Diagnostic Program Documentation

Documentation Release: 9735

Software Releases:

Category	Disk Type	Part Number	Revision
All	8" DSDD	732-0002G	6734
Printers/Plotters/Terminals	8" SSSD	702-0295B	6591
	5-1/4" DSDD	732-0052B	6591
Magnetic Media	8" SSSD	702-0292B	6734
	5-1/4" DSDD	732-0049B	6734
Telecommunications	8" SSSD	702-0294	6436
	5-1/4" DSDD	732-0051	6436
CPU/Memory test	8" SSSD	702-0293	6436
	5-1/4" DSDD	732-0050	6436

NOTE DSDD means Double-Sided Double-Density
SSSD means Single-Sided Single-Density

Documentation Part Number: 760-0029B

Package Part Number 195-2956-0B ECO Number: XXXXX

Program Name: 2200 Diagnostic Package

Date: April 15, 1987

Table of Contents

Diagnostic Engineering Department
WANG Laboratories, INC.
One Industrial Ave.
Lowell, Massachusetts 01851

1.0 REFERENCE DOCUMENTATION

Wang BASIC 2 Language Reference Manual.

2.0 CONFIGURATION REQUIREMENTS

2.1 Hardware

Minimum required configuration

2200 system
Check the configuration requirements for the program that is going to be run.

NOTE: Ensure that the partition size is large enough and the Device Table is properly configured.

2.2 Software

MVP CPU software must be rev. 1.8 or higher

VP CPU software must be rev. 2.1 or higher

Check the configuration requirements for the program that is going to be run.

3.0 PROGRAM DESCRIPTION

These are menu driven disks containing a combination of the diagnostics, utilities and exercisers for the 2200 MVP/LVP/SVP/VP systems. These programs are divided into four categories:

1. Printers/Plotters/Terminals
2. Magnetic Media
3. Telecommunications
4. CPU/Memory Test

The entire Diagnostic Package is contained on either one 8" Double-Sided Double-Density (DDDS) disk, four 8" Single-Sided Single-Density (SSSD) disks or four 5-1/4" Double-Sided Double-Density (DSDD) disks. The four disk set has the package divided into the four categories previously listed (one category per disk).

4.0 LOAD PROCEDURES

1. Select the device address with a 'SELECT DISK ###' statement (### equals the device address where program resides).

2. Input command 'LOAD RUN' to load if there is a "START" file. Input command 'LOAD RUN T"@MENU"', if there is no start file.

5.0 OPERATING INSTRUCTIONS

The menus in this package run the same as the system menus except the screening is revised. The Terminal number, Partition number and the size of the partition will be displayed in the lower right corner of the screen. Also the menus can be stepped backwards with 'PREV SCRN', CLEAR, or SF'31 keys.

Selection is made with the 'BACK SPACE', 'SPACE' bar, and the cursor arrows. When the desired selection is made (large dot before the name and the line is highlighted), press 'RUN' or 'RETURN' to initiate the selection. If the selection is another menu, then it will be displayed. If the selection is a program, then it will be loaded and run.

In order to support all of the 2200 LVP/SVP/MVP systems the diagnostic package needs to be available on 8" DSDD, 8" SSSD and 5-1/4" DSDD. The package is divided into four categories. Each category is small enough that it will fit on a SSSD 8" (or DSDD 5-1/4") disk. The entire package is on one 8" DSDD disk, four 8" SSSD or four 5-1/4 DSDD disks. The instructions for these disks are as follows:

Disk Type	Category	refer to Section
8" DSDD	All	7.1
8" SSSD & 5-1/4" DSDD	Printers/Plotters/Terminals	7.2
8" SSSD & 5-1/4" DSDD	Magnetic Media	7.3
8" SSSD & 5-1/4" DSDD	Telecommunications	7.4
8" SSSD & 5-1/4" DSDD	CPU/Memory test	7.5

5.1 2200 LVP/SVP Diagnostic Package

After the menu is loaded the following four selections will be displayed on the screen;

. Printers/Plotters/Terminals	Proceed to section 7.2
. Magnetic Media	Proceed to section 7.3
. Telecommunications	Proceed to section 7.4
. CPU/Memory test	Proceed to section 7.5

Select one of the above, using the normal menu selection procedure, and proceed with the corresponding instructions below.

5.2 Printers/Plotters/Terminals

When this menu is loaded the following options are available by the normal menu selection procedure:

- Printers and Plotters
- Terminals/Keyboards

The options for these selections are described in Appendix A.

5.3 Magnetic Media

When this menu is loaded, the following options are available by the normal menu selection procedure:

- PLL/VCO Adjustments
- Alignment Routines
- Disk Utilities
- Disk Exercisers
- Mag Tape

The options for these selections are described in Appendix B.

5.4 Telecommunications

When this menu is loaded, the following options are available by the normal menu selection procedure:

- 2228 D/E/F Power-Up Diagnostic Error Code Interpreter
- 2228 D/E/F 7 Board Burn In
- 2228 E/F Field Service Diagnostic
- 2228 D Field Service Diagnostic Rev. 2
- 2228 D Field Service Diagnostic Rev. 1
- 2227B/2228B T/C Diagnostic

For these procedures, numbers and names see Appendix C.

5.5 CPU/Memory Test

When this menu is loaded, the following options are available by the normal menu selection procedure:

- CPU Instruction Exerciser
- CPU/Memory Diagnostic Procedure
- Memory Error Chip Identifier

For these procedures, numbers and names see Appendix D.

6.0 MISCELLANEOUS

SSSD means Single-Sided Single-Density
DSDD means Double-Sided Double-Density

Revision numbers are explained in Appendix E.

7.0 PROGRAM REVISION HISTORY

6734 Added support for [illegible] and RAM Disk to MULTIDSK and FTU. Also fixed time out errors on long cabled mux.
Added old style mapping routine to SUPERZAP.

6591 Internal change ECI update needed.

6534 Added 2220DW printer test to package.

64A7 Multidsk has been modified to check for intermittent writing.
STARTPLL was renamed to PLL and address selection was added.
General Disk was converted to an FTU and named FTU.
Phoenix Alignment was renamed to 2280ALGN and now has address selection.

6436 The package has been broken into four sections for use on Single-Sided Single-Density disks and the 5-1/4" disks.
The programs have been updated to the latest revisions.
MECI and FILZAP have been added.

6396 This package has been expanded to exercise the 2209A Tape Drive Unit.

APPENDIX A

OPTIONS FOR PRINTERS/PLOTTERS/TERMINALS

Select the desired test and refer to the appropriate documentation for the procedures.

Menu selection	Documentation Program Name	Revision Part Number	Soft	Doc.
. PRINTERS/PLOTTERS				
. 2201L	2201L	760-1259	1.0	9434
. 2220DW	2220DW	760-1327	6534	9534
. 2221W	2221W	(see note 1)		
. 2231W-1	2231W-1	(see note 1)		
. 2231W-2	2231W-2	(see note 1)		
. 2231W-3	2231W-3	(see note 1)		
. 2231W-6	2231W-6	(see note 1)		
. 2232	2232	760-1258	61B0	9434
. 2235	2235	(see note 1)		
. 2245	2245	(see note 1)		
. 2251	2251	(see note 1)		
. 2261W	2261W	(see note 1)		
. 2263-1	2263-1	(see note 1)		
. 2263-2	2263-2	(see note 1)		
. 2263-3	2263-3	(see note 1)		
. 2273-1	2273-1	(see note 1)		
. 2273-2	2273-2	(see note 1)		
. 2281W	2281W	(see note 1)		
. 2282	2282	760-1276	414A	9434
. TERMINALS/KEYBOARDS				
. 2200 Universal Keyboard Test	uTextTst	760-1265	1294	9434
. Burn-In Test	36debin	(see note 2)		
. Local Printer Test	36ptrloc	(see note 2)		
. Character/Attributes Test	36chratb	(see note 2)		
. CRT Alignment Test	36caling	(see note 2)		
. Partition Monitor	36parton	(see note 2)		

Notes

1 - Part of General Printer Exerciser 760-1257 6441 9434

2 - Part of 2236DE/DW Field Service Diag. 760-1270 11B1 9434

Revision numbers are explained in Appendix E.

APPENDIX B

OPTIONS FOR MAGNETIC MENIA

Select the desired test and refer to the appropriate documentation for the procedures.

Menu selection	Documentation Revision Program Name	Part Number	Soft	Doc.
. PLL/VCO Adjustments				
. PLL Adj. (DSDD/Winchester)	PLL	760-1250B	84A5	94A5
. VCO Adj. (DSDD/Win. w/o scope)	2200 VCO	760-1263	81B4	9434
. Alignment Routines				
. DSDD Drive (850/851)	850ALIGN	760-1223A	8448	9434
. Phoenix	2280ALGN	760-1264A	84A4	94A4
. Disk Utilities				
. Field Test Unit	FTU	760-1261B	8734	9734
. Volume Zap	SUPERZAP	760-1260A	8734	9734
. Alternate Sector Test	PLL	760-1250B	84A5	94A5
. Disk Exerciser				
. Multiple Disk Exerciser	MULTIDSK	760-1209B	6734	9734
. LVP DPU Burn In	DPU BI	760-1262	41B4	9434
. Mag Tape				
. 2209A Tape Drive	I09A010A	760-1269	2.0	9434
. Kennedy Archiving Tape Drive	TAP 29M	760-1103A	7320	9434

Revision numbers are explained in Appendix E.

APPENDIX C

OPTIONS FOR TELECOMMUNICATIONS

Select the desired test and refer to the appropriate documentation for the procedures.

Menu selection	Program Name	Documentation Part Number	Revision Soft	Revision Doc.
. 2228 D/E/F Power-up Diag. Error Code Interpreter	28DEFEI	760-1121A	3370	9434
. 2228 D/E/F 7 Board Burn In	7BDEFBI	760-1124B	4370	9434
. 2228 E/F F.S. Diag.	28EFSR2	760-1122A	1370	9434
. 2228 D F.S. Diag. Rev. 2	28DFSR2	760-1267	1158	9434
. 2228 D F.S. Diag. Rev. 1	28DFSR1	760-1268	1121	9434
. 2227B/2228B T/C Diagnostic	STARTTC	760-1275	13B1	9434

Revision numbers are explained in Appendix E.

APPENDIX D

OPTIONS FOR CPU/MEMORY TEST

Select the desired test and refer to the appropriate documentation for the procedures.

Menu selection	Program Name	Documentation Part Number	Revision Soft	Revision Doc.
. CPU Instruction Exerciser	SYS1(note 2)	760-1266	1.0	9434
. CPU/Memory Diagnostic Procedure	@@ (note 1)	760-1271	1164	9434
. Memory Error Chip Identifier	MECI	760-1272	8434	9434

Notes:

1. The CPU/Memory Diagnostic Procedure explaines how to load (boot) the CPU/Memory diagnostic. The documentation number and revision numbers are for the CPU/Memory diagnostic.

2. This test contains many files on the media. The file names are listed in the documention for the program.

Revision numbers are explained in Appendix E.

APPENDIX E

EXPLANATION OF REVISION NUMBERS

Rev. ___ ___ ___ ___

1st Position = Kind of Diagnostic

Not Supported	0
Diagnostic Program	1
Monitor Package	2
Monitor Program	3
Burn In	4
Power Up	5
Exerciser	6
Board Repair	7
Utility	8
Document only	9
Reserved	A-F

2nd Position = Last Digit of Year

Self-explanatory	0-9

3rd Position = Month of Revision

January	1
February	2
March	3
April	4
May	5
June	6
July	7
August	8
September	9
October	A
November	B
December	C

4th Position = Type of Change

Brand New	0
Software Fix	1
Test Added	2
Enhancement	4
Hardware Change	8

These numbers can be added together (in hex) to include more than one type of change.

1.0 TITLE

2209A Tape Drive Diagnostic

2.0 REVISION/DATE

Date:	May 3, 1984
Package Part Number:	195-2956-0
Documentation Part Number:	760-1269
Documentation Release:	9434
Software Release:	2.0

3.0 REFERENCE DOCUMENTS

Wang BASIC 2 language reference manual.

4.0 CONFIGURATION REQUIREMENTS

4.1 Hardware

MVP/LVP/SVP/VP with the minimum required configuration

At least 16K bytes of user memory

2236DE/DW or equivalent terminal

4.2 Software

LVP CPU software must be rev. 1.8 or higher

VP CPU software must be rev. 2.1 or higher

Media containing the 2209A Tape Drive diagnostic which is made up of the following programs:

I09A010A - start module
T09A010A - memory test
T09A020A - tape function test
T09A030A - exerciser

5.0 PROGRAM DESCRIPTION

This program was designed to insure that the 2209A I/O Board, Formatter, Tape Drive, and I/O memory is free of hardware faults. Also, designed into the program, were error messages and a halt on error mode.

6.0 LOAD PROCEDURE

6.1 Load Directly from Disk

1) Select the device address with a 'SELECT DISK ###' statement (see note 1)
2) Input command 'LOAD RUN T"I09A010A"'

6.2 Load from 2200 Diagnostic Package

1) Select the device address with a 'SELECT DISK ###' statement (see note 1)
2) Input command 'LOAD RUN'
3) If 'MAGNETIC MEDIA' disk, proceed with step 4
   Under '2200 DIAGNOSTIC PACKAGE' menu, select 'Magnetic Media'
4) Under 'MAGNETIC MEDIA' menu, select 'Mag Tape'
5) Under 'MAG TAPES' menu, select '2209A Tape Drive'

Note 1: (### equals the device address where program resides)

7.0 OPERATING INSTRUCTIONS

7.1 Description of Operation

The 2209A Tape Drive Diagnostic is modularized into four different modules. The main monitor called "I09A010A" loads in first and inputs the test parameters. The monitor will then load and run the three tests (run in the order listed below), monitor them and handle error recovery when errors occur. Due to the monitor loading in the programs as they are run the floppy disk, on which the programs are stored, must remain as the SELECTed drive when the diagnostic is running.

1 T09A010A - Memory Test
2 T09A020A - Tape Function Test
3 T09A030A - Mixed Commands Exerciser

7.2 Procedures

When the program is initially loaded, the operator will have to input (via the command screens displayed on the next page) the following:

Tape Drive Address
CPU Type
Halt On Error?
Print Errors?

Once these inputs are completed the program will proceed with running the tests (listed above). If the 'PRINT ERRORS' answer is 'N', then no further questions are displayed and the tests will begin.

```
2209A TAPE DRIVE DIAGNOSTIC - SYSTEM VERSION
SELECT TAPE CONTROLLER ADDRESS ? 2
1. 07A          2. 07B          3. 07C
4. 07D          5. 07E          6. 07F


 SELECT CPU TYPE ? 2
1. 2200T                        2. VP/MVP
HALT ON ERROR ( Y OR N)? Y
PRINT ERRORS (Y OR N)? Y
TYPE IN YOUR NAME PLEASE? xxxx xxxxxx
TODAY'S DATE (MM/DD/YY)? mm/dd/yy
WHAT TIME IS IT (HH:MM)? hh:mm
SERIAL # ? ######
```

Each question will appear as the preceding one is answered.

7.3 Test Descriptions

See Appendix A.

8.0 REVISION HISTORY

Rev. 2.0:

Unknown history.

Rev. 1.0:

Initial Release.

9.0 MISCELLANEOUS

None.

APPENDIX A

2209A TEST DESCRIPTIONS

MEMORY TESTS

This part of the diagnostic tests the 4K of ram located on the tape I/O board. If an memory error occurs, the IC number in which the error appeared to occur, will be displayed on the CRT as,

'MEMORY IC L? IS BAD'

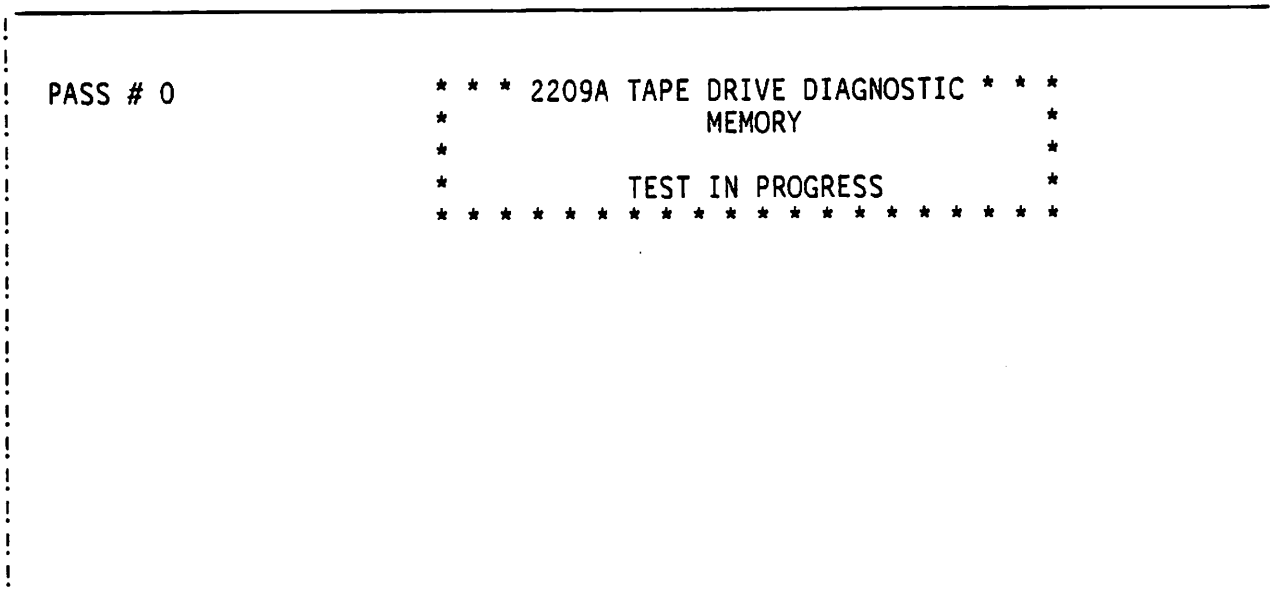
Fifty passes are run (as displayed on the CRT (see below)) before the memory test loads the function tests.

NOTE

It should be taken into account that this program cannot distinguish between a bad ram and/or a bad buffer which exists between the ram and the data bus.

Each memory pass can be broken down into six different test patterns. They are:

1. Alternate pattern (55AA)
2. Reverse alternate pattern (AA55)
3. Incremental pattern (00,11,22,33, FF,10,21,32,etc.)
4. Rotated incremental pattern (00,22,44,66,etc.)
5. Random pattern (different each time)
6. Rotated random pattern.



APPENDIX A

STATUS TABLE

Function and Mixed Commands, will display a status table at the end of each tape operation. The format of the status table is:

```
                    * * * 2209A TAPE DRIVE DIAGNOSTIC * * *
                    *                                     *
                    *              xxxxxxxx               *
                    *                yyyyy                *
                    *           TEST IN PROGRESS          *
                    * * * * * * * * * * * * * * * * * * * *


                       TAPE STATUS TABLE
                   (( X = CONDITION TRUE))

READY                X                    BOT          0
WRITE ENABLE         0                    EOT
TAPE ERROR                                EOF          X
BUFFER OVERFLOW      0                    Byte Count   1234
```

In the title block:

xxxxxxxx	will be the test currently running
yyyyy	will be the function being done.

Byte count always displays four digits and it indicates how many bytes were transferred in a Read or Write.

'BOT' = beginning of tape marker.
'EOT' = end of tape marker.
'EOF' = end of file marker.

An "X" next to a status name means the condition exists.
An "0" next to a status name means the condition does not exist.
A blank means it hasn't been checked yet.

If an error occurs, '*=ERROR=*' will be printed under '((X = CONDITION TRUE))' and an '*' is printed to the right of the failing status name. The error conditions relate to the failing status and the possibilities are:

1. Tape not ready
2. No write enable ring
3. Tape error
4. Buffer overflow
5. EOT encountered in any test other than "WGAP to EOT"
6. Byte count not equal to internal program byte count

APPENDIX A

FUNCTION TESTS

This portion of the diagnostic is included to insure that each software command, available to the programmer, works as described and documented in the tape drive manual. This is done by:

checking status bits

keeping internal byte counts so they can be compared to status byte counts

doing read/write data comparisons

keeping internal counts of all operations performed

For this test, a status table is displayed, and the function currently being executed is displayed in the test identifier block on the CRT.

After the 20 steps (below) are completed, the test loads the MIXED COMMANDS TEST. The function test is run in the order listed below:

1. Rewind
2. Write 64 blocks of data with random data patterns starting with a 64 byte block and incrementing each block by 64 bytes until 4096 is reached
3. Rewind
4. Read/compare written blocks
5. BSR to BOT
6. FSR to the last written block
7. Read/compare
8. Rewind
9. Write random # of gaps
10. Write check record
11. Rewind
12. Read/compare check record
13. Rewind
14. Write random # of EOF's
15. Write check record
16. BSF to BOT
17. FSF to check record
18. Read/compare check record
19. Write GAP to EOT Note: It is recommended that short tapes be used or that the EOT marker be placed closer to BOT. Otherwise, it will take quite a long time to reach EOT
20. Rewind

APPENDIX A

MIXED COMMANDS

The function test which verifies that each command works, does not test the tape drive thoroughly enough.

By continuously running different command sequences in fast order, and then by doing error checking on these sequences, the program is able to run a worst case diagnostic. This will determine if any commands produce errors. During this test, a status table is displayed, and the function currently being executed is displayed in the test identification block on the CRT. There is also the following list of statements (with the number of occurences) displayed to the left of the identifier block:

0000 DATA ERROR	
0000 BOT	
0000 MISSING BOT	
0000 FILE MARK	
0000 MISSING FILE MARK	
0000 COUNT ERROR	internal byte counts compared to status byte counts
0000 DATA NOT EQUAL	doing read/write data comparisons

After one pass is complete, the memory test is restarted.

1.0 TITLE

2200 Kennedy Tape Field Service and Board Repair Diagnostic

2.0 REVISION/DATE

Date:	May 3, 1984
Package Part Number:	195-2956-0
with listing:	195-2552-0
Documentation Part Number:	760-1103A
with listing:	760-1119A
Documentation Release:	9434
Software Release:	7320

3.0 REFERENCE DOCUMENTS

Kennedy 6455 Tape Cartridge System Manual

Kennedy 1/4 Inch Tape Controller Spec.

Wang BASIC 2 language reference manual.

4.0 CONFIGURATION REQUIREMENTS

4.1 Hardware

LVP/MVP with the minimum required configuration

ZeBug Unit

Kennedy 1/4 Tape Formatter

Kennedy Tape Controller Board

4.2 Software

Minimum System Basic Rev. Level 2.1

56K Basic Memory Partition

2200 Kennedy Tape Drive Basic Monitor

Z-80 Prom Based Board Repair or Field Service Aid

Z-80 Ram Loadable Tape Function Code

Media containing the 2200 Kennedy Tape Field Service and Board Repair Diagnostic which is labeled:

TAP 29M

5.0 PROGRAM DESCRIPTION

5.1 Uses

This program is used for the diagnosing of 2200 Kennedy Tape Controller Boards and error detection on Kennedy 1/4 inch Tape Formatter Drives.

5.2 User Interface

It is recommended that the user should use a Zebug while interfacing to this diagnostic. If only the Power Up tests are to be checked, then the Zebug and source list are required. If the user wants to interface with the monitor, then a disk containing the monitor "TAP 29M" and down loadable RAM code "TAPEHOST" is required.

5.3 Hardware Tested

Kennedy Tape controller Mother and Daughter Boards

Kennedy Tape Formatter Drive

2200 Controller interfacing hardware

5.4 Tests in the Program

No.	Name of Test	Hardware Tested
01	Led Visual Test	LEDs on Controller and Drive
02	Prom Checksum Test	Check integrity of prom code
03	Send Board Status	Sends 2200 current board status
16	RAM Moving Inversions Test	Extended Testing of RAM
21	PIO A Port Register Test	Checks PIO A Port Data Register
22	PIO B Port Register Test	Checks PIO B Port Data Register
23	PIO OBS - IBS Test	Checks PIO to 2200 transfer
31	CTC Timing Interrupt Test	Checks CTC Timing Interrupt
32	CTC Priority Interrupt Test	Checks CTC Priority Interrupts
41	DMA Reset Status Test	Checks the reset status of DMA
42	DMA Temporary Register Test	Checks the DMA Temporary Reg.
43	DMA Register Integrity Test	Checks DMA Reg. Integrity
44	DMA Memory to Memory Test	Checks DMA Mem to Mem Transfer
45	DMA Off Board Transfer Test	Checks DMA interface to 2200
50	Tape Rewind Function Test	Checks Tape Drive Rewind func.
51	Tape Load Function Test	Checks Tape Drive Load func.
52	Tape Unload Function Test	Checks Tape Drive Unload func.
53	Tape Track Sel Function Test	Checks Tape Drive Trck Select
54	Tape Erase Function Test	Checks Tape Drive Erase func.
55	Tape Space Fwd Func Test	Checks Tape Drive Space Fwd.
56	Tape Space Rev Func Test	Checks Tape Drive Space Rev.
57	Tape Space Fwd FM Test	Checks Tape Drive Space Fwd FM
58	Tape Space Rev FM Test	Checks Tape Drive Space Rev FM
59	Tape Reset Function Test	Checks Tape Drive Reset func.
5A	Tape Parity Function Test	Checks Tape Drive Parity func.
5B	Tape Write FM Function Test	Checks Tape Drive Write FM func.
5C	Tape Write Rec Function Test	Checks Tape Drive Write Rec
5D	Tape Read Rec Function Test	Checks Tape Drive Read Rec func.
5E	Send 8 bytes of I/O Buffers	Send 1st 8 bytes I/O buffs
5F	Tape Erase Track Test	Checks Tape Track Erase func.

6.0 LOAD PROCEDURE

6.1 To Run Board Repair or Field Service Tests with ZEBUG and Monitor

1) To run Board Repair or Field Service Tests the controller board configuration switches must be set according to section 6.4 below.

6.2 Load Directly from Disk

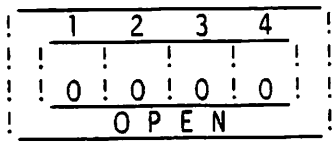
1) Select the device address with a 'SELECT DISK ###' statement (see note 1)
2) Input command 'LOAD RUN T"TAP 29M"'

6.3 Load from 2200 Diagnostic Package

1) Select the device address with a 'SELECT DISK ###' statement (see note 1)
2) Input command 'LOAD RUN'
3) If 'MAGNETIC MEDIA' disk, proceed with step 4
   Under '2200 DIAGNOSTIC PACKAGE' menu, select 'Magnetic Media'
4) Under 'MAGNETIC MEDIA' menu, select 'Mag Tape'
5) Under 'MAGNETIC TAPES' menu, select 'Kennedy Archiving Tape Drive'

Note 1: (### equals the device address where program resides)

6.4 Configuration Switch Settings (sw1)



Switch Settings -

1	2	3	4	
1	1	1	0	= (Power Up)
0	1	1	0	= (Field Service/Repair Aid)
0	1	0	0	= (Error Loop)
1	1	0	0	= (Scope Loop)
1	0	0	0	= (Loop on Power Up)

Symbol Definitions -

0 = switch open(+5v) = 1
1 = switch closed(+0v) = 0
x = don't care

NOTE

If the controller is not responding properly, it is necessary to run Power Up tests. For more information look under 2200 Kennedy Tape Power Up Diagnostic Documentation (760-1102).

7.0 OPERATING INSTRUCTIONS

The first menu will request the tape controller Device Address.

Device Address 018 is the only address that should be used.

If the Device Address is not accepted, then check the address switches on the controller board and reload the Device Address. If the Device Address has been accepted, then continue with next step.

The Device Address having been accepted, the monitor will ask the following 3 questions:

1) Is loop on error wanted?
2) Are instructions wanted?
3) How many passes are wanted?

After these questions have been answered, then the GO/NOGO test are run. These include a re-run of the Power Up tests, a PIO CBS-IBS Interface test and a DMA Interface test. If any of the GO/NOGO tests failed, see ERROR CODES AND DESCRIPTION OF FAILURE (Appendix A.). If the monitor has run through all the GO/NOGO tests successfully, the tape function code "TAPEHOST" should now be located in RAM. The controller is now ready to accept instructions from the monitor. The monitor is waiting in the Unit Test Select Menu. Depress the SF' key which pertains to the operation desired (see below).

Unit Test Select Menu

SF 0 - RE-KEY Parameters
SF 1 - Re-run Automatic Tests
SF 2 - Controller Tests Menu
SF 3 - Formatter Tests Menu
SF 4 - Board Repair or Field Service Chain Mode

SF 0 - will first the following three questions:
1) Do you want to loop on error 'Y' or 'N'
2) Do you want to display instructions 'Y' or 'N'
3) How many passes (less than 10000, default =1)

After this information has been filled in, the monitor will either return to the Unit Test Select Menu or if the host code has not yet been loaded into RAM, then the GO/NOGO tests are run again.

SF 1 - re-run the GO/NOGO tests.

SF 2 - this will put the user in the menu that contains all of the controller tests. This menu will allow the user to select each individual controller test which makes it easier to segregate any problems on those boards. A description of each test can be found under the heading Controller Tests Menu of Appendix B.

SF 3 - this will put the user in the menu containing all the tape function tests. This menu will allow the user to select each individual tape function test which makes it easier to segregate any problems on the tape drive, the interface from the controller to the drive, or the controller hardware used in accessing the drive. A description of each test can be found under the heading Formatter Tests Menu of Appendix B.

SF 4 - this will run all the controller tests and selected tape funtions tests in a chain. All parameters for these tests are pre-determined by the monitor. This test may be exited at any time by depressing the Return key.

7.0 REVISION HISTORY

Rev. 7320:

Initial Release.

9.0 MISCELLANEOUS

None.

APPENDIX A

ERROR CODES AND DESCRIPTION OF FAILURE
Controller Errors Descriptions

NOTE

(Please note that it is impossible to always know immediately what has caused a failure. The descriptions of Probable Cause are merely to assist in the recovery effort, by indicating what the most likely cause(s) of failure not necessarily the only cause(s).)

Monitor Error Messages:

"Checking Device Ready/Busy Status.....Ready/Busy Test Failed"

Controller Should be ready after power on reset, but the board is still busy.

Probable Cause of Failure:
- a) Check Ready/Busy lines on the controller
- b) Address switches set incorrectly
- c) Bad Data Line(s)
- d) Bad Address Line(s)
- e) Bad clock to controller

"Checking Power Up.....Power Up Failed"

Either there was a Power Up Test Failure, or the controller never became ready after the Power Up Tests were run.

Probable Cause of Failure:
- a) Power Up Test Failure. Power Up should be run using Zebug interface (see Power Up documentation)
- b) PIO control signal failure

"Controller is not responding properly. Run Power Up Tests using Zebug for more informative error detection. Also see Power Up Diagnostic documentation for probable cause of failure."

Monitor has timed out waiting for information from controller.

Probable Cause of Failure:
- a) bad connection to controller
- b) Bad Ready/Busy signal
- c) Bad strobe signal
- d) Unknown controller failure. Run Power Up tests

APPENDIX A

Rtn.No.	Err.No.	Error Description and Probable Causes of Failure
01	00	LED visual test - all LED are lit and then unlit. Error analysis must be determined by visual sighting.

Probable Cause of Failure:

1) if none of the LEDs are lit;
   a) no power to tape drive unit
   b) bad connection from controller
   c) bad data bus on controller
   d) no clock on controller

2) if only one LED is failing;
   a) bad LED
   b) bad connection to that LED. Path is L30 to L17 of mother board to drive to LED.
   c) bad address line on A3, A2, A1, A0
   d) bad driver line, I/O6 to L30

02	01	Prom Checksum Error - indicates that the prom has bad data.

Probable Cause of Failure:
   a) bad prom chip at L6 of daughter board
   b) bad data line(s)
   c) bad address line(s)
   d) bad ROM select from L14 pin 4 daughter
   e) bad memory request from L22 pin 8 daughter
   f) bad voltages

03	00	Read board configuration switch - this can be used with a Zebug to determine the current settings of the configurations switches at any time. However the reading when using this diagnostic in Repair Aid mode will be BIN XXXX-10X1. If this is not so, then the program never would have gotten this far.
16	01	RAM data error - expected and received data are not the same. Expected data is in D', received data is in E', and the current address is in HL'.

Probable Cause of Failure:
   a) bad data line(s)
   b) bad data cell at current address
   c) RAM memory request timing error

21	01	PIO Port A Data Error - expected and received data are not the same. Expected data is in D', received data is in E'.

Probable Cause of Failure:
   a) bad data line(s)
   b) bad PIO Port A Data Register(L27 mother)
   c) bad M1 or I/O select line

Rtn.No.	Err.No.	Error Description and Probable Causes of Failure
22	01	PIO Port B Data Error - expected and received data are not the same. Expected data is in D', received data is in E'. Probable Cause of Failure: a) bad data line(s) b) bad PIO Port B Data Register(L27 mother) c) bad M1 or I/O select line
23	00	PIO 2200 Interface Test - this test should not indicate errors. It will either hang waiting for a strobe from the 2200 or the monitor program on the 2200 side will indicate a data error. Probable Cause of Failure: a) bad strobe signal from 2200 b) bad data line on the 2200 side of the controller c) bad board select d) I/O drivers(L46, L40, L45, L35)
31	01	CTC Timing Mode Error - the interrupt was received sooner than was expected. D' contains the current CTC channel being used. E' contains the prescalar value for the current channel. Probable Cause of Failure: a) system clock is not timing correctly b) bad CTC channel(L20 mother) c) bad control line(s) to CTC d) bad data line(s)
31	02	CTC Timing Mode Error - the interrupt was never received in the time allowed. D' contains the current CTC channel being used. E' contains the prescalar value for the current channel. Probable Cause of Failure: a) system clock is not timing correctly b) bad CTC channel(L20 mother) c) bad control line(s) to CTC d) bad data line(s) e) problem with CPU interrupt circuitry
32	01	CTC Channel 0 Priority Interrupt Error - the channel 0 interrupt either never happened or occurred in the wrong priority order. Probable Cause of Failure: a) bad CTC(L20 mother) b) bad control line(s) to CTC c) problem with CPU interrupt circuitry

APPENDIX A

Rtn.No.	Err.No.	Error Description and Probable Causes of Failer
32	02	CTC Channel 1 Priority Interrupt Error - the channel 0 interrupt either never happened or occurred in the wrong priority order. Probable Cause of Failure: a) bad CTC(L20 mother) b) bad control line(s) to CTC c) problem with CPU interrupt circuitry
32	03	CTC Channel 2 Priority Interrupt Error - the channel 0 interrupt either never happened or occurred in the wrong priority order. Probable Cause of Failure: a) bad CTC(L20 mother) b) bad control line(s) to CTC c) problem with CPU interrupt circuitry
32	04	CTC Channel 3 Priority Interrupt Error - the channel 0 interrupt either never happened or occurred in the wrong priority order. Probable Cause of Failure: a) bad CTC(L20 mother) b) bad control line(s) to CTC c) problem with CPU interrupt circuitry
41	01	DMA Reset Error - the DMA has been reset but the DMA status word was not clear. D' contains the expected status(00) and E' contains the received status. Probable Cause of Failure: a) DMA caught in a state waiting for DREQ acknowledge b) bad reset line to DMA c) bad data line d) bad DMA status register(L14 mother)
42	01	DMA Temporary Register Error - the DMA has been cleared using the Master Clear but the DMA temporary register was not clear. D' contains the expected status(00) and E' contains the received status. Probable Cause of Failure: a) DMA caught in a state waiting for DREQ acknowledge b) bad reset line to DMA c) bad data line d) bad DMA temporary register(L14 mother)

APPENDIX A

Rtn.No.	Err.No.	Error Description and Probable Causes of Failure

43 01 DMA Low Order Channel Register Error - a pattern has been written to the current address or word count register. However, the pattern written is not the same as the pattern read back. C' contains the current channel port address, D' contains the expected data and E' contains the received data.

Probable Cause of Failure:
a) DMA caught in a run state
b) bad data line
c) bad DMA low order channel register(L14 mother)

43 02 DMA High Order Channel Register Error - a pattern has been written to the current address or word count register. However, the pattern written is not the same as the pattern read back. C' contains the current channel port address, D' contains the expected data and E' contains the received data.

Probable Cause of Failure:
a) DMA caught in a run state
b) bad data line
c) bad DMA high order channel register(L14 mother)

44 01 DMA Memory to Memory Transfer Error - 16k of data has been transferred from 16k of memory starting at address X'6000' to another 16k block of memory starting at location X'A000'. The data was sent through channel 0 and received through channel 1. The operation ran to completion but the data that was sent was not the same as the data that received. D' contains the expected data, E' contains the received data, HL contains the receiving address, DE contains the sending address.

Probable Cause of Failure:
a) bad addressing line
b) bad data line
c) bad DMA control signal
d) bad channel register

45 01 DMA from 2200 Transfer Error - the 2200 is attempting to send data to the controller via the DMA but the operation never completed. DMA channel 2 is being used for this operation.

Probable Cause of Failure:
a) bad strobe from the 2200
b) bad DMA Request on channel 2
c) bad EOP(acknowledge)
d) bad clock to PIO or DMA
e) incorrect values in the channel 2 registers

APPENDIX A

Rtn.No.	Err.No.	Error Description and Probable Causes of Failure
45	02	DMA to 2200 Transfer Error - the 2200 is attempting to receive data from the controller via the DMA but the operation never completed. DMA channel 3 is being used for this operation.

Probable Cause of Failure:

a) bad strobe from the 2200
b) bad DMA Request on channel 3
c) bad EOP(acknowledge)
d) bad clock to PIO or DMA
e) incorrect values in the channel 3 registers

APPENDIX A

Formatter Error Descriptions

Since many of the error messages are the same for the various Formatter Tests, a list of these errors and their possible causes are listed in Table 2. below. Error Description can then be found by going to the Routine and Error Numbers wanted, beside these numbers there will be the words Error Description #(# is equal to some number). Go to Table 2. and find the comparable # and read the description given. If the error description is unique, then it will be listed beside the Routine and Error Numbers.

B' - contains the routine number
C' - contains the error number
D' - contains expected data(exceptions are noted)
E' - contains received data(exceptions are noted)
HL'- contains the address in question if applicable(exceptions are noted)

Table 2.

Error Description #	Error Description and Probable Cause of Failure
01	Timeout waiting for Formatter to the read its status command. CBSY or STRB was never received. Check the 2200 monitor for error information. Probable Cause of Failure: a) bad interface to the formatter drive b) bad formatter c) bad CREQ signal d) bad STRB signal e) bad CBSY signal
02	Timeout waiting for Formatter to respond to function command. CBSY or STRB was never received. Check the 2200 monitor for error information. Probable Cause of Failure: a) bad interface to the formatter drive b) bad formatter c) bad CREQ signal d) bad STRB signal e) bad CBSY signal
03	Timeout waiting for Formatter to complete its current function. CBSY was never received. Check the 2200 monitor for error information. Probable Cause of Failure: a) bad interface to the formatter drive b) bad formatter c) bad CREQ signal d) bad CBSY signal e) in the case of write or read functions the DRDY circuitry may be bad

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Error Description #	Error Description and Probable Cause of Failure
04	Formatter status error was encountered. Check the 2200 monitor for error information. Probable Cause of Failure: Check the KENNEDY Model 6455 Tape Cartridge System Operation and Maintenance Manual for more information pertaining to status errors.
05	Tape should be positioned at LBOT but is not. Check the 2200 monitor for error information. Probable Cause of Failure: a) bad interface to the formatter drive b) bad formatter c) bad CREQ signal
06	Tape should be positioned at LEOT but is not. Check the 2200 monitor for error information. Probable Cause of Failure: a) bad interface to the formatter drive b) bad formatter c) bad CREQ signal
07	Tape is currently positioned at LEOT. Therefore, the current operation, which moves the tape in a forward direction, cannot be performed until the tape is positioned back from LEOT.
08	Tape is currently positioned at LLP. Therefore, the current operation, which moves the tape in a reverse direction, cannot be performed until the tape is positioned back from LLP.

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NOTE

The following Error Descriptions refer to the descriptions in table 1 on the previous pages.

Rtn.No.	Err.No.	Error Description and Probable Causes of Failure
50	01	Rewind Routine - Error Description 01
50	02	Rewind Routine - Error Description 04
50	03	Rewind Routine - Error Description 02
50	04	Rewind Routine - Error Description 03
50	05	Rewind Routine - Error Description 01
50	06	Rewind Routine - Error Description 04
50	07	Rewind Routine - Error Description 05
51	01	Load Routine - Error Description 01
51	02	Load Routine - Formatter Status indicates that there is no tape cartridge in the drive. Probable Cause of Failure: a) tape cartridge not in drive b) tape cartridge not inserted properly
51	03	Load Routine - Error Description 02
51	04	Load Routine - Error Description 03
51	05	Load Routine - Error Description 01
51	06	Load Routine - Error Description 04
51	07	Load Routine - Error Description 05
52	01	Unload Routine - Error Description 01
52	02	Unload Routine - Error Description 04
52	03	Unload Routine - Error Description 02
52	04	Unload Routine - Error Description 03
52	05	Unload Routine - Error Description 01

APPENDIX A

Rtn.No.	Err.No.	Error Description and Probable Causes of Failure
52	06	Unload Routine - Tape Drive should have responded with a Drive Not Ready status after Unload command. However, the formatter status was still indicating Drive Ready. Probable Cause of Failure: a) bad interface to controller b) bad data line c) bad formatter
52	07	Unload Routine - Tape should be positioned at EOT(bit 3 of position status) but is not. Check the 2200 monitor for error information. Probable Cause of Failure: a) bad interface to the formatter drive b) bad formatter c) bad CREQ signal
53	01	Track Select Routine - Error Description 01
53	02	Track Select Routine - Error Description 04
53	03	Track Select Routine - Error Description 02
53	04	Track Select Routine - Timeout waiting for Formatter to accept Track # parameter. CBSY or STRB was never received. Check the 2200 monitor for error information. Probable Cause of Failure: a) bad interface to the formatter drive b) bad formatter c) bad CREQ signal d) bad STRB signal e) bad CBSY signal
53	05	Track Select Routine - Error Description 03
53	06	Track Select Routine - Error Description 01
53	07	Track Select Routine - Error Description 04
53	08	Track Select Routine - Error Description 05
53	09	Track Select Routine - Error Description 06
53	10	Track Select Routine - Track that was selected is not the track that the heads are currently on(see position status).
54	01	Erase Space Routine - Error Description 01
54	02	Erase Space Routine - Error Description 04

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Rtn.No.	Err.No.	Error Description and Probable Causes of Failure
54	03	Erase Space Routine - Error Description 07
54	04	Erase Space Routine - Error Description 02
54	05	Erase Space Routine - Error Description 03
54	06	Erase Space Routine - Error Description 01
54	07	Erase Space Routine - Error Description 04
55	01	Space Forward Routine - Error Description 01
55	02	Space Forward Routine - Error Description 04
55	03	Space Forward Routine - Error Description 07
55	04	Space Forward Routine - Error Description 02
55	05	Space Forward Routine - Error Description 03
55	06	Space Forward Routine - Error Description 01
55	07	Space Forward Routine - Error Description 04
56	01	Space Reverse Routine - Error Description 01
56	02	Space Reverse Routine - Error Description 04
56	03	Space Reverse Routine - Error Description 08
56	04	Space Reverse Routine - Error Description 02
56	05	Space Reverse Routine - Error Description 03
56	06	Space Reverse Routine - Error Description 01
56	07	Space Reverse Routine - Error Description 04
57	01	Space Forward FM Routine - Error Description 01
57	02	Space Forward FM Routine - Error Description 04
57	03	Space Forward FM Routine - Error Description 07
57	04	Space Forward FM Routine - Error Description 02
57	05	Space Forward FM Routine - Error Description 03
57	06	Space Forward FM Routine - Error Description 01

APPENDIX A

Rtn.No.	Err.No.	Error Description and Probable Causes of Failure
57	07	Space Forward FM Routine - Error Description 04
57	08	Space Forward FM Routine - No File Marks(FM) were found on the tape. To test this function first the Write File Mark function must be performed on this track.
58	01	Space Reverse FM Routine - Error Description 01
58	02	Space Reverse FM Routine - Error Description 04
58	03	Space Reverse FM Routine - Error Description 08
58	04	Space Reverse FM Routine - Error Description 02
58	05	Space Reverse FM Routine - Error Description 03
58	06	Space Reverse FM Routine - Error Description 01
58	07	Space Reverse FM Routine - Error Description 04
58	08	Space Reverse FM Routine - No File Marks(FM) were found on the tape. To test this function first the Write File Mark function must be performed on this track.
59	01	Formatter Clear Routine - Error Description 03
5A	01	Formatter Parity Routine - Error Description 01
5A	02	Formatter Parity Routine - a formatter parity trap was expected but never received. Probable Cause of Failure: a) bad tape parity chip(L2 mother)) b) bad drive (L9 mother) c) bad reverse parity signal d) bad formatter
5B	01	Write FM Routine - Error Description 01
5B	02	Write FM Routine - Error Description 04
5B	03	Write FM Routine - Error Description 07
5B	04	Write FM Routine - the tape is currently write protected(see position status). No write operations may be performed until the write protect is removed.
5B	05	Write FM Routine - Error Description 02

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Rtn.No.	Err.No.	Error Description and Probable Causes of Failure
5B	06	Write FM Routine - Error Description 03
5B	07	Write FM Routine - Error Description 01
5B	08	Write FM Routine - Error Description 04
5C	01	Write Record Routine - Error Description 01
5C	02	Write Record Routine - Error Description 04
5C	03	Write Record Routine - Error Description 07
5C	04	Write Record Routine - the tape is currently write protected(see position status). No write operations maybe performed until the write protect is removed.
5C	05	Write Record Routine - Error Description 02
5C	06	Write Record Routine - Error Description 03
5C	07	Write Record Routine - Error Description 01
5C	08	Write Record Routine - Error Description 04
5D	01	Read Record Routine - Error Description 01
5D	02	Read Record Routine - Error Description 04
5D	03	Read Record Routine - Error Description 07
5D	04	Read Record Routine - Error Description 02
5D	05	Read Record Routine - Error Description 03
5D	06	Read Record Routine - Error Description 01
5D	07	Read Record Routine - Error Description 04
5D	08	Read Record Routine - data compare error. The data that was written or expected was not the data that was received. Check the 2200 monitor for more error information. Probable Cause of Failure: a) bad RAM memory cell b) bad RAM addressing c) bad data line d) bad DMA transfer on channel 1 e) formatter bad

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Rtn.No.	Err.No.	Error Description and Probable Causes of Failure
5E	01	Transfer 8 Bytes of DMA I/O Buffers to 2200 - this routine timed out waiting for the 8 byte DMA to complete. Probable Cause of Failure: a) bad IBS strobe from 2200 b) bad DMA control signals c) bad DMA chip d) bad system clock
5F	01	Erase Track Routine - Error Description 01
5F	02	Erase Track Routine - Error Description 04
5F	03	Erase Track Routine - Error Description 07
5F	04	Erase Track Routine - Error Description 02
5F	05	Erase Track Routine - Error Description 03
5F	06	Erase Track Routine - Error Description 01
5F	07	Erase Track Routine - Error Description 04
5F	08	Erase Track Routine - Error Description 06
61	00	Online Switch Error - the Online switch on the front of the drive has not been activated. This switch must first be depressed before any tape functions can be performed.

APPENDIX B

TEST DESCRIPTIONS

Controller Tests Menu

SF 0 - Return to Unit Select Menu	SF10 - PIO A Reg. Data Test
SF 1 - LED Visual Test	SF11 - PIO B Reg. Data Test
SF 2 - Check Sum Test	SF12 - PIO OBS IBS Test
SF 3 - Read Contlr. Confg. Switch	SF13 - CTC Timer Mode Test
SF 4 - RAM Data Line Integrity Test	SF14 - CTC Priority Interrupt Test
SF 5 - RAM High Address Lines Test	SF15 - DMA Reset Test
SF 6 - RAM Low Address Lines Test	SF16 - DMA Temporary Register Test
SF 7 - RAM Data Cell Integrity Test	SF17 - DMA Channel Select Test
SF 8 - RAM Parity Checking Test	SF18 - DMA Mem to Mem Transfer Test
SF 9 - RAM Moving Inversions Test	SF19 - DMA 2200 Interface Test

SF 0 - return the user to the Unit Tests Select Menu (see previous pages).

SF 1 - test controller and tape drive leds using visual verification

SF 2 - prom checksum test, tests whether the prom is good or bad

SF 3 - read the current Controller Configuration switches.

SF 9 - extensive test of the RAM address and data lines. Allow approximately 17 seconds for this test to run.

WARNING - Running the RAM MOVING INVERSIONS TEST will cause all executable code previously in RAM to be destroyed!!!!

If this test has been run and the user wants to recover the RAM code that was destroyed. Run the DMA 2200 Interface Test (SF 19).

SF10 - checks the PIO A Port data register.

SF11 - checks the PIO B Port data register.

SF12 - checks the interface between the 2200 and the controller through the PIO.

SF13 - check the CTC Timer Mode circuitry.

SF14 - check the CTC interrupt handling on priority levels.

SF15 - check the DMA Reset circuitry.

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SF16 - check the integrity of the DMA temporary register.

SF17 - check the DMA Channel registers.

SF18 - check the DMA Memory to Memory Transfer circuitry.

SF19 - check the interfacing between the 2200 and the controller via the DMA.

Formatter Tests Select Menu

SF 0 - Return to Unit Select Menu
SF 1 - Load Tape
SF 2 - Unload Tape
SF 3 - Load - Unload Chain Mode
SF 4 - Select Track(0-3) Test
SF 5 - Space Forward Test
SF 6 - Space Reverse Test
SF 7 - Space Fwd-Rev Chain Mode
SF 8 - Space Forward FM Test
SF 9 - Space Reverse FM Test
SF10 - Space Fwd-Rev FM Chain Mode
SF11 - Erase Track Test
SF12 - Erase Space Test
SF13 - Erase-Reverse Chain Mode
SF14 - Rewind Tape Test
SF15 - Tape Parity Checking Test
SF16 - Write File Mark(FM) Test
SF17 - Write FM-Rev FM Chain Mode
SF18 - Write Record(s) Test
SF19 - Read Record(s) wo/cmp Test
SF20 - Read record(s) w/cmp Test
SF21 - Write-Read Rec(s) Chain Mode
SF22 - Reset Tape Drive
SF23 - 8 Bytes of DMA I/O Buffs

SF 0 - return the user to the Unit Tests Select Menu (see previous pages).

SF 1 - check the tape load function.

SF 2 - check the tape unload function.

SF 3 - check both the tape load and unload functions in sequence.

SF 4 - check the drives ability to select track 0 through 3 and position the heads at LLP or LEOT. After selecting the track select function, a second menu will request the track and where the heads are to be positioned. Enter the position of the heads in the high order number, 8 for LEOT and 0 for LL Enter the track wanted in the low order number, 0 through 3 are valid.

EXAMPLE: 83 - indicates that track 3 is wanted and the heads are to be positioned at LEOT.

SF 5 - check the space forward function of the drive. After selecting this test, another menu will be displayed requesting the number of spaces to be forwarded.

SF 6 - check the space reverse function of the drive. After selecting this test, another menu will be displayed requesting the number of spaces to be reversed.

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SF 7 - check the space forward and space reverse functions of the drive in chain sequence. After selecting this test, another menu will be displayed requesting the number of spaces the tape is to be moved.

SF 8 - check the space forward file mark function of the drive. After selecting this test, another menu will be displayed requesting the number of file marks to be forwarded.

SF 9 - check the space reverse file mark function of the drive. After selecting this test, another menu will be displayed requesting the number of file marks to be reversed.

SF10 - check the space forward file mark and space reverse file mark functions of the drive in chain sequence. After selecting this test, another menu will be displayed requesting the number of file marks the tape is to be moved.

SF11 - check erase track function. This is done by erasing the currently selected track from its current position to LEOT of that track.

SF12 - check the erase space function of the drive. After selecting this test, another menu will be displayed requesting the number of spaces to be erased.

SF13 - check the erase space and space reverse functions of the drive in chain sequence. After selecting this test, another menu will be displayed requesting the number of spaces the tape is to be moved.

SF14 - check the tape rewind function. Rewinding the tape to LBOT of track 0.

SF15 - check the tape parity circuitry.

SF16 - check the write file mark function of the drive. After selecting this test, another menu will be displayed requesting the number of file marks to be forwarded.

WANG LABORATORIES, INC.

M E M O R A N D U M

TO: Distribution

FROM: Gail Stanwyck

DATE: October 21, 1980

SUBJECT: 2200 Diagnostic Release

The enclosed diagnostics are being released for the convenience of our employees out in the field who may not have these classic 2200 diagnostics at this time.

This package contains the following items:

Mass Storage diagnostics for the 2200 702-0078

Peripheral diagnostic for the 2200 702-0079

BASIC diagnostic for the 2200 702-0080

Please be informed that the 2200 Diagnostic Release has no documentation. These items are copies of older diagnostic programs that have been used on 2200 VP/MVP systems and are assumed to already exist in the Field.

It is our intention to support the 2200 Diagnostic Release on a replace/rewrite basis only. That is, if a problem arises which requires any significant modification to any of the programs contained on this diskette we will rewrite that entire program.

If you should have any questions or problems concerning these diagnostics, please contact Lynda Derby at Wang Corporate Headquarters extension 4667.

WANG LABORATORIES, INC.

M E M O R A N D U M

TO: Distribution

FROM: Gail Stanwyck

DATE: December 19, 1980

SUBJECT: Recent Diagnostic Release

The 2228D TC Field Service Diagnostic has been released. This diagnostic will only run on Rev 1 boards. The Field Service Monitor Program and Microcode Diagnostics are stored on the 702-0097 Floppy Diskette under file names 28DFSR1 and FSDIAGS respectively. The Monitor Program handles all screening, test control, and error reporting. The part number is 702-0097.

Please contact Lynda Derby at Wang Corporate Headquarters extension 2314, if you should have any questions or problems concerning this diagnostic.

1.0 TITLE

2228D TC Field Service Diagnostics for Rev. 1 only.

2.0 REVISION/DATE

Date: November 5, 1980
Documentation Release: Rev. 1.0
Software Release: Rev. 1.0
Part Number: 702 - 0097

3.0 REFERENCE DOCUMENTS

Z80 - Assembly Language Programming Manual
Z80 - PIO Technical Manual
Z80 - CTC Technical Manual
Z80 - SIO Technical Manual
Am9517 - Technical Information Sheet
MOSTEK 1979 Memory Data Book and Designers Guide
2228D Telecommunications Controller Hardware Specification 1/8/80
Addendum to 2228D Telecommunications Controller Hardware Spec. 6/11/80
WANG BASIC 2 Language Reference Manual

4.0 CONFIGURATION REQUIREMENTS

4.1 Hardware

Minimum required configuration

2200 VP or MVP with 2236MXD or equivalent and 80 X 24 Terminal
2228D Rev. 1 Telecommunications Controller Board with 378 - 4219 Power-Up Prom
RS232 Loop Back Connector
RS449 Loop Back Connector
Requires 56K bytes of user Memory

4.2 Software

MVP BASIC 2 Rev. 2.1 or VP BASIC 2 Rev. 2.3

5.0 PROGRAM DESCRIPTION

The Field Service Monitor Program and Microcode Diagnostics are stored on the 702 - 0097 Floppy Diskette under file names 28DFSR1 and FSDIAGS respectively.

The Monitor Program handles all screening, test control, and error reporting. Following is a description of the normal screens (shown in Appendix B) that will be encountered when using this diagnostic.

SCREEN 1 - This is a warning screen identifying the intended use of this diagnostic.

SCREEN 2 - This screen requests operator input of the correct device address for the controller, (default is 01C). After the operator depresses RETURN the Monitor program checks the device for a Ready/Busy condition. The result is displayed to the operator. NOTE: a Busy response indicates either the device address is wrong or the controller will be unable to respond to any future requests from the Monitor program.

SCREEN 3 - This screen requests operator input of the condition the controller is in, (LED ON or OFF). If the LED is OFF the operator will answer Y. The monitor will immediately enter a communications test between the controller and the 2200. NOTE: the communications test is only run upon initial entry of this diagnostic or upon a restart request by the operator from the menu.

If the LED is ON or Flashing the operator will answer N. The next question that will appear asks the operator if the LED is Flashing. If the operator answers N, indicating the LED is ON solid an error screen will be displayed and no further testing will take place. If the answer is Y, indicating the LED is Flashing the monitor will check the controller's power up diagnostic error reporting routine for the error that was detected. If a RAM failure of some type exists an error screen will be displayed and no further testing will take place. If any other type of error exists, the controller will be forced into the operating system firmware portion of the prom and the communications test will be invoked. NOTE: if the communications test is invoked after determining no RAM errors exist, the LED may remain ON or OFF, ignore this condition.

SCREEN 4 - This screen displays the conditions of the first communications test. Any errors will be reported on this screen and no error looping will be used. If a CPU Time Out error IBS occurs, no further testing will take place. If a failure to get an IBS from the controller occurs, no further testing can take place. Both failures indicate a fault in either the DMA or PIO.

SCREEN 5 - This screen displays the conditions of the second communications test. Any errors will be reported on this screen and error looping will be automatically invoked.

SCREEN 6 - This screen requests testing parameter inputs from the operator. The parameters are Loop or Halt On Error, Display or no Display of instruction/information screens, and the number of passes each test is to make.

SCREEN 7 - This screen displays the conditions encountered by the controller after successful completion of the communications tests. It is at this time that the microcode diagnostic program file is downline loaded from the disk to the controller memory, starting at location 0900.

SCREEN 8 - This is the menu screen and indicates that the microcode was successfully loaded into the controllers memory and that the controller has been sent to this program and is awaiting test requests from the monitor.

The remaining screens are test screens and are self-explanitory. Each test will provide the operator with error information indicating the cause of failure.

The following is a brief description of each test that will or can be performed using this diagnostic. These tests are more exhaustive checks of the various capabilities of the controller not performed in the power up diagnostic.

Automatic Testing - These two tests check the communications capability of the controller utilizing the firmware microcode portion of the prom. The tests check the ability of the controller and 2200 to communicate utilizing the PIO and DMA chips.

The first test transfers a 256 byte incremental data pattern to the controller memory starting at address 0900. It then reads back and compares the data sent with the expected data. Successful functioning of this test will result in advancement to the next communications test.

The second test is designed to check the high order address bit multiplexer for the DMA chip. A unique byte is placed in each of the memory locations shown below. Then each unique byte is read at the specific address and checked with the expected byte. Successful completion of this test will result in advancement to the parameter inputs by the operator and eventual loading of the microcode diagnostic progam.

ADDRESS AND BYTE = 8000 (00), 8100 (01), 8200 (02), 8400 (04), 8800 (08)
9000 (10), A000 (20), C000 (40)

The remaining tests are invoked by the operator from the menu of the Monitor program.

RE-KEY INPUT PARAMETERS - This routine allows the operator to re-input the Loop On Error or Halt On Error, Instruction/Information Display, and Number of Passes parameters. After reentry the microcode program is again downline loaded into controller memory.

MOVING INVERSIONS MEMORY TEST - This test program performs a more exhaustive RAM memory check using the moving inversions test procedure with a AA/55 test pattern. NOTE: If all banks are to be tested, the number of passes must be set to 4 and chain mode requested. Otherwise, the test requests which bank you desire to test and will test only this bank for the number of passes requested during the input parameters screen. NOTE: If an error is detected it will display the address of failure, the expected and actual data patterns. If the data patterns are equal this indicates a Parity RAM failure has occurred.

SIO EXTERNAL LOOP - This test requires that the RS232 Loop Back connector be installed. The test runs a more extensive test of the SIO and associated circuitry utilizing Async, Bisync, and SDLC modes of operation. Error messages are more detailed then the SIO External Loop Test for the power up diagnostic. No option switch setting is required.

SIO/DMA TEST - The RS232 Loop Back Connector is required for this test. The test performs a interaction check between the SIO, DMA, and CTC utilizing the Async mode of operation. Transfers of 256 bytes, 512 bytes, 1K, 2K, 4K, 8K, and 16K are performed with error checking after each transfer completion. A time out feature is also incorporated in case no transfer operation takes place as expected, indicating an SIO DMA problem exists.

CONTROL CHARACTER RAM TEST - The RS232 Loop Back Connector is required for this test. The test operates in two modes. First the Control Character RAM is flooded not to recognize any characters. With the SIO and DMA (Receive channel only) activated 256 characters 00 to FF are transmitted and received. The CTC is monitored, as well as the DMA, checking each character that did not cause a downcount of CTC channel 0 after completion of each transfer. The Control Character RAM is then flooded to recognize all characters as control characters. The CTC channel 0 is monitored after each transfer to insure a downcount occurred indicating a control character was recognized.

PRIORTY INTERRUPT TEST - The RS232 Loop Back Connector is required for this test. The test will check the IEI/IEO line connected between the SIO, CTC, and PIO to see if it is functioning properly. It also insures the priorty scheme with the SIO having the highest and the PIO the lowest is maintained.

RS449 LOOP BACK TEST - The RS449 Loop Back Connector is required for this test, also the switch on the rail must be in the RS449 position. The tests performed are the same as those performed by the SIO EXTERNAL LOOP Test.

OPTION SWITCH TEST - This test allows the operator to test SW2 on the controller motherboard. After test entry the screen will display the current switch setting. The operator need only change the setting of the switch at will and the screen display will automatically reflect the new setting. To exit the test the operator must depress RETURN.

CHAIN MODE - This test invokes the tests associated with Special Function Keys 1, 2, 3, 4, and 5. This program will invoke each test one at a time for the number of passes entered during parameter entry. The bank number for the Moving Inversions Test will automatically be incremented. If a minimum of 4 passes was selected by the operator, each bank of memory will be tested once by Moving Inversions.

RESTART - This entry forces a software reset of the controller to location 0000 of the prom. The Monitor program is also reset to the first screen. NOTE: If an error existed during the power up diagnostic and if bank number 4 of the moving inversions test was not run, the operator will have to wait for the power up diagnostic to complete before proceeding. However, if neither of these conditions mentioned exist, the operator may begin immediately.

6.0 LOAD PROCEDURE

The operator must request the loading of file 28DFSR1 using the LOAD RUN DC F or R and " 28DFSR1 " RETURN procedure.

7.0 OPERATING INSTRUCTIONS

All operating instructions are screen prompted and require no detailed explanation.

8.0 REVISION HISTORY

None.

9.0 MISCELLANEOUS

None.

APPENDIX A

TEST AND ERROR INFORMATION TABLE

TEST NO.	TEST NAME	ERROR CODE	FAILING MODULE or DESCRIPTION
1	DMA/PIO	NONE	Screen display of the expected data and actual data.
2	DMA MULTIPLEXER TEST	NONE	Screen display of the failing address, expected data and actual data.
3	MOVING INVERSIONS	NONE	Screen display of the failing address, expected data and actual data.
4	SIO EXTERNAL LOOP	F0	Receiver failed to enter hunt mode in either Bisync or SDLC mode of testing. Display will give mode of testing.
		F1	Transmitter failing to send sync or flag characters during Bisync or SDLC mode of testing. Display will give mode of testing.
		F2	Receiver failed to receive sync or flag character and exit hunt mode. Display will give mode of testing.
		F3	Transmitter failing to transmit data characters. Display will give mode of testing.
		F4	Receiver failed to receive transmitted character. Display will give mode of testing.
		F5	Data error between transmitted and received character. Display will give mode of testing, expected and actual character.
		F6	Transmit interrupt failed to occur during Bisync mode of testing.
		F7	Receive interrupt failed to occur during Bisync mode of testing.
		F8	Overrun interrupt failed to occur during Bisync mode of testing.
		F9	CTS interrupt failed to occur during Bisync mode of testing.
		FA	DCD interrupt failed to occur during Bisync mode of testing.
		FB	DCD interrupt occurred when DCD was supposed to be turned off during Bisync mode of testing.

5	SIO/DMA	F0	CTC channel 2 downcounter failed to decrement as a result of EOP from the DMA.
		F1	Data error between transmitted and received data. Display give expected and actual data.
		F2	Parity error occurred during DMA transfer.
		F3	Timed out waiting for Transfer to complete.
6	CC RAM	F0	Character was recognized during non-recognition test. Display gives character that caused failure which equivocates to the RAM address.
		F1	Character failed to recognized during recognition test. Display gives character that caused failure which equivocates to the RAM address.
7	PRIORTY	F0	CTC interrupt failed to occur in allotted time.
		F1	SIO interrupt failed to occur after CTC interrupt had occurred and before a return from interrupt was executed.
		F2	PIO interrupt occurred before completion of service to the CTC interrupt i.e. a return from interrupt has not been executed.
		F3	PIO interrupt failed to occur within the allotted time.
8	RS449 LOOP BACK TEST		SAME ERRORS AS SIO EXTERNAL LOOP

APPENDIX B

MODULE DESCRIPTIONS

```
Er  Loc. Code     Value  Stmt No.  File Line  Source Statement

                  0000        2         2  FSTEST1 MODULE
                  FFFF        3         3              NOLIST
                  0000      152       152              LIST
                            153       153 ************************************************************************
                            154       154 *                        2228D FIELD SERVICE HOST ROUTINE              *
                            155       155 *                                                                      *
                            156       156 *          This routine will communicate with the 2200 to interpret commands  *
                            157       157 *    requesting various tests be executed and/or various error reporting,  *
                            158       158 *    echo responses,etc. be returned properly to the 2200.             *
                            159       159 *                                                                      *
                            160       160 ************************************************************************
```

```
Er  Loc.  Code      Value  Strt No.  File Line  Source Statement

                    FFFF     162      162            NOLIST
                    0000     334        2            LIST
                             335        3 ************************************************************************
                             336        4 *                                                                      *
                             337        5 *                        SIO EXTERNAL LOOP BACK TEST                   *
                             338        6 *                                                                      *
                             339        7 *     Testing of the SIO chip is done in three distinct phases. The SIO is *
                             340        8 *     tested using Async, Bisync, and SDLC. The CTC Channel 1 is set to clock *
                             341        9 *     at 9600 baud, Clocks are provided externally via the loop back.  *
                             342       10 *                                                                      *
                             343       11 *     ASYNC MODE: In this mode the SIO chip is initialized to transmit and *
                             344       12 *     receive characters in the Async mode using 1 stop bit. An incremental *
                             345       13 *     data pattern of 00 to FF is used with the exclusion of a Hex 32. The *
                             346       14 *     32 is excluded because  bisync testing uses this same routine.   *
                             347       15 *                                                                      *
                             348       16 *     BISYNC MODE: In this mode the SIO chip is initialized to transmit and *
                             349       17 *     receive characters in the Bisync mode. An incremental data pattern is *
                             350       18 *     again used excluding the sync byte Hex 32. Several error reportable *
                             351       19 *     checks are made here that are not made in the Async mode. The status *
                             352       20 *     of the receiver is checked to see that it entered the Hunt mode from *
                             353       21 *     a command given during initialization. The transmitter is then enabled *
                             354       22 *     and checks are made to determine if it is sending Sync characters. The *
                             355       23 *     receiver is then checked to determine if it is receiving Sync characters *
                             356       24 *     after completion character transmission and reception with checking *
                             357       25 *     begins. After character transmission and reception is completed the *
                             358       26 *     testing of interrupts begin. Transmit, receive, and overrun interrupts *
                             359       27 *     are checked for both internal and external loop back. If you are running *
                             360       28 *     external loop back two additional interrupts are checked, they are *
                             361       29 *     CTS and DTR.                                                     *
                             362       30 *                                                                      *
                             363       31 *     SDLC MODE: In this mode tests are made on the flag character transmission*
                             364       32 *     and reception and also transmission and reception to two data patterns *
                             365       33 *     AA and 55. Except for interrupts some of the same checks as Bisync mode *
                             366       34 *     are made prior to transmission of the two data patterns.         *
                             367       35 *                                                                      *
                             368       36 *     All errors will be reported via the 2200 basic test monitor program *
                             369       37 *     and should be easily understood by the user.                     *
                             370       38 *                                                                      *
                             371       39 ************************************************************************
```

```
                    Stmt File
Er  Loc. Code       Value No.  Line Source Statement

                    FFFF  373    41          NOLIST
                    0000  816   484          LIST
                          817   485 ************************************************************************
                          818   486 *                          SIO / DMA TEST                              *
                          819   487 *                                                                      *
                          820   488 *          This test is downline loaded from disk into controller memory and  *
                          821   489 *     runs starting at location 0900. The function of this test is to check  *
                          822   490 *     the ability of the SIO to transfer bytes out of memory and receive them  *
                          823   491 *     via loop back and put the received characters into memory. The inter-  *
                          824   492 *     -action between the DMA and SIO is tested here. Data is transfered from  *
                          825   493 *     Memory locations 4000 to 4100 in the BiSync mode. After completion of  *
                          826   494 *     the data transfer from and to memory the data is checked by the Z80 for  *
                          827   495 *     validity and the pass or fail parameters are passed onto the 2200 via  *
                          828   496 *     the from resident host routine.                                  *
                          829   497 *                                                                      *
                          830   498 ************************************************************************
```

```
                    Stmt File
Er  Loc. Code       Value No.  Line Source Statement

                    FFFF  832   500          NOLIST
                    0000  1000  668          LIST
                          1001  669 ************************************************************************
                          1002  670 *                  CONTROL CHARACTER RECOGNITION RAM TEST               *
                          1003  671 *                                                                      *
                          1004  672 *          This test is downline loaded from disk into controller memory and  *
                          1005  673 *     runs starting at location 0900. The furction of this test is to check   *
                          1006  674 *     the ability of Control Character Recognition Ram to detect control char- *
                          1007  675 *     acters during an SIO/DMA transfer. The output of the ram will trigger the*
                          1008  676 *     CTC channel 2. On the first pass the ram will be set to not recognize   *
                          1009  677 *     any characters by flcoding it with all ones using an OUT 31 command and  *
                          1010  678 *     a 256 byte incremental data pattern to accompolish this. Then using an   *
                          1011  679 *     OUT 30 command and the same data pattern the ram will be set to recognize*
                          1012  680 *     all characters as control characters. The end result will a down count   *
                          1013  681 *     of the CTC channel 2 after the transfer of each character. Any failure   *
                          1014  682 *     will be reported to the 22CC monitor program.                        *
                          1015  683 ************************************************************************
```

```
Er  Loc.  Code      Value  Stmt No.  File Line  Source Statement

                    FFFF     1017       685          NOLIST
                    0000     1122         2          LIST
                             1123         3 ********************************************************************************
                             1124         4 *                  PRIORITY INTERRUPT LINE TEST FOR SIO/CTC/PIO                *
                             1125         5 *                                                                              *
                             1126         6 *       The function of this test is to check the priority scheme of the       *
                             1127         7 *     IEI /IEO line that runs between the SIO/CTC/PIO chips is functioning.    *
                             1128         8 *     The test will allow an interrupt from the CTC then while in the service  *
                             1129         9 *     routine will create an interrupt from the SIO. When this interrupt is    *
                             1130        10 *     received the SIO service routine should be entered varifying the SIO     *
                             1131        11 *     has a higher priority then the CTC. The 2200 will then be informed to    *
                             1132        12 *     send a character which will cause a PIO interrupt, once enabled. A       *
                             1133        13 *     Return from Interrupt will be executed thus the routine should exit the  *
                             1134        14 *     SIO routine and return to the CTC routine. After verification of entry   *
                             1135        15 *     into the CTC routine is completed another Return from interrupt will be  *
                             1136        16 *     performed which then should allow the PIO interrupt to occur signifing   *
                             1137        17 *     successful test completion. Any errors will be reported to the 2200 for  *
                             1138        18 *     display on the monitor.                                                  *
                             1139        19 ********************************************************************************
```

```
Er  Loc. Code     Value  Stmt No.  File Line  Source Statement

FFFF  1141   21            NOLIST
0000  1276   156           LIST
      1277   157 ********************************************************************************
      1278   158 *                    MOVING INVERSIONS RAM TEST FOR BANK 1                     *
      1279   159 *                                                                              *
      1280   160 *       The MOVING INVERSIONS RAM Test is used to check the functionality of   *
      1281   161 *    the 16K RAM chips. This test should be run only after the RAM Test has    *
      1282   162 *    passed since this test is downline loaded into memory. This test will     *
      1283   163 *    find the bad RAM's not detected by the RAM test which should catch most   *
      1284   164 *    common RAM failures. MOVING INVERSIONS should find the flakey failures    *
      1285   165 *    that a cheap and dirty RAM test like the MARCHING 1's and 0's won't.       *
      1286   166 *    The error reporting is done via the 2200 monitor. The expected data,      *
      1287   167 *    actual data read and the address of the failure will be displayed on the  *
      1288   168 *    screen.                                                                   *
      1289   169 *                                                                              *
      1290   170 *      This MOVING INVERSIONS test uses all increment values for 16K RAM chips.*
      1291   171 *    The test uses only two patterns ('AA'+'55'),because the RAMS are single   *
      1292   172 *    bit.                                                                      *
      1293   173 *                                                                              *
      1294   174 *  TIME TO RUN : APPROX = 45 SECONDS                                           *
      1295   175 ********************************************************************************

FFFF  1297   177           NOLIST
0000  1502   382           LIST
      1503   383 ********************************************************************************
      1504   384 *                MOVING INVERSIONS RAM TEST FOR BANKS 2,3,4                    *
      1505   385 *                                                                              *
      1506   386 *       The MOVING INVERSIONS RAM Test is used to check the functionality of   *
      1507   387 *    the 16K RAM chips. This test should be run only after the RAM Test has    *
      1508   388 *    passed since this test is downline loaded into memory. This test will     *
      1509   389 *    find the bad RAM's not detected by the RAM test which should catch most   *
      1510   390 *    common RAM failures. MOVING INVERSIONS should find the flakey failures    *
      1511   391 *    that a cheap and dirty RAM test like the MARCHING 1's and 0's won't.       *
      1512   392 *    The error reporting is done via the 2200 monitor. The expected data,      *
      1513   393 *    actual data read and the address of the failure will be displayed on the  *
      1514   394 *    screen.                                                                   *
      1515   395 *                                                                              *
      1516   396 *      This MOVING INVERSIONS test uses all increment values for 16K RAM chips.*
      1517   397 *    The test uses only two patterns ('AA'+'55'),because the RAMS are single   *
      1518   398 *    bit.                                                                      *
      1519   399 *                                                                              *
      1520   400 *  TIME TO RUN : APPROX = 45 SECONDS                                           *
      1521   401 ********************************************************************************
```

```
Er  Loc. Code     Value  Stmt No.  File Line  Source Statement

                  FFFF    1523      403             NOLIST
                  0000    1732      612             LIST
                          1733      613 ************************************************************************
                          1734      614 *                          OPTION SWITCH TEST                          *
                          1735      615 *                                                                      *
                          1736      616 *      This test is designed to test the option switch (SW2) on the 7658*
                          1737      617 *      board of the controller. Upon entry into this test the 2200 will*
                          1738      618 *      be notified of the current switch setting. The user will have the*
                          1739      619 *      opportunity to change the switch and have the setting displayed *
                          1740      620 *      by the 2200. This test will terminate when instructed to do so by*
                          1741      621 *      the 2200 monitor.                                               *
                          1742      622 *                                                                      *
                          1743      623 ************************************************************************
```

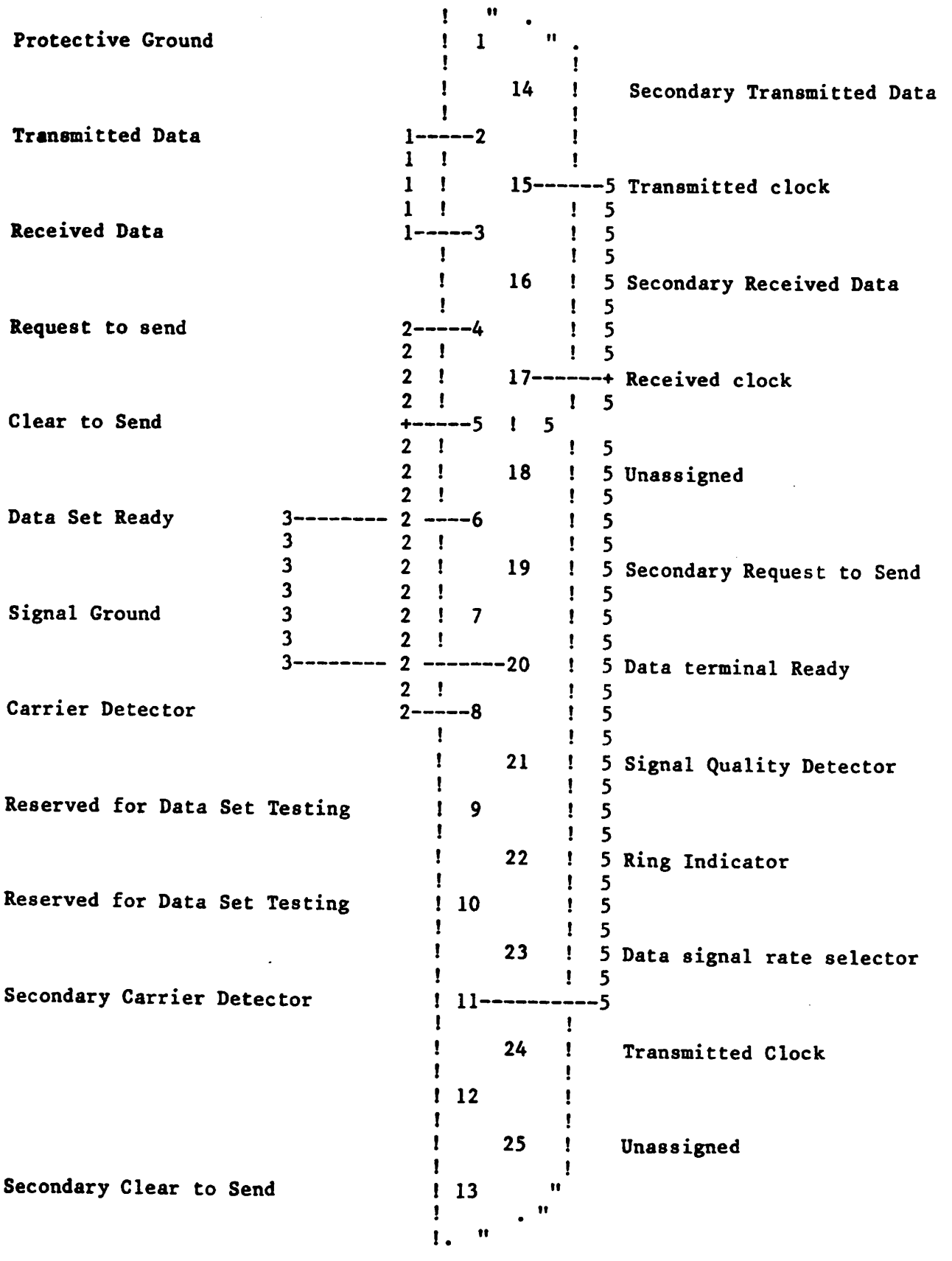
APPENDIX C

RS232 AND RS449

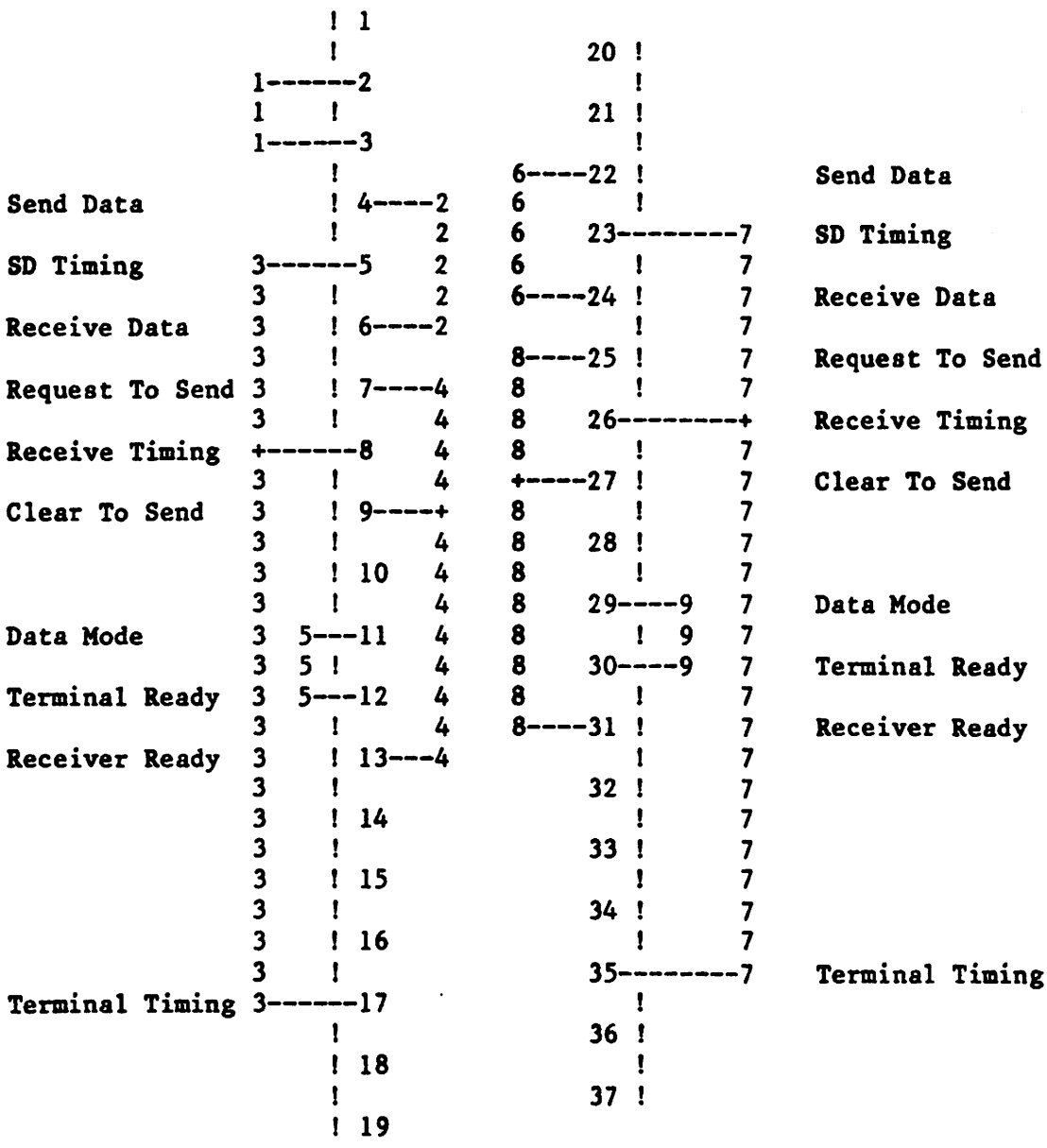
LOOP BACK CONNECTOR

WIRING DIAGRAMS

RS232 LOOP BACK CONNECTOR



RS449 LOOP BACK CONNECTOR



APPENDIX D

SAMPLE SCREENS

WARNING FIELD SERVICE DIAGNOSTIC FOR 2228D REV 1 ONLY

KEY 'RETURN' TO CONTINUE

2228D TC FIELD SERVICE DIAGNOSTICS REV 1.0

Avalible device addresses are: Requires MVP BASIC Revision 1.9

01C 01F

What is the device address ? 01C

DEVICE IS READY

KEY 'RETURN' TO CONTINUE

Device address '01C' will be used for all tests

Is the LED OFF ? 'Y' or 'N'*Y

CHECKING DMA/PIO

SENDING 256 BYTES OF DATA TO CONTROLLER MEMORY

READING & COMPARING 256 BYTES OF DATA FROM CONTROLLER MEMORY

DMA/PIO TEST PASSED

DMA MULTIPLEXER TEST

SENDING UNIQUE ADDRESS PATTERNS

READING AND COMPARING UNIQUE ADDRESS PATTERNS

DMA ADDRESS MULTIPLEXER TEST PASSED

```
Device address '01C' will be used for all tests

Do you want to loop on error 'Y' or 'N' N
* The program will STOP on error
Do you want to display instructions 'Y' or 'N' Y
* Instructions will be displayed
How many passes do you wish to make (less than 10000)? 4
* All tests will make  4  pass(es)
```

KEY 'RETURN' TO CONTINUE

```
SENDING MICROCODE TEST PROGRAMS TO CONTROLLER MEMORY
TRANSFER OF MICROCODE SUCCESSFUL
FORCING CONTROLLER INTO MICROCODE TEST PROGRAM
```

TEST SELECTION MENU

SF 0 - RE-KEY INPUT PARAMETERS
SF 1 - MOVING INVERSIONS MEMORY TEST
SF 2 - SIO EXTERNAL LOOP
SF 3 - SIO/DMA TEST
SF 4 - CONTROL CHARACTER RAM TEST
SF 5 - PRIORITY INTERRUPT TEST
SF 6 - RS449 LOOP BACK TEST
SF 7 - OPTION SWITCH TEST
SF 8 - CHAIN MODE
SF 9 - RESTART

STRIKE THE SPECIAL FUNCTION KEY ASSOCIATED WITH THE DESIRED TEST

WHICH TEST DO YOU DESIRE?

MOVING INVERSIONS TEST

This test will run a more complete RAM check and is bank selective. In the Chain Mode bank selection will be an automatic function.

KEY 'RETURN' TO CONTINUE

MOVING INVERSIONS TEST

RAM MEMORY WILL ONLY BE TESTED ON 1 BANK AT A TIME

ENTER 1 FOR BANK 1 ADDRESS 2000 TO 3FFF
ENTER 2 FOR BANK 2 ADDRESS 4000 TO 7FFF
ENTER 3 FOR BANK 3 ADDRESS 8000 TO BFFF
ENTER 4 FOR BANK 4 ADDRESS C000 TO FFFF

ENTER THE NUMBER OF THE BANK YOU WISH TO TEST ? 3

PASS# 1

MOVING INVERSIONS TEST

WAITING FOR CONTROLLER TO COMPLETE TESTS

CURRENTLY TESTING BANK # 3

PASS# 1

MOVING INVERSIONS TEST

MOVING INVERSIONS TEST PASSED

CONTROLLER IS BACK IN HOST

SIO EXTERNAL LOOP

This program tests the controller's SIO external loop back circuitry. The tests are conducted in all 3 modes ie Async, Bisync and SDLC. In addition 3 vectored interrupt tests are performed, Transmit, Receive, Overrun, CTS, & DCD.

KEY 'RETURN' TO CONTINUE

PASS# 1

SIO EXTERNAL LOOP

WAITING FOR CONTROLLER TO COMPLETE TESTS

PASS# 1

SIO EXTERNAL LOOP

SIO EXTERNAL LOOP PASSED

CONTROLLER IS BACK IN HOST

SIO/DMA TEST

This test requires the RS232 LOOP BACK Plug. The test checks the ability to transfer data from one section of memory to another. The test is run in the Async mode.
This test checks transfers of 256 bytes, 512 bytes, 1k, 2k, 4k, 8k,and 16k.

KEY 'RETURN' TO CONTINUE

PASS# 1

SIO/DMA TEST

WAITING FOR CONTROLLER TO COMPLETE TESTS

PASS# 1

SIO/DMA TEST

SIO/DMA TEST PASSED

CONTROLLER IS BACK IN HOST

CONTROL CHARACTER RECOGNITION RAM TEST

This program checks the static ram using the SIO in Async mode. The failing character is interpreted as the RAM address. INSTALL RS232 LOOP BACK

KEY 'RETURN' TO CONTINUE

PASS# 1

CONTROL CHARACTER RECOGNITION RAM TEST

WAITING FOR CONTROLLER TO COMPLETE TESTS

PASS# 1

CONTROL CHARACTER RECOGNITION RAM TEST

CHARACTER RAM TEST PASSED

CONTROLLER IS BACK IN HOST

PRIORITY INTERRUPT TEST

This test checks the IEI and IEO line between the SIO,CTC, and PIO chips. The test insures also that higher priorty is observed. INSTALL RS232 LOOP BACK

KEY 'RETURN' TO CONTINUE

PASS# 1

PRIORITY INTERRUPT TEST

WAITING FOR CONTROLLER TO COMPLETE TESTS

PASS# 1

PRIORITY INTERRUPT TEST

PRIORITY INTERRUPT TEST PASSED

CONTROLLER IS BACK IN HOST

RS449 LOOP BACK

This program tests the controller's SIO external loop back circuitry for the RS449 plug. The RS449 LOOP BACK must be INSTALLED and the Toggle switch switched . Testing is the same as for the SIO External Loop Test.

KEY 'RETURN' TO CONTINUE

PASS# 1

RS449 LOOP BACK

WAITING FOR CONTROLLER TO COMPLETE TESTS

PASS# 1

RS449 LOOP BACK

RS449 LOOP BACK PASSED

CONTROLLER IS BACK IN HOST

OPTION SWITCH TEST

This program tests the user option switch on the daughter board. The user sets the switch to the desired switch setting which will automatically be updated on the screen. To exit the routine the user must key RETURN.

KEY 'RETURN' TO CONTINUE

OPTION SWITCH TEST

	1	2	3	4	5	6	7	8
O	O	O	O	O	O	O	O	O
N	F	F	F	F	F	F	F	F
↑	F	F	F	F	F	F	F	F

USER OPTION SWITCH (SW2)

KEY RETURN TO EXIT TEST

TEST SELECTION MENU

SF 0 - RE-KEY INPUT PARAMETERS
SF 1 - MOVING INVERSIONS MEMORY TEST *
SF 2 - SIO EXTERNAL LOOP *
SF 3 - SIO/DMA TEST *
SF 4 - CONTROL CHARACTER RAM TEST *
SF 5 - PRIORITY INTERRUPT TEST *
SF 6 - RS449 LOOP BACK TEST
SF 7 - OPTION SWITCH TEST
SF 8 - CHAIN MODE
SF 9 - RESTART

STRIKE THE SPECIAL FUNCTION KEY ASSOCIATED WITH THE DESIRED TEST

WHICH TEST DO YOU DESIRE?

CHAIN MODE TEST ROUTINE

THIS TEST WILL CALL AND EXECUTE ALL MARKED (*) TESTS

THE ENTIRE TEST WILL BE EXECUTED 4 TIME(S)

KEY 'RETURN' TO CONTINUE

Diagnostic Program Documentation

Documentation Release: 9735 Software Release: 6735
Documentation Part Number: 760-1209C

Program Name: 2200 Multiple Disk Exerciser

Date: April 10, 1987

Table of Contents

Diagnostic Engineering Department
WANG Laboratories, INC.
One Industrial Ave.
Lowell, Massachusetts 01851

1.0 REFERENCE DOCUMENTS

2200 Multiple Disk Exerciser

2.0 CONFIGURATION REQUIREMENTS

2.1 Hardware

Minimum required configuration

2200 with the minimum required configuration

Soft-sectored diskettes are not supported on 2270A controllers

2236DE/DW or equivalent terminal

If a printer is used, it must have a column width of at least 66 characters

2.2 Software

MVP CPU software must be rev. 1.8 or higher

VP CPU software must be rev. 2.1 or higher

Media containing the 2200 Multiple Disk Exerciser which is labeled: MULTIDSK

3.0 PROGRAM DESCRIPTION

The 2200 Multi-Disk Exerciser is a disk burn-in/exerciser with error logging capabilities. The exerciser tests eight sequential sectors for each random selection of; function, disk address and sector address.

4.0 LOAD PROCEDURES

4.1 Load directly from disk

1) Select the device address with a 'SELECT DISK ###' statement (see note 1)
2) Input command 'LOAD RUN "MULTIDSK"'

4.2 Load from 2200 Diagnostic Package

1) Select the device address with a 'SELECT DISK ###' statement (see note 1)
2) Input command 'LOAD RUN'
3) If 'MAGNETIC MEDIA' disk proceed with step 4
   Under '2200 DIAGNOSTIC PACKAGE' menu, select 'Magnetic Media'
4) Under 'MAGNETIC MEDIA' menu, select 'Disk Exercisers'
5) Under 'DISK EXERCISERS' menu, select 'Multiple Disk Exerciser'

Note 1: (### equals the device address where program resides)

5.0 OPERATING INSTRUCTIONS

5.1 Description of Operation

The first two screens of the exerciser require operator input to select the processes, the function, and amount of testing. The third screen displays the functions running, device being tested, number of errors, and the number of accesses that have been completed. When inputs are needed, it is indicated and all the options are listed at the bottom of the screen.

7.2 Screen Descriptions

On each screen, lines:

a) 20 and 21 will describe any status or error information.
b) 22 and 23, (in box), describe all input/command options for the current screen.

7.3 Procedures

1) For the exercisers set up procedure and screens see Appendix A.
2) For a description of the run time screen see Appendix B.
3) For a description of standard input and command options see Appendix C.

6.0 MISCELLANEOUS

6.1 Definitions

Hard error — A disk operation that failed during normal testing and would not successfully execute during ten retries.

Soft error — A disk operation that failed during normal testing and was successfully executed in less than eleven retries. Also a data compare error is considered a soft error.

7.0 PROGRAM REVISION HISTORY

Rev. 6735:

Added support for 2200DS and RAM Disk. Also fixed time out errors on long cabled mux.

Rev. 64A4:

Added a routine to zero the sector to R/A/W test so intermittent write problems would show up.

Removed the zero retries function.

Added the 30 MEG to the 2275.

Rev. 6441:

Corrected counter problem during init read and write.

Rev. 639C:

The 2275 option (Winchester and 5 1/4" floppy disk) have been added to the list of recognizable devices.

The screening has been made more user friendly. This will speed up the time it takes to initiate the test and also made it easier to understand.

Rev. 61B4:

The Quantum drives have been added to the list of recognizable devices. Since the Quantum Q2040 responds to two addresses it is treated as two separate devices.

Rev. 61A4:

Firmware retries on error are now suppressed on Disk Processing Unit's that have the ability.

Rev. 1.1:

Sector write backfill is now randomly selecting worst case data patterns.

APPENDIX A

IMPORTANT: THIS EXERCISOR WILL RENDER ALL RESIDENT DATA IN THE RANGE OF THE SELECTED SECTORS INVALID AND TOTALLY USELESS.

A.1 INITIAL INPUT and SCREEN

1 The operator is instructed to mount platters in all the drives that are to be tested. For a device to be testable it must:

a) have a scratch platter mounted.
b) not be write protected.
c) be operable enough for the address to be recognized as available.

2 Press 'RUN' or 'RETURN' and the program will scan all the possible disk addresses. The routine tries to ascertain what types of devices are at what addresses and reports this information on the Test and Parameter Select screen.

NOTE: If desired the default parmeters can be altered by pressing SF'2 and then editing to the desired parmeters (as described by appendix A.2). These parmeters will then be inserted as the test parmeters. If a sector selected is out of range of a cevice then the parmeter used will be as close to the the altered default as possible.

A.2 TEST and PARAMETER SELECTION

1 A display of all devices available for testing is given with the following information:

a) test options
b) device address (see note 2)
c) model number
d) address of the first sector to be tested
e) address of the last sector to be tested

Note 2: (If the address was recognized, but an error occurred, the error is printed to the left of the device address).

2 The user prompts are as follows:

A) "Are all the above parameters correct?"

'N' (no), enters the edit mode, and 'CONT'/'CTNUE' will exit the edit mode. The option select menu may be edited using the following options:

a) Test	'yes' or 'no'		If no, then no functions will be run on that device.
b) Frmt	'yes' or 'no'		Format device?

A) (continued)

c)	Init	'yes' or 'no'	Initialize the device. Write a test pattern on every sector selected for test.
d)	Ver	'yes' or 'no'	Verify the device. Read the test pattern from every sector selected for test.
e)	Address	'xxx'	xxx=address of the device to be tested.
f)	Model	'xxxxxxxx'	Model number. (not used in exerciser operation)
g)	Sec. Range	'xxxxx/yyyyy'	Sectors to be tested, from xxxxx to yyyyy. (must be greater than 8)
h)	Accesses	'xxxxxxxx'	Number of sectors to be read. Type infinite for infinite.

'Y' (yes) or 'CONT'/'CTNUE', then the system proceeds to the next prompt.

B) "To proceed type ENABLE WRITING "

The operator MUST enter 'ENABLE WRITING' to procred further. If the phrase has already been entered correctly, and the exerciser has not been returned to the first screen (A1), then the phrase will not be requested again and the exerciser will by-pass this prompt.

C) "'WARNING: All resident data will be DESTROYED by this exercise'"

This is the final step and warning before any WRITING is done.

Ensure that all devices to be tested have scratch media installed.

Depressing CONT/CTNUE will start the exerciser.

A.3 Miscellaneous

1 No further operator commands are needed UNLESS:

a) An error occurs during format, at which time the exerciser will have to be restarted.

b) A format is requested on a device that can't be software formatted.

2 If an error occurs during Init, then the device is eliminated from the test and the exerciser continues.

3 The model descriptions of the drives are as follows;

```
850 DSDD    - Double Sided Double Density floppy
1000        - internal winchester
1002        - internal winchester
1004        - internal winchester
Q2040       - internal winchester
Q2020       - internal winchester
2200DS RAMD- 2200 Data Storage Cabinit ram disk
2200DS FLPk- 2200 Data Storage Cabinit 320/360k floppy
2200DS FLPm- 2200 Data Storage Cabinit 1.2 meg floppy
2200DS WINr- 2200 Data Storage Cabinit removable carterage winchester
2200DS WIN - 2200 Data Storage Cabinit winchester
2230-1      - external disk drive
2260-1/2    - external disk drive
2260-1/4    - external disk drive
2266        - external disk drive
2275   WIN - 2275 winchester
2275   FLPm- 2275 1.2 meg floppy
2275   FLPk- 2275 320/360k floppy
2270        - external floppy drives
2270a       - external floppy drives
2280        - external disk drive
SYSTEM RAMD- System ram disk
```

APPENDIX B

The following screen/test descriptions are in the order in which they occur.

B.1 If no devices have been selected to test, then the following message will be displayed on line 20 and the exerciser will wait for a command.

"RECHECK PARAMETERS, NO DEVICES ARE SELECTED"

Pressing 'RETURN' or 'RUN' will cause the routine to return to the Test and Parameter Select Menu.

B.2 Format

1 If a device is selected for Test and Format, and:

a) It can be software formatted, then the following message will appear on line 22 and the format will begin.

" CHECK: to ensure that the device is formatting and the system isn't hung"

b) It can not be software formatted, then the exerciser will stop, print the following message on line 20, and will wait for a command.

"Press the format button for xxx" (where xxx is the device address to be formatted)

2 When all of the devices requesting a format are formatted, then the initialize and/or test routines will commence.

B.3 Run Screen

The run screen will be displayed with the following information of all the devices that are to being tested.

a) the disk address
b) the function (see note 3)
c) the number of accesses
d) the sector range being tested
e) the number of hard errors (see note 4)
f) the number of soft errors (see note 4)

Note 3: The current function (if in process) or the last function (if not in process) processed. During init "w" or "r" is printed next to "init" to indicate whether reading or writing.

Note 4: During init this column will stay blank. Init terminates testing of the device if an error is encountered.

The line containing the parameters of the device currently being processed is highlighted and the function updated, when applicable.

B.4 Initialization

1 Init — A lower case 'w' appears to the right of the function name (Init) while the media is being written.

All disks sectors to be tested must be written, in the data field, with the current sector and disk addresses and then back-filled with a worst case data pattern.

2 Ver — A lower case 'r' appears to the right of the function name (Init) while the media is being verified. Seek location is also checked whenever a read is performed.

A) If media verification was selected, all sectors to be tested are read. The sector and disk addresses written in the data field are compared with the current sector and disk addresses for equality (i.e., to see if the heads seek to the correct location).

B) If media verification was not selected, the first, middle and last sectors to be tested on the disks are verified.

B.5 Test

This is the exerciser portion of the "EXERCISER". The device, sector address, and function are reselected after eight sequential accesses.

1 All the devices selected for Test are assembled in a device list and the device to be tested is randomly selected.

2 The function is randomly selected from one of the following four:

a) VERIFY — Verifies the sectors selected and reports controller detected errors.
b) READ — Reads the selected sectors and checks that the correct data was read.
c) WRITE — Writes the selected sectors with same information that Init does and will report controller detected errors.
d) R/A/W — Writes the 8 sectors selected then immediately reads them and reports any errors.

3 The sector address is randomly selected from within the range allowed by the test parameters. That address PLUS 7 are the eight sectors tested (the range of sectors allowed for test can vary up to eight greater than the maximum address selected in the test parameters but not more than the system allows).

4 These parameters are combined, the test is run, and the above selection process is redone. Each device will be accessed (access = 1 sector R/A/W, READ, WRITE or VERIFY) as many times as was specified.

B.6 Error Recovery

1 Four types of errors can occur:

A) The first error is a hardware error. When a hardware error occurs the statement "CHECKING ERROR" appears at the top center of the screen. This statement remains while the program does up to ten retries of the current function on the failing sector and then reports the error.

B) The second type of error is a seek error (the disk and sector address read from the media, as written by Init, did not compare with the addresses requested). If this error is detected, the error is reported, counted as a soft error and the test continues.

C) The third type of error is a data compare error (the data read from the disk didn't compare with the data that was expected from the disk, as written by Init). If this error is detected, the error is reported, counted as a soft error and the test continues.

D) The fourth error is a format error. If an error occurred during a Format operation, then the exerciser will stop, report the error, and wait for another command.

2 Errors are reported with the device address, sector address, function that was being performed, and the type of error that occurred.

A) The last error that occurred is displayed on line 21 of the RUN SCREEN. If the screen has been changed (define an error or to change the page) then the error is not redisplayed, but new ones will be displayed when they occur.

B) Errors can be printed on either printer 204 or printer 215. If the printer is selected, 500 errors will be printed and then printing will cease, unless SF'14 (printer select key) is toggled or the exerciser screen is changed (to a different page or screen), but the screen error display will constantly update.

APPENDIX C

This is a description of the commonly used commands/inputs. All commands or inputs can be used when defined at the bottom of the screen (in the box).

SF'15/31	change the page. If there are more than 17 devices to be listed, then at the top right corner of the screen "More" will be printed. This applies to the Parameter Select, Test and Run screens, if more than 17 devices are available for testing.
SF'0	"Define error I-xx" will be displayed. There is an explanation of errors I-90 through I-99 in the "Exerciser". xx is the last error encountered or selected by the operator, if neither has occurred then default is 90. xx can be left or changed to select 90-99. When the explanation is displayed the exerciser continues operation.
RETURN	displays the explanation of the error selected.
SF'0	returns to the normal screen.
SF'14	printer select. The currently selected printer option is displayed in the upper left corner of each screen. To change selection press SF'14, the selected printer option will toggle between 204, 215, and off (no printer selected), until the desired option is selected.
CLEAR/PREV SCRN	Returns to the last functional screen or menu.
CONT/CTNUE RETURN or Y	These are general usage keys which cause a continuation to the next step.

Diagnostic Program Documentation

Documentation Release: 9734 Software Release: 8734
Documentation Part Number: 760-1260A

Program Name: Volume Zap Utility

Date: April 10, 1987

Table of Contents

Diagnostic Engineering Department
WANG Laboratories, INC.
One Industrial Ave.
Lowell, Massachusetts 01851

1.0 REFERENCE DOCUMENTATION

Wang BASIC 2 Language Reference Manual
2200 Disk Reference Manual

2.0 CONFIGURATION REQUIREMENTS

2.1 Hardware

Minimum required configuration

MVP/LVP/SVP/VP with at least 10K of data memory

2.2 Software

LVP CPU software must Rev. 1.8 or higher
VP CPU software must Rev. 2.1 or higher

Media containing Volume Zap which is labeled: SUPERZAP

3.0 PROGRAM DESCRIPTION

This utility will give the user the ability to inspect and/or alter any valid, formatted sector of a disk. Any legal system sector can be accessed and will be displayed on the CRT in both ASCII and hex.

Format, Read and Write errors will be reported and handled as a standard system error. This program can not override hardware errors.

4.0 LOAD PROCEDURES

4.1 Loa' Directly from Disk

1. Select the device address with a 'SELECT DISK ###' statement (see note 1)
2. Input command 'LOAD RUN T"SUPERZAP"'

4.2 Load from 2200 Diagnostic Package

1. Select the device address with a 'SELECT DISK ###' statement (see note 1)
2. Input command 'LOAD RUN'
3. If 'MAGNETIC MEDIA' disk, proceed with step 4
4. Under 'MAGNETIC MEDIA' menu, select 'Disk Utilities'
5. Under 'DISK UTILITIES' menu, select 'Volume Zap'

Note 1: (### equals the device address where program disk resides)

5.0 OPERATING INSTRUCTIONS

When the program is running the user must input the address of the device and sector that is to be loaded first. The address and sector information will be displayed on the top line, two left blocks. When they are waiting for input, or any other input is required, a prompt will be highlighted at the top of the display.

When the sector address has been input, the selected sector will be displayed. The display will provide both ASCII and HEX displays of the sector. Listed at the bottom of the screen are the options that can be run with this utility. These options are selected with SF' keys.

There are two modes that this program runs in, one is the Display Mode which allows examinining the sectors. The other mode is Edit Mode. Edit Mode allows the operator to edit the sector and save it on the media.

See Appendix A for a description of the options.

6.0 MISCELLANEOUS

This utility will allow writing on the media. The operator must be cautious not to inadvertently alter any parameters on the media.

7.0 PROGRAM REVISION HISTORY

8734 Added file hashing option.

8434 Added use of the cursor move arrows and modified the file limits selection. Added decimal to hex conversion function. Changed the file name from "FILEZAP" to "SUPERZAP".

3.9 Initial Release.

APPENDIX A

OPTION DEFINITIONS

The following options are available in Edit and/or Display Mode determined by which column it is listed in below. In the program, it is available when it is listed at the bottom of the screen.

Mode	
Display	Edit

SF'0 — Change sector - Any valid sector address may be selected for display. The sector address is displayed and input on the top line leftmost box.

SF'0 — Switch Hex/ASCII - Allows the Edit mode to input either ASCII characters or Hex numbers.

SF'1 — Change device - Select any valid device address. The device address is displayed and input on the top line second box from the left.

SF'2 SF'2 — Decimal to hex - Converts any positive decimal number less than 65535 to the hex equivalent. This display and input is on the top line rightmost box.

SF'3 SF'3 — Decimal to hex - Converts any positive hex number less than FFFF to the decimal equivalent. This display and input is on the top line rightmost box.

SF'4 — End of sector - Mover the cursor to the last byte of the sector.

SF'5 (Dn arrow) — Down - Move the cursor down one line.

SF'6 (Up arrow) — Up - Moves the cursor up one line.

SF'7 — Start of sector - Moves the cursor to the first byte of the sector.

SF'8 — Fill sector - Fills the displayed sector with a specified byte. The operator will be prompted (top line middle of the screen) for the byte to fill with.

SF'12 (NEXT SCRN) — Next sector - Display the next sequential sector.

SF'12 (Left arrow) — Left - Moves the cursor left one byte.

SF'13 (PREV SCRN)		Previous sector - Display the previous sector.
	SF'13 (Rt arrow)	Right - Moves the cursor right one byte.
	SF'15	Recall original data - Reads and displays the sector from the media.
	SF'16	Save changes - Copies the sector onto the media exactly as it is displayed.
SF'17	SF'17	File limits - Operator must input the filename and the device that it resides on. The starting and ending sectors, the number of sectors used and the number of free sectors will be displayed on the second and third lines left side of the screen.
SF'18	SF'18	File hashing - Determines what index sector the file is listed in. If the specified sector is full then decrement one sector till the file name is found.
SF'31		Exit program - Exits the program and loads the menu (if it is available).
EDIT		Edit mode - Switches the program into the edit mode.
	EDIT	Display mode - Switches the program into the display mode.
NEXT SCRN (SF'12)		Next sector - Display the next sequential sector.
PREV SCRN (SF'13)		Previous sector - Display the previous sector.
	(arrows)	
	Left (SF'12)	Left - Moves the cursor left one byte.
	Right (SF'13)	Right - Moves the cursor right one byte.
	Down (SF'5)	Down - Move the cursor down one line.
	Up (SF'6)	Up - Moves the cursor up one line.

Diagnostic Program Documentation

Documentation Release: 9734 Software Release: 8734
Documentation Part Number: 760-1261C

Program Name: 2200 FTU

Date: April 15, 1987

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Diagnostic Engineering Department
WANG Laboratories, INC.
One Industrial Ave.
Lowell, Massachusetts 01851

1.0 REFERENCE DOCUMENTATION

Wang BASIC 2 Language Reference Manual.

2.0 CONFIGURATION REQUIREMENTS

2.1 Hardware

Minimum required configuration

MVP/SVP/LVP/VP with the minimum required configuration
At least 50K of CPU user memory
Soft-sectored diskettes cannot be used on 2270A controllers
CRT must be 24 x 80

2.2 Software

MVP CPU software must be rev. 1.8 or higher
VP CPU software must be rev. 2.1 or higher
Media containing the 2200 FTU which is labeled: FTU

3.0 PROGRAM DESCRIPTION

This program is a troubleshooting aid and a general disk utility for disk and controller faults. Alignments can also be done with this using the head positioning function.

This program has no software limitations, any parameter can be input through the software. If a parameter is determined, by the software, to be out of limits it will be flagged but will not halt operation unless a system error occurs which can't be ignored.

4.0 LOAD PROCEDURES

4.1 Load Directly from Disk

1) Select the device address with a "SELECT DISK ###" statement (see note 1)

2) Input command "LOAD RUN T"FTU""

4.2 Load from 2200 Diagnostic Package

1) Select the device address with a "SELECT DISK ###" statement (see note 1)

2) Input command "LOAD RUN"

3) If "MAGNETIC MEDIA" disk, proceed with step 4
Under "2200 DIAGNOSTIC PACKAGE" menu, select "Magnetic Media"

4) Under "MAGNETIC MEDIA" menu, select "Disk Utilities"

5) Under "DISK UTILITIES" menu, select "Field Test Unit"

Note 1: (### equals the device address where program resides)

5.0 OPERATING INSTRUCTIONS

5.1 Operating Procedures

When the program is loaded the primary screen will be displayed requesting that the user:

"Load all devices to tested"

When this is done key "RETURN" and the program will scan all pos- sible device addresses and attempt to determine what devices are available. When all the devices are scanned a table will be dis- played giving the "Available Addresses", the "Disk Model", and the "Ending Sector". If any errors occurred, other than I-93, 95 or 96 they will be displayed next to the associated address. If I-93, 95 or 96 is encountered then the device is not listed and is considered not available.

When the device list is displayed the operator will be prompted (at the bottom of the screen) to;

"Select the address of the device to be tested".

NOTE: This address does not have to be in the "Available Addresses" list.

When the address is submitted, the program then scans that address for a device and its "End Sector" boundary. Finally the Test Selection Menu is displayed with the parameter options.

The "TEST SELECTION MENU" displays all the routines in this program and the parameter options that the routines run with. These parameters are not restricted by software, any legal system parameters can be input.

Warnings (parameters blinking) are given when a parameter is determined to be invalid. These warnings will not stop the running of any routines, but errors may occur if the routines are run.

If a device error occurred when entering this "TEST SELECTION MENU" the error number will be displayed next to the device address in the parameter list.

No write tests can be performed unless the device has first been write enabled (SF'8).

At the bottom of each screen is a box which contains any input options available at that time.

NOTE

The write enable writes a Hex(FF) in byte 7 of sector zero. This is an unused byte in a normal index sector, this "should" do no damage to a device.

See Appendix A for a description of the "TEST SELECTION MENU".

5.2 Test Descriptions

See Appendix B

5.3 Error Reporting

Errors are reported as they occur during the running of the routines. The last error that occurred will be displayed on line 21 and the number of errors that have occurred is displayed to the right of the screen on line 20.

If a printer is selected, up to 500 errors will be printed. To reset the printer counter, exit the test and restart it from the menu screen.

6.0 MISCELLANEOUS

6.1 Definitions

Loop on Error — Executes a particular routine continuously from the beginning to an error or the end of the routine un- til the it is aborted.

All errors are counted and if a printer is selected then errors will be reported on the printer

Loop on Test — Runs an entire routine continuously from the beginning to the end until the routine is aborted. All errors are counted and if a printer is selected then errors will be reported on the printer

If either loop is selected, then a pass counter is displayed on right side of the screen line 20. The pass counter counts the number of loops, back to the beginning of the routine, have been made.

If no loop is selected, the routine will run to completion or till an error occurres.

6.2 Notes

1 If the Disk Model is not accurate on the Available Addresses screen, then the max sector address may be inaccurate (lower than actual).

2. The word "Checking" flashes on the screen when the device(s) are being scanned for availability and size. If "checking" stops blinking for more than 30 seconds, check for a hung system.

3. If write lock is selected and the device is not write enabled (sector zero byte seven), no changes are made. Otherwise a Hex(00) is written in place of the Hex(FF).

4. Since the 30-MEG Winchester on the 2275 and the 40-MEG Win- chester in the LVP (Q2040) respond to two addresses, they are treated as two separate devices.

7.0 PROGRAM REVISION HISTORY

6735 Added support for 2200DS and RAM Disk. Also fixed time out errors on long cabled mux.

854E The program has been rewritten to emulate an FTU, also renamed "FTU". The password lock has been removed.
The 2275 has been added to the list of recognizable devices.

61B4 Disk Initialization has been changed to Disk Write Enable for clarity of function.
The Quantum Drives have been added to the list of recognizable devices.

1.2 The 'Re-run This Program' routine has been replaced by 'Phoenix/LVP/SVP DPU Status' routine.

1.1 Display A Sector routine is now much faster.

APPENDIX A

TEST SELECTION MENU

```
                        TEST SELECTION MENU  Rev. xxxx

SF 01 - Compare Disk                                          SF  08 - Write Enable
SF 02 - Compare File                                          SF  09 - Write Lock
SF 03 - Display a Sector      WRITE LOCKED                    SF  10 - Scratch Disk
SF 04 - Verify                                                SF  11 - Format Disk
SF 05 - Read                                                  SF 12 - Write
SF 06 - Position Head(s)                                      SF 13 - Read After Write
SF 07 - Code Revs                                             SF  14 - Instruction Test

                 Device  D10     **********
           Start Sector  0       Track  0
             End Sector  xxxx    Track  xx     Maximum =  xxxx
       Hex Data Pattern  B8B8B8B8B8B8B8B8B8B8B8B8B8B8B8B8B8B8
                 Printer  OFF (204, 215, OFF)
                    Loop  N (N = no, T = on Test, E = on Error or test)
                    Mode  I (I = sequential step In,  A = Alternate step)
                            (O = sequential step Out, R = Random step)
    # Random Operations  1000
```

APPENDIX B

MENU

MENU

CAUTION

BACKUP ANY CUSTOMER DATA BEFORE RUNNING WRITE TESTS

```
!
!                          TEST SELECTION MENU  Rev. xxxx
!
!  SF 01 - Compare Sector(s)                      SF 08 - Write Enable
!  SF 02 - Compare File                           SF 09 - Write Lock
!  SF 03 - Display a Sector       WRITE LOCKED    SF 10 - Scratch Disk
!  SF 04 - Verify                                 SF 11 - Format Disk
!  SF 05 - Read                                   SF 12 - Write
!  SF 06 - Position Head(s)                       SF 13 - Read After Write
!  SF 07 - Code Revs                              SF 14 - Instruction Test
!
```

TEST DESCRIPTIONS

SF'01 - Compare Sector(s)

This will compare sector(s) on one or two devices. This utility is useful after a COPY has been performed to see if the data was copied exactly.

The device address and the sector boundaries on the option list are the parameters for the first device. When entering the routine the user must input the device address and starting sector to compare to.

SF'02 - Compare File

This compares file(s) on one or two devices. This utility is useful for comparing files of different names to see if they are the same.

The device address from the options list is used for the first device. At the beginning of the routine, the user inputs the second device address and the file(s) to be compared. The files are then located and compared. Any difference is flagged as a data compare error.

SF'03 - Display a Sector

This routine reads any sector, if readable without error, from any device and displays it in Hex and ASCII.

The "Start Sector" and "End Sector" are used as the parameters. If mode "0" (sequentially step out) is selected, the "End Sector" is displayed first. If any other mode is selected, the "Start Sector" is displayed first.

If the loop is set to "T" or "E" the routine will automatically step through and display the sectors in incrementing or decrementing order depending on the "Mode" selected. If an error is encountered, the stepping will stop until a "RETURN" is hit.

If the routine is not looping, the "Start Sector" and "End Sector" parameters are ignored.

SF'04 - Sequential Verify

This routine verifies any device from "Start Sector" to the "End Sector". Checks verify function and sequential seeking ability of the device.

When the routine is loaded, the operator must select fast or slow test.

> The slow test will verify each sector with a separate Verify statement and display the number of the sector currently being verified.
>
> The fast test will verify the selected sectors all in one statement. This test gives no indications that it is running until it is complete or a detectable error occurres.

If an error occurs, key "RETURN" to continue the Verify.

SF'05 - Read

This routine reads any device from the "Start Sector" to the "End Sector" and compares the data read with the "Hex Data Pattern". Checks read function and sequential seeking ability of the device.

SF'06 - Position Head(s)

This routine will move the heads to the specified start track and load the heads until the routine is exited. The heads can be stepped from track to track with the "RETURN" and "BACKSPACE" keys.

The start and end parameters and any errors are ignored when stepping between tracks.

SF'07 - Code Revs

This routine polls all Disk Processing Units that will respond via a special statement requesting the DPU type and the revision level of the proms. The Operating System revision is also given.

The information is printed to the right of the device address on the "TEST SELECTION MENU" screen.

SF'08 - Write Enable

This routine writes a Hex(FF) on sector zero byte seven (this is an unused byte of a normal index sector). Write operations via this program can not be executed if this Write Enable byte has not been written.

If a device is unreadable a warning is displayed and the routine can be continued. Once this routine has been performed on a device, the program is capable of writing on the device.

SF'09 - Write Lock

If a device is write enabled, a Hex(FF) in byte seven of sector zero, this routine writes a Hex(00) in place of the Hex(FF).

Write operations via this program can not be executed if this byte has other than Hex(FF). Once this routine has been performed on a "Write Enabled" device, the program can no longer write on the device.

If the device wasn't write enabled then the routine does no writing.

SF'10 - Disk Scratch

This routine is used to Scratch a disk. The user inputs the number of sectors for the catalog index and for the catalog area if other than default values are desired.

SF'11 - Disk Format

This routine will initiate a device FORMAT if the selected device can be formatted by software. The device will be write enabled after the format is completed.

SF'12 - Write

This routine writes the selected device from the "Start Sector" to "End Sector" with the "Hex Data Pattern". Checks write function and sequential seeking ability of the device.

This pattern is written sixteen times per sector (256 bytes/sector).

SF'13 - Read After Write

This routine writes, reads and then compares the data on the selected device from "Start Sector" to "End Sector" using the "Hex Data Pattern". Checks read after write function and sequential seeking ability of the device.

SF'14 - Instruction Test

This routine tests all of the Basic II disk commands except move amd copy commands to ensure that all commands function properly. Checks write and read functions as well as disk scratch and move end commands.

CAUTION

This routine will destroy any data on the media.

The "Start Sector" must be at least fifteen less than the last "End" sector or errors will occur. The "Start Sector" is used for most of the test but the entire device will be altered.

APPENDIX C

OPTIONS

OPTIONS

```
                  Device  D10     **********
            Start Sector  0       Track  0
              End Sector  xxxx    Track  xx     Maximum =  xxxx
        Hex Data Pattern  B8B8B8B8B8B8B8B8B8B8B8B8B8B8B8B8
                 Printer  OFF (204, 215, OFF)
                    Loop  N (N = no, T = on Test, E = on Error or test)
                    Mode  I (I = sequential step In,  A = Alternate step)
                            (O = sequential step Out, R = Random step)
     # Random Operations  1000
```

DEVICE

Selects the device to be tested. The device will be checked for accessibility and then the "Maximum" value set equal to the ending sector address for that device.

********** - when the device is being scanned the word "searching" will be printed here. If there was an error, the error number is displayed here.

NOTE If the sector to track relationship is in question then use the sector address as the parameter and ignore the track parameter.

START SECTOR

First sector for all routines to utilize. Any changes to this will adjust the start track.

The "Start Sector" number will blink, if it is larger than the "End Sector".

TRACK (start)

This is the starting track with respect to the "Start Sector". A change to this will also cause the the "Start Sector" to change.

END SECTOR

Last sector for the routines to utilize. Any changes to this will adjust the end "Track".

The "Maximum" sector number will blink if the "End Sector" is larger than it.

TRACK (end)

This is the ending "Track" with respect to the "End Sector". A change to this will also cause the the "End Sector" to change.

HEX DATA PATTERN

This 32-character pattern is repeated 16 times to fill a sector. Any number of characters (up to 32) can be input. This character string is repeated x times until the 32-character pattern is complete.

PRINTER

Select a printer to print any errors. If no printer is selected then errors will be reported on the screen as they occur. The last error and a count of all errors that have occurred are displayed on the screen.

LOOP

"T" - Loop on a test and report errors.

"E" - Loop on the first error and report errors.

"N" - No loop, stop on error or at the end of the test

Any of the Menu picks can be looped except "Write Lock" and "Write Enable"

MODE

"I" - The routine selected will step the heads from the outer edge of the device to the center.

"O" - The routine will step the heads from the center to the outer edge.

"A" - The routines will address the sectors in the following manor;

```
"Start Sector"       "End Sector"
"Start Sector" +1    "End Sector" -1
"Start Sector" +2    "End Sector" -2
                etc. until
"Start Sector" = "End Sector"
```

"R" - Randomly selects a sector between the start and end boundares. This is repeated for the number of operations indicated.

RANDOM OPERATIONS

Number of random passes to make. This option is displayed only when Random Mode is selected.