3-1. INTRODUCTION

This chapter describes the diagnostic test routines used by the CE to troubleshoot a faulty subassembly installed on the Series II and Series III Winchester Peripheral Chassis development system. Section 3-2. describes in brief the CE diagnostic test routines while Section 3-3. contains test execution times and diagnostic initialization procedures. Section 3-4. provides a listing of error messages and a troubleshooting guide based on analyzing test results to determine the probable failing subassembly.

3-2. SIIWIN.CE TEST DESCRIPTION

Test descriptions of the SIIWIN.CE Winchester Diagnostic are contained in the following table.

Table 3-1. Winchester Peripheral CE Test Description

Test No.	Test Description
0H	Reset Test. Resets the controller and initializes the Winchester drive.
1H	Transfer Status Test. Checks communication lines between controller and drive by enabling the transfer error status function.
2H	Buffer I/O Test. Verifies the transfer of data between the controller and drive.
3H	ROM Checksum Test. Checks the controller ROM by running the on-board ROM checksum test.
4H	RAM Window Test. Checkes 2K bytes of on-board RAM by walking ones and then zeroes through memory.
5H	RAM Address Test. Verifies RAM address lines.
6H	Format Test. Formats and verifies diagnostic tracks on the Winchester drive.

Table 3-1. Winchester CE Test Description (continued)

Test No.	Test Description
7H	Micro-Diagnostic Test. Executes on-board ROM-based diagnostics to verify fundamental controller-drive functions.
8H	Seek/Verify Test. Checks seek and verify functions by verifying a sector on the last track of the drive and a sector on the first track of the drive.
9H	Worst Case Seek Test. Checks seek and verify function by executing a worst case seek sequence.
AH	Write/Read Test. Verifies write and read functions by writing and reading the diagnostic tracks.
BH	Drive Selection Test. Verifies the drive select lines for each platter.
CH	Platter/Head Selection Test. Verifies that each recording surface and head can be selected and accessed individually.
DH	Sector Selection Test. Verifies that each sector of a track can be addressed.
EH	Overlap Seek Test. Verifies that the controller can properly handle overlapped operations.
FH	Track Verify Test. Verifies data fields on a predetermined number of tracks.
10H	Platter Verify Test. Verifies data fields on all drive tracks.
11H	Alternate Track Test. Checks alternate track capability by accessing the first and last diagnostic tracks.
12H	Zero Fill Test. Verifies the controller's ability to fill partial sectors with zeros.
13H	Data Overrun Test. Reads the area immediately following partial sectors to determine if overrun (extra) data is being written.

Table 3-1. Winchester CE Test Descriptions (continued)

Test No.	Test Description
14H	Auto-Increment Test. Verifies the controller's ability to automatically increment to the next sector, head, or cylinder.
15H*	Write/Read/Compare Test. Writes the worst case data pattern (6DB6H) to all sectors and verifies the pattern. Writes the complement pattern (9249H) and verifies that pattern.
16H*	Write All/Read/Compare Test. Writes a unique data pattern to all drive sectors, then reads and compares the data with the original patterns.
17H*	Format Entire Drive(s). This utility formats all attached drives. All sectors are formatted as data sectors. An interleave factor of four is used.

WARNING

The last three tests (identified by asterisks) are not included in the Winchester Peripheral Customer Confidence Test because of their destructive nature. The execution of these tests will destroy the data currently stored on the drives. Before running tests 15H, 16H, and 17H, make sure that the customer has back up for all data.

3-3. INDIVIDUAL TEST TIMES

A number of the individual tests in the CE diagnostic test require a significant amount of time to execute. Table 3-2 outlines the approximate test times of these tests; those tests omitted from the table execute in 10 seconds or less.

Table 3-2. Test Execution Times

Test No.	Test Name	Time
00H	Reset Test	1 minute
09H	Worst Case Seek	2.5 minutes
10H	Platter Verify	10 minutes
15H*	Write/Read/Compare	2-2.5 hours
16H*	Write All/Read/Compare	2-2.5 hours
17H*	Format Entire Drive	5 minutes

*Denotes destructive test (destroys data on disk); they are automatically excluded during test initialization.

3-3. CE DIAGNOSTIC INITIALIZATION PROCEDURES

The following section describes the procedures used to initiate the CE Diagnostic Test. The development system must be powered up before power can be applied to the Winchester Peripheral Chassis.

NOTE

Any deviation from the displays in the following procedures denotes an error.

1. Insert the test diskette labelled ISIS II (W) V4.2 into drive :F4:.

2. Press the "RESET" switch on the front panel of the mainframe and then on the keyboard, press the "F" key and read from the CRT:

   ISIS-II(W), X 424

3. On the keyboard, type:

```
:F4:STFS
```

4. The following display should appear on the CRT:

```
ISIS-II STFS, V1.1
```

5. On the keyboard, type:

```
INI (Initialize) :F4:SIIWIN.CE
```

6. The following display should appear on the CRT:

```
WINCHESTER CUSTOMER ENGINEER DIAGNOSTIC
     FOR ISIS-II(W) PERIPHERAL CHASSIS X012

I/O MAP SWITCHES MUST BE SET AT 0005H,
ALL INITIALIZE NUMBERS MUST BE DECIMAL
IS THE DATA ON THIS UNIT BACKED-UP (Y or N) Y
```

NOTE

The destructive tests 15H, 16H, and 17H will be automatically ignored if N; automatically included if Y.

```
DO YOU WANT TO USE THE INITIALIZATION DEFAULTS (Y or N) Y
PASS
MIN/VERSION 1.07
USER RETURN
*;
*; If the above test passed, press(CNTL + E) to continue
*^E
```

7. If the above test failed, it could be due to cable connections or incorrect switch settings on the drive. On the keyboard, type: EXIT (and depress the RETURN key) and verify the test equipment set-up. If the above test passed, then on the keyboard, simultaneously depress the CNTL and E keys and read the CRT:

```
*^E^E
*Load :F4:WCALL Nolines
*Load :F4:SIIWIN.CE Nocode Nolines
*Recognize 0 to 14
*Ignore B,E,F,10
*Debug = FF
*Test 0 to A,C,D,11 to 14
0000H RESET TEST                "PASSED"
0001H TRANSFER STATUS           "PASSED"
                                    DIAGNOSTICS
```

```
0002H BUFFER I/O TEST              "PASSED"
0003H ROM CHECKSUM TEST            "PASSED"
0004H RAM WINDOW TEST              "PASSED"
0005H RAM ADDRESS TEST             "PASSED"
0006H FORMAT TEST                  "PASSED"
0007H MICRO-DIAGNOSTICS            "PASSED"
0008H SEEK/VERIFY TEST             "PASSED"
0009H WORST CASE SEEK TEST         "PASSED"
000AH WRITE/READ TEST              "PASSED"
000CH PLATTER/HEAD TEST            "PASSED"
000DH SECTOR SELECTION             "PASSED"
0011H ALTERNATE TRACK TEST         "PASSED"
0012H ZERO FILL TEST               "PASSED"
0013H DATA OVERRUN TEST            "PASSED"
0014H AUTO-INCREMENT TEST          "PASSED"
*;
*Summary 0 to A,C,D,11 to 14 EO
0001H COMPLETE ITERATIONS
*;
*; Test complete, press CNTL and E to exit
*^E
```

8. If any of the above test have failed; on the keyboard, type: EXIT (and depress the RETURN key).
   If all the above test have passed, simultaneously on the keyboard, depress the "CNTL" and "E" keys and read CRT:

```
*^E^E
*Exit
-:f4:Restor
```

9. When testing is complete, enter the following command:

```
:F4:LOGOFF (cr)
```

10. The CRT screen will clear and the following message will displayed on the CRT:

```
DRIVE SPUN DOWN
```

11. Observe that the "RUN" light on the IPC goes out. This is not an error.

12. Remove the test diskette from the drive :f4:

13. Turn the power switch on the front panel of the Winchester peripheral chassis to "OFF" position.

14. Depress the power switch on the front panel of the mainframe. The switch light will go off.

3-4. TROUBLESHOOTING

The following table explains the probable subassembly failures as determined by the diagnostic test executions. The failing test number is the primary factor used to isolate failures to a field replaceable subassembly. Failing test numbers and the respective subassemblies are as follows:

Test Number	Subassembly
0 to 5	Controller
6,7	Controller/Cables/Drive
8 to D	Drive
E	Drive/Controller
F to 17	Drive

The CE should check each test's results as they may indicate the relationship between two or more subassemblies. For example, if tests 0 through 5 pass but test 8 fails, the drive should be considered faulty. Another example is, if test 2 and tests 8 through A fail, the controller is the probable cause and should be replaced. A bad controller can cause the drive tests to fail as can a faulty cable.

Table 3-3 lists additional messages that the test may display during test execution.

Table 3-3. SIIWIN.CE Messages

Error Code	Description
FORMAT	Format error
LBUF	I/O buffer error
DIAG	Micor-Diagnostic error
READID	Read sector ID error
READ	Read error
RESET	Reset error
SEEK	Seek error
TRANST	Transfer error status error
WRTBUF	Write controller buffer to disk error
WRITE	Write error
VERIFY	Verify error

Table 3-3. SIIWIN.CE Messages (continued)

Status Message	Description
DIAGNOSTIC FAULT	Micro-Diagnostice fault
DRIVE FAULT	Read/Write, position, power, or speed fault in selected drive
INVALID COMMAND	Invalid command issued to drive
INVALID ADDR	Cylinder address beyond available tracks
SELECTED UNIT NOT READY	Selected unit not ready or not responding
WRITE PROTECTION FAULT	Attempted write to write protected unit
END OF MEDIA	End of media detected
EFECTIVE ALTERNATE	Alternate cylinder also defective
SECTOR NOT FOUND	Desired sector not found
ILLEGAL SECTOR SIZE	Test suite sector size variable does not match actual disk sector size

Soft Error Status Message	Description
SYNC NOT FOUND	Read electronics unable to synchronize on either ID or data field
DATA FIELD	Correctable error found in data field (note retry count)
ID FIELD	Correctable error found in ID field (note retry count)
CYLIN. ADDR MISC	ID field contains address different than expected address
SEEK ERROR	Seek error detected

Table 3-3. SIIWIN.CE Messages (continued)

Time Out Error Message	Description
NON-INTERRUPT TIME-OUT	Controller has not posted an operation complete response for a function that does not use the operation complete interrupt
INTERRUPT TIME-OUT	Controller has not interrupted for an operation complete
TIME-OUT ON SEEK COMPLETE	Controller has not posted a seek complete response.