SPERRY UNIVAC

SOFTWARE RELEASE DESCRIPTION

V70-SERIES SYSTEM TEST

Revision 4R0.0
92W0114-001D0

Prepared by:

Diagnostic Software Development
Irvine, California
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1. GENERAL INFORMATION

1.1 Release Identification

Release Number:
V70-SERIES SYSTEM TEST 4R0.0

Release Media:
Magnetic Tape, Cartridge Disk, and Flexible Diskette

1.2 Release Description

This release of the V70-Series System Test incorporates major enhancements to the Executive and unit programs.

1.3 Error Reporting Procedure

Users discovering errors or deficiencies in the performance of the software being released should communicate this information to the local Sperry Univac Branch Office. Use a DIAGNOSTIC SOFTWARE USER REPORT (DSUR), Form UD1-1943, to describe the problem. DSURs should include the release number and a clear description of the problem. The DSUR may be accompanied by a console printout, and memory dump.

The local Sperry Univac personnel will verify that the errors in question are adequately documented and forward the DSUR to:

> Diagnostic Software Development
> Sperry Univac
> P.O. Box C-19504, M.S. 0582
> Irvine, CA 92713
> Attn: DSUR Coordinator

All inquiries concerning the status of these DSUR's should be directed to the DSUR Coordinator.

1.4 Related Documents

SYSTEM TEST USER GUIDE UP-9098

1.5 Media Contents

The contents of the released media are contained in the following list.

PROGRAM	ID. REV.	FILE NO.
SYSTEM TEST EXECUTIVE	M4EX00.D	0
V77-600 WCS TEST	M4WC01.0	1

PROGRAM	ID. REV.	FILE NO.
V77-600 FPP TEST	M4FP02.0	2
MEMORY TEST	M4ME03.0	3
DISK TEST MODEL 0 TYPE DB, DF	M4DF04.B	4
DISK TEST MODEL 1 TYPE DC, DD, DE	M4DC05.B	5
DISK TEST MODEL 2 TYPE DH	M4DH06.C	6
MAGNETIC TAPE TEST	M4MT07.0	7
LINE PRINTER TEST	M4LP08.B	8
DATA COMMUNICATIONS MULTIPLEXER TEST	M4DM09.A	9
TERMINAL TEST	M4TT10.0	10.
INTERCOMPUTER LINK TEST	M4CC11.0	11
LASER PRINTER TEST	M4ZP12.0	12
DISK TEST MODEL 4 TYPE DG	M4DG13.0	13
V77-800 WCS/FPP TEST	M4WC15.0	14
DISK TEST MODEL 3 TYPE DJ	M4DJ16.0	15

A cross reference of disk type and Sperry Univac type and feature numbers follows.

DISK TYPE	MODEL	TYPE AND FEATURE NUMBERS
DB, DF	0	F3094-00, F3094-02, F3094-03 F3310-00, F3310-01, F3310-02
DC, DD, DE	1	2822-00, 2822-02
DH	2	2825-00, 2825-01, 2825-02 2826-00, 2826-01 2824-00, 2842-02 2843-00, 2843-01
DJ	3	F3353
DG	4	F2823-00, F2823-02, F2823-04, F2823-05 F2824-00, F2824-02, F2824-04, F2824-05 F3091-00 F3092-00

2. PRODUCT OVERVIEW

The V70 Series System Test is designed to be used on a VORTEX II configured system. It is intended to be used after the system has successfully executed the appropriate Maintain III diagnostic programs. It is not a replacement nor substitute for Maintain III. The V70 Series System Test consists of Preliminary Tests and Loader, an Executive Program, which includes the System Test Generator, and a library of Unit Programs. The System Test Generator is used to create a Configured System Test.

The Configured System Test is a real time, multiprogrammed, mapped, standalone system test for Sperry Univac V70 Series mini-computers; that is, mini-computers having memory protection option and an extended instruction set.

The V70-Series System Test has been designed to provide the following:

. A real time, multiprogrammed, mapped test environment for running mapped, unit level test programs.

. Isolation of marginal main frame or peripheral components in the system to the module or Input/Output device controller.

. A quick validation of system hardware prior to running the VORTEX II Operating System.

. A means of generating a standalone system test for any VORTEX II system hardware configuration.

3. NEW FUNCTIONS AND ENHANCEMENTS

The following pertains to the System Test Executive (M4EX00). Note: For information concerning individual unit programs please see the appropriate appendix.

3.1 Loading

The System Test may be loaded from magnetic tape, cartridge disk, or flexible disk using the appropriate bootstrap routine (see Appendix A).

3.1.1 Sense Switch 1 (SS1)

Prior to executing the bootstrap routine, SS1 may be set to select an alternative console.

3.1.1.1 After booting the System Test Generator, the CPU halts (blinking run mode) at location 64206. Register A is preset to device 01. Switch to STEP mode, enter the desired device address, reset SS1, and return to RUN mode.

3.1.1.2 After booting the Configured System Test, the CPU halts at location 1026. Register A contains the current console device address, Register B contains the current read ready interrupt location (vector), and Register X contains the current write ready vector. Switch to STEP mode, enter the new values, reset SS1, and return to RUN mode.

3.1.2 Sense Switch 2 (SS2)

To copy the System Test Generator from one medium to another, set SS2 prior to executing the bootstrap loader. After the parameter message is displayed, enter the appropriate parameters, reset SS2 if copying disk to disk, or leave SS2 set if copying tape to disk.

3.1.3 Sense Switch 3 (SS3)

If SS3 is set prior to executing the bootstrap loader for the System Test Generator, no output will be generated, and the Configured System Test will be run directly from memory.

> Note: SS2 and SS3 are also used by the Preliminary Instruction Test and Memory Test. If any error occurs during these preliminary tests, the load procedure must be repeated.

3.2 System Test Generator

Some changes have been made in the dialog questions and answers as follows:

3.2.1 The initial header line now includes the revision level.

3.2.2 A new response has been added to the CNFG question. This response, I(ndex), scans the input medium and displays the ID of each unit program in the System Test Generation Library.

3.2.3 Question 3 (Memory) includes a new sub-question:

  ECC? (Y;N)

If the System to be tested uses ECC memory boards, answer Y; otherwise, N.

3.2.4 Question 5 (List Device) has deleted the 0, 1, or 2 option selection.

3.2.5 Questions 6 and 7 (Input & Output Devices) now specify a response of (H, 0-4;1). Enter H for the model definitions.

3.2.6 Question 11 (Disk) has modified the model codes. Enter H for the model definitions.

3.2.7 Question 13 (Line Printer) now includes the SUL and the Laser Printers. Enter H for the model definitions. Appropriate subquestions have been added.

3.2.8 Question 14 (DCM) line subquestion has been modified. The subquestion now reads:

  WHICH LINES? (00-077;A)

Up to 64 (077) lines may now be tested in one run of the unit program (UP-9). Each line to be tested must be specified in octal representation, i.e., 0, 3,

17, 43, 77 will test each of the specified lines during a single run. If A (the default) is entered, all 64 lines will be tested.

3.2.9 Question 14 (DCM) has added a subquestion for the terminal unit program. The question reads:

TERMINAL - UP10? (Y;N)

If the terminal unit program is to be included, enter Y; otherwise, enter N.

3.2.10 Question 15 (ICL) now applies to the new Inter-Computer Link unit program, UP11.

3.2.11 Questions 16, thru 19 have been deleted.

3.2.12 Question 99 (Add-on) has been added to accommodate unit programs which are not in the System Test Generation Library, but are contained on separate tapes. When the 2 digit decimal unit program number (0-99) is entered, a search for the program will be made. The search will fail and display a not found message. At this point the master tape must be replaced by the appropriate tape, and a period must be entered. This procedure is repeated for each add-on program.

3.3 System Test

Some operator commands have been modified, and new commands have been added.

3.3.1 The initial header line now includes the revision level. A new prompter has been added, DG**. This is the diagnostic mode prompter, and indicates that an operator input is expected. The phrase "MEMORY SIZE=" has been changed to "VERIFIED MEMORY SIZE=." The function performed when this phrase is displayed, is a verification of the memory parameter entered during the system generation.

3.3.2 The command line flags have been modified:
    /F still sets fixed memory mode operation.
    /L still selects the line printer for messages.
    /D invokes the diagnostic mode.
    /T invokes the trap mode (formerly called the debug mode).
    /P selects both the line printer and the operator's console for messages.

3.3.3 Operator command changes

3.3.3.1 An LI command has been added which lists only the enabled unit programs.

3.3.3.2 When Entering data for the C command, the last 6 characters are used.
For example, 2A123456 is processed as 123456.

3.3.3.3 Some enable/disable commands have been added:

    E(X)(CR or .) or D(X)(CR or .)

    Where X=P: enable/disable parity interrupts
           C: enable/disable the cache option
           S: enable/disable spurious interrupt handling

The latter command (ES/DS) is used to investigate a spurious interrupt (IIA 36).
When enabled, a spurious interrupt can occur at any undefined vector. To deter-
mine which vector was involved, enter the DS command, and repeat the previous
run command. If the spurious interrupt occurs, the IIA 36 message will be dis-
played on the V77-600. The program counter register display (the last register
display) will indicate the interrupting vector address +2 on the V77-800, the
program counter contains the vector address +1. The ES command may be entered
(after a return to EX**) to return to normal operation.

4. SUPPORTED SOFTWARE

V70 Series System Test is being released under one part number (92( ) 0114-001D0)
but currently has 16 component parts as listed in Section 1.5.

5. SUPPORTED HARDWARE

Hardware supported by the System Test is defined as follows:

(1) Minimum System Configuration
(2) Supported hardware

5.1 Minimum System Configuration

The minimum system configuration is:

(1) V70-Series CPU
(2) 64K (16-bit words) read/write memory
(3) Teletypewriter or CRT keyboard
(4) Real time clock
(5) Megamap

5.2 Supported Hardware

The supported mainframe options are:

(1) Floating Point Processor
(2) Writable Control Store
(3) Cache

The supported peripheral device options are:

(1) Disk (VORTEX) types DB, DC, DD, DE, DF, DG, DH
(2) Magnetic tape
(3) Line printer
(4) SUL printer
(5) Laser printer
(6) DCM
(7) Terminal
(8) Intercomputer Link

6. GUIDELINES AND RESTRICTIONS

6.1 Guidelines

Before attempting a system generation, UP-9098 should be read and understood.
This section of the SRD further clarifies the operation of System Test and the
system generation phase. References will be made to UP-9098 and one should be
on hand.

Prior to loading the System Test for the system generation phase the Sense
switches should be reset (off). If set (on), the following action is taken:

Sense switch 1 provides the facility to alter the operator
      console device address.

Sense switch 2 provides the facility to copy the unconfigured system test
      to a cartridge disk or flexible diskette.

Sense switch 3 prevents the results of the system generation from being output
to any of the system media.

Question number 2 allows for noncontiguous memory. For example, if two 32K memory
modules are addressed as 0-32 and 64-98, the operator would input:
      0,32 64,96.

Question number 11 asks for the disk model. The following list gives a cross
reference of VORTEX type, model, and feature numbers,

DISK TYPE	MODEL	TYPE AND FEATURE NUMBERS
DB, DF	0	F3094-00, F3094-02, F3094-03 F3310-00, F3310-01, F3310-02
DC, DD, DE	1	2822-00, 2822-02
DH	2	2825-00, 2825-01, 2825-02 2826-00, 2826-01 2824-00, 2842-02 2843-00, 2843-01
DJ	3	F3353

DISK TYPE	MODEL	TYPE AND FEATURE NUMBERS
DG	4	F2823-00, F2823-02, F2823-04, F2823-05
		F2824-00, F2824-02, F2824-04, F2824-05
		F3091-00
		F3092-00

Question number 12 asks for the magnetic tape model (0-1). The following list is a cross reference by model and feature numbers. All Sperry Univac MCO magnetic tape controllers are software compatible. If the feature number is not listed, use model 0 as the response.

MODEL	FEATURE NUMBERS
0	F3088-00, F3088-01, F3088-02
	F3089-00, F3089-02, F3089-03
1	F3093-00, F3093-02, F3093-03
	0870-35, 0870-38, 0870-98, 0870-99

Question number 13 asks for the Line Printer Model number (0-02). The following list is a cross reference between the model number and the feature number.

MODEL	FEATURE NUMBERS
0	2820, 0786, CENTRONICS
1	0776, 0780, 0789
2	0777

Depending on the model number entered, a series of questions will be asked.

A model number of 0 (2820, 0786, CENTRONICS) causes the following questions to be asked:

    DEVICE ADDRESS? (0-076; 35)
    BIC/BTC EVEN DEVICE ADDRESS? (0-076)
    BIC/BTC COMPLETE EVEN INTERRUPT ADDRESS? (0100-0276)

A model number of 1 (0776, 0780, and 0789) causes the following questions to be asked:

    DEVICE ADDRESS? (0-076; 35)
    BIC/BTC EVEN DEVICE ADDRESS? (0-076)
    BIC/BTC COMPLETE EVEN INTERRUPT ADDRESS? (0100-0276)
    *BAND NO? (0-022)
*Note: At this time only a band number entry of 00 is a valid response.

A model number of 2 (0777) causes the following questions to be asked:

    DEVICE ADDRESS? (0-076; 35)
    CHANNEL COMPLETE EVEN INTERRUPT ADDRESS? (0100-0200)
    CCB ADDRESS? (0100-0270)

For the Device Address, any number from 0 to 076 can be specified. The default value is 35. Any even number from 0 to 076 can be specified as the BIC/BTC EVEN DEVICE ADDRESS. Any even number from 0100 to 0276 can be specified as the BIC/BTC COMPLETE EVEN INTERRUPT ADDRESS.

Question number 14 asks for the DCM model code number. The following is a cross reference between the model and the feature number:

MODEL	FEATURE NUMBERS
0	F3001-00
1	F3001-01,-02,-03
2	F3001-04
3	F3001-05,F3006-00

After the configured system test is generated, the message "SYSTEM GENERATION DONE" is printed. At this point the following options are available at the operator's console:

(1) Repeat system generation dialogue-enter a CONTROL C
(2) Repeat configured system test output-enter a space
(3) Load and start the system test-enter a carriage return
(4) Load and start the system generation-enter a period

6.2 Restrictions

6.2.1 Disk Test, Model 2, Type DH (M4DH06.B). In this program access control is not incorporated in the storage module type disk (DH). When the program is run with dual access, it is possible for one system to lock the other out when the user terminates testing on either system.

6.2.2 Line Printer Test (M4LP08.B)

. Unit program is designed to run in system mode.

. The unit program formats the output for 8½ x 11 form size.

. For Line Printer models 0776, 0780 and 0789 only a band with a feature dash number of 00 is supported.

6.2.3 Terminal Test (M4TT10.0)

. Only one terminal is output to at a time, it might seem that all the terminals are working simultaneously, but the speed is what causes this misconclusion.

6.2.4 Laser Printer Test (M4ZP12.0)

. Unit program designed to run in system mode.

. The unit program formats the output for 8½ x 11 form size.

6.2.5 Disk Test, Model 4, Type DG (M4DG13.0)

. The MSC unit program diagnostic mode will allow access to any cylinder address. However, any attempt to write any cylinder other than cylinder 560 will be aborted.

6.2.6 Disk Test, Model 3, Type DJ (M4DJ16.0)

. Closing the door on the drive unit generates an interrupt that is not currently defined during system generation. This will result in a spurious interrupt (IIA 36) which may be ignored.

7. KNOWN PROBLEMS

Due to equipment and time limitations, not every possible configuration or device has been validated. As configuration problems are discovered, DSUR's should be written so that these problems can be corrected.

On V77-800 systems with the storage module type DH disk, a rate error message from disk test may occur. This is a possible hardware problem and is being investigated.

When the Control-C or interrupt button is used to terminate the running of the unit programs the storage module type DH disk (UP06) and the DCM (UP09) may be left in a state where they are trying to interrupt. When a new run of the unit programs is started, unexpected interrupts from these devices may occur. This only occurs at the start of a run. This is not an error indication and can be ignored.

Another general problem is system overloading. It is not always possible to run every device in a system at the same time because of the DMA trap rate. There is a practical limit to how many DMA trap requests the system can handle in a given amount of time. This loading factor varies with the system configuration and is not easily computed. If a DMA overload problem is suspected, reduce the number of devices.

Other problems that have been reported from the Field via Diagnostic Software USER Reports include the following:

DSUR NO.	PROBLEM
19254	DCM Unit program (M4DM09). Only one type of LAD can be selected for test at any one time. Need to enhance the test with the capability to select and test up to four LAD's concurrently.
36760	System Test Executive (M4EX00). Does not provide status information when unit programs operate. A control-command that provides status information and run-time is required. This command must not interrupt the operation of any active test.
49544	Magnetic Tape Unit Program (M4MT07) Systems Test Reports Pertec Disc 'Selected Unit Timing Errors' when the disc is run concurrently with a phase encoded (PE) 125 IPS Bristol Mag tape.

It is suspected that at 010000, the Mag tape program's I/O algorythm is too low for this configuration.

8. DSURS CLOSED BY THIS RELEASE

19336
19338
36763
36774
39329
39330
39332
49536
51628

9. DOCUMENTATION CHANGES

An update to the System Test User Guide (UP-9098) will be released in the future to upgrade the manual to reflect the changes caused by this release.

APPENDIX A

This appendix describes the procedure to generate a Master System Test from Magnetic Tape or Disk (Cartridge or Floppy) to a Disk (Cartridge or Floppy).

PROCEDURE:

1. Mount the Master System Test medium.
2. Mount a formatted (VORTEX II or Maintain III) scratch disk.
3. Set sense switch 2 (on).
4. Enter the appropriate bootstrap routine into memory.

MAG TAPE BOOT		DISK BOOT	
LOCATION	CONTENTS	LOCATION	CONTENTS
200	1031BE	1130	1004DA
201	005301	1131	1040DA
202	1031B0	1132	1002DA
203	1000BE	1133	005001*(011170)
204	1000DA	1134	1031DA
205	1012DA	1135	1010DA
206	007002	1136	001141
207	005000	1137	001000
210	001000	1140	001135
211	000205	1141	1025DA
212	1000B0	1142	151167
213	104UDA	1143	001016
214	005141	1144	001130
215	001000	1145	1000B0
216	000200	1146	1003DA
		1147	005102*(021171)
		1150	1032DA
		1151	1031BE
		1152	006010
		1153	001127
		1154	1031B0
		1155	1000BE
		1156	1000DA
		1157	1014DA
		1160	001157
		1161	1025DA
		1162	151167
		1163	001016
		1164	001130
		1165	001000
		1166	000600
		1167	007760
		1170	000001*(020000)
		1171	000001*(020001)

NOTE: *-If booting a cartridge disk, use the parenthetical values.
In the above routines, replace BE, BO, DA, and U by:
        BE=BIC even address
        BO=BIC odd address
        DA=device address
        U=unit number (0-3)
5. Set the X register to 07000.
6. Start (set the program counter) at 0212 or 01130.

After loading, the following message is printed:

V70-SERIES SYSTEM TEST GENERATION-REV D.0
****
GENERATE MASTER SYSTEM DISK
ENTER INPUT & OUTPUT DEV ADR, BIC ADR, UNIT NO & PLATTER NO
NOTE: ENTER COMMA TO SELECT A DEFAULT VALUE OR
        ENTER PERIOD TO SELECT ALL DEFAULT VALUES
            ENTER: DA,BA,U,P DA,BA,U,P
(DEFAULT VALUES: 10,22,0,0 16,20,0,1)

7. Reset Sense Switch 2 if input device is a disk.

8. Enter the required data as shown above.
    The unit number (U) must be 0-3.
    For mag tape, set platter (P) to 0.
    For cartridge disk, set platter (P) to 1 (0 if fixed platter).
    For floppy disk, set platter (P) to 2.

9. Enter a period or carriage return to end the input.

10. When the generation is complete, the message "DONE" is output. Proceed with
    the system generation dialogue, or remove and save the input and output media.

    If any error occurs during the generation of the master System Test, the entire
    procedure must be repeated.

6.0 OPERATING INSTRUCTIONS.

6.1 Pre-Loading Requirements.

The System Test executive must be running in order to schedule a unit program. The procedure for running unit programs is standard and documented in the System Test executive design description. The unit program for the particular test to be run must have been selected during System Generation and the applicable device must be ready for operation.

6.2 Program Loading/Execution.

Program loading and execution is accomplished by the System Test executive. The same procedures apply to all unit programs and are documented in the System Test executive design description.

7.0 TEST DESCRIPTION.

Systems Test Mode. All unit programs may be run in this mode. This is simply a high speed test and requires no operator intervention.

Diagnostic Test Mode. Individual unit programs have a diagnostic capability which requires entry of test commands and/or parameters by the operator during program execution. Diagnostic Mode commands are positional and must be entered as follows:

command, pattern, continuous run flag

Valid commands are:

Ø - Run as if in systems test mode. If a pattern follows the "Ø" command it will be used in place of the normal pattern. The continuous run flag is not applicable.

B - Floating Bit Test. This test uses a 1 bit and its complement for the pattern. After each compare the bit is shifted to the left. Comparison continues until all bit positions have been stored and compared. The pattern parameter is not applicable. If the continuous run flag is entered it must be preceded by two commas. The continuous run flag "C" is used to cause the program to loop continually, executing the test until a Control C is entered to return to the Test Executive

F - Fixed Pattern. This command causes the pattern indicated and its complement to be used during the test. The continuous run flag "C" may be used to loop on this pattern.

H - Help. This command lists the valid commands which may be entered. The pattern and continuous run flag parameters are not applicable.

APPENDIX A - Console/Terminal Messages

Information Messages:

         INPUT DIAGNOSTIC COMMAND

            command, pattern, continuous run flag "C"

         INVALID TEST COMMAND

            command other than $\emptyset$, H, B or F entered

Help Command Message:

         VALID COMMANDS
         $\emptyset$-RUN NORMAL MEMORY TEST
         B (FLOATING BIT),, C (CONTINUOUS)
         F (FIXED PATTERN), O (OCTAL PATTERN), C (CONTINUOUS)

Error Messages:

The first line of each error message is generated by the Test Executive and is described in the Test Executive design description. The following information is output by the unit program:

         MEM DATA COMPARE ERROR or MEM INSTRUCTION EXECUTION ERROR
         BUFFER ADDRESS xxxxxx SIZE (OCTAL) xxxxxx
         DATA EXPECTED (PATTERN) FOUND (DATA)
         LOCATION xxxxxx (Not printed for Instruction Execution Error)

6.0 OPERATING INSTRUCTIONS.

6.1 Pre-Loading Requirements.

The System Test executive must be running in order to schedule a unit program. The procedure for running unit programs is standard and documented in the System Test executive design description. The unit program for the particular test to be run must have been selected during System Generation and the applicable device must be ready for operation.

6.2 Program Loading/Execution.

Program loading and execution is accomplished by the System Test executive. The same procedures apply to all unit programs and are documented in the System Test executive design description.

7.0 TEST DESCRIPTION.

Systems Test Mode. All unit programs may be run in this mode. This is simply a high speed test and requires no operator intervention.

Diagnostic Test Mode. Individual unit programs have a diagnostic capability which requires entry of test commands and/or parameters by the operator during program execution.

Diagnostic Mode commands are positional and must be entered as follows:

command, continuous run flag, status word mask or for the 'Z' command only

Z, read retry, write retry, record length, fixed pattern

When a command has been entered and executed, exit is to the routine which outputs the Enter Diagnostic command message.

Valid commands are:

∅ - Runs as if in systems test mode. The continuous run flag is not applicable. Any parameters entered with the 'Z' command will apply. At the end of execution the program will exit to the Test Executive and be rescheduled in the Diagnostic Mode in another map key.

B - The program will backspace the tape one record. If the continuous run flag "C" is used the program will backspace the tape all the way to beginning of tape (BOT). The last backspace will cause a TIMEOUT error message and clear the continuous run flag.

C - Compatability Test. When a growing record test (G) has been run on a tape, the tape may be mounted on another tape unit and run using this command to insure compatability between the two drives. This test is the read portion of the growing record test. The continuous run flag is not applicable.

D - Runs as if in system test mode. The program will not exit upon completion of the run. Instead it will again output the enter diagnostic command message. The continuous run flag "C" is applicable.

F - Forward one record. The program will move the tape forward one record and exit. If the continuous run flag "C" is used the program will continuously move forward one record at a time. At end of tape, the tape will rewind and the program exits.

G - Growing Record Test. The program starts with a minimum record size (1 or 2) and writes, backspaces then reads a record. If the data compares, the record length is incremented by one word and the process continues until the maximum record length (9999) or end of tape is reached. The program then rewinds the tape and exits. The continuous run flag "C" is not applicable.

H - Help. Lists all valid commands.

J - Read File Mark. The program reads one record which it expects to be a file mark and exits. The continuous run flag "C" may be used for continuous reads. At end of tape the tape is rewound and the program exits.

K - Write File Mark. The program writes a file mark. If the continuous run flag
     "C" is used, the program will write file marks to the end of tape. The tape
     will then rewind and exit.

L - Rewind. The tape will rewind and exit. The continuous run flag parameter is
     not applicable.

M - Random Motion Test. The random motion test writes short records, long records
     and file marks based on random number selection. A fixed pattern is used.
     Tape will be rewound at end of run and exit. Records written are read to in-
     sure the correct data was written. The continuous run flag is not applicable.

P - Parity Test. Writes sequential records with a pattern containing a changing
     bit pattern then reads them back to determine if a parity error has occured.

R - Read. A fixed length record (0170) is read and the program exits. The
     continuous run flag "C" may be used for continuous reads. At end of tape the
     tape is rewound and the program exits.

T - Motion Test. This test checks for tape motion. The test involves rewind,
     write file mark, backspace, forward record and writing large and small records.
     Records are written, then read with comparison of data. The continuous run
     flag "C" may be used. At end of the test the program exits.

W - Write. A fixed length record (0170) is written and the program exits. The
     continuous run flag "C" may be used for continuous writes. The tape will
     rewind at end of tape and the program exits.

Z - Command Parameters. This command allows certain parameters to be entered.
     These parameters will apply to all following tests run until the program is
     rescheduled, another "Z" command is input or a test is run which overlays
     any of these fields. The parameters are positional and missing parameters
     must be indicated by ",,". The parameters which may be input are:

                 Read Retry Count, Write Retry Count, Fixed Record Length,
                 Fixed Pattern

The status word mask may be changed to ignore certain erros by following a
command with the desired mask. A "1" bit in the mask causes that bit to be
ignored.

APPENDIX A - Console/Terminal Messages

Information Messages:

INPUT DIAGNOSTIC COMMAND

command, continuous run flag "C", status mask
or
Z, read retry count, write retry count, fixed record
length, fixed pattern.

INVALID TEST COMMAND

command entered which is invalid. Use "H" command
to list valid commands

Help Command Message:

VALID COMMANDS
Ø-SYSTEM TEST (WRITE-BACKSPACE-READ)
B-BACKSPACE
C-COMPATABILITY TEST
D-SYSTEM TEST (DIAGNOSTIC LOOP)
F-FORWARD ONE RECORD
G-GROWING RECORD TEST
J-READ FILE MARK
K-WRITE FILE MARK
L-REWIND
M-RANDOM MOTION TEST
P-PARITY TEST
R-READ
T-MOTION TEST
W-WRITE
Z-COMMAND PARAMETERS (POSITIONAL)-
,Read Retry Value
,Write Retry Value
,RECORD LENGTH
,FIXED PATTERN

Parameters which may follow commands other than Z
,C (CONTINUOUS RUN)
,STATUS WORD MASK

Error Messages:

The first line of each error message is generated by the Test Executive and is
described in the Test Executive design description. The following information is
output by the unit program:

BIC Error Messages-
(Line 2) BIC xxxxxx TIMEOUT (error message) ERROR
         BIC xxxxxx   (error message) ERROR

(Line 2 error messages)   BUSY
                          SETUP
                          ABNORMAL BIC DEVICE STOP ON WRITE
                          ABNORMAL BIC DEVICE STOP ON READ
                          BIC STOPPED-MAP MEMORY
                          NOT AVAILABLE

(Line 3-where applicable)
                          INITIAL ADDRESS xxxxxx

(Line 4-where applicable)
                          FINAL ADDRESS WAS xxxxxx SHOULD BE xxxxxx

Device Error Messages-
(Line 2) MT xxxxxx TIMEOUT (error message) ERROR
         MT xxxxxx   (error message) ERROR

(Line 2 error messages)   REWINDING
                          NOT READY
                          REWIND
                          TRANSPORT SELECT
                          WRITE
                          WRITE PARITY
                          BACKSPACE
                          READ BINARY RECORD
                          READ FILE MARK INSTEAD OF DATA
                          READ PARITY
                          WRITE/READ DATA COMPARE
                          WRITE FILE MARK
                          SENSE END OF TAPE
                          BEGINNING OF TAPE
                          SENSED HIGH DENSITY
                          FORWARD ONE RECORD
                          DID NOT SENSE FILE MARK

(Line 3-where applicable)STATUS WORD xxxxxx

(Line 4-n for each bit set)
                          B15-RATE ERROR
                          B14-LRC ERROR/MULTIPLE DEAD TRACKS (PE)
                          B13-DEAD TRACK ERROR
                          B12-FORMATTER FATAL ERROR
                          B11-CRC ERROR/FALSE POSTAMBLE ERROR (PE)
                          B10-CHARACTER PARITY ERROR
                          B9- HIGH DENSITY
                          B8- NOT USED
                          B7- REWIND
                          B6- BOT
                          B5- EOT
                          B4- ODD LENGTH
                          B3- FILE MARK
                          B2- TRANSPORT NOT READY
                          B1- WRITE ENABLE
                          B0- TAPE ERROR

Data Compare Error Message

(Line 2) MT xxxxxx BUFFER ADDRESS xxxxxx SIZE (OCTAL) xxxxxx

(Line 3) DATA EXPECTED xxxxxx DATA FOUND xxxxxx

(Line 4) LOCATION xxxxxx

2.2 Hardware Required

The minimum hardware configuration for test purposes is:

- One V70 Series Computer

- One Data Communications Multiplexor

- One RS232/DT-TTL Line Adaptor (LAD) or
  a direct connection current loop LAD

- One Sperry Univac UTS10 CRT or
  Infoton 200 Terminal (CRT)

- One operator console

  - CRT or TTY

  - Computer control panel

- One program input device

  - Magnetic tape unit

  - Cartridge disk unit, or

  - Flexible diskette unit

At present, up to sixty-four CRT's can be tested and may only be used to
test output only.

2.3 Software Required

This program requires that the system test executive be loaded and operational.
The executive is required to schedule the unit program (M4TT10).

2.4 Software Supplied

The system test executive is available for use by the diagnostic program.

2.5 Restrictions

The following restrictions exist at this time.

- Only one terminal is output to at a time, it might seem that all the
  terminals are working simultaneously, but the speed is what causes this
  misconclusion.

3. DETAILED DESCRIPTION

3.1 General

This program is implemented by using the Sperry Univac V70 instruction set as the host language. The program uses structured program coding techniques. It is divided into various subroutines and three tests. Input, output and echo. Plus a printer RS232 test. Each subroutine is used for either:

. Receiving input

, Testing functions, or

, Generating test messages

At present, parameters are entered via the operator's console only during System Test Generation.

Test messages are displayed in English text on the CRT or TTY.

The unit program is designed to operate with the V70 Series System Test Executive. The program uses I/O Interfaces, timing routines, and system constants contained in the executive.

3.2 Unit Program Description

At present, the program runs under system mode only.

. Systems Test Mode

  - Spiral Pattern Display Test

When the program is scheduled, several parameters are passed from the executive to the unit program.

3.2.1 Systems Test Mode

Since this test is designed to test the Infoton 200 or the UTS10, and since there are apparent differences between the two, the test has been designed to handle special functions on the UTS10 first.

Those UTS10 terminals which support RS232 Printers will be tested first by the Transparent Print Test 3.2.1.1.

After the test has been run, the Spiral Pattern Display Test will execute on all lines selected at sysgen time (both the I-200 and UTS10) lines.

3.2.1.1 Spiral Pattern Display Test

In this test, output only to display is executed. Operating in a continuous

loop mode, each loop prints a line on the screen. Of each CRT being tested, each line printed begins with the next character in the text creating a spiral pattern on the screen of each terminal being tested.

In each loop, an incrementing data pattern is used. A new 80 word buffer is requested from the executive at the beginning of each loop. The new buffer borders on the previous buffer. This process continues until all of the map has been used. That map portion is not occupied by the unit program.

When the map space has been exhausted, the following message is displayed:

    CRT END, #LOOP=X

Where
    X
     is the octal number of completed output loops.

The program is then rescheduled in another map. The line addresses are supplied at System Generation time. A Control C command is the only valid command during execution of this test. This command terminates the test and transfers control to the executive.

4. INTERFACE DESCRIPTION

4.1 Hardware Interface

This section describes:

. The expected state of the hardware upon initial execution of the diagnostic program.

. The state of the hardware upon termination of the diagnostic program.

4.1.1 Input Interface

Prior to initiating the diagnostic program, ensure that:

1. Power is on

2. Keyboard is unlocked

3. Either a or b

    a. In the control page under buffered mode the echo parameter is turned on.

    b. Or character mode

4.1.2 Output Interface

Execution of the diagnostic program does not affect the hardware in any manner. The state of the hardware at the end of the test remains the same as that of the start.

4.2 Software Interface

This section describes:

. The interface between the diagnostic program and the called software module.

. The software output resulting from the execution of the diagnostic program.

4.2.1 Input Interface

The software input interface between the operator and the diagnostic is the executive (EXEC).

The unit program is scheduled by the EXEC upon operator request. During scheduling, the following parameters are passed.

. Map Key

. DCM device address

. Test flag indicating System Test or diagnostic mode

. Bits (5-8)

. Line numbers (with a bit set to recognize a UTS-10)

5. OPERATING INSTRUCTIONS

5.1 Preloading Instructions

The terminal test unit program must be included during System Test Generation. Refer to (UP-09). Dialog question (14) is used to enter the unit program. The following message is displayed:

    HOW MANY DCM's-UP9 (0-4)

Enter the number (up to 4) of DCM's. The following messages are displayed for each DCM:

    DCM N:

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MODEL CODE NO? (H, 0-3)

DEVICE ADDRESS? (0-76;70)

DCM INTERRUPT ADDRESS ORIGIN? (0100-0260; 260)

BITS PER BYTE? (5-010;010)

LCB MEMORY PAGE? (070-077;075)

WHICH LINES? (0-077)

TERMINAL-UP10? (Y;N)

If a 0 is entered for the number of controllers, no questions are displayed. Address requirements are self explanatory. Refer to the system memo. Line number must be specified.

Terminal unit parameters are passed by the EXEC to the unit program when the System Test Generation is complete. The unit program is included in the System Test unless the following error message is displayed.

UNIT PROGRAM NOT FOUND

This message indicates a problem in one of two areas:

. The unit program is not part of the System Test Library. Check the Software Release Description (SRD) for media content.

. An error was made during System Test Generation. The generation process must be reinitiated.

5.2 Program Scheduling

After System Test is configured and loaded, the unit program can be scheduled.

Prior to scheduling, ensure that the following has been completed on each unit to be tested:

1. Apply power

2. Unlock keyboard

Scheduling can be accomplished by including the program in the system mode run list. For example:

RU10   RU/L10   RU/P10
               or
               RU

From one to sixteen units can be tested in system mode. All units are tested by using the same parameters.

An alternate method of scheduling is to execute the diagnostic mode. For example:

    RU/D10

5.3 Error Messages

The following is a list of error messages generated by this unit program:

    DCM ERROR ON LINE   octal line number
    LINE ERROR INTERRUPT
    FRAMING ERROR
    PARITY ERROR
    STATUS CHANGE INTERRUPT
    STATUS WORD IS XXXXXX
    OUTPUT UNDERFLOW
    CONTROL-LINE-IN
    RING INDICATOR
    CLEAR TO SEND
    CARRIER ON
    INTERLOCK ON
    FORMAT ERROR
    STATUS-LINE-IN
    CONTROL CHARACTER DETECTED
    OUTPUT COMPLETE
    NO CONTROL INTERRUPT
    DCM TIMEOUT ERROR ON LINE   octal line number
    DCM DATA COMPARE ERROR ON LINE   octal line number
    TOTAL NUMBER OF ERRORS IS   octal line number
    FIRST ERROR AT   octal address
    DCM NOT AVAILABLE
    PRINTER ERROR ON LINE   octal line number

5.3.1 Conditions

When the alarm beeps repeatedly, the printer has malfunctioned.

6.0 OPERATING INSTRUCTIONS.

6.1 Pre-Loading Requirements.

The System Test executive must be running in order to schedule a unit program. The procedure for running unit programs is standard and documented in the System Test executive design description. The unit program for the particular test to be run must have been selected during System Generation and the applicable device must be ready for operation.

6.2 Program Loading/Execution.

Program loading and execution is accomplished by the System Test executive. The same procedures apply to all unit programs and are documented in the System Test executive design description.

7.0 TEST DESCRIPTION.

Systems Test Mode. All unit programs may be run in this mode. This is simply a high speed test and requires no operator intervention.

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Diagnostic Test Mode. Individual unit programs have a diagnostic capability which requires entry of test commands and/or parameters by the operator during program execution.

At present time, this mode just makes sure that operator set sense switch 3 of FECP "on" and then come back to type "DO" on the operator console and the rest will be the same as System Test Mode.

APPENDIX A - Console/Terminal Messages

1. COMMON MESSAGES FOR BOTH SYSTEM MODE AND DIAGNOSTIC MODE

1.1 General Messages

1.1.1 Information messages about FE operations:

. When FE finishes Instructions Test with no error
   FE FINISHES INSTRUCTION TEST
   BEGINS MEMORY TEST

. When FE finishes Memory Test with no error
   FE FINISHES MEMORY TEST
   BEGINS SEND DATA BACK TO THE HOST

1.1.2 Host Messages

. Before program exit and return to system for whatever reasons:
   RETURN TO SYSTEM TEST AND READY TO RESCHEDULE

. When host finishes receiving data from FE:
   HOST FINISHES RECEIVING DATA
   FE BEGINS INSTRUCTION AND MEMORY TEST LOOP

1.2 Device Error Messages

1.2.1 When the program detects an error of device, it will print out:

   E-1499 CONTROLLER ERROR
   DEVICE ADDRESS IS XX (octal number)

1.2.2 Accompanied with the above messages will be one of the following two messages:

. When device is not ready:
   TIMEOUT - DEVICE NOT READY

. When device is stopped:
   ABNORMAL DEVICE STOP

1.2.3 Accompanied with the above ones will be a retry message:

   RETRY XX MORE

1.3 BIC Error Messages

1.3.1 When BIC error is detected by the program, it will print out:

```
BIC ERROR
BIC ADDRESS IS              XXXX
INITIAL ADDRESS IS          XXXX
FINAL ADDRESS IS            XXXX
ACTUAL FINAL ADDRESS IS     XXXX or NOT TRANSFER YET
```

1.3.2 Accompanied with the above messages will be one of the following messages:

. When the program could not get BIC
  BIC NOT AVAILABLE

.. When BIC is doing something else:
   BIC BUSY

. When memory map error:
  BIC STOP BECAUSE MEMORY MAP ERROR

. When device could not connect BIC:
  TIMEOUT - CANNOT CONNECT BIC WRITE or
  TIMEOUT - CANNOT CONNECT BIC READ

. When final address is different with actual final address:

  DIFFERENT FINAL ADDRESS

1.3.3 Accompanied with the above messages will be a retry message:

  RETRY   XX   MORE

1.4 FAILURE MESSAGES

. Host cannot transfer
  HOST CANNOT TRANSFER DATA TO FRONT END

. No complete receiving signal from FE
  FE CANNOT RECEIVE DATA FROM THE HOST

. No complete Instruction Test from FE
  FE CANNOT FINISH INSTRUCTION TEST

. No complete Memory Test from FE
  FE CANNOT FINISH MEMORY TEST

. When the program detects error of received data from FE, it will printout:

HOST CANNOT RECEIVE DATA

2. DIAGNOSTIC MESSAGES

2.1 Initial set up messages

DIAGNOSTIC MODE JUST SHOWS HOW TO SET UP. YOU HAVE TO SET SENSE SWITCH
3 OF THE FRONT END PROCESSOR.

AFTER SETTING IT, COME BACK AND TYPE "DO".

2.2 If the operator didn't do exactly like what he has been told, then the
program will respond:

DO IT CORRECTLY, NEXT TIME I WILL EXIT. YOU HAVE TO SET SENSE SWITCH 3
OF THE FRONT END PROCESSOR.

AFTER SETTING IT, COME BACK AND TYPE "DO".

2.3 Again, if the operator can't do it correctly, then the program prints out
the following message and exits.

FAIL TO SET SS3 OF FRONT END PROCESSOR AND TYPE "DO" ON CONSOLE.

6.0 OPERATING INSTRUCTIONS

6.1 System Generation

The T0777 Laser Printer unit program must be included during system test gen-
eration. Refer to UP9098. Dialog question 13 is used to select the unit
program. The following message is displayed:

    13. HOW MANY PRINTERS – UP8, 12 (0-4)

Where:

    UP is the unit program

    8 is the line printer unit programs

    12 is the T0777 Laser Printer program

If a 0, or period, is entered, no printer questions are displayed. Enter the
number of printers that are connected. The following messages are displayed:

    PRINTER 1:

    MODEL? (H, 0-02)

This question solicites the model number for printer number 1. The model number
for the T0777 Laser Printer is 2. The following questions are displayed on the
system console for the T0777 Laser Printer.

    DEVICE ADDRESS? (0-76; 36)

    CHANNEL COMPLETE EVEN INTERRUPT ADDRESS? (0100-0276)

    CCB ADDRESS? (0100-0270)

The reply to the questions are contained in the System Memo supplied with the
system.

The unit program will be included as part of the system test unless the following
message is displayed.

    UNIT PROGRAM 12 NOT FOUND

This message indicates a problem in one of two areas:

. The T0777 Laser Printer program is not part of the system test library.

. A mistake was made during system generation. The generation process must be reinitiated.

6.2 Program Scheduling

After the system test is configured and loaded, the unit program can be scheduled.
Prior to scheduling, ensure that the Laser Printer is in operating condition.

Scheduling can be accomplished by including the unit program in the system mode
run list. For example:

        RU12
          or
        RU

The Laser Printer unit program number 12 cannot be run in diagnostic mode at this
revision.

6.3 Program Input

To be supplied when diagnostic mode is implemented.

6.4 Program Termination

A command C causes program control to be transferred to the System Test Executive
routine, thereby stopping all unit programs which were scheduled by the RU command.

6.5 Error Messages

When an error message is generated by the unit program, the first line is
created by the System Test Executive. The remaining data is furnished by the
unit program. The format of the message is:

        M4ZP12.0 DA=d KY=k PP=p,p,.. BP=b,n TM=h:m:s

Where:

        d = device address
        k = map key
        p = program pages
        b = initial buffer page
        n = number of buffer pages
        h:m:s = time

The following error message displays indicate the printer function when the error occurred, status word in binary and the 18 sense bytes in binary. The following is an example:

M4ZP12.0 DA=07 KY=03 PP=056,03 BP=061,01 TM=0:01:04

LZP ERROR DURING INITIALIZE PRINTER

        BIT POSITIONS   01234567   01234567

STATUS WORD   10000010   00000011

SENSE BYTES   (00) 01000000 (01) 00000000

                      (02) 00000001 (03) 00001000

                      (04) 00000000 (05) 00001001

                      (06) 00000000 (07) 00000000

                      (08) 00000000 (09) 00000000

                      (10) 00100000 (11) 00000000

                      (12) 00000000 (13) 00000000

                      (14) 00000000 (15) 00000000

                      (16) 00000000 (17) 01110000

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The Status word is displayed in two groups of 8 bits. The left 8 bits is the Printer Status, the right 8 bits is the Channel Controller Status.

Table 6-1 defines the Printer Status Bits.

TABLE 6-1 PRINTER STATUS

BIT	DESCRIPTION
0	Attention
1	Status Modifier
2	Control Unit End
3	Busy
4	Channel End
5	Device End
6	Unit Check
7	Unit Exception

Table 6-2 defines the Channel Controller Status.

TABLE 6-2 CHANNEL CONTROLLER STATUS

BITS 01234567	OCTAL	DESCRIPTION
00000000	00	Normal Completion
00000001	01	Halt Channel
00000010	02	Suspend Function
00000011	03	Check C.U. Status
00000100	04	Chain Interrupt
00000101	05	No Unit Response
00000110	06	C.U. Timed Out
00000111	07	Retry Count Exhausted
00001000	10	Control Unit Requesting Service
00001001	11	Parity Error
00001010	12	Buffer Size Error
00001011	13	C.U. Issued Disconnect
00001100	14	CPT Error
00001101	15	CCT Error
00001110	16	C.U. Write Terminate

Table 6-3 defines the 18 Printer Sense Bytes

TABLE 6-3 PRINTER SENSE BYTES

		BIT POSITIONS							
		0	1	2	3	4	5	6	7
SUMMARY INFORMATION	0	COMMAND REJECT	INTERVENTION REQUIRED	BUS OUT CHECK	EQUIPMENT CHECK	DATA CHECK	PROGRAM ALERT	BUFFER LOAD CHECK	INVALID SEQUENCE
PROGRAMMING	1	INVALID CHARACTER GENERATION	INHIBIT DATA CHECK	INHIBIT STATUS IN	MUST IPL	POINT INTEGRITY	INTERFACE SIGN OR SELECTIVE RESET	INVALID VFB	INVALID (SELECTED) TRANSLATE TABLE
	2	INVALID REGISTER ADDRESS	INVALID DATA LENGTH	INVALID FCB ID	(UNASSIGNED)	COPY ADVANCE	INVALID ADVANCE	SPACE LINE OVERFLOW	SPACE LINE ERROR
	3	DATA TO FCB ENTRY	INVALID FLASH NUMBER	INVALID FCB MODIFICATION	PAGE FCB OVERFLOW	PRINTING ACTIVE	(UNASSIGNED)		
POWER ON/OFF REPORTS	4								
	5								
HARD ERRORS	6	PRINTER STORAGE ERROR				ALU STATUS	BUS-IN PARITY ERROR	TRANSLATE ACCESS	IF MAIN STORAGE READ PARITY ERROR
	7	CHARACTER GENERATOR PARITY ERROR	INVALID CHARACTER GEN. ID	(UNASSIGNED)	INPUT BUS REG. IDSDE SCRATCH PAD	INPUT P REG. CODES MAIN MEMORY	INPUT BUS REG. STORED EXPANDED BUS	PROCESSING REG. INPUT BUS PARITY ERROR	IF MAIN MEMORY INPUT BUS PARITY ERROR
	8	(UNASSIGNED)			KEYBOARD OUTPUT REGISTER PARITY ERROR	MODULE TEMPERATURE EARLY WARNING	UNCORRECTABLE MAIN MEMORY READ ERROR	UNCORRECTABLE MAIN MEMORY OUTPUT USE DFO ERROR	UNCORRECTABLE MAIN MEMORY INPUT USE DFO ERROR
	9	(UNASSIGNED)				DISKETTE NOT READY	TRAILS MISMATCH	SECTOR NOT FOUND	DISKETTE CRC ERROR
	10	DEVICE POWER CHECK	FORCED DC SPLAT	FMS ERROR	GENERAL OFF	TONER SUPPLY	SAFETHROW FULL	END OF OIL FELT	TONER NOT DETECTED
	11	TRANSFER ST. TO PRECOAT PL OPEN	TOP OF PAPER	PAPER JAMS	DEVELOPER STATION OPEN	FORWARDS ERROR	AIR PRESSURE ERROR	CLEANING CLOTH PAPER STEP	DISORIENTATION LAMP
	12	OPEN FMS SERVICE TO SAFETY DOOR	AC POWER OPTION	OZONE CONCENTRATION	PAPER STEP ERROR	FUSER POSITION ERROR	TRANSFER ST. RTN POSITION ERROR	CLEANING STAND	NO PAPER READ
	13	LASER SAFETY SWITCH	DTP FUSED	FUSER TEMPERATURE TOO LOW	SAFETY BRAKE	FUSER SUPPLY	CLEANING FAILURE	DEVELOP PURGE	CLEANING CYCLE
	14	OVERLAY OUT OF SYNC	OVERLAY LAMP FAILURE	OVERLAY UFP 1007 ALIGN	OVERLAY STATION SWITCH	IMAGE FLUTTER	PRESSURE ROLLER JAM	STACKER FULL	VACUUM SUPPLY FAILURE
	15	(UNASSIGNED)					TEMPERATURE SERVICE FAILURE	HEATER FAILURE	DEVELOP STATION TEMPERATURE
ADDITIONAL DEVICE STATUS	16	(UNASSIGNED)				DFS OFFLINE	DFS WORN	DFS STACKER FULL	DFS ABNORMAL
FEATURES	17	(UNASSIGNED)	SPLICING SYSTEM FEATURE	PAGE OVERLAY FEATURE	ADDITIONAL CHARACTER STORAGE MEMORY FEATURE	MODULE VOLUME SPLICE FEATURE	(UNASSIGNED)		

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7.0 TEST DESCRIPTION

7.1 General

This section provides a detailed description for each test within the unit program.

7.2 Print-Advance Functional Test

This test is described in paragraph 3.2.1.1 and is test 1. This test is automatically selected when the unit program is scheduled to run in system mode.

7.3 Mark Forms Test

This test is described in paragraph 3.2.1.2 and is test 2. This test is automatically selected when the unit program is scheduled to run in system mode.

6.0 OPERATING INSTRUCTIONS

6.1 Preloading Instructions

The MSC/Locust unit program must be included during System Test Generation. Refer to UP-9098. Dialog question 11 is used to enter the unit program. The following message is displayed:

    11. HOW MANY DISC CONTROLLERS-UP 4, 5, 6, 13, 16? (0-4)

Enter the number (up to four) of controllers that are connected. The following disk messages are displayed:

    DISC N:

If a 0 is entered for the number of controllers, no disk questions are displayed.

A set of disk questions is displayed for each connected controller. The questions within each set are sequentially displayed as each question is answered.

The specified model must be 'DG'.

Address requirements are self explanatory. Refer to the system memo.

A specific head must be specified. System (high speed) model will test one head on cylinder 560. Specify each drive unit (0 or 1) to be tested. If more than one unit is to be tested, separate the unit numbers with a comma.

MSC unit parameters are passed by the EXEC to the unit program when System Test Generation is completed. The unit program is included in the System Test unless the following error message is displayed:

    UNIT PROGRAM 13 NOT FOUND

This message indicates a problem in one of two areas:

. The unit program is not part of the System Test library. Check the Software Release Description (SRD) for media content.

. A mistake was made during System Test Generation. The generation process must be reinitiated.

6.2 Program Scheduling

After System Test is configured and loaded, the unit program can be scheduled.

Prior to scheduling, ensure that the drives(s) are ready.

Scheduling can be accomplished by including the program in the system mode run list. For example:

    RU
    or
    RU13

One or two units can be tested in system mode. All units are tested by using the same parameters.

6.3 Program Termination

A Control-C causes an exit to the System Test EXEC.

6.4 Error Messages

When an error message is generated, the first two lines of the message are created by the EXEC. The remaining data is furnished by the unit program. The format of the first two lines of the message is:

    M4uuuu.u DA=d KY=k PP=p,p,... BP=b,n TM=h:m:s .
    r0 r1 r2 r3 r4 r5 r6 r7 pc

where u=Unit Program Identification
    k=Map Key
    p=Program pages
    b=Initial buffer page
    n=Number of contiguous pages in use
    h:m:s=Time error occured, relative to time 0
    r0-r7=contents of registers at time of error (called pseudo registers)
    pc=program counter for return

6.5 MSC Unit Program Error Messages

The following messages are generated by the unit program:

. BIC ERROR MESSAGES

   - BIC BUSY

   - SETUP

- ABNORMAL BIC DEVICE STOP WRITE

- ABNORMAL BIC DEVICE STOP READ

- BIC STOPPED, MAP MEMORY

- NOT AVAILABLE

- INITIAL ADDRESS XXXXXX

- FINAL ADDRESS WAS XXXXXX, SHOULD BE XXXXXX

. DATA ERROR MESSAGES

- WRITE/READ DATA COMPARE

- BUFFER ADDRESS XXXXXX, SIZE XXXXXX

- DATA EXPECTED XXXXXX, FOUND XXXXXX, SHOULD BE XXXXXX

. DEVICE ERROR MESSAGES

- DC XXXXXX

- SELECT CYLINDER

- RESTORE CYLINDER REGISTER

- STOP TRANSFER AND INITIALIZE

- OUTPUT SUW

- WRITE

- READ

- RESTORE

- DCU RESET

- FILL/EMPTY BUFFER

. DIAGNOSTIC ERROR MESSAGES

- INVALID COMMAND

- BIC INITIAL/FINAL ADDR REVERSAL

. STATUS ERROR MESSAGES

- STATUS WORD=

- HEADER ECC ERROR

- CORRECTABLE ECC ERROR

- INVALID CYLINDER ADDRESS

- INVALID HEAD ADDRESS

- INVALID SECTOR ADDRESS

- INVALID TRANSFER COUNT

- BIC IS NOT ACTIVE

- MEMORY PARITY ERROR

- DMA EXECUTION ERROR

- DRIVE DID NOT SELECT

- SEEK TIMEOUT

- DRIVE FAULT

- SEEK ERROR

- DRIVE NOT ON CYLINDER

- DRIVE NOT READY

- NO SELECT AT COMPLETION

- WRITE PROTECT ERROR

- END OF TRACK

- PROGRAMMATIC COMMAND ABORT

- HEADER COMPARE ERROR

- DEFECTIVE TRACK

- SECTOR NOT FOUND

- UNCORRECTABLE ECC ERROR

- CONTROLLER RAM PARITY ERROR

- INVALID STATUS WORD

. <u>MESSAGE TABLE FILLERS</u>

- INTERRUPT LATE

- TIMEOUT

7.0 <u>TEST DESCRIPTION</u>

7.1 General

This section provides a detailed description for each test within the unit program.

7.2 Echo Test

This test will perform a read, write, and verify record. The pattern used will alternate between 'APAT' and 'BPAT' if system mode.

6.0   OPERATING INSTRUCTIONS.

6.1   Pre-Loading Requirements.

The System Test executive must be running in order to schedule a unit program. The
procedure for running unit programs is standard and documented in the System Test
executive design description. The unit program for the particular test to be run
must have been selected during System Generation and the applicable device must be
ready for operation.

6.2   Program Loading/Execution.

Program loading and execution is accomplished by the System Test executive. The same
procedures apply to all unit programs and are documented in the System Test executive
design description.

7.0   TEST DESCRIPTION.

Systems Test Mode. All unit programs may be run in this mode. This is simply a high
speed test and requires no operator intervention.

Diagnostic Test Mode. Individual unit programs have a diagnostic capability which requires entry of test commands and/or parameters by the operator during program execution. Diagnostic Mode commands are positional and must be entered as follows:

    Command, continuous run, page/test number, number of micro-instructions
                                or
    Z, number of pages of WCS, page to run test in.

Valid commands are:

O - Runs as if in systems test mode. Parameters are not applicable.

D - Dump WCS. Continuous run parameter is not applicable. The page number parameter is an octal number indicating the page of WCS to be dumped. The number of micro-instructions parameter indicates number of micro-words to be dumped.

H - Help. Lists all valid commands.

R - Runs as if in systems test mode, but returns to diagnostic command entry routine. Only the continuous run parameter is applicable.

S - Single Test. Executes a single test. The continuous run parameter may be used. The Test Number parameter is the octal number for the test to be run.

Z - Parameter Input. Allows the test to be run with multiple pages of WCS. The page the test will be run in may be specified.

APPENDIX A - Console/Terminal Messages

Information Messages:

        INPUT DIAGNOSTIC COMMAND

            command, continuous run flag (c), octal Page/Test
            number, number of micro-instructions or Z, number
            of pages of WCS, page in which to run test.

        INVALID PARAMETER

            Parameter entered was invalid.

        INVALID TEST COMMAND

            Invalid command entered. Use "H" command to list
            valid commands.

Help Command Message:

        VALID COMMANDS
        0 - SYSTEM TEST
        D - DUMP WCS
        R - RUN DIAGNOSTIC
        S - SINGLE TEST
        Z - PARAMETERS (POSITIONAL)
        ,NUMBER OF PAGES OF WCS
        ,PAGE TO RUN TEST IN
        COMMAND PARAMETERS
        ,C (CONTINUOUS RUN)
        ,PAGE NUMBER
        ,NUMBER OF MICRO-INSTRUCTIONS

Error Messages:

The first line of each error message is generated by the Test Executive and is described in the Test Executive design description. The following information is output by the unit program:

(Line 2) WCS xxxxxx TIMEOUT (error message)
         WCS xxxxxx   (error message)

(Line 2 error messages)
         WCS READ ERROR
         WCS WRITE ERROR
         NO PAGE OF WCS AVAILABLE FOR TEST
         TEST NUMBER XX

(Lines 3-11)
         REGISTER FOUND EXPECTED
         R0   xxxxxx xxxxxx
         R1   xxxxxx xxxxxx
         R2   xxxxxx xxxxxx
         R3   xxxxxx xxxxxx
         R4   xxxxxx xxxxxx
         R5   xxxxxx xxxxxx
         R6   xxxxxx xxxxxx
         R7   xxxxxx xxxxxx

6. OPERATING INSTRUCTIONS

6.1 Preloading Instructions

The flexible disk unit program must be included during System Test Generation. Refer to UP-9098. Dialog question 11 is used to enter the unit program. The following message is displayed:

    11. HOW MANY DISC CONTROLLERS-UP 4, 5, 6, 16? (0-4)

Where:

    UP is the unit program

If a 0 is entered for the number of controllers, no disk questions are displayed. Enter the number (up to four) of controllers that are connected. The following disk messages are displayed:

    DISC n:

    MODEL ? (H, 0-6;5)

The specified model must be 'DJ'.

A set of disk questions is displayed for each connected controller. The questions within each set are sequentially displayed as each question is answered.

The questions are:

    DEVICE ADDRESS? (010-076;12)
    BIC/BTC EVEN DEVICE ADDRESS? (010-076)
    BIC/BTC COMPLETE EVEN INTERRUPT ADDRESS? (0100-0276)
    CONTROLLER COMPLETE EVEN INTERRUPT ADDRESS? (0100-0276)
    WHICH TRACK (T=0-0114), SECTOR (S=0-033)?(T,S)
    WHICH UNITS? (0-3)

where:

    N
     is the disk controller number

    H
     is Help

    T
     is the track to be tested

    S
     is the sector to be tested

Address requirements are self explanatory. Refer to the system memo.

Specify each diskette unit (0, 1, 2, or 3) to be tested. If more than one unit

is to be tested, separate the unit number entries with commas.

Diskette unit parameters are passed by the EXEC to the unit program when System Test Generation is completed. The unit program is included in the System Test unless the following error message is displayed:

    UNIT PROGRAM NOT FOUND

This message indicates a problem in one of two areas:

. The unit program is not part of the System Test library.

. A mistake was made during System Test Generation. The generation process must be reinitiated.

6.2 Program Scheduling

After System Test is configured and loaded, the unit program can be scheduled.

Prior to scheduling, ensure that the following has been completed on each unit to be tested:

1. Apply power

2. Install a write enabled diskette

3. Close the door on the unit

Scheduling can be accomplished by including the program in the system mode run list. For example:

    RU16   RU/L16   RU/P16   etc.
    or
    RU

From one to four units can be tested in system mode. All units are tested by using the same parameters.

An alternate method of scheduling is to execute the diagnostic mode. For example:

    RU/D16

6.3 Command Input

When the diagnostic mode is selected, the following message is displayed:

    INPUT DIAGNOSTIC COMMAND

Table 1 lists the valid commands.

TABLE 1. DIAGNOSTIC COMMANDS

COMMAND	FUNCTION	DESCRIPTION
A	Unique Address Test	Writes data pattern in every sector. First and second bytes contain track and sector address (unique address) of that sector.
C	Compatibility Test	Reads every sector. Verifies the data pattern and unique address.
D	Diagnostic Exit	Control is transferred to system mode. Current parameters remain the same. A CONTROL-C causes an exit to system test EXEC.
E	Echo Test	Performs read, write, and data verification. Use alternating track and random sector addresses if parameter 3=A. Use random track and random sector addresses if parameter 3=R. Default value of parameter 3 is continuous current track and current sector address.
F	Format	Issue format command to unit being tested. Parameter 3 specifies disk recording type. When F or FO specified, error message displayed and list of types is output. Format types are: 1 = Single sided MCO 2 = Double sided MCO 3 = Single density IBM 4 = Double density IBM
H	Help	Print list of diagnostic commands.
L	Report Disk Configuration	Update current disk configuration and print status.
R	Read	Read a record by using current parameters. Perform data verification.
S	Seek	Return to track 0 and search for current address. If parameter 3=R, will seek random track(s).

TABLE 1. DIAGNOSTIC COMMANDS (CONT'D)

COMMAND	FUNCTION	DESCRIPTION
T	Sense Status Test	Test error bits by forcing error conditions. Generate a report that includes bits not tested.
W	Write	Write a record by using current parameters.
Z	Change Input Parameters	Input parameters in the following order: 1. Read retry count 2. Write retry count 3. Record length 4. Fixed pattern 5. Track address 6. Sector address

Format: Command, PMTR1, PMTR2, PMTR3.

When a diagnostic command is entered, the operator can enter three parameters: continuous flag, status mask, and a command dependent parameter (parameter 3). Valid entries are:

. Continuous flag (command parameter 1)

  - No entry indicates a single cycle through the selected test. This is the default value.

  - An entry of C indicates a continuous test cycle mode until terminated with a Control-C.

. Status Mask (command parameter 2)

  - No entry indicates causes a default mask of -1 to be used. If the mask has been modified by a previous test entry, the last entered mask is used.

  - Any mask, except for -1, can be entered by the operator. This mask will be used for subsequent tests until changed by the operator.

. Command dependent parameter (command parameter 3)

  - The meaning of this parameter changes with each diagnostic command.

  - The meanings are:

COMMAND	FUNCTION	COMMAND	FUNCTION
A	Not used	L	Not used
C	Not used	R	Not used
D	Not used	S	Random Trk Addrs
E	C=Continuous	T	Not used
	R=Random Trk Adrs	W	Not used
	A=Alternating Trk Ads	Z	Not used
F	Format type 1,2,3,4		
	1=MCO double-sided		
	2-4 not used		

When the diagnostic command is entered, a unit-ready scan (starting with unit
0) is made. Command execution begins with the first unit found to be ready.
Upon completion of the execution sequence, the unit program will prompt the
operator for another command.

At the present time, command execution is accomplished on only the lowest-
numbered unit. In order to test the high-numbered units, remove the diskette
from the lower-numbered units. Diskette removal deactivates the unit and flags
it as not ready.

6.4 Program Termination

A command-C causes program control to be transferred to system mode. A Control-
C causes an exit to the System Test EXEC.

6.5 Error Messages

When an error message is generated, the first two lines of the message are cre-
ated by the EXEC. The remaining data is furnished by the unit program. The
format of the first two lines of the message is:

    M4uuuu.u DA=d KY=k PP=p,p,... BP=b,n TM=h:m:s
    r0 r1 r2 r3 r4 r5 r6 r7 pc

where u=Unit Program Identification
      k=Map key
      p=Program pages
      b=Initial buffer page
      n=Number of contiguous pages in use
      h:m:s=Time error occured, relative to time 0
      r0-r7=contents of registers at time of error (called pseudo registers)
      pc=program counter for return

This Unit Program provides the capability of writing and reading between memory
and a flexible disk unit. Specific error information will always be preceded by

'DC' for Disk Controller or 'BIC' for Buffer Interlace Controller followed by
the Device Address for the unit. Messages output are:

INTERRUPT LATE (followed by a further explanatory message)

BIC

BUSY ERROR

SETUP ERROR

ABNORMAL BIC DEVICE STOP ON WRITE ERROR

ABNORMAL BIC DEVICE STOP ON READ ERROR

BIC STOPPED - MAP MEMORY ERROR

INITIAL ADDRESS xxxxxx

FINAL ADDRESS WAS xxxxxx SHOULD BE xxxxxx

NOT AVAILABLE ERROR

DC -

BUSY ERROR

SELECT UNIT ERROR

WRITE ERROR

READ ERROR

OUTPUT TRACK ADDRESS ERROR

WRITE/READ DATA COMPARE ERROR

BUFFER ADDRESS xxxxxx SIZE (OCTAL) xxxxxx

DATA EXPECTED xxxxxx FOUND xxxxxx LOCATION xxxxxx

STATUS WORD BIT IDENTIFICATION -

STATUS WORD

B15 - NOT USED

B14 - NOT USED

B13 - TRACK ANALYSIS RECOMMENDED

B12 - SELECTED UNIT NOT READY

B11 - WRITE PROTECT VIOLATION

B10 - TRACK OVERFLOW

B9 - DATA CRC ERROR

B8 - HEADER CRC ERROR

B7 - TRANSFER TIMING ERROR

B6 - SEEK ERROR

B5 - BAD SECTOR ADDRESS

B4 - ILLEGAL DISK ADDRESS

B3 - RECORD SEARCH ERROR

B2 - NOT USED

B1 - NOT USED

B0 - CONTEXT ERROR

7. TEST DESCRIPTION

7.1 General

This section provides a detailed description for each test within the unit program.

7.2 Unique Address and Compatibility Test

The unique address portion of this test, writes a data pattern into every sector on the diskette. The pattern is obtained from a random number generator. The first two bytes of the pattern contain the respective track and sector addresses (unique address) of that sector.

The compatibility portion of this test, reads and verifies the data pattern and unique address of each sector. This test ensures that every sector of every track can be physically and electronically accessed.

7.3 Sense Status Test

This test uses a table of subroutine addresses. Each position within this address table corresponds to a position in a bit mask table.

The bit masks, for which there is no valid entry in the address table, are OR'ed together. The masks are output after the following message is displayed:

    BITS NOT TESTED

The bit masks in the bit mask table are the expected result of the corresponding test in the address table. At the conclusion of the individual test, any expected bits that are not present and any unexpected bits are OR'ed with a relative error accumulator.

There are two additional accumulators. One is used to represent the number of times the corresponding or relative test in the address table failed. Another contains the cumulative number of times that each test has been executed.

7.4 Echo Test

This test performs a write-read-data verification operation on a record. Current parameters are used during this test. The parameters are entered by the operator. In all cases, two parameters (continuous flag and status mask) are used. In other cases, a third parameter is used. The operator can change the parameters at any time during the test.

If the third parameter is an A, random sector and alternating track addresses are used. The first track address used is 38. For the second write-read-data verification, the head is moved in one track to track 37. The third operation moves the head out two tracks to track 39. Thus, the incremental movement of the head is increased by one for each operation. The process continues until the last track is accessed. At this time, the continuous flag is reset and the test is halted.

If the third parameter is an R, random sector and random track addresses are used. In this mode, the random process will continue until the test is halted. It is possible that not all sectors and tracks will be tested.

The default value of the third parameter is the current track and sector addresses.