

IBM 3590 Tape Subsystem



Maintenance Information

Models B11, B1A, E11 and E1A

IBM 3590 Tape Subsystem



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Models B11, B1A, E11 and E1A

Part Number 05H9018

| EC Number F24190

Note!

Before using this information and the product it supports, be sure to read the general information under "Notices" on page NOTICES-1.

The Revision character | found in this document identifies the information that has been added or changed. This release includes information to support the following enhancements :

- Release form number for stocking manual in Mechanicsburg.
- Support for Magstar Models E11 and E1A.
 - New power supply.
 - New power supply cable (FRU DB).
 - New card pack.
 - New HGA head guide assembly.
 - Update pneumatic and power MAPs.
 - Update the INTRO section.
 - Update the INST section.
 - Update the MSG section.
 - Update the PANEL section.
 - Changes to START section.
 - Add tape write protected error
 - Add FID 07 and 08
 - Add FRU DB, power supply cable
 - New microcode to support Model E11/E1A.
- Add CE SCSI Config Menu

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Preface

This manual is for use by service personnel who intend to install, remove, diagnose, repair, or test the IBM 3590 Models B11, B1A, E11, E1A, Deskside, and to support the Magstar Ultra drives, FC 9790/5790.

Part Number 05H9018

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Related Information

Additional information related to the subsystem is available in the following publications:

- *IBM Magstar 3590 Tape Subsystem Introduction and Planning Guide*, GA32-0329
- *IBM Magstar 3590 Tape Subsystem Operator Guide*, GA32-0330
- *IBM 3590 Operator Quick Reference*, GA32-0354
- *IBM 3590 High Performance Tape Subsystem Hardware Reference*, GA32-0331
- *IBM 3494 Tape Library Dataserver Maintenance Information*, P/N 05H7566
- *IBM Care and Handling of the IBM Magnetic Tape Cartridge*, GA32-0047
- *IBM 3590 Tape Subsystem Models C12/C14 Maintenance Information*, P/N 05H9205
- *IBM 3590 Tape Subsystem A00 and A50 Controller Models Maintenance Information*, P/N 05H9206

AS/400 Information

For additional information about the AS/400 subsystems and software, see:

- *IBM 3494 Tape Library Dataserver User's Guide: Media Library Device Driver for Application System/400*, GC35-0153
- *Application System/400 Service Functions*, SY44-3902
- *Application System/400 System Operation*, SC41-3203
- *Application System/400 Physical Planning Reference*, SA41-3109
- *Application System/400 Physical Planning Summary*, SA41-3108
- *Application System/400 Control Language Reference*, SC41-0030
- *Application System/400 Security Concepts and Planning*, SC41-8083
- *IBM 9309 Rack Enclosure Setup and Operation Guide (Models 1 and 2)*, GA24-4039

RISC System/6000 Information

For additional information about the RISC System/6000 subsystems and software, see:

- *RISC System/6000 Getting Started: Using RISC System/6000*, GC23-2377
- *RISC System/6000 Getting Started: Managing RISC System/6000*, GC23-2378
- *RISC System/6000 Problem Solving Guide*, SC23-2204
- *RISC System/6000 System Overview and Planning*, GC23-2406
- *RISC System/6000 Planning for System Installation*, GC23-2407
- *7202 Install and Service Guide*, SA23-2670

- *7015 Install and Service Guide, SA23-2628*

9076 SP2 Information

- *Scalable POWERparallel Systems: System Planning, SC233864 PACKAGE on MKTTOOLS*
- *Scalable POWERparallel Systems: Installation Guide, SH23-3865*
- *Scalable POWERparallel Systems: High-Performance Technical Computing Solutions, GH23-2485*
- *Scalable POWERparallel Systems: Business Solutions, GA23-2475*
- *IBM 9076 Scalable POWERparallel Systems: SP2 Administration Guide, SH26-2486*
- *IBM 9076 Scalable POWERparallel Systems: SP2 Diagnosis and Messages, SC23-3866*
- *IBM 9076 Scalable POWERparallel Systems: SP2 Command and Technical Reference, SC23-3867*
- *IBM 9076 Scalable POWERparallel Systems: Maintenance Information, Vol. 1, SY66-0294*
- *IBM 9076 Scalable POWERparallel Systems: Maintenance Information, Vol. 2, SY66-0295*

Device Driver Information

- *IBM 3494 Tape Library Dataserver User's Guide: Media Library Device Driver for Application System/400, GC35-0153*
- *IBM SCSI Tape Drive, Medium Changer, and Library Device Drivers: Installation and User's Guide, GC35-0154*

Start

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Attention Drive Messages	START-25
Attention ACF Messages	START-29

Maintenance Starting Point

Begin all maintenance action here. Most drive failures result in a FID (FRU identifier) error code on the drive Operator/CE panel. Some load or unload problems may also result in ATTN DRV or ATTN ACF messages. All of these error codes and messages are recorded in the drive CE Error Log for your convenience. See “CE Logs Menu” on page PANEL-43 for details.

The table below lists possible reasons for service and the associated service action. Find the reason you are here in the left column and perform the stated action in the right column. After determining the failing hardware, remove and replace the FRU as directed. After any hardware replacement or other maintenance action is performed, go to “End of Call” on page PROC-8.

Note: If the service call is on a status 3 machine, see “General Instructions” in the INSP section, then return here to continue the service call.

If you are unable to determine the cause of the problem (No Defect Found), or the problem is intermittent, or the symptoms change and you need further assistance, go to “Problem Determination Procedure” on page PROC-4.

If the next level of support is needed, it is important that the full details of the error are understood prior to calling support. Information related to the position and condition of the cartridge, media and mechanical assemblies is important. Note the condition or status of items such as:

1. Location of cartridge and transport assembly
2. Position of loader assembly (up or down), and is the cartridge fully seated?
3. Position of the pantocam pin and tape leader block
4. Is the tape leader block attached to the pantocam pin and/or the tape?

Figure 1 (Page 1 of 5). Start Here

If You Are Here For This Reason	Perform This Action
3590 Model Axx Control Unit Problem	Go to START section of <i>IBM 3590 Tape Subsystem A00 and A50 Controller Models Maintenance Information</i> .
3590 Model B11/B1A attached to a Model Axx Control Unit	Go to START section of <i>IBM 3590 Tape Subsystem A00 and A50 Controller Models Maintenance Information</i> .
3590 Model E11/E1A attached to a A50 Controller	Go to START section of <i>IBM 3590 Tape Subsystem A00 and A50 Controller Models Maintenance Information</i> .
3590 Model C12/C14 Problem	Go to START section of <i>IBM 3590 Tape Subsystem Models C12/C14 Maintenance Information</i> .
Problem with Model B11, B1A, E11, or E1A in Desk Side Sleeve , RPQ 8B3191 or 8B3190	Go to “Prepare Model B11, B1A, E11, or E1A in Desk Side Sleeve for Service” on page PROC-13.
Install the 3590 Model B11, B1A, E11, or E1A or Desk side	Go to “Before Installation” on page INST-3.
FID message from the operator/CE panel, the CE Error Log in the device, or from the host.	Go to “FID Entry Point” on page START-7.
Attention (ATTN) message on the operator/CE panel or from the CE Error Log.	Go to “Attention Drive Messages” on page START-25 or “Attention ACF Messages” on page START-29.
Analyze 3590 CE Error Log.	“Error Log Analysis Procedure” on page PROC-99.

Figure 1 (Page 2 of 5). Start Here

If You Are Here For This Reason	Perform This Action
SIM Message	Use MSG section to get Message Code and FID. See "Message Codes" on page MSG-6 which contains SIM and MIM messages. See Figure 35 on page MSG-3 for the location of the FID in the SIM record. Perform the stated action in the Message Code or from the displayed FID.
SIM Service Message	See "SIM Service Messages" on page MSG-7. Read and understand the meaning of the service message. Use the MSG section to get message code and FID. See also "Message Codes" on page MSG-6. SIM format is shown on Figure 35 on page MSG-3. Perform the stated action in the Message Code or from the displayed FID.
MIM Message	See "Message Codes" on page MSG-6. For MIM format, see Figure 36 on page MSG-3. Use this information to obtain the message code. Perform the stated action in the Message Code.
MIM Exception Message	See "MIM Exception Messages" on page MSG-6. Read and understand the meaning of the exception message, then use the MSG section to get the message code from the MIM record. See also Figure 36 on page MSG-3 and "Message Codes" on page MSG-6 and perform the action stated by the message code.
Operator/CE Panel problems such as a blank display or partial characters are indicated.	Go to "Operator/CE Panel Problems" on page MAPS-3.
Drive operator panel is hung/frozen.	Go to "No Response from Operator/CE Panel and No Message" on page PROC-107.
Drive does not power ON.	Go to "Operator/CE Panel Problems" on page MAPS-3.
Stuck tape or cartridge.	<ol style="list-style-type: none"> 1. If tape is loaded in the tape path, go to "Manual Cartridge Removal" on page PROC-33. 2. If the cartridge is stuck in the loader or transport (Model B11/E11), go to "Manual Unloading the Loader or Transport (Model B11/E11)" on page PROC-45. 3. If the cartridge is stuck in the loader (Library models), check the tension of the Cartridge Present Loader spring(s). See Figure 334 on page LOC*CAR-75 and refer to step 3 on page LOC*CAR-75 for the loader spring replacement procedure. Ensure that the correct spring(s) are installed. See the Parts Catalog, "Assembly 3: Deck Enclosure" on page PARTS-12.
Remove a cartridge by hand.	Go to "Manual Cartridge Removal" on page PROC-33.
Replace a leader block.	Go to "Leader Block Separated From the Magnetic Tape" on page PROC-41.
Broken or damaged tape.	Go to "Manual Cartridge Removal" on page PROC-33.
Broken or damaged cartridge.	Go to "Manual Cartridge Removal" on page PROC-33.

Figure 1 (Page 3 of 5). Start Here

If You Are Here For This Reason	Perform This Action
Clean messages on operator/CE panel, or reported to the host.	Insert the cleaning cartridge in the drive, cleaning is performed automatically. Note: If there was an excessive number of clean messages, go to "Excessive Clean Messages, Problem Determination" on page PROC-4.
Excessive temporary errors reported to the host.	<ol style="list-style-type: none"> 1. Go to "Error Log Analysis Procedure" on page PROC-99. 2. Go to "Error Log Analysis, RS/6000" on page MSG-14. <ol style="list-style-type: none"> a. Review "Message Codes" on page MSG-6. b. Review "Sense Key, ASC and ASCQ Information" on page MSG-8. 3. Ensure that the Force Error Log option is OFF. Go to "CE Config/Install Menu" on page PANEL-39. 4. Contact your next level of support if further assistance is needed.
Media surface errors reported by RS/6000.	<ol style="list-style-type: none"> 1. Go to "Error Log Analysis, RS/6000" on page MSG-14. Analyze the error log for media surface errors. 2. Contact your next level of support if further assistance is needed.
Tape write protected errors	If the operator/CE panel shows the file protect icon, the tape is either physically write protected, or the customer has used a SCSI command to logically write protect the tape. <ol style="list-style-type: none"> 1. Inform the customer that this is normal operation. If the operator/CE panel does not show the file protect icon, the drive had a problem reading the tape at the load point. <ol style="list-style-type: none"> 1. The wrong format tape may be loaded. The 3590 Model Exx drives cannot write on 128 track tapes, and the 3590 Model Bxx drives cannot write on 256 track tapes. 2. There may be something wrong with the cartridge. Try writing on a different cartridge. If the failure occurs on multiple cartridges, go to "FID Entry Point" on page START-7, FID F0.
No Defect Found (NDF), Intermittent, or Symptoms changing	Go to "Problem Determination Procedure" on page PROC-4.
Processor Check light remains ON after power-on reset.	Go to "Operator/CE Panel Problems" on page MAPS-3.
Operator panel displays the CE menu rather than the Operator menu after a power-on sequence.	<ol style="list-style-type: none"> 1. Remove the wrap tool from a SCSI port or the library manager port. See "Setup for SCSI Ports Wrap Test" on page PROC-83 and "Setup for Library Manager Port Wrap Test" on page PROC-85. 2. If step 1 does not fix the problem, go to "FID E4: Card Pack" on page LOC*CAR-56.

Figure 1 (Page 4 of 5). Start Here

If You Are Here For This Reason	Perform This Action
The <i>Diags Failed</i> message appears on the operator panel without a FID displayed.	<ol style="list-style-type: none"> 1. Select Unload drive. 2. Select Cancel. 3. Select Verify Fix. 4. When the request for scratch tape appears, try another tape cartridge. If the drive still fails, go to Reported FID F0 in "FID Entry Point" on page START-7.
Media Test mode (MTM) message on the operator/CE panel.	Call your next level of support.
Host-reported SCSI problems (selection time-outs, command time-outs, parity errors, and similar errors)	Go to "SCSI Bus Problem Determination" on page PROC-108.
Host-reported FID FE (Media/Drive problems)	Go to "FID FE—Isolate Fault Between Media and Hardware" on page PROC-96.
Host-reported FID FF (Operator Action or Host Programming Error)	Go to "FID FF—Operator Action or Host Program Error" on page PROC-98.
Interface problem between the 3494 or 3495 library manager and the 3590.	<p>You were sent here from the 3494 or 3495 MI.</p> <p>Perform "Library Manager Port Wrap Test" on page PROC-86. If no error occurs, the problem could be the cable between the 3590 and the library manager.</p> <p>Also see "Checking 3494 Control Path by Using MTLIB Command from RS/6000" on page PROC-87.</p>
ACF indicator lights problem.	<p>ACF indicator or indicators will not light. Replace the following FRUs:</p> <ol style="list-style-type: none"> 1. "FID A6: LED Cards and Random Lock Sensor" on page LOC*CAR-45. 2. "FID A4: LED Cable" on page LOC*CAR-43. 3. "FID 97: Motor Control Card" on page LOC*CAR-24.
Microcode problem suspected.	Go to "Suspected Microcode Problem" on page PROC-98.
Set Error Match Trap.	Go to "Set Error Match Trap (To Get a Dump)" on page PROC-103.
Remove Error Match Trap.	Go to "Remove Error Match Trap" on page PROC-104.
Microcode dump to SCSI.	Go to "Off-loading Dumps from 3590 to RS/6000 by Using TAPEUTIL" on page PROC-60, "Off-loading Dumps from 3590 Attached to AS/400" on page PROC-57, "Off-loading Dumps from 3590 to a Sun System by Using TAPEUTIL" on page PROC-63, or "Off-loading Dumps from 3590 to SP2 Using TAPEUTIL" on page PROC-69.
Microcode dump to 3591.	Go to the Procedure section of the 3591 Maintenance Information.
Microcode dump to cartridge.	Go to "Off-loading Dumps from 3590 to Tape Cartridge" on page PROC-57.

Figure 1 (Page 5 of 5). Start Here

If You Are Here For This Reason	Perform This Action
Microcode update via SCSI.	Go to "Updating Microcode from RS/6000 by Using TAPEUTIL" on page PROC-58, "Updating Microcode from an AS/400" on page PROC-57, "Updating Microcode from a Sun System by Using TAPEUTIL" on page PROC-62, or "Updating Microcode From SP2 Using TAPEUTIL" on page PROC-66.
Microcode update via 3591.	Go to the Procedure section of the 3591 Maintenance Information.
Microcode update via cartridge.	Go to "Updating Microcode from FMR Cartridge" on page PROC-53.
Update microcode cartridge with drive microcode.	Go to "Update FMR Tape from the Drive" on page PROC-52.
Convert microcode cartridge to scratch cartridge.	"Convert FMR Tape to Scratch Tape" on page PROC-52.
Create microcode cartridge from a scratch cartridge.	"Making FMR Tape from Scratch Tape" on page PROC-52.
Obtain and analyze error log and sense information data from RS/6000.	"Error Log Analysis, RS/6000" on page MSG-14.
Obtain and analyze error log and sense information data from AS/400.	"Error Log Analysis, AS/400" on page MSG-25.
Obtain and analyze error information from Sun Systems	"Obtaining Error Information from a Sun (Solaris) System" on page MSG-33.
Obtain and analyze error information from HP/UX Systems	"Obtaining Error Information from an HP/UX System" on page MSG-33.
Obtain and analyze error information from Windows NT Systems	"Obtaining Error Information from a Windows NT System" on page MSG-33.
EREP information for 3590s attached to 3591.	Go to the Message Section of the 3591 Maintenance Information.
Locate FRUs or replace defective FRUs.	Go to "Locations, Checks, Adjustments, Removals, and Replacements" on page LOC*CAR-1.
Run verification tests.	Select Verify Fix on "CE Options Menu" on page PANEL-27.
Vary (take) the device off-line.	Have the customer vary (take) the device off-line.
Power OFF the 3590.	Go to "Powering Device ON and OFF" on page PROC-6.
Relocate or remove the 3590.	Go to "Removing a 3590" on page INST-63.
Inspection for maintenance agreement qualification.	See "General Instructions" on page INSP-2, for the safety inspection procedures.

FID Entry Point

Figure 2 lists the FRU identifiers (FIDs) and the field replaceable units (FRUs) that you can change. The reported FID is displayed on the operator/CE panel in a FID message, in the CE Error Log, and reported to the host. For example, if the message is FID1 90, **1** is the severity and **90** is the FID. “Intervention Messages” on page PANEL-8 describes the different types of messages and their impact on 3590 availability. The service information message (SIM) record, which the 3590 sends to the host, also has the reported FID information. See “Service and Media Information Messages (SIMs and MIMs)” on page MSG-2.

The following list also contains the FRU name and a page reference to the removal and replacement procedure for the FRU. Each FRU is identified by a one-byte identifier (FID). The FID relates to the FRUs that have the highest probability of causing the problem. Always replace the FRU with the highest probability of failure first. The technical area code (TAC), provided here and in the LOC*CAR section, is to assist you with call reporting.

Along with each Reported FID is 12 hex characters of support data. This support data will be needed when contacting your next level of support, and should also be included in your call reporting data.

At the start of your service call, write down the reported FID and the 12 hex characters of support data for use in your call reporting when the service call is complete.

- If the FID is displayed in the Operator Panel, see Figure 79 on page PANEL-9. The 12 characters of support data are shown below the “CALL FOR SERVICE” message.
- If the FID was reported in one of the Error Logs, see Figure 124 on page PANEL-44. The 12 characters of support data are shown below the reported FID.

At the end of the service call, record the FID in the *COMMENT* field of the call record, and record the 12 hex characters of support data in the *FAULT SYMPTOM CODE (FSC)* field.

This detailed call reporting will help Engineering and Field Support to quickly identify, understand, and resolve field problems.

See Figure 2 for the complete list of FIDs and associated FRUs.

If the FID has cable FRUs in the FRU list, reseal the cable FRUs before replacing any FRU in the list.

Figure 2 (Page 1 of 18). FIDs, FRUs, and TACs					
Reported FID	FRUs	FRU Name or Description	Probability	TAC	Page Reference or Instruction
00	The drive serial number is the default value				
	—	Invalid drive serial number	—	—	Enter valid drive serial number. Go to “Drive Serial Number” on page PROC-46.

Figure 2 (Page 2 of 18). FIDs, FRUs, and TACs

Reported FID	FRUs	FRU Name or Description	Probability	TAC	Page Reference or Instruction
01	The card pack serial number is the default value				
	E4	Invalid card pack serial number	100%	T21	LOC*CAR-56
03	Invalid setup detected				
	—	Configuration problem	—	—	Ensure the config/install options are correct. See "Set Customer Options" on page INST-33.
04	Incorrect pneumatic pressure detected				
	—	Pneumatic pressure is adjusted automatically by the microcode after each cleaning cartridge cycle and when requested by the CE via the Adjust Pressure option of the CE panel CE Config/Install menu. At the time of the error, the pneumatic pressure was not correct.	—	—	Perform "Measurement and Adjustment of Pneumatic System" on page LOC*CAR-3
07	Incorrect Card Pack or HGA installed				
	—	The Card Pack and HGA FRU's are not interchangeable between the Model E11/E1A drives and the Model B11/B1A drives.	—	—	See the Parts Catalog, "Assembly 3: Deck Enclosure" on page PARTS-12 to ensure the correct FRU is installed. The Model E11/E1A HGA serial number on the bar code label starts with a "T", and the Model B11/B1A serial number starts with a "B".
08	Incorrect switch setting on Card Pack				
	—	The Card Pack for the Model E11/E1A drives has a rotary switch on one of the logic cards. See Figure 323 on page LOC*CAR-58 The switch setting is not correct for the Model of the 3590.	—	—	See "FID E4: Card Pack" on page LOC*CAR-56 for the correct switch setting. For the Model E11/E1A card pack, the switch should be set to "F".
90	Electronic fault. See also "Operator/CE Panel Problems" on page MAPS-3.				
	90	Operator/CE Panel	88%	V08	LOC*CAR-10
	DC	ACF and operator/CE panel cable	5%	C09	LOC*CAR-100
	91	Operator panel cable (Model B11/E11)	5%	C09	LOC*CAR-12
	94	Operator panel cable (Model B1A/E1A)	5%	C09	LOC*CAR-103
	E4	Card pack	2%	T21	LOC*CAR-56
93	Gripper-present sensor did not change state.				
	<ol style="list-style-type: none"> 1. This error applies only to drives in a library subsystem. It does not apply to Model B11/E11. If this drive is not in a library, then change the config/install options to indicate that the drive is not in a library. See "Set Drive Options" on page INST-35. 2. Before replacing FRUs below, ensure that the gripper-present sensor is operating correctly. See Figure 83 on page PANEL-13 and select UTILITIES from the CE OPTIONS Menu, and DISP SENSORS from the CE UTILITIES Menu. 				
	93	Gripper-present sensor card	80%	T03	LOC*CAR-102
	E4	Card pack	15%	T21	LOC*CAR-56
	DC	ACF and operator/CE panel cable	5%	C09	LOC*CAR-100

Figure 2 (Page 3 of 18). FIDs, FRUs, and TACs

Reported FID	FRUs	FRU Name or Description	Probability	TAC	Page Reference or Instruction
95	<p>Did not detect elevator movement</p> <ol style="list-style-type: none"> 1. Attempt to perform "Check and Adjustment of Transport Position Sensor" on page LOC*CAR-27 before replacing any FRUs. 2. Before replacing FRUs below, ensure that the transport-position sensors A & B (FID 98) are operating correctly. See Figure 83 on page PANEL-13 and select UTILITIES from the CE OPTIONS Menu, and DISP SENSORS from the CE UTILITIES Menu. <p>Note: When the power is cycled the elevator should move. If it does move, suspect one of the elevator servo sensors (A or B). If the elevator does not move, suspect the hardware that is used to move the elevator.</p>				
	92	Leadscrew asm	38%	T03	LOC*CAR-13
	95	Elevator motor asm	37%	T03	LOC*CAR-19
	99	Transport cable	8%	T04	LOC*CAR-30
	9A	Transport	6%	T03	LOC*CAR-34
	98	Transport-position sensor	5%	T01	LOC*CAR-25
	A1	Motor cable asm	2%	T04	LOC*CAR-41
	97	Motor control card	2%	T02	LOC*CAR-24
	A2	Drive/ACF cable	2%	T04	LOC*CAR-42
96	<p>Did not detect pinch motor movement</p> <ol style="list-style-type: none"> 1. Check that the pinch arms are not bent. If the arms are bent, replace the transport FID 9A. 2. Before replacing FRUs below, ensure that the pinch 1 and 2 sensors are operating correctly. See Figure 83 on page PANEL-13 and select UTILITIES from the CE OPTIONS Menu, and DISP SENSORS from the CE UTILITIES Menu. 				
	99	Transport cable	40%	T04	LOC*CAR-30
	96	Pinch motor asm	35%	T03	LOC*CAR-22
	9A	Transport	10%	T03	LOC*CAR-34
	A1	Motor cable asm	5%	T04	LOC*CAR-41
	97	Motor control card	5%	T02	LOC*CAR-24
	A2	Drive/ACF cable	5%	T04	LOC*CAR-42
	E4	Card pack	5%	T21	LOC*CAR-56
97	<p>Electronic-detected fault</p> <ol style="list-style-type: none"> 1. Error applies only to drives with an ACF. If this drive does not have an ACF, then change the config/install options to indicate that the drive is not a Model B11/E11. See "Set Drive Options" on page INST-35. 2. Before replacing FRUs below, ensure that the Priority cell sensors are operating correctly. See Figure 83 on page PANEL-13 and select UTILITIES from the CE OPTIONS Menu, and DISP SENSORS from the CE UTILITIES Menu. 				
	A2	Drive/ACF cable	80%	T04	LOC*CAR-42
	97	Motor control card	12%	T02	LOC*CAR-24
	9E	Priority cell sensor (pair)	6%	T01	LOC*CAR-39
	E4	Card pack	2%	T21	LOC*CAR-56

Figure 2 (Page 4 of 18). FIDs, FRUs, and TACs

Reported FID	FRUs	FRU Name or Description	Probability	TAC	Page Reference or Instruction
98	Transport-position sensor did not change state 1. Attempt to perform "Check and Adjustment of Transport Position Sensor" on page LOC*CAR-27 before replacing any FRUs. 2. Before replacing FRUs below, ensure that the transport-position sensors A & B (FID 98) are operating correctly. See Figure 83 on page PANEL-13 and select UTILITIES from the CE OPTIONS Menu, and DISP SENSORS from the CE UTILITIES Menu.				
	98	Transport-position sensor	40%	T01	LOC*CAR-25
	99	Transport cable	30%	T04	LOC*CAR-30
	95	Elevator motor asm	15%	T03	LOC*CAR-19
	97	Motor control card	10%	T02	LOC*CAR-24
	9A	Transport	5%	T03	LOC*CAR-34
9A	One of the sensors in the transport did not change state 1. Ensure customer is using correct cartridge. 3590 only . 2. This failure may be caused by a dirty cartridge. Look for any contamination on the sides of the cartridge that could cause the pinch rollers to slip. Have the customer clean or replace the cartridge, if necessary. Use ONLY Tape Unit Cleaner, IBM P/N 13F5647. See "Tape Unit Cleaner" on page INTRO-43 for details. Note: Ensure that the customer does not ship magazines with cartridges loaded. The cartridges will vibrate in the magazine slots resulting in contamination on the sides of the cartridges that may cause this failure. 3. Check that the pinch rollers are not binding, and that the arms are not bent. If the rollers are binding or the arms are bent, replace the transport FID 9A. 4. This failure may be caused by a sensor failure (Transport-position A & B, Limit 1 & 2, Pinch 1 & 2, Import, or Export). Before replacing FRUs below, ensure that these sensors are operating correctly. See Figure 83 on page PANEL-13 and select UTILITIES from the CE OPTIONS Menu, and DISP SENSORS from the CE UTILITIES Menu. 5. Attempt to perform "Check and Adjustment of Transport Position Sensor" on page LOC*CAR-27 before replacing any FRUs. Note: If the failure only occurs when accessing a cartridge from the bottom slot of the magazine, try another magazine in the ACF.				
	99	Transport cable	50%	T04	LOC*CAR-30
	9A	Transport	40%	T03	LOC*CAR-34
	FD	Magazine	5%	Q05	Customer-purchased
	97	Motor control card	5%	T02	LOC*CAR-24
	9B	The Global/interference sensor did not change state 1. Check the position of all cartridges to ensure they are properly positioned in the magazine and in the priority cell. A cartridge that extends too far into the magazine in the import position or a damaged cartridge can cause this error. 2. Remove the magazine and look for any obvious obstructions. 3. Try another magazine in the ACF. 4. Before replacing FRUs below, ensure that the Global Interference sensor (FID 9B) is operating correctly. See Figure 83 on page PANEL-13 and select UTILITIES from the CE OPTIONS Menu, and DISP SENSORS from the CE UTILITIES Menu.			
9B		Global/ interference sensor	84%	T01	LOC*CAR-37
97		Motor control card	8%	T02	LOC*CAR-24
A5		Sensor cable	8%	T01	LOC*CAR-44

Figure 2 (Page 5 of 18). FIDs, FRUs, and TACs

Reported FID	FRUs	FRU Name or Description	Probability	TAC	Page Reference or Instruction
9C	3590 Model C12/C14 Electronic-detected Fault.				
	1. This error applies only to drives in a Model C12/C14 (library) subsystem. If this drive is not in a Model C12/C14 subsystem, then change the config/install options to indicate that the drive is not in a Model C12/C14 subsystem. See "Set Drive Options" on page INST-35.				
	9C	STL0 Library interface card	90%	T02	See LOC*CAR in <i>IBM 3590 Tape Subsystem Models C12/C14 Maintenance Information</i> .
	A3	STL0 card to ACF port ribbon cable	10%	T04	See LOC*CAR in <i>IBM 3590 Tape Subsystem Models C12/C14 Maintenance Information</i> .
9E	Sensor failed to change state				
	Note: Before replacing FRUs below, ensure that the Priority cell sensors are operating correctly. See Figure 83 on page PANEL-13 and select UTILITIES from the CE OPTIONS Menu, and DISP SENSORS from the CE UTILITIES Menu.				
	9E	Priority cell sensor (pair)	92%	T01	LOC*CAR-39
	97	Motor control card	5%	T02	LOC*CAR-24
	A5	Sensor cable	3%	T01	LOC*CAR-44
9F	Load or unload error when moving tape between the deck loader and the ACF transport.				
	1. Ensure Customer is using correct Cartridge (3590 Only).				
	2. This failure may be caused by a damaged cartridge. Before replacing any FRUs below, inspect the cartridge that was being used when the error occurred for physical defects. Have the customer replace the cartridge if it is damaged.				
	3. This failure may be caused by a dirty cartridge. Look for any contamination on the sides of the cartridge that could cause the pinch rollers to slip. Have the customer clean or replace the cartridge, if necessary. Use ONLY Tape Unit Cleaner, IBM P/N 13F5647. See "Tape Unit Cleaner" on page INTRO-43 for details.				
	Note: Ensure that the customer does not ship magazines with cartridges loaded. The cartridges will vibrate in the magazine slots resulting in contamination on the sides of the cartridges that may cause this failure.				
	4. Check that the pinch rollers are not binding, and that the arms are not bent. If the rollers are binding or the arms are bent, replace the transport FID 9A.				
	5. Attempt to perform "Check and Adjustment of Transport Position Sensor" on page LOC*CAR-27 before replacing any FRUs.				
	6. This failure may be caused by a sensor failure (Door-open, Tray up, Cartridge present, Limit 1 & 2, Transport-position A & B). Before replacing FRUs below, ensure that these sensors are operating correctly. See Figure 83 on page PANEL-13 and select UTILITIES from the CE OPTIONS Menu, and DISP SENSORS from the CE UTILITIES Menu.				
	BC	Loader assembly	35%	T42	LOC*CAR-73
	9A	Transport	34%	T03	LOC*CAR-34
	99	Transport cable	5%	T04	LOC*CAR-30
	C9	Door-open sensor	5%	T33	LOC*CAR-79
	CA	Tray up sensor	5%	T33	LOC*CAR-80
	CD	Cartridge-present sensor (in the loader)	3%	T33	LOC*CAR-82
A9	Feed motor asm	3%	T03	LOC*CAR-46	
A1	Motor cable asm	3%	T04	LOC*CAR-41	
97	Motor control card	3%	T02	LOC*CAR-24	
DA	Motor, loader, and sensor cable	3%	C09	LOC*CAR-97	
E4	Card pack	2%	T21	LOC*CAR-56	

Figure 2 (Page 6 of 18). FIDs, FRUs, and TACs

Reported FID	FRUs	FRU Name or Description	Probability	TAC	Page Reference or Instruction
A0	Sensor did not change state Note: Before replacing FRUs below, ensure that the Magazine-present sensor is operating correctly. See Figure 83 on page PANEL-13 and select UTILITIES from the CE OPTIONS Menu, and DISP SENSORS from the CE UTILITIES Menu.				
	A0	Magazine-present sensor asm	94%	T01	LOC*CAR-40
	A5	Sensor cable	4%	T01	LOC*CAR-44
	97	Motor control card	2%	T02	LOC*CAR-24
A6	Microcode did not detect current flow through ACF LED				
	A6	LED cards	80%	T02	LOC*CAR-45
	A4	LED cable	10%	T01	LOC*CAR-43
	97	Motor control card	4%	T02	LOC*CAR-24
	A5	Sensor cable	2%	T01	LOC*CAR-44
	A2	Drive/ACF cable	2%	T04	LOC*CAR-42
	E2	Card pack	2%	T21	LOC*CAR-56
A7	Load or unload error to priority slot <ol style="list-style-type: none"> 1. This failure may be caused by a damaged cartridge. Before replacing any FRUs below, inspect the cartridge that was being used when the error occurred for physical defects. Have the customer replace the cartridge if it is damaged. 2. Ensure Customer is using correct Cartridge (3590 Only). 3. This failure may be caused by a dirty cartridge. Look for any contamination on the sides of the cartridge that could cause the pinch rollers to slip. Have the customer clean or replace the cartridge, if necessary. Use ONLY Tape Unit Cleaner, IBM P/N 13F5647. See "Tape Unit Cleaner" on page INTRO-43 for details. Note: Ensure that the customer does not ship magazines with cartridges loaded. The cartridges will vibrate in the magazine slots resulting in contamination on the sides of the cartridges that may cause this failure. 4. Check that the pinch rollers are not binding, and that the arms are not bent. If the rollers are binding or the arms are bent, replace the transport FID 9A. 5. Attempt to perform "Check and Adjustment of Transport Position Sensor" on page LOC*CAR-27 before replacing any FRUs. 6. This failure may be caused by a sensor failure (Priority cell, Limit 1 & 2, Import, or Export). Before replacing FRUs below, ensure that these sensors are operating correctly. See Figure 83 on page PANEL-13 and select UTILITIES from the CE OPTIONS Menu, and DISP SENSORS from the CE UTILITIES Menu. 				
	9A	Transport	80%	T03	LOC*CAR-34
	99	Transport cable	10%	T04	LOC*CAR-30
	A9	Feed motor asm	6%	T03	LOC*CAR-46
	97	Motor control card	2%	T02	LOC*CAR-24
	A1	ACF motor cable	2%	T04	LOC*CAR-41

Figure 2 (Page 7 of 18). FIDs, FRUs, and TACs

Reported FID	FRUs	FRU Name or Description	Probability	TAC	Page Reference or Instruction
A8	Load or unload error to magazine 1. This failure may be caused by a damaged cartridge. Before replacing any FRUs below, inspect the cartridge that was being used when the error occurred for physical defects. Have the customer replace the cartridge if it is damaged. 2. Ensure Customer is using correct Cartridge (3590 Only). 3. This failure may be caused by a dirty cartridge. Look for any contamination on the sides of the cartridge that could cause the pinch rollers to slip. Have the customer clean or replace the cartridge, if necessary. Use ONLY Tape Unit Cleaner, IBM P/N 13F5647. See "Tape Unit Cleaner" on page INTRO-43 for details. Note: Ensure that the customer does not ship magazines with cartridges loaded. The cartridges will vibrate in the magazine slots resulting in contamination on the sides of the cartridges that may cause this failure. 4. Check that the pinch rollers are not binding, and that the arms are not bent. If the rollers are binding or the arms are bent, replace the transport FID 9A. 5. Attempt to perform "Check and Adjustment of Transport Position Sensor" on page LOC*CAR-27 before replacing any FRUs. 6. This failure may be caused by a sensor failure (Magazine present, Magazine lock, Limit 1 & 2, Import, or Export). Before replacing FRUs below, ensure that these sensors are operating correctly. See Figure 83 on page PANEL-13 and select UTILITIES from the CE OPTIONS Menu, and DISP SENSORS from the CE UTILITIES Menu.				
	9A	Transport	80%	T03	LOC*CAR-34
	A9	Feed motor asm	10%	T03	LOC*CAR-46
	FD	Magazine	6%	Q05	Customer-purchased
	99	Transport cable	2%	T04	LOC*CAR-30
	97	Motor control card	1%	T02	LOC*CAR-24
	A1	Motor cable asm	1%	T04	LOC*CAR-41
A9	Failure when loading or unloading tape to or from the magazine or the priority cell. 1. This failure may be caused by a damaged cartridge. Before replacing any FRUs below, inspect the cartridge that was being used when the error occurred for physical defects. Have the customer replace the cartridge if it is damaged. 2. Ensure Customer is using correct Cartridge (3590 Only). 3. This failure may be caused by a dirty cartridge. Look for any contamination on the sides of the cartridge that could cause the pinch rollers to slip. Have the customer clean or replace the cartridge, if necessary. Use ONLY Tape Unit Cleaner, IBM P/N 13F5647. See "Tape Unit Cleaner" on page INTRO-43 for details. Note: Ensure that the customer does not ship magazines with cartridges loaded. The cartridges will vibrate in the magazine slots resulting in contamination on the sides of the cartridges that may cause this failure. 4. Check that the pinch rollers are not binding, and that the arms are not bent. If the rollers are binding or the arms are bent, replace the transport FID 9A. 5. Attempt to perform "Check and Adjustment of Transport Position Sensor" on page LOC*CAR-27 before replacing any FRUs. 6. This failure may be caused by a sensor failure (Loader tray up, Door open, Cartridge present, Priority cell, Magazine present, Magazine lock, Limit 1 & 2, Import, or Export). Before replacing FRUs below, ensure that these sensors are operating correctly. See Figure 83 on page PANEL-13 and select UTILITIES from the CE OPTIONS Menu, and DISP SENSORS from the CE UTILITIES Menu.				
	9A	Transport	35%	T03	LOC*CAR-34
	BC	Loader assembly	34%	T42	LOC*CAR-73
	99	Transport cable	10%	T04	LOC*CAR-30
	A9	Feed motor asm	9%	T03	LOC*CAR-46
	FD	Magazine	5%	Q05	Customer-purchased
	A1	Motor cable asm	5%	T04	LOC*CAR-41
	97	Motor control card	2%	T02	LOC*CAR-24

Figure 2 (Page 8 of 18). FIDs, FRUs, and TACs

Reported FID	FRUs	FRU Name or Description	Probability	TAC	Page Reference or Instruction
B0	Did not detect pressure				
	B0	Pneumatic system	—	T63	MAPS-5
B1	Excessive current or speed is not correct				
	B1	Pneumatic supply	—	T63	MAPS-5
B3	Thread or un-thread failure at machine reel (no current detected in pantocam motor or a sensor did not change state)				
	<p>1. This failure may be caused by a damaged cartridge. Before replacing any FRUs below, inspect the cartridge that was being used when the error occurred for physical defects. Have the customer replace the cartridge if it is damaged.</p> <p>2. This failure may also be caused by the plastic shield over the tension transducer assembly interfering with the travel of the pin on the pantocam arm. Before replacing any FRUs below, ensure that the plastic shield is adjusted correctly. See "Adjustment of Tension Transducer Plastic Shield" on page LOC*CAR-69.</p> <p>3. Ensure that the Machine Reel hub is assembled so that it is flat against the bottom flange, with no gaps between the two parts. Also, use the gap set tool, P/N 05H4671, to check the adjustment of the gap in the Machine Reel hub. See "Replacement of Pantocam" on page LOC*CAR-71 for details.</p> <p>4. Before replacing FRUs below, ensure that the Tape path B sensor is operating correctly. See Figure 83 on page PANEL-13 and select UTILITIES from the CE OPTIONS Menu, and DISP SENSORS from the CE UTILITIES Menu.</p>				
	BB	Pantocam	85%	T45	LOC*CAR-70
	CF	Tape path B sensor	10%	T33	LOC*CAR-84
	DA	Motor, loader, and sensor cable	3%	C09	LOC*CAR-97
E4	Card pack	2%	T21	LOC*CAR-56	
B4	Thread or un-thread failure at loader (no current detected in pantocam motor or a sensor did not change state)				
	<p>1. This failure may be caused by a damaged cartridge. Before replacing any FRUs below, inspect the cartridge that was being used when the error occurred for physical defects. Have the customer replace the cartridge if it is damaged.</p> <p>2. Before replacing FRUs below, ensure that the Tape path A sensor is operating correctly. See Figure 83 on page PANEL-13 and select UTILITIES from the CE OPTIONS Menu, and DISP SENSORS from the CE UTILITIES Menu.</p>				
	BB	Pantocam	83%	T45	LOC*CAR-70
	CE	Tape path A sensor	10%	T33	LOC*CAR-83
	DA	Motor, loader, and sensor cable	3%	C09	LOC*CAR-97
B6	Decoupler asm	2%	T41	LOC*CAR-66	
E4	Card pack	2%	T21	LOC*CAR-56	
B7	Air pressure loss in transducer				
	<p>1. This failure may be caused by a loose screw in the tension transducer assembly. Before replacing any FRUs below, ensure that the hex screw in the center of the tension transducer is tight.</p> <p>Note: If the plastic shield over the tension transducer is moved for any reason, it must be readjusted. See "Adjustment of Tension Transducer Plastic Shield" on page LOC*CAR-69.</p>				
	B7	Tension transducer asm	89%	T41	LOC*CAR-67
	DA	Motor, loader, and sensor cable	3%	C09	LOC*CAR-97
	B1	Pneumatic supply	3%	T63	LOC*CAR-49
B2	Pneumatic hose kit	3%	T64	LOC*CAR-50	
E4	Card pack	2%	T21	LOC*CAR-56	

Figure 2 (Page 9 of 18). FIDs, FRUs, and TACs

Reported FID	FRUs	FRU Name or Description	Probability	TAC	Page Reference or Instruction
B9	Cartridge is not fully seated in the loader, or Cartridge present not detected				
	<ol style="list-style-type: none"> On Model B1A/E1A loaders, this problem may be caused by the picker failing to insert the cartridge all the way into the loader. Ensure that the loader spring engages with the lip of the cartridge and that the correct spring(s) are installed. See "FID BC: Loader Assembly" on page LOC*CAR-73 and see the Parts Catalog, "Assembly 3: Deck Enclosure" on page PARTS-12. On Model B1A/E1A loaders, this problem may be caused by an alignment problem between the fiducial and the loader. If the loader has been replaced or the fiducial moved, it will be necessary to run the Teach Selected Drive routine from the Teach pull-down on the library controller. This failure may be caused by a damaged cartridge. Before replacing any FRUs below, inspect the cartridge that was being used when the error occurred for physical defects. Have the customer replace the cartridge if it is damaged. This failure may also be caused by a sensor failure (cartridge present, door open, tray up, or gripper present). Before replacing FRUs below, ensure that these three sensors are operating correctly. See Figure 83 on page PANEL-13 and select UTILITIES from the CE OPTIONS Menu, and DISP SENSORS from the CE UTILITIES Menu. Attempt to perform "Check and Adjustment of Transport Position Sensor" on page LOC*CAR-27 before replacing any FRUs. 				
	BC	Loader assembly	50%	T42	LOC*CAR-73
	—	Either FID 9A, the ACF transport (Model B11/E11), or the library cartridge accessor (Model B1A/E1A)	35%	—	LOC*CAR-34 or if in a library, see the library maintenance documents (ie. 3494).
	BB	Pantocam (intermittent failures)	10%	T45	LOC*CAR-70
93	Gripper Present Sensor Card (if present)	5%	T03	LOC*CAR-102	
BA	Cannot pick leader block from tape.				
	<ol style="list-style-type: none"> This failure may be caused by a damaged cartridge. Before replacing any FRUs below, inspect the cartridge that was being used when the error occurred for physical defects. Have the customer replace the cartridge if it is damaged. This failure may also be caused by a sensor failure (cartridge present, door open, tray up, or Tape path A sensor). Before replacing FRUs below, ensure that these four sensors are operating correctly. See Figure 83 on page PANEL-13 and select UTILITIES from the CE OPTIONS Menu, and DISP SENSORS from the CE UTILITIES Menu. 				
	BC	Loader assembly	40%	T42	LOC*CAR-73
	C7	File reel motor	25%	T54	LOC*CAR-77
	BB	Pantocam	20%	T45	LOC*CAR-70
	CE	Tape path A sensor	10%	T33	LOC*CAR-83
	DA	Motor, loader, and sensor cable	3%	C09	LOC*CAR-97
E4	Card pack	2%	T21	LOC*CAR-56	

Figure 2 (Page 10 of 18). FIDs, FRUs, and TACs

Reported FID	FRUs	FRU Name or Description	Probability	TAC	Page Reference or Instruction	
BB	Pantocam thread or un-thread failure.					
	1. This failure may be caused by a damaged cartridge. Before replacing any FRUs below, inspect the cartridge that was being used when the error occurred for physical defects. Have the customer replace the cartridge if it is damaged.					
	2. This failure may also be caused by the plastic shield over the tension transducer assembly interfering with the travel of the pin on the pantocam arm. Before replacing any FRUs below, ensure that the plastic shield is adjusted correctly. See "Adjustment of Tension Transducer Plastic Shield" on page LOC*CAR-69.					
	3. This failure may be caused by the pantocam arm hitting the deck enclosure back cover. If the top cover is loose or missing, the sides of the back cover can bend in toward the center of the drive and interfere with the pantocam arm. Ensure that the top cover is in place and that the screws are tight. See Figure 235 on page PROC-24.					
	4. Ensure that the Machine Reel hub is assembled so that it is flat against the bottom flange, with no gaps between the two parts. Also, use the gap set tool, P/N 05H4671, to check the adjustment of the gap in the Machine Reel hub. See "Replacement of Pantocam" on page LOC*CAR-71 for details.					
	—	—	—	—	—	Perform "Measurement and Adjustment of Pneumatic System" on page LOC*CAR-3 before replacing any FRUs.
	BB	Pantocam		70%	T45	LOC*CAR-70
	C7	File reel motor (binding)		10%	T54	LOC*CAR-77
C6	Machine reel motor		10%	T54	LOC*CAR-76	
B0	Pneumatic assembly		3%	T63	LOC*CAR-49	
B2	Pneumatic hose kit		3%	T64	LOC*CAR-50	
DA	Motor, loader, and sensor cable		2%	C09	LOC*CAR-97	
E4	Card pack		2%	T21	LOC*CAR-56	
BC	Load or unload failure or loader motor failed to turn					
	1. This failure may be caused by a damaged cartridge. Before replacing any FRUs below, inspect the cartridge that was being used when the error occurred for physical defects. Have the customer replace the cartridge if it is damaged.					
	2. This failure may be caused by the metal plate on the bottom of the cartridge sticking to the magnet in the file reel motor clutch. Examine the metal plate on the bottom of the cartridge to ensure that it is not loose. Try the cartridge in another drive. Have the customer replace the cartridge if the metal plate is loose or if it fails in another drive.					
	BC	Loader assembly		84%	T42	LOC*CAR-73
	C7	File reel motor		10%	T54	LOC*CAR-77
DA	Motor, loader, and sensor cable		4%	C09	LOC*CAR-97	
E4	Card pack		2%	T21	LOC*CAR-56	
BD	Failure to detect fan motion electronically					
	C1	Power supply		90%	P04	LOC*CAR-53
	DB	Power supply cable (Model E11/E1A only)		8%	P04	LOC*CAR-99
	E4	Card pack		2%	T21	LOC*CAR-56
BE	Failure to detect fan motion electronically					
	C1	Power supply		90%	P04	LOC*CAR-53
	DB	Power supply cable (Model E11/E1A only)		8%	P04	LOC*CAR-99
	E4	Card pack		2%	T21	LOC*CAR-56

Figure 2 (Page 11 of 18). FIDs, FRUs, and TACs

Reported FID	FRUs	FRU Name or Description	Probability	TAC	Page Reference or Instruction
BF	Failure to detect fan motion electronically				
	BF	Card pack fan	94%	A03	LOC*CAR-52
	DA	Motor, loader, and sensor cable	4%	C09	LOC*CAR-97
	E4	Card pack	2%	T21	LOC*CAR-56
C0	Sensors are in an invalid combination (usually tape path A and B sensors ON together) Note: Before replacing FRUs below, ensure that the appropriate sensors are operating correctly. See Figure 83 on page PANEL-13 and select UTILITIES from the CE OPTIONS Menu, and DISP SENSORS from the CE UTILITIES Menu.				
	CE	Tape path A sensor	47%	T33	LOC*CAR-83
	CF	Tape path B sensor	47%	T33	LOC*CAR-84
	DA	Motor, loader, and sensor cable	4%	C09	LOC*CAR-97
	E4	Card pack	2%	T21	LOC*CAR-56
C1	12 or 36 volts not within specification.				
	—	This FID is also reported when the drive detects a power outage.	—	—	Power OFF and power back ON.
	C1	Power supply	80%	P04	LOC*CAR-53
	DB	Power supply cable (Model E11/E1A only)	12%	P04	LOC*CAR-99
	E4	Card pack	8%	T21	LOC*CAR-56
C2	Sensors are in an invalid combination Note: Before replacing FRUs below, ensure that the Tray up and Cartridge-present sensors are operating correctly. See Figure 83 on page PANEL-13 and select UTILITIES from the CE OPTIONS Menu, and DISP SENSORS from the CE UTILITIES Menu.				
	CA	Tray up sensor	45%	T33	LOC*CAR-80
	CD	Cartridge-present sensor (in the loader)	44%	T33	LOC*CAR-82
	BC	Loader assembly	6%	T42	LOC*CAR-73
	DA	Motor, loader, and sensor cable	3%	C09	LOC*CAR-97
	E4	Card pack	2%	T21	LOC*CAR-56
C3	Sensors are in an invalid combination Note: Before replacing FRUs below, ensure that the Cartridge-type sensor card and the Cartridge-present sensor are operating correctly. See Figure 83 on page PANEL-13 and select UTILITIES from the CE OPTIONS Menu, and DISP SENSORS from the CE UTILITIES Menu.				
	CC	Cartridge-type sensor card asm	45%	T33	LOC*CAR-81
	CD	Cartridge-present sensor (in the loader)	44%	T33	LOC*CAR-82
	BC	Loader assembly	6%	T42	LOC*CAR-73
	DA	Motor, loader, and sensor cable	3%	C09	LOC*CAR-97
	E4	Card pack	2%	T21	LOC*CAR-56
C4	Sensors are in an invalid combination Note: Before replacing FRUs below, ensure that the Cartridge-type sensor card and the Tray-up sensor are operating correctly. See Figure 83 on page PANEL-13 and select UTILITIES from the CE OPTIONS Menu, and DISP SENSORS from the CE UTILITIES Menu.				
	CA	Tray up sensor	45%	T33	LOC*CAR-80
	CC	Cartridge-type sensor card asm	44%	T33	LOC*CAR-81
	BC	Loader assembly	6%	T42	LOC*CAR-73
	DA	Motor, loader, and sensor cable	3%	C09	LOC*CAR-97
	E4	Card pack	2%	T21	LOC*CAR-56

Figure 2 (Page 12 of 18). FIDs, FRUs, and TACs

Reported FID	FRUs	FRU Name or Description	Probability	TAC	Page Reference or Instruction
C5	Cartridge type sensed as invalid Note: Before replacing FRUs below, ensure that the Cartridge-type sensor card is operating correctly. See Figure 83 on page PANEL-13 and select UTILITIES from the CE OPTIONS Menu, and DISP SENSORS from the CE UTILITIES Menu.				
	FE	Cartridge	84%	D07	"FID FE—Isolate Fault Between Media and Hardware" on page PROC-96
	CC	Cartridge-type sensor card asm	7%	T33	LOC*CAR-81
	BC	Loader assembly	4%	T42	LOC*CAR-73
	DA	Motor, loader, and sensor cable	3%	C09	LOC*CAR-97
	E4	Card pack	2%	T21	LOC*CAR-56
C6	Machine reel motor failed to move or its speed is not correct Note: Before replacing FRUs below, ensure that the motor connectors are seated properly.				
	C6	Machine reel motor	92%	T54	LOC*CAR-76
	D6	Motor power cable	3%	C09	LOC*CAR-96
	DA	Motor, loader, and sensor cable	3%	C09	LOC*CAR-97
	E4	Card pack	2%	T21	LOC*CAR-56
C7	File reel motor failed to move or its speed is not correct Note: Before replacing FRUs below, ensure that the motor connectors are seated properly.				
	C7	File reel motor	90%	T54	LOC*CAR-77
	D6	Motor power cable	3%	C09	LOC*CAR-96
	DA	Motor, loader, and sensor cable	3%	C09	LOC*CAR-97
	FE	Cartridge	2%	D07	"FID FE—Isolate Fault Between Media and Hardware" on page PROC-96
	E4	Card pack	2%	T21	LOC*CAR-56
C8	File protect sensor failed to change state Note: Before replacing FRUs below, ensure that the File protect sensor is operating correctly. See Figure 83 on page PANEL-13 and select UTILITIES from the CE OPTIONS Menu, and DISP SENSORS from the CE UTILITIES Menu.				
	C8	File protect sensor	90%	T32	LOC*CAR-78
	BC	Loader assembly	5%	T42	LOC*CAR-73
	DA	Motor, loader, and sensor cable	3%	C09	LOC*CAR-97
	E4	Card pack	2%	T21	LOC*CAR-56
C9	Door-open sensor failed to change state Note: Before replacing FRUs below, ensure that the Door open sensor is operating correctly. See Figure 83 on page PANEL-13 and select UTILITIES from the CE OPTIONS Menu, and DISP SENSORS from the CE UTILITIES Menu.				
	C9	Door-open sensor	92%	T33	LOC*CAR-79
	BC	Loader assembly	3%	T42	LOC*CAR-73
	DA	Motor, loader, and sensor cable	3%	C09	LOC*CAR-97
	E4	Card pack	2%	T21	LOC*CAR-56

Figure 2 (Page 13 of 18). FIDs, FRUs, and TACs

Reported FID	FRUs	FRU Name or Description	Probability	TAC	Page Reference or Instruction
CA	Tray-up sensor failed to change state Note: Before replacing FRUs below, ensure that the Tray up sensor is operating correctly. See Figure 83 on page PANEL-13 and select UTILITIES from the CE OPTIONS Menu, and DISP SENSORS from the CE UTILITIES Menu.				
	CA	Tray up sensor	92%	T33	LOC*CAR-80
	BC	Loader assembly	3%	T42	LOC*CAR-73
	DA	Motor, loader, and sensor cable	3%	C09	LOC*CAR-97
	E4	Card pack	2%	T21	LOC*CAR-56
CB	Sensor failed to change state Note: This failure may be caused by a sensor failure (File protect, Door open, Tray up). Before replacing FRUs below, ensure that these sensors are operating correctly. See Figure 83 on page PANEL-13 and select UTILITIES from the CE OPTIONS Menu, and DISP SENSORS from the CE UTILITIES Menu.				
	C8	File protect sensor	30%	T32	LOC*CAR-78
	C9	Door-open sensor	30%	T33	LOC*CAR-79
	CA	Tray-up sensor	30%	T33	LOC*CAR-80
	BC	Loader assembly	5%	T42	LOC*CAR-73
	DA	Motor, loader, and sensor cable	3%	C09	LOC*CAR-97
	E4	Card pack	2%	T21	LOC*CAR-56
CC	Cartridge-type sensor failed to change state or sensors are in an invalid combination Note: Before replacing FRUs below, ensure that the Cartridge type sensor is operating correctly. See Figure 83 on page PANEL-13 and select UTILITIES from the CE OPTIONS Menu, and DISP SENSORS from the CE UTILITIES Menu.				
	CC	Cartridge-type sensor card asm	90%	T33	LOC*CAR-81
	BC	Loader assembly	3%	T42	LOC*CAR-73
	DA	Motor, loader, and sensor cable	3%	C09	LOC*CAR-97
	E4	Card pack	2%	T21	LOC*CAR-56
	FE	Cartridge	2%	D07	"FID FE—Isolate Fault Between Media and Hardware" on page PROC-96
CD	Cartridge-present sensor failed to change state Note: Before replacing FRUs below, ensure that the Cartridge present sensor is operating correctly. See Figure 83 on page PANEL-13 and select UTILITIES from the CE OPTIONS Menu, and DISP SENSORS from the CE UTILITIES Menu.				
	CD	Cartridge-present sensor (in the loader)	92%	T33	LOC*CAR-82
	BC	Loader assembly	3%	T42	LOC*CAR-73
	DA	Motor, loader, and sensor cable	3%	C09	LOC*CAR-97
	E4	Card pack	2%	T21	LOC*CAR-56
CE	Tape path A sensor failed to change state Note: Before replacing FRUs below, ensure that the Tape path A sensor is operating correctly. See Figure 83 on page PANEL-13 and select UTILITIES from the CE OPTIONS Menu, and DISP SENSORS from the CE UTILITIES Menu.				
	CE	Tape path A sensor	93%	T33	LOC*CAR-83
	DA	Motor, loader, and sensor cable	5%	C09	LOC*CAR-97
	E4	Card pack	2%	T21	LOC*CAR-56

Figure 2 (Page 14 of 18). FIDs, FRUs, and TACs

Reported FID	FRUs	FRU Name or Description	Probability	TAC	Page Reference or Instruction
CF	Tape path B sensor failed to change state Note: Before replacing FRUs below, ensure that the Tape path B sensor is operating correctly. See Figure 83 on page PANEL-13 and select UTILITIES from the CE OPTIONS Menu, and DISP SENSORS from the CE UTILITIES Menu.				
	CF	Tape path B sensor	93%	T33	LOC*CAR-84
	DA	Motor, loader, and sensor cable	5%	C09	LOC*CAR-97
	E4	Card pack	2%	T21	LOC*CAR-56
D0 D1 D2	<p>D0 Read failure, write failure, track following error, or initial position sensor (IPS) calibration failure D1 Calibration error; possible interface problem between the head guide and the card pack. D2 The head did not move</p> <ol style="list-style-type: none"> Before replacing FRU 'D0' below, inspect the cleaning brush for full head coverage or any noticeable debris. If either condition appears unsatisfactory, go to "FID D4: Head Cleaning Brush Assembly" on page LOC*CAR-93 first. Before replacing FRU 'D0' below, ensure that the HGA cable connectors are seated and locked into the receptacles in the card pack. See "FID D0: Head Guide and Brush Assembly" on page LOC*CAR-85 If this is a new install or the card pack has been recently replaced, unplug and reseat all of the connectors on the Card Pack before replacing any FRUs below. See "FID E4: Card Pack" on page LOC*CAR-56 Ensure that the metal tab on top of the card pack is not bent forward and preventing the connectors from seating correctly. Intermittent read and write data errors may be caused by electrical noise from the pneumatic motor-control cable in the rear of the card pack, if the cable is not routed correctly. Inspect the cable routing to ensure that it is always outside of the card pack metal enclosure. Before replacing FRU 'D0' below, perform the following diagnostic procedure to determine if the problem is being caused by the Head guide and brush asm. or the Card pack/Cable FRU's. <ol style="list-style-type: none"> Power OFF the drive and disconnect the IPS connector (2 in Figure 355 on page LOC*CAR-100). Power ON and measure voltages on the IPS connector (cable end) as follows: <p>Note: Pin 2 is empty.</p> <ol style="list-style-type: none"> Pin 1 (-) to Pin 3 (+) 2.24 V dc ±10% Pin 1 (-) to Pin 4 (+) 5.10 V dc ±10% Pin 1 (-) to Pin 5 (+) 2.24 V dc ±10% If any of the voltages are not correct, the problem is being caused by the Card Pack (FRU E4) or the ACF and operator/CE panel cable (FRU DC). <p>If all of the voltages are correct, the problem is being caused by the HGA (FRU D0) or the Head cleaning brush asm. (FRU D4).</p> Warning: DO NOT connect the IPS connector with power ON. Damage to the HGA can occur. Power OFF the drive and connect the IPS connector. 				
	D0	Head guide and brush asm (D08=clean only, T22=replace)	80%	D08/ T22	LOC*CAR-85
	D4	Head cleaning brush asm	10%	T49	LOC*CAR-93
	DA	Motor, loader, and sensor cable (FID D0 only)	4%	C09	LOC*CAR-100
	DC	ACF and operator/CE panel cable	4%	C09	LOC*CAR-100
	E4	Card pack	2%	T21	LOC*CAR-56

Figure 2 (Page 15 of 18). FIDs, FRUs, and TACs

Reported FID	FRUs	FRU Name or Description	Probability	TAC	Page Reference or Instruction
D3	Track following error while moving tape Note: Before replacing FRU 'D0' below, ensure that the HGA cable connectors are seated and locked into the receptacles in the card pack. See "FID D0: Head Guide and Brush Assembly" on page LOC*CAR-85				
	FE	Cartridge	70%	D07	"FID FE—Isolate Fault Between Media and Hardware" on page PROC-96
	D0	Head guide and brush asm (D08=clean only, T22=replace)	20%	D08/T22	LOC*CAR-85
	DC	ACF and operator/CE panel cable	5%	C09	LOC*CAR-100
	E4	Card pack	5%	T21	LOC*CAR-56
D8	Read/write error. Note: Before replacing FRU 'D0' below, ensure that the HGA cable connectors are seated and locked into the receptacles in the card pack. See "FID D0: Head Guide and Brush Assembly" on page LOC*CAR-85				
	E4	Card pack	54%	T21	LOC*CAR-56
	D0	Head guide and brush asm (D08=clean only, T22=replace)	45%	D08/T22	LOC*CAR-85
	DC	ACF and operator/CE panel cable	1%	C09	LOC*CAR-100
DD	Fault detected in loader sensors or the sensors are in an invalid combination Note: This failure may be caused by a sensor failure (File protect, Door open, Tray up, Cartridge present, or Cartridge type sensor card). Before replacing FRUs below, ensure that these sensors are operating correctly. See Figure 83 on page PANEL-13 and select UTILITIES from the CE OPTIONS Menu, and DISP SENSORS from the CE UTILITIES Menu.				
	C8	File protect sensor	19%	T32	LOC*CAR-78
	C9	Door-open sensor	19%	T33	LOC*CAR-79
	CA	Tray-up sensor	18%	T33	LOC*CAR-80
	CD	Cartridge-present sensor (in the loader)	18%	T33	LOC*CAR-82
	CC	Cartridge-type sensor card asm	18%	T33	LOC*CAR-81
	BC	Loader assembly	3%	T42	LOC*CAR-73
	DA	Motor, loader, and sensor cable	3%	C09	LOC*CAR-97
	E4	Card pack	2%	T21	LOC*CAR-56
DE	Sensors are in an invalid combination Note: This failure may be caused by a sensor failure (Door open sensor, or Cartridge type sensor card). Before replacing FRUs below, ensure that these sensors are operating correctly. See Figure 83 on page PANEL-13 and select UTILITIES from the CE OPTIONS Menu, and DISP SENSORS from the CE UTILITIES Menu.				
	C9	Door-open sensor	44%	T33	LOC*CAR-79
	CC	Cartridge-type sensor card asm	43%	T33	LOC*CAR-81
	BC	Loader assembly	3%	T42	LOC*CAR-73
	DA	Motor, loader, and sensor cable	3%	C09	LOC*CAR-97
	E4	Card pack	2%	T21	LOC*CAR-56

Figure 2 (Page 16 of 18). FIDs, FRUs, and TACs

Reported FID	FRUs	FRU Name or Description	Probability	TAC	Page Reference or Instruction
DF	Sensors are in an invalid combination				
	Note: This failure may be caused by a sensor failure (File protect, Cartridge present, or Cartridge type sensor card). Before replacing FRUs below, ensure that these sensors are operating correctly. See Figure 83 on page PANEL-13 and select UTILITIES from the CE OPTIONS Menu, and DISP SENSORS from the CE UTILITIES Menu.				
	C8	File protect sensor	30%	T32	LOC*CAR-78
	CD	Cartridge-present sensor (in the loader)	30%	T33	LOC*CAR-82
	CC	Cartridge-type sensor card asm	30%	T33	LOC*CAR-81
	BC	Loader assembly	5%	T42	LOC*CAR-73
	DA	Motor, loader, and sensor cable	3%	C09	LOC*CAR-97
E4	Card pack	2%	T21	LOC*CAR-56	
E0	Tape motion error (velocity or tape slipping error).				
	—	—	—	—	Perform "Measurement and Adjustment of Pneumatic System" on page LOC*CAR-3
	FE	Tape cartridge	30%	D07	PROC-96
	—	Pneumatic problem	30%	T63	MAPS-5
	C7	File reel motor	15%	T54	LOC*CAR-77
	C6	Machine reel motor	15%	T54	LOC*CAR-76
	CF	Tape path B sensor	7%	T33	LOC*CAR-84
	DA	Motor, loader, and sensor cable	1%	C09	LOC*CAR-97
	D6	Motor power cable	1%	C09	LOC*CAR-96
	E4	Card pack	1%	T21	LOC*CAR-56
E3	Pressure sensor failed to actuate				
	E3	Pressure sensor asm	100%	T62	LOC*CAR-55
E4	Electronic-detected fault				
	1. If this is a new install or the card pack has been recently replaced, unplug and reseal all of the connectors on the Card Pack before replacing any FRUs below. See "FID E4: Card Pack" on page LOC*CAR-56 Ensure that the metal tab on top of the card pack is not bent forward and preventing the connectors from seating correctly.				
	E4	Card pack	90%	T21	LOC*CAR-56
	C1	Power supply	8%	P04	LOC*CAR-53
DB	Power supply cable (Model E11/E1A only)	2%	P04	LOC*CAR-99	
E5	Microcode detected a fault with the microcode				
	1. If this is a new install or the card pack has been recently replaced, unplug and reseal all of the connectors on the Card Pack before replacing any FRUs below. See "FID E4: Card Pack" on page LOC*CAR-56				
E5	Microcode (known or new) (M01 = known, M02 = new)	100%	M01/ M02	"FID E5—Microcode Problem" on page PROC-89	

Figure 2 (Page 17 of 18). FIDs, FRUs, and TACs

Reported FID	FRUs	FRU Name or Description	Probability	TAC	Page Reference or Instruction
E6	Timing problem in the microcode or the electronics, or multiple check-1 errors occurred 1. If this is a new install or the card pack has been recently replaced, unplug and reset all of the connectors on the Card Pack before replacing any FRUs below. See "FID E4: Card Pack" on page LOC*CAR-56				
	E5	Microcode (known or new) (M01 = known, M02 = new)	50%	M01/ M02	"FID E6 or E7—Isolate Fault Between Microcode and Hardware" on page PROC-92
	E4	Card pack	40%	T21	LOC*CAR-56
	C1	Power supply	8%	P04	LOC*CAR-53
	DB	Power supply cable (Model E11/E1A only)	2%	P04	LOC*CAR-99
E7	Timing problem in the microcode or the electronics				
	E5	Microcode (known or new) (M01 = known, M02 = new)	60%	M01/ M02	"FID E6 or E7—Isolate Fault Between Microcode and Hardware" on page PROC-92
	E4	Card pack	40%	T21	LOC*CAR-56
E8	Timing problem in the hardware or microcode				
	—	Timing problem in drive occurs while writing and/or reading tape.	—	—	See "CE Utilities Menu" on page PANEL-48 to set a microcode trap based on support data, get a dump and contact your next level of support.
EF	Fault in pantocam or electronics while threading or un-threading				
	BB	Pantocam	80%	T45	LOC*CAR-70
	E4	Card pack	15%	T21	LOC*CAR-56
	DA	Motor, loader, and sensor cable	5%	C09	LOC*CAR-97
F0 F1 F2 F3	F0 or F1 Read error F2 Read error while writing F3 Track-following error				
	FE	Cartridge	50%	D07	"FID FE—Isolate Fault Between Media and Hardware" on page PROC-96
	D0	Head guide and brush asm (D08=clean only, T22=replace)	30%	D08/ T22	LOC*CAR-85
	E4	Card pack	20%	T21	LOC*CAR-56
F4	RS-422 bus error				
	F4	RS-422 interface problem	—	—	Run the RS-422 wrap test (see "Library Manager Port Wrap Test" on page PROC-86). If problem re-occurs, get a microcode dump and contact your next level of support.
F5	SCSI bus error				
	F5	SCSI interface, operator procedural, or host problem	—	—	"SCSI Bus Problem Determination" on page PROC-108

Figure 2 (Page 18 of 18). FIDs, FRUs, and TACs

Reported FID	FRUs	FRU Name or Description	Probability	TAC	Page Reference or Instruction
F6	Informational message—Cleaning required due to performance. Notes: 1. Informational FID F6 or FF with FSC's 7036, 7037, 7038 or C559 are normal. These FSC's are generated when a drive requires cleaning or has been cleaned. 2. If this FID continues to be posted, check to see if the Head Guide and Brush Assembly cleaner blade has been removed. Refer to Figure 349 on page LOC*CAR-92 for the location of the cleaner blade. If the cleaner blade is present, remove it using the procedure at "Cleaner Blade Removal Procedure (Models B11/B1A)" on page LOC*CAR-92.				
	F6	Operator, procedural, or host problem	100%	—	—
FE	Cartridge problem				
	FE	Cartridge	—	D07	"FID FE—Isolate Fault Between Media and Hardware" on page PROC-96
FF	Informational or non-hardware related status or error Note: Informational FID FF with FSC's 7036, 7037, 7038 or C559 are normal. These FSC's are generated when a drive requires cleaning or has been cleaned.				
	—	Operator procedural or host problem	—	—	"FID FF—Operator Action or Host Program Error" on page PROC-98

Attention Drive Messages

If the ATTN DRV message is displayed on operator/CE panel (not from CE Error Log).

1. If ATTN is displayed, press the Enter push button. If a FID appears, go to Figure 2 on page START-7.
2. If no FID is presented, use the ATTN DRV message and follow the Error Log procedure below.

If the ATTN DRV message is from the CE Error Log, (“CE Error Log Menu” on page PANEL-44):

1. Go to “Error Log Analysis Procedure” on page PROC-99 and analyze the Error Log for any FID's with a time stamp close to the time of the ATTN DRV message. If a FID appears to be associated with the ATTN DRV message, go to Figure 2 on page START-7.
2. If the Error Log does not help identify a FID, run CE DIAGS, (“CE Verify Fix Menu” on page PANEL-28, Test Drive function).
3. If the CE DIAGS do not identify a FID, use the ATTN DRV message and Figure 3 to find the fault.

At the start of your service call, write down the supplemental message associated with the **Attention** message. (For example: **Load Error** or **Tension Dropped**.)

At the end of the service call, record the first 12 characters of the Attention message data in the *FAULT SYMPTOM CODE (FSC)* field of the call report.

This detailed call reporting will help Engineering and Field Support to quickly identify, understand, and resolve field problems.

Figure 3 (Page 1 of 3). ATTN DRV Messages

ATTN DRV	FRUs	FRU Name or Description	Probability	TAC	Page Reference or Instruction
Load Error	<ol style="list-style-type: none"> 1. Ensure that the cartridge is not broken and the leader block is intact. See "Damaged Cartridges" in <i>3590 High Performance Tape Subsystem User's Guide</i>, GA32-0330. 2. Ensure that the cartridge is a 3590 compatible-type cartridge. Also, check the location of the tape and the leader block. 3. This failure may also be caused by the plastic shield over the tension transducer assembly interfering with the travel of the pin on the pantocam arm. Before replacing any FRUs below, ensure that the plastic shield is adjusted correctly. See "Adjustment of Tension Transducer Plastic Shield" on page LOC*CAR-69. 4. Check Machine Reel Hub Gap, see "FID BB: Pantocam" on page LOC*CAR-70. 5. This failure may be caused by a sensor failure (Tape path A & B, Loader tray up, Door open, File protect, Cartridge present, or Cartridge type sensor card). Before replacing FRUs below, ensure that these sensors are operating correctly. See Figure 83 on page PANEL-13 and select UTILITIES from the CE OPTIONS Menu, and DISP SENSORS from the CE UTILITIES Menu. 6. Perform "Measurement and Adjustment of Pneumatic System" on page LOC*CAR-3 before replacing any FRUs. 				
	BB	Pantocam	44%	T45	LOC*CAR-70
	BC	Loader assembly	30%	T42	LOC*CAR-73
	C7	File reel motor	20%	T54	LOC*CAR-77
	D6	Motor power cable	1%	C09	LOC*CAR-96
	DA	Motor, loader, and sensor cable	1%	C09	LOC*CAR-97
	B7	Tension transducer asm	1%	T54	LOC*CAR-67
	C6	Machine reel motor	1%	T54	LOC*CAR-76
	D0	Head guide and brush asm (D08=clean only, T22=replace)	1%	D08/ T22	LOC*CAR-85
	E4	Card pack	1%	T21	LOC*CAR-56
Unload Error	<ol style="list-style-type: none"> 1. Ensure that the cartridge is not broken and the leader block is intact. See "Damaged Cartridges" in <i>3590 High Performance Tape Subsystem User's Guide</i>, GA32-0330. 2. Ensure that the cartridge is a 3590 compatible-type cartridge. Also, check the location of the tape and the leader block. 3. This failure may also be caused by the plastic shield over the tension transducer assembly interfering with the travel of the pin on the pantocam arm. Before replacing any FRUs below, ensure that the plastic shield is adjusted correctly. See "Adjustment of Tension Transducer Plastic Shield" on page LOC*CAR-69. 4. Check Machine Reel Hub Gap, see "FID BB: Pantocam" on page LOC*CAR-70. 5. This failure may be caused by a sensor failure (Tape path A & B, Loader tray up, Door open, File protect, Cartridge present, or Cartridge type sensor card). Before replacing FRUs below, ensure that these sensors are operating correctly. See Figure 83 on page PANEL-13 and select UTILITIES from the CE OPTIONS Menu, and DISP SENSORS from the CE UTILITIES Menu. 6. Perform "Measurement and Adjustment of Pneumatic System" on page LOC*CAR-3 before replacing any FRUs. 				
	BB	Pantocam	45%	T45	LOC*CAR-70
	BC	Loader assembly	30%	T42	LOC*CAR-73
	C7	File reel motor	20%	T54	LOC*CAR-77
	D6	Motor power cable	1%	C09	LOC*CAR-96
	DA	Motor, loader, and sensor cable	1%	C09	LOC*CAR-97
	C6	Machine reel motor	1%	T54	LOC*CAR-76
	D0	Head guide and brush asm (D08=clean only, T22=replace)	1%	D08/ T22	LOC*CAR-85
	E4	Card pack	1%	T21	LOC*CAR-56
	FSC Trap Taken	The microcode encountered the trap address set from a CE panel menu.			
—		Not a fault	—	—	—

Figure 3 (Page 2 of 3). ATTN DRV Messages

ATTN DRV	FRUs	FRU Name or Description	Probability	TAC	Page Reference or Instruction
Tension Dropped	Tape motion error (velocity or tape slipping error).				
	—	Pneumatic system or tape cartridge fault	—	—	See FID E0 on page START-22.
Invalid Cartridge	Ensure that the cartridge is not damaged or broken and that the cartridge is a 3590 cartridge. Note: Before replacing FRUs below, ensure that the cartridge type sensors are operating correctly. See Figure 83 on page PANEL-13 and select UTILITIES from the CE OPTIONS Menu, and DISP SENSORS from the CE UTILITIES Menu.				
	FE	Cartridge	96%	D07	See "Damaged Cartridges" in <i>3590 High Performance Tape Subsystem User's Guide</i> , GA32-0330.
	CC	Cartridge type sensor card asm	2%	T33	LOC*CAR-81
	DA	Motor, loader, and sensor cable	1%	C09	LOC*CAR-97
	E4	Card pack	1%	T21	LOC*CAR-56
Temp AC Pwr dip	The microcode encountered a Temp AC Pwr dip condition or power surge.				
	—	Customer Power	90%	—	If this condition continues, have the customer verify that his power source is adequate for the load. Note: Electrical weather conditions may be the cause of this problem.
	C1	Power supply	8%	P04	LOC*CAR-53
	DB	Power supply cable (Model E11/E1A only)	1%	P04	LOC*CAR-99
	E4	Card pack	1%	T21	LOC*CAR-56
Head Calib Failed	Head failed to position correctly.				
	D0	Head guide and brush assembly	90%	T22	LOC*CAR-85
	DC	ACF and operator/CE panel cable	6%	C09	LOC*CAR-100
	E4	Card Pack	4%	T21	LOC*CAR-56
ERP Reload Failure	<ol style="list-style-type: none"> 1. Ensure that the cartridge is not broken and the leader block is intact. See "Damaged Cartridges" in <i>3590 High Performance Tape Subsystem User's Guide</i>, GA32-0330. 2. This failure may also be caused by the plastic shield over the tension transducer assembly interfering with the travel of the pin on the pantocam arm. Before replacing any FRUs below, ensure that the plastic shield is adjusted correctly. See "Adjustment of Tension Transducer Plastic Shield" on page LOC*CAR-69. 3. Check Machine Reel Hub Gap, see "FID BB: Pantocam" on page LOC*CAR-70. 4. This failure may be caused by a sensor failure (Tape path A & B, Loader tray up, Door open, File protect, Cartridge present, or Cartridge type sensor card). Before replacing FRUs below, ensure that these sensors are operating correctly. See Figure 83 on page PANEL-13 and select UTILITIES from the CE OPTIONS Menu, and DISP SENSORS from the CE UTILITIES Menu. 5. Perform "Measurement and Adjustment of Pneumatic System" on page LOC*CAR-3 before replacing any FRUs. 				
	BB	Pantocam	64%	T45	LOC*CAR-70
	C7	File reel motor	35%	T54	LOC*CAR-77
	D6	Motor power cable	2%	C09	LOC*CAR-96
	DA	Motor, loader, and sensor cable	2%	C09	LOC*CAR-97
	B7	Tension transducer asm	2%	T54	LOC*CAR-67
	C6	Machine reel motor	2%	T54	LOC*CAR-76
	D0	Head guide and brush asm (D08=clean only, T22=replace)	2%	D08/ T22	LOC*CAR-85
	E4	Card pack	1%	T21	LOC*CAR-56

Figure 3 (Page 3 of 3). ATTN DRV Messages

ATTN DRV	FRUs	FRU Name or Description	Probability	TAC	Page Reference or Instruction
Clean Required	The drive is fenced and cannot be used until the drive is cleaned. This usually occurs when the customer ignores requests for a cleaning cycle.				
	—	Load cleaner cartridge.	—	—	INTRO-39

Attention ACF Messages

If the ATTN ACF message is displayed on operator/CE panel (not from CE Error Log).

1. If ATTN is displayed, press the Enter push button. If a FID appears, go to Figure 2 on page START-7.
2. If no FID is presented, use the ATTN ACF message and follow the Error Log procedure below.

If the ATTN ACF message is from the CE Error Log, ("CE Error Log Menu" on page PANEL-44):

1. Go to "Error Log Analysis Procedure" on page PROC-99 and analyze the Error Log for any FID's with a time stamp close to the time of the ATTN ACF message. If a FID appears to be associated with the ATTN ACF message, go to Figure 2 on page START-7.
2. If the Error Log does not help identify a FID, run CE DIAGS, ("CE Verify Fix Menu" on page PANEL-28, Test ACF function).
3. If the CE DIAGS do not identify a FID, use the ATTN ACF message and Figure 4 to find the fault.

Note: Errors in the error dump are now time stamped.

Special note about cartridges. If a 3480 or a 3490 cartridge is inserted in the ACF, unpredictable results can occur because the cartridges are transparent, making it difficult for the sensors to detect the position of the cartridge.

At the start of your service call, write down the supplemental message associated with the **Attention ACF** message. (For example: **Move Error** or **Transport Full**.)

At the end of the service call, record the first 12 characters of the Attention ACF message data in the *FAULT SYMPTOM CODE (FSC)* field of the call report.

This detailed call reporting will help Engineering and Field Support to quickly identify, understand, and resolve field problems.

Figure 4 (Page 1 of 5). ATTN ACF Messages

ATTN ACF	FRUs	FRU Name or Description	Probability	TAC	Page Reference or Instruction
Move Error (See also the next "Move Error" entry)	Ensure that the cartridge is not damaged or broken and that the cartridge is a 3590 cartridge. Note: This failure may be caused by a sensor failure (Loader tray up, Door open, Cartridge present, Pinch 1 & 2, Limit 1 & 2, Transport position A & B, Import, Export) Before replacing FRUs below, ensure that these sensors are operating correctly. See Figure 83 on page PANEL-13 and select UTILITIES from the CE OPTIONS Menu, and DISP SENSORS from the CE UTILITIES Menu.				
	—	—	—	—	Attempt to perform "Check and Adjustment of Transport Position Sensor" on page LOC*CAR-27 before replacing any FRUs.
	9A	Transport	50%	T03	LOC*CAR-34
	BC	Loader assembly	15%	T42	LOC*CAR-73
	92	Leadscrew asm	10%	T03	LOC*CAR-13
	99	Transport cable	5%	T04	LOC*CAR-30
	95	Elevator motor asm	4%	T03	LOC*CAR-19
	A9	Feed motor asm	3%	T03	LOC*CAR-46
	96	Pinch motor asm	3%	T03	LOC*CAR-22
	FD	Magazine	3%	Q05	Customer-purchased
	97	Motor control card	2%	T02	LOC*CAR-24
A1	Motor cable asm	2%	T04	LOC*CAR-41	
Move Error; all 1% probability	Continued from above.				
	98	Transport-position sensor	1%	T01	LOC*CAR-25
	A2	Drive/ACF cable	1%	T04	LOC*CAR-42
	C9	Door-open sensor	1%	T33	LOC*CAR-79
Clear Picker Path	The device detected the presence of a possible blockage in the cartridge path, such as in the magazine or in the priority cell. <ol style="list-style-type: none"> 1. Check the position of all cartridges to ensure they are properly positioned in the magazine and in the priority cell. A cartridge that extends too far into the magazine in the import position or a damaged cartridge can cause this error. 2. Remove the magazine and look for any obvious obstructions. 3. Try another magazine in the ACF. 4. Before replacing FRUs below, ensure that the interference sensors are operating correctly. See Figure 83 on page PANEL-13 and select UTILITIES from the CE OPTIONS Menu, and DISP SENSORS from the CE UTILITIES Menu. 				
	9B	Global/ interference sensor	85%	T01	See Clear Picker Path Note, then go to LOC*CAR-37
	97	Motor control card	6%	T02	LOC*CAR-24
	A5	Sensor cable	5%	T01	LOC*CAR-44
	A2	Drive/ACF cable	4%	T04	LOC*CAR-42
Lock Magazine	Lock the magazine by pressing the lock button on the front of ACF. Note: Before replacing FRUs below, ensure that the magazine lock sensor is operating correctly. See Figure 83 on page PANEL-13 and select UTILITIES from the CE OPTIONS Menu, and DISP SENSORS from the CE UTILITIES Menu.				
	A6	LED cards	84%	T02	LOC*CAR-45
	A4	LED cable	10%	T01	LOC*CAR-43
	97	Motor control card	4%	T02	LOC*CAR-24
	A2	Drive/ACF cable	2%	T04	LOC*CAR-42

Figure 4 (Page 2 of 5). ATTN ACF Messages

ATTN ACF	FRUs	FRU Name or Description	Probability	TAC	Page Reference or Instruction
Lock Error	Try locking and unlocking the magazine. Try another magazine. Note: Before replacing FRUs below, ensure that the magazine lock sensor is operating correctly. See Figure 83 on page PANEL-13 and select UTILITIES from the CE OPTIONS Menu, and DISP SENSORS from the CE UTILITIES Menu.				
	A6	LED cards	84%	T02	LOC*CAR-45
	A4	LED cable	10%	T01	LOC*CAR-43
	97	Motor control card	4%	T02	LOC*CAR-24
	A2	Drive/ACF cable	2%	T04	LOC*CAR-42
Magazine Locked	If this is a problem, try unlocking the magazine. Try another magazine. Note: Before replacing FRUs below, ensure that the magazine lock sensor is operating correctly. See Figure 83 on page PANEL-13 and select UTILITIES from the CE OPTIONS Menu, and DISP SENSORS from the CE UTILITIES Menu.				
	A6	LED cards	84%	T02	LOC*CAR-45
	A4	LED cable	10%	T01	LOC*CAR-43
	97	Motor control card	4%	T02	LOC*CAR-24
	A2	Drive/ACF cable	2%	T04	LOC*CAR-42
Unlock Magazine	Ensure that the magazine is unlocked. Try another magazine. Note: Before replacing FRUs below, ensure that the magazine lock sensor is operating correctly. See Figure 83 on page PANEL-13 and select UTILITIES from the CE OPTIONS Menu, and DISP SENSORS from the CE UTILITIES Menu.				
	A6	LED cards	84%	T02	LOC*CAR-45
	A4	LED cable	10%	T01	LOC*CAR-43
	97	Motor control card	4%	T02	LOC*CAR-24
	A2	Drive/ACF cable	2%	T04	LOC*CAR-42
Extra Cartridge	The device loaded a cartridge from the magazine and detected that another cartridge was placed in its home position. The device attempts to place the cartridge in the priority cell to await operator action. If the priority cell is full, it ejects the cartridge when the priority slot is unloaded or when the Enter push button is pressed. 1. Ensure that no cartridge has been inserted into an 'in use' cell (green LED on). 2. Visually check the transport ribbon cable for damage at the folds. Note: This failure may be caused by a sensor failure (Priority cell, Limit 1 & 2, Import, Export) Before replacing FRUs below, ensure that these sensors are operating correctly. See Figure 83 on page PANEL-13 and select UTILITIES from the CE OPTIONS Menu, and DISP SENSORS from the CE UTILITIES Menu.				
	99	Transport cable	80%	T04	LOC*CAR-30
	9A	Transport	9%	T03	LOC*CAR-34
	9E	Priority cell sensor (pair)	4%	T01	LOC*CAR-39
	97	Motor control card	3%	T02	LOC*CAR-24
	A5	Sensor cable	2%	T01	LOC*CAR-44
	A2	Drive/ACF cable	2%	T04	LOC*CAR-42
No Magazine	Ensure that the magazine is properly installed and latched in place. Try a different magazine. Note: Before replacing FRUs below, ensure that the magazine present sensor is operating correctly. See Figure 83 on page PANEL-13 and select UTILITIES from the CE OPTIONS Menu, and DISP SENSORS from the CE UTILITIES Menu.				
	A0	Magazine-present sensor asm	88%	T01	LOC*CAR-40
	97	Motor control card	6%	T02	LOC*CAR-24
	A5	Sensor cable	4%	T01	LOC*CAR-44
	A2	Drive/ACF cable	2%	T04	LOC*CAR-42

Figure 4 (Page 3 of 5). ATTN ACF Messages

ATTN ACF	FRUs	FRU Name or Description	Probability	TAC	Page Reference or Instruction
No Cartridge	<p>The device cannot find a cartridge in the import position in the magazine or the priority cell.</p> <ol style="list-style-type: none"> 1. Check the position of all the cartridges to ensure they are properly positioned in the import position of the magazine and the priority cell. If this condition is not cleared, remove and replace the magazine. 2. Press Start. <p>Note: This failure may be caused by a sensor failure (Priority cell, Global interference, Limit 1 & 2, Import, Export) Before replacing FRUs below, ensure that these sensors are operating correctly. See Figure 83 on page PANEL-13 and select UTILITIES from the CE OPTIONS Menu, and DISP SENSORS from the CE UTILITIES Menu.</p>				
	9E	Priority cell sensor (pair)	48%	T01	LOC*CAR-39
	9B	Global/Interference sensor	16%	T01	See Clear Picker Path Note, then go to LOC*CAR-37
	9A	Transport	14%	T03	LOC*CAR-34
	99	Transport cable	12%	T04	LOC*CAR-30
	A5	Sensor cable	10%	T01	LOC*CAR-44
	97	Motor control card	5%	T02	LOC*CAR-24
	A2	Drive/ACF cable	3%	T04	LOC*CAR-42
Priority Export ER	<p>The cartridge is not positioned in the correct export position (either too far in or not far enough in the cell).</p> <ol style="list-style-type: none"> 1. The sensor detected that the cartridge was not delivered far enough into the cell or too far into the cell. 2. Remove the tape cartridge. <p>Note: This failure may be caused by a sensor failure (Priority cell, Limit 1 & 2, Import, Export) Before replacing FRUs below, ensure that these sensors are operating correctly. See Figure 83 on page PANEL-13 and select UTILITIES from the CE OPTIONS Menu, and DISP SENSORS from the CE UTILITIES Menu.</p>				
	—	—	—	—	Attempt to perform “Check and Adjustment of Transport Position Sensor” on page LOC*CAR-27 before replacing any FRUs.
	FD	Magazine	55%	Q05	Customer-purchased
	9A	Transport	26%	T03	LOC*CAR-34
	99	Transport cable	10%	T04	LOC*CAR-30
	9E	Priority cell sensor (pair)	5%	T01	LOC*CAR-39
	97	Motor control card	4%	T02	LOC*CAR-24
Magazine Export ER	<p>The cartridge is not positioned in the correct export position (either too far in or not far enough in the cell).</p> <ol style="list-style-type: none"> 1. The sensor detected that the cartridge was not delivered far enough into the magazine or too far into the magazine. 2. Remove the magazine and check that the cartridges are in the correct export position. <p>Note: This failure may be caused by a sensor failure (Limit 1 & 2, Import, Export) Before replacing FRUs below, ensure that these sensors are operating correctly. See Figure 83 on page PANEL-13 and select UTILITIES from the CE OPTIONS Menu, and DISP SENSORS from the CE UTILITIES Menu.</p>				
	—	—	—	—	Attempt to perform “Check and Adjustment of Transport Position Sensor” on page LOC*CAR-27 before replacing any FRUs.
	FD	Magazine	56%	Q05	Customer-purchased
	9A	Transport	35%	T03	LOC*CAR-34
	97	Motor control card	5%	T02	LOC*CAR-24
	99	Transport cable	4%	T04	LOC*CAR-30

Figure 4 (Page 4 of 5). ATTN ACF Messages

ATTN ACF	FRUs	FRU Name or Description	Probability	TAC	Page Reference or Instruction
Magazine Full	The magazine is full of cartridges. 1. The sensor detected that the magazine cannot hold any more cartridges. 2. Remove the magazine and replace the cartridges or insert another full magazine. Note: This failure may be caused by a sensor failure (Limit 1 & 2, Import, Export) Before replacing FRUs below, ensure that these sensors are operating correctly. See Figure 83 on page PANEL-13 and select UTILITIES from the CE OPTIONS Menu, and DISP SENSORS from the CE UTILITIES Menu.				
	FD	Magazine	56%	Q05	Customer-purchased
	9A	Transport	35%	T03	LOC*CAR-34
	97	Motor control card	5%	T02	LOC*CAR-24
	99	Transport cable	4%	T04	LOC*CAR-30
ACF Not Enabled	Ensure there are cartridges in the ACF and that they are seated in the import position. Note: This failure may be caused by a sensor failure (Priority cell, Global interference, Cartridge present, Import) Before replacing FRUs below, ensure that these sensors are operating correctly. See Figure 83 on page PANEL-13 and select UTILITIES from the CE OPTIONS Menu, and DISP SENSORS from the CE UTILITIES Menu.				
	9E	Priority cell sensor (pair)	33%	T01	LOC*CAR-39
	9B	Global/Interference sensor	25%	T01	See Clear Picker Path Note, then go to LOC*CAR-37
	9A	Transport	20%	T03	LOC*CAR-34
	A5	Sensor cable	10%	T01	LOC*CAR-44
	97	Motor control card	5%	T02	LOC*CAR-24
	99	Transport cable	4%	T04	LOC*CAR-30
	A2	Drive/ACF cable	3%	T04	LOC*CAR-42
Feed Over-current	An over-current condition was detected in the ACF feed motor circuitry.				
	97	Motor control card	60%	T02	LOC*CAR-24
	A9	Feed motor asm	20%	T03	LOC*CAR-46
	A2	Drive/ACF cable	15%	T04	LOC*CAR-42
	E4	Card pack	5%	T21	LOC*CAR-56
Pinch Over-current	An over-current condition was detected in the ACF pinch motor circuitry.				
	97	Motor control card	60%	T02	LOC*CAR-24
	96	Pinch motor asm	20%	T03	LOC*CAR-22
	A2	Drive/ACF cable	15%	T04	LOC*CAR-42
	E4	Card pack	5%	T21	LOC*CAR-56
Picker Over-current	An over-current condition was detected in the ACF elevator motor circuitry.				
	97	Motor control card	60%	T02	LOC*CAR-24
	95	Elevator motor asm	20%	T03	LOC*CAR-19
	A2	Drive/ACF cable	15%	T04	LOC*CAR-42
	E4	Card pack	5%	T21	LOC*CAR-56
Transport Full	The drive attempted to unload a cartridge, but had no place to put it. Note: Also follow instructions for any other messages that are presented (such as Extra Cartridge, Magazine Full, No Magazine, etc.).				
	—	The magazine handle was moved while the drive was unloading a cartridge, or, a tape was present in the slot where ACF transport tried to unload, so tape cartridge is still left in transport.	—	—	Do not remove the magazine while the status area on the operator panel is displaying Transferring .

Figure 4 (Page 5 of 5). ATTN ACF Messages

ATTN ACF	FRUs	FRU Name or Description	Probability	TAC	Page Reference or Instruction
Wrong Mode	The ACF is operating in the wrong mode for the requested command.				
	—	The ACF is operating in the incorrect ACF mode. One of five ACF modes can be selected from the Set ACF Mode Menu on the operator/CE panel.	—	—	Determine the correct ACF mode and set it by going to the operator Options Menu on the operator/CE panel and selecting option Set ACF Mode
Pinch1 or Pinch2 Error	ACF detected an error when grasping (pinching) the cartridge				
	<p>1. This failure may be caused by a dirty cartridge. Look for any contamination on the sides of the cartridge that could cause the pinch rollers to slip. Have the customer clean or replace the cartridge, if necessary. Use ONLY Tape Unit Cleaner, IBM P/N 13F5647. See "Tape Unit Cleaner" on page INTRO-43 for details.</p> <p>Note: Ensure that the customer does not ship magazines with cartridges loaded. The cartridges will vibrate in the magazine slots resulting in contamination on the sides of the cartridges that may cause this failure.</p> <p>2. Check that the pinch rollers are not binding, and that the arms are not bent. If the rollers are binding or the arms are bent, replace the transport FID 9A.</p> <p>3. Before replacing FRUs below, ensure that the Pinch 1 and Pinch 2 sensors are operating correctly. See Figure 83 on page PANEL-13 and select UTILITIES from the CE OPTIONS Menu, and DISP SENSORS from the CE UTILITIES Menu.</p>				
	FE	Cartridge	50%	D07	"FID FE—Isolate Fault Between Media and Hardware" on page PROC-96
	9A	Transport	40%	T03	LOC*CAR-34
	97	Motor control card	6%	T02	LOC*CAR-24
99	Transport cable	4%	T04	LOC*CAR-30	
ACF IRQ Fault	Continuous ACF electronic interrupt signals are being detected.				
	Note: This failure may be caused by a sensor failure (Priority cell, Magazine present, Magazine lock, Global interference, Cartridge present, Pinch 1 & 2, Limit 1 & 2, Transport position A & B, Import, Export). Before replacing FRUs below, ensure that these sensors are operating correctly. See Figure 83 on page PANEL-13 and select UTILITIES from the CE OPTIONS Menu, and DISP SENSORS from the CE UTILITIES Menu.				
	99	Transport cable	80%	T04	LOC*CAR-30
	97	Motor control card	10%	T02	LOC*CAR-24
	A2	Drive/ACF cable	6%	T04	LOC*CAR-42
9E	Priority cell sensor (pair)	4%	T01	LOC*CAR-39	
ACF Msg Missing	Microcode not able to provide correct ACF message.				
	E5	Microcode (known or new) (M01 = known, M02 = new)	100%	M01/ M02	"FID E5—Microcode Problem" on page PROC-89

MAPs

Contents

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Operator/CE Panel Problems

- This procedure helps you isolate Operator/CE panel failures.
- See the LOC*CAR section for check, adjustment, removal, and replacement procedures.
- See “Operator Panel” on page PANEL-1 for a description of the Operator/CE panel.
- Unless otherwise directed, run **Verify Fix** and **Test Panel** from the CE Options Menu to test the drive after a FRU replacement.
- If the recommended repair actions do not fix the problem, call your next level of support.

001

Have the customer vary the drive off-line, if it was not already done.

View the LEDs on the rear of the device (on the power supply). Are the AC and DC LEDs ON and is the TH LED OFF?

Yes No

002

Go to “Power Problems” on page MAPS-9. Return to the next step in this procedure if the power supply is OK.

003

The 3590 power supply is OK.

Power the drive OFF and check that all operator/CE panel cable connectors from the operator/CE panel to the card pack assembly are seated. Power the drive ON.

After the power ON diagnostics have completed, select **Verify Fix** from the CE Options menu. Select **Test Panel** and visually check the panel display during the test.

If all of the cable connectors are seated correctly, and you still have a problem with the operator/CE panel, replace the following FRUs:

1. “FID 90: Operator/CE Panel” on page LOC*CAR-10.
2. “FID 91: Operator/CE Panel Cable (Model B11/E11 Only)” on page LOC*CAR-12 or “FID 94: Operator Panel Cable (Model B1A/E1A Only)” on page LOC*CAR-103.

(Step **003** continues)

003 (continued)

3. “FID DC: ACF and Operator/CE Panel Cable” on page LOC*CAR-100
4. “FID E4: Card Pack” on page LOC*CAR-56.

Pneumatic Problems

- This procedure helps you isolate pneumatic system failures.
- See the LOC*CAR section for check, adjustment, removal, and replacement procedures. Replacement of pneumatic system FRUs requires you to perform "Measurement and Adjustment of Pneumatic System" on page LOC*CAR-3.
- See "Pneumatic System" on page INTRO-23 for a description of the pneumatic system.
- Unless otherwise directed, run **Verify Fix** from the CE Options Menu to test the drive after a FRU replacement.
- If the recommended repair actions do not fix the problem, call your next level of support.

001

If you have not already done so, perform the following procedures and return here:

- Perform "Prepare the Tape Drive for Service" on page PROC-5.
- Remove the power cord from its source and then from the power supply at the back of the 3590.
- Remove the deck enclosure back cover. See "Deck Enclosure Covers" on page PROC-23.
- Connect the power cord to the back of the 3590 and to the source outlet. Then, switch ON power to the 3590.

A broken tape may result in a loss of pressure, which may cause a FID that points to a pneumatic system failure.

Check the tape path for a broken tape.

Was the pneumatic system error caused by a broken tape?

Yes No

002

Continue at Step 004.

003

If the edge of the tape gets nicked or damaged, it may not break right away. The damage may occur in the tape path of one drive, while the tape-break failure may occur later in a different drive.

(Step **003** continues)

003 (continued)

The most likely place for tape damage to occur is at the tension transducer during a load operation.

1. Check the teeth on the lower flange of the tension transducer. See "Adjustment of Tension Transducer Plastic Shield" on page LOC*CAR-69 for details.
2. Check the adjustment of the gap in the machine reel hub to ensure that it is not too tight. See the procedure in "Replacement of Pantocam" on page LOC*CAR-71.
3. Ensure that the latest level of microcode is installed. Call your next level of support, if necessary.

004

Load a scratch tape into the drive. This should cause the pneumatic compressor motor to run.

Is the compressor motor running?

Yes No

005

Perform the following:

1. Switch OFF the power to the 3590.
2. Remove the deck enclosure back plate. See "Removal of Deck Enclosure Back Plate" on page PROC-23.
3. Check that the connector of the pneumatic assembly compressor motor cable, CD1, is seated and latched into the rear of the card pack assembly.

Is the pneumatic assembly compressor motor cable connector, CD1, seated and latched into the rear of the card pack assembly?

Yes No

006

Reseat the connector, switch power ON, and test.

007

Perform the following:

(Step **007** continues)

Pneumatic Problems (continued)

007 (continued)

1. Ensure that power is OFF.
2. Unplug the compressor motor cable connector, CD1, from the card pack.
3. On the card pack connector, measure the resistance from ground (pin 4) to pins 5, 9, and 10. The resistance should be **greater than 9K ohms** at all three pins.

Is the resistance greater than 9K ohms at all three pins?

Yes No

008

The card pack is defective and will have to be replaced, but the problem may have been caused by a short circuit or bind in the pneumatic compressor or motor.

Perform the following steps to determine if the pneumatic assembly needs to be replaced also:

1. On the pneumatic motor cable plug, CD1, measure the resistance from ground (pin 4) to pins 5, 9, and 10. The resistance should be **infinity** at all three pins. If any resistance at all is measured, the pneumatic assembly is defective.

Is the resistance infinity at all three pins?

Yes No

009

The compressor is shorted, causing the card pack to fail also.

Replace the following FRUs:

1. "FID B1: Pneumatic Assembly" on page LOC*CAR-49.
2. "FID E4: Card Pack" on page LOC*CAR-56.

010

(Step **010** continues)

010 (continued)

Check the compressor for mechanical binds. With power OFF, you should be able to rotate the compressor with finger pressure on the end of the shaft.

Is the compressor binding?

Yes No

011

The compressor is okay.

Replace the "FID E4: Card Pack" on page LOC*CAR-56.

012

The compressor is binding, causing the card pack to fail also.

Replace the following FRUs:

1. "FID B1: Pneumatic Assembly" on page LOC*CAR-49.
2. "FID E4: Card Pack" on page LOC*CAR-56.

013

The card pack is okay.

Perform the following steps:

1. On the pneumatic motor cable plug, CD1, measure the resistance from ground (pin 4) to pins 5, 9, and 10. The resistance should be **infinity** at all three pins. If any resistance at all is measured, the pneumatic assembly is defective.

Is the resistance infinity at all three pins?

Yes No

014

Replace the "FID B1: Pneumatic Assembly" on page LOC*CAR-49.

015

Check the compressor for mechanical binds. With power OFF, you should be able to rotate the compressor with finger pressure

on the end of the shaft.

Is the compressor binding?

Yes No

016

The compressor is not shorted and not binding. If the compressor motor still does not run when a tape is loaded, replace the “FID B1: Pneumatic Assembly” on page LOC*CAR-49.

017

Replace the “FID B1: Pneumatic Assembly” on page LOC*CAR-49.

018

The compressor motor is running.

Perform the following:

1. Check that the pneumatic pressure sensor (FID E3) cable is connected correctly.
2. Check for loose or broken hoses. If the cleaner blade has been removed, the cleaner blade vacuum hose must be either removed or plugged to prevent vacuum system leaks. See “Cleaner Blade Removal Procedure (Models B11/B1A)” on page LOC*CAR-92 for details.
3. Clean the decoupler and cleaner block assemblies.
4. Measure the pneumatic system vacuum and make adjustments if needed. See “Measurement and Adjustment of Pneumatic System” on page LOC*CAR-3. This procedure also adjusts the pneumatic system pressure and displays error messages on the operator/CE panel if the pressure set point cannot be maintained.
5. Then return to this MAP.

Was the pneumatic system vacuum in adjustment?

Yes No

019

(Step 019 continues)

019 (continued)

Were you able to bring the pneumatic system vacuum into adjustment?

Yes No

020

Check that all pneumatic system hoses are seated on their connectors or fittings and that there are no leaks. See “FID B2: Pneumatic Hose Kit” on page LOC*CAR-50 for hose routing and replacement. If the cleaner blade has been removed, the cleaner blade vacuum hose must be either removed or plugged to prevent vacuum system leaks. See “Cleaner Blade Removal Procedure (Models B11/B1A)” on page LOC*CAR-92 for details.

If the hoses are OK, replace the following FRUs:

1. “FID E3: Pressure Sensor” on page LOC*CAR-55.
2. “FID B1: Pneumatic Assembly” on page LOC*CAR-49.

021

The vacuum and pressure adjustments to the pneumatic system may have fixed the problem.

Run **Verify Fix** from the CE Options Menu.

022

The pneumatic system vacuum and pressure were in adjustment. The problem must be related to tape tension.

With a tape cartridge loaded in the tape drive, check that the tape is drawn into the curvature of the decoupler. See “Locations and Removal Procedures for the Deck” on page LOC*CAR-61 for an illustration showing the decoupler tape path curvature.

(Step 022 continues)

Pneumatic Problems (continued)

022 (continued)

Is the tape drawn into the curvature of the decoupler?

Yes No

023

Check that the pneumatic system hoses going to the decoupler are seated on their connectors or fittings and that there are no leaks.

If the hoses are OK, replace the "FID B6: Decoupler" on page LOC*CAR-66.

024

Check that the tape tension transducer cable is seated in its connector.

Check that all of the pneumatic system pressure hoses are seated on their connectors or fittings and that there are no leaks.

If the hex screw in the center of the tension transducer is loose it will cause a pressure leak in the transducer assembly. Check that the plastic shield is seated correctly on top of the tension transducer and that the hex screw is tight.

Note: If the plastic shield is moved for any reason, it must be re-adjusted. See "Adjustment of Tension Transducer Plastic Shield" on page LOC*CAR-69.

If all of the above items are OK, and you still have a tape tension problem, replace the "FID B7: Tension Transducer Assembly" on page LOC*CAR-67.

Power Problems

- This procedure helps you isolate power failures.
- See the LOC*CAR section for check, adjustment, removal, and replacement procedures.
- See “Power Supplies” on page INTRO-26 for a description of 3590 power.
- Unless otherwise directed, run **Verify Fix** from the CE Options Menu to test the drive after a FRU replacement.
- If the recommended repair actions do not fix the problem, call your next level of support.

001

Have the customer vary the drive off-line, if it was not already done.

Is the AC LED at the rear of the 3590 power supply ON?

Yes No

002

Unplug the 3590 power cord from the source outlet.

Measure the ac voltage at the source outlet.

Is ac voltage at the source outlet correct?

Yes No

003

If the source outlet is in a rack or library, see the rack or library documentation for power problems.

Otherwise, inform the customer that ac power is unavailable at the customer-provided outlet.

004

Disconnect the power cord from the 3590.

Check the power cord for continuity.
(Step **004** continues)

004 (continued)

Is the power cord OK?

Yes No

005

Replace the 3590 power cord (no FID).

006

Perform the following:

1. Replace the “FID C1: Power Supply” on page LOC*CAR-53.
2. Replace the “FID DB: Power Supply Cable” on page LOC*CAR-99.

007

Is the TH LED at the rear of the 3590 power supply ON?

Yes No

008

Is the DC LED at the rear of the 3590 power supply ON?

Yes No

009

Go to Step 018 on page MAPS-10.

010

The power supply LED indicators do not indicate an error condition. The power supply appears to be OK, but there may be an intermittent failure or a failure in the cable from the power supply to the card pack assembly.

011

A thermal sensor in the power supply or card pack assembly is indicating a thermal condition or a fan motor fault has caused the DC voltages to be turned OFF and the TH LED to be turned ON.
(Step **011** continues)

Power Problems (continued)

011 (continued)

Perform the following:

1. Switch OFF the 3590 power supply and check the LEDs as described below:
 - a. The AC LED should remain ON.
 - b. The TH LED should remain OFF.

Note: On Models B11/B1A power supplies, the TH LED comes ON for about 10 seconds and then remains OFF.

2. Perform "Prepare the Tape Drive for Service" on page PROC-5.
3. Remove the power cord from its source and then from the power supply at the back of the 3590.
4. Remove the deck enclosure back cover. See "Deck Enclosure Covers" on page PROC-23.
5. Disconnect the 3590 power supply cable to isolate the power supply from the card pack.
 - a. On Models B11/B1A, disconnect the cable from the card pack.
 - b. On Models E11/E1A, disconnect the cable from the back of the power supply.
6. Connect the power cord to the back of the 3590 and then to the source outlet.
7. Switch ON the 3590 power supply, wait 20 seconds, and then check the LEDs as described below:
 - a. The AC LED should remain ON.
 - b. The TH LED should remain OFF.
 - c. About 1 or 2 seconds after the power switch is set to the ON position, the DC LED should come ON and remain ON.

Did the TH LED remain OFF after 20 seconds?

Yes No

012

The TH LED indicator is still ON, indicating an error condition.

Replace the "FID C1: Power Supply" on page LOC*CAR-53.

013

This is correct machine operation, with the card pack disconnected. The card pack may be causing the thermal condition, or the machine may have cooled enough to reset the thermal sensor.

(Step 013 continues)

013 (continued)

1. Check the power supply cooling fan(s) to ensure they are operating correctly.

Are the fan(s) operating correctly?

Yes No

014

Replace the "FID C1: Power Supply" on page LOC*CAR-53.

015

Leave the power ON long enough for the power supply to warm up to determine if the thermal failure will happen again.

Did the TH LED come ON after the power supply warmed up?

Yes No

016

The card pack may be causing the failure.

1. Switch the power OFF.
2. Reconnect the power cable to the card pack.
3. Switch the power ON.

If the TH LED comes ON and stays ON, replace the "FID E4: Card Pack" on page LOC*CAR-56.

017

Replace the "FID C1: Power Supply" on page LOC*CAR-53.

018

The power supply DC LED indicator is OFF, indicating an error condition.

Perform the following:

1. Switch OFF the 3590 power supply and check the LEDs as described below:
 - a. The AC LED should remain ON.
 - b. The TH LED should remain OFF.

Note: On Models B11/B1A power supplies, the TH LED comes ON for about 10 seconds and then remains OFF.

(Step 018 continues)

018 (continued)

2. Perform "Prepare the Tape Drive for Service" on page PROC-5.
3. Remove the power cord from its source and then from the power supply at the back of the 3590.
4. Remove the deck enclosure back cover. See "Deck Enclosure Covers" on page PROC-23.
5. Disconnect the 3590 power supply cable to isolate the power supply from the card pack.
 - a. On Models B11/B1A, disconnect the cable from the card pack.
 - b. On Models E11/E1A, disconnect the cable from the back of the power supply.
6. Connect the power cord to the back of the 3590 and then to the source outlet.
7. Switch ON the 3590 power supply, wait 20 seconds, and then check the LEDs as described below:
 - a. The AC LED should remain ON.
 - b. The TH LED should remain OFF.
 - c. About 1 or 2 seconds after the power switch is set to the ON position, the DC LED should come ON and remain ON.

Did the DC LED come ON and remain ON?

Yes No

019

The power supply DC LED indicator is still OFF, indicating an error condition,
Replace the "FID C1: Power Supply" on page LOC*CAR-53.

020

The failure is being caused by something in the power distribution circuit through the card pack to the rest of the 3590.

1. Switch OFF the 3590 power supply.
2. Reconnect the power cable from the power supply to the card pack.
3. Refer to "Cable Diagram" on page MAPS-14 and Figure 322 on page LOC*CAR-57 for cable locations. Disconnect the following power cables:
 - Loader cable (CLC)
 - Pneumatic supply cable (CD1)
 - Machine Reel Motor and File Reel Motor cable (CD121) at the card pack.

(Step **020** continues)

020 (continued)

4. Switch ON the 3590 power supply and check the LEDs again.

Did the DC LED come ON and stay ON?

Yes No

021

The power supply DC LED indicator is still OFF, indicating an error condition.

1. Switch OFF the 3590 power supply.
2. Reconnect the power cables that were disconnected in the above step.
3. Remove the card pack retaining screw and carefully pull the card pack out far enough to disconnect the two docking connectors (CD115 and CD124) on the front of the card pack.

Note: Be careful not to pull it out too far. The Head cables may be damaged.

4. Switch ON the 3590 power supply.

Did the DC LED come ON and stay ON?

Yes No

022

The power supply DC LED indicator is still OFF, indicating an error condition.

1. Power OFF and disconnect the R/W cables (J1 and J2) from the card pack.
2. Power ON the 3590.
 - a. If the DC LED indicator is still OFF, replace the "FID E4: Card Pack" on page LOC*CAR-56.
 - b. If the DC LED indicator stays ON, replace the "FID D0: Head Guide and Brush Assembly" on page LOC*CAR-85.

023

The failure is being caused by one of the docking cables.

Power OFF and re-plug the card pack in the machine.

(Step **023** continues)

Power Problems (continued)

023 (continued)

Disconnect the following cables. This will isolate the ACF from the rest of the device.

1. Operator Panel cable connector on front of the device.
2. ACF cable connector on front of the device (if installed).
3. IPS cable connector.
4. Power ON the device.

Did the DC LED indicator come ON and stay ON?

Yes No

024

The failure is being caused by the docking cable CD124 or one of the following components:

- Card pack cooling fan (bottom)
- Pressure transducer
- Tension transducer
- Head solenoid (puffer)
- Tape A sensor
- Tape B sensor
- Pantocam cable
- Head VPD cable
- Machine Reel Motor
- File Reel Motor

1. Switch OFF the 3590 power supply and push the card pack in to reconnect the docking cables.
2. Inspect all of the above cables for damage.
3. Disconnect the components in the above list, one at a time, and switch ON the power to test.

When the DC LED comes ON, with one of the components disconnected, the disconnected component is causing the failure.

Repair or replace the failing component as necessary.

025

One of the above disconnected components is causing the failure.

1. Switch OFF the 3590 power and reconnect the components in the above list, one at a time.

2. Switch ON the power to test each of the components.

When the failure returns (DC LED stays OFF), the last component that was reconnected is causing the failure.

If the failure is being caused by the ACF, use the following list and the "Cable Diagram" on page MAPS-14 to isolate the failure. Remove cables to isolate each component until the failing FRU is found.

Repair or replace the failing component as necessary.

1. Operator Panel
2. Motor Control Card (MCC)
3. Pinch Motor
4. Feed Motor
5. Elevator Motor
6. LED Card
7. Priority Cell Sns
8. Magazine Present Sns
9. Magazine Locked Sns
10. Global Interference Sns
11. Global Cartridge Present Sns
12. Elevator Card
13. Position Sns
14. Elevator Assembly

026

One of the above disconnected components is causing the failure.

1. Switch OFF the 3590 power and reconnect the components in the above list, one at a time.
2. Switch ON the power to test each of the components.

When the failure returns (DC LED stays OFF), the last component that was reconnected is causing the failure.

If the failure is being caused by the Loader Cable, use the following list and the "Cable Diagram" on page MAPS-14 to isolate the failure. Remove cables to isolate each component until the failing FRU is found.

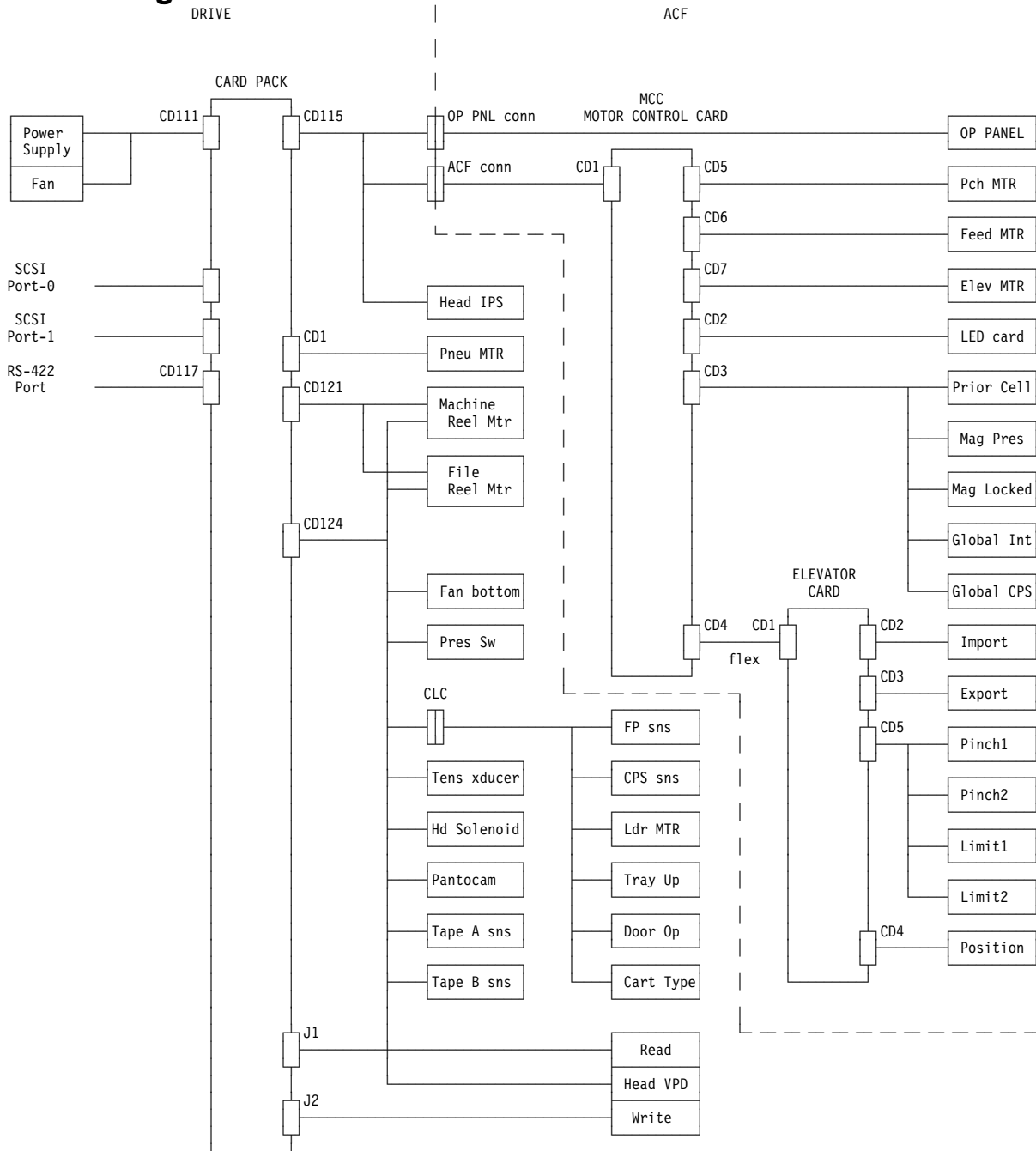
Repair or replace the failing component as necessary.

(Step 026 continues)

026 (continued)

1. File Protect Sns
 2. Cartridge Present Sns
 3. Loader Motor
 4. Tray Up Sns
 5. Door Open Sns
 6. Cartridge Type Sns
-

Cable Diagram



NOTES

1. CD115 and CD124 are the card pack docking connectors.
2. J1 and J2 are the card pack connections to the read/write head.

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3590 Introduction

The IBM 3590 High Performance Tape Subsystem provides high capacity, performance, reliability, and a wide range of host connectivity. The IBM 3590 High Performance Tape Subsystem, which features the 3590 tape drive, introduces a new technology for longitudinal recording. The new technology can significantly increase the performance of longitudinal recording while considerably improving reliability.

The 3590 Model B11/B1A tape drives read and write in a 128-track format, and the 3590 Model E11/E1A tape drives read and write in a 256-track format. While reading or writing 16 tracks at a time, the 3590 tape drive uses serpentine interleaved longitudinal recording technology to make a total of four (Model B11/B1A), or eight (Model E11/E1A), round trips from the physical beginning of the tape to physical end and back again. The tape read/write head will index, or move vertically, when it completes each round trip so that the recorded tracks will be interleaved across the width of the tape. The IBM 3590 High Performance Tape Cartridges are the same physical size as the enhanced capacity cartridge system tape (ECCST) and cartridge system tape (CST) and can be placed in the IBM 3494 and 3495 Automated Tape Library Dataservers. The 3590 cartridges are not compatible with, and can not interchange with, the ECCST or CST cartridges.

The IBM 3494 Tape Library can use either the Model B1A or the Model E1A drives.

The IBM 3495 Tape Library can use only the Model B1A drive.

See Figure 5.

In the 3590, data is written in blocks of 384 KB of user data using a 16-track format. The first set of 16 tracks is written to the physical end of the tape and then, using the electronic head switch, 16 interleaved tracks are written while the tape moves back to the beginning. The head is then indexed (physically moved a fraction of a millimeter) to the next set of 16 tracks. In this way eight (Model B11/B1A), or sixteen (Model E11/E1A) sets of interleaved tracks are written for a total of 128 tracks (Model B11/B1A), or 256 tracks (Model E11/E1A).

The IBM 3590 High Performance Tape Subsystem uses a metal particle tape in the IBM 3590 High Performance Cartridge Tape that can store 10 GB (Model B11/B1A), or 20 GB (Model E11/E1A) of un-compacted data. The 3590 tape drive uses a 3 to 1 compaction algorithm which can increase the storage capacity of these cartridges to 30 GB (Model B11/B1A) or 60 GB (Model E11/E1A).

The 3590 improved compression algorithm (IBMLZ1) provides highly efficient compression. The IBMLZ1 algorithm furnishes hardware execution efficiency by using as few machine cycles as possible to compress or decompress a byte, achieving good coding efficiency for broad applications, and performing compression without performance loss.

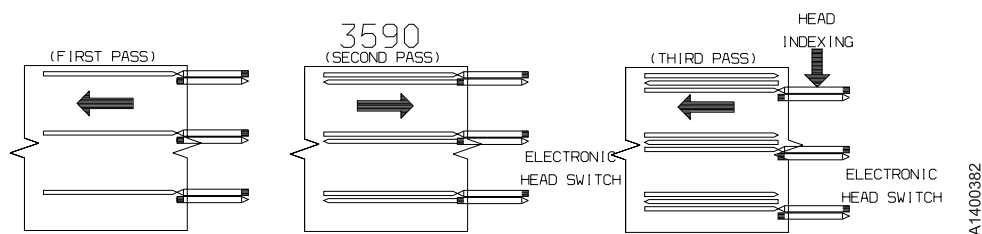


Figure 5. Serpentine Interleaved Track Sets

Overview of the 3590

The following are models of the 3590:

- Model B11/E11 is a frame-mounted or rack-mounted unit with an Automatic Cartridge Facility (ACF).
- Model B11/E11 can also be mounted in the Deskside cover, RPQ 8B3191.
- Model B1A/E1A is a 3494 library-mounted unit in a D14/L14 frame.
- Model B1A/E1A can also be mounted in a 3590 Model C12/C14 frame for library attachment.
- Model B1A/E1A can also be mounted in the Deskside cover, RPQ 8B3190.
- Model Axx is an ESCON controller.
- Model A14 is a stand-alone frame that contains one Model Axx ESCON controller and up to 4 3590 drives. It can also be library (3495) attached.

Note: The Model Exx drives cannot attach to the Model A00 controller or to the 3495 library.

See *IBM 3590 Tape Subsystem A00 and A50 Controller Models Maintenance Information* and *IBM 3590 Tape Subsystem Models C12/C14 Maintenance Information* for further information about these specific models.

Note: The 3590 Model A00 controller supports the Models B11/B1A drives only. The 3590 Model A50 controller supports both the Models B11/B1A and E11/E1A drives.

3590 Model B11, B1A, E11 and E1A (See Figure 6 on page INTRO-6.)

- Three different levels of 3590 drives now exist in the field:
 1. Base 3590 Model B11/B1A drives
 2. Magstar Ultra 3590 Model B11/B1A drives
 3. 3590 Model E11/E1A drives

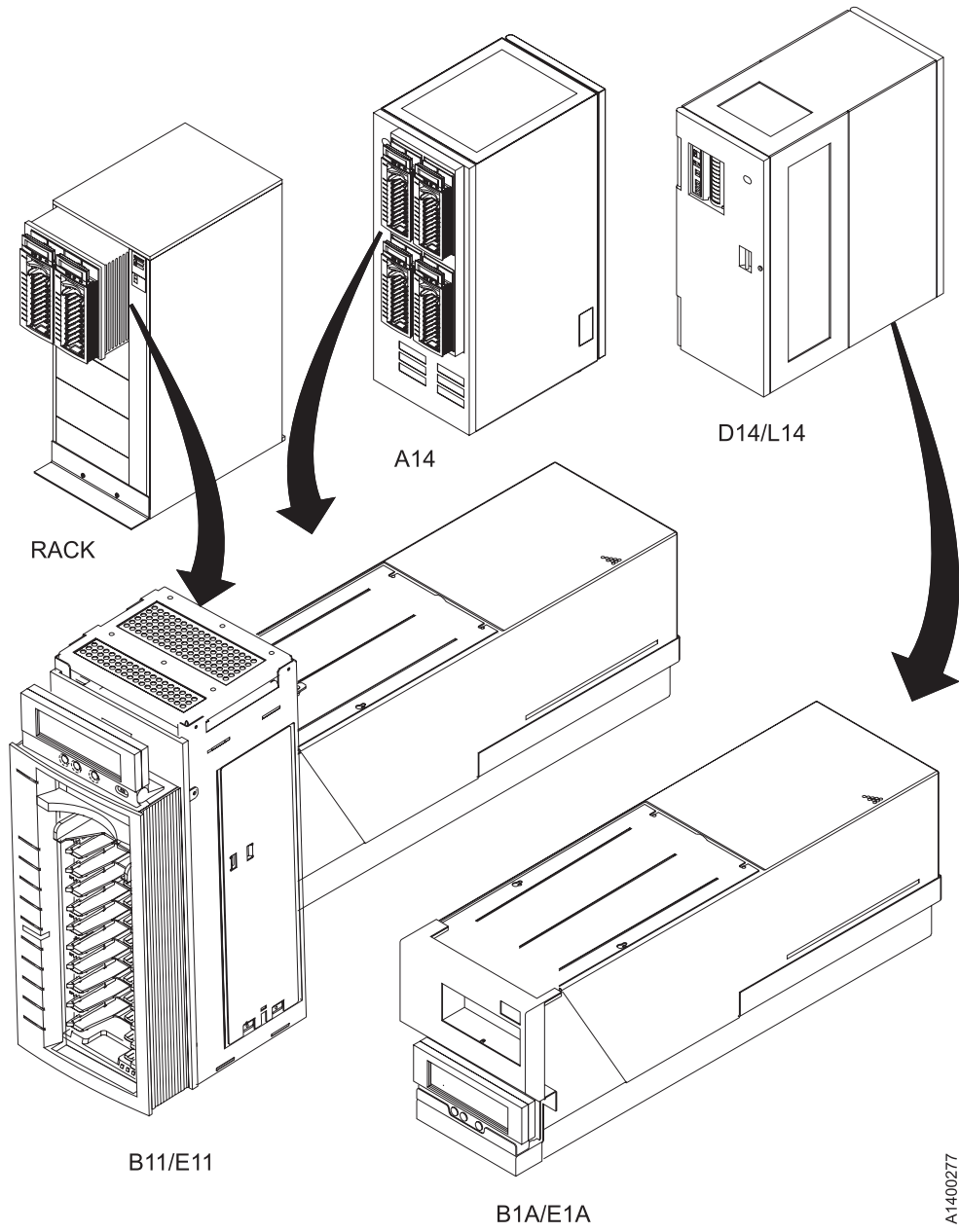
See “3590 Drive Model and Feature Levels” on page INTRO-33 for more information.

- There are 6 model conversions available:
 - Model B11 to Model B1A
 - Model B1A to Model B11
 - Model E11 to Model E1A
 - Model E1A to Model E11
 - Model B11 to Model E11
 - Model B1A to Model E1A
- Two-ported SCSI-2, SCSI-2+, or SCSI-3 attachment. (Two separate SCSI initiators can access the same 3590 drive.)
 - The 3590 can be integrated with any host system that supports a SCSI-2 (or SCSI-2+) attachment and has the proper software drivers installed.
 - All earlier production 3590 Model B11 and B1A drives may be updated to the Ultra SCSI feature by installation of Field Feature Code 5790.
 - 3590 drives can attach to various SCSI adapters:
 - Fast/wide SCSI-2 channel adapter for all 3590 drives
 - Ultra/wide SCSI-2+ adapter for Magstar Ultra Model B11/B1A drives or Magstar Model E11/E1A drives
 - Ultra/wide SCSI-3 adapter for Magstar Model E11/E1A drives

For details see “SCSI Adapter/Port Compatibility” on page INTRO-34.

- The drive ac power, pneumatic system, and dc power are contained in the drive frame.

- The Model B11/E11 is rack or frame mounted for the AS/400 and RS/6000 systems. This model has front service capabilities for the rack mount and rear service capabilities for the frame-mounted devices.
- The Model B1A is mounted in 3494 and 3495 library systems with rear service capability.
- The Model E1A is mounted in the 3494 library systems, but is not supported in the 3495 library systems.
- The Model B1A/E1A is mounted in a 3590 Model C12/C14 drive frame (for library attachment), with rear service capability.
- The Model B11/E11 has an Automatic Cartridge Facility (ACF) that contains a 10-cartridge magazine that can be pre-mounted with cartridges by an operator. The ACF can be controlled as a sequential loader or as a random access cartridge loader.
- The operator/CE panel on all drive models is a liquid crystal display (LCD) used by the operator or service representative for certain operations.
- The Deskside RPQ provides a 3590 drive in a deskside configuration.



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| Figure 6. 3590 Models

RAS Characteristics

Reliability

- Data reliability improved by 100 times over 3490.
- Longer life R/W head.
- New metal particle (MP) media is less abrasive.
- New binder formulation to improve shelf life.
- Enhanced cartridge construction with more robust shell design to improve shelf life.
- Drive/Cartridge designed to minimize operator errors.
- Magazine with indicators on processed/unprocessed cartridge.
- Magazine priority slot makes manual mode easier to use.
- Fewer cables.
- Fewer parts in ACF.
- Menu-driven operator functions in some native languages with action-specific messages.
- Model E11/E1A drives use digital read/write channel and second-generation electronics.

Availability

- Designed for first-time fix.
- Built-in hardware/microcode error detection and isolation.
- Captured error recorded in expanded nonvolatile vital product data.
- Reduced number of FRUs (approximately 1/2 of 3490).
- Service information message/Media information message (SIM/MIM) clearly indicate impact of failures and FRUs affected, impact of service.
- No planned down time for preventive maintenance.
- Designed for quick FRU replacement.
- High level of integration, fewer subassemblies.
- Minimum number of cables.
- Predictive maintenance (catches hardware and media problems before they are evident) via SIM/MIM.
- Sophisticated algorithm to keep track of error statistics to isolate between drive and media problems. This is the SARS (Statistical Analysis Reporting System) algorithm.
- Warning message is given long before the hardware and media are going bad.
- Pneumatic and power are dedicated to each drive.
- Allow only failing drive to be taken down for service.
- When in a library, a drive is designed for rear service (maintenance concurrent with library operations).

Serviceability

- No host resources or support is required for service.
- All service actions are initiated from the drive panel.
- Wrap tools are provided to test all external interfaces (SCSI, RS-422).
- Supported by microcode levels listed in "Drive Microcode Compatibility" on page INTRO-34.
- Non-disruptive microcode update via SCSI for all 3590 models.
- New level of drive microcode can be written into the flash memory without affecting the current microcode in DRAM. The new level of code is written to DRAM when the drive is IMLed.
- No error recreation.
- Error is captured and recorded in vital product data.
- Error information (SIM/MIM) is sent to the host.
- Error indicators for microcode type problems.
- Error records are retained in drive error log.
- Predictive failure analysis through SARS (Statistical Analysis and Reporting System).
- Electronic isolation.

- All drive electronic cards in one pack (one FRU).
- ACF designed for quick disconnect from drive.
- Number of drive FRUs are significantly less than 3490.
- Special utilities for IBM support service built into drive.
- Tools to help development engineers provide on-site support.

3590 Maintenance Strategy

The 3590 maintenance strategy does not use diagnostics for problem recreation. The hardware and microcode are designed to capture and isolate failures when they occur. The fault symptom code (FSC) generated either by the functional microcode or diagnostic microcode is converted into a FRU identifier (FID) and displayed to the operator and/or the CE by sending service information messages (SIMs) or media information messages (MIMs) in systems where these functions are supported. If the host system does not support SIMs and MIMs, sense data is available if the subsystem is able to present it. In addition, the FID is displayed on the 3590 display panel and placed into the drive error log. The FID and component identifiers are stored in the vital product data (VPD) at the plant of manufacture.

Each level of microcode has an FSC to FID conversion table. This table is unique for each microcode load and contains every FSC that is in this specific EC level. When a permanent error occurs or an error is detected by the diagnostics, a SIM is generated and a flag is set in the SCSI sense data. This flag informs the host system that additional information about the error should be read from the drive and displayed to the operator. Only a permanent error causes a FID to be displayed on the operator/CE panel.

| The maintenance strategy described is for all drive models of the 3590.

- Concurrent maintenance is possible even when the 3590 is part of a string on the SCSI bus, as the CE can remove both cables without breaking the connection of the bus.
- Each 3590 drive can have power removed without powering OFF any other 3590 drives.
- The 3590 is installed by the CE; that is, the drive is not designed for customer set up (CSU).
- No remote support via a direct connection to the 3590.
- The RAS package for the 3590 uses the operator/CE panel for maintenance. Also, many of the maintenance functions for the drive can be accessed via the SCSI port from the host.
- The Maintenance information is contained in one volume.
- Selecting Verify Fix from the CE Options menu on the drive operator/CE panel causes all of the drive diagnostics to be executed including the motion and read/write diagnostics.
- Error log containing up to thirty error entries for a record of machine errors.
- FID FE and FID FF logs containing up to ten entries for a record of sense data sent to the host with a FID of FE or FF.

3590 FID Strategy

The 3590 FID strategy was developed to prevent down-level maintenance documentation. Previously, when a new EC level of microcode was released, maintenance documentation would become down level because of additions and deletions of FSC codes.

With the *new FID code* concept, the maintenance documentation no longer lists FSC codes, only FID codes. Each microcode EC level has a conversion table that reflects any additions or deletions in the

FSC codes. The FSC –FID conversion table is always correct for that specific code level without the need to correct documentation.

Host Messages

Service information messages (SIM) and media information messages (MIM) are incorporated into the 3590. These messages provide the customer and the CE with diagnostic and repair information before the call, which eliminates unnecessary service calls.

The MIM makes the 3590 media self-diagnosing. The customer's media maintenance activity is specifically directed to reduce the time required to separate hardware from media problems. The operators media maintenance and CE's service activity is based on failure events occurring in the customer's functional environment. This eliminates the need to use time-consuming machine checkout procedure to recreate the failure.

The SIM and MIM functions are a primary factor in the 3590 maintenance plan for improved product availability. See "Service and Media Information Messages (SIMs and MIMs)" on page MSG-2 and "Statistical Analysis and Reporting System" on page MSG-4 for details.

Device Characteristics

See *IBM 3590 High Performance Tape Subsystem Introduction and Planning Guide*, GA32-0329, for program support and the physical characteristics.

Addressing

The SCSI unit address is set during installation by selecting the address menus on the operator/CE panel.

SCSI Connectivity

3590 drives have two SCSI ports. The type of ports in the drive is determined by the level/model of the drive as follows:

- Base Model B11/B1A drives have Fast/Wide Differential SCSI ports with a speed of 20 MB/s.
- Magstar Ultra Model B11/B1A drives with FC 9790/5790 and Model E11/E1A drives have Ultra/Wide Differential SCSI ports with a speed of 40 MB/s.

For more information on important changes in Magstar Ultra 3590 models with FC 9790/5790, see “3590 Drive Model and Feature Levels” on page INTRO-33.

All SCSI cable features are compatible with all drive levels. Connectivity is supported to AS/400, RS/6000, IBM POWERparallel SP2, Sun (Solaris), HP-UX and Windows NT attached systems.

3590 Feature Codes for RS/6000 attachment: Figure 7 shows the cable feature codes for the cable of the appropriate length.

Feature Code	Cable Length	Part Number
5106	0.6 meter (1.96 feet)	05H4644
5128	2.8 meters (9 feet)	05H4647
5145	4.5 meters (15 feet)	05H4648
5112	12 meters (39 feet)	05H4649
5118	18 meters (59 feet)	05H4650
5125	25 meters (82 feet)	05H4651

Notes:

1. The 0.6 m (1.96 ft) SCSI cable (FC 5106) can be used when two 3590s are immediately adjacent to each other and are attached to the same SCSI I/O controller on a RS/6000.
2. Conversions from meters to feet are approximate and rounded to the nearest foot.
3. Cable lengths of 18 meters (59 feet), or shorter lengths, can be used with FC 2420; cable lengths longer than 18 meters cannot be used with FC 2420.

3590 Feature Codes for AS/400 and Sun attachment: Figure 8 shows the cable feature codes for the cable of the appropriate length.

Figure 8. 3590 Feature Codes for AS/400 and Sun attachment

Feature Code	Cable Length	Part Number
5128	2.8 meters (9 feet)	05H4647
5145	4.5 meters (15 feet)	05H4648
5112	12 meters (39 feet)	05H4649
5118	18 meters (59 feet)	05H4650
5125	25 meters (82 feet)	05H4651

3590 Feature Codes for HP-UX and Windows NT Attachment: Figure 9 shows the cable feature codes for the cable of the appropriate length.

Figure 9. 3590 Feature Codes for HP-UX and NT attachment

Feature Code	Cable Length	Part Number
5128	2.8 meters (9 feet)	05H4647
5145	4.5 meters (15 feet)	05H4648
5112	12 meters (39 feet)	05H4649
5118	18 meters (59 feet)	05H4650
5125	25 meters (82 feet)	05H4651

3590 Feature Codes for 3494 attachment: Figure 10 shows the cable feature codes for connecting multiple 3590 Model B1A/E1A drives on the same SCSI bus in a 3494 Model D12, D14, L12, and L14. These features are also available for Model B11/E11.

Figure 10. 3590 Feature Codes for 3494 attachment

Feature Code	Usage:	Cable Length	Part Number
5134	Horizontal	3.4 meters (11 feet)	05H4645
5138	Vertical	4 meters (13.1 feet)	05H4646

3590 Feature Codes for 3591 attachment: Figure 11 shows the cable feature codes for the cable of the appropriate length.

Figure 11. 3590 Feature Codes for 3591 attachment

Feature Code	Cable Length	Part Number
5106	0.6 meter (1.96 feet)	05H4644
5128	2.8 meters (9 feet)	05H4647
5134	3.4 meters (11 feet)	05H4645
5138	4.0 meters (13.1 feet)	05H4646
5145	4.5 meters (15 feet)	05H4648
5112	12 meters (39 feet)	05H4649
5118	18 meters (59 feet)	05H4650

System Attachment

The subsystem provides a SCSI system attachment.

In this configuration the device attaches to a 2-byte-wide differential P cable conforming to the SCSI-2 and SCSI-3 standard. The connectors are shielded high density 68-pin D-shell connectors. This type of attachment allows cable lengths of up to 25 meters (82 feet).

Asynchronous or synchronous transfers are supported. Each initiator can establish its own mode and rate of transfer independently of other initiators. In synchronous mode, the target can support transfer periods of 50, 100, 150, 200, 250, 300, 350, or 400 nanoseconds as established by the exchange of Synchronous Data Transfer Request messages.

Direct- and Channel-Attached 3590: Figure 12 shows the SCSI and ESCON attachments from the host to the 3590.

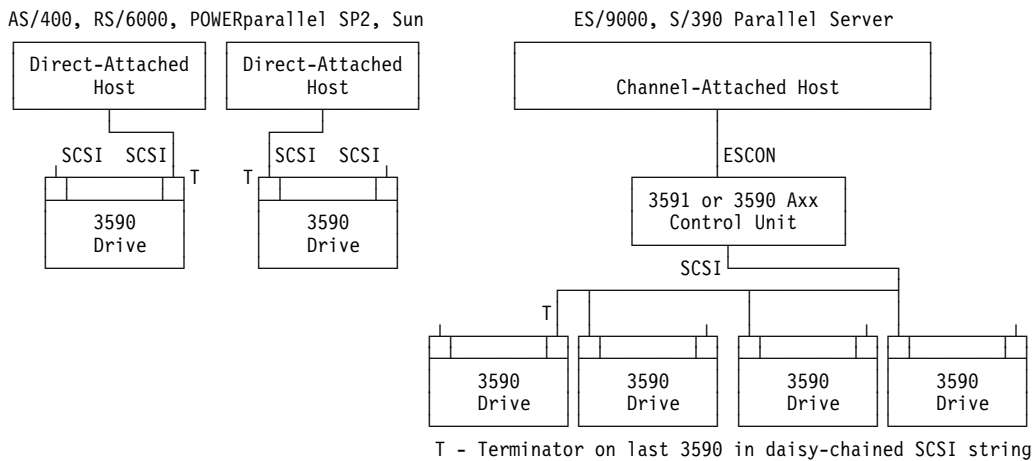


Figure 12. SCSI and ESCON Attached Host Connections

Library-Attached 3590: Figure 13 shows the SCSI and RS-232 or LAN connections from the host to the 3590 and the library manager when the device is direct-attached.

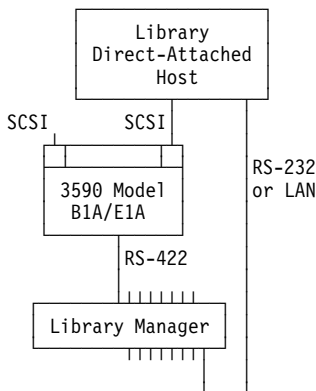


Figure 13. Library-Attached Host Connections

Tape Cartridge

The 3590 uses an IBM High Performance Cartridge Tape. This media is not compatible with the IBM Cartridge System Tape or the IBM Enhanced Capacity Cartridge System Tape, and cannot be used on 3480, 3490, or 3490E tape products. For additional information on the cartridge, see *IBM 3590 High Performance Tape Subsystem User's Guide*, GA32-0330.

See Figure 14 on page INTRO-14.

The 3590 uses a serpentine longitudinal recording technology called interleaved-longitudinal recording. This type of recording spreads the bits of a unit of information along the tape, making data on damaged tapes more recoverable. Tape media is commonly damaged in two ways; vertical damage, which can occur if the tape is folded for some reason, and horizontal damage, such as a scratch along the length of the tape, which can occur during tape movement. The probability of being able to recover from either vertical or horizontal damage is increased, because no whole unit of information (a byte) is unrecoverable. Only a few bits within many bytes are damaged, and having only a few bit errors simplifies error recovery and considerably improves the probability of being able to read a damaged tape. IBM has chosen this technology to meet three critical factors; performance, reliability, and cost. Other characteristics include:

Mechanical simplicity:

- Few moving parts
- Proven durability
- Simple loading mechanism

Start-stop operation:

- Complete back-hitch cycle in approximately 100 milliseconds
- Hundreds of millions of cycles possible

Data integrity:

- Numerous concurrent data channels offer several advantages:
- Lower head wear
- Low degree of contact between head and tape minimizes head wear
- Lower media wear

The 3590 High Performance Cartridge Tape has a capacity of 10 gigabytes of un-compacted data on the Model B11/B1A drives, and 20 gigabytes of un-compacted data on the Model E11/E1A drives. With the 3 to 1 data compression algorithm, the capacity is increased to 30 or 60 gigabytes.

An additional feature includes the implementation of an improved error correction code (ECC). A portion of the tape within each cartridge is reserved for error history; it is updated after each use (read or write) to provide statistics that can be used to identify problems with a particular tape as early as possible.

INTERLEAVED LONGITUDINAL RECORDING

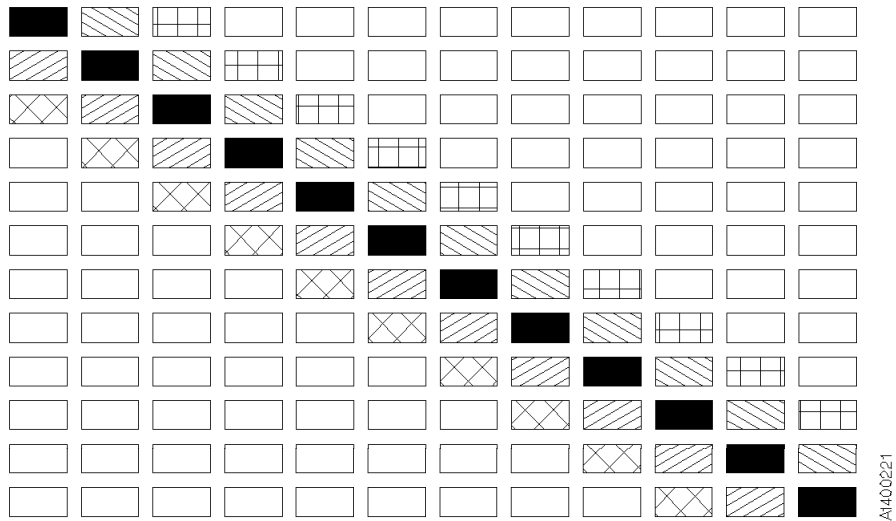


Figure 14. Interleaved Longitudinal Recording

Media Type Indicator

- | The cartridges have a **blank** (Model Cxx), or a **J** on the bar code label to identify the type of media. The library manager software uses this information to manage the different types of media in an automated library (3494 and 3495).

Servo Tracks

The media has servo tracks, which are prerecorded at the plant of manufacture. These tracks allow the 3590 to position the read/write head accurately with respect to the tape while the tape is in motion. If these servo tracks are damaged or are removed, the cartridge cannot be written to until the servo tracks are restored. Degaussing a 3590 cartridge requires use of a special metal particle degausser. After the tape is degaussed, it cannot be used again.

Erasing Data from Tape

The Erase command from the host overwrites the original data so the original data is obscured sufficiently for *data security erase* purposes.

Description of Tape Cartridge

The following is a brief description of the magnetic tape cartridge used in the 3590 High Performance Tape Subsystem. The cartridge contains:

- A single reel of magnetic tape
- A leader block
- A clutch mechanism
- A cartridge file protect mechanism

See the magnetic tape cartridge in Figure 15 on page INTRO-15.

The leader block **1** is attached to the end of the magnetic tape. During a threading operation, the leader block **3** is pulled out of the cartridge by the threader pin and moved along the tape path to the machine reel.

At the same time the leader block is engaging the threader pin, the tape clutch gear **6** on the bottom of the cartridge engages the file reel gear. This action engages the clutch surface inside the tape cartridge, allowing the file reel motor to rotate the tape reel.

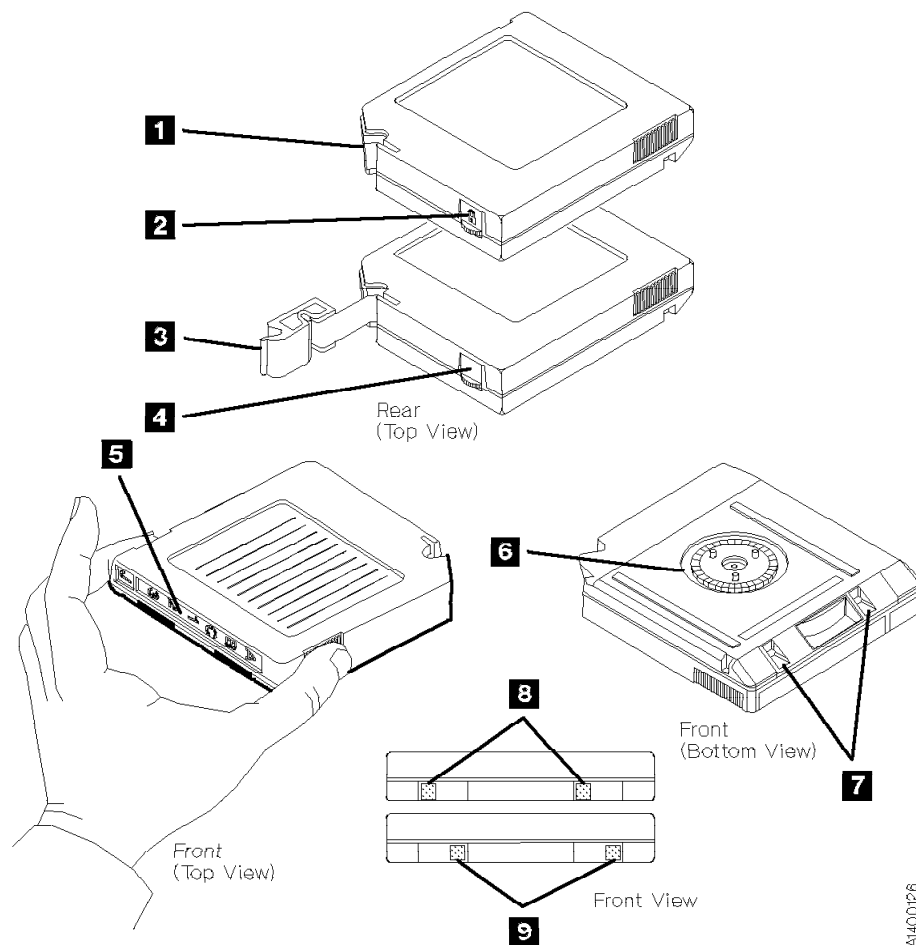
The cartridge file protect mechanism is a thumb wheel that is moved by hand to either the file protected **2** or the not file protected **4** position. A closed lock symbol on the face of the thumb wheel indicates that the cartridge is file protected.

The outside of the cartridge housing has:

- Space for the volume identification **5**, which is at the front of the cartridge housing.
- The clutch mechanism **6** in the center of the cartridge housing.
- Cartridge type sensor notches **7**.

The cartridge type sensor notches allow the 3590 to recognize cartridges designed for its use and to reject all other cartridges not designed for the 3590.

The 3590 uses two different cartridges; data storage cartridges and cleaning cartridges. When viewed from the front, the sensor notches for data storage are oriented to the left **8** and the sensor notches for the cleaning cartridge are oriented to the right **9**.



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Figure 15. Magnetic Tape Cartridge

3590 Tape Drive

The 3590 tape drive can be configured in a rack or in an automated tape library dataserer. Either SCSI or ESCON channel attachments are supported.

The 3590 tape drive is a modular drive unit that measures 221 mm (8.8 in.) wide, 750 mm (29.8 in.) deep, and 262 mm (10.5 in.) high. The 3590 tape drive contains the read/write head, the mechanical components, the sensors, the head servo system, and the motors necessary to thread and move the tape forward or backward.

Each drive has two external SCSI ports for attachment to RS/6000, POWERparallel SP2, AS/400, Sun (Solaris), HP-UX, or Windows NT attached systems. The drive can also be attached to ESCON channels using a separate control unit.

- The 3590 can be integrated with any host system that supports the correct SCSI attachment and has the proper software drivers installed.

Figure 16 on page INTRO-17 compares the IBM 3490E drive unit with a separate control unit and the IBM 3590 tape drive unit with an integrated control unit. The IBM 3490E control unit shown represents the IBM 3490-A10, which has the potential to support multiple (up to eight) drive units using its single control unit function. However, only a single drive can be used at a time.

Each IBM 3590 drive unit has its own integrated SCSI control unit function with two channel interfaces, which includes buffering and compaction, for multi-host attachment or availability. Potential contention of the drives or bottlenecks in the control unit are removed by moving these functions to the individual drive units. The integrated control unit function eliminates drive contention and thus enhances performance.

The 3590 Model B11/B1A tape drive can read and write data at a rate of 9 MB/second and the Model E11/E1A drive can read and write data at a rate of 14 MB/second. The IBM 3590 can transfer data between the host and the tape subsystem at a rate of 17 MB/second for hosts attached through Enterprise System Connection (ESCON) channels, 20 MB/second when attached through fast/wide small computer systems interface (SCSI), and 40 MB/second if the Ultra/wide SCSI feature is installed.

Microprocessors and Control Storage

The 3590 contains three microprocessors in the card-pack. One processor controls all of the buffers, read/write data flow, operator/CE panel and the ACF. The processor executes microprograms to control and monitor the 3590. The other two processors control the track following servo system and the reel to reel motors.

The control storage consists of nonvolatile storage where the microcode for 3590 is stored, and DRAM where the microcode resides following a power-ON sequence or a reset.

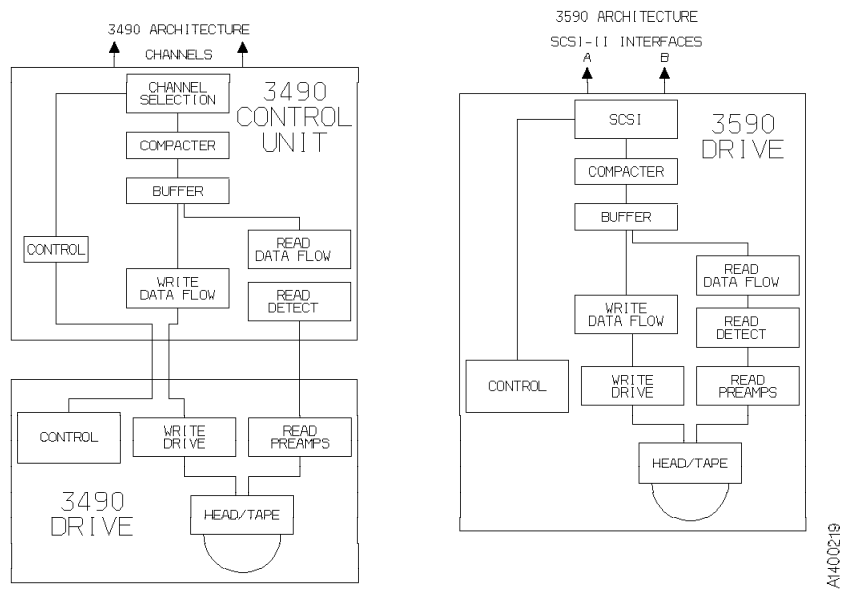


Figure 16. Tape Drive Schematic Comparison

Read/Write Functional Areas

See Figure 16.

The read/write functional areas provide the data paths to transfer data between the host system and the 3590 subsystem. The data handling areas include:

- SCSI buffer
- LZ1 compactor
- Data buffer
- Read data flow
- Write data flow

The microprocessor on the logic card controls data movement between the tape subsystem and the host system, the data flow, sends commands, and receives status from the reel-to-reel digital signal processor (DSP) and the track following DSP.

The data buffer area contains the customer data. Components of the logic process data in and out of the data buffer.

When a buffered write operation occurs, data is transferred from the SCSI buffer and the data buffer. The 3590 signals the host that the data has been written on tape. However, the data is still in the buffer. When the 3590 workload permits, the data is transferred to the analog card and is written on tape.

During read operations, the 3590 pre-reads data from the drive into the data buffer. When the host requests the data from the subsystem, the 3590 unit responds immediately and transfers the data.

Head Guide and Brush Assembly

The Head guide assembly (HGA) is a FRU, which can be removed from the 3590 deck. The HGA is a bidirectional read/write head with 16 elements and a recording format of 128 tracks (Model B11/B1A) or 256 tracks (Model E11/E1A). The bidirectional head writes 16 tracks from the load point to the physical end of tape and then writes 16 tracks from the physical end of tape back to the load point. Therefore, fully written tapes are positioned at the load point and eliminate the rewind operation.

The only visual difference between the two HGA assemblies is the serial number on the bar-code label on top of the R/W head. The Model E11/E1A serial numbers all begin with a "T", and the Model B11/B1A serial numbers all begin with a "B".

The principal purpose of the HGA assembly is to:

1. Guide the tape across the recording head with a pair of hydrodynamic bearings located on either side of the recording head. The compliant guide assembly which helps tape track on air bearing is located on top of each of the air bearing block.
2. Perform recording with the head via the flexible head cable.
3. Position the read/write head against the moving tape with the aid of the integrated actuator and optical sensor components.
4. Maintain cleanliness of the R/W head via a head cleaner brush.
5. Provide vital product data (VPD) for the performance parameters of the HGA, such as head reference positions and actuator performance parameters.
6. Provide a location for the vital product data card (VPD). The card contains a serial nonvolatile read/write memory component, which is used to store and transmit various actuator/head position data to the drive microcode during functional operation. This erasable programmable read only memory (EPROM) is programmed by manufacturing during HGA assembly with position data and head module current data from the high speed generic component tester (HSGCT). The card also provides connection to the actuator coil on the HGA. This connection is a direct connector pass through.

HGA Caution Notes:

Due to the delicate nature of the HGA, do not touch the head modules. Always unplug the head cable before removing the HGA from the drive. The head cable is extremely fragile, so do not touch or pull the cable under any circumstances. Handle only with the HGA casting and set the HGA on its feet with the head cable outwardly spread. Always use the HGA cover. When the HGA is not in use, put it in the packing box.

It is important that you do not push down on the head.

No magnetized tools may be used near the head, as they may destroy the head!

Pantocam Assembly

The pantocam assembly carrier pin engages with the leader block that is attached to the end of the magnetic tape. During a threading operation, the leader block is pulled out of the cartridge by the threader pin and moved along the tape path to the machine reel. At the same time the leader block is engaging the threader pin, the tape clutch gear on the bottom of the cartridge engages the file reel gear. This action engages the clutch surface inside the tape cartridge, allowing the file reel motor to rotate the tape reel.

Loader Assembly

The loader assembly is similar to a front loading video cassette recorder (VCR). A light push causes the cartridge to go into the loader assembly where it is lowered onto the tape deck hub/clutch assembly to commence tape threading. The reverse takes place at the end of the recording or reading cycle. The tape cartridge is lifted and then ejected horizontally into the unload position.

The loader has a manually-operable compound gear that acts as a thumb wheel to assist and facilitate manual loading and unloading of a tape cartridge.

Automatic Loading and Unloading: The step by step cartridge loading sequence is:

1. The cartridge is to be inserted into the loader opening until resistance occurs.
2. During the insertion process, the loader door is tilted inward to interrupt a door-open sensor.
3. The cartridge goes into the loader in a horizontal motion for about 15 mm (0.59 in.) until the cartridge present sensor detects the cartridge. The cartridge motor is then turned OFF.
4. With the aid of a cam follower, the cartridge is lowered to a vertical distance of about 11.5 mm (0.45 in.)
5. The cartridge motor is turned OFF 49 msec after the tray-down condition sensor is interrupted by the cartridge type sensors.
6. The file-protect button in the cartridge activates the file-protect sensor, which is located in the back of the loader.
7. In the final loaded position, there are 4 cartridge media identification sensors, that distinguish 16 different types of media. These 4 sensors are interruptive (break light beams) type. The four cartridge type ID sensors are used to detect if a cartridge is seated.

In the unloading condition, the process is reversed. The cartridge is returned to its initial position described in step 1.

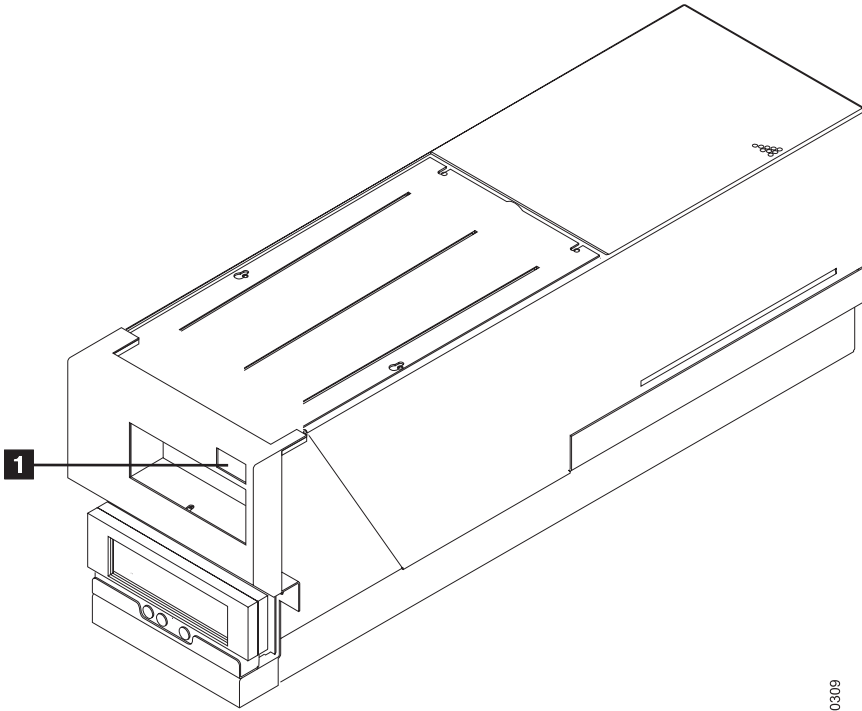
Manual Loading and Unloading: Without the aid of the loader motor, you can load the cartridge in essentially the same manner described for automatic loading. Using the protruding gear on the left side of the assembly, turn the gear towards you for loading, and turn the gear away from you for unloading.

To repeat loading and unloading cartridges, turn the gear all the way in each direction and remove the cartridge completely out of the loader before each reloading operation.

Fiducials

Fiducials are used by cartridge handling devices to locate where and what type of tape drive device is installed. Do not cover or modify the fiducials.

The 3590 Model B1A/E1A has one white fiducial **1** for 3590 devices installed in IBM Model 3494 Tape Library Dataservers.



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| *Figure 17. Fiducial for IBM Model 3494 Tape Library Dataservers*

Operator/CE Panel

The operator/CE panel is a menu-driven display used by the CE and the operator to display and set different options such as:

- Device Status
- Error Conditions (FID)
- Drive Set up
- Mount activities

Figure 18 shows the display panel. “Operator Panel” on page PANEL-1 describes the functional description of panel operations.

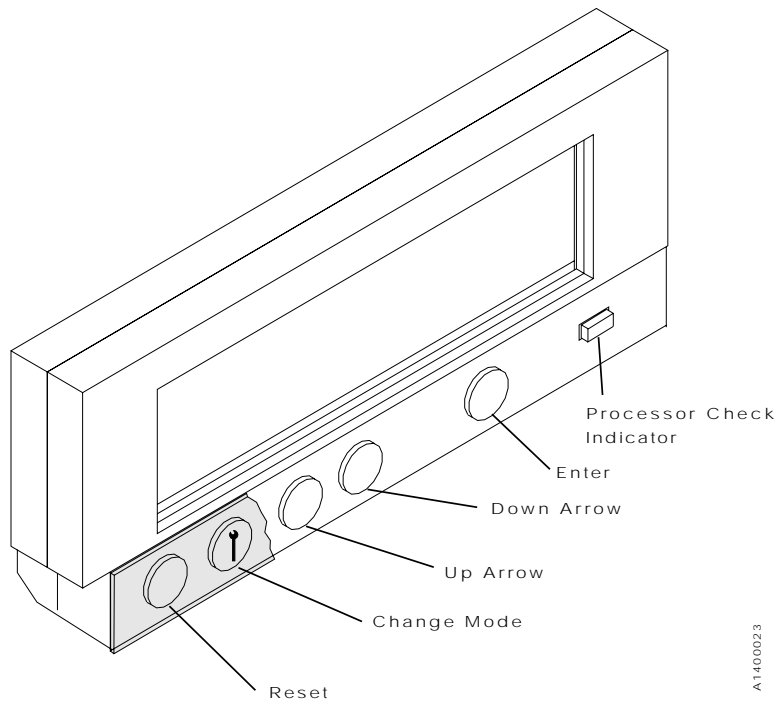


Figure 18. Operator/CE Panel

The operator/CE panel on a Model B11/E11 can be used to set one of the following ACF modes:

- Manual
- Accumulate
- Automatic
- System
- Random or Random 2-LUN
- Library

See “Modes of Operation” on page ACF-20 for a complete description of these modes.

Operator Panel Messages

The 3590 message display has 6 message types:

- FID 1 messages
- Attention messages
- Routine messages
- FID 2 messages
- FID 3 messages
- FID 4 messages

See “Intervention Messages” on page PANEL-8 for details.

Note: For Magstar Ultra Model B11/B1A drives, the word **ULTRA** will appear in the operator panel in the upper right or lower left corner.

For 3590 Model E11/E1A drives, the word **3590E** will appear in the operator panel in the upper right or lower left corner.

Pneumatic System

The 3590 pneumatic system differs from most of the earlier 3480/3490 tape systems. The 3480/3490 has a centralized pneumatic supply system to either 2 or 4 drive units. The 3490E utilizes an individual pneumatic supply system for each drive with air distribution remaining as originally designed for 3480 with improvements to the air filtration and regulation. The 3590 pneumatic supply system has a 3490E compressor with size reduction to the filters and pressure/vacuum control devices. It is a closed loop control system with pressure feedback. There is a pressure transducer for pressure feedback and a low pressure shut off. The 3590 pneumatic system has no pneumatic reservoir such as the one in the 3480/3490/3490E. The 3590 has an enhanced puffer solenoid and a complete rerouting of the air distribution system from the previous designs.

Functions

The principal function of the pneumatic supply system is to provide pressurized sources of air to the following areas:

- The hydrodynamic air bearing to guide the tape across the magnetic head.
- The tension transducer bearing to monitor the tape tension and to provide feedback to maintain reel to reel tape velocity and position control during tape acceleration and deceleration.
- The decoupler, which behaves like a mini vacuum column to buffer the dramatic changes in tape tension profile. It provides a smoothing effect on the tape tension. Both the pressure and vacuum lines go to the decoupler.
- The pressure sensor for the closed loop pneumatic control system.
- The tape lifter which is located in the magnetic head. The tape lifter prevents the tape from sticking to the head when there is no relative motion between the tape and the head. The tape lifter is normally OFF when the tape is running.

See Figure 19 on page INTRO-25 for the components of the pneumatic system.

Note: The cleaner blade is no longer used in the 3590 tape path.

Operation

The following is a description of the pneumatic system components (FRUs):

Pneumatic Assembly 10

The pneumatic assembly contains the pneumatic motor/compressor 11 and separate filters for pressurized air 15 and vacuum 14 in a single housing. There are test ports for the pressurized air 16 and vacuum 12 and an adjustable bleed valve 13 for adjusting the vacuum.

Pressure Sensor 1

The pressure sensor is used to measure the air pressure in the pressurized air supply from the motor/compressor. The pressure sensor and its small integrated circuit board controls pressurized air by varying the speed of the compressor motor.

Tension Transducer 3

The tension transducer assembly uses pressurized air to form an air bearing for the tape path and to measure tape tension. The tension transducer and its small integrated circuit board controls tape tension by varying the speed of the file and machine reel motors.

Head Guide Assembly 5

| The head guide assembly contains three pneumatic system components:

- The right 9 and left 6 D-bearings are on either side of the read/write head. They use pressurized air to create air bearings on which tape is guided over the head.
- The tape lifter 7 is a slot in the read/write head through which pressurized air is blown when tape movement stops.

| **Note:** The cleaner blade is no longer used in the 3590 tape path.

Tape-Lifter Solenoid 4

The tape-lifter solenoid is a solenoid-activated air valve. When tape movement stops, the microprogram activates this solenoid, which causes pressurized air to blow through the slot 7 in the read/write head and to push the tape away from the head.

Decoupler 2

The decoupler is a pocket-shaped guide in the tape path that is a mini-vacuum column to buffer the drastic changes in tape tension. Both vacuum and pressure lines go to the decoupler.

The vacuum inside the pocket causes the tape to be pulled into the pocket. Pressurized air goes to both surfaces outside the pocket to create air bearings for the tape path.

Pneumatic Hose Kit

The pneumatic hose kit consists of tees, crosses, elbow, and hoses, to connect the components of the pneumatic system. When one hose needs to be replaced, the entire hose kit is installed.

The small hose from the tape-lifter solenoid 4 to the tape lifter 7 is part of the head guide assembly 5 and is not replaced with the hose kit. It is replaced only with the head guide assembly.

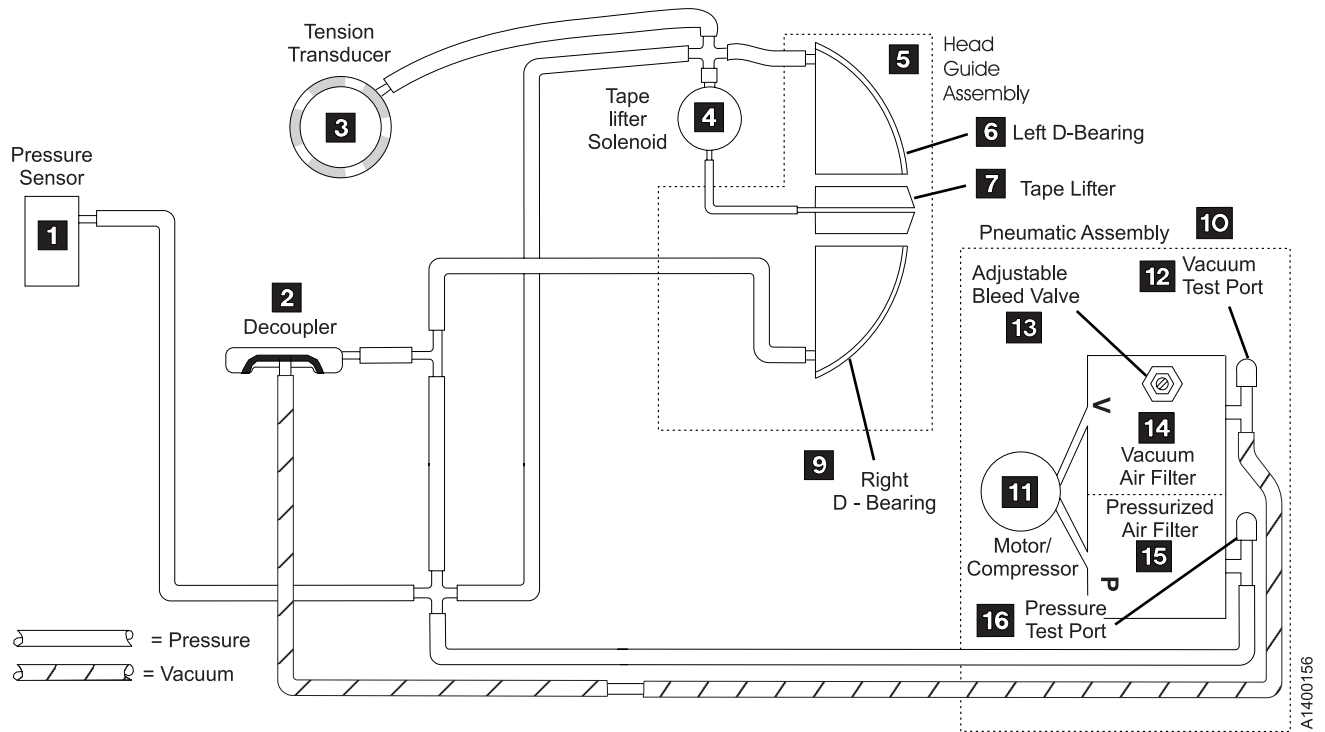


Figure 19. Pneumatic System Components

Pneumatic System Adjustments

Pressure and vacuum are adjusted when vacuum and pressure related FRUs are replaced. Pressure is adjusted by the microcode from the CE Config/Install menu or when the cleaner cartridge is run. Vacuum is adjusted manually by the CE. See “Measurement and Adjustment of Pneumatic System” on page LOC*CAR-3.

Power Supplies

Power in the 3590 is supplied by a single integrated dc power supply. The ac power cord of this supply is plugged into the ac power distribution of the rack or library in which the 3590 is mounted.

The power supply is packaged in a metal housing for structural and safety purposes and to meet the mechanical requirements for mounting. Cooling air flow is provided by fan(s) attached to the power supply. The power supply assembly is an ac/dc converter that generates the DC voltages necessary for operation of the 3590. The power supply is designed to accept a single phase 50 or 60 Hz, $\pm 5\%$, 100-127 or 200-240 V ac. Status indicators are located on the rear cover of the supply. When single phase AC power is supplied to the power supply the AC indicator turns ON. When the power switch is turned ON, the power supply begins operation, the DC voltages turn ON, and the DC indicator turns ON. The power supply provides over-current and over-voltage protection on all outputs.

The 3590 dc power supply is a single FRU. No serviceable components are contained within the power supply. The power supply has no adjustments.

The 3590 drive does not provide remote power control. If required, remote power control is provided by the enclosure or a higher level subassembly.

Function

There are two levels of power supply for the 3590. One is for the Model B11/B1A drives, and one is for the Model E11/E1A drives.

- The B11/B1A power supply converts ac input to +36, +12, +5.3, +5.2, +5.1 and -5.1 V dc. This power supply has two cooling fans, and provides dc power to the 3590 through an integral (non-removable) cable that connects to the card pack.
- The E11/E1A power supply converts ac input to +36, +12, +5.1 and -5.1 V dc. This power supply has only one cooling fan, and provides dc power to the 3590 through a separate (removable) cable that connects to the card pack.

Both levels of power supply have over-voltage, over-current and thermal protection circuits. The operational status of the power supply is indicated by three LEDs; AC, DC, and TH (thermal) on the rear cover of the power supply.

An over-voltage or over-current condition on the +36 V dc output will cause all of the output voltages to turn OFF. An over-voltage or over-current condition on any of the other dc outputs will turn OFF all output voltages except the +36 V dc. Either of the above conditions will cause the DC LED to turn OFF also. The power supply will resume operation when the fault is removed and the supply is cycled OFF/ON.

The thermal protection circuits are activated when a thermal condition is sensed in the power supply or in the card pack, or when a fan failure in the power supply is detected. The power supply must be cycled OFF and then back ON before the LED will go OFF.

Operation – LED Indicators

The three LEDs on the rear of the 3590 power supply indicate the power status as follows:

LED Indicates

AC Presence of ac voltage at the input to the power supply regardless of the position of the power switch.

DC DC voltages are being supplied. This LED goes ON several seconds after the power switch is switched to the ON position. The LED goes OFF when:

- The switch is set to the OFF position
- An over-voltage or over-current condition is detected on one of the dc outputs
- A thermal sensor is activated in the card-pack assembly or inside the power supply.

TH The thermal LED can be turned ON under any of the following conditions:

1. If a thermal error is detected in the card pack, the microcode will send a signal to the power supply that will turn ON the TH LED and also turn OFF all of the DC voltages and the DC LED.
2. If a thermal error is detected in the power supply, the power supply will turn ON the TH LED and also turn OFF all of the DC voltages and the DC LED.
3. A power supply fan failure.

- Models E11/E1A: If the power supply detects that the power supply fan is rotating too slowly or is stopped, the power supply will turn ON the TH LED and send a signal to the card pack. When the card pack detects the fan failure signal it will send a signal back to the power supply that will cause all of the DC voltages to turn OFF, and will also turn OFF the DC LED.

As an aid to failure isolation, the power supply can be turned ON while the power supply to card pack cable is disconnected. If the circuits in the power supply detect that the fan has failed, the TH LED will be turned ON within 20 seconds. This indicates that the fault is in the power supply and not in the card pack.

- Models B11/B1A: The Model Bxx fan failure detection is the same as the Model Exx, except for the TH LED control. The TH LED on a Model Bxx is controlled by the microcode, not by the power supply. If a Model Bxx power supply with a failing fan is turned ON while the power supply to card pack cable is disconnected, the TH LED will **not** turn ON.

Power Switch and Power Sequence

A description of the power-ON sequence follows:

1. When the 3590 power cord is plugged into the power source, the AC LED on the back of the power supply goes ON.
2. About one or two seconds after the power switch is switched ON, the following occurs:
 - The DC LED goes ON and remains ON.
 - The cooling fans begin operating.
 - The operator/CE panel backlighting goes ON and the Processor Check LED goes ON.
3. About 15 seconds after the power switch is switched ON, the **Panel Initialized** message is displayed on the operator/CE panel and the Processor Check LED goes OFF.

4. About 20 seconds after the power switch is switched ON, the automatic cartridge facility (ACF) is initialized. The ACF elevator is moved up and down during this initialization.
5. Approximately 2.5 minutes after the power switch is switched ON, the power-ON self-test (POST) completes.
6. Power-ON is successful if the operator/CE panel display is not blank and does not have an error message displayed.

Power Specifications

Figure 20 shows the power specifications of the 3590.

AC power to the Model B11/E11 is supplied from the rack power supply or the frame power supply. The Model B1A/E1A receives its ac power from the ac box in the tape library. The 3590 has an integrated ac to dc supply.

The 3590 accepts a variety of input voltages and frequencies. The 3590 automatically adjusts itself for proper operation with any combination of these voltages and frequencies.

Figure 20. Power Specifications

Item	Model B11/B1A	Model E11/E1A
Nominal Input Voltage	100–127 V ac 200–240 V ac	100–127 V ac 200–240 V ac
Input Frequency	50 or 60 Hz \pm 3 Hz	50 or 60 Hz \pm 3 Hz
Inrush Current	20 Amps	20 Amps
Typical Power Consumption	300 Watts	225 Watts

Power Cords

The ship group provides the necessary power cord for all electrical environments the device is expected to operate in. All power cords are 10 amperes and 50 or 60 Hz providing either one or two phase power, and ground.

The most common application uses a 3 meter, 220Vac, 50/60Hz cable that plugs into the Power Control Compartment (PCC). The part number for this cable is 05H8911.

See *IBM 3590 High Performance Tape Subsystem Introduction and Planning Guide*, GA32-0329, for details.

Automatic Cartridge Facility and Magazine

The ACF magazine loads and retrieves tape cartridges to and from the tape drive. Figure 22 on page INTRO-30 shows the magazine mounted in the ACF.

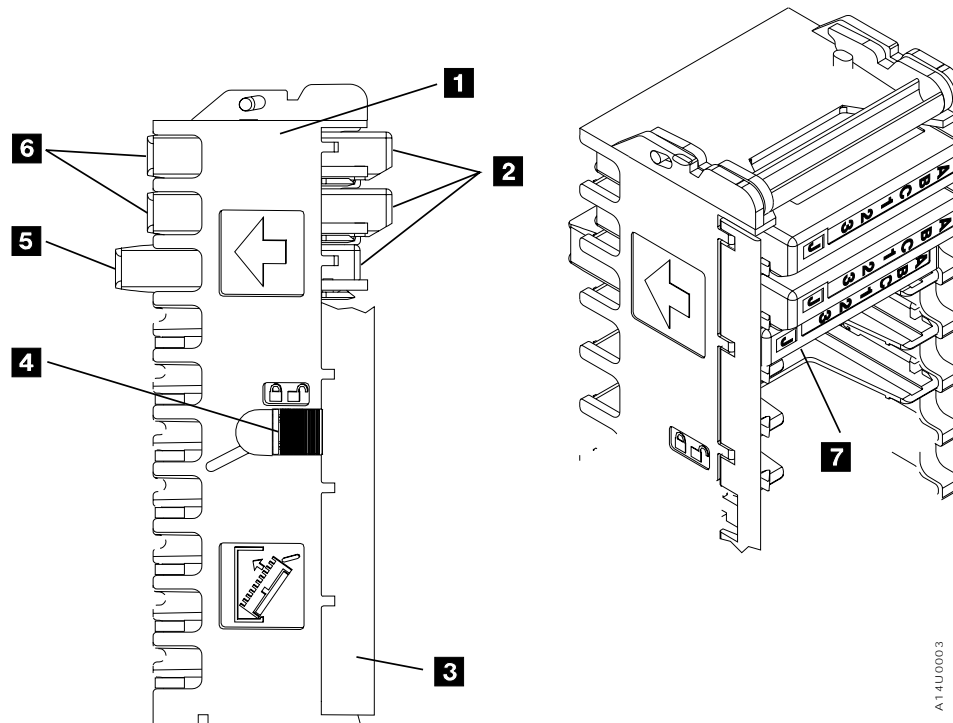
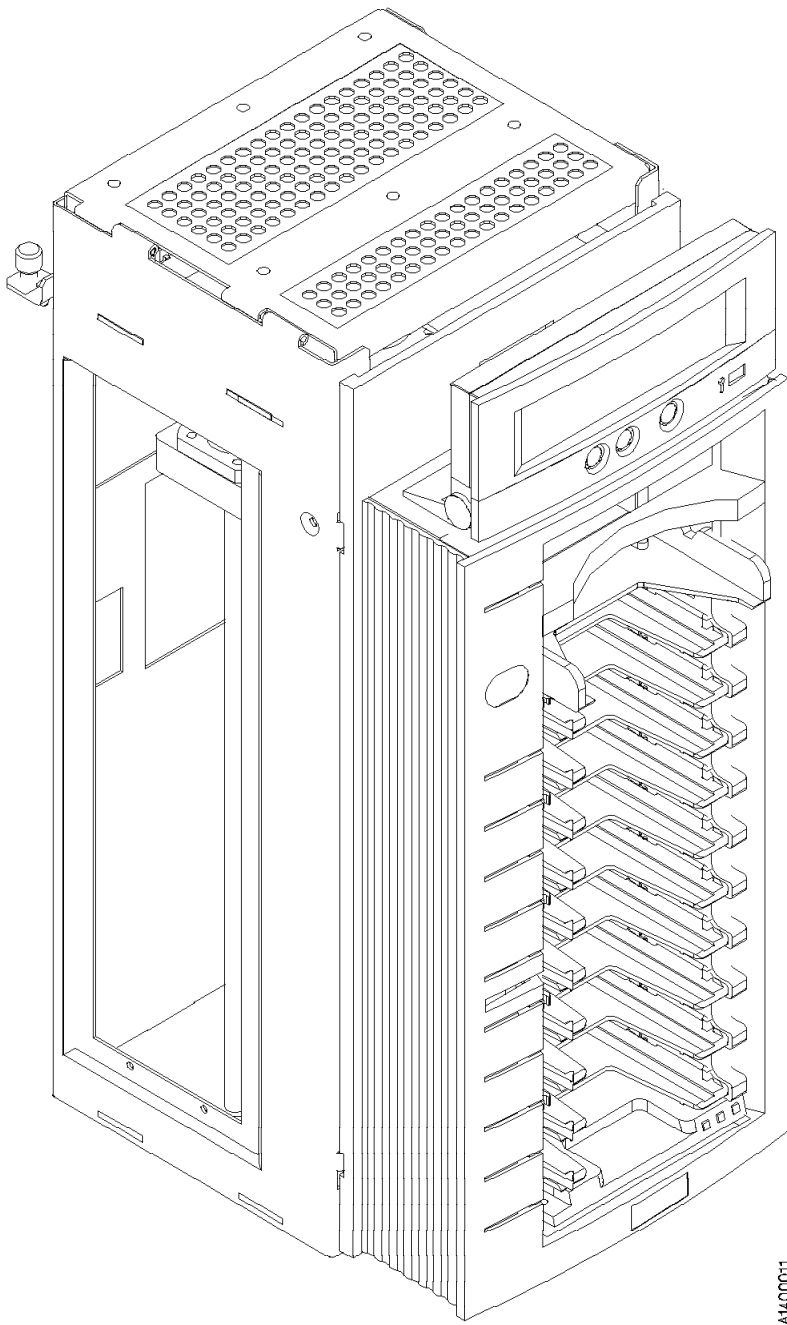


Figure 21. Left View of the 3590 Magazine Cartridge Positions

See “Automatic Cartridge Facility” on page ACF-1 for location and functional description of the ACF.

Figure 21 shows the magazine from the left side. The magazine **1** provides the following functions:

- Holds 10 tape cartridges.
- Has a carrying handle.
- Can be loaded and removed from the ACF.
- Has two cartridge positions **2** and **7**.
- Has an import position **5** where the cartridge is positioned for access by the transport.
- Has an export position **6** where the cartridge is positioned by the transport for removal by the operator.
- Has a locking bar **3** to hold the cartridge in the magazine.
- Has a latch **4** to lock and release the locking bar.
- Has 3 white fiducials that are recognized by a machine vision system when the drive is in an automated tape library.



A14.00011

Figure 22. Automatic Cartridge Facility and Magazine

Transport Mechanism

The transport within the ACF moves the cartridges between the drive, the magazine, and the priority cell.

When a mount is requested, the cartridge is moved (imported) from the magazine into the ACF where it is elevated to the opening of the drive and then mounted. The elevation of the cartridge from the lowest position in the magazine to the drive takes approximately 2 seconds. When the tape is unloaded and demounted, the elevator returns (exports) the cartridge to the designated (mode dependent) slot in the magazine.

Subsystem Initialization

Subsystem initialization includes initial microprogram load (IML), power sequencing, and subsystem diagnostics.

Initial Microprogram Load

During an initial microprogram load (IML), a microcode image that permits the subsystem to become functional is loaded into the subsystem RAM.

Anytime the unit is powered ON, the 3590 attempts to perform an IML from nonvolatile storage.

Power Sequencing

When power is applied, internal diagnostic tests check the voltages. After the voltages have been checked, a general reset of the logic is performed. Finally, a basic function test of the logic is performed. Errors detected during the power-ON sequence are displayed on the operator/CE panel. See "Power Switch and Power Sequence" on page INTRO-27 for additional details about the power supply and sequencing.

Subsystem Diagnostics

Subsystem diagnostics are divided into two sections:

1. Power-ON reset (POR)
2. Self-Test

POR Diagnostic: Drive power-ON reset diagnostic tests are initiated when a drive is powered up or when the "Device Reset" switch on the operator panel is activated. Any write data in the drive (buffers, compactor, etc.) that has not yet been transferred to the media is lost. Drive power-ON reset does not directly affect the initiator other than the device is off-line to the initiator during the reset. The device begins executing microcode from its own nonvolatile storage providing a comprehensive test of the unit logic.

Errors detected during execution of POR are posted to a table in control store and depending on the severity of the error, errors may also be displayed in the operator/CE panel and can be cross referenced to a FID in Figure 2 on page START-7. The table provides the FIDs, the FRU name, the TAC code, and the MI page for repairing the failure.

This set of diagnostics verify that the machine performs as intended. It may be invoked at any time either to verify a fix or to exercise the subsystem. See Verify Fix in Figure 100 on page PANEL-27.

3590 Drive Model and Feature Levels

Three different levels of 3590 drives now exist in the field:

1. Base Model B11/B1A 3590 Drives
2. Magstar Ultra Model B11/B1A 3590 Drives.
3. Model E11/E1A 3590 Drives

These drive levels have important differences which effect service, installation, and operations. The following section outlines these important differences.

Identifying Feature level of 3590 Drive

Refer to Figure 23 to determine the 3590 drive Model and Feature level.

Figure 23. Identifying Model and Feature level of 3590 Drive

Parameter	Model E11/E1A	Magstar Ultra Model B11/B1A	Base Model B11/B1A
Rear cover label	Magstar Model E label on rear cover near power switch, below the serial number label.	Magstar Ultra label on rear cover near power switch, below the serial number label.	Serial number label only.
Op Panel display	Displays the word 3590E on top right of display when powered ON or operating.	Displays the word Ultra on top right of display when powered ON or operating.	Does not display the drive type or model on the panel.
Microcode level	From the Operator panel, select Services , then Microcode Level to display the code level: Model Exx drives use: D0IC_xxx microcode.	From the Operator panel, select Services , then Microcode Level to display the code level: Ultra drives use: D0IB_xxx microcode.	From the Operator panel, select Services , then Microcode Level to display the code level: Base drives use: D0IA_xxx microcode
Inquiry Data page '00'	Bytes 32-35 show the microcode revision level. Model Exx drives will show Cxxx. Example: C640	Bytes 32-35 show the microcode revision level. Ultra drives will show Bxxx. Example: B640	Bytes 32-35 show the microcode revision level. Base drives will show Axxx. Example: A640
Inquiry Data page '03'	Bytes 8-11 show the Load ID, eight hex digits that are unique for each EC level. For Model Exx, Load ID = A0B00E26	Bytes 8-11 show the Load ID, eight hex digits that are unique for each EC level. For Ultra 3590, Load ID = A0B00E25	Bytes 8-11 show the Load ID, eight hex digits that are unique for each EC level. For Base 3590, Load ID = A0B00E22

Magstar Drive Model and Level Differences

The three different level drives are all designed to operate in a compatible manner, however, there are some important differences which require changes in the service and maintenance procedures. Some of these differences also require the application of system prerequisites in some installations. This section describes the key differences between the drive levels.

Hardware Differences: The three different level drives all have different card-pack electronics assemblies. There are differences in the logic cards inside the packs, but the outside metal cases are all very similar. The best way to determine the difference is by the part number label on top of the metal case. See the Parts Catalog, "Assembly 3: Deck Enclosure" on page PARTS-12, for the correct part number information. Be sure to order the correct replacement card-pack when ordering a spare part.

The Model E11/E1A Read/Write Head Guide Assembly (HGA) is different from the Base or Ultra Models B11/B1A. The Model E11/E1A HGA is designed to write 256 track tape format, and the Base and Ultra Model B11/B1A HGAs are designed to write 128 tracks. The only visual difference between the two HGA assemblies is the serial number on the bar-code label on top of the R/W head. The Model E11/E1A serial

| numbers all begin with a "T", and the Model B11/B1A serial numbers all begin with a "B". Be sure to order the correct replacement HGA when ordering a spare part.

| The Model E11/E1A Power Supply is different from the Base or Ultra Models B11/B1A. The Model E11/E1A power supply has a separate, removable cable and only one cooling fan. The Base and Ultra Model B11/B1A power supplies have a built-in non-removable cable and two cooling fans. Be sure to order the correct replacement power supply when ordering a spare part.

| **SCSI Adapter/Port Compatibility:** Base 3590 drives have two Fast/Wide Differential SCSI ports with a maximum data rate of 20MB/s. Model E11/E1A and Magstar Ultra drives have two Ultra/Wide FAST-20 differential SCSI ports with a maximum data rate of 40MB/s.

| The faster 40MB/s Ultra SCSI data-rate is only achievable if the customer Host Adapter also supports the Ultra SCSI data-rates (such as the FC 6207 RS/6000 adapter). If the host adapter does not support the Ultra data-rate, the 3590 drive will operate at the slower speed determined by the Host Adapter.

| Model E11/E1A and Magstar Ultra drives will operate properly with the existing adapters that are used to operate Base 3590 drives, as long as all of the required prerequisites are met. The Model E11/E1A drives also support attachment to SCSI-3 adapters.

| **SCSI Cabling and Terminator Compatibility:** The Model E11/E1A and Magstar Ultra drives are fully compatible with all IBM p/n SCSI cabling and terminators that are used with the base 3590 drives. Non-IBM supplied cabling used in customer installations should be reviewed by the customer for Ultra SCSI compatibility.

| **Functional and R/W Compatibility:** The Model E11/E1A and Magstar Ultra drives support the identical SCSI command and functions that the base 3590 drives support.

| The three levels of 3590 drives are **not** fully R/W compatible. The Model E11/E1A drive reads and writes in the 256 track format, and it can also read tapes written in the 128 track format. The Base 3590 and Magstar Ultra Model B11/B1A drives read and write in the 128 track format only. They can **not** read or write 256 track format tapes.

| **Drive Microcode Compatibility:** Each of the three 3590 drive models requires a unique, separate drive microcode image. When a microcode update to the drive is required, it is important to determine the level of the drive and select the proper microcode image as follows:

- | • D0IA_xxx = Base Model B11/B1A 3590 drives
- | • D0IB_xxx = Magstar Ultra Model B11/B1A 3590 drives
- | • D0IC_xxx = Model E11/E1A 3590 drives

| These code levels are not compatible between different drive types. For example, the Base Model B11/B1A drives will not accept D0IB_xxx or D0IC_xxx microcode images, and Magstar Ultra Model B11/B1A drives will not accept D0IA_xxx or D0IC_xxx microcode images. The Model E11/E1A drives will not accept D0IA_xxx or D0IB_xxx microcode images.

- | **Microcode Update Differences:** As described, the three drive levels require separate, non-compatible microcode images.
- | If the microcode is to be updated by floppy disk, three disks will be provided. One each for code images D0IA, D0IB and D0IC.
- | If the microcode is to be updated with an FMR cartridge, there are two different format cartridges available.
 - | 1. A FMR cartridge with 256 track format that is used only on the Model E11/E1A drives.
 - | 2. A FMR cartridge with 128 track format that is used only on the Base or Magstar Ultra Model B11/B1A drives.
- | The label on the FMR cartridge should clearly state which drive models the cartridge will support.
- | See “Field Microcode Support (FMR)” on page INTRO-37 or “Updating Microcode from FMR Cartridge” on page PROC-53 for details of the microcode update process.

System Pre-requisites for proper operation of Magstar Ultra Drives

Magstar Ultra level drives require some prerequisite system microcode updates to install and operate properly in some environments. These requirements are summarized as follows:

- **AS400 Attachment:**

V4R1, V4R2, and V4R3 systems with adapters FC 2729 or FC 6534 require a PTF for proper operation with Magstar Ultra drives. Please refer to Informational APAR ii11472 for more information.

This PTF may be loaded from CUM tape or via Retain.

Also, if the Magstar Ultra is used as an alternate load device (boot manager), a new SLIC CD is required. See Informational APAR ii11472 for more information.

- **3494 B16 Virtual Tape Server:**

3494 B16 system code must be at system level 2.11.20.12 (PGA4) or greater for proper operation of Magstar Ultra. Use the following procedure to determine the system microcode level of the B16 system:

1. From the Service menu, select **Magstar 3494 VTS Maintenance**
2. Select **Microcode Maintenance**
3. Select **Display Active Code Level and Status**

When the command completes, the System will display the following message:

```
IBM MAGSTAR 3494 VIRTUAL TAPE SERVER S/N 13-0011876...
Level 2.11.20.12 (cadd 4.9.0.0, Atape 4.2.8.0).
```

If the displayed level is not 2.11.20.12 or greater (as above), a subsystem microcode update will be required using the 3494 B16 subsystem microcode CD. (This CD may be provided with the Magstar Ultra drive.) Refer to *IBM 3494 Model B16 Virtual Tape Server Maintenance Information* PROC section for procedures to copy and activate the new B16 microcode. If update is necessary, inform the customer that additional install time will be required and subsystem availability will be effected. Plan the install in conjunction with customer requirements. **Attention:** Never down-level the currently activated B16 system microcode level if it is greater than the level supplied on the CD.

- **3494 B18 Virtual Tape Server:**

3494 B18 system microcode must be at system level 2.13.7.00 or greater for proper operation of Magstar Ultra. Use the following procedure to determine the system microcode level of the B18 system:

1. From the Service menu, select **Magstar 3494 VTS Maintenance**
2. Select **Microcode Maintenance**
3. Select **Display Active Code Level and Status**

When the command completes, the System will display the following message:

```
IBM MAGSTAR 3494 VIRTUAL TAPE SERVER S/N 13-1007780:  
Level 2.13.7.4 (cadd 4.9.0.0, Atape 4.2.9.0).
```

If the displayed level is not 2.13.7.00 or greater (as above), a subsystem microcode update will be required using the 3494 B18 subsystem microcode CD. (This CD may be provided with the Magstar Ultra drive.) Refer to *IBM 3494 Model B18 Virtual Tape Server Maintenance Information* PROC section for procedures to copy and activate the new B18 microcode. If update is necessary, inform the customer that additional install time will be required and subsystem availability will be effected. Plan the install in conjunction with customer requirements. **Attention:** Never down-level the currently activated B18 system microcode level if it is greater than the level supplied on the CD.

- **A50/A00 Controllers:**

A50/A00 system microcode must be at system level 1.9.20.00 or greater for proper operation of Magstar Ultra. Refer to *IBM 3590 Tape Subsystem AXX Controller Models Maintenance Information* PROC Section for procedures to determine the current system microcode level. If update is necessary, use the A50/A00 microcode diskettes. (These diskettes may be provided with the Magstar Ultra drive.) **Attention:** Never down-level the currently activated A50/A00 system microcode level if it is greater than the level supplied on the floppy disks.

- **SUN Attachment:**

For SUN attach, an external terminator **MUST** be used somewhere on the bus. In some multi-host systems this may require the removal of internal terminators from one of the host adapters to allow the addition of an external terminator. If required, inform the customer that this change must be made. **DO NOT** perform this change on non-IBM equipment without customer approval.

Field Microcode Support (FMR)

The 3590 subsystem can accept microcode updates by either of two methods:

- Down-load from the host
- Microcode cartridge

Microcode Down-load from the Host

The 3590 subsystems allow the initiator to provide microcode to the device across the SCSI bus. This process could be required because of new microcode or engineering debug activities.

Note: When a microcode update to the drive is required, it is important to determine the level of the drive and select the proper microcode image.

- D0IA_xxx = Base Model B11/B1A 3590 drives
- D0IB_xxx = Magstar Ultra Model B11/B1A 3590 drives
- D0IC_xxx = Model E11/E1A 3590 drives

The microcode down-load sequence is as follows:

- The initiator should reserve the device before proceeding with the microcode down-load. Any interference during the down-load causes a check condition with a resulting discard of all the microcode down-loaded to that point.
- The device must be synchronized by either a Rewind or Unload command before beginning the down-load sequence.
- Disconnect privilege should be allowed, as the final processing of the microcode data takes approximately 30 seconds.
- The microcode is a single image. The initiator can down-load the microcode with a single Write Buffer command or with multiple Write Buffer commands to break the image up into convenient packets.
- When multiple Write Buffer commands are used, the initiator must divide the microcode into packets and send each packet with Write Buffer commands. The packets may be sent in any order, but all packets must be sent. All write Buffer commands must have the same buffer ID and mode.
- No gaps or overlaps of the data are allowed in the buffer. If a gap or an overlap exists, when the host indicates that all data has been down-loaded, the device returns a check condition. Also, if the parameter list is longer than 1 MB, the 3590 returns a check condition.
- When the device receives the last Write Buffer command with the last of the code image data, the device begins validation of the microcode image, such as checking for correct length and the correct CRC. If this check of the microcode image reveals any problems, the device returns a check condition. If no problems exist in the image, the device begins loading the microcode into nonvolatile storage. This process takes up to 30 seconds.
- The device responds to resets or selections during the loading of nonvolatile storage, but these events do not disrupt nonvolatile storage alteration. Because of the duration of the loading process, a command timeout may occur.
- The completion of the check and save process is indicated by good status returned to the initiator for that last Write Buffer command. At this point the device is automatically reset and the new microcode is activated. The device creates a pending unit attention condition to the initiators that indicates the microcode has been changed.
- If a reset has occurred while loading nonvolatile storage, the device will have a pending unit attention. This process will complete the transfer to nonvolatile storage and perform final checking. If a problem

is found, a deferred error appropriate to the problem will be presented. If the error is such that the transferred microcode is bad, any reset can cause an unrecoverable error requiring a service call. The initiator should retry the entire down-load process immediately.

- If the reset occurred after the process was completed but before status was returned to the initiator, the device will have activated the new microcode and will have a pending unit attention with associated sense indicating that microcode has been changed.

Field Microcode Support Using FMR Cartridge

ATTENTION

There are 2 different levels of FMR cartridge available for the 3590 drives.

1. A FMR cartridge with 256 track format that has microcode for the Model E11/E1A drives.
2. A FMR cartridge with 128 track format that has microcode levels for the Base and Magstar Ultra Model B11/B1A drives.

The label on the FMR cartridge should clearly state which drive models the cartridge will support.

If an FMR tape with the wrong track format is loaded, a **Tape write prot'd** message will be displayed.

The 128 track format FMR cartridges ordered as a FRU now contain multiple microcode images for support of different levels of the Model B11/B1A 3590 drives as follows:

- D0IA_xxx = Base Model B11/B1A 3590 drives
- D0IB_xxx = Magstar Ultra Model B11/B1A 3590 drives

The 256 track format FMR cartridges ordered as a FRU now contain a single microcode image for support of the Model E11/E1A 3590 drives.

- D0IC_xxx = Model E11/E1A 3590 drives

These code levels are not compatible between different drive types. For example, the Base Model B11/B1A drives will not accept D0IB_xxx microcode images, and Magstar Ultra Model B11/B1A drives will not accept D0IA_xxx microcode images. The Base or Ultra Model B11/B1A drives will not accept the 256 track format FMR tapes, and the Model E11/E1A drives will not accept the 128 track format FMR tapes.

However, the different images for D0IA_xxx and D0IB_xxx may both be placed on the same 128 track FMR cartridge to allow a common FMR cartridge to update all Model B11/B1A drive levels. When the FMR cartridge is loaded in a drive, that drive will only allow selection of the valid levels of code. In the case of the Base 3590 drives, only D0IA code EC levels will be allowed, while Magstar Ultra drives will only allow D0IB EC levels.

For more information on the microcode load process, see "Updating Microcode from FMR Cartridge" on page PROC-53.

For more information on 3590 levels, see "3590 Drive Model and Feature Levels" on page INTRO-33.

Special Tools

Special tools are shipped, purchased, or ordered; they are used to repair or maintain the device.

Cleaning Cartridge

The 3590 cleaning cartridge P/N 05H4435 (or P/N 05H7540 for tape libraries) is for use only in a 3590. Figure 24 shows a cleaning cartridge, which is used to clean the head guide assembly.

To use the cartridge, load it in a drive and the cleaning procedure occurs automatically. The cartridge unloads when the cleaning procedure is done. This tool is part of the ship group.

The cleaning cartridge should be replaced after 100 uses. It should be undamaged and clean when it is inserted into a tape drive. You can keep track of the number of uses by marking the label provided with each cartridge.

Attention: Do not use a china-marking (grease) pencil on the label.

The 3590 cleaning cartridge is identified by its physical characteristics. The black case has two gray plastic inserts **1** and identifier notches **2** that are unique to the 3590 cleaning cartridge. The leader block **3** is also gray. The 3590 cleaning cartridge, like the 3590 data cartridge, has a finger notch **4** that is used to grasp the cartridge.

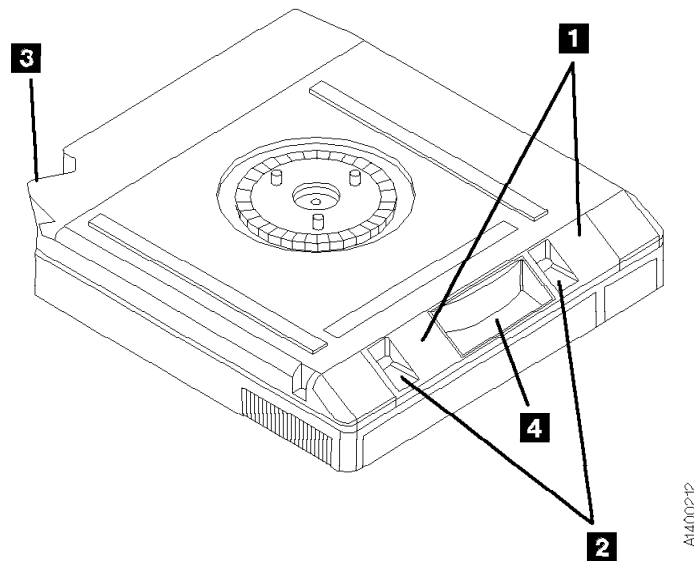


Figure 24. Bottom View of a Cleaning Cartridge

Leader Block Replacement Kit

The leader block replacement kits are a **customer-purchased kit**. The 3M part number 8498022534-0 contains 10 leader blocks. The 3M part number 8498022533-2 contains 10 leader blocks and the clutch tool. Replacing the leader block is the customer's responsibility.

Note: Replacing the leader block is used only as a temporary measure to retrieve the data from the tape; it is not a permanent fix.

ESD Kit

The ESD kit (P/N is available in *General CE Tools Reference Summary*, 5131-0075) is used to prevent damage when you work with electrostatic discharge (ESD) sensitive parts. See “Working with Electrostatic Discharge (ESD) Parts” on page PROC-20 for information on using the ESD grounding wrist strap and mat. **This tool (Figure 25) is not shipped with the subsystem and must be ordered.**

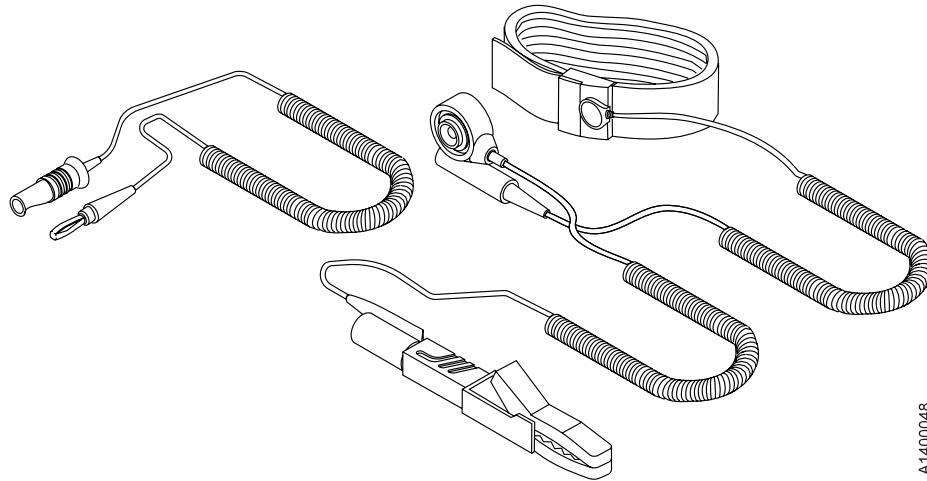


Figure 25. ESD Grounding Strap

Pressure/Vacuum Kit/Gauge

The kit P/N 6857823 (Figure 26) contains hoses, fittings and a pressure/vacuum gauge to measure the pneumatic system pressure or vacuum. **This kit is not shipped with the subsystem and must be ordered separately.**

See “Measurement and Adjustment of Pneumatic System” on page LOC*CAR-3 for instructions on how to use the pressure/vacuum gauge P/N 6850747.

Adapter hose **1**, P/N 05H9895 is part of the ship group. This adapter is used to adapt the existing pressure/vacuum gages currently in the field.

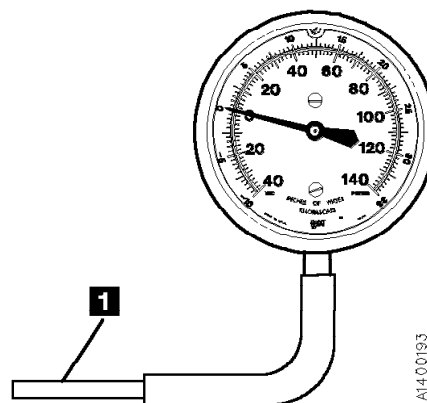


Figure 26. Pressure/Vacuum Gauge

SCSI Wrap Tool

The SCSI wrap tool P/N 62G1324 (black) or P/N 05H9163 (gray) is used during installation and diagnostic check out of the 3590. These tools will be used only by the Customer Engineer. **These tools (Figure 27 on page INTRO-41) are unique and cannot be swapped with other wrap tools.**

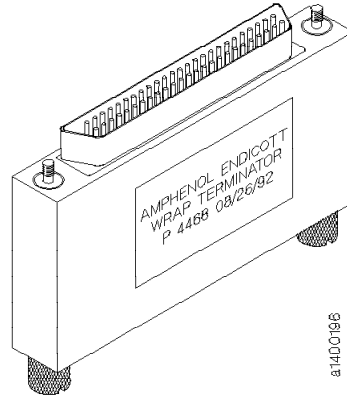


Figure 27. SCSI Wrap Tool

Library Attachment Wrap Tool

The library attachment wrap tool P/N 39F3884, which is one of the 3494 special tools, is used to verify the library attachment facility in the Model B1A. **This tool (Figure 28) is a unique part and cannot be swapped with other wrap tools.**

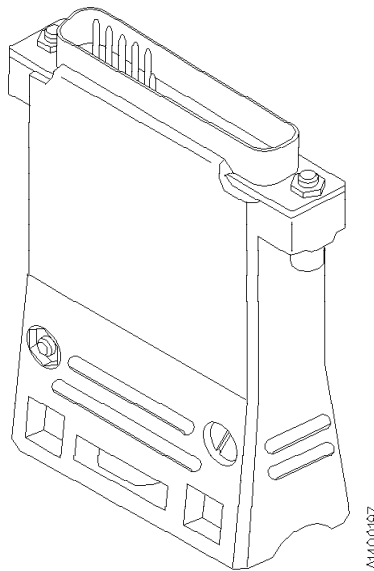


Figure 28. Library Attachment Wrap Tool

Library Attachment Wrap Interposer Tool

The library attachment wrap tool interposer P/N 05H3895, which is in the 3494 ship group, connects to the library manager connector on the back of the drive. The interposer (Figure 29) is a 9-pin male to 25-pin female connector.

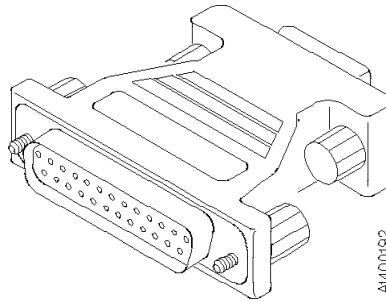


Figure 29. Library Attachment Wrap Tool Interposer

Gap Set Tool

The gap set tool P/N 05H4671, which is in the ship group, adjusts the gap in the hub of the machine reel motor. This tool (see Figure 30) must be used when the upper flange on the machine reel motor is removed.

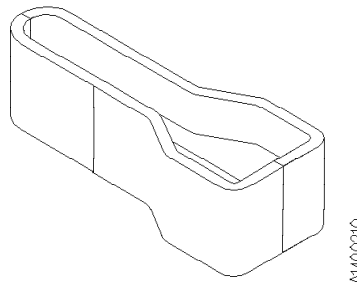


Figure 30. Gap Set Tool

ACF Motor Adjustment Tool

The ACF motor adjustment tool P/N 05H4724, which is in the ship group, sets the gear mesh gap between the motor gear and the intermediate gear. This tool (see Figure 31) is used when any of the ACF motors are replaced or reinstalled.

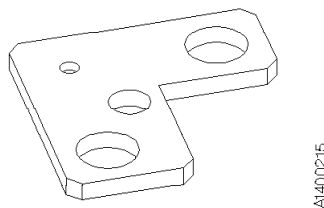


Figure 31. ACF Motor Adjustment Tool

ACF Transport Position Adjustment Tool

The ACF transport position adjustment tool P/N 05H3388, which is in the ship group, measures the distance between the priority cell floor and the top of the transport rails. This tool (see Figure 32 on page INTRO-43) is used to verify and adjust the alignment of the ACF transport position sensors.

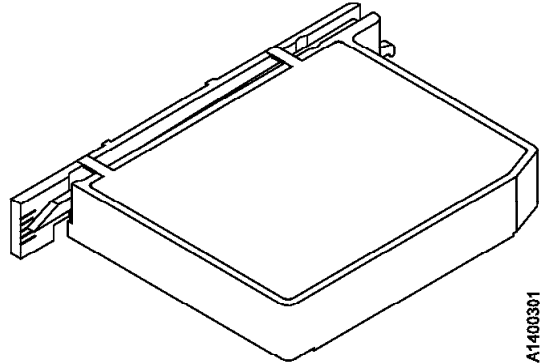


Figure 32. ACF Transport Position Adjustment Tool

Tape Unit Cleaner

The IBM Tape Unit Cleaner P/N 13F5647, is the only approved cleaning solution for the 3590. This cleaning solution (see Figure 33) is used to clean the tape cartridge, magazine, and tape path.

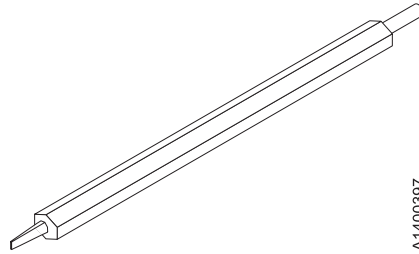
Attention: Do **NOT** wet clean the Head Guide Assembly. The cleaning process will damage the head surfaces and actuator mechanism.



Figure 33. Tape Unit Cleaner

Potentiometer Adjusting Tool

The Potentiometer Adjusting Tool P/N 1864853 (see Figure 34) is used to set the Mode switch in the Model E11/E1A card pack.



A1400397

Figure 34. Potentiometer Adjusting Tool

Messages

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Service and Media Information Messages (SIMs and MIMs)

The SIM and MIM functions are a primary factor in the 3590 maintenance plan for improved product availability.

- A SIM alerts the customer when an abnormal operational condition in the 3590 requires service attention. Information in the SIM identifies the affected drive, the failing component and the severity of the fault condition, and the expected operational impact of the pending service action. This information helps the user to initiate and expedite appropriate recovery and service procedures so that normal operation is restored with maximum efficiency and minimal disruption.

A SIM contains the machine type, machine serial number, and FID that allows the dispatch of the appropriate service personnel and the replacement parts required to correct the machine fault. This procedure helps improve service response time and helps reduce the time required for machine repair.

Physical location identifiers in the SIM directs the CE to the failing unit in the customers account. The SIM FID code specifies the parts to be replaced and directs the CE to appropriate service procedures. This allows the machine fault to be repaired without first looking in log records and without having to try to recreate the failure with diagnostic procedures. Both of these advantages further contribute to reduced outage durations.

- A MIM identifies problems with the media (tape) and the volume number of the *bad* cartridge. This allows the customer to do maintenance within the tape library and to prevent unnecessary service calls when the fault is media.

The detailed information within SIMs and MIMs is for use by the dispatcher or the CE in the branch office. This individual is responsible for decoding the information and scheduling for service based on data content within the SIM or MIM.

The customer can select, depending on their software, the severities that they wish to see. For example, one customer may only want to see the *Acute* SIM/MIM and another customer may want to see all the SIMs and MIMs that are sent to the host. The 4 severity codes follow:

- Severity 0 (FID4) code means that the device needs service.
- Severity 1 (FID3) code means that the problem is moderate.
- Severity 2 (FID2) code means that the problem is serious.
- Severity 3 (FID1) code means that the problem is acute.

A service message within the SIM also informs the customer what the service impact will be; for example, *impact unknown* disables access to the drive or requires the interface to be disconnected. A MIM specifies what is wrong with the cartridge that is indicated. The 3 MIM severity codes follow:

- Severity 1 indicates moderate *high temporary read/write* errors were detected.
- Severity 2 indicates serious *permanent read/write* errors were detected.
- Severity 3 indicates acute *block 0, cartridge type, or vol label* errors were detected.

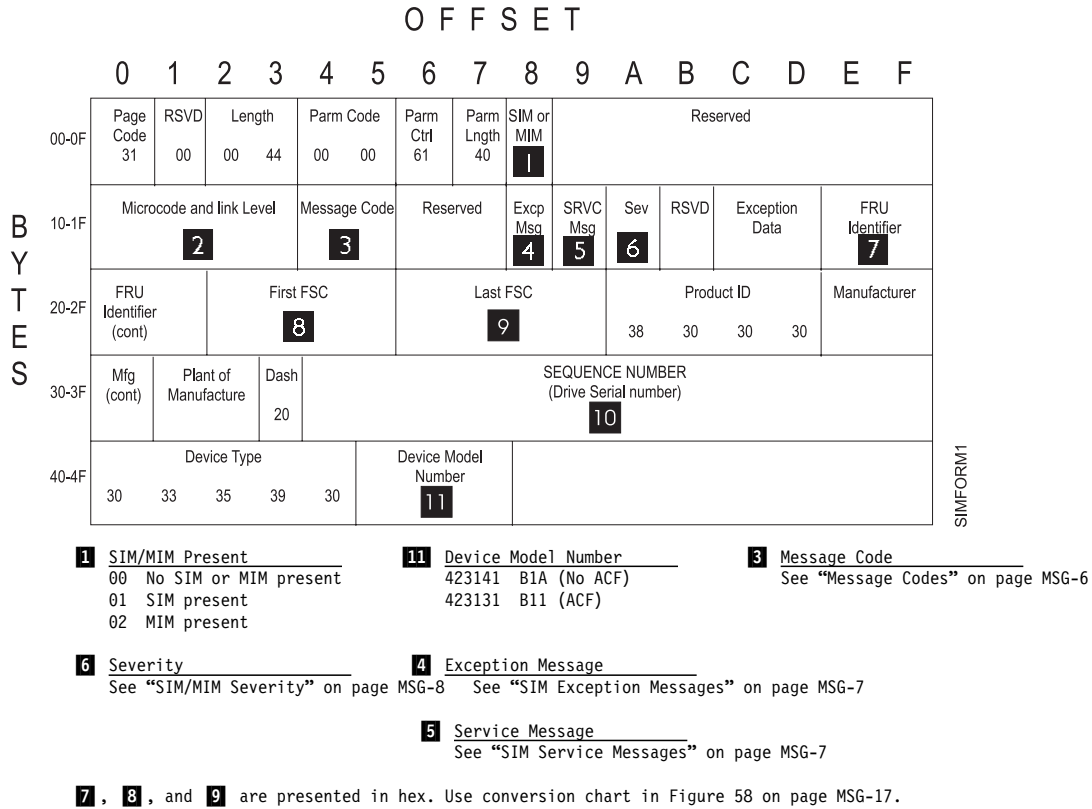


Figure 35. SIM Format

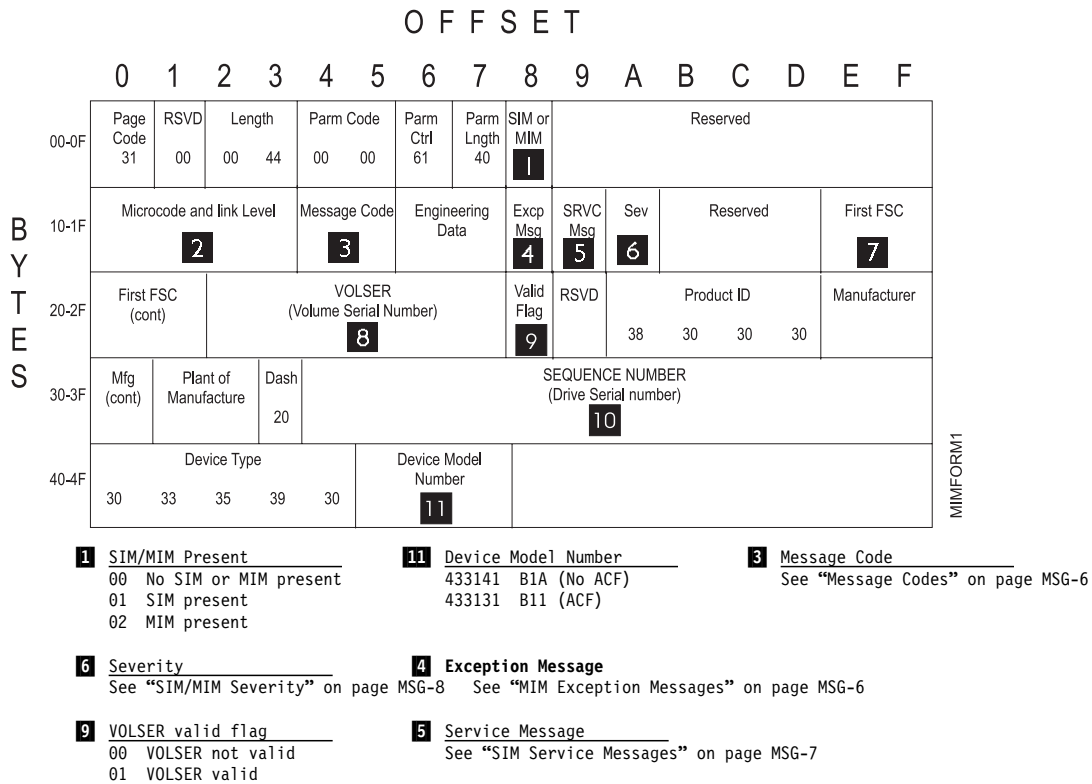


Figure 36. MIM Format

Statistical Analysis and Reporting System

The statistical analysis and reporting system (SARS) assists in determining whether read and write errors are caused by the media (tape) or the hardware in the drive and provides SIMs, MIMs, and/or media isolation messages. To analyze errors, the 3590 microcode contains a volume SARS (VSARS) algorithm and a hardware SARS (HSARS) algorithm.

The algorithms are executed in the 3590 just before a tape is unloaded. The HSARS data is stored in nonvolatile storage in the drive and the VSARS data is stored in the volume control region (VCR) on the tape.

To distinguish error patterns and trends, the SARS *volume* algorithms require the tape to be mounted on different drives while the SARS *hardware* algorithms require different volumes to be mounted on one drive. As degraded hardware passes through predefined error thresholds, cleaning and service repair messages and/or error codes are presented. Similarly, if tape volumes continue to perform poorly on different drives, re-write or discard-media messages are presented.

The current default value for SARS options is **ON** for microcode levels D0IA and later. Previous levels of microcode had the default value as **OFF**. SARS options must be enabled to take full advantage of media error isolation via MIMs and some SIMs. You can enable or disable SARS options from "CE Drive Options Menu" on page PANEL-40.

Obtaining 3590 Drive Error Information at the Host

IBM device drivers for the RS/6000 and AS/400 systems log service and media information messages (SIMs and MIMs) when an error occurs on the 3590 drive.

Note: Sun, HP-UX and Windows NT systems do not log SIM/MIM data.

The SIM includes the following error information:

1. Which drive the SIM refers to.
2. The FRU identifier (FID) code and FID severity for Drive errors. The FID is used to enter the START section where it specifies the failing FRU group.
3. The message code presented to the customer. See "Message Codes" on page MSG-6.
4. The first FSC, second FSC or flag bytes, model and microcode link level are not required to enter the START section. This support data may be requested by your next level of support.

The MIM includes the following error information:

1. The message code presented to the customer. See "Message Codes" on page MSG-6.
2. The VOLSER # of the cartridge which is having a problem.
3. The first FSC and model and link level are not required to enter the START section. This support data may be requested by your next level of support.

This information is used to service the 3590 drive and can also be obtained directly from the drive display. The PANEL section describes the 3590 display.

3590 Drive Display Panel: The following screen is an example of an error log display:

```
CE ERROR LOG
-----
▶CANCEL
CLEAR ERROR LOG
FID1 BB
 3132 3105 121A
 0001 02:33:28
ATTN DRV

PORT0 ADDR=1 OFFLINE
PORT1 ADDR=2 OFFLINE
```



FID1 BB 1 = FID Severity
 BB = FID
3132 3105 3132 = First FSC
 3105 = Last FSC
121A 1 = Model B11/E11
 21A = Microcode Level

0001 02:33:28 Time Stamp (Not real time, but relative
 to accumulated power-on time for the
 card pack installed in this machine,
 except that the time is saved in VPD
 each hour.)
 The time stamp is in the order dddd hh : mm : ss.

ATTN DRV Operator Intervention (next error log)

For more information, see “CE Error Log Menu” on page PANEL-44.

The following text explains how to obtain 3590 error information from the RS/6000, AS/400 and Sun platforms. If the utilities described below are not used on your system, please refer to the documentation that came with your system drivers.

See “Service and Media Information Messages (SIMs and MIMs)” on page MSG-2 for additional information on SIMs and MIMs.

Message Codes

Figure 37. Message Code Descriptions

Message Code Hex	Message Code ASCII	Description
3030	00	No Message: This is the default message indicating that the device does not have an error to report.
3430	40	Operator Intervention Required: An operator action is required at the device. For example, a magazine is full and needs to be replaced or emptied. Check the device error log for possible repair action. See "3590 Drive Display Panel" on page MSG-5 and also the PANEL section describes the 3590 display.
3431	41	Device Degraded: The device is performing in a degraded state, but can be used. A FID is displayed with the error message. Check the device error log for possible repair action. See "3590 Drive Display Panel" on page MSG-5 and also the PANEL section describes the 3590 display.
3432	42	Device Hardware Failure: The device can not be used. A FID is displayed with the error message. Check the device error log for possible repair action. See "3590 Drive Display Panel" on page MSG-5 and also the PANEL section describes the 3590 display.
3433	43	Service Circuits Failed, Operations not Affected: This error does not affect the performance of the device. The failure only affects circuits used for non-operational testing. A FID is displayed with the error message. Check the device error log for possible repair action. See "3590 Drive Display Panel" on page MSG-5 and also the PANEL section describes the 3590 display.
3535	55	Clean Device: Load a cleaning cartridge in the device. The drive returns the cleaning cartridge following the cleaning procedure. If excessive Clean messages are posted, go to "Maintenance Starting Point" on page START-2.
3537	57	Device has been cleaned: The drive has been cleaned by a cleaning cartridge.
3630	60	Bad Media, Read Only Permitted: MIM message. Cartridge is logically write protected. Read only is allowed. If the customer wishes to write to this tape, they should copy data to another volume. Remove this volume from the library.
3631	61	Rewrite Data if Possible: MIM message. Data on the tape cartridge is degraded. Attempt to copy data to a new volume. This volume should be removed from the library.
3632	62	Read Data if Possible: MIM message. The tape directory is degraded. Attempt to read tape to rebuild the tape directory.
3634	64	Bad Media, Cannot Read or Write: MIM message. Remove media from the tape library. Data is likely lost without special tools to recover it.
3732	72	Replace Cleaner Cartridge: MIM message. Have the customer order a new cleaner cartridge.

MIM Exception Messages

The following provides descriptions of Exception Messages for your information. Action information can be obtained by use of **Message Code** contained in reported MIM.

Figure 38. Exception Message Descriptions

Exception Message Hex	Exception Message ASCII	Description
32	2	Data Degraded:
34	4	Medium Degraded:
36	6	Block 0 Error:
37	7	Medium Exception:

SIM Exception Messages

The following provides descriptions of SIM Exception Messages for your information. Action information can be obtained by use of **Message Code** and **FID** contained in reported SIM.

Figure 39. SIM Exception Message Descriptions

Exception Message Hex	Exception Message ASCII	Description
30	0	Reserved
31	1	Effect of failure unknown
32	2	Dev. Exception - No performance impact
33	3	Dev. Exception on interface
34	4	Dev. Exception on ACF
35	5	Dev. Exception on Operator Panel
36	6	Dev. Exception on Tape path
37	7	Dev. Exception in Drive
38	8	Dev. Preventive Maintenance Required
39	9	Dev. Preventive Maintenance Completed
41-46	A-F	Reserved

SIM Service Messages

The following provides descriptions of SIM Service Messages for your information. Action information can be obtained by use of **Message Code** and **FID** contained in reported SIM.

Figure 40. SIM Service Message Descriptions

Service Message Hex	Service Message ASCII	Description
30	0	Reserved
31	1	Repair impact is unknown
32-36	2-6	Reserved
37	7	Repair will disable access to Dev.
38	8	Repair will disable message display ids on Dev.
39	9	Dev. Cleaning Required
41	A	Dev. Cleaning Complete
42	B	Dev. Cleaning For Performance Reasons is Required
43-46	C-F	Reserved

SIM/MIM Severity

Figure 41. SIM/MIM Severity Descriptions

SIM/MIM Severity HEX	SIM/MIM Severity ASCII	FID Severity Algorithm	FID Severity Displayed on Op. Panel	Description
33	3	4-3=1	1	Acute: Device requires immediate attention. Device is unusable.
32	2	4-2=2	2	Serious: Device is usable but is seriously degraded.
31	1	4-1=3	3	Moderate: Device is usable but is running degraded.
30	0	4-0=4	4	Service: Device needs scheduled maintenance but is usable.

Sense Key, ASC and ASCQ Information

The following tables list all possible combinations of Sense Keys, Additional Sense Codes (ASC), and Additional Sense Code Qualifiers (ASCQ) that are reported by the 3590. See *IBM 3590 High Performance Tape Subsystem, Hardware Reference, GA32-0331* for additional information.

Sense Key 0 (No Sense)

Figure 42. ASC, and ASCQ Summary for Sense Key 0 (No Sense)

ASC ASCQ	Description	Drive	Automatic Cartridge Facility
00 00	No Additional Sense Information - EOM	X	
00 00	No Additional Sense Information - ILI	X	
00 00	No Additional Sense Information - FM	X	
00 01	Filemarks Detected	X	
00 04	Beginning-of-Partition or Medium Detected	X	

Sense Key 1 (Recovered Error)

Figure 43. ASC, and ASCQ Summary for Sense Key 1 (Recovered Error)

ASC ASCQ	Description	Drive	Automatic Cartridge Facility
00 00	No Additional Sense Information	X	X
00 17	Drive Needs Cleaning	X	
0A 00	Error Log Overflow	X	
17 01	Recovered Data with Retries	X	
18 00	Recovered Data with Error Correction Applied	X	
37 00	Rounded Parameter	X	
5B 01	Threshold Condition Met	X	
5B 02	Log Counter at Maximum	X	

Sense Key 2 (Not Ready)

Figure 44. ASC, and ASCQ Summary for Sense Key 2 (Not Ready)

ASC ASCQ	Description	Drive	Automatic Cartridge Facility
04 00	Logical Unit Not Ready, Cause Not Reportable	X	X
04 01	Logical Unit Is in Process of Becoming Ready	X	X
04 03	Logical Unit Not Ready, Manual Intervention Required	X	X
04 04	Logical Unit Not Ready, Format in Progress	X	
15 01	Mechanical Positioning Error, Manual Intervention Required		X
30 03	Cleaning in Progress	X	
3A 00	Medium Not Present	X	
3B 12	Medium Magazine Removed		X
53 00	Media Load or Eject Failed	X	

Sense Key 3 (Medium Error)

Figure 45 (Page 1 of 2). ASC, and ASCQ Summary for Sense Key 3 (Medium Error)

ASC ASCQ	Description	Drive	Automatic Cartridge Facility
03 02	Excessive Write Errors	X	
09 00	Track Following Error	X	
0C 00	Write Error	X	
11 00	Unrecovered Read Error	X	
11 01	Read Retries Exhausted	X	
11 08	Incomplete Block Read	X	
14 00	Recorded Entity Not Found	X	
14 01	Record Not Found	X	
14 02	Filemark or Setmark Not Found	X	
14 03	End-of-Data Not Found	X	
14 04	Block Sequence Error	X	
30 00	Incompatible Medium Installed	X	
30 01	Cannot Read Medium, Unknown Format	X	
30 02	Cannot Read Medium, Incompatible Format	X	
31 00	Medium Format Corrupted	X	
31 01	Format Command Failed	X	
33 00	Tape Length Error	X	
51 00	Erase Failure	X	
85 00	Write Protected Because of Tape or Drive Failure	X	
85 01	Write Protected Because of Tape Failure	X	

Figure 45 (Page 2 of 2). ASC, and ASCQ Summary for Sense Key 3 (Medium Error)

ASC ASCQ	Description	Drive	Automatic Cartridge Facility
85 02	Write Protected Because of Drive Failure	X	

Sense Key 4 (Hardware Error)

Figure 46. ASC, and ASCQ Summary for Sense Key 4 (Hardware Error)

ASC ASCQ	Description	Drive	Automatic Cartridge Facility
09 00	Track Following Error	X	
15 01	Mechanical Positioning Error	X	
3B 00	Sequential Positioning Error	X	
3B 08	Reposition Error	X	
40 00	Diagnostic Failure	X	
44 00	Internal Target Failure	X	X
4C 00	Logical Unit Failed Self-Configuration	X	
52 00	Cartridge Fault	X	
53 00	Media Load or Eject Failed	X	
53 01	Unload Tape Failure	X	

Sense Key 5 (Illegal Request)

Figure 47 (Page 1 of 2). ASC, and ASCQ Summary for Sense Key 5 (Illegal Request)

ASC ASCQ	Description	Drive	Automatic Cartridge Facility
1A 00	Parameter List Length Error	X	X
20 00	Invalid Command Operation Code	X	X
21 01	Invalid Element Address		X
24 00	Invalid Field in CDB	X	X
25 00	Logical Unit Not Supported	X	X
26 00	Invalid Field in Parameter List	X	X
26 01	Parameter Not Supported	X	
26 02	Parameter Value Invalid	X	
26 03	Threshold Parameters Not Supported	X	
2C 00	Command Sequence Error	X	
39 00	Saving Parameters Not Supported	X	
3B 0D	Medium Destination Element Full		X
3B 0E	Medium Source Element Empty		X
3B 11	Medium Magazine Not Accessible		X
3B 80	Medium Transport Element Full		X
3D 00	Invalid Bits in Identify Message	X	X
53 02	Medium Removal Prevented	X	
5B 03	Log List Codes Exhausted	X	
80 00	CU Mode, Vendor-Unique	X	X

Figure 47 (Page 2 of 2). ASC, and ASCQ Summary for Sense Key 5 (Illegal Request)

ASC ASCQ	Description	Drive	Automatic Cartridge Facility
85 03	Write Protected Because of Current Tape Position	X	

Sense Key 6 (Unit Attention)

Figure 48. ASC, and ASCQ Summary for Sense Key 6 (Unit Attention)

ASC ASCQ	Description	Drive	Automatic Cartridge Facility
00 02	End-of-Partition/Medium Detected, Early Warning	X	
28 00	Not Ready to Ready Transition, Medium May Have Changed	X	X
28 01	Import or Export Element Accessed		X
28 80	Not Ready to Ready Transition, Medium Changer		X
29 00	Power On, Reset, or Bus Device Reset Occurred	X	X
2A 01	Mode Parameters Changed	X	X
2A 02	Log Parameters Changed	X	
2F 00	Commands Cleared by Another Initiator	X	
30 00	Incompatible Medium Installed	X	
3B 12	Medium Magazine Removed		X
3B 13	Medium Magazine Inserted		X
3B 14	Medium Magazine Locked		X
3B 15	Medium Magazine Unlocked		X
3F 01	Microcode Has Been Changed	X	X
3F 02	Changed Operating Definition	X	X
3F 03	Inquiry Data Has Changed	X	X
5A 01	Operator Medium Removal Request	X	
82 83	Cleaning Completed, Cleaning Cartridge Ejected	X	

Sense Key 7 (Data Protect)

Figure 49. ASC, and ASCQ Summary for Sense Key 7 (Data Protect)

ASC ASCQ	Description	Drive	Automatic Cartridge Facility
27 00	Write Protected	X	

Sense Key 8 (Blank Check)

Figure 50. ASC, and ASCQ Summary for Sense Key 8 (Blank Check)

ASC ASCQ	Description	Drive	Automatic Cartridge Facility
00 05	End-of-Data Detected	X	
14 01	Record Not Found, Void Tape	X	

Sense Key B (Aborted Command)

Figure 51. ASC, and ASCQ Summary for Sense Key B (Aborted Command)

ASC ASCQ	Description	Drive	Automatic Cartridge Facility
14 00	Recorded Entity Not Found	X	
14 01	Record Not Found	X	
14 02	Filemark or Setmark Not Found	X	
1B 00	Synchronous Data Transfer Error	X	X
43 00	Message Error	X	X
44 00	Internal Target Failure	X	X
45 00	Select or Re-select Failure	X	X
47 00	SCSI Parity Error	X	X
48 00	Initiator Detected Error Message Received	X	X
49 00	Invalid Message Error	X	X
4A 00	Command Phase Error	X	X
4B 00	Data Phase Error	X	X
4E 00	Overlapped Commands Attempted	X	X

Sense Key D (Volume Overflow)

Figure 52. ASC, and ASCQ Summary for Sense Key D (Volume Overflow)

ASC ASCQ	Description	Drive	Automatic Cartridge Facility
00 02	End-of-Partition/Medium Detected	X	

Error Log Analysis, RS/6000

The AIX Tape and Medium Changer Device Driver for the RS/6000 provides logging to the system error log for a variety of errors. You can view the error log in various formats by using one of the following AIX commands:

- **tapeutil** command on page MSG-14
- **diag** command on page MSG-15
- **smit** command on page MSG-19
- **errpt** command on page MSG-19

Use the Hex to ASCII conversion in Figure 58 on page MSG-17. Examples of the different error log formats are shown following this text.

To use the **tapeutil** command:

Note: The **tapeutil** command gives you a detailed report by device only.

1. Type **tapeutil** at the AIX command line.
2. Select **Tape Drive Service Aids** (listed under General Commands) from the menu.
3. Select **Error Log Analysis** from the Service Aid menu.

4. Select the device from the Drive Selection menu and press PF7 to commit. The error log will be displayed.
5. You can scroll through the log by pressing the Enter key.

To use the **diag** command:

Note: You must have root authority to run the AIX **diag** command.

Note: The **diag** command gives you a detailed report by device only.

1. Type **diag** at the AIX command line.
2. Select **Service aids** from the Diagnostic Function Selection menu.
3. Select **IBM Tape Drive Service Aids** from the Service Aid Selection menu.
4. Select **Error Log Analysis** from the Service Aid menu.
5. Select the device from the Selection menu and press PF7 to commit. The error log will be displayed.
6. You can scroll through the log by pressing the Enter key.

Analyze the sense key and ASC/ASCQ data to determine the type of sense information reported in the error log. If a hardware failure is indicated, use the FID and go to START-1 for problem determination. For errors that indicate SCSI adapter or SCSI bus errors, see Figure 56 on page MSG-16, go to "SCSI Bus Problem Determination" on page PROC-108.

For errors indicating system problems, enter the appropriate maintenance package.

Note: The following example is valid for microcode levels DOIA or later.

```

IBM Tape Device Error Log Analysis
NAME: rmt1  LOCATION: 00-02-01-20  DEVICE TYPE: 3590
DATE: 10/31/95 07:33:21  SEQUENCE #203274  ERROR ID: HARDWARE ERROR
SCSI CDB: 0A0100001400
SCSI STATUS BYTE: CHECK CONDITION  SENSE KEY: 4  ASC/ASCQ: 4400
SCSI SENSE BYTES 0-17:
  7100040000000040000000004400B3083106
SCSI EXTENDED SENSE BYTES:
  4132030101000000724100000A50053343000E00000000334100000000000000
  FFFFFFF00000000000000000000000000000000000000000000004438362020202000
Press ENTER for additional entries...

F3=Cancel      F10=Exit      Enter

```

HEX	ASCII	Description
04		Sense key (Byte 2)
4400		ASC/ASCQ (additional sense code/additional sense code qualifier)(Bytes 12 and 13) (See "Sense Key, ASC and ASCQ Information" on page MSG-8 for error sense information.)
B3		FID (FRU identification number, Byte 14)
3106		First FSC (fault symptom code, Bytes 16 and 17)
3341		Last FSC (fault symptom code, Bytes 41 and 42)
443836	D86	Microcode level (Bytes 72-78)
(not shown)		VOLSER # in ASCII or EBCDIC (Bytes 83-88)

Figure 53. AIX TAPEUTIL and DIAG Commands Sense Data Error Log Example

```
IBM Tape Device Error Log Analysis
NAME: rmt1   LOCATION: 00-02-01-20   DEVICE TYPE: 3590
DATE: 10/31/95 07:33:21   SEQUENCE #203274   ERROR ID: 3590 SIM/MIM PAGE
SIM/MIM DATA:
310000440000614001303030303030303144383634313030373732303030303045383338
3039333830393830303049424D31332D303030303030303030303331353033353930423131
Press ENTER for additional entries...

F3=Cancel           F10=Exit           Enter
```

Figure 54. AIX TAPEUTIL and DIAG Commands SIM Error Log Example

```
IBM Tape Device Error Log Analysis
NAME: rmt1   LOCATION: 00-02-01-20   DEVICE TYPE: 3590
DATE: 10/31/95 07:33:21   SEQUENCE #203274   ERROR ID: 3590 SIM/MIM PAGE
SIM/MIM DATA:
310000440000614002303030303030303235384136313535363031303030334132415051
5239353001303830303049424D31322D30303030303054513331353033353930423141
Press ENTER for additional entries...

F3=Cancel           F10=Exit           Enter
```

Figure 55. AIX TAPEUTIL and DIAG Commands MIM Error Log Example

```
IBM Tape Device Error Log Analysis
NAME: rmt1   LOCATION: 00-02-01-20   DEVICE TYPE: 3590
DATE: 10/31/95 07:33:21   SEQUENCE #203274   ERROR ID: SCSI ADAPTER ERROR
SCSI CDB: 170000000000
SCSI ADAPTER ERROR: COMMAND TIMEOUT
Press ENTER for additional entries...

F3=Cancel           F10=Exit           Enter
```

Figure 56. AIX TAPEUTIL and DIAG Commands Error Log Example

Running Tapeutil

If **tapeutil** is running and an error condition is detected, an error message is displayed. The error sense data has the format seen in Figure 57 on page MSG-17. The **errno**, or error number, is explained in Figure 59 on page MSG-18.

Note: The following example is valid for microcode levels D0IA and later.

```

Read/Write test terminated, total bytes written 0
Operation failed with errno 5: I/O error
Residual count: 204800

Error Sense Data, Length 80

      0 1 2 3 4 5 6 7 8 9 A B C D E F
0000 - 7100 0400 0000 0040 0000 0000 4400 E403 [q.....@....D.õ.]
0010 - AD12 0021 0201 0100 0000 0000 0000 0A00 [!..!.....]
0020 - 0000 0000 0000 0000 0000 0000 0000 0000 [.....]
0030 - 0000 0000 0000 0000 0000 0000 0000 0000 [.....]
0040 - 0000 0000 0000 0000 4438 3620 2020 2000 [.....D86 .]

```

HEX	ASCII	DESCRIPTION
E4		FID (FRU identification number, Byte 14)
AD12		FSC (fault symptom code, Bytes 16 and 17)
443836	D86	Microcode level (Bytes 72-74)
(not shown)		VOLSER # in ASCII or EBCDIC (Bytes 83-88)

Figure 57. Tape Util Error Sample

Figure 58. Hex to ASCII Conversion									
Hex	ASCII	Hex	ASCII	Hex	ASCII	Hex	ASCII	Hex	ASCII
00	Null	30	0	41	A	4A	J	54	T
20	Space	31	1	42	B	4B	K	55	U
		32	2	43	C	4C	L	56	V
		33	3	44	D	4D	M	57	W
		34	4	45	E	4E	N	58	X
		35	5	46	F	4F	O	59	Y
		36	6	47	G	50	P	5A	Z
		37	7	48	H	51	Q	5F	-
		38	8	49	I	52	R		
		39	9			53	S		

Note: All codes are not shown.

Figure 59 shows only the **errno** values pertaining to tape devices. The complete list of **errno** values can be found in the AIX `/usr/include/sys/errno.h` header file.

<i>Figure 59. Device Driver to AIX ERRNO Translation</i>		
AIX errno	Device Driver Error Code	Description
1	EPERM	<ul style="list-style-type: none"> • General: The process does not have adequate permission to perform the desired function.
5	EIO	<ul style="list-style-type: none"> • Open: An I/O error occurred that indicates a failure to operate the device. • Write: The physical end of medium was detected, or it is a general error state indicating a failure to write to device. • IOCTL: An I/O error occurred during the operation. • Close: An I/O error occurred during the operation.
6	ENXIO	<ul style="list-style-type: none"> • General: The device has not been configured and is not receiving requests. • Write: A write operation was attempted after the device had reached end of medium.
9	EBADF	<ul style="list-style-type: none"> • General: A bad file descriptor was passed. • Write: A write operation was attempted on a device that was opened for read only.
11	EAGAIN	<ul style="list-style-type: none"> • Read: The device is already opened.
12	ENOMEM	<ul style="list-style-type: none"> • General: Insufficient memory available for some internal memory operation. • Read: The number of bytes requested in a read of a variable block record was less than the size of the block. This is referred to as an over-length condition.
14	EFAULT	<ul style="list-style-type: none"> • General: A memory failure occurred due to an invalid pointer or address.
16	EBUSY	<ul style="list-style-type: none"> • General: An excessive busy state was encountered. • Open: The device is reserved by another initiator or an excessive busy state was encountered.
22	EINVAL	<ul style="list-style-type: none"> • Open: The operation requested had invalid parameters or an invalid combination of parameters. • Write: The operation requested had invalid parameters or an invalid combination of parameters, or the number of bytes requested in the write was not a multiple of the block size for a fixed block transfer, or the number of bytes requested in the write was greater than the maximum block size allowed by the device for variable block transfers.
28	ENOSPC	<ul style="list-style-type: none"> • Write: A write operation failed because it had reached the early warning mark while running in label processing mode. This return code is only returned once at the moment early warning is reached.
46	ENOTREADY	<ul style="list-style-type: none"> • General: The device is not ready for operation or a tape is not in the drive. • Open: If not opened with the O_NONBLOCK or O_NDELAY, the drive is not ready for operation or there is no tape in drive. If the non-blocking flags are used, the drive is not ready for operation.
47	EWRPROTECT	<ul style="list-style-type: none"> • Open: An open operation with the O_RDWR or O_WRONLY flag was attempted on a write-protected tape. • Write: A write operation was attempted on a write-protected tape. • IOCTRL: An operation that would modify the media was attempted on a write-protected tape or a device that was opened for O_RDONLY.
78	ETIMEDOUT	<ul style="list-style-type: none"> • General: A command has timed out.
110	EMEDIA	<ul style="list-style-type: none"> • General: An unrecoverable media error was detected.

Using SMIT/ERRPT Commands

- To use the **smit** command:

Note: The **smit** command has various ways to format the error log.

1. Type **smit** at the AIX command line.
 2. Select **Problem Determination** from the System Management menu.
 3. Select **Error Log** from the Problem Determination menu.
 4. Select **Generate Error Report** from the Error Log menu.
 5. Select **filename**, then select **no** from the Single Select list.
 6. From the Generate Error Report menu you can select the type of reports you want to view, then press the **Do** icon.
 7. You can scroll through the log by using the up or down icons on the menu.
- To use the **errpt** command:
 1. Select **errpt |pg** at the AIX command line. The summary report will be displayed.
 2. You can scroll through the log by pressing the Enter key for the next page.
 3. You can type **q** to quit the error log at any time.

Or,

1. Type **errpt -a |pg** at the AIX command line. The detailed report will be displayed.
2. You can scroll through the log by pressing the Enter key for the next page.
3. You can type **q** to quit the error log at any time.

Analyze the sense key and ASC/ASCQ data to determine the type of sense information reported in the error log. If a hardware failure is indicated, use the FID and go to START-1 for problem determination. For errors that indicate SCSI adapter or SCSI bus errors, see Figure 56 on page MSG-16, go to “SCSI Bus Problem Determination” on page PROC-108.

For errors indicating system problems, enter the appropriate maintenance package.

Figure 60 on page MSG-20 is valid for microcode levels D0IA and later.

ERROR LABEL: TAPE_ERR2
ERROR ID: 476B351D

Date/Time: Tue Oct 31 07:33:21
Sequence Number: 203274
Machine ID: 000003243700
Node ID: kitt
Error Class: H
Error Type: PERM
Resource Name: rmt1
Resource Class: tape
Resource Type: 3590
Location: 00-02-01-20
VPD:

Manufacturer.....IBM
Machine Type and Model.....03590B11
Serial Number.....00000000315
Device Specific . (FW)4D86

Error Description
TAPE DRIVE FAILURE

Probable Causes
TAPE DRIVE

10
TAPE
TAPE DRIVE

Recommended Actions
PERFORM PROBLEM DETERMINATION PROCEDURES

Detailed Data
SENSE DATA

0604 0000 1101 FFFF FE00 0000 0000 0000 0102 0000 7000 **0400** 0000 0048 0000 0000
4400 E503 3010 004A 1E01 0191 004A 8250 0000 1100 **0036 2800 0033 4D00 0033 0600**
0000 0000 0190 0000 2700 0000 0020 0000 0000 0000 0000 0000 C700 0000 **4438 3620**
2020 2000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000

HEX	ASCII	Description
04		Sense key
4400		ASC/ASCQ (additional sense code/additional sense code qualifier)
		(See "Sense Key, ASC and ASCQ Information" on page MSG-8 for error sense information.)
E5		FID (FRU identification number)
3010		First FSC (fault symptom code)
3628		Second FSC (fault symptom code)
334D		Next to last FSC (fault symptom code)
3306		Last FSC (fault symptom code)
443836	D86	Microcode level
(not shown)		VOLSER # in ASCII or EBCDIC (Bytes 83-88)

Figure 60. AIX SMIT and ERRPT Command Error Log Example

```

ERROR LABEL:    SIM_MIM_RECORD_3590
ERROR ID:      2E2EFDDĒ

Date/Time:     Tue Oct 31 07:33:21
Sequence Number: 203274
Machine ID:    000003243700
Node ID:      kitt
Error Class:   H
Error Type:    UNKN
Resource Name: rmt1
Resource Class: tape
Resource Type: 3590
Location:     00-02-01-20
VPD:
    Manufacturer.....IBM
    Machine Type and Model.....03590B1A
    Serial Number.....000000000315
    Device Specific . (FW) .....B58A

Error Description
UNDETERMINED ERROR

Probable Causes
TAPE DRIVE
TAPE CONTROL UNIT

Failure Causes
TAPE DRIVE

Recommended Actions
REFER TO PRODUCT DOCUMENTATION FOR ADDITIONAL INFORMATION

Detailed Data
DIAGNOSTIC EXPLANATION
3100 0044 0000 6140 0130 3030 3030 3030 3235 3841 3432 3030 3737 3330 3030 3030
3937 3530 3031 3530 3031 3830 3030 4942 4D31 322D 3030 3030 3030 3058 5858 5858
3033 3539 3042 3141

```

HEX	ASCII	Description
01		01=SIM 02=MIM
3235 3841	258A	Model and Microcode level
3432	42	Message code (See "Message Codes" on page MSG-6)
33	3	FID severity (See "SIM/MIM Severity" on page MSG-8)
3937	97	FID (FRU identification number)
3530 3031	5001	First FSC (fault symptom code)
3530 3031	5001	Last FSC (fault symptom code)
3033 3539 30	03590	Machine Type
42 3141	B1A	Model

Figure 61. Error Log Example of SIM Message

```

ERROR LABEL:    SIM_MIM_RECORD_3590
ERROR ID:      2E2EFDDĒ

Date/Time:     Tue Oct 31 07:33:21
Sequence Number: 203274
Machine ID:    000003243700
Node ID:      kitt
Error Class:   H
Error Type:    UNKN
Resource Name: rmt1
Resource Class: tape
Resource Type: 3590
Location:     00-02-01-20
VPD:
    Manufacturer.....IBM
    Machine Type and Model.....03590B1A
    Serial Number.....000000000315
    Device Specific . (FW) .....B58A

Error Description
UNDETERMINED ERROR

Probable Causes
TAPE DRIVE
TAPE CONTROL UNIT

Failure Causes
TAPE DRIVE

Recommended Actions
REFER TO PRODUCT DOCUMENTATION FOR ADDITIONAL INFORMATION

Detailed Data
DIAGNOSTIC EXPLANATION
3100 0044 0000 6140 0230 3030 3030 3030 3235 3841 3631 3535 3630 3130 3030 3341
3241 5051 5239 3530 0130 3830 3030 4942 4D31 322D 3030 3030 3030 3058 5858 5858
3033 3539 3042 3141

```

HEX	ASCII	Description
02		01=SIM 02=MIM
3235 3841	258A	Model and Microcode level
3631	61	Message code (See "Message Codes" on page MSG-6)
31	1	FID severity (See "SIM/MIM Severity" on page MSG-8)
5051 5239 3530	PQR950	VOLSER (volume serial number)
3033 3539 30	03590	Machine Type
42 3141	B1A	Model

Figure 62. Error Log Example of MIM Message

```

ERROR LABEL:    RECOVERED_ERROR
ERROR ID:       0F78A011

Date/Time:      Mon Nov 20 07:33:21
Sequence Number: 232646
Machine ID:     000003243700
Node ID:        kitt
Error Class:    H
Error Type:     TEMP
Resource Name:  rmt1
Resource Class: tape
Resource Type:  3590
Location:       00-02-01-0,0
VPD:
    Manufacturer.....IBM
    Machine Type and Model.....03590B1A
    Serial Number.....000000000315
    Device Specific . (FW) .....B58A

Error Description
Recovery logic initiated by device

Probable Causes
Undetermined

Failure Causes
TAPE DRIVE
MEDIA

Recommended Actions
THIS ALERT IDENTIFIES THE CAUSE OF A PREVIOUS ERROR WHICH HAS BEEN RECOVERED

Detail Data
SENSE DATA
0602 0000 0A01 0000 1400 0000 0000 0000 0102 0000 7100 0400 0000 0040 0000 0000
4400 B308 3106 4132 0301 0100 0000 7241 0000 0A50 0533 4300 0E33 4D00 0033 4100
0000 0000 0000 FFFF FF00 0000 0000 0000 0000 0000 0000 0002 2200 6000 3538 4120
2020 2000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000

```

HEX	ASCII	Description
04		Sense Key
4400		ASC/ASCQ (additional sense code/additional sense code qualifier) (See "Sense Key, ASC and ASCQ Information" on page MSG-8 for error sense information.)
FE		FID (FRU identification number)
3106		First FSC (fault symptom code)
33 43		Second FSC (fault symptom code)
33 4D		Next to Last FSC (fault symptom code)
33 41		Last FSC (fault symptom code)
3538 41	58A	Microcode level
(not shown)		VOLSER # in ASCII or EBCDIC (Bytes 83-88)

Figure 63. AIX SMIT and ERRPT Command Error Log Example

1	2	3	4	5	6
0502F666	1003075695	P	H	scsi0	ADAPTER ERROR
0502F666	1003075595	P	H	scsi0	ADAPTER ERROR
1104AA28	1003075495	T	S	SYSPROC	System reset interrupt received
9DBCfDEE	1003075795	T	O	errdemon	Error logging turned ON
0F78A011	1003075195	T	H	rmt1	Recovery logic initiated by device
4865FA9B	1003074995	P	H	rmt1	TAPE OPERATION ERROR
476B351D	1003074995	P	H	rmt1	TAPE DRIVE FAILURE
2E2EFdDE	1003074995	U	H	rmt1	UNDETERMINED ERROR
476B351D	1003074995	P	H	rmt1	TAPE DRIVE FAILURE
2E2EFdDE	1003074995	U	H	rmt1	UNDETERMINED ERROR
2E2EFdDE	1003074995	U	H	rmt1	UNDETERMINED ERROR
0502F666	1003074495	P	H	scsi0	ADAPTER ERROR
0502F666	1003074395	P	H	scsi0	ADAPTER ERROR
1104AA28	1003074395	T	S	SYSPROC	System reset interrupt received
9DBCfDEE	1003074595	T	O	errdemon	Error logging turned ON
4865FA9B	1003073795	P	H	rmt1	TAPE OPERATION ERROR
476B351D	1003073795	P	H	rmt1	TAPE DRIVE FAILURE
2E2EFdDE	1003073795	U	H	rmt1	UNDETERMINED ERROR
476B351D	1003073795	P	H	rmt1	TAPE DRIVE FAILURE
2E2EFdDE	1003073595	U	H	rmt1	UNDETERMINED ERROR
AA8AB241	1003030195	T	O	OPERATOR	OPERATOR NOTIFICATION
AA8AB241	1002030195	T	O	OPERATOR	OPERATOR NOTIFICATION
AA8AB241	1001030195	T	O	OPERATOR	OPERATOR NOTIFICATION
FCA960CE	1001001395	T	S	tok0	EXCESSIVE TOKEN-RING ERRORS
20188DE1	0928091195	P	H	tok0	WIRE FAULT
476B351D	0927132795	P	H	rmt0	TAPE DRIVE FAILURE
476B351D	0927132795	P	H	rmt0	TAPE DRIVE FAILURE
476B351D	0927132695	P	H	rmt0	TAPE DRIVE FAILURE
476B351D	0927132695	P	H	rmt0	TAPE DRIVE FAILURE
5537AC5F	0927132495	P	H	rmt0	TAPE DRIVE FAILURE

1	2	3	4	5	6
---	NUMBER-----	DESCRIPTION-----	---	ERROR-CLASS-----	DESCRIPTION-----
1	Error ID		H	Hardware	
2	Timestamp (Mon., Day, Hr., Min., Yr.)		S	Software	
3	Error Type		O	Informational	
4	Error Class				
5	Resource Name				
6	Error Description				

---	ERROR-TYPE-----	DESCRIPTION-----
PEND		The availability loss of a device or component is imminent.
PERF		The performance of a device or component has degraded to an unacceptable level.
PERM		A hardware or software condition that could not be recovered from.
TEMP		A hardware condition that was recovered from after several unsuccessful attempts.
UNKN		The severity of the condition could not be determined.

Figure 64. AIX SMIT and ERRPT Commands Error Log Example

Error Log Analysis, AS/400

To gain access to the AS/400 Problem logs and error logs, sign on at any available workstation using the QSRV logon and its security password (QSRV). After sign on, the proper access authorizations will be granted and the AS/400 MAIN MENU will be displayed.

There are two procedures depending on which version/release of OS/400 you are running.

AS/400 System with CISC Processor

1. Type STRSST (Start System Service Tools) command on the command entry line on the AS/400 Main Menu and press enter.
2. Select "Start a service tool".
3. Select "Error log utility".
4. Select "Analyze error log".
5. Specify the time period for searching the error log, then select "Magnetic media".
6. On the Select Analysis Report Options menu, specify a device type of 3590 and press enter. Leave all other options at their default value.
7. Use the "Display report" option to display the desired error log entry.
8. The following figure is a sample AS/400 Error Log display screen showing the 3590 error log data.

```

                                Display Detail Report for Resource

Resource      Type      Model      Serial      Address
TAP02        3590      B11        13-10063    0270-1700FFFF

Error log ID . . . . . : 004602D2   Sequence . . . . . : 178324
Date . . . . . : 10/23/95   Time . . . . . : 11:38:02
Reference code . . . . . : 9350   Error code . . . . . : 00000000
Table ID . . . . . : 35900B11   IPL source . . . . . : B
Error type . . . . . : Permanent
Description . . . . . :
Tape unit failure
SIM/MIM message . . . . . : 00000000137E420077300000B0311531
                            15800000B013000000000007503590B11

Press Enter to continue.

F3=Exit          F6=Display hexadecimal report
F10=Display previous detail report  F12=Cancel

```

Hex	Description
137E	Model and Microcode Level
42	Message Code (see "Message Codes" on page MSG-6)
B0	FID (FRU Identifier)
3115	First FSC (fault symptom code)
3115	Last FSC (fault symptom code)
0000000075	Sequence Number (drive serial number)
03590B11	Device Type and Model Number

Figure 65. AS/400 Example Error Log of SIM

To display the hexadecimal error report, press F6. The following figure is an example of a 3590 hexadecimal error report which shows a permanent read/write error. This figure is valid for microcode levels D0IA and later. Press **Page Up** or **Page Down** to display offset 0130 to 016C in the error log.

```

Display Hexadecimal Report for Resource

Name          Type      Model      Serial      Resource
TAP02         3590     B11        13-10063    NAME
                                         DEVICE

Offset        0 1 2 3 4 5 6 7 8 9 A B C D E F  EBCDIC
0000C0        00000000 00000000 00000000 00000000  .....
0000D0        00000000 00000000 00000000 00000000  .....
0000E0        F8807800 65010001 00000270 1700FFFF  8.....
0000F0        35900B11 93500001 00631202 05D8D5E6  ....&.....QNW
000100        F0F0F5F0 40404250 00009200 00000000  0050 .&.....
000110        00040000 0000A0B0 0E223444 32440000  .....
000120        0000F000 03000000 00400000 00000900  ..0.....
000130        FE2A3118 00010003 01300009 42494280  .....
000140        10001035 42000133 6B050433 54000000  .....
000150        00000003 00000400 00005A90 00000003  .....!.....
000160        00000100 00002300 00004438 36202020  .....
000170        20001000 00505152 39353000 00000600  .....
                                         More...

Press Enter to continue.

F3=Exit      F12=Cancel

```

OFFSET	HEX	ASCII	DESCRIPTION
00E4-00E5	6501		IOP Type
00EC-00ED	1700		1 = IOP Port Used 700 = Drive Address
00F0-00F3	35900B11		Device Type and Model
00F4-00F5	9350		SRC (system reference code)
0130	FE		FID (FRU identification number)
0132-0133	3118		First FSC (fault symptom code)
0143-0144	3542		Second FSC (fault symptom code)
0147-0148	336B		Next to Last FSC (fault symptom code)
014B-014C	3354		Last FSC (fault symptom code)
016A-016C	443836	D86	Microcode level
0175-017A	505152393530		VOLSER # in ASCII or EBCDIC

Figure 66. AS/400 Hexadecimal Error Log (display)

Figure 67. Hex to ASCII Conversion

Hex	ASCII	Hex	ASCII	Hex	ASCII	Hex	ASCII	Hex	ASCII
00	Null	30	0	41	A	4A	J	54	T
20	Space	31	1	42	B	4B	K	55	U
		32	2	43	C	4C	L	56	V
		33	3	44	D	4D	M	57	W
		34	4	45	E	4E	N	58	X
		35	5	46	F	4F	O	59	Y
		36	6	47	G	50	P	5A	Z
		37	7	48	H	51	Q	5F	_
		38	8	49	I	52	R		
		39	9			53	S		

Note: All codes are not shown.

The following figure is an example of an AS/400 hexadecimal error report printout with an Error Type of Permanent. This figure is valid for microcode levels D0IA and later.

The FID and FSC in the error log are in ASCII, while the microcode level is in hex. Use the ASCII to Hex Conversion table provided at Figure 67 on page MSG-26

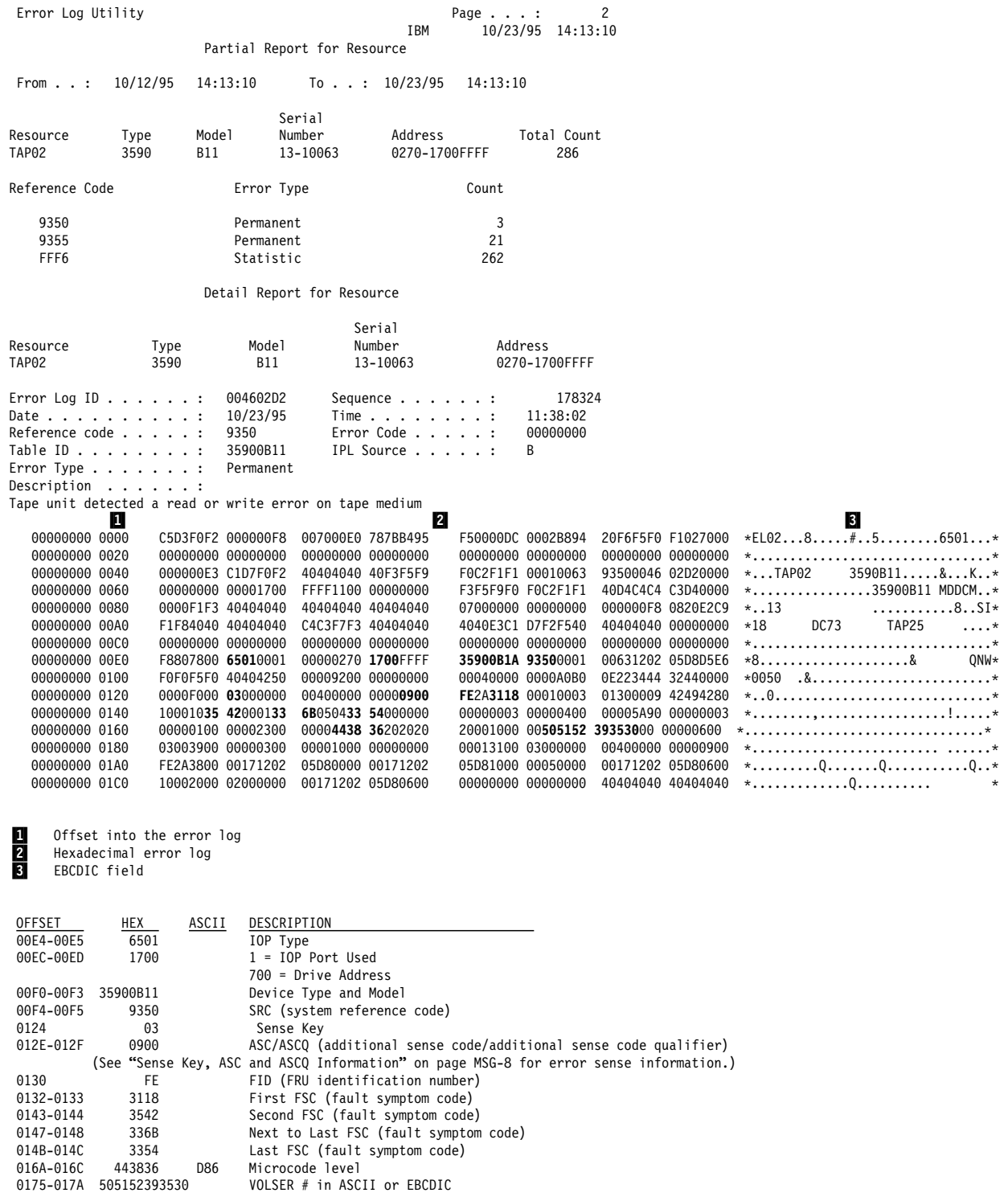


Figure 68. AS/400 Hexadecimal Error Log (printout)

Analyze the sense key and ASC/ASCQ data to determine the type of sense information reported in the error log. If a hardware failure is indicated, use the FID and go to START-1 for problem determination.

See *AS/400 Advanced Series Service Functions*, SY44-4902 for more detailed information on displaying and printing the error logs.

AS/400 System with RISC Processor

1. Type STRSST (Start System Service Tools) command on the command entry line on the AS/400 Main Menu and press enter.
2. Select "Start a service tool".
3. Select "Product activity log".
4. Select "Analyze log".
5. Specify the time period for searching the error log, then select "Magnetic media" option.
6. On the "Select Analysis Report Options" menu, specify a device type of 3590 and press enter. Leave all other options at their default value.
7. Use the "Log Analysis Report" menu to display the desired error log entry.

Note: You may use the PF11 function key which will give you a brief description of the error log entry. This could be helpful when scanning the error logs.

8. The following figure is a sample AS/400 Error Log display screen showing the 3590 error log data.

```

Display Detail Report for Resource

Name          Type      Model          Serial          Resource
TAP02         3590     B11            13-10063        TAP34

Error log ID . . . . . : 004602D2      Sequence . . . . . : 178324
Date . . . . . : 10/23/95      Time . . . . . : 11:38:02
Reference code . . . . . : 9350      Secondary code . . . : 00000000
Table ID . . . . . : 35900B11      IPL source/state . . : B/3

Class . . . . . : Permanent
System Ref Code . . . . . : 35909300
Tape unit failure

SIM/MIM message . . . . . : 00000000137E420077300000B0311531
                          1580000B013000000000007503590B11

Press Enter to continue.

F3=Exit          F4=Additional Information  F6=Hexadecimal report
F9=Address Information  F10=Previous detail report  F12=Cancel

```

Hex	Description
137E	Model and Microcode Level
42	Message Code (see "Message Codes" on page MSG-6)
B0	FID (FRU Identifier)
3115	First FSC (fault symptom code)
3115	Last FSC (fault symptom code)
0000000075	Sequence Number (drive serial number)
03590	Device Type
B11	Device Model Number

Figure 69. AS/400 Example Error Log of SIM Message

9. Press F4 to display additional information. See the example in Figure 70 on page MSG-29.

Display Additional Information for Resource

Name	Type	Model	Serial Number	Resource Name
TAP02	3590	B11	13-10063	TAP34
SIM/MIM message : 00000000 137E420077300000B0311531 1580000B01300000 00000007503590B11				

```

-----Hex-----Description-----
137E      Link and Microcode Level
  42      Message Code (see "Message Codes" on page MSG-6)
  B0      FID (FRU Identifier)
 3115     First FSC (fault symptom code)
 3115     Last FSC (fault symptom code)
0000000075 Sequence Number (drive serial number)
 03590    Device Type
  B11     Device Model Number
-----
  
```

Figure 70. AS/400 Example Error Log of SIM Message

To display the hexadecimal error report, press F6. The following figure is an example of a 3590 hexadecimal error report which shows a permanent read/write error. This figure is valid for microcode levels D01A and later. Press **Page Up** or **Page Down** to display offset 01D0 to 020C in the error log.

Display Hexadecimal Report for Resource

Name	Type	Model	Serial Number	Resource Name	
TAP02	3590	B11	13-10063	DEVICE	
Offset	0 1 2 3	4 5 6 7	8 9 A B	C D E F	EBCDIC
000180	F8807800	65010001	00000270	1700FFFF	8.....
000190	35900B11	93500001	00631202	05D8D5E6&.....QNW
0001A0	F0F0F5F0	40404250	00009200	00000000	0050 .&.....
0001B0	00040000	0000A0B0	0E223444	32440000
0001C0	0000F000	03000000	00400000	0000 0900	..0.....
0001D0	FE2A3118	00010003	01300009	42494280
0001E0	1000 1035	42000133	6B050433	54000000,
0001F0	00000003	00000400	00005A90	00000003!
000200	00000100	00002300	0000 4438	36202020
000210	20001000	00505152	39353000	00000600
000220	00000000	00000000	00000000	00000000
000230	00001000	0003FFFF	FFFC1200	0331D9E2RS

More...

Press Enter to continue.

F3=Exit F12=Cancel

OFFSET	HEX	ASCII	DESCRIPTION
0184-0185	6501		IOP Type
018C-018D	1700		1 = IOP Port Used 700 = Drive Address
0190-0193	35900B11		Device Type and Model
0194-0195	9350		SRC (system reference code)
01C4	03		Sense Key
01CE-01CF	0900		ASC/ASCQ (additional sense code/additional sense code qualifier) (See "Sense Key, ASC and ASCQ Information" on page MSG-8 for error sense information.)
01D0	FE		FID (FRU identification number)
01D2-01D3	3118		First FSC (fault symptom code)
01E3-01E4	3542		Second FSC (fault symptom code)
01E7-01E8	336B		Next to Last FSC (fault symptom code)
01EB-01EC	3354		Last FSC (fault symptom code)
020A-020C	443836	D86	Microcode level
0215-021A	505152393530		VOLSER # in ASCII or EBCDIC

Figure 71. AS/400 Hexadecimal Error Log (display)

The following figure is an example of an AS/400 hexadecimal error report printout with an Error Type of Permanent. This figure is valid for microcode levels D0IA and later.

The FID and FSC in the error log are in hex, while the microcode level is in ASCII. Use the ASCII to HEX Conversion table provided.

Partial Report for Resource

From . . : 10/12/95 14:13:10 To . . . : 10/23/95 14:13:10

Resource	Type	Model	Serial Number	Address	Total Count
TAP02	3590	B11	13-10063	0270-1700FFFF	286

Reference Code	Error Type	Count
9350	Permanent	3
9355	Permanent	21
FFF6	Statistic	262

Detail Report for Resource

Resource	Type	Model	Serial Number	Address
TAP02	3590	B11	13-10063	0270-1700FFFF

Error Log ID : 004602D2 Sequence : 178324
 Date : 10/23/95 Time : 11:38:02
 Reference code : 9350 Error Code : 00000000
 Table ID : 35900B11 IPL Source : B
 Error Type : Permanent
 Description :
 Tape unit detected a read or write error on tape medium

```

1      00000000 0000 C5D3F0F2 000000F8 007000E0 787BB495 2      F50000DC 0002B894 20100103 3C000000 *EL02...8...#...5.....*
00000000 0020 92100000 11000000 00000000 01720000 F3F5F9F0 C2F1F140 F1F260F0 F0F0F0F0 *.....3590B11 12-00000*
00000000 0040 4040F6F5 F0F10000 00000001 00010000 00020000 00050001 0002FFFF 0000FFFF *.6501.....*
00000000 0060 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
00000000 0080 00000000 00000000 00000000 00000000 00000000 00000000 00000000 0000E3C1 *.....TA*
00000000 00A0 D7F0F740 40404040 00000000 00000000 00000000 00000000 40404040 40404040 *P07 ..... *
00000000 00C0 40404040 40404040 40404040 40404040 40404040 40404040 40404040 40404040 *.....*
00000000 00E0 F3F5F9F0 F0C2F1F1 0000E2D3 C9C3C9D6 4040E5F3 D9F6D4F0 40400000 00000000 *35900B11..SLICIO V3R6M0 .....*
00000000 0100 00790000 00000000 00000170 00000000 00000000 01720000 00000000 00000000 *.....*
00000000 0120 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
00000000 0140 E3C1D7F0 F7404040 40400000 00000000 40404040 40404040 40404040 00070001 *TAP07 ..... *
00000000 0160 00000000 10200003 00000000 00000000 00000000 00000000 0005001E 00000188 *.....*
00000000 0180 F8807800 65010001 00000120 12F0FFFF 35900B11 92100000 00001202 06240000 *8.....0.....*
00000000 01A0 00000000 00004250 0000920E 00000000 00040000 0000A0B0 0E213234 433800B4 *.....&.....*
00000000 01C0 0000F000 03000000 00400000 00000900 FE2A3118 00010003 01300009 42494280 *..0.....*
00000000 01E0 10001035 42000133 6B050433 54000000 00000003 00000400 000005A9 00000003 *.....!.....*
00000000 0200 00000100 00002300 00004438 36202020 20001000 00505152 39353000 00000600 *.....*
00000000 0220 03003900 00000300 00001000 00000000 00013100 03000000 00400000 00000900 *.....*
00000000 0240 FE2A3800 00171202 05D80000 00171202 05D81000 00050000 00171202 05D80600 *.....Q.....Q.....Q..*
00000000 0260 10002000 02000000 00171202 05D80600 00000000 00000000 40404040 40404040 *.....Q.....*
00000000 0280 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
1 LINES 00000000 02A0 TO 00000000 02A0 SAME AS ABOVE
00000000 02C0 00000000 00000000 00000000 00000000 00000000 00000000 00000000 000000D5 *.....N*
00000000 02E0 00000000 00000000 00000000 00000000 00000000 00000000 00000000 0000D500 *.....N*
00000000 0300 00000000 00000000 40404040 40404040 40404040 40404040 40404040 40404040 *.....*

```

***** END OF COMPUTER PRINTOUT *****

- 1 Offset into the error log
- 2 Hexadecimal error log
- 3 EBCDIC field

OFFSET	HEX	ASCII	DESCRIPTION
0184-0185	6501		IOP Type
018C-018D	12F0		1 = IOP Port Used 2F0 = Drive Address
0190-0193	35900B11		Device Type and Model
0194-0195	9350		SRC (system reference code)
01C4	03		Sense Key
01CE-01CF	0900		ASC/ASCQ (additional sense code/additional sense code qualifier) (See "Sense Key, ASC and ASCQ Information" on page MSG-8 for error sense information.)
01D0	FE		FID (FRU identification number)
01D2-01D3	3118		First FSC (fault symptom code)
01E3-01E4	3542		Second FSC (fault symptom code)
01E7-01E8	336B		Next to Last FSC (fault symptom code)
01EB-01EC	3354		Last FSC (fault symptom code)
020A-020C	443836	D86	Microcode level
0215-021A	505152393530		VOLSER # in ASCII or EBCDIC

Figure 72. AS/400 Hexadecimal Error Log (printout)

Check the Message Code, see "Message Codes" on page MSG-6, for all SIM/MIMs before entering the START section with the FID. Once you have located the FID, go to START-1 for problem determination.

See *AS/400 Advanced Series Service Functions*, SY44-4902 for more detailed information on displaying and printing the error logs.

Figure 73. Hex to ASCII Conversion

Hex	ASCII	Hex	ASCII	Hex	ASCII	Hex	ASCII	Hex	ASCII
00	Null	30	0	41	A	4A	J	54	T
20	Space	31	1	42	B	4B	K	55	U
		32	2	43	C	4C	L	56	V
		33	3	44	D	4D	M	57	W
		34	4	45	E	4E	N	58	X
		35	5	46	F	4F	O	59	Y
		36	6	47	G	50	P	5A	Z
		37	7	48	H	51	Q	5F	-
		38	8	49	I	52	R		
		39	9			53	S		

Note: All codes are not shown.

Obtaining Error Information from a Sun (Solaris) System

The Sun system does not provide error logs for analysis; therefore, you will have to use the device diagnostics and Device Error Log for problem determination. See “CE Logs Menu” on page PANEL-43 and “Error Log Analysis Procedure” on page PROC-99. When you have located a FID, go to START-1.

You may refer to APPENDIX A which contains additional information concerning host attachment software service tools for Sun (Solaris), including *tapeutil*.

See *IBM SCSI Tape Drive, Medium Changer, and Library Device Drivers: Installation and User's Guide*, GC35-0154 for additional information about Solaris service and diagnostic aids.

Obtaining Error Information from an HP/UX System

The HP-UX system does not provide error logs for analysis; therefore, you will have to use the device diagnostics and Device Error Log for problem determination. See “CE Logs Menu” on page PANEL-43 and “Error Log Analysis Procedure” on page PROC-99. When you have located a FID, go to START-1.

You may refer to APPENDIX A which contains additional information concerning host attachment software service tools for HP-UX systems, including *tapeutil*.

See *IBM SCSI Tape Drive, Medium Changer, and Library Device Drivers: Installation and User's Guide*, GC35-0154 for additional information about HP/UX service and diagnostic aids.

Obtaining Error Information from a Windows NT System

You may refer to APPENDIX A which contains additional information concerning host attachment software service tools for Windows NT systems, including *ntutil*.

See *IBM SCSI Tape Drive, Medium Changer, and Library Device Drivers: Installation and User's Guide*, GC35-0154 for additional information about Windows NT service and diagnostic aids.

Running NT Util

If **ntutil** is running and an error condition is detected, an error message is displayed. The error sense data has the format seen in Figure 74 on page MSG-34. The **err 0 ERROR_SUCCESS>**, or error number, is explained in “NTUTIL Symbolic Error and Error Number” on page MSG-35.

```

enter selection: 39
Scsi status: 02h/Sense information Length 60h
Sense KEY/ASC/ASCQ = 02/3a/00
KEY meaning is: not ready
Sense Info - - - consult SCSI spec for details

```

```

      00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F
-----
0000 - 70 00 02 00 00 00 00 58 00 00 00 00 3a 00 FF 02
0010 - C4 08 00 00 00 00 01 40 00 00 00 00 00 00 0A 00
0020 - 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0030 - 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0040 - 00 00 00 00 00 00 00 00 32 46 31 20 20 20 20 00
0050 - 00 00 00 50 51 52 39 35 30 00 00 00 00 00 00 00

```

```

analyze <> called with rc 1 err 0 <ERROR_SUCCESS> data 0
total elapsed time in seconds = 0.00
Return to continue:

```

HEX	ASCII	DESCRIPTION
FF		FID (FRU identification number) Byte 14
C408		FSC (fault symptom code) Bytes 16 and 17
324631	2F1	Microcode level, Bytes 72-74
505152393530		VOLSER# in ASCII or EBCDIC

Figure 74. Tape Util Error Sample

For further information on gathering error data, see *IBM SCSI Tape Drive, Medium Changer, and Library Device Drivers: Installation and User's Guide*, GC35-0154, and the Hardware Reference Manual. On certain errors a `ntutil test_unit_ready` command (39) has to be issued to display the sense information. Sense information can also be retrieved with a `Log_sense` command (83).

NTUTIL Symbolic Error and Error Number

Symbolic Error	NT Error Number
ERROR_SUCCESS	0
ERROR_INVALID_FUNCTION	1
ERROR_FILE_NOT_FOUND	2
ERROR_PATH_NOT_FOUND	3
ERROR_TOO_MANY_OPEN_FILES	4
ERROR_ACCESS_DENIED	5
ERROR_INVALID_HANDLE	6
ERROR_NOT_ENOUGH_MEMORY	8
ERROR_BAD_FORMAT	9
ERROR_INVALID_BLOCK	10
ERROR_BAD_ENVIRONMENT	11
ERROR_INVALID_ACCESS	12
ERROR_INVALID_DATA	13
ERROR_OUTOFMEMORY	14
ERROR_INVALID_DRIVE	15
ERROR_WRITE_PROTECT	19
ERROR_BAD_UNIT	20
ERROR_NOT_READY	21
ERROR_BAD_COMMAND	22
ERROR_CRC	23
ERROR_HANDLE_EOF	38
ERROR_NOT_SUPPORTED	50
ERROR_DEV_NOT_EXIST	55
ERROR_ALREADY_ASSIGNED	85
ERROR_INVALID_PARAMETER	87
ERROR_OPEN_FAILED	110
ERROR_INSUFFICIENT_BUFFER	122
ERROR_INVALID_NAME	123
ERROR_BUSY_DRIVE	142
DD_NO_SENSE	200
DD_DEVICE_DRIVER_FAILURE	201
DD_EEPROM_FAILURE	202
DD_MANUAL_INTERVENTION	203
DD_RECOVERED_ERROR	204
DD_SCSI_ADAPTER_ERROR	205
DD_SCSI_ERROR	206
DD_SCSI_BUSY	211
DD_ILLEGAL_REQUEST	207
DD_COMMAND_ABORTED	208
DD_HARDWARE_MICROCODE	209
DD_UNIT_ATTENTION	210
ERROR_MORE_DATA	234
DD_CARTRIDGE_ENTRY_FAILURE	300

Symbolic Error	NT Error Number
DD_CARTRIDGE_LOAD_FAILURE	301
DD_CARTRIDGE_IN_FAILED_DRIVE	302
DD_CAROUSEL_NOT_LOADED	303
DD_CHANGER_FAILURE	304
DD_DRIVE_FAILURE	305
DD_DRIVE_OR_MEDIA_FAILURE	306
DD_ENTRY_EXIT_FAILURE	307
DD_ENTRY_EXIT_NOT_PRESENT	308
DD_LIBRARY_AUDIT	309
DD_LIBRARY_FULL	310
DD_MEDIA_EXPORT	311
DD_SLOT_FAILURE	312
DD_SLOT_OR_MEDIA_FAILURE	313
DD_SOURCE_EMPTY	314
DD_DESTINATION_FULL	315
DD_CLENER_INST	316
DD_MEDIA_NOT_EJECTED	317
DD_IOPORT_NOT_CONFIG	318
DD_FIRST_DEST_EMPTY	319
DD_END_PHYSICAL_MEDIA	400
DD_MEDIA_BLANK	401
DD_MEDIA_CORRUPTED	402
DD_MEDIA_FAILURE	403
DD_MEDIA_INCOMPATIBILITY	404
DD_SECTOR_RELOCATION	405
DD_SECTOR_OUT_OF_RANGE	406
DD_WRITE_PROTECT	407
DD_CLEAN_MEDIA	408
DD_MEDIA_FAULT	409
DD_CLEANNING_COMPLETE	410
DD_LOGICAL_END_OF_MEDIA	411
DD_MEDIA_NOT_PRESENT	412
DD_BEGINNING_OF_MEDIA	413
DD_ERASE_FAILURE	414
DD_WRITE_TO_WRITTEN_WORM	415
DD_WRONG_LENGTH_BLOCK	416
ERROR_IO_INCOMPLETE	996
ERROR_IO_PENDING	997
ERROR_NOACCESS	998
ERROR_CANTOPEN	1011
ERROR_CANTREAD	1012
ERROR_CANTWRITE	1013
ERROR_END_OF_MEDIA	1100

Symbolic Error	NT Error Number
ERROR_FILEMARK_DETECTED	1101
ERROR_BEGINNING_OF_MEDIA	1102
ERROR_SETMARK_DETECTED	1103
ERROR_NO_DATA_DETECTED	1104
ERROR_PARTITION_FAILURE	1105
ERROR_INVALID_BLOCK_LENGTH	1106
ERROR_DEVICE_NOT_PARTITIONED	1107
ERROR_UNABLE_TO_LOCK_MEDIA	1108
ERROR_UNABLE_TO_UNLOAD_MEDIA	1109
ERROR_MEDIA_CHANGED	1110
ERROR_BUS_RESET	1111
ERROR_NO_MEDIA_IN_DRIVE	1112
ERROR_IO_DEVICE	1117
ERROR_TOO_MANY_LINKS	1142



Operator Panel

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Operator/CE Panel Display

The operator/CE panel provides a menu-driven operator and service interface through a liquid crystal display assembly. Displays include operator and service menus, device status, activities, error conditions, and data.

Several languages are available on the 3590. The fonts and translations for all of these languages are included in each microcode release, regardless of country. Selection of the desired language is through the operator/CE panel. To change languages, the operator selects the desired language from the “Change Language Menu” on page PANEL-24. The CE menus are always in English.

Operator tasks include making selections from the operator menus. For example, Unload Drive is a selection from the “Options Menu” on page PANEL-17. This menu selection causes a loaded cartridge to be rewound and unloaded from the device. The device will not accept any motion commands after you select Unload Drive. If the device has data in the buffers, the device will synchronize the data (empty the buffers to tape or the host) before rewinding. If the device cannot synchronize the buffers, status appropriate to the error is presented to the initiator. The device becomes *not ready* immediately after Unload Drive is selected; the operator/CE panel displays “UNLOADED.”

Figure 75 on page PANEL-4 shows the controls and the indicator on the operator/CE panel.

- | The operator/CE panel for the Model B11/E11 is mounted above the priority cell on the ACF. The Model B11/E11 is mounted in a rack (front-serviced) or in an A14 frame (rear-serviced).
- | For the Model B1A/E1A, which does not have an ACF, the operator/CE panel is mounted in front of the drive. The Model B1A/E1A is mounted in the 3494 tape library as a rear-serviced device.

The operator/CE panel has five push buttons; three are exposed and two are hidden from view. When the display is in the normal position, the operator can use the three exposed push buttons (up arrow, down arrow, and Enter).

When the panel is in the service position, the service representative (usually called a CE) can use two additional push buttons (Reset and Change Mode). To put the panel in the service position and expose the two CE buttons, the CE releases two finger latches on the back of the panel.



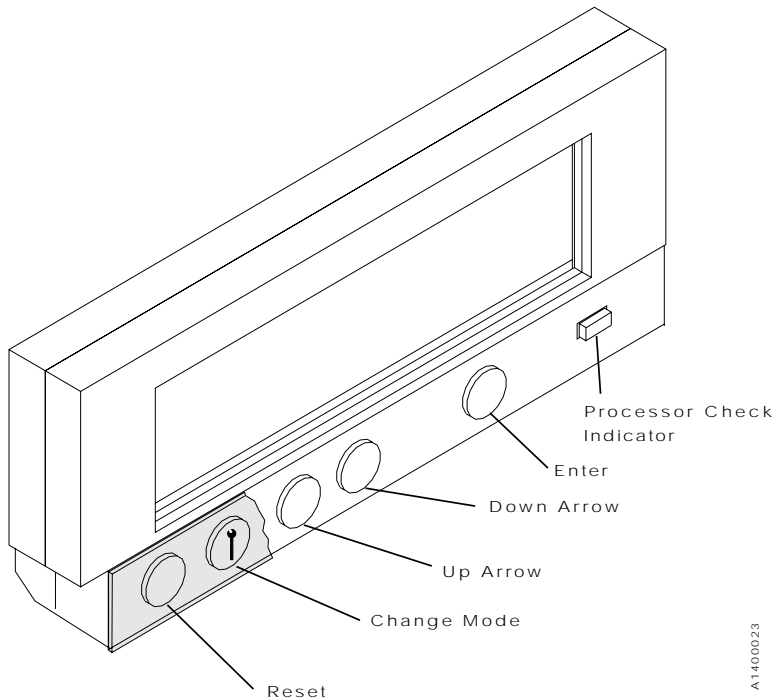
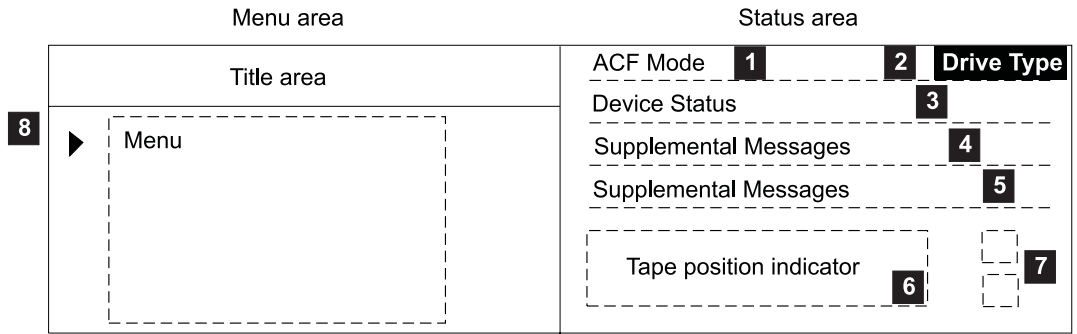


Figure 75. Operator/CE Panel

From left to right, the push buttons and indicator are as follows:

<u>Push Button</u>	<u>Description</u>
Reset	Allows the CE to perform a device power-ON reset. Attention: The device runs the diagnostics, which takes approximately 2.5 minutes. Do not insert your hands in the ACF during this time, even if the panel stops displaying <i>Diags Running</i> because the ACF transport may move up or down.
Change Mode	Allows the CE to toggle between CE mode and Normal mode. CE mode can be selected at any time, but the mode will not become active until the device completes all current operations. Normal mode can be selected at any time. Selecting Normal mode returns the operator/CE panel menu to the Operator menu (indicating status and conditions). CE mode enables special menus on the operator/CE panel display not available to the operator in Normal mode.
Up Arrow	Allows the operator or the CE to move the cursor arrow up through the menu options.
Down Arrow	Allows the operator or the CE to move the cursor arrow down through the menu options.
Enter	Allows the operator or the CE to select the menu option at the location of the cursor arrow.
<u>Indicator Name</u>	<u>Description</u>
Processor Check	During a normal power-ON or during a power-ON reset, this LED is switched ON for 10 to 20 seconds and is switched OFF if no fault is detected. If the LED remains ON, the 3590 requires service. See "Processor Check Indicator" on page PANEL-7 for details and "Maintenance Starting Point" on page START-2 to fix the fault.

See Figure 76 on page PANEL-5 and Figure 77 for the descriptions of the areas on the panel.



PANEL

Example:

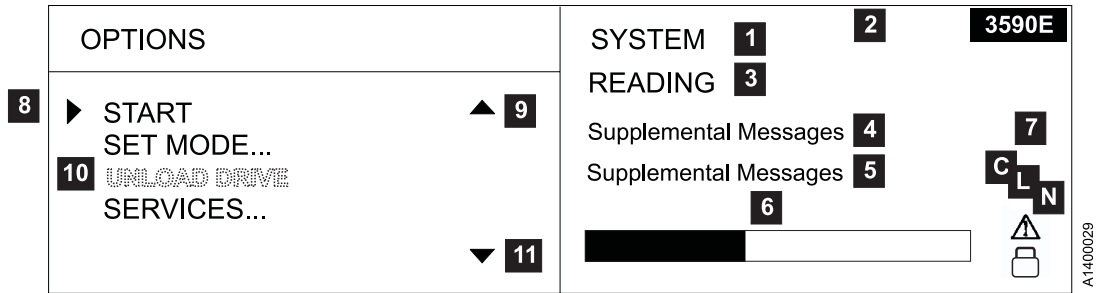


Figure 76. Options and Status Screen


Figure 77. Options and Status

Area	Description
1 ACF Mode	Displays manual, automatic, system, accumulate or random when the ACF is installed. When the operator changes modes, any current ACF operation (cartridges in transit) are completed before the request is granted.
2 Drive Type	<ul style="list-style-type: none"> If this is a Model E11/E1A drive, the 3590E icon will be displayed. If this is a Model B11/B1A Ultra drive, the ULTRA icon will be displayed. If this is a Base Model B11/B1A drive, this area will be blank.
3 Drive and ACF Status	<ul style="list-style-type: none"> Cleaning: A cleaning cartridge is in the device. Ready: A ready message is generated by the device when it is ready and other higher-priority messages do not apply. The <i>ready</i> indicator is displayed only when the transport is not moving tape. When <i>ready</i> or <i>not ready</i>, the state of the device is the same to both SCSI ports. Ready at load point: The media is at the beginning of tape and the device is ready. Accessing: The empty ACF transport is moving to a magazine position to either check for an unused volume or to get a volume to load. Transferring: The device is moving a cartridge from the magazine or the priority cell to the drive, or from the drive to the magazine or the priority cell. Loading: The cartridge is being loaded into the drive. Locating: The device is moving the tape to a specific location. Reading: The device is reading data from the tape to the device buffer. Writing: The device is writing data to the tape from the device buffer. Erasing: The device is logically erasing data from the tape. Rewinding: The device is rewinding the tape to the beginning of the logical volume. Unloading: The cartridge is being removed from the drive. Automatic Cartridge Facility Disabled: The ACF cannot perform an operation; for example, the magazine is not installed or the magazine was filled and the last imported cartridge was returned to the priority cell. For details, see "Automatic Cartridge Facility" on page ACF-1. Blank Field: The ACF is inactive and the drive is not loaded.
4 Messages and 5 Supplemental Messages	<p>Messages include:</p> <p>PORT0 ADDR=n ONLINE or OFFLINE . PORT1 ADDR=n ONLINE or OFFLINE . ('n' can be in the range 0–F.)</p> <p>For SCSI port 0 or 1 (PORT0 or PORT1), the last assigned SCSI address (ADDR=n) is listed with each port's online or offline status (ONLINE or OFFLINE). This area is a dual-use area that can be used for prompts and messages.</p> <p><i>Supplemental messages</i> appear in the two-line message area of the screens. These messages include general information, user feedback for control actions, and attention messages.</p> <p>For example, DIAGS RUNNING appears under 5 when the drive is running the internal diagnostics, and if the drive is loading the microcode, LOADING CODE appears in this area. If MTM (media test mode) appears, call your next level of support.</p>
6 Tape Position Indicator	A graphic representation of the position of the tape for processing a cartridge or rewinding a cartridge. See "Tape Position Indicator" on page PANEL-7.
7 Status Icons	Displays different icons that represent the status of the device. See "File Protected Icons" on page PANEL-7 and "Dump Icon" on page PANEL-7.
8 Cursor (►)	A symbol that moves when the operator presses the up or down arrow. The item that is beside the cursor is chosen when the operator presses Enter.
9 Up Arrow (▲)	A symbol displayed when the operator has menu choices above the viewing area.
10 Option	When the operator presses Enter, the item by the ► (cursor) is chosen. If an item is dotted, such as UNLOAD DRIVE in a lighter font, it is not available for use. If the operator presses Enter, the item is highlighted temporarily and is not activated.
11 Down Arrow (▼)	A symbol displayed when the operator has menu choices below the viewing area.

Indicators and Icons


This section describes the indicators on the 3590.


Processor Check Indicator


This LED indicator is set if the microcode is not following its normal sequence. All activity is stopped; all data not yet committed to media is lost. The Processor Check indicator is located on the operator/CE panel and is labeled by a symbol  that looks like a wrench.

File Protected Icons

The file-protected icons are displayed in the status icons area of the operator/CE panel (see Figure 76 on page PANEL-5).

The file-protected icon (physical)  is a *read only* symbol that is displayed when the thumb wheel on the cartridge is set to the file-protected position.

The file-protected icon (logical)  is a *read only* symbol that is displayed when the 3590 receives the Mode Select command from a host program that sets the volume to a logically write-protected state. Both Write Once Read Mostly (WORM) and Persistent Write Protect status leaves a volume logically write-protected on subsequent loads. Persistent Write Protection can be turned OFF with a subsequent Mode Select while write-once, read many (WORM) cannot be turned OFF. Associated Write Protection persists only while a logical volume is loaded or until a Mode Select changes the protection status. Associated Write Protection status is lost when a volume is unloaded or the device is powered OFF. File protection is temporarily inactive (and the icon reverts to file-unprotected) during volume loading and unloading when the device updates the volume control region (VCR) on the tape. See *IBM 3590 High Performance Tape Subsystem Hardware Reference* for details.


The file-unprotected icon  is a *read/write* symbol that is displayed when the thumb wheel on the cartridge is set to the not file-protected position.

Tape Position Indicator

The tape-position indicator provides the operator with a graphical representation of the position of the device relative to the beginning and end-of-volume (if processing) or the beginning and end-of-tape (if rewinding).

Dump Icon


The dump icon is located in the status area of the operator/CE panel (see Figure 76 on page PANEL-5).

The *dump* icon  appears when the dump is available, and remains on the screen to indicate that trace data is stored in the 3590. The icon remains on the screen until the 3590 power is turned OFF, a dump is taken over a SCSI port, or the dump is written to a tape.

Attention: The dump is lost if you press the Reset push button or switch OFF power to the drive.

Clean Icon

A *clean* icon is located in the status area of the operator/CE panel (see Figure 76 on page PANEL-5).

The clean icon  appears when cartridge cleaning is required. It displays in the same position as the dump icon and is overlaid by the dump icon until the **CLEAN** message displays.

This icon alerts the operator that a cleaning operation is requested.

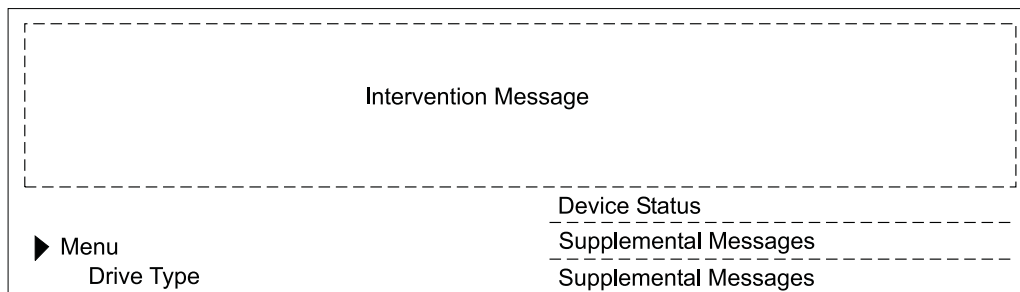
Drive Type Icon

The Drive Type Icon appears in the upper right or lower left part of the display.

- If this is a Model E11/E1A drive, the **3590E** icon will be displayed.
- If this is a Model B11/B1A Ultra drive, the **ULTRA** icon will be displayed.
- If this is a Base Model B11/B1A drive, this area will be blank.

Intervention Messages

Intervention messages are presented on the operator/CE panel in the intervention screen. The intervention screen consists of an eight-character intervention message displayed in a large font, a prompt indicating that the Options menu can be accessed by pressing Enter, device status information, and a two-line message area in the standard font. Figure 78 shows the intervention screen followed by an example of a Mount command that prompts the operator to mount a tape with the volume serial (volser) **123567**. In this example, M means *mount* and S means *scratch*.



Example:

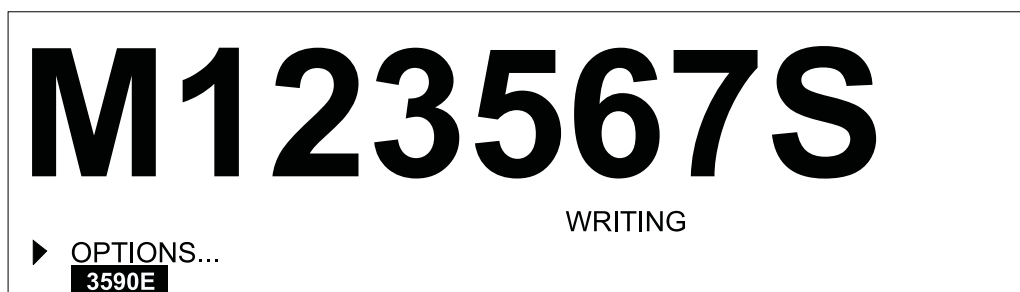


Figure 78. Intervention Screen

Intervention messages are one-part or two-part messages. Two-part messages consist of two 8-character message parts that alternate. The message types are FID1 messages, attention messages, routine messages, FID2 messages, FID3 messages, and FID4 messages.

Note: If the Enter key is pressed, the messages are removed from the screen. When a FID message is displayed and the Enter key is pressed, the FID message will be removed from the screen and deleted.

A brief description of each message follows:

- FID1 Messages

A FID1 message is generated by the device when a hardware failure occurs within the device. This message has priority over all other types of messages, and persists until the error condition is corrected. The FID code is used by maintenance personnel to identify the failing units within the device. (FID messages may be temporarily overwritten by menu selections.) Messages are in a bold font.

The format of these messages is 'FID1 xy', where 'FID1' indicates to the operator that a failure occurred, and 'xy' is the portion of the device to replace. Figure 79 shows an example of FID1 C6, which indicates the machine reel motor has a fault.

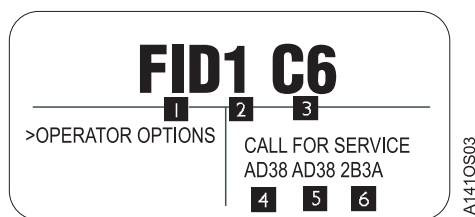


Figure 79. Error Message Example

When the FRU identifier (FID) **1** and the severity code **2** is presented, the service representative uses the FID number **3** to enter the START section. See “Service and Media Information Messages (SIMs and MIMs)” on page MSG-2 for a description of the severity codes. The message area **4**, **5**, and **6** hex data is support information to help determine if the fault is caused by microcode. **4** represents the first FSC that caused the FID. **5** represents either the last FSC or the flag data. The first character in **6** represents part of the model number (1 = ACF present, 2 = no ACF); the last three characters represent the microcode link. A corresponding SIM is transmitted to the initiator.

- Attention Messages

Attention (ATTN) messages indicate error conditions that customer personnel may be able to resolve. For example, the ATTN ACF message with a supplemental message of **Lock Magazine** can be corrected by the operator.

- Routine Messages

Routine Messages consist of messages received from the host through the SCSI Display Message command (for example, **Mount**), and messages from the device (for example, ***CLEAN**).

To generate the Clean message, the device monitors the number of megabytes processed and the number of nonpermanent errors for each drive. When either of these factors reaches a threshold, the device displays a Clean message. The clean message is maintained across device power-on reset conditions.

The routine messages that are received through the Display Message command consist of mount messages, demount messages, and general (custom) messages.

The routine messages usually refer to the priority cell. Actions that are automatically handled by the ACF usually occur without the display of an operator message. These messages can be generated by the initiator; however, if the device microcode detects that the ACF will automatically perform the action requested, any corresponding message is suppressed.

- FID2 Messages **2**

A FID2 message indicates that the drive is in a degraded state. For example, FID2 E4 could indicate that one SCSI port has a fault. The drive can still be used, but is in a less available state.

- FID3 Messages **2**

A FID3 message indicates that the drive is in a degraded state. The drive can still be used, but is in a more available state than for a FID2 type of fault.

- FID4 Messages **2**

A FID4 message indicates that some service circuitry failed. For example, FID4 E4 could indicate that a parity-check circuit failed.


3590 Intervention Messages

Figure 80 describes messages that may be displayed for the 3590.

Figure 80. Intervention Messages	
Message	Message Meaning
FID 1 Messages	
FID 1	These messages indicate device errors that require CE action. The device cannot perform any tasks. Go to the START section with the FID number.
ATTN Messages	
Attention	These messages indicate error conditions that operators can resolve, such as <i>Lock magazine</i> .
Routine Messages	
Mvolser	The M prompts the operator to mount volser in the priority cell.
CLEAN	This message prefixed with an asterisk () prompts the operator to put a cleaning cartridge in the priority cell. If the text CLEAN_REQUIRED is also present, a cleaning cartridge must be loaded before any other drive operations can be performed.
Dvolser	The D prompts the operator to remove volser from the priority cell.
FID 2 Messages	
FID 2	These messages report a degraded device condition. Go to the START section with the FID number.
FID 3 Messages	
FID 3	These messages report a degraded device condition. Go to the START section with the FID number.
FID 4 Messages	
FID 4	These messages report a service circuitry failure. Go to the START section with the FID number.
Note: The following are informational messages, not intervention conditions.	
Device activity or status messages	
Device activity	These messages are displayed in the supplemental message area. These messages include <i>reading, writing, and locating</i>

Operator/CE Panel Menus

The operator/CE panel allows information to be passed from the device to the operator and back to the device. The operator and CE can be presented menu-driven options for device operation. Examples include the display of SCSI port addresses and operator panel languages.

The first group of menus is available to the operator. The second group is available to the CE only and is accessed only by pressing the Change Mode  push button, a *hidden* push button for CE use only. Pressing the Change Mode push button while in CE mode returns the operator/CE panel to operator menus.

Options that are unavailable are displayed in a lighter, dotted font and cannot be selected. The first example in Figure 81 shows the Unload Drive option **1** when there is no cartridge in the device. The option is displayed in a lighter, dotted font, which indicates it cannot be selected. The second example in Figure 81 shows the Unload Drive option **2** when there **is** a cartridge in the device. The option is displayed in a darker font, which indicates it can be selected.

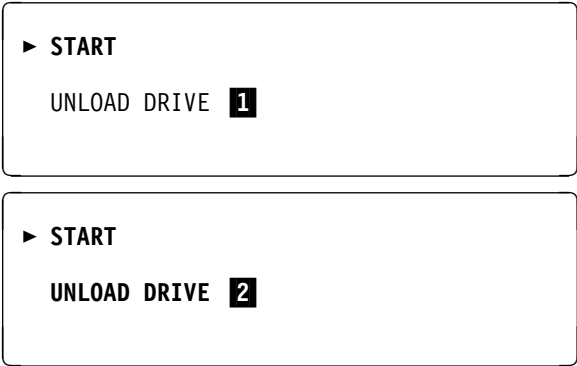


Figure 81. Example of Selection Options

If you move the cursor (▶) to **1** and press Enter, the selection responds with the normal font **2** momentarily and then returns to the lighter font. The 3590 will not perform any action.

Operator and CE Panel Flow Charts

Figure 82 shows the operator panel functions and Figure 83 on page PANEL-13 shows the CE panel functions. Bold text in the figures shows the names of the menus.

Options Menu

Start (all models except C12/C14 wherein C12/C14 models say Allow Load)

Set ACF Mode
 Unload Drive
 Services

Set ACF Mode Menu

System
 Automatic
 Manual
 Accumulate
 Random (B11 models only)
 Random 2-LUN

Services Menu

Set Online
 Set Offline
 Set Address
 Change Language
 Statistics
 Refresh Tape
 Microcode Level
 Reset Drive
 Force Error Dump

Confirmation Menu

Statistics Menu

Show Statistics
 Save

Show Statistics Menu

Mount to Drv
 Priority Mnts
 Magazine Mounts
 Clean Mounts
 Power On Hours

Change Language Menu

<language>

Set Offline Menu

Confirm Offline Menu

Set Online Menu

Set Address Menu

Port 0
 Port 1

Set Port 1 Address Menu

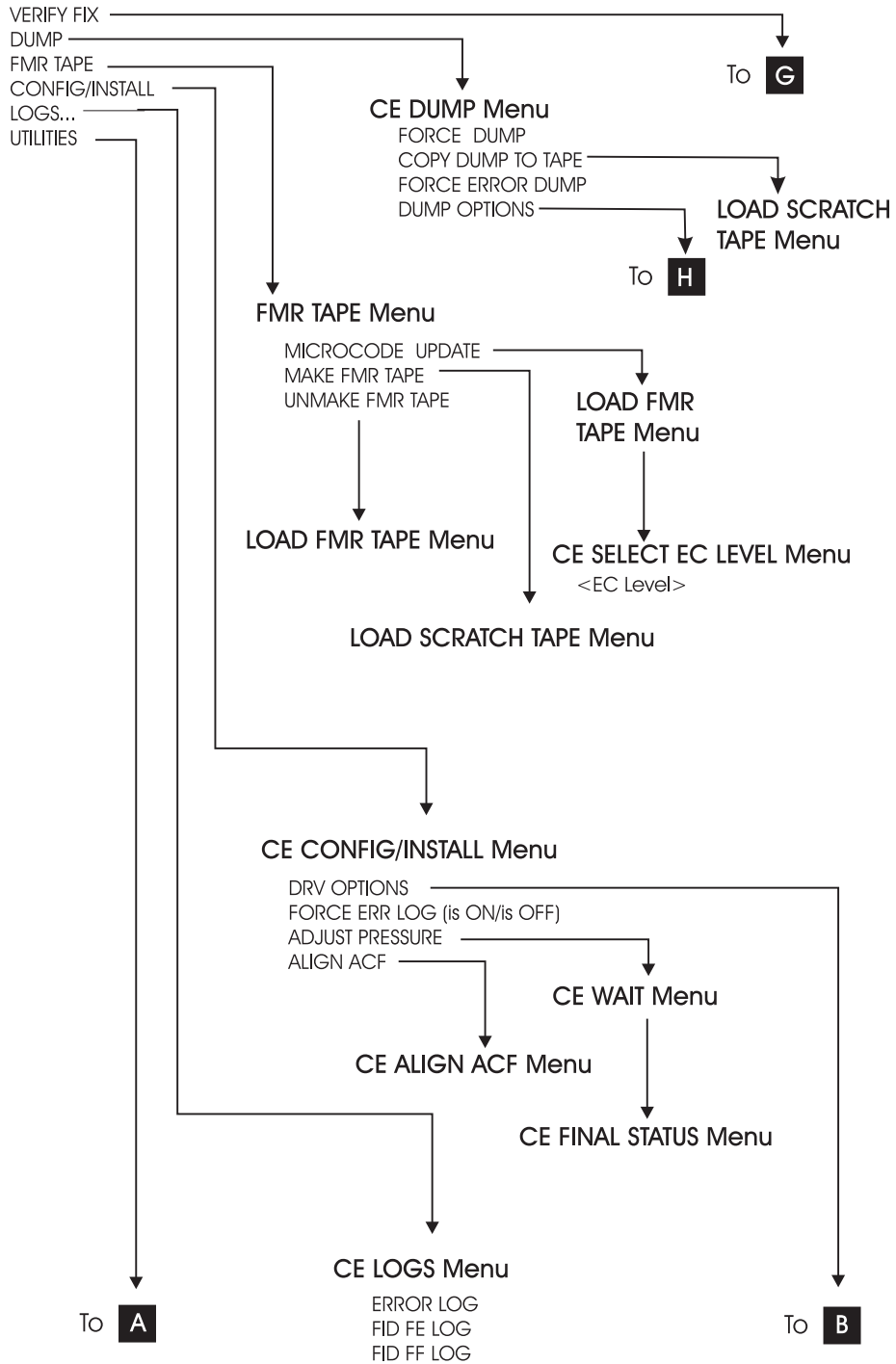
Set Port 0 Address Menu

A1400327

Figure 82. Operator Menus

CE Panel Menu

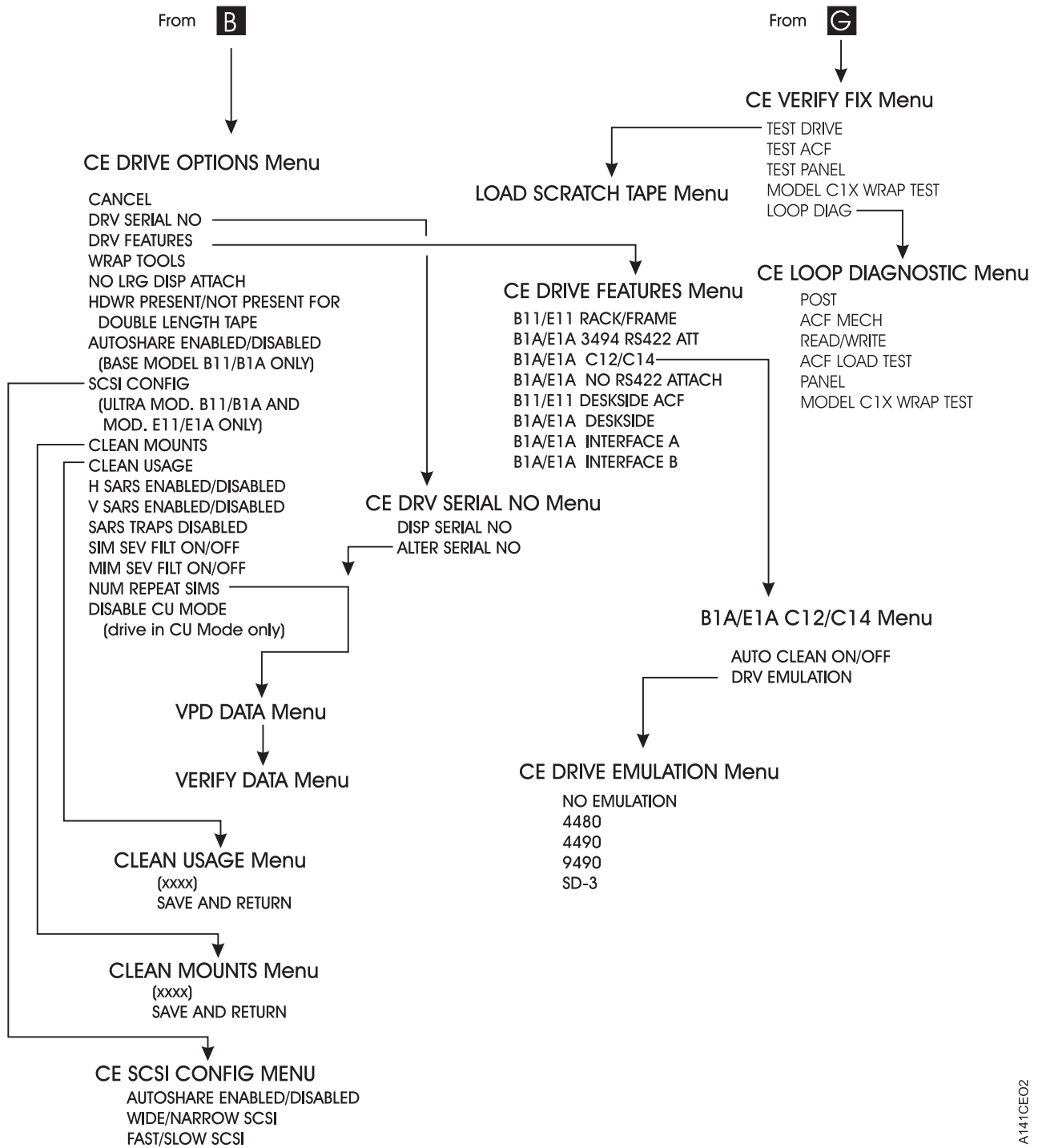
CE OPTIONS Menu



A141CE01

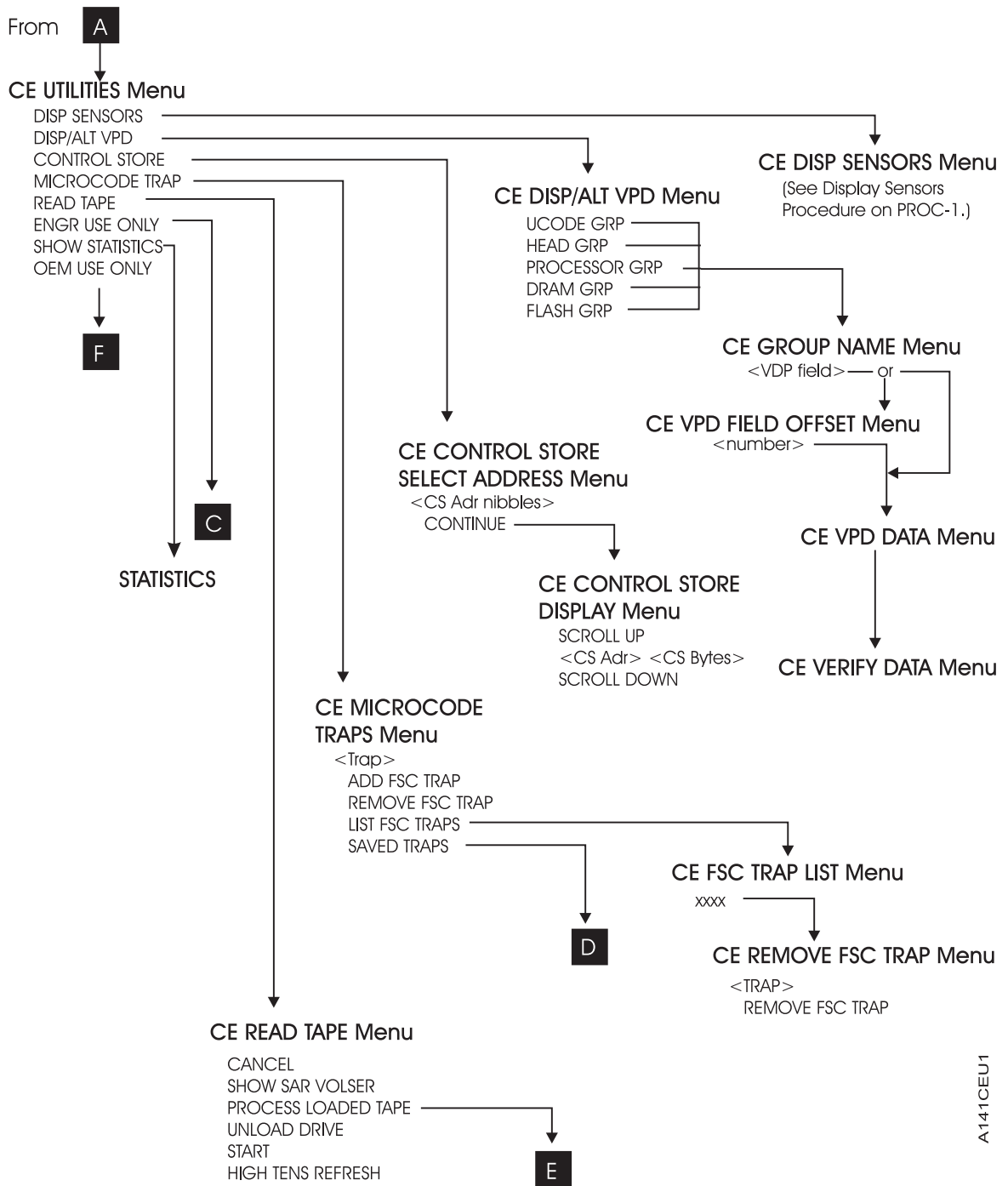
| Figure 83 (Part 1 of 4).

CE OPTIONS Menu (continued)



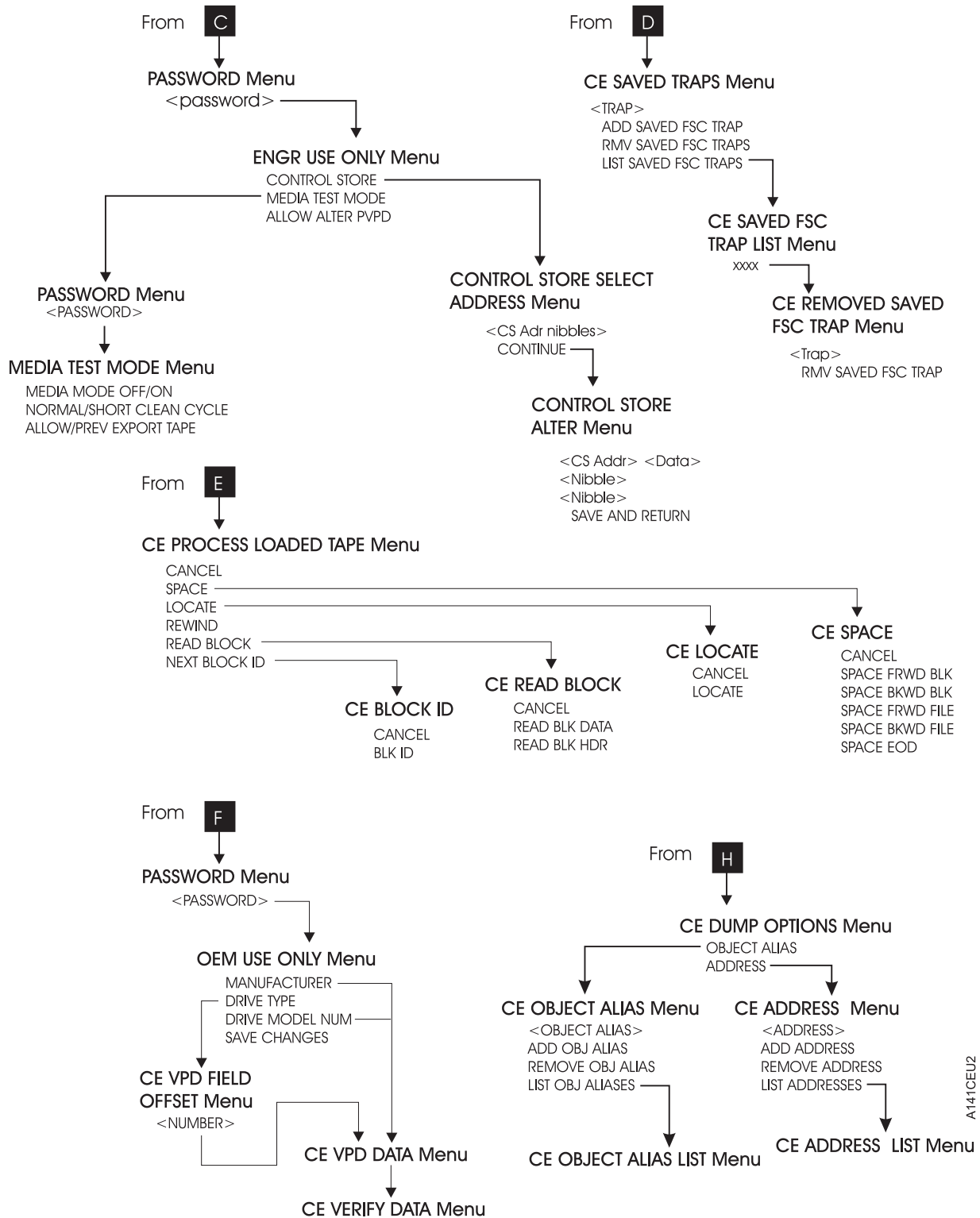
| Figure 83 (Part 2 of 4).

A141GEO2



A141CEU1

| Figure 83 (Part 3 of 4).



A141CEU2

| Figure 83 (Part 4 of 4).

Operator Menus

These menus are available at the successful completion of the power-on self-test (POST).

Options Menu

Figure 84 shows the Options menu.

<i>Figure 84. Options</i>	
Function	Next Menu
Start/Allow Load (Model C12/C14 only)	—
Set ACF Mode...	"Set ACF Mode Menu" on page PANEL-18
Unload Drive	—
Services...	"Services Menu" on page PANEL-19
Note: Supplemental Message Line 1: <none> Supplemental Message Line 2: <none>	

Start Start enables the ACF on a Model B11/E11. This function should not be selected on a Model B1A/E1A.

Allow Load Allow Load allows loading cartridges when the 3590 Model C12/C14 is in manual mode.

Set ACF Mode Sets the ACF mode for Model B11/E11.

Unload Drive Causes the device to rewind and to unload the cartridge in the device.

Services Allows the operator to perform configuration tasks, such as setting the SCSI online and offline.

Set ACF Mode Menu: Figure 85 shows the Set ACF Mode menu.

<i>Figure 85. Set ACF Mode</i>	
Function	Next Menu
Cancel	"Options Menu" on page PANEL-17
System	"Options Menu" on page PANEL-17
Automatic	"Options Menu" on page PANEL-17
Manual	"Options Menu" on page PANEL-17
Accumulate	"Options Menu" on page PANEL-17
Random (Model B11 only)	"Options Menu" on page PANEL-17
Random 2-LUN	"Options Menu" on page PANEL-17
Note: Supplemental Message Line 1: <none> Supplemental Message Line 2: <none>	

Cancel Causes the "Options Menu" on page PANEL-17 to appear.

System Places cartridge feeding under system control.

Automatic Takes the cartridges that are loaded in the import position of the magazine and automatically feeds one cartridge after another until the entire magazine is processed.

Manual Feeds a cartridge into the drive.

Accumulate Takes the cartridge from the priority cell and places it in the drive. It unloads cartridges from the drive to the magazine.

Random Places all the cartridges in the *import* position. The magazine must be locked. This option is available on the Model B11 only.

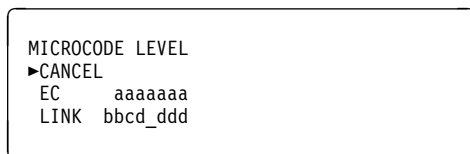
Random 2-LUN Places the ACF in Random mode, as described above, and adds an extra SCSI Logical Unit (LUN) to control the ACF. See the host software instructions for attaching to 3590 or a SCSI Medium Changer. This option is available on the Models B11 and E11.

See "Automatic Cartridge Facility" on page ACF-1 for a description of the modes and positions.

Services Menu: Figure 86 shows the Services menu.

<i>Figure 86. Services</i>	
Function	Next Menu
Cancel	"Options Menu" on page PANEL-17
Set Online...	"Set Online Menu" on page PANEL-21
Set Offline...	"Set Offline Menu" on page PANEL-21
Set Address...	"Set Address Menu" on page PANEL-22
Change Language...	"Change Language Menu" on page PANEL-24
Statistics...	"Statistics Menu" on page PANEL-24
Refresh Tape...	
Microcode Level	Figure 87, then after selection, to "Services Menu"
Reset Drive	Figure 88 on page PANEL-20, then after selection, to "Services Menu"
Force Error Dump	Figure 88 on page PANEL-20, then after selection, to "Services Menu"
Note: Supplemental Message Lines: <none>	

- Cancel** Causes the "Options Menu" on page PANEL-17 to appear.
- Set Online** Logically enables the device to communicate on the SCSI bus. Activate Set Online at the device first, then have the host place the device online (vary online).
- Set Offline** Logically disables the device from the SCSI bus. Select Set Offline only after the host has taken the device offline (vary offline) first.
- Set Address** Provides the two SCSI addresses to be selected; one address associated with each device interface. Each address consists of one hexadecimal digit that specifies the SCSI address for that interface. After the address is set, modify the host information to include the correct addresses.
- Change Language** Allows the operator to select the operator panel language.
- Statistics** Displays the number of times certain events occurred.
- Refresh Tape** If tape is loaded, allows the CE or customer to spool tape to end and back, repacking the tape on the reel.
- Microcode Level** Displays the microcode EC level that is in DRAM. Figure 87 shows an example.



Legend
aaaaaaa = Engineering change level
bb = Product identifier
c = Link identifier
d_ddd = Link number

Figure 87. Microcode Level Menu

- Reset Drive** Aborts the operation and causes the drive code to restart. If dump data is in the drive, it is not lost.

Note: Current operation (e.g. Locate) will be completed before **Reset Drive** executes. This may cause a delay before **Reset Drive** is executed.

- Force Error Dump** Aborts the operation, causes a recovery of the functional code, and forces a microcode dump. After getting the dump, select **Reset Drive**. This selection is normally used because of specific requests from support personnel.

Choosing **Reset Drive** or **Force Error Dump** causes the menu shown in Figure 88 on page PANEL-20 to appear.

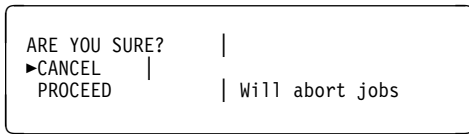


Figure 88. Confirmation Menu

Cancel Causes the microcode to ignore the selection and causes the Services menu to appear.

Proceed Causes the microcode to perform the operation chosen (Reset Drive or Force Error Dump) from the Services menu.

Set Online Menu: Figure 89 shows the Set Online menu.

<i>Figure 89. Set Online</i>	
Function	Next Menu
Cancel	"Services Menu" on page PANEL-19
Port 0	"Options Menu" on page PANEL-17
Port 1	"Options Menu" on page PANEL-17
Both	"Options Menu" on page PANEL-17
Note: Supplemental Message Line 1: <none> Supplemental Message Line 2: <none>	

Cancel Causes the "Services Menu" on page PANEL-19 to appear.

Port 0 Causes SCSI Port 0 to be set online.

Port 1 Causes SCSI Port 1 to be set online.

Both Causes SCSI Port 0 and SCSI Port 1 to be set online.

Note: The host must also vary the device online.

Set Offline Menu: Figure 90 shows the Set Offline menu.

<i>Figure 90. Set Offline</i>	
Function	Next Menu
Cancel	"Services Menu" on page PANEL-19
Port 0	"Confirm Offline Menu" on page PANEL-22 or "Options Menu" on page PANEL-17
Port 1	"Confirm Offline Menu" on page PANEL-22 or "Options Menu" on page PANEL-17
Both	"Confirm Offline Menu" on page PANEL-22
Note: Supplemental Message Line 1: <none> Supplemental Message Line 2: <none>	

Cancel Causes the "Services Menu" on page PANEL-19 to appear.

Port 0 Causes SCSI Port 0 to be set offline.

Port 1 Causes SCSI Port 1 to be set offline.

Both Causes SCSI Port 0 and SCSI Port 1 to be set offline.

If the device interface successfully goes offline, the "Options Menu" on page PANEL-17 appears, otherwise the operator can proceed to "Confirm Offline Menu" on page PANEL-22 for further options.

Attention: The device should be quiesced by the host (vary the device offline) before taking the device offline or before powering OFF the device.

Note: The device must complete all activity currently on the interface before it can go offline. If the device or the initiator cannot complete activity before going offline, "Confirm Offline Menu" on page PANEL-22 is displayed to allow the operator an override and force the ports offline.

Confirm Offline Menu: Figure 91 shows the Confirm Offline menu.

<i>Figure 91. Confirm Offline</i>	
Function	Next Menu
Cancel	"Set Offline Menu" on page PANEL-21
Proceed	"Options Menu" on page PANEL-17
Note: Supplemental Message Line 1: Caution: Data loss Supplemental Message Line 2: risk	

Cancel Cancels the offline request and causes the "Set Offline Menu" on page PANEL-21 to appear.

Proceed Forces the ports offline. If write activity exists, any write data in the device is lost. The Proceed option causes the job to terminate.

Attention: The device should be quiesced by the host (vary the device offline) before taking the device offline or before powering OFF the device.

Note: Current operation (e.g. Locate) will be completed before **Proceed** executes. This may cause a delay before **Proceed** is executed.

Set Address Menu: Figure 92 shows the Set Address menu.

<i>Figure 92. Set Address</i>	
Function	Next Menu
Cancel	"Services Menu" on page PANEL-19
Port 0...	"Set Port 0 Address Menu" on page PANEL-23
Port 1...	"Set Port 1 Address Menu" on page PANEL-23
Note: Supplemental Message Line 1: Change made after Supplemental Message Line 2: unload and reset	

Cancel Causes the "Services Menu" on page PANEL-19 to appear.

Port 0 Causes the "Set Port 0 Address Menu" on page PANEL-23 to appear.

Port 1 Causes the "Set Port 1 Address Menu" on page PANEL-23 to appear.

Note: The address must be defined at the host also.

Set Port 0 Address Menu: Figure 93 shows the Set Port 0 Address menu.

<i>Figure 93. Set Port 0 Address</i>	
Function	Next Menu
Cancel	"Set Address Menu" on page PANEL-22
0	"Options Menu" on page PANEL-17
1	"Options Menu" on page PANEL-17
...	"Options Menu" on page PANEL-17
F	"Options Menu" on page PANEL-17
Note: Supplemental Message Line 1: Change made after Supplemental Message Line 2: next power on	

Cancel Causes the "Set Address Menu" on page PANEL-22 to appear.

<value> Allows the operator to set the address of SCSI Port 0. The value can be from 0–15 (16 addresses).

Note: You must select Reset Drive from the Services menu, press the Reset push button, or switch OFF power to the device and then switch ON power to activate the new address.

Set Port 1 Address Menu: Figure 94 shows the Set Port 1 Address menu.

<i>Figure 94. Set Port 1 Address</i>	
Function	Next Menu
Cancel	"Set Address Menu" on page PANEL-22
0	"Options Menu" on page PANEL-17
1	"Options Menu" on page PANEL-17
...	"Options Menu" on page PANEL-17
F	"Options Menu" on page PANEL-17
Note: Supplemental Message Line 1: Change made after Supplemental Message Line 2: next power on	

Cancel Causes the "Set Address Menu" on page PANEL-22 to appear.

<value> Allows the operator to set the address of SCSI Port 1. The value can be from 0–15 (16 addresses).

Note: You must select Reset Drive from the Services menu, press the Reset push button, or switch OFF power to the device and then switch ON power to activate the new address.

Change Language Menu: Figure 95 shows the Change Language menu.

<i>Figure 95. Change Language</i>	
Function	Next Menu
Cancel	"Services Menu" on page PANEL-19
English	"Options Menu" on page PANEL-17
Spanish	"Options Menu" on page PANEL-17
German	"Options Menu" on page PANEL-17
Note: Supplemental Message Line 1: <none> Supplemental Message Line 2: <none>	

Cancel Causes the "Services Menu" on page PANEL-19 to appear.

<language> Allows the operator to select the operator panel language.

The languages supported are English, German, or Spanish.

The CE menus are always displayed in English.

Statistics Menu: Figure 96 shows the Statistics menu.

<i>Figure 96. Statistics</i>	
Function	Next Menu
Cancel	"Services Menu" on page PANEL-19
Show Statistics...	"Show Statistics Menu" on page PANEL-25
Save	"Statistics Menu"
Note: Supplemental Message Line 1: <none> Supplemental Message Line 2: <none>	

Cancel Causes the "Services Menu" on page PANEL-19 to appear.

Show Statistics Causes "Show Statistics Menu" on page PANEL-25 to appear.

Save Causes the statistics to be saved in nonvolatile storage.

Note: In later levels of microcode the statistics are displayed in decimal instead of hexadecimal.

Show Statistics Menu: Figure 97 is an example of the Show Statistics menu.

<i>Figure 97. Statistics</i>	
Function	Next Menu
Cancel	"Statistics Menu" on page PANEL-24
Mounts to Drv	"Show Statistics Menu"
Priority Mnts	"Show Statistics Menu"
Magazine Mnts	"Show Statistics Menu"
Clean Mounts	"Show Statistics Menu"
Pwr On Hrs	"Show Statistics Menu"
Note: Supplemental Message Line 1: <none> Supplemental Message Line 2: <none>	



Cancel Causes the "Statistics Menu" on page PANEL-24 to appear.

Mounts to Drv Displays the total number of times a cartridge was mounted in the drive.

Priority Mnts Displays the total number of times a cartridge was loaded in the priority cell.

Magazine Mnts Displays the total number of times a cartridge was loaded in any of the cells of the magazine.

Clean Mounts Displays the total number of times a cleaning cartridge was loaded in the device.

Pwr On Hrs Displays the total number of hours the device was powered ON.

Note: When the card pack is replaced, the Pwr On Hrs (time stamp) is reset to day = 0000.

Note: In later levels of microcode the statistics are displayed in decimal instead of hexadecimal.

Confirm Mode Change Menu: Figure 98 shows the Confirm Mode Change menu.

<i>Figure 98. Confirm Mode Change</i>	
Function	Next Menu
Cancel	Previous menu
Proceed	"Options Menu" on page PANEL-17 if no job, or Figure 99 if job is in progress.
Note: Supplemental Message Line 1: Unable to go offline Supplemental Message Line 2: Cancel or Reset	

When the Change Mode push button is pressed, this menu may be displayed when switching from operator to CE mode or CE to operator mode (dependent on job activity).

Cancel Displays the previous menu that was active before the Change Mode push button is pressed.

Proceed Forces the ports offline if going to CE mode and no job was in progress. If a job was active at the time, a new menu shown below is displayed:

```

RESET DRIVE...
>CANCEL..
  RESET DRIVE...
  FORCE ERROR DUMP...
  
```

Figure 99. Confirm Mode Change-Proceed Menu

The RESET DRIVE option results in job termination.

Attention: The device should be quiesced by the host (vary device offline) before taking the device offline, powering OFF the device, or entering CE mode.

The online status of the SCSI ports is restored when changing from CE mode to operator mode.

CE Panel Menus

Attention: Entering CE mode causes the device to immediately go offline to all initiators on both interfaces; therefore, any current read/write activity results in job termination. In general, the device should be quiesced by the host (vary device offline) before taking the device offline, powering OFF the device, or entering CE mode.

The following menus are accessed by pressing the Change Mode  push button.

CE Options Menu: Figure 100 shows the CE Options menu.

<i>Figure 100. CE Options</i>	
Function	Next Menu
Verify Fix...	"CE Verify Fix Menu" on page PANEL-28
Dump...	"CE Main Dump Menu" on page PANEL-32
FMR Tape...	"CE FMR Tape Menu" on page PANEL-35
Config/Install...	"CE Config/Install Menu" on page PANEL-39
Logs...	"CE Logs Menu" on page PANEL-43
Utilities...	"CE Utilities Menu" on page PANEL-48
Note: Supplemental Message Line 1: <none> Supplemental Message Line 2: <none>	

- Verify Fix** Allows the CE to check *good machine* operation.
- Dump** Allows the CE to move dump data.
- FMR Tape** Allows the CE to perform microcode updates.
- Config/Install** Allows the CE to customize the device to meet the customer's requirements at installation.
- Logs** Allows the CE to view the Error logs.
- Utilities** Allows the CE to display control store and register data from any valid address. Use this option with assistance from support personnel.

CE Verify Fix Menu: Figure 101 shows the CE Verify Fix menu. This menu allows the CE to select tests to run.

<i>Figure 101. CE Verify Fix</i>	
Function	Next Menu
Cancel	"CE Options Menu" on page PANEL-27
Test Drive	Figure 102
Test ACF	"CE Options Menu" on page PANEL-27
Test Panel	"CE Options Menu" on page PANEL-27
C1x Wrap Test	"CE Options Menu" on page PANEL-27
Loop Diag	"CE Loop Diag Menu" on page PANEL-30
Note: Supplemental Message Line 1: Load scratch (conditional) Supplemental Message Line 2: magazine (conditional)	

- Cancel** Causes the CE Options menu to appear.
- Test Drive** Runs most of the tests that normally occur when power is switched ON to the drive. Also, the CE is requested to load a tape to run the tape motion tests. The test checks motors, sensors, memory, and the card pack.
- Test ACF** Runs tests on the automatic cartridge facility.
- Test Panel** Runs tests on the operator/CE panel. Allows the service representative to visually check all pixels on the operator/CE panel display.
- C1x Wrap Test** Runs the STL0 wrap test. (This test only appears on Models C12/C14.)
- Loop Diag** Allows the CE to loop the diagnostic tests from "CE Loop Diag Menu" on page PANEL-30

```

CE WAIT MENU
RUNNING...
STOP AND
FORCE ERROR DUMP
  
```

```

CE DIAG GOOD      MANUAL
>CANCEL          DIAGS COMPLETED
UNLOAD DRIVE     SUCCESSFULLY
  
```

```

CE DIAG FAILED    MANUAL
>CANCEL          DIAGS FAILED
UNLOAD DRIVE
  
```

```

CE DIAG BLOCKED   MANUAL
▶CANCEL          DIAGS BLOCKED
UNLOAD DRIVE
  
```

Figure 102. Status Menu

Figure 103. Final Status


When a test starts to run, the Status menu shown in Figure 102 appears.

When the test needs a tape, "CE Load Scratch Tape Menu" on page PANEL-37 is displayed.

| **Attention:** The Base and Ultra Models B11/B1A require a 128 track format tape and the Model E11/E1A
| requires a 256 track format tape.

| When you load a tape and select **Process Loaded Tape**, Figure 102 on page PANEL-28 is again
| displayed until the test is completed or until an error is detected. If the operator/CE panel shows the
| file-protected icon, the tape is either physically write protected, or the wrong format scratch tape has been
| loaded.

Allow the tests to run to completion. When a test ends, the results are displayed on Figure 103 on
page PANEL-28 (the second screen shows an example of a failure).

Attention: Do not select **Force Error Dump** from the menu when the tests are running unless you are
sure the 3590 is in a hung condition. Also, when the tests are running, do not change to operator mode
by pressing the Change Mode  push button. Aborting a test can cause unexpected results.

The CE DIAG BLOCKED menu, the third screen in Figure 103 on page PANEL-28, can occur if the drive
goes through microcode recovery. To recover from this condition, press Reset or power the drive OFF
and then back ON.

The CE DIAG BLOCKED status may also occur when diagnostics are called after a tape is already loaded
or the ACF is unplugged. To recover from this condition, unload the tape or ensure that the ACF is
connected properly, then press Reset or power the drive OFF and then back ON. Use the FID that was
displayed and go to the START section.



CE Loop Diag Menu: Figure 104 shows the CE Loop Diag menu. This menu allows the CE to select tests to run in loop mode.

<i>Figure 104. CE Loop Diag</i>	
Function	Next Menu
Cancel	"CE Verify Fix Menu" on page PANEL-28
POST	"CE Loop Diag Menu"
ACF Mech	"CE Loop Diag Menu"
Read/Write	"CE Loop Diag Menu"
ACF Load Test	"CE Loop Diag Menu"
Panel	"CE Loop Diag Menu"
Model C1x Wrap Test	"CE Loop Diag Menu"
Note: Supplemental Message Line 1: Please be patient Supplemental Message Line 2: when stopping diag.	

Cancel Causes the CE Verify Fix menu to appear.

POST (Power On Self Test) Runs most of the tests that normally occur when power is switched ON to the drive. The test checks motors, sensors, memory, and the card pack. This test also includes the ACF Mech test.

ACF Mech Test Runs tests on the Automatic Cartridge Facility mechanism. The test checks motors, sensors, and the ACF card.

Read/Write Test Runs a Read/Write test. This test takes approximately 10 minutes for each cycle. A scratch tape must be loaded before selecting this test.

ACF Load Test Runs tests on the Automatic Cartridge Facility load mechanism. The ACF should be in **random** mode, with a cartridge loaded into the **import** position of the priority cell.
The test will move the cartridge from the priority cell into every available empty magazine cell, then back to the priority cell in the **export** position. To restart the test it will be necessary to manually move the cartridge into the **import** position.

Panel Test Runs tests on the operator/CE panel. Allows the service representative to visually check all pixels on the operator/CE panel display.

To stop the Panel test, select **STOP RUNNING** between test cycles.

C1x Wrap Test Runs the STL0 wrap test. (This test only appears on Models C12/C14.)

| **Attention:** The Base and Ultra Models B11/B1A require a 128 track format tape and the Model E11/E1A requires a 256 track format tape. If the operator/CE panel shows the file-protected icon, the tape is either physically write protected, or the wrong format scratch tape has been loaded.

```

CE WAIT MENU
RUNNING...
STOP AND
FORCE ERROR DUMP
▶STOP RUNNING

```

Figure 105. Status Menu

```

CE DIAG GOOD      MANUAL
>CANCEL          DIAGS COMPLETED
UNLOAD DRIVE    SUCCESSFULLY

```

```

CE DIAG FAILED    MANUAL
>CANCEL          DIAGS FAILED
UNLOAD DRIVE

```

```

CE DIAG BLOCKED   MANUAL
▶CANCEL          DIAGS BLOCKED
UNLOAD DRIVE

```


Figure 106. Final Status

PANEL

When a test starts to run, the Status menu shown in Figure 105 appears.

The tests will run continuously. To stop a test, select **STOP RUNNING**, and allow the test to finish the test cycle in process.

When a test ends, the results are displayed on Figure 106 (the second screen shows an example of a failure).

Attention: Do not select **Force Error Dump** from the menu when the tests are running unless you are sure the 3590 is in a hung condition. Also, when the tests are running, do not change to operator mode by pressing the Change Mode  push button. Aborting a test can cause unexpected results.


The CE DIAG BLOCKED menu, the third screen in Figure 106, can occur if the drive goes through microcode recovery. To recover from this condition, press Reset or power the drive OFF and then back ON.

The CE DIAG BLOCKED status may also occur when diagnostics are called after a tape is already loaded or the ACF is unplugged. To recover from this condition, unload the tape or ensure that the ACF is connected properly, then press Reset or power the drive OFF and then back ON. Use the FID that was displayed and go to the START section.

CE Main Dump Menu: Figure 107 shows the CE Main Dump menu. This menu allows the CE to force a dump or to copy a dump from dynamic random access memory (DRAM) to a cartridge.

<i>Figure 107. CE Dump Menu</i>	
Function	Next Menu
Cancel	"CE Options Menu" on page PANEL-27
Force Dump	—
Copy Dump to Tape	"CE Load Scratch Tape Menu" on page PANEL-37
Force Error Dump	—
Dump Options	"CE Dump Options Menu" on page PANEL-33
Note: Supplemental Message Line 1: <none> Supplemental Message Line 2: <none>	

The *Tape Position* indicator (see Figure 76 on page PANEL-5) is displayed when the device is writing data on the tape. The indicator provides a graphical representation of the position of the device relative to the tape.

The *dump* icon  appears when the dump is available, and remains on the screen to indicate that trace data is stored in the device. The icon is not displayed after the host takes a dump or the dump is written to tape.

Attention: Trace data is volatile and is lost if you press the Reset push button or switch OFF power to the device.

Cancel Causes the CE Options menu to appear.

Force Dump Causes a dump to control store DRAM to occur. The initiator can retrieve the data via a Read Buffer command to the control store DRAM.
Attention: Do not use this option if a FID1 condition has already caused a dump to be created. For this case, the dump data of interest is lost if you execute the Force Dump function. The dump caused by using this option will write over an existing dump.

Do not use Force Dump if the bus is in a hung state; instead, use Force Error Dump.

Copy Dump to Tape Copies the dump data to a cartridge. A menu prompts the CE to load a scratch tape.

Attention: Data on the tape may be overwritten. The Final Status menu indicates the status of the copy to tape (successful copy or unsuccessful copy). See Figure 113 on page PANEL-36 for an unsuccessful copy and see Figure 114 on page PANEL-36 for a successful copy. This option is invalid if no dump data exists.

Force Error Dump Causes a recovery procedure in which the microcode is reloaded. This option is used if a microcode-hang condition exists (that is, the host cannot communicate with the drive and no hardware fault is detected).

When a hang condition exists, the host can attempt to request a microcode dump through a SCSI port, but does not receive it from the drive.

This option is also used if a microcode dump is needed and the Force Dump option on this menu cannot provide a dump. The host is then able to successfully request the dump information via the SCSI port, or the CE can use the Copy Dump to Tape option on this menu.

Attention: Using this option will cause an existing dump to be overwritten.

Dump Options Allows the CE to customize the dump based on Engineering or Support request.

CE Dump Options Menu: Figure 108 shows the Dump Options menu.

<i>Figure 108. Dump Options Menu</i>	
Function	Next Menu
Cancel	"CE Main Dump Menu" on page PANEL-32
Object Alias...	"CE Object Alias Menu"
Address...	"CE Address Menu" on page PANEL-34
Note: Supplemental Message Line 1: <none> Supplemental Message Line 2: <none>	

Cancel Causes the "CE Main Dump Menu" on page PANEL-32 to appear.

Object Alias Allows the CE to enter Object Alias data for dump options.

Address Allows the CE to enter Control Store addresses for dump options.

CE Object Alias Menu: Figure 109 shows the Object Alias menu.

<i>Figure 109. Object Alias Menu</i>	
Function	Next Menu
Cancel	"CE Dump Options Menu"
Object Alias (4 characters displayed vertically)	—
Add Object Alias	—
Remove Object Alias	—
List Object Alias...	"List Object Alias Menu"
Note: Supplemental Message Line 1: Obj Alias set, Obj Alias removed, or Select Obj Alias Supplemental Message Line 2: <none>	

Cancel Causes the "CE Dump Options Menu" to appear.

Object Alias Allows the CE to select a specific hex value. To change the value of the nibble, select the nibble, which causes a new menu to appear where you can select 0–F.

Add Object Alias Allows the CE to add Object Alias data to the dump options.

Remove Object Alias Allows the CE to remove Object Alias data from dump options.

List Object Alias Allows the CE to list Object Alias data from the dump options.

CE Address Menu: Figure 110 shows the Address menu.

<i>Figure 110. Address Menu</i>	
Function	Next Menu
Cancel	"CE Dump Options Menu" on page PANEL-33
Address (4 characters displayed vertically)	—
Add Address	—
Remove Address	—
List Address	"List Address Menu"
Note: Supplemental Message Line 1: Address set, Address removed, or Select Address Supplemental Message Line 2: <none>	

- Cancel** Causes the "CE Dump Options Menu" on page PANEL-33 to appear.
- Address** Allows the CE to select a specific hex value. To change the value of the nibble, select the nibble, which causes a new menu to appear where you can select 0–F.
- Add Address** Allows the CE to add Address data to the dump options.
- Remove Address** Allows the CE to remove Address data from dump options.
- List Address** Allows the CE to list Address data from the dump options.

CE FMR Tape Menu: Figure 111 shows the FMR Tape menu.

<i>Figure 111. FMR Tape Menu</i>	
Function	Next Menu
Cancel	"CE Options Menu" on page PANEL-27
Microcode Update...	"CE Load FMR Tape Menu" on page PANEL-38
Make FMR Tape...	"CE Load Scratch Tape Menu" on page PANEL-37
Unmake FMR Tape...	"CE Load FMR Tape Menu" on page PANEL-38
Note: Supplemental Message Line 1: <status> Supplemental Message Line 2: <status>	



Cancel Allows the CE to abort an FMR and return to the CE Options menu.

Microcode Update Allows the CE to replace the microcode in the device from a field microcode replacement (FMR) tape and to update the FMR cartridge with the microcode. A menu prompts the CE to load the FMR tape in the device. (The FMR tape is in the ship group). When the 3590 reads the FMR tape, it checks the EC levels on the tape. If the tape does not contain the EC level of the drive, it automatically writes the microcode to the FMR tape. It then displays the EC level via the "CE Select EC Level Menu" on page PANEL-36.

Make FMR Tape Allows the CE to create a field microcode replacement (FMR) tape from a scratch tape. The FMR tape contains the current level of microcode that is active in the device. A menu prompts the CE to load a scratch tape in the device. After the tape is written, the final status menu indicates whether the operation was successful.

Unmake FMR Tape Allows the CE to convert an FMR tape to a scratch tape. A menu prompts the CE to load an FMR tape in the device. After the tape has the header information changed, the final status menu indicates whether the operation was successful.

Note: The Base and Ultra Models B11/B1A require a 128 track format FMR tape and the Model E11/E1A requires a 256 track format FMR tape. If the operator/CE panel shows the file-protected icon, the tape is either physically write protected, or the wrong format tape has been loaded.

CE Select EC Level Menu: Figure 112 shows the Select EC menu. This menu is displayed when the device loads an FMR tape. The device reads all the EC levels and displays them on this menu. The invalid EC levels are displayed in a lighter font. The message lines display the EC level running in the device. The ECs are displayed in the same order as they appear on tape. The CE picks which EC level to load into the device.

After the FMR tape is read, a power-on reset or CE reset is needed to activate the microcode that was just loaded.

Operational Note: If you insert the FMR cartridge and the EC level of the code is not on the cartridge, the microcode is automatically copied from the drive to the cartridge.

<i>Figure 112. Select EC Level</i>	
Function	Next Menu
Cancel	"CE Options Menu" on page PANEL-27
EC=aaaaaa LL=bbbb	—
EC=cccccc LL=dddd	—
EC=eeeeee LL=ffff	—
Note: Supplemental Message Line 1: Current EC Level: Supplemental Message Line 2: <EC Level q>	

Cancel Allows the CE to abort an FMR and return to the CE Options menu.

EC Level Allows the CE to pick which EC level to load into the device.

The latest EC level is determined by the link level (LL), as the EC level may not always increment to a higher number. The following example shows that the second entry is the latest level microcode.

EC=6C56789 LL=4D0D
EC=3C56789 LL=5B02 (highest EC level)

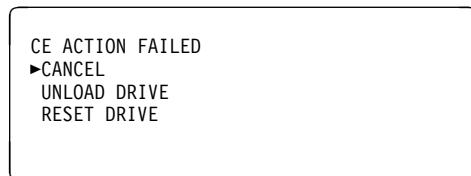


Figure 113. Final Status Menu

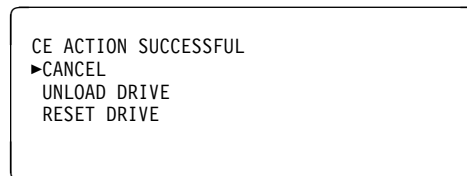


Figure 114. Final Status Menu

Note: If a failure occurs, the final status menu indicates CE ACTION FAILED. This failure can occur if the drive cannot read the tape.

Note: If the process was successful, the final status menu indicates CE ACTION SUCCESSFUL.

Note: The Base and Ultra Models B11/B1A require a 128 track format FMR tape and the Model E11/E1A requires a 256 track format FMR tape.

CE Load Scratch Tape Menu: Figure 115 shows the menu that prompts the CE to load a scratch tape.

If the scratch cartridge in the drive has a volser written on the tape, it is overwritten.

<i>Figure 115. Load Scratch Tape</i>	
Function	Next Menu
Cancel	Previous menu
Process Loaded Tape	Next menu
Unload Drive	"CE Load Scratch Tape Menu"
Start	—
Note: Supplemental Message Line 1: Use unlabeled tape Supplemental Message Line 2: Expected scratch tape Tape not at load pt Tape write prot'd Pump not set	

Cancel Allows the CE to return to the CE Options menu.

Process Loaded Tape If scratch tape is loaded and at ready point, then a **new** menu will be displayed, depending on the previous menu. See Figure 83 on page PANEL-13 for detail.

Unload Drive Allows the CE to unload the cartridge from the drive.

Start Enables the ACF on a Model B11/E11. This function cannot be selected on a Model B1A/E1A.

Note: See messages appearing on *Supplemental Message Line 2*:

Expected scratch tape - FMR tape was loaded

Tape not at load pt - Not at ready point, wait for tape to finish loading. If the Status message says **Rdy at Ld Pt**, but the Supplemental message says **Tape not at load pt**, and the 3590 is attached to a 3494, you may have to wait up to 2 minutes for the 3494 to either acknowledge the Load Point message or time out. This may indicate a problem with the interface to the 3494.

Tape write prot'd - If the operator/CE panel shows the file-protected icon, the tape is either physically write protected, or the customer has used a SCSI command to logically write protect the tape. If the operator/CE panel does not show the file-protected icon, either the wrong format scratch tape has been loaded, or the drive had a problem reading the tape at the load point. The Base and Ultra Models B11/B1A require a 128 track format tape and the Model E11/E1A requires a 256 track format tape. Try writing on a different cartridge. If the failure occurs on multiple cartridges, go to "FID Entry Point" on page START-7, FID F0.

Pump not set - Go into "CE Config/Install Menu" on page PANEL-39 and set/adjust pressure.

CE Load FMR Tape Menu: Figure 116 shows the menu that prompts the CE to load the FMR tape.

<i>Figure 116. Load FMR Tape</i>	
Function	Next Menu
Cancel	Previous menu
Process Loaded Tape	Next menu
Unload Drive	"CE Load FMR Tape Menu"
Start	—
Note: Supplemental Message Line 1: Use FMR tape Supplemental Message Line 2: Expected FMR tape Tape not at load pt Tape write prot'd Pump not set	

Cancel Allows the CE to return to the CE Options menu.

Process Loaded Tape If FMR tape is loaded and at ready point, then a **new** menu will be displayed, depending on the previous menu. See Figure 83 on page PANEL-13 for detail.

Unload Drive Allows the CE to unload the cartridge from the drive.

Start Enables the ACF on a Model B11/E11. This function cannot be selected on a Model B1A/E1A.

Note: See messages appearing on *Supplemental Message Line 2*:

Expected FMR tape - Scratch tape was loaded

Tape not at load pt - Not at ready point. Wait for the tape to finish loading. If the Status message says **Rdy at Ld Pt**, but the Supplemental message says **Tape not at load pt**, and the 3590 is attached to a 3494, you may have to wait up to 2 minutes for the 3494 to either acknowledge the Load Point message or time out. This may indicate a problem with the interface to the 3494.

Tape write prot'd - If the operator/CE panel shows the file protected icon, the tape is either physically write protected, or the customer has used a SCSI command to logically write protect the tape. If the operator/CE panel does not show the file protected icon, either the wrong format FMR tape has been loaded, or the drive had a problem reading the tape at the load point. The Base and Ultra Models B11/B1A require a 128 track format tape and the Model E11/E1A requires a 256 track format tape. Try writing on a different cartridge. If the failure occurs on multiple cartridges, go to "FID Entry Point" on page START-7, FID F0.

Pump not set - Go into "CE Config/Install Menu" on page PANEL-39 and set/adjust pressure.

CE Config/Install Menu: Figure 117 shows the Config/Install menu. The default values are in a bold font.

Note: The *Force Error Log On/Off* option displays the current status. For example, if the option says 'Forced Error Log Off', that means that forced error logging is OFF. To turn it ON, select the option. The option will change to show the new current status, 'Forced Error Log On'.

Figure 117. Config/Install	
Function	Next Menu
Cancel	"CE Options Menu" on page PANEL-27
Drv Options...	"CE Drive Options Menu" on page PANEL-40
Force Error Log On/Off	—
Adjust Pressure	Figure 118
Align ACF	"CE Align ACF Menu" on page PANEL-42
Note: Supplemental Message Line 1: Drive fenced! -or- Loading code Supplemental Message Line 2: Fix previous error Try again	

Cancel Causes the CE Options menu to appear. If any of the VPD options have been updated, the **CE WAIT** message may be displayed momentarily while the Flash memory is being re-written.

Drv Options Allows the CE to set items from "CE Drive Options Menu" on page PANEL-40.

Force Error Log On/Off Allows the CE to turn error logging ON. When set to On, deferred-check conditions are reported to the host. Therefore, temporary errors are reported in the sense data. The default is *Off*. This selection is normally used because of specific requests from support personnel.

Adjust Pressure Causes the microcode to set and record the compressor motor speed by sensing the output from the compressor pressure sensor. In addition to the time of drive install, this option should be done after replacement of any drive part that affects the pressure. See "Measurement and Adjustment of Pneumatic System" on page LOC*CAR-3

When the test is running, the menu in Figure 118 appears. Choosing **Stop Running** causes the menu in Figure 119 to appear. Choosing **Cancel** from Figure 119 causes the "CE Config/Install Menu" to appear. Select **Cancel** twice to save the value in nonvolatile storage (once from the CE Final Status menu and once from the Config/Install menu).

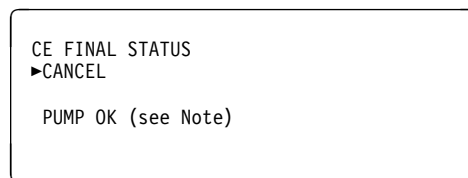
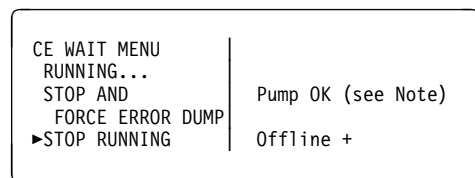


Figure 118. Status Menu

Figure 119. Final Status Menu

Note: Other values can be displayed, such as No Air, Pump Fast, Pump Slow, Pump Not Set, and Unknown Results. If any of these values are displayed, go to "Measurement and Adjustment of Pneumatic System" on page LOC*CAR-3.

Align ACF Allows the CE to view the state of the transport-position sensors in the ACF from "CE Align ACF Menu" on page PANEL-42.

CE Drive Options Menu: Figure 120 shows the Drive Options menu.

This menu allows the CE to set specific drive information needed at installation of the drive. The default values are in a bold font.

Note: The CE Drive Options menu options display the current status. For example, if the H SARS Enabled/Disabled option says 'H SARS Disabled', that means that H SARS is disabled. To enable H SARS, select the option. The option will change to show the new current status, 'H SARS Enabled'.

<i>Figure 120. CE Drv Options</i>	
Function	Next Menu
Cancel	"CE Config/Install Menu" on page PANEL-39
Drv Serial No...	—
Drv Features	"CE Drive Features Menu" on page PANEL-62
Wrap Tools	—
(No Lrg/Lrg) Disp Attach	—
Hdwr Present/Not Present for Double Length Tape	—
Autoshare Enabled/ Disabled (Base Model B11/B1A only)	—
SCSI Config (Ultra Mod. B11/B1A and Mod. E11/E1A only)	"CE SCSI Config Menu" on page PANEL-43
Clean Mounts	Clean Mounts menu
Clean Usage	Clean Usage menu
H SARS Enabled /Disabled	—
V SARS Enabled /Disabled	—
SARS Traps Enabled/ Disabled	—
SIM Sev Filt On/ Off	—
MIM Sev Filt On/ Off	—
Num Repeat SIMs	—
Disable CU Mode	—
Note: Supplemental Message Line 1: When done, select Supplemental Message Line 2: CANCEL option	

Cancel Causes the "CE Config/Install Menu" on page PANEL-39 to appear. If any of the VPD options have been updated, the **CE WAIT** message may be displayed momentarily while the Flash memory is being re-written.

Drv Serial No Allows the CE to enter the drive's serial number (maximum of 12 bytes). See "Drive Serial Number" on page PROC-46.

Drv Features Allows the CE to set items from "CE Drive Features Menu" on page PANEL-62.

Wrap Tools Allows the CE to see what (attached) wrap tools are detected by the drive during a power-on test. The drive checks for the following wrap tools before running the respective wrap tests: SCSI Port 0 and SCSI Port 1 wrap tools, RS-422 Port wrap tool and the STL0 silo interface card wrap tool (the latter for Model B1A/E1A drives in Model C12/C14 only).

Note: The wrap tools have to be installed prior to starting the power-on test to be detected by selection of this option **after** the power-on tests have been run.

The status of the wrap tools will be displayed on the operator/CE panel as follows:

```
SCSI 0:  PRESENT/NOT PRESENT
SCSI 1:  PRESENT/NOT PRESENT
RS-422:  PRESENT/NOT PRESENT
STL   :  PRESENT/NOT PRESENT
```

A status of "PRESENT" indicates that the particular wrap plug has been detected.

(No Lrg/Lrg) Disp Attach

Allows the CE to specify that a large operator display is attached to the drive. The default is *No Lrg*. (The large display is a customer-supplied option.) This option will not become active until you either select **Reset Drive** from the operator Services menu, press the **Reset** push button on the operator/CE panel, or power OFF the drive, **after you have returned** to the **CE Options menu**.

Hdwr for Dbl Length Tape

Allows the CE to indicate if the hardware required for double length tape is present.

Autoshare Enabled/Disabled

Allows the CE to enable the Autoshare option for host application. (Base Model B11/B1A only.) The default for this option is *Disabled*.

SCSI Config

Allows the CE to set items from "CE SCSI Config Menu" on page PANEL-43.

Clean Mounts

Allows the CE to change the quantity specifying the number of mounts required for the drive before a **clean** message is posted on the operator/CE panel.

Note: The default value is 0708 (1800 mounts). It is recommended that this default value **not** be changed without engineering involvement.

Clean Usage

Allows the CE to change the quantity specifying the number of bytes processed by the drive before a **clean** message is posted on the operator/CE panel.

Note: The default value is 0002BF20 (150 Gb). It is recommended that this default value **not** be changed without engineering involvement.

H SARS Enabled/Disabled

Allows the CE to enable the **hardware** statistical analysis and reporting (H SARS) system. The default for this option is *Enabled*. Hardware SARS can be enabled or disabled while the drive is operating. Enabling this option allows the drive to indicate potential hardware problems. See "Statistical Analysis and Reporting System" on page MSG-4 for details.

V SARS Enabled/Disabled

Allows the CE to enable the **volume** statistical analysis and reporting (V SARS) system. The default for this option is *Enabled*. Volume SARS can be enabled or disabled while the drive is operating. Enabling this option will allow the drive to flag bad tape media. See "Statistical Analysis and Reporting System" on page MSG-4 for details.

SARS Traps Enabled/Disabled

Allows the CE to enable **traps** used by the statistical analysis and reporting (SARS) system. The default for this option is *Disabled*. A change in SARS Traps to enabled or disabled status will not become active until you either select **Reset Drive** from the operator Services menu, press the **Reset** push button on the operator/CE panel, or power OFF the drive,

after you have returned to the **CE Options menu**. Enabling this option will force an automatic dump in the drive if a SARS trap is hit. See “Statistical Analysis and Reporting System” on page MSG-4 for details.

- | **SIM Sev Filt On/Off** Allows the CE to filter the messages sent to the host. When this option is set to **On**, only *acute* and *serious* severity service information messages (SIMs) are sent. *Moderate* and *service-related* severity SIMs are not sent. When this option is set to **Off**, all SIMs are sent. The default is *Off*.
- | **MIM Sev Filt On/Off** Allows the CE to filter the messages sent to the host. When this option is set to **On**, only *acute* severity media information messages (MIMs) are sent. *Serious*, *moderate*, and *service-related* severity MIMs are not sent. When this option is set to **Off**, all MIMs are sent. The default is *Off*.
- | **Num Repeat SIMs** Allows the CE to determine how many times to repeat sending the same SIMs to the host. For example, if you set the value to 3, the SIM is sent to the host when a SIM is generated, again eight hours later, then again eight hours later. You cannot change the time between the presentation of SIMs, which is eight hours. The default value is *zero* (do not repeat SIMs). The maximum value allowed is 255.
- | **Disable CU Mode** This option is valid only when the drive has been in an A14 environment, with a Model Axx as the ESCON controller. If this option is selectable (menu item is displayed in bold font, **not** in dotted format) for drives **not attached to a Model A00**, the CE **must** select this option to ensure the drive is **not** in control unit (CU) mode.

CE Align ACF Menu: Figure 121 shows the Align ACF menu. This menu allows the CE to align the transport-position sensors in the ACF.

<i>Figure 121. CE Align ACF</i>	
Function	Next Menu
Done	“CE Config/Install Menu” on page PANEL-39
Align High	—
Align Low	—
Note: Supplemental Message Line 1: Aligned high or Aligned low <depends on last adjustment> Supplemental Message Line 2: Blank	

Done Causes the “CE Config/Install Menu” on page PANEL-39 to appear.

Align High Causes the transport to align to the bottom transport-position sensor.

Align Low Causes the transport to align to the top transport-position sensor.

The message lines indicate the last adjustment performed.

When you select Align High or Align Low, the transport moves down three-fourths of the way, moves up to the priority slot, moves to the bottom slot, then moves up to the priority slot. See “Check and Adjustment of Transport Position Sensor” on page LOC*CAR-27 for details.

CE SCSI Config Menu: Figure 122 shows the SCSI Config Menu. This menu allows the CE to set the SCSI configuration options.

<i>Figure 122. CE SCSI Config</i>	
Function	Next Menu
Cancel	"CE Options Menu" on page PANEL-27
Autoshare Enabled/ Disabled	—
Wide /Narrow SCSI	—
Fast /Slow SCSI	—
Note: Supplemental Message Line 1: <none> Supplemental Message Line 2: <none>	

Cancel Causes the "CE Options Menu" on page PANEL-27 to appear.

Autoshare Enabled/Disabled Allows the CE to enable the Autoshare option for host applications. (Ultra Model B11/B1A and Model E11/E1A only.) The default for this option is *Disabled*.

Wide/Narrow SCSI Allows the CE to set the Wide/Narrow SCSI option. Wide is 2 bytes per clock cycle. Narrow is 1 byte per clock cycle. The default for this option is *Wide*.

Fast/Slow SCSI Allows the CE to set the Fast/Slow SCSI option. Fast is Ultra Speed 20 Mhz clock. Slow is the normal 10 Mhz clock. The default for this option is *Fast*.

CE Logs Menu: Figure 123 shows the Logs menu. This menu allows the CE to access the CE error logs.

<i>Figure 123. CE Logs</i>	
Function	Next Menu
Cancel	"CE Options Menu" on page PANEL-27
Error Log...	"CE Error Log Menu" on page PANEL-44
FID FE Log...	"CE FID FE Log Menu" on page PANEL-46
FID FF Log...	"CE FID FF Log Menu" on page PANEL-47
Note: Supplemental Message Line 1: <none> Supplemental Message Line 2: <none>	

Cancel Causes the "CE Options Menu" on page PANEL-27 to appear.

Error Log Allows the CE to view the Error Log.

FID FE Log Allows the CE to view the FID FE log.

FID FF Log Allows the CE to view the FID FF log.

The **CE Error Log** logs every FID or ATTN message posted to the Operator/CE Panel.

The **FID FE Log** logs a filtered subset of all sense data sent to the host with a FID of **FE**.

The **FID FF Log** logs a filtered subset of all sense data sent to the host with a FID of **FF**.

CE Error Log Menu: The **CE Error Log** logs every FID or ATTN message posted to the Operator/CE Panel.

Figure 124 shows an example of the menu when the log contains entries. The format is:

```
FIDx yy                ATTN DRV/ACF ttt
aaaa bbbb cccc        -or-  (detailed message)
dddd hh : mm : ss     dddd hh : mm : ss
```

Support Data: Twelve hex characters of support data (or a detailed message) are included in the error log.

```
aaaa  Fault Symptom Code (FSC)
bbbb  Fault Symptom Code (FSC)
cccc  Model number (c) and microcode link (ccc)
```

Time Stamp for CE Error Log: A time stamp accompanies each error log entry. It is **not real time** but is **relative time**, and is associated with the approximate number of power on hours for the card pack that is installed in the machine. When the card pack is replaced, the time stamp is reset to dddd=0000. A clock counter is started with power-on, but is saved each hour in VPD. The times may vary from real "relative time" depending on the number of power cycles taken, and timing between them.

```
dddd hh  : mm : ss
Days hours mins secs
Time is relative power-on time for the card pack installed
in this machine. It is not real time.
Newest entries are at the top.
```

```
EXAMPLE:
ATTN DRV   ccc
LOAD/UNLOAD ERROR
0001 05:01:10
```

The ccc=number of times, if more than once, that the ATTN message was called out within a 5 second window. The error in this example occurred on the 1st day, 5th hour, 1st minute and 10th second, "relative time".

See "Error Log Analysis Procedure" on page PROC-99 for a procedure to assist you in analyzing the error log.

<i>Figure 124. CE Error Log</i>	
Function	Next Menu
Cancel or No Entries	"CE Logs Menu" on page PANEL-43
CLEAR ERROR LOG	"CE Logs Menu" on page PANEL-43
CURRENT TIMESTAMP:	dddd hh:mm:ss
FID1 DD 3130 0030 283A 0001 04:33:32	"CE Logs Menu" on page PANEL-43
FID1 CD 311A 311A 283A 0001 05:37:04	"CE Logs Menu" on page PANEL-43
ATTN DRV LOAD/UNLOAD ERROR 0001 06:02:10	"CE Logs Menu" on page PANEL-43
ATTN ACF 005 CLEAR PICKER PATH 0001 06:34:17	"CE Logs Menu" on page PANEL-43

- Cancel** Causes the "CE Logs Menu" on page PANEL-43 to appear.
- No Entries** Indicates that no entries are in the Error log. Choosing this option causes "CE Logs Menu" on page PANEL-43 to appear.
- CLEAR ERROR LOG** Allows the CE to erase the error log. This option will only be displayed when there is at least one entry in error log. Choosing this option causes "CE Logs Menu" on page PANEL-43 to appear.
- CURRENT TIMESTAMP:** Provides a current time stamp in the form **dddd hh:mm:ss**. For a full description of this field, see "Time Stamp for CE Error Log" on page PANEL-44.
- FID1 DD** Indicates a possible fault with one of the sensors. The fault symptom codes are 3130 and 0030. The next character (2 in 283A) represents the model number followed by the microcode link (83A). Choosing this option causes "CE Options Menu" on page PANEL-27 to appear.
- FID1 CD** Indicates a possible fault with the cartridge present sensor. The fault symptom codes are 311A. The next character (2 in 283A) represents the model number followed by the microcode link (83A). Choosing this option causes "CE Logs Menu" on page PANEL-43 to appear.
- ATTN DRV** Indicates an error condition with the drive that customer personnel may be able to resolve. The condition indicated by supplemental message of **LOAD/UNLOAD ERROR** could be corrected by the operator. Choosing this option causes "CE Logs Menu" on page PANEL-43 to appear.
- ATTN ACF** Indicates an error condition with the ACF that customer personnel may be able to resolve. The condition indicated by supplemental message of **CLEAR PICKER PATH** could be corrected by the operator. Choosing this option causes "CE Logs Menu" on page PANEL-43 to appear.

The maximum entry in the Error log is 30.

Only the last 30 entries in the log are displayed. If a fault is detected and the log contains 30 entries, the oldest entry is scrolled off the end and the newest error is put in position 1 (the first position in the list).

CE FID FE Log Menu: The **FID FE Log** logs a filtered subset of all sense data sent to the host with a FID of **FE**.

Figure 125 shows an example of the menu when the log contains entries. See “CE Error Log Menu” on page PANEL-44 for format information.

See “Error Log Analysis Procedure” on page PROC-99 for a procedure to assist you in analyzing the error log.

<i>Figure 125. CE FID FE Log</i>	
Function	Next Menu
Cancel or No Entries	“CE Logs Menu” on page PANEL-43
CLEAR ERROR LOG	“CE Logs Menu” on page PANEL-43
CURRENT TIMESTAMP:	dddd hh:mm:ss
FID yy aaaa bbbb cccc dddd hh:mm:ss VolSer: 156M95	“CE Logs Menu” on page PANEL-43

Cancel Causes the “CE Logs Menu” on page PANEL-43 to appear.

No Entries Indicates that no entries are in the Error log. Choosing this option causes “CE Logs Menu” on page PANEL-43 to appear.

CLEAR ERROR LOG Allows the CE to erase the error log. This option will only be displayed when there is at least one entry in error log. Choosing this option causes “CE Logs Menu” on page PANEL-43 to appear.

CURRENT TIMESTAMP: Gives the current time stamp in the order **dddd hh:mm :ss**. For a description of this field, see “Time Stamp for CE Error Log” on page PANEL-44.

FID yy This example indicates a possible fault with the device associated with a FID yy. The 12 characters of support data include the fault symptom codes (aaaa and bbbb), and the model number (c), followed by the microcode link (ccc). A time stamp follows. The last entry is the Volume Serial number. If the Volume Serial number is not known, it will show “UNKNOWN”. Choosing this option causes “CE Logs Menu” on page PANEL-43 to appear.

The maximum entry in the FID FE log is 10.

Only the last 10 entries in the log are displayed. If a fault is detected and the log contains 10 entries, the oldest entry is scrolled off the end and the newest error is put in position 1 (the first position in the list).

CE FID FF Log Menu: The **FID FF Log** logs a filtered subset of all sense data sent to the host with a FID of **FF**.

Figure 126 shows an example of the menu when the log contains entries. See “CE Error Log Menu” on page PANEL-44 for format information.

See “Error Log Analysis Procedure” on page PROC-99 for a procedure to assist you in analyzing the error log.

Figure 126. CE FID FF Log

Function	Next Menu
Cancel or No Entries	“CE Logs Menu” on page PANEL-43
CLEAR ERROR LOG	“CE Logs Menu” on page PANEL-43
CURRENT TIMESTAMP:	dddd hh:mm:ss
FID yy aaaa bbbb cccc dddd hh:mm:ss	“CE Logs Menu” on page PANEL-43

- Cancel** Causes the “CE Logs Menu” on page PANEL-43 to appear.
- No Entries** Indicates that no entries are in the Error log. Choosing this option causes “CE Logs Menu” on page PANEL-43 to appear.
- CLEAR ERROR LOG** Allows the CE to erase the error log. This option will only be displayed when there is at least one entry in error log. Choosing this option causes “CE Logs Menu” on page PANEL-43 to appear.
- CURRENT TIMESTAMP:** Provides the current time stamp in the form **dddd hh:mm:ss**. For a description of this field, see “CE Error Log Menu” on page PANEL-44.
- FID yy** Provides the FID identifier (yy), 12 characters of support data, and the current timestamp. The 12 characters of support data include the fault symptom codes (aaaa, bbbb), the model number (c), and the microcode link (ccc).

The maximum entry in the FID FF log is 10.

Only the last 10 entries in the log are displayed. If a fault is detected and the log contains 10 entries, the oldest entry is scrolled off the end and the newest error is put in position 1 (the first position in the list).

CE Utilities Menu: Figure 127 shows the Utilities menu.

Note: This menu is normally used because of specific requests from support personnel.

<i>Figure 127. Utilities</i>	
Function	Next Menu
Cancel	"CE Options Menu" on page PANEL-27
Disp Sensors	"CE Disp Sensors Menu" on page PANEL-49
Disp/Alt VPD...	"CE Disp/Alt VPD Menu" on page PANEL-50
Control Store...	"CE Control Store Select Address Menu" on page PANEL-53
Microcode Trap...	"CE Microcode Trap Menu" on page PANEL-54
Read Tape...	"CE Read Tape Menu" on page PANEL-54
Engr Use Only...	"Password Menu" on page PANEL-57
Show Statistics...	"Statistics Menu" on page PANEL-59
OEM Use Only...	"Password Menu" on page PANEL-57
Note: Supplemental Message Line 1: <none> Supplemental Message Line 2: <none>	

- Cancel** Causes the "CE Options Menu" on page PANEL-27 to appear.
- Disp Sensors** Causes the "CE Disp Sensors Menu" on page PANEL-49 to appear which allows the service representative to exercise most of the sensors in the device and observe feedback as to their operation.
- Disp/Alt VPD** Allows the CE to display or change the vital product data (VPD). Changing the VPD should only be done with assistance from support personnel.
- Control Store** Allows the CE to read any address in nonvolatile storage and control store.
- Microcode Trap** Allows the CE to set a specific FSC trap (error code match) in microcode to force a microcode dump.
- Read Tape** Allows the CE to display a portion of the data on the tape.
- Engr Use Only** Allows support personnel to access selected utilities.
- Show Statistics** Allow the CE to display internal counts of activities.
- OEM Use Only** Allows OEM support personnel to customize VPD data.

CE Disp Sensors Menu: Figure 128 shows the Disp Sensors menu. This menu allows the CE to view the state of the ACF and drive sensors, and to change the states dynamically. A delay of approximately one second is required between sensor state changes.

Figure 128. Disp Sensors

Function	Next Menu
CANCEL	"CE Utilities Menu" on page PANEL-48
A:1 B:1	Display pantocam A and B sensor states
TU:1 DO:1	Display loader tray up and door open states
CP:1	Display loader cartridge present sensor states
FP:0 CT:0000	Display loader file protect sensor; cartridge type sensor states
PS:1 MP:0 ML:0	Model B11/E11 only. Display priority slot, magazine present, and magazine loaded sensor states
GI:0 GCP:1	Model B11/E11 only. Display global interference sensor and global cartridge present sensor states
P1:1 P2:0 IM:0	Model B11/E11 only. Display ACF pinch 1 & 2, import sensor states
L1:1 L2:0 EX:0	Model B11/E11 only. Display ACF limit 1 & 2, export sensor states
A1:1 B:1	Model B11/E11 only. Display ACF elevator servo A & B sensor states
SN:0	Model B1A/E1A with library interface card (LIC) only. Model B1A/E1A without the library interface card or those with STL0 cards Do Not display this sensor.

Note: The values shown for each sensor will vary on your machine depending upon whether a cartridge is loaded and other conditions. For more information, see "Display Sensors Procedure" on page PROC-31.

CE Disp/Alt VPD Menu: Figure 129 shows the Disp/Alt VPD menu. This menu allows the CE to select the vital product data (VPD) group that contains the specific VPD field to be displayed or altered. You can display all the contents in each of the groups, but can alter some of the contents in only the flash group.

Note: This menu is normally used because of specific requests from support personnel.

<i>Figure 129. Disp/Alt VPD</i>	
Function	Next Menu
Cancel	"CE Utilities Menu" on page PANEL-48
Microcode Grp	"CE Group Name Menu" on page PANEL-51
Head Grp	"CE Group Name Menu" on page PANEL-51
Processor Grp	"CE Group Name Menu" on page PANEL-51
DRAM Grp	"CE Group Name Menu" on page PANEL-51
Flash Grp	"CE Group Name Menu" on page PANEL-51
Note: Supplemental Message Line 1: Select VPD field Supplemental Message Line 2: <none>	

Cancel Causes the "CE Utilities Menu" on page PANEL-48 to appear.

Ucode Grp The link level and size of the microcode.

Head Grp The initial position sensor (IPS) gain settings, plant of manufacture, and serial number of the read/write head.

Processor Grp The type of processor in the card pack.

Dram Grp The EC levels of the module. These fields are only maintained in DRAM, not in flash EPROM or in the microcode.

Flash Grp The SCSI addresses, the ACF mode, and the other setup choices you can make from the operator/CE panel (the dynamic information). This information is in flash EEPROM.

CE Group Name Menu: Figure 130 shows the Group Name menu. This menu allows the CE to select a VPD field to display or alter.

Note: This menu is normally used because of specific requests from support personnel.

<i>Figure 130. Group Name</i>	
Function	Next Menu
Cancel	"CE Disp/Alt VPD Menu" on page PANEL-50
<VPD field i>	"CE VPD Field Offset Menu" or "CE VPD Data Menu" on page PANEL-52
<VPD field i+1>	"CE VPD Field Offset Menu" or "CE VPD Data Menu" on page PANEL-52
...	"CE VPD Field Offset Menu" or "CE VPD Data Menu" on page PANEL-52
<VPD field i+n>	"CE VPD Field Offset Menu" or "CE VPD Data Menu" on page PANEL-52
Note: Supplemental Message Line 1: Select VPD Field Supplemental Message Line 2: <none>	

Cancel Causes the "CE Disp/Alt VPD Menu" on page PANEL-50 to appear. If any of the VPD options have been updated, the **CE WAIT** message may be displayed momentarily while the Flash memory is being re-written.

VPD field Causes the selected VPD field to appear. If the VPD field selected is large, the VPD Field Offset menu is displayed. Otherwise, the VPD data menu is displayed.

CE VPD Field Offset Menu: Figure 131 shows the VPD Field Offset menu. This menu selects the number of bytes to skip (bytes to not display) in the VPD field chosen at "CE Group Name Menu."

Note: This menu is normally used because of specific requests from support personnel.

<i>Figure 131. VPD Field Offset</i>	
Function	Next Menu
Cancel	"CE Group Name Menu"
0	"CE VPD Data Menu" on page PANEL-52
1	"CE VPD Data Menu" on page PANEL-52
....	"CE VPD Data Menu" on page PANEL-52
Note: Supplemental Message Line 1: <VPD Field> Supplemental Message Line 2: Field Protected (conditional)	

Cancel Causes the "CE Group Name Menu" to appear.

<number> Allows the CE to select an offset in the VPD field. After you select a number, "CE VPD Data Menu" on page PANEL-52 is displayed.

The message **Field Protected** is informing the CE that the VPD field just selected is displayed, but cannot be modified.

CE VPD Data Menu: Figure 132 shows the VPD Data menu. This menu allows the CE to modify any character in the selected offset for the selected VPD field.

Note: This menu is normally used because of specific requests from support personnel.

<i>Figure 132. VPD Data</i>	
Function	Next Menu
Cancel	"CE VPD Field Offset Menu" on page PANEL-51 or "CE Group Name Menu" on page PANEL-51 or "OEM Use Only Menu" on page PANEL-58
<VPD offset high nibble>	—
<VPD offset next nibble>	—
<VPD offset next nibble>	—
<VPD offset low nibble>	—
Save and Continue	"CE Verify Data Menu"
Note: Supplemental Message Line 1: <VPD Field> <VPD Offset> Supplemental Message Line 2: Field protected (conditional)	

Cancel Causes the "CE VPD Field Offset Menu" on page PANEL-51 to appear if an offset is required. If offset is not required, "CE Group Name Menu" on page PANEL-51 or "OEM Use Only Menu" on page PANEL-58 appears. Any changes to VPD Data are **not** saved.

<VPD nibble> Shows the data (hex number) contained in the selected VPD field for the offset selected. The CE can select another value for that nibble.

Save and Continue Causes the "CE Verify Data Menu" to appear. This option is invalid if the VPD field is protected.

CE Verify Data Menu: Figure 133 shows the Verify Data menu. This menu allows the CE to check and verify the VPD entered before the data is stored in nonvolatile storage.

Note: This menu is normally used because of specific requests from support personnel.

<i>Figure 133. Verify Data</i>	
Function	Next Menu
Cancel	"CE Utilities Menu" on page PANEL-48
Yes	"CE Utilities Menu" on page PANEL-48
No	"CE VPD Data Menu"
Note: Supplemental Message Line 1: <VPD Name> <VPD Offset> Supplemental Message Line 2: <none>	

Cancel Causes the "CE Utilities Menu" on page PANEL-48 to appear. The VPD data is not modified.

Yes Causes the verified data to be stored in nonvolatile storage, then causes "CE Utilities Menu" on page PANEL-48 to appear.

No Causes the "CE VPD Data Menu" to appear. The VPD data is not modified.

CE Control Store Select Address Menu: Figure 134 shows the Control Store Select Address menu. This menu allows the CE to select an address in control store. The byte is read from the selected address. The message line indicates that the control store option was selected on the previous screen.

Note: This menu is normally used because of specific requests from support personnel.

<i>Figure 134. Control Store Select Address</i>	
Function	Next Menu
Cancel	"CE Utilities Menu" on page PANEL-48
CS Adr (8 characters displayed vertically)	—
Continue	"CE Control Store Display Menu"
Note: Supplemental Message Line 1: Control store Supplemental Message Line 2: <none>	

Cancel Causes the "CE Utilities Menu" on page PANEL-48 to appear.

<CS Adr> Defines the address to be chosen. To change the value of the nibble, select the nibble, which causes a new menu to appear where you can select 0–F.

Continue Takes the address displayed and goes to "CE Control Store Display Menu."

CE Control Store Display Menu: Figure 135 shows the Control Store Display menu. This menu allows the CE to display the byte in the specified address. The message line indicates the current control store address and value.

Note: This menu is normally used because of specific requests from support personnel.

<i>Figure 135. Control Store Display</i>	
Function	Next Menu
Cancel	"CE Utilities Menu" on page PANEL-48
Scroll Up	—
<CS Adr+0> <CS Data>	—
<CS Adr+4> <CS Data>	—
<CS Adr+8> <CS Data>	—
<CS Adr+...> <CS Data>	—
Scroll Down	—
Note: Supplemental Message Line 1: CS Adrs: <CS Adrs> Supplemental Message Line 2: CS Value: <CS Data>	

Cancel Causes the "CE Utilities Menu" on page PANEL-48 to appear.

Scroll Up Causes previous addresses to be displayed (scrolling up through memory).

<CS Adr> <data> Shows the data contained in the word starting at the specified address and causes the "CE Control Store Select Address Menu" to appear.

Scroll Down Causes the next address to be displayed (scrolling down through memory).

CE Microcode Trap Menu: Figure 136 shows the Microcode Trap menu. This menu allows the CE to set a specific trap in microcode to force a microcode dump.

Note: This menu is normally used because of specific requests from support personnel.

<i>Figure 136. Microcode Trap</i>	
Function	Next Menu
Cancel	"CE Utilities Menu" on page PANEL-48
Trap (4 characters displayed vertically)	—
Add FSC Trap	—
Remove FSC Trap	—
List FSC Traps	"CE FSC Trap List Menu" on page PANEL-67
Saved Traps	"CE Saved Traps Menu" on page PANEL-65
Note: Supplemental Message Line 1: Trap set, Trap removed, or Select FSC Supplemental Message Line 2: <none>	

Cancel Causes the "CE Utilities Menu" on page PANEL-48 to appear. The address is not saved.

Trap Allows the CE to select a specific hex value. To change the value of the nibble, select the nibble, which causes a new menu to appear where you can select 0–F.

Add FSC Trap Allows the CE to add an FSC trap.

Remove FSC Trap Allows the CE to remove an FSC trap.

List FSC Traps Causes all FSC traps to be displayed in "CE FSC Trap List Menu" on page PANEL-67.

Saved Traps Causes the "CE Saved Traps Menu" on page PANEL-65 to appear.

CE Read Tape Menu: Figure 137 shows the Read Tape menu. This menu allows the CE to select portions of the tape to be displayed on the operator/CE panel.

Note: This menu is normally used because of specific requests from support personnel.

<i>Figure 137. CE Read Tape</i>	
Function	Next Menu
Cancel	"CE Utilities Menu" on page PANEL-48
Show SARS Volser	—
Process Loaded Tape	"CE Process Tape Menu" on page PANEL-55
Unload Drive	—
Start	—
Note: Supplemental Message Line 1: <none> Supplemental Message Line 2: <none>	

Cancel Causes the "CE Utilities Menu" on page PANEL-48 to appear.

Show SARS Volser Displays SARS Volser

Process Loaded Tape Allows CE to move and read tape.

Unload Drive Allows the CE to unload the cartridge from the Drive.

Start Enables the ACF on a Model B11/E11. This function should not be selected on a Model B1A/E1A.

CE Process Tape Menu: Figure 138 shows the Process Tape menu. This menu allows the CE to select portions of the tape to be displayed on the operator/CE panel.

Note: This menu is normally used because of specific requests from support personnel.

<i>Figure 138. CE Process Tape</i>	
Function	Next Menu
Cancel	"CE Utilities Menu" on page PANEL-48
Space	"Space Menu"
Locate	—
Read Block	"Read Block Menu" on page PANEL-56
Next Block ID	"Next Block ID Menu" on page PANEL-56
Note: Supplemental Message Line 1: <none> Supplemental Message Line 2: <none>	

Cancel Causes the "CE Utilities Menu" on page PANEL-48 to appear.

Space Allows CE to move to different parts of tape.

Locate Allows the CE to locate to any block on the tape.

Read Block Allows the CE to read data or header information from tape.

Next Block ID Displays the next block ID on tape.

Space Menu: Figure 139 shows the Space menu. This menu allows the CE to select portions of the tape to be displayed on the operator/CE panel.

Note: This menu is normally used because of specific requests from support personnel.

<i>Figure 139. Space Menu</i>	
Function	Next Menu
Cancel	"CE Utilities Menu" on page PANEL-48
Space FRWD BLK	number of blocks
Space BKWD BLK	number of blocks
Space FRWD File	number of files
Space BKWD File	number of files
Space EOD	—
Note: Supplemental Message Line 1: <none> Supplemental Message Line 2: <none>	

Cancel Causes the "CE Utilities Menu" on page PANEL-48 to appear.

Space FRWD BLK Allows CE to space forward on tape the number of blocks specified.

Space BKWD BLK Allows the CE to space backwards on tape the number of blocks specified.

Space FRWD File Allows CE to space forward on tape the number of files specified.

Space BKWD File Allows the CE to space backwards on tape the number of files specified.

Space EOD Allows the CE to space to the end of data.

Read Block Menu: Figure 140 shows the Read Block Menu. This menu allows the CE to do a read block command.

Note: This menu is normally used because of specific requests from support personnel.

<i>Figure 140. Read Block Menu</i>	
Function	Next Menu
Read Blk Data	—
Read Blk HDR	—
Note: Supplemental Message Line 1: <none> Supplemental Message Line 2: <none>	

Read BLK Data Displays the first 80 characters of blocks data. At bottom of menu you can go to next 80 character and up to 16K.

Read BLK HDR Displays the first 80 characters of blocks header. By scrolling down you can display the next 16 characters.

Next Block ID Menu: Figure 141 shows the Next Block ID Menu This menu allows the CE to show the next block id.

Note: This menu is normally used because of specific requests from support personnel.

<i>Figure 141. Next Block ID Menu</i>	
Function	Next Menu
Next Block ID :xxxxxxx	—
Note: Supplemental Message Line 1: <none> Supplemental Message Line 2: <none>	

Next Block ID Displays the next blocks ID.

Password Menu: Figure 142 shows the Password menu.

This menu is displayed when Engr Use Only or OEM Use Only is chosen from the “CE Utilities Menu” on page PANEL-48. If the correct password is entered, the “Engr Use Only Menu” on page PANEL-58 or the “OEM Use Only Menu” on page PANEL-58 appears.

Note: This menu is normally used because of specific requests from support personnel.

<i>Figure 142. Enter Password</i>	
Function	Next Menu
Cancel	Previous menu
A...	—
Z...	—
0...	—
9	—
Note: Supplemental Message Line 1: Password: Supplemental Message Line 2: <password>	

Cancel Causes the previous menu to appear. See Figure 83 on page PANEL-13 for linkage.

<character> Indicates the current character to be entered into the password. When this option is chosen, the character selected is entered into the password and displayed in the message area. After the last letter is entered and the password is correct, the “Engr Use Only Menu” on page PANEL-58, or “Media Test Mode Menu” on page PANEL-59, or “OEM Use Only Menu” on page PANEL-58 is displayed, depending on which path was used to access this menu. See Figure 83 on page PANEL-13 for more detail.
If the password is not correct, the previous menu appears. See Figure 83 on page PANEL-13 for linkage.

The message area indicates that a password is being entered. Every character entered in the password field is displayed in the message area.

Engr Use Only Menu: Figure 143 shows the Engr Use Only menu. This menu allows product engineers and design engineers to access the menu items, after entering the password.

Note: This menu is normally used because of specific requests from support personnel.

<i>Figure 143. Engr Use Only Menu</i>	
Function	Next Menu
Cancel	"CE Utilities Menu" on page PANEL-48
Control Store...	"Control Store Select Address Menu" on page PANEL-61
Media Test Mode	"Password Menu" on page PANEL-57
Note: Supplemental Message Line 1: Caution: Supplemental Message Line 2: data may be lost	

Cancel Causes the "CE Utilities Menu" on page PANEL-48 to appear.

Control Store Allows a product engineer (PE) to read and write any address in nonvolatile store and in control store DRAM.

Attention: The message area warns that damage can occur to the machine. The machine can be configured improperly and made inoperable with this option.

Media Test Mode Causes the password menu to appear. After you enter the password in "Password Menu" on page PANEL-57, "Media Test Mode Menu" on page PANEL-59 allows you to set media mode.

OEM Use Only Menu: Figure 144 shows the OEM Use Only menu. This menu allows OEM support personnel to access the menu items, after entering the password.

<i>Figure 144. OEM Use Only Menu</i>	
Function	Next Menu
Cancel	"CE Utilities Menu" on page PANEL-48
Manufacturer	"CE VPD Data Menu" on page PANEL-52
Drive Type	"CE VPD Field Offset Menu" on page PANEL-51
Drive Model Num	"CE VPD Data Menu" on page PANEL-52
Save Changes	—
Note: Supplemental Message Line 1: <none> Supplemental Message Line 2: <none>	

Cancel Causes the "CE Utilities Menu" on page PANEL-48 to appear.

Manufacturer Allows OEM support personnel to customize the **manufacturer** field in the VPD Data menu.

Drive Type Allows OEM support personnel to customize the **drive type** field, using the VPD Field Offset menu and the VPD Data menu.

Drive Model Num Allows OEM support personnel to customize the **drive model number** field in the VPD Data menu.

Save Changes Stores the changes into non-volatile storage (NVS).

Media Test Mode Menu: Figure 145 shows the Media Test mode Menu. This menu allows product engineers and design engineers, after entering the password, to initiate special media test algorithms.

Note: This menu is normally used because of specific requests from support personnel.

<i>Figure 145. Media Test Mode Menu</i>	
Function	Next Menu
Cancel	"CE Utilities Menu" on page PANEL-48
Media Mode Off/On	—
Normal/Short Clean Cycle	—
Allow Prev Export Tape	—

Cancel Causes the "CE Utilities Menu" on page PANEL-48 to appear.

Media Mode Off/On Allows a product engineer (PE) to set Media Mode OFF or ON. The default is OFF. When this option is set to ON, the drive is placed in a special mode to test the media. Any media written in this mode can only be read by a device in media mode. If the device reading the media is not in media mode, the cartridge appears as a scratch.

Normal/Short Clean Cycle Allows a product engineer to set the cleaning cycle to normal or short.

Allow/Prev Export Tape Allows a product engineer to allow or prevent the export of a tape.

Statistics Menu: Figure 146 shows part of the Statistics menu.

Notes:

1. In later levels of microcode the statistics are shown in decimal instead of hexadecimal format.
2. Statistics are valid only if the Save option is selected in "Statistics Menu" on page PANEL-24.

<i>Figure 146. Statistics</i>	
Function	Next Menu
Cancel	"CE Utilities Menu" on page PANEL-48
See below for complete list	"Statistics Menu"
Note: Supplemental Message Lines : <none>	

All functions are from the ACF *transport*. For example, **Put Mag Fail** is a failure when the cartridge is moved from the *transport* to the magazine.

Cancel Causes the "Statistics Menu" on page PANEL-24 to appear.

Mounts to Drv The total number of times a cartridge was mounted in the drive.

Priority Mnts The total number of times a cartridge was mounted from the priority cell.

Magazine Mnts The total number of times a cartridge was mounted from any of the cells of the magazine.

Clean Mounts The total number of times a cleaning cartridge was loaded in the device.

Pwr On Hrs The total number of hours the device was powered ON for the card pack installed in this device.

Note: When the card pack is replaced, the Pwr On Hrs (time stamp) is automatically reset to dddd=0000.

ACF Errors The total number of errors that occurred on ACF operations.

Put Drive Fail The total number of errors that occurred when a cartridge was inserted in the drive.

Get Drive Fail The total number of errors that occurred when a cartridge was being removed from the drive.

Pinch Mtr Err The total number of timeouts on the motor.

Feed Mtr Error The total number of timeouts on the motor.

Elevator Error The total number of timeouts on the motor.

Cell to Cell The total number of times cartridges were moved to or from any cells or to or from the drive.

Re-calibrations The total number of times the transport had to be re-calibrated.

Put Mag Fail The total number of errors that occurred when a cartridge was inserted in the magazine.

Get Mag Fail The total number of errors that occurred when a cartridge was being taken from the magazine.

Put Pri Fail The total number of errors that occurred when a cartridge was being inserted in the priority cell.

Get Pri Fail The total number of errors that occurred when a cartridge was being retrieved from the priority cell.

Get Mag Retry The total number of errors that required a retry operation when a cartridge was being retrieved from a magazine or priority cell (from the front of the ACF).

Put Mag Retry The total number of errors that required a retry operation when a cartridge was being put into the magazine or priority cell (from the front of the ACF).

Get Dri Retry The total number of errors that required a retry operation when a cartridge was being retrieved from the drive.

Put Dri Retry The total number of errors that required a retry operation when a cartridge was being put into the drive.

Control Store Select Address Menu: Figure 147 shows the Control Store Select Address menu. This menu allows the CE to select an address in control store. Data is written into the selected address. The message line indicates that the Control Store option was chosen on the previous screen.

Note: This menu is normally used because of specific requests from support personnel.

<i>Figure 147. Select Address</i>	
Function	Next Menu
Cancel	"Engr Use Only Menu" on page PANEL-58
CS Adr (8 characters displayed vertically)	—
Continue	"Control Store Alter Menu"
Note: Supplemental Message Line 1: Utilities Supplemental Message Line 2: Control Store	

Cancel Causes the "Engr Use Only Menu" on page PANEL-58 to appear.

CS Adr Defines the hex address to be chosen. To change the value of the nibble, select the nibble, which causes a pop-up menu to appear where you can select 0–F.

Continue Takes the address displayed and goes to "Control Store Alter Menu."

Control Store Alter Menu: Figure 148 shows the Control Store Alter menu. This menu allows a PE to display the byte in the specified address and to update the data in that address. The message lines indicate the control store address selected and indicates the value at that address.

Note: This menu is normally used because of specific requests from support personnel.

<i>Figure 148. Display/Alter</i>	
Function	Next Menu
Cancel	"Control Store Select Address Menu"
<CS Addr> <CS Data>	—
<CS hi nibble>	—
<CS low nibble>	—
Save and Return	"Control Store Select Address Menu"
Note: Supplemental Message Line 1: CS Addr: <CS Addr> Supplemental Message Line 2: CS Val: <CS Data>	

Cancel Causes the "Control Store Select Address Menu" to appear. Any modifications to the byte are canceled.

<address> <data> Shows the data contained in the word (4 bytes) selected. This display cannot be selected and is for information purposes only.

<CS nibble> Shows the current nibble (hex number) in the byte selected. To change the value of the nibble, select the nibble, which causes a pop-up menu to appear where you can select 0–F.

Save and Return Saves the updated byte in the address and returns to the "Control Store Select Address Menu."

CE Drive Features Menu: Figure 149 shows the Drv Features menu.

This menu allows the CE to specify the configuration into which the drive is being installed.

Figure 149. CE Drv Features

Function	Next Menu
Cancel	"CE Drive Options Menu" on page PANEL-40
B11/E11 Rack/Frame	—
B1A/E1A 3494 RS422 Att	—
B1A/E1A C12/C14	"CE B1A/E1A C12/C14 Menu" on page PANEL-63
B1A/E1A No RS422 Attach	—
B11/E11 Deskside ACF	—
B1A/E1A Deskside	—
B1A/E1A Interface A	—
B1A/E1A Interface B	—
Note: Supplemental Message Line 1: When done, select Supplemental Message Line 2: CANCEL option	

- Cancel** Causes the "CE Drive Options Menu" on page PANEL-40 to appear.
- B11/E11 Rack/Frame** CE must select this option if the drive is a Model B11/E11 being installed in a rack or frame. Selecting this option also tells the drive what model number it is. This option will not become active until you either select **Reset Drive** from the operator Services menu, press the **Reset** push button on the operator/CE panel, or power OFF the drive, **after you have returned to the CE Options menu.**
- B1A/E1A 3494 RS422 Att** CE must select this option if the drive is a Model B1A/E1A being installed in a 3494 tape library. Specifying this option also tells the drive what model number it is. The drive is attached to the library manager via the RS422 port. This option will not become active until you either select **Reset Drive** from the operator Services menu, press the **Reset** push button on the operator/CE panel, or power OFF the drive, **after you have returned to the CE Options menu.**
- B1A/E1A C12/C14** Go to "CE B1A/E1A C12/C14 Menu" on page PANEL-63
- B1A/E1A No RS422 Attach** CE must select this option if the drive is a Model B1A/E1A without the RS422 hooked up. This could be the case in a 3494 tape library that contains a ESCON controller in a Model A14 frame. Specifying this option also tells the drive what model number it is. This option will not become active until you either select **Reset Drive** from the operator Services menu, press the **Reset** push button on the operator/CE panel, or power OFF the drive, **after you have returned to the CE Options menu.**
- B11/E11 Deskside ACF** Select this option if the drive is a Model B11/E11 with a deskside model which has an ACF. This option will not become active until you either select **Reset Drive** from the operator Services menu, press the **Reset** push button on the operator/CE panel, or power OFF the drive, **after you have returned to the CE Options menu.**
- B1A/E1A Deskside** Select this option if the drive is a Model B1A/E1A and is a deskside model. This option will not become active until you either select **Reset Drive** from the operator Services menu, press the **Reset** push button on the

operator/CE panel, or power OFF the drive, **after you have returned** to the **CE Options menu**.

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CE must select this option if the drive is a Model B1A/E1A being installed in a non-IBM tape library which uses a 3494-like protocol. Specifying this option will also tell the drive what model number it is. The drive is attached to the library via the RS422 port. This option will not become active until you either select **Reset Drive** from the operator Services menu, press the **Reset** push button on the operator/CE panel, or power OFF the drive, **after you have returned** to the **CE Options menu**.

B1A/E1A Interface B

CE must select this option if the drive is a Model B1A/E1A being installed in a non-IBM tape library which uses the OEM protocol for the RS422 port. Selecting this option will also tell the drive what model number it is. This option will not become active until you either select **Reset Drive** from the operator Services menu, press the **Reset** push button on the operator/CE panel, or power OFF the drive, **after you have returned** to the **CE Options menu**.

CE B1A/E1A C12/C14 Menu: Figure 150 shows the B1A/E1A C12/C14 menu.

This menu allows the CE to specify that the drive is being installed into a C12/C14 environment.

<i>Figure 150. CE B1A/E1A C12/C14 Menu</i>	
Function	Next Menu
Cancel	"CE Drive Features Menu" on page PANEL-62
Auto Clean On/Off	—
DRV Emulation	Go to "CE DRV Emulation Menu" on page PANEL-64

Cancel Causes the "CE Drive Features Menu" on page PANEL-62 to appear.

Auto Clean On/Off CE must set this option to ON if the drive is to be automatically cleaned. If set to Off, the drive will not be automatically cleaned. For more information, see *IBM Magstar 3590 High Performance Tape Subsystem Silo—Compatible Frame Model C12 Introduction, Planning, and User's Guide*, Document Number GA32-0366, or the Install section of this manual. This option will not become active until you either select **Reset Drive** from the operator Services menu, press the **Reset** push button on the operator/CE panel, or power OFF the drive, **after you have returned** to the **CE Options menu**.

DRV Emulation CE must set this option to set the condition to emulate a 4480, 4490, SD-3 or 9490, or to reset emulation mode. If this option is selected, the "CE DRV Emulation Menu" on page PANEL-64 will appear.

CE DRV Emulation Menu: Figure 151 shows the CE DRV Emulation Menu.

This menu allows the CE to specify that the drive is to emulate a 4480, 4490, SD-3 or 9490, or no emulation at all.

<i>Figure 151. CE DRV Emulation Menu</i>	
Function	Next Menu
Cancel	"CE B1A/E1A C12/C14 Menu" on page PANEL-63
No Emulation	—
4480	—
4490	—
SD-3	—
9490	—

- Cancel** Causes the "CE B1A/E1A C12/C14 Menu" on page PANEL-63 to appear.
- No Emulation** CE must set this option if no 4480, 4490 SD-3 or 9490 drive emulation is to be performed. If set to Off, the drive will act as a Model B1A/E1A. This option will not become active until you either select **Reset Drive** from the operator Services menu, press the **Reset** push button on the operator/CE panel, or power OFF the drive, **after you have returned to the CE Options menu.**
- 4480** CE must set this option if the Model B1A/E1A is to emulate a 4480 drive. This option will not become active until you either select **Reset Drive** from the operator Services menu, press the **Reset** push button on the operator/CE panel, or power OFF the drive, **after you have returned to the CE Options menu.**
- 4490** CE must set this option if the Model B1A/E1A is to emulate a 4490 drive. This option will not become active until you either select **Reset Drive** from the operator Services menu, press the **Reset** push button on the operator/CE panel, or power OFF the drive, **after you have returned to the CE Options menu.**
- SD-3** CE must set this option if the Model B1A/E1A is to emulate a SD-3 drive. This option will not become active until you either select **Reset Drive** from the operator Services menu, press the **Reset** push button on the operator/CE panel, or power OFF the drive, **after you have returned to the CE Options menu.**
- 9490** CE must set this option if the Model B1A/E1A is to emulate a 9490 drive. This option will not become active until you either select **Reset Drive** from the operator Services menu, press the **Reset** push button on the operator/CE panel, or power OFF the drive, **after you have returned to the CE Options menu.**

CE Saved Traps Menu: Figure 152 shows the Saved Traps menu.

This menu allows the CE to add, remove or list **saved** FSC traps.

Note: This menu is normally used because of specific requests from support personnel.

<i>Figure 152. Saved Traps</i>	
Function	Next Menu
Cancel	"CE Microcode Trap Menu" on page PANEL-54
Trap (4 characters displayed vertically)	—
Add Saved FSC Trap	—
Rmv Saved FSC Traps	—
List Saved FSC Traps	"CE Saved FSC Trap List Menu" on page PANEL-66
Note: Supplemental Message Line 1: Trap set, Trap remove, or Select FSC Supplemental Message Line 2: <none>	



Cancel Causes the "CE Microcode Trap Menu" on page PANEL-54 to appear. The address is not saved.

Trap Allows the CE to select a specific hex value. To change the value of the nibble, select the nibble, which causes a pop-up menu to appear where you can select 0–F.

Add Saved FSC Trap Allows the CE to add a Saved FSC trap.

Rmv Saved FSC Traps Allows the CE to remove a Saved FSC trap.

List Saved FSC Traps Causes the "CE Saved FSC Trap List Menu" on page PANEL-66 to be displayed.

CE Saved FSC Trap List Menu: Figure 153 shows the Saved FSC Trap List menu.

This menu allows the CE to select a saved FSC to be removed from a list of **saved** FSC traps.

Note: This menu is normally used because of specific requests from support personnel.

<i>Figure 153. Saved FSC Trap List</i>	
Function	Next Menu
Cancel	"CE Saved Traps Menu" on page PANEL-65
Saved FSC1	"CE Remove Saved FSC Trap Menu" on page PANEL-67
Saved FSC2	"CE Remove Saved FSC Trap Menu" on page PANEL-67
Saved FSC3	"CE Remove Saved FSC Trap Menu" on page PANEL-67
Note: Supplemental Message Line 1: Trap set, Trap remove, or Select FSC Supplemental Message Line 2: <none>	

Cancel Causes the "CE Saved Traps Menu" on page PANEL-65 to appear.

Saved FSC1 Selecting this FSC will cause "CE Remove Saved FSC Trap Menu" on page PANEL-67 to be displayed. If no saved trap exists, then "SLOT EMPTY" will be displayed.

Saved FSC2 Selecting this FSC will cause "CE Remove Saved FSC Trap Menu" on page PANEL-67 to be displayed. If no saved trap exists, then "SLOT EMPTY" will be displayed.

Saved FSC3 Selecting this FSC will cause "CE Remove Saved FSC Trap Menu" on page PANEL-67 to be displayed. If no saved trap exists, then "SLOT EMPTY" will be displayed.

Note: Only **three saved** traps can be active at a time.

CE Remove Saved FSC Trap Menu: Figure 154 shows the Remove Saved FSC Trap menu.

This menu allows the CE to remove a **saved** FSC trap which was selected in “CE Saved FSC Trap List Menu” on page PANEL-66.

Note: This menu is normally used because of specific requests from support personnel.

<i>Figure 154. Remove Saved FSC Trap</i>	
Function	Next Menu
Cancel	“CE Saved Traps Menu” on page PANEL-65
Trap (4 characters displayed vertically)	—
Rmv Saved FSC Trap	—
Note: Supplemental Message Line 1: Trap set, Trap remove, or Select FSC Supplemental Message Line 2: <none>	

Cancel Causes the “CE Saved Traps Menu” on page PANEL-65 to appear.

Trap Allows the CE to select a specific hex value. To change the value of the nibble, select the nibble, which causes a pop-up menu to appear where you can select 0–F.

Rmv Saved FSC Trap Allows the CE to remove the Saved FSC trap which was selected in the previous menu “CE Saved FSC Trap List Menu” on page PANEL-66.

CE FSC Trap List Menu: Figure 155 shows the FSC Trap List menu.

This menu allows the CE to select a (normal) FSC to be removed from a list of (normal) FSC traps.

Note: This menu is normally used because of specific requests from support personnel.

<i>Figure 155. FSC Trap List</i>	
Function	Next Menu
Cancel	“CE Microcode Trap Menu” on page PANEL-54
FSC1 (normal trap)	“CE Remove FSC Trap Menu” on page PANEL-68
FSC2 (normal trap)	“CE Remove FSC Trap Menu” on page PANEL-68
.... (normal trap)	“CE Remove FSC Trap Menu” on page PANEL-68
Note: Supplemental Message Line 1: Trap set, Trap remove, or Select FSC Supplemental Message Line 2: <none>	

Cancel Causes the “CE Microcode Trap Menu” on page PANEL-54 to appear.

FSC1 Selecting this FSC will cause “CE Remove FSC Trap Menu” on page PANEL-68 to be displayed.

FSC2 Selecting this FSC will cause “CE Remove FSC Trap Menu” on page PANEL-68 to be displayed.

.... Selecting this FSC will cause “CE Remove FSC Trap Menu” on page PANEL-68 to be displayed.

Note: If no traps exist, then “NO TRAPS SET” is displayed.

Note: More than three (normal) FSCs may be displayed on this menu.

CE Remove FSC Trap Menu: Figure 156 shows the Remove FSC Trap menu.

This menu allows the CE to remove a (normal) FSC trap which was selected in “CE FSC Trap List Menu” on page PANEL-67.

Note: This menu is normally used because of specific requests from support personnel.

<i>Figure 156. Remove FSC Trap</i>	
Function	Next Menu
Cancel	“CE Microcode Trap Menu” on page PANEL-54
Trap (4 characters displayed vertically)	—
Remove FSC Trap	—
Note: Supplemental Message Line 1: Trap set, Trap remove, or Select FSC Supplemental Message Line 2: <none>	

Cancel Causes the “CE Microcode Trap Menu” on page PANEL-54 to appear.

Trap Allows the CE to select a specific hex value. To change the value of the nibble, select the nibble, which causes a pop-up menu to appear where you can select 0–F.

Remove FSC Trap Allows the CE to remove the (normal) FSC trap which was selected in the previous menu “CE FSC Trap List Menu” on page PANEL-67.

Automatic Cartridge Facility

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ACF Magazine

The ACF magazine, 3M part 78-A068-2883-2, weighs 0.68 Kg (1.5 lbs) and each cartridge weighs 0.23 Kg (0.5 lbs).

ACF Description

Figure 157 shows the automatic cartridge facility (ACF) with a magazine loaded. The ACF holds 10 cartridges contained in a magazine and a single priority cell **2** with a capacity of one cartridge. The ACF is attached to the tape drive mechanism.

The operator/CE panel **1** is located on top of the front bezel above the ACF. The operator/CE panel is moveable for easier viewing by the operator.

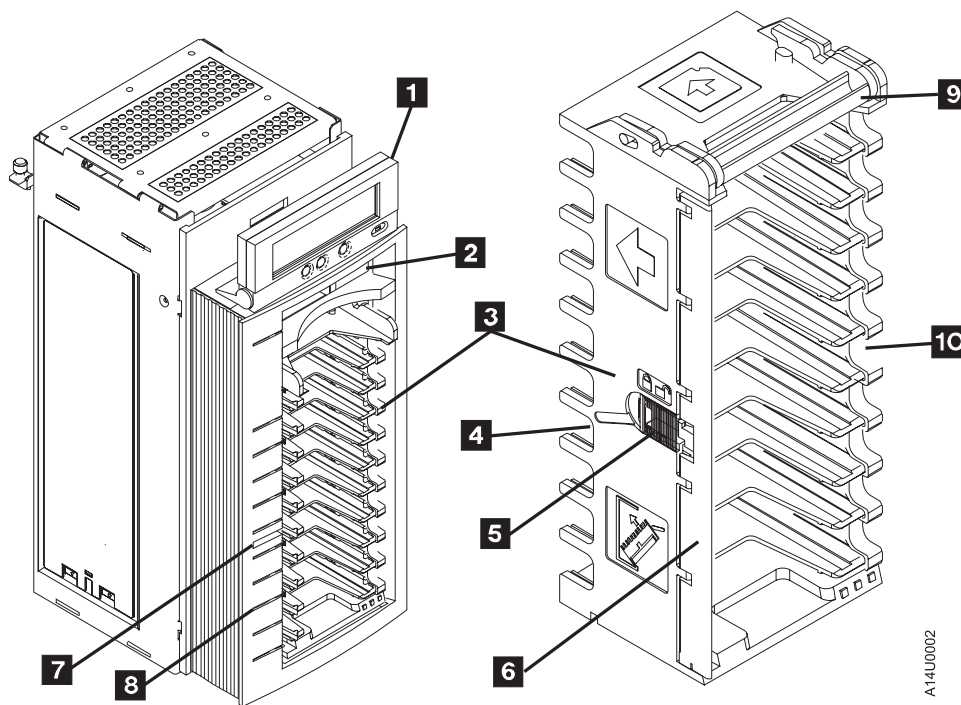


Figure 157. 3590 ACF and Magazine

Functions of the ACF

The mechanical functions of the ACF, as shown in Figure 157 on page ACF-2, are as follows:

- The magazine **3** has a capacity of 10 cartridges that can be inserted and removed by hand.

There is also a priority cell **2** in the ACF. A single cartridge may be inserted into the priority cell import position allowing the ACF to process up to 11 cartridges.

- The handle **9** is used to insert, and to remove the magazine in the ACF.

Note: Do not touch the handle during operations. Doing so may cause job interruptions.

- A magazine cartridge lock **5** that the operator can use to open or lock the door **6**. The magazine cartridge lock should be locked (door locked) for random mode and for transportation of the magazine. The magazine cartridge lock should be in the locked position when cartridges are present and should be unlocked (door unlocked) when loading cartridges. When the magazine is inserted into the ACF the cartridges are automatically unlocked and ready to be accessed depending on the operational mode selected. By pushing in the lock button **5** to the detent/lock position the operator can lock cartridges in the magazine when the magazine is in the ACF. The magazine handle **9** is used for transporting the magazine and insertion or removal from the ACF. See "Inserting and Removing the Magazine in the 3590" on page ACF-8.

ACF

Cartridge Storage Positions

The magazine has two cartridge storage positions as shown in Figure 159 on page ACF-5. They are the *import* and the *export* positions. A cartridge is in the import position when the cartridge is inserted into the operator side of the magazine, inserting the cartridge past the first detent and allowing the cartridge to stop on the second detent. This procedure places the leader block end of the cartridge nearest to the machine side of the magazine.

Notes:

1. A sensing device detects any cartridges positioned beyond the import position and prevents operation of the cartridge transport.
2. Cartridges can be loaded or unloaded from the magazine from either side of the magazine for the convenience of the operator. All cartridges must be loaded with the label side up and the leader block towards the machine side of the magazine.

When the drive ejects a cartridge in all modes **except random**, a cartridge to be removed or transferred to storage or to a different tape subsystem is placed in the export position. The cartridge is retained by the first detent with the volume serial label end of the cartridge nearest to the operator side of the magazine. In random mode, the 3590 always places cartridges in the import position in the magazine.

Components of the ACF

See Figure 158.

The ACF **3** attaches to the deck enclosure **2** with two alignment pins, two hooks, and one captive screw.

The main components of the ACF are the:

- Transport assembly **7**. It delivers cartridges from the magazine or priority cell to the loader **1**, which is located in the deck enclosure. After the cartridge is processed, it is returned to the magazine or priority cell by the transport assembly.
- Magazine assembly **6**. Contains ten cells for storing cartridges to be processed.
- Priority cell **5**. An additional storage cell for inputting a single cartridge.
- Operator/CE display **4**, which is mounted in a holder on top of the ACF.

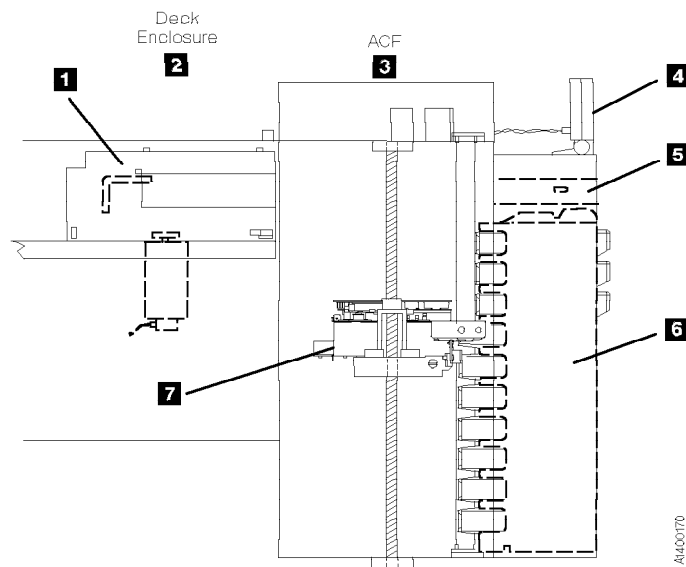


Figure 158. ACF and Deck Enclosure

Magazine

See Figure 159.

The automatic cartridge facility (ACF) has a magazine **1** that holds 10 cartridges.

The magazine is removable from the ACF and can be loaded with cartridges when it is away from the 3590 and then carried to the 3590 and inserted into the ACF. See “Inserting the Magazine” on page PROC-29 for the correct procedure to insert and remove the magazine.

The magazine has two detent positions for the cartridges. They are:

- Import position **3**. When the operator inserts a cartridge in the magazine, the cartridge is in this position. In this detent position the cartridge extends out the back of the magazine so it can be grasped by the transport and moved into the transport carriage.
- Export position **2**. When the device returns the cartridge to the magazine, the cartridge is in this position. In this detent position the cartridge extends out the front of the magazine so it can be grasped and removed by the operator.

The magazine has a slide lock on the left side **4** to lock the cartridges in the magazine while the subsystem is in the random mode of operation or when operator carrying magazine.

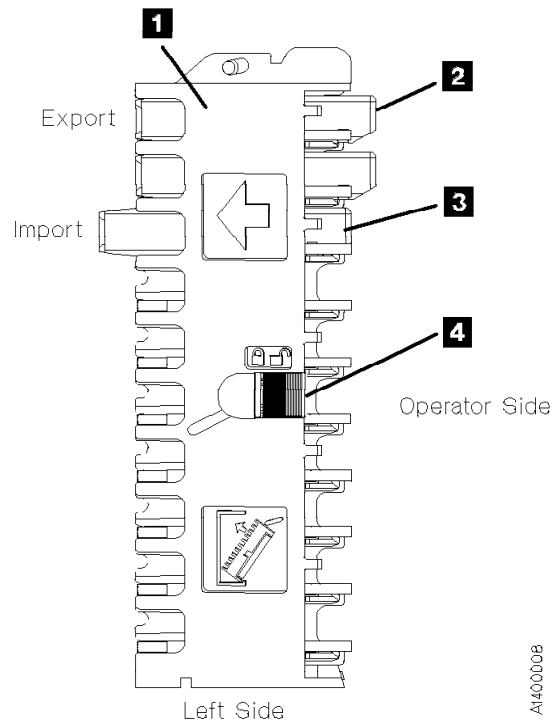


Figure 159. Magazine Import and Export Positions

Cartridge Magazine Positions

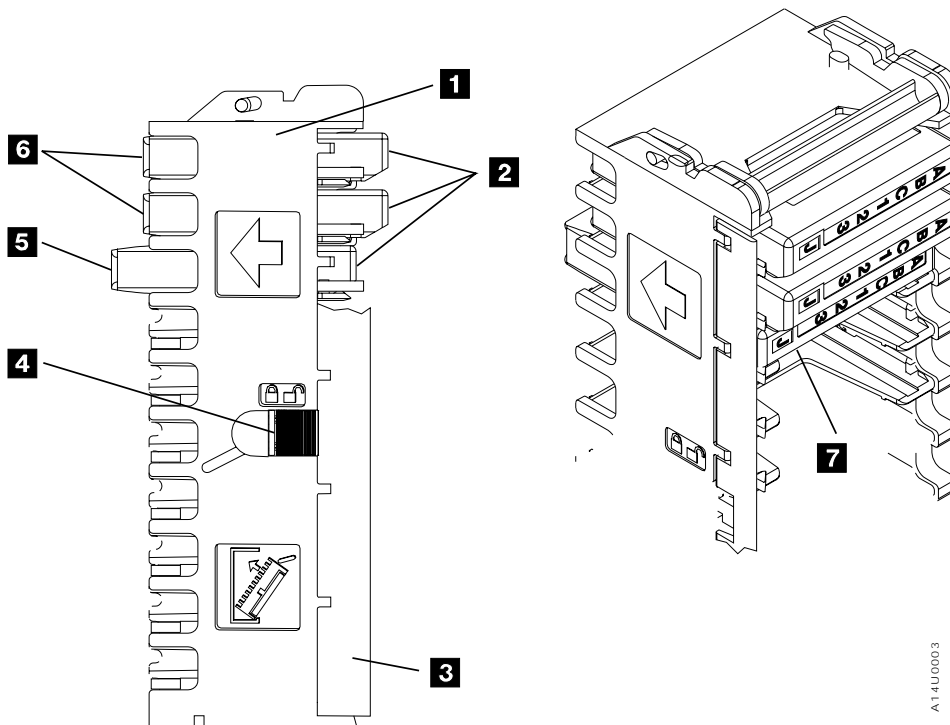


Figure 160. Left View of the 3590 Magazine Cartridge Positions

Figure 160 shows a partially loaded magazine. The magazine **1** has two positions for the cartridges **2** to be positioned.

Notes:

1. The magazine lock **4** must be in the unlocked position as indicated by the icon to remove or insert cartridges into the magazine.
2. Always insert the cartridges into the magazine so that the labels are orientated as shown in **7**.

Import position **5** The cartridge is inserted into the magazine until it comes to the second detent position towards the ACF.

Export position **6** The cartridge is inserted into the magazine until it comes to the first detent position. The export position protrudes from the magazine body (away from the ACF).

Inserting and Removing Cartridges from the Magazine

Note: The magazine cartridge lock **4** in Figure 160 on page ACF-6 must be in the unlocked position before you insert or remove cartridges from the magazine. The door **3** of the magazine **1** will be damaged if cartridges are moved with the magazine lock in the locked position.

Cartridges are inserted and removed manually.

Figure 161 shows two options for grasping the 3590 cartridge. Operators with smaller hands may elect to grasp the cartridges on the top and finger notch **2** on the bottom cartridge surface with their thumb and index finger. Operators with larger hands may find it more convenient to grasp the sides of the cartridge using the finger notches **1** on the side of the cartridge case.

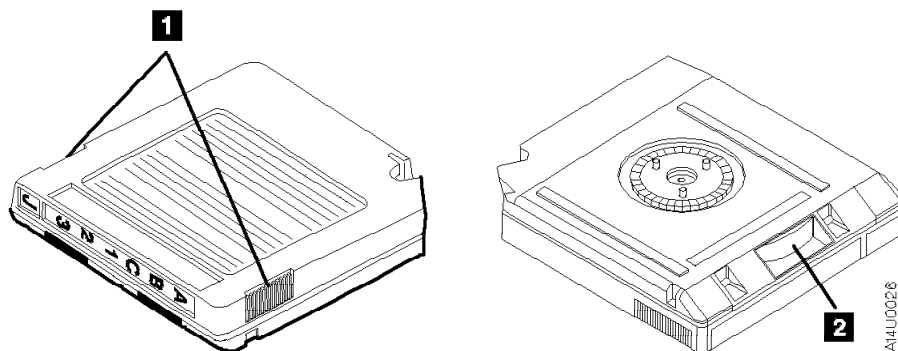


Figure 161. Grasping the Cartridges.

The cartridges are removed with the least effort by pressing the label end of the cartridge to the right (to the side of the magazine opposite the magazine lock) while pulling out.

Note: Always engage the magazine lock **4** (Figure 160 on page ACF-6) before you transport a loaded magazine to avoid dropping the cartridges or shifting their position in the magazine.

ACF Door and Lock Function


The magazine has a door (**3** in Figure 160 on page ACF-6) that extends along the entire length of the magazine. The door is located at the front left side of the magazine when viewed from the front. A hand-operated slider is located in the middle of the magazine frame. The two positions for the magazine lock are as follows:

Unlocked 

The slider is towards the front of the magazine to enable insertion and removal of the cartridge from the magazine. The magazine door opens toward the left, permitting the insertion and removal of cartridges.

Locked 

The slider is towards the back of the magazine. The Magazine is now locked for random mode of operation for the ACF or for transporting the magazine outside of the ACF.

Attention: When a Model A14 is installed in a 3495, the magazine cartridge lock must be left in the unlocked  position.

Inserting and Removing the Magazine in the 3590

Figure 162 shows how to insert or remove the magazine from the ACF. Use two hands to load the magazine in the ACF as follows:

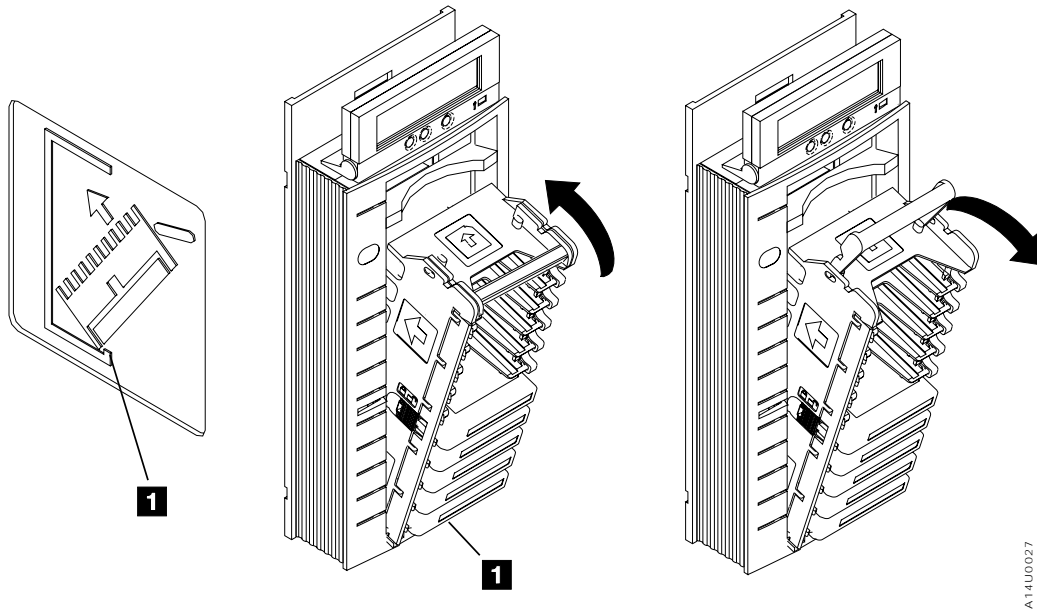


Figure 162. Inserting and Removing the magazine from the ACF

Inserting the Magazine in the 3590

1. Hold the handle with one hand while you hold the body of the magazine at a 45° angle with the other hand.
2. Insert the lower front of the magazine into the ACF as shown in Figure 162 so that the front of the magazine is inside the ACF lip **1**.
3. Pivot the magazine top towards the ACF, until the magazine is flush with the front of the ACF.
4. Push the magazine handle into the ACF lock bar to secure the magazine in the ACF.

Note: The ACF automatically unlocks the magazine cartridge lock when the magazine is correctly inserted. You must manually push the lock button in (see **11** in Figure 157 on page ACF-2) if the mode selected requires a locked magazine.

Removing the Magazine from the 3590

Use two hands to remove the magazine from the ACF as follows:

1. Pull the magazine handle out of the ACF lock bar to release the magazine from the ACF.
2. Hold the handle with one hand and use your other hand to hold the body of the magazine as you pivot the magazine top towards you until the magazine is at a 45° angle to the ACF.
3. Lift the lower front of the magazine out of the ACF until the magazine is clear of the ACF.
4. Ensure that the magazine door is locked.

Notes:

1. Do not touch the magazine handle while the 3590 is processing tape cartridges. Touching the magazine handle while the 3590 is operating may result in unexpected job interruptions.
2. Use care when moving or storing magazines. When the magazine is not in storage or loaded in the ACF, it should be set on its side to prevent it from tipping over or falling.
3. Never ship magazines with cartridges loaded. The cartridges will vibrate in the magazine slots, resulting in contamination on the sides of the cartridges. This contamination may cause transport or loader failures.



Priority Cell

See Figure 163 on page ACF-11.

The priority cell **5** is located above the magazine. The priority cell allows the operator to load a cartridge directly into the ACF when a priority system Mount command occurs. Insert the cartridge into the second detent position.

Transport Assembly

The transport assembly **2** is mounted to an elevator **13**. An elevator motor **3** and lead screw **12** drive the elevator and transport assembly up or down. The position of the elevator and transport assembly is controlled by the transport position sensor **8**.

Note: Do not attempt to lubricate ACF lead screw. Lubricants will ruin the lead screw coating.

The transport assembly can grasp a cartridge from the import position of either a magazine **6**, priority cell **5** or from the loader **1** in the drive enclosure. Two square shafts, the pinch **11** and feed **9** are mounted vertically and pass through the transport assembly. Thus, rotating the square shafts can turn gears and transfer mechanical motion to the transport assembly. Each shaft is controlled by a separate motor; the pinch **4** and feed motors **14**. Rotation of the motors will cause the following actions:

- The pinch motor **4** and its square shaft (through gears and linkage) will cause either the front roller arm **7** or rear roller arm **10** to squeeze against the side of the cartridge.
- The feed motor **14** and its square shaft (through gears) will cause the pinch rollers to rotate **7** and **10**. The direction of rotation is dependent on the operation to be performed; either pull a cartridge into the transport from a cell or the loader or push a cartridge from the transport into a cell or the loader.
- The elevator **3**, pinch **4**, and feed **14** motors are same type/model.

The position of the transport assembly and the cartridge is controlled by sensors.

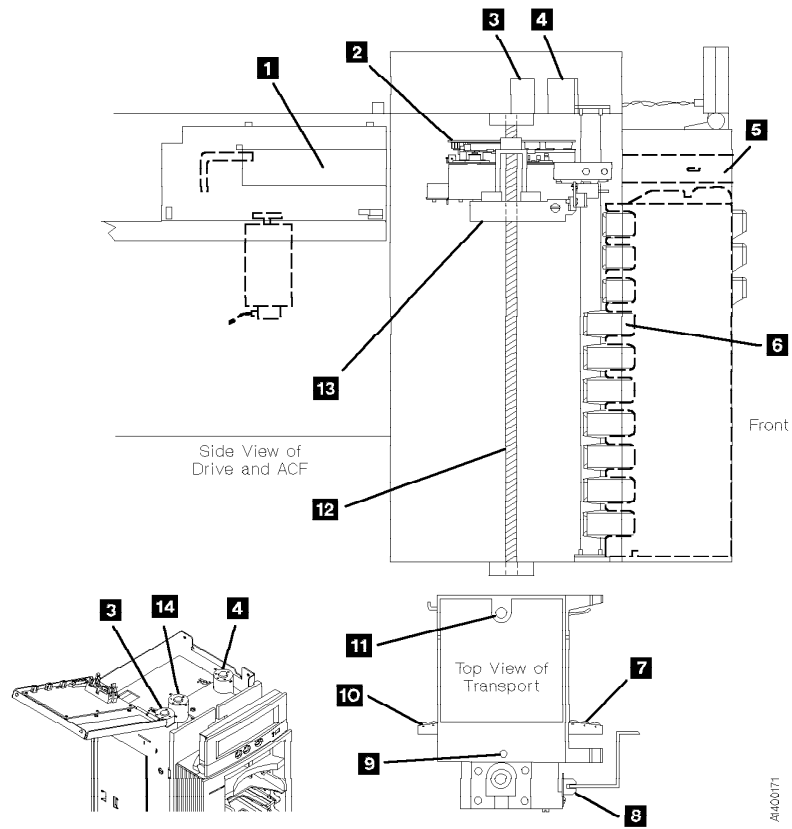
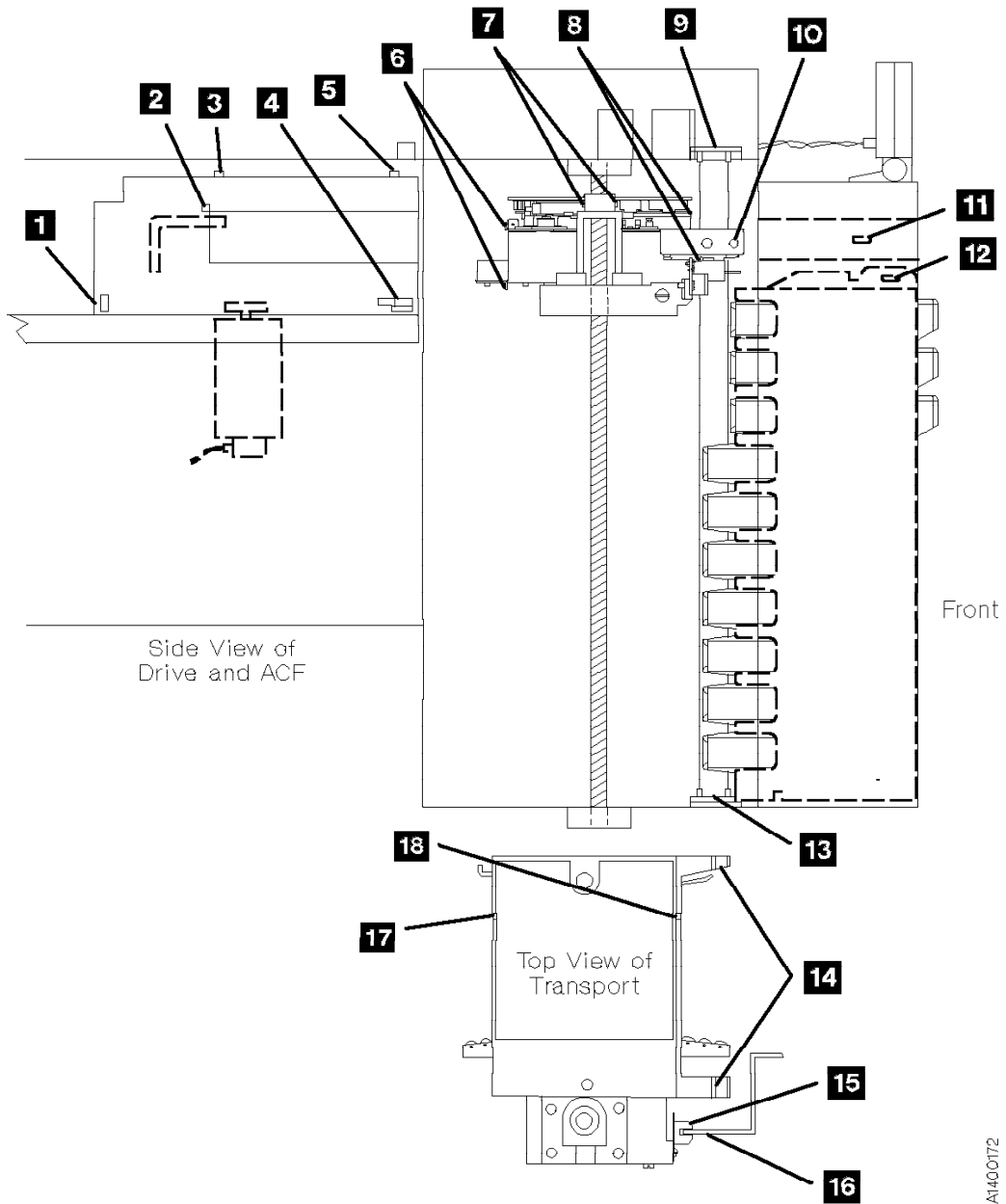


Figure 163. Transport Assembly

ACF and Drive Loader Sensors



A1400172

Figure 164. ACF and Drive Loader Sensors

The following part names refer to Figure 164.

Key	Name	Key	Name
1	File-protect sensor (FID C8)	10	Transport-position sensor (FID 98)
2	Cartridge-present sensor (FID CD)	11	Priority-cell sensor (FID 9E)
3	Tray-up sensor (FID CA)	12	Magazine-present sensor asm. (FID A0)
4	Cartridge-type sensor card asm. (FID CC)	13	Global/interference sensor asm. (FID 9B)
5	Door-open sensor (FID C9)	14	Import/export sensors (not a FRU)
6	Limit-2 sensor (not a FRU)	15	Transport-position sensor (FID 98)
7	Pinch sensor (not a FRU)	16	Transport-position bar (not a FRU)
8	Limit-1 sensor (not a FRU)	17	Limit-2 sensor (not a FRU)
9	Global/interference sensor asm. (FID 9B)	18	Limit-1 sensor (not a FRU)

ACF Sensors

Figure 165 shows the sensors in the ACF.

<i>Figure 165. ACF Sensor Functions</i>	
Type	Function
Global/interference sensor asm (top and bottom)	Senses if a cartridge is present in the import position. Senses if a cartridge has moved past the import position.
Magazine Present sensor asm	Magazine is loaded in the ACF
Import sensor	Senses cartridges in the import position
Export sensor	Senses cartridges in the export position
Limit 1/Limit 2 sensor (2)	Senses cartridge positions in transport within its limits
Pinch sensor	Senses if cartridge is pinched or not pinched (located in transport card)
Priority cell sensor	Senses cartridge in priority cell
Transport position sensor	Senses vertical position of transport

The following describes the sensor functions as a cartridge is moved from a magazine cell to the loaded position in the drive loader.

See Figure 166.

Assume the transport assembly is initially positioned at the priority cell and the next available cartridge must be loaded.

The front beam **3** of the global/interference sensors **2** and **4** is broken and the rear beam **5** is not. The front beam indicates that at least one cartridge is in the import position and the rear beam will indicate if a cartridge is beyond the import position which will cause interference with the movement of the transport **1**. With cartridge in import position and not beyond import position, elevator motor will begin rotating the lead screw **6** to lower the transport.

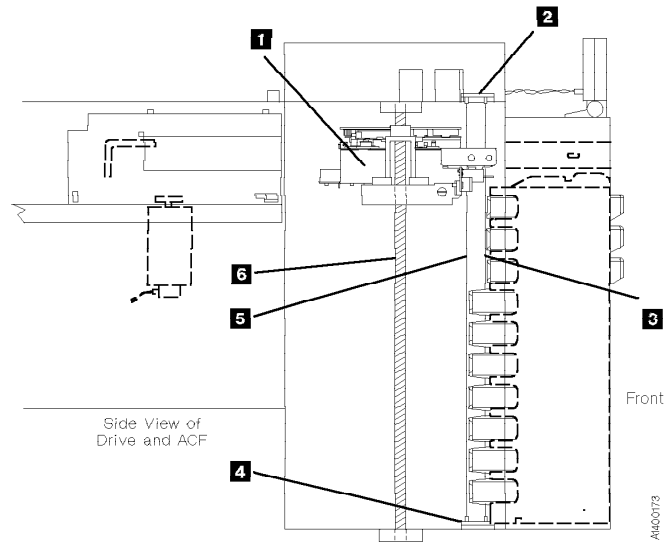


Figure 166. Transport Assembly at the Priority Cell Position

See Figure 167.

The transport **1** moves to each cell position, stops, and checks if a cartridge is in the import position. If not, the transport moves to the next cell and checks, repeating this process until a cartridge is sensed.

The transport-position sensor **6** senses the cell positions. The sensor is “U” shaped and fits around the edge of the transport position bar **7**. Elongated slots **3** cut into the bar provide the spacing from one cell to the next. When the two sensor beams **4** are broken by the solid area between the slots, the transport stops. The sensor is shown at a cell location.

The cartridge is sensed by the import/export sensors **2** and **9**. Again, two beams are used **5**. If both beams are broken, a cartridge **8** is detected in the import position.

ACF

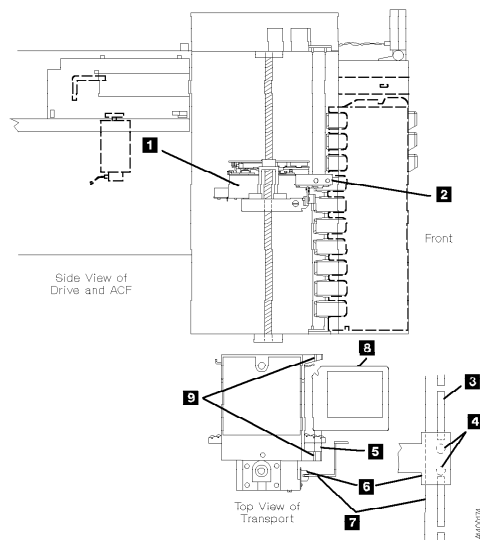


Figure 167. Transport Stops at First Cartridge in Import

See Figure 168.

After the cartridge is detected in the import position, the pinch motor rotates and causes the following action:

- Rotates the square pinch shaft **11** .
- Through gears and linkage, rotates the pinch roller arm **7** against the cartridge, squeezing the cartridge between the rollers and the guide rail bearing **4** .
- A cantilever arm **3** is rotated into the magazine detent mechanism, disengaging the detent that holds the cartridge in the magazine. Before moving the transport assembly, ensure the arm is disengaged.

The pinch motor stops and the feed motor begins rotating to cause the following:

- Rotates the square feed shaft **8** .
- Through gears, the rollers **7** on the pinch roller arm are rotated to pull the cartridge out of the magazine cell and into the transport **6** .
- The light beam of limit-1 sensor **2** and **5** is interrupted by the leading edge of the cartridge. The cartridge continues to move into the transport until the light beam of limit-2 sensor **1** and **10** is interrupted broken, at which time the feed motor stops. The indication that a cartridge **6** is in the transport is when both limit-1 and limit-2 sensor beams are interrupted broken.

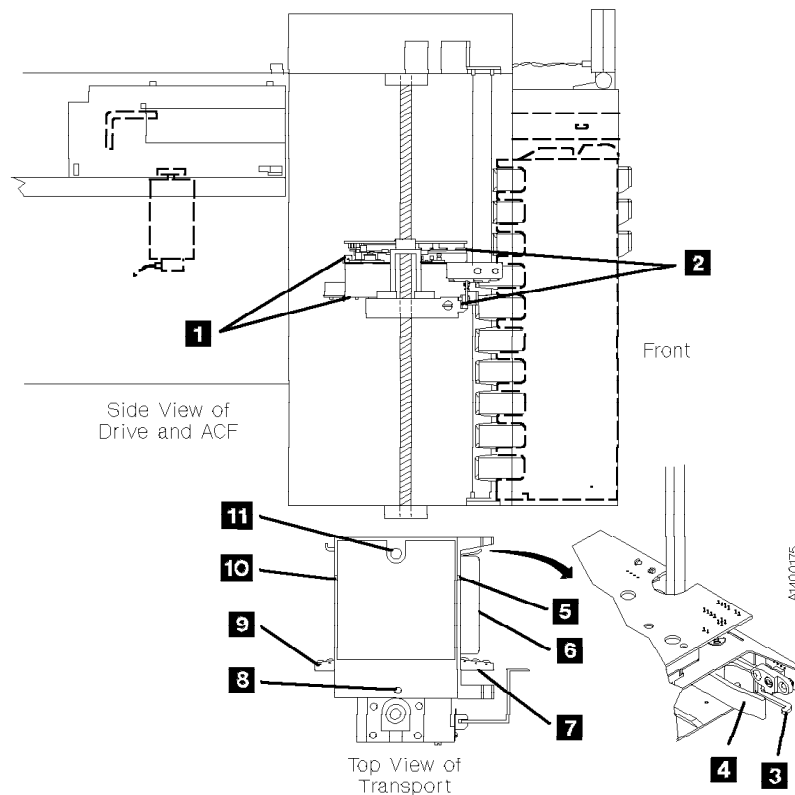


Figure 168. Cartridge is Pulled Into Transport

See Figure 169.

The elevator motor rotates, turning the lead screw **3** to raise or lower the elevator and transport. Again the transport-position sensor **4** senses the slots in the transport position bar **5**. When the priority cell position **2** is sensed, the elevator motor stops. This is also the position for the drive loader carriage **1**.

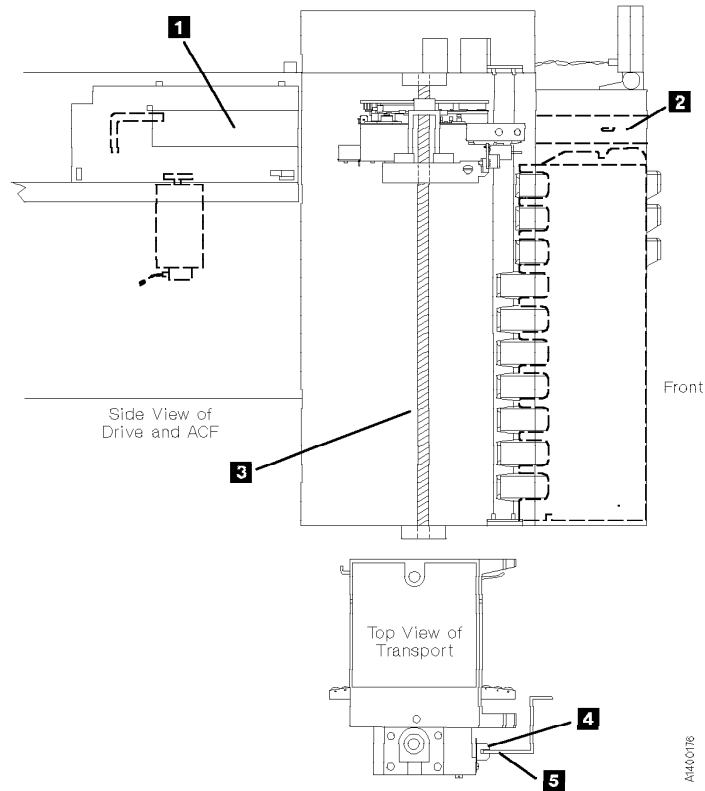


Figure 169. Transport Moves to Priority Cell

See Figure 170.

The pinch and feed motors again operate to move the cartridge. This time, into the loader carriage as follows:

- The feed motor rotates its square feed shaft **4** which, in turn, causes the rollers on the rear pinch roller arm **3** to rotate, pushing the cartridge into the loader carriage **2**.
- When the cartridge is pushed to the end of the carriage, the cartridge-present sensor operates **1** and the feed motor stops.
- The pinch motor again rotates, moving the rear pinch roller arm away from the cartridge and then stops.

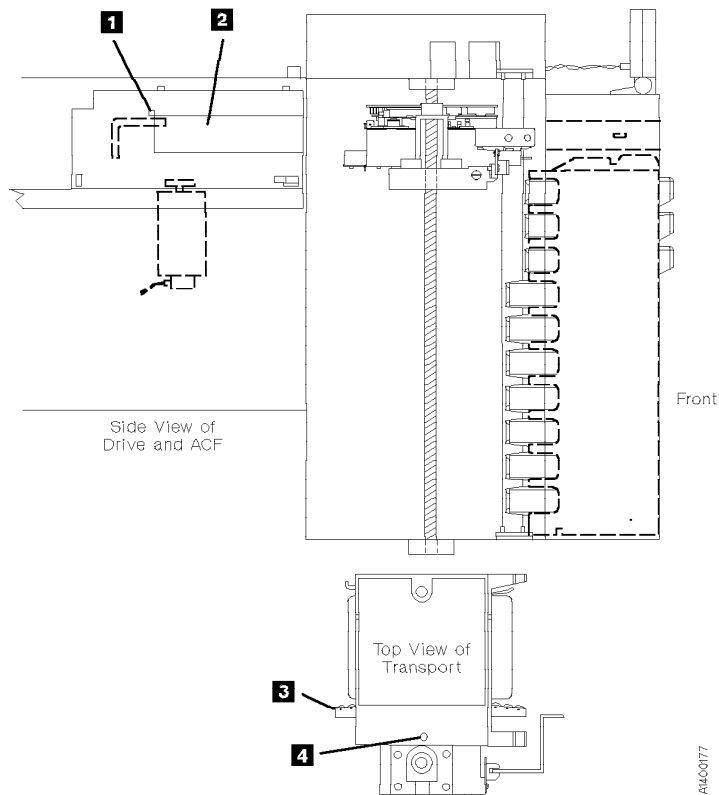


Figure 170. Transport Moves Cartridge Into Loader Carriage

See Figure 171.

Finally the loader drive motor **3** rotates to move the loader carriage forward to get the cartridge **2** and then lowers the cartridge down onto the file reel motor gear clutch **5**. The following occurs when the cartridge is lowered onto the file reel motor gear:

- The cartridge-type sensor **4** indicates if the cartridge is a valid 3590 cartridge.
- The cartridge being completely lowered onto the file reel motor gear clutch is assumed if the cartridge-type sensor indicates the correct cartridge.
- Lowering the cartridge onto the file reel motor causes the gear clutch within the cartridge to engage the drive clutch.
- The file-protect sensor **1** indicates if the cartridge is file protected or unprotected.

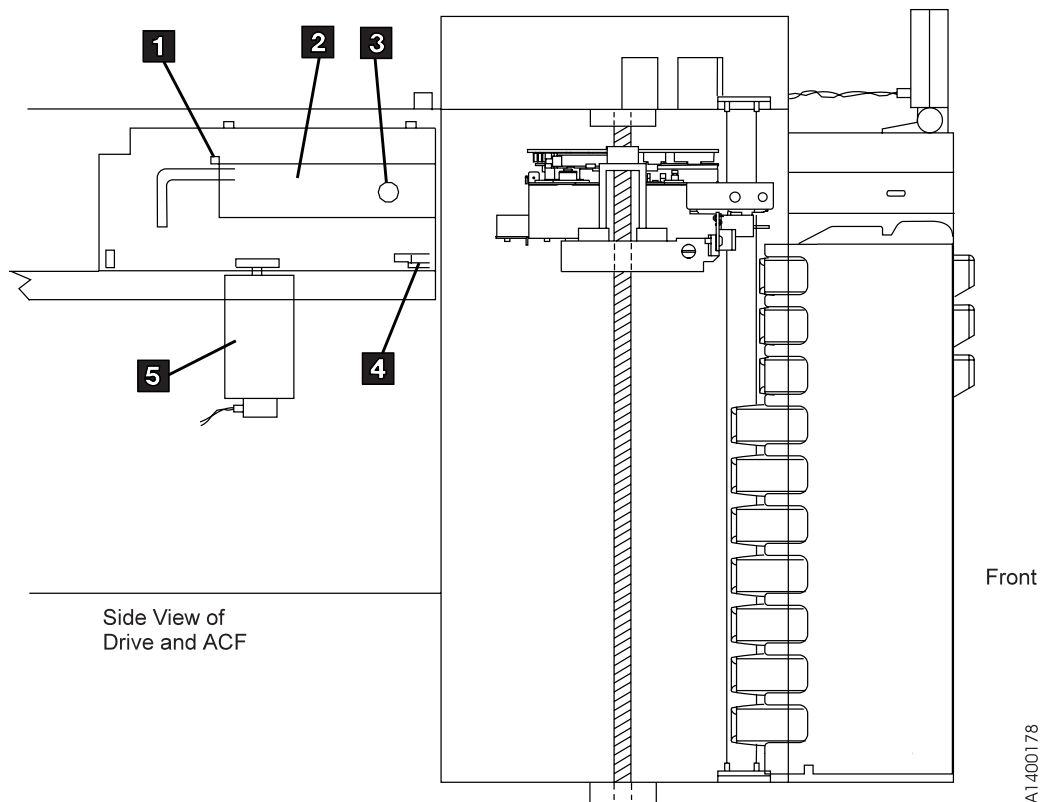


Figure 171. Loader Moves Cartridge In and Down Onto File Reel

Modes of Operation

The ACF has six modes of operation: manual, automatic, system, accumulate, random, and random 2-LUN. The operator can select all the modes.

Manual	The device takes the cartridge from the priority cell or the ACF when Start is pressed and the device returns the cartridge to its original cell.
Accumulate	The operator inserts the cartridge in the priority cell and the device returns the cartridge to the magazine.
Automatic	The operator loads the magazine with cartridges and the device automatically feeds the drive loader until the entire magazine is processed. Cartridges are returned to their original cell.
System	The host program initiates the load from the next cell. Cartridges are returned to their original cell.
Random	The device loads cartridges that are in the <i>import</i> position under host program control. Cartridges are returned to the cell specified by the host program. The indicator lights are all green and the magazine must be <i>locked</i> . This mode is supported on Model B11 only.
Random 2-LUN	Same as Random mode above, but adds an extra SCSI Logical Unit (LUN) to control the ACF. This mode is supported on Model B11 and Model E11.

ACF Notes

These items are general in nature and cover many or all modes. Rather than repeating these notes in each mode description, the notes are shown here and referenced from the mode descriptions.

1. When the magazine is removed from the ACF, it is automatically locked.
When the magazine is placed in the ACF, it is automatically unlocked. If ACF random mode is to be used, the operator must press the magazine lock button into the detent position.
2. In random mode, a cartridge that is returned to the magazine is placed in the import position, to be available for reuse by the attaching host.
3. In manual, automatic, accumulate, and system mode, a cartridge returned to the magazine is placed in the export position.
4. In all modes, to reuse a cartridge exported in the priority cell, either remove and re-insert the cartridge or push the cartridge back to the import position and select Start on the Operator Panel.
5. The feed mechanism for the ACF can access cartridges only in the import position.
6. If the ACF is disabled, the operator presses Start on the operator/CE panel, and there is no magazine in the ACF or there is no cartridge in the import position in either the magazine or in the priority cell, the ACF returns to the disabled state without changing the position of any cartridge. This condition is not an error.
7. If while unloading a cartridge to the magazine, the destination cell is occupied, the ACF tries to unload the cartridge to the priority cell (also see Note 9).
8. If the ACF is instructed to unload a cartridge to the magazine and the magazine is not installed, the ACF tries to unload the cartridge to the priority cell (also see Note 9). The cell-status indicator LED is set to alert (solid yellow) for the priority cell.
9. If the ACF tries to unload the cartridge to the priority cell (in any mode other than random) and the priority cell is occupied, the ACF sets the cell status indicator LED to attention (flashing yellow) on all

cells and disables the ACF (extra cartridge condition). Additionally the ATTN ACF message is displayed. In random mode a Move Medium command specifying an already occupied priority cell as a target will be failed as an illegal request.

For any mode other than random, when the cartridge occupying the priority cell is removed by the operator, the ACF will automatically transfer the previously blocked cartridge to the priority cell in export position without further operator intervention. The associated cell status information is reset.

10. The physical implementation for most modes can be viewed as a medium changer with 11 import and export ports, no storage elements, a single data transfer element, and a single medium transport element that cannot be used to permanently store a piece of medium. For random mode, the ACF contains one import and export port, 10 storage elements, a single data-transfer element and a single medium-transport element.

Initiator Control of ACF

When the ACF operates in manual, accumulate, or automatic mode, the initiator controls only the unload of the cartridge from the device; it does not issue any command that causes the ACF to load a cartridge. A Load/Unload command that requests an unload operation causes a cartridge to be unloaded as described in "Modes of Operation" on page ACF-20.

If a Load/Unload command with the 'load' bit set is received while the ACF is enabled in system mode, the ACF loads a cartridge. If a Load/Unload command with the 'load' bit set is received in any mode other than system mode, the command is presented check-condition status with associated sense data (70, not ready, logical unit not ready, cause not reportable). Receiving two Load/Unload commands with the 'load' bit set, without an intervening unload shall also cause the same check condition.

When the ACF operates in system mode, the program has indirect control over the ACF; the program specifies that a cartridge is to be loaded if possible, but cannot specify from which cell the cartridge is to be obtained. If no magazine is found and the priority cell is empty, the command is presented check condition status with associated sense data (70, not ready, no medium present). If a magazine is present but contains no loadable cartridges and the priority cell is also empty, the command is presented check condition status with associated sense data (70, not ready, medium source element empty).

When the ACF operates in random mode, the program can control the ACF through the Prevent/Allow Medium Removal, Read Element Status, and Move Medium commands. These commands allow the ACF to access cartridges from cells that are located non-sequentially; to assist the initiator in generating and maintaining an inventory of the cartridges in the magazine; and to indicate to the operator that these cartridges can be removed.

The physical implementation for most modes can be viewed as a medium changer with 11 import/export ports, no storage elements, a single data-transfer element, and a single medium-transport element that cannot be used to permanently store a piece of medium. Random mode has a different configuration. For random mode, the ACF contains 1 import/export port, 10 storage elements, a single data-transfer element and a single medium-transport element. The program should issue the Read Element Status command when changing ACF modes to assure the correct configuration. The program should assume that it can request medium to be moved from an import/export port that does not have the 'ImpExp' indication set (for example, an exported medium can be imported again).

Manual Mode

Manual mode allows the operator to load a cartridge by operator action. Each time the operator presses Start, the ACF selects a cartridge from the appropriate cell and mounts it in the device. Only one cartridge is loaded for each operator action.

Terminology Note: For this and all other modes, the term *initial conditions* refers to actions the operator or attaching host must take prior to attempting to initiate ACF activity. *Enabling conditions* refers to the actions that begin ACF motion. Similarly, *disabling conditions* refers to the actions that stop ACF activity.

When the ACF is operating in manual mode, the following applies (see also “ACF Notes” on page ACF-20):

- Initial conditions:

Manual mode is selected from the Set ACF Mode menu.

- Enabling condition: To enable manual mode

- Insert a cartridge into the import position of the priority cell.

- Disabling conditions: The ACF becomes disabled in manual mode when:

- The magazine cartridge was processed and returned to its original cell and there is no cartridge in the import position of the priority cell.
- The ACF is enabled from the operator choosing Start, but the ACF cannot detect a cartridge in the import position in the magazine.
- An attention condition is detected in the ACF; for example, an extra cartridge condition.
- The magazine is not installed; choosing Start causes the ACF to return to the disabled state.

- Operation

1. If the ACF is disabled and in manual mode, and the operator selects Start on the operator/CE panel, the ACF becomes enabled and then verifies that at least one cartridge is in the import position of the magazine. If so, the ACF indexes down the magazine until it finds the first cell with a cartridge in the import position. The ACF sets the cell-status indicator LED for that cell to in-use (steady green) and moves the cartridge from the cell to the device.
2. If the ACF is disabled and in manual mode, and a cartridge is placed in the import position of the priority cell, the ACF loads the cartridge in the device and sets the cell-status indicator LED to in-use (steady green) for the priority cell.
3. If a cartridge is placed in the priority cell while the ACF is enabled and in manual mode, the ACF sets the cell-status indicator LED of the priority cell to in-use (steady green). When the ACF completes its current operation, the ACF automatically loads the priority cell as described in step 2.
4. When a cartridge that was loaded while in manual mode is unloaded, it is returned to its original cell if possible, and the in-use indication is turned off. If the original cell is occupied, the ACF turns off the in-use indicator LED and puts the cartridge in the priority cell, if possible, and sets the priority cell status indicator LED to alert (steady yellow). If the priority cell is occupied, the ACF is disabled and it presents check status (see step 9 on page ACF-20). The cell-status indicator LEDs for all cells are set to attention (flashing yellow). An intervention message is posted on the operator/CE panel.

Accumulate Mode

Some customers organize their operations so that certain subsystems focus on specific cartridge mounts; that is, the entire device is dedicated to responding to servicing specific volumes requested by the attaching host. For this type of operation, the customer needs the ability to easily insert specific cartridges and to allow processed specific mounts to accumulate in a *hopper* until it is convenient for the operator to retrieve a group of cartridges.

In manual, automatic, and system mode, cartridges are always exported to the same ACF cell from which they were imported, if possible. This makes them convenient for processing scratch volumes. Accumulate mode differs in that cartridges are always imported from the priority cell, and exported to a magazine cell. This allows the operator to insert specific cartridges into the priority cell, and to accumulate processed cartridges into the magazine for pickup by the operator.



When the ACF is in accumulate mode, the following applies (see also “ACF Notes” on page ACF-20):

- Initial conditions
 - Accumulate mode is selected from the Set ACF Mode menu.
 - While not a required condition, we recommend that initially the magazine be empty.
 - To indicate to the operator that they should not place cartridges in the magazine (only remove cartridges), all magazine cells have the cell-status indicator LEDs set to in-use (steady green). This is to remind the operator that the entire magazine is reserved as the accumulate *hopper*.
- Enabling conditions: Two ways to enable accumulate mode follow:
 - Select Start ACF on the operator/CE panel.
 - Insert a cartridge into the import position of the priority cell.
- Disabling conditions: The ACF becomes disabled in accumulate mode as follows:
 - The magazine is full and the last imported cartridge is returned to the priority cell.
 - An attention condition is detected in the ACF; for example, an extra cartridge condition.
- Operation:
 1. If the ACF is disabled and in accumulate mode, and the operator selects Start on the operator/CE panel, the ACF becomes enabled and waits until a cartridge is inserted in the import position of the priority cell.
 2. When a cartridge is inserted into the priority cell, the cartridge sets the cell-status indicator LED to in-use (steady green) for the priority cell and waits for the device to become available.
 3. When the device is available, the cartridge is loaded in the device and the priority cell indicator LED is turned off.
 4. When a cartridge is unloaded from the drive, it is moved to the magazine. The ACF places the cartridge in the top cell of the magazine unless that cell is occupied. If the top cell is occupied, the ACF searches down the magazine for the next available cell. Each cartridge is placed in the export position.
 5. When the last available cell in the magazine is filled, the ACF warns the operator by activating all magazine cell-status indicator LEDs to alert (steady yellow). If another cartridge is unloaded, it is placed into the priority cell again, if possible, and the priority cell cell-status indicator LED is set to alert (steady yellow). See step 9 on page ACF-20 if the priority cell is also full.

Automatic Mode

Automatic mode provides the operator a mechanism to keep the drive continually fed with cartridges from the magazine. After enabling the ACF, it automatically feeds cartridges to the device until all the cartridges in the magazine are processed. The operator can supply specific cartridges to an application by inserting the cartridge into the priority cell. The priority cell cartridge is automatically the next cartridge to be loaded into the device. When the specific cartridge is loaded, the ACF automatically resumes processing cartridges from the magazine.

Processed cartridges can be removed from the magazine and unprocessed cartridges can be added, without disturbing the ACF. The ACF locates each unprocessed cartridge.

When the ACF is in automatic mode, the following applies (see also “ACF Notes” on page ACF-20):

- Initial conditions:
 - Automatic mode is selected from the Set ACF Mode menu.
 - The ACF is initialized so the top of the magazine is considered the current cell.
- Enabling conditions: To enable automatic mode:
 - Select Start on the operator/CE panel.
 - Insert a cartridge in the import position of the priority cell.
- Disabling conditions: The ACF is disabled in automatic mode when:
 - A magazine or a priority cartridge is processed and returned to its original cell, and there is no cartridge in the import position of the magazine or the priority cell.
 - The ACF is enabled because the operator chose Start, but the ACF cannot detect a cartridge in the import position in either the magazine or the priority cell.
 - An attention condition is detected in the ACF; for example, there is an extra cartridge in the magazine.
- Operation
 1. If the ACF is disabled and in automatic mode and the operator selects Start on the operator/CE panel, the ACF becomes enabled and verifies that there is at least one cartridge in the import position of the magazine. If so, the ACF indexes down the magazine until it finds the first cell with a cartridge in the import position. The ACF sets the cell-status indicator LED for that cell to in-use (steady green) and moves the cartridge from the cell to the device.
 2. If the ACF is disabled and in automatic mode and a cartridge is placed in the import position of the priority cell, the ACF is enabled, it loads the cartridge in the device, and it sets the cell-status indicator LED to in-use (steady green) for the priority cell.
 3. If a cartridge is placed in the priority cell while the ACF is enabled and in automatic mode, the ACF sets the cell-status indicator LED of the priority cell to in-use (steady green). When the ACF completes its current operation, it automatically loads the priority cell as described in step 2.
 4. When a cartridge that was loaded while in automatic mode is unloaded, it is returned to its original cell, if possible, and the in-use indicator LED for that cell is turned off. The ACF then searches the magazine for the next cell in the import position and loads it in the device. This process repeats until the ACF cannot find another cartridge to load.

System Mode

System mode provides the operator an additional mechanism to keep the drive continually loaded with cartridges from the magazine. When the ACF is enabled and the first cartridge loaded, subsequent load commands are under the control of the attaching host. The ACF loads one cartridge in response to each of these system commands until all the cartridges in the magazine are processed.

System mode does not preclude specific mount requests from the attaching host. The operator can supply specific cartridges to an application by inserting the cartridge in the priority cell. The priority cell cartridge is automatically the next cartridge to be loaded in the device. When the specific cartridge is complete, the ACF automatically resumes processing cartridges from the magazine under system control.

Processed cartridges can be removed from the magazine and unprocessed cartridges can be added, without disturbing the ACF. The ACF locates each unprocessed cartridge.

When the ACF is in system mode, the following applies (see also “ACF Notes” on page ACF-20):

- Initial conditions
 - System mode is selected from the Set ACF Mode menu.
 - The ACF is initialized so the top cell of the magazine is considered the current cell location.
- Enabling conditions: Two ways to enable system mode follow:
 - Select Start ACF on the operator/CE panel.
 - Insert a cartridge in the import position of the priority cell.
- Disabling conditions: The ACF becomes disabled in system mode as follows:
 - A magazine or priority cartridge is processed and returned to its original cell, and there is no cartridge in the import position of the magazine or priority cell.
 - The ACF is enabled because the operator chose Start, but the ACF cannot detect a cartridge in the import position in either the magazine or the priority cell.
 - An attention condition is detected in the ACF; for example, extra cartridge condition.
- Operation:
 1. If the ACF is disabled and in system mode, and the operator selects Start on the operator/CE panel, the ACF becomes enabled and verifies that there is at least one cartridge in the import position of the magazine. If so, the ACF indexes down the magazine until it finds the first cell with a cartridge in the import position. The ACF sets the cell-status indicator LED for that cell to in-use (steady green) and moves the cartridge from the cell to the device.
 2. If the ACF is disabled and in system mode, and a cartridge is placed in the import position of the priority cell, the ACF loads the cartridge in the device and sets the cell-status indicator LED to in-use (steady green) for the priority cell.
 3. If a cartridge is placed in the priority cell while the ACF is enabled and in system mode, the ACF sets the cell-status indicator LED of the priority cell to in-use (steady green). When the ACF completes its current operation, it automatically loads the priority cell as described in step 2.
 4. When the system completes processing a cartridge, it issues a Load command. The ACF unloads the old cartridge and returns it to its original cell, if possible, and turns off the in-use indicator LED for that cell. The ACF waits in enabled state until it receives a Load command or until a cartridge is inserted in the priority cell. In the case of the Load command, the ACF searches the magazine for the next cell in the import position and loads it to the device. This process repeats until the ACF cannot find another cartridge to load.



Random Mode

Random mode is designed to act as a small, self-contained library of up to 10 cartridges, controlled by the attaching host. The attaching host uses the SCSI Medium Mover commands to select a cartridge from a given cell and move it to its destination cell. Control of the source and destination cells are left entirely to the attaching host.

Random mode is supported on the Model B11 only, but the Random 2-LUN mode is supported on both the Model B11 and E11.

Being in random mode does not preclude attaching host requests for specific mounts. Requests for specific cartridges to be mounted can be satisfied by inserting the specific cartridge in the priority cell. In random mode, the priority cell is simply another addressable cell. The ACF notifies the attaching host of the presence of a cartridge in the priority cell, but the attaching host must specifically address that cell to access the cartridge.

To ensure the integrity of the library, the magazine has a lock on the magazine. The magazine lock prevents the addition or removal of cartridges from the magazine after the magazine is installed in the ACF and locked. The ACF senses the state of the magazine lock and does not permit random mode to be enabled unless the magazine lock is set to the locked position. A sensor on the ACF allows the unit to determine that the magazine is not installed or was removed. This disables random mode.

Because the magazine must be locked in random mode, the priority cell is used as an I/O port to the library, to add or remove cartridges from the magazine without having to violate the integrity of the locked magazine. The attaching host can move cartridges from the priority cell to any empty magazine cell (or the device), or from a magazine cell (or the device) to the priority cell. Library inventory and the control of the inventory is the responsibility of the attaching host.

If a Move Medium or Read Element Status command is issued with no magazine present, or with the magazine unlocked, the command fails with a permanent error.

When the ACF is in random mode, the following applies (see also “ACF Notes” on page ACF-20):

- Initial conditions
 - Random mode is selected from the Set ACF Mode menu.
- Enabling conditions: random mode is enabled if all the following conditions are met:
 - The magazine is installed in the ACF.
 - The magazine lock is in the locked state.
 - A valid Move Medium command is received.
- Disabling conditions: The ACF is disabled in random mode if one of the following conditions are met:
 - The magazine is removed from the ACF.
 - The magazine is unlocked.
 - An attention condition is detected in the ACF; for example, extra cartridge condition.
- Operation:
 1. When first enabled in random mode, the ACF waits for attaching host commands.
 2. All magazine cell-status indicator LEDs are set to in-use (steady green). The in-use indicator LEDs remain on unless random mode is disabled. The priority cell cell-status indicator LED is activated as it is used.

3. All cartridge movement is under control of the attaching host using the Medium Mover commands.
4. The ACF honors the Prevent Allow Media Removal command by not allowing operator-initiated export of cartridges any time the command has specified Prevent Media Removal.
5. The priority cell has an assigned element address and can be accessed by the accessor under attaching host control. If an operator inserts a cartridge in the priority cell, the ACF notifies the attaching host. The ACF will not access the cartridge in the priority cell unless commanded by the attaching host.
6. If a cartridge that was loaded while in random mode is unloaded, it may not always be returned to the same cell where it was previously located. The attaching host controls the cartridge location. When the cartridge is placed in a magazine cell, it is placed in the import position.



Random 2-LUN Mode

Random 2-LUN mode is identical to the Random mode, except that it adds an extra SCSI Logical Unit (LUN) to control the ACF.

Note: If this mode is selected when the extra SCSI Logical Unit is not available, the host will not be able to control the ACF.

Random mode is supported on the Model B11 only, but the Random 2-LUN mode is supported on both the Model B11 and E11.

Cell Status Indicator LEDs

This section describes the operation of the cell status indicator LEDs for the ACF and the priority cell, and the conditions identified by the indicator LEDs. The indicator LED operations follow:

Cell Status: Flashing Yellow—Attention Indicator LED

The device requires operator assistance. Figure 172 describes the Attention condition. There is a corresponding operator panel ATTN ACF message when the LEDs indicate attention.

Figure 172. Cell Status indicator LEDs Flashing Yellow—Attention Indicator LED

Indicator LED State	Description of the Condition
All 11 LEDs, which are the magazine LEDs and the priority cell LED, are flashing yellow (accumulate, automatic, manual, and system modes) or all 10 magazine LEDs are flashing yellow (random mode).	Further activity is stopped. Requires operator attention such as installing the magazine, locking or unlocking the magazine, or clearing a cartridge jam. When the condition is cleared, the LEDs return to normal after Start is chosen on the operator panel. Typical supplemental messages to ATTN ACF include <i>extra cartridge</i> , <i>picker error</i> , and <i>export error</i> .

Cell Status: Steady Yellow—Alert Conditions

This condition does not immediately preclude machine operation, but may, unless the condition is cleared soon. Figure 173 describes the alert condition:

Figure 173. Cell Status Indicator LEDs Steady Yellow—Alert Conditions

Indicator LED State	Description of the Condition
All 10 magazine LEDs are steady yellow	Indicates that the magazine is not installed or is locked—accumulate, automatic, manual, or system modes only. LEDs return to normal when the condition is cleared.
	The magazine is processed (no cartridges are in the import position in the magazine or the priority cell)—automatic or system modes only. LEDs return to normal when condition is cleared.
	The magazine is full (warns the operator to remove the full magazine and replace it with one that is not full)—accumulate mode only. LEDs return to normal when Start is selected.
Priority cell LED is steady yellow	Instructs the operator to remove the cartridge from the priority cell.

Cell Status: Steady Green—In-Use Indicator LED

The indicated cells are in use by the ACF or by the program. Figure 174 describes the in-use condition:

Figure 174. Cell Status Indicator LEDs Steady Green—In-Use Indicator

Indicator LED State	Description of the Condition
One magazine LED or priority cell LED is steady green.	Indicates that the designated cell is reserved for a cartridge that is presently in the drive—automatic, system, and manual modes only.
Multiple magazine LEDs are steady green	Indicates that the designated cells are reserved—random or accumulate modes only. Do not put a cartridge in a cell that shows a green LED.

Inspection

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General Instructions

Use this checklist to ensure that a machine not covered by an IBM Maintenance Agreement has the necessary safety items installed and no other changes were made that would make it unsafe or inoperable. Each machine, as it was designed and assembled, had needed safety items installed to protect the owners, operators, and service personnel from injury.

Note: This equipment is designed for connection to IT (impedance transformer) power subsystems.

Materials Needed


The following items are needed or are useful during the inspection:

- Copies of safety service memorandums (SMs) and engineering change announcements (ECAs) for this machine type
- Machine history
- *Electrical Safety for IBM Customer Engineers, S229-8124*

Education

Service personnel must be trained on the new general maintenance agreement qualification (MAQ), tailored-maintenance agreement qualification, and changed machine safety inspection procedures as part of the electrical safety course.

Safety

The general caution symbol  identifies conditions where caution must be used.

The electrical caution symbol  identifies electrical hazards where extreme caution must be used.

Perform this inspection before the normal inspection for a maintenance agreement.

Suspect that the 3590 is unsafe until you verify that it is safe. If any unsafe conditions are present, decide how serious the hazard is and whether you can continue without first correcting the problem. Possible safety hazards are:

Electrical

An electrically charged frame can cause serious or lethal electrical shock.

Mechanical

Hazards, such as a safety cover missing, are potentially harmful to people.

Chemical

Do not use solvents, cleaners, or other chemicals not approved for use on this product.

Any of the problems listed above must be repaired before you use the 3590.

The following notices are translated into selected languages. Each notice contains an identifier (Caution=Cx).

C1

CAUTION

The 3590 Model B11/E11 with the ACF weighs 40.5 kilograms (89 pounds) so remove the ACF before lifting the 3590. The 3590 weighs 28.6 kilograms (63 pounds) without the ACF attached; it takes two persons to safely lift this unit.

C2

CAUTION

The 3590 Model B1A/E1A weighs 28.6 kilograms (63 pounds); it takes two persons to safely lift this unit.

Safety Inspection Procedures

Before performing the safety procedures, ensure the existing room and electrical conditions are safe.

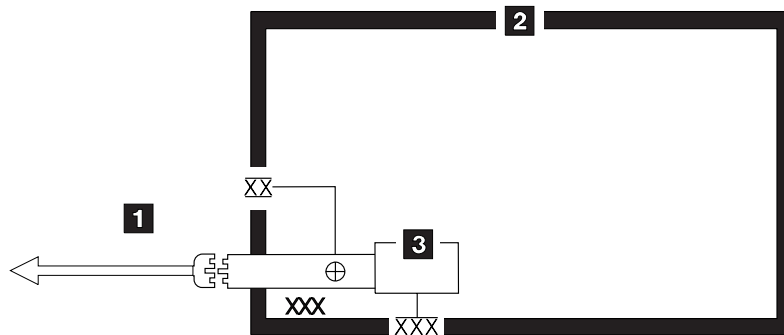
Read all Safety information on the label before starting.

See "Device Covers" on page INSP-13 and "Labels" on page INSP-14 for locations.

Perform the following steps:

3590 Drive AC Grounding Inspection

1. Power off the 3590.
2. Disconnect the channel cables.
3. See Figure 175. Disconnect the power cord **1** from its source.
4. Check that no voltage exists between the housing on the power source and building ground.
5. Check that resistance is less than 0.1 ohm from the building ground to the power supply enclosure **3**.
6. Inspect the power cable **1** for visible cracks, wear, or damage.
7. Check that the resistance between the power cable ground and the 3590 frame **2** is less than 0.1 ohm.
8. Inspect the power supply enclosure covers **3** to ensure all screws are installed and tight.




Legend:

- XX External tooth lock washer
Green/yellow ground wire terminated to chassis or ground
- ⊕ Green/yellow ground wire terminated with slip-on spade terminal
- XXX Redundant ground path to frame
- XXXX External tooth lock washer

A1400040

Figure 175. AC Grounding Diagram (50 Hz and 60 Hz)

Sécurité

Le symbole attention  indique qu'une attention particulière est nécessaire.

Le symbole risque électrique  identifie des risques liés au courant électrique ; il faut en ce cas faire preuve d'une extrême prudence.

Ces procédures doivent être effectuées avant l'inspection normale pour un contrat de maintenance. **Le sous-système de bande magnétique IBM 3590 doit être considéré comme potentiellement dangereux tant qu'il n'a pas été vérifié.** Si vous détectez la moindre condition d'insécurité, vous devez évaluer sa gravité et déterminer si vous pouvez continuer ou non sans avoir d'abord corrigé le problème. Les risques peuvent être de différentes natures :

Risques électriques

Un châssis chargé en électricité peut provoquer un choc électrique grave ou mortel.

Risques mécaniques

L'absence d'un carter de sécurité, par exemple, peut être à l'origine de blessures.

Risques chimiques

Utilisez uniquement les produits de nettoyage et autres produits chimiques recommandés pour ce matériel.

Assurez-vous que toutes ces conditions de sécurité sont remplies avant d'utiliser le sous-système de bande magnétique IBM 3590.

Chaque consigne est introduite par un identificateur (Attention=Cn).

C1

ATTENTION

Le sous-système 3590 modèle B11/E11 doté du dispositif ACF (chargeur automatique de cartouches) pèse 40,5 kilogrammes. Retirez le dispositif ACF avant de soulever le 3590. Sans ce dispositif, le sous-système pèse 28,6 kilogrammes. La présence de deux personnes est nécessaire pour le soulever.

C2

ATTENTION

Le sous-système 3590 modèle B1A/E1A pèse 28,6 kilogrammes. La présence de deux personnes est nécessaire pour le soulever.

Inspection de sécurité

Avant de procéder à l'inspection de sécurité, assurez-vous que la salle ainsi que l'installation électrique remplissent toutes les conditions de sécurité.

Pour plus de détails sur les emplacements des éléments, reportez-vous aux sections "Device Covers" et "Labels." Effectuez les opérations ci-dessous.

1. Mettez le sous-système 3590 hors tension.
2. Débranchez les cordons de transmission.
3. Reportez-vous à la Figure 176. Débranchez le cordon d'alimentation **1** du socle de prise de courant.
4. Assurez-vous que la tension est nulle entre le boîtier de la source d'alimentation et la terre du bâtiment.
5. Vérifiez que la résistance est inférieure à 0,1 ohm entre la terre du bâtiment et le carter du sous-système **2**.
6. Examinez le cordon d'alimentation **1** et assurez-vous qu'il n'est ni craquelé, ni troué, ni endommagé.
7. Vérifiez que la résistance entre la broche de terre du cordon d'alimentation et le sous-système 3590 est inférieure à 0,1 ohm.
8. Examinez les capots **3** et assurez-vous que les vis sont correctement placées et serrées

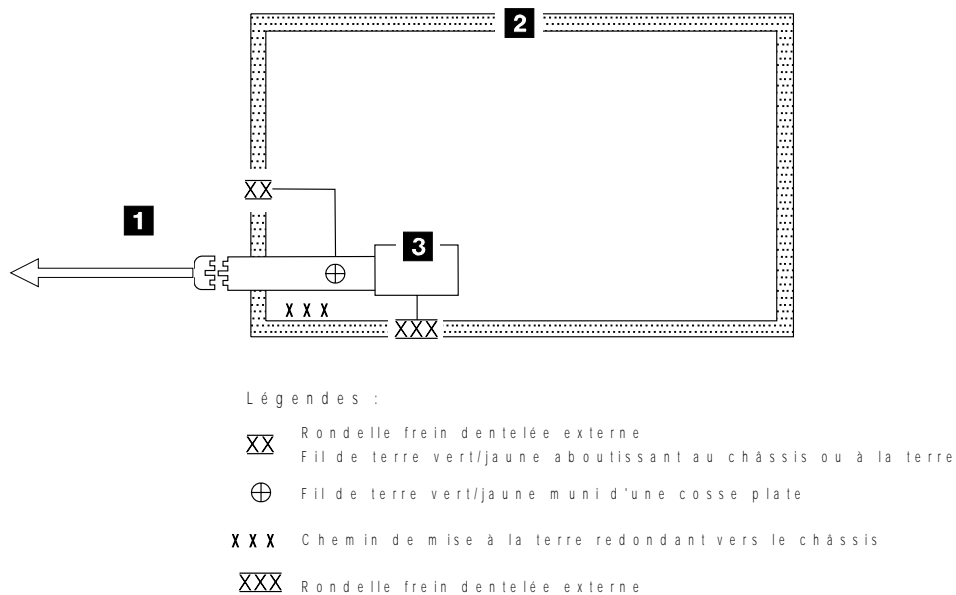



Figure 176. Schéma de mise à la terre c.a. (50/60 Hz)

안전

일반 주의 기호  는 주의를 요합니다.

전기 주의 기호  는 극도의 주의를 요하는 전기적 위험을 표시합니다.

유지보수 계약에 대한 일반 검사 전에 이 검사를 수행하십시오. **3590**이 안전하다고 증명되기 전에는 **3590**이 안전하지 않다고 생각하십시오. 안전하지 않은 조건이 있으면 그 위험의 심각성을 결정하고 그 문제가 먼저 정정되지 않고 계속할 수 있는지 결정하십시오. 가능성이 있는 위험요소는 다음과 같습니다.

전기적

충전되어 있는 프레임은 심각하거나 치명적인 전기 쇼크를 일으킬 수 있습니다.

기계적

안전 커버가 없든지 하는 위험은 잠재적으로 인체에 해롭습니다.

화학적

이 제품에서 사용이 허용되지 않은 용해제, 클리너, 기타 화학 물질을 사용하지 마십시오.

3590을 사용하기 전에 위에 나열된 문제점 중 어떤 것이 있으면 반드시 시정하십시오.

다음 주의 사항은 선택된 언어로 번역되었습니다. 각 주의 사항은 식별명을 갖습니다 (주의 = Cx).

C1

주의

ACF를 포함하는 **3590** 모델 **B11**은 **40.5** 킬로그램입니다 (**89** 파운드). **3590**을 들어올리기 전에 **ACF**를 제거하십시오. **ACF**가 부착되지 않은 **3590**은 **28.6** 킬로그램입니다 (**63** 파운드). 이 장치를 안전하게 들어 올리려면 두 사람이 들어야 합니다.

C2

주의

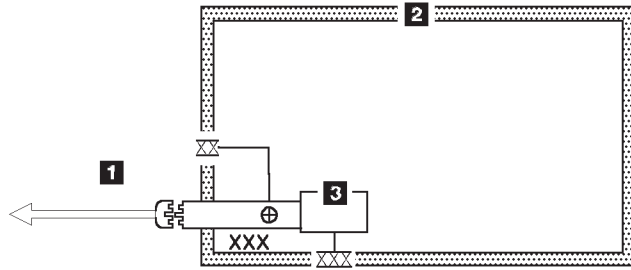
3590 모델 **B1A**은 **28.6** 킬로그램입니다 (**63** 파운드). 이 장치를 안전하게 들어 올리려면 두 사람이 들어야 합니다.

안전 검사 프로시저

안전 프로시저를 수행하기 전에 설치 장소와 전기 상태가 안전한지 확인하십시오.

위치에 대해서는 “장치 커버”와 “레이블”을 참조하십시오. 다음의 단계를 수행하십시오.

1. 3590의 전원을 끄십시오.
2. 채널 케이블을 분리하십시오.
3. 전원 코드 **1**을 소스에서 분리하십시오. 그림1을 참조하십시오.
4. 전원 소스의 단자와 빌딩 접지선 사이에 전압이 있는지 체크하십시오.
5. 빌딩 접지선과 AC 박스 커버 **2** 사이의 저항이 0.1 옴 보다 적은지 체크하십시오.
6. 전원 케이블 **1**이 눈에 띄는 파열이나 낡음, 혹은 파손된 곳이 있는지 점검하십시오.
7. 전원 케이블 그라운드와 3590 사이에 저항이 0.1 옴 보다 적은지 체크하십시오.
8. AC 박스 커버 **3**을 점검하여 모든 나사못이 제대로 짝 조여 있는지 확인하십시오.



범례:

- XX External tooth lock washer
- XX Green/yellow ground wire terminated to chassis or ground
- ⊕ Green/yellow ground wire terminated with slip-on spade terminal
- XXX Redundant ground path to frame
- XXX External tooth lock washer

그림 1. AC 그라운드 다이어그램 (50 Hz 와 60 Hz)

Seguridad

El símbolo general de precaución  identifica situaciones en las que debe tener precaución.

El símbolo de precaución eléctrica  identifica situaciones de riesgo eléctrico en las que debe extremar la precaución.

Realice esta inspección antes de la inspección normal para un acuerdo de mantenimiento. **Considere que la 3590 no es segura hasta verificar que lo es.** Si detecta alguna condición poco segura, decida el grado de riesgo existente y si puede continuar sin solucionar primero el problema. Posibles condiciones de riesgo para su seguridad son,

Riesgos eléctricos

Un bastidor cargado eléctricamente puede producir descargas serias o letales.

Riesgos mecánicos

Riesgos, como la falta de la cubierta de seguridad, son potencialmente perjudiciales para la gente.

Riesgos químicos

No use disolventes, artículos de limpieza u otros productos químicos que no hayan sido aprobados para ser usados en este producto.

Cualquier problema de los listados anteriormente debe ser corregido antes de usar la 3590.

Los avisos siguientes se han traducido en varios idiomas. Cada aviso contiene un identificador (Precaución=Cx).

C1

PRECAUCION

La 3590 modelo B11/E11 con el ACF (Dispositivo avanzado de comunicaciones) pesa 40.5 kilogramos (89 libras) por tanto, quite el ACF antes de levantar la 3590. La 3590 pesa 28.6 kilogramos (63 libras) sin el ACF montado; se necesitan dos personas para levantar la unidad sin peligro.

C2

PRECAUCION

La 3590 modelo B1A/E1A pesa 28.6 kilogramos (63 libras); se necesitan dos personas para levantar esta unidad sin peligro.

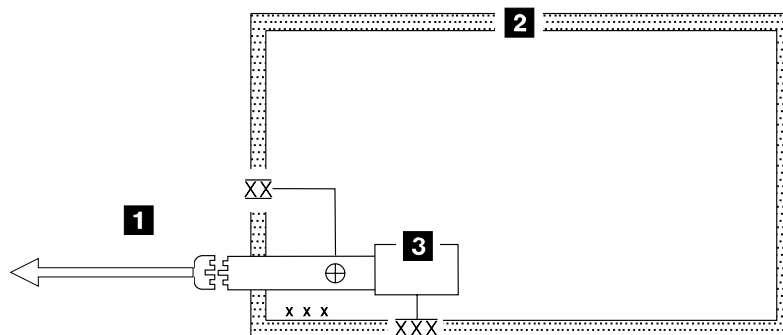


Procedimiento de inspección de seguridad

Antes de proceder con esta inspección, asegúrese de que las condiciones eléctricas y de carácter general existentes son seguras.

Consulte “Cubiertas del dispositivo” (“Device Covers”) y “Etiquetas” (“Labels”) para saber donde se encuentran. Siga los pasos siguientes:

1. Desconecte la 3590.
2. Desconecte los cables de canal.
3. Consulte la Figure 177. Desconecte el cable de alimentación **1** de su fuente de alimentación.
4. Compruebe que no hay voltaje entre el receptáculo de la fuente de alimentación y la toma de tierra del edificio.
5. Compruebe que la resistencia es menor de 0.1 ohmios desde la toma de tierra del edificio hasta el recinto del dispositivo **2**.
6. Inspeccione el cable de alimentación **1** para detectar grietas, desgaste excesivo u otros desperfectos visibles.
7. Compruebe que la resistencia entre la toma de tierra del cable de alimentación y la 3590 es menor de 0.1 ohmios.
8. Inspeccione las cubiertas del recinto **3** para comprobar que todos los tornillos están instalados y firmes.



Explicación:

XX Arandela de seguridad dentada externa. Cable de tierra verde/amarillo que acaba en chasis o toma de tierra.

⊕ Cable de tierra que acaba en terminal de horquilla deslizable


xxx Paso redundante de toma de tierra a bastidor

XXX Arandela de seguridad dentada externa

A1145P040

Figure 177. Diagrama de toma de tierra CA (50 Hz y 60 Hz)

Segurança

O símbolo geral de cuidado  identifica condições nas quais é necessário cuidado.

O símbolo de cuidado elétrico  identifica riscos elétricos onde é necessário cuidado máximo.

Execute esta inspeção antes da inspeção normal para um contrato de manutenção. **Não acredite na segurança do 3590 até certificar-se de que é seguro.** Se houver qualquer condição insegura, verifique a gravidade do risco e se você pode continuar sem antes corrigir o problema. Os riscos de segurança possíveis são:

Elétrico

Uma estrutura carregada eletricamente pode causar choque elétrico sério ou letal.

Mecânico

Riscos, tais como a falta de uma tampa de segurança, são potencialmente prejudiciais para as pessoas.

Químico

Não utilize solventes, produtos de limpeza ou outros produtos químicos não-aprovados para uso neste produto.

Qualquer um dos problemas acima relacionados deve ser resolvido antes de se iniciar a utilização do 3590.

Os seguintes avisos são traduzidos nos idiomas selecionados. Cada aviso contém um identificador (Cuidado=Cx).

C1

CUIDADO

O 3590 Modelo B11/E11 com o ACF pesa 40,5 quilos (89 libras), portanto remova o ACF antes de levantar o 3590. O 3590 pesa 28,6 quilos (63 libras) sem o ACF acoplado; são necessárias duas pessoas para levantar esta unidade com segurança.

C2

CUIDADO

O 3590 Modelo B1A/E1A pesa 28,6 quilos (63 libras); são necessárias duas pessoas para levantar esta unidade com segurança.



Procedimentos Para Inspeção de Segurança

Antes de realizar os procedimentos de segurança, certifique-se de que o local e as condições elétricas existentes são seguras.

Consulte “Device Covers” e “Labels” para obter informações sobre localizações. Execute os seguintes passos:

1. Desligue o 3590.
2. Desconecte os cabos de canal.
3. Consulte Figure 178. Desconecte o cabo de alimentação **1** da sua fonte.
4. Confirme se não existe voltagem entre o compartimento na fonte de alimentação e o terra do prédio.
5. Confirme se a resistência é menor do que 0,1 ohm entre o terra do prédio e o compartimento do dispositivo **2**.
6. Inspeccione o cabo de alimentação **1** para verificar se existem fissuras, desgastes ou danos.
7. Confirme se a resistência entre o terra do cabo de alimentação e o 3590 é menor do que 0,1 ohm.
8. Inspeccione as tampas dos compartimentos **3** para certificar-se de que todos os parafusos estão instalados e apertados.

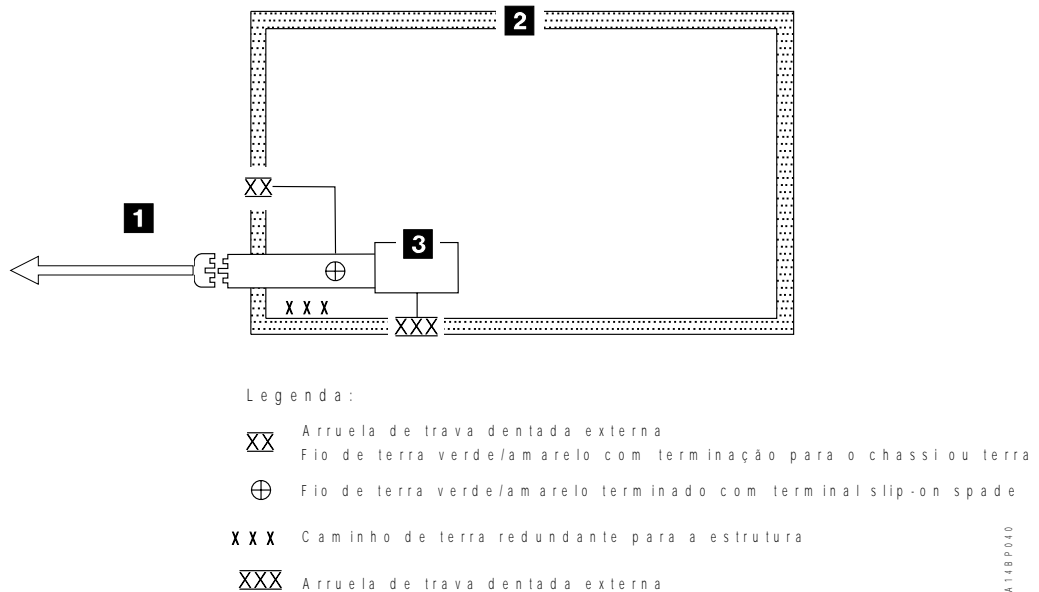


Figure 178. Diagrama de Aterramento AC (50 Hz e 60 Hz)

Device Covers

See Figure 179. Ensure that the following items are not damaged and do not have sharp edges:

- Automatic cartridge facility (ACF) **1**
- Deck enclosure **2**

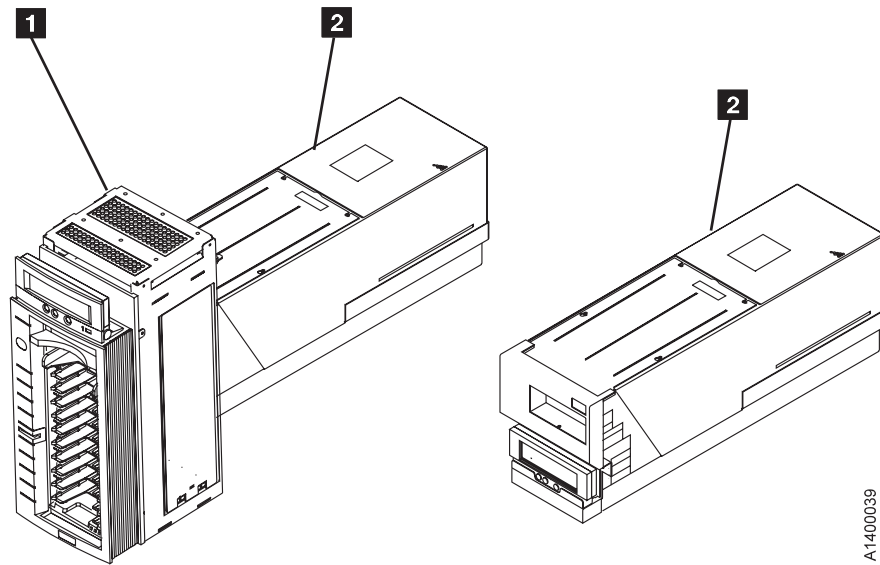


Figure 179. Covers for Model B11/E11 and Model B1A/E1A

Labels

See Figure 180. Label **2** is available in multiple languages.

Check that the following labels are installed:

- Cleaning label **1**
- Caution **2**
- Serial plate **3**
- Canada EMC **4**
- FCC **5**
- Manufactured in U.S.A. **6**
- Bar code **7** located on both sides
- Power Rating UL/CSA **8**
- Serial plate **9**
- CE **10**
- Weight **11** located on both sides

Exchange the labels if they are damaged (not readable) or order new labels if they are missing. See the “Parts Catalog” chapter for the part numbers.

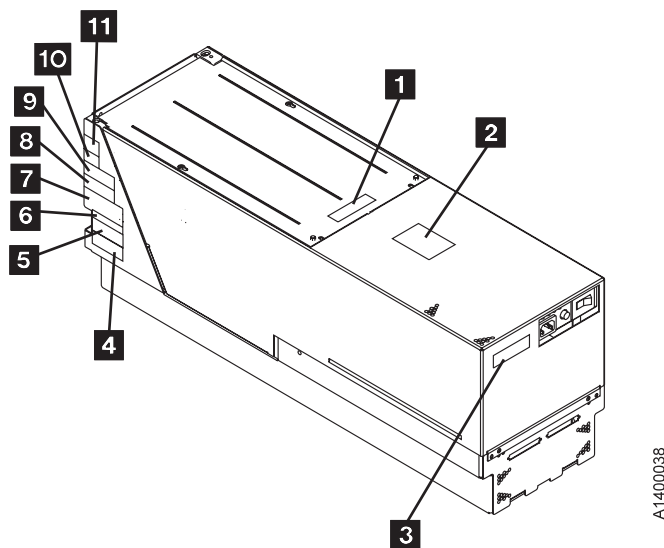


Figure 180. Label Locations

Rack Slides

See Figure 181. Ensure that the following items are not damaged and do not have sharp edges:

- Physical stops **1** located under the tray (in front)
- Position locks **2** located under the tray (push tabs inside the slide rail)

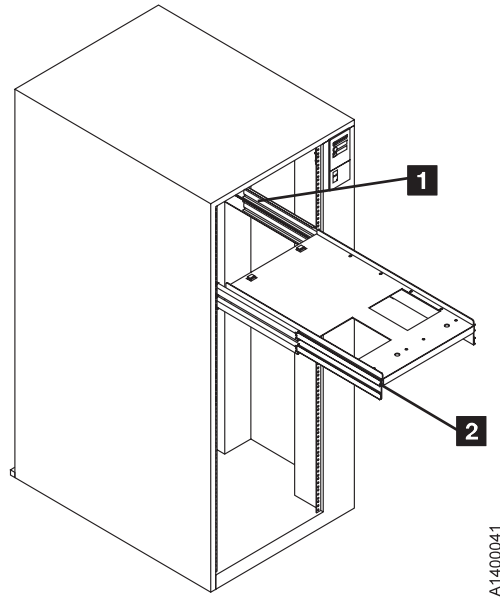


Figure 181. Rack Slides

Installation

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|
|
|

Before Installation

Attention: The Magstar Ultra level drives require certain microcode pre-requisites if attaching to an A00/A50 Control Unit or to a library. Read and understand the **Read Me** instruction sheet that was shipped with the drive. Ensure that all of the pre-requisite conditions are completed as necessary.

Note: If possible, save the packaging material for 3590 reshipment or relocation.

Perform the following steps for unpacking the subsystem:

- ___ 1. Open the shipping container and inventory the parts listed on the 3590 bills of material.
- ___ 2. Position the shipping container that contains the 3590 in front of the rack.
- ___ 3. Check to make sure that you received the following items:
 - ___ a. Appropriate power cable

Note: The most common power application is where the power cable plugs into the Power Control Compartment (PCC). This uses a 3-meter, 220 V ac, 50/60 Hz cable, P/N 05H8911.

- ___ b. Interposer (if required) for attachment to host:

P/N	Attachment
05H3834	AS/400 with FC 9410
61G8323	RS/6000 with FC 9701
50G0460	RS/6000 with FC 9702

- ___ c. Appropriate SCSI cables

This procedure describes all installation actions in detail. Read and check off the step when it is completed.

Note: Be aware that you will need assistance when lifting the drive.

Check with the branch office or physical planning representative **to ensure that the installation planning specifications have been met.**

Ensure that the customer has the correct Host software levels and correct Host PTFs for 3590 attachment.

Ensure that the **correct SCSI cables and power cables** were ordered. Ensure that the correct length SCSI cables were ordered for connection to a host or to a 3591 control unit. Ensure that the correct terminators and interposers will be available.



Head Protector

New machines from the factory are shipped **without** the orange head protector, P/N 05H4778. You should not have to remove the deck cover to install a new machine.

Relocated machines, however, may have had the head protector installed when they were discontinued at the previous location.

If this is a relocated machine, **do not** power ON the drive until the head protector is removed during the "Installation Checkout" procedure.

Tools

The following tools are contained in the ship group. For Model B1A/E1A drives, some tools in the list are in the 3494 ship group. Not all tools are shipped with all drives.

- One **blank scratch cartridge** P/N 05H4434 for testing the 3590 when the device is not in the library. When the device is library-attached, P/N 05H7539 is supplied.
- One **FMR cartridge** that contains the EC level of the microcode shipped with this device. (The P/N of the cartridge changes with each EC release of the code.)
- One **cleaner cartridge** P/N 05H4435 (P/N 05H7540 when in a library) for cleaning the tape path.
- One **SCSI wrap block** P/N 62G1324 or P/N 05H9163 for testing the SCSI hardware.
- One **RS-422 wrap block** P/N 39F3884 for testing the library manager port (always a 3494 or 3495 special tool).
- One **tape removal tool** P/N 6850663 for rewinding the tape onto the cartridge. Refer to "Magnetic Tape Attachment Procedure" on page PROC-42 for illustration of tool.
- One **library attachment wrap interposer tool** P/N 05H3895 (9-pin-to-25 pin) for isolating cable problems (always a 3494 or 3495 special tool).
- **CE vacuum gauge adapter** P/N 05H9895 for testing the pneumatic system.
- **Gap set tool** P/N 05H4671 for adjusting the machine reel motor hub.
- **ACF motor alignment tool** P/N 05H4724 for setting the gear mesh gap.
- **ACF transport position adjustment tool** P/N 05H3388 for adjusting the transport position sensor.
- **Two terminators** P/N 61G8324 for terminating the two SCSI ports. On newer devices, terminator P/N 05H4793 is shipped. Uses for the new terminator are:
 - Terminating the unused SCSI port in a 3590. Use the two short screws P/N 05H4782 or the two long screws P/N 05H8983, as required. The two sets of screws are shipped with the terminator (P/N 05H4793).
 - Daisy-chaining a non-IBM device or an IBM device that does not have a hammer-head cable to a 3590.

- Using a host cable that does not have a hammer-head in a 3495 to connect the library control unit frame to a drive unit frame that is at the end of the string (no device cables are long enough). Use the short screws P/N 05H4782 that are shipped with the terminator.

The following items, not in the ship group, may be needed to complete the installation:

- Flat-blade screwdriver
- Nut-drivers (5.5 mm, 3/16 in., and 7 mm for rack installation)
- Wrench (11 mm)
- Metal scale or flat ruler at least 5 in. (125 mm) long.
- Pressure/vacuum gauge P/N 6850747.

Choosing the Correct Installation Procedure

Use Figure 182 to select the installation procedure for the 3590 model that you are installing.

<i>Figure 182. Choosing your Correct Installation Procedure</i>	
3590 Models	Where to Start
3590 Model B11/E11 only	Go to "Model B11/E11 Installation" on page INST-6
3590 Model B1A/E1A only	Go to "Model B1A/E1A Installation" on page INST-25
The Model B11/E11 is being installed in a Desk Side sleeve as RPQ 8B3191	Go to "Install Model B11/E11 Within Desk Side Sleeve, RPQ 8B3191" on page INST-21
The Model B1A/E1A is being installed in a Desk Side sleeve as RPQ 8B3190	Go to "Install Model B1A/E1A Within Desk Side Sleeve, RPQ 8B3190" on page INST-29
3590 Model C12/C14	Go to the INSTALL section of <i>IBM 3590 Tape Subsystem Models C12/C14 Maintenance Information</i> .
Model Axx Control Unit with any Model 3590 drives	Go to the INSTALL section of <i>IBM 3590 Tape Subsystem A00 and A50 Controller Models Maintenance Information</i> .

Model B11/E11 Installation

Install the Model B11/E11 in a Rack

- If you are installing a rack that has the 3590s already installed, go to “Install Rack That Contains Model B11/E11 Devices” on page INST-24.
- If you are installing a 3590 Model B11/E11 in a rack, continue with “Unpack the 3590.”

RS/6000 7017 S70 or S7A Only

If you are installing a 3590 Model B11/E11 in a RS/6000 7017 S70 or S7A I/O rack, it will be necessary to remove the I/O rack door. Refer to the *RS/6000 Enterprise Servers S70 and S7A Installation and Service Guide, SA38-0548 I/O rack removal and replacement procedure* for details.


Attention: The door and hinge **must** be left off the I/O rack because of interference with the tape drive.

End of RS/6000 7017 S70 or S7A Only

Note: It is easier to line up the holes and level the hardware if you use two persons to install the rack shelf hardware.

Unpack the 3590

Each 3590 model has its own set of installation procedures. Follow the correct procedure for the model you are installing; do not mix procedures.

The  symbol identifies an ESD-sensitive part. See “Working with Electrostatic Discharge (ESD) Parts” on page PROC-20.

CAUTION:

The 3590 Model B11/E11 weighs 28.6 kilograms (63 pounds); it takes two persons to safely lift this unit.

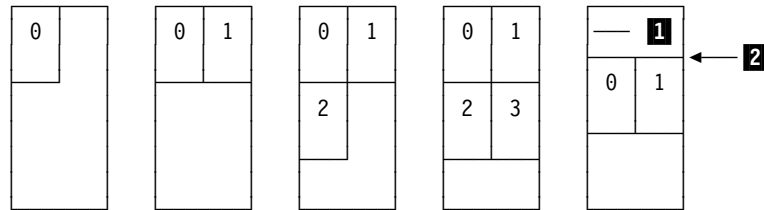
Note: This notice is translated into selected languages. See **C2** in the INSP section.

1. Place the 3590 near the rack, frame or cover (sleeve) that will contain the 3590 and unpack the boxes.
2. Verify the 3590 shipping group parts by checking that you have received all the parts listed on the 3590 bills of material. Do not remove the parts from plastic containers so you can tell the part numbers of the parts.

Device Numbering and EIA Units for Model B11/E11

During the Model B11/E11 (rack mount) installation procedure, you can locate various components by hole location and EIA rack units. All hole locations are given **from the top** unless otherwise stated.

Figure 183 shows how devices in a rack are numbered in an empty rack and the sequence of installation. Always install the lowest-numbered devices first.



Front View

1 Other devices in existing customer's rack

2 Top EIA unit allocated to 3590

Figure 183. Device Numbering in Rack

1. Position the rack and locate the physical location in the rack where the 3590 is to be installed.

The 3590 Model B11/E11 drive requires 12 EIA units. Each EIA unit consists of three holes in the rack. EIA unit number 32 (top of rack) only has two holes, all other units have three holes. Figure 184 shows an example of EIA number 20 **1** as being allocated to the 3590. When these procedures prompt you to count starting at hole 1 **2**, count from the center hole of the first allocated EIA unit.

Note: The top hole is the center hole of EIA unit 32 **3** and is therefore hole number 1.

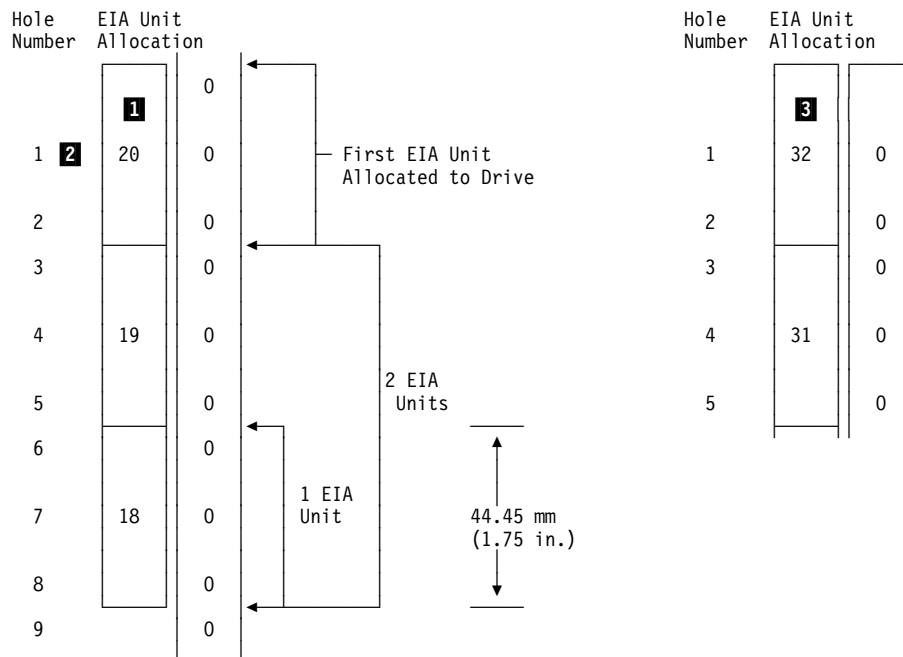


Figure 184. EIA Unit Allocation

Holes for EIA Units, Model B11/E11: The 3590 Model B11/E11 drive requires 12 EIA units. Figure 185 on page INST-9 shows the hole number and the location of the pins and screws for the hardware. Start counting at **A** hole number 1, which is the second hole in the first allocated EIA unit. Figure 184 shows an example of EIA unit number 20 as being the first EIA unit allocated to the 3590.

Legend:

(from front of rack)

rr right rear

lr left rear

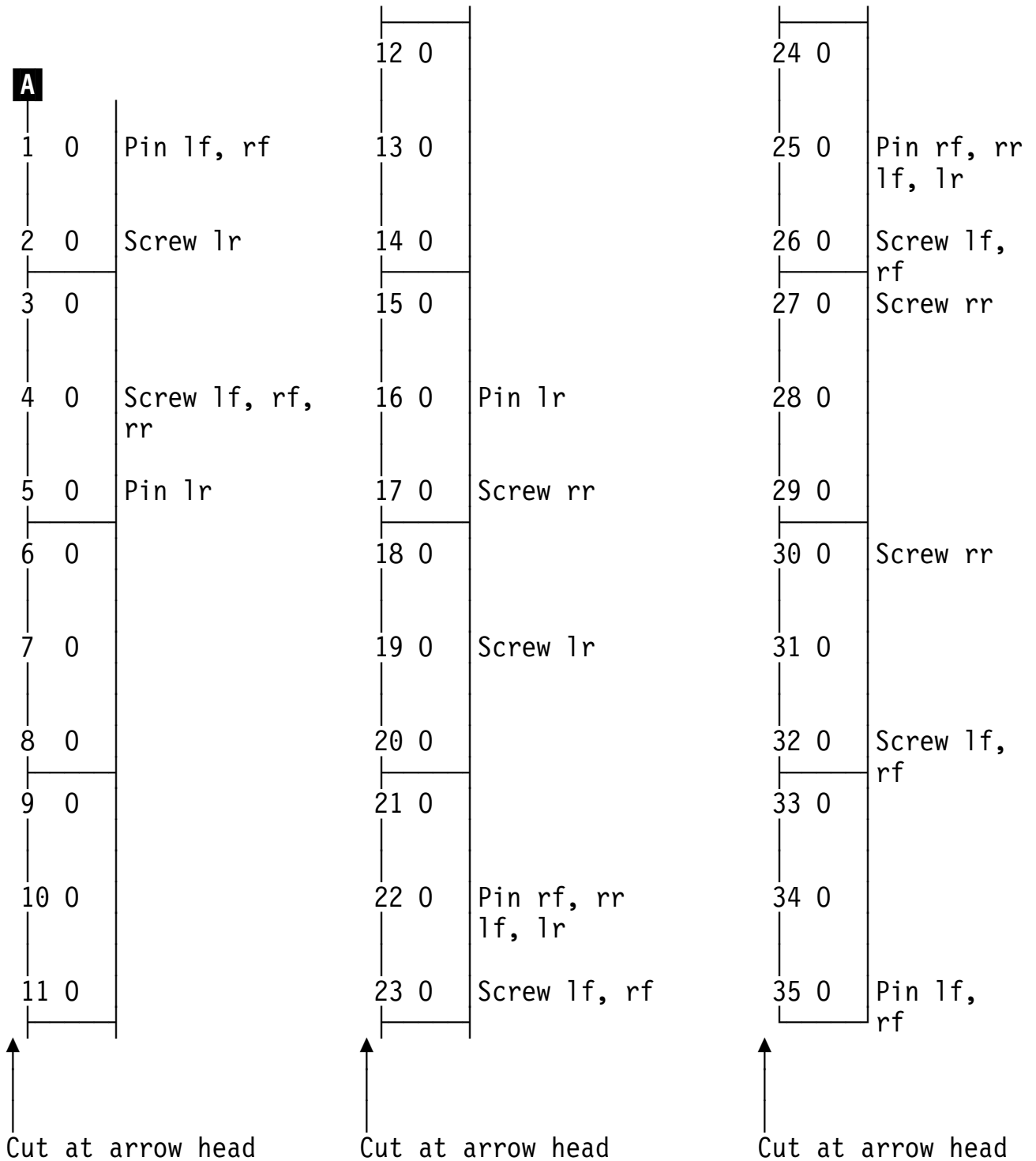
lf left front

rf right front

Use Figure 185 and Figure 186 with the figures under "Hardware for Drives 0 and 1" on page INST-12. The figures show the hole numbers and the part numbers for the hardware.

Figure 185 and Figure 186 should be identical. You can copy, if possible, one of these figures, or use the one with the blank page on the back of it to make a template. Cut the figure into three sections, then tape them together (by hole number) to help you locate the hardware mounting locations. The EIA holes may not be in exactly the correct location, but you can determine the exact hole location by the spacing between each EIA unit.

Cut the figure with the blank page on the back and use the other as the spare.

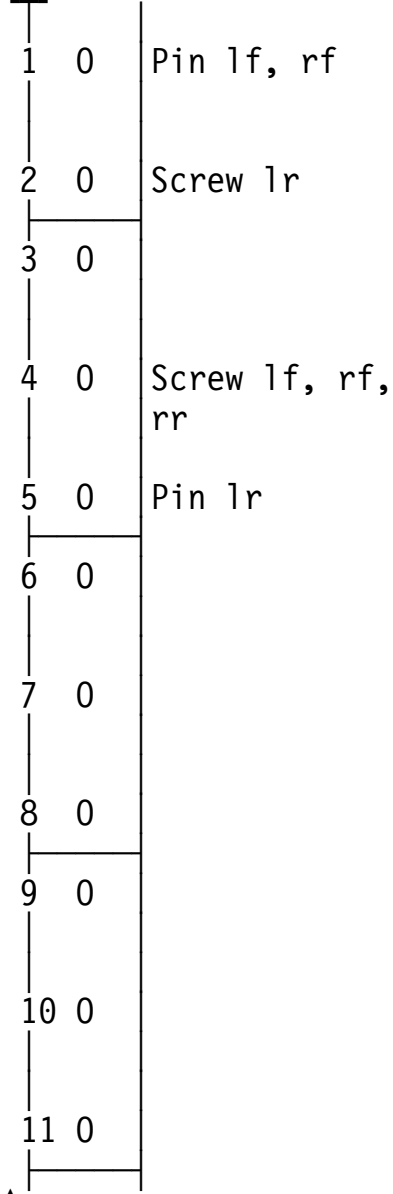


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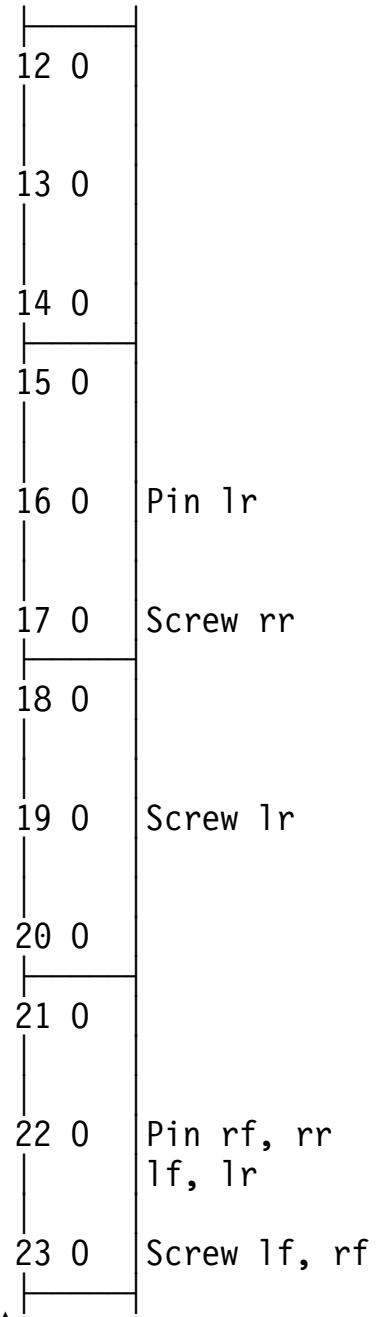
Figure 185. EIA Unit Holes

Cut out the figure on the other side of this page.

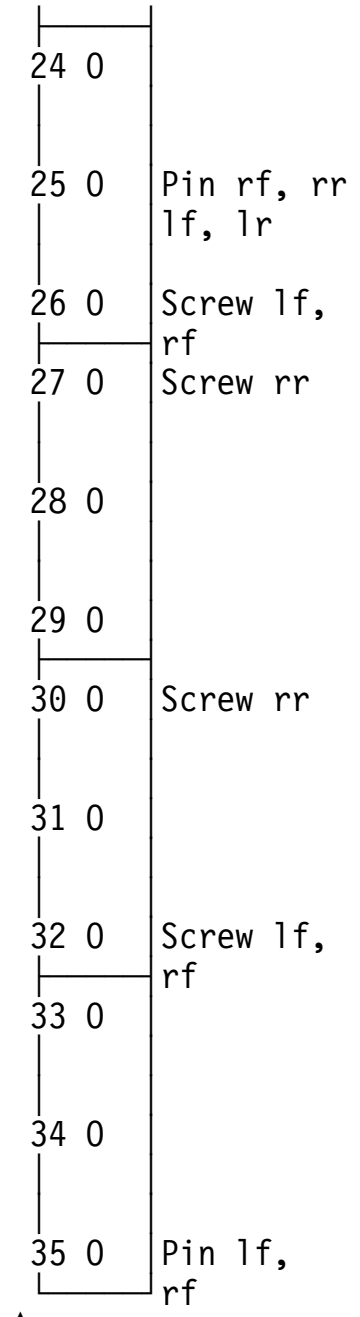
A



↑
Cut at arrow head



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Figure 186. EIA Unit Holes

Hardware for Drives 0 and 1

- See Figure 187 and Figure 188 to install the slides for drives 0 and 1. Install right slide **2** P/N 05H2341 and left slide **1** P/N 05H2340 by using four screws **3** P/N 1624778. Install the slides so that the part that holds the tray is on top.

Note: You can cut out a template to help you locate the holes. See Figure 185 on page INST-9.

Figure 187. Drives 0 and 1 Slides			
Usage	Screw Mounting Hole	Pin Locator Hole	Part Name, Number
Count the holes from the top EIA unit allocated for the drive. See Figure 184 on page INST-7.			
2 Right slide (1)	23, 26 right front	22, 25 right front and rear	Slide, 05H2341
1 Left slide (1)	23, 26 left front	22, 25 left front and rear	Slide, 05H2340

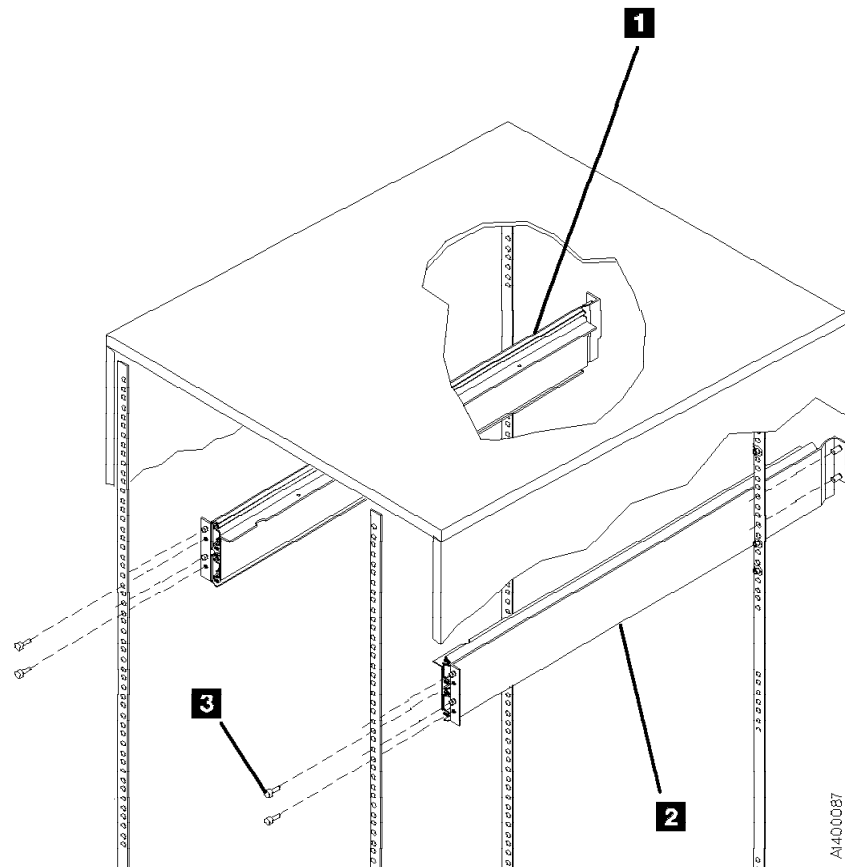


Figure 188. Slides (Front View)

- ___ 2. Install the hardware for drives 0 and 1 by using Figure 189 and Figure 190. Use six screws P/N 1624778 **1** in the mounts.

Figure 189. Drives 0 and 1 Hardware			
Usage	Screw Mounting Hole	Pin Locator Hole	Part Name, Number
Count the holes from the top EIA unit allocated for the drive. See Figure 184 on page INST-7.			
2 Rack, rear panel hardware (2)	2 left rear 19 left rear	5 left rear 16 left rear	Mount, 05H2347 Mount, 05H2347
3 2-drive cover hardware (4) (Decorative cover hardware)	4 left front 4 right front 32 left front 32 right front	1 left front 1 right front 35 left front 35 right front	Mount, 05H2347 Mount, 05H2347 Mount, 05H2347 Mount, 05H2347
4 Rack, rear panel hardware (2)	4 right rear 17 right rear	See Note. —	Nut clip, 74F1823 Nut clip, 74F1823
5 Cable guide hardware (2)	27 right rear 30 right rear	See Note. —	Nut clip, 74F1823 Nut clip, 74F1823
Note: The threaded nut must be <i>inside</i> the frame as you face the frame.			

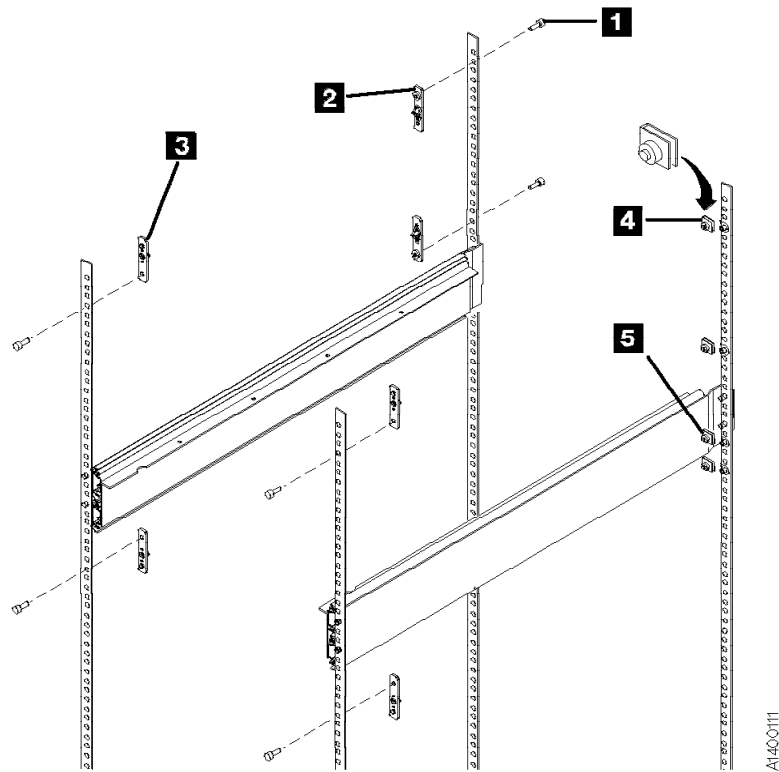


Figure 190. Cover Mounting Hardware (Front View)

- 3. Ensure that the rack stabilizer is installed. See *7202 Install and Service Guide*, *7015 Install and Service Guide*, or *9309 Model 1 and 2 Setup and Operator Guide*.
- 4. Extend the slides.
- 5. See Figure 191. Install the drive shelf **2** P/N 45G0236 by using eight screws **1** P/N 1621308.

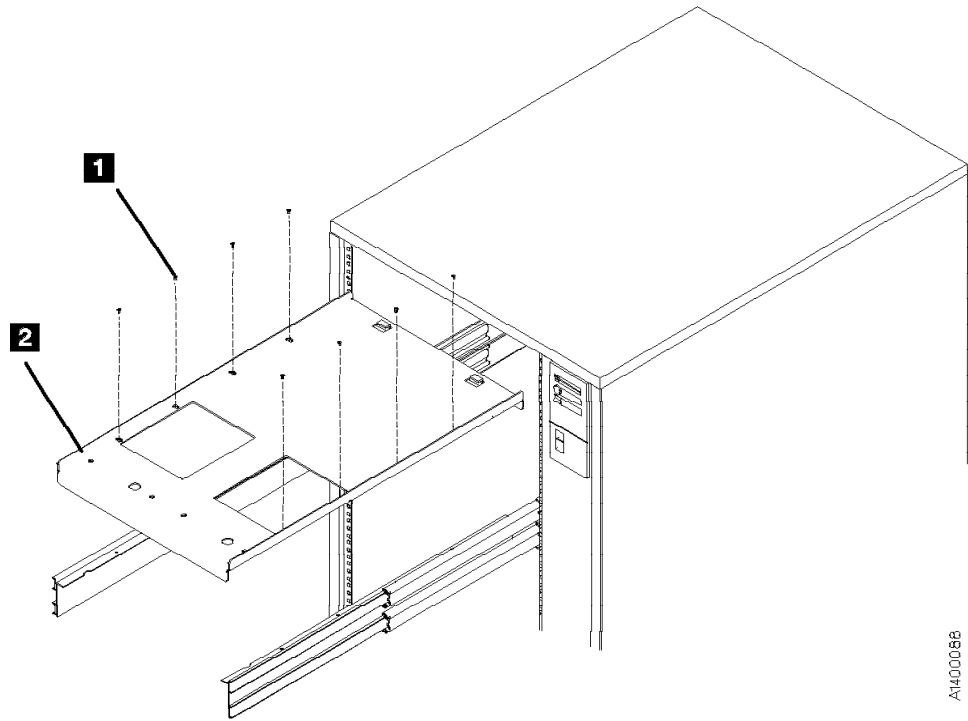


Figure 191. Drive Shelf (Front View)

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See Figure 192.

- 6. Install the cable pivot arm (cable guide) **2** P/N 45G0188 in hole locations 27 and 30 by using two screws **3** P/N 1624778.
- 7. Attach the cable pivot arm to the drive shelf by using screw **1** P/N 1621537.

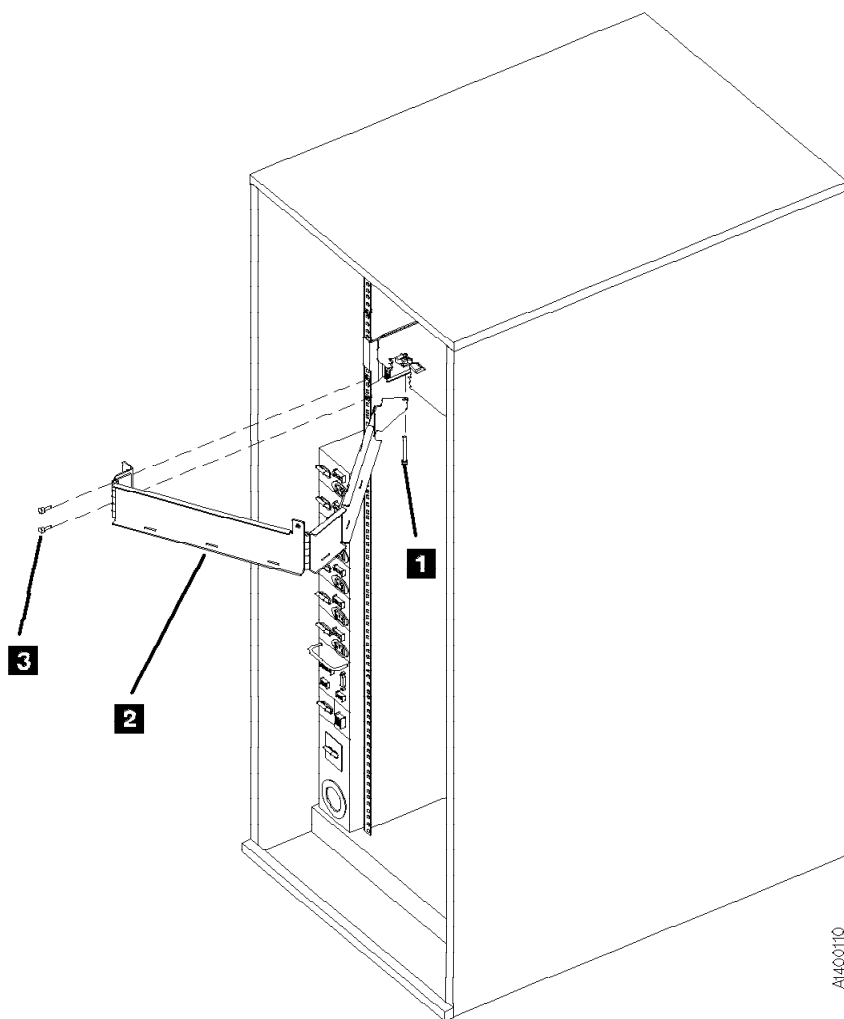


Figure 192. Cable Guide (Rear View)

- 8. If you are not installing the lower shelf for drives 2 and 3, go to “Install Drives in Rack” on page INST-18.

Hardware for Drives 2 and 3

See Figure 193 and Figure 195 on page INST-17. Count the holes from the top (use the hole locations in the figure only if the rack has Model B11/E11 drives in the top EIA space). If other than 12 EIA units were used above the space for drives 2 and 3, count the required 12 EIA units as you did for drives 0 and 1. See Figure 184 on page INST-7 for how to count the holes in the EIA units.

- ___ 1. Install right slide **6** P/N 05H2341 and left slide **5** P/N 05H2340 by using four screws **11** P/N 1624778. Use pin holes 58 and 61 if drives 0 and 1 are installed in the top position.

<i>Figure 193. Drives 2 and 3 Slides</i>			
Usage	Screw Mounting Hole	Pin Locator Hole	Part Name, Number
Count the holes from the top EIA unit allocated for the drive. See Figure 184 on page INST-7.			
5 Right slide (1)	59, 62 right front	58, 61 right front and rear	Slide, 05H2341
6 Left slide (1)	59, 62 left front	58, 61 left front and rear	Slide, 05H2340

See Figure 194 and Figure 195 on page INST-17.

- ___ 2. Install the four mounts **4** P/N 05H2347 by using four screws **3** P/N 1624778.
- ___ 3. Extend the slides.
- ___ 4. Attach the drive shelf **2** P/N 45G0236 to the slides by using eight screws **1** P/N 1621308.
- ___ 5. Install the two nut clips **9** P/N 74F1823 in the rear mounting holes 63 and 66. Ensure that the threaded nut is *inside* the frame as you face the frame.
- ___ 6. Install the cable guide **7** P/N 45G0188 in the rear hole locations 63 and 66 by using two screws **8** P/N 1624778.
- ___ 7. Attach the cable guide to the drive shelf by using screw **10** P/N 1621537.

<i>Figure 194. Drives 2 and 3 Hardware</i>			
Usage	Screw Mounting Hole	Pin Locator Hole	Part Name, Number
Count the holes from the top EIA unit allocated for the drive. See Figure 184 on page INST-7.			
4 Decorative cover hardware (4)	40 left front 40 right front 68 left front 68 right front	37 left front 37 right front 71 left front 71 right front	Mount, 05H2347 Mount, 05H2347 Mount, 05H2347 Mount, 05H2347
9 Cable guide hardware (2)	63 right rear 66 right rear	See Note. —	Nut clip, 74F1823 Nut clip, 74F1823
Note: The threaded nut must be <i>inside</i> the frame as you face the frame.			

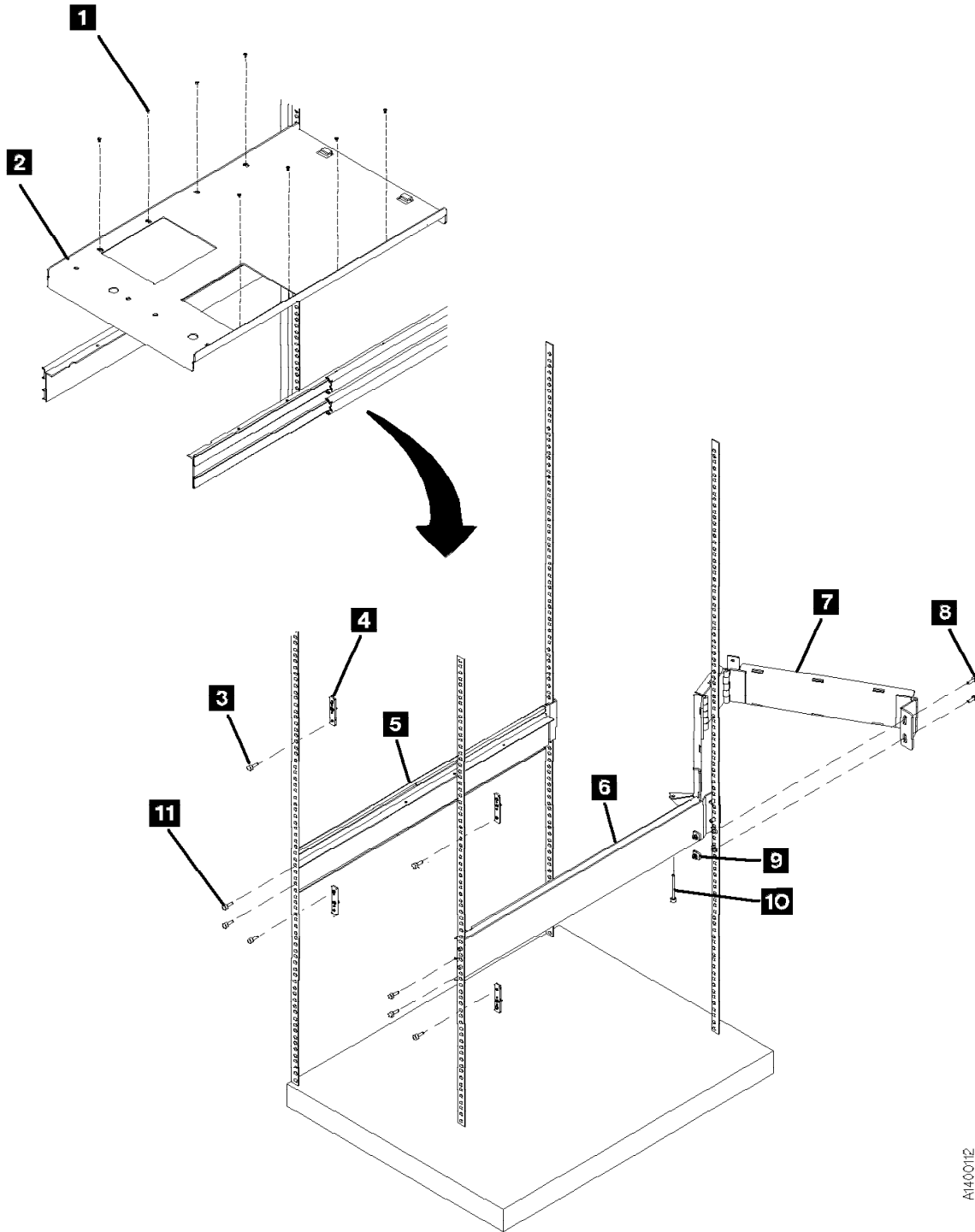


Figure 195. Drives 2 and 3 Hardware

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Install Drives in Rack:

CAUTION:

The 3590 Model B11/E11 (without the ACF) weighs 28.6 kilograms (63 pounds); it takes two persons to safely lift this unit.

Note: This notice is translated into selected languages. See **C2** in the INSP section.

Attention on lifting the drive:

- When picking up the 3590 drive, do NOT use the cartridge feed slot as a handle to lift the 3590 drive! Damage may easily result to the loader door or loader.

- Use the protrusion in the drive enclosure under the cartridge feed slot or the bottom of the drive enclosure to lift the 3590 drive.

1. Install each drive on a drive shelf by using two screws **4** P/N 1624778.

Hint

Keep the drives close together when securing them on the shelf to allow easy installation of the decorative cover.

2. Ensure that the loader door moves freely.
3. Go to "Install the ACF" on page INST-19.

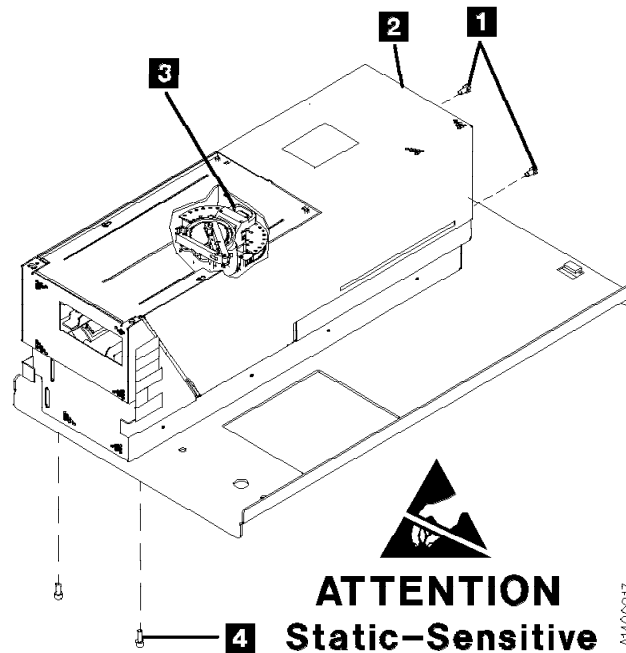


Figure 196. Deck Enclosure Cover


Install the ACF

- ___ 1. Unpack the ACF.
- ___ 2. Pull the 3590 into the service position.
(See "Service Positions of the 3590" on page PROC-10.)

Hint

If you are installing two drives on a shelf, install the right-side ACF first so that you can access the cables easier.

- ___ 3. Read this step before proceeding with placement of the ACF.

Place the ACF over the tabs on the lower part of the deck enclosure, compress the foam pad, then slide the ACF down on the tabs. Simultaneously engage the upper alignment pins.
- ___  ACF side covers may not be permanently attached. Use other points to lift the ACF.
- ___ 4. Ensure that the ACF is engaged on the upper alignment pins and tabs (slots) on lower part of deck enclosure.
- ___ 5. See Figure 198 on page INST-20.
Tighten the thumb screw **1** on the upper

left tab of the ACF into the deck enclosure.

- ___ 6. Remove the side cover as follows:

Rack-Mounted Model B11/E11 Only

You cannot remove the left cover if an ACF is mounted to the left of this device. An alternate method to plug the cable connectors into the 3590 is to remove the magazine and use that access rather than removing the side cover. If you do not remove the side cover, go to step 7 on page INST-20.

End of Rack-Mounted Model B11/E11 Only

- ___ a. See Figure 197. Remove the two screws **3**.
- ___ b. Insert a screwdriver into the hole **2** at the bottom of the side cover **1**.
- ___ c. Lift the side panel up to disengage the tabs from the frame and pull the panel out at the bottom.

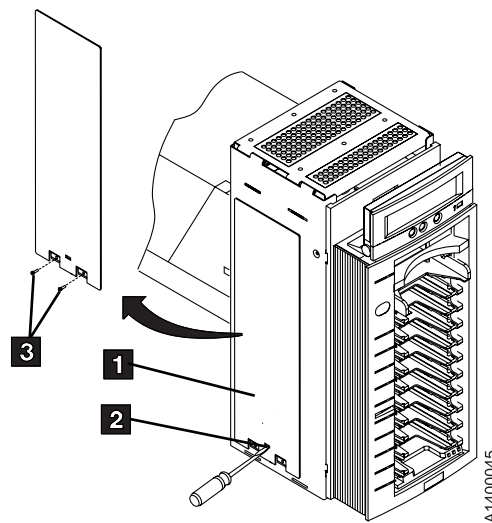


Figure 197. ACF Side Cover

- ___ 7. See Figure 198. Connect the two cable connectors **2** from the ACF to the device.
- ___ 8. Position the ACF cables to the left side of the ACF and remove any slack in them to ensure the cables do not interfere with the movement of the ACF elevator or transport. Place them into retaining clips **5**.
- ___ 9. If removed, reinstall the side cover you removed in step 6 on page INST-19.
- ___ 10. If you are installing or servicing a **desk side Model B11/E11, RPQ 8B3191**, return to the procedure that sent you here. Otherwise, continue to the next step.
- ___ 11. Install the serial number label **3** P/N 44F0904. Ensure that the serial number matches the serial number of the device, which has the label on the side panel and on the rear of the drive cover.
- ___ 12. Install the address label **4** P/N 05H8904.
- ___ 13. Go to "Installation Checkout" on page INST-31.

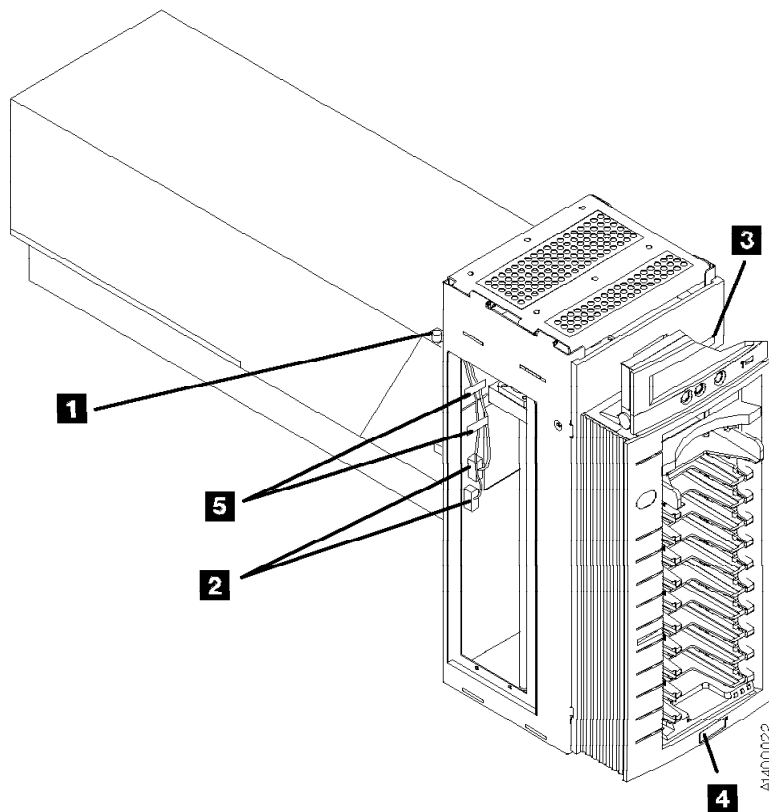


Figure 198. ACF Thumb Screw and Cables

Install Model B11/E11 Within Desk Side Sleeve, RPQ 8B3191

CAUTION:

The 3590 Model B11/E11 (without the ACF) weighs 28.6 kilograms (63 pounds); the 3590 Model B11/E11 with the ACF weighs 40.5 kilograms (89 pounds), so remove the ACF before lifting the 3590. It takes two persons to safely lift this unit (without the ACF).

Note: This notice is translated into selected languages. See **C1** in the INSP section.

- ___ 1. Place the 3590 near the sleeve that will contain the 3590, then unpack the boxes.
- ___ 2. Verify the 3590 shipping group parts by checking that you have received all the parts listed on the 3590 bills of material. Do not remove the parts from plastic containers so you can tell the part numbers of the parts.

Parts for RPQ 8B3191: Ensure that you received the following parts for RPQ 8B3191:

- ___ • Desk side sleeve top cover, P/N 05H8347.
- ___ • Desk side lower sleeve, P/N 05H8348.
- ___ • Desk side base support plate, P/N 05H9075.
- ___ • ACF cover, P/N 05H3263.
- ___ • Label assembly (ON/OFF) for top of desk side cover, P/N 05H3264.
- ___ • Eight washers, P/N 05H3348, for drive installation in the lower sleeve.
- ___ • Eight screws, M4X16, P/N 1621371, for drive installation in the lower sleeve.
- ___ • Eight additional screws, M4X16, P/N 1621371, to secure the desk side lower sleeve to the desk side base support (plate).
- ___ • Eight screws, M3X5, P/N 05H2734, to secure the desk side top cover to the desk side lower sleeve.
- ___ • AC power cable suitable for wall outlet; the P/N varies with the country of destination.

Parts included in 3590 drive ship group are not listed.

Continue Installation: Attention on lifting the drive:

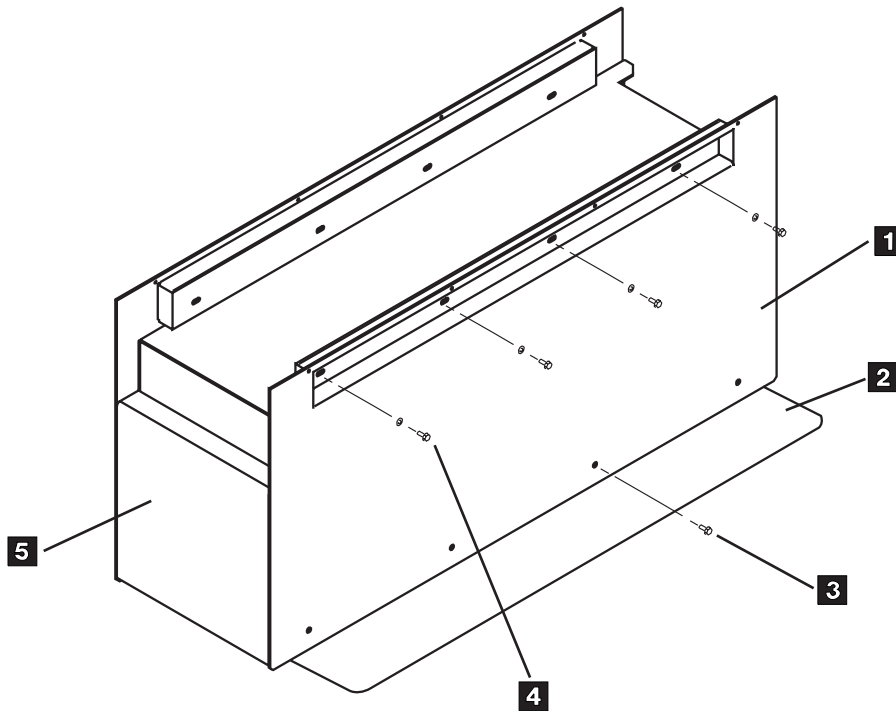
- When picking up the 3590 drive, do NOT use the cartridge feed slot as a handle to lift the 3590 drive! Damage may easily result to the loader door or loader.
- Use the protrusion in the drive enclosure under the cartridge feed slot or the bottom of the drive enclosure to lift the 3590 drive.

Note: Because of "Installation Checkout" requirements for the Model B11/E11 drive, the installation of the desk side sleeve top cover, **1** in Figure 200 on page INST-23, occurs after "Installation Checkout".

- ___ 1. See Figure 199 on page INST-22. Place the desk side lower sleeve **1**, P/N 05H8348, over the desk side base support plate **2**, P/N 05H9075.
- ___ 2. Install the eight screws **3**, P/N 1621371, four screws on each side of the lower sleeve **1**, to bolt the lower sleeve to the desk side base support **2**. Snug the screws to secure the lower sleeve to the base support plate.
- ___ 3. **With assistance**, lift the 3590 drive and place it on the desk side lower sleeve **1**. **Ensure** that the **front** of the drive is placed over the **enclosed** end **5** of the lower sleeve.
- ___ 4. Slide the front of the drive **forward** (toward the front of the lower sleeve) as far as possible to a position that still allows installation of screws **4**.

Note: Installation of the ACF to the drive will be made easier by having the front of the drive extend forward as far as possible.

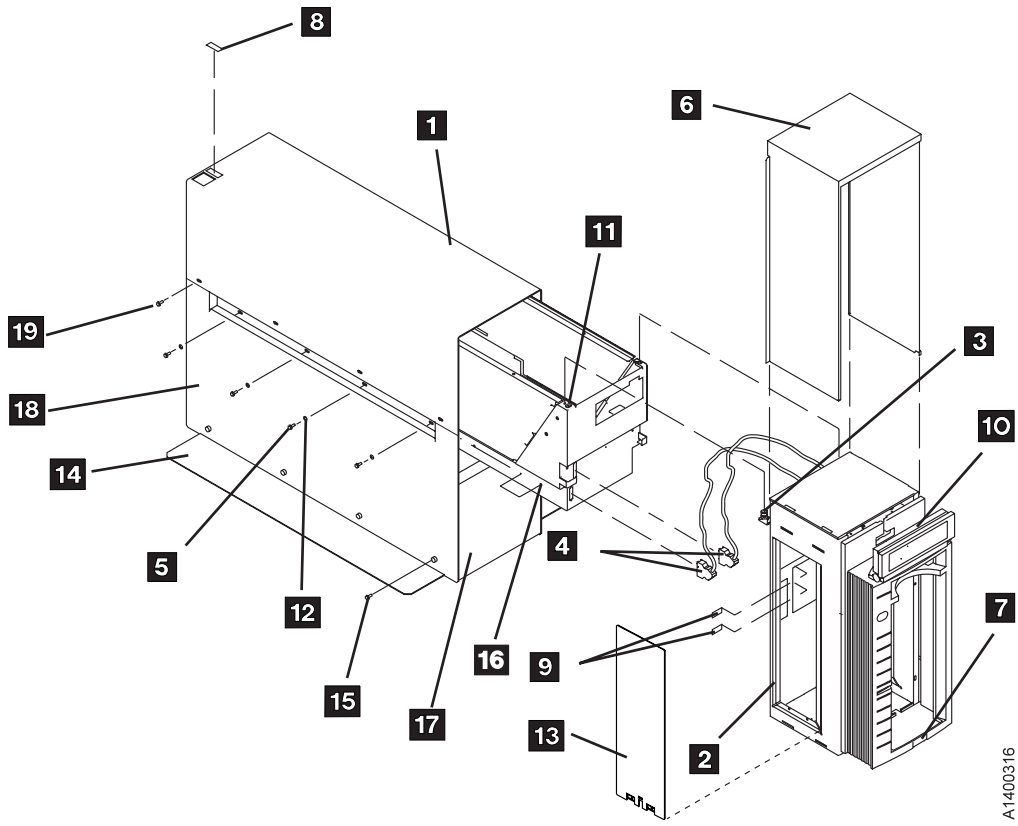
- ___ 5. Install the eight screws **4**, P/N 1621371, and washers **4**, P/N 05H3348, four screws and washers on each side of the lower sleeve, to bolt the drive to the desk side lower sleeve. Do **not** snug the screws yet.
- ___ 6. Ensure that the loader door moves freely.
- ___ 7. Unpack the ACF.



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Figure 199. View of Desk Side Lower Sleeve Installed on Base Plate

- ___ 8. Go to step 3 on page INST-19 to install the ACF. Return here after completing the procedure.
- ___ 9. Push the device and the mounted ACF back on the lower sleeve until the ACF is flush to the front of the sleeve, **5** in Figure 199.
- ___ 10. **Snug** the screws **4** (Figure 199) now to secure the drive to the lower sleeve.
- ___ 11. Refer to Figure 200 on page INST-23. Install the serial number label **10**, P/N 44F0904. Ensure that the serial number matches the serial number of the device, which has the label on the side panel and on the rear of the drive enclosure.
- ___ 12. Install the address label **7**, P/N 05H8904, to the ACF.
- ___ 13. With the ACF install completed, go to "Installation Checkout" on page INST-31.



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Figure 200. Desk Side Sleeve Installation for Model B11/E11, RPQ 8B3191

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Install Rack That Contains Model B11/E11 Devices

This procedure is to be used when a Model B11/E11 is shipped already installed in a rack.

See Figure 201.

1. Remove the shipping plates **2** P/N 05H8922 from the cable guide pivots **4** by removing screws **1** and **3**.
2. If not installed, install the ACFs and decorative covers. See "Install the ACF" on page INST-19.
3. Go to "Installation Checkout" on page INST-31.

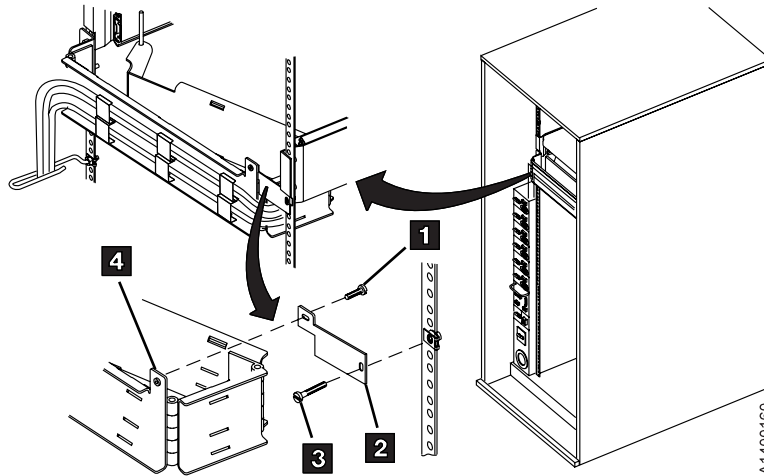


Figure 201. Shipping Plate

Model B1A/E1A Installation

- If the Model B1A/E1A is already installed in a 3494 frame, go to “Installation Checkout” on page INST-31.
- If the Model B1A/E1A is being installed into a non-IBM library, ensure that all prerequisite activity needed within the library is completed before you begin to install the drive. After the drive is installed, go to “Installation Checkout” on page INST-31.
- If you are installing a Model B1A/E1A in an existing 3494 frame, ensure that the appropriate 3494 feature code or conversion is installed, then continue with “Install a Model B1A/E1A in a 3494 Frame.”

Install a Model B1A/E1A in a 3494 Frame

Be sure to read “Before Installation” on page INST-3 before you start here.

Figure 202 shows examples of fully-configured 3494 Models D12, D14, L12, and L14 as viewed from the front. Install the 3590 in the lowest-numbered available position in the frame.

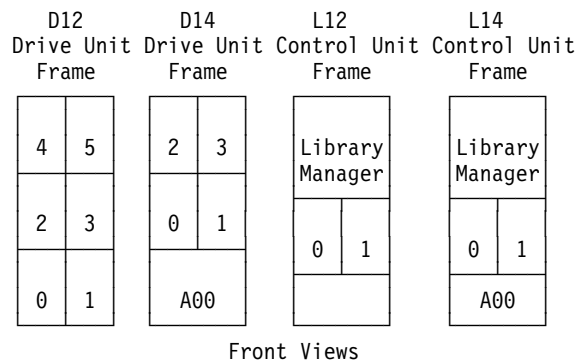


Figure 202. 3494 Frames

CAUTION:

The 3590 Model B1A/E1A weighs 28.6 kilograms (63 pounds); it takes two persons to safely lift this unit.

Note: This notice is translated into selected languages. See **C2** in the INSP section.

- 1. See the START section in *IBM 3494 Tape Library Dataserver Maintenance Information*, P/N 05H7566, then switch OFF power to the 3494.

Before you start, see how the slides work. The inner slide has a locking mechanism that you press to release and the outer slides have a locking mechanism that you move to the center position to release.

See Figure 203.

- 2. Remove the rear door from the 3494 frame.

- 3. Install the two slides **2** P/N 05H4256 in the 3494 frame by using eight screws **1** P/N 1621197.
 - Install the slides so the slide locks (the cables with the screws) are to the rear of the frame. You may have to extend the slides to access the mounting holes.
 - Loosely install the first screw in the front hole, the second and third screws in the rear, the fourth screw in the front slot, then tighten the screws.
- 4. Each slide has three sections. Pull the slides to the rear and remove the inner slide section from each slide. **Do not** reverse the inner slides. The slides must be installed in the same position as they were removed, and the tapered ends must be at the front of the drive.
- 5. Install the inner slide sections **3** on the 3590 by using 8 screws **4** P/N 1621197.

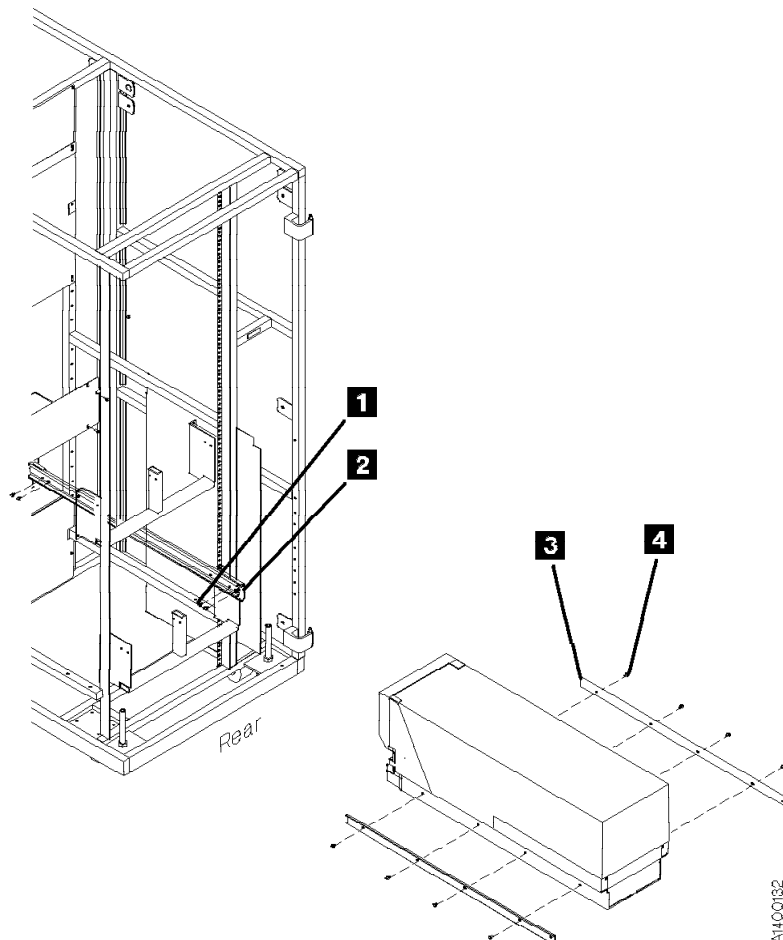
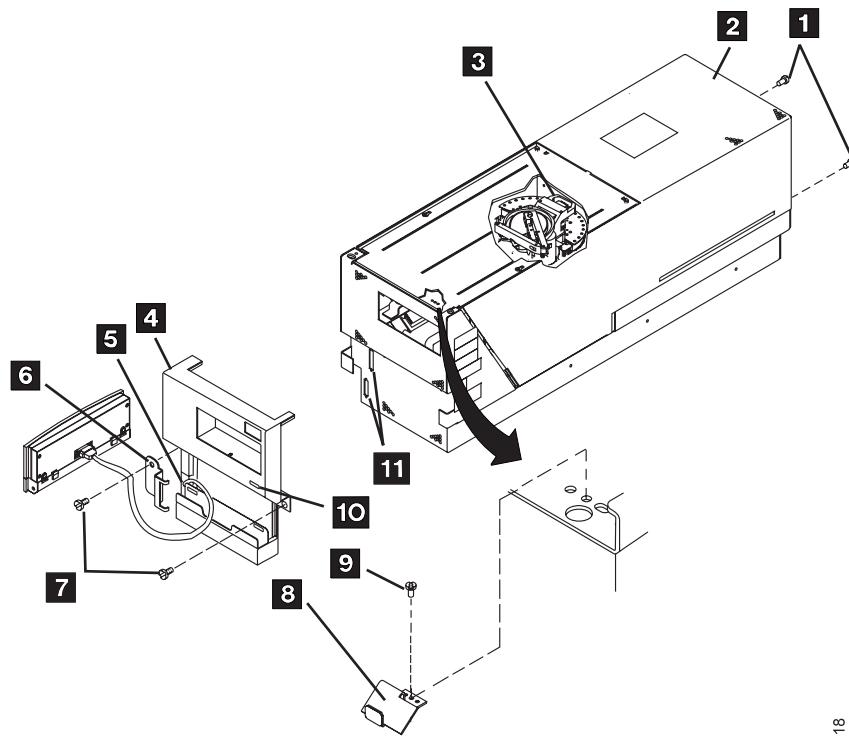


Figure 203. 3494 Slides (Rear View)

See Figure 204.

- 6. Install the fiducial bracket **8** P/N 05H3143 by using the screw **9** P/N 1621019 and lock washer P/N 1622332.
- 7. While holding the front cover **4** P/N 05H4255 near the device, plug the cables into the connectors **11**. Insert the display cable **5** P/N 45G0275 into the lower connector of the 3590 and into the panel P/N 39F3450.
- 8. Install the front cover by inserting the right screw **7** P/N 1621197 through the cover and into the device.
- 9. To hold the flat cable in place, fasten the cable retaining bracket **6** P/N 05H4756 to the left side of the cover by using the left screw **7**.
- 10. Install the serial number label **10** P/N 44F0904. Ensure that the serial number matches the serial number of the device, which has the label on the side panel and on the rear of the drive cover.



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 ATTENTION Static-sensitive

Figure 204. Front Cover and Deck Enclosure Cover

Notes for the Next Step:

- a. Ensure that the ball-bearing retaining assemblies of the slides are located at the rear of the center slide when installing the 3590.
- b. Ensure that the middle section of the slide is fully extended and locked before you push the drive in place.

Attention on lifting the drive:

- a. **When picking up the 3590 drive, do NOT use the cartridge feed slot as a handle to lift the 3590 drive! Damage may easily result to the loader door or loader.**
- b. **Use the protrusion in the drive enclosure under the cartridge feed slot or the bottom of the drive enclosure to lift the 3590 drive.**

- ___ 11. Read this complete step before proceeding. With assistance, lift the 3590 and place it in the slides. Hold the ball-bearing retainers to the rear while you guide the slides into the ball-bearing retainer assemblies, then push the 3590 into place. Guide the 3590 onto four or five ball bearings before you push it forward.

Attention: If you do not have the inner slides aligned in the ball-bearing retainers, you will damage the slides, and you will have to replace them. **Do not force** the drive to the front.

- ___ 12. Ensure that the loader door moves freely.
- ___ 13. Go to "Installation Checkout" on page INST-31.

Install Model B1A/E1A Within Desk Side Sleeve, RPQ 8B3190

CAUTION:

The 3590 Model B1A/E1A weighs 28.6 kilograms (63 pounds); it takes two persons to safely lift this unit.

Note: This notice is translated into selected languages. See **C2** in the INSP section.

- ___ 1. Place the 3590 near the sleeve that will contain the 3590, then unpack the boxes.
- ___ 2. Verify the 3590 shipping group parts by checking that you have received all the parts listed on the 3590 bills of material. Do not remove the parts from plastic containers so you can tell the part numbers of the parts.

Parts for RPQ 8B3190: Be sure you received the following parts for RPQ 8B3190:

- ___ • 3590 Logo for front cover, P/N 05H9064.
- ___ • Front cover of drive, P/N 05H3260.
- ___ • Desk side sleeve top cover, P/N 05H8347.
- ___ • Desk side lower sleeve, P/N 05H8348.
- ___ • Desk side base support plate, P/N 05H9075.
- ___ • Label assembly (ON/OFF) for top of desk side cover, P/N 05H3264.
- ___ • Two nylon washers, P/N 05H4459, to secure the swivel base to the front cover.
- ___ • Compression spring, P/N 05H4460, to secure the swivel base to the front cover.
- ___ • Screw, P/N 05H4465, to secure the swivel base to the front cover.
- ___ • Eight washers, P/N 05H3348, to install the drive in the lower sleeve.
- ___ • Eight screws, M4X16, P/N 1621371, to install the drive in the lower sleeve.
- ___ • Eight additional screws, M4X16, P/N 1621371, to secure the desk side lower sleeve to the desk side base support (plate).
- ___ • Eight screws, M3X5, P/N 05H2734, to secure the desk side top cover to the desk side lower sleeve.
- ___ • Two screws, M5X25, P/N 1621522, to secure the front cover to the front of the drive enclosure.
- ___ • Swivel base for operator/CE panel, P/N 62G2542, which is attached to the front cover.

- ___ • AC power cable suitable for wall outlet; the P/N varies with the country of destination.

Parts included in 3590 drive ship group are not listed.

Continue Installation: Attention on lifting the drive:

- **When picking up the 3590 drive, do NOT use the cartridge feed slot as a handle to lift the 3590 drive! Damage may easily result to the loader door or loader.**
- **Use the protrusion in the drive enclosure under the cartridge feed slot or the bottom of the drive enclosure to lift the 3590 drive.**

Note: Because of “Installation Checkout” test requirements for the drive, the installation of the desk side sleeve top cover **1**, in Figure 206 on page INST-31, occurs after “Installation Checkout”.

- ___ 1. See Figure 205 on page INST-30.
Place the desk side lower sleeve **1**, P/N 05H8348, over the desk side base support plate **2**, P/N 05H9075.
- ___ 2. Install the eight screws **3**, P/N 1621371, four screws on each side of the lower sleeve **1**, to bolt the lower sleeve to the desk side base support **2**. Snug the screws to secure the lower sleeve to the base support plate.
- ___ 3. **With assistance**, lift the 3590 drive and place it on the desk side lower sleeve **1**. **Ensure** that the **front** of the drive is placed over the **enclosed** end **5** of the lower sleeve.
- ___ 4. Slide the front of the drive **forward** (toward the front of the lower sleeve) as far as possible to a position that will still allow installation of screws **4**.
Note: This position will help to prevent any problems during installation of the desk side sleeve top cover to the lower sleeve after completion of “Installation Checkout”.
- ___ 5. Install the eight screws **4**, P/N 1621371, and washers **4**, P/N 05H3348, four screws and washers on each side of the lower sleeve, to bolt the drive to the desk



side lower sleeve. Do **not** snug the screws yet.

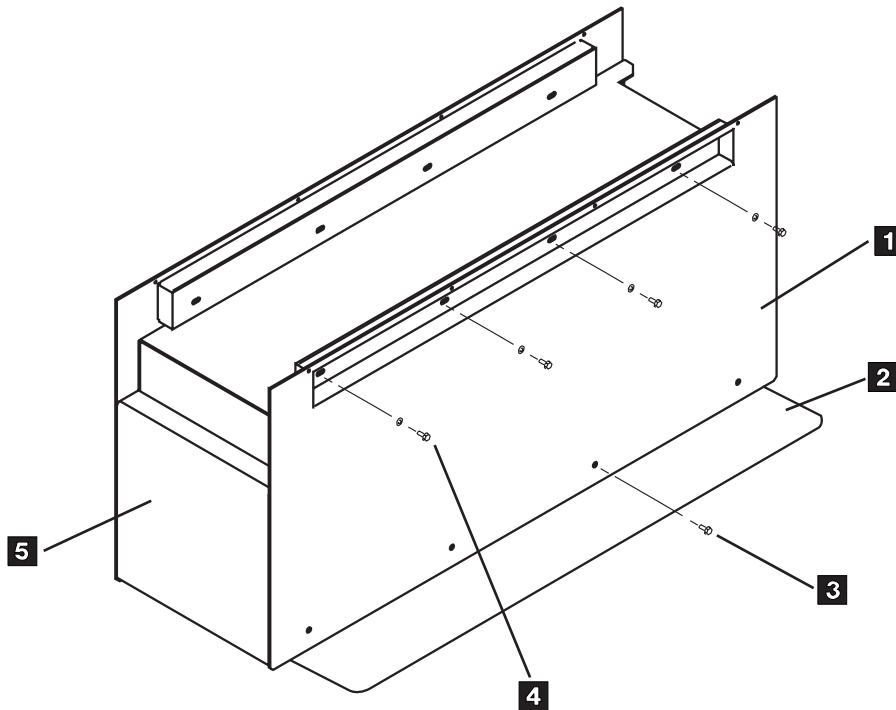


Figure 205. View of Desk Side Lower Sleeve Installed on Base Plate

- ___ 6. Refer to Figure 206 on page INST-31. Install the front cover **3**, P/N 05H3260, by hooking it onto the slots/holes **2** located at the top of the front drive enclosure. Secure the cover by tightening the screws **7**, P/N 1621522, to the front of the drive enclosure.
- ___ 7. Insert the display cable **4**, P/N 45G0275, (large plug) into the lower connector **5** of the drive. Connect the other end, the smaller connector, of the display cable into the operator/CE panel **6**, P/N 39F3450.
- ___ 8. Using screw **11**, P/N 05H4465, two nylon washers **11**, P/N 05H4459, and one spring **11**, P/N 05H4460, connect the display swivel base **12**, P/N 62G2542, to the front cover **3**.
- ___ 9. Attach the operator/CE panel **6** to the display swivel base **12**.
- ___ 10. Install the IBM label, P/N 05H9064, on the upper left side **8** of the front cover **3**.
- ___ 11. Install the serial number label **13**, P/N 44F0904. Ensure that the serial number matches the serial number of the device, which has the label on the side panel and on the rear of the drive.
- ___ 12. Ensure that the loader door moves freely.
- ___ 13. Go to "Installation Checkout" on page INST-31

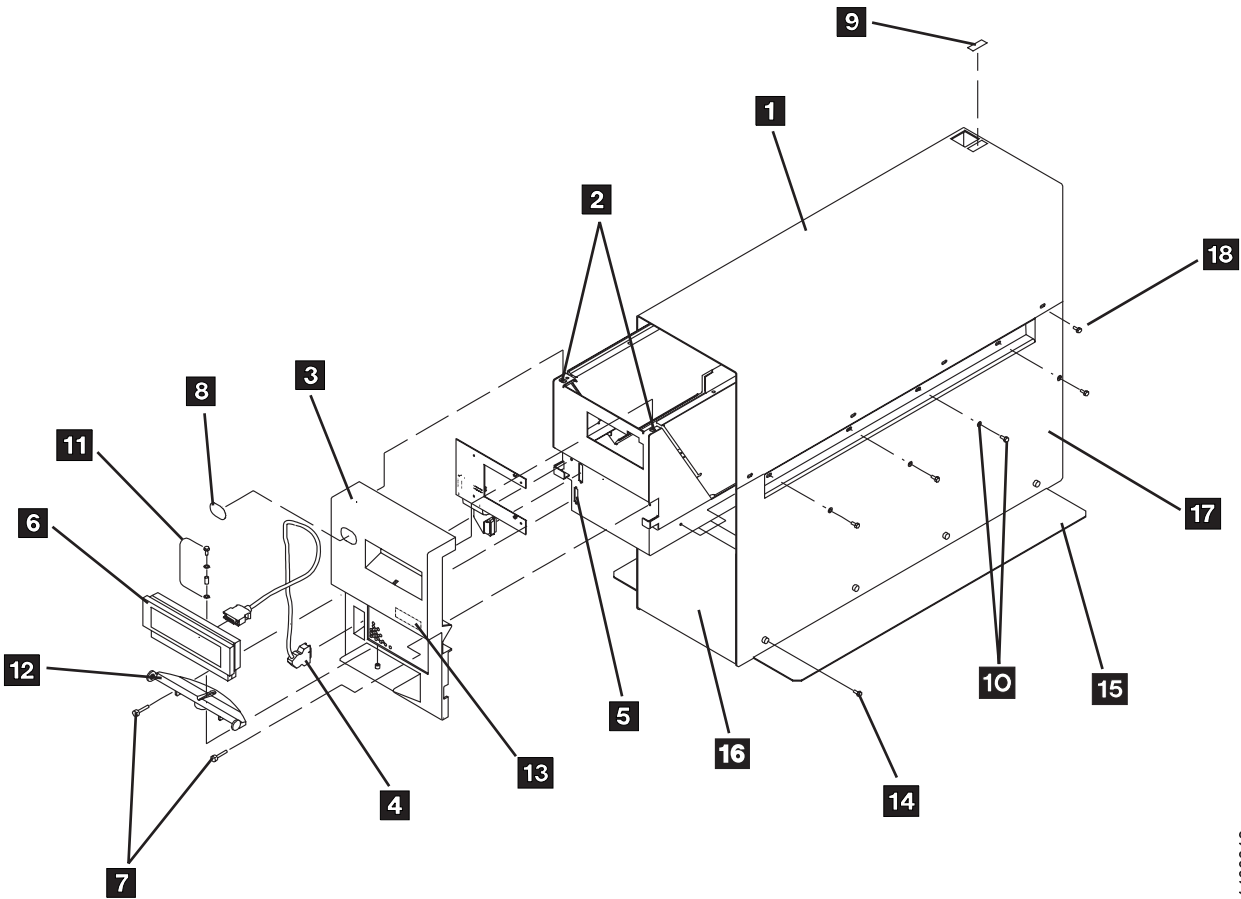


Figure 206. Desk Side Sleeve Installation for Model B1A/E1A, RPQ 8B3190

Installation Checkout

Head Protector

New machines from the factory are shipped **without** the orange head protector, P/N 05H4778. You should not have to remove the deck cover to install a new machine.

Relocated machines, however, may have had the head protector installed when they were discontinued at the previous location.

If this is a relocated machine, remove the deck cover and remove the head protector if it is installed.

- 1. Ensure that the drive is in its operating position.
- 2. Install the power cable in the 3590 and connect it to its power source. Proper routing of the power cable will be handled in later phases of the drive installation: for Model B11/E11, in procedure “Cable Guides for Model B11/E11” on page INST-52 and for Model B1A/E1A, in procedure “Cable Routing for Model B1A/E1A” on page INST-57.

Note: When you power ON the drive, the power-on diagnostic tests will run in the device. If the tests display any hardware related FIDs or ATTN messages which have cables in the FRU list (listed in the

START section), check and reseal cable connections before replacing any FRUs.

- ___ 3. Go to "Setup for SCSI Ports Wrap Test" on page PROC-83 to install SCSI port wrap plugs on all the drives.

Model B1A/E1A Only

- ___ 4. Go to "Setup for Library Manager Port Wrap Test" on page PROC-85 to install the Serial (RS-422) port wrap plug on all the drives.

End of Model B1A/E1A Only

- ___ 5. Set the drive power switch to the **ON** position.
 - The SCSI communications paths, Serial communications path, and the Model C12/C14 library communications path will be tested automatically (if wrap plugs have been installed) as part of the POST diagnostics. The drive will come up in CE mode (CE Options menu is displayed) if any of the wrap tools is detected.

Note: The power-on test takes approximately 2.5 minutes to complete.

 - If a failure occurs, a message can be posted in the operator/CE panel, or the operator/CE panel can be blank. If any of these conditions exist, go to the START section for further analysis of the failure.
- ___ 6. Perform the following procedures on all the drives.

Operator/CE Panel Setup and Tests

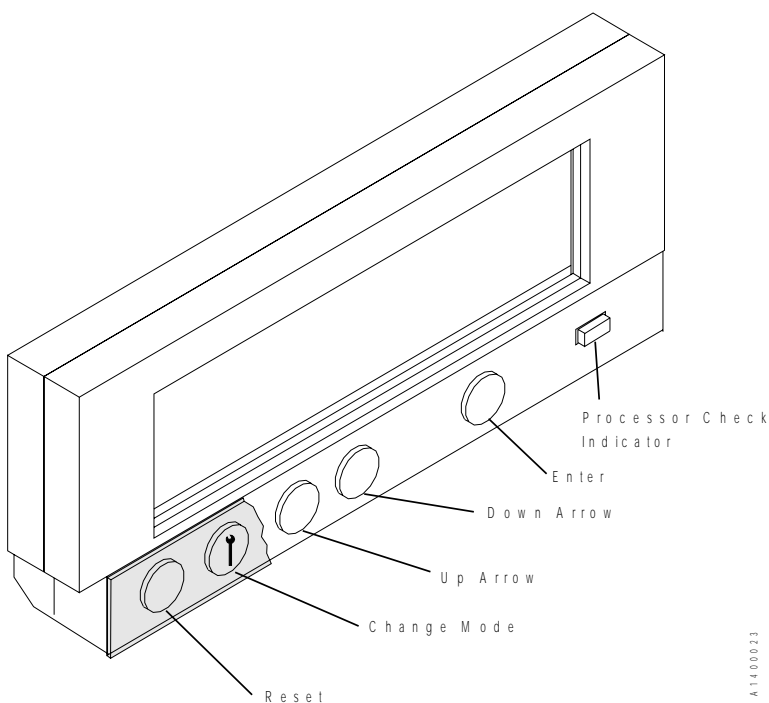



Figure 207. Operator/CE Panel

When the instructions for using the panel use the term *select*, use the **arrow** push buttons to move the cursor to the choice, then press **Enter**. Pressing **Reset** causes a power-on reset.


Pressing **Change Mode**  selects either the *operator* Options menu or the *CE* Options menu.

If the power-on diagnostics detect a problem, a FRU identifier (FID) is posted in the operator/CE panel. If an error occurs, note the FID and go to the START section.

See “Operator Panel” on page PANEL-1 for details about the operator/CE panel and the meaning of the menu options.


Check Wrap Tools

This procedure will show the installed wrap tools that were **detected**. Successful completion of all tests, including the wrap tests, is indicated if no FIDs or ATTN messages are posted on the operator/CE panel.

- ___ 1. Press the Change Mode  push button to place the subsystem in CE mode.
- ___ 2. Select **Config/Install** from the CE Options menu.
- ___ 3. Select **Drv Options** from the CE Config/Install menu.
- ___ 4. From the CE Drv Options menu, select **Wrap Tools**.
- ___ 5. The following output is displayed. The term ‘PRESENT’ means that the particular wrap tool was detected by the test and the associated wrap test was performed.


```
SCSI 0: PRESENT or NOT PRESENT
SCSI 1: PRESENT or NOT PRESENT
RS-422: PRESENT or NOT PRESENT
STL   : PRESENT or NOT PRESENT
```
- ___ 6. Ensure that ‘PRESENT’ status is indicated for all installed wrap plugs. A status of ‘NOT PRESENT’ indicates that the wrap plug was not recognized and the associated wrap test was **not** run.

Check EC Level

- ___ 1. If not displaying the operator Options menu, press the Change Mode  push button.
- ___ 2. From the operator Options menu, select **Services**.
- ___ 3. From the Services menu, select **Microcode Level**.
- ___ 4. Record the EC level and link level in “Microcode EC Level History Log” on page PROC-55.
- ___ 5. Select **Cancel** twice to return to the Options menu.

Set Customer Options

Model B11/E11 Only

- ___ 1. If not displaying the operator Options menu, press the Change Mode  push button.

- ___ 2. From the operator Options menu, select the **Set ACF Mode** option. Set the ACF mode per the customer's direction. See "Modes of Operation" on page ACF-20 for details.

Note: The drive tests can not be run correctly if the ACF is set to **Random** or **Random 2-LUN** mode. If the customer wants the ACF mode set to **Random** or **Random 2-LUN**, wait until after the drive tests are completed. Temporarily set the ACF to one of the other modes now. When the drive tests are completed, the ACF mode can be reset to **Random** or **Random 2-LUN** mode.

- ___ 3. Ensure that the ACF magazine is in the ACF in the locked position. See "Inserting the Magazine" on page PROC-29.

End of Model B11/E11 Only

- ___ 4. From the operator Options menu, select **Services**. Set the SCSI port addresses and the language of the operator screens (select the **Set Address** and the **Change Language** options).

Note:

When attaching to an AS/400 system with feature code 6501, the drive **must** be set to address '0'. The AS/400 will recognize the device as address '7' because of system design. When a 3590 drive is attached to an AS/400 system, it is a **point-to-point connection only**.

The RS/6000 host will recognize the device as address '0', if the attached drive's address is set to '0'. The RS/6000 allows multiple 3590s to be attached to a single port via SCSI string. **In this case, different 3590 drives on the same SCSI string cannot have the same address. Each 3590 must have a unique address.**

Model C12/C14 Only

Note: If you are installing Model B1A/E1A drives in a **3590 Model C12/C14**, the addresses must be set according to the feature code:

Feature Code FC 5200 or FC 5400

Consult the site planning representative or the customer for the correct SCSI addresses to be set in each of the four drives. Any address ('0' to 'F') may be set for SCSI **Port 0** and **Port 1**, as long as the addresses are **unique and non-conflicting within each SCSI string**. Refer to the INSTALL section of *IBM 3590 Tape Subsystem Models C12/C14 Maintenance Information* for descriptions of feature codes FC 5200 and FC 5400.

Feature Code FC 5201 or FC 5401

The drives' SCSI addresses must be set sequentially from '0' to '3', starting at the top drive to the bottom drive in the Model C12/C14 drive frame. Set SCSI **Port 0 addresses only**. Port 1 is unused. Refer to the INSTALL section of *IBM 3590 Tape Subsystem Models C12/C14 Maintenance Information* for descriptions of feature codes FC 5201 and FC 5401.

Feature Code FC 5202 or FC 5403

Set addresses to '0' to '1', and '0' to '1' sequentially from the top to the bottom drive. Set **SCSI Port 0 addresses only**. Port 1 is unused. Refer to the **INSTALL** section of *IBM 3590 Tape Subsystem Models C12/C14 Maintenance Information* for descriptions of feature codes FC 5202 and FC 5403.

Feature Code FC 5402

SCSI addresses are set for **both SCSI Port 0 and Port 1**. The drives' SCSI addresses must be set sequentially from '0' to '3', starting at the top drive to the bottom drive in the Model C12/C14 drive frame for **SCSI Port 0** only. For **SCSI Port 1**, set the drives' SCSI addresses sequentially from '6' to '3', starting at the top drive to the bottom drive. Refer to the **INSTALL** section of *IBM 3590 Tape Subsystem Models C12/C14 Maintenance Information* for a description of feature code FC 5402.

Feature Code FC 5404

SCSI addresses are set for **both SCSI Port 0 and Port 1**. Set the addresses to '0' to '1', and '0' to '1' sequentially from the top to the bottom drive for **SCSI Port 0** only. For **SCSI Port 1**, set the drives' SCSI addresses to '6' to '5', and '6' to '5' sequentially from the top to the bottom drive. Refer to the **INSTALL** section of *IBM 3590 Tape Subsystem Models C12/C14 Maintenance Information* for a description of feature code FC 5404.



_____ End of Model C12/C14 Only _____

Note: This option will not become active until you either select **Reset Drive** from the operator Services menu, press the **Reset** push button on the operator/CE panel, or power OFF the drive.

Set Drive Options

- ___ 1. Press the Change Mode **Y** push button to place the subsystem in CE mode.
- ___ 2. Select **Config/Install** from the CE Options menu.
- ___ 3. Select **Drv Options** from the CE Config/Install menu.
- ___ 4. If the drive is attached to a 3590 A00 Control Unit, the Control Unit will automatically set the drive to Control Unit mode. If the drive **is** attached to a 3590 A00 Control Unit, skip to the next step.

If the drive is attached in any way other than to a 3590 A00 Control Unit, continue with this step to ensure that the Control Unit mode is disabled.

Move the cursor to the **Disable CU Mode** option of the Drv Options menu. If this option is selectable (menu item displayed in **bold** font, **not** in dotted format), then select **YES** to disable the Control Unit mode. If this option is displayed in a dotted format, this indicates that it cannot be selected because the drive is not in Control Unit mode.

- ___ 5. From the CE Drv Options menu, select **Drv Features**, then select **one** of the following from the CE Drv Features menu:
 - For a Model B11/E11, select the **B11/E11 Rack/Frame** option or the **B11/E11 Deskside ACF** option.

- For a Model B1A/E1A in a desk side cover, select the **B1A/E1A Deskside** option.
- For a Model B1A/E1A in a 3494 Tape Library, select the **B1A/E1A 3494 RS422 Att** option. **Important:** Before you skip to step 6, check the next step to ensure that it **does not** apply.
- For a Model B1A attached to a Model A00 Control Unit, select the **B1A No RS422 Attach** option.
- For a Model B1A/E1A in a tape library other than the 3494 Tape Library, select the **B1A/E1A No RS422 Attach** option, then select either **B1A/E1A Interface A** or **B1A/E1A Interface B** depending upon the library or OEM protocol used. See “CE Drive Features Menu” on page PANEL-62.
- For a Model B1A/E1A in a **3590 Model C12/C14 installation**, select the **B1A/E1A C12/C14** option.

Continue after the C12/C14 selection to select **Auto Clean ON or OFF** from the B1A/E1A C12/C14 menu.

Note: Auto Clean should be **enabled (ON)** only when the Automatic Cartridge System, consisting of **all interconnected LSMs** to which the 3590 Model C12/C14 is attached, is populated exclusively by 3590 cartridges. Ask the customer if other than 3590 type of cartridges are also stored in the silos.

Continue by selecting the **Drv Emulation** option from the B1A/E1A C12/C14 menu. Consult with the customer to determine how the emulation type should be set.

Select the appropriate **drive emulation** option from the Drv Emulation menu.

Do not select the **No Emulation** option!

Select one of the following emulation options:

If 4490 drives are present in LSM, select the **9490** option.

If 9490 drives are present in LSM, select the **4490** option.

If neither type drive is present, select **either** option.

Select **Yes** to save the drive emulation type. Select **Cancel**.

- ___ 6. Select **Yes** to save the library type and return to the CE Drv Options menu.
For a Model B11, B1A, E11, or E1A Desk Side model, select **Cancel** to return to the CE Drv Options menu.
- ___ 7. From the CE Drv Options menu, select **(No Lrg/Lrg) Disp Attach**. If you are attaching a large operator TDS (Texas Digital Systems, Inc.) display to the drive, select **Lrg**. The default is *No Lrg*.
- ___ 8. Select whether to filter the messages to be displayed on the panel and to be sent to the host via the SCSI. The default is *OFF*. Ask for the customer’s preference. See **SIM Sev Filt On/Off** and **MIM Sev Filt On/Off** in the “CE Drive Options Menu” on page PANEL-40.
- ___ 9. You may select the **H SARS Enabled/Disabled** option and/or the **V SARS Enabled/Disabled** option from the CE Drv Options menu.

Note: The default is *Enabled* (turned **ON**) for microcode level IA or higher, and is *Disabled* (turned **OFF**) for microcode levels I9 and earlier.

Selecting H SARS enables the drive to indicate potential hardware problems. Selecting V SARS enables the drive to indicate potential tape media problems. Ask for the customer's preference. If he has none, we suggest that you **Enable** the options for better isolation of problems. Refer to "CE Drive Options Menu" on page PANEL-40 for more information.

- ___ 10. You may select the **Num Repeat SIMs** option from the CE Drv Options menu. Selecting this option allows you to set the number of times that the same SIM may be sent repetitively to the host. The default value is *zero*. Ask for the customer's preference. See "CE Drive Options Menu" on page PANEL-40 for more information.

- ___ 11. Select **Cancel** to return to the Config/Install menu.

- ___ 12. Ensure that the "Force Error Log On/Off" option is set **OFF**.

From the CE Config/Install menu, check the current status of the "Force Error Log On/Off" option. If the option says *Force Error Log On*, **select** the option to turn it **Off**. Otherwise, skip to the next step.

This option should only be used (turned on) at the request of support personnel.

- ___ 13. Select **Cancel** again to return to the CE Options menu.

Ensure that you have returned to the **CE Options menu** before **resetting** the drive.

Note: These options will not become active until you either select **Reset Drive** from the operator Services menu, press the **Reset** push button on the operator/CE panel, or power OFF the drive, **after you have returned** to the **CE Options menu**.

Run Tests

- ___ 1. Power **ON** the drive, and run cleaner cartridge to automatically adjust Pneumatics. If necessary, refer to *IBM Magstar 3590 Tape Subsystem Operator Guide*, GA32-0330, under "Cleaning the Tape Path."
- ___ 2. Select **Verify Fix** from the CE Options menu. "CE Verify Fix Menu" on page PANEL-28 details the operation and describes any *attention* notices.
- ___ 3. From the Verify Fix menu, select **Test Drive**. You are prompted to load a cartridge and to verify that the tape is loaded (select **Process Loaded Tape**).

Note: The Base and Ultra Models B11/B1A require a 128 track format tape and the Models E11/E1A require a 256 track format tape. If the operator/CE panel shows the file protect icon, the tape is either physically write protected, or the wrong format tape has been loaded.

If you are installing a **Model B11/E11**, put scratch tapes in the middle and bottom cells of the ACF and run the test. (If you have only one cartridge, you need to run the test every time you put a cartridge in a different cell). If the ACF does not load the tape, select the **Start** option.

- ___ 4. When the CE Options menu is displayed, remove the tape by choosing **Unload Drive** from the Ending Status menu or by pressing the Change

Mode **Y** push button to change to the operator Options menu and choosing **Unload Drive**.

- ___ 5. If you are installing a **3590 Model C12/C14** and you have completed the installation checkout procedure for each drive, return to the "Checkout of the Four Drives in 3590 Model C12/C14 Frame" procedure in the **INSTALL** section of *IBM 3590 Tape Subsystem Models C12/C14 Maintenance Information*.

Set the 3590 Offline

- ___ 1. Ensure that the drive is unloaded and the tape cartridge is removed.
- ___ 2. If not displaying the operator Options menu, press the Change Mode **Y** push button to change to the operator Options menu.

Model B11/E11 Only

Note: The drive tests can not be run correctly if the ACF was set to **Random** or **Random 2-LUN** mode.

- ___ 3. If the ACF mode was set to a mode other than **Random** or **Random 2-LUN** mode so the drive test could be run, set it back to the customer requested mode now.
 - a. From the operator Options menu, select the **Set ACF Mode** option. Set the ACF mode per the customer's direction to **Random** or **Random 2-LUN** mode. See "Modes of Operation" on page ACF-20 for details.

End of Model B11/E11 Only

- ___ 4. Select **Services**.
- ___ 5. From the Services menu, select **Set Offline**.
- ___ 6. From the Offline menu, select **Both**.
- ___ 7. If the Confirm Offline menu appears, select **Proceed**.
- ___ 8. Power OFF the subsystem.
- ___ 9. Reinstall the deck cover if it was removed during the installation.
- ___ 10. Remove and save any wrap plugs used for POST diagnostic wrap tests (for example, SCSI port wrap plugs or Serial RS-422 port wrap plugs).
- ___ 11. If the Model B1A/E1A is being installed in a **Desk Side** sleeve as part of RPQ 8B3190, go to "Model B1A/E1A Within Desk Side Sleeve, RPQ 8B3190" on page INST-40.
- ___ 12. If the Model B11/E11 is being installed in a **Desk Side** sleeve as part of RPQ 8B3191, go to "Model B11/E11 Within Desk Side Sleeve, RPQ 8B3191" on page INST-39.
- ___ 13. Go to "SCSI Attachment" on page INST-41.

Model B11/E11 Within Desk Side Sleeve, RPQ 8B3191

See Figure 208 for the final install steps of the Model B11/E11 drive.

1. Place the desk side sleeve top cover **1**, P/N 05H8347, over the mounted drive (enclosure) and on top of the lower sleeve **18**, P/N 05H8348. A ridge in the sides of the top cover allows the top cover to rest on top of the lower sleeve with the lip of the top cover on the outside of the lower sleeve sides.

Note: The rear of the sleeve top cover is indicated by the label and opening **8** on top of the sleeve (top) cover for the drive's power On/Off switch.

2. Install the eight screws **19**, P/N 05H2734, four screws on each side of the sleeve top cover **1**, to bolt the sleeve top cover to the desk side lower sleeve **18**. **Snug** the screws to secure the top cover to the lower sleeve.
3. Place the ACF cover **6**, P/N 05H3263, over the ACF.
4. Attach the "ON/OFF" label **8**, P/N 05H3264, to the top of the desk side sleeve (top cover).
5. Reconnect the power cable to the desk side subsystem.
6. Go to "SCSI Attachment" on page INST-41.

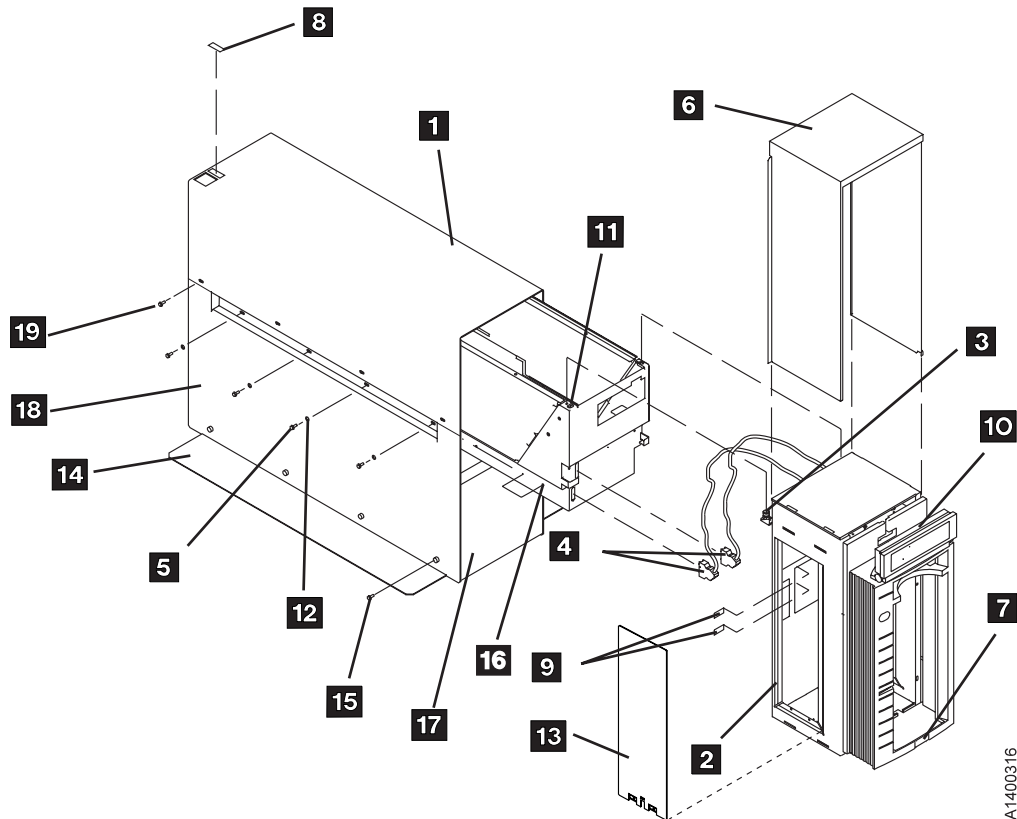


Figure 208. Desk Side Sleeve Installation for Model B11/E11, RPQ 8B3191

Model B1A/E1A Within Desk Side Sleeve, RPQ 8B3190

See Figure 209 on page INST-41 for final install steps for the Model B1A/E1A drive.

- ___ 1. Place the desk side sleeve top cover **1**, P/N 05H8347, over the mounted drive and on top of the lower sleeve **17**, P/N 05H8348. A ridge in the sides of the top cover allows the top cover to rest on top of the lower sleeve with the lip of the top cover on the outside of the lower sleeve.

Note: The rear of the sleeve top cover is indicated by the label and opening **9** on top of the sleeve (top) cover for the drive's power On/Off switch.
- ___ 2. Install the eight screws **18**, P/N 05H2734, four screws on each side of the sleeve top cover **1**, to bolt the sleeve top cover to the desk side lower sleeve **17**. **Snug** the screws to secure the top cover to the lower sleeve.
- ___ 3. Push the device into the sleeve until the front cover **3** is flush to the front of the sleeve top cover **1** and to the front **16** of the lower sleeve.
- ___ 4. Now **snug** the eight screws **10**, P/N 1621371, and washers **10**, P/N 05H3348, four screws on each side of the lower sleeve to secure the drive in the desk side sleeve.
- ___ 5. Attach the "ON/OFF" label **9**, P/N 05H3264, to the top of the desk side cover.
- ___ 6. Reconnect the power cable to the desk side subsystem.
- ___ 7. Go to "SCSI Attachment" on page INST-41.

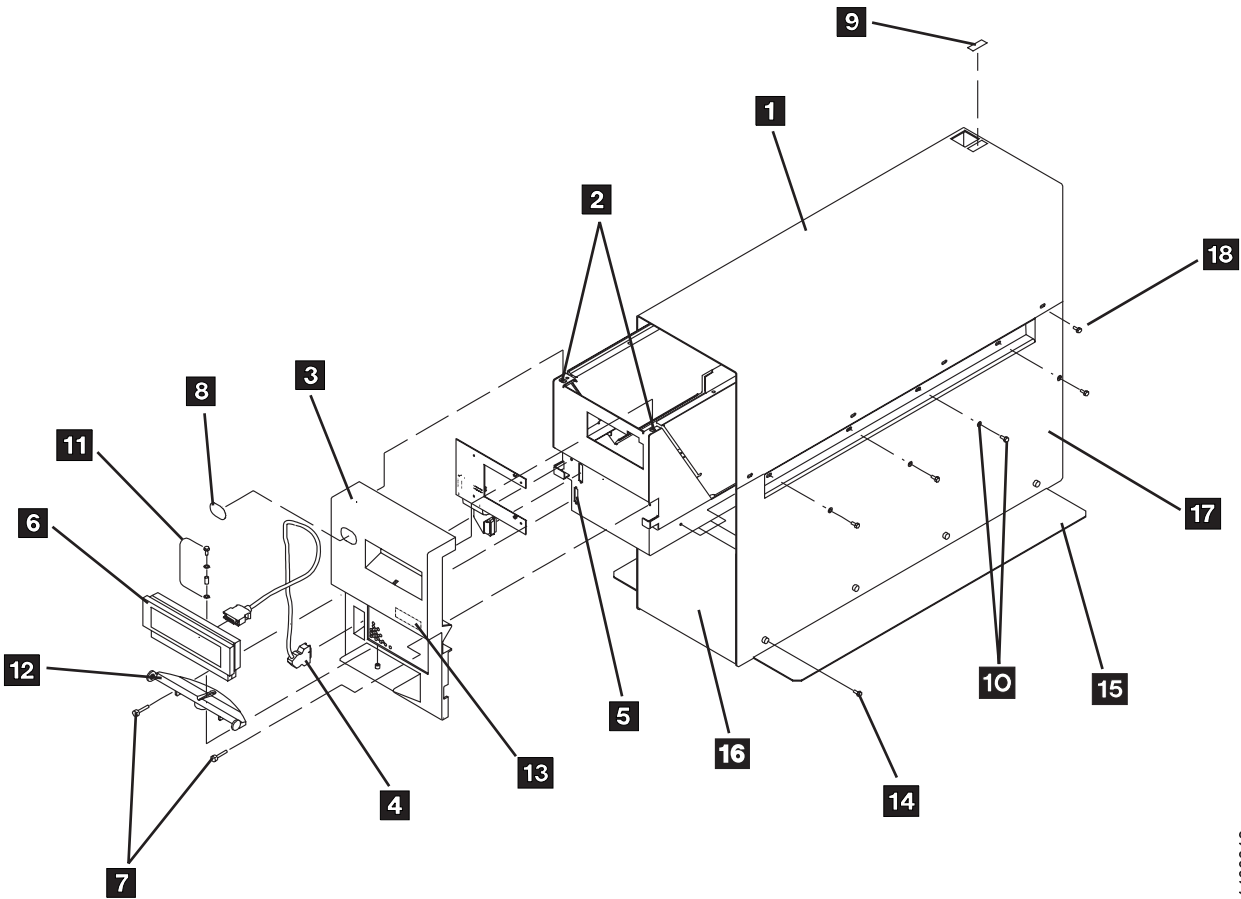


Figure 209. Desk Side Sleeve Installation for Model B1A/E1A, RPQ 8B3190

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INST

SCSI Attachment

The small computer system interface (SCSI) supports a maximum 2 MB block size. When attaching to a 1-byte SCSI-2 attachment, a 1-byte to 2-byte interposer is required.

When the Ultra SCSI feature is installed on Model Bxx drives, the protocol used is SCSI-2+ (SCSI-2 plus some SCSI-3 commands are supported). It will communicate over the Ultra SCSI interface.

- All current production 3590 Model B11/B1A drives are Magstar Ultra level drives with the Ultra SCSI Feature Code 9790 as standard equipment.
- All current production 3590 Model E11/E1A drives are Magstar Ultra level drives, also.
- All earlier production (Base) 3590 Model B11 and B1A drives may be updated to the Magstar Ultra SCSI level by installation of Field Feature Code 5790.
- The 3590 can be integrated with any host system that supports a SCSI-2 (or SCSI-2+) attachment and has the proper software drivers installed.

The 3590 subsystem contains two SCSI ports for system attachment. Each port supports the 2-byte wide SCSI-2 or the 2-byte wide SCSI-2+ (Magstar Ultra) fast attachment interface. The 3590 also logically supports the one-byte wide protocol.

Multiple systems can be attached to a 3590 tape subsystem; however, the 3590 can be varied ON to only one system at a time. The two attachments on the 3590 device requires a shielded, differential-driven, two-byte wide, SCSI-2 P cable with a 68-pin D-connector. The total cable length must not exceed 25 meters (82 feet). Figure 278 on page PROC-110 shows an example of how to calculate the bus length.

The terminator power is **not** provided by the 3590.

SCSI Bus Termination

The 3590 has a differential SCSI adapter card installed and has facilities for supporting SCSI bus termination.

The SCSI bus terminator P/N 61G8324 or P/N 05H4793 is installed on the last device in a string of multiple devices. On newer devices, terminator P/N 05H4793 is shipped. Uses for the new terminator are:

- Terminating the unused SCSI port in a 3590. Use the two short screws P/N 05H4782 or the two long screws P/N 05H8983, as required. The two sets of screws are shipped with the terminator.
- Daisy-chaining a non-IBM device or an IBM device that does not have a hammer head, to a 3590. Use the short screws P/N 05H4782 that are shipped with the terminator.
- Using a host cable, which does not have a hammer-head, in a 3495 to connect the library control unit frame to a drive unit frame that is at the end of the string (no device cables are long enough).

In a single 3590 installation, the terminator is installed in the SCSI bus connector (0 or 1) of this 3590. Two bus terminators are in the ship group, one for each port. If you do not use all the terminators, keep them in a safe place for possible future use.

All drive models provide two 68-pin SCSI connectors. The SCSI bus and all of the wires in the SCSI cable must be properly terminated according to the SCSI standard.

Examples of SCSI Bus Cabling: Figure 210 shows the SCSI cables in order by length. The Key column has references to the following two figures. Figure 211 on page INST-44 shows some examples of rack SCSI cabling and Figure 212 on page INST-45 shows some examples of SCSI cabling in a 3494.

<i>Figure 210. 3590 SCSI Bus Cables</i>					
Key	Meters	Feet	F/C	P/N	Usage
1	0.6	1.97	5106	05H4644	Device to device (see Note 4)
2	2.8	9.19	5128	05H4647	Device to host (see Note 1)
9	2.9	9.5	5129	05H3221	Device to device
3	3.4	11.15	5134	05H4645	Device to device
4	4.0	13.12	5138	05H4646	Device to device .
5	4.5	14.76	5145	05H4648	Device to host (see Note 1) .
6	12	39.37	5112	05H4649	Device to host (see Note 1) .
7	18	59.06	5118	05H4650	Device to host (see Notes 1 and 2) .
8	25	82.02	5125	05H4651	Device to host (see Notes 1 and 3) .

Notes:

1. Do not use host cables for daisy-chaining devices together because these cables do not have screws long-enough to attach two cables to the device.
2. If feature code 2420 is installed on the RS/6000 or the POWERparallel SP2 and a second drive is daisy-chained to the first drive, you can only use the 0.6-meter cable to stay under the maximum cable length of 19 meters.
3. This is the maximum distance supported for SCSI attachment to the AS/400. It is also the maximum distance when feature code 2416 is installed on the RS/6000 or the POWERparallel SP2. Also, you cannot use this cable when feature code 2420 is installed on the RS/6000 or the POWERparallel SP2 because it exceeds the maximum cable length of 19 meters.
4. When using a 0.6-meter cable to connect adjacent drives, ensure that the cable is routed between the cable pivot arm and the rack door to avoid damage during drive servicing. See Figure 216 on page INST-52 for reference on routing the cable on the outside of the cable pivot arm.

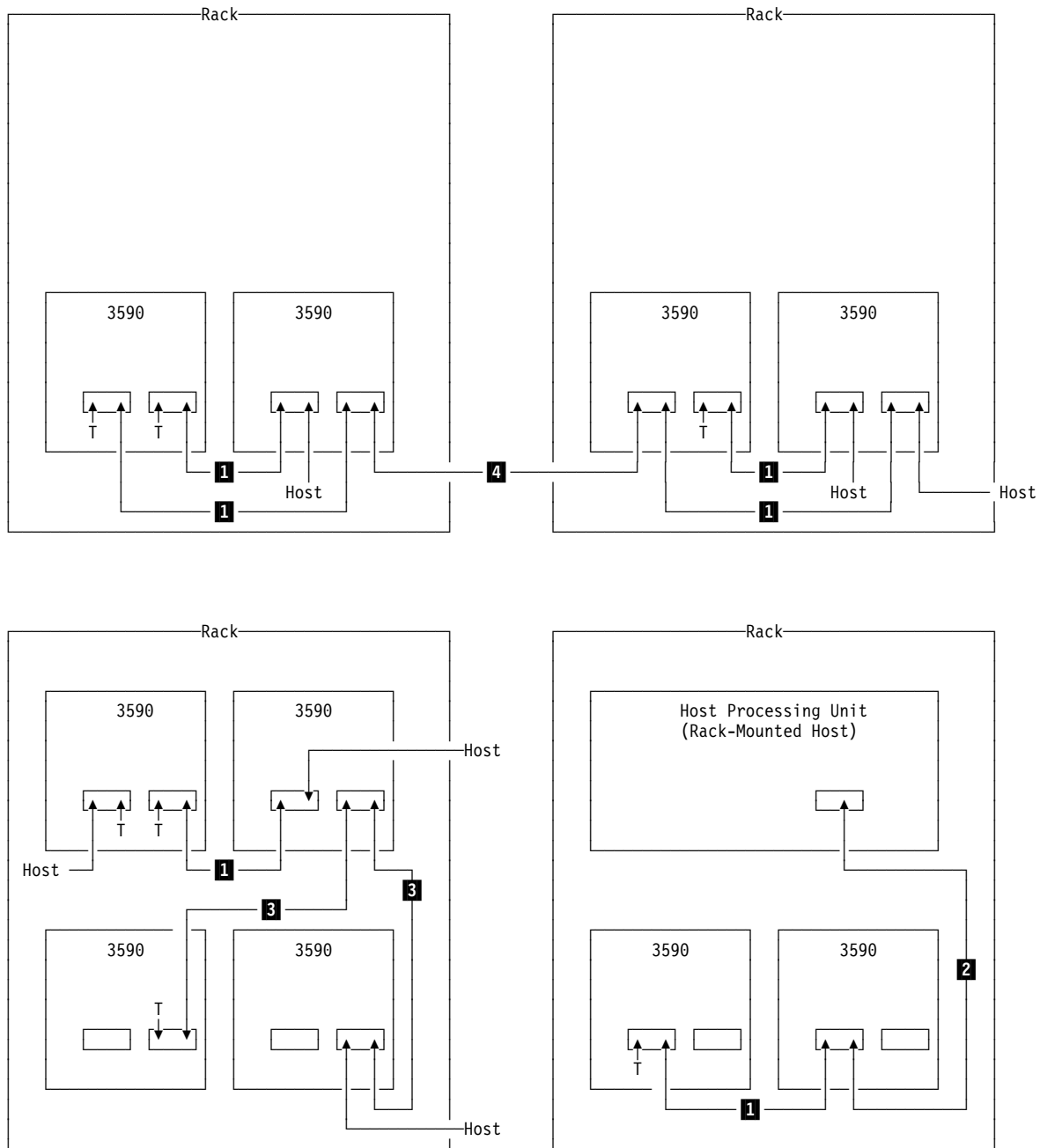
The 0.6-meter (1.96 ft) SCSI cable can be used when two 3590s are immediately adjacent to each other and are attached to the same SCSI I/O controller on an RS/6000.

When using the RS/6000 SCSI controller, feature code 9702, the maximum cable length is 25 meters (82 feet).

If you are connecting 3490 Models C1A or C2A on the same SCSI bus as 3590 Model B1A/E1A drives, the 3490 models must be first-in-line from the host. Use a device-to-host cable when daisy-chaining from a 3590 to a 3490.

Figure 278 on page PROC-110 shows an example of how to calculate the SCSI bus length.

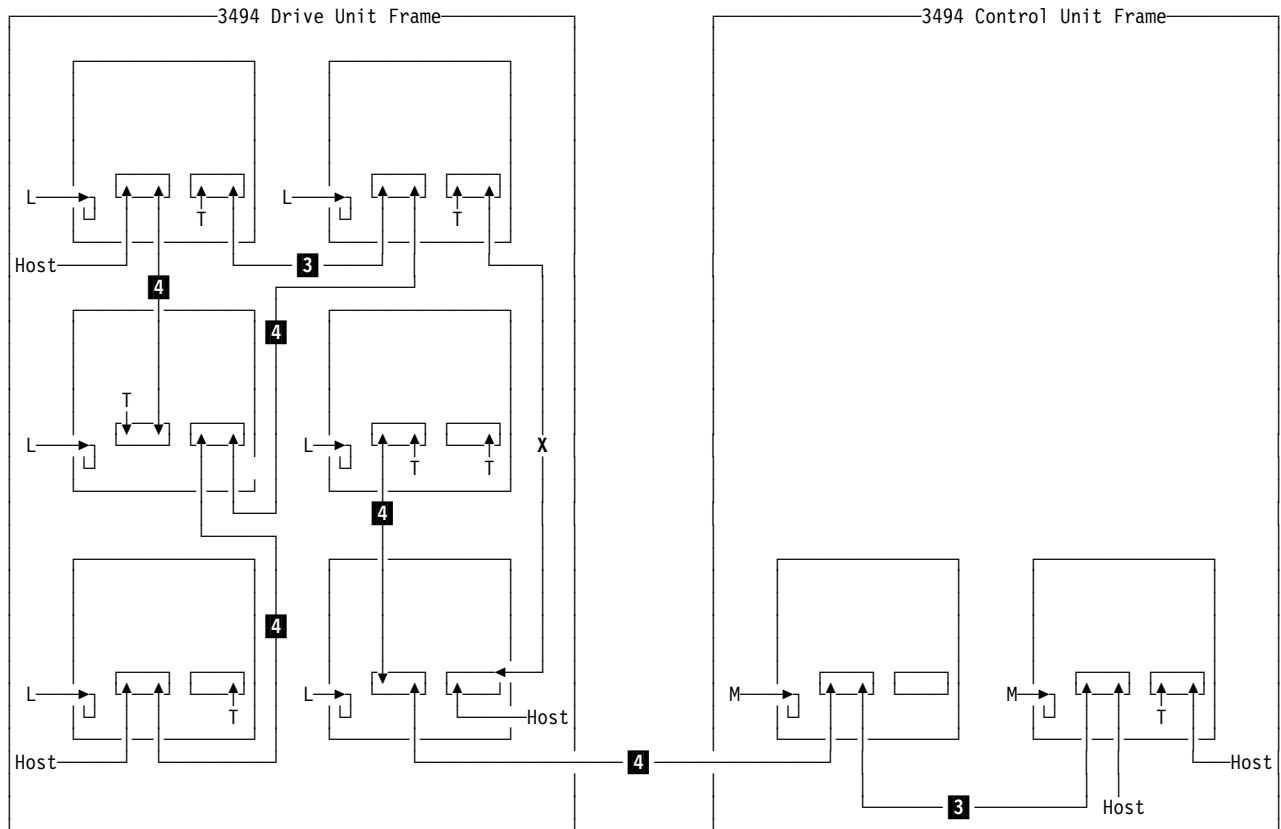
The examples show the shortest available lengths of the cables. For example, if the racks are too far apart, cable **4** shown between the racks may not be long enough, so the shown configuration may not be possible.



Host cables are **2**, **5**, **6**, **7**, or **8**.
 See Figure 210 on page INST-43.

Figure 211. Rack Cabling Example

The examples show the shortest available lengths of the cables. For example, if the control unit frame is too far from the drive unit frame, cable **4** shown between the frames may not be long enough, so the shown configuration may not be possible.



Legend.

- X Cable of this length not available
- L Library Manager RS-422 cable P/N 05H8981
- M Library Manager RS-422 cable P/N 05H8953
- T Terminator

Host cables are **5**, **6**, **7**, or **8**.
See Figure 210 on page INST-43.

Figure 212. 3494 Cabling Example

RS/6000 Controller and SP2—Features 2416 and 2420

When attaching to the RS/6000 controller or POWERparallel SP2 feature 2416, use cable interposer (feature code 9702). A total of 16 attachments are allowed. For example, one initiator can be attached to 15 targets.

Note: Some FC 2416 SCSI ports may have a “Y” cable installed. There should be a terminator plugged into one of the “Y” connectors, and the 3590 SCSI cable should plug directly into the other “Y” connector. Interposer P/N 50G0460 is not needed with this cable configuration.

- The SCSI bus is properly terminated at each end.
- When using the RS/6000 SCSI controller, feature 9702, the maximum cable length is 25 meters (82 feet). Figure 278 on page PROC-110 shows an example of how to calculate the bus length.
- Multiple RS/6000 systems may be linked to 3590 tape drives, but the systems cannot use the drives simultaneously.

When attaching 3590 Model B11, B1A, E11 and E1A subsystems to the RS/6000 controller or POWERparallel SP2 feature 2420, use a 1-byte to 2-byte interposer (feature code 9701). If feature 2420 is used, the 3590 must be attached at the end of the SCSI bus.

Notes:

1. One initiator can be attached to seven targets if a 3590 is the last device on the SCSI bus.
2. For the RS/6000 SCSI controller, feature 2420, the maximum cable length is 19 meters (62.3 feet). Figure 278 on page PROC-110 shows an example of how to calculate the bus length.
3. Multiple RS/6000 systems can be linked to 3590 tape drives, but the systems cannot use the drives simultaneously.

Figure 213 shows the cabling for an RS/6000 system.

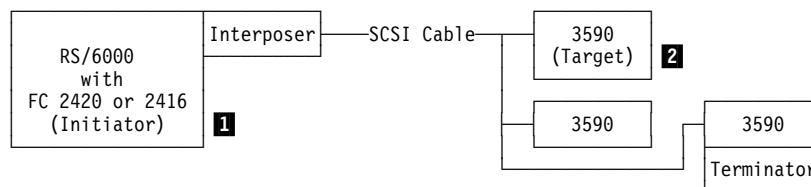


Figure 213. RS/6000 Cabling

Notes:

1. An *initiator* **1** is a SCSI device that can request an I/O process to be performed by another SCSI device (a target). A *target* **2** is a device that can perform an I/O process. An initiator can be a processor, such as an RS/6000 processor.
2. To ensure maximum performance, the 3590 subsystems must be the only targets on the SCSI bus.
3. The required interposer is supplied by ordering FC 9701 or 9702. The interposer is only to allow a mechanical connection; the lines do not change.

4. The 0.6-meter (1.96 ft) SCSI cable (FC 5106) can be used when two 3590s are immediately adjacent to each other and are attached to the same SCSI I/O controller on an RS/6000.
5. Cable lengths of 18 meters (59 feet) or shorter can be used with FC 2420; cable lengths longer than 18 meters cannot be used with FC 2420.

RS/6000 Controller and SP2—Other Available Adapters

Additional Feature codes are now available to attach the 3590 drive to the RS/6000 Controller and SP2:

FC 2412 Enhanced SCSI-2 Differential F/W Adapter/A

FC 2409 PCI SCSI-2 Differential F/W Adapter

FC 6209 PCI SCSI-2 F/W Differential Adapter

FC 6207 PCI Differential Ultra SCSI Adapter

Note: When installing a Magstar Ultra level drive, the system must be reconfigured to run at the higher Ultra data rates on Ultra-capable adapters such as the FC 6207. The customer can accomplish this in one of the following ways:

1. If the customer switches OFF the RS/6000 power prior to the upgrade and the 3590 power is switched ON first after the upgrade, the devices will be automatically configured when the RS/6000 power is switched ON.
2. If the upgrade is done without switching the RS/6000 power OFF, the device can be un-configured, then re-configured, from the RS/6000 console as follows:

```
rmdev -l rmtx
```

```
mkdev -l rmtx
```

Where x=number assigned by the system to the drive that has the Ultra SCSI feature.

See “3590 Drive Model and Feature Levels” on page INTRO-33 for more information about the Magstar Ultra drives.

AS/400 System—Feature 6501

The following feature codes apply for AS/400 9404 and 9406 SCSI bus attachment of a 3590 Model B11, B1A, E11, or E1A to system feature code 6501:

- Each feature code 6501 provides two ports.
- Each AS/400 port can support a single 3590 Model B11, B1A, E11, or E1A for a maximum of two 3590 tape drives per feature code 6501.
- No other devices can be supported on a feature code 6501-equipped port with a 3590 attached (no daisy-chaining).
- AS/400 systems cannot be interconnected by using the SCSI. Therefore, a Model B11, B1A, E11, or E1A can be attached to only one AS/400 system at a time.
- You can connect a 3490 on one port and a 3590 on another port.

Figure 214 on page INST-48 shows the cabling for an AS/400 system.

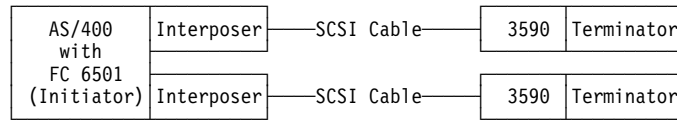


Figure 214. AS/400 System Cabling

An interposer is required when a Model B11, B1A, E11, or E1A is connected to feature code 6501. The interposer is supplied with feature code 9410.

Figure 8 on page INTRO-11 shows the cable feature codes for the cable of the appropriate length.

Advise the customer of the setting of the 6501 IOP options. The setting should be *DEV or *NO.

Notes:

1. When attaching to an AS/400 system with feature code 6501, the 3590 drive **must** be set to address '0'. The AS/400 will recognize the device as address '7' because of system design.
2. The address will not become active until you either select **Reset Drive** from the operator Services menu, press the **Reset** push button on the operator/CE panel, or power OFF the drive.

AS/400 System—Feature 6534 or 2729

Feature codes 6534 and 2729 each provide one port. Each port can support one 3590 tape subsystem. No other devices can be supported on these feature codes. An AS/400 system cannot be interconnected with any other system (including another AS/400) on the same SCSI bus. When the subsystem is attached to an AS/400 with feature codes 6534 or 2729, one of the SCSI addresses on the 3590 tape subsystem **must** be set to **0** if the 3590 is to be used as an alternate IPL device. No interposers are required for these feature codes.

Figure 8 on page INTRO-11 shows the cable feature codes for the cable of the appropriate length.

Note: AS/400 adapter Feature Codes 6534 and 2729 require new PTF's for proper operation of Magstar Ultra level drives, even if replacing or adding a drive to an operational system. Review the pre-requisite information in "3590 Drive Model and Feature Levels" on page INTRO-33 for additional details, or refer to Informational APR ii11472.

Sun Systems Attachment

The 3590 subsystem can be installed on Sun SPARC and Ultra/Enterprise Architecture workstations and servers that support one of the following:

- Sun SBus Differential Fast/Wide Intelligent SCSI-2 Host Adapter
- Sun SBus Ultra Differential Fast/Wide Intelligent SCSI-2 Host Adapter
- Sun Dual-Channel Differential Ultra SCSI Host Adapter (PCI)

The SunOS 5.x (Solaris 2.4 or higher) is required to support the 3590 when used with the Sun SBus Differential Fast/Wide Intelligent SCSI-2 Host Adapter. The SunOS 5.x (Solaris 2.5.1 or higher) is required to support the 3590 when used with the Sun SBus Ultra Differential Fast/Wide Intelligent SCSI-2 Host Adapter or the Sun Dual-Channel Differential Ultra SCSI Host Adapter (PCI). The Open Systems Device Drivers (FC 9200 and 9211) provides specific tape drive device support. ADSM for Sun Solaris 1.2.1 with PTFs also supports the 3590.

An interposer is required when attaching to a Sun system with the Sun Dual-Channel Differential Ultra SCSI Host Adapter (PCI). Figure 221 on page INST-59 shows the interposer part number and Feature Code.

Figure 8 on page INTRO-11 shows the SCSI cable feature codes for the cable of the appropriate length.

HP-UX Systems Attachment

The 3590 Model B11/B1A drives are supported on Hewlett-Packard (HP) 9000 Series 800 Business Servers. They are also supported in other HP-PB-based servers that support a SCSI Fast/Wide Differential adapter including:

- HP9000 Series /T Class Server (T500, T520, T600)
- HP9000 Series /K Class Server (K4xx, K2xx)
- HP9000 Series /D Class Server (D3xx, D2xx)

The Model B11 requires installation in a support rack or space in an existing customer rack (two B11 units per 12 EIA positions). The maximum SCSI cable length is 25 meters. See Figure 9 on page INTRO-11 and the Introduction and Planning Guide (GA32-0329) for additional SCSI cable planning information.

HP-UX 10.0x through HP-UX 10.3x supports the IBM 3590 subsystem. The Open Systems Device Drivers, FC 9200 and 9210, provides specific HP device support. For the 3590 Model B1A/E1A, this support is included in the 3494 FC 9200.

No interposers are required with these attachments.

Figure 9 on page INTRO-11 shows the cable feature codes for the cable of the appropriate length.

Windows NT Systems

The 3590 Model B11, B1A, E11 and E1A is supported in Intel-based processors. These include Intel 486DX or Pentium processors with sufficient RAM and disk space for operation of Microsoft's Windows NT operating system. An appropriate SCSI F/W Differential adapter and associated cable is also required.

The Model B11/E11 requires installation in a supported rack or space in an existing customer rack (two B11/E11 units per 12 EIA positions). The maximum SCSI cable length is 25 meters. See Figure 9 on page INTRO-11 and the Introduction and Planning Guide (GA32-0329) for additional SCSI cable planning information.

Microsoft's Windows NT Server Version 4.0, and later releases, support the IBM Model B11/E11. specific tape drive device support. The Open Systems Device Drivers (FC 9200 and 9212) provides specific tape drive device support. For the 3590 Model B1A/E1A, this support is included in the 3494 FC 9200.

No interposers are required for these attachments.

Figure 9 on page INTRO-11 shows the cable feature codes for the cable of the appropriate length.

3494 Cables

Figure 10 on page INTRO-11 shows the cable feature codes for connecting multiple 3590 Model B1A/E1A drives on the same SCSI bus in a 3494 Model D12, D14, L12, and L14.

Note: Library manager RS-422 interface cable P/N 05H8953 is for control-unit frames and cable P/N 05H8981 is for drive-unit frames.

Cables to Device

Attention: Apply **very light** torque when tightening the system cable and terminator screws. Over-tightening these screws can cause the connector standoffs (that the cable connector screws go into) to loosen and make removing the cable difficult.

Attention: Do not connect or disconnect any SCSI device while power is ON as this practice may corrupt data or may damage hardware.

- ___ 1. If not already done, insert the drive power cables into the 3590 ac connectors and insert the drive power cables into the ac power sources.
- ___ 2. Locate the cables from the hosts and route them to the rear of the devices.
- ___ 3. If you are installing Model B11/E11 devices, including the **Desk Side** model, go to “SCSI Cables for Model B11/E11” on page INST-51.
- ___ 4. If the Model B1A/E1A is being installed in a **Desk Side** cover as part of RPQ 8B3190, go to “SCSI Cables for Model B11/E11” on page INST-51.
- ___ 5. If you are installing Model B1A/E1A devices, other than the desk side model, go to “Cable Brackets for Model B1A/E1A” on page INST-55.

SCSI Cables for Model B11/E11

See Figure 215. Port 1 connections are the same as for port 0.

- ___ 1. Connect the system cable **3** (hammer-head end) straight into the card connector **4**. (SCSI port 0 in on the left when you are facing the rear of the device.)

When connecting the SCSI cables and terminators to the ports on the 3590s, use screws P/N 05H8983. One screw is in the ship group and one screw is attached to each cable.

- ___ 2. If this is the last device on the SCSI bus, install the terminator P/N 61G8324 or 05H4793 **1** on cable connector **3**. A set of two short screws (P/N 05H4782)

and a set of two long screws (P/N 05H8983) are shipped with terminator P/N 05H4793. Use the appropriate screws, as required.

- ___ 3. If connecting to the next device in the chain, install the next connector **2** in the female side of cable connector **3**.
- ___ 4. If the Model B1A/E1A is being installed in a **Desk Side** sleeve as part of RPQ 8B3190, go to "SCSI System Cable at the Host" on page INST-59.
- ___ 5. If the Model B11/E11 is being installed in a **Desk Side** sleeve as part of RPQ 8B3191, go to "SCSI System Cable at the Host" on page INST-59.
- ___ 6. Go to "Cable Guides for Model B11/E11" on page INST-52.

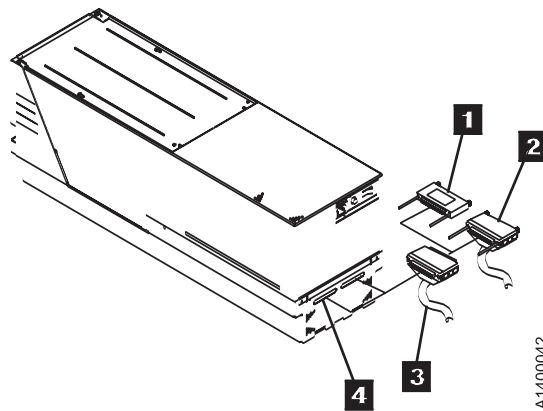


Figure 215. Installing SCSI System Cable into 3590

Cable Guides for Model B11/E11

See Figure 216.

1. Install the cable guides **6** P/N 45G0179, nuts **5** P/N 1622404, and nut clips **4** P/N 74F1823 in the eighth hole below each pivot arm.
2. Route the signal cables **1** through the upper snap-on cable retainers **3** of the cable pivot arm. Do not twist the cables.
3. Route the power cords **2** through the lower sections of the snap-on cable retainers.

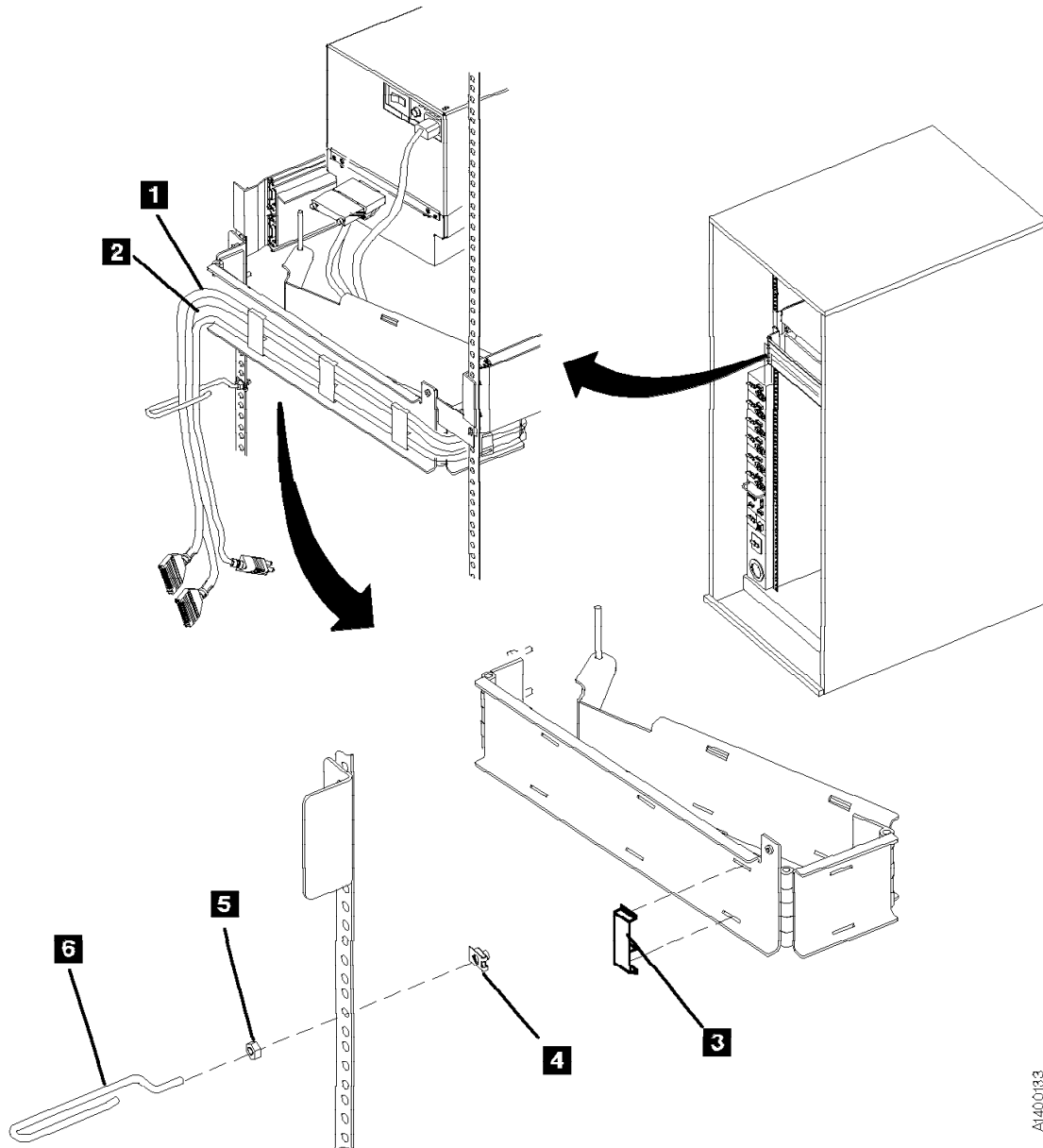


Figure 216. Cable Retainers (Rear View)

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Rack, Rear Internal Panel for Model B11/E11

See Figure 217.

1. Install the rear internal panel **1** P/N 05H2346 by using two screws **2** P/N 1624778. The internal panel is required only for the top drives.
2. If you received the shipping plate P/N 05H9822, an additional screw P/N 1624778, and an additional nut clip P/N 74F1823, keep them in a safe place. They are used when the rack and devices are moved to another location.
3. Go to “Decorative Covers (2-Drive Cover) for Rack-Mounted Model B11” on page INST-54.

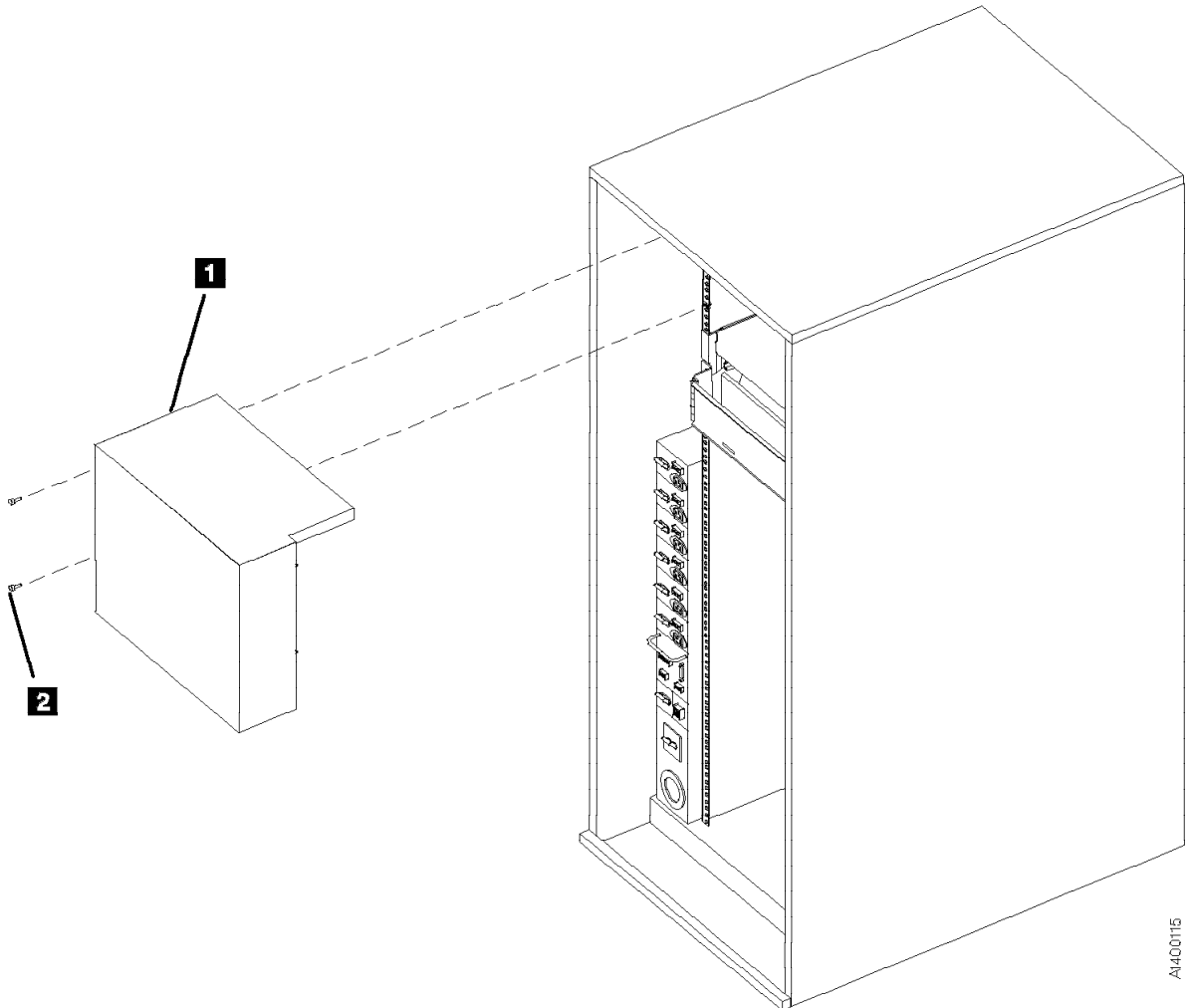


Figure 217. Internal Panel

Decorative Covers (2-Drive Cover) for Rack-Mounted Model B11

See Figure 218.

1. After you have installed the last 3590, install the 2-drive cover P/N 05H2342 over the drives:
 - a. Install the blank-out cover **5** P/N 05H2343 over any unused position of the decorative cover **4** (drive 1 or drive 3 position).

Note: The wider side lip of the cover must be positioned on the left side for installation.

- b. Insert the magazine (see "Inserting the Magazine" on page PROC-29).

Note: In the next step, if two drives are side-by-side, both displays must be tilted forward.

- c. Slide the display forward **2**, then rotate it down **1** to lower the overall height of the display.
- d. Align the studs **3** with the mounting holes and snap the decorative cover **4** onto the rack frame.

2. Put the display in the vertical position.
3. Go to "SCSI System Cable at the Host" on page INST-59.

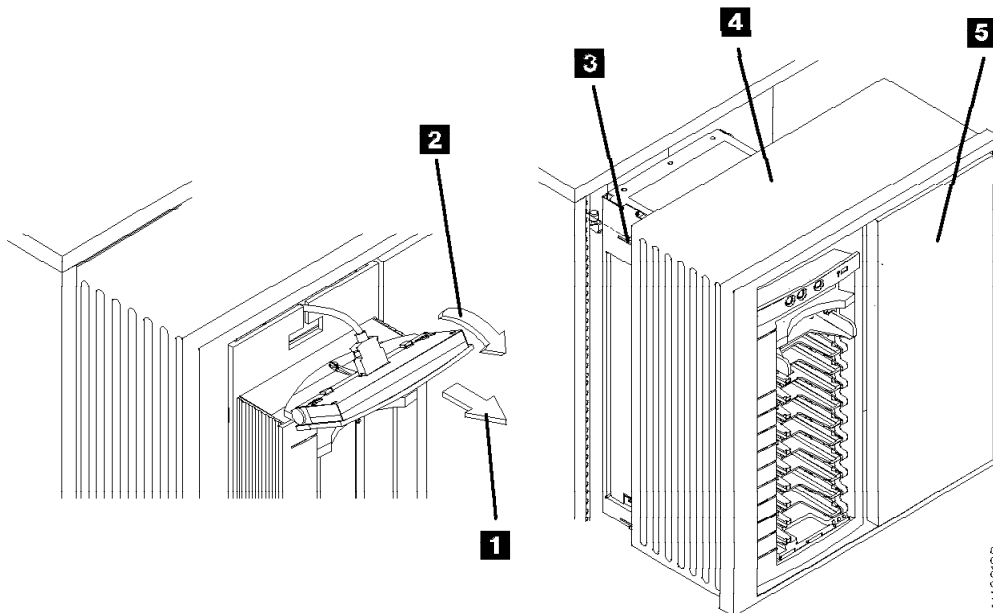


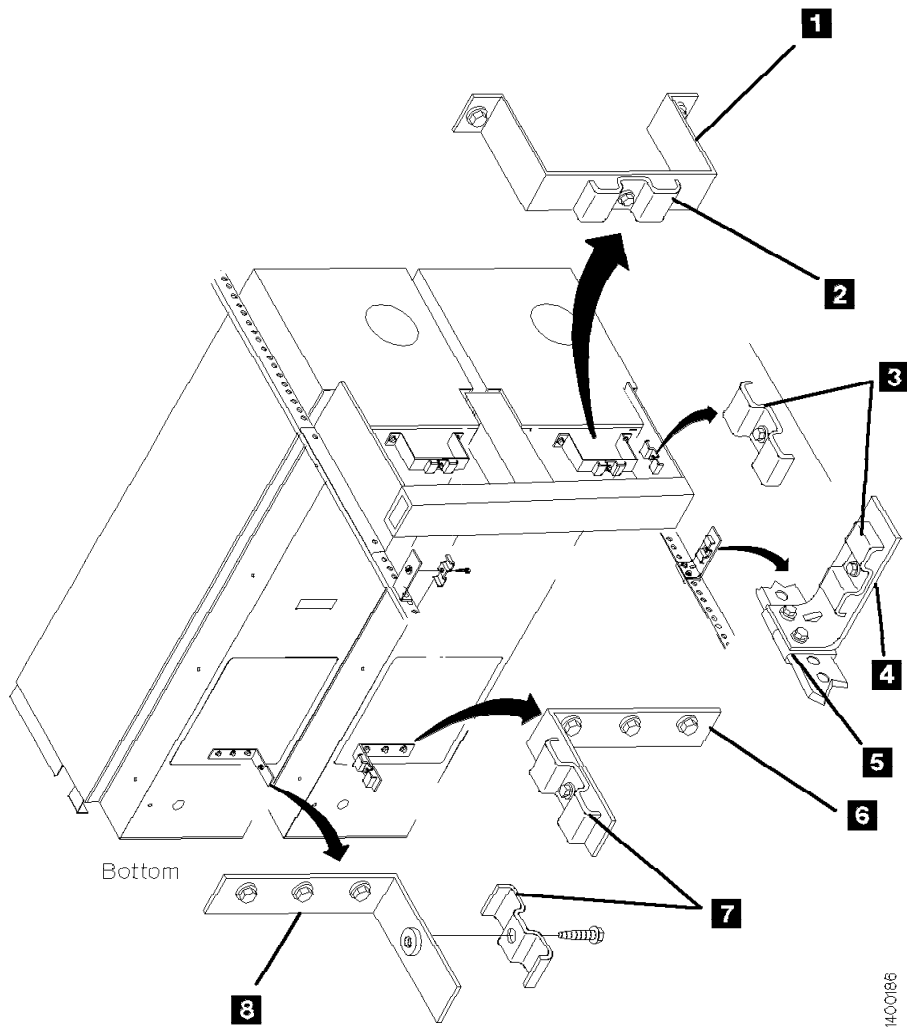
Figure 218. ACF Decorative (2-Drive) Cover

Cable Brackets for Model B1A/E1A

If the brackets are already installed, go to “Cable Routing for Model B1A/E1A” on page INST-57.

See Figure 219 on page INST-56. View the drives from the rear. In this text, *front* refers to the front of the device and *left-hand device* refers to the left device as you face the rear of the device.

- ___ 1. Extend the drive to its fully locked service position if it is not already in its service position.
- ___ 2. Loosely attach the cable clamp P/N 05H2629 **2** to the rear cable bracket P/N 45G0193 **1** with screw P/N 1624780.
- ___ 3. Attach the rear cable bracket **1** to the drive with two screws P/N 1624775.
- ___ 4. Loosely attach the cable clamp P/N 05H2629 **7** to the front cable bracket P/N 45G0178 **6** or **8** with screw P/N 1624780.
- ___ 5. For the **right-hand** drive, face the cable clamp to the **left** and attach the front cable bracket **6** with screw P/N 1624765. (If the bottom plate on the drive has only one threaded hole, use the center hole in the bracket.)
- ___ 6. For the **left-hand** drive, face the cable clamp **8** to the **right** and attach the front cable bracket with screw P/N 1624765. (If the bottom plate on the drive has only one threaded hole, use the center hole in the bracket.)
- ___ 7. Loosely attach cable clamps P/N 05H2629 **3** to the side frame bracket with screw P/N 1624780 and to the bracket **4** with screws P/N 1624778. For left-hand drives, attach the clamp to the left frame bracket.
- ___ 8. Attach the bracket P/N 45G0181 **4** below the drive with nut clips **5** and screws P/N 1624778. Use the 15th and 16th mounting holes below the pin in the slide mounting bracket.
- ___ 9. Go to “Cable Routing for Model B1A/E1A” on page INST-57.



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Figure 219. Cable Brackets (Bottom View of Drives)

Cable Routing for Model B1A/E1A

In this text, *front* refers to the front of the device and *left-hand device* refers to the left device as you face the rear of the device.

Notes:

1. The power cables and the library manager cables are not routed through the cable brackets. They are attached to the SCSI cables with cable ties.
2. If you are connecting 3490 Models C1A or C2A on the same SCSI bus as 3590 Model B1A/E1A drives, the 3490 models must be first-in-line from the host. You must use a device-to-host cable because the hammer-head on the device-to-device cables will not fit in a 3490.

Route the SCSI cables through the cable brackets as follows:

1. Extend the drive to its fully locked service position if it is not already in its service position.
2. See Figure 220 on page INST-58. Connect the SCSI cables and terminators to the ports on the 3590s. Use screws P/N 05H8983 **15**. One screw is in the ship group and one screw is attached to each cable.
3. To create the service loop, route the SCSI cables **4** and **5** through the rear bracket clamp and through the front cable clamp, then tighten these two clamps.

Route the left-hand power cable **2** in the service loop and across the rear slide mounting bracket.

For the SCSI cables that go side-by-side from drive-to-drive **3**, route them through the service loop and across the rear slide mounting bracket, then attach them and the left-hand drive power cable with cable ties **8**. If the drives in a string are above or below the drive, route the cables through the service loop and if necessary, across the rear slide mounting bracket, through the clamp **7**, and then through the service loop in the other drive.

4. Route the SCSI cables so they extend about 115 mm (4.5 in.) **10** past the front

of the rear slide mounting bracket, then route them through the side frame clamp **6** and through the rack-mount clamp **7**.

Note for the Next Step: If the drive has less than three SCSI cables attached, do not place the clamp as specified in the next step. Instead, connect it below clamp **7**. Then if more SCSI cables are added later, the clamp can be attached where specified.

5. With the drive in the fully-extended service position, clamp the SCSI cables about 25 mm (1 in.) **13** past the front of the rear slide mounting bracket **14** with clamp P/N 05H2629 **11** and bracket P/N 05H2630 **12** by using an M5 screw.
6. Route the power cable **2** and the library manager cable **1** next to the SCSI cables and attach them to the SCSI cables with cable ties **9**. Use as many cable ties as necessary so the drive can be extended to its service position without interference.
7. If the frame is a drive unit frame, route the library manager cables through the hole under the front of the lower drives and clamp them in place on the braided part of the cables. See "Frame to Frame Cables" in the INST section of *IBM 3494 Tape Library Dataserver Maintenance Information*.
8. Go to "ARTIC Adapter Cables to Tape Subsystem" in the INST section of *IBM 3494 Tape Library Dataserver Maintenance Information*, complete those steps, and then return here.

Note: Tape subsystems must be connected sequentially by library position in the 3494.

If you are adding a drive (inserting a drive within the string) to a 3494 Model L12 or D12, you shift the existing tape subsystem cables down one position to free the correct ARTIC port for the new drive. This also applies if you are replacing a 3490E with more than one 3590 Model B1A/E1A.

9. Secure the drives in their operating positions by installing the slide locking

screws (see Figure 226 on page PROC-12).

— 10. Go to “SCSI System Cable at the Host” on page INST-59.

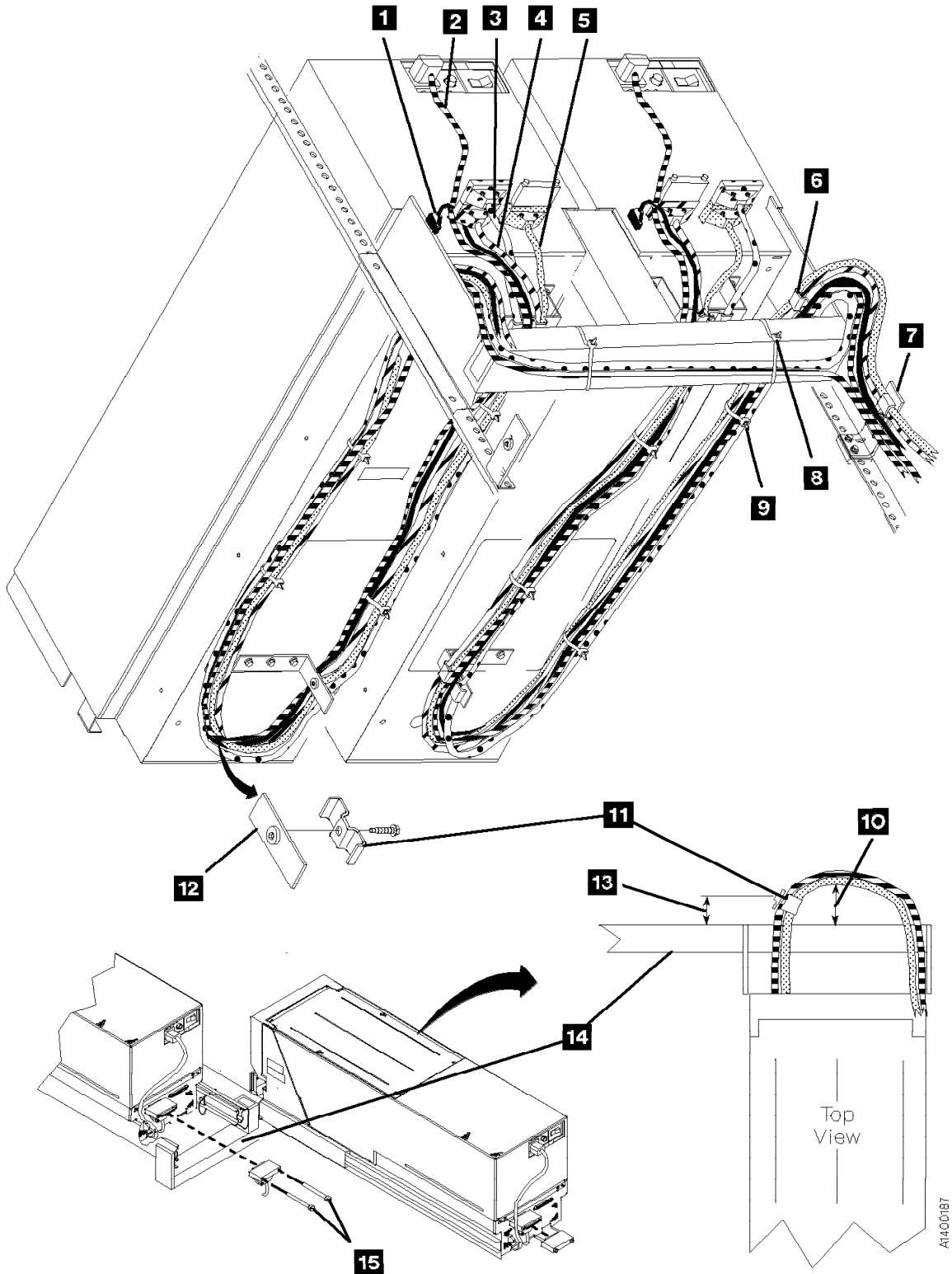


Figure 220. Cable Routing

SCSI System Cable at the Host

Install the appropriate interposer at the attachment point of the SCSI cable to the host. Be sure to securely attach the interposer before attaching the SCSI cable.

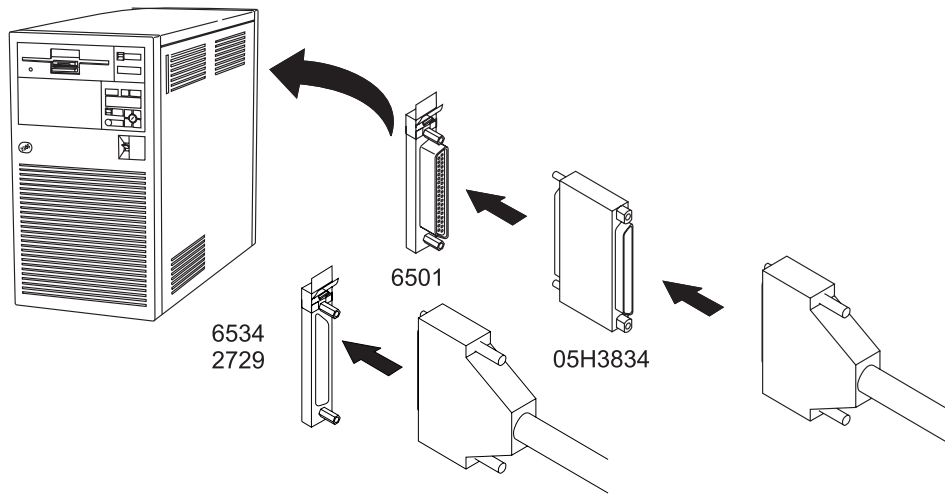
Note: If you are connecting 3490 Models C1A or C2A on the same SCSI bus as 3590 Model B1A/E1A drives, the 3490 models must be first-in-line from the host.

An interposer may be required at the host end of the SCSI cable. See Figure 221.

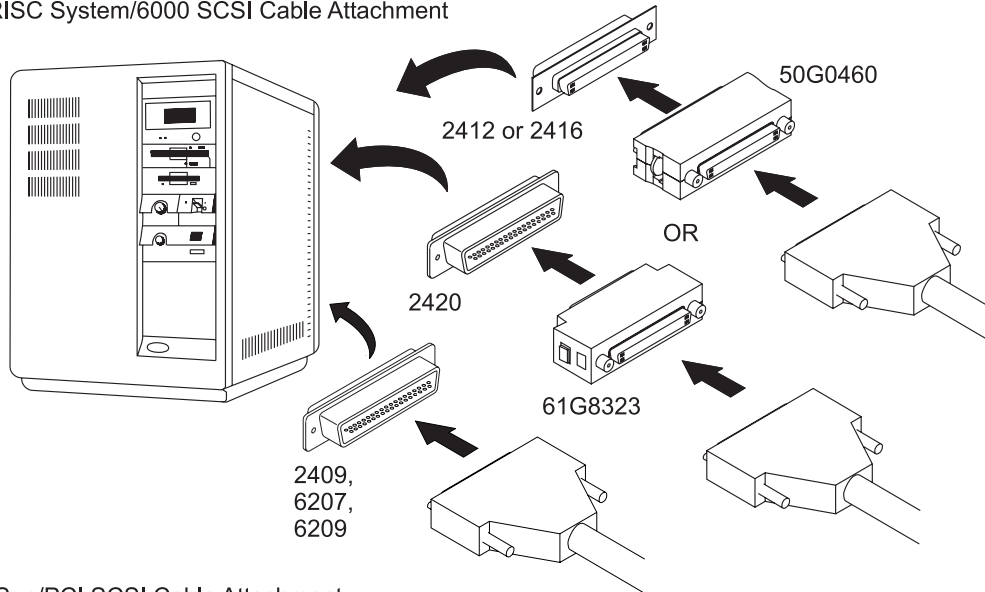
Figure 221. Interposers

Host	Description	Interposer
AS/400	Magnetic Media Subsystem Controller (FC 6501)	05H3834 (FC 9410)
RS/6000	SCSI-2 Differential High Performance I/O Controller (FC 2420)	61G8323 (FC 9701)
RS/6000	IBM SCSI-2 Differential Fast/Wide Adapter/A (FC 2416).	50G0460 (FC 9702)
SUN	Sun Dual-Channel Differential Ultra SCSI Host Adapter (PCI)	09L0878 (FC 9799)
Note: Some FC 2416 SCSI ports may have a "Y" cable installed. There should be a terminator plugged into one of the "Y" connectors, and the 3590 SCSI cable should plug directly into the other "Y" connector. Interposer P/N 50G0460 is not needed with this cable configuration.		
Note: Refer to your host documentation for the latest information.		

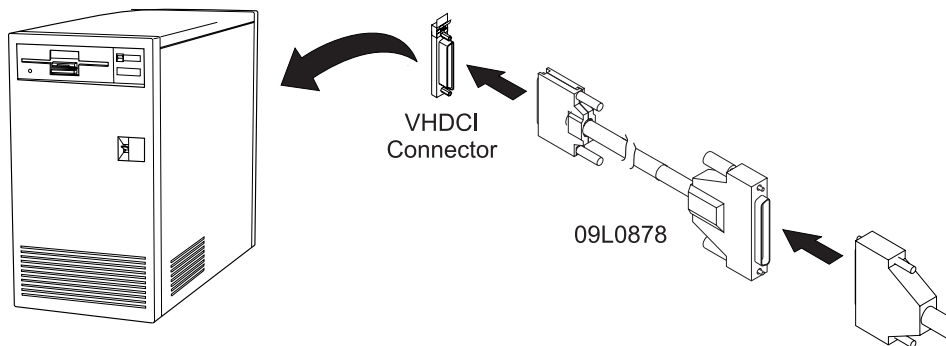
AS/400 SCSI Cable Attachment



RISC System/6000 SCSI Cable Attachment



Sun/PCI SCSI Cable Attachment



A1400107

| Figure 222. Installing SCSI System Cable at the Host

Online Test

Note: When the 3590 is powered OFF, wait approximately five seconds before powering ON the 3590 again.

- ___ 1. Set the Power switch to the ON position.

This power-on test takes approximately 2.5 minutes to complete, and is automatically performed when the subsystem is powered ON.

If a failure occurs, a message can be posted in the operator/CE panel or the operator/CE panel can be blank. If either of these conditions exist, go to the START section for further analysis. When any faults are corrected, return here.

- ___ 2. From the Options menu, select **Services**.
- ___ 3. From the Services menu, select **Set Online**.
- ___ 4. From the Set Online menu, select **Port 0** and/or **Port 1** to set the interfaces online, depending on the customer's choice.
- ___ 5. Select **Cancel** twice to return to the Options menu.

3494 Only

If you have completed an install and/or checkout of a 3590 Model B1A/E1A in a 3494 library, locate the next task to perform in the following list:

- ___ a. If you have more **field-installed** 3590 Model B1A/E1A drives to check out, return to "Install a Model B1A/E1A in a 3494 Frame" on page INST-25.
- ___ b. If you have more **factory-installed** 3590 Model B1A/E1A drives to check out, return to "Installation Checkout" on page INST-31 to check the next drive.
- ___ c. If you have checked out all of the **factory-installed** 3590 Model B1A/E1A drives in a new 3494 library (new library or new frame), return to "Checkout" in *3494 Tape Library Dataserver Maintenance Information* and complete the library teach and checkout.
- ___ d. If you are field-installing a 3590 Model B1A/E1A in an **existing** 3494 library frame (feature code 4630), return to the feature Installation Instructions to complete the library teach and checkout.
- ___ e. If you are field-installing a 3590 Model B1A/E1A in a **new** 3494 library or **new** library frame (feature code 4630), return to "Checkout" in *3494 Tape Library Dataserver Maintenance Information* and complete the library teach and checkout.

End of 3494 Only

- ___ 6. If you are installing the drives in an AIX environment, perform "Checking the SCSI Attachment in an AIX Environment" on page PROC-72 and return here.
- ___ 7. If you are installing the drives in an AS/400 environment, perform "Checking the SCSI Attachment in an AS/400 Environment" on page PROC-71 and return here.

Note: **Ensure** that you have the latest AS/400 PTFs before performing the procedure “Checking the SCSI Attachment in an AS/400 Environment.”

- ___ 8. If you are installing the drives in a Sun environment, perform “Checking the SCSI Attachment in a Sun Environment” on page PROC-76 and return here.
- ___ 9. If you are installing the drives in a HP-UX environment, perform “Checking the SCSI Attachment in a HP-UX Environment” on page PROC-79 and return here.
- ___ 10. If you are installing the drives in a Windows NT environment, perform “Checking the SCSI Attachment in a Windows NT Environment” on page PROC-81 and return here.
- ___ 11. Ensure that the **latest** level of microcode is installed in the drive. If you need to update the microcode, do so by using the “Microcode update via SCSI” entry in the START section.

Post Installation Reporting

If *IBM 3590 High-Performance Tape Subsystem Operator's Quick Guide*, GA32-0354 and *3590 Training Tape* are in the ship group, give them to the customer.

After the drive is installed and tested:

- ___ 1. Update the account management plan book.
- ___ 2. Record the serial number (from the label) in the machine history log. See Figure 180 on page INSP-14 **9** for its location.
Note: This serial number must be recorded so it can be used to restore nonvolatile storage, as required by certain repair procedures.
- ___ 3. Record the installed microcode level in the machine history log. See “Check EC Level” on page INST-33.
- ___ 4. Save the tools and cartridges in a safe place for later use.
- ___ 5. Report the installation complete using the existing branch office procedure.
- ___ 6. After successfully completing installation, notify the customer that the subsystem is now available for use.

Removing a 3590

Notes:

1. For World Trade countries, refer to WT General CEM 257, "General Internal Packaging Instructions for Replant Machines."
2. Before attempting to remove a 3590, ensure that you have the relocation kit.
3. If the host system has software aids for system upgrades, installations, or relocations, execute that software and follow the instructions it provides.

To remove a 3590, perform the following:

- ___ 1. Before proceeding, check the following:
 - ___ a. Ensure that the drive is unloaded and the tape cartridge has been removed or stored in the magazine.
 - ___ b. Notify the system operator that you must switch OFF power to the 3590 and that it will not be available, then vary the device offline from the operator panel.
- ___ 2. Set the Power switch to the OFF position. The power switch is at the rear of the device.
- ___ 3. Open the rear door.
- ___ 4. Set the circuit protector (CP) to the OFF position **for this device only**.
- ___ 5. Disconnect the power cable **for this device only** from the outlet in the rack.
- ___ 6. Disconnect the ac power cable from the 3590.
- ___ 7. Disconnect the interface cables from the 3590.

Note: The ac power cable, and any interface cables that are removed with the drive, should stay with the drive.

Remove or Relocate the Model B11/E11 in a Rack

When removing nut clips, bolts, and screws, put them into the containers provided. Mark the containers with the correct part number.

- ___ 1. Remove the rack covers.
- ___ 2. Slide the 3590 into the service position. (See "Service Positions of the 3590" on page PROC-10.)
- ___ 3. Remove the 3590 from the drive shelf.
- ___ 4. If the 3590 Model B11/E11 is to be relocated to a different rack or to a different location in the same rack, perform the installation instructions. If the 3590 is to stay in a rack and the rack is to be moved, install the shipping plates (see "Install Rack That Contains Model B11/E11 Devices" on page INST-24).
- ___ 5. If you are not reinstalling the device, place the device in the shipping box. See "Repack Instructions for the 3590" on page INST-64.

Note: The ac power cable, and any interface cables that are removed with the drive, should stay with the drive.

Remove or Relocate the Model B1A/E1A

When removing nut clips, bolts, and screws, put them into the containers provided. Mark the containers with the correct part number.

- ___ 1. Disconnect the interface cables.
- ___ 2. Disconnect the ac power cable.
- ___ 3. Move the 3590 to the new location.

OR

- ___ 4. If you are not reinstalling the device, place it in the shipping box. See "Repack Instructions for the 3590."

Note: The ac power cable, and any interface cables that are removed with the drive, should stay with the drive. Any slides and related hardware that are removed with Model B1A/E1A drives should stay with the drive, also.

Repack Instructions for the 3590

Before repacking the 3590, verify that there is no tape cartridge in the 3590. For the ACF, verify there are no tape cartridges loaded in the magazine. If there are cartridges present, remove them.

Note: The ac power cable, and any interface cables that are removed with the drive, should stay with the drive. Any slides and related hardware that are removed with Model B1A/E1A drives should stay with the drive, also.

Refer to the relocation kit:

Model	Part Number
B11/E11	7353608
B1A/E1A	7353617

Refer to the CE packaging instructions:

Model	Part Number
B11/E11	7353609
B1A/E1A	7353618

Common Procedures

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The  symbol identifies an ESD-sensitive part. See “Working with Electrostatic Discharge (ESD) Parts” on page PROC-20.

Problem Determination Procedure

Begin all maintenance action at “Maintenance Starting Point” on page START-2.

If you have a well defined or solid failure symptom, (FID, ATTN message, Operator/CE Panel indication, etc.), use the table Figure 1 on page START-2 to determine the proper service action.

If the problem is intermittent, or you are unable to determine the cause of the problem (No Defect Found), or the symptoms change and you need further assistance, return here and use the following problem determination procedure:

1. Discuss the problem with the customer.
 - a. Does the failure occur only during certain operations (load, unload, read, write, etc.)?
 - b. Is the failure unique to a certain cartridge, magazine, library, or host?
 - c. Does the failure occur only with certain software applications, or has the microcode level been changed recently?
2. Analyze the drive error log. See “CE Error Log Menu” on page PANEL-44 to display the log, and “Error Log Analysis Procedure” on page PROC-99 to analyze the data.
 - a. Look for FID's with a time stamp close to the time of the failure.
 - b. Look for FID's or associated FRU's in the same functional area as the failure, such as ACF, pneumatics, read/write data path, etc.
 - c. If a FID appears to be associated with the failure, go to “FID Entry Point” on page START-7.
3. Attempt to re-create the problem.
 - a. Run diagnostics using the “CE Loop Diag Menu” on page PANEL-30. Exercise the

functional area that was causing the problem.

- b. Have the customer run the failing job/application, if possible.
4. Analyze the host or Control Unit error logs.
 - a. Refer to “Service and Media Information Messages (SIMs and MIMs)” on page MSG-2, “Error Log Analysis, RS/6000” on page MSG-14, “Error Log Analysis, AS/400” on page MSG-25, “Obtaining Error Information from a Sun (Solaris) System” on page MSG-33, “Obtaining Error Information from an HP/UX System” on page MSG-33, or “Obtaining Error Information from a Windows NT System” on page MSG-33.
 - b. Look for any SIM/MIM or other error information that may be related to the problem.
 5. Analyze the FID FE error log. See “CE FID FE Log Menu” on page PANEL-46 to display the log, and “FID FE—Isolate Fault Between Media and Hardware” on page PROC-96 to analyze the data.
 - a. Look for FID's with a time stamp close to the time of the failure.
 - b. Look for FID's or associated FRU's in the same functional area as the failure, such as ACF, pneumatics, read/write data path, etc.
 - c. If a FID appears to be associated with the failure, go to “FID Entry Point” on page START-7.
 6. Call your next level of support, if necessary.

Excessive Clean Messages, Problem Determination

Normal clean messages require running a cleaning cartridge in the machine. Excessive clean messages indicate that other procedures are necessary.

If you have a clean message with the additional text **CLEAN_REQUIRED**, the drive will be un-usable until a clean operation is performed. Load a cleaner cartridge to clear the condition.

If you have excessive clean messages, do the following:

1. Try another cleaning cartridge.
2. Ensure that the cleaning brush fully contacts the head surface.
3. Ensure that the brush is not binding.
4. Replace the cleaning brush, if necessary. See "FID D4: Head Cleaning Brush Assembly" on page LOC*CAR-93.
5. Remove the cleaning blade if one is present on the HGA. Refer to Figure 349 on page LOC*CAR-92 for the location of the cleaner blade on the HGA. If a cleaner blade is present, use the procedure in "Cleaner Blade Removal Procedure (Models B11/B1A)" on page LOC*CAR-92 to remove and discard it. When the cleaning blade has been removed, continue with the next step.
6. Check Pneumatics for proper settings. See "Measurement and Adjustment of Pneumatic System" on page LOC*CAR-3.
7. Run diagnostics on the drive. See "CE Verify Fix Menu" on page PANEL-28 for details.
8. Replace the head guide and brush assembly, if necessary. See "FID D0: Head Guide and Brush Assembly" on page LOC*CAR-85.
9. Replace the card pack, if necessary. See "FID E4: Card Pack" on page LOC*CAR-56.

Prepare the Tape Drive for Service

1. Notify the customer that the failing device must be varied off-line as the power must be removed from the device.

Proceed with the following steps after the device is off-line.

2. Switch OFF power to the failing device by using the power switch on the back of the device. See Figure 223 on page PROC-6 for the location of power switch.

Note: Do not use magnetized tools on this drive!

3. If the failing device is:
 - Front serviced **with** an ACF attached, Model B11/E11 (Rack), go to step 4.

- Rear serviced **with** an ACF attached, Model B11/E11 (A14 Frame), go to step 9.
- Rear serviced **without** an ACF attached, Model B1A/E1A (3494) go to step 14.

Front Serviced with ACF, Model B11/E11 (Rack)

4. Remove the magazine from the failing device. See page PROC-29.
5. Remove the ACF decorative cover. See page PROC-25.
6. Pull the shelf, with the failing device, to the service position. See "Front Serviced with ACF, Model B11/E11 (Rack)" on page PROC-10.
7. Remove the cartridge, if present. See page PROC-33.
8. Return to the removal/replacement procedure that sent you here.

Rear Serviced with ACF, Model B11/E11 (A14 Frame)

9. Pull the failing device to the service position. See "Rear Serviced with ACF, Model B11/E11 (A14 Frame)" on page PROC-11.
10. Remove the magazine. See page PROC-29.
11. Remove the cartridge, if present. See page PROC-33.
12. Switch OFF power to the failing device by using the power switch on the back of the device. See Figure 223 on page PROC-6 for location of power switch.
13. Return to the removal/replacement procedure that sent you here.

Rear Serviced without ACF, Model B1A/E1A (3494)

14. Pull the failing device to the service position. See "Rear Serviced without ACF, Model B1A/E1A (3494 Library)" on page PROC-12.
15. Remove the cartridge, if present. See page PROC-33.
16. Switch OFF power to the failing device by using the power switch on the back of the device. See Figure 223 on page PROC-6 for location of power switch.
17. Return to the removal/replacement procedure that sent you here.



Powering Device ON and OFF

Attention: If the covers are removed, be careful of moving parts when power is turned ON.

Removing Subsystem Power during Normal Operations

To switch OFF power during normal operations, perform the following:

1. If the device is not varied off-line, have the customer vary it off-line.

Note: If the 3590 drives are attached to a Model Axx Controller, you also need to vary the drive on-line from the Axx. Perform **Varying On/Off 3590 drives from the A00 or A50 Controller** in the PROC section of *IBM 3590 Tape Subsystem Axx Controller Models Maintenance Information*.

2. If a cartridge is in the tape drive, select **Unload Drive** from the operator Options menu.
3. Switch OFF power by using the power switch at the back of the device.

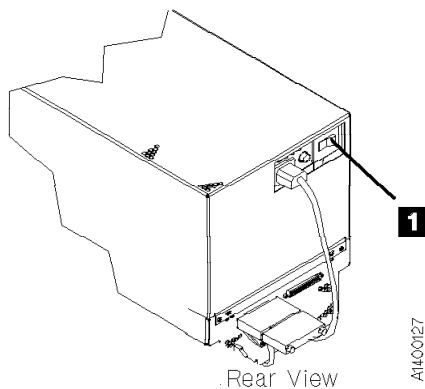


Figure 223. Subsystem Power Switch

Restoring Drive Power during Normal Operations

Restore power by setting the power switch to the ON position. The power-on self-test runs automatically.

Note: When you switch OFF power to the 3590, wait approximately 5 seconds before you switch ON power again.

This power-on self-test takes approximately 2.5 minutes to complete. When the test is running, the panel indicates **Diags Running**. Communications with the interface is not acknowledged during the power-on self-test.

Attention: The device runs the diagnostics, which takes approximately 2.5 minutes. Do not insert your hands in the ACF during this time, even if the panel stops displaying *Diags Running* because the ACF transport may move up or down.

When the power-on self-test is complete, the customer can vary the device on-line.

If a failure occurs, a message is posted in the operator/CE panel or the operator/CE panel will be blank. If either of these conditions exist, go to "Maintenance Starting Point" on page START-2 and isolate the failure.

Setting Device On-line

- 1. From the operator Options menu, select **Services**.
- 2. From the Services menu, select **Set On-line**.
- 3. From the Set On-line menu, select **Port 0** and/or **Port 1** to set the interfaces on-line, depending on the customer's choice.
- 4. Select **Cancel** twice to return to the Options menu.

Note: If the 3590 drives are attached to a Model Axx Controller, you also need to vary the drive on-line from the Axx. Perform the procedure **Varying On/Off 3590 drives from the A00 or A50 Controller** in the PROC section of *IBM 3590 Tape Subsystem Axx Controller Models Maintenance Information*.

- 5. Notify the customer that the device can now be varied (made) on-line.

3494 Only

If this drive is in a 3494 library, go to the DIAG section in *IBM 3494 Tape Library Dataserver Maintenance Information* to make the drive available.

_____ End of 3494 Only _____



End of Call


Note: When you switch OFF power to the 3590, wait approximately 5 seconds before switching ON power again.

1. Set the Power switch to the ON position.

This power-on test takes approximately 2.5 minutes to complete, and is automatically performed when the 3590 power is switched ON.

If a failure occurs, a message can be posted in the operator/CE panel or the operator/CE panel can be blank. If either of these conditions exist, go to the START section for further analysis.

2. Insert the cleaning cartridge in the priority cell to automatically clean the tape path.
3. If you replaced the card pack (FID E4):
 - a. Ensure the microcode was updated. See step 13 on page LOC*CAR-59.
 - b. Ensure the customer options and drive options are correct. See "Set Customer Options" on page INST-33 and "Set Drive Options" on page INST-35.

4. Press the Change Mode  push button to place the device in CE mode.

5. Select **Verify Fix**.

Note: The Base and Ultra Models B11/B1A require a 128 track format tape and the Model E11/E1A requires a 256 track format tape. If the operator/CE panel shows the lock icon, the tape is either physically write protected, or the wrong format tape has been loaded.


6. From the Verify Fix menu, select **Test Drive** to verify the operation of the components on the deck and part of the ACF.
 - If the problem was intermittent, or if you want to test the drive more thoroughly, select **Loop Diag** from the Verify Fix menu.
7. If the problem was a RS-422 problem, perform "Library Manager Port Wrap Test" on page PROC-86 and return here.
8. If the problem was a SCSI problem, perform "SCSI Ports Wrap Test" on page PROC-84 and return here.

Model B11/E11 Only

To test the ACF:

- a. Note the ACF mode, which is displayed on the operator panel, that the customer is using.
- b. Press the Change Mode push button to place the device in CE mode.
- c. Select the **Verify Fix** menu and select **Test ACF**.
- d. Lock magazine when prompted and press enter.
- e. Insert cartridge into priority cell when prompted and press enter. (This test will cycle the cartridge to all empty cells in the magazine).
- f. Unlock magazine when prompted and press enter.
- g. Set the ACF mode to the customer's preference.

End of Model B11/E11 Only

9. If you want to clear the device CE Error log, do the following:
 - a. Press the Change Mode  push button to place the device in CE mode.
 - b. Select **ERROR Log** option from the CE Options menu.
 - c. Select **CLEAR ERROR LOG** option from the CE Error Log menu to clear the error log.
 - d. Select **Cancel** to return to the CE Options menu.
10. If the display indicates *Off-line*, perform "Setting Device On-line" on page PROC-6.
11. If this was a 3590 Model C12/C14 drive problem, go to procedure "Return the Drive to the Operating Position" in the PROC section of *IBM 3590 Tape Subsystem Models C12/C14 Maintenance Information*.
12. If this was a Desk Side Model B11/E11 problem where the desk side sleeve is the 'old style' cover **without** the removable sleeve top

cover, go to “Return Model B11/E11 Drive to Desk Side Sleeve” on page PROC-15. If this was a Desk Side Model B11/E11 problem where the desk side sleeve **has** the removable sleeve top cover, go to “Reinstall the Sleeve Top Cover to the Desk Side Sleeve” on page PROC-18. If this was a Desk Side Model B1A/E1A problem where the desk side sleeve is the ‘old style’ cover **without** the removable sleeve top cover, go to “Return the Model B1A/E1A Drive to the Desk Side Sleeve” on page PROC-17. If this was a Desk Side Model B1A/E1A problem where the desk side sleeve **has** the removable sleeve top cover, go to “Reinstall the Sleeve Top Cover to the Desk Side Sleeve” on page PROC-19.

13. If the problem involved the SCSI bus or hang conditions, perform “Checking the SCSI Attachment in an AS/400 Environment” on page PROC-71, “Checking the SCSI Attachment in an AIX Environment” on page PROC-72, “Checking the SCSI Attachment in a Sun Environment” on page PROC-76, “Checking the SCSI Attachment in a HP-UX Environment” on page PROC-79 or “Checking the SCSI Attachment in a Windows NT Environment” on page PROC-81.

14. If the 3590 drives are attached to a Model Axx Control Unit, you need to close the SIM's at the Control Unit. Refer to the PROC section of *IBM 3590 Tape Subsystem A00 and A50 Controller Models Maintenance Information*.
15. If the 3590 drives are attached to a Model Axx Controller, you need to vary the drive on-line from the Axx. Perform the procedure **Varying On/Off 3590 drives from the A00 or A50 Controller** in the PROC section of *IBM 3590 Tape Subsystem Axx Controller Models Maintenance Information*.

16.

CALL REPORTING

- Report the FID (example: FID1-E4) in the *COMMENT* field.
- Report the 12 hex characters of support data in the *FAULT SYMPTOM CODE (FSC)* field.
--- or ---
- Report the first 12 characters of the Supplemental Message data (Example: Move Error, Load Error, etc.) in the *FAULT SYMPTOM CODE (FSC)* field.
- Charge the time and parts to 3590 Drive.



Service Positions of the 3590

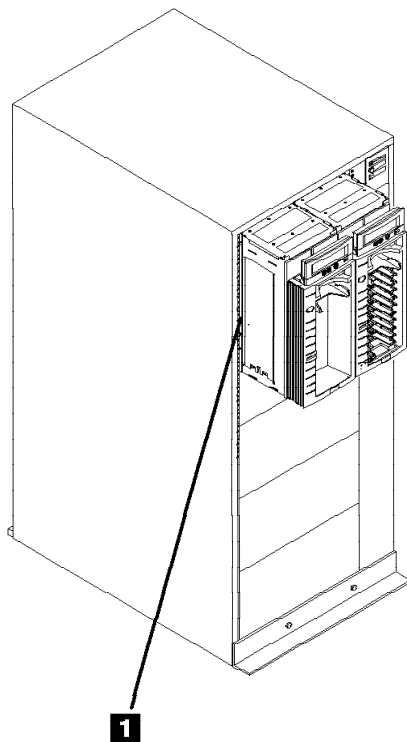
Front Serviced with ACF, Model B11/E11 (Rack)

See Figure 224.

Pull the Device to the Service Position

Attention: Ensure the rack stabilizer is installed.

1. If you have not already done so, ensure the device is varied off-line at the host. Remove the ACF decorative cover. See page PROC-25.



2. Press the shelf release latch **1** and pull the shelf far enough so that the shelf is latched in the service position **2**.
3. See "Operator/CE Panel Service Position" on page PROC-21 to put the panel in the service position.
4. Return to the procedure that sent you here.

Return the Device Drawer to the Operating Position

1. Return the operator/CE panel to the operating position.
2. Press the shelf release latch and push the shelf to the operating position. Ensure the latch is engaged.
3. Return to the procedure that sent you here.

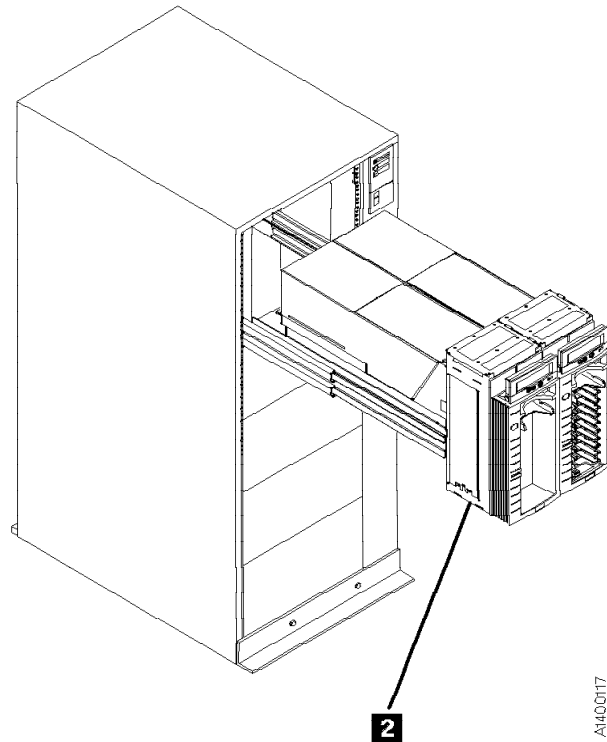


Figure 224. Front Serviced with ACF, Model B11/E11 (Rack)

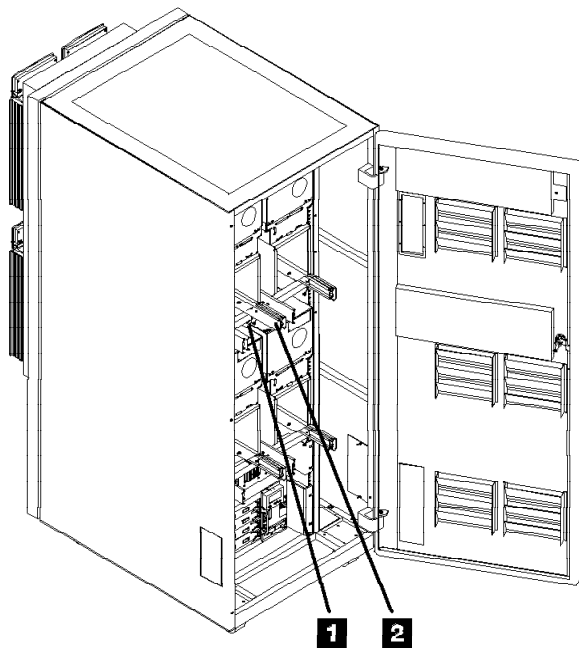
A1400117

Rear Serviced with ACF, Model B11/E11 (A14 Frame)

See Figure 225.

Pull the Device to the Service Position

1. If you have not already done so, ensure the device is varied off-line at the host.
2. If the device is in a library, make the device unavailable at the library manager.
3. Open the rear door of the frame with the failing device.
4. Remove the two slide locking screws **1** from the failing device slides.
5. There are two latches on the slides:
 - a. Press the latches on the large slides **2** and pull the failing device to the rear until it stops.
 - b. Press the latches on the inner slides **3** and pull the device out until it latches in the service position **4**.



- c. See “Operator/CE Panel Service Position” on page PROC-21 to put the panel in the service position.

6. Return to the procedure that sent you here.

Return the Device to the Operating Position

1. Return the operator/CE panel to the operating position.
2. When returning the device to the operating position:
 - a. Press the latches on the inner slides and push the device toward the operating position until it stops.
 - b. Press the latches on the large slides and push the device to the operating position.
3. Reinstall the two slide locking screws into the slides.
4. Return to the procedure that sent you here.

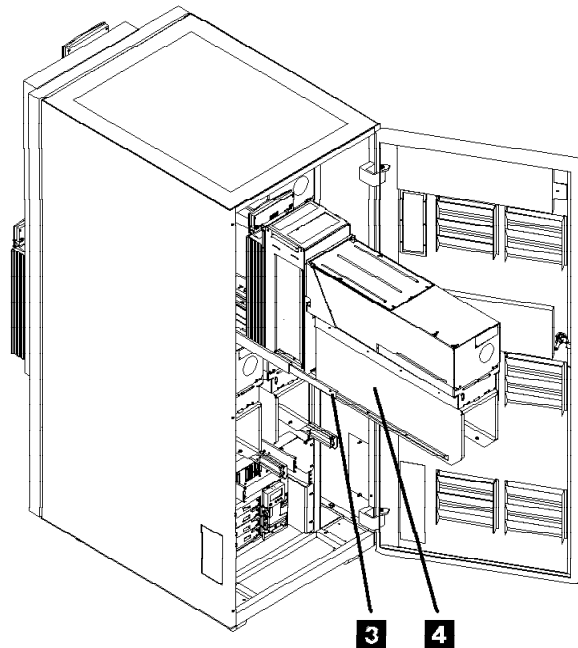


Figure 225. Rear Serviced with ACF, Model B11/E11 (A14 Frame)

Rear Serviced without ACF, Model B1A/E1A (3494 Library)

See Figure 226.

Pull the Device to the Service Position

1. If not already done, ensure the device is varied off-line at the host.
2. If the device is in a library, make the device unavailable at the library manager.
3. Open the rear door of the frame.
4. Remove the two slide locking screws **2**.
5. Press the slide latches **1** and pull the device to the rear until it **is locked** in the service position **3**.

6. See "Operator/CE Panel Service Position" on page PROC-21 to put the panel in the service position.

7. Return to the procedure that sent you here.

Return the Device to the Operating Position

1. Return the operator/CE panel to the operating position.
2. Press the slide latches and push the device to the operating position.
3. Reinstall the two slide locking screws **2** into the slides.
4. Return to the procedure that sent you here.

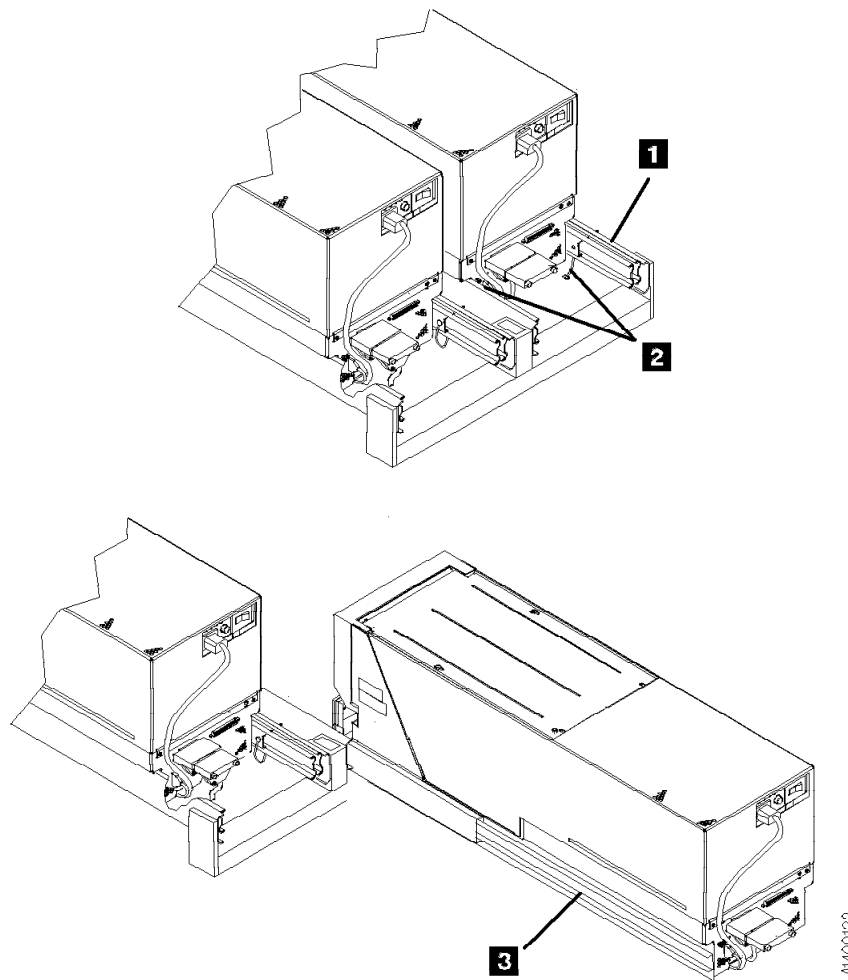


Figure 226. Rear Serviced without ACF, Model B1A/E1A (3494)

Prepare Model B11, B1A, E11, or E1A in Desk Side Sleeve for Service

1. Notify the customer that the failing device must be **varied off-line** as the power must be removed from the device.

After the device is off-line, proceed with the following steps.

2. Switch OFF power to the failing device by using the power switch on the back of the drive enclosure. See **8** in Figure 228 on page PROC-14 for location of the power switch.

Note: Do not use magnetized tools on this drive!

3. Remove the power cord from the 3590 drive.
 - For service on Model B11/E11 in the “older style” desk side cover **without the removable top**, go to “Prepare Model B11/E11 in Desk Side Cover for Service, RPQ 8B3191.”
 - For service on Model B1A/E1A in the “older style” desk side cover **without the removable top**, go to “Prepare Model B1A/E1A in Desk Side Cover for Service, RPQ 8B3190” on page PROC-16.
 - For service on Model B11/E11 in the newer desk side sleeve **with removable sleeve top cover**, go to “Prepare Model B11/E11 in Desk Side Sleeve (Removable Top Cover) for Service, RPQ 8B3191” on page PROC-17.
 - For service on Model B1A/E1A in the newer desk side sleeve **with removable sleeve top cover**, go to “Prepare Model B1A/E1A in Desk Side Sleeve (Removable Top Cover) for Service, RPQ 8B3190” on page PROC-18.

Prepare Model B11/E11 in Desk Side Cover for Service, RPQ 8B3191:

CAUTION:

The 3590 Model B11/E11 with the ACF weighs 40.5 kilograms (89 pounds), so remove the ACF before lifting the 3590 drive. The 3590 Model B11/E11 (without the ACF) weighs 28.6 kilograms (63 pounds); it takes two persons to safely lift this unit!

Note: This notice is translated into selected languages. See **C1** in the INSP section.

Note: This procedure must be used if the drive is in the “old style” desk side sleeve **without the removable sleeve top cover**.

1. Remove the SCSI cable connectors from the back of the drive. **Do not** separate the terminator or the daisy-chained cable connector from the SCSI cable connector. Remove these connectors still plugged together.
2. If a FID or ATTN message is available for the failure, go to “FID Entry Point” on page START-7 to determine if it is an ACF failure. Then decide if removal of the ACF and drive from the desk side cover is warranted. If the ACF can be serviced while attached to the sleeve, remove the ACF cover **6** in Figure 228 on page PROC-14 from the ACF and skip to step 11 on page PROC-14. **Otherwise**, continue with the next step.
3. Refer to Figure 228 on page PROC-14. Remove the eight screws **5** and eight washers **12** from the desk side cover **1**, four screws and washers from each side of the sleeve to allow removal of the drive for service.
4. Remove the ACF cover **6** from the ACF.
5. Pull the drive forward slightly in the sleeve to allow removal of the ACF.
6. Go to “Automatic Cartridge Facility (ACF)” on page PROC-30 and start at step 4 to remove the ACF. After completing the procedure, return here. Place the removed ACF on a **suitable test/work surface**, where the drive will also be placed for service.

Note: You may need assistance holding the drive enclosure in place on the test/work surface while mounting the ACF to the front of the drive.

Note: See Figure 227 on page PROC-14 for safe placement of the drive and ACF, when the ACF is reattached to the drive for servicing the device. Be sure the drive **2** is placed on the **test/work surface 1** so as to avoid any danger of tipping forward, or off the work surface due to the added weight of the ACF **3**.

Do **not** mount the ACF on the drive if the front of the drive protrudes by **more than 1.5 in. (38 mm) 4** over the edge of the test/work bench.

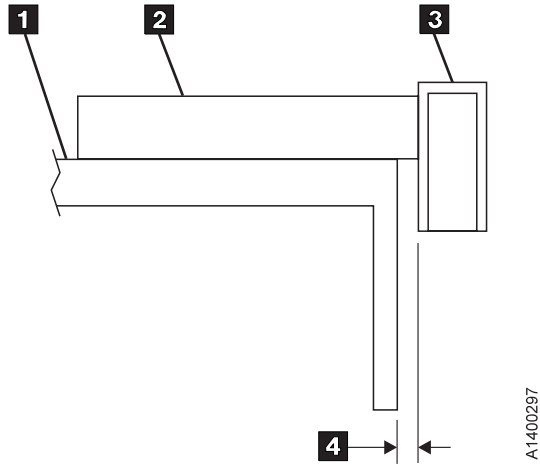


Figure 227. Side View of Model B11/E11 Drive and ACF on Work Bench

- 7. Refer to Figure 228 again.
- 8. **With assistance**, pull the drive out of the desk side sleeve **1** and lift it up to a suitable test/work surface.
- 9. Check that the loader door moves freely.
- 10. Go to step 3 on page INST-19 to install the ACF. Return here after completing the procedure. Remember the maximum dimension **4** in Figure 227.
- 11. If a FID or ATTN message is available for the problem, go to "FID Entry Point" on page START-7.
- 12. If a FID is not available, return to Figure 1 on page START-2 to find the reason for the failure.

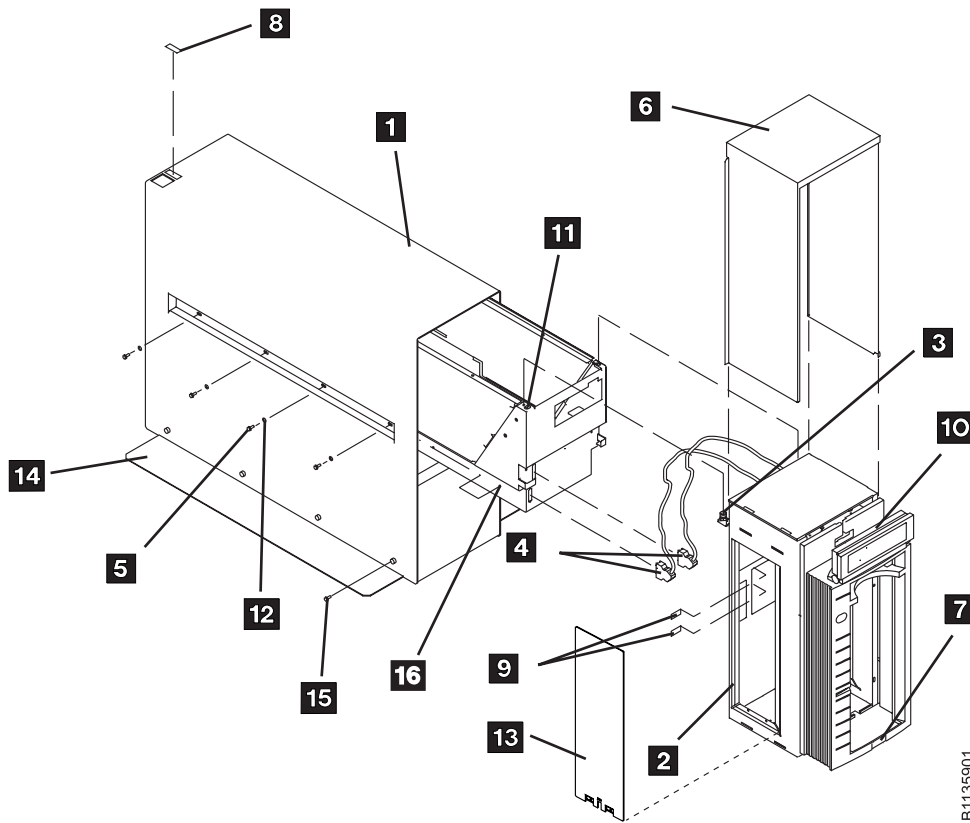


Figure 228. Desk Side Cover Installation for Model B11/E11, RPQ 8B3191

Return Model B11/E11 Drive to Desk Side Sleeve

- ___ 1. If the drive and ACF were not removed from the desk side sleeve, skip to step 11 on page PROC-15. **Otherwise**, continue to the next step.
- ___ 2. Go to “Automatic Cartridge Facility (ACF)” on page PROC-30 and start at step 4 to remove the ACF from the drive. After completing the procedure, return here.
- ___ 3. Refer to Figure 228 on page PROC-14. With assistance, lift the 3590 drive (without the ACF attached), from the work surface and slide it into the front of the sleeve **1**.
Note: The rear of the sleeve is indicated by the label and opening **8** on top of the cover for the drive's power ON/OFF switch.
Note: When sliding the 3590 drive into the desk side cover, be sure to **push the drive into the sleeve far enough to keep the desk side cover from tipping forward!**
- ___ 4. Leave the front of the drive protruding just enough to allow inserting a screw **16** P/N 1621371, into the right or left screw hole **on the drive enclosure** closest to the front of the drive. Only do two or three turns of the screw, just enough to assure that the screw is seated solidly.
- ___ 5. Now continue to push the drive into the sleeve until the protruding screw stops further movement. The drive is now in position for installation of the ACF.
- ___ 6. Check that the loader door moves freely.
- ___ 7. Go to step 3 on page INST-19 to install the ACF. Complete the procedure and return here.
- ___ 8. With the ACF installed, pull the drive forward **carefully** until you have access to the screw, previously inserted to stop movement of the drive within the sleeve. Remove the screw and save it with the other seven screws.
- ___ 9. Push the device back into sleeve until the ACF is flush to the sleeve.
- ___ 10. Install the eight screws **5** and eight washers **12** to bolt the drive to the desk side cover. Snug the screws to secure the drive.
- ___ 11. Place the ACF cover **6** over the ACF.
- ___ 12. Reinstall the SCSI cable connectors to the correct port.
- ___ 13. Reconnect the power cord to the drive power connector.
- ___ 14. Return to the procedure that sent you here.

Prepare Model B1A/E1A in Desk Side Cover for Service, RPQ 8B3190:

CAUTION:

The 3590 Model B1A/E1A weighs 28.6 kilograms (63 pounds); it takes two persons to safely lift this unit.

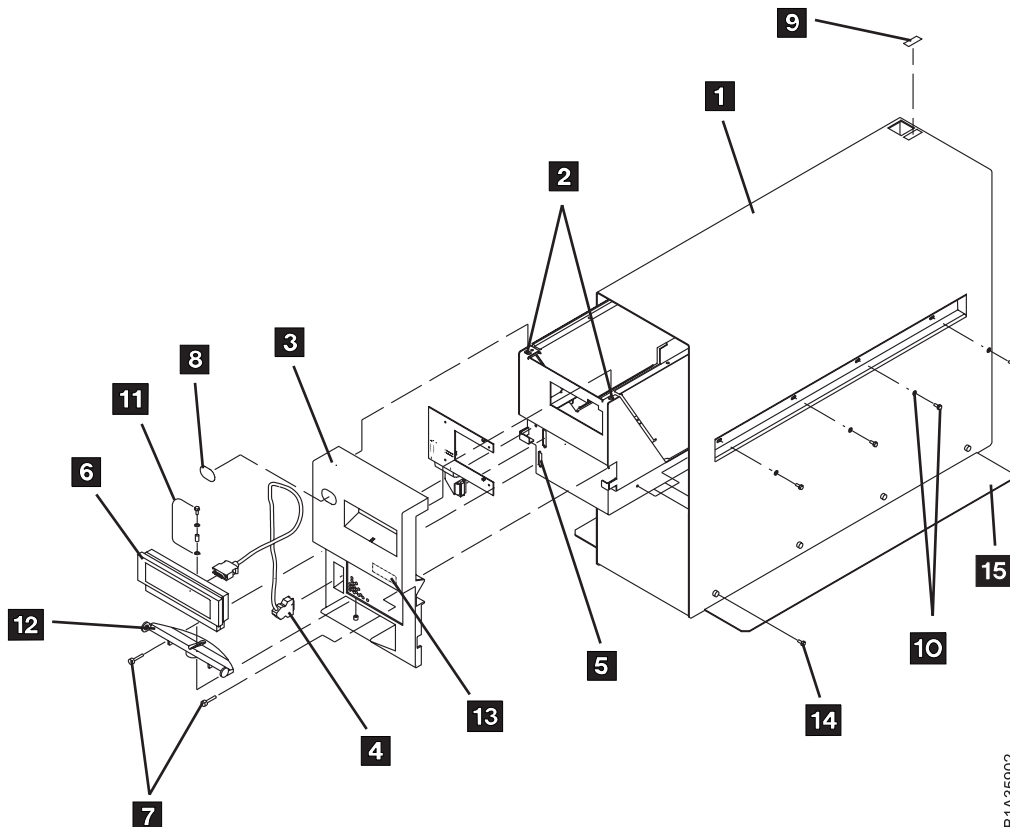
Note: This notice is translated into selected languages. See C2 in the INSP section.

Note: This procedure must be used if the drive is in the "old style" desk side sleeve **without the removable sleeve top cover**.

See Figure 229 for removal of the drive from the desk side sleeve **1**.

1. Remove the SCSI cable connectors from the back of the drive. **Do not** separate the terminator or the daisy-chained cable connector from the SCSI cable connector. Remove these connectors still plugged together.
2. Remove the eight screws **10** and washers **10**, four screws and washers from each side of the sleeve to allow removal of the drive for service.
3. **With assistance**, lift the drive (with front cover **3**) out of the desk side sleeve **1** and place it **on a suitable test/work surface**. **Be sure the drive is positioned on the test/work surface safely** to avoid any danger of tipping off the work bench.
4. If a FID is available for the problem, go to "FID Entry Point" on page START-7.
5. If a FID is not available, return to Figure 1 on page START-2 to find the reason for the failure.

Note: When sliding the 3590 drive out of the desk side cover, be sure to provide **enough support to the front of the drive to keep the desk side cover from tipping forward!**



B1A35902

Figure 229. Desk Side Cover Installation for Model B1A/E1A, RPQ 8B3190

Return the Model B1A/E1A Drive to the Desk Side Sleeve: See Figure 229 for this procedure to reinstall the drive in the desk side cover.

- ___ 1. **With assistance** pick up the drive (with attached front cover) from the test/work area and slide the drive into the sleeve **1**. Slide the rear of the device to the rear of the desk side sleeve **1**. The rear of the sleeve is indicated by the label and opening **9** for the drive's power ON/OFF switch.

Note: When sliding the 3590 drive into the desk side cover, be sure to **push the drive into the sleeve far enough to keep the desk side cover from tipping forward!**

- ___ 2. Push the device into the sleeve until the front cover **3** is flush to the sleeve.
- ___ 3. Install the eight screws **10** and washers **10**, four screws and washers on each side of the sleeve to bolt the drive to the desk side cover. Snug the screws to secure the drive in the cover.
- ___ 4. Reconnect the SCSI cable plugs to the correct SCSI port connectors.
- ___ 5. Reconnect the power cable to the drive power connector.

- ___ 6. Return to the procedure that sent you here.

Prepare Model B11/E11 in Desk Side Sleeve (Removable Top Cover) for Service, RPQ 8B3191

Note: Use this procedure if the drive is in the “new style” desk side sleeve **with the removable sleeve top cover**.

See Figure 230 on page PROC-18 for removal of the sleeve top cover **1** from the desk side lower sleeve.

- ___ 1. Remove the eight screws **19**, P/N 05H2734, four screws from each side of the desk side sleeve top cover to allow removal of the sleeve top cover.
- ___ 2. Remove the sleeve top cover **1** to allow service on the Model B11/E11 drive.
- ___ 3. **If necessary**, remove the SCSI cable connectors from the back of the drive. **Do not** separate the terminator or the daisy-chained cable connector from the SCSI cable connector. Remove these connectors still plugged together.
- ___ 4. If a FID is available for the problem, go to “FID Entry Point” on page START-7.
- ___ 5. If a FID is not available, return to Figure 1 on page START-2 to find the reason for the failure.



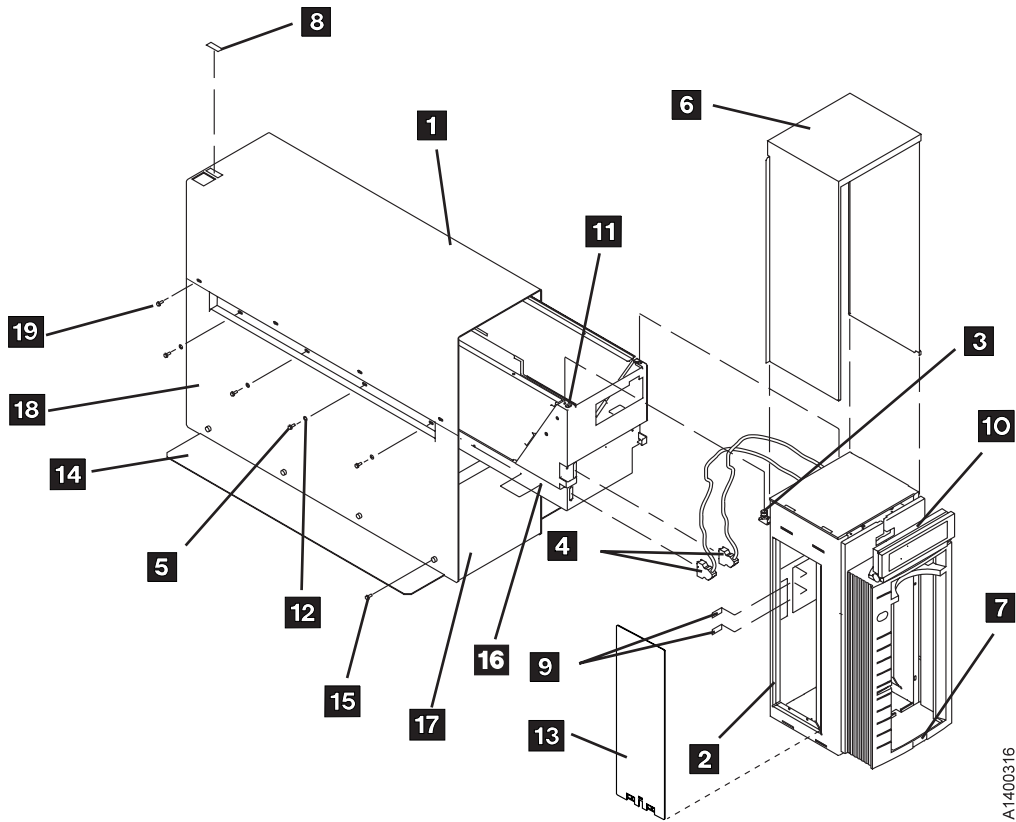


Figure 230. Desk Side Sleeve Configuration for Model B11/E11, RPQ 8B3191

Reinstall the Sleeve Top Cover to the Desk Side Sleeve: See Figure 230 to reinstall the sleeve top cover over the drive in the desk side sleeve.

- ___ 1. Place the desk side sleeve top cover **1**, P/N 05H8347, over the mounted drive (enclosure) and on top of the lower sleeve **18**, P/N 05H8348. A ridge in the sides of the top cover allows the top cover to rest on top of the lower sleeve with the lip of the top cover on the outside of the lower sleeve sides.
- ___ 2. Reinstall the eight screws **19**, P/N 05H2734, four screws on each side of the sleeve top cover. **Snug** the screws to secure the sleeve top cover to the lower sleeve.

Note: The rear of the sleeve top cover is indicated by the label and opening **8** for the drive's power ON/OFF switch.
- ___ 3. Reconnect the SCSI cable plugs to the correct SCSI port connectors.
- ___ 4. Reconnect the power cable to the drive power connector.

- ___ 5. Return to the procedure that sent you here.

Prepare Model B1A/E1A in Desk Side Sleeve (Removable Top Cover) for Service, RPQ 8B3190

Note: Use this procedure if the drive is in the "new style" desk side sleeve **with the removable sleeve top cover**.

See Figure 231 on page PROC-19 for removal of the sleeve top cover **1** from the desk side lower sleeve.

- ___ 1. Remove the eight screws **18**, P/N 05H2734, four screws from each side of the desk side sleeve top cover to allow removal of the sleeve top cover.
- ___ 2. Remove the sleeve top cover **1** to allow service on the Model B1A/E1A drive.
- ___ 3. **If necessary**, remove the SCSI cable connectors from the back of the drive. **Do not** separate the terminator or the daisy-chained cable connector from the SCSI cable connector. Remove these connectors still plugged together.

— 4. If a FID is available for the problem, go to “FID Entry Point” on page START-7.

— 5. If a FID is not available, return to Figure 1 on page START-2 to find the reason for the failure.

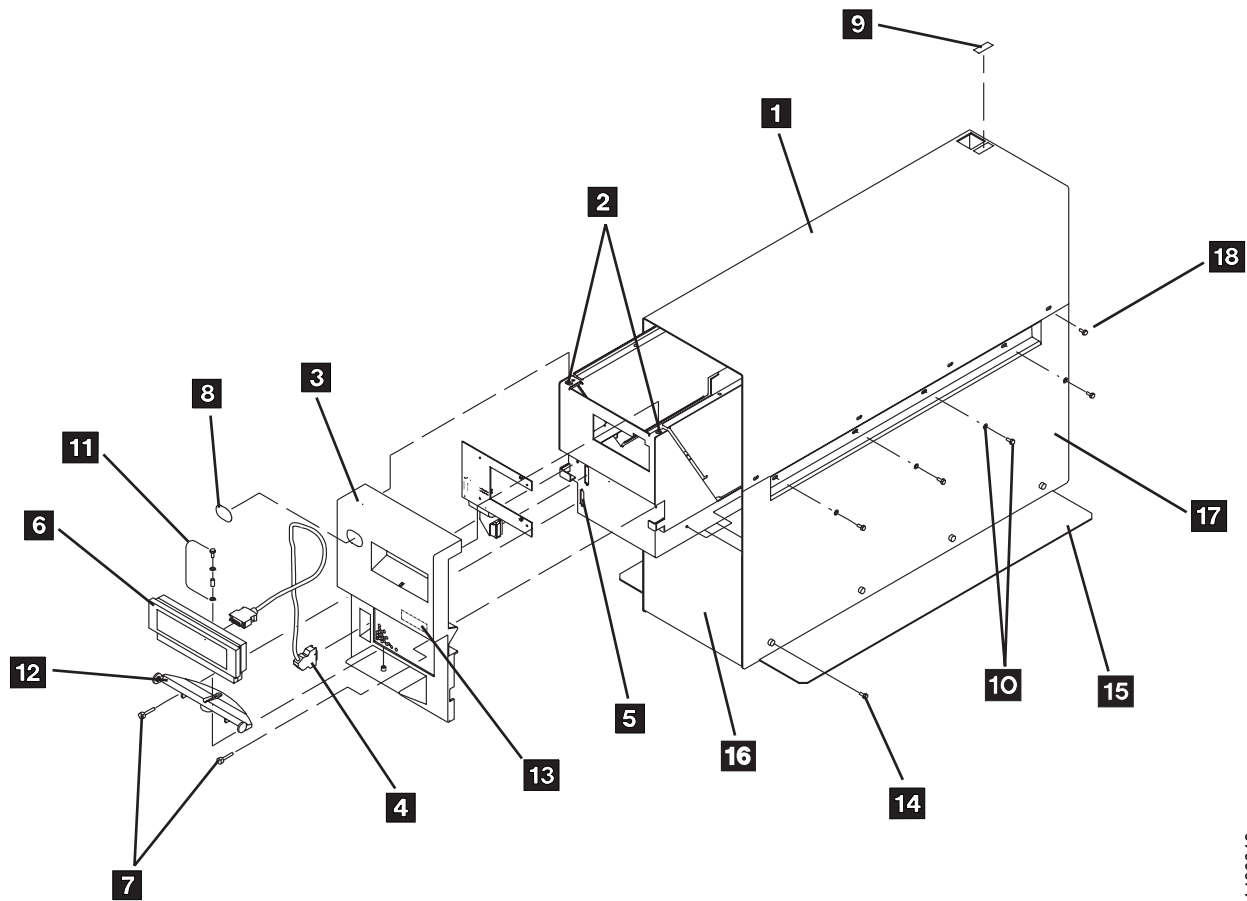


Figure 231. Desk Side Sleeve Configuration for Model B1A/E1A, RPQ 8B3190

Reinstall the Sleeve Top Cover to the Desk Side Sleeve: See Figure 231 to reinstall the sleeve top cover over the drive in the desk side sleeve.

- 1. Place the desk side sleeve top cover **1**, P/N 05H8347, over the mounted drive (enclosure) and on top of the lower sleeve **17**, P/N 05H8348. A ridge in the sides of the top cover allows the top cover to rest on top of the lower sleeve with the lip of the top cover on the outside of the lower sleeve sides.
- 2. Reinstall the eight screws **18**, P/N 05H2734, four screws on each side of the

sleeve top cover. **Snug** the screws to secure the sleeve top cover to the lower sleeve.

Note: The rear of the sleeve top cover is indicated by the label and opening **9** for the drive's power ON/OFF switch.

- 3. Reconnect the SCSI cable plugs to the correct SCSI port connectors.
- 4. Reconnect the power cable to the drive power connector.
- 5. Return to the procedure that sent you here.

Working with Electrostatic Discharge (ESD) Parts

See Figure 232. When wearing the ESD grounding wrist band **1**, ensure that the ground clip **4** remains connected. Failure to do this creates a safety exposure, the same as wearing jewelry while working on live exposed electrical circuits.

Use the most current IBM part number available when ordering a field ESD kit. In addition to the mat, the kit P/N 93F2649 contains the following components in a reclosable static-shielding bag:

- Adjustable wrist band P/N 6405959 **1**
- Wrist band cord P/N 74F9658 **2**
- Mat cord P/N 93F2652 **3**
- Large ground clip P/N 93F2654 **4**
- Cord extension P/N 93F2653 **5**

All of the logic cards and sensors in the ACF and the drive are ESD-sensitive parts in the 3590.

To prevent damage when working with ESD-sensitive parts, observe the following instructions, and the instructions printed on the ESD mat. The following instructions are in addition to all the usual precautions:

- Switch OFF power to the 3590 (see "Powering Device ON and OFF" on page PROC-6).

- Put on the ESD grounding wrist strap **1** before touching the ESD-sensitive part. This strap has a high resistance (1 megohm) resistor in series with the grounding clip **4**. Use of the ESD grounding wrist strap is not dangerous to you. It discharges the static electricity from your body. Connect the clip to the flex ground strap of the gate to the frame. Keep the strap on while you are inserting or removing a logic card or handling any ESD-sensitive part.
- Keep ESD-sensitive parts in their special ESD shipping bag until ready for installation.
- Do not place ESD-sensitive parts on any machine cover or on a metal table. If you need to put down the ESD-sensitive part for any reason, place it inside its protective shipping bag or on the ESD grounded mat provided in the ESD kit. (Large metal objects can be discharge paths without being grounded.)
- Prevent ESD-sensitive parts from being touched by other personnel.
- Reinstall all covers when not working on the machine.
- Be extra careful when handling ESD-sensitive parts when cold-weather heating is used. Heating of cold air lowers the relative humidity, which increases the static electricity.

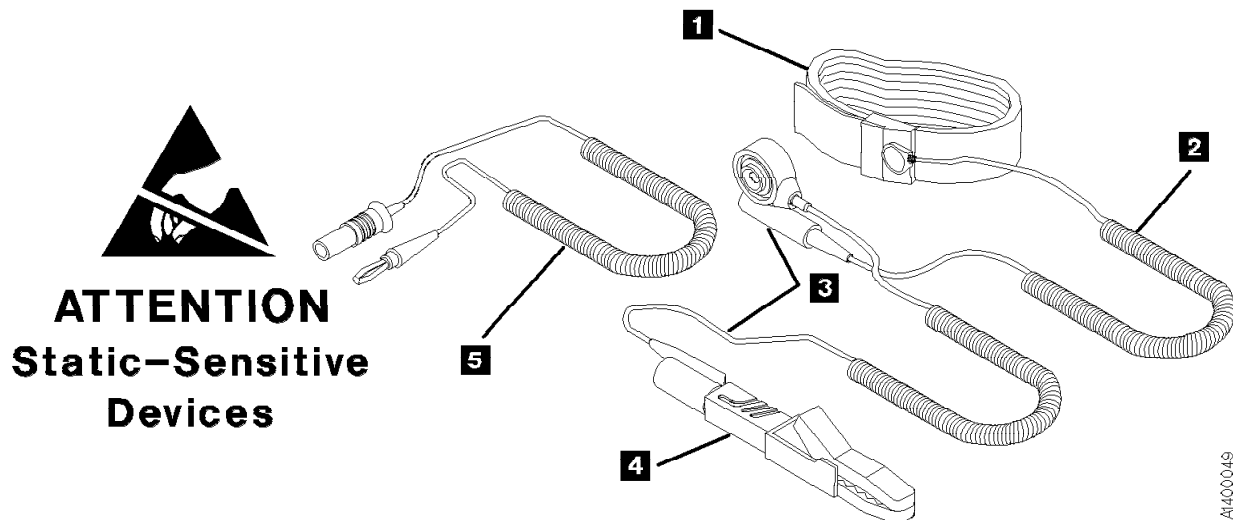


Figure 232. Static-Sensitive Device Attention Symbol and Grounding Wrist Strap

Operator/CE Panel Service Position

The operator/CE panel can be removed completely, tilted, or relocated for viewing from a different angle.

Model B11/E11 Only

See Figure 233.

To Remove Completely

1. Press the two buttons **2** on the rear of the panel and lift the panel out of its holder **6**.
2. Disconnect the connector from the rear of the panel **4**.

3. Return to the procedure that sent you here.

To Relocate

1. With the ACF decorative cover removed, open the ACF top cover **1**. See "ACF Top Cover" on page PROC-26.
2. Press the two buttons **2** on the rear of the panel and lift the panel out of its holder **6**.
3. Continue lifting the panel until its cable is out of the slot **5** in the back of the bezel.
4. The two hooks **3** on the back of the operator/CE panel can be used to hold the panel in a convenient location for viewing **4**.

Note: Be careful to not pinch the cables when you lower the top cover.

5. Return to the procedure that sent you here.

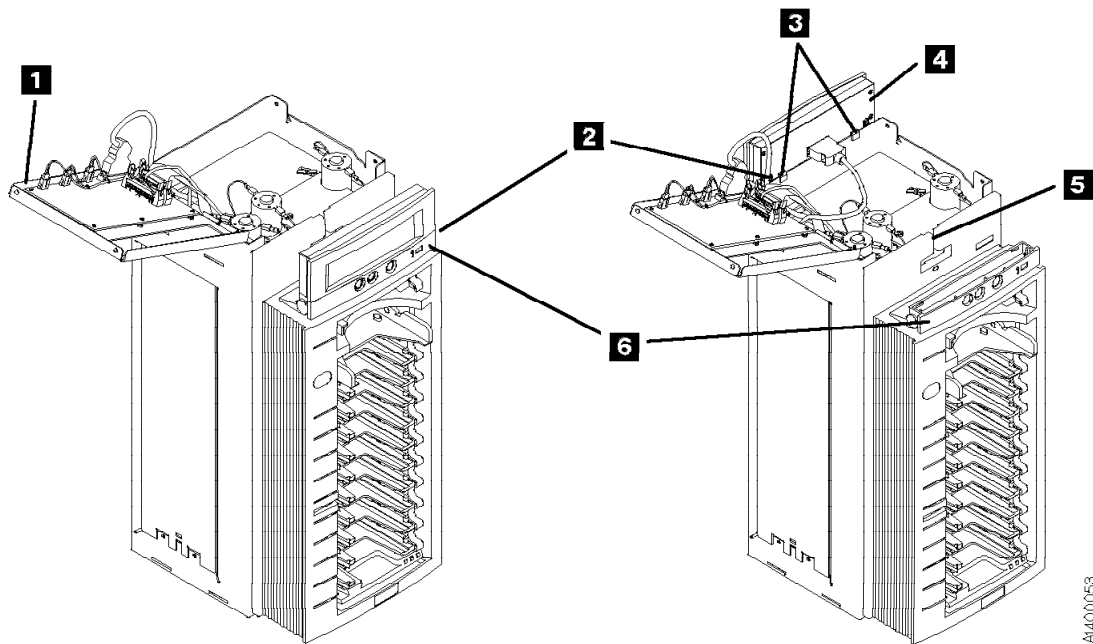


Figure 233. Operator/CE Panel (Model B11/E11)

End of Model B11/E11 Only

Model B1A/E1A Only

See Figure 234.

To Remove Completely

1. Press the two buttons **3** on the rear of the panel and lift the panel out of its holder **4**.
2. Disconnect the connector from the rear of the panel **2**.

3. Return to the procedure that sent you here.

To Relocate

1. Press the two buttons **3** on the rear of the panel and lift the panel out of its holder **4**.
2. Place the panel on a flat surface or use the two hooks **1** on the back of the operator/CE panel to hold the panel in a convenient location for viewing.
3. Return to the procedure that sent you here.

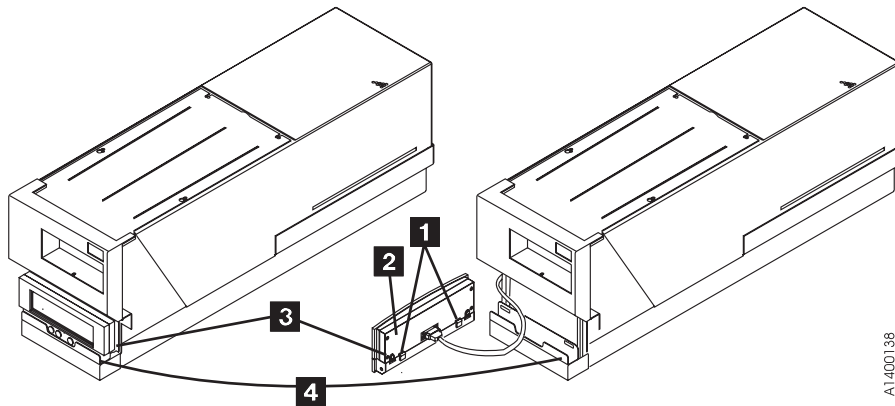


Figure 234. Operator/CE Panel (Model B1A/E1A)

End of Model B1A/E1A Only

Covers

Deck Enclosure Covers

See Figure 235 on page PROC-24 and Figure 236 on page PROC-24.

Removal of Deck Enclosure Top Cover

1. Loosen the two front screws **2** and remove the two rear screws from the top cover **1**.
2. Lift off the top cover.
3. Return to the procedure that sent you here.

Removal of Deck Enclosure Back Cover

1. Disconnect the power cord at its source and then at the back of the 3590.
2. Remove the two screws **4** that secure the back cover **3**.
3. Slide the cover toward the rear of the drive to disengage the two hooks **5** and lift off the back cover.
4. Return to the procedure that sent you here.

Removal of Deck Enclosure Pneumatic Access Cover

1. Remove screw **11**.
2. Remove the pneumatic access cover **10**.
3. Return to the procedure that sent you here.

Removal of Deck Enclosure Back Plate

1. Remove the SCSI cables from the ports, being careful to keep from separating the cables that are chained or terminated.
2. If the device is in a library, remove the library manager RS-422 cable.

Attention: If the connector mounting studs in the next step are captivated, remove the back plate retainers before you remove the mounting studs.

Note: On newer devices, the connector mounting studs do not need to be removed from the back plate.

3. Remove the connector mounting studs (two each on the SCSI connectors **7** and two on the library manager connector **8**).
4. Remove the back plate **6** by prying upward from the lip on the enclosure bottom with a screwdriver. Then lift out the back plate.
5. Return to the procedure that sent you here.

Replacement of Deck Enclosure Covers

1. Perform the removal procedure in the reverse order, then return here.

Note: If you have removed the deck enclosure back covers from two 3590s, ensure you replace the back cover on the 3590 from which it was removed so that the serial number **9** on the right side of the device is the same as the serial number on the back cover **3**.

2. Return to the procedure that sent you here.



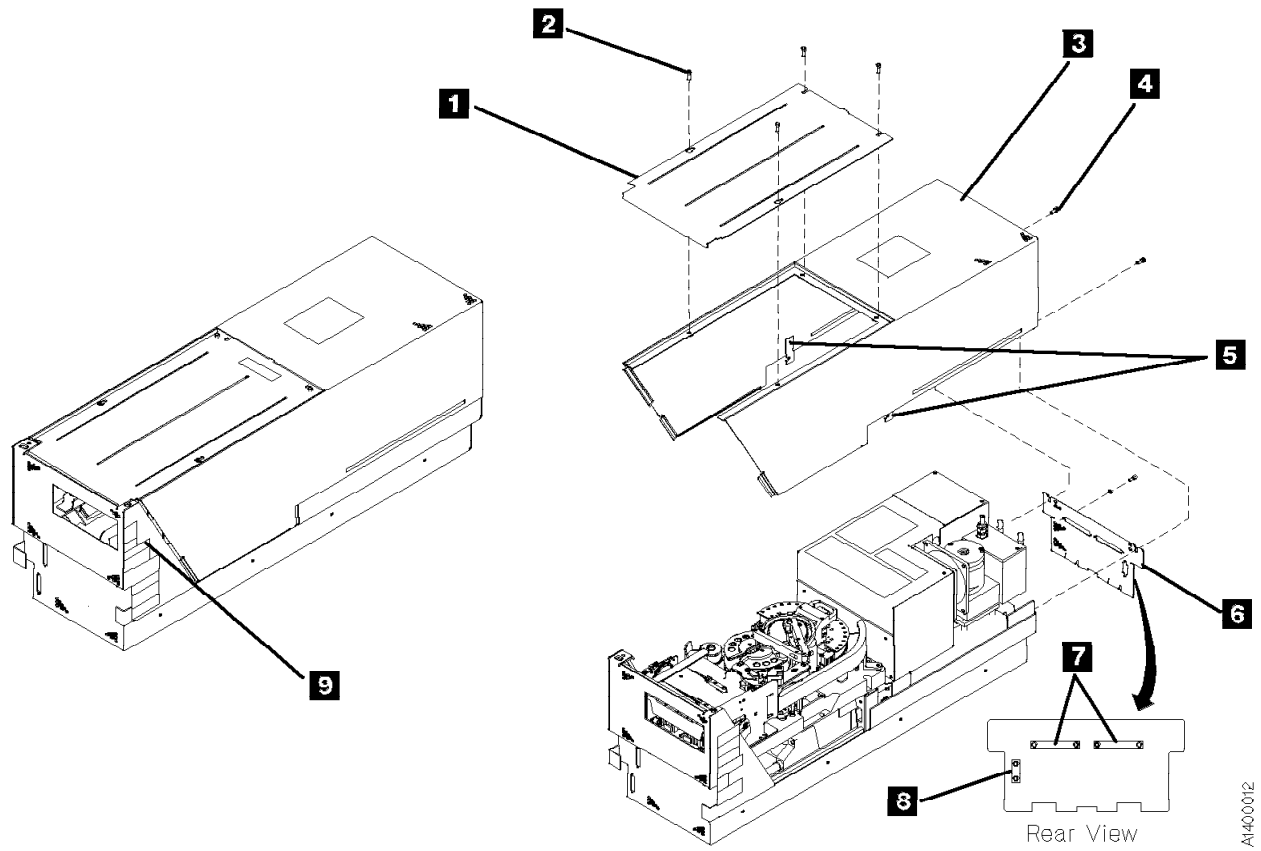


Figure 235. Deck Enclosure Covers

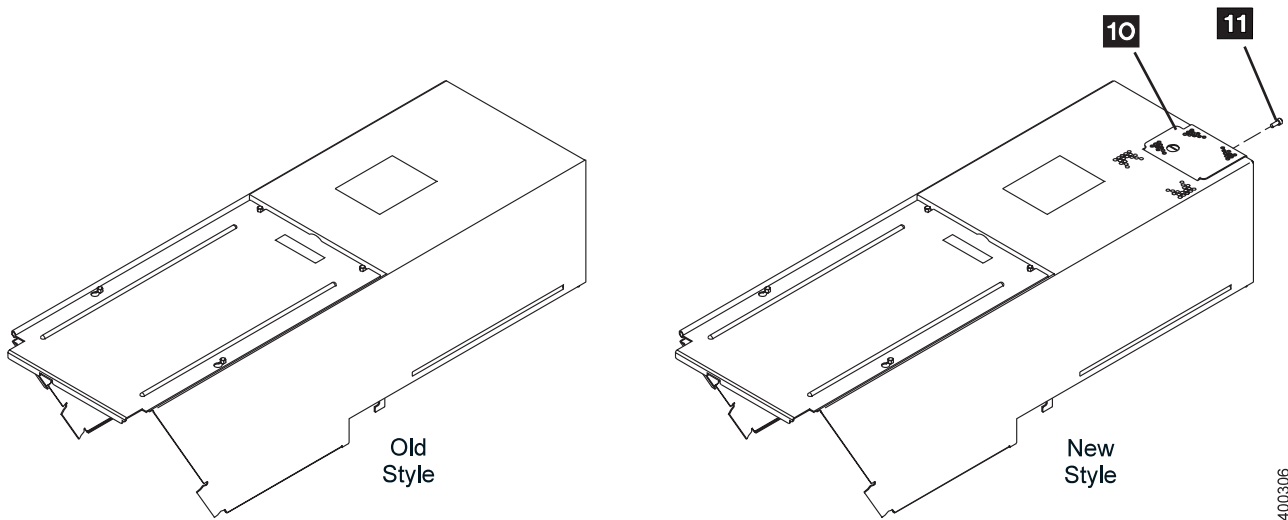


Figure 236. Deck Enclosure Back Covers

ACF Decorative Cover (Rack Mount Only)

See Figure 237.

Removal of ACF Decorative Cover

1. To lower the height of the display, slide the operator/CE panel assembly forward as far as it will go **1** and then rotate the display down as far as it will go **2**.

Note: If there are two drives side-by-side, both operator/CE panels must be pulled forward and rotated down.

2. The ACF decorative cover **4** is held to the rack frame with mounting studs **3**.

Grasp the ACF cover and pull it away from the frame and over the bezel. Use care not to loosen the operator/CE panel connector when removing the cover.

3. Return to the procedure that sent you here.

Replacement of ACF Decorative Cover

1. Perform the removal procedure in the reverse order, then return here..
2. Return to the procedure that sent you here.

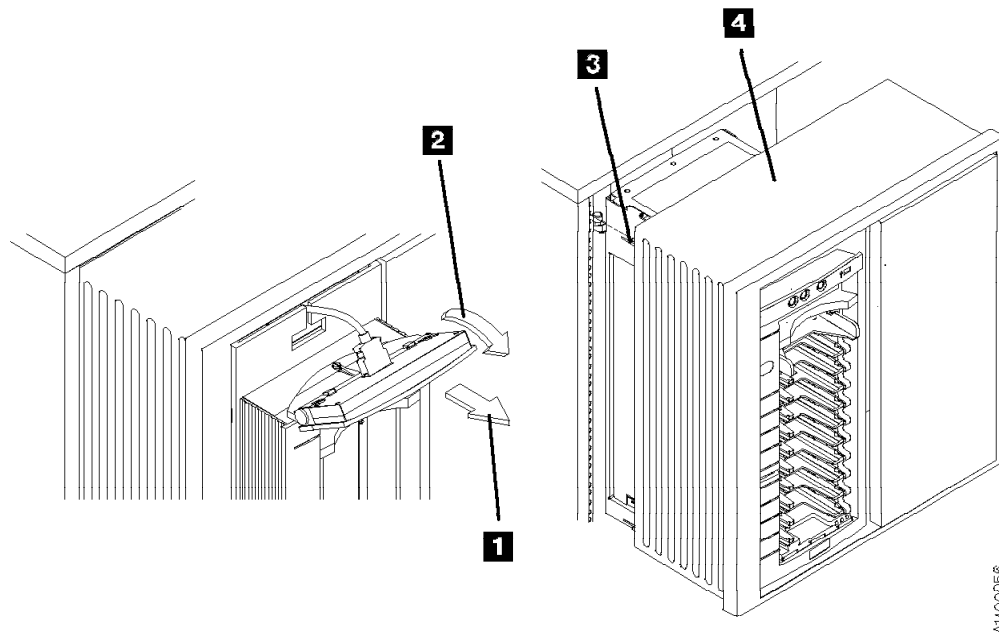


Figure 237. ACF Decorative Cover (Rack Mount Only)

ACF Side Covers

See Figure 238.

Removal of Side Covers

Note: Machines that have the improved transport ribbon cable, the cable that **has no “Z” shape**: Use caution when removing the side covers as the transport ribbon cable will be attached to the inside of one of the side plates. See “FID 99: Transport Cable (Old Style)” on page LOC*CAR-30 for details on the transport cables (old and new style).

1. Remove the two screws **3** from the side cover **1**.
2. Insert a screwdriver in the hole **2** at the bottom of the side cover.

Attention: In the next step, hold the cover as you disengage the tabs because the cover can fall and cause damage.

3. Lift the side panel up to disengage the tabs from the frame and pull the panel out at the bottom.
4. Return to the procedure that sent you here.

Replacement of Side Covers

1. Perform the removal procedure in the reverse order, then return here..
2. Return to the procedure that sent you here.

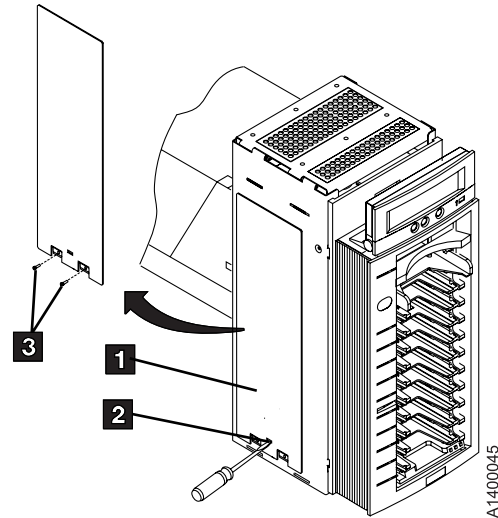


Figure 238. ACF Side Covers

ACF Top Cover

See Figure 239.

The ACF top cover is hinged.

1. Remove the ACF decorative cover. See page PROC-25.
2. Insert the tip of a flat blade screwdriver at each edge of the cover **2** and pry the cover **1** open.
3. Swing the cover to its open position **3**.
4. Return to the procedure that sent you here.

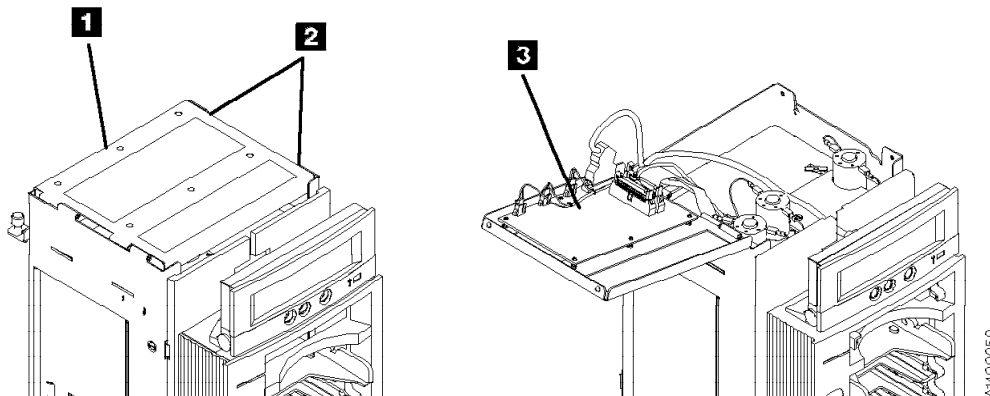


Figure 239. ACF Top Cover

Bezel (Model B11/E11 Only)

See Figure 240.

Removal of Bezel

1. Remove the magazine, if installed. See page PROC-29.
2. Remove the operator/CE panel **2** by pressing the buttons **3** on the back of the operator/CE panel and lifting the panel out of the holder.
3. Disconnect the panel cable connector **4**.
4. Remove the screw **5** from the bezel. (The bezel **1** is held in place by a screw **5** at the top and two hooks on the bottom.)

5. Pull the bezel away from the ACF far enough to gain access to the LED-card cable connectors **6**.

Attention: The hooks at the bottom of the bezel can now disengage from the ACF. Use care not to drop the bezel.

6. Carefully rotate the rear of the bezel to the left and disconnect the top, bottom, and then center LED-card cable connectors **6** from the LED cards **7** and remove the bezel.
7. Return to the procedure that sent you here.

Replacement of Bezel

1. Perform the removal procedure in the reverse order, then return here.
2. Return to the procedure that sent you here.

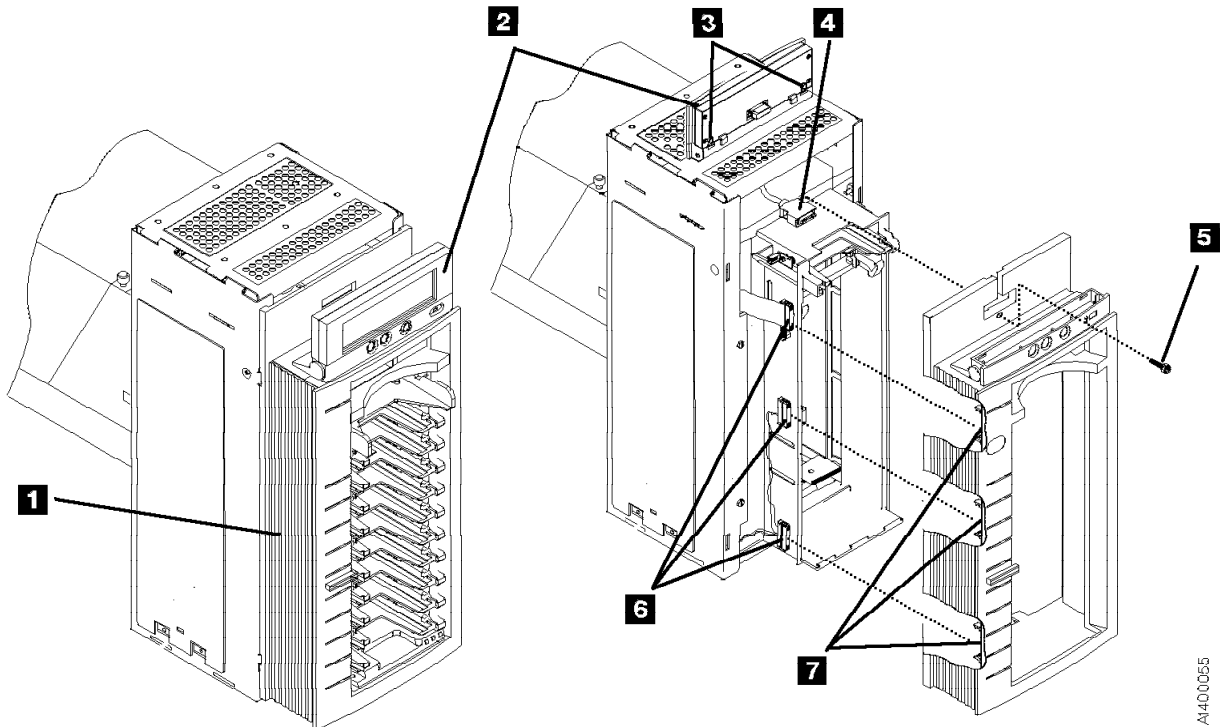


Figure 240. ACF Bezel

Library Interface Cover

See Figure 241.

Removal of Library Interface Cover

1. Lift the display panel **2** out of its holder **3** by pressing on the release tabs at each end of the panel.
2. Disconnect the display panel connector **1** and set the panel aside.
3. Remove the two cover mounting screws **5** and remove the cable retaining bracket **6**.

4. Rotate **7** the cover away from the drive far enough to get access to the two connectors **8**.

5. Disconnect the connectors **8**, and remove the cover.

Replacement of Library Interface Cover

1. Perform the removal procedure in the reverse order, then return here.
2. Return to the procedure that sent you here.

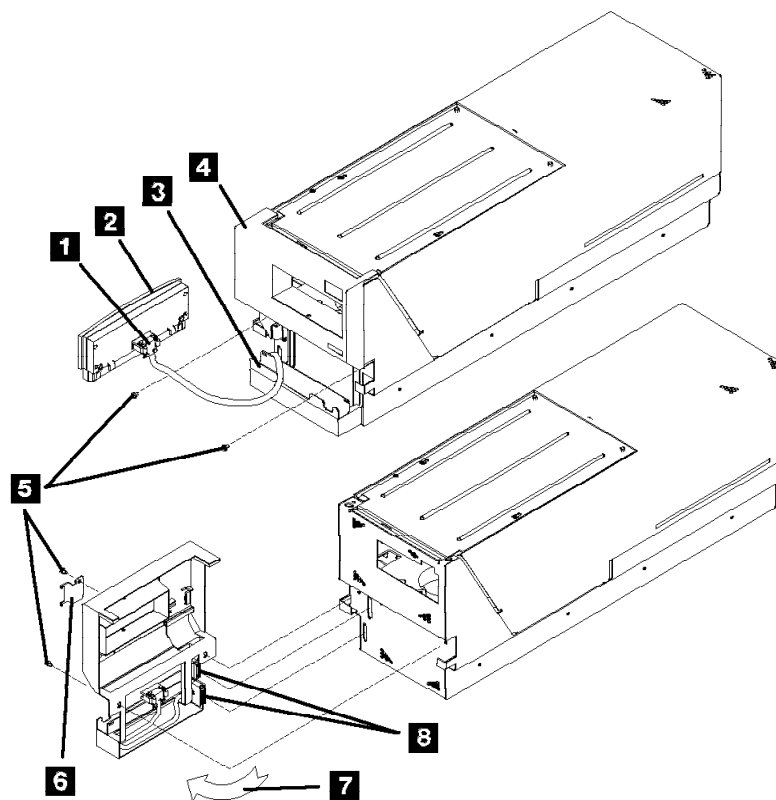


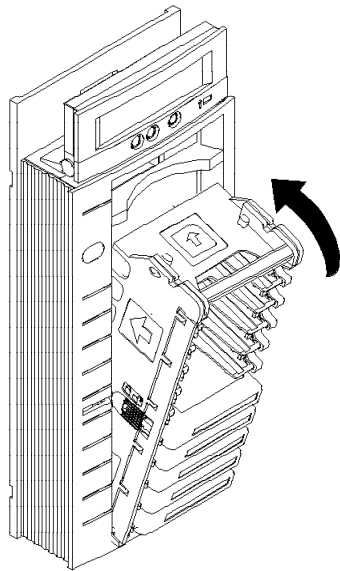
Figure 241. Library Interface Cover

Magazine

See Figure 242.

Inserting the Magazine

1. Insert the bottom of the magazine into the ACF so the bottom edge is just beyond the ridge at the bottom of the magazine support assembly.



2. Push the top of the magazine into the ACF until the magazine is latched into the ACF lockbar.
3. Return to the procedure that sent you here.

Removing the Magazine

1. Disengage the magazine by pulling the handle until it clears the ACF lockbar.
2. Rotate the top of the magazine out of the ACF and remove the magazine.
3. Return to the procedure that sent you here.

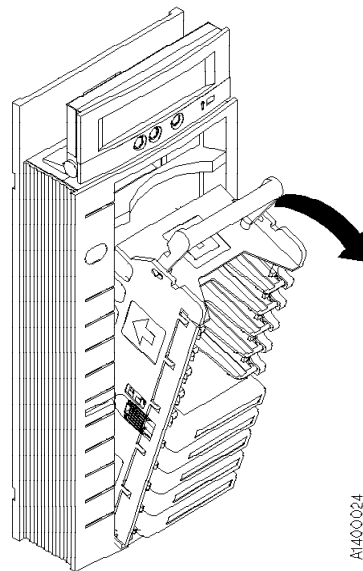


Figure 242. Magazine Insertion and Removal

Automatic Cartridge Facility (ACF)

Removal of ACF

1. Have the customer vary the device off-line, if not already done.
2. Remove the ACF decorative cover. See page PROC-25.
3. Slide the device into service position. See "Front Serviced with ACF, Model B11/E11 (Rack)" on page PROC-10 or "Rear Serviced with ACF, Model B11/E11 (A14 Frame)" on page PROC-11.
4. Remove the magazine, if present. See page PROC-29.
5. Remove cartridge if present. See "Manual Cartridge Removal" on page PROC-33.
6. Power OFF the device. See "Powering Device ON and OFF" on page PROC-6.
7. Remove the left side cover, if not obstructed by another device; otherwise, remove the right

side cover. See "ACF Side Covers" on page PROC-26.

8. See Figure 243. Disconnect the two cables **2** from the ACF to the deck enclosure.
9. Loosen the thumb screw **1** on the upper-left-rear of the ACF.



ACF side covers are not permanently attached. Use other points to lift the ACF.

Note: Before lifting the ACF, ensure that the side covers are secured by two screws at the bottom tabs. Side covers can slide off if the screws are not present.

10. Lift the ACF up and pull away from the deck enclosure.

Replacement of ACF

1. Perform the removal procedure in the reverse order, then return here.
2. Return to the procedure that sent you here.

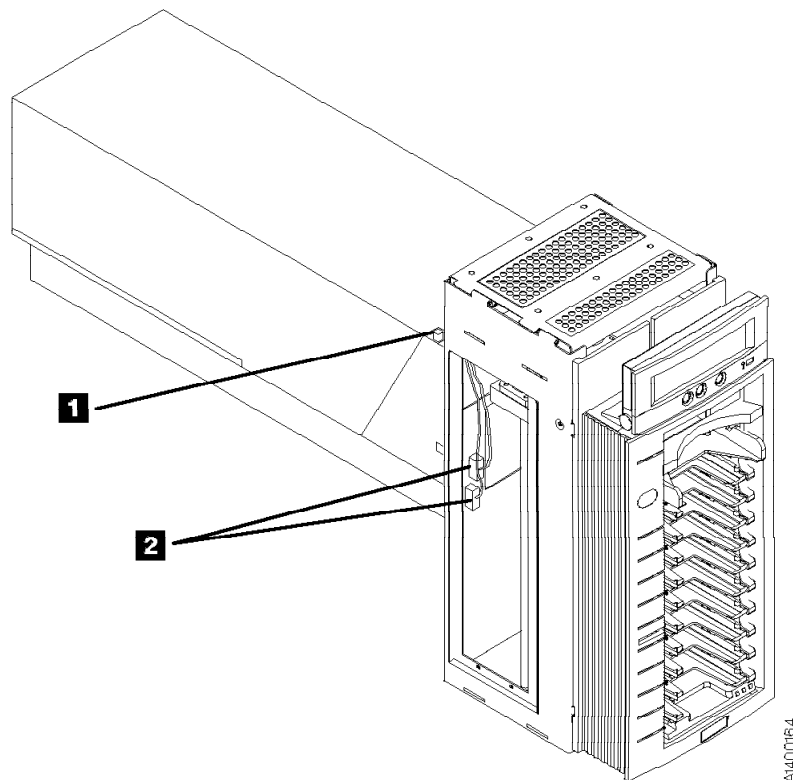


Figure 243. ACF and Deck Enclosure

Display Sensors Procedure

This procedure is used to display the dynamic settings of the ACF and drive sensors. A delay of approximately one second is required for the sensor to change state. The Disp Sensor Menu and routine may be accessed from the Figure 83 on page PANEL-13, then select **UTILITIES** then **DISP SENSORS**. Figure 244 summarizes the Sense routine menu, the meaning of each menu item, and one or more suggested methods to test each sensor.

Before you continue, it may be easier to remove some access covers. See “Removal of Deck Enclosure Top Cover” on page PROC-23 and “ACF Side Covers” on page PROC-26.

Note: Static values shown are the default values that existed on a test Model B11/E11, with no cartridges loaded in the drive, and just after completion of POST. Your machine, if in a different environment, may show different starting static values.

Figure 244 (Page 1 of 2). ACF & Drive Sensors Menu Display, Meanings and Test Methods

Menu Display	Meaning & How to Test
>CANCEL	Select to cancel routine
A:1 B:0	<p>Tape path A and B sensors (Drive Path).</p> <ol style="list-style-type: none"> For tape path A sensor, slowly move the tape threader arm CCW a short distance until the sensor changes state. Move it back slowly until it returns to the original state. For tape path B sensor, slowly move the tape threader arm CCW all the way around to near the end of rotation and watch for the B sensor to change state. After it changes state, move the tape threader in the opposite direction to have it return to the original state. When this sensor test is completed, return the tape thread arm to its original position. <p>Note: Move the arm slowly and without forcing it to keep from damaging the drive.</p>
TU:1 DO:0	<p>Loader tray up, door open sensors (Drive Loader).</p> <ol style="list-style-type: none"> To exercise the loader tray up sensor, place your hand on the loader drive gear located at the top-left of the drive, and rotate the gear toward the front of the machine. This should move the loader in and down and cause the loader tray up sensor to change state. Reverse the direction of the gear rotation to move the loader back up to make the sensor return to its original state. To exercise the door open sensor, use your hand to open and close the loader door while observing the door open sensor indication.
CP:1	<p>Loader cartridge-present sensor (Drive Loader). Manually move the loader in and down by rotating the loader drive gear located at the top-left of the drive. Rotate the gear toward the front of the machine until the loader is back far enough for you to reach in and move the loader cartridge present sensor flag. Move the flag toward the back of the drive to change state, and toward the front to return to the original state. When the loader cartridge present sensor test is complete, return the loader to its original position (up and forward).</p>
FP:0 CT:0000	<p>Loader file protect, cartridge type sensors (Drive Loader).</p> <ol style="list-style-type: none"> To exercise the file protect sensor, rotate the loader drive gear toward the front of the machine to move the loader in and down. As you near the bottom of travel, observe the file protect sensor indication. It should change its indication. Move the loader back up and the sensor should return to its original indication. To exercise the four cartridge type sensors, reach into the drive and press each sensor flag, located just below the drive door. Observe the sensors as they change state.
PS:0 MP:1 ML:0	<p>Priority cell, magazine present, magazine locked sensors (ACF Transport).</p> <ol style="list-style-type: none"> Place a cartridge in and out of the priority slot while observing the sensor indication. Raise and lower the magazine handle and observe the sense indication. Lock and unlock the magazine by depressing and releasing the magazine lock push button. <p>Note: If an ATTN ACF message appears, press Enter to clear the message.</p>
GI:0 GCP:0	<p>Global interference, global cartridge-present sensors (ACF Transport). Reach through the magazine opening on the front of the ACF and block the global interference path. The sensor should change state. Use the same procedure for the global cartridge-present sensor.</p>

Figure 244 (Page 2 of 2). ACF & Drive Sensors Menu Display, Meanings and Test Methods

Menu Display	Meaning & How to Test
P1:0 P2:0 IM:0	<p>ACF pinch 1 & 2, import sensors (<i>ACF Transport</i>).</p> <ol style="list-style-type: none"> For pinch 1 and 2, carefully rotate the square pinch shaft CCW until both sensors change state. Carefully rotate the shaft CW to return it to its original position (no pinch condition). <p>Note: If the pinch cams are left in a pinch condition, the elevator may be difficult to raise and lower for later tests.</p> <ol style="list-style-type: none"> For import, export, limit 1 and limit 2 sensors, move the elevator to an empty slot in the magazine, insert a scratch cartridge and rotate the square feed shaft (on the left) in a CCW direction while pushing the cartridge into the drive slot. The cartridge should move slowly toward the drive slot. Next, carefully rotate the square pinch shaft CCW to pinch the cartridge, and continue to rotate the square feed shaft to move the cartridge into the drive. Rotating the two square shafts in the appropriate directions, move the cartridge back and forth and observe the four sensors as they change state. An alternate method is to move the cartridge into the drive slot, then move the square pinch shaft until there is no pinch condition. Then, move the cartridge back and forth with your fingers and a flat ruler reaching through the ACF slot. <p>Note: Do not force the pinch or feed shafts as this may damage the ACF.</p>
L1:0 L2:0 EX:0	<p>Limit 1 & 2, export sensors (<i>ACF Transport</i>). See the import sensor procedure above.</p>
A:1 B:1	<p>ACF transport- position sensors (A & B) (<i>ACF Transport</i>). Manually move the elevator up and down and observe the two sensors.</p> <p>Note: Both sensors are molded into the same part.</p>
SN:0	<p>Gripper- present sensor (<i>Model B1A/E1A Drive Loader— library attached only</i>). This sensor is only on library versions (Model B1A/E1A only). To exercise this sensor, block the opening for the gripper present sensor card. The sensor should change states.</p>

Manual Cartridge Removal

Attention: Do Not touch the magnetic tape because it is extremely sensitive to the oil and salt in fingerprints. **Use** lint-free nylon gloves P/N 461621 to touch the magnetic tape surface. Read/write errors can occur where fingerprints have contaminated the magnetic tape surface. When the tape is contaminated, in either the data or non-data area of the tape, the oil and salt will eventually migrate to and cause corrosion to the read/write head. Any contamination **may cause** replacement of the head guide assembly.

The purpose of this section is to assist you to determine the condition of the cartridge or the magnetic tape and to direct you to the procedure you must follow to remove the cartridge.

Before You Begin

If you have not already done so, attempt to remove the cartridge with power ON the device.

1. Position the device to the service position. See "Service Positions of the 3590" on page PROC-10 and follow the procedure. Return here after the device is in the service position.
2. Display the Options menu on the operator/CE panel.
3. Select **Unload Drive** from the Options menu and press Enter. The cartridge should unload and return to the priority cell or to the magazine.

Note: It can take up to five minutes for the cartridge to rewind and unload.

4. If the cartridge unloads, inform the operator the cartridge is unloaded and return to the procedure that sent you here.
5. If the cartridge did not unload and:
 - The failing device is in a library, continue with "Identifying the Cartridge and Tape Condition."
 - or**
 - The failing device is not in a library, continue with the following:
 - a. Remove the ACF decorative cover. See page PROC-25.
 - b. Press the shelf release latch for the shelf with the failing device and pull the shelf to the service position. See "Front Serviced with ACF, Model B11/E11 (Rack)" on page PROC-10 for the release latch location.
 - c. Continue with "Identifying the Cartridge and Tape Condition."

Identifying the Cartridge and Tape Condition

Perform the following steps to determine the cartridge and tape condition:

1. Ensure the device is varied off-line.
2. If the failing device has an ACF, remove the magazine.
3. Switch OFF power to the failing device at the back of the device power supply. See Figure 223 on page PROC-6 for location of power switch.
4. Remove the deck enclosure top cover. See "Deck Enclosure Covers" on page PROC-23.
5. Inspect the drive for the cartridge and tape conditions shown on pages PROC-34 through PROC-36. Match the cartridge and the tape condition with the next examples and follow the directions in that example.

Example 1: Leader Block Separated From the Magnetic Tape

See Figure 245.

If the leader block **1** is separated from the magnetic tape **2** as shown in this example, do the “Leader Block Separated From the Magnetic Tape” on page PROC-41.

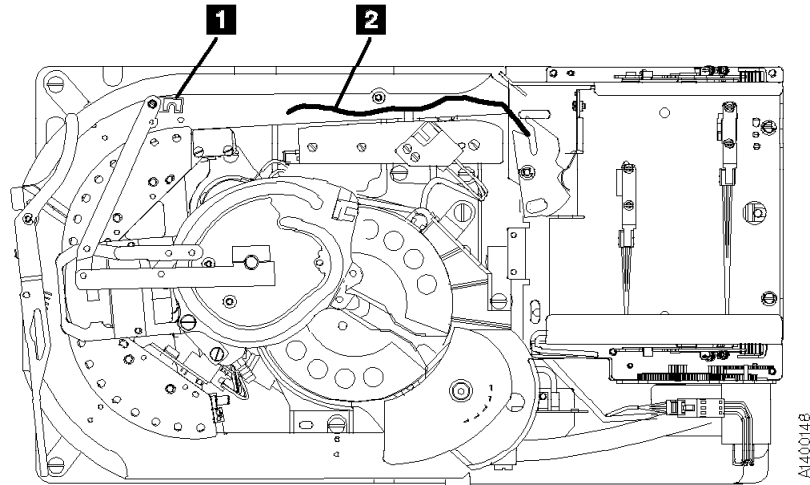


Figure 245. Example of a Leader Block Separated From the Magnetic Tape

Example 2: Magnetic Tape Pulled Out of the Cartridge

See Figure 246.

If the magnetic tape **2** has pulled out of the cartridge and has wound onto the machine reel **1**, do the “Magnetic Tape Attachment Procedure” on page PROC-42.

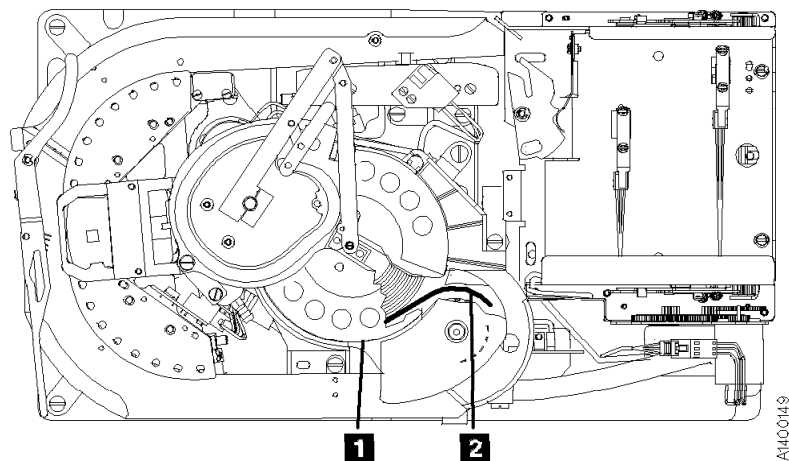


Figure 246. Example of Magnetic Tape Pulled Out of the Cartridge

Example 3: Leader Block and the Threader Pin in the Machine Reel Hub

See Figure 247.

If the leader block **1** and threader pin **2** are in the machine reel hub **3** and will not disengage from the hub, do the procedure “Leader Block and Threader Pin in the Machine Reel Hub” on page PROC-38.

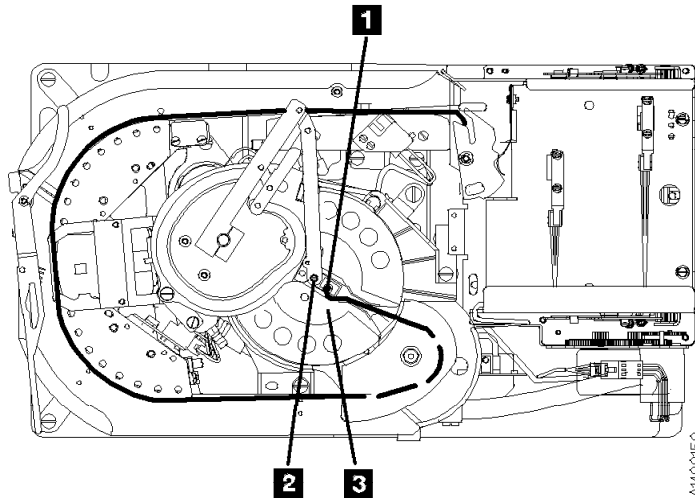


Figure 247. Example of the Leader Block and the Threader Pin in the Machine Reel Hub

Example 4: Leader Block and the Threader Pin Stopped in the Tape Path

See Figure 248.

If the leader block **2** and the threader pin **1** have stopped in the tape path **3** between the machine reel hub **4** and the loader assembly **5**, do the procedure “Leader Block and Threader Pin Stopped in the Tape Path” on page PROC-39.

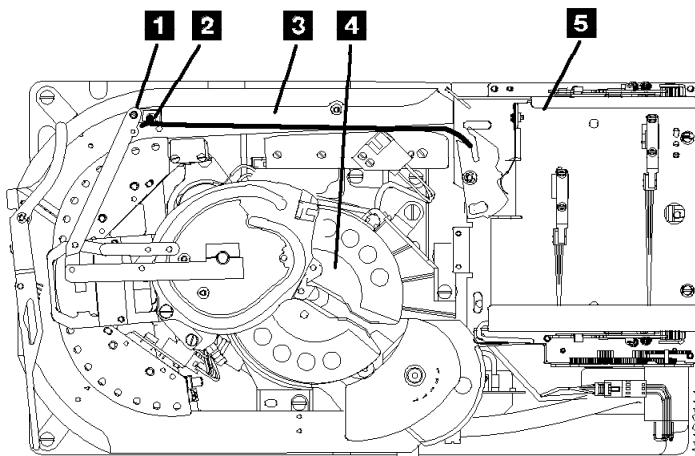


Figure 248. Example of the Leader Block and the Threader Pin Stopped in the Tape Path

Example 5: Leader Block and the Threader Pin at the Loader

See Figure 249.

If the leader block and the threader pin **1** are at the loader assembly **2** (home position), and the cartridge does not unload, do the procedure “Leader Block and Threader Pin at the Loader Assembly” on page PROC-40.

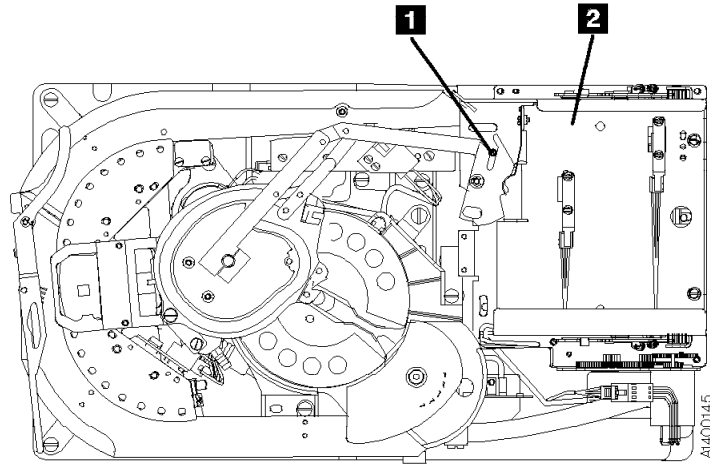


Figure 249. Example of the Leader Block and the Threader Pin at the Cartridge Loader Assembly

Example 6: Operation Stopped with Tape on the Machine Reel

See Figure 250.

If the operation has stopped with tape **2** on the machine reel **1**, do the procedure “Leader Block and Threader Pin in the Machine Reel Hub” on page PROC-38.

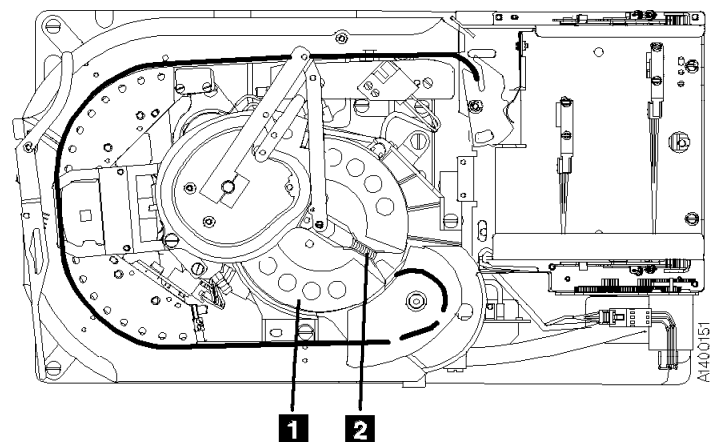


Figure 250. Example of the Operation Stopped with Tape on the Machine Reel

Example 7: Magnetic Tape Broken in the Data Area

See Figure 251.

If the tape has broken somewhere in the data area **1**, part of the tape **3** will be on the machine reel **2** and the remainder will be attached to the tape cartridge in the loader assembly **4**. The data on the tape cannot be saved, do the procedure "Magnetic Tape Broken in the Data Area" on page PROC-44.

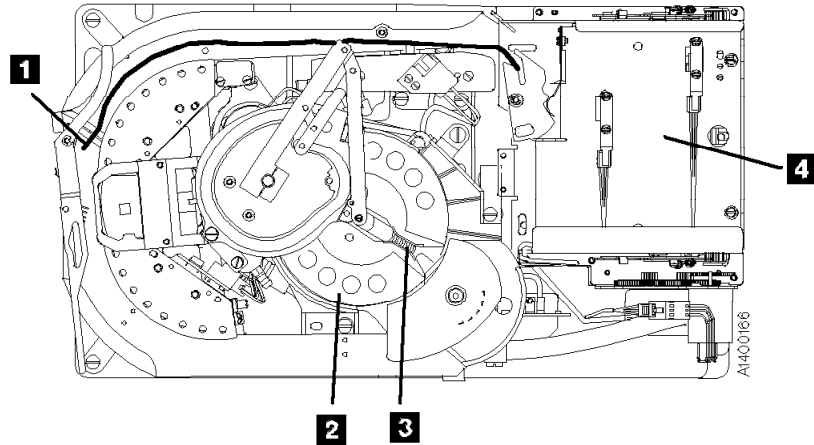


Figure 251. Example of the Magnetic Tape Broken Somewhere in the Data Area

Example 8: Cartridge Jammed in the Loader or Transport

See Figure 252.

If the cartridge is jammed in either the drive loader assembly **1** or the ACF transport assembly **2** do the procedure "Manual Unloading the Loader or Transport (Model B11/E11)" on page PROC-45

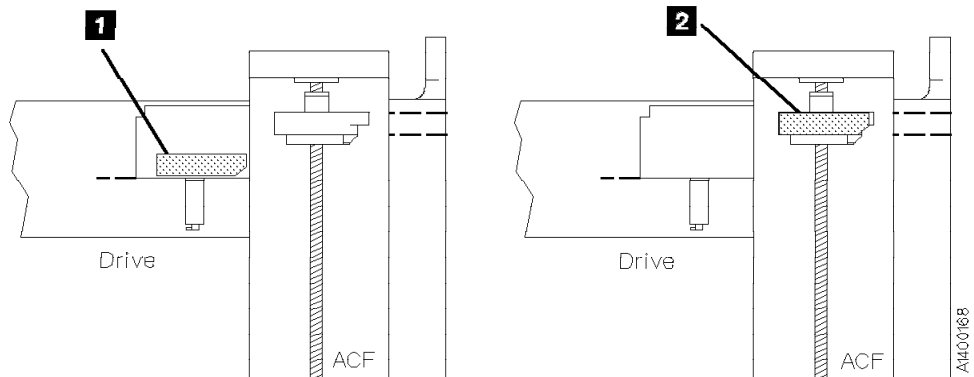


Figure 252. Example of a Cartridge Jammed in the Loader or Transport

Leader Block and Threader Pin in the Machine Reel Hub

Perform the following steps to remove the cartridge when the leader block and the threader pin are in the machine reel hub.

1. See Figure 253. Attach the tape removal tool **1** P/N 6850663 to your socket wrench handle **2**.
2. Insert the tape removal tool through the hole in the bottom of the drive enclosure, and onto the file reel motor shaft **3**.
3. Turn the tool clockwise (view from the top) to wind the tape into the cartridge.

Attention: Do not touch the magnetic tape. Finger prints contaminate the tape and can affect tape guiding. If the machine reel motor binds so that the file reel motor cannot move the tape, place your finger on the machine reel hub **6**.

4. Move the hub counterclockwise, and at the same time turn the file reel motor shaft clockwise to move the tape.
5. Turn the hub until the file reel motor is free. Continue to turn the hub until the leader block **5** can leave the machine reel hub as shown.
6. Rotate the pantocam arm at its pivot point **4** clockwise while you rotate the file reel motor shaft clockwise until the leader block is in the cartridge. (The threader pin **7** rotates the detent lever **8** as the leader block latches into the cartridge.)
7. Check the hub alignment (see "Replacement of Pantocam" on page LOC*CAR-71).
8. Remove the ACF from the drive. See page PROC-30.
9. Rotate the loader drive gear **9** (toward the rear) until the cartridge can be removed. Give the cartridge to the customer.
10. Reattach the ACF to the drive.
11. Return to the procedure that sent you here.

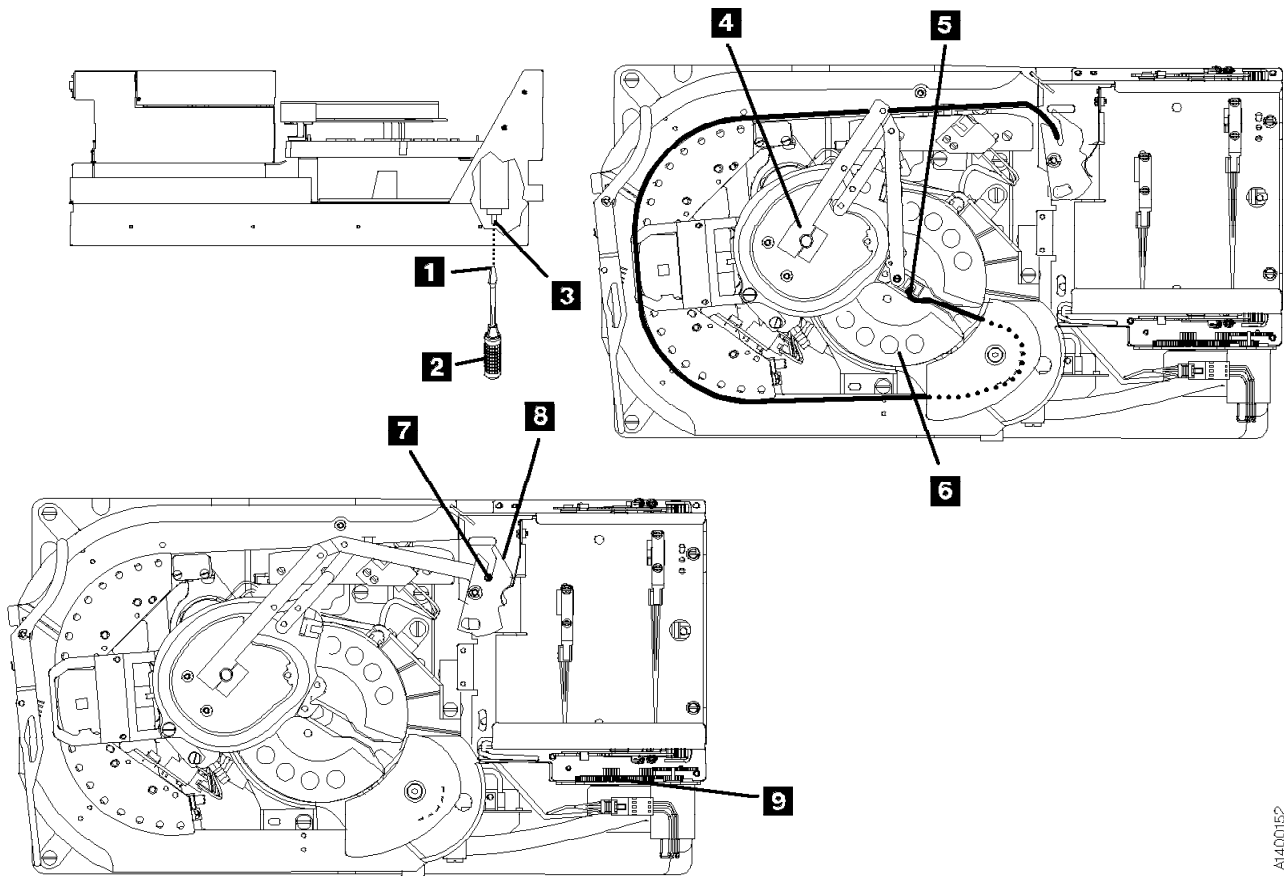


Figure 253. Leader Block and Threader Pin in the Machine Reel Hub

Leader Block and Threader Pin Stopped in the Tape Path

Perform the following steps to remove the cartridge by hand when the leader block and the threader pin have stopped in the tape path between the machine reel hub and the loader assembly.

1. See Figure 254. Attach the tape removal tool **1** (P/N 6850663) to your socket wrench handle **2**.
2. Insert the tape removal tool through the hole in the bottom of the drive enclosure, and onto the file reel motor shaft **3**.

Attention: Do not touch the magnetic tape. Finger prints contaminate the tape and can affect tape guiding.

3. Rotate the pantocam arm from its pivot point **4** in a clockwise direction. At the same time, rotate the file reel motor shaft clockwise (as seen from the top of the drive) to wind the tape into the cartridge.

4. Continue winding the tape into the cartridge.

The threader pin **5** will rotate the detent lever **6** as the leader block latches into the cartridge.

5. Remove the ACF from the drive. See "Automatic Cartridge Facility (ACF)" on page PROC-30 for removal procedure.
6. Rotate the loader drive gear **7** (toward the rear) until the cartridge can be removed. Give the cartridge to the customer.
7. Reattach the ACF to the drive.
8. Continue the repair action by returning to the procedure that sent you here.

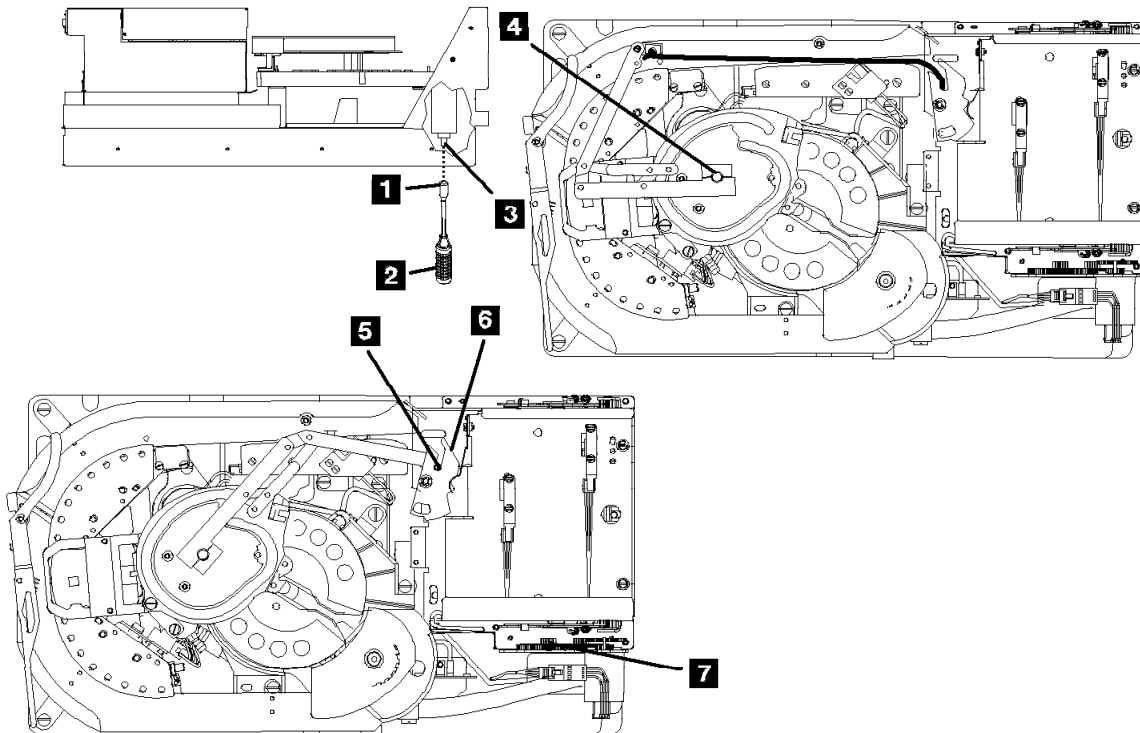


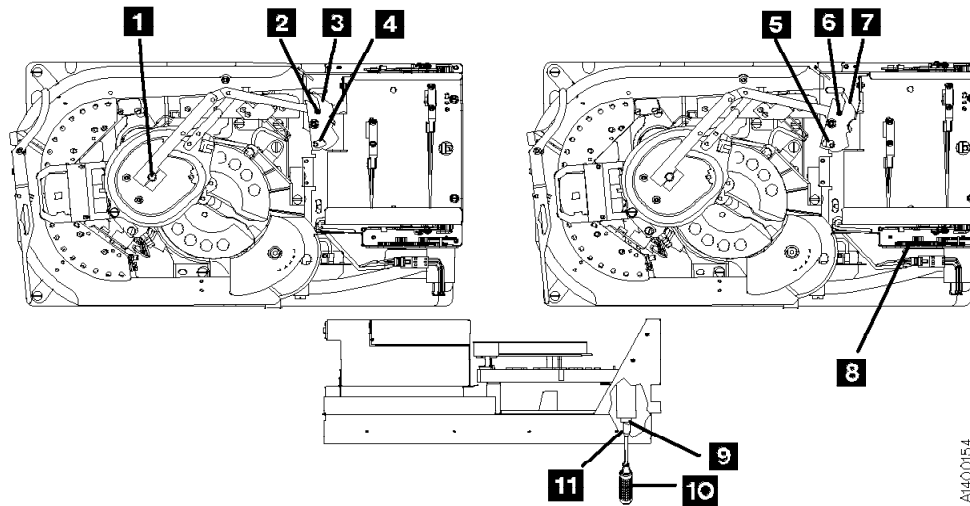
Figure 254. Leader Block and Threader Pin Stopped in the Tape Path

Leader Block and Threader Pin at the Loader Assembly

See Figure 255. The threader pin **2** or **6** can be at one of two positions at the loader assembly. Perform the appropriate procedure for the position in which the threader pin stopped:

- The threader pin **2** has engaged the detent lever **3**, but the detent lever has not rotated clockwise to latch the leader block into the cartridge. Note the position of the lever to the stop pin **4**. Go to step 1 to remove the cartridge.
Or,
- The threader pin **6** has engaged and rotated the detent lever **7** against its stop pin **5** and the leader block is latched in the cartridge. Go to step 5 to remove the cartridge.

1. Attach the tape removal tool **11** (P/N 6850663) to your socket wrench handle **10**.
2. Insert the tape removal tool through the hole in the bottom of the drive enclosure, and onto the file reel motor shaft **9**.
3. Rotate the pantocam arm from its pivot point **1** clockwise just far enough to rotate the detent lever against its stop and latch the leader block into the cartridge. At the same time, rotate the file reel motor shaft clockwise (as seen from the top of the drive) to take up the slack in the tape.
4. Remove the ACF from the drive. See "Automatic Cartridge Facility (ACF)" on page PROC-30 for removal procedure.
5. Rotate the loader drive gear **8** (toward the rear) until the cartridge can be removed. Give the cartridge to the customer.
6. Reattach the ACF to the drive.
7. Continue the repair action by returning to the procedure that sent you here.



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Figure 255. Leader Block and Threader Pin at the Loader Assembly

Leader Block Separated From the Magnetic Tape

Note: To save the data on the tape, the leader block must be replaced. Replacement of the leader block is the customer's responsibility. Notify the customer that the leader block must be replaced if it is necessary to save the data in the cartridge.

Attention: Do not touch the magnetic tape while removing the cartridge. Fingerprints may cause read/write errors and the contamination may migrate, causing corrosion to the head.

Use this procedure only when data must be copied to another cartridge. The use of this procedure can affect the performance of the leader block during threading and unloading operations. Recommend that the customer destroy the cartridge after the data is copied.

The use of any tool to remove the customer's tape can cause damage to the tape.

Do not damage the edges of the tape because edge damage can affect tape guiding.

Inform the customer before you continue with this procedure. **Removing the Cartridge and Leader Block**

See Figure 256.

1. Remove the leader block **2** from the threader pin **1**.
2. Rotate the top of the loader gear **4** toward the back of the 3590. The loader mechanism raises the cartridge up and moves it toward the front. Continue rotating the gear until the cartridge stops moving.
3. Carefully remove the cartridge, being careful not to damage the edges of the tape **3**.
4. Give the cartridge and leader block to the customer.

Note: Inform the customer the tape must not be touched without the use of protective gloves.

5. Continue the repair action by returning to the procedure that sent you here.

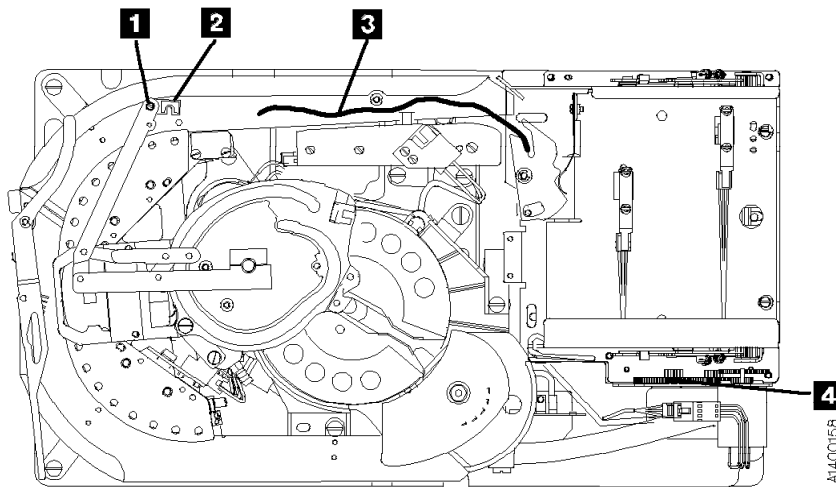


Figure 256. Removing Cartridge With Separated Leader Block

Magnetic Tape Attachment Procedure

Perform the following steps when the end of the magnetic tape has pulled out of the cartridge and has wound onto the machine reel.

Attention: Use this procedure only when data must be copied to another cartridge. The use of this procedure can affect the performance of the leader block during threading and unloading operations. Recommend that the customer destroy the cartridge after the data is copied.

The use of any tool to remove the customer's tape can cause damage to the tape.

Do not damage the edges of the tape because edge damage can affect tape guiding.

Touching the magnetic tape while performing this procedure is unavoidable. Use extreme care and do not touch the tape any further than 75 mm (3 in.) from the end of the tape. Oil from your fingers may damage the tape and can migrate to other parts of the 3590 drive.

Inform the customer before you continue with this procedure. See Figure 257 on page PROC-43.

1. Pull the tape by hand along the tape path until it is at the opening to the cartridge.

Note: If the machine reel motor binds and does not allow the tape to move, place your finger on the machine reel hub **4** and rotate the hub counterclockwise. At the same time move the magnetic tape.

2. Attach a 50 mm (2 in.) piece of double-stick cellophane tape to the shiny side of the magnetic tape. Leave a 25 mm (1 in.) overlap of cellophane tape.

Note: All lengths are approximate.

Attach the protruding end of the cellophane tape to the eraser end of a pencil or similar object.

Note: Ensure the cartridge in the loader is in the down (loaded) position.

3. Insert the pencil and the tape with the cellophane tape into the loader and the cartridge opening and attach the cellophane tape to the cartridge hub **5**. Remove the pencil without disturbing the cellophane tape that is attached to the hub.
4. Attach the tape removal tool **1** (P/N 6850663) to your socket wrench handle **2**.
5. Insert the tape removal tool through the hole in the bottom of the drive, and onto the file reel motor shaft **3**.
6. Turn the tool clockwise (as seen from the top of the drive) to wind the magnetic tape onto the cartridge.

Note: If the cellophane tape pulls off the hub, attach the cellophane tape again.

7. Rotate the machine reel hub counterclockwise and at the same time rotate the file reel motor shaft clockwise for several revolutions. Ensure the tape is secured to the cartridge hub.
8. Switch ON the device power at the back of the device power supply.
9. The tape should automatically unload when the power comes ON.

If the tape does not fully wind into the cartridge, request aid from your next level of support.

10. Remove the cartridge from the drive and give it to the customer.
11. Continue the repair action by returning to the procedure that sent you here.

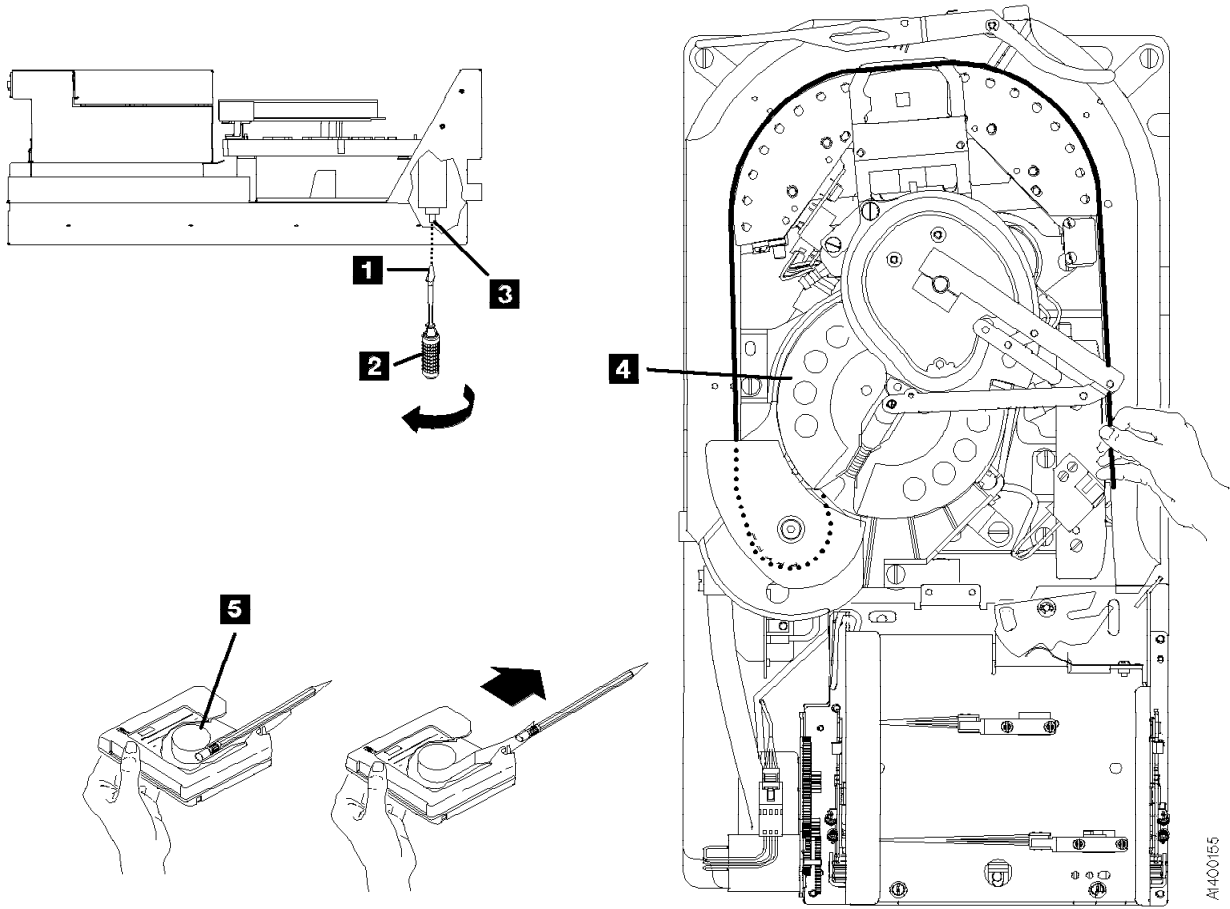


Figure 257. Attaching Magnetic Tape

Magnetic Tape Broken in the Data Area

Inform the customer that the tape cannot be spliced without contaminating the tape and drive. Read/write errors may occur where fingerprints have contaminated the magnetic tape surface and the contamination can eventually migrate to and cause corrosion to the head. Any contamination **will cause** replacement of the head guide assembly.

The tape cannot be saved and must be removed from the tape path.

Inform the customer before you continue with this procedure.

Removal of Destroyed Tape From Tape Path

See Figure 258.

1. Pull the tape **3** out of the machine reel **2** and into a suitable container.
2. When the tape is out of the machine reel, assist rotating the pantocam arm at its pivot point **1** in a clockwise direction to move the leader block out of the machine reel.
3. Remove the leader block from the threader pin when the leader block is out of the reel and accessible.
4. Rotate the loader gear **4** toward the rear of the drive far enough to remove the cartridge. Give the cartridge to the customer.
5. Give the cartridge and container of tape to the customer to be disposed of.
6. Return to the procedure that sent you here.

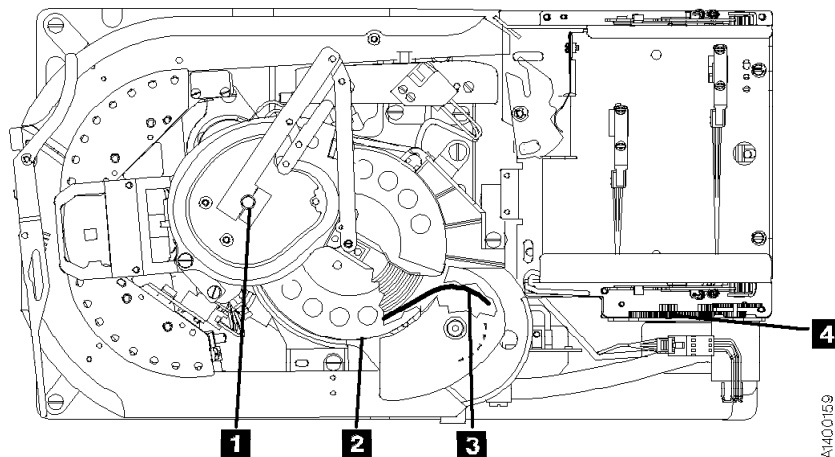


Figure 258. Removing Tape from Tape Path

Manual Unloading the Loader or Transport (Model B11/E11)

Perform the following steps to remove a jammed cartridge in either the drive loader or ACF transport.

If the cartridge is in the loader, do steps 1 through 5.

Or, if the cartridge is in the transport assembly, do steps 6 through 7.

See Figure 259.

1. If the tape cartridge is not completely in the loader, reach in through the priority cell and push the cartridge all the way into the drive loader assembly.
2. Remove the ACF **3** from the drive. See "Automatic Cartridge Facility (ACF)" on page PROC-30.

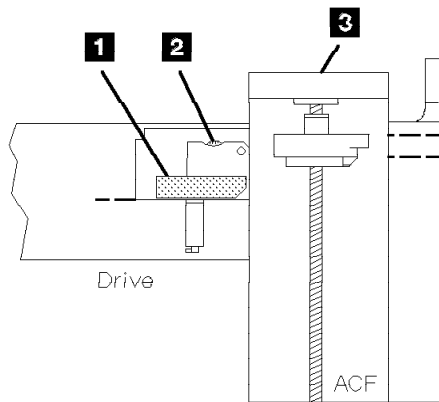


Figure 259. Removing Jammed Cartridge from Drive Loader

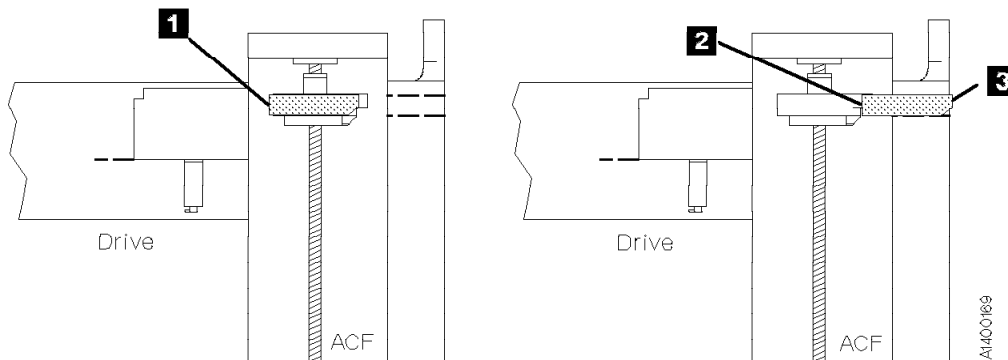


Figure 260. Removing Jammed Cartridge from ACF Transport

3. Rotate the loader drive gear **2** (toward the rear) until the cartridge **1** is unloaded from the loader **4**.
4. Manually remove the tape cartridge from the drive and give the cartridge to the customer.
5. Replace the ACF on the drive, then go to step 8.

See Figure 260.


6. Reach up and behind the cartridge **1** in the transport assembly and push the cartridge forward **2** far enough to be removed from the priority cell **3**.
7. Manually remove the tape cartridge from the ACF and give the cartridge to the customer.

Note: After retrieval of a cartridge check that transport Limit-1 and Limit-2 sensors are not knocked loose and still firmly seated. Refer to Figure 164 on page ACF-12.

8. Continue the repair action by returning to the procedure that sent you here.

Drive Serial Number

Recording the Drive Serial Number

1. At the OPTIONS display screen, switch to CE mode by pressing the Mode Change  push button.
2. Use the ↓ to select PROCEED and press **ENTER**.
3. At the CE Options screen, use the ↓ to select CONFIG/INSTALL and press **ENTER**.
4. At the CE CONFIG/INSTALL screen, use the ↓ to select DRV OPTIONS and press **ENTER**.
5. At the CE DRV OPTIONS screen, use the ↓ to select DRV SERIAL NO and press **ENTER**.
6. At the CE DRV SER NO screen, use the ↓ to select ALTER SERIAL NO and press **ENTER**.

Serial Number Change Procedure

The VPD FIELD OFFSET menu appears and the display shows the hex values for offsets 000 through 00B. Scroll the cursor up or down to see all of the offset locations. *All of the VPD offset field data is displayed and entered in hex.*

The Serial Number Entry procedure varies depending upon the microcode level that is installed on the 3590 drive. If your drive has Link Level D0I9_6F9 or earlier, you should see data similar to that shown in the example on the left hand side of Figure 261 on page PROC-47. The default ASCII value for that level of microcode is **SequenceNum**. The hexadecimal value is **X'53455155454E43454E554D00'**. If your drive has Link Level D0I9_7E6 or higher, such as D0IA or D0IB, you should see data similar to the example on the right hand side of Figure 261 on page PROC-47. The default ASCII value for that level of microcode is **000000XXXXX**. The Hexadecimal value is **X'303030303030305858585858'**.

Both levels of defaults (in ASCII, **3**, and hexadecimal, **2**, are shown in Figure 261 on page PROC-47. Also shown are the VPD Offset positions, **1**, where the hexadecimal values are entered (after conversion by the CE from ASCII to hexadecimal).

Note: The newer default value requires no entries by the CE for the first 7 positions of the VPD offset. The CE only needs to enter data in the last 5 positions. This should save time when the serial number must be re-entered.

Microcode Level D019_6F9 & Earlier			Microcode Level D019_7E6 & Later		
1	2	3	1	2	3
Offset	Hex	ASCII	Offset	Hex	ASCII
000	53	S	000	30	0
001	45	e	001	30	0
002	51	q	002	30	0
003	55	u	003	30	0
004	45	e	004	30	0
005	4E	n	005	30	0
006	43	c	006	30	0
007	45	e	007	58	x
008	4E	N	008	58	x
009	55	u	009	58	x
00A	4D	m	00A	58	x
00B	00	Nul	00B	58	x

SN359005



Figure 261. Card Pack Drive Serial Number Factory Defaults

Use the following procedure to enter the drive serial number. The following example shows what entries would be made if the serial number of the device were **12345**. The CE should substitute the real S/N value for the example shown.

Note: The 7 leading ASCII digits should always be zero in the new defaults, and when all data has been overwritten on the old defaults.

The example on the right shows how a typical five-digit (ASCII) serial number, SN 12345, is recorded in hexadecimal. Note that the first seven offsets, fields 000 through 006 must be set to hexadecimal X'30' (ASCII 0), and the serial number, once converted into hex, is entered in offsets 007 through 00B. (The first two letters of the serial number, **SN**, are not entered.)

CANCEL				CANCEL			
OFFSET	VALUE	ASCII Equivalent (Old)	(New)	OFFSET	VALUE	ASCII Equivalent (Final Value)	
000	53	S	0	000	30	0	
001	45	e	0	001	30	0	
002	51	q	0	002	30	0	
003	55	u	0	003	30	0	
004	45	e	0	004	30	0	
005	4E	n	0	005	30	0	
006	43	c	0	006	30	0	
007	45	e	X	007	31	1	
008	4E	N	X	008	32	2	
009	55	u	X	009	33	3	
00A	4D	m	X	00A	34	4	
00B	00	Nul	X	00B	35	5	

1. Starting at offset 007, write down the drive serial number below or on paper. Using the conversion chart in Figure 263 on page PROC-50, calculate the corresponding hexadecimal values.

Figure 262. Serial Number Work Sheet

Serial Number	VPD Offset	Hexadecimal Value
0	000	30
0	001	30
0	002	30
0	003	30
0	004	30
0	005	30
0	006	30
	007	
	008	
	009	
	00A	
	00B	

- You will be entering the serial number in three sections of four bytes (eight hex digits) each. Each data byte contains two hex digits. For example, data byte 0 is equal to X'30'.
- If your drive has the new default values (the first seven ASCII characters are all zero), you can review the procedure, but you need not enter any data until you reach VPD offset 007.
- If your drive has the old default values (the first seven ASCII characters are **not** all zeros), select offset 000 and press **ENTER**. The CE VPD DATA menu appears and the display shows, vertically, the four bytes (eight hex digits) for offsets 000 through 003. Scroll the cursor up or down to see all eight of the hex digits for these four offset locations. The actual screen image will look something like the following:

Note: The screen will show only one column of hexadecimal characters. Our examples will show both old and new default versions for your convenience.

CANCEL

(OLD)	(NEW)
5	3
3	0
4	3
5	0
5	3
1	0
5	3
5	0

If your drive has the older microcode installed, refer to the column on the left. If your drive has the newer microcode installed, refer to the column on the right. If your drive has the old defaults, begin entering at offset 000. If your drive has the new defaults, skip over offsets 000 through 006 (they should already be set to X'30' which equals ASCII 0) and begin entering the serial number at offset 007.

- The menu displays the first four bytes (eight digits) of the serial number vertically as follows:

CANCEL	(OLD Defaults)		(NEW Defaults)	
	Hex	ASCII	Hex	ASCII
Offset 000	5		3	
	3	= S	0	= 0
001	4		3	
	5	= e	0	= 0
002	5		3	
	1	= q	0	= 0
003	5		3	
	5	= u	0	= 0

- These eight digits represent ASCII Sequ, the first four characters of the old default value (**SequenceNum0**) or ASCII 0000, the first four characters of the new default value (**0000000XXXXX**).
- Move the cursor to the first digit you want to change (if any) and press **ENTER**.
- The CE CHOOSE VALUE menu appears. This screen allows you to select the desired hex digit. Select 3 and press **ENTER**. The data is updated and the previous menu (CE VPD DATA) appears.
- Move the cursor to the next digit to change and press **ENTER**.
- The CE CHOOSE VALUE menu appears. Select 0 and press **ENTER**. The data is updated and the previous menu (CE VPD DATA) appears.
- Repeat steps 7 through 10 until all eight digits are correct. It should look like this when completed:

```
CANCEL
3
0
3
0
3
0
3
0
```

- When you have finished changing (or reviewing) the data in these four offset fields, select SAVE AND CONTINUE. Select YES on the CE SAVE DATA? menu. This returns you to the CE DRV SER NO menu.
- At the CE DRV SER NO screen, use the ↓ to select ALTER SERIAL NO and press **ENTER**.
- To enter the next eight hex digits, select DRV SERIAL NO and press **ENTER**. At the VPD FIELD OFFSET menu select 004. A screen much like the following will appear:

CANCEL	(OLD Defaults)		(NEW Defaults)	
	Hex	ASCII	Hex	ASCII
Offset 004	4		3	
	5	= e	0	= 0
005	4		3	
	E	= n	0	= 0
006	4		3	
	3	= c	0	= 0
007	4		5	
	5	= e	8	= X

- Repeat steps 7 through 10, alternating 3 and 0 for the next six digits.

Note: The last two digits you enter in this section (offset 007) are the first two hex digits of the serial number. In our example, ASCII "1" will be entered as hex X'31'.

16. When you have finished changing (or viewing) the data in these four offset fields, select **SAVE AND CONTINUE**. Select **YES** on the **CE SAVE DATA?** menu.
17. At the **CE DRV SER NO** screen, use the ↓ to select **ALTER SERIAL NO** and press **ENTER**.
18. At the **VPD FIELD OFFSET** menu select 008. A screen much like the following will appear:

```
CANCEL
```

Offset	(OLD Defaults)		(NEW Defaults)	
	Hex	ASCII	Hex	ASCII
008	4		5	
	E	= N	8	= X
009	5		5	
	5	= u	8	= X
00A	4		5	
	D	= m	8	= X
00B	0		5	
	0	= Null	8	= X

19. Repeat steps 7 on page PROC-49 through 10 on page PROC-49, beginning with offset 008 to enter the last eight digits, but instead of entering 3's and 0's, enter the last four digits (eight hex digits) of the serial number. In our example, ASCII "2345:" is entered as hex X'32333435'.
20. When you have finished changing the data in these four offset fields, select **SAVE AND CONTINUE**. Select **YES** on the **CE SAVE DATA?** menu. This takes you back to the **CE DRV SER NO** menu.
21. To verify that the serial number you entered is correct, select **ALTER SERIAL NO** and press **ENTER**. Scroll through the **VPD FIELD OFFSET** menu to ensure that the hex values you entered are accurate and match the ones you wrote down. If you make any corrections, be sure to save the changes. Select **CANCEL**, as necessary to return to **CE OPTIONS** menu.
22. To return to the **OPTIONS** screen, press the ↑ push button, select **PROCEED** and press **ENTER**.
Note: The **CE WAIT** menu may appear momentarily while the new serial number data is written into memory.

RS/6000 Only

Note: You must have root authority to do the following step:

23. Update the VPD data in the host RS/6000 by un-configuring the device (**Example: rmdev -l rmt3**) and reconfiguring the device (**Example: mkdev -l rmt3**).

End of RS/6000 Only

24. Return to the procedure that sent you here.

Figure 263. Hex to ASCII Conversion

Hex	ASCII	Hex	ASCII	Hex	ASCII	Hex	ASCII	Hex	ASCII
00	Null	30	0	41	A	4A	J	54	T
20	Space	31	1	42	B	4B	K	55	U
		32	2	43	C	4C	L	56	V
		33	3	44	D	4D	M	57	W
		34	4	45	E	4E	N	58	X
		35	5	46	F	4F	O	59	Y
		36	6	47	G	50	P	5A	Z
		37	7	48	H	51	Q	5F	-
		38	8	49	I	52	R		
		39	9			53	S		

Note: All codes are not shown.

Convert FMR Tape to Scratch Tape

This procedure converts an FMR tape to a scratch tape.

1. From the CE Options menu, select **FMR Tape**.
2. From the CE FMR Tape menu, select **Unmake FMR Tape**.
3. When prompted, load the FMR tape. When the tape is loaded and at ready point, select **Process Loaded Tape**.

Note: 3590 Exx model drives require 256 track format tapes, and 3590 Bxx model drives require 128 track format tapes. If a tape with the wrong track format is loaded, a **Tape write prot'd** message will be displayed.

4. After the tape has the header information changed, the final status menu indicates whether the operation was successful.
5. Select **Unload Drive**.

Update FMR Tape from the Drive

This procedure updates an FMR tape with drive microcode.

1. From the CE Options menu, select **FMR Tape**.
2. From the FMR Tape menu, select **Microcode Update** menu.
3. When prompted, load the FMR tape. When the tape is loaded and at ready point, select **Process Loaded Tape**.

Note: 3590 Exx model drives require 256 track format tapes, and 3590 Bxx model drives require 128 track format tapes. If a tape with the wrong track format is loaded, a **Tape write prot'd** message will be displayed.

4. If the EC level of the code is not on the cartridge, the microcode is copied from the drive to the cartridge.
5. The EC level of the code is displayed via the Select EC Level screen.
6. Press Cancel.
7. Select **Unload Drive**.

Making FMR Tape from Scratch Tape

This procedure creates an FMR tape from a scratch tape that will contain the microcode that is active in the device.

Note: If you want to replace the microcode in the device from a field microcode replacement (FMR) tape or want to update the FMR cartridge with the microcode in the drive, go to "Updating Microcode from FMR Cartridge" on page PROC-53.

1. From the CE Options menu, select **FMR Tape**.
2. From the CE FMR Tape menu, select **Make FMR Tape**. When you are prompted, load a scratch tape. When the tape is loaded and at ready point, select **Process Loaded Tape**.

Note: 3590 Exx model drives require 256 track format tapes, and 3590 Bxx model drives require 128 track format tapes. If a tape with the wrong track format is loaded, a **Tape write prot'd** message will be displayed.

3. Select **Unload Drive**.
4. If not labeled, label the cartridge as the FMR tape and save the cartridge in a secure place.

Updating Microcode from FMR Cartridge

ATTENTION

There are 2 different levels of FMR cartridge available for the 3590 drives.

1. A FMR cartridge with 256 track format that has microcode for the Model E11/E1A drives.
2. A FMR cartridge with 128 track format that has microcode levels for the Base and Magstar Ultra Model B11/B1A drives.

The label on the FMR cartridge should clearly state which drive models the cartridge will support.

If an FMR tape with the wrong track format is loaded, a **Tape write prot'd** message will be displayed.

The 128 track format FMR cartridges ordered as a FRU now contain multiple microcode images for support of different levels of the Model B11/B1A 3590 drives as follows:

- D0IA_xxx = Base Model B11/B1A 3590 drives
- D0IB_xxx = Magstar Ultra Model B11/B1A 3590 drives

The 256 track format FMR cartridges ordered as a FRU now contain a single microcode image for support of the Model E11/E1A 3590 drives.

- D0IC_xxx = Model E11/E1A 3590 drives

These code levels are not compatible between different drive types. For example, the Base Model B11/B1A drives will not accept D0IB_xxx microcode images, and Magstar Ultra Model B11/B1A drives will not accept D0IA_xxx microcode images. The Base or Ultra Model B11/B1A drives will not accept the 256 track format FMR tapes, and the Model E11/E1A drives will not accept the 128 track format FMR tapes.

However, the different images for D0IA_xxx and D0IB_xxx may both be placed on the same 128 track FMR cartridge to allow a common FMR cartridge to update all Model B11/B1A drive levels. When the FMR cartridge is loaded in a drive, that drive will only allow selection of the valid levels of code. In the case of the Base 3590 drives, only D0IA code EC levels will be allowed, while Magstar Ultra drives will only allow D0IB EC levels.

For more information on 3590 levels, see “3590 Drive Model and Feature Levels” on page INTRO-33.

Updating Microcode Process

1. Set the 3590 to CE mode.
2. From the CE Options menu, select **FMR Tape**.
3. From the CE FMR Tape menu, select **Microcode Update**.
4. At the Load FMR Tape menu, load the FMR cartridge.
5. When the tape is loaded and at ready point, select **Process Loaded Tape**.
 - The device verifies that the FMR tape is the correct format for the drive model. Base or Ultra Model B11/B1A drives require 128 track format FMR tapes, and the Model E11/E1A drives require 256 track format FMR tapes.
 - If the *current* EC level of microcode is **not** already on the FMR cartridge, the 3590 writes the current level of microcode onto the FMR cartridge. This provides the CE with the option to go back to the current level, if necessary.

6. When the Select EC Level menu is displayed, select the desired EC level. (The drive will only display EC levels of microcode that are valid for the model and feature level of the drive.)

Note: Do not touch the Reset push button while the microcode update is in process.

- The microcode in the drive is then automatically updated with the latest level of microcode from the FMR tape.
- When the update is complete, status will be displayed.

7. If the update was not successful, **retry** with another cartridge.

8. When the update is successful, select **Unload Drive**.

9. Press the Reset push button to activate the microcode.

RS/6000 Only

Note: You must have root authority to do the following step.

10. Update the VPD data in the host RS/6000 by un-configuring the device (**Example: rmdev -l rmt3**) and reconfiguring the device (**Example: mkdev -l rmt3**).

End of RS/6000 Only


11. Record the EC level and link level of the microcode in "Microcode EC Level History Log" on page PROC-55.

12. Save the FMR cartridge in a secure place.


Figure 265 (Page 2 of 2). Microcode EC Level History Log

EC Level	Link Level 1	Date	Drive Serial Number

Off-loading Dumps from 3590 to Tape Cartridge


The dump icon  appears when the dump is available and remains on the screen to indicate that trace data is stored in the device.

Attention: Trace data is volatile and is lost if you press the Reset push button or switch OFF power to the device.

1. Press the Change Mode  push button to place the drive in CE mode.
2. Select **Dump** from the CE Options menu.
3. Select **Copy Dump to Tape** to copy a dump from dynamic random access memory (DRAM) to a tape cartridge.
4. At the prompt, load a scratch tape and select **Process Loaded Tape**.

A screen indicates the status of the copy to medium (Successful Copy or Unsuccessful Copy).

5. When the dump to tape has completed, contact your next level of support for further instructions.

The dump icon  disappears from the 3590 operator panel when the dump to tape has completed.



Updating Microcode from an AS/400

Microcode load for the 3590 tape drives directly attached to an AS/400 with the SCSI is obtained from the AS/400 using the program temporary fix (PTF) process.

1. Notify the customer that a microcode load for the 3590 is available via a PTF.
2. The customer will apply the PTF.
3. Before the customer IPLs the input/output processor (IOP):
 - Verify that the drive is unloaded.
 - On the drive operator panel, verify that the drive is on-line. The PTF indicates that the drive must be varied on with a reset.
4. The customer can now IPL the IOP. The IPL causes the microcode load to proceed.
5. When the microcode load is complete, the drive performs a soft power-on reset (restarts the code).
6. Update the account FMR cartridge. See “Updating Microcode from FMR Cartridge” on page PROC-53.

Off-loading Dumps from 3590 Attached to AS/400

Use the “Off-loading Dumps from 3590 to Tape Cartridge” procedure.

Updating Microcode from RS/6000 by Using TAPEUTIL

You may require assistance from the customer during this process.

This procedure down-loads microcode to the tape drive from a file or diskette. This diskette must be in AIX/UNIX format. The Microcode Load utility is only supported on the IBM 3590 tape drive.

1. On the drive operator panel, verify that the drive is On-line.
2. Verify that the drive is unloaded.
3. Verify that the drive is not in use by another host.
4. Insert the diskette with the microcode load into the system diskette reader.
5. Start the tape utility program by typing **tapeutil** at the prompt.
6. Select Tape Drive Service Aids from the menu by selecting **Tape Drive Service Aids** option and pressing enter.
7. Select **Microcode load** from the following panel then press **Enter**.

```
IBM Tape Device Service Aid Menu                                700000

Select One of the Service Aids to be performed

Force Microcode Dump
  Perform a microcode dump of the system. The dump is stored in
  the device.
  After the dump is performed it must be read using Read Dump.
Read Dump
  Transfer a dump from the tape device to a host file, diskette or
  a tape cartridge.
Microcode load
  Down-load microcode from host file or diskette to tape device via
  SCSI bus.
Error Log Analysis
  Analyze system error log for device.
F3=Cancel                                                    F10=Exit
```

8. Select a **Device** and press **F7=Commit** from the following panel. You must press **F7=Commit** after selecting the drive.

```
IBM Tape Device Selection Menu.                                900000

Select One of the devices listed below.

NAME          LOCATION      TYPE
rmt2          00-05-01-10  IBM 3590 Tape Drive and Medium Changer
rmt3          00-05-01-30  IBM 3590 Tape Drive and Medium Changer

F3=Cancel          F7=Commit          F10=Exit
```


9. If loading the microcode from the diskette reader, press **F7=Commit** from the following panel. Otherwise, enter the **path** and **filename** and press **F7=Commit**.

Enter the filename **./xxx.yyyy** in the source field where xxx.yyyy is the filename of the microcode file to be loaded.

Important: Be sure to select the proper code file for the type of drive to be updated.

- Magstar Ultra = D01B_xxx.fmrz
- Base 3590 = D019_xxx.fmrz or D01A_xxx.fmrz

To determine the type of drive you are updating, refer to “3590 Drive Model and Feature Levels” on page INTRO-33.

You must press **F7=Commit** after entering the filename.

Prompting for Srce File for Operation on rmt3 located at 00-05-01-30
B00000

Please enter the following fields...

Enter Filename: /dev/rfd0 +/

F1=Help	F2=Refresh	F3=Cancel	F4=List
F5=Reset	F7=Commit	F10=Exit	



10. While the microcode load takes place, the display shows:

“Operation running, please stand by”

The drive display shows the loading status messages at the bottom of the display.


11. When the microcode load completes, the initiator display shows:

Operation completed successfully!

The drive performs a soft power-on reset (restart the code).

12. Press **F10** to exit the microcode load.
13. Press **q** to quit tapeutil.
14. Remove the diskette from the diskette reader.
Note: You must have root authority to do the following step.
15. Update the VPD data in the host RS/6000 by un-configuring the device (**Example: rmdev -l rmt3**) and reconfiguring the device (**Example: mkdev -l rmt3**).
16. Update the account FMR cartridge. See “Updating Microcode from FMR Cartridge” on page PROC-53.

Off-loading Dumps from 3590 to RS/6000 by Using TAPEUTIL

The dump icon  appears when the dump is available, and remains on the screen to indicate that trace data is stored in the device.

Note: Trace data is volatile and is lost if you press the Reset push button or switch OFF power to the device.

You may require assistance from the customer during this process.

This procedure reads a dump from the 3590 and writes it to a diskette in AIX/UNIX format.

1. On the drive operator panel, verify that the drive is On-line.
2. Verify that the drive is unloaded.
3. Verify that the drive is **not in use** by another host.
4. Insert the diskette that will be used for the dump in the system floppy diskette reader.
5. When the prompt appears, format the diskette by typing **format** and pressing Enter.
6. Start the tape utility program by typing **tapeutil** at the prompt.
7. Select **Tape Drive Service Aids** option from the menu and press **Enter**.
8. Select **Read Dump** from the following panel and then press **Enter**.

```
IBM Tape Device Service Aid Menu                                700000

Select One of the Service Aids to be performed

Force Microcode Dump
  Perform a microcode dump of the system. The dump is stored in
  the device.
  After the dump is performed it must be read using Read Dump.
Read Dump
  Transfer a dump from the tape device to a host file, diskette or
  a tape cartridge.
Microcode load
  Down-load microcode from host file or diskette to tape device via
  SCSI bus.
Error Log Analysis
  Analyze system error log for device.
F3=Cancel                                           F10=Exit
```

9. Select a **Device** and press **F7=Commit** from the following panel. You must press **F7=Commit** after selecting the drive.

```
IBM Tape Device Selection Menu.                               900000
Select One of the devices listed below.
NAME      LOCATION      TYPE
rmt2      00-05-01-10  IBM 3590 Tape Drive and Medium Changer
rmt3      00-05-01-30  IBM 3590 Tape Drive and Medium Changer


F3=Cancel      F7=Commit      F10=Exit
```

10. At the next screen press **F7=Commit** to write the file to the diskette.

```
Prompting for Dest File for Operation on rmt3 located at 00-05-01-30
                                                                B00000
Please enter the following fields...
Enter Filename:                                                    /dev/rfd0 +/-

F1=Help      F2=Refresh      F3=Cancel      F4=List
F5=Reset      F7=Commit      F10=Exit
```

11. Press **F10** to exit the read dump.

The dump icon  disappears from the 3590 operator panel when the dump to tape has completed.

12. Press **q** to quit tapeutil.
13. Remove the diskette from the diskette reader. The dump diskette created above is in AIX/UNIX format.

Updating Microcode from a Sun System by Using TAPEUTIL

TAPEUTIL

Refer to *IBM SCSI Tape Drive, Medium Changer, and Library Device Drivers: Installation and User's Guide*, GC35-0154, for details of the **tapeutil** program in the Sun (Solaris) system.

You may require assistance from the customer during this process.

The 3590 supports down-loading a new microcode image from the host system via the SCSI bus. This procedure down-loads microcode to the tape drive from a file or diskette. This diskette must be in AIX/UNIX format.

To down-load microcode to these devices, perform the following steps:

1. Verify that the IBM tape subsystem is powered ON and online.
2. Verify that the tape drive does not currently have a tape cartridge loaded.
3. Verify that the drive is not in use by another host.
4. Determine the current version of microcode present on the device by entering the following command, substituting **n** with the actual value from the device special file associated with the target device:

```
/opt/IBMtape/tapeutil -f /dev/rmt/nst -o qmc -v
```

5. Determine the source of the new microcode image file (that is, floppy diskette such as /vol/dev/aliases/floppy0 or host file such as /tmp/ucode_image.file).
6. Enter the following command, substituting **file** with the actual path and filename of the microcode image file, and substituting **n** with the actual value from the device special file associated with the destination device:

```
/opt/IBMtape/tapeutil -f /dev/rmt/nst -o dmc -z file -v
```

Note: The microcode down-load procedure may also be performed using the menu-driven interface of the tapeutil program. To invoke the tapeutil program in this format, enter the following command, and then choose option 1 to open the device, followed by option 4 to query the current device microcode level, and option 7 to down-load new microcode.


```
/opt/IBMtape/tapeutil
```

Off-loading Dumps from 3590 to a Sun System by Using TAPEUTIL


TAPEUTIL

Refer to *IBM SCSI Tape Drive, Medium Changer, and Library Device Drivers: Installation and User's Guide*, GC35-0154, for details of the **tapeutil** program in the Sun (Solaris) system.

The 3590 supports forcing a diagnostic dump and storing that dump to a mounted tape cartridge or to a host system file via the SCSI bus.

The dump icon  appears when the dump is available, and remains on the screen to indicate that trace data is stored in the device.

Notes:

1. Trace data is volatile and is lost if you press the Reset push button or switch OFF power to the device.
2. If you force a dump when the dump icon  is already displayed, the existing trace data will be overlaid by the new trace data.

You may require information from the customer during this process.

To force and store a diagnostic dump on these devices, perform the following steps:

1. Verify that the IBM tape subsystem is powered ON and online.
2. Verify that the drive is not in use by another host.
3. Verify that the drive has no customer cartridges loaded. Scratch cartridge is OK.
4. Enter the following command to force the dump, substituting **n** with the actual value from the device special file associated with the target device:

```
/opt/IBMtape/tapeutil -f /dev/rmt/nst -o fdp -v
```
5. Determine the location for the dump to be stored (that is, floppy diskette such as `/vol/dev/aliases/floppy0` or host file such as `/tmp/diag_dump.file`).
6. Enter the following command, substituting **file** with the actual path and filename of the dump destination file, and substituting **n** with the actual value from the device special file associated with the dump device:

```
/opt/IBMtape/tapeutil -f /dev/rmt/nst -o sdp -z file -v
```
7. The dump may also be written to a tape cartridge mounted in the dump device by using **tapedrive** for **file**

Note: The diagnostic dump procedure may also be performed using the menu-driven interface of the **tapeutil** program. To invoke the **tapeutil** program in this format, enter the following command, and then choose option 1 to open the device, followed by option 5 to force a dump, and option 6 to store the dump:

```
/opt/IBMtape/tapeutil
```

Updating Microcode from a HP-UX System by Using TAPEUTIL

TAPEUTIL

Refer to *IBM SCSI Tape Drive, Medium Changer, and Library Device Drivers: Installation and User's Guide*, GC35-0154, for details of the **tapeutil** program in the HP-UX system.

You may require assistance from the customer during this process.

The 3590 supports down-loading a new microcode image from the host system via the SCSI bus. This procedure down-loads microcode to the tape drive from a file or diskette. This diskette must be in AIX/UNIX format.

To down-load microcode to these devices, perform the following steps:

1. Verify that the IBM tape subsystem is powered ON and online.
2. Verify that the tape drive does not currently have a tape cartridge loaded.
3. Verify that the drive is not in use by another host.
4. Determine the current version of microcode present on the device by entering the following command, substituting **n** with the actual value from the device special file associated with the target device:

```
/opt/IBMtape/tapeutil -f /dev/rmt/nst -o qmc -v
```

5. Determine the source of the new microcode image file (that is, floppy diskette such as /vol/dev/aliases/floppy0 or host file such as /tmp/ucode_image.file). Be sure to select the proper file for the EC level of the drive (Magstar Ultra or Base 3590) that you are attempting to update. For more information, see "3590 Drive Model and Feature Levels" on page INTRO-33.
6. Enter the following command, substituting **file** with the actual path and filename of the microcode image file, and substituting **n** with the actual value from the device special file associated with the destination device:

```
/opt/IBMtape/tapeutil -f /dev/rmt/nst -o dmc -z file -v
```

Note: The microcode down-load procedure may also be performed using the menu-driven interface of the tapeutil program. To invoke the tapeutil program in this format, enter the following command, and then choose option 1 to open the device, followed by option 4 to query the current device microcode level, and option 7 to down-load new microcode.


```
/opt/IBMtape/tapeutil
```

Off-loading Dumps from 3590 to a HP-UX System by Using TAPEUTIL


TAPEUTIL

Refer to *IBM SCSI Tape Drive, Medium Changer, and Library Device Drivers: Installation and User's Guide*, GC35-0154, for details of the **tapeutil** program in the HP-UX system.

The 3590 supports forcing a diagnostic dump and storing that dump to a mounted tape cartridge or to a host system file via the SCSI bus.

The dump icon  appears when the dump is available, and remains on the screen to indicate that trace data is stored in the device.

Notes:

1. Trace data is volatile and is lost if you press the Reset push button or switch OFF power to the device.
2. If you force a dump when the dump icon  is already displayed, the existing trace data will be overlaid by the new trace data.

You may require information from the customer during this process.

To force and store a diagnostic dump on these devices, perform the following steps:

1. Verify that the IBM tape subsystem is powered ON and online.
2. Verify that the drive is not in use by another host.
3. Verify that the drive has no customer cartridges loaded. Scratch cartridge is OK.
4. Enter the following command to force the dump, substituting **n** with the actual value from the device special file associated with the target device:

```
/opt/IBMtape/tapeutil -f /dev/rmt/nst -o fdp -v
```
5. Determine the location for the dump to be stored (that is, floppy diskette such as `/vol/dev/aliases/floppy0` or host file such as `/tmp/diag_dump.file`).
6. Enter the following command, substituting **file** with the actual path and filename of the dump destination file, and substituting **n** with the actual value from the device special file associated with the dump device:

```
/opt/IBMtape/tapeutil -f /dev/rmt/nst -o sdp -z file -v
```
7. The dump may also be written to a tape cartridge mounted in the dump device by using **tapedrive** for **file**

Note: The diagnostic dump procedure may also be performed using the menu-driven interface of the **tapeutil** program. To invoke the **tapeutil** program in this format, enter the following command, and then choose option 1 to open the device, followed by option 5 to force a dump, and option 6 to store the dump:

```
/opt/IBMtape/tapeutil
```

Updating Microcode From SP2 Using TAPEUTIL

You may require information/assistance from the customer during this process.

This procedure down-loads microcode to the tape drive from a file or diskette. This diskette must be in AIX/UNIX format. The Microcode Load utility is only supported on the IBM 3590 Tape Drive.

1. Insert the diskette with the microcode load in the Control Work Station (CWS) diskette reader. Be sure to select the proper EC level of diskette for the drive that is being updated. To determine the EC level of the drive, see "3590 Drive Model and Feature Levels" on page INTRO-33.
2. Copy the contents of the diskette to a file on the CWS by typing **cp /dev/rfd0 /tmp/3590.fmr** at the prompt.
3. Copy the file /tmp/3590 to the SP2 node that has the 3590 attached.
 - a. Connect to the target node by typing **ftp nodeid**.
Enter a Name and a Password when prompted.
 - b. Set Binary mode by typing **binary**.
 - c. Transfer the file by typing **put /tmp/3590.fmr /tmp/3590.fmr**.
 - d. Quit the connection by typing **quit**.
4. On the drive operator panel, verify that the drive is On-line.
5. Verify that the drive is unloaded.
6. Verify that the drive is **NOT IN USE** by another host.
7. Connect to the target node by typing **telnet nodeid**.
Enter a login id and a password when prompted.
8. Start the tape utility program on the target node by typing **tapeutil** at the prompt.
9. Choose **Tape Drive Service Aids** from the menu and press **Enter**.
10. Choose **Microcode load** from the following panel then press **Enter**.

```
IBM Tape Device Service Aid Menu                                700000

Select One of the Service Aids to be performed

Force Microcode Dump
  Perform a microcode dump of the system. The dump is stored in
  the device.
  After the dump is performed it must be read using Read Dump.
Read Dump
  Transfer a dump from the tape device to a host file, diskette or
  a tape cartridge.
Microcode load
  Down-load microcode from host file or diskette to tape device via
  SCSI bus.
Error Log Analysis
  Analyze system error log for device.
```


11. Select a **Device** and press **F7=Commit** from the following panel. You must press **F7=Commit** after selecting the drive.

```
IBM Tape Device Selection Menu.                               900000
Select One of the devices listed below.
NAME          LOCATION    TYPE
rmt2          00-05-01-10  IBM 3590 Tape Drive and Medium Changer
rmt3        00-05-01-30 IBM 3590 Tape Drive and Medium Changer

F3=Cancel          F7=Commit          F10=Exit
```



12. Enter the filename **/tmp/3590.fmr** in the source field.
You must press **F7=Commit** after entering the filename.

```
Prompting for Srce File for Operation on rmt3 located at 00-05-01-30
                                                                B00000
Please enter the following fields...
Enter Filename:                                               /tmp/3590.fmr

F1=Help          F2=Refresh          F3=Cancel          F4=List
F5=Reset          F7=Commit           F10=Exit
```

13. While the microcode load takes place the display shows

```
“Operation running, please stand by”
```

The drive display shows the loading status messages at the bottom of the display.


14. When the microcode load completes the initiator display shows

```
Operation completed successfully!
```

The drive performs a soft power-on reset (restart the code).

15. Press **F10** to exit the microcode load.
16. Press **q** to quit tapeutil.
Note: You must have root authority to do the following step.
17. Update the VPD data in the host RS/6000 by un-configuring the device (**Example: rmdev -l rmt3**), and reconfiguring the device (**Example: mkdev -l rmt3**).
18. Press **Ctrl+J** to get a telnet> prompt, then type **quit** to stop the TELNET session.
19. Remove the diskette from the diskette reader.
20. Update the account FMR cartridge. See “Updating Microcode from FMR Cartridge” on page PROC-53.

Off-loading Dumps from 3590 to SP2 Using TAPEUTIL

The dump icon  appears when the dump is available, and remains on the screen to indicate that trace data is stored in the device.

Note: Trace data is volatile and is lost if you press the Reset push button or switch OFF power to the device.

You may require assistance from the customer during this process.

This procedure reads a dump from the 3590 and writes it to a file and then to a diskette in AIX/UNIX format.

1. On the drive operator panel, verify that the drive is On-line.
2. Verify that the drive is unloaded.
3. Insert the diskette that will be used for the dump in the Control Work Station (CWS) diskette reader.
4. Format the diskette by typing **format** at the prompt and pressing Enter.
5. Connect to the target node by typing **telnet nodeid**.
Enter a login id and a password when prompted.
6. Start the tape utility program by typing **tapeutil** at the prompt.
7. Choose **Tape Drive Service Aids** from the menu and press **Enter**.
8. Choose **Read Dump** from the following panel and then press **Enter**.

```
IBM Tape Device Service Aid Menu                                700000

Select One of the Service Aids to be performed

Force Microcode Dump
  Perform a microcode dump of the system. The dump is stored in
  the device.
  After the dump is performed it must be read using Read Dump.
Read Dump
  Transfer a dump from the tape device to a host file, diskette or
  a tape cartridge.
Microcode load
  Down-load microcode from host file or diskette to tape device via
  SCSI bus.
Error Log Analysis
  Analyze system error log for device.
```

- Select a **Device** and press **F7=Commit** from the following panel. You must press **F7=Commit** after selecting the drive.

```

IBM Tape Device Selection Menu.                                900000

Select One of the devices listed below.

NAME          LOCATION    TYPE
rmt2          00-05-01-10  IBM 3590 Tape Drive and Medium Changer
rmt3          00-05-01-30  IBM 3590 Tape Drive and Medium Changer

F3=Cancel          F7=Commit          F10=Exit
  
```

- Enter the filename **/tmp/3590.dmp** in the destination field. You must press **F7=Commit** after entering the filename.

```


Prompting for Dest File for Operation on rmt3 located at 00-05-01-30
                                                                B00000

Please enter the following fields...

Enter Filename:                                               /tmp/3590.dmp

F1=Help          F2=Refresh        F3=Cancel        F4=List
Esc+5=Reset      F7=Commit         F10=Exit
  
```

- Press **F10** to exit the read dump.

The dump icon  disappears from the 3590 operator panel when the dump to file has completed.

- Press **q** to quit tapeutil.
- Press **Ctrl+]** to get a telnet> prompt, then type **quit** to stop the TELNET session.
- Copy the file **/tmp/3590.dmp** from the SP2 node that has the 3590 attached.
 - Connect to the target node by typing **ftp nodeid**.
Enter a Name and a Password when prompted.
 - Set Binary mode by typing **binary**.
 - Transfer the file by typing **get /tmp/3590.dmp /tmp/3590.dmp**.
 - Quit the connection by typing **quit**.
- Copy the contents of the file to the diskette on the CWS by typing **dd if=/tmp/3590.dmp of=/dev/rfd0 bs=18k conv=sync** at the prompt.
- Remove the diskette from the diskette reader. The dump diskette created above is in AIX/UNIX format.

Checking the SCSI Attachment in an AS/400 Environment

To verify that a 3590 is attached properly to an AS/400, do the following:

1. Type **WRKCFGSTS *DEV *TAP ASTLVL(*BASIC)** at the prompt. The following screen appears, which shows all of the attached tape device names. In this example, TAP13 **1** is the device name to use for VFYTAP.

```
Work with Tape Devices
System: 12345678
Type options below, then press Enter.
 1=Make available    2=Make unavailable    5=Display details
 7=Display message  8=Work with controller 9=Rename
13=Change description

Opt Device      Type      Status
TAPM1.B1      3590     Unavailable (use Opt 1)
TAP01         6380     Unavailable (use Opt 1)
TAP02         3490     Unavailable (use Opt 1)
TAP03         3490     Unavailable (use Opt 1)
TAP09         6390     Unavailable (use Opt 1)
TAP10         3480     Unavailable (use Opt 1)
TAP11         3480     Unavailable (use Opt 1)
TAP13 1        3590     Available to use
TAP14         6390     Unavailable (use Opt 1)
TAP15         6380     Unavailable (use Opt 1)
TAP16         6390     Available to use
TAP17         6380     Available to use

Bottom

F1=Help  F3=Exit  F5=Refresh  F9=Command line  F11=Display descriptions
F12=Cancel  F17=Top  F18=Bottom  F21=Select assistance level
```



2. Type **VFYTAP** (the Verify Tape command) on the AS/400 command line.
3. Type **tap13**, the device associated with the 3590 tape device.
4. Select the **Basic read/write test** **2** option on the Tape Device Test Menu and follow the instructions provided.

```
AJCUHQV2 Tape Device Test Menu
Select one of the following:
 1. Basic read/write test 2
 2. Read/write reliability test
 3. Exit test menu 3

Selection
-
F3=Exit
```

The following screen is displayed when the verification test completes successfully:

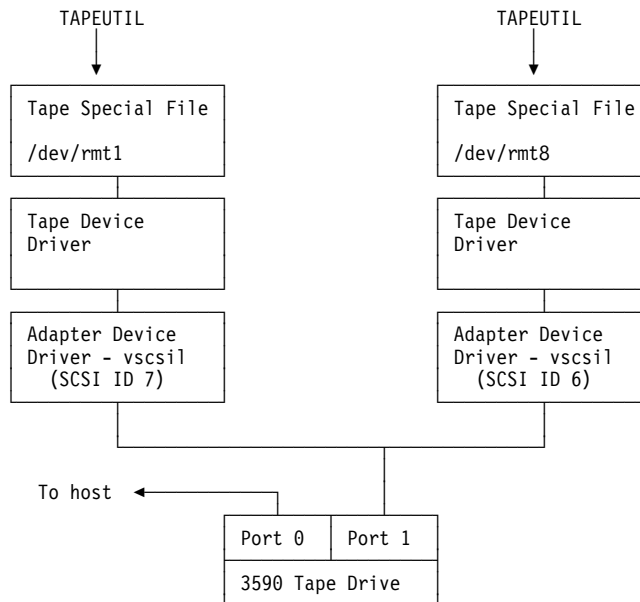
```
AJCUHQV3 Tape Problem Analysis
The verification test completed successfully.
Press Enter to continue.
```

5. When the Tape Device Test menu is displayed, select **Exit test menu** **3**.

Checking the SCSI Attachment in an AIX Environment

The devices must be fully installed and the host device drives must be configured and available. See *IBM SCSI Tape Drive, Medium Changer, and Library Device Drivers: Installation and User's Guide, GC35-0154*, for information about installing and using the IBM SCSI tape drive, medium changer, and library device drivers. Also, "Installation and Configuration Instructions" in the above guide describes the *smit* and *cfgmgr* commands.

Figure 266 shows an example of the software and hardware paths that are used in the following tests. The figure illustrates unique SCSI *initiator* addresses for a configuration with more than one initiator sharing a SCSI bus.



Note: Port 1 of a 3590 is connected to two hosts. The host drivers are configured so that one initiator is at SCSI address 7 and one initiator is at SCSI address 6. The tape special file names on each host are independent and may be different.

Figure 266. Host Attachment Example

Inquiry Command

- To check installed tape devices, type the **lsdev -Cc tape** command. From the listing of devices, remember the ones you are to test. In the following example, device `rmt0` is *defined* **1** to the host, but is not configured. Device `rmt1` is *available*, which indicates it can communicate with the host. The SCSI port address of the devices **2** are also shown.

```

1
2
rmt0 Defined 00-02-00-20 IBM 3590 Tape Drive and Medium Changer
rmt1 Available 00-02-00-10 IBM 3590 Tape Drive and Medium Changer
    
```

The example in the following text refers to the device as *rmt1*. If you do not know which devices to test, ask the customer's system administrator.

2. Type **tapeutil** and the following menu appears:

Note: Your tapeutil menus may vary from the examples, depending on the level of your **Atape.driver** installed in your system. The following examples are using **Atape.driver** at 2.5.1.0.

```

General Commands:
  1. Open a Device          5. Inquiry                9. Log Sense Page
  2. Close a Device        6. Test Unit Ready       10. Mode Sense Page
  3. Device Info           7. Reserve Device        11. Release Device
  4. Tape Drive Service Aids 8. Request Sense         Q. Quit Program

Medium Changer Commands:
  12. Element Information   16. Move Medium
  13. Position To Element  17. Load/Unload Medium
  14. Element Inventory    18. Initialize Element Status
  15. Prevent Medium Removal 19. Allow Medium Removal

Tape Commands:
  20. Query/Set Parameters  30. Read and Write Tests
  21. Load Tape            31. Unload Tape
  22. Rewind               32. Erase
  23. Erase Gap            33. Write Filemarks
  24. Forward Space Filemarks 34. Backward Space Filemarks
  25. Forward Space Records 35. Backward Space Records
  26. Space to End of Data  36. Query/Set Tape Position
  27. Log Sense            37. Library Sequence Number
  28. Display Message      38. Read or Write Files
  29. Synchronize Buffers  39. Recover Buffer Data

Enter Selection:
  
```



3. At the **Enter Selection:** prompt, select the **Open a Device** option and press **Enter**.
4. At the **Enter the device special file name:** prompt, type **/dev/rmt1** (or your actual device).
5. At the **Select mode (1=Read/Write, 2=Read Only, 3=Write Only, 4=Append):** prompt, type **1** to receive the **Opening device...** prompt.
6. At the **Hit any key to continue...** prompt, press **Enter**.

```

General Commands:
  1. Open a Device          5. Inquiry                9. Log Sense Page
  2. Close a Device        6. Test Unit Ready       10. Mode Sense Page
  
```

7. At the **Enter Selection for /dev/rmt1:** prompt, select the **Inquiry** option to receive the **Issuing inquiry...** and the following data:

Inquiry Data, Length 127

```

      0 1 2 3 4 5 6 7 8 9 A B C D E F 0123456789ABCDEF
0000 - 0180 0202 3300 0038 4942 4D20 2020 2020      ..3..81BM
0010 - 3033 3539 3045 3031 3033 3539 3042 3131      03590B1103590B11
0020 - 3344 3201 4353 3030 3030 3030 3030 3031      3D2.CS0000000001
0030 - 3632 2041 C000 0180 04D0 6101 82D0 6101      62 A....Pa..Pa.
0040 - 80D0                                6101      .Pa.. a..Pa..Pa.
0050 - 02D0          Example                0000      .Pa..Pa.....
0060 - 0000                                0000      .....
0070 - 0000 0000 0000 0000 0000 0000 0000 00      .....
  
```

8. At the **Hit any key to continue...** prompt, press **Enter**.

General Commands:		
1. Open a Device	5. Inquiry	9. Log Sense Page
2. Close a Device	6. Test Unit Ready	10. Mode Sense Page

- At the **Enter Selection for /dev/rmt1:** prompt, select the **Close a Device** option.

The system response is **Device closed...**

Read and Write Tests

Load a scratch cartridge in the 3590 before you start this test. (See "Mount specified volume to specified drive" step 4 on page PROC-88 if the device is in a 3494 library.)

Attention: This test overwrites any data or tape label on the tape.

- If the response from the previous test is **Hit any key to continue...**; press Enter. Otherwise, type **tapeutil** to restart.

Note: Your tapeutil menus may vary from the examples, depending on the level of your **Atape.driver** installed in your system. The following examples are using **Atape.driver** at 2.5.1.0.

General Commands:		
1. Open a Device	5. Inquiry	9. Log Sense Page
2. Close a Device	6. Test Unit Ready	10. Mode Sense Page

- At the **Enter Selection:** prompt, select the **Open a Device** option and press **Enter**.
- At the **Enter the device special file name:** prompt, type **/dev/rmt1** (or your specific device).
- At the **Select mode (1=Read/Write, 2=Read Only, 3=Write Only, 4=Append):** prompt, type **1**.

At the **Hit any key to continue....** prompt, press Enter.

General Commands:		
1. Open a Device	5. Inquiry	9. Log Sense Page
2. Close a Device	6. Test Unit Ready	10. Mode Sense Page
3. Device Info	7. Reserve Device	11. Release Device
4. Tape Drive Service Aids	8. Request Sense	Q. Quit Program
Medium Changer Commands:		
12. Element Information	16. Move Medium	
13. Position To Element	17. Load/Unload Medium	
14. Element Inventory	18. Initialize Element Status	
15. Prevent Medium Removal	19. Allow Medium Removal	
Tape Commands:		
20. Query/Set Parameters	30. Read and Write Tests	

- At the **Enter Selection for /dev/rmt1:** prompt, select the **Read and Write Tests** option and press **Enter**.
- At the **Select test (1=Read/Write, 2=Read Only, 3=Write Only):** prompt, type **1**.
- At the **Hit <Enter> for default 10240 block size or enter new block size:**, press **Enter**.

8. At the **Hit <Enter> for default 20 blocks per read/write or enter new blocks:** prompt, press **Enter**.
9. At the **Hit <Enter> for default 1 repetition or enter new repetition:** prompt, press **Enter**.

The following data is displayed:

```
Read/Write test, blocksize 10240 count 20 repetition 1
Setting block size...
```

```
Read/Write test pass 20
Writing 10240 bytes, 20 blocks...
Write complete, bytes written 204800, blocks 20
Writing 2 file marks...
Backward spacing 2 file marks...
Backward spacing 1 records...
Reading 204800 bytes, 20 blocks...
Read complete, bytes read 204800, blocks 20
Forward spacing file mark...
Data verification complete, no discrepancies found
```

```
Read/Write test completed, total bytes written 204800
```

10. At the **Hit any key to continue...** prompt, press **Enter**.

General Commands:		
1. Open a Device	5. Inquiry	9. Log Sense Page
2. Close a Device	6. Test Unit Ready	10. Mode Sense Page

11. Unload the drive before closing the device in the next step.
12. At the **Enter Selection for /dev/rmt1:** prompt, select the **Close a Device** option and press **Enter**.

At the **Device closed...**

Hit any key to continue... prompt, press **Enter**.

General Commands:		
1. Open a Device	5. Inquiry	9. Log Sense Page
2. Close a Device	6. Test Unit Ready	10. Mode Sense Page
3. Device Info	7. Reserve Device	11. Release Device
4. Tape Drive Service Aids	8. Request Sense	Q. Quit Program

13. At the **Enter Selection:** prompt, type **q** to stop the tapeutil program.

Checking the SCSI Attachment in a Sun Environment

The devices must be fully installed and the host device drives must be configured and available.

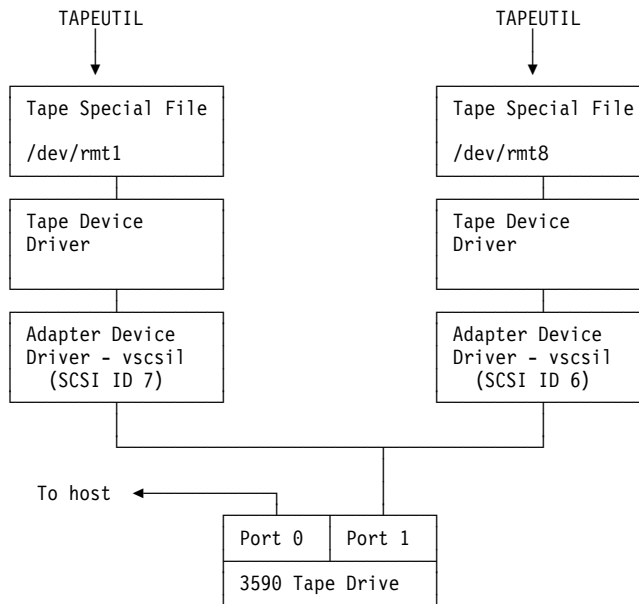
TAPEUTIL

Refer to *IBM SCSI Tape Drive, Medium Changer, and Library Device Drivers: Installation and User's Guide, GC35-0154*, for details of the **tapeutil** program in the Sun (Solaris) system.

You may require assistance from the customer during this process.

To verify that the device driver and the devices are functional, use the **tapeutil** program, which is provided with the *IBM SCSI Tape Device Driver for SunOS*.

Figure 267 shows an example of the software and hardware paths that are used in the following tests.



Note: Port 1 of a 3590 is connected to two hosts. The host drivers are configured so that one initiator is at SCSI address 7 and one initiator is at SCSI address 6. The tape special file names on each host are independent and may be different.

Figure 267. Host Attachment Example

1. Load a scratch tape cartridge in the IBM 3590.
Attention: This test overwrites any data or label existing on the tape cartridge.
2. Type **/opt/IBMtape/tapeutil**. The following menu is displayed: (This menu reappears at the completion of each command.)

```

+-----+
|               TEST UTILITY               |
|      IBM SCSI Tape Device Driver for SunOS      |
+-----+
1: Open Device           17: Forward Space File
2: Close Device          18: Backward Space File
                        19: Forward Space Record
3: Inquiry               20: Backward Space Record
4: Request Sense         21: Locate End Of Data
5: Test Unit Ready       22: Off-line
6: Reserve               23: Load Tape
7: Release               24: Unload Tape
                        25: Sync Buffer
8: Element Information   26: Display Message
9: Move Medium
10: Inventory
11: Read Data            27: Get Device Status
12: Write Data           28: Get Device Info
                        29: Get Media Info
13: Write File Mark     30: Get Position
14: Erase Tape           31: Set Position
15: Rewind              32: Get Parameter
16: Retention           33: Set Parameter

Q: Quit Program

```



3. At the **Enter Selection:** prompt, select **1** to open the device.
4. At the **Enter device special file name:** prompt, type **/dev/rmt/1st** (or the actual device special file for your device).
5. At the **Select mode (1=read-write, 2=read, 3=write, 4=append):** prompt, type **1**. The **Device opened** response is displayed.
6. At the **Enter Selection:** prompt, select **3** to receive the device inquiry data. The inquiry data follows:

```

The IOC_INQUIRY ioctl succeeded.      (EXAMPLE)

The inquiry data is:

  1 80  2  2 33  0  0 38 49 42 4d 20 20 20 20 20
30 33 35 39 30 42 31 31 20 20 20 20 20 20 20 20
34 44 30 33 54 55 20 20 20 20 20 20 20 30 30 30
32 39 30 20  3  0  0 81  0  0  0  0  0  0  0  0
  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0

```

7. At the **Enter Selection:** prompt, select **5** to verify device test-unit ready. The response is:

```

The IOC_TEST_UNIT_READY ioctl succeeded.

```

8. At the **Enter Selection:** prompt, select **12** to perform write verification.
9. At the **Enter block size:** prompt, type **1024**.
10. At the **Enter blocking factor:** prompt, type **256**.
11. At the **Enter megabytes to write:** prompt, type **10**.
12. At the **Enter pattern file name:** prompt, press Enter.
13. At the **Enter random seed:** prompt, type **0**. The response is:

```
Generated 262144 bytes of random data using seed 7892.  
*****  
*****  
Transferred 10MB in 1.98 seconds for rate of 5.16MB/second.
```

14. At the **Enter Selection:** prompt, select **15** to rewind the tape. The response is:

```
The STIOC_TAPE_OP ioctl succeeded.
```

15. At the **Enter Selection:** prompt, select **11** to perform read verification.
16. At the **Enter block size:** prompt, type **1024**.
17. At the **Enter blocking factor:** prompt, type **256**.
18. At the **Enter megabytes to write:** prompt, type **10**. The response is:

```
*****  
*****  
Transferred 10MB in 2.19 seconds for rate of 4.69MB/second.
```

19. At the **Enter Selection:** prompt, select **15** to rewind the tape. The response is:

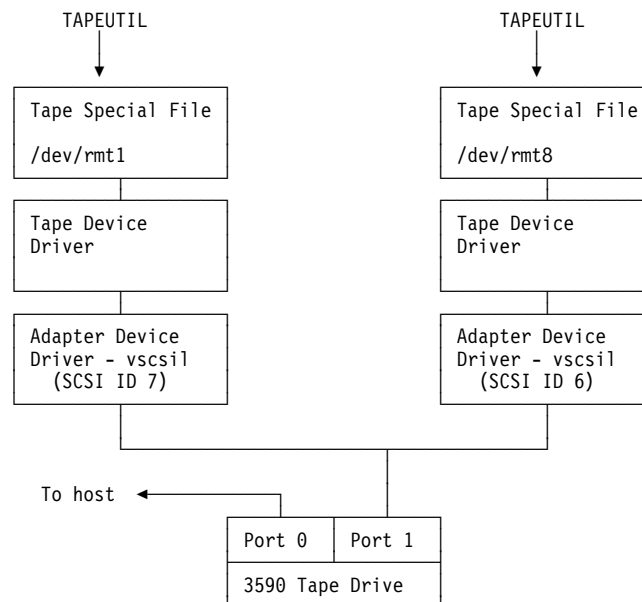
```
The STIOC_TAPE_OP ioctl succeeded.
```

20. At the **Enter Selection:** prompt, select **2** to close the device. The **Device closed** response is displayed.
21. At the **Enter Selection:** prompt, select **Q** to exit the tapetest program.

Checking the SCSI Attachment in a HP-UX Environment

The devices must be fully installed and the host device drives must be configured and available. See *IBM SCSI Tape Drive, Medium Changer, and Library Device Drivers: Installation and User's Guide*, GC35-0154, for information about installing and using the IBM SCSI tape drive, medium changer, and library device drivers. Also, "Installation and Configuration Instructions" in the above guide describes the *smit* and *cfgmgr* commands.

Figure 268 shows an example of the software and hardware paths that are used in the following tests. The figure illustrates unique SCSI *initiator* addresses for a configuration with more than one initiator sharing a SCSI bus.



Note: Port 1 of a 3590 is connected to two hosts. The host drivers are configured so that one initiator is at SCSI address 7 and one initiator is at SCSI address 6. The tape special file names on each host are independent and may be different.

Figure 268. Host Attachment Example

1. Load a scratch tape cartridge in the IBM 3590.
Attention: This test overwrites any data or label existing on the tape cartridge.
2. Type `/opt/IBMtape/tapeutil`.
3. At the **Enter Selection:** prompt, select **1** to open the device.
4. At the **Enter device special file name:** prompt, type `/dev/rmt/0st` (or the actual device special file for your device).
5. At the **Select mode (1=read-write, 2=read, 3=write, 4=append):** prompt, type **1**. The **Device opened** response is displayed.
6. At the **Enter Selection:** prompt, select **10** to receive the device inquiry data. Valid data indicating the device is a 3590 should be displayed.
7. At the **Enter Selection:** prompt, select **9** to verify the device test-unit is ready.
8. At the **Enter Selection:** prompt, select **21** to perform write verification.

9. At the **Enter block size:** prompt, type **1024**.
10. At the **Enter blocking factor:** prompt, type **256**.
11. At the **Enter megabytes to write:** prompt, type **10**.
12. At the **Enter pattern file name:** prompt, press Enter.
13. At the **Enter random seed:** prompt, type **0**.
14. At the **Enter Selection:** prompt, select **24** to rewind the tape.
15. At the **Enter Selection:** prompt, select **20** to perform read verification.
16. At the **Enter block size:** prompt, type **1024**.
17. At the **Enter blocking factor:** prompt, type **256**.
18. At the **Enter megabytes to write:** prompt, type **10**.
19. At the **Enter Selection:** prompt, select **24** to rewind the tape.
20. At the **Enter Selection:** prompt, select **2** to close the device. The **Device closed** response is displayed.
21. At the **Enter Selection:** prompt, select **Q** to exit the tapetest program.

Checking the SCSI Attachment in a Windows NT Environment

The devices must be fully installed and the host device drives must be configured and available. See *IBM SCSI Tape Drive, Medium Changer, and Library Device Drivers: Installation and User's Guide*, GC35-0154, for information about installing and using the IBM SCSI tape drive, medium changer, and library device drivers. Also, "Installation and Configuration Instructions" in the above guide describes the *smit* and *cfgmgr* commands.

Figure 269 shows an example of the software and hardware paths that are used in the following tests.

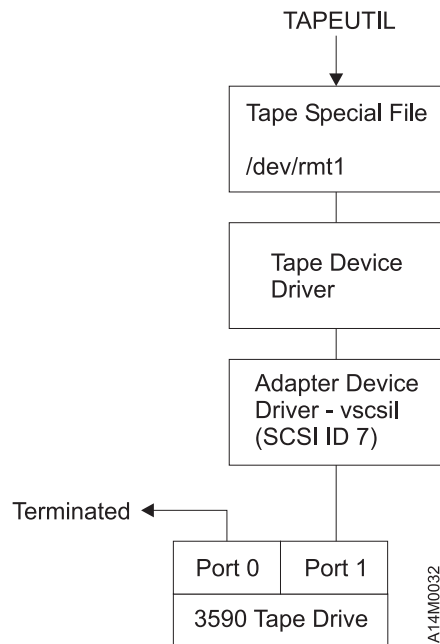


Figure 269. Host Attachment Example

1. Load a scratch tape cartridge in the IBM 3590.
Attention: This test overwrites any data or label existing on the tape cartridge.
2. Type **ntutil**.
3. At the **Enter Selection:** prompt, select **1** to open the device.
4. At the **Enter device special file name:** prompt, type **tape0** (or the actual device special file for your device).
5. At the **Select mode (1=read-write, 2=read, 3=write, 4=append):** prompt, type **1**. The **Device opened** response is displayed.
6. At the **Enter Selection:** prompt, select **49** to receive the device inquiry data. Valid data indicating the device is a 3590 should be displayed.
7. At the **Enter Selection:** prompt, select **39** to verify the device test-unit is ready.
8. At the **Enter Selection:** prompt, select **23** to perform write verification.
9. At the **Enter block size:** prompt, type **1024**.
10. At the **Enter blocking factor:** prompt, type **256**.
11. At the **Enter megabytes to write:** prompt, type **10**.

12. At the **Enter pattern file name:** prompt, press Enter.
13. At the **Enter random seed:** prompt, type **0**. The PC will write data to the tape and status will be displayed.
14. At the **Enter Selection:** prompt, select **31** to rewind the tape.
15. At the **Enter Selection:** prompt, select **22** to perform read verification.
16. At the **Enter block size:** prompt, type **1024**.
17. At the **Enter blocking factor:** prompt, type **256**.
18. At the **Enter megabytes to write:** prompt, type **10**. Data will be read from the tape and status will be displayed.
19. At the **Enter Selection:** prompt, select **31** to rewind the tape.
20. At the **Enter Selection:** prompt, select **2** to close the device. The **Device closed** response is displayed.
21. At the **Enter Selection:** prompt, select **Q** to exit the tapetest program.

Setup for SCSI Ports Wrap Test

Use **only** P/N 62G1324 or P/N 05H9163 for the SCSI wrap test; using the wrong wrap tool may cause the 3590 to not run the wrap test.

- ___ 1. See Figure 270 Be sure that the power switch **1** is in the OFF position.
- ___ 2. Install the SCSI wrap tool in SCSI port 0 **2** . As viewed from the rear, port 0 is on the left. If your account has another SCSI wrap tool, install it in SCSI port 1, you can check both ports at the same time.
- ___ 3. Return to the procedure that sent you here.

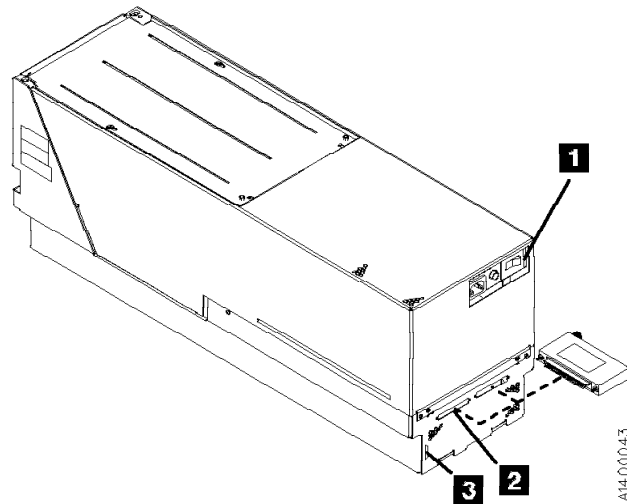


Figure 270. Installing SCSI Wrap Tool (Rear View)

SCSI Ports Wrap Test

Use **only** P/N 62G1324 or P/N 05H9163 for the SCSI wrap test; using the wrong wrap tool may cause the 3590 to not run the wrap test.

- ___ 1. See Figure 271. Set the power switch **1** to the OFF position.
- ___ 2. Install the SCSI wrap tool in SCSI port 0 **2**. As viewed from the rear, port 0 is on the left. If your account has another SCSI wrap tool, you can check both ports at the same time.

Note: When you switch OFF power to the 3590, wait approximately 5 seconds before you switch ON power again.

- ___ 3. Set the power switch to the ON position. The wrap test runs automatically. When the drive detects that the wrap tool is installed in a port, the drive enters CE mode rather than operator mode during the power-on sequence.

This power-on test takes approximately 2.5 minutes to complete.

If a failure occurs, a message can be posted in the operator/CE panel, or the operator/CE panel can be blank. If any of these conditions exist, go to the START section for further analysis.

- ___ 4. Repeat steps 1 through 3 for SCSI port 1.
- ___ 5. Set the power switch to the OFF position and remove the SCSI wrap tool.
- ___ 6. Return to the procedure that sent you here.

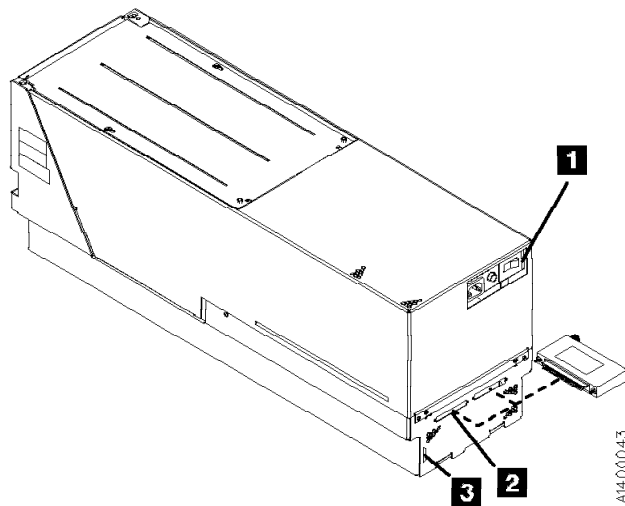


Figure 271. Installing SCSI Wrap Tool (Rear View)

Setup for Library Manager Port Wrap Test

Use **only** P/N 39F3884 (a 3494 or 3495 special tool) for the wrap test; using the wrong wrap tool may cause the 3590 to not run the wrap test.

- ___ 1. See Figure 272. Be sure that the power switch **1** is in the OFF position.
- ___ 2. Plug the 9-pin to 25-pin interposer **2** P/N 05H3895 in the back of the drive **4** (library manager connector), and then plug the terminator **3** P/N 39F3884 in the interposer.
- ___ 3. Return to the procedure that sent you here.

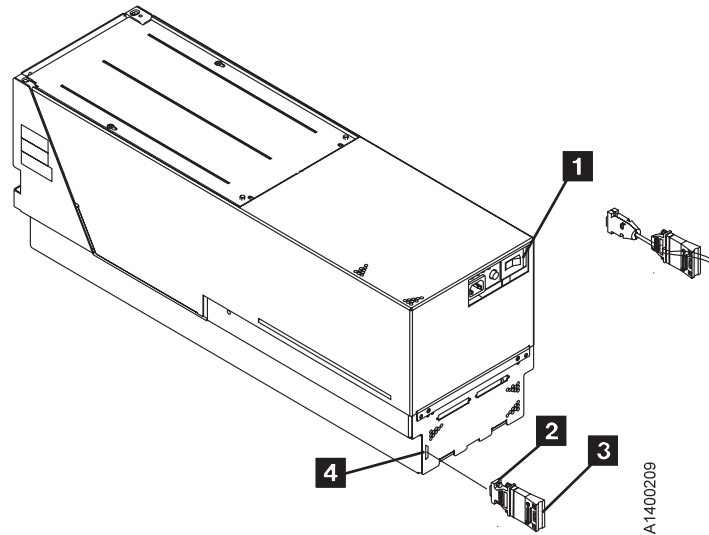


Figure 272. Installing Wrap Tool (Rear View)

Library Manager Port Wrap Test

Use **only** P/N 39F3884 (a 3494 or 3495 special tool) for the wrap test; using the wrong wrap tool may cause the 3590 to not run the wrap test.

- ___ 1. See Figure 273. Set the power switch **1** to the OFF position.
Note: When you switch OFF power to the 3590, wait approximately 5 seconds before you switch ON power again.
- ___ 2. Plug the 9-pin to 25-pin interposer **2** P/N 05H3895 in the back of the drive **4** (library manager connector), and then plug the terminator **3** P/N 39F3884 in the interposer.
- ___ 3. Set the power switch to the ON position. The wrap test runs automatically. When the drive detects that the wrap tool is installed in the port, the drive enters CE mode rather than operator mode during the power-on sequence.
This power-on test takes approximately 2.5 minutes to complete.
If a failure occurs, a message can be posted in the operator/CE panel, or the operator/CE panel can be blank. If any of these conditions exist, go to the START section for further analysis.
- ___ 4. Set the power switch to the OFF position and remove the wrap tool.
- ___ 5. Return to the procedure that sent you here.

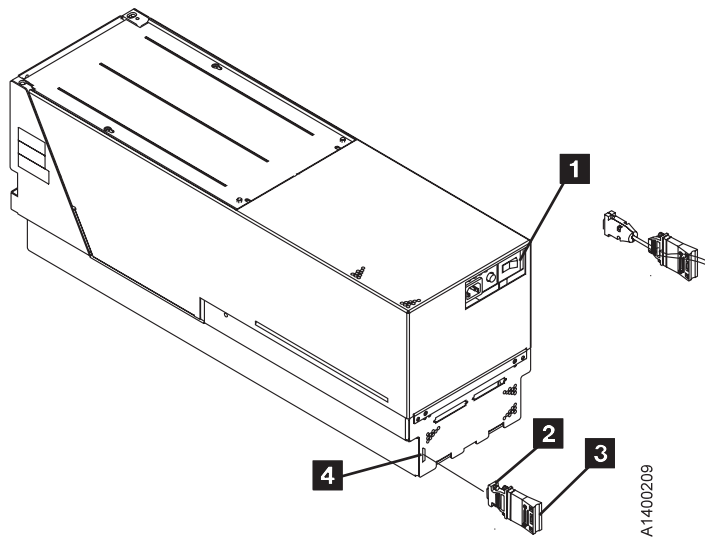


Figure 273. Installing Wrap Tool (Rear View)

Checking 3494 Control Path by Using MTLIB Command from RS/6000

The devices must be fully installed and the host device drives must be configured and available. See *IBM SCSI Tape Drive, Medium Changer, and Library Device Drivers: Installation and User's Guide*, GC35-0154, for information about installing and using the 3590 in a tape library. Also, "Tape Library Support Programs" in the above guide describes the *mtlib* program.

Figure 274 shows an example of the software and hardware paths that are used in the following test.

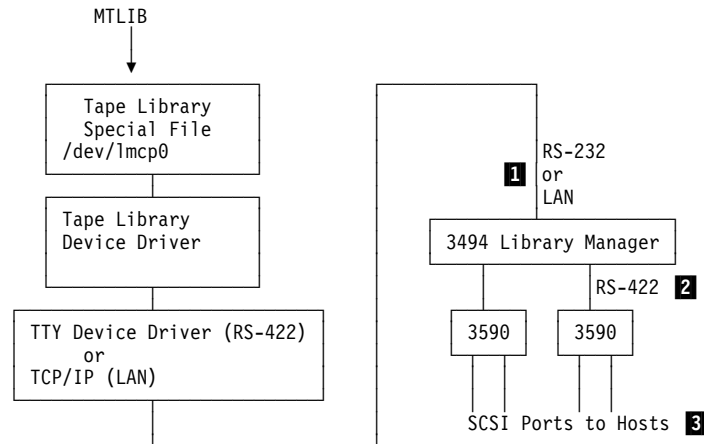


Figure 274. Tape Library Control Path Example

This procedure verifies the control path, **1**, which connects the host through the RS-232 port or the LAN to the library manager. This path is where the host sends commands the library manager to perform tasks that do not require the 3590.

To verify the library manager to the 3590 connections **2**, see "Library Manager Port Wrap Test" on page PROC-86.

To verify the SCSI connections **3**, see "Checking the SCSI Attachment in an AIX Environment" on page PROC-72 or "Checking the SCSI Attachment in a Sun Environment" on page PROC-76.

The following responses to the commands are examples only.

1. Determine the library manager control points for the installation by typing **lsdev -Cc tape** and you will receive the following response:

```
...
lmcp0 Available          LAN/TTY Library Management Control Point
rmt2  Available 00-01-01-2,0 IBM SSD 3590 Tape Drive
...
```

Use the following commands to exercise the control path to the device. Run these commands for each control path. The examples use library control point device */dev/lmcp0*, tape device */dev/rmt2*, and volume id *CS2201*.

2. Display the library inventory by typing **mtlib -l /dev/lmcp0 -ql** and you will receive the following response:

```
...
CS2200 FF00
CS2201 FF00
...
```

- Audit a specified volume by typing
mtlib -l /dev/lmcp0 -v -a -V CS2201 and you will receive the following response:

```
Performing Audit of volume CS2201 using /dev/lmcp0  
Audit was performed for volser: CS2201
```

Use the following commands to mount and eject a scratch volume through the convenience input/output (CIO) station.

The examples use library control point device */dev/lmcp0*, tape device */dev/rmt2*, and volume id *CS2201*.

- Type **mtlib -l /dev/lmcp0 -m -f /dev/rmt2 -V CS2201** to mount the specified volume on the specified drive. (No output response is produced when the mount is successful.)
- Go to "Read and Write Tests" on page PROC-74 if you want to perform read/write tests, then return here.
- Demount the volume from the specified drive (demount may be automatic) by typing:
mtlib -l /dev/lmcp0 -d -f /dev/rmt2 to demount the volume. (No output response is produced when demount is successful.)
- Eject the specified volume from the library through the convenience input/output (CIO) station by typing
mtlib -l /dev/lmcp0 -v -C -t FF10 -V CS2201 and you will receive the following response:

```
Performing Change volume category of CS2201 to FF10.
```
- Return to the procedure that sent you here.

FID E5—Microcode Problem


If FID E5 is currently displayed on the drive, go to step 1. If FID E5 is not currently displayed on the drive, go to step 2.

1. If FID E5 is **currently displayed** on the drive:

- a. From FID display, write down the support data (12 characters).
- b. Call your next level of support with the FID and support data to determine if this problem is a new or known microcode problem.
- c. For *known* microcode problems, ask your next level of support to see if a fix exists on latest EC Level. If a fix exists, update the device to latest EC level.

If a fix is not yet available, tell the customer that engineering is aware of problem and is working on a fix. Install the fix when available. For known microcode problems, use TAC M01.

New Microcode Problem

- d. For *new* microcode problems, you must provide a microcode dump, the reported FID, and FID support data to your next level of support.
- e. For certain failures, the drive automatically collects dump information. If the dump icon  is displayed when FID E5 is displayed, retrieve the dump via SCSI or cartridge and provide it to your next level of support. See START section entry point for microcode dump procedures. For new microcode problems, use TAC M02.
- f. If the dump icon is **not displayed** when FID E5 is displayed, a dump must be forced:
 - 1) Check with the customer to determine if they have collected a dump via SCSI for this problem (could be reason why no dump icon is displayed).
 - 2) If the customer has the dump data, provide it to your next level of support.
 - 3) If the customer does not have dump data or is not sure, go to CE Main Dump menu, and select **Force Dump**. A dump is available when the dump icon is displayed.
 - 4) Retrieve the dump via SCSI, 3591 Control Unit, or cartridge and provide it to your next level of support. Go to START section for the entry point to microcode dump procedures. For new microcode problems, use TAC M02.

End of New Microcode Problem

2. If FID E5 is **not currently displayed** on the drive:

- a. Look at the FID log for most recent FID E5 entry. From the FID log, write down the support data (12 characters). Call your next level of support with the FID and support data to determine if this problem is a new or known microcode problem.

- b. For *known* microcode problems, ask your next level of support to see if a fix exists on latest EC Level. If one exists, update customer to latest EC level.

If a fix is not available, tell the customer that engineering is aware of problem and working on fix. Install the fix when available. For known microcode problems, use TAC M01.

- c. For *new* microcode problems, a dump is needed. Check with customer to determine if they had collected a dump via SCSI for this problem when the FID and the dump icon was displayed. Go to START section for the entry point to microcode dump procedures.

If the customer has the dump information, provide the dump, the FID, and the FID support data to your next level of support.

If no dump exists, go to step 3. For new microcode problems, use TAC M02.

3. Determine if the customer can readily recreate the FID E5 message.

If the customer **can** readily perform operations and/or run job that caused the E5 message, wait until it occurs and follow the procedure starting at step 1 on page PROC-89.

If the customer **cannot** readily recreate the message or it is an inconvenient time, the following options exist to acquire the dump for the next level of support:

- a. Allow the problem to reoccur and customer to take the initiative.
 - 1) The customer can leave the drive with FID E5 message displayed and then call for service.
 - 2) If the dump icon is also displayed, the customer can retrieve the dump via SCSI (if host device driver software supports the dump function). Go to START section for entry point to microcode dump procedures.
 - 3) If the dump icon is not displayed, the customer can force an error dump (Op Services menu), which provides a FID FF and the dump icon. The FID FF indication means that a dump was forced (information message). The icon is for the FID E5, so now the customer can retrieve a dump via SCSI (if the host device driver software supports the dump function). Go to START section for entry point to microcode dump procedures.
- b. If the customer does not take the initiative, you can set a microcode trap. From the 12-character support data, do the following:
 - 1) Use the first four characters (if not starting with 'A' such as Axxx). If the first four characters are Axxx, use the second set of four characters.
 - 2) Take the four characters (FSC) and select **Microcode Trap** under the CE Service Utilities menu. Select the four FSC characters. Use the **Saved Traps** option, so that POR or Reset cannot reset the trap. Then select **Add Saved FSC Trap** from the CE Saved Traps menu. With this trap set, a dump will automatically be taken when this FSC is encountered, and the dump icon is displayed.

- 3) The customer can retrieve the dump via SCSI for you or call you when the dump icon appears. Go to START section for entry point to microcode dump procedures.
4. Return to the procedure that sent you here or go to "End of Call" on page PROC-8.



FID E6 or E7—Isolate Fault Between Microcode and Hardware

FID E6 can be displayed in large letters (normal FID) or in small letters with several lines of support data (abnormal condition). If FID E6 or FID E7 is displayed in large letters, use “FID E6, E7—Normal FID Display Procedure.”

If FID E6 is displayed in small letters, use “FID E6—Small Letters (Abnormal Display Condition)” on page PROC-94.

FID E6, E7—Normal FID Display Procedure

Use either the “FID Currently Displayed on Drive” or the “FID Not Currently Displayed on Drive” on page PROC-93 procedure.

FID Currently Displayed on Drive

1. From FID display, write down the support data (12 characters). Call your next level of support with the FID and support data to determine if this problem is a new or a known microcode problem.

Known Microcode Problem

2. For known microcode problems, see if fix exists on latest EC Level. If a fix exists, update the drive to the latest EC level. For known microcode problems, use TAC M01.
3. If a fix does not exist, tell the customer that engineering is aware of problem and working on a fix. Install the fix when it is available.

End of Known Microcode Problem

Possible New Microcode Problem

4. At this point it could be a new microcode problem or a hardware problem. Because it could be a potential new microcode problem, get a microcode dump.

Dump Icon Also Displayed

For certain failures, the drive automatically collects dump information. Retrieve the dump via SCSI or cartridge (save for now).

Dump Icon Not Displayed

For certain failures, the drive automatically collects dump information, other failures require you to force a microcode dump.

1. Check with the customer to determine if they collected a dump via SCSI for this problem (could be why no dump icon is displayed).
2. If the customer has the dump data, save it for now.
3. If the customer does not have the dump data, or is not sure, go to the CE Main Dump menu, and select the **Force Dump** option. Dump exists when dump icon is displayed.
4. Retrieve a dump via SCSI or cartridge or 3591 Control Unit; save it for now.

5. Press the Reset push button on the operator/CE panel.
6. Run Verify Fix diagnostics.
 - a. If you get a new or a different FID, go to the START section with that information.
 - b. If you get the same FID (E6 or E7), a hardware problem exists. Do not save the microcode dump. Perform actions for next FRU in the FID List.
 - c. If an error does not occur, the fault could be a new microcode problem or an intermittent electronics problem. Call your next level of support and provide them with dump and the 12-character support data. For new microcode problems, use TAC M02. For electronic problems, use TAC T21.

_____ End of Possible New Microcode Problem _____

7. Go to “End of Call” on page PROC-8.

FID Not Currently Displayed on Drive

1. Look at the Error Log for most recent FID E6 or FID E7 entry.
2. From the Error Log, record the support data (12 characters). Call your next level of support with the FID and support data to determine if this problem is a known microcode problem.
3. For new or known microcode problems:
 - From support, see if fix exists on latest EC Level. If a fix exists, update the drive to latest EC level.
 - If a fix does not exist, tell customer that engineering is aware of problem and working on a fix. Install the fix when it is available. For known microcode problems, use TAC M01.
4. At this point it could be a new microcode problem or a hardware problem.
 - a. Press the Reset push button on the operator/CE panel.
 - b. Run **Verify Fix** from the CE Options menu.
 - c. If you get a new or a different FID, go to the START section with that information.
 - d. If you get the same FID (E6 or E7), a hardware problem exists. Perform the actions for next FRU in FID List.
5. If an error does not occur, the fault could be a new microcode problem or an intermittent electronics problem. You need to get a dump.
 - a. A dump may already exist. Check with the customer to determine if they had collected a dump via SCSI for this problem when the FID and the dump icon were displayed.

If the customer has the dump data, provide the dump, the FID, and the FID support data to your next level of support.
 - b. If no dump exists, go to step 6.
6. Determine if the customer can readily recreate the FID message.

7. If the customer can readily perform operations and/or run the job that caused the message, wait until it occurs and follow the procedure for the FID currently displayed.
8. If the customer cannot readily recreate the message, or if this is an inconvenient time, the following options exist to acquire the dump for your next level of support.

Allow the problem to reoccur and have the customer take the initiative (go to step 8a) or you can take the initiative (go to step 9).

- a. The customer can leave the drive with FID message displayed and then call for service.
 - b. If the dump icon is also displayed, the customer can retrieve a dump via SCSI (if host device driver software supports).
 - c. If the dump icon is not displayed, the customer can select Force Error Dump (operator Services menu), which will provide a FID FF and the dump icon. FID FF indicates that a dump was forced (information message). The icon is for the FID E6, so now the customer can retrieve a dump via SCSI (if the host device driver software supports dumps)
9. You can take the initiative and Set a Microcode Trap as follows:
 - a. From the 12-character support data, use the first four characters (if it does not start with 'A' such as Axxx). Use the second set of four characters if the first four are Axxx.
 - b. Take the four characters (FSC) and use the Microcode Trap facility under CE Utilities menu. Use the Add FSC Trap function. With this trap set, a dump will automatically be taken when this FSC is encountered, and the dump icon is displayed. The customer can retrieve the dump via SCSI for you or can call for service when the dump icon appears.
 10. Perform "End of Call" on page PROC-8 or return to the procedure that sent you here.

FID E6—Small Letters (Abnormal Display Condition)

FID1 E6 is presented in small letters followed by four lines of support data. As the following example shows, each line contains eight characters:

```

FID1 E6
FSC AAAA BBBB
FSC CCCC DDDD
FSC EEEE FFFF
FSC F020 EEEE

```

When the above is displayed (EEEE is repeated), the operator panel is frozen (you cannot select another menu, and the push buttons do not respond). Therefore, you cannot use the panel or cannot get dumps from either the host or the panel.

1. Obtain as much information as possible regarding the job being run, any drive operations, and the failure scenario. Record the information displayed on the panel (including the four lines of support data). Save this information for now.
2. Switch OFF power, wait 5 seconds and then switch ON power. The drive automatically runs the power-on self-test (POST).
3. See Figure 275 on page PROC-95

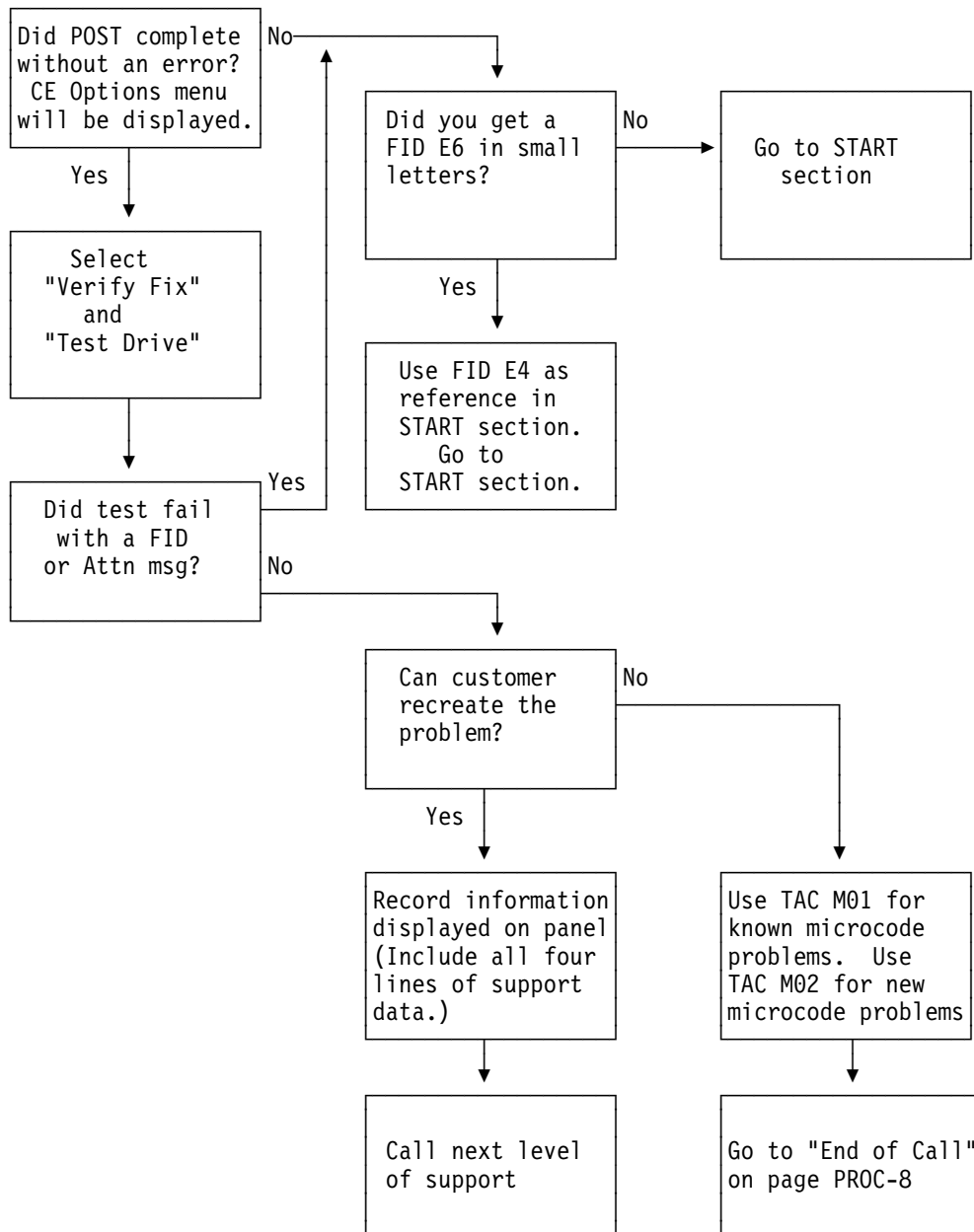


Figure 275. Flow Diagram for FID E6 in Small Letters

FID FE—Isolate Fault Between Media and Hardware


A FID FE will be generated when the drive experiences an error and cannot determine if the error was caused by the tape cartridge or by a problem in the drive hardware. The FID FE is not displayed on the drive, but is logged in the sense information that is returned to the host system. If the customer receives errors when reading or writing to the drive and there is no FID displayed on the drive, a FID FE was probably returned in the sense information to the host. If needed, refer to the Message Section to determine how to obtain service information from the host system.

To determine the cause of the read or write errors, follow the steps below:

1. Determine which VOLSER #s or cartridges are potential problems:
 - a. Ask the customer to note which cartridges (VOLSER #s) fail during the operation. (It is possible to have multiple bad cartridges.)
 - b. If the customer received MIM Messages at the host, get the “Message Code” and associated VOLSER #, if available. Refer to “Message Codes” on page MSG-6 and Figure 36 on page MSG-3.
 - c. Examine the FID FE log using the “LOGS” option of the CE Menu on the operator panel. Collect both FIDs and associated VOLSER #s. See Figure 83 on page PANEL-13 and “CE FID FE Log Menu” on page PANEL-46. The FE log will display entries for up to 10 of the most recent occurrences of the FE error. Each entry consists of four lines of information that pertain to the error:
 - 1) The first line provides an alternate FID number that you can use to isolate the problem.
 - 2) The second line displays the first and last FSC's and the microcode link.
 - 3) The third line provides a power-on date/time stamp which can be compared with power-on hours in the “Show Statistics Menu”, or a “Current Time Stamp” option (if present).
 - 4) The fourth line provides VOLSER# of the suspect cartridge, if available.
 - d. If the customer received SIM messages at the host, get VOLSER #s, if available, from Sense Data which accompanied the SIM. Refer to the Message Section for details.
2. Determine if the cartridges are bad:
 - a. If you have a MIM Message Code for the suspect VOLSER # cartridge, perform the action stated in the “Message Codes” on page MSG-6.
 - b. Examine cartridge for damage, for example, leader block not attached or cracked cartridge. If damaged, ask customer to repair or replace cartridge.

Note: a repaired cartridge may be used long enough to recover data on that cartridge. When the data has been recovered, the cartridge should be taken out of service by the customer and discarded.
 - c. If the cartridges look OK and you have access to another 3590 try the operation with the suspect cartridges in another 3590.
 - d. Have the customer replace any cartridges that have failed in more than one 3590.
3. If the cartridges are not bad, isolate the problem to a drive FRU:

- a. Examine the log entries and, using the alternate FID numbers provided, try to determine a common reason for the FE errors.
- b. Use the “Error Log Analysis Procedure” on page PROC-99 as an approach to problem isolation.
- c. Test the drive:

- 1) Press the Change Mode  push button to place the drive in CE mode.
- 2) Select **Verify Fix**.
- 3) From the Verify Fix menu, select **Test Drive**. Use the CE scratch tape when you are prompted to load a tape.

If the test fails with the same FID as the one reported or logged, go to “FID Entry Point” on page START-7 to fix the fault. Continue with the FRU list for this FID.

If the test fails with a different FID from the one reported or logged, use the new FID and go to “FID Entry Point” on page START-7 to fix the fault.

Note: Before replacing any FRUs, check the head cable connections. Ensure that the head cables are not loose.

- 4. Perform “End of Call” on page PROC-8 or return to the procedure that sent you here.

FID FF—Operator Action or Host Program Error

FID FF is always presented to the host. Some types of problems are also presented on the operator panel.

The “CE FID FF Log Menu” on page PANEL-47 provides a log of a filtered subset of all sense data sent to the host with a FID of FF. Use this log to assist you in diagnosing a FID FF problem.

FID FF Displayed on Drive Panel: FID FF is displayed on drive panel (it also went to host).

- FID FF is automatically displayed when the operator selects Force Error Dump from the operator Services menu. This causes a FID1 FF with expert systems data of E009 XXXX XXXX.

Action: Remove the dump icon and the FID message by pressing the Reset push button or by powering the drive OFF, and then ON.

The FID message can be removed without removing the dump icon by selecting **Reset Drive** on the operator Services menu.

FID FF Displayed at Host Only—Not at Drive Panel: FID FF is not displayed on drive panel (it went to host only).

- The host receives this FID, but it is not presented on the drive operator panel. If FID ‘FF’ was reported in host error log via a **SIM message**, then perform action indicated in SIM message codes (e.g. clean drive). Refer to MSG section.
- This FID is presented for an invalid and unsupported SCSI command or parameter, which is a SCSI application program software problem. Sense data exists at the host.
- This FID can also be presented for a drive operator procedural problem. For example, FID FF is presented when a magazine is not in the ACF and the host issues a Load command. Another example is when the operator tries to switch to random mode and the magazine is not locked.

The service representative should look in the drive error log for any ATTN DRIVE or ATTN ACF messages (which may have caused the FID FF to be sent to the host via sense data). If any of these ATTN messages are present in the error log, use that data to do further isolation for the FID FF cause.

Suspected Microcode Problem

1. Press Reset on the operator/CE panel.
2. Run Verify Fix test.
3. If you get a FID, go to Figure 2 on page START-7 with that FID.
4. If the drive tests work OK, the fault could be a microcode problem or an intermittent hardware problem.

Go to “Problem Determination Procedure” on page PROC-4 or “FID E5—Microcode Problem” on page PROC-89 to assist with the problem determination.

5. If the failure still occurs, collect as much information as you can from the customer and contact your next level of support.

Error Log Analysis Procedure

The Error Log Analysis Procedure is designed to assist the service representative in isolation of intermittent failures, or chronic problems that seldom happen but occur often enough to cause a concern. An example of using the error log to demonstrate how one might look for possible leads on which FRUs to replace in such a case follows. The example does not use real data, and is intended for demonstration only.

Figure 276 on page PROC-101 shows a blank Error Log Analysis Work Sheet that you can make a copy of and use to write down FIDs with the following procedure. Figure 277 on page PROC-102 shows the same Error Log Analysis Work Sheet with a sample extraction from the 3590 error log.

Following is a sample of how you might gather and analyze error log data. The following list is a summary of what you might find in the 3590 error log:

Note: Only 10 positions are shown in this example. You may prefer to use the most recent 10 or the entire error log in your analysis. The first (top) errors are the most current as shown by the relative time stamp.

Entry 1 FID 98
Entry 2 FID A7
Entry 3 FID 9F
Entry 4 FID C6
Entry 5 FID 95
Entry 6 FID CA
Entry 7 FID C6
Entry 8 FID A8
Entry 9 FID 9F
Entry 10 FID A9

Fill out the blank sheet as follows (note that our example has all the sample data already there for your information):

1. Take the FID from the most recent error log entry and put it in the first column (FID 98 in our example). Continue listing FIDs that you find in the error log until you get to the last one you choose to use in the analysis.

Note: If the time stamp shows a long duration between one entry and the next, you may want to ignore any of the older entries for the purpose of this exercise.

2. Go to the START section of the MI and look up each FID listed in the left column of your work sheet, and list horizontally each FID listed in START in the order that they are listed (in our example, we found FIDs 98, 99, 95, 97 and 9A).
3. Next, look first in the left two or three columns of your ERROR LOG ANALYSIS WORK SHEET, under the START SECTION FID ENTRIES and draw a circle around the FID that appears most often (in our example we circled FID 99 five times).
4. Next, look in the left two or three columns and draw a square around the next FID that occurs the most often (in our example we drew a square around FID A9, four times).
5. Now, look at the overall entries, and draw a diamond around any FID that occurs most often (in our example we drew a triangle around FID 97.)



Note: FID 97 only occurred in the columns in the right-hand portion of the work sheet, but that is because it was considered a low probability of failure when taken one FID at a time. If a FID occurs often, but always falls in a low probability position, That FID may be causing the problems but due to limitations of error logging, it never shows up as a high probability of being the failure. This error log analysis procedure is intended to show up some of these problems.

6. Last, look up the FID number and associated names of the FRUs they represent (in our example, the three FIDs are listed under **Legend**). Now use your training, intuition, or experience to decide which FRU is most likely to be causing the problem. In our example, the likely failing FRU might be the transport cable, the feed motor assembly, or the Motor control card. A decision at this time might be to replace the FID 97 FRU (the motor control card) for the following reasons:


a. FID 99 and A9 occurred very often, but with too large a variation in the ERROR LOG FID ENTRIES.

Note: Variation here is used as a measure of how often an error occurred exactly the same (contained identical error data) in a sample of error log entries. Low variation (similar to high correlation) points to components that are more likely to have failed, while high variation (similar to low correlation) tends to point to less likely failing components.

b. The FID 97 seems to be a low probability, but occurs too often to ignore.


Had the FID 99 or A9 occurred with similar or identical ERROR LOG FID ENTRIES, it might have been better to replace these FRUs first. These kind of decisions must rely heavily on your experience and knowledge of the device, the timing of the errors that occurred, error history of this device, and your customer environment.

Set Error Match Trap (To Get a Dump)

The dump icon  appears when the dump is available and remains on the screen to indicate that trace data is stored in the device. In addition, when the error match trap is hit, an ATTN DRV FSC Trap Taken message is displayed on the operator panel. If a FID1 E5 also occurs, that may overlay the ATTN DRV message, but the dump icon will still be displayed, and the ATTN DRV message will be underneath.

Attention: *Normal* error match traps are volatile and are lost if you press the Reset push button, switch OFF power to the device or microcode recovery occurs (via Check-1, FMR, etc.). *Saved* error match traps cannot be lost by a Reset and require a special procedure for removal. Please see procedure “Remove Error Match Trap” on page PROC-104 for details.

To set an error match trap:

1. Press the Change Mode  push button to place the drive in CE mode.
2. Select **Proceed**.
3. Select **Utilities** from the CE Options menu.
4. Select **Microcode Trap** from the CE Utilities menu.

After the CE Microcode Trap menu is displayed, four characters matching the desired error code (FSC) must be entered. Select each character and modify to the desired value.

5. With the CE Microcode Trap menu still selected there will be 4 options presented:
 - a. Add FSC Trap
 - b. Remove FSC Trap
 - c. List FSC Traps
 - d. Saved Trap

There are two options available to set the trap:

Use option **a** - Select **Add FSC Trap** which saves the *normal* trap until the next code reset. Selection of this option ends the procedure. Skip to step 9 for completion of the procedure.

Or use option **d** - Select **Saved Trap** to save the *saved* trap in the drive until it is manually removed. A code reset will not eliminate a *saved* trap from the drive. See procedure “Remove Error Match Trap” on page PROC-104 for removal of a saved FSC trap.

6. Selection of the **Saved Trap** option from the CE Microcode Trap menu will cause the CE Saved Traps menu to be displayed next.
7. Select **Add Saved FSC Trap** from the CE Saved Traps menu to save the trap.
8. Select **Cancel** when the status screen comes up.
9. Select **Cancel** to return to the previous CE menu. Repeat this step as needed to return to previous CE menus.
10. Perform “End of Call” on page PROC-8 or return to the procedure that sent you here.

Note: Only three **saved** traps can be active at a time. If more than three are selected, the procedure will not be successful. To see how many saved traps are active, select **Saved Trap** from the CE Microcode Trap menu and then select the **List Saved FSC Traps** option.

Remove Error Match Trap

Note: This procedure is similar to procedure “Set Error Match Trap (To Get a Dump)” on page PROC-103, except that it removes the trap(s) set in the previous procedure. See the definition of *normal* trap versus *saved* trap in procedure “Set Error Match Trap (To Get a Dump)” on page PROC-103.

1. Press the Change Mode **Y** push button to place the drive in CE mode.
2. Select **Proceed**.
3. Select **Utilities** from the CE Options menu.
4. Select **Microcode Trap** from the CE Utilities menu.

At this point it is necessary to distinguish between removal of a *normal* trap or a *saved* trap.

If the trap is known to be *normal*, go to heading “Remove NORMAL Trap.”

If the trap is known to be *saved*, go to heading “Remove SAVED Trap” on page PROC-105.

If the *type* of trap is unknown, but the error code is known, proceed as follows:

- a. Select **Saved Trap** from the CE Microcode Trap menu.
- b. Select **List Saved FSC Traps** from the CE Saved Traps menu. The list is displayed.
- c. Check the list of Saved FSC traps for a match of the error code.
- d. If there is no match, the trap is presumed to be *normal*. Select **Cancel** twice to return to the CE Microcode Trap menu. Skip to heading “Remove NORMAL Trap.”
- e. If there is a match, then select the appropriate error code.
- f. Select **Remove Saved FSC Trap** from the CE Remove Saved FSC Trap menu. Success or failure of the CE action will be indicated on the operator/CE panel.
- g. Select **Cancel** twice to return to CE Microcode Trap menu. Repeat this step as needed to return to previous CE menus.

This completes removal of a known, saved FSC trap.

5. Perform “End of Call” on page PROC-8 or return to the procedure that sent you here.

Remove NORMAL Trap

Known Normal Error Code

If the error code is unknown, go to heading “Unknown Normal Error Code” on page PROC-105.

With the error code **known**, proceed:

1. With the CE Microcode Trap menu still selected, four characters matching the error code (FSC) must be set. Select each character and modify to the desired value.
2. Select the **Remove FSC Trap** option from the CE Microcode Trap menu. The Op panel will indicate success or failure of the CE action.
3. Select **Cancel** to return to CE Utilities menu and repeat this step as needed to return to the previous CE menu.
This completes removal of a known, normal FSC trap.
4. Perform "End of Call" on page PROC-8 or return to the procedure that sent you here.

Unknown Normal Error Code

1. With the CE Microcode Trap menu displayed, select **List FSC Traps**. The list is displayed.
2. Select the error code to be removed (from the list).
3. Select **Remove FSC Trap** from the CE Remove FSC Trap menu. The Op panel will indicate success or failure of the CE action.
4. Select **Cancel** to return to the CE Microcode Trap menu. Repeat this step as needed to return to previous CE menus.
This completes removal of an unknown, normal FSC trap.
5. Perform "End of Call" on page PROC-8 or return to the procedure that sent you here.

Remove SAVED Trap

Known Saved Error Code

If the error code is unknown, go to "Unknown Saved Error Code" on page PROC-106.

With the error code **known**, proceed:

1. From the CE Microcode Trap menu (still displayed), select **Saved Trap**.
2. The CE Saved Traps menu is selected. Four characters matching the error code (FSC) must be set. Select each character and modify to the desired value.
3. Select the **Rmv Saved FSC Traps** option from the CE Saved Traps menu. The Op panel will indicate success or failure of the CE action.
4. Select **Cancel** to return to CE Microcode Trap menu. Repeat this step as needed to return to previous CE menus.
This completes removal of a known, saved FSC trap.
5. Perform "End of Call" on page PROC-8 or return to the procedure that sent you here.

Unknown Saved Error Code

1. From the CE Microcode Trap menu (still displayed), select **Saved Trap**.
2. Select **List Saved FSC Traps** from the CE Saved Traps menu. The list is displayed.
3. Select the error code to be removed (from the list).
4. Select **Rmv Saved FSC Trap** from the CE FSC Trap List menu. The Op panel will indicate success or failure of the CE action.
5. Select **Cancel** to return to the CE Saved Traps menu. Repeat this step as needed to return to previous CE menus.


This completes removal of an unknown, saved FSC trap.

6. Perform "End of Call" on page PROC-8 or return to the procedure that sent you here.

No Response from Operator/CE Panel and No Message


Note: The Reset push button is active, but **do not** press it until instructed.

1. If hung/frozen panel was reported by customer but **does not currently exist** on drive, ask the customer if they can readily recreate the failure. If they cannot recreate the failure or it is an inconvenient time for the customer, have them call for service when the fault reoccurs. When the fault occurs, ask them to leave the drive in that condition and call for service.

Note: An attempt to **unfreeze** the panel may be made as follows:
Force microcode recovery and a dump by pressing the Change Mode  push button **ten times** consecutively.


If the host software supports microcode dumps, ask the customer to force a dump via SCSI and retrieve dump via SCSI because this type of fault prevents dumps via the panel.

When the problem is recreated, with or without a dump, contact your next level of support.

2. If hung/frozen panel **currently exists** on the drive, check to see if the dump icon  is displayed.
 - a. If the dump icon is not displayed and the host software supports microcode dumps, ask the customer to force a SCSI dump and retrieve the dump via SCSI.
 - b. Get the dump and contact your next level of support.
3. If the dump icon is displayed and the host software supports microcode dumps, ask the customer to retrieve the dump via SCSI.

Take a microcode dump and contact your next level of support.

4. If the host does not support SCSI retrieval of dump:
 - a. Press Change Mode (wrench) to try to get into service mode.
 - b. If you cannot get into service mode, contact your next level of support.

Note: An attempt to **unfreeze** the panel may be made as follows:
Force microcode recovery and a dump by pressing the Change Mode  push button **ten times** consecutively.

- c. If you can get into service mode, copy dump to cartridge and save it for now.
 - 1) Press Reset Button on the operator/CE panel.
 - 2) Run the Verify Drive diagnostic.
 - 3) If a failure occurs with a new FID, use the new FID and go to the START section.
 - 4) If no error occurs, the problem can be a microcode problem or an intermittent hardware problem. Call your next level of support and provide them with the microcode dump.

5. Perform "End of Call" on page PROC-8 or return to the procedure that sent you here.

SCSI Bus Problem Determination

Use the "Solid Errors" or the "Intermittent Errors" on page PROC-109 procedure.

Attention: Notify the customer that the devices on the SCSI bus must be varied off-line before the problem determination procedure can be performed.

Solid Errors

Determine the number of drives on the SCSI bus.

Single Tape Drive on SCSI Bus

1. Ensure that the drive power is ON.
2. Ensure that the drive SCSI address is the same as the SCSI address being used by the host program.
3. If steps 1 and 2 are OK, run the SCSI wrap test. See "SCSI Ports Wrap Test" on page PROC-84.

Note: Refer to "SCSI Attachment" on page INST-41 to ensure that all of the SCSI cables, interposers and terminators are installed correctly.

4. If the SCSI wrap test fails, replace the card pack. (See "FID E4: Card Pack" on page LOC*CAR-56.)
5. If the SCSI wrap test runs successfully, check the SCSI attachment at the host to confirm that a problem still exists.

Note: Be sure to remove the wrap connector and restore the SCSI cable connections.

Perform one of the following procedures, depending upon which host system you have:

- a. Check the SCSI attachment in an AIX Environment. See "Checking the SCSI Attachment in an AIX Environment" on page PROC-72.
- b. Check the SCSI attachment in an AS/400 Environment. See "Checking the SCSI Attachment in an AS/400 Environment" on page PROC-71.
- c. Check the SCSI attachment in an HP-UX Environment. See "Checking the SCSI Attachment in a HP-UX Environment" on page PROC-79.
- d. Check the SCSI attachment in an Windows NT Environment. See "Checking the SCSI Attachment in a Windows NT Environment" on page PROC-81.
- e. Check the SCSI attachment in a Sun Environment. See "Checking the SCSI Attachment in a Sun Environment" on page PROC-76.

This will verify that the drive is available and properly configured at the host.

6. If the problem still exists, check the SCSI attachment at the drive. Refer to "SCSI Attachment" on page INST-41 to ensure that all of the SCSI cables, interposers and terminators are installed correctly.
7. If the problem still exists after checking the SCSI attachment at the host and the drive, replace the SCSI terminator (first), then the SCSI cable and the interposer (if installed).

8. If the problem still exists after replacing the SCSI terminator, cable and interposer, tell the customer that the fault is probably with the host hardware or software.
9. When the problem is corrected (or determined to be a host problem), restore all of the SCSI cables, interposers, and terminators to their correct position, then return to the procedure that sent you here, or go to “End of Call” on page PROC-8.

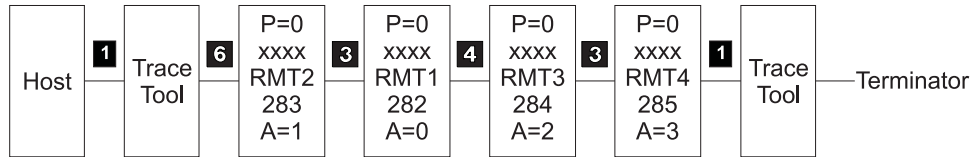
Multiple Tape Drives on SCSI Bus

1. Use one of the following procedures, depending upon which host system you have, to determine if all of the drives on the SCSI bus have the problem.
 - a. Check the SCSI attachment in an AIX Environment. See “Checking the SCSI Attachment in an AIX Environment” on page PROC-72.
 - b. Check the SCSI attachment in an AS/400 Environment. See “Checking the SCSI Attachment in an AS/400 Environment” on page PROC-71.
 - c. Check the SCSI attachment in an HP-UX Environment. See “Checking the SCSI Attachment in a HP-UX Environment” on page PROC-79.
 - d. Check the SCSI attachment in an Windows NT Environment. See “Checking the SCSI Attachment in a Windows NT Environment” on page PROC-81.
 - e. Check the SCSI attachment in a Sun Environment. See “Checking the SCSI Attachment in a Sun Environment” on page PROC-76.
2. If all of the drives on the SCSI bus have the problem, either the bus is hung or the SCSI cable from the host to the first device on the bus is defective.
 - a. Ensure that the SCSI cable from the host to the first device is connected correctly. Replace the cable, if necessary.
3. If the problem exists on one or more, but not all, of the drives on the bus, it will be necessary to determine the first failing drive on the bus.
 - a. Disconnect all except the first drive on the SCSI bus and move the terminator to the first SCSI drive.
 - b. Test the bus operation to determine if a failure occurs on that drive.
 - c. Continue to connect one drive at a time onto the bus until the first failing drive is located.
4. When you have located the first failing drive on the bus, use the procedure “Single Tape Drive on SCSI Bus” on page PROC-108 to correct the problem.
5. When the problem is corrected, restore all of the SCSI cables, interposers, and terminators to their correct position, then return to the procedure that sent you here, or go to “End of Call” on page PROC-8.



Intermittent Errors

1. Get the layout of failing SCSI bus. The maximum SCSI bus length for a differential SCSI bus is 25 M (82.02 ft) minus 0.2 M (0.66 ft) per connection. Figure 278 on page PROC-110 shows an example of how to calculate the bus length. Figure 279 on page PROC-110 shows the cable part numbers for each length. Ensure that the total length does not exceed the maximum of 25M.



$$25M = .6M + .2M + 12M + .2M + 3.4M + .2M + 3.8M + .2M + 3.4M + .2M + .6M + .2M$$

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Figure 278. SCSI Bus Cable Lengths

Figure 279. Part Numbers for the 3590 SCSI Bus Cables				
Key	Meters	Feet	P/N	Usual Connection
1	0.6	1.97	05H4644	Devices side-by-side in rack
2	2.8	9.19	05H4647	Device in same rack as processor
3	3.4	11.15	05H4645	Device is horizontal with another device in a 3494
4	3.8	12.47	05H4646	Device is vertical with another device in a 3494
5	4.5	14.76	05H4648	Device connection to the host
6	12.0	39.37	05H4649	Device connection to the host
7	18.0	59.06	05H4650	Device connection to the host
8	25.0	82.02	05H4651	Device connection to the host

- Obtain the errors that the device reported to the host. Refer to the Message Section for details, if necessary. For example, if the device is attached to a RS/6000, run **tapeutil**. Select option 9, **Error Log Analysis**. Gather all possible error information.

Note: This procedure defines using a *trace tool*. The trace tool is used under direct assistance from your next level of support.

If Single Drive on SCSI Bus

- Replace or swap the SCSI bus cable and the terminator.
- Get a 3590 microcode dump and send it to your next level of support for analysis if the next step fails to fix the fault.
- Start the trace of the next failure. For example, if you are using the AIX Tape Device Driver, type **atrc** to start the trace.
- Connect the SCSI bus trace tool if a failure occurs. On the next failure, get a 3590 microcode dump and a SCSI bus trace. Send the dump and trace to your next level of support for analysis.

If Multiple Drives on SCSI Bus

Note: If you run a SCSI bus trace tool and you have more than one drive running, the non-failing drives may overlay the error.

- If all drives fail:**

- Replace or swap the SCSI bus cable between the host and the first device and terminator.
- Get a 3590 microcode dump and send it to your next level of support for analysis.
- Start the trace of the next failure. For example, if you are using the AIX Tape Device Driver, type **atrc** to start the trace.

4. Attach the SCSI bus trace tool if a failure occurs. On the next failure, get a 3590 microcode dump and a SCSI bus trace. Send the dump and the trace to your next level of support for analysis.

- **If end drives fail:**

1. Replace or swap the SCSI bus cable and the terminator between the last drive that works and the first drive that fails.
2. Get a 3590 microcode dump and send it to your next level of support for analysis.
3. Start the trace of the next failure. For example, if you are using the AIX Tape Device Driver, type **atrc** to start the trace.
4. Connect the SCSI bus trace tool if a failure occurs. On the next failure, get a 3590 microcode dump and a SCSI bus trace. Send the dump and the trace to your next level of support for analysis.

- **If only one drive (not end drive) fails:**

1. Get a 3590 microcode dump and send it to your next level of support for analysis.
2. Start the trace of the next failure. For example, if you are using the AIX Tape Device Driver, type **atrc** to start the trace.
3. Trace only the failing drive or run only the failing drive.
4. Connect the SCSI bus trace tool if a failure occurs.
5. On the next failure, get a 3590 microcode dump and a SCSI bus trace. Send the dump and trace to your next level of support for analysis.

Locations, Checks, Adjustments, Removals, and Replacements

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Measurement and Adjustment of Pneumatic System

Note: Before you begin the pneumatic system vacuum adjustment, if this drive still has a **cleaner blade**, it should be removed. Refer to Figure 349 on page LOC*CAR-92 to determine the location of the cleaner blade on the HGA. If the HGA still has the cleaner blade installed, remove it before continuing the pneumatic system vacuum adjustment. See “Cleaner Blade Removal Procedure (Models B11/B1A)” on page LOC*CAR-92 for the removal procedure. When the cleaner blade has been removed and discarded, continue with the pneumatic system vacuum adjustment.

Attention: When the cleaner blade is removed the cleaner blade vacuum hose must be either removed or plugged to prevent vacuum system leaks. See “Cleaner Blade Removal Procedure (Models B11/B1A)” on page LOC*CAR-92 for details.

The pneumatic system vacuum adjustment is done by adjusting a bleed valve with a scratch cartridge loaded in the drive. The Pressure/Vacuum Kit/Gauge is used to measure the vacuum at the pneumatic assembly vacuum test port.

The pressure is adjusted by the microcode when the **Adjust Pressure** routine is run from the Config/Install menu. While this routine is running, the microcode senses the output of the pressure transducer and then adjusts the compressor speed to ensure the pressure is within specification.

The vacuum and pressure specifications are listed here for reference only:

- Vacuum: -4.1 to -6.6 kilopascals (-16.0 to -26.0 inches of water).
- Pressure: 29.5 to 36.6 kilopascals (116 to 144 inches of water).

Important Hints

1. The vacuum and pressure adjustments have an effect on each other. The **Adjust Pressure** routine changes the compressor speed, which will affect the vacuum. The vacuum bleed valve adjustment changes the overall load on the pneumatic system, which will affect the pressure. So it will be necessary to repeat the **Adjust Pressure** routine after each adjustment of the vacuum bleed valve. It may be necessary to **repeat** the vacuum and pressure adjustment routines **3 or 4 times** before the **Adjust Pressure** routine no longer changes the vacuum.
2. The pneumatic system compressor is very temperature sensitive. The compressor does not start to run until a tape is loaded. It takes a **minimum** of 2 minutes for the compressor to be warm enough to adjust.

See Figure 280 on page LOC*CAR-4 and Figure 281 on page LOC*CAR-4.

Note: There are two levels of deck enclosure back cover. See Figure 280 on page LOC*CAR-4. The old style back cover is one piece and must be removed to perform the pneumatic system check and adjustment. The new style back cover has a small, removable access cover **10** over the pneumatic system test ports and adjustment screw. With the new style cover, it is not necessary to power OFF and remove the deck enclosure rear cover before performing the pneumatic system check and adjustment.

1. If you have the new style deck enclosure rear cover, remove screw **11** and the small access cover **10** over the pneumatic system and go to step 7 on page LOC*CAR-4.
2. If you have the old style one-piece deck enclosure rear cover, switch OFF the 3590 power **2** and continue with step 3.
3. Disconnect the power cord at its source and then at the back of the 3590 **3**.
4. Remove the deck enclosure back cover.
5. Connect the power cord **3** to the back of the 3590 and then to the power source.
6. Switch ON the 3590 power **2**. Wait for the power-on diagnostics to run.

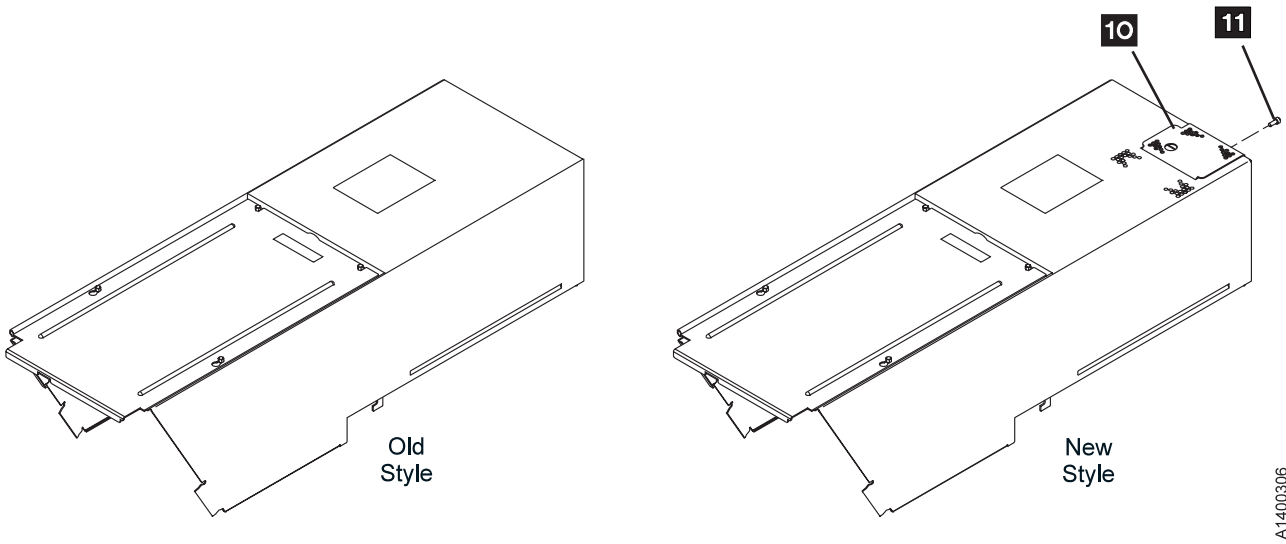


Figure 280. Deck Enclosure Back Cover

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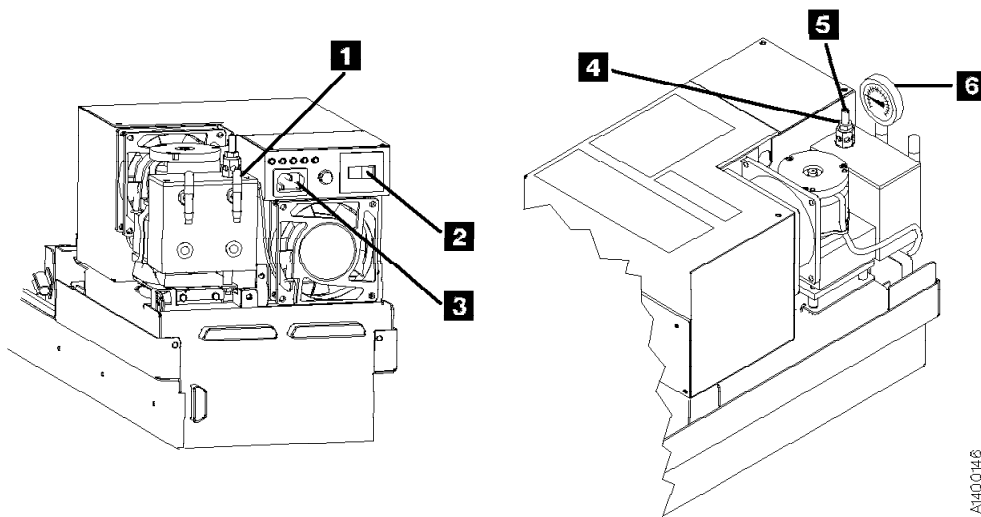



Figure 281. Measurement and Adjustment of Pneumatic System

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7. Remove the pneumatic system vacuum test-port cap **1** and attach the pressure/vacuum gauge **6** to the vacuum test port by using the CE vacuum gauge adapter P/N 05H9895.

8. Load a scratch cartridge, supplied with the ship group, into the 3590. Wait for the **Ready-At Loadpoint** message.

Note: Do not use a cleaner cartridge for this adjustment. The vacuum and pressure will vary due to the surface texture of the tape. Use only a scratch data cartridge.

9. Press the Change Mode  push button. Then select **Proceed** and press **ENTER**.

10. Select **Config/Install** from the CE Options menu and press **ENTER**.

Attention: The pneumatic system is temperature sensitive. The compressor should run for a **minimum** of 2 minutes before you start the **Adjust Pressure** routine.

11. Select **Adjust Pressure** from the Config/Install menu and press **ENTER**.

Attention: There are two levels of microcode for the Pneumatic System adjustment routine.

- If the message **UNLOAD DRIVE FIRST** appears, you have the new level of microcode.

Skip to step 21.

- If the **CE Wait** menu and the message **RUNNING** appears, you have the early level of microcode.

Continue with step 12.

Early Level Microcode Procedure

12. The program will run until you stop it. Allow the program to run for at least 10 seconds and then select **Stop Running** and press **Enter**.

13. Ensure the message **Pump OK** is displayed. If **Pump OK** is displayed, skip to 14.

If any of the following messages are displayed, run the **Adjust Pressure** routine again.

If any of the following messages are displayed again, continue with this step.

No Air	-- leak in pneumatic hose
Pump Fast	-- leak in pneumatic hose
Pump Slow	-- blockage in pneumatic hose
Pump Not Set	-- the pressure is out of specification. Continue with the next step to adjust vacuum. If this message repeats, go to Pneumatic Problems MAP.

Unknown Results -- microcode problem

For any problem related to hoses go to "Pneumatic Problems" on page MAPS-5. For microcode problems, get a microcode dump by selecting **Dump** from the CE Options menu. Select the appropriate dump option and call your next level of support.

14. Check the vacuum measurement on the gauge **6**. The required range is -4.1 to -6.6 kilopascals (-16.0 to -26.0 inches of water). The optimum setting is -5.4 kilopascals (-21 inches of water).
15. If the vacuum is within the required range after the **Adjust Pressure** routine has completed, no further adjustment is necessary. Select **Cancel**, as necessary, to return to the CE Options menu, then go to step 33 on page LOC*CAR-6.

16. If the vacuum is not within the required range, continue with step 17.

17. Loosen the locking nut **4** on the bleed valve adjustment shaft **5**. Turn the adjustment shaft until the gauge indicates a reading close to the optimum setting given above.

18. Tighten the locking nut while using a screwdriver to hold the position of the bleed valve adjustment shaft. Ensure the vacuum measurement remains within the required range while tightening the lock nut.

19. Return to 11 on page LOC*CAR-4 and run the **Adjust Pressure** routine again. Repeat step 11 on page LOC*CAR-4 through step 18 until the vacuum does not require adjustment after the **Adjust Pressure** routine has been run.

It may be necessary to **repeat** the vacuum and pressure adjustment routines **3 or 4 times** before the **Adjust Pressure** routine no longer changes the vacuum.

If vacuum cannot be set, see "Pneumatic Problems" on page MAPS-5.

20. Select **Cancel**, as necessary, to return to the CE Options menu, then go to step 33 on page LOC*CAR-6.

End of Early Level Microcode Procedure

New Level Microcode Procedure

21. Unload the drive and select **Adjust Pressure** again to restart the new procedure. The **Load Scratch Tape** message will be displayed.

22. Load a scratch tape, supplied with the ship group, into the 3590. Wait for the **Ready-At-Loadpoint** message.

Note: Do not use a cleaner cartridge for this adjustment. The vacuum and pressure will vary due to the surface texture of the tape. Use only a scratch data cartridge.

Attention: The pneumatic system is temperature sensitive. The compressor should run for a **minimum** of 2 minutes before you start the **Adjust Pressure** routine.

23. Select **Process Loaded Tape** and press **ENTER**. This will start the **Adjust Pressure**

routine. Allow the routine to run for at least 10 seconds to ensure that the microcode has enough time to adjust the pressure.

Note: If you get an **Attention Drive** error message during this procedure, select the **Set Pressure to Default** option, then unload the drive and start over.

24. Select **Stop Running** and press **ENTER**. Ensure the message **PUMP OK--CHK VACUUM** is displayed.

If **PUMP OK--CHK VACUUM** is displayed, skip to 25.

If any of the following messages are displayed, run the **Adjust Pressure** routine again.

If any of the following messages are displayed again, continue with this step.

No Air	-- leak in pneumatic hose
Pump Fast	-- leak in pneumatic hose
Pump Slow	-- blockage in pneumatic hose
Pump Not Set	-- the pressure is out of specification. Continue with the next step to adjust vacuum. If this message repeats, go to Pneumatic Problems MAP.

Unknown Results -- microcode problem

For any problem related to hoses go to "Pneumatic Problems" on page MAPS-5. For microcode problems, get a microcode dump by selecting **Dump** from the CE Options menu. Select the appropriate dump option and call your next level of support.

25. Check the vacuum measurement on the gauge **6**. The required range is -4.1 to -6.6 kilopascals (-16.0 to -26.0 inches of water). The optimum setting is -5.4 kilopascals (-21 inches of water).
26. If the vacuum is within the required range after the **Adjust Pressure** routine has completed, no further adjustment is necessary. Go to step 30.
27. If the vacuum is not within the required range, continue with step 28.
28. Loosen the locking nut **4** on the bleed valve adjustment shaft **5**. Turn the adjustment shaft until the gauge indicates a reading close to the optimum setting given above.

29. Tighten the locking nut while using a screwdriver to hold the position of the bleed valve adjustment shaft. Ensure the vacuum measurement remains within the required range while tightening the lock nut.

30. Select **PUMP OK--CHK VACUUM** and press **ENTER**. The message **WAS VAC ADJUSTED?** will be displayed.

31. Select **YES** or **NO** and press **ENTER**.

If you selected **NO**, skip to step 32.

If you selected **YES**, the **Adjust Pressure** routine will automatically start and run again. Return to step 24 and repeat steps 24 through 30 until the vacuum does not require adjustment after the **Adjust Pressure** routine has been run.

Note: It may be necessary to **repeat** the vacuum and pressure adjustment routines **3 or 4 times** before the **Adjust Pressure** routine no longer changes the vacuum.

If vacuum cannot be set, see the Pneumatic Problems MAP.

32. When the vacuum no longer requires adjustment and you answer **NO** in step 31, select **Cancel**, as necessary, to return to the CE Options menu, then continue with step 33.

End of New Level Microcode Procedure

33. To ensure the SCSI ports are on-line, press the Change Mode **Y** push button, then select **Proceed** and press **ENTER** to return to the operator Options menu.
34. Select **Unload Drive** and press Enter. Remove the scratch cartridge from the drive.
35. Load a cleaner cartridge to ensure that the automatic pressure adjustment works correctly.
36. Remove the pressure/vacuum gauge and adapter hose **6** from the vacuum test port and install the test port cap back onto the test port.
37. If you have the new style back cover, reinstall the small access cover over the pneumatic system, then return to the procedure that sent you here.

38. If you have the old style back cover, switch OFF power from the back of the drive **2** , then continue with step 39 on page LOC*CAR-7.
39. Remove the power cord, first from the power source and then from the back of the drive.
40. Reinstall the deck enclosure back cover.
41. Reinstall the power cord, first to the back of the drive and then to the power source.
42. Return to the procedure that sent you here.



Locations and Removal Procedures for the ACF

The FRUs in Figure 282 are identified by their FID number; for example, 90 is FID 90, the operator/CE panel. The list following the figure shows the locations of the ACF cables.

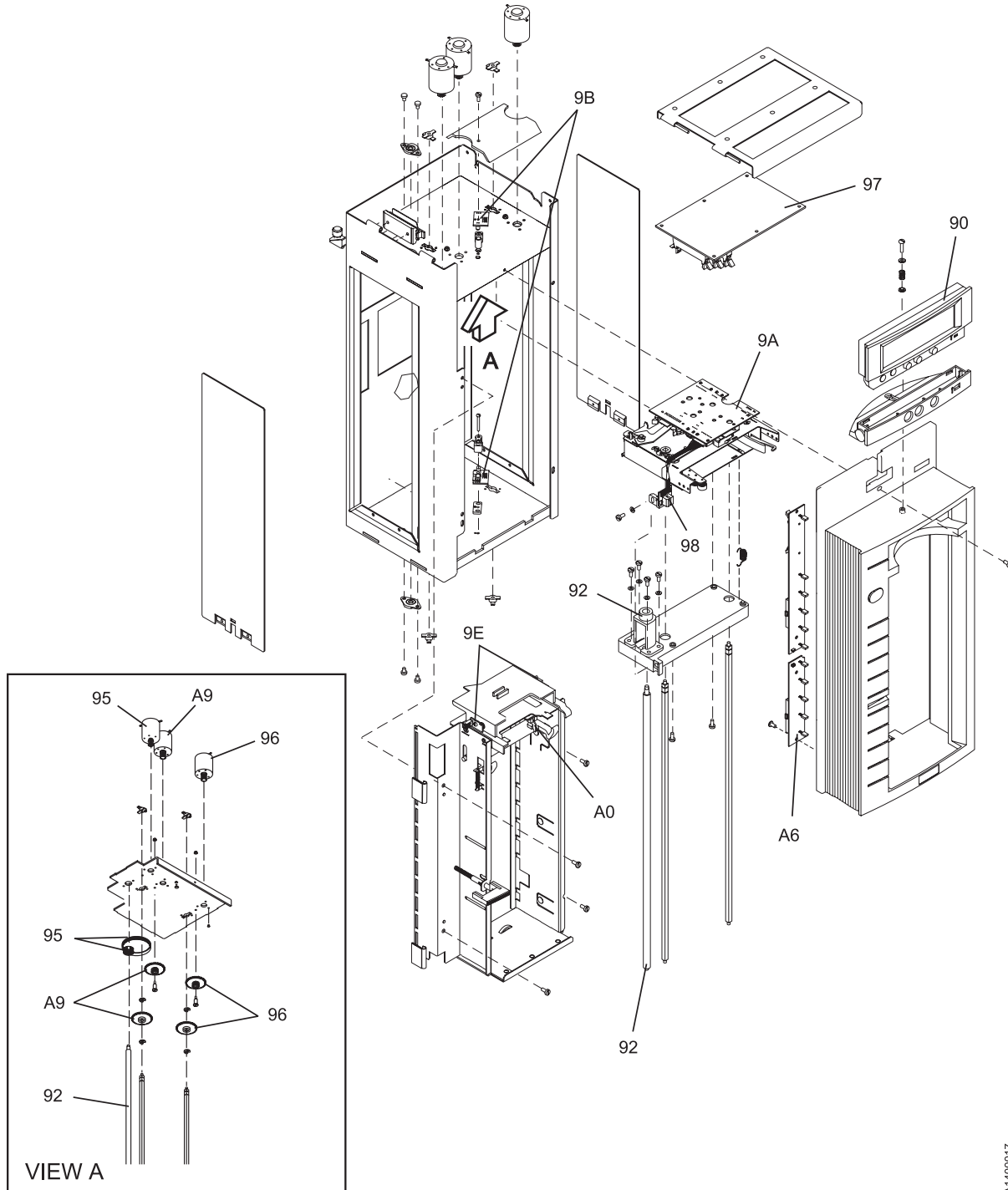


Figure 282. Locations for the ACF

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FID Number	FID Name	FID Number	FID Name
90	Operator/CE panel	9A	Transport assembly
92	Leadscrew assembly	9B	Global/interference sensor assembly
95	Elevator motor assembly	9E	Priority cell sensor pair
96	Pinch motor assembly	A0	Magazine-present sensor assembly
97	Motor control card	A6	LED cards and random lock sensor
98	Transport position sensor	A9	Feed motor assembly

See the following for the ACF cable locations:

FID	Name and FRU Location
91	Operator/CE Panel Cable LOC*CAR-12
99 (old)	Transport Cable LOC*CAR-30
99 (new)	Transport Cable LOC*CAR-32
A1	Motor Cable Assembly LOC*CAR-41
A2	Drive/ACF Cable LOC*CAR-42
A4	LED Cable LOC*CAR-43
A5	Sensor Cable LOC*CAR-44



FID 90: Operator/CE Panel

See "Locations and Removal Procedures for the ACF" on page LOC*CAR-8 for FRU location 90.

Model B11/E11 Only

Removal of Operator/CE Panel

1. "Prepare the Tape Drive for Service" on page PROC-5 and then return here.
2. See Figure 283. Press the two buttons **2** on the rear of the panel **1**.

3. Lift the panel out of the holder.
4. Disconnect the operator/CE panel cable connector **3**.

Replacement of Operator/CE Panel

1. Perform the removal procedure in the reverse order, then return here.
2. Perform "End of Call" on page PROC-8.
3. Use your local procedures to report the FRU part number for the FID and use technical area code (TAC) **V08** for the area of failure.

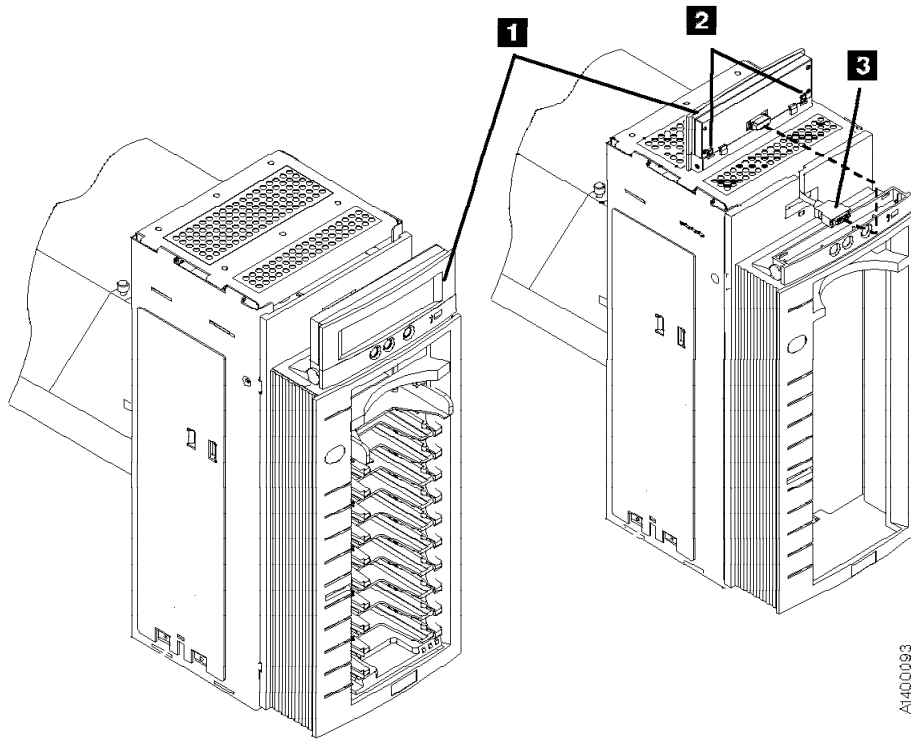


Figure 283. Operator/CE Panel, Model B11/E11

End of Model B11/E11 Only

Model B1A/E1A Only

Removal of Operator/CE Panel

1. "Prepare the Tape Drive for Service" on page PROC-5 and then return here.
2. See Figure 284. Press the two buttons **2** on the rear of the panel **1**.
3. Lift the panel out of the holder.

4. Disconnect the operator/CE panel cable connector **3**.

Replacement of Operator/CE Panel

1. Perform the removal procedure in the reverse order, then return here.
2. Perform "End of Call" on page PROC-8.
3. Use your local procedures to report the FRU part number for the FID and use technical area code (TAC) **V08** for the area of failure.

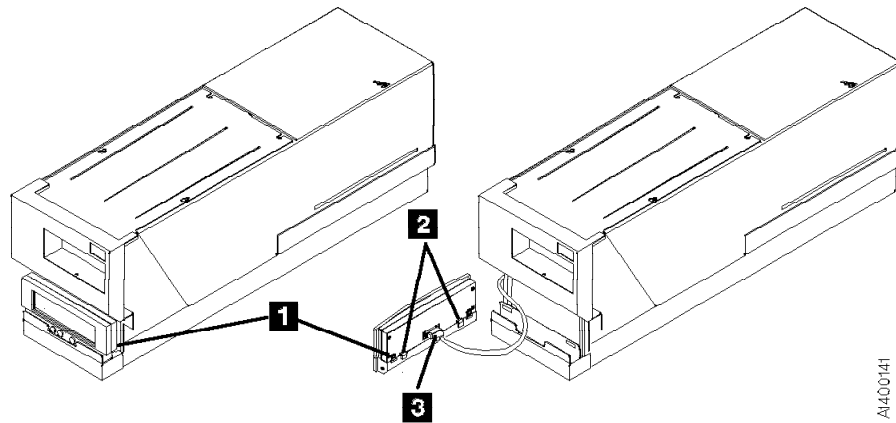


Figure 284. Operator/CE Panel, Model B1A/E1A

End of Model B1A/E1A Only

LOC*CAR

FID 91: Operator/CE Panel Cable (Model B11/E11 Only)

See "Locations and Removal Procedures for the ACF" on page LOC*CAR-8 for FRU location 91.

Removal of Operator/CE Panel Cable

1. "Prepare the Tape Drive for Service" on page PROC-5 and then return here.
2. Remove the ACF left side cover if not obstructed by another device; otherwise, you will use the magazine opening for access to the cables. See page PROC-26.
3. Open the ACF top cover. See page PROC-26.
4. Lift the operator/CE panel from its holder. See page PROC-21.
5. See Figure 285. Disconnect the operator/CE panel cable connector from the panel **1**.
6. Move the elevator up or down (turn the lead-screw) to access the cable connected to the deck enclosure.
7. Disconnect the panel cable **2** from the lower connector on the deck enclosure and remove the cable.

Replacement of Operator/CE Panel Cable

1. Perform the removal procedure in the reverse order, then return here.

2. Perform "End of Call" on page PROC-8.
3. Use your local procedures to report the FRU part number for the FID and use technical area code (TAC) **C09** for the area of failure.

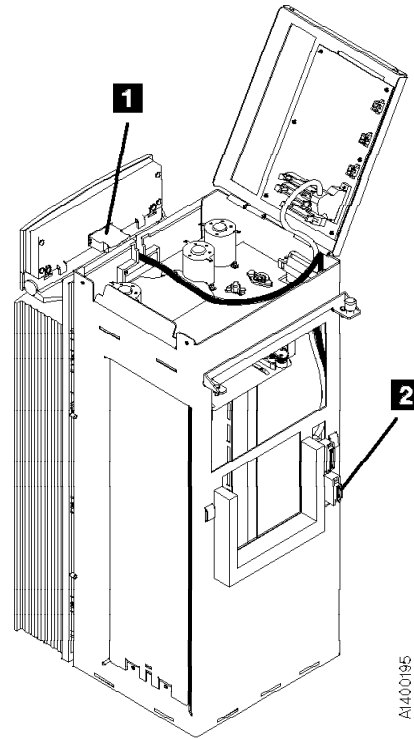



Figure 285. Operator/CE Panel Cable

FID 92: Leadscrew Assembly

See “Locations and Removal Procedures for the ACF” on page LOC*CAR-8 for FRU location 92.

Note: Do not attempt to lubricate the ACF leadscrew. Lubricants will ruin the leadscrew coating.

Attention:  The transport assembly card and sensors are ESD sensitive. See “Working with Electrostatic Discharge (ESD) Parts” on page PROC-20.

Engineering Change

There are two levels of leadscrew drive. See Figure 286 on page LOC*CAR-14 and Figure 287 on page LOC*CAR-15. The old level is gear-driven, **6**, and the new level is belt-driven, **7** and **8**.

The old level gear-drive parts are no longer available for field replacement use. If you have to replace any of the gear-drive parts, it will be necessary to upgrade the leadscrew drive mechanism to a belt-driven system. See the Parts Catalog for the necessary ordering information.

Removal of Leadscrew Assembly

1. “Prepare the Tape Drive for Service” on page PROC-5 and then return here.

This procedure can be done with the ACF attached to the drive; however, it may be easier if the ACF is removed and put on a work surface. If you have a work surface available, continue with step 2. If you do not have a work surface available, skip to step 3.

2. Remove the ACF from the drive and place it on a work surface. See “Automatic Cartridge Facility (ACF)” on page PROC-30 for ACF removal, then return here.

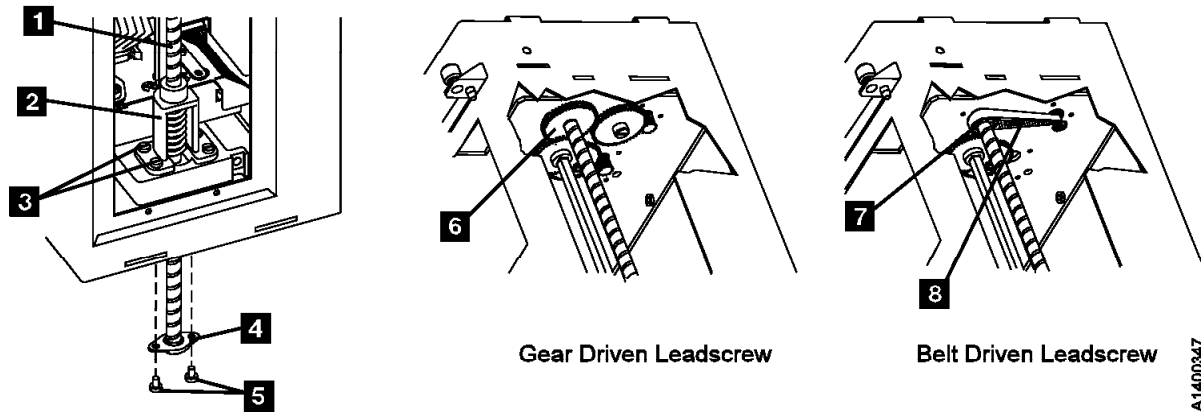
3. Remove the ACF side covers. See “ACF Side Covers” on page PROC-26.

Note: Ensure the pinch rollers are open before moving the elevator assembly. If not, rotate the pinch shaft by hand to open the pinch rollers.

4. See Figure 286 on page LOC*CAR-14. Rotate the elevator leadscrew **1** to position the elevator assembly all the way to the bottom of the ACF.

Attention: Ensure that the elevator assembly is all the way to the bottom of the ACF before removing the lower leadscrew bearing in the next step. This will ensure that the elevator assembly does not drop to the bottom of the ACF and damage the assembly.

5. Remove the two screws **5** from the lower leadscrew bearing and remove the bearing **4** from the leadscrew.
6. Lower the leadscrew by rotating it clockwise (from the top) far enough to disengage it from the upper bearing and gear **6** (gear-driven leadscrew) or gear **7** and belt **8** (belt-driven leadscrew).
7. Remove the gear **6** (gear-driven leadscrew) or gear **7** and belt **8** (belt-driven leadscrew).
8. Continue rotating the leadscrew out of the elevator assembly.
9. Remove the four screws **3** and remove the leadscrew nut and retainer assembly **2**.



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Figure 286. Gear-driven and Belt-driven Leadscrew Assembly

Replacement of Leadscrew Assembly

HINT

If you are upgrading an ACF from a gear-driven leadscrew to a belt-driven leadscrew, it will be easier if you install the new elevator motor before installing the new leadscrew assembly.

Go to "FID 95: Elevator Motor Assembly" on page LOC*CAR-19. Perform steps 9 on page LOC*CAR-20 through 12 on page LOC*CAR-20 to remove the gear-drive motor, then do the same steps in the reverse order to install the new level belt-drive motor. Then return here to install the new leadscrew.

Note: Do not re-install the intermediate gear. It is not used on the belt-drive system.

Figure 287 shows the differences between the old level and new level leadscrew assemblies.

Note: Do not attempt to lubricate the ACF leadscrew. Lubricants will ruin the leadscrew coating.

1. See Figure 288 on page LOC*CAR-16. If a new leadscrew assembly is being installed, it will be necessary to remove the nut from the new leadscrew and install it in the new retainer before the retainer is installed in the ACF.

Hold the leadscrew nut **1** with one hand, keeping the spring compressed, while you unscrew the leadscrew **2** from the nut assembly.

2. Continue to hold the spring compressed while you install the nut assembly **3** into the new retainer **4**.
3. Install the retainer and nut assembly **5** on the elevator plate with the four screws **6**.

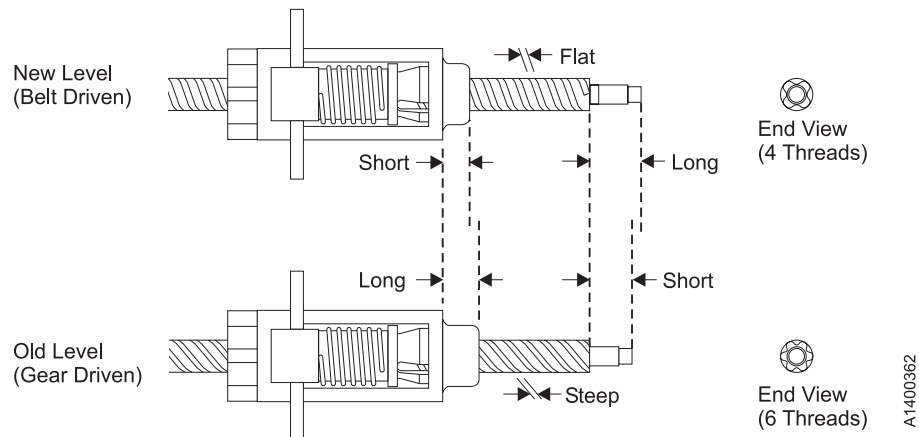


Figure 287. Identification of old level and new level Leadscrew Assemblies

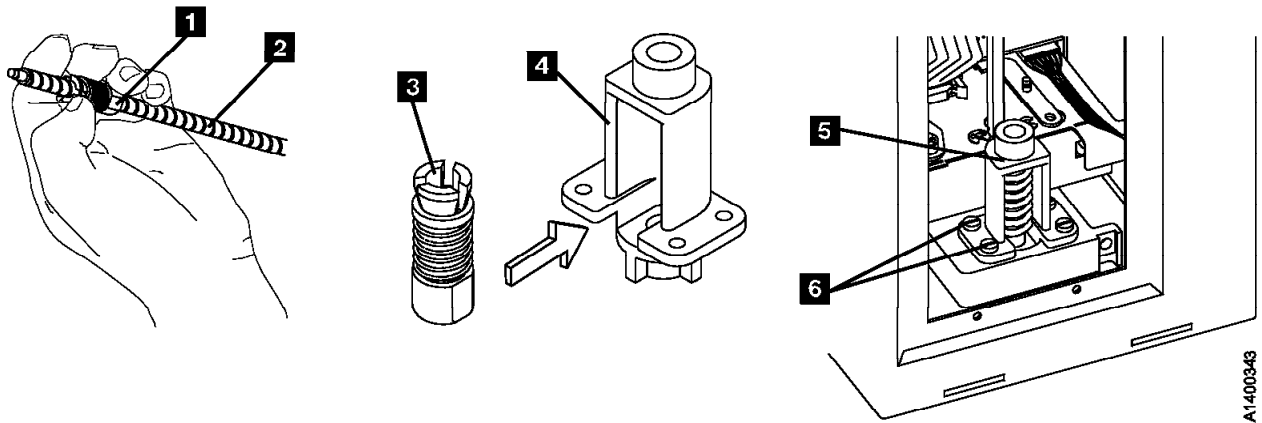


Figure 288. Leadscrew, Nut and Retainer

4. See Figure 289 on page LOC*CAR-17 (gear-driven leadscrew) or, Figure 290 on page LOC*CAR-18 (belt-driven leadscrew). The D-shaped end of the leadscrew must be up for this step. Insert the leadscrew up through the leadscrew bearing hole **1**.

The leadscrew nut spring **2** must be held compressed during the remainder of this step.

Insert the end of the leadscrew into the leadscrew nut **3** on the elevator and rotate the leadscrew upward in a counterclockwise direction (from the top). Continue rotating the leadscrew until the leadscrew extends through the nut approximately 75 mm (3 in.), then release the compression spring.

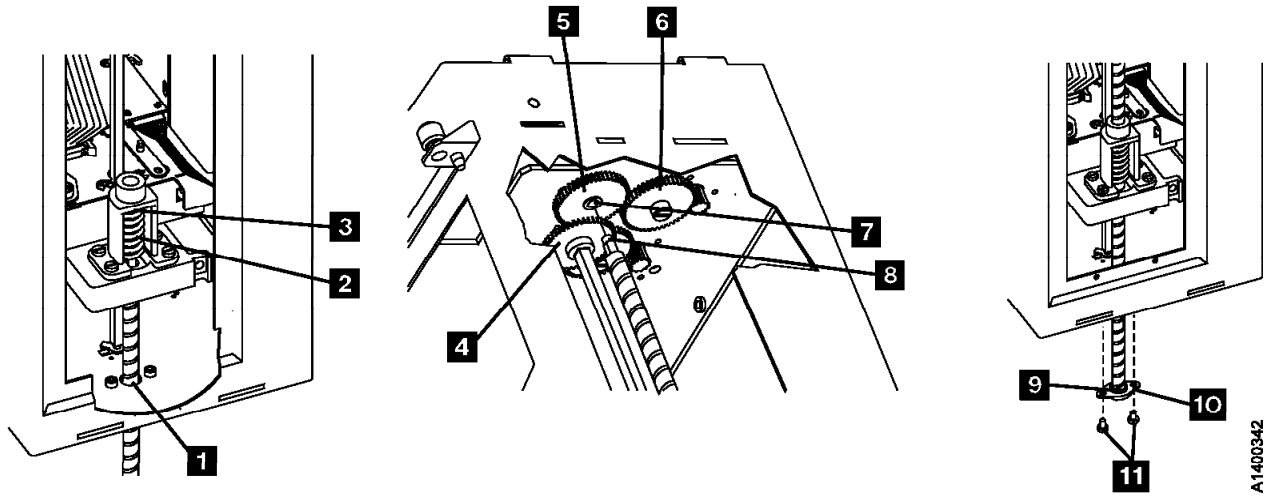
Note: If you have the gear-driven leadscrew, continue with steps 5 through 9, then skip to step 14 on page LOC*CAR-18.

Note: If you have the belt-driven leadscrew, skip to steps 10 on page LOC*CAR-18 through 13 on page LOC*CAR-18, then continue with step 14 on page LOC*CAR-18.

Gear-driven Leadscrew ONLY

5. See Figure 289 on page LOC*CAR-17. Continue rotating the leadscrew counterclockwise until the top of the leadscrew **8** is just below the bottom of the feed shaft gear **4**, as shown.
6. Hold the leadscrew shaft gear **5** (with the long collar up) in position above the feed shaft gear **4** and meshed with the elevator motor idler gear **6**.
7. Lift the leadscrew up, without rotating it, until the top of the leadscrew shaft **8** enters the D-shaped hole in the gear **7**.
8. With the top of the shaft in the gear, hold the gear and rotate the shaft **clockwise** (from the top) until the D-shaped shaft aligns with the D-shaped hole in the gear.
9. Continue raising the leadscrew to engage it with the gear and bearing in the top of the ACF, then rotate the leadscrew shaft **counter clockwise** to lower the transport all the way to the bottom of the ACF. This will hold the leadscrew gear, shaft, and transport assembly in place while you install the bearing. Skip to step 14 on page LOC*CAR-18.

End of Gear-driven Leadscrew ONLY



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Figure 289. Gear-driven leadscrew, gears, and bearing



Belt-driven Leadscrew ONLY

10. See Figure 290. Install the belt **4** over the leadscrew **5**.
11. Install the gear **6**, (with the long collar up), onto the D-shaped shaft of the leadscrew.
12. Continue rotating the leadscrew counterclockwise until the shaft on top of the leadscrew enters the bearing **7** in the top of the ACF.
13. Lift the belt **4** and install it, first on the motor pulley **3**, then onto the leadscrew gear **6**.

End of Belt-driven Leadscrew ONLY

14. Install the bottom leadscrew bearing **10** with the two screws **11** removed earlier. Ensure

the outer bearing race **9** is inserted up into the frame and the bearing housing is flat against the frame.

15. Manually move the elevator assembly (by rotating the leadscrew) to its upper and lower limits to ensure there are no binds in the elevator or cables catching on the mechanism.
16. The alignment of the transport assembly to the priority cell must be checked after this procedure. Go to "Check and Adjustment of Transport Position Sensor" on page LOC*CAR-27 to check and adjust the transport position sensor, then return here.
17. Perform "End of Call" on page PROC-8.
18. Use your local procedures to report the FRU part number for the FID and use technical area code (TAC) **T03** for the area of failure.

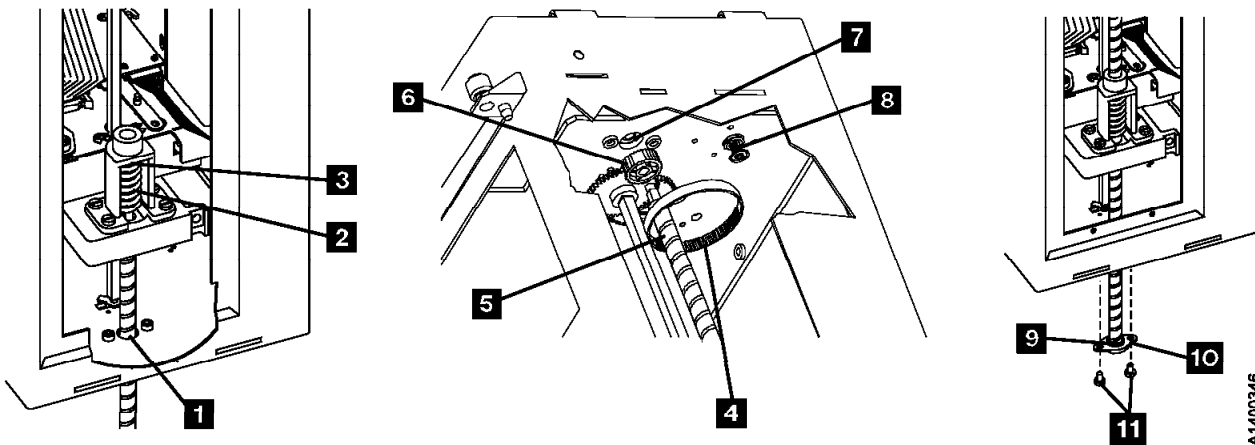


Figure 290. Belt-driven leadscrew, gears, belt, and bearing

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FID 95: Elevator Motor Assembly

See “Locations and Removal Procedures for the ACF” on page LOC*CAR-8 for FRU location 95.

Note: Do not attempt to lubricate ACF leadscrew. Lubricants will ruin the leadscrew coating.

Engineering Change

There are two levels of leadscrew drive. See Figure 292 on page LOC*CAR-20 and Figure 294 on page LOC*CAR-21. The old level uses a gear-driven leadscrew, **6**, and the new level uses a belt driven-leadscrew, **7** and **8**.

The old level gear-driven parts are no longer available for field replacement use. If you have to replace any of the gear-driven parts, it will be necessary to upgrade the leadscrew drive mechanism to a belt-driven system. See the Parts Catalog for the necessary ordering information.

Removal of Elevator Motor Assembly

1. “Prepare the Tape Drive for Service” on page PROC-5 and then return here.

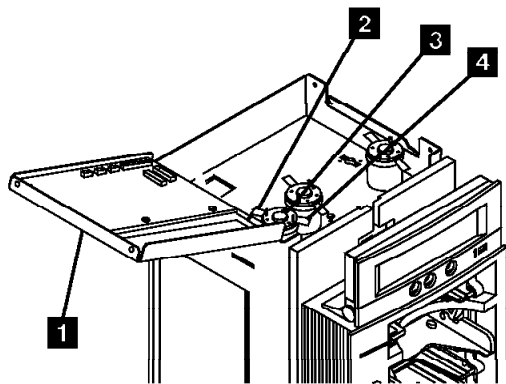


Figure 291. Elevator Motor Assembly

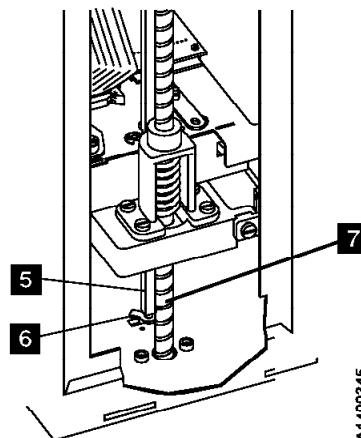
This procedure can be done with the ACF attached to the drive; however, it may be easier if the ACF is removed and put on a work surface. If you have a work surface available, continue with step 2. If you do not have a work surface available, skip to step 3.

2. Remove the ACF assembly from the drive and place it on the work surface. See “Automatic Cartridge Facility (ACF)” on page PROC-30 for ACF removal, then return here.
3. Remove the ACF side covers. See “ACF Side Covers” on page PROC-26.

Note: Ensure the pinch rollers are open before moving the elevator assembly. If not, turn the pinch shaft by hand in the clockwise direction to open the pinch rollers.

4. See Figure 291. Rotate the elevator leadscrew **7** to position the elevator assembly all the way to the bottom of the ACF.

Attention: Ensure that the elevator assembly is all the way to the bottom of the ACF before removing the lower leadscrew bearing in the next step. This will ensure that the elevator assembly does not drop to the bottom of the ACF and damage the assembly.



Replacement of Elevator Motor Assembly

Engineering Change

If the Elevator Motor assembly is being replaced for any reason, it should be replaced with a belt-drive motor only.

Figure 294 shows the differences between the old level and new level elevator motor assemblies.

1. Perform the removal procedure in the reverse order, then return here.

Note: Do not re-install the intermediate gear. It is not used on the belt-driven leadscrew system.

Note: If you are replacing the Elevator Motor as part of an upgrade from a gear-driven leadscrew to a belt-driven leadscrew, you should return to “Replacement of Leadscrew Assembly”

on page LOC*CAR-15 to install the new leadscrew.

Notes for Reassembly:

- a. Motor terminal post 2 is oriented to the front, comparable to the 5:30 position on an analog clock face.
 - b. The yellow motor wire is connected to the front terminal (post 2).
 - c. The black motor wire is connected to the rear terminal (post 1).
2. The alignment of the transport assembly to the priority cell must be checked after this procedure. Go to “Check and Adjustment of Transport Position Sensor” on page LOC*CAR-27 to check and adjust the transport position sensor, then return here.
 3. Perform “End of Call” on page PROC-8.
 4. Use your local procedures to report the FRU part number for the FID and use technical area code (TAC) **T03** for the area of failure.

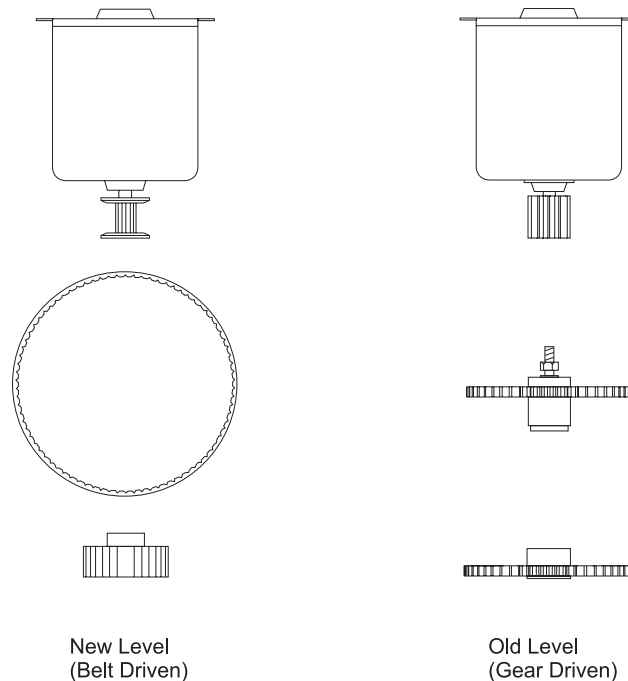


Figure 294. Identification of old level and new level Assemblies

FID 96: Pinch Motor Assembly

See "Locations and Removal Procedures for the ACF" on page LOC*CAR-8 for FRU location 96.

Removal of Pinch Motor Assembly

1. "Prepare the Tape Drive for Service" on page PROC-5 and then return here.
2. Remove the ACF side covers. See "ACF Side Covers" on page PROC-26.

Note: Ensure the pinch rollers are open before moving the elevator assembly. If not, turn the pinch shaft by hand in the clockwise direction to open the pinch rollers.

3. Rotate the leadscrew to lower the elevator assembly to the bottom.

This procedure can be done with the ACF attached to the drive; however, it may be easier if the ACF is removed and put on a work surface.

If you do not have a work surface available, proceed with step 5.

Or, if you have a work surface available, continue with step 4.

4. Remove the ACF assembly from the drive and place it on its left side (pinch shaft up) on the work surface. See "Automatic Cartridge Facility (ACF)" on page PROC-30 for ACF removal, then return here.

See Figure 295.

5. Open the ACF top cover **1**. See "ACF Top Cover" on page PROC-26.
6. Remove the wires from the pinch shaft motor **3**.
 - a. Yellow wire from the front terminal **4** (post 2).
 - b. Black wire from the rear terminal **2** (post 1).
7. Remove the lower (cross) bearing **6** from the pinch shaft **7** and lower or pull the shaft through the elevator assembly until the gear is against the transport **5**.

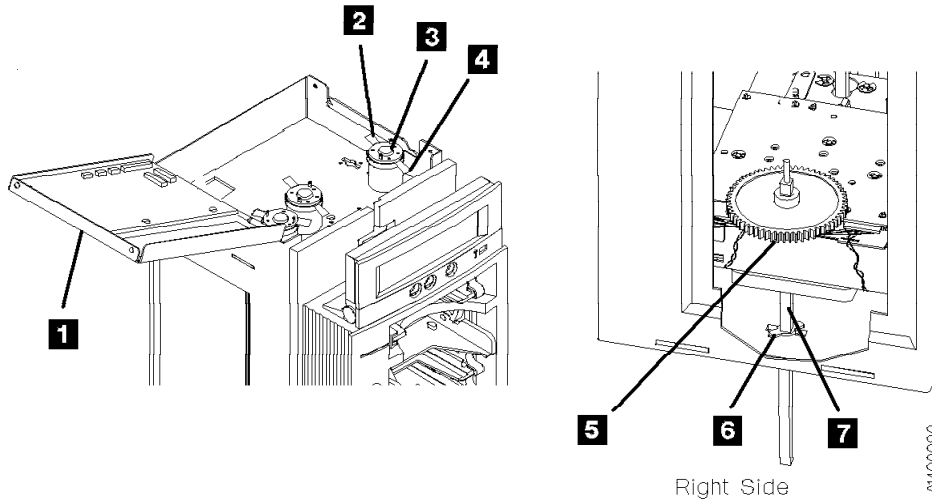


Figure 295. Motor Wires and Pinch Shaft

See Figure 296. The view is looking upward at the underside of the motor mounting plate.

8. Remove the global cartridge present sensor cover to get access to the nut in the next step.
9. Remove the screw **1** and nut on the top side of the motor mounting plate. Remove the intermediate gear **2**.
10. Remove the three motor-mounting screws **3** and remove the motor from the top.

Replacement of Pinch Motor Assembly

1. Perform the removal procedure in the reverse order, then return here.
2. When reinstalling or replacing the motor, use the ACF motor alignment tool P/N 05H4724 to set the gear mesh gap. This procedure is easier if you remove the ACF and put it on a work surface.
3. When the motor has been reinstalled, leave the screws **3** loose enough so that motor can be adjusted.
4. Position the ACF so that the motor gears face up.

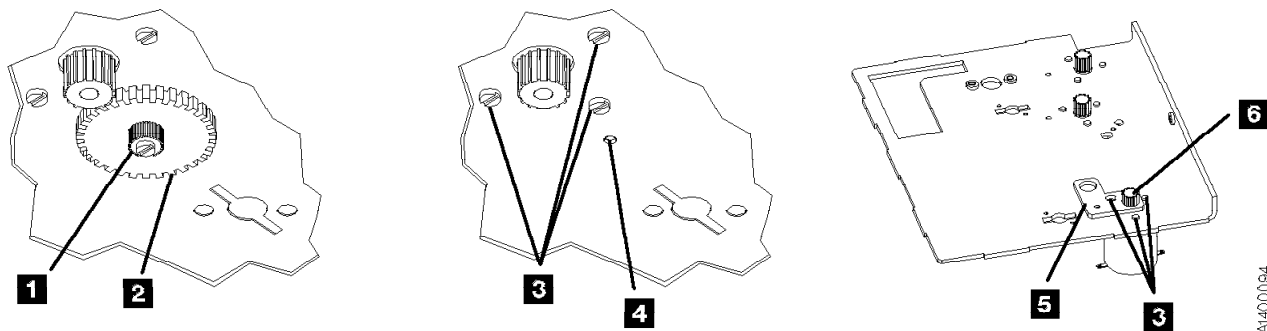


Figure 296. Intermediate Gear and Motor

5. Place the tool **5** dowel pin into the intermediate gear threaded hole **4** while aligning the tool hole over the motor gear **6**. Orient the tool **5** as shown. While holding the tool **5** firmly in position, tighten the 3 screws **3** that hold the motor in place.

Notes for Reassembly:

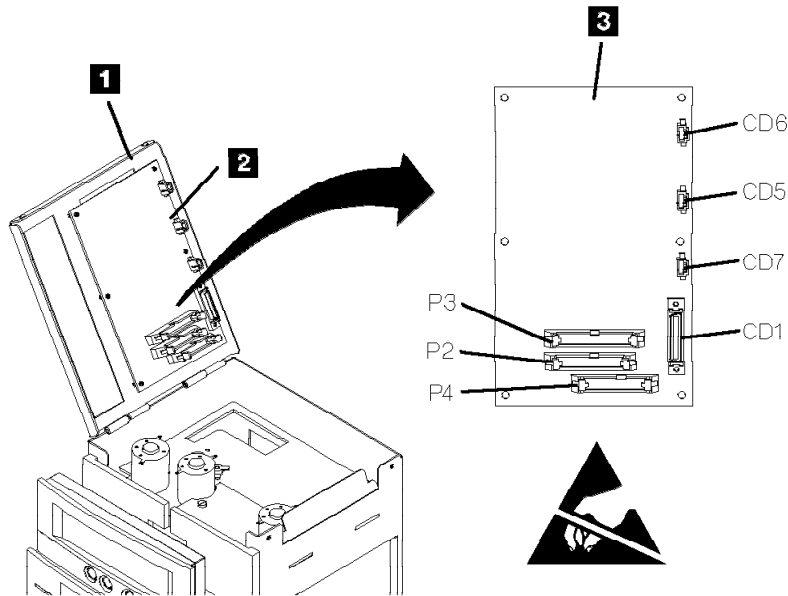
- a. Motor terminal post 2 is oriented to the front.
 - b. The intermediate gear **2** is a two-step gear, oriented with the smaller diameter gear down, as shown.
 - c. The yellow motor wire is connected to the front terminal (post 2).
 - d. The black motor wire is connected to the rear terminal (post 1).
6. Perform "End of Call" on page PROC-8.
 7. Use your local procedures to report the FRU part number for the FID and use technical area code (TAC) **T03** for the area of failure.


FID 97: Motor Control Card

See "Locations and Removal Procedures for the ACF" on page LOC*CAR-8 for FRU location 97.

Removal of Motor Control Card

1. "Prepare the Tape Drive for Service" on page PROC-5 and then return here.
2. Open the top cover **1**. See "ACF Top Cover" on page PROC-26.
3. See Figure 297. Disconnect the seven connectors (CD1, CD5, CD6, CD7, P2, P3, and P4 **3**) from the motor control card.



4.  The motor control card is ESD sensitive. See "Working with Electrostatic Discharge (ESD) Parts" on page PROC-20.
5. Carefully pull the motor control card **2** off its six mounting studs.

Replacement of Motor Control Card

1. Perform the removal procedure in the reverse order, then return here.
2. Perform "End of Call" on page PROC-8.
3. Use your local procedures to report the FRU part number for the FID and use technical area code (TAC) **T02** for the area of failure.


ATTENTION
Static-Sensitive

A1400098

Figure 297. Motor Control Card

FID 98: Transport Position Sensor

See “Locations and Removal Procedures for the ACF” on page LOC*CAR-8 for FRU location 98.

Poor sensor connection, sensor cable connection, or debris on the sensor may be causing the problem.


1. If access is possible, try to check the sensor connection, reseal the sensor cable, and clean the sensor with a brush (standard tool kit soft bristle brush). Verify that the problem remains prior to replacing the FRU.
2. If access to the sensor is too difficult, then replace the sensor.

Removal of Transport Position Sensor

1. Go to “Prepare the Tape Drive for Service” on page PROC-5 and then return here.
2. If you cannot access the left side of the ACF, remove the ACF from the drive. See “Automatic Cartridge Facility (ACF)” on page PROC-30 for ACF removal, then return here.
3. Remove the ACF left side cover. See “ACF Side Covers” on page PROC-26.

Note: Ensure the pinch rollers are open before moving the elevator assembly. If not, turn the pinch shaft by hand in the clockwise direction to open the pinch rollers.

See Figure 298 on page LOC*CAR-26.

4. Position the elevator and transport **7** to gain access to the transport position sensor **4**.
5. Disconnect the sensor connector **3** and remove cable ties as necessary.
6.  The sensor and transport board are ESD sensitive. See “Working with Electrostatic Discharge (ESD) Parts” on page PROC-20.

Remove the sensor mounting screw **5** and carefully lift the sensor up to remove the sensor from both the groove **6** in the elevator plate and from the sensor bar.

Replacement of Transport Position Sensor

1. Position the sensor around the edge of the sensor bar and slide the sensor mounting bracket into the elevator groove. Fasten the sensor to the elevator plate with the screw removed earlier **5**.

Note: When fastening the early level transport position sensor with the side adjust screw, align the top edge of the sensor bracket **2** to the top edge of the elevator plate **1**.

2. Connect the new transport-position-sensor cable connector to the transport assembly board **3**. Route the cable under the Import/Export sensor cable **8**.
3. Reinstall new cable ties in the same locations from which the old ties were removed.
4. If you were required to remove the ACF unit, reinstall the ACF unit now. See “Automatic Cartridge Facility (ACF)” on page PROC-30.
5. The alignment of the transport assembly to the priority cell must be checked anytime the transport position sensor is loosened or removed. See “Check and Adjustment of Transport Position Sensor” on page LOC*CAR-27 to check and adjust the transport position sensor, then return here.
6. Check that transport Limit-1 and Limit-2 sensors were not accidentally knocked loose and that they are firmly seated in the transport assembly. Refer to Figure 164 on page ACF-12 for location of these sensors.
7. Perform “End of Call” on page PROC-8.
8. Use your local procedures to report the FRU part number for the FID and use technical area code (TAC) **T01** for the area of failure.

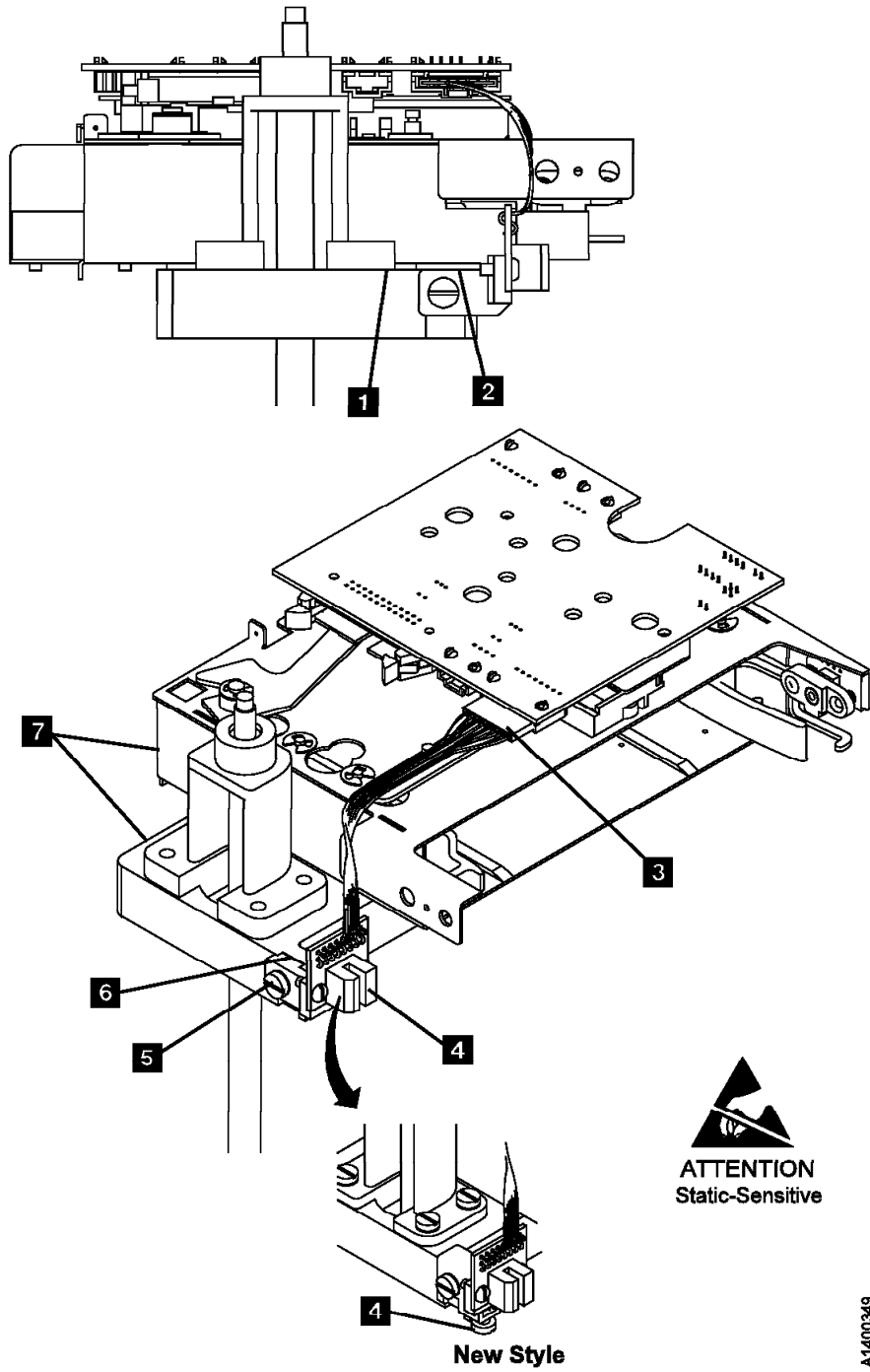


Figure 298. Transport Position Sensor

Check and Adjustment of Transport

Position Sensor: This procedure is used to verify and adjust the alignment of the ACF transport. Result of this check is that the alignment is correct or that an adjustment is needed.

See Figure 299 on page LOC*CAR-29.

The top of the transport rails **2** must be aligned with the bottom of the priority cell **5**. Adjusting the transport-position sensor **up** causes the transport assembly to stop at a **lower** position in relationship to the priority cell.

With ACF Transport Position Adjustment Tool, P/N 05H3388

1. Lift the operator/CE panel out of its holder.
2. Switch ON the tape drive power. See page PROC-6. During the power-on sequence, the ACF positions the transport at the priority cell.
3. Ensure the power-on diagnostics have successfully completed and the transport is located at the priority cell before continuing. If you get a FID at this point, do **not** continue with this procedure, use the FID and go to “FID Entry Point” on page START-7.
4. Press the Change Mode **Y** push button, and select **Proceed**, if the display is not already in CE Mode.
5. Select **Config/Install** from the CE Options menu.
Note: If **ATTN ACF** displays, the priority-cell sensor was activated. Ensure that the priority cell is empty. Press Enter to reset the condition and return to the menu.
6. Select **Align ACF** from the Config/Install menu.



The transport position sensor is ESD sensitive. See “Working with Electrostatic Discharge (ESD) Parts” on page PROC-20.

7. **Warning:** To prevent damage to the transport drive mechanism and the adjustment tool — **always remove** the adjustment tool from the priority cell before running the **Align Low** test.

Select **Align Low** from the CE Align ACF menu.

Note: On some levels of microcode, the **Align Low** test will not run if the adjustment tool, or a cartridge, is in the priority cell. If **ATTN ACF - Clear Picker Path** displays, the priority-cell sensor was activated. Ensure that the priority cell is empty. Press Enter to reset the condition and return to the menu. Allow the test to complete. The transport should be located at the priority cell and the display should read **Aligned Low**.

8. Use the ACF Transport Position Adjustment Tool, P/N 05H3388, to check the transport alignment to the priority cell floor. See “ACF Transport Position Adjustment Tool” on page INTRO-43.

Place the tool **3** on the priority cell floor as shown in Figure 299 on page LOC*CAR-29.

9. Slide the tool into the priority cell until it contacts the stops **4**.

Note: Do not force it in too hard, and do not touch the tool while you are reading the gauge.

Hint

If the adjustment tool pointer slowly drifts up (towards 1 on the scale) when the tool is first inserted into the priority cell, it will be necessary to hold the transport leadscrew to prevent it from turning.

Remove the adjustment tool.

Rerun the **Align Low** test, then hold the leadscrew, and slide the tool into the priority cell. Read the gauge while still holding the leadscrew.

10. See Figure 299 on page LOC*CAR-29.

The distance (in millimeters) from the priority cell floor **5** to the top of the transport rail **2** is indicated on the gauge.

The gauge should read **0 to .25**, as shown.

Note: Slide the tool out and back in 2 or 3 times to ensure that the readings are consistent.

Engineering Change

There are two levels of position sensor adjustments. The old level has a locking screw **1** on the side, and the sensor assembly slides up and down in a slot. The new level has an adjusting screw **6** in the bottom of the sensor, that is accessed from the front. See Figure 299 on page LOC*CAR-29.

Use bristol tool P/N 9900103 to adjust the new level. One turn of the screw equals a change of 0.5 on the transport adjust tool scale.

Attention: Do not turn the screw beyond the end of it's travel. The plastic housing may break.

11. If the gauge reads below 0, the transport is **too high**.

Adjust the transport position by loosening screw **1** and raising the position sensor (old level, side adjust) -or-

Turn the adjusting screw **6** counter-clockwise, as viewed from the bottom (new level, front adjust).

Remove the adjustment tool from the priority slot.

Rerun the **Align Low** test to ensure that the adjustment is correct. Repeat the adjustment procedure, if necessary.

12. If the gauge reads above .25, the transport is **too low**.

Adjust the transport position by loosening screw **1** and lowering the position sensor (old level, side adjust).

-or-

Turn the adjusting screw **6** clockwise, as viewed from the bottom, (new level, front adjust).

Remove the adjustment tool from the priority slot.

Rerun the **Align Low** test to ensure that the adjustment is correct. Repeat the adjustment procedure, if necessary.

13. After rerunning **Align Low**, complete the following:

- Select **Done** from the CE Align ACF menu.
- Select **Cancel** from the Config/Install menu.
- Select **Verify Fix** from the CE Options menu.
- Select **Test ACF** from the CE Verify Fix menu.
- After the test completes successfully, select **Cancel**.

14. Return to the procedure which sent you here or perform "End of Call" on page PROC-8.

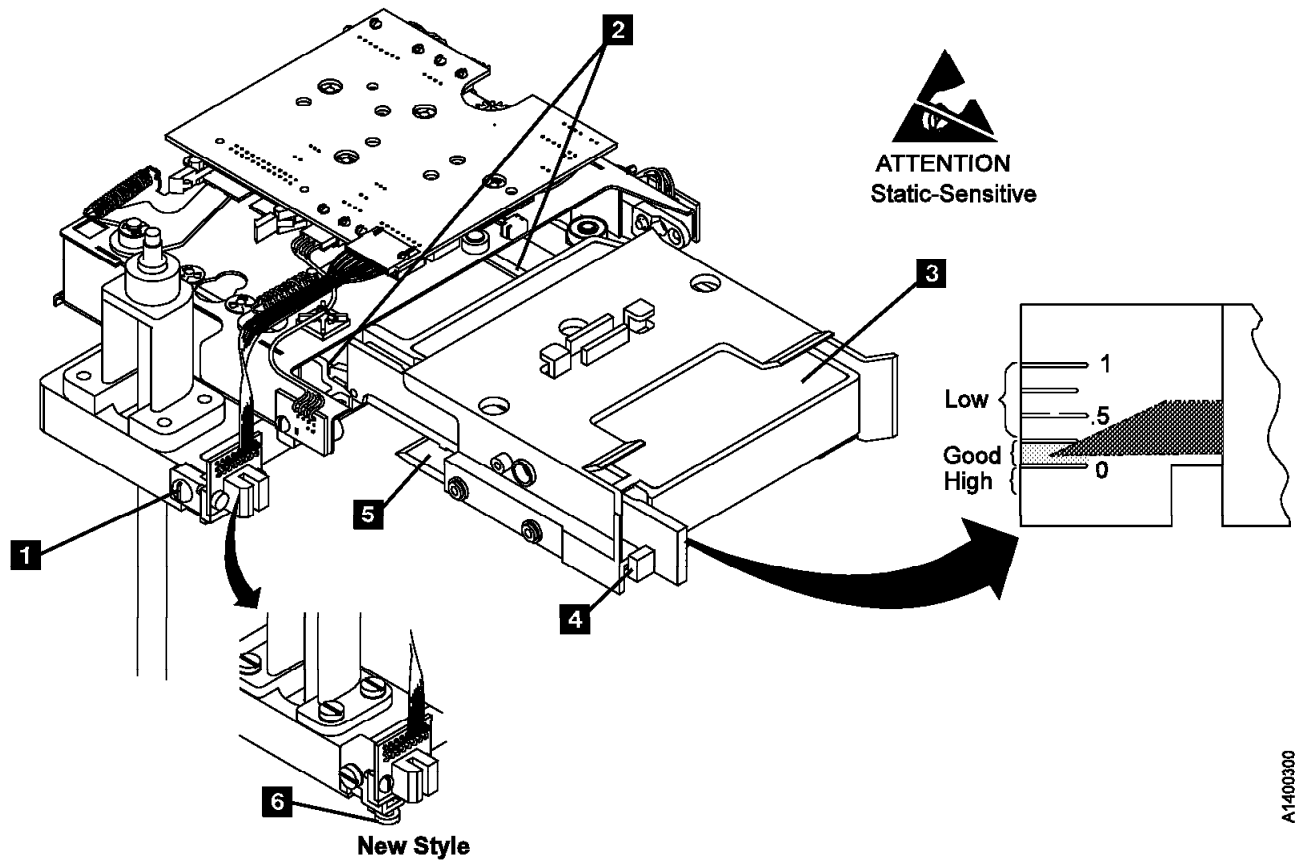


Figure 299. Transport Position Check (With ACF Transport Adjust Tool)

FID 99: Transport Cable (Old Style)

See “Locations and Removal Procedures for the ACF” on page LOC*CAR-8 for FRU location 99.

Note: The old style transport cable has a “Z” bend in the cable. If your machine has the old style transport cable, replace it with the new style transport cable shown on Figure 301 on page LOC*CAR-33. The new style transport cable has a smooth shape instead of the “Z” shape, and uses two cable retention brackets that are riveted to one of the side covers. The new cable will come as a FRU kit that will include a new side cover. Discard the old cable and cover and use the new parts. The new style transport cable replacement procedure is at “Replacement of Transport Cable (New Style)” on page LOC*CAR-32.

Removal of Transport Cable

1. “Prepare the Tape Drive for Service” on page PROC-5 and then return here.
2. Remove the side covers. See “ACF Side Covers” on page PROC-26.

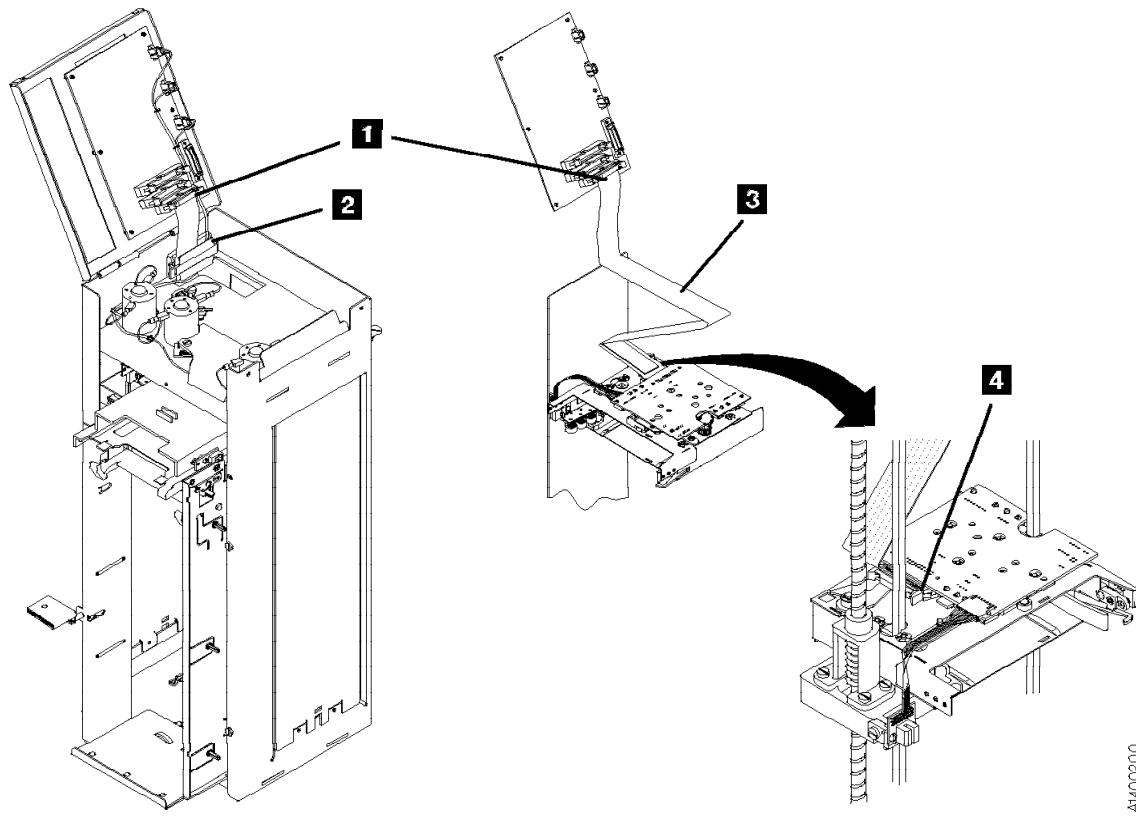
3. Open the top cover of the ACF. See “ACF Top Cover” on page PROC-26.

Note: Ensure the pinch rollers are open before moving the elevator assembly. If not, turn the pinch shaft by hand in the clockwise direction to open the pinch rollers.

4. Lower the elevator assembly approximately half way by turning the lead screw.
5. See Figure 300 on page LOC*CAR-31. Disconnect the transport ribbon cable from P4 connector **1** on the motor control card.
6. Disconnect the lower transport ribbon cable connector **4** from the transport card.
7. Open the cable retainer **2** and remove the cable **3**.
8. Remove foam from underside of motor mount plate, if it exists.

Replacement of Transport Cable

1. Install a new style cable and side cover FRU kit. See “Replacement of Transport Cable (New Style)” on page LOC*CAR-32.



A1400200



Figure 300. Transport Cable (Old Style)

FID 99: Transport Cable (New Style)

See "Locations and Removal Procedures for the ACF" on page LOC*CAR-8 for FRU location 99.

Removal of Transport Cable

1. "Prepare the Tape Drive for Service" on page PROC-5 and then return here.
2. Remove the side covers. See "ACF Side Covers" on page PROC-26.

Note: The new style transport cable has a smooth surface instead of the "Z" shape found in the old style transport cable. It also uses two cable retention brackets that are riveted to one of the side covers. Use caution when you remove this cover as it will be attached to the ribbon cable. The new cable will come as a FRU kit that will include a new side cover. Discard the old cable and cover and use the new parts.

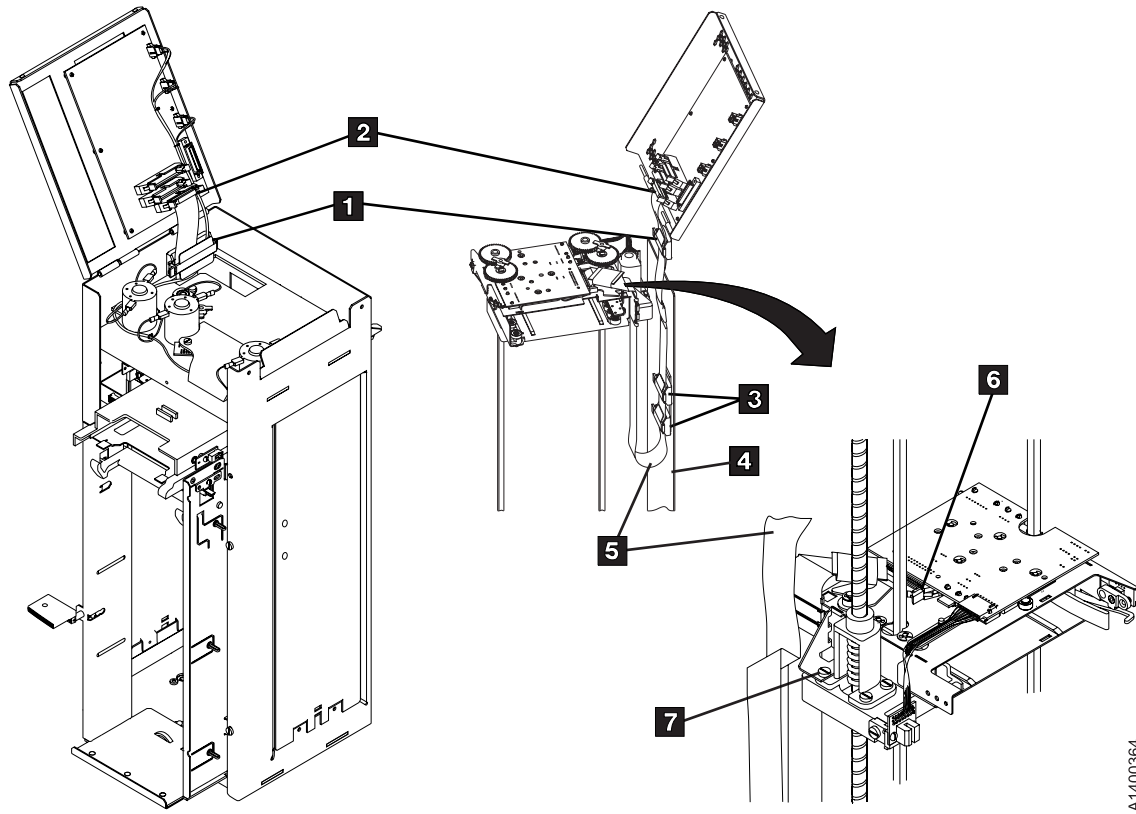
3. Open the top cover of the ACF. See "ACF Top Cover" on page PROC-26.
Note: Ensure the pinch rollers are open before moving the elevator assembly. If not, turn the pinch shaft by hand in the clockwise direction to open the pinch rollers.
4. Lower the elevator assembly approximately two-thirds of the way down by turning the lead screw.
5. See Figure 301 on page LOC*CAR-33. Disconnect the transport ribbon cable

connector, item **2** from the motor control card.

6. Disconnect the lower transport ribbon cable connector, item **6** from the transport card.
7. Open the top cable retainer, item **1** and remove the cable, item **5**.
8. Remove and save 2 screws and washers **7** from the transport, then remove the cable from the ACF.

Replacement of Transport Cable (New Style)

1. Install the new cable bracket to the transport with 2 screws and washers **7**.
2. Connect the cable to the transport card **6**.
3. Connect the upper end of the cable to the Motor Control card **2**.
4. Using the two marks on the cable as a guide, close the upper cable retainer **1** over the cable.
5. Install the side covers on the ACF. The left side cover **4** has two cable retainers **3**.
6. Using the four marks on the cable as a guide, close the cable retainers **3** over the cable.
7. Close the top cover.
8. Make sure that transport cable or another cable is not obstructing movement of the transport assembly.
9. Perform "End of Call" on page PROC-8.
10. Use your local procedures to report the FRU part number for the FID and use technical area code (TAC) **T04** for the area of failure.



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Figure 301. Transport Cable (New Style)


FID 9A: Transport

See “Locations and Removal Procedures for the ACF” on page LOC*CAR-8 for FRU location 9A.

Prior to replacing the transport:

1. Check that the transport Limit 1 and Limit 2 sensors are firmly connected to the transport assembly. See Figure 164 on page ACF-12.
2. Debris may be causing the problem, try to clean the Limit 1, Limit 2, Import, Export and Transport Position Sensors with a brush (standard tool kit soft bristle brush). Verify problem remains prior to replacing the Transport. If access to the sensors is too difficult, then replace the Transport.


Removal of Transport

1. “Prepare the Tape Drive for Service” on page PROC-5 and then return here.
2. Remove the deck enclosure back cover. See “Deck Enclosure Covers” on page PROC-23.
3. Remove the ACF side covers. See “ACF Side Covers” on page PROC-26.
4. Lower the elevator assembly approximately half way.
5. See Figure 302 on page LOC*CAR-35. Disconnect the ribbon cable connector **2** from the transport card.
6.  The transport position sensor is ESD sensitive. See “Working with Electrostatic Discharge (ESD) Parts” on page PROC-20.

Disconnect the transport position sensor connector **14** and remove cable ties as necessary to position the cable and connector out of the way (away from the transport).
7. Lower the elevator assembly to the bottom.

This procedure can be done with the ACF attached to the drive; however, it may be easier if the ACF is removed and put on a work surface. If you do not have a work surface available, proceed with step 9. If you have a work surface available, continue with step 8.

8. Remove the ACF from the drive:

See Figure 243 on page PROC-30 for the next step.
 - a. Disconnect the two ACF cables **2** from the deck enclosure and loosen the thumb screw **1** on the upper-left-rear of the ACF.
 - b. Lift the ACF assembly off the drive and place it on its right side (leadscrew is up) onto a work surface.
9. See Figure 302 on page LOC*CAR-35 and remove the pinch shaft **3**:
 - a. Remove the bottom (cross) bearing **12**.
 - b. Lower or pull the shaft toward the bottom and remove the top E-clip **4** from the shaft and remove the gear **5**. Observe the orientation of the gear to the shaft (the longer gear hub is toward the transport).
 - c. Remove the other E-clip **6** from the shaft and remove the shaft through the bottom of the ACF.
10. Repeat steps 9a through 9c to remove the feed shaft **1**.
11. Raise the elevator plate up far enough to gain access to the 2 transport mounting screws on the bottom of the elevator plate.
12. Ensure the ribbon cable is out of the way.
13.  The transport board and transport position sensor are ESD sensitive. See “Working with Electrostatic Discharge (ESD) Parts” on page PROC-20.

Remove the two transport mounting screws **15** from the bottom of the elevator plate.

If the ACF is attached to the drive, go to step 14.
Or, if the ACF is being repaired on a work surface, go to step 15.
14. Lower the elevator plate far enough to remove the transport assembly out through the right side of the ACF.
15. Remove the transport assembly out through the large hole in the back of the ACF.

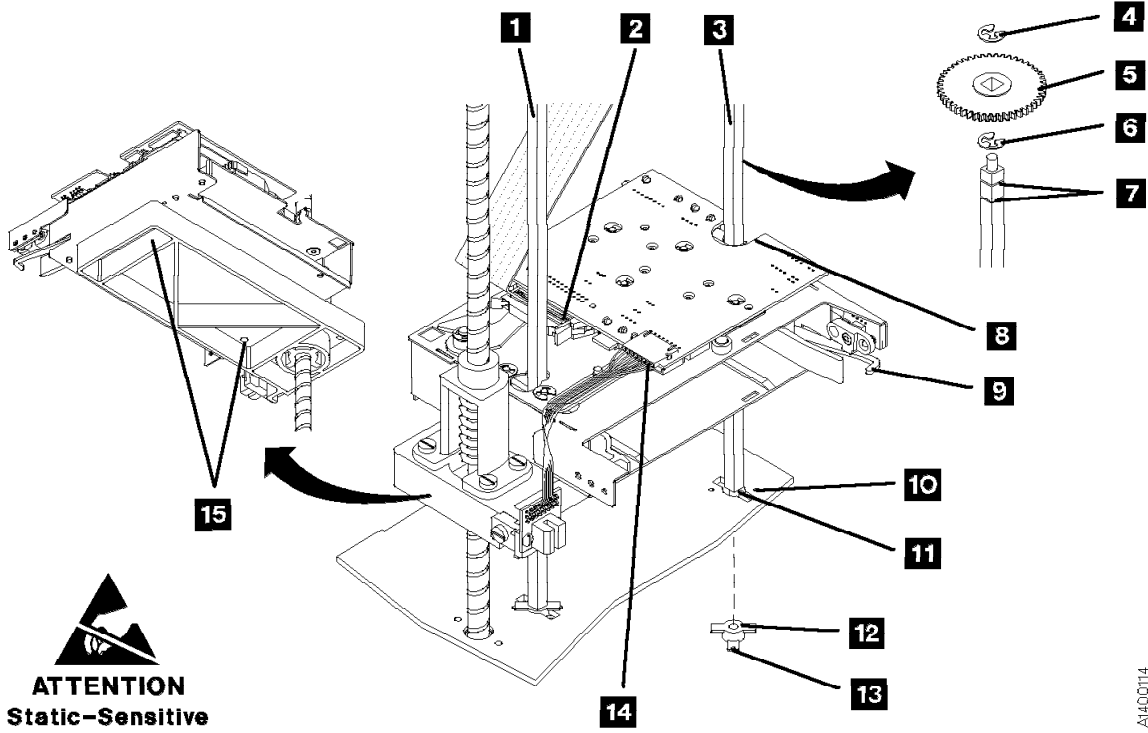


Figure 302. Transport

Replacement of Transport

1. Install the new transport assembly onto the elevator plate.

Notes:

- a. Ensure the sensor wires are not between the transport and elevator plate.
 - b. The transport assembly can be mounted on the elevator plate 180° out from its correct position. Ensure the notch in the transport board **8** is on the far end of the transport from the leadscrew.
 - c. Ensure the guide pins on the elevator plate are seated into their holes on the bottom of the transport assembly. Then reinstall the two transport mounting screws **15** from the bottom of the elevator plate to fasten transport to the elevator plate.
2. Lower the elevator to the bottom of the ACF.
 3. Replace the pinch shaft:
 - a. Reinsert the shaft through the hole in the bottom of the ACF **11** and through the elevator plate and transport (the end of the shaft with two grooves **7** is inserted first).
 - b. Install an E-clip in the groove nearest to the transport **6**.
 - c. Reinstall the gear **5** on the shaft and slide it against the E-clip. Ensure the longer gear hub is next to the transport.
 - d. Install the other E-clip **4** in the groove next to the gear.
 - e. Insert the upper end of the shaft into the top (cross) bearing and ensure the gears are properly meshed.
 - f. In this step, ensure the small protrusions **13** on the (cross) bearing **12** will be on

the outside of the frame. Insert the lower (cross) bearing **12** onto the end of the shaft and through the slot **11** in the frame. Rotate the bearing (cross member with the protrusions) in the direction of the small holes in the frame **10**, until the protrusions snap into the holes in the frame.

4. Repeat steps 3a through 3f to reinstall the feed shaft.
5. Reinstall the ACF onto the drive if it was removed earlier.
6. Rotate the pinch shaft clockwise (from the top) to ensure the cartridge release lever **9** is fully retracted.
7. Raise the elevator assembly approximately half way.
8. Reconnect the transport position sensor connector **14** to the transport board and ensure the sensor is properly positioned over the transport position bar. The (transport position) sensor mounting bracket should still be positioned so its top edge is even with the top surface of the elevator plate.
9. Reconnect the ribbon cable connector **2** to the transport card.
10. The alignment of the transport assembly to the priority cell must be checked anytime the transport position sensor is loosened or removed. Go to "Check and Adjustment of Transport Position Sensor" on page LOC*CAR-27 to check and adjust the transport position sensor, then return here.
11. Reinstall all covers removed in this procedure.
12. Perform "End of Call" on page PROC-8.
13. Use your local procedures to report the FRU part number for the FID and use technical area code (TAC) **T03** for the area of failure.

FID 9B: Global/Interference Sensor Assembly (Upper and Lower)

See “Locations and Removal Procedures for the ACF” on page LOC*CAR-8 for FRU location 9B.

Debris may be causing the problem. **Clean the top and bottom pair of sensors** with a brush (standard tool kit soft bristle brush). Verify problem remains prior to replacing the FRU.

Removal of Upper Sensor

1. “Prepare the Tape Drive for Service” on page PROC-5 and then return here.
2. Open the ACF top cover. See “ACF Top Cover” on page PROC-26

See Figure 303. The cable cover **1**, the sensor board **4**, and the sensor cover **5** (under the sensor board), are all held in place by the same mounting screw **2**.

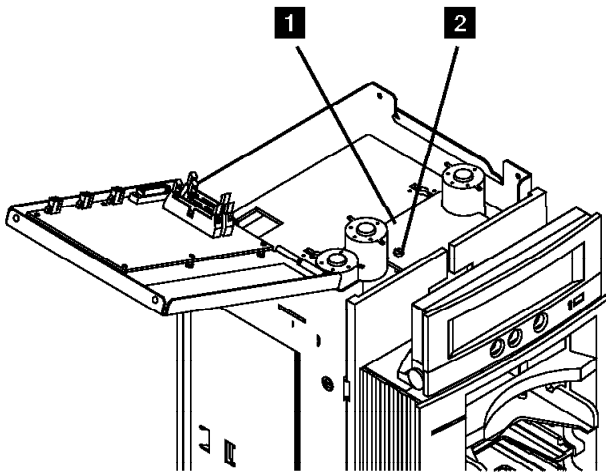



Figure 303. Global/Interference Sensor Assembly (Upper)

3. Remove the mounting screw **2** and remove the covers.

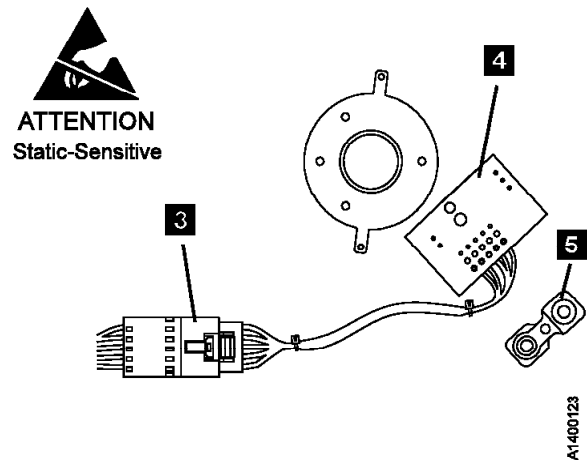
Note: For correct reinstallation of the sensor assembly, note the orientation of the sensor cover **5** relative to the sensor board **4** and the ACF mounting surface.

4.  The sensor is ESD sensitive. See “Working with Electrostatic Discharge (ESD) Parts” on page PROC-20.


Disconnect the sensor connector SC2 **3** and remove the sensor.

Replacement of Upper Sensor

1. Perform the removal procedure in the reverse order, then return here.
2. Go to “Removal of Lower Sensor” on page LOC*CAR-38 and remove and replace the lower sensor.



Removal of Lower Sensor

1. "Prepare the Tape Drive for Service" on page PROC-5 and then return here.
2. Remove the ACF side covers. See "ACF Side Covers" on page PROC-26.
3. See Figure 304. Remove the sensor mounting screw **2**, the sensor cover **5**, and the spacer **4**. Notice the spacer **4** has locating pins for the sensor board **3** and the base. Also note the orientation of the sensor cover **5** relative to the sensor board **3**.
4.  The sensor is ESD sensitive. See "Working with Electrostatic Discharge (ESD) Parts" on page PROC-20.
Disconnect the sensor connector, SC2 **1**.

Replacement of Lower Sensor

1. Perform the removal procedure in the reverse order, then return here.

Notes:

- a. When installing the sensor, ensure the spacer **4** locating pins are seated correctly in the base and the sensor card.
 - b. Reseat the sensor cover **5** over the sensors on top of the sensor board **3**, as shown in Figure 304.
 - c. Route the sensor cable to the front side of the ACF, so it will not block the sensor.
2. Perform "End of Call" on page PROC-8.
 3. Use your local procedures to report the FRU part number for the FID and use technical area code (TAC) **T01** for the area of failure.

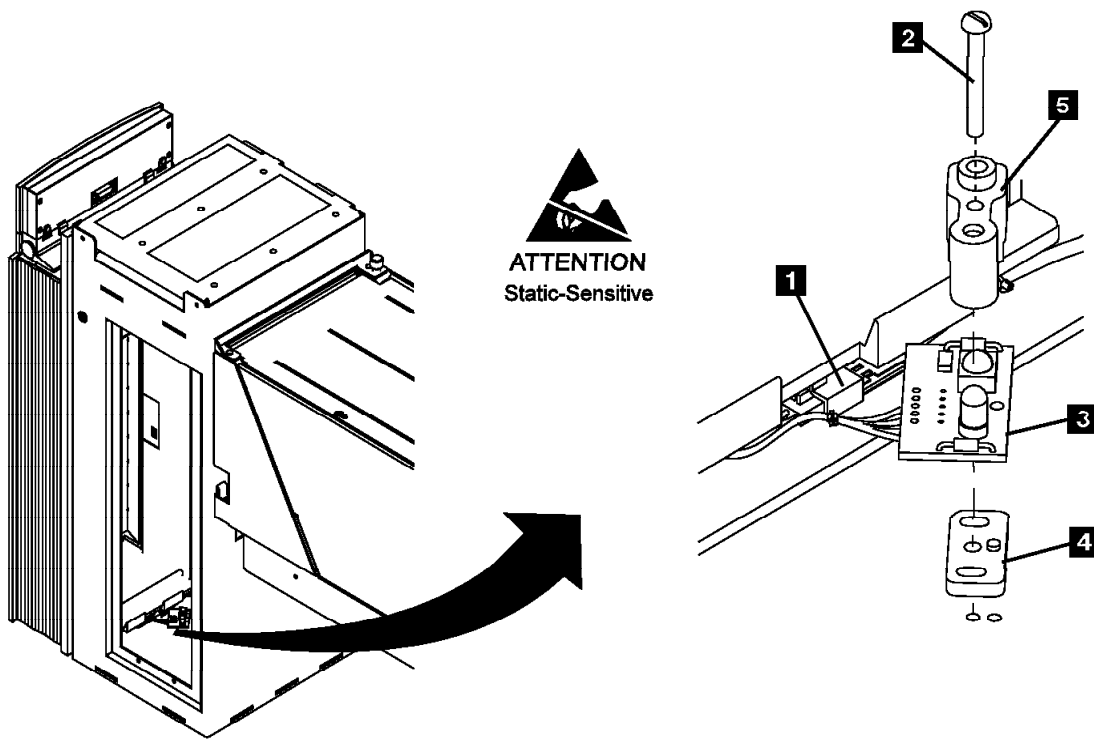



Figure 304. Global-Interference Sensor Assembly (Lower)

FID 9E: Priority Cell Sensor

See “Locations and Removal Procedures for the ACF” on page LOC*CAR-8 for FRU location 9E.

 The sensors are ESD sensitive. See “Working with Electrostatic Discharge (ESD) Parts” on page PROC-20.

Debris may be causing the problem, **clean the sensor** with a brush (standard tool kit soft bristle brush). Verify problem remains prior to replacing the FRU.

Removal of Priority Cell Sensor

1. “Prepare the Tape Drive for Service” on page PROC-5 and then return here.
2. Remove the operator/CE panel. See page PROC-21.
3. Remove the bezel. See page PROC-27.

Note: The left and right priority cell sensors are different. The new sensors must be installed in their correct positions.

4. See Figure 305. Remove the mounting screw **3** from the emitter card **2**.

Disconnect the emitter (PSBE) connector **1** from the emitter card.

5. Remove the mounting screw **5** from the detector card **4** (left side).

Disconnect the detector (PSBD) connector **6** from the detector card.

Replacement of Priority Cell Sensor: The left priority cell sensor is the emitter and the right priority cell sensor is the detector. They must be installed in their correct locations.

1. Reconnect the detector (PSBD) connector **6** to the detector card. The connector receptacle is mounted at a 90° angle to the card surface.
2. Install the detector sensor **4** on the left side of the priority cell by using the screw removed earlier.
3. Reconnect the emitter (PSBE) connector **1** to the detector card. The connector receptacle is mounted parallel to the card surface.
4. Install the emitter sensor **2** on the right side of the priority cell by using the screw removed earlier.
5. Reinstall the bezel and operator/CE panel.
6. Perform “End of Call” on page PROC-8.
7. Use your local procedures to report the FRU part number for the FID and use technical area code (TAC) **T01** for the area of failure.

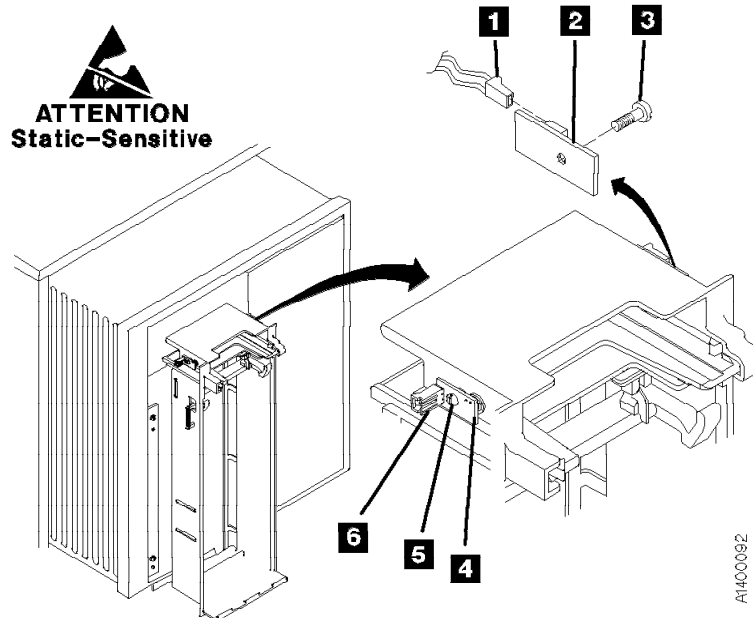


Figure 305. Priority Slot Sensor


FID A0: Magazine-Present Sensor Assembly

See “Locations and Removal Procedures for the ACF” on page LOC*CAR-8 for FRU location A0.

Debris may be causing the problem, **clean the sensor** with a brush (standard tool kit soft bristle brush). Verify problem remains prior to replacing the FRU.

Removal of Magazine-Present Sensor

1. “Prepare the Tape Drive for Service” on page PROC-5 and then return here.
2. Remove the bezel. See “Bezel (Model B11/E11 Only)” on page PROC-27.
3. See Figure 306. Disconnect the magazine-present sensor connector MP **3**

4.  The magazine-present sensor is ESD sensitive. See “Working with Electrostatic Discharge (ESD) Parts” on page PROC-20.

Remove the sensor mounting bracket screw **2** and remove the sensor assembly **1**.

5. Remove the sensor from the mounting bracket.

Replacement of Magazine-Present Sensor

1. Perform the removal procedure in the reverse order, then return here.
2. Perform “End of Call” on page PROC-8.
3. Use your local procedures to report the FRU part number for the FID and use technical area code (TAC) **T01** for the area of failure.

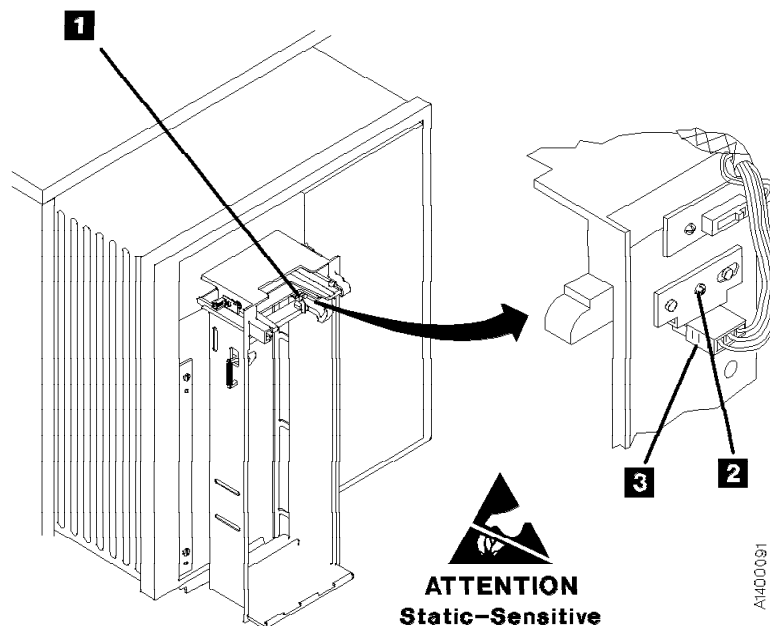


Figure 306. Magazine Present Sensor

FID A1: Motor Cable Assembly

See "Locations and Removal Procedures for the ACF" on page LOC*CAR-8 for FRU location A1.

Removal of Motor Cable

1. "Prepare the Tape Drive for Service" on page PROC-5 and then return here.
2. Open the top cover. See "ACF Top Cover" on page PROC-26.
3. See Figure 307. Remove the pinch motor connector from CD6 **1**, the feed motor connector from CD5; **2**, and the elevator motor connector from CD7 **3**.
4. From the three motors, remove the yellow wires from the front terminals **6** (post 2), and the black wire from the rear terminals **5** (post 1).
5. Remove the cable cover/sensor mounting screw **8** and remove the cable cover **7**, which allows you to remove the wires on the pinch motor.

Note: The cable cover **7** and the upper global/interference sensor are held in place by the same mounting screw **8**.

6. Open the cable retainer **4** and remove the cable.

Replacement of Motor Cable

Notes for Replacement

1. Motor terminal post 2 is to the front on all three motors **6**.
2. The yellow wire on the motors is connected to the front terminal (post 2) and the black motor wires are connected to the rear terminal (post 1) **5**.
3. Ensure the connections on the motors are correct:
 - Yellow wire (T1) goes to pinch motor.
 - Yellow wire (T2) goes to feed motor.
 - Yellow wire (T3) goes to elevator motor.

4. Ensure the connectors on the motor control card are correct:
 - The pinch motor connector attaches to CD6 **1**.
 - The feed motor connector attaches to CD5 **2**.
 - The elevator motor connector attaches to CD7 **3**.

End of Notes for Replacement

1. Perform the removal procedure in the reverse order, then return here.
2. Perform "End of Call" on page PROC-8.
3. Use your local procedures to report the FRU part number for the FID and use technical area code (TAC) **T04** for the area of failure.

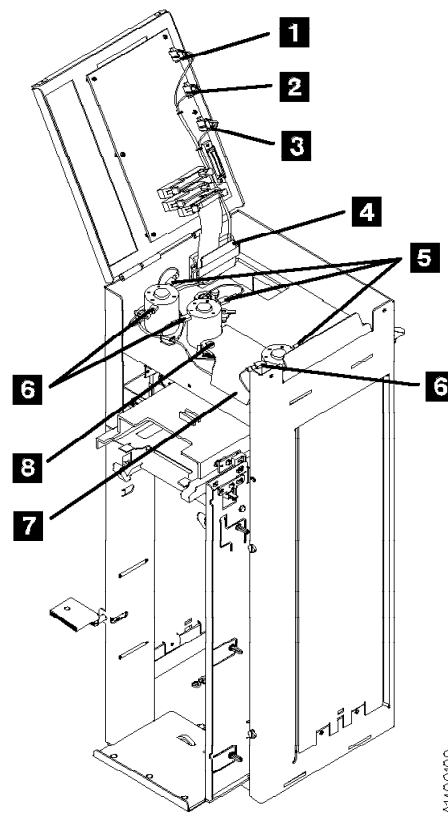


Figure 307. Motor Cable

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FID A2: Drive/ACF Cable

See "Locations and Removal Procedures for the ACF" on page LOC*CAR-8 for FRU location A2.

Removal of Drive/ACF Cable

1. "Prepare the Tape Drive for Service" on page PROC-5 and then return here.
2. Remove the ACF left side cover, if not obstructed by another device; otherwise, remove the right side cover. See "ACF Side Covers" on page PROC-26.

Note: Use caution when removing the left side cover when the new style transport cable is present on your ACF. The new style transport cable is attached to the left side cover by two cable clamps mounted on a small plate. This plate is riveted to the side cover. See Figure 301 on page LOC*CAR-33 for an illustration of the new style transport cable.

3. Open the ACF top cover. See "ACF Top Cover" on page PROC-26.
4. See Figure 308. Disconnect the drive/ACF cable connector from the CD1 connector **1** on the motor control card.
5. Move the elevator up or down (turn the lead-screw) to access the cable in the deck enclosure.
6. Disconnect the cable **2** from the upper connector on the deck enclosure.

7. Remove the cable.

Replacement of Drive/ACF Cable

1. Perform the removal procedure in the reverse order, then return here.
2. Perform "End of Call" on page PROC-8.
3. Use your local procedures to report the FRU part number for the FID and use technical area code (TAC) **T04** for the area of failure.

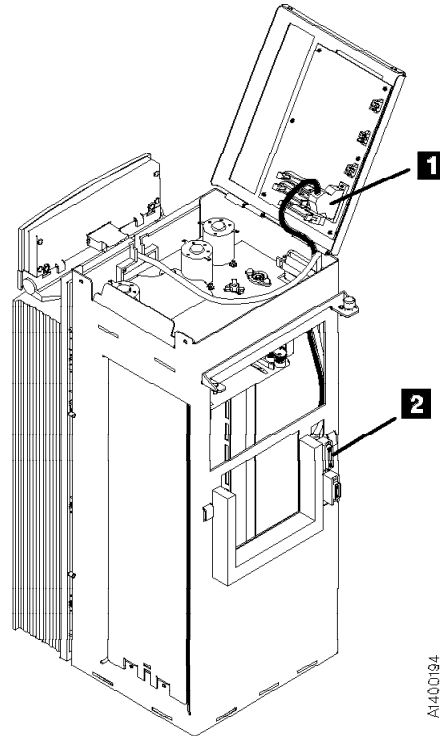


Figure 308. Drive/ACF Cable

FID A4: LED Cable

Removal of LED Cable

1. "Prepare the Tape Drive for Service" on page PROC-5 and then return here.
2. Remove the ACF side covers. See "ACF Side Covers" on page PROC-26.
3. Open the top cover **1**. See "ACF Top Cover" on page PROC-26.
4. See Figure 309. Disconnect the LED ribbon cable connector from connector P2 **1** on the motor control card.
5. Remove the bezel. See "Bezel (Model B11/E11 Only)" on page PROC-27.

6. Remove the cable **2**.

Replacement of LED Cable

Note: When reconnecting the cable connector **3** to the bezel, ensure that the two connectors **4** remain strongly in place.

1. Fold the new LED cable like the old one that was removed.
2. Perform the removal procedure in the reverse order, then return here.
3. Perform "End of Call" on page PROC-8.
4. Use your local procedures to report the FRU part number for the FID and use technical area code (TAC) **T04** for the area of failure.

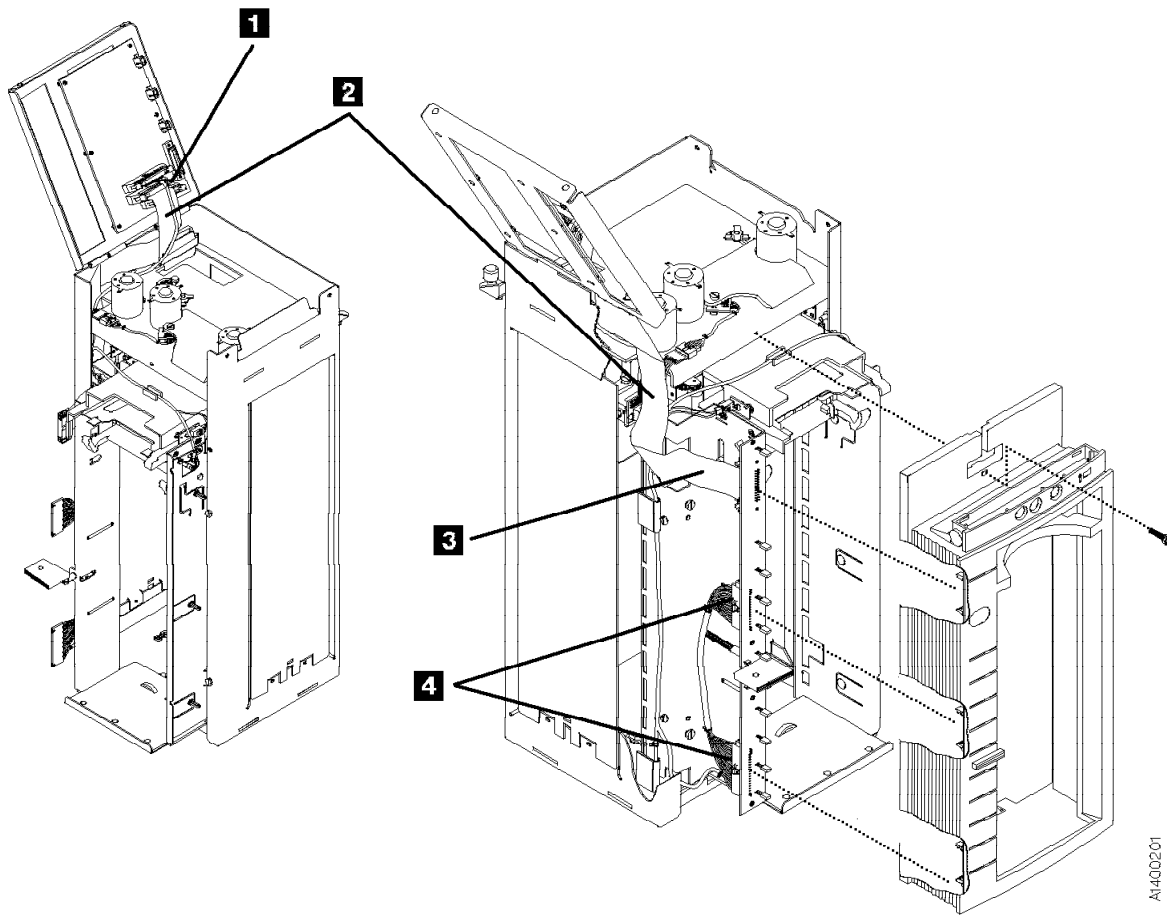



Figure 309. LED Cable

FID A5: Sensor Cable

 The sensors are ESD sensitive. See "Working with Electrostatic Discharge (ESD) Parts" on page PROC-20.

Removal of Sensor Cable

1. "Prepare the Tape Drive for Service" on page PROC-5 and then return here.
2. Remove the ACF side covers. See "ACF Side Covers" on page PROC-26.

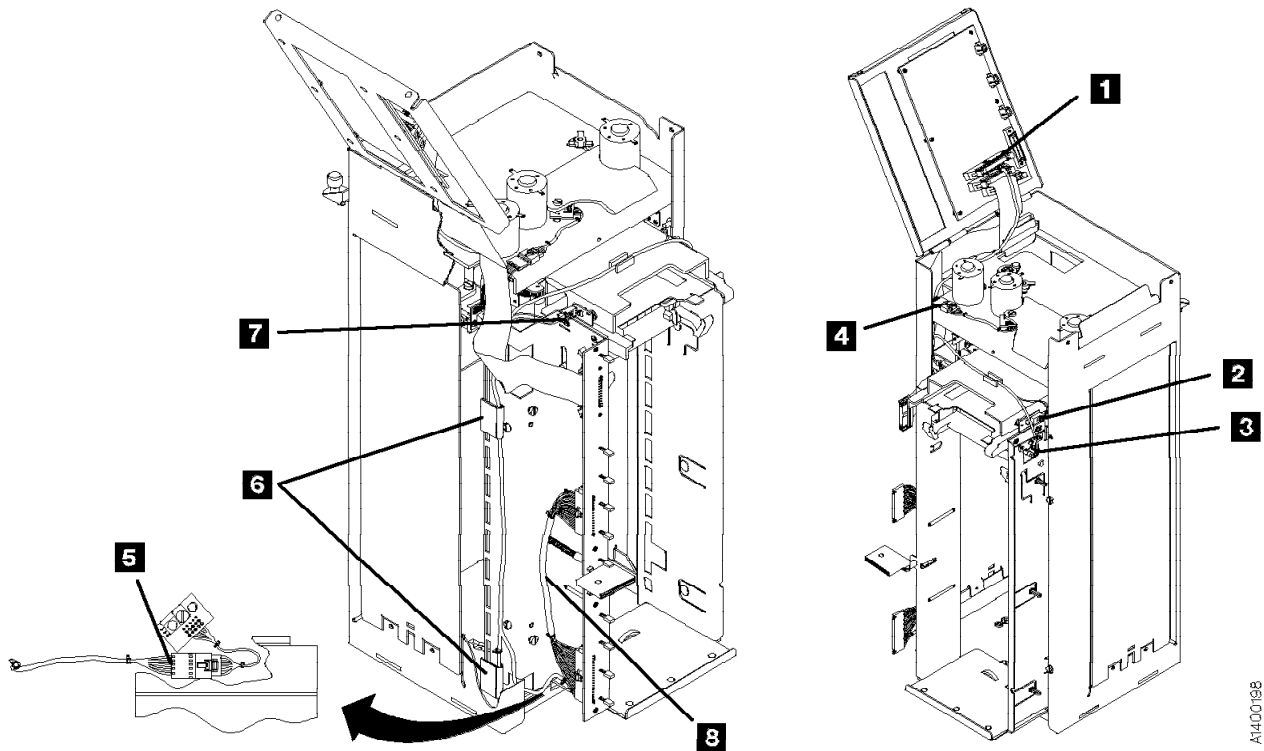
Note: Use caution when removing the left side cover when the new style transport cable is present on your ACF. The new style transport cable is attached to the left side cover by two cable clamps mounted on a small plate. This plate is riveted to the side cover. See Figure 301 on page LOC*CAR-33 for an illustration of the new style transport cable.

3. Open the top cover **1**. See page PROC-26.

4. Remove the bezel. See page PROC-27.
5. See Figure 310. Disconnect the sensor cable connector P3 **1** from the top cover (the round cable).
6. Disconnect the cables from the global/interference sensors **5** and **4** (SC2 lower and SC2 upper).
7. Disconnect the cable from the priority cell connectors **7** (PSBD) and **2** (PSBE).
8. Disconnect the cable from the magazine-present sensor **3**.
9. Disconnect the cable connectors **8** from the LED card.
10. Open the cable retainers **6** and remove the cable.

Replacement of Sensor Cable

1. Perform the removal procedure in the reverse order, then return here.
2. Perform "End of Call" on page PROC-8.
3. Use your local procedures to report the FRU part number for the FID and use technical area code (TAC) **T04** for the area of failure.



 ATTENTION Static-Sensitive


Figure 310. Sensor Cable

FID A6: LED Cards and Random Lock Sensor

See “Locations and Removal Procedures for the ACF” on page LOC*CAR-8 for FRU location A6.

Debris may be causing the problem, **clean the sensor** with a brush (standard tool kit soft bristle brush). Verify problem remains prior to replacing the FRU.

Removal of LED Cards and Random Lock Sensor

1. “Prepare the Tape Drive for Service” on page PROC-5 and then return here.
2. Remove the operator/CE panel.
3. Remove the bezel. See “Bezel (Model B11/E11 Only)” on page PROC-27.
4.  The LED cards and random lock sensor are ESD sensitive. See “Working with

Electrostatic Discharge (ESD) Parts” on page PROC-20.

The random lock sensor is mounted to and is part of the upper LED card.

See Figure 311. Remove the mounting screws **1** from the two LED cards **2** and **3** then remove the cards.

Replacement of LED Card and Random Lock Sensor

Attention: The LEDs fit into slots in the bezel. Do not damage (bend) the LEDs when replacing the LED card.

1. Perform the removal procedure in the reverse order, then return here.
2. Perform “End of Call” on page PROC-8.
3. Use your local procedures to report the FRU part number for the FID and use technical area code (TAC) **T02** for the area of failure.

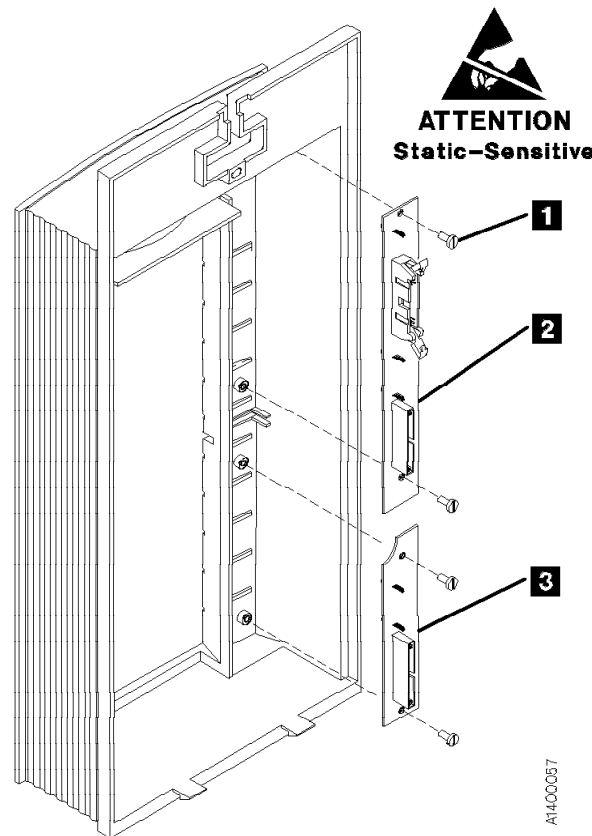


Figure 311. LED Cards (Rear View of Bezel)

FID A9: Feed Motor Assembly

See "Locations and Removal Procedures for the ACF" on page LOC*CAR-8 for FRU location A9.

Removal of Feed Motor Assembly

1. "Prepare the Tape Drive for Service" on page PROC-5 and then return here.
2. Remove the ACF side covers. See "ACF Side Covers" on page PROC-26.

Note: Use caution when removing the left side cover when the new style transport cable is present on your ACF. The new style transport cable is attached to the left side cover by two cable clamps mounted on a small plate. This plate is riveted to the side cover. See Figure 301 on page LOC*CAR-33 for an illustration of the new style transport cable.

Note: Ensure the pinch rollers are open before moving the elevator assembly. If not, turn the pinch shaft by hand in the clockwise direction to open the pinch rollers.

3. Rotate the leadscrew to lower the elevator assembly to the bottom.

This procedure can be done with the ACF attached to the drive; however, it may be easier if the ACF is removed and put on a work surface. If you do not have a work surface available, proceed with step 5.

Or, if you have a work surface available, continue with step 4.

4. Remove the ACF assembly from the drive and place it on its left side (pinch shaft up) onto the work surface to allow access to the feed shaft and feed motor assembly from the right side of the ACF. See "Automatic Cartridge Facility (ACF)" on page PROC-30 for ACF removal, then return here.

See Figure 312.

5. Open the ACF top cover **1**. See "ACF Top Cover" on page PROC-26.
6. Remove the wires from the feed shaft motor **3**:
 - a. Yellow wire from the front terminal **4** (post 2).
 - b. Black wire from the rear terminal **2** (post 1).
7. For easier access to the feed shaft and feed motor assembly, remove the lower (cross) bearing **8** from the pinch shaft **9** and lower or pull the shaft through the elevator assembly until the gear is against the transport **7**.
8. Remove the lower (cross) bearing **6** from the feed shaft **5** and lower or pull the shaft through the elevator assembly until the gear is against the ribbon cable on the transport board **10**.

Note: When reinstalling the pinch and feed shafts, ensure that the protrusions on one arm of the lower cross bearings rest against the outside frame of the bottom of the ACF.

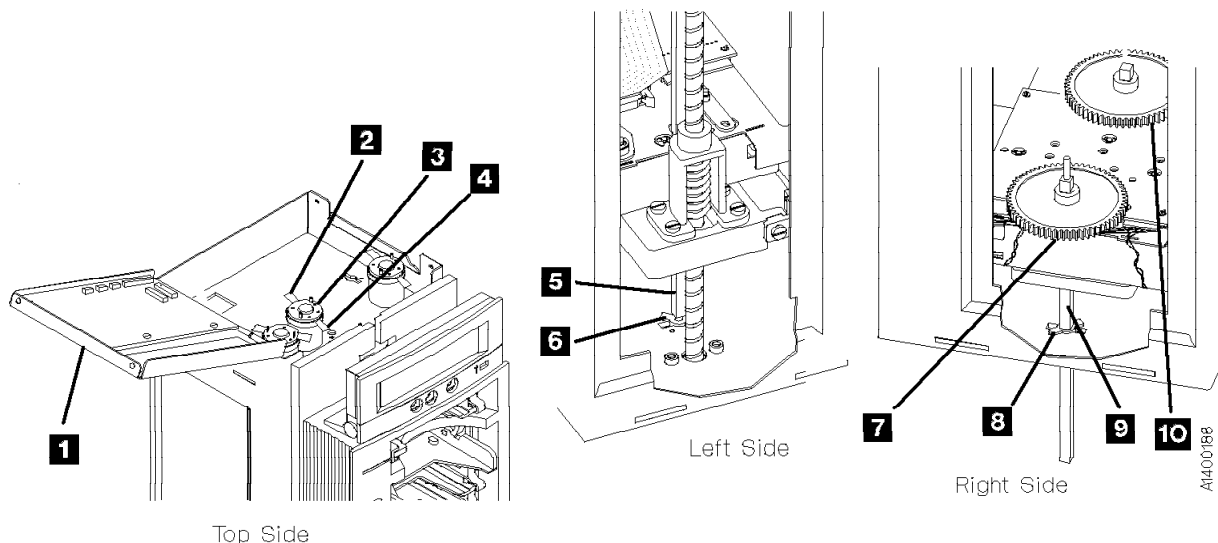


Figure 312. Feed Motor, Feed Shaft, and Pinch Shaft

See Figure 313. The view is looking upward at the underside of the motor mounting plate.

9. Remove the screw **1** and nut on the top side of the motor mounting plate. Remove the intermediate gear **2**.
10. Remove the three motor-mounting screws **3** and remove the motor from the top.

Replacement of Feed Motor Assembly

1. Perform the removal procedure in the reverse order, then return here.
2. When reinstalling or replacing motor use the ACF motor adjustment tool P/N 05H4724 to set the gear mesh gap. This procedure is easier if you remove the ACF and put it on a work surface.
3. When the motor has been reinstalled, leave the screws **3** loose enough so that the motor can be adjusted.
4. Position the ACF so that the motor gears face up.

5. Place the tool **5** dowel pin into the intermediate gear threaded hole **4** while aligning the tool hole over motor gear **6**. Orient the tool **5** as shown. While holding the tool **5** firmly in position, tighten the 3 screws **3** that hold the motor in place.

Notes for Reassembly:

- a. Motor terminal post 2 is oriented to the front.
 - b. The intermediate gear **2** is a 2-step gear, oriented with the smaller diameter gear down, as shown.
 - c. The yellow motor wire is connected to the front terminal (post 2).
 - d. The black motor wire is connected to the rear terminal (post 1).
6. Perform "End of Call" on page PROC-8.
 7. Use your local procedures to report the FRU part number for the FID and use technical area code (TAC) **T03** for the area of failure.

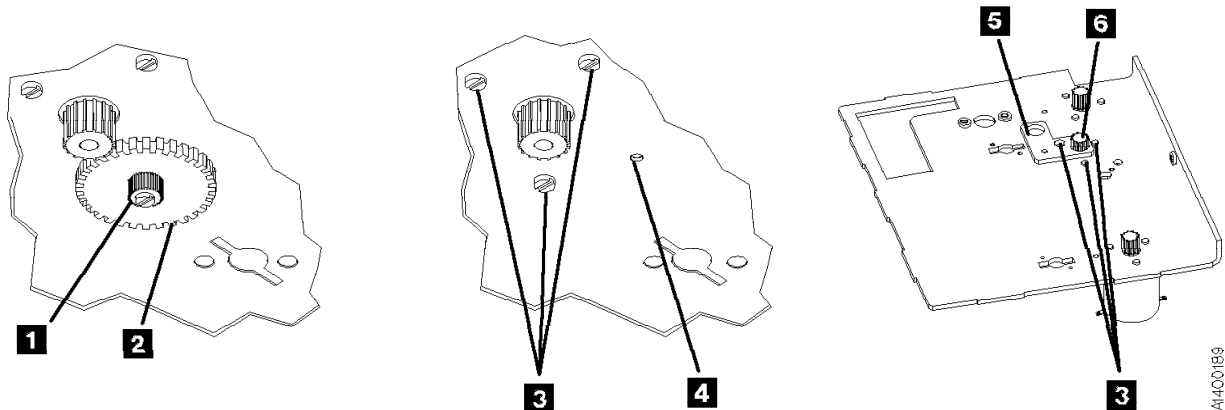
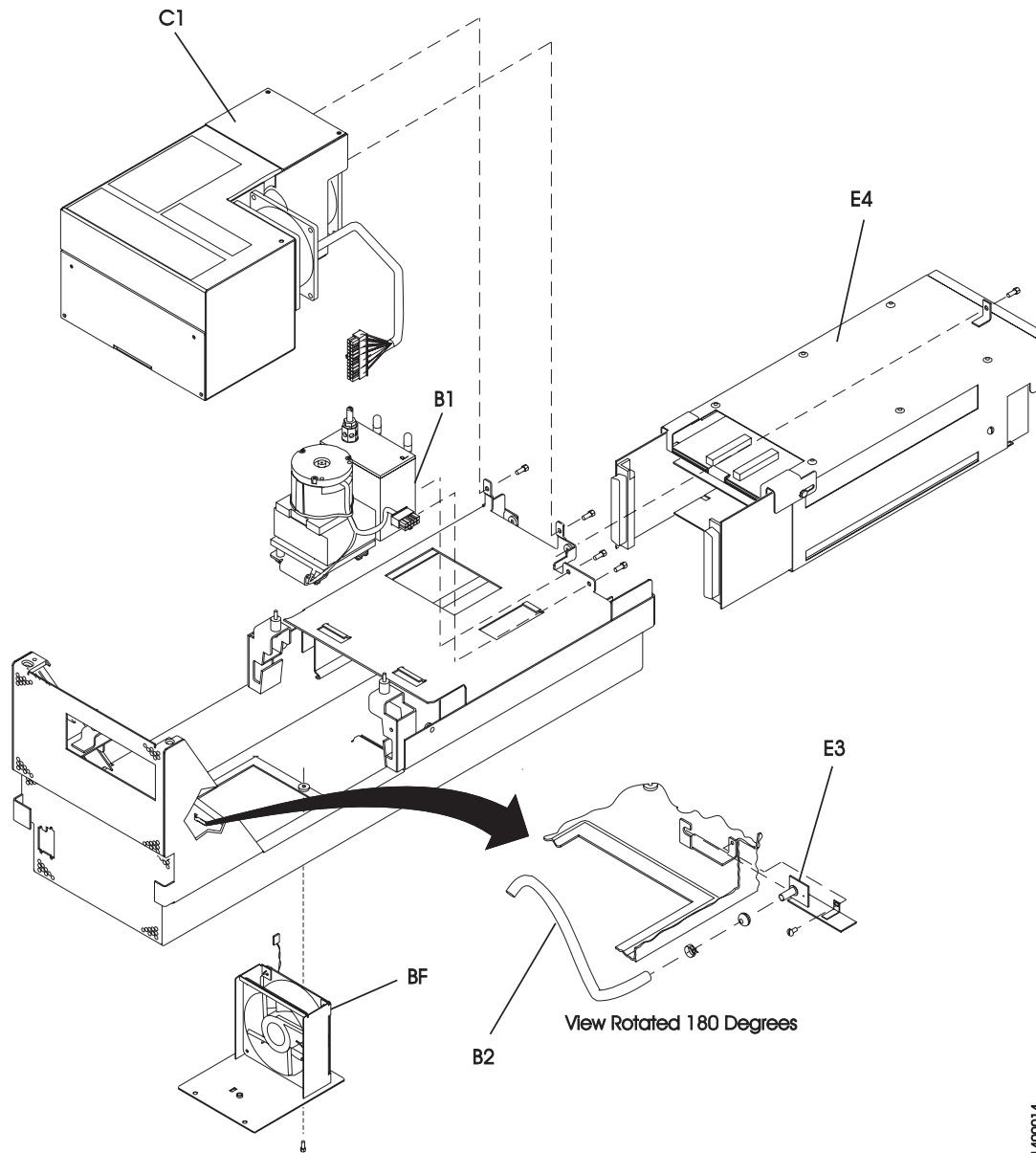


Figure 313. Intermediate Gear and Motor

Locations and Removal Procedures for the Deck Enclosure

The FRUs in Figure 314 are identified by their FID number; for example, C1 is FID C1, the power supply. The list following the figure shows the FID names. For the deck enclosure cables, see the appropriate FID.



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Figure 314. Locations for the Deck Enclosure

FID Number	FID Name	FID Number	FID Name
B1	Pneumatic assembly	B2	Pneumatic hose kit
BF	Card pack fan	C1	Power supply
E3	Pressure sensor assembly	E4	Card pack

FID B1: Pneumatic Assembly

This assembly contains the compressor and filter assembly.

See “Locations and Removal Procedures for the Deck Enclosure” on page LOC*CAR-48 for FRU location B1.

Removal of Pneumatic Assembly

1. “Prepare the Tape Drive for Service” on page PROC-5 and then return here.
2. Remove the power cord from its source and then from the 3590.
3. Remove the deck enclosure back cover and back plate. See “Deck Enclosure Covers” on page PROC-23.
4. See Figure 315. Label and disconnect the vacuum **3** and pressure **2** hoses from the rear of the pneumatic assembly. The vacuum and pressure hose positions are marked with a letter on top of the assembly; V for vacuum and P for pressure.
5. Disconnect the pneumatic motor-control connector **4** from the rear of the card pack and carefully pull the cable free.

Attention: Observe the correct cable routing for re-assembly.

6. Loosen the power supply mounting screws **8** and slide the power supply forward.
7. Remove the two mounting screws **5**.
8. Slide the pneumatic assembly **1** forward to disengage the locking tabs **6** from the front of the assembly.
9. Lift the pneumatic assembly off the enclosure.

Replacement of Pneumatic Assembly

Note: Ensure that the pneumatic motor-control cable is routed so that it is always outside of the Card Pack metal enclosure. If the cable is routed near the two large modules on the top card in the Card Pack, intermittent data errors can occur.

1. Perform the removal procedure in the reverse order, then return here.
2. The pressure and vacuum for the new pneumatic assembly must be checked and adjusted. Go to “Measurement and Adjustment of Pneumatic System” on page LOC*CAR-3, then return here. Both pressure and vacuum are adjusted in this procedure. Return here after the adjustment.
3. Perform “End of Call” on page PROC-8.
4. Use your local procedures to report the FRU part number for the FID and use technical area code (TAC) **T63** for the area of failure.

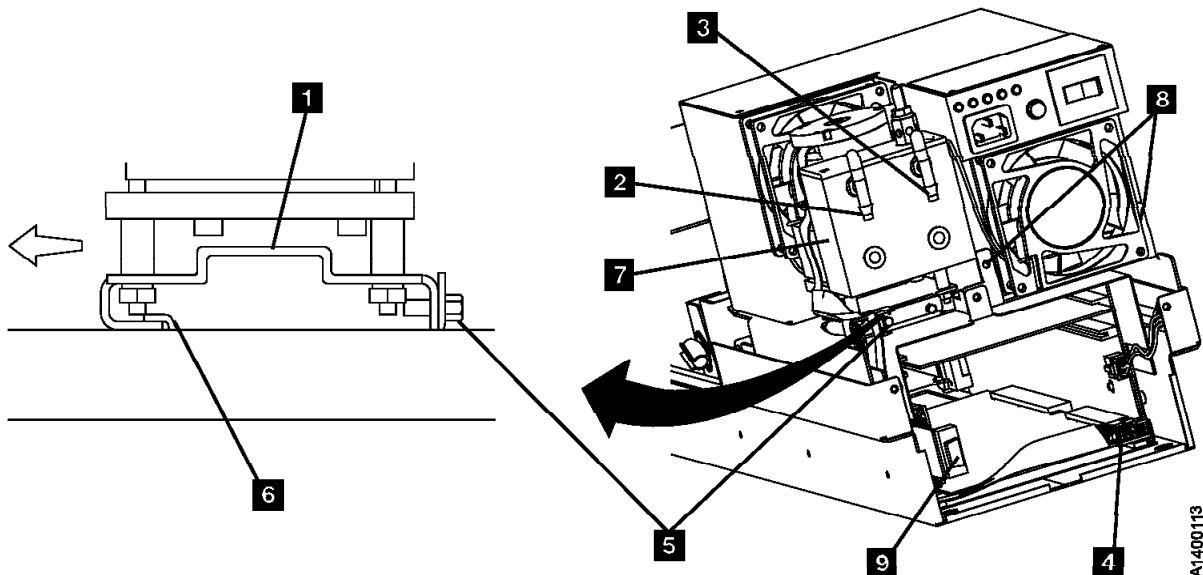


Figure 315. Pneumatic Assembly

FID B2: Pneumatic Hose Kit

Removal and Replacement of the Pneumatic Hoses and Hose Connectors

1. "Prepare the Tape Drive for Service" on page PROC-5 and then return here.
2. Remove the power cord from its source and then from the 3590.
3. Remove the deck enclosure back cover. See "Deck Enclosure Covers" on page PROC-23.

Both sides of the drive must be accessible to replace the components of the pneumatic hose kit.

If your configuration is two Model B11/E11 drives on a rack mounted shelf, it will be necessary to remove the failing drive from the shelf. Go to step 4.

Or, if your drive is individually mounted on shelf slides, go to step 8.

4. Remove the SCSI cable connector or connectors from the back of the drive.

Note: Remove only the SCSI cable connectors from the back of the drive. **Do not** separate the terminator or the daisy-chained cable connector from the back of the SCSI cable connector.

CAUTION:

The 3590 Model B11/E11 with the ACF weighs 40.5 kilograms (89 pounds) so remove the ACF before lifting the 3590. The 3590 weighs 28.6 kilograms (63 pounds) without the ACF attached; it takes two persons to safely lift this unit.


Note: This notice is translated into selected languages. See **C1** in the INSP section.

5. Remove the ACF assembly from the drive. Go to "Automatic Cartridge Facility (ACF)" on page PROC-30, then return here.
6. Remove the two screws securing the failing drive to the shelf.
7. Remove the drive and put on a work surface. See Figure 316 on page LOC*CAR-51.

8. Start the hose replacement procedure with the vacuum **11** and pressure **12** hoses. Disconnect these hoses from the pneumatic assembly and the other ends from hose connectors **13** and **14**.
9. Pull both hoses out the back of the drive.
10. Select the new vacuum and pressure hoses from the hose kit, place them side-by-side, and feed them through the channel from which the old hoses were removed.
11. Connect the vacuum **11** and pressure **12** to the vacuum and pressure ports at the rear of the pneumatic assembly.
12. While observing the hose routing, remove and replace the remaining vacuum hoses and hose connectors one-at-a-time until all the new vacuum hoses are installed.

Note: The cleaner blade is no longer used on the 3590 See "Cleaner Blade Removal Procedure (Models B11/B1A)" on page LOC*CAR-92.

The new hose kit will not have a cleaner blade vacuum hose **10**, and connector **13** will be a straight in-line connector instead of a tee connector.

13. Next, connect the remaining pressure hoses and hose connectors one-at-a-time until all the new pressure hoses are installed.
14.  The pressure sensor assembly and VPD card are ESD sensitive. Use care when connecting hoses in these areas. See "Working with Electrostatic Discharge (ESD) Parts" on page PROC-20.

Perform "Measurement and Adjustment of Pneumatic System" on page LOC*CAR-3, then return here.
15. Perform "End of Call" on page PROC-8.
16. Use your local procedures to report the FRU part number for the FID and use technical area code (TAC) **T64** for the area of failure.

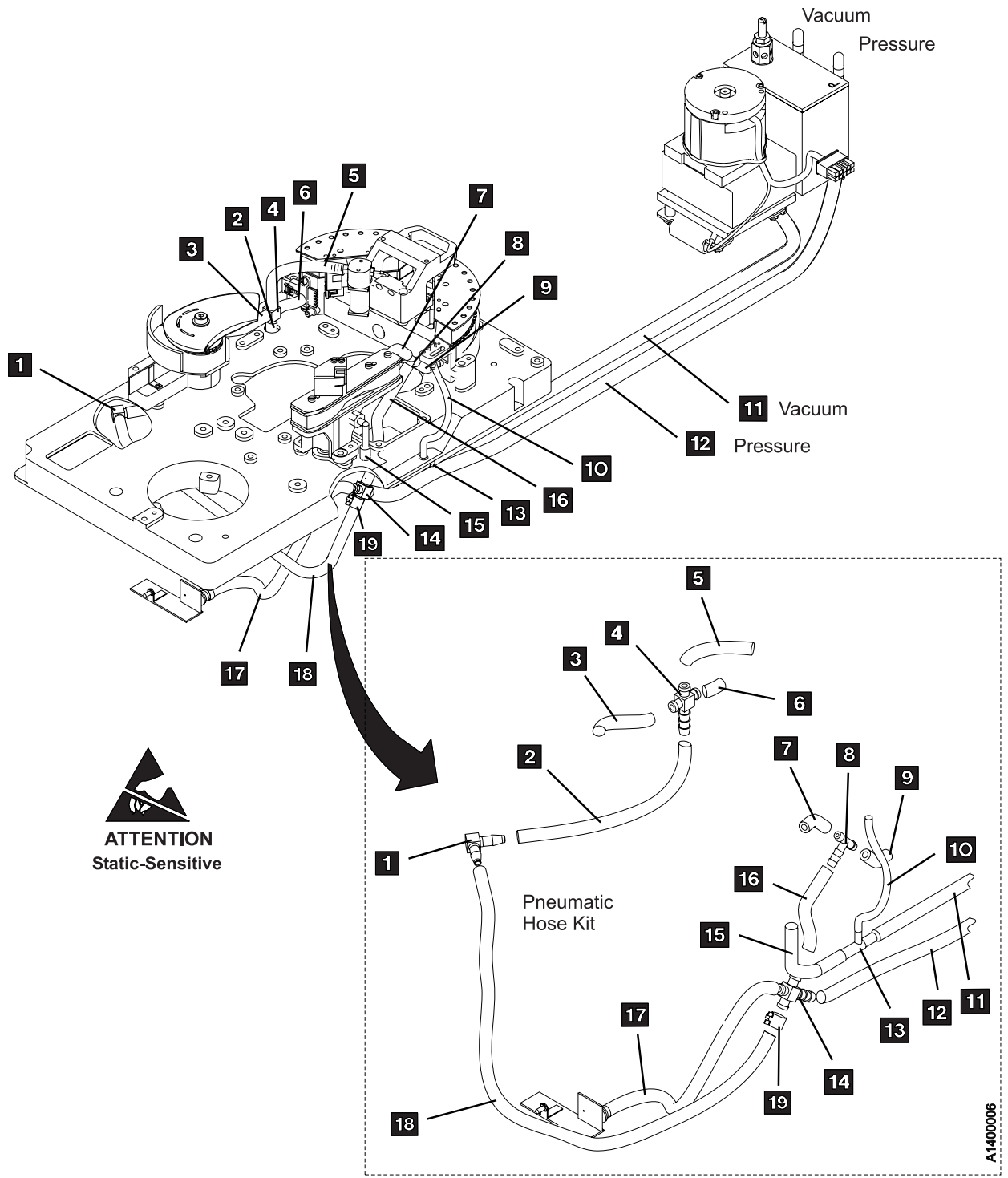


Figure 316. Pneumatic Hose Kit

FID BF: Fan (Card Pack)

See "Locations and Removal Procedures for the Deck Enclosure" on page LOC*CAR-48 for FRU location BF.

Removal of Fan (Card Pack)

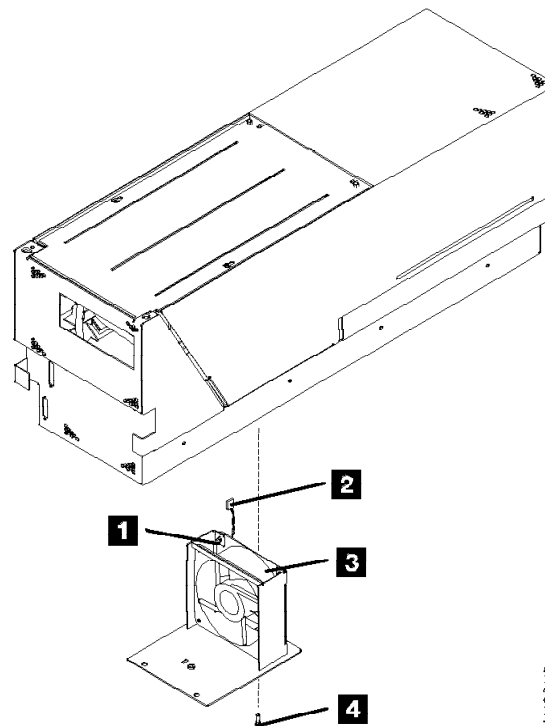
1. "Prepare the Tape Drive for Service" on page PROC-5 and then return here.
2. Unplug the power cord from the drive.

Attention: Support the fan plate when removing the mounting screws. The fan assembly can drop and damage parts.

3. See Figure 317. Remove three screws **4** from the plate.
4. Lower the fan assembly **3** and disconnect the fan connector **2**.
5. Remove four fasteners (or screws) **1** from the fan bracket and remove the fan.

Replacement of Fan (Card Pack)

1. Perform the removal procedure in the reverse order, then return here.
2. Perform "End of Call" on page PROC-8.
3. Use your local procedures to report the FRU part number for the FID and use technical area code (TAC) **A03** for the area of failure.



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Figure 317. Fan (Card Pack)

FID C1: Power Supply

See “Locations and Removal Procedures for the Deck Enclosure” on page LOC*CAR-48 for FRU location C1.

Removal of Power Supply

Model B11/B1A Only

1. “Prepare the Tape Drive for Service” on page PROC-5 and then return here.
2. Remove the power cord from its source and then from the 3590.
3. Remove the Library Manager (LM) connector, if present, and the SCSI cable connector or connectors from the back of the drive.

Note: Do not separate the terminator or the daisy-chained cable connector from the back of the SCSI cable connector.

4. Remove the deck enclosure back cover and back plate. See “Deck Enclosure Covers” on page PROC-23.
5. See Figure 318. Disconnect the power supply connector **2**.

Note: Observe the power supply cable routing for later reassembly.

Before removing the power supply, free the power supply cable from the card pack and pneumatic assembly:

- a. Carefully pull the connector end of the power supply cable up and out of the card pack area.
- b. Remove the two screws **1** from the rear of the power supply.
- c. Remove the two pneumatic assembly mounting screws. See Figure 315 on page LOC*CAR-49 **5**.
- d. Slide the pneumatic assembly forward to disengage the locking tabs from the front of the assembly.
- e. Lift the pneumatic assembly up enough to remove the power supply cable from under the pneumatic assembly so the cable will not become caught as the power supply is removed.

Note: To allow more room for power supply removal, the cleaner brush mechanical assembly (left tape guide) can be removed.

6. Slide the power supply forward to disengage the locking tabs from the front of the power supply.

Lift the power supply carefully off the enclosure, taking care not to damage the cable.

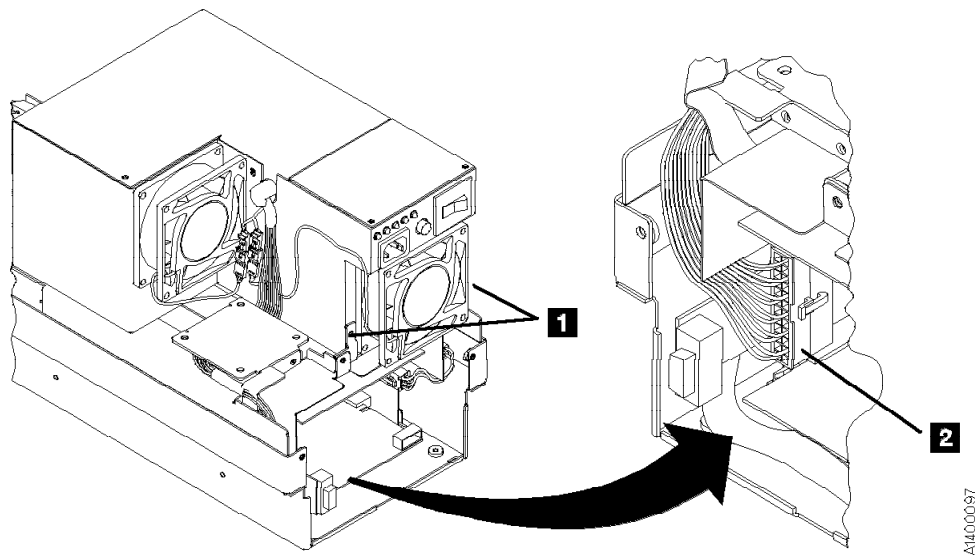


Figure 318. Power Supply (Model B11/B1A only)

Note: Prior to replacement of the power supply check the part number of the pneumatic assembly filter **7** in Figure 315 on page LOC*CAR-49.

If the part number is **not** 05H4802, it will be necessary **to remove** the spiral wrapping **1** in Figure 319 from the power supply cable of the new power supply, before installing the new power supply.

If the pneumatic assembly part number is 05H4802, then **do not** remove the spiral wrap from the power supply cable before installing the new power supply.

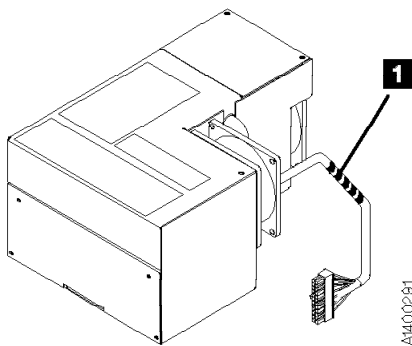


Figure 319. Power Supply Cable Spiral Wrap

End of Model B11/B1A Only

Model E11/E1A Only

1. "Prepare the Tape Drive for Service" on page PROC-5 and then return here.
2. Remove the power cord from its source and then from the 3590.
3. Remove the deck enclosure back cover. See "Deck Enclosure Covers" on page PROC-23.
4. See Figure 320. Disconnect the power distribution cable **1** from the power supply at connector J2.

5. Remove the two screws **2** from the rear of the power supply.
6. Slide the power supply forward to disengage the locking tabs from the front of the power supply.

Lift the power supply carefully off the enclosure.

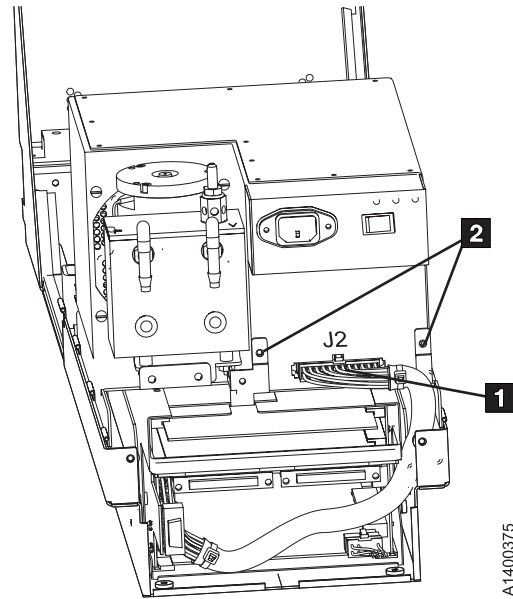


Figure 320. Power Supply (Model E11/E1A only)

End of Model E11/E1A Only

Replacement of Power Supply

1. Perform the removal procedure in the reverse order, then return here.
2. Perform "Measurement and Adjustment of Pneumatic System" on page LOC*CAR-3, then return here.
3. Perform "End of Call" on page PROC-8.
4. Use your local procedures to report the FRU part number for the FID and use technical area code (TAC) **P04** for the area of failure.

FID E3: Pressure Sensor

See “Locations and Removal Procedures for the Deck Enclosure” on page LOC*CAR-48 for FRU location E3.

Removal of Pressure Sensor


1. “Prepare the Tape Drive for Service” on page PROC-5 and then return here.
2. Remove the power cord from its source and then from the 3590.
3. **Note:** In this step, remove only the SCSI cable connectors from the back of the drive. **Do not** separate the terminator or the daisy-chained cable connector from the back of the SCSI cable connector. Remove the SCSI cable connector or connectors from the back of the drive.

CAUTION:

The 3590 Model B11/E11 with the ACF weighs 40.5 kilograms (89 pounds) so remove the ACF before lifting the 3590. The 3590 weighs 28.6 kilograms (63 pounds) without the ACF attached; it takes two persons to safely lift this unit.

Note: This notice is translated into selected languages. See C1 in the INSP section.

4. If the drive has an ACF, remove the ACF. See “Automatic Cartridge Facility (ACF)” on page PROC-30.

5. Remove the drive from the rack and place it on a work surface.
6. Remove the deck enclosure back cover. See “Deck Enclosure Covers” on page PROC-23.
7. Position the drive on its left side so you can work from the bottom and right sides.
8. Remove the card pack fan-plate from the bottom of the drive. See “FID BF: Fan (Card Pack)” on page LOC*CAR-52.
9.  See Figure 321. From the bottom access hole, remove the screw **2** that secures the pressure sensor card assembly **4**.
10. Carefully move the card assembly out of the sensor mounting bracket slot **5** and pull the assembly out the bottom of the drive.
11. Disconnect the cable connector **1** from the card.
12. Disconnect the pressure hose from the hose connection **3** and remove the card.

Replacement of Pressure Sensor

1. Perform the removal procedure in the reverse order, then return here.
2. Perform “Measurement and Adjustment of Pneumatic System” on page LOC*CAR-3, then return here.
3. Perform “End of Call” on page PROC-8.
4. Use your local procedures to report the FRU part number for the FID and use technical area code (TAC) T62 for the area of failure.

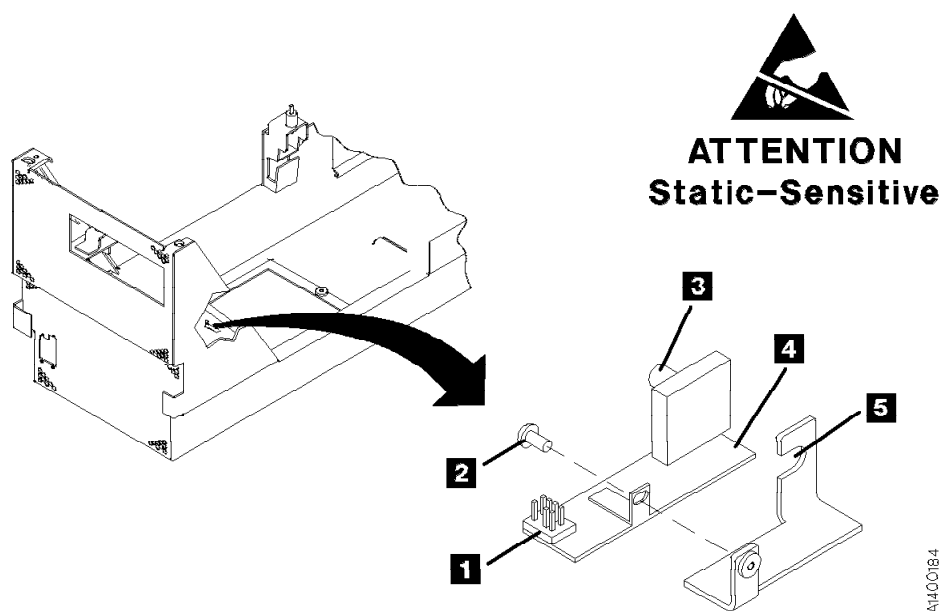



Figure 321. Pressure Sensor (View Rotated 90°)

FID E4: Card Pack

See “Locations and Removal Procedures for the Deck Enclosure” on page LOC*CAR-48 for FRU location E4.

Attention:  The card pack is ESD sensitive. Special care must be used when handling ESD parts. See “Working with Electrostatic Discharge (ESD) Parts” on page PROC-20.


Attention:

Whenever possible only handle card packs by the side of the card pack frame only. Do not handle at the ends. Damage to components and the internal card assembly solder joints will occur if packs are handled at the ends.

Notes:

1. Before replacing a card pack to correct a drive failure, try re-seating all of the connectors to see if that will correct the problem.
2. There are three (3) card pack part numbers that can be used on the 3590 drives, but they are not interchangeable. Before you order a replacement card pack, ensure that you are ordering the correct one. If the Magstar Ultra card pack, or the 3590 Model E11/E1A card pack is installed, there should be a label located at the rear of the drive with the words, **Magstar Ultra**, or **Magstar Model E**. Early Model B11/B1A machines with the base 3590 card pack (prior to Ultra) have no label. See the Parts Catalog, “Assembly 3: Deck Enclosure” on page PARTS-12. Be sure that you order the correct part because they **are not interchangeable**.

Before Removal of Card Pack: Attempt to recover the microcode EC level and link level of the failing card pack before replacing it with a new card pack.

1. Attempt to display the EC level and link level:
 - a. Press the Change Mode  push button if the operator Options menu is not displayed.
 - b. Select **Services** from the Options menu and press Enter.
 - c. Select **Microcode Level** from the Services menu and press Enter.

2. If the microcode EC level was obtained from the previous step:
 - a. Write the EC level, link level and date in “Microcode EC Level History Log” on page PROC-55.
 - b. Go to Figure 76 on page PANEL-5 and Figure 77 on page PANEL-6. Record the ACF Mode **1**, Drive Type **2**, and SCSI address information from Supplemental Messages **5**.
 - c. Go to “CE Drive Options Menu” on page PANEL-40. Record the Drive Serial Number, Drive Features, and any other CE Drive Options that will be lost when the card pack is replaced.
 - d. Continue with “Removal of Card Pack.”
3. If the microcode EC level cannot be displayed, continue with “Removal of Card Pack.”

OEM Drive Only

If the failing card pack is in an OEM drive that **does not** report to the host as an IBM 3590, it will be necessary to update the **Manufacturer**, **Drive Type**, and **Drive Model Number** fields in VPD memory after the new card pack is installed.

If possible, recover the Manufacturer, Drive Type, and Drive Model Number information from the failing card pack before it is removed.

This procedure requires a password and is normally done by OEM support personnel.

See “OEM Use Only Menu” on page PANEL-58 for details.

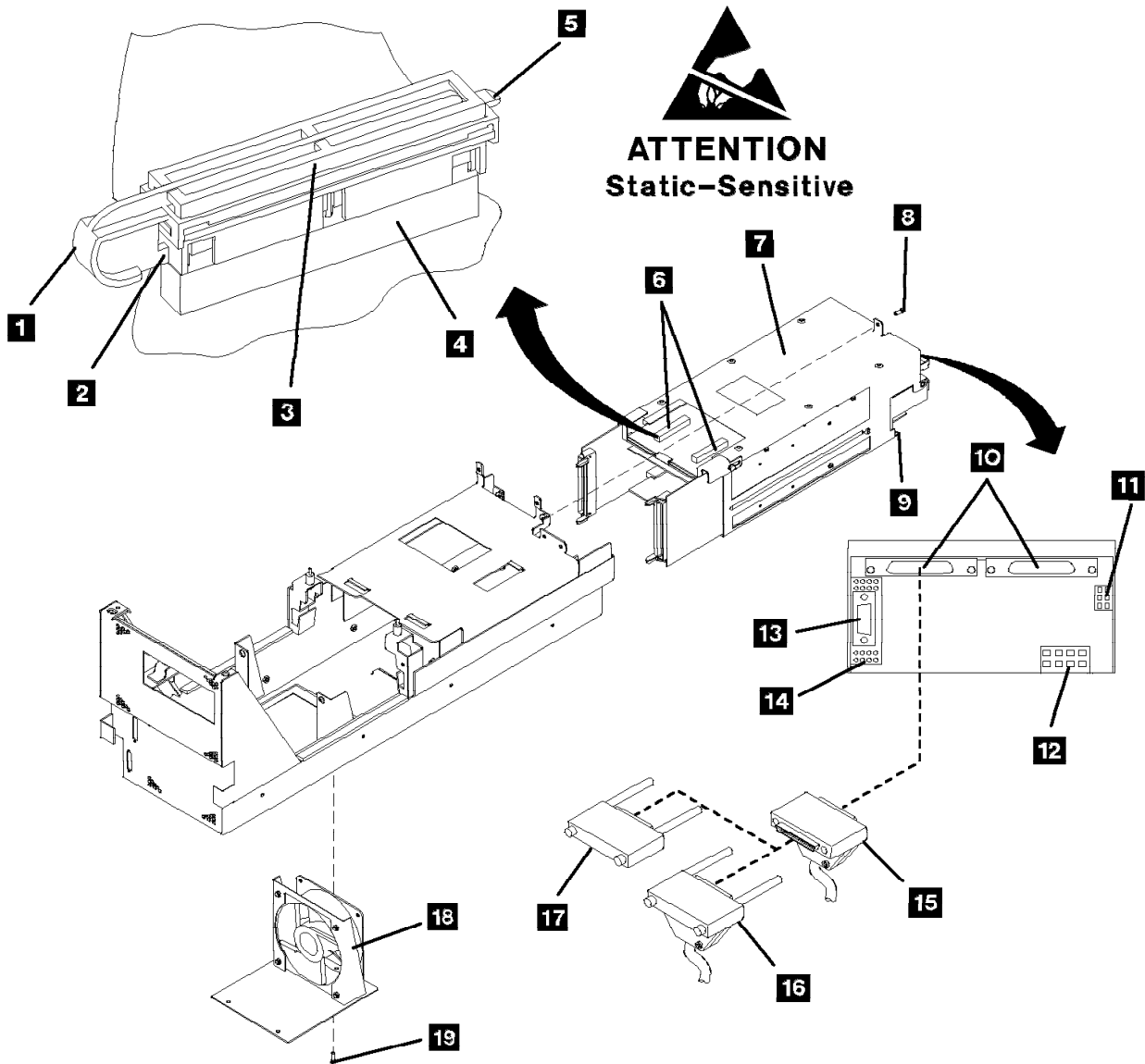
End of OEM Drive Only

Removal of Card Pack

Attention: The head guide assembly cables, which attach to the card pack, interfere with the card pack when it is being removed or installed. Use extreme care when removing or installing the card pack to avoid damaging the head guide assembly cables.

1. “Prepare the Tape Drive for Service” on page PROC-5 and then return here.


- Remove the power cord from its source and then from the 3590.



LOC*CAR

Figure 322. Card Pack

Attention: Support the fan plate when removing the mounting screws. The fan assembly can drop and damage parts.

- See Figure 322. Remove the screws **19** that secure the card pack fan **18** to the bottom of the deck enclosure and lower the fan assembly.
- Disconnect the fan connector and remove the fan.
-  Disconnect the two head cables **6** (from the top card in the card pack):

Note: Each head cable connector **3** is locked to the card receptacle **4** with a sliding retaining bar **1**. The retaining bar has a tab at the front **2** and rear **5** that engage slots in the receptacle to lock the connector in place.

- Reach into the fan opening and pull the retaining bar **1** toward the front of the drive until it stops, approximately 6 mm (1/4 in.).
- With the retaining bar disengaged, pull upward on the retaining bar while carefully tilting the front and rear of the connector

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until it is disconnected from the card receptacle (rock it several times).

c. Repeat this procedure to disconnect the other head cable connector.

6. Remove the deck enclosure back cover. See "Deck Enclosure Covers" on page PROC-23.

7. Disconnect the following external cable connectors:

- Remove only the SCSI cable connectors **15** from the back of the device **10**. **Do not** separate the terminator **17** or the daisy-chained cable connector **16** from the back of the SCSI cable connector.
- Remove the library manager connector **13** (library-connected models only).

8. Remove the deck enclosure back plate. See "Deck Enclosure Covers" on page PROC-23.

9. Disconnect the following internal cable connectors from the card pack **7**:


- Motor drive connector **11**
- Pneumatic motor drive connector **12**
- Power input connector **14** (behind the library manager connector). On Model E11/E1A drives, this cable can be disconnected from the power supply also.

Attention: Observe the correct cable routing for re-assembly.

10. Remove the card pack retaining screw **8**.

Attention: To protect the head guide assembly cables while the card pack is being removed, insert a punch card or similar object between the top of the card pack and the head guide assembly cables. Ensure the card remains between the card pack and cables while the card pack is pulled from the enclosure.

Note: On some library installations there may be a cable mounting bracket attached to the bottom of the drive enclosure. The screws for this bracket may be long enough to interfere with the bottom of the card pack **9** as it is being removed. Loosen these screws and back them part of the way out, if necessary.

11.  Carefully pull the card pack out the rear of the deck enclosure, ensuring the head cables do not become caught on the card pack.

Note: As you pull the card pack out, raise it to clear the bottom **9** of the enclosure.

Replacement of Card Pack

1. Remove the pack from the packaging by removing the foam from the side. Lift the pack out by holding the side of the pack. The FRU packaging has a handle to allow lifting the pack out of the box.

2. See Figure 323. There is a selectable mode switch **1** on the bottom of the SCSI card in the Model E11/E1A card pack. Future microcode releases may use this switch for model or mode selection. This switch should be set to the "F" position for Model E11/E1A applications.

Note: Use the Potentiometer Adjusting tool, P/N 1864853, to set this switch. See "Potentiometer Adjusting Tool" on page INTRO-44.

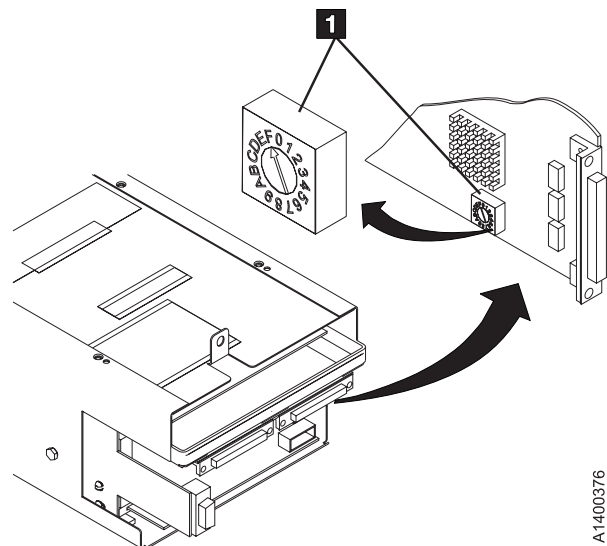


Figure 323. SCSI Card mode switch

A1400376


Attention

1. Ensure that the metal tab on top of the card pack is bent straight up. If it is bent toward the front of the drive, it may prevent the card pack connectors from seating correctly.
2. Ensure the head cables do not become caught on the card pack. Use a punch card or similar object between the card pack and head guide assembly cables while the card pack is being inserted.
3. Lift the power supply if you need more space to install the card pack.
4. Ensure that the head connectors and the power transistors that protrude through the sheet metal casing of the card pack do not get bent or otherwise damaged.
5. Ensure that the pneumatic motor-control cable is routed so that it is always outside of the Card Pack metal enclosure. If the cable is routed near the two large modules on the top card in the Card Pack, intermittent data errors can occur.

3. Perform the removal procedure in the reverse order, then return here.

Note: **DO NOT** connect the external SCSI cables at this time. They will be connected in a later step, after the Customer and Drive Options have been set.

4. After installing the new card pack, restore power to the 3590.
5. **Attention:** If any of FIDs **00 - 04** are displayed on the operator/CE panel after power-on, **do not** try to repair, as indicated in next step, but continue to step 7.
6. If the power-on test did not complete successfully, repair as needed, then go to step 7.
Or, if the power-on test completed successfully, go to step 7.
7. Perform procedure "Drive Serial Number" on page PROC-46.

8. Perform "Measurement and Adjustment of Pneumatic System" on page LOC*CAR-3.
9. Perform the "Set Customer Options" on page INST-33 procedure.
10. Perform the "Set Drive Options" on page INST-35 procedure.
11. Perform the "SCSI Ports Wrap Test" on page PROC-84.
12. Connect the external SCSI cables.
13. To ensure the EC level of the microcode on the new card pack is not down level, do the following:
 - a. Press the Change Mode push button  if the operator Options menu is not displayed.
 - b. Select **Services** from the Options menu and press Enter.
 - c. Select **Microcode Level** from the Services menu and press Enter to display the EC level and link code of the microcode on the new card pack.
 - d. Look at the latest EC level and link level written in "Microcode EC Level History Log" on page PROC-55.

Note: The latest EC level is determined by the link level (LL), as the EC level may not always increment to a higher number. The following example shows that the second entry is the latest level microcode.

EC Level	Link Level
6C56789	4D0D
3C56789	5B02 (highest EC level)

Compare the displayed EC level (new card pack) to the latest written EC level and link level previously installed. If they compare, go to step 20 on page LOC*CAR-60.

- If the card pack is up-level from the FMR tape, perform steps 14 through 16 on page LOC*CAR-60, then go to step 20 on page LOC*CAR-60.
 - If the card pack is down-level from the previously-installed level, go to step 14.
14. Select **Cancel** to return to the CE Options menu.

15. Select **Microcode Update** from the CE options menu and press Enter. (See "Updating Microcode from FMR Cartridge" on page PROC-53 for details.)
16. After you load the FMR tape when prompted, the Select EC Level menu displays a series of EC levels.
Note: If the card pack has a different EC level than that which is on the FMR tape, the microcode is automatically written on the FMR tape and is also displayed.
17. Find the EC level on the menu that matches the EC level written in "Microcode EC Level History Log" on page PROC-55.
18. Select the **EC level and link level** from the menu that matches the written level and press Enter.
19. After the microcode is written into the card pack, unload the tape and press Reset to activate the code.
- 20.

RS/6000 Only

Note: You must have root authority to do the following step. If you do not have root authority, ask your customer to enter these commands.

Update the VPD data in the host RS/6000 by un-configuring the device (**Example: `rmdev -l rmt3`**) and reconfiguring the device (**Example: `mkdev -l rmt3`**).

Note: In this example, the **3** in **rmt3** is the drive number.

End of RS/6000 Only

OEM Drive Only

If you are replacing the card pack in an OEM drive that **does not** report to the host as an IBM 3590, it will be necessary to update the **Manufacturer, Drive Type, and Drive Model Number** fields in VPD memory after the new card pack is installed.

This procedure requires a password and is normally done by OEM support personnel.

See "OEM Use Only Menu" on page PANEL-58 for details.

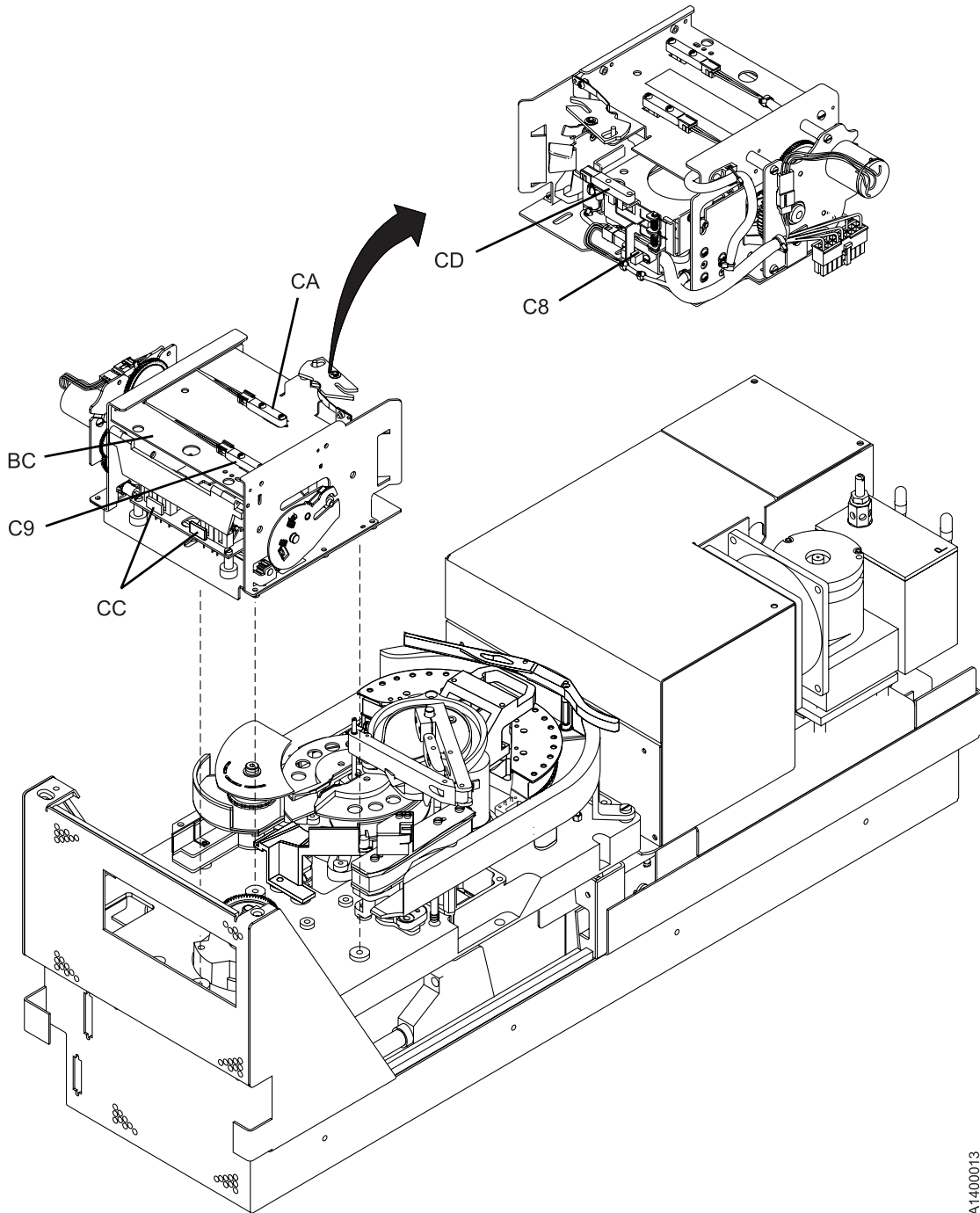
End of OEM Drive Only

21. Perform "End of Call" on page PROC-8.
22. Use your local procedures to report the FRU part number for the FID and use technical area code (TAC) **T21** for the area of failure.

Locations and Removal Procedures for the Deck

The FRUs in Figure 324 are identified by their FID number; for example, C6 is FID C6, the machine reel motor. The list following part 2 of the figure shows the FID names.

For the locations of the deck cables, see the list following the figure.



LOC*CAR

Figure 324 (Part 1 of 2). Locations for the Deck

A1400013

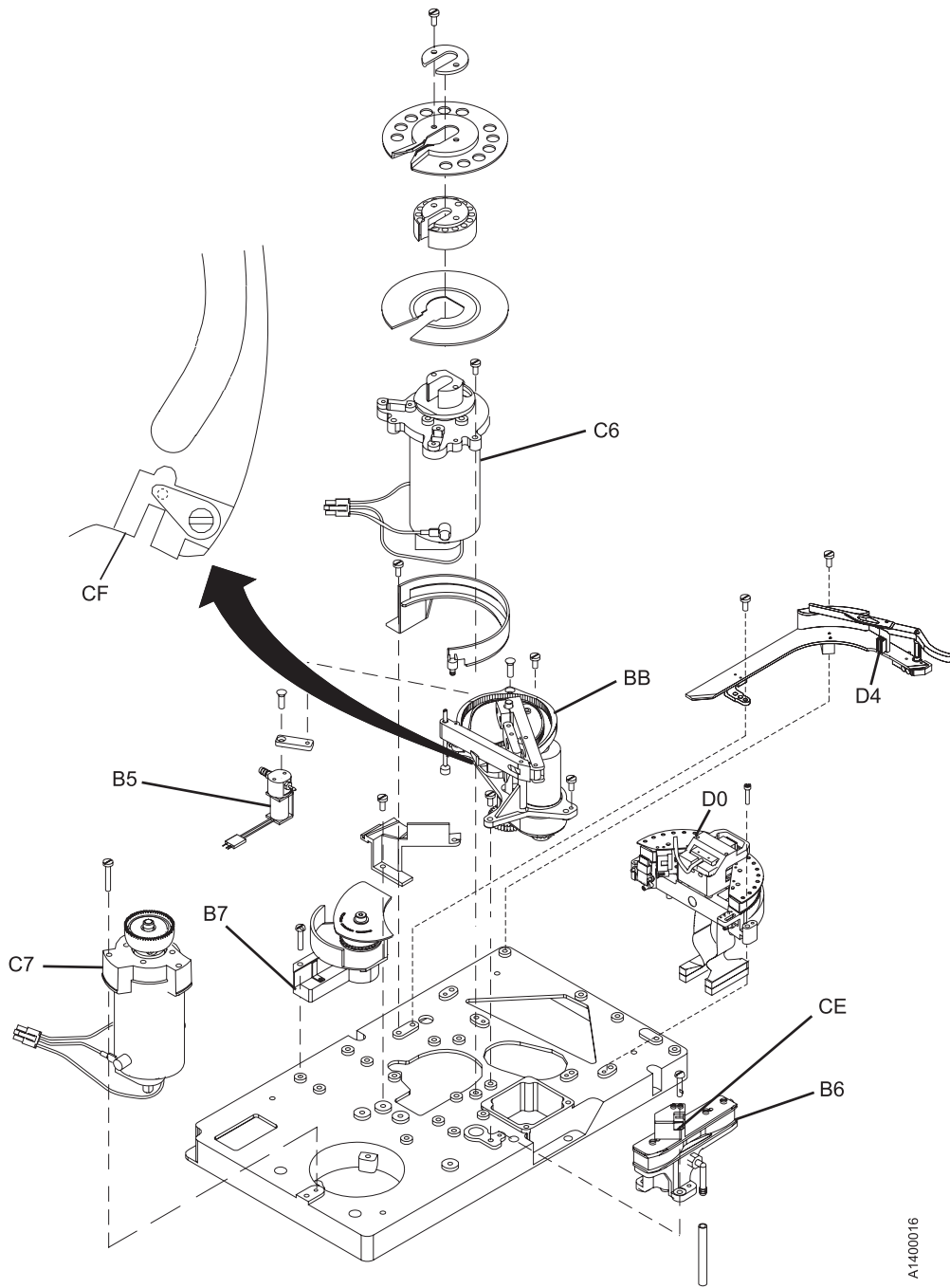


Figure 324 (Part 2 of 2). Locations for the Deck

FID Number	FID Name	FID Number	FID Name
B5	Tape-lifter solenoid	C9	Door-open sensor
B6	Decoupler	CA	Tray-up sensor
B7	Tension transducer assembly	CC	Cartridge-type sensor
BB	Pantocam	CD	Cartridge-present sensor
BC	Loader assembly	CE	Tape path A sensor
C6	Machine reel motor	CF	Tape path B sensor
C7	File reel motor	D0	Head guide and brush assembly
C8	File-protect sensor	D4	Head cleaning brush assembly

See the following for the deck cable locations:

FID	Cable FRU Name and Location
D6	Motor Power Cable LOC*CAR-96
DA	Motor, Loader, and Sensor Cable LOC*CAR-97
DB	Power Supply Cable (Model E11/E1A only) LOC*CAR-99
DC	ACF and Operator/CE Panel Cable LOC*CAR-100




FID B5: Tape-Lifter Solenoid

See "Locations for the Deck" on page LOC*CAR-62 for FRU location B5.

Removal of Tape-Lifter Solenoid

1. "Prepare the Tape Drive for Service" on page PROC-5 and then return here.
2. Remove the power cord from its source and then from the 3590.
3. Remove the deck enclosure back cover. See "Deck Enclosure Covers" on page PROC-23.
4. See Figure 325 on page LOC*CAR-65. Remove the large hose **1** from the tape-lifter solenoid.

5. **Attention:**  The VPD card is ESD sensitive and care must be used not to touch the card when disconnecting the VPD cable connector or disconnecting the hoses from the tape-lifter solenoid.

Disconnect the VPD cable connector **2**.

6. Loosen the tape-lifter solenoid mounting screw **3**.
7. Remove the tape-lifter solenoid mounting bracket screw **5**.
8. **Attention:** When disconnecting the small tape-lifter solenoid hose, **do not** pull the other end of the hose out of the head guide.

Carefully disconnect the small hose **4** from the tape-lifter solenoid (under the tape-lifter

solenoid mounting bracket) and move the tape-lifter solenoid out of the way.

9. Disconnect the tape-lifter solenoid connector (J4) **7** as follows:

Note: Connector J4 is located under the deck casting **6** and can be reached two ways, depending on access to the drive.

If you have access to the left side of the drive, the J4 connector can be reached through the opening **8** in the left side.

or, if you do not have access to the left side of the drive, remove the 3 screws **9** that secure the cooling fan to the bottom of the deck enclosure.

Attention: Support the fan plate when removing the mounting screws. The fan assembly can drop and damage parts. Lower the fan and disconnect the fan connector **10**. The J4 connector can now be reached through the fan opening.

10. Remove the tape-lifter solenoid.

Replacement of Tape-Lifter Solenoid

1. Perform the removal procedure in the reverse order, then return here.
2. Perform "Measurement and Adjustment of Pneumatic System" on page LOC*CAR-3, then return here.
3. Perform "End of Call" on page PROC-8.
4. Use your local procedures to report the FRU part number for the FID and use technical area code (TAC) **T41** for the area of failure.

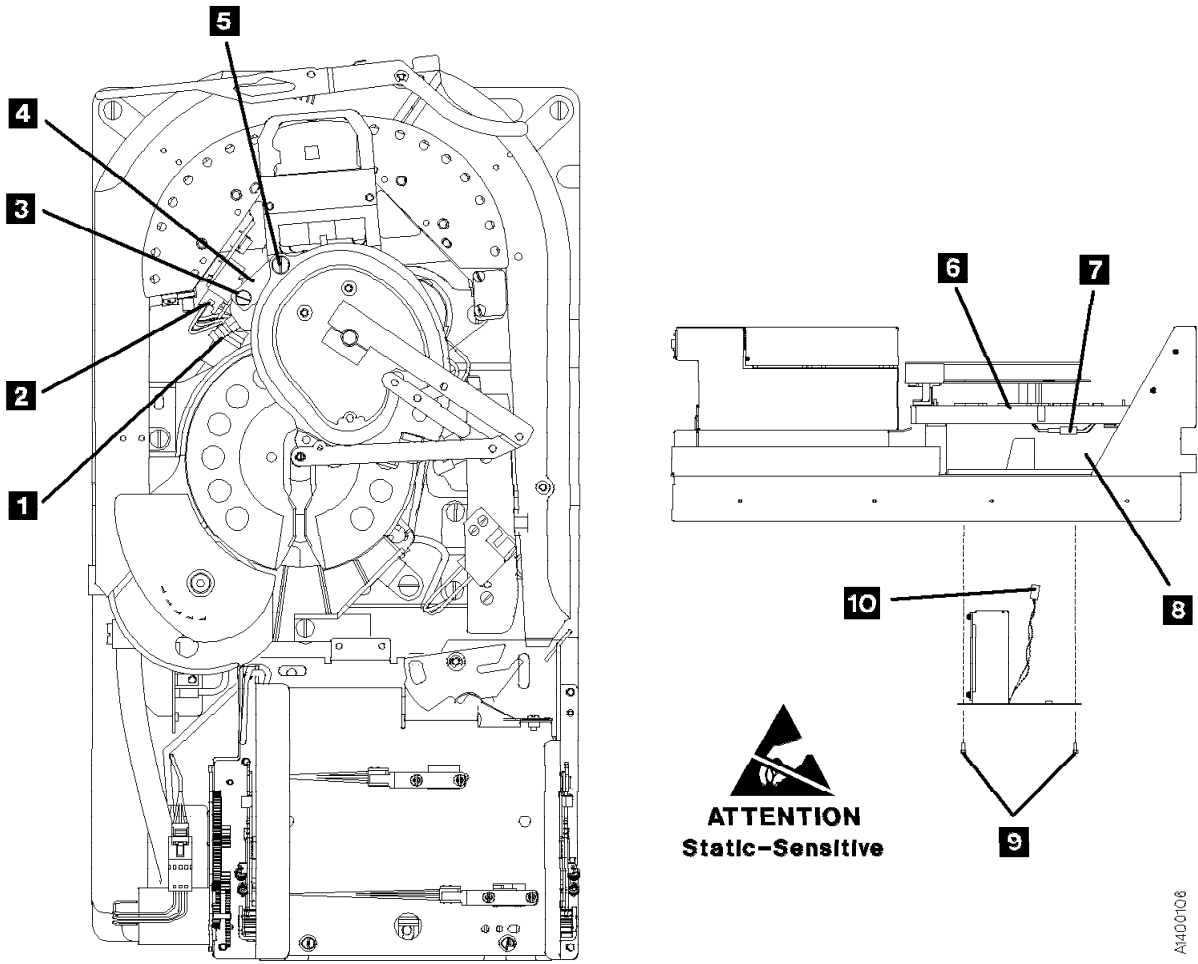


Figure 325. Tape-Lifter Solenoid

FID B6: Decoupler

See "Locations for the Deck" on page LOC*CAR-62 for FRU location B6.

Removal of Decoupler

1. "Prepare the Tape Drive for Service" on page PROC-5 and then return here.
2. Remove the power cord from its source and then from the 3590.
3. Remove the deck enclosure back cover. See "Deck Enclosure Covers" on page PROC-23.
4. See Figure 326. Position the pantocam arm **3** so the arm is out of the way of the decoupler **5**.

Note: When positioning the pantocam, always grip the arm next to the pantocam motor shaft **2**. Never grip the outer pantocam arm to reposition the pantocam.

5. Remove the two screws **1** and **4** from the right tape guide and remove the guide.

6. Disconnect the tape-path-A sensor connector **8**.
7. Disconnect the two hoses **7** from the decoupler.
8. Remove the three decoupler mounting screws **6** and **9** then remove the decoupler.

Replacement of Decoupler

1. Perform the removal procedure in the reverse order, then return here.
2. **Attention:** When reinstalling the right tape guide with screws **1** and **4**, make sure that the horizontal surfaces of the right and left tape guides are **exactly level to each other** where the two edges meet. Check this with the edge of a small metal ruler.
3. Perform "Measurement and Adjustment of Pneumatic System" on page LOC*CAR-3, then return here.
4. Perform "End of Call" on page PROC-8.
5. Use your local procedures to report the FRU part number for the FID and use technical area code (TAC) **T41** for the area of failure.

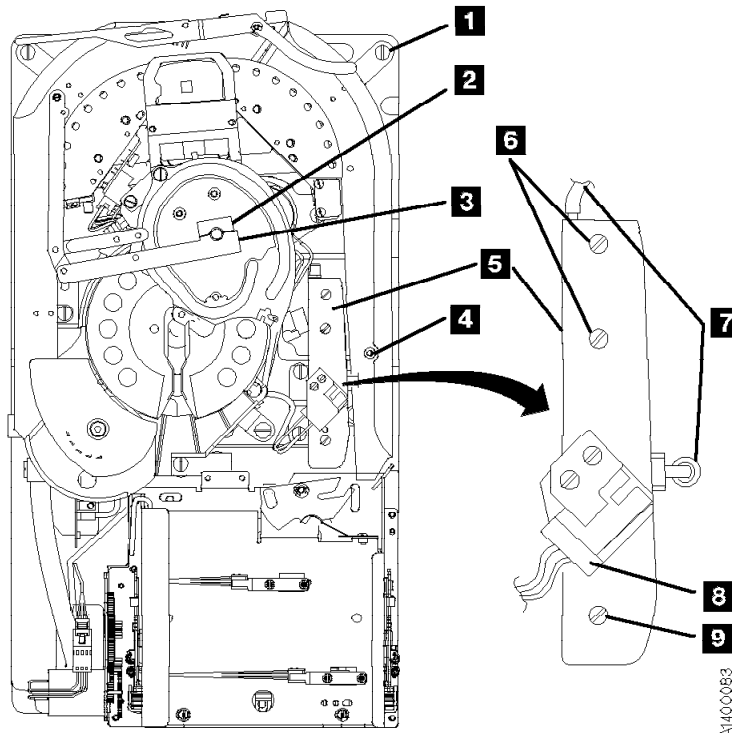


Figure 326. Decoupler

FID B7: Tension Transducer Assembly

See “Locations for the Deck” on page LOC*CAR-62 for FRU location B7.

Removal of Tension Transducer


1. “Prepare the Tape Drive for Service” on page PROC-5 and then return here.
2. Remove the power cord from its source and then from the 3590.
3. Remove the deck enclosure back cover. See “Deck Enclosure Covers” on page PROC-23.

Attention: If this FRU is in the right hand drive and it is installed in a rack with a second drive next to it, the left tape guide cannot be removed with the head guide protector installed. Use extreme care not to damage the read/write head when removing the tape guide assembly.

4. See Figure 327. Install the orange head protector P/N 05H4778 on the head **6**.
5. Remove the left tape guide screws **5** and remove the guide.

6. If the tension transducer screws **1** cannot be accessed with the plastic shield **8** in place, loosen the internal socket head cap screw **7** and rotate the plastic shield **8** to gain access to the pressure hose **2** and screws **1**.

Note: You must follow “Adjustment of Tension Transducer Plastic Shield” on page LOC*CAR-69 during the replacement of this part.

7. Disconnect the pressure hose **2**.
8. Remove the two clamp screws **3** from the transducer mounting.
9. Remove the three transducer mounting screws **1**.
10.  The tension transducer card is ESD sensitive. See “Working with Electrostatic Discharge (ESD) Parts” on page PROC-20.

Lift the transducer assembly off the base casting far enough to disconnect the transducer connector, P14 **4** and remove the assembly.

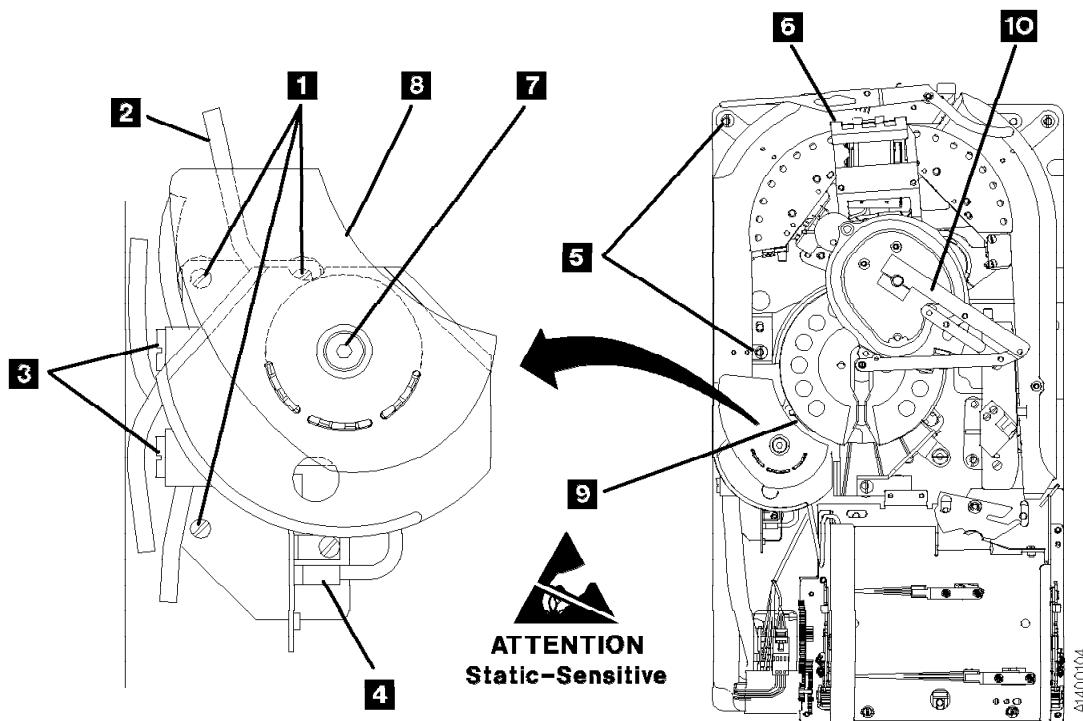


Figure 327. Tension Transducer Assembly

Replacement of Tension Transducer Assembly

1. Perform the removal procedure in the reverse order, then return here.
2. See Figure 328.

Attention: If the plastic shield **6** was moved, or if the center hex head screw **7** was loosened, perform "Adjustment of Tension Transducer Plastic Shield" on page LOC*CAR-69, then return here.

3. **Attention:** When reinstalling the left tape guide **3**, make sure that the horizontal

surfaces of the right **4** and left **3** tape guides are **exactly level to each other** where the two edges meet. Check this with the edge of a small metal ruler.

4. Perform "Measurement and Adjustment of Pneumatic System" on page LOC*CAR-3, then return here.
5. Perform "End of Call" on page PROC-8.
6. Use your local procedures to report the FRU part number for the FID and use technical area code (TAC) **T41** for the area of failure.

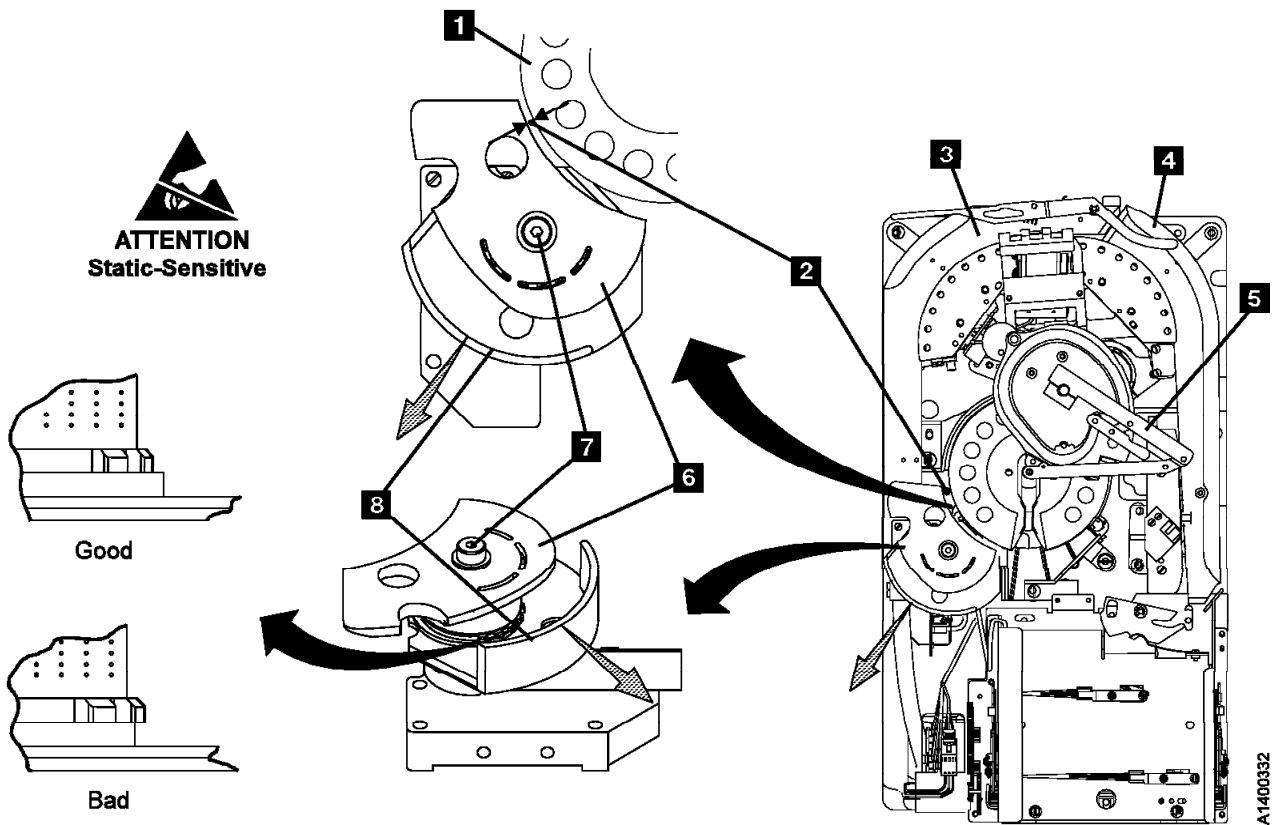


Figure 328. Tension Transducer Plastic Shield

Adjustment of Tension Transducer

Plastic Shield: See Figure 328 on page LOC*CAR-68.

Note: There are two levels of Tension Transducer assemblies. The newer level is adjusted at the factory, and the screw **7** is sealed. **Do NOT** adjust the newer level assembly.

1. **Attention:** If screw **7** is loosened for any reason, there are two conditions that must be met when it is tightened:
 - a. The gap between the plastic shield **6** and the take-up reel flange **1** must be set. See step 2.
 - b. The position of the black plastic guide **8** must be set in relation to the teeth on the lower ceramic guide. See step 3.
2. Ensure that the gap between the edge of the shield **6** and the take-up reel flange **1** is 4 mm (0.156 in.) at a point approximately 6 mm (0.250 in.) from the corner of the shield as shown **2**. You can use a 4 mm or 5/32 in. hex wrench to check the gap.
3. Ensure that the first four teeth on the lower ceramic guide do not extend beyond the top edge of the inner hub of the black plastic guide **8**. See the **Good** and **Bad** illustrations in Figure 328 on page LOC*CAR-68.
4. If either of the above conditions are not correct, perform the adjustment as follows:
 - a. Loosen screw **7** just enough so the lower black plastic guide **8** can be moved easily.
 - b. Move the lower black plastic guide **8** outward along a line that runs from the center of the pantocam through the center

of the tension transducer. See the grey shaded arrows in Figure 328 on page LOC*CAR-68.

Note: You should be able to move the lower black plastic guide so that all or most of the ceramic teeth do not extend beyond the top edge of the inner hub of the black plastic guide. See the **Good** and **Bad** illustrations in Figure 328 on page LOC*CAR-68. The most important area is the first four teeth that the leader block will pass on a load operation.

- c. Tighten screw **7** just enough so the shield **6** can be moved but still stay in place (snug).
 - d. Hold a 4 mm or 5/32 in. hex wrench vertically in the gap at a point approximately 6 mm (0.250 in.) from the corner of the shield **2**.
 - e. Move the shield towards the take-up reel until it just touches the hex wrench.
 - f. Tighten screw **7**. **Warning:** Do **NOT** over-tighten the screw. The ceramic guides break easily.
 - g. After the gap is set, rotate the pantocam arm **5** all the way around the transducer in both directions. Ensure the cross-pin on the pantocam does not touch the transducer plastic shield **6**.
 - h. Check again to ensure that the teeth on the lower ceramic guide do not extend beyond the top edge of the inner hub of the black plastic guide. See the **Good** and **Bad** illustrations in Figure 328 on page LOC*CAR-68.
5. Return to the procedure that sent you here.

FID BB: Pantocam

See "Locations for the Deck" on page LOC*CAR-62 for FRU location BB.

Note: There are 2 levels of machine reel hub assemblies. See Figure 329

The new style (gray) parts have different dimensions and tolerances than the old style (black) parts. The new style upper **3** and lower **5** flanges have a groove near the hub to prevent damage to the edge of the tape. The new style also adds a retainer plate **2** at the top to prevent distortion of the hub when the screws are tightened.

The old style (black) parts are no longer available. The new style (gray) parts are available as a FRU kit. (See the Parts Catalog section for P/N and ordering information.)

Attention: DO NOT mix old style (black) and new style (gray) parts. The dimensions are different and they are not inter-changeable.

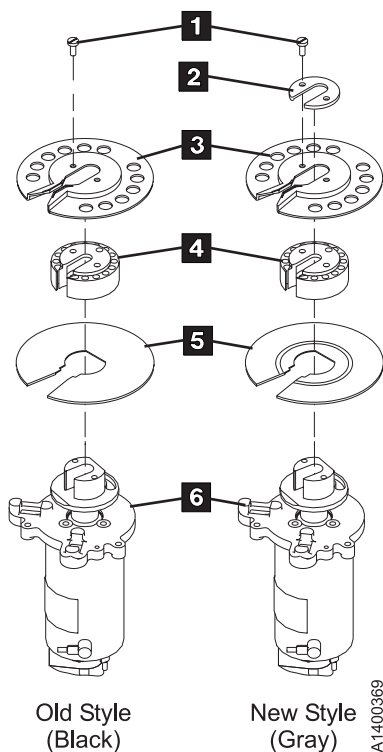



Figure 329. Machine Reel Hub assembly

When removing the pantocam you will be working very close to the head guide and brush assembly components.

Attention:  Do not touch the read/write surface or the circuit board on the head guide assembly. See "Working with Electrostatic Discharge (ESD) Parts" on page PROC-20.

Removal of Pantocam

1. "Prepare the Tape Drive for Service" on page PROC-5 and then return here.
2. Remove the power cord from its source and then from the 3590.
3. Remove the deck enclosure back cover. See "Deck Enclosure Covers" on page PROC-23.
4. See Figure 330. Disconnect the two pantocam motor leads:
 - Black motor lead: right terminal **2**
 - Yellow motor lead: left terminal **1**

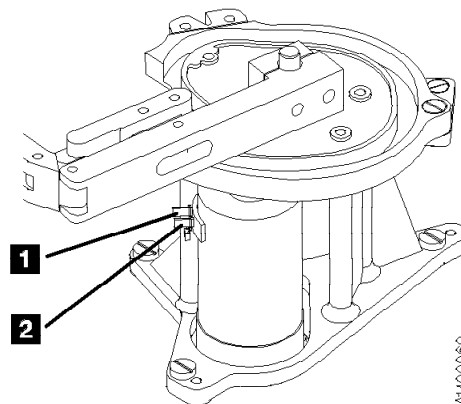



Figure 330. Pantocam Motor Connectors

See Figure 331 on page LOC*CAR-72.

5. Remove the left tape guide screws **2** and **8** then remove the guide.
6. Loosen the machine-reel guide screw **3**.
7. Remove the large hose **5** from the tape-lifter solenoid and the tee connection **4**.
8. Remove the right D-bearing hose **16** and the rear decoupler hose **15**.
9. Loosen the tape-lifter solenoid mounting screw **7**.
10. Remove the tape-lifter solenoid mounting bracket screw **10**.
11.  Disconnect the VPD cable connector **6**.

12. **Attention:** When disconnecting the small solenoid hose, **do not** pull the other end of the hose out of the head guide.

Carefully disconnect the small hose from the tape-lifter solenoid (under the tape-lifter solenoid mounting bracket **9**) and move the tape-lifter solenoid out of the way.

13. Position the pantocam arm so the threader pin **13** is away from the loader. When positioning the pantocam, always grip the arm next to the pantocam motor shaft. Never grip the outer pantocam arm to reposition the pantocam.
14. Position the machine reel **12** to gain access to the front pantocam-base mounting screw (located under the edge of the pantocam).
15. Remove the three pantocam-base mounting screws **11** and carefully lift the pantocam assembly up approximately 13 mm (1/2 in.) and let it rest at this position.
16. Remove the two screws in the top of the upper flange **1** and remove the flange.
17. Rotate the hub **18** so the opening is toward you. Use both thumbs to spread the opening apart **19** and lift off the hub.

Note: Do not use tools to remove the hub. Damage to the hub may result.

18. Remove the lower flange **20**.
19. Unsnap the machine reel guide from the center tape guide and rotate the machine reel guide **17** away from the pantocam.
20. Carefully lift the pantocam out of the drive, taking care not to damage the head cable wiring.
21. Disconnect the tape-path-B sensor connector **14**.

Replacement of Pantocam

Note: The new Pantocam FRU kit should contain a ferrite ring. It should be installed on the pantocam motor leads when the new pantocam is installed. This ferrite reduces electrical noise in the cable. Follow the instructions in the FRU kit.

When reinstalling or replacing the flange **1** or associated parts, use the gap set tool P/N 05H4671 **23** to set the gap in the hub **18**. Ensure that the keys **19** at the bottom of the hub **18** are set into the cutouts **21** in the bottom flange **20**. The bottom flange has a groove on

one side. Ensure that this groove is on the top, as shown. The hub should set flat on the bottom flange with no gaps between the two parts.

Note: Some of the new retainers have a ridge on one side of the part. This ridge is non-functional, and should be on the top side of the retainer. The flat side of the retainer should be against the top flange.

Align the top flange **1** and retainer, then turn the two screws **22** down until they barely touch the retainer. Then tighten the two screws 1/4 turn each. Using this method assures that the gap in the hub **18** will spread open properly.

Ensure that the tool slides in and out of the hub freely or the leader block on the tape will bind in the slot and cause broken tapes. If the gap set tool is still tight, loosen the screws, align the hub parts again, then tighten the screws. If the gap set tool is still tight after two attempts, perform the following procedure:

1. Loosen the two screws **22**.
2. Insert the gap set tool into the hub **18** part way, as shown in the bottom of Figure 331 on page LOC*CAR-72. Do not insert it all the way into the motor hub.
3. Hold the top flange **1** and, using the gap set tool, rotate the hub **18** to the left (clockwise). Refer to the arrow that indicates the direction of rotation at the bottom of Figure 331 on page LOC*CAR-72. The hub will only move a small distance.
4. Tighten the screws again and ensure that the tool slides in and out freely.

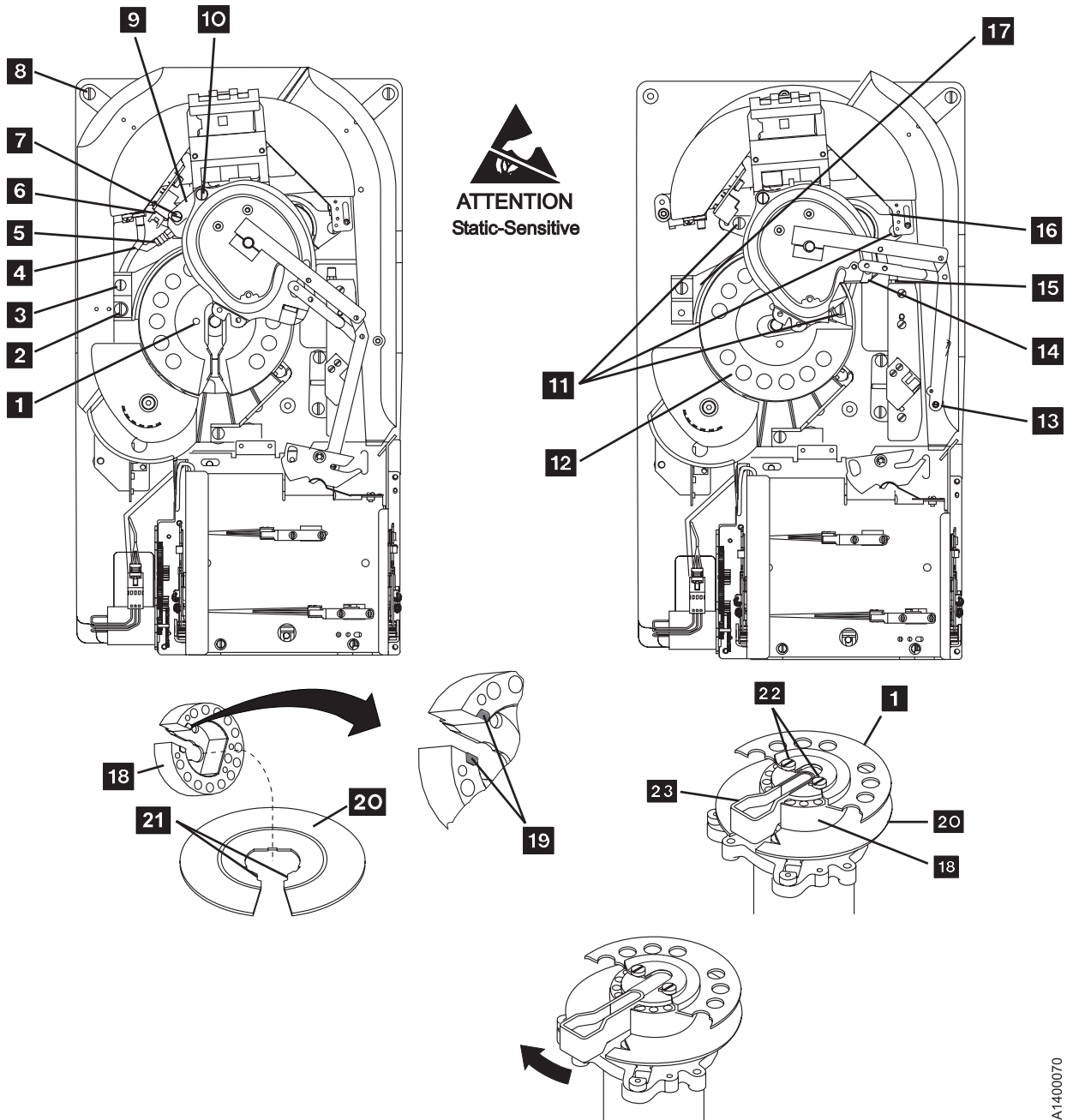
1. Perform the removal procedure in the reverse order, then return here.

2. **Attention:** When reinstalling the left tape guide with screws **2** and **8**, make sure that the horizontal surfaces of the right and left tape guides are **exactly level to each other** where the two edges meet. Check this with the edge of a small metal ruler.

3. The pressure must be adjusted after replacing the pantocam. Go to "Measurement and Adjustment of Pneumatic System" on page LOC*CAR-3 and perform the adjustment, then return here.

4. Perform "End of Call" on page PROC-8.

5. Use your local procedures to report the FRU part number for the FID and use technical area code (TAC) **T45** for the area of failure.




| Figure 331. Pantocam

A1400070

FID BC: Loader Assembly

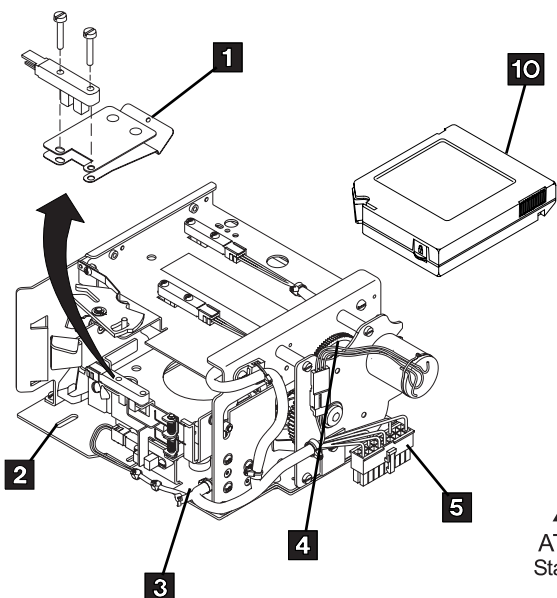
Note: There are two styles of loaders present in the field; one with the old style loader cable shown on Figure 332 and one with a new, more reliable loader cable shown in Figure 333 on page LOC*CAR-74. If you are asked to determine which loader is present, as part of the FRU isolation, refer to the cable in the area of screw items **2** and **3** to see the subtle difference. The new cable has a built-in loop with improved cable restraint for longer life.

See “Locations and Removal Procedures for the Deck” on page LOC*CAR-61 for FRU location BC.

Attention:  All of the sensors in the loader assembly are ESD sensitive. See “Working with Electrostatic Discharge (ESD) Parts” on page PROC-20.

Removal of Loader Assembly

1. “Prepare the Tape Drive for Service” on page PROC-5 and then return here.
2. Remove the power cord from its source and then from the 3590.
3. Remove the deck enclosure back cover. See “Deck Enclosure Covers” on page PROC-23.



 **ATTENTION**
Static-Sensitive

Note: When you replace the loader assembly of a drive in the 3590 Model C12/C14 drive frame, you must follow the Model B1A/E1A drive replacement instructions starting in step 5.

Model B11/E11 Only

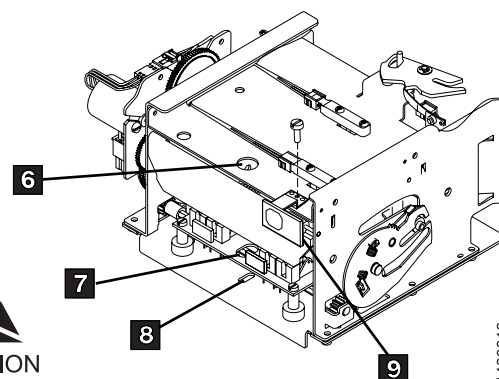
4. Remove the ACF assembly. See “Automatic Cartridge Facility (ACF)” on page PROC-30, then return here.

End of Model B11/E11 Only

Model B1A/E1A Only

5. See Figure 332. Insert a cartridge **10** in the loader before you turn the loader gear to prevent bending the file-protect sensor.
6. Turn the loader gear **4** to expose the two cartridge-present sensor screws, then remove the screws from the sensor and remove the loader spring(s) **1**. Replace the sensor and **save the loader spring(s) for installation in the new loader.**

Note: Skip the **next** step and go to step 8 on page LOC*CAR-74, if you are replacing the loader of a drive in a Model C12/C14 drive frame.



A1400018

Figure 332. Loader Assembly (Old Style Loader Cable)

7. For better access, remove the "Library Interface Cover" on page PROC-28 (you may not have to disconnect the cables). Remove and save the fiducial bracket **9** by removing the screw. Then skip to step 9.
8. If you are replacing the loader of a drive in a **Model C12/C14**, remove the fiducial bracket, screw, and lockwasher. Refer to "Begin B1A/E1A Drive Installation" in the INST section of *IBM 3590 Tape Subsystem Models C12/C14 Maintenance Information* for the correct procedure, if necessary. Save the fiducial bracket, screw and lockwasher for reinstallation on the new loader.

End of Model B1A/E1A Only

9. Position the pantocam arm so the threader pin is away from the loader. When positioning the pantocam, always grip the arm next to the pantocam motor shaft. Never grip the outer pantocam arm to reposition the pantocam.
10. See Figure 332 on page LOC*CAR-73. Disconnect cable **5**.
11. Remove screws **2** and **3**.
12. Remove screw **8** by inserting a narrow-shaft screwdriver through hole **6**. Do not force

the screwdriver against the hex-shaped shaft **7** when removing or replacing this screw as damage to the shaft and to the FRU may occur.

13. Carefully remove the loader assembly (tilt it to remove). Use care not to damage the cables.

Replacement of Loader Assembly

1. Perform the removal procedure in the reverse order, then return here. If the loader spring(s) (**1** in Figure 332 on page LOC*CAR-73 or Figure 333) was removed from a **Model B1A/E1A loader**, replace the parts in steps 6 on page LOC*CAR-73 and 7 or step 8
2. If you are replacing the loader of a drive in a **Model C12/C14**, make sure to install the fiducial bracket, screw, and lockwasher that were saved in an earlier step. The fiducial alignment with respect to the loader is critical. Refer to "Begin B1A/E1A Drive Installation" in the INST section of *IBM 3590 Tape Subsystem Models C12/C14 Maintenance Information* for the fiducial installation procedure. For correct alignment of the fiducial, refer to procedure "Align the Fiducial" in the PROC section of *IBM 3590 Tape Subsystem Models C12/C14 Maintenance Information*.

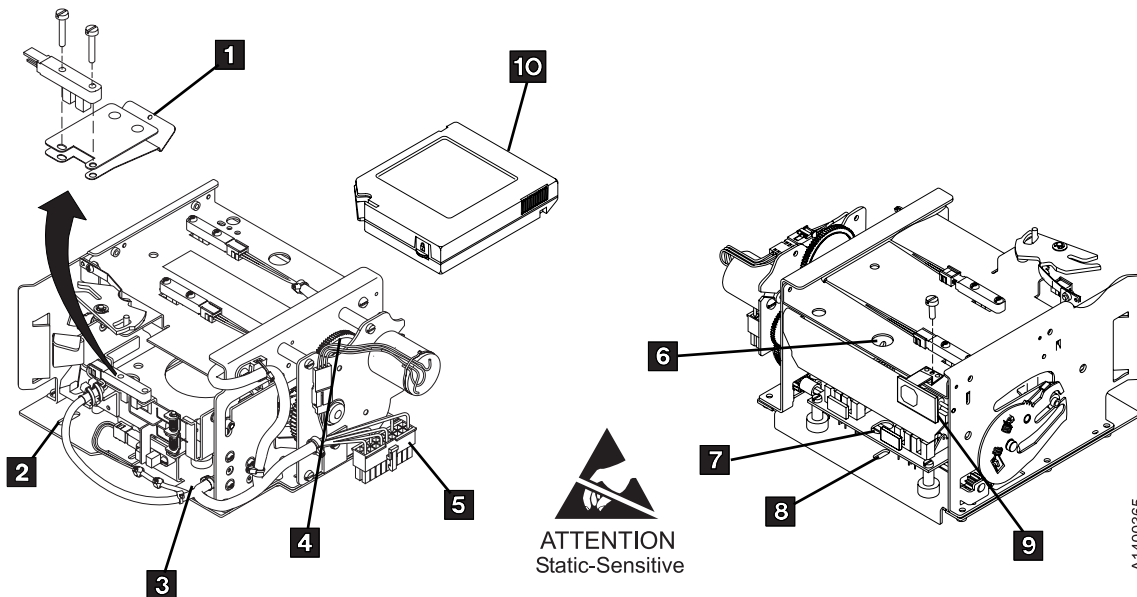


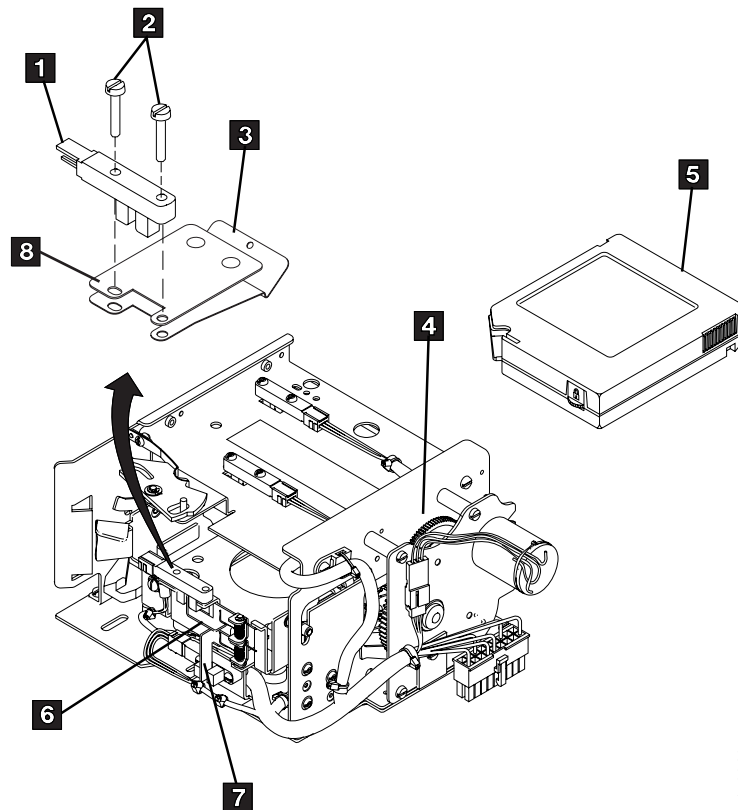
Figure 333. Loader Assembly (New Style Loader Cable)

3. For replacement of the **loader spring(s)**, perform the following steps:
 - a. Refer to Figure 334.
 - b. Check that the loader door moves freely.
 - c. Rotate the top of the loader gear **4** towards the rear of the device to move the loader tray to the front of the drive.
 - d. Insert a cartridge **5** in the loader to prevent bending the file-protect sensor flag **7**.
 - e. Rotate the top of the loader gear **4** to the front of the device to expose the cartridge-present sensor **1**, which is the top sensor at the rear of the loader.
 - f. Remove the two screws **2** that hold the sensor.
 - g. Install the loader spring(s) **3** and **8** under the sensor and reinstall the screws **2**.

Note: Loaders in 3590 drives installed in 3494 libraries use both springs **3** and **8**. Loaders in 3590 drives

installed in any other type of library use the bottom spring **3** only.

- h. Rotate the top of the loader gear **4** towards the rear of the device to move the loader tray to the front of the drive.
 - i. Remove and reinsert the cartridge while observing the cartridge-present flag **6**. It should freely exit and enter the cartridge-present sensor **1**.
 - j. Remove and save the cartridge.
4. **Important Note:** Whenever the loader assembly or fiducial bracket are removed or replaced on a Model B1A/E1A, it will be necessary to run the **Teach Selected Devices** routine from the **Teach** pull-down on the library controller. See *IBM 3494 Tape Library Dataserver Maintenance Information* for details.
 5. Perform "End of Call" on page PROC-8.
 6. Use your local procedures to report the FRU part number for the FID and use technical area code (TAC) **T42** for the area of failure.



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 ATTENTION Static-sensitive

Figure 334. Cartridge-Present Loader Springs

FID C6: Machine Reel Motor

See "Locations for the Deck" on page LOC*CAR-62 for FRU location C6.

Removal of Machine Reel Motor

1. "Prepare the Tape Drive for Service" on page PROC-5 and then return here.
2. Remove the power cord from its source and then from the back of the 3590.
3. Remove the deck enclosure back cover. See "Deck Enclosure Covers" on page PROC-23.
4. Remove the pantocam. See "FID BB: Pantocam" on page LOC*CAR-70.
5. See Figure 335. Remove the center-tape-guide mounting screw **3** and remove the guide.
6. Rotate the machine reel guide **5** out of the way of the machine reel motor.
7. Remove the three machine-reel-motor mounting screws **6**.
8. If needed, remove the card pack fan to access the motor connectors. See "FID BF: Fan

(Card Pack)" on page LOC*CAR-52, then return here.

9. Disconnect motor connector MMP1 **1**.
10. Disconnect the motor connector on the bottom of the motor **2** (the connector has a locking tab on the bottom).
11. Carefully pull the motor **4** up and out of the drive.

Replacement of Machine Reel Motor

Note: You will use the gap set tool P/N 05H4671 to adjust the motor hub clearance (see "Replacement of Pantocam" on page LOC*CAR-71).

1. Perform the removal procedure in the reverse order, then return here.
2. Perform "Measurement and Adjustment of Pneumatic System" on page LOC*CAR-3, then return here.
3. Perform "End of Call" on page PROC-8.
4. Use your local procedures to report the FRU part number for the FID and use technical area code (TAC) **T54** for the area of failure.

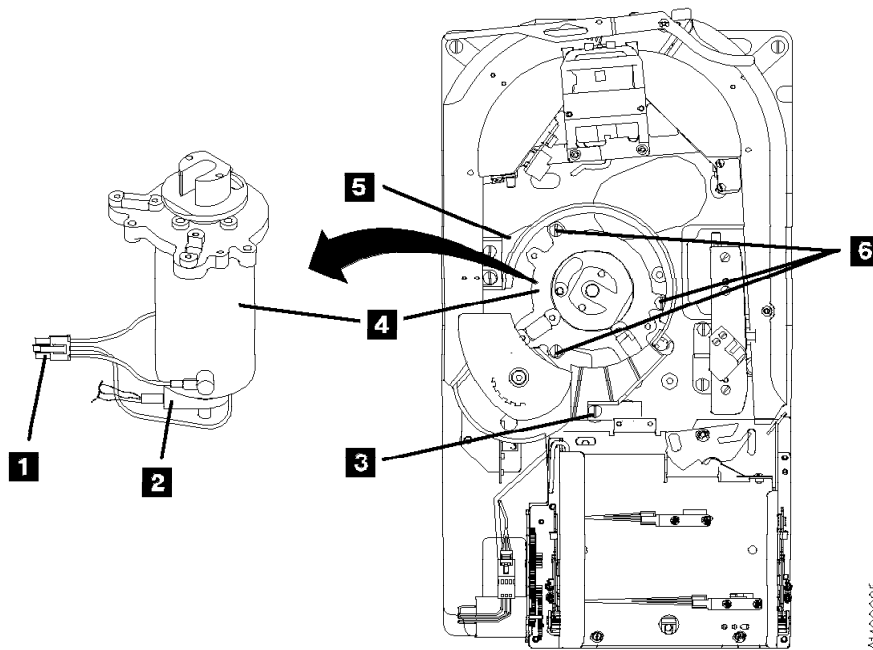


Figure 335. Machine Reel Motor

FID C7: File Reel Motor

See "Locations for the Deck" on page LOC*CAR-62 for FRU location C7.

Removal of File Reel Motor

1. "Prepare the Tape Drive for Service" on page PROC-5 and then return here.
2. Remove the power cord from its source and then from the back of the 3590.
3. Remove the deck enclosure back cover. See "Deck Enclosure Covers" on page PROC-23.
4. Remove the loader assembly. See "FID BC: Loader Assembly" on page LOC*CAR-73.
5. If needed, remove the card pack fan to get access the motor connectors. See "FID BF: Fan (Card Pack)" on page LOC*CAR-52, then return here.
6. See Figure 336. Disconnect connector MT1 **2**.
7. Disconnect the motor connector on the bottom of the motor **3** (the connector has a locking tab on the bottom).
8. The two spade connectors **4** will interfere with removing the motor. Remove the two

spade connectors **4** from the motor terminals (one on each side of the motor).

- Plus (+) lead to the red **5** terminal
- Minus (-) lead to black terminal

It is not necessary to remove the ground lead now.

9. Remove the three motor-mounting screws **1**.
10. Carefully lift the motor out of the casting, taking care not to damage the wiring.

Replacement of File Reel Motor

1. Perform the removal procedure in the reverse order, then return here.

Note: When reinstalling the motor, the red (+) motor terminal **5** should be toward the front.

2. Perform "Measurement and Adjustment of Pneumatic System" on page LOC*CAR-3, then return here.
3. Perform "End of Call" on page PROC-8.
4. Use your local procedures to report the FRU part number for the FID and use technical area code (TAC) **T54** for the area of failure.

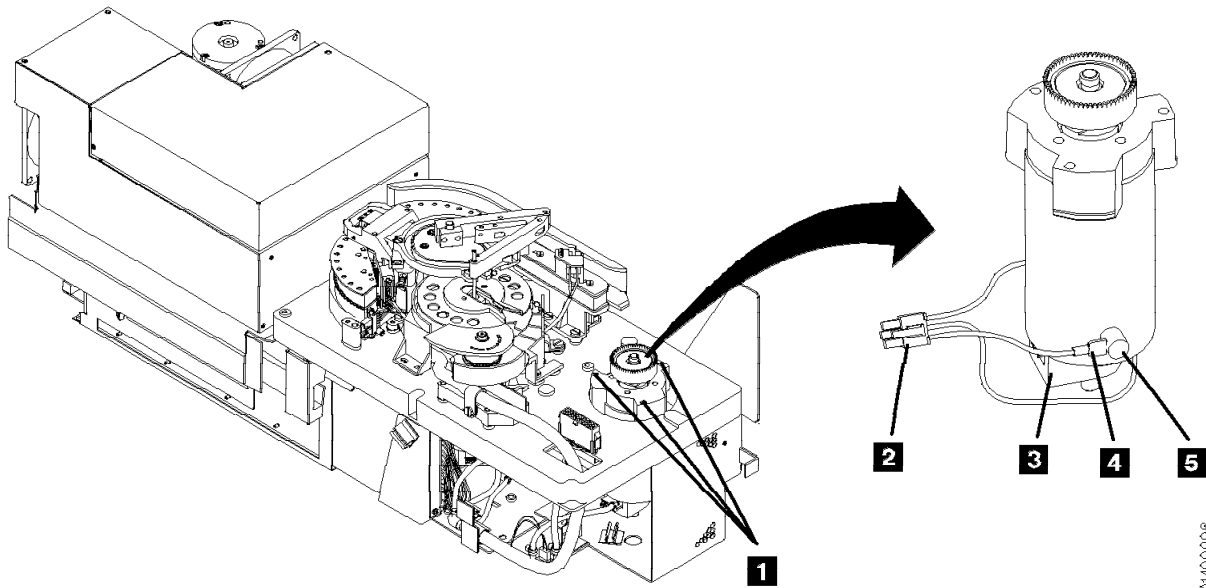


Figure 336. File Reel Motor


FID C8: File-Protect Sensor

See “Locations and Removal Procedures for the Deck” on page LOC*CAR-61 for FRU location C8.

Debris may be causing the problem, **clean the sensor** with a brush (standard tool kit soft bristle brush). Verify problem remains prior to replacing the FRU.

Removal of File-Protect Sensor

1. “Prepare the Tape Drive for Service” on page PROC-5 and then return here.
2. Remove the deck enclosure top cover. See “Deck Enclosure Covers” on page PROC-23.

3. See Figure 337. Remove two screws **3** securing the file-protect sensor **2**.
4.  The file-protect sensor is ESD sensitive. See “Working with Electrostatic Discharge (ESD) Parts” on page PROC-20.

Disconnect the connector **1** from the file-protect sensor and remove the sensor.

Replacement of File-Protect Sensor

1. Perform the removal procedure in the reverse order, then return here.
2. Perform “End of Call” on page PROC-8.
3. Use your local procedures to report the FRU part number for the FID and use technical area code (TAC) **T32** for the area of failure.

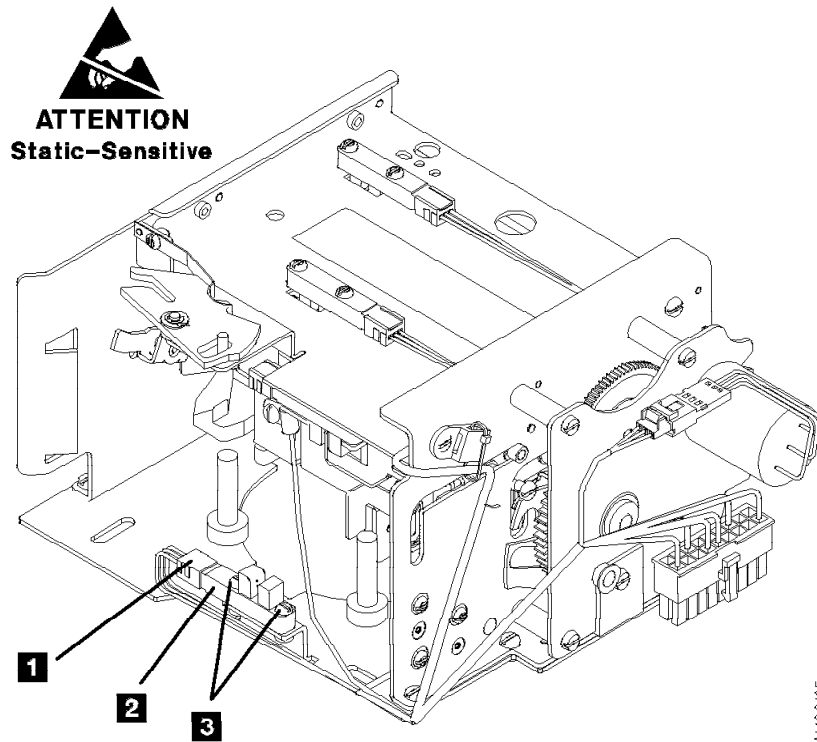


Figure 337. File-Protect Sensor

FID C9: Door-Open Sensor

See “Locations and Removal Procedures for the Deck” on page LOC*CAR-61 for FRU location C9.


Check the sensor and sensor cable connections, reset if needed.

Debris may be causing the problem, **clean the sensor** with a brush (standard tool kit soft bristle brush). Verify problem remains prior to replacing the FRU.

Removal of Door-Open Sensor

1. “Prepare the Tape Drive for Service” on page PROC-5 and then return here.
2. Remove the deck enclosure top cover. See “Deck Enclosure Covers” on page PROC-23.

3. See Figure 338. Remove two screws **3** holding the door-open sensor **2**.

4.  The door-open sensor is ESD sensitive. See “Working with Electrostatic Discharge (ESD) Parts” on page PROC-20.

Disconnect the connector **1** from the sensor and remove the sensor.

Replacement of Door-Open Sensor

1. Perform the removal procedure in the reverse order, then return here.
2. Perform “End of Call” on page PROC-8.
3. Use your local procedures to report the FRU part number for the FID and use technical area code (TAC) **T33** for the area of failure.

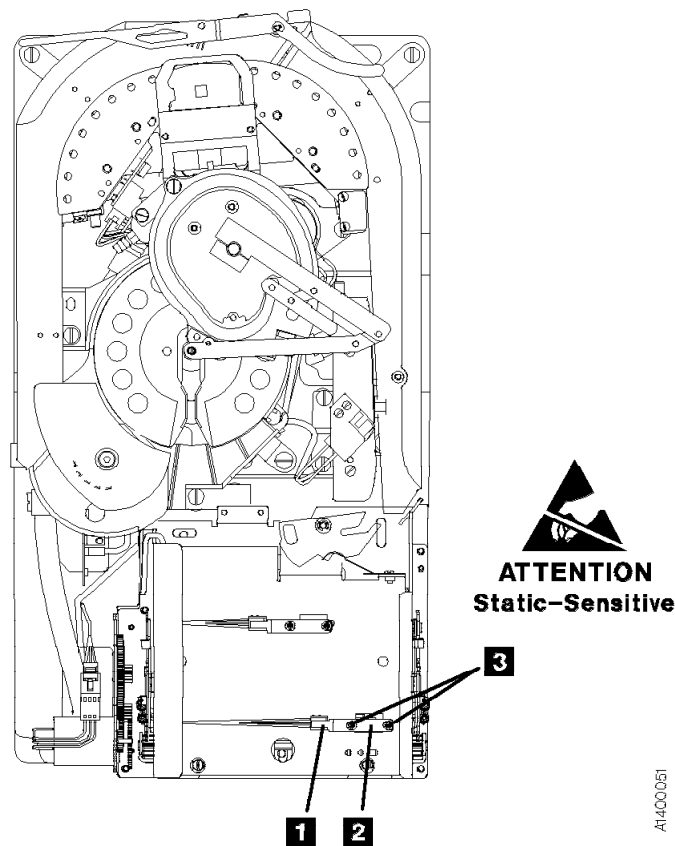


Figure 338. Door-Open Sensor

FID CA: Tray-Up Sensor

See “Locations and Removal Procedures for the Deck” on page LOC*CAR-61 for FRU location CA.


A bind in the loader can cause this FID to be presented. So before you replace this FRU, check for a bind by inserting a cartridge in the loader and turning the loader gear (see Figure 332 on page LOC*CAR-73 keys **10** and **4**). If a bind exists, go to “FID BC: Loader Assembly” on page LOC*CAR-73.

Debris may be causing the problem, **clean the sensor** with a brush (standard tool kit soft bristle brush). Verify problem remains prior to replacing the FRU.

Removal of Tray-Up Sensor

1. “Prepare the Tape Drive for Service” on page PROC-5 and then return here.

2. Remove the deck enclosure top cover. See “Deck Enclosure Covers” on page PROC-23.
3. See Figure 339. Remove two screws **2** holding the tray-up sensor **3**.

4.  The tray-up sensor is ESD sensitive. See “Working with Electrostatic Discharge (ESD) Parts” on page PROC-20.

Disconnect the connector **1** from the sensor and remove the sensor.

Replacement of Tray-Up Sensor

1. Perform the removal procedure in the reverse order, then return here.
2. Perform “End of Call” on page PROC-8.
3. Use your local procedures to report the FRU part number for the FID and use technical area code (TAC) **T33** for the area of failure.

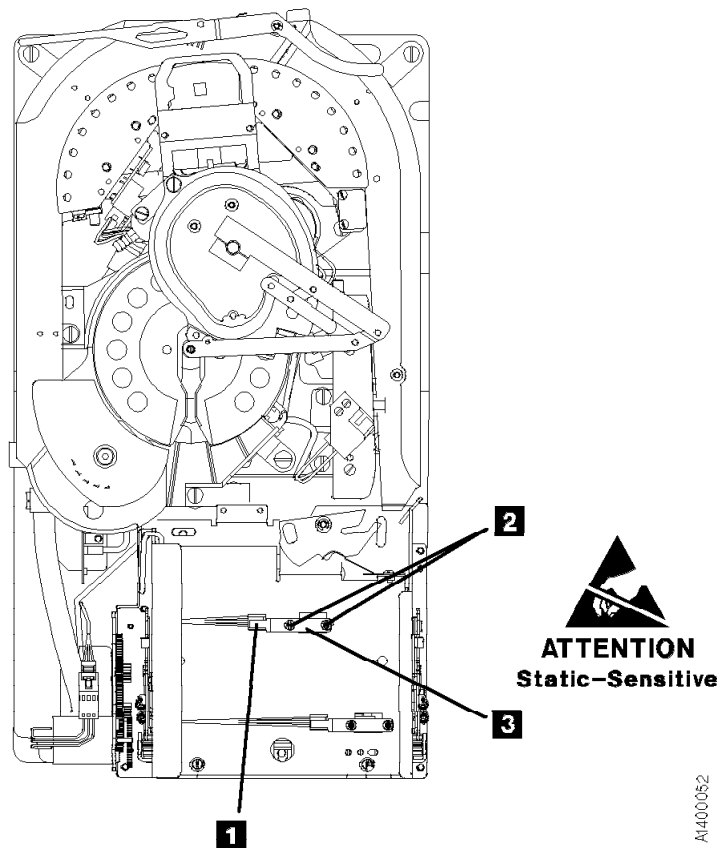


Figure 339. Tray-Up Sensor

FID CC: Cartridge-Type Sensor Card Assembly

See “Locations and Removal Procedures for the Deck” on page LOC*CAR-61 for FRU location CC.


Debris may be causing the problem, **clean the sensor** with a brush (standard tool kit soft bristle brush). Verify problem remains prior to replacing the FRU.

Notes:

1. When cleaning this sensor also check flags for sticking.
2. New style loaders have a sensor guard **5** to protect the sensors from damage during a cartridge load operation.

Removal of Cartridge-Type Sensor Card Assembly

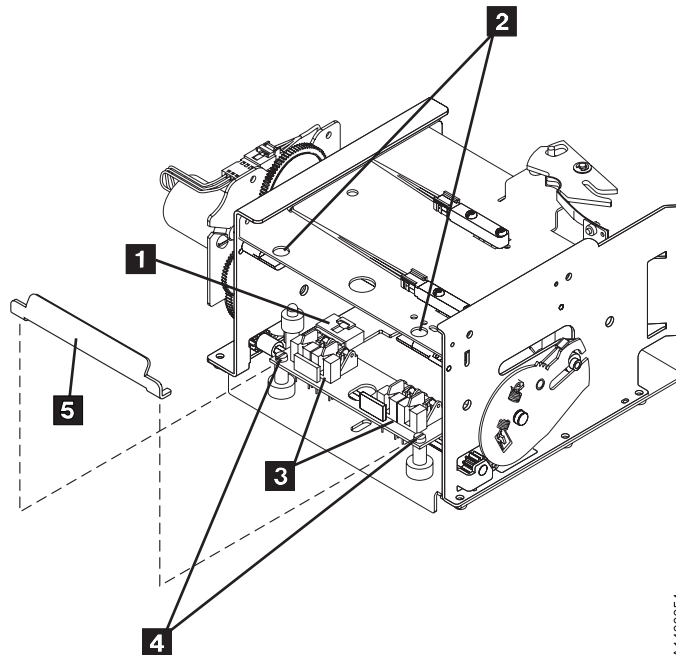
1. “Prepare the Tape Drive for Service” on page PROC-5 and then return here.

2. Remove the deck enclosure top cover. See “Deck Enclosure Covers” on page PROC-23.
3. See Figure 340. Remove the cartridge loader assembly to gain access to the cartridge-type sensor card assembly **3**. See “FID BC: Loader Assembly” on page LOC*CAR-73.
4. Remove two screws **4** holding the sensor guard **5** (if present) and the sensor card **3**, by inserting a screwdriver through the two holes **2** in the top of the loader.
5.  The cartridge type sensor card assembly is ESD sensitive.

See “Working with Electrostatic Discharge (ESD) Parts” on page PROC-20. Disconnect the connector **1** from the sensor card and remove the sensor.

Replacement of Cartridge-Type Sensor Card Assembly

1. Perform the removal procedure in the reverse order, then return here.
2. Perform “End of Call” on page PROC-8.
3. Use your local procedures to report the FRU part number for the FID and use technical area code (TAC) **T33** for the area of failure.



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Figure 340. Cartridge-Type Sensor Card Assembly

FID CD: Cartridge-Present Sensor


See “Locations and Removal Procedures for the Deck” on page LOC*CAR-61 for FRU location CD.

Before replacing the cartridge-present sensor, check for broken wires in the sensor cable in the area of the strain relief clamp **6**. If the cable is bad, replace the Loader assembly. See “FID BC: Loader Assembly” on page LOC*CAR-73.

Debris may be causing the problem, **clean the sensor** with a brush (standard tool kit soft bristle brush). Verify problem remains prior to replacing the FRU.

Removal of Cartridge-Present Sensor

1. “Prepare the Tape Drive for Service” on page PROC-5 and then return here.
2. Remove the deck enclosure top cover. See “Deck Enclosure Covers” on page PROC-23.

3. Insert a cartridge **5** in the loader before you turn the loader gear to prevent bending the file-protect sensor.
4. See Figure 341. If the cartridge-present sensor **2** is not accessible, rotate the loader gear **4** to the front to expose the sensor.
5. Remove the two screws **3** that hold the sensor.
6.  The cartridge-present sensor is ESD sensitive. See “Working with Electrostatic Discharge (ESD) Parts” on page PROC-20. Disconnect the connector **1** to remove the sensor.

Replacement of Cartridge-Present Sensor

1. Perform the removal procedure in the reverse order, then return here.
2. Perform “End of Call” on page PROC-8.
3. Use your local procedures to report the FRU part number for the FID and use technical area code (TAC) **T33** for the area of failure.

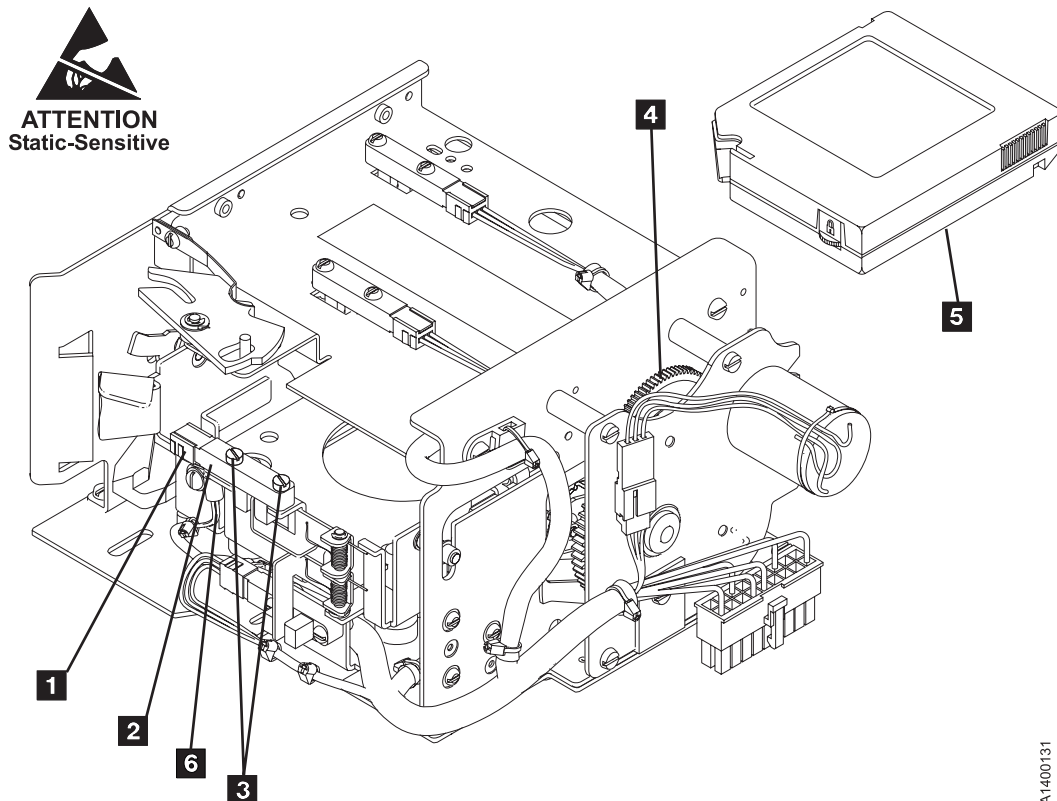


Figure 341. Cartridge-Present Sensor

FID CE: Tape Path A Sensor

See "Locations for the Deck" on page LOC*CAR-62 for FRU location CE.

Removal of Tape Path A Sensor

1. "Prepare the Tape Drive for Service" on page PROC-5 and then return here.
2. Remove the deck enclosure top cover. See "Deck Enclosure Covers" on page PROC-23.
3. See Figure 342. Position the pantocam arm **2** so the arm is away from the tape path A sensor **5**.

Attention: When positioning the pantocam, always grip the arm next to the pantocam motor shaft **1**. Never grip the outer pantocam arm to reposition the pantocam.

4. Remove two screws **3** securing tape path A sensor **5** to the decoupler.
5. Remove the sensor bracket **4**.
6. Disconnect the sensor connector **6** from the sensor.

Replacement of Tape Path A Sensor:

Attention: Ensure that the positive sign (+) located on the leading end of the sensor and positive sign (+) on the cable are aligned when plugging the sensor cable.

1. Perform the removal procedure in the reverse order, then return here.
2. Perform "End of Call" on page PROC-8.
3. Use your local procedures to report the FRU part number for the FID and use technical area code (TAC) **T33** for the area of failure.

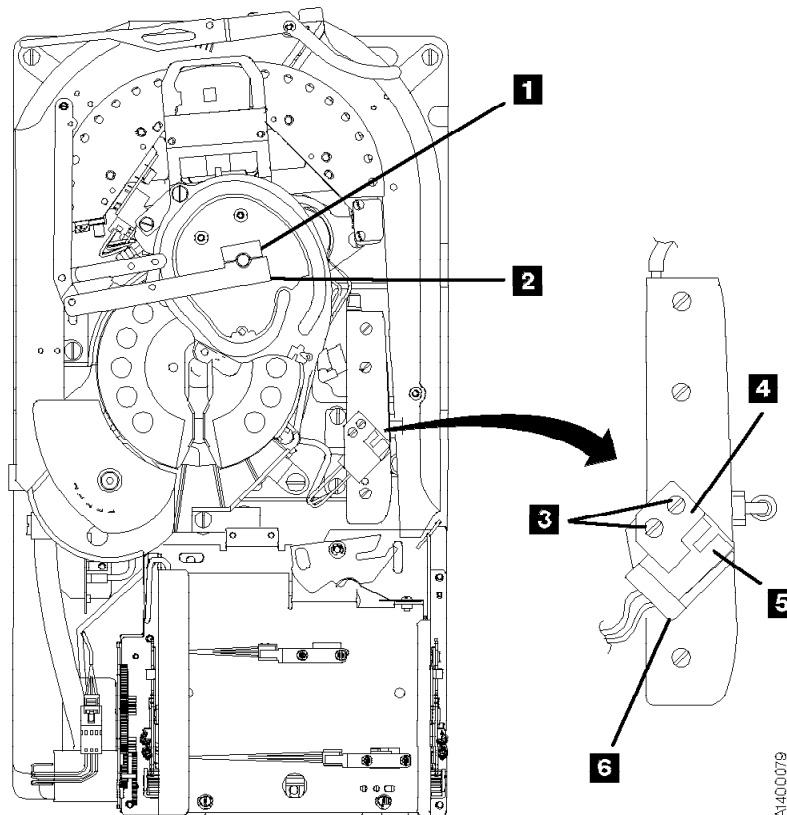


Figure 342. Tape Path A Sensor

FID CF: Tape Path B Sensor

See "Locations for the Deck" on page LOC*CAR-62 for FRU location CF.

Removal of Tape Path B Sensor

1. "Prepare the Tape Drive for Service" on page PROC-5 and then return here.
2. Remove the deck enclosure top cover. See "Deck Enclosure Covers" on page PROC-23.
3. See Figure 343. Position the pantocam arm **2** so the arm is away from the tape path B sensor **4**.

Attention: When positioning the pantocam, always grip the arm next to the pantocam motor shaft **1**. Never grip the outer pantocam arm to reposition the pantocam.

4. Remove the bracket screw **3** that clamps the sensor to the pantocam and remove the bracket.
5. From under the pantocam, push the sensor **4** and its connector (in the direction of the arrow **5**) out of the pantocam.
6. Disconnect the sensor connector.

Replacement of Tape Path B Sensor:

Attention: Ensure that the positive sign (+) located on the leading end of the sensor and positive sign (+) on the cable are aligned when plugging the sensor cable.

1. Perform the removal procedure in the reverse order, then return here.
2. Perform "End of Call" on page PROC-8.
3. Use your local procedures to report the FRU part number for the FID and use technical area code (TAC) **T33** for the area of failure.

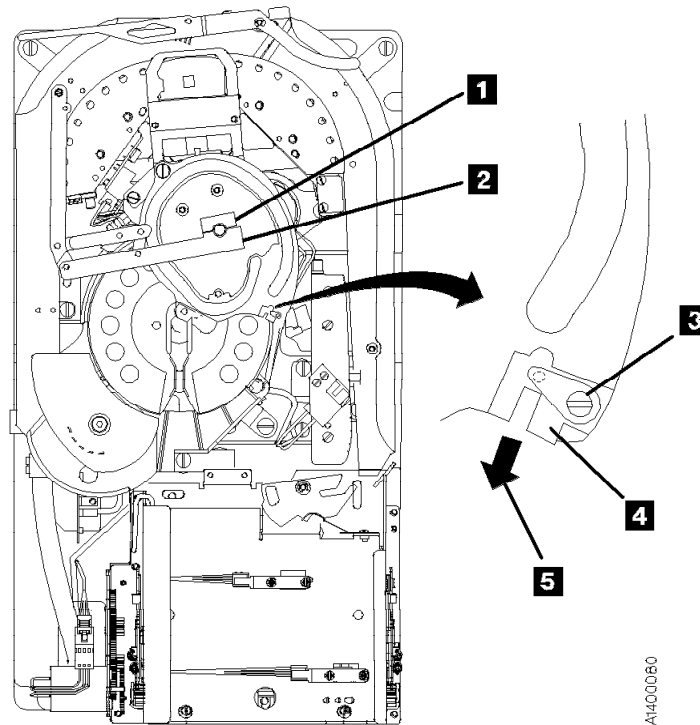


Figure 343. Tape Path B Sensor

FID D0: Head Guide and Brush Assembly

See “Locations for the Deck” on page LOC*CAR-62 for FRU location D0.

Attention:

1. Handle the head guide assembly (HGA) very carefully to prevent movement of the actuator calibration, the head actuator beam, and the flexures on top and at the bottom. Ensure that they are not touched or bumped in any way. The flexures are susceptible to handling damage with the bottom flexure the most exposed.
2. Handle the HGA by the casting and the compliant guide screw heads only.
3. Avoid bumping the HGA against any hard surfaces.
4. Never drop the HGA from heights even as low as 3.175 mm (1/8 in.).
5. Never strike the HGA with hand or another object. For example do not tap on the HGA to move it into position.
6. Always keep the HGA in the protective shipping container when it is not installed in a tape deck. The HGA should be taken directly from the shipping container at installation and placed directly into a shipping container after removal.
7. **Do not use any magnetized tools on or near the head assembly, as they will destroy the head!**

Before You Replace the Head Guide


Assembly: If the 3590 has a failure that requires the head guide assembly to be replaced, do the following to determine if cleaning the heads will correct the fault before you replace the head.

Attention: Do not perform any manual cleaning of the read/write head because any solvents, minerals, or oils in the tape path will cause the head guide assembly to become unusable.

1. Load the cleaning cartridge into the drive; the cleaning procedure is done automatically.
2. Perform “Test the Drive” on page LOC*CAR-91 to see if cleaning the tape path corrected the fault.
3. If cleaning the heads and tape path corrected the fault, the clean brush may not be cleaning the heads properly. Go to “FID D4: Head Cleaning Brush Assembly” on page LOC*CAR-93 and replace the clean brush.
4. If the above cleaning did not correct the fault, continue with this procedure.

See “Locations for the Deck” on page LOC*CAR-62 for FRU location D0.

Note: Be sure you have the correct replacement part number HGA assembly. The HGA assembly for the Model E11/E1A drive is not interchangeable with the HGA assembly for the Model B11/B1A drive. The only visual difference between the two HGA assemblies is the serial number on the bar-code label on top of the R/W head. The Model E11/E1A serial numbers all begin with a “T”, and the Model B11/B1A serial numbers all begin with a “B”.

Attention:  The head guide assembly has ESD-sensitive components. Do not touch the circuit board on the head guide assembly. Also, do not touch the surface of the read/write head or the bristles on the cleaning brush as finger prints cause corrosion on the head. See “Working with Electrostatic Discharge (ESD) Parts” on page PROC-20.

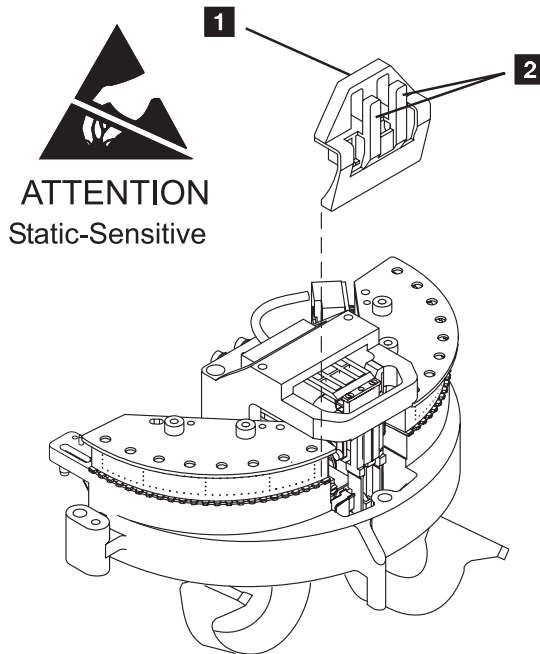
Removal of Head Guide and Brush Assembly

1. “Prepare the Tape Drive for Service” on page PROC-5 and then return here.
2. Remove the power cord from its source and then from the back of the 3590.
3. Remove the deck enclosure back cover. See “Deck Enclosure Covers” on page PROC-23.



See Figure 344.

4. **Attention:** Use extra care when installing (or removing) the head protector as to not damage the head assembly. **Do NOT push down hard** on the head protector as this may destroy the springs in floating head!



5. Install the orange head protector **1** P/N 05H4778 on the head guide assembly **3**.
 - a. Squeeze the head protector at positions **1** and **2**.
 - b. Insert the head protector into the head guide assembly, as shown **4**.

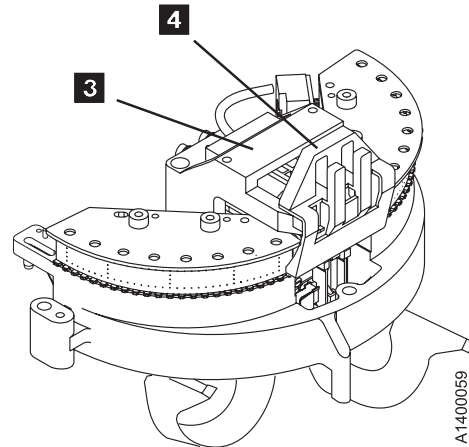


Figure 344. Head Protector P/N 05H4778


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See Figure 345.

6. Remove the screws **1** securing the card pack fan **2** to the bottom of the deck enclosure.
7. Disconnect the fan connector and remove the fan.
8. The head cable receptacles **3** are part of the card pack assembly **4** and are accessible through the electronics fan hole. Disconnect the two head cables as follows:

Note: Each head cable connector **6** is locked to its receptacle **7** with a sliding retaining bar **9**. The retaining bar has a tab

at the front **5** and rear **8** that engage slots in the receptacle to lock the connector in place.

9.  Reach into the fan opening and pull the retaining bar **9** toward the front of the drive until it stops, approximately 6 mm (1/4 in.).
10. With the retaining bar disengaged, lift the retaining bar upward while carefully tilting the front and rear of the connector until it is disconnected.
11. Repeat this procedure to disconnect the other head cable connector.

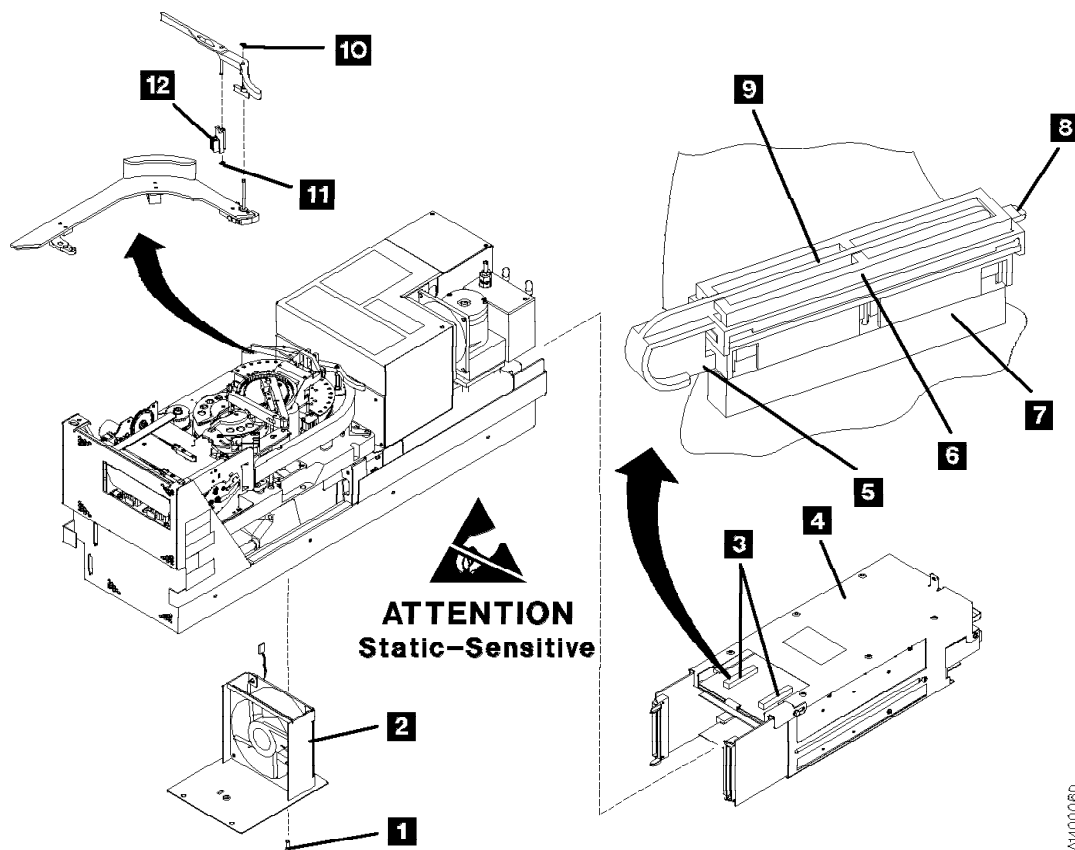


Figure 345. Head Cable Connectors

See Figure 346.

Attention: If this FRU is in the right hand drive and it is installed in a rack with a second drive next to it, the left tape guide cannot be removed with the head guide protector installed. Use extreme care not to damage the read/write head when removing the tape guide assembly.

12. Remove the left tape guide screws **1** and remove the guide.

Note: If another tape drive is installed to the left of the drive you are working on, the clearance to remove the tape guide is restricted. Do the following:



- a. With the mounting screws removed, move the rear of the tape guide to the left to disengage the tab, then move the tape guide to the rear (toward the power supply).
- b. Carefully lift the front of the tape guide up while keeping the hose and cable away from the front tape guide support.

See Figure 345 on page LOC*CAR-87.

13. **Note: Do not touch the bristles on the brush** so that it can be analyzed when you return it with the head guide assembly. Use lint-free gloves P/N 461621 to handle the cleaning brush.

Remove the head-cleaning brush **12** by removing the clip **10**, lift the arm off the stud, and then remove the clip **11**.

See Figure 346.

14. Remove the right tape guide screws **2** and remove the guide.
15. Remove the large hose **3** from the tape-lifter solenoid.
16. Remove the left D-bearing hose **4**.
17.  Disconnect the IPS cable connector **5**.
18.  Disconnect the VPD cable connector **6**.
19. Loosen the tape-lifter solenoid mounting screw **7**.
20. Remove the tape-lifter solenoid mounting bracket screw **9**.
21. **Attention:** Do not disconnect the small hose from the head guide assembly. Remove the small hose **8** from the tape-lifter solenoid (under the tape lifter solenoid mounting bracket) and move the tape-lifter solenoid out of the way.
22. If this HGA has a cleaner blade installed, disconnect the vacuum hose **11** from the bottom of the cleaner blade.
23. Remove the right D-bearing hose **10** (under the cleaner blade).

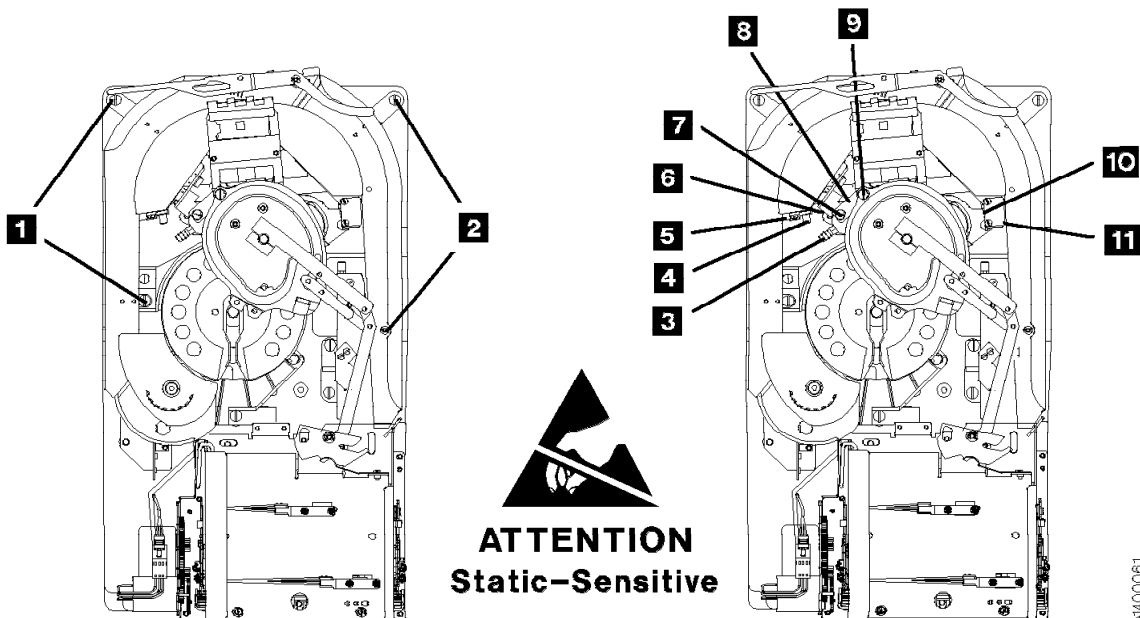


Figure 346. Tape Guides, Tape-Lifter Solenoid, Hoses, and Connectors

See Figure 347.

24. Remove the three head guide assembly mounting screws **4**.
25. Position the pantocam arm so the threader pin **5** is away from the loader.
26. Loosen the rear pantocam base mounting screws **3**, but do not remove them from the pantocam base casting.
27. Position the machine reel **2** to gain access to the front pantocam base mounting screw **1** (located under the edge of the pantocam).
28. Loosen the front pantocam base mounting screw **1**, but do not remove it from the pantocam base casting.
29. **Attention:** In the next two steps, do not rub the head cables on the casting as the wires are very fragile. Lift the pantocam until it clears the locating pins and then tilt the pantocam assembly to the front **6** while removing the head guide assembly.
30. Carefully lift the head guide assembly **7** off its locating pins **8**. Continue lifting the head guide assembly and tilting the pantocam until the head guide assembly can be removed, and at the same time, carefully guiding the head cables and connectors through the opening in the casting.

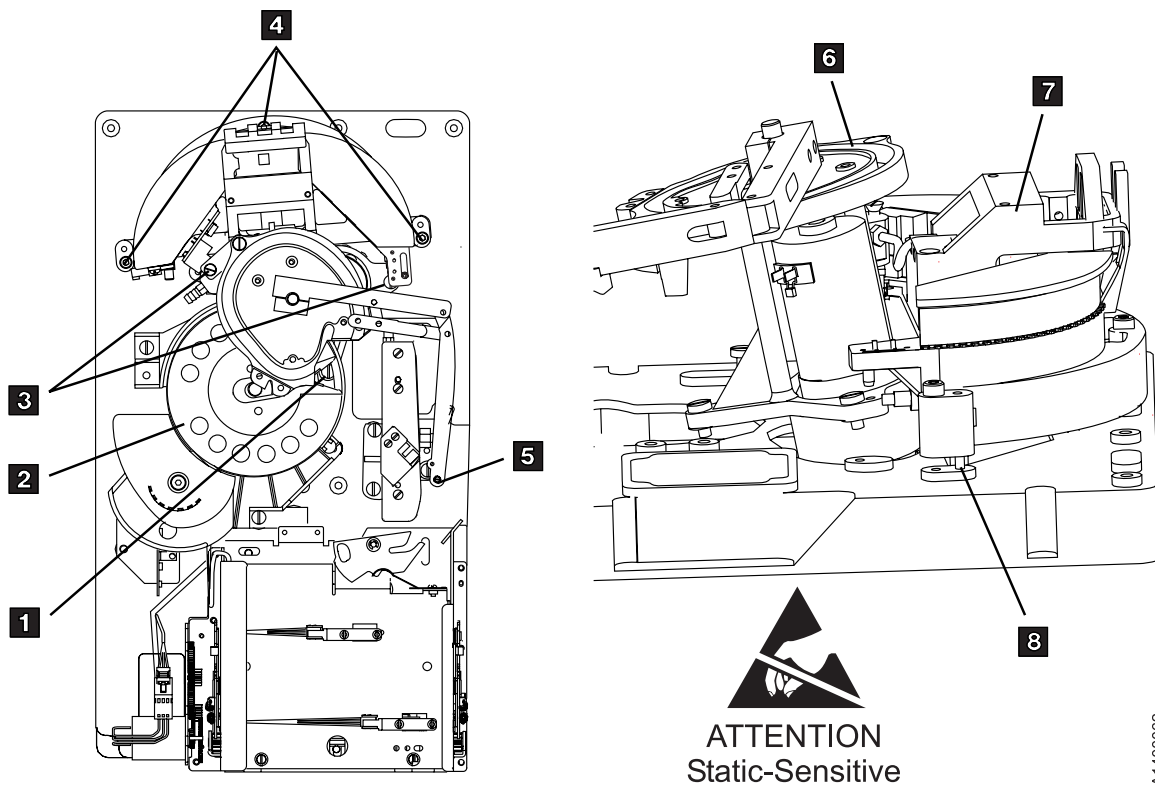


Figure 347. Pantocam Assembly and Head Guide and Brush Assembly

Replacement of Head Guide and Brush Assembly

Cleaner Blade

- The cleaner blade is no longer used on any models of the 3590 drive.
- All of the Model E11/E1A Head Guide Assemblies and most of the Model B11/B1A Head Guide Assemblies will not have the Cleaner Blade shown in Figure 348, item **2**.
- If the replacement part you just received **does** have a cleaner blade installed, carefully remove it using the procedure at “Cleaner Blade Removal Procedure (Models B11/B1A)” on page LOC*CAR-92.
- **Attention:** When the cleaner blade has been removed, the vacuum hose **4** must be either removed or plugged to prevent vacuum system leaks.
 - New HGA FRU kits for Models B11/B1A will contain a new in-line connector **6** to be used in place of the tee connector **5** when the cleaner blade vacuum hose **4** is removed.
 - If you **do not** have a new in-line connector **6**, the hose **4** can be plugged with a 4mm screw, or the end of the hose can be folded over and tied with a cable tie-wrap.

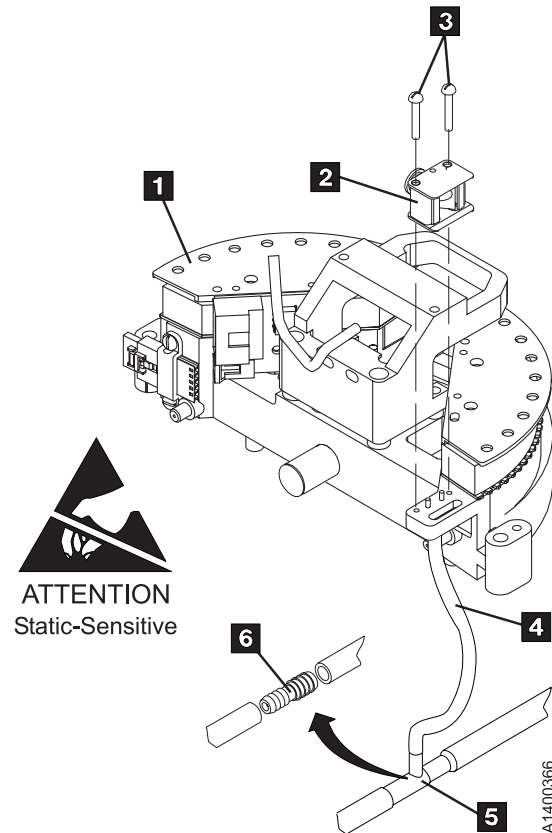


Figure 348. Cleaner Blade Removal

When the cleaner blade has been removed, continue with the Head Guide and Brush Assembly installation.

Note:

The head guide assembly is awkward to install because the flex cables must be fed through a hole in the deck at the same time that the head guide assembly is being mounted; there is only 6-mm (1/4-in.) clearance between the side of the deck opening and the flexure. In addition, care must be used so as not to allow the cables to drag on the edge of the casting. The cables can be easily damaged. Do not bump the flexure into the deck frame while moving the head guide assembly to locate it on the two dowel pins.

Hints on Reinstallation

Use extreme care when installing the head guide assembly; use the following pointers to help you install this fragile assembly:

Note: To prevent head contamination, do not touch the bristles on the brush nor the air bearing surface. Use lint-free gloves P/N 461621 to handle the automatic cleaning brush. Return the cleaning-brush with the head guide assembly.

1. Loosen the pantocam by tilting it away from the head guide assembly or removing it completely.
2. Install the head guide assembly with the end facing the pantocam position tilted downward so that the two rear bottom posts are inserted into the triangular opening of the deck first.
3. Lightly press these posts against the side of the opening toward the pantocam as the head guide assembly is tilted back to a horizontal position and gently lower it onto the deck.
4. As the assembly nears the two locating dowels on the deck, move the head guide assembly slightly away from the pantocam position until the head guide assembly is lined up with the dowel pins and then gently lower it into the final position.

End of Hints on Reinstallation

1. Perform the removal procedure in the reverse order, then return here.
2. **Attention:** When reinstalling the right tape guide and the left tape guide with screws **2** and **1**, as indicated in Figure 346 on page LOC*CAR-88, make sure that the horizontal surfaces of the right and left tape

guides are **exactly level to each other** where the two edges meet. Check this with the edge of a small metal ruler.

3. **Attention: Remove the head protector before switching ON the device power.** Damage may occur if the protector remains on the head. Save the head protector for later use.
4. Perform "Measurement and Adjustment of Pneumatic System" on page LOC*CAR-3, then return here.
5. Perform "End of Call" on page PROC-8.
6. Use your local procedures to report the FRU part number for the FID and use technical area code (TAC) **T22** for the area of failure when you replace the head guide and brush assembly. Use TAC D08 if you only clean the read/write head.

Test the Drive: After the head cleaning procedure is completed, run the verify fix diagnostic:

1. If the CE Options menu is not displayed, press the Change Mode **I** push button.
2. Select **Verify Fix** from the CE Options menu and press Enter.
3. Select **Test Drive** from the CE Verify Fix menu and press Enter.
4. If the test did not complete successfully, return to the procedure that sent you here and complete the repair action.
5. Perform "End of Call" on page PROC-8.
6. Use your local procedures to report the FRU part number for the FID and use technical area code (TAC) **D08** for the area of failure when you perform a cleaning operation.

Cleaner Blade Removal Procedure (Models B11/B1A)

- The cleaner blade is no longer used on any models of the 3590 drive.
- All of the Model E11/E1A Head Guide Assemblies and most of the Model B11/B1A HGAs will not have the Cleaner Blade shown in Figure 349, item **2**. If you are replacing a Head Guide and Brush Assembly, and the replacement part **does** have a cleaner blade attached to it, follow this procedure to remove it.
- If you were sent here from another section of the MI, perform this procedure, install a new Head Cleaning Brush assembly, and then return to the procedure that sent you here.

To remove the cleaner blade from the HGA, perform the following:

1. "Prepare the Tape Drive for Service" on page PROC-5 and then return here.
2. Remove the power cord from its source and then from the back of the 3590.
3. Remove the deck enclosure back cover. See "Deck Enclosure Covers" on page PROC-23.

Note: You may remove the cleaner blade without removing the HGA.

4. Referring to Figure 349, remove two screws, **3** holding the cleaner blade assembly, item **2** onto the Head Guide and Brush Assembly, item **1**.
5. Remove or plug the cleaner blade vacuum hose **4** to prevent vacuum system leaks.
 - If you have a new in-line connector **6** (included with new HGA FRU kits for Models B11/B1A) you can remove the hose and install the in-line connector in place of the tee connector **5**.

- If you **do not** have a new in-line connector **6**, the hose **4** can be plugged with a 4mm screw, or the end of the hose can be folded over and tied with a cable tie-wrap.

6. Discard the used parts that were removed.
7. If you are removing the cleaner blade from an HGA that is already installed in the drive, it will be necessary to install a new head cleaning brush assembly also. Refer to "FID D4: Head Cleaning Brush Assembly" on page LOC*CAR-93 and install a new head cleaning brush assembly, then return here.
8. Return to the procedure that sent you here.

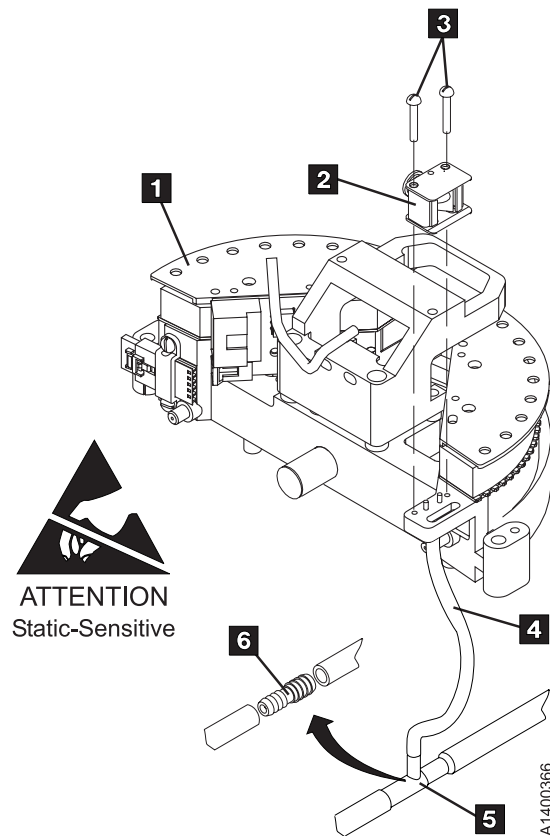



Figure 349. Cleaner Blade Removal

FID D4: Head Cleaning Brush Assembly

See “Locations for the Deck” on page LOC*CAR-62 for FRU location D4.

Attention:  The head guide assembly has ESD-sensitive components. Do not touch the circuit board on the head guide assembly. Also, do not touch the surface of the read/write head or the bristles on the cleaning brush as finger prints cause corrosion on the head. See “Working with Electrostatic Discharge (ESD) Parts” on page PROC-20.

Removal of Head Cleaning Brush Assembly

1. “Prepare the Tape Drive for Service” on page PROC-5 and then return here.

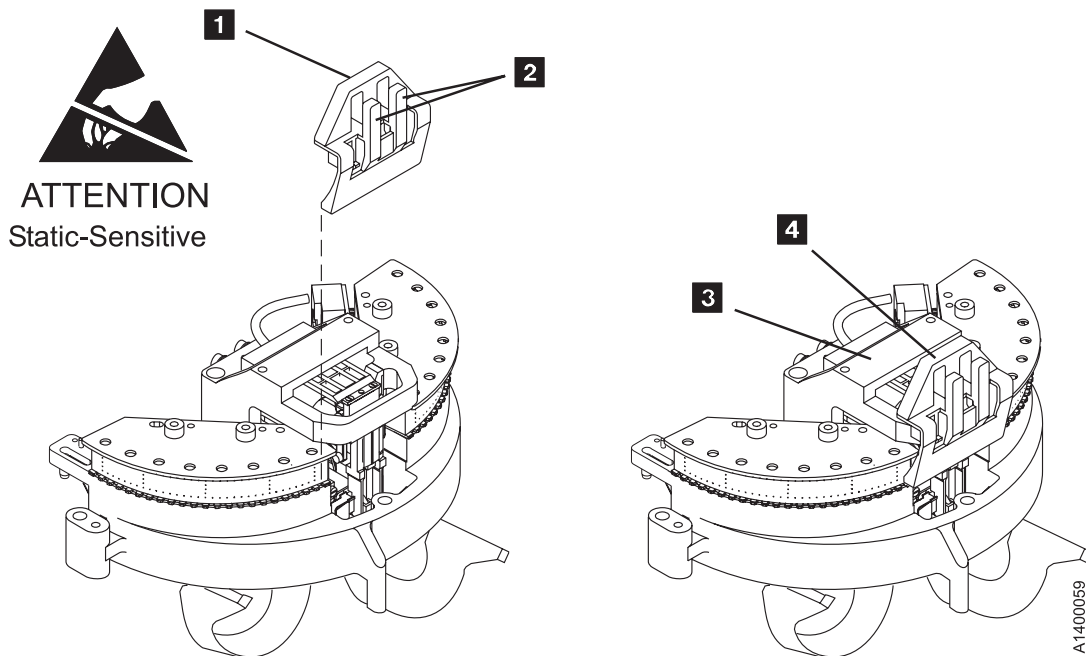


Figure 350. Head Protector P/N 05H4778

2. Remove the power cord from its source and then from the back of the 3590.
3. Remove the deck enclosure back cover. See “Deck Enclosure Covers” on page PROC-23. See Figure 350.
4. **Attention:** Use extra care when installing (or removing) the head protector so you do not damage the head assembly. **Do NOT push down hard** on the head protector as this may destroy the springs in the floating head!
5. Install the orange head protector **1** P/N 05H4778 on the head guide assembly **3**.
 - a. Squeeze the head protector at positions **1** and **2**.
 - b. Insert the head protector into the head guide assembly, as shown **4**.

See Figure 351.

Attention: If this FRU is in the right hand drive and it is installed in a rack with a second drive next to it, the left tape guide cannot be removed with the head guide protector installed. Use extreme care not to damage the read/write head when removing the tape guide assembly.

6. Remove the left tape guide screws **1** and remove the guide.

Note: If another tape drive is installed to the left of the drive you are working on, the clearance to remove the tape guide is restricted. Do the following:

- a. With the mounting screws removed, move the rear of the tape guide to the left to disengage the tab, then move the tape guide to the rear (toward the power supply).

- b. Carefully lift the front of the tape guide up while keeping the hose and cable away from the front tape guide support.

7. **Note: Do not touch the bristles on the brush.** Use lint-free gloves P/N 461621 to handle the cleaning brush.

Remove the head-cleaning brush **3** by removing the clip **2**, lift the arm off the stud, and then remove the clip **4**.

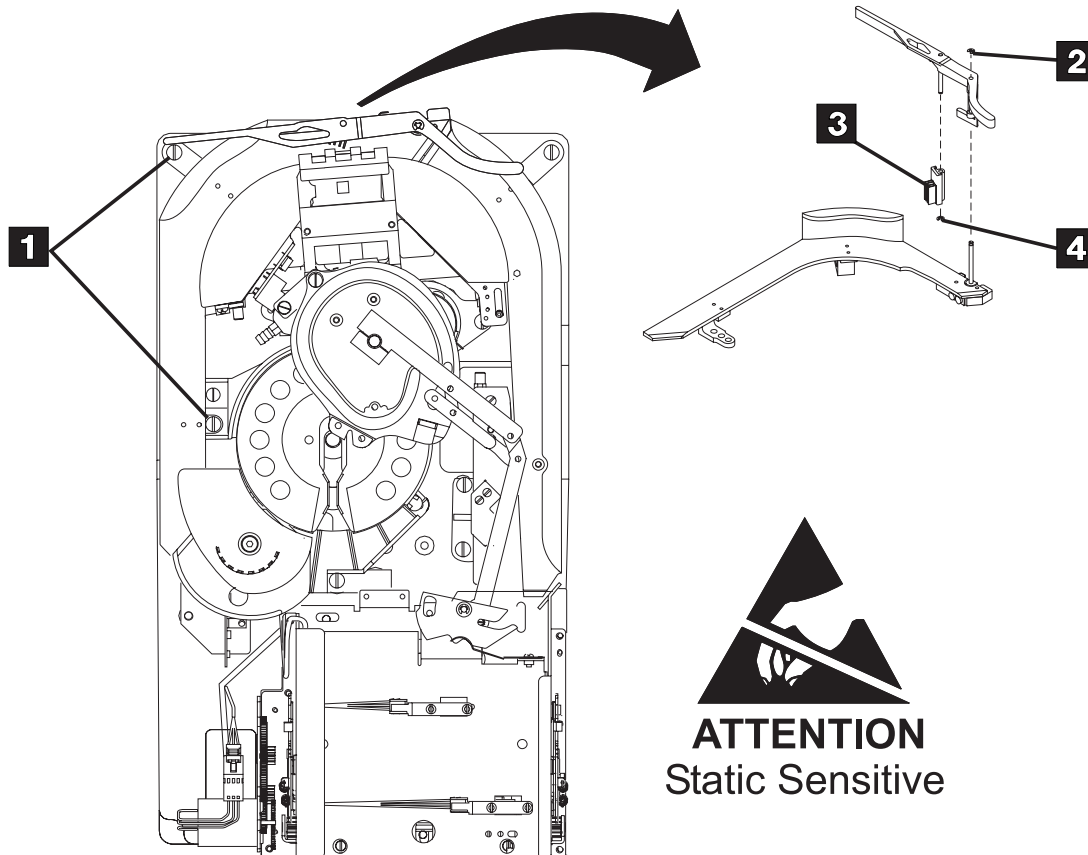


Figure 351. Head Cleaning Brush

A1400304


Replacement of Head Cleaning Brush Assembly

Note: To prevent head contamination, do not touch the bristles on the brush. Use lint-free gloves P/N 461621 to handle the automatic cleaning brush.

1. Perform the removal procedure in the reverse order, then return here.
2. **Attention:** When reinstalling the left tape guide, make sure that the horizontal surfaces of the right and left tape guides are **exactly level to each other** where the two edges meet. Check this with the edge of a small metal ruler.
3. **Attention: Remove the head protector before switching ON the device power.** Damage may occur if the protector remains on the head. Save the head protector for later use.
4. **Attention:** Perform the heads and tape path cleaning procedure before loading a data tape.
5. Load the cleaning cartridge into the drive; the cleaning procedure is done automatically.
6. Perform "End of Call" on page PROC-8.

7. Use your local procedures to report the FRU part number for the FID and use technical area code (TAC) **T49** for the area of failure when you replace the head cleaning brush assembly. Use TAC D08 if you only clean the read/write head.

Test the Drive: After the head cleaning procedure is completed, run the verify fix diagnostic:

1. If the CE Options menu is not displayed, press the Change Mode  push button.
2. Select **Verify Fix** from the CE Options menu and press Enter.
3. Select **Test Drive** from the CE Verify Fix menu and press Enter.
4. If the test did not complete successfully, return to the procedure that sent you here and complete the repair action.
5. Perform "End of Call" on page PROC-8.
6. Use your local procedures to report the FRU part number for the FID and use technical area code (TAC) **D08** for the area of failure when you perform a cleaning operation.

FID D6: Motor Power Cable

Removal of Cable

1. "Prepare the Tape Drive for Service" on page PROC-5 and then return here.
2. Remove the power cord from its source and then from the 3590.
3. Remove the deck enclosure back cover. See "Deck Enclosure Covers" on page PROC-23.
4. See Figure 352. Disconnect the motor cables at the rear of the drive **1**.
5. Disconnect the two motor cables **2** and **4** under the deck.

6. Remove the cable from the cable clamp **3**.
7. Pull the cables through the cable trough toward the front.

Replacement of Cable

1. Perform the removal procedure in the reverse order, then return here.
2. Perform "Measurement and Adjustment of Pneumatic System" on page LOC*CAR-3, then return here.
3. Perform "End of Call" on page PROC-8.
4. Use your local procedures to report the FRU part number for the FID and use technical area code (TAC) **C09** for the area of failure.

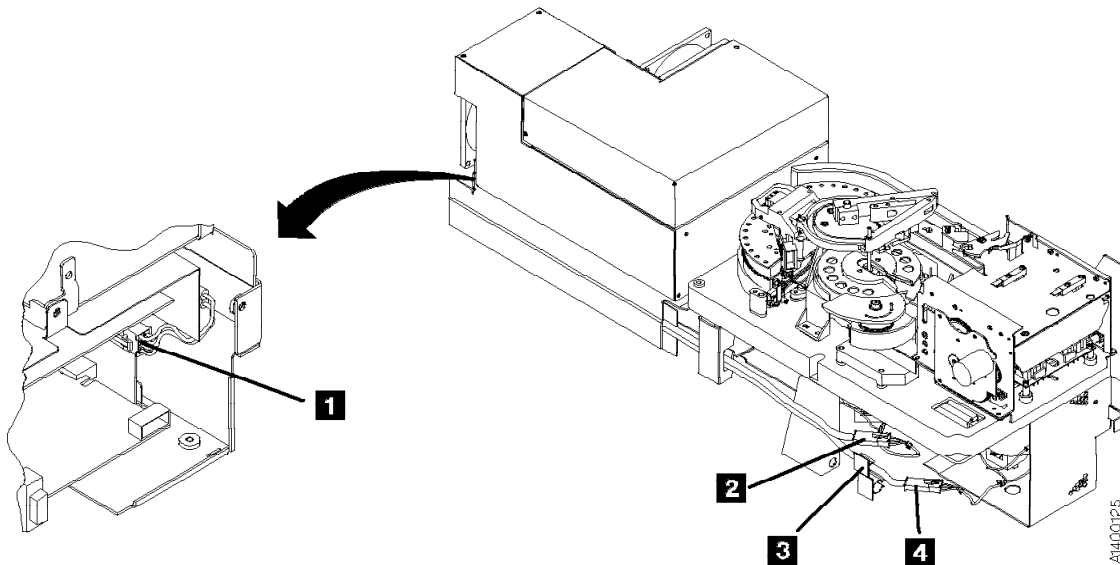


Figure 352. Motors Cable

FID DA: Motor, Loader, and Sensor Cable

Removal of Cable

1. "Prepare the Tape Drive for Service" on page PROC-5 and then return here.
2. Remove the power cord from its source and then from the back of the 3590.
3. Remove the deck enclosure back cover. See "Deck Enclosure Covers" on page PROC-23.

Hint

It is easier to perform this procedure if the drive is removed from the rack and placed on a work surface.

Refer to Figure 344 on page LOC*CAR-86 for installing the head protector in the next step.

4. Install the orange head protector **1** P/N 05H4778 on the head guide assembly **3**.
 - a. Squeeze the head protector at positions **1** and **2**.
 - b. Insert the head protector into the head guide assembly, as shown **4**.
5. Remove the card pack. Refer to "FID E4: Card Pack" on page LOC*CAR-56 for the removal procedure.
6. See Figure 353 on page LOC*CAR-98. Remove cable clamps **1**, **6**, and **9**.

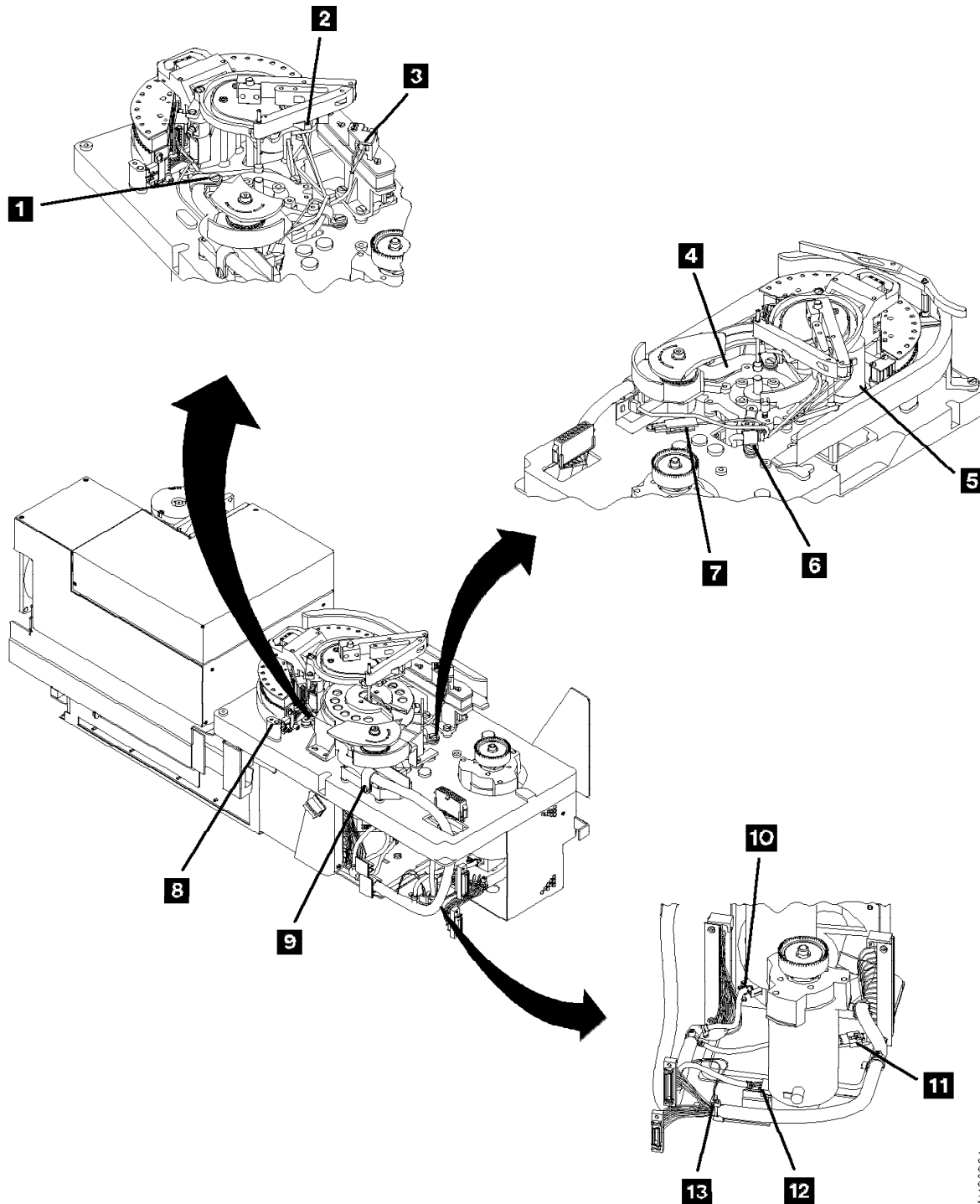
7. Disconnect connectors **2**, **3**, **7**, **8**, **10**, **11**, **12**, and **13**.
8. Disconnect the cable connections from the pantocam motor **5**.
9. Remove the two screws from the cable docking connector.
10. Remove the cable **4**.

Replacement of Cable

Notes:

- a. When connecting the tape path A sensor connector, ensure that the + on the cable connector and the sensor are aligned.
- b. When connecting the tape path B sensor connector, ensure that the + on the cable connector and the sensor are aligned.
- c. The new Cable FRU kit should contain a ferrite ring. This ferrite should be installed on the pantocam motor leads. It reduces electrical noise in the cable. Follow the instructions in the FRU kit.

1. Perform the removal procedure in the reverse order, then return here.
2. Perform "Measurement and Adjustment of Pneumatic System" on page LOC*CAR-3, then return here.
3. Perform "End of Call" on page PROC-8.
4. Use your local procedures to report the FRU part number for the FID and use technical area code (TAC) **C09** for the area of failure.



A1100204

Figure 353. Tach, Motor, and Loader Cable

FID DB: Power Supply Cable

Note: This FID is removable on the Model E11/E1A drives only.

Removal of Cable

1. "Prepare the Tape Drive for Service" on page PROC-5 and then return here.
2. Remove the power cord from its source and then from the 3590.
3. Remove the deck enclosure back cover and back plate. See "Deck Enclosure Covers" on page PROC-23.

4. See Figure 354. Disconnect the power supply cable **1** from the power supply at connector J2.
5. Disconnect the other end of the power supply cable from the card pack connector.
6. Remove the cable from the drive.

Replacement of Cable

1. Perform the removal procedure in the reverse order, then return here.
2. Perform "End of Call" on page PROC-8.
3. Use your local procedures to report the FRU part number for the FID and use technical area code (TAC) **C09** for the area of failure.

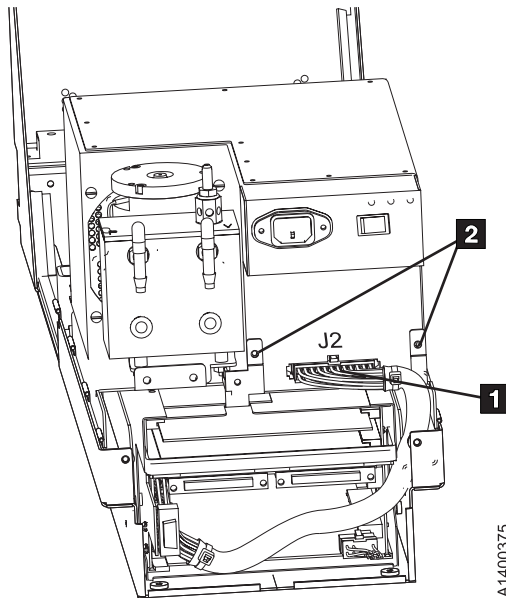


Figure 354. Power Supply Cable

FID DC: ACF and Operator/CE Panel Cable

Removal of Cable

1. "Prepare the Tape Drive for Service" on page PROC-5 and then return here.
2. Remove the power cord from its source and then from the back of the 3590.
3. Remove the deck enclosure back cover. See "Deck Enclosure Covers" on page PROC-23.
4. See Figure 355.
5. Remove the cable from the clamps **1** and **3**.
6. Unplug the cable from connector **2**.

7. Remove the four screws **4** from the two connectors.
8. Remove any necessary parts to obtain access to the cable and connectors. Refer to the appropriate procedures in this section.
9. Note the routing and remove the cable.

Replacement of Cable

1. Perform the removal procedure in the reverse order, then return here.
2. Perform "End of Call" on page PROC-8.
3. Use your local procedures to report the FRU part number for the FID and use technical area code (TAC) **C09** for the area of failure.

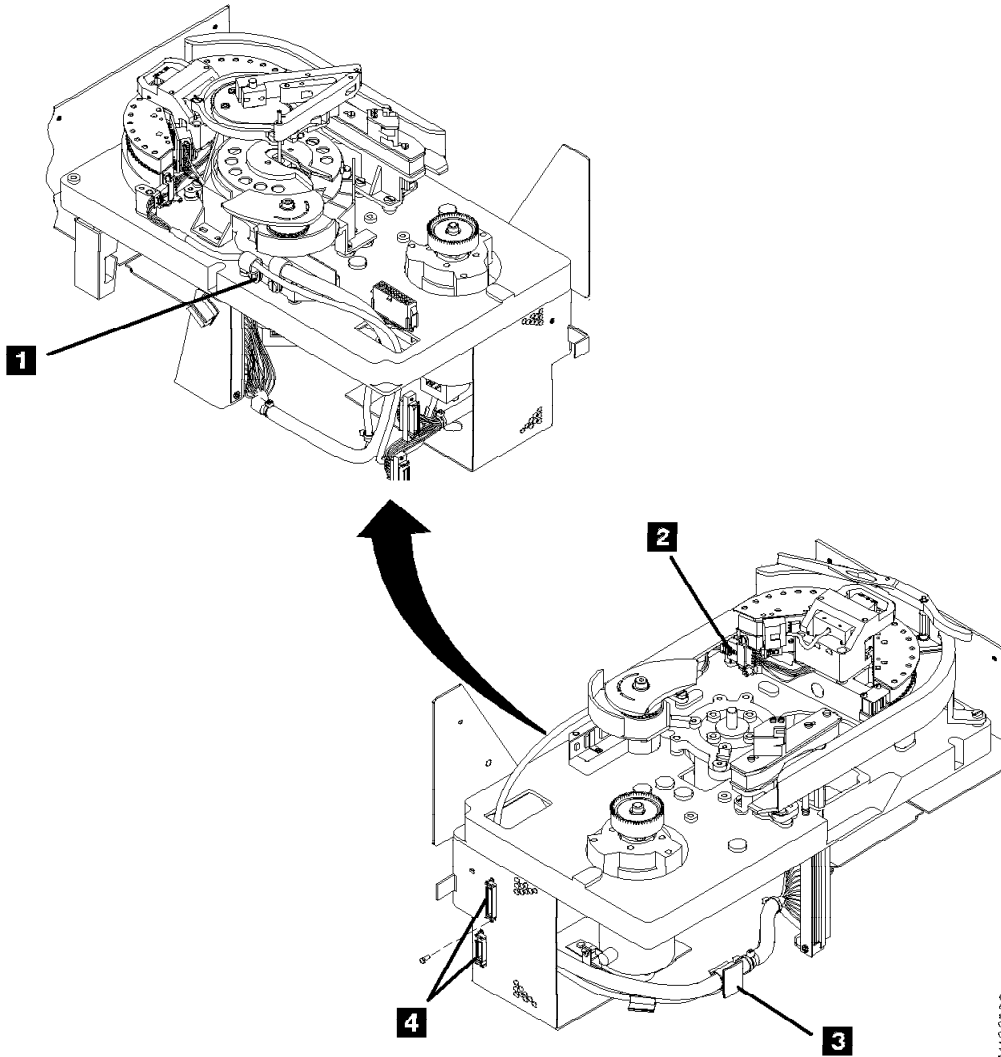
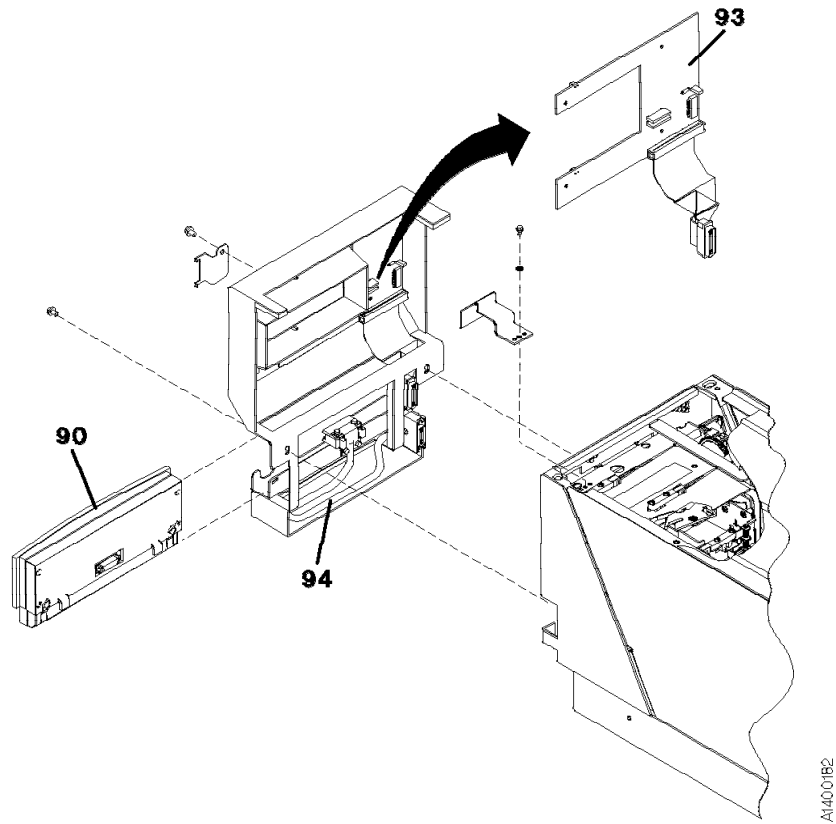


Figure 355. ACF and Operator/CE Panel Cable

Locations and Removal Procedures for Model B1A/E1A (Library) Components

The FRUs in Figure 356 are identified by their FID number; for example, 90 is FID 90, the operator/CE panel. The list following the figure shows the FID names.



LOC*CAR

Figure 356. Locations for Model B1A/E1A Components

FID Number	FID Name
90	Operator/CE Panel
93	Gripper-present sensor card
94	Operator panel cable

FID 93: Gripper Present Sensor Card (Model B1A/E1A Only)


See “Locations and Removal Procedures for Model B1A/E1A (Library) Components” on page LOC*CAR-101 for FRU location 93.

Debris may be causing the problem, **clean the sensor** with a brush (standard tool kit soft bristle brush). Verify problem remains prior to replacing the FRU.

Hint

Before you change this FRU, ensure you have the proper setting in the “CE Drive Options Menu” on page PANEL-40. For example, FID 93 occurs if the configuration reflects the drive being in a library and the library interface cover is not installed.

Removal of Gripper Present Sensor Card

1. “Prepare the Tape Drive for Service” on page PROC-5 and then return here.
2. See Figure 357. Remove the library interface cover **1**. See “Library Interface Cover” on page PROC-28, then return here.
3.  Remove the four screws **4** from the sensor card **3**.
4. Pull the card away from the cover and carefully pull the cable and connector out of the hole **2** and remove the sensor card.

Replacement of Gripper Present Sensor Card

1. Perform the removal procedure in the reverse order, then return here.
2. Perform “End of Call” on page PROC-8.
3. Use your local procedures to report the FRU part number for the FID and use technical area code (TAC) **T33** for the area of failure.

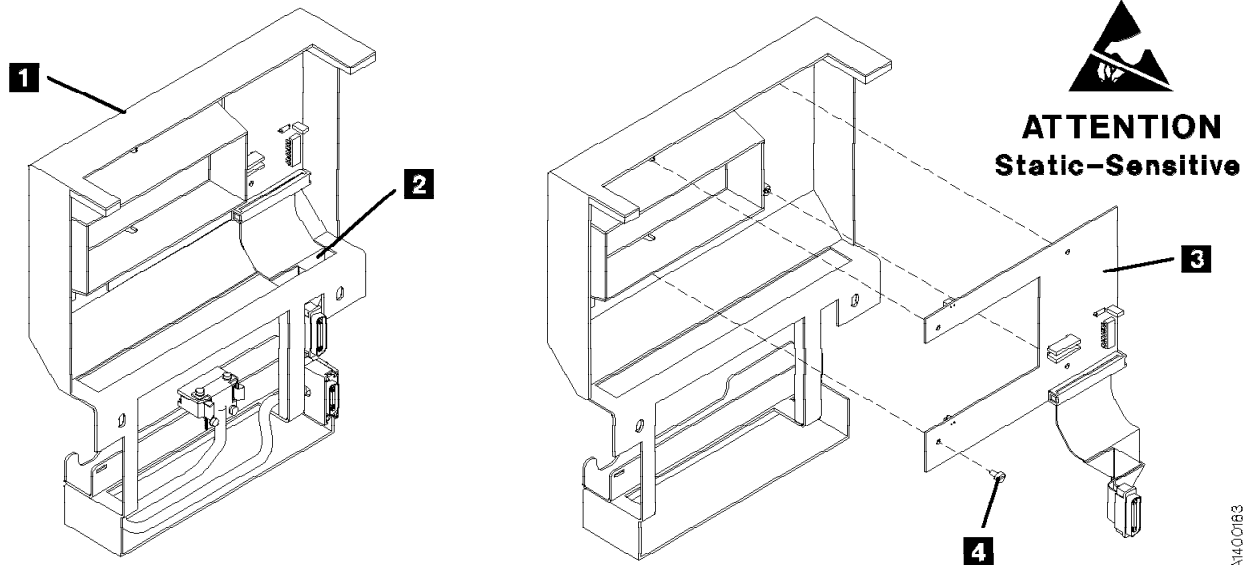


Figure 357. Gripper Present Sensor Card (Model B1A/E1A Only)

FID 94: Operator Panel Cable (Model B1A/E1A Only)

See “Locations and Removal Procedures for Model B1A/E1A (Library) Components” on page LOC*CAR-101 for FRU location 94.

Removal of Cable

1. “Prepare the Tape Drive for Service” on page PROC-5 and then return here.
2. See Figure 358. Remove the library interface cover **1**. See “Library Interface Cover” on page PROC-28, then return here.
3. Remove the cable **2** by pulling it away from the cover.

Replacement of Cable

1. Perform the removal procedure in the reverse order, then return here.
2. Perform “End of Call” on page PROC-8.

3. Use your local procedures to report the FRU part number for the FID and use technical area code (TAC) **T33** for the area of failure.

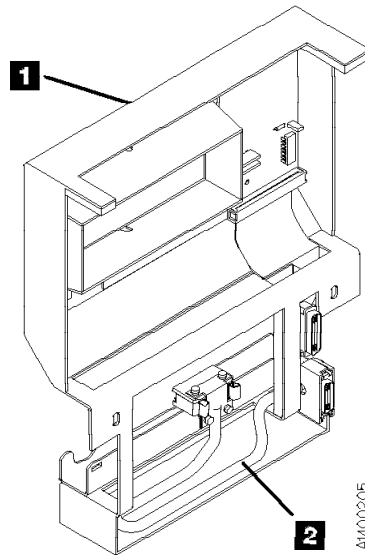


Figure 358. Operator Panel Cable

Parts Catalog

How to Use This Parts Catalog

- **SIMILAR ASSEMBLIES:** If two assemblies contain a majority of identical parts, they are broken down on the same list. Common parts are shown by one index number. Parts peculiar to one or the other of the assemblies are listed separately and identified by description.
- **AR:** (As Required) in the Units column indicates the quantity of the part is used as required.
- **NP:** (Non-Procurable) in the Units column indicates that the part is non-procurable and that the individual parts or the next higher assembly should be ordered.
- **NR:** (Not Recommended) in the Units column indicates that the part is procurable but not recommended for field replacement, and that the next higher assembly should be ordered.
- **R:** (Restricted) in the Units column indicates the part has a restricted availability.

- **INDENTURE:** The indenture is marked by a series of dots located before the parts description. The indenture indicates the relationship of a part to the next higher assembly. For example:

Indenture	Relationship of Parts
(No dots)	MAIN ASSEMBLY
(One dot)	• Detail parts of a main assembly
(One dot)	• Subassembly of the main assembly
(Two dots)	• • Detail part of a one-dot subassembly
(Two dots)	• • Subassembly of a one-dot subassembly
(Three dots)	• • • Detail part of a two-dot subassembly

Assembly *n*: Cover Assembly

Asm-Index	Part Number	Units	Description
<i>n</i> -	2512667	1	Cover Assembly, Rear, Red
-	2512668	1	Cover Assembly, Rear, Yellow
-	2512669	1	Cover Assembly, Rear, Blue
-	2512670	1	Cover Assembly, Rear, Gray
-	2513714	1	Cover Assembly, Rear, White
			For Next Higher Assembly, See 1-2 on page 15
-1	5373637	1	• Seal, Top
-2	5356429	2	• Clip, Retaining
-3	2513013	3	• Liner, Cover
-4	5373727	1	• Seal, Left Side
-5	5356429	3	• Clip, Retaining
-6	513668	2	• Catch,Cover
-7	81693	4	• Screw, Mach Bind Hd- 6-32, X 0.375 Long
-8	1847630	R	• Finger Stock Assembly
-9	1847602	NR	• • Channel, Finger Stock
-10	1847604	NR	• • Finger Stock, 2.00 Long
-11	5373639	AR	• Seal, Bottom
-12	5356429	2	• Clip, Retaining
-13		NP	• Cover, Rear, without Paint

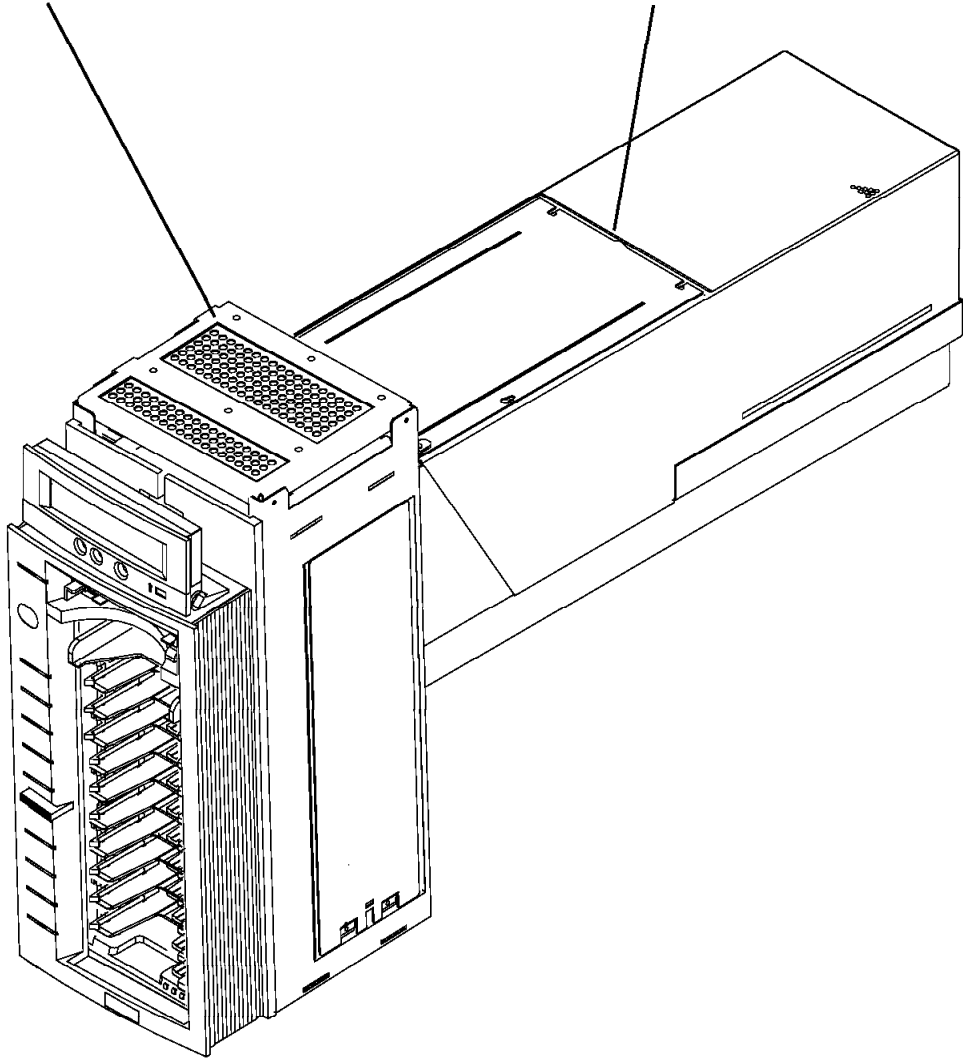
Assemblies List

ACF Final Assembly	PARTS-6
B1A, E1A Final Assembly	PARTS-10
Cable List	PARTS-22
Deck Enclosure	PARTS-12
Install Parts and Tools	PARTS-23

Visual Index, Model B11, E11

Final Assembly, ACF
Assembly 1
Parts 6

Deck Enclosure, Hardware
Assembly 3
Parts 12

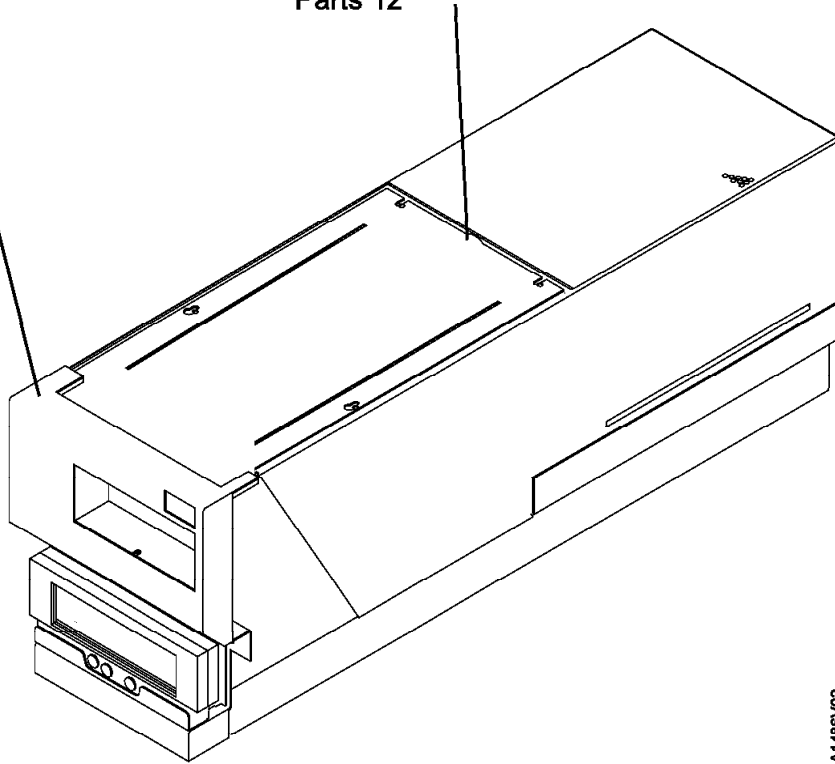


A1485V01

Visual Index, Model B1A, E1A

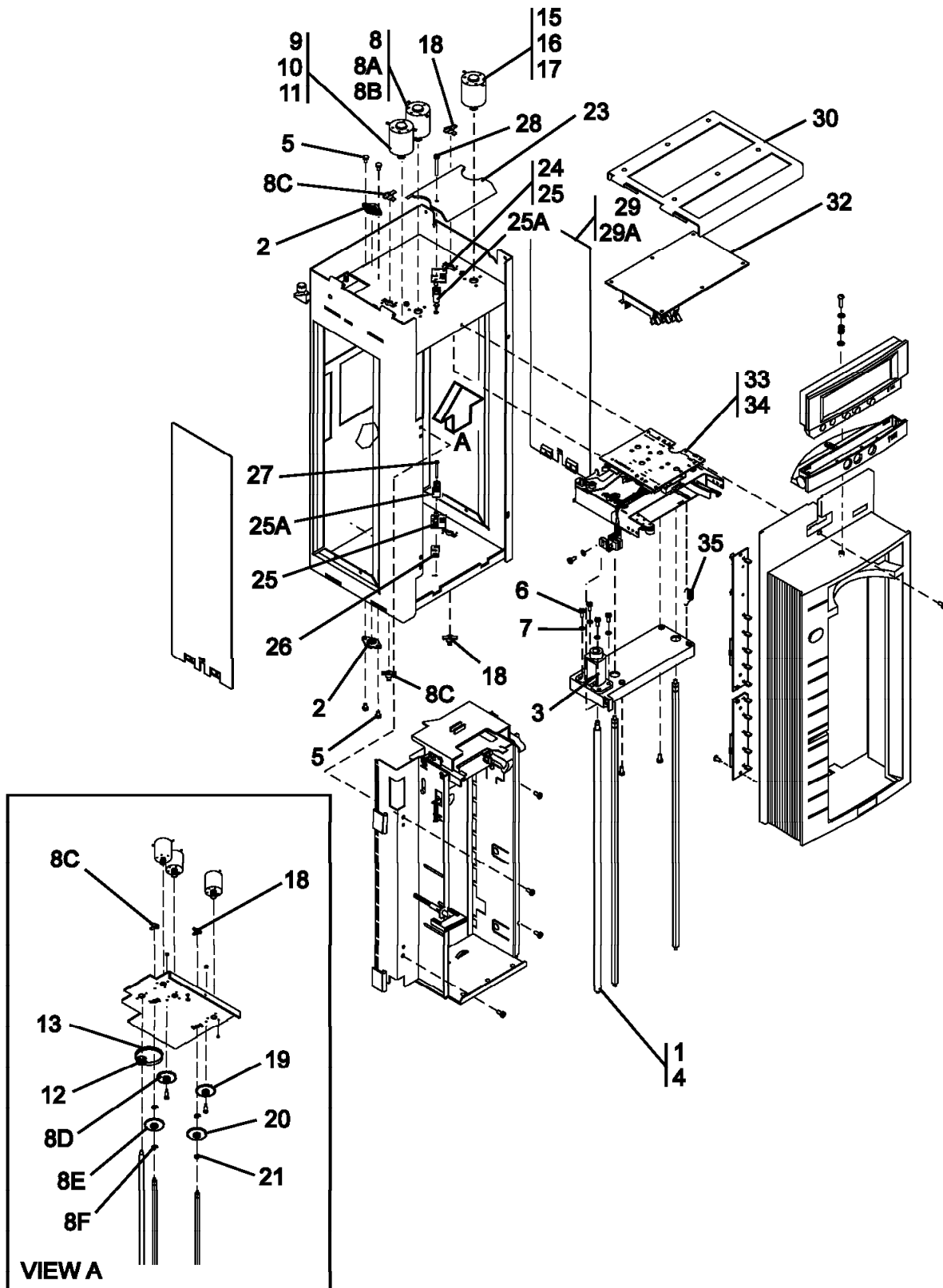
Final Assembly, B1A
Assembly 2
Parts 10

Deck Enclosure, Hardware
Assembly 3
Parts 12



A1486V02

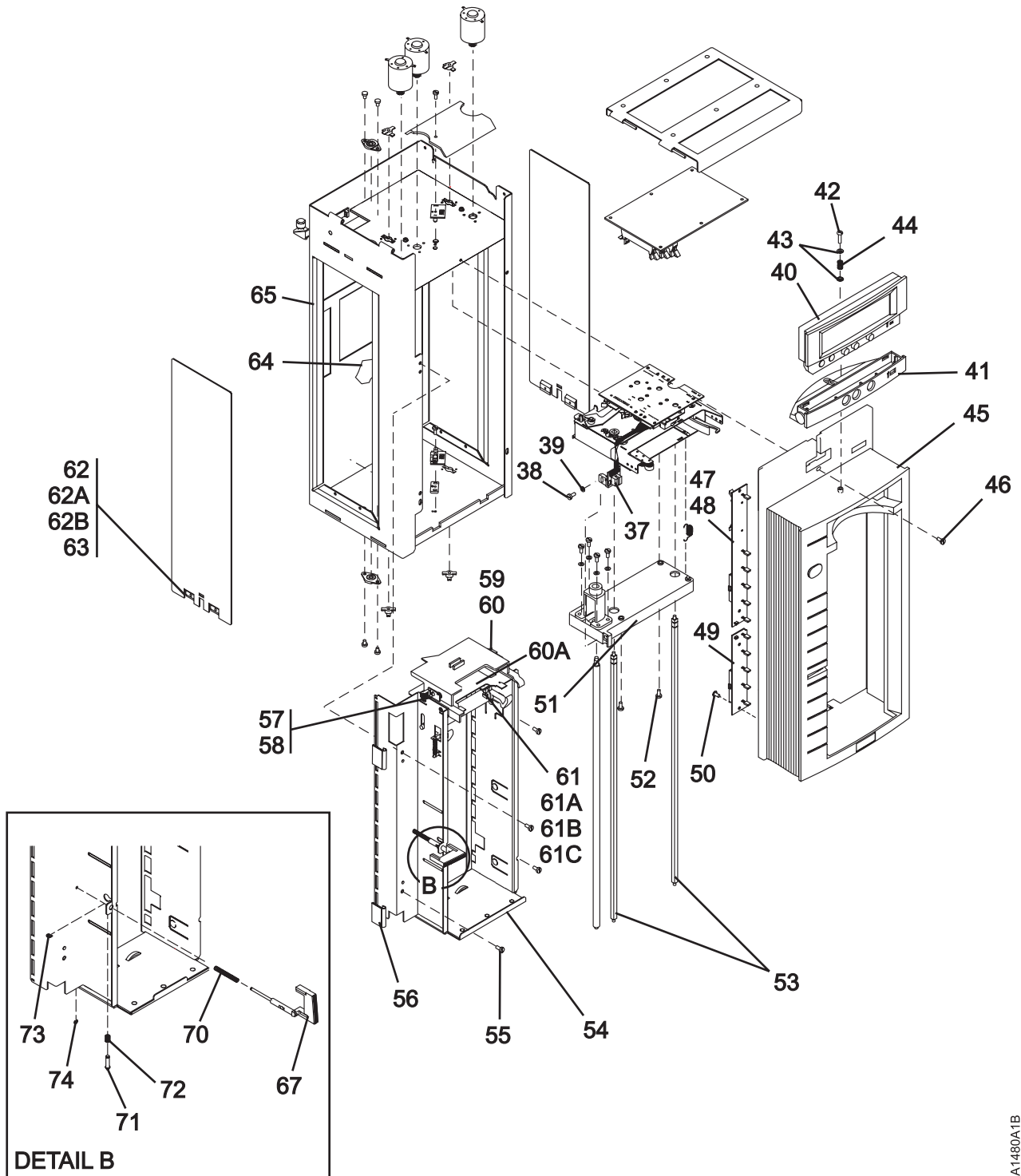
Assembly 1: ACF Final Assembly



A148DA1A

Asm-Index	Part Number	Units	Description
1-		NP	ACF Final Assembly (Sheet 1 of 2)
-1	05H2960	1	<ul style="list-style-type: none"> • Kit, Leadscrew Assembly NOTE: If the ACF has a gear driven leadscrew (below EC C88823), also order "Kit, Elevator Motor, Pulley and Belt Set, P/N 05H2959" to convert to a belt driven leadscrew.
-2	39F3447	NP	<ul style="list-style-type: none"> • • Bearing Assembly
-3	50G0551	NP	<ul style="list-style-type: none"> • • Retainer, Nut
-4	50G0545	NP	<ul style="list-style-type: none"> • • Leadscrew and Nut
-5	1621197	4	<ul style="list-style-type: none"> • Screw, Metric-Slot Pan Hd M4 X 6 mm Long
-6	1621192	4	<ul style="list-style-type: none"> • Screw, Metric-Slot Pan Hd M4 X 12 mm Long
-7	1622304	4	<ul style="list-style-type: none"> • Washer, Metric-Flat 4.3 ID X 9 OD X 0.8 Thick
-8	05H2388	1	<ul style="list-style-type: none"> • Kit, Feed Motor and Gear Set
-8A	39F3433	NP	<ul style="list-style-type: none"> • • Motor, Feed
-8B	39F3449	NP	<ul style="list-style-type: none"> • • Screw
-8C	05H4676	NP	<ul style="list-style-type: none"> • • Bearing
-8D	39F3435	NP	<ul style="list-style-type: none"> • • Gear
-8E	39F3436	NP	<ul style="list-style-type: none"> • • Gear
-8F	1126831	NP	<ul style="list-style-type: none"> • • E-Ring
-9	05H2959	1	<ul style="list-style-type: none"> • Kit, Elevator Motor, Pulley and Belt Set NOTE: If the ACF has a gear driven leadscrew (below EC C88823), also order "Kit, Leadscrew Assembly, P/N 05H2960" to convert to a belt driven leadscrew.
-10	50G0547	NP	<ul style="list-style-type: none"> • • Motor, Elevator
-11	39F3449	NP	<ul style="list-style-type: none"> • • Screw
-12	50G0544	NP	<ul style="list-style-type: none"> • • Pulley
-13	50G0546	NP	<ul style="list-style-type: none"> • • Belt
-15	05H2388	1	<ul style="list-style-type: none"> • Kit, Pinch Motor and Gear Set
-16	39F3433	NP	<ul style="list-style-type: none"> • • Motor, Pinch
-17	39F3449	NP	<ul style="list-style-type: none"> • • Screw
-18	05H4676	NP	<ul style="list-style-type: none"> • • Bearing
-19	39F3435	NP	<ul style="list-style-type: none"> • • Gear
-20	39F3436	NP	<ul style="list-style-type: none"> • • Gear
-21	1126831	NP	<ul style="list-style-type: none"> • • E-Ring
-23	62G2630	NP	<ul style="list-style-type: none"> • Cover, Cable
-24	05H9041	1	<ul style="list-style-type: none"> • Kit, Global and Interference Sensor
-25	05H9038	NP	<ul style="list-style-type: none"> • • Sensor, Global Upper and Lower
-25A	05H2692	NP	<ul style="list-style-type: none"> • • Cover, Global Sensor, Upper and Lower
-26	62G2597	NP	<ul style="list-style-type: none"> • Standoff - spacer
-27	1621177	1	<ul style="list-style-type: none"> • Screw, Metric-Slot Pan Hd M3 X 25 mm Long
-28	1621177	1	<ul style="list-style-type: none"> • Screw, Metric-Slot Pan Hd M3 X 25 mm Long
-29	62G2540	NP	<ul style="list-style-type: none"> • Cover, Right
-29A	1621170	2	<ul style="list-style-type: none"> • Screw, Metric-Slot Pan Hd M3 X 6 mm Long
-30	39F3431	NP	<ul style="list-style-type: none"> • Cover
-32	50G0574	1	<ul style="list-style-type: none"> • Card, ACF Motor Control
-33	05H9839	1	<ul style="list-style-type: none"> • Kit, Transport
-34	50G0552	NP	<ul style="list-style-type: none"> • • Cartridge Transport Assembly
-35	50G0566	NP	<ul style="list-style-type: none"> • • Spring

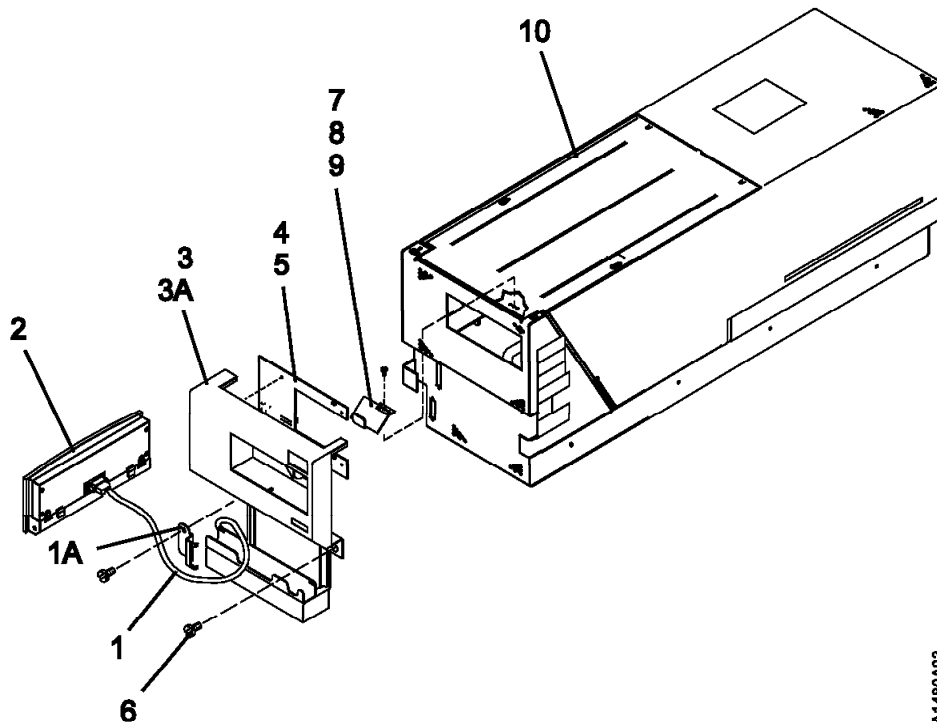
Assembly 1: (continued)



A1480A1B

Asm-Index	Part Number	Units	Description
1-		NP	ACF Final Assembly (Sheet 2 of 2)
-37	50G0542	1	• Vertical Position Sensor Assembly
-38	1621192	1	• Screw, Metric-Slot Pan Hd M4 X 12 mm Long
-39	1622304	1	• Washer, Metric-Flat 4.3 ID X 9 OD X 0.8 Thick
-40	39F3450	1	• Display Assembly, Operator/CE Panel
-41	62G2542	1	• Base Assembly
-42	05H4465	NR	• Screw, Metric-Slot Pan Hd M4 X 16 mm Long
-43	05H4459	NR	• Washer, Spring
-44	05H4460	NR	• Spring, Compression
-45	39F3456	NR	• Bezel Assembly
-46	1621194	1	• Screw, Metric-Slot Pan Hd M4 X 20 mm Long
-47	05H2452	1	• Kit, LED Cards
-48	05H4441	NP	• • Card, Bld2
-49	05H9921	NP	• • Card, Bld3
-50	05H4447	4	• Screw, M4 X 8 mm Long
-51	39F3445	NP	• Plate, Elevator
-52	1621190	2	• Screw, Metric-Slot Pan Hd M4 X 8 mm Long
-53	39F3438	NP	• Shaft
-54	39F3444	NP	• Magazine Support Assembly
-55	1621197	NP	• Screw, Metric-Slot Pan Hd M4 X 6 mm Long
-56	05H8970	NP	• Retainer, Cable
-57	05H2451	1	• Kit, Priority Cell Sensor Pair
-58	05H8925	NP	• • Detector Card, BDT1
-59	62G2620	NP	• • Emitter Card, BEM1
-60	1621844	2	• Screw, Metric-Thd Form Slot Pan Hd M3 X 6 mm Long
-60A	39F4761	1	• Priority Slot Base Assembly
-61	62G2609	NP	• Sensor Assembly, Magazine Present
-61A	62G2611	NP	• • Bracket
-61B	45G0277	1	• • Sensor
-61C	1621172	NP	• • Screw, Metric-Slot Pan Hd M3 X 10 mm Long
-62	08L5760	1	• Kit, Cover and Cable Assembly
-62A	06J0056	NP	• • Cable asm., ACF Transport (new style)
-62B	06J0057	NP	• • Cover, Left
-63	1621170	2	• Screw, Metric-Slot Pan Hd M3 X 6 mm Long
-64	62G2615	NP	• Seal
-65	39F3430	NP	• Frame
-67	50G0548	NR	• Button, Magazine Lock
-70	05H4721	NR	• Spring, Shaft Magazine Lock
-71	05H4445	NR	• Pin, Detent
-72	05H4450	NR	• Spring, Detent Magazine Lock
-73	1126829	NR	• Ring, Retaining M4
-74	1126828	NR	• Ring, Retaining M3

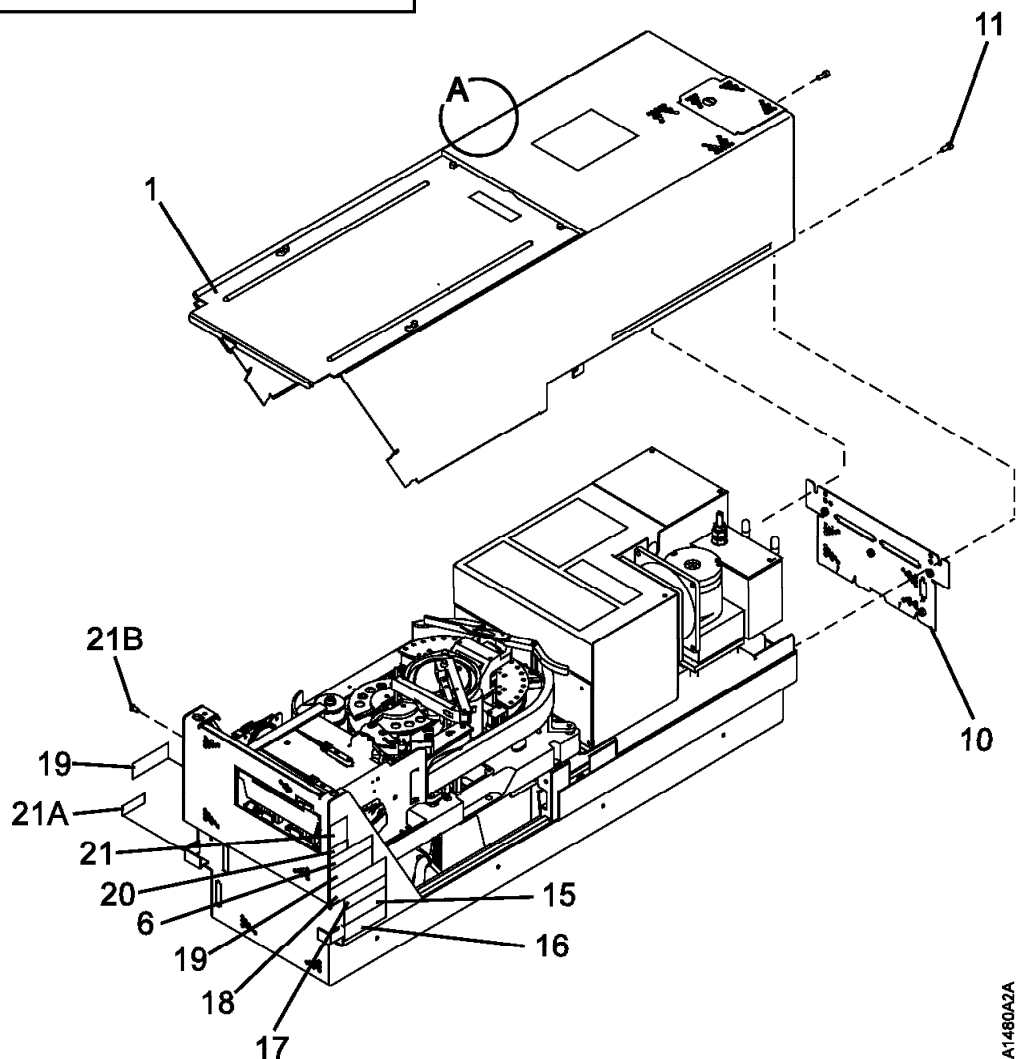
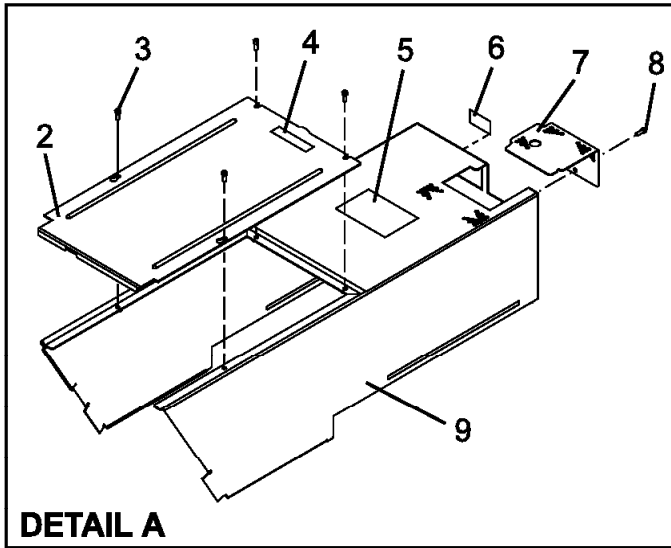
Assembly 2: B1A, E1A Final Assembly



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Asm- Index	Part Number	Units	Description
2-		NP	B1A, E1A Final Assembly
-1	45G0275	1	• Cable Assembly, Operator Panel
-1A	05H4756	NP	• Bracket, Cable Retention
-2	39F3450	1	• Display Assembly, Operator/CE Panel
-3	05H4255	1	• Cover Weldment Assembly, Front
-3A	05H4254	NP	• • Cover Weldment, Front
-4	05H4678	NP	• • Card Assembly, Gripper Present Sensor
-5	1621019	NP	• • Screw, Metric-Slot Pan Hd M3 X 4 mm Long
-6	1621197	2	• Screw, Metric-Slot Pan Hd M4 X 6 mm Long
-7	05H3143	1	• Bracket Assembly, Fiducial
-7	05H2689	1	• Bracket Assembly, Fiducial (3590 A14 in 3495 Library only)
-8	1621019	1	• Screw, Metric-Slot Pan Hd M3 X 4 mm Long
-9	1622332	1	• Lockwasher, Metric-Int Tooth 3.2 ID X 6 OD
-10		NP	• Deck Enclosure For Detail Breakdown, See "Assembly 3: Deck Enclosure" on page PARTS-12

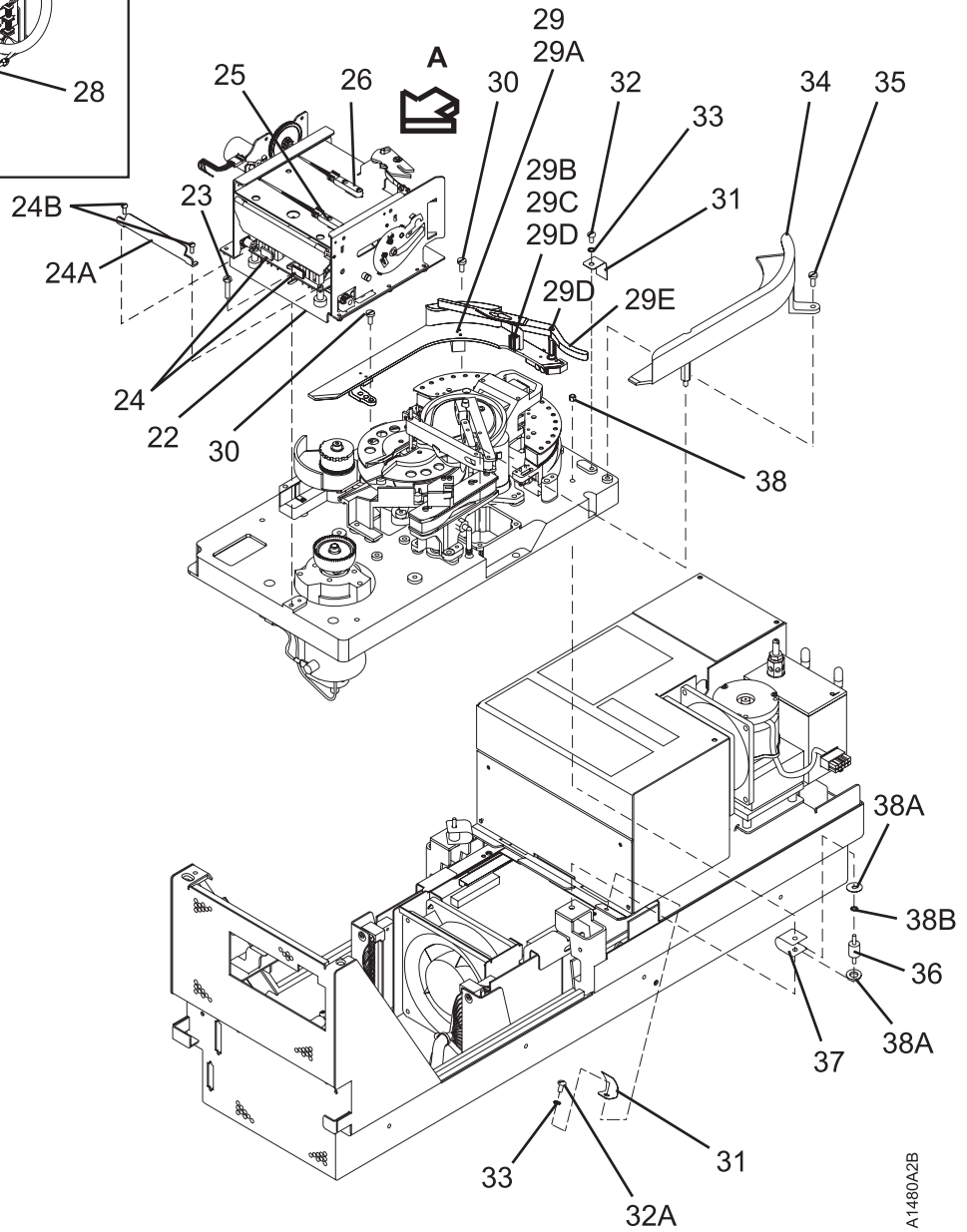
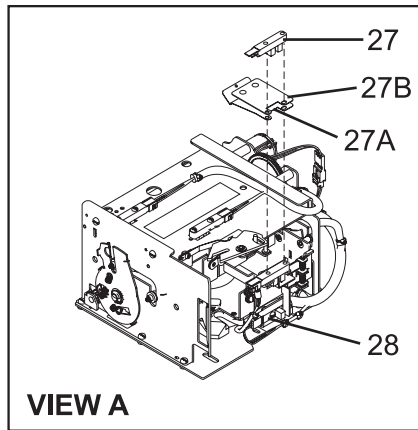
Assembly 3: Deck Enclosure



A1480A2A

Asm- Index	Part Number	Units	Description
3-		NP	Deck Enclosure (Sheet 1 of 5) For Next Higher Assembly, See 2-10 on page PARTS-11.
-1	05H3294	NP	• Cover Assembly
-2	45G0152	NP	• • Cover, Top
-3	1624765	4	• • Screw, Metric-Thd Form Hex Fling Hd M4 X 8 mm Long
-4	05H4716	NP	• • Label
-5	21F7954	NP	• • Label
-6	31F7453	2	• • Label, Serial Plate
-7	05H3281	1	• • Cover, Pneumatic Access
-8	1624765	1	• • Screw, Metric-Thd Form Hex Fling Hd M4 X 8 mm Long
-9	45G0151	NP	• • Cover, Back
-10	05H3183	NP	• Plate, Back
-11	1624765	2	• Screw, Metric-Thd Form Hex Fling Hd M4 X 8 mm Long
-15	62G2485	1	• Label, FCC
-16	05H8892	1	• Label, Canada EMC
-17	31F7473	1	• Label, Manufactured in USA
-18	94F9116	2	• Label, Bar Code
-19	05H2367	1	• Label, Power Rating UL/CSA
-20	05H9925	1	• Label, CE
-21	34G7113	1	• Label, Weight
-21A	05H4710	NP	• Label, Magstar
-21B	1621308	1	• Screw, Metric-Slot Flat Hd M4 X 8 mm Long

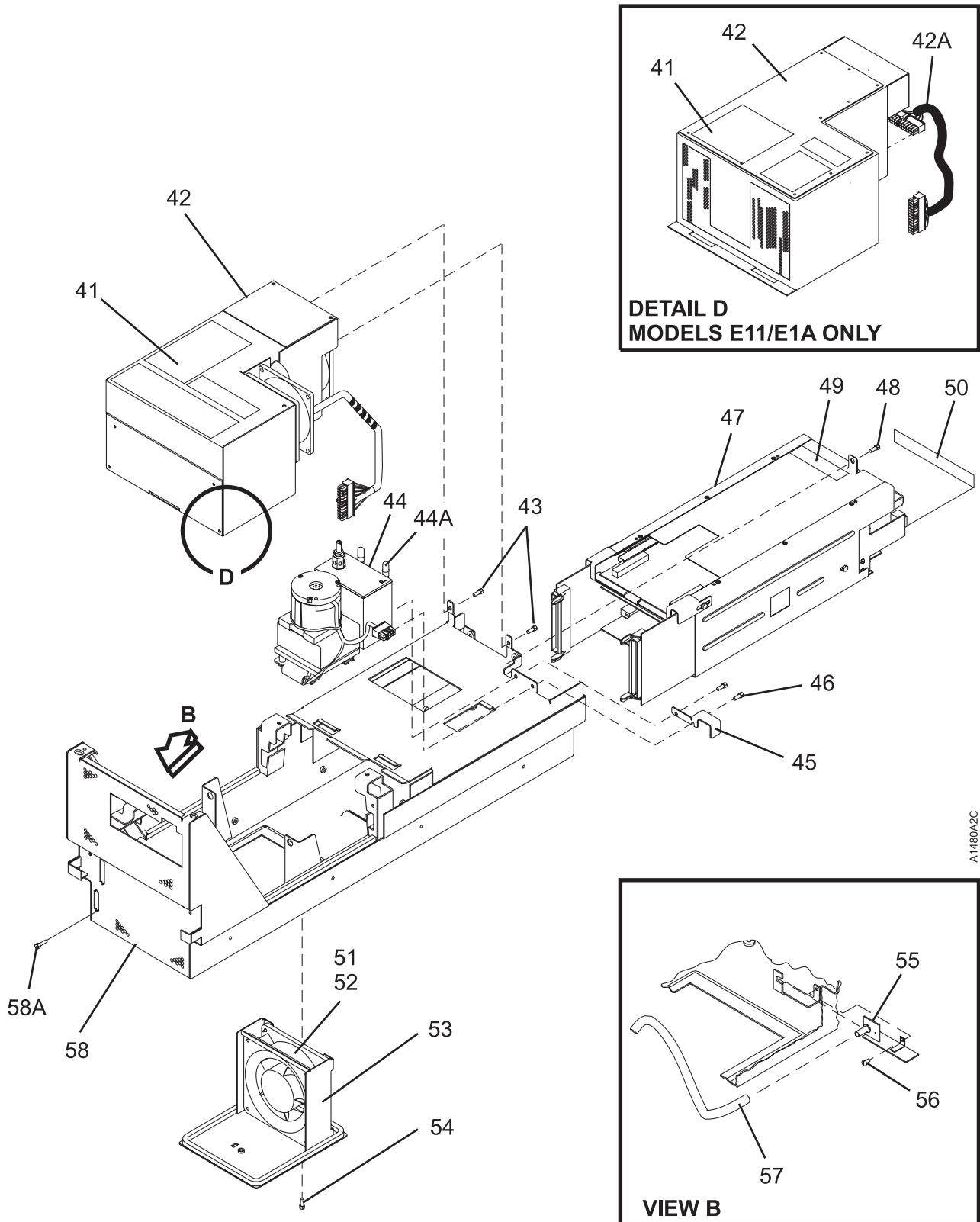
Assembly 3: (continued)



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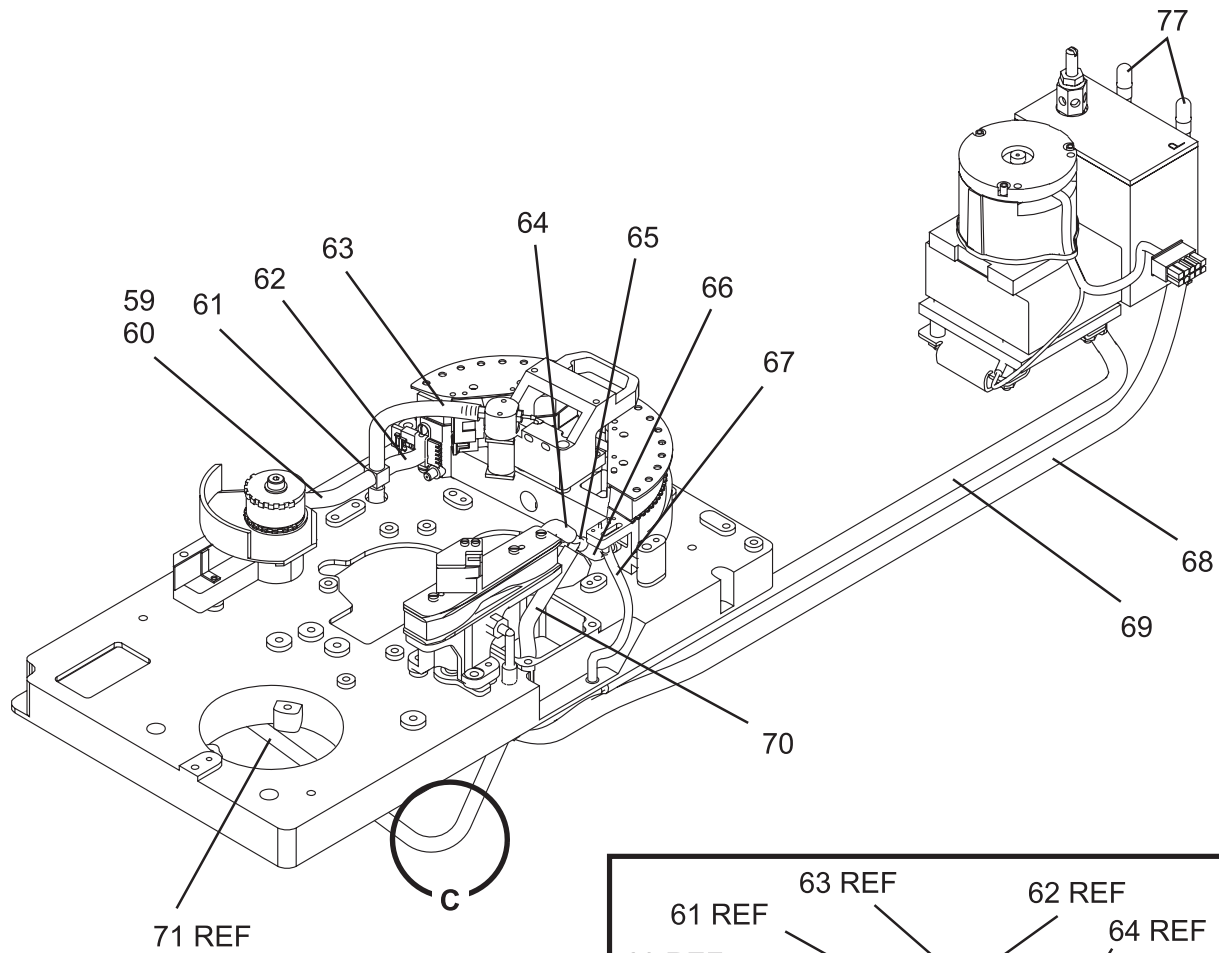
Asm- Index	Part Number	Units	Description
3-		NP	Deck Enclosure (Sheet 2 of 5)
-22	05H4804	1	• Loader Assembly
-23	1621190	3	• Screw, Metric-Slot Pan Hd M4 X 8 mm Long
-24	49G8239	2	• Sensor, Cartridge Type
-24A	05H7137	1	• Guard, Sensor
-24B	1621171	2	• Screw, Metric-Slot Pan Hd M3 X 8 mm Long
-25	45G0277	1	• Sensor, Door Open
-26	45G0277	1	• Sensor, Tray Up
-27	45G0277	1	• Sensor, Cartridge Present
-27A	08L6060	1	• Spring, Latch -- Used on Model B1A, E1A (all)
-27B	08L6061	1	• Spring, Latch, Upper -- Used only on Model B1A/E1A in 3494, along with P/N 08L6060 (27A).
-28	45G0277	1	• Sensor, File Protect
-29	05J9602	1	• Mechanical Assembly, Cleaner Brush
-29A	05J9553	NP	• • Tape Guide, Left
-29B	05H4667	1	• • Kit, Brush Assembly
-29C	05H9931	NP	• • • Brush Assembly, Cleaner (See also page PARTS-20)
-29D	1126828	NP	• • • Retainer, E-Clip
-29E	05J9601	NP	• • Arm, Cleaner Brush
-30	1621191	2	• Screw, Metric-Slot Pan Hd M4 X 10 mm Long
-31	05H9015	NP	• Strap, Ground
-32	1621191	1	• Screw, Metric-Slot Pan Hd M4 X 10 mm Long
-32A	1621308	1	• Screw, Metric-Slot Pan Hd M4 X 12 mm Long
-33	1622346	2	• Lockwasher, Metric-Ext Tooth 4.3 ID X 8 OD
-34	05J9554	NP	• Tape Guide, Right
-35	1621191	1	• Screw, Metric-Slot Pan Hd M4 X 10 mm Long
-36	45G0047	NP	• Shockmount
-37	05H4438	NP	• Strap, Ground High Frequency
-38	257189	NP	• Nut, Hex 8-32 X 0.344 Flat W
-38A	05H9898	NP	• Shim, 0.5 mm Thick
-38A	05H9899	NP	• Shim, 1 mm Thick
-38B	55901	NP	• Washer, Lock-Ext Tooth 0.168 ID X 0.381 OD

Assembly 3: (continued)

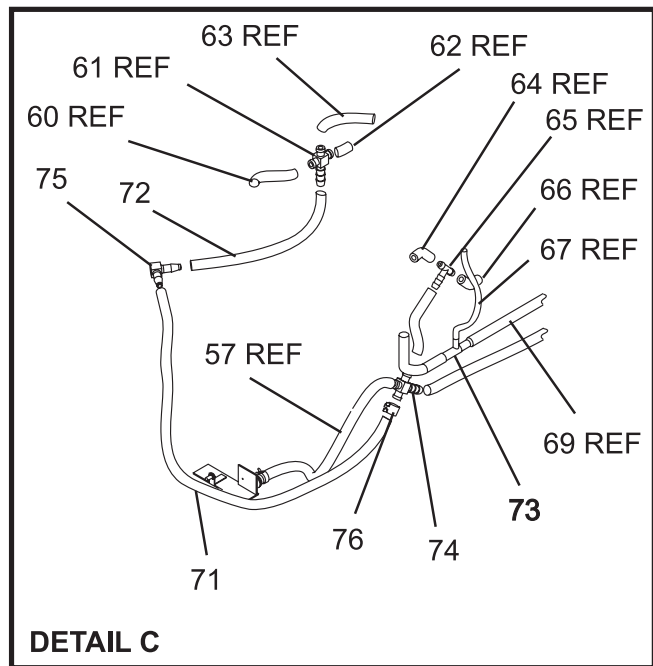


Asm-Index	Part Number	Units	Description
3-		NP	Deck Enclosure (Sheet 3 of 5)
-41	09G5418	NP	• Label, Safety
-42	05H9098	1	• Power Supply -- Used on Models B11/B1A Only, (P/N on label is 20H1167)
-42	05J9721	1	• Power Supply -- Used on Models E11/E1A Only
-42A	08L6082	1	• Cable, Power Supply to Card Pack -- Used on Models E11/E1A Only
-43	1624765	2	• Screw, Metric-Thd Form Hex Flng Hd M4 X 8 mm Long
-44	05H4802	1	• Pneumatic Assembly
-44A	45G0110	2	• Cap, Pressure and Vacuum
-45	05H4469	NP	• Bracket, Power Supply Cable
-46	1624765	2	• Screw, Metric-Thd Form Hex Flng Hd M4 X 8 mm Long -- Card Pack -- Be sure to order the correct Part Number.
-47	05J9895	1	• Card Pack Assembly -- Used on Base 3590, Models B11/B1A
-47	06J0015	1	• Card Pack Assembly -- Used on Magstar Ultra level 3590, Models B11/B1A, with FC 9790/5790
-47	09L4673	1	• Card Pack Assembly -- Used on Magstar 3590, Models E11/E1A (See Figure 323 on page LOC*CAR-58 for SCSI card switch setting.)
-48	1624765	1	• Screw, Metric-Thd Form Hex Flng Hd M4 X 8 mm Long
-49	94F9116	NP	• Label, Bar Code
-50	05H2423	NP	• Label, Caution
-51	45G0288	1	• Assembly, Fan
-52	62G0632	NP	• • Fan
-53	05H9155	NP	• • Bracket, Fan
-54	1621308	3	• Screw, Metric-Slot Flat Hd M4 X 8 mm Long
-55	05H2454	1	• BTDO Card Assembly, Transducer
-56	1621170	1	• Screw, Metric-Slot Pan Hd M3 X 6 mm Long
-57	45G0131	NP	• Hose, Vacuum Switch 4.76 ID X 235 mm Long Part of Pneumatic Hose Kit, Part Number 05H3203
-58	05H2428	NP	• Weldment, Deck Enclosure
-58A	1621161	4	• Screw, Metric-Slot Pan Hd M2.5 X 6 mm Long

Assembly 3: (continued)

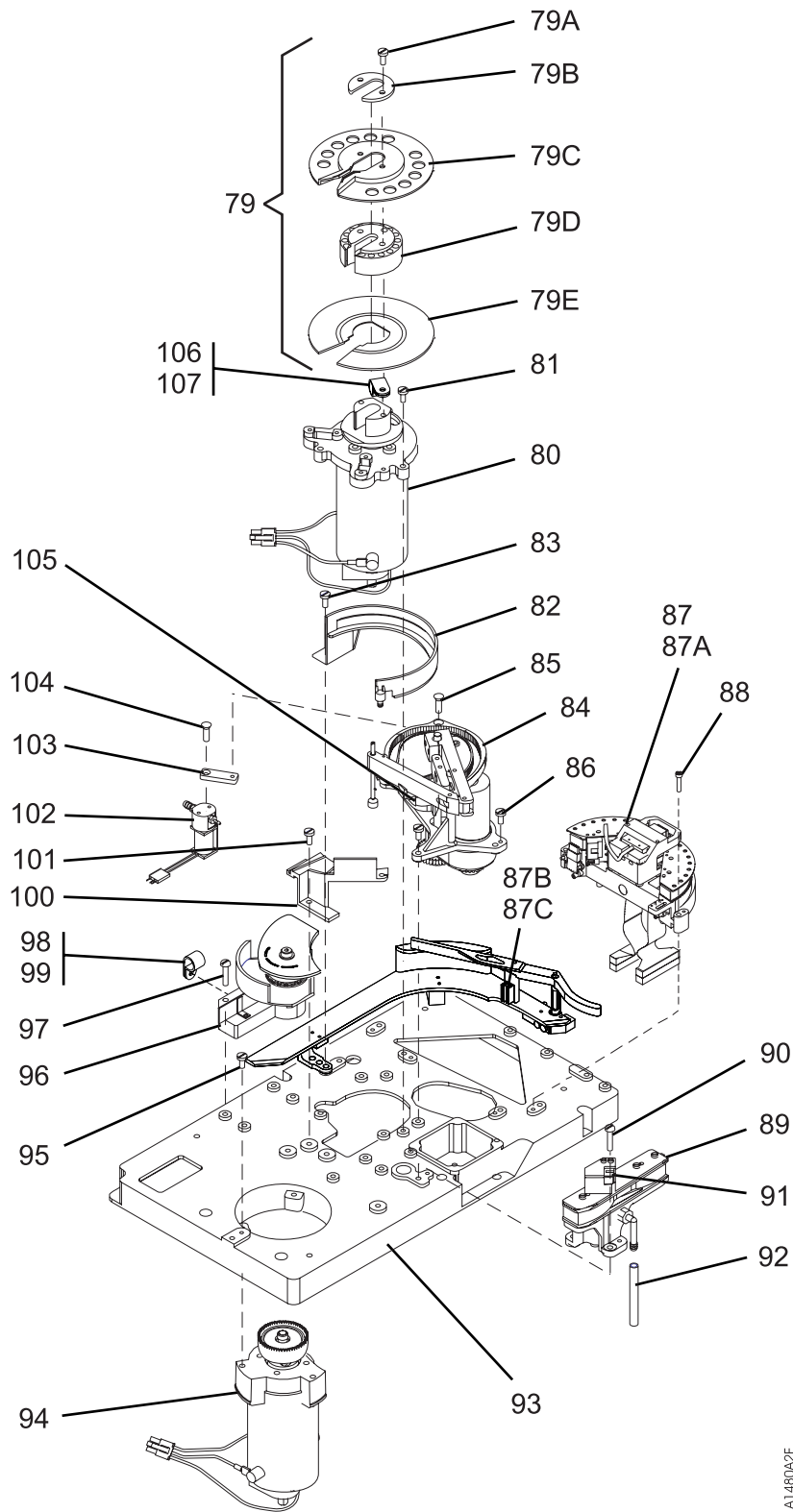


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Asm- Index	Part Number	Units	Description
3-		NP	Deck Enclosure (Sheet 4 of 5)
-59	05H3203	1	• Kit, Pneumatic Hose
-60	45G0129	NP	• • Hose, Transducer 4.76 ID X 100 mm Long
-61	45G0116	NP	• • Tee, Modified Cross
-62	45G0126	NP	• • Hose, Head Casting 4.76 ID X 25 mm Long
-63	45G0128	NP	• • Hose, Puffer 4.76 ID X 62 mm Long
-64	45G0127	NP	• • Hose, Decoupler 4.76 ID X 32 mm Long
-65	49G0117	NP	• • Tee
-66	45G0127	NP	• • Hose, Head Casting 4.76 ID X 32 mm Long
-67	45G0124	NP	• • Hose, Cleaner Blade 3.18 ID X 75 mm Long Used for HGAs w/cleaner blade. Not used if HGA has no cleaner blade.
-68	62G2557	NP	• • Hose, Pressure 6.35 ID X 610 mm Long
-69	45G0134	NP	• • Hose, Vacuum 6.35 ID X 580 mm Long
-70	45G0130	NP	• • Hose, Cross Tee 4.76 ID X 115 mm Long
-71	05H3202	NP	• • Hose, Vacuum Switch 4.76 ID X 235 mm Long
-72	45G0129	NP	• • Hose, 4.76 ID X 100 mm Long
-73	4479762	NP	• • Tee, Vacuum
-73A	09L4687	NP	• • Connector, In-line, Vacuum
-74	45G0116	NP	• • Tee, Modified Cross
-75	05H2263	NP	• • Elbow
-76	6857796	NP	• • Clamp, Hose
-77	45G0110	2	• • Cap, Pressure and Vacuum

Assembly 3: (continued)



A1480A2E

Asm-Index	Part Number	Units	Description
3-		NP	Deck Enclosure (Sheet 5 of 5)
-79	09L4590	1	• Kit, Machine Reel Motor Hub Assembly
-79A	1621192	NP	• • Screw, Metric-Slot Pan Hd M4 X 12 mm Long
-79B	08L5748	NP	• • Retainer
-79C	08L5932	NP	• • Flange, Upper
-79D	08L5747	NP	• • Hub
-79E	08L5931	NP	• • Flange, Lower
-80	45G0009	1	• Machine Reel Motor Assembly
-81	1621194	3	• Screw, Metric-Slot Pan Hd M4 X 20 mm Long
-82	65F3709	1	• Guide, Machine Reel
-83	1621191	1	• Screw, Metric-Slot Pan Hd M4 X 10 mm Long
-84	05J9577	1	• Pantocam Assembly
-85	512508	1	• Screw, Mach-Flat Hd 6-32 X 0.500 Long
-86	1621191	3	• Screw, Metric-Slot Pan Hd M4 X 10 mm Long
--- Head Guide Kit, Models B11/B1A Only ---			
-87	08L6007	1	• Kit, Head, Guide and Brush Assembly (w/o cleaner blade)
-87A	45G0005	NP	• • Head Guide Assembly
-87B	05H4667	1	• • Kit, Brush Assembly, (See also page PARTS-14)
-87C	05H9931	NP	• • • Brush Assembly, Cleaner
-87D	1126828	NP	• • • Retainer, E-Clip
-87E	05H4778	NP	• • Head Protector, (Orange)
-87F	09L4687	NP	• • Connector, In-line, Vacuum
--- Head Guide Kit, Models E11/E1A Only ---			
-87	09L4912	1	• Kit, Head, Guide and Brush Assembly (w/o cleaner blade)
-87A	09L4791	NP	• • Head Guide Assembly
-87B	05H4667	1	• • Kit, Brush Assembly, (See also page PARTS-14)
-87C	05H9931	NP	• • • Brush Assembly, Cleaner
-87D	1126828	NP	• • • Retainer, E-Clip
-87E	05H4778	NP	• • Head Protector, (Orange)
-88	1621490	3	• Screw, Metric-Spln Cap Hd M4 X 25 mm Long
-89	45G0094	1	• Decoupler Assembly
-90	1621191	3	• Screw, Metric-Slot Pan Hd M4 X 10 mm Long
-91	4780523	1	• Sensor A, Tape Path
-92	45G0130	NP	• Hose Decoupler, 4.76 ID X 115 mm Long Part of Pneumatic Hose Kit, Part Number 45G0286
-93	45G0007	NP	• Deck Press Assembly
-94	45G0010	1	• File Reel Motor Assembly, 512 Line Tach
-95	1621200	3	• Screw, Metric-Slot Pan Hd M4 X 35 mm Long
-96	05J9807	1	• Transducer Assembly
-97	1621194	3	• Screw, Metric-Slot Pan Hd M4 X 20 mm Long
-98	356742	3	• Clamp, Cable 1/4 in.
-99	1621190	3	• Screw, Metric-Slot Pan Hd M4 X 8 mm Long
-100	4780540	1	• Tape Guide, Center
-101	1621191	1	• Screw, Metric-Slot Pan Hd M4 X 10 mm Long
-102	05H2406	1	• Solenoid Assembly
-103	45G0258	NP	• Bracket
-104	316807	1	• Screw, Mach-Flat Hd 6-32 X 0.375 Long
-105	4780523	1	• Sensor B, Tape Path
-106	2102365	1	• Clamp, Cable 3/8 in.
-107	1621190	1	• Screw, Metric-Slot Pan Hd M4 X 8 mm Long

Assembly 4: Cable List

Asm- Index	Part Number	Units	Description
4-		NP	Cable List
-	05H3226	AR	• Cable Assembly, ACF and Operator/CE Panel/IPS Sensor
-	05H3227	AR	• Cable Assembly, Motor/Loader/Sensors
-	05H4647	AR	• Cable Assembly, 2.8 M SCSI
-	05H8911	AR	• Cable Assembly, AC Power (Drive to PCC)
-	05J9535	AR	• Cable Assembly, ACF Drive For illustration, see "FID A2: Drive/ACF Cable" on page LOC*CAR-42.
-	06J0056	AR	• Cable Assembly, ACF Transport (new style) For illustration, see "FID 99: Transport Cable (New Style)" on page LOC*CAR-32.
-	08L6082	AR	• Cable Assembly, Power Supply to Card Pack Used on Models E11/E1A Only
-	45G0273	AR	• Cable Assembly, Motors (Power)
-	45G0275	AR	• Cable Assembly, Operator Panel Used on Model B1A, E1A
-	46F4593	AR	• Cable Assembly, Line Cord 6 Feet Watertight
-	46F4594	AR	• Cable Assembly, Line Cord 14 Feet Watertight
-	46F6063	AR	• Cable Assembly, WTC Hardware
-	62G0681	AR	• Cable Assembly, ACF Operator Panel to Drive Used on Model B11, E11; For illustration, see "FID 91: Operator/CE Panel Cable (Model B11/E11 Only)" on page LOC*CAR-12.
-	62G1012	AR	• Cable Assembly, ACF LED For illustration, see "FID A4: LED Cable" on page LOC*CAR-43.
-	62G1013	AR	• Cable Assembly, ACF Sensor For illustration, see "FID A5: Sensor Cable" on page LOC*CAR-44.
-	62G1024	AR	• Cable Assembly, ACF Motors For illustration, see "FID A1: Motor Cable Assembly" on page LOC*CAR-41.
			Note: For SCSI cable information, see "SCSI Attachment" on page INST-41.

Assembly 5: Install Parts and Tools

Asm- Index	Part Number	Units	Description
5-		NP	Part Listing
-	05H2340	AR	• Slide, left. See page INST-12.
-	05H2340	AR	• Slide, left. See page INST-12.
-	05H2340	AR	• Slide, left. See page INST-16.
-	05H2340	AR	• Slide, left. See page INST-16.
-	05H2341	AR	• Slide, right. See page INST-12.
-	05H2341	AR	• Slide, right. See page INST-16.
-	05H2341	AR	• Slide, right. See page INST-16.
-	05H2342	AR	• Cover, 2-drive. See page INST-54.
-	05H2343	AR	• Cover, blank-out. See page INST-54.
-	05H2346	AR	• Panel, rear internal. See page INST-53.
-	05H2347	AR	• Mount, rack. See page INST-13.
-	05H2347	AR	• Mount, rack. See page INST-13.
-	05H2347	AR	• Mount, rack. See page INST-16.
-	05H2347	AR	• Mount, rack. See page INST-16.
-	05H3143	AR	• Bracket, fiducial. See page INST-27.
-	05H2629	AR	• Clamp, cable. See page INST-55.
-	05H2629	AR	• Clamp, cable. See page INST-55.
-	05H2629	AR	• Clamp, cable. See page INST-55.
-	05H2629	AR	• Clamp, cable. See page INST-57.
-	05H2630	AR	• Bracket. See page INST-57.
-	05H3388	AR	• ACF Transport Position adjustment tool See page INST-4.
-	05H3834	AR	• Interposer, AS400 with FC 9410. See page INST-3.
-	05H3834	AR	• Interposer, AS400 with FC 9410. See page INST-59.
-	05H3895	AR	• Wrap interposer tool, Library attachment. See page INST-4.
-	05H4255	AR	• Cover, front. See page INST-27.
-	05H4256	AR	• Slide. See page INST-26.
-	05H4434	AR	• Scratch Cartridge. See page INST-4.
-	05H4435	AR	• Cleaner Cartridge. See page INST-4.
-	05H4644	AR	• Cable, SCSI device to device. See page INST-43.
-	05H4645	AR	• Cable, device to device. See page INST-43.
-	05H4646	AR	• Cable, device to device. See page INST-43.
-	05H4647	AR	• Cable, device to host. See page INST-43.
-	05H4648	AR	• Cable, device to host. See page INST-43.
-	05H4649	AR	• Cable, device to host. See page INST-43.
-	05H4650	AR	• Cable, device to host. See page INST-43.
-	05H4651	AR	• Cable, device to host. See page INST-43.
-	05H4671	AR	• Gap set tool. See page INST-4.
-	05H4724	AR	• ACF motor alignment tool. See page INST-4.
-	05H4756	AR	• Bracket, cable retaining. See page INST-27.
-	05H4782	AR	• Screw. See page INST-5.
-	05H4782	AR	• Screw. See page INST-42.
-	05H4782	AR	• Screw. See page INST-51.
-	05H4793	AR	• Terminator, SCSI. See page INST-4.
-	05H4793	AR	• Terminator, SCSI. See page INST-42.
-	05H4793	AR	• Terminator, SCSI. See page INST-42.
-	05H4793	AR	• Terminator, SCSI. See page INST-51.
-	05H7539	AR	• Scratch Cartridge. See page INST-4.
-	05H8904	AR	• Label, address. See page INST-20.
-	05H8922	AR	• Plate, shipping. See page INST-24.
-	05H8953	AR	• Cable, RS-422. See page INST-45.
-	05H8953	AR	• Cable, RS-422. See page INST-50.
-	05H8981	AR	• Cable, RS-422. See page INST-45.
-	05H8981	AR	• Cable, RS-422. See page INST-50.

Assembly 5: (continued)

–	05H8983	AR	• Screw. See page INST-4.
–	05H8983	AR	• Screw. See page INST-42.
–	05H8983	AR	• Screw. See page INST-51.
–	05H8983	AR	• Screw. See page INST-51.
–	05H8983	AR	• Screw. See page INST-57.
–	05H9163	AR	• Wrap block, SCSI. See page INST-4.
–	05H9822	AR	• Plate, shipping. See page INST-53.
–	05H9895	AR	• Adapter, vacuum gauge. See page INST-4.
–	1621197	AR	• Screw. See page INST-26.
–	1621197	AR	• Screw. See page INST-26.
–	1621197	AR	• Screw. See page INST-27.
–	1621308	AR	• Screw. See page INST-14.
–	1621308	AR	• Screw. See page INST-16.
–	1621537	AR	• Screw. See page INST-15.
–	1621537	AR	• Screw. See page INST-16.
–	1622332	AR	• Lockwasher. See page INST-27.
–	1622404	AR	• Nut. See page INST-52.
–	1624765	AR	• Screw. See page INST-55.
–	1624765	AR	• Screw. See page INST-55.
–	1624775	AR	• Screw. See page INST-55.
–	1624778	AR	• Screw. See page INST-12.
–	1624778	AR	• Screw. See page INST-13.
–	1624778	AR	• Screw. See page INST-15.
–	1624778	AR	• Screw. See page INST-16.
–	1624778	AR	• Screw. See page INST-16.
–	1624778	AR	• Screw. See page INST-16.
–	1624778	AR	• Screw. See page INST-16.
–	1624778	AR	• Screw. See page INST-18.
–	1624778	AR	• Screw. See page INST-53.
–	1624778	AR	• Screw. See page INST-53.
–	1624778	AR	• Screw. See page INST-55.
–	1624778	AR	• Screw. See page INST-55.
–	1624780	AR	• Screw. See page INST-55.
–	1624780	AR	• Screw. See page INST-55.
–	1624780	AR	• Screw. See page INST-55.
–	39F3450	AR	• Panel. See page INST-27.
–	39F3884	AR	• Wrap block, RS-422. See page INST-4.
–	44F0904	AR	• Label, serial number. See page INST-20.
–	44F0904	AR	• Label, serial number. See page INST-27.
–	45G0178	AR	• Bracket, cable. See page INST-55.
–	45G0179	AR	• Guide, cable. See page INST-52.
–	45G0181	AR	• Bracket. See page INST-55.
–	45G0188	AR	• Cable pivot arm, cable guide. See page INST-15.
–	45G0188	AR	• Guide, cable. See page INST-16.
–	45G0193	AR	• Bracket, cable. See page INST-55.
–	45G0236	AR	• Shelf, drive. See page INST-14.
–	45G0236	AR	• Shelf, drive. See page INST-16.
–	45G0275	AR	• Cable, display. See page INST-27.
–	50G0460	AR	• Interposer, RS/6000 with FC 9702. See page INST-3.
–	50G0460	AR	• Interposer, RS-6000, FC 9702. See page INST-59.
–	61G8323	AR	• Interposer, RS/6000 with FC 9701. See page INST-3.
–	61G8323	AR	• Interposer, RS/6000 with FC 9701. See page INST-59.
–	61G8324	AR	• Terminator, SCSI. See page INST-4.
–	61G8324	AR	• Terminator, SCSI. See page INST-42.
–	61G8324	AR	• Terminator, SCSI. See page INST-51.
–	62G1324	AR	• Wrap block, SCSI. See page INST-4.
–	6850663	AR	• Tape removal tool. See page INST-4.
–	74F1823	AR	• Nut clip. See page INST-13.
–	74F1823	AR	• Nut clip. See page INST-16.
–	74F1823	AR	• Nut clip. See page INST-16.
–	74F1823	AR	• Nut clip. See page INST-52.

-	74F1823	AR	• Nut clip. See page INST-53.
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TAPEUTIL in a Sun (Solaris) System Environment

A SCSI Tape and Medium Changer Utility Program called *tapeutil* is provided with the IBM SCSI Tape and Medium Changer Device Driver for Solaris and installed in the */opt/IBMtape* directory as part of the IBMtape package. This program fulfills several purposes:

- It provides the following service aids for IBM tape subsystems:
 - Query Device Type/Verify Device Attachment
 - Query Device Serial Number
 - Query Device Microcode Level
 - Force Device Diagnostic Dump
 - Store Device Diagnostic Dump
 - Download Device Microcode
- It provides a menu-driven test tool for exercising or testing IBM tape and medium changer devices with a full suite of supported operations:
 - Reading/Writing Data
 - Tape Motion Commands
 - Setting/Displaying Device Information/Status
 - Mounting/Demounting Cartridges
 - Cartridge Inventory
- In addition to the menu-driven front end, the *tapeutil* program provides a command-line interface that is convenient for use in shell scripts.

Note: When using the command-line calls to the *tapeutil* program, the tape device is opened and closed for each invocation. Configuration parameters that are changed in one call to the *tapeutil* program are returned to default values when the device is closed.
- The source code for the *tapeutil* program is provided for example purposes, and is installed in the */opt/IBMtape* directory during the IBMtape package installation. This source code is commented and demonstrates calls to all of the supported device driver entry points and *ioctl* commands, thus giving the application developer a starting point for interfacing to the IBMtape device driver.

The *tapeutil* program provides both an interactive menu-driven interface as well as a command-line interface. If the *tapeutil* program is invoked with no command-line parameters, the menu-driven version will be started. In the menu-driven version, the device to be operated on should first be opened using option 1. Other options may then be selected.

The user will be prompted for additional information if required for the specific options selected. The results of a command are displayed after it is executed. If an error occurs for the command, error information and device sense data are displayed. The device can be closed using option 2, or it will automatically be closed when the Quit option is selected. The menu is automatically displayed once when the program is first invoked. To prevent unnecessary scrolling of the screen, the menu is not automatically displayed again after each command, but is instead refreshed only after the M (menu refresh) command is entered.

Figure 359 on page APPENDA-3 shows the menu that is displayed by the *tapeutil* program.

IBM SCSI TAPE & MEDIUM CHANGER UTILITY PROGRAM	
GENERAL COMMANDS 1: Open Device 2: Close Device D: Device Type M: Menu Refresh Q: Quit Program	BASIC SCSI COMMANDS 9: Test Unit Ready 10: Inquiry 11: Request Sense 12: Reserve 13: Release
SERVICE COMMANDS 3: Query Serial Number 4: Query Microcode Level 5: Force Dump 6: Store Dump 7: Download Microcode 8: Format Cartridge	MEDIUM CHANGER COMMANDS 14: Move Medium 15: Position To Element 16: Element Information 17: Inventory 18: Audit 19: Lock/Unlock Door
TAPE DRIVE COMMANDS	
20: Read Data 21: Write Data 22: Write File Mark 23: Erase Tape 24: Rewind 25: Retension 26: Offline 27: Load/Unload Tape 28: Forward Space File 29: Backward Space File 30: Forward Space Record 31: Backward Space Record	32: Locate End Of Data 33: Get Record Size 34: Set Record Size 35: Get Device Status 36: Get Device Info 37: Get Media Info 38: Get Position 39: Set Position 40: Get Parameter 41: Set Parameter 42: Sync Buffer 43: Display Message

Figure 359. TAPEUTIL Program Menu

If command-line parameters are provided when the program is invoked, the command-line mode will be started. For each command-line execution of the program, the device is first opened, the specific command is issued, and the device is then closed. The program can be driven from within a shell script if desired. Results of the operation will be displayed only when executed in verbose mode. No information is displayed when not in verbose mode. This is particularly useful for quiet shell script implementations. A completion code, as defined in `/usr/include/sys/errno.h` for the operation requested is always returned from the program upon exit (in both verbose and quiet mode).

Note: Options 4 through 8 of the `tapeutil` program supported **only** by the IBM 3570 Magstar MP Tape Subsystem and the IBM 3590 High Performance Tape Subsystem.

The usage of the `tapeutil` program in command-line mode is as follows:

```
tapeutil -f device -o operation [options]
```

where **device** is the name of the tape device special file (for example: `/dev/rmt/1st`) and **operation** is one of the values listed below. The device special file and the operation are required. The specific **options** associated with a particular operation are indicated in Figure 360, Figure 361 on page APPENDA-4, Figure 362 on page APPENDA-4 and Figure 363 on page APPENDA-5. Parameters enclosed in square brackets are optional. All others are required.

<i>Figure 360. Service Commands and Syntax</i>	
Service Commands	Syntax
Query Serial Number	tapeutil -f f.-o qsn [-w w][-v]
Query Microcode Level	tapeutil -f f.-o qmc [-w w][-v]
Force Dump	tapeutil -f f.-o fdp [-w w][-v]
Store Dump	tapeutil -f f.-o sdp [-w w][-v] -z z
Download Microcode	tapeutil -f f.-o dmc [-w w][-v] -z z
Format Cartridge	tapeutil -f f.-o fmt [-w w][-v]
Query Device Type	tapeutil -f f.-o chk [-w w][-v]

<i>Figure 361. Basic SCSI Commands and Syntax</i>	
Basic SCSI Commands	Syntax
Test unit Ready	tapeutil -f f.-o tur [-w w][-v]
Inquiry	tapeutil -f f.-o inq [-w w][-v]
Request Sense	tapeutil -f f.-o req [-w w][-v]
Reserved	tapeutil -f f.-o res [-w w][-v]
Reserved	tapeutil -f f.-o rel [-w w][-v]

<i>Figure 362. Medium Changer Commands and Syntax</i>	
Medium Changer Commands	Syntax
Move Medium	tapeutil -f f.-o mov [-w w][-v] -s s -d d
Position To Element	tapeutil -f f.-o pos [-w w][-v] -s s
Element Information	tapeutil -f f.-o ele [-w w][-v]
Inventory	tapeutil -f f.-o inv [-w w][-v]
Audit	tapeutil -f f.-o aud [-w w][-v]
Lock/Unlock Door	tapeutil -f f.-o lck [-w w][-v] -x x

Figure 363. Tape Drive Commands and Syntax

Tape Drive Commands	Syntax
Read	tapeutil -f f.-o rea [-w w][-v] -b b -n n -m m
Write	tapeutil -f f.-o wri [-w w][-v] -b b -n n -m m [-r r] [-z z]
Write File Mark	tapeutil -f f.-o eof [-w w][-v] -c c
Erase Tape	tapeutil -f f.-o era [-w w][-v]
Rewind	tapeutil -f f.-o rew [-w w][-v]
Retension	tapeutil -f f.-o ret [-w w][-v]
Offline	tapeutil -f f.-o off [-w w][-v]
Load/Unload Tape	tapeutil -f f.-o lod [-w w][-v] -x x
Forward Space File	tapeutil -f f.-o fsf [-w w][-v] -c c
Backward Space File	tapeutil -f f.-o bsf [-w w][-v] -c c
Forward Space Record	tapeutil -f f.-o fsr [-w w][-v] -c c
Backward Space Record	tapeutil -f f.-o bsr [-w w][-v] -c c
Locate End of Data	tapeutil -f f.-o eod [-w w][-v]
Get Record Size	tapeutil -f f.-o grs [-w w][-v]
Set Record Size	tapeutil -f f.-o srs [-w w][-v]
Get Device Status	tapeutil -f f.-o gds [-w w][-v]
Get Device Information	tapeutil -f f.-o gdi [-w w][-v]
Get Media Information	tapeutil -f f.-o gmi [-w w][-v]
Get Position	tapeutil -f f.-o gpo [-w w][-v] -t t
Set Position	tapeutil -f f.-o spo [-w w][-v] -t t -x x
Get Parameter	tapeutil -f f.-o gpa [-w w][-v] -t t
Set Parameter	tapeutil -f f.-o spa [-w w][-v] -t t -x x
Sync Buffer	tapeutil -f f.-o syn [-w w][-v]
Display Message	tapeutil -f f.-o msg [-w w][-v] -t t -y y1,y1

Note: Invoking the *tapeutil* program with the **-h** flag (for example, **tapeutil -h**) or the **-?** flag (for example, **tapeutil -?**) will display the usage help information.

The supported flags, their meanings, their associated operations, and their acceptable ranges are as follows:

Flag Description

- ? Usage Help (stand-alone flag) {no value required}
- b Block Size (rea, wri) {0 < (block size x blocking factor) <2097152}
- c Operation Count (eof, fsf, fsr, bsf, bsr) {0 - 65535}
- d Destination Address (mov) {device specific, determine range from Element Info}
- f Device Special File Name (always required) {/dev/rmt/1st or similar}
- h Usage Help (stand-alone flag) {no value required}
- m Multiples to Read or Write (rea, wri) {0 - 2097152}
- n Blocking Factor (rea, wri) {0 > (block size x blocking factor) <2097152}
- o Operation (always required) {refer to previous list}
- r Random Seed (wri) {0 - 65535}
- s Source Address (mov, pos) {device specific, determine range from Element Info}
- t Type of Parameter Value
 - (gpo) {1=logical block, 2=physical block}
 - (spo) {1=logical block, 2=physical block}
 - (gpa) {1=block size, 2=compression, 3=buffering, 4=immediate, 5=trailer, 6=write protect, 7=acf mode, 8=capacity, 9=sili}
 - (spa) {1=block size, 2=compression, 3=buffering, 4=immediate, 5=trailer, 6=write protect, 8=capacity, 9=sili}
 - (msg) {1=display msg0, 2=display msg1, 3=flash msg0, 4=flash msg1, 5=alternate msg1/msg2}
- v Verbose Mode (optional for all commands, stand-alone flag) {no value required, absence of flag means quiet mode}
- w Open Mode (optional for all commands) {1=read/write, 2=read only (default), 3=write only, 4=append}
- x Parameter Value
 - (lck) {1=lock, 2=unlock}
 - (lod) {1=load, 2=unload}
 - (srs) {0 - 65536}
 - (spo) {0 - 65535}
 - (spa) {0 - 65535}
- y Messages (msg) {message1,message2}
- z Input/Output File Name
 - (sdp) {path and name of the file in which to store dump}
 - (dmc) {path and name of the microcode image file}
 - (wri) {path and name of the file containing write data pattern}

Notes:

1. For read and write operations, the size of one buffer of data transferred during a single SCSI read or write command is determined by the product of the *Block Size* value and the *B Factor* value. The number of these buffers transferred is determined by *Multiplier* value. The actual total number of bytes transferred is then (Block Size) x (Blocking Factor) x (Multiplier). If the device is set to fixed block mode (block size not equal to zero), the product of *Block Size* and *Blocking Factor* must be a multiple of the device block size setting.

2. For further information on the Get Parameter (gpa) and Set Parameter (spa) operations, refer to the STIOC_GET_PARM and STIOC_SET_PARM ioctl commands described in the *Programming Reference*.

The following examples should help to demonstrate and clarify the command-line usage of the *tapeutil* program. For all examples, substitute the actual value of the special file associated with the target device.

- To query the serial number of the device:

```
/opt/IBMtape/tapeutil -f /dev/rmt/0st -o qsn -v
```
- To request inquiry data from the device:

```
/opt/IBMtape/tapeutil -f /dev/rmt/0st -o inq -v
```
- To move a cartridge from cell 32 to the tape drive (16):

```
/opt/IBMtape/tapeutil -f /dev/rmt/0smc -o mov -s 32 -d 16 -v
```
- To set the block size of the device to 64K:

```
/opt/IBMtape/tapeutil -f /dev/rmt/0st -o spa -t 1 -x 65535 -v
```
- To write 100 64K blocks of data to the tape device:

```
/opt/IBMtape/tapeutil -f /dev/rmt/0stn -w 1 -o wri -b 65535  
-n 1 -m 100 -v
```
- To write two file marks to the tape device:

```
/opt/IBMtape/tapeutil -f /dev/rmt/0stn -w 1 -o eof -c 2 -v
```
- To rewind the tape device:

```
/opt/IBMtape/tapeutil -f /dev/rmt/0stn -o rew -v
```
- To read 100 64K blocks of data from the tape device:

```
/opt/IBMtape/tapeutil -f /dev/rmt/0stn -o rea -b 65535 -n 1 -m  
100 -v
```

TAPEUTIL in a HP-UX System Environment

Introduction

A SCSI Tape and Medium Changer Utility Program called *tapeutil* is provided with the IBM SCSI Tape and Medium Changer Device Driver for HP-UX and installed in the */usr/bin* directory. The *tapeutil* program fulfills several purposes:

- It provides the following service aids for IBM tape subsystems:
 - Query Device Type/Verify Device Attachment
 - Query Device Serial Number
 - Query Device Microcode Level
 - Force Device Diagnostic Dump
 - Store Device Diagnostic Dump
 - Download Device Microcode
- It provides a menu-driven test tool for exercising or testing IBM tape and medium changer devices with a full suite of supported operations:
 - Reading/Writing Data
 - Tape Motion Commands
 - Setting/Displaying Device Information/Status
 - Mounting/Demounting Cartridges
 - Cartridge Inventory
- In addition to the menu-driven front end, the *tapeutil* program provides a command-line interface which is convenient for use in shell scripts.
- The source code for the *tapeutil* program is provided for example purposes, and is installed in the *tapeutil* directory during the *tapeutil* package installation. This source code is commented and demonstrates calls to all of the supported device driver entry points and *ioctl* commands, thus giving the application developer a starting point for interfacing to the HP-UX device driver.

The *tapeutil* program provides both an interactive menu-driven interface as well as a command-line interface. If the *tapeutil* program is invoked with no command-line parameters, the menu-driven version will be started. In the menu-driven version, the device to be operated on should first be opened using option 1. Other options may then be selected. The user will be prompted for additional information if required for the specific options selected. The results of a command are displayed after it is executed. If an error occurs for the command, error information and device sense data are displayed. The device can be closed using option 2, or it will automatically be closed when the Quit option is selected. The menu is automatically displayed once when the program is first invoked. To prevent unnecessary scrolling of the screen, the menu is not automatically displayed again after each command, but is instead refreshed only after the M (menu refresh) command is entered.

Interactive Menu-Driven Interface

Figure 364 on page APPENDA-10 shows the menu that is displayed by the *tapeutil* program when the program is invoked, and no command-line parameters are entered:

IBM SCSI TAPE & MEDIUM CHANGER UTILITY PROGRAM	
GENERAL COMMANDS 1: Open Device 2: Close Device D: Device Type M: Menu Refresh Q: Quit Program	BASIC SCSI COMMANDS 9: Test Unit Ready 10: Inquiry 11: Request Sense 12: Reserve 13: Release
SERVICE COMMANDS 3: Query Serial Number 4: Query Microcode Level 5: Force Dump 6: Store Dump 7: Download Microcode 8: Format Cartridge	MEDIUM CHANGER COMMANDS 14: Move Medium 15: Position To Element 16: Element Information 17: Inventory 18: Audit 19: Lock/Unlock Door
TAPE DRIVE COMMANDS	
20: Read Data 21: Write Data 22: Write File Mark 23: Erase Tape 24: Rewind 25: Retension 26: Offline 27: Load/Unload Tape 28: Forward Space File 29: Backward Space File 30: Forward Space Record 31: Backward Space Record	32: Locate End Of Data 33: Get Record Size 34: Set Record Size 35: Get Device Status 36: Get Device Info 37: Get Media Info 38: Get Position 39: Set Position 40: Get Parameter 41: Set Parameter 42: Sync Buffer 43: Display Message

Figure 364. TAPEUTIL Program Menu

Command-Line Mode

If command-line parameters are provided when the *tapeutil* program is invoked, the command-line mode will be started. For each command-line execution of the program, the device is first opened, the specific command is issued, and the device is then closed. The program can be driven from within a shell script if desired. Results of the operation will be displayed only when executed in verbose mode. No information is displayed when not in verbose mode. This is particularly useful for quiet shell script implementations. A completion code, as defined in */usr/include/sys/errno.h* for the operation requested is always returned from the program upon exit (in both verbose and quiet mode).

Command-Line Commands and Syntax: The usage of the *tapeutil* program in command-line mode is as follows:

```
tapeutil -f device -o
operation [options]
```

where **device** is the name of the tape device special file (for example: /dev/rmt/1m) and **operation** is one of the values listed below. The device special file and the operation are required. The specific **options** associated with a particular operation are indicated in Figure 365, Figure 366, Figure 367 and Figure 368 on page APPENDA-13. Parameters enclosed in square brackets are optional. All others are required.

<i>Figure 365. Service Commands and Syntax</i>	
Service Commands	Syntax
Query Serial Number	tapeutil -f f.-o qsn [-w w][-v]
Query Microcode Level	tapeutil -f f.-o qmc [-w w][-v]
Force Dump	tapeutil -f f.-o fdp [-w w][-v]
Store Dump	tapeutil -f f.-o sdp [-w w][-v] -z z
Download Microcode	tapeutil -f f.-o dmc [-w w][-v] -z z
Format Cartridge	tapeutil -f f.-o fmt [-w w][-v]
Query Device Type	tapeutil -f f.-o chk [-w w][-v]

<i>Figure 366. Basic SCSI Commands and Syntax</i>	
Basic SCSI Commands	Syntax
Test unit Ready	tapeutil -f f.-o tur [-w w][-v]
Inquiry	tapeutil -f f.-o inq [-w w][-v]
Request Sense	tapeutil -f f.-o req [-w w][-v]
Reserved	tapeutil -f f.-o res [-w w][-v]
Reserved	tapeutil -f f.-o rel [-w w][-v]

<i>Figure 367. Medium Changer Commands and Syntax</i>	
Medium Changer Commands	Syntax
Move Medium	tapeutil -f f.-o mov [-w w][-v] -s s -d d
Position To Element	tapeutil -f f.-o pos [-w w][-v] -s s
Element Information	tapeutil -f f.-o ele [-w w][-v]
Inventory	tapeutil -f f.-o inv [-w w][-v]
Audit	tapeutil -f f.-o aud [-w w][-v]
Lock/Unlock Door	tapeutil -f f.-o lck [-w w][-v] -x x

Figure 368. Tape Drive Commands and Syntax

Tape Drive Commands	Syntax
Read	tapeutil -f f.-o rea [-w w][-v] -b b -n n -m m
Write	tapeutil -f f.-o wri [-w w][-v] -b b -n n -m m [-r r] [-z z]
Write File Mark	tapeutil -f f.-o eof [-w w][-v] -c c
Erase Tape	tapeutil -f f.-o era [-w w][-v]
Rewind	tapeutil -f f.-o rew [-w w][-v]
Retension	tapeutil -f f.-o ret [-w w][-v]
Offline	tapeutil -f f.-o off [-w w][-v]
Load/Unload Tape	tapeutil -f f.-o lod [-w w][-v] -x x
Forward Space File	tapeutil -f f.-o fsf [-w w][-v] -c c
Backward Space File	tapeutil -f f.-o bsf [-w w][-v] -c c
Forward Space Record	tapeutil -f f.-o fsr [-w w][-v] -c c
Backward Space Record	tapeutil -f f.-o bsr [-w w][-v] -c c
Locate End of Data	tapeutil -f f.-o eod [-w w][-v]
Get Record Size	tapeutil -f f.-o grs [-w w][-v]
Set Record Size	tapeutil -f f.-o srs [-w w][-v]
Get Device Status	tapeutil -f f.-o gds [-w w][-v]
Get Device Information	tapeutil -f f.-o gdi [-w w][-v]
Get Media Information	tapeutil -f f.-o gmi [-w w][-v]
Get Position	tapeutil -f f.-o gpo [-w w][-v] -t t
Set Position	tapeutil -f f.-o spo [-w w][-v] -t t -x x
Get Parameter	tapeutil -f f.-o gpa [-w w][-v] -t t
Set Parameter	tapeutil -f f.-o spa [-w w][-v] -t t -x x
Sync Buffer	tapeutil -f f.-o syn [-w w][-v]
Display Message	tapeutil -f f.-o msg [-w w][-v] -t t -y y1,y1

Note: Invoking the *tapeutil* program with the **-h** flag (for example, **tapeutil -h**) or the **-?** flag (for example, **tapeutil -?**) will display the usage help information.

Flag Descriptions: The supported flags, their meanings, their associated operations, and their acceptable ranges are as follows:

Flag Description

- ? Usage Help (stand-alone flag) {no value required}
- b Block Size (rea, wri) {0 < (block size x blocking factor) <2097152}
- c Operation Count (eof, fsf, fsr, bsf, bsr) {0 - 65535}
- d Destination Address (mov) {device specific, determine range from Element Info}
- f Device Special File Name (always required) {/dev/rmt/1st or similar}
- h Usage Help (stand-alone flag) {no value required}
- m Multiples to Read or Write (rea, wri) {0 - 2097152}
- n Blocking Factor (rea, wri) {0 > (block size x blocking factor) <2097152}
- o Operation (always required) {refer to previous list}
- r Random Seed (wri) {0 - 65535}
- s Source Address (mov, pos) {device specific, determine range from Element Info}
- t Type of Parameter Value
 - (gpo) {1=logical block, 2=physical block}
 - (spo) {1=logical block, 2=physical block}
 - (gpa) {1=block size, 2=compression, 3=buffering, 4=immediate, 5=trailer, 6=write protect, 7=ac mode, 8=capacity, 9=sili}
 - (spa) {1=block size, 2=compression, 3=buffering, 4=immediate, 5=trailer, 6=write protect, 8=capacity, 9=sili}
 - (msg) {1=display msg0, 2=display msg1, 3=flash msg0, 4=flash msg1, 5=alternate msg1/msg2}
- v Verbose Mode (optional for all commands, stand-alone flag) {no value required, absence of flag means quiet mode}
- w Open Mode (optional for all commands) {1=read/write, 2=read only (default), 3=write only, 4=append}
- x Parameter Value
 - (lck) {1=lock, 2=unlock}
 - (lod) {1=load, 2=unload}
 - (spo) {0 - 65535}
 - (spa) {0 - 65535}
- y Messages (msg) {message1,message2}
- z Input/Output File Name
 - (sdp) {path and name of the file in which to store dump}
 - (dmc) {path and name of the microcode image file}
 - (wri) {path and name of the file containing write data pattern}

Notes:

1. For read and write operations, the size of one buffer of data transferred during a single SCSI read or write command is determined by the product of the *Block Size* value and the *B Factor* value. The number of these buffers transferred is determined by *Multiplier* value. The actual total number of bytes transferred is then (Block Size) x (Blocking Factor) x (Multiplier). If the device is set to fixed block mode (block size not equal to zero), the product of *Block Size* and *Blocking Factor* must be a multiple of the device block size setting.

2. For further information on the Get Parameter (gpa) and Set Parameter (spa) operations, refer to the STIOC_GET_PARM and STIOC_SET_PARM ioctl commands described in the *Programming Reference*.

Examples: The following examples should help to demonstrate and clarify the command-line usage of the *tapeutil* program. For all examples, substitute the actual value of the special file associated with the target device.

- To query the serial number of the device:

```
/opt/IBMtape/tapeutil -f /dev/rmt/0m -o qsn -v
```
- To request inquiry data from the device:

```
/opt/IBMtape/tapeutil -f /dev/rmt/0m -o inq -v
```
- To move a cartridge from cell 32 to the tape drive (16):

```
/opt/IBMtape/tapeutil -f /dev/rmt/0smc -o mov -s 32 -d 16 -v
```
- To write 100 64K blocks of data to the tape device:

```
/opt/IBMtape/tapeutil -f /dev/rmt/0mn -w 1 -o wri -b 65535  
-n 1 -m 100 -v
```
- To write two file marks to the tape device:

```
/opt/IBMtape/tapeutil -f /dev/rmt/0mn -w 1 -o eof -c 2 -v
```
- To rewind the tape device:

```
/opt/IBMtape/tapeutil -f /dev/rmt/0mn -o rew -v
```
- To read 100 64K blocks of data from the tape device:

```
/opt/IBMtape/tapeutil -f /dev/rmt/0mn -o rea -b 65535  
-n 1 -m 100 -v
```

TAPEUTIL in a Windows NT System Environment

NT Utility Program

The Magstar device is supported on Intel-based processors with a minimum processor level of Intel 486DX or Pentium with sufficient RAM and disk space for operation of the Microsoft Windows NT operating system.

The utility has these general characteristics:

1. Can be driven interactively or from a file (batch mode).
2. Allows specification of desired results from each step of the test so that the test can be self-checking.
3. Allows testing of all device driver interfaces with both valid and invalid parameters.

Invoking NTUTIL: The tool can be invoked as a command from the command line or from within a shell script:

```
ntutil <-f input-file> <-o output-file> <-d special-file> <-t>
```

The options are:

-f input-file	Specifies the input file for batch mode. If a file is specified, NTUTIL will execute in batch mode and read input from this file. The default for this file is NTUTIL.in.
-o output-file	Specifies the output file. The default for this file is NTUTIL.out.
-d special-file	Specifies the special file value (for example, tape0) to substitute on the “open” statement in the input file.
-t	Turns on internal tracing printouts in the output file. Used only to debug the tool itself.

Notef if no parameters are specified, NTUTIL will operate in interactive mode.

Interactive Mode: When NTUTIL is invoked without the *-f* flag, it defaults to running in interactive or manual mode. This mode allows a developer to interactively determine the kind of testing to be done. When in interactive mode, NTUTIL provides a menu of functions that can be performed.

For a description of interactive modes, see [Interactive Mode](#)

The two modes are:

- Base mode (LUN0) commands such as open/close/read/write
- Library mode (LUN0 and LUN1) that supports open/close/read/write plus media mover commands such as read element status and move media.

The Magstar 3590 must be in Random 2 LUN mode and the other Magstar devices must be in Random mode both when booted and to operate NTUTIL in library mode.

Base mode (only LUN 0 is accessed) is shown in Figure 369 on page APPENDA-18

Library mode (LUN 0 and LUN 1 are accessed) is shown in Figure 370 on page APPENDA-19

Base Mode: The Base Mode menu follows:

```
MANUAL TEST MENU:
+-----+
| 1: set device special file          2: display symbols
| 3: set block size R/W (now !0 fixed) 4: set block count (R/W)
| 5: set return error when fail       6: set/reset trace
| 7: set exit on unexpected result    8: Library Mode
+-----+
| 20: open                            21: close
| 22: read                             23: write
| 24: read and display block          25: flush (buffer->media)
| 26: read block id                  27: erase
| 28: locate block id                29: display block data
+-----+
| 30: write filemark(s)              31: rewind
| 32: forward space filemark(s)      33: unload
| 34: reverse space filemark(s)      35: load (3590 Sys Mode)
| 36: forward space record(s)        37: return error
| 38: reverse space record(s)        39: test unit ready
| 43: set media parms (block size)   44: set dev parms (comp.
| 46: get device information
| 48: get medium information          49: inquiry
| 53: space EOD                      54: display message
+-----+
| 70: system command
+-----+
| 80: Force Dump                     81: Read Dump
| 82: Update Code                    83: Log Sense
| 84: Get Last Sense                 85: Get Version
| 86: Associative/Persistent WProtect 87: Read/Write Test
| 88: Find Devices                   89: Get MTDevice info
+-----+
| 99: return to main menu
+-----+
enter selection:
```

Figure 369. Base Mode

Library Mode: The Library Mode menu follows:

```
MANUAL TEST MENU:
+-----+
| 1: set device special file          2: display symbols
| 3: set block size R/W (now !0 fixed) 4: set block count (R/W)
| 5: set return error when fail       6: set/reset trace
| 7: set exit on unexpected result    8: Base Mode
+-----+
|10: ioctl return library inventory   11: ioctl move medium
|12: ioctl initialize element status
+-----+
|20: open                             21: close
|22: read                             23: write
|24: read and display block           25: flush (buffer->media)
|26: read block id                   27: erase
|28: locate block id                 29: display block data
+-----+
|30: write filemark(s)               31: rewind
|32: forward space filemark(s)       33: unload
|34: reverse space filemark(s)       35: load (3590 Sys Mode)
|36: forward space record(s)         37: return error
|38: reverse space record(s)         39: test unit ready
|43: set media parms (block size)    44: set dev parms (comp.)
|46: get device information
|48: get medium information           49: inquiry
|53: space EOD                       54: display message
+-----+
|70: system command
+-----+
|80: Force Dump                      81: Read Dump
|82: Update Code                     83: Log Sense
|84: Get Last Sense                  85: Get Version
|86: Associative/Persistent WProtect 87: Read/Write Test
|88: Find Devices                    89: Get MTDevice info
+-----+
|99: return to main menu
+-----+
enter selection:
```

Figure 370. Library Mode

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Symbols

The following symbols are used in this manual:

Symbol	Description
--------	-------------



Imprinted on the panel to indicate that the device requires service if the Processor Check LED is on. Also imprinted on the Change Mode switch to allow the CE to change between the operator menus and the CE menus.



Displayed on the panel to indicate that trace data is stored in the device. Also printed in text as an *attention* notice.



Printed in text and in figures to indicate an ESD-sensitive part.



Displayed on the panel to indicate that the thumbwheel on the cartridge is set to the file-protected position. Also imprinted on the magazine of the ACF to indicate the position where the magazine door is locked.



Displayed on the panel to indicate that the host file-protected the volume.



Displayed on the panel to indicate that the thumbwheel on the cartridge is set to the not file-protected position. Also imprinted on the magazine of the ACF to indicate the position where the magazine door is unlocked.

Communication Statements

Federal Communications Commission (FCC) Statement

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. IBM is not responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

The United Kingdom Telecommunications Act 1984

This apparatus is approved under approval No. NS/G/1234/J/100003 for the indirect connections to the public telecommunications systems in the United Kingdom.

Industry Canada Compliance Statement

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus as set out in the interference-causing equipment standard entitled: *Digital Apparatus*, ICES-003 of Industry Canada.

Avis de conformité aux normes d'Industrie Canada

Cet appareil numérique respecte les limites de bruits radioélectriques applicables aux appareils numériques de Classe A prescrites dans la norme sur le matériel brouiller: *Appareils numériques*, NMB-003 édictée par Industrie Canada.

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VCCI

Glossary

This glossary defines the special terms, abbreviations, and acronyms that are used in this publication. If you do not find the term you are looking for, refer to the index or to the *Dictionary of Computing*, New York: McGraw-Hill, 1994.

A

ac. Alternating current.

access method. A technique for moving data between main storage and input or output devices.

ACF. Automatic cartridge facility.

adj. Adjustment.

AEN. Asynchronous event notification.

AIX. Advanced Interactive Executive. IBM's implementation of the UNIX operating system. The RS/6000 system, among others, runs the AIX operating system.

alter. To change.

ANSI. American National Standards Institute.

ARTIC. A real time interface processor. In a tape library, the RS-422 communication path between the 3590 and the library manager.

ASCII. American National Standard Code for Information Interchange. A 7-bit coded character set (8 bits including parity check) that consists of control characters and graphic characters.

assigning a device. The establishing of the relationship of a device to a running task, process, job, or program.

assignment. The naming of a specific device to perform a function.

assistance. Aid.

asynchronous. Pertaining to two or more processes that do not depend upon the occurrence of specific events such as common timing signals.

attention (notice). A word for calling attention to the possibility of danger to a program, device, or system, or to data. Contrast with *caution* and *danger*.

ATTN. Attention.

B

backhitch. Magnetic tape that makes a slight backward motion just prior to moving forward.

backup. To make additional copies of documents or software for safekeeping.

BCR. Buffer channel remainder register.

BCSE. Buffer channel status/error register.

BDSE. Buffer device status/error register.

beginning-of-tape (BOT). The location on a magnetic tape that indicates the start of the permissible recording area.

bezel. Decorative and safety cover.

bicolored. Having two colors.

BM or bill of materials. A list of specific types and amounts of direct materials expected to be used to produce a given job or quantity of output.

BOB. Beginning-of-block.

BOT. Beginning-of-tape.

buffer. A routine or storage used to compensate for a difference in rate of flow of data or time of occurrence of events, when transferring data from one device to another.

bus. A facility for transferring data between several devices located between two end points, only one device being able to transmit at a given moment.

C

caution (notice). A word to call attention to possible personal harm to people. Contrast with *attention* and *danger*.

CCW. Channel command word.

CCW chain. A list of channel command words to be performed in sequence.

CE. Customer engineer; field engineer; service representative.

CEM. customer engineering memorandum.

CER. Channel error register.

channel command. An instruction that directs a data channel, control unit, or device to perform an operation or set of operations.

char. Character.

CHK. Check.

cm. Centimeter.

command. A control signal that initiates an action or the start of a sequence of actions.

concurrent. Refers to diagnostic procedures that can be run on one control unit while the rest of the subsystem remains available for customer applications.

contingent connection. A connection between a channel path and a drive caused when a unit check occurs during an I/O operation.

controller. A device that provides the interface between a system and one or more tape drives.

CP. Circuit protector.

CRC. Cyclic redundancy check.

CRR. Channel request register.

ctrl. Control.

CU. Control unit.

CUM. Cumulative tape (collection of PTF's)

D

danger (notice). A word to call attention to possible lethal harm to people. Contrast with *attention* and *caution*.

data. Any representations such as characters or analog quantities to which meaning is or might be assigned.

data buffer. The storage buffer in the control unit. This buffer is used to increase the data transfer rate between the control unit and the channel.

data check. A synchronous or asynchronous indication of a condition caused by invalid data or incorrect positioning of data.

dc. Direct current.

degradation. A decrease in quality of output or throughput or an increase in machine error rate.

degraded. Decreased in quality of output or throughput or increased machine error rate.

deserialize. To change from serial-by-bit to parallel-by-byte.

detented. A part being held in position with a catch or lever.

DEV. Device.

DIAG. Diagnostic section of maintenance information manual.

direct access storage. A storage device in which the access time is independent of the location of the data.

DLR. Device level register.

DLX. Device configuration register (hexadecimal 13).

DRAM. Dynamic random-access memory.

drive, magnetic tape. A mechanism for moving magnetic tape and controlling its movement.

DRV. Drive.

DSE. Data security erase.

DSE (register). Device status and error register.

DSH. Control unit serial high register.

DSL. Control unit serial low register.

DSP. Digital signal processor.

E

EBCDIC. Extended binary-coded decimal interchange code.

EC. Edge connector. Engineering change.

ECC. Error correction code.

EEPROM. Electrically erasable programmable read-only memory.

EIA. Electronics Industries Association.

EIA unit. A unit of measure, established by the Electronic Industries Association, equal to 44.45 millimeters (1.75 inches).

end-of-block (EOB). A code that marks the end of a block of data.

end-of-file (EOF). A code that marks the end of a file of data.

end-of-tape (EOT). The end of the recording area on a tape.

EOB. End-of-block.

EOF. End-of-file.

EOT. End-of-tape.

EPO. Emergency power off.

EPROM. Erasable programmable read only memory.

EQC. Equipment check.

equipment check. An asynchronous indication of a malfunction.

EREP. Environmental recording, editing, and printing.

Error log. A dataset or file in a product or system where error information is stored for later access.

ESCON. Enterprise Systems Connection.

Enterprise Systems Connection (ESCON). A set of IBM products and services that provide a dynamically connected environment within an enterprise. The ESCON channel connection allows the 3590 Model A00 to communicate directly with a System/390.

ESD. Electrostatic discharge.

F

fault symptom code (FSC). A hexadecimal code generated by the drive or the control unit microcode in response to a detected subsystem error.

fiducial. A target used for teaching a physical location to a robot.

FC. Feature code.

FCC. Federal communications commission.

FE. Field engineer, customer engineer, or service representative.

FID. FRU identifier (may be more than one FRU).

field replaceable unit (FRU). An assembly that is replaced in its entirety when any one of its components fails.

file. A named set of records stored or processed as a unit. Also referred to as a dataset.

file protection. The processes and procedures established in an information system that are designed

to inhibit unauthorized access to, contamination of, or deletion of a file.

FLASH EEPROM. An electrically erasable programmable read-only memory (EEPROM) that can be updated.

FMR. Field microcode replacement.

format. The arrangement or layout of data on a data medium.

formatter. Part of a magnetic tape subsystem that performs data conversion, speed matching, encoding, first level error recovery, and interfaces to one or more tape drives.

FP. File protect.

frayed. Damaged as if by an abrasive substance.

FRU. Field replaceable unit.

FSC. Fault symptom code.

FSI. Fault symptom index.

functional microcode. Microcode that is resident in the machine during normal customer operation.

G

g. Gram.

gnd. Ground.

H

hertz (Hz). Unit of frequency. One hertz equals one cycle per second.

hex. Hexadecimal.

Hz. Hertz (cycles per second).

I

ID. Identifier.

identifier (ID). (1) In programming languages, a lexical unit that names a language object; for example, the names of variables, arrays, records, labels, or procedures. An identifier usually consists of a letter optionally followed by letters, digits, or other characters. (2) One or more characters used to identify or name data element and possibly to indicate certain properties of that data element. (3) A sequence of bits or characters that identifies a program, device, or system to another program, device, or system.

IDRC. Improved Data Recording Capability.

IML. Initial microprogram load.

Improved Data Recording Format. An improved data recording mode that can increase the effective data capacity and the effective data rate when enabled and invoked.

initial microprogram load (IML). The action of loading a microprogram from an external storage to writable control storage.

initiator. The component that executes a command. The initiator can be the host system or the tape control unit.

INST. Installation.

interblock gap (IBG). An area on a data medium to indicate the end of a block or physical record.

interface. A shared boundary. An interface might be a hardware component to link two devices or it might be a portion of storage or registers accessed by two or more computer programs.

interposer. The part used to convert a 68-pin connector to a 50-pin D-shell connector.

intervention required. Manual action is needed.

INTRO. Introduction.

I/O. Input/output.

IOP. Input/output processor.

IPL. Initial program load.

ITST. Idle-time self-test.

K

km. kilometer.

L

LAN. Local area network. A computer network within a limited area.

LED. Light-emitting diode.

loadable. Having the ability to be loaded.

LZ-1. Lempel-Ziv electronic data compactor.

M

magnetic tape. A tape with a magnetical surface layer on which data can be stored by magnetic recording.

MAP. Maintenance analysis procedure.

mask. A pattern of characters that controls the retention or elimination of portions of another pattern of characters. To use a pattern of characters to control the retention or elimination of portions of another pattern of characters.

master file. A file used as an authority in a given job and that is relatively permanent, even though its contents may change. Synonymous with main file.

media capacity. The amount of data that can be contained on a storage medium, expressed in bytes of data.

micro. One millionth of.

microcode. (1) One or more micro instructions. (2) A code, representing the instructions of an instruction set, implemented in a part of storage that is not program-addressable. (3) To design, write, and test one or more micro instructions. (4) See also *microprogram*.

microdiagnostic routine. A program that runs under the control of a supervisor, usually to identify field replaceable units.

microdiagnostic utility. A program that is run by the customer engineer to test the machine.

microinstruction. A basic or elementary machine instruction.

microprogram. A group of microinstructions that when executed performs a preplanned function.

The term microprogram represents a dynamic arrangement or selection of one or more groups of microinstructions for execution to perform a particular function. The term microcode represents microinstructions used in a product as an alternative to hard-wired circuitry to implement certain functions of a processor or other system component.

MIM. Media information message.

mm. Millimeter.

modifier. That which changes the meaning.

mount a device. To assign an I/O device with a request to the operator.

MP. Microprocessor.

ms. Millisecond.

MSG. Message.

multipath. Pertaining to using more than one path.

N

N/A. Not applicable.

node. In a network, a point at which one or more functional units connect channels or data circuits.

NVS. Nonvolatile storage. A storage device whose contents are not lost when power is cut off.

O

offline. Pertaining to the operation of a functional unit without the continual control of a computer. Contrast with *online*.

online. Pertaining to the operation of a functional unit that is under the continual control of a computer. Contrast with *offline*.

OPER. Operation.

ov. Over voltage.

overrun. Loss of data because a receiving device is unable to accept data at the rate it is transmitted.

overtightening. To tighten too much.

P

p bit. Parity bit.

parameter. A variable that is given a constant value for a specified application and that may denote the application.

PC. Parity check.

PCC. Power control compartment.

PE. Parity error. Product engineer.

PGID. Path group identification.

PM. Preventive maintenance.

PNEU. Pneumatics.

pneumatic. The parts of the subsystem that control the pressurized air and vacuum.

POR. Power-on reset.

port. A physical connection for communication between the 3590 and the host processor. The 3590 has two SCSI ports.

POST. Power-on self-test.

Power-on self-test (POST). A series of diagnostic tests that are run automatically by a device when the power is turned on.

PROM. Programmable read only memory.

PS. Power supply.

PTF. Program temporary fix.

PWR. Power.

R

RAM. Random access memory.

Random access memory. A storage device into which data is entered and from which data is retrieved in a nonsequential manner.

RAS. Reliability, availability, and serviceability.

record. A collection of related data or words, treated as a unit.

recording density. The number of bits in a single linear track measured per unit of length of the recording medium.

recoverable error. An error condition that allows continued execution of a program.

ref. Reference.

reg. Register.

reinventary. To inventory again.

retension. The process or function of tightening the tape onto the cartridge, if it is sensed that the tape has a loose wrap on the cartridge.

RPQ. Request for price quotation.

R/W. Read/write.

S

s. Seconds of time.

SARS. Statistical analysis and reporting system. The microcode in the drive that assists in determining if read and write errors are caused by the tape or the hardware.

SCSI. Small computer system interface.

segment. A part.

sel. Select.

serialize. To change from parallel-by-byte to serial-by-bit.

serializer. A device that converts a space distribution of simultaneous states representing data into a corresponding time sequence of states.

servo, servos. An adjective noun for use in qualifying some part or aspect of a servomechanism.

servomechanism. A feedback control system in which at least one of the system signals represents mechanical motion.

SIM. Service information message.

small computer system interface (SCSI). An input and output bus that provides a standard interface between the host system and the 3590.

SNS. Sense.

special feature. A feature that can be ordered to enhance the capability, storage capacity, or performance of a product, but is not essential for its basic work.

SR. Service representative, see also *CE*.

SRAM. Static random access memory.

SS. Status store.

ST. Store.

standard feature. The significant design elements of a product that are included as part of the fundamental product.

START. Start maintenance.

Stoplock. A position-hold mode used when the tape is in a stopped position and under tension.

subsystem. A secondary or subordinate system, usually capable of operating independently of, or asynchronously with, a controlling system.

SUPP. Support.

sync. Synchronous, synchronize. Occurring with a regular or predictable time relationship.

T

TAC. Technical area code.

tachometer, tach. A device that emits pulses that are used to measure/check speed or distance.

tape cartridge. A container holding magnetic tape that can be processed without separating it from the container.

tape void. An area in the tape in which no signal can be detected.

TCP/IP. Transmission Control Protocol/Internet Protocol. When in a tape library, the LAN communication path between the host and the library manager. This communication path is used for *tape library* commands that do not require the 3590, while the SCSI bus is used for commands, data, and responses that require the 3590. All SCSI-attached processors require an RS-232 or a LAN attachment for library control.

TCU. Tape control unit.

TH. Thermal.

thread/load operation. A procedure that places tape along the tape path.

TM. Tapemark.

tty. When in a tape library, the RS-232 communication path between the host and the library manager. This communication path is used for *tape library* commands that do not require the 3590, while the SCSI bus is used for commands, data, and responses that require the 3590. All SCSI-attached processors require an RS-232 or a LAN attachment for library control.

U

UART. Universal asynchronous receiver/transmitter.

unload. Prepare the tape cartridge for removal from the drive.

utilities. Utility programs.

utility programs. A computer program in general support of the processes of a computer; for instance, a diagnostic program.

uv. Under voltage.

V

VOLSER. Volume serial number.

volume. A certain portion of data, together with its data carrier, that can be handled conveniently as a unit.

VPD. Vital product data. The information contained within the tape drive that requires nonvolatile storage used by functional areas of the drive, and information required for manufacturing, RAS, and engineering.

W

word. A character string that is convenient for some purpose to consider as an entity.

Write. Write command.

WT. world trade.

X

XR. External register.

XRA. External register address register.

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