

# **TAPE TRANSPORT, 9-TRACK**

**9550/51;9570/71**

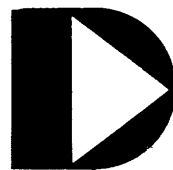
**(2200-300/301/305)**

## **Product Specification**

March 29, 1974

Model Code No. 60088

**DATAPOINT CORPORATION**



**The Leader in  
Dispersed Data Processing**

DATAPOINT CORPORATION

PRODUCT SPECIFICATION

3/29/74

9-TRACK TAPE MEMORY SYSTEM (CONSOLE)	2200-300
9-TRACK TAPE MEMORY SYSTEM (FREESTANDING)	2200-301
230 VAC OPTION	2200-305

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## 1.0 GENERAL DESCRIPTION

The Datapoint 2200-300 or 2200-301 tape memory system is capable of reading and writing industry compatible 9-track, 800bpi NRZI formatted tapes. The 2200-300/301 system consists of an 8-1/2 inch, 12.5ips tape drive and an interface controller. (The Datapoint 2200 terminal is a separate item.) The controller and transport are configured to interface with the 2200 terminal consistent with other external devices.

The controller automatically formats records and programs the transport for tape motion in response to 9 basic commands from the 2200 terminal. The controller includes a 1057 byte buffer which accepts data from the terminal or the transport during a write record or read record operation, respectively; therefore, the maximum record length capacity of the system is 1057 bytes.

Ninth track odd vertical parity for each data byte, a cyclic redundancy check character (CRCC) and a longitudinal redundancy check character (LRCC) for each record are automatically generated and checked during each write and read operation respectively. The write record operation performs a simultaneous read-after-write parity check (vertical parity, CRC, and LRC). The controller delivers 8 status bits to the terminal.

## 2.0 SYSTEM REQUIREMENTS

### 2.1 Installation

The 2200-300 or 2200-301 requires a 600 watt alternating current power source of 115 or 230 volts RMS, 50 or 60 HZ. The console has a single three-wire power cable to connect with the source. In the case of a 2200-300 console system, the terminal's power cord is plugged into a socket on the power distribution box inside the equipment tub accessible with the rear door open. Connect a 5 foot Universal I/O Cable (2200-164) between the 2200 terminal's external I/O connector to J5 on the rear of the controller mounted in the bottom of the equipment tub.

If Communications Adaptors are mounted on the console, first connect the 2200 terminal external I/O connector to J1 on one Adaptor using an 18 inch 2200 Universal I/O Connector (2200-162). Connect J2 of this Adaptor to J1 of another Adaptor with another 18 inch I/O cable. Connect J2 of the last Adaptor to J5 of the controller with a 5 foot I/O cable. It is important to connect these Communications Adaptors directly to the 2200 terminal with short cables since they derive their power from the terminal, unlike the tape controller.

Connect additional external devices such as printers, disk and other tape systems in daisy-chain fashion from J4 of the tape controller.

Connect the appropriate devices to J3 of the Communications Adaptors.

This completes installation of a typical 2200 Tape Memory System.

### 2.2 Operation

To operate the system, a reel of 1/2 inch magnetic tape is mounted on the transport. Reels smaller than 8-1/2 inches in diameter can be used. The 2200 terminal must be loaded with a program from a cassette to access the external 1/2 inch tape memory system. Additional programs may be loaded from the 1/2 inch tape or the tape system may be used for data entry or retrieval, a typical application.

Note: A write enable ring must be located on tapes to activate the write circuitry and control logic; otherwise write commands from the 2200 terminal will be ignored.

### 3.0 2200-300/301 SPECIFICATIONS

#### 3.1 Power Requirements:

Voltage	115 volts RMS -10% to +10%
Current	6 amps (includes power required for one 2200 with up to two com- munication adaptors)
Optional Voltage	230 volts RMS -10% to +10%
Current	3 amps
Phase	Single
Frequency	47-63HZ
Connection	3-wire grounded wall plug

#### 3.2 Environmental Requirements:

Temperature	+40 to +90 degrees F
Humidity	20% to 80%

These conditions must be maintained to assure tape integrity and to minimize headwear.

#### 3.3 Physical Characteristics:      2200-300                      2200-301

Height	36.5 inches	28.5 inches
Width	52.5 inches	29.4 inches
Depth	22.7 inches	22.7 inches
Weight	290 lbs.	240 lbs.

#### 3.4 Performance

Tape Speed	12.5 ips
Rewind Speed	50-75 ips
Recording Format	IBM compatible, 9 track, NRZI
Recording Density	800 bpi
Read Density	800/556 bpi
Magnetic Head Assembly	Dual gap (read-after-write)
Reel Capacity	1200 feet; 8-1/2 inch or smaller reels
Nominal IRG	.65 to .90 inches
Maximum Access Time	20 minutes (BOT to EOT)
Maximum Rewind Time	5 minutes

### 3.4.1 Timing for Tape Movement - Writing and Reading Data

#### Write Block

Add Pre-delay + Data Transfer  
to Tape + Post Delay

Write Pre-data delay 32 milliseconds  
(Time from COM 2 (512 milliseconds from BOT)  
command until first  
character in  
buffer is trans-  
ferred to tape)

Write Data .8 milliseconds + .1  
Transfer milliseconds per character  
(Buffer to Tape)

Write Post-Data Delay 42 milliseconds  
(Time from last  
buffered charac-  
ter written on  
tape until Deck  
Ready returns true)

#### Write Filemark

341 milliseconds

#### Erase 3-1/2" Tape

340 milliseconds

#### Read Block

Add Pre-delay + Data Transfer  
to Buffer + Post Delay  
or

Add Pre-delay + Time to  
Transfer Buffer to 2200

Read Pre-Data Delay 20 milliseconds minimum  
(Time from Read 65 milliseconds maximum for  
command until 0.75 inch IRG.  
first character Longer IRGs add 1 millisecond  
read into buffer) for each additional  
.0125 inches

Data Transfer - .8 millisecond + .1  
Tape to Buffer millisecond per character

Read Post-data Delay 34 milliseconds

#### Advance Block, Back- space Block

Add Read Pre-data + Data  
Transfer (tape to buffer)  
+ Read Post-data Delay

### 3.5 Error Detection

The Controller automatically performs the following data checks:

- 1) Write
  - a) Ninth Track odd vertical parity (VP) generated and written on tape.
  - b) Cyclic redundancy check character (CRCC) generated and written on tape.
  - c) Longitudinal redundancy check character (LRCC) generated and written on tape.
- 2) Read Record
  - a) VP of each character checked.
  - b) The CRCC is regenerated and checked.
  - c) The LRCC is regenerated and checked.

### 3.6 Software Commands

- 1) Write Record\*
- 2) Write File Mark
- 3) Erase
- 4) Read Record\*
- 5) Advance Record
- 6) Advance File Mark
- 7) Backspace File Mark
- 8) Backspace Record
- 9) Rewind

Note: \*Maximum record length of 1057 bytes

### 3.7 Status Conditions Sensed

- 1) Deck Ready
- 2) Parity Error
- 3) Read Ready
- 4) Write Ready
- 5) Beginning of Tape (BOT)
- 6) File Mark Detected
- 7) Deck in Service
- 8) End of Tape (EOT)
- 9) Buffer Full

### 3.8 Programmable Address

Factory wired to 264 octal (easily field changed).

### 3.9 Operator Controls and Indicators

**REMOTE:** This is a combination pushbutton switch and indicator. It is lit when the transport is in 'Remote' mode (under control of the Datapoint 2200). The transport may be placed in Remote mode by momentarily depressing this switch.

**LOAD:** This is a pushbutton switch. After tape is threaded, momentary depression of this switch causes the tape to be advanced to BOT, after which the transport will go into Remote mode. At this time the REMOTE lamp will be lit.

**REWIND:** Momentarily depressing this pushbutton switch will result in high-speed rewind of the tape. This operation can be stopped by pushing the RESET pushbutton. If RESET is not pressed, the tape will rewind past the BOT marker, stop, and then automatically return to the load point. If REWIND is again depressed, the tape will be drawn out of the tape path and the unload sequence will be completed. The manual rewind operation is inhibited when the system is in Remote mode to prevent accidental tape damage.

**RESET:** All tape motion is stopped by momentary depression of this pushbutton. All read, write and control functions are cleared and the transport is removed from Remote mode and placed in 'Local' (off-line) mode. The REMOTE lamp will be turned off.

**FILE PROTECT:** This is an indicator that is lit when a write enable ring is not installed on the tape reel. This indicator will be off when a tape reel with the write enable ring in place is installed. This indicates that data may be written on the tape. Unless the ring is in place, protective circuits in the system prevent writing on the tape.



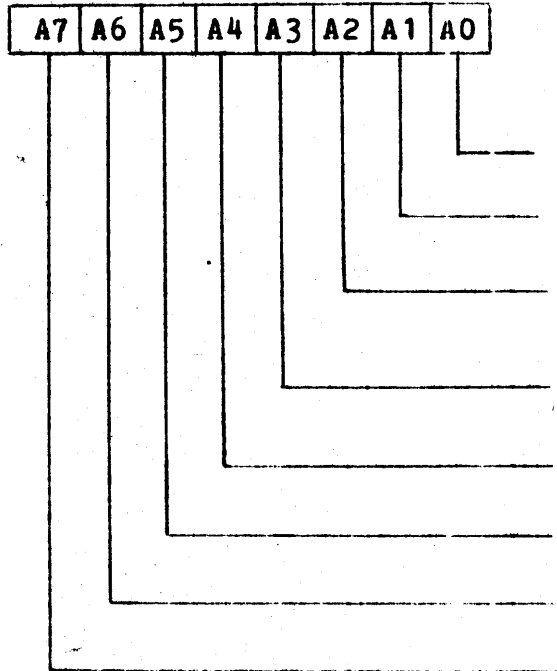
### 3.10 Maintenance Intervals

The tape transport should be cleaned after every eight hours of tape motion. The operator maintenance kit (2200-304) consists of head cleaner, non-linting cloth, cotton swabs and isopropyl alcohol.

#### **\*\*Clean Capstans\*\***

The black rubber capstan must be cleaned with alcohol or soap and water (never use head cleaner) every day to insure accurate tape movement.

3.11 DESCRIPTION OF STATUS BITS



DECK READY

PARITY ERROR

READ READY (BUFFER  
FULL-WRITE MODE)

WRITE READY (BUFFER  
FULL-READ MODE)

BOT DETECTED

FILE MARK DETECTED

DECK IN SERVICE

EOT DETECTED

A0 Deck Ready

Deck Ready will be set true if the tape controller is ready to accept another command. Deck Ready True is a function of Deck in Service and no command in progress (including Buffer Empty). If it is desired to terminate a Write Record command or empty the buffer without reading all the data during a Read Record, the Clear Buffer Command can be issued while this bit is false. Deck Ready will be set false within 3 microseconds after execution of an EX COM1. If a rewind, backspace block, or backspace filemark command is issued when the tape is at BOT or if a write block, write filemark or erase command is issued and a write enable ring is not installed, Deck Ready will return true within 10 microseconds after execution of the EX COM1 instruction.

A1 Parity Error

This bit indicates that a parity error was detected in the Vertical, Longitudinal or Cyclic Parity checks. Once set, this bit will remain true until a new command is issued. In the write mode, this bit reflects that an error was detected during write echo check. (A record written with a write echo parity error may be read and have no parity error detected because read mode has a lower sensitivity to errors on tape. This enables reading aged tapes with degredated data.)

A2 Read Ready(Buffer Full-Write Mode)

Read Ready indicates that the controller buffer contains one or more characters which may be read into the 2200. In the write mode, the Read Ready status bit is used to indicate Buffer Full (the buffer will store a maximum of 1057 bytes).

A3 Write Ready(Buffer Full-Read Mode)

Write Ready indicates that the controller buffer will accept one or more characters to be written onto tape commencing with a COM 2 command. In the read mode, the Write Ready status bit is used to indicate Buffer filled or possibly overflowed (lost data). (The buffer will store a maximum of 1057 bytes.)

A4 BOT

BOT (beginning of tape) indicates the transport is at the beginning of tape and will accept forward commands only. (Reverse motion of the tape for unloading must be enacted by placing the transport in local mode - by pressing the reset switch on the transport - and operating transport local controls.)

A5 File Mark Detected

This bit indicates that a file mark has been detected by the controller.

A6 Deck In Service

This bit indicates that the tape is loaded, no transport interlocks are tripped and that the transport is capable of executing a command when Deck Ready is true. (Deck Ready is a function of Deck in Service; the Deck Ready bit cannot be true if the Deck In Service bit is not true.)

A7 EOT

EOT indicates that the end of tape mark has been detected by the deck. This bit will be set when EOT is detected and reset when a new command is issued to the deck. The deck will continue to the physical end of the tape if allowed.

### 3.12 DESCRIPTION OF COM 1 COMMAND

The commands listed and described below will be executed by the transport when the A-Register is loaded with the prescribed coding and an EX COM1 is executed. The condition of bits A4 through A7 is ignored by the controller. One and only one of the commands can be executed at a time. After receiving one of the commands, the transport will ignore any COM1 command until the current command has been executed and the Deck Ready status bit has been set. Termination of certain commands prior to completion can be accomplished by issuing a EX COM3 (Clear Buffer).

<u>OCTAL CODE</u>	<u>BITS SET</u>				<u>COMMAND NAME</u>
	A3	A2	A1	A0	
000	0	0	0	0	Write Record
001	0	0	0	1	Write File Mark
002	0	0	1	0	Erase 3-1/2" of tape
003	0	0	1	1	Read Record
004	0	1	0	0	Advance Record
005	0	1	0	1	Advance File Mark
006	0	1	1	0	Backspace Record
007	0	1	1	1	Backspace File Mark
010	1	0	0	0	Rewind

000 Write Record

This causes the Deck Ready status bit to go false and the Write Ready bit to go true. (If the Write Enable Ring is not on the Tape file reel, Deck Ready will return true within 10 microseconds and Write Ready will not come True.) Data can now be loaded into the speed buffer by execution of EX WRITE instructions while each data byte is resident in the A-register. Tape motion is started and the contents of the buffer will be written on tape commencing with the issuing of an EX COM2. (COM2 signifies to the controller the end of the data record to be written). Write Ready will go false when COM2 is issued. Deck Ready will come true when the record has been written on tape and tape motion has ceased. Maximum record length is 1057. A minimum record length of 18 characters is required for IBM compatible tapes.

001 Write File Mark

This causes a File Mark to be written on tape. Deck Ready will go false and will return true after the File Mark is written. File Mark Detected (status bit A5) will also come true due to the write echo. IBM compatible tapes normally have only one File Mark at the end of the usable data records. Tape to be used exclusively on the 2200/TAPE system may have any number of File Markers at desired positions on the tape.

002 Erase 3-1/2 inches of tape. Erasures of up to 25 feet in length are regarded as IRG during read or position operations.

\*003 Read Record

This will cause the next record of data on tape to be read into the speed buffer. Read Ready status will come true when the first data byte reaches the buffer output holding register. Deck Ready will return true when the buffer is empty and tape motion has ceased.

\*004 Advance Record

This will cause the deck to skip over the next data record or filemark on tape (no data will be stored in the buffer).

\*005 Advance File Mark

This will cause the deck to advance over the next file mark located on tape. If there is data on tape with no IRG over approximately 25 feet in length and if no File Mark is written on tape, the transport will continue to the physical end of tape.

\*006 Backspace Record

This causes the deck to backspace to the beginning of the next data record or File Mark encountered in reverse direction. If no records or File Marks exist behind the starting position on tape, the transport will backspace to the BOT.

\*007 Backspace File Mark

This will cause the deck to backspace to the next file mark written on tape. If there are no File Marks and no IRG's in excess of 25 feet, the transport will backspace to the BOT.

010 Rewind

This causes the deck to rewind to the BOT. Once the transport is stopped the Deck Ready and BOT status bits will come true.

- \* If there are no Records and no File Marks within 25 feet of the location on tape from which a Read, Advance Record, Advance File Mark, Backspace Record or Backspace File Mark command is issued, the transport will stop at the end of a 25 foot section of blank tape and Deck Ready status will come true.

### 3.13 Description Of Command Pulse Functions

In addition to the nine EX COM1 words used to control the tape transport, there are 8 External Command strobes which control the interface electronics. The controller must be addressed for command strobes 2 through 8 listed below to produce the described actions. The controller is normally wired to respond to address 0264 octal. However, the address may be changed in the field.

- 1) Address Command (EX ADR) -- addresses the transport controller and causes the device status to be placed on the 2200 I/O input lines, if and only if the address of the controller is present on the output of the 2200 I/O channel at the time the Address strobe is given. The controller will become unaddressed when any other device is addressed.
- 2) Sense Status Command (EX STATUS) -- causes the controller status to be placed on the A Register data inputs to the 2200. When the controller is addressed, status is automatically presented to the 2200 until a Sense Data Command is issued or the controller becomes unaddressed.
- 3) Sense Data Command (EX DATA) -- causes the contents of the controller buffer output holding register to be placed on the A Register data inputs to the 2200.
- 4) Write Strobe (EX WRITE) -- will cause the character presently residing in the A-Register to be written into the tape speed buffer.
- 5) Command 1 (EX COM1) -- causes the transport to execute the command word presently specified by the data output lines of the 2200 I/O channel. These are the 9 commands described previously.
- 6) Command 2 (EX COM2) -- causes the contents of the speed buffer to be written on tape during a Write Record Command execution.



- 7) Command 3 (EX COM3) -- Clear Buffer - The speed buffer and the output holding register will be cleared upon receipt of this command. If the tape were in motion when the command was executed, the Deck Ready status bit will come true when tape motion stops, otherwise Deck Ready will come true as soon as the buffer is empty. This command may be issued during a Read Record or Write Record command execution. If no command is in progress, COM3 generates a master reset to the tape controller.

During a Read Record command execution, it is sometimes desirable to read only the first few characters when doing a file search operation and then issue a COM3 to clear the buffer without the 2200 reading the remainder of the record. In some instances, a Read Record Command is issued when the next record on tape is a File Mark in which case in the File Mark character will be loaded into the buffer, and the File Mark Detected and Read Ready status bits will be set true and Deck Ready will remain false. For Deck Ready to come true, either a COM3 (Clear Buffer) or Sense Data Command followed by an input command strobe must be executed to empty the buffer and return Deck Ready Status true.

If, when executing a Write Record command, it is desired to terminate the command before the data in the buffer has been written on tape (before COM2 has been issued), issuing a COM3 will clear the buffer of data and Deck Ready Status will return true. A COM3 should not be issued after tape motion has been started by a COM2 and before Deck Ready has returned true because the contents of the record written on tape is indeterminate.

- 8) Input Strobe (INPUT) -- will cause the next character in the tape speed buffer to be placed on the A-Register input data bus where it is read into the 2200. (Input Strobe is not actually an external command but its function is similar with reference to an external device.) The Input Strobe is generated during execution of the internal 2200 instruction INPUT. The Input Strobe indicates to the external device that data on the A Register Input Bus has been sampled and loaded into the A-Register.

#### 4.0 PHYSICAL DESCRIPTION

##### 4.1 2200-300 Console Tape System - 9-Track

The 2200-300 is an office styled console tape system with provisions for mounting a Datapoint 2200 terminal on the table surface and up to two Communications Adaptors on the rear vertical surface. The tape system itself is mounted in a 19 inch equipment rack style tub with front and rear doors. The front door is plexiglass with an aluminum frame hinged from the right-hand side. The console is painted brown with cast aluminum legs painted brown on the vertical side surfaces. Figure 4.1 shows complete dimensions.

##### 4.2 2200-301 Free Standing Tape System - 9-Track

The 9-track tape memory system is available in a table height cabinet styled to complement an existing tape, printer or disk system console. The 2200-301 contains the same functional features as the 2200-300 except that there is no provision for mounting a Datapoint 2200 terminal or communications adaptors. Figure 4.2 shows complete dimensions.

#### 5.0 ENVIRONMENTAL REQUIREMENTS

The 2200-300/301 will operate in an environment between +40 and +90 degrees F and with a humidity between 20% and 80%. It is advisable to maintain as low a temperature and humidity as possible in order to minimize wear on the transport heads.

The transport should be cleaned every eight hours of use. Remove all dust and loose oxide from the tape guides and capstans. The heads and tape guides should be cleaned with the head cleaner solution provided with the system. Frequent cleaning is the most significant factor in obtaining minimum error rates in the overall system operation.

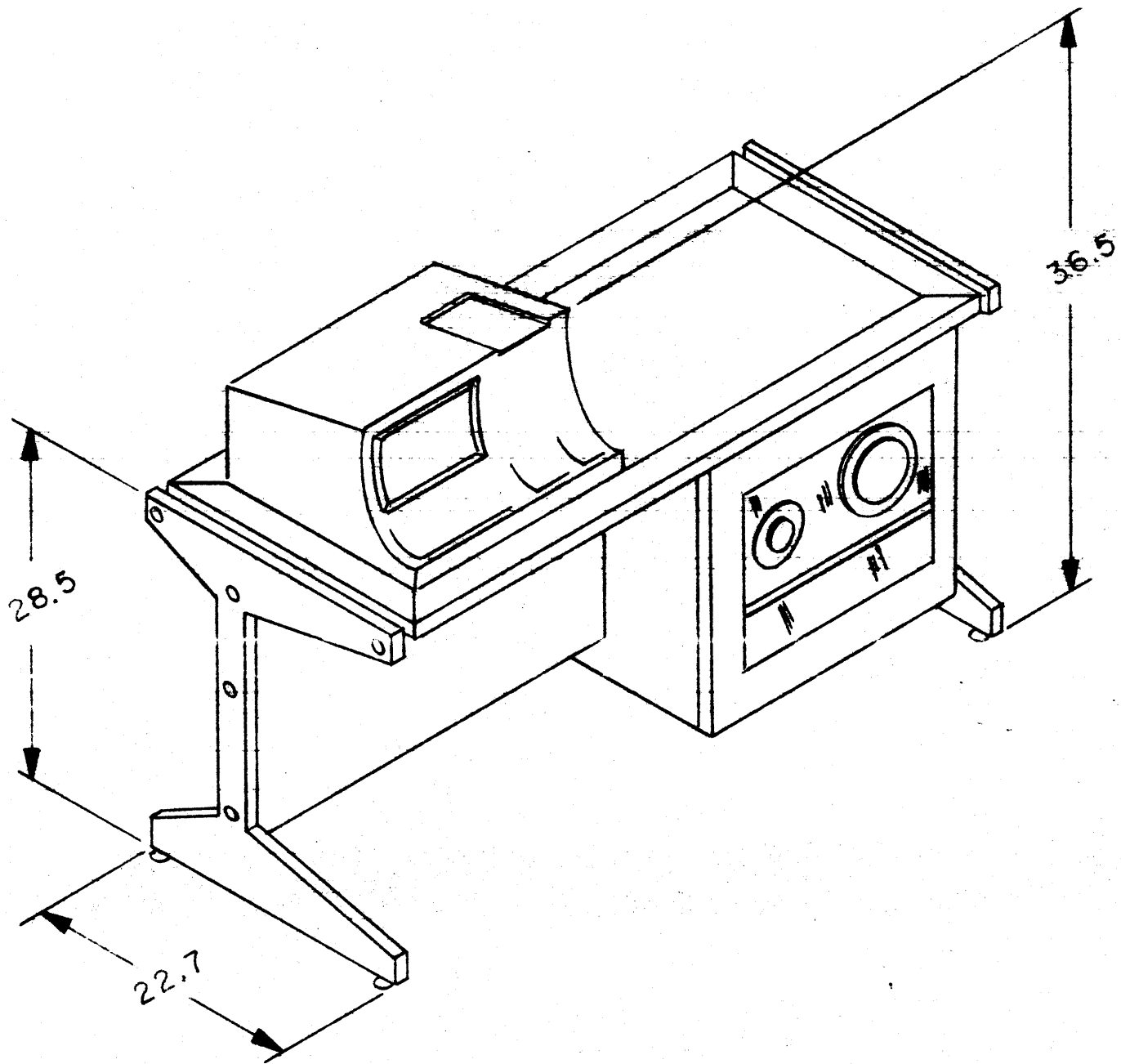


Figure 4.1 CONSOLE TAPE SYSTEM

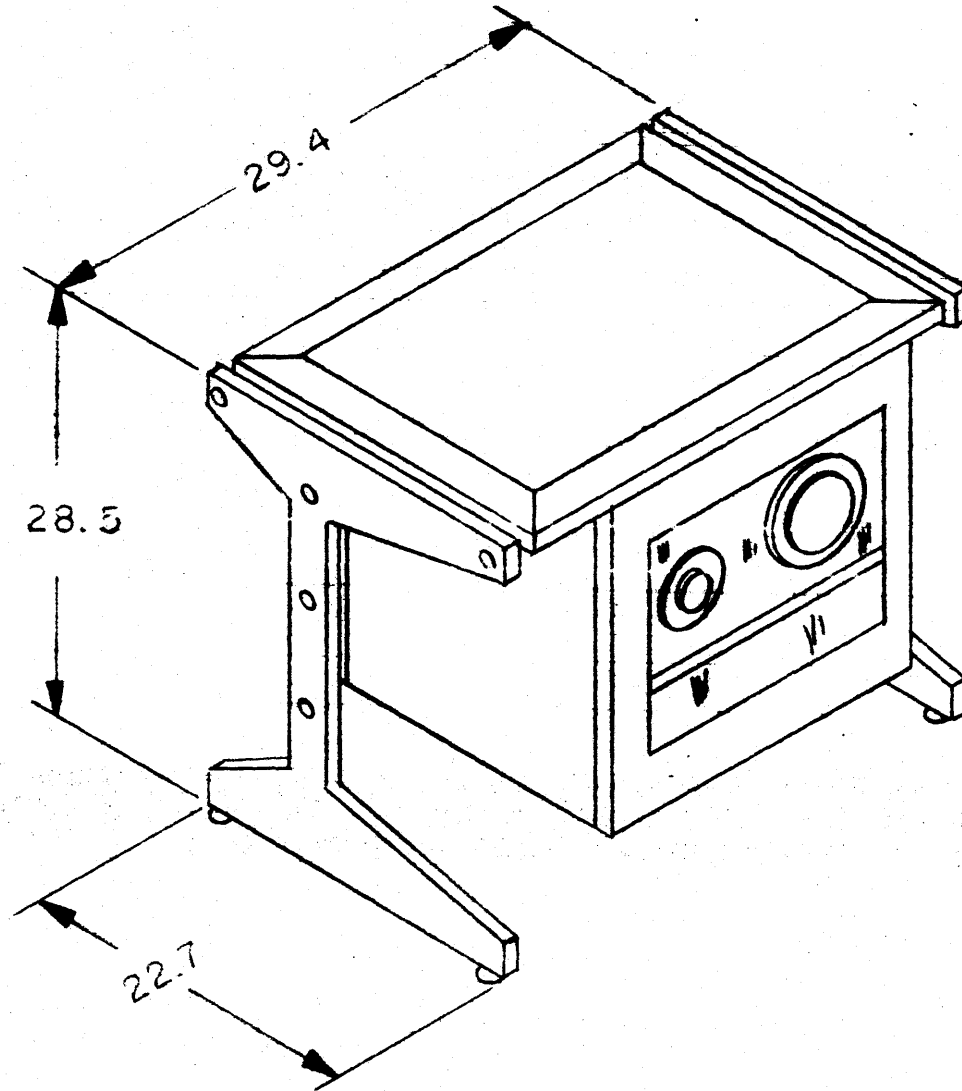


Figure 4.2 FREESTANDING TAPE SYSTEM

## 6.0 INTERFACE REQUIREMENTS

The 2200-300/301 power cord must be plugged into a 115 volt AC wall socket capable of 6 amp service. The tape transport and controller contain power supplies which provide all voltages required from the AC power source.

The controller is connected to the Datapoint 2200 Input/Output system bus with a 2200-164 5 foot I/O cable in the 2200-300 Console system and with a 2200-160 8 foot I/O cable in the 2200-301 Freestanding system.

## 7.0 OPTIONS

### 7.1 230 VAC Operation (2200-305)

The tape transport, controller and fan are wired to operate from 230 volts AC, 50 or 60 Hz. The equipment tub power cord is shipped without a connector. An appropriate 3-prong 230 volt connector must be attached at time of installation.

The power distribution box inside the equipment tub has 5 three-prong 115 VAC sockets wired with 230 volts. CAUTION must be exercised that 115 volt equipment is not plugged into these sockets.

The complete model codes for this option are 2200-300/305 or 2200-301/305.

### 7.2 Controller Address

Factory wired for 0264. See 2200-300 Field Service Maintenance Bulletin for optional address coding (easily changed in field).

## 8.0 SHIPPING PARTS LIST

### 8.1 2200-300

The following items are shipped with each 2200-300:

<u>QUANTITY</u>	<u>ITEM</u>
(1)	TDRIVE Tape (cassette)
(1)	EXRIBM Tape (cassette)
(1)	2200-164 Cable, 2200/ External Device, 5'
(1)	2200-304 Tape Cleaning Kit: (1) can of head cleaner (2) cotton swabs (boxes of 50) (1) non-linting cloth (1) bottle of alcohol
Ref (1)	2200/External Device Cable Cover
(10)	Cable Wraps
(1)	2200-300/301 Product Specification
Ref (4)	Foot
(1)	EXRIBM User's Guide

### 8.2 2200-301

The following items are shipped with each 2200-301:

<u>QUANTITY</u>	<u>ITEM</u>
(1)	TDRIVE Tape (cassette)
(1)	EXRIBM Tape (cassette)
(1)	2200-160 Cable, 2200/ External Device, 8'
(1)	2200-304 Tape Cleaning Kit: (1) can of head cleaner (2) cotton swabs (boxes of 50) (1) non-linting cloth (1) bottle of alcohol
(10)	Cable Wraps
(1)	2200-300/301 Product Specification
Ref (4)	Foot
(1)	EXRIBM User's Guide