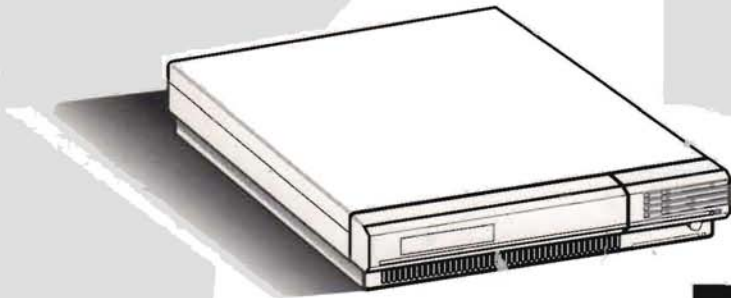




OVERLAND
DATA



Desktop TapePro

*Installation and
User Manual*

Desktop TapePro™ Series

User Manual

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Chapter 1 - Introduction and Installation

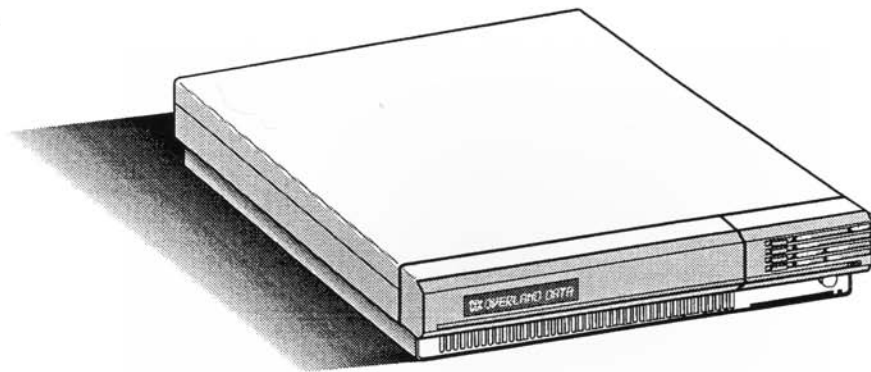
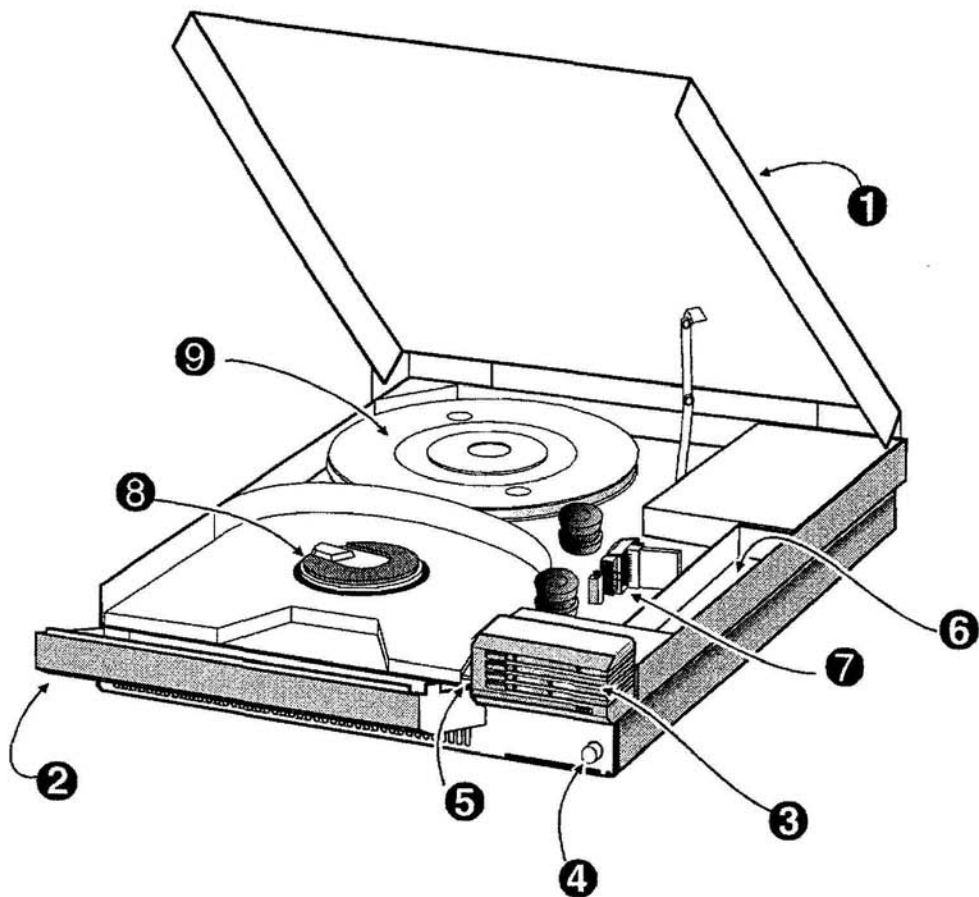


Figure 1-1a Desktop TapePro



- ① Enclosure Top Cover ② Door ③ Control Panel and Indicators
④ Power Switch ⑤ Top Cover Release Lever ⑥ Cleaning Supplies
Compartment ⑦ Head and Tape Scraper ⑧ Supply Hub ⑨ Take-up Reel

Figure 1-1b Features

Features

Refer to Figure 1-1b for identification of external features.

Identifying Your Drive Model

TapePro™ drives are autoloading and available with various interface capabilities. Models 5212, 5612, 5614 have a taller chassis to accommodate an additional SCSI interface circuit board. The SCSI interface circuitry is integrated onto the main circuit board in later models 5222, 5224, 5622 and 5624. In addition to interface differences, the models have different recording density capability. Table 1-1 lists TapePro Series configurations.

Table 1-1 Series Summary

MODEL	INTERFACES	CHASSIS	RECORDING DENSITY PE = Phase Encoded GCR = Group-Coded Recording
3210	Pertec parallel port	normal	PE
5212	SCSI single-ended parallel port	tall	PE
5214	SCSI differential parallel port	tall	PE
3610	Pertec parallel port	normal	GCR
5612	SCSI single-ended parallel port	tall	GCR
5614	SCSI differential parallel port	tall	GCR
5622	SCSI single-ended	normal	GCR
5624	SCSI differential	normal	GCR

Installation

To install and use your tape drive, you must properly cable the drive and connect to your host system. Then, you need to go to “Configuration” to set up the drive for optimum performance with your system.

Interfaces and Cabling

The TapePro™ Series tape drives can be used with SCSI or Pertec and parallel port interfaces, depending on the drive model. Refer to Table 1-1 to identify the model interface capability.

Parallel Port Installation

For tape drives with parallel port compatibility, you must have an open parallel port to connect to your tape drive. The parallel port cable should be included in your tape drive installation package. The cable can be attached to any parallel port (LPT).

To attach to a parallel port:

Refer to Figure 1-2a.

1. Place the P-clamp around the exposed metal shielding on the cable.
2. Use a Phillips screwdriver to attach the P-clamp to the drive with the provided screw.
3. Working at the same end of the cable, attach the cable connector to connector, P3 on the tape drive. Pin-1 is clearly marked on the cable and the tape drive.
4. Attach the other end of the cable to the parallel port on the computer.
5. Check for good connections and proper seating.

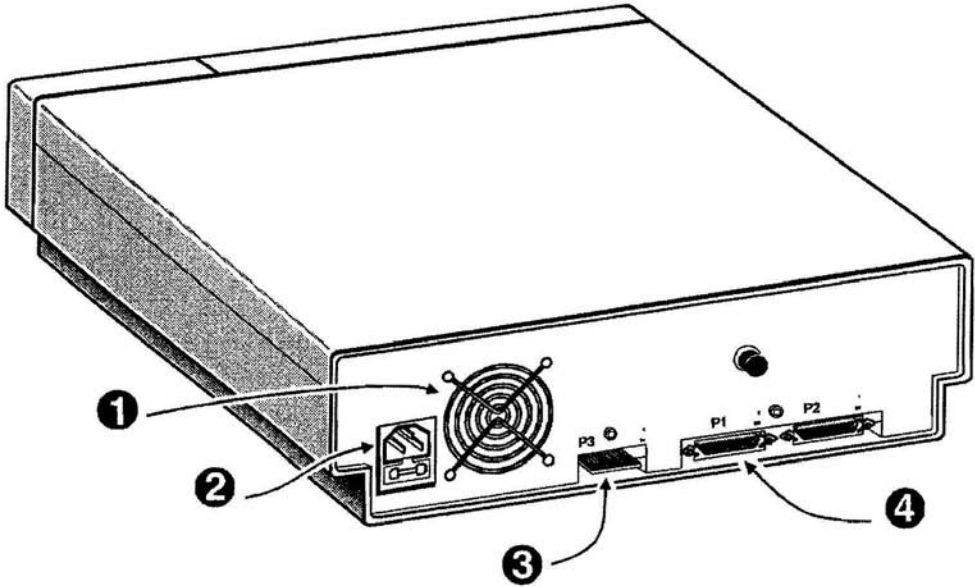


Figure 1-2a

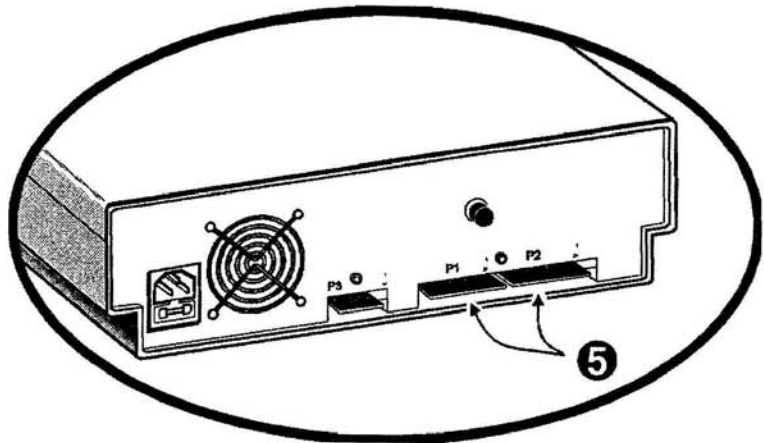


Figure 1-2b

- ① Fan ② AC Cable Connector ③ Parallel Port (selected models only)
- ④ SCSI Interface (selected models only) ⑤ Pertec Interface

Pertec Interface Installation

The Pertec interface on the tape drive is terminated internally. Therefore, the tape drive must be used at the end of the Pertec bus. If you need to use the tape drive as a daisy chained device, contact Overland Data Technical Support for more information.

The Overland Data/Pertec interface controller card should be included in your tape drive installation package or already installed on your computer. The controller is available in models:

- TXi-16 (16 bit, ISA)
- TXi-8 (8 bit, ISA)
- XL2 (8 bit, MCA)

Pertec Cable Requirements

Pertec cables have one shielded, D-type connector that attaches to a PC controller card. The other end splits into a Y and has two, 50-pin, female, card edge connectors. These two connectors are marked J1 and J2. Pin-1 identification is essential to proper cabling. Pin-1 position is clearly marked on the cable and on the tape drive.

Pertec interface cables are usually shipped with the drive. However, if you plan to use a different cable than the one supplied with the drive, or require additional cables for the bus, it is recommended that the cables meet the following requirements:

- Cable length maximum of 30 ft (9.14m).
- Cable length between daisy-chained units to a maximum of 10 ft (3.05m).
- Cable length between host I/O port and first tape drive: 15 ft (4.57m).
- Twists per inch of not less than 1 twist per inch (25.4 mm).
- Conductor size of 22 or 24 AWG, minimum insulation thickness of 0.01 in (0.25 mm).
- It is important that the ground side of each twisted pair be grounded to the signal ground of the interface circuit.
- For twisted-pair cables, a Sullins Electronics Corp. P/N EXC25DREN or equivalent should be used.

Tables 1-2 and 1-3 list the pin locations for interface inputs and outputs.

Table 1-2 Pertec Interface Signals, Controller to Tape Drive

PLUG NUMBER 1			
SIGNAL PIN	GROUND PIN	SIGNAL DESCRIPTION	SIGNAL NAME
4	3	Last Word	ILWD
6	5	Write Data 4	IW4
8	7	Initiate Command	IGO
10	9	Write Data 0	IW0
12	11	Write Data 1	IW1
14	13	Not Used *	---
16	15	Not Used *	---
18	17	Reverse	IREV
20	19	Rewind Command	IREW
22	21	Write Data Parity	IWP
24	23	Write Data 7	IW7
26	25	Write Data 3	IW3
28	27	Write Data 6	IW6
30	29	Write Data 2	IW2
32	31	Write Data 5	IW5
34	33	Write Command	IWRT
36	35	Not Used *	---
38	37	Edit Command	IEDIT
40	39	Erase Command	IERASE
42	41	Write Filemark Command	IWFM
44	43	Not Used *	---
46	45	Transport Address 0	ITAD0
PLUG NUMBER 2			
SIGNAL PIN	GROUND PIN	SIGNAL DESCRIPTION	SIGNAL NAME
18	17	Formatter Enable	IFEN
24	23	Rewind/Unload	IRWU
46	45	Transport Address 1	ITAD1
48	47	Formatter Address	IFAD
50	49	High Speed Select	IHISP

* These are properly terminated for compatibility with other products.

Table 1-3 Pertec Interface Signals, Tape Drive to Controller

PLUG NUMBER 1			
SIGNAL PIN	GROUND PIN	SIGNAL DESCRIPTION	SIGNAL NAME
2	1	Formatter Busy	IFBY
48	47	Read Data 2	IR2
50	49	Read Data 3	IR3
PLUG NUMBER 2			
SIGNAL PIN	GROUND PIN	SIGNAL DESCRIPTION	SIGNAL NAME
1	---	Read Data Parity	IRP
2	---	Read Data 0	IR0
3	---	Read Data 1	IR1
4	---	Load Point	ILDLP
6	5	Read Data 4	IR4
8	7	Read Data 7	IR7
10	9	Read Data 6	IR6
12	11	Hard Error	IHER
14	13	Filemark Status	IFMK
16	15	Identification	IIDENT
20	19	Read Data 5	IR5
22	21	End of Tape	IEOT
26	25	Not Used	---
28	27	Ready	IRDY
30	29	Rewinding	IRWD
32	31	File Protect	IFPT
34	33	Read Strobe	IRSTR
36	35	Write Strobe	IWSTR
38	37	Data Busy	IDBY
40	39	High Speed Status	ISPEED
42	41	Corrected Error	ICER
44	43	On-line	IONL

To attach to a Pertec interface:

Refer to Figure 1-2b.

1. Connect the D-type connector to the controller card. Secure the cable to the controller firmly, by tightening the captive screws.
2. Attach the P-clamp to the cable, then secure it to the tape drive as shown.
3. Orient Pin-1 to the right and connect to the tape drive.

SCSI Installation

Overland Data Technical Support is available to answer your questions about installation procedures for specific host systems. 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.

Before installation, see the recommended SCSI cable specifications in the following section. Also, see the section on termination of the SCSI bus.

Interface Cable Specifications

It is recommended that all SCSI cables used meet the following requirements:

- Shielded or double-shielded.
- Impedance match with cable terminators of 132 ohms, ideally.
- Characteristic impedance of greater than 90 ohms, required.
- Conductor size of 28 AWG, required.
- Twists per inch (twisted pair) of not less than 1 twist/inch required.
- For single-ended applications,
 - Maximum cable length for the entire SCSI bus is 19.68 feet (6 meters).
- For differential applications,
 - Maximum cable length for the entire SCSI bus is 82 feet (25 meters).
- Cables of different impedance should not be used together.
- 50-conductor flat cable or 25-signal twisted-pair cable should be used.
- Each end of the twisted pair ground wire must be connected to chassis ground.

Termination

A terminator must be installed on the drive if the drive is to be used at either end of a SCSI bus, such as the first or last device along a daisy-chain, or as a single SCSI interface peripheral. A daisy-chain application has several devices connected in series to a host. There are single-ended and differential terminators. **Note:** It is important that the appropriate terminator is used. The terminator shipped with your drive should match your drive configuration.

SCSI Interface Cable and Terminator Installation

Refer to Figure 1-2a.

1. Make sure that your host system configuration (single-ended or differential) matches the requested drive configuration. If it does not, contact your system administrator and do not install the drive.
2. Determine if the host system has an appropriate SCSI interface card and software drivers installed.
3. Inspect the terminator and make sure that its configuration matches the drive configuration. If it does not, call Overland Data Customer Service. The terminator should be clearly marked “single-ended” or “differential”.
4. Determine whether you plan to use the drive in a daisy-chain application.
 - ▶ If not used as a daisy-chain, install the terminator in the second SCSI connector.
 - ▶ If used in a daisy-chain, and the tape drive is *not* the last device of the chain, do not use the terminator.
 - ▶ If used in a daisy-chain application and it *is* the last device of the chain, install the terminator into the second SCSI connector on the rear of the drive.
5. Make sure that the SCSI cable you intend to use meets the specifications listed earlier in this chapter.
6. Measure the cable length required to connect the drive to the system. Check to make sure that it falls within the range given earlier in this chapter.
7. Plug one end of the SCSI cable into the SCSI connector, and the other end into the next SCSI device on the bus, or into your host system.

If you are connecting the tape drive to a workstation, please contact Overland Data Technical Support for related installation instructions.

Configuration

TapePro models can be configured for particular applications. For most applications, it is not necessary to change the default configuration options. However, for some applications it is desirable to use the configuration options to optimize the drive performance with your system.

Check your platform system documentation to see if you need to change any configuration options on the drive. Overland Data Technical Support is available to help you with configuration.

It is highly recommended that you familiarize yourself with drive operation in Chapter 2 before modifying the configuration.

Configuration Options

Table 1-4 shows the configuration options, all available settings, and the factory default setting. Each option is assigned an Option Number. Below there is a brief description of the function of each option.

Note: Table 1-4 includes the configuration options for the current firmware revision at the time of this publication. Your drive firmware may differ. For more information contact Overland Data Technical Support.

Option 0 - Data Transfer Rate (Pertec/SCSI)

This option sets the burst rate for transferring data between the tape drive and the host computer.

Option 1 - Drive Address

This option sets the drive address when multiple devices are daisy-chained together.

Option 2 - Write Data Parity

Do not change this setting on SCSI interface tape drives. External parity performs interface parity checking during write operations. As each data byte to be written is transferred to the tape drive, the drive regenerates a parity bit from the eight data bits sent by the host. This bit is compared to the parity bit accompanying the host data byte. If these parity bits do not match, the write operation is interrupted and an Operational Error 29 (Parity Error During Write) is displayed on the control panel. Internal write parity should be selected only when the drive is used with a host controller that does not generate write parity.

Option 3 - Ramp Delay

This option specifies a set time delay between IGO and the setting of IDBY. The delay is the command response time that corresponds to the ramp time in a start/stop tape drive. It is used to match the drive to the system command response capability, and can be tuned to optimize the drive performance. This option should not be changed on a SCSI interface drive.

Option 4 - Write Retry Count

This option sets the number of retries the tape drive performs on one block before generating an error message to the host. The chosen value affects the amount of time the drive takes to report a hard error condition.

Option 5 - Read Retry Count

This option sets the maximum number of retries the drive performs on one block before generating an error message to the computer. The chosen value affects the amount of time the drive takes to perform a hard error condition.

Option 7 - Emulation

This option is used to emulate different drives when interfacing with a workstation, and it differs between SCSI capable models. **Note:** This option is used with SCSI interface drives.

Option 8 - Reporting of Single Track Errors

This option commands the drive to report single-track errors. Single-track errors are usually not reported since they are correctable. This option may be changed to Reporting Mode for troubleshooting or system requirements. **Note:** This option is used only on drives capable of GCR 6250 recording density.

Option 9 (Pertec) - Early IDBY Mode

This option commands the drive to emit the IDBY signal for Pertec earlier than for the Overland Data controllers. Some other controllers require this feature. Always set this option to 0 if you are using an Overland Data controller.

Option 9 (SCSI) - Default Block Size

The option is used to set the write block-size for SCSI capable models.

Table 1-4 Configuration Options

OPT NO.	OPTION	INTERFACE	SETTINGS (BINARY VALUE)	DEFAULT
0	Data Transfer Rate	Pertec	50 KB/s = 0 100 KB/s = 1 200 KB/s = 2 300 KB/s = 3 350 KB/s = 4 400 KB/s = 5 450 KB/s = 6 500 KB/s = 7	7
0	SCSI Interface Transfer Rate	SCSI	5 MB/s = 0 3.3 MB/s = 1 2.5 MB/s = 2 2.0 MB/s = 3 1.7 MB/s = 4 1.4 MB/s = 5 1.25 MB/s = 6 asynchronous = 7	0
1	Drive Address	SCSI/ Pertec	Pertec = 0 1 = 1 2 = 2 3 = 3 4 = 4 SCSI = 5 6 = 6 7 = 7	0 5
2	Parity	SCSI/ Pertec	Internal = 0 External = 1	1
3	Ramp Delay	Pertec	No delay = 0 2 mS = 1 8 mS = 2 16 mS = 3	0
4	Write Retry Count	SCSI/ Pertec	0 retries = 0 1 retries = 1 2 retries = 2 3 retries = 3 4 retries = 4 5 retries = 5 6 retries = 6 7 retries = 7	4

Continued on the next page.

OPT NO.	OPTION	INTERFACE	SETTINGS (BINARY VALUE)	DEFAULT
5	Read Retry Count	SCSI/ Pertec	0 retries = 0 1 retries = 1 2 retries = 2 3 retries = 3 4 retries = 4 5 retries = 5 6 retries = 6 7 retries = 7	3
7	Emulation	SCSI	<u>Models 3X1X, 5X1X, only:</u> [0 - 8 = synchronous transfer, parity checking, no fixed block mode] No emulation = 0 IBM 9348 = 1 DEC TSZ07 = 2 Kennedy 9610 = 3 SCO/UNIX = 4 IBM 9348 = 5 HP 88780 = 6 Cipher 995 = 7 HP 7980S = 8 See below Table 3-1a = 9 - 12 <u>Models 5X22, 5X24, only:</u> [0 - 8 = synchronous transfer, parity checking, no fixed block mode] ODI 5X22, 5X24 = 0 ODI 5X12, 5X14 = 1 HP 88780 = 2 Kennedy 96X2 Tape = 3 IBM 9348 Model 001 = 4 Cipher M995 = 5 Tandberg TDC 360092X4180 = 6 Tandberg TDC 360021F8568 = 7 HP 7980S = 8 See below Table 1-4a = 9 - 12	0
8	Single Track Error Reporting	SCSI/ Pertec	Errors off = 0 Errors on = 1	0
9	Early IDBY Mode	Pertec	Early IDBY off = 0 Early IDBY on = 1	1

Continued on the next page.

OPT NO.	OPTION	INTERFACE	SETTINGS (BINARY VALUE)	DEFAULT
9	Default Block Size	SCSI	variable = 0 512 bytes = 1 1024 bytes = 2 2048 bytes = 3 4096 bytes = 4 8192 bytes = 5 16384 bytes = 6 32768 bytes = 7	0

Table 1-4a Emulation

EMULATION	SYNCHRONOUS TRANSFERS	PARITY CHECKING	FIXED BLOCK MODE (512 BYTES)
0 - 8	enabled	enabled	disabled
9	disabled	disabled	disabled
10	disabled	enabled	disabled
11	enabled	disabled	disabled
12	enabled	enabled	enabled

Configuration Mode

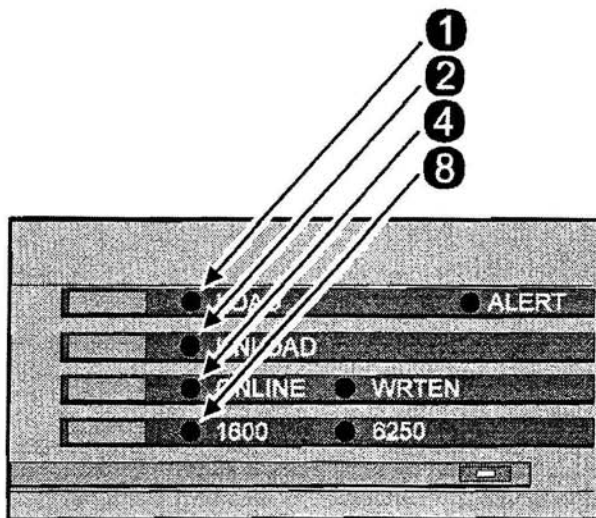


Figure 1-3 Configuration Indicator Numbering

The configuration options are viewed and modified in Configuration Mode. When you enter Configuration Mode, *WRTEN* will flash. The buttons are used to enter and exit Configuration Mode and are also used to toggle the indicators ON/OFF.

During configuration, indicators are assigned numerical values as shown in Figure 1-3. When lit, the indicator is equivalent to the assigned value. The values are used additively to equal the desired configuration options and settings.

Changing the Configuration

All selection and editing is done using the front panel buttons. You must enter Configuration Mode first, then select the option you want to change. When you are enabled to change the settings, *ALERT* lights. Configuration Mode is automatically canceled if there have been no new entries for 20 seconds.

If you decide that you need to change the configuration, follow the instructions and example in this section and use Table 1-4 and Figure 1-3 for reference. An example follows the instructions below.

Note: **DENSITY** refers to the 1600/3200/6250 button.

To enter Configuration Mode:

1. Put the drive in an idle condition (powered-on, unloaded and off-line).
2. Press and hold **DENSITY**.
3. Press **LOAD**.
4. Release **DENSITY** and **LOAD**.

⇒ The drive enters Configuration Mode and *WRT EN* flashes.

To select and change a Configuration Option:

1. Use Table 1-4 as a reference and use the buttons to toggle the indicators ON/OFF to equal the numerical value of the Option Number or the desired setting.

⇒ Check the number value for the lit indicators using Figure 1-3. It should add up to the Options number you selected.

⇒ Refer to the example above.

2. Press and hold **DENSITY**.
3. Press **LOAD**.
4. Release **DENSITY** and **LOAD**.

⇒ *ALERT* will begin to flash.

5. Use Table 1-4 as a reference and enter the number value of the setting.






















⇒ Check the number value of the lit indicators. It should add to the number value of the setting you selected.

⇒ Refer to the example above.

6. To save the changes and exit, press and hold **DENSITY**.
 7. Press **LOAD**.
 8. Release **LOAD** and **DENSITY**.
 9. Cycle the power to the drive.
- ⇒ All indicators will lit momentarily, indicating that new settings have been saved.

An Example

To change Option 4 (Write Retry Count) from 4 retries to 8 retries follow these keystrokes:

Entering Configuration Mode	 1600		
	 LOAD		WRT EN (flashes)
Selecting Option No. 4	 ONLINE		ONLINE (on)
Current Setting Displayed (8 Retries)			1600 (on)
Select Setting 3 (3 Retries)	 UNLOAD		UNLOAD (on)
	 1600		1600 (off)
	 LOAD		LOAD (on)
Saving Settings	 1600		LOAD (flash)
	 LOAD		UNLOAD (flash)
			ONLINE (flash)
			WRT EN (flash)
			1600 (flash)
			6250 (flash)

Chapter 2 - Operation

This chapter explains the functions of each button, indicator and switch. Basic loading, rewinding, unloading and density selection operations are described.

Power

The power supply is autoranging and operates between 100 VAC to 240 VAC, and between 50 Hz and 60 Hz.

Use any standard power cord that fits the IEC standard plug located on the rear panel of the drive and local AC outlet. The outlet end of the cord has a different configuration depending on the power source. For example, the 110 VAC power cord will not fit into a 220 VAC outlet, however the other end will fit any drive.

Front Panel

The basic operation of each button and indicator is described in the following tables.

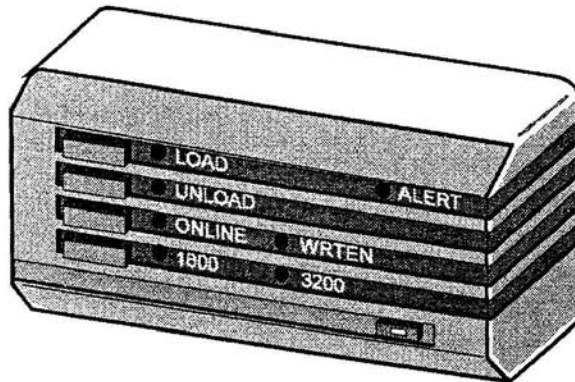













Figure 2-1 Front Panel

BUTTON	FUNCTION
 LOAD	Initiates the autoloader process. The tape must be on the hub and the door must be closed.
 UNLOAD	Initiates the unload process if the drive is on-line.
 ONLINE	Toggles the drive on and off-line. The drive must be online for a host system to detect it.
 DENSITY (1600, 6250)	Toggles the available write densities. The drive must be loaded, off-line and at BOT, or unloaded.

INDICATORS	INDICATIONS
 POWER	The AC power is supplied to the drive.
 ALERT	An error has been detected. Alert will flash momentarily at power-up and the beginning of a load operation. This is normal.
 LOAD	<u>Flashes:</u> A tape is being loaded. <u>Constant:</u> A tape is loaded and at BOT.
 UNLOAD	<u>Flashes:</u> A tape is being unloaded. <u>Constant:</u> No tape is loaded.
 ONLINE	The drive is online and detectable by a host system.
 DENSITY (1600, 6250)	The selected write density is 1600 bpi, 3200 bpi or 6250 bpi.*
 WRT EN	A write-enable tape is loaded.

* Selections dependent on drive model.

Tape Requirements

The TapePro can use 7 or 10.5-inch reel tape with 1.0 or 1.5-mil thickness. The tape should comply with ANSI X3.40-1983.

Write-Enable Ring

A write-enable ring is a rubber or plastic ring that fits onto the hub of a reel of tape. It must be installed on the reel if the tape will be overwritten. To install a write-enable ring, turn over the tape reel and press the ring into the fitted space as shown in Figure 2-2.

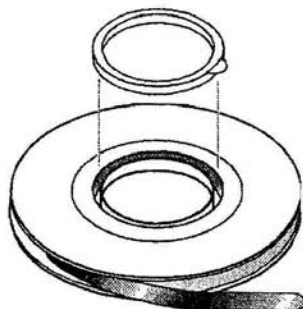


Figure 2-2 **Write-Enable Ring**

Loading/Unloading

All Desktop TapePro models have autoloading capability. The user only places the reel on the hub inside the drive. Follow the instructions below to load a tape and refer to Figure 2-3. A description of the loading process follows.

Drive Door

The drive door is spring loaded and closes automatically or when released. During operation the door is automatically locked. The door lock is released when the tape drive is unloaded.

To load a tape:

1. Install a write-enable ring, if desired.
2. Open and hold down the drive door.
3. Insert the tape reel and set it down on the hub inside the drive, write-ring side down.
4. Release the door.
5. Press **LOAD**.

The following events take place:

- *LOAD* flashes.
- The reel is centered.
- The supply hub rotates counterclockwise until the reel is locked on the hub.
- The fan comes on.
- The tape is blown into the tape path past the tape sensors.
- The supply/takeup hubs rotate clockwise as the tape is wrapped on.
- The drive moves the tape to the BOT.
- After the operation, *DENSITY*, *POWER* and *LOAD* should remain lit. *WRT EN* will also be lit if the loaded tape is write-enabled.

Note: If *ALERT* is flashing, see Chapter 4 - Troubleshooting.

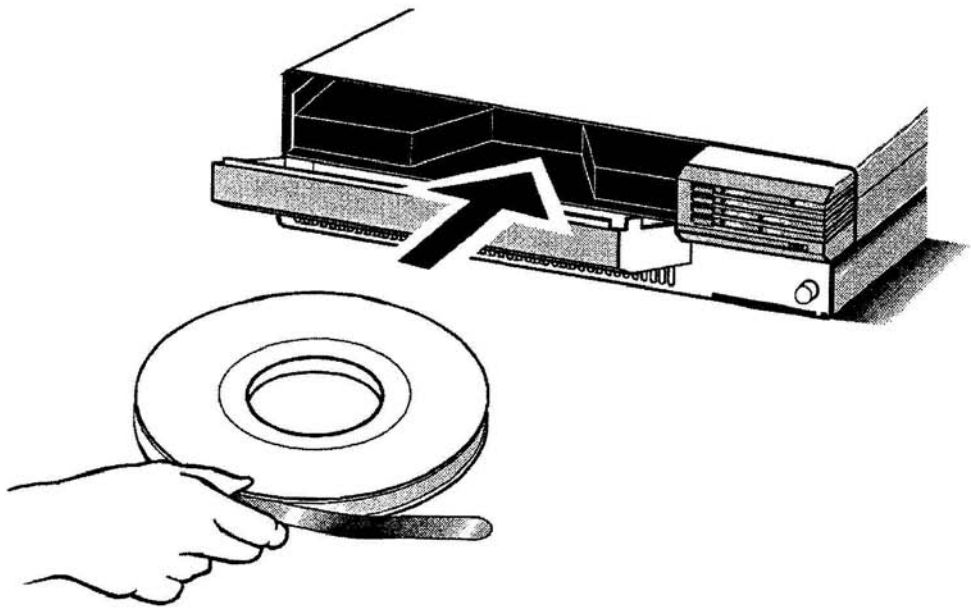


Figure 2-3 Loading the Tape

To unload a tape:

1. If the drive is on-line, press **ONLINE** to take the drive off-line.
2. Press **UNLOAD** and wait until *UNLOAD* is constant and the door is unlocked.
3. Open and hold the drive door.
4. Lift the reel off the drive hub.
5. Release the drive door.

Density Selection

Manually selecting density is only necessary when writing to a new tape. Otherwise, the drive will read the previously recorded density. The factory default for a 9-track drives is 1600 bpi. The drive will use the last selected density at power-off as the next power-on default density.

When a Read command is given, the drive will first try to read the tape with the selected density. If that fails, it will select the next available density and try again to read the tape.

To change the density:

1. If a tape is loaded, rewind to the BOT and press **ONLINE** to take the drive off-line.
2. Press **DENSITY** button until the indicator for the desired density is lit.
3. Press **ONLINE** to place the drive on-line.

Service Aids

All TapePro models have built in diagnostics and utilities called Service Aids. These utilities assist in calibration, optimization, test and repair. However, Service Aids are intended for use only by trained service technicians. All Service Aids are explained in detail in the Service Manual. Contact Overland Data for ordering conformation.

Chapter 3 - Regular Maintenance

For low error rates, it is recommended that you periodically clean the tape path and specific parts in the tape path. No other regular maintenance is required.

The drive should be cleaned in any of the following circumstances:

- After 24 hours of operation.
- Before using, if the drive is only used occasionally.
- If data errors or corrected error rates rise.

Cleaning Supplies

Cleaning materials are supplied with the drive and stowed in a compartment located under the top cover. These supplies include isopropyl cleaning pads.

All models should be cleaned with a 70% - 90% isopropyl-soaked non-abrasive pad, specifically designed for cleaning tape drives or other magnetic tape and electronic equipment. Overland Data offers these cleaning kits with instructions.

Cleaning Instructions

The parts to be cleaned are the head, tape scraper, reel/hub lock and roller guides. These parts can withstand considerable force when cleaning. Make sure to press and rub hard enough to remove debris. The isopropyl pads will not harm any part of the drive.

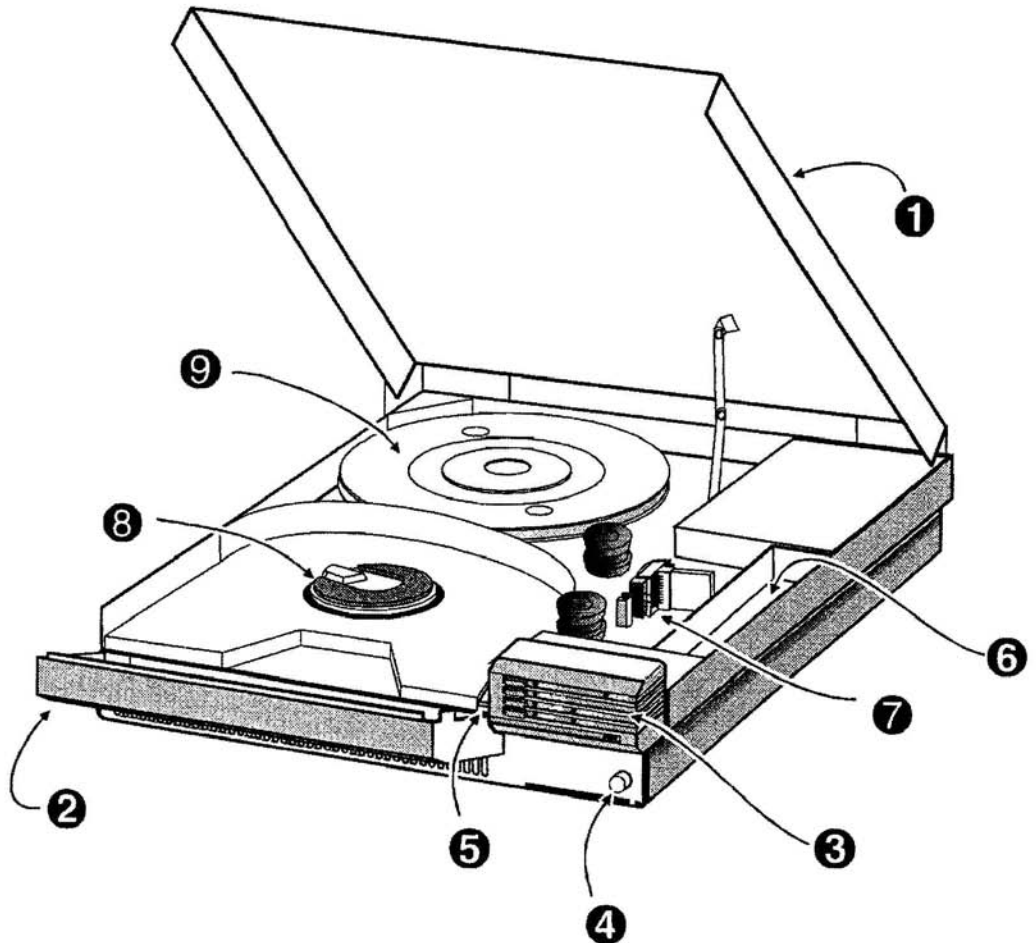
CAUTION!

Do not scratch the head face with rings or other objects while cleaning.

To clean the tape drive:

Refer to Figure 3-1.

1. Unload any loaded tape.
2. Turn off the power to the drive.
3. Unlock the top cover by opening the drive door and pressing down on the small lever to the right side, just inside the door.
4. Lift the cover until the strut arm locks in place.
5. Locate the cleaning material in the supply compartment.
6. Using an alcohol-soaked pad, rub the face of the head vigorously.
7. Using the same pad, wipe down the tape scraper. **Warning:** The tape scraper blades are very sharp.
8. Using another pad, rub around each roller guide.
9. Using the same pad, wipe along the tape path.
10. Using the same pad, wipe the locking cam on the supply hub. Wipe the area that contacts the reel and the outer edge.
11. Using the same pad, wipe the edge of the reel flange surface.
12. Using the same pad, wipe away any remaining debris.
13. Wait until all cleaned surfaces are dry.
14. Remove all used cleaning supplies from the drive interior.
15. Return-used supplies to the supplies compartment.
16. Close the top cover by raising it slightly to disengage the support arm and lowering the cover slowly.



- 1** Enclosure Top Cover **2** Door **3** Control Panel and Indicators
4 Power Switch **5** Top Cover Release Lever **6** Cleaning Supplies
 Compartment **7** Head and Tape Scraper **8** Supply Hub **9** Take-up Reel

Figure 3-1 Desktop Cleaning

Chapter 4 - Troubleshooting

All TapePro models have the capability of detecting errors and failures and reporting them to the technician using the indicators. *ALERT* is used to signal that an error has been detected and to allow the technician to determine the error category. The other indicators are assigned binary values so every error has a unique code number displayed with indicators.

This chapter briefly discusses types of errors, then goes on to list all Error Codes. Troubleshooting and repair procedures are also discussed in detail.

Types of Errors

There are three types of errors, varying in severity, that may occur: Minor, Operational and Critical. For each error category, the cause of the error and the general type of repair procedure is unique. A complete explanation of the types of errors and a list of all errors follows.

Minor

Minor Errors are usually due to power supply problems or involve front panel failures. The repair procedures for these types of errors usually involves checking and reconnecting power cables and interface cables, but can occasionally involve replacing a defective part.

Minor Errors may not be reported to the front panel because the power to the indicators, or the indicators themselves may be defective. The determining factor in identifying a Minor Error is observing the cooling fan condition. The cooling fan is located in the middle of the power bus, and therefore it can be used to identify the power route and defective part.

Operational

Operational Errors can be caused by loading problems or data errors. In most cases, these types of errors can be cleared by pressing one of the front panel buttons or other simple procedures. However, in severe cases, a part may need to be replaced.

Operational Error codes are displayed by the indicators. *ALERT* flashes at a distinct rate of 1 flash/sec for an error of this type. This distinguishes it from Critical Errors.

Critical

Critical Errors are the rarest of failures and almost always require replacement of a part. They are usually due to hardware failures, usually the Main PWB.

Critical Error codes are displayed by the indicators. *ALERT* flashes at a distinct rate of 4 flashes/sec for critical errors.

Error Codes

All numbered Error Codes are displayed using the six front panel indicators, along with *ALERT*. The codes should be deciphered using the Table 4-1.

Indicator Numbering

The indicators are assigned a binary value in order to uniquely define each possible error code. The binary values for each indicator should be added together to obtain the Error Code, which can be found in Table 4-1. The values assigned to the indicators and other error display functions are shown in Figure 4-1.

An Example

If *ALERT* is flashing *slowly* at 1/sec it means the error is an Operational Error. In addition, the following indicators are lit:

- *UNLOAD* (16)
- *WRT EN* (4)
- *6250* (1)
- The total binary value is 16 (*UNLOAD*) + 4 (*WRT EN*) + 1 (*6250*) = 21. Therefore the Error Code is 21. This corresponds to a Hard Write Error on Table 4-1.

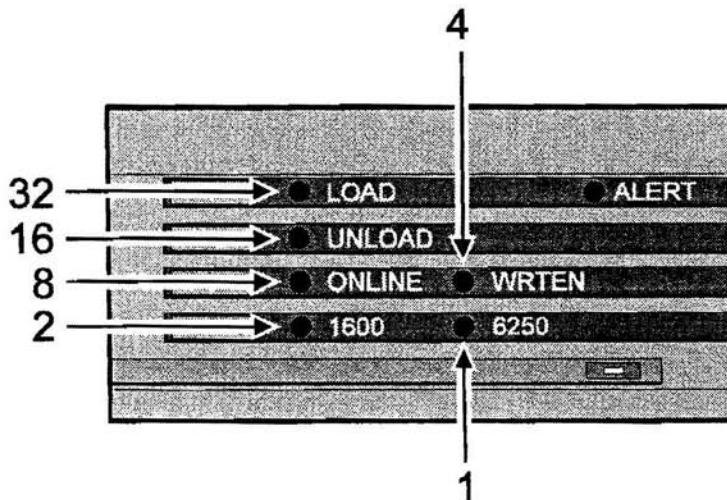


Figure 4-1 Indicator Values

Error Code List

The following table shows all detectable drive errors and the recommended Repair Code (RC). Repair Code details are in following section.

Table 4-1 Error Code List

MINOR ERRORS		
No indicators light.		
ERROR CODE	ERROR	REPAIR CODE
None	Condition: Fan running	RC 36, 4, 1
None	Condition: Fan not running	RC 15, 10, 3
OPERATIONAL ERRORS		
ALERT flashes 1/sec.		
ERROR CODE	ERROR	REPAIR CODE
2	Door open	RC 17, 16, 20
3	Motor jammed	RC 25, 2
4	No tape reel	RC 27, 18, 6, 2
5	Bad tape feed	RC 28, 18, 2, 14
6	Take-up failed	RC 28, 18, 2
7	Hub did not lock	RC 19, 27, 6, 2
8	Reel upside down	RC 26, 27, 18, 6, 2
9	No BOT detected	RC 18, 11, 2, 1
10	Tape is broken	RC 21, 18, 11, 2
11	No tape on take-up reel	RC 19, 28, 18, 2
12	Blower time-out	RC 28, 18, 2
19	Host disconnected	RC 31, 32, 22, 9, 1
21	Hard write error	RC 14, 18, 1, 2
22	Illegal host timing	RC 33, 32, 1
23	Unknown command	RC 22, 32, 9, 1
24	Write to protected tape	RC 23
25	Write block too large	RC 24, 1, 2
26	18 feet past EOT	RC 35, 14, 18, 2
27	Hard write error after FEN	RC 14, 18, 2
28	Hard write error after REW	RC 14, 18, 2
29	Interface parity error	RC 22, 9, 1
30	Read block too large	RC 24, 12
31 (during Autotest)	Blank tape	RC 14, 18, 1, 39
32 (during Autotest)	Reverse command at BOT	RC 1
33 (during Autotest)	Data compare error	RC 14, 18, 1, 39
34 (during Autotest)	Unrecoverable read error	RC 14, 18, 1, 39
35 (during Autotest)	Debug Error	RC 39

Continued on next page.

CRITICAL ERRORS		
ALERT flashes 4 / second		
ERROR CODE	ERROR	REPAIR CODE
0	Power failure	RC 13, 3, 1
1	Non-specific error	RC 16, 1
20	Bad Formatter ROM U104 or U38	RC 16, 1
21	Bad Formatter ROM U106 or U40	RC 16, 1
22	Bad Formatter ROM U105 or U39	RC 16, 1
23	Bad Formatter ROM U71 or U76	RC 16, 1
24	Bad Formatter ROM U73 or U70	RC 16, 1
25	Bad Formatter ROM U72 or U77	RC 16, 1
26	Bad Formatter ROM U107 or U32	RC 16, 1
27	Bad Formatter ROM U70 or U75	RC 16, 1
28	Bad Formatter ROM U69 or U74	RC 16, 1
29	Bad Formatter ROM U27 or U116	RC 16, 1
30	Bad Formatter ROM U16 or U117	RC 16, 1
41	EOT/BOT slip (double markers)	RC 1, 2
42	SCSI failed selftest	RC 8
43	Bad ROM decompress	RC 1
44	Read threshold	RC 37, 2, 1
45	Memory parity error	RC 1
46	Door sense	RC 40, 42, 43
47	SU servo circuit	RC 45, 1, 46
48	TU servo circuit	RC 45, 1, 47
49	Time-out	RC 8, 1
50	Supply phase error	RC 46, 2, 1
51	Take-up phase error	RC 47, 2, 1
52	Bad 15Vdc power	RC 1
53	Bad A to D converter	RC 16, 1
54	Bad D to A converter	RC 1
55	Bad CTCB	RC 1
56	Bad CTCA	RC 1
57	Bad PIO	RC 1
58	Assert failure	RC 1, 2
59	Bad NOVRAM checksum	RC 1
60	Bad NOVROM magic	RC 1
61	RAM failure	RC 1
62	ROM failure	RC 1
63	Servo failure	RC 2, 1, 14

Troubleshooting

The following procedure for users is recommended for troubleshooting most errors. Technicians should make use of the Service Aids as necessary and refer to the Service Manual.

1. Perform a power cycle, if the drive can power-up. The drive will perform the POST. If the drive can not power-up, go to "C" below.
2. Follow one of these troubleshooting subroutines, depending on whether the POST fails:
 - A. If the POST fails, and *ALERT* is flashing,
 - 1) Decipher the Error Code using Table 4-1. Note the frequency of Alert flashing.
 - 2) Perform the first listed Repair Code as indicated in Table 4-2.
 - 3) Power up the drive and repeat the operation that caused the original error.
 - 4) If the drive malfunctions, repeat Steps 1 - 3 and perform the next listed Repair Code until it passes the POST or until you are instructed to call a Service Technician.
 - B. If the drive passes the POST,
 - 1) Repeat the error causing condition.
 - 2) If an error code is issued, decipher the Error Code using Table 4-1.
 - 3) Perform the first listed Repair Code as indicated in Table 4-2.
 - 4) Repeat the error causing condition.
 - 5) If the drive malfunctions, repeat Steps 3 and 4 and perform the next listed Repair Code until the drive functions properly, or until you are instructed to call a Service Technician.
 - C. If the drive can not power-up,
 - 1) Perform RC-16 from Table 4-2.

- 2) If the drive does not power up, refer to a Service Technician.

Repair Codes

Some Repair Actions involve merely checking the tape cabling, drive door or a power cycle. Other actions are more involved and require use of the Service Aids or require a part to be replaced. Those repairs are referred to a Service Technician.

The following table lists Repair Codes referred to in Table 4-1.

Table 4-2 Repair Codes

Repair Code	Repair Action
RC-1	Call a Service Technician to replace Main PWB.
RC-2	Call a Service Technician to replace Deck Plate.
RC-3	Call a Service Technician to replace Power Supply.
RC-4	Call a Service Technician to replace Control Panel.
RC-6	Call a Service Technician to replace Supply Hub.
RC-7	Call a Service Technician to replace Take-up Hub.
RC-8	Call a Service Technician to replace SCSI Board.
RC-9	Call a Service Technician to replace Interface Cable.
RC-10	Call a Service Technician to replace Fuse.
RC-11	Call a Service Technician to replace BOT/EOT Sensors.
RC-12	Make sure the drive is capable of reading the tape density.
RC-13	Call a Service Technician to re-seat, P4, the DC power connector. See Power Supply in Chapter 7.
RC-14	Clean the heads and tape path. See Chapter 4.
RC-15	Check the power cord connection, and interface cable and connector. Check software, controller configurations. Check the Host.
RC-16	Cycle the power and try again.
RC-17	Close the top Cover and front Door.
RC-18	Change the tape.
RC-19	Clean the hub locking mechanism. See Chapter 4.
RC-20	Call a Service Technician to run a Level 1 Service Aid 7 - Door Alignment.
RC-21	Call a Service Technician to unload the tape manually.
RC-22	Re-seat write ring on tape reel.
RC-23	Insert write ring on tape reel.
RC-24	Maximum block sizes are: GCR - 65512 bytes, PE - 65519 bytes

Continued on next page.

Repair Code	Repair Action
RC-25	Check for tape or debris wedged under the hub.
RC-26	Turn the reel over and try loading again.
RC-27	Turn power off, open the Cover and check to make sure nothing is obstructing the reel from seating properly.
RC-28	Trim and straighten the tape leader.
RC-29	Make sure that there us 15 feet of tape leader before the BOT marker.
RC-30	Make sure that there is a BOT reflective strip on the tape in the BOT area.
RC-31	Make sure the drive is on-line.
RC-32	Call a Service Technician to clean the surface connectors.
RC-33	Reconfigure controller and software for Pertec interface.
RC-34	Make sure that the drive interface Transfer Rate does not exceed the controller specifications.
RC-35	Check the tape for an EOT reflective strip in the correct area.
RC-36	Call a Service Technician to re-seat the P6 connector on the Main PWB.
RC-37	Make sure the tape is a Blackwatch 700.
RC-38	Check the Head Cables at both connection ends.
RC-39	Call a Service Technician to run Level 3 Service Aid 0 - Read Threshold Calibration.
RC-40	Call a Service Technician to run Level 1 Service Aid 7 - Cover and Door Sensor Calibration.
RC-41	Call a Service Technician to align the Head.
RC-42	Call a Service Technician to re-seat the Door Sensor and check the cable connection.
RC-43	Call a Service Technician to replace the Door Sensor.
RC-44	Call a Service Technician to replace the Head.
RC-45	Call a Service Technician to check the tachometer cable.
RC-46	Call a Service Technician to replace the Supply Motor.
RC-47	Call a Service Technician to replace the Take-up Motor.

Special Corrections

Correction of minor mechanical failures is described in the next section. This includes how to unload the tape manually and how to re-wind the tape onto the supply reel, when the EOT was exceeded and all tape is loaded onto the take-up reel.

To manually unload the tape back onto the Supply Hub:

1. Power-off the drive.
2. Open the top cover.
3. Wrap the tape about 20 times around the Supply Hub, following the correct tape path (note the arrows).
4. Power-on the drive.
5. After the POST, press **LOAD**.

Appendix A - Specifications

The specifications for each Desktop TapePro model are listed below. Differences between drive models are fully detailed.

MECHANICAL				
Dimensions	Model	Height	Width	Depth
	5X12/14	4.4 in	16.6 in	23.0 in
		11.1 cm	42.2 cm	58.4 cm
	3X10, 5X2X	3.5 in	16.6 in	23.0 in
8.89 cm		42.1 cm	58.4 cm	
Weight	Model	Enclosed		
	5X12/14	34 lbs		
		15.4 kg		
	3X10, 5X2X	Enclosed		
		30 lbs		
				13.6 kg
			Rack Mounted	
			37 lbs	
			16.78 kg	
Shipping Weight	Model	Enclosed		
	5X12/14	46 lbs		
		20.9 kg		
	3X10, 5X2X	Enclosed		
		42 lbs		
				19.1 kg
			Rack Mounted	
			49 lbs	
			22.2 kg	

Operating Mode	Streaming	
Density	32XX, 52XX	1600/3200 bpi
	36XX	1600/6250 bpi
	56XX	1600/3250 bpi
Capacity	Density, Tape Size	Capacity
	1600 bpi, 1 mil	68 MB
	1600 bpi, 1.5 mil	46 MB
	3200 bpi, 1 mil	138 MB
	3200 bpi, 1.5 mil	90 MB
	6250 bpi, 1 mil	403 MB
	6250 bpi, 1.5 mil	262 MB
Block Size	GCR	65512 bytes
	PE	65519 bytes
Media	Tape Specifications	
	Type	ANSI X340-1976
	Thickness	1.5 mil (0.038 mm)
		1.0 mil (0.026 mm)
	Width	0.5 in (12.7 mm)
	Tension	8 oz. (227 gm)
	Certification	6250
Reel Sizes	10.5 in (267 mm)	
	8.5 in (216 mm)	
	7.0 in (178 mm)	
	6.0 in (153 mm)	
RELIABILITY		
MTBF	25,000 hours @ 10%	
Hard Error Read Rate	1 in 10 ¹² bytes	

Appendix B - Accessories, Spares, FRUs

The following table lists all parts, spares and FRUs available for the Desktop TapePro models. The column titled "AV" lists the availability restrictions, if applicable:

1 = Available for Field Service only

2 = Available for Authorized Depot Repair Center only

3 = Available for Authorized Service Providers

“●” indicates that the part is applicable to the listed model number.

“○” indicates that you must call Customer Service for more information.

	AV	MODELS						
		3610	3210	5612 5614	5222 5224	5622 5624	5212 5214	
PART NUMBER								DESCRIPTION
108002-001	1		●		○		●	Deckplate Assy - No PWB
108004-001	1	●		●		○		Deckplate Assy - No PWB
108014-001	2	●	●	●	●	●	●	Supply Motor
108016-001	2	●	●	●	●	●	●	Supply Hub
108017-001	2	●	●	●	●	●	●	Take-up Motor
108019-001	2	●	●	●	●	●	●	Take-up Hub/Reel
108020-001	2	●	●	●	●	●	●	Blower Motor
108022-001	2	●	●	●	●	●	●	BOT/EOT Sensor Assy.
108023-001	2		●		○		●	Head RW, GCR

Continued on next page.

PART NUMBER	AV	MODELS						DESCRIPTION
		3610	3210	5612	5222	5622	5212	
				5614	5224	5624	5214	
108023-002	2	●		●		○		Head R/W, PE
108024-002	2	●	●	●	●	●	●	Cable Assy, Read/Write
108025-001	2	●	●	●	●	●	●	Tape Guides
108026-001	2	●	●	●	●	●	●	Tape Scraper
108006-001	1		●		○		●	Control Panel Assy, PE
108007-001	1	●		●		○		Control Panel Assy, GCR
108028-001	2	●	●	●	●	●	●	PWB/Solenoid/Cable
108029-001	2	●	●	●	●	●	●	Door Sensor
108009-001	1	●	●	●	●	●	●	Power Supply Assy.
108032-001	2	●	●	●	●	●	●	Cooling Fan
108035-001	2	●	●	●	●	●	●	Fuses (2A / 250v) 10 pk
108010-001	1		●		○		●	PWB, Main PE
108010-002	1	●		●		○	●	PWB, Main GCR
108011-001	1		●		○		●	Firmware Kit
108012-001	1	●		●		○		Firmware Kit
108013-002	1			●			●	SCSI BOARD - DIFF
108013-001	1			●			●	SCSI Board - S E
108036-001	2			●			●	Pertec to SCSI Cable
RO5693	1			●	○	○		Firmware Kit, PE
RO5694	1						●	Firmware Kit, GCR
108034-001	1	●	●	●	●	●	●	Support Strut
108030-001	1	●	●	●	●	●	●	Tape Door
108037-001	1	●	●	●	●	●	●	Hinges (Set of 2)
104066-101	1	●	●					User Manual
104067	1			●			●	User Manual
104081-101	1				●	●		User Manual
104075	3	●	●	●	●	●	●	Service Manual
106002-002	1	●	●	●	●	●	●	Head Cleaning Kit (50 pk)

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