INSTRUCTION MANUAL

TRS9200

TAPE READER/SPOOLER

EECO

DOC11120-01

INSTRUCTION MANUAL

TRS9200
TAPE READER/SPOOLER

For customer service contact...

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Incorporated

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—Tape Readers	One (1) Year
—Punches	One (1) Year
—Punch Mechanism	Ninety (90) Days
Switches	
—Standard Switches	One (1) Year
—8000 Series	Ninety (90) Days
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—EECO 2D	One (1) Year
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—D300/D400 VDU	One (1) Year

Any item not listed is not warranted by EECO.

June 1979

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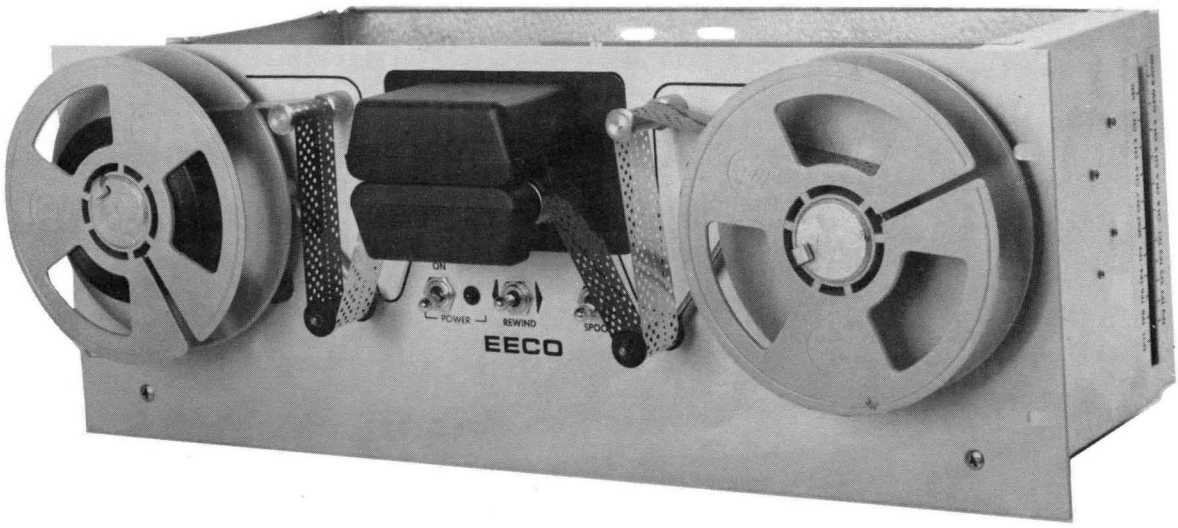

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Figure 1-1. TRS9200 Reader/Spooler

SECTION I

GENERAL DESCRIPTION

1-1. SCOPE.

The manual contains operation and maintenance information for the TRS9200 Tape Reader/Spooler (reader/spooler). This information includes general description, installation and operation procedures, functional description, maintenance procedures, engineering drawings, and parts lists.

1-2. EQUIPMENT DESCRIPTION.

The reader/spooler shown in figure 1-1 converts information in the form of hole patterns in perforated tape into electrical signals. Hole patterns conforming to Electronic Industries Association standard RS-227-A, American National Standards X3.18, American Standard Code for Information Exchange X3.4, and all major commercial specifications are suitable. An adjustable tape guide permits reading of 5, 6, 7, or 8-level tape. Tape supply and take-up reels 5-1/4 inches in diameter have the capacity to hold up to 600 feet of tape. The reader/spooler is also capable of reading loops or strips of tape.

A read head containing an infrared light source, sensing elements, stepper motor, and tape drive sprocket is mounted on the front panel. Spooler servo motors and control potentiometers positioned by the tape tension arms are also mounted on the front panel. Spooler servo electronics, data conversion circuits, control logic circuits, and power supplies are contained on a single printed circuit card.

Table 1-1. Specifications

Parameter	Specification
Dimensions	
Width	19.00 inches (48.26 centimeters)
Height	
5-1/4 inch reels	7.00 inches (17.8 centimeters) +2 inches for cables at bottom
Depth	7.00 inches (17.8 centimeters)
Weight	15 pounds (6.8 kilograms)
Tape	
Material	Paper, aluminum-Mylar, paper-Mylar, or Mylar-aluminum
Thickness	Up to 0.0045 inch (0.1143 millimeter)
Tolerance	Tape punched per EIA Standard RS-227-A, ECMA, ANSI, or ISO
Width/Levels	1.000 ±0.003 inch (25.400 ±0.076 millimeters) 5, 6, 7, or standard 8 track plus sprocket
Tape Capacity	
5-1/4 inch reel	600 feet (182.88 meters)
Power Requirement	115 ±10% Vac, 50-400 Hz
Fuse Requirement	2 Amp Slo-Blo
Power Consumption	
Maximum	120 watts
Typical	100 watts
Peak Inrush Current	4 amperes at 115 Vac
Logic Levels	
Negative Logic	Logic 0 = +2.4 to +5.2 Vdc at 400 μA Logic 1 = 0.0 to +0.5 Vdc at 16 mA
Normal Operating Temperatures at Room Ambient	
Front of Read Head	45°C
Back of Read Head	60°C
Stepper Motor	100 to 135°C

Parameter	Specification
Reading Modes	
Step (Pulse)	Logic 1 input pulse synchronized with READER READY signal
Pulse Width	35 μs to 2 ms
Rate	0 to 200 characters (pulses) per second
Slew	Logic 1 input for duration of slew, 200 characters per second ±20%
Stop	Logic 0
Rewind	Logic 0 at 5 mA, 400 characters per second ±20%
Stop Rewind	Logic 1 at 100 μA
Data (8 channels)	
Hole	Logic 1
No Hole	Logic 0
READ CLOCK (Sprocket)	
Hole	Logic 1
No Hole	Logic 0
RUN STATUS	
LOAD (Head Open)	Logic 1
RUN (Head Closed)	Logic 0
DRIVE ACKNOWLEDGE	
Step or Slew signal received	Logic 1 pulse 140 μs ±30%
Step or Slew signal not received	Logic 0
READER READY	
Ready	Logic 1 when the reader is ready to accept an input drive command
Not Ready	Logic 0
BROKEN TAPE	
Tension arm in extreme downward position	Logic 1 indicates broken tape
Tension arm in normal operating position	Logic 0

SECTION II

INSTALLATION AND OPERATION

2-1. GENERAL.

This section of the instruction manual contains installation and operation information for the reader/spooler. Mounting, power and interface, tape loading, tape splicing, and operating instructions are provided. Refer to the Options section of this manual and/or interfacing equipment instruction manuals for special installation requirements.

2-2. INSTALLATION.

The front panel is provided with mounting holes for installation in a standard 19-inch RETMA equipment rack. Mounting slides may be provided as optional equipment. See outline dimension drawing 126701 in section V.

Apply power to the reader/spooler via the three-pin power connector J2. The power cord, three-wire Switchcraft part number P-2392 (EECO part number 346323-01) is supplied in the parts kit. Position the voltage select switch S2, on the rear panel, for the voltage supplied.

CAUTION

When connecting the ac line cord to the line, be certain that the grounding pin is connected to a good ground source.

The data and control signals necessary for reader/spooler operation are shown in figure 2-1. To interface with other equipment, fabricate appropriate cables using size 22 AWG wire of necessary length not to exceed 10 feet. For noise immunity, use twisted pairs, terminated at both ends of the cable to the ground points.

2-3. Interface.

To synchronize the input drive signals with the reader control signals, observe the timing relationships of figure 2-2. The recommended interface circuits are shown in figure 2-3. In the step mode, apply a logic 1 pulse between 35 microseconds and 2 milliseconds (t_1) to either DRIVE RIGHT or DRIVE LEFT. Hold the unused drive input at logic 0.

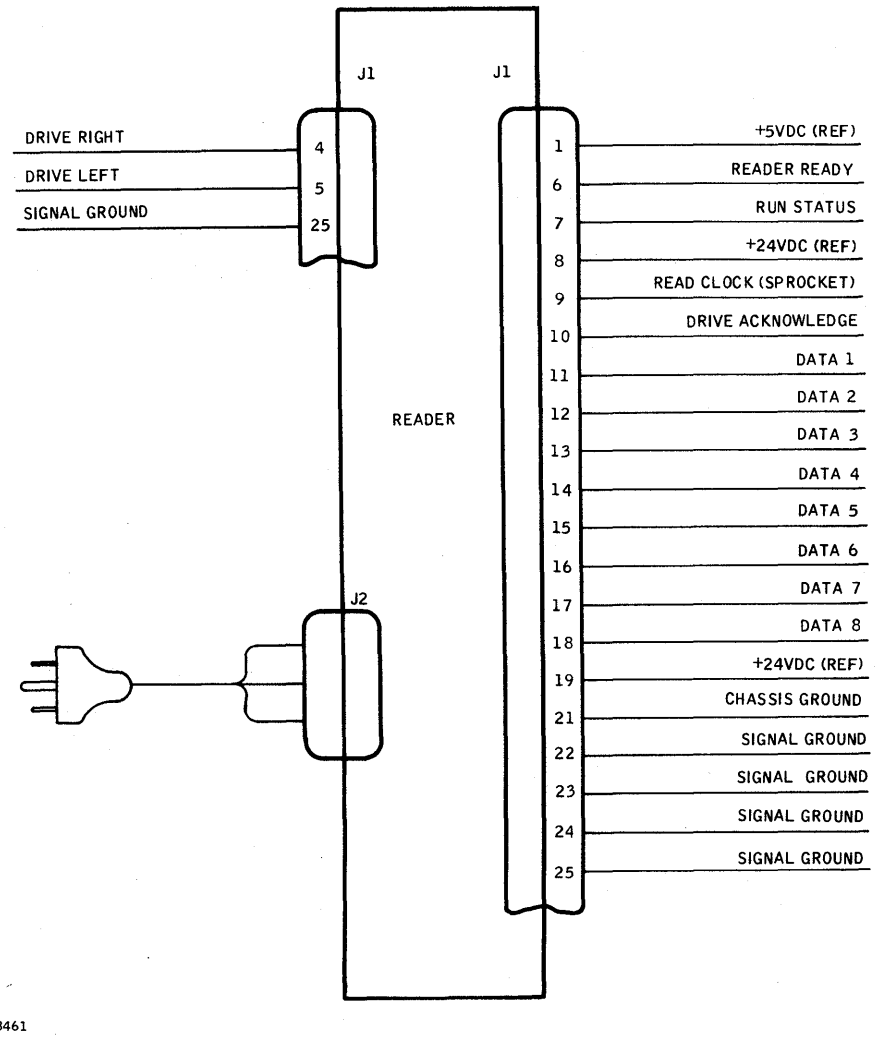

Figure 2-1. Input/Output Signals

Synchronize on the READER READY signal J1-6 by applying the step pulse only when READER READY is in the logic 1 state. READER READY goes to the logic 0 state when a step input is applied and returns to logic 1 typically 83 microseconds after the READ CLOCK (Sprocket) returns to logic 1 (t_3). The minimum interval between step pulses is limited by the reader to 5 milliseconds (t_2).

The reader can also be operated in the step mode using the DRIVE ACKNOWLEDGE signal. Apply a logic 1 pulse at any time and hold at logic 1 until DRIVE ACKNOWLEDGE signal is received. See figure 2-3 for recommended drive circuit.

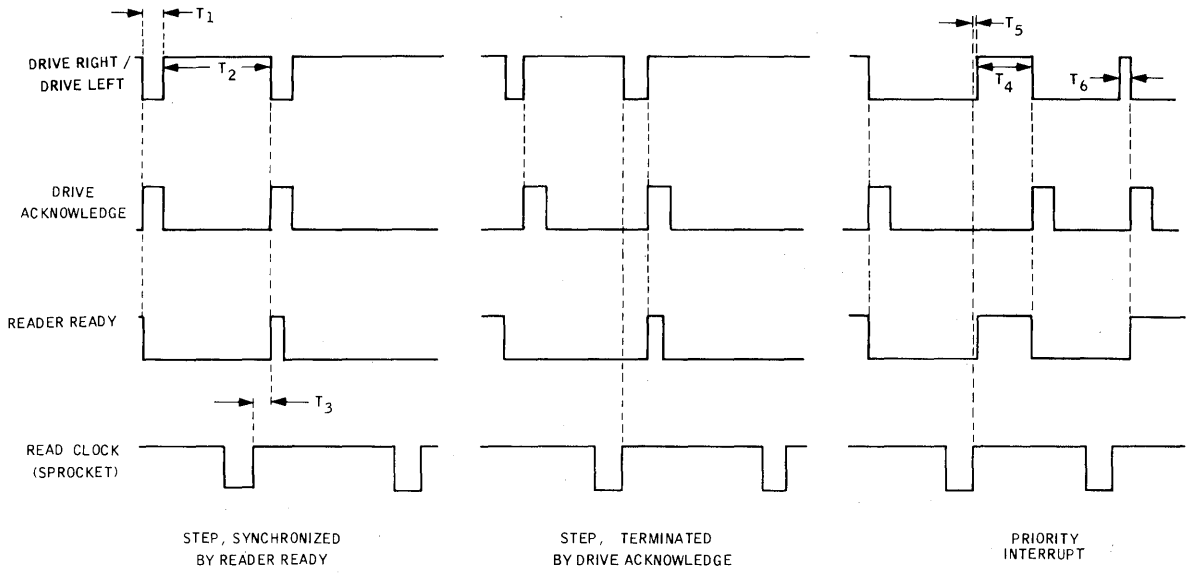

Figure 2-2. Reader Interface Timing Diagram

For slew mode operation, hold DRIVE RIGHT or DRIVE LEFT at a logic 1 level for the duration of slewing. The repetition rate in the slew mode is limited by the reader. In the priority interrupt mode, an interruption greater than 50 microseconds causes the reader to pause until another DRIVE input is received (t_4). The reader continues to run at maximum speed if the DRIVE input is dropped for less than 50 microseconds (t_6). To stop on-character, remove the DRIVE input within 50 microseconds of the rising edge (hole-going condition) of the READ CLOCK (Sprocket) (t_5).

Note

When switching from a DRIVE RIGHT input to a DRIVE left or vice versa in any mode, hold both inputs at logic 0 for a minimum of 50 microseconds.

Sample the data after READ CLOCK (Sprocket) goes to the logic 1 level (hole condition). The READ CLOCK (Sprocket) may be delayed before sampling the data for higher reliability when using worn or skewed tapes.

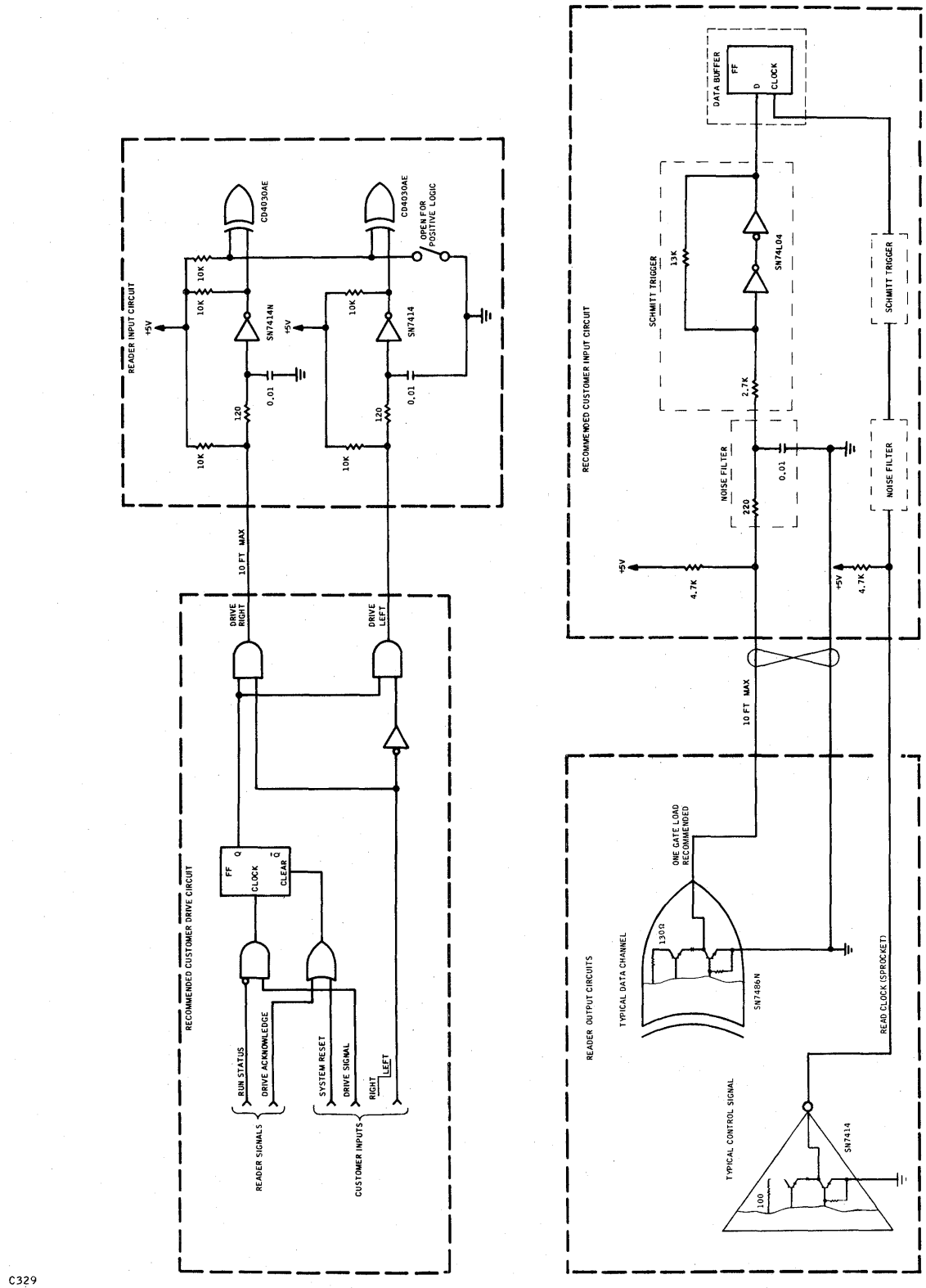

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Figure 2-3. Recommended Reader/Spooler Interface Circuits

2-4. Logic Modes.

Input and/or output logic modes may be inverted by changing logic switch settings on the control printed circuit card. The logic mode options are listed in table 2-1.

Table 2-1. Reader Logic Options

LOGIC		LOGIC SWITCH POSITION			
Input	Output	Drive Input S1-1	Read Clock (Sprocket) S1-2	Broken Tape Reader Ready S1-3	Data Output S1-4
Negative	Negative	On	Off	On	On

2-5. TAPE LOADING.

One inch, eight track tape has three rows of information holes on one side of the row of sprocket holes and five rows of information holes on the other side. Narrower tapes have three information holes on one side and fewer than five on the other. The tape is always installed with the three information holes nearest the front panel, that is, with the sprocket hole in the fourth row from the front panel.

The reel of tape to be read is normally installed on the left side of the reader/spooler. The free end of tape, which contains the leader followed by the beginning of information to be read, should leave the reel from the top. Tape unwinds when the reel is rotated clockwise. Forward travel of the tape is defined as left to right movement through the read head.

When loading tape, handle only the very end of the tape. Avoid touching the tape more than necessary. To load the tape, refer to figure 2-4 and proceed as follows.

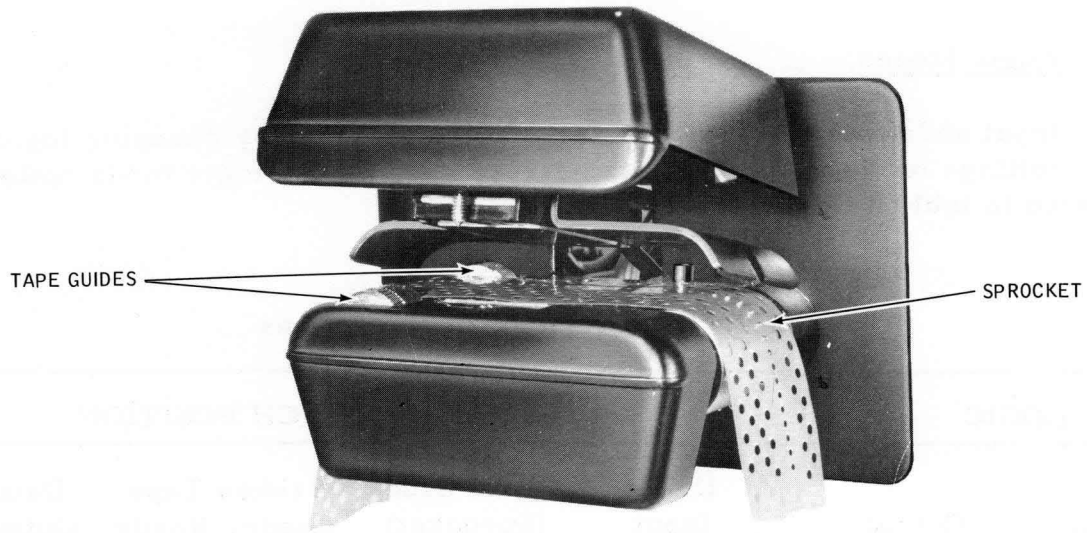

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Figure 2-4. Tape Loading

1. Install the reel of tape on the left hub. Rotate reel until latch engages in the groove in the reel.

2. Unwind about 3 feet of tape leader.

3. Open the read head by carefully lifting the upper section.

4. Rotate tape width selector to set for width of tape being used.

5. Route tape over the top of the left guide roller, down and under the left tension arm guide roller, and up through the head making certain that the sprocket teeth engage the sprocket holes in the tape.

6. Carefully close read head by pressing down on top section until top snaps in place.

7. Route remainder of tape down and under right tension arm guide roller and up and over the top of the right guide roller.

CAUTION

Do not attach free end of tape to take-up reel with adhesives. Failure to comply may result in damage to the reader/spooler.

8. Attach tape leader to take-up reel by inserting free end of tape into slot in reel. Tape must pass over top of reel for clockwise rotation.

9. Manually rotate each reel to take up tape slack.

2-6. TAPE SPLICING.

When necessary to splice punched tape, a butt splice is recommended. A butt splice is made by placing the square-cut ends of the tape together without overlapping (see figure 2-5). Care should be taken to maintain the proper distance between holes. The hole spacing should be 0.100 ±0.001 inches. Splicing can best be accomplished by use of a commercial punched tape splicer such as manufactured by the Data-Link Corp. There should also be no lateral shift of the tape ends. Apply contact adhesive splicing material such as silver Scotch tape No. 852 to the top side of the punched tape so that it will be away from the phototransistor array and sprocket wheel. Pre-punched splices are also available from several sources. Be certain the splicing material ends between holes. Trim the splicing material evenly at the edges of the tape. Do not use transparent splicing material on butt spliced tape.

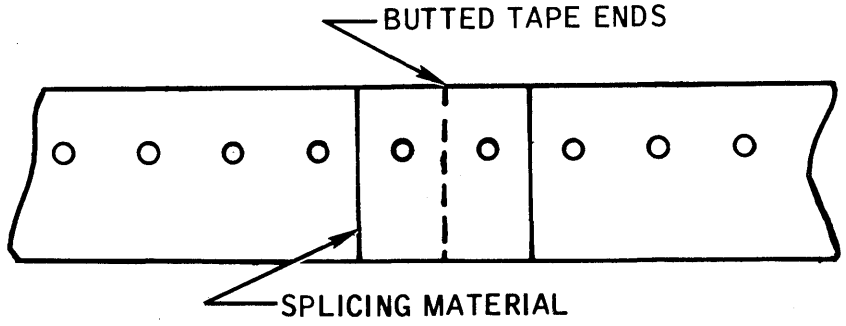

Figure 2-5. Tape Splice

2-7. OPERATION.

Operator controls and an indicator are located on the front panel (see figure 1-1). The operation and functions of the controls and indicator are described below.

POWER switch	Applies power to the reader/spooler.
POWER indicator	A LED indicator that lights when 115 Vac power is applied to the reader/spooler and internal dc power is available.
REWIND switch	A three-position momentary toggle switch to wind the tape at 400 characters per second on either reel. In the left rewind position (◀), tape travels from right to left through the read head and winds on the left reel. Tape is wound on the right reel in the right rewind position (▶). The center position is the normal speed run position.
SPOOL/LOOP switch	A two-position toggle switch. When set to SPOOL for operation using reels of tape, the spooler motors are active and the BROKEN TAPE output signal is also active. The LOOP position is for operation using loops or strips of tape. In the LOOP position, the spooler motors do not operate and the BROKEN TAPE output signal is forced to logic 0 regardless of the positions of the tape tension arms.

SECTION III
FUNCTIONAL DESCRIPTION

3-1. GENERAL.

This section describes the operation of the reader/spooler on a functional basis. The description is in the form of a block diagram explanation of the unit.

3-2. FUNCTIONAL DESCRIPTION.

A simplified block diagram of the reader/spooler is shown in figure 3-1. Note that the unit is divided into two sections, reader and spooler, with no electrical connection between sections.

3-3. Reader.

The reader section of the reader/spooler is a photoelectric perforated tape reader. The perforated tape, driven by the stepper motor, passes between a light-emitting diode (LED) array and a phototransistor array located in the read head. Infrared light from the LED array passes through holes in the tape to cause the phototransistors to conduct. Outputs of the phototransistor array are applied to the data amplifier where they are amplified, wave shaped, and applied to exclusive OR gates for logic level selection. Eight data signals, corresponding to eight tracks of tape holes, and several interface signals are available at the input/output connector.

External control signals are applied through the input/output connector to the input logic circuit. The input logic circuit provides motor drive logic control signals. These logic signals are amplified by the motor drive circuit to the power level necessary to activate the stepper motor. As the stepper motor drives the tape to a new row of holes, the sprocket hole initiates several control signals. Status signals are available at the input/output connector to be used to control operation of the reader.

The LED array consists of light-emitting diodes arranged in a nine-diode array. The LED's transmit infrared light through holes in the perforated tape to be sensed by nine similarly arranged phototransistors. Current through the LED array is adjusted to bias the phototransistors into conduction for holes in the tape and into cutoff for no holes. The adjustable output of the transistors is applied to the data amplifier.

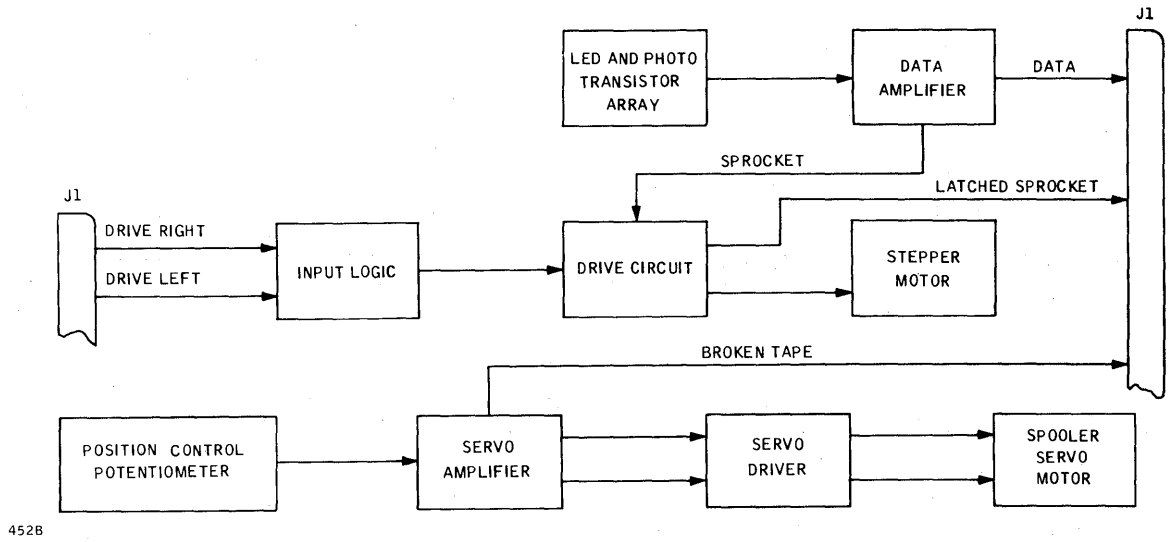

Figure 3-1. Simplified Block Diagram

The data amplifier consists of eight voltage comparators, each connected to an exclusive OR gate. A voltage comparator compares the output of a phototransistor to a reference voltage. When the voltage from the phototransistor is less than the reference voltage (hole condition), the comparator output is low. When the voltage from the phototransistor is greater than the reference voltage (no-hole condition), the comparator output is high.

Each comparator output is applied to one input of an exclusive OR gate. The other input to an exclusive OR gate is selected by an internal switch and can be either ground or +5 volts. A ground (switch closed) results in a low output from an exclusive OR gate when a hole is present. +5 volts (switch open) results in a high output when a hole is present.

The input logic circuit uses externally supplied signals and an internal sprocket signal to generate logic signals and motor drive control signals. The motor drive control signals sequence the stepper motor in the desired direction. The motor drive circuit is disabled by a switch in the read head when the head is open. Closing the read head resets the logic and allows normal operation. The motor drive control signals are amplified to the power level necessary to drive the stepper motor.

The stepper motor is a four-phase motor that drives the sprocket. The sprocket engages the sprocket holes in the tape and propels the tape in the direction controlled by the externally supplied control signals. The direction of rotation of the motor is determined by the sequence of energizing adjacent pairs of motor windings.

3-4. Spooler.

The spooler consists of two identical and separate right and left servo control circuits. Each circuit drives a tape reel in response to a control potentiometer. This closed-loop proportional system is balanced with the servo motors running or stopped to maintain the tape tension arms near the center (neutral) position. The spooler is disabled when the SPOOL/LOOP switch is in LOOP.

+20 volts is applied to the control potentiometers which are mechanically positioned by the tape tension arms. Movement of the tape tension arms changes the voltage from the control potentiometers which is applied to the servo electronics. Voltage from the potentiometers changes with tape speed.

The servo electronics amplifies the voltages from the control potentiometers and determines the required direction and speed of the respective spooler motor. A lead-lag compensator momentarily boosts the amplifier output voltage for rapid servo motor response and system stability.

The voltages from the control potentiometers are compared to a reference voltage by arm travel limiting comparators. When a control potentiometer voltage is increased slightly higher than the reference voltage, a comparator switches to disable the respective servo control circuit. The spooler drivers amplify the motor drive signals from the servo electronics and produce current gain to supply the servo motor current. The right and left spooler motors rotate the reels of tape to take-up and play-out tape as required.

SECTION IV

MAINTENANCE

WARNING

Hazardous voltages are present in this equipment when power is connected. Use caution to avoid electrical shock.

4-1. GENERAL.

This section contains information for maintaining the reader/spooler. The instructions include preventive maintenance, alignments and adjustments, and troubleshooting.

4-2. PREVENTIVE MAINTENANCE.

Preventive maintenance consists of cleaning and lubrication. When performed at regular intervals, reader/spooler breakdown may be prevented and optimum performance ensured.

4-3. Cleaning.

The glass surfaces of the read head must be cleaned to prevent excessive accumulation of dirt from causing misreading of tape. To clean the read head, perform the following procedure.

CAUTION

Do not use sharp tools or volatile solvents. Avoid excessive pressure in glass. Failure to comply may result in damage to equipment.

1. Open head by carefully pulling up top section.
2. With a dry cotton swab, wipe the two glass surfaces and surrounding area of head. If glass cannot be cleaned thoroughly with a dry cotton swab, proceed with the following steps.
3. Prepare a cleaning solution of water and mild liquid detergent.
4. Wipe glass surfaces with clean cotton swab moistened with cleaning solution. Use solution sparingly and do not saturate area.
5. Rinse area with clean cotton swab moistened with clean water.
6. Wipe dry with soft clean cloth or dry cotton swab.

7. Inspect glass surfaces for cleanliness making certain that no residue is present. If further cleaning is required, repeat steps 3 through 7 until glass is thoroughly clean.

8. Close read head by pressing down on top section until top snaps in place.

4-4. Lubrication.

Lubrication is required on the read head cover hinge and ball detent holes. A small amount of Dow Corning 33 lubricant may be used in the locations pointed out in figure 4-1.

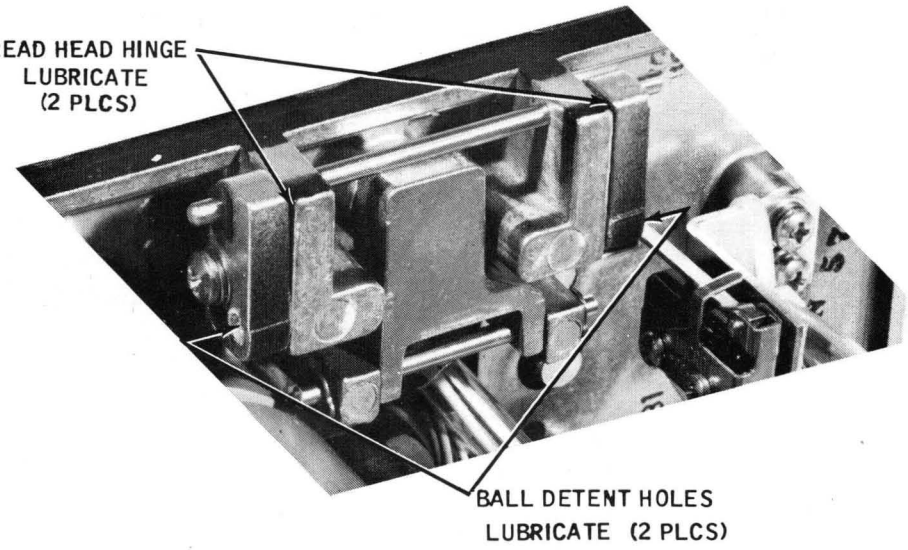

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Figure 4-1. Lubrication Points

WARNING

DO NOT TOUCH THE STEPPER MOTOR WHILE HOT. THIS MOTOR MAY OPERATE AT TEMPERATURES AS HIGH AS 275°F (135°C).

4-5. ALIGNMENT AND ADJUSTMENT PROCEDURES.

All alignments and adjustments, both mechanical and electrical, are carried out initially at the factory. Readjustments should not normally be necessary; however, due to wear or replacement of parts and components, some readjustments may be required.

Positive input/output logic is used in these procedures. The positive logic levels are:

Logic 0 = 0.0 to +0.4 Vdc at 16 milliamps (sink)
Logic 1 = +2.4 to +5.2 Vdc at 400 milliamps (source)

For a reader/spooler using negative logic, interchange the two logic levels.

Unless otherwise specified, all parameter tolerances are ±10%.

Test equipment and special tools required to perform alignment and adjustments are listed in table 4-1. Equivalent test equipment and tools may be substituted.

Table 4-1. Test Equipment and Special Tools

Item No.	Tool or Test Equipment	Model or Part No.	Characteristics
1	Oscilloscope	Tektronix 545A	Dual channel preamplifier
2	Digital Voltmeter	Fluke 8000A	0.5% accuracy
3	Test Clip (Dual-in-line IC)	EECO 117228-01	Extends IC pins for test and is used for extraction of IC
4	Test Tape Kit	EECO 230997-01	
5	Green Mylar/Foil/ Mylar Tape Loop	EECO 131498-11*	Checkerboard punched
6	Blue Paper Tape Loop	EECO 131498-54*	All holes punched
7	Yellow Paper Tape Loop	EECO 131498-91*	Checkerboard punched

*Items 5, 6, and 7 are included in item 4.

1. Spooler Servo Control Potentiometer Alignment

Note

No tape or reels are required for this adjustment.

a. Connect power to the reader/spooler.

b. Set POWER switch up (on) and SPOOL/LOOP switch to SPOOL.

c. Manually move the left tape arm approximately 1/2 inch away from the rubber stopper and verify that the left spooler motor rotates in the correct direction (counter-clockwise). Continue to raise tape arm and note servo motor slows to a stop in a null position. As tape arm is raised further, the motor will rotate in opposite direction (clockwise). If motor rotates in the correct direction proceed to step d.

d. Manually lower left tape arm until motor stops. Tape arm should be 0.25 ± 0.1 inch from lower rubber stopper. If the position of the tape arm is not within specification, re-adjust by loosening the set screw and move the tape arm to the correct position. Retighten the set screw, then release the tape arm. Repeat steps c and d to verify that the adjustment has been performed properly.

e. Repeat steps c and d for the right tape arm except the right motor should rotate clockwise when the arm is first raised.

2. LED Current and Phototransistor Output Adjustments

a. Power

(1) Set the reader/spooler power switch to ON.

(2) Verify that power LED is on.

(3) Using the digital multimeter, verify that the voltage at the printed circuit board (PCB) connector J1 pin 1 is +4.75 to +5.25 Vdc. (See figure 4-2.)

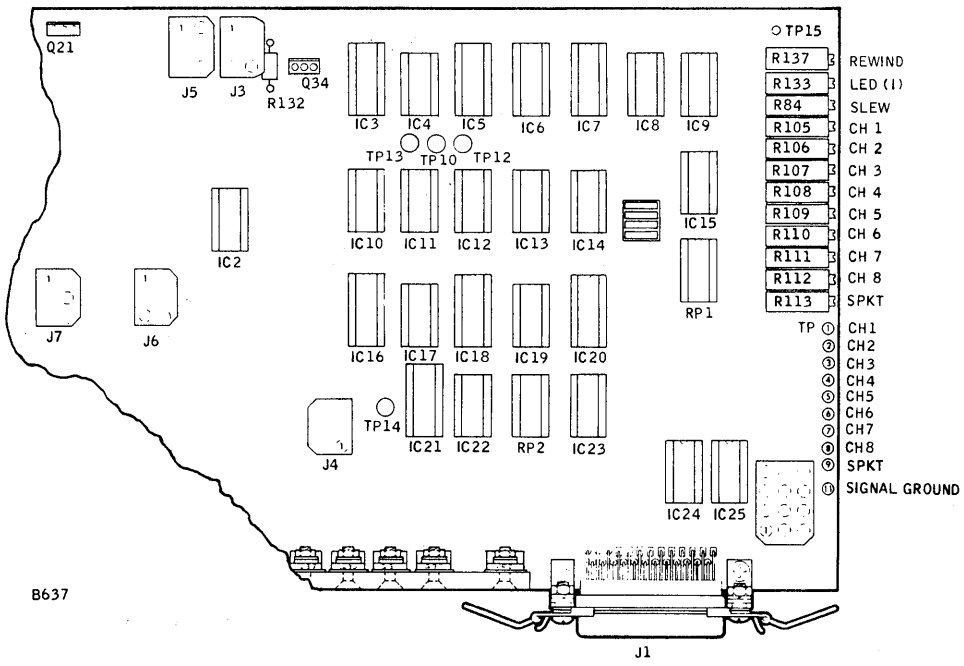


Figure 4-2. Control and Test Point Locations

(4) Verify that the voltage at fuse F2 is +22.0 to +26.0 Vdc.

b. LED Current Adjustment

(1) Place the reader/spooler in the Loop Mode.

WARNING

MOTOR MAY BE HOT

(2) Load the green test tape (P/N 131498-11) into the read head. Be sure the sprocket teeth are engaged and a character is lined up to be read by photo array. If the character does not align with the photo array when power is applied to the unit, loosen the three synclamps which secure the motor to the mounting plate and rotate the body of the motor until the character and the photo array are aligned. Tighten the synclamps.

(3) Operate the reader/spooler in the right slew mode.

Note

If no computer or test box is available, this may be accomplished by jumpering as follows:

Positive Logic Unit - J1 pin 4 (DRIVE RIGHT) to J1 pin 25 (SIGNAL COMMON)

Negative Logic Unit - J1 pin 4 (DRIVE RIGHT) to J1 pin 1 (+5VDC)

(4) If the reader/spooler operates satisfactorily, go to paragraph c.

(5) If the reader/spooler fails to operate, adjust the LED potentiometer (R133) on the printed circuit board for 1.6 Vdc to 1.8 Vdc at test point TP15. (Use the digital multimeter.)

Note

If motor fails to run, continue with paragraph c.

c. Photo Transistor Adjustment

(1) Load the blue test (P/N 131498-54) into the read head.

(2) Operate the reader/spooler in the slew right mode. If the unit fails to run, turn the sprocket potentiometer (R113) on the PCB counter-clockwise until the tape runs from left to right.

(3) Connect the channel A scope probe to the PCB test point TP9 (raw sprocket).

(4) Stabilize and trigger the scope at about +1.0 Vdc.

(5) Adjust the PCB sprocket potentiometer (R113) until the no-hole portion of the waveform is at +3.0 Vdc. (See figure 4-3.) Keep the baseline below +0.4 Vdc and any dips above +2.4 Vdc. If +3.0 Vdc cannot be reached with the sprocket potentiometer, adjust the LED potentiometer (R133) slightly until +3.0 Vdc can be reached.

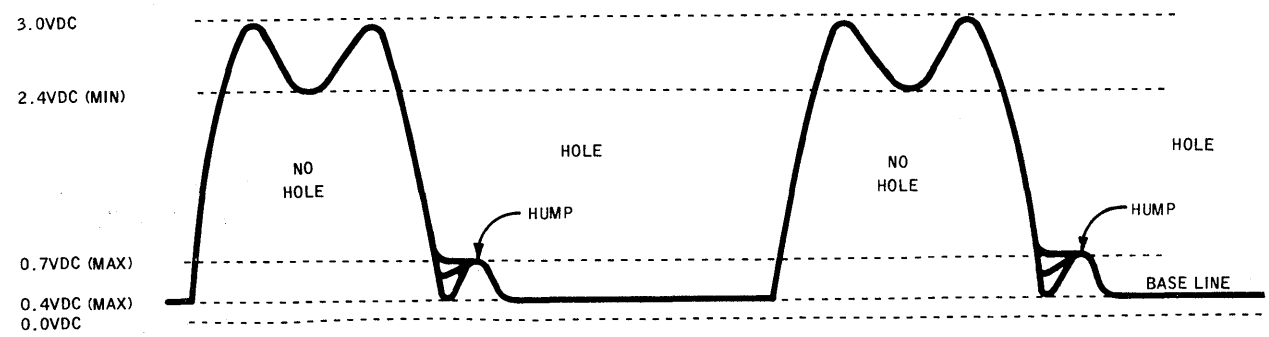


Figure 4-3. Sprocket Waveform

(6) Move the scope probe to each of the eight PCB data test points (TP1-TP8) and adjust the eight corresponding data channel potentiometers (R105 through R112) for +3.0 Vdc at the no-hole portion of the waveform. (See figure 4-4.)

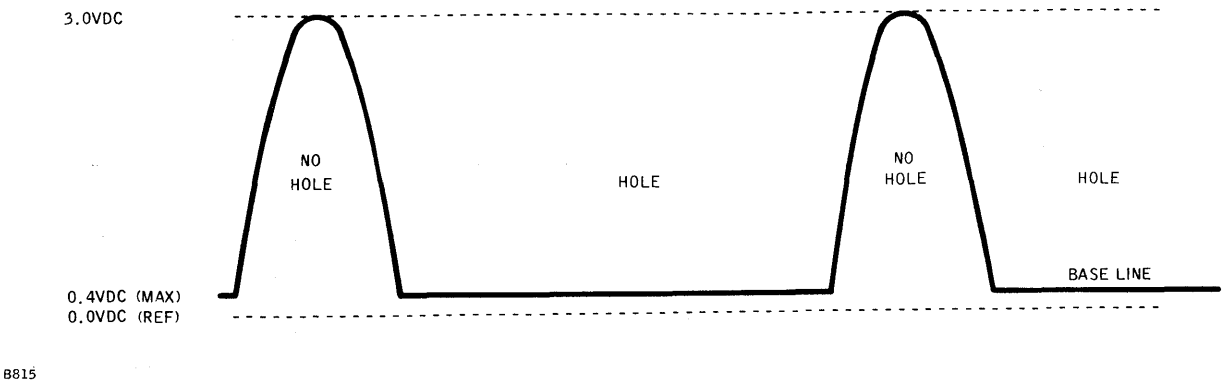


Figure 4-4. Data Waveform

d. Stepper Motor Rotational Alignment

WARNING

STEPPER MOTOR MAY BE EXTREMELY HOT!. DO NOT TOUCH MOTOR WITH BARE HANDS.

(1) Load the green test tape (P/N 131498-11) into the read head.

(2) Set the scope to alternate mode, external trigger.

(3) Place the channel A scope probe to test point TP12 or connector J1 pin 10 (DRIVE-ACKNOWLEDGE). Trigger the scope on J1 pin 10.

(4) Place the channel B scope probe to the PCB test point TP9 (raw sprocket).

(5) Operate the reader/spooler in slew mode.

(6) While observing channel B, reverse the tape direction. Verify that the shift in position of the positive-going leading edge of the waveform does not exceed 200 microseconds. (See figure 4-5.). If the shift is less than 200 microseconds, go to paragraph e.

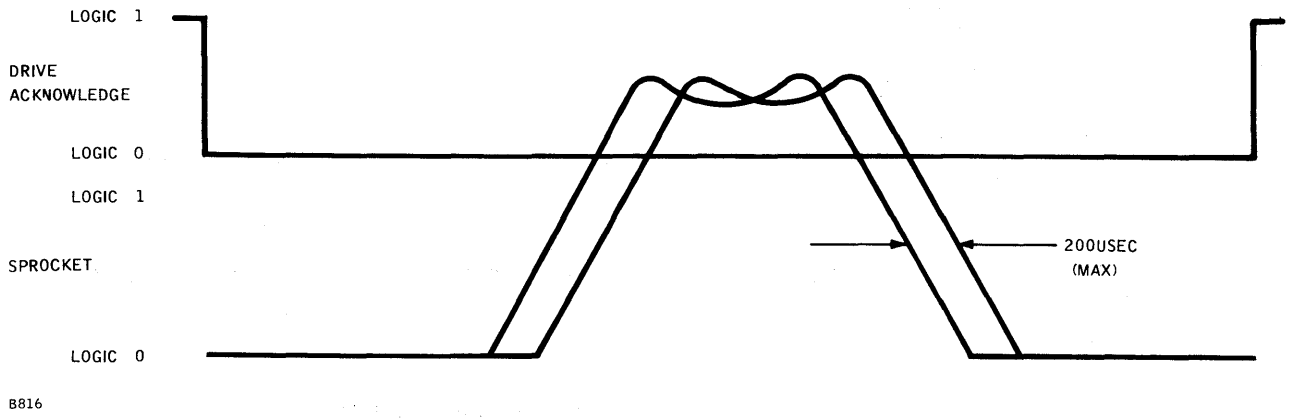


Figure 4-5. Sprocket Waveform Shift (Direction Change)

(7) If the waveform shift exceeds 200 microseconds:

(a) Loosen the three syn-clamp screws which secure the stepper motor to its mounting plate.

(b) Rotate the body of the motor while reversing the tape direction until the shift is less than 200 microseconds.

(c) Retighten the three screws.

(d) Repeat paragraph d(6).

e. Data Channel

(1) Load the blue test tape (P/N 131498-54) into the read head.

(2) Operate the reader/spooler in the slew right mode.

(3) Place the channel A scope probe at the PCB connector J1 pin 9 (sprocket). Trigger scope on external negative at J1 pin 9.

(4) Place the channel B scope probe on each of the eight data test points (PCB connector J1 pins 11 - 18) and check for the waveform of figure 4-6.

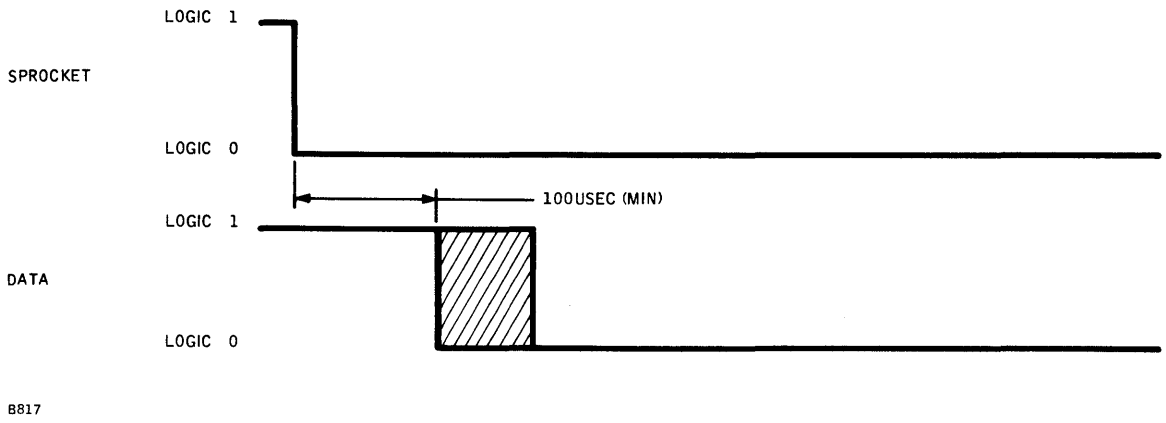


Figure 4-6. Sprocket/Data Timing
(Negative Going)

(5) If any data negative excursion is less than 100 microseconds after the sprocket negative excursion, adjust the corresponding potentiometer (R105 through R112) slightly to obtain 100 micorseconds.

(6) Move the channel A scope probe to the data 1 test point (J1 pin 1). Trigger the scope on external positive at pin 1.

(7) Move channel B scope lead to the sprocket test point (J1 pin 9).

(8) Check for the waveform of figure 4-7. If the positive sprocket excursion is less than 100 microseconds after the data positive excursion, adjust the data potentiometer (R105) slightly to obtain 100 microseconds.

(9) Move the channel A scope probe and trigger to each of the other seven data test points (J1 pin 2-8) and observe the waveform of figure 4-7. Again, if the sprocket positive excursion is less than 100 microseconds, adjust the corresponding data potentiometer (R106 - R112) to obtain 100 microseconds.

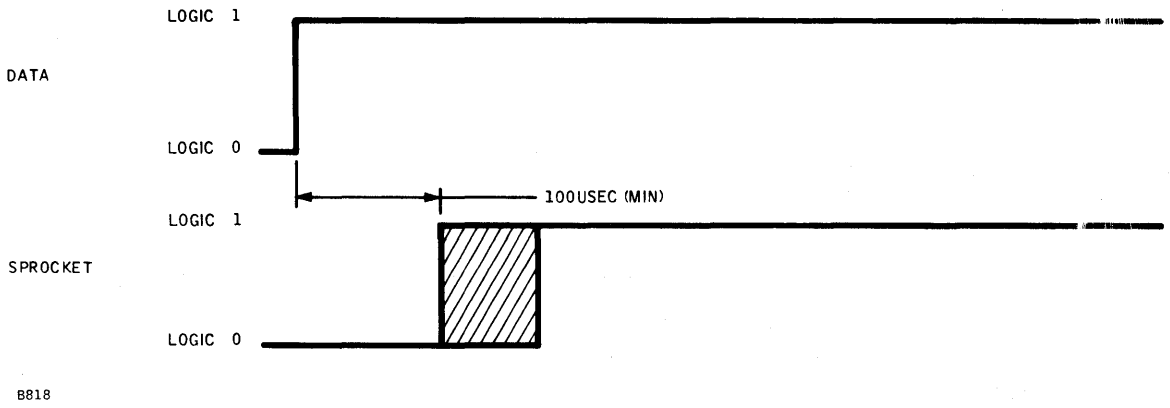


Figure 4-7. Sprocket/Data Timing
(Positive Going)

(10) Repeat paragraphs (3) through (9) for any channel requiring adjustment until all channels meet the 100 microsecond specification without further adjustment.

f. Error-Free Check

If an EECO test box (P/N SKD2907) or proper computer test program is available, use the yellow test tape (P/N 131498-91) to check the error-free operation.

Note

The reader/spooler may not operate error-free using tapes with an opacity equal to or greater than the yellow test tape (per ANSI X 3.29 - 1971). If the reader/spooler makes reading errors after alignment, consult the factory.

3. Data/Sprocket Timing

a. Load the all holes tapes loop (item 6 of table 4-1) and operate in the slew mode.

b. Monitor each data phototransistor output test point (TP1 through TP8) relative to the sprocket phototransistor output at TP9 for the characteristics shown in figure 4-8. Synchronize the oscilloscope with the sprocket signal.

c. If Δt_1 of Δt_2 is less than 100 microseconds, increase sprocket (SPKT) phototransistor output voltage by adjusting potentiometer R113. See paragraph 2. c. (5).

d. Remove the tape from the read head and verify that TP9 is less than +0.4 Vdc.

4. Slew Speed Adjustment

a. Monitor the motor clock pulses at TP12 on the printed circuit card while operating the reader/spooler in the slew mode.

b. Adjust potentiometer R84 until the time between leading edges of pulses is 5 milliseconds.

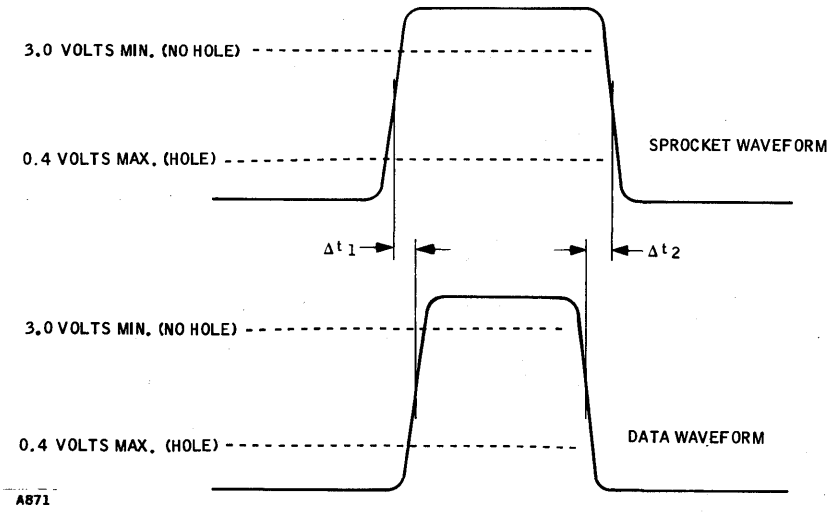


Figure 4-8. Data/Sprocket Timing Relationship

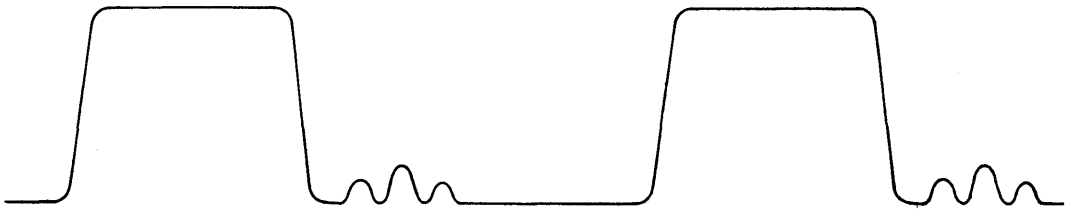
5. Stepper Motor Damping Adjustment

   a. Monitor the sprocket waveform at TP9 with an oscilloscope.

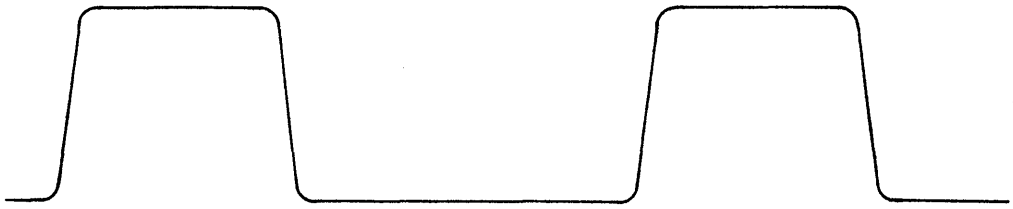
   b. Step the reader at various speeds to find a resonant condition. At resonance, the oscilloscope will display a waveform similar to the one shown in figure 4-9A.

   c. Adjust rheostat RS1 until a clean sprocket waveform is obtained as shown in figure 4-9B.

   d. Vary the speed of the reader and readjust RS1 as necessary to remove all resonant points.



A. RESONANCE



A1035

B. RS1 ADJUSTED TO REMOVE RESONANCE

Figure 4-9. Stepper Motor Damping Adjustment

6. Rewind Speed Adjustment

   a. Monitor the motor clock pulses at TP12 on the printed circuit card while operating the reader/spooler in the rewind mode.

   b. Adjust potentiometer R137 until the time between the leading edges of pulses is 2.5 milliseconds.

4-6. TROUBLESHOOTING.

Troubleshooting to isolate a defective component is required should the reader/spooler fails to perform a designed function. Refer to table 4-2 for troubleshooting the reader/spooler. This table lists several symptoms of trouble with suggested remedies. If the trouble indication is not listed in the troubleshooting tables, refer to the drawing in section V.

CAUTION

Observe standard CMOS handling procedures where applicable.

Note

Logic levels must be measured using an oscilloscope or digital voltmeter, not a multimeter. Access to integrated circuit pins is gained by attaching the dual-in-line IC test clip to the integrated circuit package. The IC test clip is also used to remove IC packages from the printed circuit board.

Table 4-2. Troubleshooting

Item	Symptom	Remedy
1	Stepper Motor does not step.	a. Check input power and fuse. b. Thread tape correctly. Refer to tape loading procedure in section II. c. Check RUN STATUS signal (J1-7) logic 0 to run. d. Verify proper input signals. e. Check logic level switches for desired logic option. f. Check power supply voltages. See schematic 126706. g. Troubleshoot control card.
2	Stepper Motor steps in one direction only.	a. Check DRIVE RIGHT and DRIVE LEFT signal levels. J1-4 at logic 1 for the right tape travel. J1-5 at logic 1 for left tape travel with the remaining input at logic 0. b. Troubleshoot input logic circuit.
3	Motor steps erratically.	a. Perform alignment and adjustment procedure in section IV. b. Troubleshoot motor drive circuit.

Table 4-2. Troubleshooting (Continued)

Item	Symptom	Remedy
4	Incorrect reading rate.	Check slew speed adjustment procedure in section IV.
5	Tape chatters or flutters and does not drive smoothly.	Check stepper motor damping adjustment procedure in section IV.
6	No data output.	a. Verify proper LED current. Refer to adjustment procedure in section IV. b. Check logic level switch. Refer to section II. c. Check phototransistor outputs TP1 through TP8.
7	Erroneous data output.	a. Clean read head. See cleaning procedure in section IV. b. Check individual phototransistor outputs at TP1 through TP8.
8	Both spooler motors inoperative.	a. Check that SPOOL/LOOP switch is in SPOOL. b. Verify that tape tension arms are in correct position. c. Check spooler control potentiometer adjustment procedure in section IV. d. Check dc power supply voltages.
9	One spooler motor inoperative.	Troubleshoot respective servo circuit.
10	Incorrect rewind speed.	a. Check rewind speed adjustment in section IV. b. Troubleshoot rewind circuit. See schematic 126706.

SECTION V

DRAWINGS AND PARTS LIST

5-1. GENERAL.

This section contains parts lists and those assembly and schematic drawings necessary for maintenance and operation of the EECO Model TRS9200 Tape Reader/Spooler as modified by EECO specification 230438-01. The parts lists are grouped together and followed by the assembly and schematic drawings arranged in numerical order.

Description	Parts List	Assembly	Schematic
Tape Reader/Spooler	230438-01	126702	127136
Front Panel Assembly	126808-02	126808	--
Read Head Assembly	127124-01	127124	--
Control Card PCB	126706-02	126706 (Sheet 1)	126706 (Sheet 2, 3)
Resistor Cable Assembly	127166-01	127166	127166
Parts Kit	129162-01	--	--
Outline Dimensions	--	126701	--

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DESCR. PCB ASSY,RDR/SPLR CNTL
ENGRG DWG # 126706 ECO PEND CONTR NO.

MODEL/ASSY PL 126706-02
PL REV LTR R
PL LAST MAINT 12-22-78
PL ECO PEND
SHT 1 OF 3

REF LN #	QTY REQD	U/M	LEVEL	PART NO. OR IDENT NO.	C C	REV LTR	VENDOR PART NO.	DESCRIPTION	DWG NO.	ECO NO.	REF DES	REF DES NO. OR NOTE
124	2.000	EA		05 110642-03	X	C	MS51957-13	SCR, PAN HD 4-40X1/4	110642			
137	2.000	EA		05 110642-04	X	C	MS51957-14	SCR, PAN HD 4-40X5/16	110642			
130	38.000	EA		05 110659-02	X	B	MS35333-70	WASHER,INT TOOTH #4	110659			
131	14.000	EA		05 110662-02	X	F	MS15795-803	WASHER,FLAT #4	110662			
128	38.000	EA		05 110664-04	X	D	NAS671-C4	NUT,HEX 4-40 NC SM	110664			
	REF	EA		04 126706	X	R	EECO	PCB ASSY,RDR/SPLR CNTL	126706		**	ASSY INSTR
	1.000	EA		04 126707-01	X	G	EECO	PCB,CONT CARD,RDR/SPLR	126707			
7	REF	EA		04 126709	X	A	EECO	ATP,CONTROL CARD	126709		**	ATP
5	REF	EA		04 126710	X	C	EECO	ATC,RDR/SPLR CNTL CARD	126710		**	ATC
129	1.000	EA		04 126830-84	X	D	EECO	LG EXT RUDED HEAT SINK	126830			
33	7.000	EA		04 304061-25	X	D	CK05BX102K	CAP,,1000PF 200V+-10%	304061		**	C12,45-50
20	2.000	EA		04 304061-33	X	D	SEE SCD	CAP,,4700PF 100V +-10%	304061		**	8-20
14	11.000	EA		07 304061-37	X	D	CK05BX103K	CAP,, .01UF 100V 10%	304061		**	SEE ASSY
15	1.000	EA		07 304061-72	X	D	CK06BX104K	CAP,, .1UF 100V 10%	304061		C	35,
19	1.000	EA		07 304451-30	X	B	DM-15-101J	CAP,, 100PF 500V 5%	304451		C	33,
18	1.000	EA		05 304451-38	X	B	DM-15-221J	CAP,, 220PF 500V 5%	304451		C	29,
17	1.000	EA		05 304451-47	X	B	DM-15-471J	CAP,, 470PF 500V 5%	304451		C	34,
21	2.000	EA		04 304850-05	X	D	192P10292	CAP,, .0010UF 200V 10%	304850		C	27,30,
16	11.000	EA		04 304850-17	X	D	192P10392	CAP,,.010UF 200V 10%	304850		**	SEE ASSY
27	1.000	EA		04 304850-21	X	D	192P22392	CAP,, .022UF 200V 10%	304850		C	15,
23	1.000	EA		07 304951-10	X	L	CSR13D226K	CAP,, 22UF 15V 10	304951		C	41,
22	1.000	EA		04 304951-15	X	L	CSR13E106K	CAP,, 10UF 20V 10%	304951		C	44,
11	4.000	EA		04 304951-22	X	L	CSR13F474K	CAP,, .47UF 35V 10%	304951		C	3,4,17,18,
25	1.000	EA		04 304951-28	X	L	CSR13F475K	CAP,, 4.7UF 35V 10%	304951		C	23,
26	4.000	EA		04 304951-32	X	L	CSR13F226K	CAP,, 22UF 35V 10%	304951		C	9,11,12,43,
134	A/R	EA		04 306019-03	X	E	NO. 92X.250W	TAPE,THERMO SETTING	306019			
110	A/R	EA		07 306351-02	X	C	340	CMPD,SILICONE HTSNK	306351			
121	2.000	EA		05 311006-02	X	F	D110277	LATCH,SPRING CONN ABCE	311006	20697		
107	1.000	EA		04 311035-01	X	N	09-18-5121	CONN,12 POS WFR	311035		J	2,
103	1.000	EA		04 311035-03	X	N	09-18-5061	CONN,6 POS HDR	311035		J	3,
104	1.000	EA		04 311035-04	X	N	09-18-5960	CONN,6 POS HDR	311035		J	6,
138	3.000	EA		04 311035-07	X	N	02-09-2118	TERM,PIN 18-22 AWG	311035			
139	3.000	EA		04 311035-08	X	N	02-09-1118	TERM, SKT 18-22 AWG	311035			
105	1.000	EA		04 311035-11	X	N	09-18-5069	CONN,6 POS HDR	311035		J	4,
101	1.000	EA		04 311035-13	X	N	09-18-5031	CONN,3 POS HDR	311035		J	8,
106	1.000	EA		04 311035-22	X	N	09-18-5062	CONN,6 POS HDR	311035		J	7,
108	1.000	EA		04 311035-23	X	N	09-18-5064	CONN,6 POS HDR	311035		J	5,
135	1.000	EA		04 311035-24	X	N	03-09-2032	CONN,3 POS PLUG	311035		P	1,
140	1.000	EA		04 311035-37	X	N	03-09-1033	CONN, 3 POS RCPT	311035		J	10,
102	1.000	EA		04 311035-47	X	N	09-18-5035	CONN,3 POS HDR	311035		J	9,
100	1.000	EA		04 311035-48	X	N	09-18-5034	CONN,3 PIN WAFER	311035		J	16,
109	1.000	EA		07 311182-02	X	H	206584-1	CONN,25 POS RCPT	311182		J	1,
9	5.000	EA		04 311273-05	X	G	45228-4.5	TERM,TURRET	311273		**	TP10,12-15
8	10.000	EA		04 311273-06	X	G	45318-5.04	TERM,TURRET	311273		**	TP1-9,11
93	17.000	EA		04 312202-01	X	F	CA14LS2-10SD	SOCKET,IC 14 PIN L/P	312202			
94	8.000	EA		04 312202-02	X	F	IEW3700-16BW	SOCKET,IC 16 PIN L/P	312202			
120	14.000	EA		04 322049-02	X	C	4-40 X 5/16	SCR, HEX	322049			
117	14.000	EA		04 322714-03	X	A	DF137A	WASHER,SHOULDER TO-220	322714			
133	4.000	EA		04 322804-08	X	A	SE-34	EYELET	322804			
132	4.000	EA		04 323404-16	X	G	6007-30CC	CLIP,COMPONENT	323404			
54	4.000	EA		07 325401-01	X	B	10030	TRANSIPAD, TO-5	325401		Q	4,12,17,24,

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DESCR. PCB ASSY,RDR/SPLR CNTL
ENGRG DWG # 126706 ECO PEND CONTR NO.

MODEL/ASSY PL 126706-02
PL REV LTR R
PL LAST MAINT 12-22-78
PL ECO PEND
SHT 2 OF 3

REF LN #	QTY REQD	U/M	LEVEL	PART NO. OR IDENT NO.	C C	REV LTR	VENDOR PART NO.	DESCRIPTION	DWG NO.	ECO NO.	REF DES	REF DES NO. OR NOTE
50	12.000	EA		07 325406-01	X	C	MR10053	TRANSIPAD, TO-18 NYLON	325406			
43	2.000	EA		04 326010-04	X	H	SN7486N	IC,QUAD 2-INPT XOR	326010		IC	24,25,
35	2.000	EA		04 326018-01	X	K	CD4001AE	IC,4,2-INPUT NOR	326018		IC	13,22,
36	1.000	EA		04 326018-11	X	K	CD4011AE	IC,4,2-INPUT NAND	326018		IC	10,
37	1.000	EA		04 326018-12	X	K	CD4012AE	IC,4,2-INPUT NAND	326018		IC	4,
38	2.000	EA		04 326018-13	X	K	CD4013AE	IC,2,D FLIP FLOP	326018		IC	11,12,
39	1.000	EA		04 326018-27	X	K	CD4027AE	IC,2,J-K M/S FLIP FLOP	326018		IC	18,
40	3.000	EA		04 326018-30	X	K	CD4070BE	IC,4,EXCLUSIVE OR	326018		IC	14,17,19,
41	4.000	EA		04 326018-49	X	K	CD4049AE	IC,HEX BUFF/CON	326018		IC	3,16,20,21,
47	1.000	EA		04 326018-50	X	K	CD4050AE	IC,HEX BUFF/CON	326018		IC	6,
42	1.000	EA		04 326207-06	X	D	SN7414N	IC,HEX SCHMITT TRIGGER	326207		IC	23,
44	4.000	EA		04 326710-02	X	J	LM339N	IC,QUAD COMPARATOR	326710	20540	IC	2,8,9,15,
45	2.000	EA		04 326711-16	X	G	MC14538CP	IC,MV DUAL RETRIG	326711		IC	5,7,
55	2.000	EA		05 326910-05	X	K	7805	IC,VOLTAGE REG	326910		VR	1,2,
46	1.000	EA		04 326913-01	X	D	RC4136DB	IC,QUAD OP AMP	326913		IC	1,
87	1.000	EA		04 335005-09	X	C	RC07GF220J	RES,22 OHM 1/4W 5%	335005		R	10,
57	14.000	EA		07 335005-25	X	C	RC07GF101J	RES,100 OHM 1/4W 5%	335005		**	SEE ASSY
59	6.000	EA		07 335005-33	X	C	RC07GF221J	RES,220 OHM 1/4W 5%	335005		R	77,78,17,29,58,69,
60	4.000	EA		04 335005-39	X	C	RC07GF391J	RES,390 OHM 1/4W 5%	335005		R	16,28,57,68,
62	5.000	EA		07 335005-41	X	C	RC07GF471J	RES,470 OHM 1/4W 5%	335005		R	95,96,97,98,26,
79	4.000	EA		07 335005-53	X	C	RC07GF152J	RES,1.5KOHM 1/4W 5%	335005		R	15,27,54,67,
64	2.000	EA		07 335005-57	X	C	RC07GF222J	RES,2.2KOHM 1/4W 5%	335005		R	88,90,
65	2.000	EA		04 335005-59	X	C	RC07GF272J	RES,2.7KOHM 1/4W 5%	335005		R	14,56,
66	1.000	EA		04 335005-60	X	C	RC07GF302J	RES,3.0KOHM 1/4W 5%	335005		R	86,
67	1.000	EA		05 335005-61	X	C	RC07GF332J	RES,3.3KOHM 1/4W 5%	335005		R	85,
68	10.000	EA		07 335005-65	X	C	RC07GF472J	RES,4.7KOHM 1/4W 5%	335005		**	SEE ASSY
69	9.000	EA		07 335005-73	X	C	RC07GF103J	RES,10KOHM 1/4W 5%	335005		**	SEE ASSY
71	9.000	EA		05 335005-77	X	C	RC07GF153J	RES,15KOHM 1/4W 5%	335005		**	R114-122
72	2.000	EA		04 335005-81	X	C	RC07GF223J	RES,22KOHM 1/4W 5%	335005		R	87,89,
73	2.000	EA		07 335005-82	X	C	RC07GF243J	RES,24KOHM 1/4W 5%	335005		R	12,53,
70	1.000	EA		04 335005-84	X	C	RC07GF303J	RES,30KOHM 1/4W 5%	335005		R	41,
76	6.000	EA		04 335005-89	X	C	RC07GF473J	RES,47KOHM 1/4W 5%	335005		R	22,63,93,40,44,70,
78	4.000	EA		05 335005-95	X	C	RC07GF823J	RES,82KOHM 1/4W 5%	335005		R	5,21,47,62,
80	12.000	EA		07 335006-01	X	C	RC07GF104J	RES,100KOHM 1/4W 5%	335006		**	SEE ASSY
74	2.000	EA		04 335006-03	X	C	RC07GF124J	RES,120K OHM 1/4W 5%	335006		R	76,91,
77	3.000	EA		05 335006-13	X	C	RC07GF334J	RES,330KOHM 1/4W 5%	335006		R	79,83,94,
75	1.000	EA		05 335006-17	X	C	RC07GF474J	RES,470KOHM 1/4W 5%	335006		R	140,
83	2.000	EA		04 335006-19	X	C	RC07GF564J	RES, 560K OHM 1/4W 5%	335006		R	8,51,
84	2.000	EA		05 335006-22	X	C	RC0GF754	RES, 750K OHM 1/4W 5%	335006		R	6,48,
91	4.000	EA		04 335016-43	X	A	RC42GF561J	RES, 560 OHM 2W 5%	335016		R	18,34,59,74,
90	1.000	EA		04 335018-49	X	A	RL07S512G	RES,5.1K 1/4W 2%	335018		R	35,
89	1.000	EA		04 335018-54	X	A	RL07S822G	RES,8.2K 1/4W 2%	335018		R	36,
95	1.000	EA		04 335018-72	X	A	RL07S473G	RES,47K 1/4W 2%	335018		R	42,
82	1.000	EA		04 335018-84	X	A	RL07S154G	RES,150K 1/4W 2%	335018		R	43,
61	1.000	EA		04 335502-62	X	B	RNR55C4320FM	RES,432 OHM 1/10W 1%	335502		R	136,
63	1.000	EA		04 335503-01	X	B	RRN55C1001F	RES, 1,00K 1/10W 1%			R	135,
86	1.000	EA		04 335546-14	X	K	899-1-R3.3K	RES,ARRAY 13 RES,	335546	20313	RP	2,
85	1.000	EA		04 335546-18	X	K	899-1-R10K	RES,ARRAY 13 RES,	335546	20313	RP	1,
98	1.000	EA		04 337418-05	X	B	89PR200	POT, 200 .75W 15T	337418		R	133,
96	9.000	EA		04 337418-14	X	B	89PR100K	POT, 100K .75W 15T	337418		XX	255,
97	2.000	EA		04 337418-17	X	B	89PR500K	POT, 500K .75W 15T	337418		R	84,137,

ELECTRONIC ENGINEERING CO. CODE IDENT 97525
DESCR. PCB ASSY,RDR/SPLR CNTL
ENGRG DWG # 126706 ECO PEND CONTR NO.

MODEL/ASSY PL 126706-02
PL REV LTR R
PL LAST MAINT 12-22-78
PL ECO PEND
SHT 3 OF 3

REF LN #	QTY REQD	U/M	LEVEL	PART NO. OR IDENT NO.	C	REV LTR	VENDOR PART NO.	DESCRIPTION	DWG NO.	ECO NO.	REF DES	REF DES NO. OR NOTE
28	8.000	EA		07 338101-14	X	G	1N4448	DIODE,IN4448 75V	338101		**	SEE ASSY
29	1.000	EA		04 338210-22	X	E	1N5250B	DIODE,VZ 20V .5W +-5%	338210		CR	6,
30	13.000	EA		07 338311-04	X	C	1N4004	DIODE, RECT 400V	338311		**	SEE ASSY
31	1.000	EA		05 338316-01	X	A	VH248	DIODE,BRIDGE 140V 6A	338316		CR	2,
49	6.000	EA		04 338506-08	X	C	2N2907A	TRANSISTOR,PNP	338506		Q	1,5,13,14,18,25,
51	17.000	EA		04 338700-02	X	E	RCA 3055	TRANSISTOR,	338700		**	SEE ASSY
53	6.000	EA		07 338701-06	X	D	2N2222A JAN	TRANSISTOR, NPN SI	338701		Q	2,15,26,27,28,29,
52	4.000	EA		04 338704-05	X	B	2N5784	TRANSISTOR, NPN SI	338704		Q	4,12,17,24,
114	1.000	EA		04 339051-08	X	F	313003	FUSE,3A 250V SLO/BLO	339051		F	1,
115	1.000	EA		04 339053-13	X	A	312002,	FUSE, 2 AMP	339053		F	2,
111	1.000	EA		07 339327-01	X	A	435166-2	SWITCH	339327			
112	1.000	EA		05 339327-08	X	A	435238-01	COVER,SWITCH	339327			
136	.300	FT		07 346123-24	X	A	A2013-05	WIRE, 20AWG YEL 19X32	346123			
136	.300	FT		07 346123-25	X	A	A2013-04	WIRE, 20AWG GRN 19X32	346123			
136	.300	FT		07 346123-26	X	A	A2013-06	WIRE, 20AWG BLU 19X32	346123			
136	1.500	FT		05 346123-33	X	A	A2011-08	WIRE, 22AWG ORN 19X34	346123			

ELECTRONIC ENGINEERING CO. CODE IDENT 97525
DESCR. PANEL ASSY,FRONT
ENGRG DWG # 126808 ECO PEND

MODEL/ASSY PL 126808-02
PL REV LTR G
PL LAST MAINT 5-29-79
PL ECO PEND
SHT 1 OF 2

REF LN #	QTY REQD	U/M	LEVEL	PART NO, OR IDENT NO,	C	REV LTR	VENDOR PART NO,	DESCRIPTION	DWG NO,	ECO NO,	REF DES	REF DES NO, OR NOTE
40	8.000	EA	05	110640-05	X	B	MS51957-43	SCR, PAN HD 8-32X3/8	110640			
41	2.000	EA	04	110640-09	X	B	MS51957-47	SCR, PAN HD 8-32X3/4	110640			
39	8.000	EA	07	110641-05	X	D	MS51957-28	SCR, PAN HD 6-32X3/8	110641			
48	6.000	EA	07	110659-03	X	B	MS35333-71	WASHER,INT TOOTH #6	110659			
49	10.000	EA	05	110659-04	X	B	MS35333-72	WASHER,INT TOOTH #8	110659			
44	2.000	EA	07	110662-04	X	F	MS15795-805	WASHER,FLAT #6	110662			
45	12.000	EA	05	110662-06	X	F	MS15795-807	WASHER,FLAT #8	110662			
53	2.000	EA	06	110664-08	X	D	NAS671-C8	NUT,HEX 8-32 NC SM	110664			
10	2.000	EA	04	123820-01	X	C	EECO	GUIDE,TAPE FIXED	123820			
11	2.000	EA	04	126307-01	X	A	EECO	HUB ASSY,REEL	126307			
14	4.000	EA	04	126526-01	X	B	EECO	ROLLER,TAPE ,125 I.D.	126526			
	REF	EA	04	126808	X	G	EECO	PANEL ASSY,FRONT	126808		**	ASSY INSTR
	REF	EA	04	126809	X	E	EECO	WIRE LIST,PNL FR	126809			
	REF	EA	04	126926	X	A	EECO	INST,INSTALLATION	126926			
7	1.000	EA	04	126959-01	X	C	EECO	PNL,FR TRS9200	126959			
13	2.000	EA	04	127083-01	X	A	EECO	CAM,SPRING	127083			
9	2.000	EA	04	127149-01	X	C	EECO	ARM ASSY,TAPE CNTL	127149			
52	2.000	EA	04	129258-01	X	C	EECO	SPRING,POT MTG	129258			
12	2.000	EA	04	129259-01	X	C	EECO	COUPLING,PRECISION	129259			
50	2.000	EA	04	304956-89	X	G	SEE SCD	CAP,, 100UF 25V	304956		C	1,2,
27	3.000	EA	05	311035-06		N	03-09-1063	CONN, 6 POS RCPT	311035		**	P5-7,
29	7.000	EA	04	311035-07	X	N	02-09-2118	TERM,PIN 18-22 AWG	311035			
30	15.000	EA	04	311035-08	X	N	02-09-1118	TERM, SKT 18-22 AWG	311035			
28	1.000	EA	04	311035-30	X	N	03-09-1042	CONN, 4 POS RCPT	311035		**	P10,
31	4.000	EA	04	311295-01	X	B	42617-2	TERM,CRIMP RCPT	311295			
38	2.000	EA	07	311301-10	X	J	#10	TERM,RING #10 CRIMP	311301			
47	2.000	EA	04	311305-18	X	F	54C	TERM,STRIP 5-LUG	311305		TB	1,2,
22	2.000	EA	04	316001-11	X	B	FF-312-2	BEARING,FLG BRZ ,252	316001			
18	4.000	EA	04	317311-01	X	B	5555-12	RING,RETAINING	317311			
20	2.000	EA	04	317608-01	X	C	173 A	SPRING	317608			
57	1.000	EA	04	322723-01		B	F-50	WASHER-FELT	322723	20732		
26	2.000	EA	04	323008-01	X	B	SP-094-0875	PIN,SPRING,094X,875	323008			
8	4.000	EA	04	323569-03	X	A	8232A0632	STANDOFF,6-32X1-7/8 AL	323569			
19	2.000	EA	04	323607-04	X	C	SEE SCD	BUMPER,RBR 1/2 OD	323607			
54	A/R	FT	05	325511-18	X	B	3003-6-CLEAR	SLVNG,CLEAR ,166	325511			
55	2.000	EA	04	325650-01	X	J	GSB-124	SLEEVE, CRIMP INNER	325650			
56	2.000	EA	04	325650-20	X	J	GSC-187	SLEEVE,CRIMP OUTER	325650			
17	2.000	EA	04	328037-01	X	G	722-901749-705	MOTOR	328037		**	R2,3,
51	2.000	EA	07	335005-49	X	C	RC07GF102J	RES,1K OHM 1/4W 5%	335005		R	3,4,
21	2.000	EA	04	337423-03	X	G	EJA4N056P502UA	POT,5K 2W 1T	337423	20161		
25	1.000	EA	04	338112-04	X	F	5082-4860	LED/RES ASSY	338112	20313	**	DS1,
23	2.000	EA	04	339210-01	X	H	8820011	SWITCH, TOGGLE 6AMP	339210		**	S1,4,
24	1.000	EA	04	339210-04	X	H	MTG-106G	SWITCH	339210		**	S3
35	3.170	FT	06	346123-30		A	A2011-02	WIRE, #22AWG BLK 19X34	346123			
35	2.830	FT	05	346123-33	X	A	A2011-08	WIRE, 22AWG ORN 19X34	346123			
35	1.040	FT	06	346123-34	X	A	A2011-05	WIRE, 22AWG YEL 19X34	346123			
35	4.000	FT	06	346123-35		A	A2011-04	WIRE, 22AWG GRN 19X34	346123			
35	1.830	FT	05	346123-37	X	A	A2011-10	WIRE, 22AWG VIO 19X34	346123			
35	1.000	FT	05	346123-38	X	A	A2011-09	WIRE, 22AWG GY 19X34	346123			
35	2.330	FT	07	346123-40		A	A2009-02	WIRE, 24AWG BLK 19X36	346123			
35	2.330	FT	07	346123-49		A	A2009-01	WIRE,24AWG WHT 19X36	346123			

ELECTRONIC ENGINEERING CO. CODE IDENT 97525
DESCR. PANEL ASSY,FRONT
ENGRG DWG # 126808 ECO PEND

MODEL/ASSY PL 126808-02
PL REV LTR G
PL LAST MAINT 5-29-79
PL ECO PEND
SHT 2 OF 2

REF LN #	QTY REQD	U/M	LEVEL	PART NO. OR IDENT	NO.	C	REV LTR	VENDOR PART	NO.	DESCRIPTION	DWG NO.	ECO NO.	REF DES	REF DES NO. OR NOTE
36	1.000	FT		05	346124-04	X	H	TYPE A2011		WIRE, 22 AWG GY/BLK	346124			
37	A/R	FT		04	346128-02	X	D	EECO		CA,TW PR 24AWG WHT/BLK	346128			
33	A/R	EA		08	346901-01	X	E	SST 1M		CABLE TIE,NYLON	346901			

ELECTRONIC ENGINEERING CO. CODE IDENT 97525
DESCR. READ HEAD ASSY
ENGRG DWG # 127124 ECO PEND CONTR NO.

MODEL/ASSY PL 127124-01
PL REV LTR D
PL LAST MAINT 6-22-78
PL ECO PEND
SHT 1 OF 1

REF LN #	QTY REQD	U/M	LEVEL	PART NO, OR IDENT NO,	C	REV LTR	VENDOR PART NO,	DESCRIPTION	DWG NO,	ECO NO,	REF DES	REF DES NO, OR NOTE
38	2.000	EA	05	110642-03	X	C	MS51957-13	SCR, PAN HD 4-40X1/4	110642			
41	2.000	EA	05	110642-04	X	C	MS51957-14	SCR, PAN HD 4-40X5/16	110642			
42	2.000	EA	05	110642-07	X	C	MS51957-17	SCR, PAN HD 4-40X1/2	110642			
39	4.000	EA	06	110643-05	X	B	MS-51957-9	SCR, PAN HD 2-56X3/8	110643			
50	4.000	EA	05	110659-02	X	B	MS35333-70	WASHER,INT TOOTH #4	110659			
49	2.000	EA	05	110659-04	X	B	MS35333-72	WASHER,INT TOOTH #8	110659			
52	2.000	EA	05	110660-02	X	B	MS35338-135	WASHER,LOCK #4	110660			
46	2.000	EA	05	110662-02	X	F	MS15795-803	WASHER,FLAT #4	110662			
55	3.000	EA	05	110664-04	X	D	NAS671-C4	NUT,HEX 4-40 NC SM	110664			
56	1.000	EA	04	110664-07	X	D	MS35649-284	NUT,HEX 8-32 NC STD	110664			
6	1.000	EA	04	119953-02	X	H	EECO	TAPE GUIDE ASSY,ROTARY	119953			
11	1.000	EA	04	120935-01	X	D	EECO	TAPE,HOLD-DOWN	120935			
17	1.000	EA	04	120974-01	X	B	EECO	SCREW,ADJ	120974			
4	1.000	EA	04	121565-01	X	J	EECO	PLATE,MTG-MACH	121565			
7	1.000	EA	04	121567-01	X	J	EECO	COVER,HEAD MACH	121567			
9	1.000	EA	04	121855-01	X	D	EECO	BAR,LIGHT MACH	121855			
8	1.000	EA	04	122487-01	X	C	EECO	SHAFT,COVER	122487			
10	1.000	EA	04	122488-01	X	C	EECO	SHAFT,LIGHT BAR	122488			
	REF	EA	04	124367	X	A	EECO	ALIGN PROC,9000 RDR HD	124367			
14	3.000	EA	04	124937-01	X	C	EECO	SYN CLAMP	124937			
12	1.000	EA	04	125246-01	X	C	EECO	PHOTOELECTRIC ARRAY	125246			
15	1.000	EA	04	125461-01	X	B	EECO	BRKT,SW MTG	125461			
13	1.000	EA	04	127001-01	X	B	EECO	STEPPER MOTOR ASSY	127001			
	REF	EA	04	127124	X	D	EECO	READ HEAD ASSY	127124		**	ASSY INSTR
5	1.000	EA	04	128081-01	X	A	EECO	BLOCK,MTG MACHINED	128081			
16	1.000	EA	04	128082-01	X	A	EECO	SPROCKET,24 TOOTH	128082			
	REF	EA	04	129721	X	A	EECO	ATC ARRAYS	129721		**	ATC ARRAYS
25	A/R	OZT	04	306351-01	X	C	33	GREASE,SILICONE	306351			
30	A/R	EA	07	306351-02	X	C	340	CMPD,SILICONE HTSNK	306351			
31	A/R	OZT	04	306353-01	X	A	15 OZ. CAN	LUBRICANT,OIL STP	306353			
24	2.000	EA	04	316006-01	X	B	MS134353	BALL,STEEL .156+-.0005	316006			
29	1.000	EA	04	316006-03	X	C	N/A	BALL,STEEL .125 DIA	316006			
26	4.000	EA	04	317312-01	X	B	G5555-9	RING,RETAINING	317312			
27	1.000	EA	04	317602-01	X	K	LC-022C-5SS	SPRING,COMP,	317602			
23	2.000	EA	05	317602-03	X	K	LC-020A-2SS	SPRING,COMP,	317602			
21	1.000	EA	04	317602-05	X	K	LC-020A-1SS	SPRING,COMP	317602			
37	2.000	EA	04	322106-06	X	A	MS16995-28	SCR,CAP 8-32X3/4	322106			
35	1.000	EA	04	322204-81	X	E	LP57XD82J2	SCR,SET 8-32X1/8	322204	20080		
36	2.000	EA	04	322206-04	X	C	AN565-DC6-H?	SCR,SET 6-32X1/8	322206			
22	1.000	EA	04	323976-01	X	B	NS-51	PLUNGER,SPRNG 8-32X5/8	323976			
28	1.000	EA	04	339221-01	X	C	V3L-131-D8	SWITCH,LEVER-SPDT	339221		**	S5

ELECTRONIC ENGINEERING CO. CODE IDENT 97525
DESCR. CA ASSY,RESISTOR
ENGRG DWG # 127166 ECO PEND CONTR NO.

MODEL/ASSY PL 127166-01
PL REV LTR B
PL LAST MAINT 1-16-76
PL ECO PEND
SHT 1 OF /

REF LN #	QTY REQD	U/M	LEVEL	PART NO. OR IDENT NO.	C	REV LTR	VENDOR PART NO.	DESCRIPTION	DWG NO.	ECO NO.	REF DES	REF DES NO. OR NOTE
4	3.000	EA	04	311035-07	X	N	02-09-2118	TERM,PIN 18-22 AWG	311035			
3	1.000	EA	04	311035-37	X	N	03-09-1033	CONN, 3 POS RCPT	311035		**	P16
7	A/R	FT	04	325511-20	X	B	3003-4-CLEAR	SLVNG,CLEAR ,208	325511			
2	1.000	EA	04	335001-07	X	D	RH10	RES,4 OHM 10W 1%	335001		**	R1
5	A/R	FT	06	346123-30		A	A2011-02	WIRE, #22AWG BLK 19X34	346123			
6	A/R	FT	05	346123-33	X	A	A2011-08	WIRE, 22AWG ORN 19X34	346123			

ELECTRONIC ENGINEERING CO. CODE IDENT 97525
DESCR. PARTS KIT
ENGRG DWG # 129162 ECO PEND

MODEL/ASSY PL 129162-01
PL REV LTR B
PL LAST MAINT 10-15-76
PL ECO PEND
SHT 1 OF 1

REF LN #	QTY REQD	U/M	LEVEL	PART NO. OR IDENT	NO.	REV LTR	VENDOR PART NO.	DESCRIPTION	DWG NO.	ECO NO.	REF DES	REF DES NO. OR NOTE
6	2.000	EA		02	119265-00	B	EECO	REEL, 5-1/4 W/ADAPTER	119265			
4	1.000	EA		03	311006-03	D	D110278	END, DISC	311006			
5	1.000	EA		03	311008-02	H	DB-19678-2	SHELL JUNCTION CONN	311008	10379		
3	1.000	EA		03	311178-05	F	DB-25P	CONN,25 POS PLUG	311178			
2	1.000	EA		03	341201-01	A	EECO	BRUSH,CLEANING	341201			
1	1.000	EA		03	346323-01	A	P-2392	CORD,POWER A-C 7-1/2FT	346323			

MODEL/ASSY PL 230438-01
PL REV LTR J
PL LAST MAINT 9-07-78
PL ECO PEND
SHT 1 OF 2

ELECTRONIC ENGINEERING CO. CODE IDENT 97525
DESCR. TRS9200BBDED
ENGRG DWG # 230438 ECO PEND

REF LN #	QTY REQD	U/M	LEVEL	PART NO. OR IDENT NO.	C C	REV LTR	VENDOR PART NO.	DESCRIPTION	DWG NO.	ECO NO.	REF DES	REF DES NO. OR NOTE
56	2.000	EA		08 110639-01	X	B	MS51958-59	SCR,PHD 10-32X1/4 C/R	110639			
53	14.000	EA		07 110641-03	X	D	MS51957-26	SCR, PAN HD 6-32X1/4	110641			
54	2.000	EA		07 110641-05	X	D	MS51957-28	SCR, PAN HD 6-32X3/8	110641			
55	3.000	EA		06 110641-07	X	D	MS51957-30	SCR, PAN HD 6-32X1/2	110641			
52	2.000	EA		06 110643-04	X	E	MS51957-4	SCR, PAN HD 2-56X5/16	110643			
68	4.000	EA		05 110659-02	X	B	MS35333-70	WASHER,INT TOOTH #4	110659			
69	16.000	EA		07 110659-03	X	B	MS35333-71	WASHER,INT TOOTH #6	110659			
70	2.000	EA		08 110659-05	X	B	MS35333-73	WASHER,INT TOOTH #10	110659			
64	2.000	EA		06 110660-01	X	B	MS35338-134	WASHER,LOCK #2	110660			
65	6.000	EA		08 110660-03	X	B	MS35338-136	WASHER, SPLIT #6	110660			
77	4.000	EA		05 110662-03	X	F	MS15795-804	WASHER,FLAT #4	110662			
63	4.000	EA		07 110662-04	X	F	MS15795-805	WASHER,FLAT #6	110662			
57	2.000	EA		06 110664-02	X	D	MS35649	NUT,HEX 2-56 NC SM	110664			
58	4.000	EA		05 110664-04	X	D	NAS671-C4	NUT,HEX 4-40 NC SM	110664			
59	5.000	EA		06 110664-06	X	D	NAS671-C6	NUT,HEX 6-32 SM	110664			
20	2.000	EA		03 123753-01	X	A	EECO	SPCR,READ HEAD	123753			
	REF	EA		03 125270	X	E	EECO	ATP,RDR/SPLR TRS9200	125270			
13	1.000	EA		03 125725-01	X	B	EECO	HTSNK,BRKT RECT	125725			
	REF	EA		03 126155	X	V	EECO	ACP,TRS9200B-E	126155		**	ACP
	REF	EA		03 126701	X	A	EECO	DIM,OUTLINE DRAWING	126701			
	REF	EA		03 126702	X	G	EECO	INST,TAPE RDR ASSY	126702		**	REF LINE#S
17	1.000	EA		03 126706-02	X	R	EECO	PCB ASSY,RDR/SPLR CNTL	126706			
9	1.000	EA		03 126808-02	X	G	EECO	PANEL ASSY,FRONT	126808			
	REF	EA		03 126810	X	C	EECO	WIRE LIST,TRS9200	126810			
16	1.000	EA		03 126814-01	X	F	EECO	CHAS,UNIVL-9200/9301	126814			
80	1.000	EA		03 126932-01	X	C	EECO	PLATE,NAME 230438	126932			
14	1.000	EA		03 126952-01	X	B	EECO	PNL,SIDE L	126952			
15	1.000	EA		03 126952-02	X	B	EECO	PANEL,SIDE R	126952			
18	1.000	EA		03 127038-01	X	B	EECO	LABEL,CHAS LEFT	127038			
19	1.000	EA		03 127038-02	X	B	EECO	LABEL,CHAS LEFT	127038			
10	1.000	EA		03 127124-01	X	D	EECO	READ HEAD ASSY	127124			
	REF	EA		03 127136	X	J	EECO	SCHEMATIC,TAPE RDR/SPL	127136			
11	1.000	EA		03 127166-01	X	B	EECO	CA ASSY,RESISTOR	127166		R	1,
8	1.000	EA		03 128658-01	X	B	EECO	BRKT,RHEOSTAT	128658			
12	1.000	EA		03 129162-01	X	B	EECO	PARTS KIT	129162			
	REF	EA		04 129721	X	A	EECO	ATC ARRAYS	129721		**	ATC ARRAYS
	REF	EA		03 132132	X	A	EECO	TDS, TRS9200B-E	132132		**	TDS
	REF	EA		03 132781		A	EECO	ATC,RDR	132781			
	REF	EA		03 132782		A	EECO	ATC,SPOOLER	132782			
	REF	EA		03 132783		A	EECO	ATC,PWR SPLY	132783			
	REF	EA		03 230438	X	J	EECO	SPEC,TRS9200BBDED	230438			
	REF	EA		03 230907	X	P	EECO	SPEC,TRS9200BB-E-(STD)	230907		**	SPEC
45	1.000	EA		03 304901-05	X	E	86F168M	CAP,, 9300UF 50VDC	304901			
28	A/R	EA		07 306351-02	X	C	340	CMPD,SILICONE HTSNK	306351			
75	3.000	EA		04 311035-07	X	N	02-09-2118	TERM,PIN 18-22 AWG	311035			
42	7.000	EA		04 311035-08	X	N	02-09-1118	TERM, SKT 18-22 AWG	311035			
47	3.000	EA		05 311035-15	X	N	02-09-2103	TERM, PIN 14-20 AWG	311035			
48	3.000	EA		04 311035-16	X	N	02-09-1103	TERM, SKT 14-20 AWG	311035			
2	1.000	EA		04 311035-24	X	N	03-09-2032	CONN,3 POS PLUG	311035		P	10,
41	1.000	EA		04 311035-31	X	N	03-09-2042	CONN, 4 POS PLUG	311035		J	10,
46	3.000	EA		04 311035-37	X	N	03-09-1033	CONN, 3 POS RCPT	311035		**	J1,P8&9

ELECTRONIC ENGINEERING CO. CODE IDENT 97525
DESCR. TRS9200BBDED
ENGRG DWG # 230438 ECO PEND

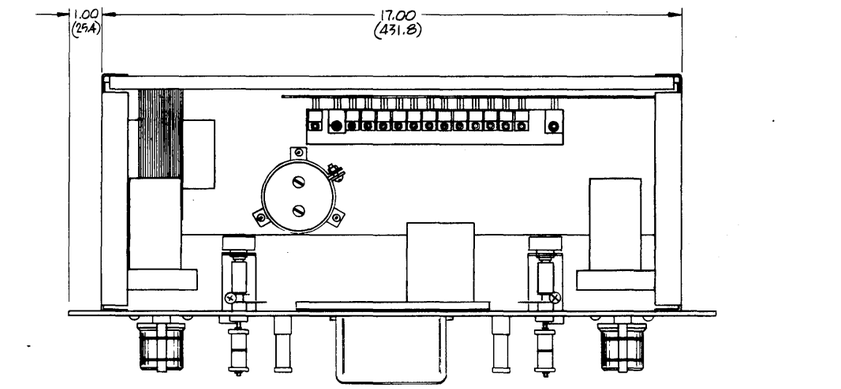
MODEL/ASSY PL 230438-01
PL REV LTR J
PL LAST MAINT 9-07-78
PL ECO PEND
SHT 2 OF 2

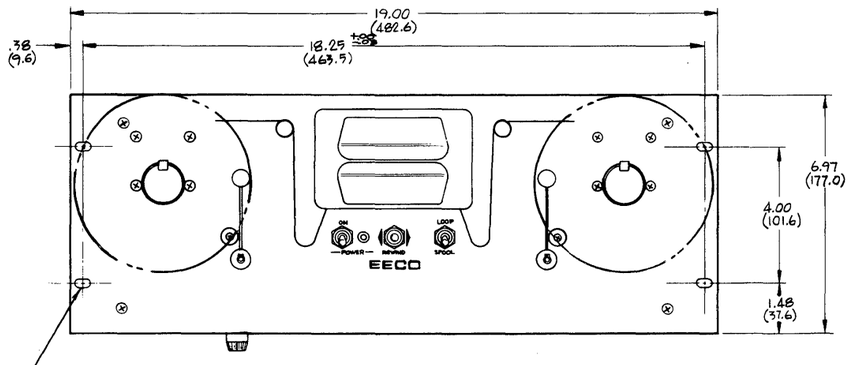
REF LN #	QTY REQD	U/M	LEVEL	PART NO. OR IDENT	NO.	C	REV LTR	VENDOR PART NO.	DESCRIPTION	DWG NO.	ECO NO.	REF DES	REF DES NO. OR NOTE
23	1.000	EA		04 311252-01		X	C	Y-140	TERM,SLDR LUG	311252			
49	2.000	EA		07 311301-10		X	J	#10	TERM,RING #10 CRIMP	311301			
5	1.000	EA		04 311704-02		X	E	9866-15-5	SOCKET, TRANSISTOR	311704		XQ	8,
24	1.000	EA		04 311711-01		X	C	EAC-301	RCPT,AC POWER	311711		J	2,
4	1.000	EA		03 316507-01		X	A	8903NW	COVER, TO-3 WHITE	316507			
38	4.000	EA		03 322046-01		X	B	8-32	SCR,OVAL HD 8-32X5/8	322046			
37	4.000	EA		04 322049-02		X	C	4-40 X 5/16	SCR, HEX	322049			
32	1.000	EA		03 322601-05		X	D	C8019-632-04	NUT, SPEED 6-32	322601			
22	4.000	EA		03 322602-07		X	D	C6452-632-24	NUT,SPEED 6-32	322602			
33	4.000	EA		03 322602-47		X	D	C915-832-24	NUT,SPEED 8-32	322602			
35	7.000	EA		04 322917-07		X	C	1601-0410	RIVET	322917			
36	4.000	EA		03 322917-08		X	C	1601-0613	RIVET	322917			
34	11.000	EA		03 322918-01		X	B	1125-0508	RIVET	322918			
29	1.000	EA		06 323402-07		X	C	CMC-32	CLAMP, 2 DIA, CAP,	323402			
30	7.000	EA		04 323513-24		X	B	8423	SPACER,HEX 6-32,500	323513	20068		
3	1.000	EA		07 325416-01		X	B	60-11-4305-1664	INSULATOR, TO-3 ST	325416			
7	1.000	EA		05 337445-01		X	A	0112	RHEOSTAT,100 OHM 12W	337445		RS	1,
6	1.000	EA		04 338718-01		X	D	2N3055	TRANSISTOR, NPN SI	338718		Q	8,
27	1.000	EA		03 339051-05		X	F	313002	FUSE,2A 250V SLO/BLO	339051		F	1,
26	1.000	EA		04 339100-01		X	C	HKP	FUSEHOLDER,PNL MTG	339100		XF	1,
25	1.000	EA		04 339550-11		X	A	46206LF	SW,SLIDE DPDT 3A	339550		S	2,
44	1.000	EA		03 343059-01		X	G	EECO	XFMR,POWER 115/230 VAC	343059		T	1,
43	A/R	FT		07 346003-01		X	B	8013	WIRE,BUSS 16 AWG SOLID	346003			
39	.500	FT		04 346123-00		X	A	A2016-02	WIRE, 16AWG BLK 19X29	346123			
39	.500	FT		04 346123-03		X	A	A2016-08	WIRE, 16AWG ORN 19X29	346123			
39	.400	FT		07 346123-24		X	A	A2013-05	WIRE, 20AWG YEL 19X32	346123			
39	.820	FT		07 346123-25		X	A	A2013-04	WIRE, 20AWG GRN 19X32	346123			
39	.400	FT		07 346123-26		X	A	A2013-06	WIRE, 20AWG BLU 19X32	346123			
39	2.170	FT		07 346123-28		X	A	A2013-09	WIRE, 20AWG GY 19X32	346123			
72	.800	FT		05 346123-33		X	A	A2011-08	WIRE, 22AWG ORN 19X34	346123			
40	2.500	FT		07 346124-03		X	H	TYPE A2013	WIRE, 20 AWG GY/BLK	346124			
31	A/R	EA		08 346901-01		X	E	SST 1M	CABLE TIE,NYLON	346901			

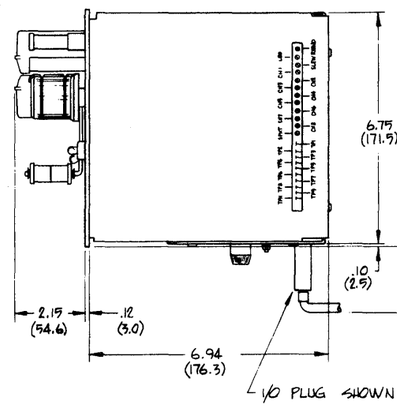
NOTES: UNLESS OTHERWISE SPECIFIED

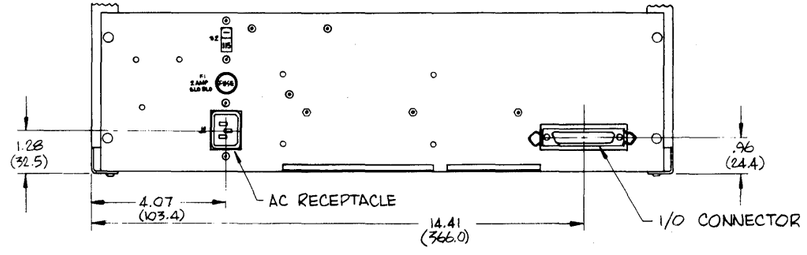
1. DIMENSIONS IN PARENTHESES ARE IN MILLIMETERS
2. TOLERANCES ON (X) ±(.8); (.XX) ±(.25)
3. INTERFACE WITH: 3 WIRE POWER CORD SWITCHCRAFT P/N P-2392, 25 PIN I/O PLUG CANNON P/N DB25P
4. PANEL MTG PER MIL-STD-189.

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	A	RELEASE	9/19/75	









FRONT PANEL REMOVED FOR CLARITY

QTY REQD	ITEM NO.	REF DES	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL OR NOTE	CODE IDENT

PARTS LIST

NEXT ASSY	USED ON
	730438
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS IN INCHES. TOLERANCES ON DECIMALS ANGLE .XX±.01 .XXX± ± 1/2°

DO NOT SCALE DRAWING

BREAK SHARP EDGES

MATERIAL

FINISH

CONTRACT NO. ALLEN-BRADLEY

	APPROVED	DATE
DRAWN		10/23/74
CHECK		7/15/75
ENGR		8/8/75
MGR		7/16/75

ELECTRONIC PRODUCTS DIVISION
ELECTRONIC ENGINEERING COMPANY OF CALIFORNIA

TITLE
DIMENSION DRAWING
TAPE RDR/SPLR TRS9200

SIZE	CODE IDENT NO.	DWG NO.
D	97525	126701

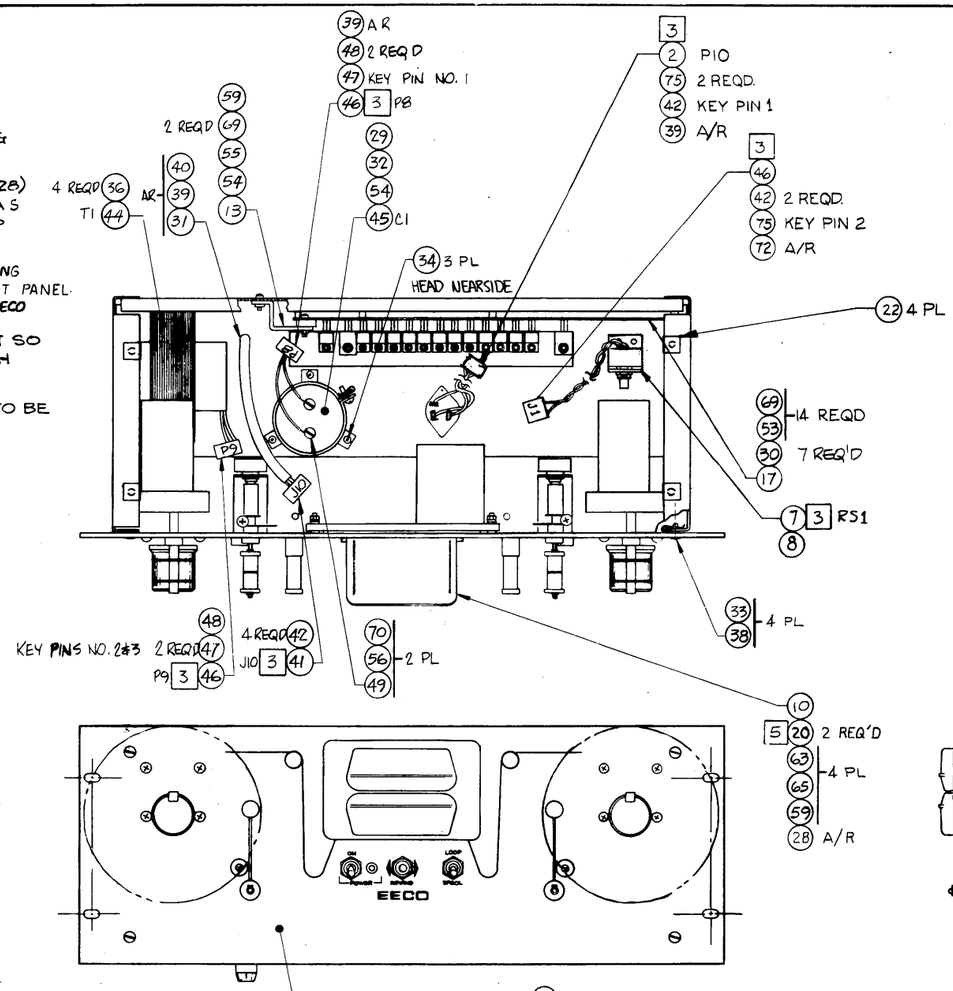
SCALE 1/2 SHEET 1 OF 1

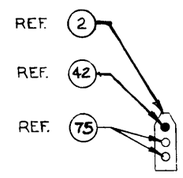
"THE INFORMATION CONTAINED HEREON IS PROPRIETARY AND CONFIDENTIAL TO ELECTRONIC ENGINEERING COMPANY OF CALIFORNIA AND SHALL NOT BE USED OR DISCLOSED, IN WHOLE OR IN PART, WITHOUT FIRST OBTAINING THE WRITTEN PERMISSION OF ELECTRONIC ENGINEERING COMPANY OF CALIFORNIA."

NOTES: UNLESS OTHERWISE SPECIFIED

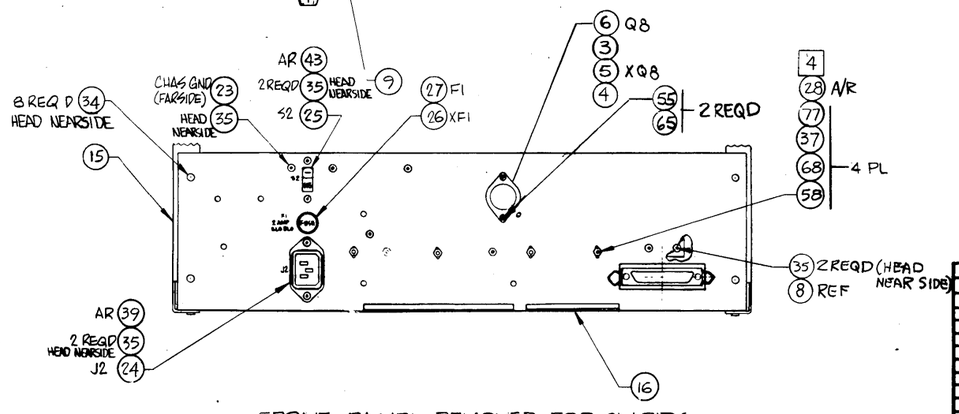
1. REF WIRE LIST 126810.
2. REF SCHEMATIC 127136.
3. RUBBER STAMP REF DESIGNATOR WITH 1/8" HIGH CHARACTERS USING BLACK ACID ETCH INK.
4. APPLY HEATSINK COMPOUND (ITEM 28) TO MATING SURFACES OF ITEMS AS INDICATED PER EECO WORKMANSHIP MANUAL.
5. APPLY HEATSINK COMPOUND (ITEM 28) TO MATING SURFACES OF SPACER (ITEM 20) BETWEEN FRONT PANEL (ITEM 9) AND READ HEAD (ITEM 10) PER EECO WORKMANSHIP MANUAL.
6. CENTER (ITEMS 18 & 19) ON CUTOUT SO POT ADJUSTMENTS LINE UP WITH FUNCTION ON LABELS.
7. (ITEM 12) PARTS KIT (125659-01) TO BE SHIPPED WITH UNIT.

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	A	RELEASED	7/9/75	
	B	EO 5137A	6/21/75	
	C	EO 5438	10/7/75	
	D	EO 5798A RY	3/23/76	
	E	EO 6369A	8/13/76	
	F	EO 6433	9/14/76	
	G	PER E.O. 8365	4/17/79	

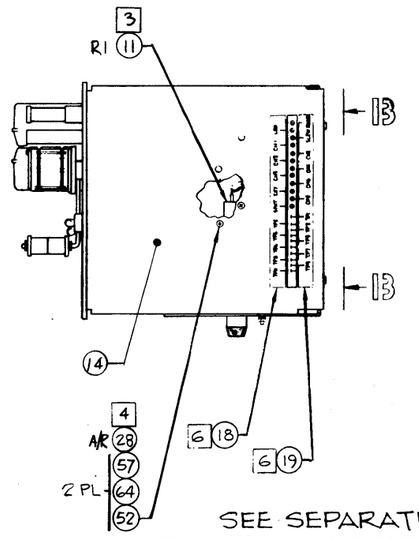


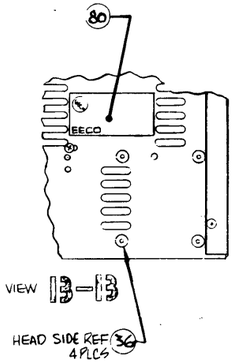


DETAIL OF P10



FRONT PANEL REMOVED FOR CLARITY





SEE SEPARATE PARTS LIST 230438-01

QTY REQD	ITEM NO.	REF DES	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL OR NOTE	CODE IDENT

PARTS LIST

NEXT ASSY. USED ON	230438
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS IN INCHES. TOLERANCES ON DECIMALS ANGLE .XX±.02 .XXX±.005 ± 1/2°

DO NOT SCALE DRAWING

BREAK SHARP EDGES

MATERIAL

FINISH

CONTRACT NO. ALLEN-BRADLEY

	APPROVED	DATE
DRAWN		10/23/74
CHECK		7/15/75
ENGR		2/19/75
MGR		2/19/75

ELECTRONIC PRODUCTS DIVISION
ELECTRONIC ENGINEERING COMPANY OF CALIFORNIA

TITLE: INSTR. ASSY, TR59200

SIZE	CODE IDENT NO.	DWG NO.
D	97525	126702

SCALE 1/2 SHEET 1 OF 1

"THE INFORMATION CONTAINED HEREON IS PROPRIETARY AND CONFIDENTIAL TO ELECTRONIC ENGINEERING COMPANY OF CALIFORNIA AND SHALL NOT BE USED OR DISCLOSED, IN WHOLE OR IN PART, WITHOUT FIRST OBTAINING THE WRITTEN PERMISSION OF ELECTRONIC ENGINEERING COMPANY OF CALIFORNIA."

NOTES: UNLESS OTHERWISE SPECIFIED.

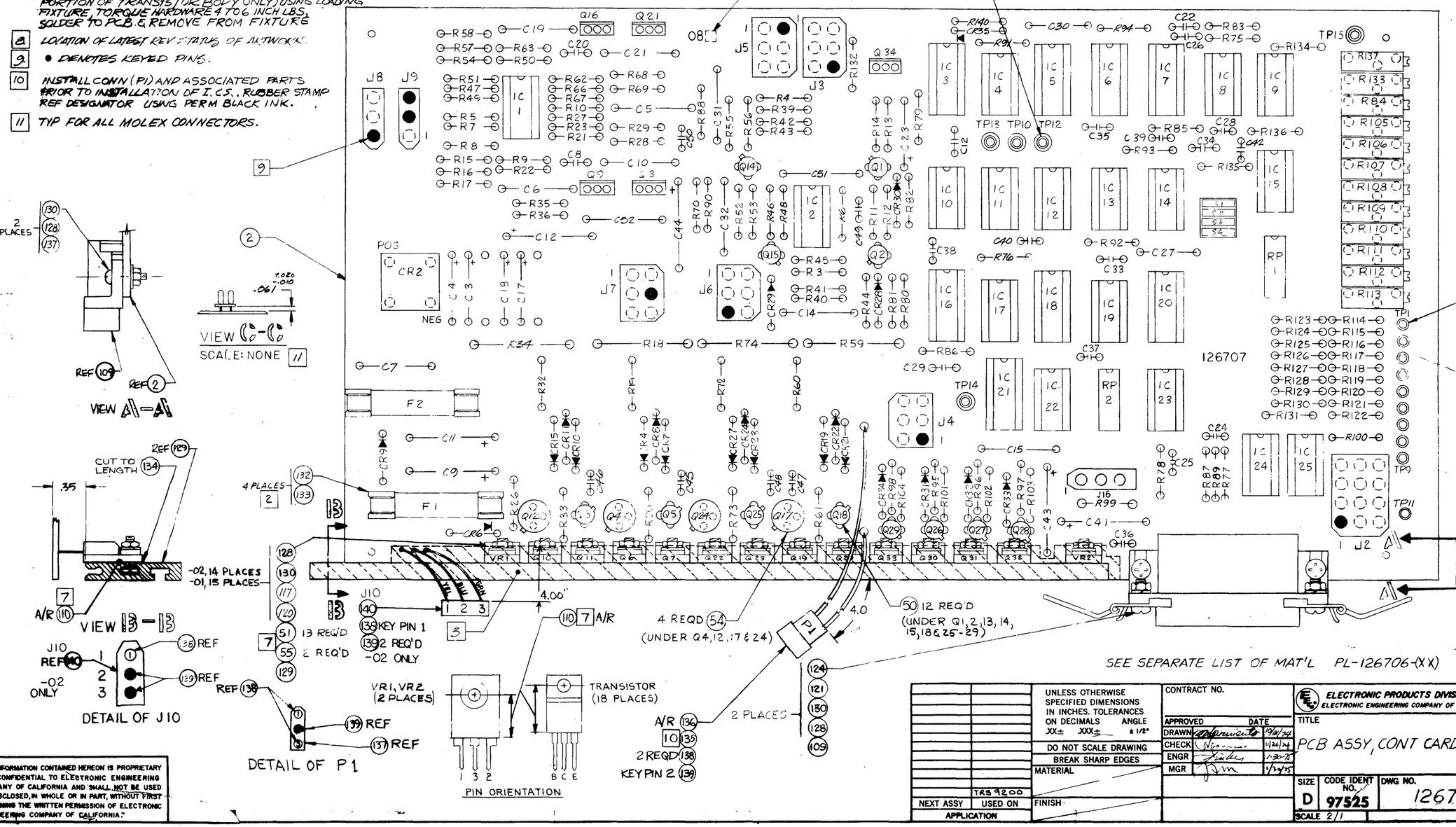
1. BEFORE STUFFING COMPONENTS, ENTIRE AREA OF COMPONENT SIDE TO BE SILKSCREENED WITH ARTWORK P/N 127484.
2. INSTALL ITEMS 8,9,132 & 133 PRIOR TO SOLDERING INSTALLED COMPONENTS TO PRINTED WIRING BOARD.
3. MASK OFF AREAS INDICATED BY [hatched] PRIOR TO FLOW SOLDER.
4. NOTCH OR DOT ON I.C. INDICATES PIN NO.1 LOCATION, REF ONLY.
5. SOLDER INSTALLED COMPONENTS TO PRINTED WIRING BOARD.
6. THE FOLLOWING REFERENCE DESIGNATORS ARE OMITTED: C1 & C13, R1, R2, R24, R30, R37, R38, R64, CR1, CR13, CR16, CR17.
7. ITEMS 51 & 55 TO BE ASSEMBLED ON HEATSINK, USING THERM 110 (COMPOUND) ON MATING SURFACES (LONGER PORTION OF TRANSISTOR BODY ONLY) USING LOADING FIXTURE. TORQUE HARDWARE 4 TO 6 INCH LBS. SOLDER TO P.C.B. & REMOVE FROM FIXTURE
8. LOCATION OF LATEST REV STATUS OF ARTWORK.
9. ● DENOTES KEYED PINS.
10. INSTALL CONN (P1) AND ASSOCIATED PARTS PRIOR TO INSTALLATION OF I.C.S. RUBBER STAMP REF DESIGNATOR USING PERM BLACK INK.
11. TYP FOR ALL MOLEX CONNECTORS.

REFERENCE DESIGNATOR NUMBERS

ITEM NO. PER P/L	DESIGNATOR NO.'S	ITEM NO. PER P/L	DESIGNATOR NO.'S
14	C22, 24, 25, 26, 28, 36, 37–40, 42	80	R23, 66, [illegible], 129–131
16	C5, 6, 7, 10, 14, 19, 21, 31, 32, 51, 52	51	Q3, 6, 7, 9, 10, 11, 16, 19-23, 30-33, 34.
57	R19, 20, 32, 33, 60, 61, 72, 73, 101–104, 132, 134		
68	R7, 9, 13, 39, 49, 50, 55, 80–82		
69	R3, 4, 11, 45, 46, 52, 99, 100, 75		
28	CR4, 15, 19, 27–30, 35		
30	CR7–11, 21–24, 31–34		

-	ECO 7425 CLASS II	10/22/74	[illegible]
L	ECO 7744	12/11/74	[illegible]
M	ECO 8366	3/4/75	[illegible]
N	ECO 9986	3/31/75	[illegible]
P	E.O. 10599	4/21/75	[illegible]
-	E.O. 11632 CLASS II	11/24/75	[illegible]
R	E.O. #119288	4/2/76	[illegible]

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	A	RELEASED	1/30/75	[illegible]
	B	PER E.O. 4972	4/11/75	[illegible]
	C	EO 5094	5/6/75	[illegible]
	D	PER E.O. 5131	8/19/75	[illegible]
	E	E.O. 5594	10/13/75	[illegible]
	F	EO 5622	11/3/75	[illegible]
	G	EO 6210	RY 3/16/76	[illegible]
	H	EO 6353	9/3/76	[illegible]
	J	EO 6369	9/16/76	[illegible]
	K	EO 6956	9/16/76	[illegible]



SEE SEPARATE LIST OF MAT'L PL-126706-(XX)

THE INFORMATION CONTAINED HEREON IS PROPRIETARY AND CONFIDENTIAL TO ELECTRONIC ENGINEERING COMPANY OF CALIFORNIA AND SHALL NOT BE USED OR DISCLOSED, IN WHOLE OR IN PART, WITHOUT FIRST OBTAINING THE WRITTEN PERMISSION OF ELECTRONIC ENGINEERING COMPANY OF CALIFORNIA.

NEXT ASSY	USED ON
	TRS9200
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS IN INCHES. TOLERANCES ON DECIMALS ANGLE .XX± .XXX± ± 1/2°

DO NOT SCALE DRAWING

BREAK SHARP EDGES

MATERIAL

FINISH

CONTRACT NO.

	APPROVED	DATE
DRAWN	[illegible]	10/21/74
CHECK	[illegible]	11/24/74
ENGR	[illegible]	1-30-75
MGR	[illegible]	1/30/75

ELECTRONIC PRODUCTS DIVISION
ELECTRONIC ENGINEERING COMPANY OF CALIFORNIA

TITLE: PCB ASSY, CONT CARD RDR SPLR

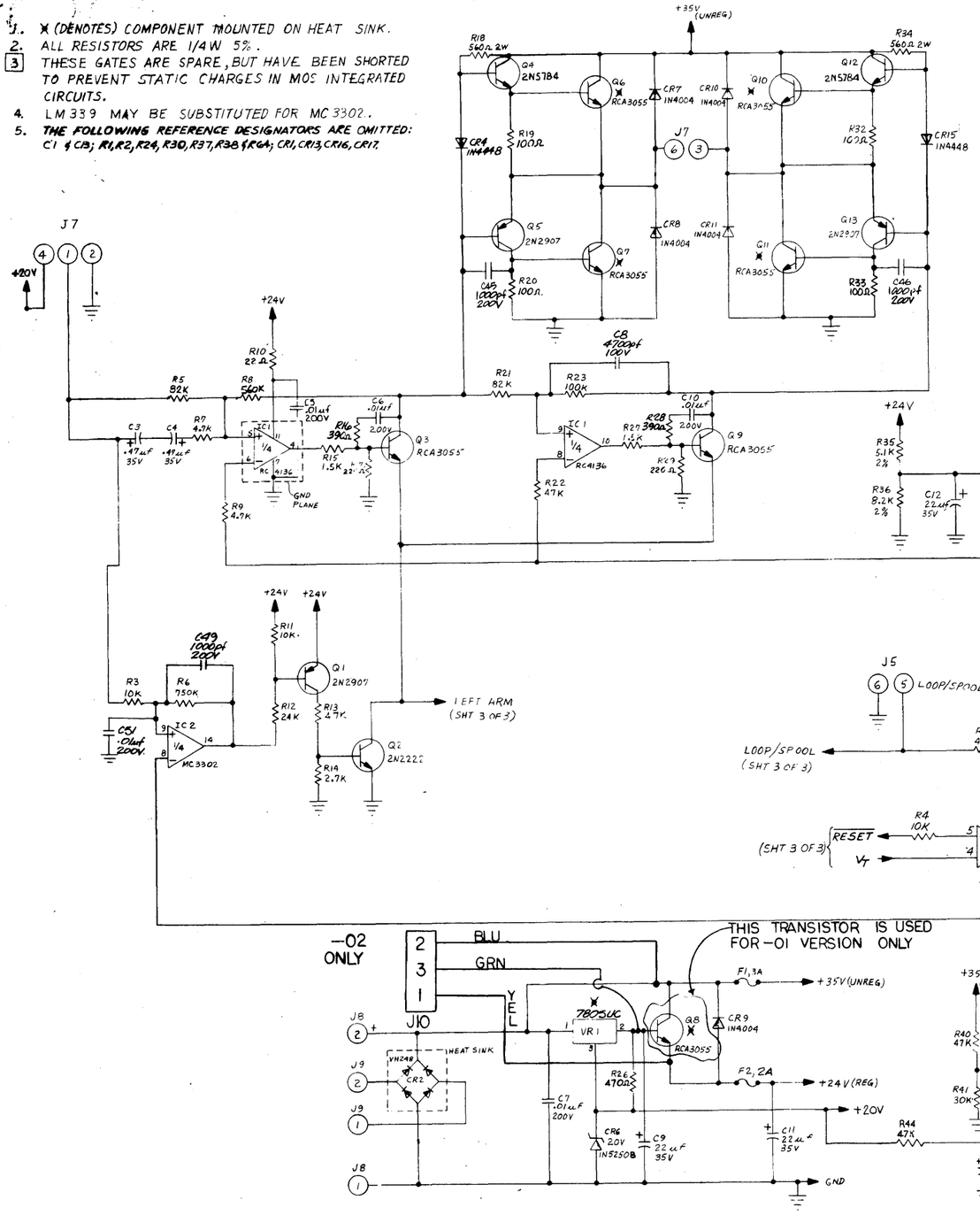
SIZE	CODE IDENT NO.	DWG NO.
D	97525	126706

SCALE 2/1

NOTE: UNLESS OTHERWISE SPECIFIED

1. X (DENOTES) COMPONENT MOUNTED ON HEAT SINK.
2. ALL RESISTORS ARE 1/4W 5%.
3. THESE GATES ARE SPARE, BUT HAVE BEEN SHORTED TO PREVENT STATIC CHARGES IN MOS INTEGRATED CIRCUITS.
4. LM339 MAY BE SUBSTITUTED FOR MC3302.
5. **THE FOLLOWING REFERENCE DESIGNATORS ARE OMITTED: C1 & C13; R1, R2, R24, R30, R37, R38 & R64; CR1, CR13, CR16, CR17.**

REVISIONS			
ZONE LTR	DESCRIPTION	DATE	APPROVED
SEE SHT 1			



SPARE GATES

IC No.	INPUTS	OUTPUT
IC 8	8, 9	14

IC No.	+5V	GND
IC 17		8, 9
IC 24		12, 5 & 8, 9

+5V → 1 → IC 3, IC 6, IC 16, IC 21, IC 22 (16) → IC 5, IC 7, IC 18 (14) → IC4, IC10–14, IC17, IC19, IC 22–25

GND → 8 (12 IC8, 9) → 8 → 7

+5V → RP1–14, RP2–14, IC8-3, IC9-3

SIZE	CODE IDENT NO.	DWG NO.
D	97525	126706
SCALE NONE		SHEET 2 OF 3

REVISIONS			
ZONE	LTR	DESCRIPTION	DATE	APPROVED
		SEE SHEET 1		

DRIVE RIGHT
DRIVE LEFT
RESET
LOAD
CONM
LOAD
LEFT ARM (FROM SHT 2)
RIGHT ARM (FROM SHT 2)
LOOP/SPOOL (FROM SHT 2)
DRIVE ACKNOWLEDGE
READER READY
BROKEN TAPE
RUN STATUS
SPROCKET
REMOTE REWIND LEFT
REMOTE REWIND RIGHT
KEY PIN
N/C
+24V
3PK LED
CH LED
CH 1
CH 2
CH 3
CH 4
CH 5
CH 6
CH 7
CH 8

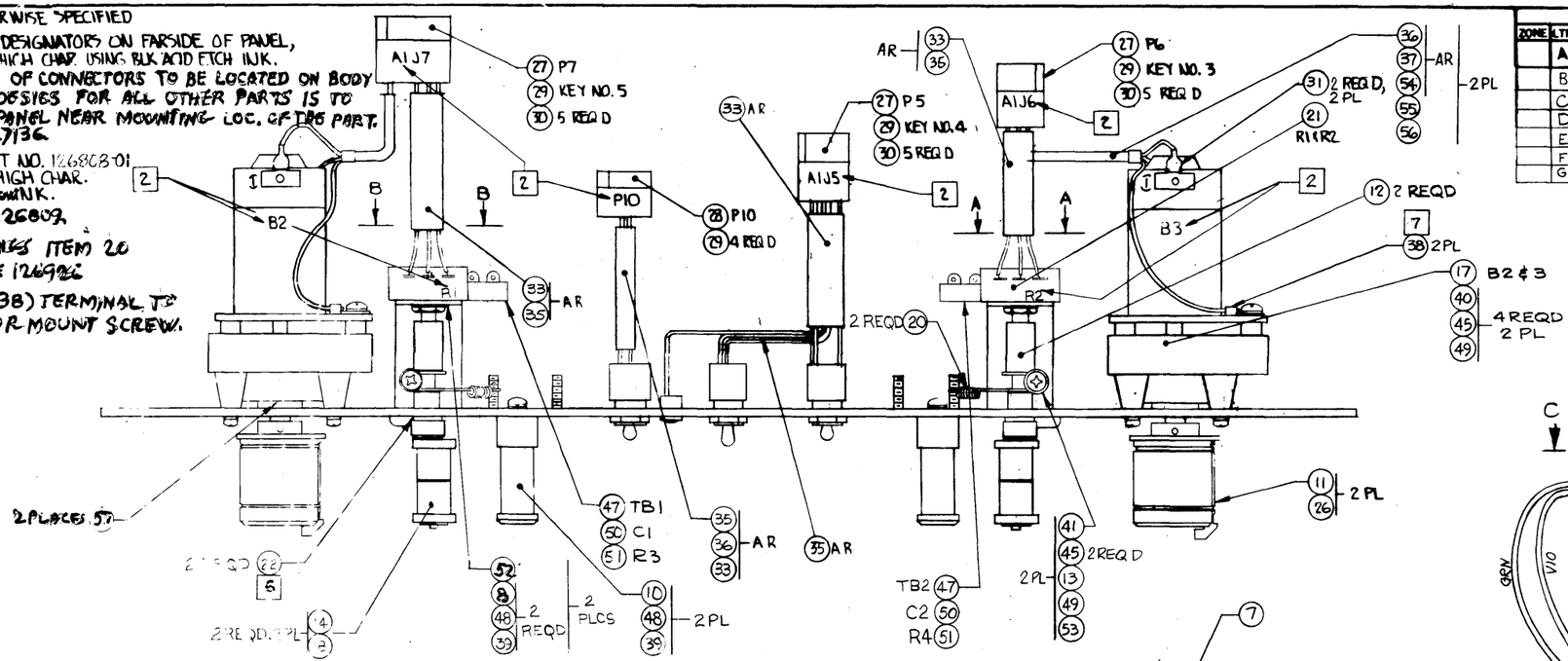
SIZE	CODE IDENT NO.	DWG NO.
D	97525	126706

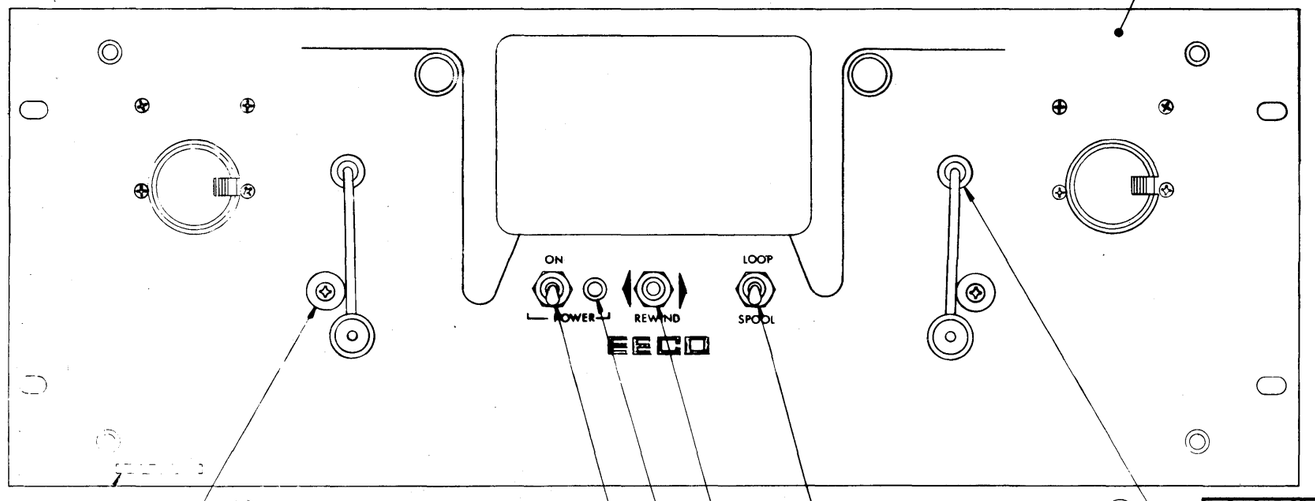
SCALE NONE

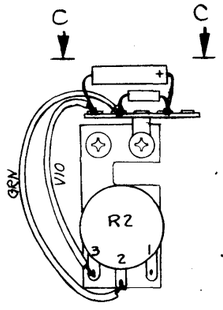
NOTES: UNLESS OTHERWISE SPECIFIED

1. RUBBER STAMP REF DESIGNATORS ON FARSIDE OF PANEL, AS SHOWN, 1/8" HIGH CHAR. USING BLK ACID ETCH INK.
2. REF DESIGNATIONS OF CONNECTORS TO BE LOCATED ON BODY OF PART. REF DESIGS FOR ALL OTHER PARTS IS TO BE LOCATED ON PANEL NEAR MOUNTING LOC. OF THE PART.
3. REF SCHEMATIC 127136.
4. RUBBER STAMP PART NO. 126808-01 + LATEST REV IN 1/8" HIGH CHAR. USING BLK PERMANENT INK.
5. REF WIRE LIST 126809.
6. INSTALL BEARINGS ITEM 20 PER PROCEDURE 126926.
7. INSTALL (ITEM 38) TERMINAL TO EXISTING MOTOR MOUNT SCREW.

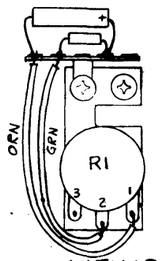
ZONE	LTR	REVISIONS DESCRIPTION	DATE	APPROVED
	A	RELEASED	7/14/71	
	B	EO 5137A	6/4/74	
	C	EO 5438	11/7/74	
	D	EO 6210	2/5/76	
	E	PER E.O. 7436	11/16/77	
	F	PER E.O. 8365	11/6/78	
	G	PER E.O. 20571	4/18/79	



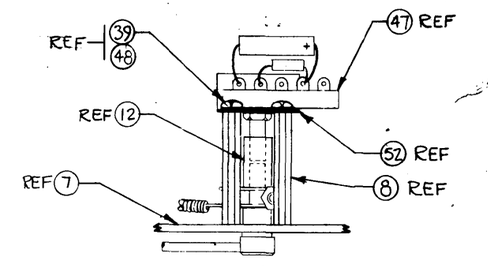




VIEW A-A
(ROTATED 180°)



VIEW B-B
(ROTATED 180°)



VIEW C-C

SEE SEPARATE PARTS LIST 126808-XX

QTY REQD	ITEM NO.	REF DES	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL OR NOTE	CODE IDENT

PARTS LIST

126702	230438
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS IN INCHES. TOLERANCES ON DECIMALS ANGLE .XX± — .XXX± — ± 1/2°

DO NOT SCALE DRAWING

BREAK SHARP EDGES

MATERIAL

FINISH

CONTRACT NO. ALLEN BRADLEY

	APPROVED	DATE
DRAWN		12/17/74
CHECK		2/14/75
ENGR		2/19/75
MGR		2/19/75

ELECTRONIC PRODUCTS DIVISION
ELECTRONIC ENGINEERING COMPANY OF CALIFORNIA

TITLE: PANEL ASSY, FRONT

SIZE	CODE IDENT NO.	DWG NO.
D	97525	126808

SCALE NONE

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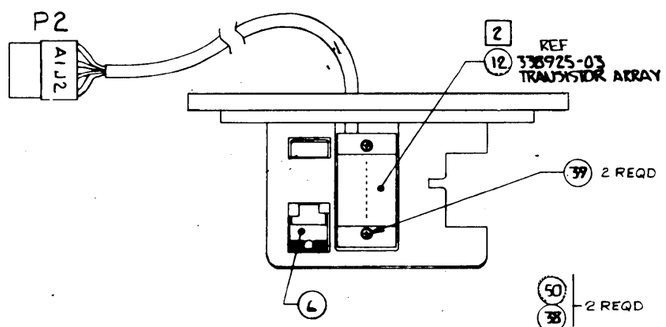
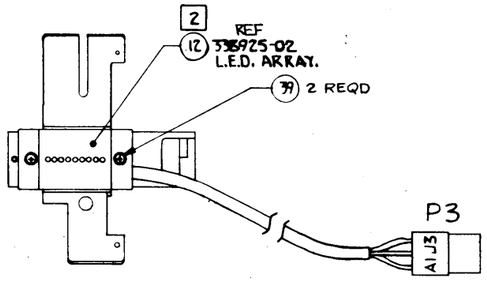
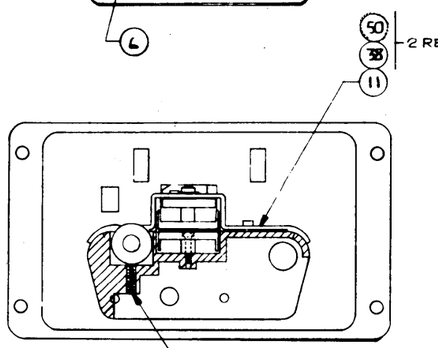
NOTES: UNLESS OTHERWISE SPECIFIED

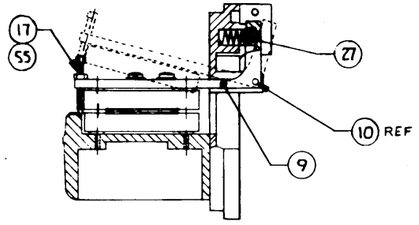
1. LUBRICATE SPRINGS & BALLS (ITEMS 23&24) WITH GREASE, ITEM 25.
2. ITEM 12 WILL BE A MATCHED PAIR ONLY
3. LUBRICATE HEAD COVER PIVOT SHAFTS (ITEMS 8&10) WITH (ITEM 31), STR.
4. ALIGNMENT PROCEDURE NO. 624367.
5. BAG & TAG WITH PART NO. 127124-01 & LATEST REV.
6. REF SCHEMATIC 127136

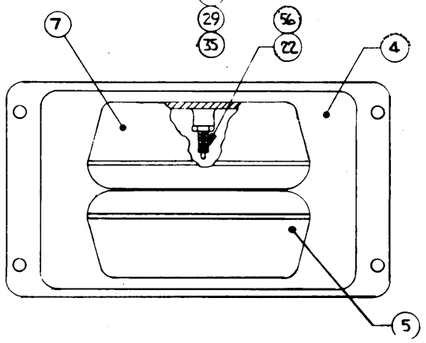
REVISIONS					
ZONE	LTR	DESCRIPTION		DATE	APPROVED
	A	RELEASE		7/19/74	
	B	EO 5799	RY	7/15/74	
	C	EO 6173	RY	7/15/74	
	D	EO 6488	RY	7/15/74	
	D	EO 11061	Class II	9/78	T.P

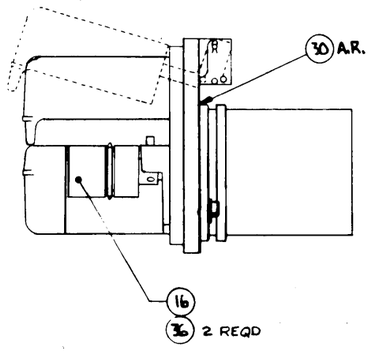


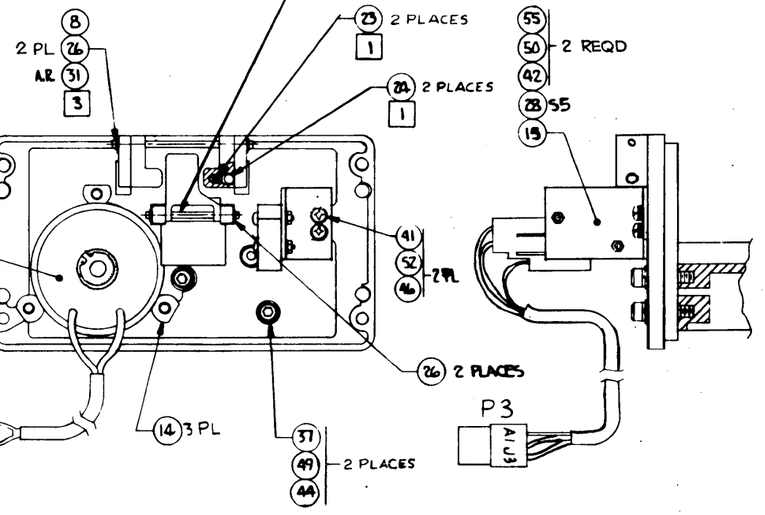












SEE SEPARATE PARTS LIST 127124-01

QTY REQD	ITEM NO.	REF DES	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL OR NOTE	CODE IDENT
PARTS LIST						

UNLESS OTHERWISE SPECIFIED DIMENSIONS IN INCHES. TOLERANCES ON DECIMALS ANGLE XX± .XXX± ± 1/2°

DO NOT SCALE DRAWING

BREAK SHARP EDGES

MATERIAL

FINISH

CONTRACT NO.

	APPROVED	DATE
DRAWN		1/24/75
CHECK		2/14/75
ENGR		2/18/75
MGR		2/18/75

ELECTRONIC PRODUCTS DIVISION
ELECTRONIC ENGINEERING COMPANY OF CALIFORNIA

TITLE
READ HEAD ASSEMBLY

NEXT ASSY	USED ON
127102-01	230438
APPLICATION	

SIZE	CODE IDENT NO.	DWG NO.
D	97525	127124

SCALE 1/1 SHEET 1 OF 1

"THE INFORMATION CONTAINED HEREON IS PROPRIETARY AND CONFIDENTIAL TO ELECTRONIC ENGINEERING COMPANY OF CALIFORNIA AND SHALL NOT BE USED OR DISCLOSED, IN WHOLE OR IN PART, WITHOUT FIRST OBTAINING THE WRITTEN PERMISSION OF ELECTRONIC ENGINEERING COMPANY OF CALIFORNIA."

NOTES: UNLESS OTHERWISE SPECIFIED

1. ASTERISKS * DENOTES KEYING PIN ON CONNECTORS.
2. SEE WIRE LIST 126810 FOR ADDITIONAL TWISTED WIRES.

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	A	RELEASED	2/19/75	
	B	EO 5137A	6/2/76	
	C	EO 5438	10/6/76	
	D	EO 5798A	RY 1/31/76	
	E	EO 6210	RY 3/5/76	
	F	EO6369	3/26/76	
	G	EO6567	9/6/76	
	H	PER E.O. 7-36	11/7/77	
	J	PER E.O 8365	8/2/78	

PART OF FRONT PANEL ASSY.

SPOOLER LEFT — SPOOLER RIGHT

STEPPER MOTOR ASSY — READ HEAD ASSY. — PHOTOELECTRIC ARRAY ASSY

L.E.D. ARRAY 338925-02 — TRANSISTOR ARRAY 338925-03

A1 CONTROL CARD READER/SPOOLER ASSY

J2 — F1 2AMP SLO BLO — AC VOLTAGE SELECT — T1 — S1 — S2 — POWER

PART OF FRONT PANEL ASSY.

J16 P16 — MV, +24V — R1 1.4Ω, 10W — CA ASSY, RESISTOR

J1 connector pinout:

+5VDC	1
REMOTE REWIND RIGHT	2
REMOTE REWIND LEFT	3
DRIVE RIGHT	4
DRIVE LEFT	5
READER READY	6
RUN STATUS	7
+24 VDC	8
(SPROCKET) READ CLK	9
DRIVE ACKNOWLEDGE	10
CH 1	11
CH 2	12
CH 3	13
CH 4	14
CH 5	15
CH 6	16
CH 7	17
CH 8	18
+24VDC	19
BROKEN TAPE	20
CHASSIS GND	21
SIGNAL GND	22
SIGNAL GND	23
SIGNAL GND	24
SIGNAL GND	25

S1 REAR VIEW — KEY

C1 9000 mF 50VDC — +34 V. UNREG, NC, GND

S2 REAR VIEW — S2 FRONT VIEW

XF1 REAR VIEW

S4 REAR VIEW — KEY

LOOP / SPOOL — S4A — S3 — REWIND — POWER DS1

PART OF FRONT PANEL ASSY.

S3 REAR VIEW — KEY

RS1 FRONT VIEW (SHAFT)

PART OF A1 — P1 J1 — RS1 — J10 P10 — Q8 2N3055 REF.

QTY REQD	ITEM NO.	REF DES	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL OR NOTE	CODE IDENT

PARTS LIST

UNLESS OTHERWISE SPECIFIED DIMENSIONS IN INCHES. TOLERANCES ON DECIMALS ANGLE XX± XXX± ± 1/2°

DO NOT SCALE DRAWING

BREAK SHARP EDGES

MATERIAL

FINISH

NEXT ASSY 130438 — USED ON APPLICATION

CONTRACT NO.

	APPROVED	DATE
DRAWN		1/16/75
CHECK		2/11/75
ENGR		4/14/75
MGR		7/15/75

ELECTRONIC PRODUCTS DIVISION
ELECTRONIC ENGINEERING COMPANY OF CALIFORNIA

TITLE: SCHEMATIC, TAPE RDR/SPLR, TRS9200

SIZE D — CODE IDENT NO. 97525 — DWG NO. 127136

SCALE NONE — SHEET — OF

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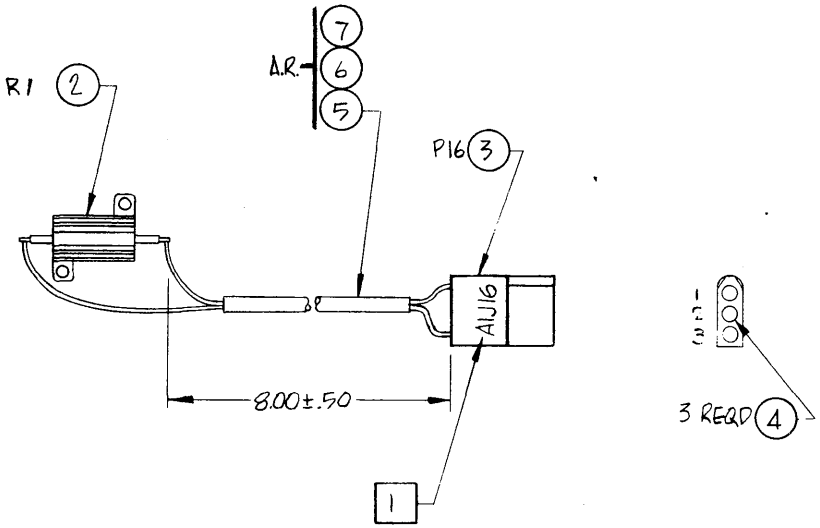
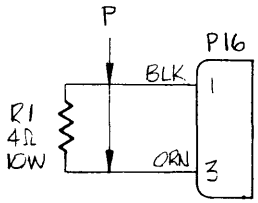
NOTES: UNLESS OTHERWISE SPECIFIED

1. RUBBER STAMP REF DESIGNATOR IN 1/8 HIGH CHARACTERS, BLACK ACID ETCH INK.
2. BAG & TAG WITH PART NO. 127166-01 & LATEST REV FOR IDENT

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	A	RELEASE	4-1-75	
	B	EO 5137A	5/2 75	





WIRING DIAGRAM

SEE SEPARATE PARTS LIST 127166-01

QTY REQD	ITEM NO	REF DES	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL OR NOTE	CODE IDENT

PARTS LIST

126702-01	230438
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS IN INCHES. TOLERANCES ON DECIMALS .XX±.02 .XXX±.005 ANGLE ± 1/2°

DO NOT SCALE DRAWING

BREAK SHARP EDGES

MATERIAL

FINISH

CONTRACT NO.

		DATE
APPROVED		
DRAWN		1-14-75
CHECK		2/4/75
ENGR		5/12/75
MGR		

ELECTRONIC PRODUCTS DIVISION
ELECTRONIC ENGINEERING COMPANY OF CALIFORNIA

TITLE

CABLE ASSY, RESISTOR

SIZE	CODE IDENT NO.	DWG NO.
B	97525	127166

SCALE 1:1.5 SHEET 1 OF 1