



POTTER INSTRUMENT COMPANY, INC.

151 Sunnyside Boulevard • Plainview, New York (11803) • 516 Overbrook 1-3200

Dear Sir:

Thank you for your recent inquiry.

The revolutionary new RAM[®] is a new cartridge loaded random access memory system which establishes a breakthrough in random access memories. The RAM is a fast access device having a storage capacity in excess of 50 million bits of information, and is 30% faster in all modes of operation than any presently used system. The RAM is available at less than half the cost of any presently available memory system.

The RAM also is the first cartridge loaded random access memory system to provide an immediate check-read-after-write capability. Check reading is performed immediately after writing: it is not necessary for the recording medium to make an additional full revolution of the recording medium to check read, as is required in other memories.

A unique drive system permits the use of high density magnetic tape loops as the recording medium. Exceptionally long machine and cartridge life is achieved by using air-floating techniques for the tape loops. The recording medium, when in operation, never makes contact with any fixed surface. Magnetic tape, a flexible storage medium, flies over the head, thus avoiding the well-known difficulties of flying head techniques and a rigid recording surface. The drive mechanism provides operational reliability, has no critically adjusted moving parts, and is highly resistant to shock and vibration. Accurate head positioning is achieved by linear movement of a common head post actuated by a simple mechanical linkage.

Each Tape Pack Cartridge provides 50.2 million bits of information: 196,000 bits per cylinder and 1000 bits per inch of tape. Cartridges are interchangeable to permit processing of many different files on one machine.

In contrast to magnetic disks used in other memories, the flexible substrate eliminates the need for critical mechanical adjustments and results in a lower-cost package as well as one much less susceptible to damage. There is no danger of data loss due to rough handling. "Handle with care" treatment associated with conventional disk cartridges is completely eliminated. This feature is essential in any retrieval system for the security of vital company records.

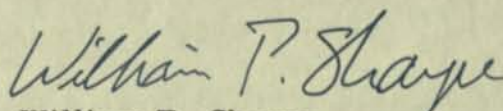
These are only some of the exceptional performance characteristics of the Potter RAM. The product catalog enclosed provides complete technical information.

Prices range from \$12,000 to \$18,000, depending upon equipment requirements. Units are available for delivery six months after receipt of order.

For further information on the revolutionary new RAM and other Potter peripheral equipments, contact your Potter sales representative or return the reply card attached to the enclosure.

Very truly yours,

POTTER INSTRUMENT COMPANY, INC.



William P. Sharpe
General Sales Manager

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POTTER

EDP EQUIPMENT

This catalog will serve as a convenient reference to the complete line of Potter peripheral equipment for digital electronic computers . . . equipment which has been used and respected since the inception of the EDP field. Please make sure that we have your name and correct mailing address so that we can help you keep your binder up to date with new and revised data as it is published.

For additional information write: Sales Manager,
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151 Sunnyside Boulevard, Plainview, New York —
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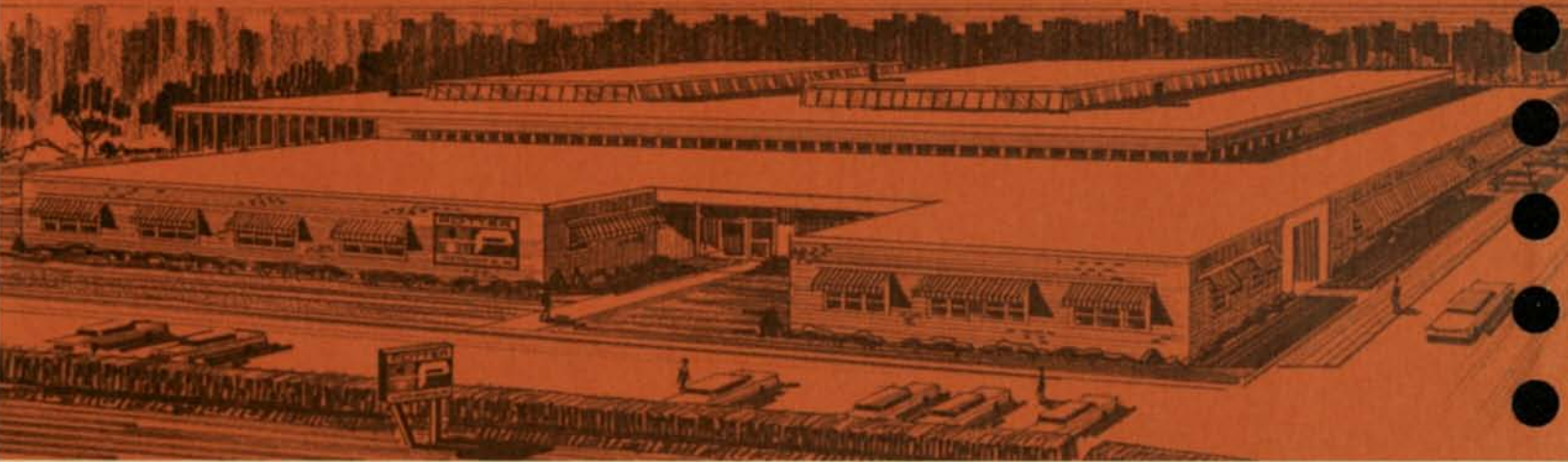


INSTRUMENT CO., INC.®

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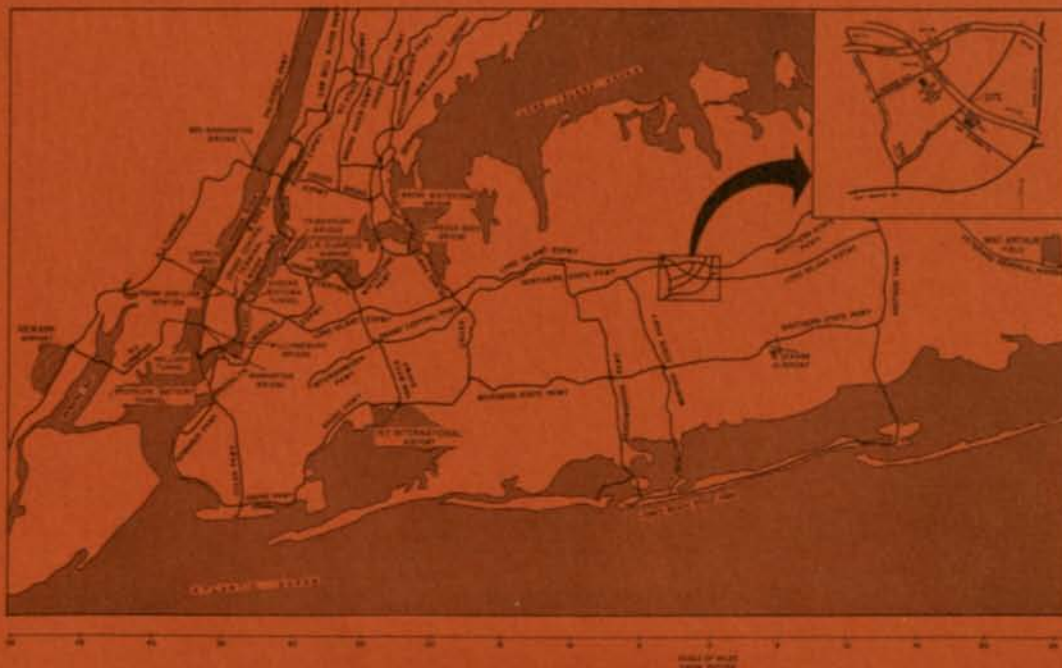
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Location of Potter, Long Island Facilities.



PERIPHERAL COMPUTER
EQUIPMENT TERMINOLOGY

- "A" WIND...** The method of winding tape on a reel in which the oxide surface of the tape faces toward the hub.
- "B" WIND...** The method of winding tape on a reel in which the oxide surface of the tape faces away from the hub.
- BINARY CODED DECIMAL (BCD)...** Pertaining to a number-representation system in which each decimal digit is represented by a unique bit-pattern.
- BINARY DIGIT...** Either zero or one.
- BIT...** The abbreviation for "binary digit."
- BIT PACKING DENSITY...** The number of bits of information per unit length longitudinally of a channel consisting of a single row serially recorded.
- BIT-PATTERN...** A combination of n bits to represent 2^n possible choices; e.g., a 3-bit pattern represents 8 possible combinations, an 8-bit pattern represents 256 possible combinations, etc.
- CHANNEL...** A discrete path for recording or transmission of information.
- CHARACTER...** A single symbol used to convey information such as a letter of the alphabet, a decimal digit, a punctuation mark, a mathematical symbol, a control code, or functional code. The term "character" is also used to describe a group of binary bits representing a code, including associated parity and clock bits.
- CHARACTER, ALPHA-NUMERIC...** A single graphic selected from the coded character set consisting of the 26 letters of the English alphabet, the decimal digits 0 thru 9, and other selected symbols up to a total of 64, which can be represented by a 6-bit binary code.
- CHARACTER, NUMERIC...** A single graphic selected from the coded character set consisting of the decimal digits and other selected symbols up to a total of 16, which can be represented by a 4-bit binary code.
- CHECK BIT...** Extra bit(s) appended to a bit-pattern to help detect errors.
- COAST TIME...** The time which multiplied by the nominal tape speed gives the nominal distance travelled by the tape after receipt of a STOP command.
- CODE...** A set of rules used to convert data from one set of representations to another. Sometimes the set of bit-patterns defined by the set of rules is also called the code.
- CODE CONVERSION...** Translation of one code set to another.
- CODE SET...** A set of bit-patterns that have been derived according to the rules in a code.
- CODED CHARACTER-SET...** A group of characters to which a code has been assigned.
- COLLATING SEQUENCE...** A prescribed ordering of the characters in a coded character-set.
- COMMAND REPETITION RATE...** Frequency of occurrence of operational commands such as FWD START, REV START, or STOP, expressed in commands per second.
- COMMAND REPETITION RATE, NORMAL...** Highest command repetition rate for commands occurring at equal time intervals at which Start Time, Start Distance, Stop Time, and Stop Distance etc. remain within specified limits.
- COMMAND REPETITION RATE, MAXIMUM...** Highest command repetition rate, for commands occurring at equal time intervals, which will not damage the equipment. Other performance parameters may be outside of specification rates in excess of the normal command repetition rate.
- COMPUTER LIMITED OPERATION...** Operation of a peripheral device in a mode in which the device can receive or transmit information more rapidly than the computer can supply or absorb it (peripheral device operates in start/stop mode).
- CONTIGUOUS ALPHABET...** An alphabet (A through Z) assigned, by code, to a continuous binary sequence.
- CONTROL CHARACTER...** A character whose occurrence in a particular context initiates, modifies, or terminates a control operation.
- EFFECTIVE PRINTING RATE...** In a printer, the actual printing rate including the effect of paper advance and information loading cycle times for worst case message formats, when operating in a printer limited mode, expressed as lines per minute.
- ERROR...** A parity failure.
- ERROR, PERMANENT...** An error which is not eliminated by reprocessing the information a limited number of times.
- ERROR RATE...** The average number of characters processed prior to the occurrence of an error.
- ERROR, TRANSIENT...** An error which is eliminated by reprocessing the information a limited number of times.
- ESCAPE CHARACTER...** A control character to signal a change in the meaning of one or more of the characters that follow it.

GAP AZIMUTH...In multi-channel digital magnetic record/playback heads, the angle between the parallel lines measuring gap scatter and the nominal direction of tape motion over the head assembly.

GAP SCATTER...In multi-channel digital magnetic tape record/playback heads, the distance expressed in micro-inches between the closest pair of parallel lines which bound all gap trailing edges of a stack.

GRAPHIC...A written or printed form or shape, e.g.,
3 A e % ,

GRAPHIC CHARACTER...A character which has been assigned a graphic.

INTERCHANNEL TIME DISPLACEMENT, COMPENSATED...The ICTD remaining after compensating for static skew.

INTERCHANNEL TIME DISPLACEMENT (SKEW)... Maximum time difference between earliest and latest bits of a single parallel bit character. ICTD for a tape transport, head, and guide assembly is based on the full width of the tape, includes the effects of interchanging tapes between machines, and is measured after the START TIME has elapsed. Tape width and tape speed must be stated with each ICTD specification.

Note: ICTD is simply the total time delay between a pair of bits and therefore \pm values are of no significance.

MACHINE CODE...The internal code of a central processing unit.

MEDIA, MEDIUM...The configuration or material used in recording and transmitting data—e.g., punched cards, perforated tape, magnetic tape, data transmission.

MEDIA CODES...Code sets assigned to media.

NRZ (Non-Return to Zero)...A mode of recording in which each state of the medium corresponds to one binary state. In this mode, the state of the recording medium changes when the information changes from 1 to 0 or from 0 to 1.

Note: "NRZ Modified" is also often called "NRZ."

NRZ MODIFIED...A mode of recording in which a change in the state of the recording medium occurs for a "1" bit, but remains unchanged for a "0."

PARITY BIT...A type of check bit.

PASS...A single unidirectional movement of tape over an R/P head, continuous or discontinuous.

PEAK PRINTING RATE...In a printer, the printing rate excluding the effects of paper advance and information loading cycle times, expressed as lines per minute.

PROGRAM RESTRICTION...A limitation in the performance of a tape transport falling within the specified normal range of operation of the unit and requiring modification of the com-

mand sequences to obtain normal accuracy in recording and reproduction of information.

QUALIFICATION TIME...The time which multiplied by the nominal tape speed gives the START DISTANCE.

RB (Return to Bias)...A mode of recording in which the state of recording medium changes from a bias state to another state and returns to record binary "1."

RZ (Return to Zero)...A mode of recording similar to RB, except that the bias state is the zero or quiescent state of the medium.

SPECIAL GRAPHIC (OR SPECIAL SYMBOL)...A non-numeric or non-alphabetic character, e.g.,
() % @ , .

STABILIZATION TIME...Time from start of tape motion until tape speed first reaches and remains within a stated limit of fluctuation from the steady state tape speed.

START DELAY...Elapsed time from receipt of START Command to start of tape motion.

START DISTANCE...Distance tape travels after receipt of a START Command before velocity reaches and remains within a stated limit of fluctuation from the steady state tape speed (equals Qualification Time X Nominal Speed).

START TIME...Elapsed time after receipt of a START command until velocity reaches and remains within a stated limit of fluctuation from the steady state tape speed. (Sum of Wait Time plus Qualification Time.)

STATIC SKEW...In a tape transport system, the STATIC SKEW is that component of the ICTD which can be compensated with adjustable delays.

STOP DISTANCE...Distance tape travels after receipt of a STOP command until tape comes to a complete stop (equals Coast Time X Nominal Speed).

STOP TIME...Elapsed time from receipt of a STOP command until tape comes to a complete stop.

SUBSET...A set contained within a larger code set.

TAPE LIMITED OPERATION...Operation of a tape deck in a mode where the tape unit receives or transmits information at a rate slower than the computer is capable of supplying or absorbing it. (Tape moves continuously without stopping in the interblock gaps.)

TAPE SPEED...Steady running tape speed averaged over a period of 1 second or greater.

TAPE SPEED VARIATION...Difference between actual steady running tape speed, averaged over a period of 1 second or greater, and nominal tape speed, expressed as a \pm percentage tolerance on tape speed.

TRACK...On magnetic tape, a channel consisting of a single row of serially recorded bits.

WAIT TIME...Elapsed time from receipt of START Command to start of tape motion in an idealized rectangular velocity profile.



POTTER INSTRUMENT COMPANY, INC.

151 SUNNYSIDE BOULEVARD, PLAINVIEW, LONG ISLAND, N. Y. (516) OV 1-3200

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POTTER

RAM CONTROL UNIT
MODEL CTM-4550



- For Use With Any Data Processing System
- Cartridge Preparation
- Error Detection
- Address Location
- Complete Logic Package

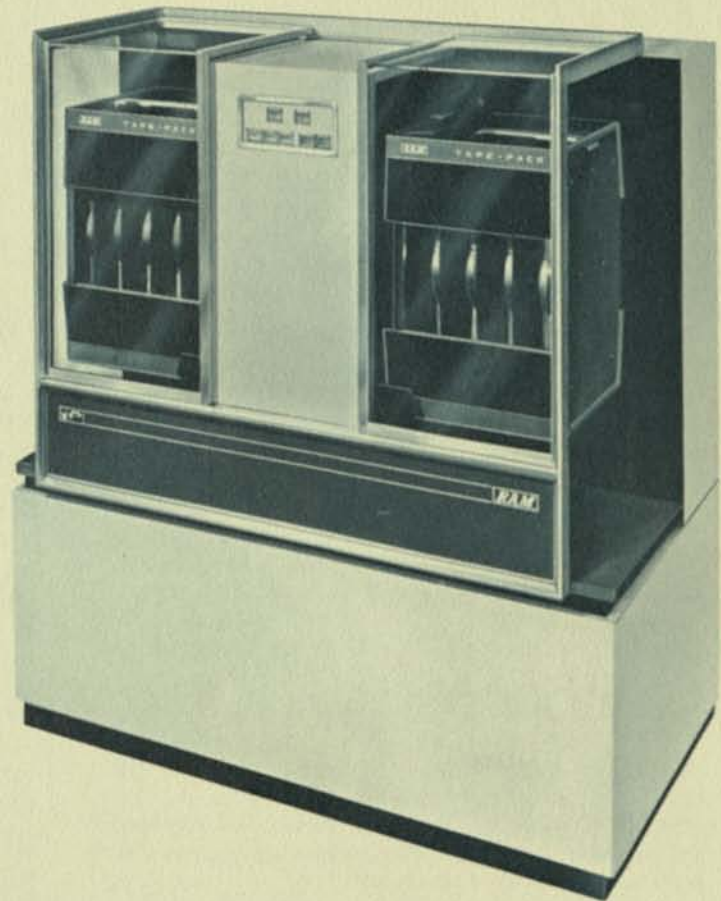
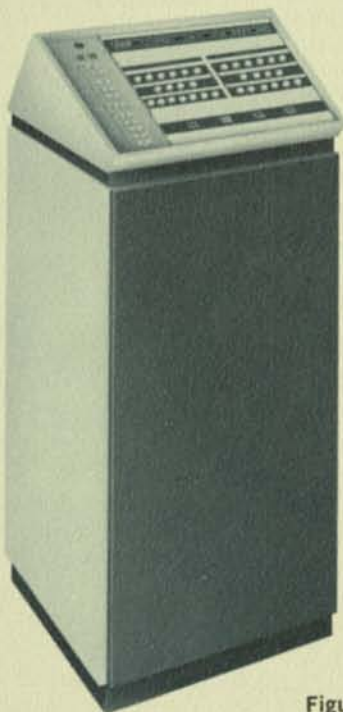


Figure 1. Potter RAM shown with Model CTM-4550 Control Unit

DESCRIPTION

The RAM Control Unit, Model CTM-4550, provides the logic and electronics necessary to adapt the Potter RAM memory system, Model TLM-4550 (see Product Data sheet 1-103), to a standard computer interface. The controller provides for cartridge (TAPE-PACK) preparation, error detection and address location to enable the RAM to be used for data storage for any Data Processing system.

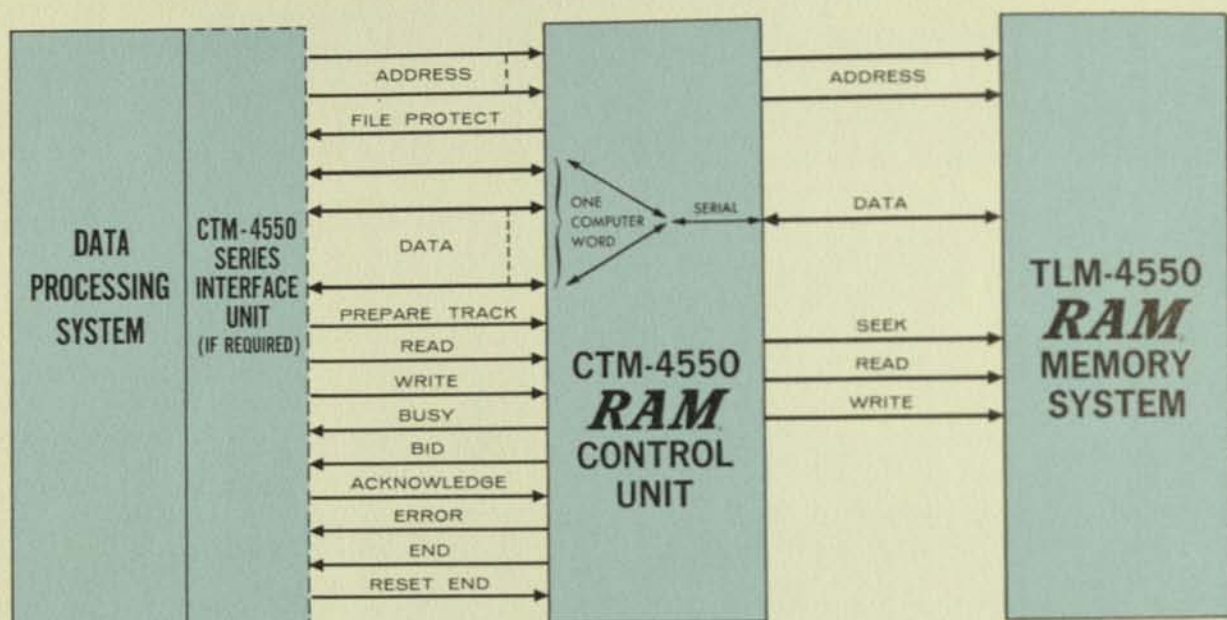


Figure 2. Simplified Functional Diagram — RAM Control Unit Model CTM-4550

DESCRIPTION continued

Addressing of RAM

The CTM Control Unit accepts a 14-bit RAM address from the data processor interface, in conjunction with a "read" or "write" command. The fourteen bits comprise the following information:

- left or right cartridge 1 bit
- RAM track 10 bits
- sector on the track 3 bits

The CTM causes the RAM heads to be properly positioned, and locates the correct one of up to 8 sectors on the specified track.

Reading of RAM Sector

In a "read" operation, after sector addressing has been accomplished, the CTM reads the entire sector from the RAM and sends it word-parallel to the data processor interface. Error-checking through word-parity, and a record-length check are performed.

Writing of RAM Sector

In a "write" operation, after sector addressing has been accomplished, the CTM obtains the entire sector word-parallel from the data processor interface, and stores it in the RAM. Parity bits are affixed while writing. A read-after-write check is performed on the complete sector, while writing is being performed.

DESCRIPTION OF CTM OPERATION

A functional block diagram of the CTM Control Unit is presented in Figure 2. With the CTM, a Data Processing system can conveniently cause any of the three operations of read, write, or sectorize to be performed.

Seek and Read

The search logic causes the proper one of the 1792 RAM tracks to be selected. When the RAM head is in position, the stored information on the track is examined by the search logic until the sector ID corresponding to the desired sector is found. The desired information immediately follows the sector ID on the track. This information is decoded and accumulated in the Computer Access Register. Whenever one computer word has been accumulated in the Computer Access Register, a BID signal is sent to the DP System; this instructs the DP System that one word is ready to be transferred out of the CTM; return of the ACKNOWLEDGE signal by the DP System indicates to the CTM that the word has been transferred out. This word-serial transfer operation continues until the end of the sector is reached.

Redundancy bits are stored with the data to insure error-free operation; they are checked and stripped off during reading by the read check logic. If they do not meet the specified criteria, an ERROR is signalled. The redundancy bits consist of parity bits spaced throughout the data.

Seek and Write

SEEK AND WRITE proceeds identically with SEEK AND READ until the proper sector ID is located. At that time, a BID signal is sent to the DP System, indicating that the CTM requires a computer word. The ACKNOWLEDGE signal from the DP System indicates that the word is ready on the data lines. The CTM stores the word into the Computer Access Register, and then transfers it serially to be encoded and written onto the RAM sector. This transfer operation is repeated until the end of the sector is reached.

The Write Check Generator Logic fabricates parity bits and inserts them into the proper places in the data. Simultaneous with writing, the data parity is checked in a read-after-write operation.

Sectorization of RAM Cartridge or Track

RAM cartridges require sectorization before initial use, whenever a tape loop is replaced, and whenever a cartridge or a single track is to be erased and re-used. The result of sectorization of a track is that the track contains 8 sectors; each sector is identified by a stored sector number, and no other data exists on the track. The result of sectorization of a track is as described here regardless of whether the track originally—i.e. before being sectorized—contained data, contained some different number of sectors, or contained nothing. Multiple length records can be written by overwriting unused sector identifiers.

Since inadvertent sectorization could destroy live data, a fully interlocked sectorization operation is provided. A console mode switch is set to "sectorize;" this causes a "sectorize" status line to be sent to the data processing interface, and simultaneously prevents the performing of a normal "read" or "write" operation. The data processor then provides a track address (11 of the 14 address bits) and a "sectorize" command, and the track is automatically sectorized.

Prior to the initiation of a sectorization, the console mode switch is set to SECTORIZE. The eleven bit cartridge-and-track address is placed on the address lines by the DP System, and the SECTORIZE command given. The desired track is located as before. The Sectorization Logic then saturates the track with a recorded pattern, locates the tape splice, and records the ID blocks, dividing the track into precisely equal sectors. The recorded ID blocks contain an ID indicator, plus the address of the sector. The data portion of each sector is erased.

Maintenance Facilities

Built-in maintenance indicators and exercisers are provided to assist in preventive and corrective maintenance on the CTM-RAM system. The combination of these facilities and computer-generated diagnostic programs will provide integrity of data and operation, and minimization of downtime.

ERROR CHECKING FACILITY

Check bits are added by the CTM when writing on the RAM, checked in the read-after-write mode, and checked and stripped from the data when reading from the RAM. There are two checking facilities:

- 1—Two even-parity bits are added to approximately each two DP System words stored. These two bits represent, respectively, the even parity for all the odd and even bits in the words.
- 2—In the ID block, the 3-bit sector portion of the address is stored in full duplicate, to provide protection against operation on the wrong sector.

Using this checking scheme, and using as a basis a 24-bit DP System word, an undetected data error can be expected to occur less than once in 3×10^9 records, or once every 100 years, assuming that a block is read every 200 ms for an 8-hour shift, 200 days per year.

Note that the affixing of two parity bits per 48-data bits results in a deterioration of data storage capacity of slightly over 4%.

OPTIONAL ACCESSORIES

Data Processor Interface

The CTM interface logic is compatible with standard computer interface practice. However, in general some hardware is required to exactly match the CTM to a specific computer, either logically or electrically. Interface units are available for this purpose.

Each of these Interface Units (designated Series ITM4550) adapts the CTM to a particular DP System, both logically and electrically.

Sectorization Control

The Sectorization Control Unit attaches to the CTM and relieves the DP System from programming the addresses used for the sectorization operation. Two modes of operation are provided:

- Sectorize a Track: One track address is manually selected, and only that track is sectorized.
- Sectorize a Cartridge: Each of the 896 tracks in a cartridge is selected in turn, and sectorized.

OPTIONAL ACCESSORIES*continued***Multiple-RAM Unit**

This unit allows a group of RAMS to be treated as a single data storage unit. Additional bits are added to the normal 11-bit address to accommodate the additional RAMs; these are decoded and the appropriate RAM unit is connected to the CTM.

CTM Configurations

Two basic controllers are available: one which is

6-bit character oriented and one which is 8-bit byte oriented. The 6-bit oriented controller handles computer words of 12, 18 or 24 bit lengths to be specified by the user.

The 8-bit byte oriented controller can be used directly with interface word lengths which are 8 bits in length. For multiples of 8 bits (e.g. 16-bit computer words), additional buffering must be supplied in the interface.

Input Logic Levels: 1 = $+5 \pm 1V$ from a 2k source impedance
0 = $0 \pm .5V$ at 12 ma

Output Logic Levels: 1 = $+5 \pm .25V$ from a 2k source impedance
0 = $.25 \pm .25V$ at 6 ma

POTTER WORLDWIDE FIELD SERVICE AND LOGISTICS PROGRAMS

Repair centers in strategic locations within the continental United States and abroad have been established to support the entire Potter product line.

Staffed by highly-trained field representatives, these repair centers are equipped to effect on-site installation of equipments and to perform quality repair, maintenance and overhaul.

Supplementing this capability, if a customer prefers to provide his own equipment support, Potter has established standard instruction courses to train customer personnel, either at Potter or in the field.

A Spare Parts Department, backed up by an extremely large inventory, and streamlined order pro-

cessing, is available for customer convenience and economy. This inventory permits the customer to realize virtual elimination of downtime as well as savings on spare parts dollars by offering expeditious delivery for replaceable parts. Delivery is available in 24 hours to meet customer emergency requirements — within 72 hours for standard parts under normal conditions. Potter also offers provisioning and logistics capabilities to meet all existing military specifications.

The Potter field service and logistics program is one of the finest in the EDP equipment industry. With reliable, quality-engineered equipment, supported by comprehensive field service, Potter guarantees satisfaction.

**POTTER INSTRUMENT COMPANY, INC.**

151 SUNNYSIDE BOULEVARD • PLAINVIEW, NEW YORK • 516 OVERBROOK 1-3200

TLM-4550
DUAL CARTRIDGE RANDOM ACCESS MEMORY



FOR THE FIRST TIME
A RANDOM ACCESS MEMORY
USING MAGNETIC TAPE

- Fastest Operation Available
- Automatic Cartridge Loading
- Unique Check-Read-After-Write Capability
- Non-Contact Recording
- Linear Head Positioning
- Extreme Dependability
- Simple Servicing



Figure 1. The Potter RAM, Model TLM-4550.
Shown with Model ACC-8601 Tape Pack Cartridge

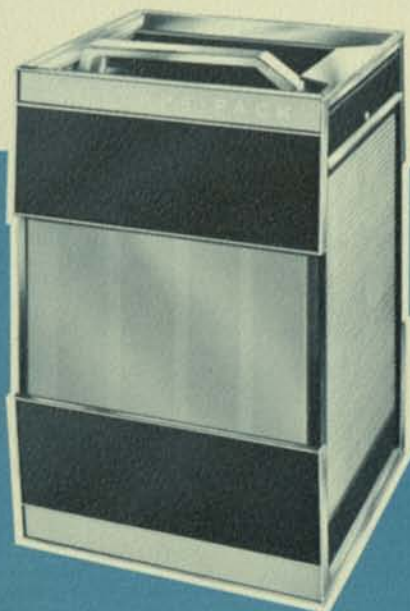


Figure 2. RAM Tape Pack
Cartridge, Model ACC-8601

TAPE PACK FEATURES

- High Capacity — Over 50 Million Bits
- Low Price — Lowest Available
- Complete Data Security
- Interchangeable Cartridges
- Rugged Strength, Sealed Enclosure
- Lightweight — Readily Stacked
- Replaceable Low-Cost Storage Element

AUTOMATIC CARTRIDGE LOADING — Approximately 15 Seconds!



Operator Selects Tape Pack Cartridge.



Places Cartridge on Loading Carriage.



Presses "LOAD" Pushbutton, Fully Automatic Startup.

Figure 3. Cartridge loading is as simple for the operator as it is possible to make it. A cartridge is placed on the machine carriage; a latch snaps it secure. From this point everything is automatic. The operator simply presses the "LOAD" pushbutton and walks away, leaving the machine to load the cartridge, start

up automatically, and signal the "ready" condition, all within a few seconds. Both cartridges are driven simultaneously and cartridges may be interchanged from one side of the machine to the other, a file of several cartridges, or between machines.

DRAMATIC STEP FORWARD IN PERFORMANCE CHARACTERISTICS!

Unlike any other machine in its class, the RAM can check-read data immediately after writing. This makes a dramatic difference in the performance characteristic. While other machines are occupied with the extra revolution of the recording medium, necessary to check-read, the RAM has already started the next access. Data throughput rates are enormously improved, and there is no need for the special data sequencing which attempts to minimize latency effects.

The remarkable characteristics of the RAM concept provide advanced performance plus simplified machine design, high reliability and lowest cost per bit stored. This is truly a breakthrough in design approach.

Comparisons between the RAM and other ma-

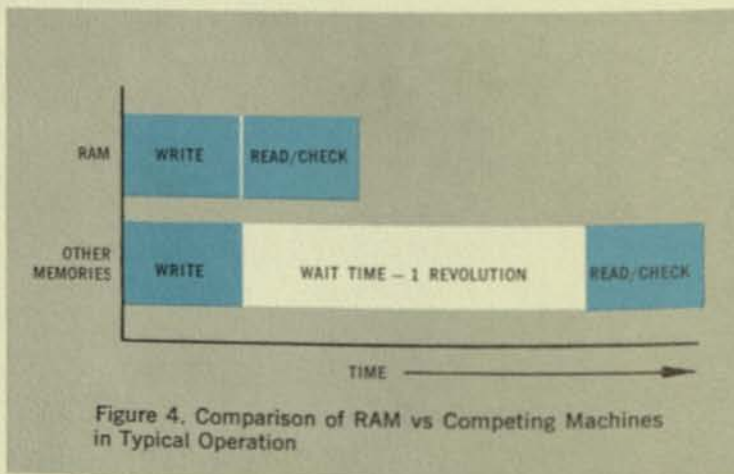


Figure 4. Comparison of RAM vs Competing Machines in Typical Operation

chines show typical operations being accomplished in half the usual time, with cartridge capacity doubled and cost per bit stored reduced to one quarter. In addition, vulnerable recording discs have been replaced by highly shock resistant magnetic tape sealed in rugged Tape Pack cartridges.

The Potter RAM is a cartridge loaded random access system for use with medium and low cost digital computer systems. Typical applications are: inventory control, computer programming, real-time data processing, and mathematical and scientific analyses . . . wherever rapid access to a volume of information is required, and where the information is too large to be economically accommodated by ferrite core memory systems.

Information is recorded serially in a multiplicity of tracks on loops of tape, and any information may be written or read at random by transmitting address information to the unit together with an appropriate command signal.

All channels have equal storage capacity and equal bit packing density. Thus, "zoned" arrangements of information, as used with disc memories to achieve reasonable storage efficiency, are not required.

The dual-cartridge RAM offers the same on-line capacity and performance capabilities intrinsic in the single-cartridge model, but offers additional operational flexibility. The dual-cartridge RAM is capable of copying partial or entire data content from one cartridge to the other, eliminating the need for two machines where the on-line capacity of one machine is adequate.

UNIQUE TAPE PACK CARTRIDGE

The Model TLM-4550 accepts two Potter Model ACC-8601 Tape Pack Cartridges, each of which has a storage capacity of 25.1 million bits of information. The tape loop assembly is totally enclosed within a dust-tight, rigid, aluminum case. An aluminum-on-plastic tambour door on the end of the cartridge case provides passage for the drive mechanism when in use.

The complete cartridge assembly is highly resistant to rough handling. The rectangular form, convenience of handling, and light weight of the cartridge permits stacked storage in minimum space and very easy handling. The absence of close tolerance internal fittings avoid misalignment by careless handling, and the tape loops are inherently not subject to deformation and damage by shock and vibration.

Non-contact Potter high density recording is used in a "write broad-read-narrow" single track configuration. No permanent errors occur and the probability of transient errors is so low as to be a negligible factor.

PRINCIPLES OF OPERATION

THE DRIVE SYSTEM

The loops of high quality digital magnetic recording tape in the cartridge each have an associated drive unit on the machine. Figure 6 shows the position of the tape loop which clears the drive assembly and the head as the cartridge is loaded, with the capstan stationary. When the tape loops are positioned, vacuum

is applied to the buffer chamber above the capstan, deflecting the tape so that its backing surface makes a non-slipping contact with the surface of the capstan, which is now rotating. The tape loop is now in the driving condition as shown in Figure 7.

Of special importance is the fact that the tape flies over the write-read head, maintaining a precise and stable gap between the oxide recording surface and the head profile.

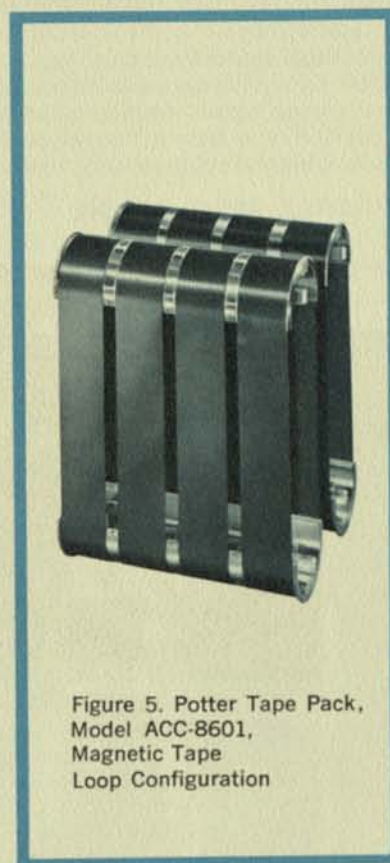


Figure 5. Potter Tape Pack, Model ACC-8601, Magnetic Tape Loop Configuration

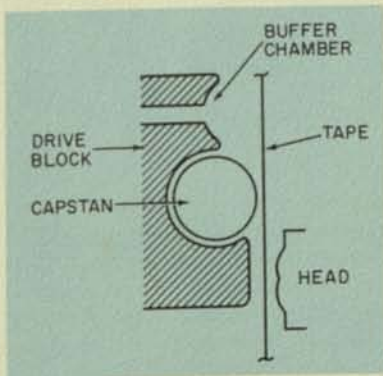


Figure 6. Position of Tape Loop As Cartridge Is Loaded

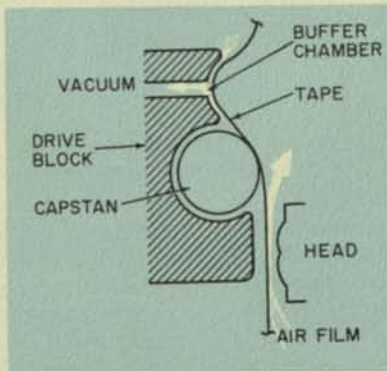


Figure 7. Tape Loop in Driving Condition

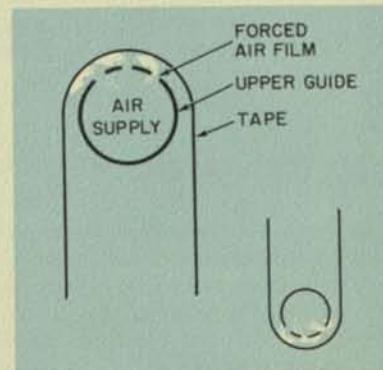


Figure 8. The Tape Loop is Entirely Supported on An Air Cushion While in Motion

PRINCIPLES OF OPERATION *continued*

Figure 8 shows, diagrammatically, the fixed air bearings which control the tape loop, at top and bottom. These fixed elements conduct air under pressure to the bearing surfaces which forms a supporting film. Thus the tape loop is entirely supported on an air cushion while it is in motion.

MULTIPLE DRIVE BLOCKS

The individual drive blocks are arranged in two compact groups on the faceplate of the machine, with a common capstan serving each group. (Figure 9). A

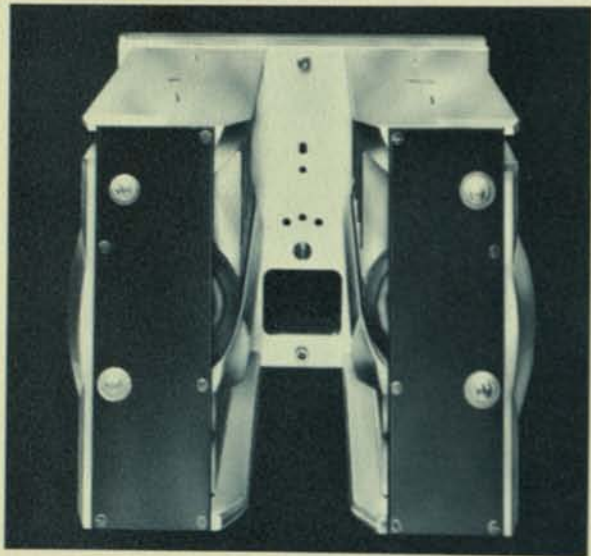


Figure 9. Multiple Drive Block Assembly

common vacuum supply is connected to all of the buffer chambers so that all loops are engaged in the driving position simultaneously, as part of the automatic load cycle. The twin capstans run in specially designed long-life bearings. Figure 10 shows the appearance of the drive assembly with one group of drive blocks removed to provide access to the head post. The vacuum and pressure porting can be seen and also the location of the capstan threading the remaining group of drive blocks. There are sixteen drive block sections in all, providing a 16 loop drive.

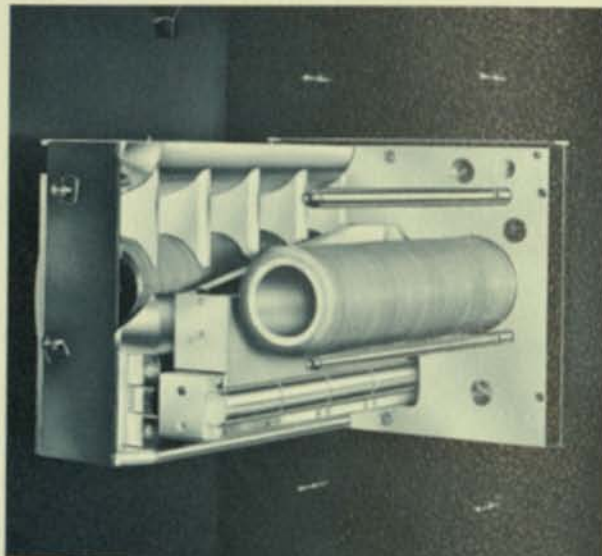


Figure 10. Multiple Drive Block Assembly with One Group of Drive Blocks Removed

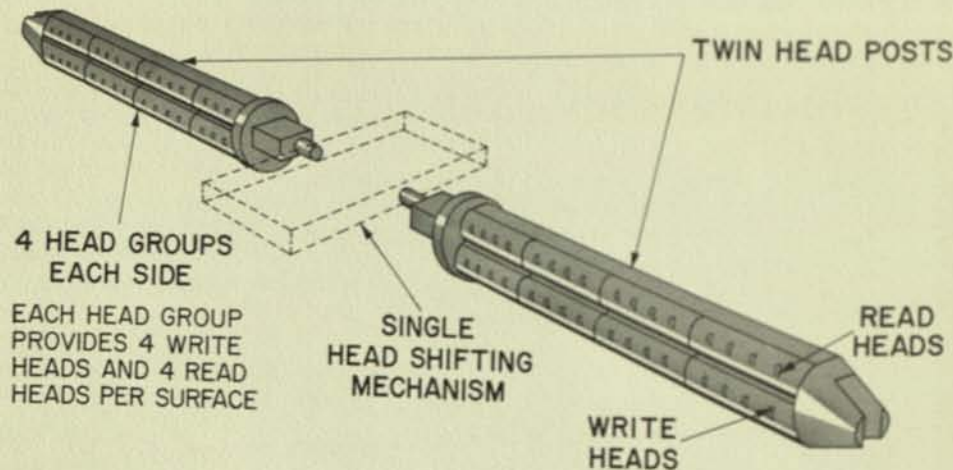


Figure 11. Write/Read Head Post

HEAD POST ASSEMBLY

All of the write/read heads are mounted in a common head post located between the two rows of tape loops in each group. The position of the head post can be seen in Figure 10. The general arrangement of the head post itself is as shown in Figure 11. The lower row of heads provides the writing function and the upper row the reading function. The heads are arranged in sections so that four writing and four reading heads are presented to each of the recording surfaces. A similar arrangement prevails on the other

side of each head post to furnish reading and writing functions for the alternate group of loops.

The profile of the head post is contoured with a smooth surface finish to define the desired stable flying attitude for the tape. The head post forms a rigid beam structure which permits the heads to be traversed over the recording surfaces under the control of the head post positioning mechanism. Both head posts move simultaneously under the control of a single positioning mechanism.

HEAD POSITIONING MECHANISM

Because the head positioning system demands only a linear movement of a single assembly over a very short distance, a simple mechanism is possible. This takes the form of a binary input positioning linkage sometimes referred to as a "whiffletree." A diagrammatic representation of the head positioning mechanism showing linkage relationships is given in Figure

12. Five equal amplitude input deflections acquire binary weightings of $2^0 - 2^4$ and from the linkage relationships provide 32 precisely repeatable positions of the head post with very fast head shifting. Of these 32 positions 28 are actually required for positioning the head; the remaining four are electronically ignored by the equipment. The actual head positioning mechanism is shown in Figure 13.

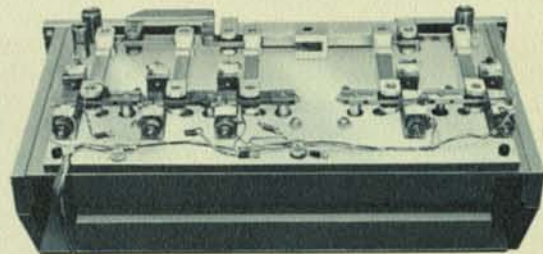
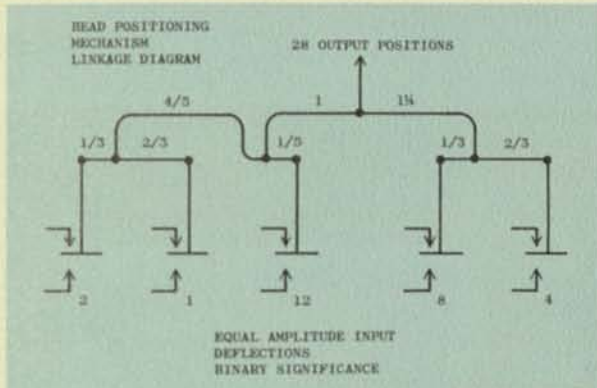


Figure 12. Diagrammatic Representation of Head Positioning Mechanism Showing Linkage Relationships

Figure 13. Head Positioning Mechanism

PERFORMANCE CHARACTERISTICS

The average access time to any stored record at random is made up of the average head positioning time plus an average latency time of one half revolution of the recording medium.

Check reading is performed immediately after writing. It is not necessary for the recording medium to make an extra revolution to check read, as required in other random access devices.

This is illustrated by the characteristic shown in Figure 14. At point A the first access to a record has been achieved in time T_1 . Normally the time T_2 would elapse before check reading could be carried out at point B. The characteristic RAM operation follows line AB, check reading at B still being achieved in time T_1 plus the very small increment of time which elapses due to gap spacing. The elimination of wait time for check reading results in higher processing rates.

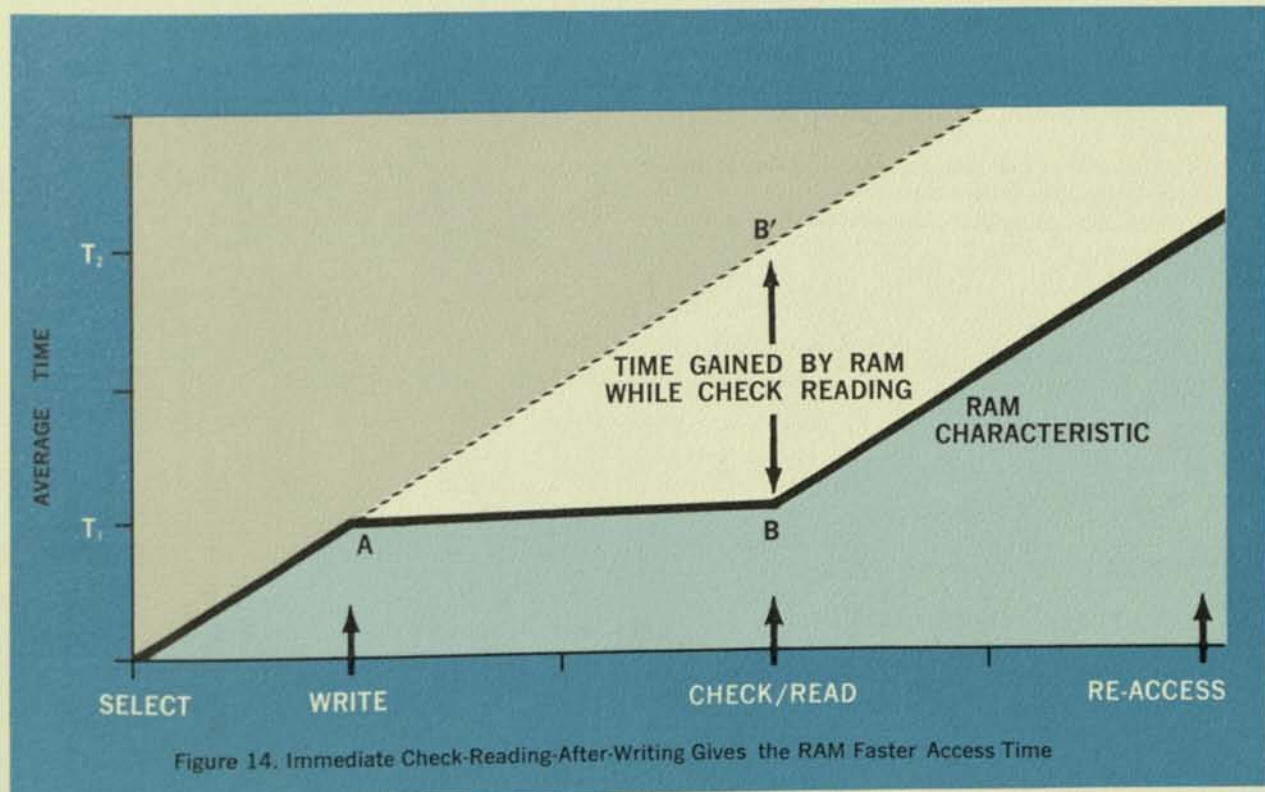


Figure 14. Immediate Check-Reading-After-Writing Gives the RAM Faster Access Time

PERFORMANCE CHARACTERISTICS

continued

DATA SECURITY

As the design approach of the RAM is reviewed feature by feature, it becomes obvious that a vital supplement to the higher performance/price ratio is the new order of data security that is realized. The use of a flexible recording medium eliminates machine damage and information loss resulting from head and disk crashes encountered in other random access memories. The sealed cartridges do not require the rigorous and elaborate machine room procedures which are essential to establish confidence in disk cartridge storage.

Spare tracks on the recording surfaces are unnecessary. Under normal conditions, the tape loops are practically indestructible and it is possible to recover data even in the extreme case of catastrophic damage to a cartridge housing.

SIMPLE MAINTENANCE

The maintenance required to insure reliability is reduced to a minimum and made exceptionally convenient and quick. After sliding back the transparent machine cover, drive blocks can be removed from their mountings after unfastening only two captive screws. This exposes the head post completely in a few seconds. The conveniently laid out components are all easily accessible in the frame assembly of the unit, which has removable cover panels.

EQUIPMENT

The complete Model TLM-4550 RAM System comprises:

- 1 - Free-standing cabinet of welded box frame construction with removable cover panels
- 2 - Faceplates, each with two drive block assemblies and twin loop drive capstans

- 2 - Read/Write head post assemblies, each with eight Read/Write head modules, each module containing four tracks
- 2 - Cartridge loading assemblies with motor drive
- 1 - Head positioning mechanism
- 1 - Capstan drive system

Logic level interface electronics, including Write amplifier, Read amplifier, track addressing system, with address register and associated power supply.

All local controls, interlocks and auxiliary equipment associated with machine functions, including automatic load cycle control, air pressure and vacuum generators.

The equipment is furnished complete with all controls, indicators and internal wiring and ready for interconnection and operation with a suitable control unit.

TAPE PACK CARTRIDGE

Tape Pack cartridges may be supplied on special order to cover a range of storage capabilities. RAM Model TLM-4550 accepts Model ACC-8601 Tape Pack Cartridges which contain 8 tape loops, each 30 inches in length and 2 inches in width. Storage capacity of the ACC-8601 cartridge is in excess of 25.1 million bits. All channels have equal storage capacity and equal bit packing density.

Complete specification for the TLM-4550 and ACC-8601 Tape Pack are given on the following page. For further information, write, wire or call: General Sales Manager, Potter Instrument Company, Inc., 151 Sunnyside Boulevard, Plainview, New York (11803). Telephone: 516 OVERbrook 1-3200. TWX: 510-221-1852. Cable: PICO.

SPECIFICATIONS

I. EQUIPMENT SPECIFICATIONS

MEMORY	Flexible tape loop memory using dual, interchangeable cartridges
METHOD OF RECORDING	Non-contact recording using serial format in multiple unrelated tracks. Potter high-density Write broad/Read narrow configuration
STORAGE CAPACITY	
ON-LINE STORAGE CAPACITY	50.2 million bits
CARTRIDGE CAPACITY	25.1 million bits
TOTAL CYLINDER CAPACITY (without head movement)	1,792,000 bits
SINGLE LOOP CYLINDER CAPACITY (without head movement)	112,000 bits
INFORMATION PER TAPE LOOP	3.1 million bits
INFORMATION PER TRACK	28,000 bits
CARTRIDGE CONFIGURATION	
NUMBER OF TRACKS PER TAPE LOOP	112
INFORMATION PACKING DENSITY	1020 bits/inch
CIRCUMFERENCE OF TAPE LOOP	29.76 inches
RECORDING LENGTH OF TAPE LOOP	27.72 inches
TAPE WIDTH	2 inches
NUMBER OF LOOPS PER CARTRIDGE	8
NUMBER OF CARTRIDGES PER RAM	2
HEAD CONFIGURATION	
Separate Read and Write heads permit immediate check-reading-after-writing.	
OPERATION TIMES	
AVERAGE ACCESS TIME (Random Mode)	96 ms
AVERAGE HEAD POSITIONING TIME	71 ms
MAXIMUM HEAD POSITIONING TIME	85.0 ms
MINIMUM HEAD POSITIONING TIME	45.0 ms
AVERAGE LATENCY TIME	25.0 ms
FULL REVOLUTION TIME	50.0 ms
CHECK-READ LATENCY TIME	0.425 ms
DATA TRANSFER RATE	600 kc/sec
TAPE SPEED	588 inches/sec
INPUT VOLTAGE	117V or 234V ± 10%, 50/60 cps ± .15%
POWER	3KVA maximum
DIMENSIONS	
CARTRIDGE, ACC-8601 (8 loops, 25.1 million bits of on-line capacity)	12 1/8" W x 18" H x 12" D
RAM, TLM-4550 (16 loops, 50.2 million bits of on-line capacity)	46" W x 50" H x 25 1/2" D
WEIGHT, APPROXIMATELY (RAM)	1000 lbs.
WEIGHT, APPROXIMATELY (CARTRIDGE)	12 lbs.

II. ENVIRONMENTAL SPECIFICATIONS

OPERATING	
TEMPERATURE RANGE	40°F to 100°F (5°C to 38°C)
HUMIDITY RANGE	30% RH to 90% RH, no condensation
STORAGE AND TRANSIT (Equipment and Cartridge)	
TEMPERATURE RANGE	-20°F to +140°F (-30°C to +60°C)
HUMIDITY RANGE	Up to 98% RH, no condensation

III. MODES OF OPERATION AND CONTROL SIGNALS

SIGNALS TO UNIT	
TRACK LOCATE (16 loop system)	parallel input comprising 11 binary bits
WRITE ENABLE	Control Signal (level)
DATA INPUT	Serially at selected frequency
SIGNALS FROM UNIT	
EQUIPMENT READY	DC level = 6 volts in ready condition

About POTTER

POTTER WORLDWIDE FIELD SERVICE AND LOGISTICS PROGRAM — Repair centers in strategic locations within the continental United States and abroad have been established to support the entire Potter product line.

Staffed by highly-trained field representatives, these repair centers are equipped to effect on-site installation of equipments and to perform quality repair, maintenance and overhaul.

Supplementing this capability, if a customer prefers to provide his own equipment support, Potter has established standard instruction courses to train customer personnel, either at Potter or in the field.

A Spare Parts Department, backed up by an extremely large inventory and streamlined order processing, is available for customer convenience and economy. This inventory permits the customer to realize virtual elimination of downtime as well as savings on spare parts dollars by offering expeditious delivery for replaceable parts. Delivery is available in 24 hours to meet customer emergency requirements—within 72 hours for standard parts under normal conditions. Potter also offers provisioning and logistics capabilities to meet all existing military specifications.

The Potter field service and logistics program is one of the finest in the EDP equipment industry. With reliable, quality-engineered equipment, supported by comprehensive field service, Potter guarantees satisfaction.



POTTER PLANTS — Tape transport production is carried on in this modern 62,000 sq. ft. plant on Sunnyside Boulevard, Plainview, New York. Building also houses corporate offices, sales, engineering and research groups.

East Bethpage Road plant (below), completed in 1963, produces high-speed printers. A third plant in Luquillo, Puerto Rico, manufactures magnetic and photoelectric recording and playback heads. Total manufacturing space in all Potter plants exceeds 110,000 sq. ft.

Present Potter employment is in excess of 650 people.



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POTTER

PRODUCT
DATA
1-403

MODEL MSA375 READ/WRITE SWITCHING AMPLIFIER



MULTIPLE TAPE STATION

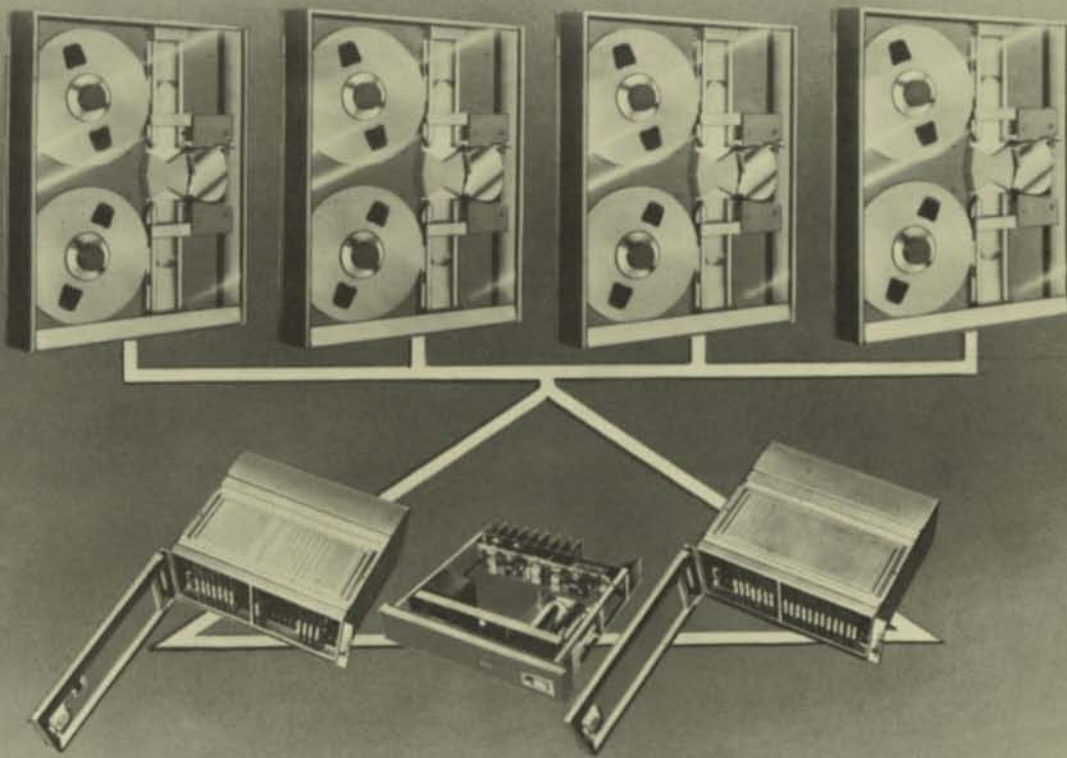


Figure 1. MSA375 Read/Write Switching Amplifier
Interconnected with Four MT-24 Transports

INTRODUCTION

The Potter MSA375 Switching Amplifier System reduces the cost of digital magnetic tape systems by permitting time-sharing of a single Read/Write amplifier package among groups of up to four tape units. Switching is performed by solid-state devices. Transport selection is provided by energizing one of four transport lines.

By specifying tape transport and Read/Write amplifier from a

single supplier, the computer system designer secures the advantage of undivided responsibility in a complex area of electromechanical equipment which includes multilevel linear, control, and information logic signals. He need only concern himself with processing.

An integrated digital tape system consisting of Potter tape transports, Read/Write heads, amplifier electronics and amplifier switching system assures the best performance at the lowest cost.

EFFECTIVE: APRIL 15, 1964

DESCRIPTION

The MSA375 Read/Write Switching Amplifier System consists of two chassis: a main (-M) and local (-L). The MSA375 simplifies the design tasks of the systems engineer by providing complete compatibility with all 1/4-inch IBM tape formats at all packing densities, together with the necessary auxiliary logic and control functions.

For a 4x1 switching system one MSA375-M chassis and one MSA375-L chassis are required. Special versions of the MSA375 using multiple MSA375-L chassis to provide switching of more than four transports can be supplied. Consult your Potter Sales Engineer for specific details.

FEATURES...

- Compatible with IBM, 7-channel format; packing densities of 200/556/800 bpi
- Time-sharing of up to four tape units
- Simultaneous Read/Write capability; simultaneous Write only and Read only on two different transports
- Switching recovery time—1 milliseconds
- Designed to minimize maintenance costs:
 - a) solid-state modular construction
 - b) accessible test points at front of chassis to permit making most adjustments with modules in normal positions
 - c) extension frames provide complete exposure of all plug-in modules for circuit testing under actual operating conditions
 - d) standard 19" rack mounting
 - e) independent packaging of short-circuit-proof power supply
- Selectable dual threshold amplifiers
- Assured tape interchangeability between IBM-compatible tape units
- Silicon switch elements and precision metal oxide film resistors for critical switching operations
- Low-cost 4x1 switching is standard in basic system.
- All functions controlled by computer logic signals
- Built-in lateral parity check on reading
- Integral longitudinal parity character recognition
- Short-circuit-proof output circuits
- Peak detection Read Amplifier
- Circuitry provides for accurate Write and Read skew compensation
- In-line Read output of all character bits and clock pulse output

SPECIAL OPTIONAL FEATURES...

- MSA375 units may be interconnected to provide switching between more than four transports
- Forward and Reverse Read capability may be provided
- Dual tape speed operation available

For further information, consult your Potter Sales Engineer.

SPECIFICATIONS... 4 X 1 SYSTEM

CAPACITY	Simultaneous Read/Write operation of any one of a group of two, three or four transports at one time, or simultaneous Write only and Read only on two different transports
TAPE FORMAT	IBM 7-channel, NRZ mod.
TAPE SPEED	30 to 75 ips (up to 120 ips available on special order)
PACKING DENSITY	200/556/800 bpi
TAPE UNIT SELECT LOGIC	One of four lines
WRITE SWITCHING TIME	Amplifier is ready to write after Tape Unit Select command within a time equal to the Write Current Turn-On Time plus 10 μ sec. (Normally—15 μ sec)
READ SWITCHING TIME	Transient recovery time: 1 msec
READ AMPLIFIER BLANKING	Read amplifier output is inhibited for a 1.5 msec period after change in the Tape Unit Select signal
READ/WRITE HEAD	Potter Model 7513-7 for high speed (50-120 ips) 7552-7 for low speed (30-50 ips)
ERASE HEAD	Potter Model EH-2 with 906II and MT-120 Tape Transports Potter Model EH-3 with MT-24, -36, and -75 Tape Transports
ERASE HEAD SELECT	Concurrent with Write head Select
WRITE LOCK-OUT	Switched as transports are selected
CABLE LENGTHS	
Read/Write Head to MSA375-L	12 ft., maximum
MSA375-L to MSA375-M	12 ft., standard, 100 ft. maximum on special order
CABLE CAPACITANCE	20 pf/ft. maximum. Individual twisted pairs in individual braid shields. Individual shields tied together at connector and to circuit ground. Read and Write Head cables run separately in overall braided shields which connect to chassis ground at connector
UNIT SELECT SIGNAL	Previous Select signal line must be in Logic "O" state before subsequent Select signal is applied. Only one Select line may be active at any time.

STANDARD EQUIPMENT

STANDARD BASIC CHASSIS (7-Channel Format, IBM-Compatible)

TWO CHASSIS, AN MSA375-L (LOCAL) AND AN MSA375-M (MAIN), ARE REQUIRED FOR A 4 x 1 SWITCHING SYSTEM

DESCRIPTION

The MSA375 Read/Write Switching Amplifier System consists of two chassis: a main (-M) and local (-L). The MSA375 simplifies the design tasks of the systems engineer by providing complete compatibility with all 1/2-inch IBM tape formats at all packing densities, together with the necessary auxiliary logic and control functions.

For a 4x1 switching system one MSA375-M chassis and one MSA375-L chassis are required. Special versions of the MSA375 using multiple MSA375-L chassis to provide switching of more than four transports can be supplied. Consult your Potter Sales Engineer for specific details.

FEATURES...

- Compatible with IBM, 7-channel format; packing densities of 200/556/800 bpi
- Time-sharing of up to four tape units
- Simultaneous Read/Write capability; simultaneous Write only and Read only on two different transports
- Switching recovery time—1 millisecond
- Designed to minimize maintenance costs:
 - a) solid-state modular construction
 - b) accessible test points at front of chassis to permit making most adjustments with modules in normal positions
 - c) extension frames provide complete exposure of all plug-in modules for circuit testing under actual operating conditions
 - d) standard 19" rack mounting
 - e) independent packaging of short-circuit-proof power supply
- Selectable dual threshold amplifiers
- Assured tape interchangeability between IBM-compatible tape units
- Silicon switch elements and precision metal oxide film resistors for critical switching operations
- Low-cost 4x1 switching is standard in basic system.
- All functions controlled by computer logic signals
- Built-in lateral parity check on reading
- Integral longitudinal parity character recognition
- Short-circuit-proof output circuits
- Peak detection Read Amplifier
- Circuitry provides for accurate Write and Read skew compensation
- In-line Read output of all character bits and clock pulse output

SPECIAL OPTIONAL FEATURES...

- MSA375 units may be interconnected to provide switching between more than four transports
- Forward and Reverse Read capability may be provided
- Dual tape speed operation available

For further information, consult your Potter Sales Engineer.

MODEL	DESCRIPTION	REQUIRED PER SYSTEM (4x1)
MSA375-L (1) (Chassis)	Chassis wired for operation with four transports. Provides the Read/Write Head Selection circuitry, the Read Preamplifiers, the Write Amplifier and Write Skew Compensation circuitry for operation of up to four tape transports. Wired to receive 13 printed circuit boards	1
Local Chassis (MSA375-L) Requires the Following Modules:		
RP 41 READ PREAMPLIFIER (2)	Provides linear amplification of playback signals from Read head of selected transport. Circuitry for one channel per board	1
RP 42 READ PREAMPLIFIER (2)	Similar to RP 41 except two circuits per board are provided	3
HS 40 HEAD SELECTOR	Provides Head Selection circuitry and transient suppressor driver for selection of Read head from one of four transports	1
WA 41 WRITE AMPLIFIER	Provides the Write flip-flop and head selection circuit for operation of one Write channel. Selection of circuitry for four transports is included	1
WA 42 WRITE AMPLIFIER	Similar to WA 41, except two channels are provided per board	3
WS 43 WRITE SKEW COMPENSATOR (2)	Provides three multivibrators to compensate three Write channels for operation at 556 and 800 bpi. Timing selection for multivibrators is provided on the TC 44 board	1
WS 44 WRITE SKEW COMPENSATOR (2)	Similar to WS 43 except that four multivibrators are provided for four Write channels	1
TC 44 TIMING CONTROL	Provides the selectable Skew adjustment resistors for the timing of the Write Skew multivibrator for each Write channel of up to four transports	1
WC 42 WRITE CONTROL (3)	Provides the control functions of Write Reset, and the combined Write and Erase Enable, and the connections for the Write Lock-Out switch and Erase head used in the writing functions of the amplifier	1
MSA375-M (Chassis) (4)	Chassis wired to provide the Read Amplifiers, Read Skew Compensator, Read Buffer Outputs plus the Clock Generator and Control for operation with up to 16 transports. In standard 4 x 1 system, the chassis is wired for 14 printed circuit boards, including optional lateral parity circuit	1
Main Chassis (MSA375-M) Requires the Following Modules:		
RA 41 READ AMPLIFIER	Provides final stage of linear amplification, rectifier, asymmetry adjustment, peak detector and integration circuit to digitize linear playback signals. One circuit per board	1
RA 42 READ AMPLIFIER	Similar to RA 41 except that circuits for two channels are provided per board	3

(continued on page 4)

- NOTE (1): 375-L-1 is used with a maximum of four transports, 375-L-2 is used when more than four transports are required.
- NOTE (2): Write Skew, Read Skew Read Preamplifiers and Read Amplifiers use 3 dash numbers to indicate the variables required to operate between 30 ips and 120 ips. These dash numbers are: -2, 30 to 36.0; -3, 36.1 to 72.0; -4, 72.1 to 120.
- NOTE (3): The Write Control card, WC 42, uses two dash numbers to indicate which erase heads are used with the transports. -1: EH-1, EH-2-A-2, EH-2-B-2, EH-3. -2: EH-2-A-1, EH-2-B-1.
- NOTE (4): 375-M-1 is used when a CP 502 Control Panel is supplied. 375-M-2 is used when no control panel is supplied.
- NOTE (5): Required when the CP 502 is supplied.

MODEL	DESCRIPTION	REQUIRED PER SYSTEM (4x1)
RS 43 READ SKEW COMPENSATOR (2)	Provides multivibrators used to compensate for static Read Skew. Includes three multivibrators for Skew Compensation of three channels and 800 bpi strobe delay multivibrator (CG-20)	1
RS 44 READ SKEW COMPENSATOR (2)	Similar to RS 43 except four multivibrators are provided for Skew Compensation of four Read channels	1
TC 44 TIMING CONTROL	Same timing control module used in the -L chassis. Provides fixed timing adjustments for Read Skew Compensation	1
RB 03 READOUT BUFFER	Provides Read flip-flop, gating circuitry and output drive for information channels. Contains circuitry for three channels and clock output	1
RB 04 READOUT BUFFER	Similar to RB 03 except that circuitry for four channels is provided	1
CG 20 CLOCK GENERATOR	Provides internally-clocked IBM Strobe Signal appropriately delayed, the Read Reset pulse for the Read flip-flops and End-Of-Block indication. Also includes strobe delay multivibrators for operation at 200, 556 and 800 bpi (RS-43), and end-of-block selection circuitry for multiple density operation.	1
CT 40 CONTROL	Provides control functions for amplifier operation. Includes control inputs for Low Threshold Select, Read Inhibit, End-of-Block Detection Inhibit, Read Reset and Density Selection at 200, 556 and 800 bpi, and automatic blanking circuitry for End-of-Block, Read Reset, and Read Inhibit	1
SC 41 SELECTION CONTROL	Provides circuitry for selection of one of four transports	1
SD 41 SELECT & DENSITY DRIVER	Provides circuitry for Select lamp drivers and density switch drivers	1
PC 01 PARITY CHECK	Provides circuitry to check odd/even lateral parity of each character read from Read character flip-flops	1
EX 01 EXTENSION	. . . . .	1
P 11 POWER SUPPLY	Provides regulated dc output for operation of MSA375 Read/Write Amplifiers. —15 volt supply at 4 amps; +15 volt supply at 0.75 amps	1
CP 502 CONTROL PANEL	Panel which provides all controls normally contained on EC-36 and Density Select switch, Read/Write Select, File Protect, Auto/Local and EOT indicators and the Address Select switch	1

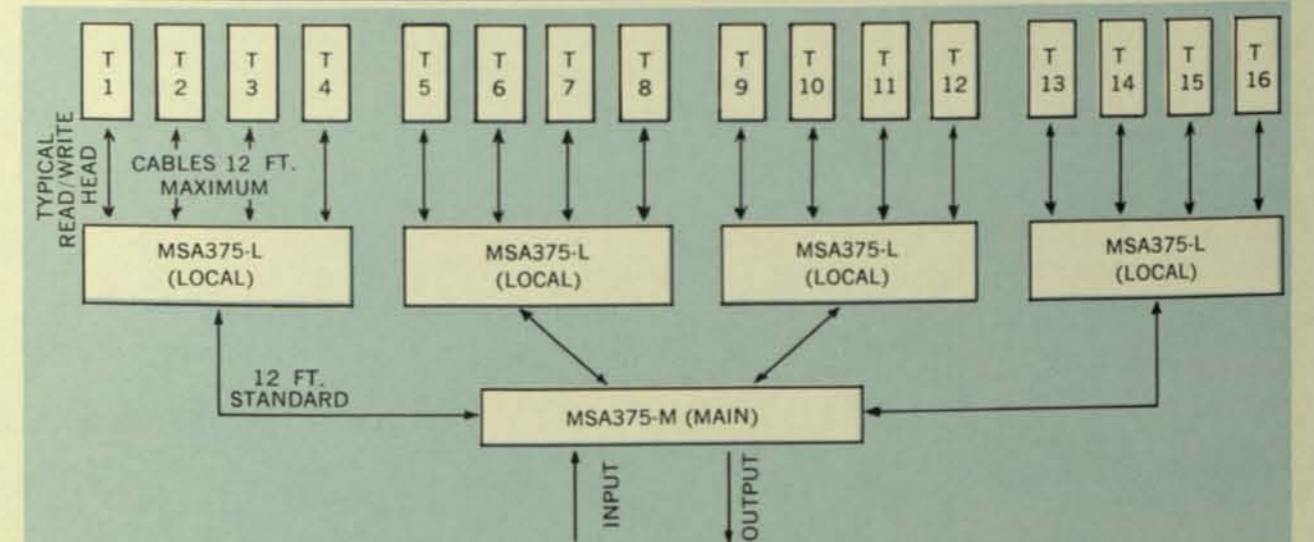


Figure 2. Typical 16x1 MSA375 Read/Write Switching Amplifier System

SPECIFICATIONS... 4 X 1 SYSTEM

CAPACITY	Simultaneous Read/Write operation of any one of a group of two, three or four transports at one time, or simultaneous Write only and Read only on two different transports
TAPE FORMAT	IBM 7-channel, NRZ mod.
TAPE SPEED	30 to 75 ips (up to 120 ips available on special order)
PACKING DENSITY	200/556/800 bpi
TAPE UNIT SELECT LOGIC	One of four lines
WRITE SWITCHING TIME	Amplifier is ready to write after Tape Unit Select command within a time equal to the Write Current Turn-On Time plus 10 μ sec. (Normally—15 μ sec)
READ SWITCHING TIME	Transient recovery time: 1 msec
READ AMPLIFIER BLANKING	Read amplifier output is inhibited for a 1.5 msec period after change in the Tape Unit Select signal
READ/WRITE HEAD	Potter Model 7513-7 for high speed (50-120 ips) 7552-7 for low speed (30-50 ips)
ERASE HEAD	Potter Model EH-2 with 906II and MT-120 Tape Transports Potter Model EH-3 with MT-24, -36, and -75 Tape Transports
ERASE HEAD SELECT	Concurrent with Write head Select
WRITE LOCK-OUT	Switched as transports are selected
CABLE LENGTHS	
Read/Write Head to MSA375-L	12 ft., maximum
MSA375-L to MSA375-M	12 ft., standard, 100 ft. maximum on special order
CABLE CAPACITANCE	20 pf/ft. maximum. Individual twisted pairs in individual braid shields. Individual shields tied together at connector and to circuit ground. Read and Write Head cables run separately in overall braided shields which connect to chassis ground at connector
UNIT SELECT SIGNAL	Previous Select signal line must be in Logic "0" state before subsequent Select signal is applied. Only one Select line may be active at any time.

INPUT/OUTPUT LINES . . .

Input Lines

Data Input Pulse	Logic "1"	Ground $\pm 0.5v$
	Logic "0"	-3.5 to -15vdc
Input Current	Logic "1"	1.5 ma sink
	Logic "0"	None
a) Write Inputs (7 lines) (See Write Clock below)	Level (RB)	A "1" is written when the input is switched from "0" to "1." Maximum 1 microsecond rise time for the minimum voltage swing (3.5v). If a rectangular wave is used, the maximum duty cycle of the input is 50% of the pulse period. Minimum pulse width is 1 microsecond.
b) Write Clock	Level	All Write inputs are simultaneously enabled when the Write clock line is raised to ground and a "1" is written by all Write input lines which are at ground.
c) Write Enable	Level	Enabled with Logic "1" signal.
d) Write Reset	Level	Reset with Logic "1" signal. Minimum pulse width is 2.0 μ sec.
e) Erase Head Enable	Level	Enabled with Logic "1" signal.
f) Read Inhibit	Level	Inhibited with Logic "1" signal.
g) Read Reset	Level	Reset with Logic "1" signal. Minimum pulse width is 2.0 μ sec.
h) Density Select 200	Level	Selected with Logic "1" signal.
i) Density Select 556	Level	Selected with Logic "1" signal.
j) Density Select 800	Level	Selected with Logic "1" signal.
k) Threshold Select High/Low	Level	High: Logic "0"; Low: Logic "1"
l) Unit Select (4 lines)—Write	Level	Appropriate Write head on selected transport selected with Logic "1" signal.
m) Unit Select (4 lines)—Read	Level	Appropriate Read head on selected transport selected with Logic "1" signal.

Output Lines

Output levels	logic "1"	Ground ± 0.5 V DC
	logic "0"	-10 V DC -2.0 V +1.0 V
Output current	logic "1"	20 ma sink
	logic "0"	20 ma source
a) Read Outputs		
Pulse width		0.5 to 2.0 microsecond adjustable
Rise time		0.2 microseconds into 1000pf capacitance to ground
Fall time		0.3 microseconds into 1000pf capacitance to ground
b) Clock Output		
Same characteristics as Read Outputs		
Occurs simultaneously with Read Outputs		
c) End of Block Signal		
Detects absence of two clock pulses		
Pulse width		1 millisecond
Rise time		0.2 microseconds into 1000pf capacitance to ground
Fall time		0.3 microseconds into 1000pf capacitance to ground
Signal normally at logic "0" level.		
Switches to logic "1" level for 1 millisecond to indicate end of block.		
Transition from logic "1" to logic "0" can be used to strobe longitudinal check bit register.		
Transition from logic "0" to logic "1" can be used to initiate transport stop signal.		
Note: An input to inhibit the End of Block Signal in reverse Read operation is available.		
d) Lateral Parity, Odd and Even *		
Same characteristics as Read Outputs.		
Occurs simultaneously with Read Outputs.		

*Optional—Additional Card (PC-01) Required

Information subject to change without notice.

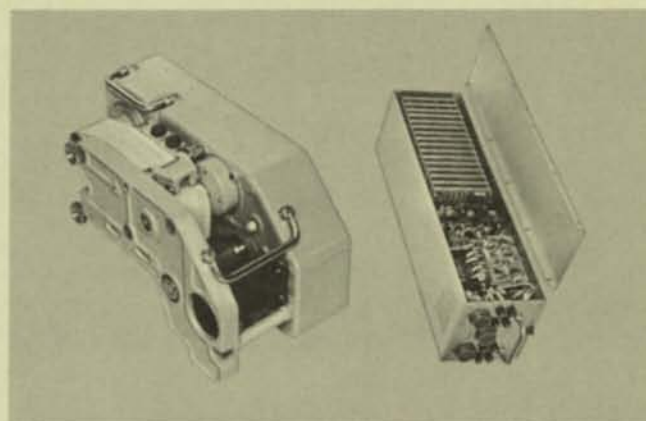


POTTER INSTRUMENT COMPANY, INC.

151 SUNNYSIDE BOULEVARD, PLAINVIEW, LONG ISLAND, N. Y. (516) OV 1-3200

POTTER

HSP-3606 ON-LINE ALPHANUMERIC PRINTER



The HSP-3606 printer is designed for a maximum printing speed of 10 lines per second. This printer is a rugged, militarized unit constructed and tested to operate under the severe environmental conditions demanded of most military applications.

SPECIFICATIONS

PRINT-OUT SPEED	3 to 10 lines per second
NUMBER OF COLUMNS	10 columns maximum. 8 columns for digital information and 2 columns for special information.
PAPER TYPE	Pressure sensitive
LINE STORAGE	4 columns, data lead shared.
DATA INPUT	Series parallel loading. Information presented on 16 lines (4 columns of 4 level BCD lines) for storage. Information is then re-loaded for parallel entry of remaining 4 columns and the print cycle is initiated. Special columns require single line input for each character.
TEMPERATURE RANGE	Printer will function normally from 0°C to +55°C.
INPUT POWER	110VAC, single phase, 400 cps. 28VDC.
DIMENSIONS	
Mechanical	8" wide x 8" high x 15 1/2" deep
Electronic	7" wide x 7" high x 22" deep

Information subject to change without notice.



POTTER INSTRUMENT COMPANY, INC.

151 SUNNYSIDE BOULEVARD • PLAINVIEW, NEW YORK • (516) 681-3200

POTTER

HSP-3603 HIGH-SPEED PRINTER

PRODUCT
DATA

3-204

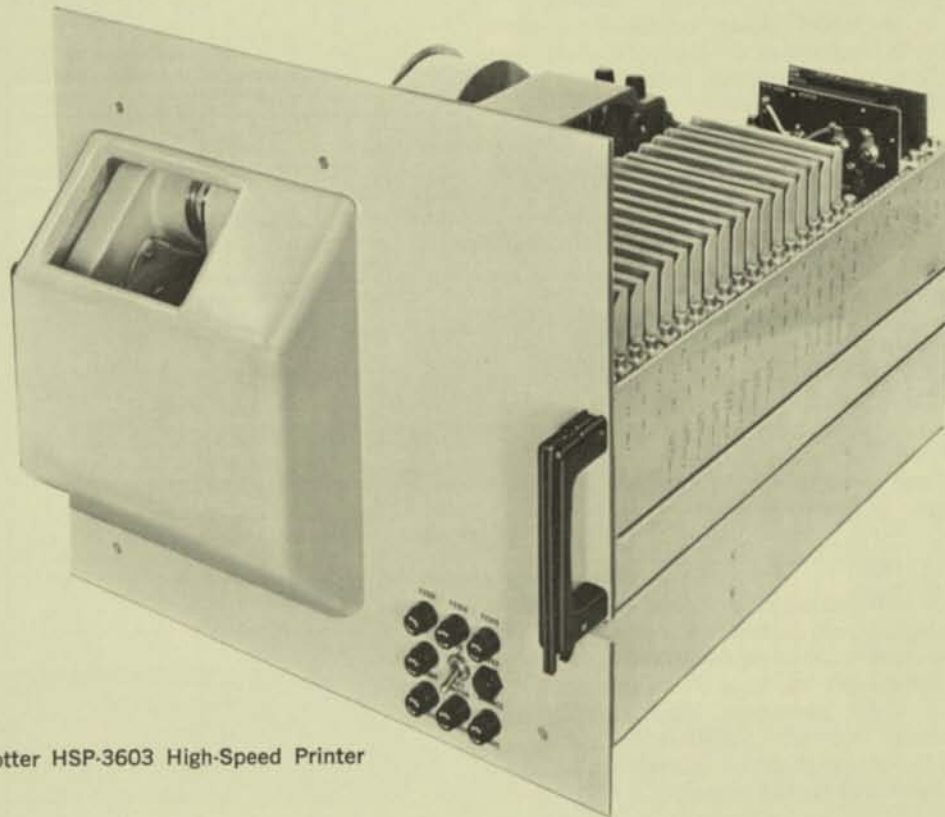


Figure 1 — Potter HSP-3603 High-Speed Printer

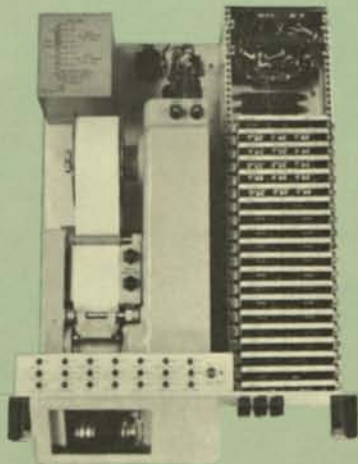


Figure 2 — Potter HSP-3603
High-Speed Printer Electronics

FEATURES

- Solid-state circuitry, mounted on keyed plug-in PCBs
- Printing speed of 600 lpm
- 400 feet of internal paper storage and supply facilities
- Free flight hammers eliminate the need for adjustments
- Convenient operator controls including test points
- Militarized construction meeting the applicable portions of: MIL-E-16400, MIL-T-21200, MIL-Q-9858
- Complete support documentation

DESCRIPTION

The Potter HSP-3603 Militarized High-Speed Printer is a series-parallel input type printer capable of printing up to 12 columns with 16 characters available per column at 600 lines per minute. Data is presented serially by character and parallel by bit, asynchronously up to 95 kc rate.

The printer is self-contained, consisting of a fixed mechanical and electronics unit, assembled on a rack mounted chassis. Logic circuits and power supply are mounted on keyed plug-in modules.

Utilizing a staggered character two-font drum, print quality is unsurpassed. Its solid-state electronics and field proven printer mechanism assure highest reliability.

OPERATING CONTROLS AND INDICATORS

1. Motor - ON-OFF Switch
2. Initial Power AC & DC controlled by user's equipment through printer power relay
3. "Paper Advance" pushbutton
4. Adjustable Line Space Potentiometer
5. Test points to allow simple isolation of a malfunction and for routine preventive maintenance
6. Additional operating controls located on Mechanical Unit
 - Paper Feed Forward
 - Paper Feed Reverse
7. Elapsed time indicator

SYSTEM OUTLINE

The HSP-3603 Militarized High Speed Printer offers a printer system which includes a line buffer. The buffer storage system is capable of receiving information asynchronously up to a 95 kc rate which is ideal for "on line" operation. This results in a simplified printer interface. Another desirable feature is the self contained paper storage and supply facilities for over 400 feet of paper.



Figure 3 - Drum Format

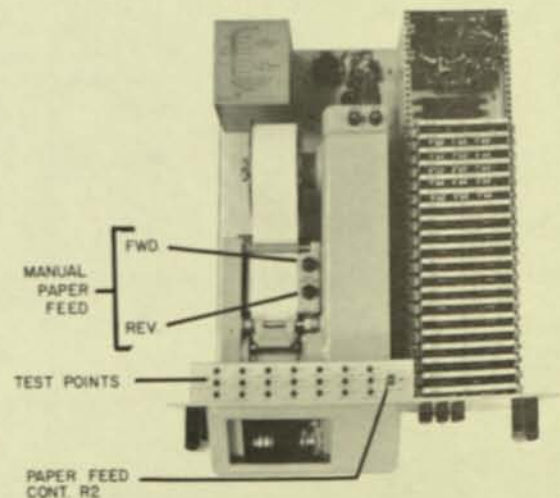
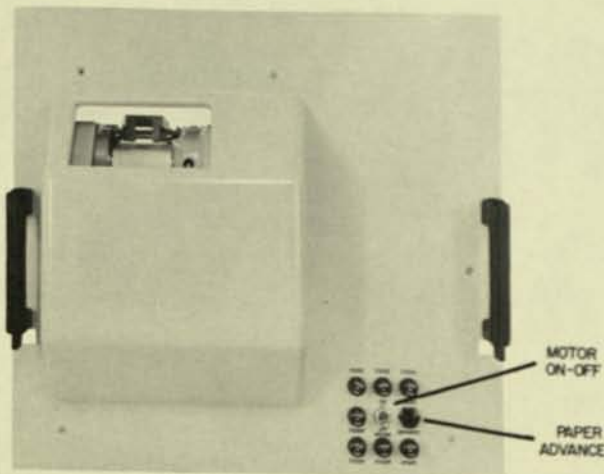


Figure 4 - Operating Controls

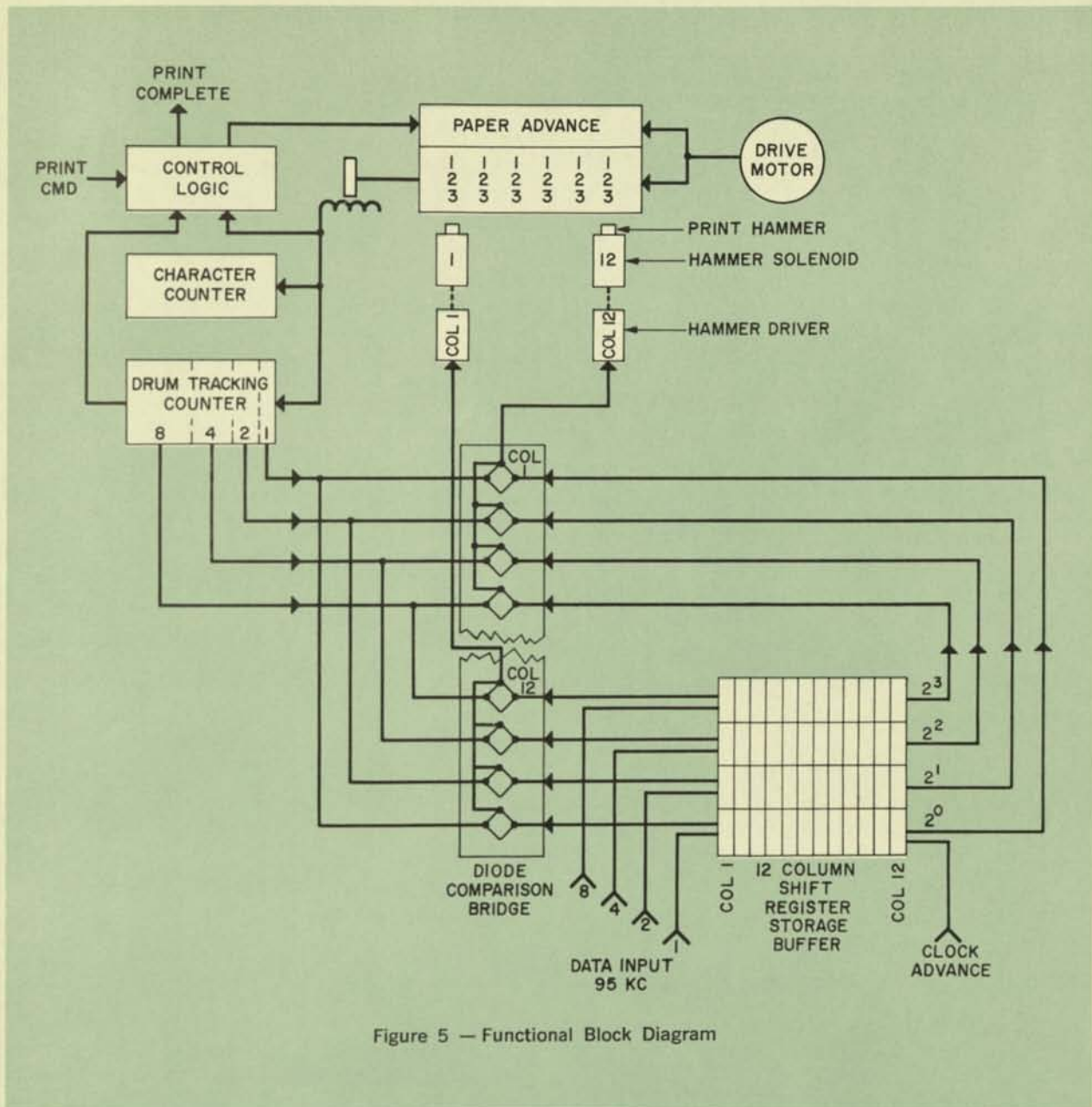


Figure 5 — Functional Block Diagram

ENVIRONMENTAL SPECIFICATIONS

- | | |
|--|--|
| <p>A. TEMPERATURE</p> <p>B. ALTITUDE</p> <p>C. VIBRATION</p> <p>D. SHOCK</p> | <p>Operating: -20°C to +55°C
Non-Operating: -62°C to +85°C</p> <p>Operating: 10,000 feet
Non-Operating: 50,000 feet</p> <p>5 to 55 cycles at 10 g's
15 g's</p> |
|--|--|

SPECIFICATIONS

PRINTOUT SPEED	600 lines/minute
LINE CAPACITY	12 columns, standard
CHARACTER SELECTION	16 characters, standard
PAPER STOCK	Pressure sensitive — 400 foot capacity spool (supply and storage facilities contained in printer)
ELECTRONICS	The printer contains power supply and necessary logic required for printing and decoding of the information presented
INPUTS	Data — Information must be supplied parallel by bit and serial by character at a maximum input rate of 95 kc. Information must be presented in pulse form, 4 level (8421) binary coded. Clock pulse must precede the character presented by 2 microseconds
INPUT SIGNAL CHARACTERISTICS	AC or DC coupled pulse, width 2.5 milliseconds minimum Rise time — 1 μ sec maximum Amplitude: 8V \pm 1V
OUTPUTS	DC Load Gate: "0" volts indicates printer is ready to accept data "-7.2V to -10V" indicates printer busy. Optional — buffer ready — pulse output Supplied after the 12th clock to initiate the print cycle
PRINT COMMAND	
VALIDATION CHARACTER	The 12th column will yield normal printout. However, if the validation symbol is desired, a separate line may be energized and will print out the symbol immediately (see drum format)
INPUT POWER	A. 115 VAC, \pm 10%, 400 cycle, single-phase @3 amperes B. 28 VDC, @2 amperes
DIMENSIONS	17 $\frac{1}{2}$ " H, 19" W, 22" D
WEIGHT	95 pounds, approximately

HIGH SPEED PERFORATED TAPE READERS AND SPOOLERS

Potter manufactures a line of high speed tape readers and spoolers that have proven successful in a variety of military and commercial applications.

Constructed to military specifications, these high speed systems provide synchronous, bidirectional operation at 300 characters/second. Asynchronously, these units will operate at 70 characters/second.

Product features include photoelectric sensing with silicon solar cells for high reliability, completely transistorized silicon semiconductors, high speed reading at 5, 6, 7 or 8 level perforated tape, individual sensitivity adjustments and self-contained regulated power supply.

POTTER SERVICE

Potter Repair Centers have been established in strategic locations within the continental United States and abroad, to support the entire Potter product line.

Staffed by trained representatives, these centers are equipped to effect on-site installation of equipment, and to perform repair, maintenance and overhaul functions.

In addition, Potter spare parts are available on a 24-hour delivery basis to meet any customer's emergency requirements — within 72 hours for standard parts under normal conditions. Potter also offers provisioning and logistics capabilities to meet all existing military specifications.

Information subject to change without notice.



POTTER INSTRUMENT COMPANY, INC.

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POTTER

MT-120 MAGNETIC TAPE TRANSPORT AND MAGNETIC TAPE SYSTEMS



*Replacement by SC-1030
~ 4 yrs old
11/14/68*

DESCRIPTION

The MT-120 is a high-speed digital magnetic tape transport for use with high performance computers as on-line or auxiliary equipment where high transfer rates are required. This field-proven unit, providing maximum performance in a minimum size package, is unsurpassed in the industry for overall economy both in original equipment costs and operational cost performance.

The MT-120 provides unrestricted bidirectional tape speeds to 120 ips at all packing densities — speeds to 150 ips with minor program restrictions. IBM-compatible 7- and 9-channel (IBM 360 and ASCII) formats are available. Other tape formats utilizing 1/2- or 1-inch tape are also provided.

The transport features front access to all components, push button tape loading, a two-stage vacuum blower for quick operation, vertical or horizontal mounting, and fully transistorized drive electronics. Sturdy loop control arms provide secondary bulk storage on each side of the recording head. This tape reservoir capacity accommodates higher speed operation. Changes in tape direction and velocity are sensed by the loop control arms which also provide control to the reel servos. Low tape sensor and loop control arms are simultaneously retracted by the tape load button for convenient reel loading.

FEATURES

- Bidirectional tape speeds up to 120 ips (150 ips with 1/2" tape with some program restrictions)
- Reliable data transfer to 240 kc (bcd)
- Unrestricted programming
- IBM 7- and 9-channel (IBM 360 and ASCII) capability
- Information density to 800 bpi, NRZ
- Push-button arm retraction for faster reel loading
- Two-stage vacuum blower for quiet operation
- Fully transistorized control and amplifier electronics
- Optional "slope-front" cabinet or vertical cabinet
- Vertical or horizontal mounting

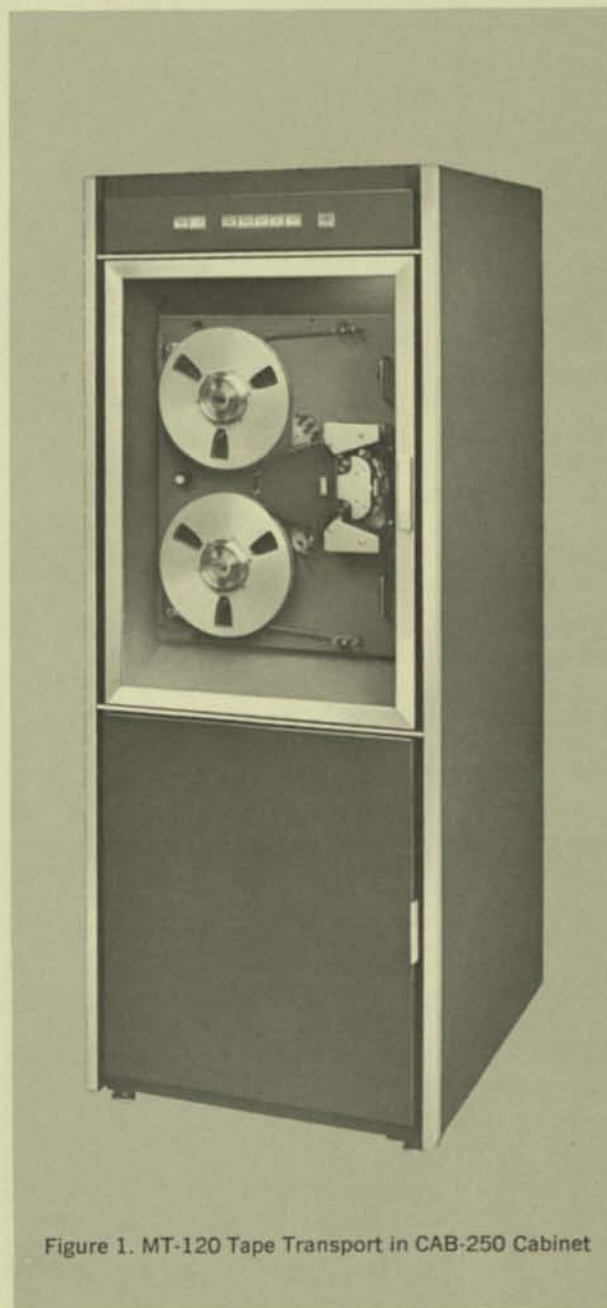


Figure 1. MT-120 Tape Transport in CAB-250 Cabinet

EFFECTIVE APRIL 25, 1966

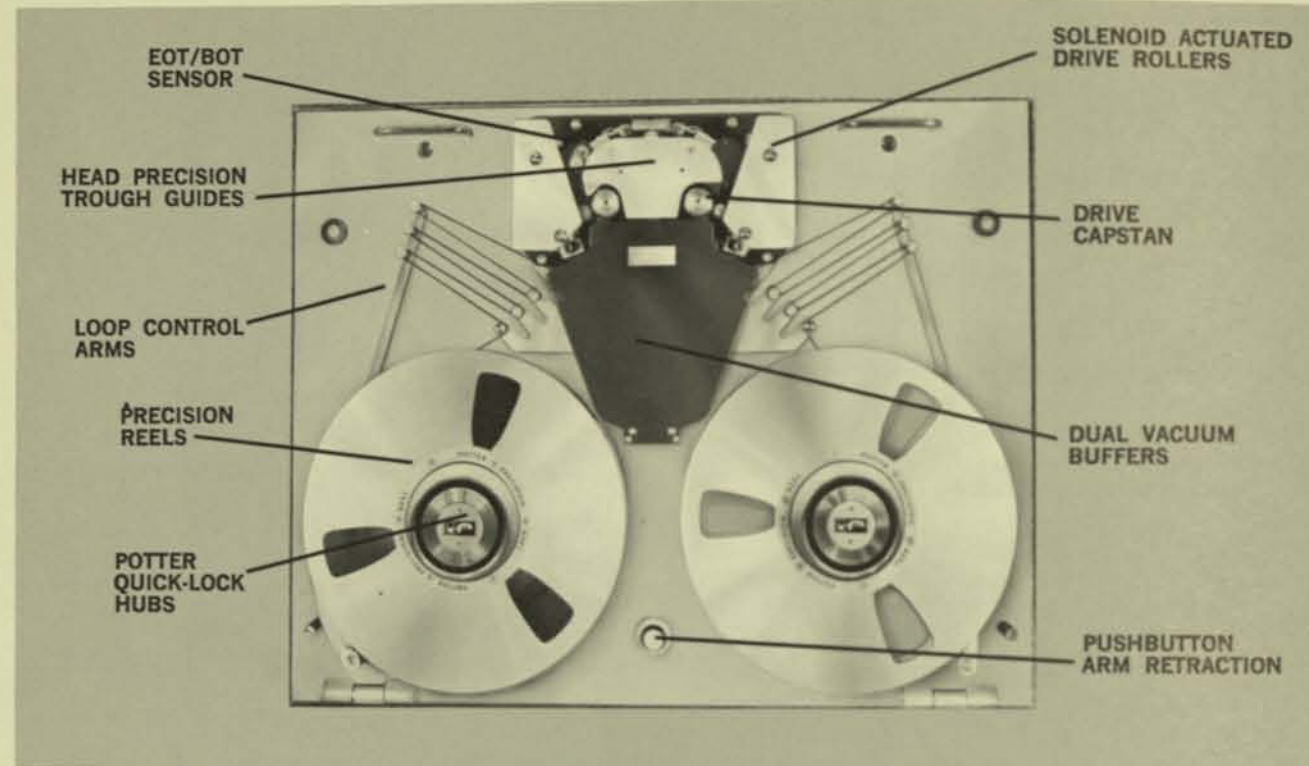


Figure 2. MT-120 Tape Drive.

MT-120 MAGNETIC TAPE TRANSPORT

The MT-120 transport includes the following as standard equipment:

- Tape drive
- Drive electronics
- Supply transformer

Accessory equipment generally supplied with MT-120 transport includes:

- Read-write magnetic heads
- Reels and hubs
- Write lock-out (write enable)
- EOT and BOT sensing
- Dust cover (or cabinet)

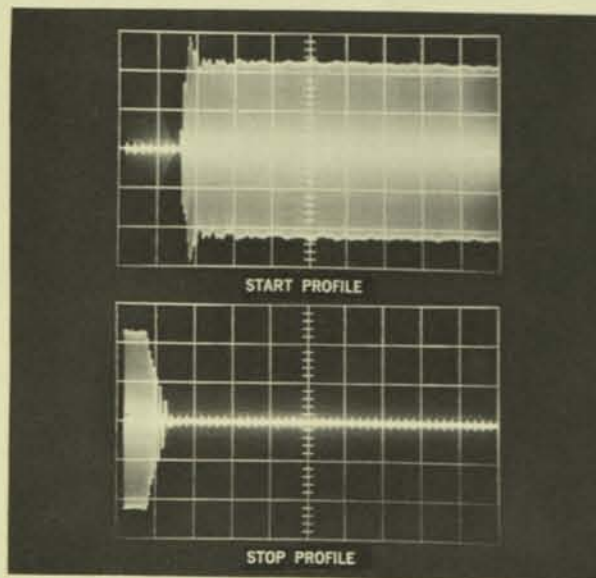


Figure 3. Typical Velocity Profiles (1 div. = 1 ms)

TAPE LOOP CONTROL

Loop control arms provide slack-loop storage and feedback for servos. Stronger arm design gives improved tape guiding and longer tape life.

VACUUM BUFFERS

High capacity dual vacuum buffers isolate loop control arms from drive roller and capstan drive system. An improvement of the Potter-pioneered vacuum buffer system, the new enlarged buffers accommodate more tape and respond rapidly and smoothly. Start-stop, reverse-stop, forward-reverse programming is accommodated at 120 ips without restriction over the entire cycling range from 0-200 commands per second. Start time is less than 3.0 ms to 120 ips $\pm 10\%$. Stop time is less than 1.5 ms from 120 ips. See Figure 3 for velocity profiles.

DRIVE ELECTRONICS

The EC-120 all solid-state drive electronics assembly is a standard component of the MT-120 tape transport. This unit generates all control signals and voltages required for transport operation from computer-type or manual command signals.

DRIVE SYSTEM

Bi-directional tape motion is controlled by two drive capstans and their associated solenoid-actuated drive rollers. The drive capstans are driven by a heavy-duty, hysteresis synchronous motor to provide uniform tape speed. New current switching drive circuitry gives faster, more uniform start-stop performance.

SUPPLY TRANSFORMER

The TR-120 transformer supplies all necessary voltages for operation of the MT-120 transport.

MT-120 SPECIFICATIONS

TAPE SPEED: Forward/Reverse	120 ips max, without program restrictions 150 ips max, with minor program restrictions												
TAPE SPEED VARIATIONS	$\pm 2\%$												
STANDARD SPEED COMBINATIONS	75/225, 100/200, 112.5/225, 120/240. Both speeds may be used in forward and reverse directions. The lower speed is for Read/Write; the higher speed is for rewind.												
PERFORMANCE FIGURES	at 120 ips with $\frac{1}{2}$ inch, 1 $\frac{1}{2}$ mil Mylar												
START TIME	Less than 2.0 ms from receipt of command to start of tape motion. Less than 3 ms from receipt of command to within $\pm 10\%$ of nominal tape speed.												
START DISTANCE	Over a cycling range of 0 to 200 commands per second, tape travels 0.180" ± 0.045 " (120 ips) at 3 ms after receipt of start command.												
STOP TIME	Less than 1.5 ms.												
STOP DISTANCE	Tape travel is 0.110" ± 0.03 " max (120 ips).												
COMMAND REPETITION RATE	0 to 200 commands per second (up to 120 ips).												
WOW & FLUTTER	Less than 2% rms at 120 ips (steady running).												
INTERCHANNEL TIME DISPLACEMENT (at 120 ips, $\frac{1}{2}$ " tape) —	Static: 3 microseconds, maximum, at 120 ips Dynamic ± 2 microseconds at 120 ips Total: 5 microseconds, maximum, at 120 ips.												
TAPE WIDTHS	$\frac{1}{2}$ or 1 inch.												
TAPE TYPE	1 $\frac{1}{2}$ mil Mylar recommended.												
TAPE REELS	Potter precision NAB or IBM 10 $\frac{1}{2}$ " dia. reels.												
HUBS	Potter NAB or IBM "QUICK-LOCK" optional.												
TAPE THREADING	In line, quick, simple; push-button control of electrically operated retraction mechanism for loop and low tape sensor arms.												
FIXED TAKE-UP REEL	Precision captive take-up reel available.												
CONTROL LINES	Standard logic levels are -5 to -15 volts for "action" and 0 volts for "no action". Other logic levels are available.												
	<table border="0"> <tr> <td></td> <td>ACTION/NO ACTION</td> <td>Alternate</td> </tr> <tr> <td></td> <td>Reverse/Forward</td> <td>(Forward/Stop)</td> </tr> <tr> <td></td> <td>Run/Stop</td> <td>(Reverse/Stop)</td> </tr> <tr> <td></td> <td>High Speed/Low Speed</td> <td></td> </tr> </table>		ACTION/NO ACTION	Alternate		Reverse/Forward	(Forward/Stop)		Run/Stop	(Reverse/Stop)		High Speed/Low Speed	
	ACTION/NO ACTION	Alternate											
	Reverse/Forward	(Forward/Stop)											
	Run/Stop	(Reverse/Stop)											
	High Speed/Low Speed												
REPLY LINES	Nominal output voltages are -15 volts (no load) and 0 volts. Other levels are available.												
	<table border="0"> <tr> <td>Forward</td> <td>Ready</td> </tr> <tr> <td>Reverse</td> <td>EOT/BOT Lamp Failure</td> </tr> <tr> <td>EOT</td> <td>Low Tape (Contact Closure)</td> </tr> <tr> <td>BOT</td> <td>Write Lockout (Form C contacts)</td> </tr> </table>	Forward	Ready	Reverse	EOT/BOT Lamp Failure	EOT	Low Tape (Contact Closure)	BOT	Write Lockout (Form C contacts)				
Forward	Ready												
Reverse	EOT/BOT Lamp Failure												
EOT	Low Tape (Contact Closure)												
BOT	Write Lockout (Form C contacts)												
CIRCUITS	All control circuits completely transistorized with modular construction mounted on glass epoxy plug-in-cards.												
POWER (Transport and Drive Electronics)	115 volts, 60 cycles; 9 amp. standby; 16 amp. peak (230 volts, 50 cycles optional).												
AMBIENT TEMPERATURE (Operating)	32°F. to 125°F.												

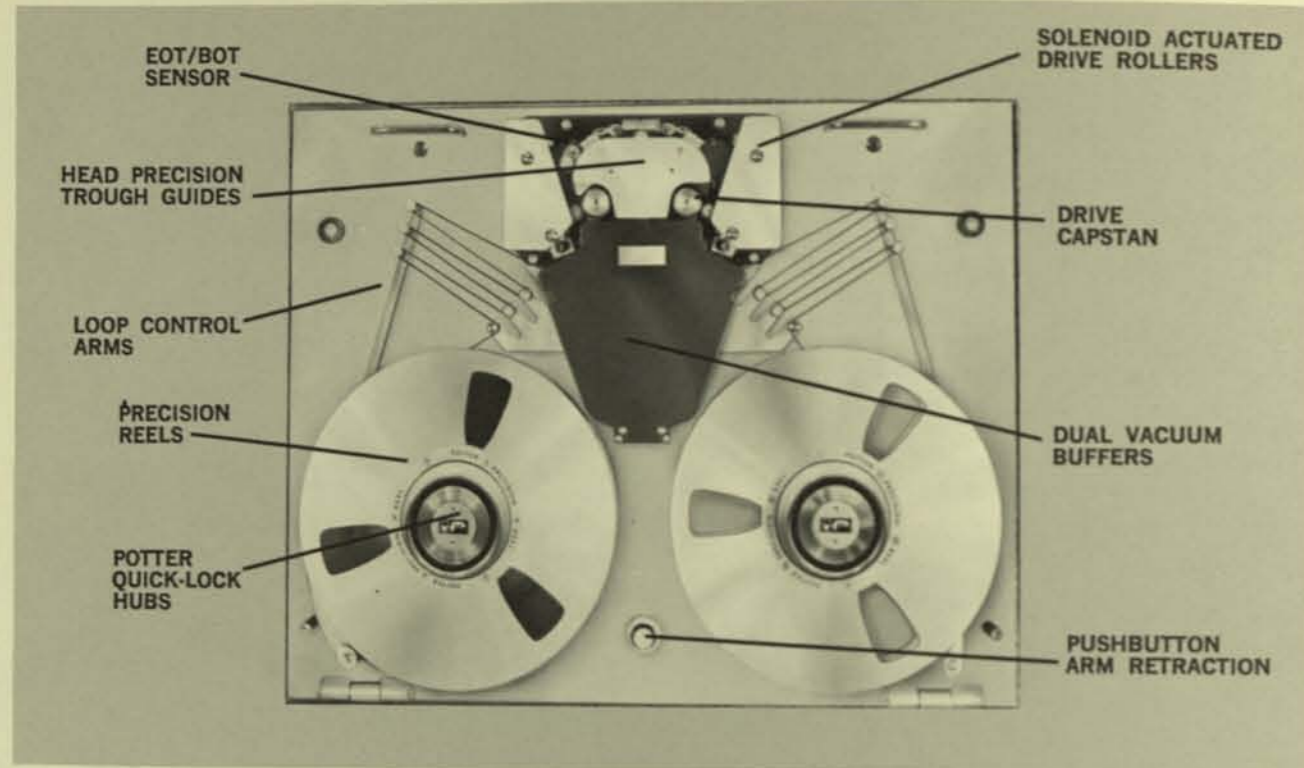


Figure 2. MT-120 Tape Drive.

MT-120 MAGNETIC TAPE TRANSPORT

The MT-120 transport includes the following as standard equipment:

- Tape drive
- Drive electronics
- Supply transformer

Accessory equipment generally supplied with MT-120 transport includes:

- Read-write magnetic heads
- Reels and hubs
- Write lock-out (write enable)
- EOT and BOT sensing
- Dust cover (or cabinet)

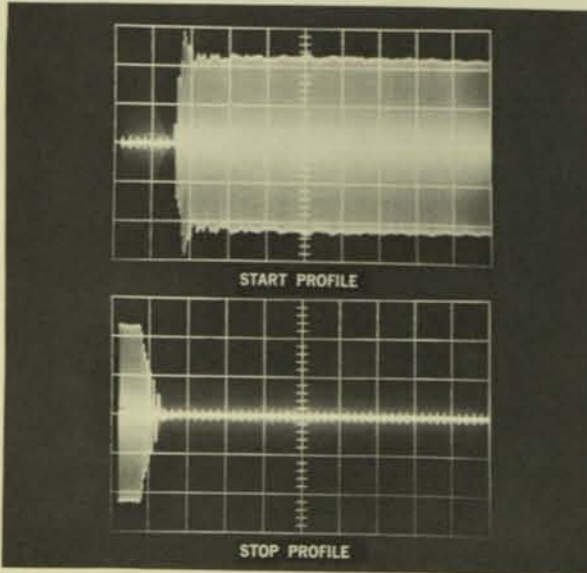


Figure 3. Typical Velocity Profiles (1 div. = 1 ms)

TAPE LOOP CONTROL

Loop control arms provide slack-loop storage and feedback for servos. Stronger arm design gives improved tape guiding and longer tape life.

VACUUM BUFFERS

High capacity dual vacuum buffers isolate loop control arms from drive roller and capstan drive system. An improvement of the Potter-pioneered vacuum buffer system, the new enlarged buffers accommodate more tape and respond rapidly and smoothly. Start-stop, reverse-stop, forward-reverse programming is accommodated at 120 ips without restriction over the entire cycling range from 0-200 commands per second. Start time is less than 3.0 ms to 120 ips $\pm 10\%$. Stop time is less than 1.5 ms from 120 ips. See Figure 3 for velocity profiles.

DRIVE ELECTRONICS

The EC-120 all solid-state drive electronics assembly is a standard component of the MT-120 tape transport. This unit generates all control signals and voltages required for transport operation from computer-type or manual command signals.

DRIVE SYSTEM

Bi-directional tape motion is controlled by two drive capstans and their associated solenoid-actuated drive rollers. The drive capstans are driven by a heavy-duty, hysteresis synchronous motor to provide uniform tape speed. New current switching drive circuitry gives faster, more uniform start-stop performance.

SUPPLY TRANSFORMER

The TR-120 transformer supplies all necessary voltages for operation of the MT-120 transport.

SPEED COMBINATIONS

Four standard tape speed combinations are available:

75/225	112.5/225
100/200	120/240

Both speeds may be used in forward and reverse directions. Low speed is for Read/Write. High speed is for rewind.

TAPE LOADING

Automatic electrical retraction of loop control and low-tape sensing arms is push-button initiated. Suitable interlocking prevents inadvertent arm retraction when reel motors are energized. Limit switches at extremes of arm travel represent an added safety feature. Use of Potter QUICK-LOCK® NAB or IBM reel hubs facilitate faster, easier reel loading.

*Trademark of POTTER INSTRUMENT COMPANY, INC.

**MT-120 SYSTEM ACCESSORIES
READ-WRITE ELECTRONICS**

Standard read-write amplifiers are available to accommodate packing densities up to 800 bpi and data transfer rates up to 96 kc. With special Potter high-density recording techniques, data transfer up to 240 kc (bcd) is obtainable.

Each read-write electronics assembly contains:

- up to 9 read-write amplifier channels
- clock generator
- write inhibit electrical switching
- erase head control
- head compensation for Read/Write (as required)
- power supply

For further information ask for the following Product Data sheets:

- Product Data 1-400 Amplifiers for 9-Channel Operation
- Product Data 1-402 MA315 Read/Write Amplifier
- Product Data 1-403 MSA375 Switching Amplifier
- Product Data 1-404 MA212 Read/Write Amplifier

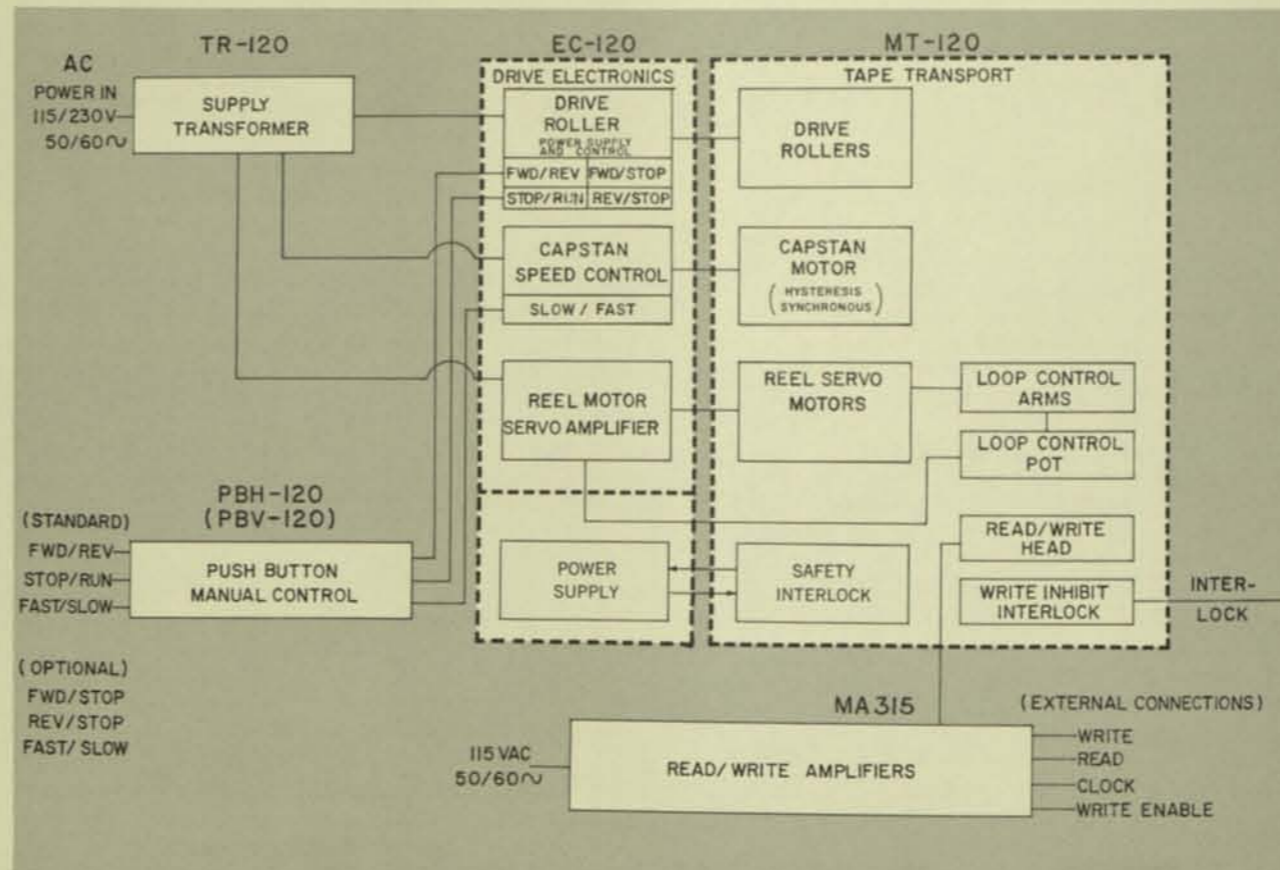
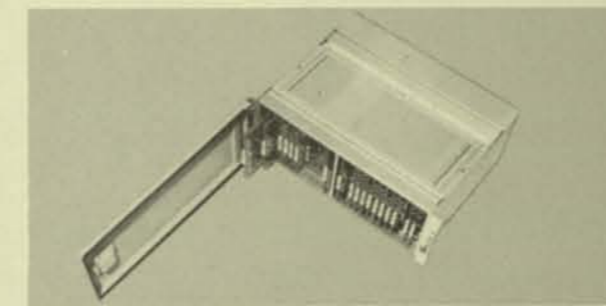


Figure 4. MT-120 Transport Functional Diagram

ACCESSORIES

**MT-120 TRANSPORT ACCESSORIES
READ-WRITE HEADS**

A complete selection of Potter read-write heads is available in a wide variety of computer tape formats. These all-metal interchangeable head assemblies are precision-machined for minimum inter-channel time displacement.

REELS AND HUBS

NAB and IBM reels and hubs are available as standard accessories with the MT-120 transport.

EOT/BOT SENSING

Split-post and IBM-type EOT and BOT sensing amplifiers are available to meet your requirements for positive tape control. Beginning and end-of-tape signals are brought out for computer identification and control.

WRITE LOCK-OUT

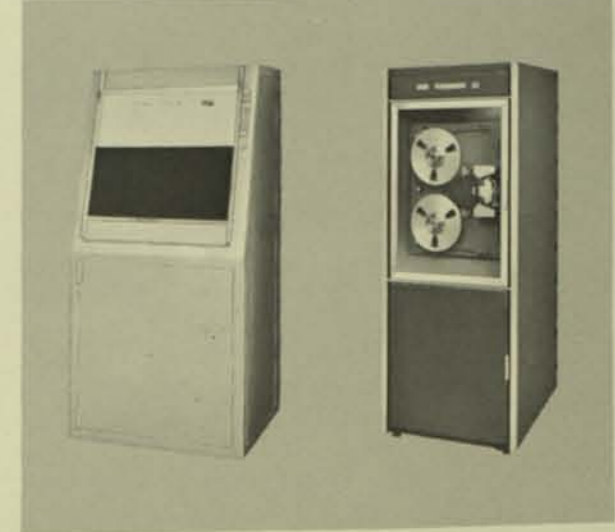
Transport design readily accommodates write lock-out (write enable) mechanism. Electro-magnetic, non-contact type write lock-out switch design gives positive file protection.

MANUAL CONTROL

Manual Control Panel CP-512 provides PBN 120 push button operator control for the MT-120 transport when ordered with the CAB-250 Cabinet. The CP-512 is designed for standard 19" rack mounting. The CP-512 is not required where CT-120 cabinet is specified, as this cabinet includes an equivalent control panel.

CABINET

Potter offers a choice of two standard cabinets for housing the MT-120 transport or tape system. The CT-120 cabinet features a "slope-front" design for operator convenience and a built-in manual control panel (See Figure 1). The CAB-250 upright cabinet (See Figure 1) is also available. Both cabinets have a 300 cfm blower, air filter, power convenience strip and acrylic plastic dust cover. Standard 19-inch mounting rails give solid mounting support for drive electronics, as well as provide abundant space for mounting of customer electronic packages.



MT-120 TAPE SYSTEMS

PHYSICAL DATA

Model No.	Component Description	Dimensions (in.)			Weight (lbs.)
		High	Wide	Deep	
MT-120	Tape Transport	24½	19	11	160
EC-120	Drive Electronics	6¾	19	18	35
PBH-120	Manual Control	3¾	19	6½	10
CT-120	Cabinet	63	30¾	28½	285
CAB-250	Cabinet	69¼	27	31½	290
					(approx)
TR-120	Transformer	7½	10½	6¼	75

OPTIONAL EQUIPMENT

1. Manual Control Unit: Pushbutton controls (Model PBH-120) for standard rack mounting. Controls include OFF, STANDBY, AUTOMATIC, FWD, REVERSE, FAST FORWARD, REVERSE, and EOT/BOT INDICATOR.

2. DC Erase Head.
3. Potter NAB or IBM-compatible QUICK-LOCK reel hubs.
4. Read/Write single-gap heads, dual-gap interlaced Read/Write heads, dual-gap simultaneous Read-While-Write heads.
5. EOT/BOT sensing: photoelectric or split-post.
6. Relay-operated system for remote control of main power turn on/turn off.
7. Non-contact type Write Lock-out (Write Enable).
8. Address Selector (when used with Potter Cabinet).
9. Read and/or Write Amplifier electronics (Models MA315, MSA375, MA212).
10. Upright cabinet, Model CAB-250; slope-front cabinet, Model CT-120.
11. Cabinet and panel color combinations.

POTTER WORLDWIDE FIELD SERVICE AND LOGISTICS PROGRAMS

Repair centers in strategic locations within the continental United States and abroad have been established to support the entire Potter product line.

Staffed by highly-trained field representatives, these repair centers are equipped to effect on-site installation of equipments and to perform quality repair, maintenance and overhaul.

Supplementing this capability, if a customer prefers to provide his own equipment support, Potter has established standard instruction courses to train customer personnel, either at Potter or in the field.

A Spare Parts Department, backed up by an extremely large inventory, and streamlined order processing, is available for customer convenience and economy. This inventory permits the customer to realize virtual elimination of downtime as well as savings on spare parts dollars by offering expeditious delivery for replaceable parts. Delivery is available in 24 hours to meet customer emergency requirements - within 72 hours for standard parts under normal conditions. Potter also offers provisioning

and logistics capabilities to meet all existing military specifications.

The Potter field service and logistics program is one of the finest in the EDP equipment industry. With reliable, quality-engineered equipment, supported by comprehensive field service, Potter guarantees satisfaction.

POTTER TAPE TRANSPORTS AND TRANSPORT SYSTEMS

Potter offers the world's broadest line of digital tape transports and tape transport systems.

Tension arm, vacuum-column, single-capstan and incremental transports are available, as well as a complete line of components and accessories, including read/write amplifiers, magnetic heads, drive electronics, manual controls, QUICK-LOCK hubs and cabinets.

In the single-capstan series, units are available with tape speeds to 150 ips at all packing densities with unrestricted programming. For complete product specifications, write, wire or call General Sales Manager, Potter Instrument Company, Inc., 151 Sunnyside Boulevard, Plainview, New York. Telephone: (516) Overbrook 1-3200. TWX: 510-221-1852

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POTTER INSTRUMENT COMPANY, INC.

EAST BETHPAGE ROAD • PLAINVIEW, L.I., NEW YORK 11803 • (516) 694-9000

MT-24 MAGNETIC TAPE TRANSPORT AND MAGNETIC TAPE SYSTEMS



INTRODUCTION

The Potter MT-24 Magnetic Tape Transport is a low-cost unit designed for applications requiring moderate data transfer rates. It is particularly well-suited for use with small and medium scale computers, in mass storage and sequential access applications for which high-priced, high-performance transports cannot be justified. The MT-24 provides many features normally found only in more expensive transports. Vacuum column tape storage is used in combination with Potter's precision tape drive system.

MT-24 Magnetic Tape Systems, which consist of an MT-24 Tape Transport, manual control unit, and suitable read/write electronics, are completely compatible with IBM systems such as the 7330 and 360/2400 series. Packing densities up to 1600 bpi using phase modulation recording can be accommodated. Other conventional tape formats up to 800 bpi utilizing 1/2- or 1-inch tape are also available.

Read-write speeds of 3, 7.5, 15, 24, 30 and 36 ips are standard with the MT-24, with fast three minute rewind. Start-stop profiles are smooth and program restriction free over a command frequency rate up to 200 per second. Other MT-24 design innovations provide simplified tape threading, convenient transport adjustments, and easier maintenance.

FEATURES

- standard, unrestricted tape speeds to 36 ips
- highest performance and reliability for lowest price
- up to 57.6 kc data transfer (1600 bpi phase modulated recording)
- compatible with IBM 7330 and 360/2400 series at all packing densities; 7- and 9-channel convertibility available
- low interchannel time displacement
- fast, smooth Start/Stop performance
- new over-and-under vacuum storage system
- tape loading in 15 seconds
- automatic advance to BOT

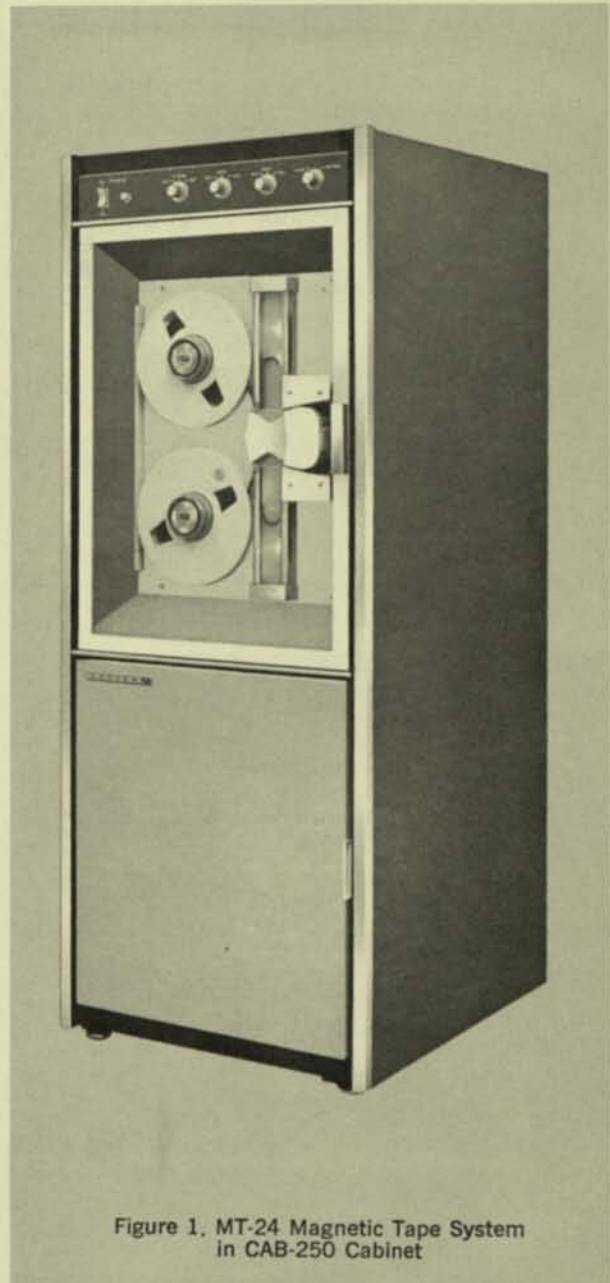


Figure 1. MT-24 Magnetic Tape System
in CAB-250 Cabinet

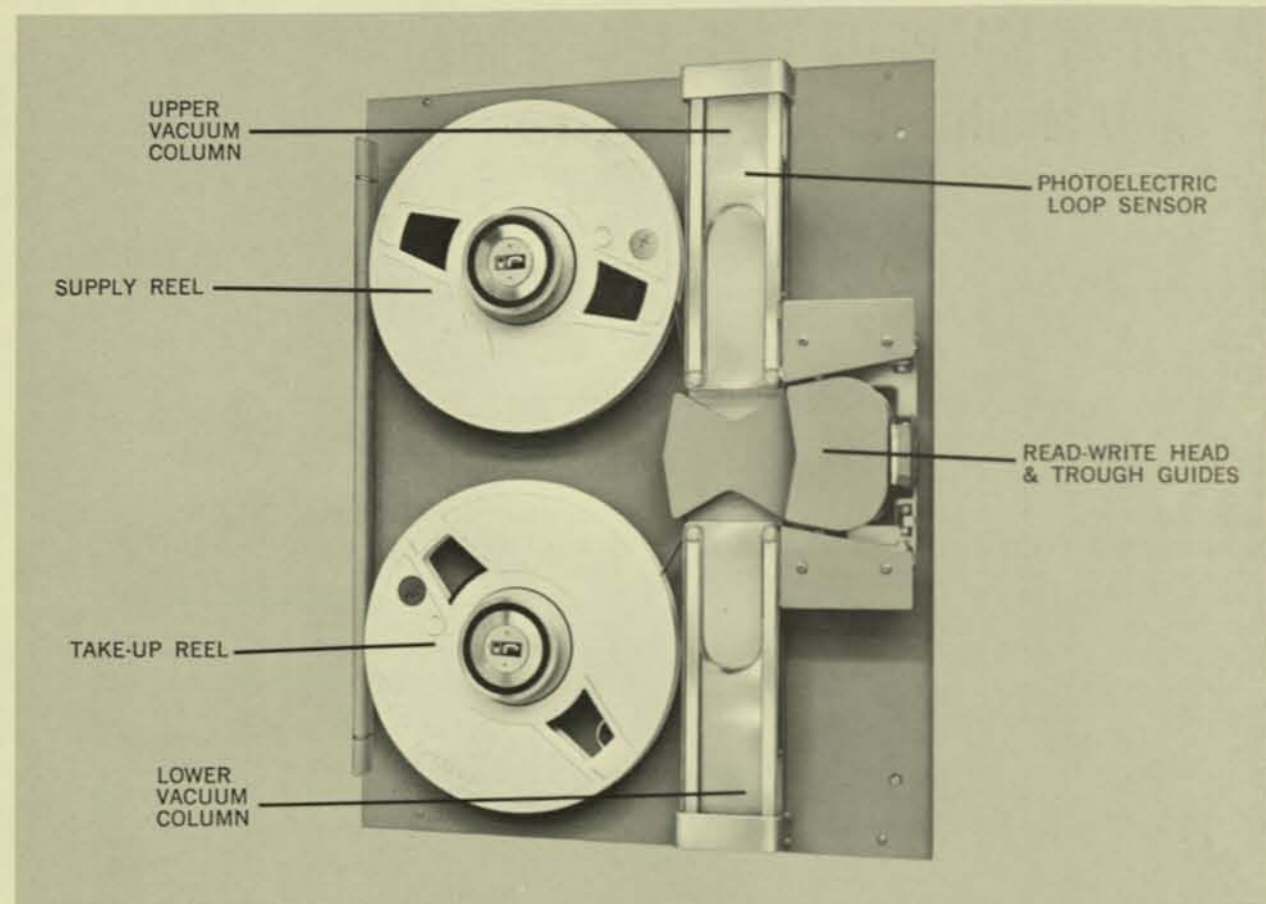


Figure 2. MT-24 Tape Drive

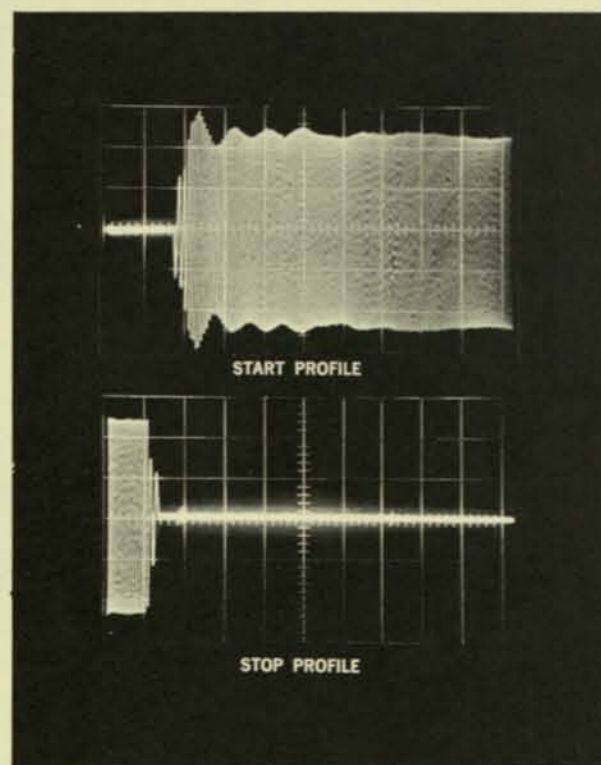


Figure 3. MT-24 Typical Velocity Profiles (1 div. = 1 ms)

VACUUM COLUMN STORAGE

An extremely simple dual vacuum column tape storage system is incorporated in the MT-24 design — a feature normally associated with the most costly tape transport systems. Ample tape storage in the vacuum reservoirs provides restriction-free reading and writing up to 36 ips. Photoelectric loop sensing reliably controls amount of tape in both vacuum columns. Transparent vacuum column covers are readily detachable for easy access to column area during routine cleaning.

TAPE DRIVE SYSTEM

The MT-24 utilizes the Potter fast-response drive system which has become a standard of dependability in the EDP field. Tape motion is controlled by two drive capstans with associated solenoid-actuated drive rollers. The trough guides which are precision-shaped for optimum tape guidance, hold dynamic skew to ± 8 microseconds, maximum, at 24 ips. Start time is 5 milliseconds to within 10% of rated speed; stop time is less than 2 milliseconds, with smooth velocity profile. (See Figure 3)

MT-24 SPECIFICATIONS

TAPE SPEEDS (single)	3, 7.5, 15, 24, 30 and 36 ips standard; other speeds available: 3 to 36 ips (30 ips max. for 1" tape)																									
(dual)	Combinations in a ratio of 2:1, 3:1, 4:1 and 6:1 available																									
TAPE SPEED ACCURACY	$\pm 2\%$ Above 15 ips																									
TAPE REWIND	3 minutes, maximum, for full 2400 foot reel																									
TYPICAL PERFORMANCE	at 24 ips, with 1/2-inch 1.5 mil Mylar tape																									
START TIME	5 ms from receipt of command to within $\pm 10\%$ of tape speed																									
START DISTANCE	over cycling range of 0-200 commands/second tape travels $.073" \pm .020"$ within 5 ms after receipt of command at a tape speed of 24 ips																									
STOP TIME	3 ms max.																									
STOP DISTANCE	$.036" \pm 0.020"$																									
COMMAND REPETITION RATE	Start/Stop or Forward/Reverse 0-200 commands per second, 5 milliseconds between commands for performance within specification																									
WOW & FLUTTER	less than 2% rms at 24 ips																									
INTERCHANNEL TIME DISPLACEMENT (at 24 ips, any two channels, 1/2" tape)	Static: 12 microseconds maximum Dynamic: ± 8 microseconds Total: 20 microseconds maximum																									
TAPE WIDTHS	1/2 or 1-inch																									
TAPE TYPE	IBM heavy duty or equal recommended																									
TAPE REELS & HUBS	IBM-type 10 1/2" reels and hubs standard for 1/2-inch tape. Potter NAB-type reels and special QUICK-LOCK hubs standard for 1-inch NAB. Other reel/hub combinations available																									
TAPE LOADING	complete tape loading and threading is less than 15 seconds																									
REMOTE CONTROL INPUTS	Stop/Run; Forward/Reverse; Normal Speed/Rewind Speed, Speed control: High/Low. All 0v/-5v at 6 ma, d.c. levels																									
CONDITION INDICATION	EOT/BOT Sensing Ready Automatic-Manual Write Lock-out (Type C contact) Power Supply																									
ELECTRONICS	All control circuits completely transistorized; modular plug-in construction used throughout																									
INFORMATION RADIATION	Special Models of this equipment have been field tested and approved to Federal Standard No. 222 and MIL-16910A. Conformance with these specifications is available as an option.																									
PHYSICAL DATA:																										
	<table border="0"> <tr> <td></td> <td colspan="3">Dimensions (inch)</td> <td>Weight (lbs.)</td> </tr> <tr> <td></td> <td>High</td> <td>Wide</td> <td>Deep</td> <td></td> </tr> <tr> <td>MT-24 Tape Transport</td> <td>24 1/2</td> <td>19</td> <td>11</td> <td>110</td> </tr> <tr> <td>EC-36A Drive Electronics & Control</td> <td>7</td> <td>19</td> <td>19</td> <td>55</td> </tr> <tr> <td>CAB-250 Rack Cabinet</td> <td>70</td> <td>27</td> <td>31 1/2</td> <td>290</td> </tr> </table>		Dimensions (inch)			Weight (lbs.)		High	Wide	Deep		MT-24 Tape Transport	24 1/2	19	11	110	EC-36A Drive Electronics & Control	7	19	19	55	CAB-250 Rack Cabinet	70	27	31 1/2	290
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EC-36A Drive Electronics & Control	7	19	19	55																						
CAB-250 Rack Cabinet	70	27	31 1/2	290																						
POWER	115v $\pm 10\%$, 60 cycles, 600 watts, 900 watts peak; 230v, 50 cycles optional																									
AMBIENT TEMPERATURE (Operating)	32°F. to 125°F. (within tape limitations)																									

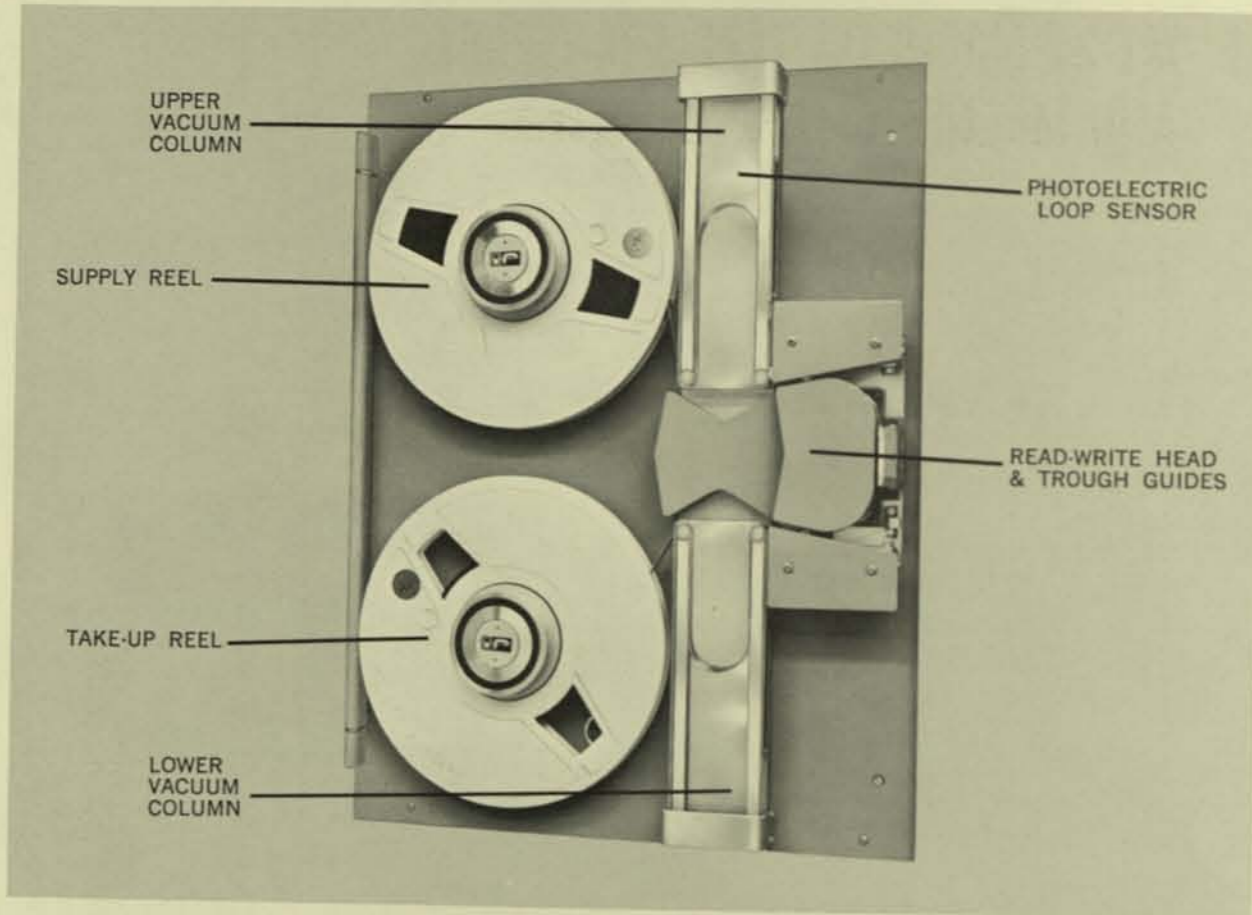


Figure 2. MT-24 Tape Drive

VACUUM COLUMN STORAGE

An extremely simple dual vacuum column tape storage system is incorporated in the MT-24 design — a feature normally associated with the most costly tape transport systems. Ample tape storage in the vacuum reservoirs provides restriction-free reading and writing up to 36 ips. Photoelectric loop sensing reliably controls amount of tape in both vacuum columns. Transparent vacuum column covers are readily detachable for easy access to column area during routine cleaning.

TAPE DRIVE SYSTEM

The MT-24 utilizes the Potter fast-response drive system which has become a standard of dependability in the EDP field. Tape motion is controlled by two drive capstans with associated solenoid-actuated drive rollers. The trough guides which are precision-shaped for optimum tape guidance, hold dynamic skew to ± 8 microseconds, maximum, at 24 ips. Start time is 5 milliseconds to within 10% of rated speed; stop time is less than 2 milliseconds, with smooth velocity profile. (See Figure 3)

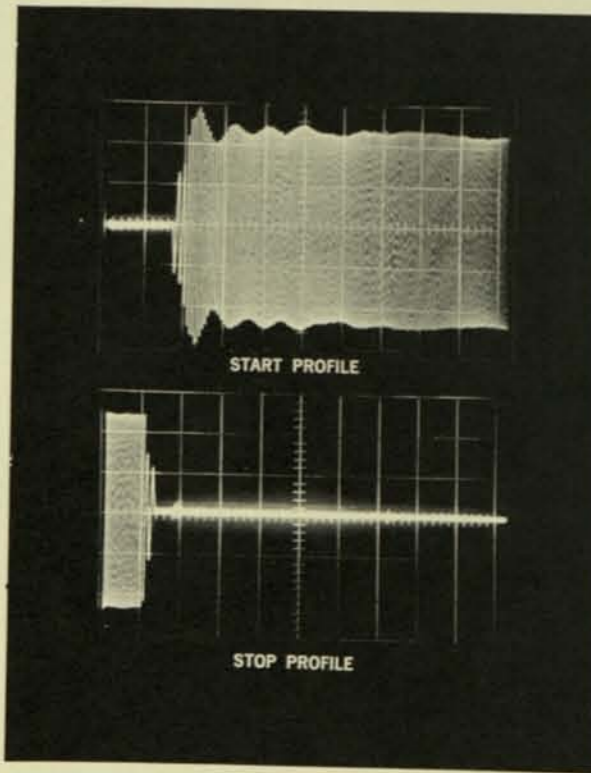


Figure 3. MT-24 Typical Velocity Profiles (1 div. = 1 ms)

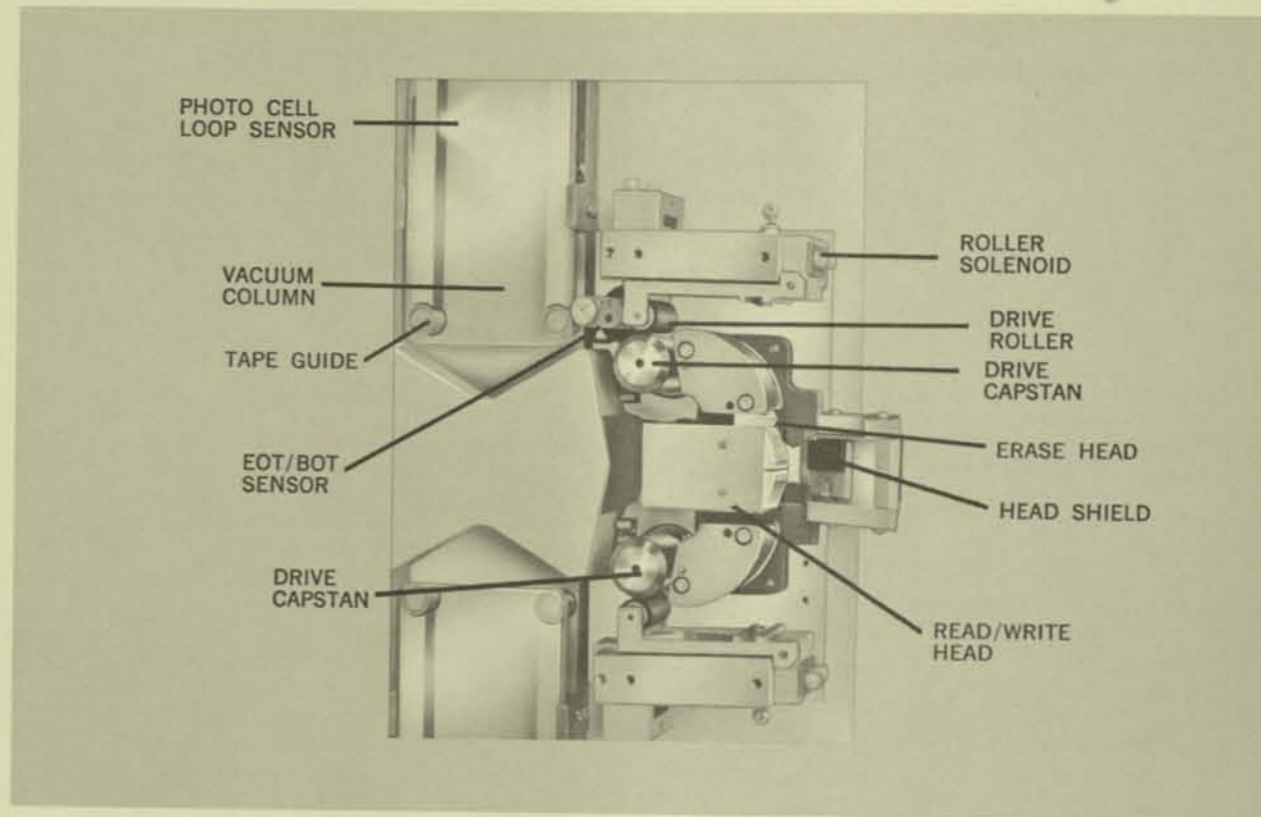


Figure 4. MT-24 Tape Drive Assembly

DRIVE ELECTRONICS & CONTROL

All MT-24 transport functions are controlled by a combined drive electronics and manual control assembly supplied with the transport. This compact package contains all control electronics, together with necessary power supplies and blower for automatic or manual operation. Electronics are solid-state, and feature printed circuit, plug-in modules. Controls include a power ON/OFF switch and a LOAD POINT/UNLOAD switch, and three operating mode selector switches: LOAD-MANUAL-AUTOMATIC,

REVERSE-STOP-FORWARD, and FAST REVERSE-STOP FAST FORWARD. For remote operation, the LOAD-MANUAL-AUTOMATIC switch is placed in the AUTOMATIC position; other controls in the STOP position.

Control switches are placed vertically on the front of the CT-120 "slope front" cabinet to the right of the transport. When the CAB-250 or M3340 rack cabinet is specified, or when no cabinet is supplied, the controls are mounted on the front cover of the drive electronics package (Figure 5).

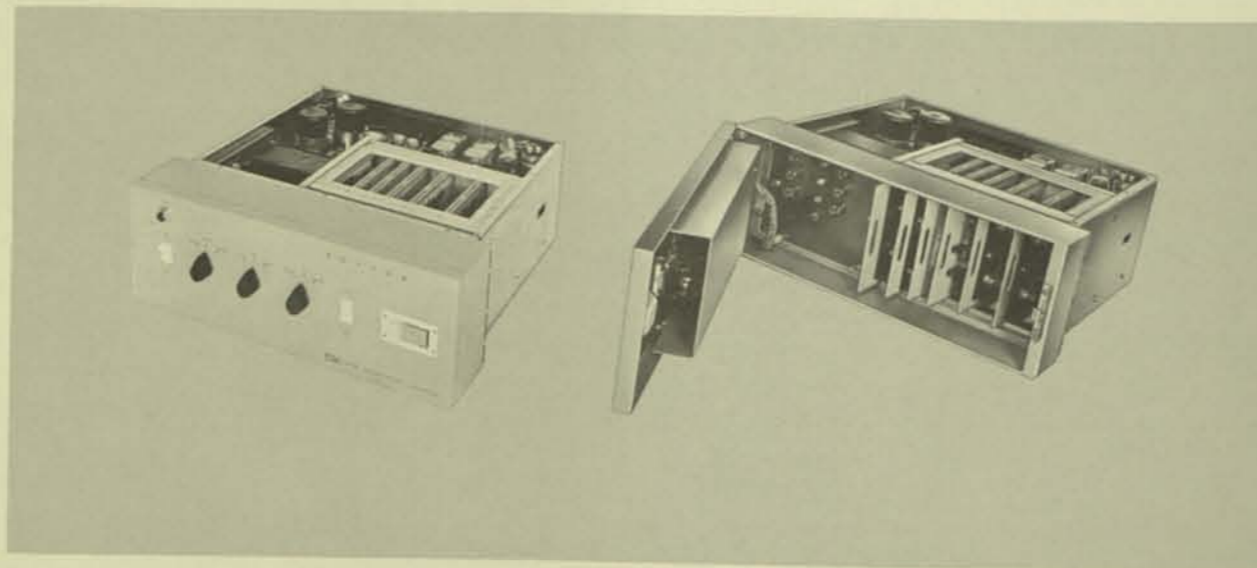


Figure 5. EC-36A Drive Electronics & Control

ACCESSORIES

MT-24 TRANSPORT ACCESSORIES

READ/WRITE HEADS

A complete selection of magnetic heads is available, including heads for IBM 7- or 9-channel format. Heads are all-metal, precision fabricated for maximum tape life and minimum interchannel time displacement.

REELS & HUBS

IBM-type reels and hubs are standard equipment on MT-24 transports for 1/2" tape. Reel/hub combinations of other manufacturers can also be accommodated. Potter NAB reels and QUICK-LOCK® hubs are standard for one-inch tape.

EOT/BOT SENSING

Photoreflexive (IBM-type) end-of-tape and beginning-of-tape sensing is available for reliable MT-24 tape control.

WRITE CONTROL

A Write Lockout (Write Enable) switch is available for use with file protect rings on IBM or NAB reels.

MT-24 SYSTEM ACCESSORIES

READ/WRITE ELECTRONICS

Standard amplifiers are available to accommodate packing densities up to 1600 bpi and data transfer rates up to 57.6 kc.

Each read/write electronics assembly contains:

- up to nine Read/Write amplifier channels
- clock generator
- Write Inhibit electrical switching
- Erase head control
- head compensation for Read/Write (as required)
- power supply

For further information see the following Product Data Sheets:

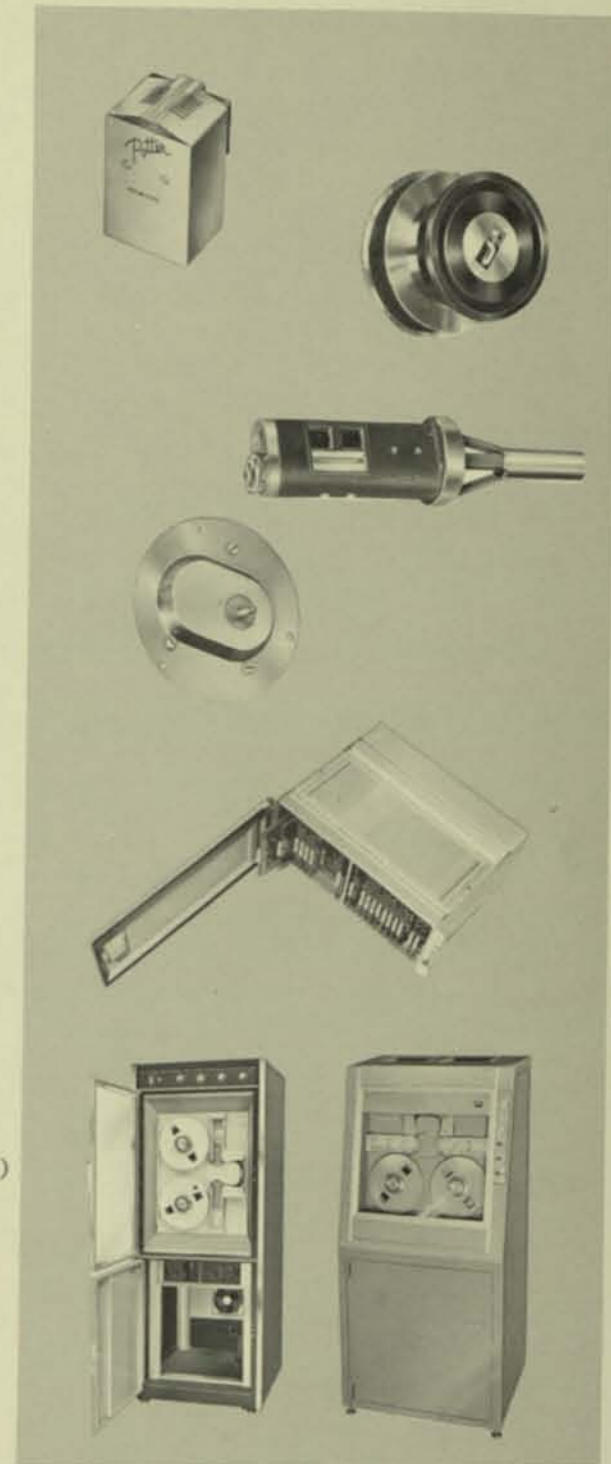
- No. 1-400 Read/Write Amplifier for 9-channels
- No. 1-402 MA315 Read/Write Amplifier
- No. 1-403 MSA375 Read/Write Switching Amplifier
- No. 1-404 MA212 Read/Write Amplifier

SWITCHING ELECTRONICS

Switching amplifiers are available which reduce the cost of digital magnetic tape systems by permitting time-sharing of a single Read/Write amplifier package among groups of up to four tape units.

CABINET

Potter Standard cabinet, Model CAB-250, as shown in Figure 1, is recommended for housing the MT-24 transport. Other cabinet styles are available for special requirements. All cabinets are rigidly constructed and will accommodate the transport, manual control,



drive electronics, power supply, read/write amplifier assemblies, and all accessories that comprise the system. The Cabinet provides accessibility, both front and rear, and allows space for customer electronics. Casters permit easy maneuverability.

Cabinets are supplied with standard Potter colors or can be finished to customer specification. Main Structure: charcoal gray, semi-gloss, Federal Standard 595, Number 26081, Doors, Front and Rear: light gray, semi-gloss, Federal Standard 595, Number 26622.

*QUICK-LOCK IS A TRADEMARK OF POTTER INSTRUMENT CO. INC.

MT-24 INTERFACE CONNECTIONS

Letters refer to contact pins, connector J/P-102, EC-36 Drive Electronics Chassis:

- A. -5v run/0v stop, at 6 ma
- B. -5v reverse/0v forward, at 6 ma
- C. Stop at EOT input (place jumper to pin D)
- D. EOT Output: Not on Foil, -15v. Maximum load to ground, 5 ma. On Foil, 0v.
- E. Ready Signal: -10v at 5 ma
- F. 10v nominal servo supply sample at 2 ma
- G. Rewind Command: -5v at 6 ma
- J. Stop at BOT input (place jumper to pin K)
- K. BOT Output: Not on Foil, -15v. Maximum load to ground, 5 ma. On Foil, 0v.
- L. Chassis GND
- M. Circuit GND
- Q. Automatic Mode Reply: -7.5v at 2 ma
- T. Capstan Speed Change Command: -5v at 6 ma (2 speed units, only)
- U. +15v sample (for interrogation only) at 5 ma
- V. -15v sample (for interrogation only) at 5 ma
- W. EOT Lamp Out Signal: Out, 0v, 24 ohms to ground; On -5v to -10v @ 5 ma
- X. Write Lock-out Switch (normally closed contact)
- Y. Write Lock-out Switch (common contact)
- Z. Write Lock-out Switch (normally open contact)

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MT-24 AND MT-36 TAPE TRANSPORTS AND TAPE SYSTEMS

The MT-24 is one member of a family of vacuum-buffered tape transports providing a range of speed capabilities as follows:

MT-24 Tape Transport	2 to 36 ips
MT-36 Tape Transport	2 to 50 ips
MT-75 Tape Transport	2 to 75 ips

All these units employ the same basic design configuration, and most parts are interchangeable between models.

POTTER WORLDWIDE FIELD SERVICE AND LOGISTICS PROGRAM

Repair centers in strategic locations within the continental United States and abroad have been established to support the entire Potter product line.

Staffed by highly-trained field representatives, these repair centers are equipped to effect on-site installation of equipments and to perform quality repair, maintenance and overhaul.

Supplementing this capability, if a customer prefers to provide his own equipment support, Potter has established standard instruction courses to train customer personnel, either at Potter or in the field.

A Spare Parts Department, backed up by an extremely large inventory, and streamlined order processing, is available for customer convenience and economy. This inventory permits the customer to realize virtual elimination of downtime as well as savings on spare parts dollars by offering expeditious delivery for replaceable parts. Delivery is available in 24 hours to meet customer emergency requirements - within one week for standard parts under normal conditions. Potter also offers provisioning and logistics capabilities to meet all existing military specifications.

The Potter field service and logistics program is one of the finest in the EDP equipment industry. With reliable, quality-engineered equipment, supported by comprehensive field service, Potter guarantees satisfaction.

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MT-36 MAGNETIC TAPE TRANSPORT AND MAGNETIC TAPE SYSTEMS



INTRODUCTION

The Potter MT-36 Magnetic Tape Transport is a low-cost unit designed for applications requiring moderate data transfer rates. It is particularly well-suited for use with small and medium scale computers, in mass storage and sequential access applications for which high-priced, high-performance transports cannot be justified. The MT-36 provides many features normally found only in more expensive transports. Over-and-under vacuum column tape storage is used in combination with Potter's precision tape drive system.

MT-36 Magnetic Tape Systems, which consist of an MT-36 Tape Transport, manual control unit, and suitable read/write electronics, are completely compatible with IBM systems such as the 7330 and 360/2400 series. Packing densities up to 1600 bpi using phase modulation recording can be accommodated. Other conventional tape formats up to 800 bpi utilizing 1/2- or 1-inch tape are also available.

Read-write speeds of 30, 36, 45 and 50 ips are standard with the MT-36, with fast three minute rewind. Start-stop profiles are smooth and program restriction free over a command frequency rate up to 200 per second. Other MT-36 design innovations provide simplified tape threading, convenient transport adjustments, and easier maintenance.

FEATURES

- standard unrestricted tape speeds to 50 ips
- highest performance and reliability for lowest price
- up to 80 kc data transfer (1600 bpi phase modulated recording)
- compatible with IBM 7330 and 360/2400 series at all packing densities; 7- and 9-channel convertibility available
- low interchannel time displacement
- fast, smooth Start/Stop performance
- new over-and-under vacuum storage system
- tape loading in 15 seconds
- automatic advance to BOT

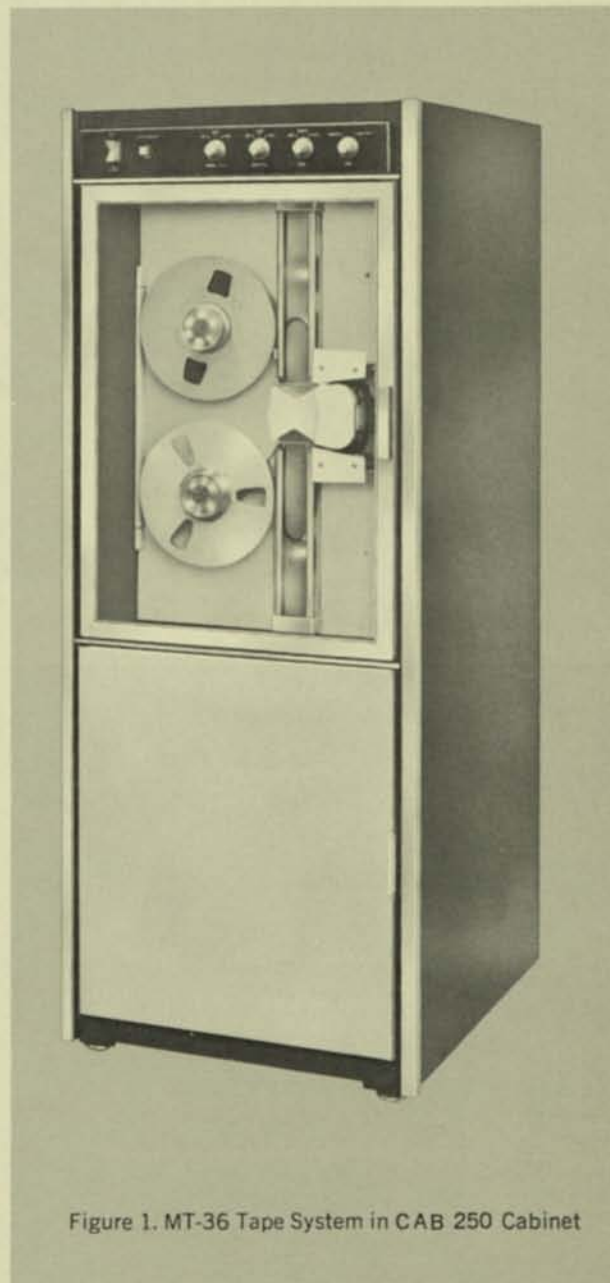


Figure 1. MT-36 Tape System in CAB 250 Cabinet

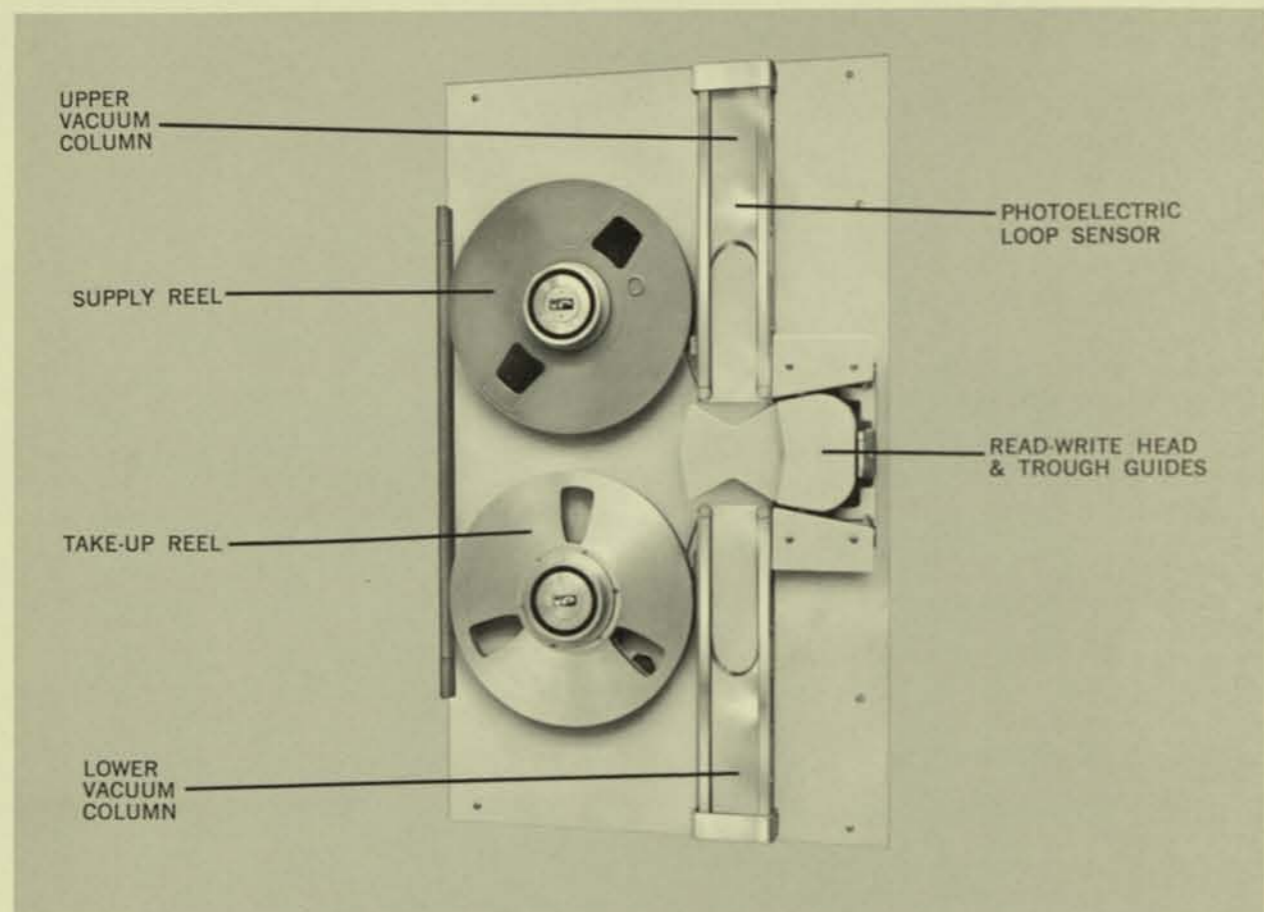


Figure 2. MT-36 Tape Drive

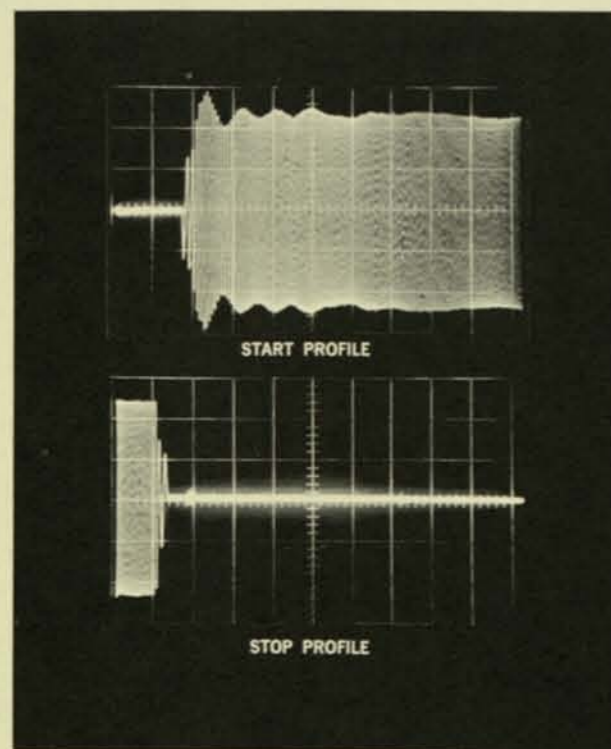


Figure 3. MT-36 Typical Velocity Profiles (1 div. = 1 ms)

VACUUM COLUMN STORAGE

An extremely simple dual vacuum column tape storage system is incorporated in the MT-36 design – a feature normally associated with the most costly tape transport systems. Ample tape storage in the vacuum reservoirs provides restriction-free reading and writing up to 50 ips. Photoelectric loop sensing reliably controls amount of tape in both vacuum columns. Transparent vacuum column covers are readily detachable for easy access to column area during routine cleaning. The vacuum blower is exceptionally quiet.

TAPE DRIVE SYSTEM

The MT-36 utilizes the Potter fast-response drive system which has become a standard of dependability in the EDP field. Tape motion is controlled by two drive capstans with associated solenoid-actuated drive rollers. Vacuum trough guides hold dynamic skew to ± 3 microseconds maximum at 36 ips. Start time is 5 milliseconds to within $\pm 10\%$ to rated speed; stop time is less than 2 milliseconds, with smooth velocity profiles. (See Figure 3)

MT-36 SPECIFICATIONS

TAPE SPEEDS: Single speed	30, 36, 45, and 50 ips standard; other speeds available up to 50 ips (36 ips max. for 1" tape)
Dual speed	combinations in a ratio of 2:1, 3:1, 4:1 and 6:1 available
TAPE SPEED ACCURACY	$\pm 2\%$ Above 15 ips
TAPE REWIND	3 minutes, maximum, for full 2400 foot reel
TYPICAL PERFORMANCE	at 36 ips with $\frac{1}{2}$ -inch 1.5 mil Mylar tape
START TIME	5 ms from receipt of command to within $\pm 10\%$ of tape speed
START DISTANCE	over cycling range of 0-200 commands/second tape travels $0.110" \pm .020"$ 5 ms after receipt of command
STOP TIME	3 ms max.
STOP DISTANCE	$0.054" \pm 0.020"$
COMMAND REPETITION RATE	Start/Stop; 0-200 commands per second, 5 milliseconds between commands for performance within specification.
WOW & FLUTTER	less than 2% rms
INTERCHANNEL TIME DISPLACEMENT (at 36 ips), any two channels, $\frac{1}{2}$ " tape	Static: 8 microseconds maximum Dynamic: ± 6 microseconds Total: 14 microseconds, maximum
TAPE WIDTHS	$\frac{1}{2}$ or 1-inch
TAPE TYPE	IBM heavy duty or equal recommended
TAPE REELS & HUBS	IBM-type $10\frac{1}{2}$ " reels and hubs standard for $\frac{1}{2}$ -inch tape. Potter NAB-type reels and special QUICK-LOCK hubs standard for 1-inch tape. Other reel/hub combinations available.
TAPE LOADING	complete tape loading and threading is less than 15 seconds
REMOTE CONTROL INPUTS	Stop/Run; Forward/Reverse; Normal Speed/Rewind Speed; Speed control: High/Low. All 0v/-5v at 6 ma, d.c. level
CONDITION INDICATION	EOT/BOT Sensing Ready Automatic-Manual Write Lock-out (Type C contact) Power Supply
ELECTRONICS	All control circuits completely transistorized; modular plug-in construction used throughout
INFORMATION RADIATION	Special Models of this equipment have been field tested and approved to Federal Standard No. 222 and MIL-16910A. Conformance with these specifications is available as an option.

PHYSICAL DATA:

	Dimensions (inch)			Weight (lbs.)
	High	Wide	Deep	
MT-36 Tape Transport	31 $\frac{1}{2}$	19	11	110
EC-36A Drive Electronics & Control	7	19	19	55
CAB-250 Cabinet	70	27	31 $\frac{1}{2}$	290

POWER	115v $\pm 10\%$, 60 cycles, 600 watts, 875 watts peak; 230v, 50 cycles optional
AMBIENT TEMPERATURE (Operating)	32°F. to 125°F. (within tape limitations)

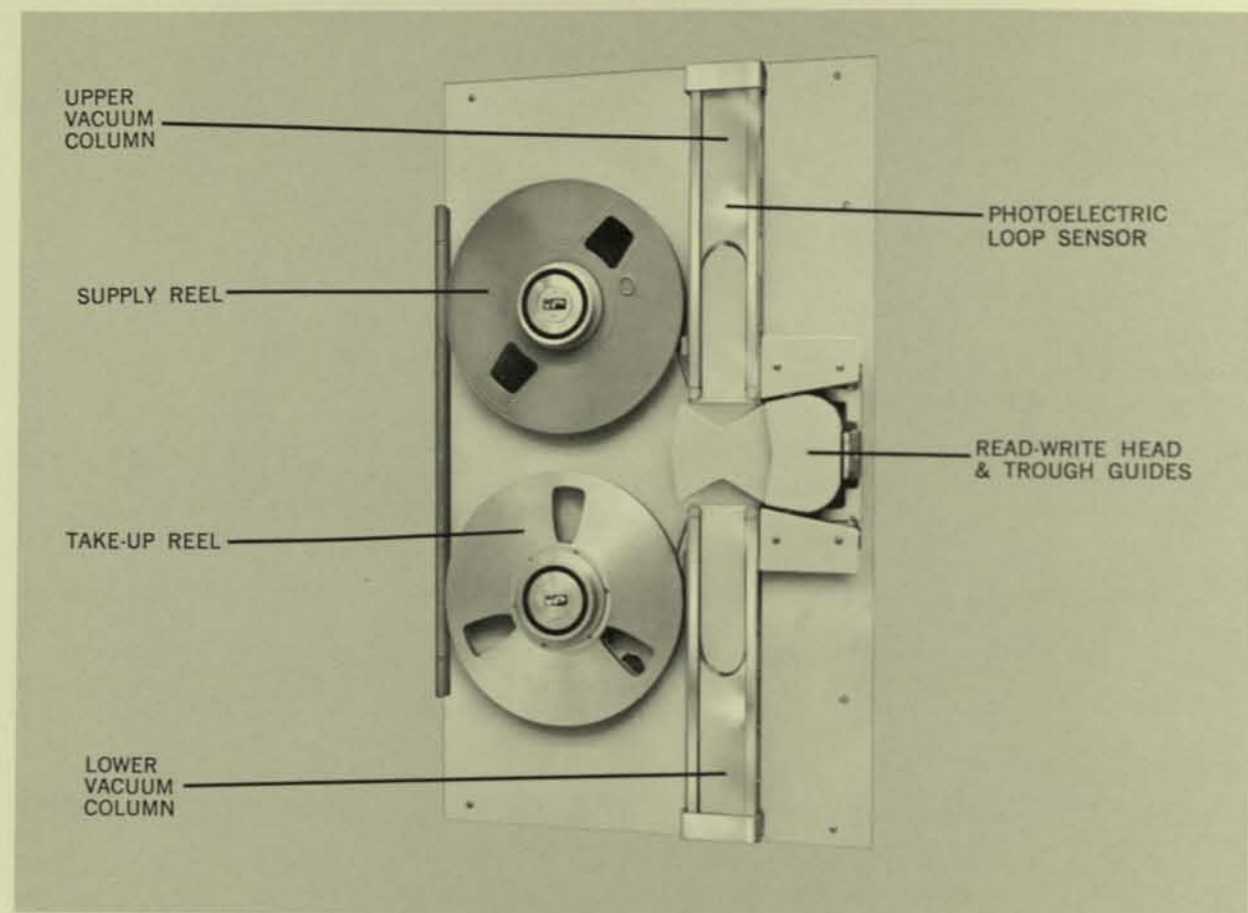


Figure 2. MT-36 Tape Drive

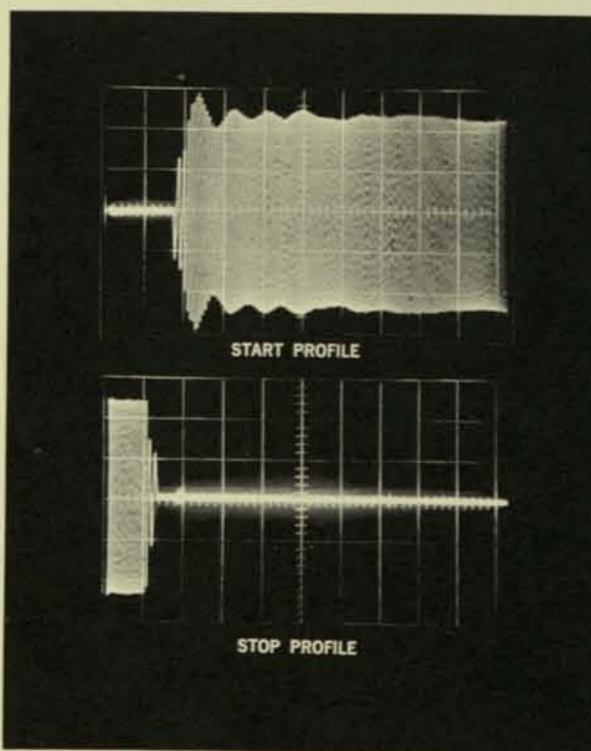


Figure 3. MT-36 Typical Velocity Profiles (1 div. = 1 ms)

VACUUM COLUMN STORAGE

An extremely simple dual vacuum column tape storage system is incorporated in the MT-36 design — a feature normally associated with the most costly tape transport systems. Ample tape storage in the vacuum reservoirs provides restriction-free reading and writing up to 50 ips. Photoelectric loop sensing reliably controls amount of tape in both vacuum columns. Transparent vacuum column covers are readily detachable for easy access to column area during routine cleaning. The vacuum blower is exceptionally quiet.

TAPE DRIVE SYSTEM

The MT-36 utilizes the Potter fast-response drive system which has become a standard of dependability in the EDP field. Tape motion is controlled by two drive capstans with associated solenoid-actuated drive rollers. Vacuum trough guides hold dynamic skew to ± 3 microseconds maximum at 36 ips. Start time is 5 milliseconds to within $\pm 10\%$ to rated speed; stop time is less than 2 milliseconds, with smooth velocity profiles. (See Figure 3)

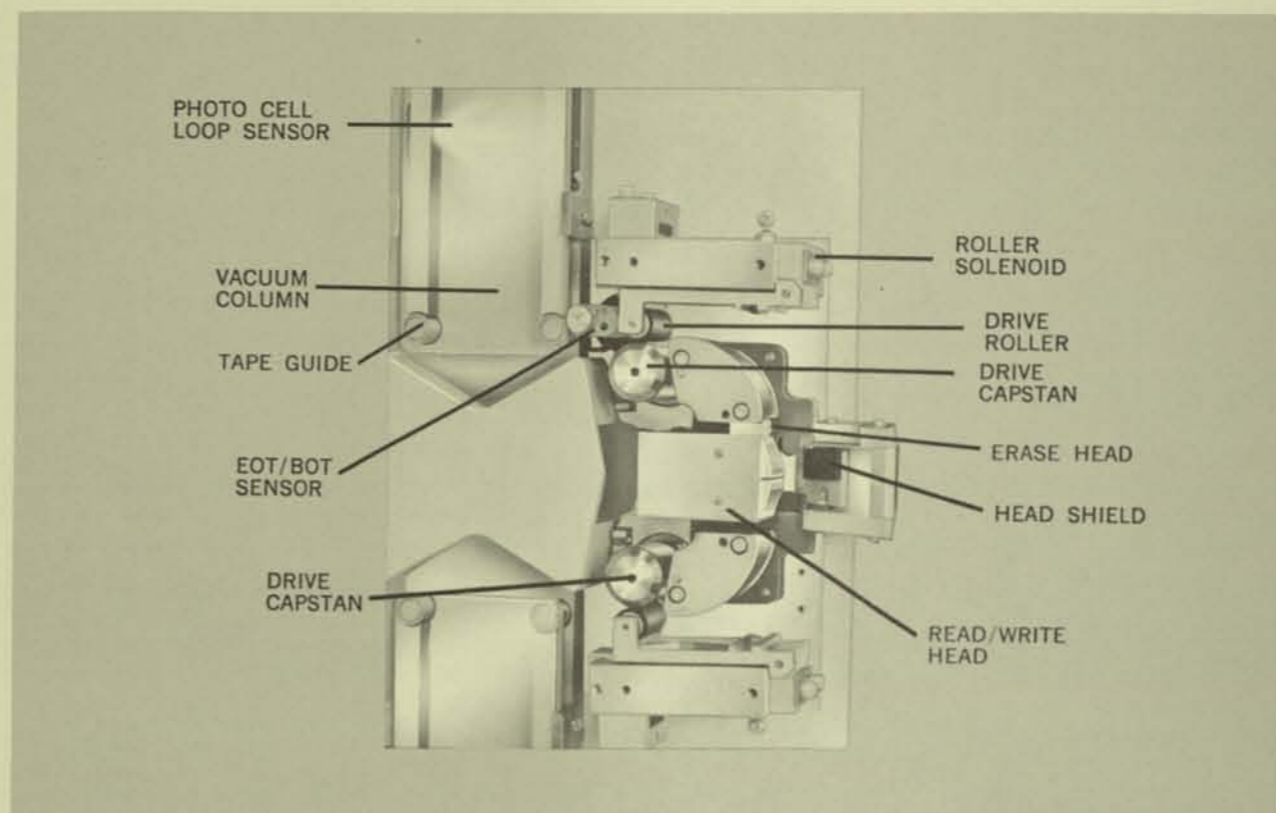


Figure 4. MT-36 Tape Drive Assembly

DRIVE ELECTRONICS & CONTROL

All MT-36 transport functions are controlled by a combined drive electronics and manual control assembly which is supplied with the transport. This compact package contains all control electronics, together with necessary power supplies for automatic or manual operation and checkout. Electronics are solid state, and feature printed circuit, plug-in mod-

ules. The hinged front door gives immediate access to all components. Controls include a power on-off switch and three operating mode selector switches; "load-manual-automatic", "reverse-stop-forward", and "fast reverse-stop-fast forward".

For remote operation, the LOAD-MANUAL-AUTOMATIC switch is placed in the AUTOMATIC position; other controls in the STOP position.

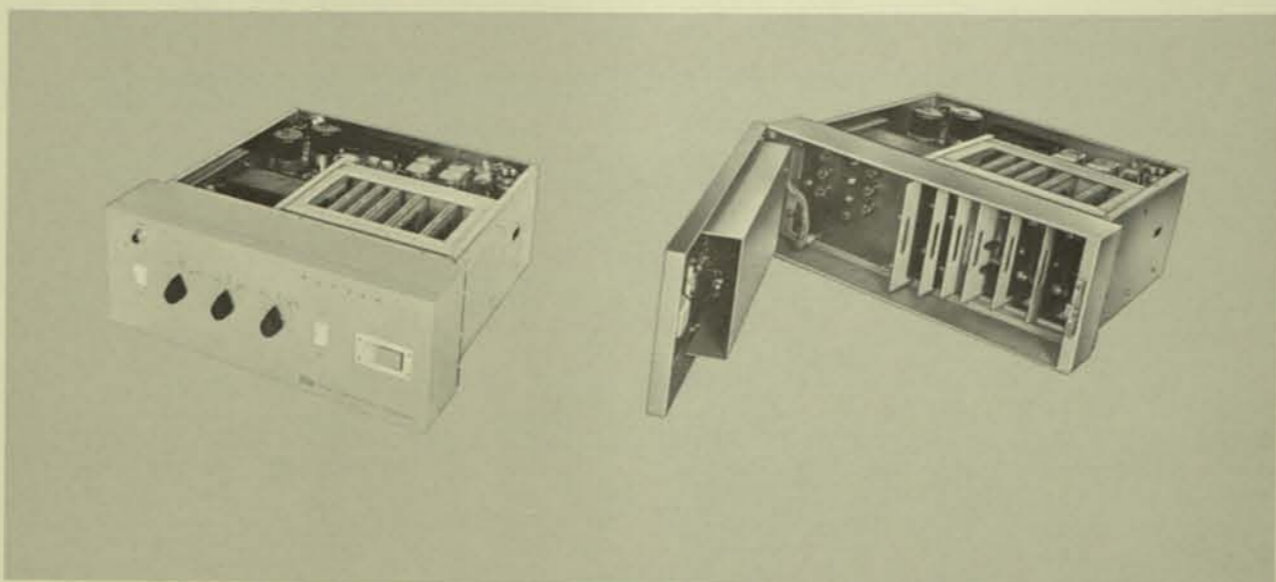


Figure 5. EC-36A Drive Electronics & Control

ACCESSORIES

MT-36 TRANSPORT ACCESSORIES

READ/WRITE HEADS

A complete selection of magnetic heads is available, including heads for IBM 7- or 9-channel format. Heads are all-metal, precision fabricated for maximum tape life and minimum interchannel time displacement.

REELS & HUBS

IBM-type reels and hubs are standard equipment on MT-36 transports for $\frac{1}{2}$ " tape. Reel/hub combinations of other manufacturers can also be accommodated. Potter NAB reels and QUICK-LOCK® hubs are standard for one-inch tape.

EOT/BOT SENSING

Photoreflexive (IBM-type) end-of-tape and beginning-of-tape sensing is available for reliable MT-36 tape control.

WRITE CONTROL

A Write Lockout (Write Enable) switch is available for use with file protect rings on IBM or NAB reels.

MT-36 SYSTEM ACCESSORIES

READ/WRITE ELECTRONICS

Standard amplifiers are available to accommodate packing densities up to 1600 bpi and data transfer rates up to 80 kc.

Each read/write electronics assembly contains:

- up to nine Read/Write amplifier channels
- clock generator
- Write Inhibit electrical switching
- Erase head control
- head compensation for Read/Write (as required)
- power supply

For further information see the following Product Data Sheets:

- No. 1-400 Read/Write Amplifier for 9-channels
- No. 1-402 MA315 Read/Write Amplifier
- No. 1-403 MSA375 Read/Write Switching Amplifier
- No. 1-404 MA212 Read/Write Amplifier

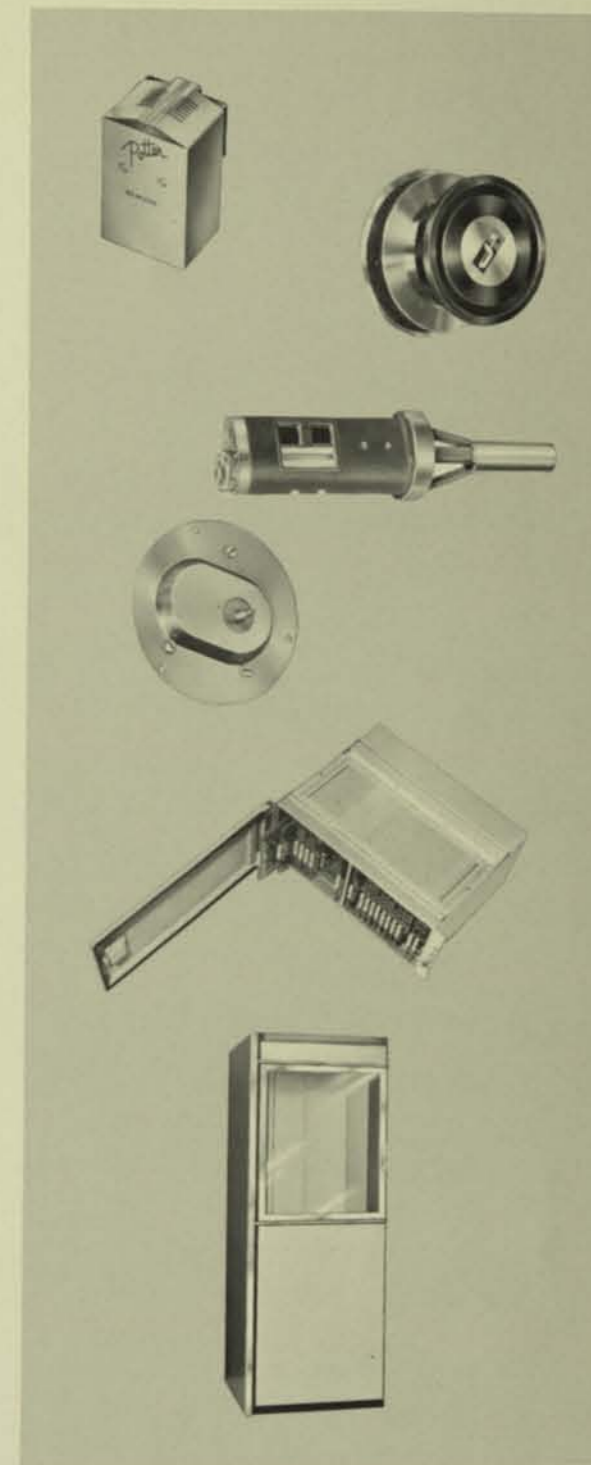
SWITCHING ELECTRONICS

Switching amplifiers are available which reduce the cost of digital magnetic tape systems by permitting time-sharing of a single Read/Write amplifier package among groups of up to four tape units.

CABINET

Potter Standard cabinet, Model CAB-250, as shown in Figure 1, is recommended for housing the MT-36 transport. Other cabinet styles are available for special requirements. All cabinets are rigidly constructed and will accommodate the transport, manual control,

*QUICK-LOCK is a trademark of Potter Instrument Company, Inc.



drive electronics, power supply, read/write amplifier assemblies, and all accessories that comprise the system. The Cabinet provides accessibility, both front and rear, and allows space for customer electronics. Casters permit easy maneuverability.

Cabinets are supplied with standard Potter colors or can be finished to customer specification. Main Structure: charcoal gray, semi-gloss, Federal Standard 595, Number 26081, Doors, Front and Rear: light gray, semi-gloss, Federal Standard 595, Number 26622.

MT-36 INTERFACE CONNECTIONS

Letters refer to contact pins, connector J/P-102, EC-36 Drive Electronics Chassis:

- A. -5v run/0v stop, at 6 ma
- B. -5v reverse/0v forward, at 6 ma
- C. Stop at EOT input (place jumper to pin D)
- D. EOT Output: Not on Foil, -15v. Maximum load to ground, 5 ma. On Foil, 0v.
- E. Ready Signal: -10v at 5 ma
- F. 10v nominal servo supply sample at 2 ma
- G. Rewind Command: -5v at 6 ma
- J. Stop at BOT input (place jumper to pin K)
- K. BOT Output: Not on Foil, -15v. Maximum load to ground, 5 ma. On Foil, 0v.
- L. Chassis GND
- M. Circuit GND
- Q. Automatic Mode Reply: -7.5v at 2 ma
- T. Capstan Speed Change Command: -5v at 5 ma (2 speeds only)
- U. +15v sample (for interrogation only) at 5 ma
- V. -15v sample (for interrogation only) at 5 ma
- W. EOT Lamp Out Signal: Out, 0v, 24 ohms to ground; On -5v to -10v @ 5 ma
- X. Write Lock-out Switch (normally closed contact)
- Y. Write Lock-out Switch (common contact)
- Z. Write Lock-out Switch (normally open contact)

MT-24 AND MT-75 TAPE TRANSPORTS AND TAPE SYSTEMS

The MT-36 is one member of a family of vacuum-buffered tape transports providing a range of speed capabilities as follows:

MT-24 Tape Transport	2 to 36 ips
MT-36 Tape Transport	2 to 50 ips
MT-75 Tape Transport	2 to 75 ips

All these units employ the same basic design configuration, and most parts are interchangeable between models.

POTTER WORLDWIDE FIELD SERVICE AND LOGISTICS PROGRAM

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POTTER INSTRUMENT COMPANY, INC.

EAST BETHPAGE ROAD • PLAINVIEW, L.I., NEW YORK 11803 • (516) 694-9000

POTTER

PRODUCT
DATA

1-502

STANDARD CAB-250 CABINET



FEATURES OF CAB-250 CABINET

- Sturdy, Steel Construction
- Immediate Accessibility, Both Front and Rear
- Modular Designed to Accommodate Vacuum Transports and Electronics
- Space Allowance for Customer Components

INTRODUCTION

Potter offers standard cabinets for housing tape transports and tape systems. Cabinet structure design provides proper stability for the equipment during operation and transfer from one location to another. All cabinets are accessible both front and rear to eliminate the necessity for physically removing the transport from its working station.

Cabinets are rigidly constructed to accommodate the transport, manual control, drive electronics, power supply, read/write amplifier assemblies and all accessories that comprise the system, in addition to allowing space for customer electronics. Space, a constant problem in system design, has been engineered into all Potter cabinets, permitting the installation of machine interface and special control circuitry immediately adjacent to the transport.

System color and complementary mechanical appearance are other prime factors in selecting cabinetry. Potter standard colors (Ref. Fed. Std. 595) are listed below. Many other colors and finishes can be supplied as an option. Please consult your Potter sales representative for further details.

CAB-250 UPRIGHT CABINET

The CAB-250 cabinet has been designed to accommodate the MT-24, MT-36, MT-75, MT-120, M906II tape transports, and the MT-SW and MT-SR incremental transports.

This modular cabinet is built on a tubular steel frame and includes front and rear service access doors and tempered glass dust cover. All doors and side panels may be removed for servicing.

Accessories include an integral filtered air cooling system with a 300 cfm blower, removable side panels, door interlocks, oversized casters, floor jacks, AC power control panel and a power convenience strip. The cabinet is supplied in standard Potter colors or can be finished to customer specification.

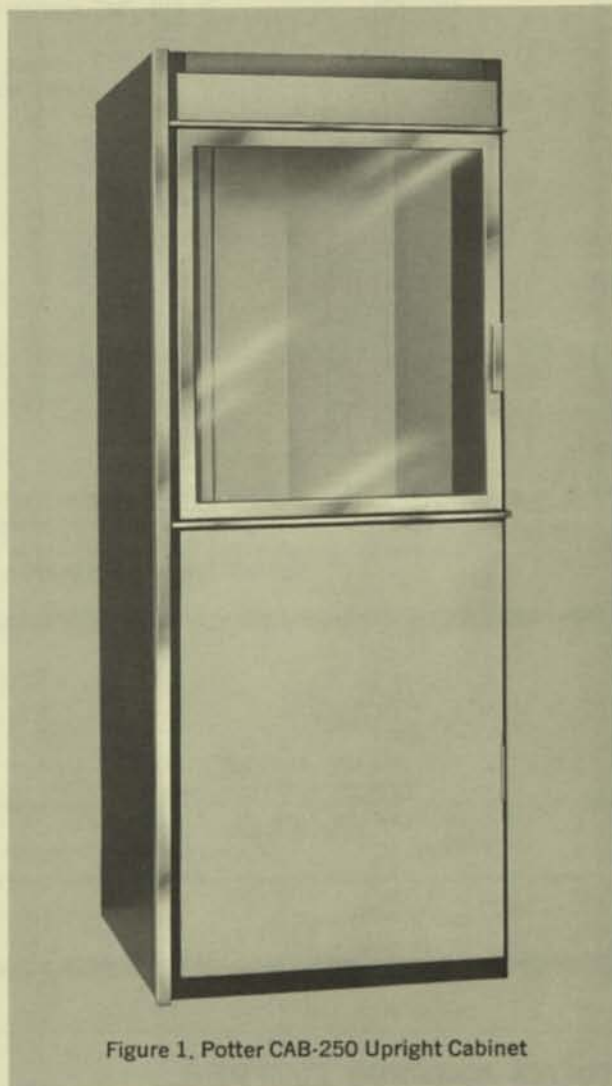


Figure 1. Potter CAB-250 Upright Cabinet

STANDARD COLORS

Cabinet frame and side panels . . . Charcoal gray, semi-gloss, color #26081
Front and rear cabinet doors . . . Light gray, semi-gloss, color #26622

Tape transport panels and transport shadow box are ordinarily medium gray gloss, color #16251. Dust cover and front edges of the side panels are brushed aluminum.

Dimensions 70"H x 27"W x 31½"D
Weight 290 lbs.

EFFECTIVE: MAY 25, 1967

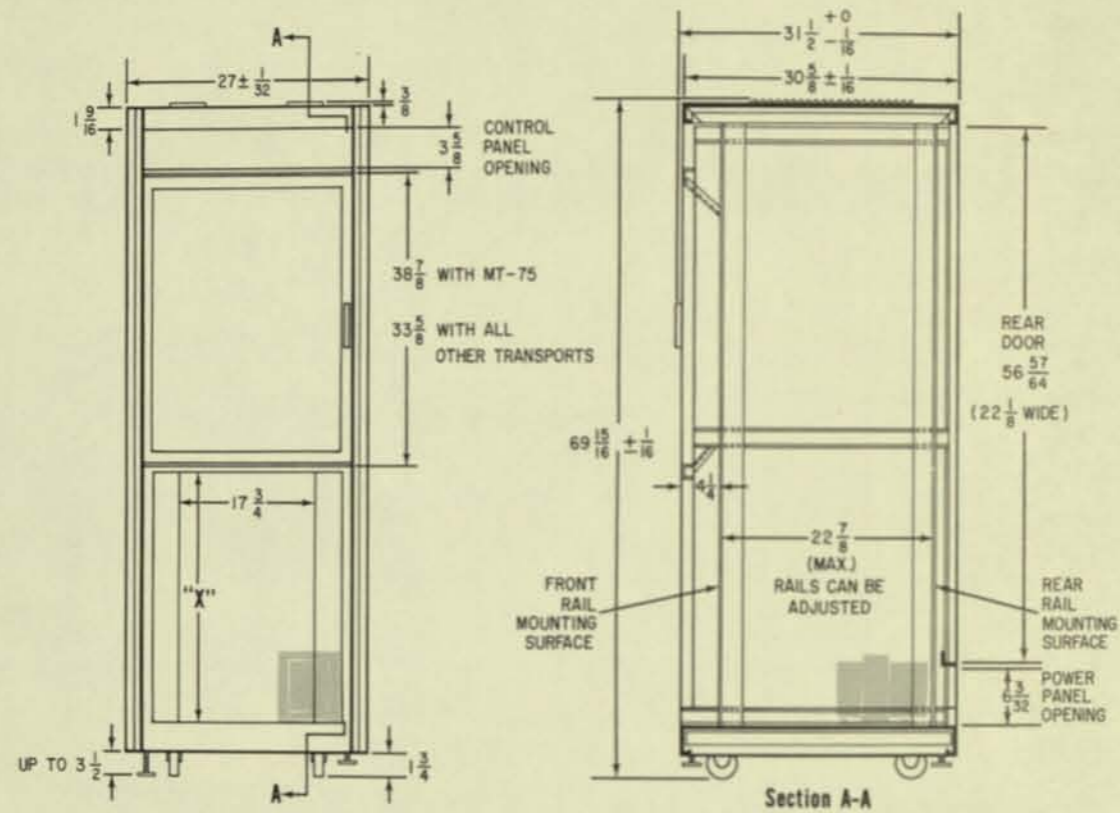


Figure 2. Dimensional Drawing, Potter CAB-250 Upright Cabinet

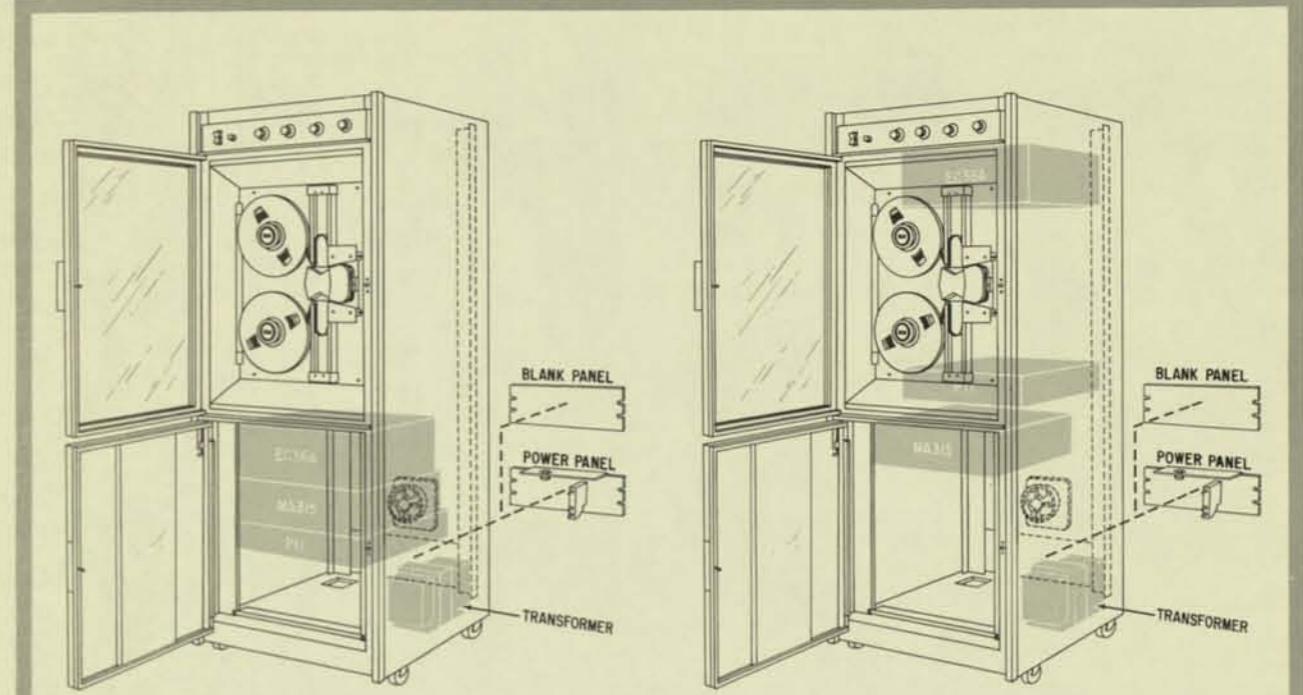


Figure 3. Alternate locations for drive electronics, amplifier, and amplifier power supply. The drawing on the left is the standard configuration. Rear mounted locations, shown on the right, are recommended when additional space is required for customer electronics and/or storage.

POTTER TAPE TRANSPORT	TRANSPORT HEIGHT	"X"
MT-24	24 1/2	24 1/2
MT-36	31 1/2	24 1/2
MT-75	36 1/4	19 1/4
MT-120	24 1/2	24 1/2
MT-SR	24 1/2	24 1/2
MT-SW	24 1/2	24 1/2
M906II	24 1/2	24 1/2

SPACE AVAILABLE FOR ELECTRONIC COMPONENTS (POTTER OR CUSTOMER SUPPLIED)

POTTER ACCESSORY EQUIPMENT continued . . .

Unit	Used With Transport Model	Height	Width	DIMENSIONS Depth
*Read/Write Amplifiers				
MA-151 (ea. chassis)	ALL	9 1/4	19	12 + 5 for cables
MA-212 (ea. chassis)	ALL	5 1/4	19	13 + 5 for cables
MA-315 (ea. chassis)	ALL	5 1/4	19	13 + 5 for cables
MA-375 (ea. chassis)	ALL	5 1/4	19	13 + 5 for cables
*Read/Write Power Supply				
P11		3 1/2	19	16 1/2
*Transformers				
** TR-120	MT-120	7 1/2	6 1/8	10 1/4
TR-S42-1298	906II	8 1/2	5 3/4	8 3/4
Control Panels				
CP-504	MT-24/36/75	4	23 3/4	14 1/2 + 6 1/4 for cables
CP-505	MT-120	4	23 3/4	14 1/2 + 6 1/4 for cables
CP-506	MT-SR	4	23 3/4	14 1/2 + 6 1/4 for cables
CP-509	MT-SW	4	23 3/4	14 1/2 + 6 1/4 for cables
CP-512	M906II	4	23 3/4	14 1/2 + 6 1/4 for cables

*Optional Item **Required with MT-120.

POTTER ACCESSORY EQUIPMENT

Unit	Used With Transport Model	Height	Width	DIMENSIONS Depth
Transport Drive Electronics				
EC-36A	MT-24/36	7	19	19 + 5 for cables
EC-75A	MT-75	7	19	14 1/4 + 6 1/8 for cables
EC-120	MT-120	7	19	14 1/4 + 6 1/8 for cables
EC-SW	MT-SW	7	19	14 1/4 + 6 1/8 for cables
EC-SR	MT-SR	7	19	14 1/4 + 6 1/8 for cables
M3323	M906II	7	19	14 1/4 + 6 1/8 for cables

Note: All dimensions shown are in inches.

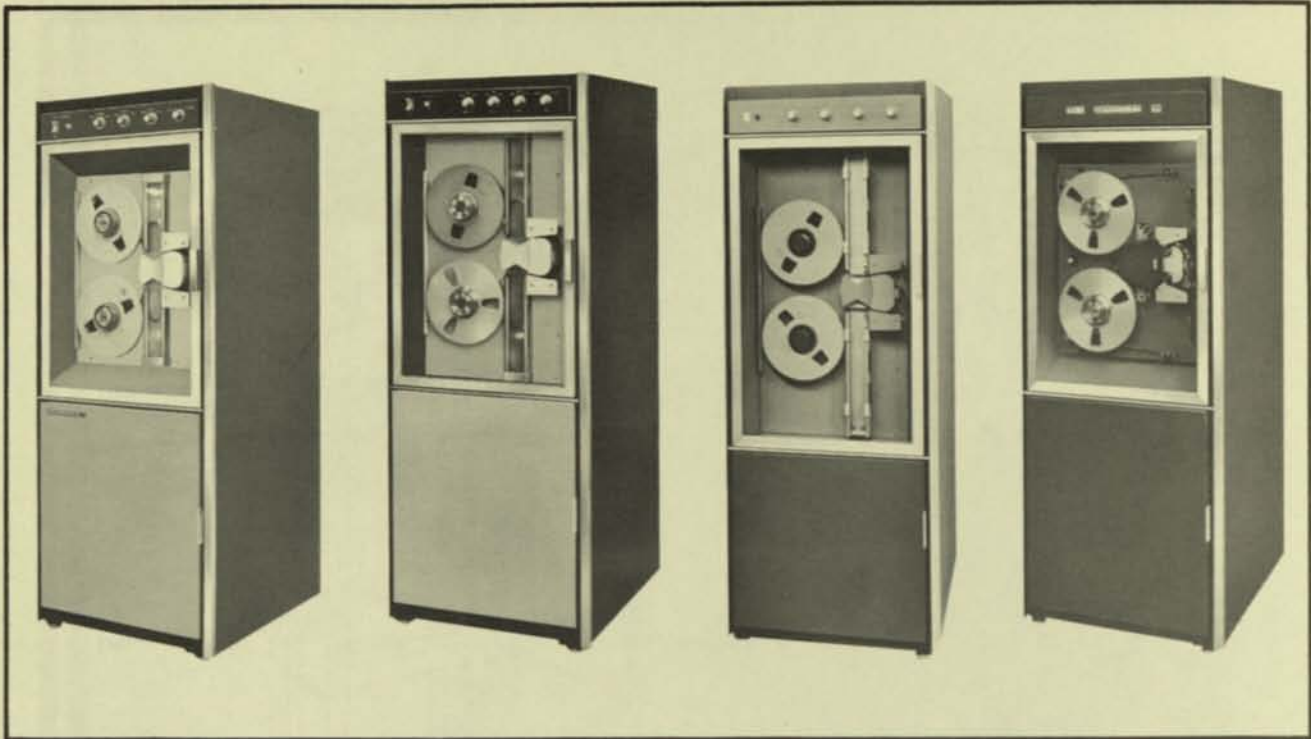


Figure 4. Standard CAB-250 Cabinet with Potter Magnetic Tape Transports (from left to right: MT-24, MT-36, MT-75 and MT-120).

POTTER WORLDWIDE FIELD SERVICE AND LOGISTICS PROGRAMS

Repair centers in strategic locations within the continental United States and abroad have been established to support the entire Potter product line.

Staffed by highly-trained field representatives, these repair centers are equipped to effect on-site installation of equipments and to perform quality repair, maintenance and overhaul.

Supplementing this capability, if a customer prefers to provide his own equipment support, Potter has established standard instruction courses to train customer personnel, either at Potter or in the field.

A Spare Parts Department, backed up by an extremely large inventory, and streamlined order processing, is available for customer convenience and economy. This inventory permits the customer to realize virtual elimination of downtime as well as savings on spare parts dollars by offering expeditious delivery for replaceable parts. Delivery is available in 24 hours to meet customer emergency requirements—within 72 hours for standard parts under normal conditions. Potter also offers provisioning

and logistics capabilities to meet all existing military specifications.

The Potter field service and logistics program is one of the finest in the EDP equipment industry. With reliable, quality-engineered equipment, supported by comprehensive field service, Potter guarantees satisfaction.

POTTER TAPE TRANSPORTS AND TRANSPORT SYSTEMS

Potter offers the world's broadest line of digital tape transports and tape transport systems.

Tension arm, vacuum-column, single-capstan and incremental transports are available, as well as a complete line of components and accessories, including read/write amplifiers, magnetic heads, drive electronics, manual controls, QUICK-LOCK® hubs and cabinets.

In the single-capstan series, units are available with tape speeds to 150 ips at all packing densities with unrestricted programming. For complete product specifications, write, wire or call General Sales Manager, Potter Instrument Company, Inc., 151 Sunnyside Boulevard, Plainview, New York. Telephone: (516) 681-3200. TWX 510-221-1852.

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POTTER

PRODUCT
DATA
1-404

MODEL MA212 READ/WRITE AMPLIFIER



INTRODUCTION

The MA212 Read/Write Amplifier is an extension of the Potter MA315 and MSA375 amplifier line. The MA212 amplifier is IBM 7/9 channel compatible and can be adapted to 8- or 16-channel systems using internally generated or center track

recorded clocking. The amplifier is designed for 200 bpi and skew compensated 200/556/800 bpi operation. It will operate with tape transports in speed ranges between 2 and 120 ips. Recording method is modified non-return-to-zero (NRZI).

Three basic amplifiers are available:

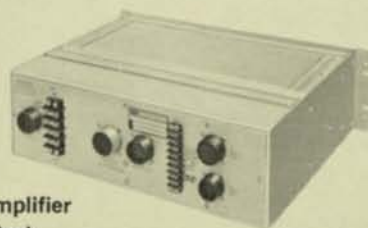
- Single-Speed MA212 Primarily for use with low speed (2 ips to 25 ips) non-simultaneous Read/Write applications not covered by the MA315 amplifier.
- Two-Speed MA212 For use with two-speed Read or Write or Read/Write application in the 2 to 120 ips speed range.
- Four-Speed MA212 For use with three- or four-speed transports in the 2 to 120 ips range.

Each Read channel has its own preamplifier gain adjustments for each speed selected. Each density selected for a given speed has its own strobe

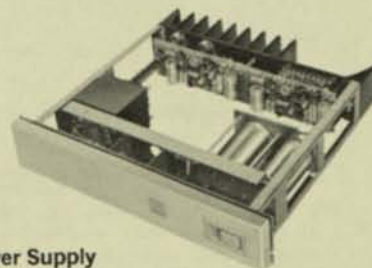
delay and each Read and Write channel contains its own skew adjustable compensation selected as a function of speed.



Potter MA212
Read/Write Amplifier
(front view)



MA212 Amplifier
(rear view)



P11 Power Supply

EFFECTIVE: JUNE 1, 1967

FEATURES INCLUDE...

- Compatible with IBM 7/9 channel format
- Low density version for economy
- 8- and 16-channel internally strobed or clocked system available
- Multi-tape speed operation available for speeds between 2 and 120 ips. To 150 ips for special applications
- Information transfer rates up to 96,000 characters/second, up to 120 kc for special applications
- Tape interchangeability between IBM-compatible tape units assured
- Operation in either Read, Write or simultaneous Read/Write modes
- Differential Read preamplifiers for high noise rejection with individual gain adjustments automatically selected as a function of speed
- Skew compensation selected as a function of speed or direction
- In-line Read output of all character bits and clock pulse output
- Provision made for external controls:
 - Write Enable
 - Erase Head Enable
 - Write Reset
 - Read Inhibit
 - Write Clock standard on 7/9 compatible amplifier
 - Read Reset
 - Density Select: 200/556/800
 - Threshold Level Select: High/Low
 - Speed Select
- Provision for odd or even lateral parity check
- Dual threshold level
- Input circuit drive requirements: 1.5 ma
- Output circuit short-circuit-proof and drive load currents up to ±20 ma
- Peak detectors employed in Read amplifiers
- Circuitry provides for accurate Write and Read skew alignment
- Designed to minimize maintenance costs:
 - Solid-state modular construction
 - Test points accessible at front of chassis
 - Extension frames included provide complete exposure of all plug-in modules for circuit testing under actual conditions
 - 19-inch rack mounting
 - Independent packaging of power supply; supply is overload-protected and short-circuit-proof

TO ORDER:

1. Select format required (if 7-channel convertible to 9-channel is desired, option must be specified when initially ordered).
2. Select packing density, i.e.: 200 or multiple.
3. Define Read/Write requirement.
4. Determine speed, direction of Read and simultaneous threshold sensing (reference: Note 1).
5. Determine if lateral parity check is required.

SPECIFICATIONS

Item	Low Density	Multiple Density	Single Density
	Model MA212-1 Uncompensated	Model MA212-2 Compensated	Model MA212-4 Compensated
Number of Channels	Up to 8	Up to 8	9 channel
Packing Density	200 bpi	Up to 800 bpi	800 bpi
Writing Mode	NRZI	NRZI	NRZI
Tape Speed (Single, Dual, and Four-Speed Units)			
Write Only	2-120 ips	2-120 ips	2-120 ips
Simultaneous Write/Read	25-120 ips	25-120 ips	25-120 ips
Read Only	2-120 ips	2-120 ips	2-120 ips
Read Direction	FWD/REV	FWD/REV	FWD/REV
Compatible Head Types			
Simultaneous Read/Write Operation			
Dual Gap	25-120 ips: 18517-7	25-120 ips: 18517-7	50-120 ips: 19506-9
Non-Simultaneous Single Gap			
Read or Write	10-120 ips: 16460-7 (Recovery time between Write and Read operation: 0.1 second)	10-120 ips: 16460-7 (Recovery time between Write and Read operation: 0.1 second)	10-120 ips: 19402-9 (Recovery time between Write and Read operation: 0.1 second)
Read Only Operation	Single Gap 30-120 ips: 18411-7 2-30 ips: 16401-7	Single Gap 30-120 ips: 18411-7 2-30 ips: 16401-7	Single Gap 30-120 ips: 19406-9 2-30 ips: 16401-7
Write Only Operation	Single Gap 2-120 ips: 18413-7	Single Gap 2-120 ips: 18413-7	Single Gap 2-120 ips: 19405-9
Power Supply (separate package)			
Input	115V ±15%, 50/400 cps, single phase	115V ±15% 50/400 cps, single phase	115V ±15%, 50/400 cps, single phase
Output (Short-Circuit-Proof)	-15VDC ±0.5V @ 4 amps +15VDC ±0.5V @ 0.75 amp	-15VDC ±0.5V @ 4 amps +15VDC ±0.5V @ 0.75 amp	-15VDC ±0.5V @ 4 amps +15VDC ±0.5V @ 0.75 amp
Dimensions			
Amplifier Chassis (each)			
MA212-1	5¼"H, 19"W, 18"D*	5¼"H, 19"W, 18"D*	5¼"H, 19"W, 18"D*
MA212-2	5¼"H, 19"W, 18"D*	5¼"H, 19"W, 18"D*	5¼"H, 19"W, 18"D*
Power Supply Chassis			
P-11	3½"H, 19"W, 16⅝"D	3½"H, 19"W, 16⅝"D	3½"H, 19"W, 16⅝"D
Weights (approximate)			
Amplifier Chassis (each)			
	15 lbs.	15 lbs.	15 lbs.
Power Supply Chassis			
	25 lbs.	25 lbs.	25 lbs.

*Depth includes 5" for mating cable connectors.

INPUT/OUTPUT LINES

Input Lines

Input Levels	Logic "1" Logic "0"	Ground $\pm 0.5V$ -3.5 to -15VDC
Input Current	Logic "1" Logic "0"	1.5 ma sink None
Write Inputs	Pulse (RB)	A "1" is written when the input is switched from "0" to "1". Maximum pulse width is 1.5 usec. Minimum pulse width is 1 usec.*
Write Clock	Pulse (RB)	When this option is supplied, broad pulse write amplifiers may be used with a narrow pulse write clock. Any data ("1" bits) held at the write inputs when write clock is strobed will be recorded on the tape. Minimum pulse width, 1 usec; maximum 1.5 μ sec. (Standard on MA212-4; Not Used on MA212-1/MA212-2)
Write Enable	Level-	Enabled with logic "1" signal.
Write Reset	Level-	Reset with logic "1" signal. Minimum pulse width is 2.0 usec.
Erase Head Enable	Level-	Enabled with logic "1" signal.
Read Inhibit	Level-	Inhibited with logic "1" signal.
Read Reset	Level-	Reset with logic "1" signal. Minimum pulse width is 2.0 usec.
Density Select, 200 bpi	Level-	Selected with logic "1" signal. (Not used on MA212-1).
556 bpi	Level-	Selected with logic "1" signal. (Not used on MA212-1).
800 bpi	Level-	Selected with logic "1" signal. (Not used on MA212-1).
Threshold Select, High/Low	Level-	Logic "0", high; logic "1", low.
Speed Select (4 lines)	Level-	Logic "0", not selected; logic "1", selected.

Output Lines

Output Levels	Logic "1" Logic "0"	Ground $\pm 0.5VDC$ -10VDC -2.0V +1.0V
Output Current	Logic "1" Logic "0"	20 ma sink 20 ma source
Read Outputs		
Pulse Width	0.5 to 2.0 usec, adjustable	
Rise Time	0.2 usec into 1000pf capacitance to ground	
Fall Time	0.3 usec into 1000pf capacitance to ground	
Clock Output	Same characteristics as Read outputs. Occurs simultaneously with Read outputs.	
Lateral Parity, Odd and Even**	Same characteristics as Read outputs. Occurs simultaneously with Read outputs.	

* Write or Write clock pulse width limits are a function of speed and density. Figure given is for 60-120 ips at 800 bpi. (See chart which follows.)

Range No.	Speed Range	vs	Maximum Permissible Pulse Width
1	2.0 - 3.0		25 usec
2	3.1 - 4.0		25 usec
3	4.1 - 8.0		15 usec
4	8.1 - 16.0		7.5 usec
5	16.1 - 32.0		3.5 usec
6	32.1 - 64.0		2 usec
7	64.1 - 120		1.5 usec
Special	120.1 - 150		1.5 usec

** Option—Additional Card Required.

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POTTER

MODEL MA310 READ/WRITE AMPLIFIER



DESCRIPTION

The MA310 Silicon Read/Write Amplifier records digital information on magnetic tape and check-reads this data to insure recording accuracy.

The Amplifier System, designed for single speed applications with Potter's Single Capstan transports, SC-1060, SC-1065, & SC-1080, features complete IBM compatibility. All MA310 7-channel, 200/556/800 bpi systems are prewired for immediate field expansion to 9-channel, 800 bpi compatible operation. Field retrofit of additional input/output channels is achieved by inserting extra printed circuit modules.

READ/WRITE AMPLIFIER

SINGLE-SPEED, READ/WRITE AMPLIFIER SYSTEM, SKEW-COMPENSATED...for IBM 200/556/800 bpi 7- or 9-channel compatible operation. Completely prealigned for any specified tape speed from 75 to 150 ips. Amplifier includes full chassis prewiring for future expansion to IBM 9-channel, 800 bpi compatible operation. Read Reverse Capability and End-of-Block Detection options are available on all amplifiers.



MA310 (Read/Write Amplifier)

FEATURES

- Compatible with IBM 7-channel format for 200/556/800 bpi and IBM 9-channel format for 800 bpi
- Tape speed operation available for speeds between 75 and 150 ips
- Operation in simultaneous Read/Write mode
- Read Reverse Capability
- Tape interchangeability between IBM-compatible tape units assured
- Information transfer rates up to 120 Kilocharacters
- Read Amplifier automatically reset when power is turned ON
- Circuitry provides for accurate Write and Read deskewing
- Provision for compensated writing the longitudinal redundancy check character (7- and 9-channel)
- Strobed Write input available
- Individual adjustments for pulse pairing compensation of Write amplifiers
- End-of-Block Detection capability
- Write amplifier automatically reset when Write Enable is switched to "1" state
- Input circuit drive requirements less than 3 ma
- In-line Read output of all character bits and clock pulse output
- Dual threshold level standard
- Strobe delay automatically reduced to 25% during check read operation
- Peak detectors employed in Read amplifiers
- Output circuits short-circuit-proof
- Provision for ODD or EVEN lateral parity Read check
- Provision made for external controls
 - Write Enable
 - Write Reset (LRCC)
 - Read Reset (Read Inhibit)
 - Density Select—200/556/800 bpi
- Designed to minimize maintenance costs
 - Solid-state silicon modular construction
 - Accessible test points at front of chassis permit most adjustments to be made with modules in normal position
 - Extension frames included provide complete exposure of all plug-in modules for circuit testing under actual operating conditions
- Front access for ease of maintenance

SPECIFICATIONS

	7-CHANNEL COMPENSATED	9-CHANNEL COMPENSATED
Packing Density	200/556/800 bpi	800 bpi
Writing Mode	NRZI	NRZI
Tape Speed (Single)	75 to 150 ips (simultaneous Read/Write)	75 to 150 ips (simultaneous Read/Write)
Read Direction	FWD/REV	FWD/REV
Compatible Head Types	Simultaneous Read/Write Operation (Dual Gap) 18517-7 Series 19506-9 Series Read Only Operation (Single Gap) 18411-7 Series 19406-9 Series Write Only Operation (Single Gap) 18413-7 Series 19405-9 Series	
	NOTE: Write Current Requirements; All Heads 45 ma 75-100 ips; 60 ma 100-150 ips	
Power Supply	Input power provided by power supply modules in Single-Capstan Series transports.	
Dimensions	Designed for mounting in Potter's SC-Series Transports 25 ³ / ₄ " x 4 ³ / ₄ " x 8 ¹ / ₃₂ "	
Weight	35 lbs. maximum	

TYPICAL MODULE SELECTION CHART

Card Type	9-Channel Single Speed 75 ips Logic 1 = +5; Logic 0 = 0V	
	Qty.	Type
Chassis	1	
Power Supply	Incl.	
Write Amplifier	9	WA 91
Write Control	1	WC 95-3
Write Enable	1	RWE 91
Read Pre-amplifier	3	RP 93
Read Amplifier	9	RA 93
Read Buffer	4	RB 81
Read Buffer	1	RB 85
Threshold Control	1	TC 91
Strobe Gate	1	SG 91
Strobe Reset	1	SRB 1
Strobe Delay Multivibrators	1	SDM 93
Remote Density Select	1 (opt.)	RDS 91
End-of-Block Detector	1 (opt.)	EOB 90
Lateral Parity Check	1 (opt.)	PC 95

AMPLIFIER ACCESSORIES

7/9-CHANNEL OPTIONAL PARITY CHECK MODULE (READ).
 IBM 7- OR 9-CHANNEL MASTER ALIGNMENT TAPE, 800 BPI (FULL WIDTH)

MAGNETIC TAPE TRANSPORT READ/WRITE AMPLIFIER — MODEL MA310

FEATURES

- Compatible with IBM 7-channel format for 200/556/800 bpi and IBM 9-channel format for 800 bpi
- Tape speed operation available for speeds between 75 and 150 ips
- Operation in simultaneous Read/Write mode
- Read Reverse Capability
- Tape interchangeability between IBM-compatible tape units assured
- Information transfer rates up to 120 Kilocharacters
- Read Amplifier automatically reset when power is turned ON
- Circuitry provides for accurate Write and Read deskewing
- Provision for compensated writing the longitudinal redundancy check character (7- and 9-channel)
- Strobed Write input available
- Individual adjustments for pulse pairing compensation of Write amplifiers
- End-of-Block Detection capability
- Write amplifier automatically reset when Write Enable is switched to "1" state
- Input circuit drive requirements less than 3 ma
- In-line Read output of all character bits and clock pulse output
- Dual threshold level standard
- Strobe delay automatically reduced to 25% during check read operation
- Peak detectors employed in Read amplifiers
- Output circuits short-circuit-proof
- Provision for ODD or EVEN lateral parity Read check
- Provision made for external controls
 - Write Enable
 - Write Reset (LRCC)
 - Read Reset (Read Inhibit)
 - Density Select—200/556/800 bpi
- Designed to minimize maintenance costs
- Solid-state silicon modular construction
- Accessible test points at front of chassis permit most adjustments to be made with modules in normal position
- Extension frames included provide complete exposure of all plug-in modules for circuit testing under actual operating conditions
- Front access for ease of maintenance

Functions		Components																	
READ/WRITE MODE	PACKING DENSITY	Wired for 200/556/800 bpi operation and 7/9-channel compatible operation. Provides input line receivers, Write flip-flops, Write Asymmetry adj. and Write skew multivibrators for compensated operation. Circuitry for one Write Amplifier contained on each board. Provides control functions of Write Reset, Write Clock, LRCC. Provides Write Enable, Initial Read Reset, Read Inhibit and ODD/EVEN Parity Selection. Provides linear amplification of playback signals and symmetry adjustments. Three channels per board. Provides linear amplification of playback signals and symmetry adjustments. One channel per board. Provides final stage of linear amplification, rectifier, forward and reverse skew adjustment, peak detector and integration to digitize linear playback signals. One channel per board. Provides line receivers, Read Storage flip-flops, strobe gate and line driver for information channel. Two channels per board. Provides line receivers, Read Storage flip-flops, strobe gate and line driver for information channel. One channel per board. Provides logic converters and three threshold circuits for selection of High Threshold, Low Threshold and Check Read Threshold. Provides a 9-channel "OR" Gate, a 200/556/800 bpi Strobe Select Driver. Provides strobe driver, reset driver and read clock driver circuitry. Provides one-shot multivibrators to establish proper strobe delay for 200 bpi, 556 bpi or 800 bpi operation. Provides for remote control of 200 bpi, 556 bpi or 800 bpi density select and contains output driver for EOB circuitry. Provides End-of-Block detection circuitry for 200 bpi, 556 bpi and 800 bpi operation. (EOB output drive circuit located on RDS 9X module.) Provides up to 9 channels of lateral parity checking. Module within SC-Series transport provides ±15V DC and +5V DC regulated output for operation of MA310 Read/Write Amplifiers. —15 volt supply at 0.75 amps; +15 volt supply at 3 amps; +5 volt supply at 0.75 amps. Master alignment tape provided with high-density systems.																	
		Chassis	Write Amp WA 9X (See Note 3)	Write Control WC 9X (See Notes 1 & 3)	Read/Write Enable RWE 9X (See Note 3)	Read Preamp RP 93	Read Preamp RP 94	Read Amp RA 93	Read Buffer RB 8X (See Note 3)	RB 8X' (See Note 3)	Threshold Control TC 9X (See Note 3)	Strobe Gate SG 9X (See Note 3)	Strobe and Reset Card SR 8X (See Note 3)	Strobe Delay Multivibrators SDM 93	Remote Density Select RDS 9X (See Notes 2 & 3)	End-of-Block Detector EOB 90 (See Note 2)	Lateral Parity Check (See Note 3)	Extension EX 03	Power Supply	Test Tape T20
7-Channel	R/W	200/556/800	1	7	1	1	2	1	7	3	1	1	1	1	1	1	2		
	Read Only		1			1	2	1	7	3	1	1	1	1			2		
	Write Only		1	7	1	1							1		OPTIONAL	OPTIONAL	OPTIONAL	2	OPTIONAL
9-Channel	R/W	800	1	9	1	1	3		9	4	1	1	1	1	1	1	2		OPTIONAL
	Read Only		1			1	3		9	4	1	1	1	1	1	1	2		
	Write Only		1	9	1	1						1					2		

NOTES: 1) Module is coded: 60 ma Application = -1 (EH-2 Erase Head in contact)
 90 ma Application = -3 (EH-2 Erase Head out-of-contact)
 100 ma Application = -4 (EH-5 Erase Head out-of-contact)

2) Remote Density Select Module required with End-of-Block detector, EOB 90 option.

3) Logic Selection:
 Four different logic level options are available. The following table gives coding for each of these options. Substitute the value from the table for the letter X and X' in each module where X and X' appears:

	Value of X and X'			
	+5V OV	0V +5V	-5V OV	0V -5V
Logic 1	1	2	3	4
Logic 0	5	6	7	8
WA 9X	1	2	3	4
WC 9X	5	6	7	8
RWE 9X	1	2	3	4
RDS 9X	1	2	3	4
RB 8X	1	2	3	4
RB 8X'	5	6	7	8
TC 9X	1	2	3	4
SG 9X	1	2	3	4
SR 8X	1	2	3	4
PC 9X	5	6	7	8

INPUT/OUTPUT LINES

Input Lines

Input Levels (available standard logics)	Logic "1"	+5 to +15V DC	5 ma
	Logic "0"	0V ±1.0V	3 ma
	Logic "1"	0V ±1.0V	3 ma
	Logic "0"	+5 to +15V DC	5 ma
	Logic "1"	-5 to -15V DC	5 ma
	Logic "0"	0V ±1.0V	1 ma
	Logic "1"	0V ±1.0V	1 ma
	Logic "0"	-5 to -15V DC	5 ma

Input Current

Write Inputs (7 and 9 lines)	Level (RB)	A "1" is written on tape when the input is switched from "0" to "1". Maximum 1 microsecond rise time for minimum voltage swing (5.0V). If a rectangular wave is used, the maximum duty cycle of the input is 50% of the pulse period. Minimum pulse width is 1 microsecond.
Write Clock	Pulse	All Write inputs are simultaneously enabled when the Write Clock line is raised to the level corresponding to Logic "1" Level and a "1" is written by all Write input lines which are at Logic "1" Level.
Write Enable	Level	Enabled with Logic "1" signal. (Simultaneous Erase head enable).
Write Reset	Pulse	Reset with Logic "1" signal. Minimum pulse width is 2.0 microseconds.
Read Reset	Level/Pulse	Reset with Logic "1" signal. Minimum pulse width is 2.0 microseconds.
Density Select—200	Level	Selected with Logic "1" signal (optional).
Density Select—556	Level	Selected with Logic "1" signal (optional).
EVEN Read Lateral Parity Select (optional)		EVEN selected with Logic "1" signal.

Output Lines

Output Levels (available standard logics):

Logic "1"	+5V ±1.0V	3ma source
Logic "0"	Ground ±1.0V	20ma sink
Logic "1"	Ground ±1.0V	20ma sink
Logic "0"	+5V ±1.0V	3ma source
Logic "1"	-5V ±1.0V	3ma source
Logic "0"	Ground ±1.0V	20ma sink
Logic "1"	Ground ±1.0V	20ma sink
Logic "0"	-5V ±1.0V	3ma source

Read Outputs

Pulse Width	1 microsecond
Rise Time	0.2 microseconds into 1000pf capacitance to ground
Fall Time	0.3 microseconds into 1000pf capacitance to ground
Clock Output	Same characteristics as Read Outputs. Occurs simultaneously with Read Outputs.
Lateral Parity, Odd or Even*	Same characteristics as Read Outputs. Occurs simultaneously with Read Outputs.

*Additional card required.

Information subject to change without notice.



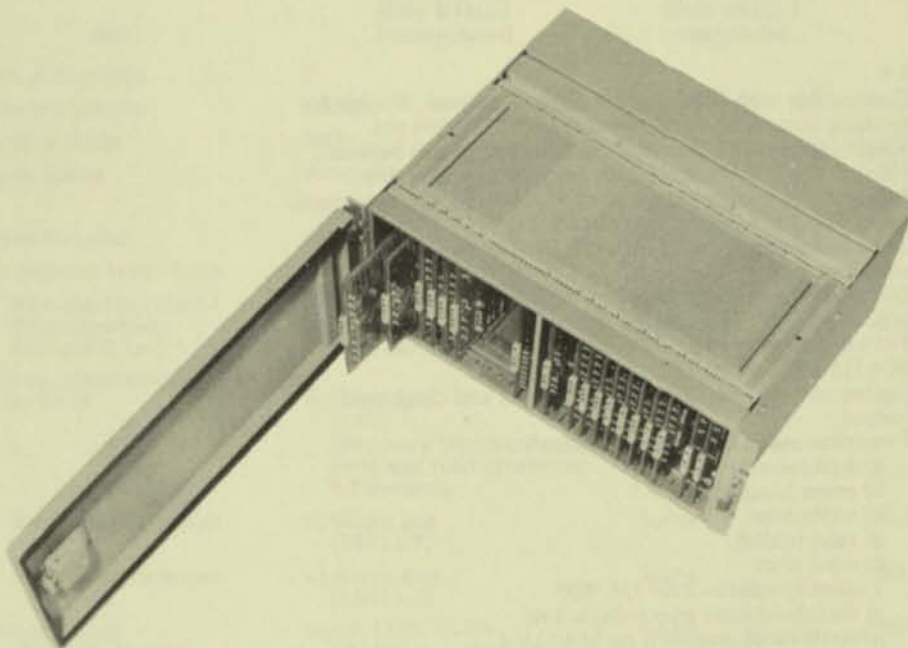
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POTTER

PRODUCT
DATA
1-402

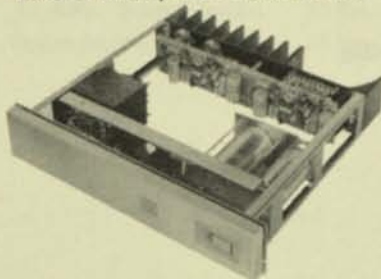
MODEL MA315 READ/WRITE AMPLIFIER



TYPICAL MA315 READ/WRITE AMPLIFIER



(Rear View)
MA315 READ/WRITE AMPLIFIER



P11 Power Supply

DESCRIPTION

The MA315 Read/Write Amplifier records digital information on magnetic tape and check-reads this data to insure recording accuracy.

Three models are offered to cover the range of IBM-compatible tape formats:

- Model MA315-1 Uncompensated—7 channel 200 bpi
- Model MA315-2 Compensated—7 channel 200/556/800 bpi (not convertible to 9 channel)
- Model MA315-4 Compensated—7 channel 200/556/800 bpi (convertible to 9 channel) or 9 channel 800 bpi.

FEATURES INCLUDE . . .

- Compatible with IBM, 7- or 9-channel format. Models for packing densities of 200 bpi and 200/556/800 bpi.
- Single tape speed operation available for speeds between 30 and 120 ips. Up to 150 ips for special applications.
- Information transfer rates up to 96,000 characters/second, up to 120 KC for special applications.
- Tape interchangeability between IBM compatible tape units assured.
- Operation in either read, write, or simultaneous read/write modes.
- Forward and reverse read capability (available on MA315-4).
- In-line read output of all character bits and clock pulse output.
- Provision made for external controls:
 - a) write enable
 - b) erase head enable
 - c) write reset
 - d) read inhibit
 - e) read reset
 - f) density select—200/556/800
 - g) threshold level select—high/low
 - h) write clock standard on MA315-4
- Provision for writing the longitudinal redundancy check character (compensated on MA315-4).
- Recognition signal for end-of-block character.
- Provision for odd or even lateral parity check.
- Dual threshold level.
- Input circuit drive requirements 1.5 ma.
- Output circuits short-circuit-proof and drive load currents up to ± 20 ma.
- Peak detectors employed in read amplifiers.
- Strobe Delay automatically reduced to 25% during Check-Read operation (MA315-4).
- Write Asymmetry compensation standard on MA315-4.
- Circuitry provides for accurate write and read skew alignment.
- Designed to minimize maintenance costs:
 - a) solid state modular construction
 - b) accessible test points at front of chassis permit most adjustments to be made with modules in normal position
 - c) extension frames included provide complete exposure of all plug-in modules for circuit testing under actual operating conditions
 - d) 19" rack mounting
 - e) independent packaging of power supply

SPECIFICATIONS

Item	Low Density Model MA315-1 Uncompensated	Multiple Density Model MA315-2 Compensated	Multiple Density Model MA315-4 Compensated	Single Density Model MA315-4 Compensated
No. of Channels	7	7	7 (convertible to 9)	9
Packing Density	200 bpi	200/556/800 bpi	200/556/800 bpi	800 bpi
Writing Mode	NRZI	NRZI	NRZI	NRZI
Tape Speed	Write: 0-120 ips Read: 30-120 ips	Write: 0-120 ips Read: 30-120 ips	Write: 0-120 ips Read: 30-120 ips	Write: 0-120 ips Read: 30-120 ips
Read Direction	FWD/REV	FWD	FWD/REV	FWD/REV
Compatible Head Types				
Simultaneous Read/Write Operation (30 to 120 ips)	a) Dual gap (18517-7)	Same	Same	Dual Gap (19506-9)
Non-simultaneous Read or Write	b) Single gap (6460-7) (Recovery time between write and read operation: 0.1 second)	Same	Same	Single Gap (19402-9)
Read Only Operation	c) Single gap (18411-7)	Same	Same	Single Gap (19406-9)
Write Only Operation	d) Single gap (18413-7)	Same	Same	Single Gap (19405-9)
Power Supply (Separate Package)	Input: 115V $\pm 15\%$, 50/400 cps, Single Phase Output: -15VDC $\pm 0.5V$ at 4 amps +15VDC $\pm 0.5V$ at 0.75 amps Short-Circuit-Proof	Same	Same	Same
Dimensions				
Amplifier Chassis (each)				
MA315-1	19" x 5 1/4" x 18" D*	Same	Same	Same
MA315-2	Same	Same	Same	Same
MA315-4	Same	Same	Same	Same
*NOTE: Depth includes 5" for mating cable connectors.				
Power Supply Chassis				
P-11	19" x 3 1/2" x 16 1/2" D	Same	Same	Same
Weights				
Amplifier Chassis (each)	15 lbs., approximately	Same	Same	Same
Power Supply Chassis	25 lbs., approximately	Same	Same	Same

INPUT/OUTPUT LINES

Input Lines

Input levels	logic "1"	Ground $\pm 0.5V$
	logic "0"	-3.5 to -15VDC
Input current	logic "1"	1.5 ma sink
	logic "0"	None
a) Write Inputs (MA315-1) (MA315-2)	Level (RB)	A "1" is written when the input is switched from "0" to "1". Maximum 1 microsecond rise time for minimum voltage swing (3.5v). Minimum pulse width is 1 microsecond. Maximum pulse width 2 microseconds when no write clock is used.
b) Write Enable	Level—	Enabled with logic "1" Signal
c) Write Reset	Level—	{ Reset with logic "1" Signal Minimum pulse width 2.0 μ sec
d) Erase Head Enable	Level—	Enabled with logic "1" Signal (Not used on MA 315-4)
e) Read Inhibit	Level—	Inhibited with logic "1" Signal
f) Read Reset	Level—	{ Reset with logic "1" Signal Minimum pulse width 2.0 μ sec
g) Density Select 200	Level—	Selected with logic "1" Signal (Not used on 315-1 or 9-channel amplifier)
h) Density Select 556	Level—	Selected with logic "1" Signal (Not used on 315-1 or 9-channel amplifier)
i) Density Select 800	Level—	Selected with logic "1" Signal (Not used on 315-1 or 9-channel amplifier)
j) Threshold Select High/Low	Level—	Logic "0"-High; Logic "1"-Low
k) Write Clock	Level—	A "1" is written when the clock is switched from "0" to "1" in the channels where the corresponding Write Input is switched from "0" to "1" simultaneous with or before the write clock signal. Write clock pulse width 1 microsecond minimum; 2 microseconds maximum.

Output Lines

Output levels	logic "1"	Ground $\pm 0.5VDC$
	logic "0"	-10VDC -2.0V +1.0V
Output current	logic "1"	20 ma sink
	logic "0"	20 ma source
a) Read Outputs		
Pulse width		0.5 to 2.0 microsecond adjustable
Rise time		0.2 microseconds into 1000pf capacitance to ground
Fall time		0.3 microseconds into 1000pf capacitance to ground
b) Clock Output		
Same characteristics as Read Outputs		
Occurs simultaneously with Read Outputs		
c) End-of-Block Signal		
Detects absence of two clock pulses		
Pulse width		1 millisecond
Rise time		0.2 microseconds into 1000pf capacitance to ground
Fall time		0.3 microseconds into 1000pf capacitance to ground
Signal normally at logic "0" level.		
Switches to logic "1" level for 1 millisecond to indicate end of block.		
Transition from logic "1" to logic "0" can be used to strobe longitudinal check bit register.		
Transition from logic "0" to logic "1" can be used to initiate transport stop signal.		
Note: An input to inhibit the End-of-Block Signal in reverse read operation is available.		
d) Lateral Parity, Odd and Even*		
Same characteristics as Read Outputs		
Occurs simultaneously with Read Outputs		

*Option—Additional Card Required

Information subject to change without notice



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M906II-2 MAGNETIC TAPE TRANSPORT AND MAGNETIC TAPE SYSTEMS



INTRODUCTION

The M906II-2 Magnetic Tape Transport provides high performance, reliability and maximum design flexibility. Tape speeds are offered in a wide variety of combinations with standard tape widths from $\frac{1}{2}$ to $1\frac{1}{4}$ inches.

Potter tape transports are also supplied as integrated tape systems. Read/Write amplifiers, manual controls, cabinets and a full line of tape accessories are available to meet almost every known computer format, as well as special laboratory requirements.

When combined with the Potter MA315 Read/Write Amplifier, standard IBM recording densities of 200, 556 or 800 bpi, with data transfer rates up to 80 kc, are available *without program restriction*.

DESIGN FEATURES

The M906II-2 is the latest model of the well-known and respected Potter M906II series of magnetic tape transports. Experience with over one thousand M906II installations throughout the world has resulted in the evolution of many refinements in this line of equipment which further improve its exceptionally high data transfer performance, reliability and general operating dependability. Among the more significant features are:

- reliable data transfer up to 120 kc with standard IBM recording format
- electromagnetic Write Lockout switch
- muffled vacuum motor for silent transport operation
- improved servo amplifier
- automatic arm retraction system for easy, smooth tape loading and threading
- long-life EOTS lamp readily accessible
- regulated power supply
- large tape loop reservoirs and Potter-pioneered vacuum buffers for fast, smooth Start/Stop performance
- interchangeable drive plates to accommodate all major computer tapes from $\frac{1}{2}$ to $1\frac{1}{4}$ inches

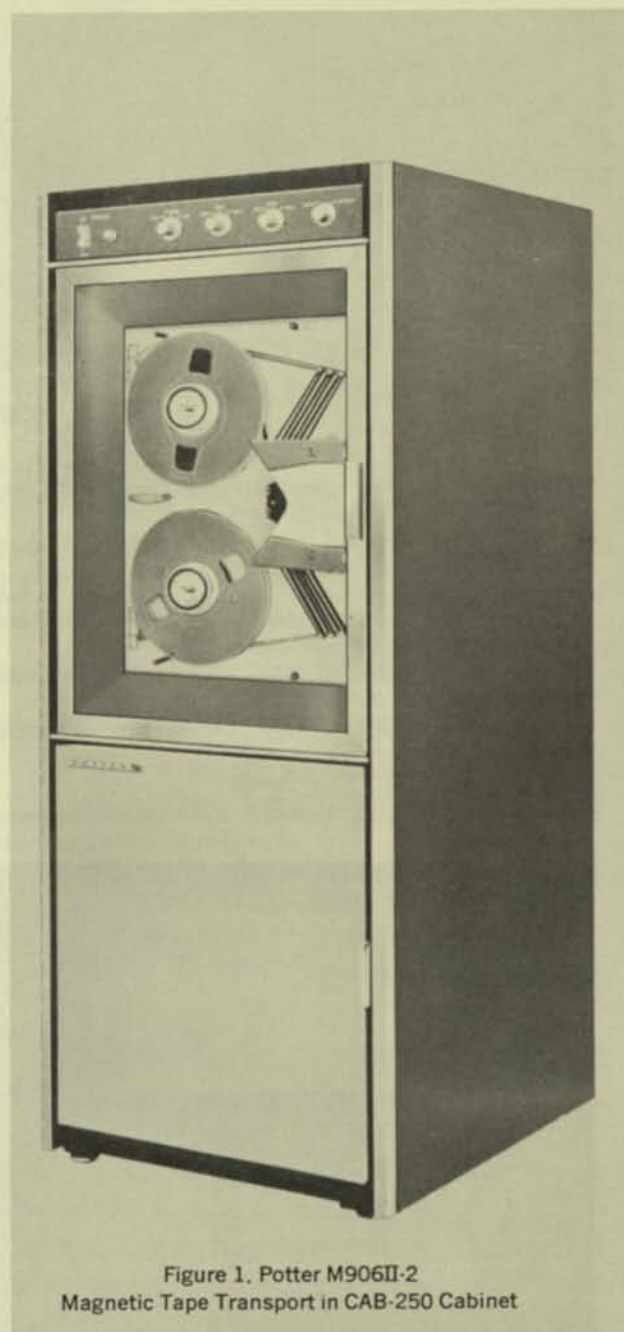


Figure 1. Potter M906II-2
Magnetic Tape Transport in CAB-250 Cabinet

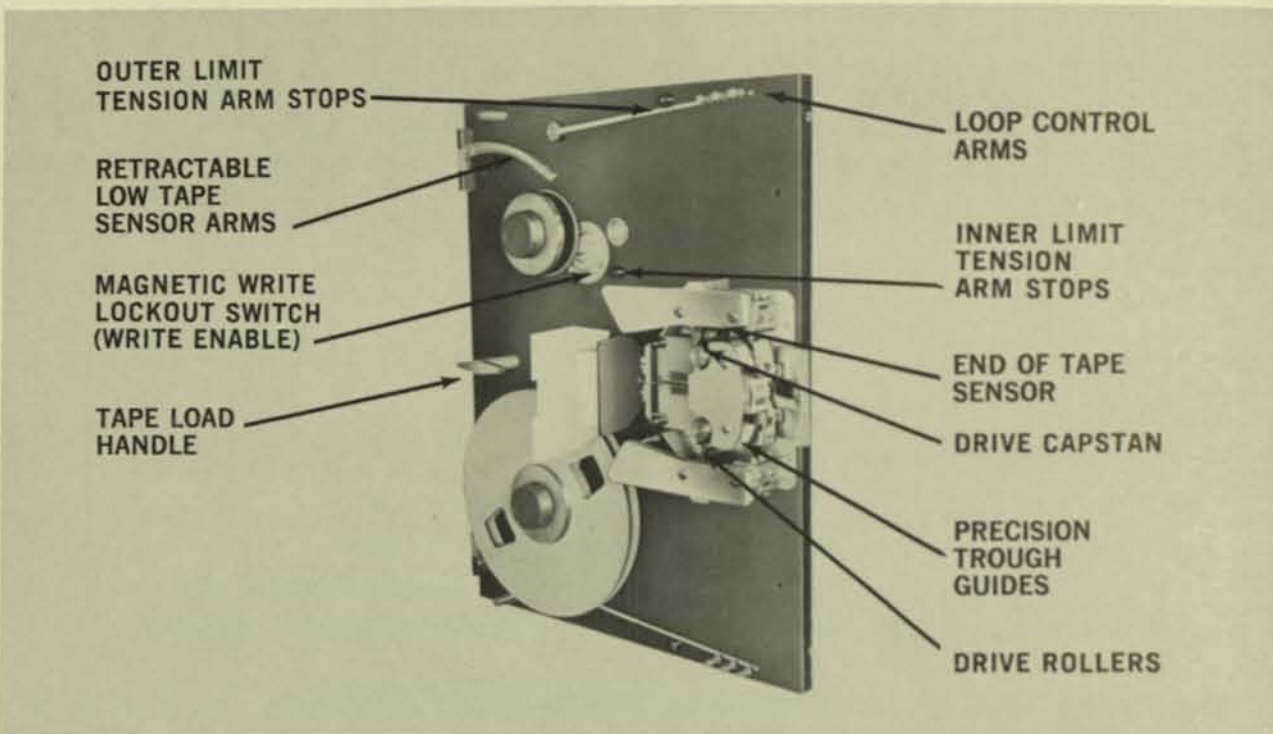


Figure 2. M906II-2 Magnetic Tape Drive

- widest selection of speed combinations with easy retrofit to different speeds
- very low interchannel time displacement obtained with precision tape trough guides
- all solid-state electronics... plug-in modules, including solenoid tape drive circuits and servo amplifiers for fast, dependable tape control
- high-precision, all-metal Read/Write heads for minimum gap scatter and accurate azimuth orientation
- equipment flexibility provided by separate packaging of control and drive electronics
- full tape width DC Erase heads
- optional accessory equipment to meet specific customer requirements

DESCRIPTION

The M906II-2 Magnetic Tape Transport includes the following as standard equipment:

- M906II-2 Tape Drive System
- M3323 Drive Electronics
- Isolation Transformer

Accessory equipment for the M906II-2 transport includes:

- Magnetic Read/Write and Erase heads
- Special reels and hubs
- Write Lock-out switch
- EOT and BOT sensing
- Tape fault detectors

DRIVE SYSTEM

Drive Rollers—Dual, fast-acting solenoid-operated drive rollers, together with their corresponding drive capstans, provide reliable bidirectional tape drive. Capstans are driven by a hysteresis-synchronous motor at single or multiple speeds.

Loop Control Arms—Lightweight yet sturdy loop control arms provide bulk tape storage on each side of the magnetic head. A tape reservoir capacity of 60 inches accommodates high-speed sorting routines and other operations requiring rapid Forward/Reverse cycling. The supply and take-up reels are under the direct control of heavy-duty DC servo motors. Changes in tape direction and velocity are sensed by the loop control arms which provide feedback control to the reel servos.

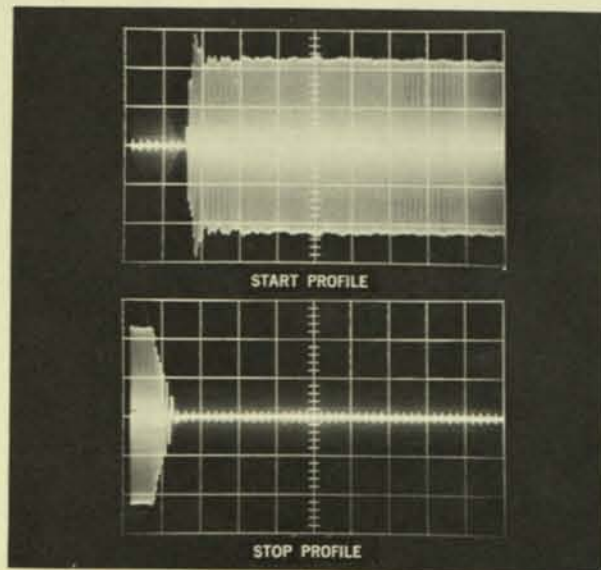


Figure 3. Typical Velocity Profiles (1 div. = 1 ms)

SPECIFICATIONS

NUMBER OF TAPE SPEEDS	MAX. SPEED (IPS)	MIN. SPEEDS AT SELECTED MOTOR RATIOS (IPS)					STANDARD SPEED COMBINATIONS (IPS) (HYPHEN INDICATES REWIND) ACCURACY: 3%, standard; 1%, optional	MAX. REWIND SPEED	
		1.5:1	2:1	3:1	4:1	6:1		1/2-1" TAPE	1 1/4" TAPE
I 2 Speeds	150	20	10	14	10	7	150/75, 120/60, 75/37.5, 60-240, 60-30, 125/62.5, 62.5/20.83, 75-225, 55.5/9.25, 30-180, 150/50, 112.5/75, 110-220, 100/50, 110/55, 100-200, 60/180, 37.5/150, 60/10, 100/16.67, 112.5/225, 120/240	240	225
II 3 or 4 speeds (no low speed)	150	17	13	17	13	8	150/112.5/75, 150/120/60, 150/75/37.5, 112.5/75-225, 112.5/75/97.5/65, 150/70/35, 150/110/55, 120/60/75/37.5	240	225
III 3 or 4 speeds (with low speed)	150	2	2	2	1.5	1	150/75/15/7.5, 150/75/3.75/1.875, 120/60/2/1, 120/60/5, 75/37.5/10/5, 100/50/25/12.5, 100/50/5/2.5, 120/60/3.75/1.875, 60/30/10/5, 150/75/20/10, 150/50/11.25/3.75, 75/18/6-225, 75/36/12-225, 60/20/5-240	240	225
IV 5 or 6 speeds rewind capstan controlled	150	3	2	2	1.5	1	150/100/50/33.3/25, 150/60/30/7.5/3.75, 150/100/75/50/37.5/, 75/37.5/33.3, 60/30/15/10/5-180, 100/50/25/12.5, 120/100/50/75/37.5-240, 150/50/100/25	240	225

PERFORMANCE FIGURES

START TIME

START DISTANCE

STOP TIME

STOP DISTANCE

COMMAND REPETITION RATE

PROGRAM LIMITATIONS (1/2" tape)

WOW & FLUTTER

INTERCHANNEL TIME DISPLACEMENT (1/2" tape; any two tracks, per gap)

TAPE WIDTHS

TAPE THICKNESS

TAPE REELS

REEL HUBS

TAPE LOADING

REMOTE CONTROL INPUTS

Typical performance at 75 and 112.5 ips with 1/2-inch, 1 1/2 mil Mylar™ tape:

3 ms to within ±10% of steady state speed

0.100" ±0.035" at 75 ips, 0.150" ±0.050" at 112.5 ips, in 3 ms after "go" signal

Less than 2.0 ms

0.090" ±0.025" at 75 ips; 0.135" ±0.035" at 112.5 ips

Information can be written at rates up to 100 blocks per second with minimum command separation of 5 ms

Start/Stop—100 ips and below: none
100-120 ips: minor
120-150 ips: specified upon evaluation of requirement.

Forward/Reverse—75 ips and below: none.
75-120 ips: minor
120-150 ips: specified upon evaluation of requirement.

Less than 2% rms, both speeds

Static: 4 microseconds, maximum, at 75 ips; 3.0 microseconds, maximum, at 112.5 ips

Dynamic: ± 1.5 microseconds, maximum, at 75 ips; ± 1.0 microseconds, maximum, at 112.5 ips

Total: 5 1/2 microseconds, maximum, at 75 ips; 4 microseconds, maximum, at 112.5 ips

1/2, 3/4, 1, 1 1/4 inches

1 and 1 1/2 mil Mylar

Standard units have provision for IBM-type 10 1/2" diameter reels. Other types are optional. Potter precision fixed take-up reels are also available

IBM-compatible hubs are standard. Potter NAB and IBM-compatible QUICK-LOCK® hubs, UNIVAC, RCA and other hubs are optional.

Tape load handle provides in-line roller position and low tape arm retraction

All tape functions including SPEED SELECTION, FORWARD, and REVERSE are controlled with standard level-type signals: 0 volts OFF, -5 volts ON; pulse control signals or other levels optional

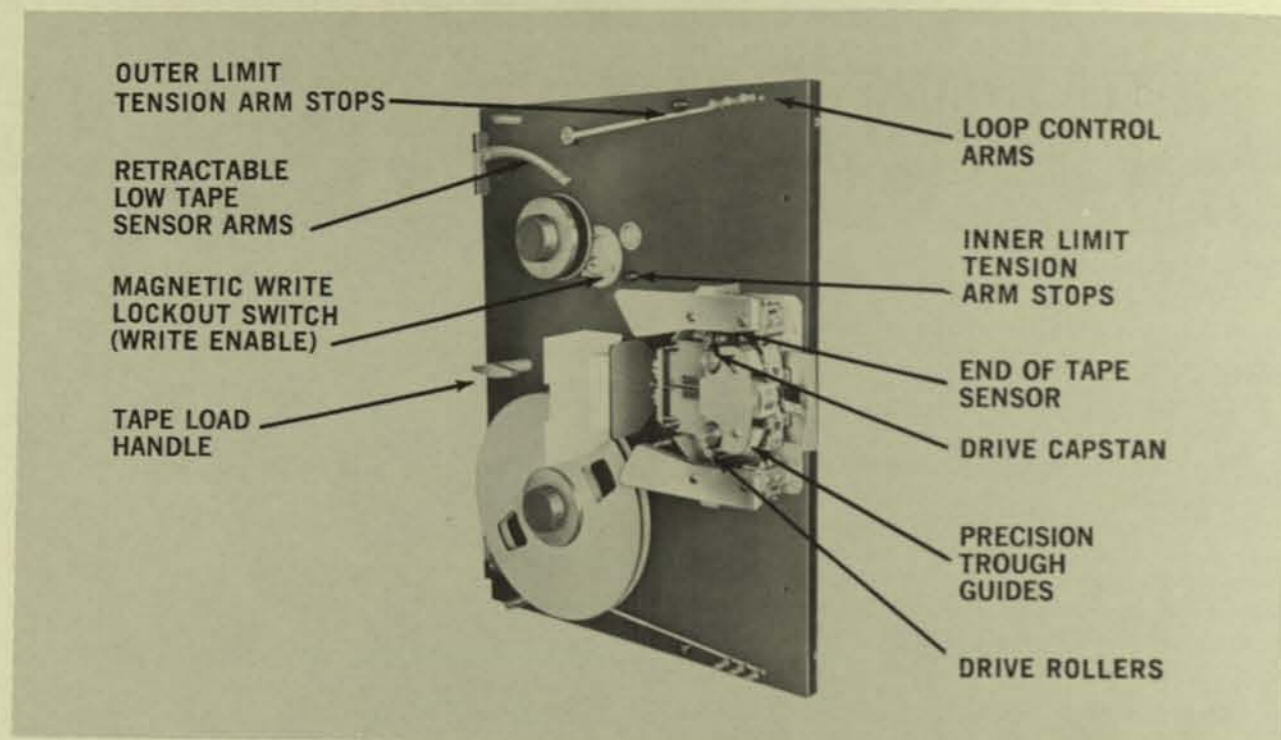


Figure 2. M906II-2 Magnetic Tape Drive

- widest selection of speed combinations with easy retrofit to different speeds
- very low interchannel time displacement obtained with precision tape trough guides
- all solid-state electronics... plug-in modules, including solenoid tape drive circuits and servo amplifiers for fast, dependable tape control
- high-precision, all-metal Read/Write heads for minimum gap scatter and accurate azimuth orientation
- equipment flexibility provided by separate packaging of control and drive electronics
- full tape width DC Erase heads
- optional accessory equipment to meet specific customer requirements

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- M3323 Drive Electronics
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Accessory equipment for the M906II-2 transport includes:

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- Special reels and hubs
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- EOT and BOT sensing
- Tape fault detectors

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Drive Rollers—Dual, fast-acting solenoid-operated drive rollers, together with their corresponding drive capstans, provide reliable bidirectional tape drive. Capstans are driven by a hysteresis-synchronous motor at single or multiple speeds.

Loop Control Arms—Lightweight yet sturdy loop control arms provide bulk tape storage on each side of the magnetic head. A tape reservoir capacity of 60 inches accommodates high-speed sorting routines and other operations requiring rapid Forward/Reverse cycling. The supply and take-up reels are under the direct control of heavy-duty DC servo motors. Changes in tape direction and velocity are sensed by the loop control arms which provide feedback control to the reel servos.

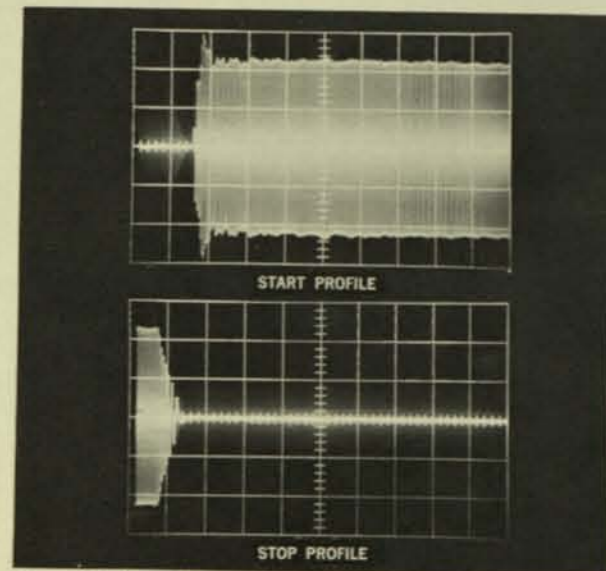


Figure 3. Typical Velocity Profiles (1 div. = 1 ms)

Vacuum Buffers—Dual vacuum buffers isolate loop control arms from the drive roller and capstan drive system. Vacuum buffers, vital to smooth tape velocity control, are a patented Potter development. Reacting instantaneously to changes in tape speed, the vacuum buffers, together with the loop control arms, eliminate start/stop program restrictions at tape speeds up to 100 ips and minimize restrictions up to 150 ips.

M3323 DRIVE ELECTRONICS

The all-solid-state M3323 Drive Electronics assembly is a standard component of the M906II-2 transport. This unit generates all control signals and voltages required to operate the transport from computer and/or manual command signals.

SPEED COMBINATIONS

A wide variety of speeds and speed combinations have been produced from 1.0 ips, minimum, to 150 ips, maximum. Combinations of one, two or three pairs of speeds with the following ratios are available: 1.5, 2, 3, 4 & 6:1. Consult your local Potter sales office for special tape speeds.

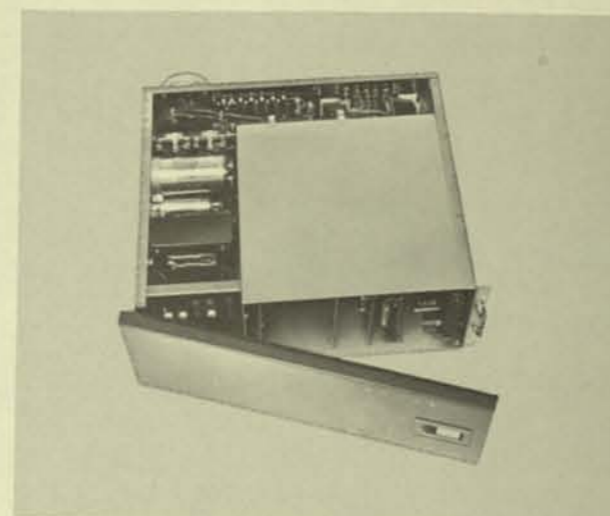


Figure 4. M3323 Drive Electronics Assembly

TAPE LOADING

Low tape sensor and loop control arms are simultaneously retracted by the tape load handle for easy reel loading and tape threading.

Interlocks prevent inadvertent retraction of low tape and loop control arms when reel servos are energized. Potter QUICK-LOCK® reel hubs are available for fast, easy reel loading.

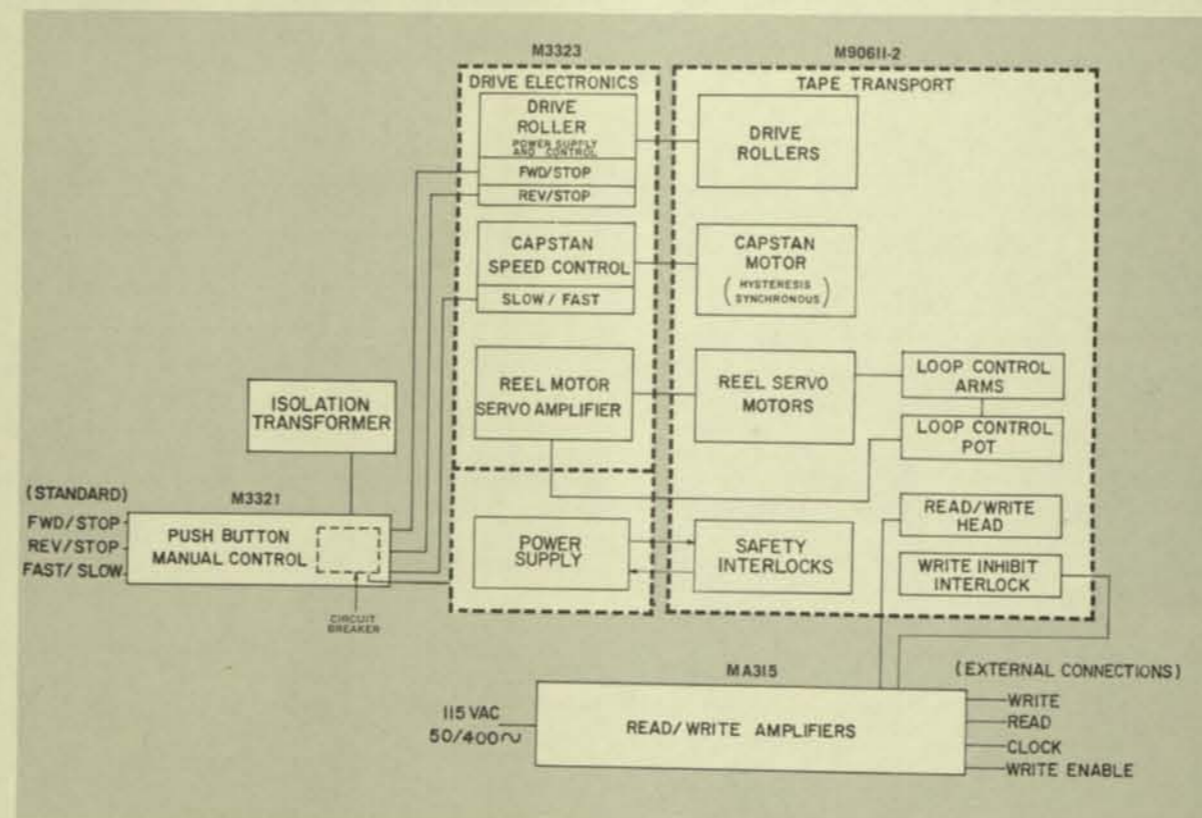


Figure 5. Functional Diagram of M906II-2 Magnetic Tape Transport System

ACCESSORIES
M906II-2 TRANSPORT ACCESSORIES
READ/WRITE HEADS

A complete selection of Read/Write heads is available in a wide variety of computer tape formats. These all-metal head assemblies are precision-machined and mounted on a unique, fixed trough guide assembly which permits interchangeable field replacement. DC Erase heads are also available.

REEL HUBS

IBM-type reel hubs are supplied as standard equipment. Potter NAB and IBM-compatible QUICK-LOCK hubs are available as optional accessories, permitting reel change in less than 3 seconds.

EOT/BOT SENSING

Split post and IBM-type EOT and BOT sensors and amplifiers are available to meet customer requirements for positive tape control. Beginning and end-of-tape signals are supplied as outputs for computer interpretation.

WRITE LOCK-OUT

Transport design readily accommodates the Write Lock-out (Write Enable) mechanism. Electromagnetic non-contact type Write Lock-out switch design gives positive performance.

AC LINE ISOLATION TRANSFORMER

The AC Line Isolation Transformer supplies all necessary voltages for operation of the M906II-2 transport or tape system from 105/115/125 VAC, 60 cycles, stable line; 210/230/240 VAC, 50 cycles can also be accommodated (not shown).

M906II-2 SYSTEM ACCESSORIES
READ/WRITE ELECTRONICS

A wide variety of compatible and independent format RZ and NRZ Read/Write amplifiers are available for reliable reading and writing of digital data. The MA315 Read/Write Amplifier accommodates all standard IBM packing densities (200, 556 and 800 bpi). Special Potter high-density systems permit data transfer up to 240 kc. A typical Read/Write amplifier contains:

- 9 Read/Write amplifier channels
- Compatible Clock Generator
- Write Inhibit electrical switching
- Erase head control
- Head compensation for multiple density Read/Write (as required)
- Power Supply (optional)

For further information see the following Product Data sheets:

- No. 1-402 MA315 Read/Write Amplifier
- No. 1-403 MSA375 Read/Write Switching Amplifier
- No. 1-404 MA212 Read/Write Amplifier
- No. 1-405 MA151 Read/Write Amplifier
- No. 1-406 MA310 Read/Write Amplifier
- No. 1-407 MA320 Read/Write Amplifier

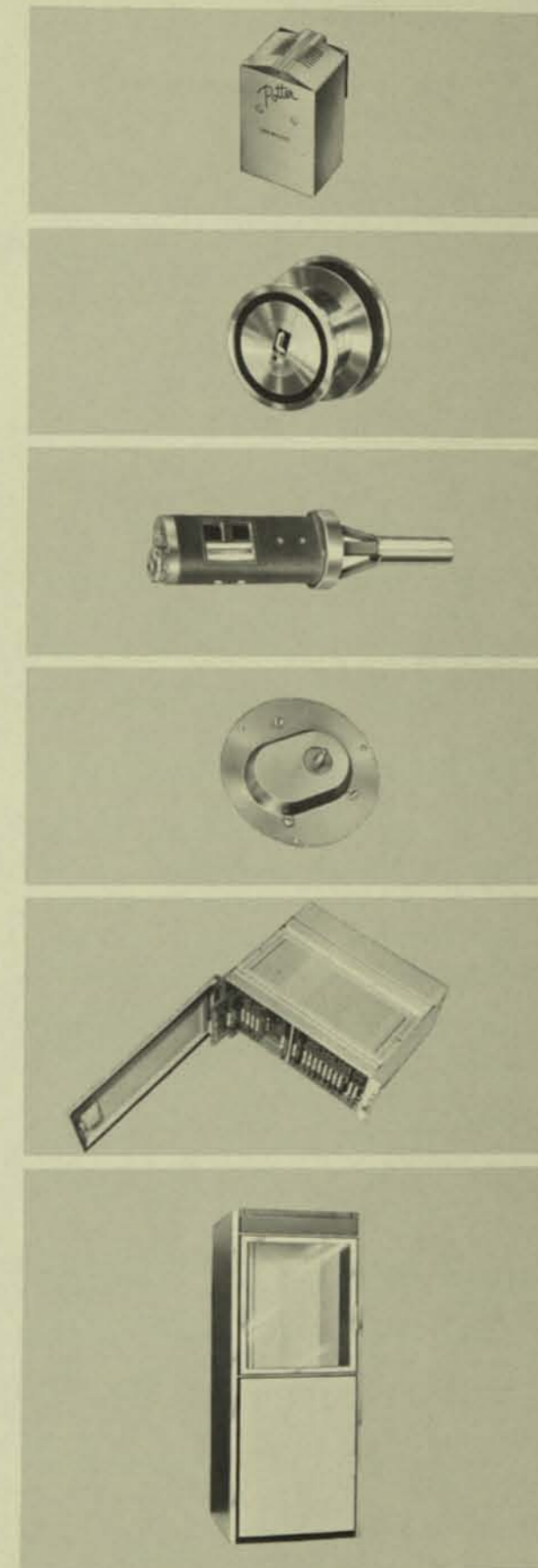
MANUAL CONTROL

Manual Control Panel M3321 provides manual push-button control of the M906II-2 Tape Transport. The unit is equipped for standard 19" rack mounting. In addition to the standard controls, REWIND FORWARD and REWIND REVERSE and other optional controls are available (not shown).

CAB-250 UPRIGHT CABINET

The CAB-250 cabinet has been designed to accommodate the MT-24, MT-36, MT-75, MT-120, M906II tape transports, and the MT-SW and MT-SR incremental transports. This modular cabinet is built on a tubular steel frame and includes front and rear service access doors and tempered glass dust cover. All doors and side panels may be removed for servicing.

Accessories include an integral filtered air cooling system with a 300 cfm blower, removable side panels, door interlocks, oversized casters, floor jacks, AC power control panel and a power convenience strip. The cabinet is supplied in standard Potter colors or can be finished to customer specification.



* QUICK-LOCK is a trademark of Potter Instrument Company, Inc.

SPECIFICATIONS (Continued)

CONDITION INDICATION

Low tape on either reel: NO type contact. Tape being loaded or tape not loaded: NC contact. Write Lock-out: form C contact (optional). End-of-tape and beginning-of-tape sensors:

- split post and photorefective types with associated amplifiers available:
- 10 volts @ 5 ma: not sensed; 0.0 volts @ 10 max.: sensed.

CIRCUITS

All control circuits completely transistorized; mounted on glass epoxy plug-in cards

POWER REQUIRED

115 ± 10 volts, 60 cycles, 6 amp standby, 16 amps, peak. 230 volts, 50 cycle input optional

AMBIENT TEMPERATURE (Operating)

32°F. to 125°F. (Within tape limitations)

M906II INTERFACE CONNECTIONS

Numbers refer to terminal strip TB-101, M3321 Control Panel Chassis:

1. Lowest speed: Ov off, -5v @ 1.8 ma on (select direction at Pin 10 or 14)
2. 2nd speed, if any: Ov off, -5v @ 1.8 ma on (select direction at Pin 10 or 14)
3. 3rd speed, if any: Ov off, -5v @ 1.8 ma on (select direction at Pin 10 or 14)
4. 4th speed, if any: Ov off, -5v @ 1.8 ma on (select direction at Pin 10 or 14)
5. 5th speed, if any: Ov off, -5v @ 1.8 ma on (select direction at Pin 10 or 14)
6. 6th speed, no rewind with 6-speed unit: Ov off, -5v @ 1.8 ma on (select direction at Pin 10 or 14)
9. Rewind: Ov off, -5v @ 1.8 ma on (select direction at Pin 10 or 14)
10. Forward Drive: Ov off, -5v @ 1.8 ma on
14. Reverse drive: Ov off, -5v @ 1.8 ma on
15. BOT sensor: Ov on foil, -10v off @ 5 ma (1000 ohms source)
17. EOT sensor: Ov on foil, -10v off @ 5 ma (1000 ohms source)
18. Upper low tape: contact closure
19. Common low tape: contact closure
20. Lower low tape: contact closure
25. Write Lockout (normally open contact): contact closure
26. Write Lockout (common contact): contact closure
27. Write Lockout (normally closed contact): contact closure
28. Circuit ground
29. Ready: -15v = Ready or Open = Not Ready
30. Chassis ground

PHYSICAL DATA

	O/A Dimensions (inches)			Weight (lbs)
	High	Wide	Deep	
M906II-2 Tape Transport	24½	19	11	160
M3323 Drive Electronics	7	19	18	35
M3321 Manual Control	3½	19	9	12
CAB250 Cabinet	70	27	31½	290
Transformer	8¼	8¾	5¾	55

POTTER WORLDWIDE FIELD SERVICE AND LOGISTICS PROGRAM

Repair centers in strategic locations within the continental United States and abroad have been established to support the entire Potter product line.

Staffed by highly-trained field representatives, these repair centers are equipped to effect on-site installation of equipments and to perform quality repair, maintenance and overhaul.

Supplementing this capability, if a customer prefers to provide his own equipment support, Potter has established free instruction courses to train customer personnel at the factory.

Our spare parts department, with an extremely large inventory and streamlined order processing, is available for customer convenience and economy. This inventory permits the customer to realize virtual elimination of downtime as well as savings on spare parts dollars by offering expeditious delivery for replaceable parts. Delivery is available in 24 hours to meet customer emergency requirements - within 72 hours for standard parts under normal conditions. Potter also offers provisioning and logistics capabilities to meet all existing military specifications.

The Potter field service and logistics program is one of the finest in the EDP equipment industry. With reliable, quality-engineered equipment, supported by comprehensive field service, Potter guarantees satisfaction.

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POTTER INSTRUMENT COMPANY, INC.

151 SUNNYSIDE BOULEVARD • PLAINVIEW, NEW YORK • 516 OVERBROOK 1-3200

FT-151, FT-152 AND FT-153 DIGITAL
MAGNETIC RECORDING SYSTEMS

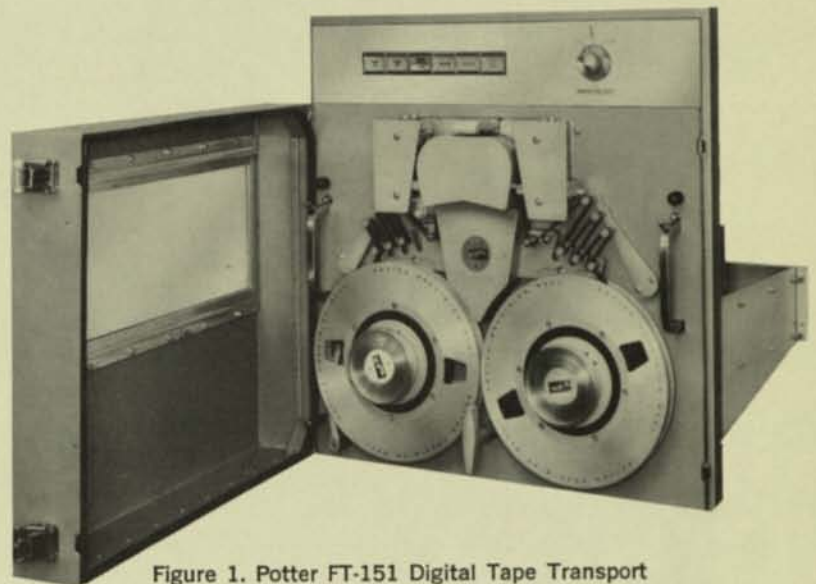


Figure 1. Potter FT-151 Digital Tape Transport

Figure 2. Model FT-153 Portable Field Transport

FEATURES

- Operates from 12V battery
- Portable Model—less than 50 lbs.
- Tape speeds from 15 to 150 ips. Three independent speeds
- Reliable data transfer to 120 kc.
- IBM 7- or 9-channel (System 360, ASCII or TIAC) compatibility
- Packing densities to 800 bpi
- Rugged construction
- Small Size
- Low Power
- Shock and vibration resistant for truck or shipboard application
- Full tape width Erase head
- Low tape sensing
- Available with plug-to-plug compatibility
- Low interchannel time displacement obtained with precision tape-trough guides
- Convenient arm retraction system for easy, smooth tape loading and threading

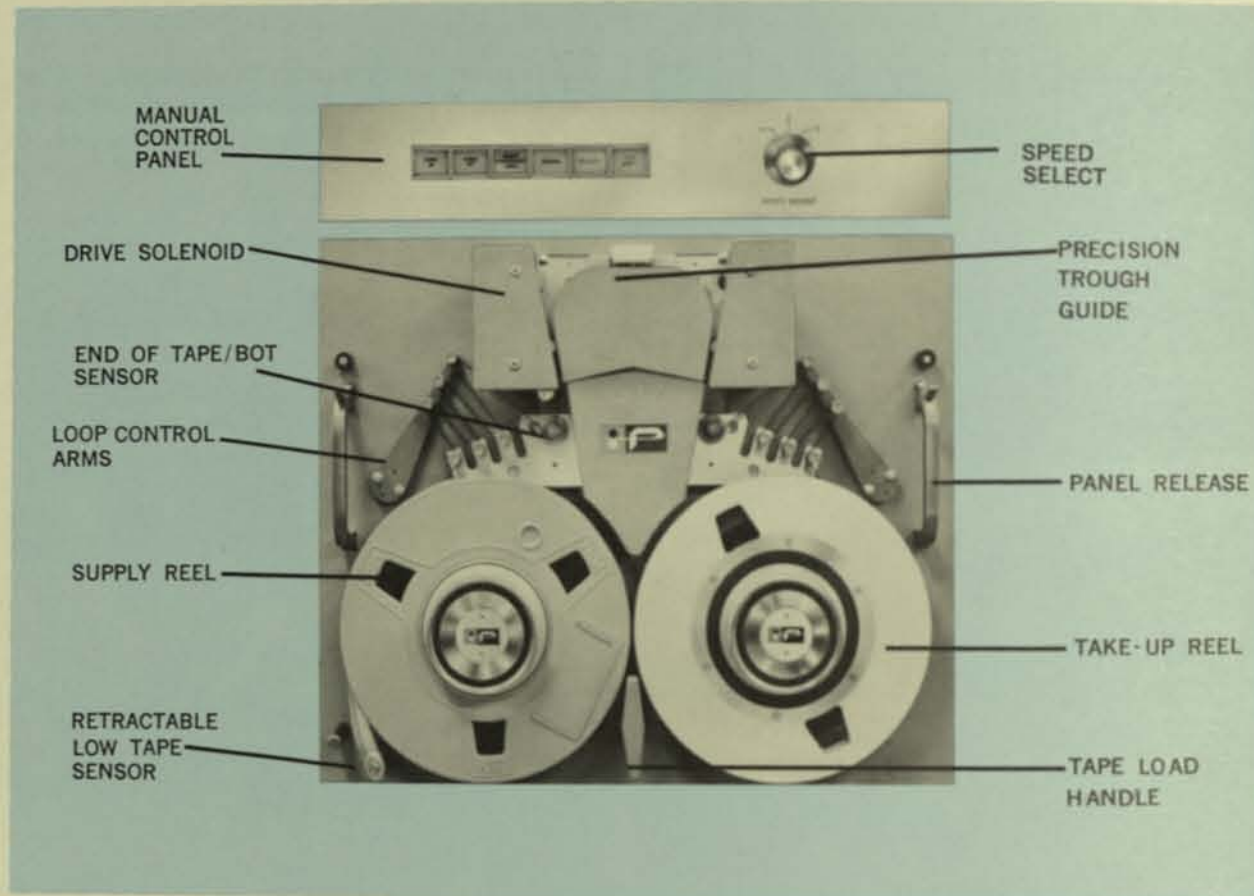


Figure 3. Potter FT-153 Magnetic Tape Drive

INTRODUCTION

Potter FT-151, FT-152 and FT-153 Digital Magnetic Tape Transports are rugged, compact recording systems designed for geophysical, mobile, and shipboard field recording applications. Potter's extensive design experience with IBM-compatible, high-performance digital tape transports and systems has been incorporated into these ruggedized systems. Units equipped with 21-channel dual gap head assemblies, TIAC-compatible, are also available. The FT-151, FT-152 and FT-153 transports are available with plug-to-plug compatible interfaces.

The entire system is packaged to withstand adverse environmental conditions encountered in field seismic exploration operations. The transport operates directly from a 12 volt battery. Power consumption is extremely conservative for the high performance obtained.

Standard FT-151 and FT-153 transports provide three selectable tape speeds which are accurately maintained by a capstan servo system. Any combination of tape speeds desired is available from 15 ips, minimum, to 150 ips, maximum with a maximum speed ratio of 4:1 (with 1/2" tape).

Three basic models are available:

FT-151 equipped with 8 1/2" reels, accommodates 1/2" and 1" tape. The unit is designed for 19" rack mounting and weighs 95 pounds maximum.

*Trademark of Potter Instrument Company, Inc.

FT-152 equipped with 10 1/2" reels, accommodates 1/2" tape. The unit can be provided with extension frames for 19" rack mount, and is available in a plug-to-plug compatible configuration to the FT-151 and FT-153 units. The maximum weight of this unit is 110 pounds.

FT-153 portable unit, equipped with 8 1/2" reels, accommodates 1/2" tape. The unit is plug-to-plug compatible with the FT-151 transport and can be 19" rack mounted and/or supplied with a suitable carrying case. The maximum weight is 48 pounds.

The case designed for the FT-153 features a high strength-to-weight ratio with greater rigidity pound for pound than steel, and weighs approximately 16 pounds.

When the FT-151, FT-152 or FT-153 transport is combined with Potter's FA-151 data electronics, the resulting magnetic tape transport system writes and/or reads digital data in IBM-compatible, 7-channel and 9-channel (IBM 360 or ASCII-compatible) formats. Packing densities up to 800 bpi are standard. FT-151 and FT-153 units are available for 1/2" or 1" tape widths. FT-152 units are available for 1/2" tape width only.

All units feature versatile operation, modular construction and minimum depth behind the front panel

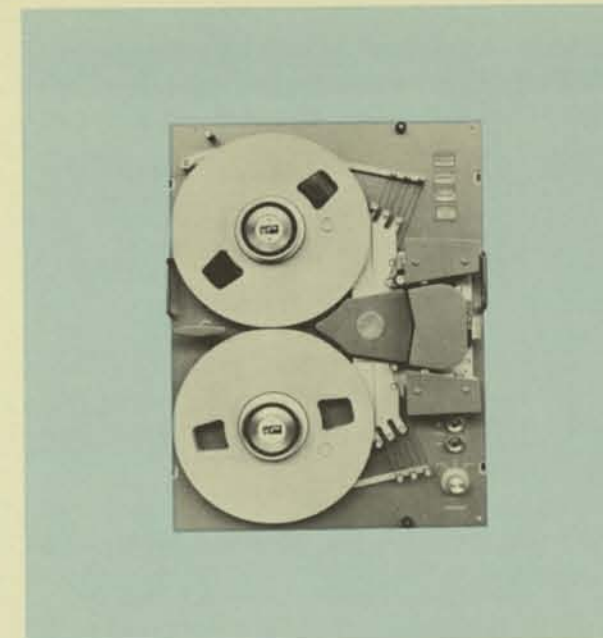


Figure 4. Model FT-152 Digital Tape Transport is equipped with 10 1/2" reels.

for mounting in confined areas. The FT-151 and FT-152 feature front access to all components for ease of maintenance. The FT-153 is designed for permanent mounting and access to components, but slide mounting is available for front access if desired.

DRIVE SYSTEM

Low power solenoid-operated drive rollers, together with their corresponding drive capstans, provide reliable tape drive. The tape velocity is maintained within ±2% by the capstan servo feedback system at speeds about 30 ips. The capstan motor speed is monitored by a DC tachometer whose output voltage is compared with a regulated voltage from the transport drive electronics. Any voltage differential is fed through the servo feedback system to compensate tape speed variations.

An external speed control line permits a ±5 ips variation of nominal selected tape speed. The speed control is linear over the entire 10 ips range. A 1-volt change results in a 1 ips variation.

Lightweight, yet sturdy, loop control arms provide secondary bulk tape storage on each side of the magnetic head. This tape reservoir capacity accommodates high speed operation. The supply and take-up reels are under the direct control of heavy-duty DC servo motors. Changes in tape direction and velocity are sensed by the loop control arms which provide feedback control to the reel servos.

Low tape sensor and loop control arms are simultaneously retracted by the tape load handle for convenient reel loading and tape threading.

Interlocks on the tension arms automatically turn the transport off to prevent tape damage.

Potter QUICK-LOCK* reel hubs are available for fast, easy reel loading.

EQUIPMENT

Potter FT-151, FT-152 and FT-153 Geophysical Tape Transports include a tape cleaner and servo drive and control electronics. An 8 1/2" (FT-151 or FT-153) or 10 1/2" (FT-152) IBM plastic take-up reel is supplied. An optional power supply (PS 151) is also available and is packaged separately.

Transport Accessories include:

- Manual Control Panel (May be included on front panel of FT-152).
- IBM-compatible EOT/BOT photoreflexive sensors, with amplifiers.
- IBM-compatible Write Lockout (File Protect) Switch.
- IBM-compatible QUICK-LOCK Reel Hubs.
- IBM-compatible Precision Metal Reel, 8 1/2 or 10 1/2 inch.
- Full Width Erase Head.
- Dustproof Dust Cover Door with Window (only with 19" rack mount on FT-152).
- DC to DC Power Supply (PS-151).
- 1" Tape Width (FT-151 only).

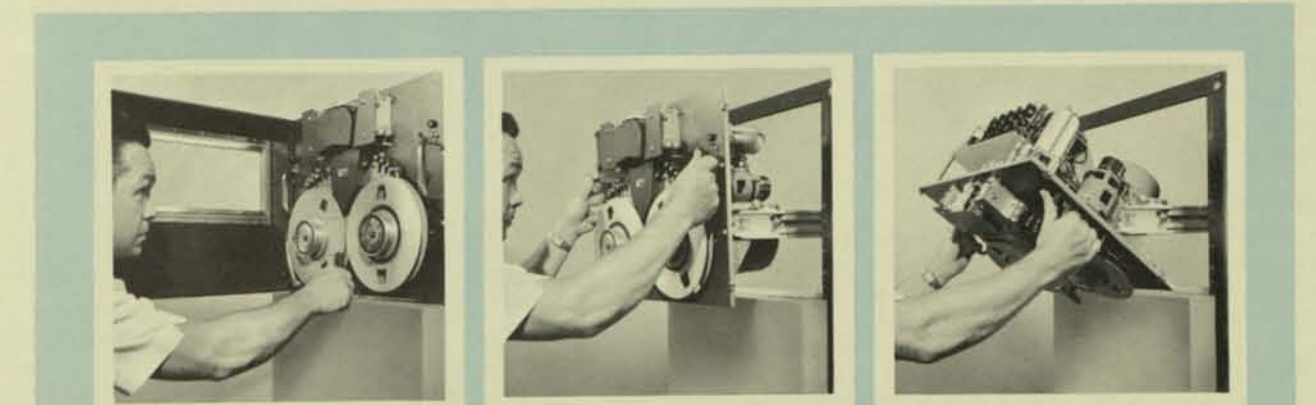


Figure 5. Service Procedure. The FT-151 (shown) is mounted on slides which are secured to the mounting rack. The slides enable complete access to all

components behind the front panel. Handle triggers release the transport so that it can be tilted to a horizontal position for quick easy servicing.

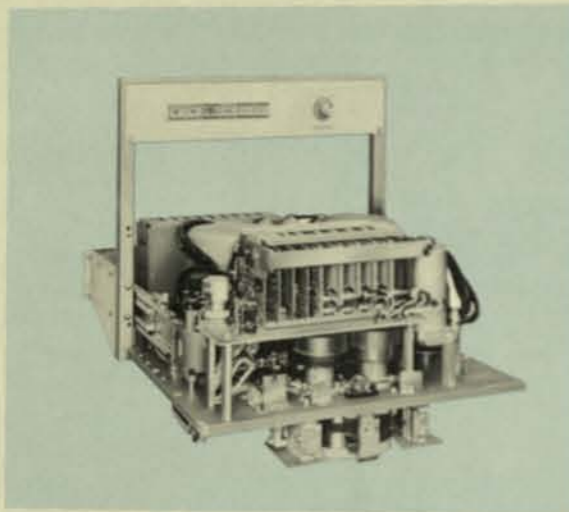


Figure 6. Rear view of FT-151

DRIVE ELECTRONIC AND POWER SUPPLY

Servo amplifiers and other electronic circuitry are solid state throughout, and are packaged on printed circuit cards mounted in the back of the transport. A separate power supply (PS-151) is available to provide all voltages required to operate the transport from an input voltage of 12 volts. An optional manual control panel is available for use with the FT-151 and FT-153. The manual control is included on the front panel of the FT-152.

TRANSPORT ACCESSORIES

READ/WRITE HEADS

A complete selection of Potter magnetic heads is available for IBM 7- or 9-channel, TIAC 21-channel and other formats. Heads are all-metal and precision machined to stringent specifications for maximum tape life and minimum interchannel time displacement.

REELS AND HUBS

IBM-type reels and hubs are standard equipment on Potter transports for 1/2" tape. Potter NAB reels and QUICK-LOCK hubs are standard for 1" tape.

EOT/BOT SENSING

Photoreflective (IBM-type) end-of-tape and beginning-of-tape sensing is available for reliable tape control.

WRITE LOCK-OUT

Transport design readily accommodates write lock-out (write enable) mechanism. New electro-magnetic, non-contact type write lock-out switch design gives improved file protect performance.

POWER SUPPLY (PS-151)

A separate DC to DC power supply, Model PS-151, provides all voltages required to operate the transport from an input voltage of 12 volts. Power consumption is extremely conservative for the high performance obtained.

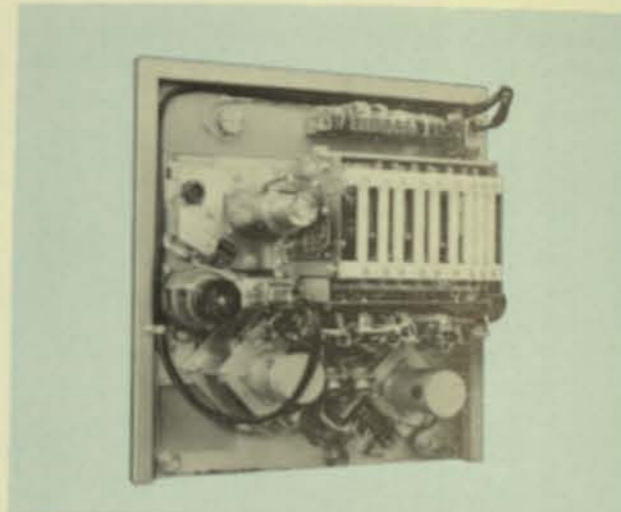
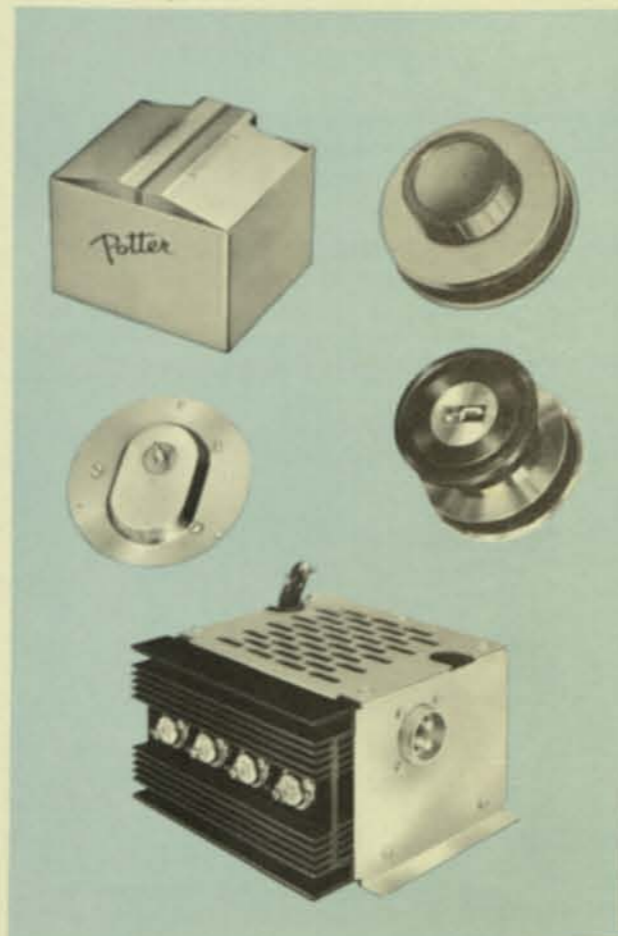


Figure 7. Model FT-153 Portable Field Transport Rear View

The following controls are included:

- Power: On, Off
- Operation: Remote/Local, Load Point
- Direction: FORWARD, REVERSE
- Speed Select: 1-2-3

Input lines are provided for external control (see specifications).



SPECIFICATIONS

TAPE WIDTH	FT-151 — 1/2" or 1" tape on 8 1/2" IBM-type reels; FT-152 — 1/2" tape on 10 1/2" IBM-type reels FT-153 — 1/2" tape on 8 1/2" IBM-type reels
TAPE TYPE	3M8938 1.5 mil Mylar™ recommended
TAPE SPEED (Forward and Reverse)	FT-151 — 3 speeds (Max. ratio 4:1) in range of 15 to 150 ips — 1/2" tape (8 1/2" reels). 15 to 120 ips — 1" tape (8 1/2" reels). FT-152 — 3 speeds (Max. ratio 4:1) in range of 15 to 120 ips — 1/2" tape (10 1/2" reels). FT-153 — 3 speeds (Max. ratio 4:1) in range of 15 to 120 ips — 1/2" tape (8 1/2" reels).
TYPICAL PERFORMANCE	
START TIME	50 ms, maximum { 1/2" tape, 8 1/2" reels, below 120 ips 1" tape, 8 1/2" reels, below 85 ips 1/2" tape, 10 1/2" reels, below 97 ips
START DISTANCE (during 50 ms)	45 x ips/1000, max.
STOP TIME	100 ms, maximum { 1/2" tape, 8 1/2" reels, below 120 ips 1" tape, 8 1/2" reels, below 85 ips 1/2" tape, 10 1/2" reels, below 97 ips
STOP DISTANCE	60 x ips/1000, max.
SPEED VARIATIONS — Long Term	±2%
SPEED VARIATIONS — Short Term (50 ms)	±4% less than 30 ips; ±2% above 30 ips
SKEW — STATIC (Normally compensated in high density application in amplifier)	300 (microseconds) ips
SKEW — Instantaneous varying time displacement between any two channels reading on all 1's tape excluding pulse pairing effects	250 (microseconds) ips
PROGRAM LIMITATIONS	With a 1 second or greater run command, tape may be reversed after 200 ms or greater stop, or may be reversed after any run command with a 500 ms stop.
POWER	
OPERATING (peak during start-up time)	10.5-14VDC — 350 watts maximum
OPERATING (steady running at 120 ips)	10.5-14VDC — 200 watts maximum
ENVIRONMENTAL CONDITIONS	
NON-OPERATING (excluding tape)	
TEMPERATURE	-40°F to +170°F
HUMIDITY	RH — up to 95%
SHOCK	5 g, 11 ms, all 3 axes
VIBRATION	5 — 35 cps, 1/2", single amplitude, 3 axes
OPERATING (with specified tape)	
TEMPERATURE	32°F to 125°F
HUMIDITY	RH — up to 90% at 100°F up to 80% at 125°F
DUST COVER — TAPE TRANSPORT	Rubber gasketed, front cover door with window. (Supplied with FT-151 and FT-152 for 19" rack-mounted only, with optional extender brackets.)
DIMENSIONS	
TAPE TRANSPORT, FT-151 8 1/2" reels	15 3/4" high, 19" wide, 9" maximum behind panel. (Excluding chassis slides.) 3 1/2" maximum in front of panel (cover door).
TAPE TRANSPORT, FT-152 10 1/2" reels	22 3/4" high, 17" wide, 12 1/2" maximum behind panel. Optional extender brackets available for 19" rack mounting.
TAPE TRANSPORT, FT-153 8 1/2" reels (without carrying case).	15 3/4" high, 19" wide, 8 3/4" maximum behind panel.
WEIGHT	
TRANSPORT AND COVER DOOR	
Model FT-151 8 1/2" reels	95 lbs., maximum, transport; 5.5 lbs., maximum, cover door.
Model FT-152 10 1/2" reels	110 lbs., maximum, transport.
Model FT-153 8 1/2" reels	50 lbs. maximum, transport
INPUT/OUTPUT LOGIC	
INPUT LEVELS (available standard logics)	Logic "1" OV ±0.5V Logic "0" +5V (+4V min., +15 max.)
REPLY LINES	Power Broken Tape Interlocks Load Point EOT Low Tape Supply Write Lockout
	1 = OV 0 = +5V ±1V 1 = OV 0 = +5V ±1V Type C contact Type A contact

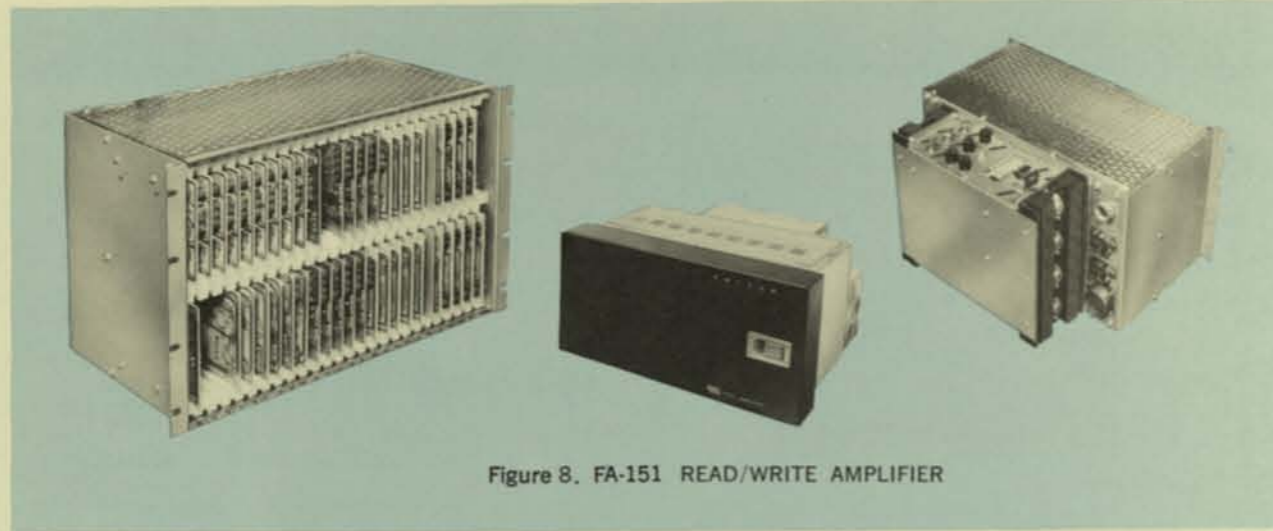


Figure 8. FA-151 READ/WRITE AMPLIFIER

DESCRIPTION

The FA-151 Read/Write Amplifier is designed for use with FT-151, FT-152 and FT-153 Tape Transports. The FA-151 Silicon Read/Write Amplifier records digital information on magnetic tape and check-reads this data to insure recording accuracy.

The FA-151 Amplifier System, designed for single and optional multi-speed applications, features complete IBM compatibility. All FA-151 7-channel, 200/556/800 bpi systems are prewired for immediate field expansion to 9-channel, 800 bpi compatible operation. Field retrofit of additional input/output channels is achieved by inserting extra printed circuit modules.

READ/WRITE AMPLIFIER

SINGLE-SPEED, TWO-SPEED OR THREE-SPEED, READ/WRITE AMPLIFIER SYSTEM, SKEW-COMPENSATED... For IBM 200/556/800 bpi 7- or 9-channel compatible operation. Completely pre-aligned for any specified tape speed from 15 to 150 ips. Amplifier includes full chassis prewiring for field expansion to IBM 9-channel, 800 bpi compatible operation. (Used with both FT-151 and FT-152.) Read Reverse Capability available on all amplifiers.

AMPLIFIER ACCESSORIES

- 7/9-Channel Optional Parity Check Module (Read).
- 7/9-Channel Optional Parity Generator Module (Write).
- T20-IBM 7- or 9-(ASCII) Channel Master Alignment Tape, 800 bpi (full width).
- P12-Amplifier Power Supply, for 12VDC Operation.

FEATURES

- Compatible with IBM 7-channel format for 200/556/800 bpi and IBM 9-channel format for 800 bpi
- Tape speed operation available for speeds between 15 and 150 ips
- Operation in simultaneous Read/Write mode
- Read/Reverse Capability

- Tape interchangeability between IBM-compatible tape units assured
- Information transfer rates up to 120 kc
- Read and Write amplifier automatically reset when power is turned ON
- Circuitry provides for accurate Write and Read skew alignment
- Individual gain and skew adjustment circuits standard on all multi-speed amplifiers
- Provision for writing the longitudinal redundancy check character (7- and 9-channel)
- Strobed Write input available
- Individual adjustments for pulse pairing compensation of Write amplifiers
- Write amplifier automatically reset when Write Enable is switched to "1" state
- Input circuit drive requirements less than 3 ma
- In-line Read output of all character bits and clock pulse output
- Dual threshold level standard
- Peak detectors employed in Read amplifiers
- Output circuits short-circuit-proof and drive load currents up to ±20 ma
- Provision for generation of lateral Write parity
- Provision for odd or even lateral parity check
- Provision made for external controls
 - Write Enable
 - Write Reset
 - Write Set
 - Read Reset
 - Density Select — 200/556/800 bpi
- Designed to minimize maintenance costs
 - solid-state silicon modular construction
 - accessible test points at front of chassis permit most adjustment to be made with modules in normal position
 - extension frames included provide complete exposure of all plug-in modules for circuit testing under actual operating conditions
 - front access for ease of maintenance in confined areas
- Compact packaging
 - 8 3/4" high, 12" deep
 - 19" rack mounting

SPECIFICATIONS FA-151 READ/WRITE AMPLIFIER

	7-Channel Compensated	9-Channel Compensated
PACKING DENSITY	200/556/800 bpi	800 bpi
WRITING MODE	NRZI	NRZI
TAPE SPEED (Single or Multiple)	15 to 150 ips (simultaneous Read/Write)	15 to 150 ips (simultaneous Read/Write)
READ DIRECTION	FWD	FWD
COMPATIBLE HEAD TYPES		
SIMULTANEOUS READ/WRITE OPERATION (DUAL GAP)	17555-7: 15 to 150 ips 18517-7	19500-9 Series 19500-9 Series } 19506-9
READ ONLY OPERATION (SINGLE GAP)	18411-7	19500-9 Series } 19406-9
WRITE ONLY OPERATION (SINGLE GAP)	18413-7	19500-9 Series } 19405-9
POWER SUPPLY	DC to DC converter separately packaged.	
DIMENSIONS	8 3/4" x 17" x 12"***	8 3/4" x 17" x 12"***
WEIGHT	35 lbs maximum	35 lbs maximum

INPUT/OUTPUT LINES

INPUT LINES

Input Levels (available standard logics)

Logic "1"	+5 to +15V DC
Logic "0"	Ground ±1.0V
Logic "1"	Ground ±1.0V
Logic "0"	+5 to +15V DC
Logic "1"	-5 to -15V DC
Logic "0"	Ground to ±1.0V
Logic "1"	Ground to ±1.0V
Logic "0"	-5 to -15V DC

Input Current

- Write Inputs (7 and 9*** lines) Level (RB)
- Write Clock Level
- Write Enable Level
- Write Reset Level
- Write Set (9-channel only) Level
- Read Reset Level
- Density Select — 200 Level
- Density Select — 556 Level
- Density Select — 800 Level
- Second Speed Select Level
- Third Speed Select Level

A "1" is written when the input is switched from "0" to "1". Maximum 1 microsecond rise time for minimum voltage swing (3.5V). If a rectangular wave is used, the maximum duty cycle of the input is 50% of the pulse period. Minimum pulse width is 1 microsecond.

All Write inputs are simultaneously enabled when the Write Clock line is raised to the level corresponding to Logic "1" Level and a "1" is written by all Write input lines which are at Logic "1" Level.

Enabled with Logic "1" signal. (Simultaneous Erase head enable).

Reset with Logic "1" signal. Minimum pulse width is 2.0 microseconds.

Set with Logic "1" signal. Minimum pulse width is 2.0 microseconds.

Reset with Logic "1" signal. Minimum pulse width is 2.0 microseconds.

Selected with Logic "1" signal.

Selected with Logic "1" signal.

Selected with Logic "1" signal.

Selected with Logic "1" signal. (Optional)

Selected with Logic "1" signal. (Optional)

*Extender brackets are provided to facilitate mounting of FA-151 Unit in Standard 19" Rack

** Depth includes mating cable connectors

*** Additional cards required. If Write parity generation is selected as an option, the Write inputs must be present 1 microsecond prior to the Write Clock strobe.

SPECIFICATIONS continued . . .

OUTPUT LINES

Output Levels (available standard logics)

Logic "1"	+10V DC \pm 2.0V	20 ma source
Logic "0"	Ground -1.0V +1.5V	20 ma sink
Logic "1"	Ground -1.0V +1.5V	20 ma sink
Logic "0"	+10V DC \pm 2.0V	20 ma source
Logic "1"	-10V DC \pm 2.0V	20 ma source
Logic "0"	Ground +1.0V - 1.5V	20 ma sink
Logic "1"	Ground +1.0V - 1.5V	20 ma sink
Logic "0"	-10V DC \pm 2.0V	20 ma source

• **Read Outputs**

- Pulse Width 1 microsecond
- Rise Time 0.3 microsecond into 1000pf capacitance to ground
- Fall Time 0.3 microsecond into 1000pf capacitance to ground
- **Clock Output** Same characteristics as Read Outputs. Occurs simultaneously with Read Outputs.
- **Lateral Parity, Odd or Even ****** Same characteristics as Read Outputs. Occurs simultaneously with Read Outputs.

**** Additional card required.

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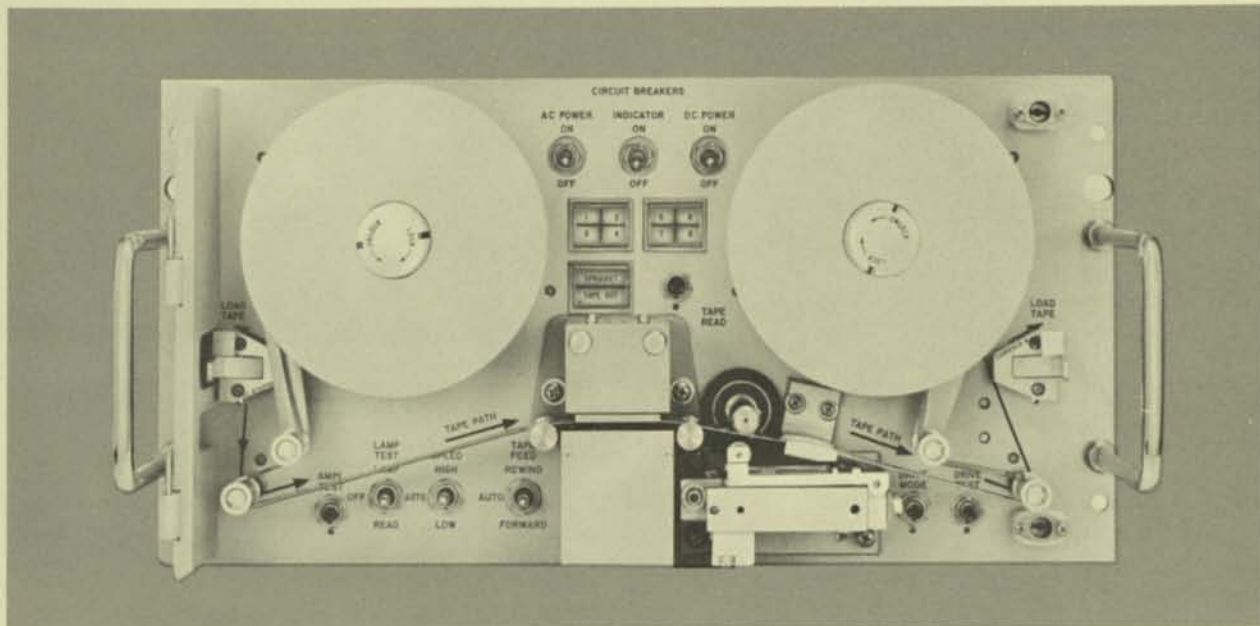
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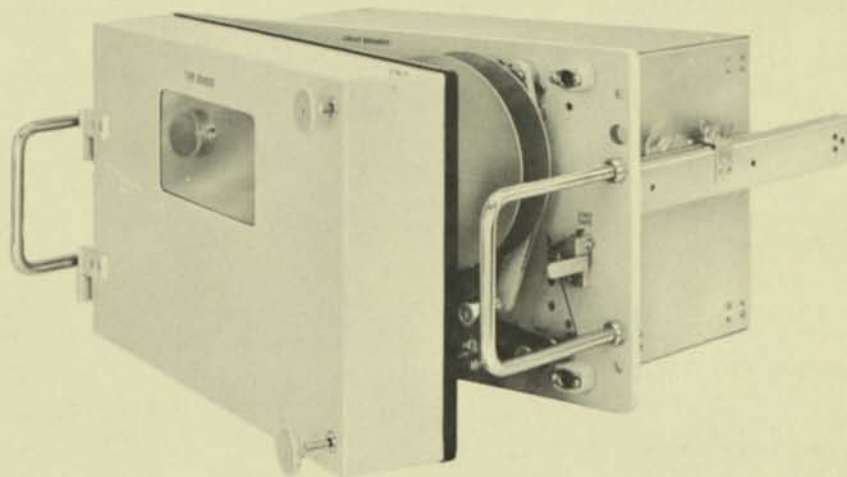
PT-5000 MILITARIZED
PERFORATED TAPE READER



Potter PT-5000 Militarized Perforated Tape Reader

FEATURES

- Dual Speed Operation — 250/500 characters per second (forward only)
- Adjustment-free Sub-assemblies
- Built-in Diagnostic Test Exercises and Indicators
- MTBF: 3000 hours; MTTR: 15 minutes
- MIL-D-70327 Drawings
- MIL-M-9868 Microfilm
- Manufactured to ABMA standards
- Lightweight: 45 pounds
- Compact: 18"W x 9"H

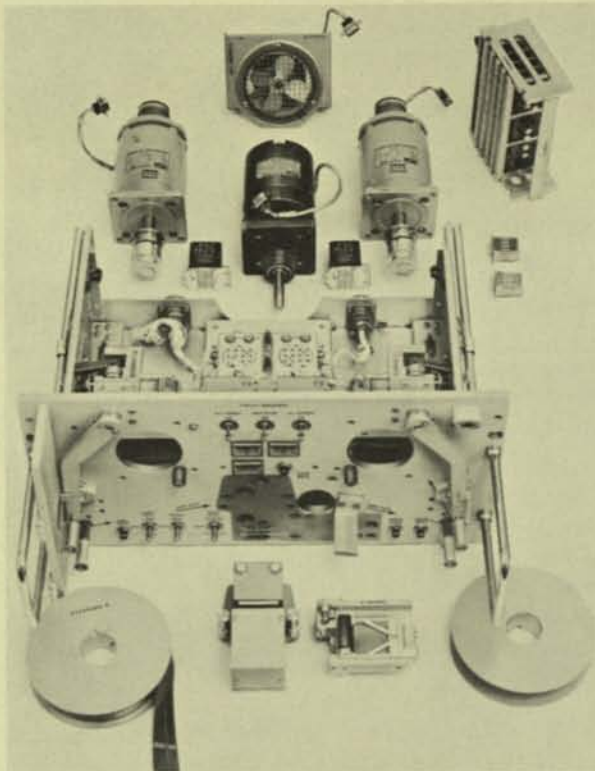


PT-5000 shown with dust cover

DESCRIPTION

The PT-5000 Militarized Perforated Tape Reader offers a new concept in reliability and maintainability. This militarized unit is constructed to the most stringent high reliability specifications, providing operation from -25°F to $+135^{\circ}\text{F}$ at 250 and 500 characters per second operation. Significant state-of-the-art advances have resulted in an unparalleled simple design. Complete interchangeability of sub-assemblies *without adjustments* combined with built-

in diagnostic test exercises and indicators offers the ultimate in maintainability. Self-contained manual test panel and indicators allow manual operation or malfunction isolation without the aid of test equipment. This unit contains only three types of printed circuit board modules — Sprocket Data Channel, Start/Stop Control, Test-Lamp Driver. The PT-5000 can be operated in any attitude with functions controlled manually or remotely.



Exploded view of PT-5000

SPECIFICATIONS

- TAPE SPEED** Dual speed 250/500 ch/sec, (bi-directional motor provides reverse search mode)
- TAPE STORAGE CAPACITY** 500 feet of 2.5 mil aluminized Mylar
- TAPE WIDTH** 1" EAI standard
- START TIME** 18 milliseconds (time to reach next character)
- STOP TIME** Stops before next character at 250 ch/sec.
- DIAGNOSTIC TEST POSITIONS** Drive Mode
Drive Test
Amplifier Test
Lamp Test
Read Amplifier Test
- CIRCUIT BREAKERS** AC Power
DC Power
Indicator Power
- INDICATORS** 8 Read Channels
Sprocket
- MANUAL CONTROLS**
- SPEED SWITCH** High Speed 500 ch/sec.
Low Speed 250 ch/sec.
Automatic-External Selection of Speeds
- DIRECTION SWITCH** Forward
Reverse
Automatic-External Selection of Direction

ENVIRONMENTAL CONDITIONS

- Temperature,**
Operating—High +135°F
Low -25°F
- Shock** 25 g's for 40 milliseconds, vertical axis
15 g's for 40 milliseconds in remaining axes
- Vibration** 2 to 20 cps @ 2 g's
20 to 200 cps @ 4 g's
200 to 500 cps @ 2.5 g's
- Humidity** 0 - 95%
- Radio Frequency Interference** MIL-I-6181
- Fungus** MIL-E-4970
- POWER** 28 VDC, ±4V @ 3 amperes
+12 VDC, ±5% @ 2.6 amperes
-12V ±5% @ .280 amperes
208 VAC 400 Hz @ 1.1 amperes, 3 phase
- DIMENSIONS** 18" W x 9" H x 8" D (behind front panel)
- Dust cover 3.25" D
- NET WEIGHT** 45 pounds

J1 LOGIC CONNECTOR (Type MIS 17090/2-5)

Pin No.	Designation	
1	Channel 1 out	} Logic "1" = +12 VDC (hole) "0" = 0 VDC (no hole)
2	GND	
3	Channel 2 out	
4	GND	
5	Channel 3 out	
6	GND	
7	Channel 4 out	
8	GND	
9	Channel 5 out	
10	GND	
11	Channel 6 out	} 0 VDC = Run +12 VDC = Stop
12	GND	
13	Channel 7 out	} 0 VDC = Forward +12 VDC = Reverse
14	GND	
15	Channel 8 out	} +12 VDC = High Speed 0 VDC = Low Speed
16	GND	
17	Sprocket out	} 0 VDC = Tape Break +12 VDC = Tape Normal
18	GND	
19	Run/Stop	} Tape read (Manual Signal to computer)
20	GND	
21	Forward/Reverse	} 0 VDC = Forward +12 VDC = Reverse
22	GND	
23	High/Low Speed	} +12 VDC = High Speed 0 VDC = Low Speed
24	GND	
25	No Tape Reply	} 0 VDC = Tape Break +12 VDC = Tape Normal
26	GND	
28	N.O.	} Tape read (Manual Signal to computer)
29	Common	
30	N.C.	
31	Common	

J2 POWER CONNECTOR (Type MIS 17090/3-5)

Pin No.	Designation
1	- } 28 VDC Reel Motor Supply
6	+ }
3	-12 VDC Logic Supply
4, 13	+12 VDC Logic Supply
* 7	208 VAC, 400 cycle phase A
* 8	208 VAC, 400 cycle phase B
* 9	208 VAC, 400 cycle phase C
** 2	- } Indicator Lamp Supply 0-28V for dimming lamps
** 5	+ }
22	Chassis Ground
23	Circuit Ground
24	Shield Ground (Data Output Line)

*Optional 115V AC 400 cycle available pins 7, 8, 9, change to 17, 18, 19 respectively.
**Can be connected in parallel with pins 1 & 6 if dimming is not required.

Information subject to change without notice



POTTER INSTRUMENT COMPANY, INC.

151 SUNNYSIDE BOULEVARD • PLAINVIEW, NEW YORK • 516 OVERBROOK 1-3200

POTTER

PRODUCT
DATA
1-310

STANDARD MAGNETIC HEADS

POTTER

INSTRUMENT CO., INC.

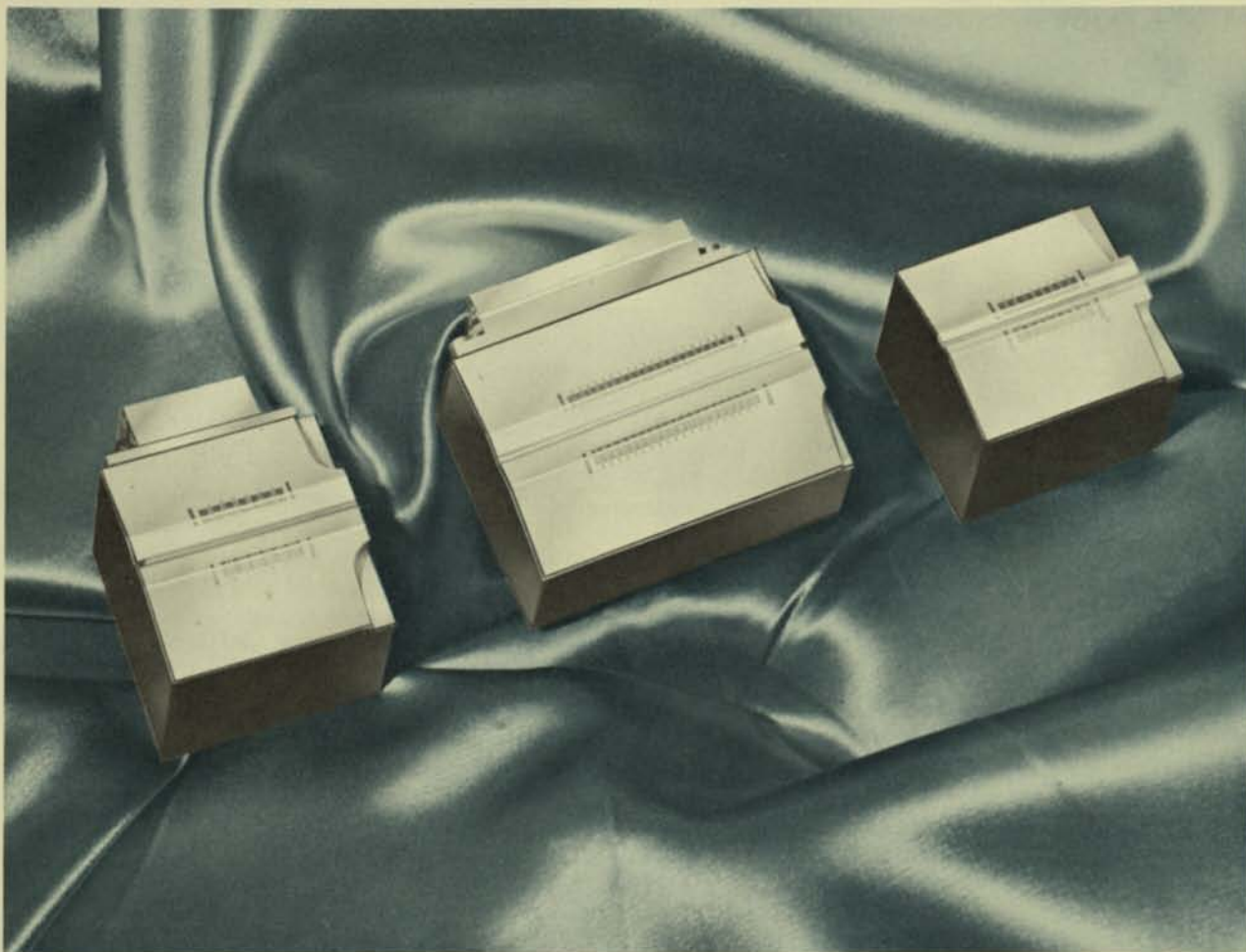


Figure 1—POTTER Standard Read/Write Head Assemblies.
(Photo shows 7, 21 and 9-track heads, l. to r.)

INTRODUCTION

Potter Instrument Company manufactures a wide variety of magnetic tape recording heads both for commercial and military applications. A complete selection of standard designs is provided, including types to meet the demands of all state-of-the-art applications in the digital recording field. Standard heads can be readily modified to meet special requirements, or Potter's design and manufacturing know-how and long experience can be applied to producing new types as required.

Potter manufactures magnetic heads compatible with virtually all formats, including IBM, Univac, RCA, IRIG, TIAC, ICT and ASCII.

STANDARD HEAD DESIGNS

Standard designs are "all-metal" construction with lamination stacks fitted into precisely machined metal blocks so that a minimum of plastic material can come in contact with the tape. The contour of the head surface facing the tape is carefully shaped to avoid spurious outputs from the ends of the lamination stacks and to allow the tape to remain in contact with the head gaps at the highest tape speeds.

Most heads used for computer applications consist of an erase head, a write head and a read head. When energized, the erase head removes previously recorded data and premagnetizes the tape in a standardized direction. The write head and read head

EFFECTIVE JANUARY 1, 1968

record and reproduce data on command. The write and read head gaps are separated by a short distance so that written data can be immediately checked for errors and rewritten if necessary.

Any one of the three types is also available as a single purpose write, read, or erase head.

The track configuration (width, spacing, windings, etc.) is completely flexible. Heads have been built for all existing computer tape formats and IRIG compatibility as well as for many unusual applications.

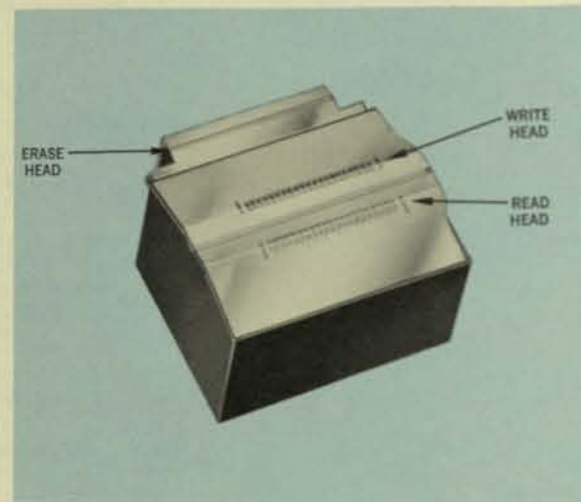


Figure 2—Typical Read/Write Head Assembly consists of three heads—read head, write head, and erase head.

CHARACTERISTICS FOR STANDARD HEADS

Mechanical Characteristics

Outline and mounting dimensions (see outline drawing on last page).

- Track Density— 1/2" —up to 9 tracks.
1" —up to 21 tracks.
For additional number of tracks on 1/2" and 1" configurations, interlacing or a non-standard design may be used.
- Track Width— minimum—10 mils.
- Tape Widths— 1/4 to 1 inch.
- Tape Approach Angle— 10°.
- Tape Speeds— to 150 ips.
- Gap Lengths— 100 microinch minimum.
- Gap Scatter— all within 100 microinch per 1/2 inch of tape width.
- Gap Azimuth— best line through gaps within 100 microinches per 1/2 inch of a true perpendicular to the head mounting surface.
- Gap Tilt— less than 1° from true perpendicular to the head mounting surface.
- Minimum Dimensions— Head base to edge of first track—.240
- Undercut at Tape Edge (Gutters)— optional.

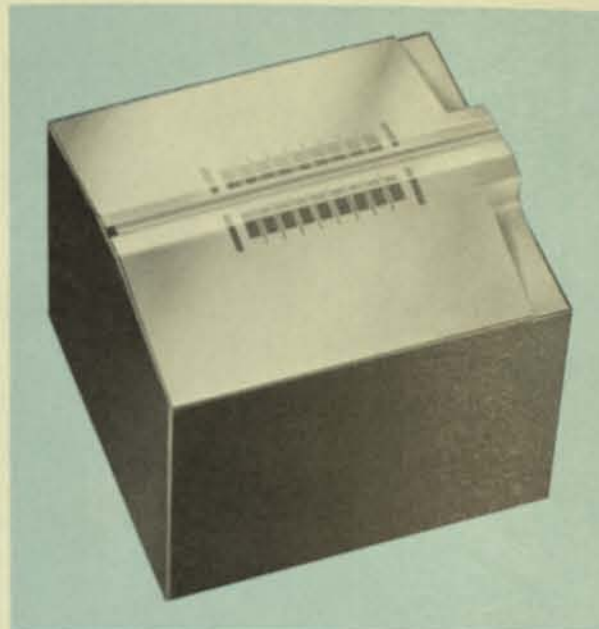


Figure 3—Potter Standard 9-channel Read/Write Head Assembly.

Electrical Characteristics

Write current requirement at saturation. Function of tape speed, flux rise time, density, tape type.*

Typically less than 2.2 ampere turn for 800 bpi NRZ—recording at 75 ips for 9-track heads.

Output—Function of many variables—Peak-to-peak output for low density isolated pulses is given approximately by

$$E = N_r V_r W K_e \text{ Millivolts}$$

where N_r = Read head winding turns.

V_r = Tape velocity in ips when reading.

W = Track Width in inches.

K_e = Function of tape type and head construction. Typically, for a 7- or 9-track —IBM/ASCII head with 3M 8938 tape, $K_e = .05$. and for 75 ips, 140 turns output would be about 17 mv.

Inductances

Function of track and shield dimensions— for estimating, $L = K_1 N^2$ microhenries

and for 7-track read heads, Width = .030", $K_1 = .08$

7-track write heads, Width = .048", $K_1 = .12$

9-track read heads, Width = .040", $K_1 = .11$

9-track write heads, Width = .044", $K_1 = .14$

*Pear, C. B.—Factors Influencing Write Current in NRZI Recording—Intermag Conference—1967.

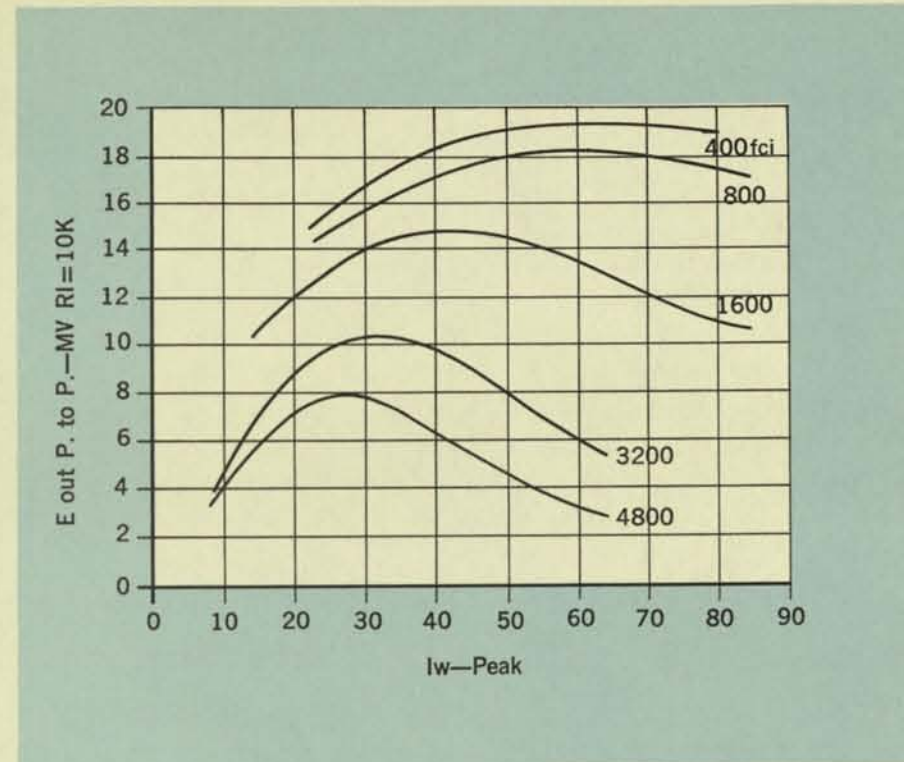


Figure 4—Typical Electrical Performance Curves for 1600 bpi Head.

Write to Read Crosstalk—with .150 inch gap spacing <0.4 MV. peak/100 T of the read winding when fitted with appropriate shield on opposite side of tape.

Read-to-read crosstalk <5% of output.

Spurious Pulses <3% of output.

Resolution—Depends on application and customer requirements. In heads for 800 bpi NRZ systems, the output at 800 bpi will not be less than 80% of the low density output.

STANDARD HEAD DESIGNS

Representative heads for 800 bpi NRZI systems to meet IBM or ASCII standards would be:

7-track heads—Model 18517-7

$N_w = 43, N_r = 140$

9-track heads—Model 19506-9

$N_w = 55, N_r = 180$

Heads can also be provided for 1600 bpi Phase Encoding systems.

ERASE HEADS

Auxiliary erase heads which mount on the write/read blocks can be supplied for 1/2 or 1 inch wide tape. These provide 99% reduction of the recorded amplitude when energized, and less than 1% reduction when not energized.

When operating out-of-contact with the tape, typical DC current of 100 milliamperes is used.

REPLACEMENT HEADS

Orders for replacement heads must reference the Model No. and Serial No. of the head being replaced.

MOUNTING HARDWARE

To assure optimum alignment of head and trough guide, heads and transport mounting hardware are sold as a matched set. Potter will supply heads mounted on customer mounts as required.

Potter Head Mounting Hardware includes (where required):

- Precision Trough Guides
- Ferrite Shields
- Pressure Pad Assembly

REPAIRING & REFINISHING

Head repairing for seven (7) or nine (9) channel heads is available. Repairing may include:

1. Replacement of any burned out or damaged channels up to a quantity of three (3).
2. Replacement or rework of any worn hardware.
3. Replacement of worn or damaged erase head.
4. Replacement of ferrite and drag pads.

If inspection indicates that repairing would be less economical than replacement, inspection costs are applied to the cost for a new head.

Send returned heads to Potter Instrument Company, Inc., Magnetic Head Dept., 151 Sunnyside Boulevard, Plainview, L.I., New York 11803.

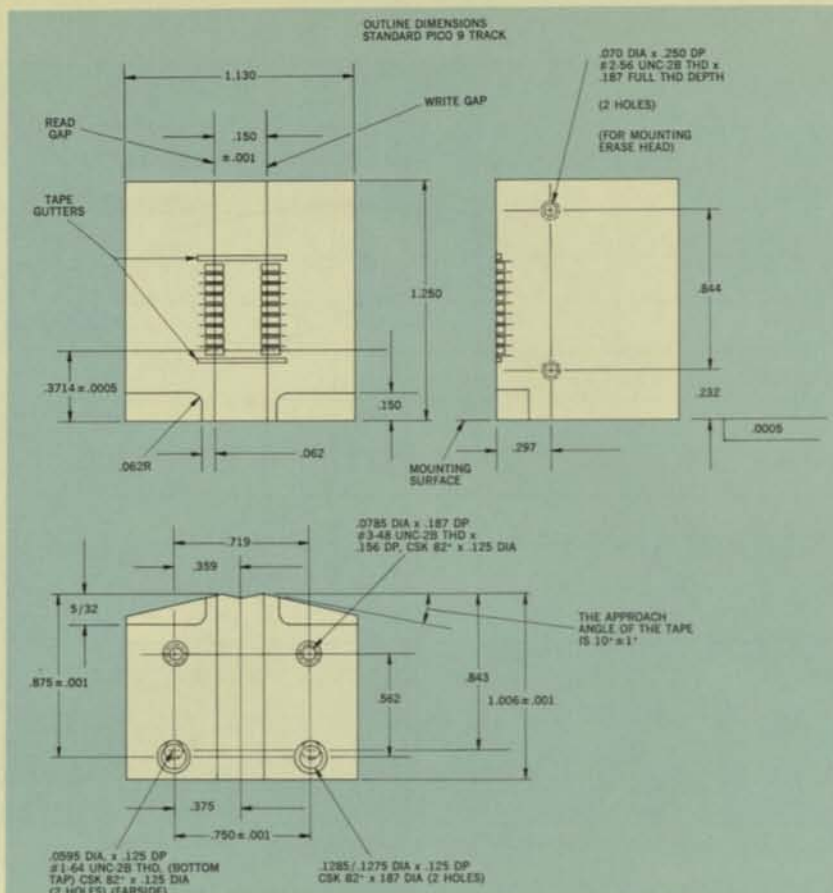


Figure 5—Standard Potter 9-Track Head.

POTTER WORLDWIDE FIELD SERVICE AND LOGISTICS PROGRAM

Repair centers in strategic locations within the continental United States and abroad have been established to support the entire Potter product line.

Staffed by highly-trained field representatives, these repair centers are equipped to effect on-site installation of equipments and to perform quality repair, maintenance and overhaul.

Supplementing this capability, if a customer prefers to provide his own equipment support, Potter has established standard instruction courses to train customer personnel, either at Potter or in the field.

A Spare Parts Department, backed up by an extremely large inventory, and streamlined order processing, is available for customer convenience and economy. This inventory permits the customer to realize virtual elimination of downtime as well as savings on spare parts dollars by offering expeditious delivery for replaceable parts. Delivery is available in 24 hours to meet customer emergency requirements—within 1 week for standard parts under normal conditions. Potter also offers provisioning and logistics capabilities to meet all existing military specifications.



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POTTER INSTRUMENT COMPANY, INC.

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EDP EQUIPMENT CATALOG CONTENTS



	EQUIPMENT	TITLE	EFFECTIVE DATE	INDEX NO.
EDP GENERAL INFORMATION	Sales Representatives	—	September 15, 1968	EDP-2
	Conditions of Sale	—	January 15, 1968	EDP-3
	Peripheral Computer Equipment Terminology	—	April 1, 1964	EDP-4
1-000 MAGNETIC TAPE SYSTEMS RANDOM ACCESS MEMORIES	TLM-4550 RAM® Dual Cartridge Random Access Memory	Product Data	April 15, 1966	1-103
	CTM-4550 RAM Control Unit	Product Data	November 30, 1966	1-104
	DD4311 Disk Drive	Product Data	August 1, 1968	1-105A
1-200 MAGNETIC TAPE TRANSPORTS	ME-4210 Incremental Magnetic Tape Recorder	Product Data	August 1, 1968	1-200
	MT-24 Transport	Product Data	January 15, 1967	1-201
	MT-120 Transport	Product Data	April 25, 1966	1-203
	MT-36 Transport	Product Data	January 15, 1967	1-204
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	M906II-2 Transport	Product Data	August 1, 1967	1-206
	FT-150 Series Field Transports	Product Data	October 25, 1967	1-207
	SC-1131 Single Capstan Militarized Transport	Product Data	September 30, 1968	1-213
	SC-1060 Medium Speed Single Capstan Transport	Product Data	April 30, 1968	1-216
	SC-1080 High Speed Single Capstan Transport	Product Data	October 31, 1968	1-218
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1-300 MAGNETIC HEADS	Magnetic Heads	Product Data	January 1, 1968	1-310

	EQUIPMENT	TITLE	EFFECTIVE DATE	INDEX NO.
1-400 AMPLIFIERS	Read/Write Amplifier for 9 Channels	Technical Data	March 15, 1966	1-400
	MA315 Read/Write Amplifier	Product Data	June 30, 1967	1-402
	MSA375 Read/Write Switching Amplifier	Product Data	April 15, 1964	1-403
	MA212 Read/Write Amplifier	Product Data	June 1, 1967	1-404
	MA151 and MA330 Read/Write Amplifiers	Product Data	June 30, 1968	1-405
	MA310 Read/Write Amplifier	Product Data	June 30, 1967	1-406
	MA320 Read/Write Amplifier	Product Data	June 1, 1968	1-407
1-500 ACCESSORIES	CAB-250 Cabinet	Product Data	May 25, 1967	1-502
2-000 MILITARIZED PERFORATED TAPE EQUIPMENT	PT-5000 Perforated Tape Reader	Product Data	November 1, 1967	2-205
	PE 1000 Tape Reader	Product Data	April 1967	83.02.03
	PE 1300 Tape Reproducers	Product Data	March 1965	87.02.01
	PE 1130 Tape Spooler/Dispenser	Product Data	July 1967	85.02.01
	PE 1500 Tape Punch	Product Data	April 1967	82.02.05
3-000 HIGH-SPEED PRINTERS	HSP-3502 Chain Printer	Product Data	June 30, 1968	3-102
	ICP-3501 Interface Module	Tech. Description	November 30, 1968	TD3-102
	HSP-3604 High-Speed Printer	Product Data	April 1, 1968	3-207

Information subject to change without notice.



POTTER INSTRUMENT COMPANY, INC.

EAST BETHPAGE ROAD • PLAINVIEW, L. I., NEW YORK 11803 • (516) 694-9000

POTTER

CONDITIONS OF SALE



ACCEPTANCE — No order received shall be considered to have been accepted by the Potter Instrument Company, Inc., until it has been officially approved by, and acknowledged from, PICO headquarters, at Plainview, New York.

PRICES — Potter prices are quoted f. o. b. Plainview, New York. Prices are subject to change without notice.

PACKAGING — All packaging shall be of domestic-commercial variety suitable for protection of materials under normal shipping modes and conditions. Prices listed do not include charges for special handling, export packaging, marking or materials unless agreed to in writing as a result of negotiation between Potter and the purchaser.

TERMS — Terms of sale are net 30 days from date of invoice.

MINIMUM BILLING CHARGE — Due to costs incurred in processing an order, the minimum price on a single order is \$10.00.

ORDERS RECEIVED — Upon receipt of purchaser's formal purchase order, Potter will mail to the purchaser an acknowledgement of the sale containing the terms and conditions thereof. In the event that the purchaser fails to notify Potter within five (5) days that any term or condition of the acknowledgement is unacceptable, the purchaser shall be deemed to have accepted the agreement as set forth in the acknowledgement. Upon acceptance in this manner the contract cannot be cancelled, revoked or modified in any particular (including changes in design, specifications or production) without prior agreement having been reached between the customer and Potter as to the effect of such cancellation, change, etc., on the price and/or delivery of said contract.

DELIVERY — Every effort will be made to deliver material in accordance with the shipping dates appearing on the acknowledgement of an order. Delivery is based on the receipt by Potter of a purchase order or other written communication containing the purchase order number. Potter shall ship in accordance with the delivery schedule appearing on the acknowledgement provided that all necessary information has been made available to Potter, except that Potter shall not be liable for delays in delivery due to causes beyond its reasonable control.

TAXES — Potter Instrument Company, Inc., prices do not include sales, use, excise or similar taxes. Consequently, the amount of any presently applicable or future tax shall be paid by the purchaser, or the purchaser shall provide Potter with a tax exemption certificate acceptable to the taxing authorities.

PATENT INDEMNITY — If notified promptly in writing of any action brought against the Purchaser based on a claim that any Potter designed products or parts thereof infringe a United States patent, Potter will defend such action at its expense and will pay the costs and damages awarded in any such action, provided that Potter shall have had sole control of the defense of any such action and all negotiations for its settlement or compromise. In the event that a final injunction shall be obtained against the Purchaser's use of the products or any of their parts by reason of infringement of a United States patent, or if in Potter's opinion the products are likely to become the subject of a claim of infringement of a United States patent, Potter will, at its option and at its expense, either procure for the Purchaser the right to continue using the products, replace or modify the same so that they become noninfringing, or grant the Purchaser a credit for such products as depreciated and accept their return. The depreciation shall be at the rate of twenty per cent (20%) of the purchase price per year. Potter shall not have any liability to the Purchaser under any provision of this claim if any patent infringement, or claim thereof, is based upon the use of the products in combination with machines or devices not made by Potter, or in a manner for which the products were not designed. The foregoing states the entire liability of Potter with respect to infringement of patents by the products or any part thereof or by their operation.

Purchaser agrees to indemnify, protect and hold Potter harmless against all legal actions or proceedings, and from all damages, claims, demands, costs and expenses, including counsel fees, for actual or alleged infringement of any Letters Patent arising out of manufacture by Potter in accordance with any specifications of Purchaser.

LAW — All matters relating to or arising out of this transaction shall be interpreted in accordance with the laws of the State of New York.

DATA — The data to be supplied as representing the equipment covered under this order shall be restricted to that information provided in Potter's Standard Operating and Service Instruction Manual, along with those schematics and drawings of a non-proprietary nature necessary for the normal operation and/or maintenance of equipment by the purchaser.

TESTING — Final testing of equipment at Potter Instrument Company, Inc. is painstaking and thorough. It also represents a considerable portion of the cost and, therefore, reflects in the selling price of the equipment. Furthermore, final test is not only a check on equipment characteristics, but also includes final adjustments to enable the unit to achieve those characteristics. Experience has shown that if a representative of the customer is in attendance while these tests are being run, the length of time the unit is in test is substantially increased and therefore becomes more costly.

Accordingly, a charge must be made when the purchaser wishes to be present during testing. Purchasers' representatives are welcome at our plants for informal visits at any time it is mutually convenient. Charges for purchasers' observation of Potter final test or customer-specified acceptance testing are as follows: \$100/day (\$14.00/hour for half-day) plus any additional material required during such testing. If this service is desired it should be specified in purchase order.

WARRANTY

NEW PRODUCTS — Potter Instrument Company, Inc., warrants its products for a period not to exceed 120 days or 1,000 operating hours, whichever occurs first after date of shipment to initial user. This warranty is limited to defects in material and workmanship, providing the product has not been subjected to misuse, neglect, accident, or improper installation, and that the procedures outlined in the maintenance manual pertaining to preventive maintenance and adjustments have been adhered to.

Seller's obligation under this warranty is limited to repairing or replacing on the purchaser's premises or at its factory (in both cases whichever it deems advisable) each instrument or parts thereof found to be defective under the terms of this warranty. In the event Potter elects to have the parts returned to its factory, Return Material forms will be provided authorizing shipment, transportation charges prepaid.

If found to be defective under the terms of this warranty, repair or replacement will be made, without charge, together with a refund for transportation costs where applicable. If found not to be so defective, a charge will be made for repair or replacement. (No credit will be allowed for equipment returned as defective.) This warranty shall not apply to any equipment which shall have been repaired or altered outside its factory by other than Potter Instrument Company, Inc., authorized service representatives. This warranty is in lieu of all other obligations or liabilities on Potter's part and Potter neither assumes nor authorizes any other party to assume for it any other obligation in connection with the sale of Potter Instrument Company, Inc., products.

Seller reserves the right to make design improvements or changes in design at any time without incurring any obligation to make similar changes in equipment previously supplied.

REPAIRS — Potter Instrument Company, Inc., warrants its repairs for a period not to exceed sixty (60) days or five hundred (500) operating hours, whichever occurs first after date of shipment to the user, against defects in material and workmanship, providing the product has not been subjected to misuse, neglect, accident or improper installation or application.

Seller's obligation under this warranty is limited to repairing or replacing on the Purchaser's premises or at its factory (in both cases whichever it deems advisable) each instrument or parts thereof found to be defective under the terms of this warranty.

If found defective under the terms of this warranty, repair or replacement will be made, without charge, together with a refund for transportation costs where applicable. If found not to be so defective, a charge will be made for repair or replacement. No credit will be allowed for equipment returned as defective. This warranty shall not apply to any equipment which shall have been repaired or altered outside its factory. This warranty is in lieu of all other obligations or liabilities on its part and it neither assumes nor authorizes any other persons to assume for it any other obligation in connection with the sale of its products.

Seller reserves the right to make design improvements or changes in design at any time without incurring any obligation to make similar changes on equipment previously supplied.

POTTER

HSP-3604 HIGH-SPEED MINIATURIZED PRINTER

PRODUCT
DATA
3-207

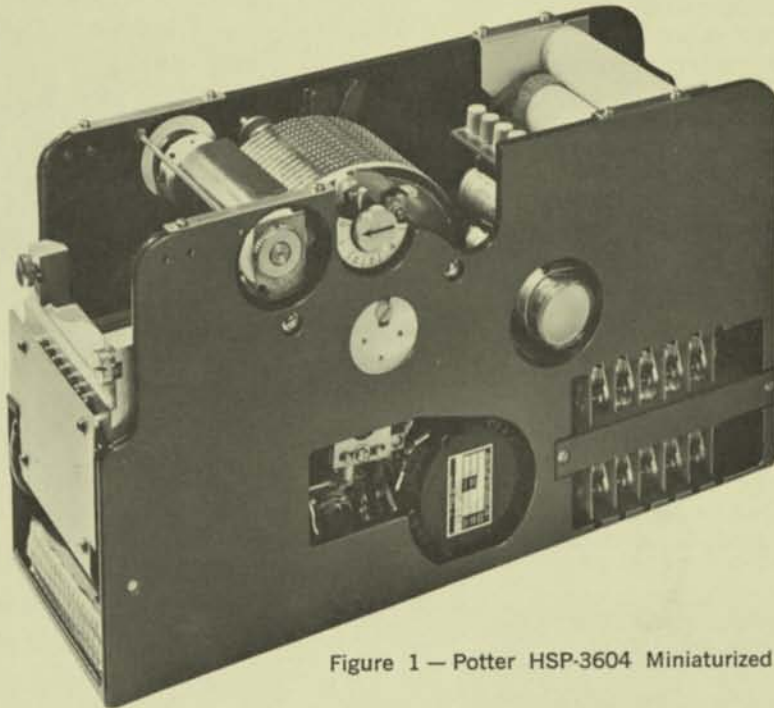


Figure 1 — Potter HSP-3604 Miniaturized Printer

FEATURES

- High-speed serial print rate of 20 characters/second average
- 26 column, 64 character complement
- Quick replaceable-type drum — less than 10 seconds
- Immediate view of last line printed
- Accommodates up to 3 part fanfold paper with internal supply and storage facilities
- Double-width print hammers
- Silicon circuitry
- Designed to meet military specs MIL-E-16400, MIL-T-21200, MIL-Q-9858
- MTBF: 2500 hours MTRR: 10 minutes

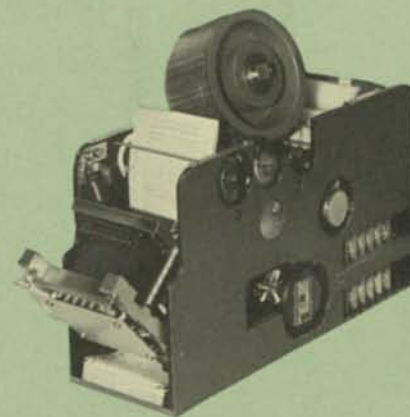


Figure 2 — Potter HSP-3604 shown with drum partially removed and hammer plate open.

DESCRIPTION

The HSP-3604 is a militarized high-speed serial printer providing a minimum print rate of 12 ch/sec in a 26-column format with a 64-character complement. A typical message of random characters will

yield an average print rate of 20 ch/sec. Designed for operation in the most extreme environments, maintenance-free operation is assured through the use of high reliability components and unparalleled simple design. Basic electronics simplifies interface and reduces RFI interference.

EFFECTIVE: APRIL 1, 1968

The HSP-3604 printer is designed specifically for military applications where reliability, miniaturization, low cost, and ease of maintenance are essential requirements. The printer and its associated basic electronics is packaged for mounting in a container 5.4" wide x 8.8" high x 15.8" deep.

The printer mechanism contains the mechanical and electrical components associated with:

- storage and movement of paper
- printing operation
- character timing amplifier
- column select gates
- power supply storage capacitors

PRINT DRUM AND TIMING MECHANISM

A horizontally mounted drum containing 26 columns with 64 printable symbols is utilized.

An odd/even drum format, Figure 3, provides the following:

- minimized power supply requirements
- eliminates ghosting
- reduces to one-half the number of hammer drivers and associated circuitry due to use of double-width hammers

The print drum contains the timing marks (character identification) etched on its periphery, in addition to the 64 character symbols. A timing mark

will appear for each character which will be sensed by a reluctance pickup.

When application requires, replacement of the drum may be accomplished in 10 seconds to facilitate various drum formats.

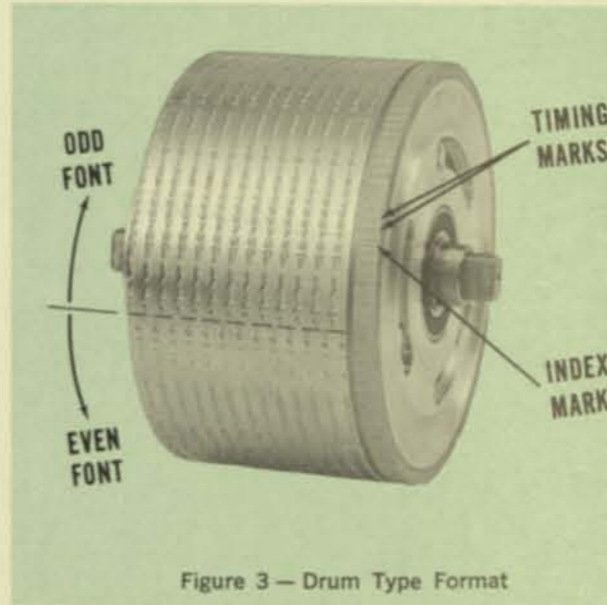


Figure 3 - Drum Type Format

SPECIFICATIONS

DRUM SPEED	11 RPS
NUMBER OF COLUMNS	26 (standard)
NUMBER OF CHARACTERS	64 (standard)
DRUM FORMATS (STANDARD)	
HSP-3604-1	See Table I (Figure 3A)
PAPER MEDIA	
TYPE	Pressure sensitive, fanfold with self-contained supply and storage facilities.
NUMBER OF COPIES	3
LINE SPACING	Variable (normally 6 lines/inch)
CAPACITY	100 ft. minimum
ALARM	Low Paper sensing microswitch
MANUAL CONTROLS	
Paper Advance	
Fuses	
Power "On-Off"	
Internal illumination lamp	
DIMENSIONS	5.4" W x 9.0" H x 16.0" D
WEIGHT	29 pounds
ELECTRONICS	See Figure 6 for details
POWER REQUIREMENTS	115 VAC, 400 cycle single phase @ 1 ampere
POWER SUPPLY (OPTIONAL)	+6 VDC regulated @ 200 ma -6 VDC regulated @ 120 ma +90 VDC @ 1.5 amp pulse load 25 ma quiescent
DIMENSIONS	6.25" W x 5 1/2" H x 6.25" D
POWER REQUIREMENTS	115 VAC, 400 cycle single phase @ 1 ampere
ENVIRONMENTAL CONDITIONS	
TEMPERATURE	
OPERATING	-40°F to +160°F
NON-OPERATING	-65°F to +160°F
SHOCK	Vertical Axis - 25 g's peak/40 milliseconds
VIBRATION	5 g's from 2 cps to 500 cps
RELIABILITY	
MTBF	2500 hours
WARRANTY	
	HSP-3604 is warranted for a period of one (1) year or 2500 hours, whichever shall occur first.

DRUM FORMAT HSP-3604-1			
Position Number	Character	Position Number	Character
0	\$	32)
1	◊	33	-
2	◊	34	+
3	◊	35	<
4	◊	36	=
5	Blank	37	>
6	A	38	-
7	B	39	\$
8	C	40	*
9	D	41	(
10	E	42	"
11	F	43	:
12	G	44	?
13	H	45	!
14	I	46	;
15	J	47	'
16	K	48	0
17	L	49	1
18	M	50	2
19	N	51	3
20	O	52	4
21	P	53	5
22	Q	54	6
23	R	55	7
24	S	56	8
25	T	57	9
26	U	58	'
27	V	59	:
28	W	60	/
29	X	61	.
30	Y	62	□
31	Z	63	†

Figure 3A

PAPER MEDIA

Facilities for storage and supply of 100 feet of pressure-sensitive fanfold paper are contained within the printer. Operator convenience is further enhanced by a unique paper take-up system. Access to printed material is provided by a lever-type mechanism that withdraws the paper for operator handling. Upon examination and release of the printed material, the paper will automatically return to the storage bin, Figure 4.

PRINT HAMMERS

The Potter exclusive odd/even drum format allows use of double-headed hammers requiring only 13 hammer modules and associated driving circuitry to provide a 26-column printout. Need for hammer adjustments has been eliminated by unique features of the hammer design. The swing down hammer plate permits quick, efficient front loading of the paper and component accessibility.

ELECTRONICS

The HSP-3604 contains the basic electronics detailed in Logic Diagram, Figure 6. Five printed circuit board modules utilizing silicon semiconductors are used.

Three types of modules used are: Hammer Driver, Timing Amplifier and Paper Feed Driver.

The HSP-3604 printer is designed specifically for military applications where reliability, miniaturization, low cost, and ease of maintenance are essential requirements. The printer and its associated basic electronics is packaged for mounting in a container 5.4" wide x 8.8" high x 15.8" deep.

The printer mechanism contains the mechanical and electrical components associated with:

- storage and movement of paper
- printing operation
- character timing amplifier
- column select gates
- power supply storage capacitors

PRINT DRUM AND TIMING MECHANISM

A horizontally mounted drum containing 26 columns with 64 printable symbols is utilized. An odd/even drum format, Figure 3, provides the following:

- minimized power supply requirements
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The print drum contains the timing marks (character identification) etched on its periphery, in addition to the 64 character symbols. A timing mark

will appear for each character which will be sensed by a reluctance pickup.

When application requires, replacement of the drum may be accomplished in 10 seconds to facilitate various drum formats.

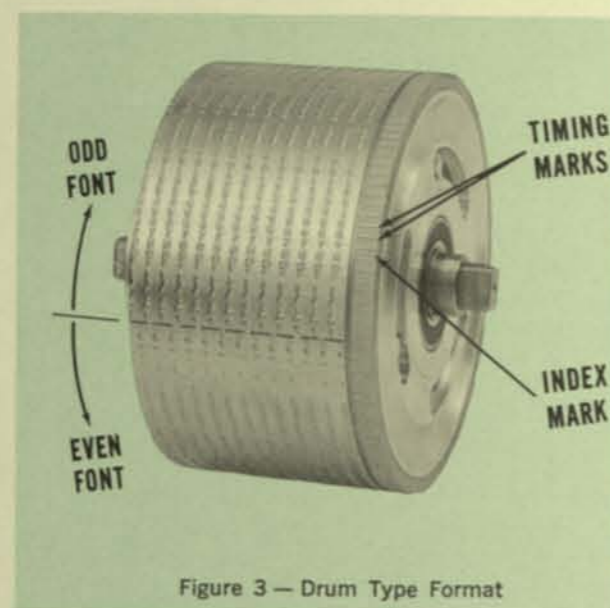


Figure 3 - Drum Type Format

DRUM FORMAT HSP-3604-1			
Position Number	Character	Position Number	Character
0	\$	32)
1	0	33	.
2	1	34	+
3	2	35	=
4	3	36	>
5	Blank	37	<
6	A	38	-
7	B	39	*
8	C	40	!
9	D	41	"
10	E	42	#
11	F	43	~
12	G	44	^
13	H	45	^
14	I	46	^
15	J	47	^
16	K	48	0
17	L	49	1
18	M	50	2
19	N	51	3
20	O	52	4
21	P	53	5
22	Q	54	6
23	R	55	7
24	S	56	8
25	T	57	9
26	U	58	'
27	V	59	;
28	W	60	/
29	X	61	.
30	Y	62	□
31	Z	63	+

Figure 3A

PAPER MEDIA

Facilities for storage and supply of 100 feet of pressure-sensitive fanfold paper are contained within the printer. Operator convenience is further enhanced by a unique paper take-up system. Access to printed material is provided by a lever-type mechanism that withdraws the paper for operator handling. Upon examination and release of the printed material, the paper will automatically return to the storage bin, Figure 4.

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The Potter exclusive odd/even drum format allows use of double-headed hammers requiring only 13 hammer modules and associated driving circuitry to provide a 26-column printout. Need for hammer adjustments has been eliminated by unique features of the hammer design. The swing down hammer plate permits quick, efficient front loading of the paper and component accessibility.

ELECTRONICS

The HSP-3604 contains the basic electronics detailed in Logic Diagram, Figure 6. Five printed circuit board modules utilizing silicon semiconductors are used.

Three types of modules used are: Hammer Driver, Timing Amplifier and Paper Feed Driver.

HAMMER DRIVE module contains 13 hammer drivers, and 13 dual input selection "AND" gates. One side of the 13 "AND" gates are connected in parallel and coupled to the common hammer fire one shot, located on the timing amplifier module.

The external controller to the printer selects the column to be printed and triggers the hammer fire one shot, which actuates the enabled column to provide the required printout.

TIMING AMPLIFIER - A reluctance pickup senses etched timing marks on the drum periphery, providing a pulse for each character on the drum (128 equidistant pulses), and one index mark indicating "start of type font." The index mark is located between the 128th and 1st character on the drum.

PAPER FEED DRIVER provides paper feed drive circuitry including a dual input single-shot-multivibrator, which acts as an "OR" gate for the paper advance. One input is received from the printer's logic and advances the paper one vertical line. The second input is typically connected to a front panel pushbutton - one push, one line. A potentiometer located on this module provides for variable line spacing from 5 to 9 lines/inch.

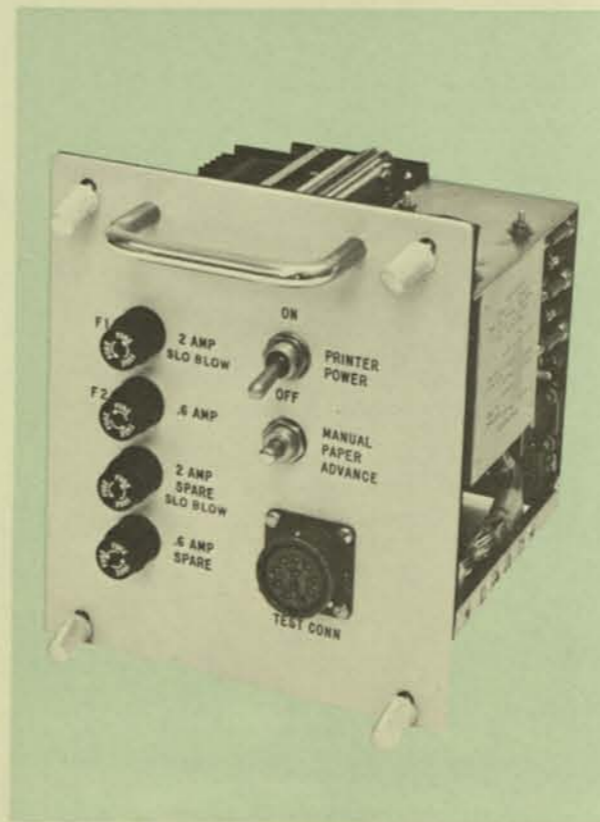


Figure 5 - HSP-3604 Power Supply

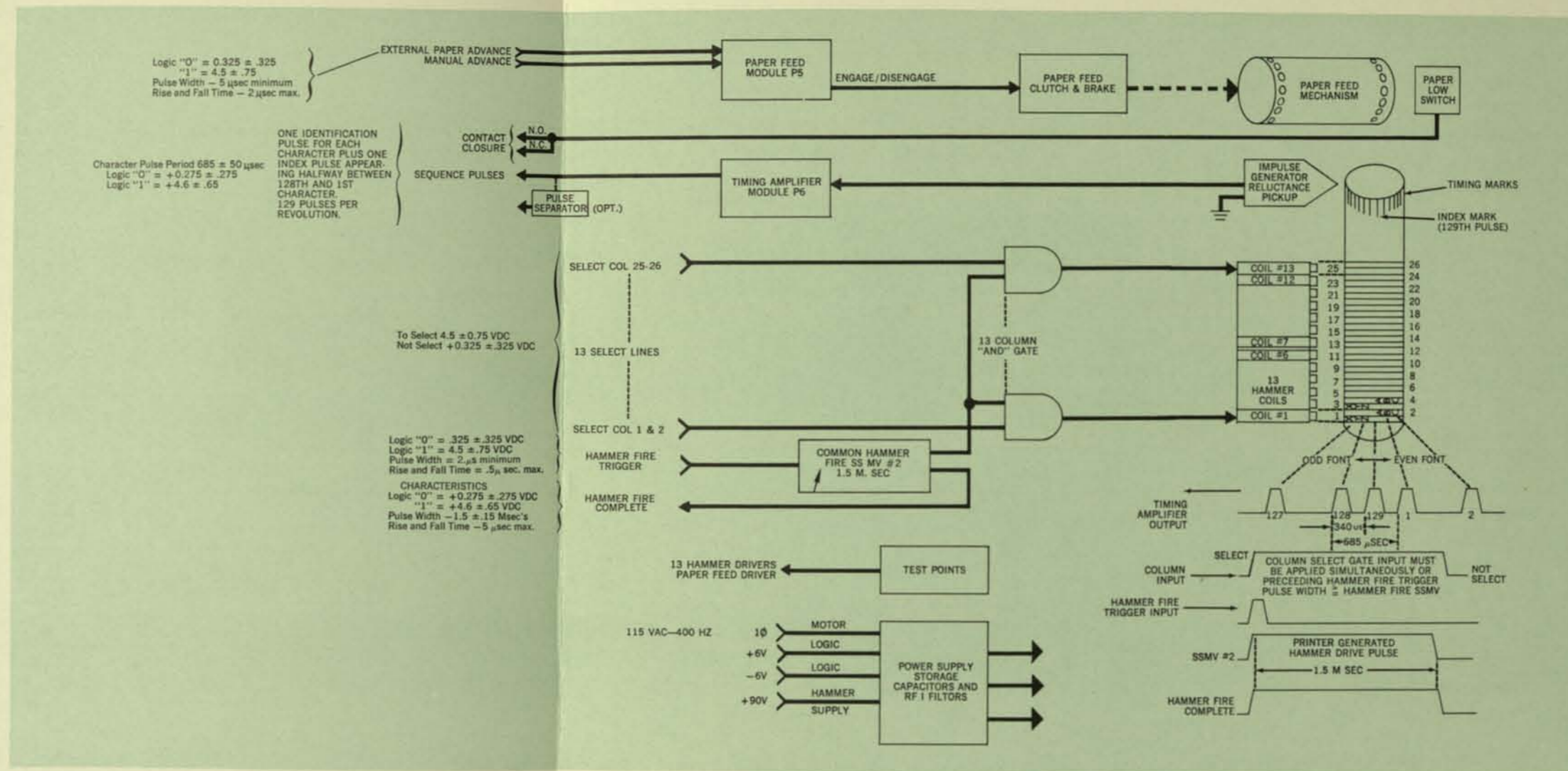


Figure 6 - HSP-3604 Printer Logic Diagram

This self-contained power supply provides automatic turn-on sequencing. Current limiting and voltage sensing are provided for fail-safe turn-off sequencing, in the event of a malfunction.

HIGH-SPEED PERFORATED TAPE READERS AND SPOOLERS

Potter manufactures a line of high-speed tape readers and spoolers proven successful in military and commercial applications.

Constructed to military specifications, these high-speed systems provide synchronous, bidirectional

operation at 500 ch/sec. Asynchronously, these units will operate at 70 ch/sec.

Product features include photoelectric sensing with silicon solar cells for high reliability, completely transistorized silicon semiconductors, high speed reading at 5, 6, 7 or 8 level perforated tape, individual sensitivity adjustments and self-contained regulated power supply.

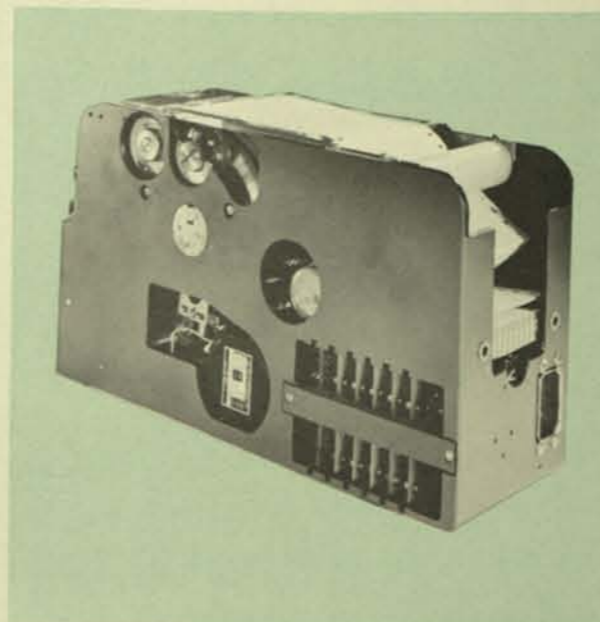


Figure 4 - HSP-3604 Printer showing paper storage bin

About POTTER

POTTER WORLDWIDE FIELD SERVICE AND LOGISTICS PROGRAM—Repair centers in strategic locations within the continental United States and abroad have been established to support the entire Potter product line.

Staffed by highly-trained field representatives, these repair centers are equipped to effect on-site installation of equipments and to perform quality repair, maintenance and overhaul.

Supplementing this capability, if a customer prefers to provide his own equipment support, Potter has established standard instruction courses to train customer personnel, either at Potter or in the field.

A Spare Parts Department, backed up by an extremely large inventory and streamlined order processing, is available for customer convenience and economy. This inventory permits the customer to realize virtual elimination of downtime as well as savings on spare parts dollars by offering expeditious delivery for replaceable parts. Delivery is available in 24 hours to meet customer emergency requirements—within 1 week for standard parts under normal conditions. Potter also offers provisioning and logistics capabilities to meet all existing military specifications.

The Potter field service and logistics program is one of the finest in the EDP equipment industry. With reliable, quality-engineered equipment, supported by comprehensive field service, Potter guarantees satisfaction.



POTTER PLANTS—Tape transport production is carried on in this modern 62,000 sq. ft. plant on Sunnyside Boulevard, Plainview, New York. Building also houses corporate offices, sales, engineering and research groups.

East Bethpage Road plant (below), completed in 1963, produces high-speed printers. A third plant in Luquillo, Puerto Rico, manufactures magnetic and photoelectric recording and playback heads. Total manufacturing space in all Potter plants exceeds 150,000 sq. ft.

Present Potter employment is in excess of 1000 people.



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POTTER INSTRUMENT COMPANY, INC.

151 SUNNYSIDE BOULEVARD •

PLAINVIEW, NEW YORK • 516 681-3200

MT-SR INCREMENTAL MAGNETIC TAPE TRANSPORT AND SYSTEM (READ/WRITE MODEL)



FEATURES

- IBM 7- or 9-Channel Compatible, 200 bpi Tape Format, Automatic I-R Block Generation
- Fast, Smooth Start/Stop Performance
- Single-Capstan Tape Drive
- Completely Asynchronous Operation — Up to 300 Characters/Second with Better than $\pm 10\%$ Pulse Spacing
- High-Speed Continuous Mode for Rapid Read-Check
- All Solid-State Electronics
- Vacuum Column Slack Loop with Photoelectric Loop Sensing
- Maximum Interchangeability of Parts — Member of MT-24/36/75 Family of Tape Transports.

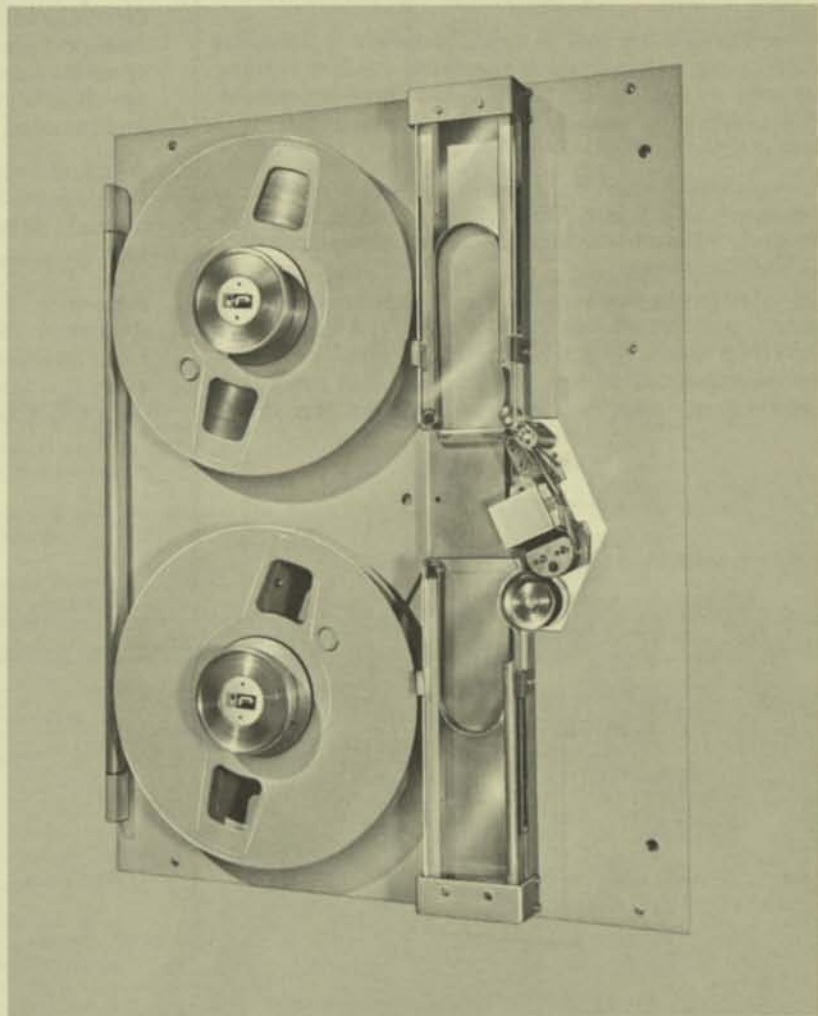


Figure 1. MT-SR Magnetic Tape Transport for Reading and Writing Incrementally

GENERAL

Magnetic incremental stepping recorders are finding widespread use in the fields of data logging, digital data transmission and data processing. These units record digital data on magnetic tape one-character-at-a-time with constant spacing. Unlike computer tape transports which require a constant data rate and a fixed tape speed to insure computer acceptance of recorded data, incremental stepping transports record asynchronously to maintain constant packing density.

Tape is advanced on receipt of a digital character and records information received at any fixed or variable rate up to 300 characters per second.

The incremental magnetic tape transport eliminates the need for intermediate storage (i.e.: punched paper tape and tape-to-tape conversion operations). Typical applications include off-line data logging, digital data transmission and data processing, inventory control, telemetry, point-of-origin data documentation and long-term recording.

DESCRIPTION

The Potter MT-SR Incremental Tape Transport provides reading or writing capability in a 300 character-per-second incremental feed mode using an IBM 200 bpi 7- or 9-channel tape format. The unit is designed on a standard Potter Model MT-24 transport panel frame to achieve maximum interchangeability of common spare parts, simplicity of maintenance procedures, and flexibility of operation with Potter's MT-24/36/75 family of low-cost tape transports.

The MT-SR utilizes a new, proprietary stepping mechanism which permits asynchronous step reading as well as writing up to 300 characters-per-second. Bit positioning accuracy (pulse spacing jitter) is better than $\pm 10\%$.

Unique features incorporated in the design enable the transport to attain full operating speed in 2.5 milliseconds without transient overshoot when operating in the Step mode.

In addition to the incrementing mode, a continuous drive mode providing 21 ips steady running speed and fast Start/Stop times permits interblock gaps to be generated with a minimum of lost time. The continuous mode may also be used for high-speed

back-spacing to permit check reading and rewrite of blocks of information.

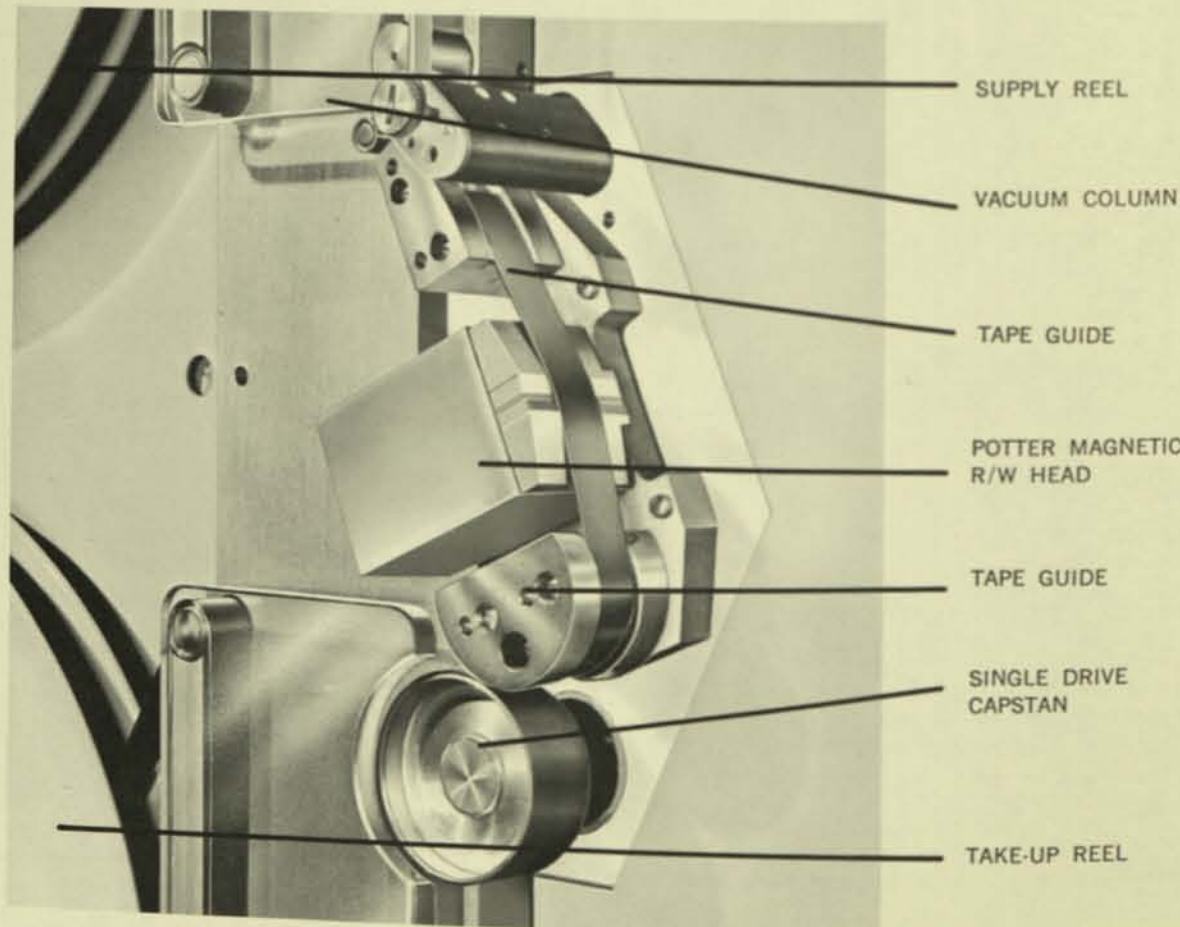
The MT-SR employs a single-capstan tape drive for accurate tape motion control, vacuum-column slack loops with photoelectric loop sensing, and handles standard 10½-inch reels of ½-inch tape. Solid-state circuits are included for controlling all operations by means of standard signals.

The entire transport, including control panels and drive electronics, fits on a standard 19-inch rack. The transport panel requires only 24½ inches (minimum) of vertical space and 11 inches in depth. All controls are on the front, and printed circuit cards are inserted and removed from the front.

A special version of the Potter MA212 solid-state Read/Write Amplifier has been developed for incremental and continuous Read/Write operation in IBM tape formats. (See Specifications.)

Accessory items include a Potter M7500 series 7- or 9-channel IBM compatible dual-gap Read/Write head assembly, remote manual control pushbutton station, a tempered glass dust cover, and Potter ACC-8501 QUICK-LOCK® Hubs for instant reel changing.

Figure 2. MT-SR Incremental Tape Transport



REPLY LINES			
READY	The output is Logic "1" when the AUTO/MANUAL/LOAD switch is in the AUTO position, the power is on, the tape is loaded in the vacuum columns; the vacuum column, EOT, and the tone wheel lamps are on, and the transport is not in rewind. Output Levels — Logic "1": -15V DC through 1K Logic "0": Ground $\pm 0.5V$ DC Output Current — Logic "1": 5 ma maximum, source Logic "0": 20 ma maximum, sink	WRITE CLOCK DELAY	Information is written when the Write Clock switches from the "0" to "1" level; all Write input lines to be written must be at the "1" level when this switching takes place and for a minimum of 2 μs thereafter. The trailing edge of the Write Clock Delay is used to signal for tape motion to stop provided that the Step Write input is at the "0" level. Output Levels — Logic "1": -15V DC through 1K Logic "0": Ground $\pm 0.5V$ DC Output Current — Logic "1": 5 ma maximum, source Logic "0": 20 ma maximum, sink Maximum Rise Time: 2 μs Maximum Duration: 1 ms Maximum Fall Time: 20 μs
EOT	The end-of-tape output line is at Logic "1" when the reflective strip nearest the panel is under the sensor and Logic "0" when the strip is away from the sensor. Output Levels — Logic "1": -15V DC through 1K Logic "0": Ground $\pm 0.5V$ DC Output Current — Logic "1": 5 ma maximum, source Logic "0": 20 ma maximum, sink	READ GATE DELAY	The output switches to "1" when the "first-bit-in" of any character is detected. The trailing edge of this signal is used to stop tape motion provided that the Step Read input is at the "0" level. Output Levels — Logic "1": -15V DC through 1K Logic "0": Ground $\pm 0.5V$ DC Output Current — Logic "1": 5 ma maximum, source Logic "0": 20 ma maximum, sink Maximum Rise Time: 2 μs Maximum Duration: 1 ms Maximum Fall Time: 20 μs
BOT	The beginning-of-tape output line is at Logic "1" when the reflective strip furthest from the panel is under the sensor and Logic "0" when the strip is away from the sensor. Output Levels — Logic "1": -15V DC through 1K Logic "0": Ground $\pm 0.5V$ DC Output Current — Logic "1": 5 ma maximum, source Logic "0": 20 ma maximum, sink		

READ/WRITE INPUT LINES		READ/WRITE OUTPUT LINES	
Description	Logic	Description	Logic
Write Inputs—7 or 9 Channels	Level: "1" = -5V to -15V DC "0" = 0V $\pm 0.5V$ DC	Read Outputs—7 or 9 Channels	Pulse: "1" = -10V $\pm 2V$ DC "0" = 0V $\pm 0.5V$ DC Maximum Rise Time: 0.3 μsec into 1000pf capacitance to ground Maximum Fall Time: 0.3 μsec into 1000pf capacitance to ground Pulse Width: 0.75 to 2.25 μsec , adjustable
Write Enable—Enables recording	Level: "1" = -5V to -15V DC "0" = 0V $\pm 0.5V$ DC	Read Clock—Synchronous with Read outputs	Pulse: "1" = -10V $\pm 2V$ DC "0" = 0V $\pm 0.5V$ DC Maximum Rise Time: 0.3 μsec into 1000pf capacitance to ground Maximum Fall Time: 0.3 μsec into 1000pf capacitance to ground Pulse Width: 0.75 to 2.25 μsec , adjustable
Write Reset—A general reset for Write flip-flops and to be used for the generation of the LRCC	Level or Pulse: "1" = -5V to -15V DC "0" = 0V $\pm 0.5V$ DC Maximum Rise Time: 1 μsec Maximum Fall Time: 1 μsec Minimum Pulse Width: 2 μsec	Gap Indicator—Indicates when stepper is in AUTO mode during generation of Interrecord Gap and End-of-File gap. Write inputs, Rewind command and Reverse command must be kept at the zero level when gap indicator output is at the one level	Level: "1" = -10V $\pm 2V$ DC "0" = 0V $\pm 0.5V$ DC
Write Clock—To be used for synchronous writing at slew speed	Pulse: "1" = -5V to -15V DC "0" = 0V $\pm 0.5V$ DC Maximum Rise Time: 1 μsec Maximum Fall Time: 1 μsec Minimum Pulse Width: 2 μsec 50% maximum duty cycle		
Low Threshold Select — Reduces Read threshold from approximately 30% to 20%	Level: "1" = -5V to -15V DC "0" = 0V $\pm 0.5V$ DC		
Read Reset—A general reset for Read buffer flip-flops and can be used as a Read inhibit	Level or Pulse: "1" = -5V to -15V DC "0" = 0V $\pm 0.5V$ DC Maximum Rise Time: 1 μsec Maximum Fall Time: 1 μsec Minimum Pulse Width: 2 μsec		

DESCRIPTION

The Potter MT-SR Incremental Tape Transport provides reading or writing capability in a 300 character-per-second incremental feed mode using an IBM 200 bpi 7- or 9-channel tape format. The unit is designed on a standard Potter Model MT-24 transport panel frame to achieve maximum interchangeability of common spare parts, simplicity of maintenance procedures, and flexibility of operation with Potter's MT-24/36/75 family of low-cost tape transports.

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In addition to the incrementing mode, a continuous drive mode providing 21 ips steady running speed and fast Start/Stop times permits interblock gaps to be generated with a minimum of lost time. The continuous mode may also be used for high-speed

back-spacing to permit check reading and rewrite of blocks of information.

The MT-SR employs a single-capstan tape drive for accurate tape motion control, vacuum-column slack loops with photoelectric loop sensing, and handles standard 10½-inch reels of ½-inch tape. Solid-state circuits are included for controlling all operations by means of standard signals.

The entire transport, including control panels and drive electronics, fits on a standard 19-inch rack. The transport panel requires only 24½ inches (minimum) of vertical space and 11 inches in depth. All controls are on the front, and printed circuit cards are inserted and removed from the front.

A special version of the Potter MA212 solid-state Read/Write Amplifier has been developed for incremental and continuous Read/Write operation in IBM tape formats. (See Specifications.)

Accessory items include a Potter M7500 series 7- or 9-channel IBM compatible dual-gap Read/Write head assembly, remote manual control pushbutton station, a tempered glass dust cover, and Potter ACC-8501 QUICK-LOCK® Hubs for instant reel changing.

Figure 2. MT-SR Incremental Tape Transport

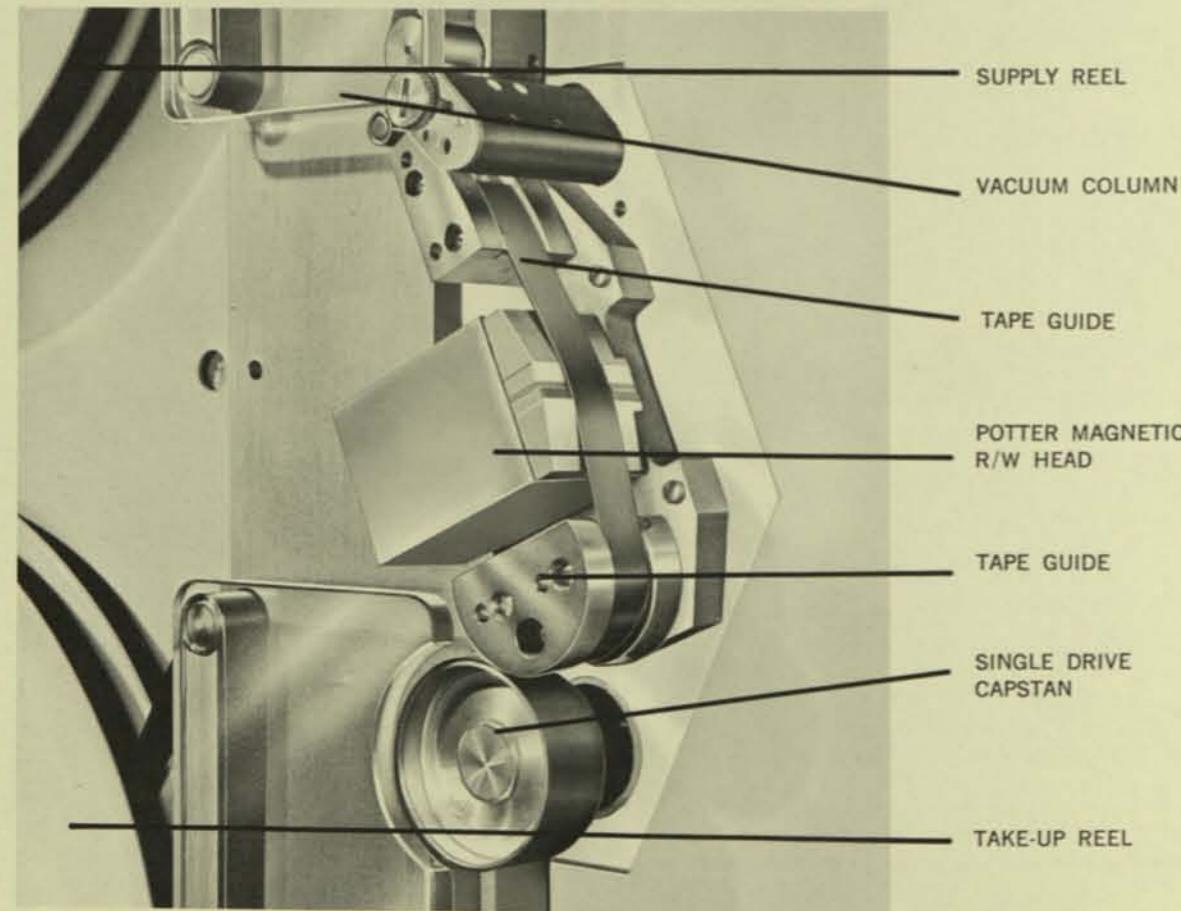


Figure 3. Potter EC-SR Drive Electronics and Control Assembly

DRIVE ELECTRONICS & CONTROL PANEL

All transport functions are controlled by a combined drive electronics and manual control assembly supplied with the transport. This compact package contains all electronics, together with necessary power supplies for automatic or manual operation. Electronics are solid-state and feature printed circuit plug-in modules. A hinged front door gives immediate access to plug-in modules.

For remote operation, the LOAD/MANUAL/AUTOMATIC switch is placed in the AUTOMATIC position; other controls, in the STOP position.

OPERATING CONTROLS

Manual Control

Function		Type of Switch
Power	On/Off	2-position
Speed	Fast/Slew/Step (operation in Manual only)	3-position, fixed
Direction	Reverse/Stop/Forward (operation in Manual only)	3-position, fixed
Mode	Load/Manual/Auto	3-position, fixed
Setup	Unload/Off/Load Point	3-position, momentary rocker
Command	One Step/Off/Advance	3-position, momentary rocker

An interlock protects equipment from operation error by prohibiting rapid switching from fast forward to fast reverse.

Complete reel loading and tape threading can be accomplished in only fifteen seconds.

ACCESSORIES

M7500 MAGNETIC READ/WRITE HEAD

A complete selection of Potter magnetic heads is available for IBM 7- or 9-channel and other formats. Heads are all-metal and precision machined to stringent specifications for maximum tape life and minimum interchannel time displacement.

REELS AND HUBS

IBM-type reels and hubs are standard equipment on MT-SR transports. Reel/hub combinations of other manufacturers can also be accommodated. Special Potter QUICK-LOCK® hubs are available for fast reel changing.

*QUICK-LOCK is a tradename of Potter Instrument Company, Inc.

EOT/BOT SENSING

Photoreflexive (IBM-type) end-of-tape and beginning-of-tape sensing is available for reliable tape control.

WRITE CONTROL

A Write Lockout (Write Enable) switch is available for use with File Protect rings on IBM or NAB reels.

READ/WRITE ELECTRONICS

Each Read/Write electronics assembly may contain:

- Up to 9 Read/Write amplifier channels
- Clock Generator
- Write Inhibit electrical switching
- Erase Head control (as required)
- Power Supply

TEMPERED GLASS DUST COVER

Tempered glass dust covers are supplied at no charge if the transport is ordered with a cabinet or at nominal cost as an accessory item. Frames are of rigid, extruded aluminum. Simplified latch facilitates opening and closing operation.

CABINET

The MT-SR can be installed in any standard 19-inch rack cabinet, including Potter's M3340 and CAB-250. The sturdy construction of these cabinets permits full swing-out of the transport. Standard 19-inch mounting rails give solid mounting support for drive and write amplifier electronics assembly, as well as provide abundant space for mounting of customer electronics packages.

SPECIFICATIONS

TAPE FORMAT	IBM 7- or 9-channel, 200 bits/inch			
TAPE FEED MODES	a) Incremental: Step Read; Step Write; b) Continuous at 21 ips, Forward/Reverse c) Fast Forward (manual only) d) Rewind (automatic or manual)			
INCREMENTAL FEED				
SPEED				
ASYNCHRONOUS	0 to 500 steps per second, reading or writing			
SYNCHRONOUS	3.5 ips (700 characters per second)			
DENSITY				
WRITING	200 bpi			
READING	Any density up to 200 bpi			
DIRECTION				
STEP/WRITE	Forward only			
STEP/READ	Forward or Reverse			
INTERNAL INCREMENTAL FEED CONTROL, RECORDING				
From tone-wheel derived position signal				
INTERNAL INCREMENTAL FEED CONTROL, READING				
From character gate signal (generated clock) developed in playback amplifier				
CONTINUOUS FEED				
21 ips, $\pm 2\%$, FWD or REV, Suitable for ¼" interblock gap using 0.3" spacing dual Read/Write IBM-compatible head				
START TIME — FWD				
3 msec to within 10%				
START TIME — REV				
30 msec to within 10%				
START DISTANCE — FWD				
Less than .050" in 3 msec				
START DISTANCE — REV				
Less than 0.200" in 10 msec				
STOP TIME				
2 msec maximum				
STOP DISTANCE				
Less than 0.030"				
SKEW @ 21 IPS — Static				
.16 μ sec, maximum				
SKEW @ 21 IPS — Dynamic				
$\pm 16 \mu$ sec, maximum				
REWIND TIME (2400 FEET)				
Less than 4 minutes				
SPEED CHANGE TIME				
TO SWITCH FROM STEP TO CONTINUOUS, OR VICE VERSA				
1 second				
TO SWITCH FROM FORWARD TO REVERSE, OR VICE VERSA, IN EITHER STEP OR CONTINUOUS MODE				
10 msec				
REWIND TO STEP OR CONTINUOUS				
5.0 seconds				
BIT SPACING (STEP WRITE)				
0.005" $\pm 10\%$ (200 bpi)				
BEGINNING AND END OF TAPE SENSING				
IBM-compatible reflective spot detector for both Beginning End and End-of-Tape				
TAPE WIDTH				
½-inch				
TAPE TYPE				
IBM heavy-duty tape or equal recommended				
TAPE REEL				
IBM 10½" or 8" plastic reels				
PROGRAM LIMITATIONS (See explanation of commands on last page)				
0-200 commands per second FORWARD, STOP and REVERSE are considered commands. Minimum time between commands: 5 milliseconds				
ENVIRONMENTAL CONDITIONS — OPERATING				
TEMPERATURE				
40°F to 95°F				
RELATIVE HUMIDITY				
20% to 80% with a maximum wet bulb of 78°F				
ELECTRONICS (OPERATING CONDITIONS)				
0°F to 125°F				
POWER				
115V AC $\pm 10\%$, 50-60 cps, single-phase				
TRANSPORT & DRIVE ELECTRONICS				
600 VA, standby; 800 VA, normal run; 950 VA, peak				
AMPLIFIER				
200 VA maximum				
DIMENSIONS AND WEIGHT				
	Height	Width	Depth (approx.)	Weight
MT-SR INCREMENTAL TRANSPORT	24½"	19"	11"	110 lbs
EC-SR TRANSPORT ELECTRONICS	7"	19"	19"	60 lbs
MA212 AMPLIFIER	5¼"	19"	18"	15 lbs.
P-11 POWER SUPPLY (for Amplifier)	3½"	19"	16½"	25 lbs.
TRANSPORT DUST COVER	—	—	—	15 lbs.

CONTROL INPUT LINES			
INPUT LEVELS	Logic "1": -5V to -15V DC Logic "0": Ground $\pm 0.5V$ DC	RUN	The "1" input level will cause tape motion in the selected direction (as determined by the Reverse input line) at 21 ips, provided that the Slew input is also at the "1" level.
REWIND	A "1" level places the unit in a high speed reverse mode. The tape is first withdrawn from the vacuum columns and after a 5-second delay, the tape is wound at full speed onto the supply reel. If BOT is detected, the tape will stop, load into the vacuum columns, run forward at 21 ips (provided the Reverse line is at the "0" state) and stop on the BOT marker. If the input signal is dropped to the "0" level before the BOT is detected, tape motion will stop and the tape will automatically be loaded into the vacuum columns. The Ready signal will be at the "0" level throughout the rewind mode (until the unit is ready to accept other commands).	REVERSE	The Reverse input level determines the direction of tape motion for Step Write, Step Read, and Slew inputs. The "1" level selects Reverse and the "0" level selects Forward.
STEP WRITE	When the input is switched from the "0" to the "1" level, the tape will move at 3.5 ips in the direction determined by the Reverse input line. Tape motion will stop only if the input level is switched to "0" before the trailing edge of the Write Clock Delay signal. Any pulse shorter than 0.5 milliseconds will limit tape motion to one step.	GENERATE INTERRECORD GAP	When the input is switched from "0" to "1", the tape will move 0.75 inch with the longitudinal check character written four character spaces after the last written character; maximum rise time is 2 μ s; minimum duration is 2 μ s, maximum duration is 50 ms. (A separate output will be generated by the Read/Write equipment to indicate when the IRG or IFG has been generated and the next command may be given.)
STEP READ	When the input is switched from the "0" to the "1" level, the tape will move at 3.5 ips in the direction determined by the Reverse input line. Tape motion will stop only if the input level is switched to "0" before the trailing edge of the Read Gate Delay signal. Any pulse shorter than 0.5 milliseconds will limit tape motion to one step.	GENERATE FILE GAP	When the input is switched from "0" to "1", the tape will move 3.5 inches with the longitudinal check character written four character spaces after the last written character and the file mark written after the 3.5 inch space. After the file mark another longitudinal check character and 0.75 inch inter-record gap will be generated. Maximum rise time is 1 μ s; minimum duration is 2 μ s, maximum duration is 50 ms. (A separate output is generated by the Read/Write equipment to indicate when the IRG or IFG has been generated and the next command may be given. See Gap Indicator.)
SLEW	The "1" level selects 21 ips tape speed. Tape can only move at 21 ips if the Run and Slew input lines are both at the "1" level. After a maximum of 1 second from the time that the input line is switched from "1" to "0", the unit will take from 1 to 3 steps so as to be ready to accept Step Write commands.	NOTE: The Step Write, Step Read and Slew lines are interlocked so that if more than one of these three commands are given at the same time, the unit will only respond to the command given first and ignore all others. The Rewind command overrides all others.	

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POTTER INSTRUMENT COMPANY, INC.

EAST BETHPAGE ROAD • PLAINVIEW, L.I., NEW YORK 11803 • (516) 694-9000

SC-1060 SINGLE-CAPSTAN
TAPE TRANSPORT SYSTEM

11/14/68 812K

FEATURES

- Any bidirectional tape speed up to 150 ips
- Easy tape loading — stops on load point
- Unrestricted programming capacity
- IBM 7- and 9-channel (IBM 360 and ASCII) capability
- Speed tolerance $\pm 2\%$
- Information density to 800 bpi, NRZI; 1600 bpi, phase modulated recording
- Revolutionary new single-capstan tape drive
- Data reliability — only surface in contact with oxide is read/write head
- No mechanical adjustments required
- Photoelectric tape position sensors
- All solid-state servo controls
- Long Life . . . minimum servicing

GENERAL DESCRIPTION

The Potter Model SC-1060 is a high-performance, single-capstan digital tape transport capable of bidirectional tape speeds to 150 ips. The unit is completely compatible with IBM 729 and 2401 series Tape Transports at all packing densities.

The SC-1060 is IBM 7- or 9-Channel compatible. Other $\frac{1}{2}$ - or 1-inch tape formats, including ASCII 9-channel IRIG or TIAC are available with packing densities to 800 bpi, NRZI, and 1600 bpi phase modulated recording.

The SC-1060 is designed for use with high performance computer systems. The transport features operator convenience, high transfer rate and high-speed rewind. The basic simplicity of the system assures maximum data reliability and system up-time.

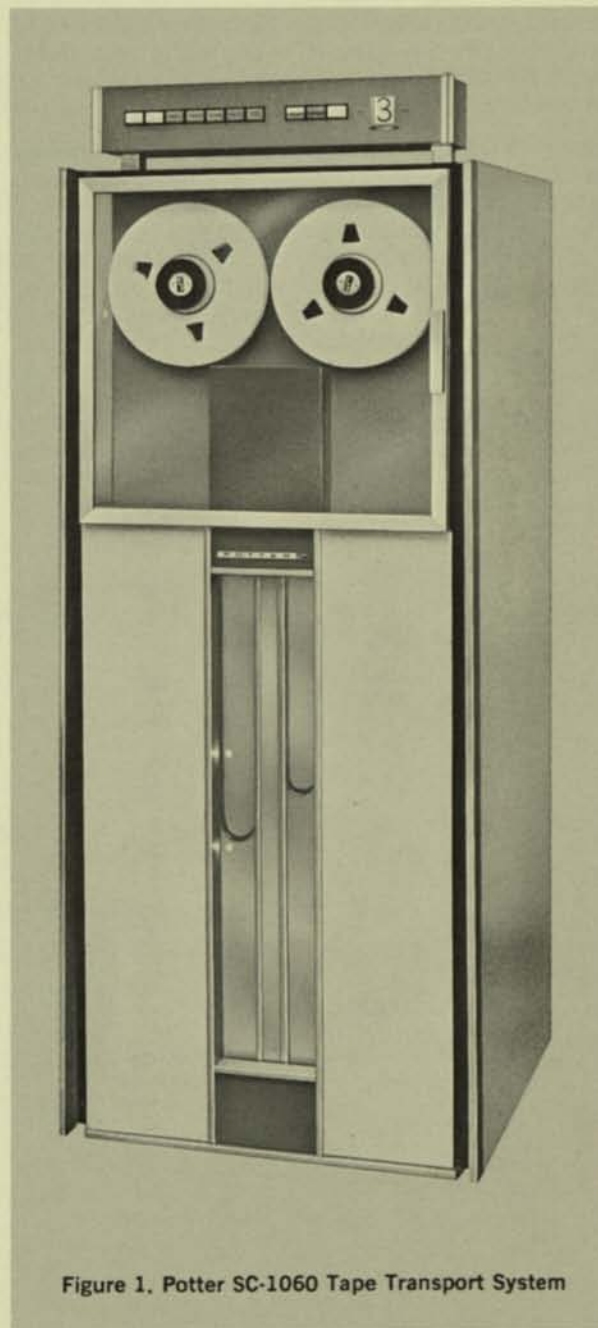


Figure 1. Potter SC-1060 Tape Transport System

TAPE LOADING

The tape drive design utilizes a single capstan to pass the tape across the read/write head. Tape is threaded from the supply reel, over the read/write head to the take-up reel on the left side of the transport. When the LOAD push button is pushed, tape is automatically dropped into the vacuum columns, driven to the LOAD point and automatically switched from LOCAL to REMOTE.

TAPE PATH

In normal forward/reverse operation, the oxide touches no surface except the read/write head, while the Mylar™ side of the tape is guided gently to eliminate wear particles, greatly increasing tape life and data reliability. Simple loading with Potter IBM-compatible QUICK-LOCK™ hubs enhances operator convenience.

Control of the tape path is maintained by a precision edge guidance system guaranteeing IBM interchange. Data may be transferred to or from the tape transport at standard bit densities of 200, 556, 800 and 1600 bpi or at any other transfer rate up to 192 kc at 120 ips. Tape tension is uniform throughout the entire reel, resulting in a smooth even pack. During rewind a vacuum column maintains constant tension, and the tape does not contact the read/write head, but "floats" on an air film over the head because of the unit's high rewind speed — over 360 ips. There are no vacuum or pressure switches, guide rollers, air guides or tension arms to restrict performance. Complicated mechanical adjustments are eliminated.

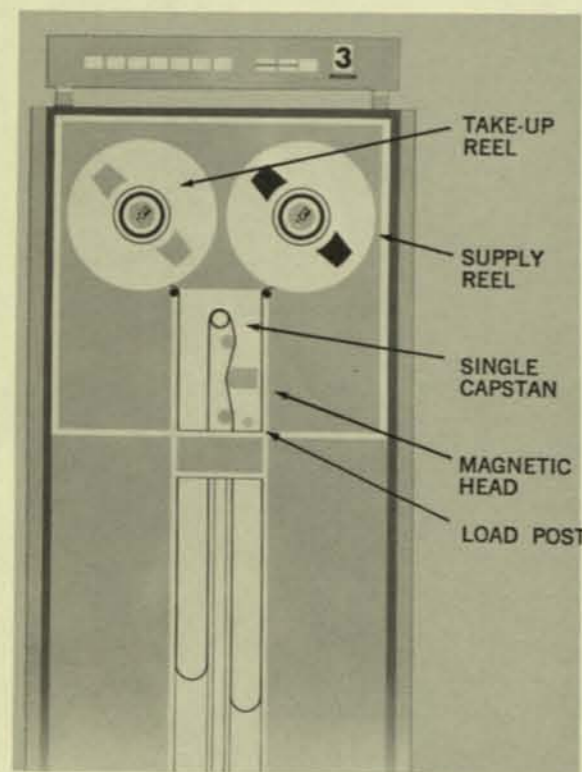


Figure 2. New Single-Capstan Tape Drive System and Direct Tape Path is Ultimate in Design Simplicity

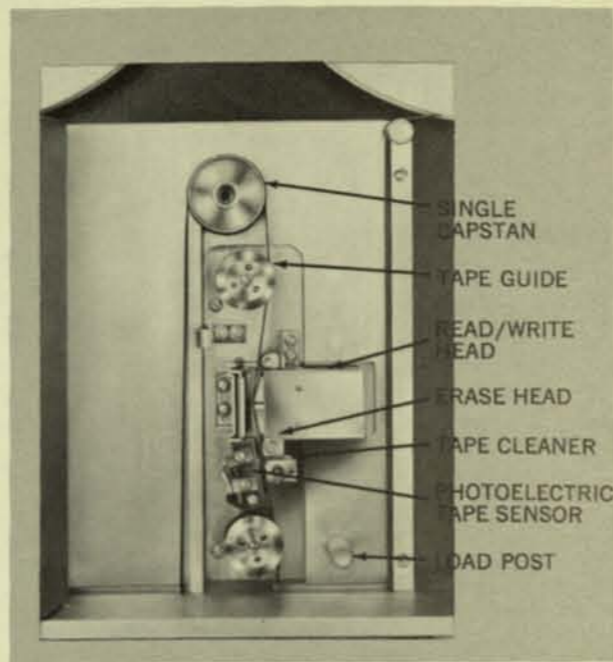


Figure 3. Precision Tape Guidance System

LOW INERTIA CAPSTAN DRIVE

A low inertia drive provides rapid linear acceleration and deceleration while maintaining control of the tape on the capstan at all times.

The tape is driven as shown in Figure 3 by passing the tape 180° around a metal capstan coated with a resilient material. Sufficient force is applied to the Mylar side of the tape by the vacuum capstan to preclude slippage of the tape with respect to the capstan.

The capstan is directly driven from a high-performance dc motor which utilizes a combination of integrated and discrete solid-state drive circuitry. Program restrictions of any kind are completely eliminated so that any sequence of commands, FWD/REV, FWD/STOP or REV/STOP may be given with no intermediate delays up to a maximum of 200 commands/second. No longer are "stop-delays" or "FWD/REV delays" required. Internal circuitry "remembers" command sequences and executes them properly, eliminating any requirements in tape control units.

REEL SERVOS

The tape position in the vacuum columns is controlled by two "closed-loop" servo systems, one column for the left reel and one column for the right reel. Position is detected by photoelectric cells in the tank which drive the servo amplifier to control the servo motor to pay out tape into, or take up tape from the vacuum column as required to follow capstan movement. The servo motor utilizes a dynamic braking system which eliminates forever, mechanical brakes and adjustments. No tachometers or other velocity sensors are required. The new system is fail-safe even if AC power is interrupted during high-speed rewind, providing maximum tape protection.

SPECIFICATIONS

TAPE DRIVE	Single Capstan				
TAPE SPEED	Standard Speeds.....75, 90, 112.5, 120, 150 ips				
	Max. Speed 1/2 inch.....150 ips				
	Max. Speed 1 inch.....90 ips				
TAPE SPEED VARIATION	Steady State.....±2%				
	Short Term (15ms).....±2%				
REWIND SPEED	.....290 ips, nominal				
	Rewind Time.....Less than 130 seconds for a full 2400' reel				
PACKING DENSITY	.....200/556/800 bpi, NRZI				
	1600 bpi, phase modulated recording				
PROGRAM RESTRICTIONS (1/2- or 1-inch tape)	.....None				
TYPICAL PERFORMANCE	75 ips	90 ips	112.5 ips	120 ips	150 ips
(1/2" 1.5 mil Mylar)					
Start Time (to within ±10% of speed, max.)	5ms	4ms	4ms	4ms	3.25ms
Start Distance	0.185 ±.020"	0.180 ±.020"	0.225 ±.025"	0.240 ±.030"	0.225 ±.025"
Stop Time	5ms	4ms	4ms	4ms	3.25ms
Stop Distance	0.160 ±.020"	0.160 ±.020"	0.200 ±.020"	0.215 ±.020"	0.210 ±.020"
Command Repetition Rate	Any sequence up to 200 commands/second				
SKEW	Static μsec, max.....225/ips				
	Dynamic μsec, peak.....180/ips				
Dynamic Skew: Tape written on SC-1060 and read on IBM 729-VI or written on IBM 729-VI and read on SC-1060 transport.	.....1/2" or 1"				
TAPE WIDTH	.....3M8938, or equal; 1.5 mil Mylar				
TAPE TYPE	.....diameter reels IBM-type 10 1/2-inch—1/2-inch				
TAPE REELS	.....NAB 10 1/2-inch—1-inch				
REEL HUBS	.....Potter QUICK-LOCK IBM-compatible hubs.				
TAPE LOADING	.....Complete tape loading and threading in less than 15 seconds				
REMOTE CONTROL INPUT/OUTPUT	INPUT LOGIC LEVELS:		OUTPUT LOGIC LEVELS:		
	1. 1=+5 to +15V 5ma	0=0V±1.0V 3ma	1. 1=+5V±1.0V 3ma	0=0V±1.0V 20ma	
	2. 1=0V±1.0V 3ma	0=+5 to +15V 5ma	2. 1=+5V±1.0V 20ma	0=+5V±1.0V 3ma	
	3. 1=-5 to -15V 5ma	0=0V±1.0V 1ma	3. 1=-5V±1.0V 3ma	0=0V±1.0V 20ma	
	4. 1=0V±1.0V 1ma	0=-5 to -15V 5ma	4. 1=0V±1.0V 20ma	0=-5V±1.0V 3ma	
STATUS REPLIES	.....EOT; BOT; Ready, Rewinding; Write Lockout form "c" contact				
ELECTRONICS	.....All control circuits fully integrated circuits or with transistorized modular plug-in construction throughout				
SERVO CONTROL	.....All solid-state with dynamic braking eliminating mechanical brakes				
ENVIRONMENTAL CONDITIONS	Ambient Temperature—Operating (within tape characteristic).....45°-110°F				
	—Non-operating.....0°F - 165°F				
HUMIDITY	.....20% to 80% (without condensation)				
POWER	115V AC ±10%, 60 cps, single-phase (50 cps/230V optional)				
	10 amperes—Standby				
	12 amperes—Running				
	15 amperes—Peak (less than 100 ms)				
DIMENSIONS	Height	Width	Depth		
Transport/Cabinet (without control panel)	63"	26 1/2"	27 1/4" (excl. Door handle)		
With Control Panel	68 1/2"	26 1/2"	27 1/4" (excl. Door handle)		
WEIGHT500 pounds, approx.				

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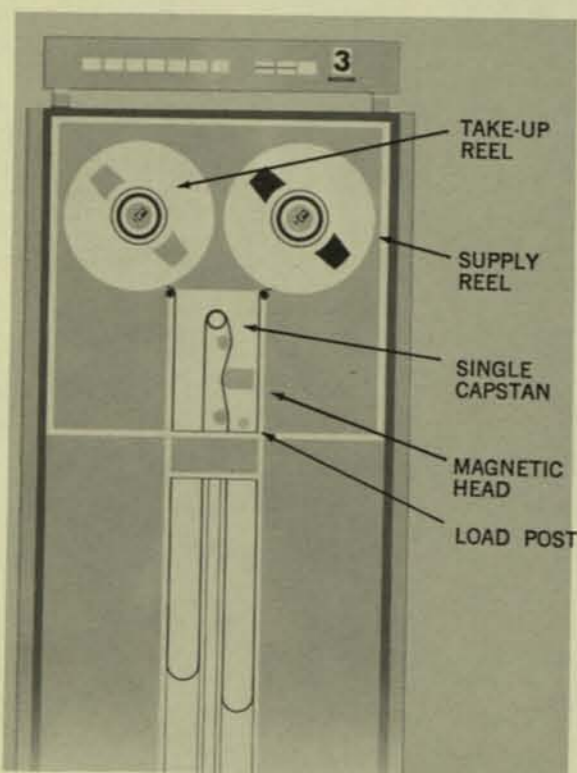


Figure 2. New Single-Capstan Tape Drive System and Direct Tape Path is Ultimate in Design Simplicity

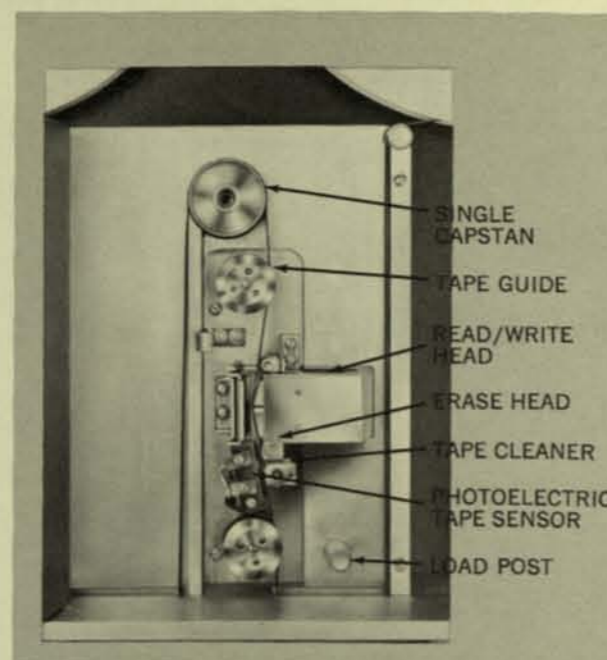


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Figure 4. Operator Control Panel

OPERATOR CONTROLS

An operator control panel is an optional feature for local operation and indication. Indicators and switches as shown in Figure 4 show the status of the system under local or remote conditions. The local controls include Power ON/Power OFF, Forward, Reverse, Rewind, Load and Unload.

SIMPLIFIED TAPE LOADING

Tape loading is easier and faster than ever before with Potter's new single-capstan transport. All that is necessary is to first mount the supply reel on the QUICK-LOCK hub assembly. Then thread tape from the supply reel, over the head assembly to the take-up reel. From this point loading is accomplished fully automatically at a touch of the LOAD button. Tape is pulled into the vacuum tanks and advances to load point. The transport will then automatically switch from LOCAL to REMOTE and be ready for the first computer command. Threading around rollers, multiple capstans, and guides is completely eliminated.

EQUIPMENT

The basic Potter SC-1060 transport consists of the following subassemblies:

- The tape transport assembly including all tape drive components
- Beginning-of-tape (BOT) sensor, photoreflexive IBM-type, plus amplifier



Figure 5. Simplified Tape Loading

- End-of-tape (EOT) sensor, photoreflexive IBM-type, plus amplifier
- Transport drive electronics
- Two IBM-type QUICK-LOCK hubs
- One empty IBM-type plastic reel with File Protect Ring.
- Safety Glass Dust Cover

OPTIONAL ACCESSORIES —

- Operator Control Panel without address select
- Operator Control Panel with address select switch (seven position)
- Master Reel Write Lockout, (File Protect), IBM-type switch
- Dual gap write-check read head assembly for 7-channel (IBM 729) operation: 0.048 inch write and 0.030 inch read tracks on 0.070 inch centers. Gap spacing 0.300 inch.
- Dual gap write-check read head assembly for 9-channel (IBM 2401 or ASCII) operation: 0.044 inch write and 0.040 inch read tracks on 0.055 inch centers. Gap spacing: 0.150 inch.
- Other compatibilities are available
- Erase Head
- 50 cycle and/or 230 VAC Input Power
- Special Paint (paint supplied by customer)
- Cabinet

All Potter equipment is supplied with mating connectors.

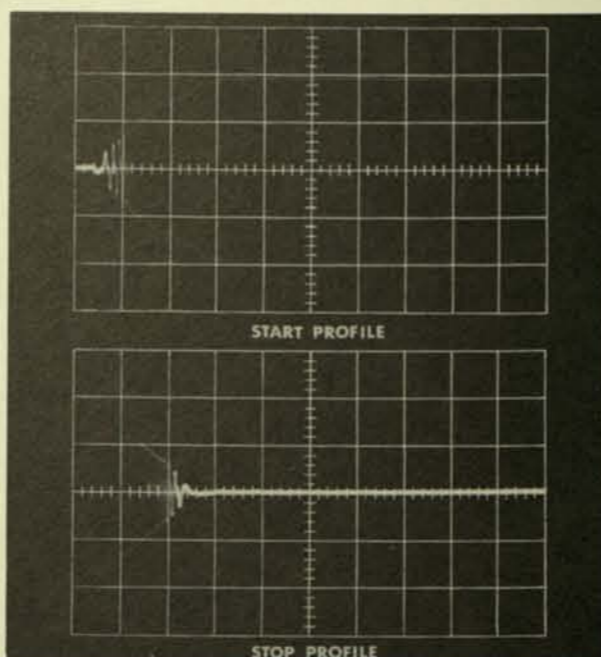


Figure 6. Start/Stop Profiles at 120 ips.

ACCESSORIES

Dual-Gap Read/Write Head

The dual-gap read/write head assembly uses an all-metal flush surface housing for longer life and greater reliability. The assembly is non-adjustable and can be replaced by normally skilled maintenance personnel. The read/write head assembly is designed for operation at transfer rates to 192 kc (120 ips and 1600 bpi).

A complete selection of magnetic heads is available, including heads for IBM 7- or 9-channel format. Heads are all-metal, precision fabricated for maximum tape life and minimum interchannel time displacement.

Reel and Hub Assemblies (Standard)

IBM-compatible hubs and one IBM-compatible tape reel are provided. Potter's IBM-compatible QUICK-LOCK hub assembly, a significant development in tape transport technology is provided as standard equipment with the SC-1060.

EOT/BOT Sensing (Standard)

A dual-channel photoelectric sensor is provided immediately adjacent to the read/write head assembly to detect the presence of standard IBM photoreflexive strips attached to the Mylar side of the tape for indicating the load point and end-of-tape positions. A two-channel amplifier with logic level outputs is provided.

WRITE LOCKOUT

A non-contact write lockout, or file protect, switch is mounted at the supply reel hub. A single form "c" contact is brought to the transport interface connector. This switch may be wired to Potter MA-series amplifiers to provide automatic write inhibit.

LOGIC CONVERSION

A standard logic conversion board is available to provide any input/output logic of "0"s and "1"s in the gnd, -5V or gnd, +5V range.

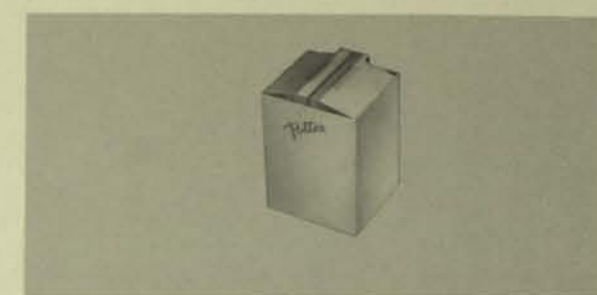
READ/WRITE ELECTRONICS

Standard read/write amplifiers are available to accommodate packing densities up to 1600 bpi and data transfer rates up to 192 kc.

Each read/write electronics assembly contains:

- up to 9 read/write amplifier channels
- clock generator
- write inhibit electrical switching
- erase head control
- head compensation for Read/Write (as required)
- power supply

*QUICK-LOCK is a trademark of Potter Instrument Company, Inc.
™Mylar is a trademark of E. I. duPont de Nemours Company, Inc.



CABINET

The newly-styled modular cabinet with tubular steel frame is equipped with rear service access doors, less side panels. The cabinet includes AC power control panel, with Hubbel twist lock 3-wire receptacle with mate; cabinet fan with filter. Side panels (specify right or left when facing transport) are also provided. The cabinet will accommodate all transport components, drive electronics, power supply and accessories that comprise the system, as well as read/write electronics. The drive and read/write electronics are accessible for front access servicing.

STANDARD COLORS:

Cabinet — ARMORHIDE™ Light Grey Textured #U-621

Transport Panel and Operator Control Panel — ARMORHIDE™ Medium Grey Textured #U-242 Decorative Trim — ARMORHIDE™ Ocean Blue #U-11695.

RELIABILITY AND MAINTENANCE

Reliability of operation is a prime requisite of computer peripheral equipment. The SC-1060 has been planned with this consideration receiving major attention. The mechanical design incorporates a minimum of moving parts with all electronic components derated to conservative levels. There are no mechanical adjustments, and only a minimum number of electrical adjustments are necessary in the operation of the transports.

POTTER WORLDWIDE FIELD SERVICE AND LOGISTICS PROGRAM

Repair centers in strategic locations within the continental United States and abroad have been established to support the entire Potter product line. Staffed by highly-trained field representatives, these repair centers are equipped to effect on-site installation of equipments and to perform quality repair, maintenance and overhaul. Supplementing this capability, if a customer prefers to provide his own equipment support, Potter has established standard instruction courses to train customer personnel, either at Potter or in the field. A Spare Parts Department, backed up by an extremely large inventory, and streamlined order processing, is available for customer convenience and economy. This inventory permits the customer to

realize virtual elimination of downtime as well as savings on spare parts dollars by offering expeditious delivery for replaceable parts. Delivery is available in 24 hours to meet customer emergency requirements — within one week for standard parts under normal conditions. Potter also offers provisioning and logistics capabilities to meet all existing military specifications. The Potter field service and logistics program is one of the finest in the EDP equipment industry. With reliable, quality-engineered equipment, supported by comprehensive field service, Potter guarantees satisfaction.

POTTER TAPE TRANSPORTS AND TRANSPORT SYSTEMS

Potter offers the world's broadest line of digital tape transports and tape transport systems.

Tension arm, vacuum-column, single-capstan and incremental transports are available, as well as a complete line of components and accessories, including read/write amplifiers, magnetic heads, drive electronics, manual controls, QUICK-LOCK hubs and cabinets.

In the single-capstan series, units are available with tape speeds to 150 ips at all packing densities with unrestricted programming.

For further information, write, wire or call General Sales Manager, Potter Instrument Company, Inc., East Bethpage Road, Plainview, New York. Telephone (516) 694-9000 TWX 510-224-6485.

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POTTER INSTRUMENT COMPANY, INC.

EAST BETHPAGE ROAD • PLAINVIEW, L.I., NEW YORK 11803 • (516) 694-9000

MT-75 MAGNETIC TAPE TRANSPORT AND MAGNETIC TAPE SYSTEMS



INTRODUCTION

The MT-75 Magnetic Tape Transport is the highest performance model in Potter's MT-Series of vacuum-column, digital tape handlers. The unit features IBM 7- or 9-channel operation at packing densities to 800 bpi.

The MT-75 is designed for use with small- and medium-scale computers, in mass storage, and for sequential access application where high-priced transports cannot be justified.

The MT-75 operates at a speed of 75 ips, with a three minute rewind; and data transfer rates to 120 ks (bcd). Start/Stop profiles are smooth and program restriction free over a command frequency rate up to 200 per second. In addition to IBM packing densities of 200, 556 and 800 bpi, other formats utilize 1/2-inch tape.

MT-75 Magnetic Tape Systems, which consist of an MT-75 Tape Transport, manual control unit, and suitable read/write electronics, are completely compatible with IBM systems such as the 7330 and 360/2400 series.

FEATURES

- standard unrestricted tape speeds to 75 ips
- highest performance and reliability for lowest price
- up to 60 kc data transfer
- compatible with IBM 7330 and 360/2400 series at all packing densities; 7- and 9-channel convertibility available
- low interchannel time displacement
- fast, smooth Start/Stop performance
- new over-and-under vacuum storage system
- tape loading in 15 seconds
- automatic advance to BOT

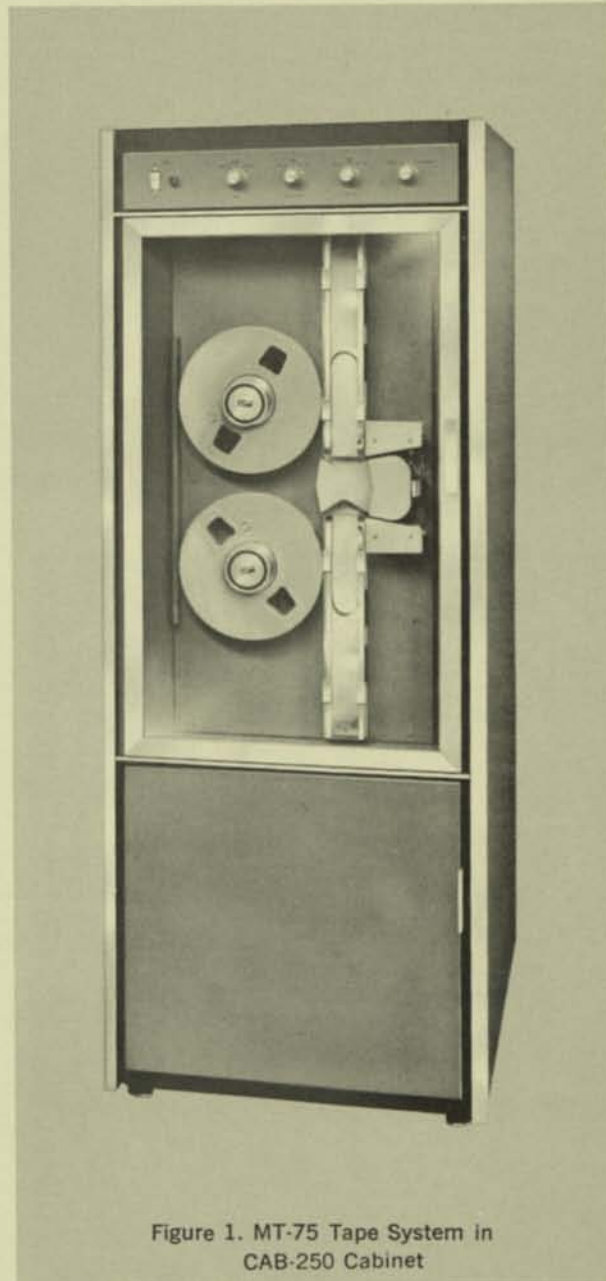


Figure 1. MT-75 Tape System in
CAB-250 Cabinet

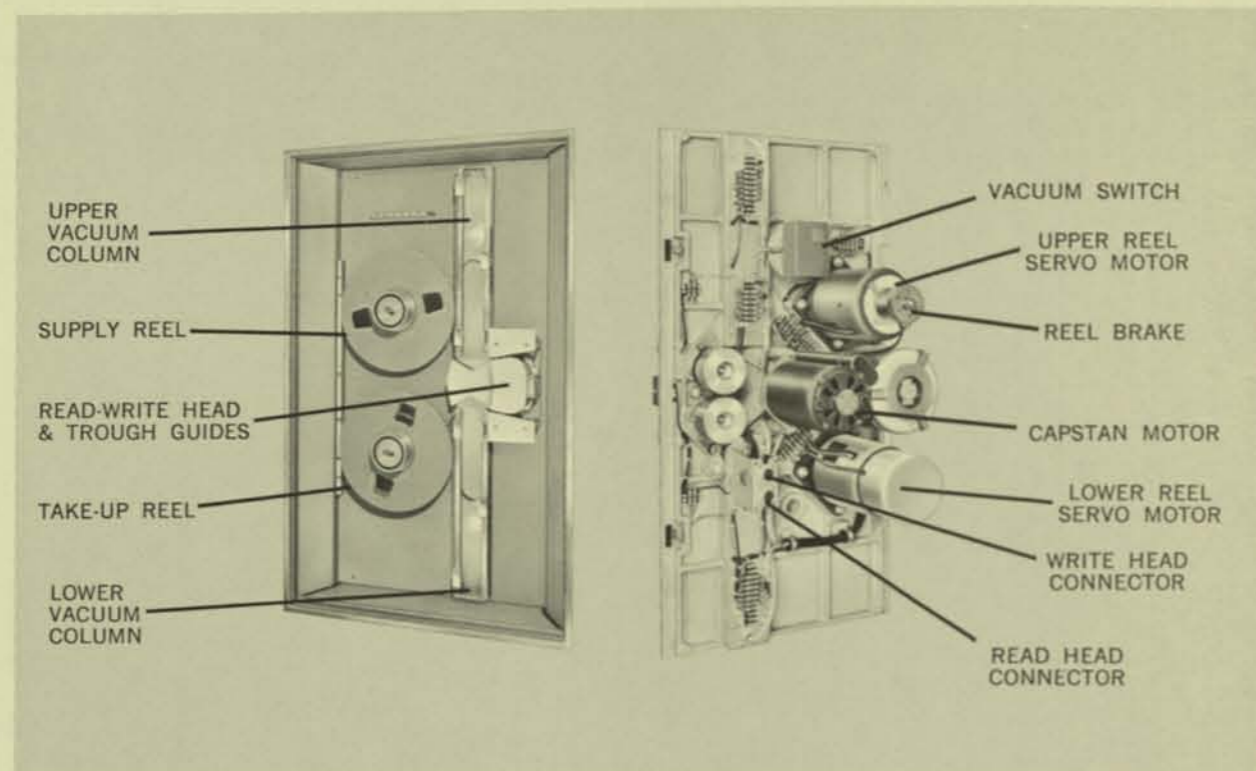


Figure 2. MT-75 Tape Drive

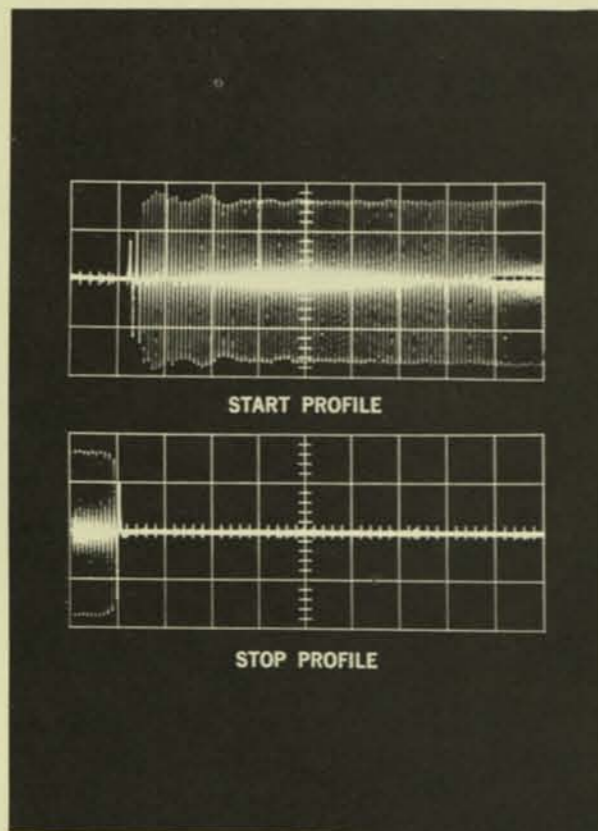


Figure 3. MT-75 Typical Velocity Profiles (1 div. = 1 ms)

DESIGN FEATURES

The MT-75 Tape Transport incorporates several outstanding design features which simplify overall operation, improve reliability and reduce service costs. Tension arms have been replaced by a dual under-and-over vacuum-column tape storage system, used in combination with Potter's precision tape drive system. Ample storage in the vacuum reservoirs provide restriction-free reading and writing.

Secondary buffers integrally designed into the vacuum columns provide extremely fast velocity stabilization. Photoelectric loop sensing reliably controls the amount of tape in both vacuum columns. The vacuum column covers are hinged for easy access to the column area for routine cleaning.

The trough guides, precision-shaped for optimum tape guidance, hold dynamic skew to ± 2 microseconds, maximum, at 75 ips. Start time is 3 milliseconds to within 10% of rated speed; stop time is less than 2 ms with smooth velocity profiles.

Integrated mechanical design throughout results in accessibility for easy maintenance. The main casting is designed to incorporate bearing mounts, vacuum columns and other components. This minimizes the number of component parts and provides simpler operation, maintenance and longer life.

Grouped control functions result in trouble-free switching.

The unit is self-checking. Safety interlock is provided for loss of vacuum, the power supply is cut off, the computer is signaled, and the tape transport stops.

MT-75C SPECIFICATIONS

TAPE SPEEDS	60 and 75 ips standard; other speeds available to 75 ips
TAPE SPEED VARIATIONS	$\pm 2\%$
TAPE REWIND	3 minutes, maximum, for full 2400 foot reel
TYPICAL PERFORMANCE	at 75 ips with 1/2-inch, 1.5 mil Mylar tape
START TIME	3 ms from receipt of command to within $\pm 10\%$ of tape speed
START DISTANCE	over cycling range of 0 to 200 commands per second tape travels 0.100" ± 0.035 " 3 ms after receipt of command
STOP TIME	2 ms to cease all tape motion
STOP DISTANCE	0.090" ± 0.025 "
COMMAND REPETITION RATE	Start/Stop; 0-200 commands per second, 5 milliseconds between commands for performance within specification.
WOW & FLUTTER	less than 2% rms at 75 ips
INTERCHANNEL TIME DISPLACEMENT (at 75 ips, any two channels, 1/2" tape)	Static: 4 microseconds maximum Dynamic: ± 2 microseconds Total: 6 microseconds maximum
TAPE WIDTHS	1/2 inch
TAPE TYPE	3M777 or equal recommended
TAPE REELS & HUBS	IBM-type 10 1/2" reels and hubs standard for 1/2-inch tape.
TAPE LOADING	complete tape loading and threading is less than 15 seconds
REMOTE CONTROL INPUTS	Run/Stop; Forward/Reverse; Normal Speed/Rewind Speed, Speed control: High/Low. All 0v/-5v at 6 ma, d.c. levels.
CONDITION INDICATION	EOT/BOT Sensing Ready Automatic-Manual Write Lock-out (Form C contact) Power Supply
ELECTRONICS	All control circuits completely transistorized; modular plug-in construction used throughout
HEAD SPECIFICATIONS	For IBM compatibility, specify Model 17513-7 head. Heads for other formats available

PHYSICAL DATA:

	Dimensions (inch)			(lbs.) Weight
	High	Wide	Deep	
MT-75 Tape Transport	36 3/4	19	12	120
ECA75 Drive Electronics & Control	7	19	19	55
CAB-250 Rack Cabinet	70	27	31 1/2	290
M3340 Cabinet	76	27	35	415

POWER 115v $\pm 10\%$, 60 cycles, 600 watts, 900 watts peak; 230v, 50 cycles optional

AMBIENT TEMPERATURE (Operating) 32°F. to 125°F. (within tape limitations)

*QUICK-LOCK IS A TRADEMARK OF POTTER INSTRUMENT CO. INC.

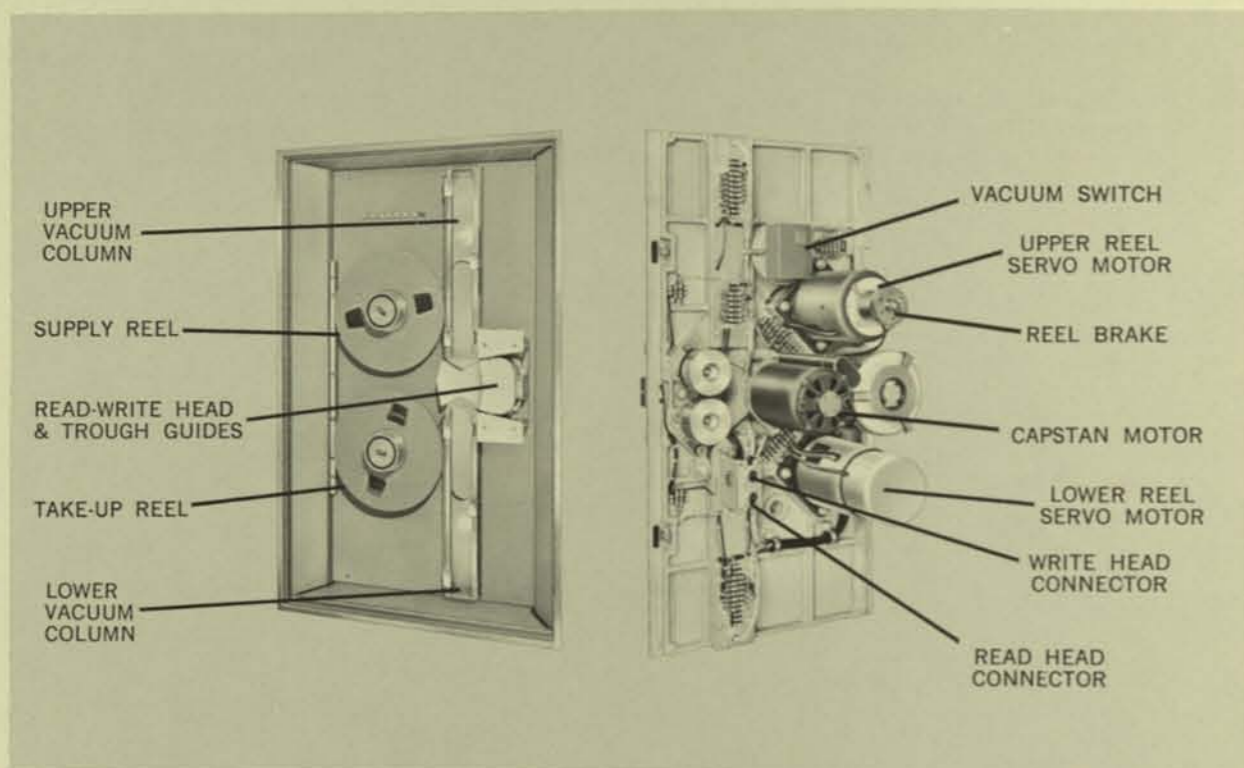


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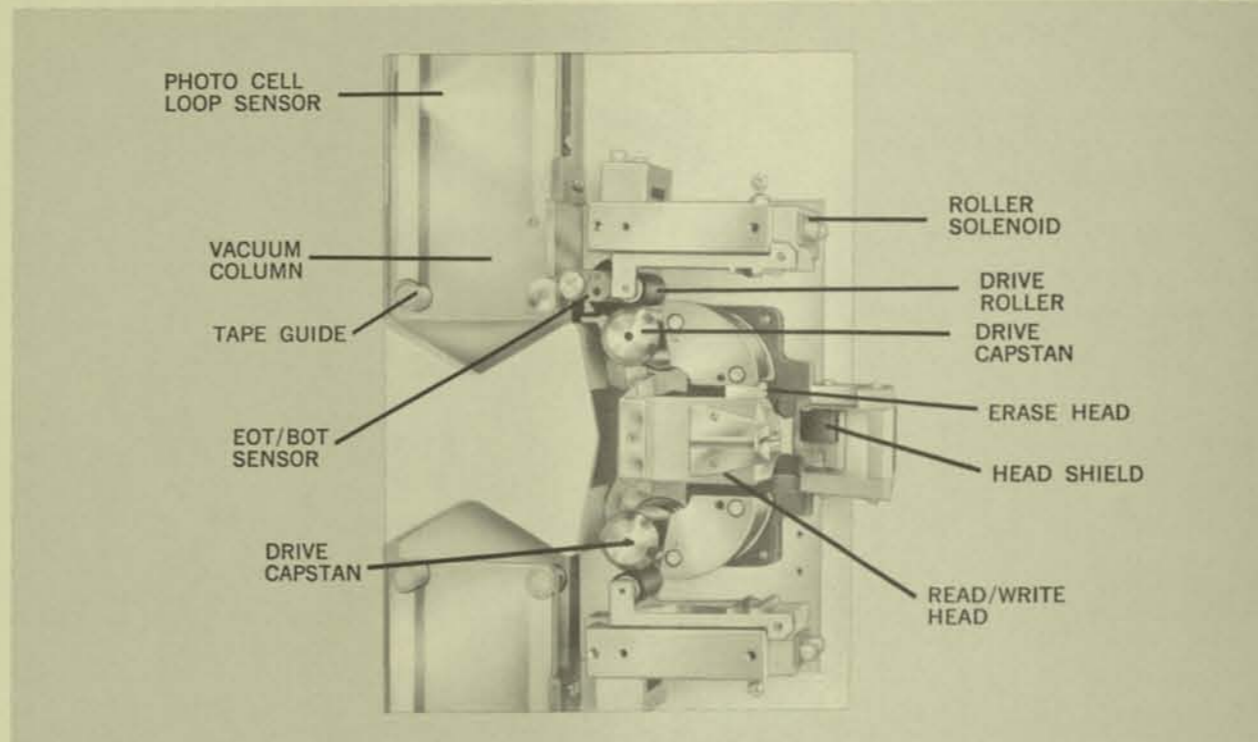


Figure 4. MT-75 Tape Drive Assembly

DRIVE ELECTRONICS & CONTROL PANEL (EC-75)

All MT-75 transport functions are controlled by a combined drive electronics and manual control assembly (EC-75) supplied with the transport. This compact package contains all electronics, together with necessary power supplies for automatic or manual operation. Electronics are solid-state and feature printed circuit plug-in cards. A hinged front door gives immediate access to plug-in cards.

For remote operation, the LOAD-MANUAL-AUTOMATIC switch is placed in the AUTOMATIC position; other controls in the STOP position.

OPERATING CONTROLS

- Three Rotary Position Switches
 REVERSE/STOP/FAST FORWARD/
 FAST REVERSE/STOP/FAST FORWARD
 LOAD/MANUAL/AUTOMATIC
- One Push Switch ON/OFF
- One Momentary Switch UNLOAD/LOAD POINT

New type interlock switches protect equipment from operator error by prohibiting rapid switching from FAST FORWARD to FAST REVERSE.

The Potter vacuum column tape handler incorporates the simplest technique for loading and threading tape. Complete reel loading and tape threading can be accomplished in only fifteen seconds.

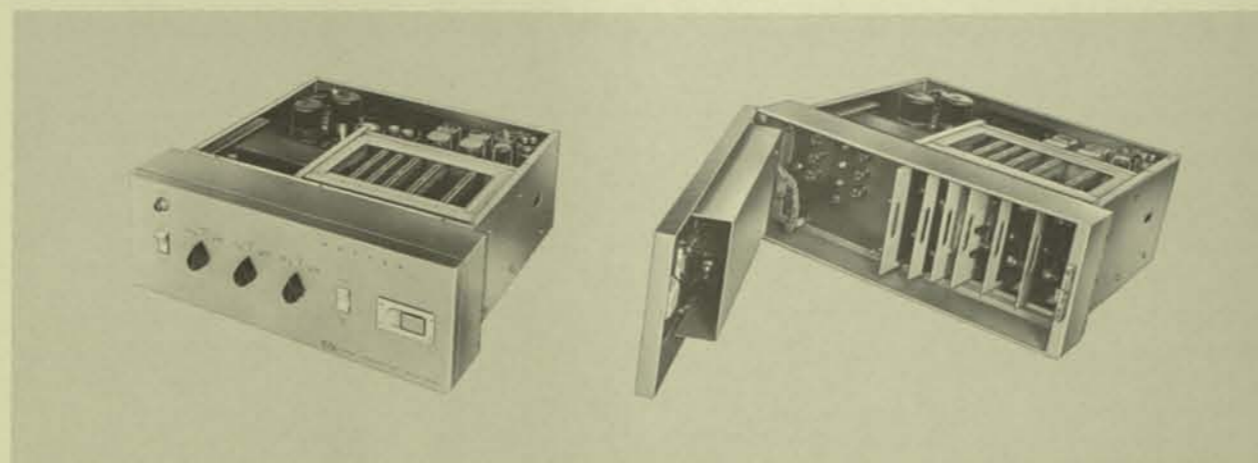


Figure 5. EC-75 Drive Electronics & Control

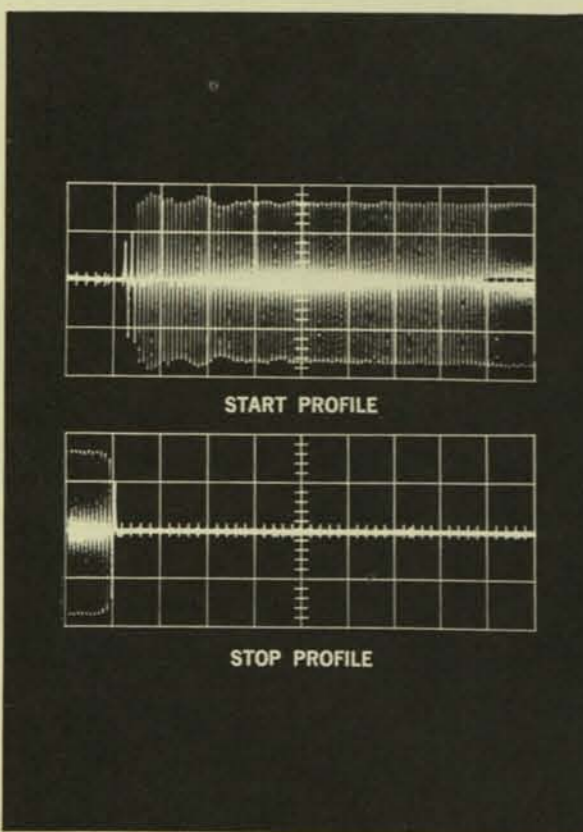


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The unit is self-checking. Safety interlock is provided for loss of vacuum, the power supply is cut off, the computer is signaled, and the tape transport stops.

ACCESSORIES

MT-75 TRANSPORT ACCESSORIES

READ/WRITE HEADS

A complete selection of magnetic heads is available, including heads for IBM 7- or 9-channel format. Heads are all-metal, precision fabricated for maximum tape life and minimum interchannel time displacement.

REELS & HUBS

IBM-type reels and hubs are standard equipment on MT-75 transports for 1/4" tape. Reel/hub combinations of other manufacturers can also be accommodated.

EOT/BOT SENSING

Photoreflective (IBM-type) end-of-tape and beginning-of-tape sensing is available for reliable MT-75 tape control.

WRITE CONTROL

A Write Lockout (Write Enable) switch is available for use with file protect rings on IBM or NAB reels.

MT-75 SYSTEM ACCESSORIES

READ/WRITE ELECTRONICS

Standard amplifiers are available to accommodate packing densities up to 800 lpi and data transfer rates up to 60 kc.

Each read/write electronics assembly contains:

- up to nine Read/Write amplifier channels
- Clock Generator
- Write Inhibit electrical switching
- Erase head control
- head compensation for Read/Write (as required)
- power supply

For further information see the following Product Data Sheets:

- No. 1-400 Read/Write Amplifier for 9-channels
- No. 1-402 MA315 Read/Write Amplifier
- No. 1-403 MSA375 Read/Write Switching Amplifier
- No. 1-404 MA212 Read/Write Amplifier

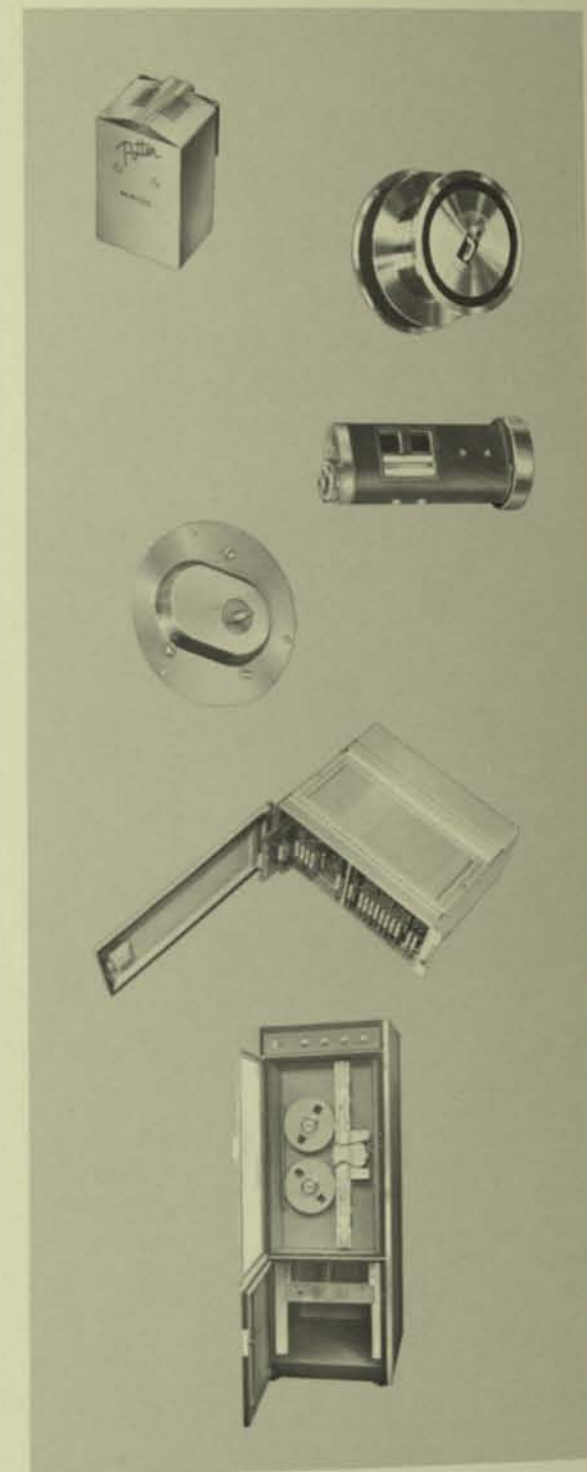
SWITCHING ELECTRONICS

Switching amplifiers are available which reduce the cost of digital magnetic tape systems by permitting time-sharing of a single Read/Write amplifier package among groups of up to four tape units.

CABINET

Potter Standard cabinet, Model CAB-250, as shown in Figure 1 is recommended for housing the MT-75 transport. Other cabinet styles are available for special requirements. All cabinets are rigidly constructed and will accommodate the transport, manual control,

*QUICK-LOCK is a trademark of Potter Instrument Company, Inc.



drive electronics, power supply, read/write amplifier assemblies, and all accessories that comprise the system. The Cabinet provides accessibility, both front and rear, and allows space for customer electronics. Casters permit easy maneuverability.

Cabinets are supplied with standard Potter colors or can be finished to customer specification. Main Structure: charcoal gray, semi-gloss, Federal Standard 595, Number 26081, Doors, Front and Rear: light gray, semi-gloss, Federal Standard 595, Number 26622.

MT-75 INTERFACE CONNECTIONS

Letters refer to contact pins, connector J/P-102, EC-75 Drive Electronics Chassis:

- A. -5v run/0v stop, at 5 ma
- B. -5v reverse/0v forward, at 5 ma
- C. Stop at EOT input (place jumper to pin D)
- D. EOT Output: Not on Foil, -15v. Maximum load to ground, 5 ma. On Foil, 0v.
- E. Ready Signal: -10v at 5 ma
- F. 10v nominal servo supply sample at 2 ma
- G. Rewind Command: -5v at 10 ma
- J. Stop at BOT input (place jumper to pin K)
- K. BOT Output: Not on Foil, -15v. Maximum load to ground, 5 ma. On Foil, 0v.
- L. Chassis GND
- M. Circuit GND
- Q. Automatic Mode Reply: -7.5v at 2 ma
- T. Capstan Speed Change Command: -5v at 5 ma
- U. +15v sample (for interrogation only) at 5 ma
- V. -15v sample (for interrogation only) at 5 ma
- W. EOT Lamp Out Signal: Out, 0v, 24 ohms to ground; On -5v to -10v @ 5 ma
- X. Write Lock-out Switch (normally closed contact)
- Y. Write Lock-out Switch (common contact)
- Z. Write Lock-out Switch (normally open contact)

MT-24 AND MT-36 TAPE TRANSPORTS AND TAPE SYSTEMS

The MT-75 is one member of a family of vacuum-buffered tape transports providing a range of speed capabilities as follows:

MT-24 Tape Transport	1 to 36 ips
MT-36 Tape Transport	1 to 50 ips
MT-75 Tape Transport	1 to 75 ips

All these units employ the same basic design configuration, and most parts are interchangeable between models.

POTTER WORLDWIDE FIELD SERVICE AND LOGISTICS PROGRAM

Repair centers in strategic locations within the continental United States and abroad have been established to support the entire Potter product line.

Staffed by highly-trained field representatives, these repair centers are equipped to effect on-site installation of equipments and to perform quality repair, maintenance and overhaul.

Supplementing this capability, if a customer prefers to provide his own equipment support, Potter has established standard instruction courses to train customer personnel, either at Potter or in the field.

A Spare Parts Department, backed up by an extremely large inventory, and streamlined order processing, is available for customer convenience and economy. This inventory permits the customer to realize virtual elimination of downtime as well as savings on spare parts dollars by offering expeditious delivery for replaceable parts. Delivery is available in 24 hours to meet customer emergency requirements - within one week for standard parts under normal conditions. Potter also offers provisioning and logistics capabilities to meet all existing military specifications.

The Potter field service and logistics program is one of the finest in the EDP equipment industry. With reliable, quality-engineered equipment, supported by comprehensive field service, Potter guarantees satisfaction.

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POTTER

ME-4210 INCREMENTAL
MAGNETIC TAPE RECORDER



Figure 1 Potter ME-4210

INTRODUCTION

The Potter ME-4210 is the first truly low-cost, industry-compatible incremental magnetic tape unit. The ME-4210 was designed to provide the user with the advantages of magnetic tape at a paper tape price. It is ideally suited to record from keyboard entry devices (e.g., cash registers, typewriters, data systems, etc.), communications systems, and data acquisition systems.

The ME-4210 is a 7-channel, 200 bpi, industry-compatible incremental recorder. Data can be recorded at rates up to 60 characters per second. It is a compact table-top unit, housed in an attractive enclosure suitable for any data processing facility.

The ME-4210 is supplied complete with transport drive and control electronics, data record electronics, and all necessary power supplies. The unit features all silicon solid-state electronics.

FEATURES

- Low cost
- Industry-compatible recording
- Simplified loading
- Inter-record gap generation
- File gap generation
- Compact, attractive enclosure

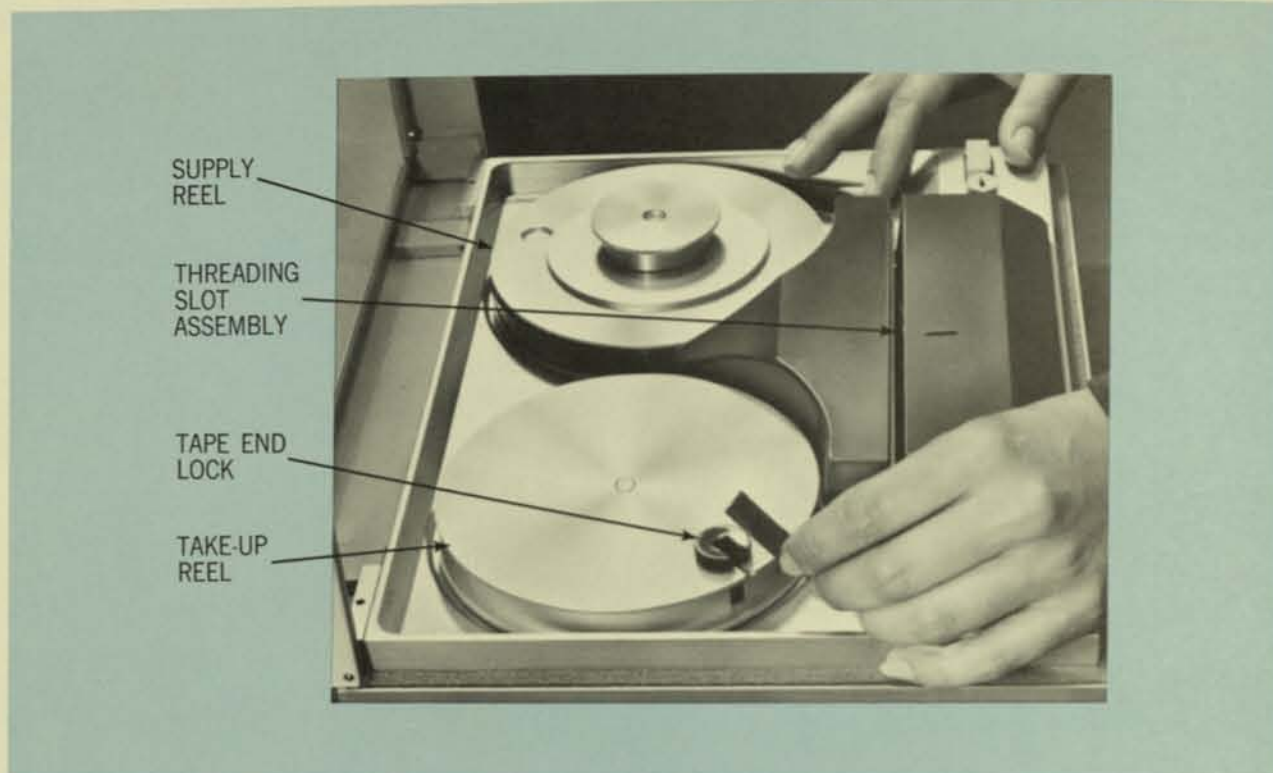


Figure 2. Loading

PACKAGING DETAILS

During operation, the magnetic tape and ME-4210 components are protected by a tightly sealing, lockable Plexiglass cover. Beneath the cover are a take-up reel, on the left side, and a supply reel hub on the right side, each of which is driven by a separate motor. The supply reel is mounted on the hub with an expansion lock. The take-up reel is permanently mounted on the recorder.

When the Plexiglass cover is opened, the threading slot assembly opens simultaneously, to facilitate tape loading. See figure 2.

INCREMENTAL FEED MECHANISM

The incremental feed mechanism comprises two brakes and a plunger, each controlled by solenoids. See figure 3. There are two tension take-up rollers which guide the magnetic tape to and from the reels. An EOT/BOT sensor is provided to detect the markers at beginning and end of tape.

Incremental tape feed, forward and rewind operations are powered by two motors, one for the take-up reel and one for the supply reel hub.

When the ME-4210 is at rest, i.e., between two successive recordings, the motors apply tension to the

magnetic tape via two tension take-up arms located between the tape reels and the threading slot. The righthand brake secures the tape. The plunger solenoid is de-energized and the plunger remains at its rear position. The magnetic tape is given an initial downward deflection by the plunger when the threading slot assembly is closed.

Magnetic tape is fed through a one character increment as follows. The left side brake is applied, and the right side brake is released. The plunger solenoid is energized and the plunger advances, pulling with it a small loop of tape which, in this initial stage, is obtained from the backward movement of the right tension take-up arm. When the plunger is fully advanced, the right brake is re-actuated and the left brake released. Current to the plunger solenoid is then interrupted. The loop of tape which was formed by the plunger action is taken up by the left tension take-up arm and then by the take-up reel, thus completing the incremental feed cycle.

DRIVE AND RECORD ELECTRONICS

The ME-4210 includes complete drive electronics and a 7-channel write amplifier. This electronics assembly packaged on two printed circuit modules, features integrated circuits and silicon devices throughout. The unit contains all required power supplies. The control electronics provide for automatic generation of inter-record and file gaps, upon command.

SPECIFICATIONS

TAPE REEL CAPACITY	140 ft.
PACKING DENSITY	200 bpi
MAXIMUM STEPPING RATE	60 characters per second
TAPE	3M777 or equivalent recommended
POWER REQUIREMENTS	115 or 230 vac, $\pm 10\%$; 50/60 hz, single-phase; 1.5 amperes.

OPERATING TEMPERATURE & HUMIDITY

TEMPERATURE	+40°F to +95°F.
RELATIVE HUMIDITY	20% to 80%, with a maximum wet bulb of 78°F.
ELECTRONICS (OPERATING CONDITIONS)	0°F to 125°F.
DIMENSIONS (WITH DRIVE ELECTRONICS)	13.5" wide, 9" high, 10.5" deep.
WEIGHT	Approx. 35 lbs.

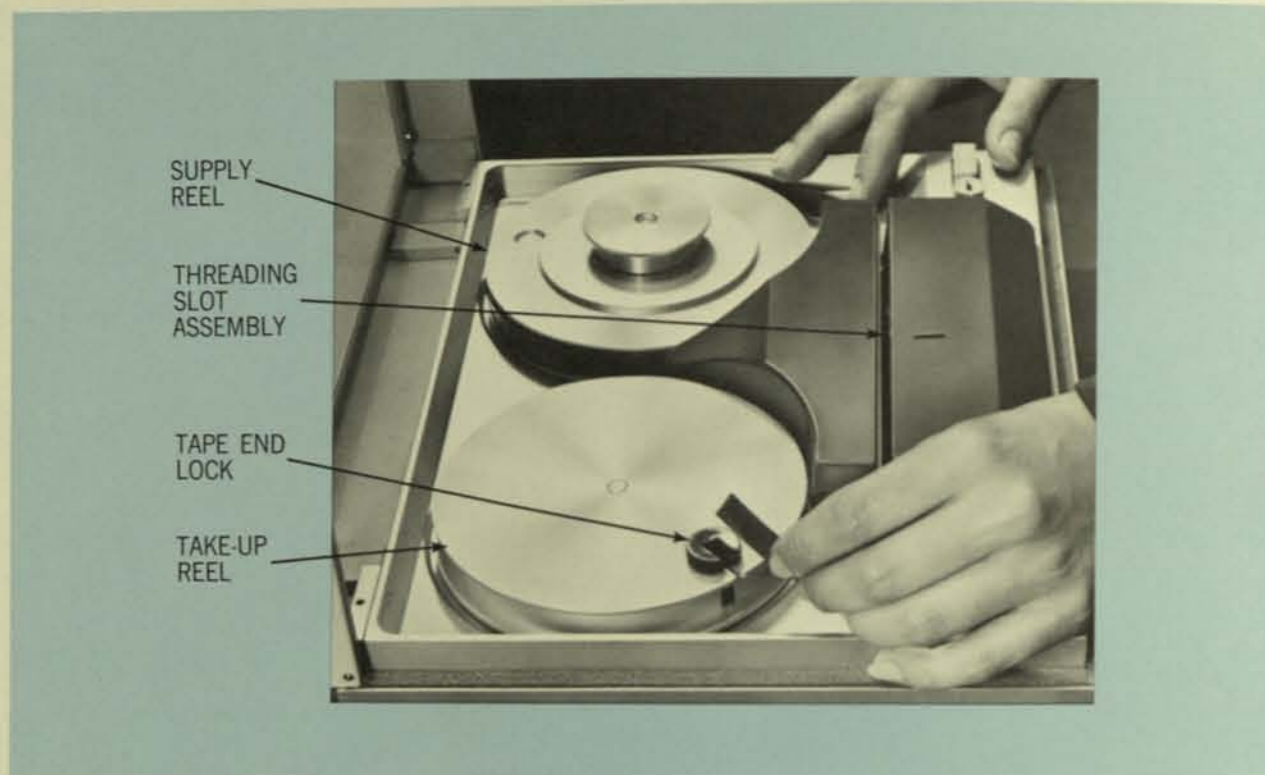


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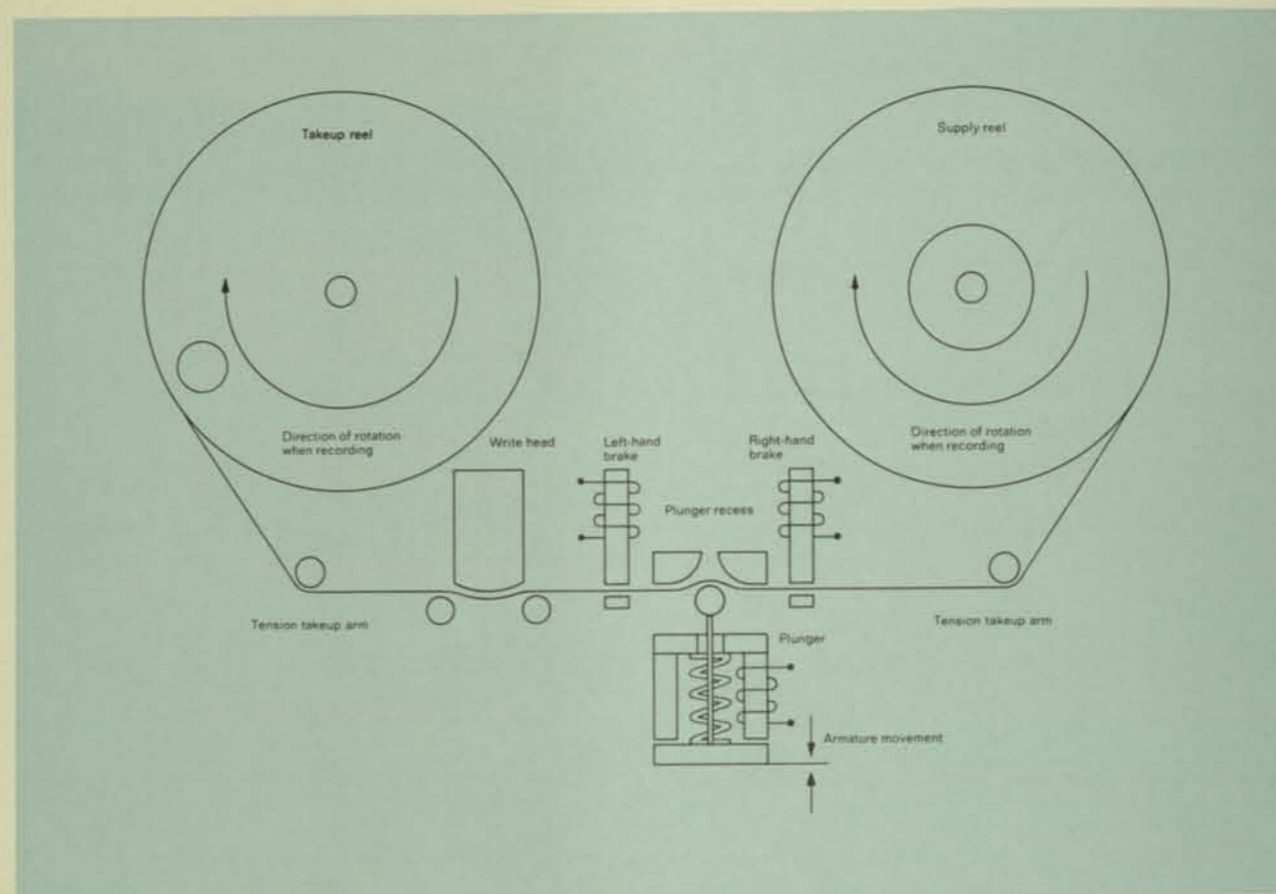


Figure 3. Operating Principles

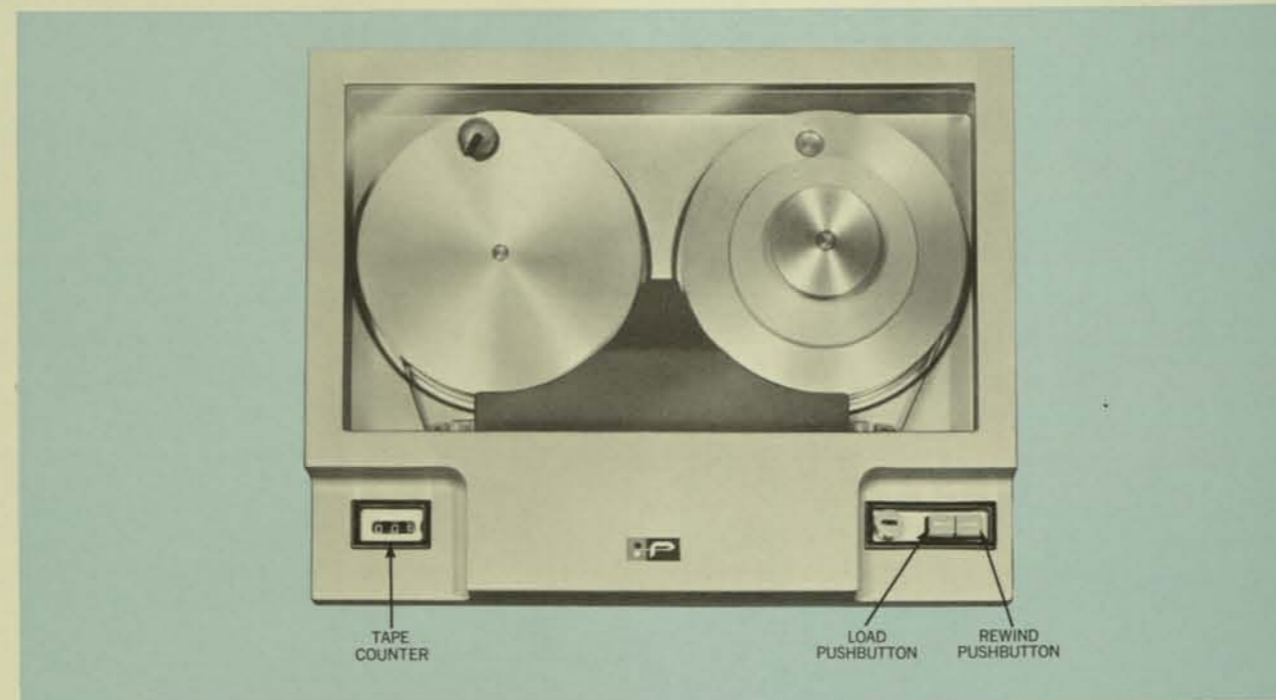


Figure 4. Operator Controls

OPERATOR CONTROLS AND INDICATORS

Operating controls are reduced to two pushbuttons. The first pushbutton is used to initiate the load sequence and the second is used to initiate the rewind sequence. A counter is included to indicate the

length of tape on which data has been recorded.

PARITY GENERATION

Optionally, the ME-4210 is available with a parity generation circuit. At the data source's option either odd or even parity can be selected.

INTERFACE REQUIREMENTS

WRITE DATA LINES	
Logic Levels	
Logic "1": Ground $\pm 0.5V$; 1 ma	
Logic "0": +5VDC $\pm 0.5V$; 0 ma	
Logic "1" = Ground $\pm 0.5V$; 5 ma, maximum, sink	
Logic "0" = 5VDC ± 0.5 ma, maximum, source	
WRITE DATA	Description
	The "1" level signifies that a "1" is to be written when a STEP command is given. WRITE DATA levels should be present 1 μs before STEP command. The "1" is written when the STEP signal is generated.
REPLY LINES	
Description	
READY	The output is a "1" when the unit is ready to write next data character.
EOT	The End-Of-Tape output line is "1" when the reflective strip has passed under the sensor and "0" when the strip has not passed the sensor.
WRITE ECHO CHECK	The write echo check is a "1" when a character is written. It remains a "1" for 10 microseconds.

CONTROL INPUT LINES	
Logic Levels	
Logic "1" = Ground $\pm 0.5VDC$; 1 ma	
Logic "0" = 5VDC $\pm 0.5VDC$; 0 ma	
STEP	Description
	A step is initiated when the input is switched from "0" to "1". The maximum rise time of the pulse is 2 μsec ; minimum duration is 2 μsec ; maximum duration is 1 ms.
GENERATE INTER-RECORD GAP	When the input is switched from "0" to "1", the tape will move 0.75" with the longitudinal check character written four character spaces after the last written character. The maximum rise time of the pulse is 2 μsec ; minimum duration is 2 μsec ; maximum duration is 10 msec.
GENERATE FILE GAP	When the input is switched from "0" to "1", the tape will move 3.5" with the longitudinal check character written four character spaces after the last written character and a file mark written after the 3.5" space. After the file mark, another longitudinal check character and 0.75" inter-record gap is generated. The maximum rise time of the pulse is 2 μsec ; minimum duration is 2 μsec ; maximum duration is 10 msec.
PARITY SELECT (optional)	When the input is a "1", even parity is selected; when the input is a "0", odd parity is selected.



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POTTER

PRODUCT
DATA
1-105A

POTTER DD4311 DISK DRIVE



INTRODUCTION

The new Potter DD4311 Disk Drive is a low-cost random access memory, plug-to-plug interchangeable with the IBM 2311 Disk Drive. It is completely program and interface compatible with the 2311. The Potter unit employs completely field-proven design techniques, and will provide the user with a highly reliable direct replacement for the IBM 2311.

FEATURES

- Low cost
- Complete interchangeability with the IBM 2311
- Field-proven, hydraulic head actuator
- No stray electro-magnetic fields
- Minimum number of electrical adjustments
- Track-to-track access time of 25ms
- Uses existing programs



EFFECTIVE: AUG. 1, 1968

HEAD ACTUATOR

The DD4311 features a highly reliable hydraulic head actuator. This proven, dependable system provides consistent, accurate, head positioning. There are no stray electromagnetic fields such as may result from electromagnetic-type head actuators. The use of hydraulic head actuators also reduces the number of electrical adjustments.

DATA AND INTERFACE ELECTRONICS

The Potter DD4311 data electronics and interface electronics feature silicon devices throughout. Plug-in circuit modules facilitate maintenance. The interface electronics are completely plug-to-plug compatible with the IBM 2311. Third generation techniques ensure state-of-the-art design and performance — wire wrapping and integrated circuits are used throughout.

OPERATOR AND CONTROL PANEL

The operator control panel is identical to that of the IBM 2311 with respect to layout and function of all controls and indicators. An elapsed time meter is included, as in the IBM 2311, to record operational use time.

OTHER CONFIGURATIONS

The Disk Drive is available for high volume requirements in other interface configurations. In such applications, the same mechanical drive and data electronics are used; only the interface electronics are changed.



Loading of the 6-disk pack.

Potter's patented ADLOGIC coding can be used in these applications to effect an increase of 33 1/3% in packing density using the same disk packs (i.e., IBM 1316). This dramatic increase is accomplished by the use of Potter's special data coding techniques.

SPECIFICATIONS

Storage Capacity	7.25 million bytes
Access Times	
Adjacent Tracks	25ms
Average Overall	75ms
Maximum Overall	135ms
Disk Speed	2400 rpm ± 2%
Latency Time	
Maximum	25ms
Average	12.5ms
No. of Cylinders	200 plus 3 spares
Data Transfer Rate	156,000 8-bit bytes per second
Data Density	
Outer Track	765 bpi
Inner Track	1105 bpi



Indicators and controls are similar to preceding equipment in the field.

SPECIFICATIONS

Recording Mode	Double Frequency
Written Track Width	0.008 inch
Track Width After Tunnel Erase	0.005 inch
Disk Pack	IBM 1316 or equivalent
Primary Power	208/230 VAC ± 10%, 50 or 60 Hz ± 1%, 3 phase
Environment (operating)	
Temperature	60° to 90°F.
Humidity	8% to 80% RH
Weight (maximum)	400 lbs.
Dimensions	24"D x 30"W x 40"H

POTTER MAINTENANCE ENGINEERING

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POTTER

SC-1131 SINGLE CAPSTAN MILITARIZED TAPE TRANSPORT SYSTEM



FEATURES

- Designed to meet military specifications — MIL-E-16400, MIL-E-4158C and MIL-E-5400
- Minimum size and weight—single unit construction
- Tape speeds to 37½ ips without program restrictions
- IBM 7- and 9-channel compatible at 800 bpi
- Family of units available to meet varying requirements
- No mechanical adjustments
- Single capstan, vacuum column design providing gentle tape handling
- 400 Hz, three phase primary power
- Oxide surface protection—oxide touches no stationary surface except the head and tape cleaner

GENERAL DESCRIPTION

Model SC-1131 provides a single capstan, magnetic tape transport designed to meet military requirements at tape speeds to 37½ ips. The unit is designed to comply with all applicable sections of MIL-E-16400 and MIL-E-4158C.

Model SC-1131 incorporates a tape guidance system designed for optimum data reliability, providing IBM-compatible operation at densities to 800 bpi (7- or 9-channel).

The tape path has been chosen so that the oxide side of the tape touches no fixed surface except the read/write head and tape cleaner. The back of the tape is constantly in non-slip contact with the capstan. Acceleration and deceleration of the tape is performed gently, resulting in maximum tape life.

Model SC-1131 includes servo drive electronics and an optional read/write amplifier mounted as a single package, with or without manual controls. Total weight of the transport alone is only 110 lbs.; 125 lbs. including manual control and read/write amplifier. Volume is about 2.5 cubic feet, depending on configuration chosen.

All electronics are silicon with the exception of six power drivers. Integrated circuits are used in all logic and low power linear functions. The transport is hinge mounted, allowing all maintenance to be performed from the front.

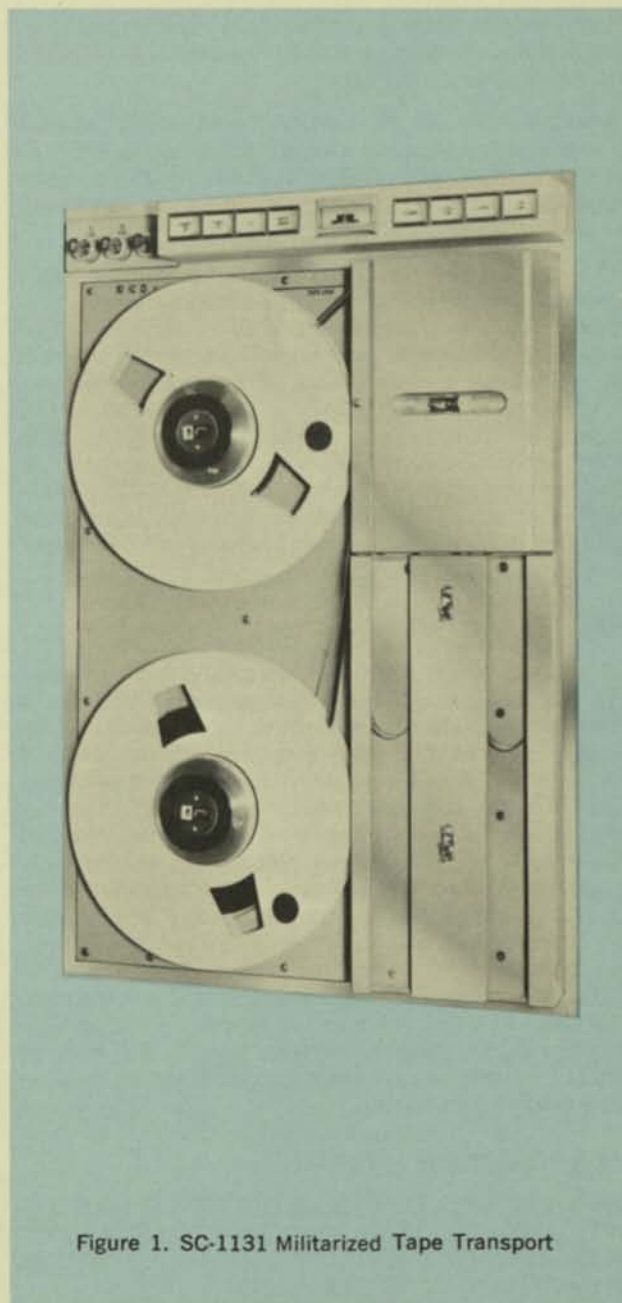


Figure 1. SC-1131 Militarized Tape Transport

SEMI-AUTOMATIC TAPE LOADING

The tape transport design utilizes a single capstan to drive the tape across the read/write head. Tape is threaded from the supply reel, over the read/write head to the take-up reel on the left side of the transport. When the cover door is closed, tape is automatically drawn into the vacuum columns and driven to the LOAD point.

Simple loading with Potter IBM-compatible QUICK-LOCK* hubs adds operator convenience, and at the same time, provides minimum projection from the front of the transport.

LOW INERTIA CAPSTAN DRIVE

A low inertia drive provides rapid acceleration and deceleration while maintaining control of the tape on the capstan at all times.

The tape is driven by passing the tape 180° around a metal capstan coated with a resilient material. Sufficient tension is applied to the tape by the vacuum columns to preclude slippage of the tape with respect to the capstan.

The capstan is directly driven from a high-performance DC motor which utilizes a combination of integrated and discrete solid-state drive circuitry. The speed of the capstan, and hence of the tape, is directly controlled by a closed loop motor-amplifier system wherein motor back EMF is used as a feedback signal. No tachometers or optical decoders are used. Program restrictions are completely eliminated so that any sequence of commands, FWD/REV, FWD/STOP or REV/STOP may be given with no intermediate delays up to a maximum of 40 IBM-compatible blocks-per-second.

REEL SERVO SYSTEM

The tape position in the vacuum columns is controlled by two "bang-bang" servo systems. Tape position is detected by photoelectric cells in the vacuum column which controls the servo amplifier driving the reel servo motor. The servo motor utilizes dynamic braking which is accomplished by solid-state, short-circuiting of the servo motor armature. Mechanical brakes and adjustments are eliminated, and no tachometers or other velocity sensors are required. Even if AC power is interrupted, all rotary components are brought to a complete stop without tape damage, whether the transport is in normal operation or in high speed rewind. Tape tension is uniform throughout the entire reel. All tape movement, including high speed rewind, takes place with tape in the vacuum columns, thus maintaining proper winding tension and tape reel packing.

TAPE GUIDANCE SYSTEM

IN FORWARD/REVERSE OR REWIND OPERATION THE OXIDE TOUCHES NO STATIONARY SURFACE EXCEPT THE READ/WRITE HEAD AND TAPE CLEANER.

Control of the tape path is maintained by a precision edge guidance system guaranteeing IBM interchange-

ability. The guidance system consists of a spring-loaded edge guide located on each side of the read/write head. Each guide has 10° of wrap, and lateral force on the tape is under 25 grams minimizing tape wear and the formation of wear particles, thus increasing both tape life and data reliability.

DRIVE ELECTRONICS

The capstan and servo amplifiers use silicon solid-state components throughout, with the exception of six power germanium drivers. Integrated circuits are used for all logic function and low power linear applications. The drive electronics package includes all required power supplies, and servo amplifiers mounted on interchangeable plug-in modules. Test points are provided on all modules for routine maintenance and service checks. All potentiometer adjustments are accessible with the module in place.

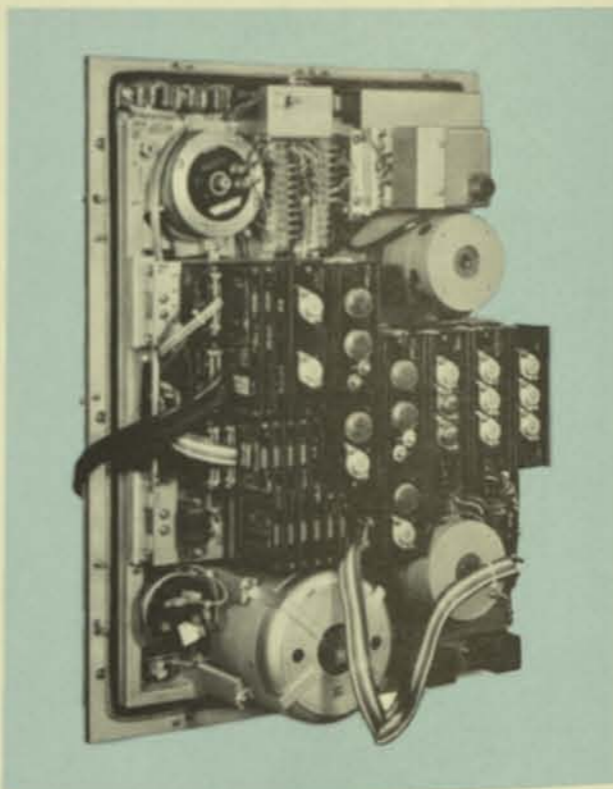


Figure 2. Readily accessible electronics of the SC-1131 are mounted on the rear of the tape deck.

RELIABILITY AND MAINTENANCE

All components and sub-systems are designed for maintenance-free operation. Other than periodic cleaning of the head and the vacuum tanks at the servicing periods, the only items likely to wear or need replacement after 5000 to 15,000 hours of tape passage are the brushes on the reel motors and capstan motor. No mechanical adjustments are required.

All components, including plug-in electronics modules, are mounted on the rear of the tape deck, and are readily accessible from the front by swinging the transport forward on its mounting hinges.

SPECIFICATIONS — SC-1131 (Continued)

TAPE FORMAT	IBM 7-channel 200/556/800 bpi NRZI IBM 9-channel 800 bpi NRZI
REWIND SPEED	2400' in 4 minutes, max
BEGINNING AND END-OF-TAPE SENSING	IBM Compatible Reflective Strip Detector
TAPE WIDTH	1/2 inch
TAPE REEL	IBM type 10 1/2" or 8" reels
PROGRAM LIMITATION	None
TAPE	3M 777 1.5 Mil Mylar* or equivalent
OPERATING ALTITUDE	10,000 feet, maximum (20,000 feet, max., at reduced speed)
OPERATING TEMPERATURE	0 to +55°C
HUMIDITY	10 to 95% RH
POWER SOURCE	115 or 208V, ±400 Hz, three phase

DIMENSIONS:	Height	Width	Depth	Weight
TAPE TRANSPORT (INCL. DUST COVER)	24 1/2"	19"	9 3/8"	110 lbs.
READ/WRITE AMPLIFIER	7"	19"	4 3/4"	15 lbs.
TAPE TRANSPORT WITH CONTROL PANEL, READ/WRITE AMPLIFIER, DUST COVER	27 1/2"	19"	9 3/8"	125 lbs.

INPUT AND OUTPUT REQUIREMENTS

INTERFACE — SC-1131 TRANSPORT	
Control Signals	Run-Stop; Forward-Reverse; Rewind to Load Point. Required signal levels are 0 Volts +5 Volts
Reply Lines	Load Point; End-of-Tape; Ready; Rewinding; Write Inhibit signal levels are 0 Volts +5 Volts

INTERFACE — MA511 Read/Write Amplifier

Output Signals	
Read Data	1 microsecond pulse width
Read Clock	1 microsecond pulse width. Occurs simultaneously with Read Data
Input Signals	
Write Data	Level
Write Clock	1 μsec pulse
Control Signals	
Density Select	Level
Read Enable	Level
Write Enable	Level
Write Reset	1 μsec pulse

Signal Levels
The signal levels and logic for the Read/Write Amplifier are the same as the tape transport.
Logic Zero (False) = +5 Volts
Logic One (True) = 0 Volts

MILITARY SPECIFICATIONS

Models SC-1131 and MA511 have been designed to meet all applicable requirements of MIL-E-16400, Class E, and MIL-E-5400, equipment for material, processes, components and workmanship.

APPLICABLE SPECIFICATIONS

MIL-E-16400	Electronic Equipment, Naval Ship and Shore (Class E)
MIL-E-4158C	Electronic Equipment, Ground
MIL-E-5400	Electronic Equipment, Aircraft
MIL-STD-826	Electromagnetic Interference
MIL-S-19500	Semiconductor Devices
MIL-Q-9858A	Quality Program System Requirements

* TM Mylar is a trademark of E. I. duPont deNemours & Company, Inc.

* QUICK-LOCK is a trademark of Potter Instrument Company, Inc.

SEMI-AUTOMATIC TAPE LOADING

The tape transport design utilizes a single capstan to drive the tape across the read/write head. Tape is threaded from the supply reel, over the read/write head to the take-up reel on the left side of the transport. When the cover door is closed, tape is automatically drawn into the vacuum columns and driven to the LOAD point.

Simple loading with Potter IBM-compatible QUICK-LOCK® hubs adds operator convenience, and at the same time, provides minimum projection from the front of the transport.

LOW INERTIA CAPSTAN DRIVE

A low inertia drive provides rapid acceleration and deceleration while maintaining control of the tape on the capstan at all times.

The tape is driven by passing the tape 180° around a metal capstan coated with a resilient material. Sufficient tension is applied to the tape by the vacuum columns to preclude slippage of the tape with respect to the capstan.

The capstan is directly driven from a high-performance DC motor which utilizes a combination of integrated and discrete solid-state drive circuitry. The speed of the capstan, and hence of the tape, is directly controlled by a closed loop motor-amplifier system wherein motor back EMF is used as a feedback signal. No tachometers or optical decoders are used. Program restrictions are completely eliminated so that any sequence of commands, FWD/REV, FWD/STOP or REV/STOP may be given with no intermediate delays up to a maximum of 40 IBM-compatible blocks-per-second.

REEL SERVO SYSTEM

The tape position in the vacuum columns is controlled by two "bang-bang" servo systems. Tape position is detected by photoelectric cells in the vacuum column which controls the servo amplifier driving the reel servo motor. The servo motor utilizes dynamic braking which is accomplished by solid-state, short-circuiting of the servo motor armature. Mechanical brakes and adjustments are eliminated, and no tachometers or other velocity sensors are required. Even if AC power is interrupted, all rotary components are brought to a complete stop without tape damage, whether the transport is in normal operation or in high speed rewind. Tape tension is uniform throughout the entire reel. All tape movement, including high speed rewind, takes place with tape in the vacuum columns, thus maintaining proper winding tension and tape reel packing.

TAPE GUIDANCE SYSTEM

IN FORWARD/REVERSE OR REWIND OPERATION THE OXIDE TOUCHES NO STATIONARY SURFACE EXCEPT THE READ/WRITE HEAD AND TAPE CLEANER.

Control of the tape path is maintained by a precision edge guidance system guaranteeing IBM interchange-

ability. The guidance system consists of a spring-loaded edge guide located on each side of the read/write head. Each guide has 10° of wrap, and lateral force on the tape is under 25 grams minimizing tape wear and the formation of wear particles, thus increasing both tape life and data reliability.

DRIVE ELECTRONICS

The capstan and servo amplifiers use silicon solid-state components throughout, with the exception of six power germanium drivers. Integrated circuits are used for all logic function and low power linear applications. The drive electronics package includes all required power supplies, and servo amplifiers mounted on interchangeable plug-in modules. Test points are provided on all modules for routine maintenance and service checks. All potentiometer adjustments are accessible with the module in place.

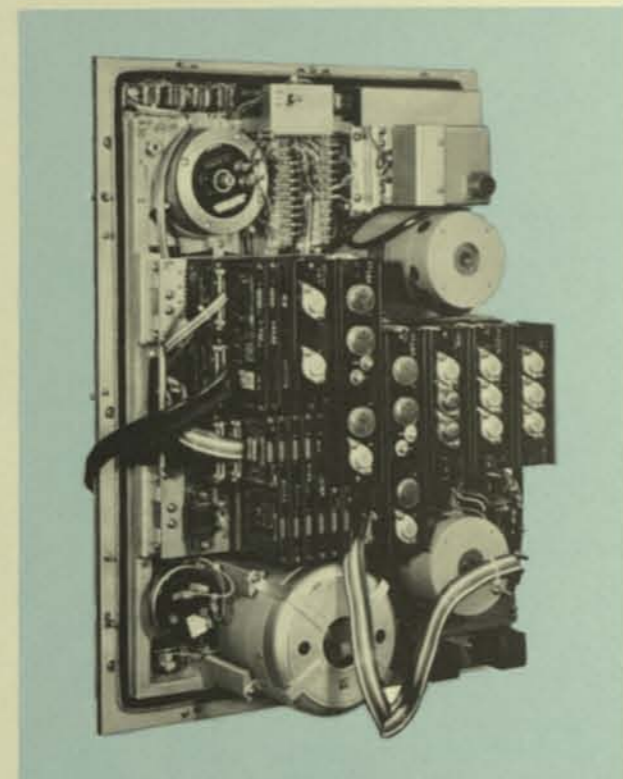


Figure 2. Readily accessible electronics of the SC-1131 are mounted on the rear of the tape deck.

RELIABILITY AND MAINTENANCE

All components and sub-systems are designed for maintenance-free operation. Other than periodic cleaning of the head and the vacuum tanks at the servicing periods, the only items likely to wear or need replacement after 5000 to 15,000 hours of tape passage are the brushes on the reel motors and capstan motor. No mechanical adjustments are required.

All components, including plug-in electronics modules, are mounted on the rear of the tape deck, and are readily accessible from the front by swinging the transport forward on its mounting hinges.

OPERATOR CONTROLS

Operator controls are available as an option. The control panel, item specified, is located directly above the transport and integral with the transport panel. Indicators show the status of the system under local command conditions. Illuminated pushbutton controls include: POWER ON, POWER OFF, REWIND, LOCAL and ON-LINE. In addition, the following indicators are provided: EOT, WRITE ENABLE and LOAD POINT. When multiple transports are to be used, a UNIT SELECT switch may be added.

READ/WRITE HEADS AND ERASE HEADS

The dual-gap read/write head assembly uses an all-metal flush surface housing for longer life and greater

reliability. The precision built, fully interchangeable head requires no adjustment and can readily be replaced by field personnel.

A complete selection of IBM-compatible 7-channel assemblies are available with 0.300" gap separation or 9-channel head assemblies with 0.150" gap separation.

The electrical characteristics of the head have been designed to be compatible with a Potter Model MA511 amplifier design and comply with all requirements for 200/556/800 bpi operation.

The erase head is a separate component mounted on the head block assembly. The erase head is operated out of contact with the tape to avoid skew and wear problems.

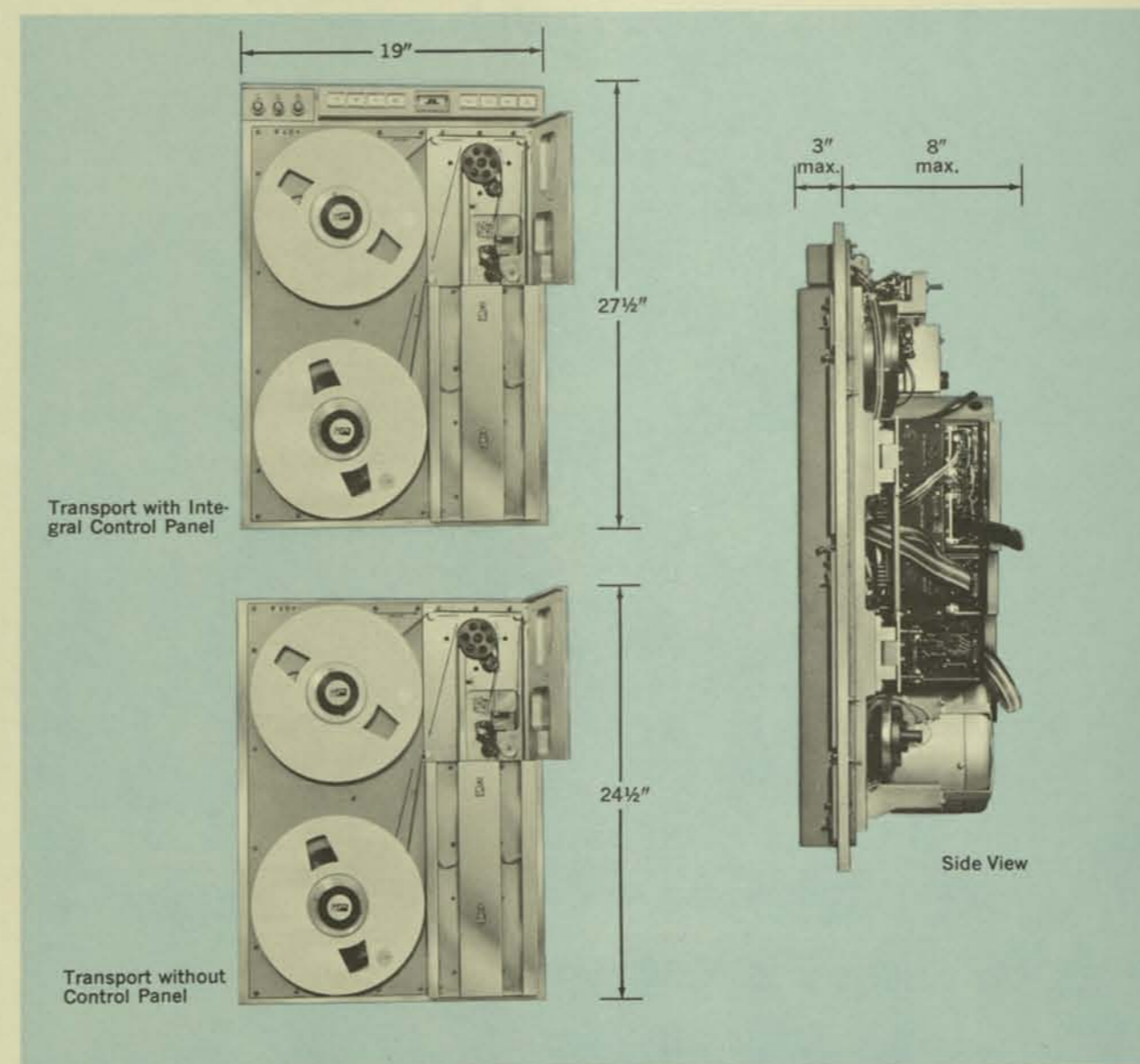


Figure 3. SC-1131 Transport with Integral Control Panel (optional)

LOAD POINT AND EOT/BOT SENSORS

Photoelectric (IBM-type) end-of-tape and beginning-of-tape sensing is provided for reliable tape control. To insure long life performance, the sensor lamps are derated. In the event of bulb failure, system operation is inhibited.

EQUIPMENT

The basic Potter SC-1131 transport consists of the following subassemblies:

- Tape transport panel including all tape drive components
- Solid state drive electronics and regulated power supplies
- IBM-type EOT/BOT sensors, photoreflexive, plus amplifier
- IBM-type reel hubs
- One empty IBM-type plastic reel
- Tape cleaner
- Integral transformer and power supply

ACCESSORIES

- Manual control panel (mounted integrally with tape transport unit)
- Dust cover—minimum projection from front of unit
- Master reel write lockout (file protect) switch
- Dual- or single-gap read/write head assembly, 7- or 9-channel with erase head
- IBM-compatible QUICK-LOCK Hubs (must be used if Potter dust cover is specified)

All Potter equipment includes mating connectors for all interface points.

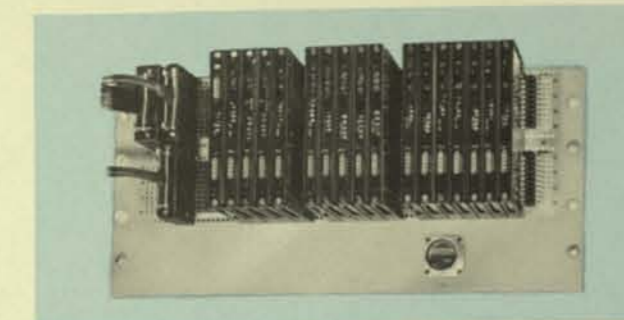


Figure 4. MA511 Read/Write Amplifier (optional)

READ/WRITE AMPLIFIER (Optional)

Potter's MA511 Militarized Read/Write Amplifier provides reliable record/playback operation in IBM-compatible 200/556/800 bpi NRZI format. The amplifier, consisting of a write section and a read section, is designed on a modular basis and incorporates silicon circuitry and/or integrated circuits throughout. The MA511 can be mounted directly behind the transport.

REELS AND HUBS

IBM-compatible hubs and one IBM-compatible tape reel are provided. Potter's optional IBM-compatible QUICK-LOCK hub assembly, provides ease of tape loading and also minimizes projection from the front panel of the transport.

TAPE CLEANER

A tape cleaner is located on the supply side of the magnetic head.

WRITE LOCKOUT

A non-contact write lockout, or file protect switch is available. A logic signal is brought to the transport interface connector. Another switch is wired to the Potter MA511 read/write amplifier to provide automatic write inhibit.

SPECIFICATIONS — SC-1131

TYPICAL PERFORMANCE

TAPE SPEED	37 1/2 ips
START TIME	8ms
START DISTANCE	0.150 ± .025"
STOP TIME	8ms
STOP DISTANCE	0.105 ± .025"
SKEW: (When reading on all "one's" tape)	
Static	8 μsec max
Dynamic	5 μsec peak
POWER CONSUMPTION	
Average	350 watts
Peak Under Worst Case Cycling	500 watts



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POTTER

SC-1080 SINGLE-CAPSTAN TAPE TRANSPORT AND SYSTEM



FEATURES

- 11/14/68* *RETRACT. H.A.* *413K*
- Any bidirectional tape speed up to 150 ips
 - Fully automatic tape loading — stops on load point
 - Retractable Read/Write Head
 - Unrestricted programming capacity
 - IBM 7- and 9-channel (IBM 360 and ASCII) capability
 - Speed tolerance $\pm 2\%$
 - Information density to 800 bpi, NRZI; 1600 bpi, (P E)
 - Single-capstan tape drive
 - Data reliability — only surface in contact with oxide is read/write head. Head retracts during rewind
 - No mechanical adjustments required
 - Photoelectric tape position sensors
 - All solid-state servo controls
 - Long Life . . . minimum servicing
 - U.L. Approved

GENERAL DESCRIPTION

The Potter Model SC-1080 represents a new design in tape transports. This tape system is one in a family of the industry's simplest, high-performance, single capstan tape transport.

The Potter SC-1080 is a single-capstan digital tape transport capable of bidirectional tape speeds to 150 ips with no program restrictions. The unit is completely compatible with IBM 729 and 2401 Tape Transports at all packing densities.

The SC-1080 is IBM 7- or 9-Channel compatible. Other 1/2- or 1-inch tape formats, including ASCII 9-channel, IRIG or TIAC* are available with packing densities to 800 bpi, NRZI, and 1600 bpi phase encoded recording.

The SC-1080 single capstan tape transport is designed for use with the highest performance computer systems. The transport features operator convenience, high transfer rate and high-speed rewind. The basic simplicity of the SC-1080 transport assures maximum data reliability and system up-time.

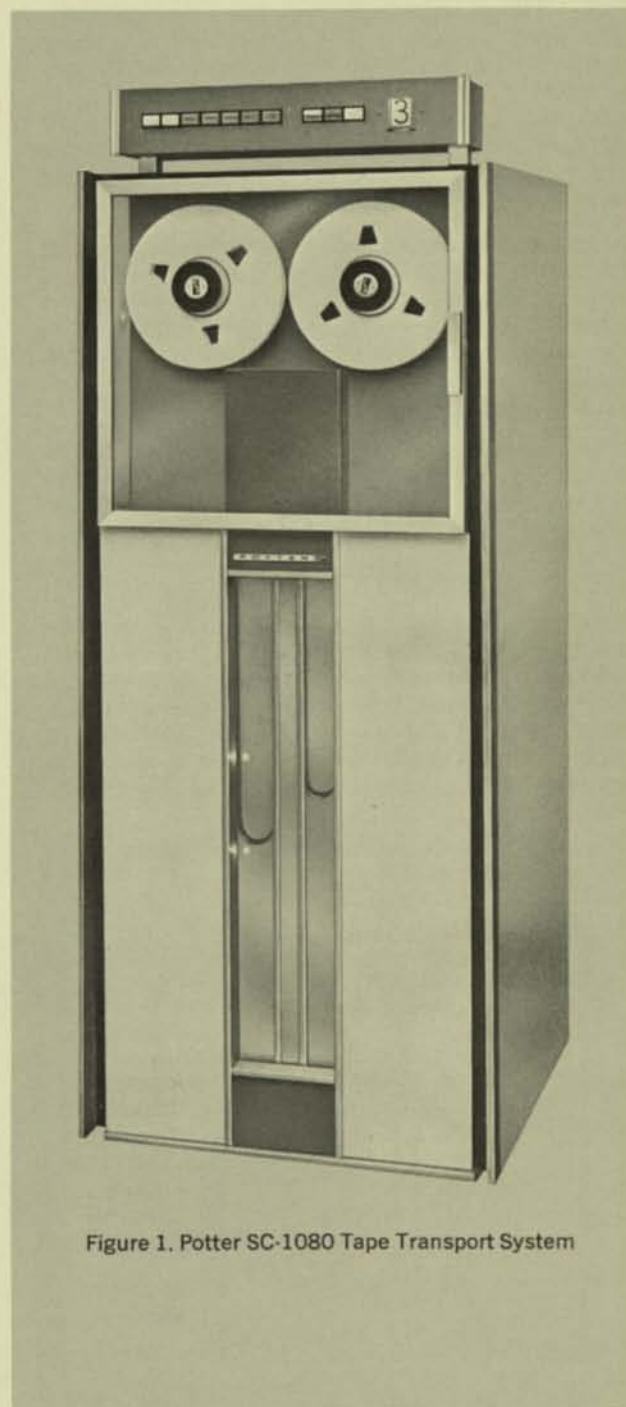


Figure 1. Potter SC-1080 Tape Transport System

*TIAC is a registered trademark of Texas Instruments, Inc.

TAPE LOADING

The tape drive design utilizes a single capstan to pass the tape across the read/write head. Tape is threaded from the supply reel, directly to the take-up reel on the left side of the transport. When the LOAD pushbutton is pushed, tape is automatically dropped into the vacuum columns, the read/write head is moved into position and tape is driven to the LOAD point and automatically switched from LOCAL to REMOTE.

TAPE PATH

In normal forward/reverse operation the oxide touches no surface except the read/write head, while the Mylar™ side of the tape is guided gently to eliminate wear particles, greatly increasing tape life and data reliability. During rewind the read/write head is retracted to a neutral position out of contact resulting in longer head/tape life.

Control of the tape path is maintained by a precision edge guidance system guaranteeing IBM interchange. Data may be transferred to or from the tape transport at standard bit densities of 200, 556, 800 and 1600 bpi or at any other transfer rate up to 240 kc at 150 ips. Tape tension is uniform throughout the entire reel, resulting in a smooth even pack.

During rewind a vacuum column maintains constant tension. There are no guide rollers, air guides or tension arms to restrict performance. Complicated mechanical adjustments are eliminated.

TAPE GUIDANCE SYSTEM

The tape guidance system of the SC-1080 was designed to be compatible with the IBM series 729 and 2401 tape transports. This design enables tapes to be freely interchanged between the above machines. Potter specifies the dynamic skew of the SC-1080 in terms of the IBM 729 Mod VI (see specification back page).

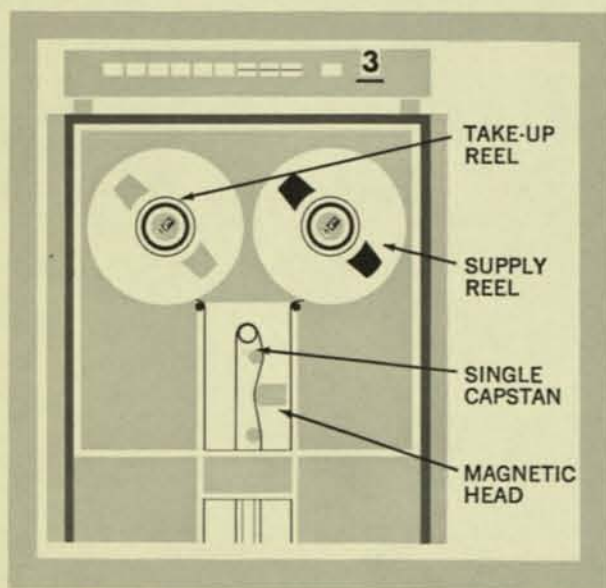


Figure 2. New Single-Capstan Tape Drive System and Direct Tape Path is Ultimate in Design Simplicity

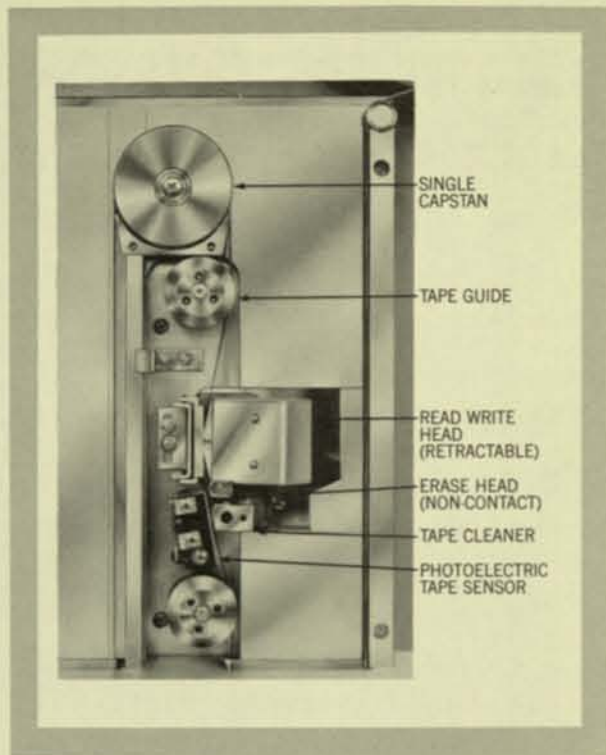


Figure 3. Precision Tape Guidance System

LOW INERTIA CAPSTAN DRIVE

A low inertia drive provides rapid linear acceleration and deceleration while maintaining control of the tape on the capstan at all times.

The tape is driven as shown in Figure 3 by passing the tape 180° around a metal capstan coated with a resilient material. Sufficient force is applied to the Mylar side of the tape by the vacuum capstan to preclude slippage of the tape with respect to the capstan.

The capstan is directly driven from a high-performance dc motor which utilizes a combination of integrated and discrete solid state drive circuitry. Program restrictions of any kind are completely eliminated so that any sequence of commands, FWD/REV, FWD/STOP or REV/STOP may be given with no intermediate delays up to a maximum of 200 commands/second. No longer are "stop-delays" or "FWD/REV delays" required. Internal circuitry "remembers" command sequences and executes them properly, eliminating any requirements in tape control units. Maximum input rate may be sustained up to 5 minutes at 150 ips.

REEL SERVOS

The tape position in the vacuum columns is controlled by two "closed-loop" servo systems, one column for the left reel and one column for the right reel. Position is detected by photoelectric cells in the tank which drive the servo amplifier to control the servo motor to pay out tape into, or take up tape from the vacuum column as required to follow capstan movement. The servo motor utilizes a dynamic braking system which eliminates mechanical brakes and

ACCESSORIES

Dual-Gap Read/Write Head

The dual-gap read/write head assembly uses an all-metal flush surface housing for longer life and greater reliability. The assembly is non-adjustable and can be replaced by normally skilled maintenance personnel. The read/write head assembly is designed for operation at transfer rates to 240 kc (150 ips and 1600 bpi).

A complete selection of magnetic heads is available, including heads for IBM 7- or 9-channel format. Heads are all-metal, precision fabricated for maximum tape life and minimum interchannel time displacement.

Reel and Hub Assemblies (Standard on SC-1080)
IBM-compatible hubs and one IBM-compatible tape reel are provided. Potter's IBM-compatible QUICK-LOCK hub assembly, a significant development in tape transport technology is provided as standard equipment with the SC-1080.

EOT/BOT Sensing (Standard on SC-1080)

A dual-channel photoelectric sensor is provided immediately adjacent to the read/write head assembly to detect the presence of standard IBM photoreflexive strips attached to the Mylar™ side of the tape for indicating the load point and end-of-tape positions. A two-channel amplifier with logic level outputs is provided.

WRITE LOCKOUT (OPTIONAL)

A non-contact write lockout, or file protect, switch is mounted at the supply reel hub. A single form "c" contact is brought to the transport interface connector. This switch may be wired to Potter MA-series amplifiers to provide automatic write inhibit.

LOGIC CONVERSION

A standard logic conversion board is available to provide any input/output logic of "0"s and "1"s in the gnd, -5V or gnd, +5V range.

READ-WRITE ELECTRONICS

Standard read/write amplifiers are available to accommodate packing densities up to 1600 bpi and data transfer rates up to 240 kc.

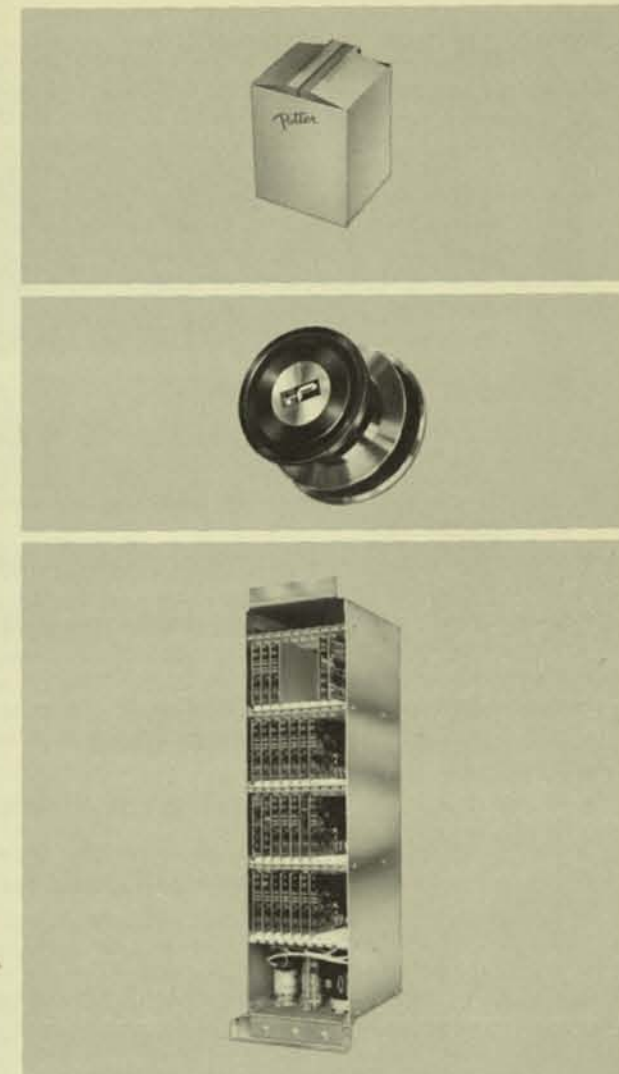
Each read/write electronics assembly contains:

- up to 9 read-write amplifier channels
- clock generator
- write inhibit electrical switching
- erase head control
- head compensation for Read/Write (as required)

SWITCHING ELECTRONICS

Switching amplifiers are available which reduce the cost of digital magnetic tape systems by permitting time-sharing of a single Read/Write amplifier package among groups of up to four tape units.

™Armorhide is a registered trademark of J. L. Armitage Co.
™Mylar is a trademark of E. I. du Pont de Nemours Company, Inc.



CABINET

The newly styled modular cabinet with tubular steel frame is equipped with rear service access doors, less side panels. The cabinet includes AC power control panel, with Hubbel™ twist lock 3-wire receptacle with mate; cabinet fan with filter. Side panels (specify right or left when facing transport) are also provided. The cabinet will accommodate all transport components, drive electronics, power supply and accessories that comprise the system, as well as read/write electronics.

If transport is ordered without cabinet, a simplified mounting frame is provided to facilitate shipping and handling. This frame provides a convenient means of testing and moving the transport.

STANDARD COLORS:

- Cabinet – ARMORHIDE™ Light Grey Textured #U-621
- Transport Panel and Operator Control Panel – ARMORHIDE Medium Grey Textured #U-242
- Decorative Trim – ARMORHIDE Ocean Blue #U-11695.

TAPE LOADING

The tape drive design utilizes a single capstan to pass the tape across the read/write head. Tape is threaded from the supply reel, directly to the take-up reel on the left side of the transport. When the LOAD pushbutton is pushed, tape is automatically dropped into the vacuum columns, the read/write head is moved into position and tape is driven to the LOAD point and automatically switched from LOCAL to REMOTE.

TAPE PATH

In normal forward/reverse operation the oxide touches no surface except the read/write head, while the Mylar™ side of the tape is guided gently to eliminate wear particles, greatly increasing tape life and data reliability. During rewind the read/write head is retracted to a neutral position out of contact resulting in longer head/tape life.

Control of the tape path is maintained by a precision edge guidance system guaranteeing IBM interchange. Data may be transferred to or from the tape transport at standard bit densities of 200, 556, 800 and 1600 bpi or at any other transfer rate up to 240 kc at 150 ips. Tape tension is uniform throughout the entire reel, resulting in a smooth even pack.

During rewind a vacuum column maintains constant tension. There are no guide rollers, air guides or tension arms to restrict performance. Complicated mechanical adjustments are eliminated.

TAPE GUIDANCE SYSTEM

The tape guidance system of the SC-1080 was designed to be compatible with the IBM series 729 and 2401 tape transports. This design enables tapes to be freely interchanged between the above machines. Potter specifies the dynamic skew of the SC-1080 in terms of the IBM 729 Mod VI (see specification back page).

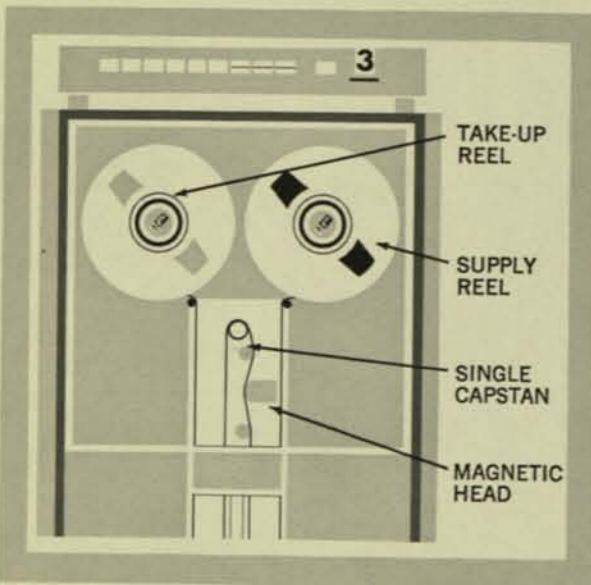


Figure 2. New Single-Capstan Tape Drive System and Direct Tape Path is Ultimate in Design Simplicity

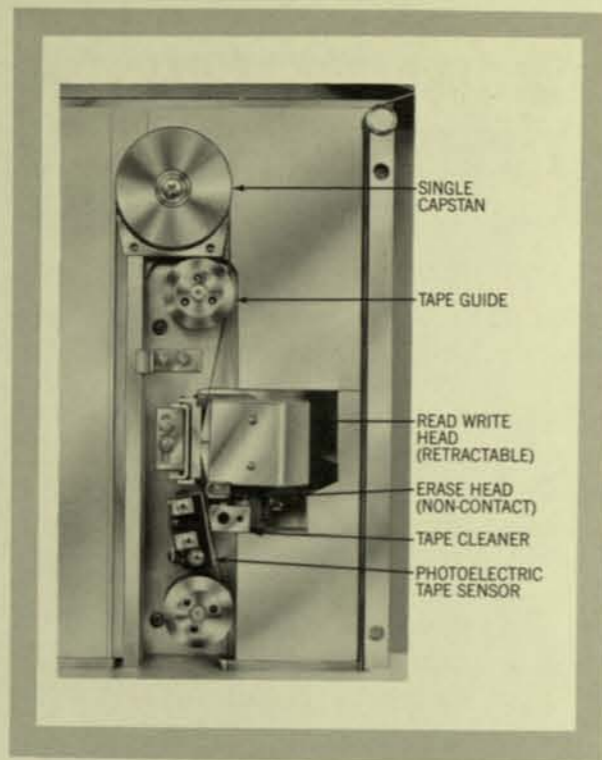


Figure 3. Precision Tape Guidance System

LOW INERTIA CAPSTAN DRIVE

A low inertia drive provides rapid linear acceleration and deceleration while maintaining control of the tape on the capstan at all times.

The tape is driven as shown in Figure 3 by passing the tape 180° around a metal capstan coated with a resilient material. Sufficient force is applied to the Mylar side of the tape by the vacuum capstan to preclude slippage of the tape with respect to the capstan.

The capstan is directly driven from a high-performance dc motor which utilizes a combination of integrated and discrete solid state drive circuitry. Program restrictions of any kind are completely eliminated so that any sequence of commands, FWD/REV, FWD/STOP or REV/STOP may be given with no intermediate delays up to a maximum of 200 commands/second. No longer are "stop-delays" or "FWD/REV delays" required. Internal circuitry "remembers" command sequences and executes them properly, eliminating any requirements in tape control units. Maximum input rate may be sustained up to 5 minutes at 150 ips.

REEL SERVOS

The tape position in the vacuum columns is controlled by two "closed-loop" servo systems, one column for the left reel and one column for the right reel. Position is detected by photoelectric cells in the tank which drive the servo amplifier to control the servo motor to pay out tape into, or take up tape from the vacuum column as required to follow capstan movement. The servo motor utilizes a dynamic braking system which eliminates mechanical brakes and

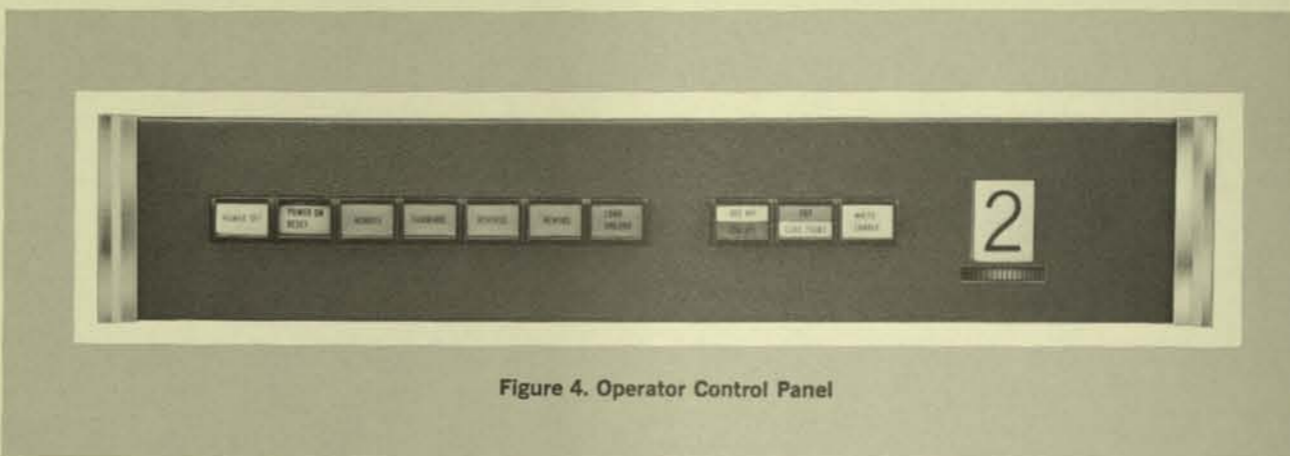


Figure 4. Operator Control Panel

adjustments. The new system is fail safe even if AC power is interrupted during high-speed rewind, providing maximum tape protection.

An operator control panel is an optional feature for local operation and indication. Indicators and switches as shown in Figure 4 show the status of the system under local or remote conditions. The local controls include Power ON/Power OFF, Forward, Reverse, Rewind, Load and Unload.

AUTOMATIC TAPE LOADING

Tape loading is the easiest and fastest in the industry with Potter's new single-capstan transports. All that is necessary is to first mount the supply reel on the QUICK-LOCK® hub assembly. Tape is then threaded from the supply reel directly to the take-up



Figure 5. Automatic Tape Loading

reel. From this point loading is accomplished fully automatically at a touch of the LOAD button. Tape is pulled into the vacuum tanks, the head is positioned, and tape is advanced to the load point. The transport will then automatically switch from LOCAL to REMOTE and be ready for the first computer command. Threading around rollers, multiple capstans, and guides is completely eliminated.

DRIVE ELECTRONICS

Drive electronics are all solid-state (silicon on low level stages) or integrated circuitry.

All circuits are mounted on removable printed circuit modules. Test points are provided where required for routine maintenance or service checks. The drive electronics include all modular power supplies required for transport operation.

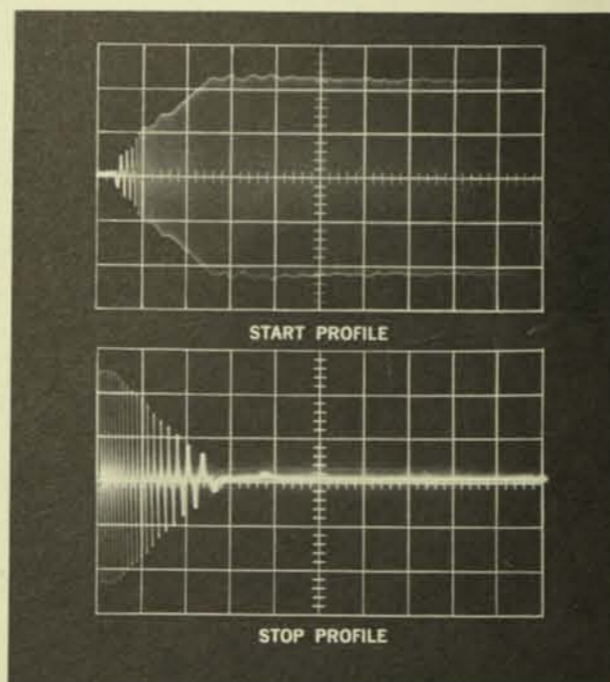


Figure 6. Start/Stop Profiles at 150 ips (1 ms/cm)

RELIABILITY AND MAINTENANCE

Reliability of operation is a prime requisite of computer peripheral equipment. The SC-1080 has been planned with this consideration receiving major attention. The mechanical design incorporates a minimum of moving parts with all electronic components derated to conservative levels. There are no mechanical adjustments, and only a minimum number of electrical adjustments are necessary in the operation of the SC-1080 transport.

EQUIPMENT

The basic Potter SC-1080 transport consists of the following subassemblies:

- The tape transport assembly including all tape drive components
- Beginning-of-tape (BOT) sensor, photoreflexive IBM-type, plus amplifier
- End-of-tape (EOT) sensor, photoreflexive IBM-type, plus amplifier
- Transport drive electronics
- Two IBM-type QUICK-LOCK hubs
- One empty IBM-type plastic take-up reel
- Retractable Head Mount
- Safety Glass Dust Cover
- Tape Cleaner

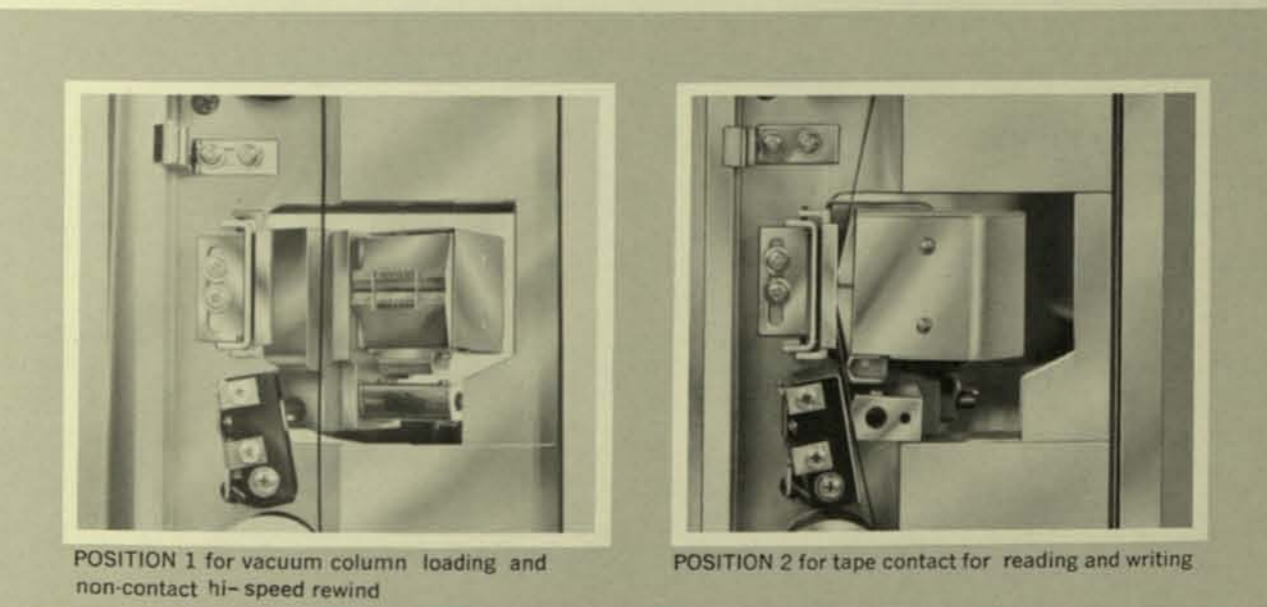
®QUICK-LOCK is a registered trademark of Potter Instrument Company, Inc.

Optional Accessories —

- Operator Control Panel without address select
- Operator Control Panel with address select switch (seven position)
- Master Reel Write Lockout, (File Protect), IBM-type switch
- Dual gap read/write head assembly for 7-channel (IBM 729) operation: 0.048 inch write and 0.030 inch read tracks on 0.070 inch centers. Gap spacing 0.300 inch.
- Dual gap read/write head assembly for 9-channel (IBM 2401 or ASCII) operation: 0.044 inch write and 0.040 inch read tracks on 0.055 inch centers. Gap spacing: 0.150 inch.
- Other compatibilities are available
- Erase Head
- 50 cycle and/or 230 VAC Input Power
- Special Paint (paint supplied by customer)
- Cabinet

All Potter equipment is supplied with mating connectors.

For further information, write, wire or call General Sales Manager, Potter Instrument Company, Inc., East Bethpage Road, Plainview, N. Y. 11803. Telephone (516) 694-9000. TWX 510-224-6485. CABLE: PICO.



POSITION 1 for vacuum column loading and non-contact hi-speed rewind

POSITION 2 for tape contact for reading and writing

NEW RETRACTABLE HEAD PROVIDES FOR LONGER LIFE

The read/write head assembly is mounted on a 2-position hinged plate: retracted to permit vacuum column loading (position 1), or for rewind, and in

contact with tape for reading and writing (position 2). This action is controlled by a cam controlled positioning motor. Special construction methods have been employed to insure repeated positioning accuracy.

SPECIFICATIONS

TAPE DRIVE	Single Capstan
TAPE LOADING	Fully automatic tape loading in less than 15 seconds Automatic BOT searching
TAPE SPEED 1/2 inch	any speed between 75 ips and 150 ips
1 inch	any speed between 75 ips and 90 ips
TAPE SPEED VARIATION (steady state)	±2%
REWIND SPEED AND TIME (2400 ft. reel)	100 sec avg, (288 ips avg) 130 sec max, 200, 556, 800 bpi NRZI 1600 bpi PE
PACKING DENSITY	none
PROGRAM RESTRICTIONS	within IBM IRG specifications

TYPICAL PERFORMANCE

(1/2 inch 1.5 mil Mylar)	75 ips	112.5 ips	150 ips
Start time (to within 10% of speed)	5 ms	4 ms	3.25 ms
Start distance— inches	.185±.020	.225±.025	.225±.025
Stop time (max)	5 ms	4 ms	3.25 ms
Stop distance— inches	.160±.020	.200±.020	.210±.020
(1 inch 1.5 mil Mylar)	75 ips	90 ips	
Start time (to within 10% of speed)	5 ms	4 ms	
Start distance— inches	.185±.020	.180±.020	
Stop time (max)	5 ms	4 ms	
Stop distance— inches	.160±.020	.160±.020	
Command Repetition rate	200 command/sec see text p. 2 "Low Inertia Capstan Drive" section		
SPEED STABILITY (long term 1 sec)	±2%		
(short term 15 ms)	±2%		

SKEW 1/2-inch machines*

(a) Static usec	75 ips	112.5 ips	150 ips
	3 usec	2 usec	1.5 usec
(b) Dynamic** usec peak			
guidance + reading all 1's tape	2.5 usec	1.5 usec	1.2 usec
guidance + head + reading random tape	4.0 usec	2.5 usec	2.0 usec

*For 1 inch machines double the figures given for 1/2 inch machines.

**The dynamic skew figure is specified when reading on the SC1080 a tape which has been generated on an IBM 729-VI or for reading tapes on the IBM 729-VI generated on the SC1080.

TAPE WIDTH	1/2" or 1"
TAPE TYPE	3M8938, or equal; 1.5 mil Mylar
TAPE REELS	Standard 10 1/2"
REEL HUBS	Potter QUICK-LOCK IBM-compatible 1/2" or NARTB 1"

REMOTE CONTROL INPUTS

- a. Logic Levels 0/+5 standard, 0/-5, -5/0, +5/0 optional.
- b. Input Commands

Unit Select, Direction, Run, Rewind, Rewind and Unload

STATUS REPLIES

EOT/BOT, Ready, Unit Selected and Ready, Rewinding Write Lockout (Form C contact)

ELECTRONICS

All control circuits fully transistorized or integrated, modular plug-in construction throughout

SERVO CONTROL

All solid state with dynamic braking eliminating mechanical brakes

ENVIRONMENTAL CONDITIONS

Ambient Temperature—Operating

(within tape characteristic)

Non-Operating

Humidity

45°F to 110°F

-30°F to 165°F

20% to 80% (without condensation)

POWER

115V AC ±10%, 50/60 cps, single-phase or 220V AC optional

10 amperes—Standby

12 amperes—Running

15 amperes—Peak (less than 100 ms)

DIMENSIONS

Transport/Cabinet (without control panel)

With Control Panel

Height	Width	Depth
63"	26 1/2"	27 1/4" + Door Handle
68 1/2"	26 1/2"	27 1/4" + Door Handle

WEIGHT

Transport Only (with shipping frame)

Transport with Cabinet

384 lbs.

500 lbs. approx.

U.L. APPROVED

Underwriters' Laboratories has granted U.L. Listing when SC-1080 is supplied in Potter Standard Cabinet.



POTTER INSTRUMENT COMPANY, INC.

EAST BETHPAGE ROAD • PLAINVIEW, L.I., NEW YORK 11803 • (516) 694-9000

POTTER

SC 1035 SINGLE CAPSTAN TAPE TRANSPORT



JUL 2 1970

FEATURES

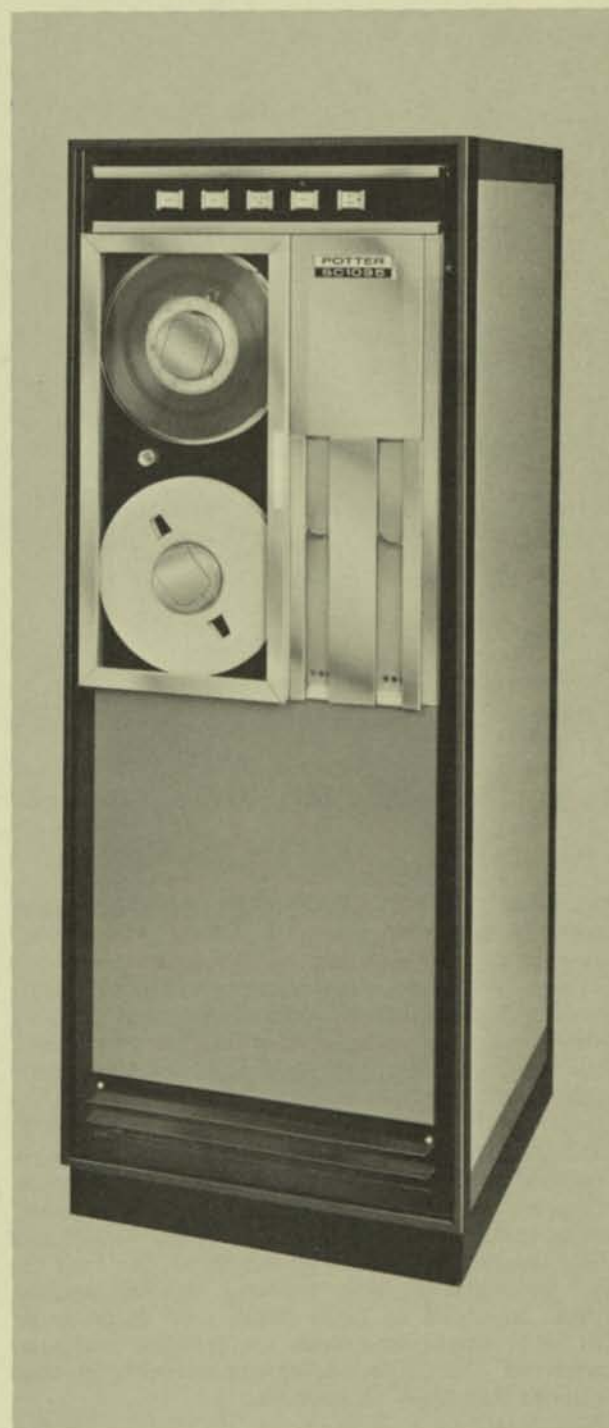
- Low cost with optimum performance and reliability
- Bi-directional tape speed to 45 ips
- Industry compatible recording in 9-channel 800 bpi or 7-channel dual density, NRZI format
- Single capstan, dual vacuum column tape drive for long tape life and uniform tape tension
- Data reliability — oxide surface of tape touches no fixed surface except read/write head and tape cleaner
- Permanent magnet reel motors run cool (require no field supply)
- Electronic reel braking — no mechanical adjustments required
- Industry compatible QUICK-LOCK® reel hubs
- State-of-the-art read/write amplifiers
- Simplicity in design for long life . . . minimum servicing

INTRODUCTION

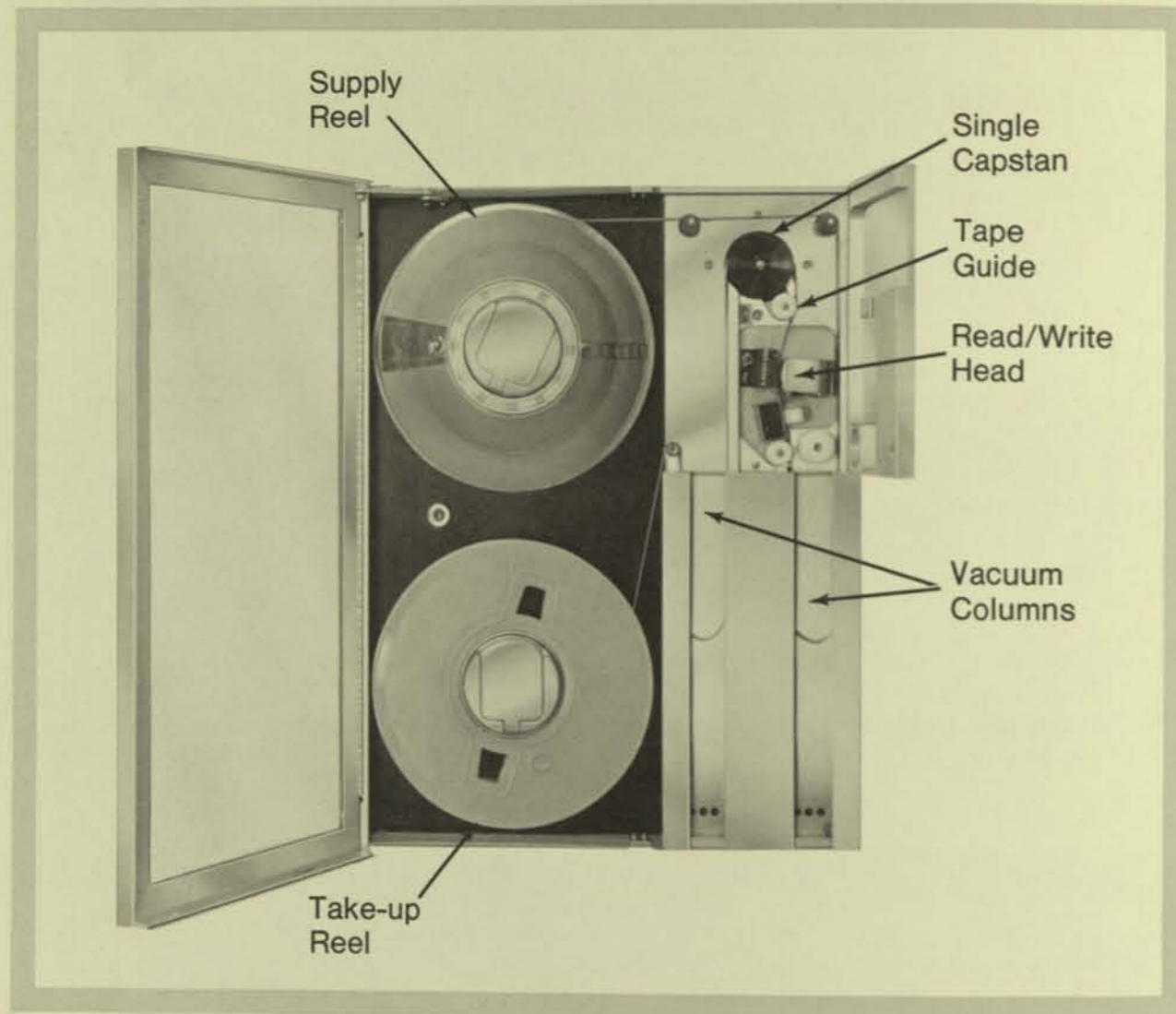
The Potter SC 1035 Single Capstan Magnetic Tape Transport is a medium speed transport specifically designed for low cost computer and data acquisition applications. The unit incorporates all the important data reliability features of Potter's high performance SC-series transports, but all non-essential functions have been simplified or eliminated. The SC 1035 stresses low unit cost and optimum performance, without sacrificing data reliability, ease of servicing, or operator convenience.

The SC 1035 single capstan vacuum column drive provides rapid linear acceleration and deceleration while maintaining control of the tape by the capstan at all times. There are no pinch rollers or mechanical adjustments, thus assuring controlled tape tension and long tape life. The transport drive permits program-free bi-directional operation at tape speeds to 37.5 ips. A 45 ips tape speed is optionally available depending upon the rate and sequence of commands.

Control of the tape path is maintained by a precision edge guidance system which matches industry standards and assures complete tape interchangeability with the most widely used tape systems.



EFFECTIVE: APRIL 30, 1970



New Single-Capstan Vacuum-Column Tape Drive System is the ultimate in design simplicity. Transport can be mounted horizontally (shown) or vertically.

THE BASIC SC 1035 TRANSPORT consists of a mechanical transport assembly (which includes all drive components), a solid state drive electronics package with a regulated power supply, EOT/BOT sensors and amplifier, read/write electronics, a dual-gap read/write head assembly, an erase head, industry-compatible QUICK-LOCK hubs, tape cleaner, write lockout and a dust cover.

SIMPLIFIED TAPE LOADING yields operator convenience with minimum tape handling. After the reel is placed on the QUICK-LOCK® hub and threaded, the operator then depresses the "Load" switch, and the transport automatically completes the load cycle. Automatically, tape is pulled into vacuum columns, advances to Load Point, and assumes an ON LINE condition — ready for the first computer command. The entire loading and threading process requires less than 15 seconds.

A LOW INERTIA CAPSTAN DRIVE provides rapid linear acceleration and deceleration with positive tape control. Slippage is prevented by having the tape pass 180° around a capstan with a resilient coating, while dual vacuum columns assure continuous tape to capstan contact. No pinch rollers are used.

A fast reacting low inertia servo motor directly drives the capstan. The speed of the motor is precisely controlled by maintenance-free integrated circuitry. Tachometers, optical decoders, and mechanical adjustments have been eliminated.

Start/stop performance of the capstan drive is compatible with standard inter-record gaps of either 0.75 inch (7-channel) or 0.60 inch (9-channel) up to 45 ips. Program restrictions are non-existent while reading or generating any combination of industry-compatible blocks.

THE REEL SERVO SYSTEM optically detects and servo maintains tape position within the vacuum columns. Tape is automatically payed into or taken from the vacuum columns as required by capstan movement. Potter's exclusive dynamic braking system operates on the reel servo motors and eliminates mechanical brakes and adjustments. The permanent magnetic reel motors run cool and provide reliable performance unaffected by line voltage variations.

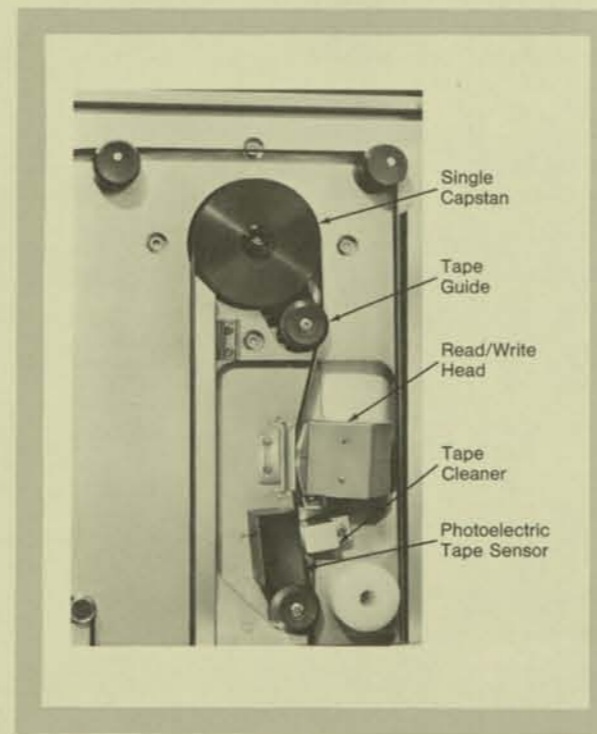
Tape tension is uniform throughout the entire reel. All tape movement, including rewind, takes place with tape in the vacuum columns, thus maintaining uniform tape tension.

In the event of power failure, the unit comes to a smooth controlled halt. There is no danger of tape spillage, damage or information loss.

THE TAPE GUIDANCE SYSTEM consists of a simplified tape path and precision spring-loaded edge guides. In forward, reverse or rewind, the only stationary surfaces touched by the tape oxide are the read/write head and tape cleaner. The results of this tape path are long-term tape life and data reliability.

The precision edge guidance system guarantees IBM interchangeability. Spring-loaded edge guides, located on each side of the read/write head, enable tapes to be freely interchangeable with IBM series 729, 2401, and 2420 tape units. Potter specifies the dynamic skew in terms of the IBM 2401-Mod 3 (see specifications).

THE DRIVE ELECTRONICS package includes all required power supplies, and servo amplifiers



Close-up of Single-Capstan Mechanism.

mounted on plug-in modules. Capstan and servo amplifiers use silicon solid-state components. Integrated circuits are used for all logic function and low power linear applications. Test points are provided on all modules for routine maintenance and service checks. Modules are mounted on the rear of the tape deck with all potentiometer adjustments readily accessible.

EOT/BOT SENSING is accomplished by a dual channel photoelectric sensor adjacent to the read/write head assembly. It detects the presence of standard IBM photoreflexive strips and indicates Load Point and End-of-Tape positions with logic level outputs.

A READ/WRITE AMPLIFIER records and reproduces industry compatible data in 9-channel, 800 bpi or 7-channel dual density, NRZI format. The amplifier, integrally packaged within the transport drive electronics, consists of a two module "read" amplifier, a one module "write" amplifier, and a one module "control". The "read" amplifier outputs de-skewed "read" data in 7- or 9-channel format and provides an associated clock pulse for each character. The "write" amplifier accepts 7- or 9-channels of digital data and outputs de-skewed data onto tape. And the "control" module functions as an interface between the TCU input and the internal logic of the amplifier. In addition it also contains threshold potentiometers and write status flip-flops. Two threshold levels for increased data reliability are a standard feature. The high threshold is automatically selected during the write operation; the low threshold during read operation. Among other standard amplifier features are: electronic skew compensation (forward direction only), automatic reset of write flip-flops, variable read gate (strobe delay) for output clocking, and automatic reset of read buffer flip-flops whenever power is applied.

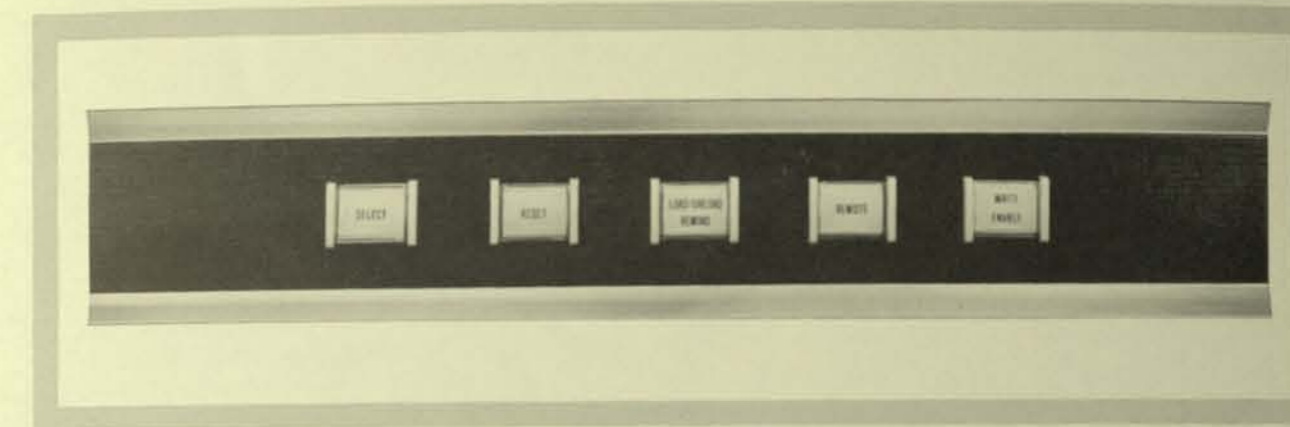
THE DUAL-GAP READ/WRITE HEAD ASSEMBLY uses an all-metal flush surface housing for longer tape life and greater reliability. The precision built, fully interchangeable head requires no mechanical adjustments and can readily be replaced by field personnel. Industry-compatible 7- and 9-channel assemblies are available.

The electrical characteristics of the head have been designed to be compatible with standard Potter amplifiers. They comply with all requirements for 200/556/800 bpi operation.

THE ERASE HEAD is a separate component mounted on the head block assembly. It is operated out of contact with the tape.

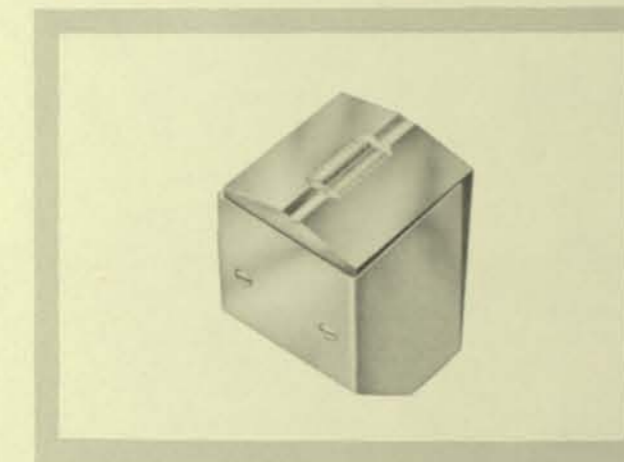
INDUSTRY-COMPATIBLE QUICK-LOCK® HUB ASSEMBLIES are standard on the SC 1035. They provide ease of tape loading and minimum projection from the front panel of the transport.

A TAPE CLEANER is located on the supply side of the magnetic head. Along with the magnetic head, it is the only other stationary surface which contacts tape oxide.

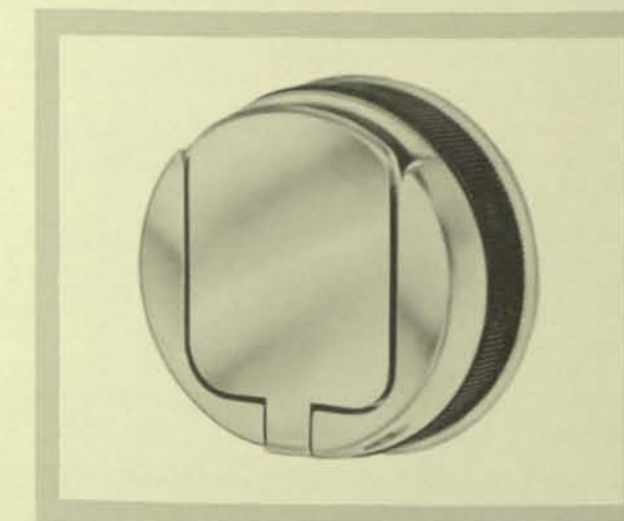


Close-up of Operator Control Panel.

THE CONTROL PANEL can be located directly above the transport. Indicators show the status of the system under local command conditions. Illuminated push button controls include: RESET, LOAD/REWIND and REMOTE. WRITE/ENABLE is supplied as an indicator.



Close-up of Read/Write Head.



Close-up of QUICK-LOCK® Hub.

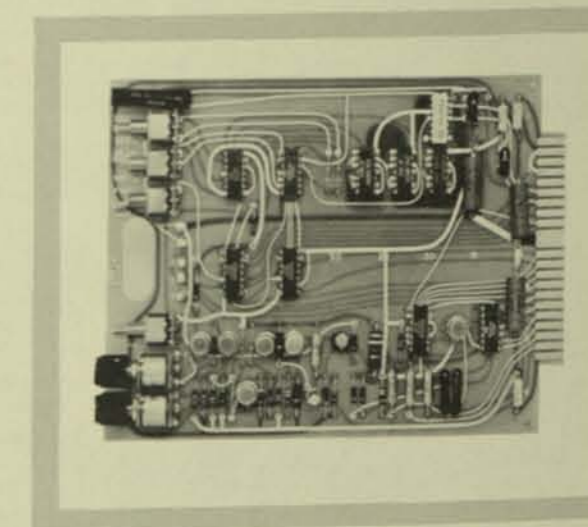
A WRITE LOCKOUT (file protect switch) is another standard feature. It insures against accidental erasure of recorded data.

A DUST COVER protects the unit under all operations and helps reduce periodic cleaning and maintenance.

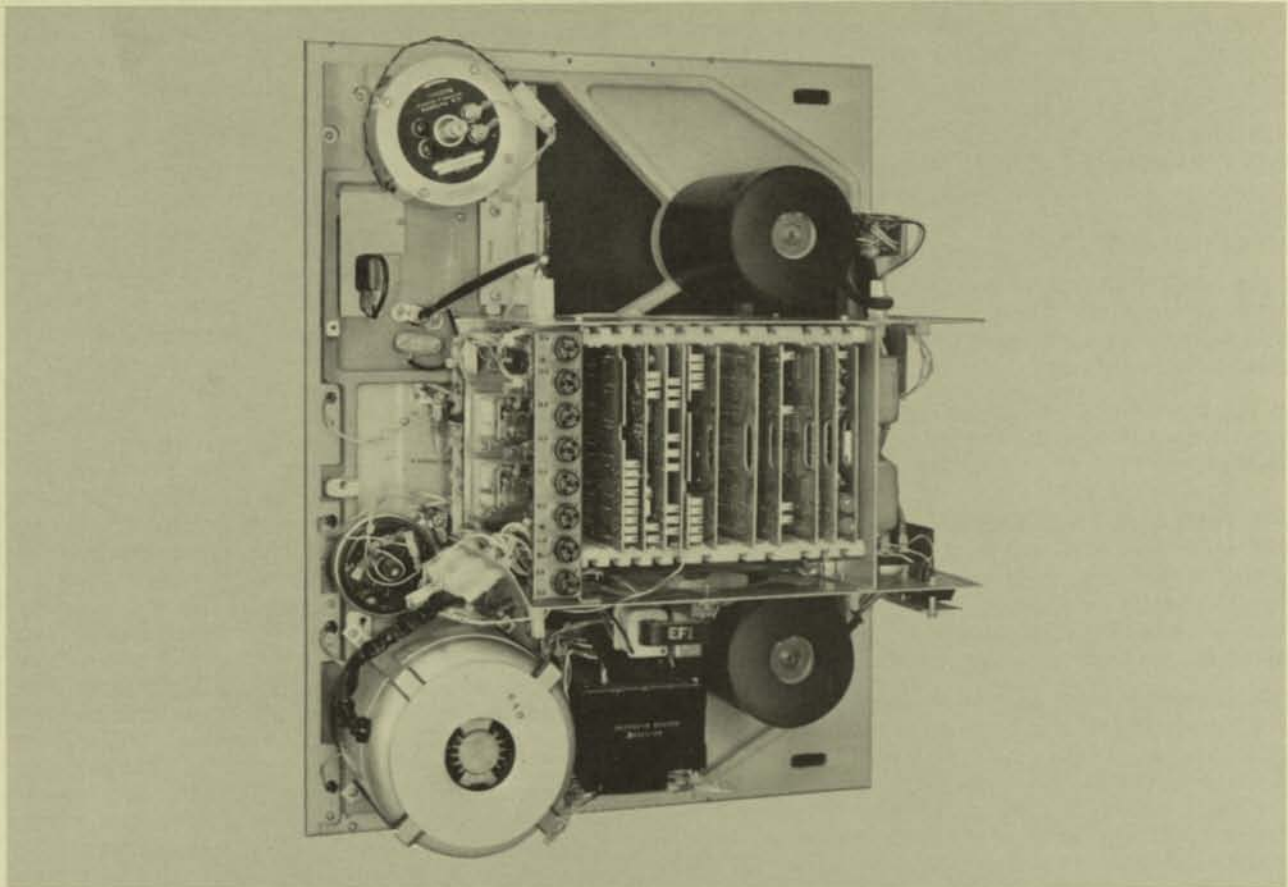
OPTIONAL EQUIPMENT includes an operator control panel, maintenance control module, and CAB 110 cabinet.

THE MAINTENANCE CONTROL MODULE allows the unit to be cycled in the FORWARD and REVERSE directions at a rate of 1 to 120 commands-per-second; or allows the machine to run in a continuous mode in the FORWARD or REVERSE direction, with automatic stopping provided at EOT/BOT markers. The module also includes an all "1" pattern generation feature to facilitate amplifier deskewing at densities of 200, 556 and 800 bpi.

A CAB 110 CABINET is available to satisfy system packaging of the transport system and manual control. The standard CAB-110 can be supplied with Potter colors or can be finished to customer specifications.



Close-up of Maintenance Control Module.



Rear view of SC 1035 Tape Transport.

SALES AND FIELD SERVICE CENTERS

NORTHEAST DISTRICT

East Bethpage Road
Plainview, New York 11803
Telephone: (516) 694-9000
New York City: (212) 895-8786
TWX: 510-224-6485
CABLE: PICO

665 Woodstock Avenue
Tonawanda, New York 14150
Telephone: (716) 837-0595

9 Meriam Street, Suite 18
Lexington, Mass. 02173
Telephone: (617) 861-0705

2 Carriage Drive
Thompsonville, Connecticut 06082
Telephone: (203) 289-8718

MIDDLE ATLANTIC DISTRICT

1400 Spring Street
Silver Spring, Maryland 20910
Telephone: (301) 588-0030

Fort Washington Industrial Park
Fort Washington, Penna. 19034
Telephone: (215) 643-5533

NORTH CENTRAL DISTRICT

18610 West Eight Mile Road
Southfield, Michigan 48075
Telephone: (313) 353-9822

MIDWEST DISTRICT

Suite 115
2220 East Devon Avenue
Des Plaines, Illinois 60018
Telephone: (312) 827-6623

4510 West 77th Street
Suite 275
Minneapolis, Minnesota 55424
Telephone: (612) 920-4973
TWX: 910-576-2947

SOUTHEAST DISTRICT

2559 Creek View Drive
Marietta, Georgia 30060
Telephone: (404) 436-6191

SOUTHWEST DISTRICT

4031 Broadway
Houston, Texas 77017
Telephone: (713) MI 3-2114
TWX: 910-881-2575

3327 Winthrop Avenue
Ft. Worth, Texas 76117
Telephone: (817) 738-1702

1640 Gilbreth Road
Burlingame, California 94010
Telephone: (415) 692-1722

715 East Mission Drive
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TWX: 910-589-3372

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TELEX: 851-84330

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954 Wilson Avenue
Downsview 461, Ontario
Telephone: (416) 630-7672
TWX: 610-491-1713

FACIT AB

Data Products Department
Fack
Solna 1, Sweden
Telephone: Solna 08/29 00 20
TELEX: 19035
CABLE: FACIT SOLNA

GERMANY

Potter Instrument Co., G.m.b.H.
2 Norderstedt 3
13 Koesliner Weg
West Germany
Telephone: 0411/5273096



POTTER INSTRUMENT COMPANY, INC.

EAST BETHPAGE ROAD • PLAINVIEW, L.I., NEW YORK 11803 • (516) 694-9000

JUL 2 1970

POTTER

SC 1051 SINGLE CAPSTAN TAPE TRANSPORT



FEATURES

- Low Cost
- Bi-directional tape speed up to 75 ips
- Single Capstan Tape Drive
- In-line tape threading, automatic tape loading — stops on Load Point
- Retractable Read/Write Head
- Information density to 800 bpi, NRZI; 1600 cpi, PE
- IBM 7- and 9-channel (IBM 360 and ASCII) capability
- Unrestricted programming capacity
- Data reliability — only surface in contact with oxide is read/write head. Head retracts during rewind.
- No mechanical adjustments required
- Photoelectric tape position sensors
- All solid-state servo controls; no relays are used
- Simplified operator controls
- Speed tolerance $\pm 3\%$
- Long life . . . minimum servicing

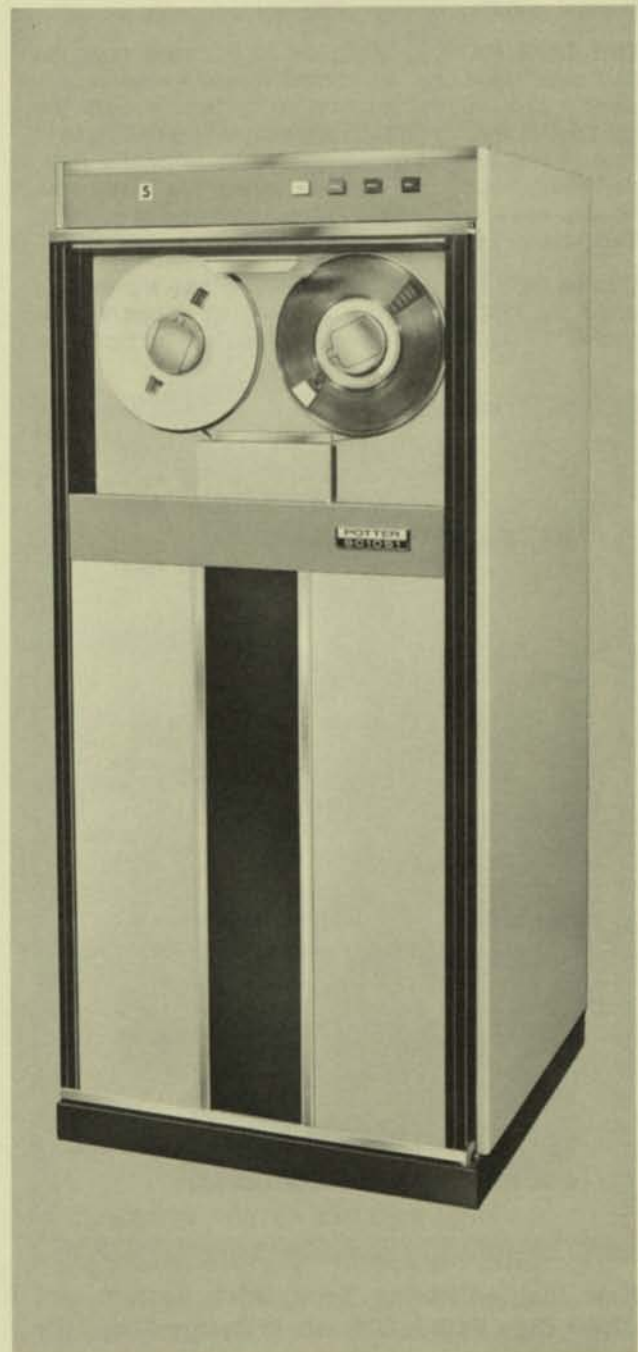
INTRODUCTION

The Potter Model SC1051 is part of a family of the industry's lowest cost, medium-performance tape transports.

Capable of bi-directional tape speeds to 75 ips with no program restrictions, the Potter SC1051 provides industry compatible read/write operation at densities to 800 bpi, NRZI, and 1600 cpi, PE.

The system features an advanced single-capstan design, dual vacuum columns and state-of-the-art electronics; all field-proven on Potter SC-series transports. A precision edge guidance system provides reliable tape control.

Designed for use with the highest performance computer systems, the SC1051 features operator convenience, high transfer rate and high speed rewind. The unit's basic simplicity assures maximum data reliability and system up-time.



EFFECTIVE: May 15, 1970

TAPE LOADING is the easiest and fastest in the industry. All that is necessary is to first mount the supply reel on the QUICK-LOCK® hub assembly. Tape is then manually threaded from the supply reel directly to the take-up reel. From this point on, loading is accomplished automatically at the touch of the OPERATE button. A prewind mode advances several more turns of tape around the take-up reel and tape is pulled into the vacuum tanks. The read/write head then swings into position and tape is driven forward beyond BOT, then run reverse to stop on BOT. Automatically the transport switches to "Remote" and becomes ready for the first computer command. Threading around rollers, multiple capstans, and guides are completely eliminated. No manual winding of reel after unload cycle.

THE TAPE PATH is designed to increase tape life and data reliability. In normal forward/reverse operation tape oxide touches no surface except the read/write head and tape cleaner, while the Mylar™ side of the tape is gently guided to eliminate wear particles. During high speed rewind the read/write head is retracted to a neutral position out of contact. This results in longer head/tape life.

Control of the tape path is maintained by a precision edge guidance system guaranteeing industry-compatibility. Data may be transferred to or from the

tape transport at standard bit densities of 200, 556, 800 bpi and 1600 cpi, Phase Encoded or at any other transfer rate up to 120 kc at 75 ips. Tape tension is uniform throughout the entire reel, resulting in a smooth, even pack.

During rewind a vacuum column maintains constant tension. Special circuits have eliminated tape loop bounce and flutter. There are no guide rollers, air guides or tension arms to restrict performance. Complicated mechanical adjustments are eliminated.

THE TAPE GUIDANCE SYSTEM of the SC 1051 is compatible with IBM 729, 2401, and 2420 series tape transports. This design enables tapes to be freely interchanged between the above machines. Dynamic skew of the SC 1051 is specified in terms of the IBM 2401 Mod 3 (see "specifications" back page).

A LOW INERTIA SINGLE CAPSTAN DRIVE provides rapid linear acceleration and deceleration while maintaining control of the tape on the capstan at all times.

The tape is driven by passing the tape 180° around a neoprene coated metal capstan. Sufficient force is applied to the tape by the vacuum columns to preclude slippage of the tape with respect to the capstan. The capstan is directly driven from a high performance dc motor which utilizes a combination of

THE DUAL-GAP READ/WRITE HEAD ASSEMBLY uses an all-metal flush surface housing for longer tape life and greater reliability. The assembly is non-adjustable and can be replaced by normally skilled maintenance personnel. The read/write head assembly is designed for operation at transfer rates to 120 kc (75 ips and 1600 cpi).

A complete selection of magnetic heads is available, including heads for IBM 7- or 9-channel format. Heads are all-metal, precision fabricated for maximum tape life and minimum interchannel time displacement.

EOT/BOT SENSING is accomplished with a dual-channel phototransistor sensor immediately adjacent to the read/write head assembly. It detects the presence of standard IBM photoreflexive strips attached to the Mylar™ side of the tape, and indicates Load Point or End-Of-Tape positions.

A NON-CONTACT WRITE LOCKOUT, or file protect, switch is mounted at the supply reel hub. A single Form C contact is brought to the transport interface connector. This switch may be wired to Potter MA-series amplifiers to provide automatic write inhibit.

THE MAINTENANCE CONTROL MODULE allows the unit to be cycled in the FORWARD and REVERSE directions at a rate of 1 to 150 commands-per-second; or allows the machine to run in a continuous mode in the FORWARD or REVERSE direction, with automatic stopping provided at EOT and BOT markers. The module also includes an all "1" pattern generation to facilitate amplifier de-skewing at densities of 200, 556, or 800 bpi.

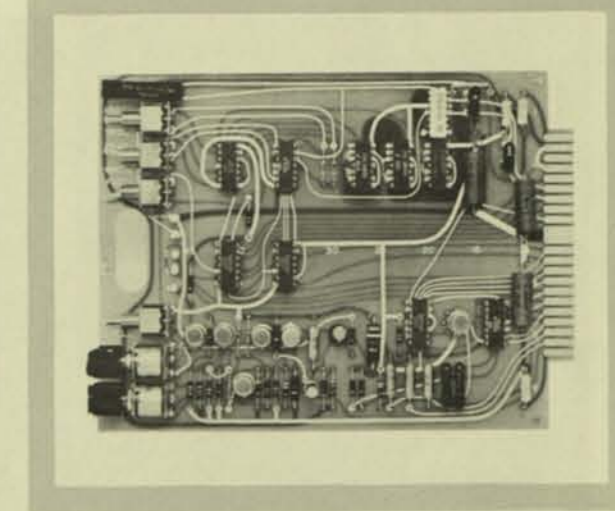
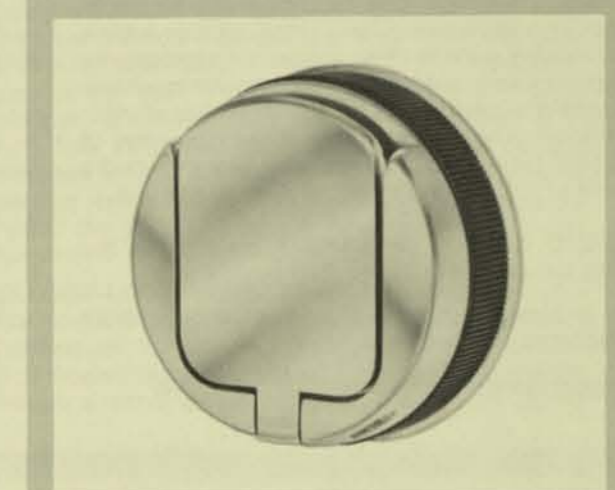
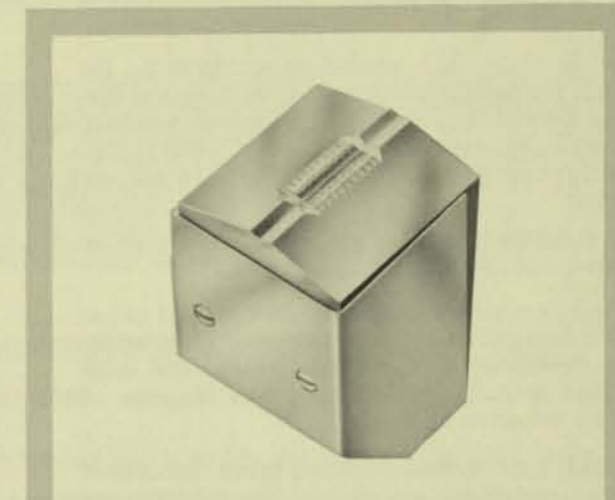
STANDARD READ/WRITE AMPLIFIERS are available to accommodate recording densities up to 800 bpi, NRZI format and 1600 cpi, PE format. Since the amplifiers are designed on a modular basis, each system can be customized to comply with unique customer requirements.

Amplifier variations include:

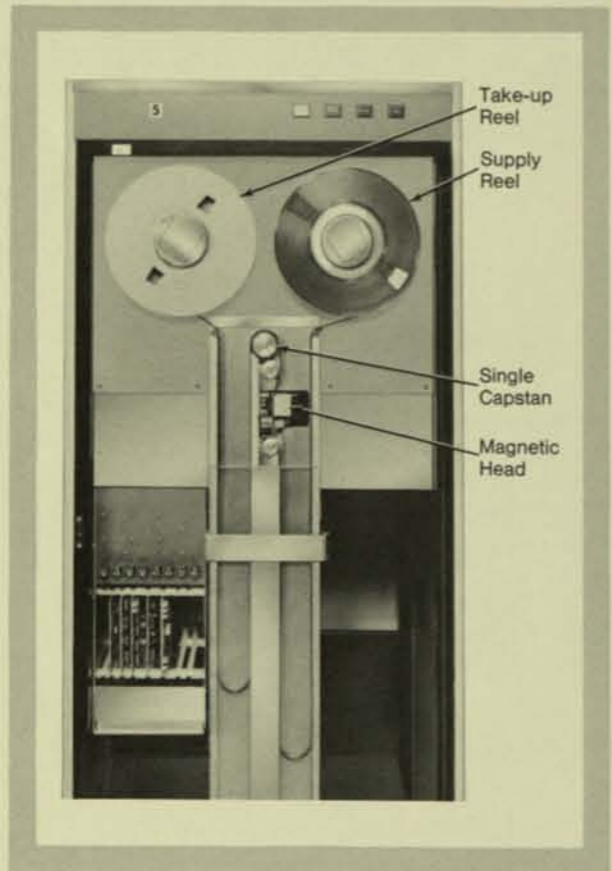
- Complete NRZI and PE amplifiers for single transport application in parallel operation.
- Daisy chained amplifiers with common electronics for both NRZI and PE applications.
- Complete PE system typically includes up to one-by-eight or two-by-eight channel transport system. Phase encoded channel provides coding/decoding, envelope check, preamble and postamble validity check, error correction, file mark generation and recognition, and miscellaneous "housekeeping" functions.

THE NEWLY STYLED MODULAR CABINET with welded steel frame is equipped with front and rear access doors and sliding glass cover door for ease of loading and removal of file reels. The cabinet includes an AC power switch, Hubbel™ twist lock 3-wire receptacle with mate, and a fan with filter.

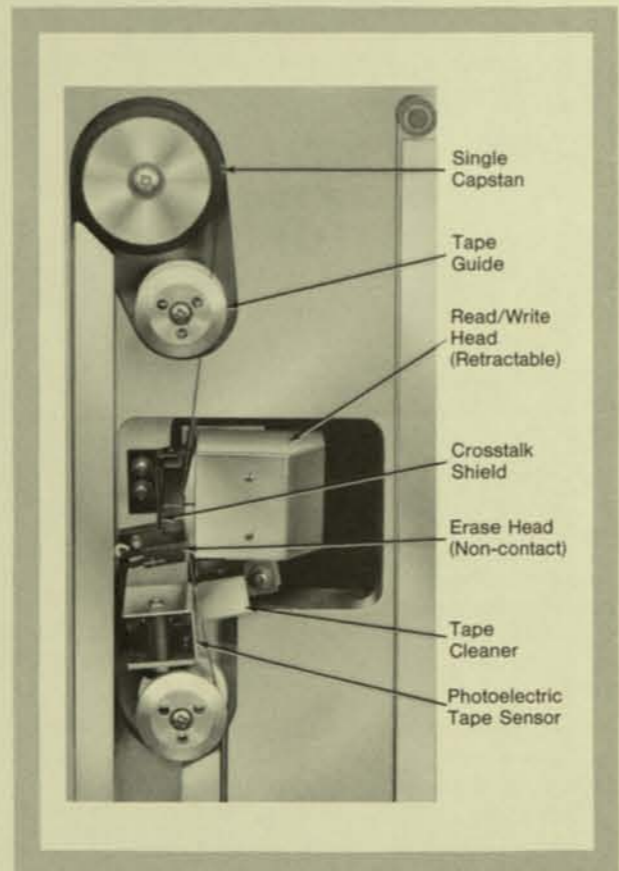
The cabinet will accommodate all transport components, drive electronics, power supply and accessories that comprise the system, as well as read/write electronics.



STANDARD POTTER COLORS ARE:
 Cabinet — Armorhide™ U621, Light Gray.
 Control Panel & Feature Strip — Armorhide U1169, Ocean Blue.
 Front Door & Dress Panels — Armorhide U242, Gray.



New Single-Capstan Tape Drive System and Direct Tape Path is Ultimate in Design Simplicity



Close-up of Precision Tape Guidance System

™Mylar is a trademark of E. I. du Pont de Nemours Company, Inc.
 ™Hubbel is a trademark of Harvey Hubbel, Inc.
 ™Armorhide is a trademark of J. L. Armitage Company

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Control of the tape path is maintained by a precision edge guidance system guaranteeing industry-compatibility. Data may be transferred to or from the

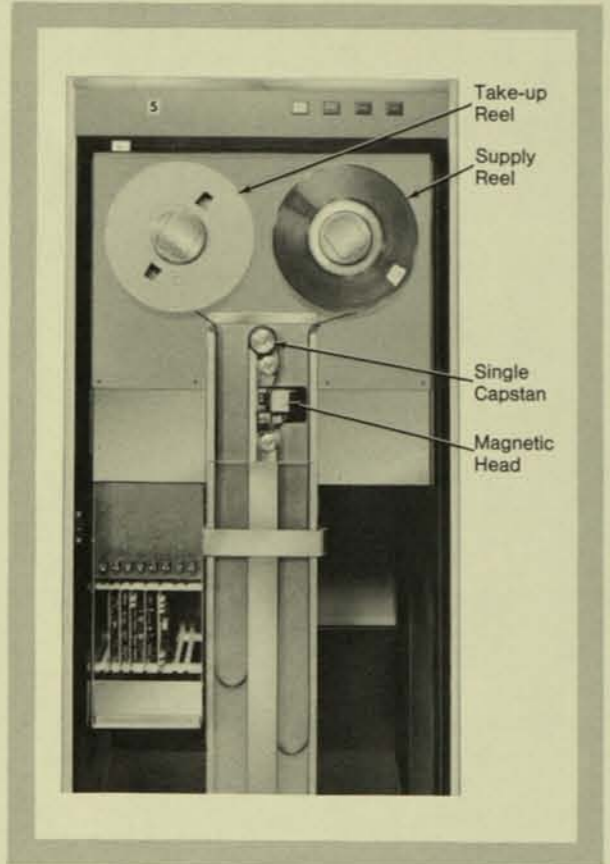
tape transport at standard bit densities of 200, 556, 800 bpi and 1600 cpi, Phase Encoded or at any other transfer rate up to 120 kc at 75 ips. Tape tension is uniform throughout the entire reel, resulting in a smooth, even pack.

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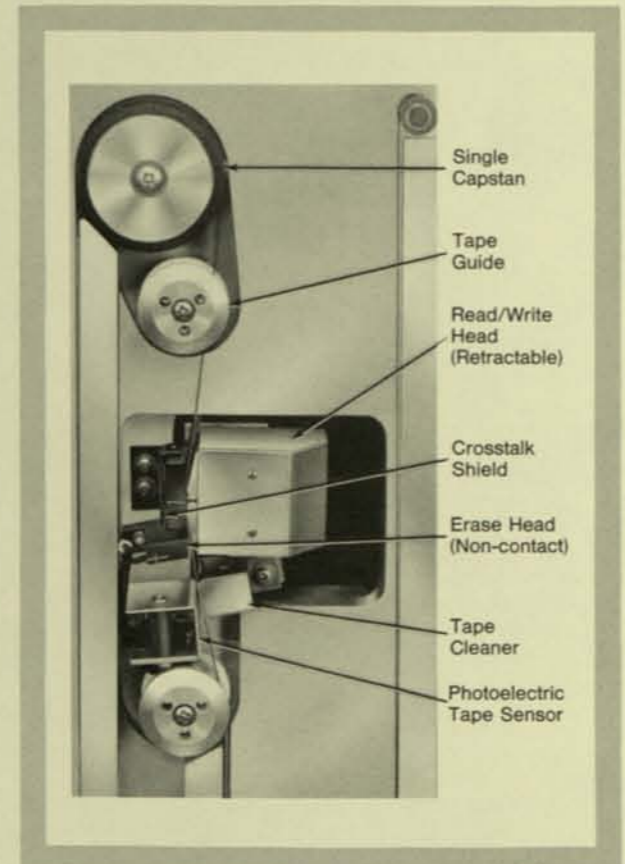
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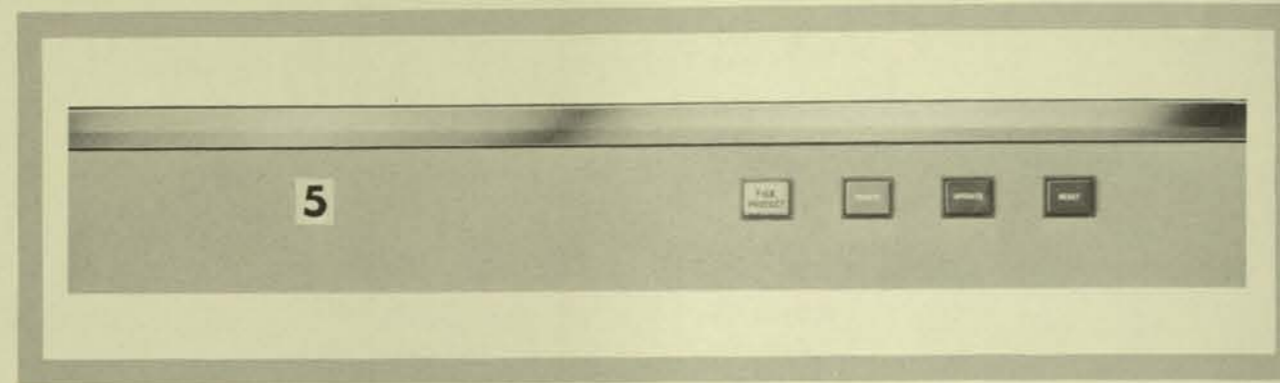
The tape is driven by passing the tape 180° around a neoprene coated metal capstan. Sufficient force is applied to the tape by the vacuum columns to preclude slippage of the tape with respect to the capstan. The capstan is directly driven from a high performance dc motor which utilizes a combination of



New Single-Capstan Tape Drive System and Direct Tape Path is Ultimate in Design Simplicity



Close-up of Precision Tape Guidance System



Operator Control Panel

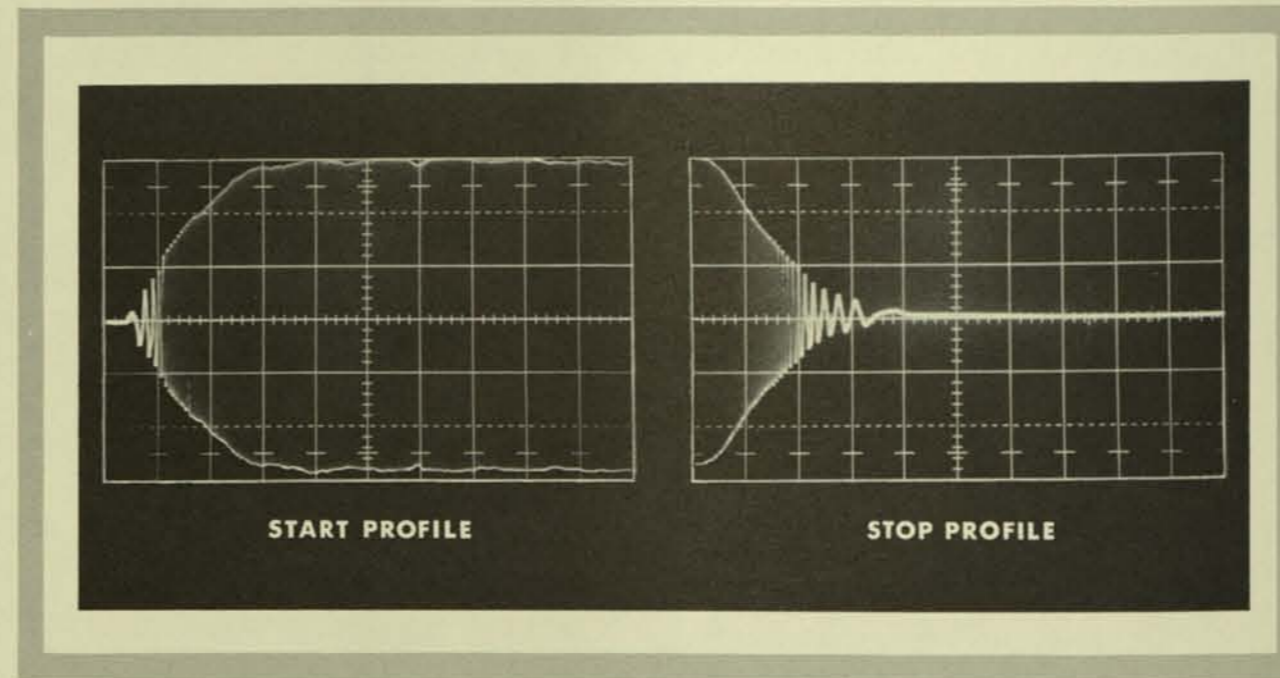
integrated and discrete solid state circuitry. Any sequence of commands, FWD/REV, FWD/STOP, or REV/STOP may be given with no intermediate delays up to a maximum of 150 commands/second. No longer are "stop-delays" or "FWD/REV delays" required. Internal circuitry "remembers" command sequences and executes them properly, eliminating any requirements in tape control units. Maximum input rate may be sustained up to 5 minutes at 75 ips.

THE READ/WRITE HEAD ASSEMBLY is mounted on a two-position hinged plate: retracted to permit vacuum column loading (position 1), or for rewind, and in contact with tape for reading and writing (position 2). This action is controlled by a cam controlled positioning motor. Special construction methods have been employed to insure repeated positioning accuracy. With a retractable read/write head,

both head and tape life are dramatically increased.

AN OPERATOR CONTROL PANEL provides the necessary indicators and switches for local operation. The local controls include FILE PROTECT, REMOTE, OPERATE, and RESET. The OPERATE pushbutton controls the load, unload and rewind modes. Mode selection is automatically determined by the transport. This simplified approach to operator control increases the unit's convenience, and decreases operator training time. The FILE PROTECT indicator depicts the presence of a write enable ring on the tape reel.

"CLOSED-LOOP" REEL SERVO SYSTEMS control tape position in the vacuum columns. Each reel has a corresponding vacuum column. Position is detected by photoelectric cells in the vacuum tank. These cells, through a servo amplifier, control the servo motor



Start/Stop Profiles at 75 ips (1ms/cm)

to pay out tape into, or take up tape from the vacuum columns as required to follow capstan movement.

Further simplicity and control is provided by the servo motor's dynamic braking system. This new system has eliminated mechanical brakes and adjustments and is fail-safe even if AC power is interrupted during high speed rewind. Tape is afforded maximum protection.

DRIVE ELECTRONICS are all solid-state silicon or integrated circuitry. No relays are used.

All circuits are mounted on removable printed circuit modules. Test points are provided where required for routine maintenance or service checks. The drive electronics include all modular power supplies required for transport operation.

RELIABILITY OF OPERATION is a prime requisite of computer peripheral equipment. The SC 1051 has been planned with this consideration receiving major attention. The mechanical design incorporates a minimum of moving parts with all electronic components derated to conservative levels. There are no mechanical adjustments, and only a minimum number of electrical adjustments are necessary in the operation of the SC 1051 tape transport. All normal and periodic service is accomplished from the front of the unit.

THE BASIC SC 1051 TRANSPORT consists of the following subassemblies:

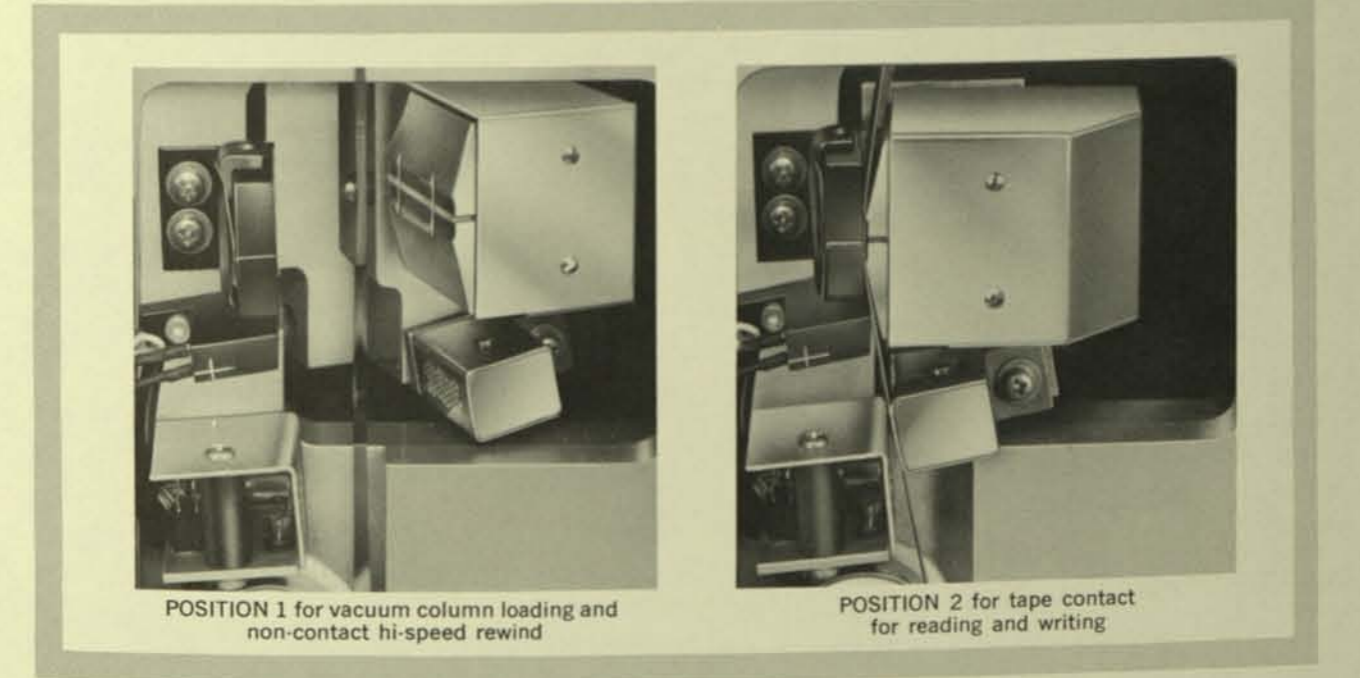
- Tape transport assembly including all tape drive components
- Transport drive electronics and power supply

- BOT/EOT sensors, photoreflexive IBM-type
- Master reel write lockout (file protect) IBM-type switch
- Operator control panel
- Retractable head mount
- Tape cleaner
- Two IBM-type QUICK-LOCK hubs
- One empty IBM-type plastic take-up reel
- Cabinet and cover door

OPTIONAL ACCESSORIES include:

- Dual gap read/write head assembly for 7-channel (IBM 729) operation
 - Dual gap read/write head assembly for 9-channel (IBM 2401 or ASCII) operation
 - Dual gap read/write head assembly for 9-channel PE 1600 cpi operation
 - Erase head
 - Maintenance control module
 - 208/230 Volt, 50 Hz Power
 - Special paint (paint supplied by customer)
- All Potter equipment is supplied with mating connectors.

For further information, write, wire, or call OEM Product Manager, Potter Instrument Company, Inc., East Bethpage Road, Plainview, N. Y. 11803. Telephone: (516) 694-9000. TWX: 510-224-6485. Cable: PICO.



Retractable Read/Write Head Assembly

SPECIFICATIONS

TAPE DRIVE	Single Capstan						
TAPE LOADING	In-line tape threading with automatic tape loading in less than 15 seconds. Automatic BOT searching						
TAPE SPEED	75 ips						
TAPE SPEED VARIATION (steady state)	±3%						
REWIND SPEED AND TIME (2400 ft. reel)	150 sec. maximum						
RECORDING DENSITY	200, 556, 800 bpi NRZI, 1600 cpi PE						
PROGRAM RESTRICTIONS	none; within IBM IRG specifications						
TYPICAL PERFORMANCE AT 75 IPS							
Start time (to within 10% of speed)	3.5 ms 0.150" ± .025"						
Start distance — inches175 ± .030						
Stop time (maximum)	3.5 ms 0.115" ± .020"						
Stop distance — inches160 ± .020						
Command repetition rate (max.)	150 command/sec. see text p. 2 "LOW INERTIA SINGLE CAPSTAN DRIVE" section						
SPEED STABILITY (long term 1 sec)	±3%						
(short term 15 ms)	±3%						
SKEW (½" tape) at 75 ips							
(a) Static usec	3 usec						
(b) Dynamic* usec							
guidance + reading all 1's tape	2.5 usec						
guidance + head + reading random tape	4.0 usec						
*The dynamic skew figure is specified when reading on the SC1051 a tape which has been generated on an IBM 2401 or for reading tapes on the IBM 2401 generated on the SC 1051							
TAPE WIDTH	½"						
TAPE TYPE	3M777, or equal; 1.5 mil Mylar						
TAPE REELS	Potter QUICK-LOCK IBM-compatible ½"						
REMOTE CONTROL INPUTS							
a. Logic Levels	Logic "0" = +5V Logic "1" = OV						
b. Input Commands							
Unit Select, Direction, Run, Rewind, Rewind and Unload							
STATUS REPLIES							
EOT/BOT, Ready, Unit Selected and Ready, Rewinding							
Write Lockout (Form C contact)							
ELECTRONICS	All control circuits fully transistorized or integrated, modular plug-in construction throughout						
SERVO CONTROL	All solid state with dynamic braking eliminating mechanical brakes						
ENVIRONMENTAL CONDITIONS							
Ambient Temperature — Operating (within tape characteristic)	45°F to 110°F						
Non-Operating	-30°F to 165°F						
Humidity	20% to 80% (without condensation)						
POWER	120V ± 10%, 60 Hz, single-phase 208/230V, 50 Hz Optional Power consumption at 120V: 6 amperes — Standby 7 amperes — Running 10 amperes — Peak (less than 100 ms)						
DIMENSIONS							
With Control Panel	<table border="0"> <tr> <td>Height</td> <td>Width</td> <td>Depth</td> </tr> <tr> <td>62½"</td> <td>27½"</td> <td>20"</td> </tr> </table>	Height	Width	Depth	62½"	27½"	20"
Height	Width	Depth					
62½"	27½"	20"					
WEIGHT	Transport with Cabinet						
U.L. APPROVAL PENDING	380 lbs. Approx. Underwriters' Laboratories U.L. Listing applied for.						



POTTER INSTRUMENT COMPANY, INC.

EAST BETHPAGE ROAD • PLAINVIEW, L.I., NEW YORK 11803 • (516) 694-9000

POTTER

SC-1030 LOW SPEED SINGLE-CAPSTAN TAPE TRANSPORT AND SYSTEM



D 81K

FEATURES

- Simplicity
- Low cost
- Bidirectional tape speed to 37.5 ips
- IBM 7-and 9-channel (IBM 360 and ASCII) capability
- Information density to 800 bpi, NRZI; 1600 bpi, (PE)
- Single capstan, vacuum-column tape drive for gentle tape handling
- Data reliability — oxide surface of tape touches no stationary surface except the read/write head and tape cleaner.
- Uniform tape tension.
- Permanent magnetic reel motors require no field supply, run cool.
- No delicate tachometers used.
- Electronic reel braking — no mechanical adjustments required.
- Simplicity in design assures long life . . . minimum servicing.

GENERAL DESCRIPTION

The Potter SC-1030 Single-Capstan, Magnetic Tape Transport is a low-cost unit designed for applications requiring moderate data transfer rates. It is particularly well suited for use with small and medium scale computers, in mass storage and sequential access applications for which high-performance transports cannot be justified.

The SC-1030 represents a new design in tape transports. The system is one in a family of the industry's highest performing, single-capstan tape transports.

SC-1030 is a vacuum-column transport capable of bidirectional tape speeds to 37.5 ips with no program restrictions. The entire transport assembly and drive electronics are packaged on a single rugged casting, thereby providing ease of mounting and utilizing minimum rack space.

The unit is IBM 7- or 9-channel compatible, with packing densities to 800 bpi, NRZI, and 1600 bpi phase encoded recording.

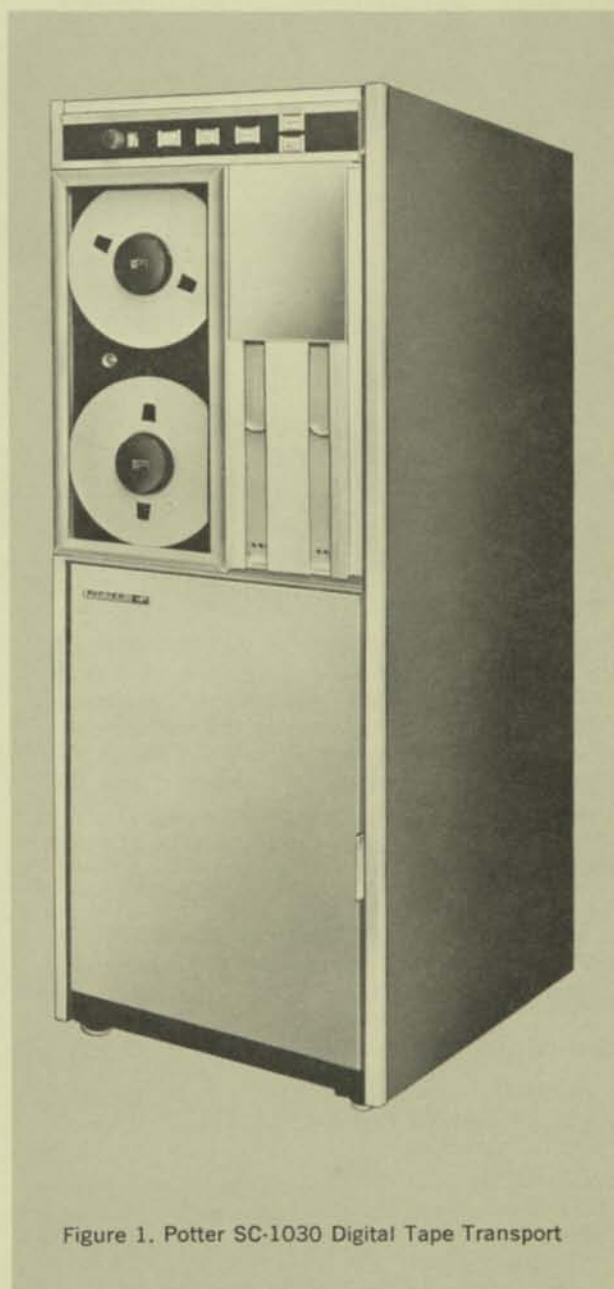


Figure 1. Potter SC-1030 Digital Tape Transport

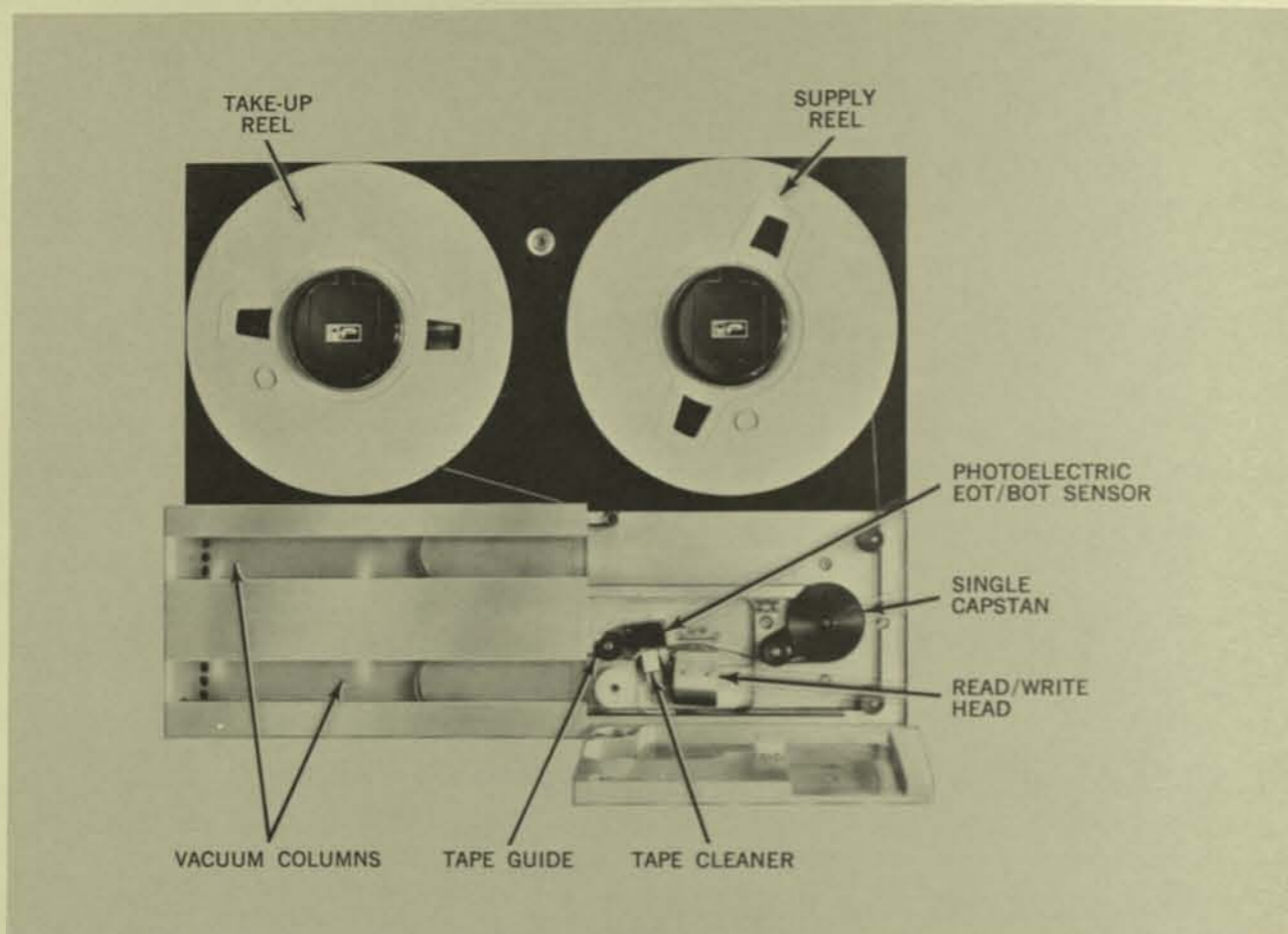


Figure 2. New Single-Capstan Vacuum-Column Tape Drive System is the ultimate in design simplicity. Transport can be vertically or horizontally (shown) mounted.

The tape path has been chosen so that the oxide side of the tape touches no fixed surface except the read/write head and tape cleaner. The Mylar™ surface of the tape is in constant contact with the non-slip drive capstan. Acceleration and deceleration of the tape is performed gently, resulting in maximum tape life.

The basic transport includes drive electronics, EOT/BOT photoreflexive sensors and QUICK-LOCK™ reel hubs.

Drive electronics feature integrated circuits in all logic and low power linear functions. With the exception of two germanium power drivers, all remaining electronics are silicon.

Horizontal and Vertical Mounting

The SC-1030 transport assembly can be supplied as a separate integral unit for both 24" horizontal or 19" vertical mounting.

The unit can be vertically mounted in Potter's standard CAB-250 cabinet. Special color combinations are available.

SEMI-AUTOMATIC TAPE LOADING

SC-1030 design utilizes a single capstan to drive the tape across the read/write head. After the tape is threaded and the load pushbutton is depressed, tape is

automatically drawn into the vacuum columns and driven to the LOAD point.

Potter's IBM-compatible QUICK-LOCK hubs enhance tape loading and provide minimum projection from the front of the transport.

LOW INERTIA CAPSTAN DRIVE

A low inertia drive provides rapid acceleration and deceleration while maintaining control of the tape on the capstan at all times.

The tape is driven (See Figure 3) by passing the tape 180° around a metal capstan coated with a resilient material. Sufficient tension is applied to the tape by the vacuum columns to preclude slippage of the tape with respect to the capstan.

The capstan is directly driven by a high-performance, low inertia motor. A combination of integrated and discrete drive circuitry controls the speed of the capstan. No tachometers or optical decoders are used. There are no program restrictions while reading or generating any combination of IBM-compatible blocks.

REEL SERVO SYSTEM

The tape position in the vacuum columns is controlled by two "bang-bang" servo amplifiers. Photoelec-

Mylar is a trademark of E. I. du Pont de Nemours Company, Inc.

QUICK-LOCK is a trademark of Potter Instrument Co. Inc.

SPECIFICATIONS

TAPE DRIVE	Single Capstan, Vacuum-Column		
TAPE LOADING	Semiautomatic tape loading in less than 15 seconds Automatic BOT searching		
TAPE SPEED (Standard)	37.5 ips, 30 ips, 25 ips Other tape speeds from 5 ips optional		
TAPE SPEED VARIATION (steady state)	37.5 ips 5% 25.0 ips 6% 10.0 ips 8%		
REWIND SPEED AND TIME (2400 ft. reel)	Less than 4 mins. for 2400' of tape		
PROGRAM RESTRICTIONS	None within IBM IRG specifications		
TYPICAL PERFORMANCE (37.5 ips)			
Start time (to within 10% of speed)	8 ms		
Start distance—inches	0.160 ± .025"		
Stop time (max)	7 ms		
Stop distance—inches	0.120 ± .020"		
Command Repetition rate	120 command/sec		
SKEW			
(a) Static	6 μsec, max (37.5 ips)		
(b) Dynamic**			
guidance + reading all I's tape	5 μsec peak		
guidance + head + reading random tape	8.0 μsec peak		
**The dynamic skew figure is specified when reading on the SC-1030 a tape which has been generated on an IBM-2401, or for reading tapes on the IBM-2401 generated on the SC-1030.			
TAPE WIDTH	1/2"		
TAPE TYPE	3M 8980 or equal; 1.5 mil Mylar		
TAPE REELS	Standard 10 1/2"		
REEL HUBS	Potter QUICK-LOCK IBM-compatible		
REMOTE CONTROL INPUTS			
a. Logic Levels 0/+5 standard			
b. Input Commands	Unit Select, Direction, Run, Rewind, Rewind & Unload		
STATUS REPLIES			
EOT/BOT, Selected and Ready, Rewinding			
Write Lockout (Form C contact)			
ELECTRONICS	All control circuits fully transistorized or integrated, modular plug-in construction throughout		
SERVO CONTROL	All solid state with dynamic braking.		
ENVIRONMENTAL CONDITIONS			
Ambient Temperature—Operating (within tape characteristics)	45°F to 110°F		
Non-Operating	-40°F to 165°F		
Humidity	20% to 80% (without condensation)		
POWER REQUIREMENT	115VAC ± 10%, 50/60 Hz, single-phase or 230VAC optional 4 amperes — Standby 5.0 amperes — Running 7.0 amperes — Peak (less than 100 ms)		
DIMENSIONS	Height	Width	Depth
Transport Assembly Only	24 1/2"	19"	11"
Manual Control	3 1/2"	19"	3"
WEIGHT			
Transport Only	130 lbs.		

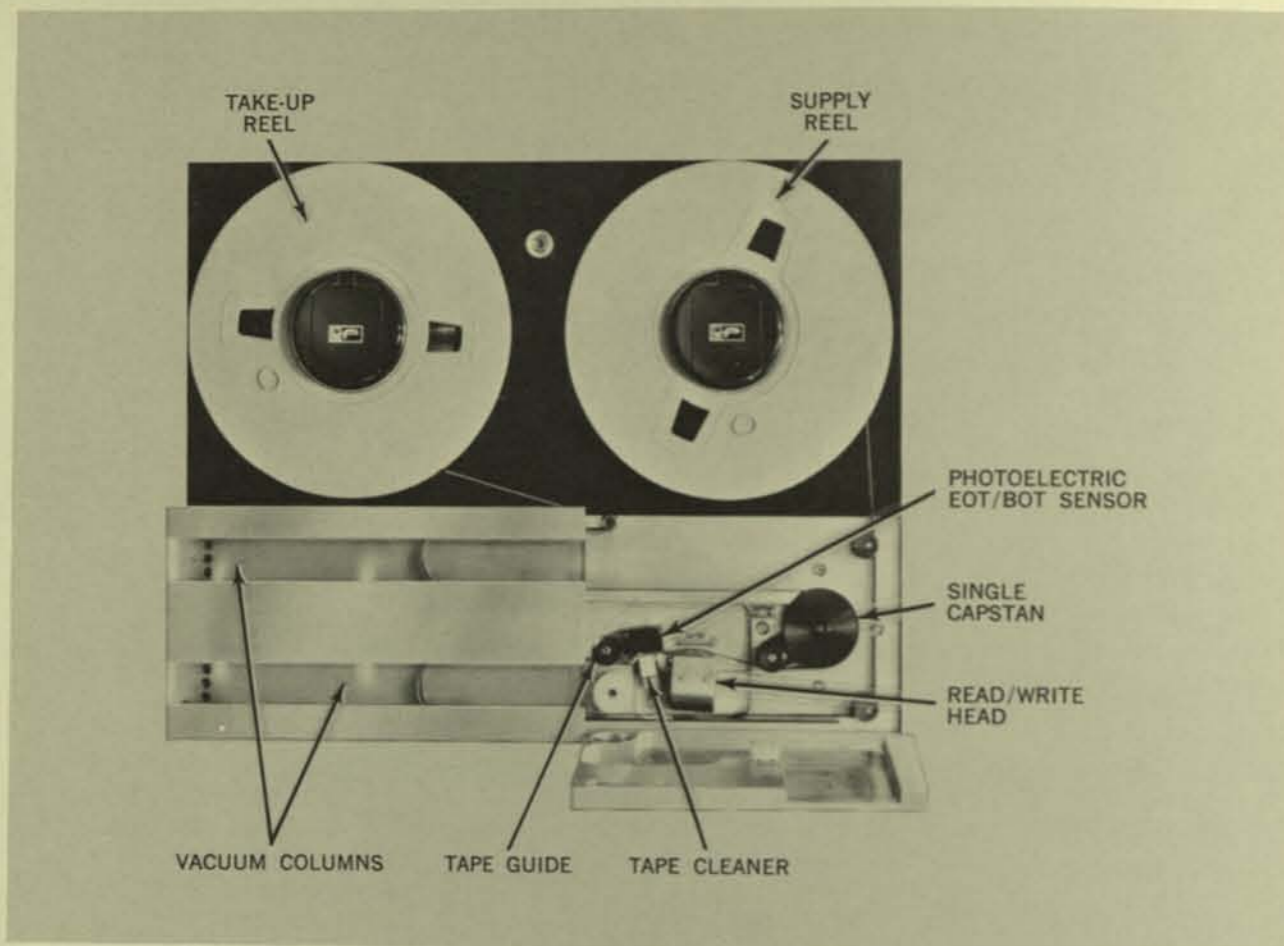


Figure 2. New Single-Capstan Vacuum-Column Tape Drive System is the ultimate in design simplicity. Transport can be vertically or horizontally (shown) mounted.

The tape path has been chosen so that the oxide side of the tape touches no fixed surface except the read/write head and tape cleaner. The Mylar™ surface of the tape is in constant contact with the non-slip drive capstan. Acceleration and deceleration of the tape is performed gently, resulting in maximum tape life.

The basic transport includes drive electronics, EOT/BOT photoreflexive sensors and QUICK-LOCK™ reel hubs.

Drive electronics feature integrated circuits in all logic and low power linear functions. With the exception of two germanium power drivers, all remaining electronics are silicon.

Horizontal and Vertical Mounting

The SC-1030 transport assembly can be supplied as a separate integral unit for both 24" horizontal or 19" vertical mounting.

The unit can be vertically mounted in Potter's standard CAB-250 cabinet. Special color combinations are available.

SEMI-AUTOMATIC TAPE LOADING

SC-1030 design utilizes a single capstan to drive the tape across the read/write head. After the tape is threaded and the load pushbutton is depressed, tape is

automatically drawn into the vacuum columns and driven to the LOAD point.

Potter's IBM-compatible QUICK-LOCK hubs enhance tape loading and provide minimum projection from the front of the transport.

LOW INERTIA CAPSTAN DRIVE

A low inertia drive provides rapid acceleration and deceleration while maintaining control of the tape on the capstan at all times.

The tape is driven (See Figure 3) by passing the tape 180° around a metal capstan coated with a resilient material. Sufficient tension is applied to the tape by the vacuum columns to preclude slippage of the tape with respect to the capstan.

The capstan is directly driven by a high-performance, low inertia motor. A combination of integrated and discrete drive circuitry controls the speed of the capstan. No tachometers or optical decoders are used. There are no program restrictions while reading or generating any combination of IBM-compatible blocks.

REEL SERVO SYSTEM

The tape position in the vacuum columns is controlled by two "bang-bang" servo amplifiers. Photoelec-

tric cells provide reliable control of tape loop movement. Mechanical brakes and adjustments are completely eliminated. No tachometers or other velocity sensors are required. Even if AC power is interrupted, all rotary components are brought to a controlled stop without tape damage, whether the transport is in normal operation or in high speed rewind. The permanent magnetic reel motors provide reliable performance and are not affected by line voltage variations.

Tape tension is uniform throughout the entire reel. All tape movement, including rewind, takes place with tape in the vacuum columns, thus maintaining uniform tape tension.

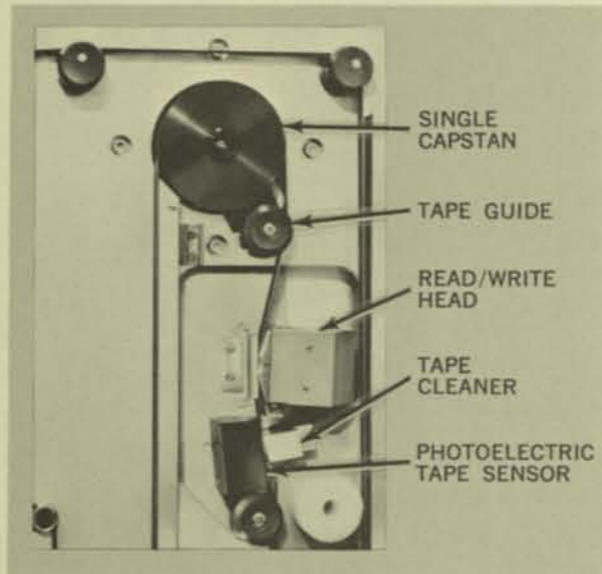


Figure 3. Precision Tape Guidance System

TAPE GUIDANCE SYSTEM

IN FORWARD/REVERSE OR REWIND OPERATION THE OXIDE TOUCHES NO STATIONARY SURFACE EXCEPT THE READ/WRITE HEAD AND TAPE CLEANER.

Control of the tape path is maintained by a precision edge guidance system guaranteeing IBM interchangeability. The guidance system consists of a spring-loaded edge guide located on each side of the read/write head. The guides are designed to minimize tape wear and the formation of wear particles, thus increasing both tape life and data reliability.

The tape guidance system enables tapes to be freely interchangeable with IBM series 729 and 2401 tape transports. Potter specifies the dynamic skew in terms of the IBM 2401-Mod 3 (see specification page 5).

DRIVE ELECTRONICS

Capstan and servo amplifiers of the SC-1030 use silicon solid-state components throughout. Integrated circuits are used for all logic function and low power linear applications. The drive electronics package includes all required power supplies, and servo amplifiers mounted on interchangeable plug-in modules.

Test points are provided on all modules for routine maintenance and service checks. All potentiometer adjustments are accessible with the modules in place.

RELIABILITY AND MAINTENANCE

All components and sub-systems are designed for maintenance-free operation, other than periodic cleaning of the head and the vacuum tanks.

No mechanical adjustments are required.

All components, including plug-in electronics modules, are mounted on the rear of the tape deck.

OPERATOR CONTROLS

Operator controls are available as an option. The control panel (Figure 4), can be located directly above the transport. Indicators show the status of the system under local command conditions. Illuminated push button controls include: RESET, LOAD/REWIND, REMOTE, and UNIT SELECT (Rotary Switch).

In addition, the following indicators are provided: EOT/WRITE ENABLE.

EQUIPMENT

The basic Potter SC-1030 transport consists of the following subassemblies:

- The tape transport assembly including all tape drive components
- Solid-state drive electronics and regulated power supply
- Beginning-of-tape (BOT) and End-of-Tape (EOT) sensors, photoreflexive IBM-compatible, plus amplifier.
- IBM-compatible QUICK-LOCK hubs
- One empty IBM-type plastic take-up reel
- Standard panel color — Black

Optional Accessories

- Operator control panel with address select switch (8 position)
- Master reel write lockout (file protect), IBM-type switch
- Tape cleaner
- Dual gap read/write head assembly for 7-channel (IBM 729 operation: 0.048 inch write and 0.030 inch read tracks on 0.070 inch centers. Gap spacing 0.300 inch
- Dual gap read/write head assembly for 9-channel (IBM 2401 or ASCII) operation: 0.044 inch write and 0.040 inch read tracks on 0.055 inch centers. Gap spacing: 0.300"
- Erase head
- Maintenance Control Module
- Dust cover
- 190-250 VAC power kit
- Cabinet (incl. dust cover, access doors, mounting and cabling. Optional Accessories: jacks and casters, fan, power panel and outlets and door interlock.

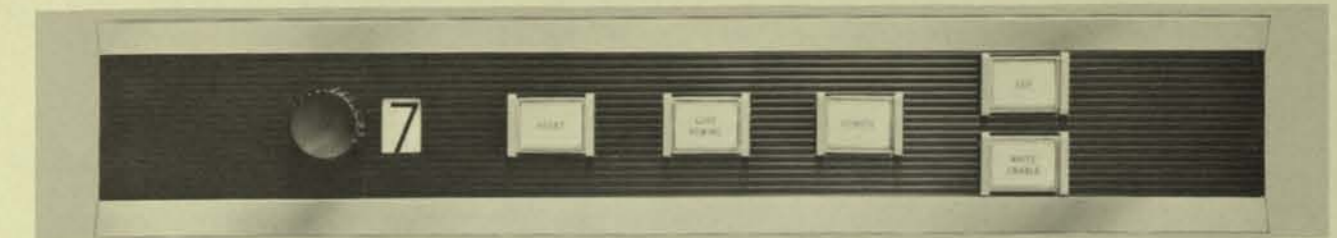


Figure 4. Operator Control Panel

ACCESSORIES

Read/Write Heads and Erase Heads

The dual-gap read/write head assembly uses an all-metal flush surface housing for longer life and greater reliability. The precision-built, fully interchangeable head requires no mechanical adjustments and can readily be replaced by field personnel.

A complete selection of IBM-compatible 7 and 9-channel assemblies is available.

The electrical characteristics of the head have been designed to be compatible with Potter's standard MA-series amplifiers, and comply with all requirements for 200/556/800 bpi operation.

The erase head is a separate component mounted on the head block assembly. The erase head is operated out of contact with the tape and is required on all recording systems.

Reels and Hubs

Potter IBM-compatible QUICK-LOCK hub assemblies, standard on the SC-1030, provide ease of tape loading and minimum projection from the front panel of the transport.

Tape Cleaner

A tape cleaner is located on the supply side of the magnetic head.

Write Lockout

A write lockout, or file protect switch is available (Form C contact).

EOT/BOT Sensing (Standard)

A dual-channel photoelectric sensor is provided im-

mediately adjacent to the read/write head assembly to detect the presence of standard photoreflexive marker strips, indicating load point and end-of-tape positions. An amplifier with logic level output is provided on BOT; a flip-flop memorizes passing of EOT marker.

MAINTENANCE CONTROL MODULE

The Maintenance Control Module allows the unit to be cycled in the FORWARD and REVERSE directions at a rate of 1 to 150 commands-per-second; or allows the machine to run in a continuous mode in the FORWARD or REVERSE direction, with automatic stopping provided at EOT and BOT markers.

The module also includes an all "1" pattern generation to facilitate amplifier deskewing at densities of 200, 556, 800 and 1600 bpi.

READ-WRITE ELECTRONICS

Read/write amplifiers are available to accommodate packing densities up to 800 bpi and data transfer rates up to 30 kc.

Each read/write electronics assembly contains:

- up to 9 read-write amplifier channels
- clock generator
- write inhibit electrical switching
- erase head control
- head compensation for read/write (as required)

CABINET

Potter can offer a variety of cabinet styles to satisfy system packaging of the transport, manual control and read/write electronics.

Cabinets are supplied with Potter colors or can be finished to customer specifications.



Figure 5. QUICK-LOCK Hub

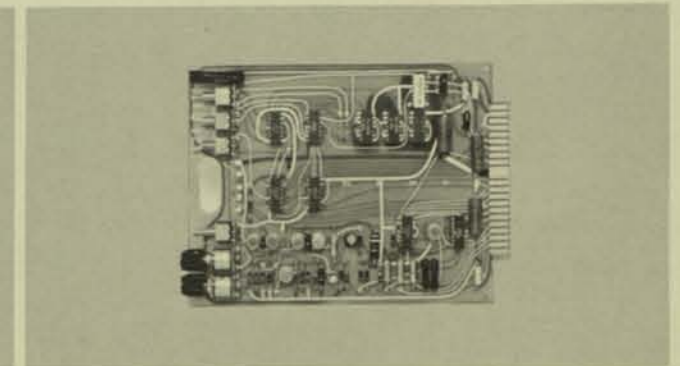


Figure 6. Maintenance Control Module

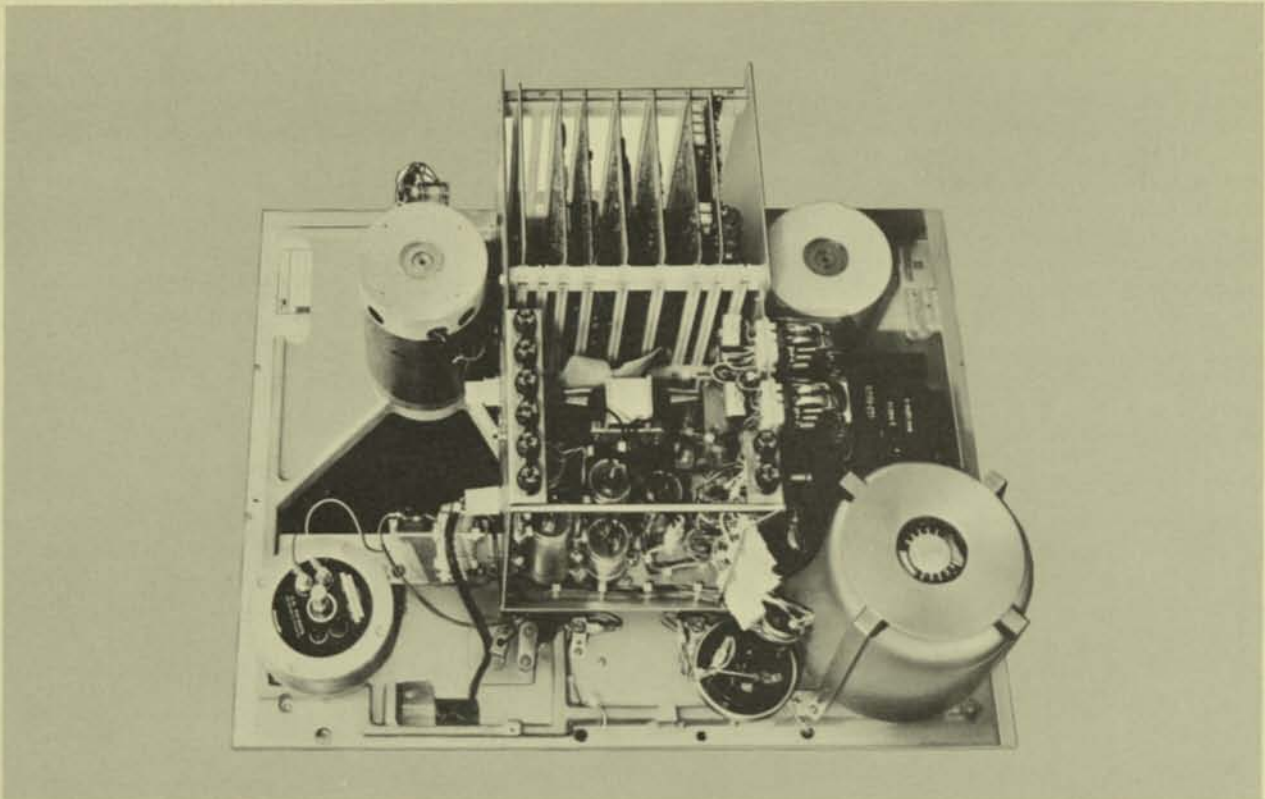


Figure 7. Rear view of SC-1030 Tape Transport

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POTTER

PRODUCT
DATA
1-221

AT-1082 AUTOMATIC THREADING TAPE TRANSPORT



MAR 7 1973

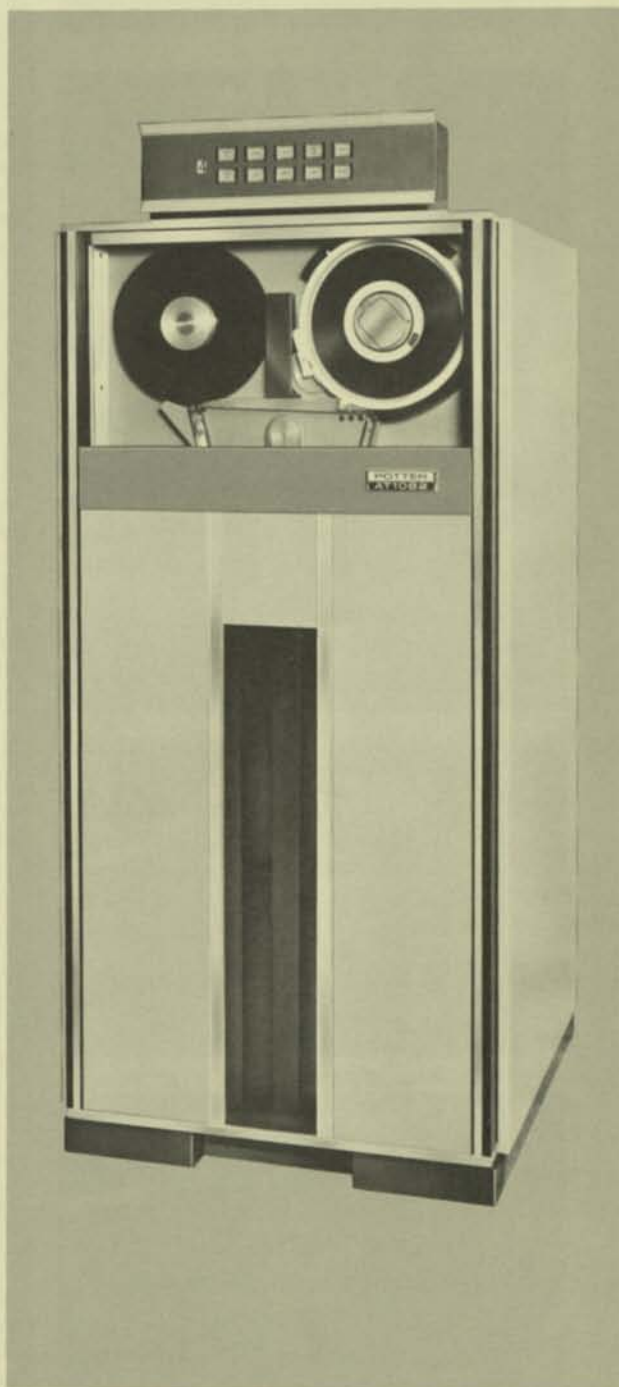
FEATURES

- Fully automatic tape threading—stops on Load Point
- Single Capstan tape drive
- Any bi-directional tape speed up to 150 ips (3,8 m/s)
- Retractable read/write head
- IBM 7- and 9-channel (IBM 360) compatible
- Speed tolerance $\pm 2\%$
- Information density to 800 bpi (NRZI) 1600 bpi (PE)
- Long term data reliability—only surface in contact with oxide is read/write head. Head retracts during rewind.
- Hard Coat head assembly virtually eliminates head wear
- No mechanical adjustments
- Photoelectric tape position sensors
- All solid-state servo controls
- Long life — minimum servicing
- U.L. approval will be made available

GENERAL DESCRIPTION

The Potter AT-1082 is the industry's lowest cost, high performance self threading tape transport. This transport records and reproduces industry compatible data in seven and nine channel formats at any bit density up to 800 bpi NRZI and 1600 bpi Phase Encoded. The AT-1082 is capable of bi-directional tape speeds of up to 150 ips (3,8 m/s). It is totally compatible with IBM 729, 2401 and 2420 Tape Transports at all recording densities.

Designed for use with the highest performance computer systems, the AT-1082 features operator convenience, high transfer rate and high-speed rewind. The simplicity of design provides an outstanding long-term data and machine reliability while eliminating mechanical adjustments and reducing maintenance to a minimum.



EFFECTIVE: January 31, 1971

TAPE LOADING AND THREADING

Tape loading of this Potter unit is one of the fastest and easiest in the industry. During the Loading Operation, the operator simply mounts the tape cartridge or tape reel on the supply reel QUICK-LOCK™ hub assembly and depresses the LOAD pushbutton. When the cartridge is used it is automatically opened under machine control. Through the use of gentle air pressure and vacuum, the tape is automatically threaded onto the take-up reel. At the same time, the vertically sliding power window closes. When sufficient tape is wound on the take-up reel, tape is pulled into the vacuum tanks, the head is positioned and the tape is advanced to the LOAD POINT. The transport is then switched from LOCAL to REMOTE.

In the event the transport fails to load during cartridge operation, the tape retracts on the supply reel and a fully automatic LOAD re-try is then implemented. If the second try is unsuccessful, the tape retracts, the Load Check Indicator lights and the unit comes to a halt. When no cartridge is in use, the transport stops if the tape fails to thread on the first try.

TAPE PATH

In normal forward/reverse operation, the oxide surface of the tape touches no surface except the read/write head. The Mylar™ backing of the tape is gently guided to eliminate wear particles and to increase tape line and data reliability. During rewind, the read/write head is retracted and the tape is kept in the vacuum columns to maintain proper tension.

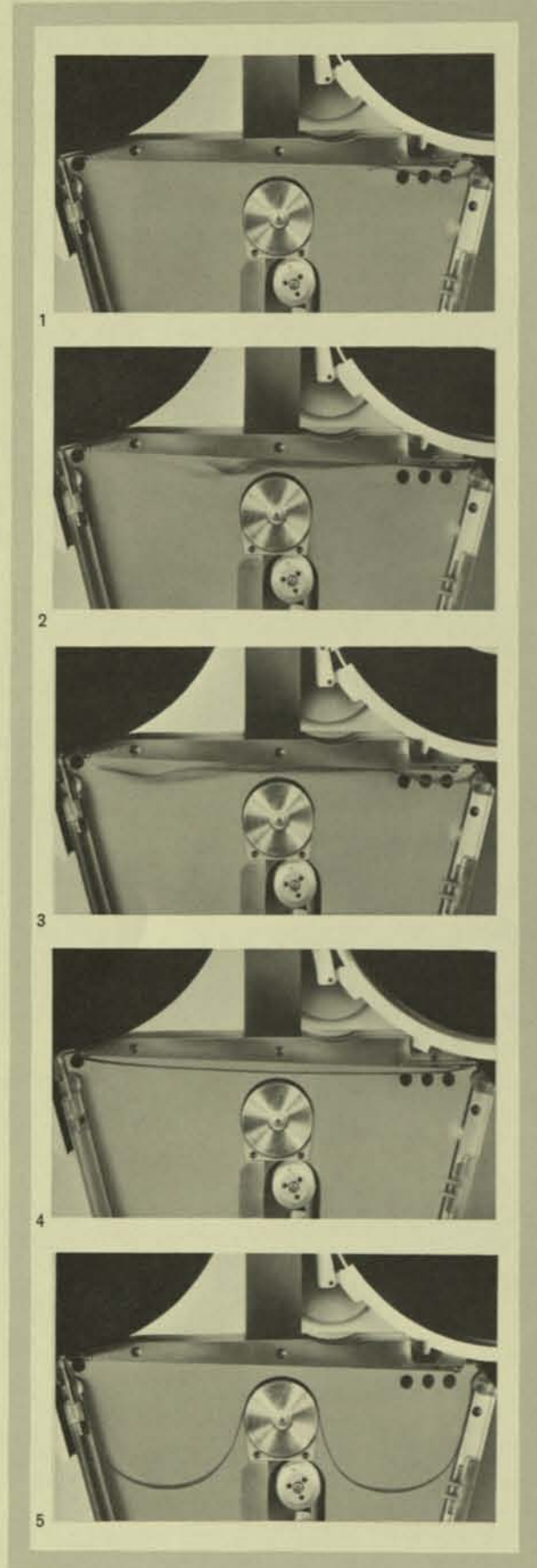


Figure 2. Automatic Tape Threading Sequence Shown in Operation

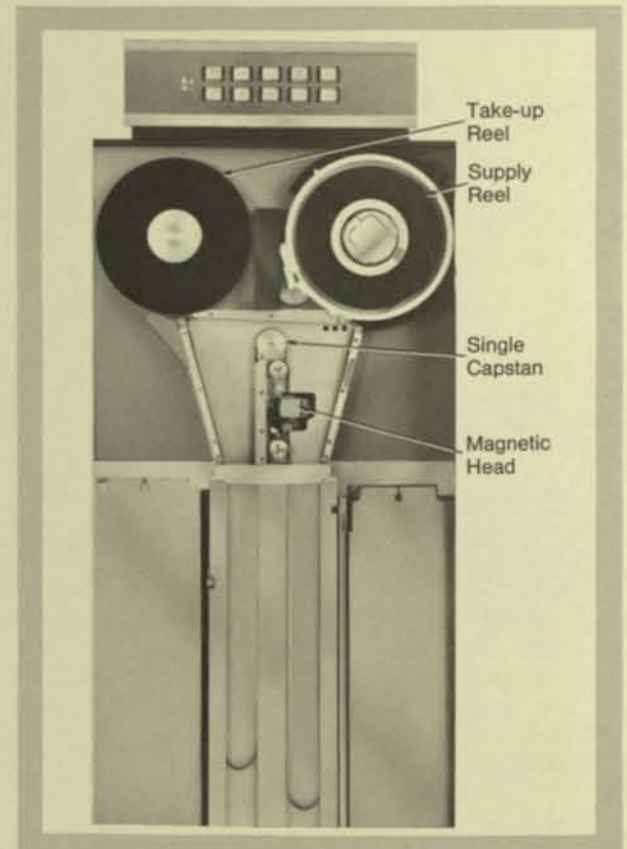


Figure 3. New Single-Capstan Tape Drive System and Direct Tape Path is Ultimate in Design Simplicity

™QUICK-LOCK is a trademark of Potter Instrument Company, Inc.
 ™Mylar is a trademark of E. I. du Pont de Nemours Company, Inc.

ACCESSORIES

Dual-Gap Read/Write Head

The dual gap read/write head assembly is supplied with Potter's exclusive Hard Coat surface treatment which virtually eliminates head wear, and dramatically reduces the continual need for amplifier adjustments due to head wear. The head assembly, designed for operation at transfer rates to 240 KHz (150 ips and 1600 bpi), is non-adjustable and can be replaced by normally skilled maintenance personnel.

A complete selection of Hard Coat Magnetic Heads is available, including heads for IBM 7- or 9-channel format. Dual gap read/write head assembly for 7-channel (IBM 729) operation: 0.048 inch write and 0.030 inch read tracks on 0.070 inch centers. Gap spacing 0.300 inch. Dual gap read/write head assembly for 9-channel (IBM 2401) operation: 0.044 inch write and 0.040 inch read tracks on 0.055 inch centers. Gap spacing 0.150 inch.

Reel and Hub Assemblies

Potter's compatible QUICK-LOCK® hub assembly, a standard feature on the AT-1082, provides simple loading and enhances operator convenience.

EOT/BOT Sensing

A dual channel photoelectric sensor is provided immediately adjacent to the read/write head assembly to detect the presence of standard photorefective strips attached to the Mylar side of the tape for indicating the Load Point and End-of-Tape positions. A two-channel amplifier with logic level outputs is provided.

Write Lockout (File Protect)

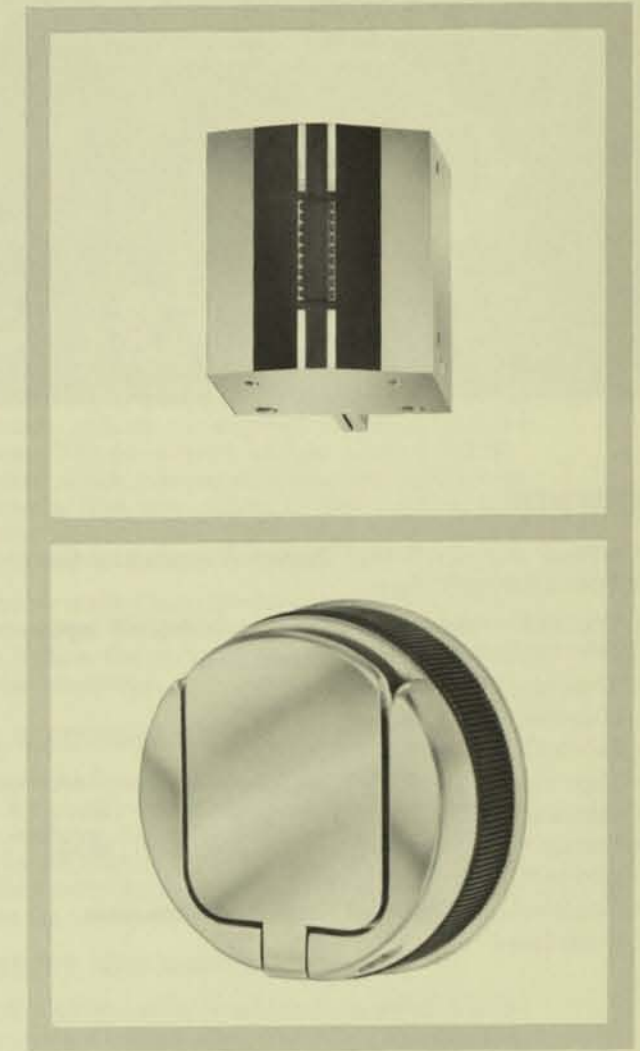
A non-contact write lockout, or file protect, switch is mounted at the supply reel hub. A single form "C" contact is brought to the transport interface connector. This switch is connected to Potter MA series amplifiers to provide automatic write inhibit.

READ-WRITE ELECTRONICS

Standard read/write amplifiers are available to accommodate packing densities up to 800 bpi (NRZI) and 1600 bpi (PE). The amplifiers, designed on a modular basis, can be customized to comply with unique customer requirements.

Variations include:

- Complete NRZI and PE amplifiers for single transport application in parallel operation.
- Daisy-chained amplifiers with common electronics for both NRZI and PE.
- Complete PE system typically includes up to a one-by-eight channel transport system. The phase encoded channel includes coding/decoding, envelope check, preamble and postamble validity check, error correction, file recognition, and miscellaneous "housekeeping" functions.



CABINET (Standard with AT-1082)

The newly styled modular cabinet with tubular steel frame is equipped with front and rear service access doors. A power operated, sliding glass cover door provides ease of loading and removal of file reels. The cabinet includes door interlock and cabinet fan with filter.

The cabinet will accommodate all transport components, drive electronics, power supply and read/write electronics as well as accessories that comprise the system.

Standard Colors

Cabinet — ARMORHIDE™ Light Gray #U621

Control Panel and Trim — ARMORHIDE Ocean Blue #U1169

Transport and Front Door Panels — ARMORHIDE Light Gray #U242

Special paint available.

™Armorhide is a registered trademark of J. L. Armitage Co.

TAPE LOADING AND THREADING

Tape loading of this Potter unit is one of the fastest and easiest in the industry. During the Loading Operation, the operator simply mounts the tape cartridge or tape reel on the supply reel QUICK-LOCK™ hub assembly and depresses the LOAD pushbutton. When the cartridge is used it is automatically opened under machine control. Through the use of gentle air pressure and vacuum, the tape is automatically threaded onto the take-up reel. At the same time, the vertically sliding power window closes. When sufficient tape is wound on the take-up reel, tape is pulled into the vacuum tanks, the head is positioned and the tape is advanced to the LOAD POINT. The transport is then switched from LOCAL to REMOTE.

In the event the transport fails to load during cartridge operation, the tape retracts on the supply reel and a fully automatic LOAD re-try is then implemented. If the second try is unsuccessful, the tape retracts, the Load Check Indicator lights and the unit comes to a halt. When no cartridge is in use, the transport stops if the tape fails to thread on the first try.

TAPE PATH

In normal forward/reverse operation, the oxide surface of the tape touches no surface except the read/write head. The Mylar™ backing of the tape is gently guided to eliminate wear particles and to increase tape line and data reliability. During rewind, the read/write head is retracted and the tape is kept in the vacuum columns to maintain proper tension.

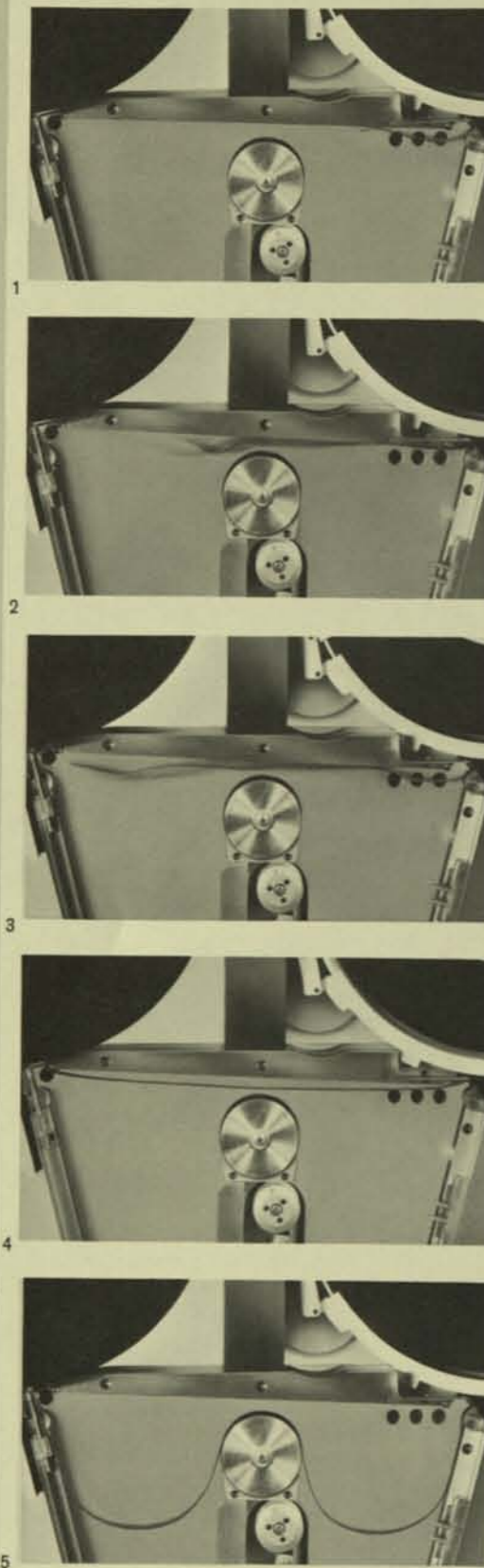


Figure 2. Automatic Tape Threading Sequence Shown in Operation

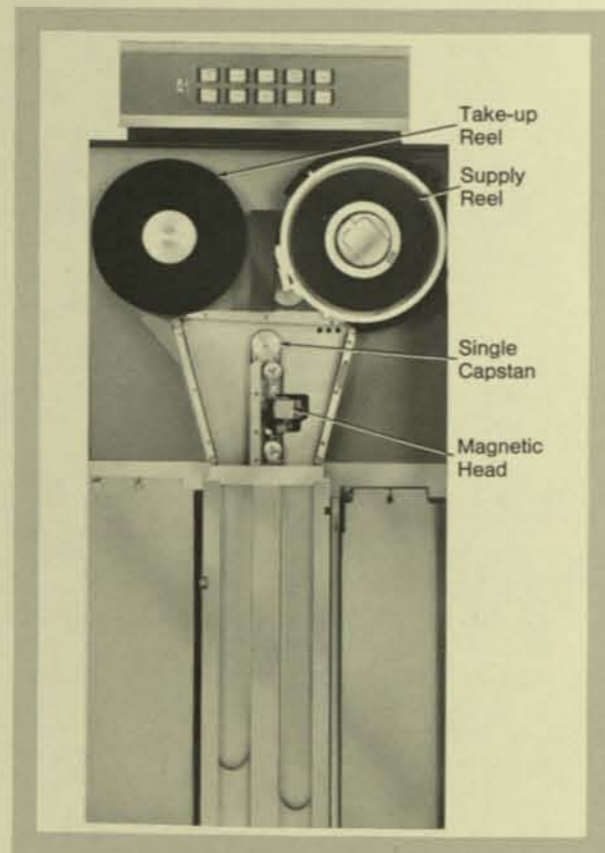
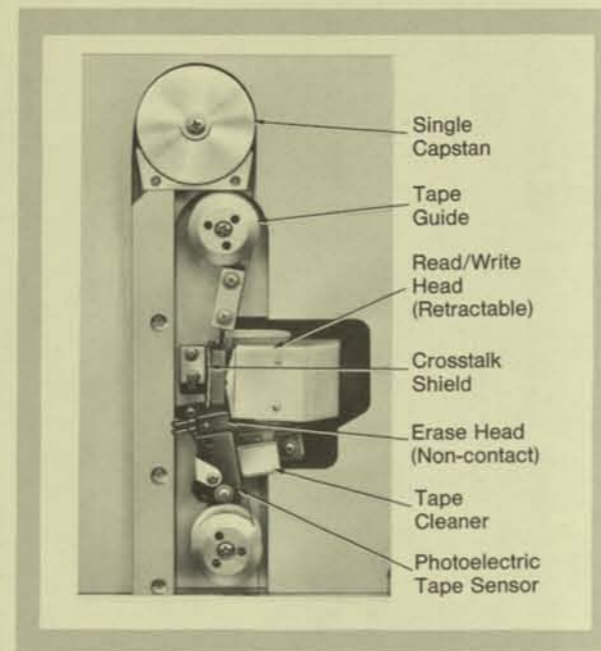


Figure 3. New Single-Capstan Tape Drive System and Direct Tape Path is Ultimate in Design Simplicity

™QUICK-LOCK is a trademark of Potter Instrument Company, Inc.
™Mylar is a trademark of E. I. du Pont de Nemours Company, Inc.



TAPE GUIDANCE

The precision edge guidance system on the AT-1082 was designed to meet precisely the industry standards. This insures complete tape interchangeability with the most widely used tape systems, both NRZI and PE. See the "Specifications" section for complete details.

LOW INERTIA CAPSTAN DRIVE

A low inertia drive provides rapid linear acceleration and deceleration while maintaining control of the tape on the capstan at all times.

The tape is driven as shown in Figure 4 by passing the tape 180° around a metal capstan coated with a resilient material. Sufficient force is applied to the Mylar side of the tape by the vacuum capstan to preclude slippage of the tape with respect to the capstan.

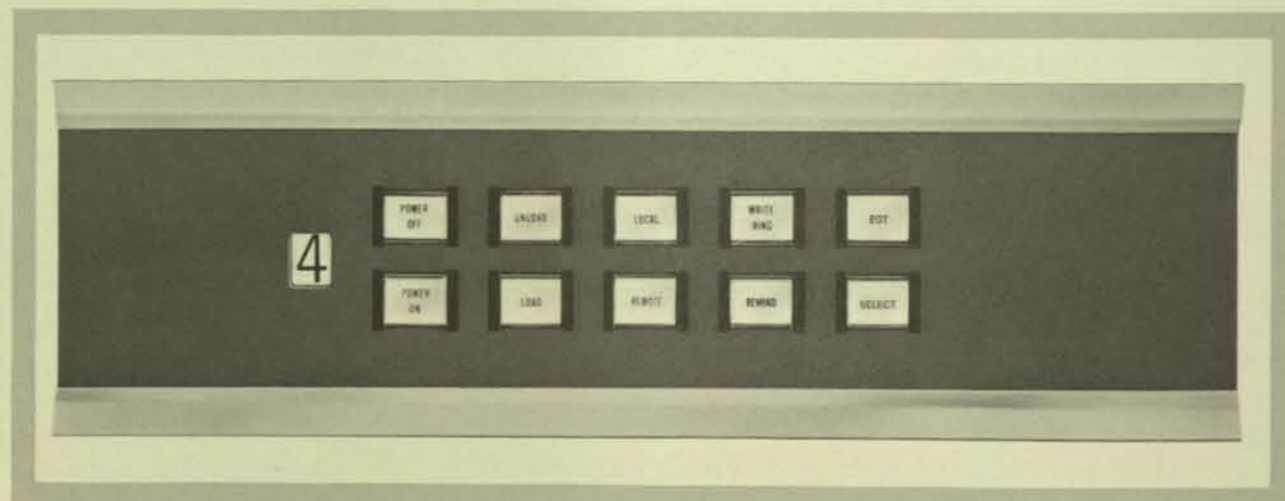


Figure 5. Operator Control Panel

The capstan is directly driven from a high-performance dc motor. Any sequence of commands; FWD/REV, FWD/STOP or REV/STOP may be given with no intermediate delays up to a maximum of 200 commands/second. No longer are "stop-delays" or "FWD/REV delays" required. Maximum command rate may be sustained up to 5 minutes at 150 ips (3.8 m/s).

REEL SERVOS

The tape position in the vacuum columns is controlled by two "closed-loop" servo systems, one column for the left reel and one column for the right reel. Position is detected by photoelectric cells in the tank which drive the servo amplifier to control the servo motor to pay out tape into, or take up tape from the vacuum column as required to follow capstan movement. The servo motor utilizes a dynamic braking system which eliminates mechanical brakes and adjustments. The new system is "fail safe" even if AC power is interrupted during high-speed rewind, providing maximum tape protection.

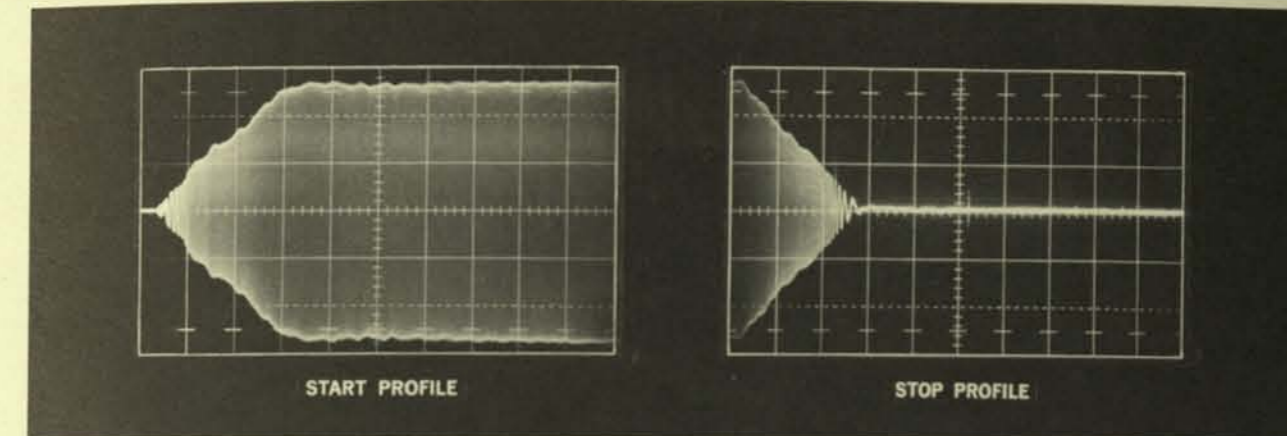
An operator control panel provides for local operation and indication. Indicators and switches as shown in Figure 5 show the status of the system under local or remote conditions.

DRIVE ELECTRONICS

Drive electronics are all solid-state or integrated circuitry. All circuits are mounted on removable printed circuit modules. Test points are provided where required for routine maintenance or service checks. The drive electronics include all modular power supplies required for transport operation.

RELIABILITY AND MAINTENANCE

Reliability of operation is a prime requisite of computer peripheral equipment. The AT-1082 has been planned with this consideration receiving major attention. The mechanical design incorporates a minimum of moving parts. All electronic components are derated to conservative levels. Only a minimum number of electrical and mechanical adjustments are necessary in the operation of the AT-1082 Transport.



EQUIPMENT

The basic Potter AT-1082 Transport consists of the following subassemblies:

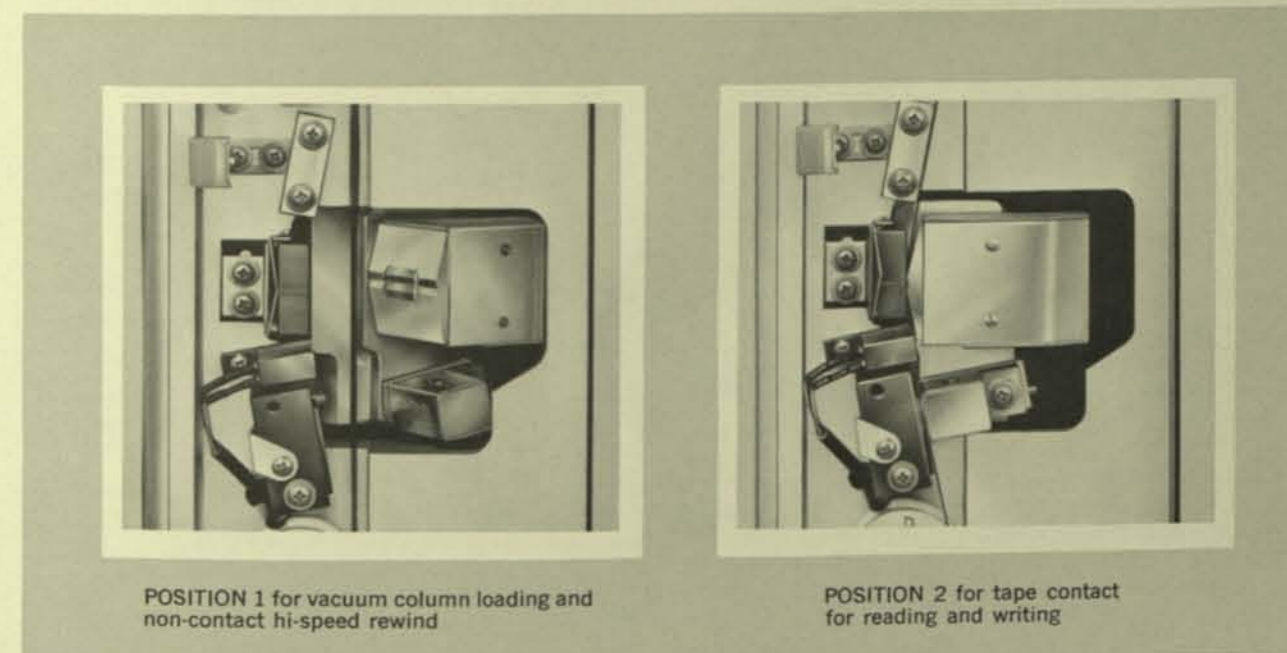
- The tape transport assembly including all tape drive components
- Transport Drive Electronics
- Retractable Head Mount
- Safety Glass Dust Cover
- Tape Cleaner
- Operator Control Panel
- Master Reel Write Lockout, (File Protect), IBM-type switch
- Single or Dual Gap Read/Write Head Assembly
- Erase Head

- 60 Hz, 208/230 VAC Input Power
- Cabinet with filtered air blower

All Potter equipment is supplied with mating connectors.

NEW RETRACTABLE HEAD PROVIDES FOR LONGER LIFE

The read/write head assembly is mounted on a 2-position hinged plate: retracted to permit vacuum column loading and for rewind (position 1), and in contact with tape for reading and writing (position 2). This action is controlled by a cam controlled positioning motor. Special construction methods have been employed to insure repeated positioning accuracy.



POSITION 1 for vacuum column loading and non-contact hi-speed rewind

POSITION 2 for tape contact for reading and writing

Figure 7. Retractable Read/Write Head Assembly

SPECIFICATIONS

TAPE DRIVE	Single Capstan															
TAPE LOADING	Fully automatic tape threading and loading in less than 8 seconds Automatic BOT searching															
TAPE SPEED 1/2 INCH	Standard speeds 75, 100, 112.5, 120, 150 ips (1.9; 2.5; 2.8; 3.0; 3.8 m/s) Any other speed between 75 (1.9 m/s) and 150 ips (3.8 m/s) optional															
TAPE SPEED VARIATION (steady state)	±2%															
REWIND SPEED AND TIME (2400 ft. reel)	100 sec max.															
PACKING DENSITY	200, 556, 800 cpi NRZI 1600 bpi PE															
TYPICAL PERFORMANCE (1/2 inch 1.5 mil Mylar)																
	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="text-align: center;">75 ips (1.9 m/s)</th> <th style="text-align: center;">112.5 ips (2.9 m/s)</th> <th style="text-align: center;">150 ips (3.8 m/s)</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">5 ms</td> <td style="text-align: center;">4 ms</td> <td style="text-align: center;">3.25 ms</td> </tr> <tr> <td style="text-align: center;">.185±.020 (.467±.051)</td> <td style="text-align: center;">.225±.025 (.572±.064)</td> <td style="text-align: center;">.225±.025 (.572±.064)</td> </tr> <tr> <td style="text-align: center;">5 ms</td> <td style="text-align: center;">4 ms</td> <td style="text-align: center;">3.25 ms</td> </tr> <tr> <td style="text-align: center;">.160±.020 (.406±.051)</td> <td style="text-align: center;">.200±.020 (.508±.051)</td> <td style="text-align: center;">.210±.020 (.533±.051)</td> </tr> </tbody> </table>	75 ips (1.9 m/s)	112.5 ips (2.9 m/s)	150 ips (3.8 m/s)	5 ms	4 ms	3.25 ms	.185±.020 (.467±.051)	.225±.025 (.572±.064)	.225±.025 (.572±.064)	5 ms	4 ms	3.25 ms	.160±.020 (.406±.051)	.200±.020 (.508±.051)	.210±.020 (.533±.051)
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.160±.020 (.406±.051)	.200±.020 (.508±.051)	.210±.020 (.533±.051)														
Start time (to within 10% of speed)																
Start distance — inches/cm																
Stop time (max)																
Stop distance — inches/cm																
Command Repetition rate (max)	200 command/sec															
SPEED STABILITY (long term 1 sec)	±2%															
(short term 15 ms)	±2%															
SKEW																
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3 usec	2 usec	1.5 usec														
2.5 usec	1.5 usec	1.2 usec														
4.0 usec	2.5 usec	2.0 usec														
(a) Static usec																
(b) Dynamic* usec peak																
guidance + reading all 1's tape																
guidance + head + reading random tape																
*The dynamic skew figure is specified when reading a tape on the AT-1082 which has been generated on an IBM 2400 Series or for reading tapes on the IBM 2400 Series generated on the AT-1082.																
TAPE WIDTH	1/2"															
TAPE TYPE	3M777 or equal; 1.5 mil Mylar															
TAPE REELS	Standard 10 1/2"															
REEL HUBS	Potter QUICK-LOCK IBM-compatible 1/2"															
REMOTE CONTROL INPUTS																
a. Logic Levels: Logic "0" = +5 Volts Logic "1" = 0 Volts																
b. Input Commands Unit Select, Direction, Run, Rewind, Rewind and Unload																
STATUS REPLIES EOT/BOT, Ready, Unit Selected and Ready, Rewinding, Write Lockout (Form C contact)																
ELECTRONICS	All control circuits fully transistorized or integrated, modular plug-in construction throughout															
SERVO CONTROL	All solid state with dynamic braking eliminating mechanical brakes															
ENVIRONMENTAL CONDITIONS																
Ambient Temperature-Operating (within tape characteristics)	45°F to 110°F -30°F to 165°F															
Non-Operating	20% to 80% (without condensation)															
Humidity																
POWER	208/230V AC, 50/60 Hz single-phase or 120V AC optional 6 amperes — Standby 7 amperes — Running 10 amperes — Peak (less than 100 ms)															
DIMENSIONS	68"H (1.7 m) x 29"W (0.7 m) x 29"D (0.7 m)															
WEIGHT	700 lbs. approx. (318 Kg)															



POTTER INSTRUMENT COMPANY, INC.

EAST BETHPAGE ROAD • PLAINVIEW, L.I., NEW YORK 11803 • (516) 694-9000

MA 751 READ/WRITE SWITCHING AMPLIFIER



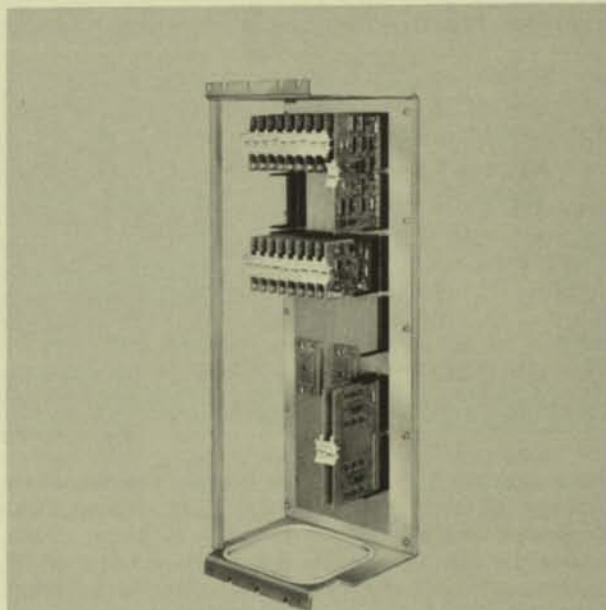
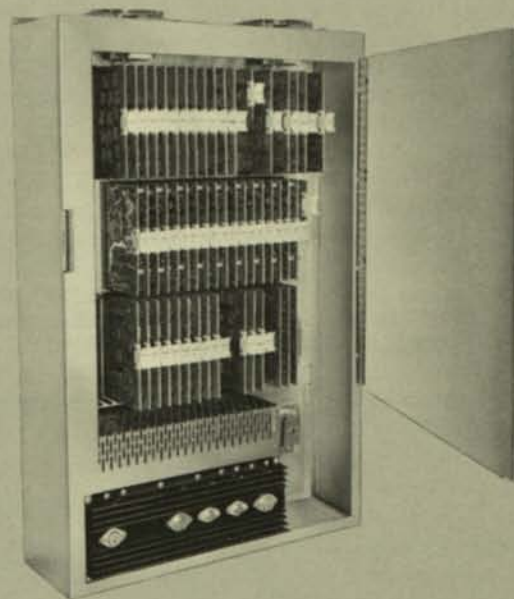
FEATURES

- Write and/or Read 1600 cpi Phase Encoded magnetic tapes which are compatible and interchangeable with tapes recorded on IBM 2400 Series Tape Units.
- Amplifier sharing of up to eight tape units.
- Information transfer rates up to 320 kilocharacters per second.
- Write data electronics includes required circuitry to record customer generated Identification Burst, Preamble, Postamble and Tape Mark. Input data is clocked serial-by-bit, parallel-by-character, binary. Data is converted to phase encoded format prior to recording on magnetic tape.
- Read Data Electronics includes required circuitry to strip the Preamble, Postamble, and to detect the Tape Mark. Read electronics also provide read deskew and single track error correction. Read output consists of 9-bytes of data, binary format with read clock signal.
- Automatic head degauss cycle reduces erasure and pulse distortion.
- Shaped write current optimizes data recording symmetry.
- Designed to minimize maintenance costs. Accessible test points at front of chassis permit most adjustments to be made with modules in normal position. Extension frames included provide complete exposure of all plug-in modules for circuit testing under actual operating condition.

INTRODUCTION

Potter Model MA751 Read/Write Switching Amplifier records and reproduces magnetic tapes in industry standard 1600 cpi phase encoded format. Unlike NRZI format which records a flux reversal in either direction on a "1" bit, the Phase Encoding method of recording records information by producing a distinct flux reversal on tape, for the "0" and "1" information bits (See Figure 1). A "1" is recorded as a reversal to the polarity of the interrecord gap; a "0" as a reversal opposite to the polarity of the interrecord gap. Therefore, when recording a typical 10101 pattern we have reversals at bit times only.

In Phase Encoded recording like bits require reversals in the same direction, and thereby necessitate the insertion of an additional "phase transition" between reversals to achieve proper polarity of data. The phase bit reversal, although not used as data, increases the recording density to 3200 flux reversals per inch.

MA 751 Local Read/Write
Switching Amplifier

MA 751 Common Electronics

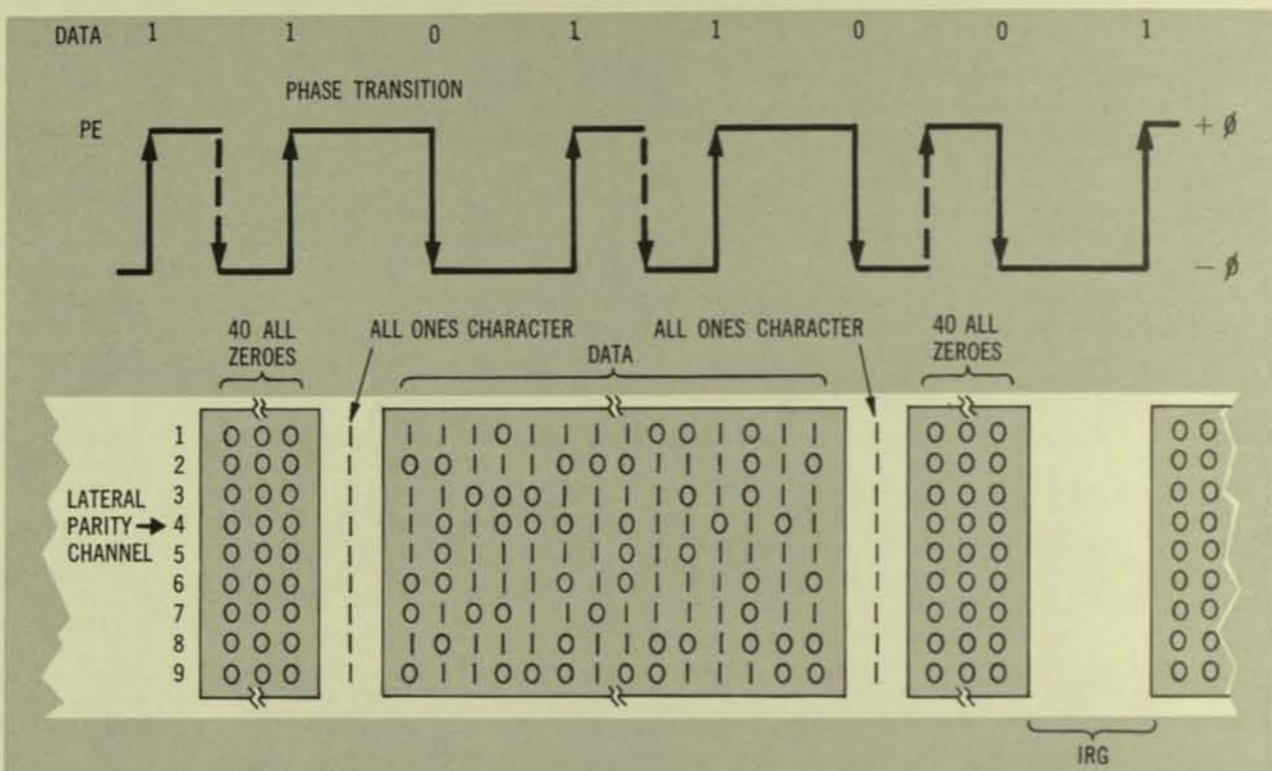


Figure 1. PE Recording Format

When recording in the Phase Encoded mode, each block of information is preceded by, and followed by, a burst of synchronizing information — the preamble — and the postamble. The preamble consists of 40 characters containing "0" bits in all tracks including parity followed by a single character of "1" data in all tracks. The postamble contains a single character of "1" data in all tracks, followed by 40 characters containing "0" bit data in all tracks.

Although the Phase Encoded format increases the recording density of the system, the discrete transition and clock techniques eliminate many of the problems normally encountered with 800 bpi NRZI recording systems. Phase Encoded recording properly compensates for the errors associated with static and dynamic skew, "drop outs", "drop ins" (noise) and speed variation and thereby improves the inherent system reliability.

The Phase Encoded system and Potter MA 751 Amplifier provide the following features:

- ... Static and Dynamic Skew: The deskewing (eggcrate) buffer, in conjunction with the preamble, automatically deskews the recorded information. No static or dynamic deskewing one-shots nor deskewing delay lines are required in Phase Encoded format even though the recorded tape can contain as much as one full bit time of skew and the guidance system of the tape handler reading this tape can add an additional cell of skew time.
- ... Drop outs: The read sensitivity of the Phase Encoded system is fixed at 15% of standard recording level. If the signal from any single track drops below the 15% level, the information for this track is reconstructed from the information supplied by the remaining 8 tracks. Under most conditions,

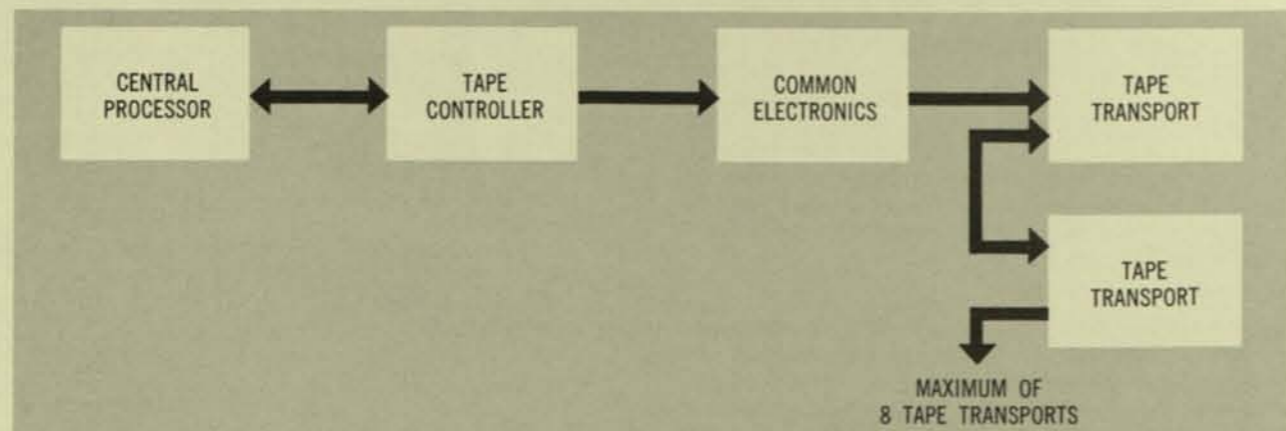


Figure 2. Magnetic Tape System

CONTROL ELECTRONICS MODULES

MODULE	FUNCTION
Common Electronics Receiver	Contains circuits which invert the Transport Unit output signal levels to Common Electronics operating levels and act as line terminators.
Clock Counter	Contains the Read Out Counter circuit which generates the signals to transmit the data to TCU.
Deskew Buffer and Control	Contains the Read In Counter which indicates the stage of the deskewing buffer into which the decoded data are to be stored. The deskewing buffer allows data alignment on each channel so that each bit of a character is presented simultaneously to the tape control unit.
Decoder Control	Contains the circuits which enable the internal Read Forward and Read Reverse decoder signals. Also generates the Phase Test Pulse, Master Reset to the decoder circuits, and the signal which inhibits data from the start of block until phase test is checked.
End File and Parity Control	Contains the circuits which enable the envelope detector and the End-of-Block signal that occurs when a valid postamble is detected. The module generates the End of File signal, the Error Correct mode signal, and detects Interrecord Gaps.
Gates	Contains gating circuits which detect the all zeros character in the deskew buffer (ZERO) and the all ones character in the error check Register.
Logical Block Detect	Contains the circuits which generate the data block detection signals, Active Envelope Level, Valid Block and the Detection of Data Block. It also generates the Zone Signals and the Error Level Signal.
One Shot	Contains the circuits which generate the pulses that inhibit the read operation during BOT and accelerate. Also generates the End-of-File detector and Leading Edge of IRG signals.
PE Decoder	Contains the circuits which together with the circuits on the Phase Encoded Servo Loop module, process the digitized data from the read amplifier by converting the PE coded data into digital data. Also generates the internal data clock for the deskewing buffer.
Phase Encoding Servo Loop	Contains the comparator circuits and the ramp generator circuits necessary to convert the PE coded data into digital data. Generates the Variable Frequency Compensation signals.
Postamble Detect and Control	Contains the circuits which generate the End of Information Level and the Data Transmission Signal.
Parity Check	Contains the circuits to determine the parity of the data.
Read Amplifier	Contains the circuits that digitize the incoming data signal from the tape transport and checks the data signal envelopes.
Receiver	Contains the circuits which act as line terminators for the digital signals from the Tape Control Unit and converts control unit signals to acceptable CE signals.
Reset Control	Contains the circuits which generate the Threshold Select, reset of write coders, and reset of deskewing buffers.
Transmitter	Converts data to correct logic levels for use by CP.
Unit Select	Contains the circuits which convert the four bit binary coded transport selection signal into any one of eight discrete select signals.
Write Coder	Contains the circuits which convert the binary input write data from the tape control unit into PE coded data.

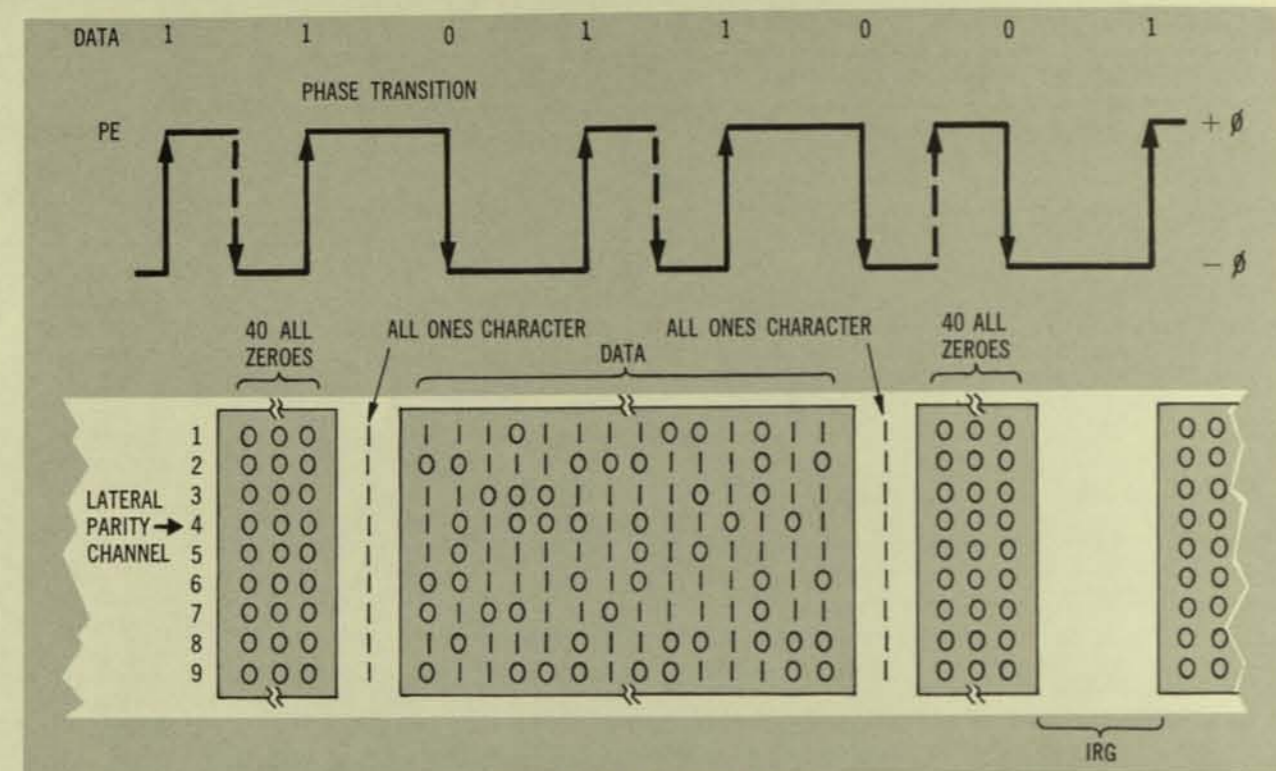


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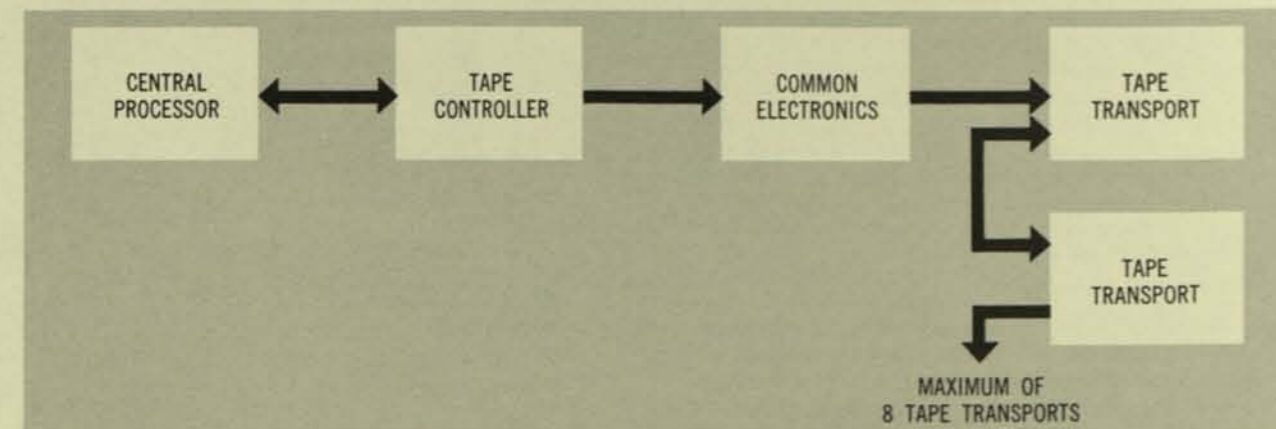


Figure 2. Magnetic Tape System

this 'force feeding' method of data correction reduces the error rate caused by bit drop outs by a factor of 10.

... Drop ins: In Phase Encoded recording if an information block is not preceded and terminated with a preamble and postamble, the recorded data is not accepted as valid information. In addition to synchronizing data and clock, the preamble and postamble reduce the incidence of reading, as data, spurious signals which appear within the inter-record gap.

... The discrete transitions associated with the "0" data bit in Phase Encoded recording eliminates many of the drop in errors attributed to noise distortion in NRZI format.

... Speed variations: The speed at which Phase Encoded tapes can be recorded can vary within $\pm 4\%$ of nominal. The short term speed variation can add up to $\pm 10\%$ at a rate of change of 0.5% per character. To assure reliable read data output, Potter's MA 751 Amplifier will accommodate the change in transfer rate due to speed variation and compensate any additional changes due to the reproducing system. The amplifier compensates

the speed of each track independently by utilizing a variable frequency flywheel oscillator with multi-zone synchronization circuits.

FUNCTIONAL OPERATION

The Common Electronics provides interface control for transmitting data between the central processor and the tape transports in the system, as shown in figure 2. The amplifier provides up to 1x8 Switching and all input/output lines to tape transport are daisy-chained with appropriate termination in the chain's last unit. During reading, the CE detects zero crossings of the 9-channel data signal from the Read/Write Amplifier located in the Tape Units. After detection, the signals are decoded, deskewed, checked for format and parity and then transmitted to the central processor at digital levels. When writing data, the data is encoded by the CE. The data and required control signals are transmitted from the central processor to the CE. The CE provides the proper control functions and the encoded write signals to the local amplifier for subsequent recording on tape. The CE also provides decoding circuits for converting binary coded 4-line Transport Unit selection signals into discrete selection signals for each of the eight Transport Units.

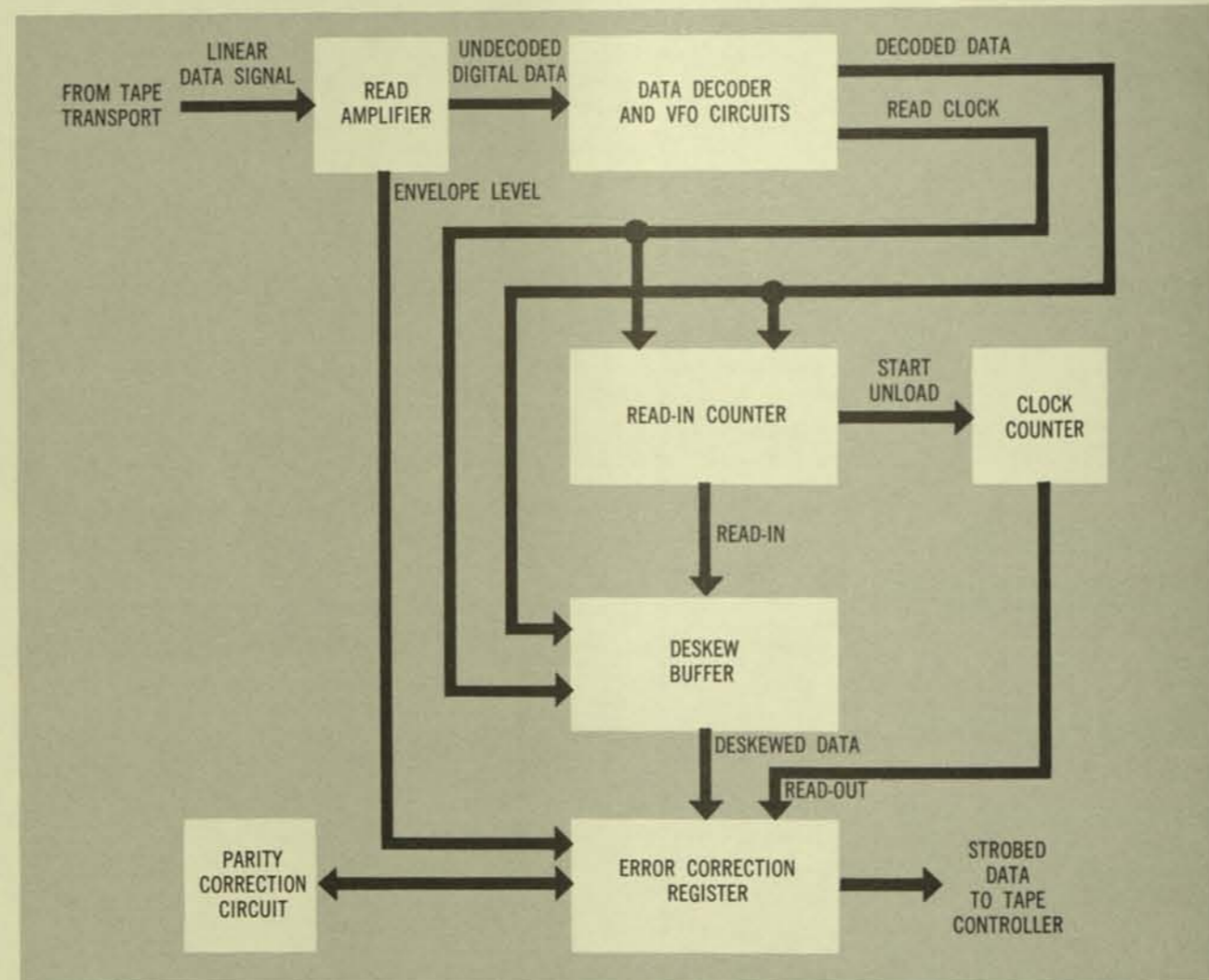


Figure 3. Read Circuits, Block Diagram

READ OPERATION

The data record transmitted to the CE is preceded by a preamble consisting of 40 all zeros and an all ones character for purposes of synchronizing and data decoding. The preamble is then followed by the data record which is then followed by a postamble. The postamble facilitates data synchronization when operating in the read reverse mode.

The purpose of the preamble is to allow the decoding circuits to synchronize with the incoming data. This is accomplished by a phase test which checks whether zeros are misinterpreted as ones. If they are, the circuits shift the clock 180 degrees so that zeros are correctly interpreted as zeros. No data is transferred to the Tape Control Unit until the all ones character is decoded. The purpose of the all ones character and the 40 all zeros in the postamble is to detect the end of the data block during writing or during reading.

During a read operation, the signal from the Tape Transport is applied to the read amplifier portion of the read circuits where amplitude checks and zero crossover detection is accomplished (Figure 3). The

read amplifier provides undecoded digital data which is then applied to the data decoder and variable frequency oscillator (VFO) circuits. The speed variation component of the data is eliminated as an aid to reliable detection.

The data decoder circuits decode the signal from the read amplifiers, and decoded data together with a self-generated read clock are applied to the read-in counter and the deskew buffer circuits. The read-in counter determines into which stage of the deskew buffer a data bit is stored. In addition, the read-in counters provide a start unload signal to the clock counter for reading out data. Deskewed data is then read out to the Error Correction Registers. Data is then strobed and read out to the Tape Control Unit. In the event that a single track output signal drops below the 15% threshold during a read mode, data will be reconstructed for the dropped track.

The Read Amplifier digitizes the incoming data signal from the tape transport by detecting zero crossings of the data signal. In addition, the read amplifier detects the envelope of the incoming data signal and allows transmission of the digitized data when the envelope is present.

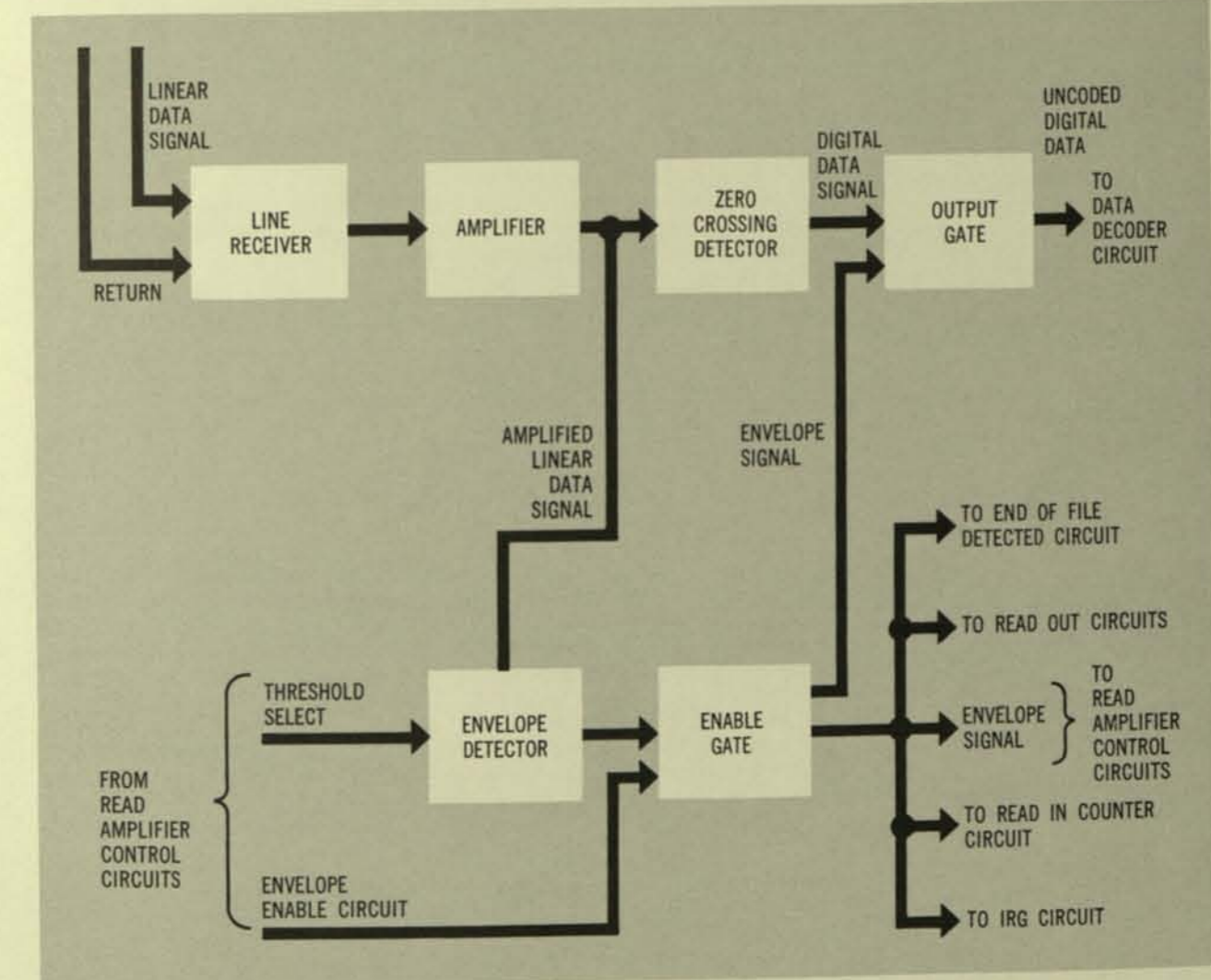


Figure 4. Read Amplifier, Block Diagram

LOCAL READ/WRITE AMPLIFIER CHASSIS

The Local Read/Write Amplifier chassis is equipped with Write Amplifier plug-in modules which convert and record digital information on magnetic tape. The chassis also includes read preamplifier modules which reproduce recorded data and, on command,

transfers this data over the read buss. A Write Control module controls the recording current levels, and degausses the write heads whenever the 'set write' condition is disabled.

MODULE	FUNCTION
Read Preamplifier	The nine read preamplifiers detect the output of the nine read channels, amplify these outputs and feed the amplified signals, in parallel, to Read Amplifier modules located in the CE.
Write Control	The write control circuits provide the signals which control the operation of the write amplifier circuits. These circuits also generate signals which control the operation of the erase head. In addition, this module contains the automatic degauss circuit.
Write Amplifier	The function of the nine write amplifier circuits is to receive phase encoded write data from the CE, amplify it, and apply this data to the nine write channels. These circuits also provide the degauss function to the write head.

SPECIFICATIONS

Read/Write Format	Phase Encoded (PE)		
Recording Density	1600 cpi, 3200 FRPI		
Tape Speed (single)	20 ips to 200 ips		
Data Frequency	Up to 320 Kilocharacters/second		
Read Direction	Forward/Reverse		
Compatible Head Types	20-45 ips	50-150 ips	200 ips
Simultaneous Read/Write	HD 903	HD 901	HD 902
Read Only	HS 901	HS 903	HS 902
Input Power	115 VAC ±10% 60 Hz Single Phase or 208/230 VAC ±10% 50/60 Hz, Single Phase		
Input/Output Levels			
Input	Logic "1" = 0V ±0.7 V 3 MA Logic "0" = +5 VDC ±1.0 V 5 MA		
Output	Logic "1" = Ground ±0.7 V 20 MA Sink Logic "0" = +5 VDC ±1.0 V 3 MA Source		
Ambient Amplifier Operating Temperatures	45°F to 110°F with 20% to 95% Relative Humidity		
	<u>Common Electronics</u>	<u>Local Electronics</u>	
Height	33.5 inches	23.5 inches	
Width	22.0 inches	8.5 inches	
Depth	7.5 inches	6.5 inches	
Weight	85 lbs.	15 lbs.	



POTTER INSTRUMENT COMPANY, INC.

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Potter

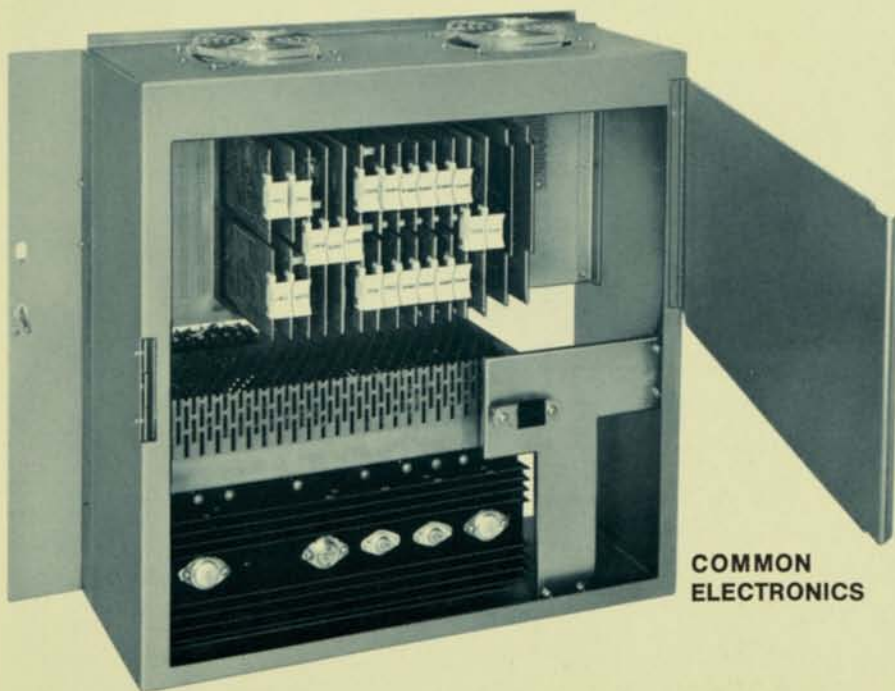
MA 360 Read/Write Switching Amplifier

Total NRZI Performance for Potter Magnetic Tape Transports

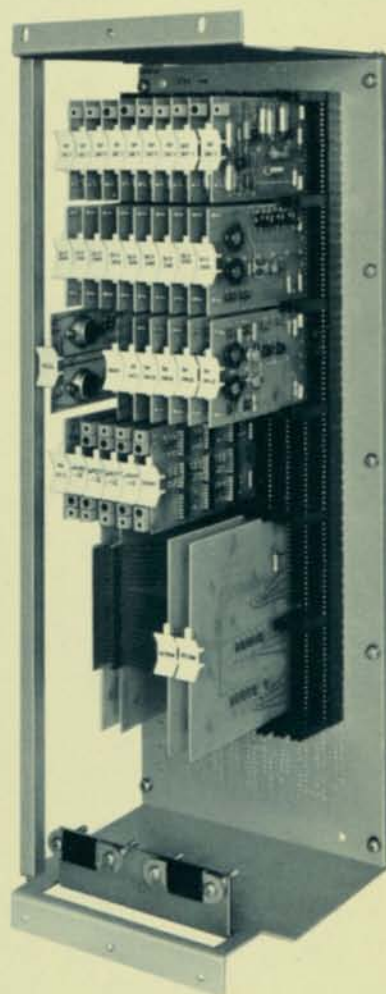
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FEATURES

- Industry Compatible NRZI Read/Write Operation
- Logic Sharing of up to 8 Tape Transports
- Operation From 25 to 200 ips
- Data Integrity Check-Read Insures Data Reliability
- Read Reverse Capability



COMMON
ELECTRONICS



LOCAL AMPLIFIER

INPUT/OUTPUT LINES (Continued)

Write Mode	Level	Enabled with Logic "1" signal. (Simultaneous Erase head enable.)
Write Reset	Pulse	Reset with Logic "1" signal. Pulse width is 1-2 μ s.
Density Select — 200	Level	Selected with Logic "1" signal (optional).
Density Select — 556	Level	Selected with Logic "1" signal (optional).
Even Lateral Parity Select (optional)		EVEN selected with Logic "1" signal.
Read Enable	Level	Enables Read Amplifiers when at Logic "1".
Address Lines		Four binary coded lines.
OUTPUT LINES		
Output Levels (available in standard logics)	Logic "1" Logic "0"	Ground \pm .7V 35 ma source capability. +5VDC \pm 1.0V 3 ma
Read Outputs	Level (NRZ)	"1" for output line at Logic "1".
Clock Output	Pulse	1.0 microsecond duration.
Data Error	Level	Set to Logic "1" on detection of a data error. Reset to Logic "0" when Read Enable goes to Logic "0".
End of Block	Pulse	1 microsecond duration.
Multiple Select	Level	Two, or more, transports responding to address.
In addition to the above Input/Output lines associated with the MA 360, all transport interface signals are routed through the Common Electronics.		

INPUT

Run	Level	A "1" causes addressed transport to run.
Direction	Level	A "1" conditions addressed transport to reverse.
Rewind	Pulse	Logic "1" causes addressed transport to rewind. Pulse width 5.0 μ s minimum.
Rewind & Unload	Pulse	Logic "1" causes addressed transport to rewind and unload. Pulse width 5.0 μ s minimum.

OUTPUT

Ready	Level	Addressed transport is ready.
Rewinding	Level	Addressed transport is rewinding.
Write Ring In	Level	Addressed transport has Write Ring.
Write Status	Level	Addressed transport is in Write Status.
EOT	Level	Addressed transport is at EOT.
BOT	Level	Addressed transport is at BOT.
Seven Track	Level	Addressed transport is Seven Track.

FUNCTIONAL DESCRIPTION OF MODULES

		9 TRACK		7 TRACK	
		CE CHASSIS	LOCAL CHASSIS	CE CHASSIS	LOCAL CHASSIS
		800 BPI		200/556/800 BPI	
Local Chassis MA 360L		One Local Chassis Required Per Transport			
CE Chassis MA 360C		One CE Chassis Required Per System			
Read Pre Amp RP 247	Provides linear amplification of playback signals. One circuit per board.		9		7
Read Amp RA 240-2	Two linear signal drivers per board.		4		3
Read Amp RA 240-1	One linear signal driver per board.		1		1
Deskew Delay DLY 240	Provides forward and reverse read deskewing by means of a tapped lumped delay line. One circuit per board.		9		7
Write Amp WA 247-12	Provides write flip-flops, write asymmetry adj. and write skew one shots for compensated operation. Two circuits per board.		5		4
Interface Bd. INTF	Generates replies for the CE and TCU. Detects multiple select error when more than one transport respond to the address lines.		1		1
Control Bd. CONT	Controls write functions and forward and reverse read deskew delay selection. (See note 1)		1		1
Jumper Bd. JUMP	Jumpers read signals into the daisy chain. (See note 2)		3		3
Terminator Boards WTRM RTRM	Termination resistors for the daisy chain. Fitted to the last R/W chassis in the chain. (See note 2)		1 1		1 1

THE MA 360 READ/WRITE SWITCHING AMPLIFIER is designed for the OEM user who requires the latest technology with the highest degree of reliability. It is ideally suited for single speed applications (25-200 ips) with up to 8 Potter SC 1051, SC 1081, AT 1082 or AT 1092 Single Capstan Magnetic Tape Transports. Utilizing advanced integrated circuitry the unit will record digital information on magnetic tape, then check-read that data to insure recording accuracy. The MA 360 Amplifier is IBM-compatible for 200/556/800 bpi NRZI operation, and all 7 track units are prewired for immediate field expansion to 9 track, 800 bpi compatible operation. Each MA 360 Amplifier is modular in construction and is physically divided into two separate sections, common electronics and local amplifiers.

THE MA 360 COMMON ELECTRONICS accommodates up to eight local amplifiers and serves as the control point for the system. It handles all transport commands, replies to and from the computer, and performs transport selection, read digitizing

output, read strobe and read/write enable functions.

THE MA 360 LOCAL AMPLIFIER contains all static skew compensation circuits, thereby establishing plug-to-plug interchangeability between "local" tape transports. The local amplifier contains: (1) 7 (or 9) identical circuits which receive read head signals and subsequently accomplish required amplification, and deskewing functions; (2) 7 (or 9) write circuits with deskewing and symmetry adjustment. Tape interchangeability between IBM-compatible tape transports is assured.

MAINTENANCE is rarely required, but quickly accomplished when needed. Test points are provided at the front of chassis so that most adjustments may be made with the modules in their normal position. Extension frames permit complete module exposure for circuit testing under actual operating conditions. Output and power circuits are short-circuit proof. A rugged, value-engineered design assures long life with minimum maintenance.

ADDITIONAL MA 360 FEATURES include:

- Operation in simultaneous read/write mode.
- Logic sharing of up to 8 tape units.
- Read reverse capability.
- Information transfer rates to 160,000 cps.
- Accurate read/write deskewing.
- Compensated writing of longitudinal redundancy check character (7 & 9 track).
- Strobed write input.
- Individual adjustments for pulse pairing by write amplifier compensation.
- In-line read output of all character bits and clock pulse output.
- Two standard threshold levels; check-read and read.
- Automatic reduction of strobe delay during check read operation.
- Peak detectors employed in read amplifiers.
- Multiple select error indicator.
- Write memory status.
- Remote density select.
- Provision for ODD or EVEN lateral parity read generation and/or check (7 track).

SPECIFICATIONS

	7 TRACK COMPENSATED	9 TRACK COMPENSATED		
Packing Density	200/556/800 bpi	800 bpi		
Writing Mode	NRZI	NRZI		
Tape Speed (Single)	25-200 ips (simultaneous read/write)	25-200 ips (simultaneous read/write)		
Read Direction	FWD/REV	FWD/REV		
Compatible Head Types				
Simultaneous Read/Write Operation (Dual Gap)....	LD 702	LD 902		
Power Supply — Local	Input power provided by power supply modules in Single Capstan Series Tape Transports.			
PS1087	Integral power supply for the common electronics.			
Dimensions	Designed to be mounted internally in Potter SC & AT Series Tape Transports.			
		Height	Width	Depth
	Local	25¼"	8½"	7½"
	Common	18½"	22¼"	7½"
Weight	Local — 14 lbs. maximum, Common — 36 lbs. maximum			

INPUT/OUTPUT LINES

INPUT LINES

Input Levels (available in standard logics)	Logic "1" Logic "0"	0V ± .7V at 28 ma +5V ± 1V 3 ma
Write Inputs (7 and 9 lines)	Level (NRZ)	A "1" is written on tape when the input is at "1" at write clock time.
Write Clock	Pulse	All Write inputs are simultaneously enabled when the Write Clock line is raised to the level corresponding to Logic "1" Level and a "1" is written by all Write Input lines which are at Logic "1" Level. Pulse width 1-2 μs.

INPUT/OUTPUT LINES (Continued)

Write Mode	Level	Enabled with Logic "1" signal. (Simultaneous Erase head enable.)
Write Reset	Pulse	Reset with Logic "1" signal. Pulse width is 1-2 μ s.
Density Select - 200	Level	Selected with Logic "1" signal (optional).
Density Select - 556	Level	Selected with Logic "1" signal (optional).
Even Lateral Parity Select (optional)		EVEN selected with Logic "1" signal.
Read Enable	Level	Enables Read Amplifiers when at Logic "1".
Address Lines		Four binary coded lines.

OUTPUT LINES

Output Levels (available in standard logics)	Logic "1" Logic "0"	Ground \pm .7V 35 ma source capability. +5VDC \pm 1.0V 3 ma
Read Outputs	Level (NRZ)	"1" for output line at Logic "1".
Block Output	Pulse	1.0 microsecond duration.
Data Error	Level	Set to Logic "1" on detection of a data error. Reset to Logic "0" when Read Enable goes to Logic "0".
End of Block	Pulse	1 microsecond duration.
Multiple Select	Level	Two, or more, transports responding to address.

In addition to the above Input/Output lines associated with the MA 360, all transport interface signals are routed through the Common Electronics.

INPUT

Run	Level	A "1" causes addressed transport to run.
Direction	Level	A "1" conditions addressed transport to reverse.
Rewind	Pulse	Logic "1" causes addressed transport to rewind. Pulse width 5.0 μ s minimum.
Rewind & Unload	Pulse	Logic "1" causes addressed transport to rewind and unload. Pulse width 5.0 μ s minimum.

OUTPUT

Ready	Level	Addressed transport is ready.
Rewinding	Level	Addressed transport is rewinding.
Write Ring In	Level	Addressed transport has Write Ring.
Write Status	Level	Addressed transport is in Write Status.
EOT	Level	Addressed transport is at EOT.
BOT	Level	Addressed transport is at BOT.
Seven Track	Level	Addressed transport is Seven Track.

FUNCTIONAL DESCRIPTION OF MODULES

		9 TRACK		7 TRACK	
		CE CHASSIS	LOCAL CHASSIS	CE CHASSIS	LOCAL CHASSIS
		800 BPI		200/556/800 BPI	
Local Chassis MA 360L		One Local Chassis Required Per Transport			
CE Chassis MA 360C		One CE Chassis Required Per System			
Read Pre Amp RP 247	Provides linear amplification of playback signals. One circuit per board.		9		7
Read Amp RA 240-2	Two linear signal drivers per board.		4		3
Read Amp RA 240-1	One linear signal driver per board.		1		1
Deskew Delay DLY 240	Provides forward and reverse read deskewing by means of a tapped lumped delay line. One circuit per board.		9		7
Write Amp WA 247-12	Provides write flip-flops, write asymmetry adj. and write skew one shots for compensated operation. Two circuits per board.		5		4
Interface Bd. INTF	Generates replies for the CE and TCU. Detects multiple select error when more than one transport respond to the address lines.		1		1
Control Bd. CONT	Controls write functions and forward and reverse read deskew delay selection. (See note 1)		1		1
Jumper Bd. JUMP	Jumpers read signals into the daisy chain. (See note 2)		3		3
Terminator Boards WTRM RTRM	Termination resistors for the daisy chain. Fitted to the last R/W chassis in the chain. (See note 2)		1 1		1 1

FUNCTIONAL DESCRIPTION OF MODULES (Continued)

		9 TRACK		7 TRACK	
		CE CHASSIS	LOCAL CHASSIS	CE CHASSIS	LOCAL CHASSIS
		800 BPI		200/556/800 BPI	
Regulator Board REGL ZENR	Accepts voltage lines from the transport and generates supplies required by the local amplifier		1 (SC1081) (AT1082) 1 (SC1051)		1 (SC1081) (AT1082) 1 (SC1051)
Receiver Board FXAJ	Receives write data lines from CE		1		1
Read Amp RAMP	Processes linear read signals from the daisy chain. Threshold levels for check and read are selected automatically. One channel per board.	9		7	
Data Register DREG	Provides deskew and output buffering.	1		1	
Clock Gen. CGEN	Generates system clocks at 20 times bit rate. Density selection (200/556/800 bpi) is by interface lines.	1		1	
Counter CNTR	Eight stage binary counter driven by the clock generator.	1		1	
Data Control DCON	Generates read and check read strobe gates by decoding counter outputs. Generates read clocks to channel, detects missing characters and excessive write skew. Contains error flop.	1		1	
Controller Receiver TCUR	Contains line receivers. (See note 1)	1		1	
Controller Drive TCUD	Contains line drivers.	1		1	
Daisy Chain Receiver DCHR	Contains daisy chain receivers.	1		1	
Daisy Chain Driver DCHD	Contains daisy chain drivers. (See note 1)	1		1	
Extension EX 06	Extension frame for double boards.	1	1	1	1
Extension EX 05	Extension frame for single boards.	1	1	1	1
End of Block Detection EOBD	Signals EOB and checks character gap centers. Generates read clocks for CRC and LRC. (See note 1)				
Cyclic Redundancy Check CRCB	Generates a CRC byte from write or read data.				
Write Check Character Check WCCC	Controls EOB write operation.				
Vertical Parity Gen. VRCG	Provides vertical parity generation (odd or even for 7 track).				
Vertical Parity Check VRCC	Provides vertical parity checking for up to 9 tracks (odd or even for 7 track).				
LRC Check LRCC	Provides LRC checking				
Power Supply PS 1087	Integral power supply for the common electronics. (Power for local chassis supplied by the transport)	1		1	

OPTIONAL

One each in CE chassis. When VRCC or LRCC are used, EOBD is also required. When VRCG is used, WCCC is also required. When CRCB is used to generate, WCCC is also required. When CRCB is used for checking, EOBD is required.

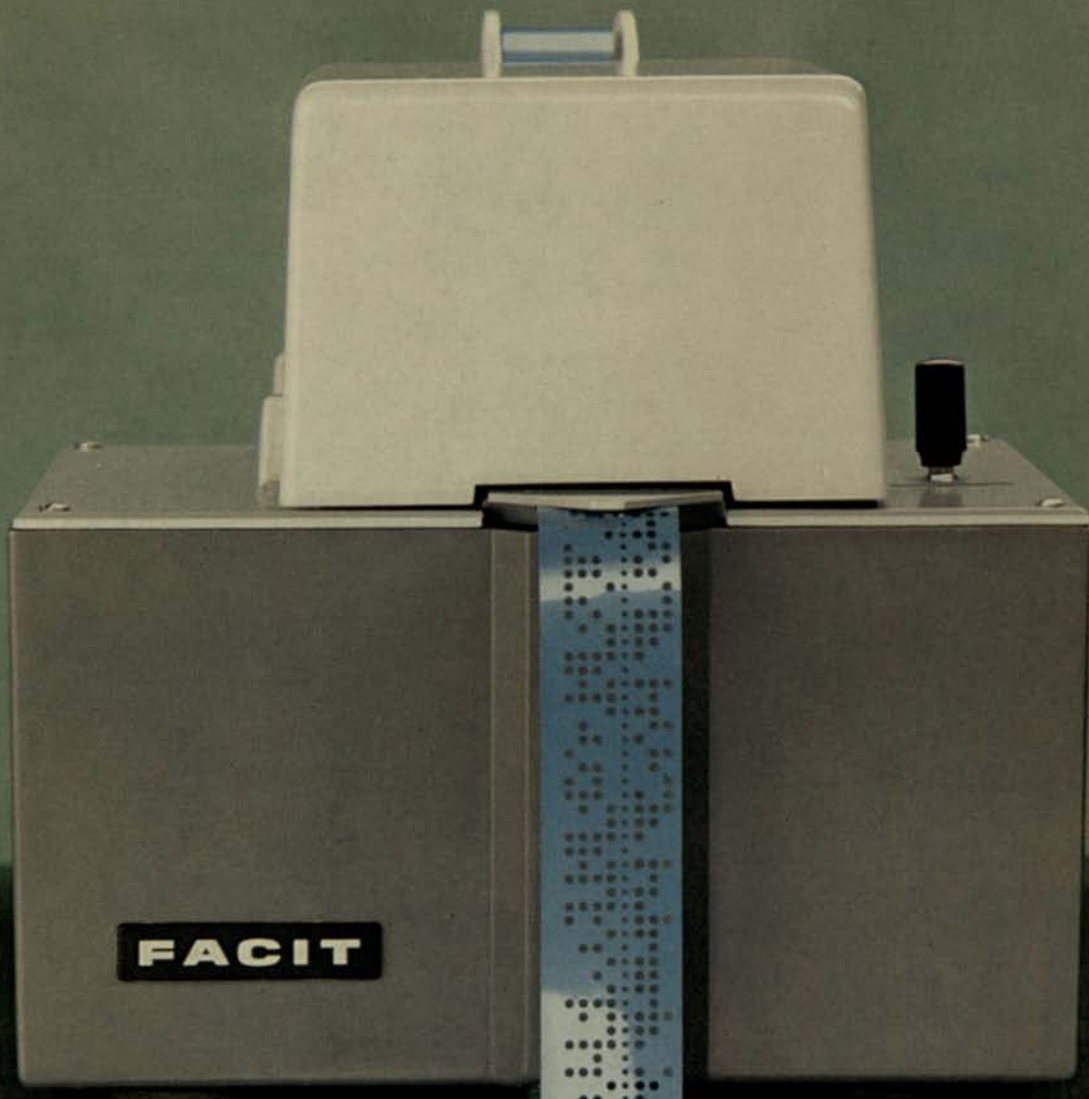
Notes:

- The following circuit options are available on a no charge basis and must be specified when ordering.
 - Controller receiver - FWD/STOP - REV/STOP or RUN/STOP - REV/FWD.
 - Control board - write enable flop reset by FWD read command and on reverse and local or on reverse and local only.
 - Daisy chain driver - permit external or internal CRC clocking.
 - End of block detection - provide EOB pulse only or EOB and check gap pulses.
- Transports in the daisy chain require 3 jumper boards. Single transports or last transport in the daisy chain requires one jumper board and one each terminator board (WTRM, RTRM).



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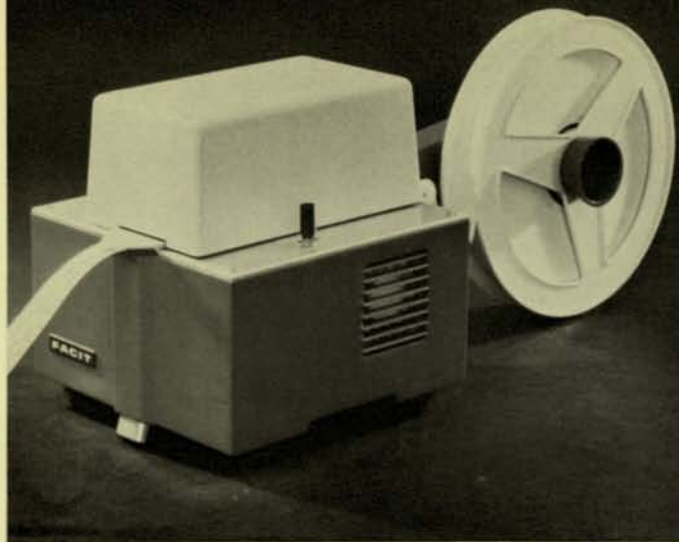


FACIT PE 1500

tape punch featuring electronic control
convertible for 5, 6, 7 or 8-track tape
punches up to 150 characters per second



Today tape punches are indispensable in the fields of data transmission and digital data recording, as well as in all complete data processing installations. The Facit PE 1500, designed for all-round duty, is now performing yeoman service in all these fields. Flexibility combined with high speed guarantees immediate and long-term returns on your Facit PE 1500 investment.



GENERAL DATA	
Operating speed	Max. up to 150 characters per second
Tape feed	Intermittent externally controlled
Common code tracks	5, 6, 7 or 8
Acceptable tape width	5 tracks, 17.5±0.1 mm 6 and 7 tracks, 22.2 mm±0.1 mm 8 tracks, 25.4 mm±0.1 mm
Thickness of tape	Subsequent adjustment can be made for any tape thinner than max. 0.12 mm.
Type of tape	Paper, oiled paper, mylar, metallized mylar
Inner diameter of tape reel	50 mm
Outer diameter of tape reel	Max. 200 mm
Supply	Approx. 300 m which corresponds to about 120,000 characters
Register	Built in, stores one character, max. eight bits.
Mark character	Choice of character on request.

INPUT	
Start pulse	Negative 0.1—3 ms duration Upper level max. +25 V min. +1 V Lower level max. —25 V min. —4 V
Information signals	Input impedance 5 kohms 5, 6, 7 or 8 parallel lines. DC voltage or negative incoming pulse at least 0.1 ms duration occurring simultaneously with the start pulse. Not hole max. +25 V min. +1 V Hole max. —25 V min. —4 V Input impedance 5 kohms

OUTPUT	
Ready signal	From —10 V to +1 V when information is stored in register. From +1 V to —10 V when punching is complete. Max. rise and fall time is 10 μs Output impedance 500 ohms.

DIMENSIONS	Length	Width	Height	Weight
Punch unit	520 mm	205 mm	220 mm	13.5 kg
Control unit	525 mm	265 mm	180 mm	15.5 kg

UNIT NOTATIONS Note*					Power consumption approx.
Notations	Unit	Tape	No. of tracks	Supply voltage/freq.	
PE 1501	punch	conventional	5-8	220 V/ 50 Hz	90 W
PE 1502	punch	conventional	5-8	220 V/ 60 Hz	90 W
PE 1503	punch	conventional	5-8	115 V/ 50 Hz	90 W
PE 1504	punch	conventional	5-8	115 V/ 60 Hz	90 W
PE 1507	control		5-8	220 V/50-60 Hz	100 W
PE 1508	control		5-8	115 V/50-60 Hz	100 W
PE 1509	control		5-8	240 V/50-60 Hz	100 W
PE 1511	punch	type-setting	6	220 V/ 50 Hz	90 W
PE 1512	punch	type-setting	6	115 V/ 60 Hz	90 W
PE 1513	punch	type-setting	6	220 V/ 60 Hz	90 W

Punch and control units can be combined as follows:

Punch unit	Control unit
PE 1501	PE 1507
	PE 1508
PE 1502	PE 1507
	PE 1508
PE 1503	—
PE 1504	—
PE 1511	PE 1507
	PE 1508
PE 1512	—
PE 1513	PE 1507
	PE 1508

* When combining the punch and control unit the power to the punch unit is supplied from the control unit.

Facit PE 1500 features

Control unit—fully transistorized circuits provide feed brake and punch action plus synchronization.

Quiet, high-speed operation—speeds up to 150 characters per second assure most efficient use of your processing equipment.

Punches different tapes—both conventional round-hole tapes and type-setting tapes with advanced feed hole.

Convertible for use with 5, 6, 7 or 8-track tape. Rapid conversion can be made right on the job by a simple tape-guide alteration.

Punches different materials—not merely a single grade and thickness

of paper, but mylar, metallized and other materials.

Easy to connect up—input register and wide voltage limits for input signals simplify installation.

Requires little power—full-load operation draws only 180 W.

Your choice of mark character—Select any one of 256 possible mark characters to mark the beginning or end of a data block, for example.

Automatic shut-off—the motor continues to operate without feeding tape two to three seconds after the last character is punched—then shuts off automatically.

The tape punch with all-round adaptability



Computer output: processed data, programs, memory contents (during debugging for example), tapes for data transmission and for the control of machines and processes.



Data transmission with high-speed receiving subsets.



Recording of laboratory data and industrial measurements. Swift and simple subsequent processing is assured when values are taped.



Duplication of tapes on special equipment, for example Facit PE 1300, which replaces worn tapes and makes conversions between various track-systems, tape materials and codes.



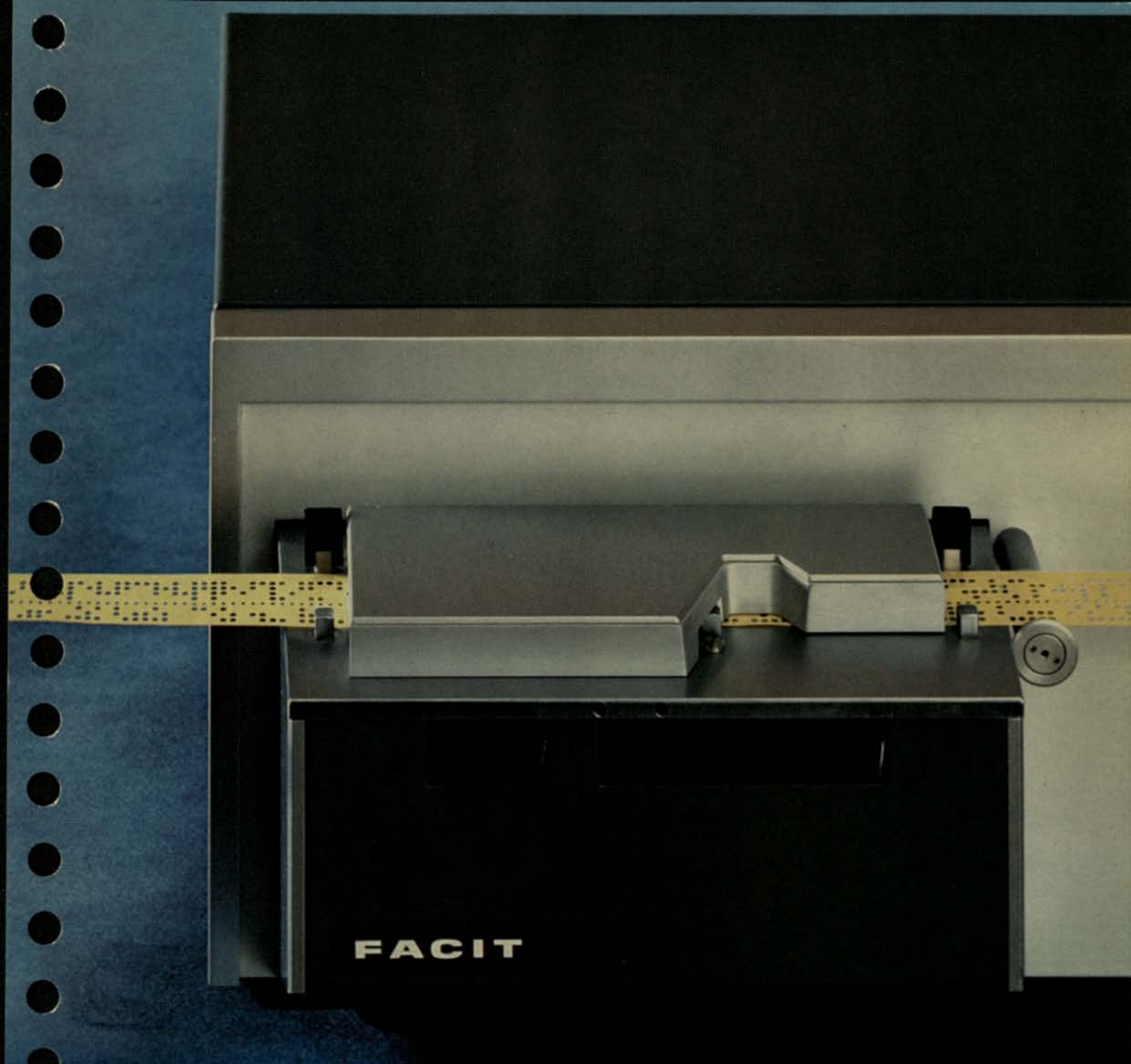
United States, Canada, Mexico

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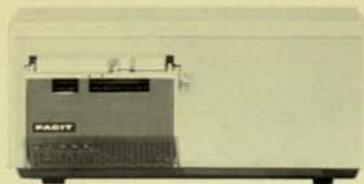


FACIT PE 1000

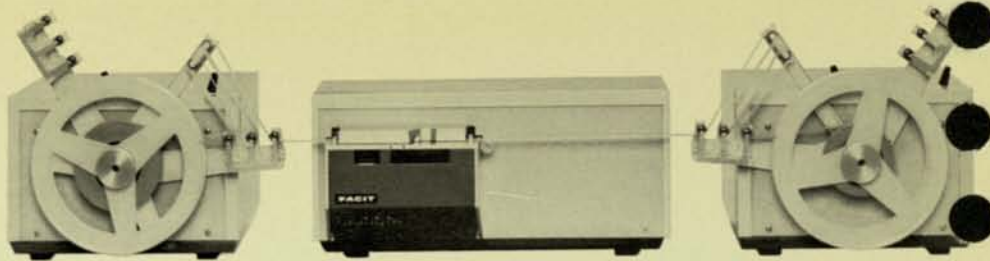
tape reader
for
up to 1000
characters
per
second



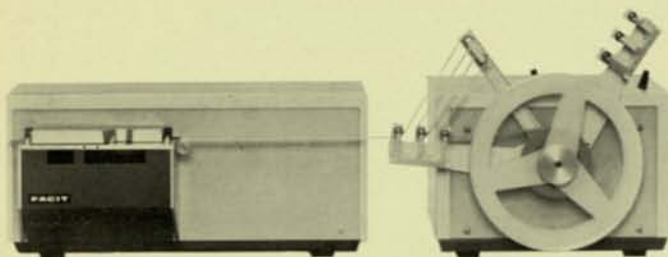
Reliable high-speed reading is a phrase that typifies the Facit PE 1000 paper tape reader which incorporates benefits gained at Facit from many years of experience. Behind the world-famous reputation of the Facit trade mark lie quality and integrity, two attributes of the Facit PE 1000. It satisfies the most stringent demands that can be placed on modern paper tape readers. **Universal application.** Facit PE 1000 design is compatible with nearly all data processing systems. But it finds uses in other fields too—wherever reliable high-speed reading is required.



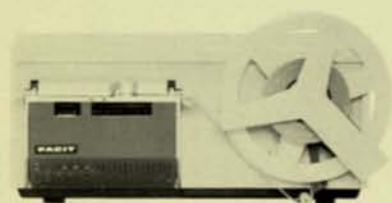
FACIT PE 1000 tape reader.



Facit PE 1000 tape reader with Facit PE 1130 wind and unwind equipment. Maximum speed 1000 characters/second.



Facit PE 1000 tape reader with Facit PE 1130 arranged for unwinding. Maximum speed 1000 characters/second.



Facit PE 1000 tape reader with supply wheel permitting operation at maximum speed of 500 characters/second.

7 imposing features

Flexible—versions for standard, type-setting or Olivetti tapes, convertible for 5, 6, 7 or 8 tracks, reading and winding at speeds up to 500 characters/second or 1000 characters/second.

Dielectric reading—radical new design departure eliminates risk of reading mistakes. Reading head contains no components which age. Unaffected by dust, dirt and incident light. Reads all tape colours—even transparent tape.

Few movable parts—reliable operation.

Compact, convenient size.

Quiet operation—a hushed whirr is all you hear, thanks to solid construction and well-damped mechanical movement.

Converts quickly—with a simple hand motion for different numbers of tracks.

Easy to load—you can load a new reel of tape in a few seconds.

GENERAL DATA

Reading speed	Up to 500 or 1000 ch/s (choice by selector switch).
Stopping distance	Stop between 2 characters. Stopping distance at 500 ch/s is about 0.5 mm and at 1000 ch/s about 1 mm.
Paper feed	Pinch roller and capstan externally controlled.
Tape quality	Paper, oiled paper.
Tape width, standard	5 tracks, 17.5±0.1 mm 6 and 7 tracks, 22.2±0.1 mm 8 tracks, 25.4±0.1 mm
	Olivetti
	Type-setting
Tape thickness	6 tracks, 20.5 mm 6 tracks, 22.2 mm
Tape thickness	Max. 0.15 mm, min. 0.05 mm Spliced tape with a thickness of max. 0.2 mm
Row spacing	2.54 mm, 0.1 inch. The reader is unaffected by inaccurate character spacing.

INPUT

Start pulse	Negative 0.05—0.5 ms
	Upper level max. +25V min. +1V
	Lower level max. -25V min. -4V
	Input impedance 5 kohms

OUTPUT

Information signals	5—8 parallel lines and sprocket information. Negative signal at holes. Length of pulse determined by reader's tape speed.
	Upper level +1V Lower level -10V Output impedance max. 1 kohm
Ready signal	From -10V to +1V, less than 10 μs after the front edge of the start pulse. From +1V to -10V at the hole's rear edge. Max. rise and fall time: 10 μs Output impedance: Max. 1 kohm

DIMENSIONS

Length	Width	Height	Weight
425 mm	280 mm	195 mm	15 kg

ACCESSORIES

Tape supply wheel for 500 ch/s
Tape reels, inner diameter 50 mm
Tape reels, outer diameter 200 mm

UNIT NOTATIONS

Notations	Type of tape and tracks	Supply voltage single-phase	Supply freq.	Power consumption
PE 1001	5—8 standard	220V	50 Hz	120W
PE 1002	5—8 standard	115V	50 Hz	120W
PE 1003	5—8 standard	220V	60 Hz	120W
PE 1004	5—8 standard	115V	60 Hz	120W
PE 1005	6 square hole	220V	50 Hz	120W
PE 1006	6 square hole	115V	50 Hz	120W
PE 1011	6 type-setting	220V	50 Hz	120W
PE 1012	6 type-setting	115V	50 Hz	120W
PE 1014	6 type-setting	115V	60 Hz	120W
PE 1018	6 type-setting	240V	50 Hz	120W



United States, Canada, Mexico

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POTTER

DD 4314-1 Disk Storage Systems

High Speed Access - Proven Reliability

MAR 7 1973

FEATURES

- Pack-to-pack interchangeable with IBM 2314 Systems
- Operable with IBM software
- Diagnostic routines and error print-outs are IBM-identical
- Low cost
- Field proven, voice coil actuator
- Track-to-track access time of 6 ms
- Single spindle
- Automatic disk pack cleaning
- Eddy-current brake provides a smooth, efficient disk stop within 15 seconds
- Degating switch permits off-line testing without affecting operation of other peripherals
- File Protect Switch and light



The Potter DD 4314-1 Disk Storage Drive is a random access device which provides an "on-line" capacity of 233 million bits. The unit is capable of reading and writing on disk surfaces and utilizes the IBM 2316 Disk Pack or equivalent. Each disk pack can be removed and interchanged between disk drives in a simple and rapid operation.

The highly reliable, fast accessing DD 4314-1 provides the user with a low cost, field-proven random access memory. Advanced fourth generation design and engineering techniques insure long life and maximum on-line availability.

The Potter DD 4314-1 Disk Storage Drive coupled with the DC 5314 Storage Control Unit is available as a plug-to-plug replacement for the IBM 2314 Disk Storage Drive System or can be customized to accommodate specific design and coding techniques.

DD 4314-1 MECHANICAL DRIVE consists of four major components.

- The voice coil actuator consistently provides precise head positioning. In the event of a power failure, the actuator automatically withdraws the carriage from the disk pack, for complete protection of the heads and disk pack.
- The motor and single spindle, another precision assembly, drives and carries the disk packs at a speed of 2400 rpm. The spindle is cone-shaped to expedite loading and clamping of the disk pack. An automatic interlock insures that the disk pack is properly loaded with its dust cover door closed — before the unit can operate.
- The carriage carries all loading and unloading mechanisms. Its simple design, utilizing a minimum of moving parts, virtually eliminates carriage maintenance.
- Solid-state transducers generate the timing signals that give the DD 4314-1 Disk Storage Drive accurate timing and control.



LOADING OF THE 11-DISK PACK

THE DATA AND CONTROL ELECTRONICS are contained in two chassis.

Data channel electronics are mounted on the disk drive's deck; logic electronics use plug-in PC boards and are contained within a hinged subassembly which swings out for fast servicing. A degating switch, provided on this subassembly, permits field maintenance on a DD 4314-1 without requiring a power-down of the Storage Control Unit or other disk drives. Advanced techniques, such as wire wrapping and extensive integrated circuitry, provides the most advanced design and performance available in disk drives.

THE HIGH CAPACITY DISK DRIVE STORAGE utilizes IBM compatible disk packs on IBM compatible recording.

Each disk pack can be removed and interchanged between disk drives in a simple and rapid operation. For consistent data reliability, a disk pack cleaning cycle is initiated each time

the disk drive is started.

THE OPERATOR'S CONTROL PANEL

consists of a start/stop switch, select lock indicator, file protect switch indicator and a module identifier plug. When the file protect switch is illuminated, disk writing is inhibited. To enable writing the switch is depressed. An elapsed time meter, interior mounted Seek Counter, and AC Power On Meter are available options.

MINI EXERCISER, DISPLAY AND TERMINATOR MODULES are available for

field testing and trouble shooting. The Mini Exerciser simulates all significant input commands, and permits the service engineer to set up any single seek or repetitive seek operation. The Mini Display visually shows the contents of the cylinder, difference and head registers, and also the condition of the safety circuits associated with reading and writing. The Mini Terminator permits disk drives to be tested off-line.



CLOSE-UP OF CONTROL PANEL

DD 4314-1 SPECIFICATIONS

PERFORMANCE DATA

Storage Capacity	233 Million bits 29 million 8-bit bytes
Access Times	
Adjacent Tracks	6 ms
Average Overall	less than 30 ms
Maximum Overall	less than 60 ms
Disk Speed	2400 rpm \pm 2%
Latency Time	
Maximum	25 ms
Average	12.5 ms
Number of Cylinders	203
Data Transfer Rate (IBM compatible)	312,000 8-bit bytes per second
Data Density (IBM compatible)	
Outer Track	1520 bpi
Inner Track	2200 bpi
Magnetic Transition Density	
Outer Track	3040 per inch (7722 per cm)
Inner Track	4400 per inch (11176 per cm)
Recording Modes	Double Frequency
Disk Pack	IBM 2316 or equivalent

POWER REQUIREMENTS

AC Power	208/230 VAC \pm 10% 50 or 60 Hz \pm 1/2 Hz 3 phase input (single phase line to line utilized) 4 amps steady running, 208V
DC Power (supplied by Storage Control Unit)	+6V \pm 4% 0.20 amps +3V \pm 4% 0.15 amps -3V \pm 4% 0.35 amps -36V \pm 4% 0.45 amps peak 0.3 amps average

ENVIRONMENTAL DATA

Operating Temperature	60° to 90°F (16° to 32°C)
Operating Atmosphere (Humidity)	8% to 80% RH
Thermal Output	2500 BTU/hr.
Storage and Transit Temperature	-40° to 150°F (-4° to 64°C)

PHYSICAL DATA

Weight	400 lbs. (182 kg.)
Dimensions	24"D (0,6 m) x 30"W (0,8 m) x 40"H (1,0 m)

OTHER CONFIGURATIONS of the Disk Storage Drive are available for high volume requirements which require different interface configurations. In such applications, the mechanical drive and data and control electronics remain the same and only the interface electronics are changed.

THE PACKAGING of the DD4314-1 features functional cabinetry designed to offer both attractive styling and maximum serviceability. Snap-on cov-

ers provide both color styling flexibility and ease of servicing. Cable access can be made through either the rear or floor of the cabinet. A 115 VAC convenience outlet is provided to facilitate maintenance.

THE HIGH PERFORMANCE DC5314 CONTROL UNIT provides direct connection between the Potter DD 4314-1 Disk Drive and IBM System/360/370. It has a transfer rate of 312,000 bytes/sec. or 624,000 digits/sec. with packed

decimal data.

Among standard features are File Scan which permits an automatic search of all or part of Count, Key and Data areas of the Disk Packs; and, Record Overflow, which allows input data to overflow onto other tracks for greater packing efficiency. Included as an optional feature is the two channel switch which allows the controller to connect to two input/output channels.

DC5314 SPECIFICATIONS

Transfer Rate	312,000 bytes/sec. or 624,000 digits/sec. (packed decimal)
Number of Disk Drives Under Control	Up to 8 on-line, with provision for 1 off-line
Update Cycle Rates:	
Without overlapping of seektimes	7.0 references/sec.
With max. overlapping of seektimes	15.5 references/sec.
Note: These figures pertain to a complete random accessing cycle of one 150-character record which includes; reading, updating, rewriting and rereading for verification of recording accuracy.	
Read Only Reference Cycle Rates:	
Without overlapping of seektimes	11.1 references/sec.
With max. overlapping of seektimes	70.0 references/sec.
Note: These figures pertain to a complete accessing and reading cycle of one 150-character record, with no updating or rewriting.	
POWER REQUIREMENTS	
AC Power	208/230 VAC \pm 10% 50 or 60 Hz \pm 1/2 Hz 3 phase input 2.0 amps steady running, 208V
ENVIRONMENTAL DATA	
Operating Temperature	60° to 90°F (16° to 32°C)
Operating Atmosphere (Humidity)	8% to 80% RH
Thermal Output	1000 BTU/hr.
Storage and Transit Temperature	-40° to 150°F (-4° to 64°C)
PHYSICAL DATA	
Weight	400 lbs. (182 kg.)
Dimensions	20"D (0,5 m) x48"W (1,2 m) x60"H (1,5 m)



POTTER
INSTRUMENT CO., INC.

532 Broad Hollow Road • Melville, N. Y. 11746 • (516) 694-9000

POTTER

PRODUCT
DATA
1-106

DD 4314 DISK STORAGE DRIVE



FEATURES

- Pack-to-pack interchangeable with IBM 2314 Systems
- Operable with IBM software
- Diagnostic routines and error print-outs are IBM-identical
- Low cost
- Field-proven, hydraulic head actuator
- Track-to-track access time of 19 ms
- Single spindle
- Fully magnetic transducers
- Automatic disk pack cleaning
- Eddy-current brake provides a smooth, efficient disk stop within 15 seconds
- Degating switch permits off-line testing without affecting operation of other peripherals
- File Protect Switch and light

INTRODUCTION

The Potter DD 4314 Disk Storage Drive is a random access device which provides an "on-line" capacity of 233 million bits. The unit is capable of reading and writing on disk surfaces and utilizes the IBM 2316 Disk Pack or equivalent. Each disk pack can be removed and interchanged between disk drives in a simple and rapid operation.



The highly reliable, fast accessing DD 4314 provides the user with a low cost, field-proven random access memory. Advanced fourth generation design and engineering techniques insure long life and maximum on-line availability.

The Potter DD 4314 Disk Storage Drive coupled with the DC 5314 Storage Control Unit is available as a plug-to-plug replacement for the IBM 2314 Disk Storage Drive System or can be customized to accommodate specific design and coding techniques.

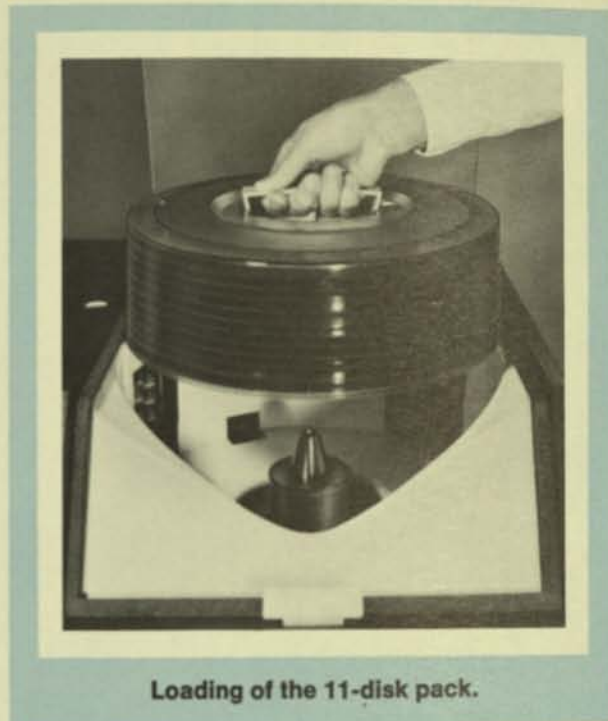
EFFECTIVE: July 31, 1970

DD 4314 MECHANICAL DRIVE consists of four major components.

- The hydraulic head actuator consistently provides precise head positioning. In the event of a power failure, the hydraulic head actuator automatically withdraws the carriage from the disk pack, for complete protection of the heads and disk pack.
- The motor and single spindle, another precision assembly, drives and carries the disk packs at a speed of 2400 rpm. The spindle is cone-shaped to expedite loading and clamping of the disk pack. An automatic interlock insures that the disk pack is properly loaded with its dust cover door closed — before the unit can operate.
- The carriage carries all loading and unloading mechanisms. Its simple design, utilizing a minimum of moving parts, virtually eliminates carriage maintenance.
- Magnetic transducers generate the timing signals that give the DD 4314 Disk Storage Drive accurate timing and control.

THE DATA AND CONTROL ELECTRONICS are contained in two chassis. Data channel electronics are mounted on the disk drive's deck; logic electronics use plug-in PC boards and are contained within a hinged subassembly which swings out for fast servicing. A degating switch, provided on this subassembly, permits field maintenance on a DD 4314 without requiring a power-down of the Storage Control Unit or other disk drives. Advanced techniques, such as wire wrapping and extensive integrated circuitry, provides the most advanced design and performance available in disk drives.

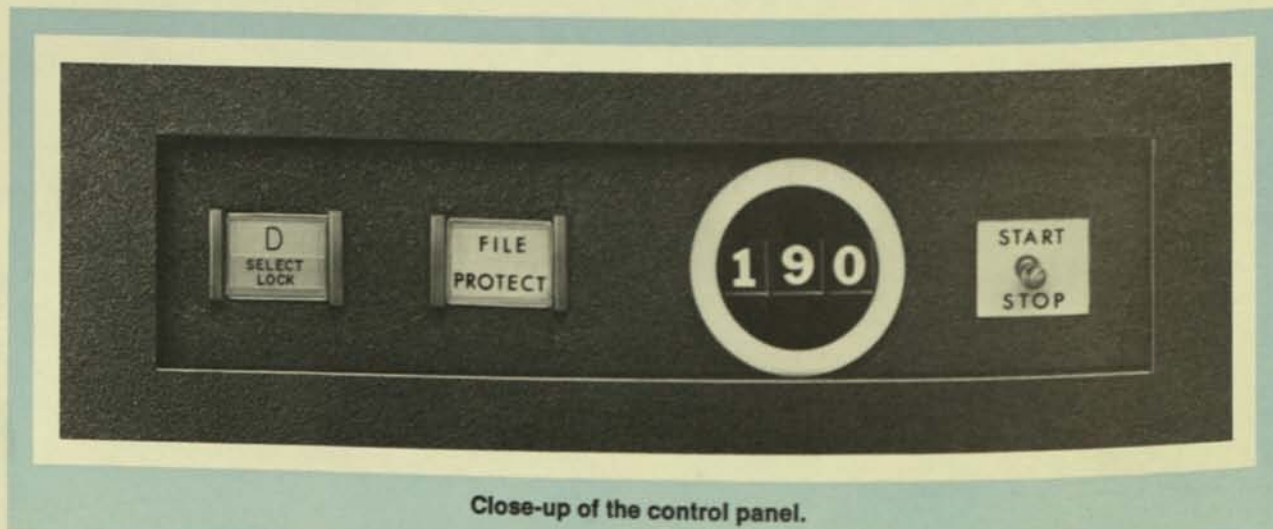
THE HIGH CAPACITY DISK DRIVE STORAGE utilizes IBM compatible disk packs on IBM compatible recording. Each disk pack can be removed and interchanged between disk drives in a simple and rapid operation. For consistent data reliability, a disk pack cleaning cycle is initiated each time the disk drive is started.



Loading of the 11-disk pack.

THE OPERATOR'S CONTROL PANEL consists of a start/stop switch, select lock indicator, file protect switch indicator and a module identifier plug. When the file protect switch is illuminated, disk writing is inhibited. To enable writing the switch is depressed. An elapsed time meter, interior mounted Seek Counter, and AC Power On Meter are available options.

MINI EXERCISER, DISPLAY AND TERMINATOR MODULES are available for field testing and trouble shooting. The Mini Exerciser simulates all significant input commands, and permits the service engineer to set up any single seek or repetitive seek operation. The Mini Display visually shows the contents of the cylinder, difference and head registers, and also the condition of the safety circuits associated with reading and writing. The Mini Terminator permits testing of the line drives.



Close-up of the control panel.

OTHER CONFIGURATIONS of the Disk Storage Drive are available for high volume requirements which require different interface configurations. In such applications, the mechanical drive and data and control electronics remain the same and only the interface electronics are changed.

THE PACKAGING of the DD 4314 features functional cabinetry designed to offer both attractive styling and maximum serviceability. Snap-on covers provide both color styling flexibility and ease of servicing. Cable access can be made through either the rear or floor of the cabinet. A 115 VAC convenience outlet is provided to facilitate maintenance.

SPECIFICATIONS

PERFORMANCE DATA

Storage Capacity	233 million bits 29 million 8-bit bytes
Access Times	
Adjacent Tracks	19 ms
Average Overall	55 ms
Maximum Overall	110 ms
Disk Speed	2400 rpm \pm 2%
Latency Time	
Maximum	25 ms
Average	12.5 ms
Number of Cylinders	203
Data Transfer Rate (IBM compatible)	312,000 8-bit bytes per second
Data Density (IBM compatible)	
Outer Track	1520 bpi
Inner Track	2200 bpi
Magnetic Transition Density	
Outer Track	3040 per inch
Inner Track	4400 per inch
Recording Modes	Double Frequency
Written Track Width	0.007 inch
Disk Pack	IBM 2316 or equivalent

POWER REQUIREMENTS

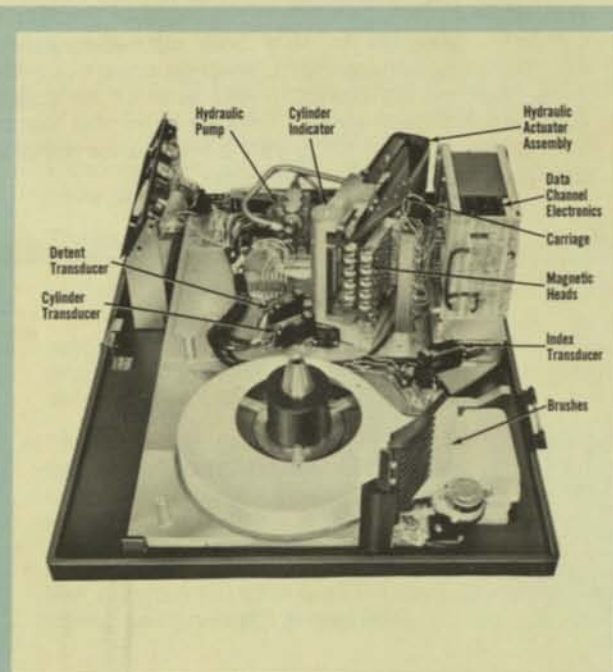
AC Power	208/230 VAC \pm 10% 50 or 60 Hz \pm 1/2 Hz 3 phase input (single phase line to line utilized) 4 amps steady running, 208V
DC Power (supplied by Storage Control Unit)	+6V \pm 4% 0.20 amps +3V \pm 4% 0.15 amps -3V \pm 4% 0.35 amps -36V \pm 4% 0.45 amps peak 0.3 amps average

ENVIRONMENTAL (OPERATING) DATA

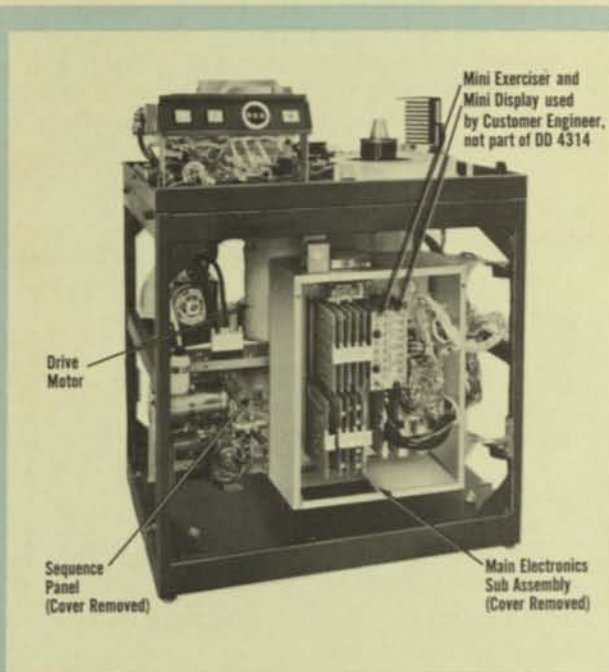
Temperature	60° to 90° F
Humidity	8% to 80% RH

PHYSICAL DATA

Weight	400 lbs.
Dimensions	24"D x 30"W x 40"H



DD 4314 deck components,
(top side view with shroud removed).



DD 4314 with covers removed for accessibility.

SALES AND FIELD SERVICE CENTERS

NORTHEAST DISTRICT

East Bethpage Road
Plainview, New York 11803
Telephone: (516) 694-9000
New York City: (212) 895-8786
TWX: 510-224-6485
CABLE: PICO

665 Woodstock Avenue
Tonawanda, New York 14150
Telephone: (716) 837-0595

2 Militia Drive
Lexington, Mass. 02173
Telephone: (617) 861-0705

2 Carriage Drive
Thompsonville, Connecticut 06082
Telephone: (203) 289-8718

MIDDLE ATLANTIC DISTRICT

1400 Spring Street
Silver Spring, Maryland 20910
Telephone: (301) 588-0030

Fort Washington Industrial Park
Fort Washington, Penna. 19034
Telephone: (215) 643-5533

NORTH CENTRAL DISTRICT

18610 West Eight Mile Road
Southfield, Michigan 48075
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MIDWEST DISTRICT

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2220 East Devon Avenue
Des Plaines, Illinois 60018
Telephone: (312) 827-6623

4510 West 77th Street
Suite 275
Minneapolis, Minnesota 55424
Telephone: (612) 920-4973
TWX: 910-576-2947

SOUTHEAST DISTRICT

2559 Creek View Drive
Marietta, Georgia 30060
Telephone: (404) 436-6191

SOUTHWEST DISTRICT

4031 Broadway
Houston, Texas 77017
Telephone: (713) MI 3-2114
TWX: 910-881-2575

3327 Winthrop Avenue
Ft. Worth, Texas 76117
Telephone: (817) 738-1702

1640 Gilbreth Road
Burlingame, California 94010
Telephone: (415) 692-1722

715 East Mission Drive
San Gabriel, California 91776
Telephone: (213) 283-8177
TWX: 910-589-3372

INTERNATIONAL

POTTER INSTRUMENT COMPANY, LTD.

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CABLE: PICO MAIDENHEAD
TELEX: 851-84330

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POTTER INSTRUMENT COMPANY, INC.

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POTTER

MA351 READ/WRITE AMPLIFIER



DESCRIPTION

Potter Model MA351 Read/Write Amplifier is designed to record and reproduce IBM-compatible data at densities up to 800 bpi, NRZ-I format. The ampli-

fier, consisting of a write section and a read section, is designed on a modular basis and incorporates silicon circuitry and integrated circuits throughout.

WRITE INPUTS TO AMPLIFIER	CONTROL INPUTS TO AMPLIFIER	OUTPUTS OF READ AMPLIFIER
Write Clock Write Data (7 or 9 lines) Write Enable Write Reset (LRCC)	Low/High Thresholds (internally wired) Read Enable Read Reset	Deskewed read data (7- or 9-channel) (strobed buffer output is available with an optional printed circuit module)

FEATURES

- Chassis prewired for fast field expansion to 9-channel, 800 bpi compatible operation. Retrofit achieved by inserting additional printed circuit modules.
- Dual-level threshold select circuitry for increased reliability. High threshold is automatically selected during write operation, low threshold during read.
- Write Flip-Flops always hold reset except when write enabled.
- Automatic reset of the read buffer Flip-Flops whenever power is applied.
- Automatic skew compensation switching to allow read forward or read reverse.
- Dual density select (200/556 or 556/800 or 200/800.)

OPTIONAL FEATURES

The following are available but are not included in the basic amplifier:

- Provision for generation of 7 or 9 channel lateral parity, with selectable odd/even parity generation control.
- Provision for lateral parity check, with input for odd/even parity selection. This module is similar to Write Amplifier parity generator.
- Variable read gate (strobe delay) for output clocking. Strobe delay is automatically changed from 30% to 50% when the system is switched from set write status to read status. Two density select system available with this card.

INPUT/OUTPUT LOGIC

Input/Output logic in the MA351 is compatible with integrated circuit interface:

Logic "0" = +5 Volts
 Logic "1" = 0 Volts

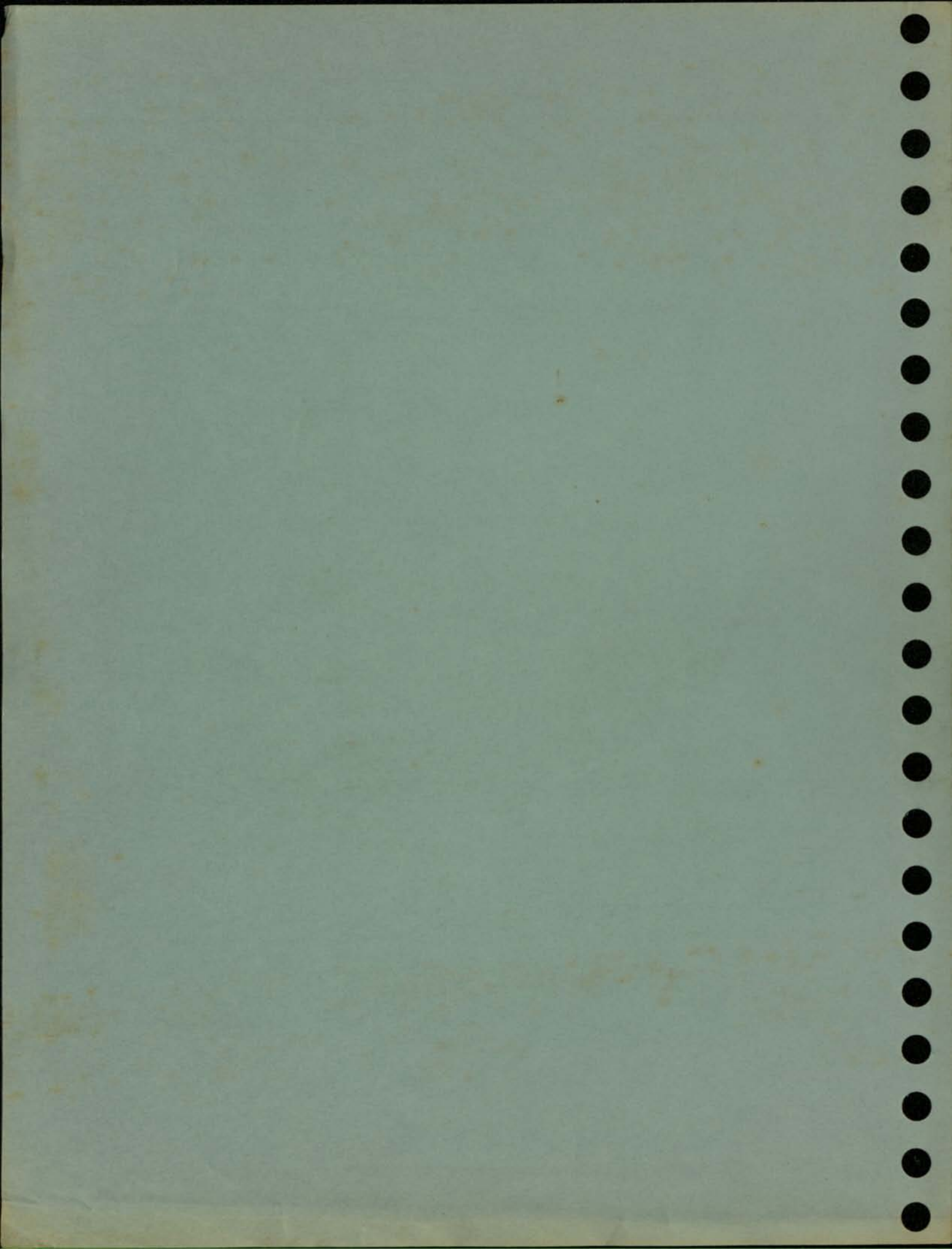
ALL SPECIFICATIONS IN THIS PUBLICATION
 ARE PRELIMINARY AND SUBJECT TO CHANGE

EFFECTIVE DATE: JANUARY 27, 1969



POTTER INSTRUMENT COMPANY, INC.

EAST BETHPAGE ROAD • PLAINVIEW, L.I., NEW YORK 11803 • (516) 694-9000



SC-1091 SINGLE CAPSTAN TAPE TRANSPORT



INTRODUCTION

The Potter Model SC-1091 is one in a family of the industry's simplest, high-performance, single-capstan tape transports.

Capable of bi-directional tape speeds to 200 ips with no program restrictions, the Potter SC-1091 provides industry compatible read/write operation at packing densities to 1600 bpi.

The SC-1091 transport is designed for use with the highest performance computer systems. Operator convenience is enhanced by the fully automatic threading and loading feature on the transport.

The system also features an advanced single-capstan design and vacuum column tape buffering which has been field-proven on Potter SC-series transports. A precision edge guidance system provides reliable tape control.

High reliability, simplified operation and easier maintenance are also achieved on the SC-1091 by use of a minimal number of mechanical parts and advanced electronic circuitry.

FEATURES

- Fully automatic threading and loading within 7 seconds
- Bi-directional tape speeds up to 200 ips
- Unrestricted programming capacity
- IBM 9-channel compatible
- Information density to 800 bpi (NRZI); 1600 bpi (PE)
- Single-capstan drive
- Data reliability — only surface in contact with oxide is read/write head and tape cleaner. Both retract during rewind.
- No mechanical adjustments required
- Optional cartridge loading available

ALL SPECIFICATIONS IN THIS PUBLICATION ARE
PRELIMINARY AND SUBJECT TO CHANGE

EFFECTIVE DATE: FEBRUARY 1, 1969

SPECIFICATIONS:

TAPE DRIVE	Single Capstan
TAPE LOADING	Fully automatic tape threading and loading in less than 7 seconds. Automatic BOT searching
TAPE SPEED ½ inch	Standard speeds: 75, 112.5, 120, 150 and 200 ips
TAPE SPEED VARIATION (Steady State)	±2%
REWIND TIME AND SPEED (2400 ft. reel)	60 sec. avg.
PACKING DENSITY	800 bpi NRZI; 1600 bpi PE
PROGRAM RESTRICTIONS	None Within IBM IRG specifications
SPEED STABILITY (long term 1 sec)	±2%
(short term 15 ms)	±2%
TAPE WIDTH	½"
TAPE TYPE	3M8938, or equal; 1.5 mil Mylar
TAPE REELS	Standard 10-½". Optional Tape Cartridge
REEL HUBS	Potter QUICK-LOCK® IBM-compatible ½"
REMOTE CONTROL INPUTS	
a. Logic levels 0/+5 Volts	
b. Input Commands	
Unit Select, Direction, Run, Rewind, Rewind and Unload	
STATUS REPLIES	
EOT/BOT, Ready, Unit Selected and Ready, Rewinding	
Write Lockout (Form C contact)	
ELECTRONICS	Integrated circuitry whenever feasible, modular plug-in construction throughout
SERVO CONTROL	All solid state with dynamic braking eliminating mechanical brakes
ENVIRONMENTAL CONDITIONS	
Ambient Temperature-Operating (within tape characteristic)	45°F to 110°F
Non-Operating	-30°F to 165°F
Humidity	20% to 80% (without condensation)
POWER	115V AC ±10%, 50/60 cps, single-phase or 220 V AC optional
	10 amperes — Standby
	12 amperes — Running
	15 amperes — Peak (less than 100 ms)
U.L. APPROVED	Underwriters' Laboratories listing will be applied for

* QUICK-LOCK is a trademark of Potter Instrument Company, Inc.

ALL SPECIFICATIONS IN THIS PUBLICATION ARE PRELIMINARY AND SUBJECT TO CHANGE



POTTER INSTRUMENT COMPANY, INC.

EAST BETHPAGE ROAD • PLAINVIEW, L.I., NEW YORK 11803 • (516) 694-9000

POTTER

PRODUCT
DATA

1-405

MODELS MA151 AND MA330 READ/WRITE AMPLIFIERS

POTTER

INSTRUMENT CO. INC.

DESCRIPTION

The MA151 and MA330 Silicon Read/Write Amplifiers record digital information on magnetic tape and check-read this data to insure recording accuracy.

The Amplifier System, designed for single and optional multi-speed applications, features complete IBM compatibility. All 7-channel, 200/556/800 bpi systems are prewired for immediate field expansion to 9-channel, 800 bpi compatible operation. Field retrofit of additional input/output channels is achieved by inserting extra printed circuit modules.

The MA151 Read/Write Amplifier is a horizontal 19" rack mounting unit which can be used for single speed, dual speed and three speed recording applications.

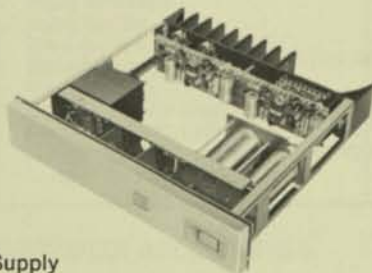
The MA330 Read/Write Amplifier is a vertical mounting assembly specifically designed for use with Potter's SC-Series transports. The unit is available in single and dual speed configurations.

READ/WRITE AMPLIFIER

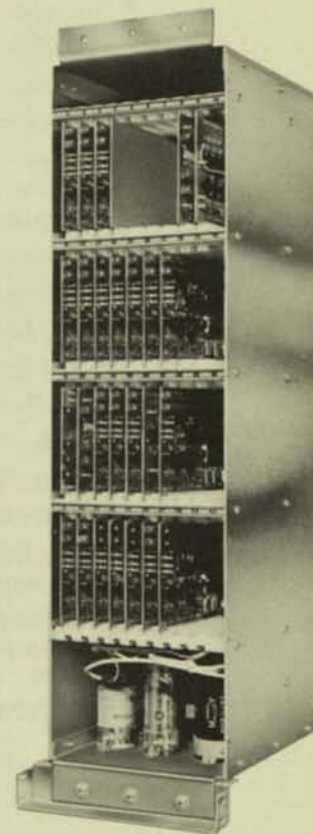
SINGLE-SPEED, 2-SPEED OR 3-SPEED READ/WRITE AMPLIFIER SYSTEM, SKEW-COMPENSATED . . . for IBM 200/556/800 bpi 7- or 9-channel compatible operation. Completely prealigned for any specified tape speed from 15 to 150 ips. Amplifier includes full chassis prewiring for future expansion to IBM 9-channel, 800 bpi compatible operation. Read Reverse Capability available on all amplifiers.



MA151
Read/Write Amplifier



P-11M
Power Supply



MA330
(door removed)

EFFECTIVE: JUNE 30, 1968

MAGNETIC TAPE TRANSPORT READ/WRITE AMPLIFIERS — MODELS MA151/MA330

FEATURES

- Compatible with IBM 7-channel format for 200/556/800 bpi and IBM 9-channel format for 800 bpi
- Tape speed operation available for speeds between 15 and 150 ips
- Operation in simultaneous Read/Write mode
- Read Reverse Capability (Available on highest speed only on MA151; both speeds on MA330)
- Tape interchangeability between IBM-compatible tape units assured
- Information transfer rates up to 120 kc
- Read Amplifier automatically reset when power is turned ON
- Circuitry provides for accurate Write and Read deskewing
- Individual gain and skew adjustment circuits standard on all multi-speed amplifiers
- Provision for writing the longitudinal redundancy check character (7- and 9-channel)
- Strobed Write input available
- Individual adjustments for pulse pairing compensation of Write amplifiers
- Write amplifier automatically reset when Write Enable is switched to "1" state
- Input circuit drive requirements less than 3 ma
- In-line Read output of all character bits and clock pulse output
- Dual threshold level standard
- Peak detectors employed in Read amplifiers
- Output circuits short circuit-proof and drive load currents up to ±20 ma
- Provision for generation of lateral Write parity bit
- Provision for ODD or EVEN lateral parity Read check
- Provision made for external controls
 - Write Enable
 - Write Reset (LRCC)
 - Read Reset (Read Inhibit)
 - Density Select—200/556/800 bpi
- Designed to minimize maintenance costs
- Solid-state silicon modular construction
- Accessible test points at front of chassis permit most adjustments to be made with modules in normal position
- Extension frames included provide complete exposure of all plug-in modules for circuit testing under actual operating conditions
- Front access for ease of maintenance

Functions		Components																			
		Chassis	Write Amp WA9X (Note 1 & 3)	Write Control WC 9X (See Note 3)	Write Enable WE 9X (See Note 2 & 3)	Speed Select SS 9X (See Note 3)	Read Preamp RP 91 (Note 1)	Read Amp RA 90 (Note 1)	Read Buffer RB 9X (Note 1 & 3)	Threshold and Read Reset TR 9X (See Note 3)	Strobe Gate SG 90 (Note 1)	Strobe and Reset Card SR 9X (See Note 3)	Density/Parity Select DP 9X (See Note 3)	Multi-Speed Strobe Delay SDM 90 (Note 1)	Lateral Parity Check PC 9X (See Note 3)	Lateral Parity Generate PG 9X (See Note 3)	Extension EX03	Power Supply P-11M	Test Tape T20		
7-Channel	Read/Write	1	1	7	1	1	7	7	7	1	1	1	1	1			2	1			
		2 or 3	1	7	1	1	1	7	7	7	1	1	1	1			2	1	OPTIONAL		
	Read Only	1	1				7	7	7	1	1	1	1	1	OPTIONAL	OPTIONAL	2	1	OPTIONAL		
		2 or 3	1			1	7	7	7	1	1	1	1	1	OPTIONAL	OPTIONAL	2	1	OPTIONAL		
	Write Only	1	1	7	1	1											2	1			
		2 or 3	1	7	1	1	1										2	1			
9-Channel	Read/Write	1	1	9	1	1	9	9	9	1	1	1	1	1			2	1			
		2 or 3	1	9	1	1	1	9	9	9	1	1	1	1	OPTIONAL	OPTIONAL	2	1	OPTIONAL		
	Read Only	1	1				9	9	9	1	1	1	1	1	OPTIONAL	OPTIONAL	2	1	OPTIONAL		
		2 or 3	1			1	9	9	9	1	1	1	1	1	OPTIONAL	OPTIONAL	2	1	OPTIONAL		
	Write Only	1	1	9	1	1											2	1			
		2 or 3	1	9	1	1	1										2	1			

NOTES: 1) Modules are coded: Single Speed = -1 · Δ99 Multi-Speed = -3 · ΔΔΔ Δ denotes operating speed code

Δ = Speed Range ips

-1	100.1-150
-2	60.1-100
-3	30.1-60
-4	15-30

2) Module is coded: 60 ma Application = -1 (Erase Head in Contact) 100 ma Application = -3 (Erase Head Out-of-Contact) 100 ma Application = -4 (EH-5 Out-of-Contact)

3) Logic Selection: Four different logic level options are available. The following table gives coding for each of these options. Substitute the value from the table for the letter "X" in each module where "X" appears:

	+5V 0V	0V +5V	-5V 0V	0V -5V
Logic 1				
Logic 0				
WA 9X	1	2	3	4
WC 9X	1	2	3	4
SS 9X (FWD only)	1	2	3	4
(FWD/REV Read)	5	6	7	8
WE 9X	1	2	3	4
RB 9X (FWD only)	1	2	3	4
(FWD/REV Read)	5	6	7	8
TR 9X	1	2	3	4
SR 9X	1	2	3	4
DP 9X	1	2	3	4
PC 9X	5	6	7	8

INPUT/OUTPUT LINES

Input Lines

Input Levels (available standard logics)	Logic "1"	+5 to +15V DC	5 ma
	Logic "0"	0V ±1.0V	3 ma
	Logic "1"	0V ±1.0V	3 ma
	Logic "0"	+5 to +15V DC	5 ma
	Logic "1"	-5 to -15V DC	5 ma
	Logic "0"	0V ±1.0V	1 ma
	Logic "1"	0V ±1.0V	1 ma
	Logic "0"	-5 to -15V DC	5 ma

Input Current

Write Inputs (7 and 9** lines)	Level (RB)	A "1" is written on tape when the input is switched from "0" to "1". Maximum 1 microsecond rise time for minimum voltage swing (4.0V). If a rectangular wave is used, the maximum duty cycle of the input is 50% of the pulse period. Minimum pulse width is 1 microsecond.
Write Clock	Pulse	All Write inputs are simultaneously enabled when the Write Clock line is raised to the level corresponding to Logic "1" Level and a "1" is written by all Write input lines which are at Logic "1" Level.
Write Enable	Level	Enabled with Logic "1" signal. (Simultaneous Erase head enable).
Write Reset	Pulse	Reset with Logic "1" signal. Minimum pulse width is 2.0 microseconds.
Read Reset	Level/Pulse	Reset with Logic "1" signal. Minimum pulse width is 2.0 microseconds.
Density Select—200	Level	Selected with Logic "1" signal.
Density Select—556	Level	Selected with Logic "1" signal.
Density Select—800	Level	Selected with Logic "1" signal.
FWD/REV Select***	Level	Selected with Logic "1" signal (on Read Reverse Unit only).
Second Speed Select (optional)	Level	Selected with Logic "1" signal.
Third Speed Select (optional)	Level	Selected with Logic "1" signal.
EVEN Write Parity Generation Select (optional)		EVEN selected with Logic "1" signal.
EVEN Read Lateral Parity Select (optional)		EVEN selected with Logic "1" signal.

Output Lines

Output Levels (available standard logics):		
Logic "1"	+10V DC ±2.0V	20 ma source
Logic "0"	Ground, -1.0V, +1.5V	20 ma sink
Logic "1"	Ground, -1.0V, +1.5V	20 ma sink
Logic "0"	+10V DC ±2.0V	20 ma source
Logic "1"	-10V DC ±2.0V	20 ma source
Logic "0"	Ground, -1.0V, +1.5V	20 ma sink
Logic "1"	Ground, -1.0V, +1.5V	20 ma sink
Logic "0"	-10V DC ±2.0V	20 ma source

Read Outputs

Pulse Width	1 microsecond
Rise Time	0.2 microseconds into 1000pf capacitance to ground
Fall Time	0.3 microseconds into 1000pf capacitance to ground

Clock Output Same characteristics as Read Outputs.
Occurs simultaneously with Read Outputs.

Lateral Parity, Odd or Even**** Same characteristics as Read Outputs.
Occurs simultaneously with Read Outputs.

Note:

- ** If Write parity generation is selected as an option, the Write inputs must be present 1 microsecond prior to the Write Clock strobe. Additional cards required.
- *** Reverse Read available on highest selectable speed only.
- **** Additional card required.

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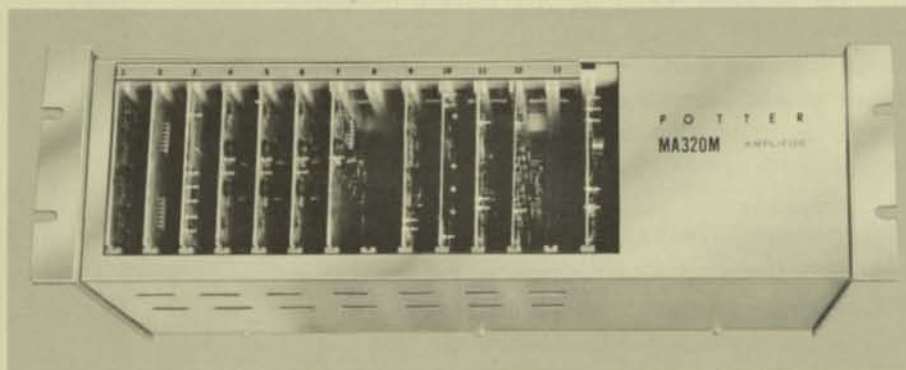
POTTER

PRODUCT
DATA
1-407

MODEL MA320 READ/WRITE SWITCHING AMPLIFIER

POTTER

INSTRUMENT CO. INC.



MA320M Main Amplifier

DESCRIPTION

The MA320 Silicon Read/Write Switching Amplifier records digital information on magnetic tape and check-reads this data to insure recording accuracy.

The Amplifier System, designed for single speed applications with Potter's Single Capstan transports, SC-1060, SC-1065, and SC-1080, features complete IBM compatibility and permits "sharing" of logic of up to eight tape units. All MA320 7-channel, 200/556/800 bpi systems are prewired for immediate field expansion to 9-channel, 800 bpi compatible operation. Field retrofit of additional input/output channels is achieved by inserting extra printed circuit modules.

READ/WRITE AMPLIFIER

The MA320 Seven or Nine Channel Read/Write Amplifier consists of a main chassis (MA320M), a local chassis (MA320L) and a power supply (P11M). The skew-compensated amplifier is IBM compatible for 200/556/800 bpi operation, and operates with a modified non-return-to zero (NRZI) recording system within a tape speed range of 75 to 150 inches per second (ips). All MA320 7-channel amplifiers are prewired for immediate field expansion to 9-channel, 800 bpi compatible operation.

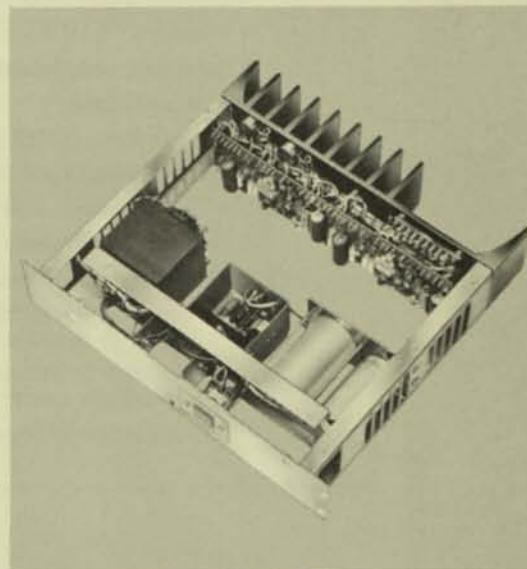
MA320M MAIN AMPLIFIER. The MA320M Main Amplifier accommodates up to eight local amplifiers and serves as the control point for the system. The main amplifier handles all transport commands and replies to and from the computer and performs transport selection, read output, read strobe and read/write enable functions.

MA320L LOCAL AMPLIFIER. All skew compensation circuits are contained within the Local Amplifier, thereby establishing plug-in interchangeability between all "local" transports.

The local amplifier consists of seven (or nine) identical circuits which receive information signals and subsequently accomplish required amplification, digitizing and deskewing functions.



MA320L Local Amplifier



P11M Power Supply

EFFECTIVE: JUNE 1, 1968

FEATURES

- Compatible with IBM 7-channel format for 200/556/800 bpi and IBM 9-channel format for 800 bpi
- Logic sharing of up to eight tape units
- Local transport units "plug-in" interchangeable
- Tape speed operation available for speeds between 75 and 150 ips
- Operation in simultaneous Read/Write mode
- Read Reverse Capability
- Tape interchangeability between IBM-compatible tape units assured
- Information transfer rates up to 120 Kilocharacters/second
- Read Amplifier automatically reset when power is turned ON
- Circuitry provides for accurate Write and Read deskewing
- Provision for compensated writing the longitudinal redundancy check character (7- and 9-channel)
- Strobed Write input
- Individual adjustments for pulse pairing compensation of Write amplifiers
- Write amplifier automatically reset when Write Enable is in "O" state
- Input circuit drive requirements less than 5 ma per input
- In-line Read output of all character bits and clock pulse output
- Three threshold levels standard (check read; hi read; low read)
- Strobe delay automatically reduced to 25% during check read operation
- Peak detectors employed in Read amplifiers
- Output circuits short-circuit-proof
- Multiple select error indicator
- Write memory status
- Remote density select
- Provision for ODD or EVEN lateral parity Read check
- Provision made for external controls
 - Write Enable
 - Write Reset (LRCC)
 - Read Reset (Read Inhibit)
 - Density Select—200/556/800 bpi
- Designed to minimize maintenance costs
 - Solid-state silicon modular construction
 - Accessible test points at front of chassis permit most adjustments to be made with modules in normal position
 - Extension frames included provide complete exposure of all plug-in modules for circuit testing under actual operating conditions
 - Front access for ease of maintenance

SPECIFICATIONS

	7-CHANNEL COMPENSATED	9-CHANNEL COMPENSATED
Packing Density.....	200/556/800 bpi.....	800 bpi
Writing Mode.....	NRZI.....	NRZI
Tape Speed (Single).....	75 to 150 ips (simultaneous Read/Write).....	75 to 150 ips (simultaneous Read/Write)
Read Direction.....	FWD/REV.....	FWD/REV
Compatible Head Types		
Simultaneous Read/Write Operation (Dual Gap).....	18516-7 Series.....	19513-9 Series
Read Only Operation (Single Gap).....	18414-7 Series.....	19404-9 Series
Write Only Operation (Single Gap).....	18416-7 Series.....	19407-9 Series
	NOTE: Write Current Requirements; All Heads 45 ma 75-100 ips; 60 ma 100-150 ips	
Power Supply.....	Local	Input power provided by power supply modules in Single-Capstan Series transports.
	P11M Main	Input: 115V ±15%, 50/400 cps Single Phase Output: + 5 VDC ±0.3V at 0.75 amps +15 VDC ±0.5V at 3 amps -15 VDC ±0.5V at 0.75 amps Short Circuit-Proof
Dimensions.....	Designed for mounting in Potter's SC-Series Transports	
	Local	25 1/4" x 6 3/4" x 8 1/2"
	Main	5 1/2" x 19" x 7 1/2"
	P11M	3 1/2" x 19" x 16 1/2"
Weight.....	Local	35 lbs. maximum
	Main	25 lbs. maximum
	P11M	25 lbs. maximum

TYPICAL MODULE SELECTION CHART

Card Type	9-Channel Single Speed 75 ips 4 x 1 System Logic 1 = +5; Logic 0 = 0V	
	Qty.	Type
Chassis MA320M	1	
Chassis MA320L	4	
Power Supply P11M	1	
Logic Converter	1	LC 91
Decoding Select Driver	1	DSD 90
Multiple Select Error	1	MSE 91
Write Amplifier	9	WA 91
Write Control	1	WC 95-4
Read/Write Enable	1	RWE 91
Read Preamplifier	3	RP 93
Read Amplifier	9	RA 93
Read Buffer	4	RB 81S
Read Buffer	1	RB 85S
Read Buffer	1	TC 91
Threshold Control	1	SG 91
Strobe Gate	1	SRB 1
Strobe Reset	1	SDM 93
Strobe Delay Multivibrators	1	DC 91
Remote Density Select	1	WS 91
Write Memory Status	1	PC 95
Lateral Parity Check	1 (opt.)	

AMPLIFIER ACCESSORIES

7/9-CHANNEL OPTIONAL PARITY CHECK MODULE (READ)
IBM 7- OR 9-CHANNEL MASTER ALIGNMENT TAPE, 800 BPI (FULL WIDTH)

FEATURES

- Compatible with IBM 7-channel format for 200/556/800 bpi and IBM 9-channel format for 800 bpi
- Logic sharing of up to eight tape units
- Local transport units "plug-in" interchangeable
- Tape speed operation available for speeds between 75 and 150 ips
- Operation in simultaneous Read/Write mode
- Read Reverse Capability
- Tape interchangeability between IBM-compatible tape units assured
- Information transfer rates up to 120 Kilocharacters/second
- Read Amplifier automatically reset when power is turned ON
- Circuitry provides for accurate Write and Read deskewing
- Provision for compensated writing the longitudinal redundancy check character (7- and 9-channel)
- Strobed Write input
- Individual adjustments for pulse pairing compensation of Write amplifiers
- Write amplifier automatically reset when Write Enable is in "O" state
- Input circuit drive requirements less than 5 ma per input
- In-line Read output of all character bits and clock pulse output
- Three threshold levels standard (check read; hi read; low read)
- Strobe delay automatically reduced to 25% during check read operation
- Peak detectors employed in Read amplifiers
- Output circuits short-circuit-proof
- Multiple select error indicator
- Write memory status
- Remote density select
- Provision for ODD or EVEN lateral parity Read check
- Provision made for external controls
 - Write Enable
 - Write Reset (LRCC)
 - Read Reset (Read Inhibit)
- Density Select—200/556/800 bpi
- Designed to minimize maintenance costs
 - Solid-state silicon modular construction
 - Accessible test points at front of chassis permit most adjustments to be made with modules in normal position
- Extension frames included provide complete exposure of all plug-in modules for circuit testing under actual operating conditions
- Front access for ease of maintenance

Functions		Components															
READ/WRITE MODE	PACKING DENSITY	Local and Main chassis Wired for 200/556/800 bpi operation and 7/9-channel compatible operation.															
		Contains all gain, skew and pulse pairing adjustments.															
7-Channel	200/556/800	Contains switching and control functions and output buffer circuits.															
		Provides four input lines for Binary Coded Decimal (BCD) Selection of a particular transport within the system.															
9-Channel	200/800	Provides ten address select lines to connect the transport to one of four select lines from the computer.															
		Transmits an error signal any time more than one transport is selected at the same time.															
		Transmits an error signal any time more than one transport is selected at the same time. Module is used whenever system exceeds 4 x 1 configuration.															
		Provides input line receivers, Write flip-flops, Write Asymmetry adj. and Write-skew multivibrators for compensated operation. Circuitry for one Write Amplifier contained on each board.															
		Provides control functions of Write Reset, Write Clock, LRCC.															
		Provides Write Enable, Initial Read Reset, Read Inhibit and ODD/EVEN Parity Selection.															
		Provides linear amplification of playback signals and symmetry adjustments. Three channels per board.															
		Provides linear amplification of playback signals and symmetry adjustments. One channel per board.															
		Provides final stage of linear amplification, rectifier, forward and reverse skew adjustment, peak detector and integration to digitize linear playback signals. One channel per board.															
		Provides line receivers, Read Storage flip-flops, strobe gate and line driver for information channel. Two channels per board.															
		Provides line receivers, Read Storage flip-flops, strobe gate and line driver for information channel. One channel per board.															
		Provides logic converters and three threshold circuits for selection of High Threshold, Low Threshold and Check Read Threshold.															
		Provides a 9-channel "OR" Gate, a 200/556/800 bpi Strobe Select Driver.															
		Provides strobe driver, reset driver and read clock driver circuitry.															
		Provides one-shot multivibrators to establish proper strobe delay for 200 bpi, 556 bpi or 800 bpi operation.															
		Upon receipt of computer command, module provides for remote change of density (i.e. high/low select). Also provides loop drivers for control panel indicator display.															
		Provides a memory status for last computer selected operation. Also maintains Write Enable in a Write permit condition as long as unit is not re-selected.															
		Provides up to 9 channels of lateral parity checking.															
		Module within SC-Series transport provides ±15V DC and -5VDC regulated output for operation of MA320 Amplifiers. The P11M Power Supply provides similar function for the MA320M Amplifiers. ±15 volt supply at 0.75 amps; ±15 volt supply at 3 amps; ±5 volt supply at 0.75 amps.															
		Master alignment tape provided with high-density systems.															
		Test Tape T20															

NOTE: 1) Module is coded: 60 ma Application = -2 (EH-2 Erase Head in contact)
 90 ma Application = -3 (EH-2 Erase Head out-of-contact)
 100 ma Application = -4 (EH-5 Erase Head out-of-contact)

2) Logic Selection:
 Four different logic level options are available. The following table gives coding for each of these options. Substitute the value from the table for the letter X and X' in each module where X and X' appear.

Value of X and X'

	+5V	0V	-5V	0V
Logic 1	+5V	0V	-5V	0V
Logic 0	0V	+5V	0V	-5V
LC 9X	1	2	3	4
MSE 9X	1	2	3	4
MSE 9X'	5	6	7	8
WA 9X	1	2	3	4
WC 9X	5	6	7	8
RWE 9X	1	2	3	4
RB 8XS	1	2	3	4
RB 8X'S	5	6	7	8
TC 9X	1	2	3	4
SG 9X	1	2	3	4
SR 8X	1	2	3	4
PC 9X	5	6	7	8
DC 9X	1	2	3	4
WS 9X	1	2	3	4

OPTIONAL

INPUT/OUTPUT LINES

Input Lines

Input Levels (available standard logics).....	Logic "1"	+5 to +15 VDC	5 ma
	Logic "0"	0V ±1.0V	3 ma
	Logic "1"	0V ±1.0V	3 ma
	Logic "0"	+5 to +15 VDC	5 ma
	Logic "1"	-5 to -15 VDC	5 ma
	Logic "0"	0V ±1.0V	1 ma
	Logic "1"	0V ±1.0V	1 ma
	Logic "0"	-5 to -15 VDC	5 ma

Input Current

Write Inputs (7 and 9 lines).....	Level (RB)	A "1" is written on tape when the input is switched from "0" to "1". Maximum 1 microsecond rise time for minimum voltage swing (5.0V). If a rectangular wave is used, the maximum duty cycle of the input is 50% of the pulse period. Minimum pulse width is 1 microsecond.
Write Clock.....	Pulse	All Write inputs are simultaneously enabled when the Write Clock line is raised to the level corresponding to Logic "1" Level and a "1" is written by all Write input lines which are at Logic "1" Level.
Write Enable.....	Level	Enabled with Logic "1" signal. (Simultaneous Erase head enable).
Write Reset.....	Pulse	Reset with Logic "1" signal. Minimum pulse width is 2.0 microseconds.
Read Reset.....	Level/Pulse	Reset with Logic "1" signal. Minimum pulse width is 2.0 microseconds.
Density Select—200.....	Level	Selected with Logic "1" signal (optional).
Density Select—556/800.....	Level	Change density pulse. Density will be changed at end of 10 microsecond pulse delay.
EVEN Read Lateral Parity Select (optional).....		EVEN selected with Logic "1" signal

Output Lines

Output Levels (available standard logics):.....	Logic "1"	+5 VDC ±2.0V	3 ma source
	Logic "0"	Ground, ±1.0V	20 ma sink
	Logic "1"	Ground, ±1.0V	20 ma sink
	Logic "0"	+5 VDC ±2.0V	3 ma source
	Logic "1"	-5 VDC ±2.0V	3 ma source
	Logic "0"	Ground, ±1.0V	20 ma sink
	Logic "1"	Ground, ±1.0V	20 ma sink
	Logic "0"	-5 VDC ±1.0V	3 ma source

Read Outputs

Pulse Width.....	Standard: Unstrobed Data Output Optional: Strobed Data Pulse 0.5 microsecond duration
Rise Time.....	0.2 microseconds into 1000pf capacitance to ground
Fall Time.....	0.3 microseconds into 1000pf capacitance to ground
Clock Output.....	0.5 microsecond duration
Lateral Parity, Odd or Even*.....	Same characteristics as Clock Output Occurs simultaneously with Clock Output

*Additional card required.

Information subject to change without notice.



POTTER INSTRUMENT COMPANY, INC.
EAST BETHPAGE ROAD • PLAINVIEW, L. I., NEW YORK 11803 • (516) 694-9000

POTTER

DD 480 Flexible Disk Storage System

Random Access—Simple Operation—Low Cost

MAR 7 1973

FEATURES

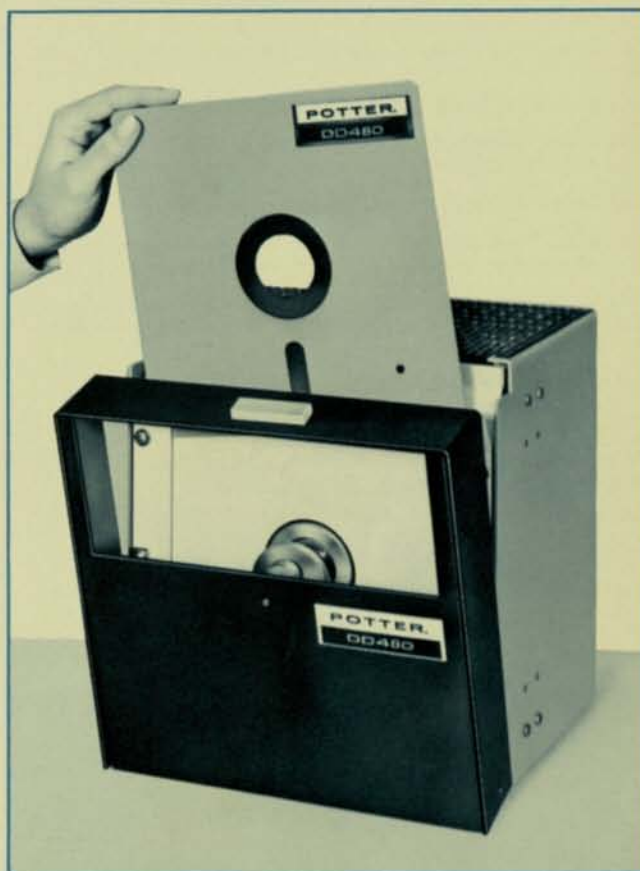
- Uses IBM compatible plastic enclosed disk
- 653 Kilobit capacity ideal for data input station use
- Data transfer rate of 33.3 Kilobits per second
- Data can be sector organized for interchange compatibility
- Positive identification of beginning of records
- Disk loaded from front of machine
- Design simplicity provides long term reliability
- Low cost

THE POTTER DD 480 FLEXIBLE DISK DRIVE is available for use by systems manufacturers in applications where cassette units have previously been specified. Using a single, plastic enclosed, flexible disk medium, this new disk drive provides several advantages over cassette type equipment. The Flexible Disk Drive uses multiple concentric tracks to record data, rather than just the one or two used in cassettes. Combining a disk organization of multiple tracks with a moving head-track accessing system provides the user with access to the recorded data in an average time of 1.67 seconds.

Data recorded on the disk may be organized on the individual tracks in up to 8 separate sectors. A series of holes, located on the outer periphery of the disk is detected photoelectrically, providing an output pulse for every 45° of disk rotation. When a Potter Disk Cartridge is used, an extra hole provides identification of the first sector.

Data check reading can be accomplished within one revolution of the disk (.67 seconds). The disk capacity of over 650,000 bits provides enough storage for the daily production of a keypunch operator.

The disk drive is loaded more simply than a home record player. The plastic enclosed disk is inserted into a loading slot at the top of the machine. Closing the door centers the disk and readies the drive for operation. Disk speed is 90 rpm which provides a data transfer rate of 33.3 K bits per second. The single gap head is held in contact with the disk only during actual read/write operations providing extended disk life. In use, if one and one half revolutions of the disk occur without a command to read or write data, a pressure pad, provided to



insure proper head-disk contact, is retracted. In addition, should no further commands occur within one and one half additional revolutions, the disk drive motor may be turned off. These features, along with the overall simplicity, provide long term reliability.

The DD 480 is ideally suited to applications such as Key-to-disk systems, hard-copy and crt data input stations and data terminals. It can also be used as a replacement for paper tape and magnetic tape for computer and peripheral microprogramming. The unit is available in three basic configurations—the drive with accessing capability only, with accessing and read only electronics, and with accessing and read/write electronics. Special interfacing to suit customer requirements is also available.

SPECIFICATIONS

Recording Medium — Single Disk Cartridge in sealed plastic envelope. Envelope size 8" x 8" x $\frac{1}{4}$ " (20.3 cm x 20.3 cm x 1.8 mm). Disk Diameter 7½" (19 cm). Recording Surface High Density micro-dispersed iron oxide. Disk substrate 0.0045" Mylar. Recording surface covered by 50 u inch Mylar. Specify IBM 23FD-II Disk Cartridge or Potter FD 239. The Potter Disk is interchangeable and provides an additional hole for sector indexing.

Disk Loading — From front of Disk Drive.

Disk Capacity — 653,312 bits (81,664 8 bit bytes).

Number of Tracks — 32 concentric tracks (Outer track is number 0, Inner track is number 31).

Track Capacity — 20,416 bits (2,552 8 bit bytes).

Sectors per Disk — 8.

Sector Indexing System — Sectors are identified photoelectrically through holes in the disk. The first sector on the Potter disk is identified by two holes, other sectors by a single hole each.

Disk Recording System — Double frequency, self clocking serial by bit.

Disk Rotational Speed — 90 revolutions per minute.

Disk Track Density — 1000 data bits per inch outer track, 1600 data bits per inch inner track, Constant data frequency.

Disk Data Transfer Rate — 33.3 Kilo bits per second.

Recording Head Assembly — Potter long life, single gap track for read/write or read only operation as required.

Disk Track Accessing Mechanism — 2 pulse operated stepping solenoids driving 1 lead screw. One solenoid for each direction of head travel.

Track Accessing Time — 80 milliseconds track to track.

Track Accessing Rate — 12 tracks/second.

Ready Time From Head Pressure Pad Retraction — 200 milliseconds.

Ready Time From A.C. Power on to Motor — 3 seconds.

Ready Time From Inserting Disk — 3 seconds.

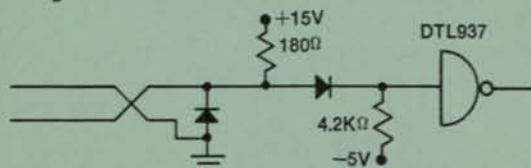
Recording Head Pressure Pad Retraction Cycle — Recording head pressure pad will disengage and retract if no read or write or track access command is received in 1.5 revolutions of the disk. (One second).

Motor Off Cycle — A "Motor Off" cycle command may be issued to the disk drive if no read or write or track access command is received within 3 revolutions of the disk. (2 seconds). This time may be overlapped with the "Recording Head Pressure Pad Retraction Cycle."

Logic and Command Interface — All status, command and data lines to or from the disk drive are negative going DTL/TTL +5/0 volt signals where 0 volts = the active state.

Logic 0 (inactive state) = +5V \pm 0.5V, Logic 1 (active state) = 0 \pm 0.5V, Sink 30 ma.

Data and command signals to the disk drive should be driven by a type 944 DTL integrated circuit with a 10,000 ohm pull up resistor to +5 volts or equivalent TTL type 9009. Data and reply lines from the disk drive should be terminated with the following recommended circuit.



Interconnecting Cable — One PC board mating connector is supplied with each disk drive.

The maximum cable length from connector pin to connector pin is 50 feet (15 meters).

All inputs and outputs require twisted pairs, one pair per function, one for ground. All wires should be 22 AWG minimum with at least one twist/inch (1 twist/25 mm).

Environment — 50°-100°F (10°-43°C), 8%-80% Relative Humidity.

Disk storage within +5° of Disk Drive Ambient temperature.

Physical Size — 11¼" High (28.6 cm), 9¼" Wide (24.1 cm), 8½" Deep (21.6 cm).

Mounting — Stand offs for integration into chassis assembly, or can be supplied with panel for standard 19" rack mounting or any other custom enclosure.

Weight — Approx. 18 pounds.

Power Requirements — A.C. 115 volts 60 Hz 100 watts, D.C. +24 volts, 3 amp. pulses for 75 msec. with 5 msec. recovery, +24 volts constant at 250 ma., -15 volts constant at 750 ma. 50 Hz and other A.C. voltages available.

Input Commands:

Turn on Motor — Maintained level 0 volts = Motor on.

Seek Track "In" — Pulse, 80 milliseconds minimum. Each pulse causes head to advance away from the home position from one track to the next higher track — 1 to 2, 2 to 3, etc.

Seek Track "Out" — Pulse 80 milliseconds minimum. Each pulse causes head to retract towards the home position from one track to the next lower track — 9 to 8, 8 to 7, etc.

Write — Maintained level, 0 volts = unit will write data presented on data input lines from the disk controller.

Read — Maintained level, 0 volts = unit will read data and supply it on the read data line to the disk controller.

Note — Either a Write or a Read command will cause the head pressure pad to move to the engaged position with the disk surface in contact with the head assembly. In the event of a simultaneous command to both read and write data, the disk drive will permit only reading of data, and will not write over information which may be on the disk.

Reply Lines from Disk Drive:

Sector Boundary and Sector Index — Sector Boundary pulses of 80 usec. will occur every 83.3 msec. In addition, when using the Potter Disk, an index pulse of 80 usec. will occur once every revolution. The sector index pulse is spaced 41.5 msec. after the "last" or eighth sector pulse and is used as an indication that the next sector pulse is the "first" or number one.

Head Pressure Pad Engaged — Maintained level, 0 volts = head pressure pad has engaged and the disk surface is in contact with the head assembly. This signal will appear approximately 200 msec. after the disk drive receives either a read or write command.

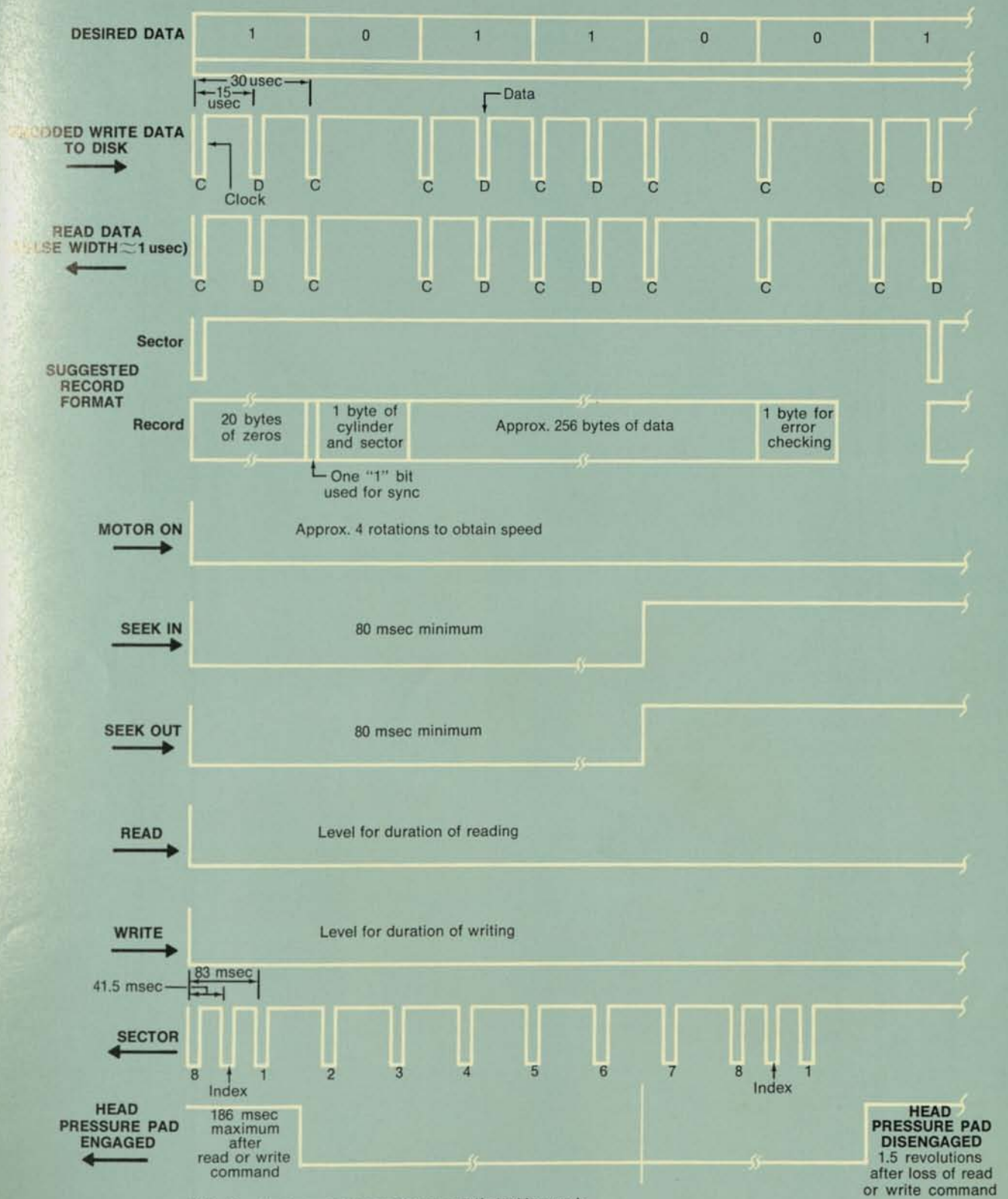
The head pressure pad engaged signal will remain in the active state after the Read Data or Write Data command is removed for 1½ revolutions of the disk. This line may be interpreted as a unit ready signal.

Home — Maintained level, 0V = head assembly is in the home, or "out" position.

Data Lines:

Write Data and Read Data — Serial data stream, digitally organized, double frequency type recording. See chart on next page.

WRITE DATA — DOUBLE FREQUENCY ENCODED (See Below)



Note: Double frequency encoding is a self clocking code and therefore requires a windowing generator to strip the data from the clock bits.

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532 Broad Hollow Road • Melville, New York 11746 • (516) 694-9000

POTTER

LP 3500 Chain Printer

JUL 31 1972

Outstanding Print Quality, Reliability and Versatility

FEATURES

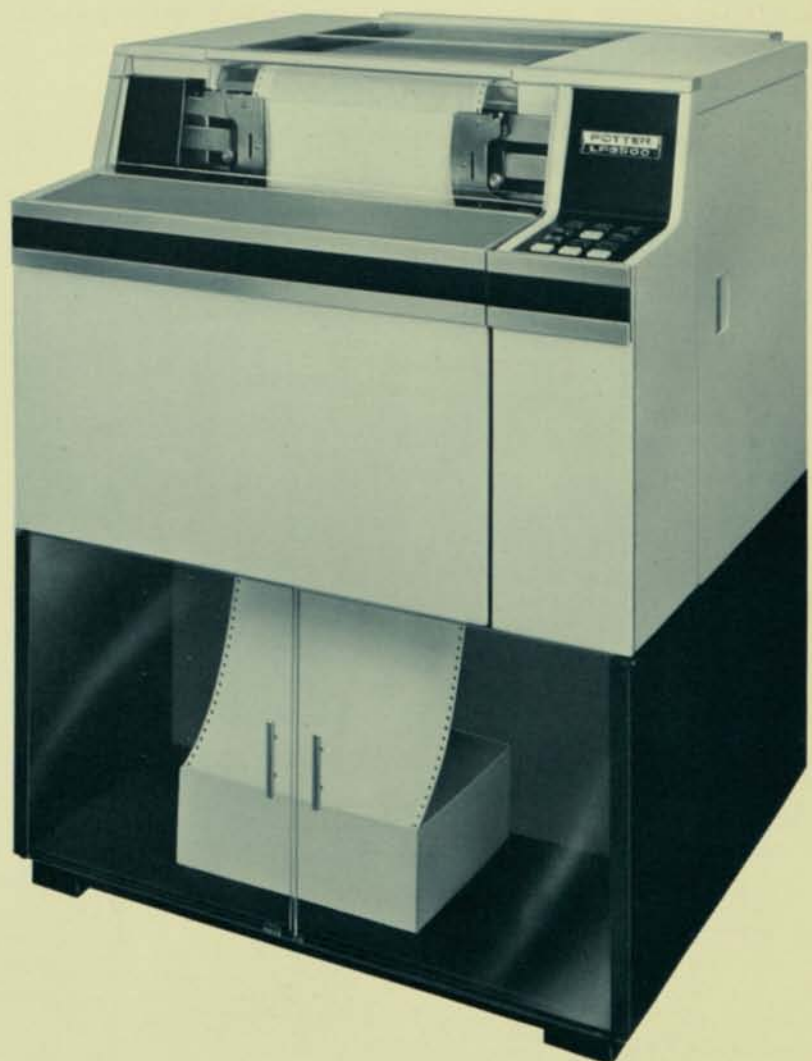
- Up to 1500 Lines Per Minute
With 48 or 64 Character Sets
- Excellent Print Quality
- Up to 128 Characters—132 Columns
- Changeable Character Fonts
- Up to 6 Copies
- Ease of Operation
- High Reliability—Minimum Maintenance

The LP 3500 Chain Printer incorporates advanced developments in printing technology to produce a highly reliable design. The unit attains its high speed by using extremely stable, high energy free-flight hammers impacting a removable, encased, multi-character chain module.

Many mechanical adjustments have been simplified to provide ease of operation. Acoustic noise levels have been reduced. Immediate access is provided to all internal components for faster maintenance. Simplicity and reliability summarize the LP 3500's construction.

Versatility is built-in. Operators may change forms, ribbons and even character fonts in minutes. They may route forms out of the printer's top for immediate access, or out the back for stacking. Adjustments can be made quickly, since all operator controls are conveniently accessible. Human engineering is inherent in the design.

The LP 3500 is ideal for all computer and data processing systems requiring high speed, high quality printout.



A FULL LINE IS PRINTED in a single print cycle. Data, representing the columns, is abstracted serially by character, parallel by bit from the buffer and then compared to the chain position counter. When coincidence takes place, the appropriate hammer is energized. When the number of energized hammers in a line equals the number of printable characters loaded into the buffer (not including blanks) the print cycle is terminated and the printer advances the paper. The printer then becomes ready to accept the next line of data. This "adaptive control" technique allows the printer to move to the next line as soon as the buffer is empty, instead of continuing to read the blank spaces that constitute the rest of the line. It provides a 10 to 15% increase in throughput when printing less than 100% page density.

THE PRINT MECHANISM consists of 132 high-energy, free-flight hammers (one hammer for each column of printout) impacting a character chain moving horizontally at 230 inches per second.

The hammers are solenoid actuated for high energy, and are driven by constant current solid-state drive circuitry. Print density is operator adjustable.

The character chain is enclosed within an operator interchangeable module, which may be exchanged with another module in less than 3 minutes. It consists of case-hardened character slugs mounted on a fiberglass reinforced neoprene belt. Each field-replaceable slug contains 2 characters spaced 0.150 inches apart.

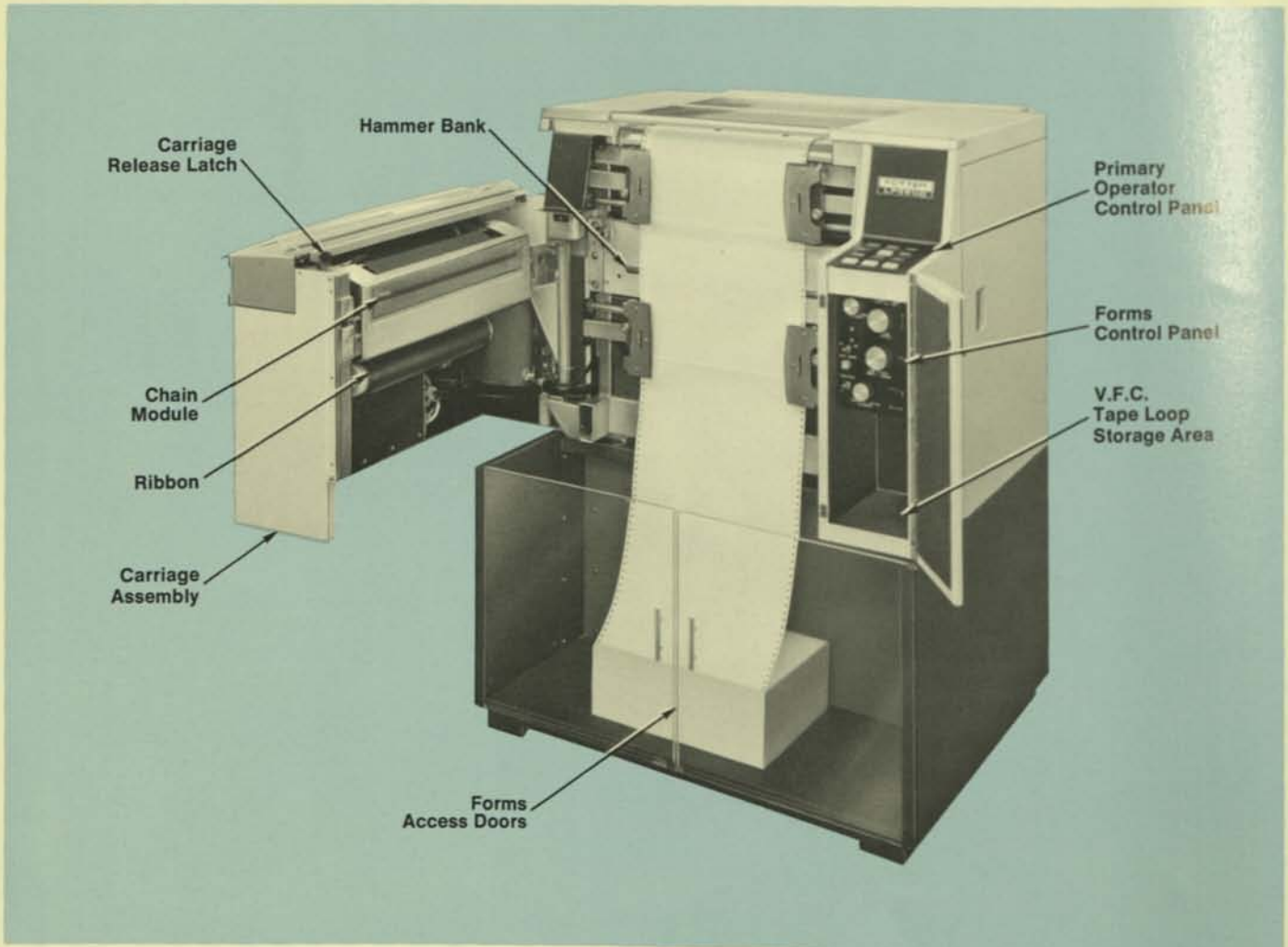
Character timing signals are generated as the teeth from a rotating

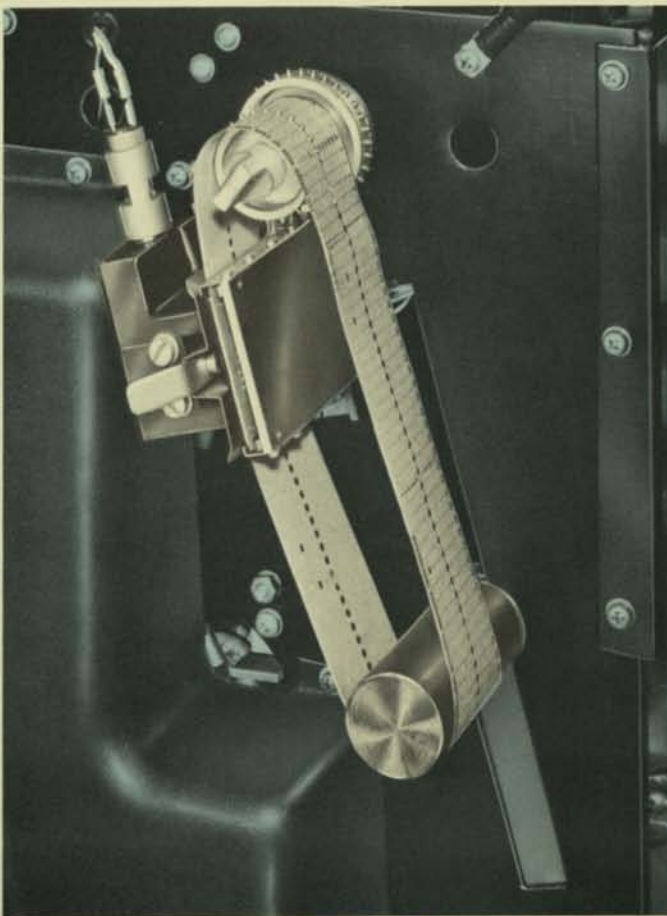
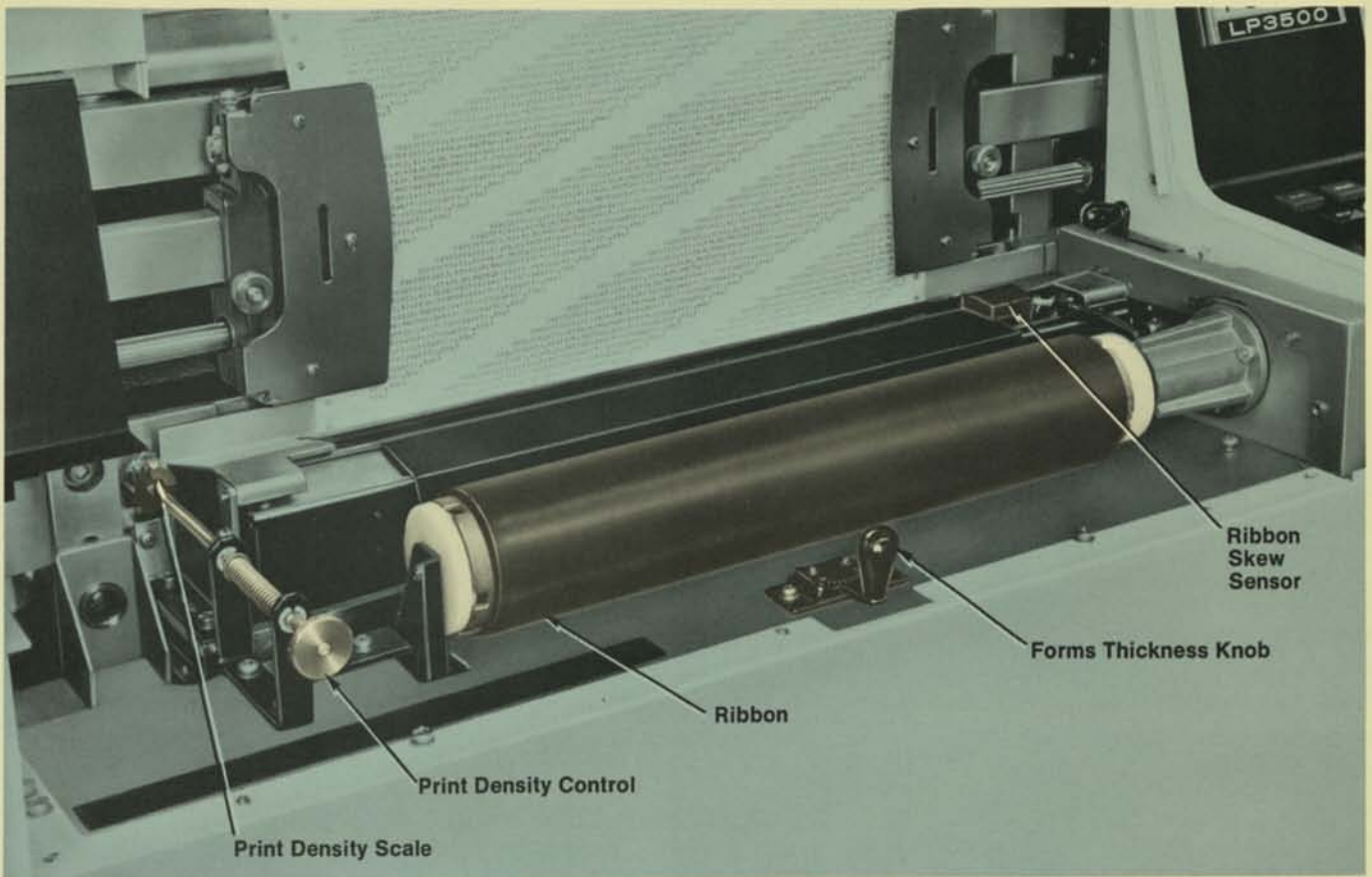
wheel revolve past a magnetic transducer. Character timing is unaffected by dirt or dust. Reliability is increased.

STANDARD CHARACTER SETS contain 48, 64, 96 or 128 characters, ASCII or EBCDIC coded. Special character sets and codes are optionally available.

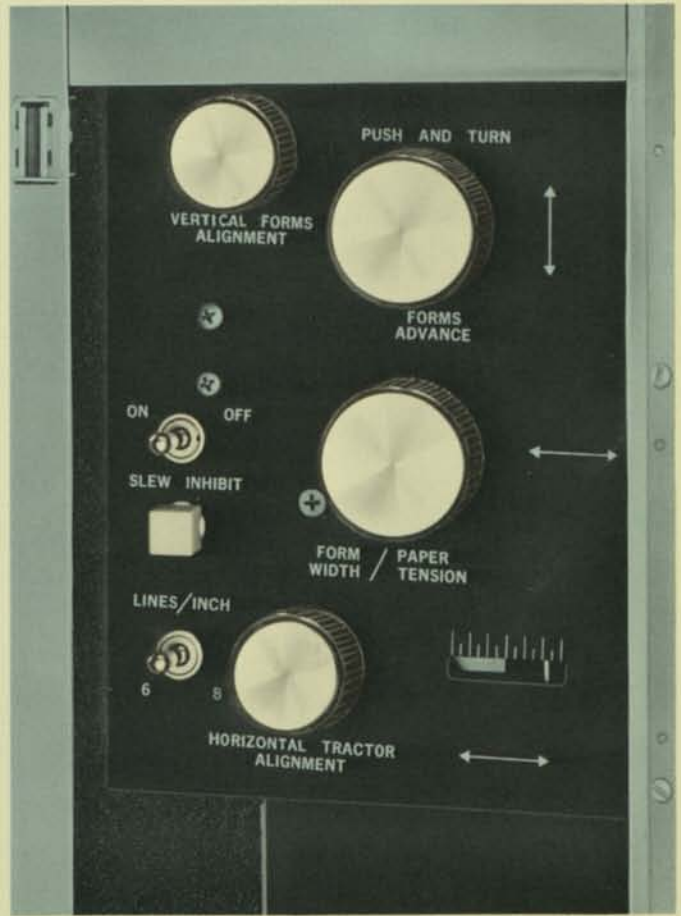
The 48 and 96 character sets are composed of six fonts of 48 or three fonts of 96 characters, for a total of 288 characters per chain. The 64 and 128 character sets are composed of four fonts of 64 characters or two fonts of 128 characters, for a total of 256 characters per chain.

Character chains with the same number of character positions may be freely exchanged by an operator within 3 minutes. Larger type fonts required for special printing jobs are available.





VERTICAL FORMAT CONTROL UNIT



FORMS CONTROL PANEL

SPECIFICATIONS

Mechanical

Print Speed	
Minimum	1020 LPM with a 64 character set 1240 LPM with a 48 character set
Maximum	1500 LPM
Character Sets	48, 64, 96, or 128 ASCII or EBCDIC
Chain Size	256 or 288 characters
Chain Speed	230 ips (5,8 m/s)
Column Capacity	132
Horizontal Spacing	10 columns per inch
Line Spacing	6 or 8 lines per inch, switch selectable
Print Registration	
Horizontal	±.005" (±.013 cm)
Vertical	±.005" (±.013 cm)
Paper Feed System	
Form Width	4" (10 cm) to 18½" (47 cm)
Number of Copies	Up to 6, fan-fold.
Form Length	22" (56 cm) Max.
Paper	
Type	Pin Feed, Fan-fold
Weight	
Single Part	15 lb. min.
Multiple Part	12-10-15 lbs.
Single Line Advance	17 ms @ 15 ips (0.4 m/s)
2 to 7 Line Advance	30 ips (0.8 m/s)
Greater Than 7 Line Advance	75 ips (1.9 m/s)
Vertical Format Control (Optional)	12 Channel optical tape reader, IBM-compatible.
Ribbon	
Width	14" (36 cm)
Length	20 yards scroll type (16.2 m)

Electrical

Buffer Storage	Full Line
Data Input Rate	1 character per microsecond (max)
Interface Levels	Logic "0" = +5V Logic "1" = 0V
Line Voltage	208/230V + 10%, 60 Hz, Three Phase, Optional, 195/220/235/380/408V ± 10%, 50 Hz, Three Phase
Power Consumption	9 Amp Max. per Phase at 208V

Environment

Ambient Temperature	Operating 50°F (10°C) to 105°F (40°C) Storage -50°F (-46°C) to 150°F (65°C)
Humidity	Operating 10% to 90%, no condensation Storage 5% to 95%, no condensation

Physical

Size	37" W (,9 m) x 46½" H (1,2 m) x 30" D (,8 m)
Weight	750 lbs. (341 kg)

THE PAPER FEED SYSTEM consists of two sets of tractor assemblies adjustable to paper widths from 4" to 18½". Forms can be loaded and removed in seconds. The tractors are driven by a high torque, low inertia DC motor. There are no mechanical brake/clutch systems, no mechanical adjustments.

Paper incrementing is controlled by a positional encoding disc detected by an electro-optical reader. No mechanical linkages are used. A "top of form" mechanism activates during each cycle of 66 lines. It allows the user to slew to top of form.

When flexible vertical formatting is desired, an optional IBM-compatible 12 channel punched tape Vertical Format Unit is available. Coupled to the paper feed tractors, it provides line feed spacing under the control of a vertical format loop.

THE FORMS POWER FEED UNIT assists in providing smooth, effortless exiting of forms from the printer into the forms basket. Paper is driven by a motorized feed roller and directed into the forms basket. Horizontal forms tension is operator adjustable. Paper flow is unrestricted; tearing and smudging is prevented. The user has the choice of exiting forms from the top front of the printer for immediate access, or out of the back for stacking.

THE AUTOMATICALLY REVERSING RIBBON MECHANISM utilizes two permanent magnet synchronous stepping motors. Motion from the drive motors to the ribbon drive spindles is transferred by heavy-duty fiberglass reinforced timing belts. Ribbon skew is corrected by an automatic motor



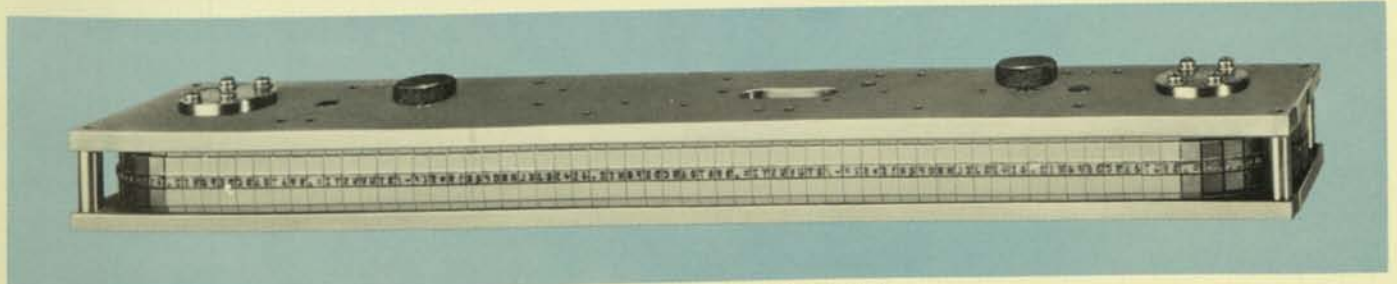
driven correction mechanism; uneven winding and wear distribution is eliminated. The ribbon drive mechanism has no clutches, and requires no mechanical adjustments. It uses industry-standard 14" wide by 20 yard long scroll-type ribbon. Ribbons may be changed by operators in less than 60 seconds.

LOGIC AND CONTROL ELECTRONICS are housed inside a hinge-mounted, fan-cooled card cage, which swings out for easy access. Integrated circuitry, packaged on plug-in printed circuit modules, are used to provide maximum reliability. Test points are provided wherever required to facilitate routine servicing. The power supply is mounted on extension slides in the base of the printer. Throughout the LP 3500 total circuitry accessibility ensures simplified, faster maintenance.

A SOUND ABSORBING ENCLOSURE houses printing mechanisms and associated electronics, with ample

room left for customer or Potter control unit electronics. Welded heavy-gauge sheet metal construction yields increased mechanical stability with decreased size and weight. Snap-off or swing-open panels provide immediate access to all internal components. Casters ensure easy movement. Standard cabinet colors are Armohide No. U-1768 textured white for top panels; Armohide No. U-1068 textured gray for base panels, and Armohide No. U-1067 textured blue for the carriage top and interior panels. Special colors are optionally available.

THE OPERATOR CONTROL PANEL consists of 4 indicator lamps, 4 pushbutton switches, and 4 indicator/pushbutton switches. To facilitate maintenance, a service control panel is located in the rear of the printer. It consists of a START indicator/pushbutton switch, a STOP pushbutton switch and a RESTORE pushbutton switch. The function of these rear controls are identical to those found on the front operator control panel.



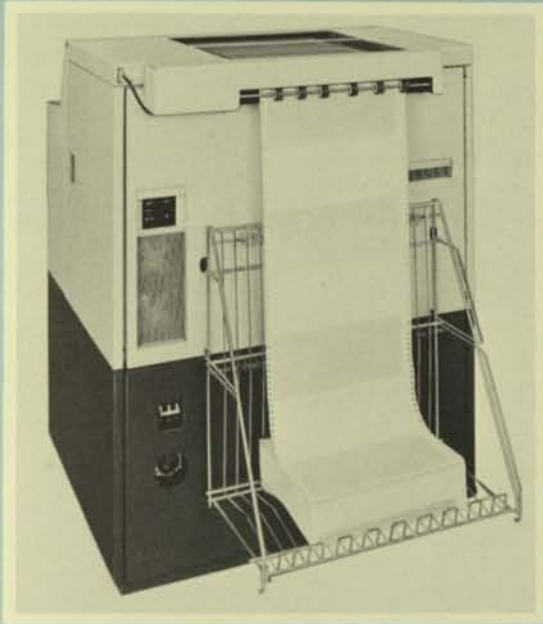
INTERCHANGEABLE CHAIN MODULE

FRONT OPERATOR CONTROL PANEL

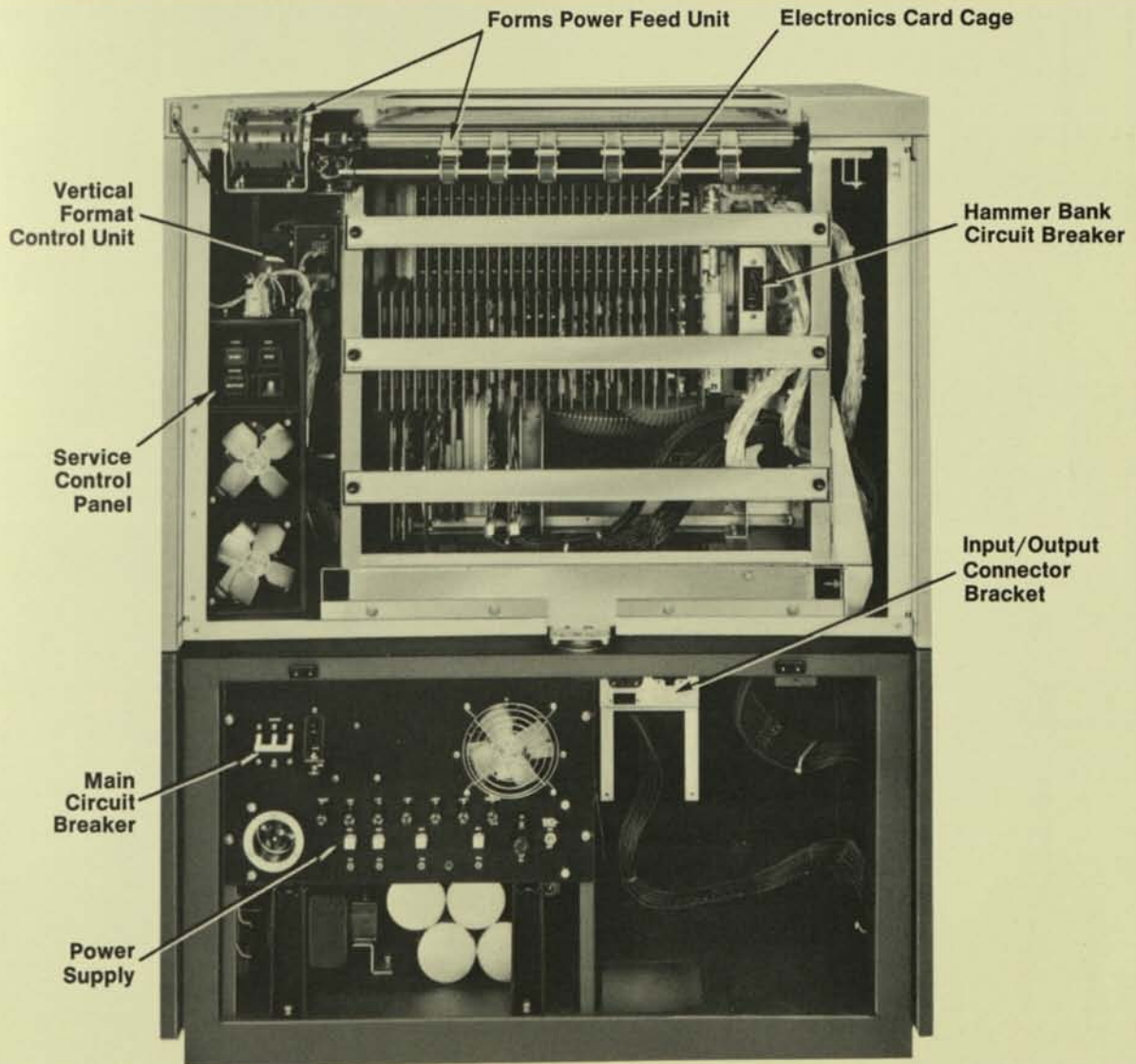
CONTROL/INDICATOR	TYPE	FUNCTION
POWER	Indicator Lamp	Illuminates when printer receives AC power
READY	Indicator Lamp	Illuminates when printer is ready to be placed on line
INTERLOCK	Indicator Lamp	Illuminates when inoperative condition exists
END-OF-FORM	Indicator Lamp	Illuminates when end-of-form is reached
STOP	Pushbutton Switch	Switches printer from Start to Ready
SPACE	Pushbutton Switch	Advances paper 1 line
RESTORE	Pushbutton Switch	Advances paper to top-of-form
PRINT TEST	Pushbutton Switch	Prints out pre-determined character
START	Indicator/Pushbutton	Places printer on-line
PRINT ERROR/RESET	Indicator/Pushbutton	Detects sync or parity error — Resets error
THERMAL	Indicator/Pushbutton	Indicates overheated chain or hammer bank — Resets printer when cool
SINGLE CYCLE	Indicator/Pushbutton	Enables operator to print one line per pushbutton actuation after end-of-form, until top-of-form is reached

OPERATOR MECHANICAL CONTROLS

CONTROL	LOCATION	FUNCTION
FORMS THICKNESS KNOB	Center of carriage behind hinged panel	Adjusts distance between hammer bank and chain for different form thicknesses
PRINT DENSITY CONTROL	Left side of carriage behind hinged panel	Controls print density
HORIZ. TRACTOR ALIGNMENT—COARSE	On left forms tractor	Adjusts left tractors to 1 of 7 positions at 1" increments
HORIZ. TRACTOR ALIGNMENT—VERNIER	Right side of printer behind hinged front panel	Simultaneously moves right and left tractors $\pm .5"$ (Printer may be operated during use of this control)
FORM WIDTH/PAPER TENSION	Right side of printer behind hinged front panel	Adjusts right tractors for form width and properly tensions forms
ADVANCE KNOB	Right side of printer behind hinged front panel	Disengages VFU from feed mechanism — Allows manual feeding of forms
VERTICAL FORMS ALIGNMENT KNOB	Right side of printer behind hinged front panel	Adjusts forms $\pm 2\frac{1}{2}$ lines in relation to the vertical format loop (Printer may be operated during use of this control)
VERTICAL FORMAT CONTROL UNIT	Right side of printer behind side door	12 channel IBM compatible VFU, unloaded from side of unit
6/8 LPI SELECT	Right side of printer behind hinged front panel	Sets line to line spacing at 6 or 8 LPI
HIGH SPEED SLEW INHIBIT SWITCH	Right side of printer behind front panel	Reduces paper slew from 75 ips to 15 ips for problem forms
FORMS POSITION INDICATOR	Left side of hammer bank	Indicates position of form's printed column and line



Easy accessibility to all internal components and assemblies ensures rapid maintenance, and therefore minimum downtime. The rear covers lift off in seconds. The electronics card cage swings out on heavy-duty hinges and the power supply, mounted on ball bearing slides, pulls out for immediate access. A rear service control panel further illustrates the ease-of-maintenance design which is prevalent throughout the printer's construction.



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POTTER

HSP-3502 CHAIN PRINTER



THE NEWEST DESIGN CHAIN PRINTER

FEATURES

- High Speed — up to 540 lines per minute
- Versatility — up to 192 characters in 132 columns
- Sharp Character Definition
- Alphanumeric, Numeric & Symbolic Printing Capability
- Integrated Circuit Electronics
- Electronically Adjustable Double Width Hammers
- Minimum Number of Parts
- Price Breakthrough — LOW COST

NEW DESIGN

The HSP-3502 Chain Printers provide the ultimate in user satisfaction due to the precise control of vertical registration. The chain-design concept, formerly available from only one computer manufacturer, is now provided to the industry in a revolutionary, value-engineered design.

The order-of-magnitude reduction made in the total number of parts enormously enhances reliability.

Wiring simplification, the use of integrated circuits, and reduction in number of hammers and driver circuits to one

half, have eliminated thousands of parts.

The chain system makes the HSP-3502 Chain Printer substantially lower in cost than comparative systems and extraordinarily simple to maintain and operate.

Value engineered from the major functional components such as the unique, radically new, 192 character horizontal type font to the mounting hardware, the HSP-3502 represents a new concept in reliability and maintainability.



11/14/68

8 11K

8 20K

2 17, 18K

TO E 2, 5, 7
" 12K.

REVOLUTIONARY NEW CONCEPT IN



APPLICATION

The HSP-3502 is designed for use with all computers and data processing systems. This versatile printing system can also be interfaced off-line with a tape transport for use as an off-line print station, or interfaced with a DATA-PHONE[®] for remote terminal system applications.

DESCRIPTION

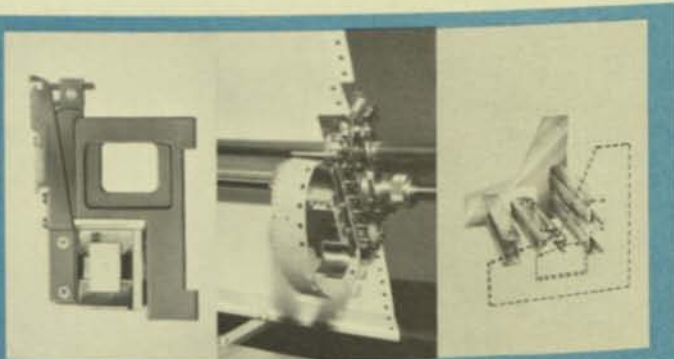
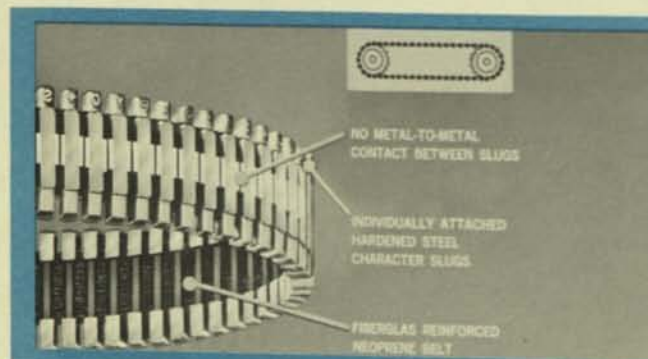
PRINT MECHANISM The heart of the Chain Printer is a uniquely designed, continuous rotating chain. The chain contains individually attached characters along its periphery on 0.2 inch centers. The print hammers are double-width; that is, the hammer head is 0.2" wide. Only one hammer is there-

fore required for every two columns of print-out. A photo-electric code wheel is mechanically linked to the rotating print type font providing a character timing pulse for each character position located on the chain.

The ribbon mechanism is a simple, automatically reversing unit which moves a standard 3/4" wide ribbon horizontally.

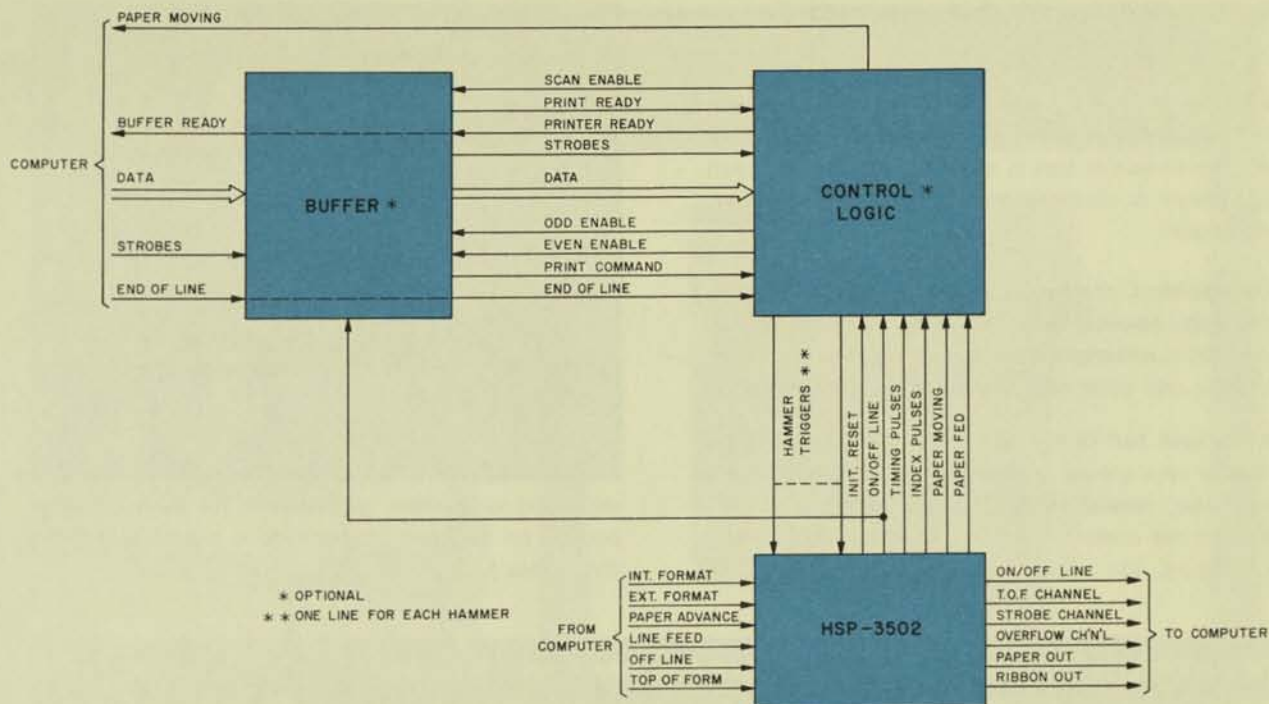
A simple manual control opens the carriage for a rapid paper load cycle.

CHARACTER COMPLEMENT Up to 192 different characters (numeric, alphanumeric and symbolic) in 132 columns may be placed on the horizontally rotating type chain.



NEW CHAIN DESIGN Potter's uniquely designed continuous rotating chain contains hardened steel character slugs individually attached to a non-stretch timing belt. Type font and character sets may be changed in minutes with no hammer realignment cycle necessary.

TECHNOLOGICAL ADVANCES — have substantially reduced total number of different parts. Illustrations show (1) patented double column-spanning hammers halve the number of hammers and drivers; (2) multi-purpose tractor assembly accurately feeds paper and controls format; (3) identical sectioned structural extrusions and multiple machined side plates simplify main frame assembly.



SPECIFICATIONS - ELECTRONICS

The electronics comprise integrated circuit logic combined with all silicon semiconductors to provide maximum reliability.

A building block configuration offers the system engineer a wide variety of control and sequencing to accommodate virtually any conventional source of data, and is available in 3 standard configurations.

1. PRINTER COMPLETE WITH BASIC ELECTRONICS

- Low cost regulated power supply with integral power sequencing.

Power Requirements:

115 volts AC, $\pm 10\%$, 50 or 60 cycles, $\pm 1\%$ single-phase, 16 amperes (60 cycles).

- One hammer driver is included for every two columns with individual dual electronic adjustments to eliminate normal skilled critical mechanical adjustments.
- Dual channel timing amplifier provides identification pulse for each character and a reset pulse indicating start of type font.
- Ribbon Control: Automatic reversal of the ribbon at end of spool. Ribbon advanced automatically, during print cycle.
- Paper Feed: Line feed is controlled by punched holes in the four channel paper tape format loop for programming of the following functions:

Top of Form
Overflow
Page Format
Strobe

Automatic internal or external paper advance is provided with the above photoelectric control system, as well as external override of format functions.

2. PRINTER COMPLETE WITH BASIC ELECTRONICS AND CONTROL LOGIC

The control logic contains all necessary circuitry for sequencing and decoding. Information is presented to the logic on demand by the printer, parallel by bit, serial by character. The six to eight data lines and the strobe line must be supplied at a minimum synchronous rate of 125 kc and a maximum rate of 250 kc when the line buffer is external to the printer.

4. PRINTER COMPLETE WITH BASIC ELECTRONICS, CONTROL ELECTRONICS, AND FULL-LINE BUFFER

The full-line (shifted-register) buffer can be loaded asynchronously up to a 250 kc serial by character, parallel by bit rate. Storage for the second line should be accomplished within 25 milliseconds to maintain the maximum print rate.

LOGIC LEVELS:

Input Signal characteristics standards
"0" = 0V "1" = +4.0V

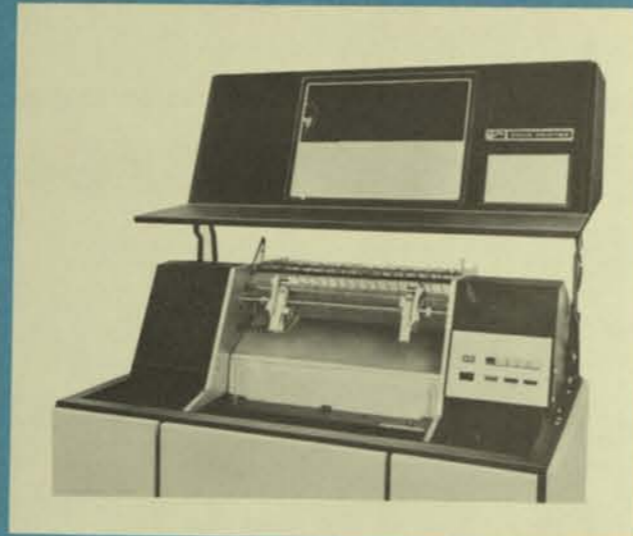
Optional Logic "0" and Logic "1" can be accommodated at either polarity with the following voltage levels:

0, +3V 0, +6V
0, -3V 0, -6V

REVOLUTIONARY NEW CONCEPT IN



DESIGN • RELIABILITY • SERVICEABILITY



APPLICATION

The HSP-3502 is designed for use with all computers and data processing systems. This versatile printing system can also be interfaced off-line with a tape transport for use as an off-line print station, or interfaced with a DATA-PHONE® for remote terminal system applications.

DESCRIPTION

PRINT MECHANISM The heart of the Chain Printer is a uniquely designed, continuous rotating chain. The chain contains individually attached characters along its periphery on 0.2 inch centers. The print hammers are double-width; that is, the hammer head is 0.2" wide. Only one hammer is there-

fore required for every two columns of print-out. A photoelectric code wheel is mechanically linked to the rotating print type font providing a character timing pulse for each character position located on the chain.

The ribbon mechanism is a simple, automatically reversing unit which moves a standard 3/4" wide ribbon horizontally.

A simple manual control opens the carriage for a rapid paper load cycle.

CHARACTER COMPLEMENT Up to 192 different characters (numeric, alphanumeric and symbolic) in 132 columns may be placed on the horizontally rotating type chain.

Where less than 192 different characters are required, multiples of a smaller, full character set are placed on the chain, effecting an increase in printing speed. In addition, any type slug may be changed by an unskilled operator in a matter of minutes. The absence of waving print lines due to misregistration is an outstanding by-product of this system. Standard print fonts and character sets are available, including upper and lower case. Hammer recovery time is less than 8 milliseconds. Only one moving part enhances reliability.

PRINT HAMMER Potter patented, double-width, controlled penetration hammers halve the number of required print hammers and associated drive control circuitry. Both hammer flight time and energy control are accomplished by adjustment of simple electrical controls. An exceptionally low power requirement for the hammers permits the use of a simple, unsophisticated, low-current power supply.

PAPER FEED SYSTEM The printer features an exclusive automatic paper feed system which provides clear, sharp definition and precise vertical registration. Internal or external paper advance is automatic. Paper width may be 4 to 18 1/2 inches. Number of copies is up to six interleaved, card stock or Multith master. Slewing speed is 16.5 inches per second. Line feed spacing is under control of a vertical format loop which is coupled directly to the paper feed tractor.

RIBBON FEED The HSP-3502 utilizes industry standard 3/4" ribbon for clean, simple operator usage. An operator can change ribbons in a minute or two.

CONSOLE The HSP-3502 is available with its own sound proofed cabinet which houses the printer mechanism, electronics, and buffer. The attractive cabinet is supported by a rugged, welded, steel frame. Front, side and rear panels are removable, providing immediate access to all internal components. Convenient accessibility is provided to all operator controls and to load and remove forms with ease. Standard cabinet colors are Armorhide No. U-1605 textured black for the top and rear panels, and Armorhide No. U-621 light textured gray for side panels.

MANUAL CONTROLS AND INDICATORS Operator controls are ON/OFF, PRINT START, PRINT STOP, TOP OF FORM, LINE ADVANCE, and RESET. Indicators in the form of lights on the operator's control panel display the status of the printer, showing AC POWER ON, DC POWER ON, RIBBON OUT, and CARRIAGE (paper out).

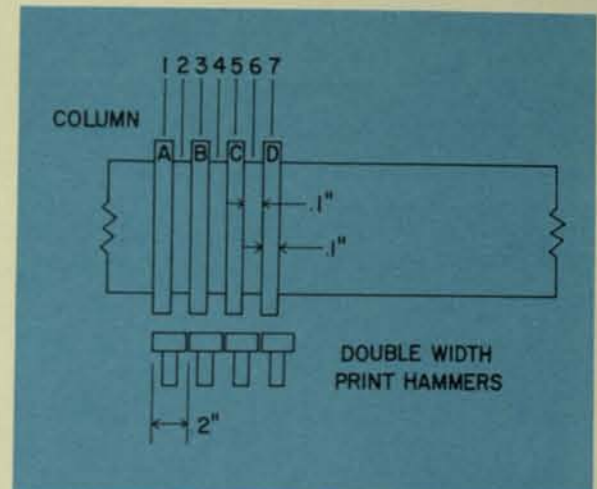


PRINCIPLES OF OPERATION

This printer utilizes a continuous longitudinal traveling chain which contains up to 192 individually attached characters. The character type is spaced on .2" centers. Each print hammer is double width and spans two columns as illustrated.

The individual character slug is 0.1 inch, while the double width hammer head is 0.2 inch in width. A full line of print is accomplished in two cycles. Printing occurs first in the odd columns and then in the even columns.

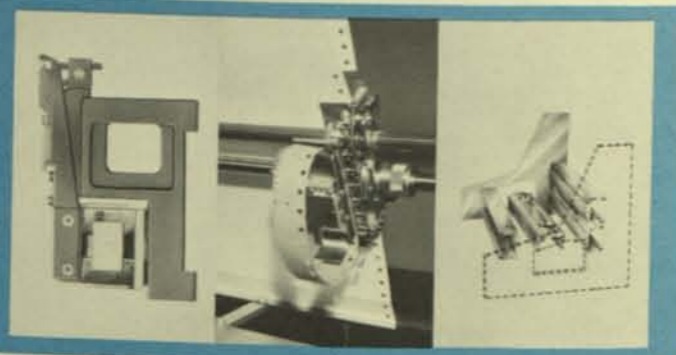
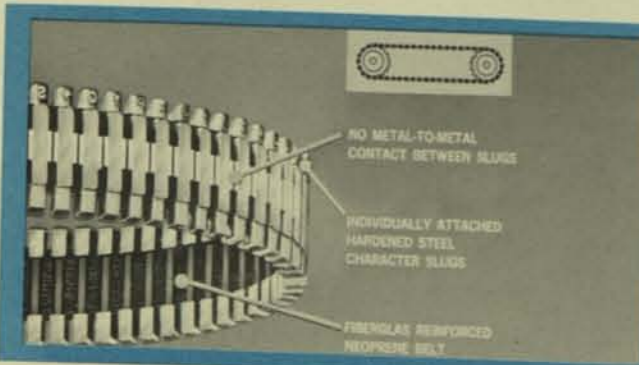
During each half of the print cycle, data, representing the odd or even groups of columns, is abstracted serially by character, parallel by bit from the buffer and compared with the character position counter. When coincidence occurs, the appropriate hammer is fired. This



sequential comparison occurs once for each character position on the chain. Comparison is accomplished at a 250 kc rate (with buffer).

SPECIFICATIONS - PRINTER MECHANISM

	Lines Per Minute	Number of Characters in Set
Printing speeds	540	1- 32
	400	33- 48
	315	49- 64
	225	65- 96
	120	97-192
Column Capability	Up to 132 print positions — standard up to 160 columns optional	
Print Spacing	10 columns per inch	
Line Spacing	6 or 8 lines per inch	
Paper Feed System		
Form Width	4" to 18 1/2"	
Number of Copies	1 - 6	
Single Line Advance	25 milliseconds	
Paper Slew	16.5 ips	
Format Control	continuous 4-channel photoelectric tape loop.	
Ribbon	conventional, low cost 3/4" ribbon activated only during print cycle.	
Ambient Conditions:		
Operating	50°F to 105°F	
Storage & Transit	-50°F to +150°F	
Humidity:		
Operating	10% to 90%, no condensation	
Storage & Transit	5% to 95%	



TECHNOLOGICAL ADVANCES — have substantially reduced total number of different parts. Illustrations show (1) patented double column-spanning hammers halve the number of hammers and drivers; (2) multi-purpose tractor assembly accurately feeds paper and controls format; (3) identical sectioned structural extrusions and multiple machined side plates simplify main frame assembly.

NEW CHAIN DESIGN Potter's uniquely, designed continuous rotating chain contains hardened steel character slugs individually attached to a non-stretch timing belt. Type font and character sets may be changed in minutes with no hammer realignment cycle necessary.

SPECIFICATIONS-PHYSICAL INSTALLATION

Dimensions	45 $\frac{1}{8}$ " Wide, 30 $\frac{7}{8}$ " Deep, 49 $\frac{7}{8}$ " High
Weight, Approximate	540 lbs.
Power	115 Volts AC \pm 10%, 50 or 60 cycles \pm 1%, Single Phase, 16 Amperes

ACCESSORIES

Vertical Format Paper Tape Punch

The Vertical Format Paper Tape Punch is a 4-channel paper tape punch used to prepare the vertical format tape loops employed by the HSP-3502.

ACC-8801 Printer Exerciser

The ACC-8801 is a portable, self-contained test set for use in off-line maintenance and check out of the HSP-3502. The ACC-8801 connects directly to the interface connection of the HSP-3502.

Maintenance Tools

The following special tools to simplify and facilitate maintenance of the HSP-3502 are available.

- Integrated circuit removal tool
- Character slug removal tool
- Hammer alignment tool

ORDERING

The basic printer is comprised of soundproofed console, print mechanism, paper and ribbon feed systems, and basic electronics. It is furnished complete with all controls, indicators, and internal wiring ready for inter-connection and operation with a suitable controller. Specify on your order:

1. HSP-3502 Chain Printer
2. Character set and coding
3. Column capacity
4. Console color combination, standard or otherwise
5. Configuration — three configurations are offered:
 - (a) Basic printer
 - (b) Basic printer with control logic
 - (c) Basic printer, control logic and full-line buffer

POTTER WORLDWIDE FIELD SERVICE AND LOGISTICS PROGRAM

Repair centers in strategic locations within the continental United States and abroad have been established to support the entire Potter product line.

Staffed by highly-trained field representatives, these repair centers are equipped to effect on-site installation of equipment and to perform quality repair, maintenance and overhaul.

Supplementing this capability, if a customer prefers to provide his own equipment support, Potter has established standard instruction courses to train customer personnel, either at Potter or in the field.

A Spare Parts Department, backed up by an extremely large inventory and streamlined order processing, is available for customer convenience and economy. This inventory permits the customer to virtually eliminate downtime and to save on spare parts dollars by offering expeditious delivery for replaceable parts. Delivery is available in 24 hours to meet customer emergency requirements — within one week for standard parts under normal conditions. Potter also offers provisioning and logistics capabilities to meet all existing military specifications.

The Potter field service and logistics program is one of the finest in the EDP industry. With reliable, quality-engineered equipment, supported by comprehensive field service, Potter guarantees satisfaction.

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TWX: 910-881-2575

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TELEX: 858-2415
CABLE: FACIT DUSSELDORF

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1800 Avenue Road
Toronto 12, Ontario, Canada
Telephone: (416) 783-3329

JAPAN

MUNZIG INTERNATIONAL, INC.
660 S. Western Avenue
Los Angeles, California 90005
Telephone: (213) DUNKIRK 2-1276



POTTER INSTRUMENT COMPANY, INC.

EAST BETHPAGE ROAD

PLAINVIEW, NEW YORK 11803

516-694-9000

POTTER

ICP-3501 INTERFACE MODULE for DIGITAL EQUIPMENT
CORP.'S PDP-8, PDP-8I, PDP-8L and PDP-8S COMPUTERS



FEATURES

- Field-Proven Performance and Reliability
- Silicon Semiconductor and Integrated Circuit Electronics
- Plug-In Printed Circuit Boards
- Easy Installation
- Programing Ease
- No mounting space required — interface integrally packaged with HSP-3502 Chain Printer



HSP-3502 Chain Printer
Complete with ICP-3501 Interface

GENERAL DESCRIPTION

The Potter Model ICP-3501 Interface Module provides the complete interface between the Potter Model HSP-3502 High-Speed Chain Printer and Digital Equipment Corporation's PDP-8, PDP-8I, PDP-8L and PDP-8S computers. The ICP-3501 is one of a family of interface modules to attach the HSP-3502 Chain Printer to various D.E.C. computers.

The ICP-3501 is complete with all required power supplies and cables, ready to be connected to the PDP-8 computer. The HSP-3502 and ICP-3501 are approved by both the Underwriters' Laboratory and the Canadian Standards Association.

The ICP-3501 is designed to operate with a PDP-8 in a program transfer mode. Data and paper formatting information are transferred to the ICP-3501 from the PDP-8 Accumulator in the form of 12-bit words; each word consisting of two 6-bit characters. The first character is obtained from bits 0 through 5 of the Accumulator, and the second from bits 6 through 11. The ICP-3501 is also available in configurations permitting the user to have up to 192 different characters in the print font. In this case, each word transferred is one character, 7 or 8 bits as required.

The ICP-3501 will blank-fill short lines; therefore, blanks at the end of a line need not be transferred to the printer.

The cable drivers supplied with the ICP-3501 will permit cable lengths of up to 15 feet between the HSP-3502 and the PDP-8.

The ICP-3501 interface module is packaged within the HSP-3502 Chain Printer and requires no additional space.

The following table briefly summarizes the PDP-8 instruction repertoire used for operation with the ICP-3501.

INSTRUCTION	OCTAL CODE	FUNCTION
Load Printer Buffer	6654	Transfers contents of bits 0-11 of PDP-8 Accumulator to HSP-3502 buffer.
Load Printer Format Register and Print	6664	A. If preceded by a data transfer, initiates a print and feed paper cycle. If HSP-3502 buffer is not completely filled, the remainder of buffer will be filled with blanks prior to printing. B. If not preceded by data transfer, initiates a paper feed cycle. (In either case, bits 9-11 of Accumulator are transferred into format register to define format for feed cycle.)
Skip on Printer Done Flag	6661	Causes the skip bus to be actuated if Printer Done Flag is set. This flag is set whenever printer is ready to either accept a new line of data or a paper feed command. The Printer Done Flag also activates the PDP-8 interrupt bus.
Skip on Printer Error	6651	Causes the skip bus to be actuated whenever the HSP-3502 is off-line, out of paper, or the ribbon or print carriage is out.
Skip on Printer Ready	6652	Generates an active status signal whenever HSP-3502 is ready to accept a new line of data or Print and Feed command.
Clear Printer Done Flag	6662	Resets Printer Done Flag.

Information subject to change without notice

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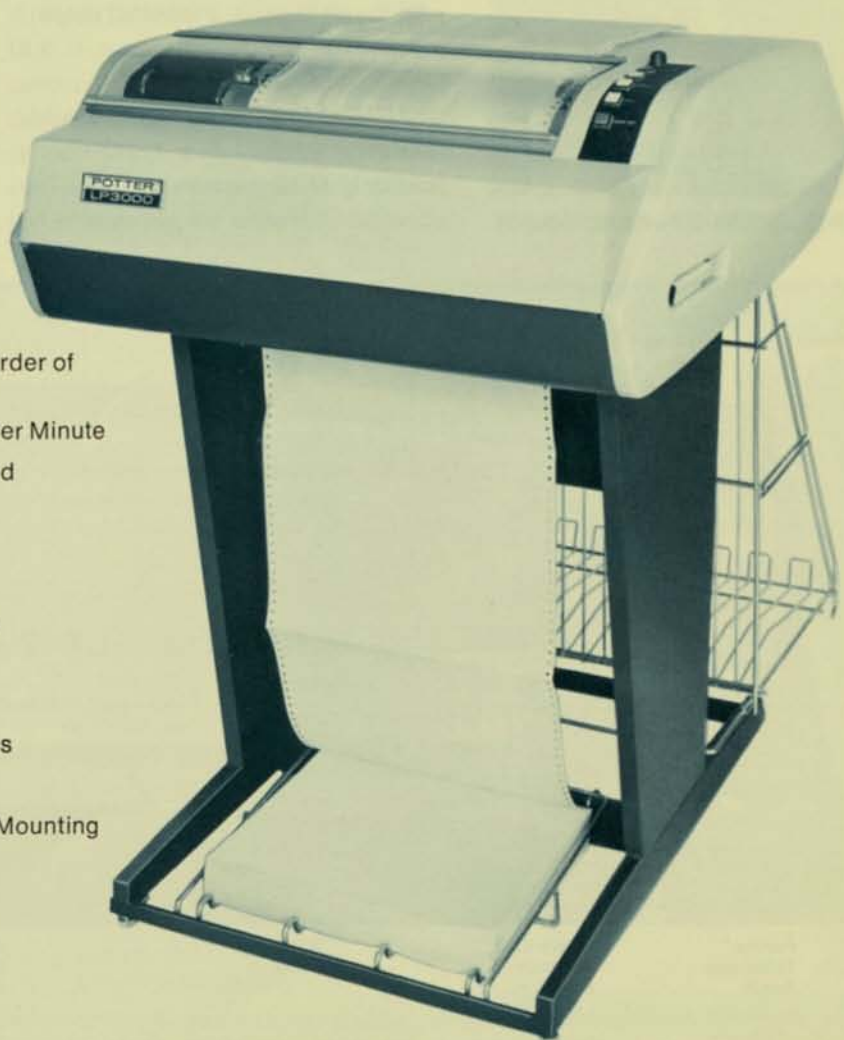
EAST BETHPAGE ROAD • PLAINVIEW, NEW YORK • (516) 694-9000

JUL 31 1972

POTTER

LP 3000 and LP 3300 Line Printers

Low Cost Line Printers and Plotters for Every Application



FEATURES

- Low Cost
- High Reliability — Unique Design, Order of Magnitude Parts Reduction
- Medium Speed — 135 or 300 Lines Per Minute
- 64 Characters — Alpha, Numeric, and Symbolic
- Up to 132 Columns
- Quiet Operation
- Easily Changeable Character Fonts
- Single and Multi-Part Copy
- Built-In Maintenance Module
- Integrated Circuit Power Electronics
- LSI Logic and Data Electronics
- Compact, Self-Contained Pedestal Mounting
- Available as Plotter
- Available for Data Terminal Use

The Potter LP 3000/LP 3300 Line Printers are designed to fill the void between character-at-a-time I/O typewriters and high speed line printers. Operating on an entirely new printing principle, a rotating helical scanner with linear hammer actuators, they provide the user with a highly reliable, low cost printing capability.

Their unique design requires only a fraction of the parts used in other line printers. Complex mechanical devices used for precision line and character control have been replaced by new simplified mechanisms. Further simplification is provided by maintenance-free integrated circuit electronics. Electrical adjustments have been eliminated.

These new Potter line printers operate at 135 lpm (LP 3000) and 300 lpm (LP 3300) using 64 characters and up to 132 columns. Since the LP 3000 Series are dot matrix impact printers, they provide clear readable characters with a multiple copy capability. An optional electronics interface package is available to enable high resolution plotting and other graphics, in

addition to normal alphanumeric printing.

The LP 3000/LP 3300 Line Printers are fully buffered devices each completely self-contained in a compact, pedestal cabinet. Snap-on contemporary styled, acoustically insulated covers permit immediate access to all internal components. Operator controls are conveniently located.

TYPICAL APPLICATIONS in the EDP industry include:

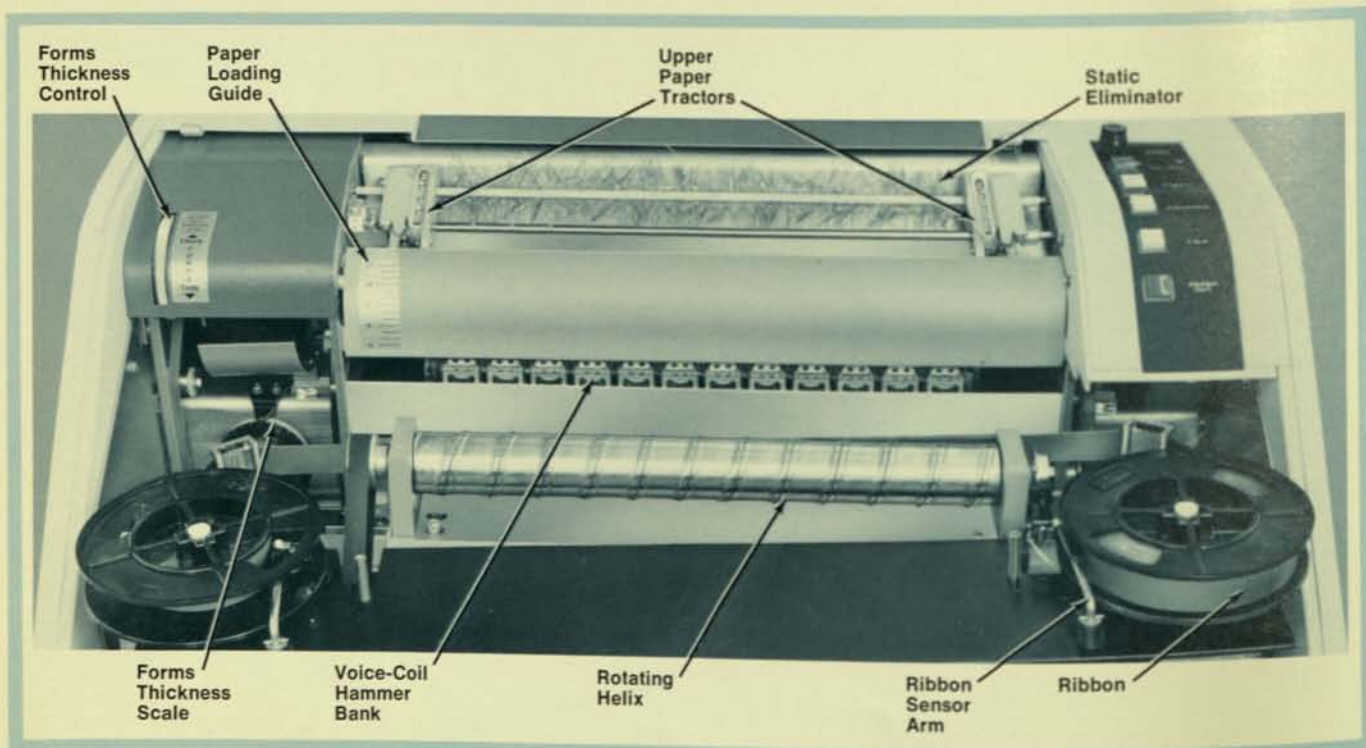
- Output printer for mini-computers
- Console printer for large scale CPU
- Remote batch terminals
- Hard copy output for CRT terminals
- Time sharing terminals
- Output printer for accounting and small business computers
- Listing printer for key-to-tape systems
- Buffered keyboard terminal output
- Printer/Plotter

CHARACTER SETS are stored electronically within a 5 x 7 dot matrix read-only MOS memory module. The standard character set consists of 64

ASCII or EBCDIC coded alphanumeric characters. Optionally, special 64 or 96 character sets can be provided to print in 5 x 7, 8 x 7, 5 x 9, or 9 x 9 matrix patterns. These larger matrix sets readily permit high resolution printing of upper and lower case, special symbol, and foreign character sets.

Replacement of a character set is quickly accomplished by exchanging a single plug-in integrated circuit module.

THE PRINT MECHANISM utilizes Potter's newly developed printing technique. In the LP 3000 (135 lpm), paper moves past 12 linear voice coil actuated hammers impacting a rotating helix with a 1.1" pitch, to form dot matrix characters. In the LP 3300 (300 lpm), 22 hammers with a 0.6" pitch helix are used. In both units electrical adjustments have been eliminated. There are no mechanical clutches or brakes. With the exception of the print mechanism and power supply, the LP 3000 and LP 3300 use identical components and have identical interface requirements.



PRINT MECHANISM (WITH CARRIAGE OPEN, COVERS REMOVED)

This simplified printing technique, without character drums and chains, establishes new reliability standards unmatched by any other manufacturer.

THE RIBBON DRIVE MECHANISM consists of two direct drive motors, which move 3-mil ribbon horizontally across the print area. There are no belts to break, no gears to wear out. Sensor arms monitor the ribbon supply on each reel, and automatically reverse ribbon direction as required. To optimize ribbon usage, the ribbon is skewed in respect to the hammers to insure maximum ribbon utilization. Pressure sensitive paper can be used without the ribbon.

THE PAPER FEED SYSTEM provides precise vertical registration. The paper is driven by 2 pairs of pin feed tractors which accommodate various form widths. The tractors can be quickly adjusted by the operator to any width within the print area. Paper is loaded simply and easily. Vertical alignment of preprinted forms is performed with an operator front panel

control which permits an adjustment of ± 2 lines.

Paper feed is $\frac{1}{4}$ " per second while printing, and paper advance between lines as well as slew is $8\frac{1}{2}$ ips. An industry compatible 4 or 12 channel vertical format control is optionally available.

DATA AND CONTROL ELECTRONICS are all solid state. LSI circuitry is used to the greatest extent. All circuits are mounted on removable printed circuit modules. The Power Supply is also modular in construction. A slide mounted chassis extends upward beyond the top of LP 3000 Series printers to provide complete access to all printed circuit modules, power supply modules, hammer actuator bank, and chassis back-panel wiring.

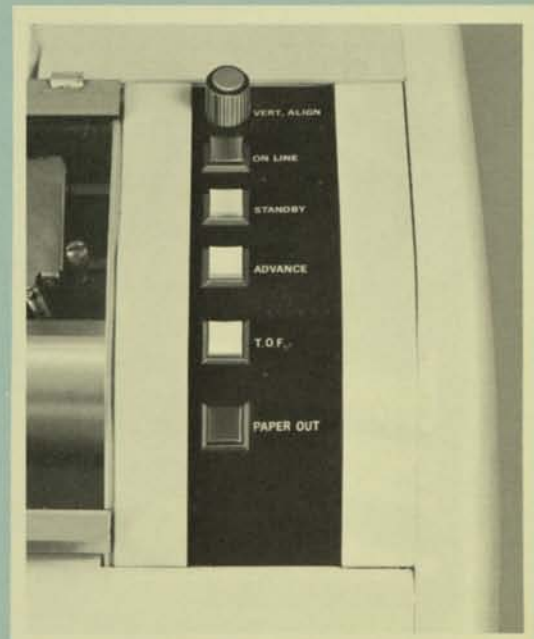
A MAINTENANCE CONTROL MODULE is supplied with each printer to permit complete off-line testing, independent of the data source or external control units. Toggle switches can select any character in a set to be printed.



MAINTENANCE CONTROL MODULE

OPERATOR CONTROLS AND INDICATORS

Control/Indicator	Type	Function
On Line	Push Button Illuminated	Places printer on-line
Standby	Push Button Illuminated	Indicates printer ready to go on-line. Depression places printer off-line
Advance	Push Button	Advances paper 1 line
Top of Form	Push Button	Slews paper to top of form when depressed
Paper Out	Indicator Lamp	Indicates paper out condition
Vertical Adjustment	Rotary Control	Vertical registration adjusts ± 2 lines
Forms Thickness	Thumbwheel	Adjusts for paper thickness



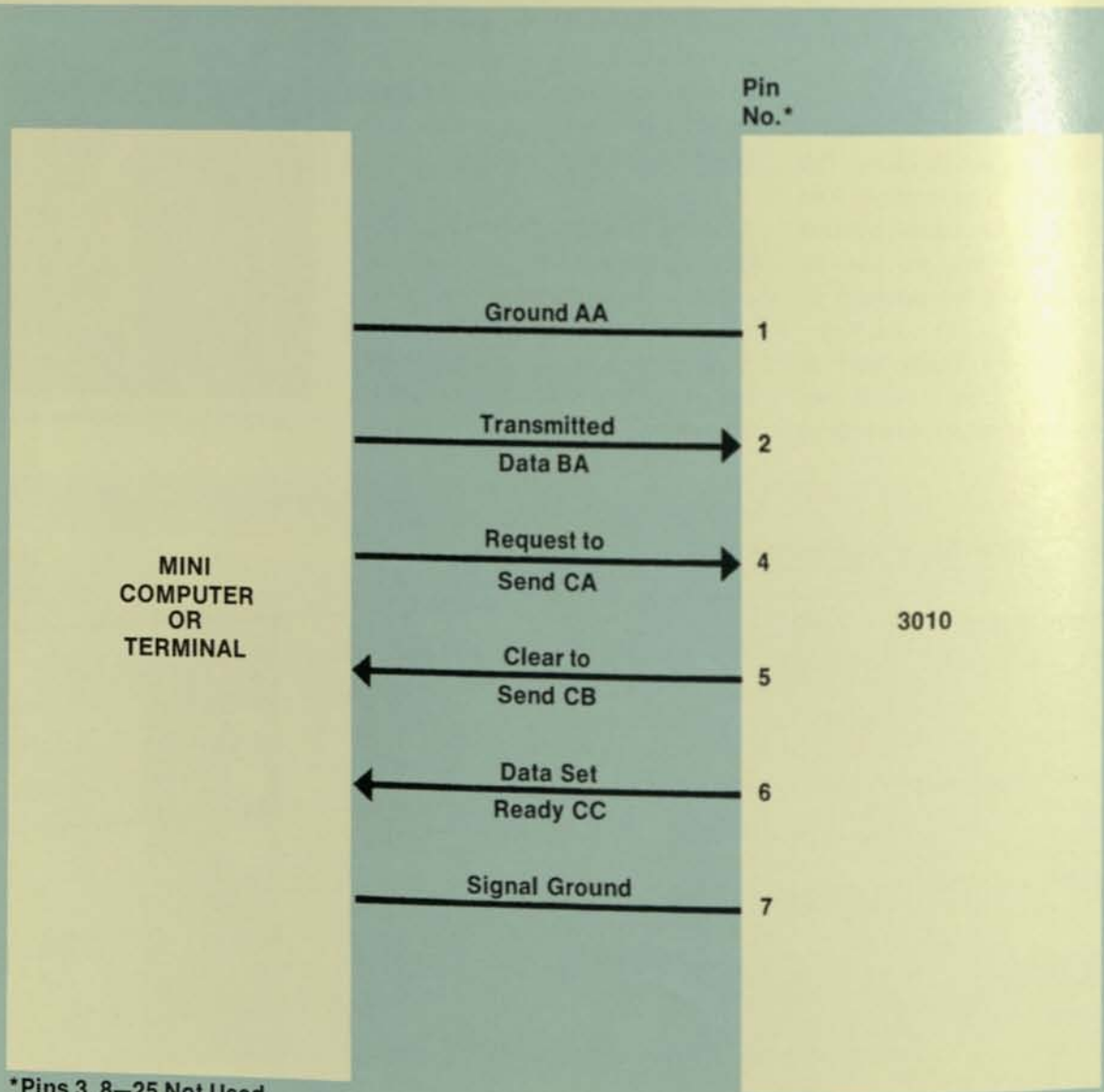
OPERATOR CONTROL PANEL

MODEL 3010 HAS AN RS 232C COMPATIBLE INTERFACE, which allows it to be used with computers and data terminals equipped with RS232C asynchronous communications input/output lines. The printer accommodates data transfer rates from 1200 to 100,000 baud. For speeds from 1200 to 35,000 baud an optional communications buffer is available to assure maximum printer utilization. In addition, optional parity error detection is available to print an * in place of a character error, when an error is detected.

SPECIFICATIONS pertaining to the Model 3010 Terminal Printer:

Input Requirements	RS 232C
Operating Mode	Character Asynchronous
Code	USASCII, 64 Character Subset
Data Format	1 Start Bit, 8 Data Bits, 1 Stop Bit
Logic Levels	Logic "0"—0VDC to +25VDC Logic "1"—0VDC to -25VDC

The interconnection of the Model 3010 conforms to EIA RS232C. The interface is equipped to accept Cannon or Cinch Connector #BB-19804-433.



* Pins 3, 8-25 Not Used.

MODELS 3050 AND 3350 PROVIDE PLOTTING CAPABILITY. These models print individual dots under CPU control with bi-directional paper feed, or operate as standard line printers. When operating as a plotter, built-in storage is provided for one complete dot row of information containing 924 storage locations (132 column spaces x 7 dot spaces per column), each individually addressable. Graphics electronics are mounted on removable printed circuit modules in a card cage directly below the main printer chassis.

TYPICAL PRINTING/PLOTTING APPLICATIONS include:

- Business:
 - Forms Plotting,
 - Information Charts
- Engineering:
 - Drawing
 - Reproduction
- Medical:
 - Electrocardiograms,
 - Encephalograms, etc.
- Computer Programming:
 - Flow Charts,
 - Graphic Program Listing
- Numerical Control:
 - Isometric Printouts,
 - X-Y Plotting
- Civil Engineering:
 - Maps,
 - Property Layouts,
 - Topography
- Scientific:
 - Graphs,
 - Equation Plotting,
 - Celestial Plotting
- Graphic CRT:
 - Hard Copy Output
- Remote Terminal:
 - Remote Reception of
 - Charts, etc.

SPECIFICATIONS pertaining to Models 3050 and 3350:

Plotting Speeds:

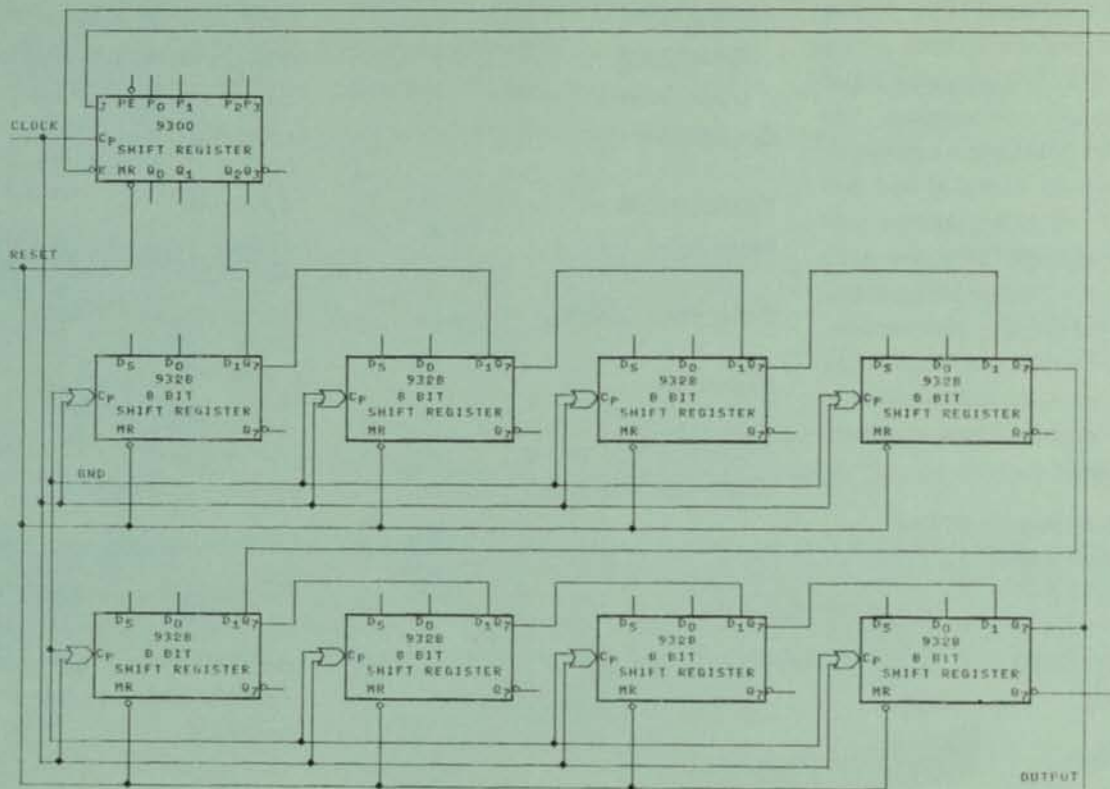
Model 3050	16 Horizontal Scans/Sec. (1-924 Dots)
Model 3350	35 Horizontal Scans/Sec. (1-924 Dots)
Dot Spacing	Horizontal — 0.0143 inches Vertical — 0.0141 inches
Plotting Width	13.2 inches
Paper Feed	Advance Forward or Reverse — 3 ips Slew to Top of Form — 8½ ips
Paper Feed Control	Single Dot Line Advance Top of Form
Resolution	70 Dots/Inch Horizontal 72 Dots/Inch Vertical
Interface Logic Levels	0V, +5VDC DTL, TTL Compatible
Power Requirements	300 watts maximum



MODEL 3050



For communications and remote terminal applications the Models 3050 and 3350 may be combined with Models 3010 or 3310 Terminal Printers.



SAMPLE OF GRAPHICS PRINTOUT (REPRODUCED AT HALF SIZE)

ASCII 64 CHARACTER SET

Binary Code	Character	Binary Code	Character
000000	@	100000	(Blank)
000001	A	100001	!
000010	B	100010	" (Quote)
000011	C	100011	#
000100	D	100100	\$
000101	E	100101	%
000110	F	100110	& (Ampersand)
000111	G	100111	' (Apostrophe)
001000	H	101000	(
001001	I	101001)
001010	J	101010	*
001011	K	101011	+
001100	L	101100	, (Comma)
001101	M	101101	- (Dash)
001110	N	101110	. (Period)
001111	O	101111	/
010000	P	110000	0
010001	Q	110001	1
010010	R	110010	2
010011	S	110011	3
010100	T	110100	4
010101	U	110101	5
010110	V	110110	6
010111	W	110111	7
011000	X	111000	8
011001	Y	111001	9
011010	Z	111010	:
011011	[	111011	;
011100	\	111100	<
011101	]	111101	=
011110	^	111110	>
011111	_ (Underline)	111111	?

EBCDIC 64 CHARACTER SET

Binary Code	Character	Binary Code	Character
000000	(Blank)	100000	- (Dash)
000001	A	100001	/
000010	B	100010	S
000011	C	100011	T
000100	D	100100	U
000101	E	100101	V
000110	F	100110	W
000111	G	100111	X
001000	H	101000	Y
001001	I	101001	Z
001010	␣	101010	(Blank)
001011	. (Period)	101011	, (Comma)
001100	<	101100	%
001101	(	101101	_ (Underline)
001110	+	101110	>
001111	|	101111	?
010000	& (Ampersand)	110000	0
010001	J	110001	1
010010	K	110010	2
010011	L	110011	3
010100	M	110100	4
010101	N	110101	5
010110	O	110110	6
010111	P	110111	7
011000	Q	111000	8
011001	R	111001	9
011010	!	111010	:
011011	\$	111011	#
011100	*	111100	@
011101	)	111101	' (Apostrophe)
011110	:	111110	=
011111	7	111111	" (Quote)

**SPECIFICATIONS FOR
LP 3000 AND LP 3300 LINE PRINTERS**

Mechanical

Print Speed	
LP 3000	135 lpm (300 characters/sec.) $\pm 2\%$
LP 3300	300 lpm (660 characters/sec.) $\pm 2\%$
Number of Characters	64 Standard (96 or 128 Upper and Lower Case Optional)
Characters Per Line	80 Standard (132 Optional)
Character Type	5 x 7 Dot Matrix Standard 5 x 9, 9 x 7 or 9 x 9 Optional
Column Spacing	0.10"
Line Spacing	6 Lines per inch (4, 23 lines/mm)
Character Size	.070 Wide (1, 8 mm) x .100 High Nominal (2, 5 mm)
Print Registration	
Horizontal	$\pm .007$ inch (0, 18 mm)
Vertical	$\pm .007$ inch (0, 18 mm)
Ribbon System	Standard (may be deleted for self-imaging paper)
Paper Feed	$\frac{1}{4}$ " /sec. while printing (6, 4 mm/sec.) $8\frac{1}{2}$ " /sec. slew (254 mm/sec.)
Forms Control	Top of Form Vertical Control ± 2 lines Optional: 4 or 12 channel Vertical Format Control
Print Feed Forms	
With Ribbon System	Single Part: 15 or 20 lb. (56 g/m ² or 74, 5 g/m ²) bond, (Standard Register 1401 or equivalent) Two or Three part: 10 lb. (37, 3 g/m ²) bond each, with 7 lb. (26 g/m ²) single shot carbon. Four, Five and Six Part carbon backed forms.
Without Ribbon System	Single Part: 15 lb. Pressure Sensitive Two or Three Part: 10 lb. each Pressure Sensitive
Forms Width	4 (101, 6 mm) to 14 $\frac{7}{8}$ (378 mm) inches (including margins)

Electrical

Buffer Storage	Full Line
Data Input Rate	Synchronous Data Entry, 33 KC max.
Codes	Standard 6 bit ASCII or EBCDIC, other special codes optional.
Interface Levels	Logic "0" = +5VDC Logic "1" = 0VDC DTL-TTL Compatible
Line Voltage	Standard - 115 VAC $\pm 10\%$, 60 Hz $\pm 2\%$, Single Phase Optional - 210, 230, 250 VAC, $\pm 10\%$, 50 or 60 Hz $\pm 2\%$, Single Phase
Power Consumption	
LP 3000	900 Watts Maximum
LP 3300	1100 Watts Maximum

Environment

Ambient Conditions	Operating 50°F (10°C) to 105°F (40°C) Storage and Transit -50°F (-45°C) to 150°F (65°C)
Humidity	Operating 10% to 90%, no condensation Storage and Transit 5% to 95%, no condensation

Physical

Size	31" W (79 cm) x 27" D (69 cm) x 41" H (94 cm) (mounted on pedestal)
Weight	
LP 3000	Approximately 260 lbs. (125 kg)
LP 3300	Approximately 285 lbs. (130 kg)

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TWX: 910-881-2575

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Telephone: (904) 355-9034

HAWAII:

Honolulu, Hawaii
Telephone: (808) 536-8346



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532 Broad Hollow Road • Melville, New York 11746 • (516) 684-9000

POTTER INSTRUMENT COMPANY, INC.

MANUFACTURERS OF PERIPHERAL EQUIPMENT FOR ELECTRONIC DATA PROCESSING



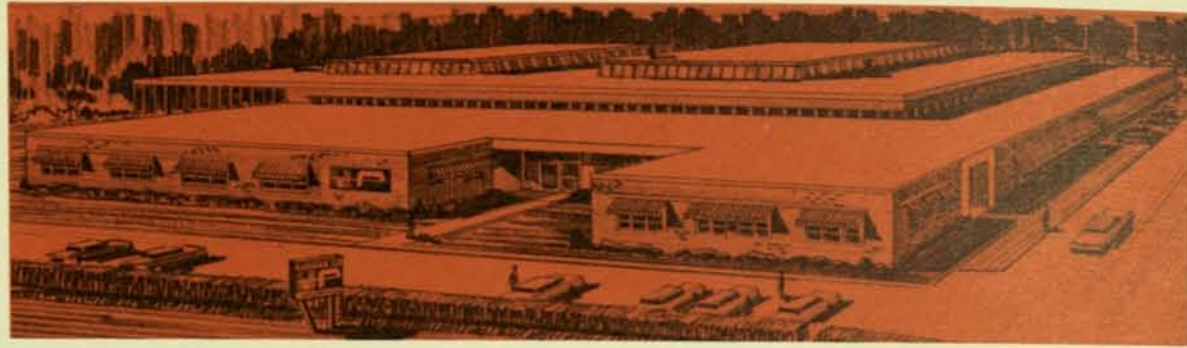
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Product Catalog



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Potter Subsidiary - Transducer Corporation; Luquillo, Puerto Rico

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IS ALWAYS HAPPY
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POTTER INSTRUMENT COMPANY, INC. designs and manufactures a diversified line of peripheral electronic and electro-mechanical digital data-processing equipment including:

- High-speed, digital, magnetic Tape Transports and Systems
- High-speed, digital, Line Printers and Systems
- Magnetic Recording and Playback Heads
- High-speed photoelectric Perforated Tape Readers and Spoolers
- Random Access Memory Systems
- Precision Measuring Equipment
- Complete Line of Accessories

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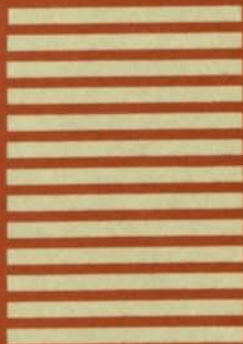
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on POTTER products
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 - Incremental Tape Transports
 - MT-24 Transport — 1-36 ips
 - MT-36 Transport — 1-50 ips
 - MT-75 Transport — 1-75 ips
 - MT-120 Transport — 1-120 ips
 - M906II-2 Transport — 1-150 ips
 - Quick-Lock Hubs

- Read/Write Amplifiers**
 - Switching Amplifiers

Record/Playback Magnetic Heads

High Density Recording System

- Off-Line Print Systems**
 - Graphic Print System

High-Speed Line Printers

Random Access Memory Systems

Machine Calibration Equipment

Special product interest or application _____

- Please have engineer call**
- Please arrange for a demonstration**
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Telephone Luquillo 729-2880

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Luquillo, Puerto Rico
Telephone Luquillo 729-2880



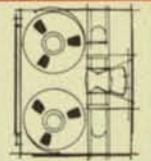
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CONDENSED
CATALOG M-2



POTTER[®]

EDP Equipment



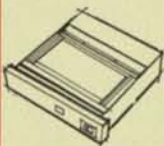
Magnetic Tape Transports



Perforated Tape Readers



High Speed Printers



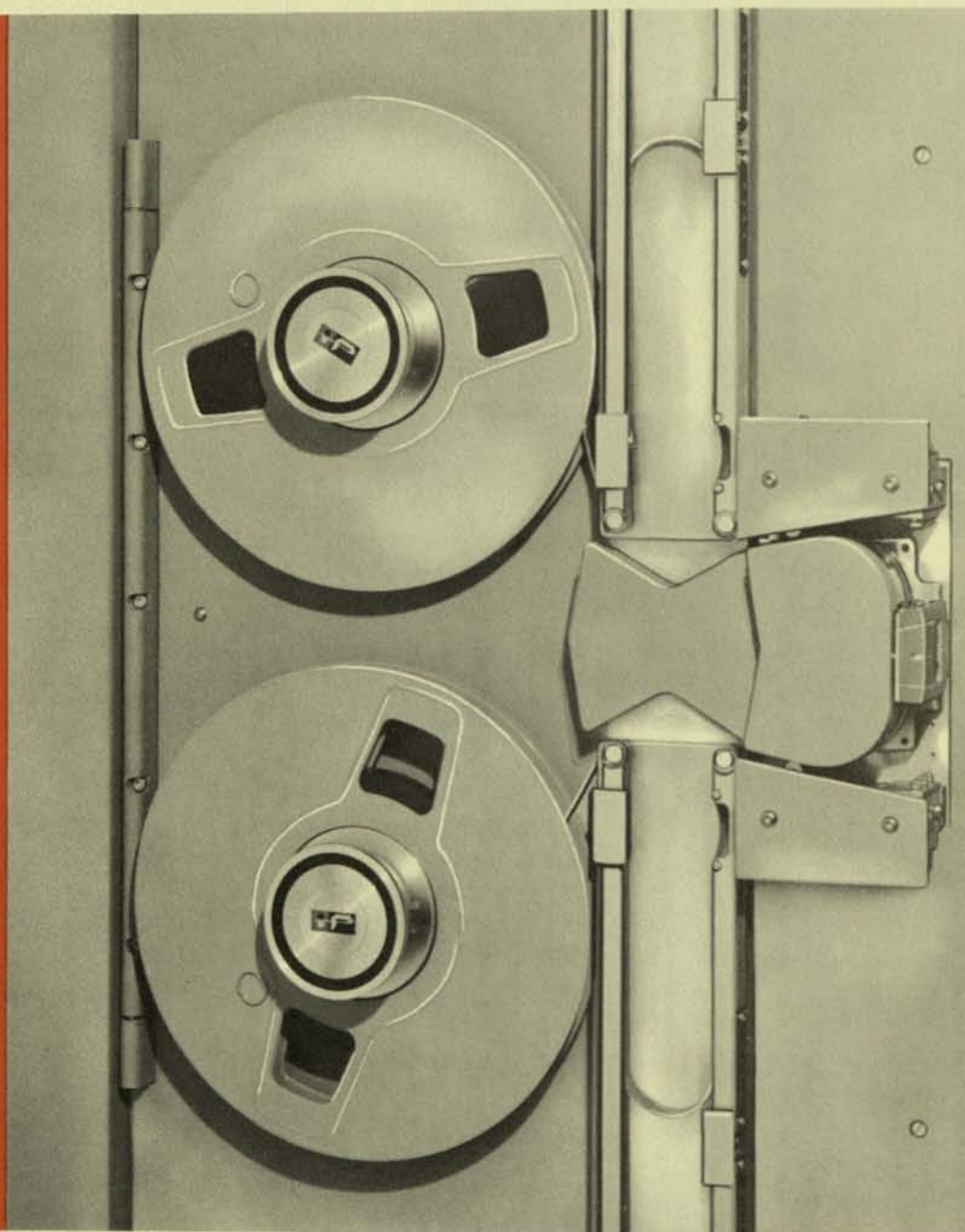
Accessory Equipment

POTTER INSTRUMENT COMPANY, INC.

NEW low-cost digital

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UNIQUE VACUUM COLUMN BUFFER DESIGN results in a simplified unit with fewer moving parts. Photoelectric tape loop sensing eliminates mechanical vacuum switches. New Potter Quick-Lock hubs and easy tape threading cut reel change time by more than 80%.

* Patent Applied For. QUICK-LOCK is a Potter Instrument Company trademark.

magnetic tape transports...

three models allow a choice of speed capabilities

New Potter vacuum-column magnetic tape transports and tape systems are economical units designed for applications requiring moderate data transfer rates. Speeds range from 1 ips to 75 ips with packing densities up to 800 bpi.

A choice of three models with different performance ranges permits selection of the most economical machine for every individual application. All three models are alike in design, operation and maintenance. Most component parts are interchangeable. This means all three may be specified

for the same computer without losing the benefits of standardization.

Vacuum-column tape buffer storage is used on all models in combination with a Potter precision tape drive system. Vacuum cleaning and vacuum tape drag before the read/write head assure high operating reliability.

These new Potter transports units are particularly well suited for use with small- and medium-scale computers, as well as a variety of special applications.



MT-24 Tape Transports and Magnetic Tape Systems

- 1-36 ips (standard speeds 3, 7.5, 15 and 24 ips)
- 200 commands per second at 24 ips
- packing densities of 200, 556 and 800 bpi
- data transfer to 28.8 kc
- compatible with IBM 729 and 7330 at all packing densities
- two and one-half minute rewind
- tape threading in 15 seconds

See Product Data 1-201



MT-36 Magnetic Tape Transport and Magnetic Tape Systems

- 1-50 ips (standard speeds 30, 36 and 45 ips)
- 200 commands per second at 36 ips
- packing densities of 200, 556 and 800 bpi
- data transfer to 40 kc
- compatible with IBM 729 and 7330 at all packing densities
- two and one-half minute rewind
- tape threading in 15 seconds

See Product Data 1-204

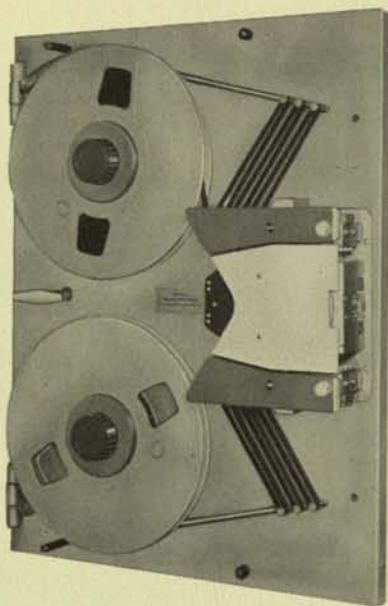


MT-75 Magnetic Tape Transport and Magnetic Tape Systems

- 1-75 ips (standard speeds 60 and 75 ips)
- 200 commands per second at 75 ips
- packing densities of 200, 556 and 800 bpi
- data transfer to 60 kc
- compatible with IBM 729 and 7330 at all packing densities
- two and one-half minute rewind
- tape threading in 15 seconds

See Product Data 1-205

POTTER high-performance digital magnetic tape transports



M906II-2 Magnetic Tape Transport and Magnetic Tape Systems

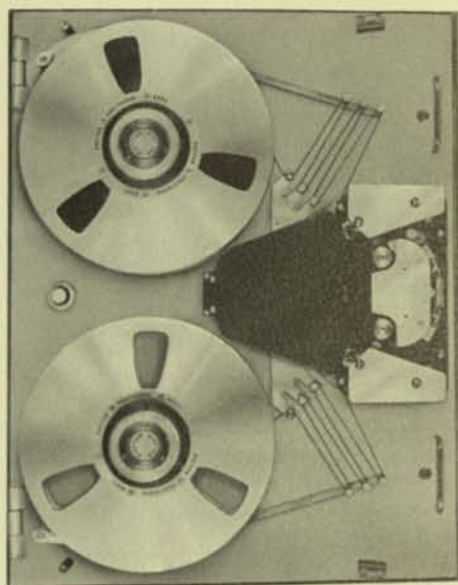
The most versatile transport on the market today, the M906II-2 has a proven record in over 1000 installations. Tape speeds of 1-150 ips are offered in a variety of combinations with standard tape widths from $\frac{1}{2}$ "- $1\frac{1}{4}$ ".

Supplied as a transport alone, or as an integrated tape system with read/write amplifiers, manual controls, cabinets, and other standard Potter accessories, the M906II-2 meets almost every computer format requirement as well as special laboratory needs.

SPECIFICATIONS

- 1-150 ips
- up to six speed combinations
- 200 commands per second at 100 ips
- data transfer up to 96 kc with standard IBM recording format — up to 240 kc with Potter High Density Recording
- packing densities of 200, 556 and 800 bpi in IBM format (1100 bpi in Potter high density format).

See Product Data 1-206



MT-120 Magnetic Tape Transport and Magnetic Tape Systems

A high-speed, reliable tape handling machine — at a moderate cost. An improved vacuum-buffering system makes possible bidirectional tape speeds up to 120 ips without program restrictions. Convenient operator features include push-button loop control arm retraction, fast tape threading. The MT-120 is available as a transport separately or with associated read/write amplifiers, cabinets and other accessories.

SPECIFICATIONS

- 1-120 ips
(standard speeds 75, 100, 112½, 120 ips)
- 200 commands per second at 120 ips
- data transfer up to 96 kc with standard IBM recording format
- packing densities of 200, 556 and 800 bpi
- also available for use with other computer formats

See Product Data 1-203

POTTER HIGH DENSITY RECORDING

Potter contiguous, double-transition, high-density recording is a revolutionary multi-channel technique that permits recording up to 500,000 alpha-numeric characters per second at densities up to 1100 bpi. Bit dropouts are guaranteed fewer than 1 in 10^7 at

1100 bpi, and reread time to recover transient errors is less than .005%.

Since interchannel time displacement is rendered insignificant under this system, significant increases in longitudinal recording density are practical.

POTTER

transport accessories



Magnetic Heads

A variety of digital magnetic record/playback heads compatible with virtually all formats have been developed by Potter engineers. Special materials for all-metal construction and ultra-precise manufacturing methods assure long head life and highest data recovery reliability. Heads are available in single-gap, interlaced, and dual-gap models, from single track to as many as 56 tracks.



Cabinets

Two standard rack cabinets are available to accommodate tape transports and accessories. Sturdy construction — 19-inch mounting rails give solid support for the transport, manual control, drive electronics and power supply and read/write amplifiers. Casters permit easy maneuverability. Colors: Potter gray — or to specification.

◀ M3340

Upright cabinet for all Potter transports. Hinged glass door. Includes built-in blower and filter.

▶ CT-120

Slope front design for operator convenience. Accommodates models MT-24, M906II-2 and MT-120. Sliding Plexiglass door.



Manual Control

The following Manual Control units are available for use with Potter Tape Transports:

M3321 for Transport Model 906II-2
PBH/V-120 for Transport Model MT-120 and MT-24

Drive Electronics

EC-75 . . . for Transport Model MT-75 (mounted on drive electronics chassis)

EC-36 . . . for Transport Model MT-24 and MT-36 (mounted on drive electronics chassis)

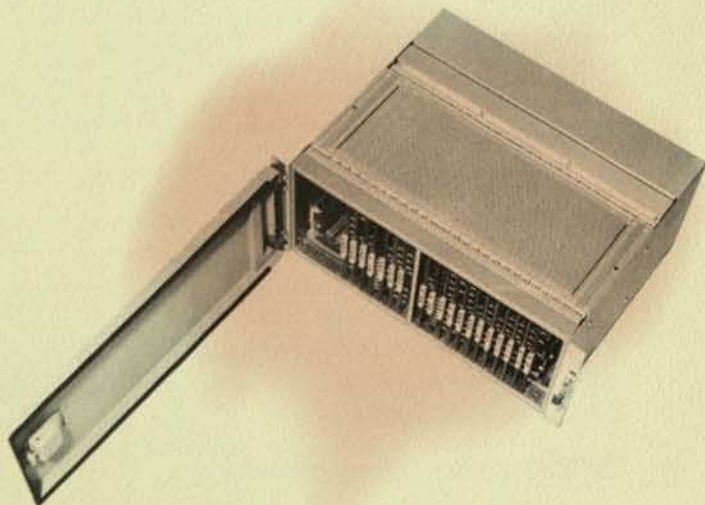
Read/Write Amplifiers

Potter read/write amplifier systems are solid-state electronic packages housing read/write amplifiers, various control and logic modules, and a regulated power supply. In conjunction with the tape transport, the amplifier records digital information on magnetic tape — reproduces the data on command.

MODEL MA-315 . . . designed to cover the range of IBM-compatible tape formats: Model MA-31 (uncompensated) for 200 bpi; and Model MA-315 (compensated) for 200/556/800 bpi. Read/write tape speed: 0 to 120 ips. (PD 1-402)

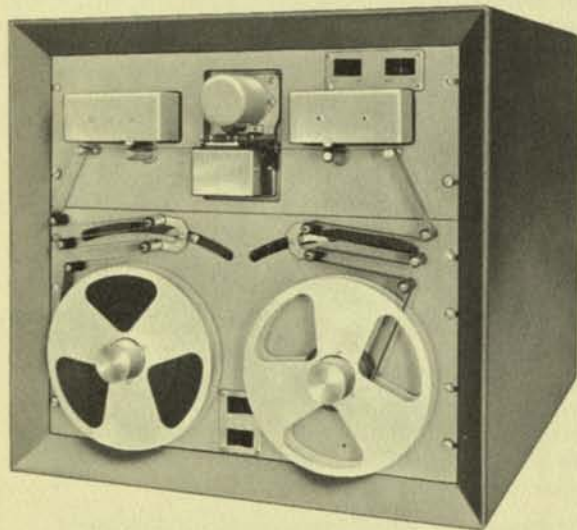
MODEL MSA375 . . . read/write switching amplifier . . . designed to reduce the cost of digital magnetic tape systems by permitting time sharing among groups of up to 4 tape units. Compatible with all IBM tape formats at 200/556/800 bpi. (PD 1-403)

MODEL 921A . . . read/write amplifier . . . compatible with a variety of computer formats including IBM, Uniservo, Burroughs, Philco, Minneapolis-Honeywell and RCA. Tape speeds from 1 ips to 150 ips. (PD 1-401)



POTTER high speed tape readers

to military specifications



PTR-500 perforated tape reader

The Potter PTR-500 is a high-speed, bidirectional photoelectric tape reader which provides high reliability and high performance at a moderate price.

Standard two-speed unit reads tape dependably at 25 inches (250 characters) or 50 inches (500 characters) per second. First characters can be read in 8 ms when operating at 50 ips. Patented MONOBRAKE® feature enables stopping on sprocket hole of stop character — eliminates tape bounce and buckling.

Where tape supply and take-up is required, a PTS-500 perforated tape spooler companion unit is furnished. It operates compatibly with the PTR-500 reader at all speeds up to 50 ips.

SPECIFICATIONS

- 25 and 50 ips
- 5, 7 and 8 levels standard
- 11/16", 7/8" and 1" tape widths standard
- Stop on STOP Character
- Start Time: 8 milliseconds maximum
- up to 100 steps/second

See Product Data 2-110

* trademark of Potter Instrument Company, Inc.

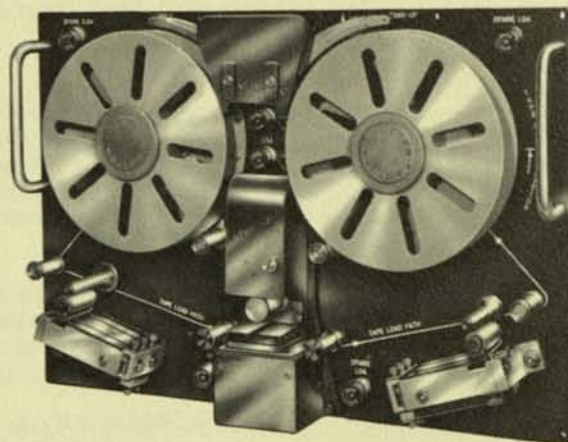
PSR-200 perforated tape reader

Proven successful in a variety of military applications, the PSR-200 is a bidirectional, 200 character-per-second, photoelectric tape reader. Self-contained regulated power supply, amplifiers and start-stop circuits are completely transistorized. Rugged construction permits operation in any position. Qualified to meet stringent environmental requirements of Mil-T-21200.

SPECIFICATIONS

- 20 inches per second tape speed
- 6-inch diameter tape reels
- Start Time: 15 milliseconds at 20 ips
- Stop on STOP character
- Rewind Time: Less than 3 minutes per 500 feet
- 1-inch tape width standard, 11/16 & 7/8-inch optional
- 8 channels standard; 5, 6, 7 optional

See Product Data 2-211



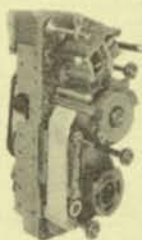
and militarized printers

Potter Instrument Company has specialized in the design and development of high-speed, electronic printing systems for over a decade. Potter high-speed systems have proved their efficiency in such applications as communication lines, data checkout, programmers, data listers and computer checkout. Units are available to meet military specifications.



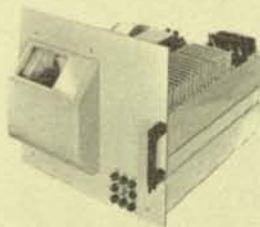
HSP-3601 Parallel Input High-Speed Printer

An in-line parallel input military printer capable of printing up to 26 columns of 16 characters each at 720 lines per minute. Pressure sensitive paper.



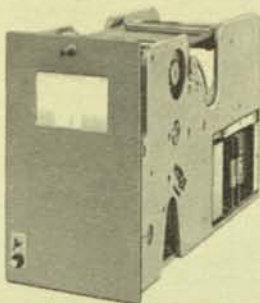
HSP-3602 High Speed Printer

Designed for maximum printing speed of 420 lines per minute, up to 20 columns and 16 characters. Fanfold or roll-type paper. Separate electronic packages available for parallel or serial inputs. Developed for Polaris program.



HSP-3603 Serial Input High-Speed Printer

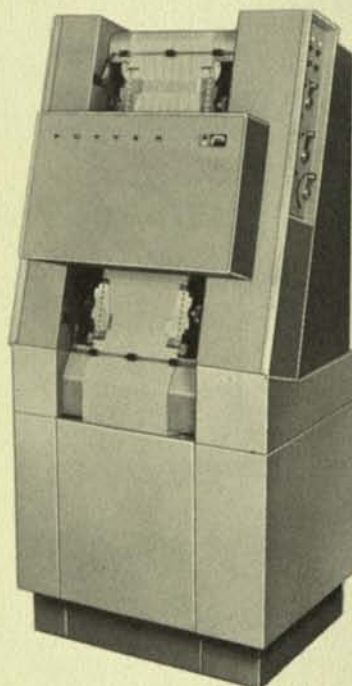
Designed for printing speeds of 600 lines per minute in a 12-column format — 16 characters available. Contains buffer storage capable of accepting information asynchronously up to 90 kc, serial by character, and parallel by bit. Pressure sensitive paper utilized.



HSP-3604 High-Speed Serial or Parallel Printer

Designed for character at a time or parallel printing in a 26 column with 64 characters available. Drum speed of 15 RPS yields a serial average print-out of 100 characters per second or 600 lines per minute in the parallel mode.

High-Speed Computer Output Printers and Printing Systems



HSP-3501

Was developed to meet a long-standing need in the data processing industry for a reliable high-performance printer at moderate cost. It uses impact printing techniques that have been successfully employed on a large scale by Potter Instrument Company in its Polaris Printer Program. The HSP-3501 is available as a basic line printer or as a complete printing system. A wide selection of print characters and line widths available.

SPECIFICATIONS

- alphanumeric printing with a full complement of 64 characters, numeric copy at 2400 lpm
- up to 64 characters in up to 160 columns
- asynchronous input up to 100 kc, optional synchronous input at 2 MC or less
- paper stock up to 17-25/32 in width.

About POTTER



POTTER PLANTS

Tape transport production is carried on in this modern 62,000 sq. ft. plant on Sunnyside Boulevard, Plainview, New York. Building also houses corporate offices, sales, engineering and research groups.

East Bethpage Road plant (below), completed in 1963, produces high-speed printers. A third plant in Luquillo, Puerto Rico, manufactures magnetic and photoelectric recording and playback heads. Total manufacturing space in all Potter plants exceeds 110,000 sq. ft.

Present Potter employment is in excess of 650 people.



POTTER SERVICE

Potter Repair Centers have been established in strategic locations within the continental United States and abroad, to support the entire Potter product line.

Staffed by trained representatives, these centers are equipped to effect on-site installations of equipment, and to perform repair, maintenance and overhaul functions.

In addition, Potter spare parts are available on a 24-hour delivery basis to meet any customer's emergency requirements—within 72 hours for standard parts under normal conditions. Potter also offers provisioning and logistics capabilities to meet all existing military specifications.

SALES OFFICES

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TWX: 516-433-9320
Cable Address: PICO

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1041 Foothill Boulevard
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Telephone FELtham 4266

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151 SUNNYSIDE BOULEVARD, PLAINVIEW, LONG ISLAND, N. Y. (516) OV 1-3200



POTTER INSTRUMENT COMPANY, INC.
151 Sunnyside Boulevard • Plainview, New York • Overbrook 1-3200

TLM-4505
A CARTRIDGE LOADED RANDOM ACCESS MEMORY



FOR THE FIRST TIME
A RANDOM ACCESS MEMORY
USING MAGNETIC TAPE

- Fastest Operation Available
- Automatic Cartridge Loading
- Unique Check-Read-After-Write Capability
- Non-Contact Recording
- Linear Head Positioning
- Extreme Dependability
- Simple Servicing



Figure 1. The Potter RAM
(a random access memory system)
Model TLM-4505, Shown with Model ACC-8606 Cartridge



Figure 2. Potter Tape Pack
Cartridge, Model ACC-8606

TAPE PACK FEATURES

- High Capacity — Over 50 Million Bits
- Low Price — Lowest Available
- Complete Data Security
- Interchangeable Cartridges
- Rugged Strength, Sealed Enclosure
- Lightweight — Readily Stacked
- Replaceable Low-Cost Storage Element

AUTOMATIC CARTRIDGE LOADING — Approximately 15 Seconds!



Operator Selects Tape Pack Cartridge.



Places Cartridge on Loading Carriage.



Presses "LOAD" Pushbutton, Fully Automatic Startup.

Figure 3. Cartridge loading is as simple for the operator as it is possible to make it. The cartridge is placed on the machine carriage; a latch snaps it secure. From this point everything is automatic. The operator

simply presses the "LOAD" pushbutton and walks away, leaving the machine to load the cartridge, start up automatically, and signal the "ready" condition, all within a few seconds.

DRAMATIC STEP FORWARD IN PERFORMANCE CHARACTERISTICS!

Unlike any other machine in its class, the RAM can check-read data immediately after writing. This makes a dramatic difference in the performance characteristic. While other machines are occupied with the extra revolution of the recording medium, necessary to check-read, the RAM has already started the next access. Data throughput rates are enormously improved, and there is no need for the special data sequencing which attempts to minimize latency effects.

The remarkable characteristics of the RAM concept provide advanced performance plus simplified machine design, high reliability and lowest cost per bit stored. This is truly a breakthrough in design approach.

Comparisons between the RAM and other ma-

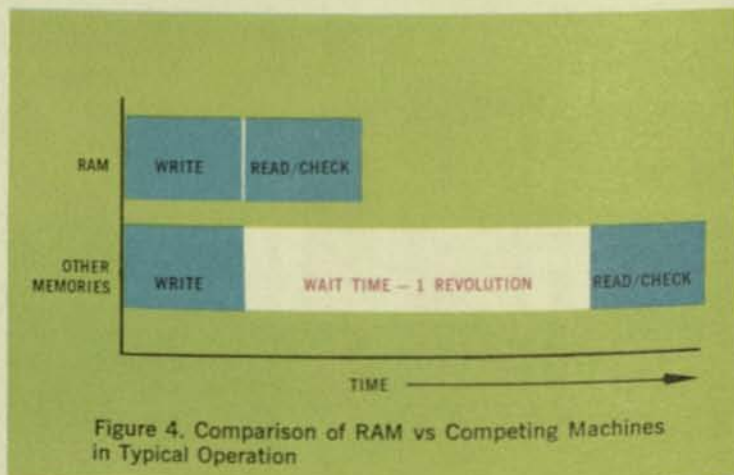


Figure 4. Comparison of RAM vs Competing Machines in Typical Operation

chines show typical operations being accomplished in half the usual time, with cartridge capacity doubled and cost per bit stored reduced to one quarter. In addition, vulnerable recording discs have been replaced by highly shock resistant magnetic tape sealed in rugged Tape Pack cartridges.

The Potter RAM is a cartridge loaded random access system for use with medium and low cost digital computer systems. Typical applications are: inventory control, computer programming, real-time data processing, and mathematical and scientific analyses . . . wherever rapid access to a volume of information is required, and where the information is too large to be economically accommodated by ferrite core memory systems.

Information is recorded serially in a multiplicity of tracks on loops of tape, and any information may be written or read at random by transmitting address information to the unit together with an appropriate command signal.

All channels have equal storage capacity and equal bit packing density. Thus, "zoned" arrangements of information, as used with disc memories to achieve reasonable storage efficiency, are not required.

UNIQUE TAPE PACK CARTRIDGE

The Model TLM-4505 accepts a Potter Model ACC-8606 Tape Pack Cartridge which has a storage capacity of 50.3 million bits of information. The tape loop assembly is totally enclosed within a dust-tight, rigid aluminum frame case. A door on the end of the cartridge case provides passage for the drive mechanism when in use. Plexiglass side and end panels permit immediate visual inspection of the storage elements at all times.

The complete cartridge assembly is highly resistant to rough handling. The rectangular form, convenience of handling, and light weight of the cartridge permits stacked storage in minimum space and very easy handling. The absence of close tolerance internal fittings avoid misalignment by careless handling, and the tape loops are inherently not subject to deformation and damage by shock and vibration.

Non-contact Potter high density recording is used in a "write broad-read-narrow" single track configuration. No permanent errors occur and the probability of transient errors are so low as to be a negligible factor.

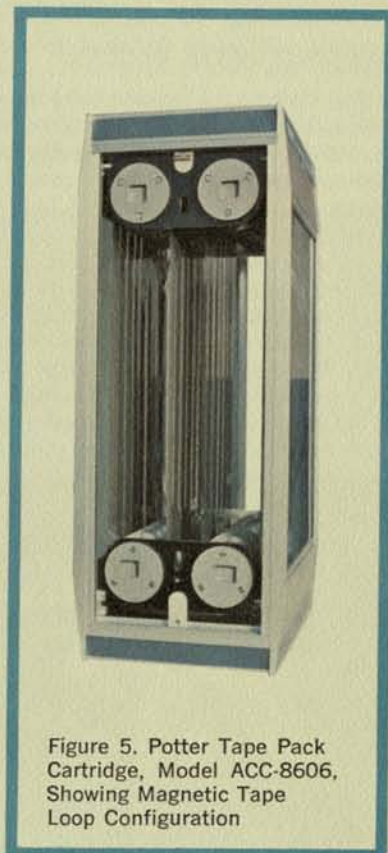


Figure 5. Potter Tape Pack Cartridge, Model ACC-8606, Showing Magnetic Tape Loop Configuration

PRINCIPLES OF OPERATION

THE DRIVE SYSTEM

The loops of high quality digital magnetic recording tape in the cartridge each have an associated drive unit on the machine. Figure 6 shows the position of the tape loop which clears the drive assembly and the head as the cartridge is loaded, with the capstan stationary. When the tape loops are positioned, vacuum is applied to the buffer chamber above the capstan, deflecting the tape so that its backing surface makes a non-slipping contact with the surface of the capstan,

which is now rotating. The tape loop is now in the driving condition as shown in Figure 7.

Of special importance is the fact that the tape flies over the write-read head, maintaining a precise and stable gap between the oxide recording surface and the head profile.

Figure 8 shows, diagrammatically, the fixed air bearings which control the tape loop, at top and bottom. These fixed elements conduct air under pressure to the bearing surfaces which forms a supporting film. Thus the tape loop is entirely supported on an air cushion while it is in motion.

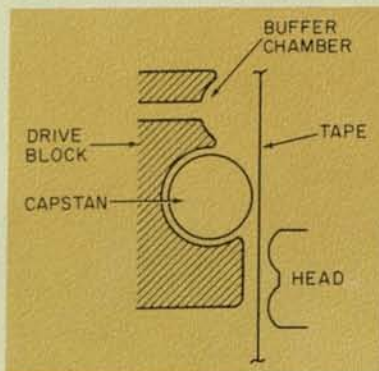


Figure 6. Position of Tape Loop As Cartridge Is Loaded

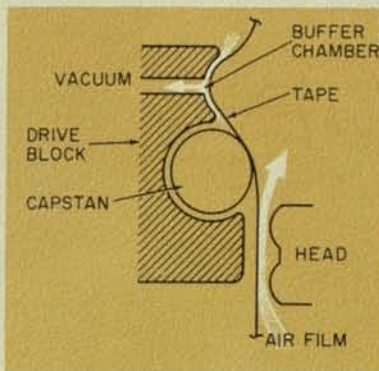


Figure 7. Tape Loop in Driving Condition

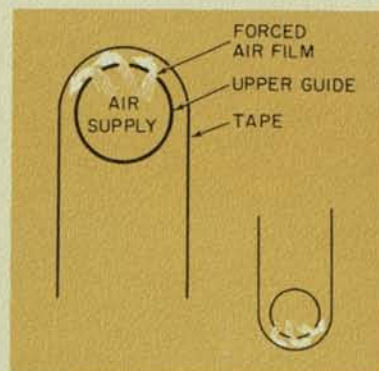


Figure 8. The Tape Loop is Entirely Supported on An Air Cushion While in Motion

PRINCIPLES OF OPERATION *continued*

MULTIPLE DRIVE BLOCKS

The individual drive blocks are arranged in two compact groups on the faceplate of the machine, with a common capstan serving each group. (Figure 9). A common vacuum supply is connected to all of the buffer chambers so that all loops are engaged in the driving position simultaneously, as part of the automatic load cycle. The twin capstans run in specially designed long-life bearings. Figure 10 shows the appearance of the drive assembly with one group of drive blocks removed to provide access to the head post. The vacuum and pressure porting can be seen and also the location of the capstan threading the remaining group of drive blocks. There are sixteen drive block sections in all, providing a 16 loop drive.

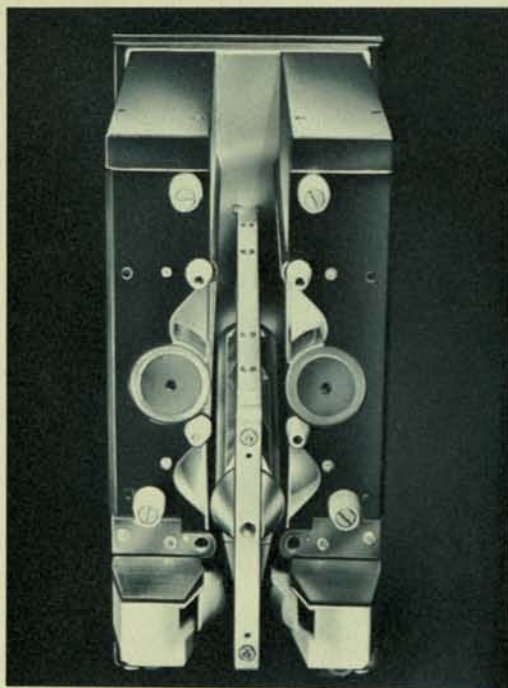


Figure 9. Multiple Drive Block Assembly

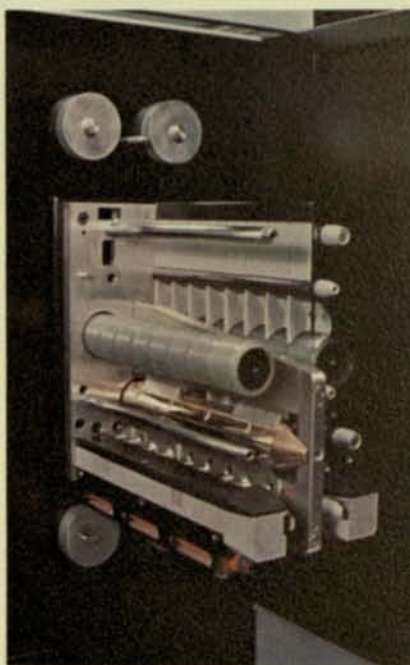


Figure 10. Multiple Drive Block Assembly with One Group of Drive Blocks Removed

HEAD POST ASSEMBLY

All of the write/read heads are mounted in a common head post located between the two groups of tape loops. The position of the head post can be seen in Figure 10. The general arrangement of the head post itself is as shown in Figure 11. The lower row of heads provides the writing function and the upper row the reading function. The heads are arranged in sections so that seven writing and seven reading heads are presented to each of the eight recording surfaces. A similar arrangement prevails on the other side of the head post to furnish reading and writing functions for the alternate group of eight loops.

The profile of the head post is contoured with a smooth surface finish, to define the desired stable flying attitude for the tape. The head post forms a rigid beam structure which permits the heads to be traversed over the recording surfaces under the control of the head post positioning mechanism.

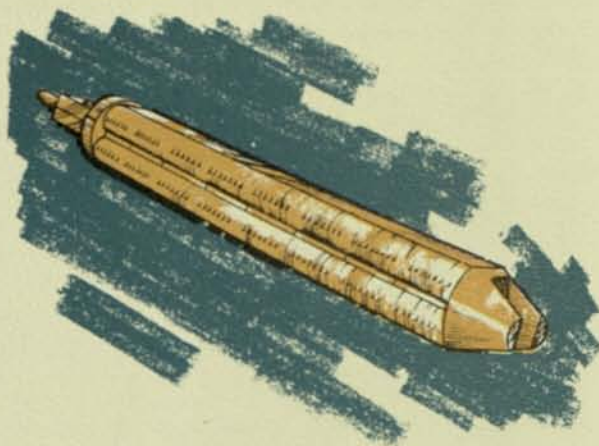


Figure 11. Write/Read Head Post

PERFORMANCE CHARACTERISTICS

continued

DATA SECURITY

As the design approach of the RAM is reviewed feature by feature, it becomes obvious that a vital supplement to the higher performance/price ratio is the new order of data security that is realized. The use of a flexible recording medium eliminates machine damage and information loss resulting from head and disk crashes encountered in other random access memories. The sealed cartridges do not require the rigorous and elaborate machine room procedures which are essential to establish confidence in disk cartridge storage.

Spare tracks on the recording surfaces are unnecessary. Under normal conditions, the tape loops are practically indestructible and it is possible to recover data even in the extreme case of catastrophic damage to a cartridge housing.

SIMPLE MAINTENANCE

The maintenance required to insure reliability is reduced to a minimum and made exceptionally convenient and quick. After sliding back the transparent machine cover, drive blocks can be removed from their mountings after unfastening only two captive screws. This exposes the head post completely in a few seconds. The conveniently laid out components are all easily accessible in the frame assembly of the unit, which has removable cover panels.

EQUIPMENT

The complete Model TLM-4505 RAM System comprises:

- Free standing cabinet of welded box frame construction with removable cover panels containing:
 - Faceplate and multiple drive block assembly with group drive actuators
 - Twin capstans and motor drive
 - Read/write head assembly with separate check read after write head
 - Head positioning mechanism
 - Cartridge holder and auto-load mechanism
 - Drive selection circuits
 - Head selection circuits
 - Load sequence control circuits and interlocks
 - Control pushbuttons: Power on/off, load and unload signal lamps with unit "ready" indicator
 - Vacuum generator and tape loop bearing air supply system
 - Power supplies, interconnecting wiring, cables, terminals, etc.

The equipment is furnished complete and ready for interconnection and operation with a suitable control source.

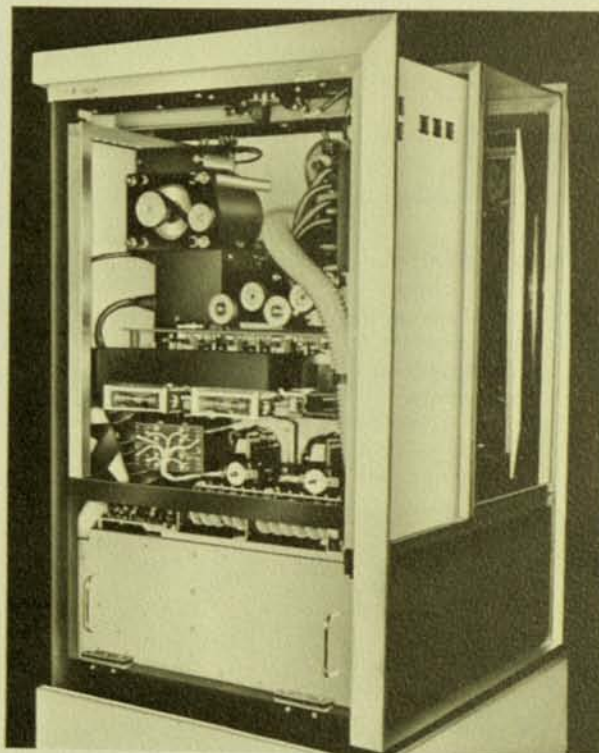


Figure 15. RAM with End Panel Removed

TAPE PACK CARTRIDGE

Tape Pack cartridges may be supplied on special order to cover a range of storage capabilities. The Model TLM-4505 RAM accepts a Potter Model ACC-8606 Tape Pack Cartridge which contains 16 tape loops, 30 inches in length and 2 inches in width. Storage capacity of the ACC-8606 cartridge is in excess of 50 million bits. All channels have equal storage capacity and equal bit packing density.

Complete specification for the TLM-4505 RAM and ACC-8606 Tape Pack are given on the following page. For further information, write, wire or call: General Sales Manager, Potter Instrument Company, Inc., 151 Sunnyside Boulevard, Plainview, New York (11803). Telephone: 516 Overbrook 1-3200. TWX: 516-433-9320. Cable: PICO.

SPECIFICATIONS

MEMORY CONFIGURATION	Interchangeable cartridge type
METHOD OF RECORDING	Non-contact magnetic tape loops with Potter high-density recording in a "write broad-read narrow" single track configuration
STORAGE CAPACITY	50.3 million bits
INFORMATION PER TRACK	28,000 bits
INFORMATION PER CYLINDER	196,000 bits
DATA TRANSFER RATE (BITS)	600 kc/s
INFORMATION PACKING DENSITY	1,000 bits/inch, recorded serially
HEAD POSITIONING TIME	45 milliseconds, minimum 80 milliseconds, maximum
AVERAGE HEAD POSITIONING TIME	62.5 milliseconds
AVERAGE LATENCY TIME	25.0 milliseconds
AVERAGE ACCESS TIME	87.5 milliseconds
CHECK READ LATENCY TIME	1.7 milliseconds
AVERAGE CHECK READ/AFTER/WRITE CYCLE TIME	89.2 milliseconds (based on average access time)
TIME TO SCAN TRACK	50.0 milliseconds
CARTRIDGE CHANGE TIME	17 seconds, approximately
NUMBER OF TAPE LOOPS PER CARTRIDGE	16
NUMBER OF TRACKS PER TAPE LOOP	112
LENGTH OF TAPE LOOP	30 inches
TAPE WIDTH	2 inches
RECORDING LENGTH	28 inches
TAPE SPEED	600 ips
NUMBER OF HEADS PER RECORDING SURFACE	7
NUMBER OF HEAD POSITIONS	16
CYLINDER CAPACITY	Content of 7 tracks
READ/WRITE HEAD SEPARATION	1 inch, nominal
CARTRIDGE LIFE EXPECTANCY	5 years, typical

MODES OF OPERATION & CONTROL SIGNALS

Signals TO Unit	
TRACK LOCATE (16 LOOP SYSTEM)	parallel input comprising 11 binary bits
WRITE ENABLE	Control Signal (level)
DATA INPUT	Serially at selected frequency
Signals FROM Unit	
EQUIPMENT READY	DC level = 6 volts in ready condition
DATA INPUT	Serially at selected frequency
POWER	110/120V or 220/240V, 50/60 cps
DIMENSIONS	
CARTRIDGE, MODEL ACC-8606, 16 LOOPS, 50.3 MILLION BITS	approximately 13" W x 22" H x 8" D
CARTRIDGE STACKING FACTOR	96-98%
MACHINE (OVERALL DIMENSIONS)	approximately 48" W x 51" H x 23" D

About POTTER®

POTTER WORLDWIDE FIELD SERVICE AND LOGISTICS PROGRAM — Repair centers in strategic locations within the continental United States and abroad have been established to support the entire Potter product line.

Staffed by highly-trained field representatives, these repair centers are equipped to effect on-site installation of equipments and to perform quality repair, maintenance and overhaul.

Supplementing this capability, if a customer prefers to provide his own equipment support, Potter has established standard instruction courses to train customer personnel, either at Potter or in the field.

A Spare Parts Department, backed up by an extremely large inventory and streamlined order processing, is available for customer convenience and economy. This inventory permits the customer to realize virtual elimination of downtime as well as savings on spare parts dollars by offering expeditious delivery for replaceable parts. Delivery is available in 24 hours to meet customer emergency requirements—within 72 hours for standard parts under normal conditions. Potter also offers provisioning and logistics capabilities to meet all existing military specifications.

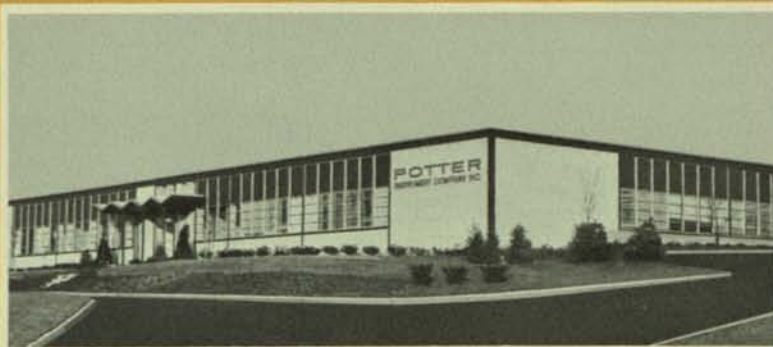
The Potter field service and logistics program is one of the finest in the EDP equipment industry. With reliable, quality-engineered equipment, supported by comprehensive field service, Potter guarantees satisfaction.



POTTER PLANTS — Tape transport production is carried on in this modern 62,000 sq. ft. plant on Sunnyside Boulevard, Plainview, New York. Building also houses corporate offices, sales, engineering and research groups.

East Bethpage Road plant (below), completed in 1963, produces high-speed printers. A third plant in Luquillo, Puerto Rico, manufactures magnetic and photoelectric recording and playback heads. Total manufacturing space in all Potter plants exceeds 110,000 sq. ft.

Present Potter employment is in excess of 650 people.



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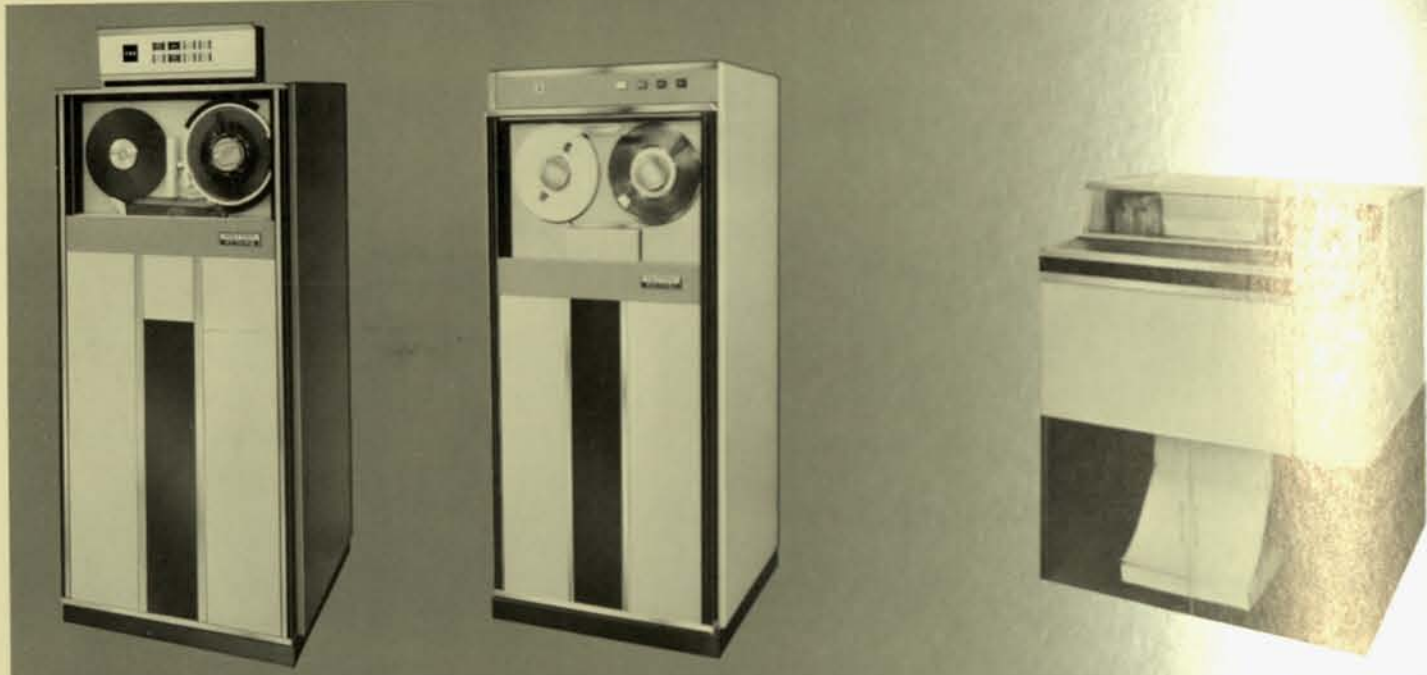
POTTER

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PERIPHERAL EQUIPMENT FOR ELECTRONIC DATA PROCESSING SYSTEMS · SYSTEMS · SYSTEMS · PERIPHERAL EQUIPMENT FOR ELECTRONIC DATA PROCESSING SYSTEMS · SYSTEMS · SYSTEMS



POTTER PERIPHERAL EQUIPMENT FOR EDP SYSTEMS



AUTOMATIC THREADING TAPE TRANSPORTS

MAGNETIC TAPE TRANSPORTS. Automatic Threading Tape Drives are available in tape speeds of from 75 to 200 ips. These high performance units have features unavailable on many competitive machines. The single capstan operation combined with the retractable read/write head increases tape life and data reliability because only the tape cleaner and tape head come in contact with the oxide surface of the tape. During load and rewind cycles the head retracts.

Single Capstan models give top performance and low cost in systems that do not require automatic threading. They are available in tape speeds from 12.5 to 150 ips. They incorporate all of the important data reliability features of high performance transports, but all non-essential functions have been simplified or eliminated. The basic transport design stresses low unit cost, optimum performance, ease of servicing and operator convenience.

All Potter Magnetic Tape Transports can be supplied with appropriate read/write amplifiers that provide industry compatible 7- or 9-channel operation to 800 bpi NRZI or 1600 bpi PE. Read Reverse and End-of-Block Detection capabilities are available as options. All 7-channel systems are pre-wired for immediate field expansion to 9-channel. Tape Formatters are also available for use with Potter Amplifiers to permit formatting tape to insure IBM-Compatible recording. These units also generate and detect field mark in 7- and 9-channel format and generate and check required CRC, LRC and VRC information.

SINGLE CAPSTAN TAPE TRANSPORTS

HIGH SPEED CHAIN PRINTERS

The LP 3500 Chain Printer incorporates advanced developments in printing technology to produce a high reliable design. The unit attains 300 lines per minute speed through the use of extremely stable, high energy free flight hammers. Mechanical adjustments have been simplified and noise levels have been reduced. Operators can change forms, ribbons and even character fonts in minutes. Forms may be changed out of the top of the printer for immediate access or out the back for stacking. The LP 3500 is ideal for any computer system requiring high speed printing and high quality printout.

LOW COST LINE PRINTERS AND PLOTTERS

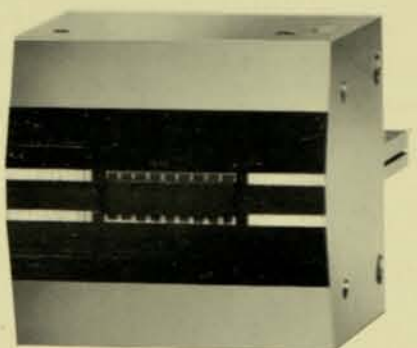
The LP 3000 and LP 3300 Series Line Printers operate at 135 lpm and 300 lpm respectively on 132 columns. These highly reliable dot matrix printers use either 64 or 96 character sets and can be provided to print 5x7, 9x7 or 9x9 matrix patterns. Because characters are generated electronically, fonts can be changed by simply changing plug-in PC boards. The LP 3000 is optionally available to output high resolution plotting and other graphics in addition to normal printing. Both printers can be supplied with an RS 232C Communications Interface. These units are available on pedestal mounting or in square cabinets as shown.

HIGH CAPACITY DISK STORAGE SYSTEM

The Potter DD 4330 Disk Storage System provides an 800 million bit/spindle capacity. Average access time is 20 milliseconds—considerably faster than available competitive units. The high speed accessing is accomplished by a field proven voice coil actuator which also insures precise head positioning. Built-in diagnostics combined with a degating switch for each spindle permit field service or maintenance without shutting down the entire system. The DD 4330 uses IBM compatible disk packs and IBM compatible recording.

LOW COST DISKETTE STORAGE SYSTEM

The DD 480 Diskette Drive is available for use by system manufacturers in applications where tape cassette units have previously been specified. Using a single, plastic enclosed, flexible disk as the recording medium, this new disk drive provides many advantages over serial recording cassette type equipment. A disk organization of multiple tracks combined with a movable head accessing system permits the user to access recorded data in an average time of 1.67 seconds. Data check reading is accomplished within one revolution of the disk (0.67 seconds). Disk capacity is 653,312 bits.



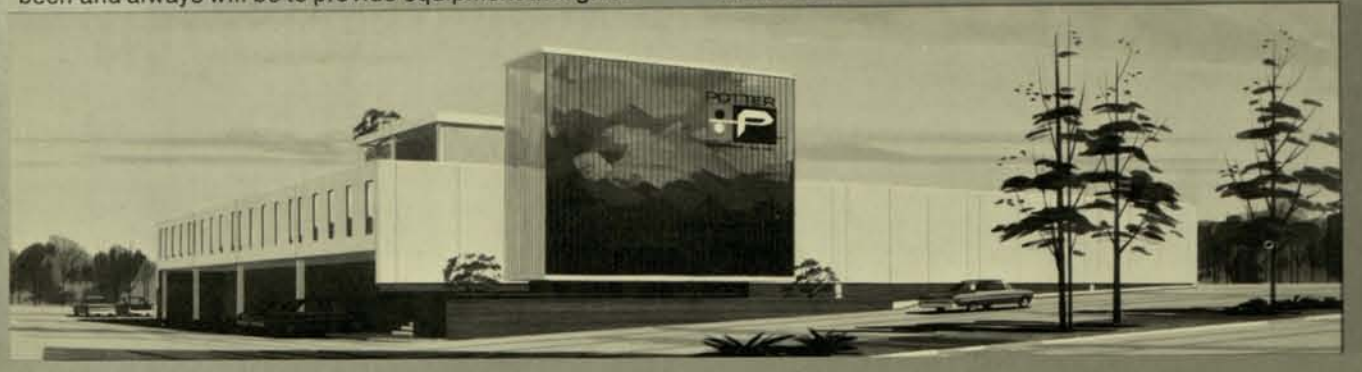
HARD COAT MAGNETIC HEADS

All Potter Magnetic Tape Transports are supplied with the exclusive Hard Coat Magnetic Heads. The plasma applied Hard Coat is a patented process which virtually eliminates head wear. As a consequence, the time consuming amplifier adjustments normally associated with gradual head wear are drastically reduced, system maintenance costs are lower, system up-time is greater. These outstanding magnetic heads are available to manufacturers of tape transports, check readers or other digital recording equipment.

POTTER PERIPHERAL EQUIPMENT FOR EDP SYSTEMS

Potter has been manufacturing and marketing data processing peripherals for a quarter of a century. There are more Potter magnetic tape drives in use on computer systems around the world than those of any other independent peripherals manufacturer. Our goal has been and always will be to provide equipment that gives

superior performance, greater reliability and lower cost. Every Potter product has an engineering edge—design pluses that are not available anywhere else. If you would like additional information about any of the products shown here, just fill out the attached card and drop it in the mail.





POTTER INSTRUMENT COMPANY, INC.

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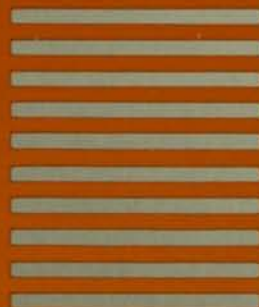
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Magnetic Tape Transports

- AT 1092—to 200 ips
- AT 1082—to 150 ips
- AT 1052—to 75 ips
- SC 1081—to 150 ips
- SC 1051—to 75 ips
- SC 1035—to 45 ips NRZI
- SC 1037—to 45 ips PE

Line Printers and Plotters

- LP 3500—1500 lpm Chain Printer
- LP 3300—300 lpm Matrix Printer
- LP 3000—135 lpm Matrix Printer
- LP 3050—Matrix Printer/Plotter

Disk Storage Systems

- DD 4330—8 million bit capacity
- DD 480—Diskette Drive

- Tape Transport Amplifiers and Formatters**
- Potter Hard Coat Heads**
- Have a Potter Representative call for an appointment**

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#4950

IMPACT LINE PRINTERS



LP 6350 - 500 LINES PER MINUTE



RELIABLE, MULTIPLE COPY OUTPUT DEVICES WITH UNIQUE CONSTRUCTION FEATURES AND OPERATING ADVANTAGES FOR SYSTEMS MANUFACTURERS

- FEATURES** Swing Gate Loading Scroll Ribbon — Industry Standard
 Adjustable Dual Tractors 64 or 128 Standard or Custom Character Sets
 Economical Multi-Part Forms 132 Columns Reliable LSI Electronics

The POTTER LP6350 Line Printer

The Potter LP6350 impact line printer provides hard copy output with unmatched reliability and performance for a variety of applications. This field-proven equipment contains a unique mechanism which produces clear dot matrix characters on multi-part forms at speeds up to 500 full 132 character lines per minute.

The printed line is produced with only two types of moving parts — voice coil hammers and a rotating

helix. Delivering more than 8 lines per second, the LP6350 provides full line printer throughput by means of a parallel interface. Character-at-a-time printing is no longer an economical trade-off.

The expanded and improved printer power delivered by the Potter LP6350 provides new market and application opportunities for systems designers and manufacturers.

Applications

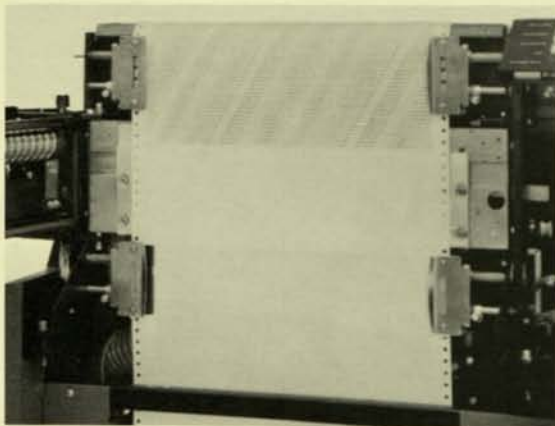
Potter's LP6350 impact line printer has numerous applications for EDP users and systems manufacturers. Typical applications in electronic data processing include—

Minicomputer output device . . . the steadily increasing use of minicomputers in EDP systems has created a need for economical, dependable impact line printers.

Communications Systems . . . the LP6350 with serial interface is useful in communication systems as terminal printout devices.

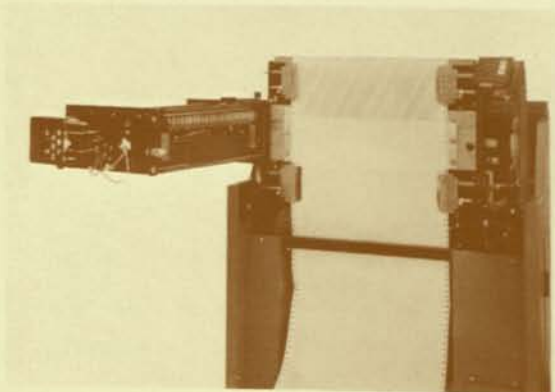
Data Logging systems gather data at various time intervals and then process the data periodically. In this type of system an impact line printer provides a hard copy output for record and review purposes. Process control, point-of-sale, material movements are typical data logging fields.

Advantages



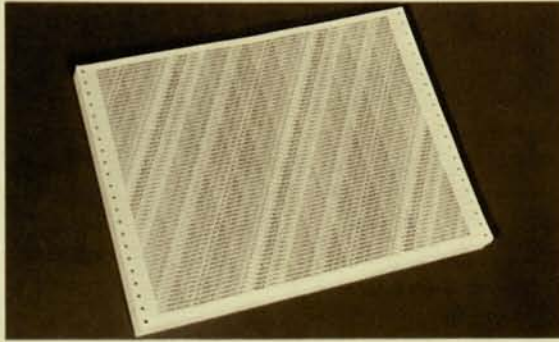
ADJUSTABLE DUAL TRACTORS

Dual tractors, located above and below the print area, provide precise paper handling. The heavy duty tractors can be set for any paper width from 4½" to 14⅞". The use of four tractors allows complete control of paper through the print area.



SWING GATE LOADING

The printer features a swing gate carriage for easier paper and ribbon loading and maintenance. Paper is easily loaded by opening the hinged carriage. The carriage opens more than 90° providing full access to the paper, ribbon and tractors. The swing gate feature is extremely useful for operator maintenance by permitting easy cleaning of paper and ribbon dust.



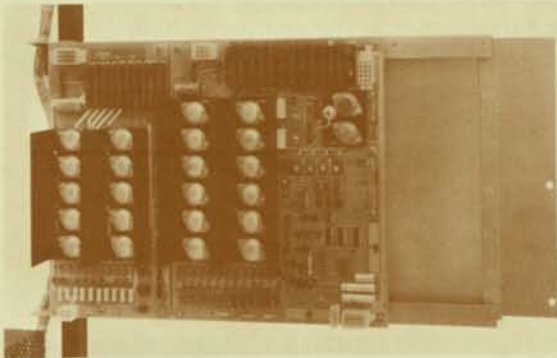
132 COLUMNS

With spacing of 10 characters per inch, the LP6350 prints 132 columns on 14⁷/₈ inch wide fanfold paper. Continuous, edge perforated forms from 4¹/₂" to 14⁷/₈" wide are easily handled.



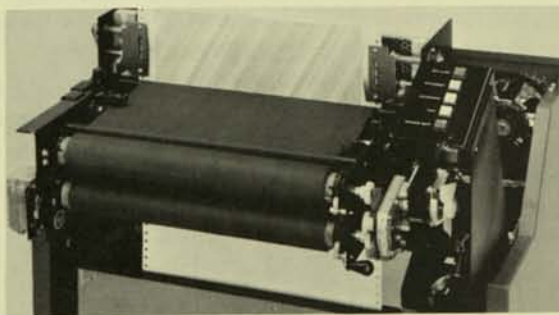
PRINTS MULTI-PART FORMS

The LP6350 printer uses standard fan fold single or carbon interleaved paper. The clear dot matrix format produces clean, legible copies on all multiple parts allowing flexibility in forms design and distribution.



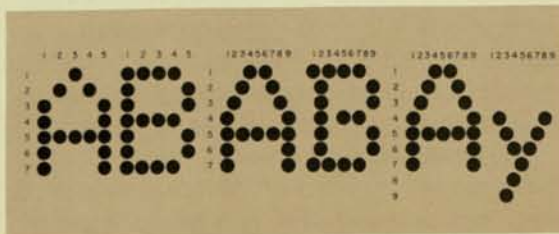
LSI ELECTRONICS

Potter experience in designing and building computer peripheral equipment assures dependable LSI electronics for the LP6350 printer. Greater reliability and lower power consumption are built-in. Electronic plug boards and power supplies are readily accessible for testing or replacement. Power supplies — 60 Hz, 115V standard — 50Hz, 230 V optional for international use.



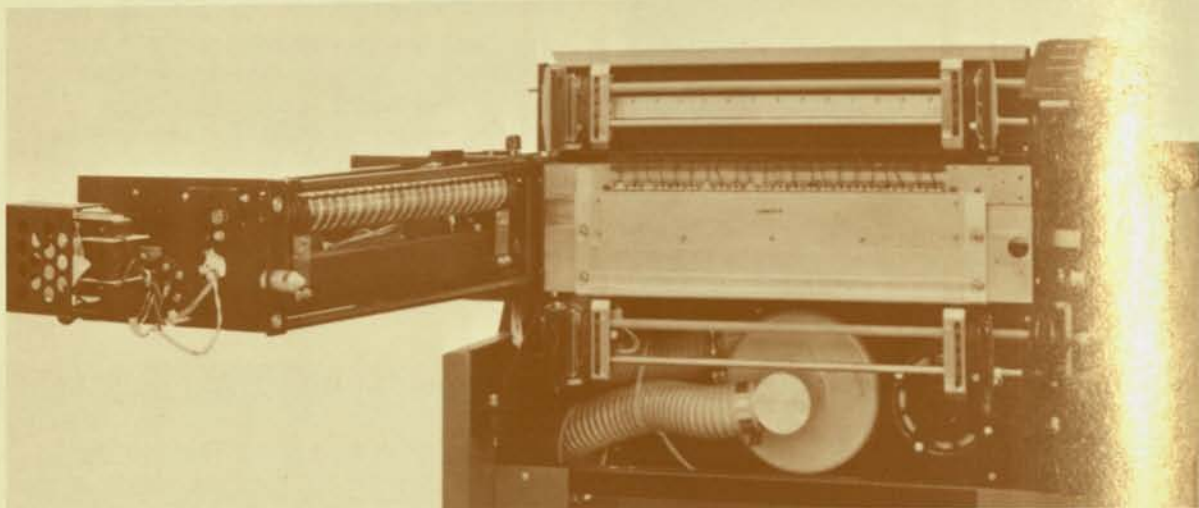
SCROLL RIBBON

Industry standard scroll ribbons are used on the LP6350 printers providing five time more area than narrow strip ribbons at considerable overall savings. Regular nylon scroll ribbons are 14 inches by 25 yards long and are easily loaded when the swing gate carriage is open. For applications requiring a more intense black imprint, Mylar™ scroll ribbons are available.



64 OR 128 CHARACTER SETS

Standard character sets use a 5 x 7 matrix (5 dots across, 7 dots vertically) with up to 128 characters in the set. Upper and lower case characters, foreign alphabets and custom graphics offer unusual flexibility. 9 x 7 and 9 x 9 characters are available as options.



PRINTING PRINCIPLE

The new LP6350 uses the same basic printing principle and Unibank® assembly originally developed for the Potter line of intermediate speed printers. The new Unibank® hammer assembly is a one piece structure which increases magnetic field strength 20% over individual magnets and consists of voice coil hammers mounted on a single plate over the magnet.

A rotating helix, in concert with the column spanning voice coil driven hammers produces a dot pattern capability that is used to reproduce characters stored in a fixed

memory ROM chip.

Printing is accomplished by the spinning spiral (helix) mounted in front of 22 voice coil hammers. When the voice coil is activated, the resultant action pushes the hammer against the rotating helix creating a dot on the paper. By keeping electronic count of the location of the hammer and the helix, a dot pattern can be generated at will. The standard character set uses a 5 x 7 matrix with 9 x 7 and 9 x 9 character sets as options. Any custom character or foreign alphabet can be included in the fixed program ROM memory on special order.



BUILT-IN RELIABILITY

The latest advances in printer technology are incorporated in the Potter LP6350 producing a dependable product with a background of proven performance. Among the built-in Potter design features delivering greater reliability are — only one moving part for each print position; Unibank® voice coil hammers using a long life flexure instead of pivoting bearings; and simplified construction for easy accessibility and maintenance. The rotating Helix (platen) principle used in the LP6350 printers eliminates the wear and vibration that occurs with massive reciprocating components.

Another example of advanced Potter design is the use of ferro-resonant power supplies. They deliver flat output voltages required for electronic data processing regardless of variations in input. In effect, this voltage stabilizer insures continuous operation despite seasonal voltage drops or substantial line changes.

The Potter impact printer is a "designed-for-the-customer" product which delivers easily read, hard copy printouts when and where required.

Specifications

Mechanism:

Speed: LP6350 500 lines per minute

No. of Columns: 132

Character Set: 64 characters, ASCII or EBCDIC coded

Character Spacing: 10 characters per inch

Printer Technique: Dot Matrix

Line Spacing: 6 lines per inch

Character Style: 5x7 Matrix, Standard 9x7, 9x9 upper and lower case available.

Registration: ± 0.007 inches, non-cumulative, horizontal and vertical.

Paper Control:

Feed Mechanism: 4 pin feed tractors, with integral paper out switches, all tractors are adjustable right and left.

Paper Slew Speed: 10 inches per second

Forms: Continuous fanfold, edge perforated, with variable from 4¼ to 14¾ inches. 15 or 20# bond for single part, 10# bond with 7# one shot carbon for multiple part, edge crimped.

Vertical Control: Electronic top-of-form with automatic skip-over. 4-channel or IBM compatible 12-channel photoelectric tape units available.

Ribbon: Industry Standard scroll ribbon, 14" wide x 25 yards long — Nylon. Standard self-reinking mylar film ribbons available.

Electrical: Interface — Logic 0 = +5V
Logic 1 = 0V

Power: 115V 60Hz-230V 50Hz Available

Dimensions:

	high	wide	deep
	42¼"	27¾"	22¼"
	107 cm.	71 cm.	56 cm.

Weight: 250 pounds 114 kg.

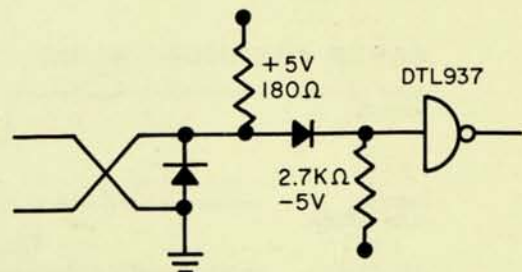
Environment: Operating: 50-105°F/10-40°C
Humidity: 5-95%

Wiring

Logic and Command Interface — All status, command and data lines to or from the LP6350 are negative going DTL/TTL +5/0 volt signals where 0 volts = the active state.

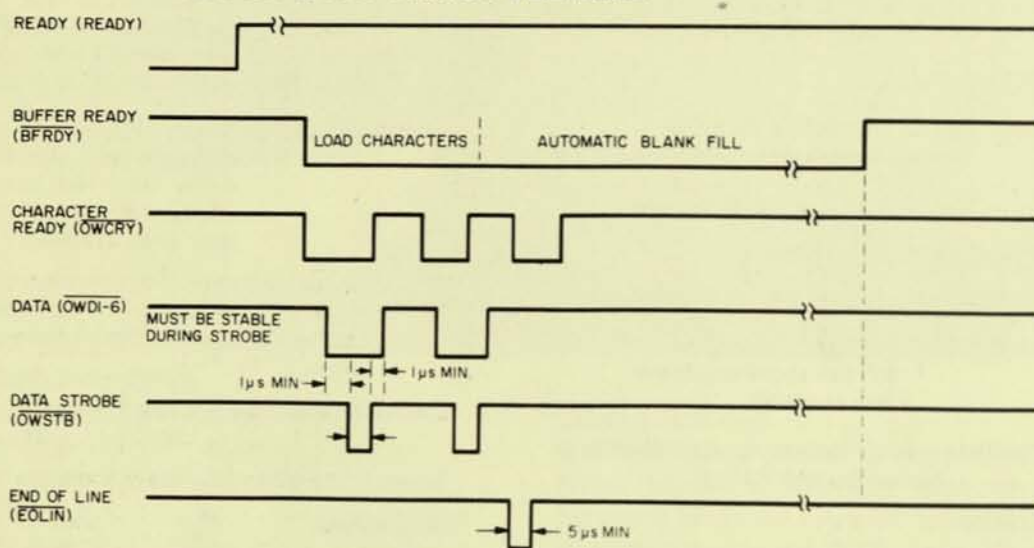
Logic 0 (inactive state) = +5V ± 0.5 V, Logic 1 (active state) = 0 ± 0.5 V, Sink 30 ma.

Data and command signals to the LP6350 should be driven by a type 944 DTL integrated circuit with a 10,000 ohm pull up resistor to +5 volts or equivalent TTL type 9009. Data and reply lines from the LP6350 should be terminated with the following recommended circuit.

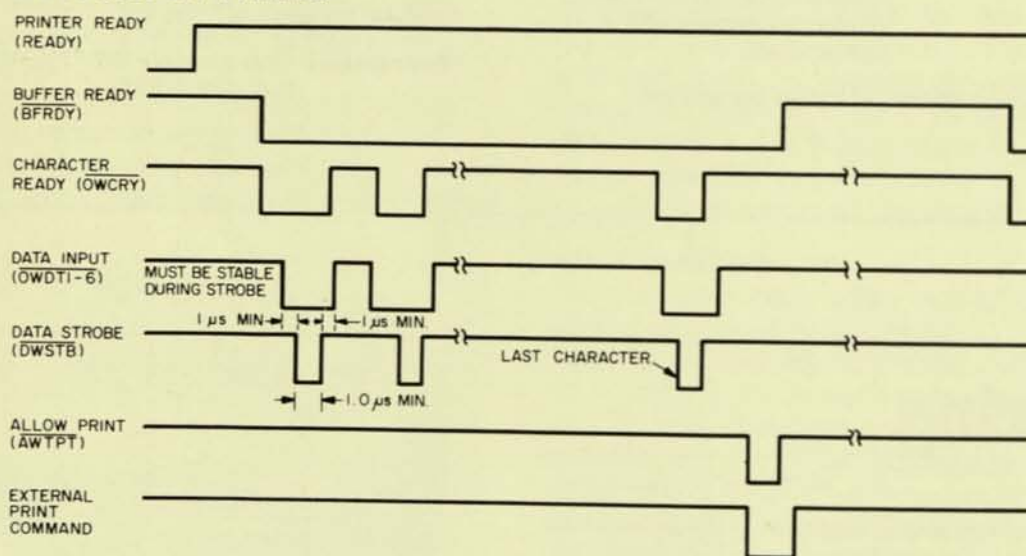


Timing

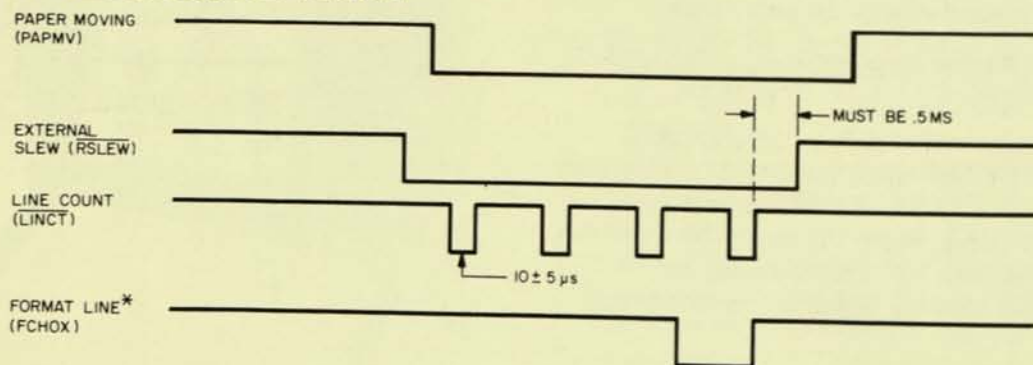
DATA TRANSFER LESS THAN FULL LINE



DATA INPUT TIMING

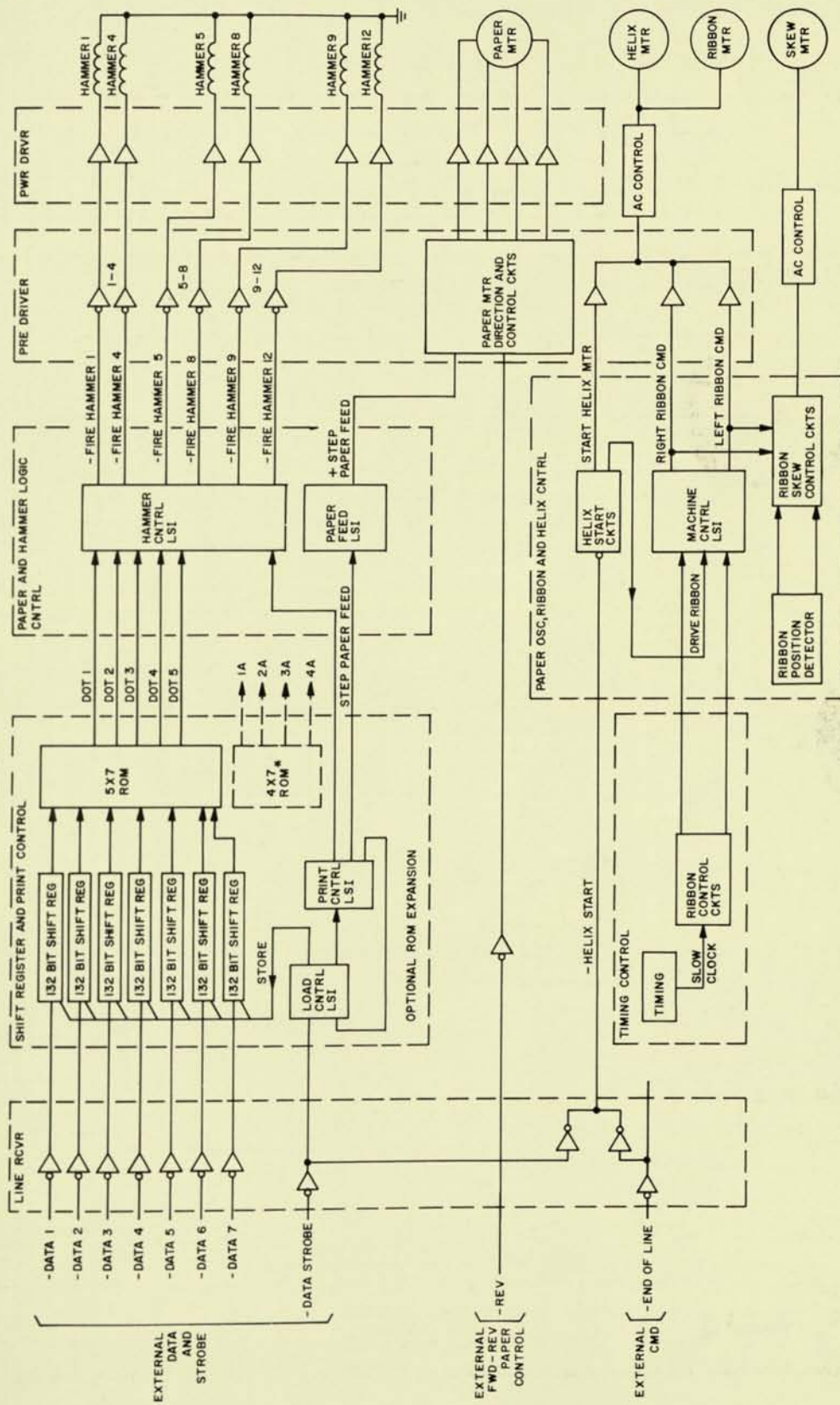


PAPER ADVANCE TIMING

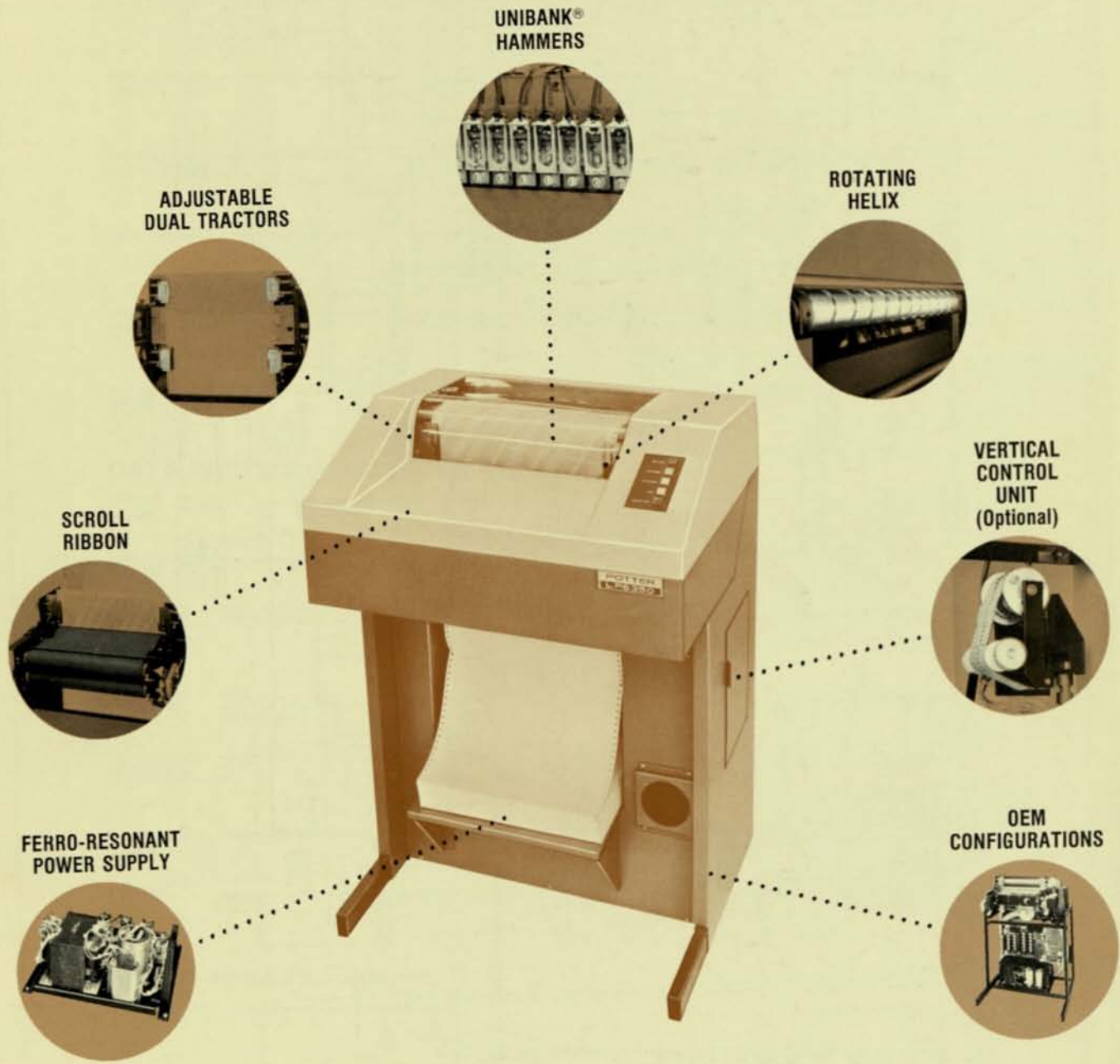


* IF VERTICAL FORMAT OPTION SELECTED, RSLEW IS GUARANTEED STABLE DURING LINCT. PAPER WILL STOP WITH FCHOX ACTIVE.

Logic



Some Key Features of the New POTTER LP 6350 Impact Line Printers



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102687088

POTTER

DD 4740 DISKETTE DRIVE



FLEXIBLE DISK DRIVE FOR SYSTEMS MANUFACTURERS

FEATURES Compatible with IBM 3740 System Compact Random Access
Replaces Cassettes Easy Self-Centering Loading Higher Reliability

APPLICATIONS Minicomputers Program Loading Point-of-Sale Storage
for Programs, Data, Work Area, Tables, Etc. Data Entry Systems Data
Logging Process Control Communications Terminals

The Potter Diskette Drive is a compact disk drive storage device that uses flexible diskettes, each with over three million bits storage capacity. When the diskette is interchanged with IBM 3740 entry terminals, programming format capacity is 242,944 bytes, and 26 addressable sectors are added to each of 74 tracks. The Potter drive accesses any addressable position on the diskette in random sequence, then provides data transfer at a peak rate of a quarter million bits per second. The diskette is easily handled and mailed.

The electronic system designer now has a memory unit for many uses such as computers, communications terminals and data entry machines. Compared to tape cartridges or cassettes, high data reliability and random access are among the Potter advantages.

Potter's simple design, using components long tested in data processing, assures easy maintenance. The DD4740 Diskette Drive is compact (9.90"x6.13"x12.88") and mounts vertically or horizontally.

The POTTER DD 4740 Diskette Drive

Applications

Potter's new diskette drive uses the small, flexible diskette that activates IBM's 3740 entry stations and terminals. The Potter drive has more applications in data processing systems than any other storage system in its price range. All data storage (whether permanent or interchangeable) in the speed and capacity range of the DD 4740 can now be assured of greater reliability and other advantages over tape cassette or cartridge systems.

DATA ENTRY SYSTEMS using the Potter diskette drive substitute the easily handled, clean diskette for punch cards and eliminate a host of card handling, storage, and transporting inconveniences along with their noisy and dust-producing machines. For most record layouts, an operator's accurate production for the day can be accelerated and accumulated on one diskette. Compared to tape cassettes, large disk, or multiple keyboard entry systems, the Potter DD 4740 holds an operator's work on one, individually loaded and handled diskette. This permits flexible job scheduling and reduction in software required to operate the entry system. And, because the diskette is compatible with IBM 3740 entry devices, its data can readily be entered into the host computer.



Data Entry Systems

COMMUNICATIONS TERMINALS, whether programmable or not, are being designed more and more with storage capability. The Potter diskette drive provides advantageous storage compared to tape cassettes or cartridges. This is particularly true for the high reliability required in remote locations, and the ease of reread for verification of data affected by transmission uncertainties. Additional data files in unlimited numbers can be transmitted/received by changing diskettes, a simple file change for even an untrained employee. Remote stations can use the Potter unit to accumulate manually entered data preparatory to transmission.



Communications Terminals

MINICOMPUTERS can replace cassettes and provide random access to data with the DD 4740. The Potter diskette drive unit also offers high speed read/write with a changeable data base, adequate for most minicomputer uses that previously required expensive, metal disk files.

PROGRAMS IN COMPUTERS, MINICOMPUTERS, OR PERIPHERAL CONTROLLERS can easily be entered or changed through the diskette drive. One example is the program in a Read Only Memory. Any program load is facilitated. Operating systems, diagnostic programs and revision of stored tables can be entered expeditiously.

STORAGE with random access, for small capacity data processing machines becomes economical with Potter's DD 4740. Programmable calculators can use it for programs and intermediate data storage. Word processing machines can store text and editing programs.

DATA LOGGING describes a series of DD 4740 applications in which data is gathered at intervals and removed for periodic processing. *Point-of-Sale* recording in the retail industry can use the Potter unit to accumulate style, color, size, other identifying information and quantitative information at the time of sale. Accumulated records can then be hand carried on diskettes or transmitted to central EDP systems. *Process control* readings can be logged, or auxiliary programs stored, on the Potter diskette and later processed by a controlling system. Warehouse or factory *material movements* may be entered and held on remotely located Potter diskette drives. Later this information may be transmitted and consolidated for daily entry to operating reports.

Applications for the Potter DD 4740 Diskette Drive are almost unlimited.

POTTER Advantages

RELIABILITY reaches a new high for a memory featuring changeable media with this capacity and price and offering fast access to additional data. The design goal is one recoverable ("soft") error in 10^9 bits, and one nonrecoverable ("hard") error in 10^{12} bits.

INDUSTRY COMPATIBLE diskette permits the customer to design his system to interchange data with the IBM 3740 entry/transmission system. The Potter DD 4740 can read and write in the same format as IBM.

RANDOM ACCESS allows direct addressing of any data in the file. File organization and addressing is accomplished by programming.

EASE OF OPERATION begins with simplicity of handling, mailing and storing the diskette without worrying about damage to recorded data. Also, the Potter drive is easily loaded by simply inserting the diskette and closing the lid. The rest is done automatically.

CHECKING DATA is easy on a diskette compared to tape cassette. The Potter unit can reread, read after write, rewrite etc., by sequential program commands, while the head

is still positioned at one track.

PRICE for the Potter DD 4740 drive is a new low in the industry for a reliable, disk memory.

Operation

DISKETTE — The diskette, flexible disk, or "floppy" disk is a data storage medium that also offers manual interchange of files. The 1973 version used in IBM's 3740 series of Data Entry Systems differs from the units used in prior years. The diskette, for IBM 3740 and Potter DD 4740, is made of flexible mylar-like material with an oxide coat. It is permanently enclosed in an 8" x 8" (20.3 x 20.3 cm) thick plastic envelope, lined with material that gently wipes the diskette surface. Access to the recording surface is gained by a read/write head through a slot in the envelope. In another position, a hole in the diskette is sensed through a hole in the envelope to index the start of tracks.

Data and record addresses are organized on the diskette surface into concentric tracks, the outermost one numbered 00, and the innermost track numbered 76. Leaving a short space between the end of a track and its beginning, the user can record 40,624 bits on a track, or 3,128,048 bits on 77 tracks using the whole surface. When using the Potter diskette drive compatibly with IBM, permanent programming maintains 26 addressable sectors in each track and reads/writes in EBCDIC characters. This reduces storage capacity to 3,328 data bytes per track on 73 data tracks, or 242,944 bytes on the disk surface.

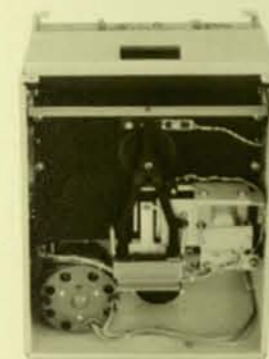
Because the diskette is protected from damage, it can be handled easily and quickly by untrained personnel and can be sent through the mail, etc., without special or costly precautions.

LOADING — An operator loads the drive by inserting a diskette with the aperture side in first. The envelope fits conveniently; there is nothing to align, thread, or turn on. She then closes a cover over the diskette slot and instantly, automatically, the diskette is centered, and the motor starts to rotate the diskette. Unloading is just as simple beginning with opening the cover and removing the diskette.

DRIVE OPERATION — Fast loading and unloading is assured by the design of the mechanism within the Diskette Drive. When the

access cover is closed, a cone shaped idler moves into the 1½ inch center hole of the diskette. As a result, the diskette is always perfectly centered regardless of the envelope position. The idler loads the diskette by friction against a rotating hub, and provides a positive coupling. The hub is part of a spindle driven by a belt from the AC motor.

A three-phase stepper motor with integral lead screw assures fast track access. A carriage and nut assembly containing the head is mounted on the lead screw. This carriage, in



Diskette Drive — Front View

turn, is guided by two independent, parallel rods. Each command to the stepper motor translates into a 15 degree rotation of the lead screw and a .021 inch radial step of the carriage. An anti-backlash mechanism ensures consistent positioning. Stepper motor electronics include additional features to achieve fast head settling time. These features reduce the velocity of the stepper as it approaches detent position. Settling time is under 25 milliseconds.

Contact between head and diskette is controlled by a spring-loaded pressure pad mounted on the carriage and nut assembly, on the opposite side from the head. The pressure pad, and a diskette envelope guidance system, remain open until the drive cover is closed; then they are activated by a solenoid. The solenoid is also used to unload the head when read/write operation is not being performed, prolonging the life of the head and diskette. A circuit is provided at the interface connector for this purpose.

An index hole in the diskette is sensed by a light emitting diode (LED) and phototransistor. The index hole is used to locate the start of each track, and it can also be used to check rotational speed. A LED and phototransistor are also used to sense track 00 when the head is in position over this track. Track 00 sensing is used to safeguard against further outward movement of the head, and to calibrate the unit.

The Potter read/write head is single gap with erase. Read electronics consist of amplifier, a zero crossing detector, and pulse

shaper. The design uses filters and shaping networks to achieve optimum signal detection with maximum noise rejection. The dynamic range of usable signal exceeds 35 DB, providing excellent read reliability under all conditions. Read circuits are disconnected from write with Field Effect Transistor (FET) switches. FET switches provide maximum isolation during write and minimum bias currents during read. The read electronics achieve peak performance with double frequency encoded recording, which has a maximum bit frequency of 250,000 bits/second. Read data is presented to the interface as a serial pulse train encoded in double frequency.

Write electronics use a three-stage amplifier. Data in the form of a serial, double frequency, pulse train are converted into flux transitions by a write driver. An additional Potter feature provides low write current when writing on the high numbered tracks. As density of recording increases, the DD 4740 improves resolution with lower current. Additionally, the write electronics section contains a safety circuit that inhibits writing whenever power to the unit is shut off. Write inhibit also prevents accidental erasure due to power failure.

Electronics associated with the stepper motor are drivers, decoders, and an up-down counter. Inputs to the drive electronics are seek-in and seek-out pulses; each pulse advances the motor one step in a designated direction. Outside control of the DD 4740 must supply the correct number and direction of pulses for each seek, through an interface connector.

INSTALLATION, MOUNTING — Drives may be installed for top loading or front (side) loading. The diskette rotates in a vertical plane or, when side loaded, it may rotate in a horizontal plane. The drive is mounted using a flange integral with the case at top. Additional mounting points are provided on the sides for slide or other type installation. A bezel that snaps over the front end conceals mounting details.

Front and rear panels are each held by two quarter turn fasteners. Removal of covers affords complete access to all components.

SERVICING — The head can be cleaned through the diskette loading slot whenever needed. For any other servicing, the entire Diskette Drive is simply pulled from its installation, and the covers removed.

PERFORMANCE SPECIFICATION

Diskette Medium	IBM 2305830 or equivalent	
Protective sealed envelope	8 x 8 x 1/8 inch with slot for access	
Diskette within envelope	7.88 inches diameter .003 inches thick, flexible material, iron oxide coated	
Track spacing	48/inch, or .021 inch	
Beginning of track	Indexed by hole in disk	
Diskette Capacity depends upon system compatibility with IBM 3740:	Maximum Available Capacity	Compatible with IBM 3740 Series
Tracks, 48/inch	77	#00 index records #01-73 data #74, 75 spares 8 bits/byte 26 sectors: 5 address and 128 data bytes/sector 130 address bytes 3328 data bytes (1) 1898 80 col. punch cards, or (2) 242,944 data bytes
Coding	—	
Sector format, per track	minimum 1 sector	
Track storage	40,624 bits	
Diskette storage	3,128,048 bits	
Recording density	3270 bits/inch max.	
Rotation speed	360 rpm, or 167 ms/revolution	
Latency	167 ms max., 83 ms average	
Recording system	Double frequency	
Data Transfer rate	250,000 bits/second	
Access time, head movement	10 ms track-to-track	
Settling time	25 ms nominal	
Head load at start-up	100 ms	
Logic levels	Logic 0 +5V ±.5V; Logic 1 0 ±.5V	
Power required	+24V ±5%, 2 amperes +5V ±5%, .5 ampere -15V ±5%, .25 ampere 60Hz, 115 VAC ±10%, 1 ampere	
Connector	1 mating connector supplied with each unit	
Cable length max. between connectors	50 ft.	
Operating Environment is limited by the flexible diskette:		
Temperature	40°-100°F.	
Relative humidity, without condensation	20%-80%	
Non-operating storage, without media:		
Temperature	32°-120°F.	
R.H. without condensation	10%-80%	
Dimensions	9.90" wide x 6.13" deep x 12.88" high*	

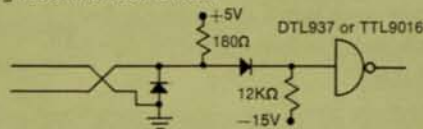
*A bezel extends .5" in width and .625" in depth on each side at one end in addition to dimensions given. Bezel contains cover for loading.

INTERFACE:

Logic and Command Interface — All status, command and data lines to or from the disk drive are negative going DTL/TTL +5/0 volt signals where 0 volts = the active state.

Logic 0 (inactive state) = +5V ±0.5V, Logic 1 (active state) = 0 ±0.5V, Sink 30 ma.

Data and command signals to the drive should be driven by a type 944 DTL integrated circuit with a 10,000 ohm pull up resistor to +5 volts or equivalent TTL type 9009. Data and reply lines from the disk drive should be terminated with the following recommended circuit.



Interconnecting Cable — One PC board mating connector is supplied with each disk drive.

The maximum cable length from connector pin to connector pin is 50 feet (15 meters).

All inputs and outputs require twisted pairs, one line per function, one for ground. All wires should be 22 AWG minimum with at least one twist/inch (1 twist/25 mm).

INPUT COMMANDS:

Signal	Mnemonic	Description
Seek Track "In"	SKIN	Ground going pulse 1-10 μsec. wide. Each pulse causes head to advance toward spindle and away from home position.

INPUT COMMANDS Cont.:

Signal	Mnemonic	Description
Seek Track "Out"	SKOT	Ground going pulse 1-10 μsec. wide. Each pulse causes head to retract away from spindle toward home position.
Engage Head	ENGH	Ground level maintains head engaged.
Write Command	WCMD	Ground level maintains unit in a write condition. High level maintains unit in read condition.
Write Data	WDAT	Ground going pulse train. Each pulse will cause a flux change on the disk.
Low Current Select	LCSL	Ground going level, reduces write current at the higher tracks.

OUTPUT SIGNALS:

Signal	Mnemonic	Description
Index	INDX	Ground going pulses approximately 100 μsec. wide, occurring every revolution.
Read Data	RRDT	Ground going pulse train 200 μsec. wide.
Track φ	TKφφ	Ground level when head is home, i.e., track φφ.
Unit Select (option)	USEL	Ground going level provides unit selection in multidisk systems.



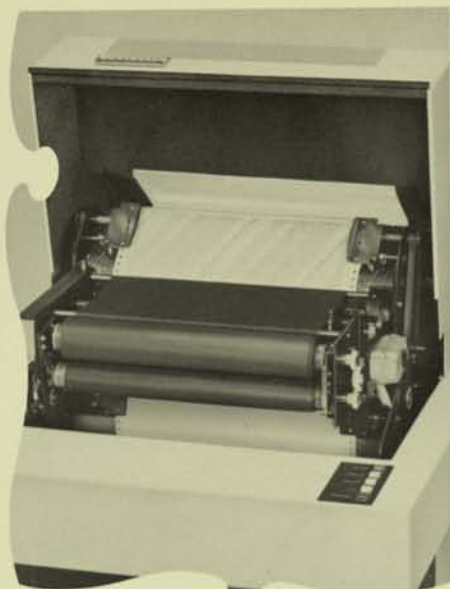
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POTTER puts it all together



SYSTEM 85 . . . Potter engineering puts it *all* together with advanced technology Diskette Data Systems.

SYSTEM 85 offers a new concept in data entry, the unique combination of flexible diskette *and* hard copy in an operator-oriented data station. Now data validation and correction become simple, efficient operations.

SYSTEM 85 . . . Featuring the **DDS 8505 Diskette Data Station**

- 150 lpm Impact Line Printer
- Flexible (Floppy) Diskette Drive
- Operator-Oriented Data Entry
- Communications

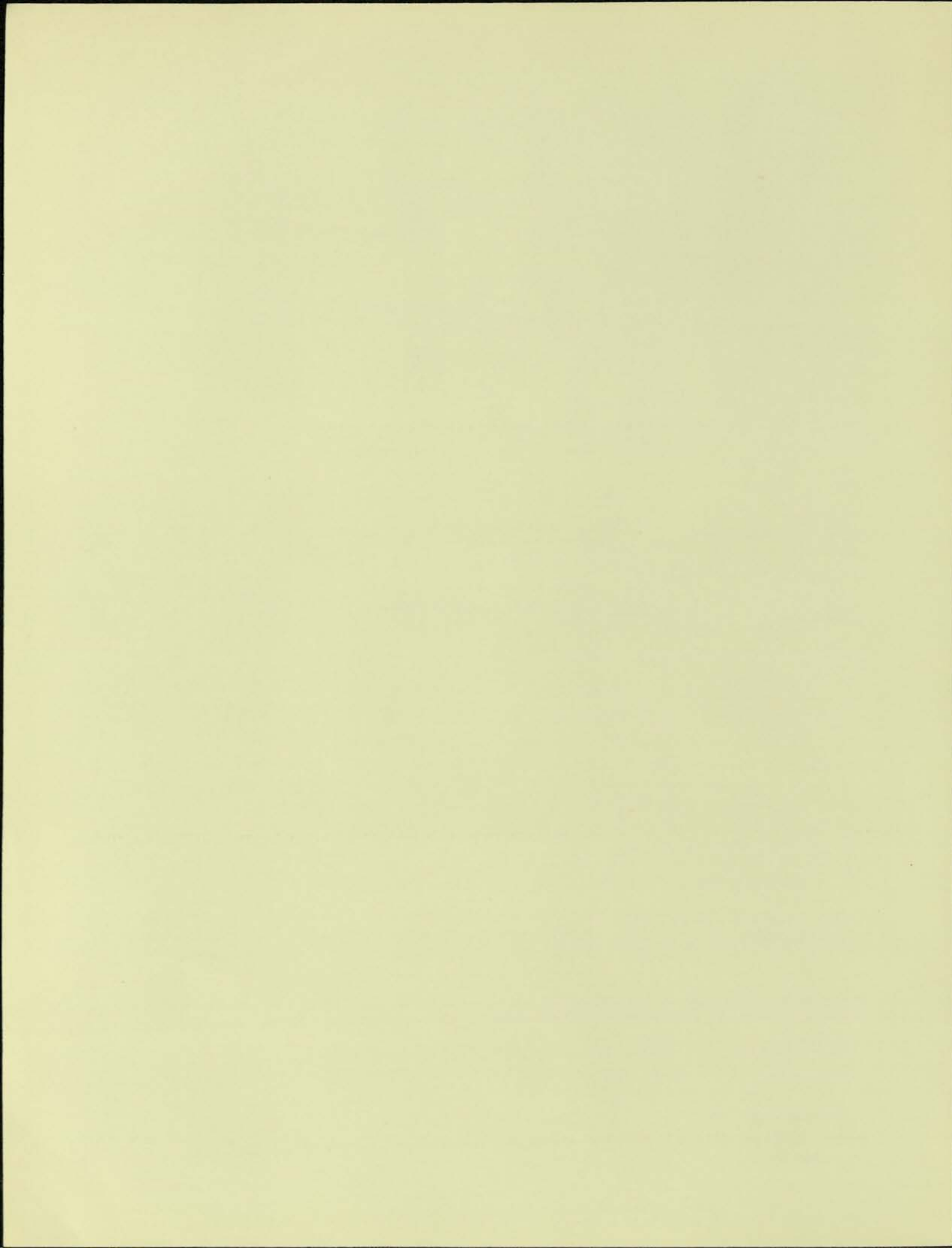
Potter's **SYSTEM 85** . . . The right solution for *your* industry and applications.

To learn how **SYSTEM 85** will fit into your data processing plans, call (516) 694-9000 or write Marketing Department, Potter Instrument Company, Inc., 532 Broad Hollow Road, Melville, New York 11746.

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NATIONAL COMPUTER CONFERENCE
NEW YORK COLISEUM, JUNE 4-8, 1973



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