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# System 8000

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For the first time Kennedy Company System 8000 makes available a completely planned and coordinated magnetic tape system for the small computer user. System 8000 can be easily interfaced to any computer and may be expanded to include more transports, differing densities with minimum expense.

All compatible tape formats are provided for, including 1600 cpi Phase-Encoded format: obsolescence of the system cannot occur in the foreseeable future.

System 8000 has as its components Model 8109 Nine-Track, 800/1600 NRZI/Phase-Encoded Magnetic Tape Transport; Model 8208 NRZI Format Control Unit; and Model 8216 Phase-Encoded Format Control Unit. Model 8107 Magnetic Tape Transport is also available for installation requiring seven-track operation at 200/556/800 cpi. Format control units will control up to four tape transports.

The system is planned to enable the user to update at any time with minimum expense. For example, a system configured for nine-track, 800 cpi operation may be converted when required to 800/1600 cpi operation by addition of the Model 8216 Phase-Encoded Format Control unit. Model 8216 simply plugs into the Model 8208 and converts the system with no further changes to transports or interface. All nine-track transports then become dual density, 800/1600. Similarly, any number of transports in the system may be Model 8107 seven-track NRZI units.

The computer interface always operates into the Model 8208 NRZI Format Control unit; thus, the tape system interface is invariant whether 800 or 1600 cpi operation is selected.

To simplify the interface designer's task, inputs to the Model 8208 consist of commands such as:

- Write One Block
- Read One Block
- Backspace One File
- Search Forward One File
- Backspace One Block
- Etc.

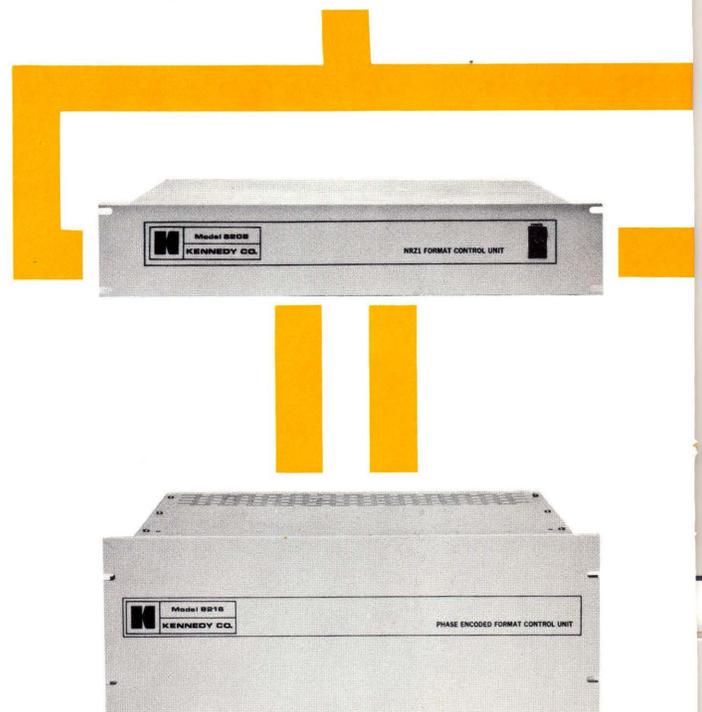
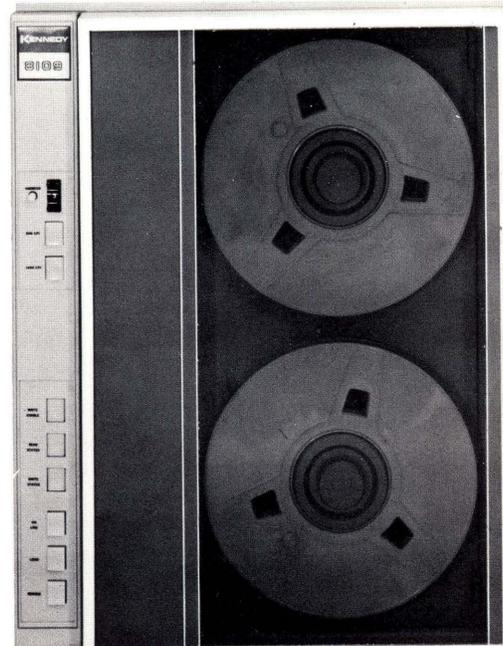
These commands are in the simplest terms. Tape Transport status is available to the interface in detailed form at all times.

Model 8109 Magnetic Tape Transport, the basic system component, is a high quality single capstan drive transport operating at 25 ips standard. Other operating speeds from 10 to 45 ips are available as options.

Transport electronics can handle 800 cpi NRZI or 1600 cpi Phase-Encoded format. Outputs are all in digital form, simplifying the job of those users who wish to provide their own format control electronics.

When used in System 8000, in conjunction with Model 8216 Phase-Encoded Format Control unit, Model 8109 is capable of writing and reading 1600 cpi IBM compatible tapes. Features include automatic density recognition and switching, postamble/preamble generation, error detection and correction, and deskewing.

With Model 8208 NRZI Format Control unit, the same 8109 transport writes and reads 800 cpi NRZI fully compatible tapes.



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—the first dual format system for small computers

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#### CONTROL FUNCTIONS

The Formatter can perform the following functions in response to the commands from the computer:

1. Read one block
2. Search forward one block
3. Search forward one file
4. Backspace one block
5. Backspace one file
6. Write one block
7. Write consecutive blocks without stopping tape unit
8. Write an end-of-file gap
9. Erase tape
10. Rewind
11. Select density
12. Select parity
13. Select tape transport

Computer

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## Model 8109 magnetic tape transport

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Central to System 8000's concept is the Model 8109 Magnetic Tape Transport. A synchronous, low speed digital tape recorder, Model 8109 operates at both 800 and 1600 cpi with proper external control.

Model 8109 operates at speeds of 10 to 45 ips with an 8,000 to 72,000 char/sec transfer rate. Speed is selected at the time of order. Recording formats are 9-channel, 800/1600 cpi; or in Model 8107, 7-channel, 200/556/800 cpi complete with Read-After-Write electronics.

Model 8109 is equipped with motion control electronics and the read/write circuitry required for generation of 800/1600 cpi tapes.

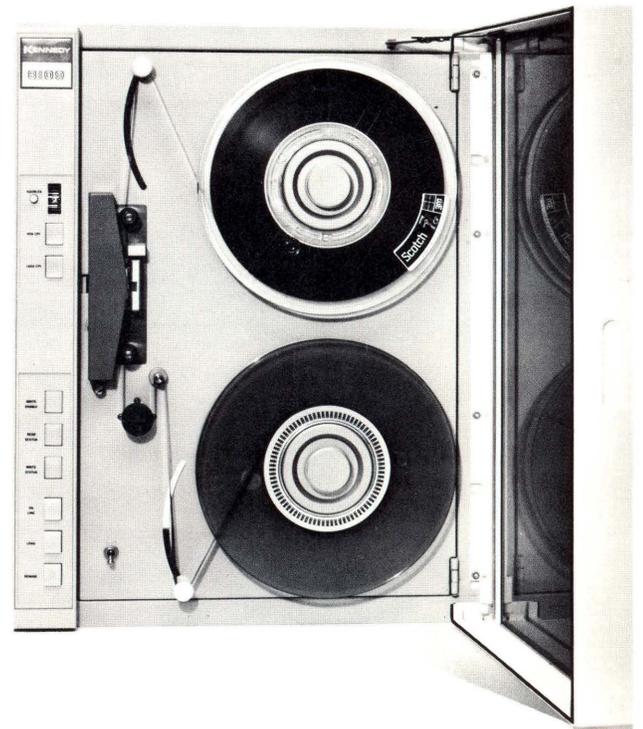
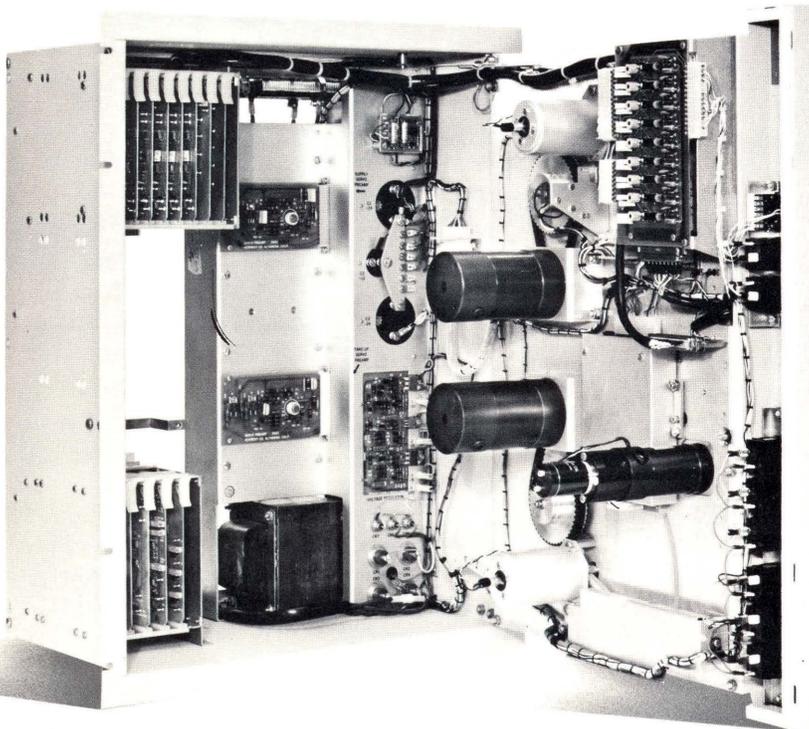
The 8109 has been designed and built to provide higher performance, greater reliability, and longer life. Inside the protective solid steel case are such features as small functional printed circuit cards to simplify troubleshooting; a high performance single capstan 180°

wrap drive system; an indirect drive, high torque dc drive servo system which responds to signals from mechanical buffer arms; photoelectric tension positioning sensors to eliminate potentiometer wear; and exclusive Kennedy mother board construction to eliminate the possibility of human error.

Model 8109 is a beautifully simple machine to service—all electrical test points and adjustments are accessible from the front; a simplified tape loading path allows the oxide to touch friction points only twice, providing longer tape life; and the transport door is hinged for easy access to plug-in modules, requiring no additional rack space.

Both Model 8109 (nine-track) and Model 8107 (seven-track) are equipped with 10½", 2400' reels.

Also available is Model 8108; 9-track, 800 cpi NRZI Read-after-write. Model 8108 operates at 25 ips with 45 available as an option.

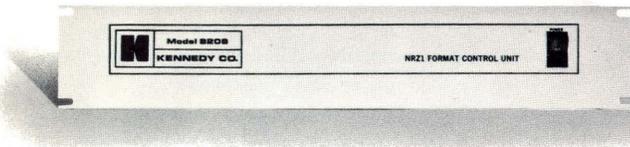


## Specifications

Model	8109	8108	8107
<b>Data density</b>	800/1600 cpi	800 cpi	200, 556, 800 cpi
<b>Number of tracks</b>	9	9	7
<b>Tape format</b>	NRZI/Phase—Encoded IBM compatible	NRZI IBM compatible	NRZI IBM compatible
<b>Tape velocity</b>	10-25 ips (8109)	10-25 ips (8108)	10-25 ips
<b>Instantaneous speed variation</b>	±3%	±3%	±3%
<b>Long term speed variation</b>	±1%	±1%	±1%
<b>Interchannel displacement error</b>	150 microinches (max.) at 800 cpi	150 microinches (max.) at 800 cpi	150 microinches (max.) at 800 cpi
<b>Start/Stop time</b>	15 ms ±1 ms at 25 ips inversely proportional to tape speed	15 ms ±1 ms at 25 ips inversely proportional to tape speed	15 ms ±1 ms at 25 ips inversely proportional to tape speed
<b>Start/Stop displacement</b>	0.1875 inches ±0.0125 inches	0.1875 inches ±0.0125 inches	0.1875 inches ±0.0125 inches
<b>Gaps</b>	Externally timed	Externally timed	Externally timed
<b>Parity</b>	Externally generated	Externally generated	Externally generated
<b>Tape tension</b>	8 oz. ±0.5 oz.	8 oz. ±0.5 oz.	8 oz. ±0.5 oz.
<b>Reel size</b>	Model 8109: 10.5 inches	Model 8108: 10.5 inches	Model 8107: 10.5 inches
<b>Drive system</b>	Single capstan drive 180° wrap	Single capstan drive 180° wrap	Single capstan drive 180° wrap
<b>Rewind speed</b>	150 ips	150 ips	150 ips
<b>Electronics</b>	Silicon solid state and DTL logic	Silicon solid state and DTL logic	Silicon solid state and DTL logic
<b>Tape unit interface</b>	DTL Low True	DTL Low True	DTL Low True
<b>Physical dimensions</b>	19"W x 24.5"H x 11"D	19"W x 24.5"H x 11"D	19"W x 24.5"H x 11"D
<b>Mounting</b>	Standard EIA rack	Standard EIA rack	Standard EIA rack
<b>Weight</b>	90 lbs.	90 lbs.	90 lbs.
<b>Power</b>	115/230 VAC ±10%, 48-500 Hz	115/230 VAC ±10%, 48-500 Hz	115/220 VAC ±10%, 48-500 Hz
<b>Operating temperature</b>	+2° to +50°C (+35° to +122°F)	+2° to +50°C (+35° to +122°F)	+2° to +50°C (+35° to +122°F)
<b>Humidity</b>	15 to 95% non-condensing	15 to 95% non-condensing	15 to 95% non-condensing
<b>Altitude (operating)</b>	0 to 30,000 feet	0 to 30,000 feet	0 to 30,000 feet
<b>Options available</b>	37.5/45 ips Vacuum tape cleaner	37.5/45 ips Vacuum tape cleaner	37.5/45 ips Vacuum tape cleaner
<b>Price</b>	\$2,800*	\$2,500*	\$2,500*

\*(In quantities of 100)

# Model 8208 NRZI Format Control Unit



The Model 8208 Format Control Unit is designed to format the NRZI magnetic tape and contains all electronics to read or write seven- or nine-track ASCII and IBM compatible readings. It will handle seven- or nine-track tape transports, any of the three standard densities (800, 556, and 200 cpi), and any one of several speeds from 45 ips to 10 ips. Model 8208 is fully compatible with the 8107, 8108 or 8109 tape transport and can handle up to four transports. These four tape transports may be a mixture of seven- or nine-track transports but must have the same speed. The Format Control Unit also offers the capability of adding a Phase-Encoded Formatter (8216) to handle 8109 transports in the 1600 cpi PE mode.

## SPECIFICATIONS

<b>Data density</b>	Nine-track — 800 cpi Seven-track — 200/556/800 cpi
<b>Character transfer rate</b>	2 KHz to 36 KHz
<b>Parity check</b>	VRC, LRCC, and CRCC, generated and checked automatically
<b>Gaps</b>	IBM compatible IRG, BOT, and EOF, generated automatically
<b>Start/Stop time</b>	Start/stop delays, generated automatically for IRG generation
<b>File mark</b>	Generated and detected per NRZI format
<b>Number of tape units to be controlled</b>	Maximum four (with same speeds)
<b>Power</b>	115/230 VAC $\pm 10\%$ , 100 watts, 48 to 400 Hz
<b>Weight</b>	25 lbs.
<b>Mounting</b>	3½" standard EIA rack panel

## CONTROL FUNCTIONS

### Read One Block

One data block is read from the selected tape unit and transmitted to the computer. Vertical parity (VRC), longitudinal parity (LRC), and CRC are checked. When a parity error is encountered, the parity error indication will be transmitted to the computer. Reading of a file mark block causes a file mark pulse to be transmitted to the computer. When a read attempt results in a successful read, a good block pulse is sent to the computer instructing it to accept the data in the block.

The reading of a block will result in the occurrence of one of the conditions defined as follows:

File Mark Recognition	Parity Errors	Block Condition
Yes	—	File mark block
No	Yes	Bad block and parity errors indicated
No	No	Good block, data accepted

### Search Forward One Block

Tape is moved in the forward direction with the normal speed to the inter-record gap (IRG) following the next block. Skipping over a file mark block causes a file mark pulse to be generated and sent to the computer.

### Search Forward One File

Tape is moved in the forward direction with the normal speed to the IRG following the next file mark block.

### Backspace One Block

Tape is moved in the reverse direction with the normal speed to the IRG preceding the previous block. File mark blocks will cause the file mark pulse to be transmitted.

### Backspace One File

Tape is moved in the reverse direction with the normal speed to the file mark gap preceding the previous file mark block, then moves forward to IRG following file mark block.

### Write One Block

One data block is written from the memory onto the magnetic tape of the selected tape unit. Vertical parity check character is simultaneously generated and written for each character. The formatter also generates a longitudinal parity check character and a cyclic redundancy check character (nine-track only) and writes them onto the tape.

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## Model 8216 PE Format Control Unit

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### Write Consecutive Blocks Without Stopping Tape Unit

This command is the same as the Write One Block command except that the consecutive blocks may be written without stopping the tape unit after each block.

### Write an End of File Gap

This command will cause the formatter to generate the EOF gap delay and write the file mark onto the tape.

### Erase Tape

This command will cause the tape to be erased for a length of tape approximately equal to the length of an EOF gap (3.5 inches).

### Rewind

Tape is moved in reverse at high speed until the BOT mark is sensed and the tape is positioned at the load point. This command will be ignored while the selected tape unit is at the load point.

### Select Density

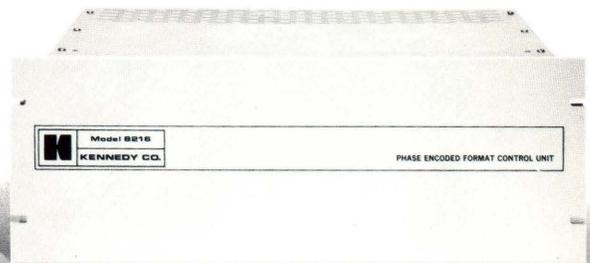
This command will select one of three densities (200, 556, or 800 cpi). When PE formatter is added, this command can also select 1600 cpi.

### Select Parity

This command will select either odd or even parity for seven-track tape transports, but for the nine-track tape transport odd parity will be selected automatically.

### Select Tape Transport

This command will select one of four tape transports which are connected to the formatter, and the selected tape transport can be controlled by commands from the computer.



Model 8216 enables Model 8109 tape transports to write fully formatted 1600 cpi tapes.

In the read format, electronics are provided to strip preamble, postamble, 1600 cpi identification burst, and EOF tape mark from the data. To further insure valid data, a crystal clock, provided for the accurate timing of write and calibration of read, is present only for data characters. A four-character deskewing register allows a wide range of skew on tape read. Dynamic data rate variations of  $\pm 10\%$ , in addition to steady state data rate variations of  $\pm 10\%$ , are tolerated. Error correction for errors occurring in a single track is provided, as well as detection circuitry for preamble not detected, postamble not detected, vertical parity error, multiple track error, and skew register overflow.

### SPECIFICATIONS

<b>Data density</b>	Nine-track — 1600 cpi
<b>Character transfer rate</b>	16 KHz to 72 KHz
<b>Preamble/Postamble</b>	Generate and detect consistent with ASCII and IBM requirements
<b>Parity</b>	Generate and check odd parity
<b>Track dropout</b>	Detect single and multiple track dropout
<b>Error correction</b>	Will correct "on-the-fly" (single track dropout only)
<b>Input power</b>	115/230 VAC $\pm 10\%$ , 100 watts, 48 to 400 Hz
<b>Size</b>	7"H x 19"W x 9"D
<b>Weight</b>	25 lbs.
<b>Mounting</b>	19" rack per EIA

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