

“DATASPEED”\* PRINTER

RECEIVE-ONLY STATION

GENERAL DESCRIPTION AND OPERATION

	CONTENTS	PAGE
1.	GENERAL . . . . .	1
2.	COMPONENTS . . . . .	8
3.	PHYSICAL CHARACTERISTICS . . . . .	16
4.	OPERATION . . . . .	18
1.	GENERAL	

1.01 This section provides the general description and operational information for the “DATASPEED” Printer Receive-Only Station. It is being reissued to incorporate recent engineering changes and technical comments not previously presented. Since Issue 1 was presented in limited quantity, this is the first general distribution of this section.

1.02 This is a high-speed, nonimpact type of recorder that directs ink droplets (character-by-character) to form its page output. The incoming intelligence may be received from the data set in the form of ASCII or Baudot codes.

1.03 The receive-only printer (Figures 1 and 5) is intended for “DATASPEED” service with serial operation (Type 2 “DATASPEED” equipment), or parallel operation (Type 5 “DATASPEED” equipment). The initial offering (Figure 2) is used with a 202C data set (serial) or 804A (parallel) data auxiliary set and a 402D data set to provide a receive-only “DATASPEED” printer station. Should the 402D data set be used, it will be necessary to locate it outside the cabinet. The eight station arrangements for “DATASPEED” service (four each for Type 2 and Type 5) are shown in Figure 5. Certain facilities such as discrete calling, which provides unattended service, and the paper winder may be added.

1.04 The printer operates at a speed of up to 1200 words per minute by electrostatically tracing characters with charged droplets of ink. These droplets are drawn, by means of a large voltage differential, out of a series of

nozzles which each trace two characters. The nozzles are held at -1900 volts dc and the platen is held at +10,000 volts dc. Control electrodes, located between the nozzles and the platen, deflect the ink droplets in the horizontal and vertical directions to form each character. Ordinary teletypewriter paper is used for printing. Refer to Section 592-820-110 for further information.

1.05 The basic character forming mechanism consists of a page recorder mechanism (ink tank, nozzles, and deflecting elements) and the paper transport mechanism (high speed, paper stepping mechanism for line feeding) which are located about four feet above the floor and enclosed by a protective cover (Figure 2). These mechanisms are fully dependent upon the associated modules and assemblies contained in the floor-type cabinet that supports the basic equipment. Two cabinet styles provide facilities for the “DATASPEED” or the data set input signal source.

1.06 References made to right or left, front or rear, up or down, apply to the printer set as viewed from the operators position. Instructions for installing a new roll of paper are shown by the diagram located on the rear lid of the recorder and paper transport cover. Note that the interlock system de-energizes the high voltage power supply when either of the cover lids or the cabinet doors is opened. Also, the paper out/paper jam alarm circuit is associated with the interlock string.

1.07 The “DATASPEED” printer is capable of receiving and printing 120 characters per second or 1200 words per minute. It will print up to 63 upper case letters and symbols on an 80 character line using Baudot (5-level) code or ASCII code as the input intelligence. A horizontal spacing of 10 characters per inch and a six line per inch vertical spacing is provided on the 8-1/2 inch paper. The incoming intelligence is received by the interface module in the cabinet and routed to the associated module for conversion to analog signals that vary the charge applied to the valving and deflecting electrodes of the recorder. The resultant charge between the two elements of the horizontal electrodes and the differential between the vertical electrodes cause the ink droplets to move to the appropriate point on the 8 by 10 matrix. The upper case characters and symbol shapes are defined by dots (up to 31) on the matrix with a

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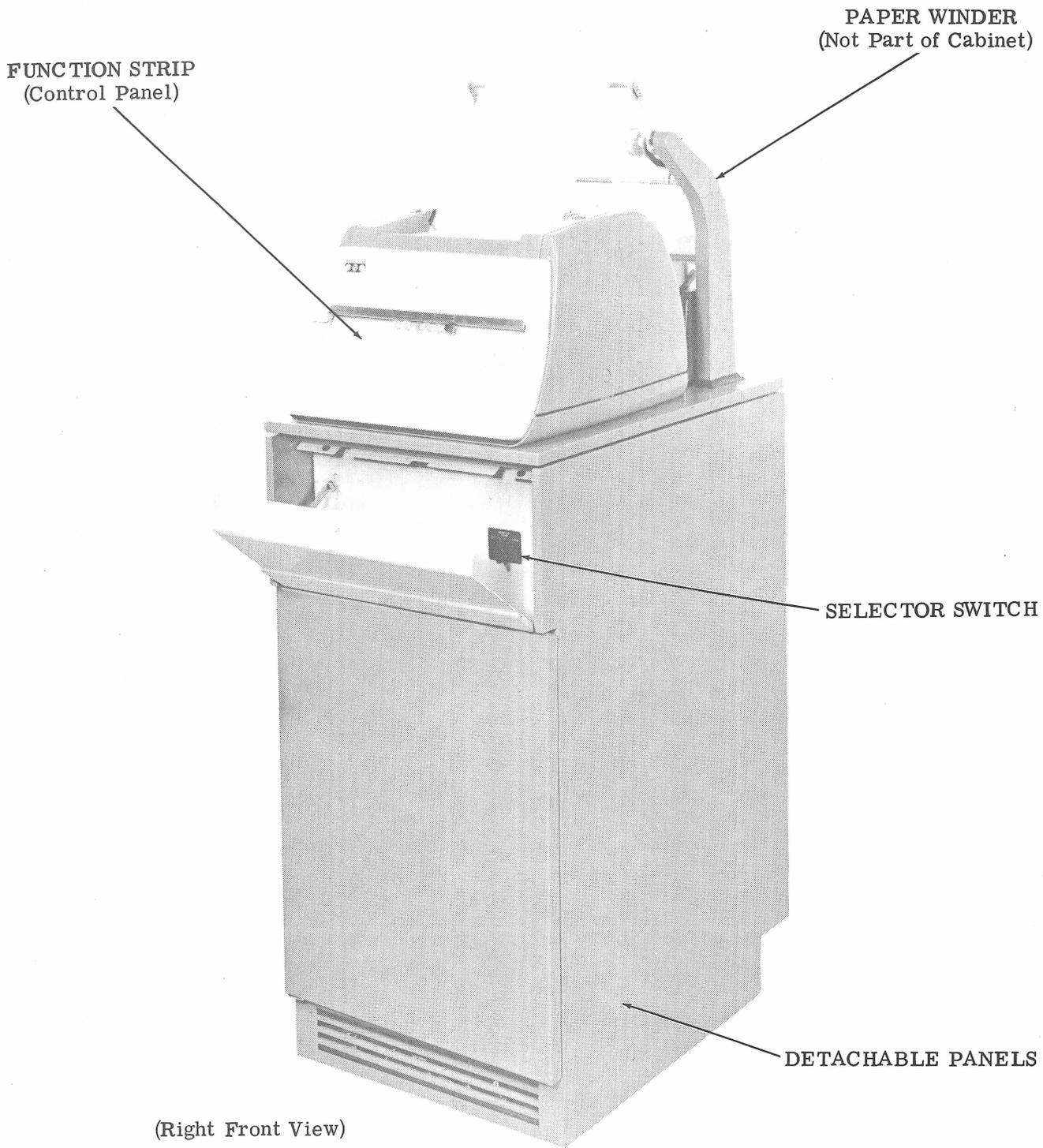


Figure 1 - "DATASPEED" Printer With  
Paper Winder

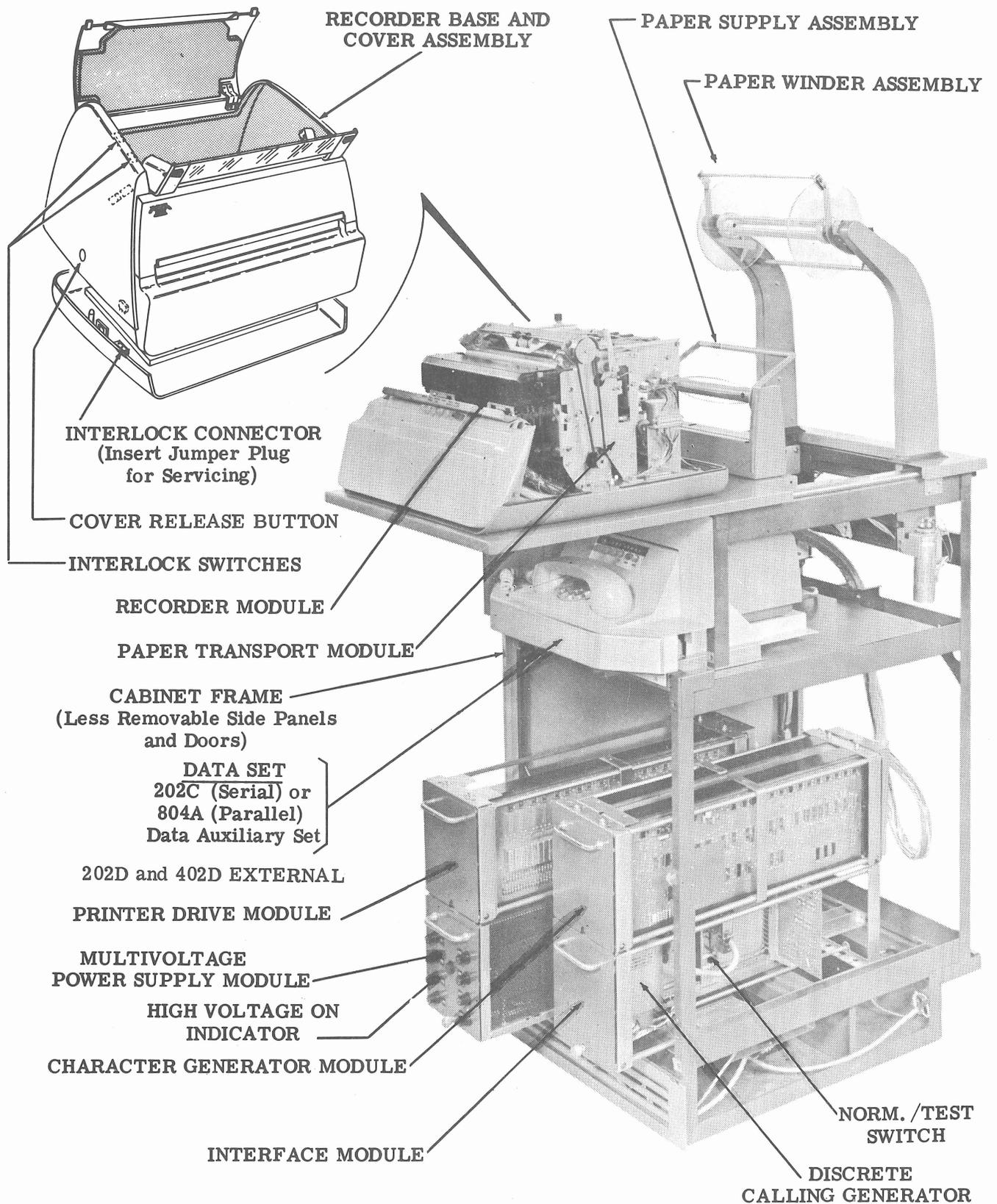


Figure 2 - Basic Recorder With Modular Assemblies

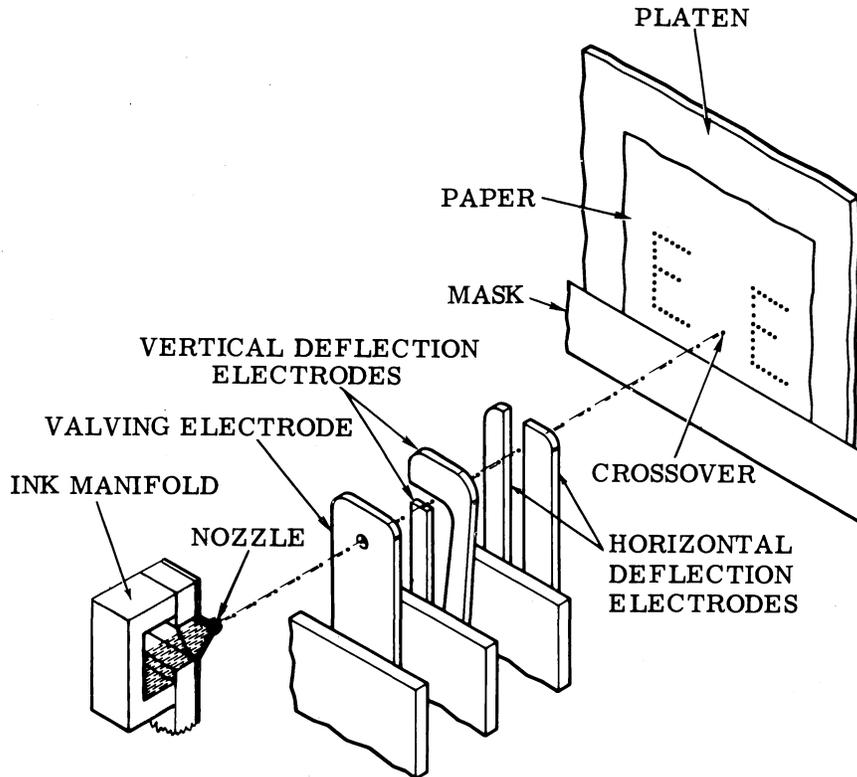


Figure 3 - Ink Manifold, Modulating Electrodes, and Mask Assembly

center-to-center spacing of approximately 0.010 inch. This provides a character size of approximately 0.080 inch by 0.100 inch for the 8 by 10 matrix.

**CAUTION: DE-ENERGIZE SET BEFORE ATTEMPTING ANY INSPECTION OR TEST. ONLY A QUALIFIED CRAFTSMAN SHOULD ATTEMPT TO OVERRIDE THE SAFETY INTERLOCK SYSTEM. AVOID SPILLING INK ON THE UNIT OR COMING INTO CONTACT WITH INK RESIDUE AROUND ELECTRODE ASSEMBLY. THIS INK WILL STAIN THE SKIN OR CLOTHING, AND TRANSFERS EASILY TO OTHER MATERIALS. ALLOW A 15 MINUTE WARM-UP TIME BEFORE INITIATING A PRINTING CYCLE.**

1.08 The only moving part, excluding the paper feed mechanism, is the ink pump that is submerged in the ink reservoir. Thus, the nonimpact type of recorder provides a high speed character forming medium (using conventional paper) that operates with a very low noise level. The one pint ink supply is adequate for approximately 100 rolls of paper, 4-1/2 inches in diameter at 1200 wpm. The recorder mechanism and ink tank assembly encloses the ink reservoir, the submerged pump, the manifold assembly, which is filled by the pump, and the 40 element nozzle and electrode assembly. A thermostat and heater assembly maintains the fluid at a temperature which supports good printing. A long cavity in the manifold is continuously filled

by a small flow of ink from the reservoir with the surplus draining back over the wires to the reservoir. The ink nozzle assemblies (40) are attached to the ink cavity at a level which will maintain a slight hydrostatic pressure upon all of the 40 nozzles. Each valving electrode (Figure 3) is charged sequentially (left-to-right). These components are encased by the tight fitting cover and the package is aligned with the platen on the transport mechanism.

1.09 A positive potential of 550 volts dc is applied to the respective valving electrode to start the ink flowing from the nozzle at the desired character position (column). Each nozzle assembly prints two characters; that is, the ink stream from one nozzle is caused to cross over on the completion of the left character and print the next character on the right. A basic tracing pattern is arranged by the circuit logic in the cabinet for each character (Figures 3, 4, 16, and 17). By returning the ink stream to its approximate starting point no trailing line is present. As the stream of ink passes through the hole in the valving electrode, the stream is broken up into droplets and into segments to form the desired character as directed by the received data. The horizontal and vertical deflecting electrodes, mounted directly to the rear of the valving electrode, direct a drop to a particular matrix point. Figure 3 shows a typical electrode assembly structure. Forty such assemblies are located side by side to form the printing head. The ultimate goal of the ink droplets is to impinge upon the paper that is stepped across

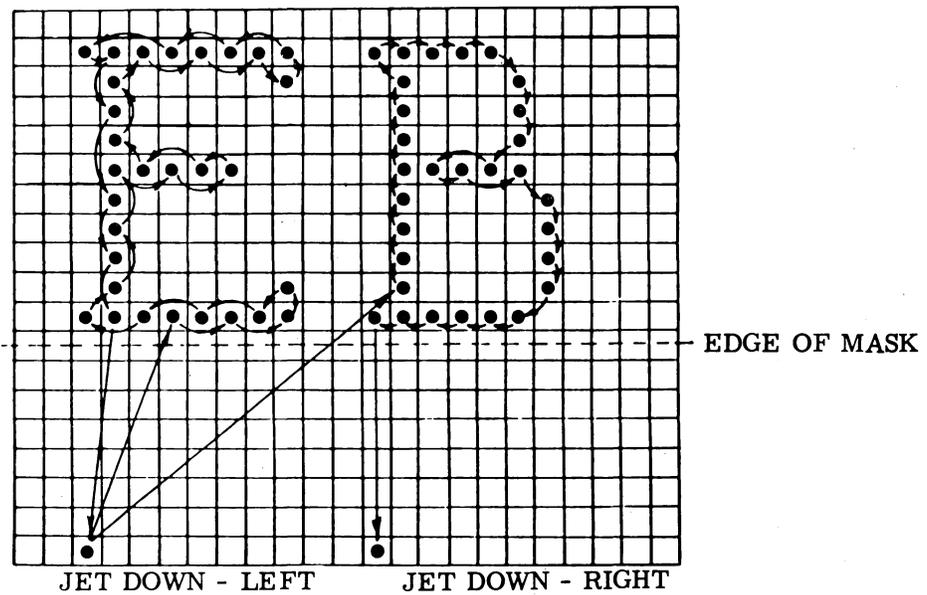


Figure 4 - Basic Tracing Pattern of Typical Electrode Assembly

the platen. The positively charged platen (10,000 v dc) is common to all nozzle assemblies and is attached to the paper transport mechanism.

1.10 The pushbutton control switches located on the function strip of the upper enclosure are interconnected with the modules, interlock and alarm circuits of the supporting cabinet. As mentioned above, the character forming process is dependent upon associated modules and mechanisms for the drive pulses, control voltages, paper input and output regulation, interface circuits, and the 64-element character generator. The circuit logic is housed in four separate modules that are latched together in groups of two. A clamping arrangement secures each group within its slide assembly for shipment. With the clamp released, the modules may be extended toward the front to facilitate servicing. No major controls of the set are enclosed by the cabinet door with the exception of the printer set ON/OFF switch and protective fuses (located on lower ledge) and the multivoltage power supply fuses on the lower left module.

1.11 The printed copy is formed on conventional 8-1/2 inch teletypewriter paper on a single copy basis only. Multiple copies may be reproduced from the received data by a conventional letter copier. Functions for the line-feed and/or carriage return operation require a time interval equal to one character—approximately 8 milliseconds. On the 81st character (printing or spacing), with the exception of carriage return, automatic carriage return/line feed operation is initiated internally. With the automatic feature for carriage return/line feed function in operation, the 81st character received will not print. Furthermore the 82nd character will be distorted at speeds over 500 wpm. The cabinet supports a paper unwinder assembly for a 5-inch

supply roll of paper which travels forward with the recorder and paper transport mechanisms. Space is provided in one of the cabinet styles to house the data sets as follows:

<u>INPUT</u>	<u>DATA SET</u>
Serial	202C or equivalent 202D # or equivalent
Parallel	402D # or equivalent 804A Aux. Set or equivalent

# The 202D and 402D data sets must be mounted outside of the cabinet.

1.12 The nonimpact printer input-output characteristics for the service indicated in Figure 5 are as follows:

#### SERIAL OPERATION

(Type 2 "DATASPEED" Service)

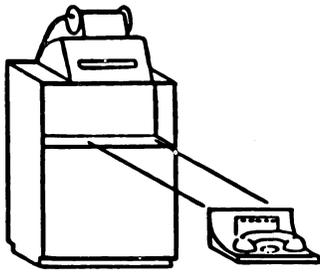
Data Input: 5- to 8-level code 10-unit frame.

Data Rates: 1050, 1200 baud; Limitation-maximum speed 120 characters per second.

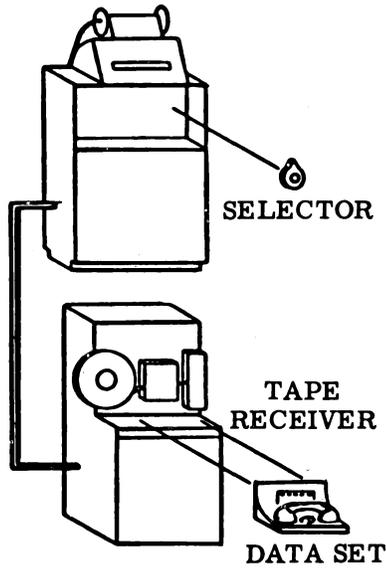
Control Inputs: Data Set Ready, Data Carrier Detect, Clear to Send, Ring Indicator.

Control Outputs: Data Terminal Ready, Supervisory Channel Send, Request to Send.

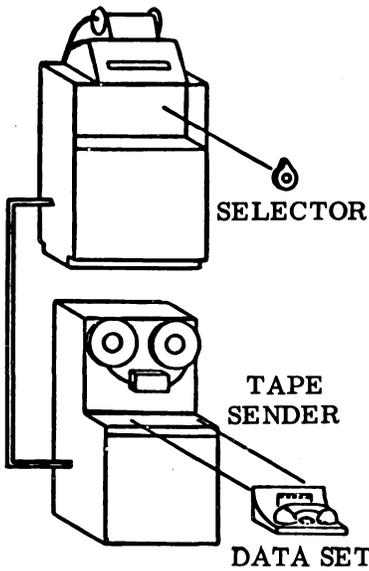
Input and Output Voltages and Impedances: In accordance with EIA-RS232B.



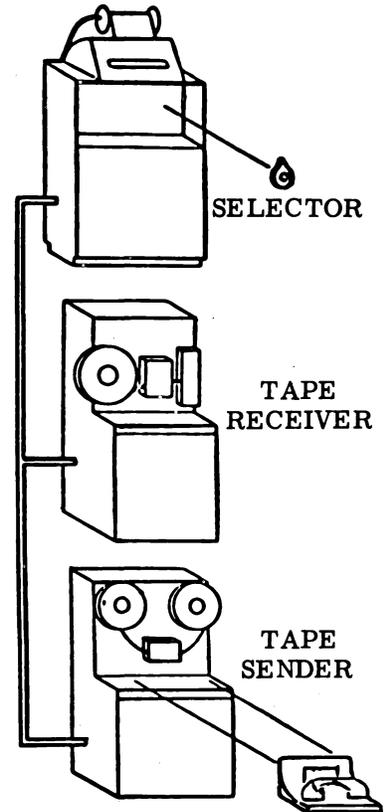
Printer Set With Data Set  
(Series or Parallel)



Printer Set with Tape Receiver

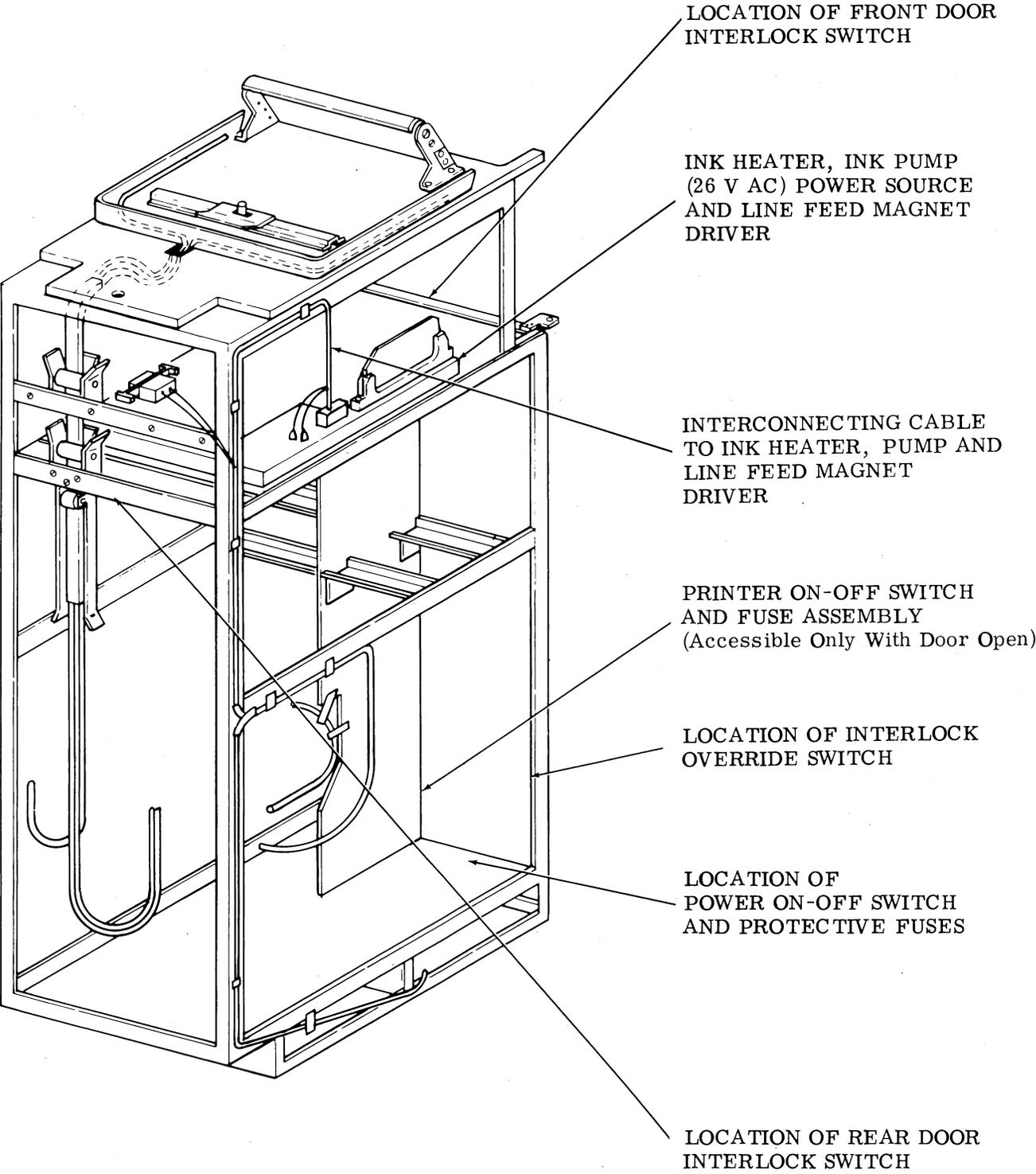


Printer Set With Tape Sender



Printer Set With Tape Sender and Receiver

Figure 5 - Typical Printer Set Applications – Monitoring High Speed Data



LOCATION OF FRONT DOOR INTERLOCK SWITCH

INK HEATER, INK PUMP (26 V AC) POWER SOURCE AND LINE FEED MAGNET DRIVER

INTERCONNECTING CABLE TO INK HEATER, PUMP AND LINE FEED MAGNET DRIVER

PRINTER ON-OFF SWITCH AND FUSE ASSEMBLY (Accessible Only With Door Open)

LOCATION OF INTERLOCK OVERRIDE SWITCH

LOCATION OF POWER ON-OFF SWITCH AND PROTECTIVE FUSES

LOCATION OF REAR DOOR INTERLOCK SWITCH

**PARALLEL OPERATION**

(Type 5 "DATASPEED" Service)

Data Input: Up to 8-level code, and character available.

Data Rate: Up to 75 characters per second.

Control Inputs: Interlock, Carrier ON, Ring Indicator.

Control Outputs: Data Receive, Answer-Back A, Answer-Back B, Reverse Channel Send, Remote Release, Remote Operate.

Input and Output Voltages and Impedances: As required by the 402D data set.

Station Adapters

1.13 The station adapters are electrical and mechanical assemblies used to interconnect the printer with existing tape terminal equipment to form various station arrangements. These adapters include the interconnecting cables, selector switch, and hardware for the station arrangements. These station arrangements are located adjacent to one another.

1.14 There are six station adapters for the existing receive-only application. The adapters interconnect the printer with either Type 2 or Type 5 "DATASPEED" equipment in the following manner: (a) Monitor the Tape

Sender terminal (b) Monitor the Tape Receiver terminal and (c) Monitor the Tape Send/Receive terminal as shown in Figure 5.

1.15 In an arrangement with the receive-only "DATASPEED" printer used in conjunction with Type 2 or 5 "DATASPEED" tape terminal, the entire station is under the control of the "DATASPEED" tape terminal. The printer acts as a "slave unit" to monitor either the outgoing or incoming intelligence. Calls can be initiated and terminated in accordance with the established tape terminal procedures.

2. COMPONENTS

2.01 A station is made up of discrete modular assemblies as shown in the figures that follow. Provisions have been made in the design of the unit to facilitate the addition of other features or modifications that may be needed for future station requirements.

2.02 The cover and base assembly is a two piece metal envelope that tightly encloses the electrostatic ink dispensing mechanism. Note the location of the interlock sensitive switches and the jumper plug arranged to override the safety feature for service only (Figure 2). The major control and operating pushbutton switches are the nonlatching, nonexclusing type and are located on the base assembly. The copyright assembly is located at the rear of the control buttons.

**BREAK LAMP AND PUSHBUTTON:** When pushbutton is depressed, the supervisory channel signal will be interrupted. The lamp will remain on and signal interrupted until pushbutton is released.

**TRANSMITTER LAMP AND PUSHBUTTON:** With pushbutton depressed, discrete calling generator will be activated. Lamp will remain on until generator completes its cycle. With no generator option present, lamp will not light and no action will take place.

**PRINTER ON LAMP AND PUSHBUTTON:** When printer motors and high voltage supply are turned on, this lamp will light. If lamp lights when pushbutton is depressed, all interlocks are closed and paper supply is adequate. If light does not go on check interlocks and paper alarm circuits.

**LOW PAPER ALARM LAMP:** When a low paper condition exists, as monitored by the paper unwinder, this lamp (red) will light.

**PAPER ADVANCE LAMP AND PUSHBUTTON:** Depressing this pushbutton initiates a repetitive line feed action. Paper feed function is set for 16 lines 1 sec. (Max rate-local only). Lamp will remain lit until pushbutton is released.

**READY LAMP AND PUSHBUTTON:** When ready lamp is on, the interlock and alarm string (all interlocks, paper-out alarm and overvoltage circuit) are in their ready state. Printer should then be capable of turning on and receiving messages. Depressing the pushbutton will reset overvoltage monitoring circuits.



Figure 7 - Base with Mountings for Paper Transport and Recorder Mechanism

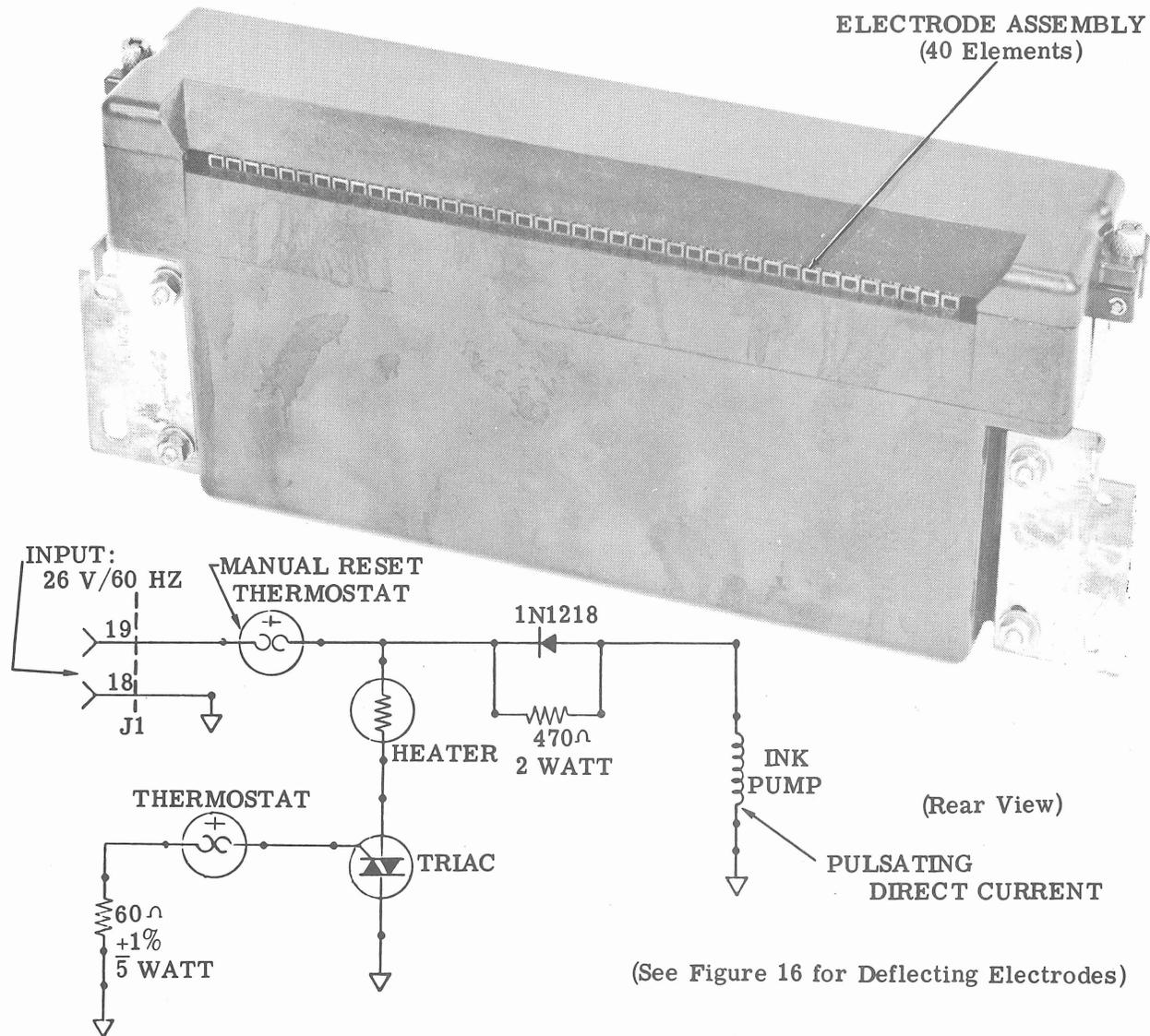


Figure 8 - Recorder Mechanism

**Purpose**

The recorder modular assembly is arranged to be supported and positioned by the front brackets on the paper transport mechanism. The molded container encloses the ink reservoir, ink pump, heater, thermostats, manifold, and deflecting electrode assembly. This is the mechanism for lifting minute quantities of ink from the reservoir, distributing and modulating ink droplets to form an 80 character line.

**Description**

The container and tight fitting cover is approximately 4-1/2 inches high, 10-1/2 inches wide, and 2-1/2 inches deep, and weighs 8 pounds.

**Operation**

The reservoir holds one pint of ink which provides for 1000 to 1500 hours of printing at 1200 wpm. The ink is heated and held at 133 degrees F; the "warm-up" time for a 70 degree F ambient temperature is about 15 minutes. The heater is normally on and the thermostats guard against an overheated condition (see above schematic). Refer to the text for electrode description.

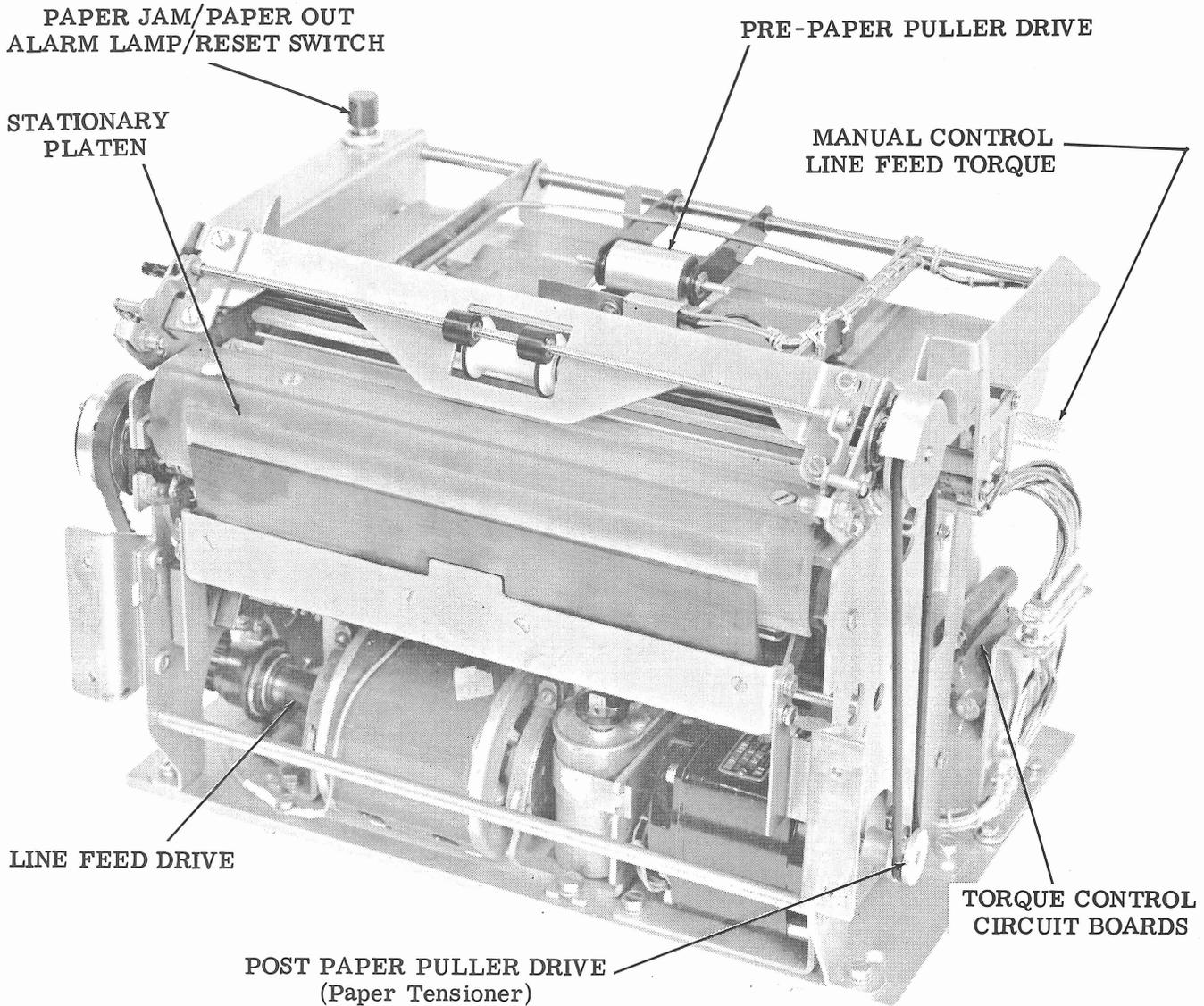


Figure 9 - Paper Transport Mechanism

**Purpose**

The paper transport modular assembly is arranged to support the recorder (character forming mechanism) in line with its platen and to step the 8-1/2 inch teletypewriter paper over the platen. The line feed assembly is an escapement type precise stepping mechanism which positions the paper by increments of 0.167 inch. The unit operates at speeds up to 1200 wpm. Three circuit boards located at the right rear corner of the unit provide automatic control of the paper handling mechanism. Also, the right corner of the unit houses the high voltage supply which furnishes the electrostatic charges for the character forming mechanism. The paper jam/paper out alarm indicates a paper feed jam when it is lit. Depressing the reset switch will reset the paper jam counter circuit.

**Description**

The dimensions of the transport mechanism are approximately 12 inches wide, 9-1/2 inches high, and 8-1/2 inches deep.

**Operation**

Three separate motors provide the torque for (a) pre-paper puller drive roller that strips paper from the supply roll, forms a paper loop that is free of tension, (b) line feed motor and drive roller which advances the paper 6 lines per inch, and (c) the post paper puller motor and drive roller to provide essentially a constant tension upon the paper output during the feeding cycle. Refer to Section 592-820-110 for further description.

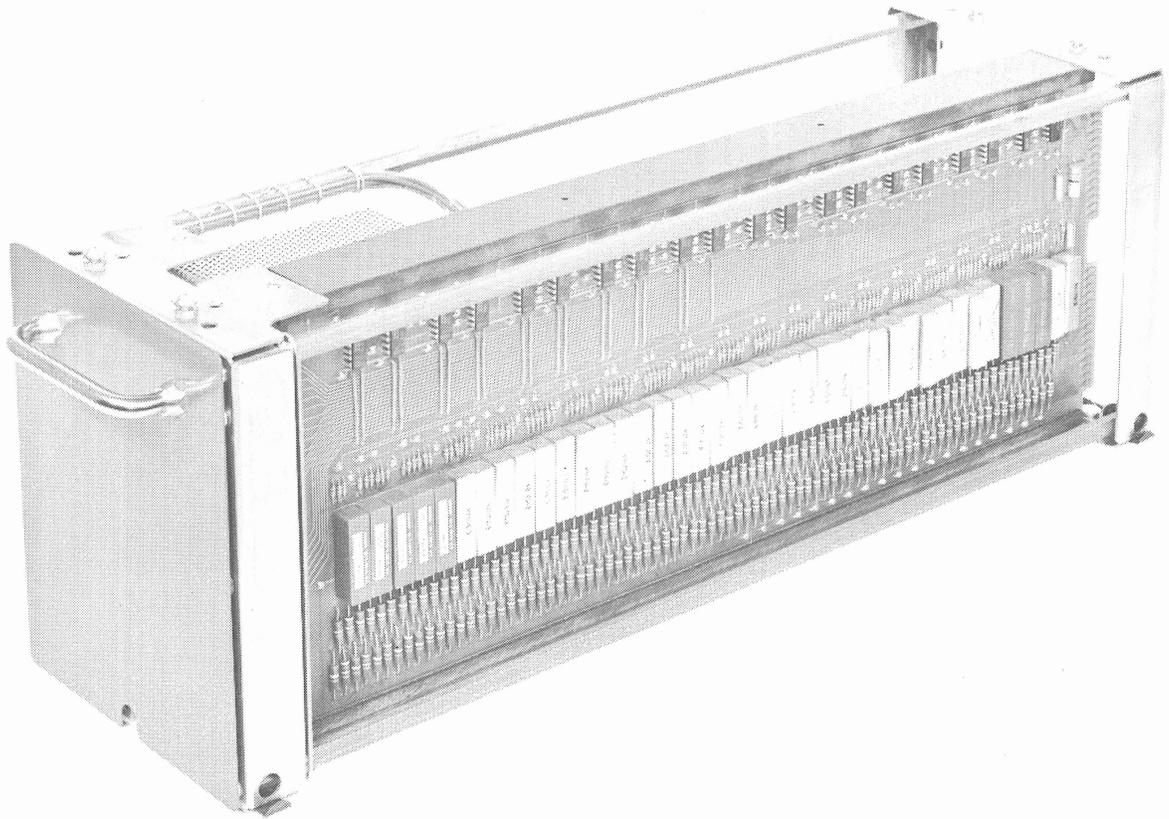


Figure 10 - Printer Drive Module

#### Purpose

This module converts the low voltage digital output signals from the character generator module into high voltage analog signals for the recorder (ink stream deflecting) electrodes. Also, a signal is generated to initiate the paper movement in the transport mechanism. Two circuit boards provide the drive pulses from (0 volt to +6 volt) digital signals: One circuit board consists of 6 high voltage amplifiers the outputs of which trace out the character shape; the second circuit board containing 40 relays and associated switching circuits to select one of forty printing columns (sequentially) across the printed page. The printer will generate a maximum rate of 120 characters per second.

#### Description

The printer drive is housed in a module frame that is approximately 6-1/2 inches wide, 7 inches high, and 19-11/16 inches deep. It weighs approximately 5 pounds. The frame is latched to the top of the power supply module.

#### Operation

The inputs required for the printer drive can be divided into several groups. Eleven signals are required to determine the column in which printing should take place. These signals are the outputs of a three stage binary counter (six signals) and five group signals. There are eleven input signals required for tracing a character shape. There are four inputs of vertical information, three inputs of horizontal information.

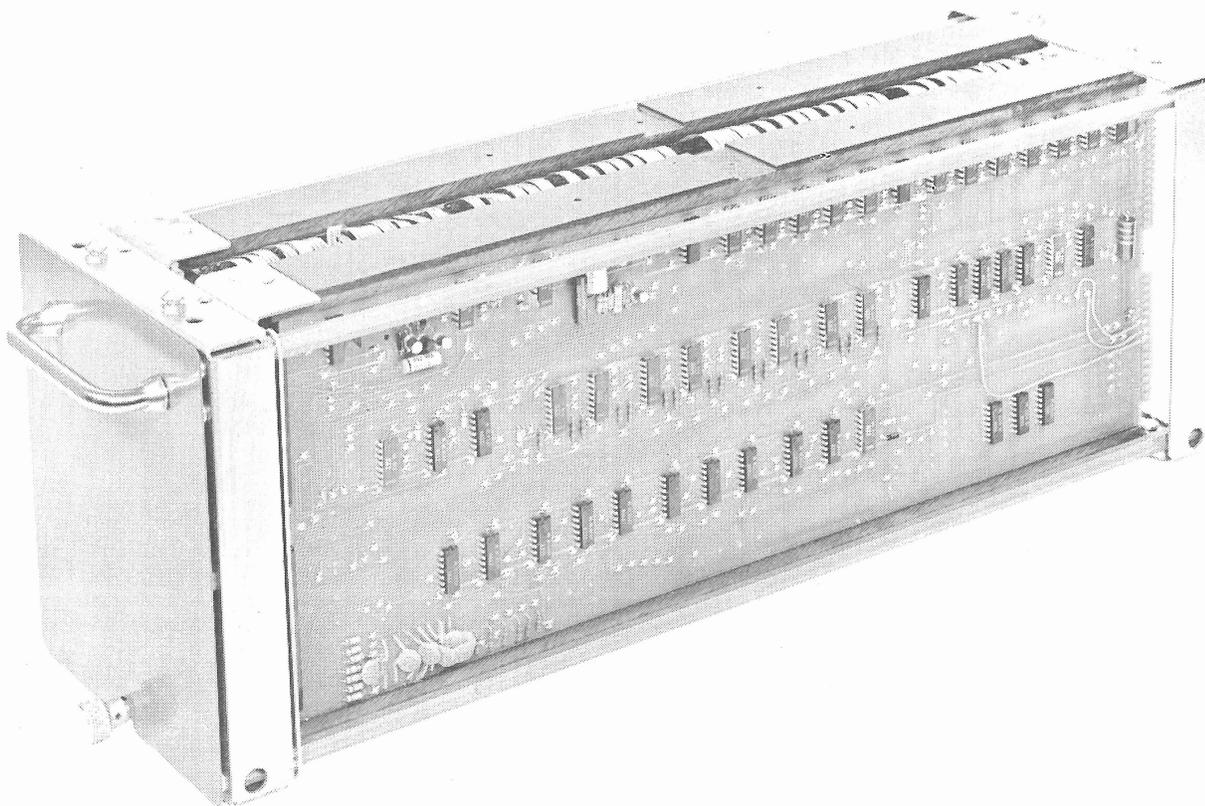


Figure 11 - Character Generator Module

#### Purpose

This module contains the memory and logic system which translates the incoming (intelligence) codes into the appropriate signals and sequences required by the spacing and tracing drive circuits (printer drive module) and the associated circuits of the printer set. These functions are obtained by an electrical and mechanical assembly consisting of a transformer type magnetic core memory, logic circuits, interconnecting wiring, and hardware. The carriage return, line feed and spacing functions are initiated by the module in response to the incoming signals from the interface module.

#### Description

Presently this assembly includes 64 printed wire character sheets, four circuit boards, 112 ferrite U shaped core combinations with each leg (224 total) threading its own transformer winding, three connectors, and hardware. The dimensions of the module are approximately 6-1/2 inches wide, 7 inches high, and 19-11/16 inches deep. the weight is approximately 10 pounds.

#### Operation

Each character shape is stored on a separate printer circuit sheet in the memory assembly which has a capacity for 64 sheets. Characters can be changed by changing the printed sheets. Code changes require the changing of the memory program board and the control board (simple plug-in change for each board). At the present time, the character shape is limited to a shape which can be made up of 31 dots or less in an 8 by 10 matrix.

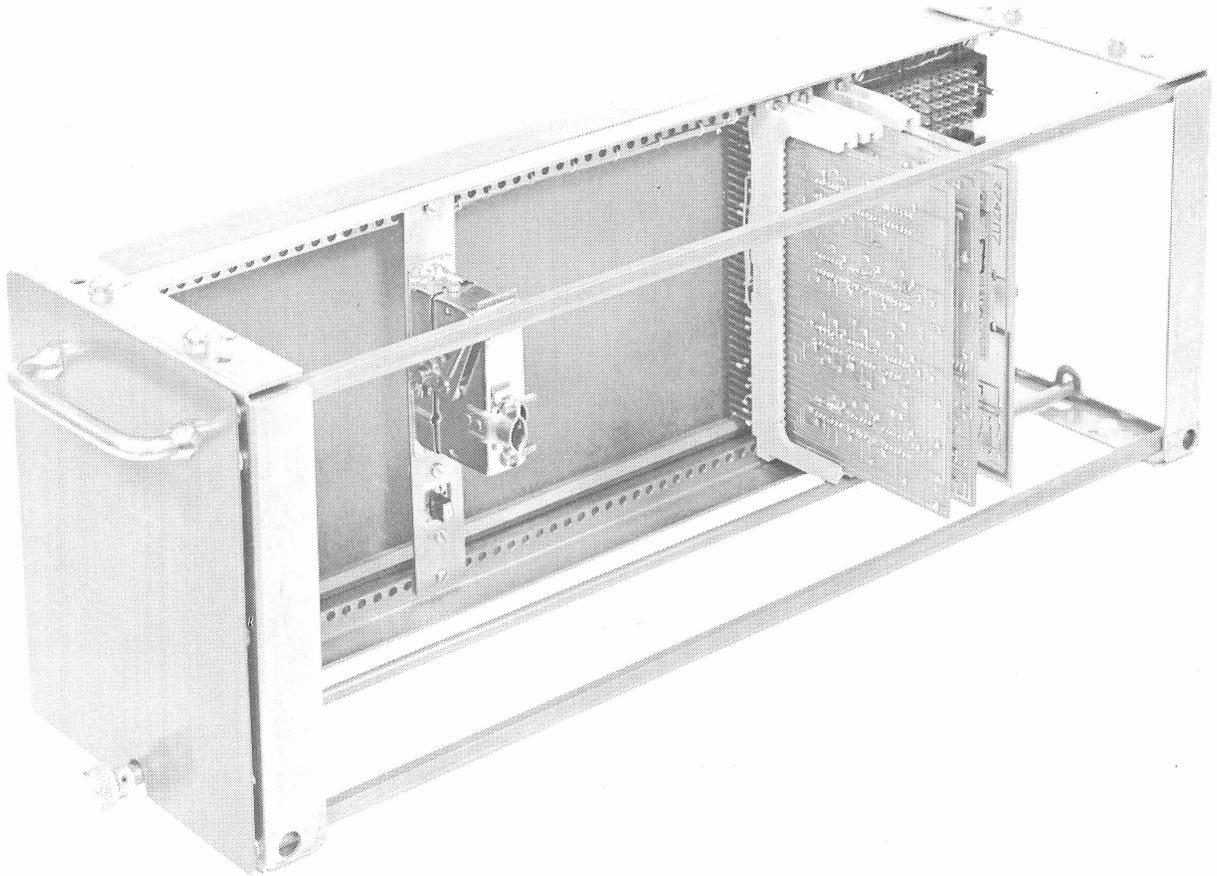


Figure 12 - Interface Module --- Serial or Parallel Input

#### Purpose

This module assembly includes the logic circuitry that converts the incoming data and call control signals into appropriate signals and controls for the printing terminal. Flexibility in providing transmission and communication procedures is available.

#### Description

The dimensions are approximately 6-1/2 inches wide, 7 inches high, and 19-11/16 inches deep, and weighs about 10 pounds. Provision is made for discrete calling or other options.

#### Operation

Either of two modes of operation are available on the initial offering.

- (1) Serial Interface Module Provides necessary station controls and signal conversions to enable a data interchange between a signal source such as 202C or 202D data set and the nonimpact printer. It converts data from a polar serial nonsynchronous form to neutral parallel form.
- (2) Parallel Interface Module Provides station controls and signal conversions to enable a data interchange between a signal source such as a 402D data set or equivalent and nonimpact printer. It converts data signals from parallel contact closures or equivalent to neutral parallel (voltage) form.

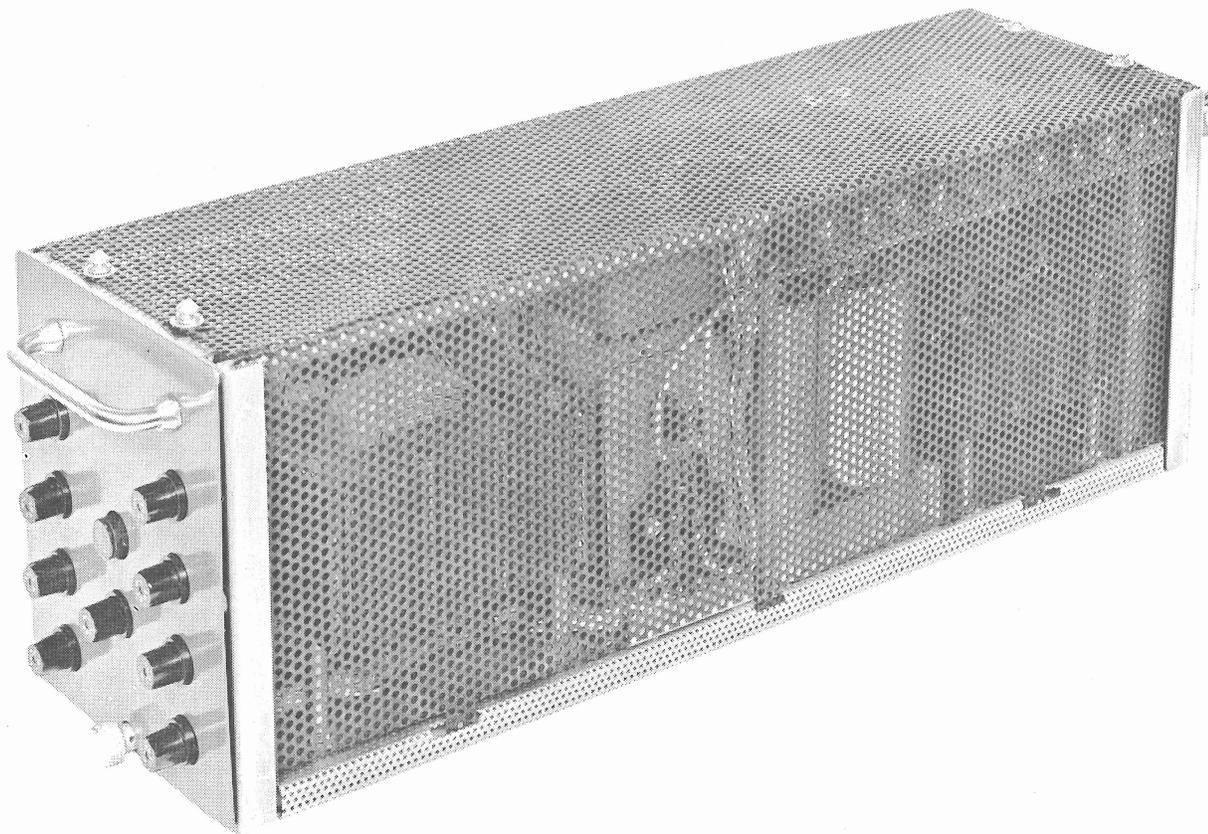


Figure 13 - Multivoltage Power Supply Module

#### Purpose

This module contains low and high voltage components that furnish the regulated multivoltage dc outputs for the various modules and assemblies of the printer set. The low voltage outputs energize the interface, character generator, and printer drive modules; also certain paper transport, recorder and function strip assembly requirements. The high voltage outputs are routed through the printer drive module (+550 volts switched to respective valving electrode (total 40) and +3900 v dc plate supply for 6 high voltage amplifier) to control the ink stream. A regulated ac output is furnished to the electrostatic power supply located in the transport mechanism. Various reference voltages, signal lamp and relay supply voltages are provided by the module. Note that the interlock relays and alarm circuits are housed in this module but interconnected with the cabinet, paper handling, and cover sensitive switches to de-energize certain outputs when a malfunction is detected. Also the plate load resistors (6) for the high voltage amplifiers are contained in the left rear corner.

#### Description

The overall dimensions are approximately 6-1/2 inches wide, 7 inches high, and 14-11/16 inches deep. The weight is approximately 57 pounds. The operating characteristics are as follows:

Input: 117 v ac 10%, 50 1/2 Hz, 6 amps.

Output: +3900 v dc, 5 ma; +550 v dc, 2.6 ma; +120 v dc, 1.0 ma; +30 v dc, 2.5 amps; 6.3 v ac, 2.0 amps; 167 v ac, 0.85 ma; +6 v dc, 3.0 amps; -12 v dc, 1.0 amps; +48 v dc, 1.0 amp; 117 v ac fused, 0.5 amps.

#### Operation

This is a self-regulating ferroresonant transformer and solid state rectifier assembly with regulated dc output. Refer to Section 592-820-111 for further description.

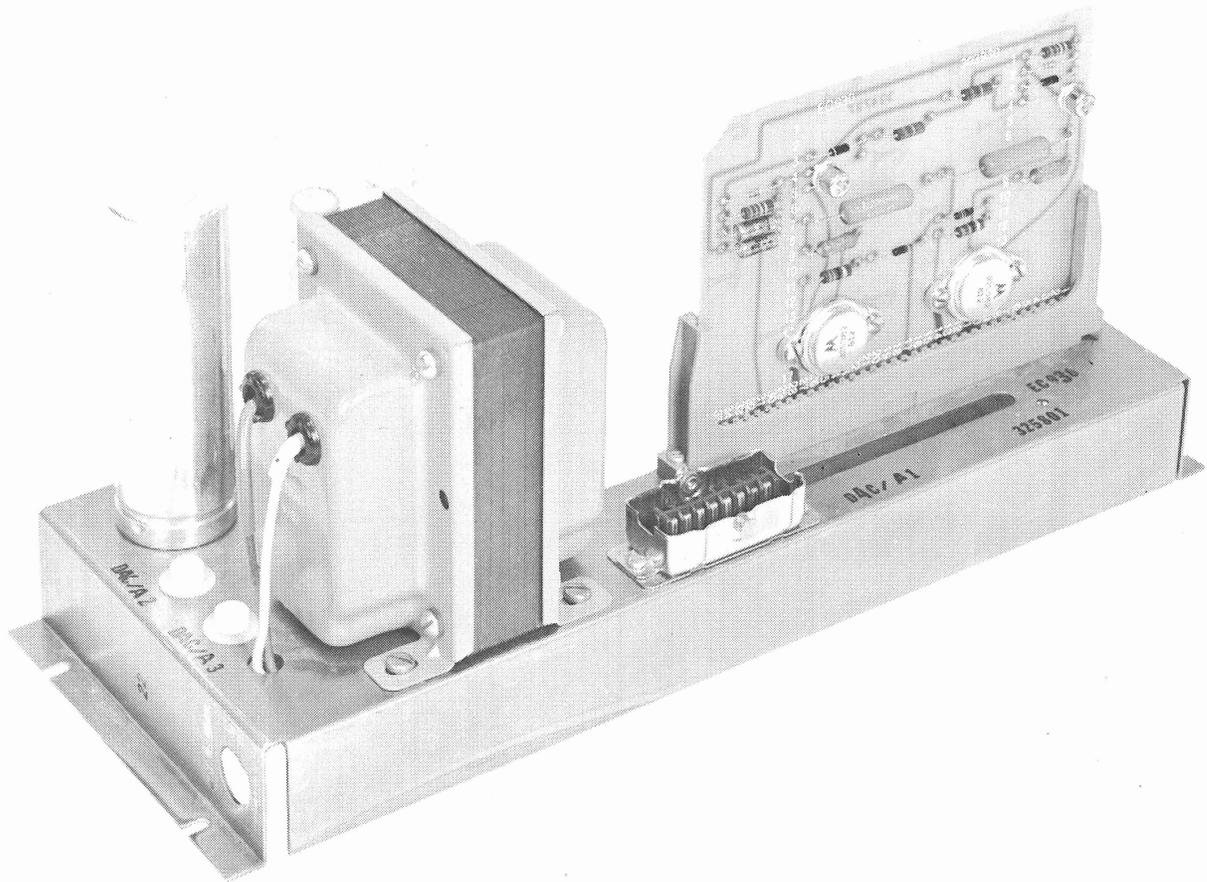


Figure 14 - Ink Heater and Line Feed Bracket Assembly

#### Purpose

This modular bracket assembly provides a dual function:

- (a) It supplies the heater current (26 v ac, 2.5 amps) for the recorder ink heater and the low potential which energizes the ink pump, and
- (b) It contains the paper transport escapement magnet drivers and filter assembly. These components are located at the upper left front corner of the cabinet with the chassis cut out for the data set.

#### Description

The approximate dimensions of the bracket assembly are 5-1/2 inches wide at rear end and 2 inches wide at the front, 6 inches high and 13-1/2 inches deep. Interconnecting cables transfer the energy to the respective character forming and paper transport mechanism.

#### Operation

Referring to the partial wiring diagram (Figure 8) it will be noted that the ink heater and the ink pump (vibrator type) are energized continuously unless the thermostat senses an abnormal condition. The triac is favorably biased to pass current on each positive or negative going alternation, unless the thermostat rises above 133 F. Should a malfunction of the thermostat occur, a second thermostat shuts off the ac input. Since the latter is a manual reset unit, it will be necessary to remove the ink tank cover to service the assembly. Refer to circuit board TP303930 for a description of the magnet drivers.

## 3. PHYSICAL CHARACTERISTICS

## Dimensions

HEIGHT	WIDTH	DEPTH	REMARKS (See Notes)
47-3/4 inches	18 inches	27 inches	Less Paper Winder
55 inches	-	-	With Paper Winder

Note 1: Provide 16-3/8 inch clearance at front for door to open.

Note 2: Allow 13-1/4 inch clearance for top panel to slide forward.

Note 3: Maintain at least 3 inch clearance between back of set and wall — make sure bumper (stand off) screws are in place.

Weight: Approximately 300 pounds.

Electrical:	INPUT	RUNNING CURRENT	IDLE	POWER FACTOR	REMARKS
	117 volts ac +10% 60 $\pm$ 1/2 Hertz	8 Amps	-	-	12 ft, 3-wire (with ground) cable #16 AWG

Temperature:

OPERATING	STORAGE
+40° F to +110° F	-30° F to +110° F

Signal Input:

Interface provisions. Disconnect timer; 15 sec min, 25 sec max. Field option --- programmable; Jumper plug TP325186.

VARIATIONS	CHARACTER LENGTH	BAUD RATE	RD CONT.	SHIFT REGISTER*	DATA SET OR EQUIVALENT	REMARKS
AAA	-	-	-	-	-	Basic
AAB	10 Unit	1050	MC180	D	202C or D	
AAC	10 Unit	1200	MC181	A	202C or D	
AAD	7 Unit	840	MC183	A	202C or D	
AAE	7.42 Unit	890	MC182	A	202C or D	

\*Refer to Section 592-820-200TC for Strapping Information.

Parallel Interface

VARIATIONS	CHARACTER LENGTH	CHARACTER PER SEC	DATA SET OR EQUIVALENT	REMARKS
AAA	-	-	-	Basic
AAB	8	75	402D	

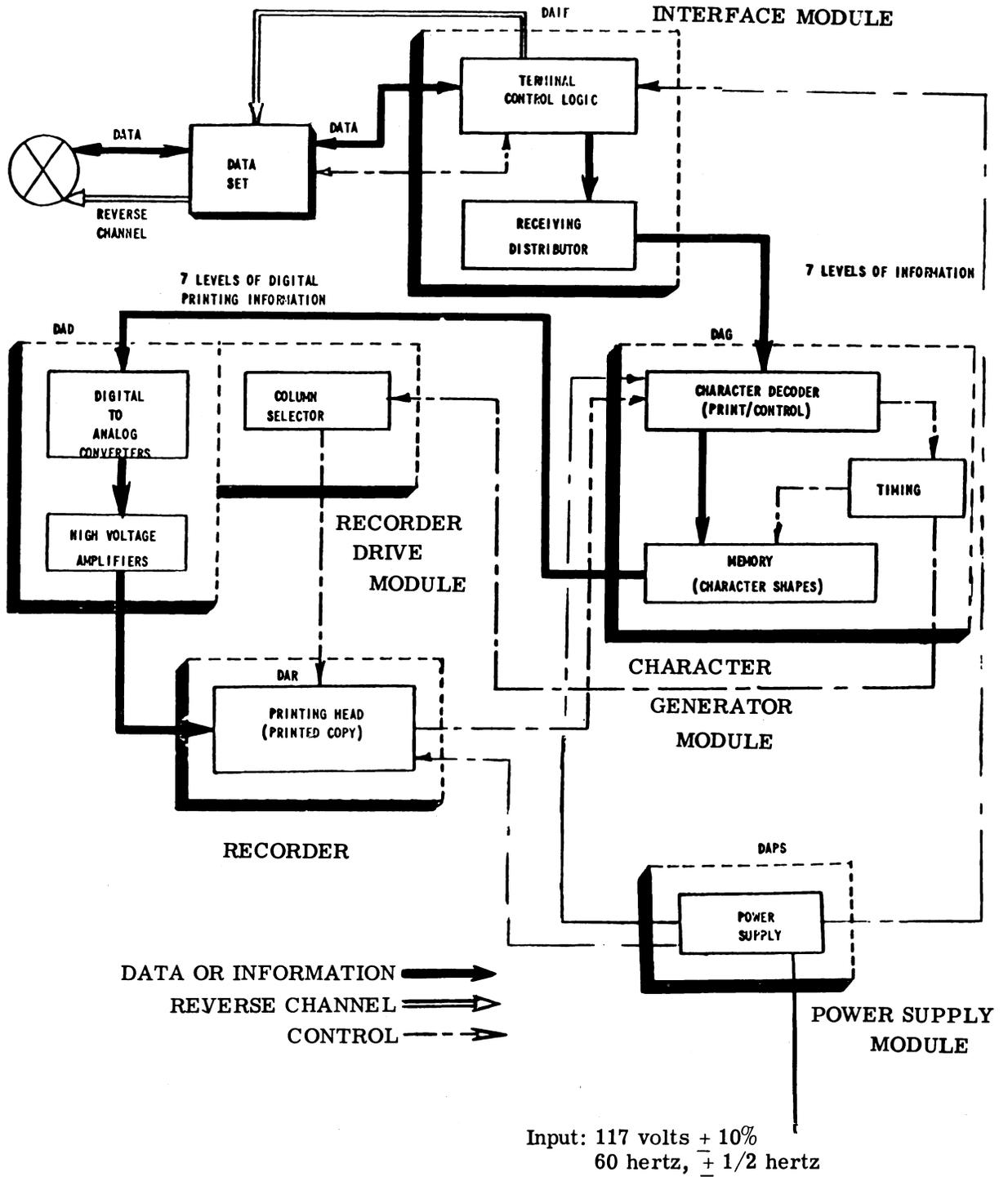


Figure 15 - Block Diagram of Drive and Control Circuits

## 4. OPERATION

4.01 With the receive-only printer set installed and ready for service, the printer ON-OFF switch located in the lower ledge of the cabinet (behind front door) should be in its ON position at all times. It is necessary that all doors and covers be kept fully closed and that the paper is properly threaded through the set in order to complete the interlock and alarm circuit path. With no interruptions in the interlock string, the READY lamp will be illuminated. This signifies the terminal ready status to respond and turn on for printing.

4.02 Manual Operation: A manually controlled call may be either initiated or answered by the printer station in the normal manner for the high speed on-line data equipment. Depressing the DATA key on the data set will turn on the motors, the high voltages, the ON lamp and the supervisory channel. The printer is now ready for operation.

4.03 A Receive-Only Station with Discrete Calling Accessory: A call to an unattended sending station is placed in the usual manner. After completion of the 2025 hertz tone, the printer terminal goes to the DATA mode, the operator waits 5 to 10 seconds and depresses the TRAN START key. The lamp will light and remain lit for several seconds. The data should be printed within 10 seconds after the light is extinguished. If no data is received, the TRAN START button should be depressed again. If several attempts are made and no data is received, it can be assumed that the discrete calling identification code sent by the printer is not valid and the sender is not responding.

4.04 Unattended Operation: To answer calls unattended, the printer READY lamp must be lit and the PAPER ALARM lamp must be extinguished. The data set AUTO key must be depressed. If these conditions exist, all incoming calls will be answered and printing will occur.

4.05 Disconnect Procedures: Calls may be terminated in any of the following ways: (1) The operator can return to the TALK mode and lift and return the handset, (2) the sender can remove carrier from the channel for 5 seconds and the printer will automatically turn off, (3) a printer malfunction condition (open door, abnormal input on high voltage leads, faulty paper feeding, etc, detected by the interlock string) will cause the READY light to turn off. Note that if any of the items listed in this paragraph occur, no further calls will be accepted until the faulty conditions are cleared.

4.06 The printer will automatically turn on after detecting the presence of an ON condition on the DSR lead from the data set, if the READY lamp is lighted and the PAPER ALARM lamp is extinguished. The printer will automatically turn off after 15 seconds of an OFF condition on the DCD lead, or if the DSR turns off.

4.07 With reference to the brief description of the incoming signal as outlined above and a reference to the block diagram shown in Figure 15, the signal path through the three major modules may be reviewed. This will cover the printer drive module, character generator module, and the interface module. The multivoltage power supply, in addition to furnishing the ac and dc voltages for the various modules and assemblies, houses the interlock relays and certain resistors and components of associated modules. Since no direct signal path is involved in the fourth module (Figures 2 and 15), this circuit will not be discussed at this time.

4.08 As mentioned previously, the recorder electrode assembly (printing head) is dependent upon many elevated potentials. The major portion of the output voltages are furnished by the printer drive module. The voltages present at the electrode assembly are as follows:

Nozzle -1900 v dc  
(From the transport power pack)

Valving Electrodes (40 elements)  
0 voltage ( a NO printing condition)  
+550 volts (2 electrodes ON, to print)

Horizontal Deflection Electrodes  
Left Field  
Right Electrode +1360 v to +1920 v  
Left Electrode +2840 v to +2280 v  
Right Field  
Right Electrode +2200 v to +2760 v  
Left Electrode +2000 v to +1440 v

Vertical Deflection Electrodes  
+1100 v to +1600 v (printing condition)  
+800 v lower electrode  
+1880 upper electrode

Mask +5050 v dc  
(From paper transport power pack)

4.09 The printer drive assembly converts the low voltage digital output signals from the character generator into high voltage analog signals for printing characters on a recorder and for moving paper through the paper transport. Two large circuit boards provide the outputs. The spacing drive circuit board contains 40 relays; the tracing drive contains six high voltage amplifiers.

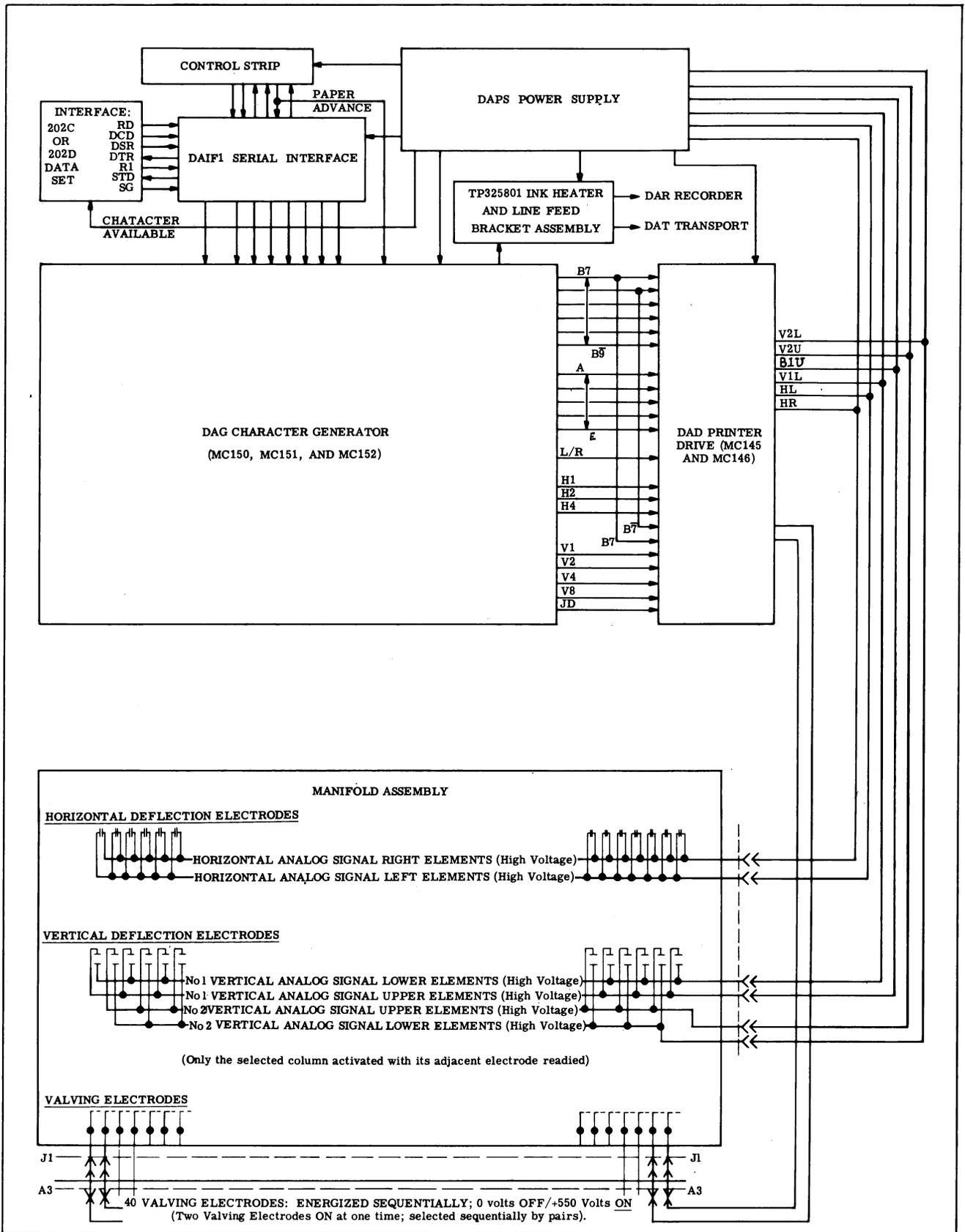


Figure 17 - Block Diagram of Recorder Drive Modules and Deflecting Electrodes

4.10 The circuitry on the spacing drive circuit board converts the binary outputs of the character generator logic for control of the printing position into high voltage signals for the recorder (column selection) valving electrodes. The input and output characteristics of these circuits are given below:

Spacing Drive (Column Selector)

Input Signals:

Five group signals, three binary signals and their complements.

Output Signals:

$5 \times 2^3 = 40$  discrete outputs for the 40 sets of electrodes. 0 v = off, +550 v = on.

4.11 The tracing drive circuitry converts the digital output signals from the memory portion of the character generator into high voltage analog signals required to deflect the ink droplets. The conversion is accomplished through the use of digital to analog converter circuits and precision high voltage amplifier circuits. The input and output characteristics of the tracing drive circuits are given below:

Tracing Drive: (Ink Stream Deflecting)

Input Signals:

Four digital signals for vertical position.  
Three digital signals for horizontal position.  
One digital signal for jet up-down.  
One digital signal for selecting the left or right position in a column.  
One digital signal for selecting the first or second set of vertical amplifiers.

Output Signals:

Two complementary high voltage outputs for horizontal deflection.  
Two sets of complementary high voltage outputs for vertical deflection.

4.12 The character generator is a memory and logic system used to translate incoming codes into the appropriate signals and sequences required by the spacing (column selector) and tracing (ink stream modulating) drive assemblies and other portions of the set. This unit supplies the tracing drive with sequential digital information necessary to control the tracing of the ink in the printing of a character, and the control signals needed by the spacing drive in the positioning of a character on a line. The procedure is as follows: The incoming information (bits) is stored for eight milliseconds while the logic selects and processes a memory subroutine determined by this incoming information. This processing includes the sequential interrogation of the memory and the storing of this information while the tracing drive processes it, and on completion of the printing of this character the relocation to a new printing position.

4.13 The interface module controls both the data terminal (Figure 2) and the signal source in either the attended or unattended mode of operation. It signals the data terminal to turn on its motors and enables data to flow only if the data terminal indicates it is capable of copying data. If the data terminal is not capable of copying the data, the interface, through control signals, will indicate to the signal source that it should not present data to be copied. Refer to Section 592-820-111 for further description of the module circuits and to the installation Section 592-820-200 for information with regard to strapping, bit timer, and pulse length requirements for the respective station.