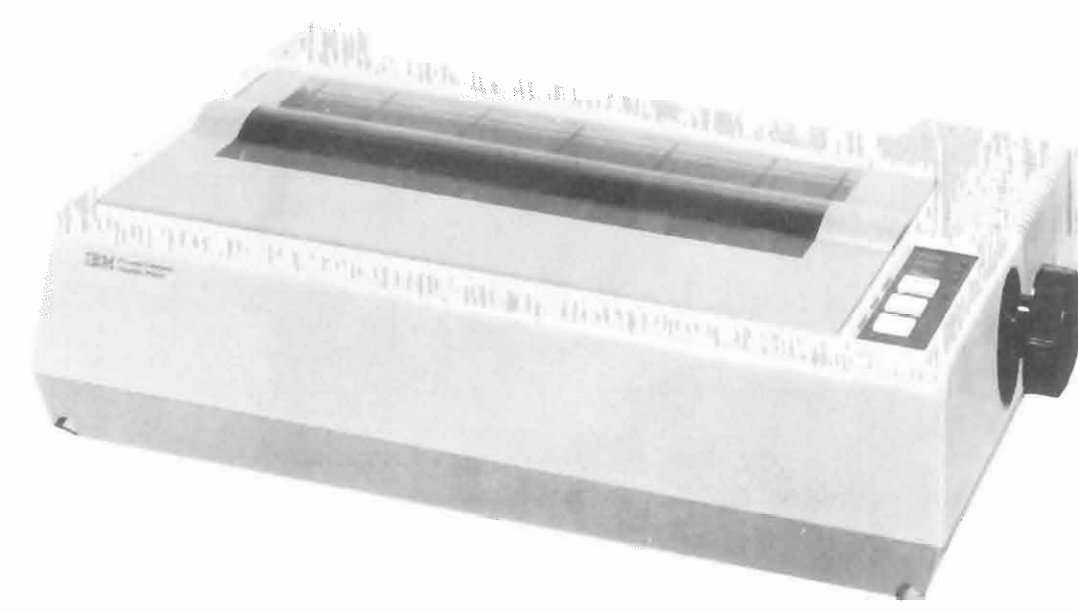


LINE IDENTIFICATIONS ASSIGNED FOR REFERENCE

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CONTROL, DRIVER & AC SWITCH BOARDS IBM
MODEL 5152-002



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PRELIMINARY SERVICE CHECKS
ENCLOSED

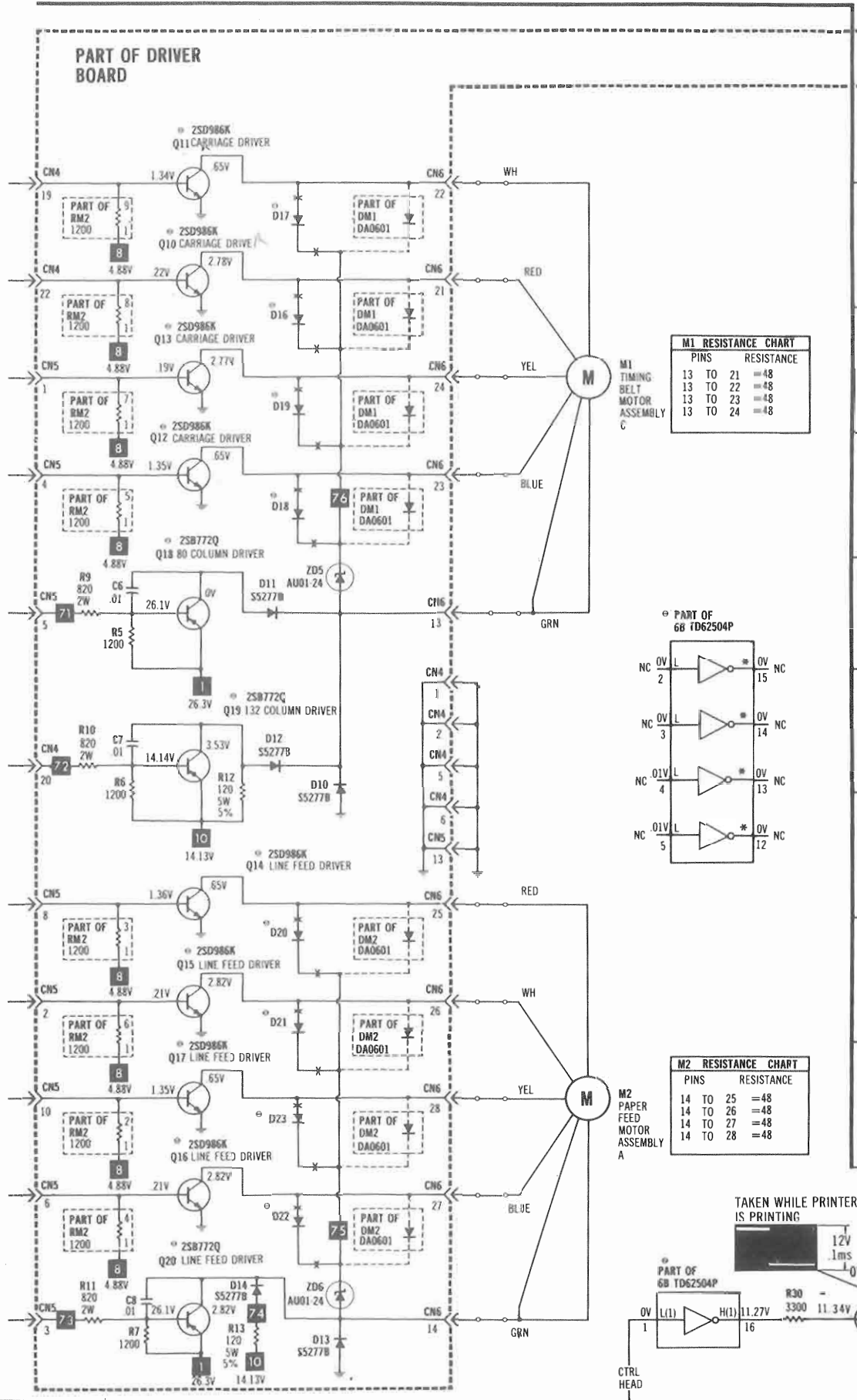
SAFETY PRECAUTIONS
See page 21.

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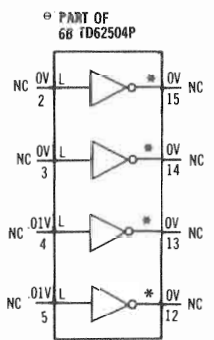
The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed.

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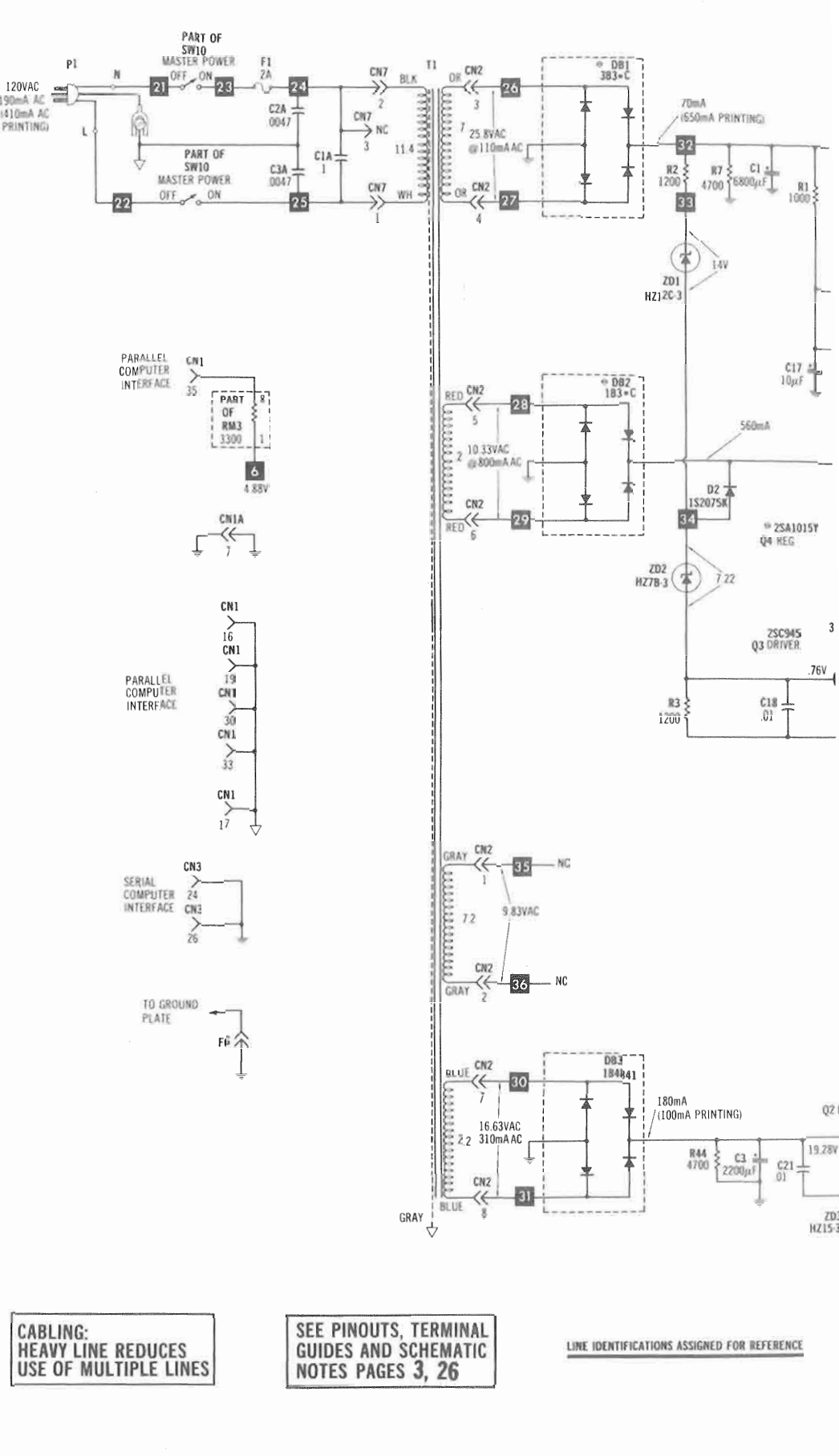
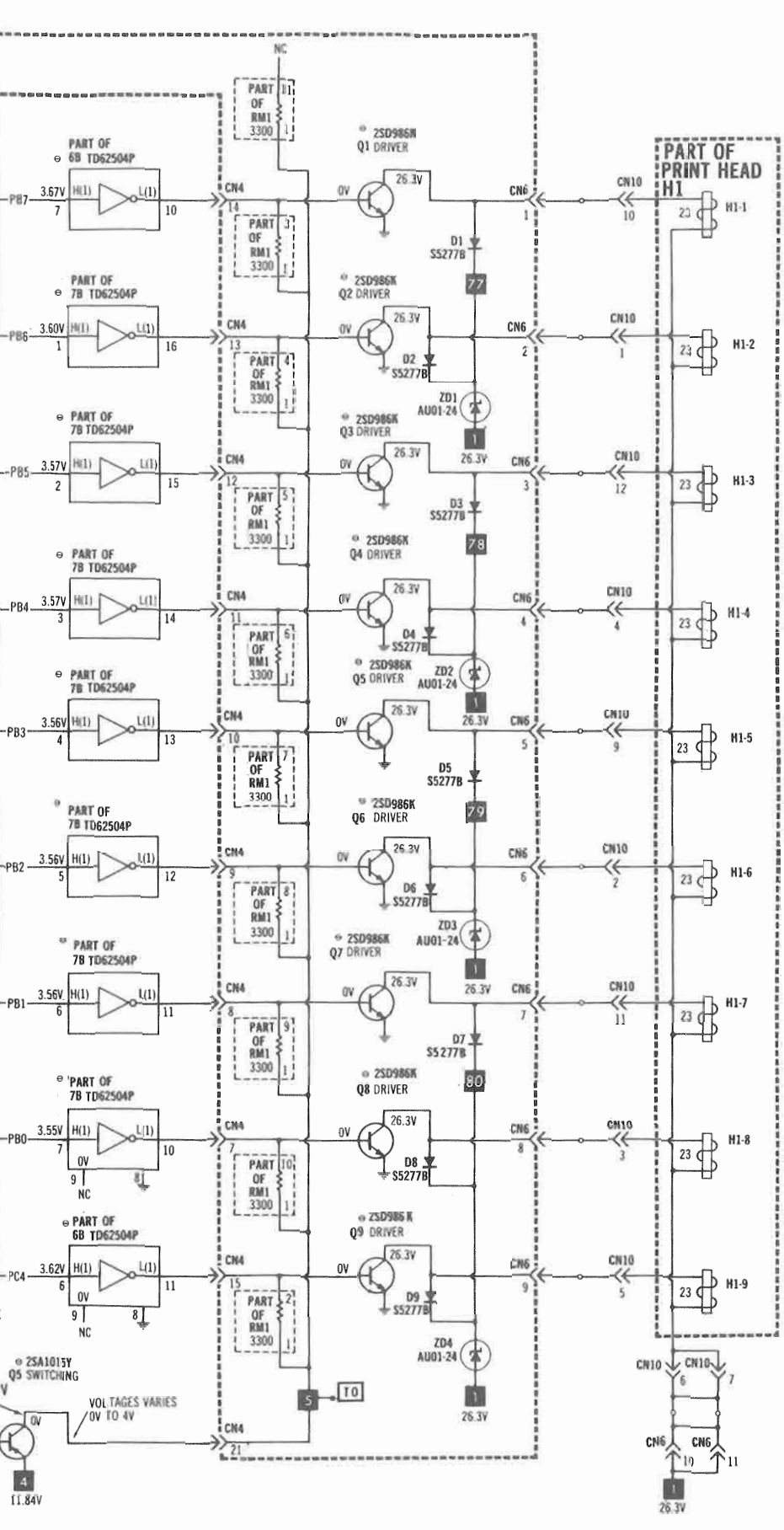
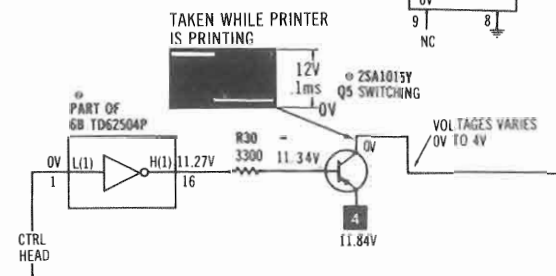
M1 RESISTANCE CHART

PINS	RESISTANCE
13 TO 21	=48
13 TO 22	=48
13 TO 23	=48
13 TO 24	=48



M2 RESISTANCE CHART

PINS	RESISTANCE
14 TO 25	=48
14 TO 26	=48
14 TO 27	=48
14 TO 28	=48



CABLING:
HEAVY LINE REDUCES
USE OF MULTIPLE LINES

**SEE PINOUTS, TERMINAL
GUIDES AND SCHEMATIC
NOTES PAGES 3, 26**

LINE IDENTIFICATIONS ASSIGNED FOR REFERENCE

CONTROL, DRIVER & AC SWITCH BOARDS

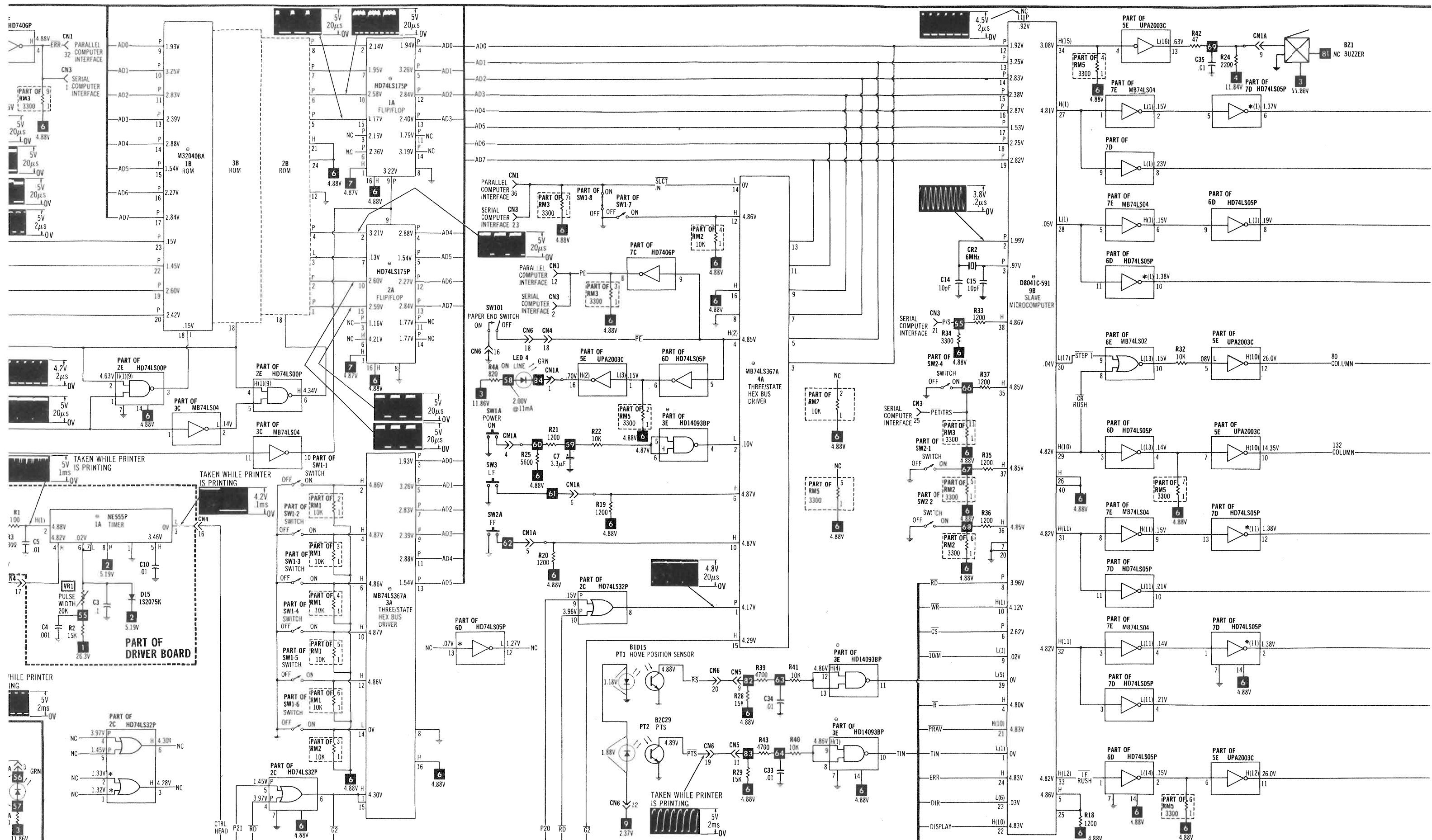
SEE LINE DEFINITIONS ON PAGE 21



SEE PINOUTS, TERMINAL GUIDES AND SCHEMATIC NOTES PAGES 3, 26

CABLING: HEAVY LINE REDUCES USE OF MULTIPLE LINES

SEE LINE DEFINITIONS ON PAGE 21

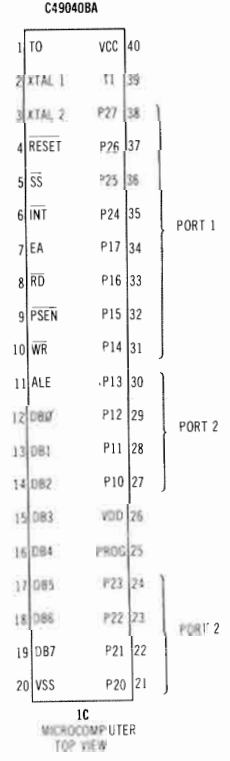
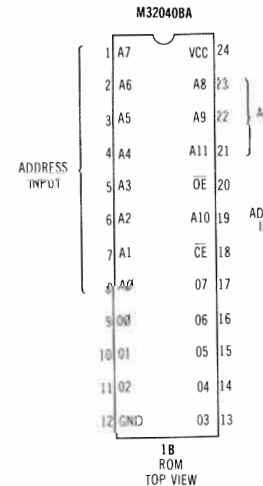
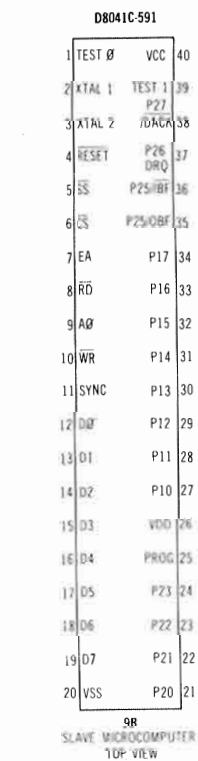
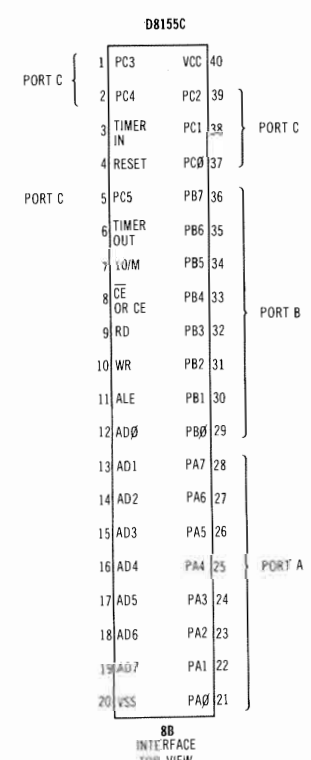
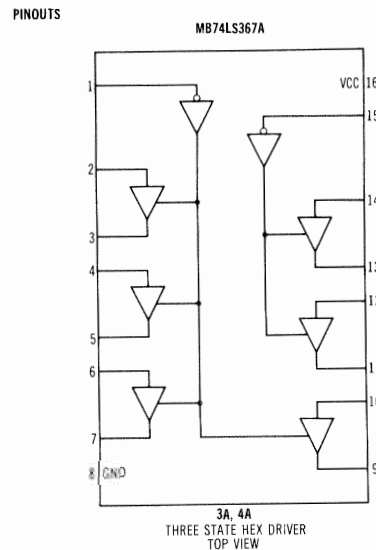
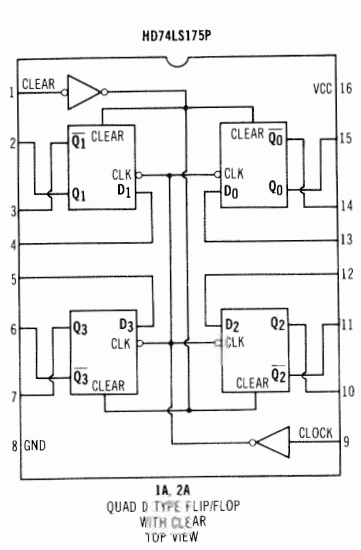


SEE LINE DEFINITIONS ON PAGE 21

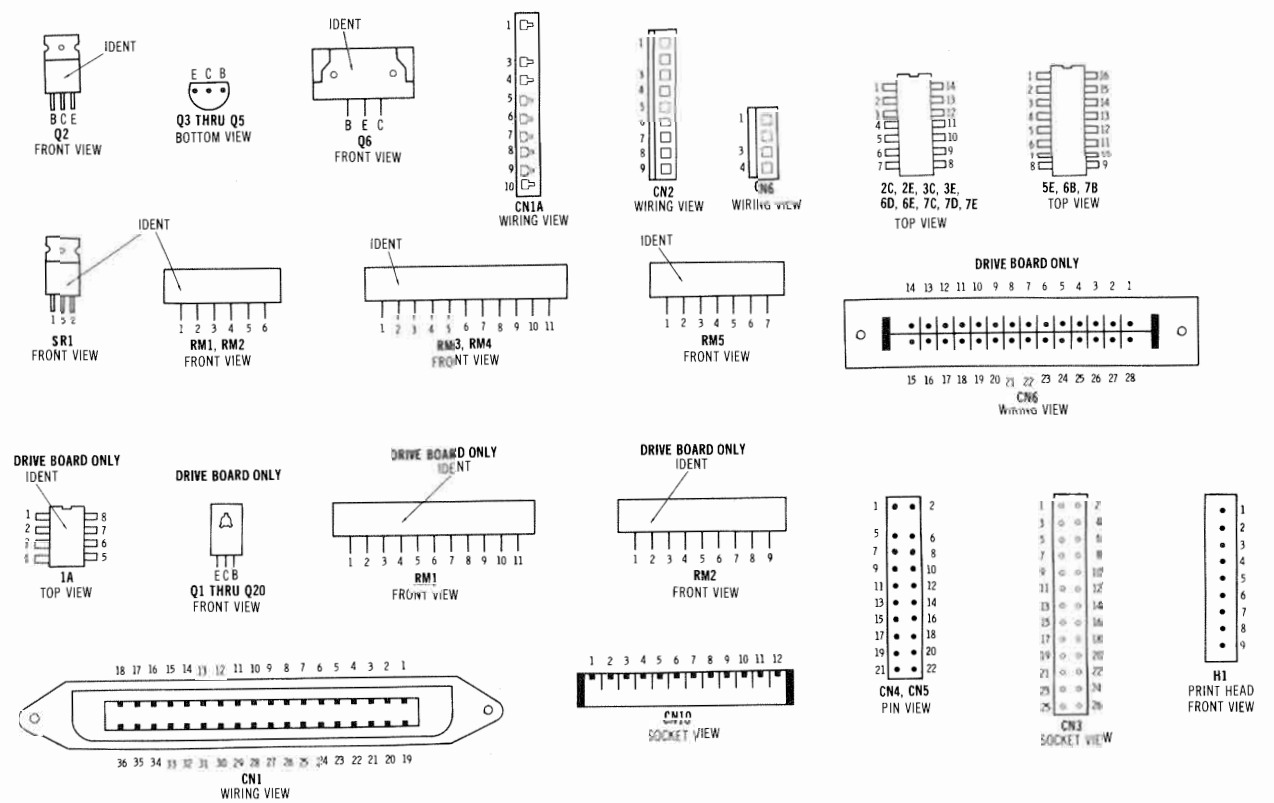
FUNCTION, CONTROL & DRIVER BOARDS

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MODEL 5152-002

IC PINOUTS, TERMINAL GUIDES & SCHEMATIC NOTES



TERMINAL GUIDES



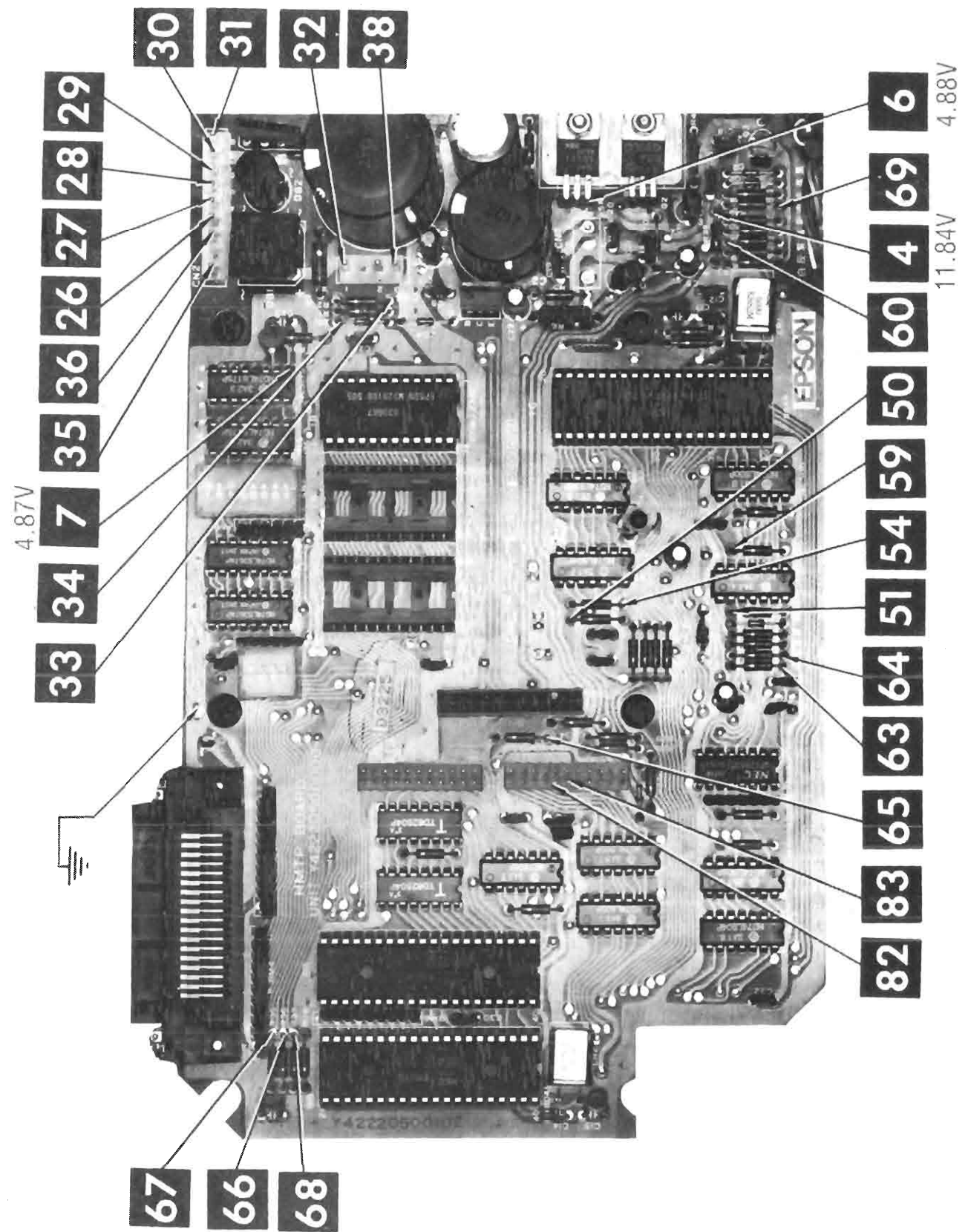
SCHEMATIC NOTES

- ✖ Circuitry not used in some versions
 - Circuitry used in some versions
 - ⊕ See parts list
 - ⊕ Ground
 - ▽ Common tie point
- Voltages measured with digital meter.
Waveforms and voltages are taken from ground, unless noted otherwise.
Voltages, waveforms and logic readings taken with printer On Line and not printing unless noted. Printer Self-Test mode used to get readings taken while printing.
Switches SW1 and SW2 set as shown on schematic.
Waveforms taken with triggered scope and Sweep/Time switch in Calibrate position, scope input set for DC coupling on "0" reference voltage waveforms. Switch to AC input to view waveforms after DC reference is measured when necessary. Each waveform is 7.5cm width with DC reference voltage given at the bottom line of each waveform. Time in μ s per cm, given with p-p reading at the end of each waveform.
- Item numbers in rectangles appear in the alignment/adjustment instructions.
Supply voltage maintained as shown at input.
Controls adjusted for normal operation.
Terminal identification may not be found on unit.
Resistors are $\frac{1}{2}$ W or less, 10% unless noted.
Value in () used in some versions.

NOTE: Logic probe readings taken with printer On Line and not printing unless otherwise noted. Printer Self-Test mode used to get readings with switches SW1 and SW2 set as shown on schematic.

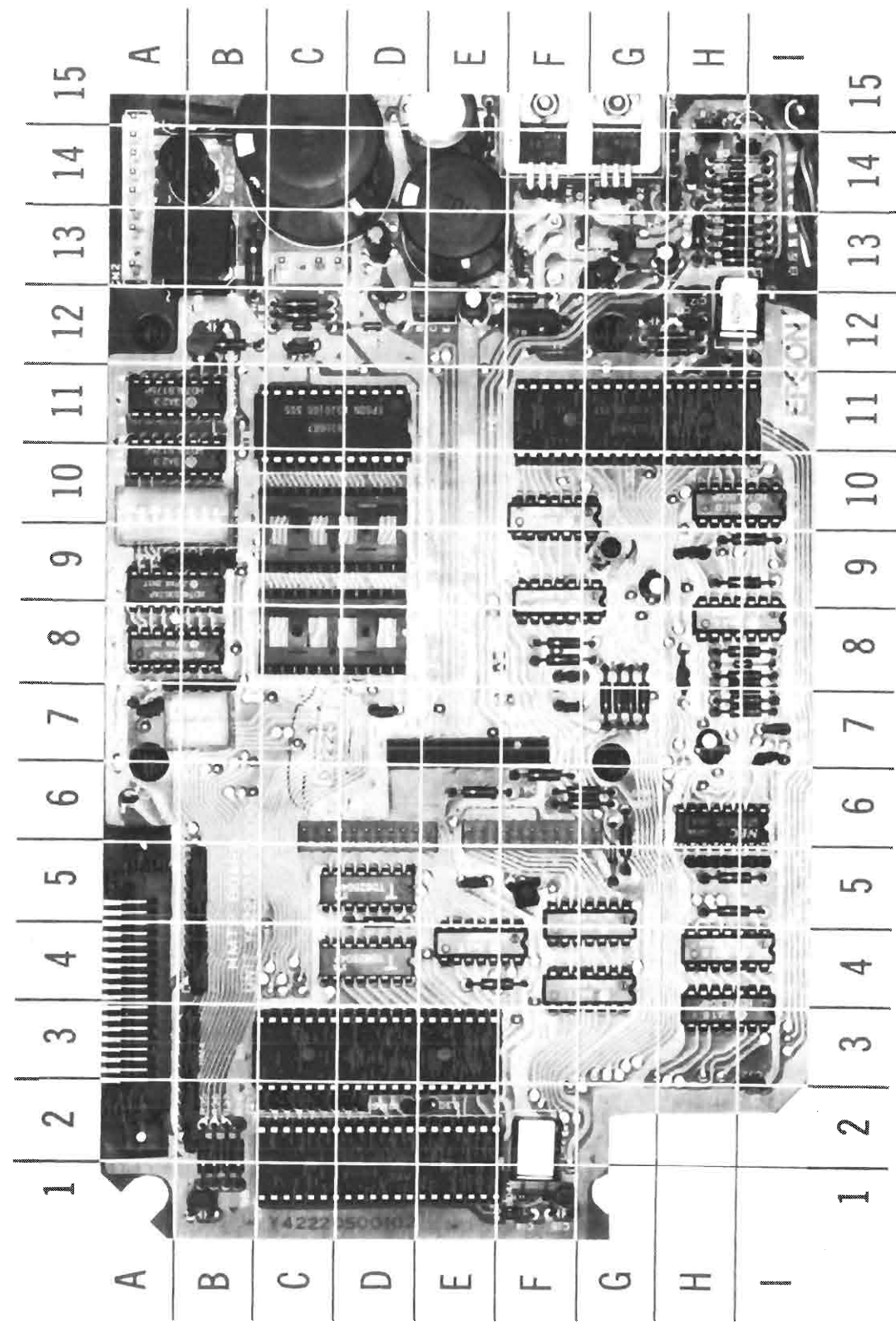
- Logic Probe Display
L = Low
H = High
P = Pulse
* = Open (No lights On)
- (1) Probe indicates P when printer is printing.
 - (2) Probe indicates L with no paper in printer.
 - (3) Probe indicates H with no paper in printer.
 - (4) Probe indicates L when print head is not at home position.
 - (5) Probe indicates H when print head is not at home position.
 - (6) Probe indicates H when print head moves from left to right, and L when head moves from right to left.
 - (7) Probe indicates H when the printer is not on line.
 - (8) Probe indicates L when the printer is not on line.
 - (9) Probe indicates P when the printer is not on line or is printing.
 - (10) Probe indicates L when printer is printing.
 - (11) Probe indicates P when a line feed occurs.
 - (12) Probe indicates L when a line feed occurs.
 - (13) Probe indicates H when printing.
 - (14) Probe indicates H when a line feed occurs.
 - (15) Probe indicates L when buzzer sounds.
 - (16) Probe indicates H when buzzer sounds.
 - (17) Probe indicates H when printing in compressed mode.

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CONTROL BOARD

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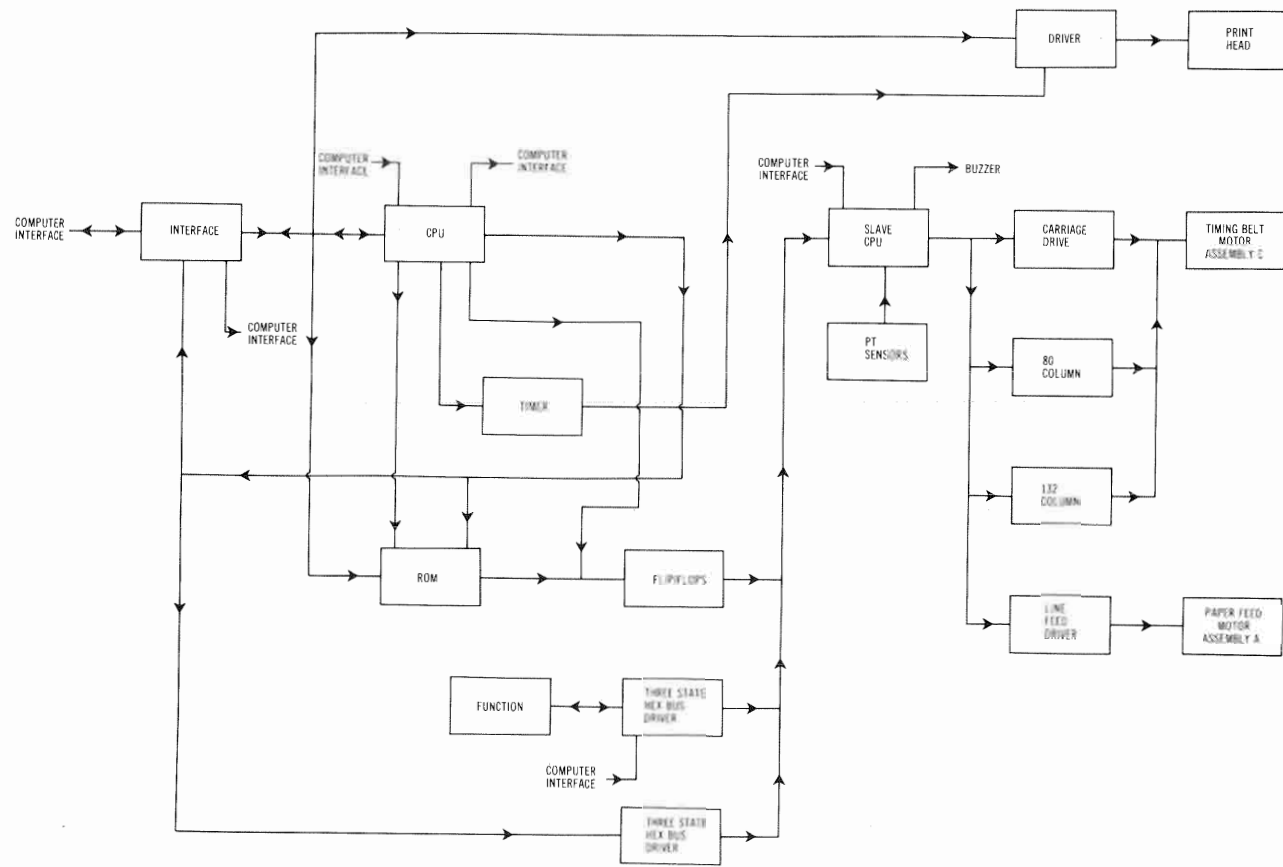
CONTROL BOARD

A Howard W. Sams **GRIDTRACE**™ Photo

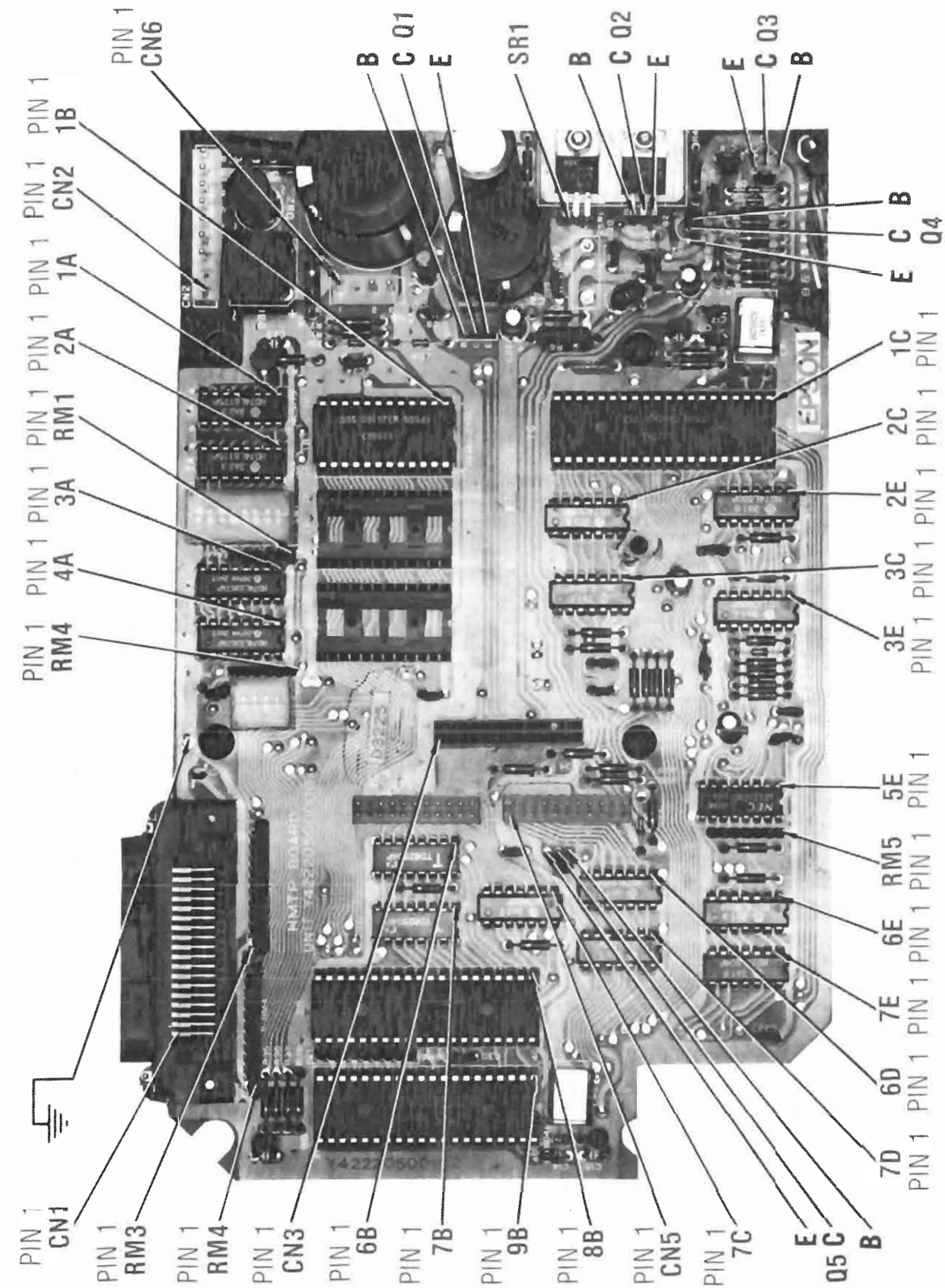
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MODEL 5152-002

CONTROL BOARD GridTrace LOCATION GUIDE

C1	C-14	C29	E-5	R2	C-12	R29	G-6	ZD3	G-13
C2	E-13	C30	D-2	R3	F-13	R30	D-5	ZD4	D-12
C3	E-15	C31	B-1	R4	H-14	R31	B-12	ZD5	I-8
C4	G-13	C32	I-3	R5	F-12	R32	H-5	1A	A-11
C5	G-13	C33	H-8	R6	F-12	R33	E-6	1B	C-11
C6	H-7	C34	I-7	R7	B-13	R34	F-6	1C	G-11
C7	G-9	C35	H-14	R8	F-8	R35	B-2	2A	A-10
C8	D-12	CN1	A-4	R9	I-9	R36	B-2	2C	A-10
C9	F-8	CN2	A-13	R10	F-8	R37	B-2	2E	H-10
C10	I-7	CN3	E-7	R11	G-7	R38	H-13	3A	A-9
C11	H-9	CN4	D-6	R12	G-7	R39	I-7	3C	F-9
C12	H-12	CN5	F-6	R13	G-7	R40	I-8	3E	H-8
C13	H-12	CN6	C-13	R14	G-7	R41	I-8	4A	A-8
C14	F-1	CR1	H-12	R15	I-8	R42	H-14	5E	H-6
C15	F-1	CR2	F-2	R16	H-12	R43	I-7	6B	D-5
C17	D-13	D1	G-5	R17	H-12	R44	E-14	6D	G-5
C18	H-14	D2	H-14	R18	B-2	RM1	B-9	6E	H-4
C19	F-13	DB1	B-13	R19	H-13	RM2	B-7	7B	D-4
C20	F-13	DB2	A-14	R20	H-13	RM3	A-4	7C	E-4
C21	G-13	DB3	B-15	R21	H-13	RM4	B-2	7D	G-4
C22	E-12	J1	F-12	R22	I-9	RM5	H-5	7E	H-3
C23	B-12	Q1	E-12	R23	E-4	RM6	C-2	8B	D-3
C24	C-12	Q2	G-14	R24	H-14	SR1	F-14	9B	D-2
C25	G-12	Q3	I-15	R25	H-13	SW1	A-10		
C26	A-7	Q4	H-14	R26	H-5	SW2	B-7		
C27	D-7	Q5	F-5	R27	G-6	ZD1	C-12		
C28	F-7	R1	C-12	R28	G-6	ZD2	H-14		

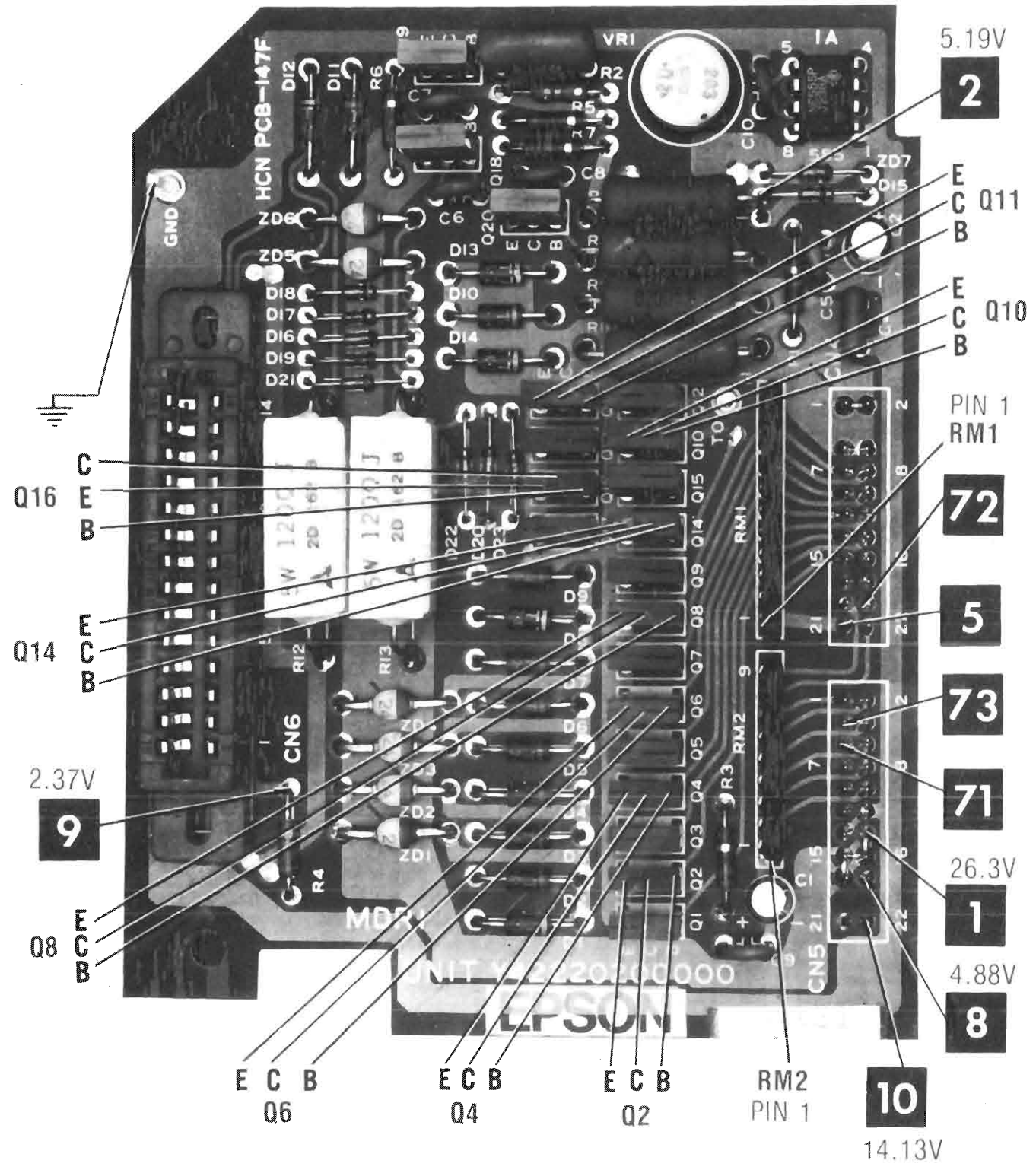


BLOCK DIAGRAM



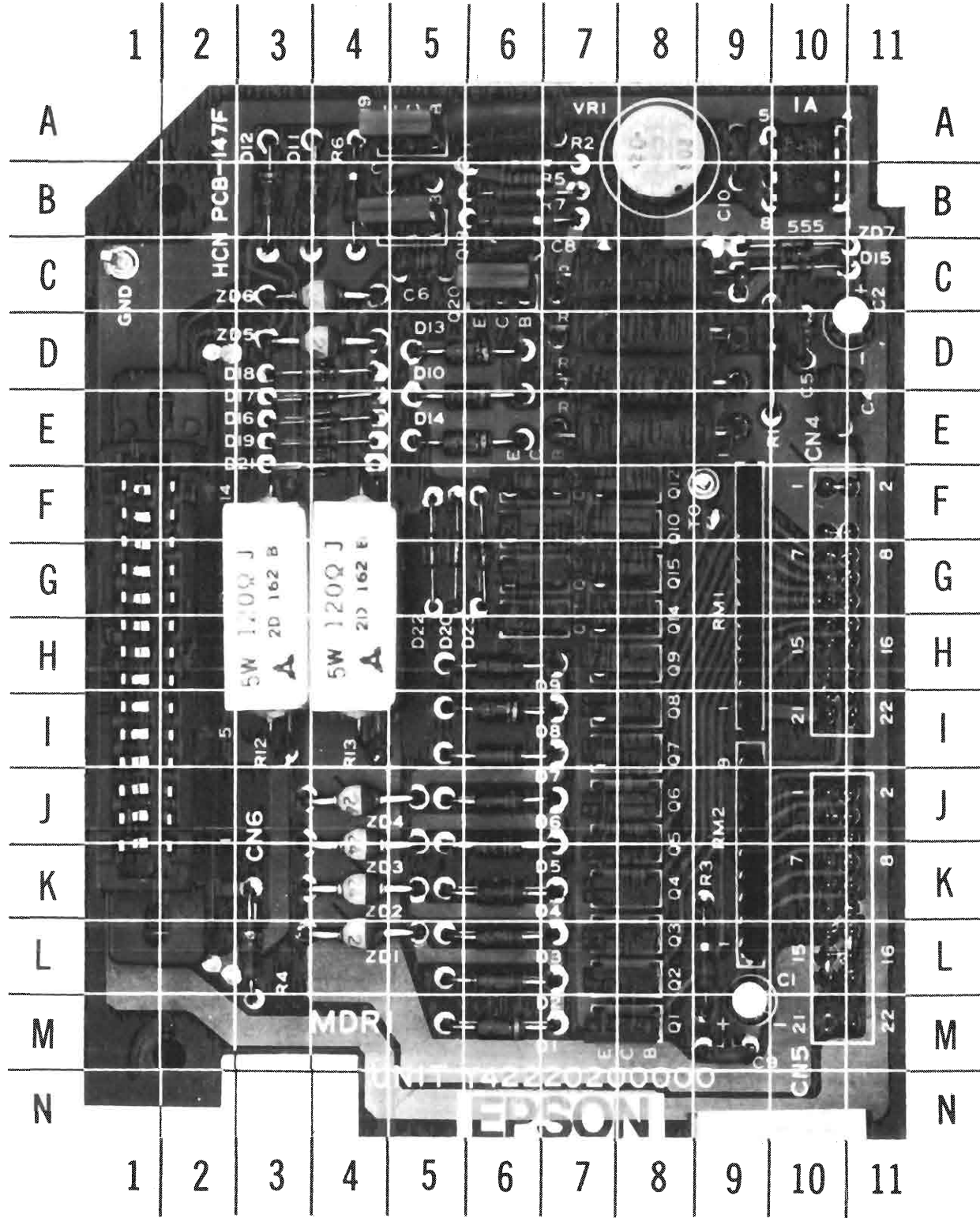
CONTROL BOARD

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DRIVER BOARD

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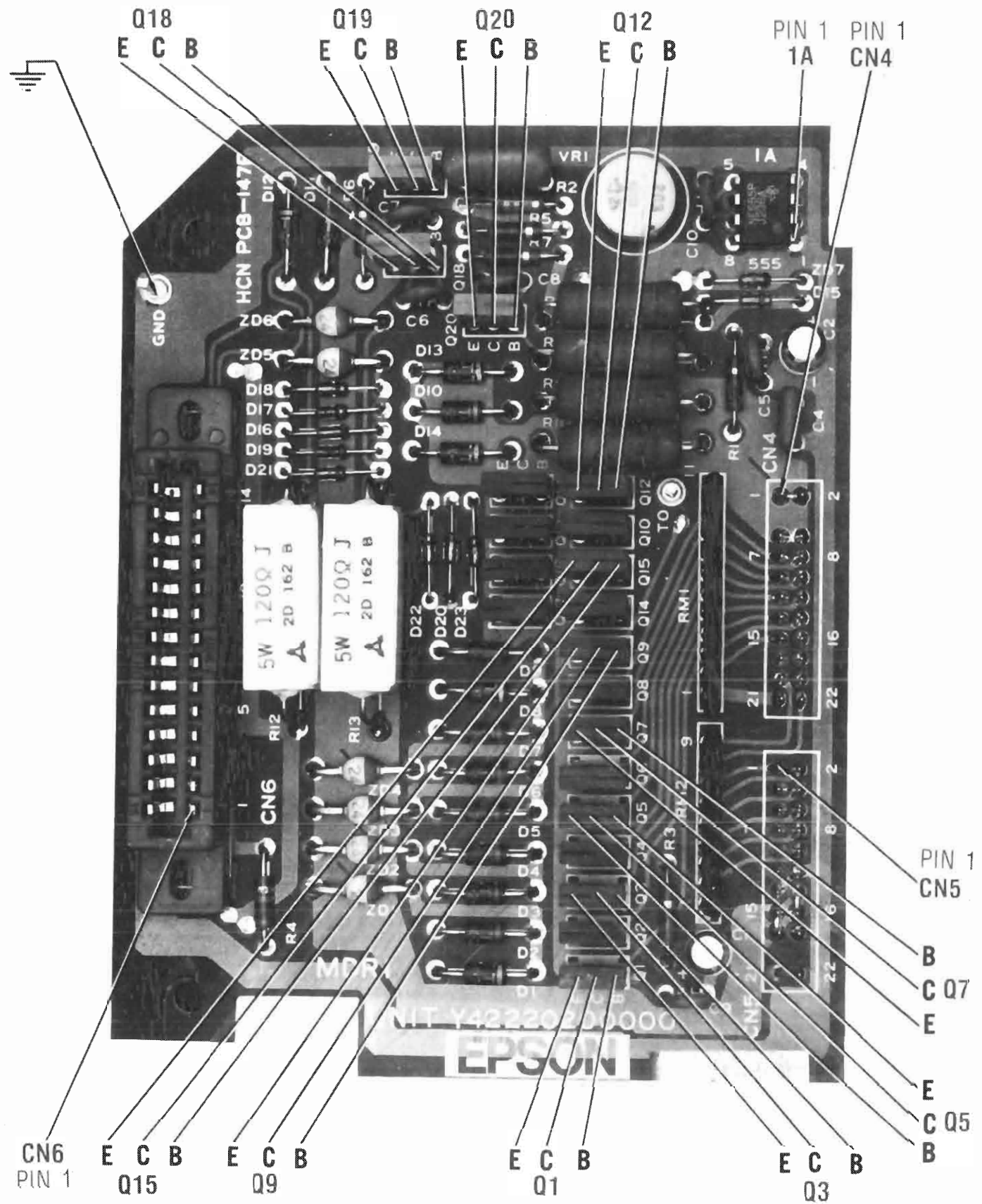
A Howard W. Sams **GRIDTRACE** Photo

DRIVER BOARD

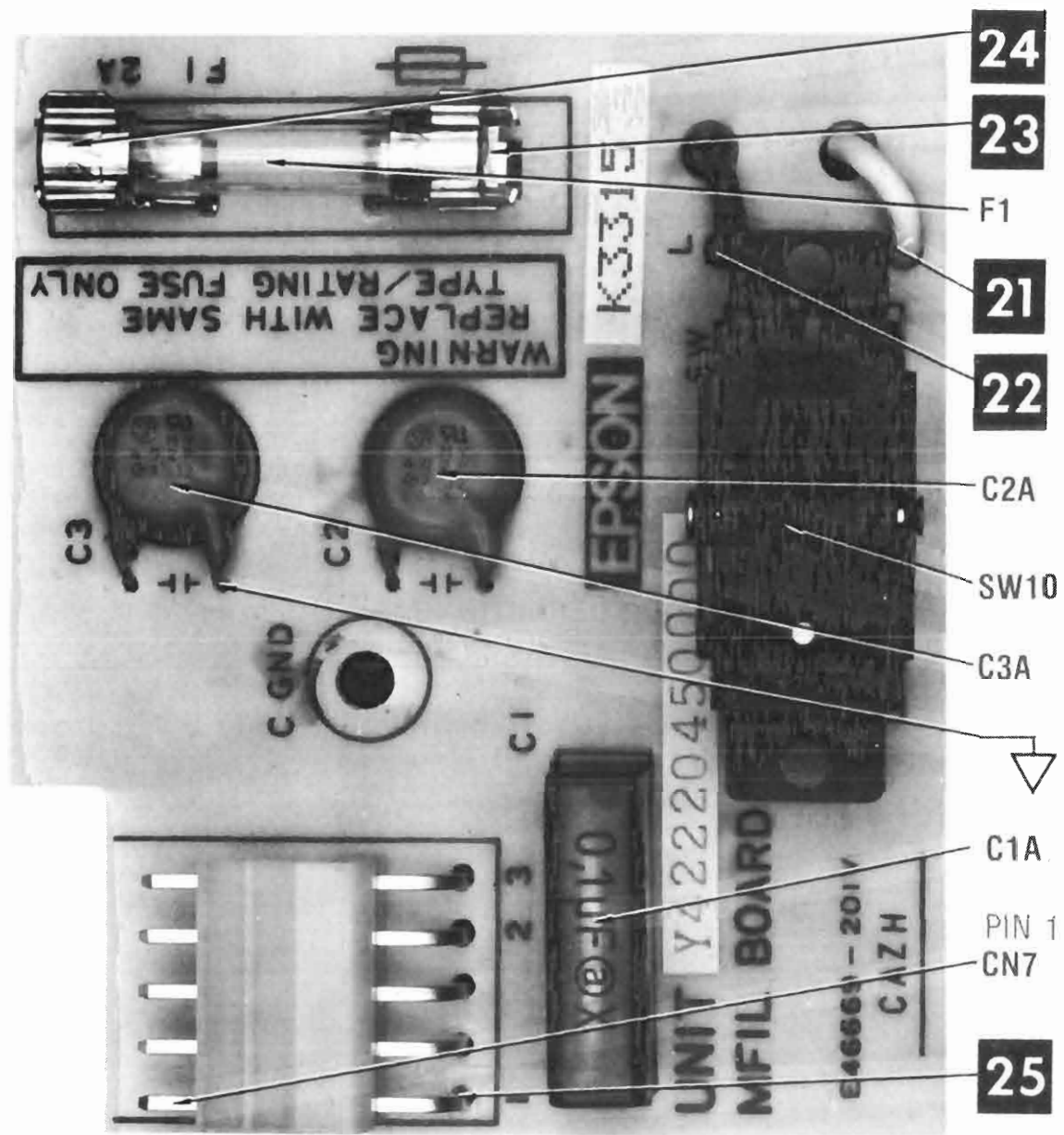
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DRIVER BOARD GridTrace LOCATION GUIDE

C1	M-9	D5	K-6	D22	G-5	Q16	G-6	R13	G-4
C2	D-11	D6	J-6	D23	G-6	Q17	H-6	RM1	G-9
C3	A-6	D7	I-6	Q1	M-7	Q18	B-5	RM2	K-9
C4	E-10	D8	I-6	Q2	L-7	Q19	A-5	TO	F-9
C5	D-10	D9	H-6	Q3	L-7	Q20	C-6	VR1	A-8
C6	C-5	D10	E-6	Q4	K-7	R1	D-10	ZD1	L-4
C7	B-5	D11	B-4	Q5	K-7	R2	A-6	ZD2	K-4
C8	C-6	D12	B-3	Q6	J-7	R3	L-9	ZD3	J-4
C9	M-9	D13	D-6	Q7	I-7	R4	L-3	ZD4	J-4
C10	A-9	D14	E-6	Q8	I-7	R5	B-6	ZD5	C-4
CN4	G-10	D15	C-10	Q9	H-7	R6	B-4	ZD6	C-4
CN5	K-10	D16	E-4	Q10	F-7	R7	B-6	ZD7	C-10
CN6	H-1	D17	E-4	Q11	F-6	R8	C-8	1A	A-10
D1	M-6	D18	D-4	Q12	F-7	R9	D-8		
D2	L-6	D19	E-4	Q13	F-6	R10	E-8		
D3	L-6	D20	G-5	Q14	G-7	R11	D-8		
D4	K-6	D21	F-4	Q15	G-7	R12	G-3		



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AC SWITCH BOARD

DRIVER BOARD

GENERAL OPERATING INSTRUCTIONS

PRINT STATUS (SW1) AND LINE FEED STATUS (SW2)

SW1	On	Off
1	Compressed	Normal
2	Not Used	
3	Paper Out Sensor On	Paper Out Sensor Off
4	Italic	Normal
5	Emphasized	Normal
6	Buzzer On	Buzzer Off
7	Slashed Zero	Regular Zero
8	Select Fixed	Select Not Fixed

SW2	On	Off
1	Not Used	
2	Not Used	
3	Auto Line Feed with Carriage Return	Line Feed from Host
4	One Inch Skip Over Perf	Normal (No Skip)

PRINTER SELF-TEST

To use the built-in self-test function, put paper in the printer and hold down the LF (Line Feed) button while turning On the printer.

ON LINE, FF AND LF BUTTONS

Printer is On Line (Ready to receive data from the computer) when all three green LED's are On. The printer is Off Line when only the top green LED is On. Pressing the On Line button once puts the printer Off Line and pressing it again puts the printer back On Line. The printer must be Off Line for the FF (Form Feed) and LF (Line Feed) buttons to function.

ADJUSTMENTS

HEAD DRIVER PULSE WIDTH ADJUSTMENT

Connect the input of a scope to Test Point TO on the Driver Board and set the horizontal sweep to .1ms trigger to positive edge. Use the printer self-test mode (Hold LF button down while turning On the printer) to make the printer print. While the printer is printing, adjust the Pulse Width Control (VR1) for a pulse width of .32ms. See Figure 1.

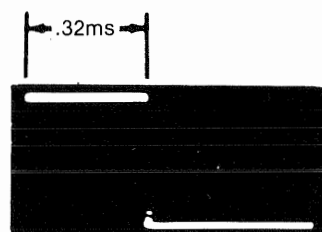


Figure 1

Connect Channel B input of the scope to pin 28 of IC 1C and set the trigger to trigger on Channel B, negative edge, normal mode. Check for a time difference of .8ms or more from the trailing edge of the PRAV signal on pin 28 to the leading edge of the first pulse of the TIN signal on pin 39. If the time difference is less than .8ms, readjust the PTS Sensor Board slightly for a difference of .8ms or more. See Figure 3.

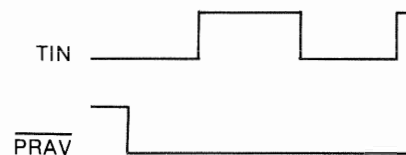


Figure 3

PTS SENSOR BOARD ADJUSTMENT

Connect Channel A of a dual trace scope to pin 39 of Microcomputer IC (1C) and set the horizontal sweep to .5ms, trigger to positive edge. Use the printer self-test mode (Hold LF button down while turning On the printer) to make the printer print. Loosen the screw holding the PTS (Position Timing Signal) Sensor Board to the right side of the carriage return motor. Use a screwdriver in the slot provided to adjust the PTS Sensor Board for a pulse cycle of 2.08ms while the printer is printing. See Figure 2.

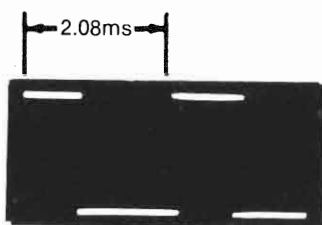


Figure 2

HOME POSITION SENSOR ADJUSTMENT

Connect Channel A input of a dual trace scope to pin 11 of IC 3E and Channel B input to pin 39 of IC (1C). Set the horizontal sweep to .5ms and set the trigger for Channel A, positive edge, normal mode. Use the printer self-test mode (Hold LF button down while turning On the printer) to make the printer print. Loosen the screw holding the Home Sensor Board and use a screwdriver in the slot provided to adjust the Home Sensor Board for a phase relationship of .9ms to 1.2ms between the reset signal on pin 11 of IC 3E and the TIN signal on pin 39 of IC 1C. See Figure 4.

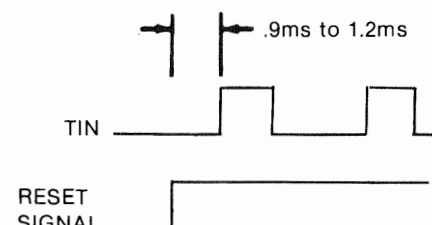


Figure 4

SAFETY PRECAUTIONS

1. Use an isolation transformer for servicing.
2. Maintain AC line voltage at rated input.
3. Remove AC power from the printer before servicing or installing electrostatically sensitive devices. Examples of typical ES devices are integrated circuits and semiconductor "chip" components.
4. Use extreme caution when handling the printed circuit boards. Some semiconductor devices can be damaged easily by static electricity. Drain off any electrostatic charge on your body by touching a known earth ground. Wear a commercially available discharging wrist strap device. This should be removed prior to applying power to the unit under test.
5. Use a grounded-tip, low voltage soldering iron.
6. Use an isolation (times 10) probe on scope.
7. Do not remove or install boards, mechanical or electrical parts, or other peripherals with printer AC power On.
8. Do not use freon-propelled sprays. These can generate electrical charges sufficient to damage semiconductor devices.
9. This printer is equipped with a grounded three-pronged AC plug. This plug must fit into a grounded AC power outlet. Do not defeat the AC plug safety feature.
10. Periodically examine the AC power cord for damaged or cracked insulation.
11. The printer cabinet is equipped with vents to prevent heat build-up. Never block, cover, or obstruct these vents.
12. Instructions should be given, especially to children, that objects should not be dropped or pushed into the vents of the cabinet. This could cause shock or equipment damage.
13. Never expose the printer to water. If exposed to water turn the unit Off. Do not place the printer near possible water sources.
14. Never leave the printer unattended or plugged into the AC outlet for long periods of time. Remove AC plug from AC outlet during lightning storms.
15. Do not allow anything to rest on AC power cord.
16. Unplug AC power cord from outlet before cleaning printer.
17. Never use liquids or aerosols directly on the printer. Spray on cloth and then apply to the printer cabinet. Make sure the printer is disconnected from the AC power line.

LINE DEFINITIONS

ACK	Acknowledge	P20	Port
AD0 THRU AD7	Address Data	P21	Port
ALE	Address Latch Enable	PB0 THRU PB7	Drive Signal
AUTO FEED	Auto Feed	PC4	Drive Signal
BUSY	Busy	PE	Paper End
CE	Control Enable	PET/TRS	Line Feed From Host
CR RUSH	Carriage Return Rush	PRAV	Printer Availability
CS	Control Select	PSEN	Program Store Enable
CTRL HEAD	Control Head	PTS	Position Timing Signal
DIR	Direction	R	Reset
DISPLAY	Display	RD	Read
DT1 THRU DT8	Data	RS	Home Position Signal
ERR	Error	SLCT IN	Select Input
G2	Input	SLCT OUT	Select Output
HEAD TRIGGER	Head Trigger	STB	Strobe
INT	Interrupt	STEP1	Step One
INIT	Initial	TIN	Timing Input
LF RUSH	Line Feed Rush	WR	Write
P/S	Parallel/Serial	10/M	10 Times Magnification
P15	Port	80 COLUMN	80 Column
P16	Port	132 COLUMN	132 Column

Any Bar above any alphabetical or numerical combination indicates line active in a low (0) state.

MODEL 5152-002

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MECHANICAL REMOVAL, REPLACEMENT AND ADJUSTMENTS

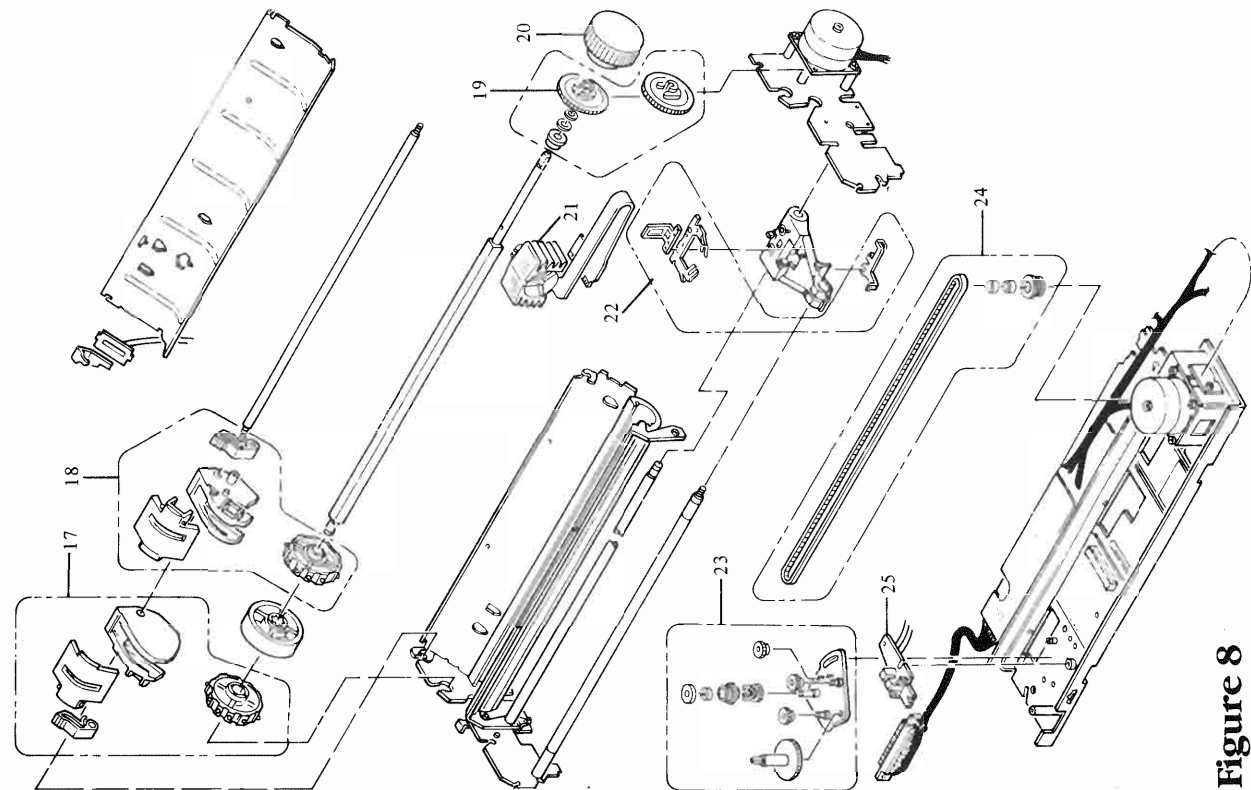
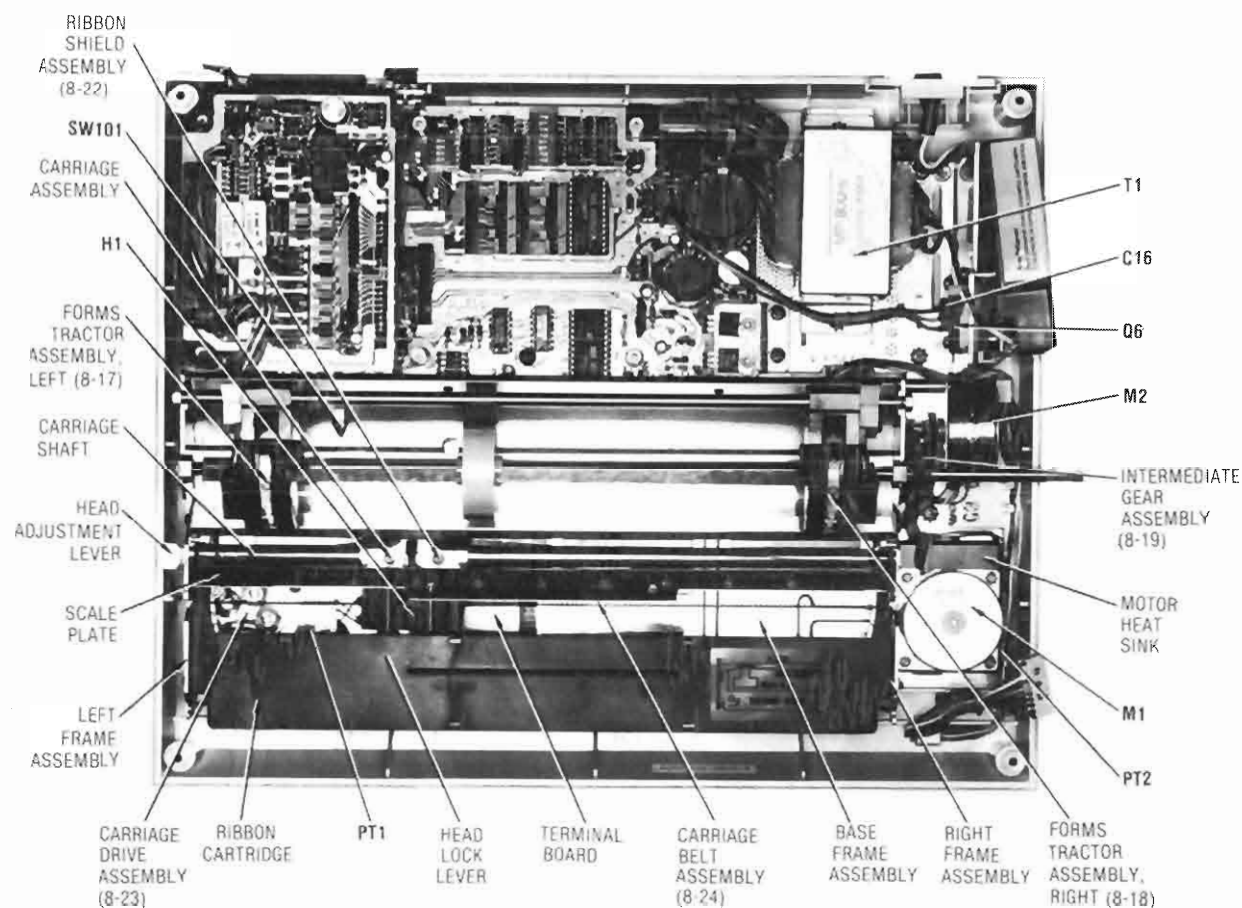


Figure 8
Printer (5152)

Courtesy of IBM

PRINTER MECHANISM — EXPLODED VIEW



CHASSIS-TOP VIEW

RIBBON CARTRIDGE REPLACEMENT

Slide Carriage Assembly to center. Move Scale Plate back and remove Ribbon Cartridge. Turn knob, on replacement Ribbon Cartridge, counterclockwise to tighten ribbon. Install the Ribbon Cartridge with the four tabs (two on each end) in the slots of Left and Right Frame Assemblies. Press down on Ribbon Cartridge to secure in place. Slip the ribbon between Print Head (H1) and Ribbon Shield Assembly (8-22). Turn knob to retighten ribbon.

PRINT HEAD REPLACEMENT

Slide Carriage Assembly to the right. The Print Head cable has a pull tab. Use this tab to disconnect Print Head cable from connector on Terminal Board. Move Head Lock Lever, part of Ribbon Shield Assembly (8-22), clockwise. Lift and remove the Print Head (H1). Install replacement by reversing the removal procedure.

PAPER THICKNESS ADJUSTMENT

Head Adjustment Lever moves the Print Head to allow for paper thickness. The seven settings provide normal adjustment. If adjustment of lever is required, because of replacement of parts, perform the following procedure.

Set the lever to the center position and loosen the nut securing Carriage Shaft. Insert a screwdriver into hole in shaft. Hold screwdriver perpendicular to Base Frame Assembly and retighten nut. Movement of Head Adjustment Lever toward Maximum — position should move Print Head forward. If Print Head moves away, loosen nut, rotate Carriage Shaft 180 degrees and repeat adjustment.

TIMING BELT REPLACEMENT

Remove printer mechanism from the cabinet, see Disassembly Instructions. Loosen Carriage Drive Assembly

(8-23) and remove tension from Carriage Belt Assembly (8-24). Remove bottom left and top right screws securing Motor Heat Sink and remove belt from pulley. The belt is fitted into the grooved plastic projection at the base of Carriage Assembly and glued in place. A cutout is provided in Base Frame Assembly for access to separate the belt from the Carriage Assembly. Slide the Carriage Assembly over this cutout, located to the right of the Terminal Board.

The type of glue used does not produce a permanent bond. From the bottom, the grooved plastic projection can be forced apart to remove the belt or, if preferred, a drop of rubber cement solvent (or equivalent) can be used. CAUTION: Too much solvent can damage the belt. Tension on belt should not be adjusted until solvent has completely dried.

Install replacement by reversing the removal procedure. Before adjusting tension apply a drop of glue and allow to dry to prevent belt from slipping out of the Carriage Assembly.

TIMING BELT MOTOR REPLACEMENT

Loosen Carriage Drive Assembly (8-23) and remove tension from Carriage Belt Assembly (8-24). Remove four mounting screws from Timing Belt Motor Assembly C (M1). Remove the motor assembly and Motor Heat Sink. Slide the motor assembly from the heat sink. Observe routing of lead wires and verify the same routing after performing replacement. Unsolder motor assembly lead wires from Terminal Board. Install replacement by reversing the removal procedure.

PAPER FEEDING MOTOR REPLACEMENT

Remove two mounting screws from Paper Feeding Motor Assembly A (M2). Observe routing of lead wires and verify the same routing after performing replacement. Unsolder motor assembly lead wires from Terminal Board. Install replacement by reversing the removal procedure.

MECHANICAL PARTS LIST

REF. NO.	PART NO.	DESCRIPTION
8-17	8529188	Forms Tractor Assembly, Left
8-18	8529216	Forms Tractor Assembly, Right
8-19	8529194	Intermediate Gear Assembly

REF. NO.	PART NO.	DESCRIPTION
8-22	8529192	Ribbon Shield Assembly
8-23	8529195	Carriage Drive Assembly
8-24	8529190	Carriage Belt Assembly

For replacement of parts not listed, order from manufacturer, state description and location of part.

TROUBLESHOOTING

PRINTER WILL NOT RECEIVE DATA

Printer will not receive data from the computer. Set the computer up to send information to the printer and check for STB (Strobe) signal pulses at pin 8 of IC 2E.

If the STB pulses are missing, check for pulses on pin 12 of IC 3C. If the pulses are present on pin 12 of IC 3C, check Capacitor C11 and check IC 2E by substitution. If the pulses are missing on pin 12 of IC 3C, check Capacitor C9 and check IC 3C by substitution.

If the STB pulses check good, check for pulses on the BUSY line (pin 4 of Plug CN3) and the ACK line (pin 6 of Plug CN3). If either pulses are missing, check for pulses at pin 2 of IC 6E. If pulses are missing at pin 2 of IC 6E, check Interface IC (8B) and IC 1C by substitution. If pulses are present at pin 2 of IC 6E, check IC's 6E and 7C by substitution.

If the STB, BUSY and ACK signals check good, check IC's 8B and 1C by substitution.

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TROUBLESHOOTING (Continued)

POWER SUPPLY

Printer will not turn On. Check the AC Line Fuse (F1). If Fuse F1 is bad, check Capacitors C1A, C2A and C3A on the AC Switch Board for possible shorts, check Transformer T1 for shorted windings, and check the inputs and outputs of the Bridge Rectifier Diodes (DB1, DB2 and DB3) for possible shorts to ground.

If Fuse F1 is good, apply AC power and check for 120VAC from pin 1 to pin 2 of Plug CN7. If 120VAC is missing, check the Master Power Switch (SW10). If the 120VAC is present, check the AC voltages on the four secondary windings of Transformer T1 at Plug CN2. If any of the AC voltages are missing, check Transformer T1 windings.

Check the DC voltages at the outputs of Diodes DB1, DB2 and DB3. If any of the voltages are missing, check the associated Diode.

Check for 26.3V at pin 3 of Plug CN6. If 26.3V is missing, check the voltages and components associated with Driver Transistor (Q1) and Regulator Transistor (Q6), and check Zener Diode ZD4.

Check for 11.84V at the collector of Regulator Transistor (Q4). If 11.84V is missing, check the voltages and components associated with Driver Transistor (Q3) and Transistor Q4, check Zener Diodes ZD1 and ZD2, and Diode D2.

Check for 4.88V at pin 2 of Regulator SR1. If 4.88V is missing, check Regulator SR1 and associated components.

Check for 14.13V at the emitter of Regulator Transistor (Q2). If 14.13V is missing, check Transistor Q2, Zener Diode ZD3 and Capacitor C21.

MICROCOMPUTER CHIP OPERATION

Check for 4.88V on pin 40 of Microcomputer IC (1C). If 4.88V is missing, refer to the "Power Supply" section of this Troubleshooting guide.

Verify that the clock oscillators are functioning by checking the waveforms on pin 2 of IC 1C and Slave Microcomputer IC (9B) and check for a frequency of 6.00MHz on both oscillators. If either oscillator is not functioning, check the components connected to pins 2 and 3 of the IC with the defective oscillator and check the IC by substitution.

If the clock oscillators are good, check the waveforms on pins 9 and 11 of IC 1C and pin 11 of IC 9B. The pulses should measure 2.5μs from the leading edge of one pulse to the leading edge of the next pulse. If any of the waveforms are missing, check the IC by substitution. If the waveforms check good, check the logic probe readings on the remaining pins of IC's 1C and 9B.

PRINT HEAD

Print Head is moving back and forth but not printing. Check for 26.3V on the emitters of Driver Transistors (Q1 thru Q9) on the Driver Board. If 26.3V is missing, refer to the "Power Supply" section of this Troubleshooting guide. If 26.3V is good, check for pulses at pin 37 of Microcomputer IC (1C) while printing.

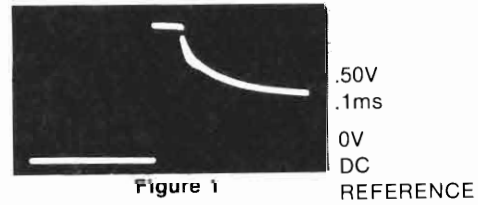
If the pulses at pin 37 of IC 1C are missing, check IC 1C by substitution. If the pulses are present, check for pulses at pin 3 of Timer IC (1A) on the Driver Board while printing.

If the pulses at pin 3 of IC 1A are missing, check the voltages and components associated with pins 1 thru 8 of IC 1A and check the adjustment of the Pulse Width Control (VR1). If pulses are present, check for pulses at Test Point TO and check for a pulse width of about .32ms.

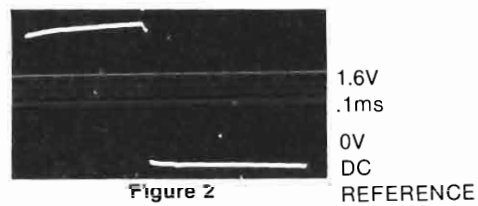
If the pulses at Test Point TO are missing, check Switching Transistor (Q5) and check pins 1 and 16 of IC 6B. If the pulse width is not correct, check the adjustment of the Pulse Width Control (VR1). If the pulses at Test Point TO are good, check for pulses at pins 2 and 29 thru 36 of Interface IC (8B) while printing.

If the pulses at pins 2 and 29 thru 36 of IC 8B are missing, check IC 8B by substitution. If the pulses are present, check IC 7B and pins 6, 7, 10 and 11 of IC 6B.

If one pin in the Print Head is not functioning, check for the waveform shown in Figure 1 at the collector of the Transistor driving the defective pin while printing. If the collector waveform is good, check the pin on the Print Head for possible damage.

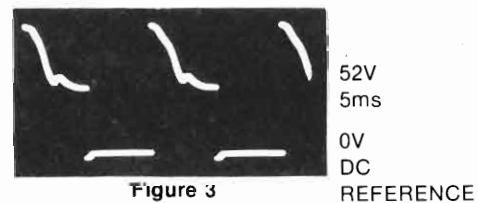


If the collector waveform is missing, check for the waveform shown in Figure 2 at the base of the Driver Transistor while printing. If the base waveform is good, check the Driver Transistor and check for an open solenoid coil in the Print Head. If the base waveform is missing, check the buffer driving the Driver Transistor and check IC 8B by substitution.



PAPER FEED MOTOR ASSEMBLY

Printer will not advance the paper. Put the printer in Off Line mode (press the On Line button), press the FF (Form Feed) button and check for the waveform shown in Figure 3 at the collectors of Line Feed Driver (Q14 thru Q17).



LOGIC (Continued)

PIN NO.	IC 6B	IC 6D	IC 6E	IC 7B	IC 7C	IC 7D	IC 7E	PIN NO.	IC 8B	PIN NO.	IC 8B	PIN NO.	IC 9B	PIN NO.	IC 9B
1	L(1)	H(12)	H(8)	H(1)	L	L(11)	H(1)	1	L(7)	21	H	1	L(1)	21	H(10)
2	L	L(14)	L	H(1)	H	* (11)	L(1)	2	H(1)	22	H	2	P	22	H(10)
3	L	H(10)	L(7)	H(1)	L	H(11)	H(11)	3	L(1)	23	H	3	P	23	L(6)
4	L	L(13)	H(8)	H(1)	H	L(11)	L(11)	4	L	24	H	4	H	24	H
5	L	H(2)	L(7)	H(1)	L(7)	L(1)	L(1)	5	L	25	H	5	H	25	H
6	H(1)	L(3)	L(7)	H(1)	H(8)	* (1)	H(1)	6	H	26	H	6	P	26	H
7	H(1)	L	L	H(1)	L	L	L	7	L(1)	27	H	7	L	27	H(1)
8	L	L(1)	H(10)	L	L(3)	L(1)	L(11)	8	H(9)	28	H	8	P	28	L(1)
9	*	H(1)	L	*	H(2)	H(1)	H(11)	9	P	29	H(1)	9	L(1)	29	H(10)
10	L(1)	* (1)	L(13)	L(1)	L(7)	L(11)	L(7)	10	H(1)	30	H(1)	10	H(1)	30	L(17)
11	L(1)	L(1)	H	L(1)	H(8)	H(11)	H(8)	11	P	31	H(1)	11	P	31	H(11)
12	*	L	L	L(1)	H	* (11)	L(7)	12	P	32	H(1)	12	P	32	H(11)
13	*	*	L	L(1)	L	L	H(8)	13	P	33	H(1)	13	P	33	H(12)
14	*	H	H	L(1)	H	H	H	14	P	34	H(1)	14	P	34	H(15)
15	*			L(1)				15	P	35	H(1)	15	P	35	H
16	H(1)			L(1)				16	P	36	H(1)	16	P	36	H
17								17	P	37	L	17	P	37	H
18								18	P	38	L	18	P	38	H
19								19	P	39	H	19	P	39	L(5)
20								20	L	40	H	20	L	40	H

NOTE: Logic probe readings taken with printer On Line and not printing unless otherwise noted. Printer Self-Test mode used to get readings with switches SW1 and SW2 set as shown on schematic.

Logic Probe Display
L = Low
H = High
P = Pulse
* = Open (No lights On)

- Probe indicates P when printer is printing.
- Probe indicates L with no paper in printer.
- Probe indicates H with no paper in printer.
- Probe indicates H when print head is not at home position.

- Probe indicates H when print head moves from left to right, and L when head moves from right to left.
- Probe indicates H when the printer is not on line.
- Probe indicates L when the printer is not on line.
- Probe indicates P when the printer is not on line or is printing.
- Probe indicates L when printer is printing.
- Probe indicates P when a line feed occurs.
- Probe indicates L when a line feed occurs.
- Probe indicates H when printing.
- Probe indicates H when a line feed occurs.
- Probe indicates L when buzzer sounds.
- Probe indicates H when printing in compressed mode.

DISASSEMBLY INSTRUCTIONS

CABINET REMOVAL

Remove the knob on the right side. Set the printer on its left side and remove four Phillips screws from the bottom. Set the printer back down, lift up on the left side of the cabinet and move the cabinet to the right to clear the manual paper feed shaft. Unplug the Function board connector and remove the cabinet. Remove two Phillips screws from the Function board and remove the Function board from the cabinet top.

AC SWITCH BOARD REMOVAL

Unplug the power transformer from the board and remove one Phillips screw holding the board and one Phillips screw holding the ground lead of the power cord. Remove the AC Switch board.

DRIVER BOARD REMOVAL

Unplug the printer mechanism cable and remove two Phillips screws holding the board. Lift up and remove the Driver board.

CONTROL BOARD REMOVAL

Unplug the ground connector (FG), connector CN2 and connector CN6. Remove one Phillips screw near the center of the board and two Phillips screws from the transistor heat sink on the side of the board. Push the three board retaining clips back, lift up and remove the Control board.

PRINTER MECHANISM REMOVAL

Unplug the printer mechanism cable from the Driver board. Remove two Phillips screws going thru rubber grommets at the front of the mechanism and remove one Phillips screw from the grounding strap next to the power transformer. Slide the mechanism forward and lift mechanism out of the cabinet bottom.

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LOGIC

PIN NO.	IC 1A	IC 1B	PIN NO.	IC 1C	PIN NO.	IC 1C	PIN NO.	IC 2A	IC 2C	IC 2E	IC 3A	IC 3C	IC 3E	IC 4A	IC 5E
1	H	P	1	H	21	P	1	H	*	H	H	H	H	P	L(3)
2	P	P	2	P	22	P	2	P	*	H	H	L	H	L	*(8)
3	P	L	3	P	23	P	3	P	H	L	P	L	L	P	H(8)
4	P	P	4	H	24	H(9)	4	P	P	H	H	H	L	H(2)	H(15)
5	P	P	5	H	25	H	5	P	P	L	P	H	H	P	L
6	P	P	6	H	26	H	6	H	H	L	H	L	H	H	L(14)
7	P	P	7	L	27	H(8)	7	L	L	L	P	L	L	P	L(13)
8	L	P	8	P	28	H(10)	8	L	P	H	L	H	H	L	L
9	P	P	9	P	29	H	9	P	P	H	P	L	H	H(1)	P
10	P	P	10	H(1)	30	H(10)	10	P	P	L	H	L	P	H	H(10)
11	P	P	11	P	31	L(6)	11	P	H	H	P	P	L	P	H(12)
12	P	L	12	P	32	H	12	P	*	L	H	L	H	H	H(10)
13	P	P	13	P	33	L(7)	13	P	*	L	P	H	H	P	L(16)
14	P	P	14	P	34	H	14	P	H	H	L	H	H	L	L(7)
15	P	P	15	P	35	H	15	P	P	H	L	H	H	L	L(7)
16	H	P	16	P	36	L(1)	16	H	H	H	H	H	H	H	H(2)
17		P	17	P	37	H(1)									
18		L	18	P	38	H(8)									
19		P	19	P	39	L(1)									
20		P	20	L	40	H									
21		H													
22		P													
23		P													
24		H													

LOGIC (DRIVER BOARD)

PIN NO.	IC 1A	PIN NO.	IC 1A	PIN NO.	IC 1A	PIN NO.	IC 1A
1	L	3	L	5	H	7	L
2	H(1)	4	H	6	L	8	H

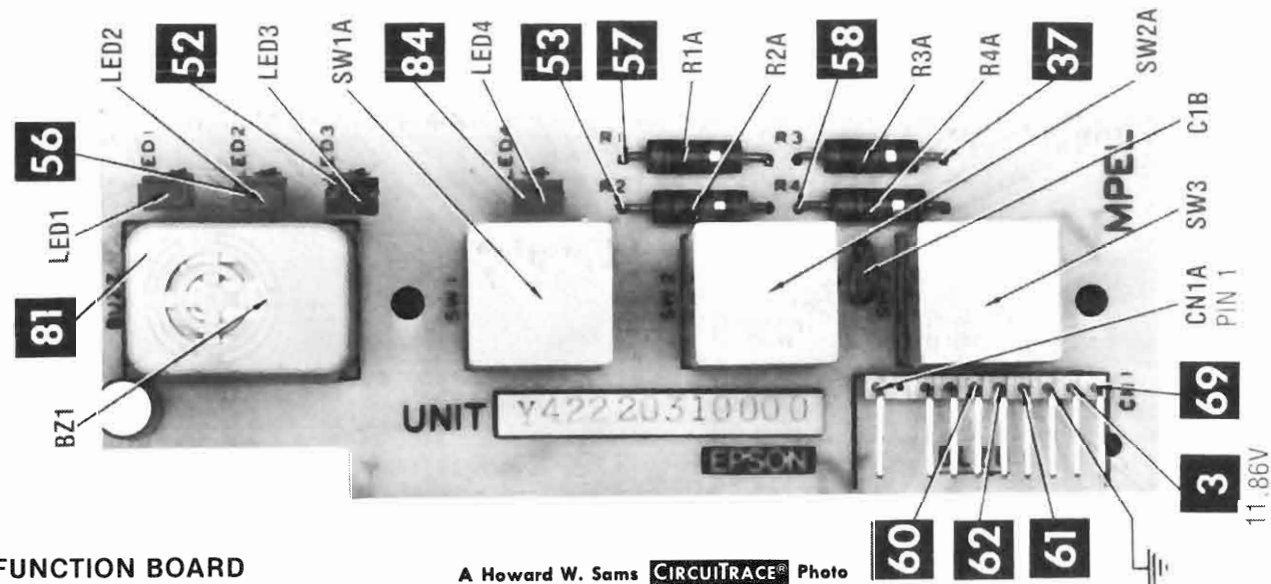
NOTE: Logic probe readings taken with printer On Line and not printing unless otherwise noted. Printer Self-Test mode used to get readings with switches SW1 and SW2 set as shown on schematic.

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- Probe indicates H with no paper in printer.
- Probe indicates L when print head is not at home position.

- Probe indicates H when print head is not at home position.
- Probe indicates H when print head moves from left to right, and L when head moves from right to left.
- Probe indicates H when the printer is not on line.
- Probe indicates L when the printer is not on line.
- Probe indicates P when the printer is not on line or is printing.
- Probe indicates L when printer is printing.
- Probe indicates L when a line feed occurs.
- Probe indicates H when printing.
- Probe indicates H when a line feed occurs.
- Probe indicates L when buzzer sounds.
- Probe indicates H when buzzer sounds.



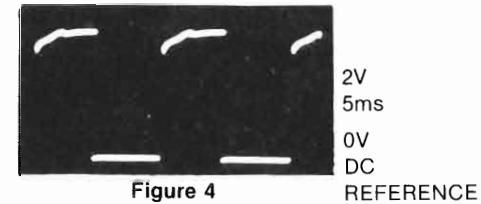
FUNCTION BOARD

A Howard W. Sams CIRCUITRACE® Photo

TROUBLESHOOTING (Continued)

PAPER FEED MOTOR ASSEMBLY (Continued)

If the collector waveform is missing at one of the Transistors, check for the waveform shown in Figure 4 at the base of the Transistor. If the base waveform is present, check the Transistor, and associated components, that has the missing collector waveform. If the Transistor and associated components check good, check the Paper Feed Motor Assembly (M2). If the waveform on the base of the Transistor is missing, check the buffers driving the Transistor and check Slave Microcomputer IC (9B) by substitution.



If the collector waveform does not appear on any of Transistors Q14 thru Q17, check the voltage on the collector of Line Feed Driver Transistor (Q20) after pressing the FF button. The voltage should go up to 25.5V. If 25.5V is missing, check the emitter and base voltage of Transistor Q20. If the emitter voltage is missing, refer to the "Power Supply" section of this Troubleshooting guide. If the base voltage does not drop to about 24.8V after pressing the FF button, check Transistor Q20 and associated components. Also, check the logic probe readings on pins 6 and 11 of IC 5E and pins 1 and 2 of IC 6D.

If the probe readings are not correct, check IC's 5E, 6D and 9B by substitution. If all readings are correct, check the Paper Feed Motor Assembly.

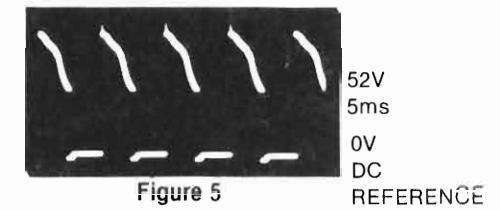
TIMING BELT MOTOR ASSEMBLY

Timing Belt Motor Assembly (M1) does not move the Print Head back and forth. Check the operation of the Home Position Sensor (PT1) and the PTS (Position Timing Sensor) Sensor (PT2).

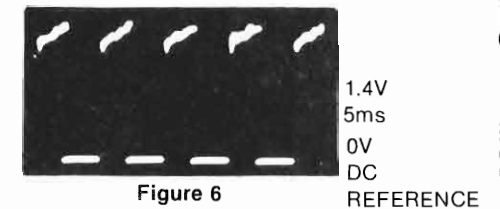
Check the Home Position Sensor by monitoring the logic probe reading at pin 20 of Plug CN6 while sliding a piece of paper in and out of the slot in the Home Position Sensor. The probe should read low with the paper out of the slot and high with the paper in the slot. If the Home Position Sensor checks good, check the logic probe reading at pin 11 of IC 3E while sliding the paper in and out of the Home Position Sensor. The probe should read high with the paper out of the slot and low with the paper in the slot. If the probe reading is not correct, check the components connected to pins 12 and 13 of IC 3E and check IC 3E and Slave Microcomputer (9B) by substitution.

Check the PTS Sensor by checking for pulses with a logic probe at pin 19 of Plug CN6 while manually moving the Print Head. If the PTS Sensor checks good, check for pulses at pin 10 of IC 3E while manually moving the Print Head. If the pulses are missing, check the components connected to pins 8 and 9 of IC 3E and check IC's 3E and 9B and Interface IC (8B) by substitution.

If the sensor circuits check good, check for the waveform shown in Figure 5 on the collectors of Carriage Driver Transistors (Q10 thru Q13) while the printer is printing.



If the collector waveform is missing on one of the Transistors, check for the waveform shown in Figure 6 at the base of the Transistor. If the base waveform is present, check the Transistor, and associated components, that has the missing collector waveform. If the transistor and associated components check good, check the Timing Belt Motor Assembly. If the base waveform is missing, check the buffers driving the Transistor and check IC 9B by substitution.



If the collector waveform does not appear at any of the Transistors Q10 thru Q13, check for 25.4V on the collector of 80 Column Driver Transistor (Q18) and 14.00V on the collector of 132 Column Driver Transistor (Q19) while printing. If the voltages check good, check the Carriage Return Motor.

If 25.4V is missing from the collector of Transistor Q18, check for 26.3V on the emitter. If 26.3V is missing, refer to the "Power Supply" section of this Troubleshooting guide. NOTE: If the printer is printing in the compressed mode, the voltage on the collector of Transistor Q18 will stay at 0V. If the emitter voltage of Transistor Q18 checks good, check the logic probe readings on pins 8, 9 and 10 of IC 6E and pins 5 and 12 of IC 5E while printing. If the probe readings are good, check Transistor Q18 and associated components. If the probe readings are not correct, check IC's 5E, 6E and 9B by substitution.

If 14.00V is missing from the collector of Transistor Q19, check for 14.13V on the emitter of Transistor Q19. If 14.13V is missing, refer to the "Power Supply" section of this Troubleshooting guide. If 14.13V is present, check the logic probe readings on pins 3 and 4 of IC 6D and pins 7 and 10 of IC 5E while printing. If the probe readings are good, check Transistor Q19 and check the components associated with Transistor Q19. If the probe readings are not correct, check IC's 5E, 6D and 9B by substitution.

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12 PARTS LIST AND DESCRIPTION

When ordering parts, state Model, Part Number, and Description

SEMICONDUCTORS (Select replacement for best results)

ITEM No.	TYPE No.	MFGR. PART No.	REPLACEMENT DATA						ZENITH PART No.
			EGG PART No.	GENERAL ELECTRIC PART No.	MOTOROLA PART No.	NTE PART No.	RCA PART No.	WORKMAN PART No.	
D1,2	1S2075K		EGG519	GE-514	1N4935	NTE519	SK3100/519	WEP925/519	103-131
DB1	3B3-C		EGG5312	MDA801	MDA801	NTE5312	SK3985/5312	WEP1065	
DB2	3B4B1		EGG5312	MDA801	MDA801	NTE5312	SK3985/5312	WEP1065	
	1B3-C		EGG5304	MDA920A6	MDA920A6	NTE5304	SK3106/5304	WEP1053	
	1B4B1		EGG5304	MDA920A6	MDA920A6	NTE5304	SK3106/5304	WEP1053	
DB3	1B4B41		EGG166	GE-166	3N254	NTE166	SK9075/166	WEP1051/166	212-Z9001
PT1	B1A15	(1)							
PT2	B2C29	(2)							
Q1	2SD880Y		EGG152	GE-66A	T1P41A	NTE152	SK3440/291	WEP745/152	121-987-03
Q2	2SD880		EGG152	GE-66A	T1P41A	NTE152	SK3440/291	WEP745/152	121-987-03
Q3	2SD560		EGG85	GE-212	MPSA18*	NTE85	SK3124A/289A	WEP736/123A*	121-972*
	2SC945								
Q4,5	2SA1015Y		EGG290A	GE-82*	2N4403	NTE290A	SK9132	WEP911/290A	121-Z9003
	2SA1015	(3)	EGG290A	GE-82*	2N4403	NTE290A	SK9132	WEP911/290A	121-Z9003
Q6	2SA1094		EGG93			NTE93	SK9447/93		
SR1	14305		EGG977	GEVR-100	MC78L05CP	NTE977	SK3462/977		221-Z9044
	UPC14305		EGG977	GEVR-100	MC78L05CP	NTE977	SK3462/977		221-Z9044
	UA7805C		EGG960	GEVR-102	MC7805CT	NTE960	SK3591/960		221-Z9043
ZD1	HZ12C-3								
ZD2	HZ7B-3								
ZD3	HZ15-3								
ZD4	HZ27-1								
ZD5	HZ5C-1								
1A	HD74LS175P		EGG74LS175		SN74LS175N	NTE74LS175N	SK74LS175		HE-443-752
	LS175		EGG74LS175		SN74LS175N	NTE74LS175N	SK74LS175		HE-443-752

PARTS LIST AND DESCRIPTION (Continued)

When ordering parts, state Model, Part Number, and Description

FUSE DEVICES

ITEM No.	DESCRIPTION	REPLACEMENT DATA				NOTES
		MFGR. PART No.		BUSS PART No.		
		DEVICE	HOLDER	DEVICE	HOLDER	
F1	2A @ 250V Fast-Acting					

MISCELLANEOUS

ITEM No.	PART NAME	MFGR. PART No.	NOTES
BZ1	Buzzer		
CR1	Crystal		6MHz
CR2	Crystal		6MHz
H1	Print Head		
LED1	LED		Power, Grn (2.00V @ 12mA)
LED2	LED		Ready, Grn (2.00V @ 11mA)
LED3	LED		No Paper, Red (1.67V @ 12mA)
LED4	LED		On Line, Grn (2.00V @ 11mA)
M1	Motor		Timing Belt Motor Assembly C
M2	Motor		Paper Feed Motor Assembly A
P1	Power Cord		AC, Polarized
SW1	Switch		Print Status
SW1A	Switch		Power On
SW2	Switch		Line Feed Status
SW2A	Switch		Form Feed
SW3	Switch		Line Feed
SW10	Switch		Master Power
SW101	Switch		Paper End
	Mechanism		Printer
	P.C. Board		AC Switch (MFIL)
	P.C. Board		Control (HMTP)
	P.C. Board		Driver (MDRI)
	P.C. Board		Function (MPEL)
	P.C. Board		Paper End
	P.C. Board		Paper End Assembly (Includes SW101)
	P.C. Board		Terminal

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CABINET & CABINET PARTS (When ordering specify model, chassis & color)

ITEM	PART No.
Forms Rack	8529191
Access Cover	8529185
Top Cover	8529182

ITEM	PART No.
Base Assembly	8529181
Forms Feed Knob	8529193

WIRING DATA

Shielded Hook-up Wire	Use BELDEN No. 8401 or 8421 (Single-Conductor) 8208 (Two-Conductor)
General-use Unshielded Hook-up Wire	Use BELDEN No. 8529 (Solid) Available in 13 Colors 8522 (Stranded) Available in 13 Colors

PARTS LIST AND DESCRIPTION (Continued)

When ordering parts, state Model, Part Number, and Description

CONTROLS (All wattages 1/2 watt, or less, unless listed)

ITEM NO.	FUNCTION	RESISTANCE	MFGR. PART NO.	NOTES
DRIVER BOARD				
VR1	Pulse Width	20K		

RESISTORS (Power and Special)

ITEM No.	RATING	REPLACEMENT DATA		
		MFGR. PART No.	WORKMAN PART No.	REMARKS
RM1	Resistor Network	(3)		
RM2	Resistor Network	(3)		
RM3	Resistor Network	(1)		
RM4	Resistor Network	(1)		
RM5	Resistor Network	(4)		
RM6	Resistor Network	(5)		
DRIVER BOARD				
R12	120 5% 5W WW			
R13	120 5% 5W WW			
RM1	Resistor Network	(1)		
RM2	Resistor Network	(2)		

- (1) Contains ten, 3300 10% 1/8W, resistors.
- (2) Contains eight, 1200 10% 1/8W, resistors.
- (3) Contains five, 10K 10% 1/8W, resistors.
- (4) Contains six, 3300 10% 1/8W, resistors.
- (5) Contains eight, 10K 10% 1/8W, resistors.

TRANSFORMER (Power)

ITEM No.	RATING			REPLACEMENT DATA		
	PRI.	SEC. 1	SEC. 2	MFGR. PART No.	THORDARSON PART No.	NOTES
T1	120VAC @ 410mAAC	16.63VAC @ 180mADC	9.83VAC	MP-80U-a(1)		
	SEC. 3 10.33VAC @ 560mADC	SEC. 4 25.8VAC @ 650mADC	SEC. 5			

- (1) Number on unit.

PARTS LIST AND DESCRIPTION (Continued)

When ordering parts, state Model, Part Number, and Description

SEMICONDUCTORS (Select replacement for best results) (cont)

ITEM No.	TYPE No.	MFGR. PART No.	REPLACEMENT DATA							
			EGG PART No.	GENERAL ELECTRIC PART No.	MOTOROLA PART No.	NTE PART No.	RCA PART No.	WORKMAN PART No.	ZENITH PART No.	
1B	M520408A 2716-HM1-C2 2332/2716 2332-374		ECG74LS175 ECG74LS175		SN74LS175N SN74LS175N	NTE74LS175N NTE74LS175N		SK74LS175 SK74LS175		HE-443-752 HE-443-752
1C	C490408A 8039 8039/8049 8049-170		ECG74LS32 ECG74LS00		SN74LS32N SN74LS00N	NTE74LS32 NTE74LS00		SK74LS32 SK74LS00		HE-443-875 HE-443-728
2A	HD74LS175P LS175		ECG74LS367 ECG74LS367		SN74LS367AN SN74LS367AN	NTE74LS367 NTE74LS367		SK74LS367 SK74LS367		HE-443-857 HE-443-857
2B	2716		ECG74LS04 ECG4093B ECG4093B		SN74LS04N MC14093BCP MC14093BCP	NTE74LS04 NTE4093B NTE4093B		SK74LS04 SK4093B SK4093B		HE-443-755 HE-443-758 HE-443-758
2C	HD74LS32P		ECG74LS367 ECG74LS367		SN74LS367AN SN74LS367AN	NTE74LS367 NTE74LS367		SK74LS367 SK74LS367		HE-443-857 HE-443-857
2E	HD74LS00P		ECG74LS05 ECG74LS02		SN74LS05N SN74LS02N	NTE74LS05 NTE74LS02		SK74LS05 SK74LS02		HE-443-818 HE-443-779
3A	MB74LS367A LS367		ECG7406 ECG74LS05		SN74LS05N SN74LS05N	NTE7406 NTE74LS05		SK7406 SK74LS05		HE-443-698 HE-443-818
3B	2716									
3C	MB74LS04									
3E	HD14093BP TC4093BP									
4A	MB74LS367A LS367									
5E	UPA2003C									
6B	TD62504P									
6D	TD62504 HD74LS05P									
6E	MB74LS02									
7B	TD62504P									
7C	TD62504 HD7406P									
7D	HD74LS05P									

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14 PARTS LIST AND DESCRIPTION (Continued)

When ordering parts, state Model, Part Number, and Description

SEMICONDUCTORS (Select replacement for best results) (cont)

ITEM No.	TYPE No.	MFGR. PART No.	REPLACEMENT DATA							ZENITH PART No.
			EGG PART No.	GENERAL ELECTRIC PART No.	MOTOROLA PART No.	NTE PART No.	RCA PART No.	WORKMAN PART No.		
7E 8B 9B	MB74LS04 D8155C 8155 D8041C-591 8041-591 8041		ECG74LS04		SN74LS04N	NTE74LS04	SK74LS04			HE-443-755
DRIVER BOARD										
D1 Thru D14	S5277B		ECG552	GE-511		NTE552	SK9000/552	WEP172/506		103-287
D15 D16 Thru D23	1S2075K		ECG519	GE-514	1N4935	NTE519	SK3100/519	WEP925/519		103-131
DM1,2	DA0601									
Q1 Thru Q17	2SD986K 2SD986		ECG185 ECG185	GE-58 GE-58	2N5194 2N5194	NTE185 NTE185	SK9370 SK9370	WEP883/185 WEP883/185		103-248
Q18 Thru Q20	2SB772Q 2SB743Q		ECG5137A	GE5ZD-24	1N5359B	NTE5137A	SK9042/374 SK9042/374	WEP1631/5137		
ZD1 Thru ZD6	AU01-24						SK24X/5137A			
ZD7 1A	H25C-1 NE555P 555		ECG955M ECG955M	GE1C-269 GE1C-269	MC1455P1 MC1455P1	NTE955M NTE955M	SK3564/955M SK3564/955M	WEP2119/955M WEP2119/955M		221-Z9042 221-Z9042

- (1) Home Position Sensor Assembly, Includes P.C. Board.
- (2) Position Timing Signal Assembly, Includes P.C. Board.
- (3) Assembly, includes cables, Capacitor and Connectors.

* Lead configuration may vary from original.

PARTS LIST AND DESCRIPTION (Continued)

When ordering parts, state Model, Part Number, and Description

ELECTROLYTIC CAPACITORS

ITEM No.	RATING	MFGR. PART No.
C1	6800 50V	
C2	6800 16V	
C3	2200 25V 20%	
C4	10 16V 20%	
C5	10 35V 20%	
C6	3.3 50V 20%	
C7	3.3 50V 20%	

ITEM No.	RATING	MFGR. PART No.
C17	10 35V 20%	
C22	10 35V 20%	
DRIVER BOARD		
C1	10 16V	
C2	10 16V	

CAPACITORS

ITEM No.	RATING	MFGR. PART No.
C1A	.1 250V	
C1B	.01 50V	
C2A	.0047 125VAC	
C3A	.0047 125VAC	
C8	.001 50V 10%	
C9	.0015 50V 10%	
C10	.0015 50V 10%	
C11	.0047 50V 10%	
C12	10 50V 10%	
C13	10 50V 10%	
C14	10 50V 10%	
C15	10 50V 10%	
C16	.1 50V	
C18	.01 50V	
C19	.01 50V	
C20	.01 50V	
C21	.01 50V	
C23	.01 50V	
C24	.01 50V	
C25	.01 50V	
C26	.01 50V	

ITEM No.	RATING	MFGR. PART No.
C27	.01 50V	
C28	.01 50V	
C29	.01 50V	
C30	.01 50V	
C31	.01 50V	
C32	.01 50V	
C33	.01 50V	
C34	.01 50V	
C35	.01 50V	
DRIVER BOARD		
C3	.1 50V 10%	
C4	.001 50V 10%	
C5	.01 50V	
C6	.01 50V	
C7	.01 50V	
C8	.01 50V	
C9	.01 50V	
C10	.01 50V	

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PRELIMINARY SERVICE CHECKS (Continued)

TEST EQUIPMENT AND TOOLS

TEST EQUIPMENT

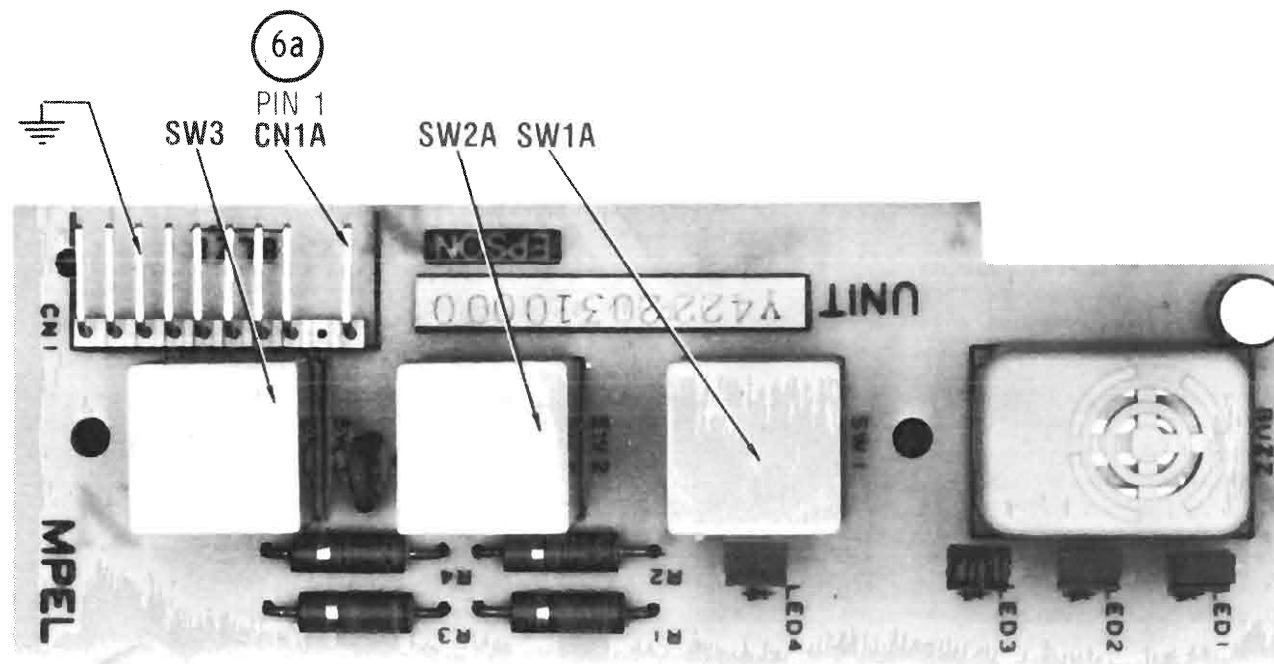
Digital Volt/Ohm Meter
Logic Probe
Transistor Tester

TOOLS

Phillips Screwdriver
Needlenose Pliers
Solvent for Belt
9/32" Socket
Small Screwdriver

PARTS LIST AND DESCRIPTION

ITEM NO.	PART NO.	DESCRIPTION
F1		Fuse (2A @ 250V)
H1		Print Head
M1		Timing Belt Motor Assembly C
M2		Paper Feed Motor Assembly A
Q6		Regulator Transistor (2SA1075)
T1		Power Transformer
1C		Microcomputer IC
8B		Interface IC
9B		Slave Microcomputer IC
		AC Switch Board (MFIL)
		Control Board (HMTP)
		Driver Board (MDRI)
		Printer Mechanism (Model-3310)



PRELIMINARY SERVICE CHECKS

This data provides the user with a time-saving service tool which is designed for quick isolation and repair of printer malfunctions.

Check all interconnecting cables for good connection and correct hook-up before making service checks.

Replacement or repair of the AC Switch Board, Control Board, Driver Board, Function Board, or connectors may be necessary after the malfunction has been isolated.

GENERAL OPERATING INSTRUCTIONS

PRINT STATUS (SW1) AND LINE FEED STATUS (SW2)

SW1	On	Off
1	Compressed	Normal
2	Not Used	
3	Paper Out Sensor On	Paper Out Sensor Off
4	Italic	Normal
5	Emphasized	Normal
6	Buzzer On	Buzzer Off
7	Slashed Zero	Regular Zero
8	Select Fixed	Select Not Fixed

SW2	On	Off
1	Not Used	
2	Not Used	
3	Auto Line Feed with Carriage Return	Line Feed from Host
4	One Inch Skip Over Perf	Normal (No Skip)

PRINTER SELF-TEST

To use the built-in self-test function, put paper in the printer and hold down the LF (Line Feed) button while turning On the printer.

ON LINE, FF AND LF BUTTONS

Printer is On Line (Ready to receive data from the computer) when all three green LED's are On.

The printer is Off Line when only the top green LED is On.

Pressing the On Line button once puts the printer Off Line and pressing it again puts the printer back On Line.

The printer must be Off Line for the FF (Form Feed) and LF (Line Feed) buttons to function.

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PRELIMINARY SERVICE CHECKS (Continued)

SERVICE CHECKS

SEE INTERCONNECTING DIAGRAM, PLACEMENT CHART, AND PHOTOS TO MATCH THE NUMBER IN THE CIRCLES WITH THOSE IN THE FOLLOWING DATA FOR SERVICE CHECKS TO BE PERFORMED

① PRINTER DEAD

- (a) Check Fuse F1. If bad, disconnect the Power Transformer (T1) connectors CN2 and CN7. Check for shorted windings or shorts from the windings to the chassis. Replace Transformer T1 if bad.
- (b) If Transformer T1 is good, disconnect connector CN6 (On Control Board) and check the Regulator Transistor (Q6) with a transistor tester. If Transistor Q6 is good, replace or troubleshoot the Control Board and the Driver Board.
- (c) If Fuse F1 is good, apply AC power and check for 120VAC at pins 1 and 2 of connector CN7. If 120VAC is missing, check the AC Power Cord (P1) and Master Power Switch (SW10).
- (d) If 120VAC is present, disconnect connector CN2 and check the following AC voltages on the secondary windings of Transformer T1 at connector CN2. 9.83VAC at pins 1 to 2, 25.8VAC at pins 3 to 4, 10.33VAC at pins 5 to 6 and 16.63VAC at pins 7 to 8. If any voltages are missing, replace Transformer T1. If the voltages are good, replace or troubleshoot the Control Board and the Driver Board.

② WILL NOT RECEIVE DATA FROM COMPUTER

- (a) Check Microcomputer IC (1C) and Interface IC (8B) by substitution.

③ PRINT HEAD WILL NOT PRINT

- (a) Remove power. Check resistance of the print head solenoids from pin 7 of connector CN10 to pins 1 thru 5 and 9 thru 12 of connector CN10 (23 ohms each). If bad, replace the Print Head (H1). If good, check the connections and wiring from connector CN10 to connector CN6 (On Driver Board).

- (b) If the connections are good, check the Interface IC (8B) by substitution.

④ PRINT HEAD HAS MISSING DOTS

- (a) Check the print head solenoid resistance (23 ohms) of the solenoid producing the missing dot (See Wiring Diagram). If the solenoids check good, remove the Print Head and check the print head wires for possible damage.
- (b) If the print head is good, check the Microcomputer IC (1C) and Interface IC (8B) by substitution.
- (c) If the IC's are good, replace or troubleshoot the Control Board and the Driver Board.

⑤ PAPER FEED AND TIMING BELT MOTORS DO NOT FUNCTION

- (a) Check for 26.3V at pin 10 of connector CN6 (On Driver Board). If 26.3V is missing, remove power and check the Regulator Transistor (Q6) with a transistor tester. If Transistor Q6 is good, replace the Control Board or troubleshoot the power supply section on the Control Board.
- (b) If 26.3V is present, check the Microcomputer IC (1C) and Slave Microcomputer IC (9B) by substitution.
- (c) If IC's 1C and 9B are good, remove power and check the resistance of the motor windings (48 ohms each winding). Check the Timing Belt Motor Assembly C (M1) from pin 13 of connector CN6 (On Driver Board) to pins 21 thru 24 of connector CN6. Check the Paper Feed Motor Assembly A (M2) from pin 14 of connector CN6 to pins 25 thru 28 of connector CN6.
- (d) If the motors check good, check the Home Position Sensor (PT1) by monitoring pin 20 of connector CN6 (On Driver Board) with a logic probe while sliding a piece of paper in and out of the slot in the Home Position Sensor. The probe should read low with the paper out of the slot and high with paper in. If the readings are not correct, check for 2.37V at pin 12 of connector CN6. If 2.37V is present, replace the Home Position Sensor (PT1). If 2.37V is missing, replace or troubleshoot the Driver Board and the Control Board.

⑥ FUNCTION BOARD BUTTONS HAVE NO EFFECT

- (a) Check connector CN1A for good connection.
- (b) Remove power and check contacts of Switches SW1A, SW2A and SW3 (On Function Board) with an ohmmeter.

PRELIMINARY SERVICE CHECKS (Continued)

DISASSEMBLY INSTRUCTIONS

CABINET REMOVAL

Remove the knob on the right side. Set the printer on its left side and remove four Phillips screws from the bottom. Set the printer back down, lift up on the left side of the cabinet and move the cabinet to the right to clear the manual paper feed shaft. Unplug the Function board connector and remove the cabinet. Remove two Phillips screws from the Function board and remove the Function board from the cabinet top.

AC SWITCH BOARD REMOVAL

Unplug the power transformer from the board and remove one Phillips screw holding the board and one Phillips screw holding the ground lead of the power cord. Remove the AC Switch board.

DRIVER BOARD REMOVAL

Unplug the printer mechanism cable and remove two Phillips screws holding the board. Lift up and remove the Driver board.

CONTROL BOARD REMOVAL

Unplug the ground connector (FG), connector CN2 and connector CN6. Remove one Phillips screw near the center of the board and two Phillips screws from the transistor heat sink on the side of the board. Push the three board retaining clips back, lift up and remove the Control board.

PRINTER MECHANISM REMOVAL

Unplug the printer mechanism cable from the Driver board. Remove two Phillips screws going thru rubber grommets at the front of the mechanism and remove one Phillips screw from the grounding strap next to the power transformer. Slide the mechanism forward and lift mechanism out of the cabinet bottom.

MECHANICAL REMOVAL, REPLACEMENT AND ADJUSTMENTS

RIBBON CARTRIDGE REPLACEMENT

Slide Carriage Assembly to center. Move Scale Plate back and remove Ribbon Cartridge. Turn knob, on replacement Ribbon Cartridge, counterclockwise to tighten ribbon. Install the Ribbon Cartridge with the four tabs (two on each end) in the slots of Left and Right Frame Assemblies. Press down on Ribbon Cartridge to secure in place. Slip the ribbon between Print Head (H1) and Ribbon Shield Assembly (8-22). Turn knob to retighten ribbon.

PRINT HEAD REPLACEMENT

Slide Carriage Assembly to the right. The Print Head cable has a pull tab. Use this tab to disconnect Print Head cable from connector on Terminal Board. Move Head Lock Lever, part of Ribbon Shield Assembly (8-22), clockwise. Lift and remove the Print Head (H1). Install replacement by reversing the removal procedure.

PAPER THICKNESS ADJUSTMENT

Head Adjustment Lever moves the Print Head to allow for paper thickness. The seven settings provide normal adjustment. If adjustment of lever is required, because of replacement of parts, perform the following procedure.

Set the lever to the center position and loosen the nut securing Carriage Shaft. Insert a screwdriver into hole in shaft. Hold screwdriver perpendicular to Base Frame Assembly and retighten nut. Movement of Head Adjustment Lever toward Maximum – position should move Print Head forward. If Print Head moves away, loosen nut, rotate Carriage Shaft 180 degrees and repeat adjustment.

TIMING BELT REPLACEMENT

Remove printer mechanism from the cabinet, see Disassembly Instructions. Loosen Carriage Drive Assembly

(8-23) and remove tension from Carriage Belt Assembly (8-24). Remove bottom left and top right screws securing Motor Heat Sink and remove belt from pulley. The belt is fitted into the grooved plastic projection at the base of Carriage Assembly and glued in place. A cutout is provided in Base Frame Assembly for access to separate the belt from the Carriage Assembly. Slide the Carriage Assembly over this cutout, located to the right of the Terminal Board.

The type of glue used does not produce a permanent bond. From the bottom, the grooved plastic projection can be forced apart to remove the belt or, if preferred, a drop of rubber cement solvent (or equivalent) can be used. CAUTION: Too much solvent can damage the belt. Tension on belt should not be adjusted until solvent has completely dried.

Install replacement by reversing the removal procedure. Before adjusting tension apply a drop of glue and allow to dry to prevent belt from slipping out of the Carriage Assembly.

TIMING BELT MOTOR REPLACEMENT

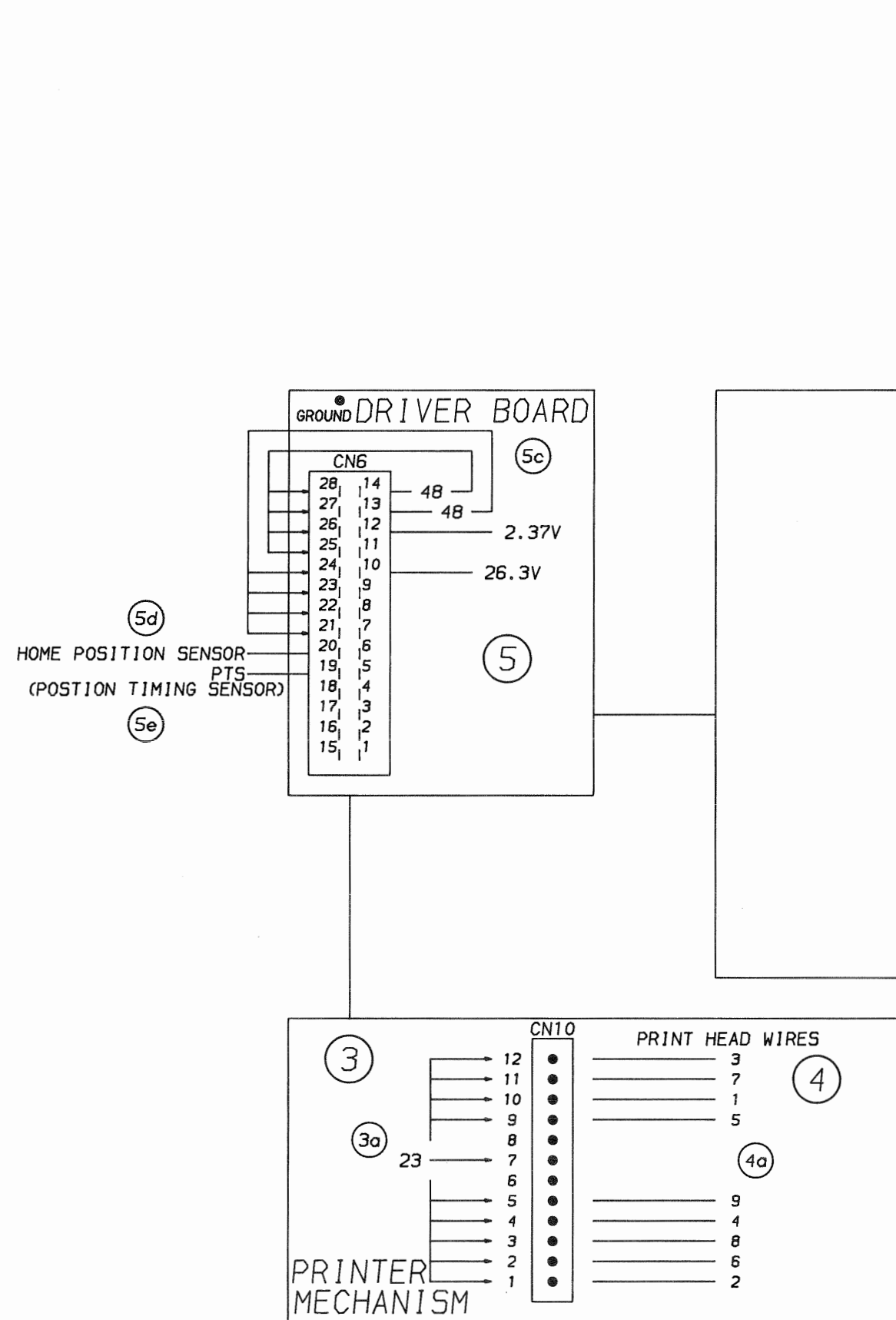
Loosen Carriage Drive Assembly (8-23) and remove tension from Carriage Belt Assembly (8-24). Remove four mounting screws from Timing Belt Motor Assembly C (M1). Remove the motor assembly and Motor Heat Sink. Slide the motor assembly from the heat sink. Observe routing of lead wires and verify the same routing after performing replacement. Unsolder motor assembly lead wires from Terminal Board. Install replacement by reversing the removal procedure.

PAPER FEEDING MOTOR REPLACEMENT

Remove two mounting screws from Paper Feeding Motor Assembly A (M2). Observe routing of lead wires and verify the same routing after performing replacement. Unsolder motor assembly lead wires from Terminal Board. Install replacement by reversing the removal procedure.

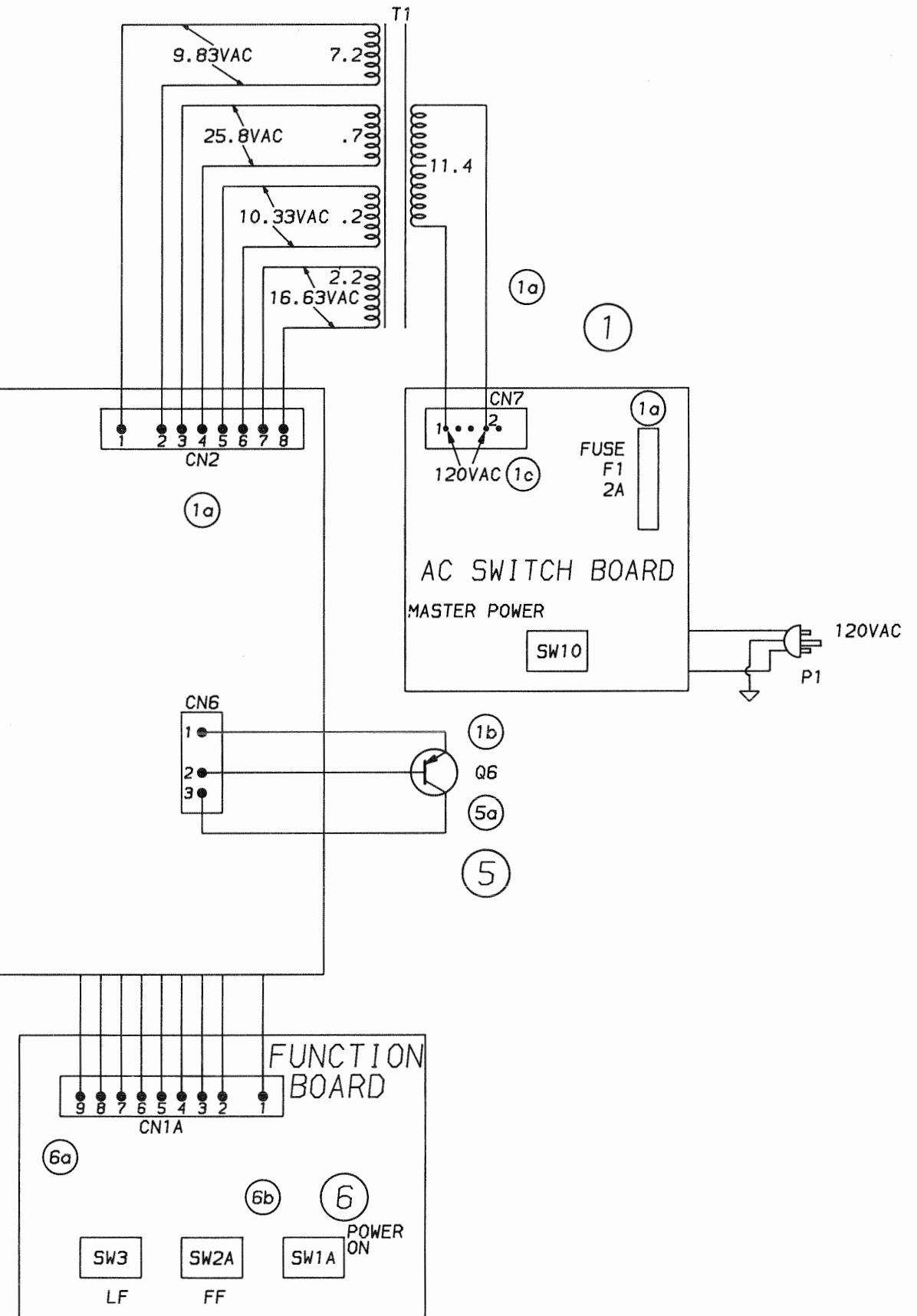
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PRELIMINARY SERVICE CHECKS (Continued)



INTERCONNECTING DIAGRAM

PRELIMINARY SERVICE CHECKS (Continued)

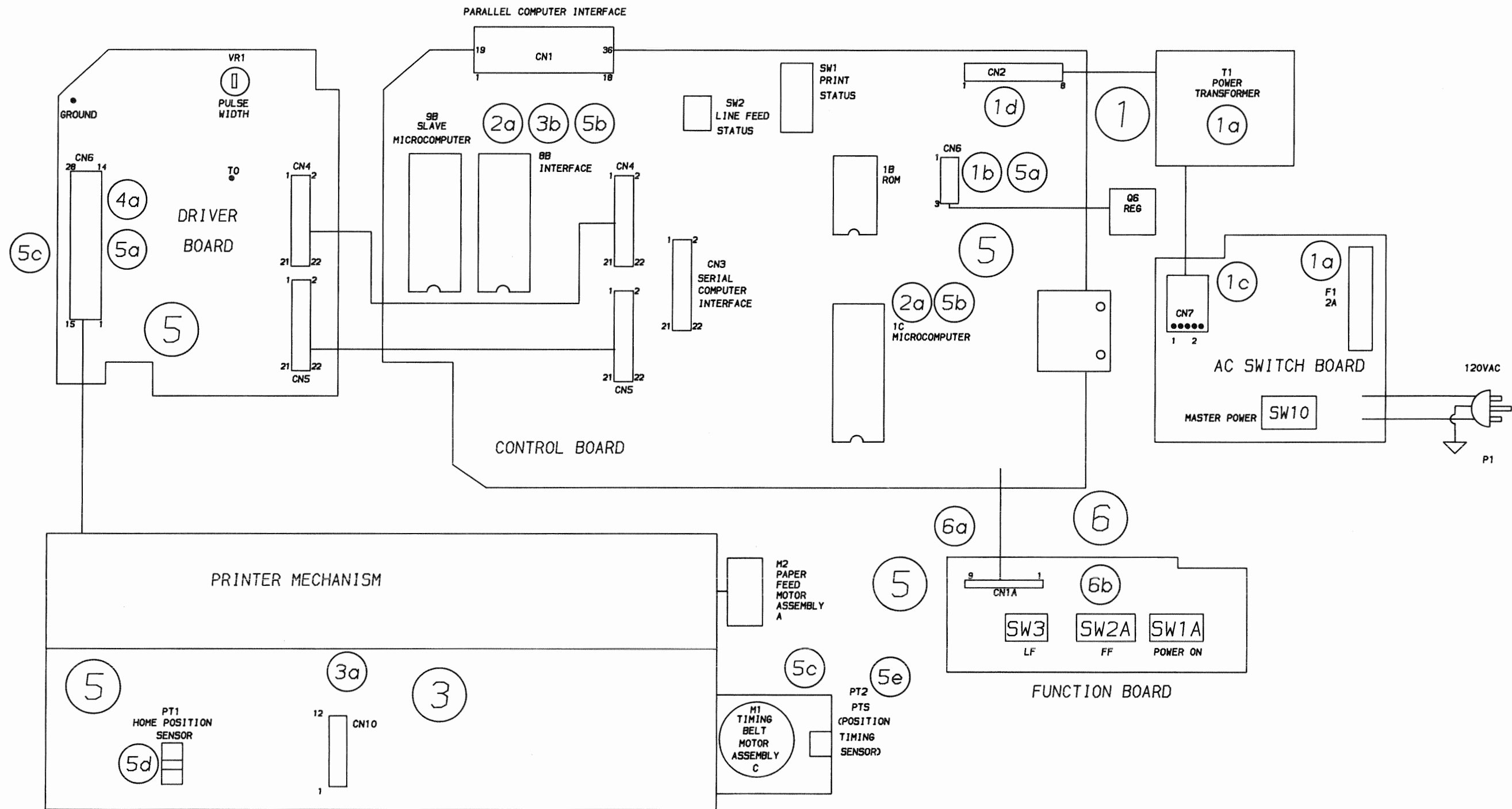


INTERCONNECTING DIAGRAM

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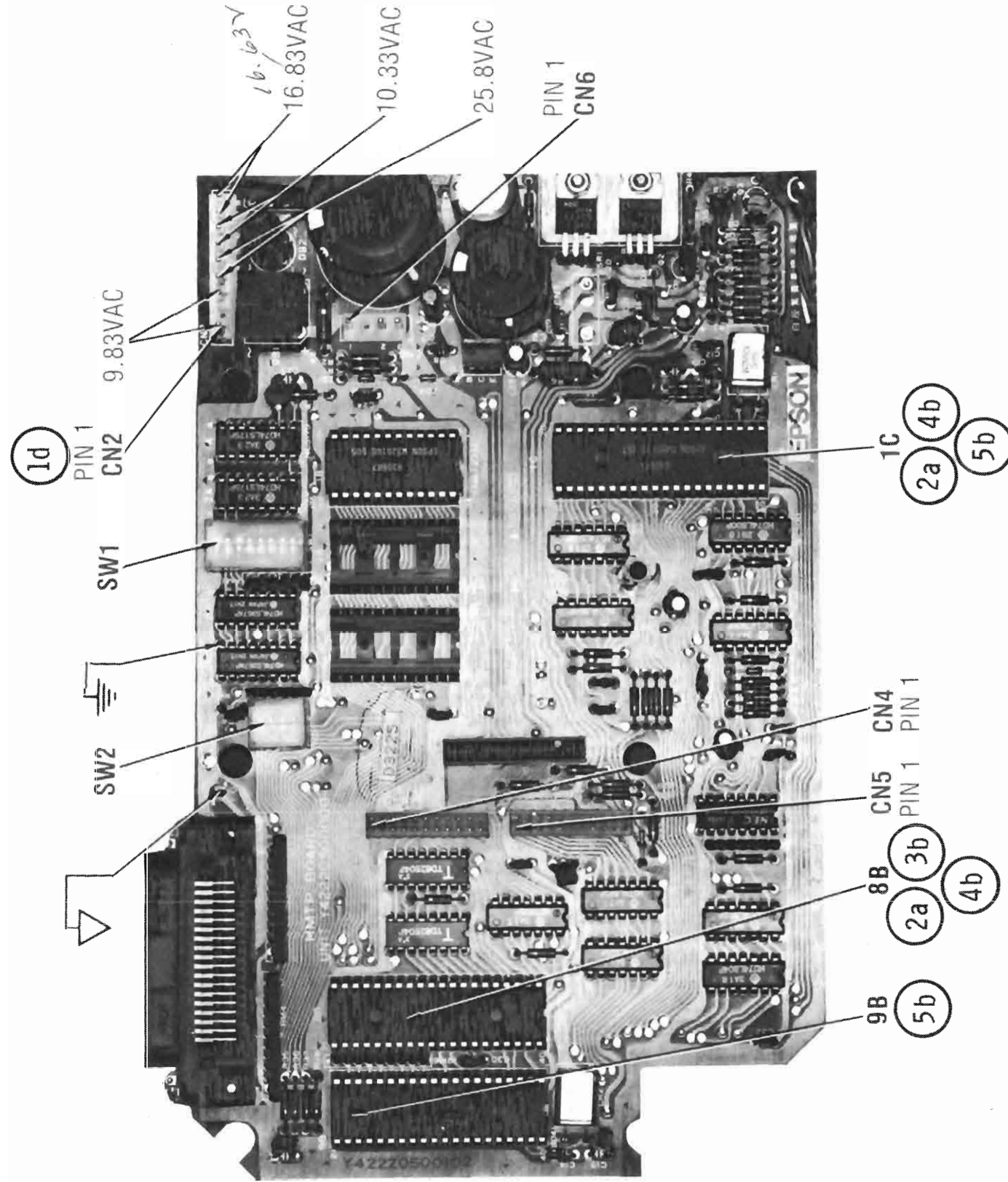
PRELIMINARY SERVICE CHECKS (Continued)

PRELIMINARY SERVICE CHECKS (Continued)



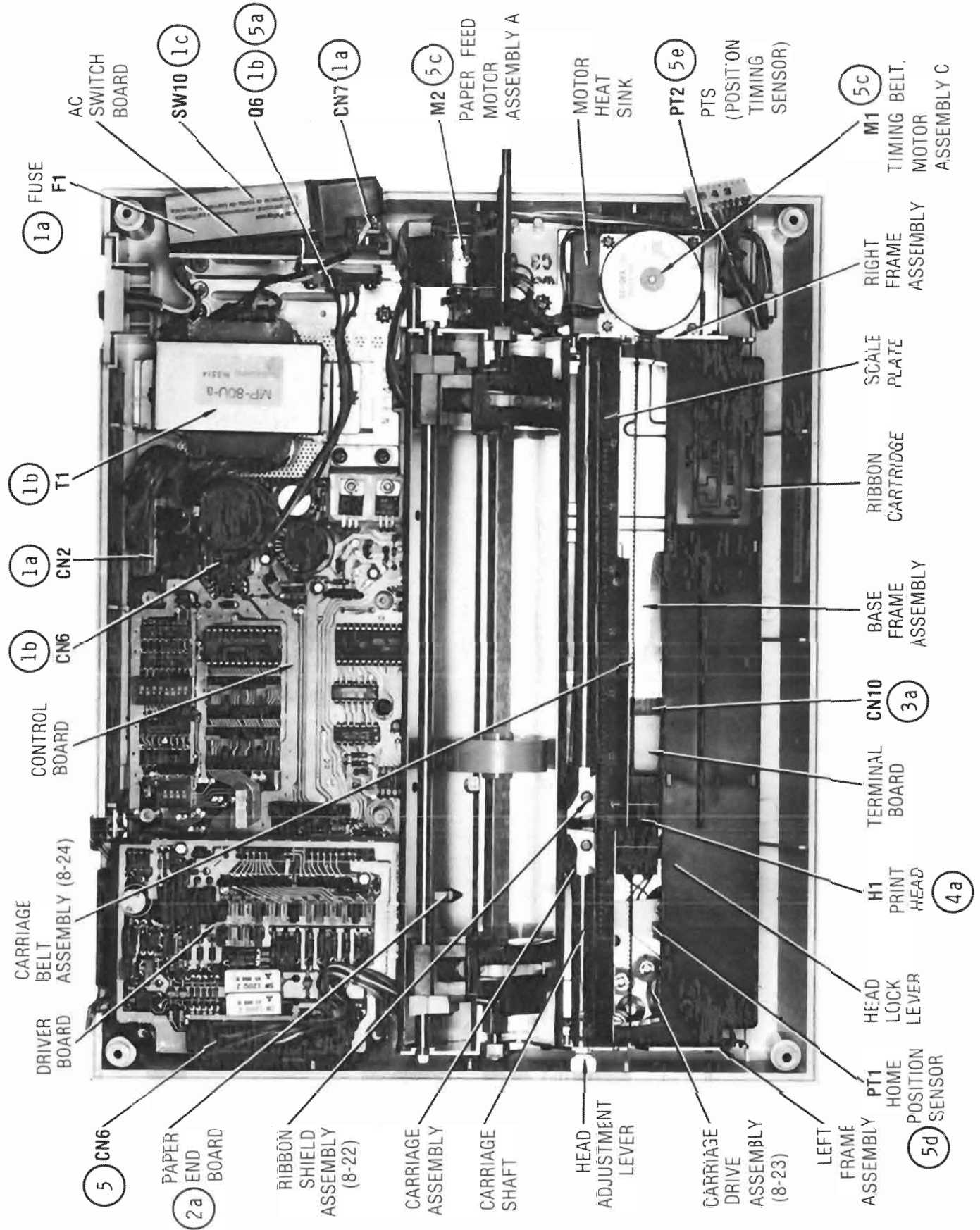
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PRELIMINARY SERVICE CHECKS (Continued)



CONTROL BOARD

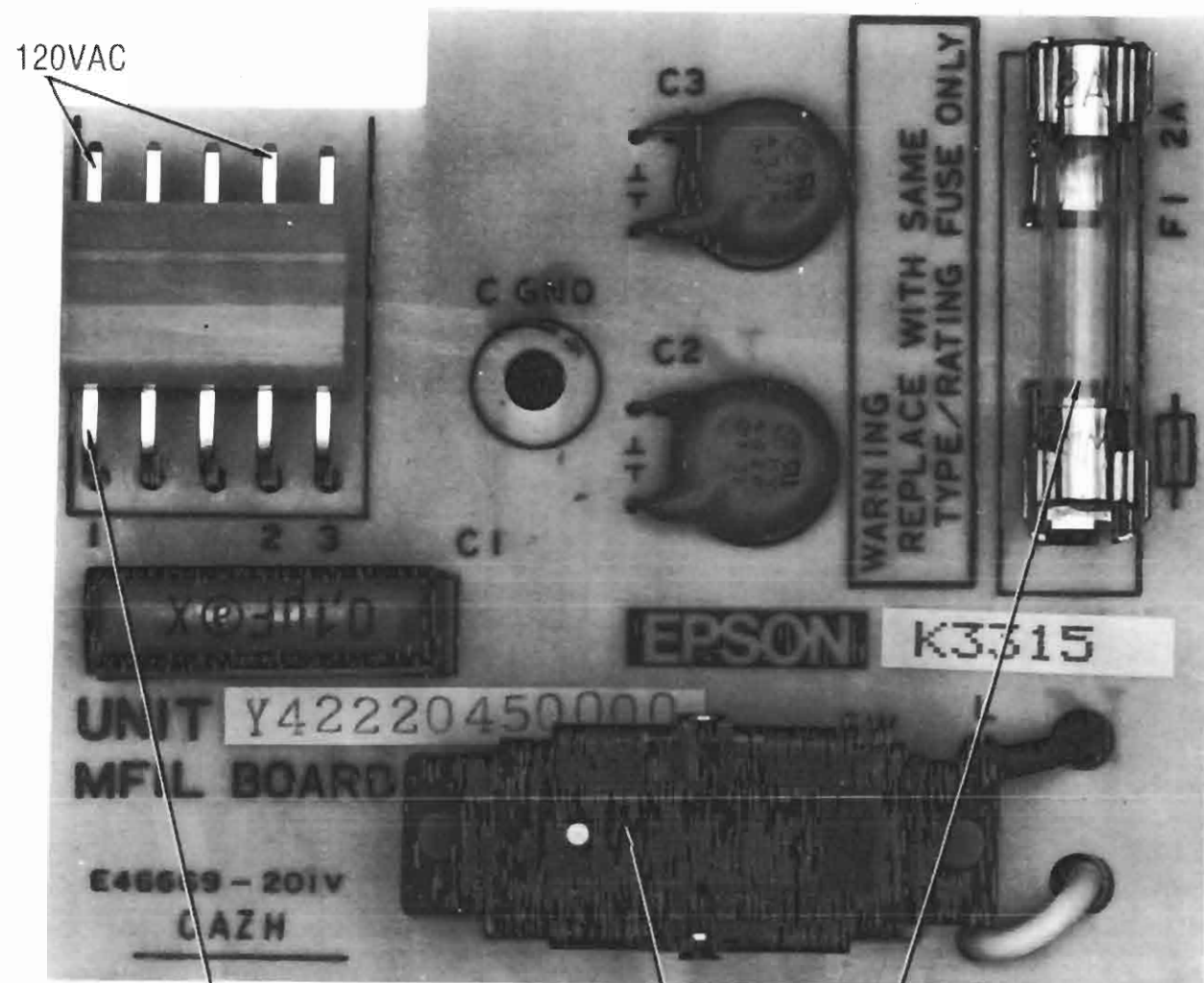
PRELIMINARY SERVICE CHECKS (Continued)



CHASSIS-TOP VIEW

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PRELIMINARY SERVICE CHECKS (Continued)



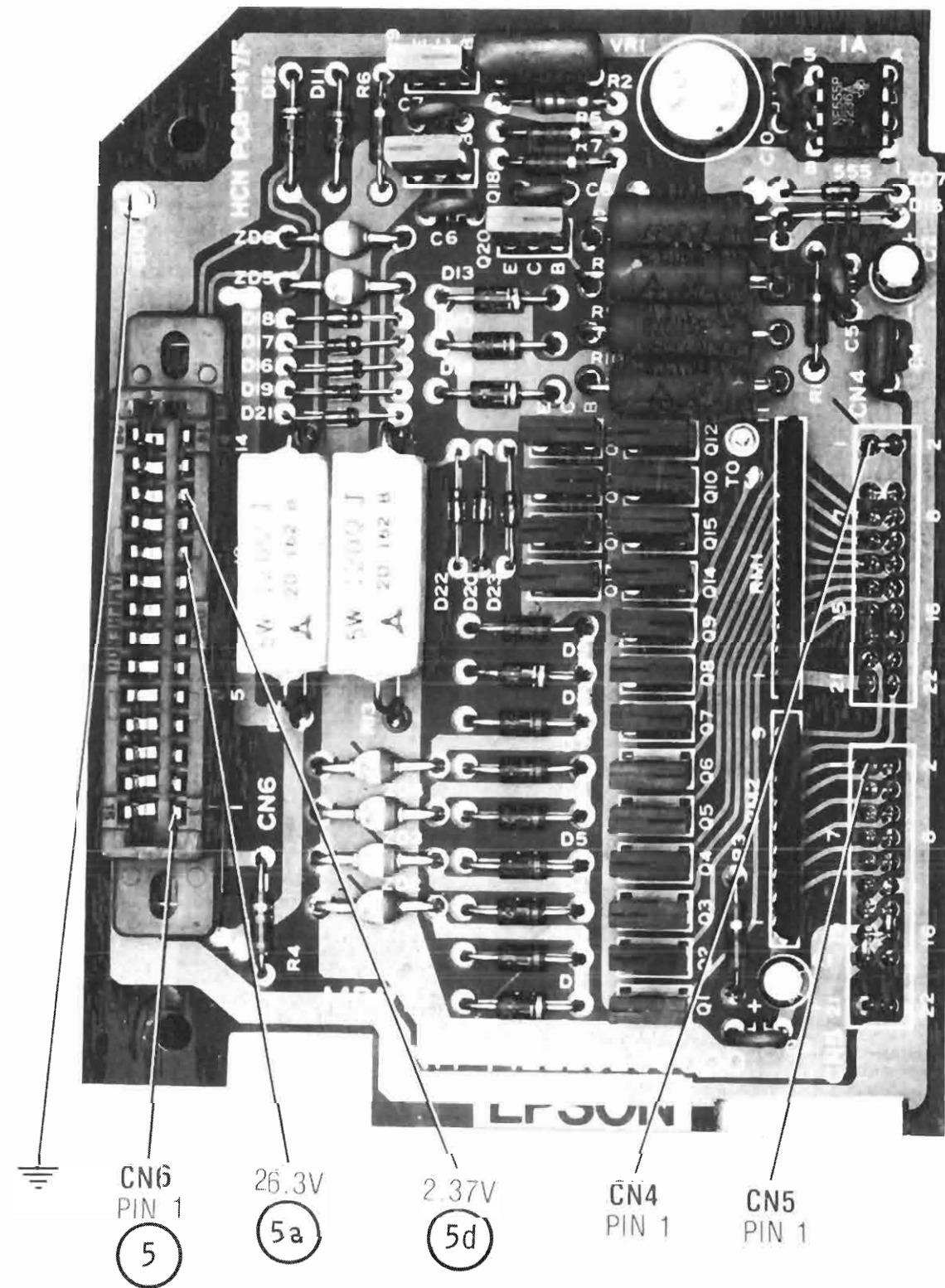
CN7
PIN 1
1c

SW10
1c

F1
1a

AC SWITCH BOARD

PRELIMINARY SERVICE CHECKS (Continued)



5
CN6
PIN 1
5

26.3V
5a

2.37V
5d

CN4
PIN 1

CN5
PIN 1

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DRIVER BOARD