EK-TUA81-SV-003

# TU81/TA81 Pathfinder

digital™

EK-TUA81-SV-003

PRE-SITE
ACTIONS

ON-SITE
ACTIONS

# TU81/TA81 Pathfinder

TROUBLESHOOTING
DIAGNOSTICS

DIAGNOSTIC
TEST
INFORMATION

Prepared by Educational Services
of
Digital Equipment Corporation

1st Edition, October 1984
2nd Edition, September 1985



The information in this document is subject to change without notice. Digital Equipment Corporation assumes no responsibility for any errors that may appear in this document.

The following are trademarks of Digital Equipment Corporation, Maynard, Massachusetts.

| | | | |
|---|---|---|---|
| digital™ | DIBOL | Rainbow | VAX |
| DEC | MASSBUS | RSTS | VMS |
| DECmate | PDP | RSX | VT |
| DECUS | P/OS | RT | Work Processor |
| DECwriter | Professional | UNIBUS | |

TABLE OF CONTENTS

## LIST OF TABLES



## LIST OF ILLUSTRATIONS

# Section 1 - TROUBLESHOOTING

## 1.1 GENERAL DESCRIPTION

The TU81/TA81 Subsystem contains a broad range of microdiagnostics to monitor the operation of the subsystem. When these microdiagnostics detect fault conditions a numerical fault code is reported via the 3-digit display on the control panel. Fault detection and reporting occur from the time the subsystem is powered on through the normal on-line operation or off-line diagnostic testing. Three general types of conditions are tested:

1. Tape Motion Faults
2. Internal Control Operational Faults
3. Human and System Interface Faults

This manual is divided into two sections. Section 1 contains descriptions and procedures for troubleshooting the TU81/TA81 Subsystem. Section 2 contains descriptions of the diagnostic tests. To facilitate use of the manual, four of the most frequently used topics in the manual have been identified at the page edges with a black rectangle. The marked sections are:

1. Pre-Site Actions
2. On-Site Actions
3. Troubleshooting Diagrams
4. Diagnostic Test Information

NOTES

1. The procedures contained in this section of the manual are intended for use by a qualified field service representative familiar with operation of the TU81/TA81 Subsystem. Under no circumstances should these procedures be performed by persons other than fully qualified maintenance personnel.

2. In this manual, the description of the operator diagnostic procedure is expanded for use by maintenance personnel. Procedures for use by the operator are in the CUSTOMER DIAGNOSTICS section of the TU81/TA81 Subsystem User Guide.

The diagnostic tests designed into the TU81/TA81 are functions that can be initiated through the operator control panel or on-line by the host. The host controller is capable of monitoring TU81/TA81 status through the STATUS TRANSFER command. A CHANNEL LOOPBACK command is also provided to exercise the interface logic.

Even when not running diagnostics, the microprocessor tests for many operational fault conditions while operating on-line. These conditions are indicated as fault codes, appearing on the control panel display. The fault condition is indicated by lighting of the RESET/FAULT indicator and display of the appropriate fault code. Faults which occur while tape is loaded may initiate a controlled removal by the microprocessor of servo and write circuitry power to prevent tape damage.

When the TMSCP controller detects a fatal error condition, it enables the CONTR FAULT indicator/switch and stays in the same state. When the CONTR FAULT indicator/switch is pressed, the controller enters the available state. The controller attempts to clear the error upon receipt of an INIT from the system. If the error is cleared, the controller disables the CONTR FAULT indicator/switch and enters the ON-LINE state relative to the system. If the error is not cleared, the TMSCP controller enters the fatal error condition state with the CONTR FAULT indicator/switch enabled. No error code is displayed on the front panel.

## 1.2 FIELD SERVICE PROCEDURES

Trouble analysis procedures by the field service representative consist of a pre-site determination of the reported problem, and an on-site procedure to isolate and correct verified faults. Figure 1-1 depicts a troubleshooting flowchart to aid fault isolation.

### 1.2.1 Pre-Site Actions

When the trouble call is received from the site, proceed as follows:

1. Consult the matrices in Tables 1-1 and 1-2 to determine if operator action is required. Specific malfunctions or fault codes indicate the need for operator action in the form of visual checks, cleaning, or performing Operator Diagnostic Test 01. It should also be verified that Operator Diagnostic Test 01 has been performed after the operator corrective actions have been completed.

2. After verifying that the fault still occurs following completion of all operator actions, consult Table 1-1 or Table 1-2 for a list of assemblies related to the reported malfunction or fault code. As many of these assemblies as are available should be taken to the site to prevent unnecessary call-backs.

#### 1.2.1.1 Malfunction/Failing Assembly Tables

The matrices in Tables 1-1 and 1-2 list malfunctions or fault codes and the possible assemblies which may cause the fault condition. The purpose of these tables is to provide you with a list of fault-related assemblies prior to reporting to the customer site. Assemblies listed under the individual malfunction or fault codes are arranged in a "most probable fault" order. In addition to the assemblies listed, the table may direct you to request the operator to perform Diagnostic Test 02 or 03. Test 02 is required if Fault Codes 22, 24, 26, 30, 31 or 36 terminate Diagnostic Test 01. Tables 1-3 thru 1-6 list possible failing assemblies for fault codes which terminate Diagnostic Test 02.

Test 03 is required if Fault Codes 03, 04, 06, 25, 30, 31, 32, 33, 35, 36, 48, or 52 terminate Operator Diagnostic Test 01. Tables 1-7 thru 1-14 list possible failing assemblies for fault codes which terminate Diagnostic Test 03.

Also contained on the matrices in Tables 1-1 and 1-2 are those actions (A, B, C) which should be performed by the operator. Verify these actions prior to making an on-site call.

Table 1-1. MALFUNCTION/FAILING ASSEMBLY MATRIX

| MALFUNCTION / OPERATOR CORRECTIVE ACTION | AFTER PRESSING THE CIRCUIT BREAKER TO THE 1 POSITION, THE LOGIC ON INDICATOR DOES NOT LIGHT. | TU81/TA81 DISPLAYS 000 ON POWER-UP. | TU81/TA81 POWERS DOWN WHILE IN USE. | OPERATOR PANEL SWITCH DOES NOT OPERATE. | TU81/TA81 OPERATES WITH OPERATOR DOOR OPEN. | FILE PROT INDICATOR DOES NOT LIGHT WHEN A WRITE PROTECTED TAPE IS LOADED. | TAKE UP REEL DOES NOT TURN FREELY. | SUPPLY REEL DOES NOT TURN FREELY. | SUPPLY REEL HUB CANNOT BE LATCHED. | EXCESSIVE PNEUMATIC NOISE. |
|---|---|---|---|---|---|---|---|---|---|---|
| ENSURE TU81/TA81 IS PLUGGED INTO A LIVE SUPPLY | A | | | | | | | | | |
| ENSURE OPERATION IS LEGAL | | | | A | | | | | | |
| CHANGE TAPE | | | | | | | | | A | |
| FAILING ASSEMBLY | | | | | | | | | | |
| SERVO-CONTROL | 8 | 1 | 3 | 2 | 2 | 2 | | | | |
| PE/GCR READ AMP R | 5 | | | | | | | | | |
| PE/GCR WRITE DRIVER | 4 | | | | | | | | | |
| FORMATTER READ | 7 | | | | | | | | | |
| FORMATTER WRITE | 6 | | | | | | | | | |
| INTERFACE | 9 | | | | | | | | | |
| POWER SUPPLY | 1 | 2 | 1 | | | | | | | |
| POWER AMPLIFIER | | | 2 | | | | | | | |
| CONTROL PANEL | 3 | | | 1 | | 3 | | | | |
| PNEUMATIC PUMP | | | | | | | | | | 1 |
| PRESSURE REGULATOR | | | | | | | | | | 2 |
| SUPPLY MOTOR/TACH | | | 5 | | | | | 1 | | |
| SUPPLY HUB | | | | | | 4 | | 2 | 1 | |
| TAKE-UP MOTOR/TACH | | | 4 | | | | 1 | | | |
| TAKE UP HUB | | | | | | | 2 | | | |
| TOP COVER SWITCH | | | | | 1 | | | | | |
| FILE PROTECT SENSOR | | | | | | 1 | | | | |
| COOLING FAN | 2 | | | | | | | | | |

Table 1-2. FAULT CODE MATRIX (OPERATOR TEST 01)

| | FAULT CODE | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Test Successful | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Latch Hub Correctly | | | | | | | | | | | | | A | | | | | | | | | A | | | A | | | | |
| | Thread Tape Correctly | | | | | | | | | | | | A | | A | | | | A | | | | | | | | | | | A |
| | Clean Head/Tape Path/Hubs | | A | A | A | A | A | A | A | A | | | | C | | | | | | | | | B | | | B | | | | |
| * | Change Tape | | B | B | B | B | B | B | B | B | | | | B | | A | | A | B | | | | C | | | C | | | | B |
| | Close Top Cover | | | | | | | | | | | A | | | | | | | | | | | | | | | | | | |
| | Install Wr. Protect Ring | | | | | | | | | | | | | | | | | A | | | | | | | | | | | | |
| | Run Test 02 (See NOTE 1) | | | | | | | | | | | | | | | | | | | | | | X | | X | | X | | | |
| | Run Test 03 (See NOTE 1) | | | | X | X | | X | | | | | | | | | | | | | | | X | | | X | X | | | |
| | (See NOTE 2 Below) | | | | | | | | | | | | | | | | X | | | | | | | | | | | | | |
| | Servo-Control | | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 1 | 2 | 2 | 1 | 3 | 2 | 2 | 2 | 1 | 1 | 2 | 2 | 4 | 1 | 2 | 2 | 4 | 1 | 1 | 2 |
| | PE/GCR Read Amplifier | | 3 | 3 | 1 | 2 | 1 | 2 | 1 | 2 | | | | | | | | | | | | | | | | | | | | |
| | PE/GCR Write Driver | | 2 | 2 | 2 | 1 | 3 | 1 | 3 | 1 | | | | | | | | | | | | | | | | | | | | |
| | Formatter Read | | | | 5 | 5 | 2 | 5 | 2 | 5 | 3 | | | | | | | | | | | | | | | | | | | | |
| | Formatter Write | | 5 | 5 | 6 | 6 | 5 | 6 | 5 | 6 | 2 | | | | | | | 3 | 2 | | | | | | | | | | | |
| | Interface | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Power Supply | | 6 | | | | | | | | | | | | 2 | | | | | | | | | | | | | | | |
| | Power Amplifier | | | | | 7 | | 7 | | | | | | | | | | | | | | | 5 | | 3 | 4 | 3 | | | |
| | Control Panel | | | | | | | | | | | | | | | | 1 | | | | | | | | | | | | | |
| ** | Pneumatic Pump | | | | | | | | | | | | | | 1 | | | | | | | | | | | | | | | |
| | Filter | | | | | | | | | | | | | | 4 | | | | | | | | | | | | | | | |
| | Supply Air Bearing | | | | | | | | | | | | | | | | | | | | 1 | | | | | | | | | |
| | Take-Up Air Bearing | | | | | | | | | | | | | | | | | | | | | 1 | | | | | | | | |
| | Head (Amplitude Error) | | 1 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Head (Data Reliability) | | | | 3 | 3 | 6 | 3 | 6 | 3 | | | | | | | | | | | | | | | | | | | | |
| | Supply Motor/Tach | | | | | | | | | | | | | 3 | | | | | | | | | 3 | 2 | 1 | | 2 | 2 | | |
| | Supply Hub | | | | | | | | | | | | | 2 | | | | 4 | | | | | 1 | | | 1 | | | | |
| | Take-Up Motor/Tach | | | | 7 | 8 | | 8 | | | | | | | | | | | | | | | 2 | | | 3 | 1 | | | |
| | EOT/BOT Sensor | | | | | | | | | | | | 1 | 4 | | 1 | | | | | | | | | | | | | | 1 |
| | Top Cover Switch | | | | | | | | | | | 1 | | | | | | | | | | | | | | | | | | |
| | File Protect Sensor | | | | | | | | | | | | | | | | | 1 | | | | | | | | | | | | |
| | Pressure Regulator | | | | | | | | | | | | | | 5 | | | | | | | | | | | | | | | |
| | Cooling Fan | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Temperature Sensor | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

* OPERATOR CORRECTIVE ACTIONS

** FAILING ASSEMBLY

NOTE 1. Do not run Tests 02 and 03 unless Test 01 directs their use. Test 02 will not run Stand-alone.

NOTE 2. Fault can be caused by operator pressing RESET/FAULT switch during a LOAD or UNLOAD operation.

Table 1-2. FAULT CODE MATRIX (Cont'd)

| | FAULT CODE | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 41 | 42 | 43 | 47 | 48 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| * | Test Successful | | | | | | | | | | | | | | | | | | | | | | | | . | | | | | |
| * | Clean Hub Pads | | | | | | | | | | | | | | | A | | | | | | | | | | | | | | |
| * | Thread Tape Correctly | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| * | Clean Head/Tape Path/Hubs | A | A | | | | | | | | | | A | | | | | | | | | | | | | | | | | |
| * | Change Tape | | | | | | | | | | | | B | | | | | | | | | | | | | | | | | |
| * | Close Top Cover | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| * | Run Test 02 (See NOTE 1) | X | X | | | | | X | | | | | | | | | | | | | | | | | | | | | | |
| * | Run Test 03 (See NOTE 1) | X | X | X | X | | X | | | | | | X | | | X | | | | | | | | | | | | | | |
| * | (See NOTE 2 Below) | | | | | | | | | | | | | | | | | | | | X | X | | | | | | | | |
| ** | Servo-Control | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 3 | 3 | 1 | | 1 | 1 | 2 | 1 | 3 | 1 | 2 | 2 | 2 | | | | | | | | 1 |
| ** | PE/GCR Read Amplifier | | | | | | | 10 | | | | | | | | | | 2 | | | | | | | | | | | | |
| ** | PE/GCR Write Driver | | | | | | | 9 | | | | | | | | | | 1 | | | | | | | | | | | | |
| ** | Formatter Read | | | | | | | 12 | | | | | | | | | | | | | | | | 1 | 1 | 1 | | | | |
| ** | Formatter Write | | | | | | | 13 | | | | | | | | | | | | 1 | | | 1 | 2 | 2 | | 2 | | | 2 |
| ** | Interface | | | | | | | | | | | | | | | | | | | 3 | | | | | | | 1 | 1 | 1 | 3 |
| ** | Power Supply | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ** | Power Amplifier | 2 | 2 | 1 | | | | 2 | | | | | | | | | | | | | | | | | | | | | | |
| ** | Control Panel | | | | | | | | | | | | | | | | | | | | 1 | 1 | | | | | | | | |
| ** | Pneumatic Pump | 4 | 4 | 4 | | | | 4 | | | | | | | | | | | | | | | | | | | | | | |
| ** | Filter | 5 | 5 | 5 | | | | 5 | | | | | | | | | | | | | | | | | | | | | | |
| ** | Supply Air Bearing | 7 | 7 | | | | | 7 | | | | | | | | | | | | | | | | | | | | | | |
| ** | Take-Up Air Bearing | 8 | 8 | | | | | 8 | | | | | | | | | | | | | | | | | | | | | | |
| ** | Head (Amplitude Error) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ** | Head (Data Reliability) | | | | | | | 11 | | | | | | | | | | 4 | | | | | | | | | | | | |
| ** | Supply Motor/Tach | | | | | | | | | | | | 2 | | | 3 | | | | | | | | | | | | | | |
| ** | Supply Hub | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ** | Take-Up Motor/Tach | 3 | 3 | 3 | 2 | | 2 | 3 | | | | | 3 | | | 1 | | | | | | | | | | | | | | |
| ** | EOT/BOT Sensor | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ** | Top Cover Switch | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ** | File Protect Sensor | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ** | Pressure Regulator | 6 | 6 | 6 | | | | 6 | | | | | | | | | | | | | | | | | | | | | | |
| ** | Cooling Fan | | | | | | | | | 1 | 1 | | | | | | | | | | | | | | | | | | | |
| ** | Temperature Sensor | | | | | | | | | 2 | 2 | | | | | | | | | | | | | | | | | | | |

* OPERATOR CORRECTIVE ACTIONS

** FAILING ASSEMBLY

NOTE 1. Do not run Tests 02 and 03 unless Test 01 directs their use. Test 02 will not run Stand-alone.

NOTE 2. A Fault can be caused by the operator pressing any operator panel switches for longer than 15 seconds during the power-up cycle

1.2.1.2 Test 02 Follow-Up - Refer to Table 1-3 if, after running Operator Test 01, Fault Code 22 appears on the display. Table 1-2 indicates that Test 02 is required if operator actions A, B and C did not resolve the problem. If Test 02 is unsuccessful, refer the fault code displayed to this table for probable failing assemblies.

Table 1-3. TEST 02 TERMINATION CODES FOLLOWING TEST 01 FAULT CODE 22

| FAULT CODE | 70 | 71 | 72 | 73 | 74 | 75 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 89 | 90 | 91 | 92 | 97 | 98 | 00 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OPERATOR ACTION | | | | | | | | | | | | | | | | | | | | | |
| Illegal Op Sequence | A | | | | | | | | | | | | | | | | | | | | |
| Ensure Tape is Thd'd | | B | | | | | | | | | | | | | | | | | | | |
| Repeat Test | | C | | | | | | | | | | | | | | | | | | | A |
| FAILING ASSEMBLY | | | | | | | | | | | | | | | | | | | | | |
| Servo-Control | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 |
| Power Amplifier | | | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | | 2 | 2 | 2 | 2 | 2 | 2 | | 2 | 2 | 2 |
| Supply Motor/Tach | | | | | | | | | | | | | | | | | | 1 | | | |
| Supply Hub | | | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Take-Up Motor/Tach | | | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 2 | 4 | 4 | 4 | 4 | 4 | 4 | | 4 | 4 | 4 |

Refer to Table 1-4 if, after running Operator Test 01, Fault Code 24 appears on the display. Table 1-2 indicates that Test 02 is required. If Test 02 is unsuccessful, refer the fault code displayed to this table for probable failing assemblies.

Table 1-4. TEST 02 TERMINATION CODES FOLLOWING TEST 01 FAULT CODE 24

| FAULT CODE | 70 | 71 | 72 | 73 | 74 | 75 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 89 | 90 | 91 | 92 | 97 | 98 | 00 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OPERATOR ACTION | | | | | | | | | | | | | | | | | | | | | |
| Illegal Op Sequence | A | | | | | | | | | | | | | | | | | | | | |
| Ensure Tape is Thd'd | | B | | | | | | | | | | | | | | | | | | | |
| Repeat Test | | C | | | | | | | | | | | | | | | | | | | A |
| FAILING ASSEMBLY | | | | | | | | | | | | | | | | | | | | | |
| Servo-Control | | 1 | 1 | 3 | 1 | 3 | 1 | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 1 | 3 | 1 |
| Power Amplifier | | | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Supply Motor/Tach | | | | 1 | | 1 | | | | | | | | | | | | 1 | | 1 | |

Refer to Table 1-5 if, after running Operator Test 01, Fault Code 26 appears on the display. Table 1-2 indicates that Test 02 is required. If Test 02 is unsuccessful, refer the fault code displayed to this table for probable failing assemblies.

Table 1-5. TEST 02 TERMINATION CODES FOLLOWING TEST 01 FAULT CODE 26

| FAULT CODE | 70 | 71 | 72 | 73 | 74 | 75 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 89 | 90 | 91 | 92 | 97 | 98 | 00 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OPERATOR ACTION | | | | | | | | | | | | | | | | | | | | | |
| Illegal Op Sequence | A | | | | | | | | | | | | | | | | | | | | |
| Ensure Tape is Thd'd | | B | | | | | | | | | | | | | | | | | | | |
| Repeat Test | | C | | | | | | | | | | | | | | | | | | | A |
| FAILING ASSEMBLY | | | | | | | | | | | | | | | | | | | | | |
| Servo-Control | | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 3 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Power Amplifier | | | | | | | | 1 | 1 | | | | | | | | | | | | |
| Supply Motor/Tach | | | | | | | | 2 | | | | | | | | | | | | | |
| Take-Up Motor/Tach | | | 2 | 2 | 2 | 2 | 2 | | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |

Refer to Table 1-6 if, after running Operator Test 01, Fault Code 30, 31 or 36 appears on the display. Table 1-2 indicates that Test 02 is required if operator action A did not resolve the problem. If Test 02 is unsuccessful, refer the fault code displayed to this table for probable failing assemblies.

Table 1-6. TEST 02 TERMINATION CODES FOLLOWING TEST 01 FAULT CODES 30, 31, OR 36

| FAULT CODE | 70 | 71 | 72 | 73 | 74 | 75 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 89 | 90 | 91 | 92 | 97 | 98 | 00 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OPERATOR ACTION | | | | | | | | | | | | | | | | | | | | | |
| Illegal Op Sequence | A | | | | | | | | | | | | | | | | | | | | |
| Ensure Tape is Thd'd | | B | | | | | | | | | | | | | | | | | | | |
| Repeat Test | | C | | | | | | | | | | | | | | | | | | | A |
| FAILING ASSEMBLY | | | | | | | | | | | | | | | | | | | | | |
| Servo-Control | | 1 | | 2 | | 2 | 3 | 3 | 3 | 3 | 2 | | 3 | 3 | | | 3 | | 3 | 3 | 3 |
| Power Amplifier | | | | | | | 1 | 1 | 1 | 1 | | | 1 | 1 | | | | | 1 | 1 | 1 |
| Pneumatic Pump | | | 3 | 4 | 3 | 4 | | | | | | | | | | | 2 | 2 | | | |
| Filter | | | 2 | | 2 | | | | | | | | | | | | | 1 | | | |
| Supply Air Bearing | | | | | 1 | 1 | | | | | | | | | 1 | | | | | | |
| Take-Up Air Bearing | | | 1 | 1 | | | | | | | | | | | | 1 | | | | | |
| Take-Up Motor/Tach | | | | | | | 2 | 2 | 2 | 2 | 1 | | 2 | 2 | | | | | 2 | 2 | 2 |
| Pressure Regulator | | | 4 | 3 | 4 | 3 | | | | | | | | | | | 1 | 3 | | | |

1.2.1.3 Test 03 Follow-Up - Refer to Table 1-7 if, after execution of Operator Test 01, Fault Code 03 appears on the display. Table 1-2 indicates that Test 03 is required if operator actions A or B does not resolve the problem. If Test 03 is unsuccessful, refer the fault code displayed to this table for probable failing assemblies.

Table 1-7. TEST 03 TERMINATION CODES FOLLOWING TEST 01 FAULT CODE 03

| FAULT CODE | 82 | 84 | 94 | 95 | 96 | 98 | 00 |
|---|---|---|---|---|---|---|---|
| OPERATOR ACTION | | | | | | | |
| Ensure Tape is Not Threaded | | | A | | | | |
| Repeat Test | | | B | A | | | A |
| FAILING ASSEMBLY | | | | | | | |
| Servo-Control | | | 1 | 1 | 2 | 1 | 4 |
| Power Amplifier | 1 | | | | | | |
| Read/Write Head | | | | | | | 3 |
| Take-Up Motor/Tach | | | | | | 2 | |

Refer to Table 1-8 if, after execution of Operator Test 01, Fault Code 25 appears on the display. Table 1-2 indicates that Test 03 is required. If Test 03 is unsuccessful, refer the fault code to this table for probable failing assemblies.

Table 1-8. TEST 03 TERMINATION CODES FOLLOWING TEST 01 FAULT CODE 25

| FAULT CODE | 82 | 84 | 94 | 95 | 96 | 98 | 00 |
|---|---|---|---|---|---|---|---|
| OPERATOR ACTION | | | | | | | |
| Ensure Tape is Not Threaded | | | A | | | | |
| Repeat Test | | | B | A | | | A |
| FAILING ASSEMBLY | | | | | | | |
| Servo-Control | 2 | 2 | 1 | 1 | 2 | 2 | 2 |
| Power Amplifier | 1 | 1 | | | 1 | | 1 |
| Read-Write Head | | | | | | | |
| Take-Up Motor/Tach | | | | | | 1 | |
| Pneumatic Pump | | | | | | | |
| Filter | | | | | | | |
| Pressure Regulator | | | | | | | |

Refer to Table 1-9 if, after execution of Operator Test 01, Fault Code 04, 06, or 36 appears on the display. Table 1-2 indicates that Test 03 is required if operator actions A or B does not resolve the problem. If Test 03 is unsuccessful, refer the fault code displayed to this table for probable failing assemblies.

Table 1-9. TEST 03 TERMINATION CODES FOLLOWING TEST 01 FAULT CODE 04, 06, or 36

| FAULT CODE | 82 | 84 | 94 | 95 | 96 | 98 | 00 |
|---|---|---|---|---|---|---|---|
| OPERATOR ACTION | | | | | | | |
| Ensure Tape is Not Threaded | | | A | | | | |
| Repeat Test | | | B | A | | | A |
| FAILING ASSEMBLY | | | | | | | |
| Servo-Control | | 2 | 1 | 1 | 2 | 1 | 1 |
| Power Amplifier | 1 | | | | | | |
| Read/Write Head | | | | | | | 3 |
| Take-Up Motor/Tach | | 1 | | | 1 | 2 | |

Refer to Table 1-10 if, after execution of Operator Test 01, Fault Code 32 appears on the display. Table 1-2 indicates that Test 03 is required. If Test 03 is unsuccessful, refer the fault code to this table for probable failing assemblies.

Table 1-10. TEST 03 TERMINATION CODES FOLLOWING TEST 01 FAULT CODE 32

| FAULT CODE | 82 | 84 | 94 | 95 | 96 | 98 | 00 |
|---|---|---|---|---|---|---|---|
| OPERATOR ACTION | | | | | | | |
| Ensure Tape is Not Threaded | | | A | | | | |
| Repeat Test | | | B | A | | | A |
| FAILING ASSEMBLY | | | | | | | |
| Servo-Control | | | 1 | 1 | 2 | 2 | 1 |
| Power Amplifier | 1 | | | | | | 2 |
| Read-Write Head | | | | | | | |
| Take-Up Motor/Tach | | 1 | | | 1 | 1 | 3 |
| Pneumatic Pump | | | | | | | 5 |
| Filter | | | | | | | 4 |
| Pressure Regulator | | | | | | | 6 |

Refer to Table 1-11 if, after execution of Operator Test 01, Fault Code 33 or 35 appears on the display. Table 1-2 indicates that Test 03 is required if operator actions A or B does not resolve the problem. If Test 03 is unsuccessful, refer the fault code displayed to this table for probable failing assemblies.

Table 1-11. TEST 03 TERMINATION CODES FOLLOWING TEST 01 FAULT CODE 33 or 35

| FAULT CODE | 82 | 84 | 94 | 95 | 96 | 98 | 00 |
|---|---|---|---|---|---|---|---|
| OPERATOR ACTION | | | | | | | |
| Ensure Tape is Not Threaded | | | A | | | | |
| Repeat Test | | | B | A | | | A |
| FAILING ASSEMBLY | | | | | | | |
| Servo-Control | 1 | 1 | 1 | 1 | 1 | | 1 |
| Power Amplifier | | | | | | | |
| Read/Write Head | | | | | | | |
| Take-Up Motor/Tach | | | | | | 1 | |

Refer to Table 1-12 if, after execution of Operator Test 01, Fault Code 48 appears on the display. Table 1-2 indicates that Test 03 is required. If Test 03 is unsuccessful, refer the fault code to this table for probable failing assemblies.

Table 1-12. TEST 03 TERMINATION CODES FOLLOWING TEST 01 FAULT CODE 48

| FAULT CODE | 82 | 84 | 94 | 95 | 96 | 98 | 00 |
|---|---|---|---|---|---|---|---|
| OPERATOR ACTION | | | | | | | |
| Ensure Tape is Not Threaded | | | A | | | | |
| Repeat Test | | | B | A | | | A |
| FAILING ASSEMBLY | | | | | | | |
| Servo-Control | 1 | 1 | 1 | 1 | 2 | | 1 |
| Power Amplifier | | | | | | | 2 |
| Read-Write Head | | | | | | | |
| Take-Up Motor/Tach | | | | | 1 | 1 | |
| Supply Motor/Tach | 2 | 2 | | | | | 2 |

Refer to Table 1-13 if, after execution of Operator Test 01, Fault Code 52 appears on the display. Table 1-2 indicates that Test 03 is required if operator actions A or B does not resolve the problem. If Test 03 is unsuccessful, refer the fault code displayed to this table for probable failing assemblies.

Table 1-13. TEST 03 TERMINATION CODES FOLLOWING TEST 01 FAULT CODE 52

| FAULT CODE | 82 | 84 | 94 | 95 | 96 | 98 | 00 |
|---|---|---|---|---|---|---|---|
| OPERATOR ACTION | | | | | | | |
| Ensure Tape is Not Threaded | | | A | | | | |
| Repeat Test | | | B | A | | | A |
| FAILING ASSEMBLY | | | | | | | |
| Servo-Control | 2 | 2 | 1 | 1 | 2 | | 2 |
| Power Amplifier | | | | | | | |
| Read/Write Head | | | | | | | |
| Take-Up Motor/Tach | | | | | 1 | 1 | |

Refer to Table 1-14 if, after execution of Operator Test 01, Fault Code 30 or 31 appears on the display. Table 1-2 indicates that Test 03 is required. If Test 03 is unsuccessful, refer the fault code to this table for probable failing assemblies.

Table 1-14. TEST 03 TERMINATION CODES FOLLOWING TEST 01 FAULT CODE 30 or 31

| FAULT CODE | 82 | 84 | 94 | 95 | 96 | 98 | 00 |
|---|---|---|---|---|---|---|---|
| OPERATOR ACTION | | | | | | | |
| Ensure Tape is Not Threaded | | | A | | | | |
| Repeat Test | | | B | A | | | |
| FAILING ASSEMBLY | | | | | | | |
| Servo-Control | 2 | 2 | 1 | 1 | 2 | | 3 |
| Power Amplifier | 1 | | | | | | 1 |
| Read-Write Head | | | | | | | |
| Take-Up Motor/Tach | | 1 | | | 1 | 1 | 2 |

### 1.2.2 On-Site Actions

Prior to initiating any diagnostic test, perform a thorough visual inspection of the TU81/TA81. Inspection of the head recording surface, cleaner blades, write enable reflective ring, hub assemblies, and proper seating of electrical connectors is always the first step in an organized troubleshooting procedure.

After the visual inspection, perform a functional check of the TU81/TA81 as follows (see Figure 1-1):

1. Perform Functional Troubleshooting Procedure 1001. This procedure checks out the functional operation of the transport, including ancillary sensors, which the microprocessor cannot fault detect without manual operation and visual feedback.

2. Refer to the individual troubleshooting procedures for specific fault codes.

3. Perform any corrective action as directed by the troubleshooting procedures.

4. Verify operation of the transport by again performing Operator Diagnostic 01 or other set up tests, as directed by the troubleshooting procedure.

## 1.3 DIAGNOSTIC TESTS

The maintenance philosophy for trouble analysis of the TU81/TA81 is to minimize the time required to restore the TU81/TA81 to an on-line status, after a reported fault condition occurs. This is accomplished by providing two types of diagnostics as follows:

1. A test which the operator initiates prior to reporting the fault condition.

2. Field Service tests to be performed at the request of or by maintenance personnel.

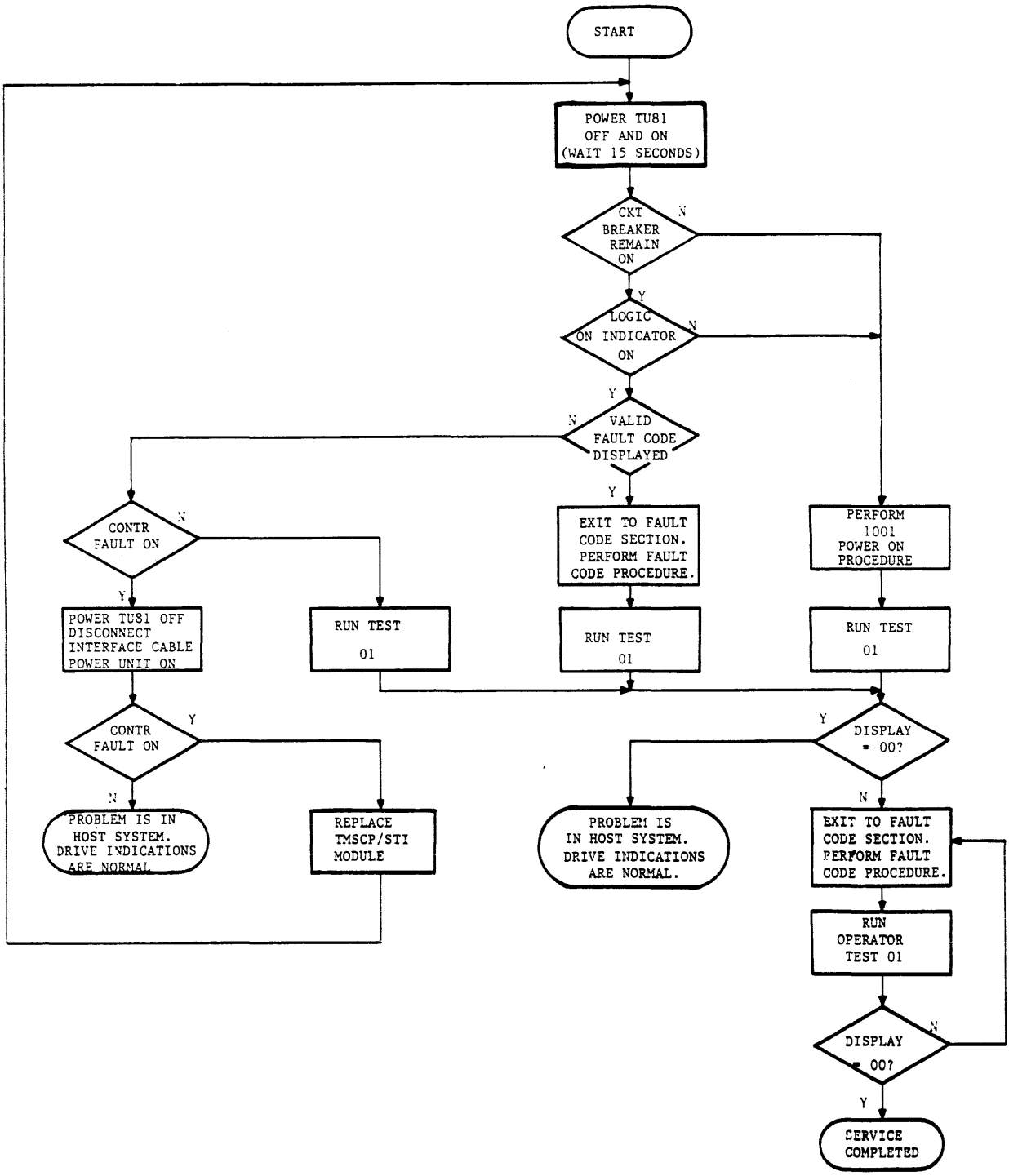



Figure 1-1. ON-SITE TROUBLESHOOTING FLOWCHART

### 1.3.1 Operator Tests

The operator tests are:

1. Operator Diagnostic (Test 01)
2. Unit Identification (Test 04)

The operator diagnostic comprises a functional test which directs operator actions after a fault code appears. Operator tests, procedures and a fault code/corrective action table are contained in the CUSTOMER DIAGNOSTICS section of the TU81/TA81 Subsystem User Guide. The fault code may indicate any one or more of the following types of fault conditions:

- Environment or Media Problems

  This type of problem would direct the operator to clean the tape path area and/or use another known good quality tape.

- Operator Error Problem

  This type of problem would indicate conditions such as top cover open, write enable ring not present, tape threaded incorrectly, etc.

- Transport Circuit Problems

  These would be fault conditions which require field service personnel intervention.

It is the responsibility of the field service representative to ensure that the operator performs this diagnostic, and to determine from the operator the fault code which appears, after running the operator diagnostic.

Because the operator diagnostics are an integral part of the trouble analysis procedures, subsequent paragraphs contain the procedure to initiate this diagnostic. The only difference between the procedure contained in the CUSTOMER DIAGNOSTICS section of the TU81/TA81 Subsystem User Guide, and the following procedure, is an expanded feature to display a Sub-Fault Code for maintenance purposes.

#### 1.3.1.1 Operator Diagnostic (Test 01)

The operator diagnostic consists of one selectable test (Test 01) which runs for approximately 10 minutes, when a 2400 foot tape is used. Faults encountered during the test terminate the diagnostics and display a numerical code on the display panel. Any fault code should be logged by the operator and reported to the field service representative, if operator corrective actions do not resolve the problem. The operator diagnostics are initiated as follows:

- Transport Status

  1. Transport powered on (LOGIC ON indicator lit).

  2. Tape threaded through tape path and onto take-up reel, but not loaded (untensioned).

- Test Procedure

  1. Press TEST switch.

     a. DIAGNOSTIC indicator lights.
     b. Display panel shows 01.
     c. Disable port switches (TA81 only).

  2. Press EXECUTE switch.

     a. Test starts with display panel incrementing from 000 thru 999. Verify that all segments of the numerical display are functioning.

     b. Concurrent with step a. above, the following indicators are lit: FILE PRO, LOGIC ON, ON-LINE, RESET/FAULT, and DIAGNOSTICS.

     c. Test continues with various motion and read/write exercises for approximately 10 minutes.

The transport performs a Rewind/Unload operation and 00 appears on the display panel if the test runs to completion. If the test is unsuccessful, the test terminates and a fault code appears on the display panel. If the problem cannot be resolved through operator actions, as indicated in Table 1-2, the fault code is referenced directly to the corresponding troubleshooting procedure for corrective action.

When referring to the Fault Code Troubleshooting Procedures for corrective action, a Sub-Fault Code interrogation may be required. With the fault code still indicated on the display panel, press and hold the CE switch. This action will cause the Sub-Fault Code to appear on the display.

### 1.3.1.2 Unit Identification (Test 04)

The Unit Identification Number (Test 04) is a unit address feature giving each tape transport a unique ID code (from 0 to 255) to be recognized by the host. This ID is especially useful in a multi-drive configuration since it gives you the opportunity to re-address peripheral device from one tape drive to another in case of emergency (tape drive failure, connection breakdown, etc.).

The Unit Number is a three-digit code that is manually entered from the transport control panel using the procedure shown below. This code is stored in the transport non-volatile memory (which retains stored data in case of power fluctuations or failure) until you enter a new unit ID number. The Unit Number is constantly indicated on the display panel when the drive is powered on and is in the normal on-line, off-line, or tape-unloaded status. When there is a fault condition, or a diagnostic test is running, the Unit Number is replaced by the fault code or test number indications.

The unit number can flash on the display if low Tension Mode is detected (see Test 82, Option 01).

Example - To enter Unit Identification Number 201, proceed as follows:

| | |
|---|---|
| * Press simultaneously CE and TEST switches | -- DIAGNOSTIC indicator -- display = 00 |
| * Press STEP four times | -- display = 04 |
| * Press EXECUTE | -- display = 000 |
| * Press STEP twice | -- display = 002 |
| * Press TEST twice | -- display = 200 |
| * Press STEP once | -- display = 201 |

To store that ID code in the transport memory,

| | |
|---|---|
| * Press EXECUTE | -- display = 00 |
| * Press RESET to return the drive to operating condition | -- display = 201 |

### 1.3.2 Field Service Diagnostic Tests

Field service diagnostic tests should be performed in conjunction with the requirements of the Fault Code Troubleshooting Procedures. When reporting to the site, obtain as much information from the operator and operating system as is available. Fault Codes, the frequency at which they occur and, if possible, the operation in progress at that time, are all things which should be considered prior to execution of the diagnostics. If the fault is intermittent, the information received from the operator and operating system may be instrumental in directing field service personnel to the appropriate test to duplicate the condition, under which the fault occurs.

If the fault condition is a "hard error", or one which occurs frequently, start the troubleshooting procedure by executing Operator Diagnostic Test 01. This test is a lead-in to all fault codes and subsequent troubleshooting procedures.

1.3.2.1 Initiating Field Service Diagnostic Tests - The field service diagnostic tests are initiated as follows:

o Transport Status

  Status requirements of the transport are listed in the individual Field Service Diagnostic Tests.

o Test Procedure

  1. While pressing CE switch, press TEST switch.

     a. DIAGNOSTICS indicator illuminates.

     b. Display panel indicates 00.

  2. Press STEP switch.

     a. Display number increments each time STEP is pressed, or will increment automatically, if STEP is held pressed.

     b. To facilitate test number selection, the following procedure can be used. Example: Test 39 selection required.

        - Press STEP switch until 03 appears on display panel.
        - Press TEST switch and the 3 digit transfers to the left.
        - Display now indicates 30.
        - Press STEP switch again until display increments from 30 to 39.

     c. If test options (see Section 2) are desired, press and hold CE switch, then press EXEC while CE is held pressed. Display will indicate 00. STEP switch is then pressed to select the desired option.

  3. Press EXECUTE switch.

     a. Test is initiated.

If test runs to completion, the display panel indicates 00.
If test fails, the display panel indicates the fault code.

1.3.2.2 Field Service Special LOAD/UNLOAD Procedures - While performing specific Fault Code Procedures, the Field Service Representative may be directed to perform a TEST LOAD or an UNTENSIONED UNLOAD procedure. A description of these special procedures is as follows:

- o TEST LOAD - This function is used if a reel of tape is suspected of not being wrapped properly and a tape re-wrap is necessary.

  1. Press TEST Switch - DIAGNOSTIC indicator lights and display indicates 01.

  2. Press LOAD Switch - Forward tape motion is initiated to EOT. The take-up reel motor moves tape while the supply reel motor is completely untensioned. When EOT is detected, a normal rewind function is initiated (with tape tension) to BOT.

- o UNTENSIONED UNLOAD - This function is used to unwrap tape from the take-up reel onto the supply reel following a servo fault. The velocity servo (take-up reel motor) is completely untensioned while the supply reel moves tape in the reverse direction. Press UNLOAD switch while tape is untensioned (not loaded).

1.3.2.3 Sub-Fault Codes - The troubleshooting procedures may direct the field service representative to display the sub-fault code associated with the primary fault code. The sub-fault code is displayed by pressing the CE switch after the primary fault code appears on the digital indicators. The sub-fault code will be displayed as long as the CE switch is held pressed. Interpretation of the sub-fault codes is discussed in section 1.5.

## 1.4 KEY TO FAULT CODE TROUBLESHOOTING PROCEDURES

After a fault code appears on the display panel, reference the fault code number directly to the corresponding number of the troubleshooting procedures listed numerically on subsequent pages. The basic troubleshooting procedure format (Figure 1-2) uses YES (Y) or NO (N) responses to sequential conditions to lead maintenance personnel to appropriate corrective action.

When a fault can be caused by any one of several factors, the separate actions to correct each of these factors are numbered according to priority level with the action having the highest probability of success being listed as number 1. If several actions have the same probability of correcting the fault, the one that is easiest to perform (takes the least time) is listed as the first action.

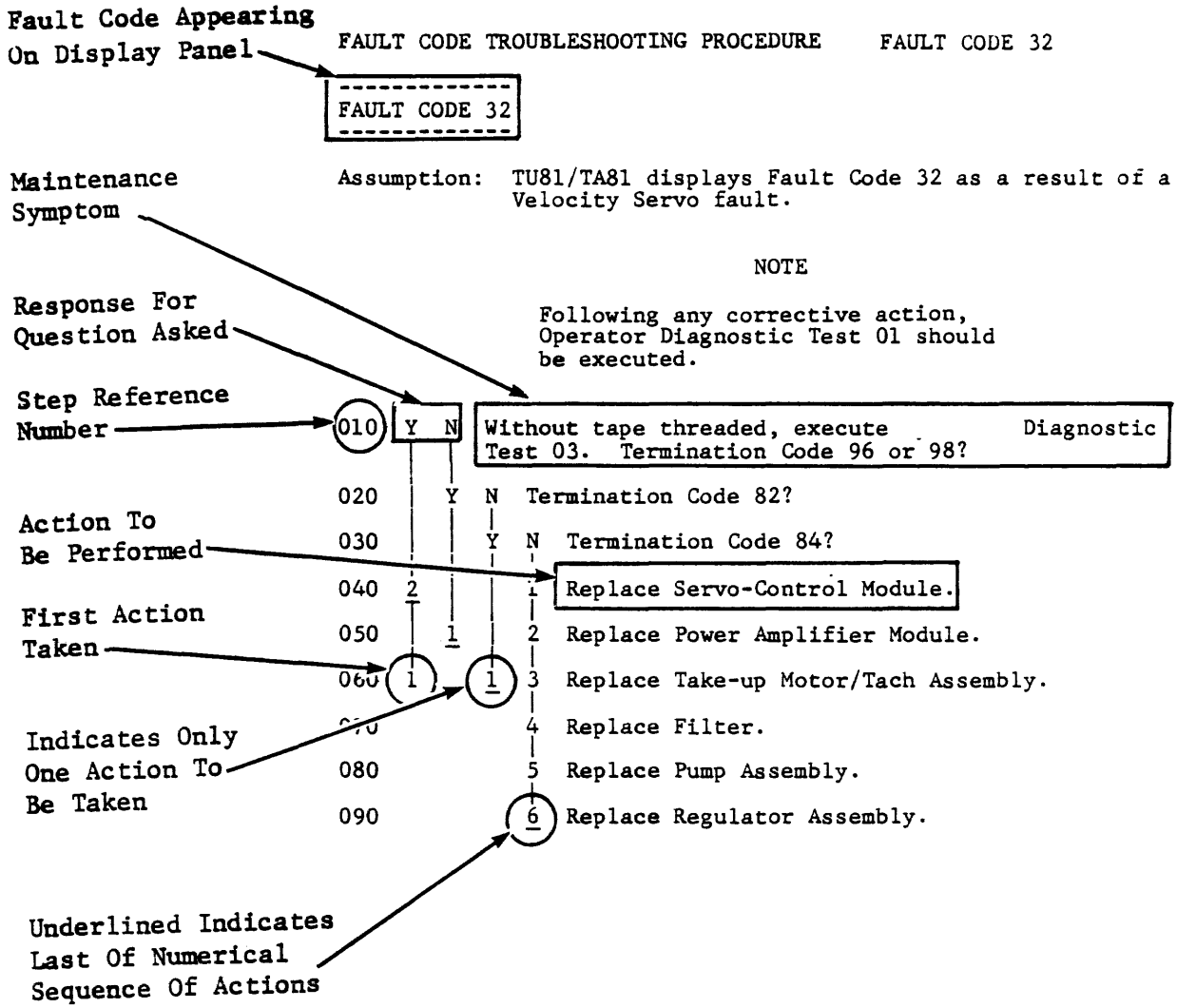



Figure 1-2. KEY TO FAULT CODE TROUBLESHOOTING PROCEDURE

## 1.5 SUB-FAULT CODE INTREPRETATION

As mentioned in paragrapn 1.3.2.3, tne sub-fault code is displayed by pressing the CE switch after tne primary fault code is indicated. Sub-fault codes are listed after the associated fault code.

Interpretation of tne sub-fault numerical display is as follows:

1. Example 1 - Fault Code 25, Sub-Fault Code 64

   a. 40 - Take Up sensor saw fault code first.
   b. 20 - Fault code occurred on up ramp.
   c. 04 - Fault occurred in reverse direction.
   d. 00 - Fault occurred with low speed demanded.
   e. 00 - Fault occurred in start/stop mode.

   64

FAULT CODE 25 SUB-FAULT CODE

| | | |
|---|---|---|
| | 00 | File sensor saw the fault first |
| a. → | 40 | Takeup sensor saw the fault first |
| | 00 | Fault occurred during constant motion |
| | 10 | Fault occurred on down ramp |
| b. → | 20 | Fault occurred on up ramp |
| | 30 | Fault occurred in stoplock |
| | 00 | Fault occurred in forward direction |
| c. → | 04 | Fault occurred in reverse direction |
| d. → | 00 | Fault occurred with low speed demanded |
| | 01 | Fault occurred with high speed demanded |
| | 02 | Fault occurred with rewind speed demanded |
| e. → | 00 | Fault occurred in start/stop mode |
| | 08 | Fault occurred in streaming mode |

Figure 1-3. SUB-FAULT CODE INTERPRETATION - EXAMPLE 1

2. Example 2 - Fault Code 25, Sub-Fault Code 19

a. 00 - File sensor saw fault first.
b. 10 - Fault occurred on down ramp.
c. 00 - Fault occurred in forward direction.
d. 01 - Fault occurred with low speed demanded.
e. 08 - Fault occurred in streaming mode.

19

FAULT CODE 25 SUB-FAULT CODE

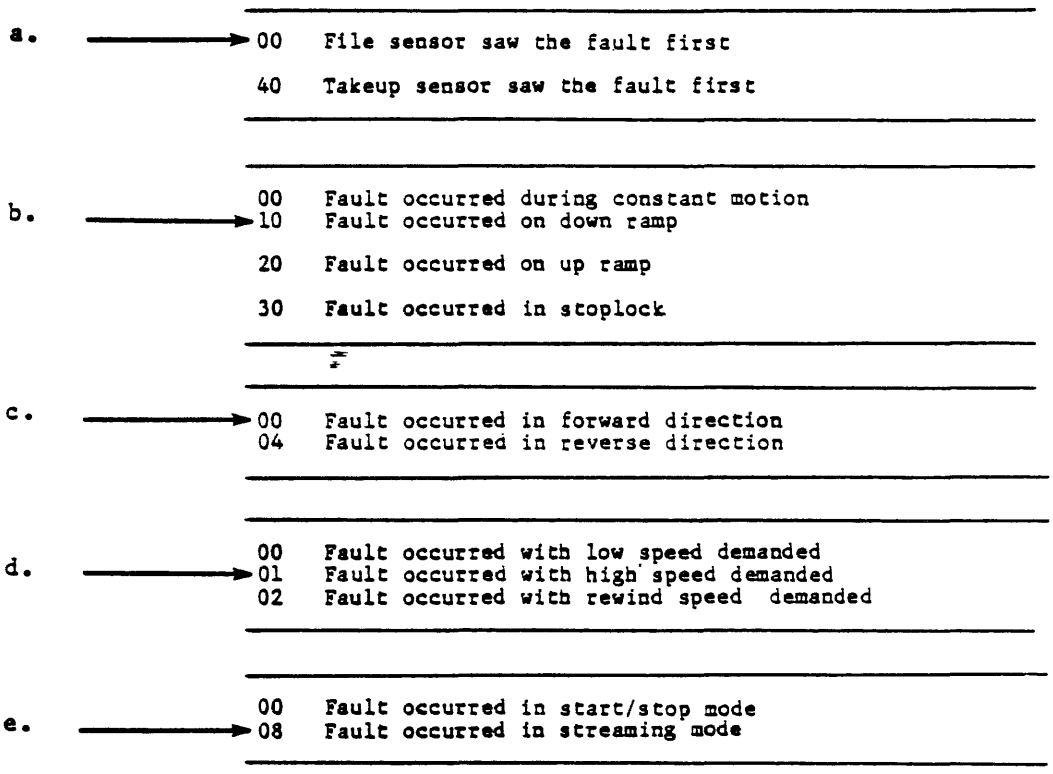



Figure 1-4. SUB-FAULT CODE INTERPRETATION - EXAMPLE 2

## 1.6 TROUBLESHOOTING DIAGRAMS

NOTE

Functional Troubleshooting Procedure 1001 through 1003 check out the functional operation of the TU81/TA81, including ancilliary sensors, which the TU81/TA81 microprocessors cannot fault detect without manual operation and visual feedback.

## POWER-ON CHECKOUT 1001

This Power-On/Installation Procedure is for the isolation of AC Power faults.

Assumption: The TU81/TA81's AC circuit breaker is turned off and the TU81/TA81 is plugged into a "live" AC supply of the correct voltage.

NOTE

Following any corrective action, reconnect any assemblies that may have been disconnected and restart this procedure with circuit breaker turned off.

| | | | | | |
|---|---|---|---|---|---|
| 010 | Y | N | | | Turn circuit breaker ON. Does circuit breaker remain on? |
| 020 | | Y | N | | Disconnect cooling fan cable from power supply. Turn circuit breaker on. Does circuit breaker remain on? |
| 030 | | | Y | N | Reconnect cooling fan cable to power supply. Disconnect pump cable from power supply. Turn circuit breaker on. Does circuit breaker remain on? |
| 040 | | | | 1 | Replace Power Supply Assembly. |
| 050 | | | 1 | | Replace Pump Assembly. |
| 060 | | 1 | | | Replace Cooling Fan Assembly. |
| 070 | Y | N | | | Is the LOGIC ON LED on control panel illuminated? |
| 080 | | Y | N | | Is the LOGIC OFF LED on control panel illuminated? |
| 090 | | | Y | N | Is the cooling fan operating? |
| 100 | | | | 1 | Ensure that AC supply cable is plugged into power supply cable. |
| | 2A | 2B | 2C | 2D | |

```
     A  B  C  D
     1  1  1  1
     |  |  |  |
110  |  |  |  2  Ensure that AC supplied to the TU81/TA81 is
     |  |  |  |  "live" and the correct voltage for the unit.
     |  |  |  |
120  |  |  |  3  Replace Power Supply Assembly.
     |  |  |
130  |  |  1  Ensure control panel cable is plugged into Servo-
     |  |  |  Control Module and power supply.
     |  |  |
140  |  |  2  Replace Power Supply Assembly.
     |  |  |
150  |  |  3  Replace Control Panel Assembly.
     |  |
160  |  Y  N  Is the cooling fan operating?
     |  |  |
170  |  |  1  Replace Power Supply Assembly.
     |  |
180  |  1  Go to Procedure 1002.
     |
190  Y  N  Is the cooling fan operating?
     |  |
200  |  1  Replace Cooling Fan Assembly.
     |  |
210  |  2  Replace Power Supply Assembly.
     |
220  Y  N  Is the OFF LED illuminated?
     |  |
230  |  Y  N  Does 3-digit display show unit identification,
     |  |  |  is FILE PRO LED illuminated, and RESET/FAULT,
     |  |  |  ON-LINE and DIAGNOSTICS LED's all extinguished?
     |  |  |
240  |  |  Y  N  Are RESET/FAULT, ON-LINE, and DIAGNOSTICS LED's
     |  |  |  |  all illuminated?
     |  |  |  |
250  |  |  |  Y  N  Is the display blank?
     |  |  |  |  |
260  |  |  |  |  Y  N  Wait for 15 seconds.  Is RESET/FAULT LED
     |  |  |  |  |  |  extinguished?
     |  |  |  |  |  |
270  |  |  |  |  |  Y  N  Is a valid fault code displayed?
     |  |  |  |  |  |  |
280  |  |  |  |  1  |  1  Replace Servo-Control Module. (Run Set-
     |  |  |  |     |     Up Tests 37, 49, 82, 04, 64, 31.)
     |  |  |  |     |
     3  3  3  3     3
     A  B  C  D     E
```

| | A | B | C | D | | E | |
|---|---|---|---|---|---|---|---|
| | 2 | 2 | 2 | 2 | | 1 | |
| 290 | | | | | | 1 | Go to procedure for displayed Fault Code. |
| 300 | | | | Y | N | | Is FILE PRO LED illuminated? |
| 310 | 1 | | | | 1 | | Replace Control Panel Assembly. |
| 320 | | | 1 | 1 | 2 | | Replace Servo-Control Module. (Run Set Up Tests 37, 49, 82, 04, 64, 31). |
| 330 | 2 | | 2 | | | | Replace Power Supply Assembly |
| 340 | | 1 | | | | | Go to Procedure 1003. |

## POWER-ON CHECKOUT 1002

This Power-On Procedure is for the isolation of DC Power faults.

Assumption: The TU81/TA81's AC circuit breaker is turned on, the OFF LED is illuminated and the cooling fan is operating.

NOTE

Following any corrective action, reconnect any assemblies that may have been disconnected and restart this procedure.

| | | | | | |
|---|---|---|---|---|---|
| 010 | Y | N | | | Disconnect DC cable harnesses from the power supply. Press LOGIC ON switch of control panel. Does LOGIC ON LED illuminate and stay illuminated? (See Table 1-1.) |
| 020 | | 1 | | | Replace Power Supply Assembly. |
| 030 | Y | N | | | Reconnect DC cable harnesses to power supply. Disconnect DC supply cable from Power Amplifier Module. Press LOGIC ON switch. Does LOGIC ON LED illuminate and stay illuminated? |
| 040 | | Y | N | | Reconnect DC supply cable to Power Amplifier Module. Disconnect DC supply cable from Write Driver Module. Press LOGIC ON switch. Does LOGIC ON LED illuminate and stay illuminated? |
| 050 | | | Y | N | Reconnect DC supply cable to Write Driver Module. Disconnect DC supply cable from Servo-Control Module and Read Amplifier Module. Press LOGIC ON switch. Does LOGIC ON LED illuminate and stay illuminated? |
| | 2A | 2B | 2C | 2D | |

| | A | B | C | D | | |
|---|---|---|---|---|---|---|
| | 1 | 1 | 1 | 1 | | |
| 060 | | | | Y | N | Reconnect DC supply cable to Servo-Control Module and Read Amplifier Module. Disconnect DC supply cable from Formatter Write Module and Formatter Read Module. Press LOGIC ON switch. Does LOGIC ON LED illuminate and stay illuminated? |
| 070 | | | | | Y | N Reconnect DC supply cable to Formatter Read Module. Disconnect DC supply cable from Interface Module. Press LOGIC ON switch. Does LOGIC ON LED illuminate and stay illuminated? |
| 080 | | | | | | 1 Replace Power Supply Assembly. |
| 090 | | | | | 2 | 2 Replace Control Panel Assembly. |
| 100 | | | | | 1 | Replace Interface Module. |
| 110 | | | | Y | N | Remove Formatter Write Module and reconnect DC supply cable to Formatter Read Module. Press LOGIC ON switch. Does LOGIC ON LED illuminate and stay illuminated? |
| 120 | | | | | 1 | Replace Formatter Read Module. |
| 130 | | | | 2 | 2 | Replace Power Supply Assembly. |
| 140 | | | | 1 | | Replace Formatter Write Module. |
| 150 | | | Y | N | | Remove Servo-Control Module and reconnect DC supply cable to Read Amplifier Module. Press LOGIC ON switch. Does LOGIC ON LED illuminate and stay illuminated? |
| 160 | | | | 1 | | Replace Read Amplifier Module. (Run Set Up Test 31.) |
| 170 | 2 | 2 | 2 | 2 | | Replace Power Supply Assembly. |
| 180 | | | 1 | | | Replace Servo-Control Module. (Run Set Up Tests 37, 49, 82, 04, 64, 31.) |
| 190 | | 1 | | | | Replace Write Driver Module. (Run Set Up Tests 64, 31). |
| 200 | 1 | | | | | Replace Power Amplifier Module. |

## POWER-ON CHECKOUT 1003

This Power-On Procedure is for the detection/isolation of operational faults.

Assumption: The TU81/TA81 is powered on with the LOGIC OFF LED extinguished, the LOGIC ON LED illuminated, the FILE PRO LED illuminated, the display blank, and the TU81/TA81 unloaded.

NOTE

Following any corrective action, this procedure should be restarted.

| | | | |
|---|---|---|---|
| 010 | Y | N | Thread a write enabled tape and close top cover. Press TEST switch. Does DIAGNOSTICS LED illuminate? |
| | | | |
| 020 | | 1 | Replace Control Panel Assembly. |
| | | | |
| 030 | | 2 | Replace Servo-Control Module. (Run Set Up Tests 37, 49, 82, 04, 64, 31.) |
| | | | |
| 040 | Y | N | Is 01 displayed? |
| | | | |
| 050 | | 1 | Replace Control Panel Assembly. |
| | | | |
| 060 | | 2 | Replace Servo-Control Module. (Run Set Up Tests 37, 49, 82, 04, 64, 31.) |
| | | | |
| 070 | Y | N | Press EXECUTE switch and observe LEDs and display of operator panel. Does display sequence from 00 to 11 to 22 to 99 without any missing segments? And while display is sequencing, are ON-LINE, HI DENSITY, and RESET/FAULT LEDs illuminated? |
| | | | |
| 080 | | 1 | Replace Control Panel Assembly. |
| | | | |
| 090 | | 2 | Replace Servo-Control Module. (Run Set Up Tests 37, 49, 82, 04, 64, 31.) |
| | | | |
| 100 | Y | N | Does Diagnostic Test 01 terminate displaying 00? |
| | | | |
| | 2 | 2 | |
| | A | B | |

| | A | B | |
|---|---|---|---|
| | 1 | 1 | |
| 110 | | 1 | Go to the Fault Code Troubleshooting Procedure for the displayed Fault Code. |
| 120 | Y | N | Is the BOT LED extinguished? |
| 130 | | 1 | Replace Servo-Control Module. (Run Set Up Tests 37, 49, 82, 04, 64, 31.) |
| 140 | | 2 | Replace Control Panel Assembly. |
| 150 | Y | N | Press the RESET/FAULT switch. Is the display blank? |
| 160 | | 1 | Replace Control Panel Assembly. |
| 170 | | 2 | Replace Servo-Control Module. (Run Set Up Tests 37, 49, 82, 04, 64, 31.) |
| 180 | Y | N | Thread tape and close operator door. Press LOAD switch. Does TU81/TA81 load tape? |
| 190 | | Y | N Fault Code displayed? |
| 200 | | | 1 Replace Control Panel Assembly. |
| 210 | | | 2 Replace Servo-Control Module. (Run Set Up Tests 37, 49, 82, 04, 64, 31.) |
| 220 | | 1 | Go to the Fault Code Troubleshooting Procedure for the displayed Fault Code. |
| 230 | Y | N | Is BOT LED illuminated? |
| 240 | | 1 | Replace Control Panel Assembly. |
| 250 | | 2 | Replace Servo-Control Module. (Run Set Up Tests 37, 49, 82, 04, 64, 31.) |
| 260 | Y | N | Is FILE PRO LED extinguished? |
| 270 | | 1 | Replace Control Panel Assembly |
| | 3 | 3 | |
| | A | B | |

| | A | B | |
|---|---|---|---|
| | 2 | 2 | |
| 280 | | 2 | Replace Servo-Control Module. (Run Set Up Tests 37, 49, 82, 04, 64, 31.) |
| 290 | Y | N | Press ON-LINE switch. Does ON-LINE LED illuminate? |
| 300 | | 1 | Replace Control Panel Assembly. |
| 310 | | 2 | Replace Servo-Control Module. (Run Set Up Tests 37, 49, 82, 04, 64, 31.) |
| 320 | Y | N | Press RESET/FAULT switch followed by UNLOAD switch. Does TU81/TA81 unload tape? |
| 330 | | Y | N Fault Code displayed? |
| 340 | | | 1 Replace Control Panel Assembly. |
| 350 | | | 2 Replace Servo-Control Module. (Run Set Up Tests 37, 49, 82, 04, 64, 31.) |
| 360 | | 1 | Go to the Fault Code Troubleshooting Procedure for the displayed Fault Code. |
| 370 | Y | N | While pressing CE switch, press TEST switch. Is 00 displayed? |
| 380 | | 1 | Replace Operator Panel Assembly. |
| 390 | | 2 | Replace Servo-Control Module. (Run Set Up Tests 37, 49, 82, 04, 64, 31.) |
| 400 | Y | N | Press STEP switch. Is 01 displayed? |
| 410 | | 1 | Replace Control Panel Assembly. |
| 420 | | 2 | Replace Servo-Control Module. (Run Set Up Tests 37, 49, 82, 04, 64, 31.) |
| 430 | Y | N | Press RESET/FAULT switch. Remove write permit ring from reel and rethread tape. With top cover open, press LOAD switch. Is Fault Code 10 displayed? |
| | A | B | |
| | 4 | 4 | |

| | A | B | |
|---|---|---|---|
| | 3 | 3 | |
| 440 | | 1 | Replace Top Cover Switch Assembly. |
| 450 | | 2 | Replace Servo-Control Module. (Run Set Up Tests 37, 49, 82, 04, 64, 31.) |
| 460 | Y | N | Press RESET/FAULT switch and close top cover. Press LOAD switch. Does the TU81/TA81 load tape successfully? |
| 470 | | 1 | Go to the Fault Code Troubleshooting Procedure for the displayed Fault Code. |
| 480 | Y | N | Is FILE PRO LED illuminated? |
| 490 | | 1 | Replace File Protect Sensor Assembly. |
| 500 | | 2 | Replace Servo-Control Module. (Run Set Up Tests 37, 49, 82, 04, 64, 31.) |
| 510 | | 3 | Replace Supply Hub Assembly. |
| 520 | 1 | | Unload tape; this procedure is completed without finding any faults. |

## FAULT CODE 01 - READ ENVELOPE FAULT

Assumption: TU81/TA81 displays Fault Code 01 as a result of failing to detect a READ signal during a read amplitude checking diagnostic test.

The most probable cause of this fault is a dirty read-write head. Another possible cause is damaged tape.

NOTE

Following any corrective action, Diagnostic Test 01 should be executed.

| | | | |
|---|---|---|---|
| 010 | 1 | | Clean read-write head, tape cleaner and air bearings. |
| 020 | 2 | | Change tape to a known good write enabled tape. |
| 030 | 3 | | Ensure that cables between read-write head and Read Amp and Write Driver Modules are correctly connected. |
| 040 | Y | N | Execute Field Service Test 58. Termination Code 00? |
| 050 | | 1 | Replace Formatter Write Module. |
| 060 | | 2 | Replace Servo-Control Module. (Run Set Up Tests 37, 49, 82, 04, 64, 31.) |
| 070 | Y | N | Unload tape and execute Field Service Test 59. Termination Code 00? |
| 080 | 1 | 3 | Replace Read-Write Head. (Run Set Up Tests 64, 31.) |
| 090 | 3 | 2 | Replace Write Driver Module. (Run Set Up Tests 64, 31) |
| 100 | 2 | 1 | Replace Read Amplifier Module. (Run Set Up Test 31.) |
| 110 | 4 | 4 | Replace Servo-Control Module. (Run Set Up Tests 37, 49, 82, 04, 64, 31.) |
| 120 | | 5 | Replace Write Cable. |

| FAULT CODE 01 SUB-FAULT CODE | |
|---|---|
| 00 | Envelope not detected during read amplitude check (EGC test) |

## FAULT CODE 02 - READ AMPLITUDE TOLERANCE FAULT

Assumption: TU81/TA81 displays Fault Code 02 as a result of detecting a read amplitude out of range during a read amplitude cnecking diagnostic test.

The most probable cause of this fault is a dirty read-write head. Another possible cause is damaged tape.

NOTE

Following any corrective action, Diagnostic Test 01 should be executed.

| | | | |
|---|---|---|---|
| 010 | 1 | | Clean read-write head, tape cleaner and air bearings. |
| 020 | 2 | | Change tape to a known good write enabled tape. |
| 030 | 3 | | Ensure that cables between read-write head and Read Amplifier Module and Write Driver Module are correctly connected. |
| 040 | Y | N | Execute Field Service Test 59. Termination Code 00? |
| 050 | 2 | 2 | Replace Write Driver Module. (Run Set Up Tests 64, 31) |
| 060 | 3 | 1 | Replace Read Amplifier Module. (Run Set Up Test 31.) |
| 070 | 4 | 4 | Replace Servo-Control Module. (Run Set Up Tests 37, 49, 82, 04, 64, 31.) |
| 080 | 5 | 5 | Replace Formatter Write Module. |
| 090 | 1 | 3 | Replace Read-Write Head. (Run Set Up Tests 64, 31.) |
| 100 | | 6 | Replace Write Cable. |

FAULT CODE 02 SUB-FAULT CODE

| | |
|---|---|
| 00 | Read amplitude outside range 1.5 volts ± 0.8 volts (i.e. difference between EGC gain and gain in backup memory would cause an amplitude difference greater than 0.8 volts) |

## FAULT CODE 03 - ID FAULT

Assumption: TU81/TA81 displays Fault Code 03 during an Diagnostic Test due to a failure to read or write the identification burst at load point.

The probable cause of this fault is damaged tape. The tape should be free of defects within the first ten inches of tape after the BOT reflective marker.

NOTE

Following any corrective action, Diagnostic Test 01 should be executed.

| | | | |
|---|---|---|---|
| 010 | 1 | | Clean read-write head, tape cleaner and air bearings. |
| 020 | 2 | | Change tape to a known good write enabled tape. |
| 030 | Y | N | Without tape threaded, run Diagnostic Test 03. Termination Code 00? |
| 040 | | Y | N Termination Code 98? |
| 050 | | | 1 Go to step 040 of Fault Code Troubleshooting Procedure 04. |
| 060 | | 1 | Replace Servo-Control Module. (Run Set Up Tests 37, 49, 82, 04, 64, 31.) |
| 070 | | 2 | Replace Take-Up Motor/Tach Assembly. (Run Set Up Tests 37, 49, 82.) |
| 080 | Y | N | Unload tape, execute Field Service Test 59. Termination Code 00? |
| 090 | 1 | 2 | Replace Write Driver Module. (Run Set Up Tests 64, 31) |
| 100 | 2 | 3 | Replace Read-Write Head. (Run Set Up Tests 64, 31.) |
| 110 | 3 | 1 | Replace Read Amplifier Module. (Run Set Up Test 31.) |
| 120 | 4 | 4 | Replace Servo-Control Module. (Run Set Up Tests 37, 49, 82, 04, 64, 31.) |
| | | 2 | |
| | | A | |

FAULT CODE 03 (Cont'd)

| | | |
|---|---|---|
| | A<br>1<br>\| | |
| 130 | 5 | Replace Formatter Read Module. |
| | \| | |
| 140 | 6 | Replace Formatter Write Module. |
| | \| | |
| 150 | 7 | Replace Write Cable. |

FAULT CODE 03 SUB-FAULT CODES

| | |
|---|---|
| 00 | Unable to read or write PE Identification Burst |
| 01 | Unable to read or write GCR ID, ARA Burst, or ARA ID |
| 02 | AGC fault occurred while reading or writing from BOT in GCR |

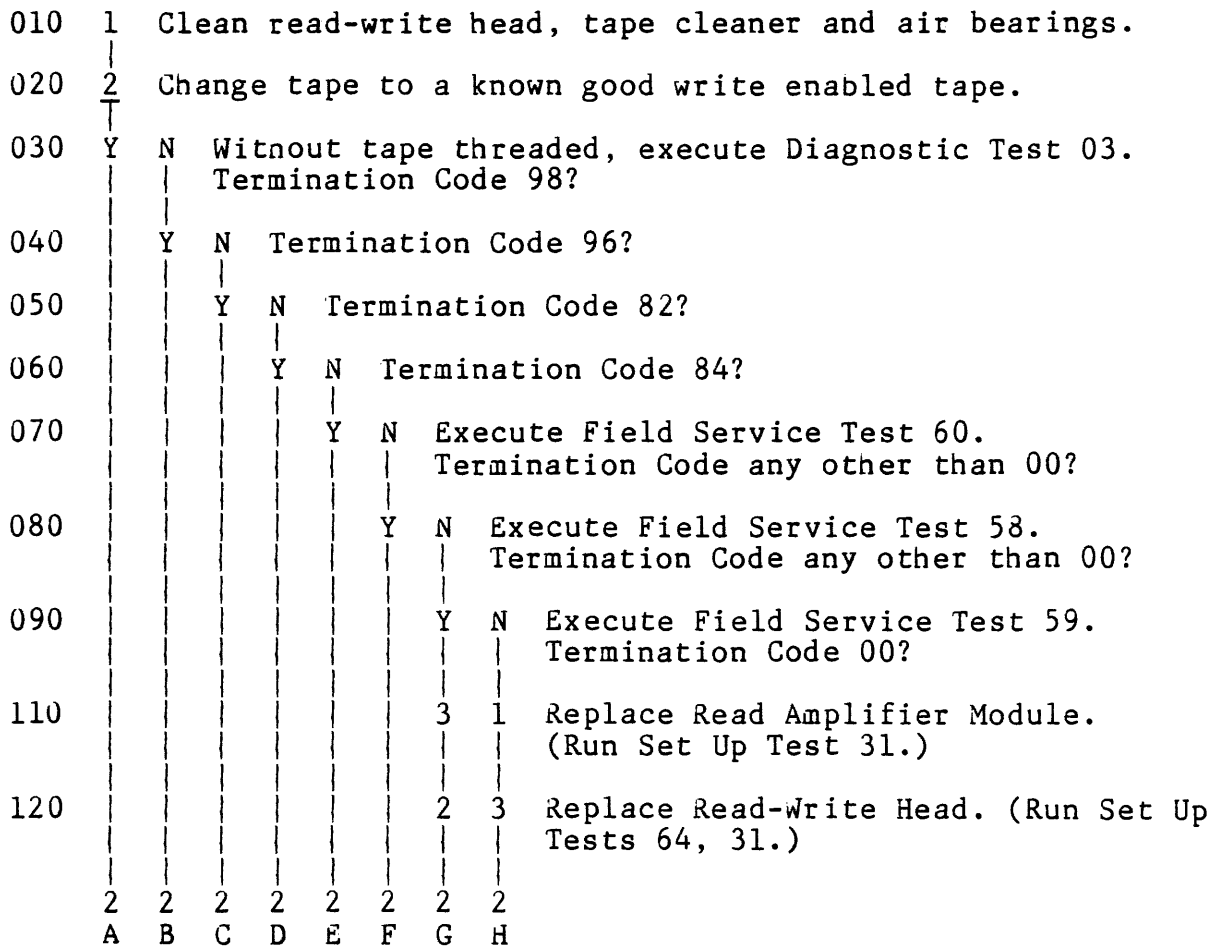
## FAULT CODE 04 - LOW SPEED WRITE ERRORS

Assumption: TU81/TA81 displays Fault Code 04 during an Diagnostic Test due to a failure to write a block witnin five attempts at low speed, or due to too many write errors while writing to EOT at low speed.

The probable causes of this fault are dirty head and damaged tape.

NOTE

Following any corrective action, Diagnostic Test 01 should be executed.



FAULT CODE 04 (Cont'd)

| | A | B | C | D | E | F | G | H | |
|---|---|---|---|---|---|---|---|---|---|
| | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| 130 | | | | | | | 1 | 2 | Replace Write Driver Module. (Run Set Up Tests 64, 31.) |
| 140 | | | | | | | | 4 | Replace Write Cable. |
| 150 | | | | | 1 | | 4 | | Replace Formatter Read Module. |
| 160 | | | | | 2 | 2 | | | Replace Formatter Write Module. |
| 170 | 1 | 2 | | 2 | | 1 | | | Replace Servo-Control Module. (Run Set Up Tests 37, 49, 82, 04, 64, 31.) |
| 180 | 2 | 1 | | 1 | | | | | Replace Take-Up Motor/Tach Assembly. (Run Set Up Tests 37, 49, 82.) |
| 190 | | | 1 | | | | | | Replace Power Amplifier Module. |

FAULT CODE 04 SUB-FAULT CODES

| | |
|---|---|
| 00 | Unable to write a block in PE within 5 attempts |
| 01 | Unable to write a block in GCR within 5 attempts |
| 37 | Filemark detection error |
| 38 | More than 32 write error recoveries performed while writing to EOT |

## FAULT CODE 05 - LOW SPEED READ ERROR

Assumption: TU81/TA81 displays Fault Code 05 during an Diagnostic Test due to a failure to read a block at low speed, or a data error was detected during a data loopback at low speed.

The probable causes of this fault are dirty head and damaged tape.

NOTE

Following any corrective action, Diagnostic Test 01 should be executed.

| | | |
|---|---|---|
| 010 | 1 | Clean read-write head, tape cleaner and air bearings. |
| 020 | 2 | Change tape to a known good write enabled tape. |
| 030 | 3 | Replace Read Amplifier Module. (Run Set Up Test 31.) |
| 040 | 4 | Replace Formatter Read Module. |
| 050 | 5 | Replace Write Driver Module. (Run Set Up Tests 64, 31.) |
| 060 | 6 | Replace Servo-Control Module. (Run Set Up Tests 37, 49, 82, 04, 64, 31.) |
| 070 | 7 | Replace Formatter-Write Module. |
| 080 | 8 | Replace Read-Write Head. (Run Set Up Tests 64, 31.) |
| 090 | 9 | Replace Write Cable. |
| 100 | 10 | Replace Take-Up Motor/Tach assembly. (Run Set Up Tests 37, 49, 82.) |

FAULT CODE 05 SUB-FAULT CODES

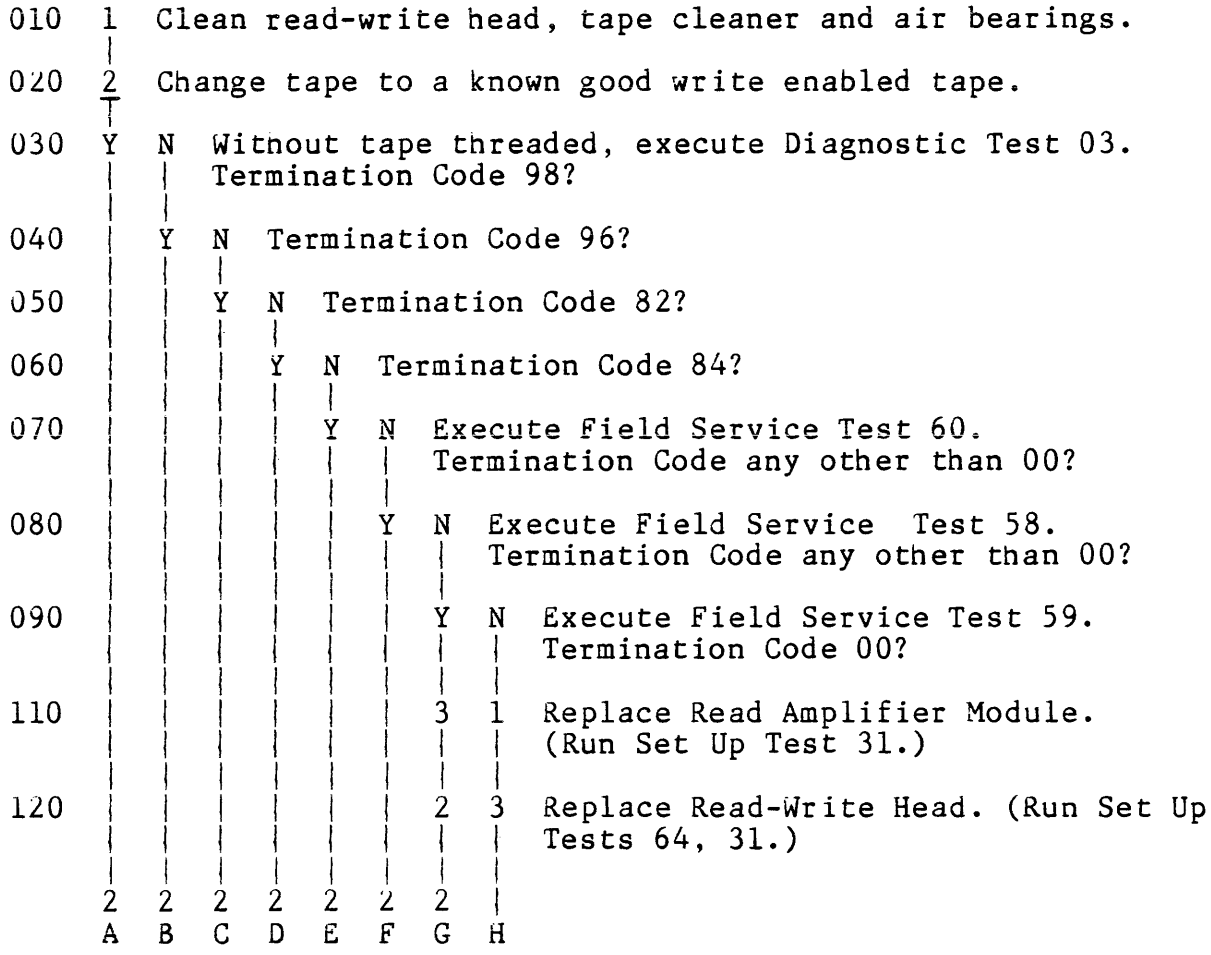
| | |
|---|---|
| 00 | Data error detected while reading in PE (No error recovery performed) |
| 01 | Data error detected while reading in GCR (No error recovery performed) |
| 37 | Filemark detection error |

## FAULT CODE 06 - HIGH SPEED WRITE ERROR

Assumption: TU81/TA81 displays Fault Code 06 during Diagnostic Test 01 due to a failure to write a block within 5 attempts at high speed, or due to too many write errors while writing to EOT at high speed. The probable causes of this fault are a dirty head and damaged tape.

NOTE

Following any corrective action, Diagnostic Test 01 should be executed.



FAULT CODE 06 (Cont'd)

| | A | B | C | D | E | F | G | H | |
|---|---|---|---|---|---|---|---|---|---|
| | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| 130 | | | | | | | 1 | 2 | Replace Write Driver Module. (Run Set Up Tests 64, 31.) |
| 140 | | | | | | | | 4 | Replace Write Cable. |
| 150 | | | | | 1 | | 4 | | Replace Formatter Read Module. |
| 160 | | | | | 2 | 2 | | | Replace Formatter Write Module. |
| 170 | 1 | 2 | | 2 | | 1 | | | Replace Servo-Control Module. (Run Set Up Tests 37, 49, 82, 04, 64, 31.) |
| 180 | 2 | 1 | | 1 | | | | | Replace Take-Up Motor/Tach Assembly. (Run Set Up Tests 37, 49, 82.) |
| 190 | | | 1 | | | | | | Replace Power Amplifier Module. |

FAULT CODE 06 SUB-FAULT CODES

| | |
|---|---|
| 00 | Unable to write a block in PE within 5 attempts |
| 01 | Unable to write a block in GCR within 5 attempts |
| 37 | File mark detection error |
| 38 | More than 32 write error recoveries performed while writing to EOT |

## FAULT CODE 07 - HIGH SPEED READ ERROR

Assumption: TU81/TA81 displays Fault Code 07 during Diagnostic Test 01 due to a failure to read a block at high speed, or a data error was detected during a loopback at high speed.

The probable causes of this fault are dirty head and damaged tape.

NOTE

Following any corrective action, Diagnostic Test 01 should be executed.

| | | |
|---|---|---|
| 010 | 1 | Clean read-write head, tape cleaner and air bearings. |
| 020 | 2 | Change tape to a known good write enabled tape. |
| 030 | 3 | Replace Read Amplifier Module. (Run Set Up Test 31.) |
| 040 | 4 | Replace Formatter Read Module. |
| 050 | 5 | Replace Write Driver Module. (Run Set Up Tests 64, 31.) |
| 060 | 6 | Replace Servo-Control Module. (Run Set Up Tests 37, 49, 82, 04, 64, 31.) |
| 070 | 7 | Replace Formatter-Write Module. |
| 080 | 8 | Replace Read-Write Head. (Run Set Up Tests 64, 31.) |

FAULT CODE 07 SUB-FAULT CODES

| | |
|---|---|
| 00 | Data error detected while reading in PE (No error recovery performed) |
| 01 | Data error detected while reading in GCR (No error recovery performed |
| 37 | File mark detection error |

## FAULT CODE 08 - NOISE IN IBG

Assumption: TU81/TA81 displays Fault Code 08 during an Diagnostic Test due to the detection of noise during an erase operation. An erase operation is used by the error recovery while writing.
The probable causes of this fault are dirty head and damaged tape.

NOTE

Following any corrective action, Diagnostic Test 01 should be executed.

| | | | | | |
|---|---|---|---|---|---|
| 010 | 1 | | | | Clean read-write head, tape cleaner and air bearings. |
| 020 | 2 | | | | Change tape to a known good write enabled tape. |
| 030 | Y | N | | | Execute Field Service Test 60. Termination Code other than 00? |
| 040 | | Y | N | | Execute Field Service Test 58. Termination Code other than 00? |
| 050 | | | Y | N | Unload tape and execute Field Service Test 59. Termination Code 00? |
| 060 | | | 3 | 1 | Replace Read Amplifier Module. (Run Set Up Test 31.) |
| 070 | | | 5 | 3 | Replace Read-Write Head (Run Set Up Test 64, 31) |
| 080 | | | 1 | 2 | Replace Write Driver Module. (Run Set Up Tests 64, 31.) |
| 090 | | | | 4 | Replace Write Cable. |
| 100 | 1 | | 4 | | Replace Formatter Read Module. |
| 110 | 2 | 2 | | | Replace Formatter Write Module. |
| 120 | | 1 | 2 | | Replace Servo-Control Module (Run Set Up Tests 37, 49, 82, 04, 64, 31). |

| FAULT CODE 08 SUB-FAULT CODE | |
|---|---|
| 00 | Noise detected while erasing |

## FAULT CODE 09 - HARDWARE FAILURE

Assumption: TU81/TA81 displays Fault Code 09 as a result of unit hardware failure.

NOTE

Following any corrective action, Diagnostic Test 01 should be executed.

```
010  Y   N  Press CE Switch.  Sub-Fault Code 01?
     |   |
020  |   Y  N  Sub-Fault Code 02?
     |   |  |
030  |   |  Y  N  Sub-Fault Code 03?
     |   |  |  |
040  1   |  2  1  Replace Formatter Write Module.
     |   |     |
050      |  1  2  Replace Servo-Control Module. (Run Set Up Tests
     |   |  |     37, 49, 82, 04, 64, 31.)
     |   |  |
060      1  Replace Formatter Read Module.
```

FAULT CODE 09 SUB-FAULT CODES

| | |
|---|---|
| 00 | A hardware failure occurred while executing a read/write diagnostic |
| 01 | Formatter Write Module hardware failure |
| 02 | Formatter Read Module hardware failure |
| 03 | Servo-Control Module hardware failure |

## FAULT CODE 10 - OPERATOR DOOR OPEN

Assumption: TU81/TA81 displays Fault Code 10 as a result of detecting an open operator door condition. The most probable cause of this fault is the top cover being open. During any normal operation, including execution of diagnostic tests, the top cover must be closed.

NOTE

Following any corrective action, the door should be closed and Diagnostic Test 01 should be executed.

| | | | |
|---|---|---|---|
| 010 | 1 | | Ensure that all interlock switch leads are unbroken and are firmly connected to the top cover switch assembly. |
| 020 | 2 | | Ensure that all cables are firmly connected to the Servo-Control Module. |
| 030 | Y | N | Using a DVM with negative terminal connected to J2 pin 3 of Servo-Control Module, measure voltages on outermost terminals of top cover switch while the top cover is closed. Is voltage difference greater than 0.2 volt? |
| 040 | | Y | N Repeat previous operation for innermost terminals. Is voltage difference greater than 0.2 volt? |
| 050 | | | 1 Replace Servo-Control Module. (Run Set Up Tests 37, 49, 82, 04, 64, 31.) |
| 060 | 1 | 1 | Ensure top cover switch plunger on top cover lines up with top cover switch and will depress switch when top cover is closed. |
| 070 | 2 | 2 | Replace Top Cover Switch Assembly. |

FAULT CODE 10 SUB-FAULT CODES

| | |
|---|---|
| 01 | Door open on load |
| 02 | Door open after tensioning |
| 03 | Door opened during unload |
| 04 | Door open on untensioned unload |
| 05 | Door opened during untensioned unload |
| 06 | Door opened during retensioned load unload |
| 07 | Door open on diagnostic test |

## FAULT CODE 11 - ABSENCE OF TAPE

Assumption: TU81/TA81 displays Fault Code 11 as a result of detecting an absence of tape condition during a load operation, or a diagnostic test that requires tape threaded.

The most probable cause of this fault is that tape is not threaded. Another possible cause is that tape is threaded with tape that has oxide removed.

NOTE

Following any corrective action, a tape load operation should be performed.

| | | | |
|---|---|---|---|
| 010 | Y | N | Disconnect cable from BOT/EOT Sensor Assembly. With top cover closed, press LOAD/REWIND switch. Is Fault Code 11 reported? |
| 020 | | 1 | Replace BOT/EOT Sensor Assembly. |
| 030 | 1 | 2 | Replace Servo-Control Module. (Run Set Up Tests 37, 49, 82, 04, 64, 31.) |

FAULT CODE 11 SUB-FAULT CODES

| | |
|---|---|
| 01 | Absence of tape on load |
| 02 | Absence of tape on operator test 2 |

---

## FAULT CODE 12 - LOAD FAULT

---

Assumption: TU81/TA81 displays Fault Code 12 as a result of detecting a hub unlatched condition or a tension fault during load operation.

The most probable cause of this fault is that supply hub was not latched after mounting a new reel of tape.

A possible cause is that tape being loaded has been subjected to extreme temperature or humidity changes. These tapes can sometimes be recognized by shaking the full reel and hearing tape pack move relative to reel. Also, while loading tape, it will be seen that hub and reel rotate counterclockwise while pack of tape rotates clockwise. To continue using these tapes, the pack requires to be rewrapped at correct tension. This is achieved by performing a test load operation which wraps all tape onto take-up reel, and then returns tape, correctly tensioned, to the supply reel.

Other possible causes of Fault Code 12 are:

1. Loading a tape while in tape trailer.
2. Loading a tape with a mispositioned or missing BOT marker. The BOT marker should be positioned 16 foot ± 2 foot from physical end of tape.
3. Loading a tape with EOT/BOT sensor cable disconnected.

NOTE

Following any corrective action, a tape load operation should be performed.

010 1 Remove supply reel from supply hub and clean hub pads.

020 Y N Inspect hub latching mechanism for breakage or excessive wear. Any problem found?
2 2
A B

FAULT CODE 12 (Cont'd)

| | A 1 | B 1 | | |
|---|---|---|---|---|
| 030 | | Y | N | Remount reel and latch hub. While holding hub, can reel be easily rotated in either direction? |
| 040 | | | 1 | Replace Servo-Control Module. (Run Set Up Tests 37, 49, 82, 04, 64, 31.) |
| 050 | | | 2 | Replace Supply Motor/Tach Assembly. |
| 060 | | | 3 | Replace BOT/EOT Sensor Assembly |
| 070 | | | 4 | Replace Take-Up Motor Assembly. |
| 080 | 1 | 1 | | Replace Supply Reel Hub Assembly. |

| FAULT CODE 12 SUB-FAULT CODE | |
|---|---|
| 01 | Tension fault on load |

## FAULT CODE 13 - TAPE THREADED INCORRECTLY

Assumption: TU81/TA81 displays Fault Code 13 during a load operation as a result of not establishing tension within 10 seconds.

The most probable cause of this fault is that tape has been threaded with a long loop, or tape has not been tightly wrapped on take-up hub.

NOTE

Following any corrective action, a tape load operation should be performed.

| | | | |
|---|---|---|---|
| 010 | Y | N | Execute Field Service Test 43. Does pump fail to start? |
| 020 | | Y N | Does air pressure lift tape off air bearings? |
| 030 | | 1 | Replace Filter. |
| 040 | 1 | 2 | Replace Pump Assembly. |
| 050 | | 3 | Replace Regulator Assembly. |
| 060 | Y | N | Unthread tape. Push LOAD switch. Fault code 11 displayed? |
| 070 | 1 | | Replace BOT/EOT assembly. |
| 080 | 2 | 1 | Replace Servo-Control Module. (Run Set Up Tests 37, 49, 82, 04, 64, 31.) |
| 090 | 3 | | Replace Power Supply Assembly. |

FAULT CODE 13 SUB-FAULT CODES

| | |
|---|---|
| 01 | Tension not detected on both sensors within 10 seconds |
| 02 | Two coarse tachs not detected within 10 seconds |
| 03 | Tension not detected within 2 seconds after seeing 2 coarse tachs |

## FAULT CODE 14 - BOT LOCATION FAULT

Assumption: The most probable cause of this fault is that tape leader is too long. ANSI Standard X3.39 specifies tnat BOT reflective marker should be placed from 14 feet to 18 feet from physical beginning of tape.

NOTE

Following any corrective action, a tape load operation followed by an unload operation should be performed.

010 1 Replace BOT/EOT Sensor Assembly.

020 2 Replace Servo-Control Module. (Run Set Up Tests 37, 49, 82, 04, 64, 31.)

FAULT CODE 14 SUB-FAULT CODES

| | |
|---|---|
| 01 | Tension fault.Loading.BOT not seen. |
| 02 | Absense of Tape.Loading.BOT not seen. |
| 03 | Did not get below lower tension limit within prescribed period during unload |

## FAULT CODE 15 - LOAD/UNLOAD ABORTED BY OPERATOR

Assumption: TU81/TA81 displays Fault Code 15 as a result of load or unload operation being aborted.

The most probable cause of this fault is that operator pressed RESET/FAULT switch during load or unload operation.

NOTE

Following any corrective action, a tape load operation followed by an unload operation should be performed.

010 1 Replace Operator Panel Assembly.
|
020 2 Replace Servo-Control Module. (Run Set Up Tests 37, 49, 82, 04, 64, 31.)

FAULT CODE 15 SUB-FAULT CODES

| | |
|---|---|
| 01 | RESET/FAULT pressed during load |
| 02 | RESET/FAULT pressed during unload |

## FAULT CODE 16 - DIAGNOSTIC TAPE IS WRITE PROTECTED

Assumption: TU81/TA81 displays Fault Code 16 on execution of a Read/Write Diagnostic Test with a write protected scratch tape.

The most probable cause of this fault is that the scratch tape in use does not have a write enable ring installed.

NOTE

Following any corrective action, Diagnostic Test 01 should be executed.

| | | | |
|---|---|---|---|
| 010 | 1 | | Remove write enable sensor cover plate and ensure connector is correctly connected to sensor. |
| 020 | Y | N | Does write permit ring push reflective ring part of Supply Reel Hub Assembly in line with write enable sensor? |
| 030 | | 1 | Replace Supply Reel Hub Assembly. |
| 040 | 1 | | Replace Write Enable Sensor Assembly. |
| 050 | 2 | | Replace Servo-Control Module. (Run Set Up Tests 37, 49, 82, 04, 64, 31.) |
| 060 | 3 | | Replace Formatter Write Module. |

| FAULT CODE 16 SUB-FAULT CODE | |
|---|---|
| 00 | Attempted to execute a read/write diagnostic with write protected tape |

## FAULT CODE 17 - RAN OFF END OF TAPE

Assumption: TU81/TA81 displays Fault Code 17 as a result of running off the physical end of tape.

The most probable cause of this fault is that the system continued issuing FORWARD READ/WRITE commands after EOT has been sensed. A possible cause is that trailer is too short (ANSI STD X3.39 specifies trailer should be longer than 25 feet.).

NOTE

Following any corrective action, Diagnostic Test 01 should be executed.

| | | | |
|---|---|---|---|
| 010 | Y | N | Load a known good tape and execute Field Service Test 44. Does tape stop within trailer? |
| 020 | 2 | 1 | Replace Servo-Control Module. (Run Set Up Tests 37, 49, 82, 04, 64, 31.) |
| 030 | 1 | 2 | Replace Formatter Write Module. |

FAULT CODE 17 SUB-FAULT CODES

| | |
|---|---|
| 01 | AOT.trailer.forward |
| 02 | BLTL.trailer.forward |

## FAULT CODE 18 - TAPE ALREADY LOADED

Assumption: TU81/TA81 displays Fault Code 18 as a result of attempting to execute a diagnostic test which requires tape to be threaded only and not at BOT.

The most probable cause of this fault is that tape is already loaded while attempting to execute a test that requires tape to be threaded only.

NOTE

Following any corrective action, a tape load operation or Diagnostic Test 01 should be executed.

010 1 Replace Servo-Control Module. (Run Set Up Tests 37, 49, 82, 04, 64, 31.)

| FAULT CODE 18 SUB-FAULT CODE | |
|---|---|
| 00 | Attempted to execute Diagnostic Test 1 with tape already loaded |

## FAULT CODE 20 - SUPPLY TENSION SENSOR FAULT

Assumption: TU81/TA81 displays Fault Code 20 as a result of a File Tension fault.

NOTE

Following any corrective action, a tape load operation or Diagnostic Test 01 should be executed.

| | | | | | |
|---|---|---|---|---|---|
| 010 | 1 | | | | Ensure that cable between Supply Air Bearing Assembly and Servo-Control Module is correctly connected. |
| 020 | Y | N | | | Press CE Switch. Sub-Fault Code 05? |
| 030 | | Y | N | | Sub-Fault Code 02 or 04? |
| 040 | | | Y | N | Disconnect cable between Supply Air Bearing Assembly and Servo-Control Module at Servo Control Module. Try to load a tape. Fault Code 20, Sub-Fault Code 05? |
| 050 | 1 | | 1 | | Replace Supply Air Bearing Assembly. Reconnect cable. |
| 060 | 2 | 1 | 2 | 1 | Replace Servo-Control Module. Reconnect cable. (Run Set Up Tests 37, 49, 82, 04, 64, 31.) |

FAULT CODE 20 SUB-FAULT CODES

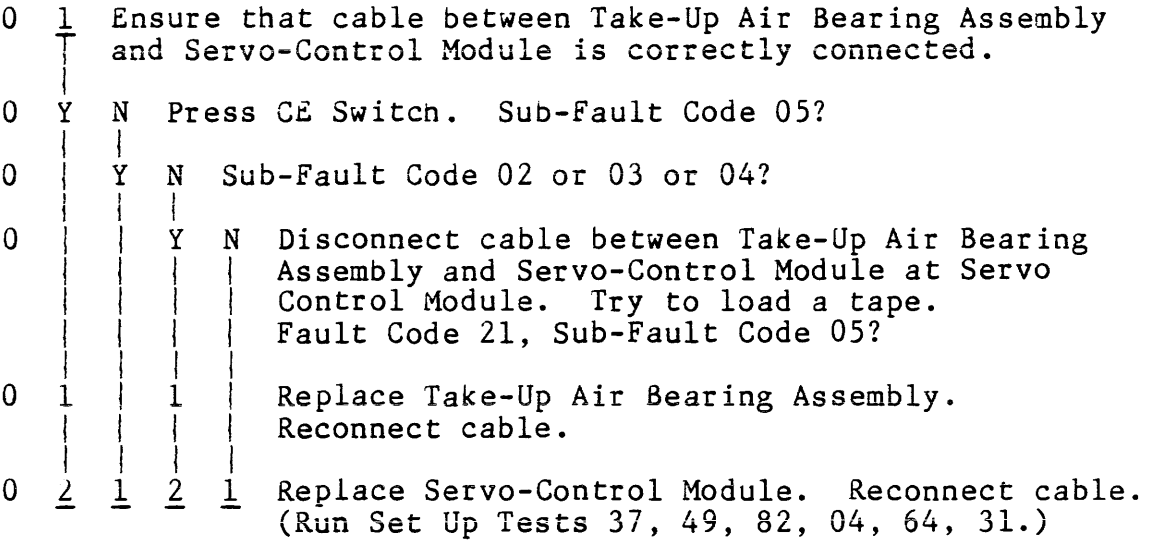
| | |
|---|---|
| 00 | Offset comparator is low with minimum offset |
| 01 | Offset comparator is high with maximum offset |
| 02 | 2 oz. detected with no tension |
| 04 | Upper tension detected with no tension |
| 05 | Did not reach 2 oz. within 100 ms of takeup sensor detecting 2 oz. during load. |

## FAULT CODE 21 - TAKE-UP TENSION SENSOR FAULT

Assumption: TU81/TA81 displays Fault Code 21 as a result of a Take-Up Tension fault.

NOTE

Following any corrective action, a tape load operation or Diagnostic Test 01 should be executed.




FAULT CODE 21 SUB-FAULT CODES

| | |
|---|---|
| 00 | Offset comparator is low with minimum offset |
| 01 | Offset comparator is high with maximum offset |
| 02 | 2 oz detected with no tension |
| 03 | 9 oz. detected with no tension |
| 04 | Upper tension detected with no tension |
| 05 | Did not reach 2 oz. within 100 ms of file sensor detecting 2 oz during load |

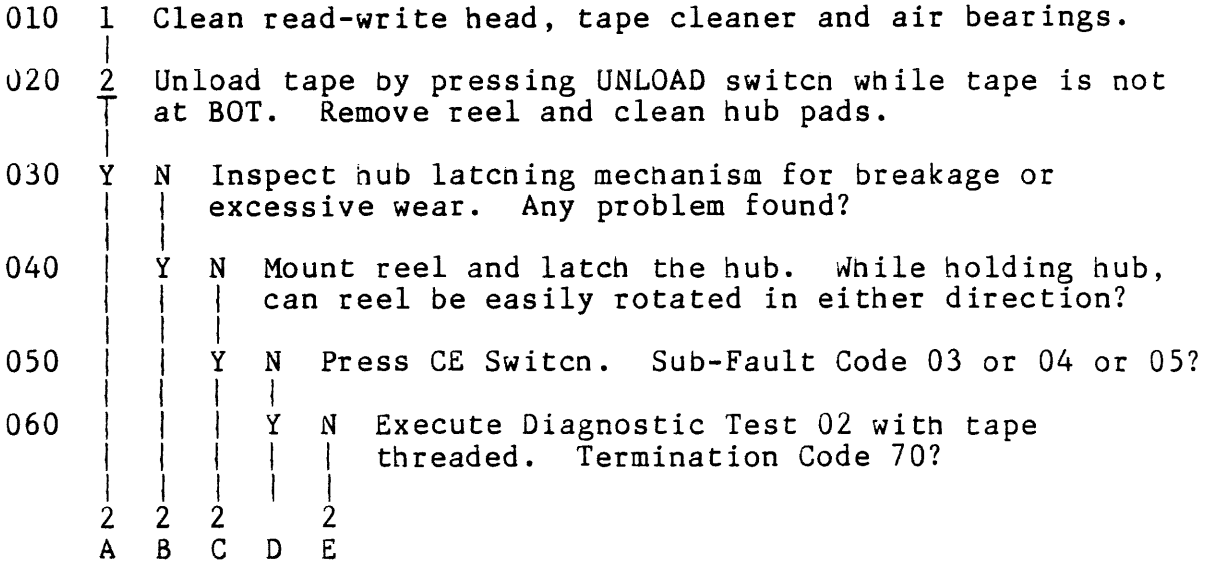
## FAULT CODE 22 - UNABLE TO TENSION TAPE

Assumption: TU81/TA81 displays Fault Code 22 as a result of being unable to maintain tape tension during a tape load operation.

The most probable cause of this fault is that the tape being loaded has been subjected to extreme temperature or humidity changes. These tapes can sometimes be recognized by shaking the full reel and hearing the tape pack move relative to the reel. To continue using these tapes, the pack requires to be re-wrapped at the correct tension. At the time of reporting the fault, all the tape may have been removed from the supply reel. Recovery for this case will be to re-wrap the tape onto the supply reel (to the BOT side of the EOT marker) and perform a normal load operation. If tape was not removed from the supply reel, a test load operation should be performed to remove tape.

NOTE

A tape load operation should be performed following any corrective action. During load operation, file reel should be observed for pack slip.



FAULT CODE 22 (Cont'd)

| | A | B | C | D | E | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1 | 1 | 1 | 1 | 1 | | | | |
| 070 | | | | 1 | | Invalid operator sequence. Refer to Diagnostic Test 02 in Section 2. | | | |
| 080 | | | | | Y | N | Termination Code 84? | | |
| 090 | | | | | | Y | N | Termination Code 92? | |
| 100 | | | | | | | Y | N | Execute Diagnostic Test 03 without tape threaded. Termination Code 96 or 98? |
| 110 | | | 1 | | 1 | 2 | 2 | 1 | Replace Servo-Control Module. (Run Set-Up Tests 37, 49, 82, 04, 54, 31.) |
| 120 | | | | | | | | 2 | Replace Power Amplifier Module. |
| 130 | | | | | | 1 | | | Replace Supply Motor/Tach Assembly. |
| 140 | | | | 2 | | | 1 | | Replace Take-up Motor/Tacn Assembly. (Run Set Up Tests 37, 49, 82.) |
| 150 | 1 | 1 | Replace Supply Hub Assembly. | | | | | | |

FAULT CODE 22 SUB-FAULT CODES

| | |
|---|---|
| 01 | Unable to successfully maintain tension during load (Fault is reported after tape is unloaded off EOT). |
| 02 | Unable to successfully maintain tension during load (Fault is reported with tape still in tne tape path after failing to find AOT within 30 seconds) |
| 03 | Tape slipping on file reel while accelerating during tension recovery |
| 04 | Tape slipping on file reel while decelerating during tension recovery |
| 05 | Tape slipping on file reel while decelerating during tension recovery/test load |

## FAULT CODE 23 - UNABLE TO RE-ESTABLISH TENSION

Assumption: TU81/TA81 displays Fault Code 23 as a result of being unable to re-establish tape tension during a tape load operation.

The most probable cause of this fault is that the tape being loaded has been subjected to extreme temperature or humidity changes. These tapes can sometimes be recognized by shaking the full reel and hearing the tape pack move relative to the reel. To continue using these tapes, the pack requires to be re-wrapped at the correct tension. At the time of reporting the fault, all the tape may have been removed from the supply reel. Recovery for this case will be to re-wrap the tape onto the supply reel (to the BOT side of the EOT label) and perform a normal load operation. If tape was not removed from the supply reel, a test load operation should be performed to remove tape.

NOTE

A tape load operation should be performed following any corrective action. During load operation, file reel should be observed for pack slip.

010 1 Rewind tape onto supply reel and repeat load operation.

020 2 Mount a new reel of tape and retry load operation.

030 3 Ensure that BOT/EOT Sensor Assembly cable is firmly connected.

040 4 Replace Servo Control Module. (Run Set Up Tests 37, 49, 82, 04, 64, 31.)

050 5 Replace Supply Motor Tach Assembly.

FAULT CODE 23 SUB-FAULT CODES

| | |
|---|---|
| 01 | Unable to establish tension during test load |
| 02 | Unable to maintain tension after stopping tape following a test load |
| 03 | Unable to re-establish tension after hub latched test |

## FAULT CODE 24 - HIGH TENSION FAULT

Assumption: TU81/TA81 displays Fault Code 24 as a result of a high tension detected on both air bearings.

NOTE

Following any corrective action, Diagnostic Test 01 should be executed.

| | | | |
|---|---|---|---|
| 010 | Y | N | Execute Diagnostic Test 02 with tape threaded. Termination Code 70? |
| 020 | 1 | | Invalid operator sequence. Refer to Diagnostic Test 02 in Section 2. |
| 030 | | Y | N Termination Code 82? |
| 040 | | | Y N Termination Code 73 or 74 or 92 or 98? |
| 050 | | | 3 1 Replace Servo-Control Module (Run Set-Up Tests 37, 49, 82, 04, 64, 31). |
| 060 | | 1 | 2 2 Replace Power Amplifier Module. |
| 070 | | | 1 Replace Supply Motor/Tach Assembly. |

FAULT CODE 24 SUB-FAULT CODES, GROUP 1

| | |
|---|---|
| 00 | Fault occurred during constant velocity motion |
| 10 | Fault occurred on down ramp |
| 20 | Fault occurred on up ramp |
| 30 | Fault occurred in stoplock |

FAULT CODE 24 SUB-FAULT CODES, GROUP 2

| | |
|---|---|
| 00 | Fault occurred in forward direction |
| 04 | Fault occurred in reverse direction |

FAULT CODE 24 (Cont'd)

FAULT CODE 24 SUB-FAULT CODES, GROUP 3

| | |
|---|---|
| 00 | Fault occurred with low speed demanded |
| 01 | Fault occurred with high speed demanded |
| 02 | Fault occurred with rewind speed demanded |

FAULT CODE 24 SUB-FAULT CODES, GROUP 4

| | |
|---|---|
| 00 | Fault occurred while drive was moving at constant velocity, on ramp, or in stoplock for less than 1 sec. |
| 01 | Fault occurred with drive in stoplock for more than 1 sec. |

FAULT CODE 24 SUB-FAULT CODES, GROUP 5

| | |
|---|---|
| 00 | Fault occurred with pneumatic pump enabled |
| 08 | Fault occurred with pneumatic pump shut down |

## FAULT CODE 25 - LOW TENSION FAULT

Assumption: TU81/TA81 displays Fault Code 25 as a result of a low tension condition being detected on one of the air bearings.

The most probable cause of this fault is damaged tape. Should tape be torn, then the fault can occur as tape passes over air bearing. Another cause, with stiction tapes, is when tape sticks to read-write head. Refer to Test 82.

NOTE

Following any corrective action, Diagnostic Test 01 should be executed.

| | | | | |
|---|---|---|---|---|
| 010 | 1 | | | Clean read-write head, tape cleaner and air bearings. |
| 020 | 2 | | | Change tape to a known good, write enabled scratch tape. |
| 030 | 3 | | | Unload tape by pressing UNLOAD switch while tape is not at BOT. Remove reel and clean hub pads. |
| 040 | Y | N | | Inspect hub latching mechanism for breakage or excessive wear. Any problem found? |
| 050 | | Y | N | Remount reel and latch hub. While holding hub, can reel be rotated in either direction? |
| 060 | | | Y | N Execute Diagnostic Test 03 without tape threaded. Termination Code 98? |
| 070 | | | | 1 Replace Power Amplifier Module. |
| 080 | | | 2 | 2 Replace Servo-Control Module. (Run Set Up Tests 37, 49, 82, 04, 64, 31.) |
| 090 | | | 1 | Replace Take-Up Motor/Tach Assembly. (Run Set Up Tests 37, 49, 82.) |
| 100 | 1 | 1 | | Replace Supply Hub Assembly. |

FAULT CODE 25 (Cont'd)

FAULT CODE 25 SUB-FAULT CODES, GROUP 1

| | |
|---|---|
| 00 | Supply sensor saw the fault first |
| 40 | Takeup sensor saw the fault first |

FAULT CODE 25 SUB-FAULT CODES, GROUP 2

| | |
|---|---|
| 00 | Fault occurred during constant motion |
| 10 | Fault occurred on down ramp |
| 20 | Fault occurred on up ramp |
| 30 | Fault occurred in stoplock |

FAULT CODE 25 SUB-FAULT CODES, GROUP 3

| | |
|---|---|
| 00 | Fault occurred in forward direction |
| 04 | Fault occurred in reverse direction |

FAULT CODE 25 SUB-FAULT CODES, GROUP 4

| | |
|---|---|
| 00 | Fault occurred with low speed demanded |
| 01 | Fault occurred with high speed demanded |
| 02 | Fault occurred with rewind speed demanded |
| 03 | Fault occurred with slow speed mode demanded |

FAULT CODE 25 SUB-FAULT CODES, GROUP 5

| | |
|---|---|
| 00 | Fault occurred while drive was moving at constant velocity, on ramp, or in stoplock for less than 1 sec. |
| 01 | Fault occurred with drive in stoplock for more than 1 sec. |

FAULT CODE 24 SUB-FAULT CODES, GROUP 6

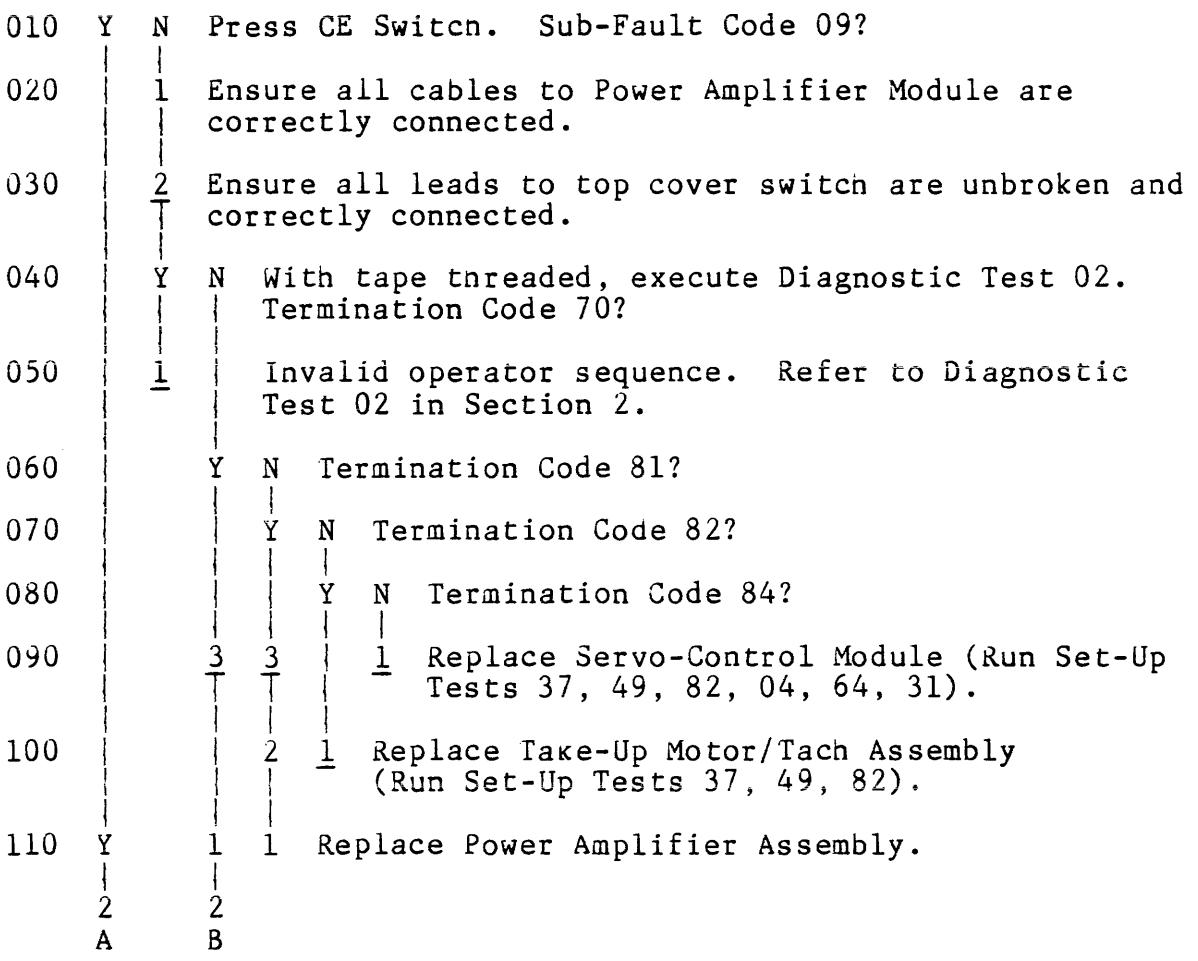
| | |
|---|---|
| 00 | Fault occurred with pneumatic pump enabled |
| 08 | Fault occurred with pneumatic pump shut down |

## FAULT CODE 26 - SERVO FAULT

Assumption: TU81/TA81 displays Fault Code 26 as a result of a Servo fault.

NOTE

Following any corrective action for Sub-Fault Codes 01 to 06, tape should be threaded onto take-up reel, wound on by hand for approximately 50 turns, and then perform an immediate Unload with tape in this hand-wound condition. For all other Sub-Fault Codes, tape should be loaded and then unloaded.



FAULT CODE 26 (Cont'd)

| | A | B | | | |
|---|---|---|---|---|---|
| | 1 | 1 | | | |
| 120 | | 2 | Replace Supply Motor/Tacn Assembly. | | |
| 130 | | N | Witnout tape threaded, execute Field Service Test 03. Termination Code 84? | | |
| 140 | | | Y | N | Termination Code 96? |
| 150 | | | Y | N | Does Take-Up Reel move during execution of Field Service Test 03? |
| 160 | | 1 | 1 | | Ensure cable is correctly connected to Take-Up Tach. |
| 170 | | | | 1 | Replace Take-Up Motor/Tach Assembly. (Run Set Up Tests 37, 49, 82.) |
| 180 | | | 2 | 2 | Replace Read-Write-Servo-Control Module. (Run Set Up Tests 37, 49, 82, 04, 64, 31.) |
| 190 | | | 3 | | Replace Door Switch (Interlock). |
| 200 | | Y | N | | Does Take-Up Reel move during execution of Test 03? |
| 210 | | | 1 | | Replace Door Switch (Interlock). |
| 220 | 1 | 2 | 2 | | Replace Take-Up Motor/Tacn Assembly. (Run Set Up Tests 37, 49, 82.) |
| 230 | 2 | | 3 | | Replace Read-Write-Servo PWA. |
| 240 | | 1 | Ensure cable is correctly connected to Take-Up Tach. | | |
| 250 | | 3 | Replace Power Amplifier Assembly. | | |

FAULT CODE 26 (Cont'd)

FAULT CODE 26 SUB-FAULT CODES

| | |
|---|---|
| 01 | Takeup reel moving in wrong direction during untensioned unload |
| 02 | Takeup reel not moving during untensioned unload |
| 03 | Takeup reel too fast during untensioned unload |
| 04 | Takeup reel too slow during untensioned unload |
| 05 | Voltage sensed in wrong half of file reel amplifier bridge while pulsing supply reel |
| 06 | Timeout to get unwind speed during untensioned unload |
| 07 | Voltage sense fault in supply reel amplifier bridge during load |
| 08 | Voltage sense fault in takeup reel amplifier bridge during load |
| 09 | Fine line tacn fault on load |

## FAULT CODE 27 - NO COARSE TACHS

Assumption: TU81/TA81 displays Fault Code 27 as a result of not detecting any single line tachs from the supply reel.

NOTE

Following any corrective action, Diagnostic Test 01 should be executed.

| | | |
|---|---|---|
| 010 | 1 | Ensure that cable is correctly connected to Supply Motor Tach. |
| 020 | 2 | Replace Servo-Control Module. (Run Set Up Tests 37, 49, 82, 04, 64, 31.) |
| 030 | 3 | Replace Supply Motor/Tach Assembly. |

FAULT CODE 27 SUB-FAULT CODES

| | |
|---|---|
| 01 | No coarse tachs during load |
| 02 | No coarse tachs during tension recovery section of load |
| 03 | Two No coarse tachs not detected within 4 seconds during file reel radius calculation |
| 04 | File reel radius calculation out of range during load |

## FAULT CODE 29 - ABSENCE OF TAPE

Assumption: TU81/TA81 displays Fault Code 29 as a result of detecting absence of tape. This fault can be caused by the use of a damaged tape that has oxide missing, such that the BOT and EOT sensors detect light passing through the tape.

Unloading of tape with a short leader may also result in Fault Code 29.

NOTE

Following any corrective action, Diagnostic Test 01 should be executed.

| | | | |
|---|---|---|---|
| 010 | Y | N | Disconnect cable from the EOT/BOT Sensor Assembly. Remove the reel of tape, close operator top cover, and press the LOAD switch. Fault Code 11? |
| 020 | 2 | 1 | Replace Servo-Control Module. (Run Set Up Tests 37, 49, 82, 04, 64, 31.) |
| 030 | 1 | | Replace BOT/EOT Sensor Assembly. |

| FAULT CODE 29 SUB-FAULT CODE | |
|---|---|
| 01 | Absence of tape |

## FAULT CODE 30 - UP RAMP FAULT

Assumption: TU81/TA81 displays Fault Code 30 as a result of a detected fault on an Up ramp. A possible cause of this fault, with stiction tapes, is when tape sticks to the read-write head. Refer to Test 82.

NOTE

Following any corrective action, Diagnostic Test 01 should be executed.

010 1 Clean read-write head, tape cleaner and air bearings.

020 Y N With tape threaded, execute Diagnostic Test 02. Termination Code 70?

030 1 Invalid operator sequence. Refer to Diagnostic Test 02 in Section 2.

040 Y N Termination Code 89?

050 Y N Termination Code 72?

060 Y N Termination Code 73?

070 Y N Termination Code 74?

080 Y N Termination Code 75?

090 Y N Termination Code 84?

100 Y N Termination Code 90?

110 Y N Termination Code 91?

120 Y N Termination Code 92?

130 Y N Without tape threaded, execute Diagnostic Test 03. Termination Code 98?

2A 2B 2C 2D 2E 2F 2G 2H 2I 2J 2K

FAULT CODE 30 (Cont'd)

| | A 1 | B 1 | C 1 | D 1 | E 1 | F 1 | G 1 | H 1 | I 1 | J 1 | K 1 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 140 | | | | | | | | | | | Y | N | | Termination Code 96? |
| 150 | | | | | | | | | | | | Y | N | Termination Code 82? |
| 160 | | | | | | | | | | | | | Y | N Termination Code 84? |
| 170 | | | | | | | | | | | | 1 | 1 | Replace Power Amp Module. |
| 180 | | | | | | 1 | | | | 1 | 1 | | 1 | 2 Replace Take-Up Motor/Tach Assy. (Run Set Up Test 38, 49, 82.) |
| 190 | | | 2 | | 2 | 2 | | 3 | | | 2 | 2 | 2 | 3 Replace Servo Control Module. (Run Set Up Tests 37, 49, 82, 04, 64, 31) |
| 200 | | 2 | | 2 | | | | | 1 | Replace Filter. | | | | |
| 210 | | 4 | 3 | 4 | 3 | | | 1 | 3 | Replace Regulator Assembly. | | | | |
| 220 | | 3 | 4 | 3 | 4 | | | 2 | 2 | Replace Pump Assembly. | | | | |
| 230 | 1 | | | 1 | 1 | | | Replace Supply Air Bearing Assy. | | | | | | |
| 240 | | 1 | 1 | | | | 1 | Replace Take-Up Air Bearing Assy. | | | | | | |

FAULT CODE 30 SUB-FAULT CODES, GROUP 1

| | |
|---|---|
| 03 | Failed to move 0.12 incn in forward direction within deadman time (detected by stiction test) |
| 04 | Failed to move 0.18 incn in forward direction witnin deadman time (detected by stiction test) |
| 05 | Failed to reach end of up ramp within deadman time |
| 06 | Ramp time less than nominal - 50% (i.e. too fast) |
| 07 | Ramp time greater tnan nominal + 50% (i.e. too slow) |

FAULT CODE 30 (Cont'd)

FAULT CODE 30 SUB-FAULT CODES, GROUP 2

| | |
|---|---|
| 00 | Fault occurred on forward ramp |
| 20 | Fault occurred on reverse ramp |

FAULT CODE 30 SUB-FAULT CODES, GROUP 3

| | |
|---|---|
| 00 | Fault occurred on 25 ips start/stop ramp |
| 10 | Fault occurred on 12.5 ips start/stop ramp |
| 40 | Fault occurred on 75 ips streaming ramp |

---

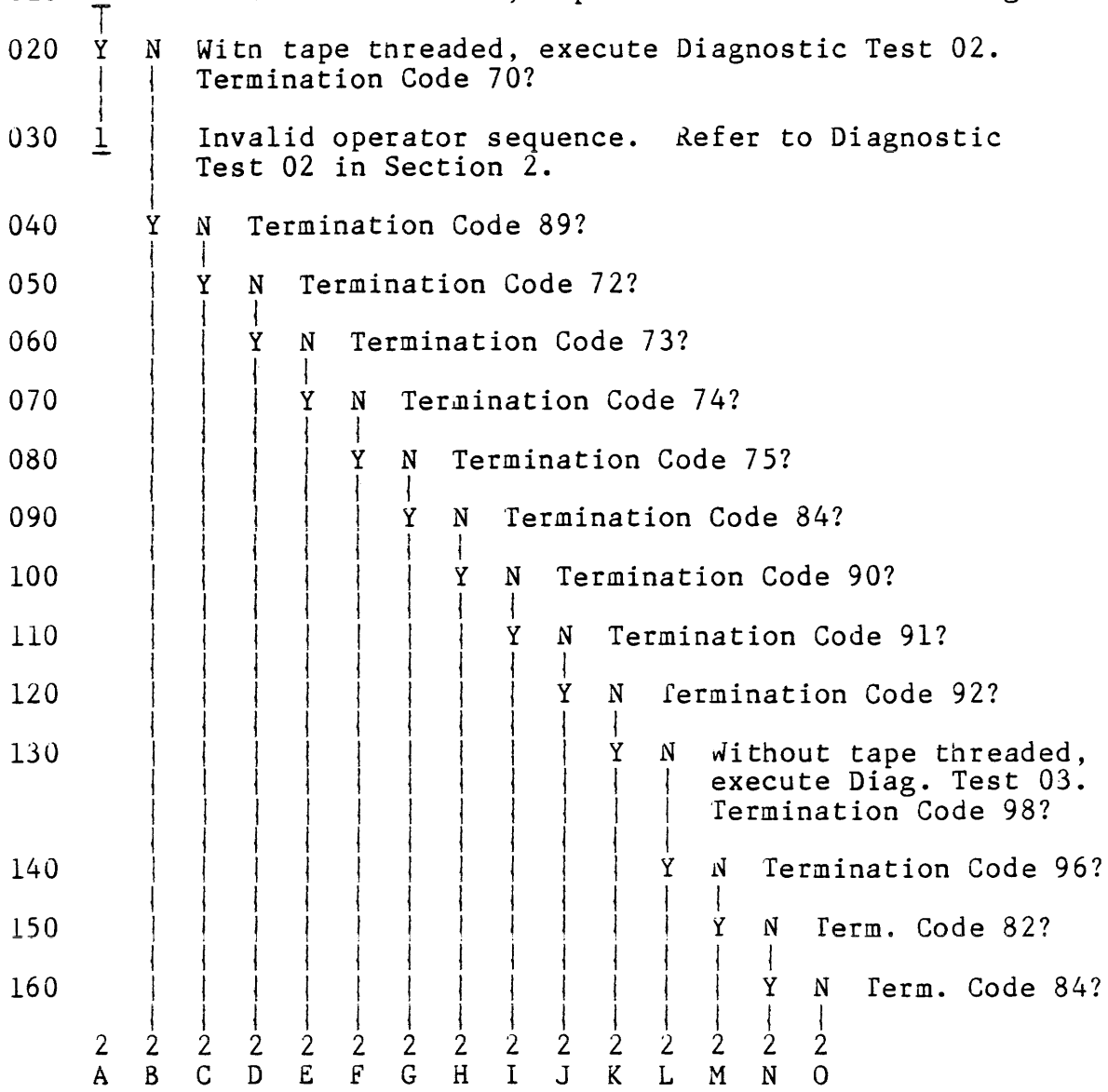
## FAULT CODE 31 - DOWN RAMP FAULT

---

Assumption: TU81/TA81 displays Fault Code 31 as a result of a detected fault on a Down ramp. Refer to Test 82.

NOTE

Following any corrective action, Diagnostic Test 01 should be executed.



FAULT CODE 31 (Cont'd)

| | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| 170 | | | | | | | | | | | | | 1 | | 1 | Replace Power Amp Module. |
| 180 | | | | | | | 1 | | | | 1 | 1 | | 1 | 2 | Replace Take-Up Motor/Tach Assy. (Run Set Up Test 37, 49, 82.) |
| 190 | | | | 2 | | 2 | 2 | | 3 | | | 2 | 2 | 2 | 3 | Replace Servo Control Module (Run Set Up Tests 37, 49, 82, 04, 64, 31) |
| 200 | | | 2 | | 2 | | | | | 1 | | | | | | Replace Filter. |
| 210 | | | 4 | 3 | 4 | 3 | | | 1 | 3 | | | | | | Replace Regulator Assembly. |
| 220 | | | 3 | 4 | 3 | 4 | | | 2 | 2 | | | | | | Replace Pump Assembly. |
| 230 | | 1 | | | 1 | 1 | | | | | | | | | | Replace Supply Air Bearing Assy. |
| 240 | | | 1 | 1 | | | | 1 | | | | | | | | Replace Take-Up Air Bearing Assy. |

FAULT CODE 31 SUB-FAULT CODES, GROUP 1

| | |
|---|---|
| 03 | Failed to detect change of direction (forward to reverse) on forward high speed down ramp |
| 04 | Failed to detect change of direction (reverse to forward) on reverse high speed down ramp |
| 05 | Failed to reach end of down ramp within deadman time |
| 06 | Ramp time less than nominal - 50% (i.e. too fast) |
| 07 | Ramp time greater than nominal + 50% (i.e. too slow) |

FAULT CODE 31 SUB-FAULT CODES, GROUP 2

| | |
|---|---|
| 00 | Fault occurred on forward ramp |
| 20 | Fault occurred on reverse ramp |

FAULT CODE 31 SUB-FAULT CODES, GROUP 3

| | |
|---|---|
| 00 | Fault occurred on 25 ips start/stop ramp |
| 10 | Fault occurred on 12.5 ips start/stop ramp |
| 40 | Fault occurred on 75 ips streaming ramp |

## FAULT CODE 32 - STOPLOCK OVER-RUN

Assumption: TU81/TA81 displays Fault Code 32 as a result of a Velocity Servo fault.

NOTE

Following any corrective action, Diagnostic Test 01 should be executed.

```
010  Y   N  Without tape threaded, execute Diagnostic Test 03.
     |   |  Termination Code 96 or 98?
     |   |
020  |   Y  N  Termination Code 82?
     |   |  |
030  |   |  Y  N  Termination Code 84?
     |   |  |  |
040  2   |  |  1  Replace Servo-Control Module. (Run Set Up Tests
     |   |  |  |  37, 49, 82, 04, 64, 31.)
     |   |  |  |
050  |   1  |  2  Replace Power Amplifier Module.
     |   |  |  |
060  1   |  1  3  Replace Take-up Motor/Tach Assembly.
     |   |  |  |
070  |   |  |  4  Replace Filter.
     |   |  |  |
080  |   |  |  5  Replace Pump Assembly.
     |   |  |  |
090  |   |  |  6  Replace Regulator Assembly.
```

FAULT CODE 32 SUB-FAULT CODES

| | |
|---|---|
| 01 | Position 32 quarter tacns reverse of correct stoplock position |
| 02 | Position 32 quarter tachs forward of correct stoplock position |
| 04 | Fault occurred while in gentle dither mode |
| 10 | Fault occurred while in pump snutdown mode |

## FAULT CODE 33 - TAPE POSITIONING FAULT

Assumption: TU81/TA81 displays Fault Code 33 as a result of a Tape Positioning fault when about to write.

NOTE

Following any corrective action, Diagnostic Test 01 should be executed.

| | | | |
|---|---|---|---|
| 010 | Y | N | Remove reel of tape and execute Diagnostic Test 03. Termination Code 98? |
| 020 | \| | 1 | Replace Servo-Control Module. (Run Set Up Tests 37, 49, 82, 04, 64, 31.) |
| 030 | 1 | | Replace Take-up Motor/Tacn Assembly. (Run Set Up Tests 37, 49, 82.) |

FAULT CODE 33 SUB-FAULT CODES

| | |
|---|---|
| 01 | Passed erase head turn-on point when about to write at low speed |
| 02 | Passed erase head turn-on point when about to write at high speed |

## FAULT CODE 34 - BOT POSITIONING FAULT

Assumption: TU81/TA81 displays Fault Code 34 as a result of the TU81/TA81 losing positioning control at Load Point.

NOTE

Following any corrective action, Diagnostic Test 01 should be executed.

010 1 Replace Servo-Control Module. (Run Set Up Tests 37, 49, 82, 04, 64, 31.)

FAULT CODE 34 SUB-FAULT CODES

| | |
|---|---|
| 01 | Timed out waiting for BOT in forward direction during a Load point "reposition". |
| 02 | Time out waiting for BOT in reverse direction during a Load point "reposition". |

## FAULT CODE 35 - POSITIONING FAULT

Assumption: TU81/TA81 displays Fault Code 35 as a result of the TU81/TA81 losing positioning control.

NOTE

Following any corrective action, Diagnostic Test 01 should be executed.

| | | | |
|---|---|---|---|
| 010 | Y | N | Remove reel of tape and execute Diagnostic Test 03. Termination Code 98? |
| 020 | \| | 1 | Replace Servo-Control Module. (Run Set Up Tests 37, 49, 82, 04, 64, 31.) |
| 030 | 1 | | Replace Take-up Motor/Tach Assembly. (Run Set Up Tests 37, 49, 82.) |

FAULT CODE 35 SUB-FAULT CODES, GROUP 1

| | |
|---|---|
| 00 | Failed to reach target at low speed |
| 02 | Failed to reach target at high speed |

FAULT CODE 35 SUB-FAULT CODES, GROUP 2

| | |
|---|---|
| 00 | Failed to reach target in forward direction |
| 01 | Failed to reach target in reverse direction |

## FAULT CODE 36 - SPEED FAULT

Assumption: TU81/TA81 displays Fault Code 36 as a result of a Speed fault.

NOTE

Following any corrective action, Diagnostic Test 01 should be executed.

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 010 | Y | N | With tape threaded, execute Diagnostic Test 02. Termination Code 70? | | | | | | | | |
| 020 | 1 | | Invalid operator sequence. Refer to Diagnostic Test 02 in section 2. | | | | | | | | |
| 030 | | Y | N | Termination Code 89? | | | | | | | |
| 040 | | | Y | N | Termination Code 72? | | | | | | |
| 050 | | | | Y | N | Termination Code 73? | | | | | |
| 060 | | | | | Y | N | Termination Code 74? | | | | |
| 070 | | | | | | Y | N | Termination Code 75? | | | |
| 080 | | | | | | | Y | N | Termination Code 84? | | |
| 090 | | | | | | | | Y | N | Termination Code 90? | |
| 100 | | | | | | | | | Y | N | Termination Code 91? |
| 110 | | | | | | | | | | Y | N Termination 92? |
| 120 | | | | | | | | | | | 1 Go to step 010 of Fault Code 04. |
| 130 | | | | | | | 1 | | | | Replace Take-Up Motor/Tach Assy (Run Set Up Test 37, 49, 82). |
| 140 | | | 2 | | 2 | 2 | | 3 | | | Replace Servo Control Module (Run Set Up Test 37, 49, 82, 04, 64, 31). |
| | 2A | 2B | 2C | 2D | 2E | 2F | 2G | 2H | 2I | 2J | |

FAULT CODE 36 (Cont'd)

| | A | B | C | D | E | F | G | H | I | J | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| 150 | | | 2 | | 2 | | | | | 1 | Replace filter. |
| 160 | | | 4 | 3 | 4 | 3 | | | 1 | 3 | Replace Regulator Assembly. |
| 170 | | | 3 | 4 | 3 | 4 | | | 2 | 2 | Replace Pump Assembly. |
| 180 | | 1 | | | 1 | 1 | | | | | Replace Supply Air Bearing Assembly. |
| 190 | | 1 | 1 | | | | 1 | | | | Replace Take-Up Air Bearing Assembly. |

FAULT CODE 36 SUB-FAULT CODES

| | |
|---|---|
| 00 | Excessive speed when running at low speed |
| 04 | Speed too slow when running at high speed |

## FAULT CODE 37 - PUMP POWER-UP FAULT

Assumption: TU81/TA81 displays Fault Code 37 as a result of not being able to re-establish tension within 5 seconds of pump power-up.

NOTE

Following any corrective action, Diagnostic Test 01 should be executed.

| | | |
|---|---|---|
| 010 | 1 | Replace Servo-Control Module. (Run Set Up Tests 37, 49, 82, 04, 64, 31.) |
| 020 | 2 | Replace Power Amplifier PWA. |
| 030 | 3 | Replace Supply Motor/Tach Assembly. |

| FAULT CODE 37 SUB-FAULT CODE | |
|---|---|
| 01 | Unable to re-establish tension within 5 seconds |

## FAULT CODE 41 - DEVICE PROCESSOR ILLOGICAL FAULT

Assumption: TU81/TA81 displays Fault Code 41 as a result of a Servo-Control Module Microprocessor Stack Overflow fault.

NOTE

Following any corrective action, Diagnostic Test 01 should be executed.

010 1 Replace Servo-Control Module. (Run Set Up Tests 37, 49, 82, 04, 64, 31.)

| FAULT CODE 41 SUB-FAULT CODE | |
|---|---|
| 01 | Hardware stack underflowed |
| 02 | Hardware stack overflowed |
| 03 | User stack underflowed |
| 04 | User stack overflowed |

## FAULT CODE 42 - HIGH TEMPERATURE LIMIT EXCEEDED FAULT

Assumption: TU81/TA81 displays Fault Code 42 when the drive has exceeded the upper temperature limit.

This fault can result from a malfunction of either the axial cooling fan on the cabinet frame or the centrifugal cooling fan on the power supply cover. The flashing of this fault code indicates that the temperature has exceeded the upper limit. On-line operation is not affected. RESET, REWIND, and UNLOAD are the only functions that can be executed while this fault is present.

NOTE

Following any corrective action, Diagnostic Test 01 should be executed.

★ Check Pwr Supply cable from Servo Control Module

| | | |
|---|---|---|
| 010 | 1 | Replace axial fan on cabinet frame. |
| 020 | 2 | Replace centrifugal fan on power supply cover. |
| 030 | 3 | Replace temperature sensor on card cage. |
| 040 | 4 | Replace power supply. |
| 050 | 5 | Replace Servo-Control Module (Run Set-Up Tests 37, 49, 82, 04, 64, 31). |

FAULT CODE 42 SUB-FAULT CODE

N/A

## FAULT CODE 43 - HIGH TEMPERATURE LIMIT EXCEEDED FAULT

Assumption: TU81/TA81 displays Fault Code 43 when the drive has exceeded the upper temperature limit for more than 10 minutes.

NOTE

Following any corrective action, Diagnostic Test 01 should be executed.

| | | |
|---|---|---|
| 010 | 1 | Replace axial fan on cabinet frame. |
| 020 | 2 | Replace centrifugal fan on power supply cover. |
| 030 | 3 | Replace temperature sensor on card cage. |
| 040 | 4 | Replace power supply. |
| 050 | 5 | Replace Servo-Control Module (Run Set Up Tests 37, 49, 82, 04, 64, 31.) |

FAULT CODE 43 SUB-FAULT CODES

| | |
|---|---|
| 01 | Upper temperature has been exceeded |

## FAULT CODE 44 - UNIT IDENTIFIER FAULT

Assumption: TU81/TA81 displays Fault Code 44 resulting from a unit identifier fault.

NOTE

Following any corrective action, Diagnostic Test 01 should be executed.

FAULT CODE 44 SUB-FAULT CODES

| | |
|---|---|
| 01 | 2201A back-up memory cnecksum fault |
| 02 | Test 49 must be executed prior to entering the unit identifier |

010 1 Replace Servo-Control Module. (Run Set Up Tests 37, 49, 82, 04, 64, 31.)

## FAULT CODE 47 - VELOCITY CORRECTION FAULT

Assumption: TU81/TA81 displays Fault Code 47 resulting from a Velocity Correction Calculation fault.

This fault can be caused by the velocity correction factor in the back-up memory being corrupted. Should this be the case, the Power-on Health Check should fault, displaying Fault Code 51. To overcome this problem, Field Service Test 37 could be executed. However, if all precautions are taken, the back-up memory should never be corrupted.

NOTE

Following any corrective action, Diagnostic Test 01 should be executed.

010 1 Replace Servo-Control Module. (Run Set Up Tests 37, 49, 82, 04, 64, 31.)

| FAULT CODE 47 SUB-FAULT CODE | |
|---|---|
| 01 | Speed correction multiplier in the backup memory is out of range |

## FAULT CODE 48 - UNLOAD FAULT

Assumption: TU81/TA81 displays Fault Code 48 resulting from an Unload fault. This fault can be caused by a damaged tape leader.

NOTE

Following any corrective action, tape should be loaded and unloaded again.

| | | | |
|---|---|---|---|
| 010 | 1 | | Clean Read-Write Head, tape cleaner and air bearings. |
| 020 | 2 | | Change tape to a known good tape. |
| 030 | Y | N | Without tape threaded, execute Diagnostic Test 03. Termination Code 98? |
| 040 | | Y | N Termination Code 96? |
| 050 | | 2 | 1 Replace Servo-Control Module. (Run Set Up Tests 37, 49, 82, 04, 64, 31.) |
| 060 | | | 2 Replace Supply Motor/Tach Assembly. |
| 070 | 1 | 1 | Replace Take-up Motor/Tach Assembly. (Run Set Up Tests 37, 49, 82.) |

| FAULT CODE 48 SUB-FAULT CODE | |
|---|---|
| 01 | Did not find AOT within 6 seconds of losing tension on unload |

## FAULT CODE 50 - IRRECOVERABLE DEVICE HEALTH CHECK FAULT

Assumption: TU81/TA81 displays Fault Code 50 as a result of a Servo-Control Module Health Check fault.

NOTE

Following any corrective action, the unit should be powered off and on again.

010 1 Replace Servo-Control Module. (Run Set Up Tests 37, 49, 82, 04, 64, 31.)

FAULT CODE 50 SUB-FAULT CODES

| | |
|---|---|
| 01 | Servo-Control diagnostic PROM checksum fault |
| 02 | Servo-Control flag memory fault |
| 03 | Servo-Control PTM II fault |
| 04 | Servo-Control PTM I fault |
| 05 | Servo-Control RAM fault |
| 08 | Servo-Control functional PROM checksum fault |

## FAULT CODE 51 - RECOVERABLE DEVICE HEALTH CHECK FAULT

Assumption: TU81/TA81 displays Fault Code 51 during Power-On Health Check.

A possible cause of this fault is that the write enable jumper on the Servo-Control Module, which protects the contents of the back-up memory, has been left in the "STORE" position. Should this have occurred, the back-up memory should be re-initialized as described in Servo-Control Module Verification Check in the Removal and Replacement section of the Pocket Service Guide.

NOTE

Following any corrective action, the unit should be powered off and powered on again.

010 1 Replace Servo-Control Module. (Run Set Up Tests 37, 49, 82, 04, 64, 31.)

FAULT CODE 51 SUB-FAULT CODES

| | |
|---|---|
| 01 | 2201 EEPROM checksum fault |
| 02 | 2210 EEPROM checksum fault |
| 14 | DAC fault |

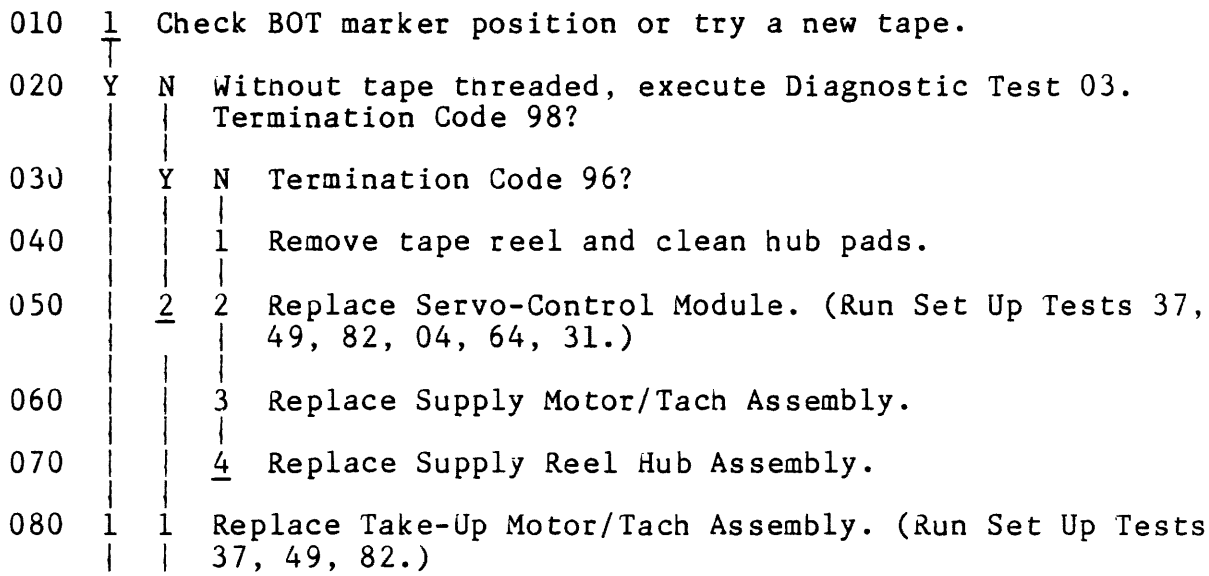
## FAULT CODE 52 - SPEED CALCULATION FAULT

Assumption: TU81/TA81 displays Fault Code 52 as a result of a Radius Calculation fault.

A possible cause of this fault is that BOT reflective marker is not positioned correctly. ANSII Standard X3.39 specifies that the BOT marker should be placed from 14 feet to 18 feet from the physical beginning of tape.

NOTE

Following any corrective action, Diagnostic Test 01 should be executed.




FAULT CODE 52 SUB-FAULT CODES, GROUP 1

| | |
|---|---|
| 10 | A previous fault caused by modulus being too large |
| 20 | A previous fault caused by modulus change inconsistent with direction of tape |
| 40 | A previous fault caused by modulus being outside expected range |
| 80 | Unable to obtain consistent harvest counts in determining the file reel radius |

FAULT CODE 52 (Cont'd)

FAULT CODE 52 SUB-FAULT CODES, GROUP 2

| | |
|---|---|
| 01 | This fault caused by modulus being too large |
| 02 | This fault caused by modulus change inconsistent with direction of tape |
| 04 | This fault caused by modulus being outside expected range |
| 08 | This fault caused by harvest count greater than 8000 |

## FAULT CODE 53 - ARITHMETIC ERROR

Assumption: TU81/TA81 displays Fault Code 53 as a result of a Radius Calculation Arithmetic error.

NOTE

Following any corrective action, Diagnostic Test 01 should be executed.

010 1 Replace Servo-Control Module. (Run Set Up Tests 37, 49, 82, 04, 64, 31.)

FAULT CODE 53 SUB-FAULT CODES

| | |
|---|---|
| 01 | Attempt to divide by 0 |
| 02 | Integer overflow on floating point to integer conversation |
| 03 | Negative result on floating point subtraction |
| 04 | Radius calculation during load out of range |

## FAULT CODE 54 - ERASE/WRITE CURRENT FAULT

Assumption: TU81/TA81 displays Fault Code 54 as a result of a Write/Erase Current fault.

NOTE

Following any corrective action, Diagnostic Test 01 should be executed.

| | | | |
|---|---|---|---|
| 010 | Y | N | Press CE Switch. Sub-Fault Code 04 or 10? |
| 020 | 1 | 1 | Replace Write Driver Module (Run Set Up Tests 64, 31). |
| 030 | 3 | 2 | Replace Read Amplifier Module. (Run Set Up Test 31.) |
| 040 | 4 | 3 | Replace Servo-Control Module (Run Set Up Tests 37, 49, 82, 04, 64, 31). |
| 050 | 2 | | Replace Read-Write Head Assembly. (Run Set Up Tests 64, 31.) |
| 060 | 5 | | Replace Write Cable. |

FAULT CODE 54 SUB-FAULT CODES

| | |
|---|---|
| 01 | Erase current present after degauss |
| 02 | Write current present when degauss |
| 04 | Write current not present when writing |
| 08 | Write current present when reading |
| 10 | Erase current not present when writing |
| 20 | Erase current present when reading |

## FAULT CODE 55 - ILLOGICAL FAULT

Assumption: TU81/TA81 displays Fault Code 55 as a result of the Servo-Control microprocessor timing out during a Rewind or Load-Rewind operation.

NOTE

Following any corrective action, Diagnostic Test 01 should be executed.

010 1 Replace Servo-Control Module. (Run Set Up Tests 37, 49, 82, 04, 64, 31.)

FAULT CODE 55 SUB-FAULT CODES

| | |
|---|---|
| 01 | Failed to reach BOT within specified time during load |
| 02 | Failed to reach BOT within specified time during rewind |

## FAULT CODE 56 - PROCESSOR COMMUNICATION FAULT

Assumption: TU81/TA81 displays Fault Code 56 as a result of a communication problem between the Servo/Control microprocessor and Formatter Write microprocessor.

NOTE

Following any corrective action, device DC power should be turned off and then turned on, followed by the execution of Diagnostic Test 01.

| | | | |
|---|---|---|---|
| 010 | 1 | | Ensure that the cable between the Formatter Write Module and Servo-Control Module is firmly connected. |
| 020 | 2 | | Ensure that the DC power connector is firmly connected to the Formatter Write Module. |
| 030 | Y | N | Controller Fault? |
| 040 | 2 | 1 | Replace Formatter Write Module. |
| 050 | 3 | 2 | Replace Servo-Control Module. (Run Set Up Tests 37, 49, 82, 04, 64, 31.) |
| 060 | 1 | 3 | Replace TMSCP/TU81 or STI/TA81 Module. |

FAULT CODE 56 SUB-FAULT CODES

| | |
|---|---|
| 01 | MOVE TAG or COMMAND TAG or STATUS/DATA did not get reset |
| 02 | INTERRUPT or MOVE TAG did not get set |
| 03 | ACKNOWLEDGE or COMMAND TAG did not get set |
| 04 | BUSY or STATUS/DATA did not get set |
| 05 | BUSY or STATUS/DATA did not get reset |
| 06 | INTERRUPT or MOVE TAG did not get reset |
| 07 | ACKNOWLEDGE or COMMAND TAG did not get reset |
| 08 | ACKNOWLEDGE or COMMAND TAG did not get set |
| 09 | DATA STROBE did not get reset |
| 10 | DATA STROBE did not get set |
| 11 | BUS INTEGRITY test fault |
| 12 | PRIMARY STATUS test fault |
| 13 | PIA/1 PORT A test fault |
| 19 | Formatter health check did not complete within 20 msec |
| 20 | Formatter did not respond to interrupt within 1 second |
| 22 | Number of bytes transferred exceeded 32 during tests 95 or 99 |

## FAULT CODE 60 - IRRECOVERABLE OPERATOR PANEL FAULT

Assumption: TU81/TA81 displays Fault Code 60 as the result of a functional control panel switch being closed during Power-On Health Check.

This fault can also be generated if any of the LOAD/REWIND, UNLOAD, ON-LINE or RESET/FAULT switches are depressed for 15 seconds during the Power-On Health Check.

NOTE

Following any corrective action, the TU81/TA81 should be powered off and powered on again.

010 1 Check control panel functional switches and repeat the Power-On Health Check.

020 2 Replace Control Panel Assembly.

030 3 Replace Servo-Control Module. (Run Set Up Tests 37, 49, 82, 04, 64, 31.)

| FAULT CODE 60 SUB-FAULT CODE | |
|---|---|
| 00 | LOAD/REWIND or UNLOAD or ONLINE or RESET/FAULT switch permanently pressed |

## FAULT CODE 61 - RECOVERABLE OPERATOR PANEL FAULT

Assumption: TU81/TA81 displays Fault Code 61 as the result of a diagnostic operator panel switch being closed during Power-On Health Check.

This fault can also be generated if any of the TEST, STEP, CE or EXECUTE switches are depressed for 15 seconds during the Power-On Health Check. Should this fault occur, normal on-line operation of the TU81/TA81 is available after pressing the RESET switch. However, the use of TU81/TA81 diagnostics will not be made available.

NOTE

Following any corrective action, the TU81/TA81 should be powered off and powered on again.

010 1 Check control panel diagnostic switches and repeat the Power-On Health Check.

020 2 Replace Control Panel Assembly.

030 3 Replace Servo-Control Module. (Run Set Up Tests 37, 49, 82, 04, 64, 31.)

| FAULT CODE 61 SUB-FAULT CODE | |
|---|---|
| 00 | TEST or STEP or CE or EXEC switch permanently pressed |

---

## FAULT CODE 62 - FORMATTER WRITE MODULE HEALTH CHECK

---

Assumption: TU81/TA81 displays Fault Code 62 as a result of Formatter Write Module Health Check fault.

NOTE

Following any corrective action, the unit should be powered off and powered on again.

010 1 Replace Formatter Write Module.

FAULT CODE 62 SUB-FAULT CODES

00 Power up flip/flop could not be reset
01 Write data transfer did not complete within specified time
02 Residual byte count check
03 CRC generator parity error
04 4 to 5 conversion parity error
05 AUX CRC generator parity error

11 ALUZ signal not functional
12 ALUZ 2 signal not functional
13 ALUN signal not functional
14 Arithmetic operation failed
15 Logical operation failed
20 Microprocessor internal RAM fault

31 Write checksum fault (IC E17)
32 Write checksum fault (IC E18)
33 Write checksum fault (IC E19)
34 Write checksum fault (IC G17)
35 Write checksum fault (IC G18)
36 Write checksum fault (IC G19)

40 LAST WORD signal stuck high
41 MOVE TAG signal not functional
42 COMMAND TAG signal not functional
43 STATUS/DATA TAG signal not functional
44 GCR status signal not functional
45 HIGH SPEED (HSPD) status signal not functional
46 FLAG bit not functional

FAULT CODE 62 SUB-FAULT CODES (Cont'd)

47 One of the formatter status bits to the interface board not functional
48 One of the device status bits to the interface board not functional
49 Microprocessor parity generator not functional

51 DATA STROBE signal from timer not functional
52 Variable timer not functional
53 Fixed timer (one-shot) not functional

61 4 to 5 converter failed
62 ECC generator failed
63 CRC generator failed
64 AUX CRC generator failed

71 WRITE FIFO AVAILABLE signal not functional
72 WRITE DATA TRANSFER COMPLETE signal not functional
73 WRITE TRANSFER CHECK signal not functional

81 Sense data path failed
82 Device data path failed
83 READ INVERT signal failed

## FAULT CODE 63 - FORMATTER READ/WRITE INTERFACE HEALTH CHECK FAULT

Assumption: TU81/TA81 displays Fault Code 63 as a result of Formatter Read-Write Interface Health Check fault.

NOTE

Following any corrective action, the unit should be powered off and powered on again.

010 1 Ensure that the Formatter Read and Formatter Write Module's are firmly connected.

020 2 Replace Formatter Read Module.

030 3 Replace Formatter Write Module.

### FAULT CODE 63 SUB-FAULT CODES

01 Read failed to go busy
02 Read stuck busy
03 Read detected an error
04 Read detected an error
05 Error occurred during a Data loopback
06 WRITE FIFO AVAILABLE signal not functional
07 Data compare error
08 Write data transfer did not complete within specified time
09 Write transfer check

11 Read failed to go busy
12 Read stuck busy
13 Read detected an error
14 Read detected an error

21 READ GATE signal not functional
22 GCR ID signal not functional
23 FMK DET signal not functional
24 READ INTR signal not functional
25 READ CER signal not functional
26 BLOCK DET signal not functional
27 DATEN signal not functional
28 READ GATE signal failed with no interrupt set
29 Read buffer was empty with interrupt set

FAULT CODE 63 SUB-FAULT CODES (Cont'd)

| | |
|---|---|
| 30 | READ TAG signal not functional |
| 31 | BYP VFO signal not functional |
| 32 | REV signal not functional |
| 33 | GCR signal not functional |
| 34 | RAW signal not functional |
| 35 | HSPD signal not functional |
| 36 | SENSE signal not functional |
| 37 | DIAG signal not functional |
| 38 | SPACE signal not functional |
| 39 | WFM signal not functional |
| 40 | ERASE signal not functional |
| 41 | ID signal not functional |
| 42 | READ signal not functional |
| 43 | DSTR signal not functional |

---

## FAULT CODE 64 - FORMATTER READ MODULE HEALTH CHECK FAULT IN DATA LOOPBACK

---

Assumption: TU81/TA81 displays Fault Code 64 as a result of Formatter Read Module Health Check fault in data loopback.

NOTE

Following any corrective action, the unit should be powered off and powered on again.

010 1 Replace Formatter Read Module.

020 2 Replace Formatter Write Module.

### FAULT CODE 64 SUB-FAULT CODES

11 Read checksum fault (IC D3)
12 Read checksum fault (IC D2)
13 Read checksum fault (IC D1)

21 Read failed to go busy during sense operation
22 Read stuck busy during sense operation
23 Read detected an error during sense operation
24 Read detected an error during sense operation
25 No sense read data
26 Excess sense read data

31 Read failed to go busy during self-diagnostics
32 Read stuck busy during self-diagnostics
41 Read failed to go busy during ID operation
42 Read stuck busy during ID operation
43 Read detected an error during PE ID operation
44 Read detected an error during GCR ID operation
45 READ GATE signal failed during ID operation
46 GCR ID signal failed during ID operation

51 Read failed to go busy during a write file mark operation
52 Read stuck busy during a write file mark operation
53 Read detected an error during a write file mark operation
54 Read detected an error during a write file mark operation

FAULT CODE 64 SUB-FAULT CODES (Cont'd)

55 FMK DET signal was stuck high
56 FMK DET signal was not set during a PE write file mark operation
57 FMK DET signal was not set during a GCR write file mark operation

61 Read failed to go busy during a space operation
62 Read stuck busy during a space operation
63 Read detected an error in PE during a space operation
64 Read detected an error in GCR during a space operation
65 BLOCK DET signal was not detected during a space operation
66 READ GATE signal was not detected during a space operation

71 Read failed to go busy during a read-after-write operation at high speed
72 Read stuck busy during a read-after-write operation at high speed
73 Read detected an error in PE during a read-after-write operation at high speed
74 Read detected an error in GCR during a read-after-write operation at high speed

81 Read failed to go busy during a read with data compare operation
82 Read stuck busy during a read with data compare operation
83 Read detected an error in PE during a read with data compare operation
84 Read detected an error in GCR during a read with data compare operation
85 Read buffer was empty during a read with data compare operation
86 Data compare error in PE detected by write
87 Data compare error in GCR detected by write

91 Read failed to go busy during a read-after-write operation using VFO.
92 Read stuck busy during a read-after-write operation using VFO
93 Read detected an error in PE during a read-after-write operation using VFO.
94 Read detected an error in GCR during a read-after-write operation using VFO.

## FAULT CODE 65 - FORMATTER READ BOARD HEALTH CHECK FAULT

Assumption: TU81/TA81 displays Fault Code 65 as a result of Formatter Read Module Health Check fault.

NOTE

Following any corrective action, the unit should be powered off and powered on again.

010 1 Replace Formatter Read Module.

FAULT CODE 65 SUB-FAULT CODES

11 ALUZ signal not functional
12 ALUZ signal not functional
13 ALUN signal not functional
14 Arithmetic operation failed
15 Logical operation failed

20-22 Microprocessor internal RAM fault

30 DATA STROBE signal stuck high
31 DATA STROBE signal stuck low
32 Variable timer fault
33 Variable timer overflow fault

40 One of the flag bits cannot be set
41 One of the flag bits cannot be reset
42 Microprocessor parity generator fault
43 Microprocessor parity generator fault

51 Illegal count fault (contained within deskew buffer)
52 Read transfer check not functional
53 Read data buffer input parity error not functional
54 Illegal count could not be reset by ILLEGAL COUNT ENABLE signal

60 Error correction logic did not correct data properly
61 3ORGT signal not functional
62 SGL PNTR, SGL CORR, or MLT PTR signal not functional
63 DUAL signal not functional
64 Error correction pointer from error correction logic was incorrect

FAULT CODE 65 SUB-FAULT CODES (Cont'd)

65 DUAL CORR signal not functional
66 ECCZ signal not functional
67 VRCZ signal not functional
68 Error correction did not complete (ECDONE = 1) in nine clock cycles
69 UNCORR signal not functional

70 ECC generator failed
71 CRC generator failed
72 AUX CRC generator failed
73 ECC generator failed in reverse mode
74 CRC generator failed in reverse mode
75 AUX CRC generator failed in reverse mode

80 DATA BLOCK signal not functional
81 7ORGT signal not functional
82 GCR TM signal not functional
83 PROM address for block PROM (IC C13) not functional
84 ANY BLOCK signal not functional

91 Deskew buffer READY signal not functional
92 DEAD TRACK signal from a deskew buffer not functional
93 BUFFER READY signal did not set for all dead track conditions.

## FAULT CODE 66 - FORMATTER/TMSCP INTERFACE HEALTH CHECK FAULT (TU81)

Assumption: TU81 displays Fault Code 66 as a result of Formatter/Interface Health Check fault.

NOTE

Following any corrective action, the unit should be powered off and powered on again.

010 Y N Press CE Switch. Sub-fault Code 04?.
| |
020 | 1 Replace TMSCP Module.
| |
030 | 2 Replace Formatter Write Module.
|
040 1 Disconnect TU81 from system.
(Note: Sub-fault Code 04 can occur when attempting to execute a diagnostic while the TMSCP Module is on-line to the system. The I/O cable should be disconnected before attempting to run TMSCP diagnostic.)

### FAULT CODE 66 (TU81) SUB-FAULT CODES

00 Adapter interface did not respond to a diagnostic request
01 Command from adapter contained a parity error
02 Command from adapter was incorrect
03 Adapter health check timeout
04 TMSCP online to the system

11 Command register bit in error
12 DATA BUSY signal not functional
13 Write data bus check failed
14 No data was received during write data bus check
15 LAST WORD signal not functional
16 Excessive data was received during write data bus check
17 Adapter detected an error during write data bus check
18 During read data bus check, the TRANSFER COMPLETE signal stuck high.
19 Adapter detected an error during read data bus check

20 STATUS SELECT signal not functional

## FAULT CODE 66 - FORMATTER/STI INTERFACE HEALTH CHECK FAULT (TA81)

Assumption: TA81 displays Fault Code 66 as a result of Formatter/Interface Health Check fault.

NOTE

Following any corrective action, the unit should be powered off and powered on again.

010 Y N Press CE Switch. Sub-fault Code 04?.

020 1 Replace STI Module.

030 2 Replace Formatter Write Module.

040 1 Release Port A and Port B switches and wait until ONLINE indicator goes out.
(Note: Sub-fault Code 04 can occur when attempting to execute a diagnostic while either Port switch is pressed, or either Port is still ONLINE to the system, shown by a lit ONLINE indicator.)

FAULT CODE 66 (TA81) SUB-FAULT CODES

| | |
|---|---|
| 00 | Adapter interface did not respond to a diagnostic request |
| 01 | Command from adapter contained a parity error |
| 02 | Command from adapter was incorrect |
| 03 | Adapter health check timeout |
| 04 | STI online to the system or port switch enabled |
| 11 | Command register bit in error |
| 12 | DATA BUSY signal not functional |
| 13 | Write data bus check failed |
| 14 | No data was received during write data bus check |
| 15 | LAST WORD signal not functional |
| 16 | Excessive data was received during write data bus check |
| 17 | Adapter detected an error during write data bus check |
| 18 | During read data bus check, the TRANSFER COMPLETE signal stuck high. |
| 19 | Adapter detected an error during read data bus check |
| 20 | STATUS·SELECT signal not functional |

## FAULT CODE 67 - TMSCP INTERFACE MODULE HEALTH CHECK (TU81)

Assumption: TU81 displays Fault Code 67 as a result of Interface Module Health Check fault. LESI Module is powered up.

NOTE

Following any corrective action, the unit should be powered off and powered on again.

| | | | | |
|---|---|---|---|---|
| 010 | Y | N | | Press CE Switch. Sub-fault Code 80? |
| 020 | | N | Y | Sub-fault Code 40-59/83-92? |
| 030 | | | Y | N Disconnect I/O cable from TU81. Run Diagnostic Test 57. Termination Code 67? |
| 040 | | | 1 | Replace LESI Module or I/O cable. |
| 050 | 1 | 1 | 1 | Replace TMSCP Module. |
| 060 | 2 | | | Replace operator's front panel. |

### FAULT CODE 67 (TU81) SUB-FAULT CODES

01 Stack Ram parity error
02 FIFO parity error
03 FIFO Controller not initialized
04 FIFO full signal not functional
05 FIFO full and overflow bits are set
06 FIFO overflfow bit not set
07 SEND DATA signal not initialized
08 RAM parity error
09 FIFO data miscompare

10 FIFO parity parity error
11 FIFO data miscompare
12 FIFO parity parity error
13 FORMATTER ENABLE bit not set
16 Host byte counter not preset to all zeros
17 Tape byte counter not preset to all zeros
18 Host byte counter not preset to all ones
19 Tape byte counter not preset to all ones

FAULT CODE 67 (TU81) SUB-FAULT CODES (Cont'd)

20 Host/Tape byte counters not preset to Shifting ones
27 Formatter HER/CER
28 Host byte count not 0
29 Parity errors/overflow/overrun

30 Tape byte count not correct
31 Data mis-compare on formatter Rx/Tx
35 Compare error
36 Incorrect compare error byte count

Data transfer from Host to FIFO

41 Data pattern AA55 - Help code not 13
42 Data pattern AA55 - Help bit not reset
43 Data pattern AA55 - Byte count not 0
44 Data pattern AA55 - Data miscompare
45 Data pattern AA55 - FIFO parity
46 Data pattern 55AA - Help code not 13
47 Data pattern 55AA - Help bit not reset
48 Data pattern 55AA - Byte count not 0
49 Data pattern 55AA - Data miscompare
50 Data pattern 55AA - FIFO parity

Data transfer from Host to FIFO - Byte Swap

51 Data pattern AA55 - Help code not 13
52 Data pattern AA55 - Help bit not reset
53 Data pattern AA55 - Byte count not 0
54 Data pattern AA55 - Data miscompare
55 Data pattern AA55 - FIFO parity
56 T1 signal is not functional
57 LESI status has error bit set
58 LESI parity error

Data transfer from FIFO to Host

60 Data pattern 55AA - Help code not 09
61 Data pattern 55AA - Data miscompare
62 Data pattern 55AA - LESI parity error
63 Data pattern 55AA - FIFO not empty

FAULT CODE 67 (TU81) SUB-FAULT CODES (Cont'd)

Data transfer from FIFO to HOST

64 Data pattern AA55 - Help code not 09
65 Data pattern AA55 - Data miscompare
66 Data pattern AA55 - LESI parity error
67 Data pattern 55AA - Help code not 09
68 Data pattern 55AA - Data miscompare
69 Data pattern 55AA - LESI parity error
70 Odd Byte - Help code not 09
71 Odd Byte - Data miscompare
72 Odd Byte - No LESI parity error
80 UART status or Data miscompare on ASCII port

Data transfer from RAM to LESI

83 Data pattern AA55 - Help code not 09
84 Data pattern AA55 - Data miscompare
85 Data pattern AA55 - Byte count not 0
86 Data pattern AA55 - Errors

Data transfer from LESI to RAM

88 Data pattern 55AA - Help code not 13
89 Data pattern 55AA - Help active
90 Data pattern 55AA - Byte count not 0
91 Data pattern 55AA - Data miscompare
92 Data pattern 55AA - Errors
93 Timer failed
94 Timer interrupt not occurred on time out
95 Timer interrupt occurred before time out

## FAULT CODE 67 - BUFFERED TMSCP INTERFACE MODULE HEALTH CHECK (TU81E)

Assumption: TU81E displays Fault Code 67 as a result of Interface Module health Check fault. LESI Module is powered up.

NOTE

Following any corrective action, the unit should be powered off and powered on again.

```
010  Y N Press CE switch. Sub-fault code 55?
     | |
020  | N Y Sub-fault code 56-82?
     | | |
030  1 1 1 Replace buffered TMSCP module.
     |
040  |   2 Replace LESI module or I/O cable.
     |
050  2 Replace operator's front panel.
```

FAULT CODE 67 (TU81) SUB-FAULT CODES

ROM-RAM Check

01 ROM parity error set
02 No ROM parity error
03 Data not equal to zero
04 Data miscompare data pattern AA55, 55AB, AB55
05 RAM parity error set
06 RAM parity error
07 No RAM parity error

Buffer Check

09 DMA port A data miscompare
10 DMA port B data miscompare
11 Input ready not set
12 Output ready not set
13 Buffer full not set
14 Buffer overflow set
15 Buffer overflow not set
16 Output ready not set

FAULT CODE 67 (TU81E) SUB-FAULT CODES

Buffer Check (Cont'd)

17 Buffer empty not set
18 Buffer underflow set
19 Buffer underflow not set
20 Buffer not full/buffer overflow
21 Data miscompare
22 Buffer not empty
23 Buffer out parity error
24 Buffer in parity error
25 Buffer in parity error not set
26 Buffer out parity error
27 Data miscompare
28 Buffer out parity error not set

CRC Generator Check

29 CRC generator's initial value incorrect
30 Buffer in parity error
31 Generated CRC in is incorrect
32 Buffer out parity error
33 Generated CRC out is incorrect

Timer-Interrupt Controller Check

34 Timer failure
35 No buffer full interrupt request
36 Interrupt controller 2 status in error
37 No buffer empty interrupt request
38 No interrupt service for interrupt controller 2
39 Interrupt service for masked interrupt controller 2
40 No timer 2 interrupt request
41 Interrupt controller 1 status in error
42 No timer 3 interrupt
43 No TX/RX ready interrupt
44 No interrupt service for interrupt controller 1
45 Interrupt service for masked interrupt controller 1
48 Formatter HER/CER
49 Buffer in parity error
50 Data transfer count not 4K
51 Read data count not 4K
52 CRC miscompare
53 Data miscompare

ASCII Port Check

55 ASCII port failure

FAULT CODE 67 (TU81E) SUB-FAULT CODES (Cont'd)

| Data | Transfer From Host To Buffer |
|---|---|
| 56 | Data miscompare |
| 57 | Transfer done status is not set |
| 58 | Buffer transfer count not zero |
| 59 | Data miscompare data pattern 55AA |
| 60 | Transfer done status is not set |
| 61 | Buffer transfer count not zero |
| 62 | Data miscompare data pattern 55AA |
| 63 | T1 not high |
| 64 | T1 not low |
| 65 | LESI status not clear |
| 78 | Data miscompare |
| 79 | No compare error |
| 80 | No second compare error |
| 81 | Byte count not correct |
| 82 | Compare error not ignored |

| Data | Transfer From Buffer To Host |
|---|---|
| 66 | Transfer done status not set |
| 67 | Buffer transfer count not zero |
| 68 | Data miscompare data pattern AA55 |
| 69 | LESI parity error |
| 70 | Transfer done status not set |
| 71 | Buffer transfer count not zero |
| 72 | Data miscompare data pattern 55AA |
| 73 | No LESI parity error |
| 74 | Transfer done status not set |
| 75 | Buffer transfer count not zero |
| 76 | Data miscompare on one byte transfer |
| 77 | No LESI parity error |

---

## FAULT CODE 67 - STI INTERFACE MODULE HEALTH CHECK (TA81)

---

Assumption: TA81 displays Fault Code 67 as a result of Interface Module Health Check fault.

NOTE

Following any corrective action, the unit should be powered off and powered on again.

010 Y N Press CE Switch. Sub-fault code 84?
| |
020 1 1 Replace STI Module.
|
030 2 Replace operator panel.

### FAULT CODE 67 (TA81) SUB-FAULT CODES

01 NO STATE parity error signal (INT)
02 STATE parity error signal (INT)
03 STATE parity error signal (INT)
04 STATE parity error signal (INT)
05 INIT signal or CRR signal (INT)
06 NOT INIT signal (INT)
07 INIT signal or CRR signal (INT)
08 INIT signal or CRR signal (INT)
09 INIT signal or CRR signal (INT)
10 NOT CRR signal (EXT A)
11 NO STATE parity error signal (EXT A)
12 STATE parity error signal (EXT A)
13 STATE parity error signal (EXT A)
14 STATE parity error signal (EXT A)
15 INIT signal or CRR signal (EXT A)
16 NOT INIT signal (EXT A)
17 INIT signal or CRR signal (EXT A)
18 INIT signal or CRR signal (EXT A)
19 INIT signal or CRR signal (EXT A)
20 NOT CRR signal (EXT A)
21 NO STATE parity error signal (EXT B)
22 STATE parity error signal (EXT B)
23 STATE parity error signal (EXT B)
24 STATE parity error signal (EXT B)

FAULT CODE 67 (TA81) SUB-FAULT CODES (Cont'd)

25 INIT signal or CRR signal (EXT B)
26 NOT INIT signal (EXT B)
27 INIT signal or CRR signal (EXT B)
28 INIT signal or CRR signal (EXT B)
29 INIT signal or CRR signal (EXT B)
30 NOT CRR signal (EXT B)
31 READ LOW error detection checker not equal 0
32 READ HIGH error detection checker not equal 0
33 READ LOW error detection checker not equal 0BAH
34 READ HIGH error detection checker not equal 0FFH
35 READ LOW error detection checker not equal 0BAH
36 READ HIGH error detection checker not equal 0FFH
40 NOT FIFO parity error signal
41 FIFO parity error signal
42 FIFO parity error signal or SEQUENCER error signal
43 FIFO input does not equal FIFO outputted
44 FIFO parity error signal or SEQUENCER error signal
45 FIFO does not equal 0FEH
46 FIFO parity error signal or SEQUENCER error signal
47 FIFO does not equal 0FDH
48 FIFO parity error signal or SEQUENCER error signal
49 FIFO does not equal 0FCH
51 HIGH read count not equal to outputted
52 READ-AFTER-WRITE COUNT ZERO signal
60 COMMAND BUSY signal
61 DATA ACKNOWLEDGE signal
62 DATA BUSY signal
63 STI error
64 LOW byte of read count not zero
65 HIGH byte of read count not zero
66 NO READ-AFTER-WRITE ZERO signal
67 HARD error or CER error
68 READ LOW error detection checker not equal 0
69 READ HIGH error detection checker not equal 0
70 FIFO input does not equal FIFO outputted
71 NOT EMPTY or (FULL or HALFFULL)
72 NOT HALFFULL or (EMPTY or FULL)
73 (NOT (FULL or HALFFULL)
74 STI error
75 NOT HALFFULL
76 NOT EMPTY
77 NO SEQUENCE error
78 NO SEQUENCE error
79 SEQUENCE error

FAULT CODE 67 (TA81) SUB-FAULT CODES (Cont'd)

| | |
|---|---|
| 80 | NO TIMEOUT |
| 81 | TIMER flag not zero |
| 83 | TRANSMISSION error |
| 84 | UART data miscompare |
| 86 | LOW read count not zero |
| 87 | HIGH read count not zero |
| 88 | COUNT 16 signal |
| 89 | NO READ-AFTER-WRITE COUNT ZERO signal |
| 90 | RAW COUNT ZERO signal or NO COUNT 16 signal |
| 91 | COUNT 16 signal |
| 92 | NO READ-AFTER-WRITE COUNT ZERO signal |
| 93 | LOW read count not OFFH |
| 94 | HIGH read count not OFFH |
| 95 | READ-AFTER-WRITE COUNT ZERO signal |
| 96 | LOW read count not equal to outputted |
| 97 | HIGH read count not equal to zero |
| 98 | READ-AFTER-WRITE COUNT ZERO signal |
| 99 | LOW read count not equal to zero |

## FAULT CODE 68 - TMSCP/STI INTERFACE MODULE PROM CHECKSUM

Assumption: TU81/TA81 displays Fault Code 68 as a result of Interface Module Checksum fault.

NOTE

Following any corrective action, the unit should be powered off and powered on again.

010 1 Replace TMSCP/TU81 or STI/TA81 Module.

FAULT CODE 68 SUB-FAULT CODES

| | |
|---|---|
| 01 | MSCP01 checksum fault (IC G07) |
| 03 | MSCP03 checksum fault (IC G03) |

## FAULT CODE 69 - REMOTE DIAGNOSTICS (TU81)

Assumption: TU81 displays Fault Code 69 as a result of TMSCP Module Health Check fault.

NOTE

Following any corrective action, the unit should be powered off and powered on again.

| | | | |
|---|---|---|---|
| 010 | Y | N | Press CE switch. Sub-Fault Code 00-04? |
| 020 | 1 | | Refer to sub-fault codes below. |
| 030 | | 1 | Replace Servo-Control Module. |
| 040 | | 2 | Replace Formatter Write Module. |
| 050 | | 3 | Replace TMSCP Module. |

FAULT CODE 69 (TU81) SUB-FAULT CODES

| | |
|---|---|
| 00 | Test cannot be run remotely |
| 01 | RESET button was pushed while executing a remote diagnostic |
| 02 | Drive was busy and test could not be executed |
| 03 | Present drive mode must be terminated prior to test execution |
| 04 | Formatter was busy and test could not be executed |

## FAULT CODE 69 - STI INTERFACE MODULE HEALTH CHECK (TA81)

Assumption: TA81 displays Fault Code 69 as a result of STI Module Health Check fault.

NOTE

Following any corrective action, the unit should be powered off and powered on again.

010 Y N Press CE switch. Sub-Fault Code 63 or 64?
| |
020 1 1 Replace STI Module.
|
030 2 Replace operator panel.

(NOTE: Sub-Fault Code 62 can occur if ASCII port cable is connected and receiving device is powered off. Receiving device power should be turned on or ASCII port cable should be disconnected before attempting to turn power on.)

### FAULT CODE 69 (TA81) SUB-FAULT CODES

| | |
|---|---|
| 01 | LOW read count not zero (INT) |
| 02 | HIGH read count not zero (INT) |
| 03 | STI error (INT) |
| 04 | FIFO EMPTY signal (INT) |
| 05 | FIFO not equal to 055H (INT) |
| 06 | FIFO not equal to 0AAH (INT) |
| 11 | LOW read count not zero (EXT A) |
| 12 | HIGH read count not zero (EXT A) |
| 13 | STI error (EXT A) |
| 14 | FIFO EMPTY error (EXT A) |
| 15 | FIFO not equal to 055H (EXT A) |
| 16 | FIFO not equal to 0AAH (EXT A) |
| 21 | LOW read count not zero (EXT B) |
| 22 | HIGH read count not zero (EXT B) |
| 23 | STI error (EXT B) |
| 24 | FIFO EMPTY signal (EXT B) |
| 25 | FIFO not equal to 055H (EXT B) |
| 26 | FIFO not equal to 0AAH (EXT B) |

FAULT CODE 69 (TA81) SUB-FAULT CODES (Cont'd)

| | |
|---|---|
| 61 | TXMT RDY 100 msec timeout on internal ASCII port test |
| 62 | REC RDY 100 msec timeout on internal ASCII port test |
| 63 | TXMT RDY 100 msec timeout on external ASCII port test |
| 64 | REC RDY 100 msec timeout on external ASCII port test |

## FAULT CODE 70/71 - INVALID OPERATOR SEQUENCE

Assumption: TU81/TA81 displays Fault Code 70/71 as a result of tests being run in improper sequence or other invalid operator action.

Refer to procedures for test being run.

# Section 2 - DIAGNOSTIC TEST INFORMATION

## 2.1 SCOPE

The diagnostic test information contained in this section consists of Test Options (Subsection 2.2) and Test Descriptions (Subsection 2.3). Each Test Description in Subsection 2.3 details Test Requirements, Test Description, Test Sequence, and Possible Termination Codes. A brief explanation of each of the headings is given below.

- Test Requirement - Preconditions which must be adhered to prior to execution of the test.
- Test Description - A brief explanation of what the test is all about.
- Test Sequence - A step-by-step breakdown of what happens during execution of the test. The test sequence is performed automatically when EXECUTE is pressed.
- Possible Termination Codes - A list of termination codes associated with the test.

## 2.2 DIAGNOSTIC TEST OPTIONS

The diagnostic tests and their options are listed below. A key to the option code is given at the end of this subsection. Refer to paragraph 1.3.2.1 for instructions on selecting options.

## 2.2 DIAGNOSTIC TEST OPTIONS (Cont'd)

| TEST NO. | DESCRIPTION |
|---|---|
| 01 | Functional Fault Detection Diagnostic |
| 04 | Unit Identification Diagnostic |
| 05-09 | Reserved |

| TEST NO. | DESCRIPTION | OPTION CODE |
|---|---|---|
| 02 | Tension Fault Isolation Diagnostic | |
| 03 | Velocity Fault Isolation Diagnostic | |
| 10 | Forward at Option Speed to EOT | S |
| 11 | Reverse at Option Speed to BOT | S |
| 12 | Forward Ramps at Option Speed to EOT | S |
| 13 | Reverse Ramps at Option Speed to BOT | S |
| 14 | GCR Start/Stop Repositioning | L |
| 15 | 75 ips Forward Ramps to EOT | L |
| 16 | 75 ips Reverse Ramps to BOT | L |
| 17 | 75 ips Repositioning | L |
| 18 | 75 ips Forward to EOT | L |
| 19 | 75 ips Reverse to BOT | L |
| 20 | Unit Internal Fault Detection Diagnostic | B |
| 21 | Write 2K Byte Records in PE Mode at 25 ips to EOT (at EOT, Rewind to BOT) | B |
| 22 | Read at 25 ips to EOT (at EOT, Rewind to BOT) | B |
| 23 | Write 2K Byte Records in PE Mode at 75 ips to EOT (At EOT, Rewind to BOT) | B |
| 24 | Read at 75 ips to EOT (at EOT, Rewind to BOT) | B |
| 25 | Write 2K Byte Records in GCR Mode at 25 ips to EOT (at EOT, Rewind to BOT) | B |
| 26 | Write 2K Byte Records in GCR Mode at 75 ips to EOT (at EOT, Rewind to BOT) | B |
| 27 | Reserved (TU81) from ASXI Port | |
| 28 | Perform Command Stack entered by Diagnostic 97 at 25 ips. | B |
| 29 | Perform Command Stack entered by Diagnostic 97 at 75 ips. | B |
| 30 | Check Read Amplitudes at 25 and 75 ips to be within tolerance of 0.8 volt. | B |

## 2.2 DIAGNOSTIC TEST OPTIONS (Cont'd)

| TEST NO. | DESCRIPTION | OPTION CODE |
|---|---|---|
| 31 | Determine EGC Gains at 25 and 75 ips and store gains in Backup Memory. Then cneck Read Amplitudes at 25 and 75 ips to be within tolerance of 0.1 volt. | X |
| 32 | Check Read Amplitudes at 25 and 75 ips with pre-recorded all 1's tape with tolerance of 0.3 volt. | B |
| 33 | Determine EGC Gains at 25 ips and store gains in Backup Memory. | X |
| 34 | Determine EGC Gains at 75 ips and store gains in Backup Memory. | X |
| 35-36 | Reserved | |
| 37 | Determine Velocity Servo Correction Multiplier and store multiplier in Backup Memory. | X |
| 38 | Apply approximately 8-ounce tension by pulsing supply reel with take-up reel in Stoplock. | X |
| 39 | Write Option Pattern in PE Mode to EOT at 25 ips (at EOT, Rewind to BOT, repeat test). | P |
| 40 | Write Option Pattern in PE Mode to EOT at 75 ips (at EOT, Rewind to BOT, repeat test). | P |
| 41 | Stoplock Take-up Reel | X |
| 42 | Enable Tension Servo | X |
| 43 | Turn-on Pump | X |
| 44 | Fast Search Forward for EOT | X |
| 45 | Refresn Scope Loop | X |
| 46 | Velocity DAC Scope Loop | X |
| 47 | Servo-Control Microprocessor Outputs Scope Loop | X |
| 48 | Set Up Pump Power-Down Timer | X |
| 49 | Set Up TU81/TA81 Mode | X |
| 50 | Enable Auto Load | X |
| 51 | Reserved | |

## 2.2 DIAGNOSTIC TEST OPTIONS (Cont'd)

| TEST NO. | DESCRIPTION | OPTION CODE |
|---|---|---|
| 52 | Write Option Pattern in GCR Mode to EOT at 25 ips (at EOT, Rewind to BOT, repeat test). | P |
| 53 | Write Option Pattern in GCR Mode to EOT at 75 ips (at EOT, Rewind to BOT, repeat test). | P |
| 54 | Examine/Change Write Current Levels | X |
| 55 | Drive Internal Diagnostic | B |
| 56 | Formatter Internal Diagnostic | B |
| 57 | Interface Internal Diagnostic | B |
| 58 | Loop Write-to-Read thru Drive Interface Interface | B |
| 59 | Loop Write-to-Read thru Read/Write | B |
| 60 | Loop Write-to-Read thru Formatter | B |
| 61 | Take-up Motor and Power Amp Marginal Fault Detection | X |
| 62 | Take-up Fine-Line Tacn Fault Detection | X |
| 63 | Reserved | |
| 64 | Automatic Write Current Adjustment | X |
| 65-69 | Reserved | |
| 70 | Enable/disable Error Printout on ASCII Terminal | Y |
| 71-81 | Reserved | |
| 82 | Enable Low Tension Mode | See Test Description |
| 83-90 | Reserved | |
| 91 | Functional Fault Detection (Same as Operator Test 01 except: a) Will start in Loaded or Unloaded condition, b) Bypass EGC test.) | B |
| 92-96 | Reserved | |
| 97 | Read/Write Command Stack Generation Diagnostic | X |

## 2.2 DIAGNOSTIC TEST OPTIONS (Cont'd)

OPTION KEY

X = Do not use any options.
L = Test will loop. Do not use any options.
B = Field Service Representative may use the following options:

- 00 = Halt if read or write errors exceed limits specified, halt on completion of test (Default option).
- 01 = Loop on test, halt if read or write errors exceed limit specified on any given pass.
- 02 = Loop on test, bypass read or write error halts.

Y = Field Service Representative may use tne following options:

- 00 = To disable error printout on ASCll terminal. (Default)
- 01 = To enable error printout on ASCll terminal.

NOTE

Option of halting or bypassing errors only exists for read/write type errors; all other errors will cause test to halt, with the appropriate fault code displayed, regardless of the option selected.

P = Field Service Representative may use the following option patterns:

- 00 = All ones pattern
- 01 = One-half frequency pattern
- 02 = One-third frequency pattern (GCR only)

S = Field Service Representative may use the following option speeds:

- 00 = 25 ips speed
- 01 = 12.5 ips speed

## 2.3 DIAGNOSTIC TEST DESCRIPTIONS

Each of the diagnostic tests is listed in numerical order, with details of the Test Requirement, Test Description, Test Sequence, and Possible Termination Codes

TEST 01: FUNCTIONAL FAULT DETECTION TEST TEST 01

TEST REQUIREMENT: A write enabled scratch tape should be threaded, but NOT loaded (untensioned). Disable port switches (TA81 only).

DESCRIPTION: Test 01 performs various functions normally performed during operations. Unit halts with appropriate fault code if a functional fault occurs.

TEST SEQUENCE:

a. Light ONLINE and RESET/FAULT indicators. Increment display from 00 to 99. Extinguish ONLINE and RESET/FAULT indicators. Display 01.

b. Load tape.

c. Check read amplitudes at low and high speeds. Rewind.

d. Write 100 blocks in PE mode at 25 ips start/stop (see NOTE 1).

e. Space Reverse, Erase, and Write File Mark (check for file mark detected). Space Reverse and check for file mark detected. Read Forward and again check for file mark detected.

f. Read Reverse 100 blocks at 25 ips start/stop.

g. Read Forward 100 blocks at 25 ips start/stop.

h. Repeat steps d thru g at 25 ips streaming.

i. Repeat steps d thru g at 75 ips streaming.

j. Write 10 blocks at 75 ips "thrashing" (see NOTE 2).

k. Read Reverse 10 blocks at 75 ips "thrashing".

l. Read Forward 10 blocks at 75 ips "thrashing".

m. Rewind.

n. Read Forward 300 blocks at 75 ips streaming. Check for file mark detected at blocks 100, 200, and 300.

o. Rewind.

p. Repeat steps d thru n in GCR mode and Space Reverse where Read Reverse is specified.

q. Write to EOT in GCR mode at 75 ips streaming (see NOTE 1).

r. Space reverse 1000 records at 75 ips streaming (reposition after every 250 records).

s. Write to EOT in GCR mode at 25 ips streaming.

t. Rewind.

NOTE 1. Data blocks written are 2K bytes with an incrementing pattern starting at zero for each block.

NOTE 2. Data blocks written are 256 bytes with an incrementing pattern starting at zero for each block.

POSSIBLE TERMINATION CODES:

00 - Test is Successful
01 - Read Envelope Fault
02 - Read Amplitude Range Fault
03 - ID Check
04 - Low Speed Write Error
05 - Low Speed Read Error
06 - High Speed Write Error
07 - High Speed Read Error
08 - Noise Detected While Erasing
09 - Hardware Failure
10 to 69 - Refer to Fault Code Troubleshooting Procedure

TEST 02: TENSION FAULT ISOLATION TEST 02

TEST REQUIREMENT: Tape should be threaded, but NOT loaded (untensioned).

Valid fault code displayed in operator panel. See NOTE below.

NOTE

Test 02 will run only if, during execution of Test 01, one of the following codes appears in the operator panel display: 22, 24, 26, 30, 31, 36.

Test will not run unless conditions above are met.

TEST DESCRIPTION: Test 02 is an extension of Test 01. Test 02 isolates servo faults by checking various assemblies of the TU81/TA81.

TEST SEQUENCE:

a. Verify top cover is closed and tape is not loaded.

b. Verify Refresh DAC of Servo-Control Module is operational. If not, display Termination Code 80.

c. Verify supply reel power amp is operational. If not, display Termination Code 81.

d. Verify take-up reel power amp is operational. If not, display Termination Code 82.

e. Verify Demand Velocity DAC of Servo-Control Module is operational. If not, display Termination Code 83.

f. Move take-up reel slightly in forward direction. Check for correct count of quarter-tacn pulses. If incorrect, display Termination Code 84.

g. Repeat step f in the reverse direction. Display Termination Code 84 if tach count is incorrect.

h. Verify velocity feedback loop of Servo-Control Module is operational by putting take-up motor in stoplock mode, and monitoring forward and reverse quarter-tachs. Display Termination Code 85 if any fault is detected.

i. Verify that tension comparators on Servo-Control Module are operational. Vary tension offsets and monitor status of tension level status lines. If any fault is detected, display Termination Code 87.

j. With pneumatic pump off, zero tension offsets. If fault occurs, display Termination Code 97.

k. Turn on pneumatic pump. If take-up sensor detects at least 2.0 ounces of tension, display Termination Code 90. If file sensor detects at least 2.0 ounces of tension, display Termination Code 89.

l. Enable take-up servo. Move take-up reel from 0 ips to 6 ips in forward direction.

m. If both sensors do not detect at least 2.0 ounces of tension within 15 seconds, display Termination Code 91.

n. If, during this 15 seconds, the supply sensor does not detect 2.0 ounces of tension within 100 milliseconds after take-up sensor, display Termination Code 74. If take-up sensor does not detect 2.0 ounces within 100 milliseconds after supply sensor, display Termination Code 72.

p. Move supply reel slowly in reverse direction while take-up reel is moving forward at 6 ips. If neither sensor detects at least 16 ounces of tension within 500 milliseconds, display Termination Code 92.

q. If, during this 500 milliseconds, the supply sensor does not detect 16 ounces of tension within 100 milliseconds after take-up sensor, display Termination Code 75. If take-up sensor does not detect 16 ounces of tension within 100 milliseconds after supply sensor, display Termination Code 73.

r. Stop moving supply reel in reverse direction. If tension detected on both sensors is not within limits in 100 milliseconds, display Termination Code 98.

s. Stop reel motion. Display Fault Code 00 to indicate test is successful.

POSSIBLE TERMINATION CODES:

00 - Test is Successful
10 to 69 - Refer to Fault Code Troubleshooting Procedure
70 - Invalid Operator Sequence. See Test 02 Requirements.
71 - Invalid Operator Sequence (Tape Loaded Fault)
72 - TU Sensor Fault 1
73 - TU Sensor Fault 2
74 - Supply Sensor Fault 1
75 - Supply Sensor Fault 2
80 - Refresh DAC Fault
81 - File Power Amp Fault
82 - TU Power Amp Fault
83 - Demand Velocity DAC Fault
84 - TU Motor/Tach Fault
85 - Velocity Feedback Loop Fault
86 - TU Comparator Fault
87 - Supply Comparator Fault
89 - Supply Sensor - 0 Fault
90 - TU Sensor - 0 Fault
91 - Pump Failure Fault
92 - Filter/Regulator, Pump, Servo-Control Module Fault
97 - Servo-Control Module, Sensor Intermittent Fault
98 - Servo-Control Module, Power Amp Fault

TEST 03: VELOCITY FAULT ISOLATION TEST 03

TEST REQUIREMENT: Tape should not be threaded.

Test 03 should not be used unless Test 01 directs its use. This test may fail if run Stand-alone.

TEST DESCRIPTION: Test 03 isolates velocity servo faults by checking the take-up motor/tach assembly and the velocity servo loop.

TEST SEQUENCE:

a. Check if the top cover is closed and tape is absent.

b. Ramp up to 4 ips.

c. Check if distance between two consecutive quarter tachs is within tolerable limits.

d. If, after five tries, at least once, the distance between two consecutive quarter tachs is within limits, go to step f.

e. Display Termination Code 96.

f. Check that the distance between all consecutive quarter tachs is within tolerable limits.

g. If distance between any two consecutive quarter tachs is not witnin limits, report fault, otherwise, go to step i.

h. Repeat steps e and f. If the error is detected five times, display Termination Code 98.

i. Apply diagnostic lines to move take-up motor in forward direction from 0 to 75 ips, and measure time it requires to ramp-up. Stop take-up motor.

j. Calculate motor constant from this data.

k. If motor constant is within range, go to step e. If motor constant is out of range the first time, repeat steps i and j. Otherwise, display Termination Code 84.

l. Apply full current to move take-up motor in forward direction from 0 to 75 ips, and measure time it requires to ramp-up. Stop take-up motor.

m. If power amp is not capable of delivering full current in forward direction, flag a fault, otherwise, go to step o.

n. If fault is the first time, repeat steps 1 and m, otherwise, display Termination Code 82.

o. Apply full current to move take-up motor in reverse direction from 0 to 75 ips, and measure time it requires to ramp-up. Stop take-up motor.

p. If power amp is not capable of delivering full current in reverse direction, flag a fault, otherwise, go to step r.

q. If fault is the first time, repeat steps o and p, otherwise, display Termination Code 82.

r. Display Termination Code 00 to indicate successful completion of test.

POSSIBLE TERMINATION CODES:

00 - Test Is Successful
10 to 69 - Refer to Fault Code Troubleshooting Procedure
82 - Take-Up Power Amp Fault
84 - Take-Up Motor/Tach Fault
94 - Tape Present Fault
95 - Formatter Interrupt received while test in progress.
96 - Servo Loop Fault
98 - Take-up Motor/Tach Fault

TEST 04: UNIT IDENTIFICATION TEST TEST 04

TEST REQUIREMENT: Prior execution of Test 49 to enable TU81/TA81 Mode.

TEST DESCRIPTION: Test 04 allows changing of the 3-digit unit identification number.

TEST SEQUENCE:

a. Enter Test 04 and press EXEC switch.

b. Enter the 3-digit (decimal) unit identification number. (For instructions on entering the unit identification number, refer to paragraph 1.3.1, Operator Tests.)

c. Press FAULT/RESET switch on the operator panel and the unit identification number just entered is displayed.

POSSIBLE TERMINATION CODES:

00 - Test is Successful
10 to 69 - Refer to Fault Code Troubleshooting Procedure
75, 76 - Bad Backup Memory
77 - Drive Not in TU81/TA81 Mode
78 - 2201 EEPROM Checksum Fault
99 - Illegal Remote Test

TEST 10: FORWARD AT OPTION SPEED TO EOT TEST 10

TEST REQUIREMENT: Tape should be loaded.

TEST DESCRIPTION: Test 10 exercises the transport in a continuous mode at the selected option speed in the forward direction. When EOT is detected, tape is stopped and the selected option speed continuous mode is executed in reverse direction. When BOT is detected, the routine starts again. Manual intervention is required to terminate the test.

TEST SEQUENCE:

a. Check if the top cover is closed and tape is loaded.

b. Run forward continuously at the selected option speed until EOT is detected.

c. Stop and run reverse continuously at the selected option speed until BOT is detected.

d. Stop motion and go to step b.

POSSIBLE TERMINATION CODES:

10 to 69 - Refer to Fault Code Troubleshooting Procedure
70 - Invalid Operator Sequence (Tape Not Loaded Fault)

TEST 11: REVERSE AT OPTION SPEED TO BOT TEST 11

TEST REQUIREMENT: Tape should be loaded.

TEST DESCRIPTION: Test 11 exercises the transport in a continuous mode at the selected option speed in the reverse direction. When BOT is detected, tape is stopped and the selected option speed continuous mode is executed in forward direction. When EOT is detected, the routine starts again. Manual intervention is required to terminate the test.

TEST SEQUENCE:

a. Check if the top cover is closed and tape is loaded.

b. Run reverse continuously at the selected option speed until BOT is detected.

c. Stop and run forward continuously at the selected option speed until EOT is detected.

d. Stop motion and go to step b.

POSSIBLE TERMINATION CODES:

10 to 69 - Refer to Fault Code Troubleshooting Procedure
70 - Invalid Operator Sequence (Tape Not Loaded Fault)

TEST 12: FORWARD RAMPS AT OPTION SPEED TO EOT TEST 12

TEST REQUIREMENT: Tape should be loaded.

TEST DESCRIPTION: Test 12 exercises the transport in a start/stop mode at the selected option speed in the forward direction. When EOT is detected, the same the selected option speed start/stop mode is executed in the reverse direction. When BOT is detected, the routine starts again. Manual intervention is required to terminate the test.

TEST SEQUENCE:

a. Check if the top cover is closed and tape is loaded.

b. Run forward at the selected option speed for 30 ms.

c. Stop and pause for 100 ms.

d. Repeat steps b and c until EOT is detected.

e. Run reverse at the selected option speed for 30 ms.

f. Stop and pause for 100 ms.

g. Repeat steps e and f until BOT is detected.

n. Go to step b.

POSSIBLE TERMINATION CODES:

10 to 69 - Refer to Fault Code Troubleshooting Procedure
70 - Invalid Operator Sequence (Tape Not Loaded Fault)

TEST 13: REVERSE RAMPS AT OPTION SPEED TO BOT TEST 13

TEST REQUIREMENT: Tape should be loaded.

TEST DESCRIPTION: Test 13 exercises the transport in a start/stop mode at the selected speed option in the reverse direction. When BOT is detected, the same the selected speed option start/stop mode is executed in the forward direction. When EOT is detected, the routine starts again. Manual intervention is required to terminate the test.

TEST SEQUENCE:

a. Check if the top cover is closed and tape is loaded.

b. Run reverse at the selected speed option for 30 ms.

c. Stop and pause for 100 ms.

d. Repeat steps b and c until BOT is detected.

e. Run forward at the selected speed option for 30 ms.

f. Stop and pause for 100 ms.

g. Repeat steps e and f until EOT is detected.

h. Go to step b.

POSSIBLE TERMINATION CODES:

10 to 69 - Refer to Fault Code Troubleshooting Procedure
70 - Invalid Operator Sequence (Tape Not Loaded Fault)

## TEST 14: GCR START/STOP REPOSITIONING

TEST REQUIREMENT: Tape should be loaded.

TEST DESCRIPTION: Test 14 is a routine emulating GCR start/stop repositioning. It repositions the tape in the forward direction. When EOT is detected, it repositions the tape in the reverse direction. When BOT is detected, the routine starts again. Manual intervention is required to terminate the test.

TEST SEQUENCE:

a. Check if the top cover is closed and tape is loaded.

b. Run forward at 25 ips for 100 ms.

c. Run reverse at 12.5 ips for 1 ms.

d. Repeat steps b and c until EOT is detected.

e. Run forward at 12.5 ips for 1 ms.

f. Run reverse at 25 ips for 100 ms.

g. Repeat steps e and f until BOT is detected.

h. Go to step b.

POSSIBLE TERMINATION CODES:

10 to 69 - Refer to Fault Code Troubleshooting Procedure
70 - Invalid Operator Sequence (Tape Not Loaded Fault)

TEST 15: FORWARD 75 IPS RAMPS TEST 15

TEST REQUIREMENT: Tape should be loaded.

TEST DESCRIPTION: Test 15 exercises the transport in a start/stop mode at 75 ips in the forward direction. When EOT is detected, the same 75 ips start/stop mode is executed in the reverse direction. When BOT is detected, the routine starts again. Manual intervention is required to terminate the test.

TEST SEQUENCE:

a. Check if the top cover is closed and tape is loaded.

b. Run forward at 75 ips for 30 ms.

c. Stop and Pause for 400 ms.

d. Repeat steps b and c until EOT is detected.

e. Run reverse at 75 ips for 30 ms.

f. Stop and pause for 400 ms.

g. Repeat steps e and f until BOT is detected.

h. Go to step b.

POSSIBLE TERMINATION CODES:

10 to 69 - Refer to Fault Code Troubleshooting Procedure
70 - Invalid Operator Sequence (Tape Not Loaded Fault)

TEST 16: REVERSE 75 IPS RAMPS TEST 16

TEST REQUIREMENT: Tape should be loaded.

TEST DESCRIPTION: Test 16 exercises the transport in a start/stop mode at 75 ips in the reverse direction. When BOT is detected, the same 75 ips start/stop mode is executed in the forward direction. When EOT is detected, the routine starts again. Manual intervention is required to terminate the test.

TEST SEQUENCE:

a. Check if the top cover is closed and tape is loaded.

b. Run reverse at 75 ips for 30 ms.

c. Stop and Pause for 400 ms.

d. Repeat steps b and c until BOT is detected.

e. Run reverse at 75 ips for 30 ms.

f. Stop and pause for 400 ms.

g. Repeat steps e and f until EOT is detected.

h. Go to step b.

POSSIBLE TERMINATION CODES:

10 to 69 - Refer to Fault Code Troubleshooting Procedure
70 - Invalid Operator Sequence (Tape Not Loaded Fault)

## TEST 17: 75 IPS REPOSITIONING

TEST REQUIREMENT: Tape should be loaded.

TEST DESCRIPTION: Test 17 is a repositioning routine at 75 ips. It repositions the tape in the forward direction. When EOT is detected, it repositions the tape in the reverse direction. When BOT is detected, the routine starts again. Manual intervention is required to terminate the test.

TEST SEQUENCE:

a. Check if the top cover is closed and tape is loaded.

b. Run forward at 75 ips for 400 ms.

c. Run reverse at 75 ips for 100 ms.

d. Repeat steps b and c until EOT is detected.

e. Run forward at 75 ips for 100 ms.

f. Run reverse at 75 ips for 400 ms.

g. Repeat steps e and f until BOT is detected.

h. Go to step b.

POSSIBLE TERMINATION CODES:

10 to 69 - Refer to Fault Code Troubleshooting Procedure
70 - Invalid Operator Sequence (Tape Not Loaded Fault)

TEST 18: FORWARD 75 IPS CONTINUOUS TEST 18

TEST REQUIREMENT: Tape should be loaded.

TEST DESCRIPTION: Test 18 exercises the transport in a continuous mode at 75 ips in the forward direction. When EOT is detected, tape is stopped and 75 ips continuous mode is executed in the reverse direction. When BOT is detected, the routine starts again. Manual intervention is required to terminate the test.

TEST SEQUENCE:

a. Check if the top cover is closed and tape is loaded.

b. Run forward continuously 75 ips until EOT is detected.

c. Stop and run reverse continuously at 75 ips until BOT is detected.

d. Stop motion and go to step b.

POSSIBLE TERMINATION CODES:

10 to 69 - Refer to Fault Code Troubleshooting Procedure
70 - Invalid Operator Sequence (Tape Not Loaded Fault)

TEST 19: REVERSE 75 IPS CONTINUOUS TEST 19

TEST REQUIREMENT: Tape should be loaded.

TEST DESCRIPTION: Test 19 exercises tne transport in a continuous mode at 75 ips in the reverse direction. When BOT is detected, tape is stopped and 75 ips continuous mode is executed in tne forward direction. When EOT is detected, the routine starts again. Manual intervention is required to terminate the test.

TEST SEQUENCE:

a. Check if the top cover is closed and tape is loaded.

b. Run reverse continuously 75 ips until BOT is detected.

c. Stop and run forward continuously at 75 ips until EOT is detected.

d. Stop motion and go to step b.

POSSIBLE TERMINATION CODES:

10 to 69 - Refer to Fault Code Troubleshooting Procedure
70 - Invalid Operator Sequence (Tape Not Loaded Fault)

TEST REQUIREMENT: None.

TEST DESCRIPTION: Test 20 checks out the internal hardware of the drive, the formatter and interface. It also checks out the bus between the formatter and interface.

TEST SEQUENCE:

a. Check out the device internal hardware.

b. Check out the formatter internal hardware.

c. Check out the bus between the formatter and interface.

d. Check out the interface internal hardware.

POSSIBLE TERMINATION CODES:

00 - Test Is Successful
10 to 69 - Refer to Fault Code Troubleshooting Procedure

TEST 21: 25 IPS STREAMING WRITE TO EOT IN PE MODE TEST 21

TEST REQUIREMENT: A write enabled scratch tape should be loaded.

TEST DESCRIPTION: Test 21 rewinds the tape and writes 2K byte records, incrementing data pattern to EOT at 25 ips streaming mode. On detection of EOT, it rewinds and positions at BOT. If a write error occurs, the unit performs Backspace, Erase, and attempts to write again. If more than five consecutive erases are required, the test terminates with a write fault. If 32 erases are required in one complete pass, the test terminates with a write fault. All functional checks are active throughout the test.

TEST SEQUENCE:

a. Rewind to BOT (this function is not performed if 02 option is selected).

b. Write 2K byte records at 25 ips streaming to EOT.

c. Rewind to BOT.

POSSIBLE TERMINATION CODES:

00 - Test is successful
03 - ID Check
04 - Low Speed Write Error
09 - Hardware Failure
08 - Noise Detected While Erasing
10 to 69 - Refer to Fault Code Troubleshooting Procedure
70 - Invalid Operator Sequence (Tape Not Loaded Fault)

## TEST 22: 25 IPS READ TO EOT

TEST REQUIREMENT: A pre-written tape should be loaded. To make a 75 ips streaming tape in the PE mode, execute Test 23. To make a 25 ips streaming tape in the GCR mode, execute Test 25.

TEST DESCRIPTION: Test 22 rewinds the tape and reads any pre-written tape to EOT at 25 ips. Any read error halts the test with a fault code. All functional checks are active. On detection of EOT, it rewinds and positions at BOT.

TEST SEQUENCE:

a. Rewind to BOT (this function is not performed if 02 option is selected).

b. Read records at 25 ips streaming to EOT.

c. Rewind to BOT.

POSSIBLE TERMINATION CODES:

00 - Test is Successful
03 - ID Check
05 - Low Speed Read Error
09 - Hardware Failure
10 to 69 - Refer to Fault Code Troubleshooting Procedure
70 - Invalid Operator Sequence (Tape Not Loaded Fault)

TEST 23: 75 IPS STREAMING WRITE TO EOT IN PE MODE TEST 23

TEST REQUIREMENT: A write enabled scratch tape should be loaded.

TEST DESCRIPTION: Test 23 rewinds the tape and writes 2K byte records, incrementing data patterns to EOT at 75 ips in streaming mode. On detection of EOT, it rewinds and positions at BOT. If a write error occurs, the unit performs Backspace, Erase, and attempts to write again. If more than five consecutive erases are required, the test terminates with a write fault. If 32 erases are required in one complete pass, the test terminates with a write fault. All functional checks are active throughout the test.

TEST SEQUENCE:

a. Rewind to BOT (tnis function is not performed if 02 option is selected).

b. Write 2K byte records at 75 ips streaming to EOT.

c. Rewind to BOT.

POSSIBLE TERMINATION CODES:

00 - Test is successful
03 - ID Check
06 - High Speed Write Error
08 - Noise Detected While Erasing
09 - Hardware Failure
10 to 69 - Refer to Fault Code Troubleshooting Procedure
70 - Invalid Operator Sequence (Tape Not Loaded Fault)

TEST REQUIREMENT: A pre-written tape should be loaded. To make a 75 ips streaming tape in the PE mode, execute Test 23. To make a 25 ips streaming tape in the GCR mode, execute Test 25.

TEST DESCRIPTION: Test 24 rewinds the tape and reads any pre-written tape to EOT at 75 ips. Any read error halts the test with a fault code. All functional checks are active. On detection of EOT, it rewinds and positions at BOT.

TEST SEQUENCE:

a. Rewind to BOT (this function is not performed if 02 option is selected).

b. Read records at 75 ips streaming to EOT.

c. Rewind to BOT.

POSSIBLE TERMINATION CODES:

00 - Test is Successful
03 - ID Check
07 - High Speed Read Error
09 - Hardware Failure
10 to 69 - Refer to Fault Code Troublesnooting Procedure
70 - Invalid Operator Sequence (Tape Not Loaded Fault)

TEST 25: 25 IPS STREAMING WRITE TO EOT IN GCR MODE TEST 25

TEST REQUIREMENT: A write enabled scratch tape should be loaded.

TEST DESCRIPTION: Test 25 rewinds the tape and writes 2K byte records, incrementing data pattern to EOT at 25 ips streaming mode. On detection of EOT, it rewinds and positions at BOT. If a write error occurs, the unit performs Backspace, Erase, and attempts to write again. If more than five consecutive erases are required, the test terminates with a write fault. If 32 erases are required in one complete pass, the test terminates with a write fault. All functional checks are active throughout the test.

TEST SEQUENCE:

a. Rewind to BOT (this function is not performed if 02 option is selected).

b. Write 2K byte records at 25 ips streaming to EOT.

c. Rewind to BOT.

POSSIBLE TERMINATION CODES:

00 - Test is successful
03 - ID Check
04 - Low Speed Write Error
08 - Noise Detected While Erasing
09 - Hardware Failure
10 to 69 - Refer to Fault Code Troubleshooting Procedure
70 - Invalid Operator Sequence (Tape Not Loaded Fault)

TEST 26: 75 IPS STREAMING WRITE TO EOT IN GCR MODE TEST 26

TEST REQUIREMENT: A write enabled scratch tape should be loaded.

TEST DESCRIPTION: Test 26 rewinds the tape and writes 2K byte records, incrementing data patterns to EOT at 75 ips in streaming mode. On detection of EOT, it rewinds and positions at BOT. If a write error occurs, the unit performs Backspace, Erase, and attempts to write again. If more than five consecutive erases are required, the test terminates with a write fault. If 32 erases are required in one complete pass, the test terminates with a write fault. All functional checks are active throughout the test.

TEST SEQUENCE:

a. Rewind to BOT (this function is not performed if 02 option is selected).

b. Write 2K byte records at 75 ips streaming to EOT.

c. Rewind to BOT.

POSSIBLE TERMINATION CODES:

00 - Test is successful
03 - ID Check
06 - High Speed Write Error
08 - Noise Detected While Erasing
09 - Hardware Failure
10 to 69 - Refer to Fault Code Troubleshooting Procedure
70 - Invalid Operator Sequence (Tape Not Loaded Fault)

TEST 28: PERFORM COMMAND STACK AT 25 IPS START/STOP TEST 28

TEST REQUIREMENT:

a. If a write-type operation is desired, a write enabled scratch tape should be loaded.

b. If a read-type operation is desired, a pre-recorded tape should be loaded.

TEST DESCRIPTION: Test 28 performs the three-level command stack entered by Test 97. If option 01 is entered, the stack will be repeated until EOT or BOT is detected. If write operation is being performed upon an error, a Backspace, Erase, and Rewrite is performed. If read operation is being performed, any uncorrectable read error will cause the test to fail with a read fault. All functional checks are active throughout the test.

Option 2 bypasses read and write errors as in all read/write tests.

POSSIBLE TERMINATION CODES:

00 - Test is Successful
03 - ID Check
04 - Low Speed Write Error
05 - Low Speed Read Error
08 - Noise Detected While Erasing
09 - Hardware Failure
10 to 69 - Refer to Fault Code Troubleshooting Procedure
70 - Invalid Operator Sequence (Tape Not Loaded Fault)
99 - Illegal Remote Test

TEST 29: PERFORM COMMAND STACK AT 75 IPS THRASHING TEST 29

TEST REQUIREMENT:

a. If a write-type operation is desired, a write enabled scratch tape should be loaded.

b. If read-type operation is desired, a pre-recorded tape should be loaded.

TEST DESCRIPTION: Test 29 performs the three-level command stack entered by Test 97. If option 01 is entered, the stack will be repeated until EOT or BOT is detected. If write operation is being performed upon an error, a Backspace, Erase, and Rewrite is performed. If read operation is being performed, any uncorrectable read error will cause the test to fail with a read fault. All functional checks are active throughout the test.

Option 2 bypasses read and write errors as in all read/write tests.

POSSIBLE TERMINATION CODES:

00 - Test is Successful
03 - ID Check
06 - High Speed Write Error
07 - High Speed Read Error
08 - Noise Detected While Erasing
09 - Hardware Failure
10 to 69 - Refer to Fault Code Troubleshooting Procedure
70 - Invalid Operator Sequence (Tape Not Loaded Fault)

TEST 30: CHECK READ AMPLITUDES AT 25 AND 75 IPS WITH TOLERANCE OF + 0.8 VOLTS — TEST 30

TEST REQUIREMENT: Tape should be loaded and not write protected, and should not be near EOT.

TEST DESCRIPTION: Test 30 checks that read amplitudes at 25 AND 75 ips are 1.5 ± 0.8 volts. For 25 ips, the minimum read amplifier gain value is determined for each track, such that the peak-to-peak voltage at the analog test point is 1.5 volts. This generates an envelope signal for that track. If, at the end of the test, an envelope is not detected for any track, a fault is reported. The gain determined for each track is compared to corresponding gain value stored in the back-up memory (determined by Test 31). If the difference for any track is such, that it causes an amplitude difference of 0.8 volts, a fault is reported. All Field Service options are available for the test.
The same operation is carried out for 75 ips.

TEST SEQUENCE:

a. Check if the top cover is closed, tape is not write protected, tape is loaded and not at EOT.

b. Calculate the minimum read gain values for all tracks for 25 ips as described.

c. Display Fault Code 01 if an envelope is not detected in track at the end of the test.

d. Display Fault Code 02 if the difference in gain, between that determined and the corresponding value stored in the back-up memory for any track, is such that it causes an amplitude difference of 0.8 volts.

e. Execute steps b, c, and d for 75 ips.

f. Display Termination Code 00 if complete test is successful.

POSSIBLE TERMINATION CODES:

00 - Test Is Successful
01 - EGC Envelope Fault
02 - EGC Wear Tolerance Fault
10 to 69 - Refer to Fault Code Troubleshooting Procedure
70 - Invalid Operator Sequence (Tape Not Loaded Fault)
72 - Tape Write Protected Fault
77 - EOT On EGC Fault

NOTE: Field Service Test 30 is a part of Operator Test 1.

TEST 31: SET UP AND CHECK READ AMPLITUDES AT 25 AND 75 IPS TEST 31

TEST REQUIREMENT: Tape should be loaded and not write protected, and should not be near EOT. Jumper on the Servo-Control Module back-up memory should be in 1-2 position.

TEST DESCRIPTION: Test 31 sets up and checks read amplitudes at 25 and 75 ips, PE mode and GCR mode. For 25 ips, it determines the minimum gain value for each track, in the same manner as described in Test 30, and stores them in the back-up memory. It again determines the minimum gain value for each track and compares it to the previously stored value. If the difference in gain between the two values for any track is such that it causes an amplitude difference of 0.1 volts, the test is repeated. Also, if any fault is detected while determining the minimum gain values, the test is repeated. If, after 5 attempts, the operation is not successful, a fault is reported.
The same operation is carried out for 75 ips, PE mode and GCR mode.

TEST SEQUENCE:

a. Check if the top cover is closed, tape is not write protected, tape is loaded, and tape is not at EOT.

b. Determine the minimum gain values for 25 ips and store them in the back-up memory. Report a fault if the jumper on the Servo-Control Module back-up memory is not in the 1-2 position.

c. Determine the minimum gain values for 25 ips and compare them with the previously stored values. If, for any track, the difference is such that it causes an amplitude difference greater than 0.1 volts, the test is repeated.

d. If, while determining the minimum gain values in steps b and c, a fault is detected, the test is repeated.

e. If, after five tries, the test is still not successful, terminate the test with Termination Code 78.

f. Execute steps b, c, and d for 75 ips. If test is not successful after five tries, display Termination Code 79.

g. Display Termination Code 00 if complete test is successful.

TEST SEQUENCE (Cont'd)

h. Execute steps b, c, and d for 25 ips, GCR mode. If test is not successful after five tries, display Termination Code 80.

i. Execute steps b, c, and d for 75 ips, GCR mode. If test is not successful after five tries, display Termination Code 81.

POSSIBLE TERMINATION CODES:

00 - Test Is Successful
10 to 69 - Refer to Fault Code Troubleshooting Procedure
70 - Invalid Operator Sequence (Tape Not Loaded Fault)
72 - Tape Write Protected Fault
74 - EEPROM Not Write Enabled
78 - EGC Low Speed Set-Up Failure
79 - EGC High Speed Set-Up Failure
80 - EGC Low Speed GCR Set-Up Failure
81 - EGC High Speed GCR Set-Up Failure
95 - Attempt to Loop on Test
99 - Illegal Remote Test

NOTE 1: After completing the test, replace the jumper on the Servo-Control Module back-up memory from the 1-2 position to the 2-3 position before powering down the TU81/TA81.

NOTE 2: Loop on test option is not permitted with this test.

TEST 32: CHECK READ AMPLITUDES AT 25 AND 75 IPS TEST 32

TEST REQUIREMENT: Tape should be loaded and pre-written with all 1's, and should not be near EOT (see Test 39 or 40).

TEST DESCRIPTION: Test 32 checks that read amplitudes at 25 and 75 ips are 1.5 ± 0.3 volts, with pre-written tape of all 1's. This test is similar to Test 30 except that it requires pre-written tape and the tolerance value is ± 0.3 volts instead of 0.8 volts. All Field Service options are available for the test.

POSSIBLE TERMINATION CODES:

00 - Test Is Successful
01 - EGC Envelope Fault
02 - EGC Wear Tolerance Fault
10 to 69 - Refer to Fault Code Troubleshooting Procedure
70 - Invalid Operator Sequence (Tape Not Loaded Fault)
77 - EOT On EGC Fault

TEST 33: SET UP READ AMPLITUDES AT 25 IPS TEST 33

TEST REQUIREMENT: Tape should be loaded and not write protected, and should not be near EOT. Jumper on the Servo-Control Module back-up memory should be in the 1-2 position.

TEST DESCRIPTION: Test 33 determines and stores the read gains at 25 ips. This test is similar to Test 31 except it is done only at 25 ips, and whenever a fault is detected, the test is terminated and the fault is reported.

POSSIBLE TERMINATION CODES:

00 - Test Is Successful
01 - EGC Envelope Fault
10 to 69 - Refer to Fault Code Troubleshooting Procedure
70 - Invalid Operator Sequence (Tape Not Loaded Fault)
72 - Tape Write Protected Fault
73, 74 - Back Up Memory Not Write Enabled
75, 76 - Bad Back Up Memory
77 - EOT On EGC Fault
95 - Attempt to Loop on Test
99 - Illegal Remote Test

NOTE 1: After completing the test, replace the jumper on the Servo-Control Module back-up memory from the 1-2 position to the 2-3 position before powering down the TU81/TA81.

NOTE 2: Loop on test option is not permitted with this test.

TEST 34: SET UP READ AMPLITUDES AT 75 IPS TEST 34

TEST REQUIREMENT: Tape should be loaded and not write protected, and should not be near EOT. Jumper on the Servo-Control Module back-up memory should be in the 1-2 position.

TEST DESCRIPTION: Test 34 determines and stores the read gains at 75 ips. This test is similar to Test 31 except it is done only at 75 ips, and whenever a fault is detected, the test is terminated and the fault is reported.

POSSIBLE TERMINATION CODES:

00 - Test Is Successful
01 - EGC Envelope Fault
10 to 69 - Refer to Fault Code Troubleshooting Procedure
70 - Invalid Operator Sequence (Tape Not Loaded Fault)
72 - Tape Write Protected Fault
73, 74 - Back Up Memory Not Write Enabled
75, 76 - Bad Back Up Memory
77 - EOT On EGC Fault
95 - Attempt to Loop on Test
99 - Illegal Remote Test

NOTE 1: After completing the test, replace the jumper on the Servo-Control Module back-up memory from the 1-2 position to the 2-3 position before powering down the TU81/TA81.

NOTE 2: Loop on test is not permitted with this test.

TEST 37: SET UP VELOCITY CORRECTION MULTIPLIER TEST 37

TEST REQUIREMENT: Tape should not be threaded. Jumper on the Servo-Control Module back-up memory should be in the 1-2 position.

TEST DESCRIPTION: Test 37 sets up the velocity correction multiplier for the velocity DAC.

TEST SEQUENCE:

a. Check if the top cover is closed and tape is absent.

b. Move take-up reel forward at about 19 ips velocity (for BOT radius).

c. Calculate velocity correction multiplier for velocity DAC.

d. Display Termination Code 93 if velocity correction multiplier is out of range.

e. Stop take-up reel and store velocity correction multiplier in back-up memory.

f. Display Termination Code 00 if complete test is successful.

POSSIBLE TERMINATION CODES:

00 - Test Is Successful
10 to 69 - Refer to Fault Code Troubleshooting Procedure
73, 74 - Back Up Memory Not Write Enabled
75, 76 - Bad Back Up Memory
93 - Velocity Correction Multiplier Factor Out of Range
94 - Tape Present Fault
95 - Attempt to Loop on Test
99 - Illegal Remote Test

NOTE 1: After completing the test, replace the jumpers on the Servo-Control Module back-up memory from the 1-2 position to the 2-3 position before powering down the TU81/TA81.

NOTE 2: Loop on test is not permitted with this test.

TEST 38: PULSE FILE REEL AT 8 OUNCES TEST 38

TEST REQUIREMENT: Tape (10.5 inch reel) should be threaded close to BOT without any loop.

TEST DESCRIPTION: This test puts the take-up reel in Stoplock. It pulses the file reel in the reverse direction to maintain approximately 8 ounces of tension. Manual intervention is required to terminate the test.

TEST SEQUENCE:

a. Check if tne top cover is closed and tape is present.

b. Put take-up reel in Stoplock.

c. Turn on pump.

d. Pulse the file reel.

POSSIBLE TERMINATION CODES:

10 to 69 - Refer to Fault Code Troubleshooting Procedure
71 - Invalid Operator Sequence (Tape Loaded Fault)

TEST 39: WRITE OPTION PATTERN IN PE MODE TO EOT AT 25 IPS TEST 39

TEST REQUIRMENT: Tape should be loaded and not write protected.

TEST DESCRIPTION: Test 39 writes tape with option pattern in PE mode at 25 ips to EOT. At EOT, tape is rewound to BOT. Pattern options are available for the test. Options available are:

00 - All ones data frequency pattern
01 - One-half frequency data pattern

TEST SEQUENCE:

a. Check if the top cover is closed.

b. Check if tape is loaded and not write protected.

c. Write option pattern in PE mode to EOT at 25 ips.

d. Rewind to BOT.

e. Repeat test from step c.

POSSIBLE TERMINATION CODES:

10 to 69 - Refer to Fault Code Troubleshooting Procedure
70 - Invalid Operator Sequence (Tape Not Loaded Fault)
72 - Tape Write Protected Fault

TEST 40: WRITE OPTION PATTERN IN PE MODE TO EOT AT 75 IPS — TEST 40

TEST REQUIRMENT: Tape should be loaded and not write protected.

TEST DESCRIPTION: Test 40 writes tape with option pattern in PE mode at 75 ips to EOT. At EOT, it is rewound to BOT. Pattern options are available for the test. Options available are:

00 - All ones data frequency pattern
01 - One-half frequency data pattern

TEST SEQUENCE:

a. Check if the top cover is closed.
b. Check if tape is loaded and not write protected.
c. Write option pattern in PE mode to EOT at 75 ips.
d. Rewind to BOT.
e. Repeat test from step c.

POSSIBLE TERMINATION CODES:

10 to 69 - Refer to Fault Code Troubleshooting Procedure
70 - Invalid Operator Sequence (Tape Not Loaded Fault)
72 - Tape Write Protected Fault

TEST 41: STOPLOCK TAKE-UP REEL — TEST 41

TEST REQUIREMENT: Tape should not be loaded.

TEST DESCRIPTION: Test 41 checks the stoplock mode of the take-up reel servo. Manual intervention is required to terminate the test.

TEST SEQUENCE:

a. Check if the top cover is closed.
b. Put take-up reel servo in stoplock mode.

POSSIBLE TERMINATION CODES:

10 to 69 - Refer to Fault Code Troubleshooting Procedure
71 - Invalid Operator Sequence (Tape Loaded Fault)

TEST 42: ENABLE TENSION SERVO TEST 42

TEST REQUIREMENT: Tape snould be threaded.

Tape slack should be removed to allow File Servo to be enabled.

TEST DESCRIPTION: Test 42 allows tape tension to be checked via the tension servo. It produces 8 ounces of tension by enabling tension servo.

TEST SEQUENCE:

a. Check if the top cover is closed. If tape is absent, go to step d.

b. Take up slack in tape by slowly moving take-up reel in reverse direction until tension is reached.

c. Enable tension servo operation at 8 ounces.

d. If tape is pulled out of tape path, display Termination Code 00.

POSSIBLE TERMINATION CODES:

00 - Test Is Successful
10 to 69 - Refer to Fault Code Troubleshooting Procedure
71 - Invalid Operator Sequence (Tape Loaded Fault)

TEST 43: TURN ON PUMP TEST 43

TEST REQUIREMENT: Tape should not be loaded.

TEST DESCRIPTION: Test 43 turns on the pump. Manual intervention is required to terminate test.

TEST SEQUENCE:

a. Check if the top cover is closed and tape is not loaded.

b. Turn on pump.

POSSIBLE TERMINATION CODES:

10 to 69 - Refer to Fault Code Troubleshooting Procedure
71 - Invalid Operator Sequence (Tape Loaded Fault)

TEST REQUIREMENT: Tape should be loaded.

TEST DESCRIPTION: Test 44 moves tape forward at rewind speed to EOT.

TEST SEQUENCE:

a. Check if the top cover is closed and tape is loaded.

b. Gradually increase speed and then maintain rewind speed.

c. Wait until EOT is detected.

d. Stop motion and display Termination Code 00.

POSSIBLE TERMINATION CODES:

00 - Test Is Successful
10 to 69 - Refer to Fault Code Troubleshooting Procedure
70 - Invalid Operator Sequence (Tape Not Loaded Fault)

TEST 45: REFRESH DAC SCOPE LOOP TEST 45

TEST REQUIREMENT: Tape should not be loaded.

TEST DESCRIPTION: Test 45 exercises the Refresh DAC on the Servo-Control Module. If Refresh DAC is operational, a triangle waveform of 35 ms period will be observed on the scope. Manual termination is required to terminate the test.

TEST SEQUENCE:

a. Check if the top cover is closed.

b. Output zero voltage at TP 14 through Refresh DAC, and increase it by 20 mv at every 60 microseconds (approximate) until it reaches 5 volts.

c. Decrease output at Refresh DAC by 20 mv at every 60 microseconds (approximate) until it reaches 0 volt.

d. Go to step b.

POSSIBLE TERMINATION CODES:

10 to 69 - Refer to Fault Code Troubleshooting Procedure
71 - Invalid Operator Sequence (Tape Loaded Fault)

TEST 46: VELOCITY DAC SCOPE LOOP TEST 46

TEST REQUIREMENT: Tape should not be loaded.

TEST DESCRIPTION: Test 46 exercises the Velocity DAC on the Servo-Control Module. If Velocity DAC is operational, a triangle waveform of 35 ms period will be observed on the scope. Manual termination is required to terminate the test.

TEST SEQUENCE:

a. Check if the top cover is closed.

b. Output zero voltage at Velocity DAC, and increase it by 20 mv at every 60 microseconds (approximate) until it reaches 6.9 volts.

c. Decrease output at Velocity DAC by 20 mv at every 60 microseconds (approximate) until it reaches 0 volt.

d. Go to step b.

POSSIBLE TERMINATION CODES:

10 to 69 - Refer to Fault Code Troubleshooting Procedure
71 - Invalid Operator Sequence (Tape Loaded Fault)

TEST 47: SERVO-CONTROL MICROPROCESSOR OUTPUTS SCOPE LOOP TEST 47

TEST REQUIREMENT: Tape should not be loaded.

TEST DESCRIPTION: Test 47 generates a pulse of 50 microseconds every 5 ms on each of the addressable outputs of the Servo-Control Module. Manual intervention is required to terminate the test.

TEST SEQUENCE:

a. Check if the top cover is closed and tape is not present.

b. Generate a 50 microsecond pulse every 5 ms on each of the addressable outputs of Servo-Control microprocessor.

POSSIBLE TERMINATION CODES:

10 to 69 - Refer to Fault Code Troubleshooting Procedure
94 - Tape Present Fault
99 - Illegal Remote Test

TEST 48: SET UP PUMP POWER-DOWN TIMER TEST 48

TEST REQUIREMENT: Tape should be unloaded. Jumper W1 on backup memory should be in the 1-2 position.

TEST DESCRIPTION: Test 48 enables the power-down timer for one minute if no tape motion has occurred.

NOTE

Return jumper to 2-3 position.

POSSIBLE TERMINATION CODES:

00 - Test Is Successful
71 - Invalid Operator Sequence (Tape Loaded Fault)
73, 74 - Backup Memory is not write enabled
75, 76 - Bad Backup Memory

NOTE: To disable pump power-down timer and high temperature sensors, execute test 37.

TEST 49: SET UP TU81/TA81 MODE

TEST REQUIREMENT: Tape should be unloaded. Jumper W1 on backup memory should be in the 1-2 position.

TEST DESCRIPTION: Test 49 enables auto load on power up, displays the unit identifier, and sets up the power-down timer for one minute if no tape motion has occurred.

NOTE

Return jumper to 2-3 position.

POSSIBLE TERMINATION CODES:

00 - Test is Successful
71 - Invalid Operator Sequence (Tape Loaded Fault)
73, 74 - Backup Memory Is Not Write Enabled
75, 76 - Bad Backup Memory

NOTE: To disable everything enabled by test 49, execute test 37.

TEST 50: ENABLE AUTO LOAD TEST 50

TEST REQUIREMENT: Tape should be unloaded. Jumper W1 on backup memory should be in the 1-2 position.

TEST DESCRIPTION: Test 50 enables auto load on power up. This test does not affect the power down timers.

NOTE

Return jumper to 2-3 position.

POSSIBLE TERMINATION CODES:

00 - Test is Successful
71 - Invalid Operator Sequence (Tape Loaded Fault)
73, 74 - Backup Memory Is Not Write Enabled
75, 76 - Bad Backup Memory
99 - Illegal Remote Test

NOTE: To disable power-on auto load, execute test 37.

TEST 52: WRITE OPTION PATTERN IN GCR MODE TO EOT AT 25 IPS TEST 52

TEST REQUIRMENT: Tape should be loaded and not write protected.

TEST DESCRIPTION: Test 52 writes tape with option pattern in GCR mode at 25 ips to EOT. At EOT, tape is rewound to BOT. Pattern options are available for the test. Option available are:

00 - All ones data frequency pattern
01 - One-half frequency data pattern
02 - One-third frequency data pattern

TEST SEQUENCE:

a. Check if the top cover is closed.

b. Check if tape is loaded and not write protected.

c. Write option pattern in GCR mode to EOT at 25 ips.

d. Rewind to BOT.

e. Repeat test from step c.

POSSIBLE TERMINATION CODES:

10 to 69 - Refer to Fault Code Troubleshooting Procedure
70 - Invalid Operator Sequence (Tape Not Loaded Fault)
72 - Tape Write Protected Fault

TEST 53: WRITE OPTION PATTERN IN GCR MODE TO EOT AT 75 IPS TEST 53

TEST REQUIRMENT: Tape should be loaded and not write protected.

TEST DESCRIPTION: Test 40 writes tape with option pattern in GCR mode at 75 ips to EOT. At EOT, it is rewound to BOT. Pattern options are available for the test. Options available are:

00 - All ones data frequency pattern
01 - One-half frequency data pattern
02 - One-third frequency data pattern

TEST SEQUENCE:

a. Check if the top cover is closed.
b. Check if tape is loaded and not write protected.
c. Write option pattern in GCR mode to EOT at 75 ips.
d. Rewind to BOT.
e. Repeat test from step c.

POSSIBLE TERMINATION CODES:

10 to 69 - Refer to Fault Code Troubleshooting Procedure
70 - Invalid Operator Sequence (Tape Not Loaded Fault)
72 - Tape Write Protected Fault

TEST 55: DRIVE INTERNAL DIAGNOSTIC TEST 55

TEST REQUIREMENT: None.

TEST DESCRIPTION: Test 55 checks out the internal hardware of the drive.

TEST SEQUENCE:

a. Check if the tape is not loaded.
b. Check the drive's Functional PROM Checksum.
c. Check the drive's Diagnostic PROM Checksum.
d. Check the Programmable Timer #1.
e. Check the Programmable Timer #2.

POSSIBLE TERMINATION CODES:

00 - Test Is Successful
10 to 69 - Refer to Fault Code Troubleshooting Procedure

TEST REQUIREMENT: None.

TEST DESCRIPTION: Test 56 checks out the internal hardware of the formatter. It does not check controller interface or device interface hardware.

TEST SEQUENCE:

a. Check out write hardware.

b. Check out read/write interface hardware.

c. Check out read hardware.

d. Check out hardware used to write or read a data block.

e. Check out VFO's for both speeds and densities.

POSSIBLE TERMINATION CODES:

00 - Test Is Successful
10 to 69 - Refer to Fault Code Troubleshooting Procedure

TEST REQUIREMENT: Disconnect the cable from the I/O interface.

TEST DESCRIPTION: Test 57 checks out the internal hardware of the TMSCP/TU81 or STI/TA81 board. It does not check the interface between itself and the formatter.

TEST SEQUENCE:

a. Check the PROM Checksum.

b. Check out internal hardware.

POSSIBLE TERMINATION CODES:

00 - Test is Successful
10 to 69 - Refer to Fault Code Troubleshooting Procedure

TEST 58: LOOP WRITE-TO-READ THRU DRIVE INTERFACE TEST 58

TEST REQUIREMENT: None.

TEST DESCRIPTION: Test 58 loops data through the drive interface. The formatter will write 2K byte records, incrementing data patterns for each speed and density.

TEST SEQUENCE:

a. Write 10 records in low speed PE mode.

b. Write 10 records in high speed PE mode.

c. Write 10 records in low speed GCR mode.

d. Write 10 records in high speed GCR mode.

POSSIBLE TERMINATION CODES:

00 - Test is Successful
04 - Low Speed Write Error
06 - High Speed Write Error
09 - Hardware Failure
10 to 69 - Refer to Fault Code Troubleshooting Procedure

TEST 59: LOOP WRITE-TO-READ THRU READ/WRITE TEST 59

TEST REQUIREMENT: Tape unthreaded.

TEST DESCRIPTION: Test 59 loops data through the read/write in the drive. The formatter will write 2K byte records, incrementing data patterns for low speed GCR mode only.

TEST SEQUENCE:

a. Write 10 records in low speed GCR mode.

POSSIBLE TERMINATION CODES:

00 - Test is Successful
04 - Low Speed Write Error
09 - Hardware Failure
10 to 69 - Refer to Fault Code Troubleshooting Procedure
94 - Tape Threaded Fault

TEST 60: LOOP WRITE-TO-READ THRU FORMATTER TEST 60

TEST REQUIREMENT: None.

TEST DESCRIPTION: Test 60 loops data through the formatter. The formatter will write 2K byte records, incrementing data patterns for each speed and density.

TEST SEQUENCE:

a. Write 10 records in low speed PE mode.

b. Write 10 records in high speed PE mode.

c. Write 10 records in low speed GCR mode.

d. Write 10 records in high speed GCR mode.

POSSIBLE TERMINATION CODES:

00 - Test is Successful
56 - Formatter/Drive Communication Fault
04 - Low Speed Write Error
06 - Hign Speed Write Error
09 - Hardware Failure

TEST 61: TAKE-UP MOTOR AND POWER AMP FULL CAPABILITY DETECTION TEST 

TEST REQUIREMENT: Tape should not be threaded.

TEST DESCRIPTION: Test 61 checks out whether take-up motor performance is within range or not. It also checks out whether take-up section of the power amp is capable of delivering full current or not.

TEST SEQUENCE:

a. Check if the top cover is closed and tape is absent.

b. Apply diagnostic lines to move take-up motor in forward direction from 0 to 75 ips, and measure time it requires to ramp-up. Stop take-up motor.

c. Calculate motor constant from this data.

d. If motor constant is within range, go to step e. If motor constant is out of range the first time, repeat steps b and c. Otherwise, display Termination Code 84.

e. Apply full current to move take-up motor in forward direction from 0 to 75 ips, and measure time it requires to ramp-up. Stop take-up motor.

f. If power amp is not capable of delivering full current in forward direction, flag a fault, otherwise, go to step h.

g. If fault is the first time, repeat steps e and f, otherwise, display Termination Code 82.

h. Apply full current to move take-up motor in reverse direction from 0 to 75 ips, and measure time it requires to ramp-up. Stop take-up motor.

i. If power amp is not capable of delivering full current in reverse direction, flag a fault, otherwise, go to step k.

j. If fault is the first time, repeat steps h and i, otherwise, display Termination Code 82.

k. Display Termination Code 00 to indicate successful completion of test.

POSSIBLE TERMINATION CODES:

00 - Test Is Successful
10 to 69 - Refer to Fault Code Troubleshooting Procedure
82 - Take-Up Power Amp Fault
84 - Take-Up Motor/Tach Fault
94 - Tape Present Fault

TEST REQUIREMENT: Tape should not be threaded.

TEST DESCRIPTION: Test 62 checks that the distance between two consecutive quarter tachs (derived from fine line tachs at the take-up motor) is within tolerable limits.

TEST SEQUENCE:

a. Check if the top cover is closed and tape is absent.

b. Ramp up to 4 ips.

c. Check if distance between two consecutive quarter tachs is within tolerable limits.

d. If, after five tries, at least once, the distance between two consecutive quarter tachs is within limits, go to step f.

e. Display Termination Code 96.

f. Check that the distance between all consecutive quarter tachs is within tolerable limits.

g. If distance between any two consecutive quarter tachs is not within limits, report fault, otherwise, go to step i.

h. Repeat steps e and f. If the error is detected five times, display Termination Code 84.

i. Display Termination Code 00 to indicate successful completion of test.

POSSIBLE TERMINATION CODES:

00 - Test Is Successful
10 to 69 - Refer to Fault Code Troubleshooting Procedure
84 - Take-Up Motor/Tach Fault
94 - Tape Present Fault
95 - Formatter Interrupt received while test in progress.
96 - Servo Loop Fault

## TEST 64: AUTOMATIC WRITE CURRENT LEVEL ADJUSTMENT

TEST REQUIREMENT: Execute this test with a 3M777 or equivalent tape (or the most frequently used tape at the site) with a minimum accumulation of 10 full reel passes on a transport. The recommended coercivity is 310 ± 5 oersteds. Discard a tape showing signs of oxide breakdown (identifiable by contamination of magnetic head).

Clean the magnetic head.

Load a qualified write-enabled tape.

Move jumper W-1 on the Servo-Control Module to the 1-2 position.

TEST DESCRIPTION: Test 64 determines the optimum write current level for all nine tracks. The write current levels are determined for 25 ips PE, 25 ips GCR, 75 ips PE, and 75 ips GCR. The values are stored in backup memory.

TEST SEQUENCE:

a. Enter Test 64. Press EXECUTE switch.

b. Test runs to completion.

c. Execute Test 31.

d. Before turning power off, move jumper W-1 on the Servo-Control Module to the 2-3 position.

POSSIBLE TERMINATION CODES:

00 - Test is Successful
01 - Read Envelope Fault
10 to 69 - Refer to Fault Code Troubleshooting Procedure
70 - Invalid Operator Sequence (Tape Not Loaded Fault)
72 - Tape Write Protected Fault
73, 74 - Backup Memory Jumper W-1 not in 1-2 position
75, 76 - Bad Backup Memory
80 - PE 25 IPS Setup Fault
81 - PE 75 IPS Setup Fault
82 - GCR 25 IPS Setup Fault
83 - GCR 75 IPS Setup Fault
87 - Write Currents Inconsistent Fault
88 - Optimized Write Current Exceeds Maximum

TEST 70: ENABLE/DISABLE ERROR PRINTOUT ON ASCII TERMINAL — TEST 70

TEST REQUIREMENT: None.

TEST DESCRIPTION: Test 70 enables/disables error reporting to the ASCll terminal. By default, the error reporting to the ASCll terminal is whenever an error occurs during normal TU81 operation is disabled.
Option 00 disables error printout on ASCll terminal.
Option 01 enables error printout on ASCll terminal.

POSSIBLE TERMINATION CODES:

00 - Test is Successful
10 to 69 - Refers to Fault Code Troubleshooting Procedure

TEST REQUIREMENT: Tape should be unloaded. Jumper W1 on backup memory snould be in tne 1-2 position.

TEST DESCRIPTION: Test 82 enables the low tension mode of operation. After running test 82, the STU drive can go into low tension mode, if required. (Stiction tapes used under high temperature/humidity conditions may require low tension mode to meet read/write error requirements.)

NOTE

Return jumper to 2-3 position after test.

TEST OPTIONS:
00 - Enable low tension mode of operation.
01 - Enable low tension mode of operation, and cause unit ID to flash if low tension mode is entered.
02 - Disable low tension mode.

POSSIBLE TERMINATION CODES:

00 - Test is Successful
71 - Invalid Operator Sequence (Tape Loaded Fault)
73, 74 - Backup Memory Is Not Write Enabled
75, 76 - Bad Backup Memory

NOTE

If option 01 is selected and low tension mode is entered, unit identification will flash until tape is unloaded and RESET is pressed. Tne drive exits low tension mode after every REWIND command.

To disable low tension mode, execute Test 82 Option 02, or Test 37.

TEST 91: FUNCTIONAL FAULT DETECTION TEST TEST 91

TEST REQUIRMENT: A write enabled scratch tape should be loaded.

TEST DESCRIPTION: Test 91 performs those functions that the TU81/TA81 would normally perform during functional operations. Unit halts with the appropriate error code, if a functional fault occurs.

TEST SEQUENCE:

a. If tape is unloaded, then load tape. Otherwise, rewind tape.

b. Write 100 blocks in PE mode at 25 ips start/stop (see NOTE 1).

c. Space Reverse, Erase, and Write File Mark (check for file mark detected). Space Reverse and check for file mark detected. Read Forward and again check for file mark detected.

d. Read Reverse 100 blocks at 25 ips start/stop.

e. Read Forward 100 blocks at 25 ips start/stop.

f. Repeat steps b thru e at 25 ips streaming.

g. Repeat steps b thru e at 75 ips streaming.

h. Write 10 blocks at 75 ips "thrashing" (see NOTE 2).

i. Read Reverse 10 blocks at 75 ips "thrashing".

j. Read Forward 10 blocks at 75 ips "thrashing".

k. Rewind.

l. Read Forward 300 blocks at 75 ips streaming. Check for file mark detected at blocks 100, 200, and 300.

m. Rewind.

n. Repeat steps b thru e for GCR mode and Space Reverse where Read Reverse is specified.

o. Write to EOT in GCR mode at 75 ips streaming (see NOTE 1).

TEST SEQUENCE (Cont'd)

p. Space reverse 1000 records at 75 ips streaming (reposition after every 250 records).

q. Write to EOT in GCR mode at 25 ips streaming.

r. Rewind.

NOTE 1. Data blocks written are 2K bytes with an incrementing pattern starting at zero for each block.

NOTE 2. Data blocks written are 256 bytes with an incrementing pattern starting at zero for each block.

POSSIBLE TERMINATION CODES:

00 - Test is Successful
01 - Read Envelope Fault
02 - Read Amplitude Range Fault
03 - ID Check
04 - Low Speed Write Error
05 - Low Speed Read Error
06 - High Speed Write Error
07 - High Speed Read Error
08 - Noise In IBG
09 - Hardware Failure
10 to 69 - Refer to Fault Code Troubleshooting Procedure

TEST REQUIREMENT: None.

TEST DESCRIPTION: Test 97 allows Field Service Representative to set up a command stack using READ, WRITE, SPACE, and ERASE commands. Up to three commands can be entered. The commands available are:

READ FORWARD - 00
READ REVERSE - 80
SPACE FORWARD - 08
SPACE REVERSE - 88
WRITE PE - 40
ERASE - 58
NO-OP - 70 or 01 (included to allow "in-place" analysis)
WRITE FILE MARK PE - 50
REWIND - 74
WRITE GCR - 41
WRITE FILE MARK GCR - 51

TEST SEQUENCE:

a. Set up for test 97 and depress EXECUTE.

b. Display goes to "00" - enter first desired command using STEP and TEST (to multiply by 10) and depress EXECUTE.

c. Repeat step b two more times to enter second and third commands.

d. After third entry, display goes to "00" and fault indicator will illuminate. Test is terminated.

POSSIBLE TERMINATION CODES:

99 - Illegal Remote Test

NOTE: Test 28 and Test 29 cause execution of the commands set up in this Command Stack Routine.

Digital Equipment Corporation • Shrewsbury, MA 01545