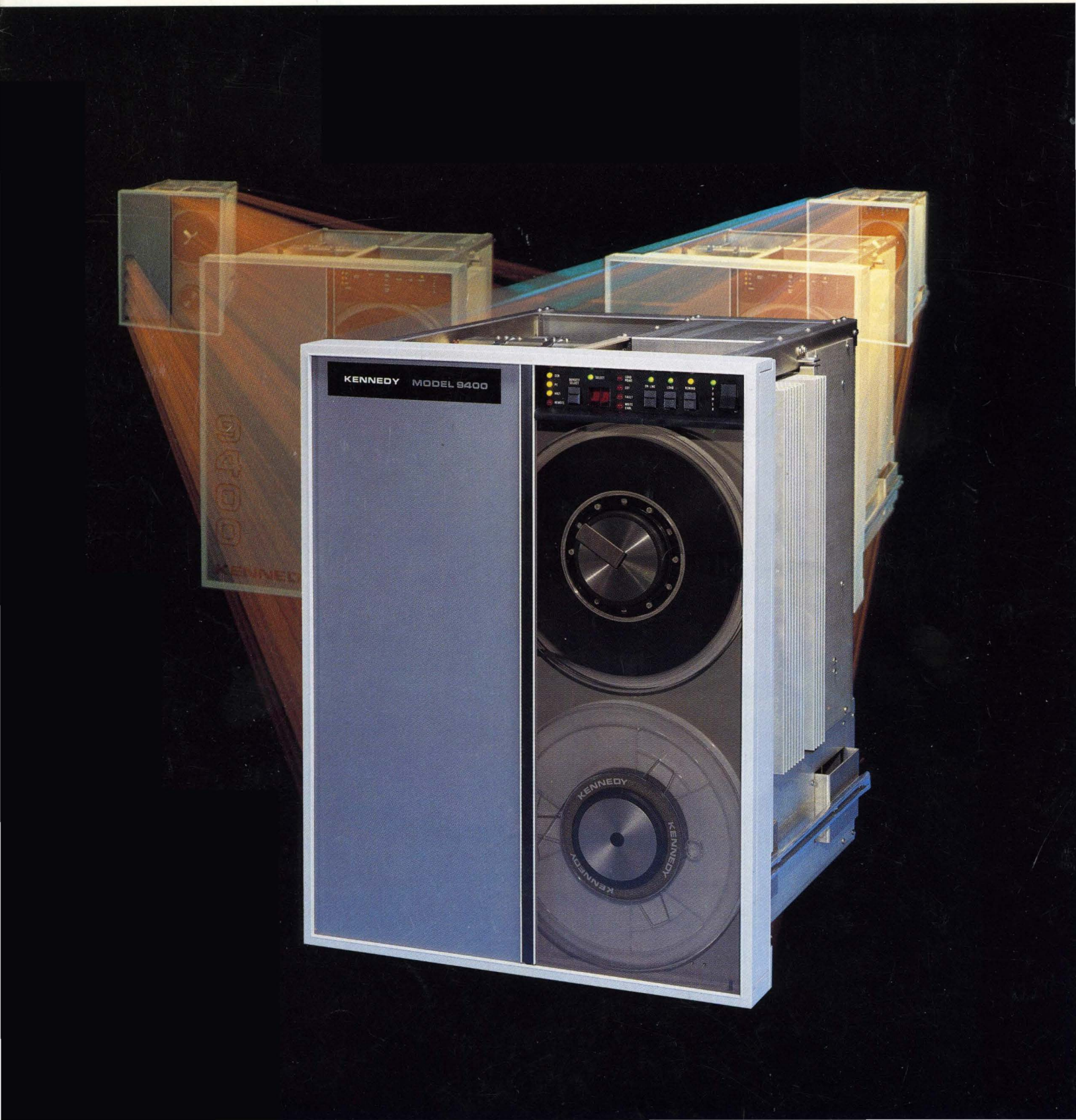
KENNEDY
An Allegheny International Company

Model 9400 GCR Tri-Density Tape System



Kennedy 9400 — the first tape system to offer low-cost tri-density with large system performance.

The Model 9400 is an extremely cost efficient tape system providing the system integrator the ability to store up to 180 MBytes of data in a GCR format while maintaining compatibility with PE and NRZI recorded tapes. (Fig. 1). Utilizing the proven tape mechanics of the Model 9100, (over 15,000 units in the field) and advanced tape technology. The 9400 is designed to achieve the upper limits of data reliability, at a reasonable cost.

Model 9400 provides up to eight times the capacity of a traditional tape transport. This translates to less cost for not only tape, but less media storage space and reduced operator time. (Fig. 2).

Model 9400 allows the fastest access time of any low-cost GCR device available. Model 9400, at 45 ips GCR, starts and stops at 2.2 milliseconds, and 75 ips PE/NRZI at 3.7 milliseconds. With it's sophisticated servo, Model 9400 maintains 0.3″ interblock gaps, providing significantly greater storage capacity than drives utilizing extended gaps, while meeting both ANSI and IBM standards. (Fig. 3).

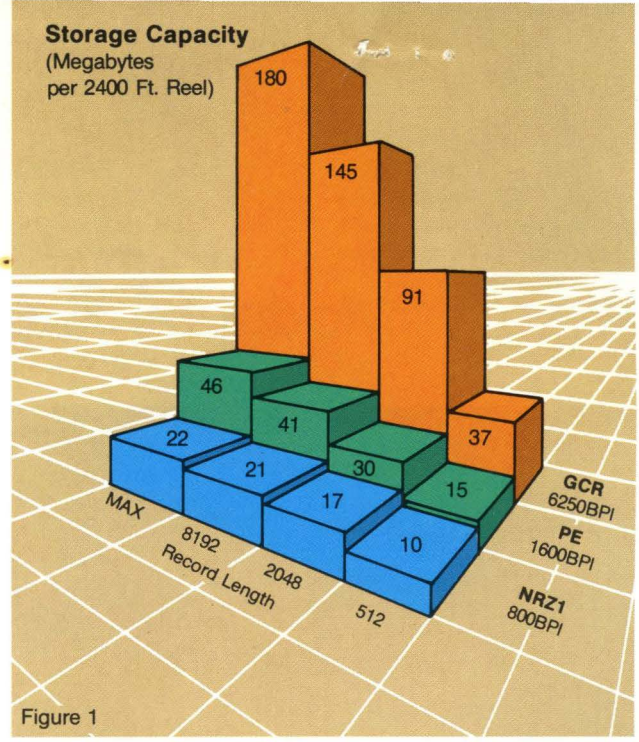


Figure 1

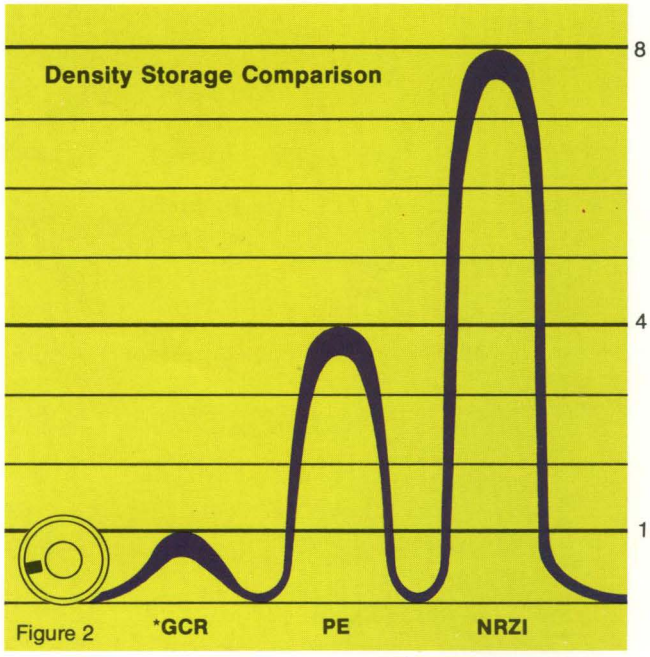


Figure 2

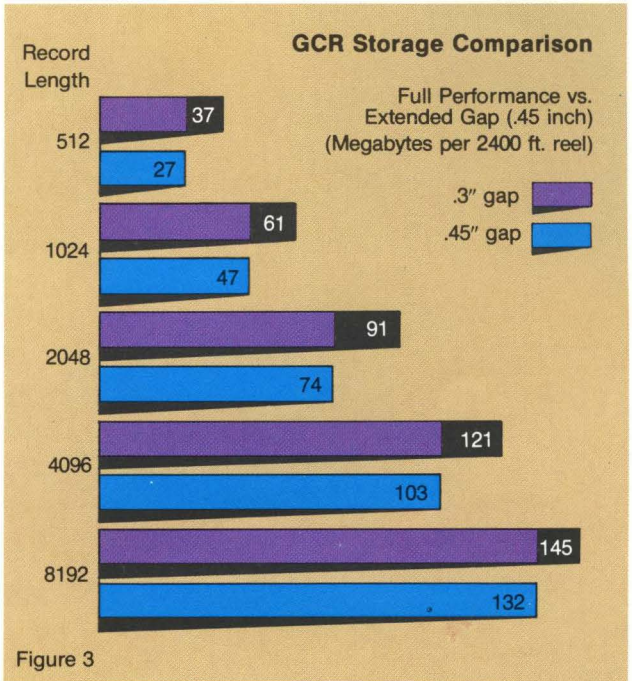


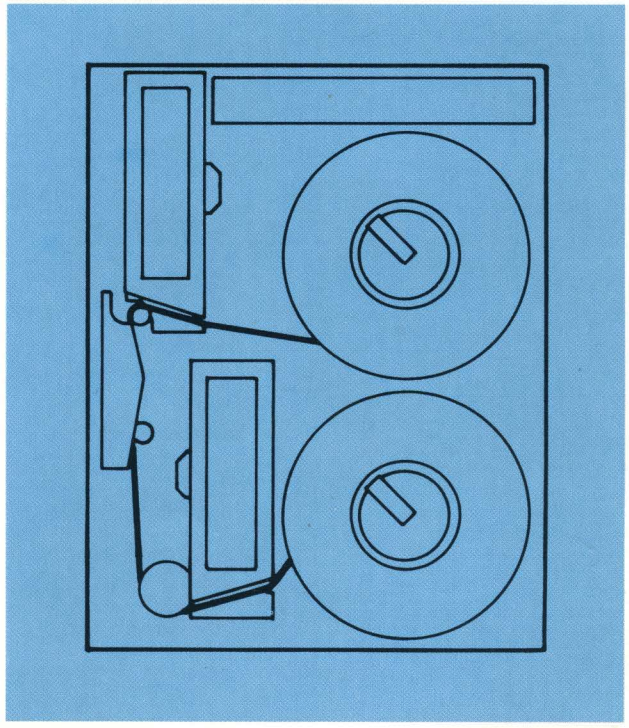
Figure 3

A Totally Modular Design

Model 9400 shown here in its service positions, was designed for ease of service, and easy access has been provided to all components.

Positive Load Features

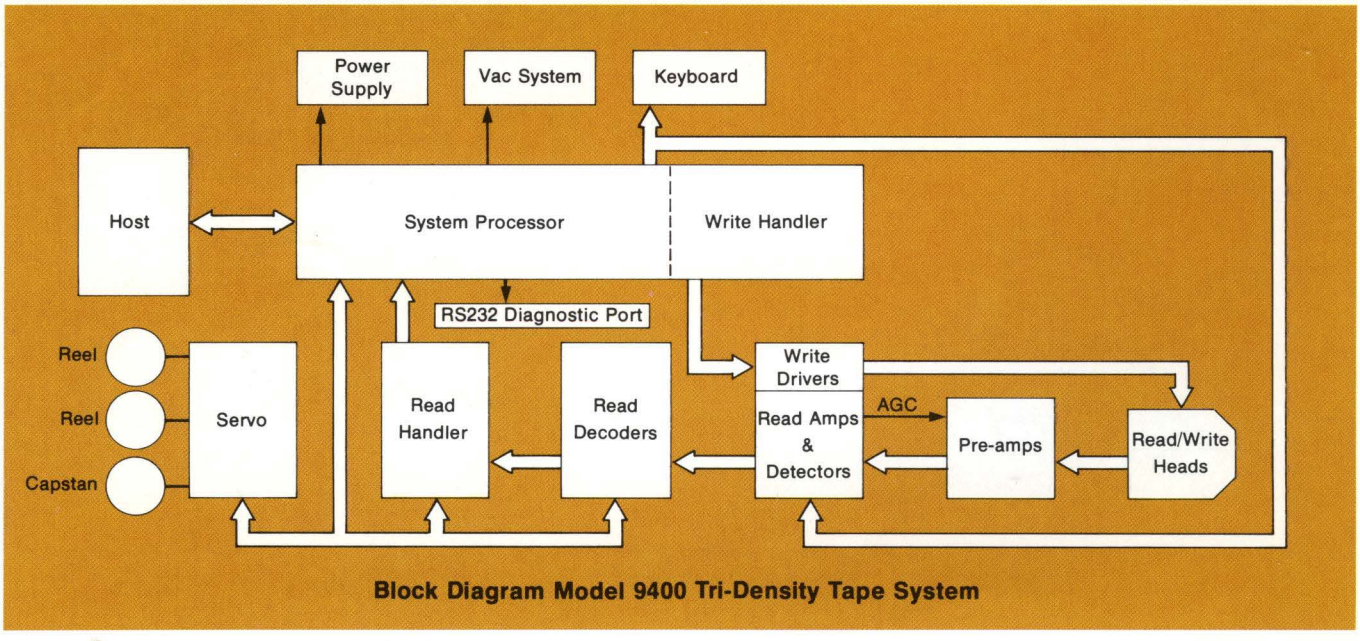
Model 9400's simplified tape path provides fast, easy loading, high reliability and gentle tape care. Kennedy, a pioneer in tape vacuum technology, has used its experience to design chambers which ensure a clean tape path environment, a positive pressure in the door chamber, and a vacuum assisted, double bladed sapphire type cleaner system. Longer tape life, higher data rates, greater data reliability and lower error rates are a direct result of this feature. Having been originally designed for use in rugged geophysical applications, Model 9400 has met all requirements for operating and protecting tape, essential for GCR operation.



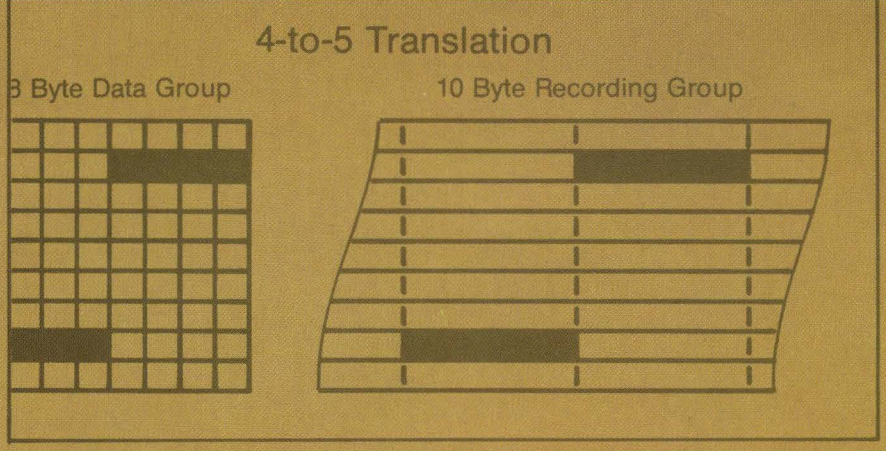
Model 9400 System

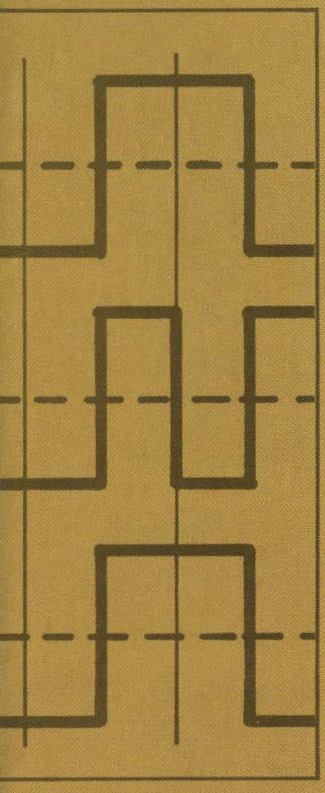
Model 9400 employes four microprocessors. The principal processor which supervises the system is an 8088, which is used in many of today's popular mini-computers. As seen in Figure 1, all functions are controlled through a microprocessor bus. Even the speed of the drive is held within ±.5 ips. This highly sophisticated servo holds a true GCR (.3″) interrecord gap allowing for maximum data capacity.

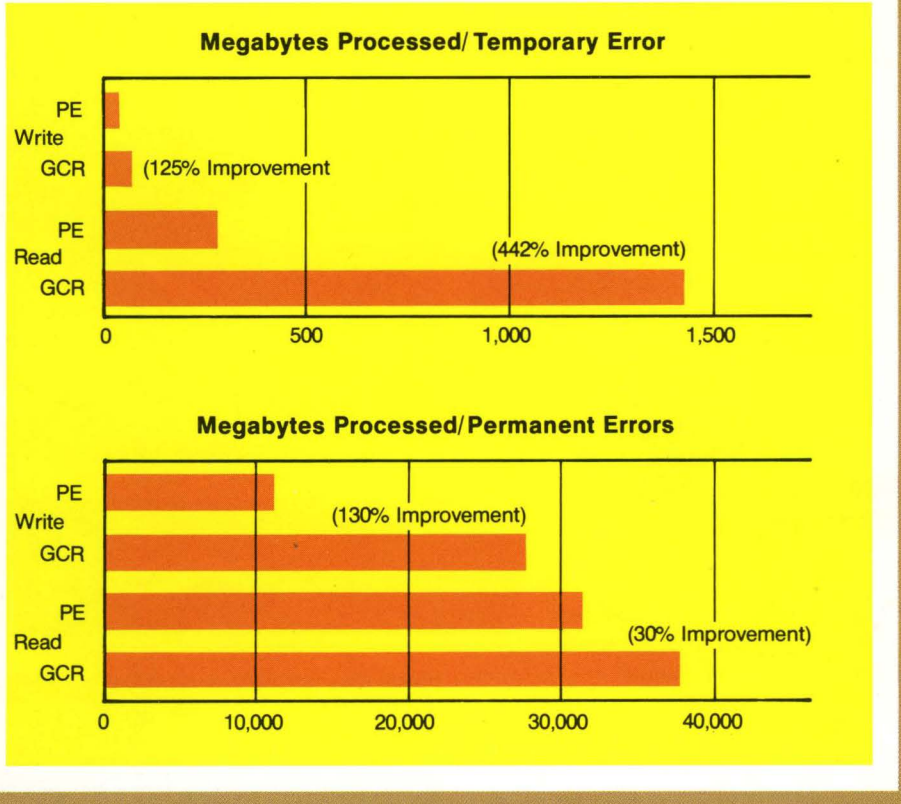
Under processor control, adjustments are kept to a minimum. Designed to a no-maintenance philosophy, Model 9400 ensures a low "total-ownership" cost.

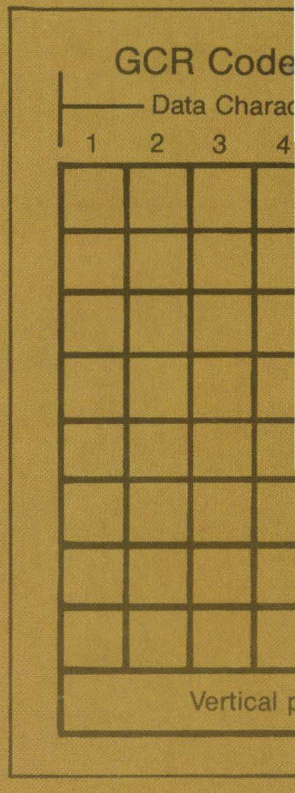


Block Diagram Model 9400 Tri-Density Tape System









180 MBytes of very reliable data

Reliable — GCR is a very powerful recording code which provides 2-track error correction, while on-the-fly, as opposed to single track error correction of phase-encoded drives. Model 9400 utilizes state-of-the-art bit slice processor technology, rather than the older repackaged VLSI designs, resulting in even better error correction and higher reliability, than previous traditional codes. (See fig. above).

Other features include:

- **Automatic Density Section** (Read mode only). When the tape is loaded, the drive will read ID bursts and automatically select the density at which the tape was written.
- **Automatic Gain Contrtol (AGC).** The 9400 automatically adjusts system parameters to compensate for variations in media quality, insuring optimal conditions for every tape read.
- **Status RAM** is powered by a lithium battery in order to hold the status of the drive in event of power failure. This will also store such information as single-track errors and the number of hours that the drive has been operating.
- **FIFO Buffer** Built in data buffering allows the tape system to operate at reduced transfer rate thereby providing compatibility with today's interfaces.
- **True Start/Stop** capability with on-the-fly operation and full edit capability gives the Model 9400 a wide variety of applications.
- **Infrared Sensors** eliminate false BOT/EOT indications.
- **Full Performance** capability with today's operating systems.

Diagnostics

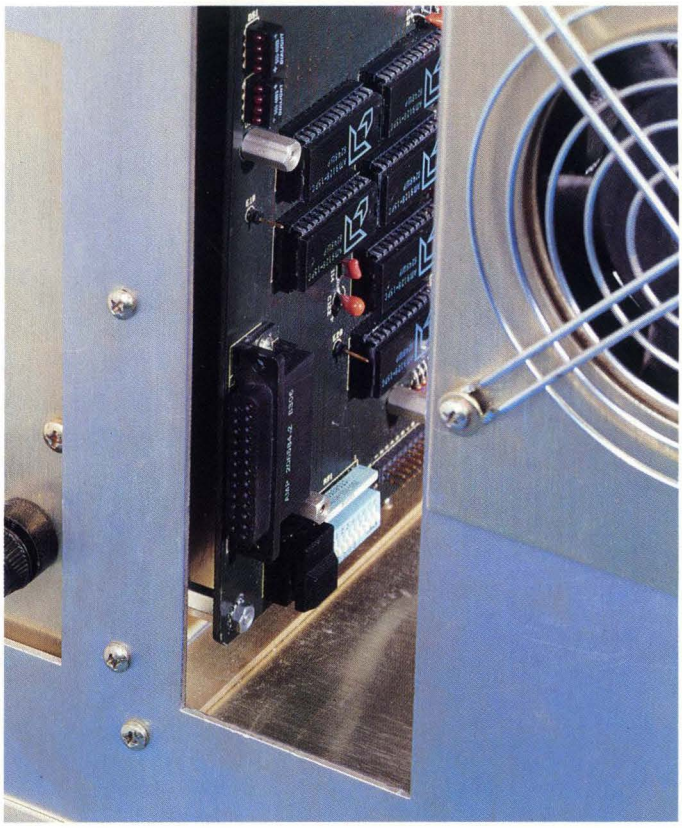
More and more powerful diagnostics
Model 9400 has been designed with the widest array of diagnostics — more than any other transport. With its RS232 Port, the system may be fully exercised and tested with either a standard terminal or modem/terminal for remote testing. The diagnostics are menu driven and all the electronics required reside in the 9400 system, eliminating the need for a special test box.

Sanity Check
On power-up or reset, the 9400 system executes extensive verification of each individual sub system. A "fault" LED is provided on the front panel and in conjunction a two digital display would indicate a faulty module.

On-Line Diagnostics
To support advanced on-line diagnostics, host commands may be sent to retrieve cumulative error information on each data channel. Results from internal test routines may be saved in the system until requested by the host, freeing it from continuously polling the system.

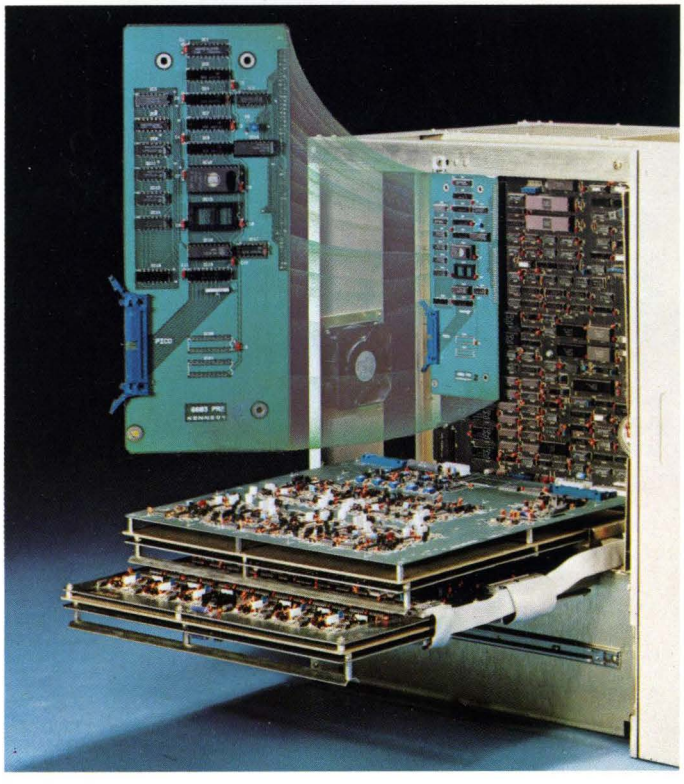
Front Panel Diagnostics
When off-line, five switches on the front panel may be used to test and align the servo system and tape path. These dual function keys may also be used to access the same variety of tests that can be accessed through the RS232 port. Shifting into diagnostics mode, a test number will be displayed in a 2-digit display. This will be indicated by a fault LED which allows the operator to both ascertain which board is bad, and eliminate expensive service calls.

Signature Analysis
As with all new Kennedy products, signature analysis capability is built into the system for localizing faulty components and signal paths. This method of troubleshooting may be used by qualified repair personnel to minimize down time.



Multiple Interface

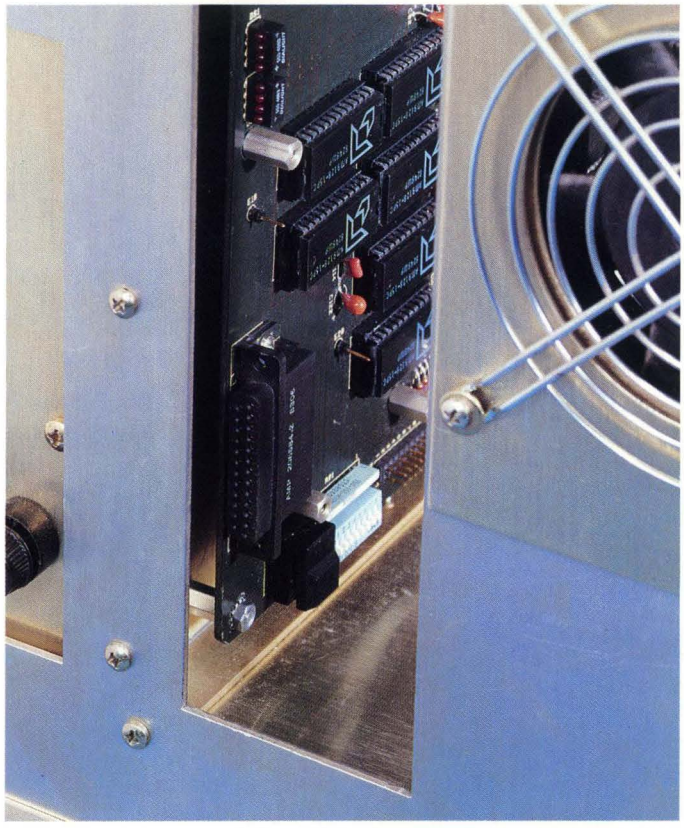
The modular design of the 9400 provides for a variety of interface options, which are field interchangeable by the replacement of a single interface card. Interfaces available are the industry standard or Pertec formulated. The PICO bus is the Kennedy family I/O and is offered on all Kennedy tape and disk products. Also available are STC and TELEX, which emulate traditional GCR systems. These formatted interfaces allow connection to a wide variety of computer systems through inexpensive tape couplers.



Specifications

Performance Specifications	
Data Density	800 BPI 1600 BPI 6250 BPI
Format	NRZI ANSI and IBM compatible PE GCR
Tape Speed	45 ips GCR 75 ips NRZI/PE
Rewind Time	500 ips max. 350 ips nominal 1 min 10 sec for 2400′ tape
Gap Length	GCR 0.3″ (RD and WRT) NRZI/PE 0.6″ (RD and WRT)
Access Time	GCR 2.2 ms @ 45 ips NRZI/PE 3.7 ms @ 75 ips
Instantaneous Speed Variation	±3%
Long Term Speed Variation	±1%
Data Transfer Rate **(GCR rates switch selectable)**	GCR 312.5 KB sec burst 281 KBS average 205 KB sec 125 KB sec PE 120 KB sec NRZI 60 KB sec
Density selection	Automatic (Read mode) Manual, from front panel or software select under host control
Tape	
Width	0.498 (±.002) inch
Thickness	1.5
Tension	8.0 ±2.0 ounces
Reel size	up to 10.5″
Tape Capacity	
1.5 mil tape	600, 1200 or 2400 feet
Magnetic Head Assembly	
Surface	Chrome or Triballoy
Number of tracks	9 track
Write to read gap	.15″
Erase head	Full Width
Wrap angle	7.5° ±5°
Write skew	Less than 75 microinches
Read skew	Less than 75 microinches
Tape cleaner	Sapphire blade, vacuum-assisted
BOT/EOT detection	Infrared
Broken tape detection	Infrared
Motion control	Microprocessor controlled servo
Formatter	Integral, all densities
Tape buffer	Vacuum column
Interface	PICO, Pertec, Stc, Telex
Diagnostics	Internal self test front panel External R232 port (for remote testing) Signature analysis
Seismic operation	Supports seismic option (Optional)
Acoustic noise	60 db (operating)
MTBF	6000 hours (design goal)
MTTR	30 minutes
Environmental Specs	
Temperature operating	2-45°c (excluding media)
Temperature non-operating	– 2-70°c
Humidity operating	15%-95% (non-condensing)
Humidity non-operating	5%-95% (non-condensing)
Altitude operating	0-4000 ft. (high altitude options available to 12,000′)
Altitude non-operating	0-50,000′
Physical Specs	
Dimensions	Height 24.5″ Width 19″ Depth 22¾″
Mounting	Std. EIA Retma Rack, (slides)
Weight	165 lbs.
Power Requirements	
60 HZ voltage	115VAC
Input current, nominal	9A
Power nominal	1000W ±10%
50 HZ voltage	220/230VAC
Input current nominal	4.5A
Power nominal	1000W
Agency recognition	UL/CSA/FCC

Diagnostics



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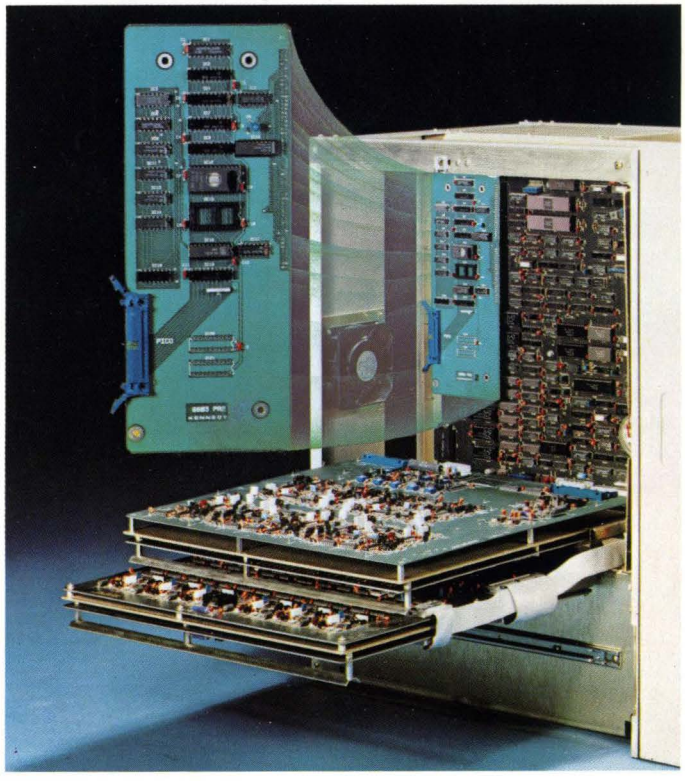

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Input current, nominal	9A
Power nominal	1000W ±10%
50 HZ voltage	220/230VAC
Input current nominal	4.5A
Power nominal	1000W
Agency recognition	UL/CSA/FCC

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Kennedy has long been the leader in computer peripheral technology. Among its long list of 'firsts' are synchronous and asynchronous tape recorders; vacuum column tape transports; ¼" cartridge tape recorders and a full line of fixed disk Winchester drives.

Kennedy's experience, innovation and attention to details and quality control are among the reasons for Kennedy's successes.

Model 9400 is no exception.

Incorporating Kennedy's proven low-noise vacuum column system, Model 9400 offers higher throughput, faster access time, powerful diagnostics and gentle tape handling, all at a very low cost.

Model 9400 has it — here and now.