QUALSTAR®

Corporation

1260

User's Guide

500250 Rev. K

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Canoga Park, CA 91303
FAX: (818) 592-0116
Phone: (818) 592-0061

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Out-Of-Warranty Service

Should service be required after the warranty period has expired, Qualstar will repair and test the tape drive or tape subsystem for a flat fee as shown in the current price list. Service charges, freight and customs charges will be billed to the Buyer.

An Extended Service Agreement, available for units located within the United States, may be purchased which extends the warranty period for one year. Units covered under the Extended Service Agreement may be serviced as often as required during the contract period. Prices are shown in the Factory Service Price List and include return freight by surface transportation. Qualstar customer service representatives can provide details on the Extended Service Agreement.

500250 Revision Table

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Tape Drive Installation 1

1.1 Introduction

This guide provides installation instructions and techniques for operating the Qualstar 1260 series tape drives. In order for the tape drive to operate, it must be connected to a tape coupler card within your computer. Refer to the specific coupler manual for the installation and configuration of the tape coupler before installing your tape drive.

The software provided with the coupler controls the transfer of data to and from the tape drive. The wide variety of options which Qualstar offers allows the tape drive to operate with a number of different coupler packages. The best choice of couplers depends upon your particular application and computer system.

Figure 1-1
The Qualstar 1260 Series Tape Drive

1.2 Model Identification

Figure 1-2 shows the breakdown of the 1260 Series model numbers. This guide applies to all models. The basic tape drive in each of the models covered by this guide is the same. Differences among models is noted when required. From an operator's point of view, all models function similarly.

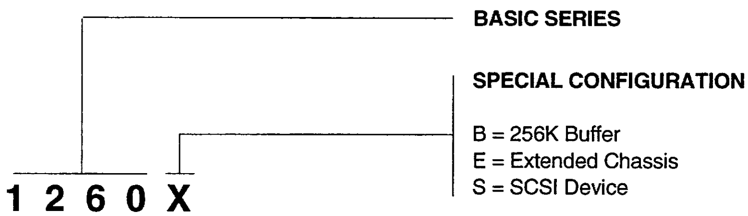


Figure 1-2
Model Number Identification

1.3 Operating Environment

The tape drive is designed to operate in an environment between 40° F to 104° F (4.4° C to 40° C), 20% to 85% relative humidity, and at altitudes from 0 to +8000 feet. Moisture must not be allowed to condense inside the drive or in the tape path area. Note that the humidity specification of the drive exceeds that of the media.

1.4 Power Requirements

The tape drive requires 100, 120, 220, or 240 volts AC, +10%/-15%, at 48 to 62 Hertz primary power. Peak power requirements for model 1260 is 195 watts, and 211 watts for models 1260B and 1260S.

DANGER! **IF THE LINE VOLTAGE DIFFERS FROM THAT SPECIFIED ON THE NAMEPLATE, DO NOT APPLY POWER. THE POWER TRANSFORMER TAPS INSIDE THE DRIVE AND THE FUSE MUST FIRST BE CHANGED BY A QUALIFIED SERVICE PERSON TO MATCH THE LINE VOLTAGE. REFER TO CHAPTER 8.**

1.4.1 Power Connections

The power connection to the drive is by means of a detachable power cord which complies with the following specifications.

- **100/120 volt applications -** U.L. listed and CSA certified three conductor, 18 AWG, SVT vinyl jacketed cord. One end is terminated with an IEC 320, C13 style connector (CEE-22 standard sheet VI). The remaining end is terminated with plug type NEMA 5-15P.

- **220/240 volt applications** - U.L. listed and CSA certified three conductor, 18 AWG, SVT vinyl jacketed cord. One end is terminated with an IEC 320, C13 style connector (CEE-22 standard sheet VI). The other end is not terminated. The conductors are to be connected to a customer-supplied plug as follows: Black or brown wire to AC hot (Live); white or blue wire to AC return (neutral or common); green or green with yellow strips to chassis (ground).

The following statement is included for compliance with German safety regulations:

Die Verbindung zür Steckdose sollte möglich kurz sein, und die Steckdose sollte frei zugänglich bleiben.

(English translation: The connection to the power receptacle should be as short as possible, and the receptacle should be readily accessible.)

1.5 Tools Required for Installation

A #2 Phillips screwdriver is required to install the drive.

1.6 Unpacking

Caution! **Model 1260 tape drives weigh between 36 and 44 pounds, depending upon the configuration. Use caution in lifting.**

The tape drive is shipped in a specially designed double-walled carton with energy-absorbing end caps. The packaging should be stored for possible future transportation purposes.

The carton contains the following items:

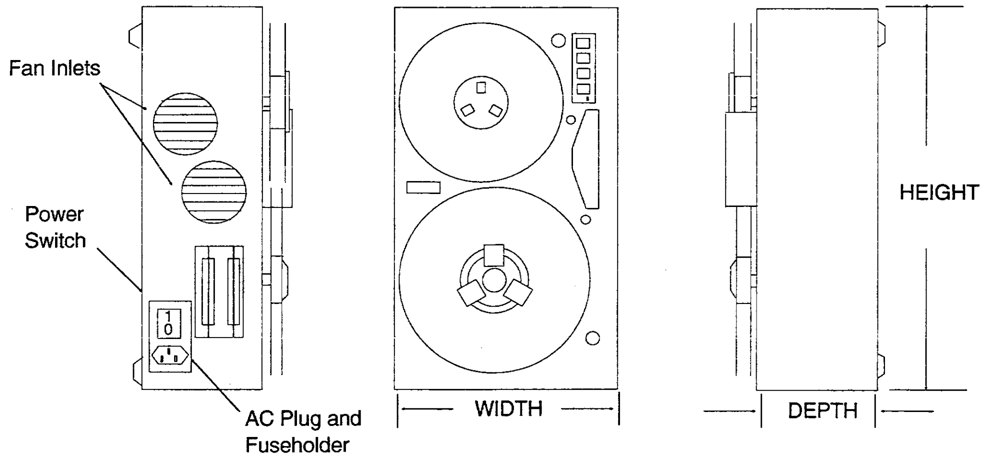
- Tape Drive
- Power Cord
- User's Guide
- Interface Cable(s) (optional)

Remove the drive together with its end-caps from the carton and place it on a table. Then remove the end-caps and the polyethylene bag.

Remove all other materials from the carton and store the end-caps and bag in the carton for the possibility of future shipment.

1.7 Orientation

The drive must be placed on a hard surface; do not place it on a typewriter pad or similar surface. It may rest on its bottom, back or side. There must be no obstructions which would prevent air from freely flowing into the fan inlet(s) or exiting from the ventilation slots.



1260	WIDTH	HEIGHT	DEPTH	WEIGHT
Without Door Option	12.25 inches (31.1 cm)	21.50 inches (54.6 cm)	8.25 inches (20.9 cm)	38 pounds (17.2 kg)
With Door Option	12.75 inches (32.4 cm)	21.50 inches (54.6 cm)	9.25 inches (23.5 cm)	44 pounds (19.9 kg)
Additional for SCSI or buffer option	none	none	1 inch (2.5 cm)	2 pounds

Figure 1-3
1260 Dimensions

1.8 Interface Connections

1.8.1 Model 1260

Model 1260 uses the Pertec interface which consists of either two cables with a 50-pin card edge connector on each, or a single cable branching out into two 50-pin card edge connectors. The card edge connectors must be connected to J1 and J2 (sometimes referred to as J101 and J102 respectively) inside of the tape drive.

A removable cable entry cover is attached to the side chassis panel with two Phillips screws. A round interface cable can be fed through the slot in the cover. A decal shows the correct connector orientation of J1 and J2.

1. Turn the tape drive off before attaching the interface cables.
2. With the drive resting on its rubber feet, remove the cable entry cover.
3. Connect the cables to J1 and J2 as shown on the decal.
4. Dress the cables and reinstall the cable entry cover.

Note: *The cable entry cover must be in place to meet FCC requirements.*

1.8.2 1260B

This model contains a Buffer PCBA. Refer to the Buffered Interface Supplement (document 500200) for instructions.

1.8.3 1260S

This model connects to a SCSI bus. Refer to Chapter 7 for further information.

Controls and Operation 2

2.1 Controls and Indicators

2.1.1 LOAD Switch and Indicator

Use the LOAD switch to load, rewind and unload tapes.

The LOAD indicator is illuminated when the tape is at Beginning of Tape (BOT.) When the tape is unloaded (no tension,) the LOAD indicator will flash rapidly when a BOT marker is sensed, providing a means of testing the BOT sensing circuits.

2.1.2 ONLINE Switch and Indicator

Use the ONLINE switch to place the drive online and offline. The drive will only respond to the host if it is online. You may place the drive online whenever tape is loaded and tensioned and may take the drive offline at any time.

Pressing the switch while a command or rewind operation is in progress will abort the command and place the drive offline. All tape motion, except for rewind, will halt. You can also use this switch to take the drive offline to abort a runaway operation.

When the Online indicator is illuminated, the drive is online and ready for operation. When it is not illuminated, the drive is offline and will not accept any commands from the host.

2.1.3 FPT Switch and Indicator

If the drive detects the presence of a *write enable ring* on the bottom side of the supply reel, the drive will initially be *write-enabled.* You can override this condition and manually protect the tape by pressing the FPT switch while the LOAD indicator is illuminated and the tape is at BOT. The FPT switch has no effect when no write ring is present.

When the drive is write-enabled, it can write on and erase tape. When the drive is file-protected, its write and erase circuits are disabled. The FPT indicator will be illuminated when the drive is in the file-protected state, and will not be illuminated when the drive is in the write-enabled state.

The FPT indicator serves as a power indicator when a tape is not tensioned.

When the tape is threaded but not tensioned, the FPT indicator will flash rapidly when an End-Of-Tape (EOT) marker is sensed, providing a means of testing the EOT sensing circuits.

2.1.4 6250 Switch and Indicator

When the tape is unloaded, or when it is tensioned and at BOT and the drive is off-line, you can select an operating density of either 6250 characters per inch (cpi) or

1600 cpi by pressing the switch. When the drive is online and the tape is tensioned and at BOT, the host may also select either density.

The data density for both writing and reading is indicated by the 6250 indicator. When illuminated, the drive reads and writes at 6250 cpi and when extinguished, at 1600 cpi.

Either 1600 or 6250 cpi may be selected for a default density upon power-up according to an option switch setting. This should not be confused with Automatic Density Select, which is determined after the first read operation. Refer to Chapter 3 for more information.

2.1.5 Power Switch

The POWER switch is located on the side of the drive near the AC line receptacle.

2.2 Tape Operation

2.2.1 Applying Power

Caution! **It is possible to create an undesired flux transition on a tape if the tape is touching the head when power is applied. This is not normally a problem, since the tape is not generally loaded when power is applied. If the tape is threaded past the BOT tab, make certain that there is at least 1/8 inch gap between the tape and the head before applying power.**

Press the side of the switch with the "I" to apply power. Listen for the fans. If they do not operate, the drive is not operational. Turn the power off, verify the power source and then turn the drive back on again. If this fails, the drive will require service. After a normal power-up sequence, the FPT indicator should be illuminated. The 6250 indicator may or may not be illuminated.

2.2.2 Loading a Tape

1. To load a reel of tape, unlock the supply hub by pressing the inside of its three reel clamps.
2. Place the tape reel over the hub with the label facing out.
3. Lock the reel to the hub by pressing the outside of all three reel clamps.
4. Thread the tape as indicated by the raised arrows on the surface of the casting. Refer to Figure 2-1.
5. Wrap the end of the tape around the take up hub such that a clockwise rotation winds the tape onto the hub and rotate the hub clockwise at least three turns.
6. Hold the supply reel and rotate the take up hub until all slack is removed.

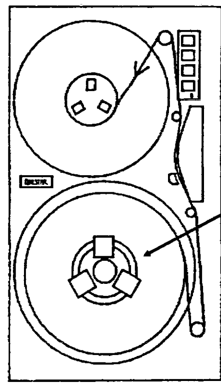


Figure 2-1
Threading the Tape

7. Turn on the power and press the LOAD switch to initiate the load sequence.
   a. After a short pause, the tape will move forward.
   b. After the BOT marker passes the head, the tape will be moved in reverse until the BOT marker is in front of the head.
   c. The LOAD indicator will then illuminate, indicating the tape is at load point, or BOT.
   d. The drive automatically sends the ONLINE and READY signals to the interface, indicating that the drive is ready to operate. The ONLINE indicator will be illuminated.

Should the tape fail to load properly due to an operator error, the drive will normally terminate the load sequence and display a load fault by flashing the LOAD indicator. Thread the tape properly and press the LOAD switch to restart the load sequence.

2.2.3 Loading with Tape Already Threaded

If the tape is threaded but not tensioned, turn on the power, remove the slack, and press the Load switch.

2.2.4 Loading Near EOT

To tension the tape when most of it is on the take up reel:

1. Make certain the EOT marker is on the supply reel.
2. Remove all slack.
3. Press LOAD while holding the FPT switch to compensate for the large amount of tape on the take up reel.

If the tape comes off the supply reel, moisten the last two inches and lay it over the top of the supply reel. Turn the reel counter-clockwise so that the tape winds onto the reel. Continue winding the tape onto the reel for five turns past the EOT marker. Hold the FPT switch before pressing the LOAD switch and then hold both for one second to initiate the load sequence. The drive will tension and rewind the tape to BOT.

2.2.5 Unloading a Tape

1. If the tape is stopped and not at BOT, take the drive offline and press the LOAD switch to rewind the tape.
2. When the tape is at BOT and the drive is offline, pressing the LOAD switch initiates an unload sequence. The drive will wind the tape onto the supply reel until the leader comes off the take up hub.
3. Press the inside of the three supply reel clamps, and then remove the reel from the supply hub.

The drive will also respond to a combination rewind-unload signal from the host.

2.2.6 File-Protecting the Drive

You may place the drive into and out of the file-protected state when the tape is at BOT by toggling the FPT switch until the FPT indicator illuminates.

2.2.7 Changing Data Densities

To read prerecorded tapes, you must first configure the drive to operate at the density of the tape to be read. 1600 cpi is the most commonly used density. You can also enable the Automatic Density Select option described in Section 3.1.7.

When writing on a tape from BOT, you must choose the operating density. When appending data to a prerecorded tape, you must first configure the drive to operate at the density at which the tape was originally written.

2.2.8 Aborting Runaways

Occasionally it may be necessary to abort a tape operation. This is preferably done by the application program. If the application program is unable to abort a read or write, you may place the drive offline manually by pressing and holding the ONLINE switch until the tape stops completely. This should also terminate the application program.

Caution! **Taking the drive offline while writing can result in an incomplete block being recorded on the tape, with subsequent loss of data.**

2.3 Using the Demonstration Mode

When the drive is in the demonstration mode, it will shuttle the tape at both low and high speeds, gradually moving the tape towards EOT. When the tape reaches EOT, the drive will rewind the tape reenter the shuttle mode. This provides an effective means of demonstrating the drive's tape handling ability. Any size reel may be used, and the demonstration mode will continue until deactivated.

2.3.1 Activating the Demonstration Mode

1. Thread a tape and remove all slack.
2. Apply power to the drive.
3. Perform the following sequence;
   a. Press and hold the ONLINE switch.
   b. Press and hold the LOAD switch.
   c. Release the ONLINE switch.
   d. Release the LOAD switch. The drive will enter the demonstration mode.

2.3.2 Deactivating the Demonstration Mode

To deactivate the demonstration mode, press the ONLINE switch. The drive will rewind the tape and place itself online.

Field Selectable Options 3

Several operating configurations may be selected by the dealer or qualified personnel. Options are changed with push-on jumpers or DIP switches on the Write/Controller PCBA which is located on the hinged chassis of the drive.

DANGER! **ACCESSING THE JUMPERS AND DIP SWITCHES REQUIRES THAT THE DRIVE BE OPENED BY A QUALIFIED SERVICE PERSON. REFER TO CHAPTER 8.**

3.1 Option Switches

An eight position DIP switchbank (SW A) is located on the upper part of the Write/Controller PCBA with switches numbered S1 through S8.

3.1.1 Diagnostic Enable (S1)

When S1 is on, the drive is in the offline diagnostic mode; when S1 is off, the drive is in the normal mode of operation. Information about the offline diagnostic mode is given in the 1260 Technical Service Manual (document number 500244.) The drive is shipped with S1 off.

3.1.2 Enable ICER (S2)

S2 is used to control correctable error reporting. A correctable error (CER) is a data error which the tape drive can detect and correct "on-the-fly" and is therefore transparent to the host. The drive can correct a single-track error in the PE and GCR modes, and a two-track error in the GCR mode. When an error is corrected, the data sent to the host is good. The drive is shipped with S2 off.

S2 is also used during the diagnostic mode as explained in the 1260 Technical Service Manual.

- **S2 ON** - The tape drive reports all detected correctable errors and sends corrected data to the host.
- **S2 off** - The tape drive does not report any correctable errors during read operations, but will still send corrected data to the host. During write operations, the drive will report only two-track correctable errors.

3.1.3 IDBY during Filemark Search Commands (S3)

Two variations of IDBY line characteristics are prevalent in the industry for Filemark Search operations. The original implementation specified that IDBY be toggled as each IBG was detected during the search to provide a way of counting blocks without using read strobes.

A later implementation specifies that IDBY remain true until the filemark is found, allowing IDBY to indicate *end-of-operation* to the host. The 1260 tape drive may be configured by S3 to provide either implementation (see Table 3-1.) The drive is shipped with S3 off.

S3	IDBY TOGGLES	IMPLEMENTATION
On	At each IBG	Original
Off (Factory default)	Only after FMK found	Later

Table 3-1
IDBY/Filemark Search Options

3.1.4 Filemark Gap Length (S4)

The early ANSI standards specify a leading gap of 3.5 inches for filemarks, followed by the standard IBG (0.3 inch for GCR and 0.6 inch for PE.) Newer revisions of the standards no longer require the space-wasting 3.5 inch leading gaps. The 1260 tape drive provides a tape-saving option of writing standard IBG-length leading gaps. This feature is selected by setting S4 ON, saving approximately 3 inches of tape for each filemark written. Depending upon the tape format, this can result in a substantial increase in formatted tape capacity. The drive is shipped with S4 off.

- **S4 off** - Normal Gap. Selects the standard filemark gap length of 3.5 inches .
- **S4 ON** - Short Gap. The filemark gap itself is zero, allowing more efficient tape use.

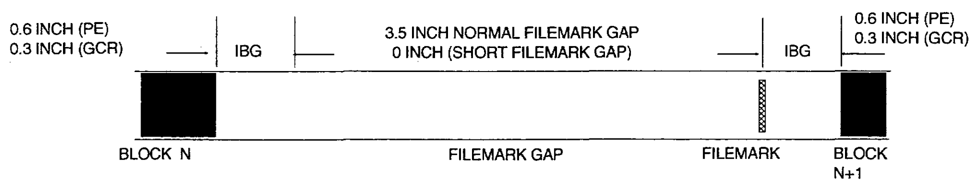


Figure 3-1
Filemark Gaps

3.1.5 Extended Write Gaps (S5 and S6)

The nominal interblock gap (IBG) is 0.6 inch. S5 and S6 are used to extend this distance during writing to allow the host more time to fetch the next block. Extending the IBG reduces the amount of data which will fit on a tape, but may allow the tape to stream, allowing for faster system throughput.

If the IBG is extended and the host does not issue another write command within the specified distance, the drive will stop and reposition the tape. The next IBG will then be the nominal 0.6 inch. If the host issues the write command in less than the specified distance, the drive will immediately start writing and the IBG will be less than the maximum selected.

Table 3-2 lists the four possible write IBG settings. The drive is shipped with S5 and S6 off (0.6 inch.) They have no effect on read operations.

Note: *Models 1260B and 1260S use a 256K buffer for better system throughput, and do not require modification of the IBG.*

S5	S6	IBG LENGTH (MAXIMUM)
Off	Off	0.6 inch
Off	On	1.8 inches
On	Off	5.4 inches
On	On	16.2 inches

Table 3-2
Write IBG Switch Settings

Note: *Extending the write IBG affects the maximum amount of data that will fit onto a tape. Use the smallest setting which keeps the tape streaming during writing.*

3.1.6 Default Density (S7)

The drive will power up with either 1600 or 6250 cpi density selected, according to the position of S7:

- **S7 ON** - 6250 cpi (factory default)
- **S7 off** - 1600 cpi

3.1.7 Automatic Density Select (S8)

The 1260 tape drive provides an Automatic Density Selection feature. This feature is disabled when the drive is shipped but may be enabled by setting S8 to the OFF position. Do not confuse this feature with the Default Density Selection option described in Section 3.1.6.

When a tape is initially loaded, the Automatic Density Selection feature causes the drive to read the Identification (ID) burst on the tape. If the ID burst is valid and the first command is a read command, the drive will automatically switch to the density indicated by the ID burst, eliminating the problem of determining the density of a prerecorded tape. When the Automatic Density Selection takes place, the drive will change to the detected density and indicate that density on the front panel before reading the tape.

If the drive receives a write command while the tape is at BOT, the drive will ignore the detected density (if any) and will write at the density indicated on the front panel.

- **S8 ON** - Manual read density selection (default)
- **S8 off** - Automatic read density selection

Summary: *To read a tape, load it and start reading. The drive will determine the correct density. To write a tape, make certain the desired density is indicated on the front panel before initiating the write operation.*

3.2 Option Jumpers

There are several jumpers on the Write/Controller PCBA and one jumper on the Read/Formatter PCBA; however, only jumpers W1 through W9 and W13 are of interest, and only those jumpers are described in this guide. A jumper is installed when a shorting bar is present at the specified location. Unless otherwise noted, 1260S drives requires that all jumpers be set to their factory default (shipping) positions.

3.2.1 Formatter Address (W0 - W7)

Jumpers W0 through W7 are used to select any one of eight addresses (0-7.) To select an address in the range of 1-7, move the jumper to a position within W1-W7, respectively. Only one jumper is allowed at W0 through W7. The drive is shipped with W0 installed and W1 through W7 removed.

3.2.2 Formatter Enable (W8)

When W8 is set to REQ (REQuired), the drive will not respond to host commands unless IFEN is true. To allow the drive to respond to host commands regardless of the state of IFEN, set W8 to IGNORE. The drive is shipped with W8 set to REQ.

W8 at REQ - respond only when IFEN is true;
W8 at IGNORE - respond regardless of the state of IFEN.

3.2.3 Status Control Signals (W9)

When W9 is set to FSEL, drive status signals IRWD, IFPT, ISPEED and IONL are enabled whenever the formatter has selected a drive. When W9 is set to ONLSEL, these signals are enabled only when the formatter has selected a drive and the tape is loaded and not rewinding. The drive is shipped with W9 set to FSEL.

W9 at FSEL - formatter must select the drive;
W9 at ONLSEL - formatter must select the drive and tape must be loaded and not rewinding.

3.2.4 W10, W11, W12

W10 is factory set to 27256 and W11 to LO; they should not be moved. W12 is used for testing and does not affect drive operation.

3.2.5 IFEN Abort (W13)

To cause IFEN to abort drive operations regardless of the position of W8, remove W13, and the drive will abort read, write, and erase operations when IFEN goes false. To disable the abort function of IFEN, install W13. The drive is shipped with W13 removed.

W13 omitted - Low-to-high edge of IFEN will abort read or write/erase operations;
W13 installed - IFEN will not abort operations.

3.2.6 Read/Formatter W1

W1 on the Read/Formatter PCBA allows the IHIDENS signal to reach the interface. IHIDENS will be high when operating at 1600 cpi, and will be low when operating at 6250 cpi. Only 1260S drives are shipped with W1 installed.

Preventive Maintenance 4

4.1 Preventive Maintenance Schedule

Table 4-1 lists the periodic maintenance required in a normal environment to achieve the anticipated life of the tape drive and to maximize data reliability. A "normal" environment is considered to be an office environment free of smoke, dirt and excessive dust.

INTERVAL	ITEM
DAILY	Clean head
	Clean reference guides (2)
	Clean tape cleaner
WEEKLY	Clean tachometer roller
	Clean fixed roller
18 MONTHS	Perform all adjustments

Table 4-1
Preventive Maintenance Schedule

4.1.1 Why Preventive Maintenance Is Necessary

As magnetic tape ages, tiny oxide particles on the coated side of the tape loosen and flake away. While most of these loose oxide particles will be caught by the tape cleaner, some will be deposited on the head. If allowed to accumulate, the data reliability of the tape drive will be adversely affected. This is usually first noticed by infrequent recoverable data errors progressing to the point where tapes simply cannot be read. Because the tape cleaner removes the larger particles of dirt and dust, it must be periodically cleaned along with the oxide build-up on the head if maximum data reliability is to be achieved.

If allowed to build up on the write head gaps, the oxide can act much like a keeper across a magnet and reduce the magnetic saturation of the flux reversals on the tape. A similar buildup on the read head gaps can cause a reduction in the induced signal from the tape. In severe cases, the build-up can actually lift the tape away from the head surface, further reducing signal strength.

Dirt, dust and oxide particles can also accumulate on the tape guide surfaces and flanges. If allowed to accumulate, they can be transferred to the recording side of the tape when it packs onto the supply and take up reels. In extreme situations, heavy accumulations on the guide surfaces can induce a skew effect resulting in data errors most noticeable when reading tapes generated on other drives.

4.1.2 Frequency of Preventive Maintenance

In addition to the "normal" environment assumed by the preceding preventive maintenance schedule, several other factors, if present, will require more frequent tape cleaning:

- Age and condition of the tape. As previously stated, oxide particles tend to flake off older tapes more readily than off newer ones. The more that older tapes are used, the more frequently the tape path will have to be cleaned.
- General cleanliness of the operating environment. Tape drives which are operated in dusty, smokey, or high humidity environments, or in machine shops or heavy manufacturing or industrial areas will require more frequent cleaning than those which are operated in office environments or in computer rooms.
- Tape handling and storage. The use of improperly handled and/or stored tapes will require more frequent tape path cleaning. Tapes which are left on work benches will accumulate dust on the reel flanges which will eventually work its way into the tape path. Tapes which have been partially unwound onto the floor or which have finger prints will pick up dirt and transfer it directly to the tape cleaner, which then requires more frequent cleaning.
- Amount of tape which has run through the tape path. Tape drives which process several thousand feet of tape each day will require more frequent cleaning than tape drives which are used only a few minutes a day.

4.2 Tape Path Cleaning Procedure

Dirt shows up as dark brown or black smudges on the face of the head and is often difficult to see. Use a strong light and a small inspection mirror to see the head more clearly. Refer to Figure 4-1.

When cleaning the head and tape path, do not use abrasive materials, detergents, or general purpose cleaning solutions. These can cause permanent damage to the head surface and roller bearings. Use only 91% isopropyl alcohol and nonabrasive applicators such as TexPads®.

1. Remove the head cover by pulling straight out from the base.
2. Clean the entire surface of the head, including the erase head. Rub firmly until all deposits are removed.
3. Clean the tape cleaner blade and the area behind it.
4. Clean the tape contact surface of the reference guides. Be especially alert to deposits under the caps on the reference guides and make sure these areas are clean.
5. Clean the tape contact surfaces of the two black roller guides located near the corners of the drive. Clean the areas between the roller surfaces and their flanges. To prevent deterioration of the lubricant in the roller guide bearings, do not allow any solution to seep into the bearings.

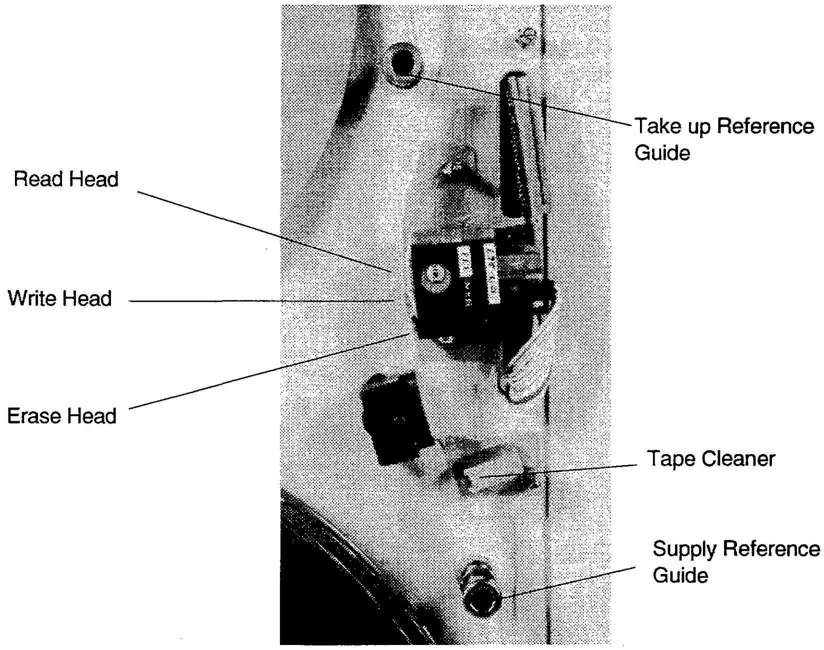


Figure 4-1
Head Area Components

6. Reinstall the head cover.

TexPads® are individually sealed pads premoistened with 91% isopropyl alcohol and are ideal for head and tape path cleaning. They can be obtained from Qualstar or directly from The Texwipe Company by calling (800) 284-5577.

Specifications 5

1260 series tape drives write and read digital data on nine-track magnetic tape and operate in the streaming mode for greater speed and efficiency. A separate read head located downstream from the erase and write heads allows simultaneous read-after-write operation and provides for maximum data reliability.

All models contain an embedded formatter which uses the Pertec interface. Tape controllers are available to adapt this interface to nearly any modern computer.

Models 1260 B and 1260S provide special features. Model 1260B contains a 256K data buffer. Model 1260S is designed for use with the Small Computer Systems Interface (SCSI) and contains a SCSI PCBA with an on-board 256K data buffer.

5.1 Data Specifications

5.1.1 Data Formats

All formats are ANSI/IBM compatible.

- 1600 cpi Phase Encoding (PE) at 50 inches per second (ips)
- 6250 cpi Group Coded Recording (GCR) at 12.5 ips

5.1.2 Data Transfer Rate

- 80 and 78.125 Kilobytes per second at 1600 and 6250 cpi respectively
- 40 Kilobytes to 312 Kilobytes per second peak, model 1260B

5.1.3 Media Requirements

The drive operates reliably using any tape meeting the requirements of ANSI X3.40-1093 and certified for 6250 cpi. Defective tapes and tapes which have been damaged or subjected to heavy wear may not pack properly and should not be used. The drive supports reel sizes from 6 to 10.5 inches, and both 1.5 and 1.0 mil tape.

5.2 Data Capacities

Data capacity is expressed in megabytes. The length of the tape is defined as the distance between the BOT and EOT reflective tabs. The data capacity is directly proportional to the tape length. The data capacity of a tape is determined by several factors:

- Length of Tape
- Recording Density
- Block Length
- IBG Length

- Number of Filemarks
- Filemark Gap Length
- Erased Areas on the Tape

5.2.1 Tape Length

Tape length is defined as the distance between the BOT and end of tape (EOT) reflective markers. The data capacity is directly proportional to the tape length.

Tapes frequently wear out near the beginning of tape (BOT) tab as this is the area of greatest use. Tapes which are worn near the beginning can receive new life by cutting off the first 25 to 50 feet and affixing a new BOT reflective tab. This tab must be located 16 ±2 feet from the beginning of the tape and positioned on the outside surface of the tape at the edge nearest the tape reel label.

5.2.2 Recording Density

The drive provides recording densities of 1600 and 6250 cpi. If data were written in one continuous block from BOT to EOT, a tape could hold almost four times as much data at 6250 cpi than it could at 1600 cpi.

5.2.3 IBG Length

Data is not normally written in one continuous block, but in a series of individual blocks, each separated by in IBG. The length of the IBG is 0.6 inch (0.3 inch in GCR.) Because the IBG is an erased area of tape, the total data capacity of a given tape is reduced by the total accumulative length of the IBGs.

5.2.4 Block Length

The number of data characters per block versus the IBG size greatly affects the amount of data that will fit on any specified tape length. As the block length increases, the number of IBGs in a given length of tape decreases, thereby increasing the data capacity.

In addition, each data block contains a preamble and a postamble (required to decode the data) which adds to the overall block length. The length of tape required for any PE data block can be determined by adding 82 to the number of characters and dividing the sum by the data density and then adding the IBG length. GCR block length is 138 characters, plus 14 characters for every 1106 data characters.

5.2.5 Number of Filemarks

A filemark is a uniquely recorded mark on the tape which the system can use to group data blocks together into files. In addition to the standard IBG, each filemark is preceded by a 3.5 inch filemark gap, and there is an IBG between a filemark and the following data block. As the number of filemarks on a given length of tape increases, the data capacity for that length decreases.

The following tables define data capacities in megabytes and assume a fixed block length, no filemarks, and an IBG length of 0.62 inch.

Note: *While all Qualstar tape drives are capable of reading or writing data blocks of any length, not all computers are equally capable. A maximum data block size of 32768 bytes is generally acceptable, but some computers have maximum limits as low as 2048 bytes (the maximum size specified by ANSI.)*

5.2.6 Data Capacity, Unformatted

Length (ft):	300	600	1200	2400	3600
Density			**MEGABYTES**		
1600 cpi	5.8	11.5	23.1	46.1	69.2
6250 cpi	22.5	45.0	90.0	180.0	270.0

Table 5-1
Unformatted Tape Capacities

5.2.7 Data Capacity, Formatted at 1600 cpi

Length (ft):	300	600	1200	2400	3600
Block Size			**MEGABYTES**		
80	0.4	0.8	1.6	3.2	4.8
128	0.6	1.2	2.4	4.9	7.4
256	1.1	2.2	4.4	8.9	13.3
512	1.8	3.7	7.4	14.9	22.3
1024	2.8	5.6	11.2	22.5	33.7
2048	3.8	7.5	15.1	30.2	45.3
4096	4.6	9.1	18.3	36.5	54.9
8192	5.1	10.2	20.4	40.7	61.1
16384	5.4	10.8	21.6	43.2	64.8
32768	5.6	11.2	22.3	44.6	66.9

Table 5-2
Formatted Tape Capacities, 1600 cpi

5.2.8 Data Capacity, Formatted at 3200 cpi

Length (ft):	300	600	1200	2400	3600
Block Size	MEGABYTES				
80	0.4	0.9	1.7	3.4	5.1
128	0.7	1.3	2.7	5.4	8.1
256	1.2	2.5	5.1	10.2	15.2
512	2.3	4.6	9.2	18.3	27.4
1024	3.8	7.6	15.3	30.5	45.8
2048	5.7	11.5	22.9	45.0	68.8
4096	7.7	15.3	30.6	61.2	91.9
8192	9.2	18.4	36.8	73.6	110.4
16384	10.2	20.5	40.9	81.8	122.8
32768	10.8	21.7	43.3	86.7	130.0

Table 5-3
Formatted Tape Capacities, 3200 cpi

5.2.9 Data Capacity, Formatted at 6250 Cpi

Length (ft):	300	600	1200	2400	3600
Block Size	MEGABYTES				
80	0.6	1.3	2.7	5.3	8.0
128	1.0	2.1	4.2	8.4	12.6
256	1.9	3.9	8.0	16.0	24.0
512	3.6	7.2	14.7	29.4	44.2
1024	6.2	12.4	25.3	50.6	75.9
2048	10.1	20.2	39.5	79.0	118.5
4096	13.9	27.9	54.9	109.8	164.7
8192	17.2	34.5	68.2	136.4	204.6
16384	19.5	39.0	77.6	155.2	232.8
32768	20.9	41.8	83.3	167.7	250.0

Table 5-4
Formatted Tape Capacities, 6250 Cpi

Error Codes and Operational Failures 6

Operational faults can arise from operator error, controller error, and drive faults. The tape drive identifies these errors and stops operation until they are corrected (if possible) or acknowledged by the operator.

Load and FPT errors are directly identified by flashing LOAD or FPT indicators. All other errors are identified by a two-digit flashing code on the ONLINE indicator. The drive communicates the two-digit code by flashing the first digit count followed by a short pause and then flashing the second digit count. After a longer pause, the sequence is repeated. The code will flash until either the operator acknowledges the error by pressing the ONLINE switch, or until power is removed. Table 6-1 summarizes detected fault conditions. Following the table, each fault condition and possible remedies are described in detail. All fault conditions are identified by a combination of one or more flashing indicators.

INDICATOR	FAULT/ERROR	TO RECOVER
LOAD	Load Error	Press LOAD
FPT	File Protect Error	Press FPT
ONL	Other Errors	Press ONL

Table 6-1
Fault Indications

6.1 Load Fault

Indicated By: Flashing LOAD indicator.

Caused By: Improper tape threading, excessive tape slack or failure to properly clamp the tape reel.

Corrective Action: Correct the situation and press the LOAD switch for one second to resume the load sequence.

6.2 File Protect Fault

Indicated By: Flashing FPT indicator.

Caused By: The host attempted to write on a file-protected tape.

Corrective Action: Correct any problem with the host program, or unprotect the tape. Then press FPT switch for one second to resume operation.

6.3 Read After Write Fault

Indicated By: Error Code 63.

Caused By: Failure to read the data being written. The tape could be incorrectly threaded or there could be an internal drive fault.

Corrective Action: Press the ONLINE switch to resume operation. The last data written will not be recoverable. Operator intervention may be required to inform the host of this condition.

6.4 Start/Position Fault

Indicated By: Error Code 36.

Caused By: Failure to reach operating speed within a specified time, or failure to properly position the tape for a read or write operation. This can be caused by improper threading, excessively low AC line voltage, or by an internal drive fault.

Corrective Action: Press the ONLINE switch to return to the pre-loaded state, then perform a load operation. If the tape is past BOT, it will automatically reverse and return to BOT. If this fault remains, check the AC line voltage.

6.5 Write/Erase Power On Fault

Indicated By: Error Code 39.

Caused By: The drive has detected write or erase current when it should be off. This is an internal drive fault.

Corrective Action: Press the ONLINE switch for one second to initiate an unload sequence. Reset the power and retry the operation. If the fault persists, the drive requires service.

6.6 Write/Erase Power Fail Fault

Indicated By: Error Code 61.

Caused By: No write or erase current detected during a write operation. This is an internal drive fault.

Corrective Action: Press the ONLINE switch for one second to initiate an unload sequence. Reset the power and retry the operation. If the fault persists, the drive requires service.

6.7 Motion Fault

Indicated By: Error Codes 31 through 35 and 37, 38.

Caused by: An internal drive fault has occurred, or the tape has come off the supply reel. Running off the supply reel can be attributed to one of three possible causes:

1. The controller failed to recognize End-of-Tape signal

2. No EOT marker on the tape

3. The drive failed to sense the EOT tab.

Corrective action:

1. Press the ONLINE switch to return to the pre-loaded state

2. Perform a load operation.

3. If the tape is past BOT, it will automatically be returned to BOT. If the tape has come completely off of the supply reel,

    a. Moisten the first two inches to help the end to adhere to the supply reel hub;

    b. Lay the end of the tape over the top of the reel;

    c. Turn the reel counter-clockwise so that the tape winds onto the reel;

    d. Continue winding the tape onto the reel for five turns past the EOT marker;

    e. Hold the FPT switch down while pressing the LOAD switch to initiate the load sequence. The tape will load, then rewind to BOT.

6.8 BOT Fault

Indicated by: Error Code 41.

Caused by: No BOT marker on the tape, or the drive failed to detect the BOT marker.Missing BOT tab or by an internal drive fault.

Corrective action: Press the ONLINE switch to return to the pre-loaded state. After checking for a BOT marker, repeat the load operation. If the failure persists, the drive requires servicing.

6.9 1260S Error Indications

The 1260S contains a SCSI PCBA which also performs a self-test at power up. If this self-test fails, an indication is given on the display LEDs located on the SCSI PCBA. For information regarding the SCSI PCBA self-test and failure indications, refer to Chapter 7.

Supplemental SCSI Drive Information 7

The term *SCSI* stands for "Small Computer Systems Interface". Information about this interface can be found in the ANSI SCSI-2 document, #X3T9/89-042. This chapter describes how to connect a Qualstar 1260S tape drive to a SCSI bus and how to configure the tape drive for various options and modes of operation in a SCSI system. While a description of SCSI is beyond the scope of this guide, a physical description of the SCSI bus as it relates to the tape drive is provided to help you understand the principles of drive installation, bus termination, and address (device ID) selection.

Due to the complexity of the SCSI-2 Adapter, the following quick reference index is provided to guide you to the section of interest.

7.1 Changing the SCSI ID

Read this section if you have already connected your tape drive to a SCSI system and only need to change the SCSI ID from the factory default of 5 to some value. Information on SCSI bus terminators and other SCSI configuration parameters is given elsewhere in this chapter.

1. Gain access to the SCSI-2 Adapter PCBA by removing the rear cover from the tape drive. The cover screws are shown in Figure 7-9 on page 7-34.

Note: *Figure 7-8 on page 7-33 will help you locate the switches and indicators mentioned in the following steps.*

2. Locate S1 near the top of the SCSI-2 Adapter. The individual switches on S1 are labeled 1 through 8, left to right, and are arranged in a binary fashion, with the MSB on the left (1) and the LSB on the right (8).
3. Set all switches on S1 off.
4. Locate S3 near the bottom of the SCSI-2 Adapter and set all switches off.
5. Apply power to the tape drive. After about one second, the current SCSI ID will appear on the LEDs.
6. Set switch 3 on S3 on, and set 1, 2, and 4 off.
7. Set the desired SCSI ID on S1. For example, to set the SCSI ID to 1, set switch 8 on and the rest off; to set the SCSI ID to 2, set switch 7 on and the rest off. To set the SCSI ID to 3, set switches 8 and 7 on, and the rest off, etc.
8. Press S2 (to the right of S1) for less than two seconds.
9. Set all switches on S3 off.
10. Set all switches on S1 off. The new SCSI ID will appear in the green LED indicators, indicating that the drive is now configured to respond to the new SCSI ID.
11. Set switch 2 on S3 on, and set 1, 3, and 4 off.
12. Press and release S2.
13. When the LEDs stop flashing, set all switches on S3 off. The new SCSI ID is now saved and will be retained when the drive is powered off and back on.
14. Turn power off and reinstall the rear cover.

7.2 Model Identification

A Qualstar 1260 Series tape drive with the SCSI-2 option is model 1260S.

7.3 Model 1260S Description

7.3.1 General

The 1260S is a Model 1260 to which a SCSI adapter and necessary mounting hardware have been added. The adapter is a printed circuit board assembly which is referred to in this document as the *SCSI PCBA*. The 1260S supplies the necessary power for the SCSI PCBA, which communicates with the tape drive via the Pertec interface connectors J1 and J2.

The 1260S is attached to the system via a cable known as the *SCSI bus*. This SCSI bus may be shared with other SCSI peripherals or *devices*. Each device, in turn, may have up to seven similar devices (*LUNs*) attached to it. The 1260S supports all logical units.

7.3.2 SCSI Power-Up Self Test

Each time the tape drive is powered up, the SCSI PCBA performs a seven-part self-test which checks the integrity of the microprocessor and its associated memory. If an error is detected, the test sequence will halt with the illuminated LED indicating which test failed. The display will then invert the states of all LEDs twice a second until the PCBA is reset. The tests are listed in Table 7-1.

UNLIT LED	CURRENT TEST
0	Z8 register test
1	RAM test
2	PROM sumcheck
3	5086 initialization
4	5086 FIFO test
5	DRAM test
6	EEPROM sumcheck

Table 7-1
SCSI PCBA Self Tests

7.3.3 Single-Ended Configuration

The SCSI PCBA utilizes a single-ended configuration, and provisions have been made to accommodate either internal or external SCSI terminators. A jumper option allows the termination power to be supplied by the SCSI PCBA or by another device on the SCSI bus.

Caution! **The 1260S utilizes a single-ended SCSI interface, and is not compatible with a differential SCSI interface. Before connecting any SCSI device to the SCSI bus, insure that the interface types are the same.**

7.3.4 On-Board Buffer

To facilitate data transfer operations, the SCSI PCBA uses a 256K buffer (1K = 1024 bytes) for temporary data storage. The buffer maximizes data throughput by helping to keep the tape streaming. It also allows data to flow to and from other SCSI devices at burst rates exceeding the data transfer rate to and from the tape.

Write operations can be performed in a buffered or unbuffered write mode. In the buffered write mode, the SCSI PCBA will return a completion status as soon as all the data specified by the command has been transferred to the buffer. Depending upon the number of blocks specified by the command, the transfer of data from the SCSI bus to the buffer may be completed long before all the data has been successfully recorded on the tape. In the unbuffered write mode however, the SCSI PCBA will not return a completion status until all data specified by the command has actually been recorded on the tape. The buffer can be controlled by the interface, or it can be forced always on or always off by a user-specified parameter (described in Section 7.12.8 on page 20).

During read operations, all data is transferred from the tape to the buffer before being transferred to the SCSI bus.

The buffer features a *read-ahead* capability which enhances data throughput by attempting to keep the buffer full whenever the tape drive receives a Read, Read Reverse, or Space Blocks command. This is most noticeable when the host sends a command to read one block while the tape is at BOT, or to read one block in the opposite direction (i.e., read reverse after a read forward operation). If read-ahead is enabled, the drive will continue to move the tape and read blocks into the buffer until the buffer is full. If read-ahead is disabled, the drive will move only the amount of tape required to read one block into the buffer. Data lready in the buffer is available to the host immediately, without having to wait for tape motion to occur. You can disable the read-ahead function (see Section 7.12.16 for details on this option).

7.3.5 Long Blocks

A *long block* is a block whose length exceeds the currently-available buffer space. Note that it is possible for the currently-available buffer space to be less than the total buffer capacity. If a long block is encountered during a read-ahead operation (described in Section 7.12.16), the drive will stop the tape and reposition it at the beginning of the long block. When a command to read that block is received, the SCSI PCBA will transfer the data in and out of the buffer in a first in-first out mode (FIFO operation).

Long blocks during write are usually encountered in audio or seismic applications, and can be many megabytes long. Currently, the block length during write is limited to 256K.

7.3.6 SCSI Configuration

You can change the configuration of the tape drive to match the requirements of a given system using a system of option switches and light-emitting diodes (LEDs).

7.4 Differences between SCSI and the Pertec Interface

The SCSI hardware and communications protocol which exists between a host and a peripheral device (i.e., the Qualstar tape drive) differs from the Pertec interface in some important respects:

- The physical connectors and the principles of signal termination differ;
- The command structures differ;

- A wide variety of peripherals can be connected to the SCSI bus, but only formatted tape drives can be connected to the Pertec interface;
- Using SCSI, peripherals can communicate with each other, but peripherals using the Pertec interface can communicate only with the host;
- SCSI allows a higher data throughput rate than the Pertec interface;
- Some functions can be taken over by the peripherals, leaving the host free for other operations.

7.5 SCSI Bus Description

The SCSI bus may be a continuous cable with a connector at each end and up to six additional connectors between the cable ends, or it may consist of a series of shorter cables which are linked together by the SCSI devices. Because the 1260S utilizes a single-ended bus configuration, the SCSI bus cable, or cables, must not exceed six meters.

In the majority of systems, at least one of the SCSI devices on the bus is the host, with the other devices consisting of a disk drive, a tape drive, and perhaps a high volume storage device or a printer. To insure proper operation, you must keep several factors in mind when configuring the SCSI bus:

- Up to eight SCSI devices may be connected to one SCSI bus;
- The device addresses (SCSI ID) range from 0 through 7;
- A device's priority on the bus is determined by its address, with SCSI ID 7 being the highest priority;
- Each device must have its own, unique SCSI ID;
- The physical location of a device on the bus has nothing to do with its SCSI ID;
- The bus must have at least two devices connected to it;
- The devices which are connected at the physical ends of the bus must have SCSI bus terminators installed;
- The devices which are not connected at the physical ends of the bus must not have SCSI bus terminators installed.

Device ID 7 is normally reserved for the host adapter to insure that the host has the highest priority among the other SCSI devices. Disk drives containing system, application, and data files normally have the next priority and are assigned a device ID of 6, while tape drives, printers, and other low priority devices have correspondingly lower ID numbers. The factory default device ID for the 1260S is 5.

7.6 Cables and Connectors

Two identical drive connectors, wired in parallel on the side of the drive, provide a connection point to the SCSI bus. Depending upon the system's configuration, the SCSI cable may be a shielded or unshielded flat ribbon cable, or a shielded round cable.

Because both drive connectors are wired in parallel, either may be used as an input or an output, or for an external SCSI bus terminator. The two cable configurations are shown in Figures 7-6 and 7-7 on page 7-32. The drive will have one of the following types of connectors:

- **SCSI Alternative 1** - This is a 50-pin male rectangular, polarized connector, Ansley P/N 622-50FM or equivalent. This connector is flush-mounted against the inside of the rear panel and has no locking provisions. Plug the cable connector into either drive connector;
- **SCSI Alternative 2** - This is a 50-pin female "Type D" polarized connector, AMP P/N 1-499977-0 or equivalent. It can be identified by its two rows of pin receptacles and by the built-in locking tabs at each end. Plug the cable connector into either drive connector and secure it with the two locking tabs;
- **Sun Systems Connector** - This is a 50-pin female "Type D" polarized connector, AMP P/N 746789-1 or equivalent. It can be identified by its three rows of pin receptacles and by the screw-type locks at each end. Plug the cable connector into either drive connector and secure it with the two locking screws.

7.7 SCSI Bus Termination

The SCSI terminators can be located either internally on the SCSI PCBA, or externally using a terminator plug which you provide. Power for either configuration is supplied by a dedicated termination power line on the SCSI bus; this line may be powered by the tape drive, as explained in Section 7.7.3, by another device (or devices) on the SCSI bus, or by both.

Note: *While any number of devices may supply termination power, no more than two devices, including the host adapter, may be terminated on any SCSI bus.*

7.7.1 Internal Terminators

The 1260S is shipped with the internal SCSI terminators installed at locations RN7 and RN8 as shown in Figure 7-8 on page 7-33.

If the drive is connected to one physical end of the SCSI bus and if internal termination is desired, leave the terminators installed in RN7 and RN8 and remove the terminators from all other devices on the SCSI bus except the device which is physically connected to the other end of the bus.

7.7.2 External Terminators

You may install an external terminator in the unused SCSI connector. If you do, you must also remove the internal terminators at locations RN7 and RN8 on the SCSI PCBA. Failure to do so may cause unpredictable operation.

7.7.3 Termination Power

In addition to supplying +5 volts termination power to the drive's internal and external terminators, the SCSI PCBA can provide +5 volts termination power to the SCSI bus as well. The +5 volts is fed to the SCSI bus TERMPWR line through a protective device (earlier units used a one-ampere fuse, Qualstar P/N 626-0014-3), a blocking diode and an option jumper (W3) as shown in Figure 7-1.

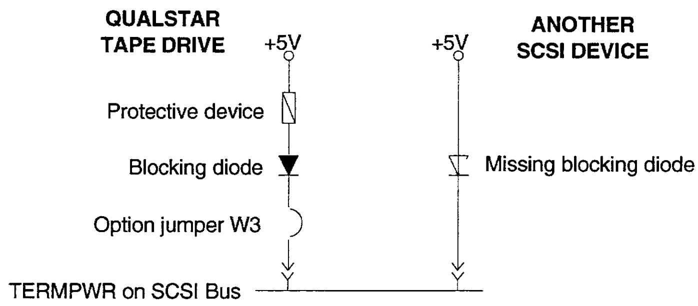


Figure 7-1
Diagram of SCSI termination power

7.7.3.1 W3

W3 is installed at the factory so that the tape drive can provide termination power to the SCSI bus. If for some reason you do not want the tape drive to supply termination power, you can remove W3. If you remove W3, termination power (TERMPWR in the drawing) must be available from another device on the SCSI bus.

7.7.3.2 Blocking Diode

The blocking diode prevents the tape drive from drawing current from other devices on the bus when the drive is turned off.

7.7.3.3 Protective Device

If another device on the bus is supplying termination power and that device does not have a similar blocking diode, it will draw current from the TERMPWR line when it is switched off. A protective device in the TERMPWR supply line in the Qualstar tape drive protects the tape drive by limiting the current which can flow from the drive to the TERMPWR line to about one ampere. If the protective device is a fuse, the fuse will blow.

If this is the case with your system and if the SCSI PCBA on your tape drive has a fuse, either remove W3, or always turn the tape drive off ***before*** turning the system off, and always turn the tape drive on ***after*** applying power to the system. Be sure that the tape drive is never turned on when the system is off.

7.8 Switches, LEDs, and Jumpers

A non-volatile memory in the form of an EEPROM retains configuration and option information when the power is off. Each time the power is applied, the configuration data in the EEPROM is copied to RAM. You can edit the configuration data in the RAM by using a combination of pushbutton and DIP switches on the SCSI PCBA. The altered data can then be stored in the EEPROM, overwriting the previous configuration data. You can also restore the original factory configuration data at any time.

Changing the configuration of the SCSI PCBA consists of the following process:

- Viewing the current configuration data in the RAM;
- Accessing the location(s) in RAM you want to edit;
- Editing the data;
- Saving the new configuration data.

Four mode select switches (S3), eight address/data switches (S1), an on-board *Load* switch (S2), and eight light emitting diodes, or LEDs, (DS7 - DS0) provide communications with the SCSI PCBA. These LEDs, S1, and S2 are shown in Figure 7-2.

7.8.1 Switchbank S1

S1 is a bank of eight DIP switches located near the top of the SCSI PCBA (see Figure 7-8 on page 7-33) which allow you to edit the configuration data in the RAM. These switches are used to encode two-digit hexadecimal numbers (00 through FF) as shown in Figure 7-39.

7.8.2 Pushbutton S2

S2 is a momentary pushbutton switch whose function varies according to the current mode, and according to the sequence of events in that mode. S2 is used to view and edit RAM data. The following S2 events are significant:

- Pressing S2
- Releasing S2
- Holding S2 longer than two seconds before releasing it

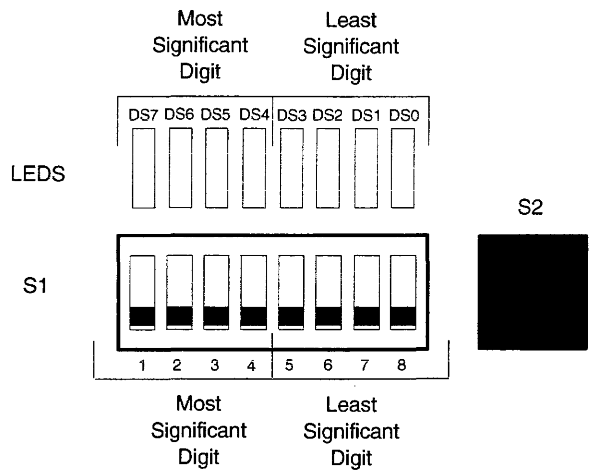
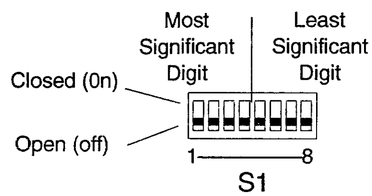


Figure 7-2
Configuration Switch S1, S2 and Display LEDs



The illustration to the right shows how to encode the least significant digit of S1 (switches 5 through 8) to a hexadecimal number from 0 to F. The most significant digit (switches 1 through 4) is encoded the same way.

In this manner, any hexadecimal number from 00 through FF can be encoded.

The same method is used to encode a single digit hexadecimal value on S3.

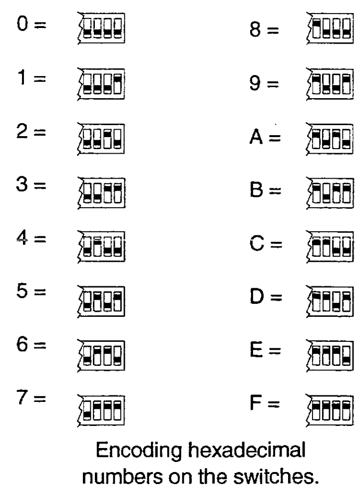
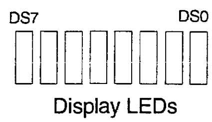


Figure 7-3
SCSI PCBA Switches

7.8.3 Display Indicators DS7 through DS0

These eight LEDs are located just above S1. From left to right, they are labeled DS7-DS0, with DS7 being the MSB and DS0 being the LSB. They display a RAM address or a RAM data byte, depending upon the current mode and the state of S2. The value



The illustration to the right shows how to decode the least significant digit of the display LEDs (DS3 through DS0) to a hexadecimal number from 0 to F. The most significant digit (DS7 through DS4) is decoded the same way.

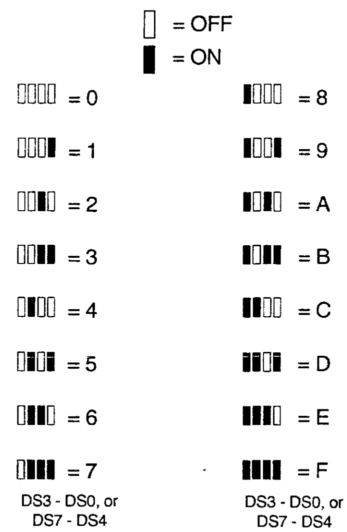


Figure 7-4
SCSI PCBA Display LEDs

on the LEDs is decoded as a two-digit hexadecimal number (00 through FF) as described in Figure 7-4.

7.8.4 Switchbank S3

S3 (see Figure 7-5) is a bank of four DIP switches near the bottom of the SCSI PCBA and are used to enable various modes of operation. The left-most individual switch is the most significant bit (MSB) and the right-most switch is the least significant bit (LSB). The switches are either open (off) or closed (on).

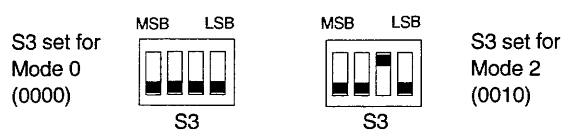


Figure 7-5
Switchbank S3

The modes are numbered hexadecimally from 0 through F but currently, only Modes 0 through 5, Mode E, and Mode F are used. Table 7-2 summarizes these modes and their uses, which are also explained in detail in subsequent paragraphs.

7.8.5 Jumpers

The SCSI PCBA contains four jumpers, labeled W1 through W4. These jumpers are shown in Figure 7-8 and have the following purpose:

- **W1** - W1 selects the type of EEPROM installed in position U3. If the EEPROM is of the type 27512 (i.e., 512K), W1 must be installed across pins 1 and 2. If the EEPROM is of the type 27256 (i.e., 256K), W1 must be installed across pins 2 and 3;
- **W2** - W2 is used during factory test and must be installed for normal operation;
- **W3** - When W3 is installed, the SCSI PCBA provides +5 volts termination voltage to the SCSI bus. When W3 is removed, the termination voltage must be provided by some other device on the SCSI bus;
- **W4** - Installing a jumper across W4 disables the SCSI PCBA and holds it reset. Momentarily shorting the pins at location W4 will reset the SCSI PCBA, the same as if the power were cycled or as if the SCSI PCBA received a SCSI Bus Reset. Shorting the pins at location W4 only resets the PCBA and does not cause a SCSI Bus Reset. The Reset function is described in Section 7.9.

7.9 Resetting the SCSI PCBA

Resetting the SCSI PCBA causes several things to happen: the buffer is cleared of any data; all pending commands are cleared; the configuration data stored in the EEPROM is copied into the RAM; and the PCBA performs its self-test.

The SCSI PCBA can be reset by:

- Applying power (also causes a Unit Attention condition)
- Momentarily shorting the pins of W4 together (does not cause a Unit Attention condition)
- Receiving a SCSI Bus Reset

7.10 SCSI PCBA Configuration Modes

As previously described, S3 is used to place the SCSI PCBA in a particular mode of operation. Entering any of these modes does not disable the tape drive, and the SCSI PCBA will continue to respond to the SCSI bus.

To enter a particular mode, set the appropriate switches on S3 on. The SCSI PCBA will be placed in that mode immediately. To enter Mode 0 (normal operating mode), place all switches on S3 off. To enter Mode 2, place the second switch from the right on. See Figure 7-5 and Table 7-2 for a complete list of available modes.

Note: *The SCSI PCBA mode may be changed while the tape drive is online (i.e., the ONLINE indicator is on). Changing from one mode to another will not result in a Unit Attention condition on the SCSI bus.*

MODE	FUNCTION	S3-1	S3-2	S3-3	S3-4
0	Normal operation	off	off	off	off
1	View configuration data	off	off	off	**ON**
2	Alter configuration data	off	off	**ON**	off
3	Reload RAM from EEPROM	off	off	**ON**	**ON**
4	Save configration from RAM to EEPROM	off	**ON**	off	off
5	Return EEPROM and RAM to factory defaults	off	**ON**	off	**ON**
6-D	No operation, no effect	-	-	-	-
E	Factory test (factory use only)	**ON**	**ON**	**ON**	off
F	Continuous diagnostics	**ON**	**ON**	**ON**	**ON**

Table 7-2
SCSI PCBA Configuration Modes

7.10.1 Mode 0 - Normal Operating Mode

Setting all S3 switches off places the SCSI PCBA in the normal operating mode, and the tape drive will respond to SCSI commands in a normal manner. In Mode 0, you may view the contents of any memory address in RAM by setting that address on S1 and looking at DS7 through DS0.

Note: *Because the drive is in the normal operating mode, displaying the RAM contents is a background operation, and there may be a delay from the time S1 is changed to the time the display is updated.*

In Mode 0, S2 is disabled and you will not be able to change the configuration data. You may enter another mode at any time by setting the appropriate switches.

7.10.2 Mode 1 - View Configuration Data

If you want to look at the data in the RAM but do not want to change it, use Mode 1 as follows:

1. To view data at any address, first set the desired address on S1, and then enter Mode 1 by turning S3-4 **on**. The display will show the data at that address;
2. To view the data at the next (sequential) address, press S2 for *less than two seconds*. Each time you press S2, the next higher address is displayed and each time you release S2, the data at the new address is displayed;
3. To view data at other than the next address, set the desired address on S1 and then press S2 for *more than two seconds*. After two seconds, the address on the switches will be displayed, and when S2 is released, the data at that address will be displayed.

7.10.3 Mode 2 - Alter Configuration Data

Use Mode 2 to view and to alter the RAM configuration data. The contents of the EEPROM will not be changed. The configuration data is edited by selecting the address of the data to be changed, entering Mode 2, setting the new data on S1, and writing that data into the selected address.

When you edit data using Mode 2, you do not change the data in the EEPROM. Furthermore, if the SCSI PCBA receives a SCSI Bus Reset, or if the power is cycled, all changes in the RAM will be lost. To save the changes, they must be stored as described in Section 7.10.5.

To alter the configuration data in the RAM:

1. Determine the address which holds the data to be changed.
2. Set the address of that data on S1.
3. Set S3-3 **ON** to enter Mode 2. This accesses the address you set on S1 and displays the data at that address.
4. Set the desired data on S1. Then:
   a. To go ahead and alter the data, press S2 for *less than* two seconds. When S2 is pressed, the address to be written to is displayed. When S2 is released, the data on S1 will be written, the address will be incremented and its data will be displayed;
   b. If you change your mind after pressing S2, just hold it pressed for more than two seconds before releasing it. After two seconds, the address will be changed to that currently on S1, and that address will be displayed. The data at the address you were viewing will remain intact;
   c. To alter the data at an address other than the one currently displayed (i.e., at some non-sequential address), exit Mode 2 and begin from Step 1, or use Step 3b.

Summary: *To alter memory contents, release S2 within two seconds. To abort, hold S2 longer than two seconds.*

7.10.4 Mode 3 - Reload RAM from EEPROM

If you make a mistake while editing, get confused, or for some reason wish to start over, you can use Mode 3 to recopy the EEPROM configuration data to the RAM. Cycling power to the drive or resetting the SCSI PCBA via W4 have the same effect, but will also generate a Unit Attention condition on the SCSI bus. To enter Mode 3, set S3 to **3**.

To reload the RAM from the EEPROM:

1. Enter Mode 3. Immediately after entering Mode 3, the display will show **73**, indicating that the reload has not yet taken place. DS7 is an "operation successful" indicator and will be off at this time. DS3 through DS0 indicate the current mode, and will show **3**.

2. Press and release S2. The LED display will count up (quickly) as each RAM address is reloaded from the EEPROM. When the operation is complete, DS7 will illuminate, indicating that the reload operation was successful. If DS7 does not come on when S2 is released, the reload operation was unsuccessful.

S1 has no effect in Mode 3.

7.10.5 Mode 4 - Save Configuration

Mode 4 is used to copy the configuration currently in RAM to the EEPROM, regardless if the RAM data has been changed. Modes 4 and 5 are the only mechanisms of changing the contents of the EEPROM, as its contents are not changed when the power is shut off. To enter Mode 4, set S3 to **4**.

To save the configuration currently in the RAM:

1. Enter Mode 4. Immediately after entering Mode 4, the display will show **4**, indicating that the save operation has not taken place. DS7 is an "operation successful" indicator and will be off at this time. DS3 through DS0 indicate the current mode, and will show **4**.

2. Press and release S2. The LED display will count up as each RAM address is reloaded from the EEPROM. When the operation is complete, DS7 will illuminate, indicating that the reload operation was successful. If DS7 does not come on when S2 is released, the reload operation was unsuccessful.

S1 has no effect in Mode 4.

7.10.6 Mode 5 - Factory Default

Mode 5 is used to restore the factory default values for all parameters to both the RAM and the EEPROM. The operation is similar to Mode 4. To enter Mode 5, set S3 to **5**.

To restore the factory defaults:

1. Enter Mode 5. Immediately after entering Mode 5, the display will show **75**, indicating that the restore has not taken place. DS7 is an "operation successful" indicator and will be off at this time. DS3 through DS0 indicate the current mode, and will show **5**.

2. Press and release S2. The LED display will count up as each RAM address is restored to the factory default data. When the operation is complete, DS7 will illuminate, indicating that the save operation was successful, and the default

values for all parameters are in effect. If DS7 does not come on when S2 is released, the restore operation was unsuccessful.

S1 has no effect in Mode 5.

7.10.7 Mode 6 through Mode D - NoOp

Mode 6 through Mode D are not currently used. Entering these modes will not affect SCSI bus operations, and the tape drive will function normally. To enter these modes set S3 to the appropriate value.

While in these no-op modes, DS7 will be off, and DS6 through DS4 will be on. DS3 through DS0 will display a hexadecimal number indicating the number of the mode which has been selected, with DS3 being the MSB. Pressing S2 in these modes will invert the display, providing an opportunity to test the LED indicators.

7.10.8 Mode E - Factory Test

Placing the SCSI PCBA in Mode E configures it for a continuous self-test operation. Mode E is for factory test only and requires a special loopback connector at J1 and J2.

7.10.9 Mode F - Continuous Self-Test

Placing the SCSI PCBA in Mode F configures it for a continuous self-test operation. In addition to performing the normal power-on diagnostics, Mode F also tests the entire contents of the 256K buffer. In Mode F, the SCSI PCBA will ignore the SCSI bus. To enter Mode F, set all S3 switches on (**4**).

The self-test is started by momentarily shorting the pins at W4 together after entering Mode F; the self-test is stopped by taking the SCSI PCBA out of Mode F.

As each test is performed, its corresponding LED will be off, and the remaining LEDs will be on, allowing the user to quickly verify that all LEDs are functioning properly. The SCSI PCBA will cycle continuously from Test 0 to Test 6 until taken out of Mode F, or until an error occurs.

If an error is detected, the display will temporarily halt with the illuminated LED indicating which test failed. The remaining LEDs will be off. The display will then invert the states of all LEDs twice a second until the user takes the SCSI PCBA out of Mode F.

You may abort a failed test and advance on to the next test by pressing S2.

7.11 Changing SCSI Parameters

This section is a quick overview of the steps required to change any programmable SCSI parameter. Detailed descriptions of each parameter are given in Section 7.12, and detailed information on the various modes is given in Section 7.10 beginning on page 7-11.

To configure the parameters:

1. Select the RAM address of the parameter to be changed using S1 (see Table 7-3 on page 7-18);

2. Enable Mode 2 (Alter Configuration Data) using S3;

3. Set up the data for the parameter using S1 (see Table 7-3 on page 7-18, or the corresponding paragraph in Section 7.12);

4. Press S2 to load the data set on S1 into RAM;

5. To retain the changes when the power is turned off, save the new configuration by enabling Mode 4 using S3 and pressing S2;

6. Return the PCBA to normal operation by turning all S3 switches off.

7.12 SCSI Configuration Parameters

Switch S1 on the SCSI PCBA allows you to select the SCSI parameters defined in Table 7-3. The procedures for loading, changing and saving the parameters are described in Section 7.10.

Note: *All configuration items, with the exceptions of write retries, read retries, and Inquiry data, must be saved to the EEPROM (using Mode 4) and then reloaded back into the RAM (using Mode 3 or resetting the PCBA) before they will take effect.*

EXAMPLE 1: Suppose you want to change the SCSI ID from its factory default of 5 to 6, and suppose the drive is currently in Mode 0.

1. The SCSI ID is stored in RAM address 00. While still in Mode 0, set S1 to **00**. The display shows the current SCSI ID of 5.

2. Next, enter Mode 2 by setting S3 to **2** (Alter Configuration Data). The display does not change.

3. Now set the new SCSI ID on S1 (**06**).

4. Finally, press S2 for *less than* two seconds. This stores the data you set on S1 in address 00. The display then shows the data in the next address (01). This will be either **00** if SCSI bus parity is disabled, or **01** if SCSI bus parity is enabled.

EXAMPLE 2: Suppose you want to disable reading beyond the EOT tab.

1. The READ EOT parameter is stored in RAM address 0F. While still in Mode 0, set S1 to **0F**. The display shows the current value of the READ EOT parameter.

2. Next, set S3 to **2** to enter Mode 2 (Alter Configuration Data). The display will show the contents of RAM address 0F.

3. Now set S1 to **01** (disables read beyond EOT).

4. Finally, press S2 for *less than* two seconds. This stores the data you set on S1 in RAM address 0F. The display then shows the data in the next address (10).

7.12.1 SCSI Device ID (Address 00)

VALID VALUES = 0 - 7; DEFAULT = 5

This parameter lets you to define a SCSI Device ID from 0 to 7. The SCSI ID is independent of the drive's physical location on the SCSI bus, and depends upon the desired priority for the drive in the system. SCSI ID 0 is the lowest priority, and SCSI ID 7 is the highest. If more than one device on the SCSI bus have the same SCSI ID, the system will operate in an unpredictable manner.

Note: *The SCSI Device ID is not the same as the Drive Address jumper on the Write/Controller PCBA. When the SCSI PCBA is used, the Drive Address jumper on the Write/Controller PCBA* **MUST** *be set to 0.*

7.12.2 SCSI Parity (Address 01)

0 = DISABLED, 1 = ENABLED; DEFAULT = 0

This parameter refers to the parity on the SCSI bus and not to the parity recorded on the tape. The SCSI PCBA always generates parity. This option determines if it *checks* SCSI bus parity.

Note: *If one device on the SCSI bus is configured to support parity, all other devices on that SCSI bus must also be configured to support parity, and vice versa.*

DISABLED - The SCSI PCBA will not check SCSI-bus parity.

ENABLED - The SCSI PCBA checks SCSI-bus parity.

RAM ADDRESS	PARAMETER	SELECTABLE VALUES (DEFAULT VALUES)	COMMENTS
00	SCSI ID	0-7 (5)	SCSI Device ID selection
01	SCSI PARITY	(0=disabled), 1=enabled	SCSI bus parity detection
02	SCSI SYNC	0=disallow, (1=allow)	Allow synchronous data transfers
03	SPACE WRITE	(0=normal), 1=read ahead	Space in Write mode switching
04	WRITE EOT	(0=write), 1=retain	Write buffer contents when EOT sensed
05	WRITE RETRIES	(13) 00-99 BCD	Max # retries (in BCD) on write error
06		don't care	Not currently used
07	BUFFER SWITCH	(0=normal), 1=force off, 2=force on	256K buffer enable
08	EARLY EOT	(0=normal), 1=eom, 2=1 blk	Buffering mode after Early EOT
09	EOM ON READ	0=no, (1=yes)	Toggles EOM check bit for EOT reads
0A	SET INQUIRY DATA	(Qualstar), various, see Section 7.12.11	Selects Inquiry Data File
0B	LNG BLK	(0=stop), 1=continue	Read ahead termination for long blocks
0C-0D		don't care	Not currently used
0E	RD BAD DATA	0=no, (1=yes)	Returns bad data to host
0F	RD EOT STOP	(0=no), 1=yes	Disable read beyond EOT tab
10	READ AHEAD	0=off, 1=1 fmk, (2=2 fmk), 3=3 fmk	Read ahead enable/termination
11	READ CER	(0=ignore), 1=report	Inhibit reporting of read CERs
12	READ RETRIES	(10) 00 - 99 BCD	Max # retries on read HER
13	RESIDUE	(0=normal), 1=invert	Residue count format
14	UNLOAD	(NORMAL), INHIBIT, REWIND	Sets response to Unload command
15	SCSI LUN	(0)-7, 8=all	SCSI LUN to which drive responds
16	REWRITE CER	(YES), NO	Enable retries for CERs
17	WRITE CER	(ERROR), LAST, NO, RETRY, YES	Reported status of last write retry
18	BUSY	(NOT READY), BUSY	See Section 7.12.24
19	READ HER	(REPORT), IGNORE	Ignore hard errors when reading
1A	WRITE HER	(REPORT), IGNORE	Ignore hard errors when writing
1B	BLOCK LENGTH	0 - 99 (2)	Block length x 256 in fixed block mode
1B - AF		don't care	Not currently used
B0 - B7	INQUIRY PARMS	see Section 7.12.29	Inquiry parameters
B8 - BF	INQUIRY VENDOR ID	Qualstar	Eight ASCII characters
C0 - CF	INQUIRY PROD. ID	various, see Section 7.12.29	Sixteen ASCII characters
D0 - D3	INQUIRY PROD. REV	various, see Section 7.12.29	Four ASCII characters
D4 - F5	(RESERVED)		
F6 - FD		don't care	Not currently used
FE	DRIVE MODEL NR	00, (01), 02, 03	Reports model number
FF	CHECKSUM	various, see Section 7.12.32	
NOTE: 0 = open, or off; 1 = closed, or on.			

Table 7-3
SCSI Configuration Parameters

7.12.3 SCSI Sync (Address 02)

0 = DISALLOW, 1 = ALLOW; DEFAULT = 1

The SCSI PCBA supports both synchronous and asynchronous data transmission. Deciding which mode to use is a matter of initiator/target negotiation.

ALLOW - If the initiator selects the synchronous mode, the drive will transfer data in the synchronous mode;

DISALLOW - If the initiator selects the synchronous mode, the drive will inform the initiator that it will not operate in the synchronous mode, and will instead operate only in the asynchronous mode.

7.12.4 Space Write (Address 03)

0 = NORMAL, 1 = READ AHEAD; DEFAULT = 0

Issuing a Read or Read Reverse command places the drive in the Read mode. When in the Read mode, the drive may or may not perform a read-ahead operation, depending upon the setting of the Read Ahead option (see Section 7.12.16 for details on this option). Issuing a Write command to the drive places it in the Write mode, where there is no read-ahead operation.

This parameter determines what the drive will do if it receives a Space Blocks command when it is in the Write mode:

- **NORMAL** - After spacing across the specified number of blocks, the drive stops the tape immediately. It does not switch into the Read mode or perform a read-ahead operation.

- **READ AHEAD** - After spacing across the specified number of blocks, the drive switches to the Read mode and continues to move tape and to read blocks into the buffer until the buffer is full (i.e., it performs a read-ahead operation.) This is advantageous if the next command is a Read or Read Reverse command, because the data will already be in the buffer and will be immediately available to the host. However, if the next command is a Write command, a delay will occur while the drive moves the tape back across all the blocks which were read ahead into the buffer. Only after this delay will the drive request data from the host.

7.12.5 Write EOT (Address 04)

0 = WRITE, 1 = RETAIN; DEFAULT = 0

This parameter determines whether or not the drive will write the contents of the buffer to tape when buffer operations are enabled and the EOT marker is sensed while writing.

- **WRITE** - All unrecorded data in the buffer will be written to tape and the drive will then report an End Of Medium Check Condition with the Information Bytes set to zero;

- **RETAIN** - The drive will complete the block being written when the EOT marker is sensed and will not write any more data. It will report an End Of Medium Check Condition with the Information Bytes equal to the number of unrecorded bytes in the buffer;

  The unrecorded data may be written to tape using the Write Filemark command or it may be recovered using the Recover Buffered Data command. Any other tape motion command will clear the contents of the buffer.

7.12.6 Write Retries (Address 05)

VALID VALUES = 0 - 99; DEFAULT = 13

When a hard or correctable error is detected during a write operation, this parameter defines the number of automatic retries the drive will perform before reporting an error. For each retry, the drive backspaces the tape over the block, erases a four-inch length of tape, and then rewrites the data.

The number of write retries is entered as a binary coded decimal (BCD) number on S1. This parameter takes effect immediately without having to be saved first.

Regardless of the value of this parameter, errors which occur while writing blocks larger than 256K will not result in retries.

7.12.7 Address 06

This address is not currently used and the data it contains is ignored.

7.12.8 Buffer Switch (Address 07)

0 = NORMAL, 1 = FORCE ON, 2 = FORCE OFF; DEFAULT = 0

This parameter determines when the SCSI PCBA will return a completion status to the SCSI bus during write commands.

- **NORMAL** - The buffered write mode is enabled after the drive is powered up. It can be disabled, and later re-enabled, via a control bit in the Mode Select command;

- **FORCE ON** - The SCSI PCBA is always in the buffered write mode, and will not respond to the buffer control bit in the Mode Select command;

- **FORCE OFF** - The SCSI PCBA is always in the unbuffered write mode, and will not respond to the buffer control bit in the Mode Select command.

The buffered and unbuffered write modes are described in Section 7.3.4 beginning on page 7-3.

7.12.9 Early EOT (Address 08)

0 = NORMAL, 1 = EOM, 2 = 1 BLOCK; DEFAULT = 0

Depending upon the recording density, the block length, and other conditions when EOT is detected, the contents of a full buffer (256K) may not fit on the remaining amount of tape. As an aid in dealing with this situation, the drive informs the SCSI PCBA when the tape reaches a point approximately 25 feet ahead of the EOT marker strip. This point is known as *Early EOT* and occurs only during write operations.

This parameter determines the course of action when Early EOT is detected:

- **NORMAL** - The buffer is reduced from 256K to 64K. If there is more than 64K of unrecorded data in the buffer, the tape drive will first wait until it has successfully recorded all but 64K before accepting another Write command. When EOT is detected, the tape drive will report EOM to the host.

  This mode of operation will prevent the possibility of running out of tape while there is still unrecorded data in the buffer; however, the drive may not be able to keep the tape streaming between Early EOT and the EOT marker;

- **EOM** - The buffer size is not reduced. The tape drive will accept further Write commands and will keep the tape streaming. It will report EOM to the host upon detecting Early EOT. It will NOT, however, report EOM when the EOT marker is detected;

- **1 BLOCK** - The buffer size is not reduced, but the tape drive will only accept data from the host one block at a time. The block can be any size. The tape may not stream.

7.12.10 EOM On Read (Address 09)

0 = NO, 1 = YES; DEFAULT = 1

The setting of this parameter affects the reporting of Check Condition when the EOT marker is detected during read operations:

- **NO** - The drive will not report the End Of Medium Check Condition;

- **YES** - The drive will report the End Of Medium Check Condition.

7.12.11 Set Inquiry Data (Address 0A)

0 = CUSTOM, 1 - 10 = Various, 3 = QUALSTAR; DEFAULT = 3

7.12.11.1 Inquiry Data File

The Inquiry Data File contains the Inquiry string which the tape drive will return to the host upon receipt of an INQUIRY command. The following choices are available:

- **QUALSTAR** - The standard data file which reflects a Qualstar tape drive;

- Various others - These data files look like those returned by other vendors' tape drives as shown in Table 7-4 on page 7-23.
- **CUSTOM** - This data file can be edited and used when the information in the other data files is not accepted by the host.

The Inquiry Data File, or *string*, which the drive returns to the host resides in the Inquiry Data File area at RAM address B0 through F5. Like the remainder of the RAM, the Inquiry Data File area is loaded from the EEPROM each time you switch on the tape drive.

Note: *This parameter takes effect immediately without having to be saved first.*

The string is divided into five fields, each containing different information about the SCSI device:

- **Bytes 0-7** - These eight bytes of hexadecimal data (RAM locations B0 through B7) describe the type of device (i.e., a tape drive, a disk drive, a printer, etc);
- **Vendor ID** - These eight bytes of ASCII data (RAM locations B8 through BF) usually contain the name of the equipment vendor ("Qualstar", for example);
- **Product ID** - These sixteen bytes of ASCII data (RAM locations C0 through CF) usually contain the product name, model number, etc.;
- **Product Revision** - These four bytes of ASCII data (RAM locations D0 through D3) usually contain revision information about the device;
- **Extended Inquiry Bytes** - These 34 bytes (RAM location D4 through F5) are only sent to the host if an IBM or NCR data file is selected.

7.12.11.2 Predefined Inquiry Strings

To facilitate integration of the 1260S into a variety of SCSI systems, you can select from a number of predefined Inquiry strings by setting a hex value at RAM address 0A. If none of these predefined files meet your needs, you can define your own custom string by entering Mode 2 and manually changing the data using S1 and S2.

Selecting the Custom Inquiry string does **NOT** change the contents of the Inquiry Data File area. Instead, whatever the file contains, whether you have changed it or not, will be saved under the name "Custom" if Mode 4 (Save Configuration) is entered. The Custom Data File area is 35 bytes long.

7.12.11.3 Modifying a Predefined Data File

You can modify a predefined data file as follows:

1. Set S1 to **0A**, the Set Inquiry Data address.

Addr. 0A Value	Inquiry String Name	BO - B7	B8 - BF (Vendor ID)	C0 - CF (Product ID)	D0 - D3 (Prod. Rev.)	D4 - F5 (Reserved)
01	**Kennedy**	018002021F000010	KENNEDY	96X2 TAPE UNIT	1.36	
02	**IBM 9348**	0180010026000000	IBM	9348 MODEL 001	1.36	00000000 *****
03	**Qualstar**	0180020220000010	QUALSTAR	1260S	1.36	
04	**Telex**	018001001F000000	TELEX	2440 MODEL A10	1.36	
05	**NCR ADP**	01C5000027C10701	NCR ADP-	53 QUAL	STAR	SCSI 07.021054
06	**HP7980**	018002021F000010	HP	7980S	1.36	
07	**HP88780**	018002021F000010	HP	88780	1.36	
08	**M4 SCSI**	018002021F000010	M4 DATA	123107 SCSI	1.36	
09	**M4 DATA**	018002021F000010	M4 DATA	OPEN REEL TAPE	1.36	
0A	**STK**	018002021F000010	STK	4280	1.36	
0B	**F880**	018002021F000010	NCR H621	0-STD-03-46F880	1.36	
0C	**M890/891**	0180020222000010	NCR H621	0-STD-03-46M890/	8911	.36
0D	**M990**	018002021F000010	NCR H621	0-STD-03-46M990	1.36	
0E	**M990-64K**	0180020222000010	NCR H621	0-STD-03-46M990-	64K1	.36
0F	**M995**	018002021F000010	CIPHER	M995	1.36	
10	**M996**	018002021F000010	CIPHER	M996	1.36	

Table 7-4
Inquiry Strings

2. Set S3 to **2** to enter Mode 2; the display will show the currently loaded data (i.e., **01** (Kennedy), **02** (IBM 9348), **03** (Qualstar), etc.
3. Set S1 to the desired data file (**01** for Kennedy, **02** for IBM 9348, etc.).
4. Press S2 for less than two seconds. The number of the data file set on S1 is written to address 0A and the contents of that data file are loaded into the Inquiry string (B0 through F5).
5. Set S3 to **0** to exit Mode 2.
6. Set the address of the byte to be modified on S1. The display shows the data at that address.
7. Set S3 to **2** to reenter Mode 2; the display does not change.
8. Set the new data on S1. Refer to Table 7-6 at the end of this chapter for ASCII conversions.

9. Press S2 for less than two seconds. The new data will be written into the RAM, and the display will show the data at the next higher address. Then:

   a. If the next higher address is also to be modified, set the new data on S1 and press S2 as before. The new data will be written at that address and the display will show the data at the next higher address. This process can be used as long as contiguous addresses are to be modified;

   b. If the next address to be modified is other than the next higher address, repeat this process starting at Step 5;

10. At this point, the following possibilities exist:

- You can save the modified data file as a Custom Inquiry string while the original predefined data files remain unchanged. This is the recommended procedure. To save the modified data file as a Custom Inquiry, proceed with the next step;

- You can test the modified data file by returning the PCBA to the normal mode (setting S3 to **0**). In this case, the modified Inquiry data file will be reported until the tape drive power is cycled, at which time the Inquiry data file area will be reloaded according to the Set Inquiry Data parameter;

- You can save the modified data under its original name by setting S3 to **4** (Save Configuration). This creates a "modified, predefined data file" in the EEPROM. Each time this particular predefined data file is loaded to the RAM from the EEPROM, the modified data will be used. **This is not a recommended procedure and should be avoided;**

- You can abort the editing process and reload the predefined data file into the Inquiry data file area by setting S3 to **3** (Reload RAM from EEPROM);

- You can restore all predefined data files to their original factory defaults by setting S3 to **5** and momentarily pressing S2 (this also restores the other configuration parameters to their factory default values).

11. After all the modifications to the Inquiry string have been made, change the Set Inquiry Data parameter to 0 as follows:

    a. Exit Mode 2 by setting S3 to **0**;

    b. Set S1 to **0A**;

    c. Enter Mode 2 by setting S3 to **2**;

    d. Set S1 to **00**;

    e. Press S2 for less than two seconds;

    f. Set S3 to **4** (Save Configuration from RAM to EEPROM);

    g. Press S2 for less than two seconds. The Inquiry string is saved and will be recalled as long as the Set Inquiry Data parameter is 0.

7.12.11.4 Creating a Custom Inquiry String

A Custom Inquiry string can be created in two ways:

- **Method 1** - By modifying a predefined data file. Follow the steps in Section 7.12.11.3;
- **Method 2** - By manually setting each individual byte of data in the Inquiry string to the desired value using Mode 2.

In either case, be sure to change the Set Inquiry Data parameter to 0 before saving the configuration.

Notes: *Editing of bytes B0 through B7 must be done with care to maintain compatibility with SCSI systems;*

The 33 reserved bytes are at RAM location D4 through F5 and should not be changed. The last 30 bytes are ASCII spaces.

7.12.12 Lng Blk (Address 0B)

0 = STOP, 1 = CONTINUE; DEFAULT = 0

If the Read-Ahead mode is enabled, this parameter determines what happens after the SCSI PCBA has transferred a long block from the tape to the SCSI bus as a result of a Read command. The Read-Ahead mode is described in Section 7.12.16 on page 7-26, and long block operation is described in Section 7.3.5 beginning on page 7-4.

- **STOP** - After a long block has been successfully transferred, the read-ahead operation stops. It may resume during a subsequent Read, Read Reverse, or Space command;
- **CONTINUE** - After a long block has been successfully transferred, the read-ahead operation continues without pause. If the block will not fit into the remaining buffer space, the Read command will be aborted; however, the tape will continue to move until the end of the long block is detected. At that time, the drive will reposition the tape back to the beginning of the long block.

  If the block is relatively short (one or two megabytes), the reposition time is insignificant. If the block is several megabytes long, the reposition time becomes significant and it may be more efficient to have the drive stop the tape (i.e., the STOP option should be selected.)

7.12.13 Address 0C - 0D

These address are not currently used and the data they contain is ignored.

7.12.14 Read Bad Data (Address 0)

0 = NO, 1 = YES; DEFAULT = 1

This parameter determines whether the drive will transfer data to the SCSI bus when that data contains an error.

YES - The drive will transfer data which contains an error and will report a Media Error Check Condition;

NO - The drive will not transfer data which contains an error and will clear that data from the buffer. It will also report a Media Error Check Condition.

Note: *The Media Error Check Condition will occur in both cases but in the YES case, it may be accompanied by an Incorrect Length Indicator (ILI).*

7.12.15 Read EOT Stop (Address 0F)

0 = NO, 1 = YES; DEFAULT = 0

Setting this parameter to 1 (YES) will terminate a read-ahead operation when the EOT marker is sensed. Setting this parameter to 0 (NO) will not terminate the read-ahead operation.

7.12.16 Read Ahead (Address 10)

0 = OFF, 1 = 1 FMK, 2 = 2 FMKS, 3 = 3 FMKS; DEFAULT = 2

This option determines whether read-ahead operation is enabled and if so, what condition terminates a read-ahead operation. The read-ahead operation is not available during write operations.

- **OFF** - The read-ahead operation is disabled;
- **1 (2) (3) FMK(S)** - The read-ahead operation is enabled for any Read or Space command, and ends either when the buffer is full or when one, two, or three sequential filemarks are encountered, according to which option has been set. The read-ahead operation will resume when a Read, Read Reverse, or Space command is processed after the filemark(s) is (are) transferred to the host. Note that two sequential filemarks usually indicate logical EOT.

7.12.17 Read CER (Address 11)

0 = IGNORE, 1 = REPORT; DEFAULT = 0

This parameter determines whether or not correctable errors (CERs) during read operations are reported.

- **IGNORE** - The drive will not report a Recoverable Error Check Condition when a read error occurs;

- **REPORT** - The drive will report a Recoverable Error Check Condition when a read error occurs.

In both cases, corrected data is sent to the host. An Incorrect Length Indicator (ILI) may accompany the Recoverable Error Check Condition.

7.12.18 Read Retries (Address 12)

VALID VALUES = 00 - 99; DEFAULT = 10

The value of the Read Retries parameter defines the number of automatic retries the drive will perform when a hard error is detected during a read operation. If the error occurs, the drive spaces across the block in the opposite direction and then repeats the read in the original direction. The number is set on S1 in binary coded decimal (BCD) format. This parameter takes effect immediately without having to be saved first. Note that errors which occur while reading blocks which are larger than approximately 128K may or may not result in retries.

7.12.19 Residue (Address 13)

0 = NORMAL, 1 = INVERT; DEFAULT = 0

The Residue parameter refers to the contents of the Information Bytes which are returned to the initiator in response to the REQUEST SENSE command. These bytes are also known as the *residue count*, and their value equals the requested block length minus the actual block length.

Qualstar SCSI tape drives feature an enhancement which allows the residue count to be redefined.

- **NORMAL** - The residue count value equals the requested block length minus the actual block length;

- **INVERT** - The residue count value equals the actual block length minus the requested block length.

7.12.20 Unload (Address 14)

0 = NORMAL, 1 = INHIBIT, 2 = REWIND; DEFAULT = 0

The Unload parameter determines how the tape drive responds to an Unload command as follows:

- **NORMAL** - The tape drive will rewind and unload the tape.

- **INHIBIT** - No tape motion will occur.

- **REWIND** - The tape drive will rewind the tape but will not unload it.

7.12.21 SCSI LUN (Address 15)

Address 15 contains the SCSI Logical Unit Number (LUN) to which the tape drive will respond. Valid entries are 0 through 8, with 0 through 7 representing actual LUNs. If the value in address 15 is set to 8, the tape drive will respond to any and all LUN values. The factory default is 0.

7.12.22 Rewrite CER (Address 16)

This parameter enables the tape drive to perform retries if a corrected error is reported after a *write* operation. Normally, the default of **YES** would be used, forcing the tape drive to perform write retries. In applications where the incoming data stream is a continuous and one-time event (seismic applications, for example), data will be lost while the tape drive performs retries. If this is not acceptable, and if it is okay to leave corrected errors on the tape, set this parameter to **NO**.

- **YES** - Forces the tape drive to automatically perform retries when it detects a corrected error while writing. The number of retries is determined by the Write Retries parameter (described in Section 7.12.6 on page 7-20).
- **NO** - Prevents the tape drive from automatically performing retries when it detects a corrected error while writing. Blocks containing corrected errors will remain on the tape.

7.12.23 Write CER (Address 17)

This parameter determines what the drive will report after the final write retry of a block. Note that if the drive is eventually able to write the data correctly, the first three choices prevent the drive from reporting that retries took place, while the last two choices force the drive to report that recovery action occurred. In any event, the drive will always report a Media Error if an operation ends in a hard error.

The following three choices prevent the drive from reporting the occurence of retries:

- **ERROR** - Use this choice to force the drive to report correctible write errors as Media Errors rather than Recoverable Errors. If retries were required but the final write retry was successful, the drive reports a Good Completion status.
- **LAST** - Use this choice if you want the drive to report the status of the last retry operation rather than the status of the block. If the block was successfully written, the drive reports a Good Completion status. If it resulted in a CER, the drive reports a Recoverable Error. Otherwise, the drive reports a Media Error.
- **NO** - Use this choice to force the drive to report a Good Completion status if a CER occurs.

The following two choices force the drive to report the occurrence of retries:

- **RETRY** - If the final retry was successful, the drive reports a Recoverable Error. If it resulted in a CER or HER, the drive reports a Media Error.

- **YES** - If the final retry was successful or resulted in a CER, the drive reports a Recoverable Error. Otherwise, the drive reports a Media Error.

PARAMETER SETTING	REPORTED STATUS IF LAST RETRY WAS SUCCESSFULL	REPORTED STATUS IF LAST RETRY RESULTED IN A CER
ERROR	Good Completion	Media Error
LAST	Good Completion	Recoverable Error
NO	Good Completion	Good Completion
RETRY	Recoverable Error	Media Error
YES	Recoverable Error	Recoverable Error

Table 7-5
Summary of the Rewrite CER Parameter

7.12.24 Busy (Address 18)

0 = NOT READY, 1 = BUSY; DEFAULT = 0

This parameter determines how the tape drive responds when it receives a tape motion command while the tape is rewinding, loading, or security erasing a tape.

- **NOT READY** - The tape drive sets the Check Condition bit in the Completion Status byte, and a sense key of Not Ready.
- **BUSY** - The tape drive sets the Busy bit in the Completion Status byte.

7.12.25 Read HER (Address 19)

0 = REPORT, 1 = IGNORE; DEFAULT = 0

The Read HER parameter allows you to inhibit the reporting of hard errors and to disable retries during read operations.

- **REPORT** - Report hard errors which occur during read operations as media errors.
- **IGNORE** - Do not report hard errors which occur during read operations and do not perform retries.

7.12.26 Write HER (Address 1A)

0 = REPORT, 1 = IGNORE; DEFAULT = 0

The Write HER parameter allows you to inhibit the reporting of hard errors and to disable retries during write operations.

- **REPORT** - Report hard errors which occur during write operations as media errors.
- **IGNORE** - Do not report hard errors which occur during write operations and do not perform retries.

7.12.27 Block Length (Address 1B)

0 - 99; DEFAULT = 2

The value of the Block Length parameter defines the default block length when in the fixed block mode. The displayed value is multiplied by 256 to get the actual block-length; therefore, the default value of 2 produces an actual block length of 512 bytes. Changing this parameter overrides the value sent by any previous Mode Select command. Also, if a Mode Select command is received after this parameter has been changed, the value in that Mode Select command overrides that set in the Block Length parameter.

BCD values from 0 through 99 are valid; other values will result in unpredictable action.

Setting a value of 0 sets the default to the variable block mode.

7.12.28 Address 1C - AF

These addresses are not currently used and the data in them is ignored.

7.12.29 Inquiry Data File (Address B0 - F5)

These addresses contain the Inquiry Data File and are referred to as the Inquiry Data File area. Information about the Inquiry Data File and how it can be changed or modified is given in Section 7.12.11 beginning on page 7-21. The data from D4 through F5 is valid only when the IBM data file is set.

7.12.30 Address F6 - FD

These addresses are not currently used and their contents are ignored.

7.12.31 Drive Model Number (Address FE)

The byte at RAM location FE represents the drive model number, and should be 00 to indicate model 1260S. Reloading the factory defaults (Mode 5) will not change the value of this parameter.

The contents of this address do not affect the contents of the Product ID field in the Inquiry Data File, and vice versa.

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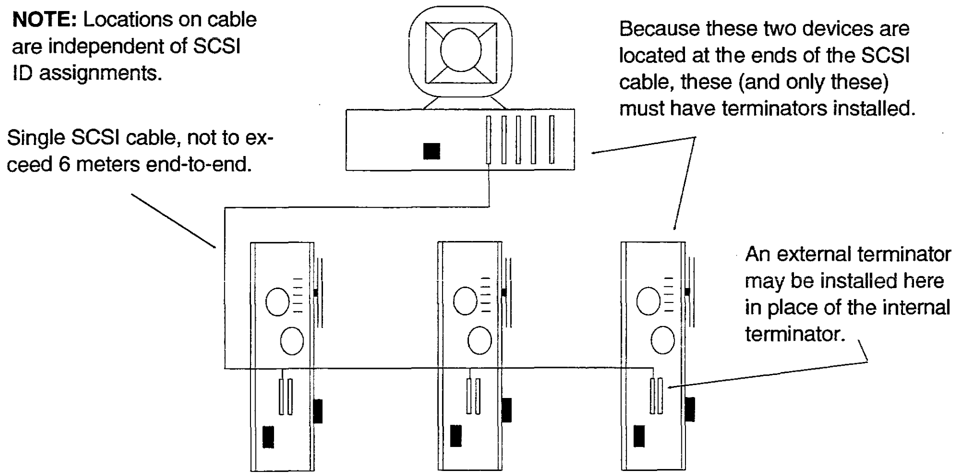


Figure 7-6
SCSI Cable Configuration A

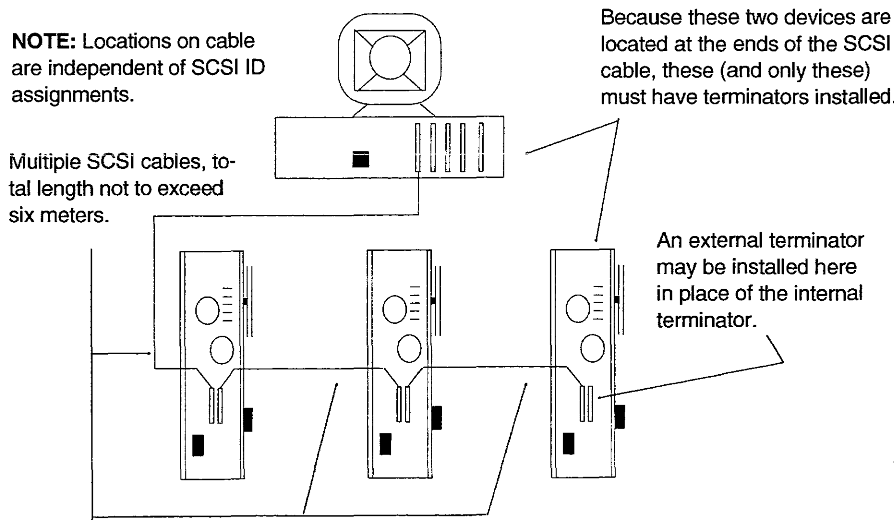


Figure 7-7
SCSI Cable Configuration B

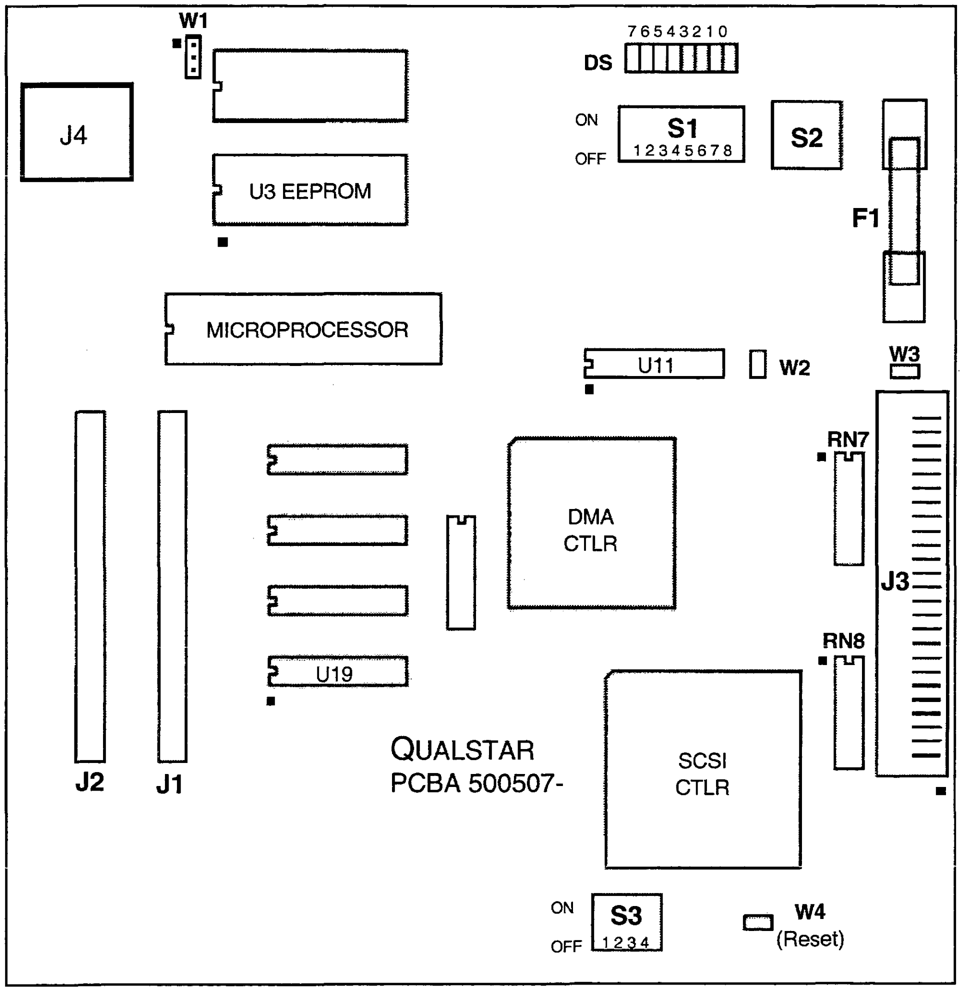


Figure 7-8
SCSI PCBA Layout

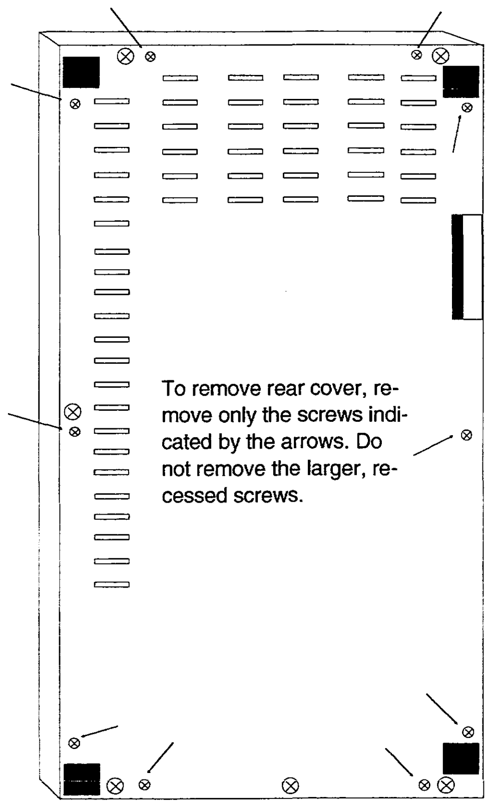


Figure 7-9
1260S Rear View

CHARACTER	ASCII VALUE	CHARACTER	ASCII VALUE	CHARACTER	ASCII VALUE
space	32	@	64	‘	96
!	33	A	65	a	97
"	34	B	66	b	98
#	35	C	67	c	99
$	36	D	68	d	100
%	37	E	69	e	101
&	38	F	70	f	102
’	39	G	71	g	103
(	40	H	72	h	104
)	41	I	73	i	105
*	42	J	74	j	106
+	43	K	75	k	107
,	44	L	76	l	108
-	45	M	77	m	109
.	46	N	78	n	110
/	47	O	79	o	111
0	48	P	80	p	123
1	49	Q	81	q	113
2	50	R	82	r	114
3	51	S	83	s	115
4	52	T	84	t	116
5	53	U	85	u	117
6	54	V	86	v	118
7	55	W	87	w	119
8	56	X	88	x	120
9	57	Y	89	y	121
:	58	Z	90	z	122
;	59	[	91	{	123
<	60	\	92	|	124
=	61	]	93	}	125
>	62	^	94	~	126
?	63	_	95		127

Table 7-6
ASCII Conversion Table

AC Power Configuration 8

DANGER! THE PROCEDURES IN THIS CHAPTER INVOLVE A POTENTIAL SHOCK HAZARD AND SHOULD ONLY BE CARRIED OUT BY QUALIFIED SERVICE PERSONNEL. HAZARDOUS VOLTAGES ARE PRESENT IN THE POWER SUPPLY. ALWAYS DISCONNECT THE AC LINE CORD BEFORE OPENING THE DRIVE.

8.1 Tools Required to Change AC Power Configuration

- You will need a #2 Phillips screwdriver and a small flatblade screwdriver.

8.2 Opening the Drive

1. Stand the drive up with the push buttons at the top.
2. Remove the six large Phillips screws from the outside edges of the rear panel. Refer to Figure 8-2 for cover screw locations.
3. Swing the chassis open and locate terminal block 1 cover next to the Write/Controller PCBA.

8.3 Closing the Drive

1. Before closing up the drive and returning it to service, ensure that S1 on the Write/Controller PCBA is off, and that the other switches are set to their original positions.
2. Close the chassis, making sure that the large ribbon cable between the Read Formatter PCBA and the Write/Controller PCBA is not pinched.
3. Reinstall the six Phillips screws in the rear.

8.4 Configuring the Drive for Available Power

1. Remove terminal block 1 cover and connect the taps as shown in the table in Figure 8-2. When moving the power wire from terminal 1 or 2, move only the larger wire. The smaller wires remain in place.
2. Reinstall the cover.
3. Install the correct fuse as shown in Figure 8-2. The fuse is located in the AC power receptacle and can be accessed by prying its cover outward with a small flatblade screwdriver. See Figure 8-1.

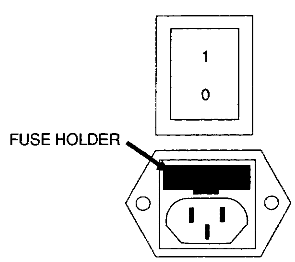
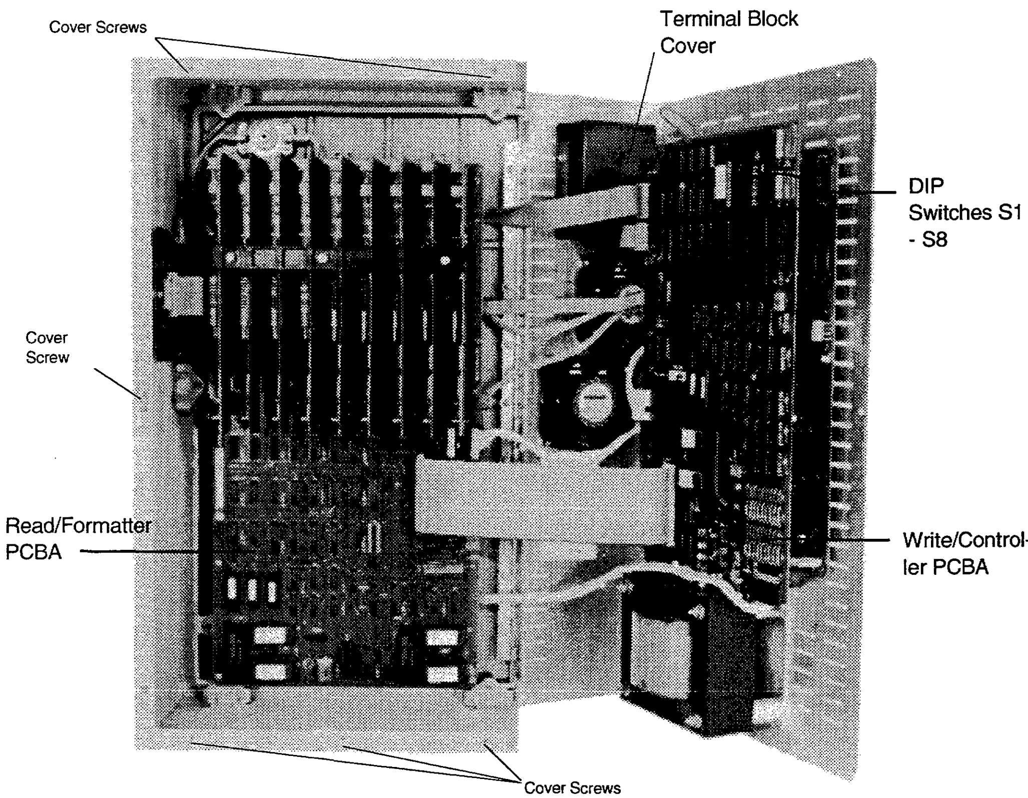


Figure 8-1
Fuseholder and Power Receptacle Location

4. Change the tag next to the nameplate to reflect the new line voltage, current and AC line fuse requirements.

TERMINAL BLOCK 1 (AC LINE VOLTAGE TAPS)		
VOLTAGE	JUMPERS	POWER TO:
100v	1-4, 3-5	2 & 5
120v	1-4, 3-5	1 & 5
220v	3-4	2 & 5
240v	3-4	1 & 5



POWER	FUSE RATING	QUALSTAR P/N
100 VAC	2.5 AMP SLO-BLO	626-0012-7
120 VAC	2.5 AMP SLO-BLO	626-0012-7
220 VAC	1.25 AMP SLO-BLO	626-0011-9
240 VAC	1.25 AMP SLO-BLO	626-0011-9

Figure 8-2
Terminal Block and Option Switch Locations

END OF DOCUMENT