SPERRY
DCP/10, DCP/10A, and DCP/15

Trouble Isolation Guide

✛SPERRY

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1. Introduction

1.1. PURPOSE

This guide provides troubleshooting information for the SPERRY Distributed Communications Processors (DCP) 10, 10A, and 15. Chapters 1 and 2 summarize indicators and power-on information common to all three machines. Chapter 3 is divided into two sections, covering system loading and error information for both Telcon downline loads and DCP/OS loads. The remainder of the guide describes the use of the offline diagnostics programs, residing on diskettes shipped with the processor.

Many of the troubleshooting procedures are identical for the DCP/10, DCP/10A, and DCP/15. Unless otherwise specified, the term "DCP" applies to any of the three processors. The primary differences occur in these areas:

> The DCP/10 has an integrated 8-inch flexible diskette drive and no integrated mass storage; both the DCP/10A and DCP/15 contain integrated 5¼-inch flexible diskette drives and 5¼-inch fixed drive for mass storage.

> The DCP/10 has 8 L-bus ports, of which 2 are required for the integrated diskette controller and the freestanding mass storage interface. The DCP/10A has 8 L-bus ports, of which 1 is required for the integrated drive controller. The DCP/15 has 14 L-bus ports available, of which 1 is required for the integrated drive controller.

> The DCP/10 does not support Telcon O/S (Level 7 or higher); the DCP/10A and DCP/15 do. System loading codes and procedures will vary accordingly.

The diagnostics program accomodates the entire family of DCP processors, including the DCP 20 and DCP/40. Portions of some tests do not apply to the DCP/10, /10A, or /15, and these are noted when applicable. Diagnostics enable you to isolate a problem to a field-replaceable unit — that is, to the processor board, a particular line module, or to the disk drives. Although you may not be able to make the necessary repairs or replacements yourself, you can report the results of a troubleshooting procedure or diagnostic test to a Sperry representative.

1.2. SOURCES OF TROUBLE ISOLATION INFORMATION

The topcap, which includes the operator controls and active line indicator panel, includes most of the hardware indicators (Figure 1-1). In addition, light-emitting diode (LED) indicators are located on the power supply, the line modules, and integrated drives (Figures 1-2 and 1-3).

When an offline diagnostics program is loaded, the terminal designated as the system console supplies screen prompts, status messages, and error codes.

DCP/15 ACTIVE LINE INDICATOR PANEL

DCP/10 AND DCP/10A
ACTIVE LINE INDICATOR PANEL
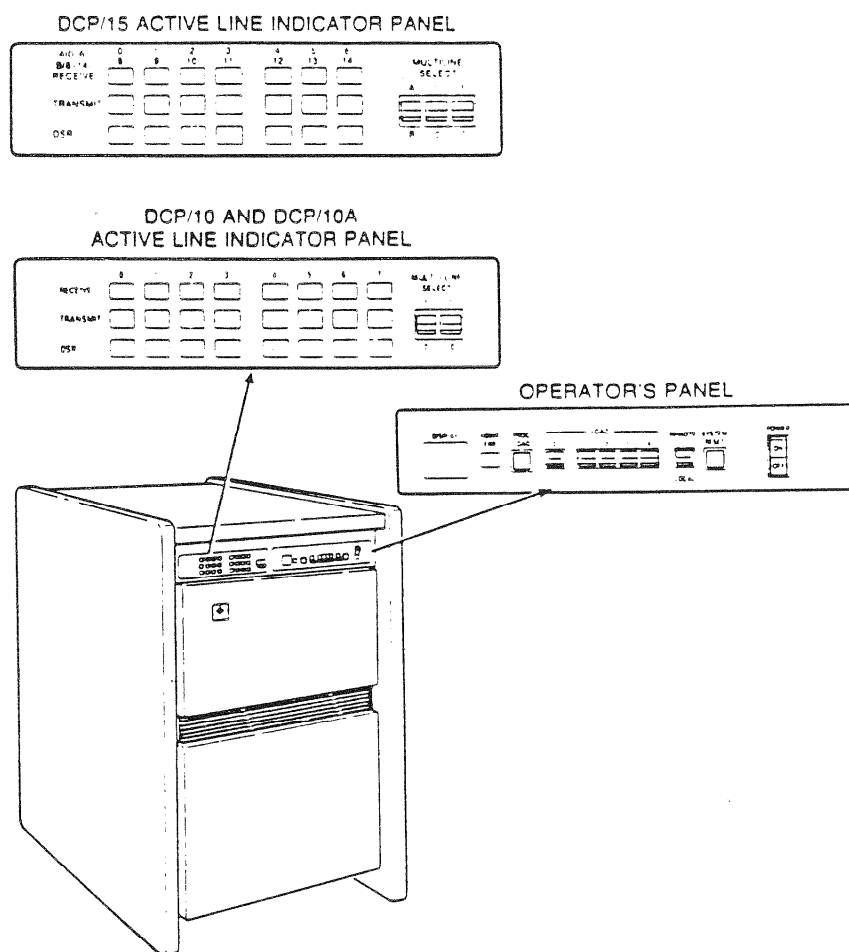
OPERATOR'S PANEL

10827-12

Figure 1-1. Operator Control and Active Line Indicator Panels

1.3. OPERATOR PANEL AND ACTIVE LINE INDICATOR PANEL

The operator panel on the right front of the enclosure is described in Table 1-1. The active line indicator panel on the left front displays receive-data, transmit-data, and data-set-ready (DSR) signals on all serial lines connected to the processor. The active line indicator panel does not provide error information.

Table 1-1. Operator Panel Indicators and Controls

Designation	Control/Indicator	Function
POWER	Control	Applies or removes primary power for all components within the cabinet, and initiates microprogram load when power is switched on.
SYSTEM RESET	Control	Reinitializes entire system processor and storage. Processor is returned to zero state, storage is cleared, and microcode and macrocode load is initiated.
REMOTE/LOCAL	Control	Selects either operator panel or a remote device as controller for system reset, program load, and load path selection.
LOAD (0-4)	Control	Selects load device for Telcon system software load and selects a local or remote console for diagnostics display.
PROG LOAD	Control	Initiates program load from local mass storage.
HDWR ERR	Indicator	Indicates hardware failure.
DISPLAY	Indicator	Indicates diagnostic code for microcode or macrocode error.

1.4. POWER SUPPLY INDICATORS

The two green LEDs at the base of the power supply and the green LED in the operator panel POWER switch should remain lit while the processor is on.

CAUTION

If the POWER indicator in the switch is lit but the power supply indicators are out, the power supply may be defective, and potentially dangerous. Turn the POWER switch off immediately (whether the light is on or off), unplug the processor, and call your Sperry representative.

ACTIVE LINE INDICATOR PANEL

OPERATOR'S PANEL

LINE MODULES

INTEGRATED
DISKETTE DRIVE
INDICATOR LED

POWER SUPPLY
INDICATOR LEDS

Figure 1-2. The DCP/10

POWER
SUPPLY
INDICATORS
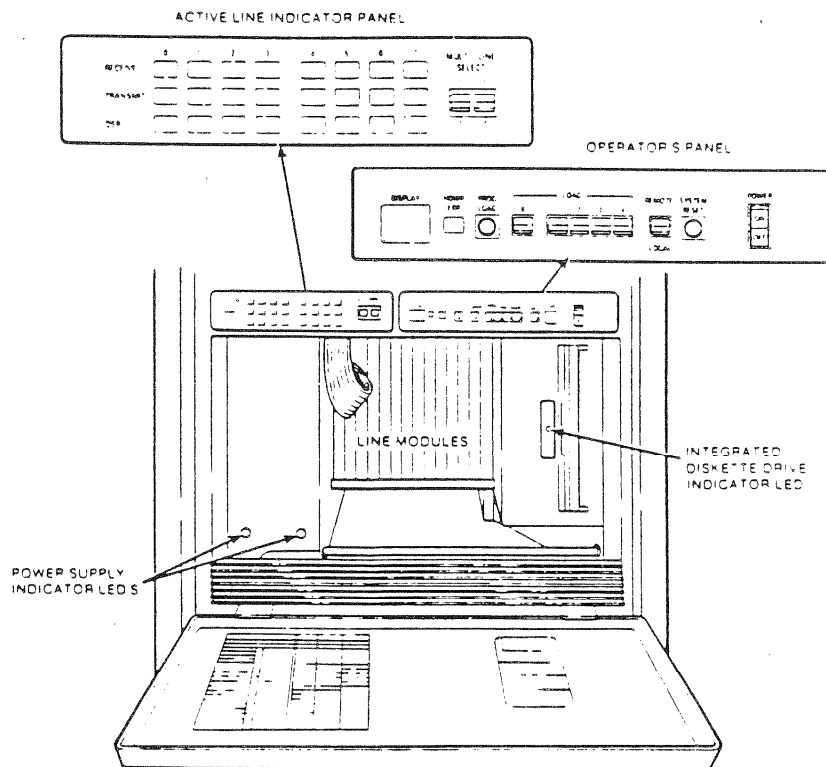
INTEGRATED DRIVE
INDICATORS
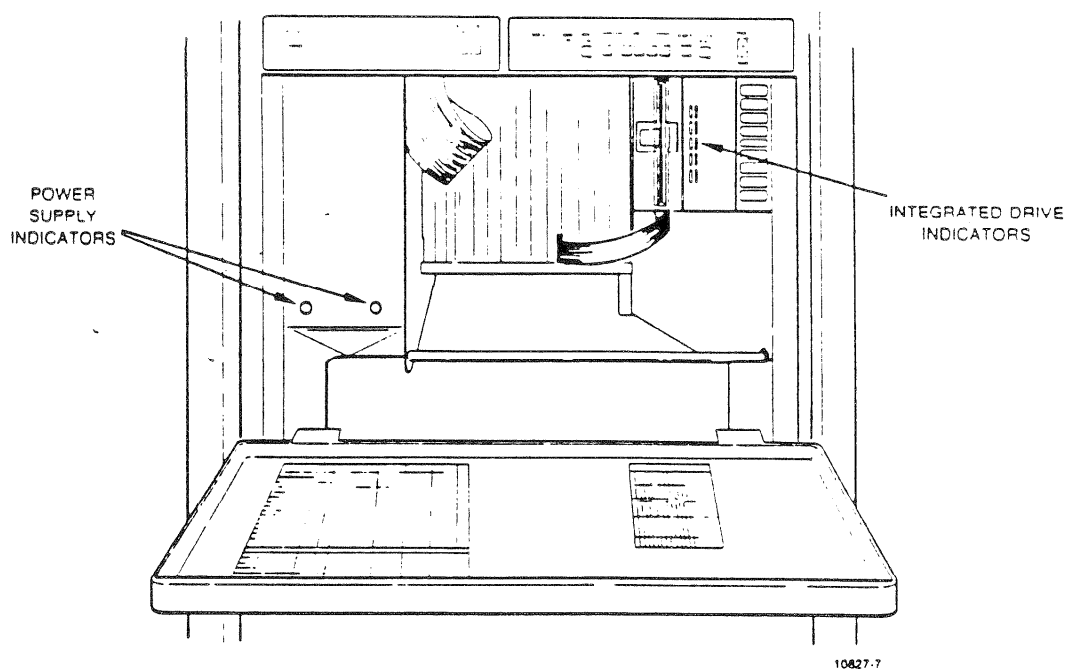
Figure 1-3. The DCP/10A and DCP/15

1.5. INTEGRATED DRIVE INDICATORS

The LED on the integrated flexible diskette drives lights momentarily when a diskette is inserted and the door is closed. It remains lighted as long as the drive is active.

If your are unable to perform a program load from the flexible diskette drive, first check that the proper diskette correctly inserted. If you have a backup copy of the load diskette, use it to try the load; if the load is successful, the original media was the problem, not the drive. (Make a new copy of the backup diskette.)

The fixed disk can be checked through the MDLM diagnostics test (chapter 11).

10827-8
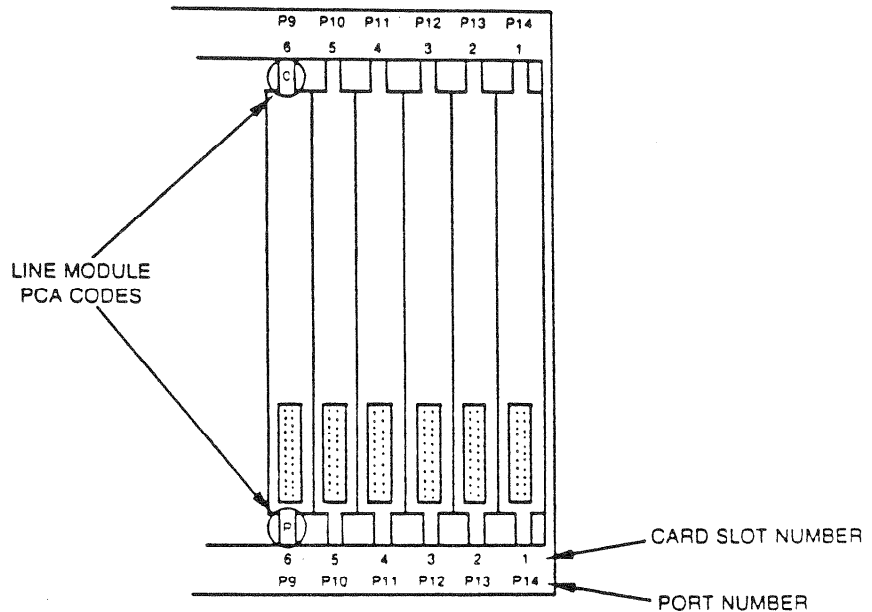
Figure 1–4. Line Module Code

1.6. LINE MODULE/SLOT CONFIGURATION

The line modules are identified by port and card slot number on the system configuration sheet attached to the inside front panel of the processor. The line module code (Figure 1–4), which identifies the specific printed circuit board part number, is also listed on the system configuration sheet. If diagnostics reports a problem with a particular line module, report this code, along with the line module identification code (LMID) listed in Appendix A.

The following table describes the slot number designations for the DCP/10 and DCP/10A.

Slot Number	Function
15	Memory printed circuit assembly (PCA)
14	Processor PCA
13	Not available
12	Port 0
11	Spare (Used when a line module occupies two circuit boards or when an empty port next to it is cooling.)
10	Port 1
9	Port 2
8	Port 3
7	Port 4
6	Port 5
5	Port 6 in DCP/10A. Spare in DCP/10.
4	Port 6 in DCP/10. Spare in DCP/10A.
3	Spare
2	Port 7 (Used for host connection. Some host/processor connections also require use of port 6 and the spare ports on this end.)
1	Remote control adapter (RCA)

This list summarizes the card slot designations of the DCP/15:

Slot Number	Function
15	Port 0
14	Port 1
13	Port 2
12	Port 3
11	Port 4
10	Port 5
9	Port 6
8	Communications processor (CP)
7	Port 8
6	Port 9
5	Port 10
4	Port 11
3	Port 12
2	Port 13
1	Port 14

1.7. LINE MODULE/PCA INDICATORS

The DCP line module printed circuit assemblies (PCAs) can be divided according to the following LED indicators. If any of the following steps (A through E) fail to occur, the line module or PCA may need replacement. Call your Sperry representative and explain what you have noted.

A.   A single green LED lights and remains lit after line module has passed POC test.

-   High speed (loadable)
-   Multiple device line module (MDLM — DCP/10A and DCP/15 only)
-   Front end processor interface (FEPI)
-   Byte interface line module
-   Asynchronous communications (nonloadable)
-   Synchronous communications (nonloadable)

B.   A single green LED flashes when the line module is loading microcode and remains lit when the load is complete. The flashing (during microcode loading) indicates that the line module has passed its POC test.

-   Direct connect single station (DCSS) (nonloadable)
-   Medium speed (loadable)
-   4 x 1 asynchronous
-   Multiline line module

C.   A single red LED flashes when the processor is turned on, indicating that the integrated flexible diskette controller (IFDC)* (DCP/10 only) has passed its POC test. When you load the system through the integrated drive, the IFDC LED lights and remains lit until 1F appears in the DISPLAY window. The LED then goes out briefly, coming back on when the load is complete and 20 appears in the DISPLAY window.

D.   No LED indicators light. Status of these line modules and PCAs must be found in other ways.

-   Host word-channel interface. Status shown in DISPLAY window and researched through the diagnostics.
-   Remote control adapter (RCA)
-   Memory/processor PCAs — Status found by using Telcon or diagnostics

E.   Five green LEDs in byte/block multiplexer interface light. These are numbered 0 through 4 in reverse order and provide the line module POC test results. Refer to Table 1-2.

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*When "IFDC" appears in prompts, it refers to the integrated drive. A prompt instructing you to insert a diskette in the IFDC means in the integrated drive.

Table 1-2. Byte Interface Indicators

Indicator Status			POC Test Interpretation
0	1	2	
OFF	OFF	OFF	Arithmetic logic unit (ALU) register failure
OFF	OFF	ON	Control store test failure
OFF	ON	ON	Data RAM test failure
OFF	ON	OFF	Device definition table failure
ON	ON	OFF	Data monitor table test failure
ON	ON	ON	All POC tests passed
3			
OFF			System not yet loaded
ON			System load complete
4			
OFF			Line module processor offline
ON			Line module processor online

1.8. POC TEST AND EXTENDED POC TEST

The POC test and extended POC test check basic processor functions. They run every time you turn the processor on or press SYSTEM RESET. When passed, 01 appears in the DISPLAY window. If the HDWR ERR indicator comes on and any other value appears in the window, the processor has failed the POC tests. Turn the processor off and call your Sperry customer services representative.

2. Hardware Initialization and System Load

Before the system operating instructions can be loaded, the hardware must be initialized.

2.1. HARDWARE PROBLEMS

Hardware initialization is the loading of microcode into your processor, starting the system boot, and building the system file. The initialization is complete when 20 appears in the DISPLAY window. If you encounter difficulty during initialization, you may have power or hardware problems. Table 2-1 lists the hardware indications to look for:

Table 2-1. Hardware Errors (Part 1 of 2)

Indication	Probable Cause	Corrective Action
POWER switch LED lights briefly, then goes out.	Internal primary power problem. Circuit breaker at POWER switch does not stay on.	Disconnect power plug from outlet. Contact your Sperry representative.
POWER switch LED does not light.	External primary power problem. Power is not getting to processor.	Make sure power outlet is live. Turn off processor POWER switch and check power cable connections.
DISPLAY window does not light.	REMOTE/LOCAL switch on rear of processor is not set to LOCAL.	Set switch to LOCAL.
DISPLAY window and power supply LEDs do not light. POWER switch LED lights.	Internal DC power problems. DISPLAY failed or internal power supply unit problems.	Turn processor off, then back on. If problem persists, turn processor off.
DISPLAY window does not light. Power supply LEDs light.	Internal DC power problem. DISPLAY failed or internal power supply unit problems.	Turn processor off, then on. If problem persists, turn processor off.
IFDC/MDLM LED does not light.	IFDC/MDLM failed.	Push SYSTEM RESET.
IFDC/MDLM LED flashing.	Either integrated drive or IFDC/MDLM failed.	1. Clean drive heads. 2. Make sure diskette is properly inserted in drive. 3. Push SYSTEM RESET.
DCP/10 integrated drive LED does not light when diskette is inserted, drive door is closed and IFDC/MDLM LED lights.	Integrated drive failed.	Remove and reinsert diskette.

Table 2-1. Hardware Errors (Part 2 of 2)

Indication	Probable Cause	Corrective Action
DCP/10 integrated drive LED lights when diskette is inserted. IFDC/MDLM LED lights. Diskette does not load. DISPLAY cycles 02, 85, 88.	Integrated drive failed.	Make sure diskette is inserted properly.
DCP/10 integrated drive LED lights when diskette is inserted. IFDC LED lights. Diskette does not load. No error code in DISPLAY.	IFDC/MDLM passed POC but cannot load diskette.	Make sure the proper diskette has been inserted.
HDWR ERR is flashing.	Hardware malfunction.	Push SYSTEM RESET.
HDWR ERR stays lit.	Irrecoverable hardware error.	Check DISPLAY window for error codes. Push SYSTEM RESET.
A line module LED does not light.	Line module failed.	Module must be replaced by your Sperry representative.

As you track a problem, record accurate information for your Sperry representative. Call for Sperry assistance any time you cannot correct a system problem.

2.2. SYSTEM LOAD

2.2.1. Load Procedures

For systems using DCP/OS, the system diskette includes the microcode loader, DCP/OS boot loader, and the DCP/OS itself. Once the DCP/OS is in place, Telcon, as well as other application programs, can be downline loaded.

The DCP/10 system diskette contains the boot loader only. Telcon, which contains all system operating instructions, must then be downline loaded.

You can load the system through a downline load (from the host) or a local load. The downline load loads software directly from the host files. Local load originates the local mass storage device. Both types of loads, whenever initiated, clear the system by overwriting the currently-loaded instructions and configuration data.

Turning the DCP power off and on, or pressing either the SYSTEM RESET or PROG LOAD switches initiates either type of system load. You specify which type by the position of the LOAD switches (Figure 2-1 for Telcon load; Figure 2-2 for DCP/OS boot).

NOTE: POWER ON/OFF and SYSTEM RESET clear the system, rerun POC and reload microcode. (Turning power off/on may also clear a suspected hardware problem.) PROG LOAD instructs the system to process a dump, then a reload, bypassing the initial POC test and executing a non-destructive POC once the microcode load source has been established.

LOAD

| 0 | 1 | 2 | 3 | 4 |

**RESILIENCY
OVERRIDE:**

0

**LOAD
THROUGH:**

LOAD TYPE:

PORT 0	00	INITIAL	01	DUMP/LOAD WITH
PORT 2	01	PROGRAM		FORMATTING
PORT 4	10	LOAD		
PORT 7	11	(HOST OR	10	DUMP/LOAD
		REMOTE)		WITHOUT FORMATTING

PORT 0	00	INITIAL	01	DUMP/LOAD WITH FORMATTING
PORT 2	01	PROGRAM		
PORT 4	10	LOAD (HOST OR	10	DUMP/LOAD WITHOUT FORMATTING
PORT 7	11	REMOTE)		
			11	DUMP ONLY

(DCP/10 ONLY)	8406 DISKETTE SUBSYSTEM	00	1ST DRIVE
		01	2ND DRIVE
	8409 DISK SUBSYSTEM	10	1ST DRIVE
		11	2ND DRIVE

	DCP/10A INTEGRATED MASS STORAGE	00	
(DCP/10A ONLY)			
0 = DOWN	8441 MASS	00	1ST DRIVE
1 = UP	STORAGE SYSTEM	01	2ND DRIVE

Figure 2-1. Telcon Load Switch Settings

LOAD

```
Path number = 0 (down)
Port number = 1 (up)


Loader port numbers
(UDLC, direct-channel, or
MDLM)

Port 0      0 0 0 0      Port 8       1 0 0 0
Port 1      0 0 0 1      Port 9       1 0 0 1
Port 2      0 0 1 0      Port 10      1 0 1 0
Port 3      0 0 1 1      Port 11      1 0 1 1
Port 4      0 1 0 0      Port 12      1 1 0 0
Port 5      0 1 0 1      Port 13      1 1 0 1
Port 6      0 1 1 0      Port 14      1 1 1 0


Path numbers (preconfigured)

01    Load       0 0 0 0
02    Dump       0 0 0 1
03    Download   0 0 1 0
04    Updump     0 0 1 1                    12253-16
```
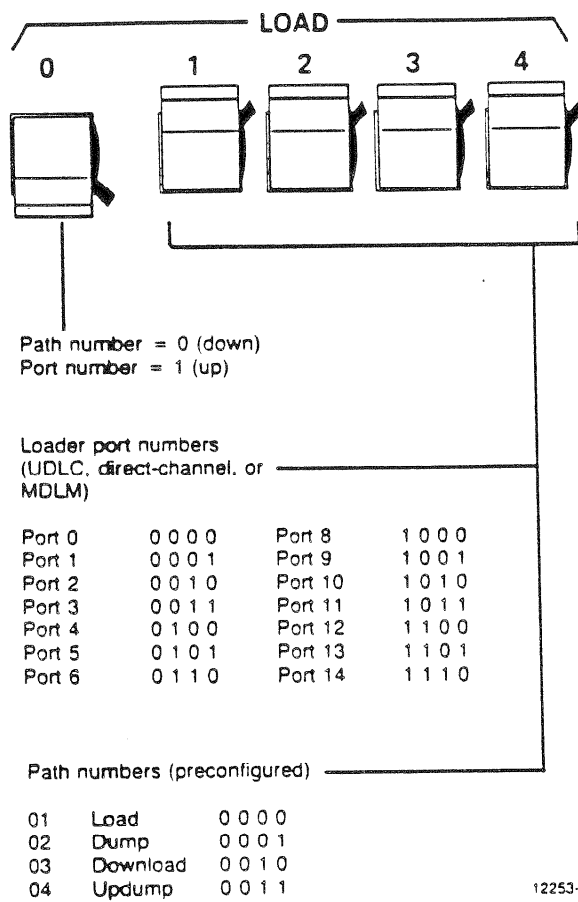
Figure 2-2.   Path and Port Number Switch Settings for DCP/OS

Once the system has been initially downline loaded (the *initial program load, or IPL)*, the operating instructions and system configuration data reside in local mass storage. You can maintain this system as is in local storage, you can modify it and upload it back to the host for future downline loads, or you can modify it and maintain it as a separate system in local storage.

The DCP/OS allows you to maintain and select (via the LOAD switch settings) different systems, residing either in the host or in local mass storage, or both.

2.2.2. Dumping the System

If a system failure occurs during loading or operation, you can dump the contents into either host or local mass storage for analysis. If you are connected directly to the host, it is generally preferable to dump to the host. The host has sufficient memory allocated for the transfer, a resident program for analyzing the cause of the failure, and a printer configured to print out the results.

The configuration utility in the DCP/OS (MONFIG) allows you to configure a specific location, and corresponding LOAD switch setting, for a dump. (See the DCP/15 configuration guide, UP-12251.) Press PROG LOAD to initiate the dump (assuming you have verified that the dump destination, as configured, is correct.)

If you are not using DCP/Telcon O/S, Level 7R1 or higher, and are dumping to the host, set LOAD switches 1 and 2 up for port 7 and switches 3 and 4 up to select dump only. This allows you to reset the switches after the dump for a local load (unless you want to change your configuration data). To dump to local storage, set switches 1 and 2 to the port connecting your storage device (usually P4 for a DCP/10; P5 for a DCP/10A) and set switches 3 and 4 for the appropriate drive. A local load automatically follows the dump onto local storage. Press PROG LOAD to initiate the dump.

The dump is complete when FFF is displayed on the system console.

NOTE: Consult your Sperry representative about local storage space reserved for a dump file. If you intend to use the host for such purposes, you may be able to increase available local storage by reducing the size of the dump file.

2.3. SYSTEM LOAD STATUS CODES

The load process begins when the power is turned on and the system microcode diskette is inserted. The load status, a 2-character hexadecimal code, appears in the DISPLAY window on the operator's panel. Table 2-2 defines the codes.

NOTE: Some of the codes listed flash too quickly in the DISPLAY window to be readily visible.

Table 2-2. System Load Status Codes

Code	Interpretation
00	Executing POC test
01	Initializing load device
02 or	DCP/10: loading microstorage from integrated drive through IFDC
10 or	DCP/10A or DCP/15: loading from MDLM
11	Loading from FEPI
06	Executing extended POC test (destructive*)
07	Building architectural interface and interface control block and initializing local storage map
08	Testing local storage
09	Executing extended POC tests (nondestructive*)
0A	(DCP/10 only) Reading index track on IFDC
0B	Macrostorage load (Telcon loader)
0C	Loading microstorage register
0D	Development panel reset/illegal program load
0E	Manual load (no load path switches set)
1F	Load complete (no errors)
11-1E	Reserved for microcode load process
20-FF	Reserved for macrocode (system software)

*There are two sets of extended POC tests. Destructive tests are run first. If you have a system failure during a load and dump the system, results of destructive tests are not recorded. Results of the second, extended POC tests (nondestructive, code 09), are saved in a system dump.

If the system isn't ready to proceed with the system load, 20 is the last DISPLAY reading you will see. If a failure occurs during loading, the code for the last step underway when the failure occurred will appear.

2.4. SYSTEM LOAD ERROR CODES

If the HDWR ERR indicator lights and stays lit during the system load, an error code appears in the DISPLAY window. The majority of these codes indicate a failure in the processor board and require the attention of a customer engineer. The codes listed in Table 2-3 are those representing conditions which you may be able to correct. Report all error codes to your Sperry representative.

Table 2-3. System Load Error Codes

Code	Interpretation	Instruction
29	Manual (no diskette)	Insert appropriate diskette
2A	The integrated diskette drive or IFDC failed POC test	Check IFDC LED. Press SYSTEM RESET to reload.
2D	Interface control block not found; rebuild	Dump the system and provide the results to Sperry customer services.
3F	Port processor error in dump routine. Software corruption of local storage; microcode problem or register stack problem	Dump the system and report the results to your Sperry customer service representative
80	Diskette drive/IFDC inoperative	Make sure diskette is inserted correctly. Check IFDC LED. Try a reload (press SYSTEM RESET).
85	No response from IFDC/MDLM when attempting to read program from diskette in integrated drive	Check integrated drive LED. Try a reload (press SYSTEM RESET). If problem persists, try new diskette.
86	Unexpected interrupt from a line module. Probable source: IFDC/MDLM or another line module.	Replacement required.
88	No valid load device was found.	Check IFDC/MDLM LED; is drive door shut?
8C, 8E, and 91	Any of these indicate a problem with the processor PCA. Conditions represented by these codes do not prevent Telcon from loading and executing, but do degrade processor performance.	
Ex	A series of codes in which x equals the port number of the problem line module	Check the LED on that line module. Try a reload (press SYSTEM RESET). If this does not eliminate the problem, the line module must be replaced.
Fx	A series of codes indicating a problem with the line module in port x or with processor PCA	Try a reload (press SYSTEM RESET). If this does not eliminate the problem, check indicator on the problem line module.

3. Telcon and the DCP/OS

3.1. LOADING TELCON

Assuming all physical connections are complete and the LOAD switches have been set appropriately, microcode load, DCP/OS boot and system software load proceeds uninterruptedly when power is turned on or the DCP is reset.

NOTE: Remember, if the operator panel HDWR ERR indicator comes on, any value in the DISPLAY window is an error code. Report these to your customer representative.

Table 3-1. Telcon Load Status Codes

Code	Interpretation
20	Macrocode loader has initiated
22	Loading loadable line module
24	Macrocode loader extension loading
26	Macrocode loader extension in control
30	Bootstrap loader initiated
40–4F	System dump in progress
50	Host load in progress
52	System volume build beginning
54	Resident segment just loaded
55	Transient segment just loaded
60	Local load in progress
70	Supervisor initialization in progress
80	Supervisor load in progress
FF	Fatal error

A fatal error code (FF) occurs only when an error makes Telcon load completion impossible. The error code appears in the DISPLAY window, and the loader automatically forces a reload. FF appears for 1 second, followed by an error code for 3 seconds. FF reappears for 1 second, followed by the same error code for 5 seconds.

After the last code appears, a forced reload begins and nothing appears in the DISPLAY window. The loading status codes being cycling again.

When 70 appears in the DISPLAY window, control has been transferred from the loader to the executive. When 80 appears, the executive code is loading and the DISPLAY window ceases to be a load indicator. When the load is complete and the system is operational, two values alternate in the DISPLAY window. The first value (8 through F, hexadecimal) cycles to show that the system is operational. The slower it changes, the greater the demand on the processor. The second value remains constant, indicating one of the following reasons for the reload:

- 0   System reset
- 1   Hardware error
- 2   Specification error
- 3   Supervisor-detected error
- 4   User-detected error

3.2.   DCP/OS

DCP/OS boot errors are reported through the DISPLAY indicator. Assuming the system microcode was loaded successfully, a "B0" indicates that DCP/OS boot has started. Boot errors are four-digit codes, repeated three times. (The first two digits alternate with the second two digits.) After the three repetitions of the error code, the system will attempt to reboot, as identified by another "B0". This cycle will continue until you press SYSTEM RESET or PROG LOAD.

To interpret the meaning of any DCP/OS error code, enter "@FAC *errorcode*". The code and probable cause of the error is listed. Most codes will need to be reported to a service representative or system programmer. However, some errors, such as "Bad Load Path" would indicate a condition that you may correct by resetting the load switches or checking a drive.

A list of DCP/OS error codes appears in the DCP/OS Operator's Reference, UP-11541.

4. Diagnostics: Introduction and Loading

4.1. INTRODUCTION

The DCP macrodiagnostics aid in tracking problems the occur during normal system operation. The diagnostic program tests peripherals (line modules and devices), communications interfaces, memory, and the entire system under simulated maximum load. The error codes will either enable you to correct the problem or to pass on useful information to your Sperry customer services representative.

The diagnostics program for the DCP/10 is on two 8-inch diskettes. Diskette 1 contains the bootloader and the executive, the operating microcode, line module microcode for synchronous and DCSS protocols, and all other tests not using line module microcode. Diskette 2 contains tests for all other line module microcode. The diagnostics program for the DCP/10A and DCP/15 is on one 5¼-inch diskette.

The same diagnostic program is used to test the entire DCP family: the DCP/40, /20, /10, /10A, and /15. Since the DCP/10, /10A, and /15 are smaller and less complicated than the other DCPs, some prompts for some of the diagnostics will not apply.

4.2. LOADING THE DIAGNOSTICS

1. With the processor on, remove the microcode diskette from the diskette drive and insert the diagnostic diskette (diskette 1 on the DCP/10), label side facing right.

2. Set switches 0 through A, as defined in Figure 4-1, to identify the port to which the console terminal is attached.

3. Enter ▶//diag on the terminal to be used as the diagnostics console. Press XMIT.

DCP/15		Switch							Switch				
		0	1	2	3	4			0	1	2	3	4
	Port 0	0	0	0	0	0		Port 8	0	1	0	0	0
	Port 1	0	0	0	0	1		Port 9	0	1	0	0	1
	Port 2	0	0	0	1	0		Port 10	0	1	0	1	0
	Port 3	0	0	0	1	1		Port 11	0	1	0	1	1
	Port 4	0	0	1	0	0		Port 12	0	1	1	0	0
	Port 5	0	0	1	0	1		Port 13	0	1	1	0	1
	Port 6	0	0	1	1	0		Port 14	0	1	1	1	0

Card Slot 8 (Processor)

LOCAL CONSOLE

DCP/10 or DCP/10A		Switch			
		1	2	3	4
	Port 0	1	0	0	0
	Port 1	1	0	0	1
	Port 2	1	0	1	0
	Port 3	1	0	1	1
	Port 4	1	1	0	0
	Port 5	1	1	0	1
	Port 6	1	1	1	0
	Port 7	1	1	1	1

Figure 4-1. Diagnostic LOAD Switch Settings

4.   Press SYSTEM RESET. The LED on the integrated drive lights as the program loads, and the following display appears on the console screen (in about 2 minutes):

CPA FAMILY DIAGNOSTICS ROUTINES RELEASE R5.1

Now building the Configuration Table

>Enter the Number of Ports to be checked (1-14)
>(Default is 14 Ports. 0 : Abort Build Routine
>[ ]

5.   Press XMIT or enter a number less than 14 and press XMIT. (Unless you are running the system test or serial line module test, you can enter 0, Abort Build Routine, to save time.)

CPA FAMILY DIAGNOSTICS ROUTINES RELEASE R5.1

Now Processing System Channels

>To inspect the Configuration Table, use the
>Display Routine which is in the Resident Utilities
>Press TRANSMIT to continue.
>[ ]

If you now wish to see the configuration table, press the FUNCTION and F1 keys and enter a 3. Refer to Appendix C for a description of the table.

The first screen of the main diagnostics menu will appear:

<div align="center">

CPA FAMILY DIAGNOSTICS ROUTINES RELEASE R5.1
MENU OF DIAGNOSTIC TESTS

</div>

> >1. System Test
> >2. Local Language Translate
> >3. Serial Line Module Test
> >4. Local Storage (Memory) Test
> >5. Rigid Disk Drive (T-8409) Test
> >6. MDLM Mass Storage Test
> >Press TRANSMIT key to display other selections or
> >Select a Test Number from the Menu
> >[ ]

Press XMIT to display the second screen:

> >7. Parallel Line Module Test
> >8. Host Channel Interface (SU00039/SU00208) Test
> * >9. Cartridge Disk Drive (T8478) Test
> * >10. Tape Drive (U10) Test
> >11. Copy Utility — Integrated Flexible Diskette
> >12. Copy Utility — FDDS (T8406)
> >Press TRANSMIT key to display other selections or
> >Select Test Number from the Menu
> >[ ]

Press XMIT to display the third screen:

> >13. Twisted Pair Terminal Test

When you enter a test number, the screen will inform you that the selected message file is being loaded. Refer to the appropriate section for a description of the individual test.

The cartridge disk and tape drive are not supported on the DCP/10, /10A, or /15, and therefore are not included in this guide.

4.3. LOAD FAILURES

If the menu shown above does not appear, press SYSTEM RESET again to reinitiate the process. Monitor the DISPLAY indicator while the system is rebooting, and if the load fails again, try to note the final sequence of DISPLAY codes to report to your Sperry representative.

4.4. INTERRUPTING A TEST

If you wish to interrupt a test for any reason, press the FUNCTION and F1 keys. This displays the following options:

1   = Continue the test
2   = Abort current activity and reinitialize the EXEC
3   = Hold current activity and use the RESIDENT UTILITIES

Enter 1 to resume the test where it had been interrupted. Enter a 2 to abort the test and redisplay the main diagnostics menu. Or enter 3 to access the resident utilities. (See Appendix C.)

5. System Test

5.1. INTRODUCTION

The system test checks data transfer functions on one or more selected line modules, after initializing the line module with an appropriate subtest and line protocol. These are the subtests available:

■ Serial Line Module Subtest : This tests the line module on the selected port by internal loopback, using a specified protocol.

■ Local Storage Subtest: This test executes random read/write operations throughout the available local memory of the DCP, and reports data mismatches or local storage error log status.

■ Freestanding Diskette Subtest (FDS) (for DCP 10 only): This test performs random read/write operations.

NOTE: The system test also includes a cartridge disk subtest. Ignore this option when it occurs, as the device is not supported on the DCP/10, DCP/10A, or DCP/15.

5.2. TEST PROCEDURE

When you select system test from the diagnostics menu, the screen will display this:

                    CPA FAMILY DIAGNOSTIC ROUTINES. RELEASE R5.1
                                     SYSTEM TEST

          1. Autostart
          2. Initialize a port with a subtest
          3. Cancel a subtest on a port
          4. Cancel all subtests
          5. Execute subtests on initialized ports
          6. Display error log
          7. Exit
          Press TRANSMIT key to display other selections, or
          Select the Test number from the menu

Enter the number of the desired option and press XMIT. The following paragraphs describe each option.

1.   Autostart

Beginning at the first occupied port, autostart checks each line module ID, initializes the line
modules with an appropriate subtest and protocol (if not already initialized), and performs
the subtests on each port. The tests cycle indefinitely until you press the FUNCTION and
F2 keys.

If the line module is capable of supporting more than one type of subtest, a screen prompt
will ask you to select the subtest you want to run for that port. As the subtests are
performed, the screen will display the port numbers sequentially (in hexadecimal codes),
the type of subtest, protocol, number of data transfer cycles performed, and number of
errors encountered.

If you wish, you may first enter option 2 to initialize a port with a particular subtest, and
then exit and enter autostart. Tests will be performed on all ports, and the port you
initialized will be tested as you designated.

2.   Initialize a Port with a Subtest

Option 2 allows you to specify a port to be tested. To specify the protocol and subtest, you
may continue specifying individual ports for testing until you press XMIT. (The tests are not
run until you select option 5.)

If you enter a port number more than once, a screen message will indicate that the port
is already initialized and ask if you want to re- initialize it. If you wish to change the subtest
you had designated or modify any of the subtest parameters, enter a 1. If you wish to
continue with the next port, press XMIT.

If you initialize a port with the flexible diskette subtest, be sure you use either an empty,
prepped, write-enabled diskette or a scratch diskette in the drive you are testing. Any data
on that diskette will be destroyed.

3.   Cancel a Subtest on a Port

Using option 3 may cancel a subtest selected through autostart or option 2.

4.   Cancel All Subtests

Option 4 cancels all subtests initialized through options 1 or 2 and redisplays the system
test menu.

5.   Execute Subtests on Initialized Ports

This option begins execution of the subtests you initialized through option 2, or restarts
execution after you press the FUNCTION and F2 keys. (A screen message will indicate
whether any ports have been initialized.) The subtest continues until you press FUNCTION
plus F2 to redisplay the system test menu.

6.   Display Error Log

7.   Exit

Stops the tests and redisplays the main diagnostic menu.

6. Local Storage Test

6.1. INTRODUCTION

The local storage test checks all the local storage locations except the area in which the diagnostic test resides. It also verifies the error correction code (ECC) logic. The first eight tests deal with the ECC logic. You *must* execute test 1 first.

6.2. TEST PROCEDURE

1. When you select the local storage test from the test menu, the following screen is displayed:

    > CPA FAMILY DIAGNOSTIC ROUTINES. RELEASE R5.1
    > LOCAL STORAGE (MEMORY) TEST

    > *****WARNING*****
    > THE USE OF THE KEYBOARD TO INTERRUPT THIS PROGRAM OR THE USE
    > OF THE "4" OPTION AFTER AN ERROR MAY RESULT IN SOME PROGRAM-INDUCED
    > PARITY ERRORS REMAINING IN MEMORY. IF SO, IT WILL BE NECESSARY TO
    > USE THE SYSTEM RESET SWITCH TO CLEAR THE SYSTEM AND REBOOT THE EXEC.
    > PRESS TRANSMIT TO CONTINUE.

2. Press XMIT. The following test selections scroll onto the screen six lines at a time, with each group followed by this prompt:

    > PRESS TRANSMIT KEY TO DISPLAY OTHER SELECTIONS, OR
    > SELECT A TEST NUMBER FROM THE MENU
    > .
    > .
    > .
    > TEST NUMBERS ARE AS FOLLOWS:
    > 1 – VERIFY ADDRESS
    > 2 – TRANSPARENT READ
    > 3 – ECC LOGIC
    > 4 – TWO-BIT ERROR SYNDROME
    > 5 – MARCH PATTERN
    > 6 – SLIDING DIAGONAL

NOTE: Test 1, VERIFY ADDRESS, must be performed first. If you are selecting a string of tests to be performed, enter the test number separated by commas: 1,2,4, etc.

3. *The following prompt will appear:*

    DO YOU WISH TO RUN THE LONG TEST? (0 = NO, 1 = YES, DEFAULT = 0)

    The two versions of tests are the long test and the short test. The short version checks the first storage location in each array to verify instructions and data paths. The long version performs each test on every memory location and requires an extended time for operation. (See Table 6-1.)

Table 6-1.   Test Execution Times Per Bank of Memory*

Test Number	1MB Expansion Bank		2MB Expansion Bank	
	Short	Long	Short	Long
1	00:00:50	00:00:50	00:03:20	00:03:20
2	00:02:30	00:02:30	00:10:00	00:10:00
3	00:01:30	10:00:00	00:06:00	27:36:00
4	00:00:07	00:00:07	00:00:28	00:00:28
5	00:01:50	00:01:50	00:07:20	00:07:20
6	02:12:00	02:12:00	08:48:00	08:48:00

*Figures given are in hours:minutes:seconds.

4. The following prompt will next appear:

    ENTER THE NUMBER OF CYCLES FOR WHICH EACH TEST IS TO BE EXECUTED
    (0 — FFFF, OR I (INFINITE), D = 1)

    Select the number of cycles you want the tests to run. The default (D) selects continuous cycling.

    As the tests execute, the screen will be updated with test information. The cycle count is updated at the end of each test. The free area in the middle of the screen displays up to 10 lines of test information. This is an example of what appears:

    CPA FAMILY DIAGNOSTIC ROUTINES. RELEASE – R5.1
    LOCAL STORAGE (MEMORY) TEST
    CURRENT BYTE ADDRESS RANGE FOR TESTS; START = 00000000 END = 00000000

    NOW EXECUTING TEST OOOX CYCLES — XXXX

    256K RAM 1.0 MEG (configuration data).

    TEST NUMBER COMPLETED 0001
    TEST NUMBER COMPLETED 0002

    When all tests are completed or if an error occurs, the screen displays this:

    NEXT OPERATION?
    ENTER 1 (CONTINUE), 2 (REPEAT), 3 (START), 4 (EXIT)

5.   Enter the desired number and press XMIT.

1   = Returns to test selection at test completion. After an error, continues where the error
    occurred.
2   = Repeat the current test
3   = Return to start of diagnostic test
4   = Exits diagnostic and returns to system executive

6.3. ERROR REPORTING

All errors are reported to the console. If an error occurs while the test is setting its parameters,
a prompt informs you of the error. However, there is no error code. If an error occurs during
execution of a test, the console displays an error message or an error code in this format:

```
***FATAL ERROR***
*ERROR CODE = XXXX
R0–R7 = xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx
R8–R15= xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx
```

Call your Sperry representative to report all error codes.

Some error messages will indicate instructions:

```
INVALID INPUT, TRY AGAIN
ILLEGAL DIGIT, RETRY
OUT OF RANGE, RETRY
```

A solicited input cannot be translated properly (for example, there is a letter in place of a
number).

7. Serial Line Module Test

7.1. TEST PROCEDURE

1. When you select the serial line module test from the system menu, the test code and message file are loaded, and the screen displays:

                    CPA FAMILY DIAGNOSTIC ROUTINES. RELEASE R5.1
                              SERIAL LINE MODULE TEST

        1 - TEST ALL SERIAL PORTS
        2 - TEST SINGLE PORT
        3 - TEST ALL PORTS ON A SINGLE IOP
        4 - TEST MULTIPLE PORTS (UP TO 16)
        MAKE SELECTION AND TRANSMIT

    Press XMIT and the following prompts appear:

        ENTER MICROCODE TYPE TO BE TESTED   LS = Low Speed
        1 = BASIC ASYNCH (LS/MS)   MS = Medium Speed
        2 = BASIC SYNCH (LS/MS)
        3 = UDLC (MS)
        4 = MULTILINE ASYNCH
        5 = X.21 SYNCH (MS)
        6 = X.21 UDLC (MS)
        TRANSMIT TO CONTINUE

    Press XMIT to continue displaying test selections:

        7 = HIGH SPEED SYNCH
        8 = HIGH SPEED UDLC
        9 = DCSS (UDLC)
        10 = TWISTED PAIR
        11 = 4X1 UNISCOPE
        12 = 4X1 UDLC
        13 = 4X1 SYNC/ASYNC
        MAKE SELECTION AND TRANSMIT

    Enter the number to be tested and press XMIT.

2.   Next, this prompt appears:

       CHOOSE LOOPBACK MODE
       1 = INTERNAL LOOPBACK
       2 = EXTERNAL LOOPBACK
       DEFAULT = 1

       ENTER THE NUMBER OF CYCLES EACH TEST IS TO BE EXECUTED
       (0 = XFFFF, OR I = INFINITE, D = 1)

       Enter the number of times you want the test to run.

3.   When you have entered all of the parameters, the screen displays the microcode you
       selected, and informs you that the microcode is being loaded and the line module is
       initialized.

       If no errors occur during the load and initialization sequence, the diagnostic program
       executes the selected test. The cycle counter display, > **CYCLES = XXXX**, is updated at
       the end of each pass through the test. When the test is finished, **COMPLETED LOOPBACK
       TESTS** is displayed.

4.   When the test is complete or if an error occurs, this message is displayed:

       NEXT OPERATION?
       1 (CONTINUE), 2 (REPEAT), 3 (START), 4 (EXIT)

       Enter the appropriate number:

       1   = Returns to test selection at test completion.
            = After an error, continues where the error occurred.
       2   = Repeats the current test (if possible).
       3   = Returns to the start of the diagnostic test.
       4   = Exits the diagnostic and returns to the executive.

7.2. ERROR REPORTING

Errors are reported through the console screen, identifying the line module port number and
microcode type, and the expected versus the received data. Report the ID numbers and status
messages to your Unisys representative.

The following error messages describe conditions you may be able to change or correct. In such
cases, attempt the recommended corrective action before calling the customer representative.

       INVALID INPUT, PLEASE TRY AGAIN
       Invalid entry. Reenter parameters.

       INCORRECT LINE MODULE I.D. FOR MULTILINE TEST
       Invalid entry. Reenter correct LMID for selected test.

       MULTILINE L.M. NOT INITIALIZED FOR LOOPBACK
       Select one of the loopback options and try again.

INVALID LINE MODULE I.D. FOR THIS PROTOCOL
Microcode type selected does not support the line module in the selected port. Reenter port number.

USE OF THE CONSOLE PORT IS INVALID
The console port was selected for testing. Enter an admissible value.

USE OF THE LOADER PORT IS INVALID
The IFDC port was selected for testing. Enter an admissible value.

Try to perform the recommended corrective actions before notifying your representative.

8. Parallel Line Module Test

8.1. INTRODUCTION

The parallel line module diagnostic is used to check the "B" and "C" printed circuit assemblies on the word-channel line module (SU00057) that interface between the DCP and a Series 1100 computer. The test runs in internal, loopback, or host mode.

8.2. TEST PROCEDURE

NOTE: Where screen prompts request a number entry, you may enter it either in decimal (first digit is 1 to 9) or hexadecimal (first digit is x) notation.

1. When you select the parallel line module test from the diagnostics test menu, this message appears on the console screen:

    CPA FAMILY DIAGNOSTICS ROUTINES. RELEASE R5.0
    PARALLEL LINE MODULE TEST

    INTERNAL, LOOPBACK, OR HOST (0 = INT, 1 = LOOP, 2 = HOST, D = 0)

2. Enter the test number and press XMIT. (The default is INTERNAL test, which is the only test that can be performed without the assistance of a Sperry representative.)

    INTERNAL (peripheral mode) checks the drivers of the PCA. This is the only test that can be performed without special strapping or cabling required.

    LOOPBACK (intercomputer mode) checks the drivers of the PCA. The test requires special cable connections and strapping on the PCA and must be completed by a Sperry representative.

    HOST (host mode) checks that the normal operating configuration functions across the channels. This test also requires special cables connections within the Series 1100 host and loopback strapping on the DCP line module PCA. These must be performed by a Sperry representative.

3. The next prompt is displayed:

    16 BIT OR 32 BIT (0 = 16, 1 = 32, D = 0)

    Enter 1 for a 32-bit data transfer. (Any other entry is invalid for the DCP/10 or DCP/10A.) Press XMIT.

4.   The next prompt is:

     ENTER DESIRED PORT (X0 - XFF, D = 0)

     Enter the port number where the "C" PCA is installed. In a DCP/10 or DCP/10A using the
     standard configuration, this should be port 7. (The word-channel line module is composed
     of three PCAs; generally, the "C" board is on the far left of the group and two "B" PCAs
     are in the center and right positions.) Once the port number is entered, the test reads the
     hardware ID set by a strap on the "C" PCA and returns one of these messages:

     ID = X10 - PERIPHERAL MODE
     ID = X11 - HOST MODE
     ID = X12 - INTERCOMPUTER MODE OR LOOPBACK

NOTE: Unless a Sperry representative pulled the PCA to restrap it, the strap would be set for
PERIPHERAL MODE.

5.   Press XMIT and the following prompt appears:

     ENTER NUMBER OF CYCLES, (0 = INDEFINITE, 0-FFF, D = FF)

     Enter the desired number of test cycles and press XMIT. Each cycle consists of one to six
     data patterns that are sent or received.

     During the test, the console displays on line 2 the port number, hardware ID, and number
     of cycles to complete. For example:

     PORT: 0007 ID: 0010 CYCLES TO COMPLETE: 00xx

6.   The next prompt appears:

     STOP ON ERROR, (0 = NO, 1 = YES, D = 1)

     This prompt allows you to specify whether you want the test to stop when an error is
     detected or whether to continue through the error. Press XMIT.

7.   The next prompt is:

     NUMBER OF FIXED PATTERNS (0-4, D = 4)

     Enter the desired number of fixed patterns that are sent or received over the port and press
     XMIT.

8.   Next prompt:

     ENTER PATTERN (0 = FFFF, D = FFFF)

     This is a request for the hexadecimal pattern of four digits for the fixed patterns selected.
     Enter one of these values: FFFF, AAAA, 5555, or 0000 and press XMIT.

9. Next prompt:

    USE RIPPLE PATTERN (0 = NO, 1 = YES, D = 1)
    Enter 1 to select two predefined patterns with all but one bit set or all but one bit off. Press XMIT.
    These patterns are shifted left one position for every two 16-bit words, producing the following
    patterns:

    FFFE FFFE FFFD FFFD FFFB FFFB FFF7 FFF7 ....

    0001 0001 0002 0002 0004 0004 0008 0008 ....

    The total number of patterns is the sum of the ripple patterns and the fixed patterns. This total must be
    greater than zero and cannot exceed six.

10. Next prompt:

    BUFFER SIZE, (0 = SMALL, 1 = LARGE, D = 1) >

    A small buffer is 64 DCP 16-bit words (32 Series 1100 words with the host option). A large
    buffer is 2,000 DCP 16-bit words (1,000 Series 1100 words with the host option). Press
    XMIT.

11. If you use the host option with the PTS software program (see the section following on the
    Series 1100 interface test), this prompt appears:

    RUN OPTION (0 = OUTPUT, 1 = INPUT, 2 = BOTH, D = 2)

    You can select either simplex (input or output only) operation or full-duplex diagnostic
    operation with the PTS software program. Press XMIT.

8.3. TEST EXECUTION

When you have successfully set all the parameters, the test details and results (port number, cycles, etc) are displayed on the console:

```
              CPA FAMILY DIAGNOSTIC ROUTINES. RELEASE R5.1
                      PARALLEL LINE MODULE TEST
PORT: 0006 ID: 0010 CYCLES TO COMPLETE: 000F    16 bit
INTERNAL FULL DUPLEX COMPLETE                                              [A]
*IN 0000 005A OUT 0000 005A INCYC 000F OUTCYC 000F DATA ERRORS: 0000       [B]


INTERNAL, LOOPBACK OR HOST (0=INT, 1=LOOP, 2=HOST, D=X0) >
ENTER DESIRED PORT(X0 - XFFF, D=X0) >
    ID = X10 - 16 BIT PERIPHERAL
NUMBER OF CYCLES, 0=INDEFINITE (0-XFFF, D=XF) >
STOP ON ERROR, (0=NO, 1=YES, D=1) >
NUMBER OF FIXED PATTERNS (0-4, D=4) >
ENTER PATTERN (0-FFF, D=FFFF) >
ENTER PATTERN (0-FFF, D=AAAA) >
ENTER PATTERN (0-FFF, D=5555) >
ENTER PATTERN (0-FFF, D=0000) >
USE RIPPLE PATTERN, 0=NO, 1=YES >
BUFFER SIZE, (0=SMALL, 1=LARGE, D=1) >
* 1ST INPUT COMPLETE EI: XFFFF *                                          [C]
* 1ST 8 DCP I/P WORDS (HEX): 0000 07D0 FFFF .... FFFF                     [D]
* 1ST OUTPUT COMPLETE *                                                   [E]
INTERNAL, LOOPBACK OR HOST (0=INT, 1=LOOP, 2=HOST, D=0)                   [F]
```

The fourth display line in this example [A] reports the type of test and its completion.

The fifth display line [B] reports the input/output (IN/OUT) transfer counts, the input/output cycle (INCYC/OUTCYC) counts, and the data error count. In this example, a nonzero count was specified.

In the lines following the parameters [C through F], the console displays the successful completion of the input and output parameters. The input complete message is:

```
* 1ST INPUT COMPLETE. EI: FFFF *
* 1ST 8 DCP WORDS (HEX): 0000 07D0 FFFF FFFF FFFF FFFF FFFF
                                                       FFFF
```

The first input buffer was received. The first two buffer words are the word count (words 0 and 1). The received external interrupt (EI) is a copy of the third word of the buffer (word 2). This example assumes a default value of FFFF.

This message tells you that the first output buffer was sent:

```
* 1ST OUTPUT COMPLETE *
```

8.4. ERROR REPORTING

Error messages are reported to the console; error codes appear in the DISPLAY window. The error messges are:

ILLEGAL DIGIT-RETRY
A nonhexadecimal value was entered. Compute the hexadecimal form of the value you want to enter (Appendix D) and reenter.

LINE MODULE ID IS INVALID
The LMID for the selected test in invalid. A Sperry representative needs to check the strapping for the PCA labeled C that determines the ID.

FATAL ERROR XXXX
The following pages summarize the list of fatal error codes that can be displayed.

000A
The port processor did not initialize. Check that the port number you entered was valid and retry.

0001
Timeout waiting for the STB to complete.

0003
A parity error was detected on input.

0004
Overflow word has been destroyed. Input buffer has room for one more word than the number sent by the output chain. The overflow word is set to a predetermined value which, if changed, indicates that too much data was received. The overflow condition is not checked during internal testing.

0005
External interrupt (EI) data is incorrect on input. The input EI is a copy of the third word of the output buffer (word 2, counting from 0). This code tells you that it did not match its calculated value.

0006
First two input words are incorrect.

0007
Input data is incorrect. The remainder of the input buffer, excluding the first two words, is compared to the expected pattern. If the data does not match, this error results.

0008
Input timeout while test is in progress. See 0009.

0009
Timeout with test in progress. Both input and output are timed by hardware response timers. If the timer expires after the first data is sent, a timeout with test in progress occurs. If the PTS software cycle is running, check the counts in both programs. The response timers are set to 2000 milliseconds (2 seconds) for both input and output.

8.5. 1100 INTERFACE TEST (PTS)

The Series 1100 computer peripheral testing sequencer (PTS) allows the processor to receive data from and transfer data to the computer over the internally specified index (ISI) word channels.

This section contains basic definitions, procedures, and operating instructions for the PTS test. For more detailed information on PTS, refer to DA-3076, *SPERRY Series 1100 Systems, Peripheral Test Sequencer (PTS) Test Description;* DA-3077, *SPERRY Series 1100 Systems, Peripheral Test Sequencer (PTS) Offline Operator's Reference;* and DA-3078, *SPERRY Series 1100 Systems, Peripheral Test Sequencer (PTS) Online Operator's Reference.*

8.5.1. PTS Data Test Description

The PTS detects data transfer errors to and from a front-end processor and provides information useful for isolating errors to channel data bits or channel function.

PTS software allows you to define the data patterns that the DCP will send to the Series 1100. Input- or output-only options enable you to check half the involved logic.

8.5.2. Setting Test Parameters

Perform the local storage diagnostic test and the parallel line module diagnostic test before running the PTS. PTS solicits only numeric input. Range and default values are provided for any request. For example, the request HOW MANY FIXED PATTERNS? 0–4 (4) indicates a range of 0 to 4 with a default of 4. To set test parameters, do the following:

.   Load the PTS software in the processor.

.   Follow the steps for setting parallel line module parameters to ensure that the sending and receiving software uses the same cycles and data patterns.

8.5.3. Running the Test

When input is requested, the PTS opens for input. If no input is received within the allocated time, a timeout message is displayed, followed by a message that the system is ready to receive input. This continues until the first data pattern is transferred with its associated external interrupt (EI). The program then tests the received data to see if it matches the expected data. The process is repeated for the number of patterns or cycles you selected.

The fixed patterns are the standard and are repeated for the entire buffer using the 16-bit or 8-byte pattern for each half of the Series 1100 word. The ripple pattern uses a 1-bit-on pattern for every two 16-bit words. Each subsequent pair of 16-bit words has the same pattern shifted circularly to the left. The second ripple pattern uses a 1-bit-off pattern, shifted in the same manner.

8.5.4. Output Messages

TOTAL PATTERNS (D): 6 TOTAL CYCLES (D) : 1

This message is displayed before any data transfer occurs. It indicates the number of patterns and cycles in decimal. Upon completion of this message, PTS opens for input or starts output as a function or I/O control option.

> FIXED PATTERN(S) USED:
> FFFF FFFF AAAA AAAA 5555 5555 0000 0000

The four fixed patterns are the four Series 1100 word patterns used.

> RIPPLE PATTERNS USED:
> 0001 0001 FFFE FFFE

The ripple patterns are the two Series 1100 word patterns used.

9. Diskette Subsystem Diagnostic Tests

TO BE SUPPLIED

4. The next display is:

CPA FAMILY DIAGNOSTIC ROUTINES. RELEASE R5.1
RIGID DISK DRIVE (T-8409) TEST

DIAGNOSTIC TEST LIST
1. – RUN ALL TESTS CONSECUTIVELY
2. – SELECT TEST
3. – CONTROLLER LOOPBACK
4. – FORMAT TEST
5. – SEEK TEST
6. – WRITE/READ TEST
>ENTER TEST SELECTION NUMBER
>[ ]

Enter the desired test number and press XMIT. (You must run test 2 first if you are testing any drive other than drive 0.)

The tests perform the following functions:

Test	Function
1	Runs tests 1 through 6 consecutively. Cycle counter is updated after each complete cycle of tests.
2	Attempts to select the drive you specified and initiates a series of invalid controller functions on head select, sector select, cylinder select, and drive select.
3	Performs controller loopback test. One byte of data is sent to the controller; the controller returns four bytes of data with parity.
4	Performs controller-format-track function on test cylinder 600, reserved for read/write diagnostic operations.
5	Executes seek patterns to verify capability of seek mechanism in disk.
6	Writes, reads back, and verifies four data patterns on sector 1 of each test cylinder for every track of the specified drive.

As the tests run, the screen displays this information:

<div align="center">

LM I.D. = 0000 PORT = 0000 CYCLES = 0000

RIGID DISK DRIVE TEST

(name of subtest)

</div>

DRIVE = 0000 SECTOR = 0000 HEAD = 0000 CYLINDER COUNT = 0000

TEST IN PROGRESS
(subtests passed)

****TEST LIST COMPLETE****
NEXT OPERATION?
ENTER 1 (CONTINUE), 2 (REPEAT), 3 (START), 4 (EXIT)

1 = At test completion, returns to diagnostic test list. If error occurred, continues from that point.

2 = Repeats current test

3 = Returns to port selection of diagnostic test. (This must be selected if you wish to change the number of cycles or the selected drive.)

4 = Exits test and returns to system executive.

10.2. ERROR REPORTING

Errors are reported as general statements on the console. If a command error occurs, the peripheral status block is displayed, as shown in 10.2.1.

Errors in the write/read test are displayed on the screen in this format:

DEVICE STATUS = XX
FUNCTION CODE = YYZZ
LINE MODULE STATUS = AA00
PERIPHERAL CONTROL BLOCK (PCB) = BBBB
DATA BYTES TRANSFERRED = CCCC

Note the codes in these positions and in error statements for your trouble report. Some error messages, such as the following, describe conditions you may be able to correct.

THIS CONFIGURATION = DRIVE 0 ONLY
The rigid disk is configured with a single drive.

CONTROLLER DOES NOT ANSWER
This message is displayed under the following conditions:
    After a master clear
    After the MODE 2 command is sent
    When the host fails to receive the 36 bytes of identification and configuration data
    The device does not have power
    The cabling is incorrect

THE CHANNEL NUMBER IS NOT WITHIN THE LEGAL RANGE
The selected port was either less than zero or greater than 255 (hexadecimal FF).

CHANNEL WILL NOT INITIALIZE
Either the parallel line module is not present for the selected channel, or it cannot
communicate with the communications line controller.

USE OF THE CONSOLE PORT IS INVALID
The selected port is the console port. Enter the correct port number.

USE OF THE LOADER PORT IS ILLEGAL
The selected port is the loader (IFDC or MDLM) port. Enter the correct port number.

THIS LINE MODULE TYPE MAY NOT BE USED BY THIS DIAGNOSTIC
The line module ID was incorrect. Enter the ID for the byte interface line module.

10.2.1. Command Error Messages

Command errors occur during the write/read test. If an error occurs, you will see:

```
   ABNORMAL TERMINATION OF WRITE/READ TEST
   PRESS XMIT FOR READ STATUS BLOCK
   ]
```

When you press XMIT, the display clears and the peripheral status block (PSB) scrolls onto the
screen:

```
   >PSB      0//1       2//3       4//5       6//7       8//9       A//B
      >      TSDS       FRFE       CCCC       HHSS       SCNT       OOSD
      >      XXXX       XXXX       XXXX       XXXX       XXXX       XXXX
```

The PSB consists of 12 bytes (labeled 0 through 9, A and B). Each reports test function status
or the error address in the disk. Read down the column to find the byte type and code. For
instance, the first byte divides like this:

```
                                    0/|/1
                                    0/|/1
                                    TS|DS
                                    40|XX
                                      |
           PSB 0      ˇ               |          PSB 1
             XX              (hexadecimal)         XX
                                      |
            YYYY               (binary)          YYYY
(MSB) 7 6 5 4 3 2 1 0           (bit)      7 6 5 4 3 2 1 0  (LSB)
```

This example shows that byte 0 reports TS (termination status) and its status (40). Table 10-1
shows 40 to be an error in the disk drive, causing the test to terminate.

This information is provided here simply to aid you in reporting the necessary codes to your
Sperry representative.

Table 10-1. PSB Byte 0 Termination Status

Error Code	Possible Errors
80	Function reject
40	Drive fault
20	Disk controller error
10	Unrecoverable read error
08	Recoverable read error
04	High operating temperature
02	Data searched for not found
01	Drive not operational

Function reject: The command received was rejected because invalid function or parameters were found in the peripheral control block.

Drive fault: The command was terminated because a fault indication was received from the disk drive (recalibrate function was performed).

Disk subsystem controller error: The command was terminated because a controller error was detected.

Unrecoverable read error: The command was terminated because an unrecoverable read error or a second error correction code (ECC) error was encountered.

Recoverable read error: An ID field error was detected and an error recovery was successfully performed on the sector identified by PSB bytes 4 through 7.

High operating temperature: The temperature inside the cabinet is approaching the maximum operating limit.

Data searched for not found: The search operation is completed and the data was not found.

Drive not operational: The selected drive either failed its POC test or stopped operating.

Table 10-2. PSB Byte 1 Read Error Status

Error Code	Possible Errors
80	ID field error
40	Cylinder/head miscompare
20	Alternate track is flagged bad
10	Alternate track error
08	Illegal format
04	Second ECC error
02	Format track error
01	Data field error

Table 10-3. PSB Byte 2 Function Reject
Status

Error Code	Possible Errors
80	Illegal sector address
40	Illegal cylinder address
20	Illegal head address
10	Illegal function
08	Illegal flag byte
04	Drive not present
02	Invalid search parameter
01	Invalid sector count

Table 10-4. PSB Bytes 3 Through F

PSB	Possible Errors
3	Flag byte
4 (MSB) 5	Cylinder address*
6	Head address
7	Sector address
8 (MSB) 9	Sector count*
A	Not used
B	Search displacement byte
C, D, E, F	Not used

* Together bytes 4 and 5 form the cylinder. The more
significant byte (MSB) is 4. Bytes 8 and 9 form the
sector count, with 8 the MSB.

Bytes 3 through B:

Flag byte (3):   Contains the second byte of the address field of the last selected track.

Cylinder address (4 and 5):   Contain the address for the last selected cylinder, or the address
for the cylinder containing a bad sector that was corrected by the controller.

Track/sector (head) address (6 and 7):   Contain the address of the last selected head/sector, or
the address of the bad sector that was corrected by the controller. PSB byte 6 is the head
address.

Sector count (8 and 9):   Contain the remainder of the peripheral control block (PCB) sector or
tracks count byte. Byte 8 is the more significant byte (MSB). The sector count is always zero
when a read or write operation is completed successfully.

11. MDLM Mass Storage Test

11.1. TEST PROCEDURE

The multiple device line module (MDLM) mass storage test checks the major functions of the line module, which includes the controller, integrated drives, and additional storage devices (8441 mass storage subsystems) attached to the DCP/10A or DCP/15. (The DCP/10 does not support the MDLM.)

<div style="text-align:center">

CAUTION:

</div>

All data on the rigid disk or the load diskette will be destroyed during the format and read/write tests. During the rigid disk diagnostic, a warning message is displayed before tests will execute. No warning message is displayed during the diskette tests unless a diagnostic or Telcon diskette is loaded.

1. When the test is selected from the main subsystem test menu, the screen displays:

    CPA FAMILY DIAGNOSTIC ROUTINES. RELEASE R5.1
    MDLM MASS STORAGE TEST

    ENTER PORT PROCESSOR NUMBER (HEXADECIMAL 00 – FF, D = 5)

    Enter the MDLM port number and press XMIT. If the MDLM is in the designated port and will initialize, the screen displays the line module identification number and the next prompt:

    LM I.D. = 09

    enter target (controller) x, l.u.n. (device) y, as "xy", range = 00–FF

2. Enter as two-digit (XY) sequence for the controller and the device. Current values are:

	X (target)	y (logical unit number, L.U.N.)
Integrated disk	7	0
Integrated diskette	7	2
8441 Subsystem		
1st disk	x*	0
2nd disk	x*	1
1st diskette	x*	2
2nd diskette	x*	3

    * *x is defined by the controller strapping in the 8441 subsystem.*

3. After you have entered the xy values for the controller and l.u.n., a status display will appear. For example:

>   scsi revision level in hex = 000x
>   controller firmware level in hex = 000x
>   1st rigid disk is present
>   1st flexible diskette is present
>   press XMIT to continue

4. Press XMIT and another status display and warning appears. For example:

>   logical block capacity in hex = 000005A0
>   blocks per track in hex = 0009
>   block size in bytes in hex = 0200
>   drive status = READY
>   media is REMOVABLE
>   parameter byte in hex = 0180
>   **WARNING** INSERT SCRATCH DISKETTE IN DRIVE TO BE TESTED
>   enter XMIT to continue, (1) select another l.u.n.

5. When these parameters are accepted, the screen will display the map of devices present and device configuration data. The next prompt asks:

>   ENTER THE NUMBER OF CYCLES FOR WHICH EACH TEST IS TO BE EXECUTED
>   CYCLE VALUES MUST BE ENTERED IN HEXADECIMAL
>   0 THRU 9, A THRU F, OR ANY COMBINATION UP TO FFFF
>   (0-0FFFF, I = INFINITE, D = 1)
>   [ ]

    Enter the number of times the test will run and press XMIT.

    NOTE: You can terminate a test in progress by pressing the FUNCTION and F2 keys. However, this is not recommended during the format sequence or the prep will have to be restarted.

6. The next prompt displays the test menus, six selections at a time:

>   CPA FAMILY DIAGNOSTICS ROUTINES. RELEASE R5.1
>   MDLM MASS STORAGE TEST
>
>
>   MDLM MASS STORAGE TEST LIST
>   1. RUN ALL TESTS CONSECUTIVELY
>   2. SELECT TEST
>   3. LINE MODULE LOOPBACK TEST
>   4. FORMAT TEST
>   5. SEEK TEST
>   6. WRITE/READ TEST
>   Press TRANSMIT key to display other selections, or
>   select a Test number from the Menu
>   >[ ]

    (If you press the XMIT key, the screen displays the last selection:

>   7 — PARK HEADS FOR SHIPPING

7. Insert a scratch diskette if you want to test the diskette drive. Enter the desired test number and press XMIT.

NOTE: The format test identifies problems with the media but does not isolate timing problems. The write/read test does both. If your main concern is the media, you can bypass the write/read test.

The test options perform the following functions:

1. RUN ALL TESTS CONSECUTIVELY.

Tests 2 through 6 run consecutively. The cycle counter is updated after each complete cycle of tests. Before test 1 executes, a warning message appears:

> *warning *data on selected drive will be destroyed
> enter (1) to continue, press XMIT to abort

> If you select 1, you are given a second chance:
> **ARE YOU SURE?**(1) TO CONTINUE, XMIT TO ABORT

2. SELECT TEST

Selects l.u.n. specified and initiates a series of controller functions: target select, l.u.n. select, cylinder select.

3. LINE MODULE LOOPBACK TEST

Performs line module loopback test. One byte of data is sent to the MDLM. The line module returns a byte in each of the possible data patterns for comparison.

4. FORMAT TEST

Performs controller-format-track (prep) function with two available options: type 0 and type 1.

Type 0 should be used when prepping the flexible diskette. Diskettes are formatted for 512 bytes per sector, 9 sectors per track, DSDD, and 96 tracks per inch.

Type 0 or 1 can be used for prepping the rigid disk drive. Approximate disk formatting times are:

10M bytes	30M bytes	72M bytes
15 min	40 min	90 min

NOTE: When formatting a 10M byte drive, type 0 format does not return an error message if you erroneously entered a higher disk capacity. Be sure you know the capacity of the drive you are formatting before using the type 0 option.

Sense bytes are displayed at the completion of the format test. A successful result is:

sense bytes	vld	ky/	blocks	ecc/rtry
	F000	0900	0000 0000	0000 0000

5. SEEK TEST

Executes seek patterns to verify the capability of the seek mechanism in the disk.

6. WRITE/READ TEST

Writes, reads back, and verifies two data patterns and performs random data seeks. Checks the selected logical blocks of the l.u.n.

NOTE: If this test is performed on a rigid disk, you will have to reformat the drive using type 0 format before you can load Telcon again.

7. PARK HEADS FOR SHIPPING

Moves heads to a safe location in the drive in preparation for shipping the DCP/10A (for 10M byte drive only).

As each test runs, the screen displays test status and parameters. For example:

```
                CPA FAMILY DIAGNOSTICS ROUTINE. RELEASE R5.1
                         MDLM MASS STORAGE TEST
PORT IS 0005    LM I.D. = 0009    TARGET/LUN = 7070
WRITE/READ TEST    ***TEST IN PROGRESS***(or TEST COMPLETE)
                         PATTERN = AAAA


(test information — up to 10 lines)
>response from target/LUN 0070
>response from target/LUN 0072 response sub-test complete
>format complete
```

The upper two digits of the target/LUN display in line 3 identify the selected device. The lower digits identify the target/LUN that answered the last good command. Both sets of numbers should be the same. The PATTERN display applies to the read/write and loopback tests.

When the tests are complete, or if an error is encountered, the following display appears:

```
NEXT OPERATION?
ENTER 1 (CONTINUE), 2 (REPEAT), 3(START), 4(EXIT), 5 (RETRY)
```

1 = Returns program to port selection at test completion, or continues from where an error occurred.

2 = Repeats current test.

3 = Returns to start of the diagnostic test. (Select 3 if you wish to change the drive or number of test cycles.)

4 = Exits test and returns to system executive.

5 = Retries the last input/output if an error occurs.

11.2. ERROR REPORTING

11.2.1. General Error Messages

Errors are reported through the console as general statements or error codes. The code describes where the test was when the error occurred. If a command error occurs, all available information is displayed. (See 10.3.2.)

Some error messages describe conditions you may be able to correct. For instance:

INVALID INPUT, PLEASE TRY AGAIN
An input cannot be translated properly (such as an letter used where a number was required)

THE LINE MODULE TYPE MAY NOT BE USED BY THIS DIAGNOSTIC CHANNEL NUMBER IS NOT WITHIN THE LEGAL RANGE
The selected port is not the MDLM. Reenter number.

CHANNEL WILL NOT INITIALIZE
ENTER PP NUMBER (HEX 00–FF, D = 7)
Selected port is not communicating with IOP. Reenter MDLM port number.

PORT IS LOADER PORT
USE OF CONSOLE PORT IS INVALID
Reenter the MDLM port number.

PP DID NOT COMPLETE IN SPECIFIED TIME
Command or data transfer did not complete in allotted time. Use retry option.

SELECTED DRIVE SIZE IS NON-STANDARD
If no logical blocks are displayed for the indicated track, check that the media has been formatted.

SELECTED L.U.N. (DRIVE) IS NOT PRESENT
The L.U.N. is not configured or cannot respond. Reenter parameter.

ERROR DETECTED ON SEEK TO LAST VALID LOGICAL BLOCK
XXXXXXXX
Seek was done to highest logical block and an error was returned. Reformat drive.

Errors in all tests are displayed in the following format. Your Sperry representative may request information from this display.

    (general statement of error)
    (command descriptor block—CMD LOG.BLK COUNT
    I/O/ status — CMD DATA FLAG CNT DEVC SCSI
    expected: (AAAA) (BBBB) (CCCC) (DDDD) (EEEE) (FFFF)
    received:
    *sense bytes, if available

where:

    AAAA = Line module status for command transfer from line module to SCSI controller

    BBBB = Line module status for data transfer between MDLM and SCSI controller

    CCCC = Flag word for tracing port processor operations

    DDDD = Number of bytes transferred between the line module and the SCSI controller on
             a read or write

    EEEE = Device error status

    FFFF = SCSI error status

*sense bytes	vld	ky/	blocks	ecc/rtry
	v000	0v00	0000 0000	0000 0000

vld

vXXX If v = 7, then sense command completed but only sense key is valid
      If v = F, then command completed and data valid
      If v = 8, then sense command did not complete but sense key is valid
      If v = 0, then sense command did not complete or sense data is not available

ky

XvXX If v = 3 (media error), insert new media. If v = 7 (write-protect), alter write-protect
      tab on media.

v =   Search/no find 0
      Recoverable error 1
      Media error 3
      Hardware error 4 Write-protect 7
      Format complete 9
      Search/found C
      Volume overflow D

11.2.2. Error Information Display

The following messages are part of the error information display and are followed by a command descriptor block:

    BAD STATUS FROM READ DEVICE TO ID COMMAND

BAD STATUS FROM REZERO UNIT COMMAND BAD STATUS FROM SEEK COMMAND

BAD STATUS FROM RESERVE UNIT COMMAND

BAD STATUS FROM RELEASE UNIT COMMAND

BAD STATUS FROM READ SENSE COMMAND

BAD STATUS FROM MODE 1 READ COMMAND

BAD STATUS FROM MODE 1 WRITE COMMAND

BAD STATUS FROM MODE 0 LOOPBACK READ COMMAND

BAD STATUS FROM MODE 1 LOOPBACK READ COMMAND

BAD STATUS FROM MODE SELECT COMMAND

BAD STATUS FROM FORMAT COMMAND BAD STATUS FROM INQUIRY COMMAND

BAD STATUS FROM STOP COMMAND

Following is a sample of an error information display, described in the next page. This information is presented to acquaint you with the type of information a service representative may request.

BAD STATUS ON SEEK COMMAND

command descriptor block		CMD	LOG.BLK		COUNT		
		0B00	C3A0		0000		
I/O/ status	cmd	data	flag	cnt	devc	scsi	
expected =	0000	0000	00A7	0000	0000	0000	
received =	0021	0000	00A7	0000	0200	0000	
*sense bytes	vld	ky/	blocks	ecc/rtry			
	F000	0500	00C3 A000	0000 0000			

seek was to logical block 0000C3A0
last seek was to logical block 00000042

command descriptor block	CMD	LOG.BLK	COUNT:
	0000	0000	0000

I/O/ status	cmd	data	flag	cnt	devc	scsi:

sense bytes	vld	ky/	blocks	ecc/rtry
	v000	0v00	0000 0000	0000 0000

ky
XvXX

If v = 3 (media error), insert new media. If v = 7 (write-protect), alter write-protect tab on media.

12. Host Channel Interface (SU00039 or SU00208) Test

12.1. INTRODUCTION

The host channel interface diagnostic test checks the byte multiplexer channel between the DCP and a Series 90 processor, verifying that the input/output processor (IOP) of the DCP can communicate with VS/9 via the online diagnostic program, ONCOMM.

All testing in this program is done in the host processor. The DCP only feeds data to the host for testing, either turning data from the host around and sending it back or generating data and sending it to the host for examination.

12.2. TEST PROCEDURE

Before running the test, you must select configuration and execution parameters. (You can select the default value parameter by pressing XMIT.) All input for this test must be in hexadecimal code. Precede hexadecimal quantities with an X.

Pressing FUNCTION plus F1, F2, or F3 will transfer control to another address during this diagnostic.

■ FUNCTION plus F1 returns the program to the system executive and calls in a new program.

■ FUNCTION plus F2 or F3 returns the program to the start of the test.

1. When you select the host channel test from the diagnostic menu, the screen displays this:

   CPA FAMILY DIAGNOSTIC ROUTINES. RELEASE R5.1
   HOST CHANNEL INTERFACE (SU00039 or SU00208) TEST

   Enter the PORT NUMBER (in hexadecimal)

   Enter the host channel interface port number (7 in a standard DCP configuration) and press XMIT. You will see this message:

   ****Port Processor Initialization Complete***

2. The next two prompts request the input/output channel entries:

   Enter input (to DCP) DEVICE ADDRESS in hexadecimal

   Enter output (to Host) DEVICE ADDRESS in hexadecimal

   Press XMIT.

3. If the SU00039/SU00208* line module port number and device addresses are correct, the following message appears:

    ID = X04 — SU00039 HOST I/F (PRIMARY PORT)

    If they are incorrect, a message will tell you that the information is invalid. If you press XMIT, this display appears:

    What do you want to do (default = 1)
    Return to EXEC (0) or Restart the Test (1)

4. The next prompt requests the microcode load:

    THIS LINE MODULE MUST BE LOADED FROM THE MICROCODE DISKETTE.
    PLACE THE MICROCODE DISKETTE IN THE IFDC.
    PRESS TRANSMIT TO CONTINUE.

    When you press XMIT, the microcode is read from diskette 1 and loaded into the SU00039 SU00208 line module. Load status is reported as:

    X58 = Microcode is loaded.
    X00 = Line module requires loading.
    XEF = Line module is loaded but not operational.

5. If the microcode loads successfully, you see this message:

    PLACE THE MACRODIAGNOSTIC DISKETTE BACK IN THE IFDC.
    PRESS TRANSMIT TO CONTINUE.

    ENTER PATTERN (X0000–XFFFF, D = 0000)

    Enter the test pattern.

    NOTE: The host and processor must have the same data pattern entered in order to compare data.

6. Next, select the buffer size and press XMIT.

    BUFFER SIZE, (0 = SMALL, 1 = LARGE, D = 1)

    A small buffer contains 64 words, a large buffer contains 1,000 words. Be sure to set the same size buffer for host and processor.

_____

* The SU00039 line module interfaces with Series 9000 systems. It does not interface with Series 1100 systems. The SU00208 line module will interface with both systems.

7.   All the parameters are set correctly when you see:

     PROGRAM IS CYCLING WAITING FOR COMMAND FROM HOST

     The program is now ready to start the test. Only error information sent from the host will
     be displayed from this point. The host determines the end of the cycle count and notifies
     you when job and run are finished by displaying:

     END OF JOB
     END OF RUN

8.   To restart the test once it has completed, press START and respond to the following
     prompt:

     RESTART (0 = SAME PARAMS 1 = CHG PARAMS DEFAULT = 0)

     If you change any parameters, remember that data pattern and buffer size must be the
     same for processor and host.

12.3. ERROR REPORTING

All error codes are reported to the console and will appear in the DISPLAY window. The first
two zeros will be dropped and the only the last two digits are displayed. If an error occurs when
you are setting parameters, a self-explanatory description of the error appears on the console,
but there is no accompanying code.

While the test is running, the host will display an error code with a description on your console.

   0001
   There was no response to the read of the LMID. The I/O timed out.

   0002
   The input command terminated because no buffer was available.

   0003
   The input command terminated with a parity error.

   0004
   The input command terminated in an overflow.

   0005
   The input command terminated in an offline condition.

   0006
   The input command terminated because the input limit was exceeded.

   0008
   The input command terminated with an input timeout on the channel.

   0009
   The output command terminated with an output timeout on the channel.

000A
An attempt to initialize the port processor failed.

000B
An attempt to set the line module online resulted in a timeout.

000C
An attempt to read the microcode ID resulted in a timeout.

000D
An invalid microcode ID was received. Valid responses are:

    58 =   SU00039 Line module
    EF =   Microcode loaded but requires activation
    00 =   Microcode requires loading
    R1 =   Returned value

000E
An attempt to load the device addresses into the line module resulted in a timeout.

0012
The input command terminated in a system reset.

0013
The input command terminated in a selective reset.

0014
The input command terminated because an interface disconnect was received from the channel.

0015
The input command terminated because no command was received from the host.

0016
The input command terminated because data was lost on the channel.

0017
The output command terminated because data was lost on the channel.

0018
The output command terminated because of an illegal offline operation.

0019
The output command terminated in a system reset.

001A
The output command terminated in a selective reset.

001B
The output command terminated because an interface disconnect command was received from the channel.

001C
The output command terminated because no command was received from the host.

001E
An attempt to activate the microcode resulted in a timeout.

001F
Incorrect microcode file was read from the diskette.

0020
The subdirectory could not be found on the diskette.

0021
An attempt to initialize the port processor prior to loading the microcode resulted in a timeout.

0022
An attempt to load the microcode resulted in a timeout.

0024
An attempt to read a sector from the diskette resulted in a timeout.

0026
The channel state byte indicated a system reset, or the attention- failed bit was set and was not expected.

0027
After the line module was set online, a test of the channel state indicated that it was offline.

13. IFDC Copy Utility

13.1. INTRODUCTION

The IFDC copy utility enables you to make copies of diskettes using the integrated flexible drive in the DCP enclosure (8-inch diskettes on the DCP/10 and 5¼-inch diskettes on the DCP/10A and DCP/15).

13.2. COPY PROCEDURES

Before using this utility, you must first prep the receiving diskette for single-sided, single-density operation, using an external peripheral device. A message will remind you of this later.

To enter the utility, select option 9 from the main diagnostics menu. Screen 1 will appear on a DCP/10; screen 2 will appear on a DCP/10A or DCP/15.

Screen 1:

```
                CPA FAMILY DIAGNOSTIC ROUTINES. RELEASE R5.1
                           IFDC COPY UTILITY



                                **** NOTE ****

        >THIS UTILITY REQUIRES A DISKETTE FOR OUTPUT WHICH HAS BEEN
        >PREPPED FOR SINGLE-SIDED, SINGLE-DENSITY OPERATION. DISKETTES
        >CANNOT BE PREPPED USING THE IFDC. DATA WHICH HAS BEEN
        >MARKED AS DELETED ON THE DISKETTE TO BE COPIED WILL BE
        >MARKED AS VALID DATA ON THE OUTPUT DISKETTE.
        >WHEN READY TO PROCEED, PRESS XMIT KEY.
        >]
```

Screen 2:

```
                CPA FAMILY DIAGNOSTIC ROUTINES. RELEASE R5.1
                           IFDC COPY UTILITY



                                **** NOTE ****

        >THIS UTILITY REQUIRES A DISKETTE FOR OUTPUT WHICH HAS BEEN
        >PREPPED FOR DOUBLE-SIDED, DOUBLE-DENSITY OPERATION. DISKETTES
        >MAY BE PREPPED USING THE MDLM MASS STORAGE TEST.
        >WHEN READY TO PROCEED, PRESS XMIT KEY.
        >]
```

1. When you press XMIT, this prompt appears:

    >ENTER NUMBER OF OUTPUT COPIES (1-9) DEFAULT = 1

2. Press XMIT for a single copy, or enter a number and press XMIT. The screen will display:

    INSERT INPUT DISKETTE
    WHEN READY TO PROCEED, PRESS TRANSMIT KEY

    Insert the diskette you want to copy in the integrated drive and press the XMIT key. The screen will display:

    CPA FAMILY DIAGNOSTICS RELEASE. R5.1
    IFDC COPY UTILITY
    Copy x of x   Track No. xxxxx

    *******READING THE DISKETTE******

    The contents of the diskette are being read into processor storage. You can monitor the progress of the read operation by watching the track number display on the third line of the screen. (The read operation will take approximately 5 minutes.)

3. When the read is complete, the screen displays:

    >REMOVE INPUT DISKETTE, INSERT OUTPUT DISKETTE
    >PRESS XMIT KEY WHEN READY

4. After you have inserted the blank diskette in the drive and pressed XMIT, the screen will display:

    ********WRITING TO THE DISKETTE********

    (This requires about the same length of time as the read operation.)

5. When the first copy is completed, the prompt will tell you to insert a new diskette in the drive (if you selected more than one copy). If the process is complete, the screen will display:

    TOTAL NUMBER OF COPIES ARE COMPLETED

    Press XMIT to return to the main diagnostics menu.

13.3. ERROR MESSAGES

Errors reported through the IFDC copy utility are limited to those occurring in the integrated diskette drive and to media errors indicated by bad status following an I/O operation. Port processor hardware and program errors are reported from the executive program, not from the utility.

If the utility finds deleted data when reading the input diskette, it writes the data to the output diskette as valid data. The copy is not treated as an error and can affect later use of the output diskette, depending on the application. The utility reports only the first instance for each copy routine:

    *** WARNING *** DELETED SECTOR FOUND ON INPUT DISKETTE

14. Local Language Translate Utility

14.1. INTRODUCTION

This utility allows you to translate all diagnostic prompts and messages into languages other than English.

Once you translate a diagnostic routine, it exists on the diskette only in its translated form. The original is overwritten. Make a copy of the original diagnostics diskette and a translated version.

14.2. UTILITY PROCEDURES

1. Make a backup copy of the diskette that will be translated.

2. Place the diskette to be translated in the integrated drive.

3. Display the main diagnostics menu and select option 2, LOCAL LANGUAGE TRANSLATE UTILITY

   The screen will display:

   CPA FAMILY DIAGNOSTICS ROUTINES. RELEASE R5.1

   LOCAL LANGUAGE TRANSLATE

   SERVICE OPTIONS ARE
   1 = TRANSLATE DISPLAY
   2 = UPDATE MEDIA AND EXIT
   3 = EXIT UTILITY

   SELECT OPTION (1–3)

   Select your option and press XMIT. (The options are described in 14.2.1.)

14.2.1. Description of Utility Options

Change messages through option 1, TRANSLATE DISPLAY, store changes on diskette through option 2, UPDATE THE MEDIA AND RETURN, and return to the main diagnostics menu through option 3, EXIT UTILITY.

1. TRANSLATE DISPLAY

The display lists each diagnostic test and the executive message element. Select the test you wish translated by entering the corresponding number and pressing XMIT.

The message file is displayed one phrase at a time. Press XMIT until you reach the message you want to change. The message is displayed in the first line and cursor positioned in the second line. If you wish to change the message, type in the entire phrase the way you want it to appear. Press XMIT. The change is echoed back in the third line. You may enter a maximum of 72 characters per phrase.

NOTE: Don't be confused by the error messages that are included in the Executive Message Element. (If an actual error occurs, the message will be accompanied by additional lines of information.)

While in TRANSLATE DISPLAY option, use:

■ The MSG WAIT key to reverse the scrolling direction actuated by the XMIT key. (SCROLL SWITCH FORWARD is in effect from the time the message file is loaded until you XMIT to the last message in the file. If you press MSG WAIT before the last message or press XMIT after the last message, SCROLL SWITCH BACKWARD is in effect.)

■ The FUNCTION and F2 keys to redisplay the current message. o FUNCTION and F3 keys to exit the utility and update the media.

■ The FUNCTION and F4 keys to return to the utility menu.

Using the FUNCTION and F3 keys is useful if you are interrupted before finishing the message file. This stores what you have already completed and returns you to the main diagnostics menu. However, it flags the message you had just completed, so that when you reenter the utility and the same message file, this is displayed:

>THE MESSAGE FILE LOADED HAS A CONTINUATION INDEX OF : XXXX
>SHALL I CONTINUE WITH THIS INDEX Y/N?

If you enter n, the top of the message file is displayed (complete with any changes you had previously made to the file). If you enter y, the utility returns you to your previous position in the file, the next message that would have been displayed before you exited the utility.

When you are at the end of the message file, use the FUNCTION and F3 keys to store your changes and to return to the main diagnostics menu.

2. UPDATE MEDIA AND EXIT

Use this option to store on diskette the changes you have made to a message file and to return to the main diagnostics menu. (Each message file must be updated individually.)

3. EXIT UTILITY

This removes you from the utility and redisplays the main diagnostics menu.

15. Twisted Pair Terminal Test

15.1. Introduction

The Twisted Pair Terminal Test verifies the integrity of data sent through the Signal Distribution Line Module (SDM), between the twisted pair line module (TPLM) and the terminals. The test will isolate the failing component(s) on the line, which may include up to 24 twisted pair terminals.

The test consists of a sequence of message transmissions from the DCP to the twisted pair line module, to the SDM, to the terminal, and back again (See Figure 15-1). The transfer count and completion status are checked on each transmission. If the message is sent and received correctly, the test continues until its cycle counter reaches zero. If an error occurs, the test will either stop on that error, or continue retransmitting until the cycle counter reaches zero, depending on an operator-selected option.

When the test is running successfully, you can observe the terminal screen being cleared, followed by a 3-line text display. Once the terminal has successfully transmitted the text back to the DCP, one cycle is complete.

NOTE: All numerical selections requested by the test prompts must be entered in hexadecimal characters. Likewise, hexadecimal numerics are used in the test error reports. See Appendix B for hexadecimal/decimal conversion.
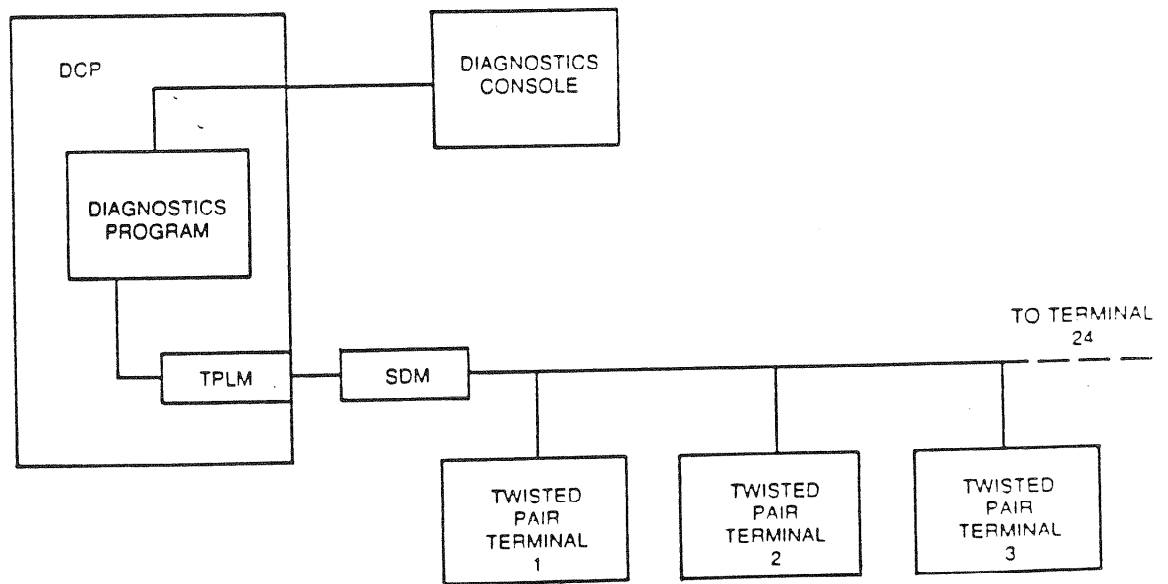

Figure 15-1. Twisted Pair Terminal Test

15.2. Test Procedure

When you select the Twisted Pair Test (item 13) from the main test menu, this display appears:

CPA Family Diagnostics Routines. Release R5.1
Twisted Pair Terminal Test
Microcode Type Being Tested — Twisted Pair

Loading Test Loader Port Processor Code
Loading Test Message File
Enter the Number of Cycles Each Test is to be Executed
(0–FFFF, or I(= Infinite), D = 1)
>[ ]

1.   Select the number of times you want the test to run. Press XMIT.

>Enter Port number in Hex
>[ ]

Enter the port number containing the twisted pair line module. The next display will show
the port number being tested and the microcode ID: (NOTE: The test will automatically
perform an internal loopback test to verify line module operation. If an error occurs during
the loopback, refer to the serial line module test in section 7.)

Twisted Pair Terminal Test
Line Module Number – xxxx
Line Module ID-0065

Loopback Test
Loopback Test Completed
Do you want to specify terminal IDs? (1 = yes, 0 = no), D = yes
[ ]

2.   If you want to designate specific terminals to be tested, press XMIT. If you wish the test
to run automatically on all twisted pair terminals, enter "0" and press XMIT.

3.   If you are specifying terminals, the next screen says:

>Enter up to 24 Terminal IDs (00-FE)—ID,ID...

Enter the 2-digit terminal addresses, separated by commas. (24 addresses maximum.) Press
XMIT.

Once you have specified the terminal addresses, or the test has automatically specified them,
the IDs are listed near the top of the screen. Meanwhile, you are asked how the test should
handle an error encountered on any of the terminals:

1 = Stop on error
2 = Set inactive and continue
3 = Continue on error
Select one option

Selection "1" stops testing if an error occurs on any terminal. Selection "2" sets one error on the responsible terminal and freezes the log until that cycle is complete, then continues testing. Selection "3" continues the test, marking each error until the cycle is completed.

Selection 2 is probably the most useful option for most environments, where the twisted pair terminals are a distance away from the diagnostics console. Problem terminals are noted without stopping rest of the tests and having to restart them.

15.3. Error Reporting

The screen displays an error message, along with the terminal address that was sending or receiving the erroneous data. Three types of errors can be reported: unexpected status errors, data compare errors, or frame count errors.

Unexpected status errors result when the actual reported status differs from that expected by the test. These are displayed in the following format:

> OUTPUT SDT ERROR
> (status message)
> TERMINAL ADDRESS = XX
>
> INPUT SDT ERROR
> (status message)
> TERMINAL ADDRESS = XX

When an output SDT (start data transfer) instruction is initiated, the line module accumulates status conditions until the instruction is completed. Status messages will be one of the following:

OUTPUT STATUS MESSAGES	INPUT STATUS MESSAGES
Response timer	No buffer
Message timer timeout	Input limit
Call cleared	Response timer timeout
Underrun	Message timer timeout
Check state	Call cleared
Status branch	FCS error
	Overrun
	Abort
	Status branch

Data errors occur when the input received by the terminal does not match what was actually sent. These errors are displayed in this format:

> INPUT DATA ERROR
> EXPECTED BYTE = XXXX RECEIVED BYTE = XXXX
> TERMINAL ADDRESS = XX

Frame count status is also reported with completion of the SDT instruction. If you had requested that the test "continue on error", the DCP will attempt to send the unreceived frame back to the terminal. If you had selected "stop on error", press FUNCTION/F2 to continue sending data to the terminal. This is the frame count error display:

FRAME COUNT ERROR
FRAME TERMINAL DID NOT RECEIVE = XXXX
TERMINAL ADDRESS = XX

This library memo announces the release and availability of "UNISYS DCP/15 Unpacking Guide", UP–12248. It is a Customer Set-Up (CSU) item.

The DCP/15 is a customer set-up (CSU) product, intended for the customer to unpack and install. The packaging itself is specially designed. Not only does it provide protection for the unit, it enables the customer to easily remove the 200-lb. processor from its shipping pallet.

This guide is to be packed with the DCP/15, on the outside of the shipping container.

Additional copies of this manual may be ordered through your Unisys representative.

Appendix A.   Line Module/Microcode Identifiers

The following table lists line module identifiers (LMIDs) and their associated microcode identifiers (MCIDs). FXXXX denotes a feature number.

LMID	Line Module	MCID
01	Integrated flexible disk controller (IFDC—256K Bytes)	03
04	SU00039 host interface (primary port) F1947	58
05	SU00039 host interface (secondary port) F1947	—
06	Front end processor interface (FEPI)—host F3882	50
19	FEPI—slave	—
07	Byte interface F3878	07
08	IFDC	08
09	Multidevice (MDLM) F3893	09
11	SU00057 host channel (32 bit) F1946	11
12	Intercomputer channel (16 bit)	12
14	SU00208 block multiplexer (primary port)	14
15	SU00208 Block multiplexer (secondary port)	—
38	Automatic dialer F1945	38
40	Asynchronous F1941	*
44	Multiline (4X1) asynchronous F3165	59
50	Synchronous F1942	*
54	Multiline synchronous F3837:	
	UNISCOPE	4E
	UDLC	4F

---

*Both of these line modules return a hardware ID of 50 following either power-on or master-clear. After they are loaded with operating parameters, they return an ID of 50 if the parameters are synchronous and an ID of 40 if the parameters are asynchronous.

LMID	Line Module	MCID
60	Medium speed loadable (MSLLM) F3163 (RS-449)	
	Basic asynchronous	20
	Basic synchronous	24
61	MSLLM (X.21)	
	Basic synchronous	25
	UDLC	29
63	MSLLM (RS-232/trend adapter)	
	Basic asynchronous	20
64	Direct connect single station (DCSS) F3847	70
65	Twisted Pair (F4230-00)	27
67	MSLLM (RS-232-C)	
	Basic asynchronous	20
	Basic synchronous	24
	UDLC	28
6F	MSLLM (no cable)	—
70	High speed loadable (HSLLM) F3164 (RS-449)	
	Basic synchronous	26
	UDLC	2A

LMID	Line Module	MCID
71	HSLLM (X.21)	2B
	UDLC	2B
	1100 FDX	33

Microcode ID 00 = Line module microcode not loaded

Microcode ID EF = Microprogram was loaded but requires an end-of-function (EOF — 4 bytes of 00 and 1 byte of FF) to operate. The ROM microcode still has control.

Microcode IDs F0 through FF = An error was detected during the microprogram load, and the line module is not operational.

Appendix B.   Hexadecimal Conversion Chart

		DATA CHARACTERS								HEXADECIMAL				
CONTROL CHARACTERS		64 CHARACTERS (UPPERCASE)				32 CHARACTERS (LOWERCASE)								
0	1	2	3	4	5	6	7		LEFT DIGIT				RIGHT DIGIT	
0	0	0	0	1	1	1	1	7	BINARY BIT NUMBER					
0	0	1	1	0	0	1	1	6						
0	1	0	1	0	1	0	1	5/4	3	2	1			
NUL 000	DLE 020	SP 040	0 060	@ 100	P 120	` 140	p 160	0	0	0	0		0	
SOH 001	DC1 021	! 041	1 061	A 101	Q 121	a 141	q 161	0	0	0	1		1	
STX 002	DC2 022	" 042	2 062	B 102	R 122	b 142	r 162	0	0	1	0		2	
ETX 003	DC3 023	# 043	3 063	C 103	S 123	c 143	s 163	0	0	1	1		3	
EOT 004	DC4 024	$ 044	4 064	D 104	T 124	d 144	t 164	0	1	0	0		4	
ENQ 005	NAK 025	% 045	5 065	E 105	U 125	e 145	u 165	0	1	0	1		5	
ACK 006	SYN 026	& 046	6 066	F 106	V 126	f 146	v 166	0	1	1	0		6	
BEL 007	ETB 027	' 047	7 067	G 107	W 127	g 147	w 167	0	1	1	1		7	
BS 010	CAN 030	(050	8 070	H 110	X 130	h 150	x 170	1	0	0	0		8	
HT 011	EM 031	) 051	9 071	I 111	Y 131	i 151	y 171	1	0	0	1		9	
LF 012	SUB 032	* 052	: 072	J 112	Z 132	j 152	z 172	1	0	1	0		A	
VT 013	ESC 033	+ 053	; 073	K 113	[133	k 153	{ 173	1	0	1	1		B	
FF 014	FS 034	, 054	< 074	L 114	\ 134	l 154	¦ 174	1	1	0	0		C	
CR 015	GS 035	- 055	= 075	M 115	] 135	m 155	} 175	1	1	0	1		D	
SO 016	RS 036	. 056	> 076	N 116	^ 136	n 156	~ 176	1	1	1	0		E	
SI 017	US 037	/ 057	? 077	O 117	_ 137	o 157	⌷ 177	1	1	1	1		F	

RID SID DID LS

Figure B-1.   Hexadecimal Conversion Chart

Appendix C. Resident Utilities: Memory Map and Configuration Table

The resident utilities contain several types of system functions, most of which are useful only to a Sperry representative. This appendix is included primarily for your use in displaying the memory map and line module configuration table, a utilities command. .

C.1. ACCESSING THE UTILITIES

1. To access the utilities, press the FUNCTION and F1 keys. (This may be done from the main menu or during the execution of any diagnostic test.) The following appears:

    1 =   Continue the test
    2 =   Abort current activity and reinitialize the EXEC
    3 =   Hold current activity and use the RESIDENT UTILITIES

2. Enter 3 and press XMIT. The screen will display:

    RESIDENT UTILITIES — ENTER COMMAND

3. Enter DC and press XMIT. This display appears:

                CPA FAMILY DIAGNOSTIC ROUTINES RELEASE R5.1

                      DISPLAY: CONFIGURATION TABLE

    DISPLAY OPTIONS
        1 — EXIT DISPLAY ROUTINE
        2 — DISPLAY THE MEMORY MAP
        3 — DISPLAY THE LINE MODULE COMPLEMENT

    Enter option (1–3) Default is 2:
    Press TRANSMIT to continue

If you enter 1, you return to the first utilities display and may exit the utility by entering EX.

If you enter 2, the screen displays the memory map. (See C.2.)

If you enter 3, the screen displays the line module ID code under each port number. (See C.3.). Appendix A lists each of these codes and the corresponding microcode ID.

C.2. MEMORY MAP

The memory map display appears like this:

> The Memory Map reads from the left (Lowest Address)
> with each character representing 64K Bytes of storage.
> A "1" indicates Error-free storage, while a "0"
> indicates storage errors, or non-existent storage.

RANGE	STORAGE	RANGE	STORAGE
000000 to 0FFFFF	1111111100000000	100000 to 1FFFFF	0000000000000000
200000 to 2FFFFF	0000000000000000	300000 to 3FFFFF	0000000000000000

> Press TRANSMIT to continue

Each time you press XMIT, two more lines are displayed. The message End of memory map entries appears when the entire storage range has been displayed.

C.3. RUN CONFIGURATION

You must run this utility if you had initially aborted the build routine after loading diagnostics (4.2) and now want to display the configuration table or run either the system test or serial line module test.

1.   Enter RC in the resident utilities.

      A message will inform you that the build is complete. You may now display the table using the "Display Configuration" utility.

C.4. CONFIGURATION TABLE

The line module configuration table appears like this:

> Each number displayed in a port number column is a
> Line Module I.D. code which identifies the L.M. type.
> Refer to the table of I.D. codes located in the manual
> to find a specific Line Module Type.
>
> PORT: 00 01 02 03 04 05 06 07
>
> LMID: xx xx xx xx xx xx xx xx
> Last port found with line modules

NOTE: If 00 is displayed beneath any port number in which a line module resides, the module is defective and must be replaced by a Sperry representative.

FF indicates the port through which the system console is attached.

Refer to Appendix A for a list of the line module identifiers.

Glossary

NOTE: The SPERRY DCP Series Systems System Reference, Volume I, UP-8720, provides complete information on DCP terms and procedures used in this book.

Address	Information for the system to locate something in memory. Several types of addressing are used in a system, with one type often translated to another as part of the storage or retrieval process. Byte addresses are grid coordinates that label each location on a given memory board. The processor uses one system of real addresses to label locations on all boards in local storage. When the processor requests a piece of data from a real address, logic on the appropriate memory board converts the real address to the correlating byte address and retrieves the data there. Virtual addresses are locations in virtual storage where a system user can send or find data. Virtual storage is limited by the system's addressing scheme and the amount of storage not needed for system operations.
Arithmetic logic unit (ALU)	A part of a computer that performs both arithmetic (adding, subtracting, etc.) and logic (comparing, selecting, etc.) functions.
Array	The basic unit of memory in the DCP system is 128K bytes of storage. An array represents one quarter of the storage capacity of a bank, 512K bytes, but not a specific quadrant such as the upper left.
BIOC	Byte input/output controller.
Byte interface	The line module that serves communication between the processor and any 8-bit peripheral.
Check bits	A series of 6 bits attached to a piece of stored data indicating its pattern of 0's and 1's. Comparison of this stored pattern with a pattern calculated upon retrieval can tell if the data has had one or more bits flipped. See syndrome.
CLC	Communications line controller. This controls input/output between the terminal or peripheral device and the processor memory. Also called the input/output processor (IOP).
Configuration	A specific connecting order in which components of a system can find and gain access to each other.
Directory	Information arranged in a specified order, as in disk directory.
EI	External interrupt

EOF   End of function. A code (four bytes of FF and one byte of 0) that tells the receiving processor unit that the preceding action is complete.

ESI   Externally specified index

Executive   The part of the diagnostics program that controls loading and service requests for the diagnostics tests and utilities.

Exigent event   Exigent events are serious hardware or software failures, or other important events. They require the immediate services of the communications processor to maintain system processing or to enforce architectural security. When an exigent event occurs, the normal program sequence is suspended, processing states are saved, and a forced call is made to a programmed procedure. Status is also stored to permit the called procedure to analyze the event and take an appropriate course of action. When servicing an exigent event is not possible, processing reverts to an error-recovery routine that reinitializes the system and accomplishes a new program load. *See queued events.*

ID   Identifier.

Integrated flexible diskette controller (IFDC)   The line module that controls reading from and writing to the diskette inserted in the integrated drive inside the DCP/10. It also serves as the DCP/10's loader.

Integrated communications processor (ICP)   A DCP/10A that is configured within a host processor and operates only as communications device, relaying and distributing data and instruction transfers entering and exiting the host.

Instrumentation call   The processor gathers information for performance analysis and software debugging. Instrumentation functions selectively record software execution and other internal events, format the information into instrumentation words, store them in buffers, and uses them to trace messages or to process steps throughout all elements of the system. An instrumentation call is a command to gather some of this information.

IOP   Input/output processor. Prefered term for communications line controller.

Line module   One, two, or three printed circuit assemblies (PCAs) combined in a unit and used for either serial or parallel communications to peripheral devices or terminals. The PCAs are in the CLC line module chassis.

Macrocode   The part of a program's code that controls series of actions.

Menu   A list of choices, displayed on the screen.

Microcode	Machine-level programs embedded or loaded into the components of the system, that supply the instructions on how a higher level program is to be implemented. For instance, macrocode may require a copy function to be performed; microcode sends the appropriate messages to the appropriate locations on how to implement the command.
Multiple device line module (MDLM)	The line module in the DCP/10A and DCP/15 that controls the integrated drives.
POC test	Power-on confidence test.
Port	The logical channel through which data input and output occurs. The port in a DCP is a physical location where a line module resides, that is linked to a logical position on the backpanel.
Port processor (PP)	Architecturally-defined processing element, using an instruction repertoire tailored for input/output operations.
Process control event	A condition that is not an error but must be resolved by the program executive before normal processing can continue.
PTS	Peripheral testing sequencer (Series 1100 diagnostics package).
Queued events	One of two kinds of special events (the other being an exigent event) requiring system attention. A queued event is one that has been delayed until it can be processed and has been put in a system queue list (SQL). Queued events do not require immediate communications processor attention or cause suspension of current program execution.
RAM	Random access memory — stored information that can be entered and read at any point.
RCA	Remote control adapter line module. Connects DCP to a remote control module.
RCM	Remote control module. Enables remote power reset and load control of the DCP.
RID	Remote identifier.
ROM	Read-only memory. Nonaccessbile coded instructions, generally for machine-level functions.
RTC	Real time clock.
SCR	System control register.
SCT	System control table.
SD	Segment descriptor.
SDT	The start-data-transmission signal.

SID	Site identifier.
SQL	System queue list.
SST	System segment table.
Specification error	A condition that does not comply with the architectural requirements of the processor.
Syndrome	The difference between the transmitted check bits and the stored check bits. The processor decodes the syndrome and uses it to find and invert a faulty bit, or to detect and report a double-bit error.
Time-out	Suspension of a process because an input is not received in a specified period of time.
UDLC	Universal data link control. A communications protocol.
UTS	Universal terminal system. A family of Sperry hardware.