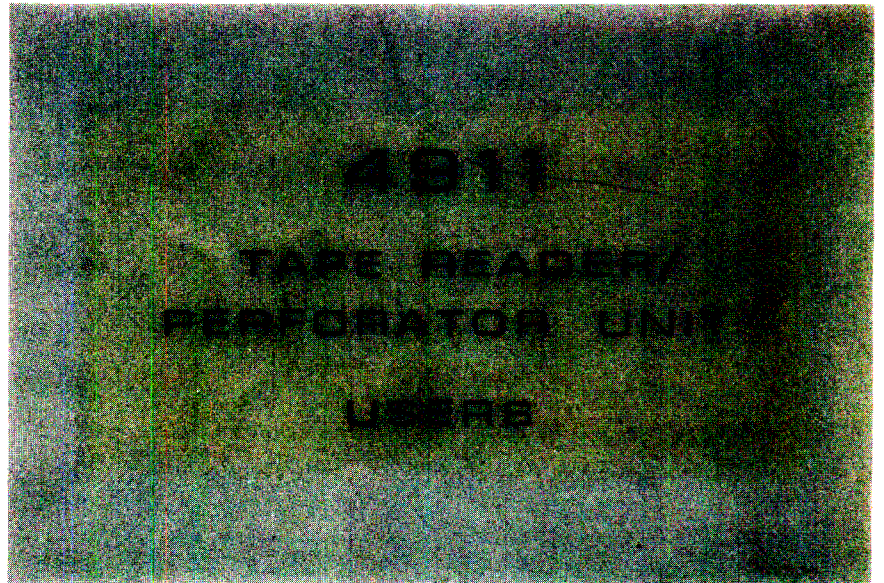


INSTRUCTION MANUAL



Serial Number _____



WARRANTY

All TEKTRONIX instruments are warranted against defective materials and workmanship for one year. Any questions with respect to the warranty should be taken up with your TEKTRONIX Field Engineer or representative.

All requests for repairs and replacement parts should be directed to the TEKTRONIX Field Office representative in your area. This will assure you the latest possible service. Please include the instrument Type Number or Part Number and Serial Number with all requests.

Specifications and prices change privileges reserved.

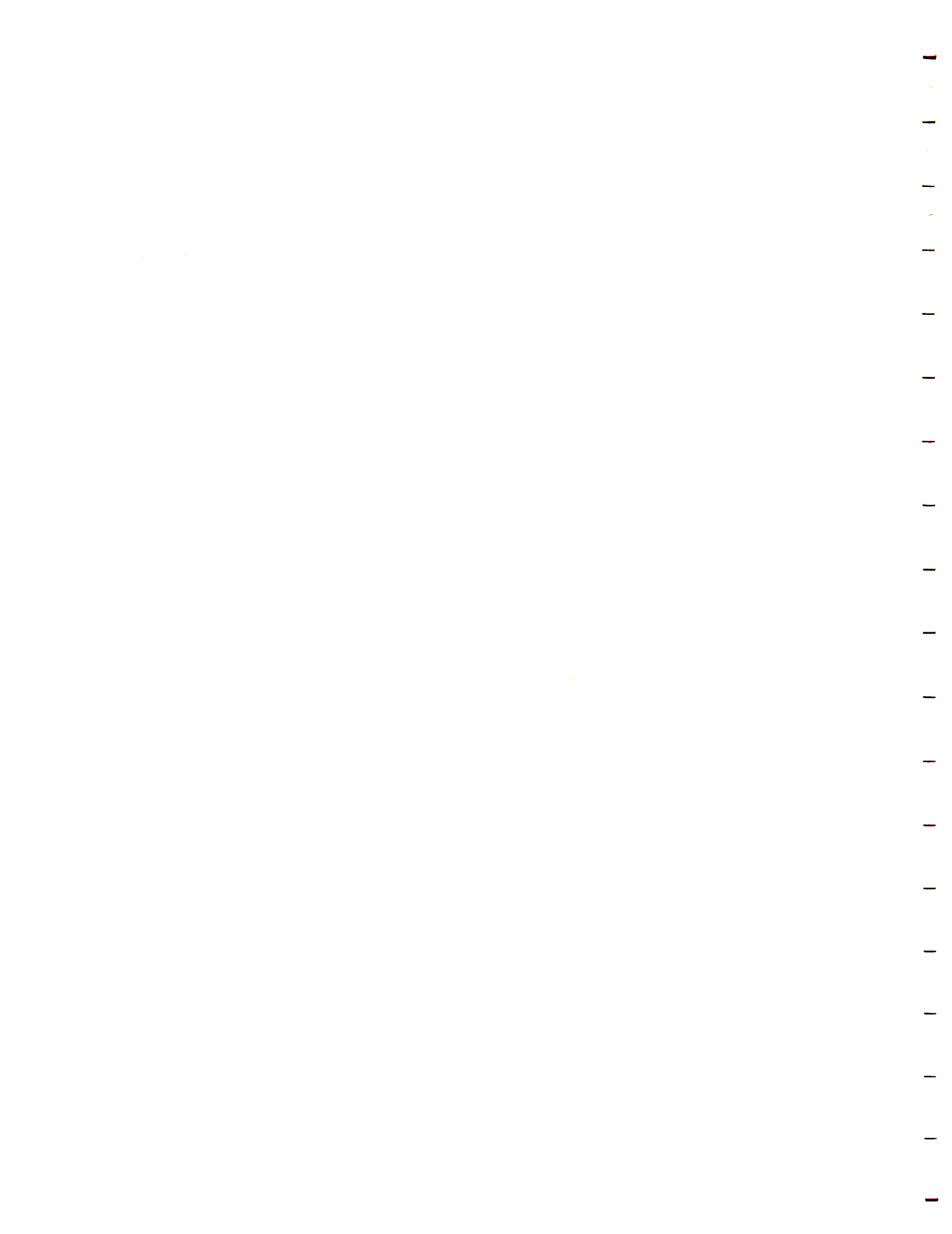
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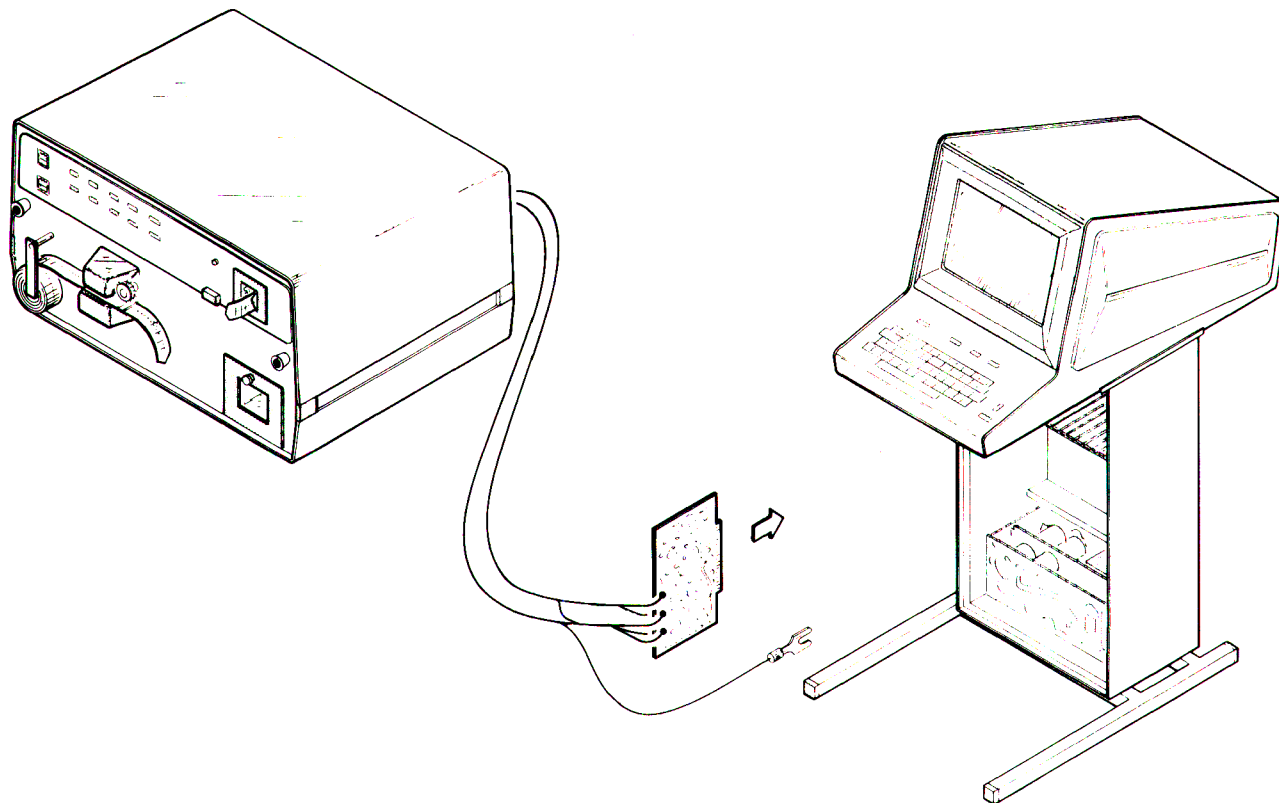


Fig. 1-1. Illustration of 4911 Tape Reader/Perforator System.

DESCRIPTION

INTRODUCTION

The 4911 Tape Reader/Perforator Unit with its Interface Card and cable is an accessory used with either the 4010 or 4010-1 Computer Display Terminals. The Tape Reader/Perforator is a self-contained unit. Circuitry contained within the Tape Reader/Perforator provides either independent or combined operation for both the Reader and Perforator.

The Tape Reader/Perforator combination can be used for most applications requiring punched tape. Tape is supplied from a standard 1000 foot roll mounted on a deck assembly above the chassis and threaded through the punch assembly. Punching is controlled by means of input signals which are processed and used to operate the punch at speeds up to 75 characters per second. The punched tape is fed through an opening in the front panel, where it is available for customer take-up.

The function of the Reader is to convert the information stored in the form of punched holes into electronic signals.

A plug-in circuit board provides the logic control for tape movement in either direction from external signals or the front panel switches. The outputs from the card control a step motor which drives the tape via a sprocket wheel. Data outputs are generated from the hybrid photocell read head, which contains both the photocells and output amplifiers. As tape passes over the photocells, changes in light intensity are sensed by the photocells, amplified, and brought out to an external connector. Operation of the Reader is independent of the punch so that they can both be operated at the same time if required.

The Tape Reader/Perforator Unit can be controlled either by its front panel controls or by the Terminal. The Terminal receives its control from its keyboard or from the computer under program control. The Tape Reader/Perforator can record the data present on the Terminal minibus by punching it out on tape; it can control the Terminal by reading pre-recorded paper tape to the Terminal minibus; and it can also make duplicate copies of a tape.

The 4911 Interface Card is a 5 X 9 inch (approximate) circuit card that provides electrical interfacing between the Tape Reader/Perforator Unit and the Terminal. The Interface Card is plugged into the minibus of the Terminal. Connection between the 4911 Interface Card and the Tape Reader/Perforator is made via a shielded cable containing 5 connectors on the 4911 end and a 37 pin connector on the Tape Reader/Perforator card.

SPECIFICATIONS AND DESCRIPTIONS

Tape Reader/Perforator Specifications

Listed in Table 1-1 are the characteristics and specifications of the Tape Reader/Perforator unit.

TABLE 1-1
Specifications of Tape Reader/Perforator

Characteristics	Perforator	Reader
Tape Material and Dimensions	Perforates standard 8 track unoled (preferred) or oiled paper tapes as well as most Mylar-paper-Mylar and Mylar-foil-Mylar laminate tapes with a thickness between 0.003 and 0.0043 inch.	Reads tape of any material with thickness between 0.0027 inch and 0.0045 inch whose transmissivity does not exceed 57% (oiled buff paper tape). Tape must be prepared to ANSI X3.18 or ECMA 10 standards for base material and perforations. Reads 1 inch, 8-channel tapes.
Tape Loading	Threading	In-Line
Tape Form	1,000 foot roll (2 inch core)	Loop or Strip
Tape Direction	Bidirectional with backspacing limited to 10 rows (1 inch max.)	Bidirectional (left-to-right or right-to-left)
Speed	Up to 75 characters per second asynchronously.	Asynchronously, up to 200 characters per second.
Life Expectancies	Minimum punch life expectancy is 8.4×10^7 characters when used with oiled or unoled paper tape.	Reader lamp has been derated approximately 15% to provide a life expectancy in excess of 13,000 hours.
Operational Modes	Tape Feed: Under control of front panel switch. Unit will feed tape forward at approximately 75 cps while punching sprocket holes only.	Asynchronous Operation, All Units: A true drive signal at J1-11 or J1-12 drives tape at up to 200 characters per second minimum, provided <u>READER-READY</u> signal is true.
	Asynchronous Forward: A true Punch Command at J1-11 causes tape to move forward one row and punch data and sprocket holes at a rate up to 75 characters per second when DIRECTION INPUT (J1-10) is true (forward). DIRECTION INPUT must be stable for 500 ns, minimum, before punch command is given. Punching is initiated by the leading edge of the PUNCH COMMAND input which must be true for 2 μ s, min. with a rise time of 1 μ s, max.	Stops on character if drive signal is removed in less than 1 ms after leading edge of next feed hole. Next drive signal may be applied any time after <u>READER-READY</u> signal comes true. If a pulse is used, the pulse must remain true until <u>READER-READY</u> signal goes false (approx. 1 μ s), and the next pulse may be applied any time after the <u>READER-READY</u> signal comes true (approximately 5 ms between pulses).
	Asynchronous Reverse: Same as described for Asynchronous Forward operation except DIRECTION INPUT (J1-10) is false (reverse) and tape will backspace one row without punching data or sprocket holes.	

TABLE 1-1 (cont)

Characteristics	Perforator	Reader
Input-Output Control Signals	See Table 2-2, Interface Signal Descriptions.	See Table 2-2, Interface Signal Descriptions.
The following specifications apply to the combined Tape Reader/Perforator systems.		
Input Power	100, 115, or 127 VAC, 47 to 64 Hz, single-phase, 2.2 A; 220 or 240 VAC, 47 to 64 Hz, single phase, 1.1 A.	
Environmental	Temperature: Operating: +5°C to +55°C (free air) Operating: 10% to 90% relative humidity without condensation. Non-Operating: All conditions without condensation of either water or frost.	
Physical Description	The unit mounts in a cabinet that is about 20 inches long, 11 inches high and 19 inches wide. The electronic chassis and power supply are mounted at the rear of the unit. The front panel, tape deck, and punch are packaged in the same assembly which is mounted on chassis slides.	
Weight	About 42 pounds.	

Tape Specifications

The Tape Reader/Perforator system is able to read and punch tape of the configurations shown in Figure 1-2. The type of tape guide used in this unit is 8-channel only.

Tape Recommendations

TABLE 1-2
Acceptable Tapes

Type	Manufacturer	Part Number
Paper, Unoiled or oiled (see note) except black carbon filled tapes	Paper Manufacturer's Inc.	Perfection Series
	Bemis	Paper Tape Series
	Crown Zellerbach	Paper Tape Series
	Friden,	Paper Tape Series
Special Paper (roll only)	Nova Tech	Syntosil Machine Tool Tape
Special Mylar, Paper-Mylar or Polyester (roll only)	Arvey	RVCZ 60
	3M Brand	N/C Tape No.
	Chase Foster	401 or No.301 MFM-153515, MFM-103515 or PMP01151

NOTE

Oiled paper tapes may be used, but with more frequent punch cleaning periods.

ALSO ACCEPTABLE, BUT WITH REDUCED PUNCH LIFE: Black Carbon Filled Tapes

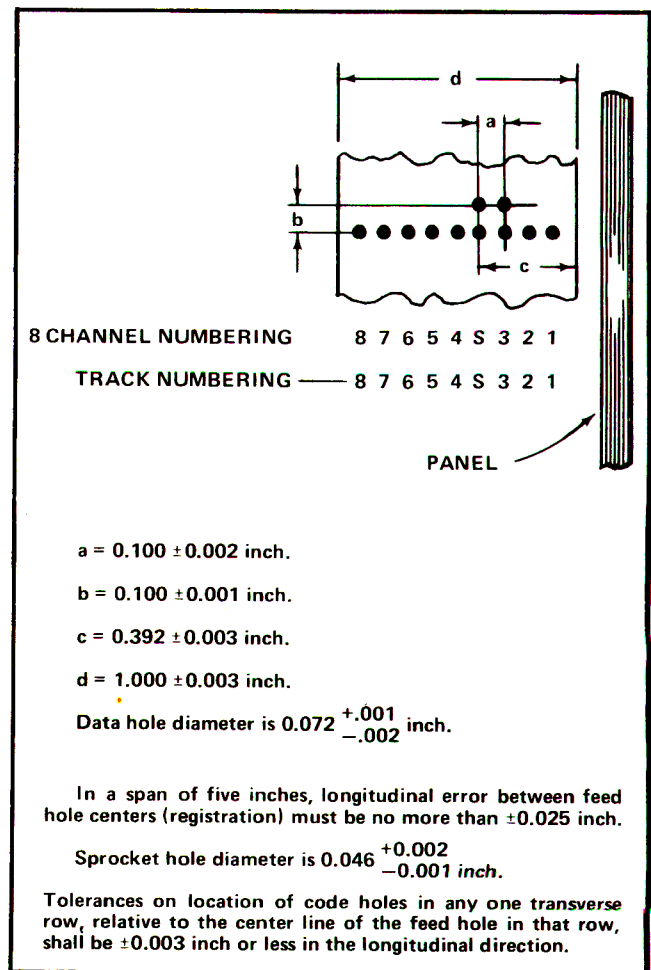


Fig. 1-2. Tape Channel numbering and specifications.

Description—4911 Users

NOT ACCEPTABLE FOR THIS PUNCH APPLICATION: Mylar-Foil, 2.6 mil, Avery RVCT52 and all other tapes with a thickness less than 3 mil and greater than 4.3 mil.

ALSO NOT ACCEPTABLE: Avery RVCP23, Numeriden No. 0500 and all vulcanized fiber tapes.

Equipment Supplied

Various items have been included with the Tape Reader/Perforator system for spare parts, installation, and maintenance. These items are listed in Table 1-3.

**TABLE 1-3
Equipment Supplied**

Item	Quantity
Brush	1
Fuse, 2.5 A, Slow-Blow, F1 (100, 115, 127 VAC Operation)	1
Fuse, 1.5 A, Slow-Blow, F1 (220 or 240 VAC Operation)	1
Fuse, Punch Mechanism, 2.0 A	3
Manual, User's	1
4911 Interface Card	1
10 foot Connector Cable	1

INSTALLATION

Unpacking

Specially designed, reinforced packing cartons have been used in the shipment of the Tape Reader/Perforator system to provide the best possible protection during transit. Also packed with the unit in separate plastic bags and packages is the kit of parts listed in Table 1-3. A careful visual inspection of the unit should be made as soon as it is removed from the carton for any apparent damage incurred during shipping. Never attempt to lift the unit by the covers, front panel, chassis slides or other parts which may not support the weight of the unit. Make sure the unit is properly secured to the cabinet to prevent it from sliding out while carrying it.

System Mounting

The front panel of the Tape Reader/Perforator secures to the cabinet by means of two fasteners which snap into studs mounted on the cabinet wall. To release the fasteners from the studs, depress the buttons. The unit should be located in such a manner that adequate cooling is provided. The ambient temperature should not exceed +5 to 55°C.

Initial Adjustments

Each unit has been accurately adjusted and aligned before leaving the factory. No adjustments or calibrations are required prior to installation or use.

Power and System Connections

AC power is applied to the unit through a standard three-prong plug, located at the rear of the unit.

CAUTION

All units come wired for 115 VAC, 47-64 Hz operation. If another voltage is to be used, a wire change on the transformer must be made. In addition, before operating the system, the proper fuse value (as indicated in Table 1-3) must be inserted from the kit of parts.

Transformer Wire Changes For Different AC Supply Voltages. Units are supplied with a transformer which allows any of five input voltages to be used: 100, 115, 127, 220 or 240 VAC, 47-64 Hz. Unless otherwise directed by the customer, all units are wired for 115 VAC.

If it becomes necessary to use one of the other four voltages, a simple wire change is required. Access to the low voltage transformer (T1), is obtained by removing the back panel of the Tape Reader/Perforator Unit. T1 is located in the bottom right hand corner. It is necessary, then, to change the wire at terminal 3 (115 VAC) to terminal 2 for 100 VAC, to terminal 5 for 127 VAC, to terminal 6 for 220 VAC or to terminal 7 for 240 VAC. The hi-line connecting the fan must remain tied to terminal 4. The fuse value of F1 for 100 VAC, 115 VAC, or 127 VAC is 2.5 A. The fuse value of F1 for 220 VAC or 240 VAC is 1.5 A.

WARNING

The instrument is intended to be operated from a single-phase power source which has one of its current-carrying conductors (the Neutral Conductor) at ground (earth) potential.

The instrument is provided with a three-wire power cord with a three-terminal, polarized plug for connection to the power source. The grounding terminal of the plug is directly connected to the instrument frame as recommended by national and international safety codes.

Interfacing the Tape Reader/Perforator to the Terminal

The 4911 Interface Card plugs directly into the Terminal minibus (as shown in the Frontispiece Fig. 1-1), thus making it accessible to all signals available to the Terminal. (For further information on the Terminal bus signals refer to the 4010/4010-1 Users Manual.) Any one of 5 spare, 72-pin minibus connectors can be used by the 4911 Interface Card. The Interface Card is keyed; thus it can be inserted only one way, component side to the right.

Cable Hook-up. The 4911 Interface Card is connected to the Tape Reader/Perforator by a 10 foot shielded cable. The end that connects to the Interface Card contains five plugs, J310-J314, plus the shield ground connection. The end that connects to the Tape Reader/Perforator contains a 37-pin connector plug, P1. Connection to the 4911 Interface Card is made as shown in Table 2-1. Plug locations P310-P314 are stenciled on the card to assure proper connection. The ground connector lug location on the Terminal is shown in Fig. 2-1.

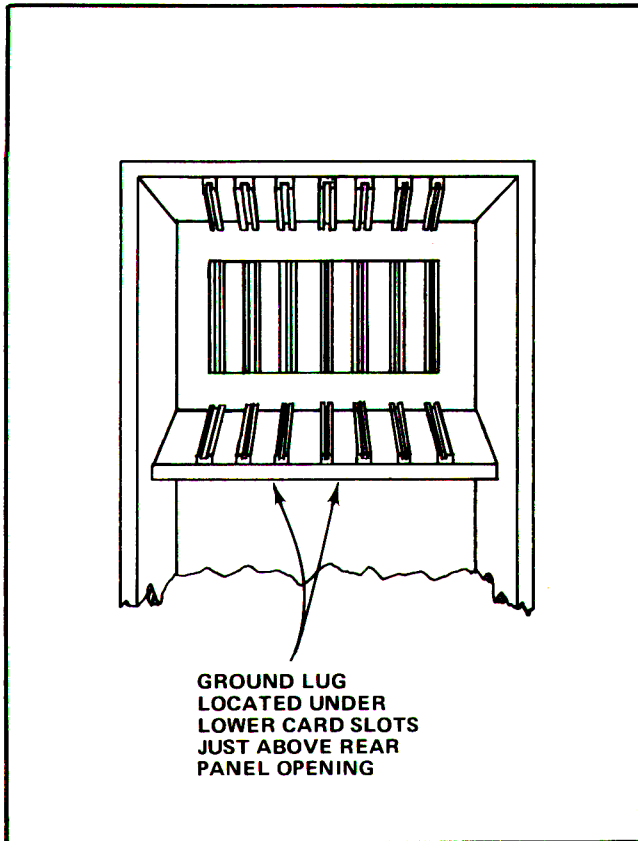


Fig. 2-1. Ground lug location for cable shield.

TABLE 2-1

PLUG COLOR ¹	CONNECTS TO
Brown	J310
Red	J311 ²
Orange	J312
Yellow	J313 ²
Green	J314

¹ Pin numbers are as shown on the plugs. Pin No. 1 on the board is indicated by a small black dot (outside pin closest to edge of board).

² Located on back of board. Pin No. 1 is still the outside pin as described in note 1.

Controlling Signals and Descriptions. All control signals and output signals are routed through the cable. Table 2-2 lists the signals associated with each pin. Their description is given in Table 2-3.

NOTE

All input and output logic signals are defined for positive logic, i.e., logic 0 = 0 V and logic 1 = +5 V. Therefore, signals that are 0 V true are written with a bar over the signal designation, e.g., READER READY output.

TABLE 2-2
Cable Wiring

J1	SIGNAL NAME	TO OR FROM	WIRE COLOR CODE
1	TRACK 1 READER (output)	J310-1	9-1-2
2	TRACK 2 READER (output)	J310-2	9-1-3
3	TRACK 3 READER (output)	J310-3	9-1-4
4	TRACK 4 READER (output)	J310-4	9-1-5
5	TRACK 5 READER (output)	J310-5	9-1-6
6	TRACK 6 READER (output)	J310-6	9-0-8
7	TRACK 7 READER (output)	J310-7	9-0-7
8	TRACK 8 READER (output)	J310-8	9-0-6
9	FEED HOLE OUT (output)	J312-6	9-0-5
10	0 VOLTS, (Signal Ground)	J312-1	BROWN-1-n
11	<u>DRIVE LEFT</u> (input)	J312-8	9-0-3
12	<u>DRIVE RIGHT</u> (input)	J312-7	9-0-2
13	<u>READER SYS RDY</u> (output)	Not used	9-0-1
14	SPARE	Not used	9-0-4
15	<u>READER READY</u> (output)	Not used	9-1-1
16	<u>READER DRIVE</u> (output)	J313-6	ORANGE-3-n
17	<u>READER START</u> or <u>DRIVE</u> (output)	J313-4	RED-2-n
18	<u>DIRECTION</u> (input)	J314-6	9-0-0
19	<u>PUNCH COMMAND</u> (input)	J314-5	TAN
20	<u>PUNCH READY</u> (output)	J314-8	T-O

TABLE 2-2 (cont)

J1	SIGNAL NAME	TO OR FROM	WIRE COLOR CODE
21	DATA 1 PUNCH (input)	J311-1	T-2
22	DATA 2 PUNCH (input)	J311-2	T-3
23	DATA 3 PUNCH (input)	J311-3	T-4
24	DATA 4 PUNCH (input)	J311-4	T-6
25	DATA 5 PUNCH (input)	J311-5	9-8
26	DATA 6 PUNCH (input)	J311-6	9-0
27	DATA 7 PUNCH (input)	J311-7	9-1
28	DATA 8 PUNCH (input)	J311-8	9-2
29	0 VOLTS, (Signal Ground)	J314-1	9-7
30	PERF SYSTEM READY (output)	Not used	9-6
31	TAPE HANDLING ERROR (output)	Not used	9-5
32	TAPE LOW (output)	J314-2	9-4
33	CHASSIS GND	(GROUND BRAID)	Not used
34	READER OFF (output)	J313-8	BLUE-6-n
35	PUNCH ONLY (output)	J313-2	9-3
36	PUNCH ONLY or START	J313-5	WHITE-9-n
37	PUNCH ONLY or OFF	J313-7	GREEN-5-n

TABLE 2-3
Interface Signal Descriptions

Connector Pin	Description	LOGIC LEVELS	
		False Cond. Logic 0 Level	True Cond. Logic 1 Level
READER OPERATION			
J1-1 thru J1-9	Reader Outputs of Data Tracks 1 through 8 and Synthetic Feed Hole (SFH). Synthetic feed hole is an exact duplicate of the feed hole but free from noise and jitter. Data envelops sprocket by at least 100 μ s on both rising and falling edges.	Between 0 and +0.4 V @ 16 mA (sink). No Hole.	Between +2.4 V and +5.0 V @ 0.2 mA (2.2 k Ω to +5 V). Hole.
J1-10	SIGNAL GROUND. 0 V signal ground reference for all inputs and outputs (isolated from chassis ground) Internally to J1-29.		
J1-11	\overline{DL} , DRIVE LEFT INPUT. A drive state moves reader tape to the left.	Between +2.4 V and +5.0 V 2 k Ω to +5 V or open circuit. Stop.	Between 0 V and +0.4 V @ 4.2 mA maximum. Drive.
J1-12	\overline{DR} , DRIVE RIGHT INPUT. A drive state moves the reader tape to the right.		
J1-13	SYSTEM READY OUTPUT. True signal indicates reader is in run (Reader RUN-LOAD switch in RUN) and system power up to operating levels. False signal indicates one or both of above conditions not present.	2 k Ω to +5 V Open collector Reader System Not Ready.	Between 0 V and +0.4 V @ 40 mA (sink) Reader System Ready.

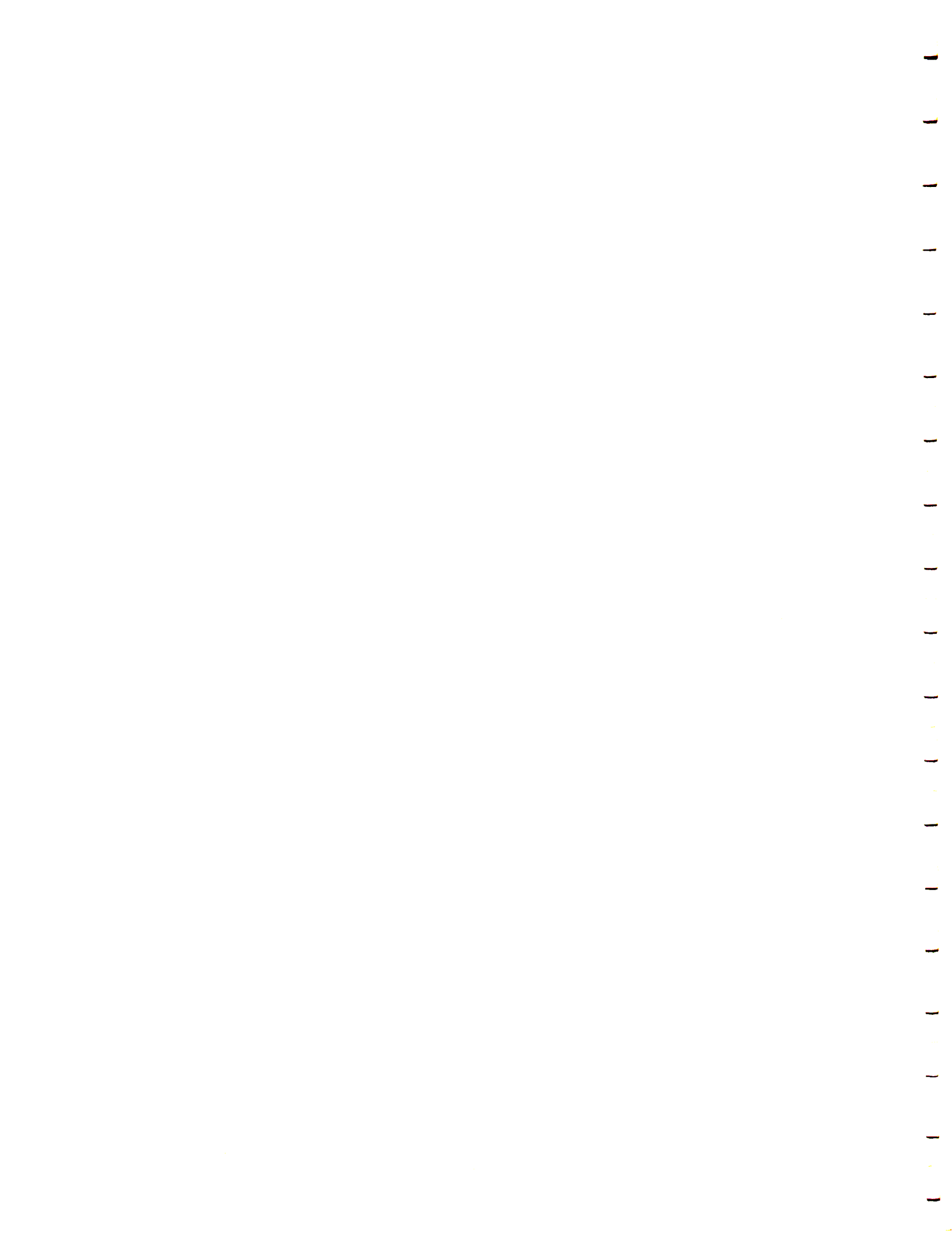
Pin 2, yellow wire

TABLE 2-3 (cont)

Connector Pin	Description	LOGIC LEVELS	
		False Cond. Logic 0 Level	True Cond. Logic 1 Level
J1-15	<u>READER READY OUTPUT</u> . True condition indicates Reader is stopped and ready to accept the next command. False condition indicated Reader is advancing tape.	2 kΩ to +5 V Open collector Reader Not Ready.	Between 0 V and +0.4 V @ 40 mA (sink) Reader Ready.
J1-16	<u>READER DRIVE</u> . Actuation of Reader DRIVE switch provides a switch contact closure to 0 V.		
J1-17	<u>READER START</u> or <u>DRIVE</u> . Actuation of Reader START or DRIVE switch provides a switch contact closure to 0 V.		
PERFORATOR OPERATION			
J1-18	<u>DIRECTION INPUT</u> . True condition moves tape forward and false condition moves tape in reverse as described in Operating Specifications, Mode of Operation, Table 1-1.	Between 0 V and +0.4 V @ 9.00 mA maximum. (ext. sink) Reverse Tape Movement.	Between +2.4 V and +5 V or open circuit. Forward Tape Movement.
J1-19	<u>PUNCH COMMAND INPUT</u> . A true condition moves tape and initiates punching at up to 75 characters per second as described in Operating Specifications, Modes of Operation, Table 1-1. This input line is disabled when Punch Ready output is false or Tape Handling Error output is true.	Between 0 V and +0.4 V @ 4.2 mA maximum. (ext. sink) Tape Stopped.	Between +2.4 V and +5 V or open circuit (transition) Tape Advances one row and punches.
J1-20	<u>PUNCH READY OUTPUT</u> . True condition indicates unit is ready to accept a punch command. Output is false during advance and punch cycle (approx. 13 ms following a punch command) and whenever Tape Handling Error output (J1-31) is true.	Between 0 V and +0.4 V @ TTL fanout of 10. Perforator Not Ready.	Between +2.4 V and +5 V @ TTL fan-out of 10. Perforator Ready.
J1-21 thru J1-28	<u>TRACKS 1-8 DATA INPUT</u> . True condition causes a hole to be punched for that track when a true punch command is given. Data must be present at the time a punch command is initiated and must remain on the line for 2 μs after the punch command input reaches the true level.	Between 0 V and +0.4 V @ 4.2 mA maximum. (ext. sink) No Hole.	Between +2.4 V and +5 V or open circuit. Hole.
J1-29	<u>SIGNAL GROUND</u> . 0 V signal ground reference for all inputs and outputs (isolated from chassis ground). Ties internally to J1-10.		
J1-30	<u>SYSTEM READY OUTPUT</u> . True condition indicates internal voltages have stabilized after power turn-on. False condition indicates power is off or internal voltages have not stabilized.	Between +2.4 V and +5 V or open circuit. TTL fan-out of 9. Perforator System Not Ready.	Between 0 V and +0.4 V @ TTL fan-out of 10. Perforator System Ready.

TABLE 2-3 (cont)

Connector Pin	Description	LOGIC LEVELS	
		False Cond. Logic 0 Level	True Cond. Logic 1 Level
J1-31	TAPE HANDLING ERROR OUTPUT. True condition indicates one or more of the following conditions: (a) Perforator RUN-LOAD switch in LOAD or (b) tape from supply is loose, broken or tight. A true signal disables PUNCH COMMAND (J1-19).	Between 0 V and +0.4 V @ TTL fan-out of 9. No Tape Malfunction.	Between +2.4 V and +5 V @ TTL fan-out of 9. Tape Malfunction.
J1-32	TAPE LOW OUTPUT. True condition indicates tape supply nearly exhausted. False condition indicates supply is greater than preset low tape level. For informational purpose only; does not affect operation of the system.	Switch contact to 0 V @ 100 mA maximum. Tape Supply Above Preset Level.	220 Ω to +5 V Tape Low.
J1-33	Chassis Ground. Output connection to chassis (isolated from signal ground).		
OUTPUT SIGNALS, FRONT PANEL SWITCHES.			
J1-34	$\overline{\text{READER STOP}}$ or $\overline{\text{OFF}}$ or $\overline{\text{LOAD}}$. Actuation of Reader LOAD, STOP or OFF switch provides a switch contact closure to 0 V.		
J1-35	$\overline{\text{PUNCH ONLY}}$. Actuation of PERF ONLY switch provides a switch contact which opens 0 volts.		
J1-36	$\overline{\text{PUNCH ONLY}}$ or $\overline{\text{START}}$. Actuation of Perforator PERF ONLY or START switch provides a switch contact closure to 0 V.		
J1-37	$\overline{\text{PUNCH STOP}}$ or $\overline{\text{OFF}}$. Actuation of Perforator STOP or OFF switch provides a switch contact closure to 0 V.		
P2	AC Power Input. See Input Power Specifications, Table 1-1.		



OPERATION AND CHECKOUT

CONTROLLING THE 4911

Description of Tape Reader/Perforator Controls

Front Panel Controls

POWER Rocker-type switch that applies and removes AC power.

RUN-LOAD RUN—Allows operation of the punch mechanism and the tape supply system.

LOAD—Disengages the pinch roller from the capstan on the punch mechanism, permitting the tape to be threaded through the punch assembly.

SPOOL Momentary-on switch that manually winds tape onto the spooler.

Front Panel Indicator

TAPE LOW Indicates tape supply is nearly exhausted. For informational purposes only; does not affect punch system operation at any time.

Perforator Controls

CAUTION

With the Tape Reader/Perforator power on, switching the Terminal power either on or off will cause the punch mechanism to momentarily activate. To assure against ruining a good tape, turn the Tape Reader/Perforator power off before switching the Terminal power on or off.

OFF Interlock type switch that disables the Perforator. Disengages by pressing STOP, START, or PERF ONLY.

STOP Momentary type switch that enables the Terminal to control the Perforator.

START Momentary type switch that provides a manual start for the Perforator. The Terminal can still provide manual control for the Perforator.

PERF ONLY

Pushbutton interlock type switch that is used to duplicate tapes. This switch activates $\overline{\text{TSUP}}$, which prevents the Terminal from processing the data on its minibus. It forces the Perforator to ignore Control Characters, i.e., DC2 (START) and DC4 (STOP). Once punching is completed, disengage PERF ONLY by pressing either the OFF, STOP, or START button.

FEED

Causes the Perforator to feed tape through the punch mechanism at approximately 75 cps. Feedholes only will be punched, and data input lines will be inhibited.

NOTE

Operation of the FEED switch in conjunction with external input is not allowed; erratic punching may occur.

Reader Controls

OFF

Interlock type switch that prevents the Reader from responding to Control Characters DC1 (START) and DC3 (STOP). However, with this switch pressed, one byte of data at a time can be read by sending $\overline{\text{TAPEFETCH}}$. ($\overline{\text{TAPEFETCH}}$ is provided by some computer interfaces.) Asserts SEND 8 which tells the Terminal to send all 8 bits to the computer.

STOP

Momentary type switch that enables the Reader and permits Control Characters DC1 and DC3 to control the Reader.

START

Momentary type switch that provides a manual start for the Reader. The Terminal can still control the Reader.

READ BINARY (DRIVE)

Pushbutton interlock type switch that remains engaged when pressed. It provides a manual drive for the Reader, allowing Control Characters to be read. Bit 8 is also sent, thus allowing duplication of tapes

that use Bit 8. To disengage, press either the OFF, STOP, or START button.

LOAD Push-push type switch that disables the Reader when installing tape. This is the only switch that completely disables the Reader. (Even when the OFF button is pressed, Control Characters can still control the Reader.) When pressed, this button locks in, and it must be pressed again to release.

Terminal Control of Tape Reader/Perforator

Three momentary type keys located on the Terminal keyboard provide controlling functions for the Perforator only. The keys and their functions are as follows:

BREAK Stops the Perforator.

SPACE When BREAK has stopped the Perforator, pressing SPACE backs up the tape one space for each momentary actuation. Any key can be used for SPACE as long as BREAK is held. About 10 spaces can be entered before the Perforator will be disabled. A space corresponds to one character of tape movement.

RUBOUT Causes the Perforator to punch out all holes, thereby "deleting" the character.

Control Character Effect

ASCII Control Characters sent from either the Terminal keyboard or from the computer can be used to turn the Perforator and Reader on and off.

Perforator Control

START CTRL R from keyboard in Local; DC2 from computer when On Line. (Perforator enabled by STOP switch.)

STOP CRTL T from keyboard in Local; DC4 from computer when On Line.

Reader Control

START CRTL Q from keyboard in Local; DC1 from computer when On Line. (Reader enabled by STOP switch.)

STOP CTRL S from keyboard in Local; DC3 from computer when On Line.

The Computer can also control the 4911 Reader by utilizing TAPEFETCH. (See explanation under Reader OFF button.)

Strappable Options

The 4911 Interface Card contains one strappable option which functions as follows:

POSITION	FUNCTION
TL (Tape Low)	Causes Indicator 2 on the Terminal Front panel (3rd from left) to blink at an approximate 1 Hz rate when the Tape Low switch inside the Tape Reader/Perforator Unit activates.
P (Perforate)	When in the Perforate position, Indicator 2 will light each time a character is punched.

Tape Loading, Reader

Use the following procedure when loading tape into the Reader:

- a. Place the POWER switch into its ON position (lighted).
- b. Place the Reader LOAD switch in the LOAD position (depressed).
- c. Place the lower tape guide located on the right side of the sprocket wheel into its open (down) position. Hold it in its open position by moving the torsion spring (located below the lower tape guide) forward.
- d. Place the roll of tape to be read on the tape spindle.
- e. Insert the tape between the upper and lower tape guides and engage the sprocket holes in the tape with the sprocket drive wheel pins. When properly loaded, the Bit 1 channel will be toward the front panel. (Fig. 1-2 provides an illustration of channel location.) Make sure the tape is on top of the tape guide shaft and flush with the front and rear tape guide edges (located to the left of the read head).
- f. Raise the lower tape guide to its closed (upper) position so that it guides the tape into the sprocket wheel. Lock it in its upper position by moving the torsion spring to its rear position. Check for proper alignment of the tape within the sprocket and the front and rear edges of the tape guide.

g. Place the Reader LOAD switch in the RUN position (nondepressed).

h. The Reader may now be operated. Refer to the Reader Checkout procedure.

i. To unload tape, stop tape movement and place the Reader LOAD switch in the LOAD position.

j. Place the lower guide in its bottom position and remove the tape.

k. To remove power, place the POWER switch into its OFF position (unlighted).

Tape Loading and Threading, Perforator

Access to the tape deck is made by pressing the two buttons located at the left and right sides of the front panel, and pulling out on the front panel. Tape is supplied from the tape deck (located at the top of the unit) and is threaded through the punch mechanism. The following procedure is recommended when threading the Perforator tape:

a. Place the POWER switch in its ON (lighted) position.

b. Place the Perforator RUN-LOAD switch in the LOAD position. This is accomplished by moving the switch to the left and rotating it slightly counterclockwise.

c. Place a spool of tape on the supply reel and thread it through the punch and out the opening in the front panel. The threading path is shown on a decal mounted adjacent to the punch.

NOTE

The tape must be threaded behind the spring guide located just to the rear of the punch assembly. This can be best accomplished by first inserting the tape through the punch assembly and out the front panel opening. Then lift the tape up and slip it between the spring guide and the chassis.

d. Place the Perforator RUN-LOAD switch in the RUN position.

e. Depress the FEED switch and verify that tape is advancing properly.

f. Empty the chad bin each time a new box or roll of tape is installed. This is important to prevent chad from backing up into the punch.

g. The Tape Perforator portion may now be operated. Refer to the Perforator Checkout procedure.

SYSTEM CHECKOUT PROCEDURE

Check for correct operation of the Tape Reader/Perforator system with the Terminal LOCAL/LINE switch in the LOCAL position.

NOTE

The Terminal must be properly connected to the Tape Reader/Perforator and powered up before the Tape Reader/Perforator Unit will operate.

Perforator Checkout

CAUTION

With the Tape Reader/Perforator power on switching the Terminal power either on or off causes the punch mechanism to momentarily activate. To assure against ruining a good tape, turn the Tape Reader/Perforator power off before switching the Terminal power on or off.

1. After the system has been properly connected, turn the power on. Hit both STOP buttons on the Tape Reader/Perforator. Check that simultaneously pressing the CTRL and R keys on the Terminal keyboard turns the Perforator on without any character being punched on the tape (checking for holes in tape can be made by pressing the FEED key and running tape out a few inches.) Now, type several characters onto the tape and press the CTRL and T keys (DC4) to stop the Perforator. Check that the DC4 character was punched on the tape.

2. Press the Perforator START key and again enter more data onto the tape. Once again, check that CTRL T stops the Perforator and is punched on the tape.

3. Push PERF ONLY and punch more data onto the tape from the keyboard, checking that these do not print on the Terminal screen. Check that the Perforator cannot be stopped by CTRL T.

4. Press the STOP button and then press FEED to check for feed holes being punched.

5. Hold down the BREAK key (on the Terminal) and press the SPACE key. Note that the tape backs up one space (character). Repeat this operation until the tape stops, checking for approximately 10 spaces. Next, press the keyboard RUBOUT key, noting that all holes are punched in the tape. Remove the tape from the Perforator as follows: Grasp it between the thumb and forefinger a few inches from where it exits from the front panel, then pull sharply to the right to cut the tape loose.

6. As a summary of Perforator operation, we will next obtain a tape that will be used in checking out the operation of the Reader. Proceed as follows: Press the FEED key and hold until about a foot of "leader" is obtained. Next, press the Perforator START button and enter data from the keyboard until a tape a few feet in length is obtained. Press CTRL T; then, once again press the FEED key until about a foot of leader is obtained. Remove the punched tape from the Perforator as described in step 5.

Reader Checkout

1. Load the Reader with the test tape. When the tape is loaded, be sure to release the Reader LOAD button. Check to make sure the Terminal is still in LOCAL.

2. Press the keyboard CTRL Q keys and check that the tape is read, displaying the data on the screen. Before the tape reaches the end, press CTRL S (DC3) and check that the Reader stops. Start the Reader once again with CTRL Q and let the Reader read to end of tape. Reload the tape.

3. With the tape reloaded, push the Reader START button and again check for output on the screen. Push CTRL S to stop the Reader in the middle of tape and then restart with CTRL Q and read to the end of the tape. Reload the tape.

4. Push the READ BINARY (DRIVE) button and check that CTRL S from the keyboard will not stop the Reader. Push the STOP button and reload the tape.

Tape Reader/Perforator Checkout

1. With the tape reloaded, push the PERF ONLY button. Next, press the Reader START button and note that the Perforator is duplicating the tape. The Terminal display will not print the information. Reload the tape.

2. Press the Perforator START button; then press the Reader START button. Note that the Perforator duplicates the tape, and that the Terminal display prints the data.

REWINDER OPERATING INSTRUCTIONS

The rewinder (manual spooler) is used in two different modes of operation.

Tape Reading Mode. During tape reading, the sliding hub is pushed back behind the circular plate and the roll of tape is placed on the shaft. The arm is swung down to hold the roll in place.



Before rewinding the tape, remove the tape from the Read Head assembly. Tape breakage might otherwise occur. Place the tape between the roller guide and the Read Head Assembly.

Tape Wind Mode. To wind the tape, the sliding hub is pulled out manually as far as it will go and the tape end is inserted in the slot. The SPOOL switch is depressed until the tape is rewound into a spool which then must be removed from the rewind hub before reading again.

PROGRAMMING CONSIDERATIONS

The Reader DRIVE button is the 4911 manual start for the Reader. It asserts SEND 8 so that binary tapes can be read. It is strictly a manual control. To control the 4911 Reader from the computer for binary tapes, press the OFF button in and use TAPEFETCH. When the OFF button is in, it sends Bit 8 by enabling SEND 8.

To punch a binary tape from the computer, and not have the information on the Terminal display, engage the PERF ONLY switch. The punch will operate only when there is data from the computer. (The DRIVE switch has no effect on the Perforator.)

TTY Port Interface

The Bit 8 strap does not have to be in the ON position to copy ASCII tapes. Bit 8 will be inserted at all times. The PDP 8/I requires Bit 8 for marking.

Non-ASCII Tapes

The PERF ONLY button does not have to be pressed to punch binary tape. The PERF ONLY button makes TSUP true to suppress the information from the Terminal display. The PERF ONLY button is used to provide a manual start for the Perforator to duplicate tapes.

TTY Port Interface

Bit 8 strap option should be in the IN position when operating a computer with the 4911. This allows the SEND $\bar{8}$ line from the 4911 to have control of bit 8.

Requirements for bit 8 high or low are software requirements and should be determined by the particular installation. Bit 8 is sent as data with SEND $\bar{8}$ low and sent as a space or mark (depending on PARITY option) when SEND $\bar{8}$ is high.

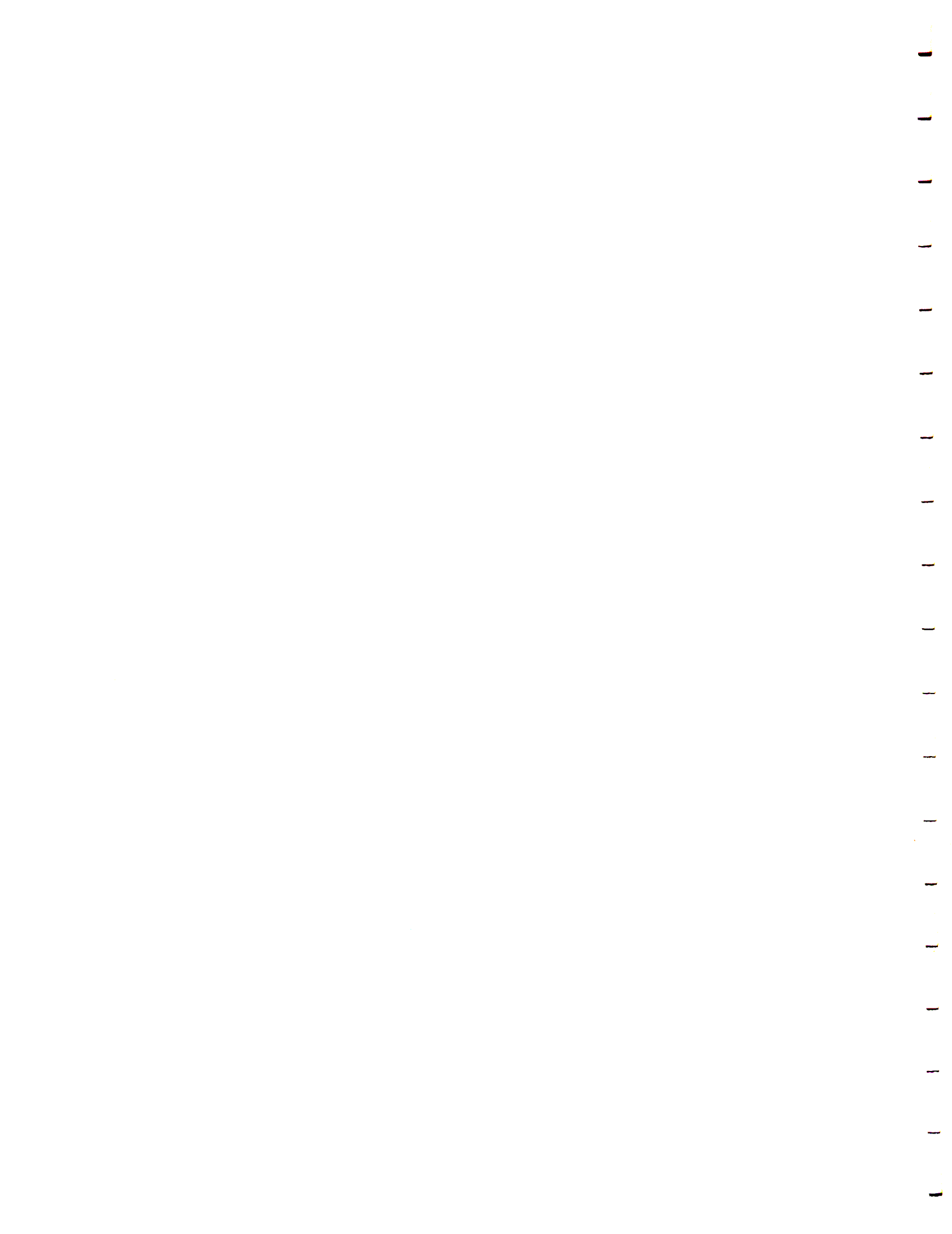
STRAP position

AB to A, CD to C
 AB to B, CD to C
 AB to A, CD to C
 AB to B, CD to D

Bit 8

Mark
 Odd Parity
 Even Parity
 Space

Be certain that switch positions on 4911 are selected so that SEND $\bar{8}$ is low if you are duplicating tapes with the computer.



PREVENTIVE MAINTENANCE

GENERAL

After every 6 to 8 hours of Reader use, the operator should check the tape transport area of the Reader for cleanliness. This is extremely important, since any dirt or foreign material covering the read head can cause readout error. For general cleaning, use the bristle brush supplied. Make sure the tape remains clean at all times, since any residue picked up by the tape can be deposited on the read head. It has been found in certain cases that residue picked up by the tape comes from soiled hands. It is important that care be exercised when handling tape, especially in machining areas or other areas where grease, oil or sprays are present.

It is important that the chad tray at the lower left corner of the front panel be emptied periodically to prevent chad from backing up into the punch and creating punching errors. A good practice to follow is to empty the tray when a new roll of tape is installed.

READER PREVENTIVE MAINTENANCE

Frequency of Reader Cleaning

The Reader must be cleaned once every two weeks. This frequency of cleaning is for clean environmental conditions and usage. However, these times may vary greatly from one installation to another. For example, a unit used in a machine shop may require cleaning more frequently. In order that the warranty remain in effect, the unit must be cleaned in accordance with the instructions outlined below.

CAUTION

In all cleaning procedures, avoid using cleaning methods and materials other than those recommended in this manual. Certain cleaning compounds will damage parts of the READER, especially in the readout assembly area. Primarily recommended is the use of Miller-Stephenson MS-200 Magnetic Tape Head Cleaner for most areas requiring cleaning. However, due to the degreasing nature of the cleaner, it should not be used in areas where the spray may come in contact with bearings or other oiled parts. This cleaner may be obtained from Miller-Stephenson Chemical Company at one of the following locations:

1001 East First Street
Los Angeles, Calif. 90012

1350 West Fullerton Ave.
Chicago, Ill. 60614

Route 7
Danbury, Conn. 06810

To use the cleaner, hold the spray can 4 to 6 inches from the area to be cleaned and allow the spray to flush the dirt off. If a heavy buildup is present, loosen with the spray mist and scrub with a cotton swab. Avoid spraying on lubricated surfaces or parts.

If the Miller-Stephenson cleaner is not available, a small amount of isopropyl alcohol applied to a clean, lint-free cloth or cotton swab may be used. However, it should be used carefully and sparingly, since damage to the photocell and the finish on the plastic covers may result. Use only clear, unadulterated isopropyl alcohol. Do not use ethyl alcohol or denatured alcohol, as the denaturing agents vary and may damage the READER.

It is important that, whether the MS-200 cleaner or the isopropyl alcohol is used, only the amount required to clean the surfaces be applied. Never saturate or drench the areas to be cleaned. Never apply these materials to the lamp assembly.

Read Head Assembly Cleaning

The top surface of the read head assembly and the area between the upper and lower tape guides should be cleaned every two weeks (For most installations having clean environments. Dirtier environments which contain dust, oil and sprays, such as machining areas, may require cleaning as often as every eight hours). Cleaning is extremely important because any dirt or foreign material in this area can create errors in readout. Use a 6 inch piece of cleaning tape (Robins THC-1 or equivalent) inserted between the top surface of the read head and the upper guide, and between the upper and lower guides. Care should be exercised so that no residue remains from the recommended cleaning materials when the cleaning operation is completed.

Lamp and Lens Cleaning

The lamp and lens should be checked for cleanliness every two weeks and cleaned as required. To clean, use only a soft cloth. **Do not use the items described in the preceding CAUTION.** Remove the upper cover and carefully clean the lamp and lens. Care should be taken so that the adjustment of the lamp is not disturbed.

CAUTION

Some lenses are made of plastic and tend to scratch easily. Care should be exercised when cleaning the plastic lens. The reflective material on the lamp is easily damaged by strong solutions. Use care in cleaning this area.

Sprocket Cleaning

The sprocket wheel should be checked for cleanliness every two weeks. Depending upon the tape conditions, accumulations may build up on the sprocket and be transferred to the sprocket holes in the tape, which may cause readout errors. Use the recommended cleaning materials described in the first CAUTION of this Section. Care should be taken that the alignment of the sprocket wheel is not disturbed.

Tape Cleaning

Repeated handling and usage of the tape leads to a buildup of grease, oil and dirt on the tape. When the buildup becomes excessive, this material will become lodged in the tape transport areas and could cause tape reading errors. To prevent this, the tape should be thoroughly inspected every two weeks and cleaned as required.

General Cleaning

The entire Reader assembly should be cleaned every year. Use the following procedure:

A. If necessary for a particular problem area, separate the front panel from the chassis using the following procedure.

1. Remove all power and control signals from the unit by disconnecting P1 and P2.
2. Pull the front panel and deck out from the cabinet by depressing the center of each fastener and pulling outward.
3. Disconnect J3/P3 and J4/P4.
4. Remove the eight machine screws which hold the slide bracket to the enclosure.
5. The front panel with the deck and punch attached should now be free from the chassis and enclosure.
6. To reassemble, reverse the above procedure.

B. Using the brush supplied with the unit and/or compressed air, remove all dust and dirt from both assemblies, paying particular attention to all moving parts. Use the recommended materials described in the first CAUTION of this Section.

Lubrication

All points of rotation on the Reader have permanently lubricated bearings and should not require lubrication for the life of the part.

PERFORATOR PREVENTIVE MAINTENANCE

Preventive maintenance, which includes checking, cleaning and lubrication, should be performed periodically in order to maintain peak performance. **In addition, in order that the warranty remain in effect, the unit must be maintained in accordance with the instructions outlined below.** A preventive maintenance schedule and log is presented in Table 4-1 which indicates the frequency of action and maintenance procedure. For customer convenience, the table is arranged so that a log can be kept when each maintenance procedure was performed.

TABLE 4-1

Preventive Maintenance and Log

Frequency, No. of Rolls	Date	Initial	Frequency, No. of Rolls
50			1050
100			1100
150			1150
200			1200
250			1250
300			1300
350			1350
400			1400
450			1450
500			1500
550			1550
600			1600
650			1650
700			1700
750			1750
800			1800
850			1850
900			1900
950			1950
1000			2000

50-Roll Service

50-Roll (1000 ft. roll) Service is carried out by the customer. It entails dust and chad removal and a check to see that data fed to the mechanism is, in fact, punched on the tape. A clean dry cloth and/or compressed air should be used to remove dust build-up.

500-Roll Service

The following paragraphs list those items to be checked after each 500-rolls (1000 ft. roll) of tape have been

punched. Normally these items are performed at a central workshop where the required facilities and equipment are available. In addition, the 50-Roll Service is required.

Cleaning and Dust Removal. Remove all dust and chad from the perforator using a clean dry cloth and/or compressed air. Clean the motor brake, using the same materials.

Wear Checks. Check for excessive wear on the following items:

- a. Punch pins.
- b. Spring attachments on punch solenoids.
- c. Punch pin driver play with respect to punch pins.

Bearing Checks.

- a. Pinch roller.
- b. Motor shaft.
- c. Capstan.
- d. Punch pin drivers.
- e. Punch solenoids.

Lubrication. Lubricate the punch head by adding Rocol MT320 grease in the punch pin guide.

Miscellaneous Checks. Check the following items:

- a. Force exerted by pinch roller against capstan.

- b. Force exerted against tape by spring-mounted tape guide.

- c. Pulling force of incremental motor.

- d. Inter-row spacing.

- e. Punching action.

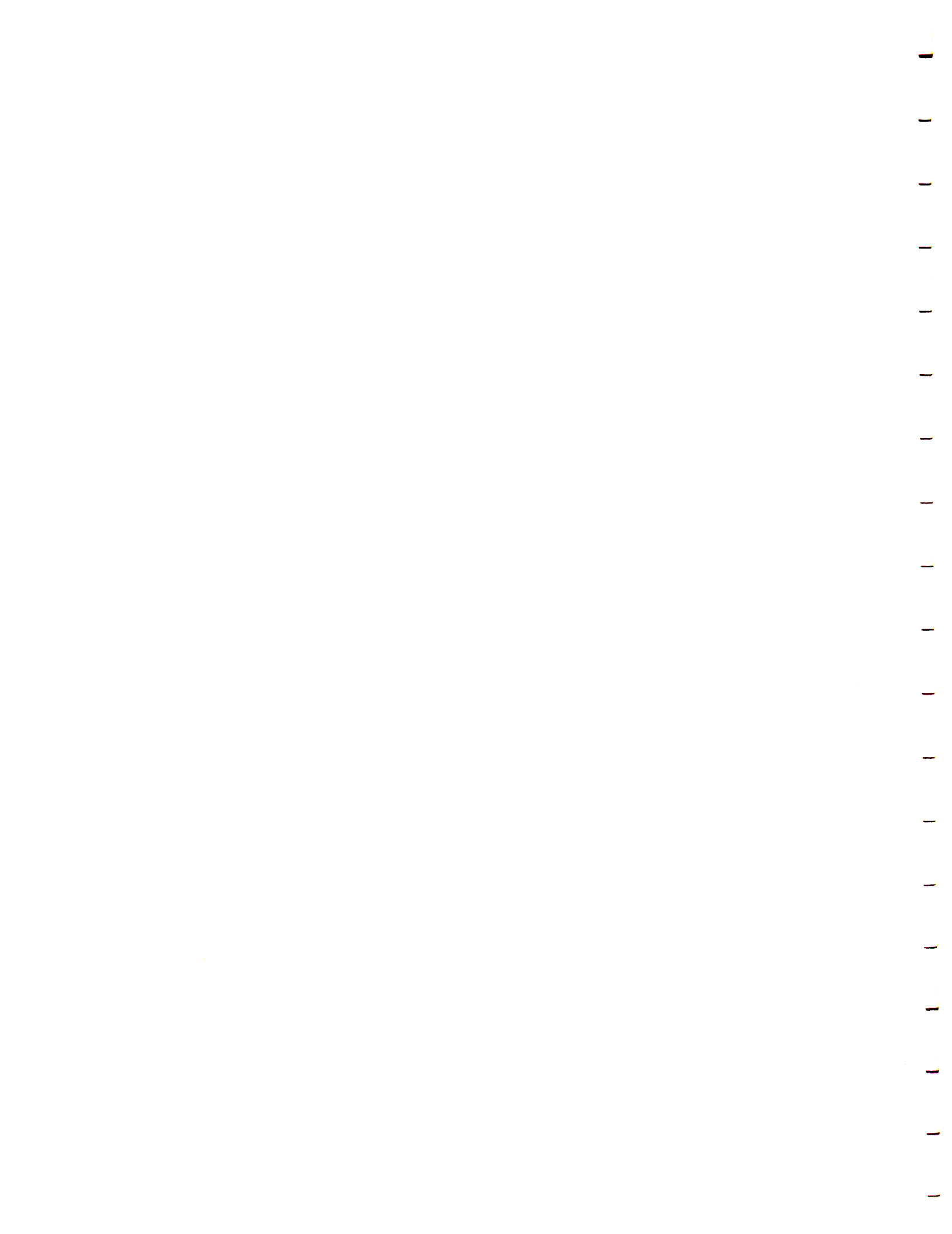
2,000-Roll Service

The paragraphs to follow list those items to be checked after 2,000 rolls (1000 ft. roll) of tape have been punched. Normally these items are performed at a central workshop where the required facilities and equipment are available. In addition, the 50-Roll and 500-Roll Service procedures are required.

Cleaning. Remove, clean and check all movable parts, shafts and bearing sleeves with the exception of those listed under operational checks.

Operational Checks. Check the following items for wear and proper operation and replace if necessary:

- a. Punch head and punch pins.
- b. Punch pin drivers.
- c. Incremental motor.
- d. Punch solenoids.
- e. Capstan.
- f. Pinch roller.



TEXT CORRECTION

SECTION 1 Description

Page 1-1, Column 1, second paragraph, line 7

CHANGE to read as follows:

speeds up to 75 characters per second (600 baud). The punched tape is-----

Column 2, first paragraph

ADD the following:

The Reader can operate up to 200 characters per second (1600 baud).

Page 1-2, Table 1-1, Item 5

CHANGE to read:

Speed Up to 75 characters per second asynchronously (600 baud).

Asynchronously, up to 200 characters per second (1600 baud).

SECTION 3 Operations and Checkout

Page 3-4 and 3-5, Column 2, Programming Considerations

CHANGE to read as follows:

TTY Port Interface

Bit 8 strap option should be in the IN position when operating a computer with the 4911. This allows the SEND $\bar{8}$ line from the 4911 to have control of bit 8.

Requirements for bit 8 high or low are software requirements and should be determined by the particular installation. Bit 8 is sent as data with SEND $\bar{8}$ low and sent as a space or mark (depending on PARITY option) when SEND $\bar{8}$ is high.

STRAP position	Bit 8
AB to A, CD to C	Mark
AB to B, CD to C	Odd Parity
AB to A, CD to C	Even Parity
AB to B, CD to D	Space

Be certain that switch positions on 4911 are selected so that SEND 8 is low if you are duplicating tapes with the computer.

General Information

Reader. The Reader DRIVE button provides the manual start for the 4911 Tape Reader. This button must be pushed to manually control the reading of binary tapes. IT IS STRICTLY A MANUAL CONTROL FOR THE READER. When reading tapes under software control, the Reader OFF button must be pressed. Both the Reader DRIVE and OFF buttons assert the minibus signal SEND 8. This signal permits all 8 bits of binary data (from those tapes which use 8 bits) to be sent to the computer. The OFF button also permits the usage of another minibus signal, TAPE-FETCH, which permits the computer to over-ride the Reader OFF button. The Teletype Interface card sets TAPEFETCH active (providing OFF button is pressed) for each request from the computer for tape data. Only one character at a time will be sent to the computer for each activation of TAPEFETCH. TAPEFETCH is used with the PDP-11, Data General (Nova Series) and Hewlett Packard computers. A signal similar to TAPEFETCH is used with the DEC 8 (series), 9, 12, and 15. To establish the on line connection with this series of computers, first press the Reader OFF button and then the LOAD button. The LOAD button then functions as a Reader START/STOP button.

Perforator. To punch a tape from the computer, and not have the information on the Terminal display, engage the PERF ONLY button. The Perforator then operates as data becomes available from the computer. The Perforator DRIVE switch has no effect on the Perforator operation.

DC1-DC4

Most computers (such as Honeywell's 316 and 516, all Varians, Interdata, and Data Communications computers) can use the DC1-DC4 ASCII Control Characters for software control of the 4911 Tape Reader and Perforator. (Remember,

that for these Control Characters to control the 4911, the STOP buttons must be pushed in.)

NOTE

Raytheon computers cannot control the 4911 through use of DC1-DC4. The 4911 must be manually controlled by the operator using the ON and OFF buttons.

