Honeywell

Test Systems Executive

SW13-510

Total Plant

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LCN Service - 3

Test System Executive

SW13-510
3/96

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About This Publication

This manual documents the use of the Test System Executive (EXEC), a common set of software functions shared by several TDC 3000^X test systems. It is provided as a reference for trained technicians and is intended to supplement TDC 3000^X service training, not replace it.

Following is a summary of the contents of each section of this document.

Section 1—Introduces you to the characteristics and uses of the Test System Executive. It also provides a list of related publications and an explanation of recent changes.

Section 2—Provides the information necessary for the loading, setup, and execution of test and exerciser programs that run under this executive.

Section 3—Provides information about advanced features of Test System Executive that are of use mainly to factory technicians or to test program developers.

Appendix A—Provides interpretation of key status registers that can be referenced in test program alarm messages.

Appendix B—Provides additional information on Test System Executive data entry rules and conventions.

Appendix C—Provides information on test network setup restrictions.

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INTRODUCTION
Section 1

This section introduces you to the characteristics and uses of Test System Executive (EXEC). It also provides a summary of recent changes to the product and a list of related publications.

1.1 WHAT EXEC IS AND WHAT IT DOES

The Test System Executive (EXEC) is a common executive program shared by several of the TDC 3000^X hardware test systems. Individual test programs within each test system will vary although some programs appear in more than one test system.

The test programs generally are subdivided into individual tests that are designed to exercise specific functions within the subsystem. The service technician controls the operation of the test system by keyboard entry of commands that specify the hardware to be tested and the number and sequence of tests to be run.

A Test Operator Control Station (TOCS) is required for the loading, execution, control, and test results recording. This normally is a TDC 3000^X Universal Station (or Universal Work Station) consisting of an electronics module, a CRT, a floppy diskette drive or a cartridge drive, and an engineer and/or operator (or supervisor) keyboard. The Universal Station screen and keyboard can be replaced with an RS-232C compatible input-output device (a keyboard for input and a printer or CRT for output) attached to its MCPU port.

The following is the typical use-scenario:

- Load the test system (including EXEC) into the selected TOCS (from floppy or from cartridge disk)
- Set system date and time
- Download the test system into selected node(s) on the LCN (from floppy or from cartridge disk)
- Using the TOCS, establish common test-program parameters in all the nodes and custom parameters at individual nodes; then begin test operation
- Test results for each node are reported at TOCS as they occur or may be queued for later display

1.2 REFERENCES

The following are other TDC 3000^X publications that will be of use during installation and maintenance of TDC 3000^X systems.

Publication Title	Publication Number	Binder Title	Binder Number
Maintenance Test Operations	SW11-502	LCN Service – 1	3060-1
Universal Station Service	US13-500	LCN Service – 1	3060-1
History Module Service	HM13-501	LCN Service – 2	3060-2
Five/Ten-Slot Module Service	LC13-500	LCN Service – 2	3060-2
Dual Node Module Service	LC13-510	LCN Service – 2	3060-2
System Startup Guide - Cartridge Drive		Implementation/ Startup & Reconfiguration - 1	3030-1
Hardware Verification Test System	SW13-511	LCN Service – 3	3060-3
Core Module Test System	SW13-512	LCN Service – 3	3060-3
LCNI Network Communications Test	SW13-508	LCN Service – 3	3060-3
LCN System Checkout	SW20-510	LCN Installation	3025
Universal Work Station, Installation Operation and Service	UW02-500	LCN Service – 2	3060-2
Process Manager/Advanced Process Manager Service	PM13-501	PM/APM/HPM Service – 1	3061-1
Process Manager Test Executive (PMEX)	PM13-520	PM/APM/HPM Service – 2	3061-2
Process Manager Test System (PMTS)	PM13-510	PM/APM/HPM Service – 2	3061-2
Process Manager Module Test System (PMMTS)	PM13-505	PM/APM/HPM Service – 2	3061-2

1.3 RECENT CHANGES

None.

TEST SYSTEM LOADING AND SETUP
Section 2

This section provides the information necessary for the loading, setup and execution of test system programs.

2.1 SYSTEM-LEVEL ISSUES

The TDC 3000^X hardware test systems are intended to serve two different functions for the field user. First, they can be useful for the post-installation system checkout before loading operational (personality) software. Later, after the operational software has been loaded, they can be used as limited troubleshooting aids.

Subsection 2.2 describes differences in preparation for, and loading of, test systems under the two circumstances.

2.1.1 Keyboard and Display Options

The primary method of test system input/output is through the product I/O devices; that is, the Universal Station (or Universal Work Station) CRT and keyboards (see Figure 2-1 and Figure 2-2 for illustration of the Operator/Supervisor keyboard keys that are recognized by EXEC); however, the use of an I/O device attached through the TOCS' RS-232C port is still supported and may be useful. For example, the product I/O subsystems of the TOCS cannot be used for communication while they themselves are under test.

The initial `'test system name' Started` message at the TOCS is reported on the same I/O device that was used to initiate the program load. This I/O device can be used for all further operator communication, or a different device can be selected.

To request a prompt for single-target* operator input, or to select a different I/O device, press the following key on the desired keyboard:

- Escape key on the RS-232C Keyboard
- Select key on the Operator's or Supervisor's Keyboard
- Escape key or Select key on the Engineer's Keyboard

To request a prompt for a multinode** operator input, or to select a different I/O device, press the following key on the desired keyboard:

- Line Feed key on the RS-232C Keyboard
- Tab key on the Operator's or Supervisor's Keyboard
- Line Feed key or Tab key on the Engineer's Keyboard

*Single-target operator input means the command entered goes to the active node.

**Multinode operator input means the command entered goes to the network, if applicable.

To signal completion of the input line, press the following key:

- Return key on the RS-232C Keyboard
- Enter key on the Operator's or Supervisor's Keyboard
- Return key or Enter key on the Engineer's Keyboard

2.1.2 Printing Option

If a printer is connected to a US or UWS being used as the TOCS, all prompts, operator entries, messages, and alarms can be printed, as well as displayed, on the CRT. All text entry is displayed on the CRT as it is typed, but the entered keystrokes are not printed until completion of the input line is signaled by pressing the RETURN or ENTER key.

The initial state of the printer is "enabled"; thus the test system Started message is reported on both the screen and the printer, if present. If there is no printer, or if the printer has no paper, is off-line, or is otherwise disabled, a 1-time-only message is reported on the screen (no operator action is required).

At the Operator or Supervisor's Keyboard—to stop printing, press CANCL PRINT; to restart the printer, press the PRINT DISP key. At the Engineer's Keyboard—to quit printing, press CONTROL and Q; to restart the printer, press CONTROL and P.

Whenever the printer state is changed between "enabled" and "disabled," a 1-line message is printed and displayed to record the change. The two messages are

```
dd-mmm-yyyy hh:mm:ss Node nn   *** PRINTER STOPPED ***
dd-mmm-yyyy hh:mm:ss Node nn   *** PRINTER STARTED ***
```

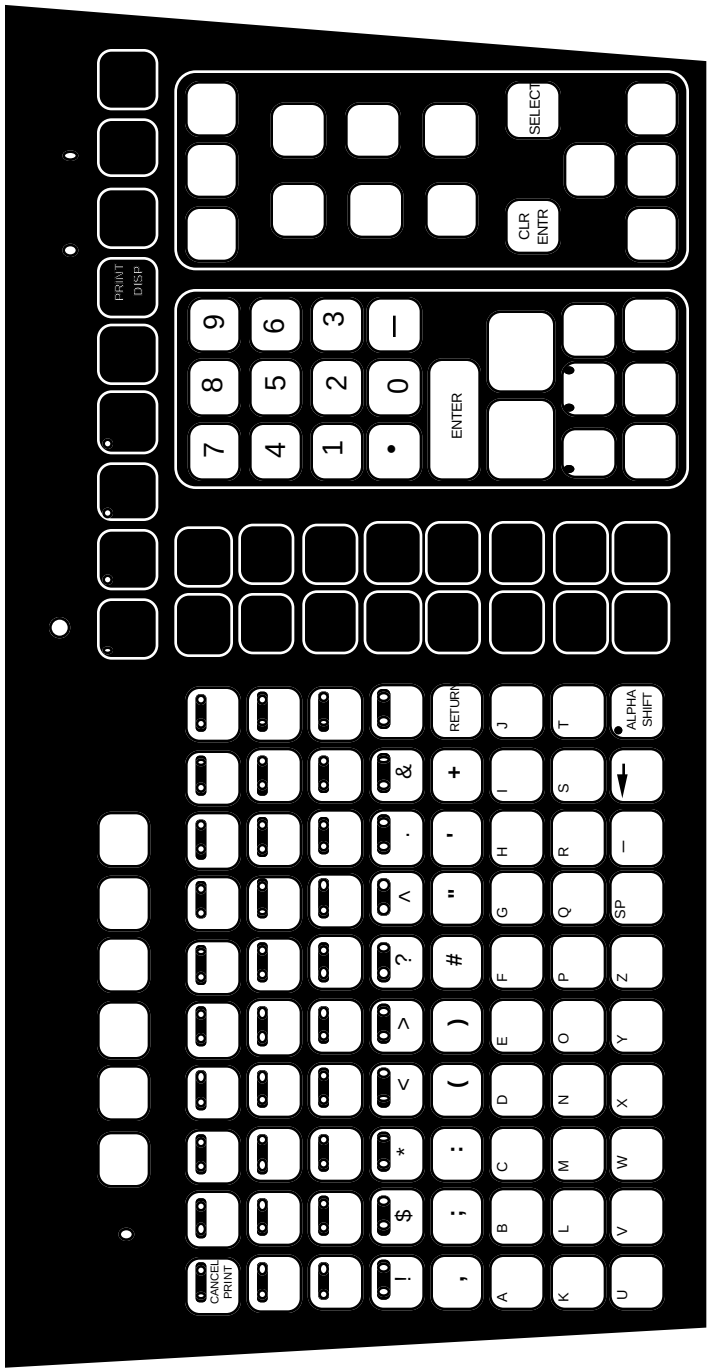

Figure 2-1 — Keys Used by EXEC on Operator or Supervisor Keyboards 2472

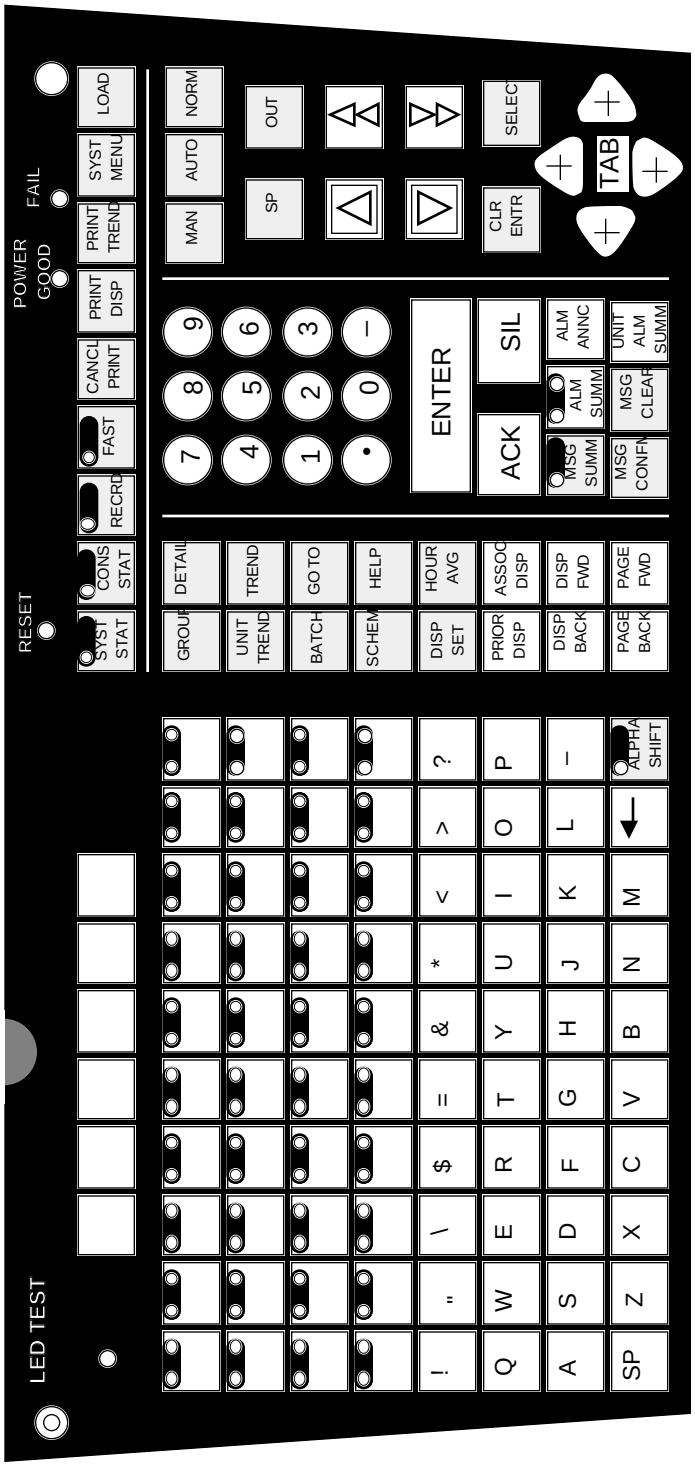

Figure 2-2 — Keys Used by EXEC on Operator or Supervisor Keyboards

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2.2 LOADING THE TEST OPERATOR CONTROL STATION

WARNING

If the RNOS-based operational software is running in any nodes in the system, the nodes to be tested and the node to be used as the TOCS must be taken out of service before the loading of test system software can begin. To accomplish this, the process operator sends shutdown messages to the selected nodes.

EXEC is packaged together with the test system software it supports (HVTS and CMTS) on both floppy diskettes and cartridge disk. Packaging of these test systems is as follows:

Test Software	Floppy Diskettes	Cartridge Disk
HVTS	51150670	51152049
CMTS	51150354	51152049

The following describes loading procedures to be followed with standard TDC 3000^X system configurations.

2.2.1 Loading the TOCS from Floppy Diskette

1. Press the RESET button on the Operator Keyboard at the Universal Station to be used as the TOCS. After the hardware and firmware self-tests run, the prompt ">" and the cursor are displayed on the Universal Station screen.

2. Press the LOAD button on the Operator Keyboard. The following prompt is displayed:
   ```
   N,1,2,3,4,X?
   ```

3. Insert the first HVTS (or the single CMTS) diskette into floppy drive 1, key in the drive number 1, and press the ENTER key (using either the Engineer or Operator Keyboard). At the next prompt, enter the capital letter L (for LOAD) and press the ENTER key. Another prompt is issued if a second floppy is required to complete the load.

4. When finished, the loader responds with a load-completion message and begins execution of test system with display of revision date and revision level similar to the following:

   ```
   Hardware Verification Test System, dd-mmm-yyyy Rel 5.n, Dwg 51150670 Rev n
   TDC 3000 HVTS Executive, dd-mmm-yyyy Rel 5.n started in node xx as TOCS
   ```

Loading of the TOCS is complete and it is now ready to accept command-line entries that will load the nodes to be tested and then to select and control the tests you wish to have executed.

2.2.2 Loading the TOCS from Cartridge Disk

1. Press the RESET button on the Operator Keyboard at the Universal Station to be used as the TOCS. After the hardware and firmware self-tests run, the prompt ">" and the cursor are displayed on the Universal Station Screen.

2. Press the LOAD button on the Operator Keyboard. The following prompt is displayed:
   `N,1,2,3,4,X?`

NOTE

See the *System Startup Guide—Cartridge Drive, SW11-504*, for important information on insertion and removal of cartridge disks from the drive mechanism.

3. Insert the test systems cartridge disk into a drive 1, key in the drive number 1, and press the ENTER key (using either the Engineer or Operator Keyboard). At the next prompt, enter the capital letter H (for HVTS) or C (for CMTS) and press ENTER.

4. When the TOCS load is complete, the HVTS startup message appears near the bottom of the US screen.

```
Hardware Verification Test System, dd-mmm-yyyy Rel 5.n, Dwg 51150670 Rev n
TDC 3000 HVTS Executive, dd-mmm-yyyy Rel 5.n started in node xx as TOCS
```

Loading of the TOCS is complete and it is now ready to accept command-line entries that will load the nodes to be tested and then to select and control the tests you wish to have executed.

CAUTION

Before proceeding to the following subsections, which explain the preparation for and execution of the test system in the target nodes, be sure you read and understand the contents of Appendix C, Establishing and Controlling the Test Network.

2.3 MAN-MACHINE DIALOG FUNDAMENTALS

Interactive communication between the test operator and the system allows the operator to have complete control of which nodes and which subsystems within them are to be tested, and the operation of the individual tests to be run. All man-machine communication with the test system consists of a test system-generated message (prompt) on the I/O device, followed by a test-operator response (command line) made through the same device. Each command-line entry follows a prompt (on the same line) and is ended by pressing the RETURN/ENTER key.

2.3.1 Initial System Communication

To begin communication with the test system, (or to resume communication if no prompt is waiting for action) press the ESCAPE/SELECT key on the I/O-device keyboard. The system responds with a prompt in the following form:

```
hh:mm NODE nn name?
```

This prompt indicates the currently selected node (`NODE nn`), the time of day (`hh:mm`), and the currently selected test program (`name`).

The initial prompt after loading of the TOCS is as follows:

`00:01 NODE nn ALL ?` This shows selection of the node used as the TOCS. `ALL` indicates that all test programs in that node are affected by subsystem-level commands.

At this point, tests can be run on the TOCS itself; however, before testing of other nodes can start, you should set the time and date, then load each node with the test system test programs.

NOTE

The example just given—and much of what follows—is based on work with a single-target node. For those cases where you will want commands to affect a predefined group of nodes, a somewhat different initiation and prompt are used. See subsection 2.3.6 for setup and use of multinode commands.

2.3.2 Setting System Date and Time

To set the system time and date, begin by pressing the ESCAPE/SELECT key on the TOCS Keyboard. Following the prompt, enter date and time in the following format:

`CLO dd-mmm-yyyy hh:mm` (Example - `CLO 27-AUG-1985 13:05`)

Press the RETURN/ENTER key to complete the entry.

2.3.3 Target Node Loading

Before a node can be loaded with test system software, it must first be reset. (To prevent a History Module from automatic reboot of RNOS software, first power down its disk drives.) Reset can be done by pressing a node's chassis-mounted RESET button. A more convenient method is to use the Reset command to accomplish this remotely. At the TOCS Keyboard, press ESCAPE/SELECT, and enter the command `RESET [space]` and the node's LCN number, as follows:

`00:01 NODE nn ALL ?` **`RESET xx`** Where xx represents the LCN address of the node to be reset.

Refer to subsection 2.4.1 for additional details on use of the Reset command such as how to reset multiple nodes with one command line.

To load a single node, begin with the test system floppy or cartridge disk mounted in physical drive number one at the TOCS. At the TOCS Keyboard, press ESCAPE/SELECT and enter the command `LOAD [space]` and the node's LCN number, as follows:

`00:01 NODE nn ALL ?` **`LOAD xx`** Where xx represents the LCN address of the node to be loaded.

Please note that in the previous and following examples, the test operator's entries are shown in **boldface** type.

If you are loading from cartridge disk, the system will prompt you to select which test system is to be loaded.

A "LOAD request is in progress" message is issued, followed on successful conclusion by a 3-line "Load completed" message. If a node fails to load, check its chassis-mounted LEDs and 3-window display for indications of self-test-detected problems.

Refer to subsection 2.4.2 for additional Load command information, such as the concurrent loading of multiple nodes, and how to switch floppy drives.

2.3.4 Basics of Test Selection

Test setup and execution in a test node is done from the TOCS. (Remember, unless there is a prompt pending, you start each MMI dialog by pressing the ESCAPE/SELECT key.)

To select a loaded node for test setup and execution, enter the Node command as follows:

`00:01 NODE nn ALL ?` **`NODE xx`**

The next time a prompt is requested (by pressing the ESCAPE/SELECT key), the test system displays the newly selected node's identity.

```
00:01 NODE xx ALL ?
```

One way to change the prompt to act on a specific test program is by use of the command `Device [space],` followed by the name of the desired test program. For example,

```
00:01 NODE xx ALL ?  DEV  FLPY
```

The next prompt displays the following selection:

```
00:01 NODE xx FLPY?
```

Subsystem commands entered while this prompt is in effect affect only the named program and node (e.g., following the preceding sequence, entry of the Run command runs the test program named `FLPY` on only the selected node).

Although the selected test program can now be run (using the default parameters), you normally need to do additional selection of test-execution parameters. This selection process involves use of other test system commands that are explained later in this section; therefore, a close reading and understanding of the balance of this section is recommended before you attempt to run any of the tests.

2.3.5 Command Entry Errors

If the test operator makes an error in a command-line entry, the test system displays error indicators on the following two lines. For example, a garbled test program name would be treated like this:

```
00:01 NODE xx ALL ?  DEV FLYP
                          ^  22
Invalid first parameter value or test program name.
```

The first error line contains a numeric code positioned adjacent to the improper command or parameter. The second line is a brief explanation of the apparent cause. See section 2.8.3 for expanded explanations for each error code.

To recover from an error in the command-line entry, first press the ESCAPE/SELECT key. After the prompt, re-enter the desired information; however, if you discover a keystroke error before completion of an entry (RETURN/ENTER), you can—

At an RS-232C device or the Engineer's Keyboard—simultaneously press the CONTROL key and X (upper or lower case), then restart your entry.

At the Operator's or Engineer's Keyboard—press CLR ENTRY, then restart your entry.

2.3.6 Multinode Commands

Multinode commands enable the operator to send the same command to several nodes on the network with a single entry. Use of multinode commands requires two steps.

1. Use of the Network command (see subsection 2.4.7) to identify which nodes are to receive the multinode commands.

2. The invocation of a command that is to go to those nodes instead of to the single-target node currently selected.

2.3.6.1 Invoking Multinode Commands

Multinode commands are identified by your use of the LINE FEED/TAB key instead of the ESCAPE/SELECT to request the prompt. Instead of the prompt beginning with `NODE nn`, the prompt begins with `NETWORK`. The two prompt types are shown for comparison.

Request	Prompt	Nodes receiving the command
LINE FEED/TAB	`hh:mm NETWORK name?`	All test system nodes specified by previous Network command.
ESCAPE/SELECT	`hh:mm NODE nn name?`	Only `NODE nn`

The currently selected (default) test program specified by `name` is not necessarily the same for both multinode (Network prompt) and single-target (Node prompt) commands. Each prompt type maintains its own default test program name based on its most recent test program name entry. Network-prompted commands go to all of the test system nodes specified by the most recent Network selection, while Node-prompted commands go to only the single node selected by the most recent Node command.

Here are some examples of both prompt types, shown preceded by the requesting key type. As usual, operator entries are shown in bold type.

```
ESCAPE/SELECT   07:30 NODE 23 FLPY? NODE  8
ESCAPE/SELECT   07:31 NODE  8 WINC? RUN  MEMX
ESCAPE/SELECT   07:31 NODE  8 MEMX? NET  10-20
LINE FEED/TAB   07:31 NETWORK ALL ? RUN
ESCAPE/SELECT   07:32 NODE  8 MEMX? CON
LINE FEED/TAB   07:32 NETWORK ALL ? PASS  DHIF
LINE FEED/TAB   07:32 NETWORK DHIF? INT  60
ESCAPE/SELECT   07:33 NODE  8 MEMX? STOP
```

In the above examples, the `RUN MEMX` command in the second entry runs only `MEMX` in `NODE 8` because `NODE 8` is the target of all single-target commands. In the fourth entry, every test program in Nodes 10 through 20 runs because these are the target nodes of all multinode commands. The fifth entry command displays the configuration for only `NODE 8` because it was requested by ESCAPE/SELECT. Had it been requested by LINE FEED/TAB, the configuration for Nodes 10 through 20 would be displayed. The sixth line displays the pass limit for every `DHIF` in Nodes 10 through 20, and the seventh line sets

the log interval for Nodes 10 through 20 to one hour. The last line commands MEMX in NODE 8 to stop running.

The Setup command is not supported as a multinode command. Attempted use is rejected with an error message.

2.3.6.2 Additional Multinode Information

Whenever a multinode command is invoked, the target nodes that are to receive the command are those nodes that are in both the Network List and in the list of nodes that were loaded (as modified by Delete and Add). Thus

```
NET -
```

is an easy way to specify that every loaded node is the target of all subsequent multinode commands. This is the initial Network List value whenever a test system is loaded and started.

If after the Network List has been specified, all specified nodes drop out or are deleted, the next attempted multinode command is alarmed so that a new Network List can be specified.

Similarly, it is possible for every Network List target node that contains the selected test program to drop out or be deleted from the test system Node List. Any attempt to send a command directed to that test program results in an alarm because there is no test program of that kind left in the network.

Commands that are honored only at the TOCS can be requested by pressing either the ESCAPE/SELECT or LINE FEED/TAB. The TOCS-only commands are Reset, Add, Delete, Help, Load, Network, Node, and Switch.

2.3.6.3 Clarifying the Two Types of Target Nodes

In effect the operator maintains two target-node specifications. One is the single selected node that sees the ESCAPE/SELECT request, sends the prompt with its node number, and gets and honors the entered command. Each node maintains the last specified test program name (or name and slot number) addressed to it, and builds this into its prompt as the default single-target node test program name.

The other target node specification is from the last Net selection command that determines the nodes that are to receive the commands requested by the LINE FEED/TAB key. Usually this includes the currently selected (single-target) node, but it need not. A single default test program name (or name and slot number) is maintained for the entire network (the last one specified by an LINE FEED/TAB-requested multinode command). This is displayed in the Network prompt and is used by all multinode commands that do not explicitly specify a test program name.

2.3.7 Data Entry Conventions

The foregoing system communication examples have illustrated only basics of the test system man-machine dialog. The following subsections discuss the data-entry elements and some of the ways they can be combined. For a more extensive explanation of ways these elements can be combined, see Appendix B, Data Entry Concepts.

The basic format of a data-entry command line consists of three fields: a command, a test program name list, and a parameter list. Only the command field is required. The fields are separated by spaces. Multiple entries within the test program name list and within the parameter list are separated by commas.

The basic format can be extended by addition of any number of single-digit "shorthand" parameter entries with their associated values (see subsection 2.3.7.5).

Some of the possible command-line combinations are illustrated by the following:

```
command
command pvalue
command pvalue,pvalue
command name
command name,name pvalue
command name pvalue,pvalue sv,v sv
command sv sv,v
```

Command lines can consist of capital letters or lower-case letters or a combination of both. The use of capital and lowercase letters in examples in this publication is intended to differentiate between the fixed and variable portions of entries (e.g., `LOAD nn`).

2.3.7.1 Command Types

Test system commands are divided into two categories: System commands have node-wide effect, while Subsystem commands affect only the selected test program. System commands are further categorized into Commands to the TOCS and Commands to Target Nodes, while Subsystem commands are further categorized into Action and Parameter commands.

Any command can be truncated anywhere after its first three letters. For example, each of the following is accepted as equivalent: `CON, CONF, CONFI,...,CONFIGURATION`.

Table 2-1 lists all commands recognized by EXEC.

Table 2-1 — EXEC Command Summary

System Commands to TOCS

RESET	Reset all specified LCN nodes
LOAD	Load the test system test programs into specified LCN nodes
NODE	Change the prompt to address the specified node
DELETE	Remove specified nodes from the active network list
ADD	Restore specified nodes to the active network list
SWITCH	Enable/disable testing of LCN cable switching
NETWORK	Identify nodes to be affected by multinode commands
HELP	Translate contents of 'was' and 'should be' indicators
LCN	Send commands to LCN nodes (CMTS/HVTS)
NMA	Send commands to UCN nodes (MMTS/PMTS)
COPY	Copy (or compare) contents of one diskette to another
PAGE	Control CRT message scrolling

System Commands to Target Nodes

CLOCK	Set the date and time of day
CONFIGURATION	Request display of hardware-status information
REVISION	Display revision status of boards in the selected node
MODE	Select operating mode: SUBSYSTEM, EXERCISE, or MODULE
INTERVAL	Set the interval for the periodic-progress log
QUEUE	Select/deselect message queuing

Subsystem "Action" Commands

DEVICE	Change the prompt to the specified test program
RUN	Start the execution of the selected test program
STOP	Stop the test program at the end of the current test
ABORT	Stop the test program immediately
STATUS	Display program status and test program-specific parameters
LOG	Display the demand progress log of a test program
STS	Display status of the general parameters only
SETUP	Start the dialog to display and enter parameters for the selected test program, one slot at a time
AUTO_CONFIGURATION	Set test program parameters according to connected devices
REMOVED	Make the specified test program "invisible" to the test system

Subsystem "Parameter" Commands

TESTS	Set up list of tests in the order they are to be run
ERROR_LIMIT	Set limit on number of errors before halting
PASS_LIMIT	Set limit on number of passes before stopping
REPORT	Enable output of LOG, TESTNUMBER, PASSNUMBER, and SUSPENDED messages
INHIBIT	Suppress output of LOG, TESTNUMBER, PASSNUMBER, and SUSPENDED messages
SCALE	Set delay between tests to xx% of nominal delay
MINUTES_LIMIT	Set limit on test execution time before stopping
ABBREVIATION	Set abbreviation level (0, 1, 2, 3, or 4)

2.3.7.2 Test Program Name Entries

All test program names are entered as 4-character mnemonics. Optionally a fifth or fifth and sixth (numeric) character can be appended to indicate the slot in which the subsystem board is located (e.g., FLPY3). If ALL or * is entered in place of a test program name, all of the test programs in the selected node are affected by subsystem commands. If no test program name is included in the command line, the currently selected test program (indicated in the prompt) is assumed.

See the documentation for each test system for lists of test program names and the subsystems they test or exercise.

2.3.7.3 Parameter Value Entry

There are two types of parameter commands: general and test program-specific. The general parameters (shown in Table 2-1 as Subsystem Parameter Commands) apply to all test programs, while the test program-specific parameters apply to only particular test programs. The parameter value(s) can be separated from the command by one or more test program names. Multiple values are separated by commas (no space following the comma). Examples are

`INH PASSNUMBER,TESTNUMBER`	(inhibit end-of-pass and end-of-test messages for the currently selected test program)
`ERR ALL 3`	(halt all test programs after 3 errors each)
`REP SIOS LOG`	(enable log messages for the SIOS test program)
`PAS FLPY4 5`	(stop the FLPY test program in slot 4 after 5 passes)

The general system response to a parameter-command entry without any parameter values is to display the current parameter value. Exceptions and special cases are covered in the detailed command information in sections 2.4, 2.5, and 2.6.

The Setup command provides an alternative method for change of all parameter values for the selected test program, one slot at a time. See section 2.6.9 for information on this command.

2.3.7.4 Comments Line Entries

If you would like to add comments to the printed record of test activity (see heading 2.1.2), begin a command line entry with an asterisk (*), followed by whatever text you wish. End the command line normally with Return/Enter. Except to print it, each such line is ignored by the test system.

2.3.7.5 "Shorthand" Parameter Entries

Values for the general parameters can be entered by abbreviated "shorthand" entries that allow multiple parameters to be entered on a single command line. Shorthand entries are not provided for test program-specific parameters.

Each abbreviated parameter-name is represented by a single letter (e.g., A for ABBREVIATE). There is no separator between the shorthand command and any parameter value (e.g., RLOG enables reporting of the Periodic Progress Log). If no parameter value is entered (first command letter only entered), the command is treated as a request to display the currently assigned value.

When a parameter value is a named value, it also can be truncated to one or more letters (e.g., RL enables reporting of the Periodic Progress Log).

If multiple shorthand commands are included on one command line, each must be separated by a blank. For example:

`RUN ALL E1 P10 T- IT RP,L S100` (run all test programs for the selected node using an error limit of 1, a pass limit of 10, execute all tests, inhibit the testnumber message, permit the passnumber message and the periodic progress log, and set the scale at 100)

See Table 2-2 for all allowed shorthand commands with examples of recognized value combinations for each.

Table 2-2 — EXEC Parameter Command Abbreviations

Abbreviation	Equivalent Command
An	ABBREVIATE n
Enn	ERROR LIMIT nn
IL	INHIBIT LOG
IL,P,T	INHIBIT LOG,PASSNUMBER,TESTNUMBER
IP,L	INHIBIT PASSNUMBER,LOG
IT	INHIBIT TESTNUMBER
Mnn	MINUTES LIMIT nn
Pnn	PASS LIMIT nn
RL	REPORT LOG
RP	REPORT PASSNUMBER
RP,T,L	REPORT PASSNUMBER,TESTNUMBER,LOG
RT,P	REPORT TESTNUMBER,PASSNUMBER
Snn	SCALE nn
Txx,yy-zz	TESTS xx,yy-zz

Note: Not all possible combinations have been shown for TESTS or for the multiple-value parameters INHIBIT and REPORT.

2.4 SYSTEM COMMANDS TO THE TOCS

The commands in this category instruct the TOCS to perform specified activities; however, it is not necessary to explicitly specify the TOCS as the target node. These commands are independent of the prompt type (Node or Network).

2.4.1 RESET Command

The Reset command performs a hardware reset of all nodes specified in the parameter list (except for the TOCS, which is always protected from this command). This enables you to prepare remote nodes for loading without the need to press the physical reset button on each module.

CAUTION

The careless use of this command can result in the reset of nodes you may not wish affected. You should be particularly cautious in defining the parameter list when On-Line (RNOS) nodes are in operation on the LCN. Use of RES - is to be avoided unless you are certain the entire LCN is available for testing.

Because of the potential dangers in use of this command, you are required to verify each Reset request as shown in the following sample dialog. A request to reset several nodes in the network begins with entry of

```
RES  n,n,n-n,n
```

Where each n represents the LCN address of a node to be reset (See Appendix B, subsection B.4 for uses of "-" when entering multiple values). The system responds with the following prompt:

```
Verify these nn nodes are safe to RESET: n,n,n-n,n
Enter YES to Reset these nodes
```

Any response other than the three letters YES (lower case letters are okay) results in the following message:

```
Your RESET request has been canceled.
```

A YES response results in the following message:

```
Your RESET request is in progress
```

When the Reset is complete, the following lines appear:

```
Reset is complete in nn nodes: n,n,....
'test system name' network now has nn nodes: n,n.....
```

The Reset command entered without parameters returns the following:

```
Specify LCN node list on the RESET line.
```

You can specify reset of a single node (`RES n`) or of all nodes on the LCN except the TOCS (`RES -`).

NOTE

Invoking Reset when there are only two nodes cabled on the LCN, results in the TOCS being "Alone in the ring." To recover, press the RESET button on the non-TOCS node.

2.4.2 LOAD Command

The Load command downloads EXEC and the complete set of test-programs to selected target nodes, meanwhile adding those nodes to the list of LCN nodes controlled by the TOCS. Make certain that you are in the EXEC (LCN) operating mode; otherwise you will wind up attempting to load UCN nodes instead of LCN nodes.

First, reset all nodes to be loaded. Then, with the test system floppy or cartridge disk mounted in the appropriate drive 1, enter the following command:

```
LOA  n,n,n-n
```

Each `n` represents the LCN address of a node to be loaded with the test programs (see Appendix B, subsection B.4, for the significance of `n-n` when entering multiple parameter values).

Enter `LOA -` (minus sign) to load all nodes on the LCN network. Remember, each node to be loaded must first be reset (see 2.4.1 for Reset command-use information).

Enter the Load command by itself to find out the floppy interface-slot number and drive number used for loading. The LCNI board must be in slot 2.

Optionally, the list of nodes to be loaded can be preceded by one or two entries in the form `Fnn,Dnn` to override the default values for the TOCS floppy slot and drive assignments (slot 3 and drive 1). For example, the command `LOAD F3,D2,16` will load node 16, using TOCS floppy drive 2.

When there is more than one diskette, the next diskette to be loaded can be installed in the opposite drive.

When loading from cartridge disk, your request to load one or more nodes is answered with a prompt that asks which test system to load:

```
Enter C for CMTS, H for HVTS, L for LCNI, or Q for quit.
```

Enter the character that represents the test system you wish loaded into the selected nodes, and then press the RETURN/ENTER key. The system responds with

```
Your LCN LOAD request is in progress...
```

Unless there is an error, no other messages from the Load appear until completion. Then the following three lines appear together at the TOCS:

```
LCN Load completed
'test system name' just started in nn nodes:  n,n-n,n,n-n
'test system name' network now has nn nodes:  n,n,n-n,n,n-n
```

See 2.8.3 for a summary of load-command error types.

During the loading process the Stop, Abort, and Status commands are operational as they are with any test program. Other commands such as date and time entry can be entered at the TOCS while the Load is in progress.

2.4.3 NODE Command

Node selection determines which module on the LCN is to be affected by subsequent single-target commands, i.e., determines which node is to be the target of these commands. To change node selection, enter

NOD nn

nn = the node's LCN address in the range of 0 to 127

Entry of NOD - specifies the TOCS node. NODE entered by itself returns the identity of the target node (which if requested by Escape/Select is the same node value found in the current prompt).

2.4.4 DELETE Command

The Delete command removes loaded nodes from the list of LCN nodes in the network controlled by this TOCS (the TOCS itself cannot be deleted). To delete nodes, enter

DEL n,n,n

where each n is the LCN address of a node to be deleted.

DEL entered without parameters returns the list of nodes currently in the test system network. Entry of DEL - (minus sign) deletes all loaded nodes (except the TOCS) from the network list.

2.4.5 ADD Command

The Add command restores deleted nodes to the list of LCN nodes in the network controlled by this TOCS. To add nodes, enter

ADD n,n,n

where each n is the LCN address of a node to be restored.

A deleted node that subsequently has been powered down cannot be added back; it must be reloaded (because of memory loss).

ADD entered without parameters returns the list of nodes currently in the test system network.

CAUTION

Do not attempt to add any nodes that are not loaded with the test system. For example, ADD - attempts to add nodes 0 through 127 to the network, which results in a failure message for each node on the LCN not loaded with the test system.

2.4.6 SWITCH Command

The Switch command enables and disables the testing of LCN cable switching. Initially, cable switching is disabled and must remain that way if there are any RNOS nodes connected to the LCN network.

To enable cable switching, enter

SWI Y

To force use of only a selected cable, enter

SWI A or **SWI B**

Following any of these requests, the following prompt appears:

```
WARNING: Must enter NO when "ON PROCESS" nodes are present on this LCN network.
Enter YES to Allow Cables to be Switched
```

A **NO** response (or any response other than YES) results in the following line's appearance:

```
Your SWITCH request has been canceled.
```

A **YES** response (lower case letters are okay) results in the following line's appearance:

```
Your Cable Switch request has begun.
```

To determine the status of cable switching, enter

SWI

The current value, SWITCH = NO (or YES or A or B) is displayed.

To disable cable switching, enter

SWI N

When cable switching is enabled, the TOCS switches the cable every minute. Any cable failure alarms are displayed at the TOCS, and specify which node reported the problem. Even after a cable failure has been reported and the network has switched to the alternate cable, attempted cable switching continues. This restores a fixed cable within one minute. No other messages about the failed cable are displayed until the cable returns to operation and has been verified by all nodes.

CAUTION

Cable switching must not be enabled when there are any RNOS nodes on the LCN network being tested.

When cable switching is disabled, the cable and switching mode is selected by each token pass frame. Thus, if an RNOS node switches the cable, all test system nodes will follow.

2.4.7 NETWORK Command

To select a set of nodes to be the targets of future multitarget commands, enter

```
NET  n,n,n,n,n
```

where each 'n' represents a node (see the Load, Add, Delete, and Tests commands). For example, to specify nodes 0 through 4, 6, 11 through 15, 33, and 124 through 127, enter

```
NET  -4,6,11-15,33,124-
```

No multitarget commands will be sent to any nodes within these ranges that have not been loaded or that have been deleted.

To specify that every node that has been loaded with the test system (and not DELeted) is to be the target of subsequent multitarget commands, enter

```
NET  -
```

To determine which nodes are currently targeted for subsequent multitarget commands, enter

```
NET
```

Using the first example, the following list is displayed:

```
Network List has 16 nodes: 0-4,6,11-15,33,124-127
```

Notice that the effective Network List is the set consisting of common elements in both the Network List and the list of currently loaded nodes. Thus, if nodes 1 and 6, for example, were not loaded or had been deleted, the previous example would show

```
Network List has 14 nodes: 0,2-4,11-15,33,124-127
```

2.4.8 HELP Command

The Help command is provided to help in understanding test alarm messages by providing identification of error fields and interpretation of the 'was' and 'should be' values.

Various levels of prompting in the use of Help are provided depending on how much information is entered by the operator. This description of how to use the Help command starts with the minimum entry and ends with an example of HELP entered with a complete list of parameters. Each example shows the entered command indented, and in bold, with the response shown below it.

HELP

```
Enter HELP, a blank and the hardware subsystem letter from the following list:
C = CLI/CLIF
D = DHI/DHIF/DHEX
F = FDC/FLPY/LOAD
K = CLOCK
P = PIC/OPIF/PDGI/KEYB
S = SIO/SIOS
W = WDC/WINC
```

HELP W

```
Follow HELP W by a comma and the register code from the following list:
HS = Hardware Status Register
CS = Configuration Status Register
IV = Interrupt Vector Register
CR = Command Register
OS = Operational Status Register
IS = IOCB Status Word
In = IOCB Word, where n is word number (0 – 7)
Pn = Paged Status Register, where n is the Command Parameter
Note: Enter HELP W,P for a list of names and their parameter values.
```

Note that the Clock Status Help needs no parameter to identify a register.

HELP W,P

```
Specify Pn from the following list:
P0 = Firmware Revision Number
P2 = Drive Present/Drive Failed
P6 = Address Causing Bus Error
PB = Current IOCB Address
PA = Drive Format
PC = Media Status
```

HELP W,P2

```
Follow HELP W,P2, by the Hexadecimal "was" value.  This alone causes all of  the "was"
fields to be reported.  To report only the fields that were wrong, follow this by yet
another comma and the Hexadecimal "should be" value, i.e.
         HELP W,P2,was,should be
All of the differences will then be reported.
```

Note that the Clock Status Help has no "should be" value.

```
HELP  W,IS,9143,8000
```

```
Winchester Disk Subsystem IOCB Status Word:
The IOCB Operation has Not Completed, should have Completed
Error Source And Type was Recoverable EDAC error in data, should have been normal
transaction
A Non-Fatal Error was Encountered, should have been Not Encountered
Number Of Errors was 3, should have been 0
```

The operator can also enter HELP without a 'should be' value in order to see the entire contents of a register or IOCB word. For example, to decode the command, the operator could enter the contents of the Command Register.

```
HELP  D,CR,8516
```

```
Data Hiway Interface Command Register:
Command Register was Not Busy.
Command Field was Display Paged Status Words.
Command Complete Interrupt Generation Flag was Reset.
Parameter Field was Poll Counter/Poll Response Counter.
```

2.4.9 NMA Command

If the PMMs, APMMs, or HPMMs of an attached UCN are loaded with test software (MMTS or PMTS), this command sets the operating mode so that all commands are sent to UCN nodes. If there are not any test-software loaded PMMs or APMMs, you will get an error message response or the very brief prompt of `NMA nn,` which signifies that there is more setup work to be done. See the *Process Manager Executive* manual.

This command also determines which NIM on the LCN is to be the target network manager for all commands to these UCN nodes. This is the PMEX operating mode. To change the operating mode from LCN to NMA, enter

NMA nn where nn = the NIM's LCN address (0-127)

NMA with no parameter returns a list of the potential network managers as follows:

```
Select a NMA from one of these nn LCN nodes:  n,n-n,n
```

2.4.10 LCN Command

This command sets the operating mode so that all commands are sent to LCN nodes. This is the EXEC operating mode. To change the operating mode from NMA to LCN, enter

LCN

without any parameters. Unlike most other commands, the LCN command does not support any parameters, nor does its entry without parameters result in any immediate display.

2.4.11 COPY Command

This command copies the contents of one floppy disk to another of the same density. On the R500 system and later, this command also copies the contents of one Bernoulli cartridge to another of the same or larger capacity, or the contents of one HM hard drive to another.

NOTE

Specify the source and destination drive numbers as 1-8 (for SCSI addresses 0-7).

`COPY s,d` (where "s" and "d" identify the source and destination floppy drive numbers)

"Copy in progress" and "Copy was successful" messages are issued.

The COPY command also is used to determine whether or not the contents of two floppies are identical.

`COPY s,d,C` (where "s" and "d" identify the floppy drive numbers, and the letter "C" commands a compare operation.)

"Compare in progress" and "compare successful (or unsuccessful)" messages are issued.

2.4.12 PAGE Command

This command controls whether the scrolling of messages to the TOCS CRT is continuous or halts on each full screen (page).

`PAGE YES` Establishes page scrolling on the CRT

`PAGE NO` Restores normal message scrolling on the CRT

While PAGE NO (the default condition) is in effect, the message outputs continue to scroll upwards on the screen with each new message or alarm.

While PAGE YES is in effect, message outputs halt when the screen is full. Press the RETURN/ENTER key to see the next full screen of messages and or alarms.

2.5 SYSTEM COMMANDS TO TARGET NODES

The commands in this category require the selected nodes (including the TOCS if included in the selection) to take a specified action.

2.5.1 CLOCK Command

Date and time are set or changed for the selected node(s) by using the CLOCK command. The TOCS initializes to a time value of 00:01 hours; all other nodes take their time from the TOCS at their time of loading.

To change date and/or time, enter:

```
CLOCK dd-mmm-yyyy hh:mm:ss
```

dd	=	Day of month (01-31)
mmm	=	Month (JAN, FEB, MAR, APR, MAY, JUN, JUL, AUG, SEP, OCT, NOV, DEC)
yyyy	=	Year
hh	=	Hour in 24-hour style
mm	=	Minute
ss	=	Seconds (optional)

It is not necessary to enter both date and time when issuing the CLOCK command. Acceptable CLOCK commands are:

CLO	= Returns the current date and time settings
CLO dd-mmm-yyyy	= Modifies day, month, year
CLO hh:mm	= Modifies hour, minutes (seconds = 00)
CLO hh:mm:ss	= Modifies hour, minutes, seconds
CLO dd-mmm-yyyy hh:mm	= Modifies day, month, year, hour, minutes (seconds = 00)
CLO dd-mmm-yyyy hh:mm:ss	= Modifies day, month, year, hour, minutes, seconds

NOTE

There are two ways to ensure time and date agreement between the TOCS and the nodes to be tested.

The recommended method is to set date and time in the TOCS before you load any of the other nodes. If the time is set or changed after the nodes are loaded, deleting then adding the nodes resets their times to agree with time in the TOCS.

The alternative method of setting date and time in all of the nodes is to use the Line Feed/Tab-initiated multitarget Clock command.

2.5.2 CONFIGURATION Command

The Configuration command has three uses:

1. The CON command entered without parameters returns a display of configuration information for the currently selected node. The node number, the date and time, and the node's type (e.g., Universal Station, Hiway Gateway, etc.) are presented, followed by information for each slot in the hardware module, including hardware-register values where appropriate. See subsection 2.8.1.10 for an example of this display.

   The entry of CON without parameters is an easy way to read and display the board hardware registers; however, the Configuration and Operational Status registers are not read and displayed if the slot is busy with other I/O such as a running test program.

2. The entry of **CON +** returns an enhanced display of configuration information for the currently selected node (CON + has no significance for the Core Module Test System). Additional information about the type of equipment attached to controller boards is provided as shown in the example display at subsection 2.8.1.11.

   To determine the attached equipment type, it is necessary for the Configuration command to operate the hardware. This often results in a delayed printout because of the time required, and occasionally causes the controller or module to hang up if the hardware is broken.

3. The CON command, when entered with slot-number parameters, is used to exclude specific subsystems within a node from testing. Subsequent subsystem commands directed to ALL devices in that node affect test program execution for only the subsystems located in the active slots.

To specify which slots are to be active, enter **CON,** followed by the string of slot numbers of subsystems to be selected. For example, entry of **CON 2-4,8** selects only slots 2, 3, 4, and 8. All slots are initially active. All slots excluded can be restored to active by entering the Configure command with the single value "-".

2.5.3 REVISION Command

The Revision command returns a display of the hardware and, if applicable, the firmware revision levels of controller cards in the currently selected nodes.

The entry of REV without a parameter results in a display of data for all cards in the selected node(s). See subsection 2.8.1.12 for an example of the Revision Status display invoked in this manner.

The entry of REV followed by a parameter that specifies a hardware subsystem type results in a display that includes information only on those slots that contain a controller card of the specified type. See subsection 2.8.1.13 for this version of the Revision Status display.

Typically, multitarget requests (those invoked by pressing LINE FEED/TAB) for the Revision level of specific hardware subsystems are most useful. These lines are reported single space in no particular node-number order and can be easily scanned for any boards not up to current revision.

The mnemonics that are used as REV parameters to identify hardware subsystems are from one-to-four characters long (one extra character for K2LCN) and are as shown below:

Parameter Values				Hardware Subsystem
A	AM	AMR		AM Redundancy
	AP	APD	APDL	AMX/PMX Data Link
C	CL	CLI		Computer Line Interface
	CN	CNI		Computer Network Interface
D	DH	DHI		TDC Data Hiway Interface
E	EM	EMP	EMPU	Enhanced Module Processing Unit
		EME	EMEM	Enhanced Memory
	EP	EPD	EPDG	Enhanced Peripheral Display Generator
		EPN	EPNI	Enhanced Process Network Interface
F	FD	FDC		Floppy Disk Controller
	FM	FME	FMEM	Fast Static RAM
H	HM	HMP	HMPU	Hi-Per Kernel Module Processing Unit
	HP	HPK	HPK2	2-meg Hi-Per Processor
K	K2	K2L	K2LC	Single-board processor/LCN interface/memory
L	LC	LCN	LCNI	Local Control Network Interface
M	MC	MCP	MCPU	Module Central Processing Unit
	ME	MEM		Unenhanced DRAM Memory (64K x 1 RAMs)
	MM	MME	MMEM	Unenhanced DRAM Memory (256K x 1 RAMs)
N	NH	NHI		Non-Honeywell Computer Interface
	NG	NGI		Network Gateway Interface
P	PD	PDG		Combined PIC/VDG
	PI	PIC		Peripheral Interface Controller
	PL	PLC	PLCI	Programmable Logic Controller Interface
	PM	PME	PMEM	Parity Only Memory
	PN	PNI		Process Network Interface
Q	QM	QME	QMEM	Quad memory
S	SI	SIO		Trend Pen Drive (Status Input/Output)
	SC	SCS		System Clock Source (Time Base Generator)
	SP	SPC		Smart Peripheral Controller
		SPD	SPDG	First slot of EPDG
V	VD	VDG		Video Display Generator
W	WD	WDC		Winchester Disk Controller

CAUTION

Do not make the mistake of using a 4-letter Test Program name (see subsection 2.3.7.2) to specify the hardware subsystem. This results in the name entered becoming the new prompt name, and the resulting REV display will be for only the selected module.

2.5.4 MODE Command

EXEC has three modes of operation, although not all modes are appropriate to all test systems.

Subsystem—This mode is intended for design verification testing. Subsystem mode provides intense functional testing of one board (subsystem) at a time. Thus, while in the subsystem mode, EXEC allows only one test program to run in a given node and tests only one subsystem if like subsystems exist in the node. There is no testing for interaction between programs in this mode. Any test program can run in the subsystem mode.

Any test identified as a "UTILITY" test runs only in Subsystem Mode and must be the only test specified in the TESTS parameter value for that test program in that node.

Exercise—This mode is used to test random interaction between hardware subsystems. One test in each test program is designed to force the types of actions that might cause interaction with another hardware subsystem. Test duration is short but tests run frequently, thereby creating heavy module bus activity. While in exercise mode, any or all test programs can run, but only the designated exerciser tests will run.

Module—This mode tests interaction between hardware subsystems, by permitting several subsystems to be concurrently tested. For example, all peripherals attached to a module can be simultaneously tested. Only a restricted set of tests can be run in this mode.

To change mode, enter

```
MOD S   (or: MODE SUBSYSTEM)
MOD E   (or: MODE EXERCISE)
MOD M   (or: MODE MODULE)
```

`MODE` entered by itself results in a system-response message that identifies the current mode setting. The default mode setting is `Exercise` for HVTS and `Subsystem` for CMTS.

2.5.5 INTERVAL Command

A periodic-progress log can be printed, which shows the run status, the pass count, and the error count for all active test programs in the selected node. The time interval for this log is set at four hours when EXEC is first started. This log interval is changed by the entry

```
INT nn
```

The periodic log is printed at the start of the next minute that is a multiple of nn minutes after midnight and then every nn minutes thereafter. For example, if `nn` = 60, the periodic log is printed every hour on the hour.

`INT` entered without any parameter returns the current setting.

See subsection 2.8.1.4 for the format of the periodic-progress log.

2.5.6 QUEUE Command

To prevent the mixing of test results from several nodes, you can temporarily suppress the alarms and messages for the selected node. To suppress the messages for a node, enter

QUE Y

Display of alarms and progress messages for this node ceases, but they are queued in the node's memory for later display. The LED display on the module's microprocessor board shows a "-" and a 3-digit value that shows how many alarms are queued, or "---" if the message queue is full.

CAUTION

Before Queuing is invoked for any long period, disable all progress messages (`INH TESTNUMBER, PASSNUMBER, LOG, SUSPENDED`) for all active test programs. EXEC can only queue up to 200 messages and alarms. After that limit is reached, any test program with a message or alarm to output is indefinitely blocked.

To resume alarm display for the selected node, enter

QUE N

Output of the queued alarms and messages resumes. Once all of the queued alarms and messages have been reported, the LED display on the module's microprocessor board shows the node's LCN address number.

`QUE` entered without a parameter returns one of two messages:

```
"Node nn, Queuing Disabled.  Enter QUE Y to Queue."
```

or

```
"Node nn, xx Alarms queued.  Queue is xx% full.
Enter QUE N to resume printing."
```

2.5.7 ARCHIVE Command

The ARCHIVE command allows the recording of the first error message associated with the K4LCN processor board in slot 1 into nonvolatile memory. Optionally, the node then resets itself in order to run self-tests that may further identify the error. Self-test failures are also recorded. The ARCHIVE command has three values that can be changed at any time. The default value is ARC N.

ARC N	means NO archiving of errors and no resetting of this node.
ARC Y	means YES archive one error and no resetting of this node.
ARC R	means YES archive one error and then RESET this node.
ARC (cr)	means display the current value.

After the first message has been written to nonvolatile memory, the software continues to run if possible, but no further errors are written to nonvolatile memory until the node is reloaded.

NOTE

The contents of nonvolatile memory can be displayed anytime by running MMPU Test 9 which is part of the CMTS image.

2.6 SUBSYSTEM "ACTION" COMMANDS

Subsystem Action Commands modify or control execution of test programs in the currently selected node.

2.6.1 DEVICE Command

The Device command is used to select the test program that is to be controlled by subsequent subsystem commands (and to appear in subsequent prompts).

To select a test program, enter

```
DEV name
```

where `name` is a 4-digit test program name with or without a slot designation.

Parameter values can be changed in the same command line by using abbreviated parameter (shorthand) entries following the test program name (each separated by a leading blank). See Table 2-2 for the parameter abbreviations recognized by EXEC.

Use of the DEVICE command is unnecessary if the device name (or name and slot number) is entered with another command, for example, `RUN name`.

`DEVICE` entered without any parameter value results in no action.

2.6.2 RUN Command

The Run command starts one or more test programs. If EXEC is running in the Exercise or Module mode, any number of test programs can be started.

To start a specific test program, enter

```
RUN
```

The test program specified in the current prompt begins running.

Or enter

```
RUN name
```

The test program specified by `name` begins running.

To start all test programs, enter

```
RUN ALL
```

All active test programs in the hardware module now run. An asterisk (*) can replace `ALL`.

A `'name' Started` message is printed for each test program commanded to run. See subsection 2.8.1.1 for the message format.

2.6.3 STOP Command

The Stop command requests that the test program stop running when it completes the test in progress. One command can stop all running test programs in the currently selected node.

To stop a specific test program, enter

```
STO
```

The test program identified in the current prompt stops after completing the test now in progress.

Or enter

```
STO name
```

The test program specified by `name` is requested to stop.

To stop all running test programs, enter

```
STO ALL
```

Each running test program in the hardware module stops after completion of the test in progress. An asterisk (*) can replace `ALL`.

A `"name" Stopped` message is printed for each test program after it stops. See

subsection 2.8.1.7 for the message format.

2.6.4 ABORT Command

The Abort command requests that the test program stop alarming immediately and stop running as soon as possible. The current test is not completed. One command can abort all running test programs in the currently selected node.

To abort a specific test program, enter

```
ABO
```

The test program identified in the current prompt stops as soon as possible.

Or enter

```
ABO name
```

The test program specified by `name` is aborted.

To abort all running test programs (and stop all alarming), enter

```
ABO ALL
```

Each running test program in the hardware module is aborted. An asterisk (*) can replace `ALL`.

A `"name" Aborted` message is issued for each test program aborted. See subsection 2.8.1.8 for the message format.

2.6.5 LOG Command

The Log command requests a single printing of the demand-progress log.

To call this status log, enter

```
LOG
```

This prints a demand-progress log for the test program specified by the current prompt.

Or enter

```
LOG name
```

to print a demand-progress log for the named test program.

To print a demand-progress log for every test program, enter

```
LOG ALL (or LOG *)
```

See subsection 2.8.1.5 for format of the demand-progress log.

2.6.6 STATUS and STS Commands

The Status command requests display of the parameter values that relate to a particular test program in the currently selected node. This presentation includes all the user-changeable parameters, both general and those specific to the test program. It also includes such data as test program release number, RAM addresses, and other values.

To display status of a test program, enter

```
STA
```

Parameters for the test program specified by the current prompt are displayed.

Or enter

```
STA  name
```

Parameters for the test program specified by `name` are displayed.

Use of `STA ALL` (or `STA *`) is not recommended because of the quantity of information that would be reported.

The `STS` command requests the first seven lines of the same display, omitting the debug values and the test program-specific parameters.

See subsection 2.8.1.6 for format of the test program Status Display.

2.6.7 AUTO_CONFIGURATION Command

The AUTO_CONFIGURATION command is addressed to one or more test programs and requests them to interrogate the hardware to determine what peripherals are connected to their associated controller cards and then to set up the appropriate test program-specific parameter values for operation of these peripherals during subsequent testing. (Auto Configuration has no significance for the Core Module Test System.)

For example, after Auto Configuration, the DRIVE_n parameter values indicate what Winchester and Floppy drives are present, what types they, are and what types of diskettes are present. The Cn_Hookup parameter values for OPIF, PDGI, and KEYB show what peripherals are on each channel, and SIOS will adapt to whether there is a simulator or real I/O devices attached.

Each parameter name and new value is reported after its update. If update for a parameter was not successful, that is reported instead (with a message such as "`Busy with other I/O`"). The operator is warned to insert diskettes into empty floppy drives.

CAUTION

AUTO CONFIGURATION should not be used if there is any question as to the integrity of the hardware. Malfunctioning hardware could falsely indicate a missing peripheral and all subsequent testing would omit the very device that most needed to be tested to find the malfunction. Extreme care must be taken to reconcile the reported peripherals with what is supposed to be configured in the network.

Worse yet, malfunctioning hardware has been known to hang up controller cards or even the entire module. In this case, you may need to reset and reload the module and manually enter the parameters.

To request that the currently selected test program be auto-configured, enter

```
AUTO
```

To request auto-configuration of a specific program, enter

```
AUTO  name
```

To request auto-configuration of every program in the module, enter

```
AUTO  ALL
```

Note that a multinode `AUTO ALL` command is an easy way to set up every peripheral-dependent parameter value in the network.

2.6.8 SETUP Command

The Setup command initiates a dialog that displays and permits change to all user-changeable parameters for the selected test program in a particular slot. The name and current value of each parameter is displayed in turn. You then enter a new value or values and press RETURN/ENTER. If no value is entered (i.e., RETURN/ENTER only), the current value(s) remain. The dialog begins with the test program-specific parameters, then continues with the general parameters.

To begin the parameter-setup dialog to the test program named in the prompt, enter

`SET`

To begin the parameter-setup dialog to a specific test program, enter

`SET name`

To terminate the setup dialog at any point, enter

`.` (period) and press RETURN/ENTER

Certain parameter sets are paired and share the same allowed value sets. Examples are `REPORT/INHIBIT, ENABLE/DISABLE` and `TURN ON/TURN OFF`. A given value, however, can appear in only one of the two lists at one time. The result of adding one of the allowed values to one parameter's list is to delete it from the partner list.

2.6.9 REMOVED Command

The Removed command is used to eliminate one or more test programs so that they will not be affected by any subsequent commands. For example, suppose that OPIF is to be used to test the PIC, but not KEYB, and that DHEX is to be used to test the DHI, but not DHIF. By entry of the command `REM KEYB,DHIF YES` you ensure that any subsequent commands addressed to ALL programs will not go to the KEYB and DHIF programs.

To make a test program "invisible," enter

`REM name Y`

Where `name` is a 4-digit test program name.

To restore all Removed programs, use the command `CON -.` Use of the command `REM name NO` cannot work because the REM command, like all others, will not be seen.

2.7 SUBSYSTEM "PARAMETER" COMMANDS

The commands in this category change or display the test program parameter values. When no parameter string follows the command field, the current value or values for that parameter is displayed. When a parameter string follows the command field, the newly entered values become the current values.

As with other subsystem commands, you have the choice of including test program names in the command line, or defaulting to the currently selected test program shown in the prompt.

The set of preset parameter values for each test program is included in the discussions of individual test programs beginning with Section 3 of this publication.

2.7.1 TESTS Command

The Tests command controls the tests to be run and the order in which they run in each pass. The preset parameter values generally result in the sequential running of all tests that are applicable to the current mode.

The tests can be run in any sequence, and any test can be repeated any number of times in a pass. As many as 30 tests can be included in the parameter string.

The parameter string consists of the test numbers (separated by commas) in the sequence in which they are to run. Single tests or ranges of tests (using the "-") can be specified. TESTS xx-yy says go sequentially up (or down if xx is greater than yy) from test xx through test yy. If the xx and/or yy are omitted, the first and/or last test numbers are assumed.

To select the tests and their order, enter

```
TES  x,x-yy,...,zz
```

To determine the current sequence of tests, enter

```
TES
```

Example entry

```
TES  -2,4,6-8,10-
```

For the test program specified by the current prompt, all tests appropriate to the current execution mode except 3, 5, and 9 run in sequence.

2.7.2 ERROR LIMIT Command

The Error Limit command limits the number of errors reported before the test program halts. When this limit is met, the program halts and issues a `name HALTED` message. See subsection 2.8.1.9 for the message format.

To set a new error limit, enter

`ERR nn`

The range of values is from 1 to 32766. Entering "-" specifies no limit. The stored error-limit value cannot be changed while the program is running or in an error-limit halt; however, the continuation limit can be increased as follows.

To continue after an error-limit halt, enter

`ERR +nn`

The new value is added to the current value and testing continues to the new limit.

or, enter

`ERR nn`

where the new value is greater than the existing limit.

Neither method of continuing changes the stored error-limit value that is used each time this test program is started or restarted.

Don't try to start the test program and change the stored error limit in the same command line (e.g., `RUN name Ennn`). The error limit won't change, but the continuation limit will, because `RUN` will have taken effect before the error limit change is interpreted.

To restart after an error-limit halt,

first enter **`ABO`**
then enter **`ERR nn`** (optional, to change the error limit)
then enter **`RUN`**

To determine the value set for error limit, enter

`ERR`

To determine the current error count, enter either of the following

`ERROR_C`

or

`LOG`

2.7.3 PASS LIMIT Command

The Pass Limit command controls the number of passes executed before the test program stops. When this limit is met, the program stops and issues a `name STOPPED` message. See subsection 2.8.1.7 for the message format.

To set or change the pass limit, enter

`PAS nn`

The range of values is from 1 to 32766. Entering "-" specifies no limit. Pass Limit can be changed at any time.

To restart after a pass-limit stop, enter

`RUN`

To determine the currently set pass-limit value, enter

`PAS`

To determine the current pass count, enter either of the following

`PASS_C` or **`LOG`**

2.7.4 REPORT Command

The Report command enables printing of messages associated with the progress of test execution. The following are the only parameters accepted:

`PASSNUMBER`	– the end-of-pass message (abbreviated `P`)
`TESTNUMBER`	– the start-of-test message (abbreviated `T`)
`LOG`	– the periodic progress log (abbreviated `L`)
`SUSPENDED*`	– the suspended/resumed message (abbreviated `S`)

The Report command accepts a parameter list that can include any or all of the accepted parameters (or their abbreviations) in any order, separated by commas.

For example, to display end-of-pass messages, enter

`REP P`

To determine which messages are enabled, enter

`REP`

`PASSNUMBER, TESTNUMBER, SUSPENDED`, and/or `LOG` are displayed as applicable.

*The `SUSPENDED` parameter applies to only special factory-test modes, and has no affect on field use of EXEC.

2.7.5 INHIBIT Command

The Inhibit command suppresses printing of messages associated with the progress of test execution. The following are the only parameters accepted:

PASSNUMBER	– the end-of-pass message (abbreviated P)
TESTNUMBER	– the start-of-test message (abbreviated T)
LOG	– the periodic progress log (abbreviated L)
SUSPENDED*	– the suspended/resumed message (abbreviated S)

The Inhibit command accepts a parameter list that can include any or all of the accepted parameters (or their abbreviations) in any order, separated by commas.

For example, to suppress display of the start of test messages, enter

```
INH T
```

To find which messages are suppressed, enter

```
INH
```

PASSNUMBER, TESTNUMBER, SUSPENDED, and/or LOG are displayed as applicable.

2.7.6 SCALE Command

The time delay between consecutive tests is made variable by use of randomly selected percentages (in the range of 0 to 200 percent) applied against a nominal delay period. The Scale command is used to adjust the preset nominal delay period, and should be carefully selected, depending on requirements of the particular test program.

The scale is entered as a percentage (0 to 999) of the nominal delay period. Thus, a value of 200 doubles the nominal delay period, while a value of 50 cuts it in half.

The value of Scale is set to 100 initially and when the mode is changed to Module or Exercise, and set to zero when the mode is changed to Subsystem.

CAUTION

If an electro-mechanical device is being tested for an extended duration, in any mode, specify a scale of 200 or greater to avoid excessive wear on the device.

*The SUSPENDED parameter applies to only special factory-test modes, and has no affect on field use of EXEC.

To change the effective nominal delay period, enter

SCALE nnn

To determine the current scale, enter

SCALE

2.7.7 MINUTES LIMIT Command

The Minutes Limit command sets a time limit (in minutes) on how long a selected test program runs. After the specified time limit is reached, the program ends as if a Stop command was issued, and a `name STOPPED` message is printed. See subsection 2.8.1.7 for the message format.

To set or change the time limit, enter

MIN nn

The range of values is from 0 (runs until the end of the current minute) to 32767. Entering "-" specifies no limit. The time-limit value can be changed by this command even while the program is running or in an error-limit halt.

NOTE

If the test program is halted because of reaching the error limit, the time count continues to increase. If the time limit is reached during an error halt, the run is aborted and a `name ABORT` message is printed. See subsection 2.8.1.8 for the message format.

To determine the established limit value, enter

MIN

To determine how long the selected test program has been running, enter

MINUTES_C

2.7.8 ABBREVIATION Command

The Abbreviation command is used to control the quantity of information that is presented with each error detected by the test programs. The following suppression levels are provided:

- `0` – No error message is printed, but the error count is maintained for execution control and logging. If ABBREVIATION is changed to 0 during test execution, all alarms are immediately suppressed.
- `1` – Only the node number, time, alarm number, and a minimum of error-type identification are printed.
- `2` – All information used to determine that there was an error is printed.
- `3` – Supporting information related to the problem is added.
- `4` – Usually the same as Abbreviation Level 3, but may further identify contents of some alarm fields.

To set the abbreviation level, enter

```
ABB n
```

`n` should always be entered as a single digit.

To determine the current abbreviation level, enter

```
ABB
```

2.8 LOGS, ALARMS, AND ERROR MESSAGES

2.8.1 Operational Messages

2.8.1.1 Start Test Program Message

Each time a test program begins execution, the following message is printed.

```
Node nn dd-mmm-yyyy hh:mm:ss name s Release b.b Started, HW Ver c Rev d
                FW Ver e Rev f Type g h, Lowest Acceptable HW Ver i Rev j
```

Where:
- `name` is the name of the test program that started to run
- `s` is the card slot
- `b.b` is the program release number
- `c` is the board hardware version
- `d` is the board hardware revision
- `e` is the firmware version
- `f` is the firmware revision
- `g` is the Upper prom firmware type
- `h` is the Lower prom firmware type
- `i` is the lowest acceptable hardware version
- `j` is the lowest acceptable hardware revision

The second line of this message is not used by all test programs. If more than one test program started, a message is displayed for each program and each card slot.

2.8.1.2 Start-of-Test Message

Each time an individual test within a test program begins running, the following message is printed.

```
Node nn dd-mmm-yyyy hh:mm:ss name s Start Of Test xx
```

Where:
- `name s` is the name and slot number of the test program
- `xx` is the number of the test just started

Printing or suppression of start-of-test messages is controlled by the Report and Inhibit commands.

2.8.1.3 End-of-Pass Message

At completion of a pass through all currently selected tests for a test program, the following message is printed.

```
Node nn dd-mmm-yyyy hh:mm:ss name s End Of Pass xx, Errors
yy
```

Where:
- `name s` is the name and slot number of the test program
- `xx` is the number of passes completed since the test program was last started
- `yy` is the number of errors

Printing or suppression of end-of-pass messages is controlled by the Report and Inhibit commands.

2.8.1.4 Periodic Progress Log

The Periodic Progress Log of a test program is automatically printed at regular intervals as defined by the Interval command. Printing or suppression of this log is controlled by the Report and Inhibit commands. Its format is as follows.

```
Node nn dd-mmm-yyyy hh:mm:ss name s status    xx Passes    yy Errors
```

Where:
- `Node nn` is the node being tested
- `name s` is the name and slot number of the test program
- `status` is Running, Stopped, Halted, or Suspended
- `xx` is the number of passes completed
- `yy` is the number of errors noted

2.8.1.5 Demand Progress Log

The Demand Progress Log is an on-demand printing of the Periodic Progress Log. It is printed in response to the Log command, and is not affected by the Report, Inhibit, or Interval command settings, or by message queuing.

2.8.1.6 Test Program Status Display

The test program Status Display is printed on-demand, in response to the Status command. Its format is shown below. The line numbers to the left of the display lines are included here for identification purposes but do not appear on the actual status display.

```
1. Node xx dd-mmm-yyyy hh:mm name s Release n.n System Mode = xxxxxxxxx
2. Log Interval = xxx     Abbreviation = x      Nominal Delay = n
3. Run Status = xxxxxxxx  Wait Mode = xxxxxxxx  Scale = xxx
4. Error Count = xxxx     Pass Count = xxxx     Minutes Running = xxxxx
5. Error Limit = xx       Pass Limit = xxxx     Minutes Limit = xxxxx
6. Report Log,TestNumber  Inhibit PassNumber,Suspended
7. Tests = x,x,.............,(x),.............xx,xx
8. Task Number = xx       Pblock At $xxxxxx     Program At $xxxxxx
9. unique1  = xxxxx       unique2  = xxxxx      unique3  = xxxxx
.
.
.
n. uniquem  = xxxxx       uniquen  = xxxxx
```

The content of each line is explained in the following:

1. Selected Node's LCN address plus date and time of the report
   Test program name, slot number and release number
   System execution mode is Subsystem, Exercise, or Module

2. The interval, in minutes, for display of the periodic-progress log
   The user-entered abbreviation level, 0 through 4
   The preset value for the delay between tests

3. The run status for the test program
   `Off` – The program is not running
   `Init Dev` – The program is running, but initialization is not complete
   `Test` – The program is running
   `Stop` – The program has been requested to stop
   `Abort` – The program has been requested to abort
   The wait mode if the test program is in some type of delay
   `None` – The program is not in a delay
   `In Delay` – The program is in the random delay between tests
   `In Pause` – The program is in a delay within a test
   `In Halt` – The program has reached an error limit and halted
   `In Wait` – The program is waiting for a device operation to complete
   The user-entered scale for changing the random delay between tests by a percentage between 0 and 999

4. The error count since the test program was last started
   The number of passes completed since the test program was last started
   The number of minutes that the test has been running

5. The user-entered limit on the number of errors allowed before the test program halts
   The user-entered limit on the number of passes to run before the test program stops
   The user-entered limit on the number of minutes to run before the test program stops

6. Indication (Report or Inhibit) of whether or not the periodic progress log, the end of pass-progress message, the suspended/resumed messages, and the start of test-progress message will be printed. The manner and order of display will vary.

7. The list of tests included in each pass in the order they will run
   The currently running test is indicated by parentheses, i.e., (x)

The remaining parameters are excluded if the status display is requested by the STS command.

8. The internal identification number of the test program
   The memory address of system-accessible parameters for this board
   The memory address of the first instruction of this test program

9. Any test program-specific parameters are displayed, up to three on each line
   If the name and value of a test program-specific parameter exceeds the available space, it will occupy more than one field.

n. Continuation of the test program-specific parameters until all are displayed

2.8.1.7 Test Program Stopped Message

The test program Stopped message is printed after execution of a Stop command, or when the number of passes limit or minutes limit is reached. Its format is as follows.

```
Node nn dd-mmm-yyyy hh:mm:ss name s Stopped After x Passes And y Errors
```

Where: name s is the name and slot number of the stopped test program
x is the number of passes completed
y is the number of errors noted

2.8.1.8 Test Program Aborted Message

The test program Aborted message is printed after an Abort is commanded or is forced by the minutes limit being reached while halted on an error. Its format is as follows.

```
Node nn dd-mmm-yyyy hh:mm:ss name s Aborted After x Passes And y Errors
```

Where: name s is the name and slot number of the aborted test program
x is the number of passes completed
y is the number of errors noted

2.8.1.9 Test Program Halted Message

The test program Halted message is printed after the specified error limit is reached. Its format is as follows.

```
Halted After x Errors
```

Where: x is the number of errors noted

2.8.1.10 Configuration Display

This display occurs in response to the Configuration command. It also automatically appears if EXEC encounters board failures during program initialization. (Exception: memory-board failures at initialization do not force the automatic display.)

The example that follows is a composite chosen to illustrate characteristics of the display that vary by board type.

```
Node  nn  dd-mmm-yyyy hh:mm:ss  "module type"
Slot   1  MCPU                    hhhh, hhhh
Slot   2  LCNI                    hhhh, hhhh, hhhh, hhhh, hhhh, hhhh, hhhh, hhhh
Slot   3  FDC                     hhhh, hhhh, hhhh, hhhh, hhhh, hhhh, hhhh, hhhh
Slot   4  PIC                     hhhh, hhhh, hhhh, hhhh, hhhh, hhhh, hhhh, hhhh
Slot   5  VDG                     hhhh, hhhh, hhhh, hhhh, hhhh, hhhh, hhhh, hhhh
Slot   6  DHI                     hhhh, hhhh, hhhh, hhhh, hhhh, hhhh, hhhh, hhhh
Slot   7  CLI                     hhhh, hhhh, hhhh, hhhh, hhhh, hhhh, hhhh, hhhh
Slot   8  Unused
Slot   9  MMEM                    nnnnn Words At 080000 EDAC 256K DRAMs
Slot  10  PMEM                    nnnnn Words At nnnnnn Parity Only DRAMs
```

The first line of a Configuration Display identifies the node number, the date and time, and the node type such as Universal Station or Application Module, etc.

The individual slot lines first identify the resident board's type. The remaining fields show hardware-register word values or, for memory boards, the memory size, starting byte address, and type of memory board.

If slots 6 through 10 are all unused, only the first five slots are displayed.

2.8.1.11 Configuration + Display

This display occurs in response to the CON + command. It contains all the information found in the regular Configuration display plus additional information about the type of equipment attached to controller boards.

The example that follows is a composite chosen to illustrate characteristics of the display that vary by board type.

```
Node nn  dd-mmm-yyyy hh:mm:ss       "module type"
Slot  1  HMPU                       hhhh, hhhh and 200000 Memory Words at 80000
Slot  2  LCNI                       hhhh, hhhh, hhhh, hhhh, hhhh, hhhh, hhhh, hhhh
Slot  3  FDC  Device Type 4,?,0,0   hhhh, hhhh, hhhh, hhhh, hhhh, hhhh, hhhh, hhhh
Slot  4  PIC                        hhhh, hhhh, hhhh, hhhh, hhhh, hhhh, hhhh, hhhh
  C0- Single   C1- Exp Ptr   C2- Open   C3- OKB,EKB,TS   C4- Para Ptr
Slot  5  VDG                        hhhh, hhhh, hhhh, hhhh, hhhh, hhhh, hhhh, hhhh
Slot  6  DHI  HTD Present, Hiway A  hhhh, hhhh, hhhh, hhhh, hhhh, hhhh, hhhh, hhhh
Slot  7  CLI  IEEE-488, Line 0 & 1  hhhh, hhhh, hhhh, hhhh, hhhh, hhhh, hhhh, hhhh
Slot  8  WDC  DEVICE TYPE 5,0       hhhh, hhhh, hhhh, hhhh, hhhh, hhhh, hhhh, hhhh
Slot  9  SIO  Trend, Digital        hhhh, hhhh, hhhh, hhhh, hhhh, hhhh, hhhh, hhhh
Slot 10  PDG  In use by other I/O   hhhh,     , hhhh, hhhh, hhhh,     , hhhh, hhhh
```

Interpretation of the additional Configuration data is

FDC: `0` = No drive
`1` = Single sided, single density
`2` = Double sided, single density
`3` = Single sided, double density
`4` = Double sided, double density
`?` = Drive present but no diskette in it

WDC: `0` = No drive
`3` = Hitachi drive (85 Mw)
`5` = Wren drive (35 Mw)
`6` = Wren drive (86 Mw)
`?` = Drive present but type unknown

PIC or PDG: `Open` = No device
`Single` = One VDG
`Dual` = Two VDGs
`Exp Kbd` = Expansion keyboard
`Exp Ptr` = Expansion printer
`Ptr` = Printer
`OPR` = Operator's keyboard
`ENG` = Engineer's keyboard
`PKB` = Parallel keyboard
`TS` = Touchscreen
`Mou` = Mouse
`Para Ptr` = Parallel printer

2.8.1.12 Revision Status Display

This display occurs in response to the Revision command. The first example that follows shows the response to REV without a parameter entry and is a composite chosen to illustrate characteristics of the display that vary by board type.

```
Node  nn  dd-mmm-yyyy hh:mm:ss    "module type"
Slot   1  MCPU   HW Ver b Rev c   FW Ver d Rev e  Type f g Lowest Acceptable
Slot   2  LCNI   HW Ver b Rev c   FW Ver d Rev e  Type f g   HW Ver h Rev i
Slot   3  FDC    HW Ver b Rev c   FW Ver d Rev e  Type f.g   HW Ver h Rev i
Slot   4  PIC    HW Ver b Rev c   FW Ver d Rev e  Type f.g   HW Ver h Rev i
Slot   5  VDG    HW Ver b Rev c
Slot   6  DHI    HW Ver b Rev c   FW Ver d Rev e  Type f.g   HW Ver h Rev i
Slot   7  CLI    HW Ver b Rev c   FW Ver d Rev e  Type f.g   HW Ver h Rev i
Slot   8  Unused
Slot   9  MMEM   HW Ver b Rev c
Slot  10  PMEM   HW Ver b Rev c
```

The individual slot lines first identify the resident board's type. The remaining fields are `b` = board hardware version, `c` = board hardware revision (alphabetic), `d` = firmware version, `e` = firmware revision (alphabetic), `f` = upper prom firmware type, `g` = lower prom firmware type, `h` = lowest acceptable hardware version, and `i` = lowest acceptable hardware revision (alphabetic) The MCPU 'Lowest Acceptable' version/revision levels are checked by startup self-test and are not shown here.

If slots 6 through 10 are all unused, only the first five slots are displayed.

2.8.1.13 Revision (P) Status Display

When the REV command is followed by a board-type parameter a differently formatted Revision Status display is generated. The following example represents the result of a multitarget request for REV F:

```
Node nn Slot ss FDC   HW Ver b Rev c   FW Ver d Rev e   Type f g  HW Ver h Rev i
Node nn Slot ss FDC   HW Ver b Rev c   FW Ver d Rev e   Type f g  HW Ver h Rev i
Node nn Slot ss FDC   HW Ver b Rev c   FW Ver d Rev e   Type f g  HW Ver h Rev i
Node nn Slot ss FDC   HW Ver b Rev c   FW Ver d Rev e   Type f g  HW Ver h Rev i
```

Note that columns 67 through 80 (HW Ver h Rev i) represent the lowest acceptable hardware version and revision.

2.8.2 Test Result Alarms

The alarm messages are divided into five disclosure levels that are controlled by the Abbreviation command. Running at level 2 or higher is recommended. See subsection 2.7.8 for definition of alarm content at each of the defined levels.

The exact form and content of the hardware-alarm messages vary among the test programs; however, the general format is as follows.

```
Node nn dd-mmm-yyyy hh:mm:ss name s Alarm xxxx
"Text of message and data"
```

Where: `xxxx` is the alarm number (the first two digits specify the test number)

The remaining text is dependent on the individual test program and the fault noted.

Appendix A contains a summary of the information found in selected data registers and memory locations. Bit-by-bit interpretation of their contents is often necessary for full understanding of alarm-message significance.

2.8.3 Data Entry Error Codes

The following error codes are displayed on the I/O device in response to invalid data entered by the user.

1x—Invalid Command Names

- `11` – The command name is invalid. It must be from 3 to 40 characters long and begin with an alphabetic character or $. It cannot be followed by a comma.
- `12` – This command does not match any valid command name.
- `13` – Either this command name is test program-specific and cannot be accessed using ALL, or the command does not match any valid name.
- `14` – SETUP cannot be a multitarget command (use ESCAPE/SELECT key to request prompt before using this command).
- `15` – Command valid only while in NMA mode (see subsection 2.4.9).
- `16` – Command valid only while in LCN mode (see subsection 2.4.10).

2x—Invalid test program Name or Parameter Value

- `21` – The first test program name and following comma are correct, but the test program name following the comma is incorrect.
- `22` – The first parameter value violates the requirements of this parameter. This can also be caused by a bad test program name or a bad shorthand command being interpreted as a parameter value.
- `23` – The first parameter value is correct, but a later value is invalid.

24 – Attempting to advance the error limit (by using "+") beyond 32766.

25 – Trying to select a target node not included in the node list.

26 – The specified Network Node list contains no nodes that are still in the test system's Node list (the node may have failed or been deleted).

27 – There are no target nodes left in the network node list that have the Default test program name (or name and slot). Specify a new test program name.

28 – Only one test program name (or ALL) can be specified in a multitarget command line (see Appendix B.7 for the reasons behind this restriction).

29 – The LCN node number specified in the NMA command is not a NIM, or the PNI (or EPNI) in that NIM is being used to run a test program.

3x—Invalid "Shorthand-Parameter" Entry

31 – The Field is assumed to contain a shorthand-parameter entry, but it does not start with a single alphabetic character.

32 – The Field is assumed to contain a shorthand-parameter entry, but it starts with an invalid shorthand character.

4x—Clock Date and/or Time Incorrectly Entered or Spelled Wrong

41 – The Value has the wrong number of characters. There should be 11 for date only, or 5 for time only, or 17 for both date and time.

42 – The Clock entry is rejected because of wrong format or values. See subsection 2.4.1 for the correct format.

43 – Attempting to change the System Mode while test programs are running.

5x—Protection Violation

50 – Attempting to change a "Display Only" parameter.

51 – Attempting to change a "Change While Off" parameter while the test program is not in the OFF state.

52 – Attempting to RUN more than one test program while in the Subsystem mode.

53 – Attempting to RUN one or more test programs that are not OFF.

54 – Attempting to STOP one or more test programs that are already OFF.

55 – Attempting to ABORT one or more test programs that are already OFF.

56 – Attempting to RUN a program while another program is already running in this slot, or to LOAD a test system while the Floppy test program is running in the slot used for loading.

57 – Attempting to RUN a program that is already running in another slot. The Floppy loader and LCN loader are subject to this restriction.

6x—LOAD Command Parameter Errors

61 – There is no Floppy or LCN in the module, or the specified slot does not contain a Floppy controller board.

62 – The Floppy and/or LCN-loader programs in the module are running (their Test Modes are not OFF).

63 – More than one Floppy slot or drive unit was specified, or a node number preceded a slot/drive specification.

64 – A Floppy drive unit outside the range of 1 to 4 was specified.

65 – No nodes were specified (when a drive and/or slots were specified).

SPECIAL PROCEDURES AND COMMANDS
Section 3

This section provides information on advanced features of EXEC that are of use mainly to factory technicians or to test program developers.

CAUTION

The procedures and commands discussed in this section are intended for use only in limited circumstances. They are included in this document as background information that may be helpful to customers while receiving direction from the Honeywell Technical Assistance Center (TAC).

3.1 CHANGING THE TOCS TO ANOTHER NODE

Any node in the test network with an I/O device becomes the new TOCS just by pressing the device's Escape/Select or Line Feed/Tab Down key. The old TOCS is replaced, and the new TOCS displays the "test system started" message and is ready to perform all TOCS functions.

3.2 RESTARTING A NODE

WARNING

The preferred method of recovery from a crash is to reload the node and set up its parameters. This guarantees integrity of the code; however, because the GO 84000 method preserves the parameter and data values, it is sometimes desirable to try this method first. Restarting this way can result in subsequent abnormal operation of this or other nodes in the network, and should not be reported as a test system problem.

Any node in the network with an RS-232C I/O device can be restarted by entering the following while in the Console Emulator on that device:

GO 84000 <return>

It may be necessary to first power cycle the module in order to clear a hangup and to invoke the Console Emulator.

To invoke the Console Emulator in any node with an RS-232C I/O device, hold down the CTL key and simultaneously press the E key.

3.3 SPECIAL COMMANDS

3.3.1 SEQUENTIAL Command

The SEQUENTIAL command starts test programs in the same way as the RUN command, except that SEQUENTIAL runs the test programs one at a time. Any number of test programs can be started in this way in either Subsystem or Module mode.

The intended use is to allow several test programs to run serially without operator intervention. In Module mode the same program runs in all slots that it resides in at the same time. Running test programs serially is useful in the factory during board test.

Several test programs are specified. When the first test program finishes (i.e., reaches its minutes or pass limit), it is suspended and the next test program starts running. After all specified test programs have run this way once, the first test program resumes, starting with the next test after the one it finished in the first cycle, and the cycle continues with each of the other specified test programs. Note that in Module mode the next program is not started until all copies of the previous program have completed.

This serial cycling of the test programs continues indefinitely until the operator commands a STOP or ABORT. The pass count continues to advance each cycle and always indicates the total number of passes actually run regardless of the specified pass limit.

If any test program halts on errors, the next test program is immediately resumed. Unless the error limit is increased or the test program is ABORTED, this test program is skipped for future cycles.

To start several test programs running serially, enter

SEQ name,name,name,name

To start all test programs running serially, enter

SEQ ALL (an asterisk "*" can replace ALL)

To start the test program specified in the prompt serially in several slots, enter:

SEQ

A "Started" message is printed for each test program the first time it runs. A "Suspended/Resumed" message is printed whenever one test program is suspended and the next one is resumed. REP S enables display of this message; INH S inhibits this message.

3.3.2 STATUS* Command

This is a special purpose STATUS display that lists every parameter value in the selected test program's Pblock in a three column format. It is intended to be used for developing and debugging the test program, and has these restrictions:

- Most of the parameter names are meaningful only to test program developers.
- The display for a single test program can be too large to fit on a screen.
- Because of this large display, STATUS* is not recommended for multiple programs.
- The command may not be abbreviated. You must enter STATUS*.

3.3.3 LOCAL Command

The LOCAL command allows the TOCS to place the nodes that are specified in the parameter LIST off-line and not pass the LCN token. Nodes that are successfully placed off-line will be listed in a summary message.

The LOCAL command does not reset the nodes, but they can only be placed back on-line through a subsequent RESET command or by pressing the hardware reset button at the front of each module. This command is intended to be used during factory test.

CAUTION

The careless use of this command can result in some nodes becoming Local when not intended to be Local. You should be particularly cautious in defining a parameter list when On-Line (RNOS) nodes are in operation in the LCN. The use of LOC - is to be avoided unless you are certain the entire LCN is available for testing.

Because of the potential dangers in this command, you are required to verify each Local request as shown in the following sample dialog. A request to Local several nodes on the network begins with an entry of:

LOC n, n, n-n, n

where each n represents the LCN address of a node to be made Local (placed off-line). See Appendix B, subsection B.4 for the use of "-" when entering multiple values.

The system responds with the following prompt.

```
Verify these nn LCN nodes are safe to RESET:  n,n,n-n,n
Enter YES to Local these nodes
```

Any response other than the three letters YES (lowercase letters are okay) results in the following message.

```
Your LOCAL request was cancelled
```

A YES response results in the following message.

```
Your LOCAL request is in progress . . .
```

When the Local is complete, the following lines appear.

```
Local is complete in nn LCN nodes: n,n . . . .
'test system name' network now has nn LCN nodes: n,n,. .
```

The Local command entered without parameters returns the following message.

```
Specify LCN node list after LOCAL
```

You can specify Local for a single node (LOC n) or all nodes on the LCN except the TOCS (LOC -).

NOTE

Invoking Local when there are only two nodes cabled to the LCN, results in the TOCS being "Alone on the ring." To recover, press the hardware Reset button on the non-TOCS node module.

3.3.4 LED_DISPLAY Command

The LED_DISPLAY command allows the TOCS to probe the nodes specified in the parameter list and print a summary message indicating which nodes have successfully completed self-test. When a node has failed self-test, the alarm messages that contain the hardware status registers are printed for all slots. After each node has been probed and found to have passed self-test, it will be reset in the same manner as described for the RESET command in the previous subsection. Nodes that have failed self-test are not reset. This command is intended for factory test use.

CAUTION

The careless use of this command can result in some nodes becoming reset when not intended to be affected. You should be particularly cautious in defining a parameter list when On-Line (RNOS) nodes are in operation on the LCN. The use of LED - is to be avoided unless you are certain the entire LCN is available for testing.

Because of the potential dangers in this command, you are required to verify each LED request as shown in the following sample dialog. A request to LED several nodes on the network begins with an entry of:

LED n, n, n-n, n

where each n represents the LCN address of a node to be probed and reset. See Appendix B, subsection B.4, for the use of "-" when entering multiple values. The system responds with the following prompt.

```
These nodes will be reset after probing
Verify these nn LCN nodes are safe to RESET:  n,n,n-n,n
Enter YES to Probe and Reset these nodes
```

Any response other than the three letters YES (lowercase letters are okay) results in the following message.

```
Your LED_DISPLAY request was cancelled
```

A YES response results in the following message.

```
Your LED_DISPLAY is now in progress...
```

If a node fails self-test, the following lines appear.

```
date time Node nn Slot n Alarm 101 $xxxx  (HSR Word 1)
date time Node nn Slot n Alarm 102 $xxxx  (HSR Word 2)
date time Node nn Slot n Alarm 104 $xxxx  (K2LCNs or K4LCNs
LCN)
date time Node nn Slot n Alarm 104 $xxxx  (Non processor
board)
```

When the LED_DISPLAY is complete, the following lines appear.

```
Self test completed in nn LCN nodes(s): n,n,n-n,n

RESET in Progress
RESET is complete in nn LCN nodes: n,n . . . .
'test system name' network now has nn LCN nodes: n,n, . .
```

An LED command entered without parameters returns the following:

```
Specify LCN node list after LED_DISPLAY
```

You can specify LED for a single node (LED n) or for all nodes in the LCN except the TOCS (LED -).

NOTE

Invoking LED when there are only two nodes cabled to the LCN, results in the TOCS being "Alone on the ring." To recover, press the hardware Reset button on the non-TOCS node module.

3.3.5 CHAMBER Command

The CHAMBER command sets the operating mode for the Factory Stress Screen Chamber and requires special hardware configuration. When in this mode, environmental data from the chamber such as elapsed time, temperature, humidity, and dc margins are appended to all alarm messages that are printed at the TOCS. To change the operating mode to the chamber, enter:

```
CHA
```

without any parameters. Unlike most other commands, the CHAMBER command does not support any parameters. Nor, does its entry without any parameters result in an immediate display. Once the Chamber mode has been selected, it cannot be reversed without reloading the test system image.

STATUS REGISTER SUMMARIES
Appendix A

A.1 INTRODUCTION

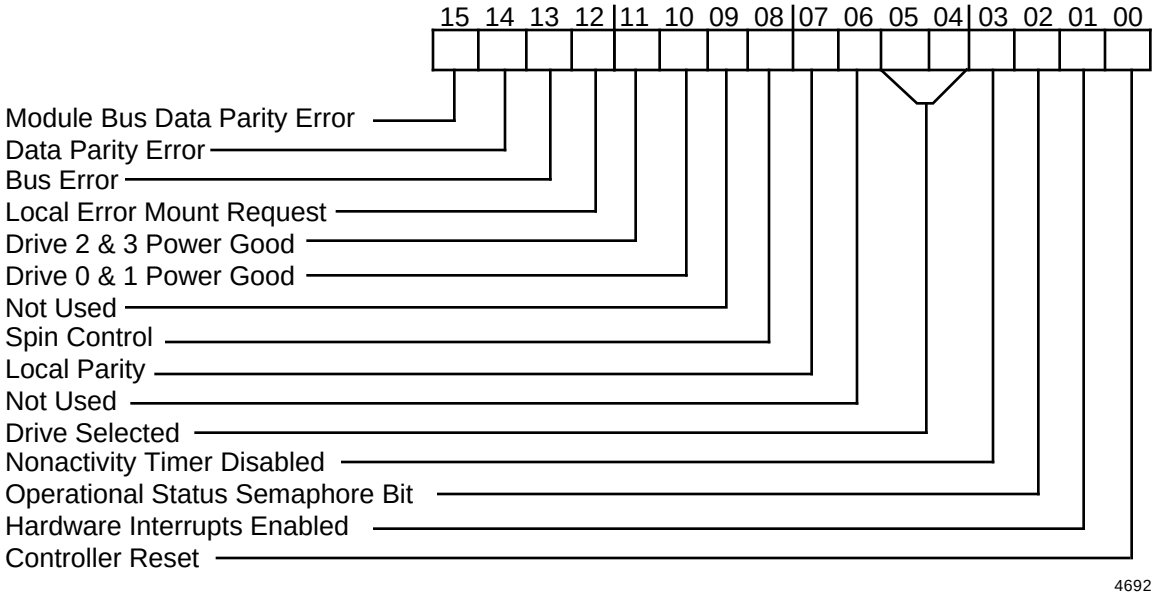
Alarm messages at level 3 and 4 refer to controller board register content, often comparing actual with expected results. This appendix contains explanation of values assigned to contents of key status registers that can be referenced in the alarm messages.

NOTE

In the discussion of individual bit positions, the reference is to the set (1) state unless otherwise specified.

A.2 FLOPPY DISK CONTROLLER

A.2.1 Configuration Status Word

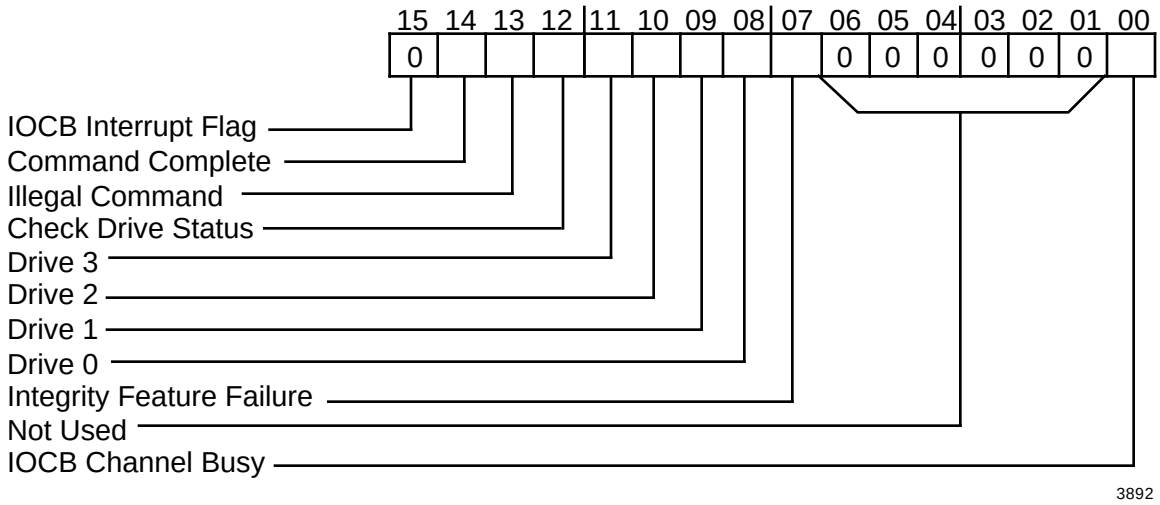


Explanation of indicators

Module Bus Data Parity Error—Data parity error was detected by the controller during a MCPU slot-addressed write to the shared bus or during a DMA read.
Bus Error—A module bus error occurred during a DMA activity.
Local Error—Parity error detected on the local MPU bus or status bus, or a firmware detected error.
Mount Request—The controller has detected a request to spin up all drives that can be spun down. Valid only for systems manufactured in Japan.

Drive Power Good—The floppy disk power supply is operating within specification.
Spin Control—Ac power has been enabled to the disk drive unit motors. If no activity has been directed to the floppy disk subsystem for more than 10 minutes, power to the disk drive motors is disabled. See Nonactivity timer below.
Local Parity—The on-board parity check system is able to generate parity checks.
Drive Selected—Indicates which drive is selected. Encoded as 00 = drive 0, 01 = drive 1, 10 = drive 2, 11 = drive 3.
Nonactivity Timer—The Nonactivity Timer is disabled.
Operational Status Semaphore—Set when the local MPU generates an interrupt, and reset when the MCPU reads the Operational Status word.
Hardware Interrupts Enabled—All interrupts are enabled.
Controller Reset—The reset line on the local MPU is activated and no controller activity can take place.

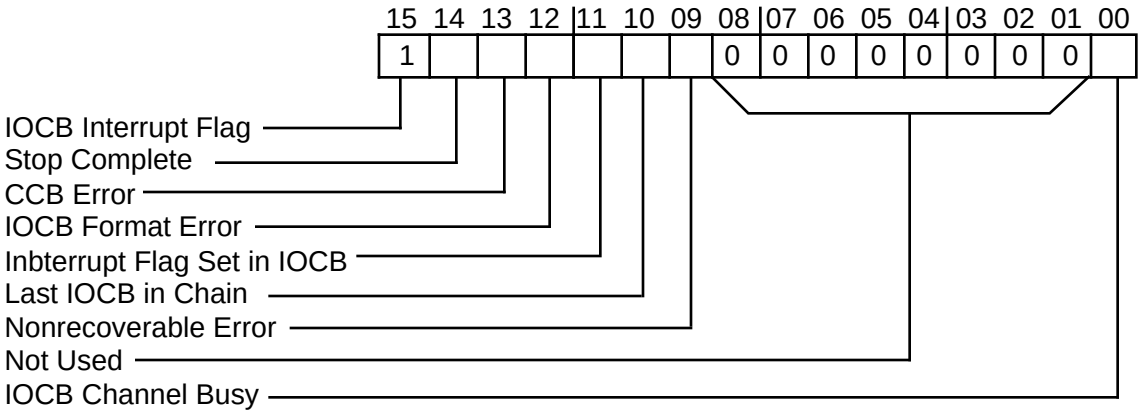
A.2.2 Board Related Operational Status Word



Explanation of indicators

IOCB Interrupt Flag—Always reset for board related operational status.
Command Complete—FDC is ready to accept another command.
Illegal Command—An invalid command was in the command register.
Check Drive Status—A change has been detected in one or more of the disk drive ready lines (door has been opened or closed, etc.) or disk power supply has changed status.
Drive 0 through 3—Indicates drive or drives where change has been detected. In the case of a power failure or multiple drive ready changes, more than one bit may be set.
Integrity Feature Failure—Failure of the subsystem parity check logic.
IOCB Channel Busy—An IOCB chain was under execution.

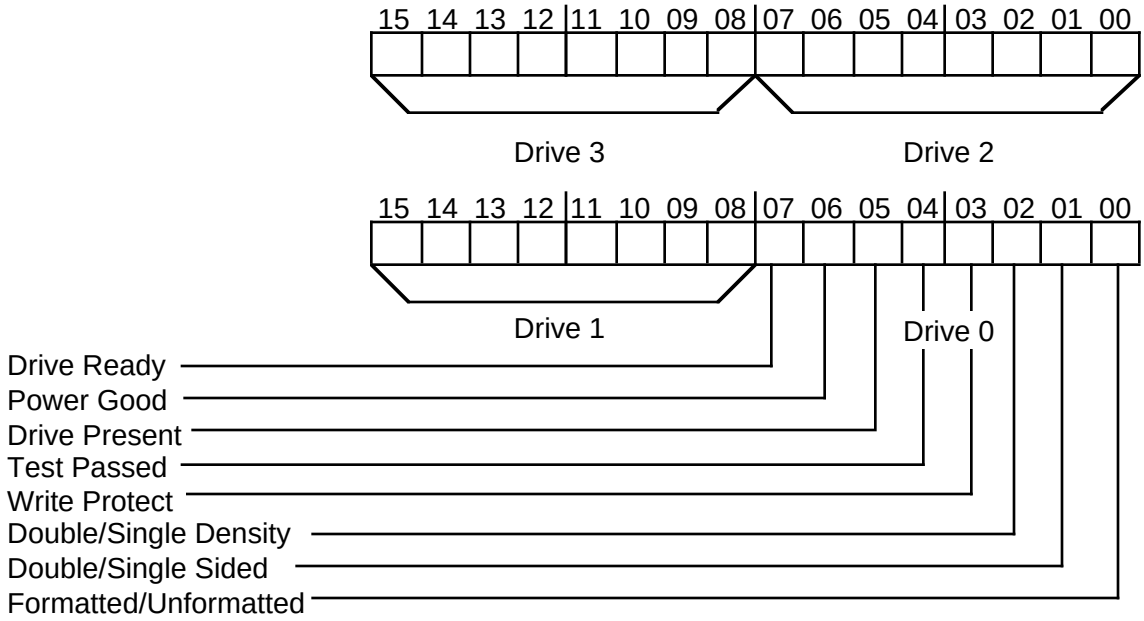
A.2.3 IOCB Related Operational Status Word



Explanation of indicators

IOCB Interrupt Flag—Always set for IOCB related operational status.
Stop Complete—"Stop" command completed for the IOCB chain.
CCB Error—Channel Control Block format was not valid.
IOCB Format Error—IOCB was not correct as received.
Interrupt Flag Set in IOCB—IOCB terminated and flag was set.
Last IOCB in Chain—"End of Chain" was true for the last IOCB executed.
Nonrecoverable Error—IOCB terminated after nonrecoverable error was encountered during execution.
IOCB Channel Busy—The IOCB chain is under execution.

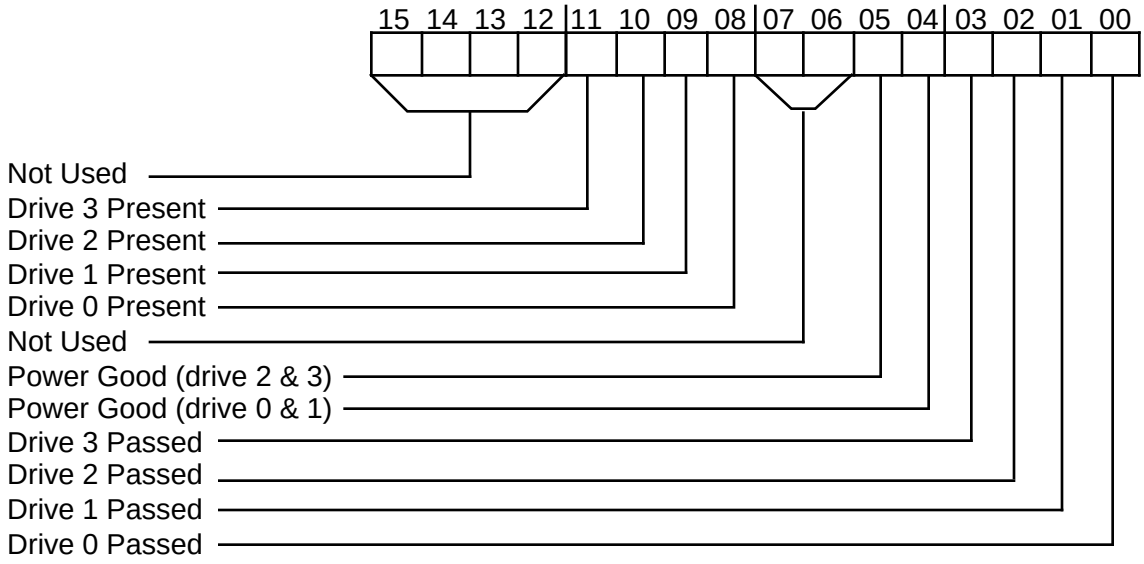
A.2.4 Paged Status Doubleword (Drive Status)



Explanation of indicators

Drive Ready—This bit is reset when door to the drive is open, or there is no diskette in the drive, or if there is a drive hardware failure.
Power Good—Power is applied to the drive and is within operating parameters.
Drive Present—The associated drive is connected.
Test Passed—Indicates that the associated drive contains a diskette that has passed a read and, if permitted, write test. This bit is valid only if the Drive Ready bit is set.
Write Protect—The diskette in the associated drive is write-protected. This bit is valid only if the Drive Ready bit is set.
Double/Single Density—Set if the associated drive contains a double-density formatted diskette; reset if it is single-density. Meaning is only valid if the Formatted/Unformatted bit is set.
Double/Single Side—Set if the associated drive contains a diskette that can be accessed on both sides; reset if single-sided. Valid only if the Drive Ready bit is set.
Formatted/Unformatted—Set if the associated drive contains a diskette formatted as indicated by the Double/Single Density and Side bits above; reset if the diskette is unformatted. Valid only if the Drive Ready bit is set.

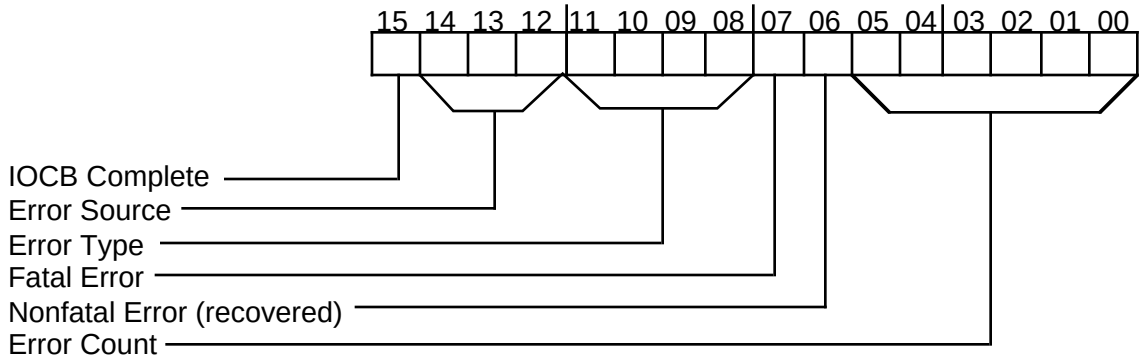
A.2.5 Paged Status Word (Drive Present/Failed)



NOTE

Drives that cannot be tested or that contain a non-testable diskette return a "0" in bits 03-00.

A.2.6 IOCB Status



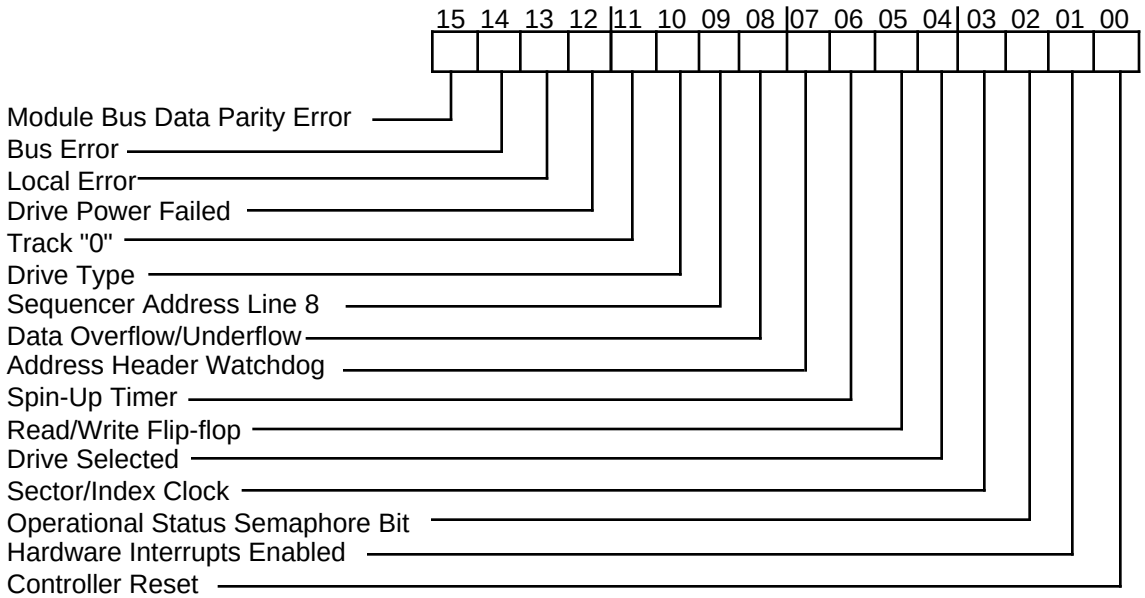
Explanation of indicators

Error Source — 0 = No abnormal condition during execution
1 = Error in data
2 = Error in record structure
3 = Error in Drive (e.g., drive unit not ready)
4 = Error in Controller (e.g., overrun of buffer)
5 = Error in IOCB.

Error Type—Significance varies with error source.
Fatal Error—Set when error cannot be corrected within the designated number of retries.
Error Count—Number of errors encountered during completion of the IOCB; reset after each sector.

A.3 WINCHESTER DISK CONTROLLER

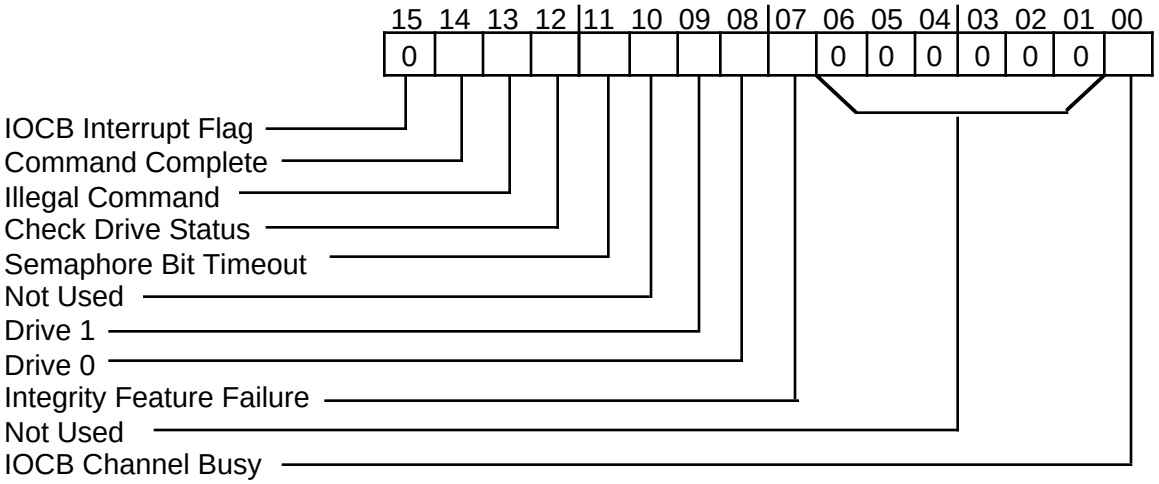
A.3.1 Configuration Status Word



Explanation of indicators

Module Bus Data Parity Error—Data parity error was detected by the controller during a MCPU slot-addressed write to the shared bus.
Bus Error—A module bus error occurred during a DMA activity.
Local Error—Parity error detected on the local MPU bus or status bus, or background testing of local memory failed.
Drive Power Failed—The Winchester disk power supply is not operating within specification.
Track "0"—Firmware use only
Drive Type—Firmware use only
Sequencer Address—Firmware use only
Data Overflow/Underflow—Reset when the interface or module bus could not keep up with the disk data transfer rate. Firmware use only.
Address Header Watchdog—No correct address header detected in two consecutive disk revolutions. Caused by faulty read circuitry, improper formatting, or a sector with the "Bad Sector" flag set. Firmware use only.
Timer in Operation—The 20-second firmware timer to allow motor spin up has not yet timed out.
Read/Write Flip-flop—Firmware use only.
Drive Selected—Output line selection: 0 = Drive 0; 1 = Drive 1.
Sector/Index Clock—Firmware use only
Operational Status Semaphore—Set when the local MPU generates an interrupt, and reset when the MCPU reads the Operational Status word.
Hardware Interrupts Enabled—All interrupts are enabled.
Controller Reset—The reset line on the local MPU is activated and no controller activity can take place.

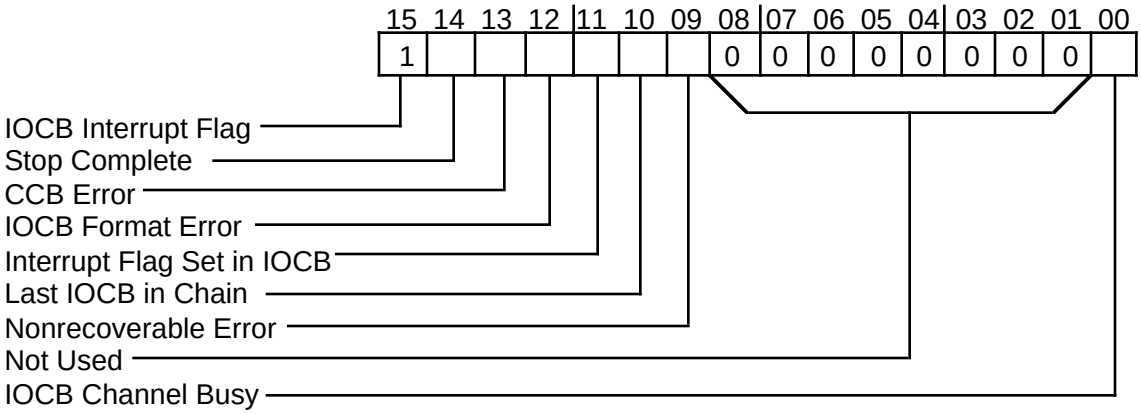
A.3.2 Board Related Operational Status Word



Explanation of indicators

IOCB Interrupt Flag—Always reset for board related operational status.
Command Complete—WDC is ready to accept another command.
Illegal Command—An invalid command was in the command register.
Check Drive Status—A change has been detected in disk drive status.
Semaphore-Bit Timeout—MCPU took longer than 10 ms to service the Module Bus interrupt.
Drive 0 and 1—Indicates drive or drives where change has been detected. In the case of a power failure, more than one bit may be set.
Integrity Feature Failure—Failure of the subsystem parity check logic.
IOCB Channel Busy—The IOCB chain was under execution.

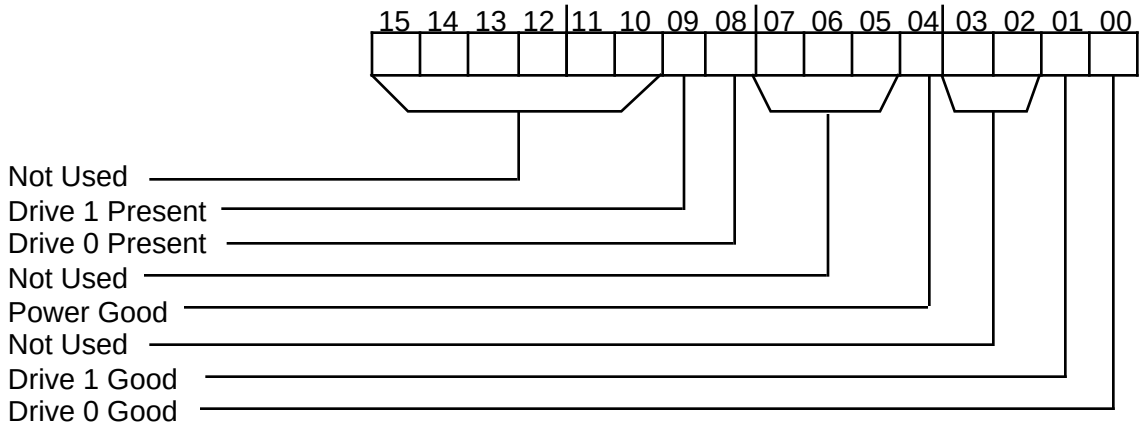
A.3.3 IOCB Related Operational Status



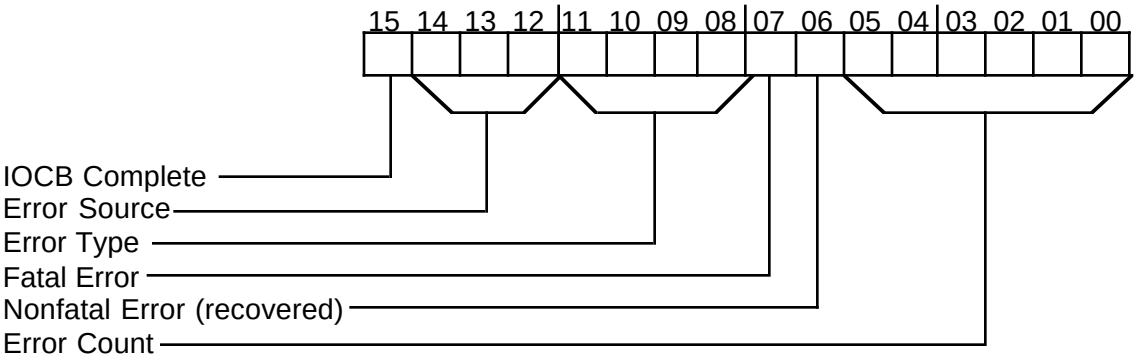
Explanation of indicators

IOCB Interrupt Flag—Always set for IOCB related operational status.
Stop Complete—"Stop" command completed for the IOCB chain.
CCB Error—Channel Control Block format was not valid.
IOCB Format Error—IOCB was not correct as received.
Interrupt Flag Set in IOCB—IOCB terminated and flag was set.
Last IOCB in Chain—"End of Chain" was true for the last IOCB executed.
Nonrecoverable Error—IOCB terminated after nonrecoverable error was encountered during execution.
IOCB Channel Busy—The IOCB chain is under execution.

A.3.4 Paged Status Word (Drive Present/Failed)



A.3.5 IOCB Status



Explanation of indicators

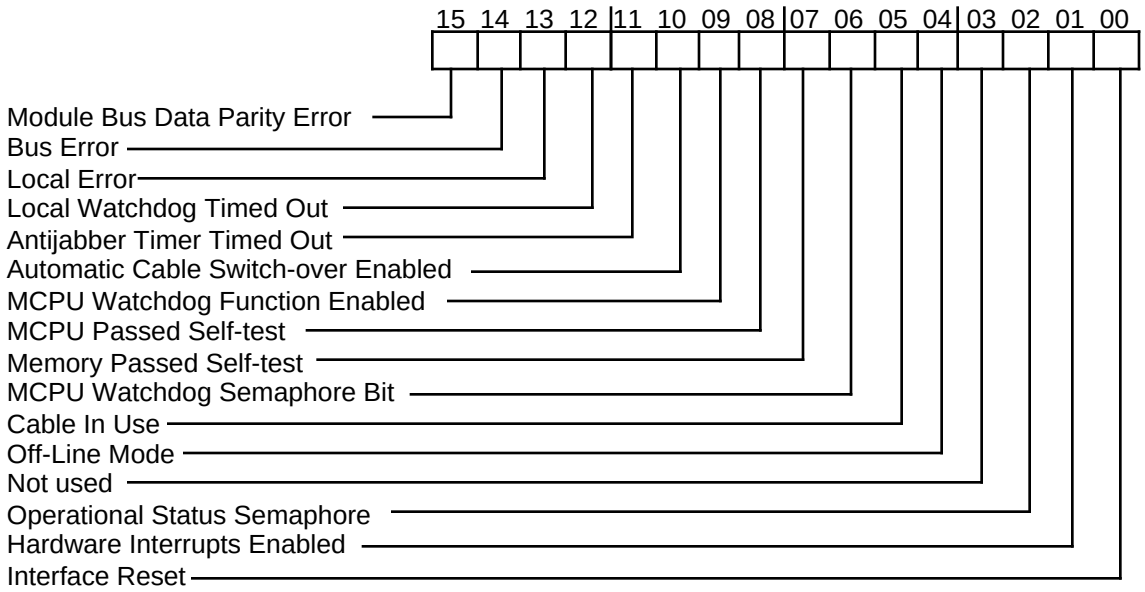
Error Source— 0 = No abnormal condition during execution
1 = Error in data
2 = Error in record structure
3 = Error in Drive (e.g., drive unit not ready)
4 = Error in Controller (e.g., overrun of buffer)
5 = Error in IOCB.

Error Type—Significance varies with error source.
Fatal Error—Set when error cannot be corrected within the designated number of retries.
Error Count—Number of errors encountered during completion of the IOCB.

IOCB status for the Winchester Disk controller commonly appears as the sixth word of an alarm output showing initial (expected) and final (actual) IOCB values.

A.4 LCN INTERFACE

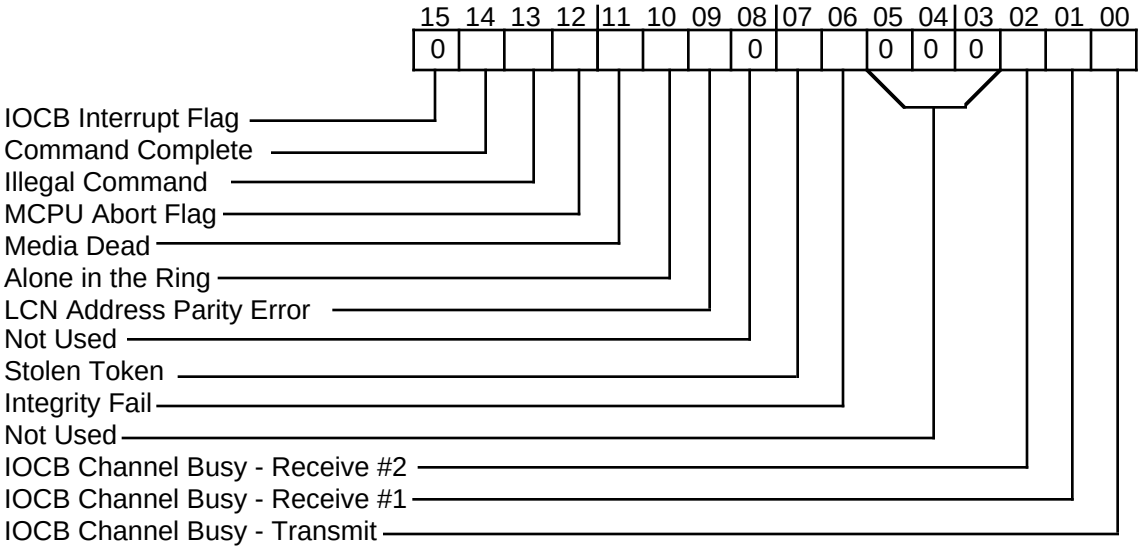
A.4.1 Configuration Status Word



Explanation of indicators

Module Bus Data Parity Error—Data parity error was detected by the controller during a MCPU slot-addressed write to the shared bus or during a DMA read.
Bus Error—A module bus error occurred during a DMA activity.
Local Error—Parity error detected on the local bus or shared bus, or the antijabber or local watchdog timer has timed out.
Local Watchdog Timed Out—The LCNI has taken too long to perform a function.
Antijabber Timer Timed Out—The LCNI has been transmitting too long.
Automatic Cable Switch-over Enabled—Automatic switch-over to the redundant cable is enabled.
MCPU Watchdog Enabled—The LCNI watchdog function is enabled.
MCPU Passed Self-test—MCPU self-test firmware has been executed successfully.
Memory Passed Self-test—MCPU has successfully tested the memory.
MCPU Watchdog Semaphore Bit—When the MCPU watchdog is enabled, the MCPU must reset this bit at least every 100 ms to avoid timeout.
Cable In Use—0 = Cable A, 1 = Cable B.
Off-Line Mode—LCNI is in the off-line mode.
Operational Status—Set by the LCNI during the interrupt dequeue process, and reset when the MCPU reads the Operational Status word.
Hardware Interrupts—All interrupts are enabled.
Controller Reset—The reset line on the local micro-engine is activated and no controller activity can take place.

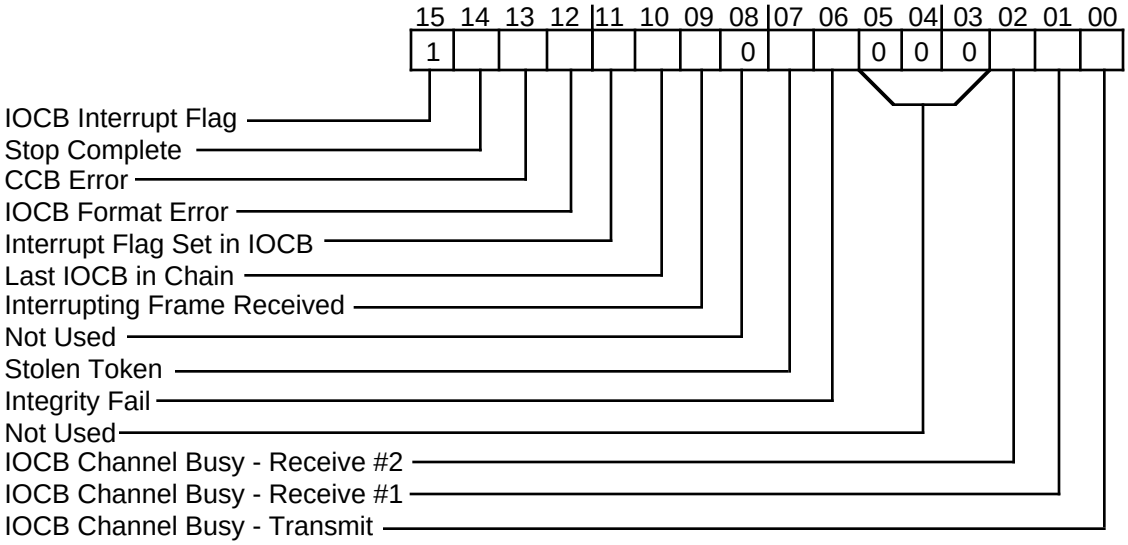
A.4.2 Board Related Operational Status Word



Explanation of indicators

IOCB Interrupt Flag—Always reset for board related operational status.
Command Complete—The LCNI is ready to accept another command.
Illegal Command—An invalid command and/or parameter was in the command register, or there was a parity error when attempting to write into the command register.
MCPU Abort Flag—LCNI forced the MCPU into a diagnostic mode.
Media Dead—The ring has collapsed or the receive circuitry has failed.
Alone in the Ring—The LCNI has not been able to pass the token and now is waiting for the token to be passed to it.
LCN Address Parity Error—A parity error has been detected in the settings of the LCN address interconnections on the paddle board, or there is not a match between what is saved in local RAM and what is read in start command processing.
Stolen Token—This LCNI received a token pass-frame addressed to it, but when it went to transmit there was nonsilence on the LCN.
Integrity Fail—Parity check circuitry found to be defective.
IOCB Channel Busy Flags—The indicated Transmit or Receive IOCB chains were executing.

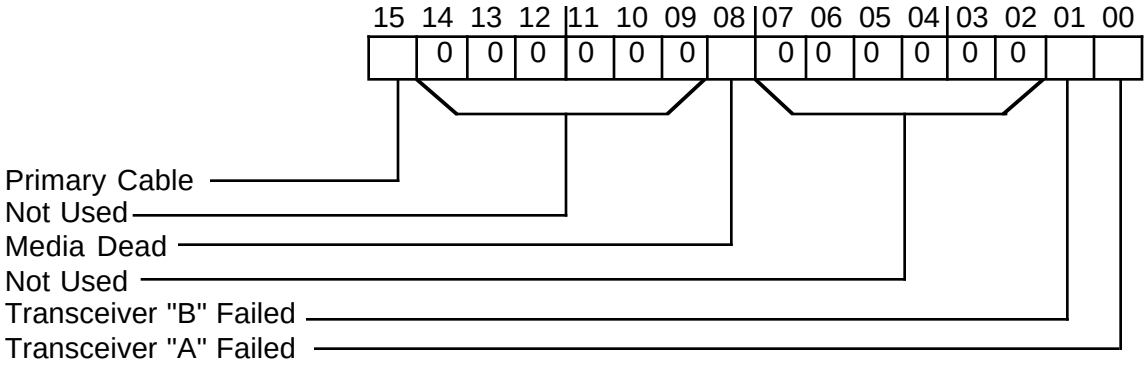
A.4.3 IOCB Related Operational Status Word



Explanation of indicators

IOCB Interrupt Flag—Always set for IOCB related operational status.
Stop Complete—"Stop" command completed for the IOCB chain.
CCB Error—Channel Control Block format was not valid.
IOCB Format Error—IOCB was not correct as received.
Interrupt Flag Set in IOCB—IOCB terminated and flag was set.
Last IOCB in Chain—"End of Chain" was true for the last IOCB executed.
Interrupting Frame Received—Frame received over the LCN that had the "Generate Interrupt" code set in the destination address field or the frame was sent to the broadcast physical address.
Stolen Token—This LCNI received a token pass-frame addressed to it, but when it went to transmit there was nonsilence on the LCN.
Integrity Fail—Parity check circuitry found to be defective.
IOCB Channel Busy Flags—The indicated Transmit or Receive IOCB chains were executing.

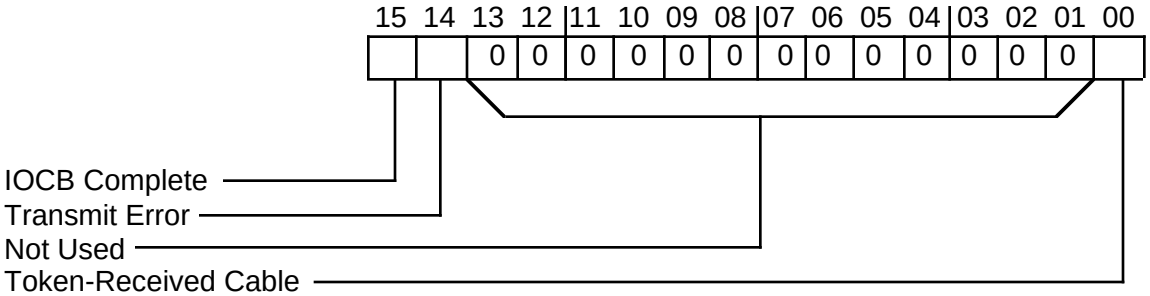
A.4.4 Paged Status Word (Cable Status)



Explanation of indicators

Primary Cable—0 = Cable A, 1 = Cable B.
Media Dead—In automatic switch-over mode, both cables are dead (no data transitions in 25.6 microseconds); or, in nonswitch-over mode, the cable being used is dead.
Transceiver Failed—The transceiver has failed loopback test performed during self-test.

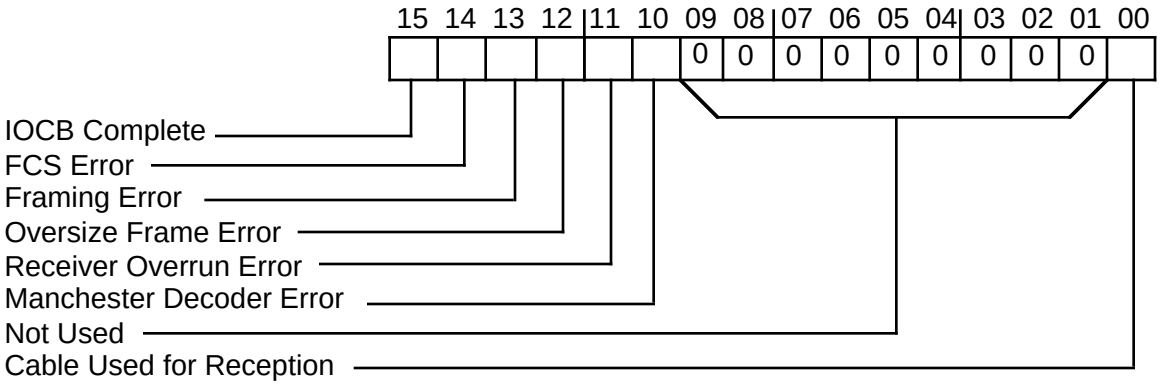
A.4.5 IOCB Status—Transmit



Explanation of indicators

Transmit Error—DMA Underrun.
Token-Received Cable—Cable used for reception of token; 0 = Cable A, 1 = Cable B.

A.4.6 IOCB Status—Receive

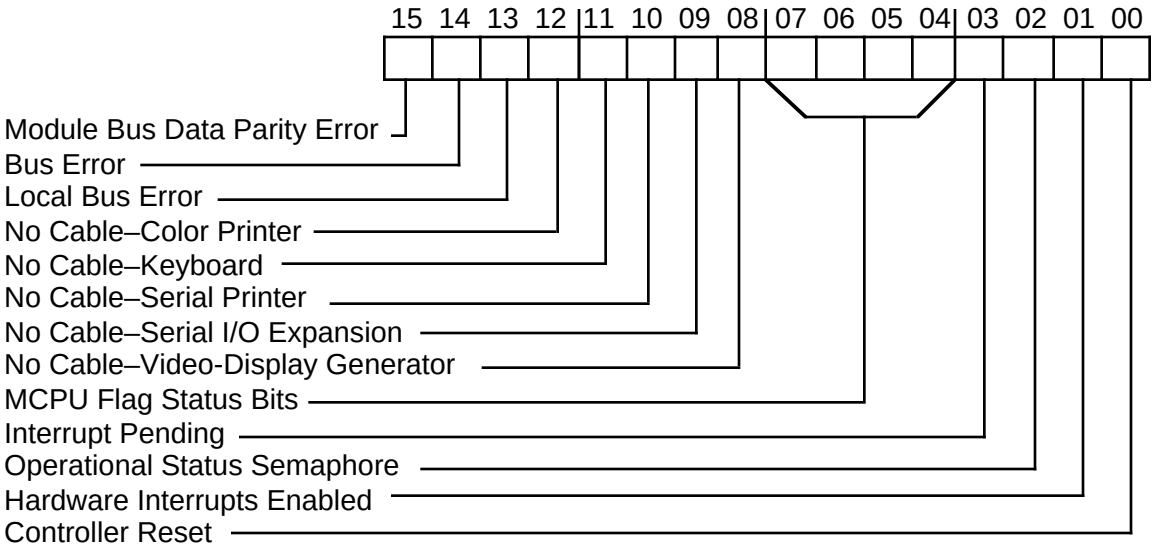


Explanation of indicators

FCS Error—Locally computed FCS did not compare with the FCS as received.
Framing Error—Number of bits between start and end-of-frame delimiters was not evenly divisible by 16.
Oversize Frame Error—Frame longer than allowed.
Receiver Overrun Error—Information could not be passed over the module bus quickly enough to avoid overrun of the LCNI internal buffer memory.
Manchester Decoder Error—May be caused by hardware failure or poor quality of received signal.
Cable Used for Reception—0 = Cable A, 1 = Cable B.

A.5 OPERATOR INTERFACE SUBSYSTEM

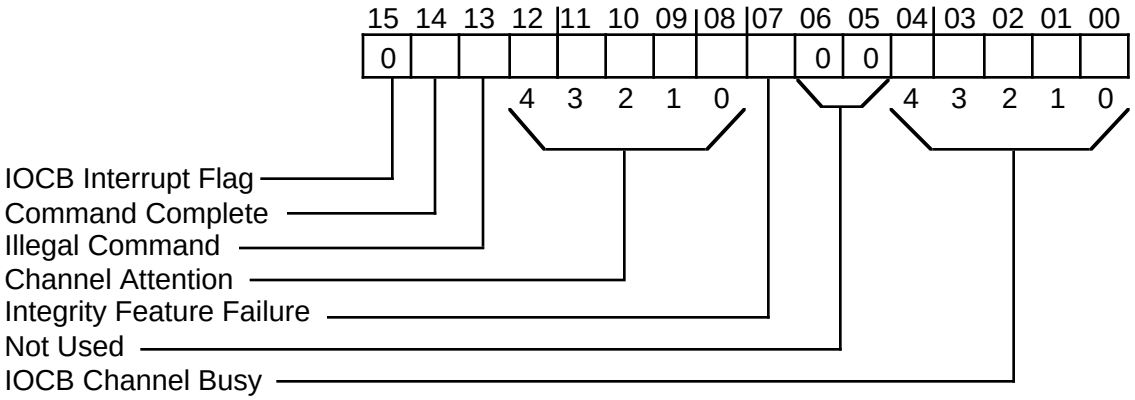
A.5.1 Configuration Status Word



Explanation of indicators

Module Bus Data Parity Error—Data parity error was detected by the controller during a MCPU slot-addressed write to the shared bus or during a DMA read.
Bus Error—A module bus error occurred during a DMA activity.
Local Error—Either parity error detected on the local MPU bus or a local timeout.
No Cable—Physical absence of peripheral devices.
Interrupt Pending—An interrupt is pending that has not been acted upon.
Operational Status Semaphore—Set when the local MPU generates an interrupt, and reset when the MCPU reads the Operational Status word.
Hardware Interrupts Enabled—All interrupts are enabled.
Controller Reset—The reset line on the local MPU is activated and no controller activity can take place.

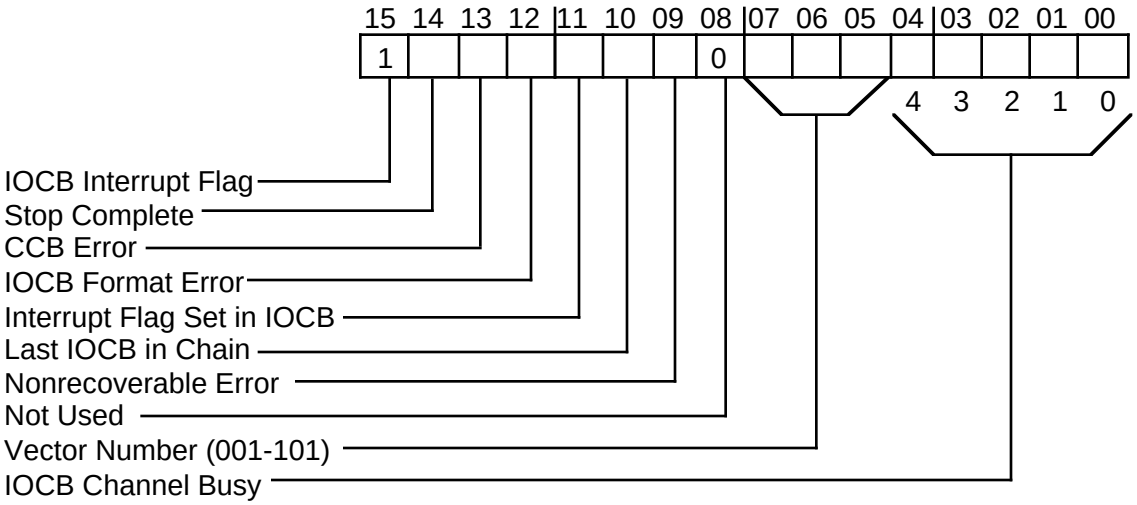
A.5.2 Board Related Operational Status Word



Explanation of indicators

IOCB Interrupt Flag—Always reset for board related operational status.
Command Complete—PIC is ready to accept a new command.
Illegal Command—The last command written to the PIC was illegal or undefined, or a parity error was detected when the MCPU wrote the command.
Channel Attention—Conditions within the specified channels require service.
Integrity Feature Failure—Failure of the integrity features tested during a start command.
IOCB Channel Busy—IOCB activity is in progress for the specified channels.

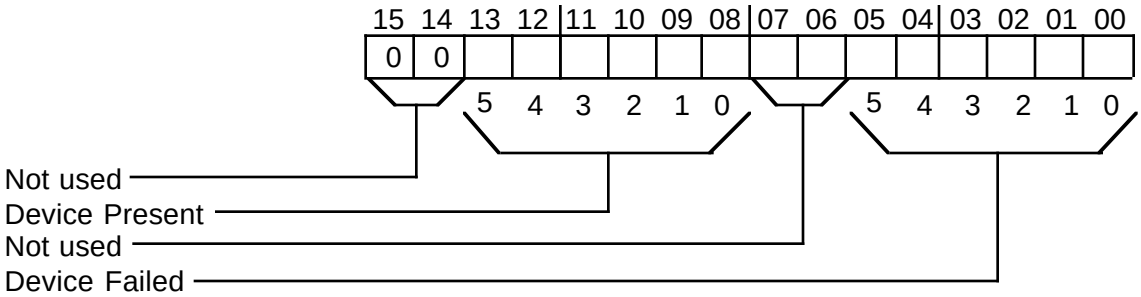
A.5.3 IOCB Related Operational Status Word



Explanation of indicators

IOCB Interrupt Flag—Always set for IOCB related operational status.
Stop Complete—"Stop" command completed for the IOCB chain.
CCB Error—Channel Control Block format was not valid.
IOCB Format Error—IOCB was not correct as received.
Interrupt Flag Set in IOCB—IOCB terminated and flag was set.
Last IOCB in Chain—"End of Chain" was true for the last IOCB executed.
Nonrecoverable Error—IOCB terminated after nonrecoverable error was encountered during execution.
IOCB Channel Busy—The associated IOCB chain is under execution.

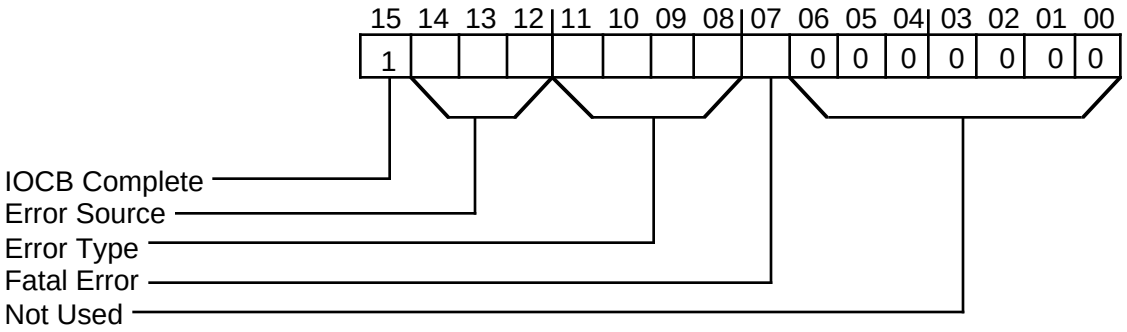
A.5.4 Paged Status Word (Device Status)



Device number/name correlation

0 = VDG #1
1 = Serial Expansion
2 = Serial Printer Interface
3 = Keyboard interface
4 = Parallel Printer interface
5 = VDG #2

A.5.5 IOCB Operation Status



Explanation of indicators

Error Source — 0 = No abnormal condition during execution
1 = Error in data
2 = Error in record structure
3 = Error in Device (e.g., device not ready)
4 = Error in Controller (e.g., overrun of buffer)
5 = Error in IOCB.

Error Type—Significance varies with error source.
Fatal Error—Set when error cannot be corrected within the designated number of retries.

A.5.5.1 IOCB Errors—VDG

Error Source	Error Type	Meaning
0	0	Normal termination, no error encountered
1	2	Problem with Download Primitives command; primitives not loaded or illegal checksum word in primitive image
1	5	Undefined ASCII character for Draw Character command
3	C	Selected VDG not ready, not connected, or failed self-test
5	0	IOCB aborted by a Reset Channel or Abort command
5	2	Illegal IOCB command
5	3	Buffer size too large for Download Primitives command

A.5.5.2 IOCB Errors—Serial I/O Expansion Channel

Error Source	Error Type	Meaning
0	0	Normal termination, no error encountered
3	1	Parity error in received data or error in communication to keyboard and retry limit has been exceeded
3	C	Selected device not ready, not connected, or channel failed self-test
4	4	Loopback timeout
5	0	IOCB aborted by a Reset Channel or Abort command
5	2	Illegal IOCB command

A.5.5.3 IOCB Errors—Serial Printer

Error Source	Error Type	Meaning
0	0	Normal termination, no error encountered
3	1	Parity error in received data
3	C	Selected device not ready, not connected, or channel failed self-test
4	4	Loopback timeout
5	0	IOCB aborted by a Reset Channel or Abort command
5	2	Illegal IOCB command

A.5.5.4 IOCB Errors—Keyboard

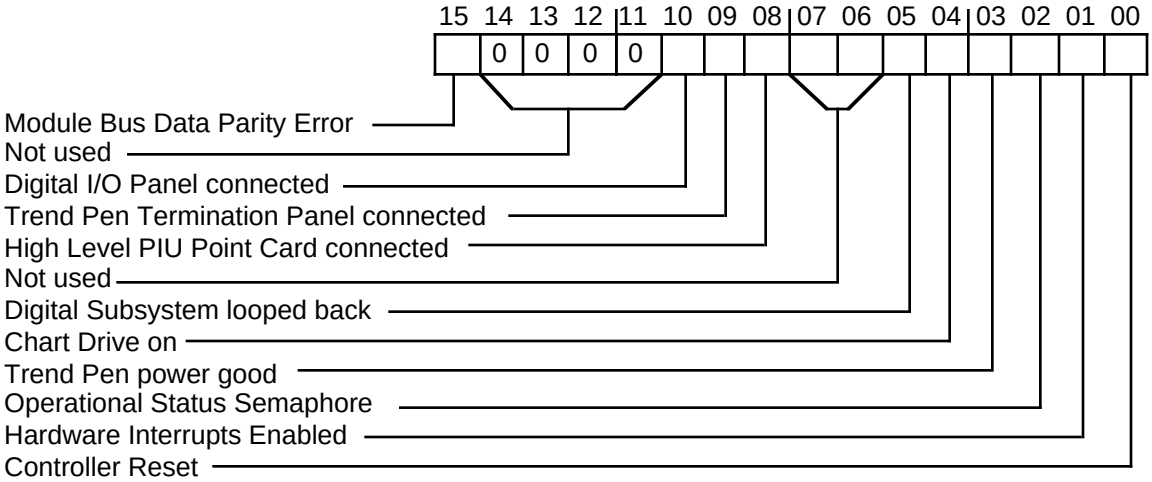
Error Source	Error Type	Meaning
0	0	Normal termination, no error encountered
3	1	Error in communication to keyboard and retry limit has been exceeded
3	C	Selected device not ready, not connected, or channel failed self-test
4	4	Loopback timeout
5	0	IOCB aborted by a Reset Channel or Abort command
5	2	Illegal IOCB command

A.5.5.5 OCB Errors -- Color Printer

Error Source	Error Type	Meaning
0	0	Normal termination, no error encountered
3	1	Paper empty
3	C	Selected device not ready, not connected, or channel failed self-test
5	0	IOCB aborted by a Reset Channel or Abort command
5	2	Illegal IOCB command

A.6 SYSTEM INPUT/OUTPUT CONTROLLER

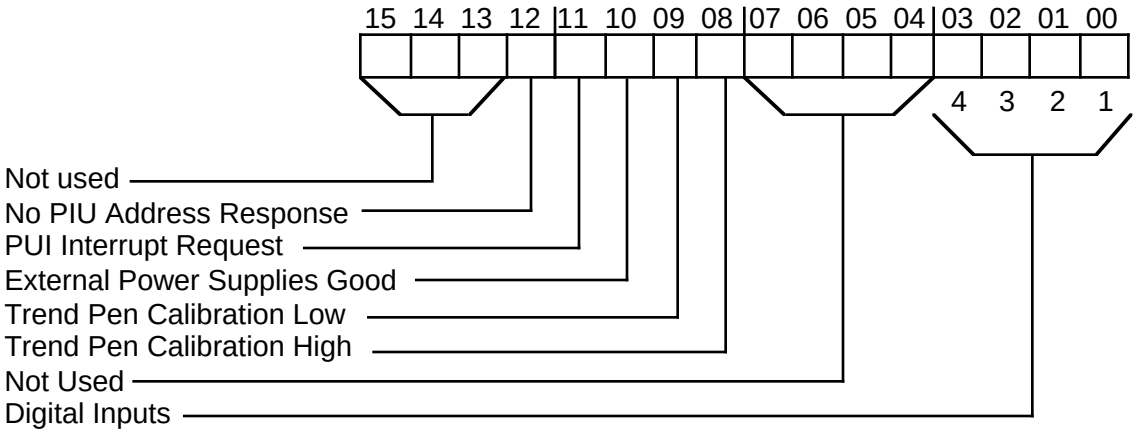
A.6.1 Configuration Status Word (Read)



Explanation of indicators

Module Bus Data Parity Error—Data parity error was detected by the controller during a MCPU slot-addressed write to the shared bus.
Digital I/O Panel connected—Should never be set at same time as bit 8.
High Level PIU Point Card connected—Should never be set at same time as bit 10 or when the board is installed in the Universal Station.
Digital Subsystem looped back—The value written to the digital output register is looped back to the digital inputs.
Operational Status Semaphore—Set when the SIO board generates an interrupt, and reset when the MCPU reads the Operational Status word.
Hardware Interrupts Enabled—All interrupts are enabled.
Controller Reset—The reset line on the local MPU is activated and no controller activity can take place.

A.6.2 Operational Status/Status Input Register

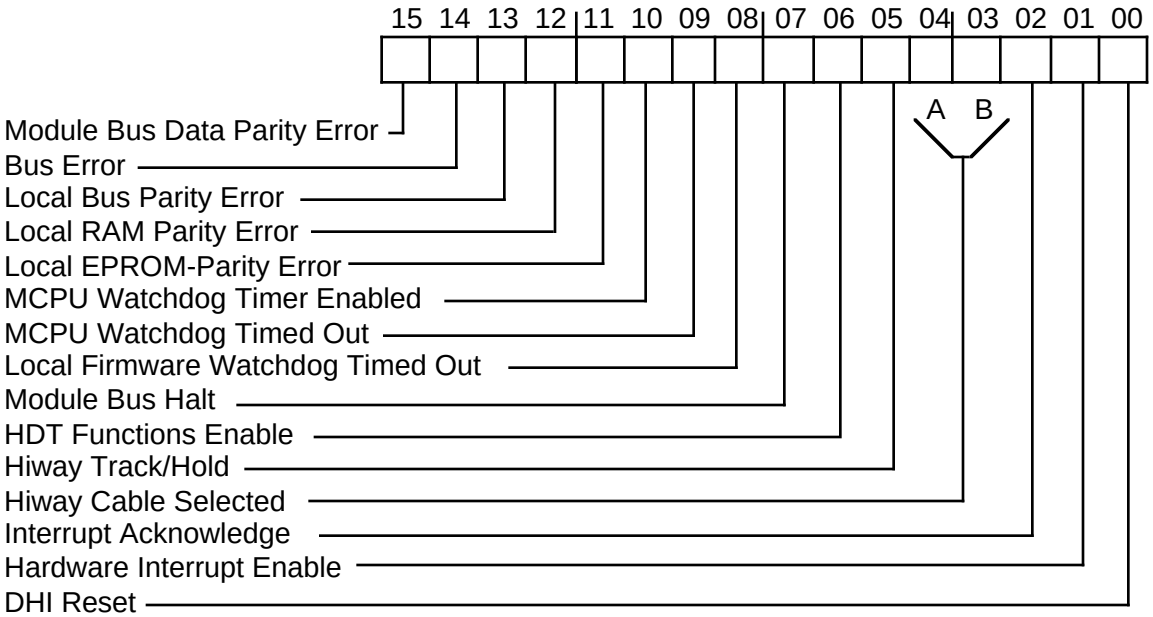


Explanation of indicators

No PIU Address—The addressed point card did not respond when it was accessed. This bit is only valid when a HLPIU point card file is present.
PIU Interrupt Request—One of the PIU digital input boards has detected a change.
External Power Supplies Good—Both the 24 Vdc supply at the Trend Pen Interface and the 5 Vdc supply from the SIO board to the Digital I/O Panel are good.
Trend Pen Calibration Low/High—Setting of the calibration switch at the Trend Pen Termination Panel.
Digital Inputs—The current state of the digital inputs to the SIO board.

A.7 DATA HIWAY INTERFACE

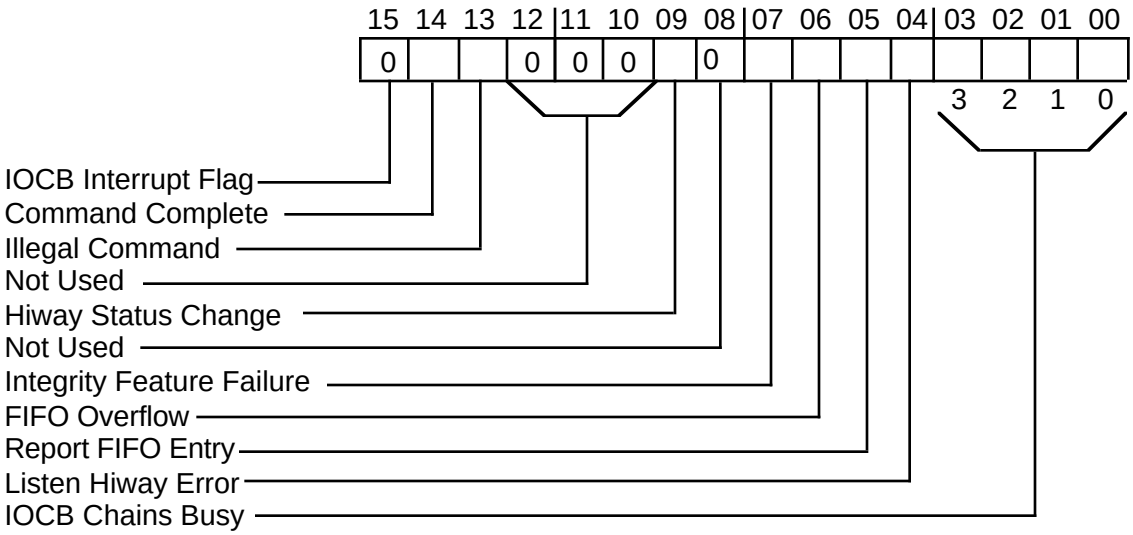
A.7.1 Configuration Status Word



Explanation of indicators

Module Bus Data Parity Error—Data parity error was detected by the controller during a MCPU slot-addressed write to the shared bus or during a DMA read.
Bus Error—A module bus error occurred during a DMA activity.
Hiway Track/Hold—When DHI is not the Hiway Traffic Director, this bit should be reset. When DHI is the HTD, it should be set.
Hiway Cable Selected—When DHI is the Hiway Traffic Director, marks hiway for most recently received data. When DHI is not the HTD, marks selected hiway.
Interrupt Acknowledge—Unacknowledged interrupt pending.
DHI Reset—The reset line on the local MPU is activated and no controller activity can take place.

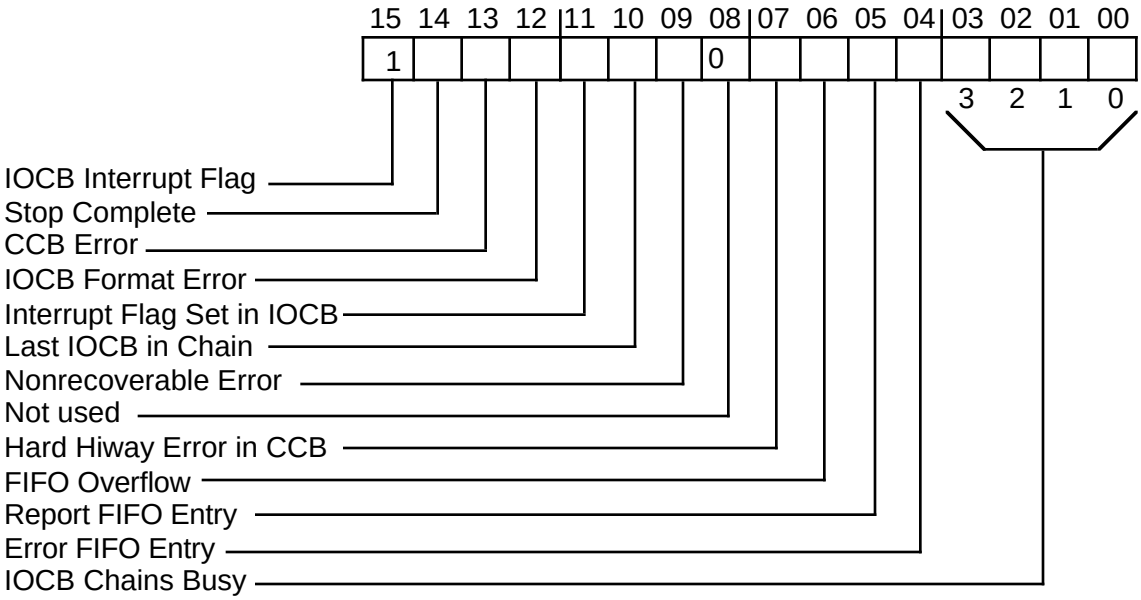
A.7.2 Board Related Operational Status Word



Explanation of indicators

IOCB Interrupt Flag—Always reset for board related operational status.
Command Complete—DHI is ready to accept a new command.
Illegal Command—An invalid command was in the command register.
Hiway Status Change—Uncommanded changes exist in the Hiway Status word.
Integrity Feature Failure—DHI has detected that local parity generating logic or parity checking logic does not properly function.
FIFO Overflow—The DHI receive report FIFO is full.
Report FIFO Entry—An entry was made in the receive report FIFO.
Listen Hiway Error—A Hiway error was detected by the DHI during listen time.
IOCB Chains Busy—The indicated chains were active.

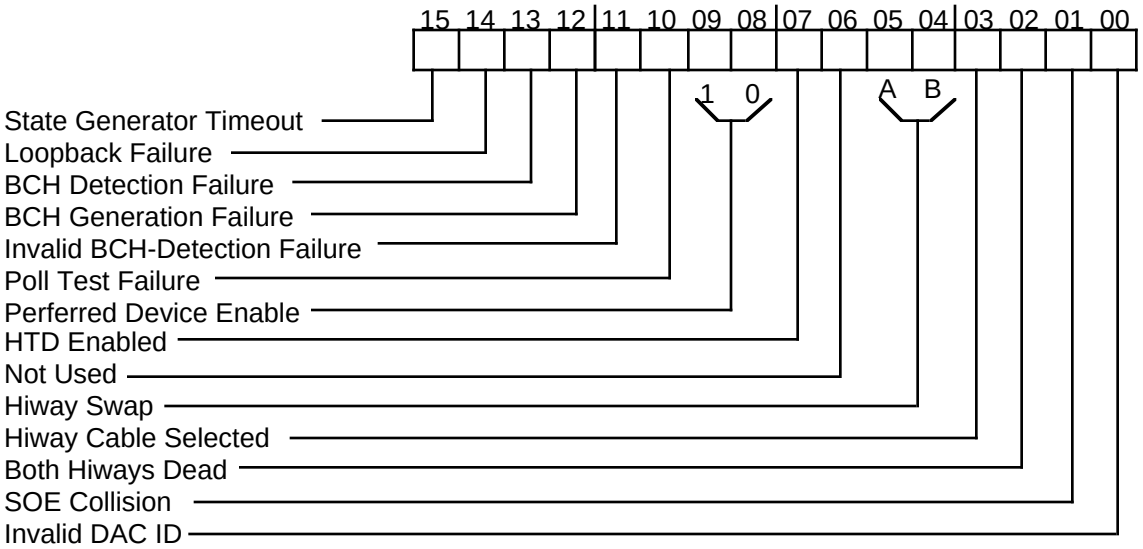
A.7.3 IOCB Related Operational Status Word



Explanation of indicators

IOCB Interrupt Flag—Always set for IOCB related operational status.
Stop Complete—"Stop" command completed for the IOCB chain.
CCB Error—Channel Control Block format was not valid.
IOCB Format Error—IOCB was not correct as received.
Interrupt Flag Set in IOCB—IOCB terminated and flag was set.
Last IOCB in Chain—"End of Chain" was true for the last IOCB executed.
Nonrecoverable Error—A nonrecoverable error was encountered during IOCB execution of the CCB.
Hard Hiway Error in CCB—At least one hard Hiway error (nonrecoverable after retries) was encountered during IOCB execution of the CCB chain.
FIFO Overflow—The CCB FIFO is full.
Report FIFO Entry—An entry was made in a report FIFO.
Error FIFO Entry—An entry was made in an error FIFO. See the Data Hiway Interface Subsystems Tests writeup in Section 8 of the *Hardware Verification Test System* manual, for interpretation of Error FIFO messages.
IOCB Chains Busy—The indicated chains were active.

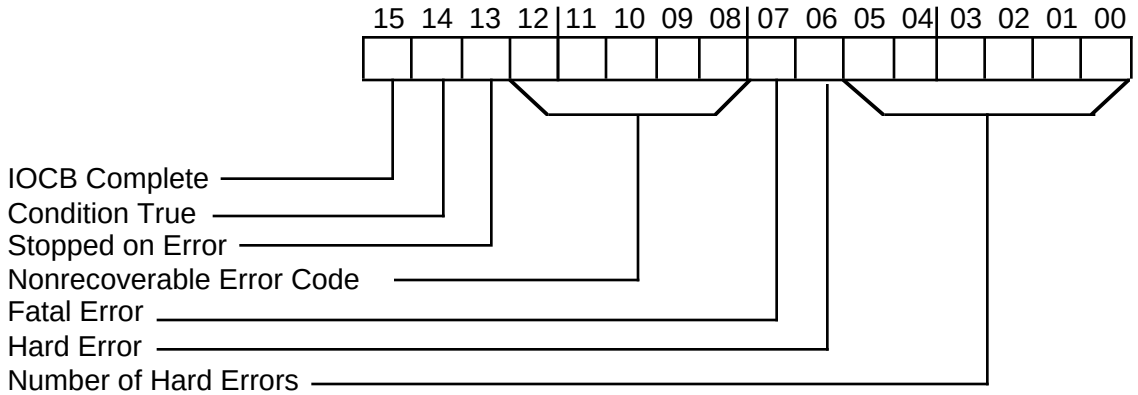
A.7.4 Hiway Status



Explanation of indicators

State Generator Timeout—The State Generator did not complete transmit operation.
Loopback Failure—The loopback data into the hiway shift register did not verify.
BCH Detection Failure—Test for valid BCH detection has failed.
BCH Generation Failure—BCH generation logic test has failed.
Invalid BCH Detection Failure—Test for invalid BCH has failed.
Preferred Device Enable—Status of the two preferred devices when the DHI is the HTD.
HTD Enabled—Set when DHI is the HTD.
Hiway Swap—The DHI has detected an uncommanded hiway swap by the HTD.
Hiway Cable Selected—Set for the hiway currently in use.
Both Hiways Dead—If the DHI is not the HTD, the active hiway could not be detected within 10 poll cycles. If the DHI is the HTD, this bit is always reset.
SOE Collision—SOE synchronization transaction was detected on the hiway while the DHI was performing a SOE synchronization.
Invalid DAC ID—An invalid ID number received.

A.7.5 IOCB Status



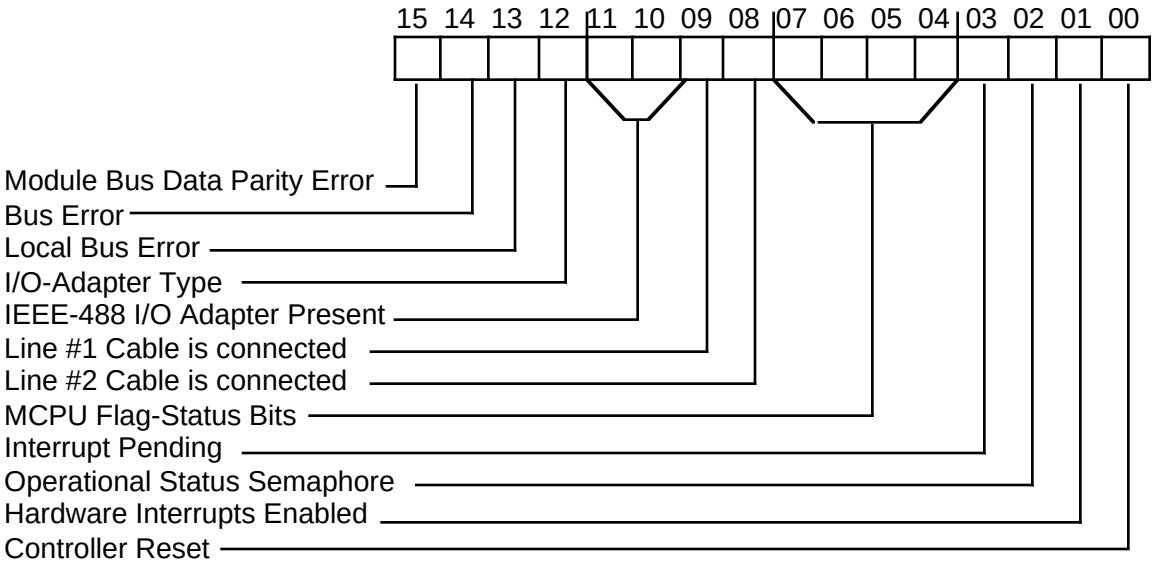
Explanation of indicators

Condition True—The condition code, if any, was satisfied.
Stopped on Error—The IOCB was stopped because of an error.
Nonrecoverable Error Code—
00 = Normal condition during execution
01 = Invalid report FIFO number
02 = Invalid error FIFO number
03 = Odd or out of range IOCB element list address
04 = Odd or out of range next IOCB in chain address
05 = IOCB operation count equal to "0"
06 = Invalid operation code
07 = Invalid IOCB subcount
08 = Invalid data in the IOCB element list
09 = Invalid error or report FIFO ID
0A= IOCB FIFO full when append attempted
0B= Abort command issued during IOCB execution
0C= Unable to get the hiway grant
0D= Excessive time on the hiway for performing the IOCB (more than 30 msec)
0E= Hiway related hardware failure; see hiway status word bits 10-15 for specifics.

Fatal Error—Repeated failure on retry of all operations in this IOCB.
Hard Error—Failure on retry of one or more operations in this IOCB.
Number of Hard Errors—Total number of hard errors (hiway errors after programmed number of retries) for this IOCB.

A.8 COMMUNICATION LINE INTERFACE

A.8.1 Configuration Status Word



Explanation of indicators

Module Bus Data Parity Error—Data parity error was detected by the controller during a MCPU slot-addressed write to the shared bus or during a DMA read.
Bus Error—A module bus error occurred during a DMA activity.
Decoding of bits 14 and 15 is as follows:

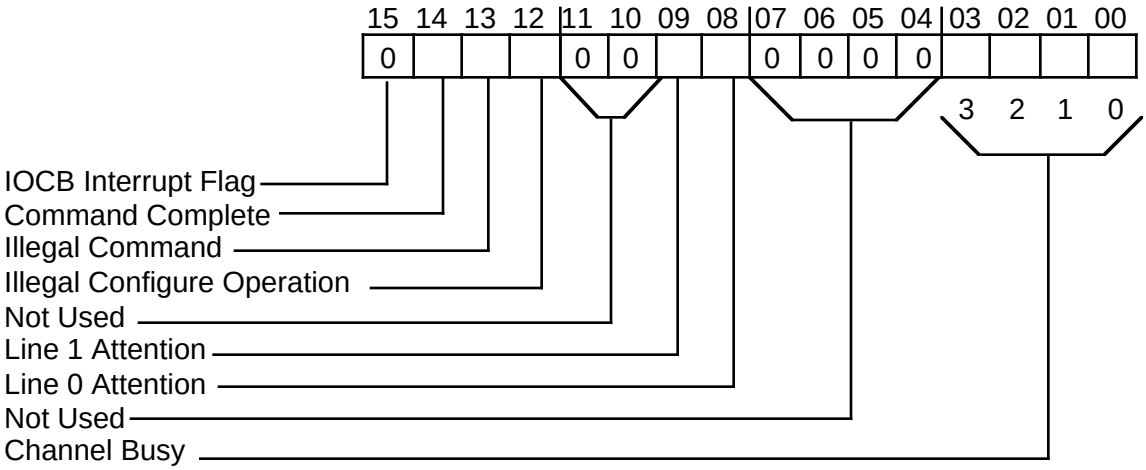
Bit 15	Bit 14	Meaning
0	0	No error
0	1	Module bus "bus error" asserted while CLI was temporary bus master
1	0	Parity error during status bus write by MCPU
1	1	Parity error during DMA read while CLI was temporary bus master

Local Bus Error—The local bus or the status bus had a parity error.
I/O Adapter Type—These bits indicate the type of I/O adapter as follows:

Bit 12	Bit 11	Adapter Type
0	0	RS-232C or IEEE-488
0	1	RS-449
1	0	RFU
1	1	None inserted

MCPU Flag Status—Subsystem flag control bits set by the MCPU.
Interrupt Pending—An interrupt is pending that has not been acted upon.
Operational Status Semaphore—Set when the local MPU generates an interrupt, and reset when the MCPU reads the Operational Status word.
Hardware Interrupts Enabled—All interrupts are enabled.
Controller Reset—The reset line on the local MPU is activated and no controller activity can take place.

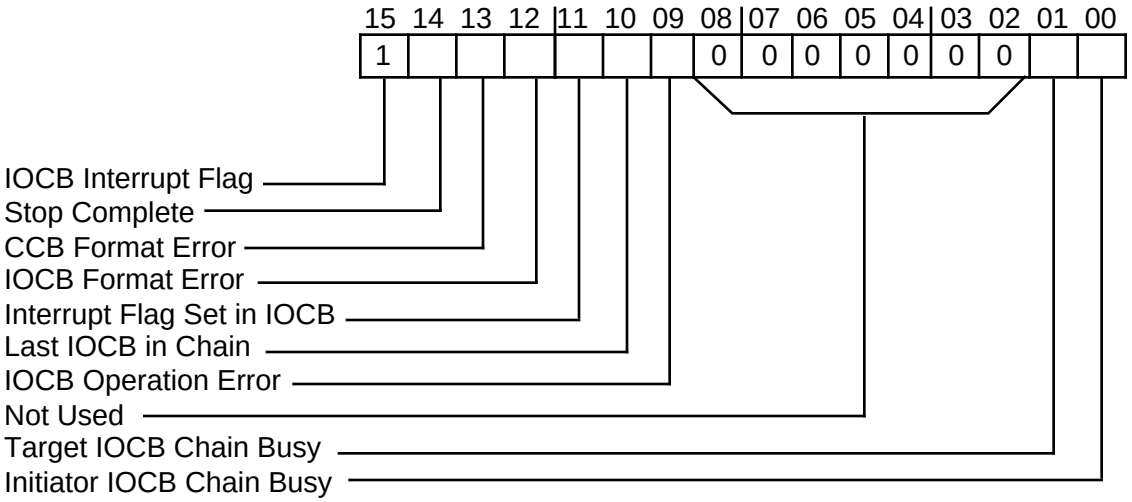
A.8.2 Board Related Operational Status Word



Explanation of indicators

IOCB Interrupt Flag—Always reset for board related operational status.
Command Complete—CLI is ready to accept a new command.
Illegal Command—The last command written to the CLI was illegal or undefined, or the Configure command address was out of bounds or odd, or a Start or Loopback was commanded while the channel was busy.
Illegal Configure Operation—Parameters given by the Configure command (parameter download) were not correct.
Line 0 or 1 Attention—Set when the line status changes.
IOCB Channel Busy—IOCB activity is in progress for the specified channels.

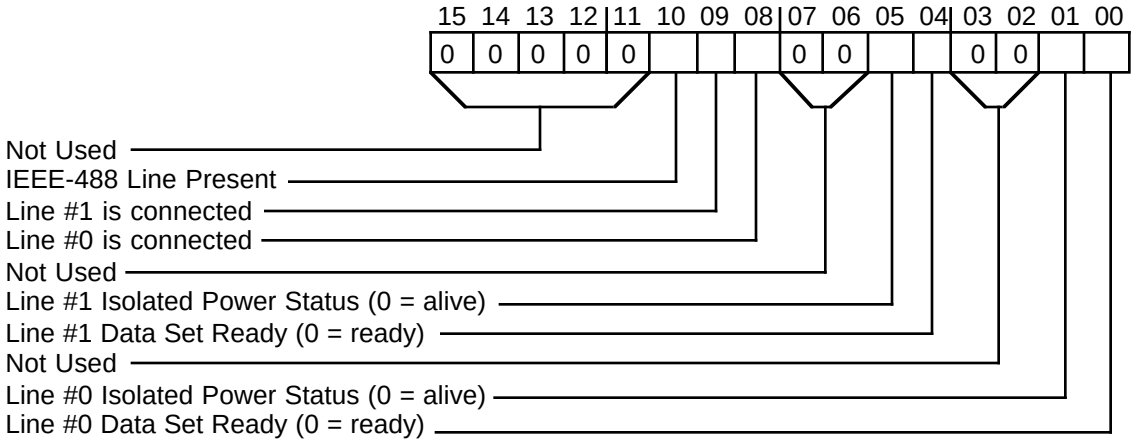
A.8.3 IOCB Related Operational Status Word



Explanation of indicators

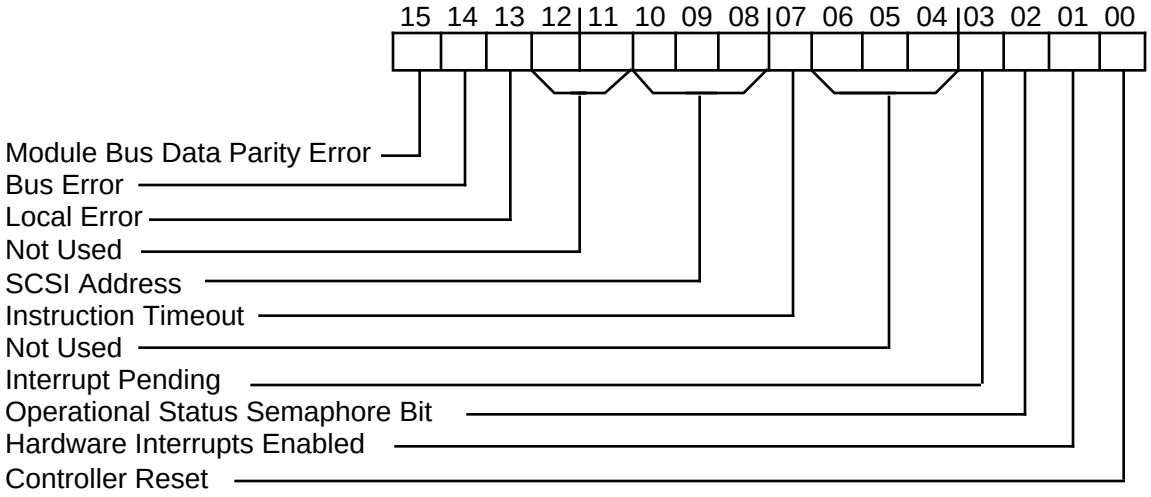
IOCB Interrupt Flag—Always set for IOCB related operational status.
Stop Complete—"Stop" command completed for the IOCB chain.
CCB Format Error—Channel Control Block format was not valid.
IOCB Format Error—IOCB was not correct as received.
Interrupt Flag Set in IOCB—IOCB terminated and flag was set.
Last IOCB in Chain—"End of Chain" was true for the last IOCB executed.
Check Device Status—One of following states exists: No line present signal; Data set ready signal was removed; Isolated dc power supply failed.
Illegal Procedure—Start command made to unconfigured channel.
Vector Number—Identifies interrupt source.
Channel Busy—The associated IOCB chain is under execution.

A.8.4 Paged Status Word (Line Status)



A.9 SMART PERIPHERAL CONTROLLER

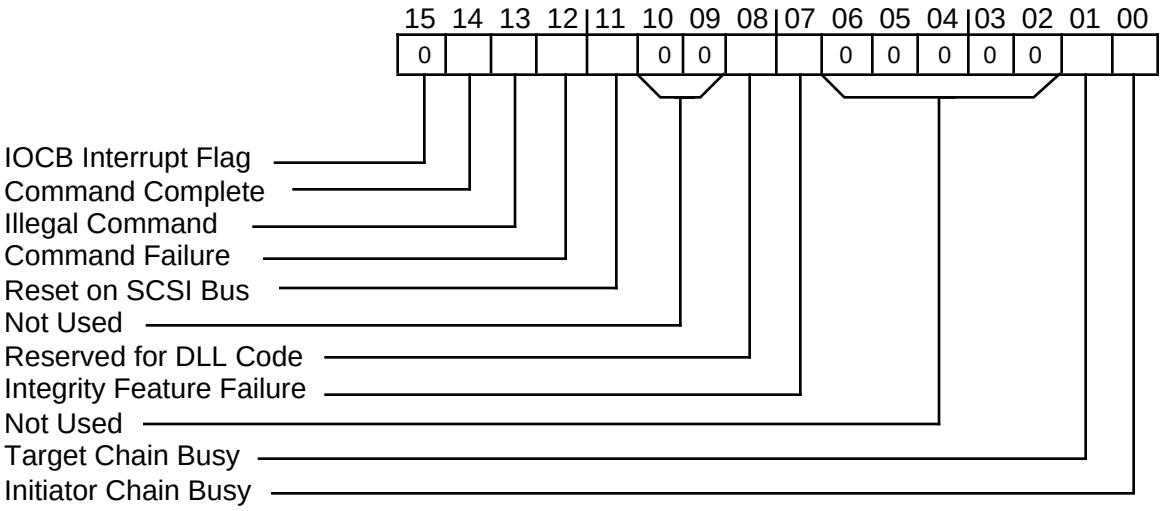
A.9.1 Configuration Status Word



Explanation of indicators

Module Bus Data Parity Error—Data parity error was detected by the controller during a MCPU slot-addressed write to the status bus or during a DMA read by the controller.
Bus Error —A module bus error occurred during a DMA activity.
Local Error—Parity error detected on the local MPU bus or status bus, or background testing of local RAM failed.
SCSI Address—Address of this SPC on the SCSI bus.
Instruction Timeout—Set when the local MPU takes too long to execute an instruction.
Interrupt Pending—The SPC has queued an interrupt.
Operational Status Semaphore Bit—Set when the local MPU generates an interrupt, and reset when the MCPU reads the Operational Status word.
Hardware Interrupts Enabled—All interrupts are enabled.
Controller Reset—The reset line on the local MPU is activated and no controller activity can take place.

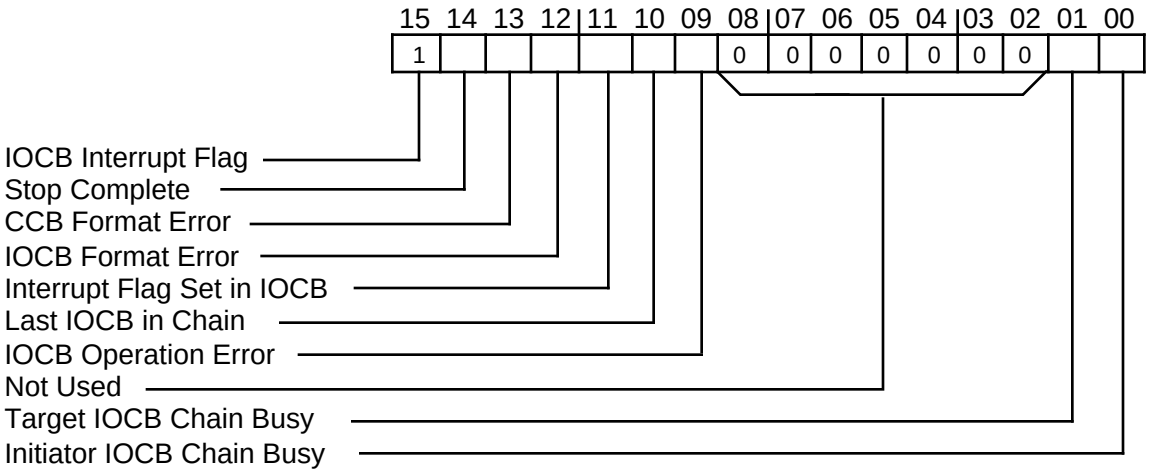
A.9.2 Board Related Operational Status Word



Explanation of indicators

IOCB Interrupt Flag—Always reset for board related operational status.
Command Complete—FDC is ready to accept another command.
Illegal Command—An invalid command was in the command register.
Command Failure—SPC unable to complete the last command.
Reset on SCSI BUs—Reset line on the SCSI bus was asserted by another device.
Integrity Feature Failure—Failure of the subsystem parity check logic during the start command routine.
Target Chain Busy—The target IOCB chain is under execution.
Initiator Chain Busy—The initiator IOCB chain is under execution.

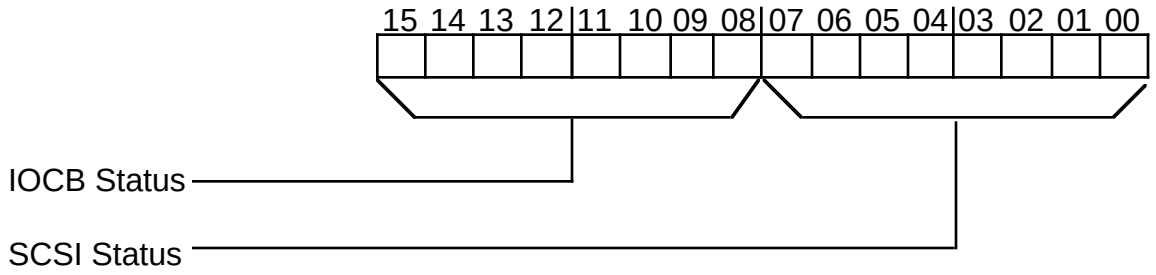
A.9.3 IOCB Related Operational Status Word



Explanation of indicators

IOCB Interrupt Flag—Always set for IOCB related operational status.
Stop Complete—"Stop" command completed for the IOCB chain.
CCB Error—Channel Control Block format was not valid.
IOCB Format Error—IOCB was not correct as received.
Interrupt Flag Set in IOCB—IOCB terminated and flag was set.
Last IOCB in Chain—"End of Chain" was true for the last IOCB executed.
IOCB Operation Error—Error encountered during IOCB execution. The IOCB chain is terminated and the error information is in the IOCB status byte.
Target IOCB Chain Busy—The target IOCB chain is under execution.
Initiator IOCB Chain Busy—The initiator IOCB chain is under execution.

A.9.4 IOCB and SCSI Status



Explanation of indicators

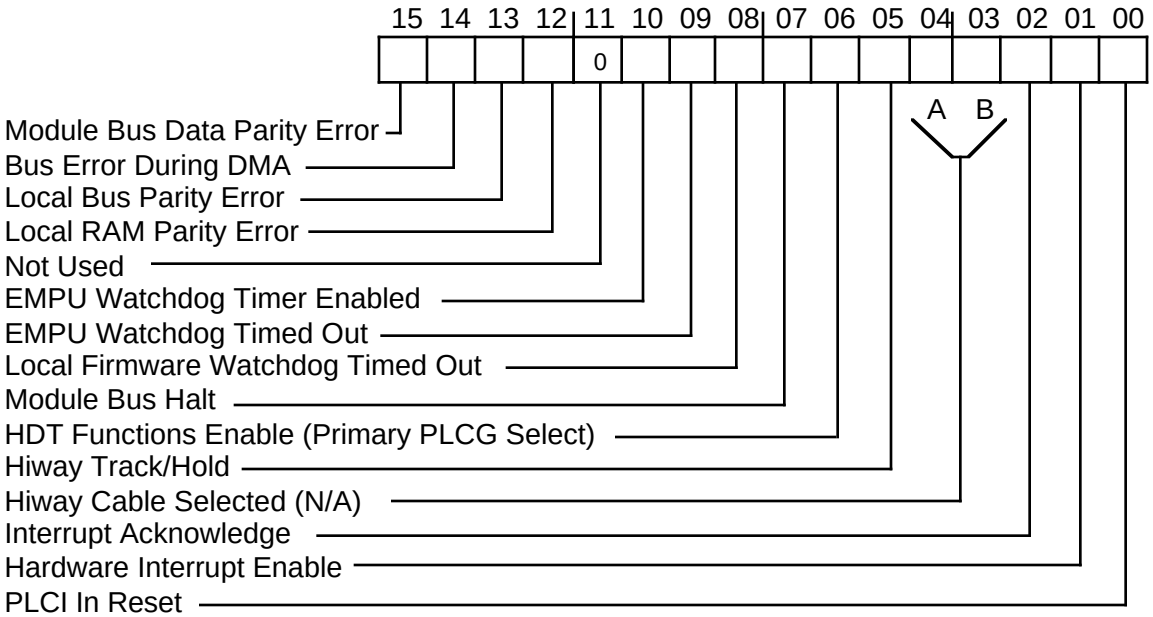
IOCB Status
- $80 = IOCB Complete—If SCSI status byte is zeros, there are no errors.
- $81 = Select Timeout—SPC could not select specified SCSI device within 2 seconds.
- $82 = Parity Error on the SCSI bus.
- $83 = Buffer Overflow—Larger than expected number of bytes received.
- $84 = Other than Send CDB received when selected as a target.
- $85 = SCSI Abnormal Operation—Unexpected termination reason.

SCSI Status
- $00 = Good
- $02 = Check Condition
- $04 = Condition Met/Good
- $08 = Busy
- $10 = Intermediate/Good
- $14 = Intermediate/Condition Met/Good
- $18 = Reservation Conflict

All other bit combinations for the IOCB and SCSI status bytes are reserved/undefined.

A.10 PLC INTERFACE

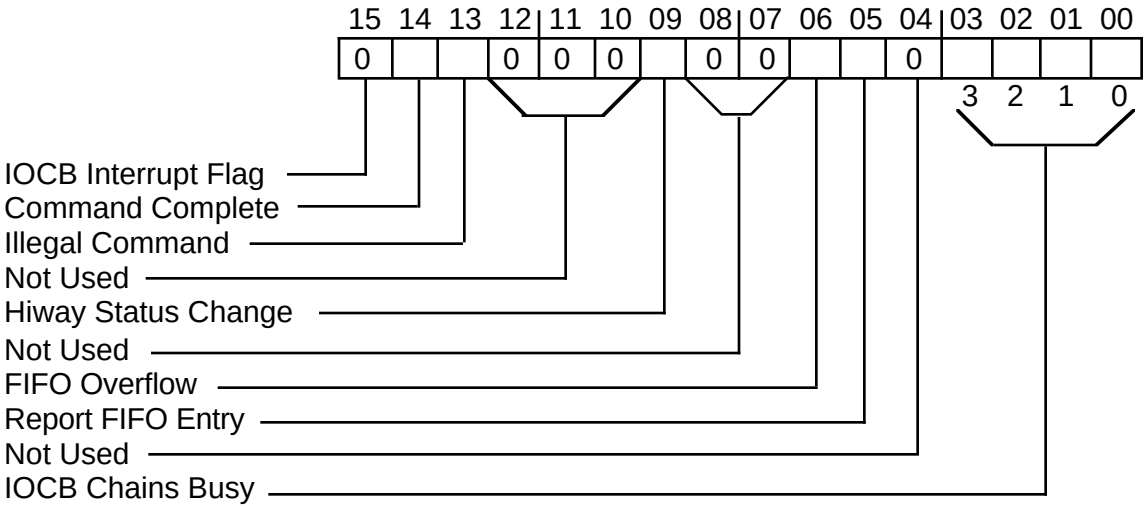
A.10.1 Configuration Status Word



Explanation of indicators

Module Bus Data Parity Error—Data parity error was detected by the PLCI during an EMPU write to the PLCI. Also set when a parity error is encountered during a DMA read by the PLCI.
Bus Error During DMA—A module bus error occurred during a DMA activity.
Hiway Track/Hold—Indicates that PLCI has recognized the HTD function command and is now in hold mode "1."
Hiway Cable Selected—Bits 3 and 4 are complement of each other. Included only for software compatibility.
Interrupt Acknowledge—An unacknowledged interrupt is pending.
PLCI In Reset—The reset line on the local MPU is activated and no controller activity can take place.

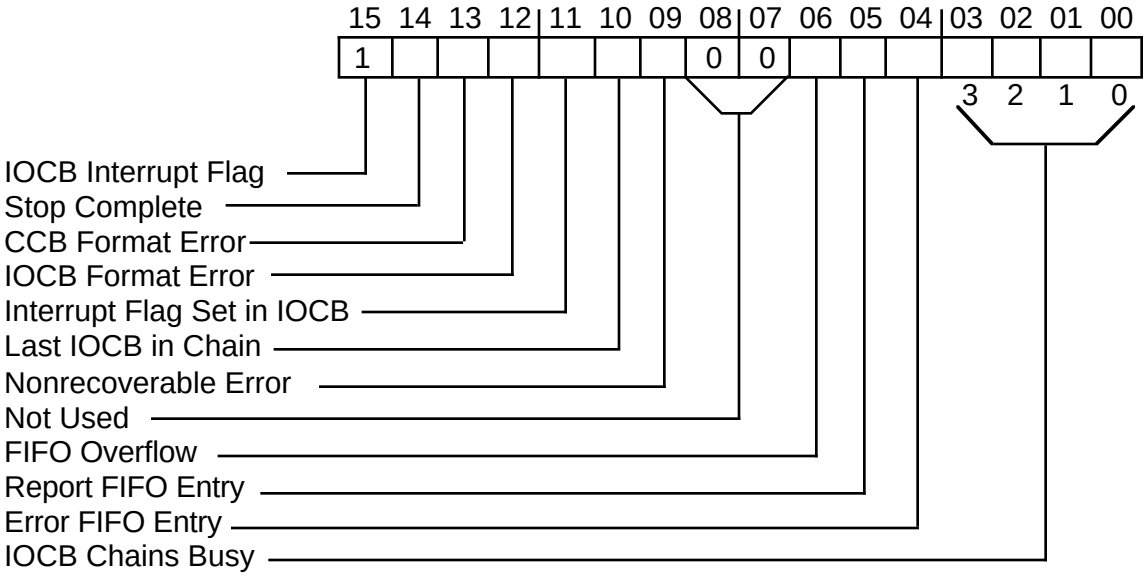
A.10.2 Board Related Operational Status Word



Explanation of indicators

IOCB Interrupt Flag—Always reset for board related operational status.
Command Complete—PLCI is ready to accept a new command.
Illegal Command—An invalid command was in the command register.
Hiway Status Change—Uncommanded changes exist in the Data Base Status word.
Integrity Feature Failure—DHI has detected that local parity generating logic or checking logic does not properly function.
FIFO Overflow—The PLCI receive report FIFO is full.
Report FIFO Entry—An entry was made in the receive report FIFO.
IOCB Chains Busy—The indicated chains were active.

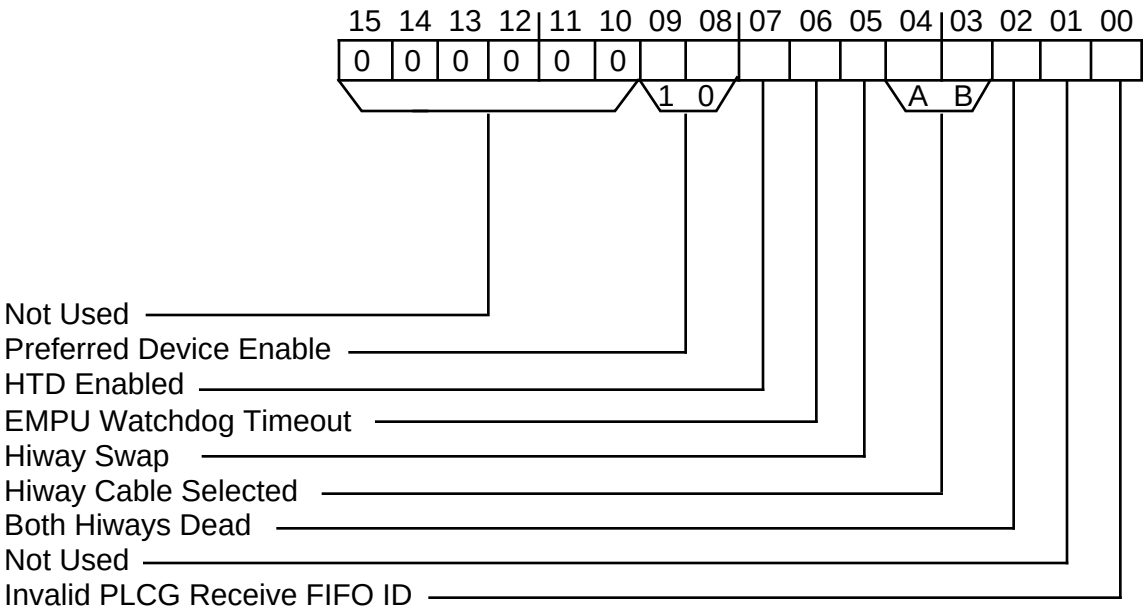
A.10.3 IOCB Related Operational Status Word



Explanation of indicators

IOCB Interrupt Flag—Always set for IOCB related operational status.
Stop Complete—"Stop" command completed for the IOCB chain.
CCB Format Error—Channel Control Block format was not valid.
IOCB Format Error—IOCB was not correct as received.
Interrupt Flag Set in IOCB—IOCB terminated and flag was set.
Last IOCB in Chain—"End of Chain" was true for the last IOCB executed.
Nonrecoverable Error—A nonrecoverable error was encountered during IOCB execution of the CCB.
FIFO Overflow—The CCB FIFO is full.
Report FIFO Entry—An entry was made in a report FIFO.
Error FIFO Entry—An entry was made in an error FIFO. See the Data Hiway Interface Subsystems Tests writeup in Section 8 of the *Hardware Verification Test System* manual, for interpretation of Error FIFO messages.
IOCB Chains Busy—The indicated chains were active.

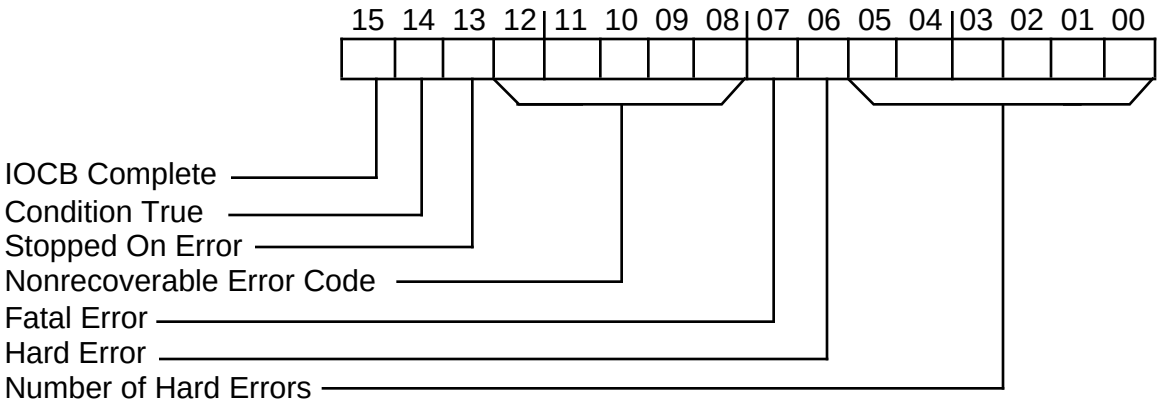
A.10.4 Data Base Status



Explanation of indicators

Preferred Device Enable—Present for software compatibility only.
HTD Primary Enabled—Always commanded by the EMPU.
EMPU Watchdog Timeout—Set by the PLCI when the EMPU watchdog timer on the PLCI board times out.
Hiway Swap—Present for software compatibility only.
Hiway Cable Selected—Present for software compatibility only.
Both Hiways Dead—Present for software compatibility only.
SOE Collision—SOE synchronization transaction was detected on the hiway while the DHI was performing a SOE synchronization.
Invalid PLCG Receive FIFO ID—An invalid ID number received.

A.10.5 IOCB Status

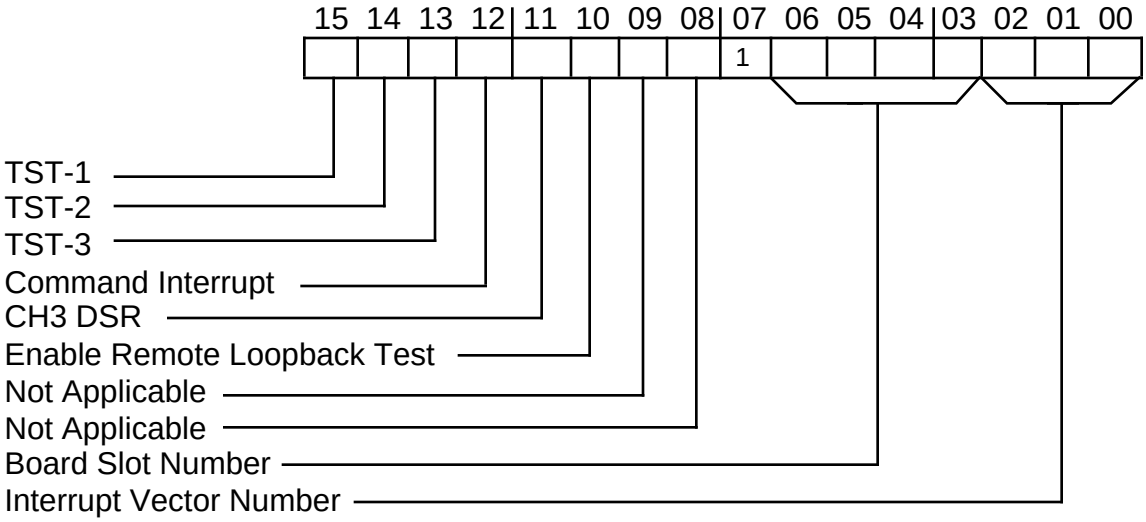


Explanation of indicators

Condition True—The condition code, if any, was satisfied.
Stopped on Error—The IOCB was stopped because of an error.
Nonrecoverable Error Code— $00 = Normal condition during execution
$01 = Invalid report FIFO number
$02 = Invalid error FIFO number
$03 = Odd or out of range IOCB element list address
$04 = Odd or out of range next IOCB in chain address
$05 = IOCB operation count equal to "0"
$06 = Invalid operation code
$07 = Invalid IOCB subcount
$08 = Invalid data in the IOCB element list
$09 = Invalid error or report FIFO ID
$0A= IOCB FIFO full when append attempted
$0B= Abort command issued during IOCB execution
$0C= Unable to get hiway grant

Fatal Error—Repeated failure on retry of all operations in this IOCB.
Hard Error—Failure on retry of one or more operations in this IOCB.
Number of Hard Errors—Total number of hard errors (Data Base errors after programmed number of retries) for this IOCB.

A.10.6 PLCI Interrupt Vector Register



Explanation of indicators

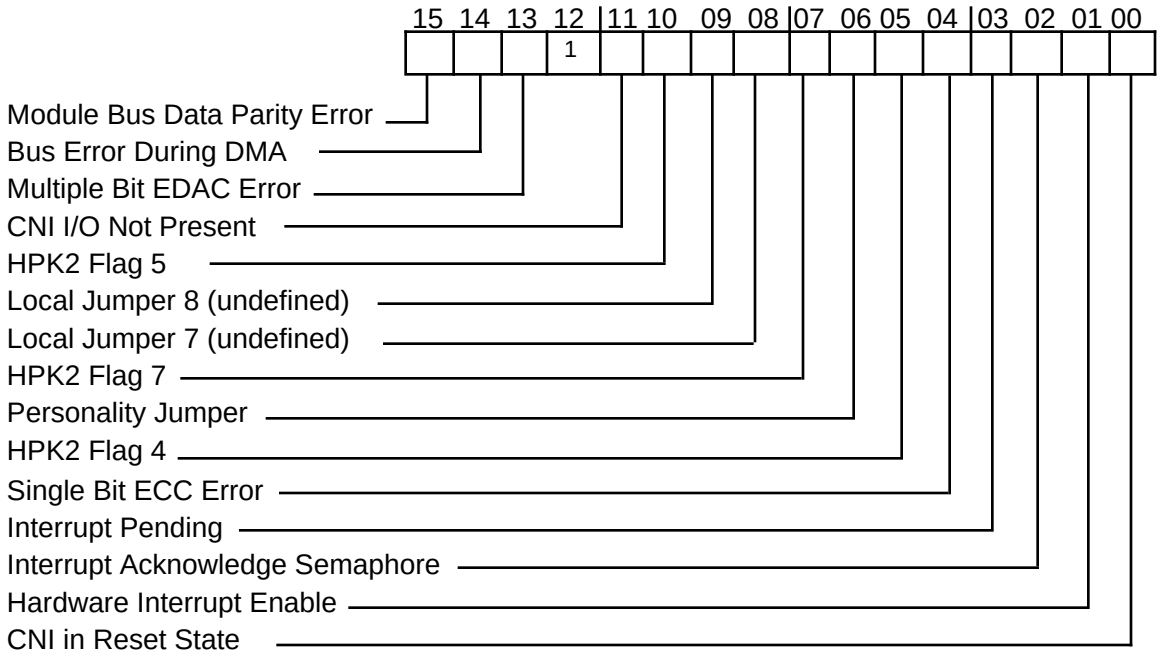
Board Slot No.—Number of the slot 0-15 in which the board is mounted. Becomes part of the interrupt vector number placed on the module bus.

Interrupt Vector No.—Number of the Interrupt Vector which is put on the module bus. This value is indeterminate after power up or a Reset sequence.

Vector Number	Description
0	Board status change interrupt
1	CCB 0 Status Interrupt (IOCBs)
2	CCB 1 Status Interrupt (IOCBs)
3	CCB 2 Status Interrupt (IOCBs)
4	CCB 3 Status Interrupt (IOCBs)
5-7	Not used

A.11 COMPUTER NETWORK INTERFACE

A.11.1 Configuration Status Register



Explanation of indicators

Module Bus Data Parity Error—Data parity error was detected by the CNI during an HPK2 write to the CNI. Also set (along with bit 14) when a parity error is encountered during a DMA read by the CNI.
Bus Error During DMA—A module bus error occurred during a DMA activity.

The decoding for the bit 15 and 14 combinations follows.

Bit 15	Bit 14	Meaning
0	0	No error
1	0	Parity error during status bus write by the HPK2
0	1	Module Bus error while CNI was temporary bus master
1	1	Parity error during DMA read while CNI was temporary bus master

Multiple Bit EDAC Error—Indicates that EDAC memory logic detected an uncorrectable memory error during either a read cycle or during the "read" of a read/modify/write cycle. Applies to local DRAM only.
CNI I/O Not Present—Indicates that the CNI I/O PWA is not present.
HPK2 Flag 5—No definition; set and cleared by the HPK2.
Local Jumper 8—No definition; set and cleared by hardware jumper.
Local Jumper 7—No definition; set and cleared by hardware jumper.
HPK2 Flag 7—No definition; set and cleared by the HPK2.
Personality Jumper—Determines how the VAXELN flash ROM personality (CM50S) processes a Download Program command. When 0, the CM50S personality processes as a no-op. When 1, the CM50S personality initiates a DECnet boot load. The CM50N personality always processes Download Program commands as no-ops.

HPK2 Flag 4—No definition; set and cleared by the HPK2.
Interrupt Pending—When 1, indicates that there is an interrupt that has not been acted upon by the Module Bus arbitration hardware. This bit is set by the CNI firmware when the interrupt to the HPK2 is generated and is cleared by the Module Bus hardware when the HPK2 accepts the interrupt.
Interrupt Acknowledge Semaphore—When 1, indicates that there is an interrupt that the HPK2 has not acknowledged (by reading the Operational Status register). This bit will be set even when interrupts to the HPK2 are disabled.
Hardware Interrupt Enable—When 1, all interrupts from the board are enabled; when 0, pending interrupts will not be generated. On power up, this bit is a 0.
CNI in Reset State—When 1, the reset line on most of the CNI circuitry is asserted, but the rtVAX itself is not reset. Instead, an interrupt is asserted to the rtVAX. This interrupt comes to the rtVAX at the same level and asserts the same interrupt vector as the module bus command interrupt ($2E0). The interrupt handler differentiates a command interrupt from a reset interrupt by the presence or absense of the command busy bit in the Command register. The interrupt handler on identifying a reset interrupt emulates, to the extent possible, the effects of a true hardware reset. This CNI feature was implemented to maximize software compatibility with existing CLI software. On power on, this bit is 0.

A.11.2 Board Related Operational Status Word

Explanation of indicators

IOCB Interrupt Flag—A 0 in this bit indicates that the remainder of the word has information relating to a status (board related) condition. A 1 indicates that IOCB information is present.
Command Complete—Indicates that the command in the Command register has been completed, and that the CNI is ready to accept a new command. It does not guarantee completion of the task directed by the command.
Illegal Command—An invalid command was in the command register.
IOCB Chains Busy—The indicated chains (0-3) are currently active. Contains 0000 during self-test.

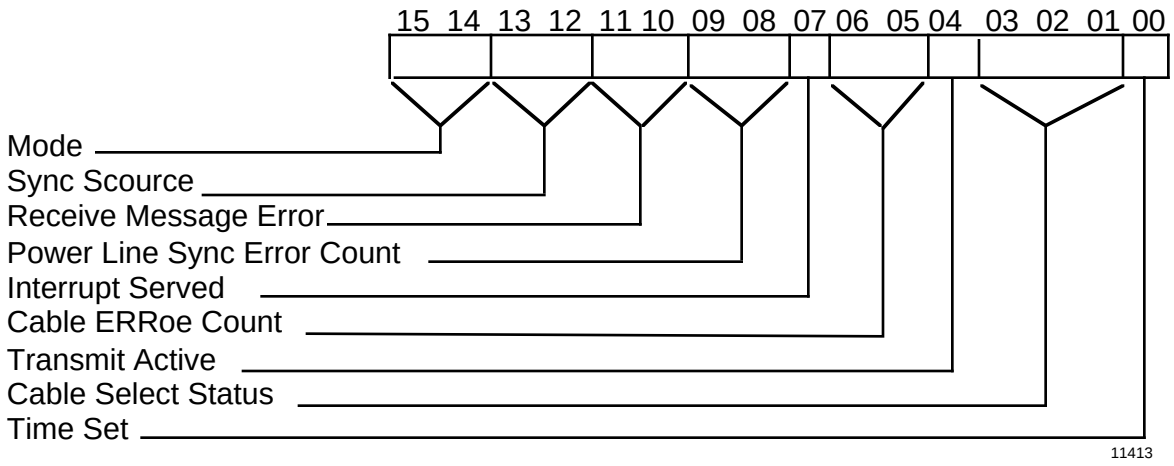
NOTE

Indications in the Operational Status register are updated only before an interrupt is generated for the HPK2.

A.11.3 Paged Status Words

The locations "offset $0C" and "$0E" are used to record the results of self-test. If all self-tests are successful, the Paged Status words will contain $0000. In the event of a self-test failure, an error code is written to the Paged Status words. See *Plant Network Module Site Planning and Installation* (PN02-300) for a description of these error codes.

A.12 CLOCK SYSTEM STATUS



Explanation of indicators

Time Set— If = 1, a time set is in progress. If this clock is configured as a Master clock, then the Time information currently being transmitted contains new "seconds" information. For all clocks, this bit indicates that the Expected Time Image is currently carrying the new "seconds" information, which will be presented to the Accumulated Seconds Register at the next one second tick.

This bit becomes set when the time set is received via K2LCN microprocessor command or receive time frame. This bit is reset when it is time to post the first 50 ms interrupt at which the new seconds information is presented.

Cable Select Status— Bits

2	1		
0	0	=	Received no cable for time update this past 50 ms cycle
0	1	=	Received cable - for time update this past 50 ms cycle
1	0	=	Received cable 3 for time update this past 50 ms cycle

Bit 3 = Receive Alternate Cable Status.
If = 1, this clock subsystem is alternating the selection of Cable A and Cable B on successive cycles.
If = 0, alternating cable selection is not occurring.

Normal status for enhanced mode Master, Slave or Listener follows the non-enhanced format: bits 3, 2, 1 = 101 or 110 alternating each successive 50 ms period.

Transmit Active— If = 1, this clock source is transmitting prestart time information. This bit is set when the Enable Master Clock Source Mode or Enable Slave Clock Source Mode command is processed. It is cleared upon receiving a Stop Transmitting command or a Local Only command.

If = 0,(cleared), this clock subsystem is not transmitting. No change for enhanced mode of operation for reasons of compatibility.

Cable Error Count— This field contains the number of errors detected on the cable (the cable identified in the Cable Select Status field) during this 1 second interval. This field is set to zero when it is time to post the first 50 ms interrupt. No change for enhanced mode.

Interrupt Queued This bit is set when it is time to post an interrupt and the previous interrupt has not been acknowledged by the 68020. It remains set until the posting of the first interrupt following the Status Change Interrupt, which accompanies this queued interrupt condition.

Reference Error Count If syncing to a reference frequency, this field contains the number of errors detected in synchronization source (wrong time or absence of interrupt - typically associated with noise on A/C) during this 1 second interval. This field is set to zero when it is time to post the first 50 ms interrupt following the posting of the next 1 second interrupt.

Receive Message Error Status

Bits 11 10		
0 0	=	No error was detected in the message just received during this past 50 ms period. Normal status for enhanced mode operation.
0 1	=	Communication Error (Parity / Improper Massage Length) was detected in the message received during this last 50 ms period. Not applicable to enhanced mode operation.
1 0	=	Invalid Data Code was detected in the message received during this last 50 ms period. Not applicable to enhanced mode operation.
1 1	=	Invalid Time Update was detected in this past 50 ms period. Not applicable to enhanced mode operation.

Sync Source

Bits 13 12		
0 0	=	Clock not in sync.
0 1	=	Clock is synchronized to line power or precision reference.
1 0	=	Clock is synchronized to the received message, subchannel or digital (5 Mpps).
1 1	=	Not defined.

Mode

Bits 15 14		
0 0	=	Master Clock Source mode is selected.
0 1	=	Slave Clock Source mode is selected.
1 0	=	Listener Only mode is selected.
1 1	=	Local mode is selected.

DATA ENTRY CONCEPTS
Appendix B

B.1 INTRODUCTION

As previously indicated, the elements that make up the HVTS command line can be combined in various ways. The following paragraphs summarize the rules for each of the three basic command elements (commands, test program names, and parameters), then provide details on the shorthand method of parameter value entry, and end with some sample command lines.

B.2 COMMANDS

The first command line entry is always a command. Commands can be entered in upper, lower, or mixed case letters (this also applies to name and parameter entries). The full command can be entered, or it can be truncated at any point after the first three letters (e.g., ABB, ABBR, ABBRE, etc.).

B.3 TEST PROGRAM NAMES

Name entry is optional; if no name is entered, the current prompt name is assumed. If more than one name is entered, the names are separated by commas but cannot contain blanks (because blanks are used as element separators). All test programs named are affected by the command line, but only the last name entered carries forward to the next prompt.

Any name can be followed by a 1-digit or 2-digit slot number. These numbers can extend from 0 (or 00) to 10 (or A). If a slot number is specified, the command affects the test only for the board in the named slot; if no slot numbers are specified, all slots where that test program applies are commanded. ALL and * (meaning all) are also legal test program name entries.

B.4 PARAMETER VALUES

When a command that requires parameter value entry (or a parameter shorthand) is entered without including a parameter value, the currently assigned value is displayed. When a value is entered, it is converted to its internal representation and limit-checked.

Sometimes, multiple parameter value entries are allowed, for example, TESTS. In this case, a dash means "through" (4-9 means 4 through 9 and 9-4 means from 9 sequentially down to 4). An omitted initial number implies the first allowed number, and omitting the terminal number implies the highest allowed number (-n means one through n; n- means start with n and end with the last number; "-" by itself means all allowed numbers). In signed numerics, the dash means "negate" and in unsigned numerics, the dash means substitute an associated code, e.g., for MIN, PAS, and ERR the dash means "no limit".

Non-numeric parameter values consist of one or more letters. Some translate to states (e.g., MODE parameter values), some to information strings (e.g., CLOCK values), and others to Boolean values that are to be set true or false (e.g., REPORT and INHIBIT). Several non-numeric parameter values (separated by commas but no spaces) can be specified in no specific order. The non-numeric parameter values (except for information strings) can be truncated after the first letter (e.g., MODE E or EX or EXER). This may not work for some test program specific parameters. In that event an entry error will be indicated, and you will have to re-enter with the full value.

B.5 PARAMETER SHORTHANDS

Shorthands are simply a convenient way to enter a number of parameter values on a single command line with a minimum of keystrokes. The shorthands follow after the primary command, test program name, and any associated parameter value(s), and are separated from the last of these elements by a single space. Each shorthand is a single letter and is followed immediately by the value (multiple values are separated by commas). Whenever no value is entered, the current value for that parameter is displayed. When multiple shorthands are entered, they are separated by spaces.

No new test program can be specified by shorthand; the prompted or previously specified test program(s) is used.

B.6 EXAMPLE COMMAND LINES

```
RUN DHIF,WINC P100 E3 T- S50 IT,P
```

This command line says, Run the Data Hiway Interface test and Winchester test; set the number of passes at 100; set the error limit at 3; run all tests; set the scale at 50 percent of nominal delay; inhibit the start-of-test and end-of-pass messages.

```
MOD E SIOS,KEYB,LCNX2 EX T20-9,5-9 T P P- M60 M
```

This command line says, Change the mode for the selected node to Exercise; set SIOS, KEYB and LCNX (slot 2 only) to have tests 20 through 9 and 5 through 9 (note the execution sequence and repetition of test 9) execute when next run; display which tests are enabled and the sequence in which they will run; display the number of passes set for each of the selected test programs; set their number of passes to unlimited; set their running time to 60 minutes; display the minutes value for the selected test programs.

B.7 MULTINODE COMMAND LINE RESTRICTION

Multinode command lines (those invoked by Line Feed/Tab) are not allowed to contain more than one test program name. This safety precaution is taken because any nodes not containing all the named programs would reject the entire command line without any notice to the operator and expected actions would not occur at those nodes.

ESTABLISHING AND CONTROLLING THE TEST NETWORK
Appendix C

C.1 HOW THE TEST NETWORK IS ESTABLISHED

As each LCN node (including the TOCS) is loaded with test system software, the node's presence is recorded in a node list. Only the nodes that are in this list can be addressed by Network commands. Other nodes on the LCN are ignored.

Because nontest system nodes are ignored, this permits a coexistence with any on-line (RNOS) nodes; however, there are precautions in the use of certain commands and test programs that should be followed to prevent meaningless alarms or other disruption to the on-line nodes.

RESET command (Paragraph 2.4.1)—This is the one network command not restricted by the node list. It will reset all specified nodes (except the TOCS) without question, so be cautious with its use.

LOAD command (Paragraph 2.4.2)—Any node is fair game for loading as long as it has been reset.

SWITCH command (Paragraph 2.4.6)—Cable switching must not be enabled if there are any RNOS nodes on the LCN network.

DHEX test program (HVTS)—The PERMISSION parameter serves as an interlock to prevent accidental operation on an on-process Data Hiway. Also, see cautions under USE INFORMATION.

CLKX test program (HVTS/CMTS)—Running CLKX in Network Scope interferes with RNOS time keeping.

C.2 SPLITTING THE NETWORK

There can be conditions where you wish to split the network into separate test segments without disturbing the physical arrangement. The prescribed method for doing this is as follows:

First, DELETE all nodes you wish to go onto the second network. Then press ESCAPE/SELECT or LINE FEED/TAB on the keyboard of the node that you wish to be the TOCS for the new network. After the 2-line test system started message is displayed, press the ESCAPE/SELECT key again and ADD the remainder of nodes that were deleted from the original network.

For example, suppose that Node 1 is the TOCS on a 30-node network that consists of nodes 1 through 30 and two networks are desired, 1 through 15 and 16 through 30 with Node 16 as the second network's TOCS. First, at the Node 1 TOCS, command `DEL 16-30`. Then press ESC on Node 16 and wait for the test system started message. Then press ESC again at this TOCS and command `ADD 17-30`. The two networks are now established.

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