGED ON - indicates that the user identified by [uic] (the protection UIC) has logged onto the terminal.

LOADED - indicates that the driver for the device is loadable and is currently loaded.

UNLOADED - indicates that the driver for the device is loadable and is currently not loaded.

Device name - A device name in the second column is the device to which the corresponding device in the first column has been redirected.

Terminal name - A terminal name in the second column followed by "-PRIVATE" indicates that the device named in the first column has been allocated to the user logged on to the terminal in the second column.

For a more detailed discussion of DEVICES refer to Chapter 4 of the *RSX-11/M-PLUS MCR Operations Manual* (order number AA-H2631-TC).

4.3.2 DDS

DDS reports the status of DECdataway devices at your terminal. Request the report for any of the following.

- A single DECdataway address
- DECdataway addresses with on-line devices
- All DECdataway addresses

Type the following to run the installed DDS.

DDS [qualifier]

The optional qualifiers may be either of the following.

SBxx: Reports the status of the device at SBxx:
/FU Reports the status of all DECdataway addresses

DDS reports all the on-line devices if the qualifier is omitted.

If DDS is not installed it reports all on-line devices. Run the uninstalled DDS as follows.

RUN \$DDS

The status report has one line for each DECdataway address.

SBxx: status,TYPE = type[,PORT n]

The following are the possible report entries and description.

status For DPM systems so is

 ONLINE for devices connected to the DECdataway and powered on;

 OFFLINE for devices that were specified during host build, but not both connected to the DECdataway and powered on.

 For DPM-PLUS systems is a two field sequence:

 AVAILABLE or NOT AVAILABLE indicates whether the device is connected to the DECdataway and powered on.

 Additionally, ONLINE or OFFLINE indicates whether, under RSX-11M-PLUS, the device was configured ONLINE or OFFLINE using the CON command.

type is the device type: DIS, DPM01, RT80X, or BROADCAST.

n is the "port" number within the device. A DIS or a DPM01/VT110 base port is always 0. The second DIS or DPM01/VT110 port is 1. The third and fourth DPM01/VT110 ports are 2 and 3. PORT n is omitted for an RT80X terminal or a broadcast channel.

4.3.2.1 DDS Error Messages – The following are descriptions of the DDS error messages.

DDS ... SB DRIVER NOT LOADED
 DECdataway software is not running.

- DDS ... **COMMAND LINE ERROR**
A qualifier was not typed properly in the command. The command line does not contain a qualifier, /FU, or an SB unit number (SBxx:). Refer to Paragraph 4.3.2.
- DDS ... **UNIT NUMBER NOT SPECIFIED IN OCTAL**
DECdataway unit number contained the digit 8 or 9.
- DDS ... **ILLEGAL UNIT NUMBER**
The DECdataway address specified in the command exceeds the highest address for the number of ports configured in the host build procedure.
- DDS ... **ERROR DURING ATTACH TO IT:**
DDS was not able to attach to the terminal attempting to run it. Two of the most common causes for this are: the terminal is under the control of some other task, or the terminal is off-line.

4.3.3 NISTAT

NISTAT reports the status of DIS nodes and their logical connections at your terminal.

Type the following to run NISTAT uninstalled.

```
RUN $NISTAT
```

NISTAT then asks two questions about the desired report.

WANT TO LIST CONNECTIONS?>

Enter Y if you want NISTAT to include the list of host and remote tasks for each mode in each connection pair.

WANT TO LIST NODE AND CONNECTION DETAILS?>

If you answered N to LIST CONNECTIONS, NISTAT just asks this question.

CONNECTION DETAILS?>

If you answered N to LIST CONNECTIONS, NISTAT just asks this question.

WANT TO LIST NODE DETAILS?>

Enter Y if you want details added to the report, as the following describes.

The NISTAT report has an entry for each open DIS node. The following is the first line.

SBxx: nodename is OPEN

If you requested node details, the next line lists the number of active connections to the node.

If you requested connections listed, NISTAT lists the names of host and remote tasks engaged in each logical connection.

If you request connection details, each listing of a host/remote task pair is followed by:

Host task's logical unit number (LUN),
Number of transmit requests pending for the host task, and
Number of receive requests pending for the host task.

You may install NISTAT with task name ...NIS. To run the installed NISTAT, type the following.

NIS

NISTAT then lists the connections for each open DIS. (Running the installed NISTAT is equivalent to answering Y and N to the two questions.)

4.3.4 PEEK

PEEK monitors the activity at a DECdataway port and dynamically updates its display at your **VIDEO TERMINAL** (must be video) screen. To run PEEK, type the following.

RUN \$PEEK

PEEK asks two questions.

WHICH UNIT DO YOU WISH TO MONITOR?>

Enter the octal unit number of the first port to display. For unit number, PEEK requires the numerical part of the DECdataway unit address. For example, to display the port at DECdataway address SB41: enter 41. The default is 0.

RUN FLAT OUT?>

If you enter N (or default by pressing RETURN), PEEK waits approximately one second between display update cycles. If you enter Y, PEEK immediately begins the next update cycle when the previous cycle ends, without waiting. You normally do not run PEEK flat out; if you do, PEEK could lock out lower-priority tasks.

The first line of the PEEK display contains the time, the PEEK version number, and the port identification in this form.

SBxx: = CTRL m, UNIT n, IS A descr

The following explains the display.

SBxx:	Port's DECdataway address
CTRL m	DECdataway controller number on the system
UNIT n	Port number on that controller
descr	Description of the device at that port - BROADCAST PORT, DPM50 (PORT p), DPM01 (PORT p), or RT80X TERMINAL.

The second line of the PEEK display contains the following.

n = ERROR SEQC NO. UCB ADDR = xxxxx

n	This is the error sequence number, that represents the cumulative number of errors logged for all DECdataway controllers since the last system boot. The DECdataway error reporting program ISBRPT can be run to examine the errors in detail.
---	--

xxxxx	This is the address of the Unit Control Block (UCB). The UCB is an internal structure; its address is displayed by PEEK for software support purposes only.
-------	---

The third line of the PEEK display shows the values of internal flags, which may be 0 or 1. Although the flags are displayed for software support purposes, one flag is of interest.

1 ONLIN means, under DPM, that the device is on-line. Under DPM-PLUS, this flag means that the device is connected to the DECdataway and powered on.

The fourth line contains the following.

IO.XXX FOR TASK XXXXXX ATTACHED XXXXXX

The following explains the display.

IO.XXX	This is the function code for the QIO outstanding to this device. If no QIO is outstanding, the field is literally IO.XXX.
TASK XXXXXX	This is the name of the task that issued the QIO. If no QIO is outstanding, the name is shown literally XXXXXX.
ATTACHED XXXXXX	This is the name of the task attached to the device. If none is attached, the name is shown literally XXXXXX.

When monitoring the base port of a DIS node, PEEK may display additional lines. This additional node information is displayed only if the communication channel is open between the host and remote network ACPs.

The additional information is as follows.

Node name

The name that was specified in the DLC /NO: switch when the DIS was downline loaded. Refer to the *DPM/DPM-PLUS Distributed Intelligent Subsystem User's Guide* for a description of DLC.

Number of active connections

Expressed as n/032., where n is the number of logical connections between tasks in the host and tasks in the DIS. The maximum number of active connections to tasks in a single DIS is 32.

Number of pending connections

The number of connect requests issued by either a host or remote task and not yet answered by its partner task.

Succeeding lines list the pairs of host and remote tasks for each logical connection, and the current activity on the connection.

PNH	Host task has a connect pending (remote partner has not yet issued connect)
PNR	Remote task has a connect pending (host partner has not yet issued connect)
ACT	Active but no data transfer pending
XMT	Host task has a transmit pending (remote partner has not yet issued receive request)
RCV	Host task has a receive pending (remote partner has not yet completed a data transmission)
X+R	Host task has both transmit and receive pending

4.3.4.1 Changing the PEEK Display – Press the space bar to change the display to the port at the next higher DECdataway address.

Press the minus key to change the display to the port at the next lower DECdataway address.

To exit PEEK, enter CTRL-C or CTRL-Z.

```

>RUN ISBRPT
ISBRPT - DEC DATAWAY ERROR REPORT TASK

  PRINT SUMMARY [Y OR N]? Y
  PRINT ENTIRE FILE [Y OR N]? N
  OUTPUT TO LINE PRINTER [Y OR N]? N
  WANT ONE CONTROLLER [Y OR N]? Y
  SPECIFY CONTROLLER NUMBER. 2
  WANT ALL DEVICES [Y OR N]? Y
  DELETE ERROR FILE [Y OR N]? N

DATAWAY ERROR SUMMARY PAGE 1 19-APR-78 10 59 SB-11 NO. 2. DEVICE NO. 0

ISB-11 NO. 2. DEVICE NO. 0
ISB-11 NO. 2. DEVICE NO. 1
ISB-11 NO. 2. DEVICE NO. 2
ISB-11 NO. 2. DEVICE NO. 3
ISB-11 NO. 2. DEVICE NO. 4
ISB-11 NO. 2. DEVICE NO. 5
ISB-11 NO. 2. DEVICE NO. 6
ISB-11 NO. 2. DEVICE NO. 7
ISB-11 NO. 2. DEVICE NO. 10

ISBRPT..OPERATION COMPLETE
MA 1367A

```

Figure 4-2 Summary Report on All Devices on Controller No. 2

4.3.5 Error Log Report (ISBRPT)

Running the ISBRPT task generates reports of the ISB11-A Error Log. The ISBRPT task is available on the DPM system software and on the field service diagnostic distribution media. Figures 4-2 through 4-5 show examples of error report task printouts. Figure 4-2 shows the dialogue required to run a summary report for all devices on one controller. Figure 4-3 shows a summary report on one device. Figure 4-4 shows how to run a full report on all controllers (only ISB #3 shown) and devices. Figure 4-5 shows how to run a full report on one device (Number 5) with one controller. ISBRPT also provides for deleting the error log when the cause for the error entries has been resolved.

There are nineteen error type entries available in the summary report (Table 4-1) along with their probable cause. A full report (refer to Figures 4-4 and 4-5) gives the time and date the error was logged and if the error was a line error. Not all errors detected are logged due to software constraints. However, errors are numbered sequentially as detected and a missing number sequence in the error log may be seen occasionally. Two kinds of entries may not be errors if they occur at the time the system is booted; they are ISBINI REQUESTED and ONLINE TRANSITION.

A complete in-depth discussion of DPM/DPM-PLUS error reporting can be found in Chapter 10 of the *DPM/DPM-PLUS System Generation and Management Guide*, (AA-J531A-TC).

```

>RUN ISBRPT
ISBRPT - DEC DATAWAY ERROR REPORT TASK

PRINT SUMMARY [Y OR N]? Y
PRINT ENTIRE FILE [Y OR N]? N
OUTPUT TO LINE PRINTER [Y OR N]? N
WANT ONE CONTROLLER [Y OR N]? Y
SPECIFY CONTROLLER NUMBER: 3
WANT ALL DEVICES [Y OR N]? N
SPECIFY DEVICE NUMBER: 5
DELETE ERROR FILE [Y OR N]? N

DATAWAY ERROR SUMMARY PAGE 1 19-APR-78 10 54 ISB 11 NO. 3. DEVICE NO. 5

ISB-11 NO. 3. DEVICE NO. 5
1 ONLINE TRANSITION
1 OFFLINE - DEVICE
1 LINE ERROR
ISBRPT...OPERATION COMPLETE
    
```

MA 1458A

Figure 4-3 Summary Report on One Device (DEV. No. 5)

```

>RUN ISBRPT
ISBRPT - DEC DATAWAY ERROR REPORT TASK

PRINT SUMMARY [Y OR N]? N
PRINT ENTIRE FILE [Y OR N]? Y
OUTPUT TO LINE PRINTER [Y OR N]? N
WANT ONE CONTROLLER [Y OR N]? N
DELETE ERROR FILE [Y OR N]? N

ERR 00001 AT 10:53:12.1 ON 19-APR-78 ISB#3. UNIT 04 ACT INP OFFLINE DEVICE
ERR 00002 AT 10:53:12.2 ON 19-APR-78 ISB#3. UNIT 04 IDL LINE ERROR
CRC = F TMO = T PRO = F PID = 0 REPEAT = 4
ERR 00003 AT 10:53:12.1 ON 19-APR-78 ISB#3. UNIT 05 ACT INP OFFLINE = DEVICE
ERR 00004 AT 10:53:12.1 ON 19-APR-78 ISB#3. UNIT 05 IDL LINE ERROR
CRC = F TMO = T PRO = F PID = 0 REPEAT = 4
ERR 00005 AT 10:53:12.3 ON 19-APR-78 ISB#3. UNIT 75 IDL OFFLINE = DEVICE
ERR 00006 AT 10:53:12.3 ON 19-APR-78 ISB#3. UNIT 75 IDL LINE ERROR
CRC = F TMO = T PRO = F PID = 0 REPEAT = 4
ERR 00007 AT 10:53:12.3 ON 19-APR-78 ISB#3. UNIT 01 IDL OFFLINE = DEVICE
ERR 00008 AT 10:53:12.3 ON 19-APR-78 ISB#3. UNIT 01 IDL LINE ERROR
CRC = F TMO = T PRO = F PID = 0 REPEAT = 4
ERR 00009 AT 10:53:12.3 ON 19-APR-78 ISB#3. UNIT 02 IDL OFFLINE = DEVICE
ERR 00010 AT 10:53:12.3 ON 19-APR-78 ISB#3. UNIT 02 IDL LINE ERROR
CRC = F TMO = T PRO = F PID = 0 REPEAT = 4
ERR 00011 AT 10:53:12.3 ON 19-APR-78 ISB#3. UNIT 03 IDL OFFLINE = DEVICE
ERR 00012 AT 10:53:12.3 ON 19-APR-78 ISB#3. UNIT 03 IDL LINE ERROR
CRC = F TMO = T PRO = F PID = 0 REPEAT = 4
ERR 00013 AT 10:53:12.4 ON 19-APR-78 ISB#3. UNIT 06 IDL OFFLINE = DEVICE
ERR 00014 AT 10:53:12.4 ON 19-APR-78 ISB#3. UNIT 06 IDL LINE ERROR
CRC = F TMO = T PRO = F PID = 0 REPEAT = 4
ERR 00015 AT 10:53:13.2 ON 19-APR-78 ISB#3. UNIT 75 IDL ONLINE TRANSITION
ERR 00016 AT 10:53:13.2 ON 19-APR-78 ISB#3. UNIT 01 IDL ONLINE TRANSITION
ERR 00017 AT 10:53:13.2 ON 19-APR-78 ISB#3. UNIT 02 IDL ONLINE TRANSITION
ERR 00018 AT 10:53:13.2 ON 19-APR-78 ISB#3. UNIT 03 IDL ONLINE TRANSITION
ERR 00019 AT 10:53:13.2 ON 19-APR-78 ISB#3. UNIT 04 IDL ONLINE TRANSITION
ERR 00020 AT 10:53:13.2 ON 19-APR-78 ISB#3. UNIT 05 IDL ONLINE TRANSITION
ERR 00021 AT 10:53:13.2 ON 19-APR-78 ISB#3. UNIT 06 IDL ONLINE TRANSITION
ISBRPT...OPERATION COMPLETE
    
```

NOTE:

SEE LEGEND IN
FIGURE 4-5

MA 1461A

Figure 4-4 Full Report on All Controllers and Devices

```

>RUN ISBRPT
ISBRPT - DEC DATAWAY ERROR REPORT TASK

PRINT SUMMARY [Y OR N]? N
PRINT ENTIRE FILE [Y OR N]? Y
OUTPUT TO LINE PRINTER [Y OR N]? N
WANT ONE CONTROLLER [Y OR N]? Y
SPECIFY CONTROLLER NUMBER: 3
WANT ALL DEVICES [Y OR N]? N
SPECIFY DEVICE NUMBER: 5
DELETE ERROR FILE [Y OR N]? N

ERR 00003 AT 10:53:12.1 ON 19-APR-78 ISB #3, JNIT 05 ACT INP OFFLINE -- DEVICE
ERR 00004 AT 10:53:12.1 ON 19-APR-78 ISB #3, JNIT 05 IDL      LINE ERROR
CRC = F TMO = T PRO = F PID = 0 REPEAT = 4
ERR 00020 AT 10:53:13.2 ON 19-APR-78 ISB #3, JNIT 05 IDL      ONLINE TRANSITION
ISBRPT..OPERATION COMPLETE

LEGEND
-----
CRC = T (CRC Error)
CRC = F (No CRC Error)
TMO = T (Time Out Error)
TMO = F (No Time Out Error)
PRO = T (Protocol Error)
PRO = F (No Protocol Error)

```

MA 1457A

Figure 4-5 Full Report on One Controller (ISB11 No. 3)

4.4 DEMONSTRATION ROUTINES

4.4.1 WSDemo

A Work Station Demonstration task (WSDemo) is supplied with each DPM system. This task facilitates on-line troubleshooting and verification of RT803 and RT805 terminals; it permits complete end-to-end (terminal-to-host and host-to-terminal) validation of data. WSDemo is not useful for Time and Attendance Stations (RT801s) or DPM01/VT110 Multiplexers.

WSDemo is useful in the initial on-site process of familiarization with the operation of RT80X terminals.

WSDemo is a multithread task, using FDMUTR, designed to concurrently demonstrate the features of up to ten RT803 and RT805 terminals. WSDemo supports T3 and T5 readers, as well as keypad-display inputs.

WSDemo may be invoked through an MCR terminal or through the FDM Dispatcher. When invoked from an MCR terminal (by typing RUN WSDemo), it asks the operator at the MCR terminal for the device number of up to ten RT803 and RT805 terminals to be used. Thereafter, WSDemo runs without host operator intervention until the demonstration has been CANCELED at all involved RT80X terminals. When invoked from a RT803 or RT805 terminal through the dispatcher, terminal usage will not start for five seconds, to allow WSDemo to be invoked from other terminals. WSDemo runs a batch of up to ten terminals concurrently until the demonstration has been CANCELED at all involved RT80X terminals.

Table 4-1 Summary Report

Item	Error Type	Probable Cause
1	Latency No Data	Noise on DECdataway or terminal stuck transmitting
2	Latency with Data	Same as above or UNIBUS latency problem
3	NXM-User Area	UNIBUS memory problem or ISB11-A fault
4	ONLINE Transition	OFFLINE device has gone ONLINE
5	OFFLINE Device	Device has gone OFFLINE
6	Buffer Overrun	User program error
7	OFFLINE Cancel	Not useful
8	Write Timeout	User program error
9	Unsolicited Data	Not useful
10	0 Bytes Transferred	User program error
11	Invalid Type 2	Not useful
12	IODN-NO XFR	Not useful
13	Invalid Unit	Not useful
14	Line Error	Caused by CRC Error, timeout, or protocol error
15	ONLINE-I/O DOne	Not useful
16	NXM-ISB11 Fatal	UNIBUS memory or ISB11 fault
17	Lost PW Interrupt	ISB11 fault
18	ISBINI Requested	Occur when ISB11 is loaded with microcode. Always occurs when system is booted
19	Reload MAX Exceeded	ISB11 has been loaded eight times unsuccessfully, ISB11 fault

WSDemo begins using an RT80X terminal by asking its operator to select a transaction (by pushing a transaction key on an RT805, or by keypad entry on an RT803). Once selected, a transaction remains in effect until CANCELED; the transaction is continued by entering media. The nine transactions are as follows.

TRANSACTION 1 - This transaction reads a 22-column stub card or ticket, and displays what was read on the 32-character alphanumeric display until the operator pushes CANCEL or enters another ticket. CANCEL exits from this transaction and allows selection of another transaction. If another ticket is inserted, it will be read and displayed on the alphanumeric display.

TRANSACTION 2 - This transaction reads a 22-column badge, and displays what was read until the operator pushes CANCEL or inserts another badge.

TRANSACTION 3 - This transaction reads an 80-column Hollerith card, and displays the first 32 columns read until the operator pushes CANCEL or inserts another card.

TRANSACTION 4 - This transaction reads an 80-column Hollerith card, and displays columns 1-14 and columns 67-80 until the operator pushes CANCEL or inserts another card.

TRANSACTION 5 - This transaction reads a 10-column badge (without local prompting), and displays what was read until the operator pushes CANCEL or inserts another badge. This transaction cannot be selected on an RT803.

TRANSACTION 6 - This transaction reads a 10-column badge (with local prompting), and displays what was read until the operator pushes CANCEL or inserts another badge. This transaction cannot be selected on an RT803.

TRANSACTION 7 - This transaction accepts keypad data (in query format), and displays what was read until the operator pushes SEND or CANCEL.

TRANSACTION 8 - This transaction accepts keypad data (in fill-in-the-question-marks format), and displays what was read until the operator pushes SEND or CANCEL.

TRANSACTION 9 - This transaction selected by turning the terminal key-switch to the supervisory position. It displays a fixed message until the operator returns the terminal keyswitch to the normal position and selects another transaction.

4.4.2 FDMTST

FDMTST, the FDM Terminal Tester Task, supplies an on-line tool for an operator to exercise and test all features of RT80X terminals as well as conventional terminals connected to DPM01/VT110 Multiplexers. FDMTST responds to commands, entered from the initiating (MCR) terminal to perform such basic functions as the following.

- Write a message to the terminal
- Read a message from the terminal
- Exercise the display on the terminal
- Test digital I/O on an RT805 terminal

FDMTST begins by asking the operator at the MCR terminal which controller and which port to use. FDMTST normally runs until the operator ends it by input of CTRL/Z. When the operator selects a controller and a port, FDMTST connects to that terminal and reports back to the operator the type of terminal which has been selected and (for DPM01/VT110 multiplexers) the attributes which have been downline loaded into that port.

FDMTST accepts and executes the following commands.

```

WRIT sf t s
WRITE sf t s
WRITV sf t s
READ sf t s
PRRD sf t s
MSG=message...
MSG(nnn)=more.message...
MSG(nnn)=X
MSG(nnn)“ooo
MSGS=ooo-ppp
DIG
ROSC nn
CLOCK
SHOW f1
REPEAT=nnnnnnnnn
TSTCAN
PRINTER
CHANGE
SEL=ooo, and SEL=ddd
SEL=+, and SEL=-

```

WRIT causes FDMTST to write a previously entered MSG to the selected DPM terminal. sf may be any subfunction (WRCODE) that is valid for that terminal. t is an optional designator for TRANLT (in the range of o through J). s is an optional designator for STATUS (in the range of a through O). WRIT will cause FDMTST to write the message, wait for completion, report the result (if bad), and then prompt for another command.

WRITE is identical to WRIT; it is merely an alternative spelling.

WRITV means WRITe Variable length. When used in conjunction with a REPEAT count, WRITV first writes the complete previously entered MSG (n characters), then writes the first n-1 characters of MSG, then writes the first n-2 characters of MSG, etc.

READ causes FDMTST to read from the selected DPM terminal and then display what was read on the input terminal. sf may be any subfunction (RDCODE) which is valid for that terminal. t and s are optional designators, as in WRIT.

PRRD causes FDMTST to prompt the selected DPM terminal with a previously entered MSG, read from that terminal, and then display what was read on the input terminal. sf may be any subfunction (PRCODE) which is valid for that terminal. t and s are optional designators, as in WRIT.

MSG=message... is a command for entering a message - up to 76 (decimal) characters - for subsequent WRITs and PRRDs.

MSG(nnn)=more.message... is a command for adding to an existing message, primarily to make it longer. nnn identifies the (decimal) column at which more.message is to begin. Entering MSG=12345, then MSG(005)=678, results in a message of 1234678.

MSG(nnn)=x is a command for replacing one character of an existing message. Entering MSG=12345, then MSG(003)=A, results in a message of 12A45.

MSG(nnn)=ooo is a command for replacing one character of an existing message with another byte whose octal code is 000. Entering MSG=XHELLO, then MSG(001)'000, results in a 6-byte message consisting of a null byte followed by HELLO. Entering MSG=1234567890ABCDEF, then MSG(012)'177, replaces the B in the message with a delete character.

MSGs=ooo-ppp is a command to enter a message string consisting of the characters from ooo through ppp (octal). Entering MSGs=040-132 results in a 59-byte message beginning with a space and ending with a Z. MSG=101-115 is equivalent to MSG=ABCDEFGHIJKLM.

DIG causes FDMTST to copy the RT805 terminal's digital inputs to its display, and to copy the most significant byte of input to its digital output module. DIG is only appropriate for an RT805 with a digital I/O module installed.

ROSC nn causes the RT80X terminal's relay to oscillate nn times ($0 < nn < 100$). ROSC is not applicable for DPM01/VT110 multiplexers.

CLOCK displays date and time (plus the repeat count) on the DPM terminal's display. On RT805 and RT803 terminals for one second out of each minute, CLOCK sequentially: sounds the alarm and lights ERROR; lights each of the eight RT805 transaction lights, or lights the RT803 transaction light; and lights ENTRY ACCEPT.

SHOW f1 sequentially displays rows of data, defined by f1. For example, SHOW AC will display a line of 32 As, then a line of 32 Bs, then a line of 32 Cs. If the selected terminal is a DPM01/VT110-device, the line size is 72 characters.

REPEAT=nnnnnnnn permits entry of a repeat count before entering one of the other commands. This causes that command to be repeated nnnnnnnn times before FDMTST asks the operator for another command.

TSTCAN permits testing of the cancel function (QIO-IO.KIL) to a terminal.

PRINTER exercises the external printer attached to an RT805 or the device connected to a DPM01/VT110.

CHANGE allows the operator to select a new set of attributes for the selected DPM01/VT110 port. Once selected, this new set of attributes is immediately downline loaded.

SEL=ooo commands FDMTST to deselect (disconnect from) the currently selected terminal and to select (connect to) a new terminal whose device number is ooo (octal). SEL=ddd. is equivalent, but ddd is interpreted as a decimal device number, due to the trailing decimal point.

SEL=+ commands FDMTST to deselect the current terminal and to select the terminal with the next higher device number. SEL=- is similar, but selects the terminal with the next lower device number. SEL=+ or SEL=-, in conjunction with the carriage return key, furnish a simple method for examining the current attributes in all four ports of a DPM01/VT110.

When FDMTST prompts for another command, pushing the carriage return key causes FDMTST to re-execute the last command.

The following FDMTST commands are equally applicable to both RT80X and DPM01/VT110-connected terminals:

MSG= HI, MOM...	Enter message for WRITs and PRRDs
MSG(010)=ITS NW...	Add to existing message
MSG(014)=M	Replace character of existing message
MSG(015)''105	Replace character of existing message
MSGs= 101-176	Enter message string
CLOCK	Display date and time on terminal
SHOW f1	Show lines of characters on terminal

REPEAT=987654321	Enter repeat count
TSTCAN	Test cancel function
PRINTER	Print sequence of messages on terminal
SEL=ooo and SEL=ddd	Select different terminal
SEL=+ and SEL=-	Select next higher or lower terminal

The following FDMTST commands are only applicable to RT80X terminals:

DIG	Copy digital inputs to outputs and display
ROSC nn	Cause relay to oscillate nn times
WRIT DM t s	Write display message
WRIT DG t s	Write to digital output
WRIT PR t s	Write to external printer
WRIT RD t s	Write relay to de-energize
WRIT RE t s	Write relay to energize
WRIT TM t s	Write time-out message
WRITE sf t s	Same as WRIT sf t s
WRITV sf t s	Write variable length message
READ DG t s	Read digital inputs
READ BD t s	Read 22-column T-3 badge
READ HO t s	Read 80-column T-3 hollerith card
READ MS t s	Reserved
READ ST t s	Read 22-column T-3 stub card (ticket)
READ TK t s	Read transaction key
READ T5 t s	Read T-5 badge, no local prompts
READ W5 t s	Read T-5 badge, with local prompts
PRRD QK t s	Display query, in from keypad
PRRD QX t s	Display query, in from ext. keyboard
PRRD FK t s	Display form, in from keypad
PRRD FX t s	Display form, in from external keyboard
PRRD PX t s	Print query, in from external keyboard
PRRD BD t s	Prompt, then read T-3 badge
PRRD HO t s	Prompt, then read T-3 hollerith card
PRRD MS t s	(Reserved)
PRRD ST t s	Prompt, then read T-3 stub card
PRRD TK t s	Prompt, then read transaction key
PRRD T5 t s	Prompt, read T-5, no local prompt
PRRD W5 t s	Prompt, read T-5, with local prompt

The following FDMTST commands are only applicable to conventional terminals connected via DPM01/VT110 multiplexers.

CHANGE	Change DPM DPM/VT110 attributes
WRIT FO	Write formatted (means first byte is VFC byte)

WRIT TR	Write transparent
READ FO	Read formatted and echo characters to device
READ FN	Read formatted, no echo
READ TR	Read transparent and echo characters to device
READ TN	Read transparent, no echo
READ TL	Read translucent and echo characters to device
READ LN	Read translucent, no echo
READ AT	Read and decode attributes from DPM01/VT110 port
PRRD FO	Write formatted prompt, then read formatted and echo characters to device
PRRD FN	Write formatted prompt, then read formatted, no echo
PRRD TR	Write transparent prompt, then read transparent and echo characters to device
PRRD TN	Write transparent prompt, then read transparent, No echo
PRRD TL	Write formatted prompt, then read translucent and echo characters to device
PRRD LN	Write formatted prompt, then read translucent, no echo

4.4.3 DPMTST

DPMTST, the DPM01/VT110 Terminal Tester Task, is an on-line tool that enables an operator to exercise and test all features of the DPM01/VT110 and demonstrate the abilities of conventional terminals connected to the DPM01/VT110.

DPMTST contains two tests.

1. A demonstration test (that uses one to four terminal devices e.g., VT52 or LA36) connected to the DPM01/VT110. This test permits operators to select various sub-tests to demonstrate and test the features of terminals connected to the DECdataway through the DPM01/VT110.

2. A loopback test that uses externally connected loop-back cables (port-to-port) to test all major features of the DPM01/VT110 and to verify its end-to-end data integrity.

DPMTST begins by asking the operator at the MCR terminal which controller and port to use. This address must correspond to port 0 on the DPM01/VT110 to be tested.

DPMTST next asks the operator which of the four DPM01/VT110 ports will be used. DPMTST attaches itself to all ports that the operator claims at this time, thus preventing their use by other tasks. If running DPMTST in loopback mode on two DPM01/VT110 ports, claim all four ports for DPMTST. The processing load on the DPM01/VT110 caused by DPMTST could cause transient loss of data on the other ports. If running DPMTST to demonstrate terminals, there is no reason to prevent other tasks from sharing this DPM01/VT110.

DPMTST next asks the operator to select loopback mode or demonstration mode.

Note that, in demonstration mode, DPMTST does not change the attributes in the DPM01/VT110. These attributes must already be correctly set for the devices connected to the DPM01/VT110, either by using the ATGEN utility task before the DPM01/VT110 came on-line or by using FDMTST to load temporary attributes.

In loopback mode, DPMTST changes the attributes. After running the DPMTST loopback test, if real terminals are connected to the DPM01/VT110 ports, the original attributes are restored only if the DPM01/VT110 is turned off while cables are being connected.

4.4.3.1 DPMTST Loopback Testing – When the loopback mode of DPMTST is selected, DPMTST asks the operator which ports are connected together by the external loopback cables. It does not matter which port is mentioned first by the operator.

DPMTST next asks the operator how long DPMLOP is to run (in hours). Runs of over one week can be requested. If the operator responds with the carriage return key (does not enter a run time) DPMTST will run one complete pass (30–45 minutes) and then exit.

DPMTST next asks the operator what the first test and last test are for this run. For a complete test run, the operator responds to these questions with the carriage return key, which defaults to the first and last implemented tests.

DPMTST next asks the operator about tracing DPMLOP. Since tracing consumes host processor time, degrades testing, and supplies little useful information, the operator should respond to this question with the carriage return key, which means no.

DPMTST then asks the operator about halting when an error occurs in DPMLOP. If the input terminal is a video terminal, the operator will normally answer this question YES (or just Y), to avoid having the error messages scrolled off the screen. If the input terminal is an LA36, the operator normally answer this question with the carriage return key.

The loopback mode of DPMTST involves three segments of code.

1. DPMLOP, the main set of tests, transmits data from the host, out through one DPM01/VT110 port, in through a different DPM01/VT110 port, and back to the host for data checking. DPMLOP tests a variety of data patterns, baud rates, UART control patterns, termination character patterns and conditions, VFC codes, both modes of writing, all six modes of reading, echo suppression, and CRT and non-CRT delete processing.
2. DPMCON, which runs before DPMLOP, primarily tests that the loop back cables are in place as defined by the operator. DPMCON performs this test at baud rates of 3600, 4800, 7200, and 9600.
3. DPMXON, which runs after DPMLOP, tests processing of X/ON and X/OFF characters at several baud rates.

At its conclusion, DPMLOP reports the amount of data transferred. If all four ports are used, the primary pair transfers about 120–150 kilobytes/hour, and the secondary pair 5-20 percent less.

Under heavy traffic conditions on the DECdataway, DPMTST may terminate due to excessive round-trip message times. The event is indicated as follows.

DPMXON - CALL FDSTAT, BAD RESULT = AC,...

All error messages from DPMTST are reported on the MCR terminal. Since the loop back mode of DPMTST is intended as an acceptance test, rather than a diagnostic, the error messages are not entirely self-explanatory and will not be defined.

Error messages that include one of the following three statements are probably due to excessive noise on the DECdataway, excessive noise on the ac power which supplies the DPM01/VT110, or because of transient loss of ac power.

**DEVICE NOT READY
I-O ABORTED
DEVICE OFF-LINE**

A condition that causes one of these error messages is likely to prevail for a few seconds. Therefore, these conditions will commonly cause a burst of errors and a burst of error messages. Since DPMLOP's error re-

ports include the approximate time of the error, these error bursts should be as related events.

If the DPM01/VT110 goes off-line for more than a few seconds, DPMLOP may not be able to recover. This may be recognized by an error report which includes the following line.

CALL FDCONN FOR ... BAD RESULTS = TN.

If DPMLOP cannot recover due to the above case, it exits.

The classes of errors discussed above are all hard errors, that correspond to detected errors in the DECdataway error log (RUN ISBRPT to see). If the DECdataway is in a noisy environment, this error log may also show some soft errors (repeat count less than 4) that did not cause DPMTST to detect errors.

If DPMTST reports errors that do not correspond to events recorded in the DECdataway error log, the DPM01/VT110 hardware is suspect. While noise could cause this class of error, the probability is extremely low. The error rate for this class of error, with standard loop back cables, should be less than one per day.

4.4.3.2 DPMTST Terminal Demonstration – DPMTST begins demonstration of terminals by asking the operator at the MCR terminal what devices are connected to each of the ports to be used. DPMTST understands LA35, LA36, LA180, VT50, VT52, and VT55 as answers. If the operator replies with a different answer, DPMTST will ask the operator for information about the terminal.

- **Is this an ASCII device?** Yes means that the device has an ASCII-encoded set of printable characters and responds to ASCII line-feed and carriage return characters. DPMTST cannot use non-ASCII devices.
- **Does this device have a keyboard?** Yes means that the device has an ASCII-encoded keyboard which includes at least A-Z and a carriage return key.
- **Maximum print-line size?** DPMTST cannot use devices which have a print line of less than 32 characters.
- **Does this device print lowercase?** DPMTST will use either.

Once DPMTST has acquired the device-type information, it ceases to use the MCR terminal, and begins running the one to four devices connected via this DPM01/VT110.

For devices without keyboards, DPMTST endlessly transmits a sequence of predefined data patterns:

Alphabet
 Rotating alphabet
 Lines of HHHHHH, for printer alignment
 Box of plus signs
 Lines of each character
 Time and date
 Lines to test carriage control characters

For devices with keyboards, DPMTST asks the operator at that device to select a demonstration sequence. These include each of the sequences used for devices without keyboards, plus several feedback sequences. Each feedback sequence prompts for data from the device's operator, and returns an image of that data to the device. These demonstration sequences can be used to validate the operation of the terminal device, as well as to demonstrate DPM01/VT110 features such as character echo, horizontal tab handling, CRT-delete, end-of-line wraparound, and CTRL/S and CTRL/Q processing.

When DPMTST begins using a DPM01/VT110-connected device with a keyboard, it asks that device's operator if he wants help. If the answer is YES (or just Y), DPMTST will produce a menu of demonstration sequences. The operator can recall the menu when DPMTST prompts for a command, by typing HELP or ? or any undefined command.

4.5 CONFIGURATION ROUTINE

4.5.1 CBC

CBC displays and changes DECdataway address assignments. CBC has two change operations.

- Removing a DECdataway address assignment for a DIS or DPM01/VT110 multiplexer
- Adding a DECdataway address assignment for a DIS or DPM/VT110 multiplexer

Any configured DECdataway address not explicitly assigned to a DIS or DPM01/VT110 is always assigned to an RT80x terminal, by default. Therefore, removing the DECdataway address assignments for a DIS implicitly reassigns those addresses to RT80x terminals. As in the host build procedure, you specify only the base port when configuring a DIS or DPM01/VT110.

4.5.1.1 How to Run CBC – You may install CBC with the task name ...CBC. When CBC is installed, use it the same as the MCR SET command. In response to an MCR prompt, type CBC followed by a switch and optional parameters. CBC executes the command and returns to MCR.

Type the following if you do not install CBC.

```
RUN $CBC
```

CBC then issues its own prompt.

```
CBC>
```

Now type a command string using switches, exactly as if CBC were installed. CBC prompts again after each command until you exit by entering CTRL-Z.

4.5.1.2 Displaying DECdataway Address Assignments – Use the following switches to display DEC dataway address assignments.

/DPM01	Displays the DECdataway addresses for all DPM01 and VT110 multiplexers
/DIS	Displays the DECdataway addresses for all DIS nodes
/RT80x	Displays the DECdataway addresses for all RT80x terminals

Select a negated switch to request display for all devices not of that switch type. Negate a switch by placing either a minus sign or the characters NO before the switch's keyword immediately after the slash.

Examples

```
CBC>DIS           Displays all DIS DECdataway addresses
```

```
CBC> /-DPM01     Displays all DECdataway addresses not assigned to multiplexers.
```

4.5.1.3 Removing a DECdataway Address Assignment – Use the following after a negated switch to remove a DEC dataway address assignments.

```
==SBxx:
```

where SBxx: is the DECdataway address assigned to the base port of a DIS or DPM01/VT110.

Note that /-RT80X is not allowed, because an address assigned to an RT80x is already considered free. Remove an RT80x address assignment implicitly by assigning it to another type of device.

Do not remove the address assignment for a device that is busy, attached, or under DPM-PLUS, mounted to the terminal ACP.

NOTE: Under DPM-PLUS, you must dismount DPM01 terminals from the terminal ACP before removing a DPM01 address assignment. For a more detailed explanation of the MCR commands MOUNT (MOU) and DISMOUNT (DMO) refer to Chapter 4 of the RSX-11/M-PLUS MCR OPERATIONS MANUAL (order Number AA-H263A-TC).

Example:

RUN \$CBC

CBC> /NODPM01-SB5:

CBC>-Z

This clears the assignment of DPM01/VT110 ports to DECdataway addresses SB5:, SB6:, SB7:, and SB10:.

4.5.1.4 Assigning a DECdataway Address – Use the following after a /DIS or /DPM01 switch to assign a DEC dataway address.

=SBxx:

SBxx: is the DECdataway address for assignment to the device's base port.

Note that /RT80X is not allowed, because you assign an address to an RT80x terminal by clearing the address from another device type.

You may not make address assignments for the following.

- To a broadcast channel
- If there are insufficient consecutive free DECdataway addresses (two for DIS; four for DPM01/VT110)
- That would span controller boundaries

NOTE: Under DPM-PLUS, when you create new DECdataway addresses for DPM01/VT110 terminals, those terminals do not become mounted to the terminal ACP until the next time the ACP is initialized.

Example

CBC> /DIS=SB5:

assigns a DIS to addresses SB5: and SB6:.

4.5.1.5 CBC Error Messages – The following are descriptions of CBC error messages.

CBC...SB DRIVER NOT LOADED

DECdataway software is not running.

CBC...MUST SPECIFY SB DEVICE

Device following the equal sign is not a DECdataway address (SBxx:).

CBC...ILLEGAL UNIT NUMBER

The DECdataway address specified in the command exceeds the highest address for the number of ports configured in the host build procedure.

CBC...UNIT NUMBER MUST BE IN OCTAL

DECdataway unit number contained the digit 8 or 9.

CBC...MUST SPECIFY BASE PORT

The DECdataway address specified in the command is not the base port of a DIS or DPM01/VT110.

CBC...NOT ENOUGH FREE PORTS FOR DEVICE ASSIGNMENT

Assigning a DIS requires one free (RT80x) port following the base port. Assigning a DPM01/VT110 requires three free ports following the base port.

CBC...SYNTAX ERROR

A switch or address was not typed properly in the command.

CBC...BASE PORT SPECIFIED IS A BROADCAST CHANNEL

The address of a broadcast channel is never free for assignment.

CBC...DEVICE ASSIGNMENT OVERLAPS CONTROLLERS

The DECdataway address assigned to a DPM01/VT110 must be fourth from the highest address on a controller, or lower. Similarly, a DIS may not be assigned the highest address on a controller.

CBC...RT80X DEVICES CAN ONLY BE DISPLAYED

Command used equal sign with RT80x switch.

CBC...UNIT IS BUSY

CBC...UNIT IS ATTACHED

CBC...UNIT IS MOUNTED

DECdataway address cannot be cleared if the device is busy, attached, or mounted.

APPENDIX A

DECdataway PORT CONNECTOR ADDRESSES

A.1 GENERAL

DECdataway is a true multidrop communications line. Jumpers inserted in each port during installation set the addresses of the DECdataway port connectors. This arrangement allows terminals to be removed from and replaced on the line for servicing without disturbing the DECdataway operation.

During the troubleshooting of a DPM system, it may be necessary to manually verify the address jumpered into a port connector. Figure A-1 is an exploded view of a DECdataway port connector. It shows the location of the address jumpers in the plug assembly. To determine the address of a connector, compare the installed jumper's pin locations to the pin locations in Table A-1. Refer to the notes at the end of the table for interpretation information.

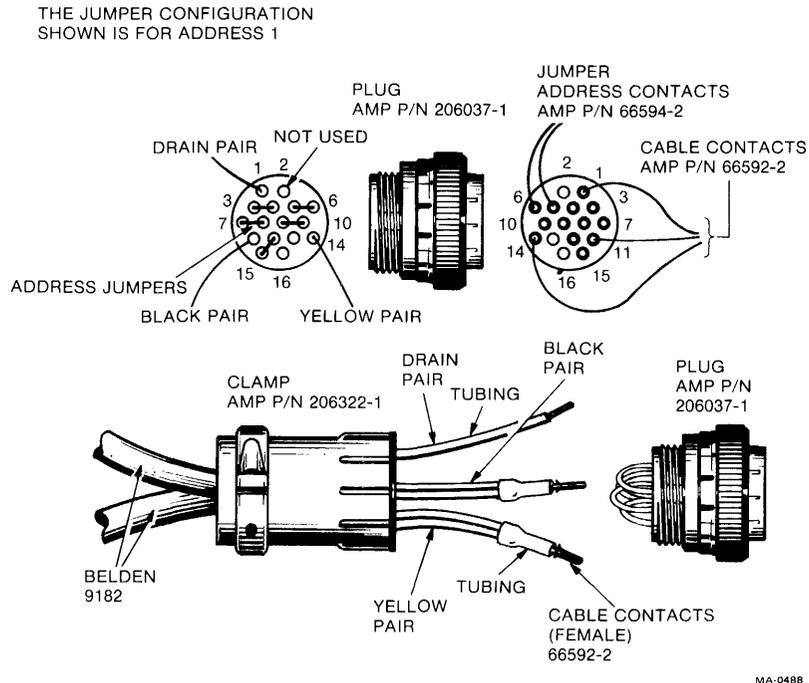


Figure A-1 DECdataway Port Connector

Table A-1 DECdataway Port Address Selection

Address		Pin Locations						Number
Octal/ Decimal		3 - 4	5 - 6	7 - 8	9 - 10	12-15	13-16	Jumpers
1	1	x	x	x	x	x		5
2	2	x	x	x	x		x	5
3	3	x	x	x	x			4
4	4	x	x	x		x	x	5
5	5	x	x	x		x		4
6	6	x	x	x		x		4
7	7	x	x	x				3
10	8	x	x		x	x	x	5
11	9	x	x		x	x		4
12	10	x	x		x		x	4
13	11	x	x		x			3
14	12	x	x			x	x	4
15	13	x	x			x		3
16	14	x	x				x	3
17	15	x	x					2
20	16	x		x	x	x	x	5
21	17	x		x	x	x		4
22	18	x		x	x		x	4
23	19	x		x	x			3
24	20	x		x		x	x	4
25	21	x		x		x		3
26	22	x		x			x	3
27	23	x		x				2
30	24	x			x	x	x	4
31	25	x			x	x		3
32	26	x			x		x	3
33	27	x			x			2
34	28	x				x	x	3
35	29	x				x		2
36	30	x					x	2
37	31	x						1
40	32		x	x	x	x	x	5
41	33		x	x	x	x		4
42	34		x	x	x		x	4
43	35		x	x	x			3
44	36		x	x		x	x	4
45	37		x	x		x		3
46	38		x	x			x	3
47	39		x	x				2
50	40		x		x	x	x	4
51	41		x		x	x		3
52	42		x		x		x	3
53	43		x		x			2
54	44		x			x	x	3
55	45		x			x		2
56	46		x				x	2
57	47		x					1
60	48			x	x	x	x	4
61	49			x	x	x		3
62	50			x	x		x	3
63	51			x	x			2
64	52			x		x	x	3
65	53			x		x		2

Table A-1 DECdataway Port Address Selection

Address		Pin Locations						Number
Octal/ Decimal		3 - 4	5 - 6	7 - 8	9 - 10	12-15	13-16	Jumpers
66	54			x			x	2
67	55			x				1
70	56				x	x	x	3
71	57				x	x		2
72	58				x		x	2
73	59				x			1
74	60					x	x	2
75	61					x		1
76	62						x	1
77	63							0

NOTES

1. Address 0 is reserved for the system broadcast.
2. X = Jumper In (Logic 0)
3. (Blank space) = Jumper Out (Logic 1)
4. On a DPM system this pattern of physical addresses is duplicated for each DECdataway.

GLOSSARY

ACP	Refer to Ancillary Control Process.
ADDRESS (DECdataway)	A device identifier for a unit on the DECdataway. The address is physically jumped into DECdataway port connectors.
ANCILLARY CONTROL PROCESS (ACP)	A privileged task that performs logical I/O functions at a level between the user task and the physical device driver. Refer to NETWORK ACP, TERMINAL ACP.
AST	Asynchronous System Trap
ATS	DPM-PLUS Application Terminal Support, consists of the ATS Dispatcher and the ATS Terminal ACP. It is used with DPM01/VT110- connected terminals.
ATTRIBUTES	Characteristics of a specific terminal or device attached to a DPM01 or VT110 on the DECdataway. These characteristics include baud rate, parity, number of bits per character, etc.
BASE PORT	The lowest port on a DPM01/VT110 or a DIS.
BROADCAST CHANNEL	Port 0 of each DECdataway controller is called the broadcast channel, and can be used only by the DPM system software.
CHANNEL	A communication path between the host and a remote.

CONNECT BLOCK	Eight-word array used in MACRO-11 programs to specify details about a network connection being either requested or rejected.
CONNECTION	Refer to LOGICAL CONNECTION.
CONNECTION STATUS BLOCK	A 32 decimal word integer array used in FORTRAN calls to the network software, to identify a connection.
CRC	Cyclic Redundancy Check
DECdataway	<p>The communication system that links the DPM host with terminals and remote computer subsystems.</p> <p>The DECdataway consists of:</p> <ol style="list-style-type: none"> 1. A multidrop cable 2. A DECdataway controller for the host (ISB11), 3. A DECdataway interface in each intelligent subsystem (ISV11), and 4. A DECdataway interface incorporated into terminals (RT801, RT803, RT805) and multiplexers (DPM01/VT110).
DECdataway CONTROLLER	A controller (ISB11) which supervises protocol control procedures for polling, data transfer, and error recovery. It is bus master for 63 DECdataway addresses and a broadcast channel. It provides DMA paths for each of the DECdataway addresses.
DECdataway CONTROLLER DRIVER	Refer to SEDRV
DECdataway REMOTE INTERFACE	A communications interface (ISV11) between the remote processor and the DECdataway. It provides for DMA transfers for the computer system and allows for booting and diagnostics.

DIS	DPM50 or DPM23 DECdataway Intelligent Subsystem
DISPATCHER	A program or set of programs that start a task executing in response to a request from a terminal operator. Specific dispatchers are the ATS dispatcher or the FDM dispatcher.
DLC	The Down-Line Control Task (DLC) loads RSX-11S system images into the DIS memory over the DECdataway, and starts the system.
DOWN-LINE LOAD	<ol style="list-style-type: none"> 1. The process of loading the memory of a DIS with an appropriate system image from the host. 2. The process of loading the attributes of a specific terminal from the host to a terminal multiplexer.
DPM	<ol style="list-style-type: none"> 1. Distributed Plant Management 2. Distributed Plant Management software that runs under RSX-11M
DPM-PLUS	Distributed Plant Management software that runs under RSX-11M-PLUS.
DPM01	A terminal multiplexer for the DECdataway that can support up to four terminals.
DPM23	DECdataway Programmable Subsystem - a DIS based on an LSI-11/23 processor.
DPM50	DECdataway I/O Subsystem - a DIS based on an LSI-11 or an LSI-11/23 and an I/O Control Module (IOCM) for process I/O modules.
DPM50H	The host version of the Network ACP. Refer to ANCILLARY CONTROL PROCESS, NETWORK ACP.
DPM50R	The remote version of the Network ACP. Refer to NETWORK ACP.

FDM	Factory Data Management
HOST PROCESSOR	The DECdataway controllers are located in this processor.
INTERTASK COMMUNICATION	The exchange of information between a pair of tasks: one in the host, and the other in a DIS.
IOCM	The Input / Output Control Module is the controller for the I/O modules that comprise the process control I/O subsystem.
ISB11	<ol style="list-style-type: none"> 1. Microcode file for the DECdataway controller 2. Refer to DECdataway CONTROLLER.
ISV11	Refer to DECdataway Intelligent Subsystem.
LOGICAL CONNECTION	A conversation path between two tasks - one task in the DPM host, and the other task in a DIS.
NETWORK ACP	An ancillary control process that transforms network requests from user tasks into I/O requests over the DECdataway. One network ACP (DPM50H) runs in the host and communicates with a network ACP (DPM50R) running in each DIS.
NIDRV	The Network Driver is one component of the DPM Network Software. It is supplied in both host and remote versions, along with the Network ACPs, to provide intertask communications.
NODE	A DIS
NODE NAME	An alphanumeric string up to six characters long. It is used to uniquely identify a DIS.
NODE NUMBER	Unit number of a DIS's base port.

PERIPHERAL CONTROL BYTES (PCBs)	The first four characters of every message sent to or from a DECdataway terminal (RT80x, DPM01/VT110) and the host computer. Used to exchange control and status information.
POLLING	The process used by the DECdataway controller to interrogate a device for its status.
PORT	<ol style="list-style-type: none"> 1. One of the drops on a DECdataway controller (maximum of 63). Devices with multiple DECdataway addresses locally refer to them as ports 0 through n; e.g., DPM01 port 0-3, or DIS ports 0 and 1. 2. One of four terminal interfaces within a DPM01/VT110 multiplexer. 3. Control and status registers of the ISB11, as in Port Wait Queue. 4. The ISV11 is sometimes referred to as a DECdataway port.
REMOTE	Any one of the subsidiary DECdataway devices in the distributed system, located some distance from the host and dependent on it for overall direction via a DECdataway.
RT801/803/805	Factory data collection terminals
SBDV	The RSX driver for the DECdataway controller.
SBTACP	Refer to TERMINAL ACP.
SVDRV	The RSX driver for the DECdataway remote interface.
TERMINAL ACP	<p>An Ancillary Control Process (SBTACP) that allows tasks using standard language interfaces to communicate with ATS terminals.</p> <p>Refer to ATS.</p>

TRANSACTION INDEX	A one- or two-digit value entered by the operator of a DPM01 / VT110 connected terminal, used by the FDM Dispatcher in searching its data file for a task to be invoked.
TRANSACTION KEY	<ol style="list-style-type: none">1. The key (pushbutton) on the face of an RT803 terminal, or one of the eight keys on the face of an RT805 terminal, used to select a transaction-handling task.2. A value used by the FDM Dispatcher in searching its data file for a task to be invoked in response to operator action at an RT80x terminal.
UNIT NUMBER	A number between 0 and 377 octal used to reference one DECdataway address; e.g., 47 used to reference SB47:.
VT110	A VT100 terminal that contains a DPM01 multiplexer.

WILL PRINT OUT ALL ADRES. & VECT.
DEV SB:

CONT 0 WILL STOP PRINTOUT

RUN DZKCH

DCP-A > STA

RUN CZKIB ^{WILL GIVE MAP}

> SET /UIC = [200, 270], AREA OF DIAGS.

> PIP /LI WILL LIST EVERYTHING IN [200, 270]

> PIP NAME.SCR; 1 /DE BELETF

RUN ISBRPT

PIP /LI GIVE DIRECTORY

RUN CZKMPB

digital

HOST		PRINT ROM ID # YES
LOCAL		Script or Auto Script ↓
Comm		FILE NAME (FROM PIP/LI)
Exit		HOW MANY PASS = ?

LOCAL WILL LET YOU RUN DIAG AT DPM50

HIT BREAK KEY TO STOP DIAG

@ 760144 / 00000 2 ^{you TYP} WILL GIVE YOU PROMPT >

1 WILL SAY THAT YOU HAVE FINISHED TESTING