

IBM 3490E Tape Subsystem
Models F01, F1A, F11, and FC0



Installation, Planning, and Operator's Guide

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Models F01, F1A, F11, and FC0



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Note

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Preface

This publication contains information about installing and operating IBM 3490E Tape Subsystem Models F01, F11, F1A, and FC0.

Note: Installation information in this publication applies only to the IBM 3490E tape subsystem model F01. Installation on all other tape subsystems (models F11, F1A, and FC0) must be performed by a service representative.

Unless otherwise indicated, basic guidelines for general operation of IBM tape subsystems are the same for all models. For this reason, not all models are pictured in every reference diagram.

Model F00 is not discussed in this release. Earlier editions of this manual (prior to version 03) containing information on the model F00 are available.

The FC3500 Controller replaced the FC3000 Controller that was in prior release of this manual. The FC3500 and FC3000 Controllers are functionally equivalent. All statements about the FC3500 are applicable to the FC3000 controller.

Using This Book

This book is organized into independent chapters to allow a reader to use any section of the book as a quick reference. The chapters are organized to correspond with the procedures a new operator will follow to setup and begin basic applications of a tape subsystem.

For added clarity and ease of use, the following formatting conventions have been used throughout the text of this publication:

CAPITAL BOLD TEXT

represents a button on the tape drive.

"CAPITAL TEXT IN QUOTES"

represents a message displayed on the tape drive control panel.

3490E Publications

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

- *Tape and Cartridge Requirements for the IBM Magnetic Tape Cartridge Drive* , GA32-0048.
- *Tape and Cartridge Requirements for the IBM Enhanced Capacity Magnetic Tape Cartridge Drive* , GA32-0216.
- *IBM Input/Output Equipment Installation Manual—Physical Planning* , GC22-7064.
- *American National Standard Institute Standard X3.180, X3B5/91-173C, and X3B5/91-305.*
- *IBM 3490E Tape Subsystem Models F01, F11, FC0, F1A Maintenance Information*, P/N 05H3145
- *IBM 3490E Tape Subsystem FC 3000 and FC 3500 Controller Maintenance Information*, P/N 05J9545
- *Overview of 3490E Model F Magnetic Tape Subsystem Operations*, GV24-0517-00 (VHS), GV24-0518-00 (PAL), GV24-0519-00 (SESAM)

Related Hardware Information

For related information about the 3490E Model Fxx Tape Subsystem, see:

- *American National Standard Institute (ANSI) Small Computer System Interface 2 (SCSI 2)* , X3.131-1994
- *Care and Handling of Computer Magnetic Storage Media* by S. G. Geller, National Bureau of Standards Special Publication 500-101, for sale by the Superintendent of Documents, U.S.A. Government Printing Office, Washington, DC 20402
- *External Devices Translated Safety Notices* , SA26-7192
- *IBM General Information Installation Manual—Physical Planning*, GC22-7072
- *9309 Rack Enclosure General Information and Site Preparation*, GA24-4103
- *IBM Magstar 3494 Tape Library Operator Guide*, GA32-0280-08

AS/400 Publications

For additional information about AS/400* systems, see:

- *AS/400 Physical Planning Guide and Reference* , GA41-9571
- *AS/400 Control Language Reference* , SC41-0030
- *AS/400 Service: Service Functions* , SY44-3902
- *AS/400 System Operation* , SC41-3203
- *AS/400 Physical Planning Reference* , SA41-3109
- *AS/400 Physical Planning Summary* , SX41-3108
- *AS/400 Control Language Reference* , SC41-0030
- *AS/400 Security Concepts and Planning* , SC41-8083
- *AS/400 System/370 Connectivity* , GG24-3336

RS/6000 Publications

For additional information about RISC System/6000* systems, 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 Planning for System Installation*, SA38-0508

Related Software Information

For information about software related to the 3490EModel Fxx Tape Subsystem, see:

- *AIX/ESA Diagnosis Guide* , SC23-3079
- *AIX/ESA Device Driver Developer's Guide* , SC23-3085
- *Basic Tape Library Support User's Guide and Reference*, SC26-7016
- *IBM SCSI Tape Drive, Medium Changer, and Library Device Drivers Installation and User's Guide* , GC35-0154

Additional publications may be ordered as required for training.

How to Send Your Comments

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- IBM Mail Exchange: USIB3VVDat IBMMAIL
- Fax from U.S.A. and Canada: 520-799-2906
- Fax from other countries: 520-799-2906

Chapter 1. Introduction

The 3490E Models F01, F11, F1A, and FC0 are high performance, high reliability streaming tape drives designed for general purpose data processing, data interchange, and backup operations.

These drives are available in four physical configurations:

- Model F01 Tower
- Model F11 Rack Mount
- Model F1A Library Mount
- Model FC0 Rack Mount

The configurations are shown in Figure 1 on page 3. The unit is shipped partially assembled in the requested configuration.

The 3490E Fxx Models are attached to host processors that use Small Computer System Interface (SCSI 2). These systems include, but are not limited to the RS/6000, RS/6000* SP, and AS/400 systems.

Note: Fxx refers to all models (F01, F11, F1A, and FC0) of the 3490E Tape Subsystem.

The 3490E Fxx Models read and write in 3490E format and also 3480/3490 format. They support 36 track parallel reading and writing. Only F01, F11, and FC0 support 18 track parallel reading and writing when attached to an RS/6000 system using A-TAPE device drivers, and AS/400 Host Systems with OS/400 V3R7 or higher and the appropriate PTF's. See 41 for more information on host system support.

Helpful Hints for Resolving Problems

Many of the problems encountered in the use of 3490E Model Fxx Tape Subsystem can be resolved readily by the operator without the assistance of your service representative.

Perform the following simple steps first whenever normal operation is disrupted:

- Ensure that the cartridge is properly positioned in the drive.
- Try to unload the cartridge.
- Check to ensure that the cartridge is the proper type.
- Check the integrity of the cartridge to see that it is properly functioning and that it is not broken or otherwise obstructed by contaminants or improperly applied user labels.
- Ensure that a cleaner cartridge has been inserted if one has been requested and, conversely, that no cleaner cartridge has been inserted if a data cartridge is required.
- Check for error or status codes. If present, record them for use by IBM Service if necessary.
- Turn the power off and then on again.

Chapter 2. Drive Features

Models F01, F11, and FC0

The features for these drives are identical, except for drive orientation. Model F01 is a stand-alone tower configuration, and Model F11 is a horizontal configuration for rack mounted usage. Model FC0 consists of several Model F11 drives linked together in a rack mounted configuration, and may include an optional FC 3500 controller. Model F1A is a library mounted configuration. Figure 1 shows all four of these models.

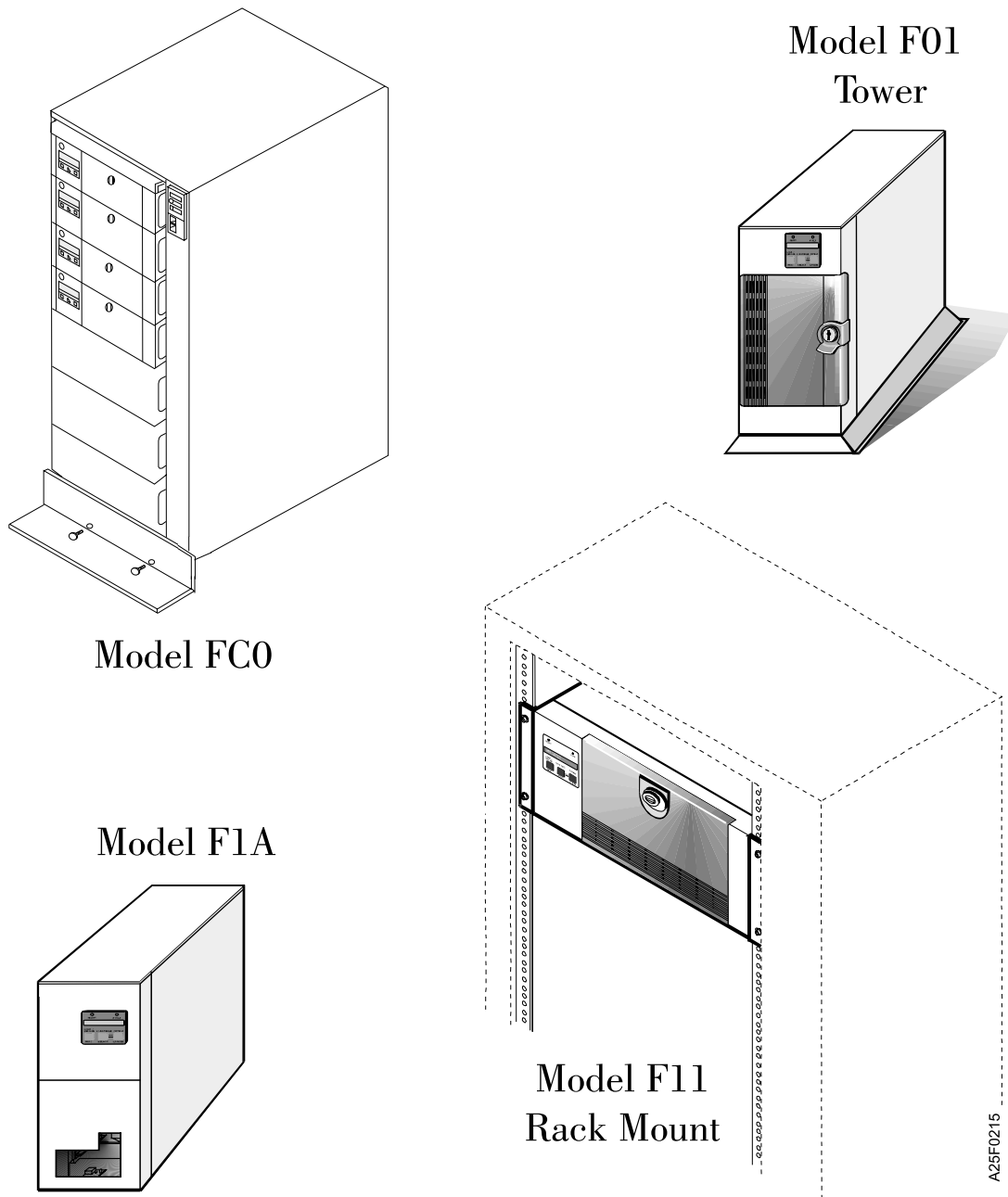


Figure 1. 3490E Fxx Model Configurations

Model F01 (Tower Configuration)

This drive is designed for stand-alone or daisy chained SCSI applications. A maximum of 15 Model F01 drives may be linked together, depending on the host system running the drives.

Model F11 (Rack-Mounted Configuration)

The model F11 drive is identical to the model F01 tower configuration, except for device orientation. These drives are designed for standalone or daisy-chained SCSI applications. A maximum of 15 Model F11 drives may be linked together, depending on the host system running the drives.

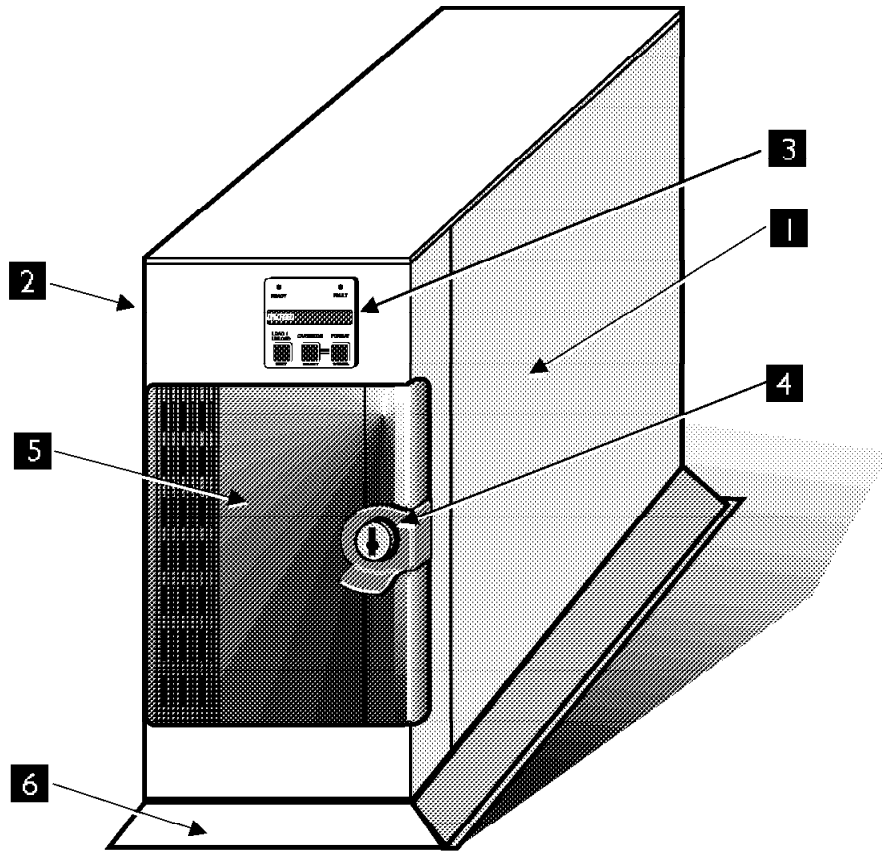
Model FC0 (Rack—Mounted Configuration)

The rack-mounted configuration is designed to contain up to four model F11 Drives to be used in daisy-chained SCSI applications. The rack features a main power control, a compartment with a sliding drawer for the optional FC3500 Controller, an interface that accommodates up to four drives, and a remote support system

Standard Features (Models F01, F11, and FC0)

Front Panel

Figure 2 on page 5 shows the front view of the 3490E Model F01 (tower configuration) with some external features identified. Model F11 (rack configuration) is identical except for orientation and color.



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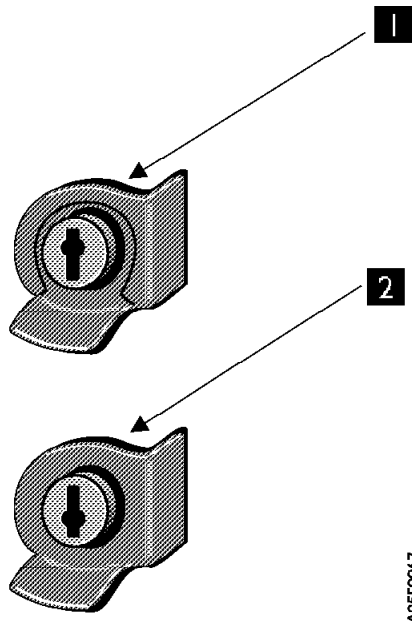
- | | | |
|--------------------|------------------------|------------------------|
| 1 Enclosure | 2 Front Panel | 3 Control Panel |
| 4 Door Lock | 5 Security Door | 6 Unit Foot |

Figure 2. 3490E Front View (Tower)

Front Door

Note: Model F1A does not have this feature.

The front door of the drive is transparent to allow operators to view drive function. If the drive is in ready mode, opening and closing the front door will initiate an inventory of the tapes in the magazine. To open the front door, push the keylock and use the finger pull. Gently push on the lock to close the front door. To lock the front door, use the supplied keys and turn the lock to the right. See Figure 3 on page 6. Door keys are interchangeable between different drives. For additional or replacement keys contact your service representative



1 Unlocked

2 Locked

Figure 3. Door Lock

Autoloader

Note: Model F1A does not have this feature.

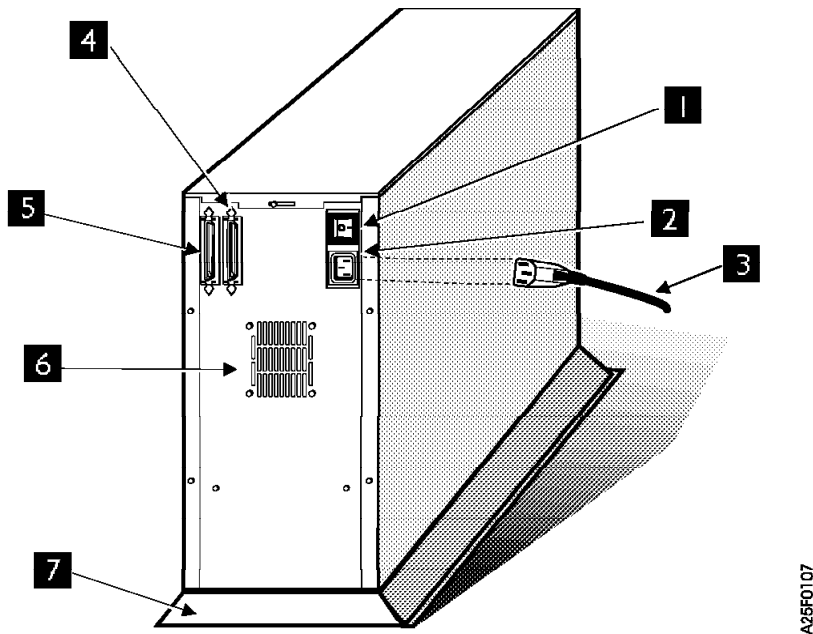
The autoloader features a fixed stack of 10 tape cartridge slots, called a magazine. A shuttle mechanism, located behind the magazine, picks up a cartridge and moves it into position to thread the tape. The autoloader can be set to load tapes according to several different load sequences. For more information, see “Autoloader Mode Settings (Shuttle Modes)” on page 48.

Control Panel

There are three multiple function push buttons, two LED indicators, and a 16 digit backlit LCD display on the control panel. The buttons are used for controlling tape drive operation, issuing diagnostic commands, and customizing drive configuration. The display is used to indicate the operational status of the drive, and report device configuration and error messages.

Rear Panel

Figure 4 on page 7 shows the rear view of the 3490E Model F01 (tower configuration) with some external features identified. Model F11 (rack configuration) is identical except for orientation and covers.



- 1 Power Switch** **2 Power Cable Connector** **3 Power Cable**
- 4 SCSI Connector** **5 SCSI Connector** **6 Fan Vent** **7 Unit Foot**

Figure 4. 3490E Rear View (Tower)

Power Switch

The power switch is located on the rear panel of the drive. Turn the drive ON by pressing 1, and OFF by pressing 0. When the drive is powered on it will perform POST diagnostics. Turning the drive off will reset any temporary configuration settings to default.

Power Supply

AC (alternating current) power is supplied to the power supply by a single cable which can be plugged into any properly grounded outlet. Different countries will have different power plugs (see Table 6 on page 23). Power supply ranges between 100-140 VAC and 200-240 VAC, and will automatically adjust to the operating voltage range.

SCSI Interface

The 3490 drives are configured with a differential fast/wide SCSI 2 interface. There are two daisy chained SCSI cable connectors at the rear of the drive. For more information, see “Cabling” on page 17.

Cooling Fan

A single forced air fan is positioned on the rear panel to provide maximum cooling for critical drive parts, including drive electronics, motors, and the power supply. For maximum cooling, the fan opening should be set a minimum of three inches away from any obstruction.

FC0 Rack Features

The FC0 may contain up to four Model F11 drives. A sliding drawer is reserved for the FC 3500 control unit. The FC0 features a main power control and a remote support system.

Figure 5 shows the front view of the 3490E Model FC0 with some external features identified.

- 1** Model F11 tape drives (may contain up to 4)
- 2** Main Control Panel with Power On LED indicator and Power On/Off switch.

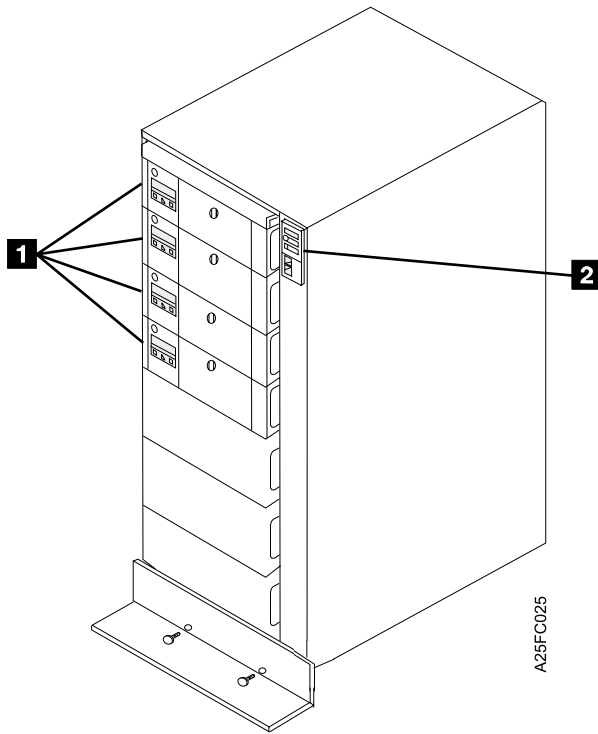


Figure 5. 3490E Front View (Model FC0)

Figure 6 on page 9 shows the rear view of the 3490E Model FC0 with some external features identified.

- 1** FC 3500 Controller
- 2** Sliding Drawer
- 3** Rear Door

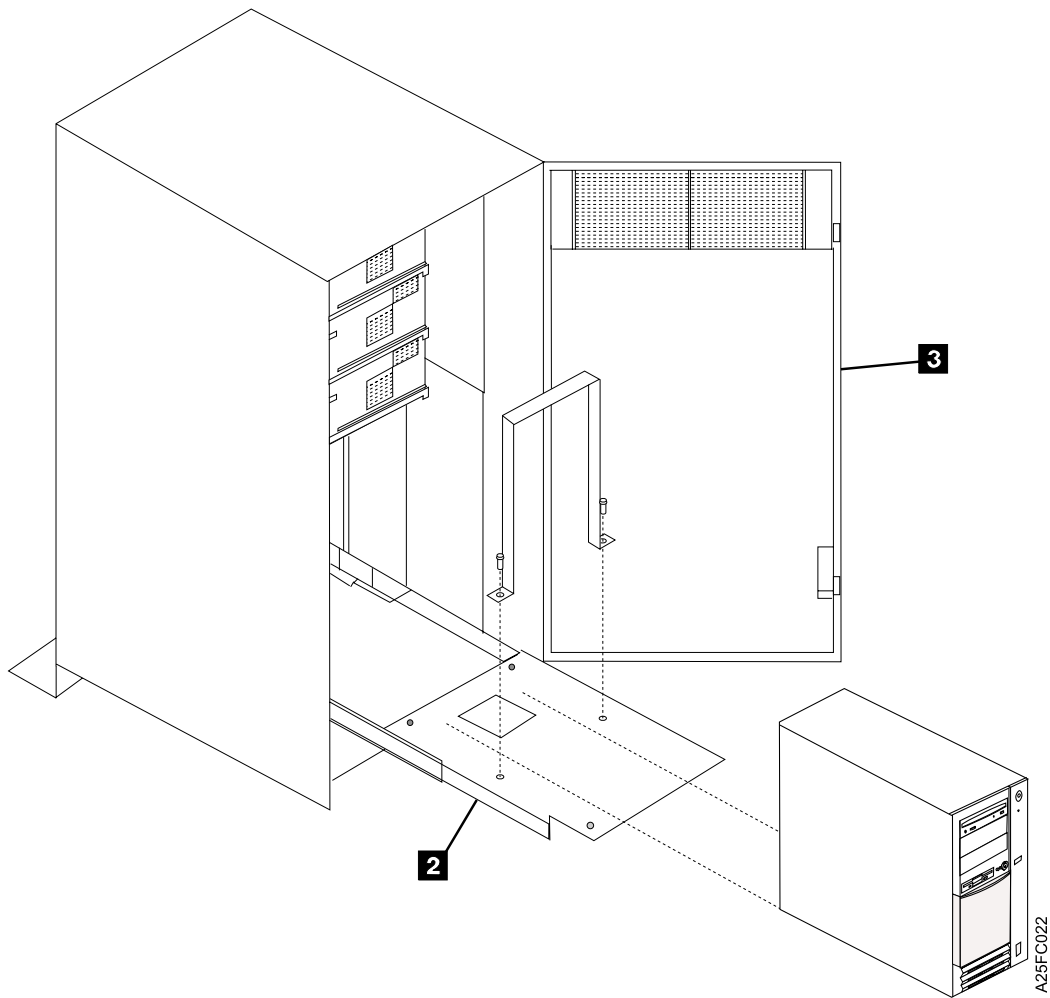


Figure 6. 3490E Rear View (Model FC0)

FC 3500 Controller

The 3490E tape drives perform operations based on SCSI channel data. For larger applications involving a Host System that operates in ESCON channels, an FC 3500 controller unit is required to translate channel data to a compatible form. The main function of the FC 3500 controller is to translate ESCON data from the Host System into SCSI data for the 3490E tape drive. The FC 3500 controller will also perform the reverse translation, where SCSI data from the 3490E tape drive will be converted to ESCON data for the Host System. The FC 3500 controller allows concurrent data transfers between the ESCON host and multiple drives. For more information, see "Introduction to the FC 3500 Controller" on page 64.

Additional SCSI adapter card (FC 3502)

FC 3502 is an additional SCSI adapter card for the FC 3500 controller. FC 3502 allows attachment of a second FC0 rack with up to 4 additional F11 drives to an existing FC0 with an FC 3500 Controller. See Figure 25 on page 67.

Remote Diagnostic Support

The FC 3500 controller features a modem (FC 2710) and switch (FC 2711) which can be used to access online diagnostic support. The FC 2711 switch has 16 different electronic positions, allowing the FC 2710 modem to be shared by up to 16 different units.

Note: An **analog** phone line must be installed for the first FC 2710 in the installation. The same modem and switch may be shared between the following units:

- 3490E Model F1A or FC0 with FC 3500
- 3494 Models B16, HA1, L10, L12, or L14
- 3590 Models A00 or A50

Note: The modem (FC 2710) and switch (FC 2711) each require a standard electrical outlet for power.

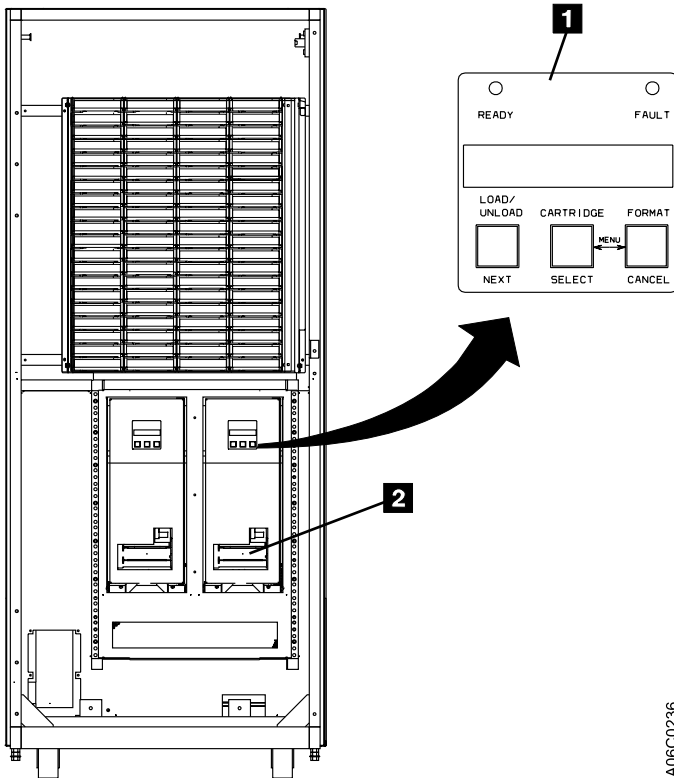
Model F1A (Library Dataserver System)

The model F1A drive is designed for Library Dataserver System applications. Up to two model F1A drives may be installed in each 3494 L10 or D10 frame. The Library Dataserver is comprised of several 3494 frames linked together and controlled by a Host System, called a Library Manager. The model F1A does not have a front door or autoloader. A single external shuttle mechanism loads the tapes for all the drives in the Library System.

Front View

Figure 7 shows the front view of a 3494 frame with two 3490E Model F1A drives, with various features identified.

- 1 Control Panel
- 2 Machine type and serial number



A06C0236

Figure 7. 3490E Front View (Two Model F1A Drives Mounted in a 3494 Frame)

Chapter 3. Advanced Design Features for the 3490E

The 3490E Fxx Models incorporate many significant design improvements in tape drive design. This chapter contains descriptions of these advanced design features.

Compatible Error Checking

The drive features industry standard IBM cross parity checking for errors for the 3480/3490 format recording and Reed Solomon error correction for 3490E format recording.

4 Megabyte Buffer

The 3490E Model Fxx buffer is designed to overcome data transfer interruptions due to host timing and tape reposition time. The 3490E Fxx Models have a standard 4 MB buffer.

Embedded Diagnostics

The 3490E Fxx Models have two levels of embedded user diagnostics. The Power On Self Test (POST) diagnostics perform various verification tests on the host processor, device processor and servo processor at power up. The second level of diagnostics is the User Diagnostics. These diagnostics include basic tests that allow the user to execute simple R/W tests, test the display, and change configuration options. There are also advanced diagnostic tests used by your service representative for servicing the drive. User Diagnostics are accessed from the control panel.

Multiprocessor Architecture

Multiple processor architecture increases processing speed because the processors are dedicated to specialized functions. The 3490E Fxx Models have four specialized microprocessors to facilitate drive operation. An 80188 processor controls the host interface functions. A 68000 processor controls buffer operations and two V40 processors control mechanical and user interface functions.

Transfer Rates

The 3490E Fxx Models are designed for high capacity and high transfer rate applications. The drive is capable of a sustained data rate of up to 6.8 MB per second with a maximum SCSI burst rate of 20 MB per second.

Compatibility

The 3490E Fxx Models read and write in standard 3490E 36 track format according to ANSI X3B51/93-272. The 3490E Fxx Models can also write in 3480/3490 format. Since the tracks recorded by the 3490E Model Fxx are narrower than the ANSI specification for 18 tracks, the format is not compliant with the ANSI specification for 3480/3490 format.

Note: Write in 3480 format is not supported when the drive is attached to an FC 3500 Controller

Note: The nonstandard 3480 Write has some limitations and is intended to provide a means for read interchange of data with a site which may have 3480 transports. This nonstandard write requires that the interchange tape to be completely written on a Model Fxx. A 3480 tape must be read and completely rewritten on a Model Fxx drive if appends to the data are required. Original 3480 Format and the nonstandard 3480 Write Format should not be intermingled on the same cartridge. Appending of data which intermixes the Original and nonstandard 3480 Formats is not supported by IBM.

Capacity

The IDRC compatible compression capability of the drive generally increases the storage capacity. However, the compression rate is dependent on the type of data being compressed. The 3490E Model Fxx 36 track format cartridges have a larger capacity than the 18 track 3480/3490 format. A summary of capacity for the 3490E Fxx Models are shown below.

Table 1. 3490E Model Fxx Capacity

Single Cartridge	With 3 to 1 Compression	3 to 1 Compression and Full Autoloader
800 MB	2.4 GB	24 GB

Chapter 4. Installing the 3490E Model F01

Attention: This chapter describes the installation procedures for the 3490E Model F01 only. All other models must be installed by a service representative.

Note: There is a charge for service representative installs for the 3490E Model F01.

Before You Begin

CAUTION:
Read “Safety Notices” on page 101 before proceeding.

Physical Specifications

Table 2. Physical Specifications for the 3490E Model Fxx

3490E MODEL F01	3490E MODEL F11	3490E MODEL F1A	3490E MODEL FC0 RACK
Height: 48.6 cm (19.1 inches)	Height: 4 EIA units (17.1 cm or 7.0 inches)	Height: 43.2 cm (17.0 inches)	Height: 1.6 m (62.1 inches)
Width: 17.7 cm (7.0 inches)	Width: 43.2cm (17 inches)	Width: 17.7 cm (7.0 inches)	Width: 65.0 cm (25.6 inches)
Depth: 61.2 cm (24.1 inches)	Depth: 61.1 cm (24 inches)	Depth: 61.1 cm (24 inches)	Depth: 92.1 cm (36.3 inches)
Weight (without cartridges): 29.5 Kg (65 lb)	Weight (without cartridges): 27.2 Kg (60 lb)	Weight (without cartridges): 27.2 Kg (60 lb)	Weight (Without drives or FC 3500) 138 Kg (303 lb)

Operating Environment

The 3490E must be installed in an environment that meets the requirements of the Operating Environment. Table 3 shows the operating environment requirements for the 3490E.

Table 3. Drive Operating Environment Requirements

Temperature	16.0 to 32.0 °C (60.8 to 85.0 °F)
Relative Humidity	15% to 80%
Electrical Voltage	85 to 295 V AC at 47 to 63 Hz
Electrical Power	150 watts (nominal)
Noise Level	Less than 50 dB

See your initiator management or system hardware books to locate information that you will need to install the 3490E. You may find the needed information under the following topics:

1. Installing an external SCSI tape drive

2. SCSI controllers or host adapters
3. External SCSI devices

If there are no specific initiator microcode aids or written instructions for system upgrades, use the following installation instructions.

There are three major steps to completing the 3490E Model F01 installation:

Mechanical Installation

Attaching the unassembled parts to the drive for tower use.

Cabling

Attaching the interfaces and terminating the buses properly.

Configuration

Customizing the configuration options and running user diagnostics.

Mechanical Installation



The weight caution symbol indicates that the 3490E Model F01 weighs approximately 29.5 kilograms (65 pounds). It takes two persons to safely lift the unit.

Note: A #2 Phillips screwdriver is required for mechanical installation.

Follow the instructions below to attach the foot. You will need a #2 Phillips screwdriver. Refer to Figure 8 on page 17.

1. Unpack your tape drive and check that it is a tower configuration. The sides and top panel should be covered with painted panels.
2. Lay the drive down on its left side on a table or other flat surface, with the bottom toward you, allowing about 2 inches of the bottom of the drive to extend past the flat surface.
3. Align the foot, item **1** with the holes in the bottom of the drive.
4. Attach the foot as shown with the 4 screws, item **2** and washers, item **3** provided.
5. Lift the unit up and set on the foot.

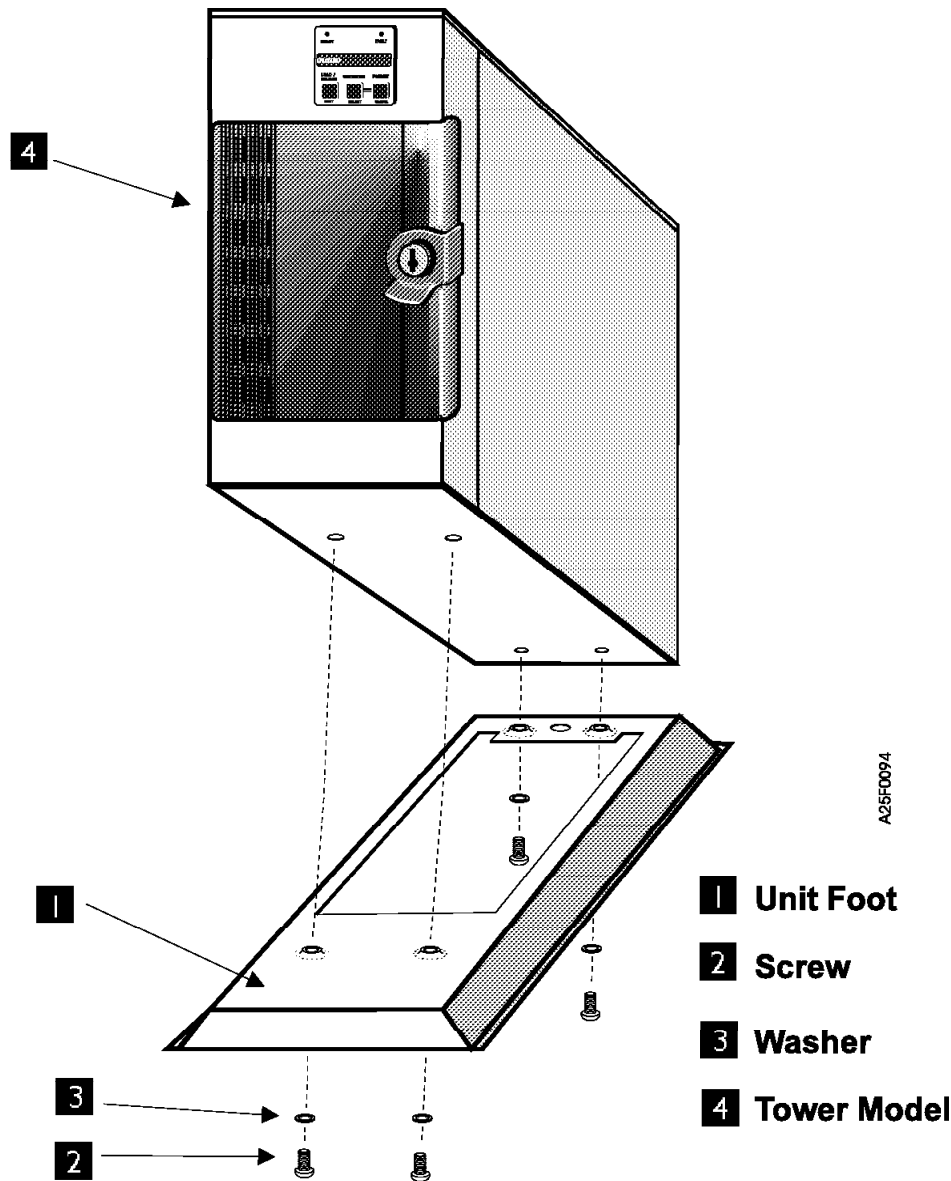


Figure 8. Tower Installation

Cabling

Cabling has three major steps:

Assembling the SCSI cable

Attaching the appropriate interfaces and terminators to the SCSI cable

Attaching the SCSI cable

Connecting the 3490E model F01 to the host system with the SCSI cable

Attaching the Power cable

Connecting the power cable to the 3490E drive

Note: Do *not* connect the interface cables and terminator when the drive is **on**. Turn the drive **off** and disconnect the power cable *before* you connect the

interface cables. If you make the connections when the drive is **on**, the over-current protection will be activated and will need to be reset. If this happens, turn off power for 1 minute, then restart.

Figure 9 shows the Power Cable Connector and SCSI connectors on the rear panel of the 3490E model F01.

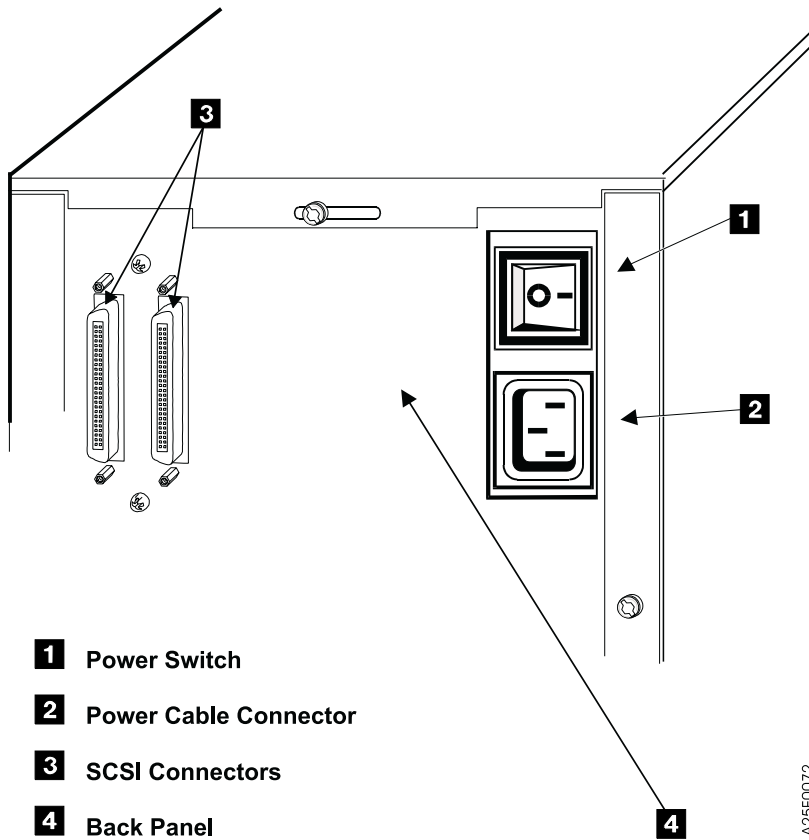


Figure 9. Interface connectors—Model F01

Preparing for Installation

Note: Do **not** connect cables at this time.

1. ___ Make sure that your host system has the appropriate SCSI interface card, connector, and driver software installed.
2. ___ Inspect the terminator and make sure that it is a differential terminator. The terminator should be clearly marked **differential**.
3. ___ Determine whether you plan to use the drive in a daisy chain or standalone application.
 - a. If the drive is to be used in a standalone configuration, the terminator will be installed in the second SCSI connector as shown in Figure 15 on page 23.
 - b. In a daisy chain configuration, the terminator is used only on the last drive in the chain. Save extra terminators for future use in case the configuration ever changes.
4. ___ Measure the cable length required to connect the drive to the system. Check to make sure that it falls within the range shown in the example under “Measuring SCSI Cable Length” on page 19.

Assembling the SCSI Cable

This section is a guideline to help you assemble the appropriate parts for SCSI cable connection. It is suggested that you first measure the cable length, and then attach the necessary interposers and adaptors.

Measuring SCSI Cable Length

The following example of a SCSI string gives an idea of how the allowed length can be taken up by cables and attached devices. 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 10 shows an example of how to calculate the bus length. Table 4 shows the cable part numbers for each length.

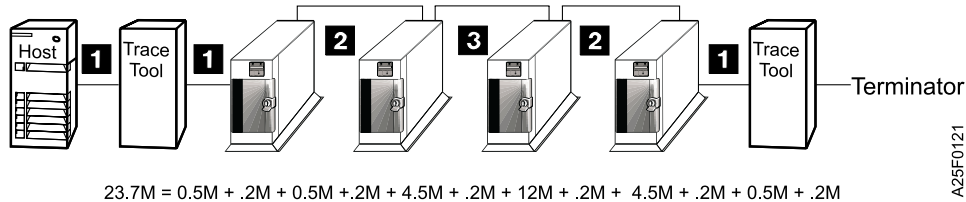


Figure 10. SCSI Bus Cable Lengths

Table 4. Part Numbers for the 3490E Model Fxx SCSI Bus Cables and Terminators

Key	Meters	Feet	P/N	Usual Connection
1	0.5	2	49G6456	Devices in same rack
2	4.5	15	49G6457	Side by side
3	12	39	49G6458	Device connection to the host or device
	N/A	N/A	05H6908	Differential Terminator
	18	59	49G6459	Device connection to the host or device

Connecting the SCSI Cable at the Host

Figure 11 on page 20 shows a typical attachment of a 3490E Model Fxx to a RS/6000 and AS/400, with connectors, interposers, and cables. An interposer may be required at the host end of the SCSI cable. See Table 5 for the needs of your particular attachment.

To connect the SCSI cable at the host, perform the following steps:

1. ___ Install the appropriate interposer on the SCSI interface connector on the host. Be sure to securely attach the interposer before attaching the SCSI cable.
2. ___ Connect the SCSI cable to the interposer that you just installed, or if no interposer was needed, install the SCSI cable into the host SCSI interface connector.
3. ___ Continue installation at “Attaching the SCSI Cables” on page 21.

Table 5. Interposers and Adapters

Host	Description	Adapter	Interposer
RS/6000	PCI SCSI 2 Differential Fast/Wide Adapter	FC 2409	None required
RS/6000	PCI SCSI 2 Fast/Wide Differential Adapter	FC 6207	None required
RS/6000	PCI SCSI 2 Fast/Wide Differential Adapter	FC 6209	None required

Table 5. Interposers and Adapters (continued)

Host	Description	Adapter	Interposer
RS/6000	SCSI 2 Differential Fast/Wide Adapter/A	FC 2416	50G0460 (FC 2892)
RS/6000	Enhanced SCSI 2 Differential Fast/Wide Adapter/A	FC 2412	50G0460 (FC 2892)
RS/6000	SCSI 2 Differential Fast/Narrow High Performance I/O Controller	FC 2420	61G8323 (FC 2891)
AS/400	Magnetic Media Subsystem Controller	FC 2729	None Required
AS/400	Magnetic Media Subsystem Controller	FC 6501	05H3834 (FC 2895)
AS/400	Magnetic Media Subsystem Controller	FC 6534	None Required

Note: The AIX Device Driver is FC 9603. Refer to your host documentation for the latest information.

Figure 11 shows the SCSI cables and interposers as they attach at the RS/6000 host end.

Figure 12 on page 21 shows the SCSI cables and interposers as they attach at the AS/400 host end.

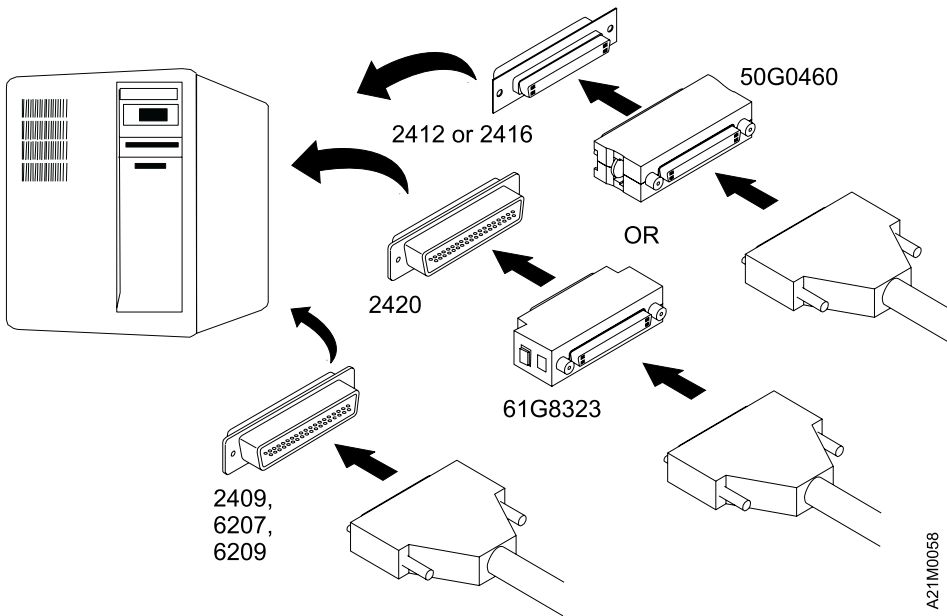


Figure 11. SCSI Cable/Interposer Attachment at RS/6000 Host End

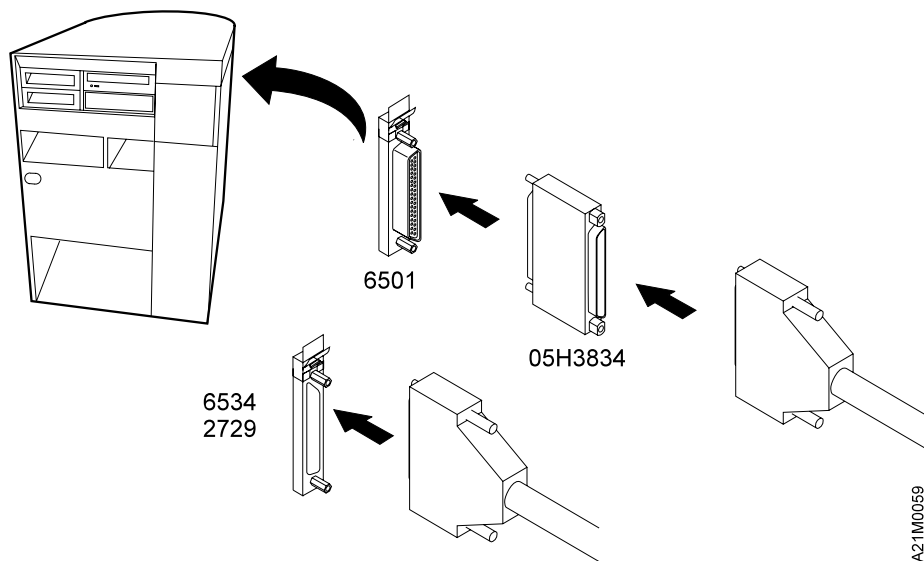


Figure 12. SCSI Cable/Interposer Attachment at AS/400 Host End

Attaching the SCSI Cables

Note: Power to the 3490E model F01 and the Host system must be **OFF** during this procedure.

Standalone Applications: To connect a single 3490E model F01 to the Host System, perform the following procedure:

1. ___ Connect the assembled SCSI cable to the Host System. See “Connecting the SCSI Cable at the Host” on page 19.
2. ___ Connect the other end of the SCSI cable to the 3490E model F01 drive. Either of the SCSI connectors on the drive may be used.
3. ___ Attach the appropriate terminator to the open SCSI connector on the drive.

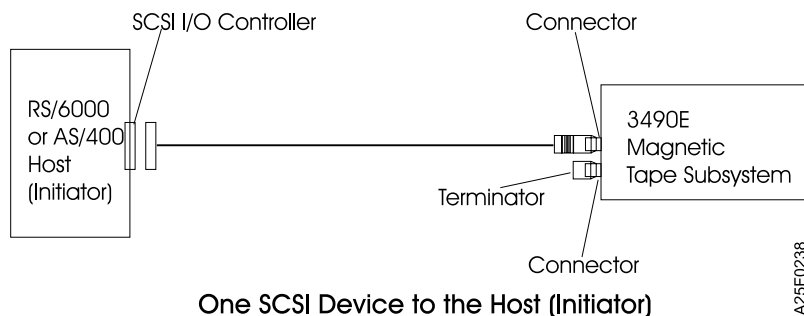


Figure 13. Connecting One SCSI Device to the Host

Daisy Chained Applications: To connect multiple 3490E model F01 drives to the Host System in a daisy chain application, perform the following procedure:

1. ___ Connect the assembled SCSI cable to the Host System. See “Connecting the SCSI Cable at the Host” on page 19.

2. ___ Connect the other end of the SCSI cable to the 3490E model F01 drive. For the first drive in the chain, the SCSI cable from the Host system may be attached to either of the SCSI connectors on the drive.
3. ___ Use the other SCSI connector to attach another SCSI cable leading to the next drive in the daisy chain.
4. ___ Repeat steps 2 and 3 until all the desired drives are connected.
5. ___ Attach the appropriate terminator to the open SCSI connector of the last drive in the daisy chain.

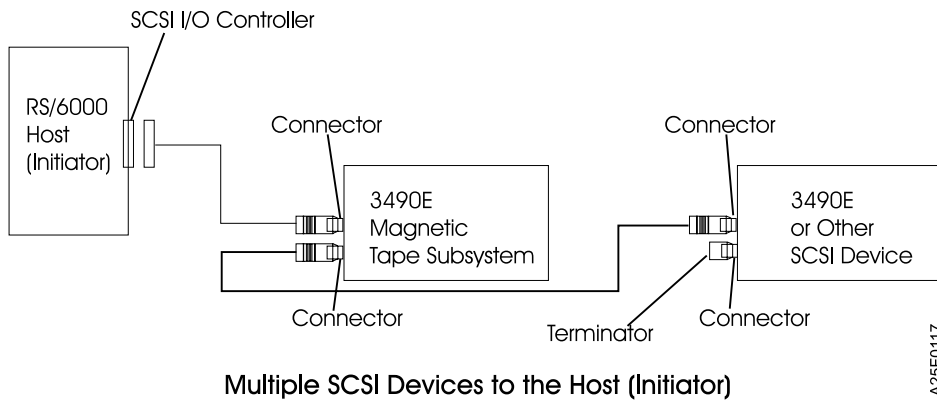


Figure 14. Connecting Multiple SCSI Devices to the Host

Interfaces

The 3490E Model Fxx is configured with a differential fast/wide SCSI 2 interface. There are two daisy chained SCSI cable connectors at the rear of the drive. Figure 15 on page 23 shows the SCSI cable, connectors and bus terminator used on the tape drive. In order to connect the tape drive to a host computer system, the host system must have a SCSI bus and the appropriate driver software.

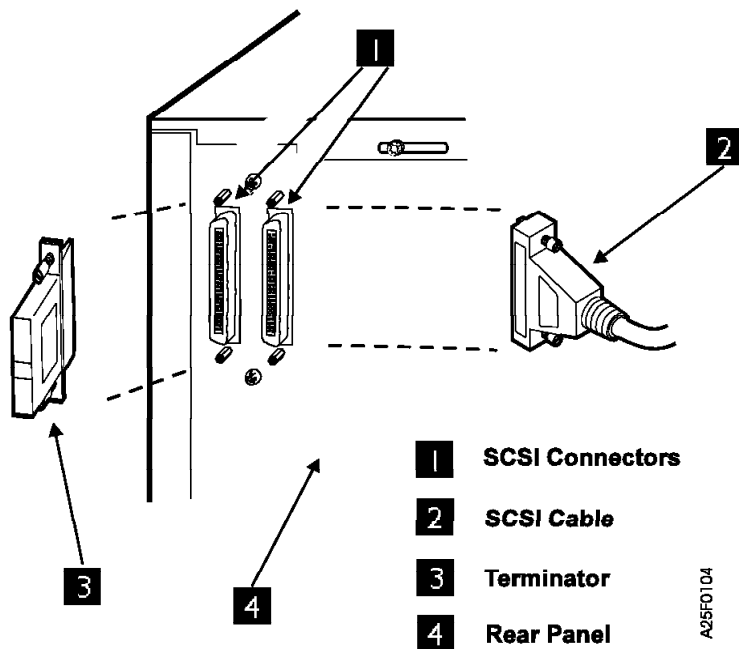


Figure 15. SCSI Rear Panel—F01

Attaching the Power Cable

The AC power cable is a standard AC cable and connects to the drive on the rear panel. Refer to Figure 9 on page 18 for the location of the power cable connector. Install the cable into the connector on the drive and connect the power end of the cable to a properly grounded AC outlet or rack power outlet.

Check to make sure that you received the appropriate power cable for your installation. See Table 6 and Figure 16 on page 25 for power cable and receptacle information.

Table 6. Power Cord Specifications

Country	Voltage / Amperes	Length	Power Cord Plug	Feature Code and P/N
Bahamas, Barbados, Bolivia, Brazil, Canada, Costa Rica, Dominican Republic, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Japan, Netherland Antilles, Panama, Peru, Philippines, Taiwan, Tobago, U.S.A. (except Chicago), Venezuela	250 V / 15 A	2.7 m (9 ft)	1	FC 9833 P/N 1838574

Table 6. Power Cord Specifications (continued)

Country	Voltage / Amperes	Length	Power Cord Plug	Feature Code and P/N
Bahamas, Barbados, Bermuda, Bolivia, Brazil, Canada, Cayman Islands, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Japan, Korea (South), Mexico, Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Puerto Rico, Saudi Arabia, Suriname, Taiwan, Trinidad, U.S.A. (except Chicago), Venezuela, Vietnam	125 V / 15 A	2.7 m (9 ft)	2	FC 9800 P/N 6952300
U.S.A. Chicago	125 V / 15 A	1.8 m (6 ft)	2	FC 9986 P/N 6952301
U.S.A. Watertight	125 V / 15 A	4.3 m (14 ft)	12	FC 9080 and FC 9800 P/N 46F5894
U.S.A. Chicago Watertight	125 V / 15 A	1.8 m (6 ft)	12	FC 9080 and FC 9986 P/N 46F5893
Argentina, Australia, New Zealand	250 V / 10 A	2.7 m (9 ft)	3	FC 9831 P/N 13F9940
Abu Dhabi, Angola, Antigua, Austria, Belgium, Bosnia, Botswana, Bulgaria, Cameroon, Croatia, Czech Republic, Egypt, Finland, France, Germany, Greece, Hungary, Iceland, Indonesia, Iran, Ivory Coast, Korea (South), Lebanon, Liberia, Luxembourg, Macao, Madagascar, Morocco, Mozambique, Netherlands, Netherlands Antilles, Norway, Paraguay, Poland, Portugal, Rhodesia, Romania, Russia, Saudi Arabia, Serbia, Slovakia, Slovenia, Spain, Sudan, Sweden, Syria, Swaziland, Tunisia, Turkey, Yugoslavia, Zaire	250 V / 16 A	2.7 m (9 ft)	4	FC 9820 P/N 13F9979
Denmark	250 V / 10 A	2.7 m (9 ft)	5	FC 9821 P/N 13F9997
Bangladesh, Burma, Pakistan, South Africa, Sri Lanka	250 V / 16 A	2.7 m (9 ft)	6	FC 9829 P/N 14F0015

Table 6. Power Cord Specifications (continued)

Country	Voltage / Amperes	Length	Power Cord Plug	Feature Code and P/N
Bahrain, Bermuda, Bosnia, Brunei, Channel Islands, Cyprus, Ghana, Hong Kong, India, Iraq, Ireland, Jordan, Kenya, Kuwait, Malawi, Malaysia, Nigeria, Oman, People's Republic of China, Qatar, Sierra Leone, Singapore, Tanzania, Uganda, United Arab Emirates (Dubai), United Kingdom, Zambia	250 V / 15 A	2.7 m (9 ft)	7	FC 9825 P/N 14F0033
Liechtenstein, Switzerland	250 V / 10 A	2.7 m (9 ft)	8	FC 9828 P/N 14F0051
Chile, Ethiopia, Italy, Libya, Malta, Sierra Leone, Somalia	250 V / 10 A to 16 A	2.7 m (9 ft)	9	FC 9830 P/N 14F0069
Israel	250 V / 6 A to 16 A	2.7 m (9 ft)	10	FC 9827 P/N 14F0087

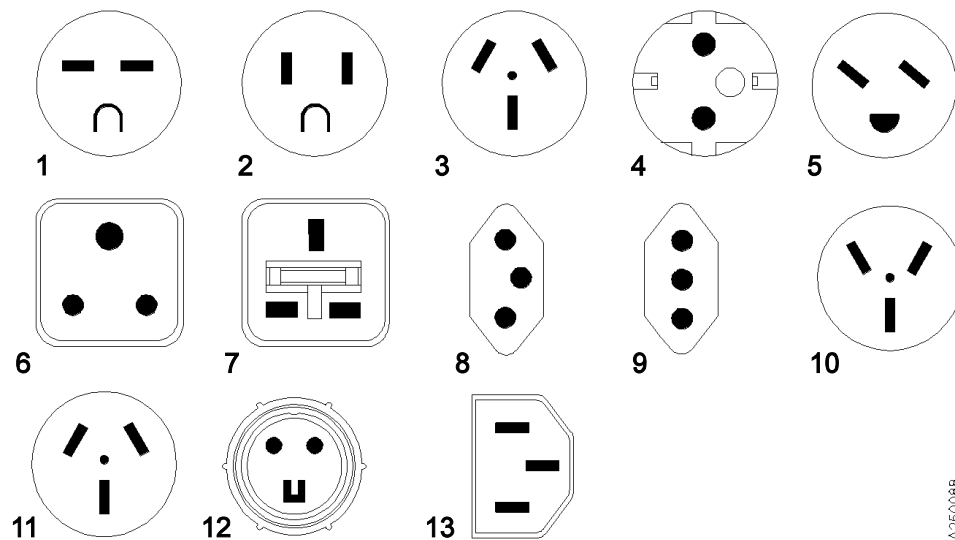


Figure 16. Types of Receptacles

3490E F01 SCSI Attach To S/390 Model 3006 or 7060

When attaching an F01 drive via SCSI to a S/390 Model 3006 or 7060 host, the following drive options must be set:

Table 7. SCSI Drive Option Settings

Option	Setting
31	Disp. Cart. Used
32	Normal Mode
44	Sync 1FMK
46	16
50	(Set to address used by customer, usually 0)

Table 7. SCSI Drive Option Settings (continued)

Option	Setting
63	3490E Mod F
65	18 Trk Wrt UNLKD=Enabled
71	Bypass FID
73	Read to 1Filemark
75	Auto clean on

All other options should be set to their default settings.

Note: Drive code level C35103 Rev F or higher is required.

Chapter 5. Using the 3490E Model Fxx Drive

The 3490E is capable of performing many different types of data transfer and processing. The configuration settings determines how the drive will operate. It is important to determine what functions you require the drive to run for your particular application. The drive comes preconfigured with factory default settings that meet the needs of most customer operations. These settings can be easily changed.

Attention: It is highly recommended that you record all current settings before changing them. If you change the settings, record the new settings also. A blank column has been reserved for recording configuration settings in Table 12 on page 36.

There are two main steps to completing the configuration setup:

Customizing the Configuration Options

Verifying the default settings and changing settings for specific application functions

Running User Diagnostics

Confirming the configuration option settings are appropriate for the drive application

Understanding the Indicators and Control Panel

Before beginning the configuration setup, become familiar with the control panel and indicator functions. The control panel is designed to display messages and menu options. Indicator lights represent drive function.

Indicators

There are two indicators on the control panel. The function of each is described in Table 8.

Table 8. Control Panel Indicators

Indicator (Color)	Function
● READY (Green)	The drive is in Ready Mode and awaiting commands. The READY light will flash on and off when the drive is performing a read or write operation.
● FAULT (Red or Yellow)	An error or fault has been detected during drive operation.

Control Panel

The control panel is located on the front panel as shown in Figure 17 on page 28.

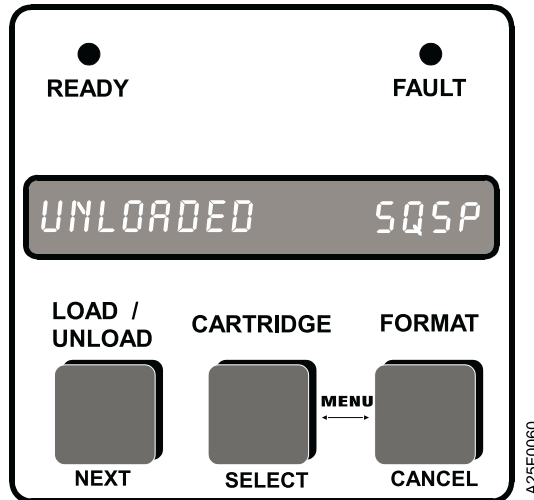


Figure 17. Control Panel

Buttons

The three buttons on the control panel of the drive are used to operate the drive. Each button has a dual function to allow basic operation and diagnostics to be initiated by using the same button. Normal Mode is described in Table 9. Diagnostics Mode, which is used to change configuration settings and run diagnostics, is described in Table 10 on page 29.

Table 9. Control Panel Buttons — Normal Mode

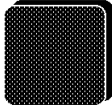

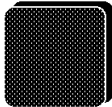




Button	Function
<p>LOAD/ UNLOAD</p>  <p>NEXT</p>	<p>To unload and load cartridge tape or clear soft errors.</p> <ul style="list-style-type: none"> • If a cartridge is not loaded, nonfatal errors will be cleared and a selected cartridge will be loaded. • If a cartridge is already loaded, the tape will be unwound and the cartridge will be unloaded from the drive.
<p>CARTRIDGE</p>  <p>SELECT</p>	<p>To display or select the cartridge to be loaded.</p> <ul style="list-style-type: none"> • To display the number of the cartridge that will be loaded, press once briefly while no cartridge is loaded. The selected cartridge number will be displayed for a few seconds. • To select a specific cartridge for loading, press and release repeatedly until selected cartridge number is displayed.
<p>FORMAT</p>  <p>CANCEL</p>	<p>To display and select the recording format.</p> <ul style="list-style-type: none"> • To display the default recording format, press once while the drive is unloaded, or when a tape is at the beginning of the tape (BOT). • To change the recording format, press and hold the button while the current recording format is displayed. The format will be changed from 3480 to 3490 to 3490E.

Table 10. Control Panel Buttons — Diagnostic Mode

Button	Function
<p>MENU</p> 	This symbol instructs the user to press SELECT and CANCEL simultaneously to access the Configuration and Diagnostic menus.
<p>LOAD/ UNLOAD</p>  <p>NEXT</p>	To advance the display to the next menu, option or setting.
<p>CARTRIDGE</p>  <p>SELECT</p>	To select the currently displayed menu, setting or option.
<p>FORMAT</p>  <p>CANCEL</p>	To cancel the current menu level and return to the next higher menu level.

Display Messages

The control panel displays four types of informational messages during drive operation:

Status

reports the current condition of the drive.

Operation

reports the current function of the drive.

Cleaning

reports the progress during a cleaning process.

Fault

reports errors encountered during drive function.

The messages coincide with menu selection and commands initiated by the host or user. Common messages that will be reported to the control panel are listed in Table 11 with a brief explanation.

Note: Display messages that are encountered while in specific diagnostics or during configuration are not shown in the table.

Table 11. Display Messages

Message	Type	Description
3480 3490 3490E	Status	Default recording format.
ACTIVE	Operation	The drive is executing a command and the tape is in motion.

Table 11. Display Messages (continued)

Message	Type	Description
AUTO CLEAN	Cleaning	Automatic cleaning is in progress.
CART X	Status	The selected cartridge (slot #X) will be the next cartridge loaded in the drive.
CART X PROT	Status	The selected or loaded cartridge (slot #X) is write protected.
CART X 34XXX	Status	The selected cartridge (slot #X) will be written in 3480, 3490 or 3490E format.
CLEAN	Cleaning	The drive is waiting for user confirmation to execute a cleaning cycle.
CLEANER CART	Cleaning	The Cleaning Options Menu is displayed.
CLEANER PRESENT	Cleaning	A Cleaner cartridge is loaded in the cleaner slot.
CONFIG OPT X	Status	Configuration option X has been selected.
DIAG TEST X	Status	Message flashes while diagnostic test X is executing.
DIAG TEST XX	Operation	Diagnostic Test XX will be executed when SELECT is pressed.
DIAG TESTS	Status	The drive is ready for the user to select a test.
DISP BUF LOG	Status	This is the buffered log menu.
DISP F/W REV	Status	This is the microcode revision number menu.
DISP SS FSC LOG	Status	This is the Fault Symptom Code log menu.
DOOR OPEN	Fault	The drive door is open.
DRIVE CLEANING	Cleaning	The drive is performing a cleaning cycle.
EDIT CONFIG OPT	Status	The drive is ready for the user to edit a configuration option.
EXECUTE?	Status	The drive is waiting for the user confirmation to execute a test.
FAULT CLEARED	Status	A temporary error has been cleared.
FAULT CODE XXXX	Fault	A fault has been detected. The number indicates the type of fault. Call IBM for service.
FLASH STATUS XX	Status	Indicates the status of the microcode update process to update the drive's flash memory.
IDRC DFLT OFF	Status	The IDRC default is off.
IDRC DFLT ON	Status	The IDRC default is on.
INITIALIZING	Operational	The drive is powering up, performing the POST diagnostics, and checking the load status.
INSTALL	Status	The drive is waiting for user confirmation to load the cleaning cartridge from Slot 10.
INSTALL CLEANER	Cleaning	The drive is waiting for user confirmation to begin the cleaning cartridge installation process.

Table 11. Display Messages (continued)

Message	Type	Description
INVENTORY	Status	The drive is performing an inventory of occupied cartridge slots.
LOADING CART X	Operation	The drive is loading cartridge X. X signifies the cartridge's slot number.
MOVING X TO Y	Status	Moving cartridge from slot #X to Slot #Y. (Displayed when the drive is in Random Mode)
NO FLASH INST	Fault	An attempt to update the Flash PROM failed, because the drive is not equipped with Flash PROM.
NOT CLEANER CART	Cleaning	The cartridge selected is not a cleaner cartridge.
OP CANCELED	Fault	A diagnostic test was canceled by user.
PANEL LOCKED	Fault	The drive is in random mode and the control panel is locked. (The cancel button is inoperable).
PLEASE POWER OFF	Operation	After a successful F/W update, the drive will need to be reset. Note: No longer exists with microcode level C 35099 or higher.
PLEASE WAIT...	Operation	The drive is performing an operation.
RECOVERING CART	Operation	A cartridge was left loaded from the last power down. The drive is retensioning the tape and will eject the cartridge.
RESETTING...	Operation	The drive is resetting its microcode for inventory. See "Power On Self Test Diagnostics" on page 43 for more information.
REMOVE	Cleaning	Remove the cleaner cartridge.
REMOVE ALL CARTS	Operation	Remove all cartridges from the drive.
REMOVE CART X	Operation	Remove cartridge X from the drive.
REPACKING	Operation	The drive is performing an error recovery based on detection of a short length cartridge or a loose wrap.
REPLACE CLEANER	Cleaning	Time to replace the cleaning cartridge.
SHOW USAGE	Cleaning	Show the number of cleaning cycles the cleaning cartridge has been through.
SHUTTLE MODE	Status	The drive is in Shuttle Mode, waiting for the operator to select an autoloader mode.
SUCCESSFUL	Status	A new configuration option setting has been accepted, or a load/clean cycle of the cleaning cartridge has been completed.
UNLOAD CART XX	Operation	The drive is unloading cartridge XX.
UNLOADED XXXX	Status	The drive is unloaded and no cartridge is threaded in the drive. XXXX represents the current autoloader shuttle mode. Shuttle modes are shown in Figure 18 on page 33.

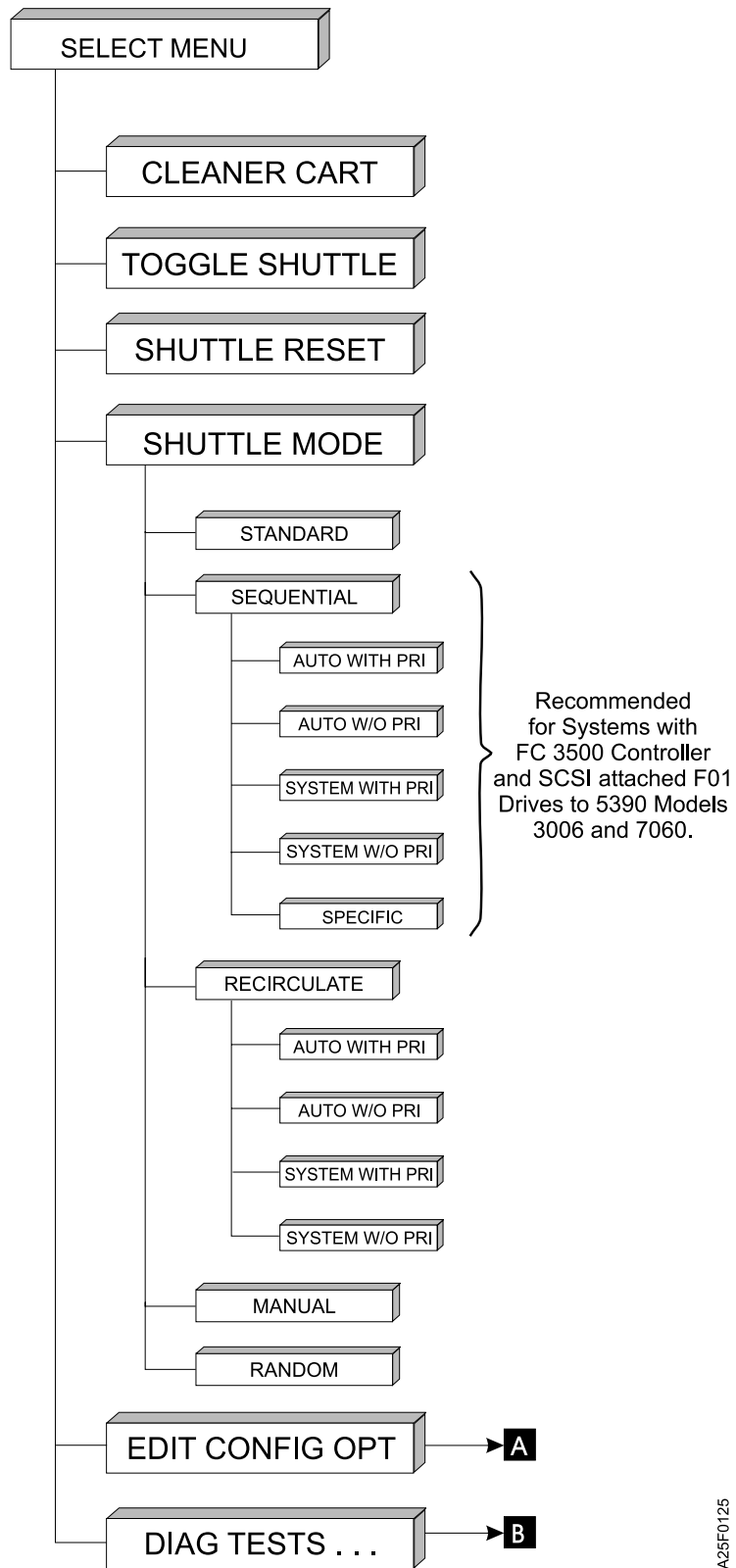
Table 11. Display Messages (continued)

Message	Type	Description
USED=XXX...MX	Status	Displays cartridges which have been used. An "M" before a cartridge number indicates that the cartridge from that slot is mounted. This message only appears when the drive is in one of the sequential shuttle modes of operation.
VIEW CONFIG OPT	Status	The drive is ready for the user to view a configuration option.

Menus

The 3490E Model Fxx has several menus for User Diagnostics. Abbreviated menus are shown on the display during operation.

The complete menu structure is shown in Figure 18 on page 33. This structure should be referenced when using any of the menu functions.



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Figure 18. Menu Structure (Part 1 of 2)

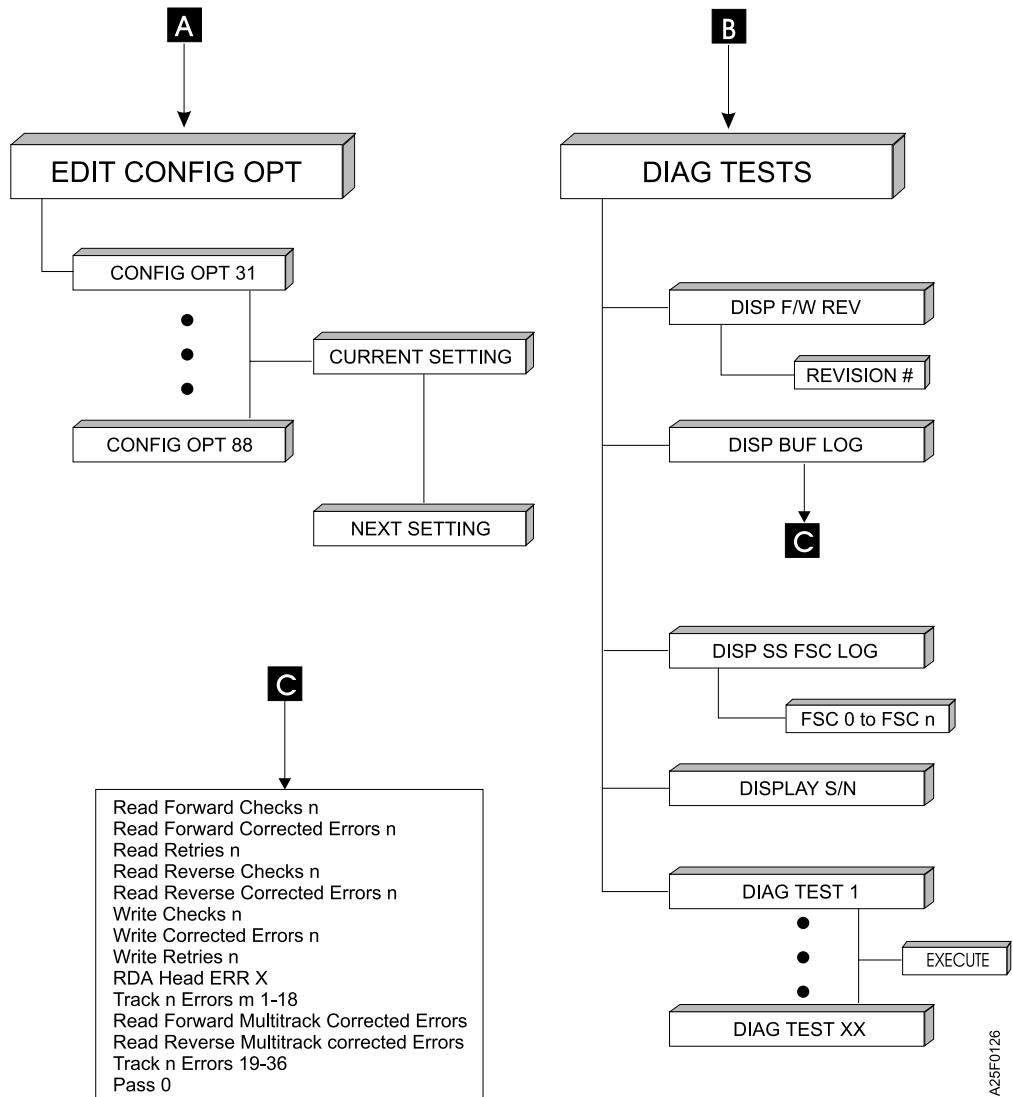


Figure 18. Menu Structure (Part 2 of 2)

Configuring the Drive

Customizing the Configuration Options

The factory default configuration settings meet most application requirements, but it is necessary to confirm that these settings are suitable for your application. This section contains information on reviewing and changing the configuration settings.

Note: It is highly recommended that you record all current settings before changing them. If you change the settings, record the new settings also. A blank column has been reserved for recording configuration settings in Table 12 on page 36.

Note: If you have an existing 3480, 3490, or 3490E, the simplest configuration is to duplicate the existing drive's configuration on the new 3490E drive(s)

Reviewing and Editing Configuration Option Settings

To review and/or change the configuration options settings, perform the following procedure:

1. If the drive is loaded, press **LOAD/UNLOAD** and wait for "UNLOADED" to be displayed on the control panel.
2. Go to **MENU**. The display will show "CLEANER CARTRIDGE".

Note: To select **MENU**, press **SELECT** and **CANCEL** simultaneously.

3. Press **NEXT** until "EDIT CONFIG OPTS" is displayed.
4. Press **SELECT**. The display will show the first option, "CONFIG OPT 31".
5. Press **SELECT** again. The display will show the current setting for this option.
6. Scroll through the various settings by pressing **NEXT**.
7. To **change** the setting:

Press **SELECT** when the desired setting is displayed. The control panel will display "SUCCESSFUL" when the setting has been changed. .

Note: Record all changes to the configuration settings in Table 12 on page 36.

To exit without changing the setting:

Press **CANCEL** once to exit to the second level menu, which displays "CONFIG OPT 31".

8. Press **NEXT** to display the next configuration option. Repeat steps 4 through 7 until all the configuration option settings have been verified.

Note: Configuration Option 88 is the drive serial number. To exit from this option, hold down the **CANCEL** button.

9. To exit from the configuration options, press **CANCEL** twice.

Note: If any of the configuration options have been changed, the control panel will display "RESETTING", and the drive will reset.

10. Press **CANCEL** to return the drive to its ready state. The control panel should display "UNLOADED".

Configuration Options

The following table shows the options available for all 3490E Model Fxx.

Table 12. Configuration Options For Model Fxx

Option #	Description	Possible Settings	Default	Custom Setting
31	Running Display Mode	DISP WRT FORMAT DISP TAPE RMNG DISP USED CARTS	DISP WRT FORMAT DISP USED CARTS <if FC 3000 or FC 3500 attached	
32	Attachment Mode	<ul style="list-style-type: none"> • NORMAL MODE • F1A MODE 	NORMAL MODE <Models F01 and F11> F1A MODE <Model F1A>	
35	VSE Native Attached	<ul style="list-style-type: none"> • VSE OFF • VSE ON 	VSE OFF	
41	SCSI Read Ahead	<ul style="list-style-type: none"> • SCSI READ AHEAD ON • SCSI READ AHEAD OFF 	SCSI READ AHEAD ON	
44	Write Synchronization	SYNC 2 FMK = Sync on 2nd consecutive filemark SYNC ALWAYS = Sync on all filemarks and data NO SYNC = No sync (Overrides Host unbuffered mode) SYNC 1 FMK = Sync on 1 filemark	SYNC 2 FMK SYNC 1 FMK <if FC 3000 or FC 3500 attached	
46	Maximum Read Retries	32 = 32 4 = 4 8 = 8 16 = 16	32	
47	Maximum Write Retries	16 = 16 1 = 1 2 = 2 4 = 4 8 = 8	16	
48	Lockout Format Switch/Host format changes	HOST/PANEL UNLKD = Host and panel unlocked PANEL LOCKED = Panel Format switch locked HOST LOCKED = Host locked	HOST/PANEL UNLKD	

Table 12. Configuration Options For Model Fxx (continued)

Option #	Description	Possible Settings	Default	Custom Setting
49	Block Size (All values in Bytes)	VARIABLE = Variable Block Mode 4 = 4 8 = 8 16 = 16 32 = 32 64 = 64 128 = 128 256 = 256 512 = 512 1024 = 1K 2048 = 2 K 4096 = 4 K 8192 = 8 K 16384 = 16 K 32768 = 32 K 65536 = 64 K	VARIABLE	
50	Address	<ul style="list-style-type: none"> ID 0 to ID 7 (00 to 07) or ID 0 to ID 15 (00 to 15) for Fast Wide AS/400 settings must be ID 0 	ID 0	
51	SCSI Parity Enabled	YES = Enable NO = Disable	YES	
52	Device Type	DFLT DEV(80H) = 80h F88OES(C5H) = C5h KENNEDY(82H) = 82h	DFLT DEV(80H)	
53	Rewind Ready Disabled	NO = Disable YES = Enable	NO	
54	Initiate Wide/Sync Transfers Disabled	NO = Disable YES = Enable	YES	
55	EOT Mode Reporting	STD = Standard PICK = PICK Mode	STD	
56	Early LEOT	<ul style="list-style-type: none"> EARLY LEOT OFF EARLY LEOT ON 	EARLY LEOT OFF	
57	Report 2's Complement	NO = No YES = Yes	NO	
62	Default Density	3490E = 3490E 3480/3490 = 3480/3490	3490E	

Table 12. Configuration Options For Model Fxx (continued)

Option #	Description	Possible Settings	Default	Custom Setting
63	SCSI Emulation Mode	SCSI 2 = SCSI 2 HP 88780 = HP 88780 HP 9348 = HP 9348 VU DENSITY = Vendor Unique 9 Track HP 7980S Fujitsu M2451E IBM 3490E MOD.C IBM 3490E MOD.E IBM 3490E MOD.F FUJITSU M2483B Note: AS/400 setting must be "3490E Mod.E" for OS/400 release level V3R6 and below. May be "3490E Mod.F" for OS/400 release level V3R7 and above.	3490E MOD.F <Models F01/F11 on RS/6000> (see Note) 3490E MOD.E <Models F01/F11 for AS/400> (see Note) 3490E MOD.F <All Model F1A and FC0 drives> Note: See note at end of table.	
65	Lock Out 18 Track Writes	18 TRK WRT UNLKD = Enabled 18 TRK WRT LKD = Disabled	18 TRK WRT UNLKD<Models F01/F11> 18 TRK WRT LKD <Model F1A, and FC 3000 or FC 3500 attached>	
66	Unload Mode	STATUS ON RELOAD STATUS ON UNLOAD	STATUS ON RELOAD	
67	MTW Errors	RETRY MTW ERRS PERMIT MTW ERRS	RETRY MTW ERRS	
68	SCSI Transfer Rate	SYNC 10 MB/SEC = Sync 10 MB/sec ASYNC ONLY = Async only SYNC 5MB/SEC = Sync 5 MB/sec	SYNC 10 MB/SEC	
69	Default Tape Format	3490E COMP 3490E UNCOMP 3490 3480	3490E COMP	
71	ILS (Inner Layer Slip) & FID (Format ID) Check	NO BYPASS ILS BYPASS FID BYPASS ALL BYPASS	NO BYPASS	
72	Immediate Command Response	DISCONNECT BUSY	DISCONNECT	
73	Filemark Processing	READ TO 2 FMARKS READ AHEAD READ TO 1 FMARK	READ TO 2 FMARKS	

Table 12. Configuration Options For Model Fxx (continued)

Option #	Description	Possible Settings	Default	Custom Setting
74	End of Data Processing	<ul style="list-style-type: none"> • READ TO EOD • READ PAST EOD 	READ TO EOD	
75	Auto Clean Mode	AUTO CLEAN ON AUTO CLEAN OFF	AUTO CLEAN ON <Models F01 and F11> AUTO CLEAN OFF <Model F1A>	
76	Pack Mode	PACK AFTER RTYS PACK BEFORE RTYS PACK ON LOAD PACK DISABLED	PACK AFTER RTYS	
77	Allow 18 Track Append	18 TRK WRITE OFF 18 TRK WRITE ON	18 TRK WRITE OFF	
88	Drive Serial Number	<Example> F1A-13-F9994 Note: In the example, F1A is the model, 13 is the plant of manufacture (for this product, San Jose which is coded 13), and F9994 is the S/N.	Actual Drive S/N	
Notes: <ol style="list-style-type: none"> 1. If you see Option 52 in the Option Menu, check to ensure that Option 63 has been set to one of the "IBM 3490E" Models. 2. If Option 54 is set to NO, error code E0B1 may occur. Always set Option 54 to YES. 3. For RS/6000 host attachment, setting "3490E MOD.F" is correct for SCSI Emulation Option (63) as long as the host A-Tape Driver installed is at 3.1.x.x level or higher. If an earlier level of A-Tape Driver is installed, you should choose setting "3490E MOD.E". 4. For AS/400 host attachment, setting "3490E MOD.F" is correct for SCSI Emulation Option (63) as long as the OS/400 release level is at V3R7 or higher. If an earlier level of OS/400 is installed, you MUST choose setting "3490E MOD.E". 5. All Model F1A drives should be configured to 3490E MOD.F for Option 63. 6. Option 66 should be set to STATUS on UNLOAD. The default value will be changed from STATUS ON RELOAD to STATUS on UNLOAD in the near future. 7. Drives with microcode levels EC C35098 and under do not have option 72 available. 8. Drives with microcode levels EC C35101 and under do not have option 71 available. 9. All autoloaders within a frame should be configured the same except for Address (Option 50) and Drive Serial Number (Option 88). 				

Configuration Options Explanation

Customizing Configuration

The configuration menu has two levels accessible from the Control Panel. In Review Mode, you can view options, but you cannot edit them. To edit the options, you must enter Edit Mode. To enter Edit Mode for the Model Fxx, go to "Reviewing and Editing Configuration Option Settings" on page 35.

The following configuration options are offered on the 3490E Model Fxx.

Option 31 - Running Display Mode: This option allows the user to select whether to indicate tape remaining, display the write format, or display tapes used and/or mounted. For systems with an FC 3000 or FC 3500 attached, the default is DISP USED CARTS. For all other systems, the default is DISP WRT FORMAT.

Option 32 - Attachment Mode: This option allows the user to select whether the drive is installed within an IBM 3494 Tape Library Dataserver or not. The default is F1A MODE for the Model F1A and NORMAL MODE for Models F01 and F11.

Option 35 - VSE Native Attached: This option must be set to VSE ON when the F1A drive is attached to an FC 3500 controller that is attached to a Native VSE host. For all other drive attachments, this option must be set to VSE OFF. The default is VSE OFF.

Option 41 - SCSI Read Ahead: Setting this option to SCSI READ AHEAD OFF may provide some performance improvement for specific applications that do a lot of positioning operations (which internally cause the drive to backspace). Data streaming operations should be run with SCSI READ AHEAD ON. The default is SCSI READ AHEAD ON.

Option 44 - Write Synchronization: The setting of this option specifies when stored data is written to tape before accepting new data from the host. The default setting, SYNC 2 FMK, causes the drive to write the buffer contents to tape when 2 consecutive filemarks are detected. However, if the system is FC 3000 attached, the default setting is SYNC 1 FMK. Setting this option to SYNC 1 FMK will force the drive to write on receipt of each file mark. When SYNC ALWAYS is selected, the drive writes to tape when it receives each Write Data or Write Filemark command. On the no sync setting the drive writes data at intervals determined by an algorithm which analyzes the data in the buffer. Use of a setting other than the default will result in slower write-to-tape speed.

Note: When the FC 3000 or FC 3500 is installed, set this option to SYNC 1 FMK

Option 46 - Maximum Read Retries: You can choose to have the drive try to read the data up to 32 times before issuing an error. However, you may also want to choose only 4 or 8 retries in order to speed up operations. Generally, if a read fails at 8 retries, it will fail at 32 retries. You may want to change this option to agree with host timeouts. The default is 32.

Option 47 - Maximum Write Retries: You can choose to have the drive attempt to write data up to 16 times before issuing an error. You may want to change this option to agree with host timeouts. The default is 16.

Option 48 - Lockout Format Switch/Host Format Changes: This option allows the user to choose whether the FORMAT button is allowed to change the write density from 3480 to 3490 to 3490E, and whether the host can do the same. The default is host and panel unlocked. If Option 43 is set to disable the format display, the FORMAT button is locked out.

Option 49 - Block Size: This option specifies the size of the data blocks that the drive will read and write for SCSI Fixed Mode commands. It is usually best to set this on variable block mode unless you know that your software requires a certain block size or if you are certain that your block sizes do not exceed the maximum size. Data contained in blocks larger than the block size setting will be truncated. The default is variable block size.

Option 50 - Address: This option specifies the drive address of the SCSI ID. The default is 03. In order for changes to this option to take effect, the power to the drive must be cycled.

Option 51 - SCSI Parity Enabled: When this option is enabled, the drive validates parity to check the controller and cable. If your controller does not support parity, this option should be disabled. In order for changes to this option to take effect, the power to the drive must be cycled. The default is parity check enabled.

Option 52 - Device Type: This option determines the Device Type qualifier byte (byte 2) of the drives response to a SCSI Inquiry command. If your system requires a specific drive emulation, change this setting to match it.

Note: You should not see this option if option 63 is set correctly.

Option 53 - Rewind Ready Disabled: This option determines the response to the Test Unit Ready Command during rewind. The default setting causes the drive to report not ready while rewinding.

Option 54 - Initiate Wide/Sync Transfers Disabled: This option allows the tape drive to initiate negotiations for synchronous data transfer and wide data transfer from the host. Only a fast/wide drive will initiate a “wide” negotiation. The default is request initiation enabled.

Option 55 - EOT Mode Reporting: In the standard reporting mode, when an EOT is detected, the drive returns a Check Condition status code following the write command. In the PICK reporting mode, the reporting of the Check Condition is delayed one write command. In response to a SCSI Request Sense command, the drive responds with the EOM and VALID bits set, and the information bytes set to the transfer length. The default is standard reporting.

Option 56 - Early LEOT: This option allows the drive to inform the FC 3500 controller that the drive has reached the early LEOT position on the tape. The default is EARLY LEOT OFF.

Option 57 - Reporting of 2' Complement: This option controls the format of reported information bytes in the Request Sense Data field for a space-reverse command. The default is not to report in 2's complement format.

Option 62 - Default Density: This option specifies the Density Code response of the drive to a SCSI Mode Sense command. It does not affect the read or write density of the drive. The default is 3490E.

Option 63 - SCSI Emulation Mode: The drive is capable of certain SCSI interface emulations. This option specifies the emulation. The default is: 3490E MOD.F for models F01 and F11 attached to RS/6000; 3490E MOD.E for models F01 and F11 attached to AS/400; and 3490E MOD.F for models F1A and FC0.

Note:

1. For RS/6000 host attachment, setting 3490E MOD.F is correct for SCSI Emulation Option (63) as long as the host A-Tape Driver installed is at 3.1.x.x level or higher. If an earlier level of A-Tape Driver is installed, you should choose setting 3490E MOD.E.

2. For AS/400 host attachment, setting 3490E MOD.E is correct for SCSI Emulation Option (63) as long as the OS/400 release level is at V3R6 or lower.
3. For AS/400 host attachment, setting 3490E MOD.F is correct for SCSI Emulation Option (63) as long as the OS/400 release level is at V3R7 or higher with the latest PTF's. (For the latest PTF's, contact your service representative.) If an earlier version of OS/400 is installed, you should choose setting 3490E MOD.E.
4. All Model F1A and FC3000 attached drives are set to 3490E MOD.F.

Option 65 - Lock Out 18 Track Writes: If this option is locked, the drive will be unable to write in 18 track mode. The default is 18 track wrt lkd (disabled).

Note: The Model F1A should be set to 18-track WRT LKD. 18-track write is not allowed on that model. Models with FC 3000 or FC 3500 should also be set to 18-track WRT LKD.

Option 66 - Unload Mode: Specifies whether to reload tape and whether to present status on reload. The default is Reload Tape (Status on Reload).

Option 67 - MTW Errors: Specifies whether to retry MTW errors or not. The default is Retry MTW Errors.

Option 68 - SCSI Transfer Rate: The maximum data transfer rate can be varied to accommodate different systems. The choices are synchronous 5 MB/second, synchronous 10 MB/sec (Fast SCSI) and asynchronous. The default is sync 10 MB/sec.

Option 69 - Default Tape Format: This option sets the drive's default write format at power up. The read format is automatically set to conform to the tape being read. The default is 3490E Compressed format at power on.

Option 71 - ILS&FID Check: This option allows an operator to bypass the inner layer slip test or the format ID write test or both. Bypassing the ILS test is not advised for customers. Bypassing the FID test can reduce the load time by 5 seconds. The Default is NO BYPASS..

Option 72 - Immediate Command Response (Rewind/Unload Immed. Reporting): This option determines whether the drive is to report disconnect or busy after a rewind or unload immediate command is received. The default is Disconnect.

Option 73- Filemark Processing: This option sets whether the drive will read to 1, 2 or ahead of a filemark for recovery purposes. The default is to read to 2 filemarks.

Note: When the drive is attached to an FC 3000 or FC3500 Controller and when reading 18 track tapes that were not written on a 3490 Mod F drive, this option must be set to read to 1 Filemark.

Option 74- End of Data Processing: This option sets whether the drive will read to end of data or read past end of data.

Option 75 - Auto Clean Mode: This option allows the operator to turn on or off the auto clean mode for Models F01 and F11. On Model F1A, Autoclean mode should always be set to **OFF**.

Option 76 - Pack Mode: This option sets whether to pack after read retries or not. The default is to pack after read retries.

Option 77 - Allow 18 Track Append: This option enables the drive to append data to an existing 18 track tape. The default is **DO NOT ALLOW**.

Attention: This option is intended for appending only to an 18 track tape made by a 36 track drive. Appending to tapes written by an 18 track only drive may result in data that is not recoverable.

Option 88 - Set Machine Serial Number: This option is used for setting the drive serial number.

3490E Models F01 and F11 Diagnostics

The 3490E Models F01 and F11 has two main diagnostic modes, Power On Self Test (POST) Diagnostics and user Diagnostics. POST Diagnostics are automatically performed on power on. User Diagnostics are accessed from the control panel and are run by user request. Diagnostic menus and options are shown on the display. There are also extended Customer Engineer diagnostics that are used by your service representative for debug and repair.

The Diagnostic Tests menu enables the user to view the current drive microcode revision number, error logs and execute the various diagnostic tests.

Refer to Figure 18 on page 33 for menu structure.

Power On Self Test Diagnostics

When the power is turned on, the drive will perform several Power On Self Test (POST) Diagnostics to insure that the drive hardware and microcode is functioning properly. During the POST, the drive will verify the operation of the processors and drive hardware then check to see if all interfaces are capable of communicating with the drive processors.

Note: If you turn off the power to the tape drive at anytime, wait 30 seconds before powering on the drive again. This will allow the drive to reset.

Attention: Connect the interface cables and terminator before you turn the drive ON. If you make the connections when the drive is ON, the over current protection will be activated. If this happens, turn off drive power for 1 minute, then restart.

To supply AC power to the drive, press the power switch located on the rear panel. The following events will happen:

- The drive will display "INITIALIZING..." while it performs the POST operation.
- The autoloader will check each slot for the presence of a cartridge.
- The drive will retension a loaded tape if one was previously loaded from the last power on.

Note: This could take several minutes if retensioning of the tape is required. The message "RECOVERING CART" will be displayed while the tape is being retensioned and the cartridge removed from the tape path. The user will be instructed to remove all cartridges so that the drive may unload the orphan cartridge.

- An "UNLOADED" message will be displayed.

User Diagnostics

After mechanical installation, cabling, and configuration options have been completed, two quick diagnostic tests should be run:

1. Test 1 -- also referred to as the "Online Test" performs a short Read/Write test which is used to confirm proper host-to-drive connection and configuration.
2. Test 18 -- performs a load, thread, unthread, and unload. This test confirms that the hardware is functioning properly, and that the threader arm is adjusted properly.

If the drive fails either test, call IBM Service.

The drive microcode is equipped with several additional tests which enable service representatives to manipulate, calibrate, reset, and test specific components of the drive function. These diagnostic tests should only be performed by a service representative.

Preparing to run User Diagnostics:

1. ___ Power on drive. The drive will perform its POST diagnostics. During POST diagnostics the drive will take an inventory of any tapes loaded into the drive, and check configuration settings. POST diagnostics take approximately two minutes, upon completion, the control panel will read "UNLOADED".
2. ___ Determine the current Configuration Options Settings. For instructions, see . For more information on configuration options, see "Configuration Options Explanation" on page 39.
3. ___ Determine if any Configuration Options need to be changed. See "Reviewing and Editing Configuration Option Settings" on page 35 for more information.

Attention: It is highly recommended that you record all current settings before changing them. If you change the settings, record the new settings also. A blank column has been reserved for recording configuration settings in Table 12 on page 36.

Quick Reference for Diagnostic Tests:

Table 13. Quick Reference for Diagnostic Tests

Test	Description	Function	Running Time
1	A short Read/Write test	Quickly tests the read and write capabilities of the drive.	Maximum of 45 minutes.
18	Sequentially loads, threads, and unloads all cartridges.	Tests for defective threader or elevator, and verifies proper threader arm adjustment.	Press CANCEL to stop.

Test Descriptions:

Test 1 -- A Short Read/Write (R/W) Test (Online Test):

Purpose

This diagnostic provides a means of quickly testing the read and write functions of the drive.

Implications

This test is used to test drive setup, or if the system exhibits unsatisfactory data reliability to test the R/W function of the drive.

Procedure

First, load a proven good tape into slot #1 of the drive. Next, to start the test, follow the procedure for "Accessing and Executing Diagnostics". The test will run on the single cartridge and exit after one pass. During the test, 32 KB blocks of incrementing data are written onto the tape to the Logical End of Partition (LEOP). Then, the tape is rewound to the Beginning of the Tape (BOT), read forward to the LEOP, and finally read reverse returning to the BOT. The test will stop and a Fault Symptom Code (FSC) will be displayed if a fault is detected during the R/W sequence. This test should have a maximum running time of 45 minutes. When the test finishes, the tape is unthread and the cartridge is ejected. The operator may terminate the test by pressing CANCEL at any time.

Note: This test will run read only if a write protected cartridge is used to perform the test.

Results

No error codes indicates that the drive is functioning properly. An error code issued when using a proven good tape indicates tape drive malfunction. If an error code is issued after the test executes, then the test indicates the problem may be related to the controller or SCSI cable.

Test 18 -- Sequentially Loads, Threads, and Unloads all Cartridges:

Purpose

This diagnostic provides a means of testing the function of the tape threader and elevator.

Implications

This test is used to test drive setup, and proper function of the hardware which loads and unloads tapes.

Procedure

First, load the desired number of tapes into the magazine. Next, to start the test, follow the procedure for "Accessing and Executing Diagnostics". The test will begin by loading a tape from the first occupied slot. The test will then thread, refresh, unthread, and unload the tape. The tape is then ejected back into its original slot. This process will continue sequentially until the operator presses **CANCEL**. The number of load cycles performed will be displayed on the control panel as they occur.

Results

If the test fails, call IBM Service.

Accessing and Executing Diagnostics

To select a test on the 3490E Models F01 and F11:

1. ___ Press **MENU** to access the first level menu of Diagnostics.

Note: For the **MENU** option, press **SELECT** and **CANCEL** simultaneously.

2. ___ Press **NEXT** until the display shows "DIAG TESTS".
3. ___ Press **SELECT**.
4. ___ Press **NEXT** until "TEST 1" or "TEST 18" is displayed.

Attention: Do not run other tests, as they are meant for service personnel and may make your machine inoperable.

5. ___ Press **SELECT**.
6. ___ The display should now show "EXECUTE?"

- To begin the selected test, press **SELECT**. The test will be performed and the drive will return to the first level diagnostic test menu.
 - To exit the menu and return to normal operation, or to select another test, press **CANCEL**.
7. ___ To select another diagnostic test, repeat steps 4 through 6.
 8. ___ To exit the diagnostic menu and return to normal operations, press **CANCEL** until the display reads "UNLOADED".

Displaying F/W Revision and Error Logs

When troubleshooting with drive operations or talking to service personnel, it may be useful to access the microcode level of the drive to view the error logs. To access error logs, perform the following procedure.

Note: For additional help with menu options, refer to Figure 18 on page 33.

1. ___ Press **MENU** to access the first level diagnostics menu.
2. ___ Press **NEXT** until "DIAG TESTS" is shown on the control panel display.
3. ___ Press **SELECT**.
4. ___ Press **NEXT** to scroll through the options:
 - "DISP F/W REV"
 - "DISP BUF LOG"
 - "DISP SS FSC LOG"
5. ___ Press **SELECT** when the desired menu option is displayed.
6. ___ Press **NEXT** to access the other third level menu options.
7. ___ When the desired menu is displayed, press **SELECT** to view menu information.

For the error logs, there are fourth level menus options. See Figure 18 on page 33.
8. ___ To exit from the menu options, press **CANCEL** until the display shows "UNLOADED".

Additional Options

The 3490E offers some additional options which the user may define for custom drive function. These additional options include:

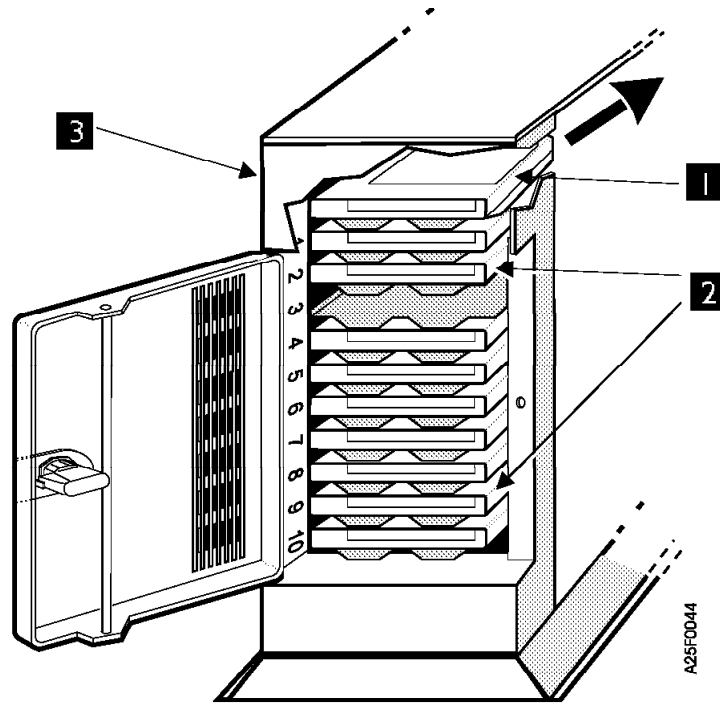
- Cleaning Cartridge
- Autoloader Mode Settings

Cleaning Cartridge

The 3490E Models F01, F11, and FC0 have a hidden tape slot reserved for a cleaning cartridge. Figure 19 on page 47 Shows the location of the cleaning cartridge. Configuration option #75 has a default setting which enables the automatic cleaning cycle. See "Configuration Options" on page 35 for more information. The automatic cleaning cycle will initiate after every 12 load cycles, or if the temporary error rate increases. The cleaning cycle can also be initiated manually using the MENU option.

Note: The cleaning cartridge is not installed at the factory.

Note: Model F1A does not have a slot for a cleaning cartridge. The cleaner cartridge for the F1A is installed in the 3494 Tape Library Data Server.



1 Cleaning Cartridge 2 Tape Cartridges
3 Front Panel

Figure 19. Cleaning Cartridge

Installing a Cleaning Cartridge: To install a cleaning cartridge, perform the following procedure:

1. ___ Remove any cartridge loaded into slot #10.
2. ___ Insert the cleaning cartridge into slot #10 and close the drive door.
3. ___ Press **MENU**. the display will show, "CLEANER CART".
4. ___ Press **SELECT**.
5. ___ The display will show, "INSTALL". Confirm that the cleaning cartridge is loaded into slot #10, and then press **SELECT**. The drive will move the cleaning cartridge from slot #10 and mount it on the drive. The drive will now run the cleaning process and display "CLEANING DRIVE". When the process is done, the cleaning drive will move the cleaner cartridge to the hidden compartment.
6. ___ To return to normal operations press **CANCEL** until the control panel displays "UNLOADED".

Manually Running a Cleaning Cycle:

Note: This section does not apply to model F1A. To run a cleaning cartridge in the model F1A, insert a cleaning cartridge in the drive and press the **LOAD** button.

To run a cleaning cycle manually perform the following procedure:

1. ___ Press **MENU**. The message "CLEANER CART" will be displayed.
2. ___ Press **SELECT**.

3. ___ Press **NEXT** until the display shows "CLEAN".
4. ___ Press **SELECT** to begin the cleaning cycle. When the cleaning cycle is running, the control panel will display, "CLEANING DRIVE". When the cleaning cycle is complete, the control panel will display "SUCCESSFUL".
5. ___ To return to normal operations press **CANCEL** until the control panel displays "UNLOADED".

Removing a Cleaning Cartridge: After 250 cleaning cycles, the cleaning cartridge will need to be replaced. To remove a cleaning cartridge, perform the following procedure:

1. ___ Remove any tape in drive slot #10.
2. ___ Press **MENU**. The control panel will show, "CLEANER CART".
3. ___ Press **SELECT**.
4. ___ Press **NEXT** until the display shows "REMOVE".
5. ___ Press **SELECT** to begin the removal operation. The drive will move the cleaning cartridge from the hidden slot to slot #10. The display will prompt the operator to remove the cleaning cartridge from slot #10.
6. ___ To return to normal operations press **CANCEL** until the control panel displays "UNLOADED".

Autoloader Mode Settings (Shuttle Modes)

To access the Autoloader Mode Settings, perform the following procedure:

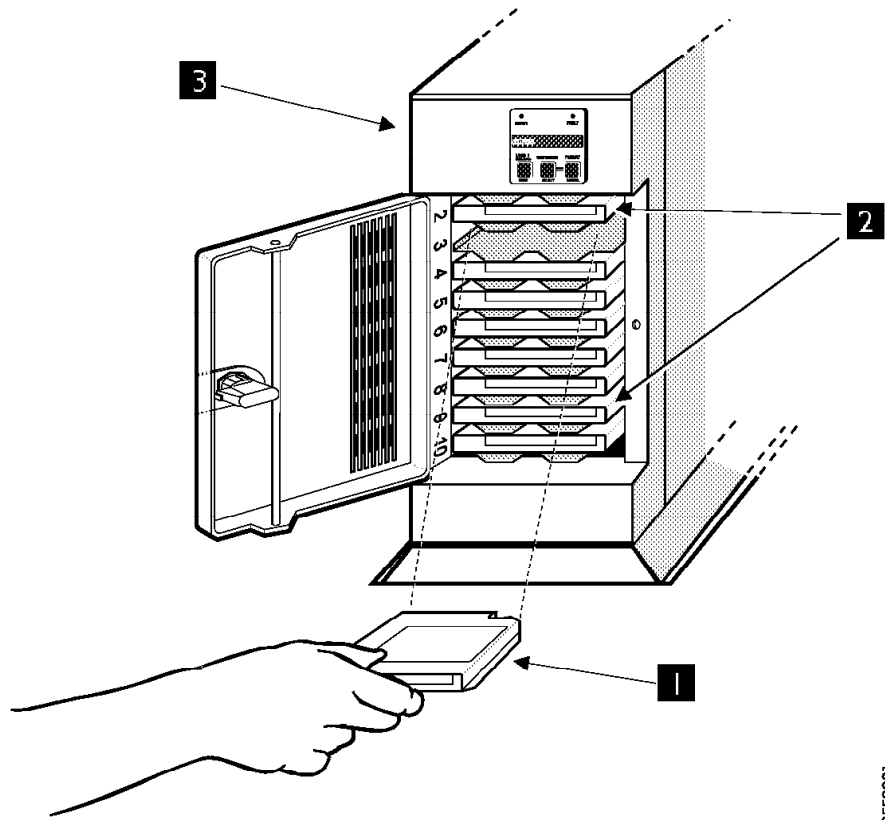
1. ___ Press **MENU**.
2. ___ Scroll through the diagnostic menu by pressing **NEXT**.
3. ___ When the "SHUTTLE MODE" option is displayed on the control panel, press **SELECT**.
4. There are five different mode settings available for different shuttle operations:

Table 14. Autoloader Mode Settings

Mode	Procedure	End Sequence	# of Cartridges Run	Notes
Standard (STD) (Not a recommended mode)	Cartridges are consecutively loaded.	At empty slot, if front door is opened, at end of stack, or LOAD/UNLOAD is pressed.	Up to 10	Do not use with FC3500 or SCSI attached F01 to S/390 Model 3006 or 7060.
Sequential <ul style="list-style-type: none"> • Autoloader Without Priority (SA) • Autoloader With Priority (SAP) • System Without Priority (SQS) • System With Priority (SQSP) • Specific Tape (SQST) 	Cartridges are loaded according to the sequential mode option selected.	At empty slot, at end of stack, or LOAD/UNLOAD is pressed.	Up to 10 without priority and 9 with priority	Sequential is the recommended mode for systems with FC3500 attached or SCSI attached F01 S/390. Refer to the S/390 documentation for supported modes.

Table 14. Autoloader Mode Settings (continued)

Mode	Procedure	End Sequence	# of Cartridges Run	Notes
Recirculation <ul style="list-style-type: none"> • Recirculate Auto Without Priority (REA) • Recirculate Auto With Priority (REAP) • Recirculate System Without Priority (RESA) • Recirculate System With Priority (RESP) 	Cartridges are consecutively loaded, at the end of stack, the drive will return to slot 1 and continue consecutive loading.	At empty slot, or LOAD/UNLOAD is pressed.	User defined.	Attention: It is possible to overwrite tapes in this mode.
Manual (MAN)	Any single cartridge is loaded and then returned to its original location.	After the tape has been run, the Host System issues an unload command, or LOAD/UNLOAD is pressed.	1	Do not use manual mode on systems with an FC3500 attached or SCSI attached F01 to S/390 Model 3006 or 7060.
Random (RAND)	Load sequence determined by Host System.	Host System stops issuing commands to the drive.	Host System defined.	Do not use with FC3500 or SCSI attached F01 to S/390 Model 3006 or 7060.



A25FC091

- 1** Tape Cartridge **2** Tape Cartridges **3** Tower Model

Figure 20. Loading the Autoloader

Standard Mode (STD)

Note: Standard Mode should not be used with model FC0.

A maximum of ten cartridges may be run consecutively with standard mode. The following is basic operating procedure in standard mode:

1. ___ Set up the magazine for the load sequence by opening the front door and placing the desired number of cartridges in any of the autoloader slots. Close the front door when the magazine is ready to be run. When the front door is closed, the drive will take an inventory of the occupied slots.
2. ___ Before beginning the load sequence, determine which slot to start sequential loading from. This can be done in two different ways:

Automatic

The drive checks its inventory, and automatically starts the load sequence from the first occupied slot in the magazine.

Manual

An operator may choose the slot to start the load sequence from by pressing **CARTRIDGE**. The current slot number will be displayed on the control panel. Press **CARTRIDGE** again until the desired slot is displayed, then press **SELECT** to select this cartridge as the first in the load sequence.

3. ___ The first cartridge must be manually loaded using the control panel (see "Control Panel" on page 27). Begin the load sequence by pressing **LOAD/UNLOAD**.
4. ___ After the drive has finished running a cartridge, it will be unloaded and returned to its original location. The drive will then load the cartridge in the next consecutive slot.
5. ___ The drive will continue loading cartridges in consecutive order until one of the following occurs:
 - An empty slot is encountered.
 - The front door is opened.
 - The end of stack (slot #10) is reached.
 - The operator presses **LOAD/UNLOAD**.
6. ___ To begin another load sequence with the same settings, open the front door and if desired change cartridges. Close the front door and press **LOAD/UNLOAD**. The drive will restart the load sequence using the current settings. The settings for the load sequence will be saved until the drive is powered off.

Sequential Mode (SA, SAP, SQS, SQSP, SQST)

There are five different load sequence options in Sequential Mode. A maximum of 10 cartridges may be run in each of the load sequences. A special feature, priority slot #1, allows an operator to place a cartridge in slot #1 and essentially "cut in line" during the loading sequence. The following is basic operating procedure for Sequential Mode:

1. ___ Set up the magazine for the load sequence by opening the front door and placing the desired number of cartridges in any of the autoloader slots, **except slot #1. Slot #1 is the priority slot, and is reserved for priority loading during the load sequence.** Close the front door when the magazine is ready to be run. When the front door is closed, the drive will take an inventory of the occupied slots.
2. ___ Select the load sequence option:

Autoloader Without Priority (SA) -- (AUTO W/O PRIORITY)

This option will automatically perform sequential loading from the designated first slot.

Autoloader With Priority (SAP) -- (AUTO W/ PRIORITY)

This option will automatically perform sequential loading from the designated first slot. Priority slot #1 is enabled in this load sequence option.

System Without Priority (SQS)-- (SYSTEM W/O PRIORITY)

This option will pause before loading the next cartridge in sequential order until the Host System issues a load command. Priority slot #1 is disabled in this load sequence option.

System With Priority (SQSP) -- (SYSTEM W/ PRIORITY)

This option will pause before loading the next cartridge in sequential order until the Host System issues a load command. Priority slot #1 is enabled in this load sequence option.

Specific Tape (SQST) -- (SPECIFIC)

This option allows an operator to use slot #1 to load specific cartridges. When the drive is set to this option, the drive will only load tapes from slot #1. This option requires that the operator place the desired cartridge in slot #1. After the cartridge is finished running, the cartridge

will be returned to slot #1. The operator may then remove this cartridge and insert the next cartridge into slot #1.

Note: No inventory will be taken when the front door is opened and closed while in this mode.

3. ___ Before beginning the load sequence, determine which slot to start sequential loading from. This can be done in two different ways:

Automatic

The drive checks its inventory, and automatically starts the load sequence from the first occupied slot in the magazine.

Manual

An operator may choose the slot to start the load sequence from by pressing **CARTRIDGE**. The current slot number will be displayed on the control panel. Press **CARTRIDGE** again until the desired slot is displayed, then press **SELECT** to select this cartridge as the first in the load sequence.

4. ___ The first cartridge must be manually loaded using the control panel (see “Control Panel” on page 27). Begin the load sequence by pressing **LOAD/UNLOAD**.
5. ___ After the drive has finished running a cartridge, it will be unloaded and returned to its original location. The drive will then load the cartridge in the next consecutive slot, depending on the sequential mode option selected.
6. ___

Note: Priority slot #1 must be enabled for this step.

Activate Priority slot #1 by opening the front door and placing a cartridge in slot #1. When the front door is closed the drive will take inventory. After the drive has finished its current task (for example, running a cartridge from another slot), the next cartridge to be loaded will be the cartridge in the priority slot. When the drive is finished running this “priority” cartridge, it will be returned to its original location in the priority slot #1. The drive will continue its load sequence where it left off, before the priority slot #1 interruption. Priority slot #1 may be activated as often as desired during a load sequence.

7. ___ The drive will continue loading cartridges in consecutive order until one of the following occurs:
 - An empty slot is encountered.
 - The front door is opened.
 - The end of stack (slot #10) is reached.
 - The operator presses **LOAD/UNLOAD**.

Note: Opening and closing the front door does not affect the load sequence.

Note: The load sequence may be restarted without ending the drive task by holding down the **NEXT** button.

8. ___ To begin another load sequence with the same settings, open the front door and if desired change cartridges. Close the front door and press **LOAD/UNLOAD**. The drive will restart the load sequence using the current settings. The settings for the load sequence will be saved until the drive is powered off.

Recirculation Mode (REA, REAP, RES, RESP)

Attention: Recirculation mode will overwrite tapes.

Note: This setting is not recommended for model FC0.

This setting has the same operating procedure as Sequential Mode, except Recirculation Mode will return to the first load slot and continue loading in a circular pattern. The four Recirculation Mode settings are:

- Recirculate Auto Without Priority (REA)
- Recirculate Auto With Priority (REAP)
- Recirculate System Without Priority (RES)
- Recirculate System With Priority (RESP)

In order for recirculation to be enabled, all ten autoloader slots must have tape cartridges. If the drive encounters an empty slot, the load sequence will terminate. The load sequence may also be manually terminated by pressing the **LOAD/UNLOAD** button.

Manual Mode (MAN)

The Manual Access Mode allows any single cartridge in the Automatic Cartridge Loader to be selected and loaded into the drive using the front panel **LOAD** button. The cartridge may be unloaded by either the host, through the SCSI Unload command, or by the operator using the front panel **LOAD/UNLOAD** button. The cartridge will be placed in the same location it was taken from originally. No other cartridge will be loaded.

Random Access Mode (RAND)

Note: Random Access Mode should not be used with Model FC0.

Note: Random Access Mode is only enabled when configuration option #63 is set for 3490E MOD.F emulation mode.

This mode should be selected when the move medium commands are issued by the Host System, rather than an operator. During drive operations, any commands sent by the Host System will have priority over operator commands.

Random Access Mode can be set manually using the menu options. However, the 3490E drive will automatically switch to Random Access Mode if a Move Medium Command is received.

ELEMENT ADDRESSING:

Location	Address
Slot 1	1
Slot 2	2
Slot 3	3
Slot 4	4
Slot 5	5

Slot 6	6
Slot 7	7
Slot 8	8
Slot 9	9
Slot 10	10
Drive	255
Shuttle	0

Basic Operations for the 3490E

Using the Autoloader

Tape Specifications

A “loaded tape” is defined as a single tape cartridge which has been moved into position so that its tape is threaded and spooled into the drive for data processing applications. Before a tape is loaded, there are several tape cartridge options which must be set for proper drive function:

Tape Density Settings

Determines at what density data will be written to the tape.

Write Protection

Protects the information stored on a tape cartridge from being overwritten.

Tape Density Settings

Before cartridges are loaded into the drive, the tape density needs to be set. The 3490E drive is compatible with $\frac{1}{2}$ inch cartridge tapes available in different densities which meet the ANSI standards as indicated below:

- 3480 tape cartridge ANSI X3B5/88-091
- 3490 tape cartridge ANSI X3B5/92-369
- 3490E tape cartridge ANSI X3B5/93-272

To order IBM approved tape media, call 1-888-IBM-MEDIA.

The default for configuration option #62 should be set to match the tape density most frequently used. See “Configuration Options” on page 35 for more information. The default density will change automatically if the host system issues a command requiring a different density tape. The default density may also be checked or changed manually using the control panel. To temporarily change the default density:

1. In ready mode with “UNLOADED XXXX” displayed on the control panel, press **FORMAT**. Default density will now be displayed.
2. To scroll through and view other density options, press **FORMAT**.
3. Press **SELECT** when the desired density setting is displayed. The display will flash the new setting when the command is executed.

Note: This change in the density setting is only temporary and will reset to default when the drive is turned off.

Write Protection

Standard ½ inch tape cartridges have a write protect switch on the cartridge. In order to write to a tape, this switch must be rotated to the write enabled position. Figure 21 shows the write protect switch in both positions. Rotate the switch with your thumb to the desired position. After writing to a tape, if you wish to prevent unauthorized re-writes, rotate the write protect switch to the write protected position.

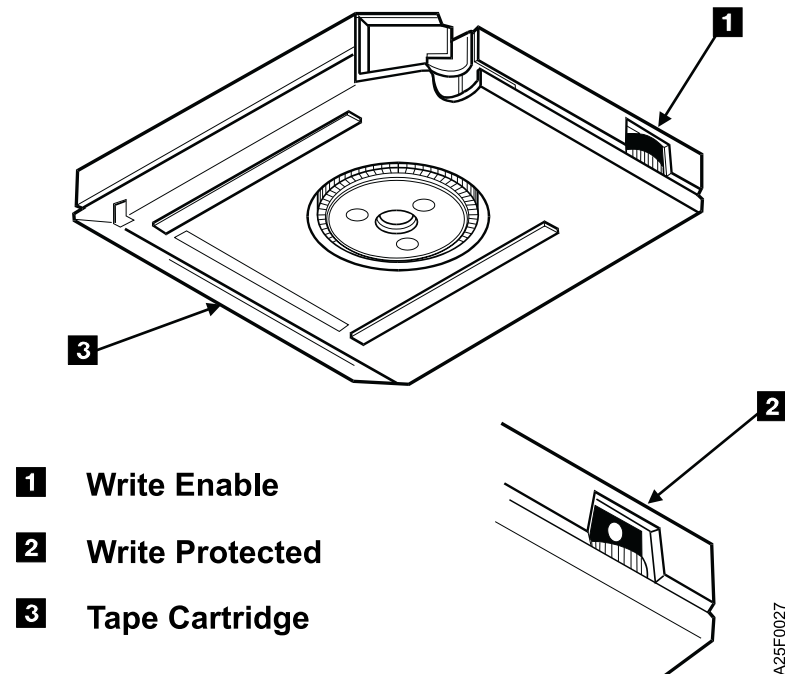


Figure 21. Tape Cartridge

Autoloader Features

Note: The F1A does not have an autoloader or front door.

The autoloader has 10 different slots available for tape cartridges. See Figure 20 on page 50 for more information. Note that each tape slot is assigned a number from 1 through 10. A magazine or stack refers to all 10 slots.

Located behind the magazine is the shuttle mechanism. The shuttle moves the tape cartridge into position to thread and spool the tape. Whenever the front door is opened and then closed, the drive takes an inventory of cartridges in the magazine.

To begin loading tape cartridges into the drive, press **LOAD/UNLOAD**. There are several different Autoloader Mode Settings which control the order in which cartridges are loaded into the drive. For more information, see “Autoloader Mode Settings (Shuttle Modes)” on page 48.

Loading the Autoloader

When inserting tapes into slots, orient the tape so that the end with the write protect switch is inserted first. The tape should rest firmly in the autoloader slot. If the tape feels loose or does not fit entirely into the slot, remove the tape and check for obstructions in the autoloader slot. Sticky or wrinkled cartridge labels can also be a problem.

Attention: Do not insert cartridges with “yellow sticky” labels or other temporary labels. They may come off in the drive, become stuck, and cause drive failure. See “Cartridge Labels” on page 60 for more information on labeling cartridges.

Figure 22 shows a cartridge being loaded into the autoloader. Note the numbering of the slots. For information on proper handling of tape cartridges, see “Handling the Cartridges” on page 59.

When the shuttle mode is set to a priority option, the sequential slots used for normal operation are slot 2 through slot 10. Slot 1 is used as the priority slot.

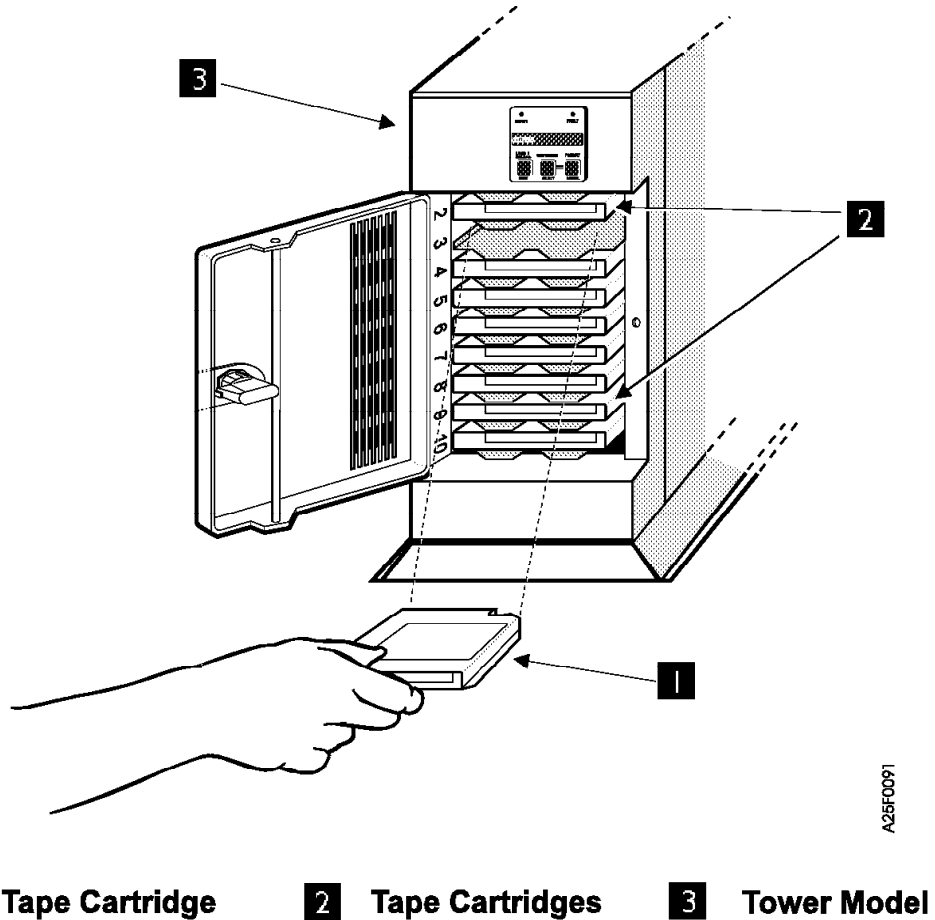


Figure 22. Loading the Autoloader

Checking the Status of a Load Sequence

To help the operator determine how much of a load sequence has been completed, the drive displays a “USED=XXXXMX” message. The message is displayed on the control panel during a load sequence when a tape is loaded. The digits before the “M” represent slot numbers which have been run. The digit after the “M” represents the current slot that is loaded. For example: if the drive has finished running cartridges in slot numbers 1 through 4 and currently is running the cartridge from slot #5, the display will show, “USED=1234M5”. When the front door is opened and closed, the “USED=XXXXMX” message will reset to zero.

Shortcuts to Drive Operations

Toggle Shuttle

The “TOGGLE SHUTTLE” option is located on the diagnostic menu. See “Menus” on page 32 for more information. It allows the operator to very quickly change the current Autoloader Mode Setting from the current setting to the previously used setting. To use the “TOGGLE SHUTTLE” command:

1. ___ Press **MENU**. The drive will now be in first level diagnostics.
2. ___ Press **NEXT** until the option “TOGGLE SHUTTLE” is displayed on the control panel.
3. ___ Press **SELECT**. The drive will display “RESETTING...” when the Toggle Shuttle Option is successfully selected.

Shuttle Reset

The “SHUTTLE RESET” option is located on the diagnostic menu. See “Menus” on page 32 for more information. It allows an operator to stop a shuttle load sequence that is running and restart the load sequence from slot #1. The benefit of this option is that it allows a new operator to takeover a load sequence, and load new tapes without losing the shuttle mode settings. To use the “SHUTTLE RESET” command:

1. ___ Press **MENU**. The drive will now be in first level diagnostics.
2. ___ Press **NEXT** until the option “SHUTTLE RESET” is displayed on the control panel.
3. ___ Press **SELECT**. The drive will display “RESETTING...” when the “SHUTTLE RESET” option is successfully selected.
4. ___ Remove the cartridges in the magazine and insert the desired cartridges starting from slot #1.
5. ___ To begin the new load sequence, press the **LOAD/UNLOAD** button. The drive will run the load sequence using the settings from the current shuttle mode (see “Autoloader Mode Settings (Shuttle Modes)” on page 48 for more information.)

Chapter 6. Tape Cartridge and Magazine Handling

Models F01, F11, F1A, and FC0 are precision mechanical devices. To maintain their maximum reliability, the operator should take time to inspect and clean not only each cartridge used, but each library unit magazine as well.

To order IBM approved tape media, call 1-888-IBM-MEDIA.

Unpacking the Cartridges

Before you use the cartridges, condition them to the normal operating environment for at least 24 hours. See “Cartridge Operating Environment” on page 61.

Handling the Cartridges

Incorrect handling or an incorrect environment can damage the magnetic tape or the cartridges. See “Damaged Cartridges” on page 60 for information about damaged cartridges. To avoid damage to your tape cartridges and to ensure continued high reliability on your subsystem, perform the following:

- **When you load a cartridge into the tape subsystem or you handle a cartridge, ensure that the cartridge case is clean.** Dirty tape cartridges can cause problems in loading or the loss of recorded data.
- **Do not carry cartridges loosely in a box or basket.**
- **Do not load a damaged tape cartridge into a tape drive.** Damaged cartridges can interfere with the reliability of your subsystem. For specific information about damaged cartridges, see “Damaged Cartridges” on page 60. If a cartridge is dropped, inspect it for damage before you use it.
- **Never touch the tape.** Opening the cartridge door to expose the tape and then touching it will cause problems. Handling the tape can damage the tape surface or tape edges, which may interfere with read or write reliability.
- **Do not expose the tape cartridge to moisture or direct sunlight.**
- **Do not expose recorded or blank cartridges to stray magnetic fields greater than 100 oersteds (such as those existing near high current cables or power supplies).** Such exposure can cause the loss of recorded data or make the blank cartridge unusable.
- **Do not attempt to degauss or ac bulk erase a tape cartridge.** Degaussing will make the tape cartridge unusable.
- **Maintain the conditions described in “Cartridge Storage Environment” on page 61 for all cartridges stored outside your operating environment.**

Stacking the Cartridges

Although cartridges are shipped and should be stored with the reel in the vertical position, you can lay the cartridges flat temporarily while moving them. The bottom of each cartridge has two raised areas that fit into indentations on the top of another cartridge. This construction helps prevent the cartridges from sliding off one another when you move a stack of them.

Do not stack more than six cartridges. See “Cartridge Storage Environment” on page 61 for recommendations on the storage of cartridges.

Cartridge Degaussing and Disposal

Under the current rules of the Environmental Protection Agency (EPA), regulation 40CFR261, the 3490E Model Fxx cartridge is classified as nonhazardous waste. As such, it may be disposed of in the same way as normal office trash. These regulations are amended from time to time and should be reviewed at the time of disposal.

If your local, state, or country (non U.S.A.) regulations are more restrictive than EPA 40CFR261, they must be reviewed before disposing of cartridges.

If the tape cartridge is to be disposed of in a secure manner, the data on cartridges can be erased by using a high energy.¹ ac degausser. Degaussing makes the tape cartridge unusable.

If you burn the cartridges and the tape, you must ensure that the incineration complies with all applicable regulations.

Damaged Cartridges

Ensure continued use of your cartridges and subsystem as follows:

- **Do not attempt to open the cartridge case at any time.** The magnetic tape inside could easily be damaged during cover removal or replacement.
- **Do not load a damaged cartridge into a tape subsystem.** During an emergency, if you need to recover data from a damaged cartridge, call your service representative. (IBM will charge the customer for the time and materials used during a service call to recover information.)

Examples of cartridge damage are:

- The cartridge case is cracked or broken.
- The cartridge door is broken.
- The write protect selector is damaged.

Cartridge Labels

With the exception of a volser label, user supplied labels should not be affixed to the cartridge because they may interfere with the proper functioning of the cartridge in either the drive or the library transport mechanism, causing drive failure and necessitating a service call from an IBM service representative.

The bar code label that comes attached to each cartridge has a small space in which you may write. Any information that you write on the label should be written only with markers that do not smear or leave a thick residue. The factory applied volser label on the edge of the cartridge facing the operator as the cartridge is inserted into the 3490E Model Fxx may be replaced if you wish. In this case, carefully peel off the preaffixed volser label and replace it with an IBM approved label.

1. A minimum of 4000 Gauss

Cartridge Labels for 3490E Model F1A

Cartridges intended for use in the IBM 3494 Tape Library Dataserver have specific label requirements. Each tape cartridge must have an external, physical label for identification by the IBM 3494 Tape Library Dataserver bar code reader in automated mode as well as by the operator in manual mode.

Note: These labeling requirements should be considered for cartridges used in 3490E Model F1A if they may at anytime become part of an automated library system.

The optimum label contains both machine readable (bar code) and operator readable identification characters. For additional information on label requirements, see *IBM 3494 Tape Library Dataserver Introduction and Planning Guide*, GA32-0279, and *IBM 3494 Tape Library Dataserver Operator's Guide*, GA32-0280.

Cartridge Operating Environment

The operating environment for the 3490E Model Fxx tape cartridge is:

- 10°C to 40°C dry bulb
- 15 to 85 percent relative humidity
- 26°C (79°F) maximum wet bulb
- 3058 meters (10,000 feet) maximum altitude

Note: Before you use a cartridge, condition it to the operating environment for a time equal to the time it was out of the operating environment up to a maximum of 24 hours. If the cartridge has been out of the operating environment for more than 24 hours, it is not necessary to condition it to the operating environment for more than 24 hours.

Cartridge Storage Environment

Until it is opened, the original shipping container is the best storage container for the cartridges. The plastic wrapping prevents contamination from accumulating on the cartridges and partially protects them from humidity changes.

The preferred orientation for cartridge storage is vertical.

Cartridges can be stored within the following temperature and humidity ranges:

- 40°C to 60°C dry bulb
- 5 to 95 percent relative humidity
- 30°C maximum wet bulb

Note: IBM does not recommend continuous, extended storage of the tape cartridges in the maximum temperature and humidity environment. However, if necessary, you can store the cartridges in the maximum condition environment for up to four weeks without damaging the data or the cartridge.

For additional information about storing magnetic tape, see the National Bureau of Standards publication listed under "Related Hardware Information" on page xii.

Cartridge Shipping Environment

When you ship a cartridge, place it in a sealed, moistureproof bag to protect the cartridge from moisture, contaminants, and physical damage. Ship the cartridge in a

shipping container with enough packing material to cushion the cartridge and to prevent the cartridge from moving inside the container.

If two or more cartridges are packed in the same container, the container should hold the cartridges firmly together so that the cartridge cases cannot rub against each other.

Unrecorded, packaged IBM cartridges can be exposed for up to 10 days to the following environment during shipment:

- -23°C to 49°C (-10°F to 120°F) dry bulb
- 5 to 80 percent relative humidity
- 29°C (84°F) maximum wet bulb

Recorded, packaged IBM cartridges can be exposed to the following environment, not to exceed 10 days, without risk of damage during shipment:

- 4.4°C to 40°C (40°F to 104°F) dry bulb
- 5 to 80 percent relative humidity
- 29°C (84°F) maximum wet bulb

Chapter 7. Understanding Host Systems

Host System Functions

The Host System is responsible for running operations such as data analysis, computations, and library functions. The 3490E drives are designed to store information from the Host System on tape cartridges. The Host System can access the data stored on these tapes at a later time for running other operations. Some possible Host Systems are:

- AS/400*
- RISC System/6000*
- ES/9000*

Model F1A may also use:

- 9370
- 4381
- 3090

Host System Data Transfer

The Host System can use two different types of channels to send and receive data:

- ESCON (A mainframe channel)
- SCSI (A PC channel)

It is important that the Host System have the same channel as the 3490E drive. All 3490E drives use SCSI channels. In order to attach 3490E drives to a Host System using ESCON, a device which translates the data into compatible form must be installed. The FC 3500 controller is the recommended server for channel translation.

Introduction to the FC 3500 Controller

The FC 3500 Controller is used to interface between the ESCON channels, and the SCSI channel of the 3490E tape drives.

FC 3500 Features — Front View

Figure 23 shows the front view of an FC 3500 Controller.

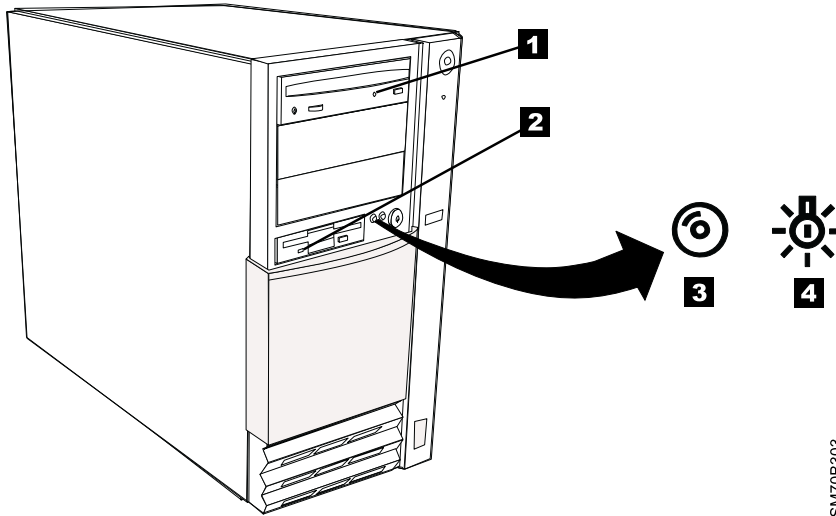


Figure 23. Front View of the FC 3500 Controller

1. CD-ROM display
The display lights up when the CD-ROM drive of the system unit is accessed.
2. Floppy disk display
The display lights up when the floppy disk drive of the system unit is accessed.
3. Hard disk display
The display lights up when the hard disk drive of the system unit is accessed.
4. Power On display
 - The display lights up **green** when the system unit is switched **on**.
 - The display lights up **amber** when the system unit is switched **off**.

FC 3500 Features — Rear View

Figure 24 shows the rear view of an FC 3500 Controller.

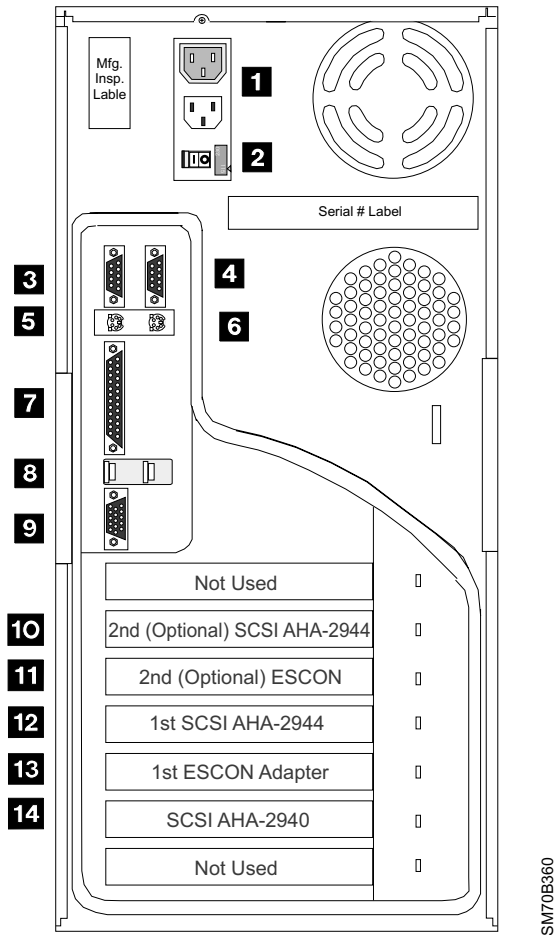


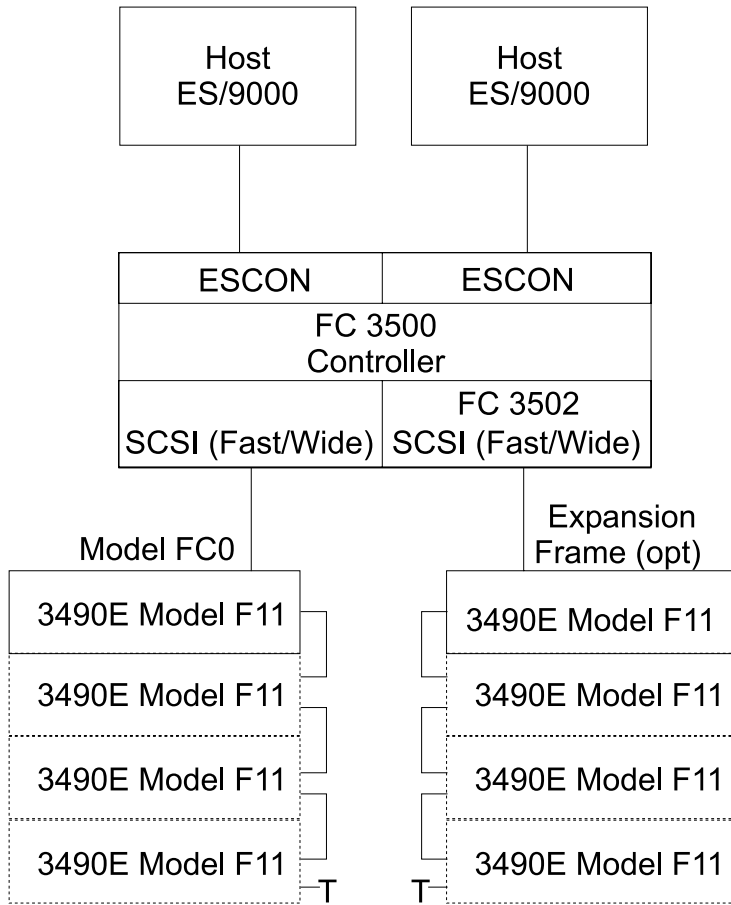
Figure 24. Rear View of the FC 3500 Controller

Table 15. Electrical Component Locations

Item	Part Name
1	Power Plug receptacle
2	Power On/Off switch and primary power jumper pullout plug
3	COM 1 serial I/O
4	COM 2 serial I/O
5	Keyboard connector (not used)
6	Mouse connector (not used)
7	Parallel port connector (not used)
8	USB Ports (not used)
9	Video monitor port (not used)
10	PCI slot 5 (2nd optional external SCSI adapter AHA-2944). May be used to control up to four additional 3490E drives.
11	PCI slot 4 (2nd optional ESCON adapter)
12	PCI slot 3 (1st external SCSI adapter AHA-2944). Usually used to control up to four 3490E drives.
13	PCI slot 2 (1st ESCON adapter)
14	PCI Slot 1 (Internal SCSI adapter to HDD and CD-ROM)

Basic Installation of the FC 3500 Controller

The FC 3500 Controller is attached to the tape drives using a SCSI Fast/Wide adapter and SCSI cable. See “Cabling” on page 17 for more information. The FC 3500 is then connected to the Host System using ESCON adapters and cables. Figure 25 shows how the FC 3500 Controller might be used to attach the 3490E drives to two host ES/9000 computers.



Legend: T=Terminator

⌋ = SCSI Cable

A25FC012

Figure 25. Example: FC0 Attachment Options

Chapter 8. Planning for Installation

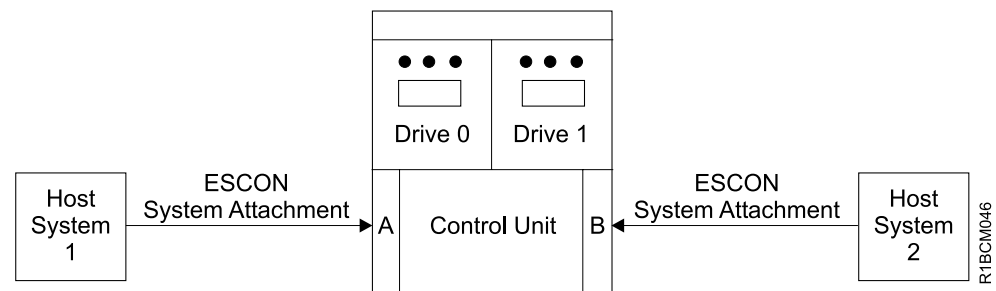
The 3490E Model F01 is an integrated tape subsystem in a tower configuration. The 3490E Model F11 is an integrated tape subsystem in a rack configuration. The 3490E Model F1A is an integrated tape subsystem installed within the IBM 3494 Tape Library Dataserver. The 3490E Model FC0 is an integrated tape subsystem consisting of from one to four tape drives and an optional controller installed in a single rack.

- Model F01 consists of one drive with an automatic cartridge loader, a control unit, and all the necessary power and cooling components.
- Model F11 consists of one drive with an automatic cartridge loader, a control unit, and all the necessary power and cooling components.
- Model F1A consists of one drive, a control unit, Library Attachment Facility, RS422 cabling to Library Manager Interface and all the necessary power and cooling components.
- Model FC0 consists of from one to four Model F11 drives, an FC 3500 feature host control unit, and all the necessary power and cooling components.

SCSI (non AS/400) attachments can be mixed with ESCON system attachments. Refer to “Configurations with ESCON System Attachments” on this page for a discussion of ESCON attachments. Refer to “Configurations with SCSI” on page 71 for a discussion of SCSI attachments.

Configurations with ESCON System Attachments

When attaching the subsystem with ESCON, 3490E Model F1A may be attached to or shared between any of the following host processors: AS/400*, RISC System/6000* or ES/9000*. IBM 3490E Model F1A may also connect to 9370, 4381, or 3090* if they are ESA capable. Because not all host processor types are supported by all system attachments, check with your marketing representative for details. A sample subsystem configuration for two Model F1A drives and one Feature Code 3500 control unit is shown in Figure 26.



Note:

An ESCON adapter can have 16 logical attachments from the host system.

Figure 26. Subsystem Configuration for two F1A drives and one Feature Code 3500 control unit with ESCON System Attachments

With ESCON, the subsystem can have one of the following channel configurations:

- One ESCON adapter
- Two ESCON adapters

As part of your installation plan, analyze your performance and distance requirements carefully. The following considerations may be used as a starting point for a discussion with your IBM installation planning representative:

ESCON System Attachments

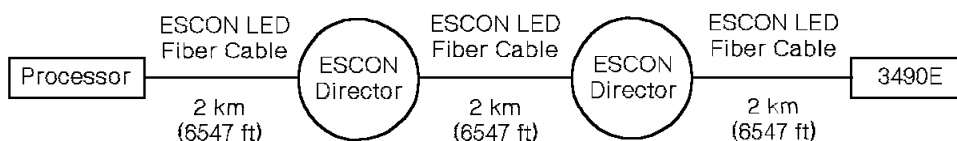
The following types of ESCON channels are available for the subsystem:

- ESCON 4.5 megabyte per second
- ESCON 9 megabyte per second
- ESCON 18 megabyte per second

ESCON channel attachments can be configured to either 10MB/sec or 17MB/sec host channels. The interface data rate is limited to a maximum of 18MB/sec.

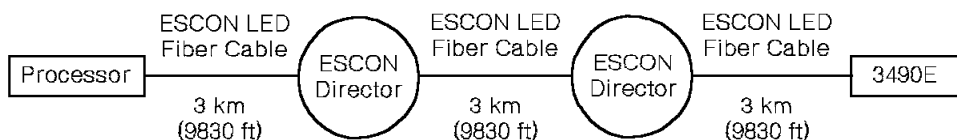
With ESCON, you have numerous options for the physical location of your 3490E subsystem. The 3490E can be located up to 23 km (14.3 miles) from a processor. Several configuration options are indicated below.

A 3490E can be located approximately 6 km (3.73 miles) from a processor when using the ESCON LED 50.0 micron cables and two ESCON directors:



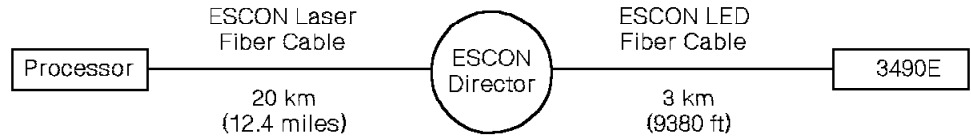
R1BCM033

A 3490E can be located approximately 9 km (5.6 miles) from a processor when using the ESCON LED 62.5 micron cables and two ESCON directors:



R1BCM034

A 3490E can be located approximately 23 km (14.3 miles) from a processor when using the ESCON laser fiber cable, an ESCON director, and an ESCON LED fiber cable:



R1BCM035

With ESCON directors, each subsystem ESCON adapter provides for up to 16 logical attachments.

For additional information about ESCON attachments, refer to *IBM FiberOptic Channel Link Planning and Installation*.

Configurations with SCSI

The 3490E SCSI system port feature 5040 is a 2-byte wide SCSI-2 fast interface. It utilizes a SCSI-3 68 pin P connector interface which will accommodate 16 bus addresses. When attaching to the RISC System/6000 controller feature 2040, a 1-byte to 2-byte interposer must be employed. This allows a total of eight interfaces and could be one initiator attaching to seven targets, seven initiators attaching to one target, or any combination of initiators and targets up to a total of eight, provided:

- A 3490E is the last device on the SCSI bus.
- The SCSI bus is properly terminated at each end.
- Cable restrictions are followed in accordance with the SCSI-2 specification. When using the RISC System/6000 SCSI controller, feature 2420, the maximum cable length is 18 meters (59 feet).

Notes:

1. An *initiator* is a SCSI device that can request an I/O process to be performed by another SCSI device (a target). A *target* is a device that can perform an I/O process. Many devices can serve as both initiators and targets. An initiator can be a processor, such as a RISC System/6000 processor.
2. To ensure maximum performance, 3490E Model F1A must be the only targets on the SCSI bus.

When connecting to a RISC System/6000 processor with the SCSI 2 Differential High Performance I/O Controller (RISC System/6000 feature 2420), any combination of eight initiators and targets is technically possible. However, a fully loaded system is not a typical installation as the length of the SCSI bus is limited to approximately 18 meters (59 feet) by the RISC System/6000 feature 2420. A typical configuration consists of one initiator attached to one 3490E target.

In addition, if you are connecting a RISC System/6000 controller (feature 2040), the controller can act as the initiator for multiple devices, but not simultaneously. Thus, when connecting a 3490E (target) to an initiator, you must understand the capabilities of the host controller as well as the capabilities of the 3490E with feature 5040.

SCSI Features and Cables

When using a 3490E SCSI 2 differential system attachment, the distance between a processor and a 3490E depends on the SCSI differential controller feature of the processor. Typically, a maximum of 25 meters of SCSI 2 Cabling can be used.

However, RISC System/6000 Controller Feature 2420 limits the maximum allowable cable length to 18 meters. When using SCSI system attachments, you can design numerous initiator and target configurations. Two recommended configurations are shown in Figure 27.

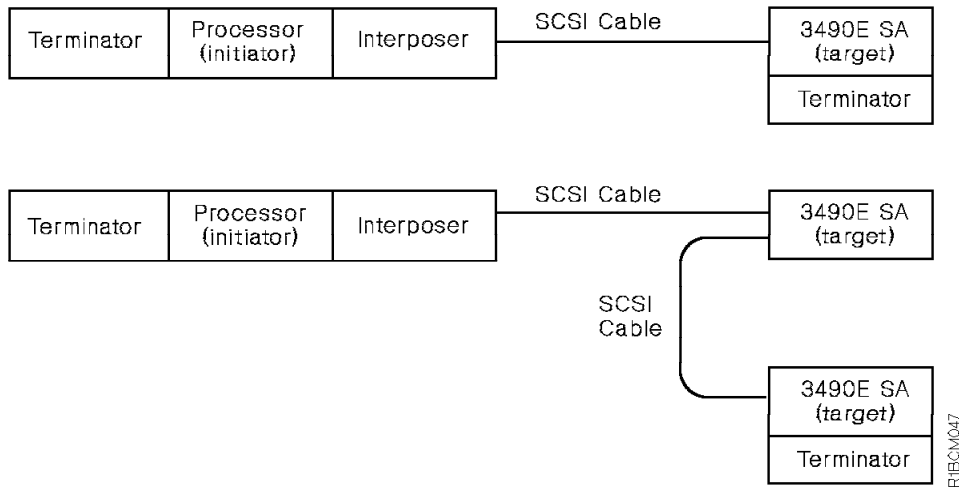


Figure 27. Recommended SCSI Configurations for RISC System/6000 Controller Feature 2420

For attaching a RISC System/6000 (with controller feature 2040) to a 3490E (with SCSI feature 5040), the feature codes in Table 16 specify a cable of the appropriate length.

Table 16. SCSI Attachment Cables

Feature Code	Cable Length
5245	4.5 meters (15 feet)
5212	12 meters (39 feet)
5218	18 meters (59 feet)
	<p>Notes:</p> <ol style="list-style-type: none"> 1. Conversions from meters to feet are approximate and rounded to the nearest foot. 2. The interposer provides a path between a 50 pin, 1 byte, SCSI 2 controller feature and the 68 pin, 2 byte, SCSI 3 wide bus, but it does not terminate the remaining wires.

Host I/O Configuration Control Requirements for ES/9000 Systems

With ESCON channel attachments, the host or control program I/O configuration controls must configure the 3490E subsystem for nonshared subchannels. The configuration controls must also define all assigned device addresses associated with the subsystem on each configured channel path independently of the number of devices actually installed on the subsystem. The device addresses selected by the subsystem address configuration controls must match the device addresses defined in the host or control program configuration controls for each channel path.

On ESCON channel attachments, the configuration controls must define the link address of the control unit on the attached channel path. This address is determined by the interconnection of attached units and is not controlled by addressing controls within the I/O subsystem.

It is recommended that the channel path scheduling algorithm for preferred path, or equivalent, be used if available. The preferred paths for the devices within a subsystem should be equally distributed among the available paths such that successive addresses are on different channel paths.

Sharing Channels with DASD

Because of channel contention, sharing a channel between tape devices and direct access storage devices (DASDs) is not recommended. Tape devices usually use large block sizes and high effective data rates. The high channel usage by tape devices can cause DASD performance to degrade because of frequent rotational position sensing (RPS) misses. Also, channel contention can cause significant delays in *interrupt* signals which may be interpreted as *missing interrupts* by your operating system. If you are mixing device types on the same channel, for example, 3390 DASD and 3490E tape, you should evaluate the performance requirements to determine the effect on the channel and subsystems.

A processor that has channels of different capacities may present a problem when you are trying to design a configuration for optimum performance throughout a production day. Daytime operation may favor having DASD on the highest speed channels, but evening production may favor having tape on these channels. Running DASD backup favors both on the highest speed channels. You can balance these requirements by assigning a high speed channel to each device type and assigning the slower channel to each device as the alternate.

Planning for Supplies and Equipment

Listed below are the supplies and equipment you will need for the operation of your tape subsystem:

- Three months' supply of tape cartridges for storing information.
For information on estimating the number of tape cartridges required in an MVS environment, refer to *MVS/DFP: Data Administration Guide*.
- Labels for writing the volume serial number that is assigned to the tape cartridge and for listing the contents of the tape cartridge.
Label spaces on the edge and top of the tape cartridges can be used to display the volume serial number and the contents for each tape cartridge.
- Storage shelves for storing shelf-resident tape cartridges.

Model FC0 Rack Power and Power Cords

The FC0 has a 200–240 V single phase 25 Amp maximum autoranging power distribution box which supplies power to the F11 drives and the FC 3500 controller. (A 30 Amp circuit breaker is recommended.) The autoranging power supply will automatically adjust to the operating voltage range. The power supply is capable of operating at 50 or 60 Hz without requiring any modification. AC power is supplied to the power supply by a single cable which can be plugged into any properly grounded outlet and controlled by an AC power switch located on the main control panel.

There are 3 possible power cables for the Model FC0 Rack Power, depending on the country:

Table 17. Power Cord Part Numbers

Country	Description	Part Number
U.S. (except Chicago) and Canada	4.37 meter Russellstoll 3750-30A (Connector Type R&S 3753) 600 VAC, 50/60 Hz.	P/N 46F4594
Chicago	1.70 meter Russellstoll 3750-30A (Connector Type R&S 3753) 600 VAC, 50/60 Hz.	P/N 46F4593
All other countries (plug not included)	Plug Not Included. 600 VAC, 50/60 Hz.	P/N 46F6063

Table 18. Rack Power Specifications

Voltage	200–240 V
Frequency	50–60 Hz
Maximum Power Consumption	.450 KW
Maximum KVA Consumption	.600 KVA
Heat Output	388 Kcal/h (1.54 BTU/h)
Inrush Current	300 AP
Inrush Duration	1.0 msec

Planning for Program Support

Support for drives attached and defined to the operating environment as type 3490E is provided in these minimum supported levels. Available levels that are higher provide 3490E support. Lower levels that are no longer in service are not cited here, although they may have included support for 3490E device type.

Note: Out of service releases may not be enabled for year 2000 support.

Most of the referenced software releases require device support PTFs. **Refer to the PSP bucket or contact your IBM representative for required or recommended PTFs and for support requirements for other IBM application software products not listed here.**

- MVS/ESA
 - MVS/ESA SP 4.3.0
 - MVS/ESA SP 5.1.0 or 5.2.0
 - JES3 4.2.1, 5.1.1, or 5.1.2
 - DFSMS/MVS 1.1.0 or higher
 - OS/390 Rel 1 or higher
 - Basic Tape Library Support (BTLS):
 - MVS/DFP 3.3 with MVS/ESA SP 4.2.0 and higher
 - DFSMS.MVS 1.1.0, 1.2.0, or 1.3.0 with MVS/ESA SP 4.3.0 and higher.
 - EREP 3.5
- VM/ESA
 - VM/ESA 1.2.2 (standalone or 3494/5 library)
 - DFSMS/VM FL 221 (3494/5 library)
- VSE/ESA

- VSE/ESA 1.3.6 (3490E Model F1A)
- VSE/ESA 1.3.6 (Standalone 3490E Model FC0 Rack)
- VM/ESA 1.2.2 and DFSMS/VM FL 221 (3494 library for guest systems)
- 3494 FC 9203 Library Control Device Drives, Version 2 (3494 library for native systems)
- 3494 FC 9203 LAN Library Control Device Drives, Version 2
- EREP 3.5
- TPF
 - TPF 4.1 (standalone or 3494/5 library).

Planning for Operator Training

Before the tape subsystem is installed, tape subsystem operators need to be trained. IBM offers a training videotape, *Overview of 3490E Model F Magnetic Tape Subsystem Operations*. The tape is offered in VHS (P/N GV24–0517), PAL (P/N GV24–0518), and SESAM (P/N GV24–0519) formats.

- Listed below are typical tasks for 3490E Model Fxx operators:
 - Switch the tape subsystem on or off.
 - Insert or remove tape cartridges from the input/output station.
 - Place labels on the tape cartridge.
 - Set or reset the write-protect switch on the tape cartridge.
 - Vary the tape subsystem on or off.
 - Initialize a tape volume.
 - Reset the controller and drive (microcode) program.
 - Reset the subsystem after a transient problem.
 - Dispose of tape cartridges.
 - Perform problem determination.
- Listed below are typical tasks for 3490E Model F1A operators:

Note: F1A operators should have a general knowledge of the IBM 3494 Tape Library Dataserver hardware as well as all of its control functions.

- Select manual mode from the IBM 3494 Tape Library Dataserver library manager.
- Switch the tape subsystem on or off.
- Insert or remove tape cartridges from the tape loader.
- Place machine readable bar code labels on the tape cartridge.
- Set or reset the write protect switch on the tape cartridge.
- Vary the tape subsystem on or off.
- Initialize a tape volume.
- Reset the controller (microcode) program.
- Reset the subsystem after a transient problem.
- Dispose of tape cartridges.
- Perform problem determination.

Chapter 9. Introduction and Checklists

Note: This section is primarily provided for the reader who will be installing a 3490E on a complex system where a considerable amount of planning and change control activity is required. If you are installing a 3490E on a midrange system, you may find that far less preparation is necessary and you may want to just scan this chapter.

Migration from a nontape environment or from an existing noncompatible tape environment to the enhanced capability tape subsystem involves the following tasks:

1. Selecting a planning team with assigned responsibilities to ensure all preinstallation planning and migration tasks are completed. Refer to “Select a Planning Team”.
2. Selecting the appropriate model and features to satisfy the performance requirements for the applications used. Refer to “Configuration Planning Tasks Checklists” on page 81.
3. Planning the physical environment for the installation of the tape subsystem. Refer to “Site Planning Tasks Checklists” on page 82.
4. Determining the software necessary to support the applications used with a tape subsystem. Refer to “Software Planning Checklist” on page 83.
5. Planning for application changes that may be necessary when used with a tape subsystem. Refer to “Application Planning Checklist” on page 83.
6. Planning for operational changes that may be necessary in a tape subsystem environment. Refer to “Operations Planning Checklist” on page 84.
7. Planning for the data migration from a nontape or noncompatible tape environment to the enhanced capacity tape subsystem. Refer to “Data-Migration Planning Checklist” on page 84.

Select a Planning Team

To ensure an efficient installation, select a planning team and define their tasks. Suggested members include:

Planning Coordinator

The planning coordinator is responsible for ensuring that all planning and ordering activities proceed on schedule. This person should work closely with the IBM marketing representative.

Physical Planner

The physical planner is responsible for determining the location of the subsystem. This person ensures that environmental, electrical, and space requirements are met. This person should work closely with the IBM installation planning representative.

System and Application Programmers

The system and application programmers are responsible for choosing the licensed programs for the system. The system programmer installs and tests the licensed programs to be used and works with the storage administrator to define an installation's storage management policy. The application programmer creates and modifies specific application programs as needed. This person should work closely with the IBM systems engineer.

Storage Administrator

The storage administrator defines a storage management policy and plans for data migration. Refer to the appropriate planning, installation, and storage administration documents for your operating system to locate planning information for:

- Migrating your data
- Analyzing your business
- Analyzing your processing environment
- Estimating your resource requirements

Typical Task Assignments

The following tables on page Table 19 on page 79 through page Table 25 on page 81 identify many of the tasks and individuals associated with preinstallation planning and migrating to a 3490E subsystem.

Note: The planning team for the 3490E Model F1A should be the same individuals responsible for planning for IBM 3494 Tape Library Dataserver installation. If not, the details in the following assignments will require careful coordination with the IBM 3494 Tape Library Dataserver planning team.

Before Ordering

Table 19. Task Assignments Prior to Ordering

Activity	Planning Coordinator	Physical Planner	System Programmer	Application Programmer	Storage Administrator
Select team members.	●				
Determine required licensed programs.			●		
Coordinate with IBM 3494 Tape Library Dataserver planning team the number of Model F1A tape subsystems needed for 3494 installation.	●	●	●		●
Determine number of MESs needed to convert existing Model F11 tape subsystems to Model F1A tape subsystems for IBM 3494 Tape Library Dataserver, if required.	●	●	●		●
Determine cable requirements.	●	●			
Determine electrical requirements.		●			
Consider end user requirements.	●	●	●		
Determine the required number of IBM Magnetic Tape Cartridges or IBM Enhanced Capacity Magnetic Tape Cartridges.			●		●
Determine the required number of cleaner cartridges.			●		●
Determine label requirements. See “Cartridge Labels for 3490E Model F1A” on page 61.			●		●

At Order Time

Table 20. Task Assignments at Order Time

Activity	Planning Coordinator	Physical Planner	System Programmer	Application Programmer	Storage Administrator
Order the 3490E F11, or F1A tape subsystem.	●				
Order the 3490E Model F1A tape subsystem for each IBM 3494 Tape Library Dataserver as needed.	●				
Order the 3490E Model F1A tape subsystem MES kits for each IBM 3494 Tape Library Dataserver as required.	●				
Order supplies.	●				
Conduct a systems assurance review with the account team.	●	●	●	●	●

Approximately 15 Weeks before Delivery

Table 21. Task Assignments Approximately 15 Weeks before Delivery

Activity	Planning Coordinator	Physical Planner	System Programmer	Application Programmer	Storage Administrator
Order licensed programs.	●				
Upgrade the operating system.			●		
Define storage management policies. Plan for data conversion and migration.			●		●
Identify applications for migration to the 3490E subsystem.			●	●	●
Identify the location for the 3490E subsystem and arrange for any site modification.		●			
Identify the internal delivery route to the planned location of the 3490E subsystem.		●			
Prepare the physical layout.		●			
Determine who will install the electrical wiring and outlets.		●			
Confirm the 3490E subsystem and the supplies orders.	●				

Approximately 10 Weeks before Delivery

Table 22. Task Assignments Approximately 10 Weeks before Delivery

Activity	Planning Coordinator	Physical Planner	System Programmer	Application Programmer	Storage Administrator
Meet with the IBM marketing representative to discuss any concerns about the planning process.	●	●	●	●	●
Begin the software installation.			●		
Arrange for the installation of electrical wiring and outlets.		●			

Approximately 6 Weeks before Delivery

Table 23. Task Assignments Approximately 6 Weeks before Delivery

Activity	Planning Coordinator	Physical Planner	System Programmer	Application Programmer	Storage Administrator
Review the progress of the installation with your IBM marketing representative. Identify and resolve any scheduling problems.	●	●	●	●	●
Start the installation of electrical wiring and outlets.		●			
Complete testing of the operating system and application software.			●	●	

Approximately 4 Weeks before Delivery

Table 24. Task Assignments Approximately 4 Weeks before Delivery

Activity	Planning Coordinator	Physical Planner	System Programmer	Application Programmer	Storage Administrator
Complete installation and testing of the electrical wiring and outlets.		●			
Complete the site preparation.		●			
Train tape subsystem operators.	●		●		

Arrival of the 3490E Tape Subsystem

Table 25. Task Assignments at 3490E Tape Subsystem Arrival

Activity	Planning Coordinator	Physical Planner	System Programmer	Application Programmer	Storage Administrator
Ensure that the MESs are assigned to the correct 3490E for conversion to 3490E Model F1A, if required.		●			
Ensure the tape subsystem is placed as close to the final location as possible.		●			
Arrange for your service representative to install the hardware.	●				
Conduct a post review of the planning process to identify problems that can be avoided with future installations.	●	●	●	●	●

Checklists

The following checklists are provided to help you ensure that all tasks are identified prior to the installation of or migration to your 3490E.

Configuration Planning Tasks Checklists

Note: When planning for 3490E Model F1A, the IBM 3494 Tape Library Dataserver planning team must be involved if they are different from the 3490E planning team.

For configuration planning information, refer to “Chapter 8. Planning for Installation” on page 69. Configuration planning tasks include:

Performance Planning

Determine the performance characteristics required.

1. ___ Remove any cartridge loaded into slot #10.
2. ___ Insert the cleaning cartridge into slot #10 and close the drive door.
3. ___ Press **MENU**. the display will show, “CLEANER CART”.
4. ___ Press **SELECT**.
5. ___ The display will show, “INSTALL”. Confirm that the cleaning cartridge is loaded into slot #10, and then press **SELECT**. The drive will move the cleaning cartridge from slot #10 and mount it on the drive. The drive will now run the

cleaning process and display "CLEANING DRIVE". When the process is done, the cleaning drive will move the cleaner cartridge to the hidden compartment.

6. ___ To return to normal operations press **CANCEL** until the control panel displays "UNLOADED".
1. ___ Determine volume throughput requirements.
2. ___ Determine access time requirements.

Configuration Planning

Determine the subsystem configuration to meet performance requirements.

1. ___ Determine the number of tape drives required.
2. ___ Determine cartridge input/output requirements.

Site Planning Tasks Checklists

For site planning information, refer to:

- "Chapter 8. Planning for Installation" on page 69 for site planning information.
- *Care and Handling of the IBM Magnetic Tape Cartridge* for cartridge labeling information.
- *IBM 3494 Tape Library Dataserver Introduction and Planning Guide*, for library dataserver physical planning.
- *IBM System/360, and System/370, and 9370 Processors Input/Output Equipment Installation Manual—Physical Planning* for physical planning specifications.

The site planning tasks include:

1. ___ Determine required power and air conditioning.
2. ___ Determine equipment location.
3. ___ Identify space for spare parts and documentation.
4. ___ Determine the number and length of required cables.
5. ___ Determine channel attachments.
6. ___ Identify device addresses.
7. ___ Determine the number and type of cartridge storage cabinets.
8. ___ Determine the number and type of cartridge system tapes required (enhanced capacity cartridges or base cartridges).
9. ___ Determine the number of cleaner cartridges required.
10. ___ Develop the equipment layout floor plan.
11. ___ Prepare for any required subsystem rearrangement.

Cartridge Labels

1. ___ Determine quantities of labels. See "Cartridge Labels for 3490E Model F1A" on page 61.
2. ___ Determine label numbering sequences.

Ordering Equipment and Consumables

1. ___ Order machines and features
2. ___ Order cartridge storage cabinets. This includes external storage as may be required by the IBM 3494 Tape Library Dataserver.
3. ___ Order cartridges system tapes. See your IBM representative for the location of your local distributor of IBM Enhanced Capacity Cartridge System Tapes or IBM Cartridge System Tapes.

4. Order cleaner cartridges.
5. Order cables.
6. Order labels. See “Cartridge Labels for 3490E Model F1A” on page 61
7. Order the subsystem documentation
8. Schedule facility changes.

Software Planning Checklist

Software planning tasks include:

1. Identify software releases and maintenance required.
2. Identify changes or user modifications required.
3. Identify vendor software impact.
4. Develop a software build and test plan.
5. Identify operational impact.
6. Coordinate with other project areas.
7. Collect and apply maintenance.
8. Rework and apply modifications.
9. Generate the system.
10. Update documentation and procedures.
11. Schedule test time.
12. Perform a regression test.
13. Perform a stress test.
14. Perform a performance test.
15. Revise the migration plan, if necessary.
16. Use the subsystem for limited production.
17. Use the subsystem for full production.
18. Use the subsystem for production on all systems.

Note: For items 1 and 2, your IBM installation planning representative and your IBM systems engineer can determine the latest levels of software, microcode, and hardware.

Application Planning Checklist

For application planning information, refer to “Chapter 10. Planning for Application Changes” on page 85. Application planning tasks include:

1. Order the application documentation.
2. Determine high benefit applications.
3. Examine device level dependencies.
4. Select the strategy.
5. Assign schedule and responsibility for applications.
6. Reevaluate schedule for hardware and software delivery.
7. Develop the tracking system for migration.
8. Design the data test plan.
9. Develop test verification procedures.

Operations Planning Checklist

For operation planning information, refer to:

- “Chapter 11. Planning for Operations” on page 89.
- *IBM 3490 Magnetic Tape Subsystem Enhanced Capability Models F00, F01, F11, and F1A Installation, Planning, and Operator’s Guide* for additional information.

Operation planning tasks include:

1. Order documentation.
2. Plan for and train operators.
3. Develop sharing and switching procedures.
4. Evaluate tape subsystem operations.
5. Coordinate with other project areas.

Data-Migration Planning Checklist

For data migration planning information, refer to “Chapter 12. Planning for Data Migration” on page 93.

Data migration planning tasks include:

1. Classify tape cartridges.
2. Inventory tape cartridges by categories.
3. Determine tape cartridge turnover.
4. Examine migration versus conversion of files.
5. Determine migration strategy.
6. Coordinate with hardware and cartridge availability
7. Develop production schedule.
8. Produce the migration plan.
9. Develop project control procedures.
10. Select initial migration files.
11. Modify job control language.
12. Run migration targeted jobs.
13. Verify progress..

Chapter 10. Planning for Application Changes

The 3490E subsystem is compatible with currently available IBM magnetic tape subsystems. No recompile or link edit is required for the majority of programs that use tape data.

Verifying That the Data Migrated

Application programming personnel may need to perform several tasks when transferring data to the subsystem. Ensuring that the data is correctly transferred is the highest priority in the overall migration. Tape programming that was written at the device level may require modifications to take advantage of functions available on the subsystem. Changes to JCL are required for the device type. Application personnel may need to participate in some of the following activities:

1. Setting up the data test plan so project control personnel can monitor the migration.
2. Producing file copies with a special copy program or another utility that provides similar functions. The copies can be used in the early stages of the migration to ensure integrity before production controlled migration begins.
3. Processing test jobs with **real** test data.
4. Verifying results with the actual production run of the same application.
5. Running a tape-compare utility.

Special Application Considerations

The following information applies to unique tape programming subjects or items of special interest in the application area.

Sense Bytes

The subsystem operates with expanded sense bytes to support error recovery procedure programs. Many of these conditions are handled by the control unit instead of in the processor. Programs that refer to sense bytes may require modification. See *IBM 3490 Magnetic Tape Subsystem Enhanced Capability Models F00, F01, F11, and F1A Hardware Reference* for a description of the status and sense bytes.

Update in Place

Programs that rewrite or update in place require a special error handling routine. The subsystem does not support rewrite and this type of program is not recommended. If such programming already exists and requires modification for the subsystem, the following characteristics are applicable:

- The control unit sequence checks the blocks during read, write, and space block operations, and these programs fail if the block sequence is altered.
- The block ID is not transferred to the system during a read operation unless explicitly requested.

Note: Most operating systems provide a macro level interface for this function, for example, the MVS NOTE macro.

Write Validity Check Option

The write validity check option (tape write immediate mode) is for applications that require a block to be placed on tape and verified before they can proceed, for example, a database log facility. The channel is released when the block is in the buffer, but device end is not sent to the system until the read back check operation during the actual write operation on the tape drive is complete.

Because device end is not sent to the system until the read back check operation is complete, the write validity check option should be used only for applications that require synchronous write verify and can tolerate lower performance. You should consider DASD logging as an alternative.

Device Type Dependencies

Programs that perform certain functions may not give the expected results when they run with the subsystem. Some of the program functions that may depend on the device type and may need alteration include:

- Dynamic allocation
- Device dependent parameters such as the DEVD parameter of the DCB macro
- JCL inspection routines
- Accounting routines
- Non IBM vendor software
- Standalone programs
- Interrupt routines
- Programs that call data security erase (see “Data Security Erase”)

Tape IPL

Tape IPL of a standalone program sets the IPL channel to selector mode. The subsystem is designed to operate on a block multiplexer with an unshared subchannel.

Forward Space File

Forward space file is performed by the control unit. Applications that do skip file processing occupy the control unit to tape drive path during the entire operation and subsystem overlaps are adversely affected during this operation.

Channel Program Execution

Occasionally, input/output channel command word (CCW) programming is used in tape application programs. If the program is modified for the subsystem, the control unit uses channel command retry protocol in response to certain unexpected circumstances. Channel command retry repeats the channel command from the CCW that contains the command currently being processed. You should not write programs that modify tape CCWs or data areas before receiving a device end from the CCW string.

Data Security Erase

In the subsystem, data security erase writes random data on the tape. Programs using the data security erase CCW should issue a Rewind or Rewind Unload command after the data security erase. Any command that attempts to read over the random data created by the data security erase can receive an indication of permanent error. If the tape must move to a point prior to the data security erase

random data, high speed search (Locate Block command) in combination with a Read Block ID command can be used after the Rewind command.

Improved Data Recording Capability

The control unit provides IDRC to support the data compaction function. For standard tape processing, the following rules apply to data compaction:

- Data compaction is invoked automatically for Read Forward or Read Buffer commands as required by the data format.

Note: The data compaction algorithm does not support the Read Backward command. Application streams that request data compaction should not issue the Read Backward command. Upon receiving a Read Backward command, the 3490 will leave the tape positioned at the beginning of the object record and request read opposite recovery. Not all control programs support read opposite recovery or can support it in all cases. This recovery also degrades performance because the procedure requires two additional commands for each original Read Backward command.

- Data compaction is not recommended for encrypted data because the resulting compaction ratio may be less than one. In general, data compaction achieves a higher ratio if the logical block is not processed by a compaction or transformation cipher algorithm (within the host).
- For standard tape processing, when data compaction is invoked by the host software, the function is invoked for all logical blocks within a data file (that is, between any two nonsuccessive tape marks). Also, data compaction is invoked for all files on a volume (excluding header and trailer label groups) and for all volumes in an aggregate.

Chapter 11. Planning for Operations

Planning requirements include modifications in physical layout, subsystem operations, and operator procedures. The elements of change include the architecture of the subsystem, tape cartridge, cartridge subsystem storage, and accompanying changes to the operating system. This chapter describes operator procedures, tape drive and media differences, storage units, and switching considerations.

The operations department can play a significant role in subsystem migration. Operations and Production Control personnel can perform many of the tasks described in other chapters of this guide, including data migration and media conversion.

Operations requirements can include equipment removal and installation, JCL changes, drive assignment schedules, cartridge external labeling, and cartridge initialization. Additional tasks include managing tape cartridges in the computer room, developing procedures where required, and providing for training requirements.

Improved Data Recording Capability

With IDRC, the following considerations are relative to the installation's subsystem composition and management of the associated tape subsystem:

- For installations with IDRC enabled on all subsystems, there are no additional requirements for managing the tape subsystem or software. Installation controls should ensure that all interchange tapes sent to external destinations are written in a format compatible with the capabilities of the receiver's tape subsystem.
- For installations with a mix of 3480, 3490, and 3490E subsystems with IDRC enabled on some, but not all subsystems, there may be additional requirements to allow proper tape processing. In this case, some subsystems in the installation cannot process certain tapes within the tape subsystem. Software or operational management controls are required to mount input tapes on compatible subsystems.

Control programs that support the data compaction function and perform device allocation automatically recognize when IDRC is enabled. Other controls, such as JCL, system defaults, and operator commands, allow the control program to determine the format of an output tape and to allocate it to a subsystem that is compatible with the processing requirements. Consequently, there are no additional concerns for generating output tapes except for typical setup requirements for new device support. These activities include installing prerequisite software or, in some cases, updating JCL.

To process an input tape, the volume must be mounted on a device that supports the format of the tape. To allocate compatible devices for a given job, the control program must know the format on the volume (from the system catalog if it is used in the installation) or must be provided with a device type (through JCL) for allocation purposes. In cases where tapes are premounted, the operator must select a compatible subsystem, or manual intervention is required to move the tape to an appropriate subsystem when the tape cannot be processed.

When tapes are allocated or mounted on incompatible devices, the control program may detect the situation from information in the volume label (if present). If the

control program attempts to access data that cannot be processed due to data compaction, the subsystem indicates the condition when the data is accessed, not when the volume is mounted.

Tape cartridges written by a 3490E subsystem can only be read by a 3490E subsystem. However, they are recognized as 3490E cartridges on the 3480 or 3490 base subsystem. For ease of migration, cartridges written by a 3480 or 3490 base subsystem can be read by a 3490E subsystem.

Enhanced Capacity Cartridge System Tape

The IBM Enhanced Capacity Cartridge System Tape can be used only on 3490E Magnetic Tape Subsystems. If you choose to use enhanced capacity cartridge system tape, IBM recommends that you use the enhanced capacity cartridge for all 3490E scratch mounts. With this practice in place, tape copy, tape replace, and tape migration requirements are simplified. Data can be copied from standard cartridges to enhanced capacity cartridges. However, copying data from enhanced capacity cartridges to standard cartridges is not recommended, as datasets may exceed the capacity of the standard cartridge.

Operator Training ESCON Environment

The 3490E Model Fxx Training Video provides a complete overview of the different operational modes of the 3490E Model Fxx drive. For the ESCON environment it is recommended that specific hands on operator training be given which covers the following operations:

- How to Interpret the Control Panel and Use the Drive's Menu Options (Refer to "Chapter 5. Using the 3490E Model Fxx Drive" on page 27.)
- How to change and set up the Autoloader's SHUTTLE MODE (Refer to "Autoloader Mode Settings (Shuttle Modes)" on page 48.)
- How to use Sequential (Scratch) Mount Operations (Refer to "Sequential Mode (SA, SAP, SQS, SQSP, SQST)" on page 51 and "Basic Operations for the 3490E" on page 54.)
- How to handle Priority (Private or Specific) Mounts (Refer to "Sequential Mode (SA, SAP, SQS, SQSP, SQST)" on page 51 and "Basic Operations for the 3490E" on page 54.)
- How to reset the Autoloader's Shuttle (Refer to "Shortcuts to Drive Operations" on page 57.)
- How to install, remove, and use the drive's Cleaning Cartridge "Cleaning Cartridge" on page 46

Recommended ESCON Environment Autoloader Settings

For the ESCON Environment it is recommended that the autoloader be set in a SEQUENTIAL MODE of Operation. In SEQUENTIAL MODE the autoloader will sequence through the cartridge slots until the last cartridge is reached. SEQUENTIAL operation is typically used for system backup scratch cartridge operations.

There are two major suboptions: SYSTEM and AUTO. The major difference between SYSTEM and AUTO modes is that in AUTO mode the drive automatically loads the next cartridge after an unload, while in SYSTEM mode the drive does not

load the next cartridge until it receives a load command. The two primary sequential modes (SEQUENTIAL SYSTEM and SEQUENTIAL AUTO) can also be selected with support for a PRIORITY slot.

When a sequential mode is selected with a priority designation (SEQUENTIAL SYSTEM W/ PRIORITY or SEQUENTIAL AUTO W/ PRIORITY), slot 1 of the autoloader is designated as the priority slot. The priority slot is used to insert a “specific” or “private” mount into the normal sequential “scratch” mounts. The priority slot functions like the feedslot on 3490E Models B40 or C22 drives.

In addition to the above, operator training should include a discussion of the following options:

- SEQUENTIAL SYSTEM W/O PRIORITY
- SEQUENTIAL SYSTEM W/ PRIORITY
- SEQUENTIAL AUTO W/O PRIORITY
- SEQUENTIAL AUTO W/ PRIORITY

There is a fifth sequential mode, called SEQUENTIAL SPECIFIC TAPE. SEQUENTIAL SPECIFIC TAPE mode is used for periods when scratch mounts are not required, and only specific or private mounts are required. This mode is used for mounting single cartridges, with the load initiated by the operator. To speed the SEQUENTIAL SPECIFIC TAPE operation, an inventory is not performed.

Note: All sequential modes require the operator to load the first cartridge by pressing the load button.

The autoloader features several other modes of operation which are commonly used when the 3490E Model Fxx drive is used in AS/400 and RS/6000 environments.

Typical ESCON Operations use SEQUENTIAL SYSTEM W/ PRIORITY as the primary mode of operation during their backup periods (2nd and 3rd shift). During 1st shift operations SEQUENTIAL SPECIFIC TAPE is used to support random Specific or Private mount requests.

Operators can use the “fastpath” option TOGGLE SHUTTLE mode to quickly switch between two primary modes of operation such as SEQUENTIAL SYSTEM W/ PRIORITY and SEQUENTIAL SPECIFIC TAPE.

Operators can use the “fastpath” menu option SHUTTLE RESET, to reset the autoloader’s pointers back to the first cartridge (versus waiting until the shuttle is “OUT OF CARTS”). This usually helps in setting up the autoloader at critical operation times such as shift changes.

Customers who are familiar with the earlier 3490 Models Bxx or Cxx drives will find that the 3490E Model Fxx drives are quite different because of the door and because there are a far greater number of possible autoloader configurations. The following comparison table may help you migrate your operations from a 3490E Model Bxx or Cxx to a 3490E Model Fxx:

Table 26. Mode Comparisons

3490E Model Fxx Feature	3490E Model B40/C22 Equivalent
SEQUENTIAL SYSTEM W/ PRIORITY	SYSTEM MODE
SEQUENTIAL AUTO W/ PRIORITY	AUTO MODE

Table 26. Mode Comparisons (continued)

3490E Model Fxx Feature	3490E Model B40/C22 Equivalent
PRIORITY SLOT	FEED SLOT

Once existing customers have adapted to the differences in the autoloader, most realize overall clocktime reduction of their jobs due to the 3490E Model FC0 and the FC3500 controller's improved ability to handle concurrent job operations over the B and C series subsystems.

Chapter 12. Planning for Data Migration

For the following discussion, data migration is the movement of data to tape cartridges during the normal processing of jobs.

The following pages explain techniques to categorize a tape subsystem, determine a data movement schedule, balance tape drive requirements, and explore alternatives for forming a general migration strategy.

Most tape libraries are composed of common categories of tapes that are defined by the characteristics of how they are used. Determining the common categories is the first step in developing a migration strategy.

Each category is unique because of special criteria applied to its use and handling in a data processing environment. The criteria can include life cycle, security requirements, special handling, or various application dependencies. Table 27 describes tape categories.

Table 27. Tape Characteristics by Tape Category

Tape Category	Tape Characteristics
Archive	<ul style="list-style-type: none">• Contain records held for historical, legal, regulatory, or disaster recovery purposes.• Retention period usually more than a year and are often stored off site.• Some processing of these tapes can be done in locations other than the site where they were created. This offsite processing can occur as a part of a comprehensive disaster plan or for various legal or regulatory requirements.
Interchange	<ul style="list-style-type: none">• Prepared for use in other locations.• May be used in other computer systems or for special purposes like microfilm production.• May be tapes prepared at another location to be used on the local system, for example, tapes created on data collection equipment.
DASD backup	<ul style="list-style-type: none">• Created in normal backup jobs for DASDs.• Usually represent several generations stored in a subsystem at any given time.• Used to recover files in the event of a program or system error or other malfunction. The restore function is seldom used, but when it is, the integrity of the copied data is usually critical.• Files usually have a high turnover rate and may require interchange with other sites.
Journal	<ul style="list-style-type: none">• Contain transactions recorded against another dataset.• Allow their companion datasets to be reconstructed by applying the journal data to a previous version of the companion datasets.• Most commonly used in data base and online systems applications.
Scratch	<ul style="list-style-type: none">• Commonly referred to as the scratch pool, contain no active data.• Used for the creation of new files during normal processing when the data is to be kept at job step or job end.• Often a regular flow of new, unused tapes entering a subsystem to be used for growth and replacement of old tapes. This may be important in determining the number of tape cartridges to order.

Table 27. Tape Characteristics by Tape Category (continued)

Tape Category	Tape Characteristics
Process	<ul style="list-style-type: none"> • Created during periodic execution of an installation's application programs. • Usually represent the highest volume of files in a subsystem. For example, multiple generations of a tape master file can be considered process tapes. • Range of criteria and time frames; most commonly is the daily, weekly, and monthly processing cycle.

Managing Multiple Tape Formats and Lengths

A migration strategy must include a consideration of multiple tape formats and the choice of cartridge system tapes. Depending on the mix of IBM 3480, 3490, and 3490E subsystems and features available, your considerations should include:

- Does the magnetic tape subsystem have IDRC?
- Does the magnetic tape subsystem write data in 18 track or 36 track format?
- Does the existing tape library contain cartridges with cataloged 18 track datasets?
- Does the magnetic tape subsystem use IBM Cartridge System Tape or IBM Enhanced Capacity Cartridge System Tape?

IDRC Considerations

The Improved Data Recording Capability (IDRC) format is designed to increase effective storage capacity. IDRC is the default mode on the 3490E Magnetic Tape Subsystem. After data is written using IDRC, it must be read (retrieved) using a drive with IDRC enabled.

18 Track and 36 Track Considerations

The 3490E subsystem uses the 36 track format. Data written on the 3490E subsystem cannot be read (retrieved) by 3480 or 3490 base subsystems which write in the 18 track format. However, data written on a 3480 or 3490 subsystem can be read by the 3490E.

Note: The 3490E with the SCSI attachment feature cannot read tapes written by a 3480 in synchronous mode with data records over 256KB.

Charting the Use of Multiple Tape Formats

A key migration consideration is knowing how to retrieve data from tape. In general, after data is written in a specific format, it must be retrieved in the same format:

- When data is written *without* IDRC, it can be retrieved by a magnetic tape subsystem *with* or *without* IDRC.
- When data is written *with* IDRC, it must be retrieved by a magnetic tape subsystem *with* IDRC.
- When data is written in 18 track format, it can be retrieved by a magnetic tape subsystem using either the 18 track format or the 36 track format.
- When data is written in 36 track format, it must be retrieved by a magnetic tape subsystem using 36 track format.

See Table 28.

Table 28. Considerations for IDRC and 18 Track and 36 Track Formats

Data Is Written On:	Data Can Be Retrieved By:
3480 and 3490 without IDRC	3480 3490 3490E
3480 and 3490 with IDRC	3480 with IDRC 3490 3490E
3490E	3490E
3490 Models F00, F01, and F11 (R6000 SCSI attachment only)	3480 3490 3490E

Standard Capacity and Enhanced Capacity Cartridge Considerations

IBM Cartridge System Tape has an uncompact data capacity of 400MB using a block size of 24KB. Improved Data Recording Capacity (IDRC) is standard on the 3490E subsystem; therefore, cartridge capacity normally exceeds 400MB.

IBM Enhanced Capacity Cartridge System Tape has an uncompact data capacity of 800MB using a block size of 24KB. IDRC is standard on the 3490E subsystem; therefore, cartridge capacity normally exceeds 800MB. For example, with a compaction ratio of 3:1, storage capacity per cartridge is 2400MB.

IBM Enhanced Capacity Cartridge System Tapes should not be mounted in a non 3490E subsystem. Only the 3490E has the design updates needed to support the use of the enhanced capacity cartridge. When an enhanced capacity cartridge is mounted in a 3480 or 3490 Magnetic Tape Subsystem with the microprogram at Engineering Change (EC) level XXX863 or XXX867, the subsystem returns an ERA code to the operating system and indicates a tape length incompatibility. If this occurs, the job will not run and should be rerun again with the cartridge mounted in a 3490E Magnetic Tape Subsystem. See *IBM Magnetic Tape Subsystems Enhanced Capability Models F01, F11, F1A, and FC0 Hardware Reference* for a discussion of ERA codes.

Note: The XXX in the EC numbers XXX863 or XXX867 are replaced by three characters that identify the specific machine and model.

If you choose to use enhanced capacity cartridge system tape, IBM recommends that you use the enhanced capacity cartridge for all scratch tape mounts. This simplifies tape copy, tape replace, and tape migration requirements. Data can be copied from standard cartridges to enhanced capacity cartridges. However, it is not recommended to copy data from enhanced capacity cartridges to standard cartridges, as datasets may exceed the capacity of the standard cartridge.

Developing a Data Migration Sequence

Another aspect of planning involves the sequence to follow during the migration. Specific considerations for each category of a subsystem determine where to begin and the preferred sequence. Some considerations are:

DASD backup tapes: These tapes can be converted easily during the first phase of the plan and quickly reduce subsystem space requirements and improve performance. Large scale data transfer is involved, which lends itself to device and data transfer verification with familiar utilities.

Process tapes: These tapes can be converted either selectively or at the normal process rate. Application programming personnel or operations staff who normally audit application job flow may monitor the transition. This category should account for the majority of the migration workload.

Archive tapes: All new archive volumes can be created on the tape cartridges with the understanding that some may be recalled by a processing agency that requires cartridges in 18 track format or tape reels. In those instances, the cartridges would have to be copied before shipment. The existing archive tapes can be converted to take advantage of space and data integrity improvements with the same understanding.

Journal tapes: A read back check operation is typically used for journal tapes after a record is written to ensure the accuracy of the data. Because the subsystem is buffered, the write validity check option can be used for these journal tapes. (See Chapter 10. Planning for Application Changes for further discussion of the implementation of the write validity check option.) Journal tapes usually do not demand this high level of integrity. Journal tapes that do require a high level of integrity could remain on the existing media type until the application is modified accordingly. The subsystem is a high performance, batch mode device. While it can be used in tape write immediate mode (write validity check option) for those applications that require low logging activity, it is not recommended for high activity logging, such as journal tapes, because the effective data rate is lowered. High activity logging applications can use DASD logging as an alternative.

Interchange tapes: These tapes cannot migrate initially. They require selective conversion based on the ability of the interchange system to operate with the tape cartridge and its format.

To develop a migration sequence, you should plan for a complete migration and conversion of all possible tapes, except for interchange and journal tapes. The total number of cartridges required is equal to the sum of process, DASD backup, scratch, and archive tapes in the current inventory plus possible additions for growth. Enough of your existing drive types must be kept to process the interchange and journal tapes.

Developing a Data Migration Strategy

The 3490E subsystem writes data in 36 track format. The 3480 and 3490 base subsystems write data in 18 track format. The 3490E can read data written in 18 track format, but cannot write data in the 18 track format. Therefore, the subsystems are not completely compatible. The discussion that follows may serve as a starting point as you develop your migration strategy.

Although the 3490E can read the 18 track format of existing cartridges, it may be beneficial to ignore this function and use it only if you really need it. New drives cannot be allocated easily when referencing old datasets from the catalog. Without some overt action to cause the allocation to happen, allocation will not select a 3490E device, when the catalog entry for an existing dataset is 3480 or 3480X. An overt action could be an exit to insert a new esoteric, a JCL change to insert the new esoteric, or a change to the catalog entry to replace the 3480 device type with the 3490E device type.

The assumption for this discussion is that you will want to replace your existing drives at a pace that allows you to convert your applications and that you will keep one or more 3480 or 3490 base drives for data interchange.

Possible strategies include:

- Old file in and new file out
- Copy and recatalog datasets
- Change catalog device types to 3490E

Your strategy plan will probably include one or more of the possibilities listed above. The determining factors will be the time you allot for migration and the number of cataloged 18 track datasets in your existing library.

Old File In and New File Out

With this migration technique, files written in 18 track format are read in and newly created files are written on 3490E drives. At any given library turnover rate, a given percentage of library cartridges will be written in 36 track format. This method involves gradually adding 3490E hardware while gradually removing 3480 or 3490 base hardware.

This migration technique can be implemented without redefining existing esoterics from 3480 and 3490 to 3490E devices and without JCL changes. All newly created files will be assigned to a 3490E esoteric.

Copy and Recatalog Datasets

With this strategy, data can be copied to 3490E cartridges and the dataset can be cataloged as a 3490E in the same job step. This will work best for multicartridge read only files that can benefit from the doubled capacity of the 3490E format. Presumably, this would be a last step to convert the remaining files not processed using one of the other strategies.

Change Catalog Device Types to 3490E

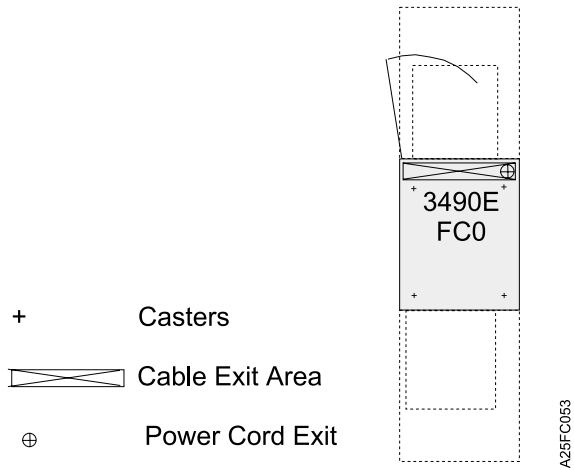
Changing the catalog entry involves uncataloging an existing 3480 or 3480X entry and recataloging that dataset as a 3490E. This process must carry forward all the existing catalog data such as *vol/ser* information, the new device type, file sequence number, and owner information. It might require building a dataset from the catalog for candidates to be recataloged. In this dataset of candidates, you can delete those that:

- Use DISP=MOD or otherwise extend an existing file
- Add additional files to the 18 track cartridge
- Expire soon, based on the dataset date
- Do not include candidates for allocation to 3490E devices

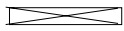

Chapter 13. Physical Planning Template

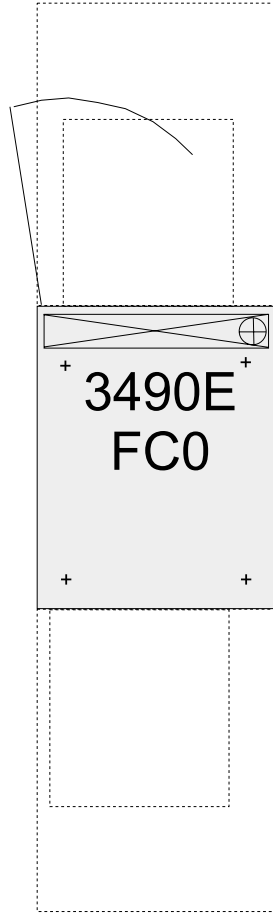
The following template illustrations can be used during initial physical planning activities to determine the appropriate layout for the subsystem and space requirements.

ENGLISH SCALE: 1/4 inch = 1 foot
METRIC SCALE: 10 mm = 0.5m



ENGLISH SCALE: 1/2 inch = 1 foot
METRIC SCALE: 20 mm = 0.5m

- + Casters
-  Cable Exit Area
-  Power Cord Exit



A25FC054

Chapter 14. Notices

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Safety Notices

Listed below are the safety requirements for operating this product.

Each danger and caution notice contains a reference number (RSFTxxxx). Use the reference number to check the translation in *External Devices Translated Safety Notices*, SA26-7192.

Danger Notices

A danger notice calls attention to a situation that is potentially lethal or extremely hazardous to people.

The following danger notices appear in this publication:

DANGER

To prevent a possible electrical shock from touching two surfaces with different electrical grounds, use one hand, when possible, to connect or disconnect signal cables. (RSFTD004)

DANGER

An electrical outlet that is not correctly wired could place hazardous voltage on metal parts of the system or the products that attach to the system. It is the customer's responsibility to ensure that the outlet is correctly wired and grounded to prevent an electrical shock. (RSFTD201)

DANGER

To prevent a possible electrical shock when adding or removing any devices to or from the system, ensure that the power cords for those devices are unplugged before the signal cables are connected or disconnected. If possible, disconnect all power cords from the existing system before you add or remove a device. (RSFTD203)

DANGER

To prevent a possible electrical shock when installing the device, ensure that the power cord for that device is unplugged before installing signal cables. (RSFTD204)

Caution Notices

A caution notice calls attention to a situation that is potentially hazardous to people because of some existing condition.



The general caution symbol identifies conditions where caution must be used.



The electrical caution symbol identifies electrical hazards where extreme caution must be used.



The weight caution symbol indicates that the 3490E Model Fxx weighs approximately 29.5 kilograms (65 pounds). It takes two persons to safely lift the unit.

Attention Notices

An attention notice indicates the possibility of damage to a program, device, system, or data.

Possible Safety Hazards

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 3490E Model Fxx Tape Subsystem.

Environmental Notices

The following environmental information pertains to this product.

Product Recycling

This unit contains recyclable materials. The materials should be recycled where facilities are available and according to local regulations. In some areas IBM will provide a product take-back program that ensures proper handling of the product. Contact IBM Service for more information.

Environmental Design

The environmental efforts that have gone into the design of this unit signifies IBM's commitment to improve the quality of its products and processes. Some of these activities include elimination of the use of CFCs, development of reusable or recyclable packaging, and reduction of manufacturing wastes.

End of Life (EOL) Plan

This product is a purchased unit. Therefore, it is the sole responsibility of the purchaser to dispose of it in accordance with local laws and regulations at the time of disposal.

Terminology

See "Glossary" on page 107 for definitions of terms, abbreviations, and acronyms used in this publication.

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ESCON	IBM	RISC System/6000
RS/6000	System 370	

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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.

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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.

Industry Canada Class A Emission Compliance Statement

This Class A digital apparatus complies with Canadian ICES-003.

Avis de conformité à la réglementation d'Industrie Canada

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

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This product has been tested and found to comply with the limits for Class A Information Technology Equipment according to European Standard EN 55022. The limits for Class A equipment were derived for commercial and industrial environments to provide reasonable protection against interference with licensed communication equipment.

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Attention: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Germany Electromagnetic Compatibility Directive

Zulassungsbescheinigung laut dem Deutschen Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG) vom 30. August 1995 (bzw. der EMC EG Richtlinie 89/336)

Dieses Gerät ist berechtigt, in Übereinstimmung mit dem Deutschen EMVG das EG-Konformitätszeichen - CE - zu führen.

Verantwortlich für die Konformitätserklärung nach Paragraph 5 des EMVG ist die IBM Deutschland Informationssysteme GmbH, 70548 Stuttgart.

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EN 55022 Klasse A Geräte müssen mit folgendem Warnhinweis versehen werden: "Warnung: dies ist eine Einrichtung der Klasse A. Diese Einrichtung kann im Wohnbereich Funkstörungen verursachen; in diesem Fall kann vom Betreiber verlangt werden, angemessene Maßnahmen durchzuführen und dafür aufzukommen."

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taitemi

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 *Dictionary of Computing*, New York: McGraw-Hill, 1994.

A

AEN. See *asynchronous event notification*.

archiving. The storage of backup files and associated journals, usually for a given period.

archiving application. The retention of records, in machine readable form, for historical purposes.

asynchronous event notification (AEN). The ability of a device to initiate communications with attached hosts.

automatic mode. A mode of operation that can be selected on the cartridge loader. This mode allows the automatic feeding and loading of premounted tape cartridges requiring no operator action.

B

backup and recovery application. The short term retention of records used for restoring essential business and system files when vital data has been lost because of program or system errors or malfunctions.

bit. A binary digit that may have the value of either 0 or 1.

block. A collection of contiguous data recorded as a unit.

buffer. A routine or storage used to compensate for a difference in the rate of flow of data, or time of occurrence of events, when transferring data from one device to another.

buffered mode. A mode that allows some logical blocks to accumulate in a buffer before the data is transferred to the device or bus.

byte. A binary number containing exactly eight bits.

C

capacity of media. The amount of data that can be contained on storage media and expressed in bytes of data.

cartridge loader. A standard function for the tape drive. It allows the automatic loading of premounted tape cartridges or the manual loading of single tape cartridges.

command. Control information that initiates an action or the beginning of a sequence of actions.

conversion. The process of changing from one method of data processing to another or from one data processing system to another.

D

data. Any representations such as characters or analog quantities to which meaning is, or might be, assigned.

data base. A set of data, consisting of at least one file, that is sufficient for a given purpose or for a given data processing system.

data compression. A technique or algorithm used to encode a quantity of data such that the encoded result can normally be stored in less space than the original data and such that the original data can be recovered from the encoded result through a reverse technique or reverse algorithm.

device driver. A technique for moving data between processor storage and input/output devices.

drive ready. A condition of a tape drive in which a tape cartridge has been inserted in the drive, and the tape has been threaded to the beginning-of-tape position.

dump. To write the contents of storage, or a part of storage, usually from an internal storage to an external medium, for a specific purpose such as to allow other use of storage, as a safeguard against faults or errors, or with debugging.

E

effective data rate. The average number of bits, bytes, characters, or blocks per unit time transferred from a data source to a data sink and accepted as valid. The rate is expressed in bits, bytes, characters, or blocks per second, minute, or hour.

EIA. A unit of measure established by the Electronics Industry Association equal to 44.45 mm (1.75 in).

enable. To provide the means or opportunity. The modification of system, control unit, or device action through the change of a microcode module or a hardware switch (circuit jumper) position.

error recovery procedures (ERP). Procedures designed to help isolate and, where possible, to recover from errors in equipment. The procedures are often used with programs that record the statistics of machine malfunctions.

F

FC. Feature code.

FID. Field Replaceable Unit (FRU) Identifier. FIDs are codes that are associated with error messages and each one indicates a specific problem condition. When a service call is made, the FID code should be given to your service representative.

file. A set of related records, treated as a unit. For example, in stock control, a file could consist of a set of invoices.

file protected. Pertaining to a tape volume from which data can be read only. Data cannot be written on the tape.

format. The arrangement or layout of data on a data medium.

formatted tape volume. A tape volume that has been initialized with certain formatting information (servo tracks) that is required to exist for the recording technique used on the volume before any data can be recorded. Depending on the format and media, formatting may or may not be required to use the media for data recording purposes.

G

GB. Gigabyte; 1 000 000 000 bytes of storage.

I

index. A function performed by the cartridge loader that moves cartridges down the input or output stack one cartridge position. A loader can perform multiple consecutive indexes.

inner layer slip. A loose wrap in a tape cartridge that results in a velocity error or write error and requires repacking. This condition is caused by dropping the cartridge and/or high temperature slip-store conditions.

initiator. A SCSI device that requests an I/O process to be performed by another SCSI device (a target). In many cases, an initiator can also be a target.

install. To set up for use or service. The act of adding a product, feature, or function to a system or device either by a singular change or by the addition of multiple components or devices.

interchange. The ability to process (read or write) a given tape volume on any one of a set of tape devices that support the form factor and recording format on the tape volume.

interchange application. The preparation of tapes for use on other systems or devices, either local or remote, or the use of tape data prepared by another system.

interposer. An interposer is a part used to convert a 68-pin connector to a 50-pin D-shell connector.

I/O. Input/output.

L

label. A label is a control file that is associated with a data file that provides volume and file identification information. The label is a software construct that appears as any other file to the I/O subsystem.

load point. The beginning of the recording area on magnetic tape.

logical block. A logical block is an independently accessible unit of information created by the program within a file. A logical block may be either a data logical block or a mark logical block.

logical record. A logical record is a string of concatenated data bytes that is passed between an application program and a control program or access method as the result of an I/O request.

loader. A standard function for the tape drive. It allows the automatic loading of premounted tape cartridges or the manual loading of single tape cartridges.

load point. The beginning of the recording area on magnetic tape.

LZ-1. Lempel-Ziv data compression program.

M

magnetic recording. A technique of storing data by selectively magnetizing portions of a magnetizable material.

magnetic tape. A tape with a magnetizable surface layer on which data can be stored by magnetic recording.

magnetic tape drive. A mechanism for moving magnetic tape and controlling its movement.

manual (sequential) mode. A mode of operation that can be selected on the cartridge loader. This mode allows a single tape cartridge feed performed by the operator.

MB. Megabyte; 1 000 000 bytes of storage.

media capacity. The amount of data that can be contained on storage media and expressed in bytes of data.

microprocessor. An integrated circuit that accepts coded instructions for execution. The instructions may be entered, integrated, or stored internally.

microprogram. (1) A sequence of elementary instructions that correspond to a specific computer operation, that is maintained in special storage, and whose execution is initiated by the introduction of a computer instruction into the instruction register of a computer. (2) A group of micro instructions that when executed perform a preplanned function.

migration. The process of changing from one method of data processing to another or from one data processing system to another.

mount. The act of making a tape volume available for processing by a specific tape device.

mounted. The state of a tape volume while it is available for processing by a specific tape device.

P

physical write protection. A facility provided by the mechanical housing of the tape volume that allows a human being or robotics device to write protect a tape volume. Physical write protection persists until the state of the facility on the tape volume is changed.

processing application. The execution of a systematic sequence of operations performed on data to accomplish a specific purpose.

Q

quiesce. To bring a device or system to a halt by a rejection of new requests for work.

R

random access. Random access refers to the processing of information on a volume in a manner that requires the device to access nonconsecutive storage locations on the medium.

removable media. Recording media that can be added to or removed from a recording device.

S

SCSI. Small computer system interface.

SCSI address. The hexadecimal representation of the unique address (0–F) assigned to a SCSI device. This

address would normally be assigned and set in the SCSI device during system installation.

SCSI device. A host adapter or a target controller that can be attached to a SCSI bus.

sequential access. Refers to the processing of information on a volume in a manner that requires the device to access consecutive storage locations (logical blocks) on the medium.

sequential mode. See *automatic mode* or *manual mode*.

ship group. The group of supplies, cords, or documentation that is shipped with the machine.

special feature. A specific design addition to an IBM product that is quoted in the IBM Sales Manual and ordered separately.

standard function. The significant design elements of an IBM product that are included as part of the basic standard product.

T

tape cartridge. A container holding magnetic tape that can be processed without separating it from the container.

tape volume. The recording medium and associated mechanical package that houses the media used by a tape device. See also *volume*.

target. A SCSI device that performs an operation requested by the initiator. A target can also be an initiator.

terminator. A part used to end a SCSI bus.

V

volume. (1) A certain portion of data, together with its data carrier, that can be handled conveniently as a unit. (2) A data carrier that is mounted and demounted as a unit, for example, a tape cartridge.

volume identifier (void). An identifier that uniquely identifies a tape volume within an installation. The volume identifier may be shown on an external label on the tape volume and may also be recorded on an internal label on the media itself. On some devices, the same void may be associated with multiple units of media or the different volume IDs may be associated with the same unit of medium.

W

write protected. A tape volume is write protected if some logical or physical mechanism causes the device processing the tape volume to prevent the program from writing on the volume.

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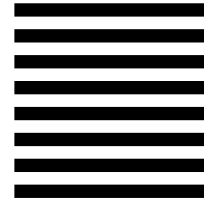
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