

User's Manual for



Magnetic Tape Transport Models 700, 701, 1052, 1053, 1053B and 1054

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9621 Irondale Avenue
Chatsworth, CA 91311
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CAUTION

References contained in this manual to DIP switch settings, jumper locations, primary voltages and other options are for reference only. Access to the interior of this equipment is restricted to dealers and qualified service technicians, and only in accordance with published service manuals and bulletins.

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1. TAPE DRIVE INSTALLATION

1.1. INTRODUCTION

This manual will provide the user with installation instructions and techniques for operating the Qualstar model 701, 1052, 1053 and 1054 tape drives. In order for the tape drive to operate, it must be connected to a tape coupler card within the user's computer. Refer to the specific coupler manual for the installation and configuration of your tape coupler before proceeding with the tape drive installation.

The software provided with your coupler is used to control the transfer of data to and from the tape drive. There are a number of different coupler packages compatible with the tape drive. Qualstar offers a wide variety of options. The best choice of couplers depends upon your application and computer system.

This manual applies to model series 70X and 105X:

MODEL	DENSITY	REEL (inch)	INTERFACE
700	1600	7	Cipher/Pertec
701	1600/3200	7	Cipher/Pertec
1052	1600/3200	10.5	Cipher/Pertec
1053	1600/3200	10.5	Cipher/Pertec (extended chassis)
1053B	1600/3200	10.5	Buffered Interface
1054	1600/3200	10.5	SCSI Interface

The basic tape drive in each of the models covered by this manual is the same. This manual will provide the user with the techniques for operating the basic Qualstar tape drive. Differences between models will be noted where required. From the operators point of view, all models function in a similar manner.

1.2. TOOLS

A number 2 Phillips screwdriver is required to complete the installation of the drive.

1.3. UNPACKING

The tape drive is shipped in a specially designed double-walled carton with energy-absorbing end-caps. It is recommended that this packing be retained for the purpose of possible future transportation.

Any drive returned to Qualstar for service or warranty repair must be shipped in the original carton. If your carton has been lost or damaged, call or write to Qualstar and a new carton will be sent for a nominal charge.

The carton contains the following:

- Qualstar Tape Transport
- Power Cord Set
- User's Manual
- Interface Card (optional)
- Interface Cable(s) (optional)
- Tape Utilities Diskette (optional)
- Dust Cover (optional)

Remove the drive with its end-caps from the carton and place it on a table. 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.

1.4. INTERCONNECTION

If you have purchased the Macintosh™ SCSI Interface, you may disregard these cabling instructions and simply plug into one of the "D" connectors provided on the rear of the drive.

1.4.1. MODELS: 700, 701, 1052 and 1053 (Cipher®/Pertec® Interface)

The Cipher®/Pertec® interface is cabled from two 50-pin connectors located behind the small cover plate at the rear of the tape drive. If the interface cabling has not been installed, refer to your interface coupler's documentation for installation instructions.

Note: if your cables are of the flat ribbon type, there is usually a colored stripe to indicate the pin 1 end. Multi-colored cables use the brown wire to indicate pin 1.

There is a decal on the cable entry cover to assist you in determining the correct orientation of J1 and J2. With the drive resting on its rubber feet, face the rear of the drive and remove the cable entry cover (on the right) by removing two Phillips screws. Connect P2 or J2 to the top PCBA (printed circuit board assembly) nearest the hinge with pin 1 to the right (away from the fan inlet). Connect P1 or J1 to the bottom PCBA also with pin 1 to the right. Dress the cables straight down and replace the cable entry cover using the two Phillips screws.

Model 1053B requires the removal of the cover plate on the bottom on the tape drive and opening of the hinged door, also on the bottom. The corresponding edge connectors are located at the end of the CACHE PCBA.

1.4.2. MODEL 1054 (SCSI Interface)

Refer to the SCSI Interface Supplement for instructions.

1.4.3. MODEL 1053B (Buffered Interface)

Refer to the Buffered Interface Supplement instructions.

1.5. POWER-UP

DANGER

If your supply voltage differs from the voltage specified on the nameplate, do NOT apply power. Consult your dealer about voltage conversion.

After confirming you have the correct line voltage, make certain the power switch is off (press the bottom of the switch) before attaching the power cord to the grounded power receptacle.

1.6. ORIENTATION

The drive may be placed on its bottom, front or side. Regardless of placement, the fan inlet(s) and the ventilating slots must not be obstructed. It must be placed on a hard surface free of obstructions that would prevent cooling air from freely flowing into the fan inlet(s) or exiting from the ventilation slots. Do not place it on a typewriter pad or similar surface.

WARNING

The drive is cooled by one or more internal fans and requires an ample supply of air. The drive must not be mounted in a drawer, box or other enclosure without providing continuous supply of room-temperature air. If you are uncertain of your installation, please consult Qualstar. Restriction of air flow may cause overheating and internal damage. The cable entry cover must be installed to insure proper air circulation.

2. OPERATING INSTRUCTIONS

2.1. CONTROLS & INDICATORS

2.1.1. POWER SWITCH

CAUTION

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

The POWER switch is located at the rear of the drive next to the fuse holder. Press the upper side of the switch to apply power. Listen for the fan. If the fan does not operate and if all three LED indicators flash, the drive is not operable. Try turning the power off and back on again. If this fails, double check the power source, otherwise it will require servicing. After a normal power-up sequence, the FPT indicator should be illuminated.

2.1.2. LOAD SWITCH and INDICATOR

The LOAD switch is used to load, rewind and unload tapes. The LOAD indicator is illuminated when the tape is at the loadpoint which is near the Beginning Of Tape (BOT) marker. When tape is unloaded (no tension), the LOAD indicator will flash rapidly while a BOT marker is sensed, thus providing a means of testing the BOT sensing circuits.

2.1.3. FPT SWITCH and INDICATOR

The File Protect (FPT) switch prevents accidental writing on or erasure of a tape. The drive will not allow writing or erasing when the FPT indicator is illuminated.

NOTE

In many tape drives, a write enable ring on the tape reel is utilized to protect files. The presence or absence of this ring is ignored by the Qualstar models 700, 701, 1052, 1053, 1053B and 1054.

The drive automatically sets the file protected state when a tape is loaded. The user may change the file protected state only when the tape is loaded and at the loadpoint (the LOAD indicator is illuminated) by pressing the FPT switch. The FPT indicator serves as a power indicator when a tape is not loaded.

2.1.4. 3200 SWITCH and INDICATOR

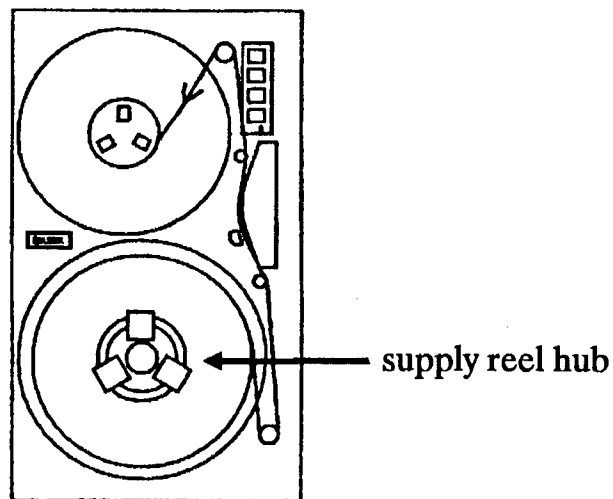
The data density for both writing and reading is indicated by the 3200 indicator. When illuminated, the 3200 BPI density has been selected. When extinguished, 1600 BPI is indicated. (The 3200 BPI function has been disabled on 1600 BPI only models.) The density may be selected by the user only when the tape is loaded and at the loadpoint by pressing the 3200 switch. The host computer may also select either density when a tape is loaded and at the loadpoint. When tape is unloaded (no tension), the 3200 indicator will flash rapidly while an EOT marker is sensed, thus providing a means of testing the EOT sensing circuits.

2.2. TAPE OPERATION

2.2.1. LOADING TAPE

To load a reel of tape, press the inside of the three reel clamps on the supply reel hub. Place the tape reel over the hub (label side out). Press the outside of all three reel clamps to lock the reel to the hub. Refer to the threading diagram below. Note that on models 700 and 701 the switches are in the upper left corner.

Thread the tape as indicated by the raised ridges on the surface of the casting. Wrap the end of the tape around the takeup hub such that a clockwise rotation winds the tape onto the hub. Rotate the hub clockwise until at least three layers of tape are on the takeup hub. Hold the supply reel and further rotate the takeup hub until all slack is removed.



With power applied, press the **LOAD** switch to initiate the load sequence. There will be a slight pause before the tape begins moving forward. It will then move forward past the **BOT** marker, whereupon it will stop then move in reverse until the **BOT** marker is ahead of the heads. The **LOAD** indicator will then illuminate indicating the tape is at the loadpoint. If you expect to write data onto the tape, see section 2.2.2.

If the tape fails to load properly because of an operator error, the drive normally terminates the load sequence and displays a load fault by flashing the LOAD indicator. Reload the tape properly and press the LOAD switch for 1 second to resume the load sequence.

Once the tape has stopped at the loadpoint and the LOAD indicator is illuminated, the drive automatically sends two signals to the interface; ONLINE and READY indicating that the drive is ready to operate.

It is sometimes necessary to reload a tape near the end of the tape, e.g. after a power interruption or running off the end of tape. Prior to loading, make certain the portion of tape with End Of Tape (EOT) marker (ideally 25 feet from the end) is wrapped on the supply reel and all slack is removed. Hold the FPT switch before pressing the LOAD switch. This will change the load operation to compensate for the large amount of tape on the takeup reel.

Here is a suggestion for loading tape which has come off the reel. Lick the end of the tape to help it stick to the reel. Lay it over the top of the reel and turn the reel counter-clockwise so that the tape winds onto the reel. Continue winding the tape onto the reel for five feet past the EOT marker. Hold the FPT switch before pressing the LOAD switch and hold both for one second to initiate the load sequence. The tape will load, then rewind to the loadpoint.

2.2.2. FILE PROTECTION

If you expect to write data onto the tape, press the FPT switch (File Protect) to extinguish the FPT indicator. The FPT status may only be changed when the tape is at the loadpoint. Repeated operation of the FPT switch will toggle the FPT status.

2.2.3. DATA DENSITIES

If you are going to read a previously written tape, you must set the data density to correspond to that of the tape. If you're not certain, start with the 1600 BPI density (most commonly used).

If you are going to write on a new tape or completely write over a previously written tape, you may choose which density to use. If the tape is to be used for interchange purposes, use the 1600 BPI density unless you are certain the receiving facility has 3200 BPI capability.

If you are going to append data to a tape which presently contains data, you must select the same density at which the tape was originally written.

2.2.4. UNLOADING TAPE

If the tape is stopped and not at the loadpoint, press the **LOAD** switch to rewind to the loadpoint.

When the tape is at the load point, press the **LOAD** switch to initiate an unload sequence. The tape will unwind until it leaves the takeup hub, whereupon it will automatically stop. Press the outside of the three supply reel clamps then remove the reel of tape.

2.2.5. RUNAWAY ESCAPE (OFF-LINE)

Occasionally it may be necessary to escape from a tape operation. This is preferably done at the host computer via methods specified by the user's application program. If the application program is unable to abort a read or write once in progress, then an Off-line operation is required. The tape drive may be forced Off-line by pressing the 3200 switch until the drive comes to a complete stop. This should terminate the application program.

If the 3200 switch is **not** held down until tape motion completely stops, the drive will reposition and resume executing the next command supplied by the application program. The drive will **not** go Off-line in this case.

If the application program fails to terminate by holding the 3200 switch, the operator may escape the operation by pressing and holding both the FPT and 3200 switches until the tape motion comes to a complete stop. The drive will then go Off-line for 5 seconds. This procedure will abruptly terminate the writing of any data block, possibly causing a loss of data.

2.3. CLEANING THE HEAD AND TAPE PATH

The head and tape path components should be cleaned regularly to maintain maximum data reliability. To clean the head, use a lint free cloth or cotton swab moistened in 91% isopropyl alcohol. Wipe the head carefully to remove all accumulated oxide and dirt. Do not use rough or abrasive cloths to clean the head. Only isopropyl alcohol or an approved head cleaning solution should be used. Other solvents may damage the head lamination adhesive.

The tape guides, tape rollers and tape cleaner should also be cleaned with a cloth or swab moistened with the head

cleaning solution. Do not spill any solution which could seep into the tape guide bearings; it may cause damage to their lubricant.

2.4. PRIMARY POWER CONNECTIONS

DANGER

Dangerous voltages are present in the power supply. Only qualified personnel should open the drive. Disconnect the primary AC line voltage before attempting to open the drive.

Nominal line voltages of 100V, 120V, 220V, and 240V at 50 or 60 Hz can be used as primary input power. Tape drives can be field converted only by a qualified technician. Instructions for conversion are in the Service Manual. If the drive has been field converted, there should be a tag next to the nameplate indicating the new line voltage, current and main fuse requirements.

2.4.1. VOLTAGE AND MAIN FUSES

<u>VOLTS</u>	<u>FUSE RATING</u>	<u>QUALSTAR</u>
<u>P/N</u>		
100V	2.0A SLOW BLOW ¹	626-0003-6
120V	2.0A SLOW BLOW ¹	626-0003-6
220V	1.0A SLOW BLOW ²	626-0004-4
240V	1.0A SLOW BLOW ²	626-0004-4

⁽¹⁾Model 1053B requires a 2.5A Slow Blow, part number 626-0007-7.

⁽²⁾Model 1053B requires a 1.25A Slow Blow, part number 626-0008-5.

2.5. ERROR INDICATIONS

Operating error conditions can arise from three possible sources: operator error, controller error, and drive faults. The tape drive detects these errors and stops operation until they are corrected (if possible) or acknowledged by the operator.

The table below summarizes the error conditions. Following the table, each error condition and possible remedies are described in detail. All error conditions are indicated by a combination of one or more flashing indicators.

INDICATOR LEDs FAULT/ERROR CONDITION

LOAD	Load Error
FPT	File Protect Error
3200	Read after Write Fault
LOAD + FPT	Start/Position Fault
LOAD + 3200	Write/Erase Power Fault
FPT + 3200	Write/Erase Power Fail
LOAD* + FPT*	Motion Fault
LOAD + FPT + 3200	Fan Failure Fault

* indicates alternately flashing

2.5.1. LOAD ERROR

Indicated by: flashing LOAD indicator

Caused by: improper threading, excessive slack or failure to properly clamp the tape reel.

Corrective action: correct the situation and press the LOAD switch for 1 second to resume the load sequence.

2.5.2. FILE PROTECT ERROR

Indicated by: flashing FPT indicator

Caused by: the coupler attempting to write on a file protected tape.

Corrective action: correct any problem with the coupler program or unprotect the tape if you plan to write on it, then press FPT switch for 1 second to resume operation.

2.5.3. READ AFTER WRITE FAULT

Indicated by: flashing 3200 indicator.

Caused by: failure to read the data being written. This could occur if the tape is incorrectly threaded or by an internal drive error.

Corrective action: press the 3200 switch to resume operation. The last data written will not be recoverable. There will probably be some operator action required to inform the program of this condition.

2.5.4. START/POSITION FAULT

Indicated by: flashing LOAD & FPT indicators

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

Corrective action: press the LOAD switch to return to the pre-loaded state, then perform a load operation. If the tape is past the load point, it will automatically reverse and return to the loadpoint. If this fault remains, check the primary line voltage.

2.5.5. WRITE/ERASE POWER ON FAULT

Indicated by: flashing LOAD & 3200 indicators

Caused by: Write or Erase power detected when it should be off. This is an internal drive fault.

Corrective action: press the LOAD switch for 1 second to initiate an unload sequence. You may reset the power and retry to operate the drive. If the fault remains, the drive will require servicing.

2.5.6. WRITE/ERASE POWER FAILURE /FAULT

Indicated by: flashing LOAD or FPT & 3200 indicators

Caused by: failure of Write or Erase power to energize during a write operation. This is an internal drive fault.

Corrective action: press the LOAD switch for 1 second to initiate an unload sequence. You may reset the power and retry to operate the drive. If the fault remains, the drive will require servicing.

2.5.7. MOTION FAULT

Indicated by: alternately flashing LOAD & FPT indicators.

Caused by: tape running off the end of the reel or by an internal drive fault. Running off the end of the reel can be attributed to one of three possible causes: 1)the coupler's failure to recognize an End of Tape signal, 2)a missing End of Tape marker on the tape or 3)failure of the drive to sense the EOT marker.

Corrective action: press the LOAD switch to return to the pre-loaded state, then perform a load operation. If the tape is past the load point, it will automatically reverse and return to the loadpoint. If the tape has come off the reel, here is a suggestion: lick the end of the tape to help it stick to the reel. Lay it over the top of the reel and turn the reel counter-clockwise so that the tape winds onto the reel. Continue winding the tape onto the reel for five feet past the EOT marker (ideally located 25 feet from the end of tape). Press the FPT and LOAD switches and hold for one second to initiate the load sequence. The tape will load, then rewind to the loadpoint.

2.5.8. FAN FAILURE FAULT

Indicated by: flashing LOAD & FPT & 3200 indicators

Caused by: failure of cooling fan.

Corrective action: press the LOAD switch for 1 second to initiate an unload sequence. You may reset the power and retry to operate the drive. If the fault remains, the drive will require servicing. Do not leave the power on if this fault persists, it may overheat the drive.

2.6. FIELD SELECTABLE OPTIONS

Several operating options 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.

To open the drive first turn off the power, then remove the cable entry cover. Stand the drive up vertically on its end (switches up) and remove the large Phillips screws along the periphery of the chassis bottom (2 screws on Model 70X on Model 105X). Swing the chassis open.

The WRITE/CONTROLLER PCBA will be on the right (mounted over the power supply chassis).

There is an 8 position DIP switch located in the upper right corner of the PCBA. The switches are numbered S1 through S8. When the slider is up, the switch is considered on.

CAUTION

Switches 5 through 8 control the operation of the reel motors. They are set at the factory and should never be changed in the field.

There are two groups of jumpers: W1-W8 at the bottom of the PCBA and W9-W16 in the middle of the PCBA. A jumper is considered installed when a shorting bar is installed at the specified location.

2.6.1. READ-WHILE-WRITE THRESHOLD

Most tape drives use a higher read threshold during write operations to assure that the written data has adequate amplitude to make it readable years later, after natural degradation has reduced the recorded signal amplitudes. Qualstar tape drives use a relatively high read threshold during writing to assure maximum data integrity. This higher threshold may cause frequent write errors on worn or marginal media. This is quite normal and is automatically corrected by the tape drive program running in the host computer. It simply erases the marginal portion of the tape and re-writes the data block downstream from the location of the media defect. The only detrimental effects of this are slower writing times and less efficient tape usage.

In this case Qualstar recommends replacing the tape with a new one, however some users may choose to give up some of this extra safety margin for fewer "write retries". This would speed up the writing process on marginal tape.

There is a lower read-while-write threshold option located on the Write PCBA. Turn DIP switch 2 to the ON position to select the lower read-while-write threshold. Doing so in no way affects normal read thresholds.

- Lower Threshold = S2 On
- Normal Threshold = S2 Off

2.6.2. WRITE INTERBLOCK GAP EXTENSION

The nominal Interblock Gap (IBG) is 0.6 inches. This distance can be extended during writing to allow the host computer more time to fetch the next block. Extending the IBG reduces the amount of data which will fit on a tape but keeps the drive streaming which greatly increases the system throughput. The maximum IBG distance is specified by two DIP switches.

If the IBG is extended and the host computer does not issue another write command within the specified distance, the drive will reposition the tape and stop. The next IBG will then be the nominal 0.6 inches. If, on the other hand, the host computer issues the write command within the specified distance, the drive will immediately start writing.

The 1053B and 1054 models do not require modification of the IBG for better system throughput. They use 256K or 64K bytes of memory (respectively) to buffer data transfers between the host computer and the tape drive.

There are four possible write IBG settings selected by switches S3 and S4:

<u>S3</u>	<u>S4</u>	<u>max. IBG distance</u>
Off	Off	0.6 inches
Off	On	1.8 inches
On	Off	5.4 inches
On	On	16.2 inches

The drive is shipped with the 0.6 inch setting. These switch settings do not affect the maximum read IBG which is 25 feet.

Caution should be exercised when extending the write IBG as it can affect the maximum amount of data that will fit onto a tape. Generally speaking, use the smallest setting which keeps the drive streaming during writing.

2.6.3. INTERNAL/EXTERNAL PARITY GENERATION

The nine-track tape format specifies 8 data tracks (supplied by the host) and a parity track. The parity data can be supplied by either the drive (default setting) or the host computer.

The advantage of generating the parity data externally (at the host computer) is that any errors which occur in the write data line-drivers, cables or line-receivers will be detected during writing. With internal parity generation, the parity will be correct regardless of the incoming data. Internal parity generation is provided as many host coupler PCBAs do not generate write parity.

To select external parity generation, move the jumper from W2 to W3. These jumpers are located at the bottom of the WRITE/CONTROLLER PCBA. To select internal parity generation, move the jumper from W3 to W2.

- External Parity = jumper at W3
- Internal Parity = jumper at W2

2.6.4. FORMATTER ADDRESS

The drive's formatter can respond to any one of eight addresses (0 through 7). As shipped, the drive responds to address 0. To change the address move the jumper on W9 to a position from W10 through W16. The drive address is equal to the W number minus 9. Only one jumper is allowed on W9 to W16 which are located on the WRITE/CONTROLLER near the left center of the PCBA.

2.6.5. CONTROL OF STATUS SIGNALS

Four of the drive status signals can be enabled by two possible conditions. These signals are:

- IRWD - drive is rewinding
- IFPT - drive is File Protected
- IONL - drive is online
- IEARLY (ISPEED) - early EOT indicator

The signals are normally enabled (as shipped) when the drive is selected, regardless of the loaded or rewinding states. The signals may be enabled whenever the drive is selected, tape is loaded and it is not rewinding by moving the jumper from W5 to W6.

- ENABLED when selected, loaded and not rewinding = W6
- ENABLED when selected only = W5

2.6.6. STANDARD SWITCH AND JUMPER SETTINGS

DIP Switch:

S1 = OFF
S2 = OFF
S3 = OFF
S4 = OFF
S5 = OFF
S6 = OFF
S7 = OFF
S8 = OFF

Jumpers:

W1 = omitted
W2 = installed
W3 = omitted
W4 = omitted
W5 = installed
W6 = omitted
W7 = omitted
W8 = omitted

W9 through W16 = installed at W9 only

3. DESCRIPTION AND SPECIFICATIONS

3.1. DESCRIPTION

The Model 700, 701, 1052, 1053, 1053B and 1054 Magnetic Tape Transports write and read digital data on 9-track magnetic tape at 1600 bits per inch (BPI) in the Phase Encoded (IBM/ANSI standard) format. In addition, most models also operate at the industry standard 3200 bits per inch (double-density). The data transfer rate is maintained constant by switching tape speeds between the two densities; 50 inches per second (IPS) for 1600 BPI and 25 IPS for 3200 BPI.

Model 700 and any other models with a /1600 in the model number operate only at 1600 BPI. All 3200 BPI functions are disabled and the user may ignore any references to 3200 BPI operation found in this manual.

The tape drives operate in the streaming mode for greater speed and efficiency. They simultaneously read and verify data while it is being written via a separate read head located downstream from the erase and write heads. This provides for maximum data reliability. All models contain an embedded formatter which uses an industry-standard Pertec[®] Formatted Interface. Interface couplers are available to adapt this interface to nearly any modern mini or microcomputer.

The 70X Series has a maximum reel size capacity of 7 inches while the 105X Series can accept any reel size up to 10.5 inches. Models 700 and 701 provide the most cost effective solution in the smallest size for customers using

7 inch reels. Model 1052 provides similar economies and accommodates up to 10.5 inch reels.

Models 1053, 1053B and 1054 provide special features and are slightly larger in size than the model 1052. The Model 1054 is designed for use with the SCSI (Small Computer Systems Interface) and contains an embedded SCSI. The Model 1053 is the same as a 1054 without the SCSI. The Model 1053B includes a Buffer PCBA providing 256K bytes of buffer memory.

3.2. SPECIFICATIONS

3.2.1. READ/WRITE MODES

Half Inch 9 track format:

- 1600 BPI phase encoded, ANSI/IBM compatible
- 3200 BPI phase encoded, Double Density
- Data Transfer Rate: 80Kbytes per second

3.2.2. INTERFACES

- Cipher[®]/Pertec[®] Interface (Standard on all models)
- Buffered Cipher[®]/Pertec[®] Interface, optional model 1053B
- SCSI Interface, optional model 1054

3.2.3. TAPE SPEEDS (nominal)

SERIES 70X and 105X:

- Operating Speed at 3200 BPI: 25 IPS
- Operating Speed at 1600 BPI: 50 IPS
- Rewind Speed: 100 IPS
- Speed Variation: +/-3 % max. (25/50 IPS)

3.2.4. START/STOP TIMING

Models:	<u>70X</u>	<u>105X</u>	
at 25 IPS -	0.23	0.25	seconds nominal
at 50 IPS -	0.45	0.50	seconds nominal

3.2.5. TIMING AND WRITE INTER BLOCK GAPS

Models:	<u>70X</u>	<u>105X</u>	
Position Time ¹	0.50	0.65	seconds max.
Reposition Time ²	1.00	1.50	seconds max.
Read Reconstruct Time ³	8.60	8.60	milliseconds max.

Write Maximum IBG's and Reinject Times:

0.6" IBG ⁴	6	milliseconds max.
1.8" IBG ⁴	30	milliseconds max.
5.4" IBG ⁴	102	milliseconds max.
16.2" IBG ⁴	318	milliseconds max.
Extended IBG ⁵	2	seconds max.

NOTES:

(1) The nominal time from read/write command to transfer of data at 1600 BPI.

(2) The nominal time from end of data to completion of tape repositioning cycle for a 2K byte record at 1600 BPI.

(3) The maximum time (at 1600 BPI/50 IPS) which can elapse between the end of a read operation (IDBY going false) and the issuance of a new read command (IGO pulse) without entering into a reposition cycle. The time is double for 3200 BPI.

(4) The nominal IBG is 0.6". This distance can be extended to afford additional time for the computer to fetch the next record by internal switch settings. The minimum IBG will be 0.6" and the maximum allowed IBG will be determined by the switch setting. The actual IBG is determined by the coupler's response time from IDBY going false to the issuance of the next write command (IGO pulse). The indicated times are the maximum time (at 1600 BPI) which can elapse between the end of a write operation (IDBY going false) and the issuance of a new write command (IGO pulse) without entering into a reposition cycle. The time is double for 3200 BPI.

(5) The IBG may be extended by holding the IGO signal true up to a maximum of 100 inches. The indicated time is at 1600 BPI. The time is doubles for 3200 BPI.

3.2.6. HEAD/MEDIA HANDLING

- Head Type: 9 track, read-while-write with D.C. erase
- Tape Cleaner: ceramic blade type
- Tape Tension: 8 ounces nominal (models 1053, 1054), 7 ounces nominal (models 701 and 1052)

3.2.7. PHYSICAL CHARACTERISTICS

Inches and pounds:

<u>MODEL</u>	<u>Width</u>	<u>Height</u>	<u>Depth</u>	<u>Weight</u>
700	8.75	15.00	6.75	21
701	8.75	15.00	6.75	21
1052	11.75	20.50	6.75	27
1053	12.25	21.50	8.25	31
1053B	12.25	21.50	8.25	31
1054	12.25	21.50	8.25	31

Centimeters and kilograms:

<u>MODEL</u>	<u>Width</u>	<u>Height</u>	<u>Depth</u>	<u>Weight</u>
700	22.2	38.1	17.1	9.5
701	22.2	38.1	17.1	9.5
1052	29.8	52.1	17.1	12.2
1053	31.1	54.6	20.9	14.1
1053B	31.1	54.6	20.9	14.1
1054	31.1	54.6	20.9	14.1

3.2.8. POWER REQUIREMENTS

- Voltage: 100, 120, 220, 240 VAC, +5% / -10%
- Frequency: 47 to 62 Hertz

Wattage:

<u>MODEL</u>	<u>Minimum</u>	<u>Average</u>	<u>Peak</u>
700	72	100	150
701	72	100	150
1052	72	110	195
1053	88	126	211
1053B	88	126	211
1054	88	126	211

3.2.9. OPERATING ENVIRONMENT

- Temperature: 40 to 110 degrees F (excluding media) 5 to 40 degrees C
- Humidity: 20% to 85% (non-condensing)
- Altitude: 0 to 8,000 feet

NOTE

Qualstar reserves the right to modify the product design or specifications without notice.

3.2.10. TAPE REQUIREMENTS

- Computer Grade, .500 inch, ANSI X3.40-1983

Standard lengths:

<u>Length</u> (feet)	<u>Reel Dia.</u> (inch)	<u>Thickness</u> (mils)
300	6.0	1.5
600	7.0	1.5
1200	8.5	1.5
2400	10.5	1.5
3600	10.5	1.0

The Qualstar Tape Transport Series 70X and 105X will work properly using any tape meeting the requirements of ANSI x3.40-1983 and certified for 3200 BPI or higher. Tape testing has been performed by Qualstar on a number of brands of tape. The results revealed that not all tapes are created equal. While all performed adequately, one was outstanding. We highly recommend Scotch 700 manufactured by the 3M Company. Its mechanical properties make for superior tape tracking and packing on the reels. Since this tape is only slightly more expensive than the standard grades, we strongly recommend spending the extra pennies.

Defective tapes, tapes that have been damaged or subjected to heavy wear, may not pack properly on the takeup hub and should not be used.

Tapes frequently wear out near the BOT marker as this is the area of greatest use. The presence of the BOT marker sometimes causes data errors to occur within the first few feet of tape. Tapes which are worn near the beginning can receive new life by cutting off the first 25 to 50 feet (or so) and installing a new BOT reflective marker sixteen feet from the end of the tape. The marker should be on the outside surface of the tape, at the labelled edge.

3.2.11. DATA CAPACITY

3.2.11.1 UNFORMATTED CAPACITY

<u>Density</u>	LENGTH(ft.)				
	300	600	200	2400	3600
1600 BPI	5.8	11.5	23.1	46.1	69.2
3200 BPI	11.5	23.0	46.1	92.2	138.4

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
- Data Density
- Amount of Data per Block
- Inter-Block-Gap
- Number of Filemarks

The Qualstar Series 70X and 105X provide for data densities of 1600 or 3200 BPI. If data were written in one continuous block from the BOT to EOT tabs, then there would be twice as much data capacity at the 3200 BPI density than at 1600 BPI. However, data is not written in one continuous block, but is instead written in many shorter blocks. The distance between these blocks is the Interblock Gap (IBG) which can vary from 0.6 inches to 25 feet. This gap is unrecorded and subtracts from the tape capacity.

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. In addition, each data block contains a Preamble and a Postamble (required to decode

the data) and adds the equivalent of 41 characters each or 82 characters per block.

The length of tape required for any 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.

$$\text{Inches/Block} = (\text{Characters} + 82)/\text{BPI} + \text{IBG}$$

Filemarks are a special block which separate the data files on the tape. They are equivalent in length to a 3.5 inch data record. There is still an IBG distance to be added between them and following data blocks.

The tables below define capacities in megabytes for tapes with all blocks of identical sizes, no filemarks, and an IBG length of 0.62 inches.

**3.2.11.2 FORMATTED CAPACITY @ 1600 BPI
(megabytes)**

<u>Block Size</u>	<u>LENGTH(ft.)</u>				
	<u>300</u>	<u>600</u>	<u>1200</u>	<u>2400</u>	<u>3600</u>
80	.4	.8	1.6	3.2	4.8
128	.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	45.3
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

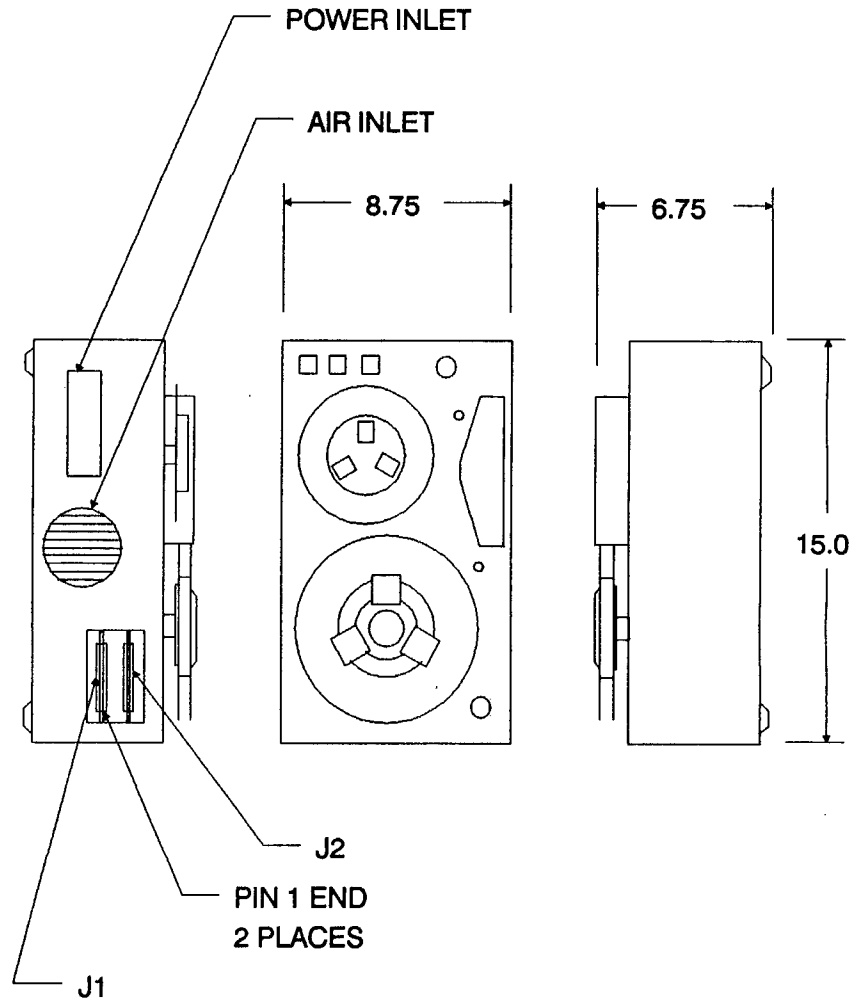
3.2.11.3 FORMATTED @ 3200 BPI (megabytes)

<u>Block Size</u>	<u>LENGTH(ft.)</u>				
	<u>300</u>	<u>600</u>	<u>1200</u>	<u>2400</u>	<u>3600</u>
80	.4	.9	1.7	3.4	5.1
128	.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	45.9	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

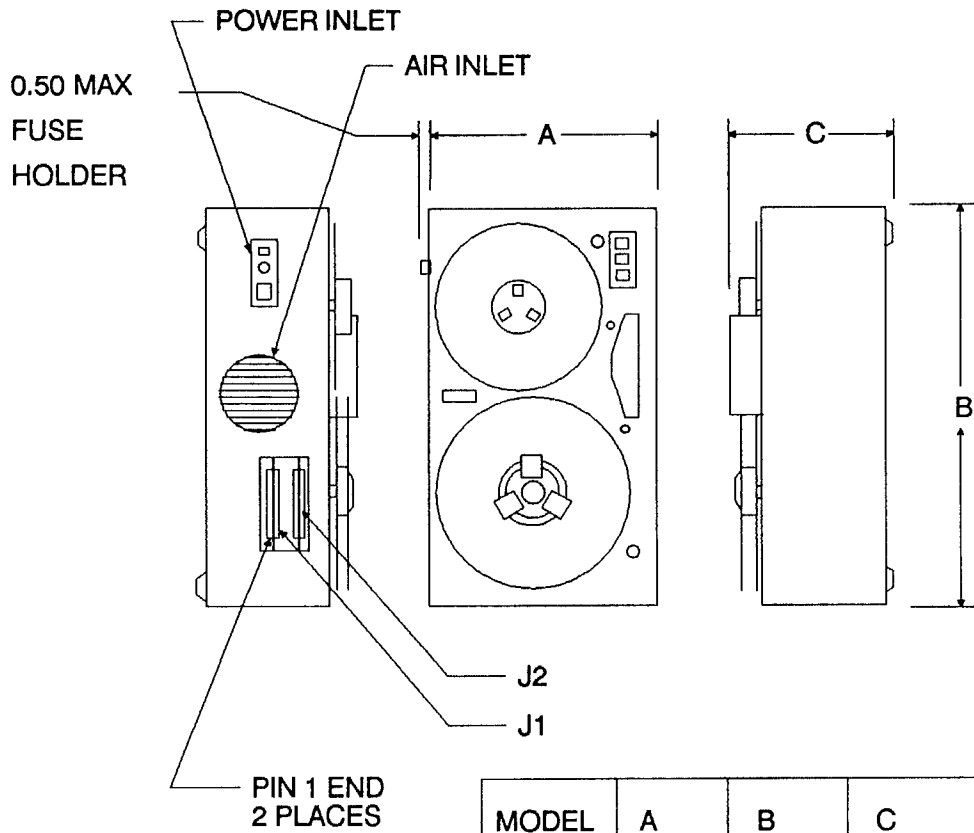
NOTES:

1. All data is based upon a 0.62 inch Interblock Gap.
2. The 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).

3.2.12. SERIES 70X OUTLINE DRAWING



3.2.13. SERIES 105X OUTLINE DRAWING



MODEL	A	B	C
1052	11.75	20.50	6.75
1053	12.25	21.50	8.25
1054	12.25	21.50	8.25

TOLERANCES UNLESS OTHERWISE SPECIFIED
 .XX +/- .090