

**PRELIMINARY SERVICE CHECKS (Continued)
PREVENTATIVE MAINTENANCE**

ENVIRONMENT

Computers perform best in a clean, cool area that is below 80 degrees Fahrenheit and free of dust and smoke particles. Even though home Computers are not affected by cigarette smoke as much as commercial Computers are affected, it is better to maintain a smoke-free area around the Computer. Do not block cabinet vents of any of the Computer system; Computer, Monitor, Printer, or other power devices.

ELECTRICAL POWER

Variations in the line voltage can affect the Computer. Try to avoid these fluctuations by using an AC receptacle that is on a power line not used by appliances or other heavy current demand devices. A power-surge protector, power-line conditioner, or non-interruptable power supply may be needed to cure the problem. **Do not** switch power On and Off frequently.

KEYBOARD

Liquids spilled into the Keyboard can ruin it. Immediately after a spill occurs, disconnect the Computer power plug from AC power outlet. Then, if circuitry or contacts are contaminated, disassemble the Keyboard and carefully rinse the Keyboard printed circuit board with distilled water and let it dry. Use a cotton swab to clean between the keys. Use a non-abrasive contact cleaner and lint-free wipers on accessible connectors and contacts.

DISK DRIVES

Clean the read/write heads of the Disk Drives about once a month or after 100 hours usage. Use only an approved head cleaning kit.

Handle carefully to preserve proper disk head alignment. A sudden bump or jolt to the Disk Drives can knock the disk head out of alignment. If the disk drive must be transported, place an old disk in slot and close door during transport.

Store disks in their protective covers and never touch the disk surface. Observe the disk handling precautions usually found on the back of disk protective covers.

PRINTERS

Carefully vacuum the Printer regularly. Wipe surface areas clean using a light all-purpose cleaner. Do not oil the machine. The oil will collect abrasive grit and dust. The dust will act as a blanket. This can cause components to overheat and fail.

STATIC ELECTRICITY

Static electricity discharge can affect the Computer. In order to minimize the possibility, use anti-static mats, sprays, tools and materials, and maintain good humidity in the Computer environment.

MONITOR

Use an isolation transformer with any Monitor that does not come as part of the system since some Monitors use a HOT chassis (chassis connected to one side of the AC line). The face of the Monitor should never be left on for long periods of time at high brightness level except when pattern is being changed periodically. Use caution when cleaning anti-glare screens, to preserve the glare-reduction feature.

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 CPU board or connectors may be necessary after the malfunction has been isolated.

TEST EQUIPMENT AND TOOLS

TEST EQUIPMENT

Digital Volt/Ohm Meter
Scope
Logic Probe

TOOLS

Phillips Screwdriver
Small Screwdriver
Low Voltage Soldering Iron
Desoldering Iron

REPLACEMENT PARTS AND DESCRIPTION

ITEM NO.	PART NO.	DESCRIPTION
F1		Fuse, 2A @250V Fast Acting
FU1	EJG00-06600	Fuse, 3A @125V Fast Acting
FU2	EJG00-12100	Fuse, 6.3A @125V Fast Acting
M1	CLABK-18301	Motor, Carriage
M2	CLAAK-10301	Motor, Linefeed
M3	CLABK-19401	Motor, Ribbon Lift
M4	CLABK-18001	Print Head
M5	CLEAK-11603	Home Position Sensor
Q31		Transistor, 2SB688

C.Itoh
MODEL M-8510CP
CP18

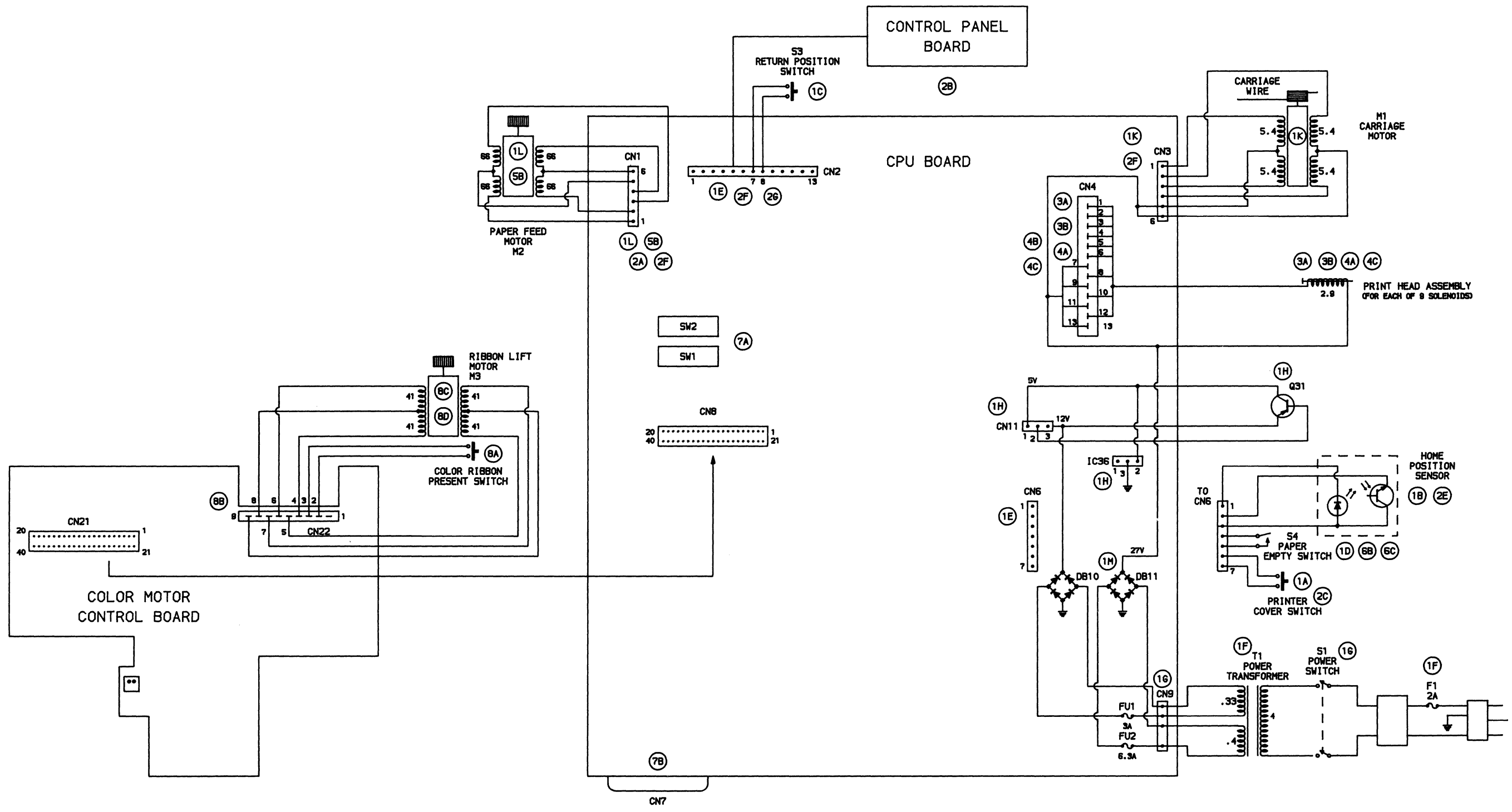
CP18
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SAMS™ Howard W. Sams & Co.
4300 West 62nd Street, P.O. Box 7092, Indianapolis, Indiana 46206 U.S.A.

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.

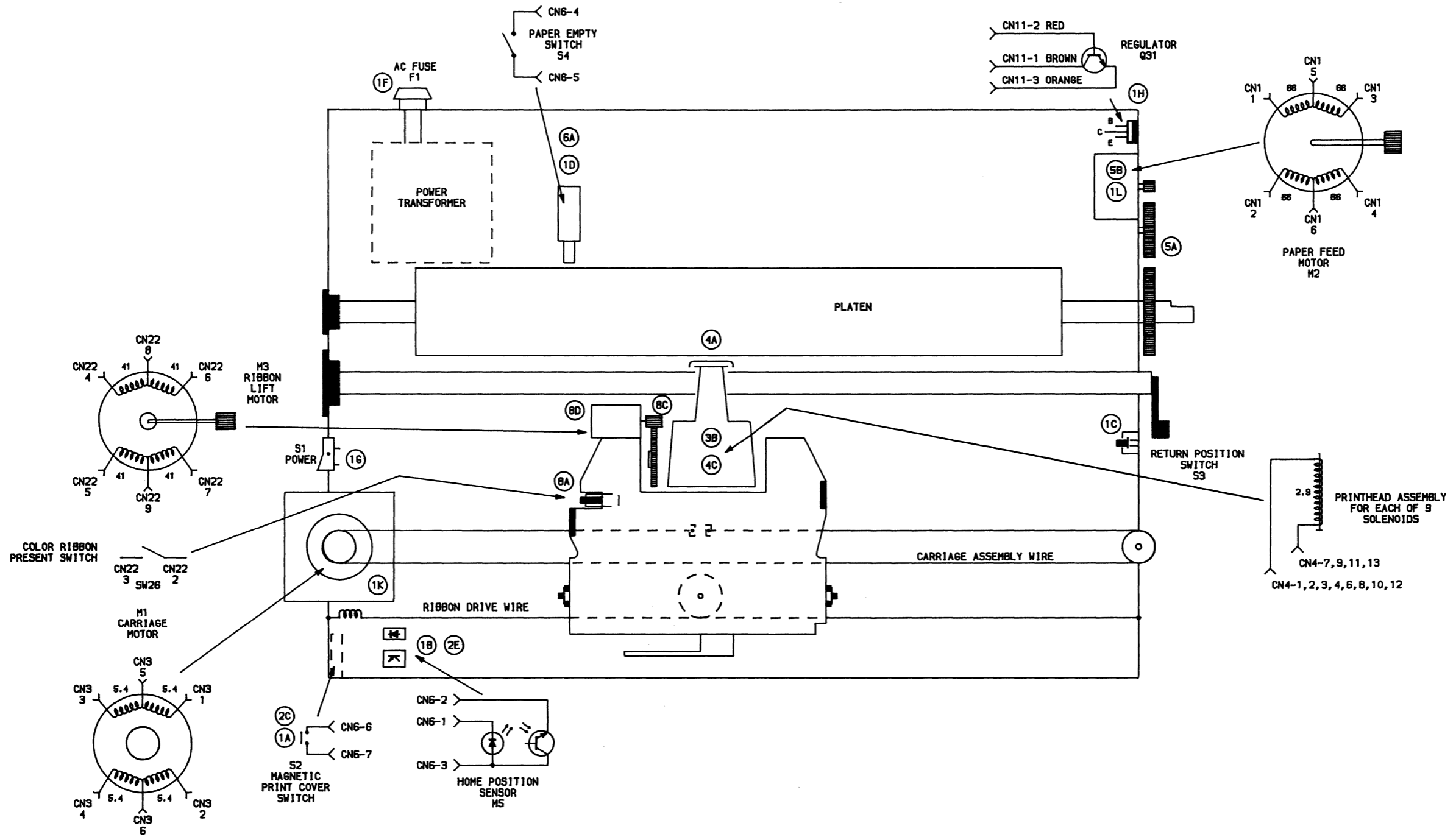
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PRELIMINARY SERVICE CHECKS (Continued)



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PRELIMINARY SERVICE CHECKS (Continued)



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PRELIMINARY SERVICE CHECKS (Continued)

SERVICE CHECKS

MATCH THE NUMBERS ON THE INTERCONNECTING DIAGRAM AND PHOTOS WITH THE NUMBERS ON THE SERVICE CHECKS TO BE PERFORMED.

① POWER SUPPLY

NOTE: Perform checks 1(A) thru 1(D) before making any other checks.

- (A) Printer cover must be closed (Magnetic Switch S2 should be closed).
- (B) Home Position Sensor (M5) must be clear of foreign objects and print head assembly should move to home position (extreme left) at power up.
- (C) Return Position Switch (S3) must be open.
- (D) Paper Empty Switch (S4) must be closed.
- (E) Check Connectors CN2 and CN6 for good connection.
- (F) Check AC Fuse (F1), if open check for a shorted Power Transformer (T1).
- (G) Check for an open Power Switch (S1) and check Connector CN9 for good connection.
- (H) Check DC Fuse (FU1), if open check Regulator Transistor (Q31). Check for 5V at pin 1 and 12.8V at pin 3 of Connector CN11.
- (J) Check for an open DC Fuse (FU2).
- (K) Check Connector CN3 for good connections and check for a shorted winding on Carriage Motor (M1).
- (L) Check Connector CN1 for good connections and check for a shorted or open winding on Paper Feed Motor (M2).
- (M) Check for 27.0V at the cathode of Diode DB11.

② PRINTER CARRIAGE ASSEMBLY DOES NOT MOVE

- (A) Press L.F. Switch (S5) button, platen should turn. If platen does not turn, check Connector CN1 for good connections.
- (B) If platen turns when L.F. button is pressed, press SEL Switch (S6) button, SEL Indicator LED (D23) should turn ON.
- (C) If SEL Indicator LED does not turn ON, check the Printer Cover Switch (S2), magnet activated switch.
- (D) Initiate Self Test function by pressing the Power Switch (S1) and T.O.F. Switch (S6) button at the same time.

- (E) If the Self Test will not operate, and the carriage assembly is not moving, check the Home Position Sensor (M5) for foreign objects clogging the opening of the sensor assembly.
- (F) Check Connectors CN1, CN2, CN3 and CN6 for open or shorted connections.
- (G) If the carriage assembly is still inoperative check pins 7 and 8 of Connector CN2 for a shorted Return Position Switch (S3).

③ PRINT HEAD WILL NOT PRINT

- (A) Check Connector CN4 for good connections.
- (B) Disconnect Connector CN4 and check resistances of print head assembly solenoids. Check for 2.9 ohms between pin 7 and pins 1 thru 6, 8, 10 and 12 of Connector CN4. If any reading is incorrect replace the print head assembly. Reconnect Connector CN4.

④ MISSING DOTS IN THE PRINT PATTERN

- (A) Clean print head face.
- (B) Check Connector CN4 for good connections.
- (C) Disconnect Connector CN4 and check resistances of print head assembly solenoids. Check for 2.9 ohms between pin 7 and pins 1 thru 6, 8, 10 and 12 of Connector CN4. If any reading is incorrect replace the print head assembly. Reconnect Connector CN4.

⑤ LINEFEED WILL NOT OPERATE

- (A) Check the operation of the gear assembly on the right side of the platen when L.F. Switch (S5) button is pressed. If gear assembly is not operating, check for a broken gear.
- (B) Check Paper Feed Motor (M2) for motion. If it is not moving, check Motor M2 and check Connector CN1 for good connections.

⑥ PAPER EMPTY INDICATOR NOT OPERATING

- (A) Initiate the Self Test function. The Paper Empty Indicator LED should not be ON when paper is loaded. Check the Paper Empty Switch (S4) for loose mounting.
- (B) Check for continuity between pins 4 and 5 of Connector CN6. If open check Switch S4 and check for broken or loose wires between Connector CN6 and Switch S4.
- (C) If Connector CN6 and wires check normal, replace Paper Empty Switch (S4).

PRELIMINARY SERVICE CHECKS (Continued)

SERVICE CHECKS (Continued)

- ⑦ **PRINTER WILL NOT PRINT BY COMPUTER COMMAND**
- (A) Check for proper setting of DIP Switches SW1 and SW2, refer to the "General Operating Instructions".
 - (B) Check Connector CN7 for proper connections and contact between Printer and host Computer.
 - (A) Check Color Ribbon Present Switch on bottom of ribbon table plate for continuity when pressed.
 - (B) Check Connector CN22 on the Color Interface board for proper connection.
 - (C) Check ribbon lift gear assembly for malfunctions.
- ⑧ **PRINTER WILL NOT PRINT IN COLOR (PRINTS ONLY YELLOW WHEN USING THE COLOR RIBBON CARTRIDGE)**
- (D) If all the above checks normal replace Ribbon Lift Motor (M3).

GENERAL OPERATING INSTRUCTIONS

SELF TEST

To initiate the Self Test function, press Power Switch and the T.O.F. Switch button at the same time. The Printer will print its entire character set and continue to print until power is turned OFF.

In case the color ribbon cartridge is installed, the printer will run the self test printing a yellow line followed by red, brown, blue, green, magenta then a black line. Then repeats the cycle of colors until turned OFF.

DIP SWITCHES

Dip Switches SW1 and SW2 must be set to match the output requirements of the host Computer.

SW1-1, SW1-2, SW1-3 and SW1-4 set characters for various host countries. For USA: set SW1-1 open, SW1-2 closed and SW1-3 open. For UNITED KINGDOM: set SW1-2 closed, SW1-3 closed and SW1-3 open. For GERMANY: set SW1-1 open, SW1-2 open and SW1-3 closed. For SWEDEN: set SW1-1 closed, SW1-2 open and SW1-3 closed. For JAPAN: set SW1-1 open, SW1-2 open and SW1-3 open.

SW1-4: set open for all the above countries.

SW1-5: sets Device control Select 1 and Deselect 3. For select and deselect condition, set SW1-5 open (standard setting). To ignore select and deselect condition, set SW1-5 closed.

SW1-6: sets an automatic line feed command when the printer prints a buffer full condition. To use full data buffer line feed, set SW1-6 closed. For non line feed condition, set SW1-6 open (standard setting).

SW1-7: sets print command code. For carriage return only code, set SW1-7 open (standard setting). For separate carriage return, line feed, vertical tab, formfeed and unit separator command codes, set SW1-7 closed.

SW1-8: sets function of carriage return. For carriage return command without line feed, set SW1-8 open (standard setting). For a carriage return followed by a line feed automatically set SW1-8 closed.

SW2-1: sets numeric display of number zero. For zero without a slash, set SW2-1 open. For zero with a slash set SW2-1 closed (standard setting).

SW2-2: sets selection of reception buffer. For 1K or more buffer, set SW2-2 open (standard setting). For one line buffer, set SW2-2 closed.

SW2-3: selects the top of form length setting. For 11 inches (66 lines), set SW2-3 open (standard setting). For 12 inches (72 lines), set SW2-3 closed.

SW2-4: sets line feed pitch selection. For 1/6" pitch, set SW2-4 open (standard setting). For 1/8" pitch, set SW2-4 closed.

SW2-5: sets selection of print mode at power-ON. For 10 CPI (character per inch), set SW2-5 open (standard setting). For proportional character, set SW2-5 closed.

SW2-6: selects 7-bit or 8-bit data. For 8-bit data, set SW2-6 open (standard setting). For 7-bit data, set SW2-6 closed.

SW2-7: sets selection of Select or Deselect at power-ON. For deselect mode, set SW2-7 open (standard setting). For select mode, set SW2-7 closed.

SW2-8: selects either bidirectional or unidirectional print. For bidirectional print, set SW2-8 open (standard setting). For unidirectional print, set SW2-8 closed.

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PRELIMINARY SERVICE CHECKS (Continued)

DISASSEMBLY INSTRUCTIONS

CABINET REMOVAL

Remove paper cover and carrier cover. Remove front panel, lift upward to release plastic clips and pull panel forward. Remove four screws holding cabinet top. Remove platen knob and lift cabinet top from Printer. Disconnect switch connectors while removing cabinet top.

CPU BOARD REMOVAL

Remove paper cover and carrier cover. Remove print head connector. Set Printer on its side and remove four screws holding CPU board access panel. Carefully disconnect all connectors from CPU board and remove board.

MISCELLANEOUS ADJUSTMENTS

PRINT HEAD CHARGING TIME ADJUSTMENT

Some dots are missing when the characters are printed. Check the adjustment of the Charging Time Control (VR2) for the Print Head charging time. The Print Head charging time is the period of time when pin 1 of IC4 is a logic Low.

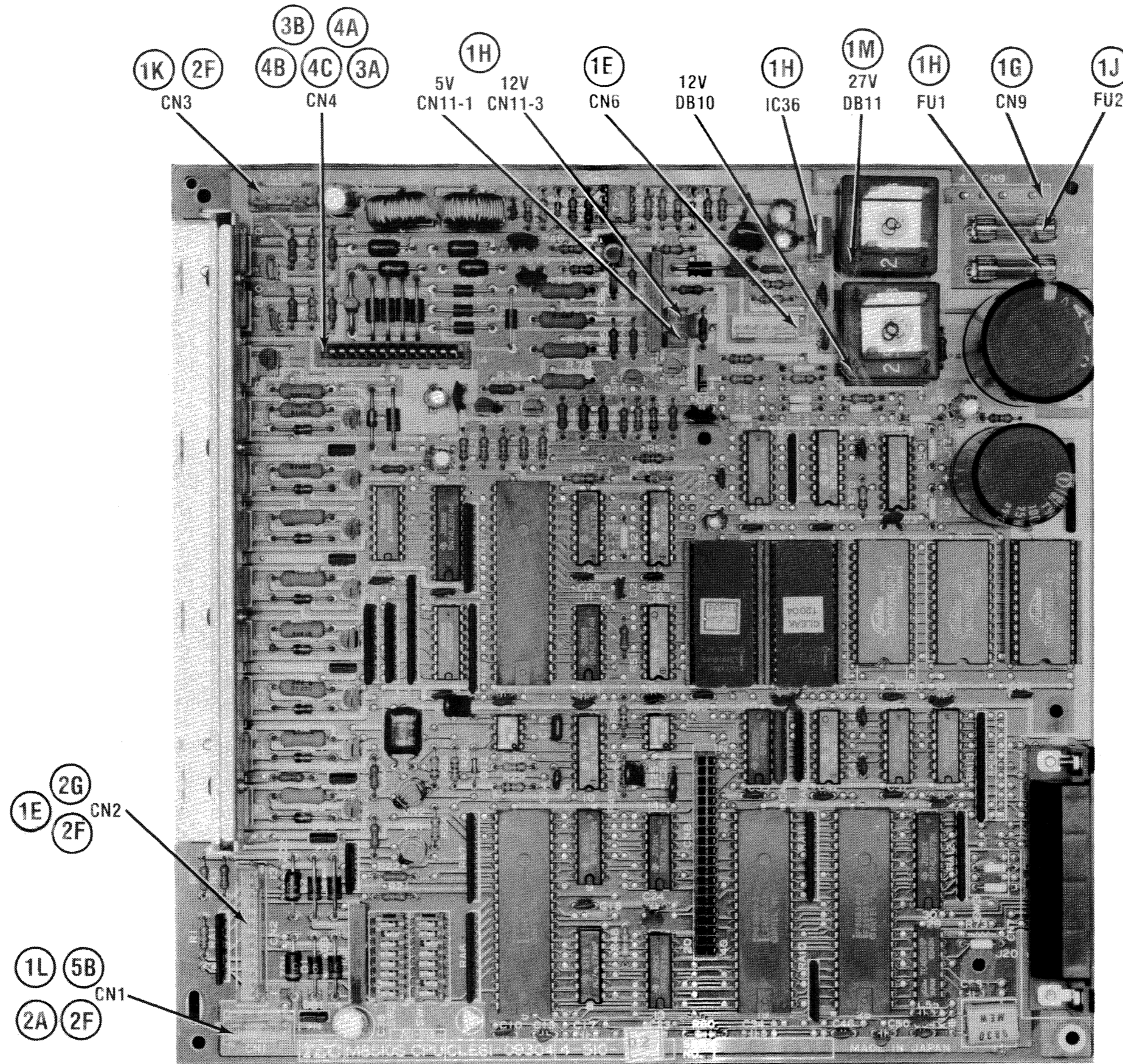
Connect the input of scope to pin 1 of IC4. Set the Printer in self-test mode. See "General Operating Instructions". Measure motor voltage at the 27.0V source. Adjust Control VR2 for the correct Print Head charging time of the Print Head according to the following:

MOTOR VOLTAGE	CHARGING TIME
26V	280 μ S
21V	320 μ S
16V	360 μ S

CHARACTER DEVIATION ADJUSTMENT

Character Deviation Control (VR1) is used to adjust for character alignment if the characters are not properly spaced. Adjust Control VR1 for the proper deviation between characters.

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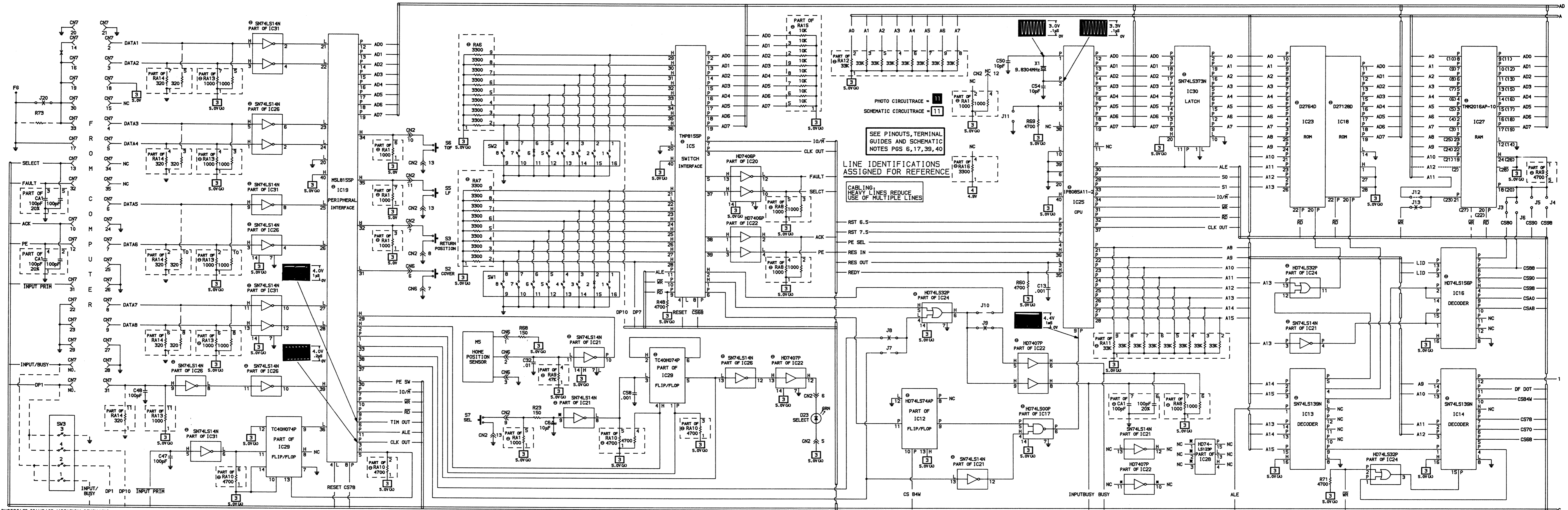
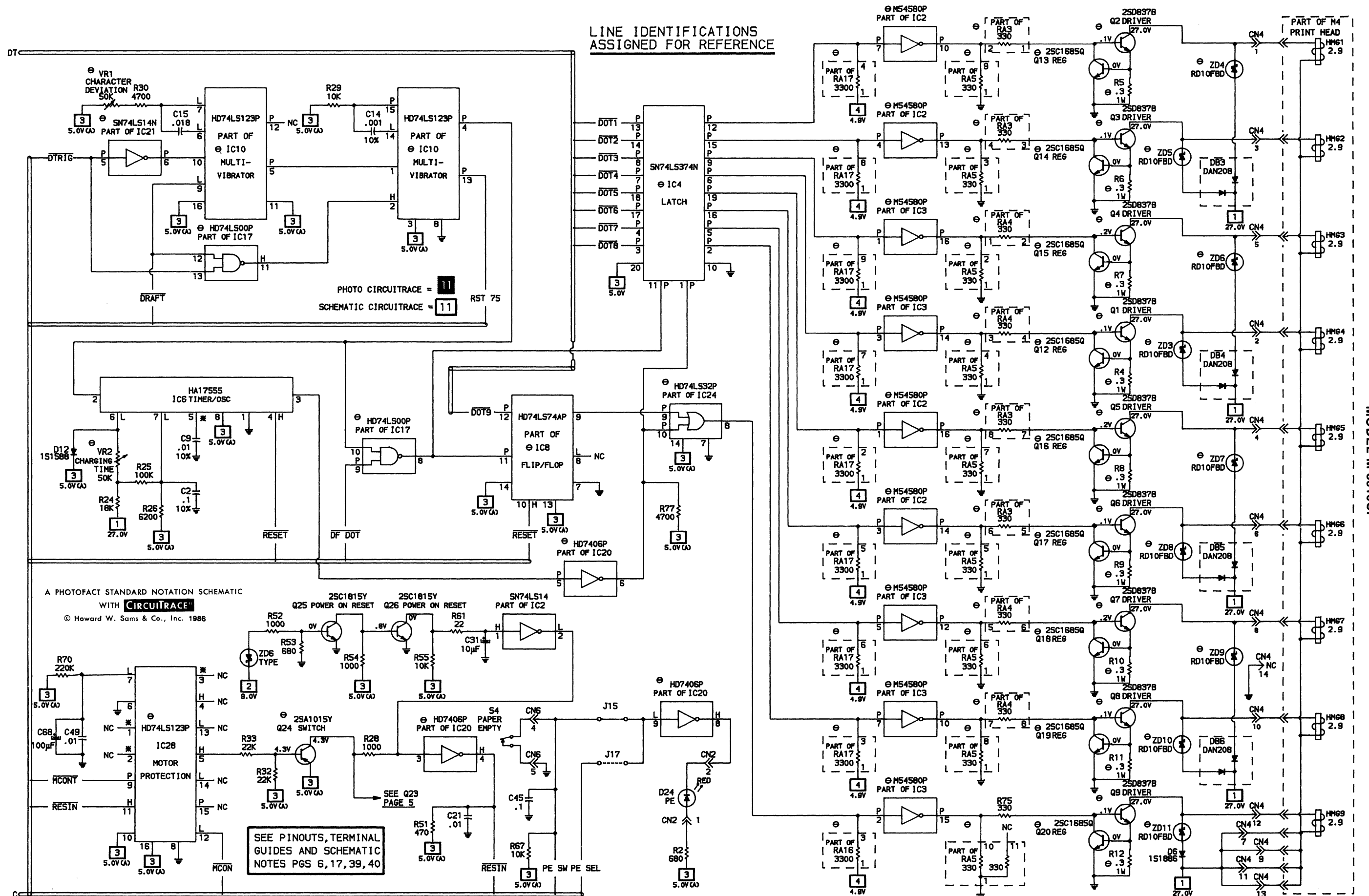


PHOTO CIRCUITRACE = 11
 SCHEMATIC CIRCUITRACE = 11

SEE PINOUTS, TERMINAL GUIDES AND SCHEMATIC NOTES PGS 6, 17, 39, 40

LINE IDENTIFICATIONS ASSIGNED FOR REFERENCE

CABLING HEAVY LINES REDUCE USE OF MULTIPLE LINES



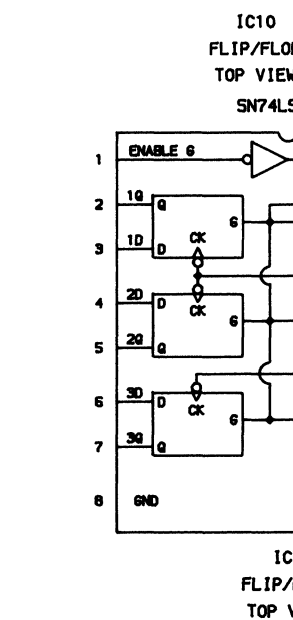
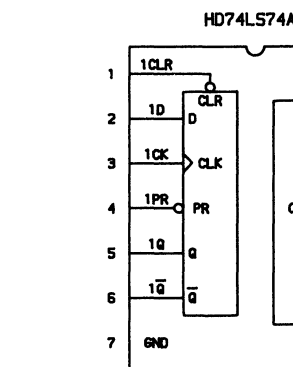
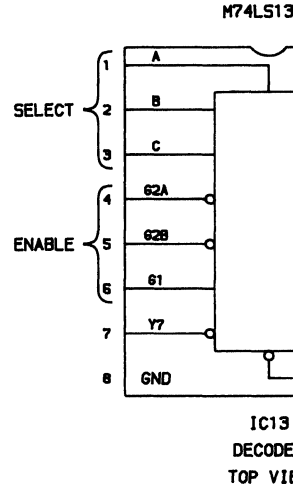
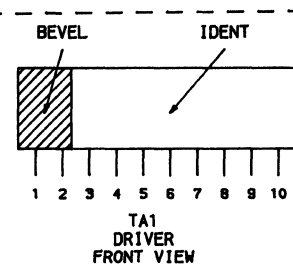
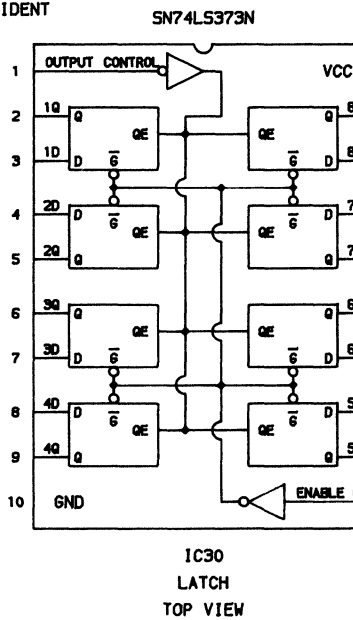
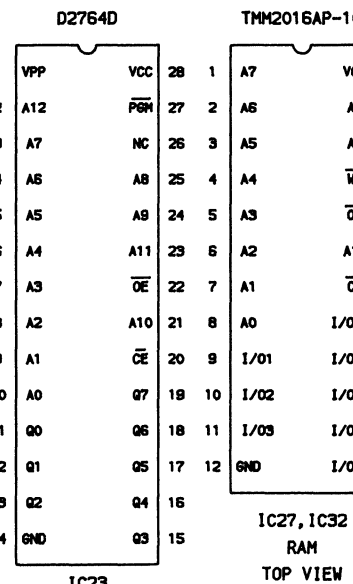
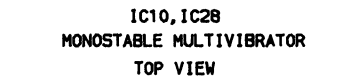
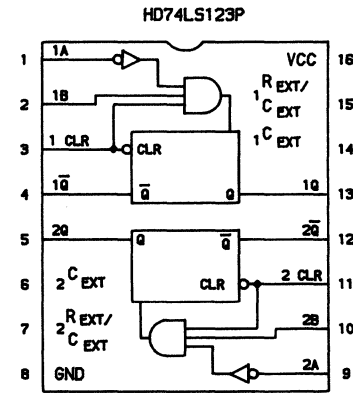
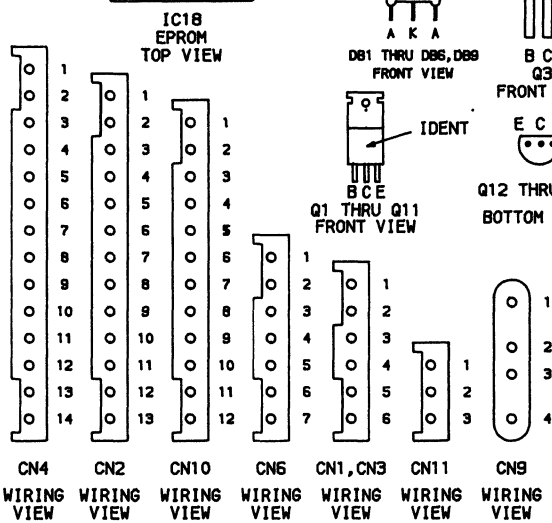
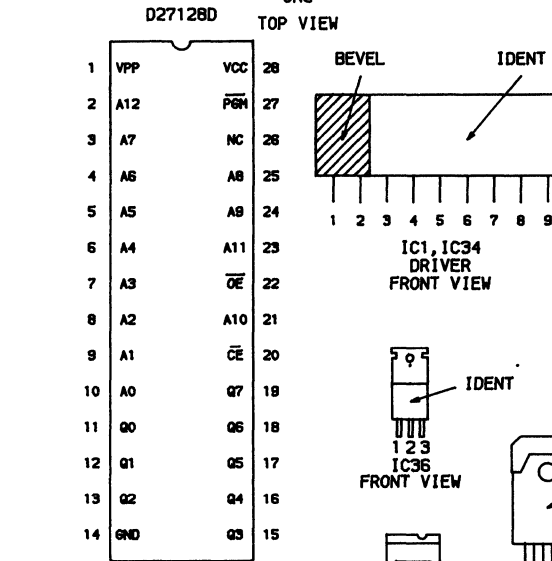
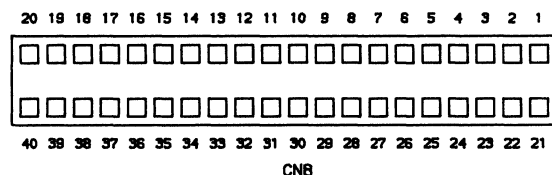
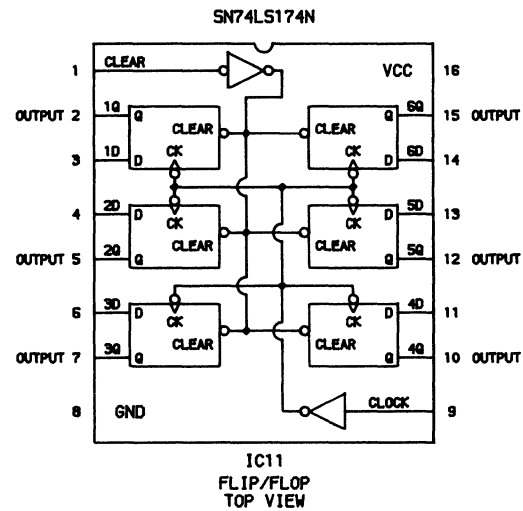
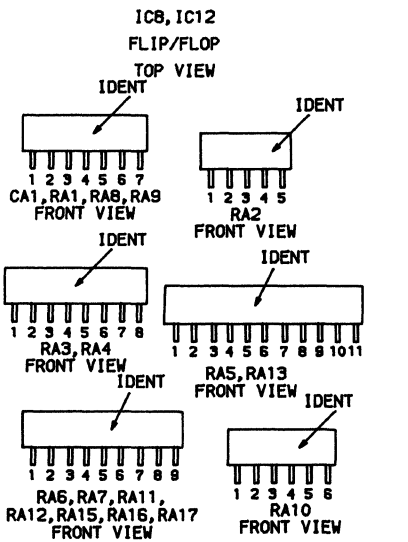
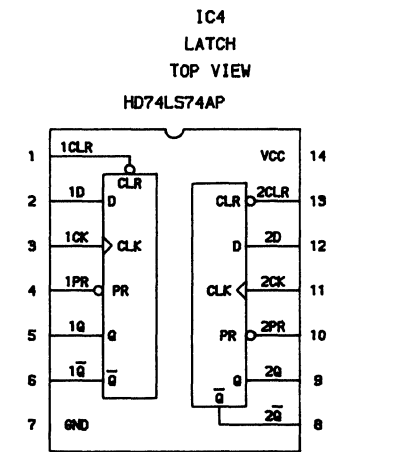
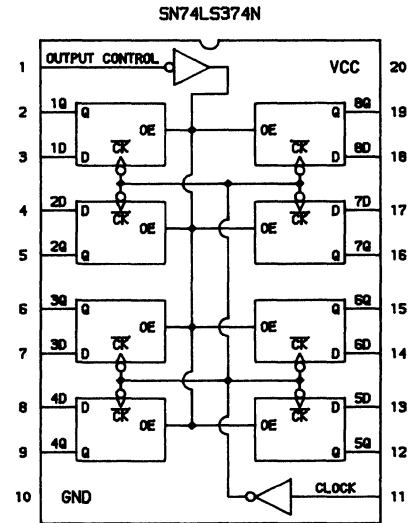
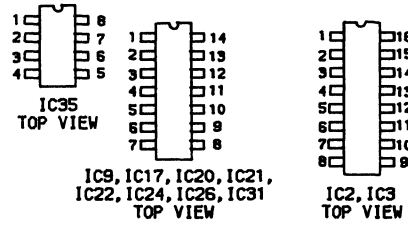
LINE IDENTIFICATIONS
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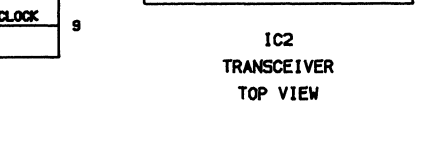
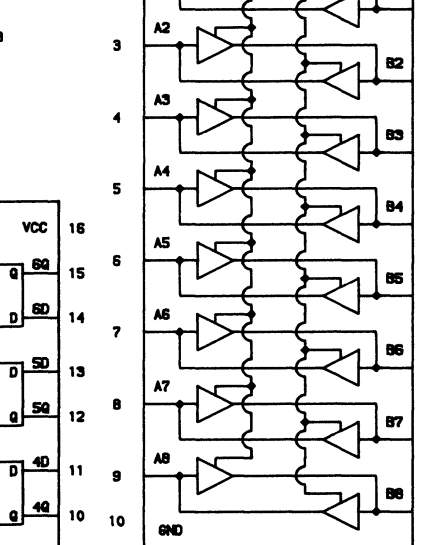
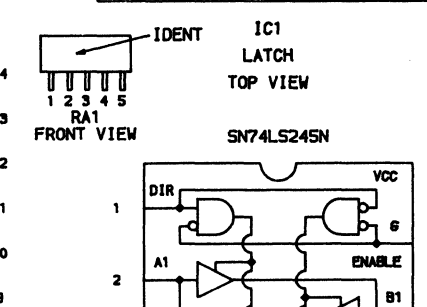
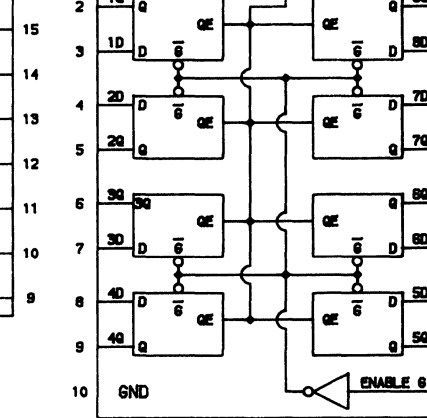
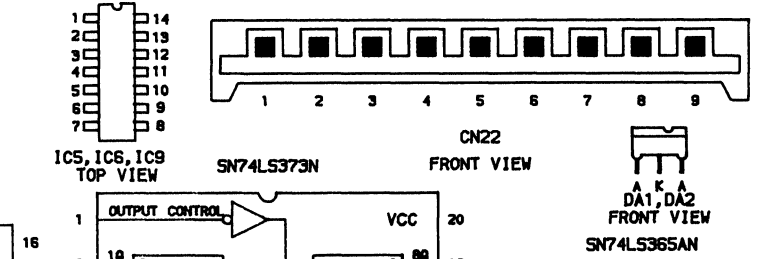
MAIN BOARD

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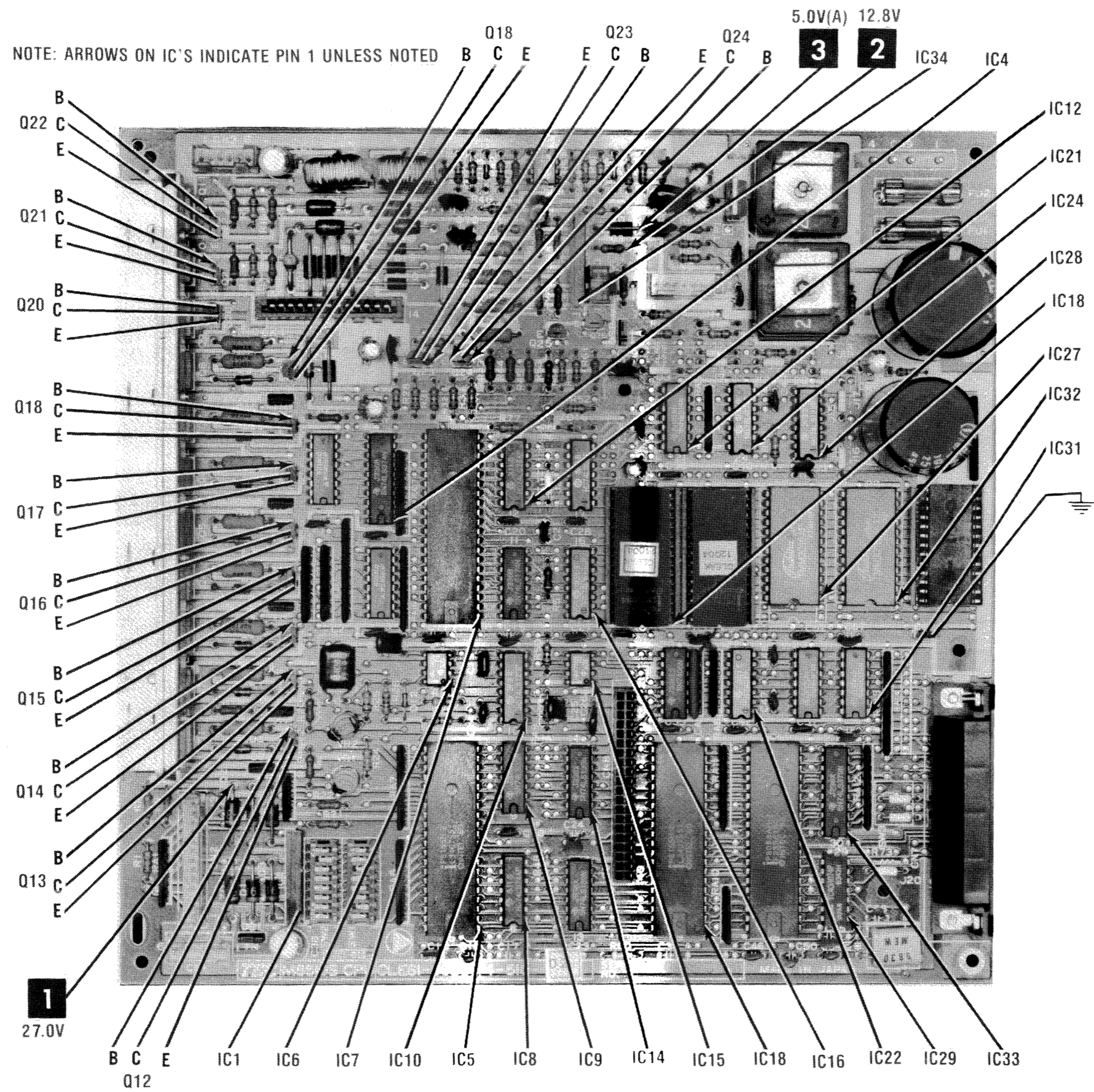
IC PINOUTS & TERMINAL GUIDES



SELECT COLOR BOARD



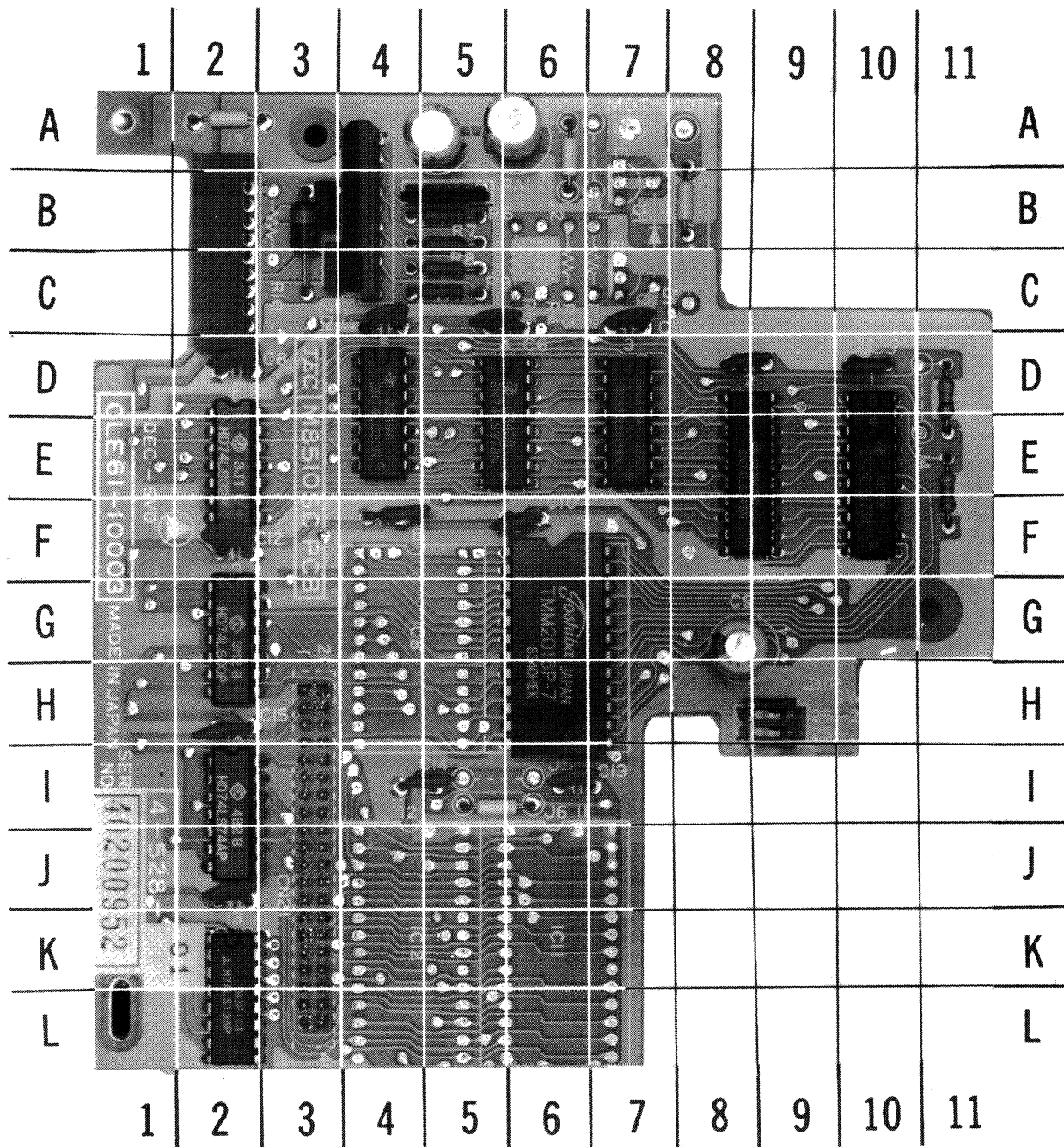
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GridTrace LOCATION GUIDE

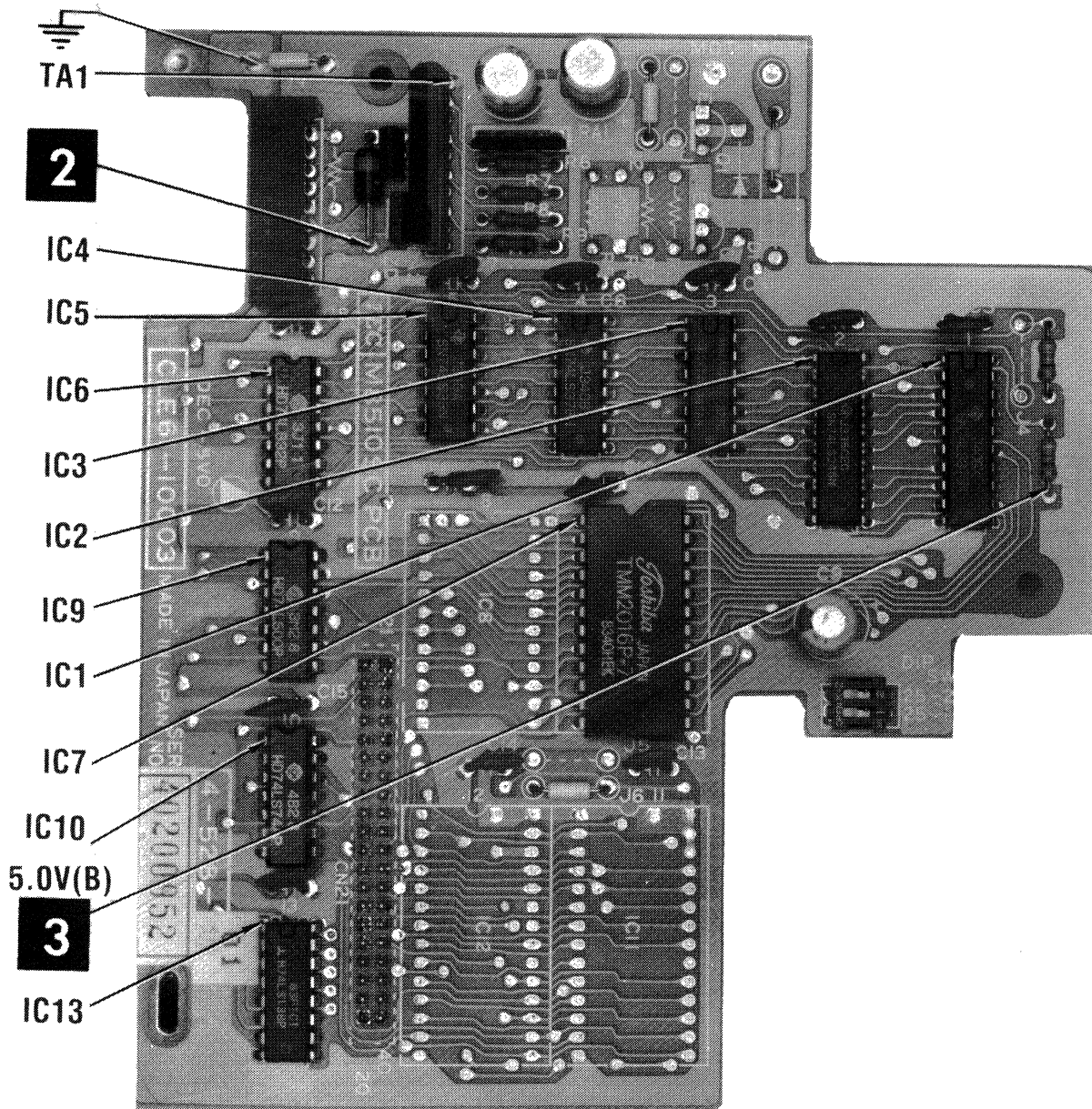
C1	A-6	CN21	I-3	J6	I-5
C2	A-5	CN22	B-2	R6	B-5
C3	D-10	DA1	B-3	R7	B-5
C4	D-8	DA2	C-3	R8	C-5
C5	C-7	IC1	E-10	R9	C-5
C6	C-5	IC2	E-8	R11	D-11
C7	C-4	IC3	D-7	R12	E-11
C8	D-2	IC4	D-6	RA1	B-5
C9	G-8	IC5	D-4	SW25	H-9
C10	F-6	IC6	E-2	TA1	B-4
C11	F-4	IC7	G-6	ZD1	B-3
C12	F-2	IC9	G-2		
C13	I-6	IC10	I-2		
C14	I-5	IC13	L-2		
C15	H-2	J2	A-6		
C16	J-2	J3	A-2		



MAIN BOARD GridTrace LOCATION GUIDE

C1	A-3	D6	C-4	Q2	L-1	R50	K-9
C2	L-5	D7	C-5	Q3	K-1	R51	J-9
C3	I-4	D8	C-5	Q4	J-1	R52	F-10
C4	K-5	D9	C-4	Q5	I-1	R53	E-9
C5	I-5	D10	B-4	Q6	H-1	R54	E-9
C6	F-5	D11	B-6	Q7	F-1	R55	E-10
C8	E-6	D12	L-6	Q8	E-1	R56	B-10
C9	K-6	D13	A-8	Q9	D-1	R57	A-9
C10	R-7	D14	A-10	Q10	C-1	R58	A-11
C11	K-7	D15	B-11	Q11	B-1	R59	A-11
C12	A-7	D16	B-4	Q12	M-4	R60	R-11
C13	R-7	D17	B-6	Q13	L-4	R61	E-10
C14	M-8	D18	C-6	Q14	K-4	R62	D-11
C15	L-8	D19	C-6	Q15	J-3	R63	C-10
C16	B-7	D20	D-6	Q16	I-4	R64	E-11
C18	O-8	D21	C-7	Q17	H-4	R65	B-10
C19	K-8	DB1	Q-3	Q18	G-4	R66	C-12
C20	I-8	DB2	N-2	Q19	E-4	R67	C-12
C21	I-9	DB3	M-3	Q20	D-2	R68	B-12
C22	B-9	DB4	J-3	Q21	C-2	R69	E-13
C24	O-10	DB5	H-3	Q22	B-2	R70	G-14
C25	M-9	DB6	F-3	Q23	E-6	R71	E-14
C26	M-10	DB9	E-11	Q24	E-7	R72	D-15
C27	K-10	DB10	O-14	Q25	E-9	R74	E-17
C28	I-10	DB11	A-14	Q26	D-10	R75	M-2
C29	E-11	FU1	B-17	R1	P-1	R76	C-8
C30	K-11	FU2	B-17	R2	O-2	R77	G-8
C31	G-11	IC1	P-4	R3	O-2	R78	E-8
C32	G-11	IC2	H-4	R4	M-3	R79	B-8
C33	A-12	IC3	J-5	R5	L-3	R80	A-10
C35	M-12	IC4	H-13	R6	K-3	R81	A-10
C36	H-12	IC5	P-7	R7	J-3	R82	C-8
C37	B-12	IC6	L-7	R8	I-3	RA1	P-1
C38	R-3	IC7	I-7	R9	G-3	RA2	N-3
C39	K-12	IC8	P-8	R10	F-3	RA3	J-4
C40	B-12	IC9	N-8	R11	E-3	RA4	J-4
C41	A-12	IC10	L-8	R12	E-3	RA5	J-5
C42	M-13	IC11	J-9	R13	C-2	RA6	P-6
C43	H-13	IC12	H-8	R14	B-2	RA7	N-6
C44	D-13	IC13	P-10	R15	C-3	RA8	L-13
C45	C-13	IC14	N-10	R16	B-3	RA9	F-12
C46	R-13	IC15	L-10	R17	C-3	RA10	Q-13
C47	L-14	IC16	J-10	R18	B-3	RA11	N-13
C48	K-14	IC17	H-10	R19	N-4	RA12	N-16
C49	F-14	IC18	I-11	R20	M-4	RA13	L-16
C50	R-14	IC19	O-12	R21	O-4	RA15	G-18
C51	M-14	IC20	L-12	R22	O-4	RA16	J-6
C52	K-14	IC21	F-12	R23	F-4	RA17	H-16
C53	G-14	IC22	L-13	R24	N-5	SW1	P-5
C54	R-15	IC23	I-13	R25	L-5	SW2	P-4
C56	M-15	IC24	F-13	R26	L-6	VR1	N-5
C57	K-15	IC25	O-14	R27	F-6	VR2	M-5
C58	Q-16	IC26	L-15	R28	F-6	X1	R-16
C65	K-17	IC27	I-15	R29	M-7	ZD1	P-2
C66	F-17	IC28	F-15	R30	L-7	ZD2	O-2
C67	D-17	IC29	P-15	R31	F-7	ZD3	M-3
C68	E-16	IC30	N-15	R32	F-7	ZD4	L-3
C69	B-11	IC31	L-15	R33	F-7	ZD5	K-3
C70	B-7	IC32	I-16	R34	E-7	ZD6	J-3
CA1	L-12	IC34	C-10	R35	D-9	ZD7	I-3
CN1	R-2	IC35	A-9	R36	C-9	ZD8	H-3
CN2	P-2	IC36	B-13	R37	D-9	ZD9	G-3
CN3	A-2	J2	H-9	R38	C-9	ZD10	F-3
CN4	D-4	J3	E-11	R39	A-8	ZD11	E-4
CN6	C-12	J8	E-13	R40	A-7	ZD12	C-4
CN7	O-18	J9	E-13	R41	A-7	ZD16	G-10
CN8	N-11	J13	E-14	R42	A-8		
CN9	A-17	J14	G-15	R43	E-8		
CN11	D-10	J15	F-15	R44	E-8		
D1	P-3	J18	E-15	R45	E-9		
D2	O-3	J20	P-16	R46	B-8		
D3	P-3	L1	A-4	R47	D-8		
D4	O-3	L2	A-6	R48	P-9		
D5	E-4	Q1	M-1	R49	M-9		

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TEST EQUIPMENT

Test Equipment listed by Manufacturer illustrates typical or equivalent equipment used by SAMS' Engineers to obtain measurements and is compatible with most types used by field service technicians.

TEST EQUIPMENT (COMPUTERFACTS)

Equipment Name	B & K Precision Equipment No.	Sencore Equipment No.	Simpson Equipment No.
OSCILLOSCOPE	1570A,1590A,1596	SC61	454
LOGIC PROBE	DP51		
LOGIC PULSER	DP101		
DIGITAL VOM	2830	DVM37,DVM56,SC61	463,467,470,474,467E
ANALOG VOM	277		260-7,160,165, 260-6XL,260-7P, 260-6XLP
ISOLATION TRANSFORMER	TR110,1604,1653,1655	PR57	
FREQUENCY COUNTER	1803,1805	FC71,SC61	710
COLOR BAR GENERATOR	1211A,1248,1251,1260	CG25,VA62	431
RGB GENERATOR	1260		
FUNCTION GENERATOR	3020		420A,420D
HI-VOLTAGE PROBE VOM/DMM Accessory probes	HV-44	HP200	248 00168,00411,00749
TEMPERATURE PROBE	TP-28		IR-10,00760,00758; 383,389,388
CRT ANALYZER	467,470	CR70	

TROUBLESHOOTING

POWER SUPPLY

Apply 120VAC power, turn On Power Switch (S1). If the power indicator is Off and the Printer is dead, check for 120VAC between the two input leads at Switch S1. If the 120VAC is missing, check Switch S1, AC Fuse (F1), Noise Filter (L3) and AC Line Cord (P1). If 120VAC is present check for 10.0VAC between pins 3 and 4 of Connector CN9 and check for 21.0VAC between pins 1 and 2 of Connector CN9. If the AC voltages are missing, check the Power Transformer (T1).

If the AC voltages are present, check for 12.8V at the cathode of Diode DB10. If the 12.8V is missing, check Fuse FU1, Diode DB10, Regulator (IC36) and Regulator Transistor (Q31) for shorts. If 12.8V is present, check for 5.0V at the collector of Transistor Q31. If 5.0V is missing, check Transistor Q31, IC36 and associated components. If these components are normal, disconnect Connectors CN2, CN6 and CN7 one at a time while monitoring the 5.0V. If the 5.0V returns, check the associated components of the connector most recently disconnected.

Check for 27.0V at the cathode of Diode DB11. If the 27.0V is missing, check Fuse FU2, Diode DB11, Electrolytic C67 and associated components. If these components are normal, disconnect Connectors CN1, CN3 and CN4 one at a time while monitoring the 27.0V. If the 27.0V returns, check associated components of the connector most recently disconnected.

SELF-TEST

Press the T.O.F. Switch (S6) and turn On the Power Switch (S1) at the same time. The Printer will go into a self-test mode and keep printing characters until the Power Switch S1 is turned Off. If the self-test does not operate properly, check all the connectors for good connection and correct hookup. If the P.E. LED (D24) is On, check the Paper End Switch (S4). If at Power-On, the Carriage Assembly moves

about 1 inch from home position, stops and the Printer becomes inoperative, check the Paper Feed Motor (M2) by pressing the L.F. button, Line Feed Switch (S5). If Line Feed does not operate, refer to "Paper Feed Motor Malfunctioning" section of this Troubleshooting guide.

PAPER FEED MOTOR MALFUNCTIONING

Check the gear assembly on the right side of the Printer. If the assembly is normal, check the resistance of Paper Feed Motor (M2) windings. Disconnect Connector CN1 and check for 66 ohms between pins 1 and 5, pins 3 and 5, pins 2 and 6 and pins 4 and 6. If the Motor M2 windings check normal, reconnect Connector CN1 and check for 21V at Pins 3, 5, 7 and 9 of IC1 while the TOF button is pressed. If the 21V is missing, check the 27.0V source. Refer to the Power Supply section of this Troubleshooting guide.

CPU OPERATION

Check for 5.0V at pin 40 of CPU (IC25). If 5.0V is missing, refer to the "Power Supply" section of this Troubleshooting guide. To verify the clock oscillator is functioning, check waveforms at pins 1 and 2 of IC25. Use a frequency counter to check for 9.8304MHz at pins 1 and 2 of IC25 and check for a frequency of 4.91616MHz at pin 37. If the waveform is missing at pins 1 and 2 of IC25, check the 9.830MHz Crystal (X1) and Capacitors C54 and C50. If the waveform is missing at pin 37 of IC25, check for a short to ground and check IC25 by substitution.

PRINT HEAD

Print head is moving back and forth but not printing. Check for 27.0V at the collector of Driver Transistors (Q1 thru Q9). If the 27.0V is missing, refer to the "Power Supply" section of this Troubleshooting guide. If 27.0V is present, check for pulses at the base of Transistors Q1 thru Q9. Check voltages and components associated with pins 12 thru 19 of the CPU (IC25) and Latch (IC4). If the space deviates between

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TROUBLESHOOTING (Continued)

characters, check the Carriage Motor (M1), the wire tension and the adjustment of the Character Deviation Control (VR1). Refer to the "Miscellaneous Adjustments". If Control VR1 will not adjust space, check logic readings of Multivibrator IC (IC10).

PRINT HEAD NOT STRIKING CORRECTLY

Print head is missing some dots or some characters are not printed correctly. Check the connections of Connector CN4 and check for 27.0V at the collector of Driver Transistors (Q1 thru Q9). If Connector CN4 and Transistors Q1 thru Q9 are normal, check the adjustment of the Charging Time Control (VR2). Refer to the "Miscellaneous Adjustments".

CARRIAGE ASSEMBLY MOVES ERRATICALLY OR NOT AT ALL

Check the Carriage Wire tension from the Carriage Motor (M1). Check for 27.0V at Pins 3, 5, 7 and 9 of IC34. If 27.0V is missing, check Fuse FU2 and refer to the "Power Supply" section of this Troubleshooting guide. If the 27.0V is present, check Connector CN3. Check the winding resistances of Motor M1. Disconnect Connector CN3 and check for 10 ohms between pins 1 and 5, pins 3 and 5, pins 2 and 6 and pins 4 and 6. If any of the resistances are incorrect, check Motor M1 by substitution. Check the Return Position Switch (S3) for short and check the resistance between pins 7 and 8 of Connector CN2. If there is a short replace Switch S3. The Home Position Sensor (M5) may be clogged with dust or is malfunctioning. The Printer Cover Switch (S2) may be open or malfunctioning. Check voltages and logic

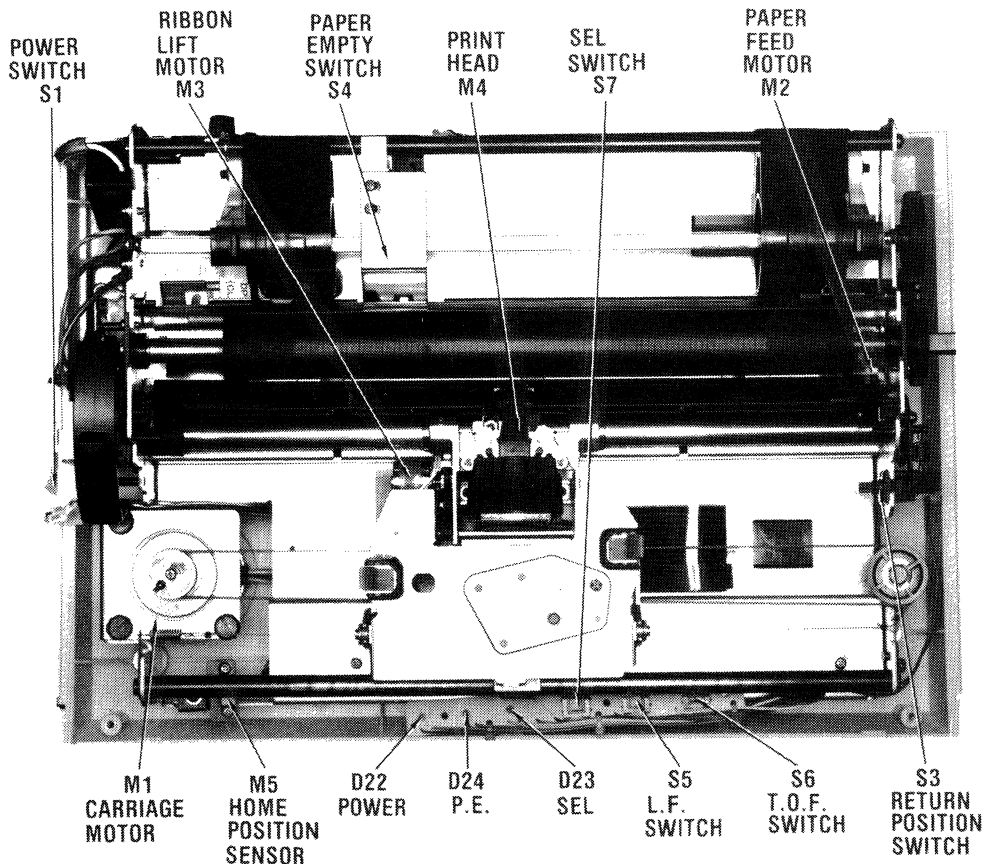
readings on Flip/Flop (IC11), Head/Motor Interface IC (IC7) and IC35. Check voltages and associated components of Transistors Q21, Q22, Q10 and Q11, Diodes D18 thru D21, D6 thru D9, D10 thru D17 and Zener Diode (ZD12).

PRINTER WILL NOT PRINT IN ON-LINE MODE

Printer prints in self-test mode but will not receive data. Confirm that the Select (SEL) Switch (S7) changes the status of the Printer and the Select Indicator LED (D23) turns On and Off when Switch S7 is pressed. If Switch S7 does not operate, check Switch S7, LED D23, Connector CN2 and the Printer Cover Switch (S2). If Switch S7 works normally, check the connector cable between the Printer and the host Computer. Check Connector CN7 and the logic readings on I/O interface section of Peripheral Interface IC (IC19) and Switch Interface IC (IC5), IC26, IC29, IC30 and IC31. Check switch settings DIP Switches SW1 and SW2.

PRINTER WILL NOT PRINT IN COLOR

Printer is printing only in yellow. Check the Color Ribbon Present Switch (SW26). If the switch checks good, check the Ribbon Lift Motor (M3) by substitution. If Motor M3 checks normal, check the voltages and components associated with the Motor Driver IC (TA1) on the Color Motor Control board. Check for pulses at pins 2, 4, 6 and 8 of IC TA1, if pulses are not present check for a logic Low at pins 3, 6, 9 and 12 of IC5 and check for pulses at pins 2, 5, 8 and 11 of IC5. If logic readings are correct check IC5 by substitution.



CHASSIS-TOP VIEW

GENERAL OPERATING INSTRUCTIONS

SELF TEST

To initiate the Self Test function, press Power Switch and the T.O.F. Switch button at the same time. The Printer will print its entire character set and continue to print until power is turned OFF.

In case the color ribbon cartridge is installed, the printer will run the self test printing a yellow line followed by red, brown, blue, green, magenta then a black line. Then repeats the cycle of colors until turned OFF.

DIP SWITCHES

Dip Switches SW1 and SW2 must be set to match the output requirements of the host Computer.

SW1-1, SW1-2, SW1-3 and SW1-4 set characters for various host countries. For USA: set SW1-1 open, SW1-2 closed and SW1-3 open. For UNITED KINGDOM: set SW1-2 closed, SW1-3 closed and SW1-3 open. For GERMANY: set SW1-1 open, SW1-2 open and SW1-3 closed. For SWEDEN: set SW1-1 closed, SW1-2 open and SW1-3 closed. For JAPAN: set SW1-1 open, SW1-2 open and SW1-3 open.

SW1-4: set open for all the above countries.

SW1-5: sets Device control Select 1 and Deselect 3. For select and deselect condition, set SW1-5 open (standard setting). To ignore select and deselect condition, set SW1-5 closed.

SW1-6: sets an automatic line feed command when the printer prints a buffer full condition. To use full data buffer line feed, set SW1-6 closed. For non line feed condition, set SW1-6 open (standard setting).

SW1-7: sets print command code. For carriage return only code, set SW1-7 open (standard setting). For separate carriage return, line feed, vertical tab, formfeed and unit separator command codes, set SW1-7 closed.

SW1-8: sets function of carriage return. For carriage return command without line feed, set SW1-8 open (standard setting). For a carriage return followed by a line feed automatically set SW1-8 closed.

SW2-1: sets numeric display of number zero. For zero without a slash, set SW2-1 open. For zero with a slash set SW2-1 closed (standard setting).

SW2-2: sets selection of reception buffer. For 1K or more buffer, set SW2-2 open (standard setting). For one line buffer, set SW2-2 closed.

SW2-3: selects the top of form length setting. For 11 inches (66 lines), set SW2-3 open (standard setting). For 12 inches (72 lines), set SW2-3 closed.

SW2-4: sets line feed pitch selection. For 1/6" pitch, set SW2-4 open (standard setting). For 1/8" pitch, set SW2-4 closed.

SW2-5: sets selection of print mode at power-ON. For 10 CPI (character per inch), set SW2-5 open (standard setting). For proportional character, set SW2-5 closed.

SW2-6: selects 7-bit or 8-bit data. For 8-bit data, set SW2-6 open (standard setting). For 7-bit data, set SW2-6 closed.

SW2-7: sets selection of Select or Deselect at power-ON. For deselect mode, set SW2-7 open (standard setting). For select mode, set SW2-7 closed.

SW2-8: selects either bidirectional or unidirectional print. For bidirectional print, set SW2-8 open (standard setting). For unidirectional print, set SW2-8 closed.

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MISCELLANEOUS ADJUSTMENTS

PRINT HEAD CHARGING TIME ADJUSTMENT

Some dots are missing when the characters are printed. Check the adjustment of the Charging Time Control (VR2) for the Print Head charging time. The Print Head charging time is the period of time when pin 1 of IC4 is a logic Low.

Connect the input of scope to pin 1 of IC4. Set the Printer in self-test mode. See "General Operating Instructions". Measure motor voltage at the 27.0V source. Adjust Control VR2 for the correct Print Head charging time of the Print Head according to the following:

MOTOR VOLTAGE	CHARGING TIME
26V	280 μ S
21V	320 μ S
16V	360 μ S

CHARACTER DEVIATION ADJUSTMENT

Character Deviation Control (VR1) is used to adjust for character alignment if the characters are not properly spaced. Adjust Control VR1 for the proper deviation between characters.

MECHANICAL REMOVAL AND ADJUSTMENTS

PRINT HEAD REMOVAL

Open Printer Carriage Cover and remove Ribbon Cassette. Rotate outward the left Head Set Lever and the right Head Set Lever. Lift Print Head (M4) straight up and out of Head connector. Reverse the procedure to replace Print Head.

RIBBON WIRE REMOVAL

Remove cabinet top cover. Remove ribbon wire from ribbon wire arm at left side of main unit. Remove left and right pivot bushings of cartridge mount plate and lift plate up to remove it. Remove screw holding gear plate located under cartridge mount plate and remove gear plate. The ribbon wire may now be removed.

CARRIER WIRE REMOVAL

Remove cabinet top cover and print head. Fasten ribbon wire to carrier plate to avoid re-threading of wire when disconnected. Loosen carrier wire tension arm screw. Remove carrier drive pulley from drive motor to remove carrier wire from pulley. Remove right and left carrier shaft springs. Remove screw holding gap set lever to carrier shaft and remove gap set lever. Pull carrier shaft out leftward. Remove left and right carrier guide shaft screws. Remove carrier assembly from unit. Remove hexagon nut holding carrier wire to lower part of carrier and remove wire.

The following is for installation of the carriage wire on drive motor pulley. Insert the end of the longer wire into the hole under carrier motor pulley and set pulley on motor. Thread wire through tension arm pulley on right frame, turn pulley clockwise until wire is tense. Insert end of wire into hole on upper part of motor pulley. While holding pulley, wind the wire in a clockwise direction. When wire is wound adjust the wire tension, see "Carriage Wire Tension" adjustment.

PLATEN REMOVAL

Remove Cabinet Top Cover Assembly. Remove two screws holding Platen Shaft Holders (4-5). Remove the right screw through the hole in the Paper Feed Gears (4-4). Remove four screws, two from each side holding Paper Guide (4.7). Remove Paper Feed Gear (1-11) to remove screws on right side of paper guide. Remove the Platen and Paper Guide at the same time by pulling them upward.

CARRIAGE MOTOR REMOVAL

Remove CPU board through Cabinet bottom. See Disassembly Instructions. Disconnect Connector CN3. Loosen the screw holding Ribbon Wire Arm and remove wire from arm. Hook the wire on the Cassette Mount Plate to keep the ribbon wire in place. Disconnect chassis ground wire and remove two screws holding Noise Filter. Remove four screws holding Printer chassis to Cabinet bottom and remove chassis. Remove three Carriage Motor set screws, and remove motor downward from mounting bracket.

PRINT HEAD AND PLATEN GAP ADJUSTMENT

Remove Carriage Cover, Top Cover and Ribbon Cassette. Loosen the screw securing the Gap Set Lever (3-37) to Gap Set Plate 3-38). Set gap clearance between Print Head and Platen to 0.5mm. Place Gap Set Lever in straight up position and Gap Set Plate detent in the frontmost adjustment hole. Tighten the securing screw and recheck gap clearance. First position should measure 0.5mm and last position 0.55mm.

HOME POSITION SENSOR ADJUSTMENT

When printing standard characters toward the right, adjust the Home Position Sensor (M5) for 70mm (2.8 in) between the inside of the Left Side Frame and the center of the left most dot of the character printed. After this adjustment the distance between the center of the left most dot printing left to right and the center of the left most dot printing right to left should be within 0.3 mm (.012 in). If distance is too large, adjust the Ribbon Wire (3-29) or replace the ribbon pulley gear. The ribbon pulley gear is part of Carriage Frame. The distance can also be affected by adjustment of the Character Deviation Control (VR1), refer to "Miscellaneous Adjustments".

CARRIAGE WIRE TENSION ADJUSTMENT

This adjustment is made with the Carriage Frame Assembly at the extreme left position. Push a tension gauge against the center of the Carriage Wire. Use a scale at the left side of the tension gauge. When the Carriage Wire is slackened 10mm (0.4 in) by pushing at its center with the tension gauge the reading should be 300gr \pm 20gr. Adjust the Carriage Tension Arm screw to adjust tension.

PAPER FEED MOTOR REMOVAL

Remove cabinet bottom plate and CPU board. (See Disassembly Instructions). Disconnect Connector CN1. Remove two screws holding Paper Feed Motor (M2) to right frame and remove motor.

DISASSEMBLY INSTRUCTIONS

CABINET REMOVAL

Remove paper cover and carrier cover. Remove front panel, lift upward to release plastic clips and pull panel forward. Remove four screws holding cabinet top. Remove platen knob and lift cabinet top from Printer. Disconnect switch connectors while removing cabinet top.

CPU BOARD REMOVAL

Remove paper cover and carrier cover. Remove print head connector. Set Printer on its side and remove four screws holding CPU board access panel. Carefully disconnect all connectors from CPU board and remove board.

LINE DEFINITIONS

A0 THRU A15	Address	FAULT	Output From Printer, Fault State
ACK	Acknowledge, Input Data Received	G	Gate
AD0 THRU AD7	Data	INPUT BUSY	Output Signal, No Data Received
ALE	Address Latch Enable	INPUT PRIM	Input Prime, Initialize Printer
BUSY	Busy, No Inputs Excepted	IO/M	Input/Output or Memory Select, Machine Cycle Status
CA0 THRU CA12	Address	LFMA, B, C, D	Line Feed Motor Driving Pulses
CAD0 THRU CAD7	Data	LFON	Line Feed On
CALE	Address Latch Enable	LPC	Left Position Carriage Motor
CAMA, B, C, D	Carriage Motor Excitation Pulses	MCON, MCONT	Motor Control, Current Limiting
CCLK OUT	Clock out	PE	Paper Empty
CCNT	Current Control Thru Carriage Motor	PE SEL	Paper Empty Select
CLK OUT	Clock Out	PE SW	Paper Empty Switch
CMCON	Motor Current Control	RD	Read Data
CRD	Read	RES OUT	Reset Output
CS70, CS78, CS88, CS90, CSB4W	Chip Select Lines	RESET	Reset
CSA0, CSAB, CSA8, CSCD, CSEF	Chip Select Lines	RESIN	Reset Input
CWR	Write	RST6.5, 7.5	Restart Interrupts
D4 THRU D7	Data	S0, S1	Machine Cycle Status Lines
DF DOT	Dot Timing	Select	Select Lines
DOT1 THRU DOT9	Print Head Solenoid Driving Pulses	SW	Switch
DP1, DP7, DP10	Dip Switch Lines	TIM OUT	Timer Output
DRAFT	Dot Timing	WR	Write
DTRIG	Dot Trigger		

SCHEMATIC NOTES

- *—Circuitry not used in some versions.
- Circuitry used in some versions.
- o See parts list.
- ⊕ Ground
- Voltages measured with digital meter.
- Waveforms and voltages are taken from ground, unless noted otherwise.
- All measurements taken with Printer in Self Test mode with Color Cartridge installed unless noted otherwise.
- Logic Probe Display
- L = Low
- H = High
- P = Pulse
- * = Open (No lights On)

- Supply voltage maintained as shown at input.
- Controls adjusted for normal operation.
- Terminal identification may not be found on unit.
- Capacitors are 50 volts or less, 5% unless noted.
- Electrolytic capacitors are 50 volts or less, 20% unless noted.
- Resistors are ½W or less, 5% unless noted.
- Value in () used in some versions.
- Measurements taken with switching as shown, unless noted.

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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 board, 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.

PARTS LIST AND DESCRIPTION

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

SEMICONDUCTORS (Select replacement transistor for best results)

ITEM No.	TYPE No.	MFRG. PART No.	REPLACEMENT DATA					
			NOTES	NTE PART No.	ECG PART No.	RCA PART No.	WORKMAN PART No.	ZENITH PART No.
	MAIN BOARD							
D1 thru D9	1S1886	EAC00-00600		NTE116	ECG116	SK3311	WEP156	212-76-02
D10,11	ERB81-004	EACT0-08100		NTE116	ECG116	SK3311	WEP155	903-535
D12	1S1588	EACT0-00400		NTE519	ECG519	SK3100/519	WEP925/519	103-131
D13,14	1S1587	EACT0-00300		NTE177	ECG177	SK9091/177	WEP1062/177	103-131
D15	1S1886	EAC00-00600		NTE116	ECG116	SK3311	WEP156	212-76-02
D16 thru D21	ERB81-004	EACT0-08100		NTE116	ECG116	SK3311	WEP155	903-535
DB1 thru DB6	DAN208 DAN-208	EAC00-10000						
DB9	DAN201 DAN-201	EAC00-09300						
DB10,11	S5VB20	CLEAK-02301		NTE5313	ECG5313	SK3986/5313		
IC1	PU4120A PU4120B	EAA00-19700						
IC2,3	M54580P M54580	EAS00-12014						
IC4	SN74LS374N 74LS374	EAQ00-19300		NTE74LS374 NTE74LS374	ECG74LS374 ECG74LS374			HE-443-863 HE-443-863
IC5	TMP8155P 18155H-2	EA001-07200						
IC6	HA17555	EAQ00-11100		NTE955M	ECG955M	SK3564/955M	WEP2119/955M	221-29042
IC7	TMP8155P 18155H-2	EA001-07200						
IC8	HD74LS74AP 74LS74	EAQ00-12700		NTE74LS74A NTE74LS74A	ECG74LS74A ECG74LS74A	SK74LS74A SK74LS74A		HE-443-730 HE-443-730
IC9	SN74LS33N 74LS33	EAQ00-24000		NTE74LS33 NTE74LS33	ECG74LS33 ECG74LS33			

8 PARTS LIST AND DESCRIPTION (Continued)

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

SEMICONDUCTORS (Select replacement transistor for best results)

ITEM No.	TYPE No.	MFGR. PART No.	REPLACEMENT DATA					
			NOTES	NTE PART No.	ECG PART No.	RCA PART No.	WORKMAN PART No.	ZENITH PART No.
IC10	HD74LS123P 74LS123	EAQ00-12900		NTE74LS123 NTE74LS123	ECG74LS123 ECG74LS123	SK74LS123 SK74LS123		HE-443-942 HE-443-942
IC11	SN74LS174N 74LS174	EAQ00-13100		NTE74LS174 NTE74LS174	ECG74LS174 ECG74LS174	SK74LS174 SK74LS174		HE-443-879 HE-443-879
IC12	HD74LS74AP 74LS74	EAQ00-12700		NTE74LS74A NTE74LS74A	ECG74LS74A ECG74LS74A	SK74LS74A SK74LS74A		HE-443-730 HE-443-730
IC13,14	SN74LS139N 74LS139	EAQ00-21500		NTE74LS139 NTE74LS139	ECG74LS139 ECG74LS139	SK74LS139 SK74LS139		HE-443-822 HE-443-822
IC15	HA17555	EAQ00-11100		NTE955M	ECG955M	SK3564/955M	WEP2119/955M	221-29042
IC16	HD74LS156P 74LS156	EAQ00-24700		NTE74LS156 NTE74LS156	ECG74LS156 ECG74LS156	SK74LS156 SK74LS156		HE-443-1036 HE-443-1036
IC17	HD74LS00P 74LS00	EAQ00-12100		NTE74LS00 NTE74LS00	ECG74LS00 ECG74LS00	SK74LS00 SK74LS00		HE-443-728 HE-443-728
IC18	D27128D 127128 27128	CLEAK-11904						
IC19	M5L8155P 18155H-2	EA001-07200						
IC20	HD7406P 7406	EAQ00-07500		NTE7406 NTE7406	ECG7406 ECG7406	SK7406 SK7406		HE-443-698 HE-443-698
IC21	SN74LS14N 74LS14	EAQ00-17200		NTE74LS14 NTE74LS14	ECG74LS14 ECG74LS14	SK74LS14 SK74LS14		HE-443-872 HE-443-872
IC22	HD7407P 7407	EAQ00-15200		NTE7407 NTE7407	ECG7407 ECG7407	SK7407 SK7407		HE-443-1020 HE-443-1020
IC23	D2764D 12764-2 2764-2	CLEAK-12004		NTE2764(12) NTE2764(12) NTE2764(12)	ECG2764(12) ECG2764(12) ECG2764(12)			
IC24	HD74LS32P 74LS32	EAQ00-17600		NTE74LS32 NTE74LS32	ECG74LS32 ECG74LS32	SK74LS32 SK74LS32		HE-443-875 HE-443-875
IC25	1P8085AH-2 18085AH-2 18085	EA001-07100						

PARTS LIST AND DESCRIPTION (Continued)

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

SEMICONDUCTORS (Select replacement transistor for best results)

ITEM No.	TYPE No.	MFR. PART No.	REPLACEMENT DATA					
			NOTES	NTE PART No.	ECG PART No.	RCA PART No.	WORKMAN PART No.	ZENITH PART No.
1C26	SN74LS14N 74LS14	EAQ00-17200	(1)	NTE74LS14	ECG74LS14	SK74LS14	WEP261/261	HE-443-872
1C27	TMM2016AP-10 TMM2016AP TMM2016 (TC5565)	EA001-02703		NTE74LS14	ECG74LS14	SK74LS14		HE-443-872
1C28	HD74LS123P 74LS123	EAQ00-12900		NTE74LS123	ECG74LS123	SK74LS123		HE-443-942
1C29	TC40H074P	EA001-06300		NTE74LS123	ECG74LS123	SK74LS123		HE-443-942
1C30	SN74LS373N 74LS373	EA000-22600		NTE74LS373	ECG74LS373	SK74LS373		HE-443-867
1C31	SN74LS14N 74LS14	EAQ00-17200		NTE74LS373	ECG74LS373	SK74LS373		HE-443-867
1C32	TMM2016AP-10 TMM2016AP TMM2016	EA001-02703		NTE74LS14	ECG74LS14	SK74LS14		HE-443-872
1C33	TMM2016AP TMM2016	EA001-02703		NTE74LS14	ECG74LS14	SK74LS14		HE-443-872
1C34	PU4411A PU4411B	EAA00-19800		NTE2128	ECG2128			
1C35	TA75393P TA75393	EAS00-12900		NTE2128	ECG2128			
1C36	7805 uPC7805	EAS00-00700		NTE960	ECG960	SK3591/960		221-Z9043
Q1 thru Q9	2SD837B 2SD1128	EAA00-17400 EAA00-16800		NTE960	ECG960	SK3591/960		221-Z9043
Q10,11 Q12 thru Q20	2SC2334L 2SC1685Q 2SC2458	EAA00-13900 EAA00-17500		NTE261	ECG261	SK3896/261		121-Z9085
Q21,22	2SA1020-0	EAB00-08900		NTE54	ECG54	SK9391		WEP705
			NTE85	ECG85	SK9229/85	WEP910/289	921-1114	
			NTE85	ECG85	SK3124A/289A	WEP916/294	121-Z9067	
			NTE294	ECG294	SK3841/294			

2 PARTS LIST AND DESCRIPTION (Continued)

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

SEMICONDUCTORS (Select replacement transistor for best results)

ITEM No.	TYPE No.	MFGR. PART No.	REPLACEMENT DATA					
			NOTES	NTE PART No.	ECG PART No.	RCA PART No.	WORKMAN PART No.	ZENITH PART No.
Q23	2SA1286	EAB00-07100		NTE290A	ECG290A	SK9132	WEP911/290A	121-Z9003*
	2SA1015-Y	EAB00-09900		NTE294	ECG294	SK3841/294	WEP916/294	121-Z9067
Q24	2SA1020-Y			NTE290A	ECG290A	SK9132	WEP911/290A	121-Z9003*
	2SA1015Y	EAB00-07100		NTE290A	ECG290A	SK9132	WEP911/290A	121-Z9003*
	2SA1015-Y	EAB00-09900		NTE294	ECG294	SK3841/294	WEP916/294	121-Z9067
Q25,26	2SC1815Y			NTE85	ECG85	SK3124A/289A	WEP66/199	121-Z9065
	2SC1815-Y	EAA00-13400		NTE85	ECG85	SK3124A/289A	WEP66/199	121-Z9065
Q31	2SB688			NTE37	ECG37	SK9415/37		
ZD1,ZD2	EQB01-35	EAD00-20800		NTE5085A	ECG5085A	SK36V/5085A	WEP1168/5085	103-270
ZD3 thru	RD10FBD	EAD00-21700		NTE140A	ECG140A	SK10V/140A	WEP1110/140	103-Z9010
ZD11	EQB01-15			NTE145A	ECG145A	SK15V/145A	WEP1114/145	103-Z9013
ZD12	AU01-33	EAD00-20700		NTE5142A	ECG5142A	SK33X/5142A	WEP1636/5142	103-Z9034
ZD16	RD6.2EL2	EAD00-20200		NTE5013A	ECG5013A	SK6A2/5013A	WEP1414/5013	103-Z9008
SELECT COLOR BOARD								
D1	1S1886	EAC00-00600	(1)	NTE116	ECG116	SK3311	WEP156	212-76-02
DA1,DA2	DAN208	EAC00-10000						
IC1	SN74LS373N			NTE74LS373	ECG74LS373	SK74LS373		HE-443-867
	74LS373	EAQ00-22600		NTE74LS373	ECG74LS373	SK74LS373		HE-443-867
IC2	SN74LS245N			NTE74LS245	ECG74LS245	SK74LS245		HE-443-885
	74LS245	EAQ00-22100		NTE74LS245	ECG74LS245	SK74LS245		HE-443-885
IC3	SN74LS365AN			NTE74LS365A	ECG74LS365A			
	74LS365	EAQ00-19000		NTE74LS365A	ECG74LS365A			
IC4	SN74LS378N			NTE74LS378	ECG74LS378			
	74LS378	EAQ00-30300		NTE74LS378	ECG74LS378			
IC5	SN74LS33N			NTE74LS33	ECG74LS33			
	74LS33	EAQ00-24000		NTE74LS33	ECG74LS33			
IC6	HD74LS32P			NTE74LS32	ECG74LS32	SK74LS32		HE-443-875
	74LS32	EAQ00-17600		NTE74LS32	ECG74LS32	SK74LS32		HE-443-875

PARTS LIST AND DESCRIPTION (Continued)

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

SEMICONDUCTORS (Select replacement transistor for best results)

ITEM No.	TYPE No.	MFR. PART No.	REPLACEMENT DATA					
			NOTES	NTE PART No.	ECG PART No.	RCA PART No.	WORKMAN PART No.	ZENITH PART No.
IC7	TMM2016P-7	EA001-02700		NTE2128	ECG2128			
IC8	TMM2016		(1)	NTE2128	ECG2128			
IC9	HD74LS00P 74LS00	EAQ00-12100		NTE2128	ECG2128			
				NTE74LS00	ECG74LS00	SK74LS00		HE-443-728
				NTE74LS00	ECG74LS00	SK74LS00		HE-443-728
IC10	HD74LS74P 74LS74	EAQ00-12700		NTE74LS74A	ECG74LS74A	SK74LS74A		HE-443-730
IC11	12764		(1)	NTE74LS74A	ECG74LS74A	SK74LS74A		HE-443-730
IC12	TC5565 TMM2016		(1)	NTE2764(12)	ECG2764(12)			
			(1)	NTE2128	ECG2128			
IC13	M74LS138P 74LS138	EAQ00-18700		NTE74LS138	ECG74LS138	SK74LS138		HE-443-877
Q1	2SA1020Y		(1)	NTE74LS138	ECG74LS138	SK74LS138	WEP916/294	HE-443-877
Q2	2SC1815GR		(1)	NTE294	ECG294	SK3841/294	WEP66/199	121-29067
TA1	PU4417	EAA00-19900		NTE85	ECG85	SK3124A/289A		121-29065
ZD1	EQB01-15	EAD00-15100		NTE145A	ECG145A	SK15V/145A	WEP1114/145	103-29013

* Lead configuration may vary from original. (12) Requires Programming.
 (1) Used in some versions.

PARTS LIST AND DESCRIPTION (Continued)

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

CAPACITORS

ITEM No.	RATING	MFGR. PART No.
CA1	CPU 100pF 20% Array	EBJ00-14000

RESISTORS (Power and Special)

ITEM No.	RATING	REPLACEMENT DATA		
		MFGR. PART No.	NTE PART No.	WORKMAN PART No.
	CPU			
RA1	Resistor Network (1)	ECM00-10800		
RA2	Resistor Network (2)	ECM00-00100		
RA3	Resistor Network (3)	ECM00-20300		
RA4	Resistor Network (3)	ECM00-20300		
RA5	Resistor Network (4)	ECM00-13300		
RA6	Resistor Network (5)	ECM00-09900		
RA7	Resistor Network (5)	ECM00-09900		
RA8	Resistor Network (1)	ECM00-10800		
RA9	Resistor Network (6)	ECM00-09800		
RA10	Resistor Network (7)	ECM00-01800		
RA11	Resistor Network (8)	ECM00-04800		
RA12	Resistor Network (8)	ECM00-04800		
RA13	Resistor Network (9)	ECM00-10100		
RA15	Resistor Network (10)	ECM00-00700		
RA16	Resistor Network (5)	ECM00-09900		
RA17	Resistor Network (5)	ECM00-09900		
R4	.3 5% 1W Metal Oxide	EC101HR30JC		
thru				
R12				
R47	.3 5% 1W Metal Oxide	EC101HR30JC		
R76	.3 5% 1W Metal Oxide	EC101HR30JC		
R78	.3 5% 1W Metal Oxide	EC101HR30JC		
R82	.3 5% 1W Metal Oxide	EC101HR30JC		
	COLOR MOTOR CONTROL BOARD			
RA1	Resistor Network (1)	ECM00-16000		

- (1) Contains Six (6 ea.) 1000 Ohms.
- (2) Contains Four (4 ea.) 1000 Ohms.
- (3) Contains Four (4 ea.) 330 Ohms.
- (4) Contains Ten (10 ea.) 330 Ohms
- (5) Contains Eight (8 ea.) 3300 Ohms.
- (6) Contains Six (6 ea.) 4700 Ohms.
- (7) Contains Five (5 ea.) 4700 Ohms.
- (8) Contains Eight (8 ea.) 33K Ohms.
- (9) Contains Ten (10 ea.) 1000 Ohms.
- (10) Contains Eight (8 ea.) 10K Ohms.
- (11) Contains Four (4ea.) 680 ohms, number on unit 680 ohm K3N.

PARTS LIST AND DESCRIPTION (Continued)

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

COILS & TRANSFORMERS

ITEM No.	FUNCTION	MFGR. PART No.	OTHER IDENTIFICATION	NOTES
L1	RF Choke	EDD00-00700		
L2	RF Choke	EDD00-00700		
L3	Noise Filter 100V, 115V	CLEAK-02004		
	Noise Filter 220V, 240V	CLEBK-04303		
T1	Power 100V, 115V	CLEAK-01904	CLE61-12001 (1)	
	Power 220V, 240V	CLEAK-04203		

(1) Number on unit.

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

ITEM NO.	FUNCTION	RESISTANCE	MFGR. PART NO.	NOTES
VR1	CPU	50K	ECA00-14700	
VR2		50K	ECA00-14700	

FUSE DEVICES

ITEM NO.	DESCRIPTION	MFGR. PART NO.		NOTES
		DEVICE	HOLDER	
F1	POWER SUPPLY			
	2A @ 250V	EJG00-00900	EMB00-00300	
	Fast-Acting	EJG00-02000	EMB00-00300	
	2A @ 100V	EJG00-08500	EMB00-02600	
FU1	2A @ 115V	EJG00-06600	EMB00-01500	
	1A @ 220V, 240V			
FU2	3A @ 125V	EJG00-12100	EMB00-01500	
	Fast-Acting			
	6.3A @ 125V			
	Fast-Acting			

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MODEL M-8510CP

PARTS LIST AND DESCRIPTION (Continued)

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

MISCELLANEOUS

ITEM No.	PART NAME	MFGR. PART No.	NOTES
D22	LED		Power, Grn
D23	LED		Select (SEL), Grn
D24	LED		Paper Empty
M1	Motor	CLABK-18301	Carriage
M2	Motor	CLAAK-10301	Linefeed
M3	Motor	CLABK-19401	Ribbon Lift Complete Assembly
M4	Print Head	CLABK-18001	
M5	Home Position Sensor	CLEAK-11603	Complete Assembly
S1	Switch	EET00-10700	Power
S2	Switch	CLEAK-11603	Printer Cover Complete Assembly
S3	Switch	EEN00-14800	Return Position
S4	Switch		Paper Empty
S5	Switch	CLEAK-12901	Linefeed
S6	Switch	CLEAK-12901	Top of Form (TOF)
S7	Switch	CLEAK-12901	Select (SEL)
SW1	Switch, DIP	EET00-08600	Character Select
SW2	Switch, DIP	EET00-08600	Character Select
SW25	Switch, DIP	EET00-10000	Print Direction
SW26	Switch	EEQ00-06700	Color Ribbon Present
X1	Crystal	EKH00-04400	9.8304MHz
	P.C. Board	CLE61-09305	CPU
	P.C. Board	CLE61-10003	Color Control
	Rubber Foot	CLA45-29302	RUSSELL Industries Replacement PAD-5018 (4 required)

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

ITEM	PART No.	ITEM	PART No.
Cabinet Main Cover BK	CLABK-19901	Carrier Cover AK	CLAAK-15601
Cabinet Main Cover AK	CLAAK-15501	Front Cover AK	CLAAK-15701
Cabinet Bottom BK	CLABK-19801	Front Cover BK	CLABK-20102
Cabinet Bottom AK	CLAAK-15401	Paper Cover	CLA35-24901
Carrier Cover BK	CLABK-20001		

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

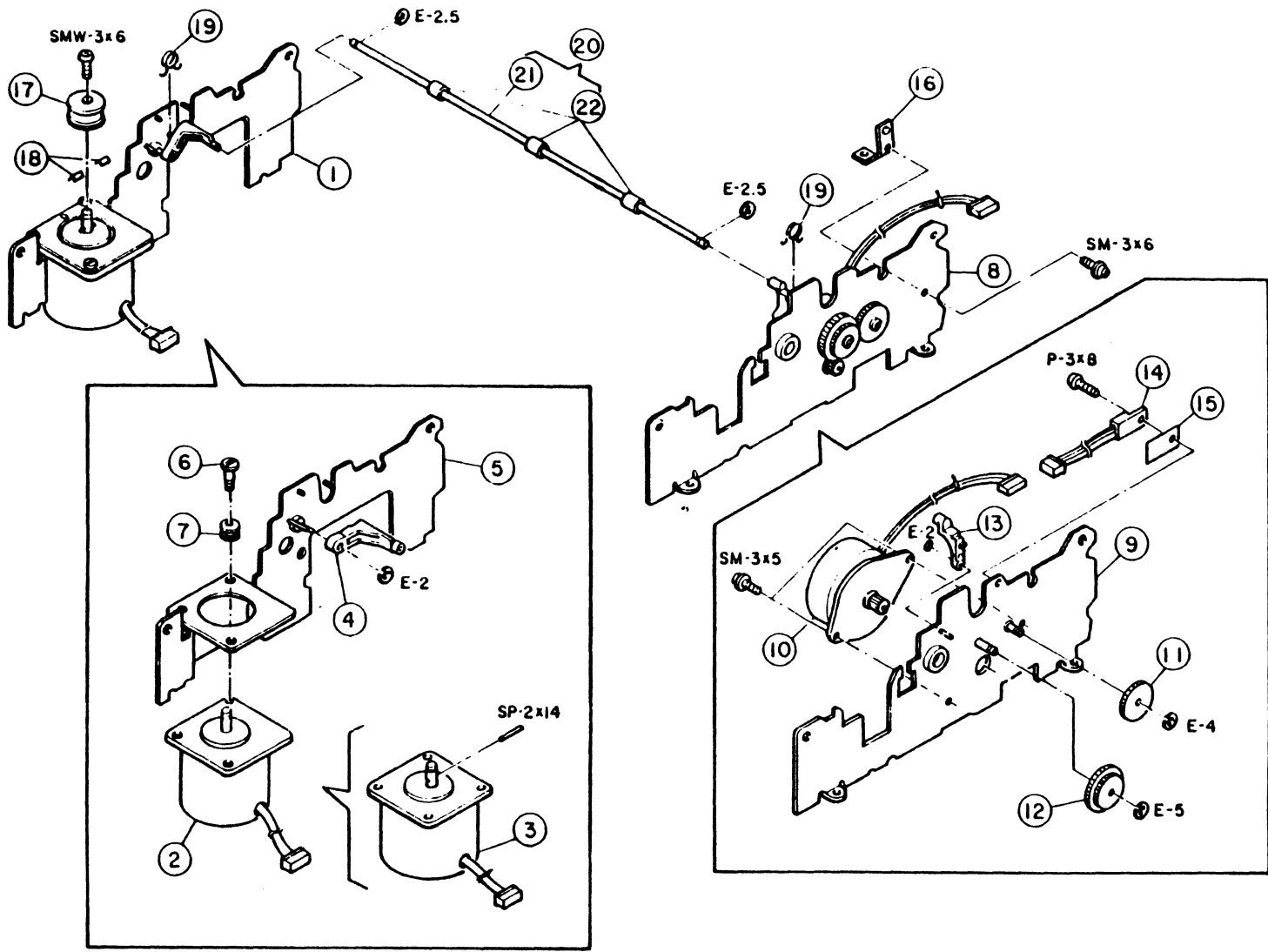
MECHANICAL PARTS LIST

REF. NO.	PART NO.	DESCRIPTION
1-1	CLABK-18801	SC L Frame BK
1-2	CLABK-18301	Carrier Motor BK
1-3	CLA45-57701	8510S Carrier Motor
1-4	CLA35-22901	Paper Set Arm (L)
1-5	CLAAK-15101	SC L Frame AK
1-6	CLA10-19801	Motor Screw
1-7	CLA45-18801	Rubber Foot
1-8	CLABK-18901	SC R Frame BK
1-9	CLAAK-15201	SC R Frame AK
1-10	CLAAK-10301	PF Motor AK
1-11	CLA35-10501	Paper Feed Gear (D)
1-12	CLA35-10301	Paper Feed Gear (B)
1-13	CLA35-23001	Paper Set Arm (R)
1-14	CLEAK-02601	5V Transistor AK
1-15	EME00-02800	Transistor Sheet AC 238
1-16	CLA20-22101	PCB Set Plate (A)
1-17	CLA40-50201	Carrier Drive Pulley
1-18	CLA20-16201	Motor Spacer
1-19	CLA30-10601	Paper Clamp Spring
1-20	CLABK-18201	Roller Shaft 2BK
1-21	CLA10-22601	Roller Shaft
1-22	CLA35-20801	Paper Clamp Roller (B)
2-1	CLABK-17001	Sprocket BK
2-2	CLABK-16901	Sprocket (L) BK
2-3	CLA35-21601	Wheel Holder (L)
2-4	CLA35-20901	Paper Clamp (L)
2-5	CLA35-12201	Sprocket Lever
2-6	CLA35-20701	Sprocket Wheel (B)
2-7	CLA45-33501	Push Nut
2-8	CLABK-16801	Sprocket (R) BK
2-9	CLA35-21501	Wheel Holder (R)
2-10	CLA35-21001	Paper Clamp (R)
2-11	CLA10-10601	Sprocket Shaft
2-12	CLA10-10701	SP Drive Shaft
2-13	CLA35-17201	Cam Metal
2-14	CLABK-10901	Release Lever Shaft BK
2-15	CLA10-10101	Release Lever Shaft
2-16	CLABK-11801	Pinch Roller BK
2-17	CLA45-10101	Friction Roller (S)
2-18	CLA30-10201	Pinch Roller Spring
2-19	CLA35-10601	Paper Feed Gear (E)
2-20	CLABK-20401	Release Lever BK
2-21	CLAAK-10004	Release Lever AK
2-22	CLA35-25101	Selector Lever
2-23	CLA30-13001	Toggle Spring
2-24	CLA10-10501	Pinch Roller SP Shaft
3-1	CLABK-18001	Head BK
3-2	DYH00-00502	Head RE-300-01
3-3	CLA35-23401	Ribbon Guide
3-4	CLA20-24001	Ribbon Guide Plate
3-5	CLABK-19101	Ribbon Cassette BK
3-6	CLABK-19401	Color Block BK (B)
3-7	CLABK-19301	Carrier Frame BK (B)
3-8	CLABK-18701	Cassette Mount Plate BK
3-9	PRA45-00401	Feed Bush

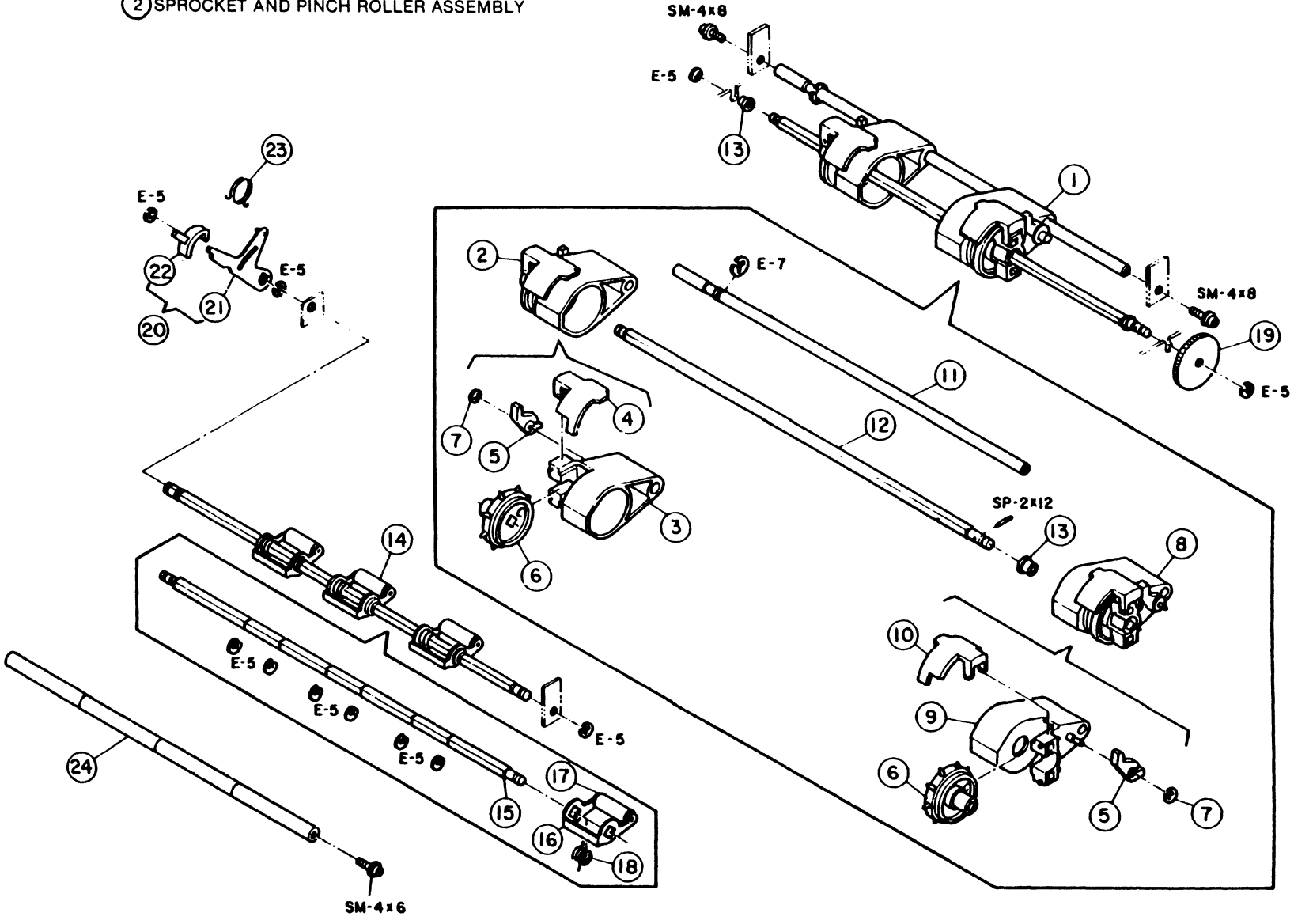
REF. NO.	PART NO.	DESCRIPTION
3-11	CLA40-50401	Carrier Frame
3-12	CLAAK-13001	Head Set Lever (L) AK
3-13	CLAAK-12901	Head Set Lever (R) AK
3-14	CLA10-19401	Lever Set Screw
3-15	CLA10-19301	Head Set Screw
3-16	CLA45-22501	CA Wire
3-17	CLEAK-12401	8510S Head Cable AK
3-21	CLAAK-15301	Cassette Mount Plate AK
3-22	CLAAK-14701	Ribbon Sub Plate AK
3-23	CLA35-23501	Cassette Drive Gear
3-24	CLA35-16201	Ratchet Gear A
3-25	CLA35-16301	Ratchet Gear B
3-26	CLA30-11201	Ratchet SP
3-27	CLA30-13401	Ribbon SP B
3-28	CLA35-24401	Ribbon Cassette Hook
3-29	CLA45-43801	Ribbon Wire SC
3-30	CLA45-13101	Lubrication Ring F
3-31	CLA45-11801	Carrier Stopper
3-32	CLA10-24701	Carrier Shaft SC
3-33	CLA10-12101	Carrier Guide Shaft
3-34	CLA45-14001	Carrier Metal
3-35	CLA10-25101	Carrier Shaft Stopper Screw
3-36	CLA30-12902	Carrier Shaft SP (3)
3-37	CLA20-51701	Gap Adjust Lever
3-38	CLA20-51801	Gap Adjust Plate
3-39	CLA10-25401	Carrier Shaft Collar (SC)
3-40	CLA10-14501	Stop Collar
3-41	CLA30-12602	Ribbon Wire SP
3-42	RGA10-10301	Screw
3-43	CLA10-50601	Lever Set Cap (2)
3-44	CLAAK-14601	Detent AK
3-45	CLA10-23501	R Select Gear Stud
3-46	CLA35-23701	C Ribbon Select Gear (A)
3-47	EEQ00-06700	Micro Switch AH1929
3-48	CLAAK-14902	Ribbon Motor Gear AK
3-49	CLA35-23801	Ribbon Select Gear (B)
3-50	SSA210080A1	Pan Head Screw MIX8
3-51	CLA45-41501	Caution Label
4-1	CLABK-10402	Platen BK
4-2	CLA45-10002	Platen
4-3	CLA35-11901	Platen Bush
4-4	CLA35-10401	Paper Feed Gear (C)
4-5	CLA20-10101	Platen Shaft Holder
4-6	CLA35-25301	Platen Knob
4-7	CLAAK-14001	Paper Guide (C) AK
4-8	CLA20-16402	Paper Guide (D)
4-9	CLAAK-12802	Paper Guide (B) AK
4-10	CLABK-19201	SC Barrier BK (B)
4-11	CLA20-24501	Barrier (E)
4-12	CLA10-21501	PCB Stud
4-13	CLA45-16401	Switch Sheet
4-14	CLABK-18101	Tension Arm 2 BK
4-15	CLAAK-14501	Tension Arm 2 AK
4-16	CLA35-11601	CA Idle Pulley
4-17	CLA10-19201	Paper Guide Set Screw

MODEL M-8510CP
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① FRAME AND CA MOTOR ASSEMBLY

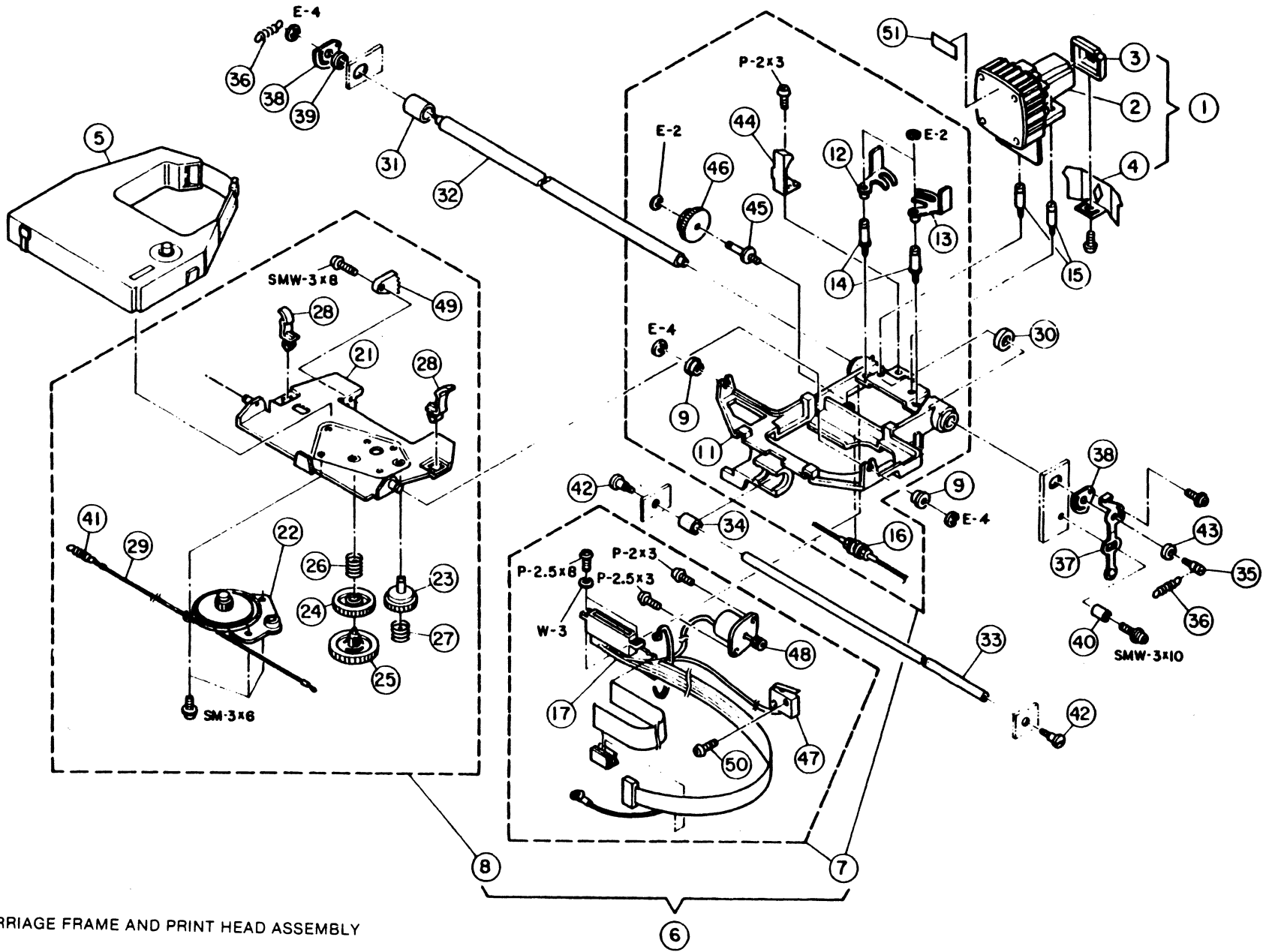


② SPROCKET AND PINCH ROLLER ASSEMBLY



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MODEL M-8510CP

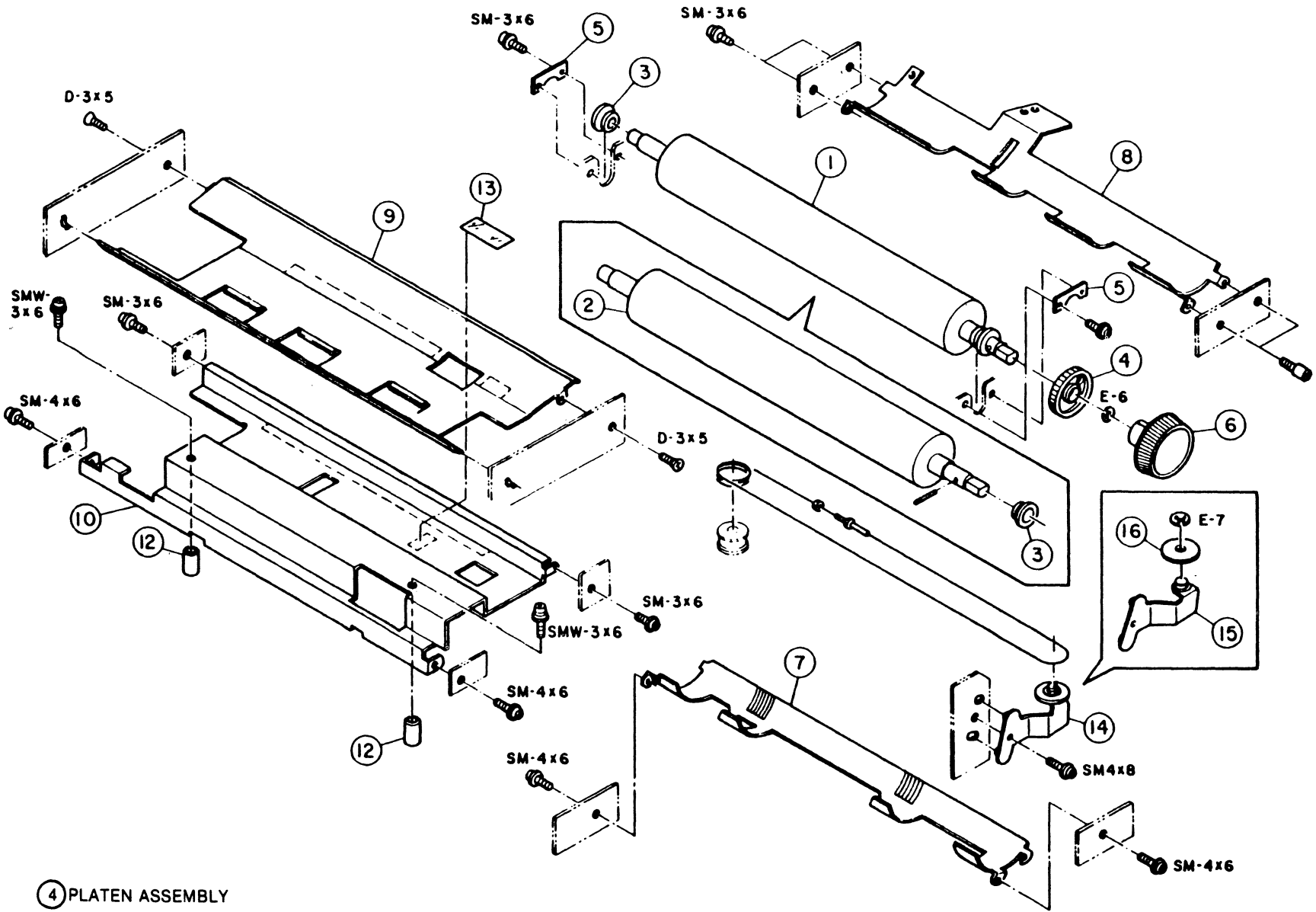
Courtesy of the Manufacturer MECHANICAL - EXPLODED VIEW



③ CARRIAGE FRAME AND PRINT HEAD ASSEMBLY

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④ PLATEN ASSEMBLY



MAIN BOARD LOGIC CHART

PIN NO.	IC1	IC2	IC3	IC4	PIN NO.	IC5	PIN NO.	IC5	PIN NO.	IC6	PIN NO.	IC7	PIN NO.	IC7
1	L	P	P	P	1	H	21	H	1	L	1	P	21	P
2	P	P	P	P	2	H	22	L	2	P	2	P	22	P
3	P	P	P	P	3	P	23	H	3	P	3	P	23	P
4	P	P	P	P	4	L	24	H	4	H	4	L	24	P
5	P	P	P	P	5	H	25	H	5	*	5	P	25	P
6	L	P	P	P	6	P	26	H	6	L	6	P	26	P
7	P	P	P	P	7	P	27	H	7	L	7	P	27	P
8	L	L	L	P	8	P	28	H	8	H	8	P	28	P
9	P	H	H	P	9	P	29	H			9	P	29	P
10	L	P	P	L	10	P	30	H			10	P	30	P
11		P	P	P	11	P	31	H			11	P	31	P
12		P	P	P	12	P	32	H			12	P	32	P
13		P	P	P	13	P	33	H			13	P	33	P
14		P	P	P	14	P	34	L			14	P	34	P
15		P	P	P	15	P	35	H			15	P	35	P
16		P	P	P	16	P	36	H			16	P	36	P
17				P	17	P	37	H			17	P	37	L
18				P	18	P	38	H			18	P	38	P
19				P	19	P	39	L			19	P	39	P
20				H	20	L	40	H			20	L	40	H

PIN NO.	IC8	IC9	IC10	IC11	IC12	IC13	IC14	IC15	IC16	IC17	PIN NO.	IC18	PIN NO.	IC18
1	H	P	P	H	P	P	P	L	P	P	1	H	15	P
2	L	P	H	P	P	P	P	P	P	P	2	P	16	P
3	P	P	H	P	P	P	P	P	P	P	3	P	17	P
4	P	P	P	P	H	P	P	P	P	H	4	P	18	P
5	P	P	P	P	P	P	P	*	P	P	5	P	19	P
6	P	P	L	P	P	P	P	P	P	P	6	P	20	P
7	L	L	L	P	L	L	P	P	P	L	7	P	21	P
8	L	P	L	L	P	P	L	H	L	P	8	P	22	P
9	P	P	L	P	P	P	H		P	P	9	P	23	P
10	H	P	P	P	P	P	P		P	P	10	P	24	P
11	P	P	H	P	P	P	P		P	H	11	P	25	P
12	P	P	P	P	L	P	P		P	P	12	P	26	P
13	H	P	P	P	H	P	P		P	L	13	P	27	H
14	H	H	L	*	H	P	P		P	H	14	L	28	H
15			P	H		P	P		P					
16			H	H		H	H		H					

MAIN BOARD LOGIC CHART (Continued)

PIN NO.	IC19	PIN NO.	IC19	PIN NO.	IC20	IC21	IC22	PIN NO.	IC23	PIN NO.	IC23	PIN NO.	IC24
1	P	21	L	1	P	H	H	1	H	15	P	1	P
2	H	22	L	2	P	L	H	2	P	16	P	2	P
3	P	23	L	3	L	P	L	3	P	17	P	3	P
4	L	24	L	4	H	P	L	4	P	18	P	4	L
5	H	25	L	5	P	P	H	5	P	19	P	5	H
6	P	26	L	6	P	P	H	6	P	20	P	6	H
7	P	27	L	7	L	L	L	7	P	21	P	7	L
8	P	28	L	8	H	L	H	8	P	22	P	8	H
9	P	29	H	9	L	*	H	9	P	23	P	9	P
10	P	30	L	10	L	P	*	10	P	24	P	10	P
11	P	31	L	11	H	L	*	11	P	25	P	11	P
12	P	32	H	12	L	H	H	12	P	26	P	12	P
13	P	33	L	13	H	L	H	13	P	27	H	13	P
14	P	34	H	14	H	H	H	14	L	28	H	14	H
15	P	35	H										
16	P	36	L										
17	P	37	L										
18	P	38	L										
19	P	39	H										
20	L	40	H										

PIN NO.	IC25	PIN NO.	IC25	PIN NO.	IC26	PIN NO.	IC27	PIN NO.	IC27	PIN NO.	IC28	IC29	IC30
1	P	21	P	1	H	1	P	13	P	1	*	P	L
2	P	22	P	2	L	2	P	14	P	2	*	H	P
3	L	23	P	3	H	3	P	15	P	3	*	L	P
4	L	24	P	4	L	4	P	16	P	4	H	H	P
5	H	25	P	5	H	5	P	17	P	5	H	L	P
6	L	26	P	6	L	6	P	18	P	6	L	H	P
7	P	27	P	7	L	7	P	19	P	7	L	L	P
8	P	28	P	8	L	8	P	20	P	8	L	H	P
9	P	29	P	9	H	9	P	21	P	9	P	L	P
10	L	30	P	10	H	10	P	22	P	10	H	H	L
11	H	31	P	11	L	11	P	23	P	11	H	L	P
12	P	32	P	12	H	12	L	24	H	12	L	H	P
13	P	33	P	13	L					13	L	H	P
14	P	34	P	14	H					14	L	H	P
15	P	35	H	15						15	P		P
16	P	36	H	16						16	H		P
17	P	37	P	17									P
18	P	38	L	18									P
19	P	39	L	19									P
20	L	40	H	20									H

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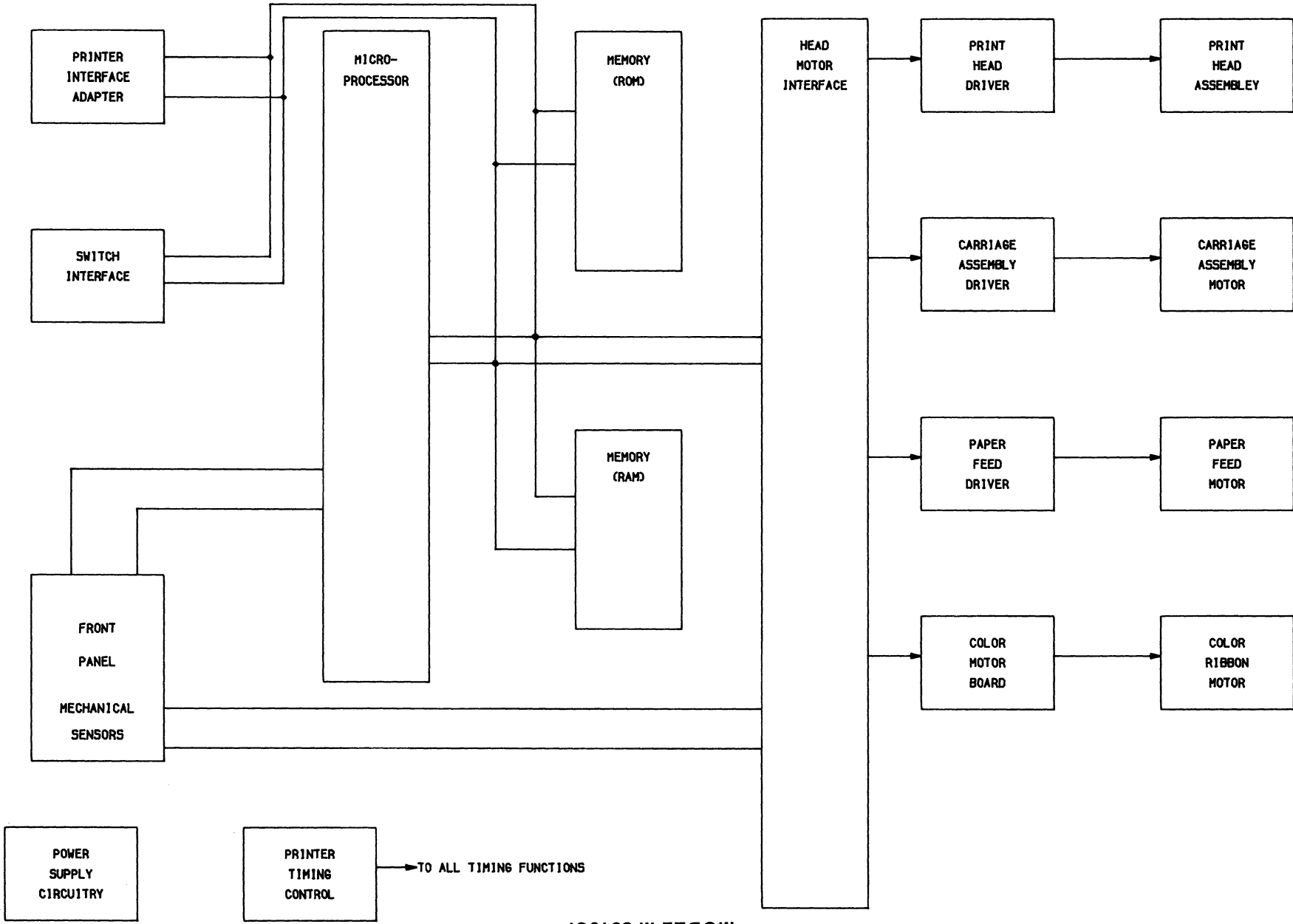
MAIN BOARD LOGIC CHART (Continued)

PIN NO.	IC31	PIN NO.	IC32	PIN NO.	IC32	PIN NO.	IC34	IC35
1	H	1	P	13	P	1	L	P
2	L	2	P	14	P	2	L	L
3	H	3	P	15	P	3	P	L
4	L	4	P	16	P	4	L	L
5	H	5	P	17	P	5	P	L
6	L	6	P	18	P	6	L	L
7	L	7	P	19	P	7	P	P
8	L	8	P	20	P	8	L	H
9	H	9	P	21	P	9	P	
10	L	10	P	22	P	10	L	
11	H	11	P	23	P	11		
12	L	12	L	24	H	12		
13	H					13		
14	H					14		
15						15		
16						16		
17						17		
18						18		
19						19		
20						20		

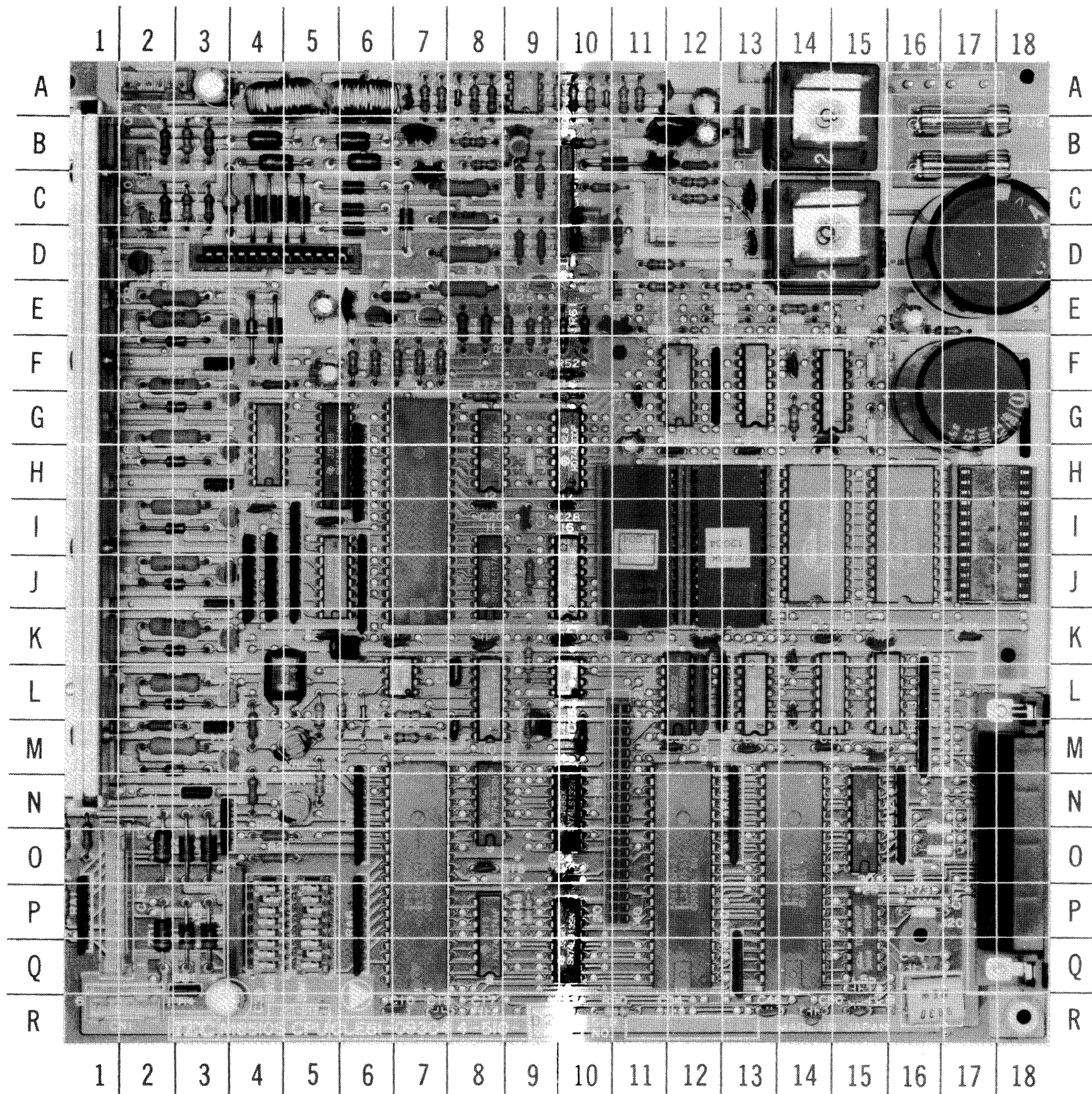
SELECT COLOR BOARD LOGIC CHART

PIN NO.	IC1	IC2	IC3	IC4	IC5	IC6	PIN NO.	IC7	PIN NO.	IC7	PIN NO.	IC9	IC10	IC13
1	L	P	P	P	P	P	1	P	13	P	1	P	*	P
2	P	P	L	H	P	P	2	P	14	P	2	P	*	P
3	P	P	P	P	L	P	3	P	15	P	3	P	*	P
4	P	P	H	P	P	P	4	P	16	P	4	H	*	L
5	P	P	P	L	P	P	5	P	17	P	5	P	H	P
6	P	P	P	P	L	P	6	P	18	P	6	P	L	H
7	P	P	P	P	L	L	7	P	19	P	7	L	L	P
8	P	P	L	L	P	P	8	P	20	P	8	P	P	L
9	P	P	P	P	L	P	9	P	21	P	9	P	P	P
10	L	L	P	P	P	P	10	P	22	P	10	P	H	P
11	P	P	P	P	P	P	11	P	23	P	11	P	P	P
12	P	P	P	P	L	P	12	L	24	H	12	P	P	P
13	P	P	P	P	P	H					13	H	H	P
14	P	P	P	P	H	H					14	H	H	P
15	P	P	P	P										P
16	P	P	H	H										P
17	P	P												H
18	P	P												
19	P	P												
20	H	H												

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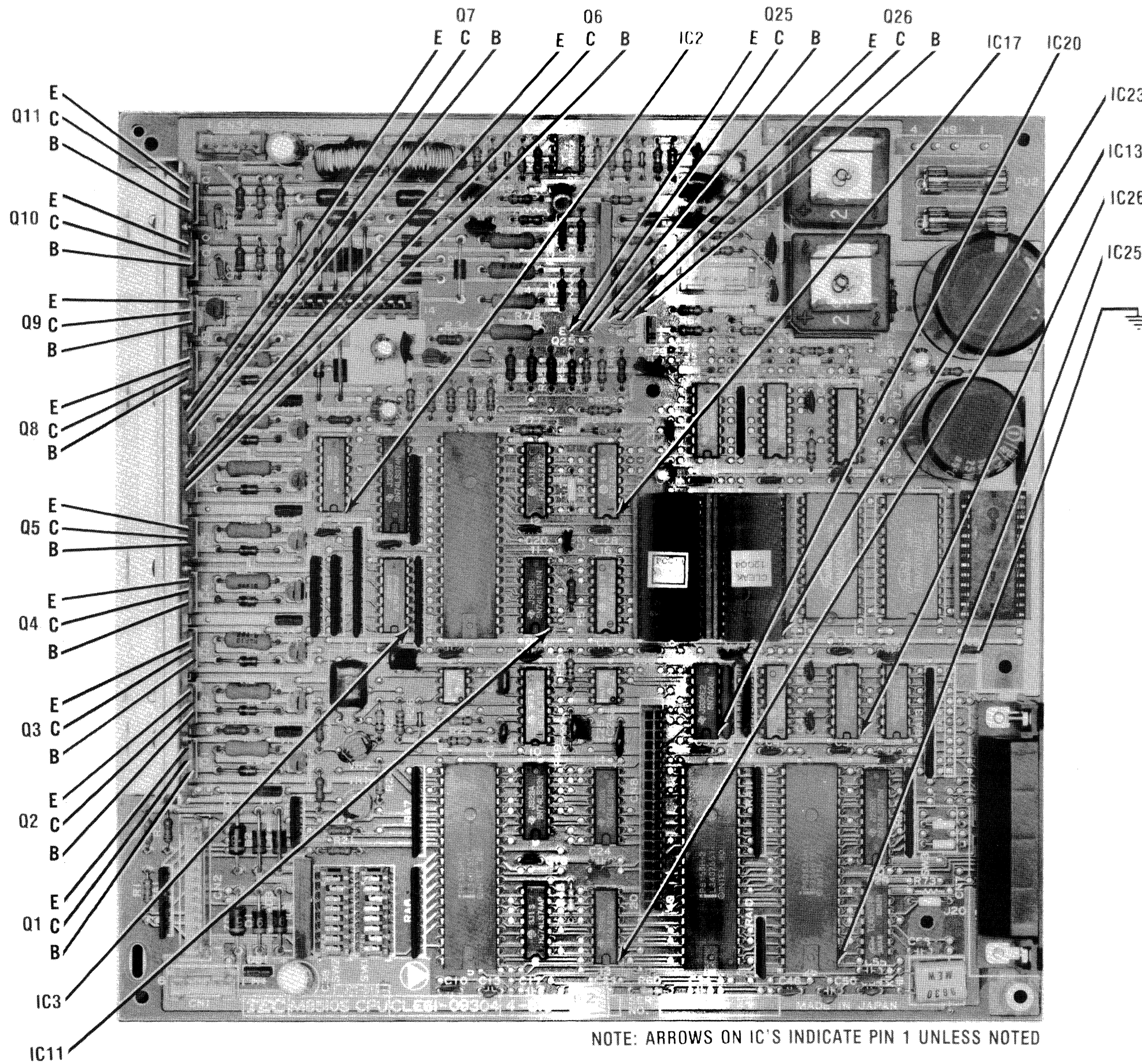
BLOCK DIAGRAM



CP18

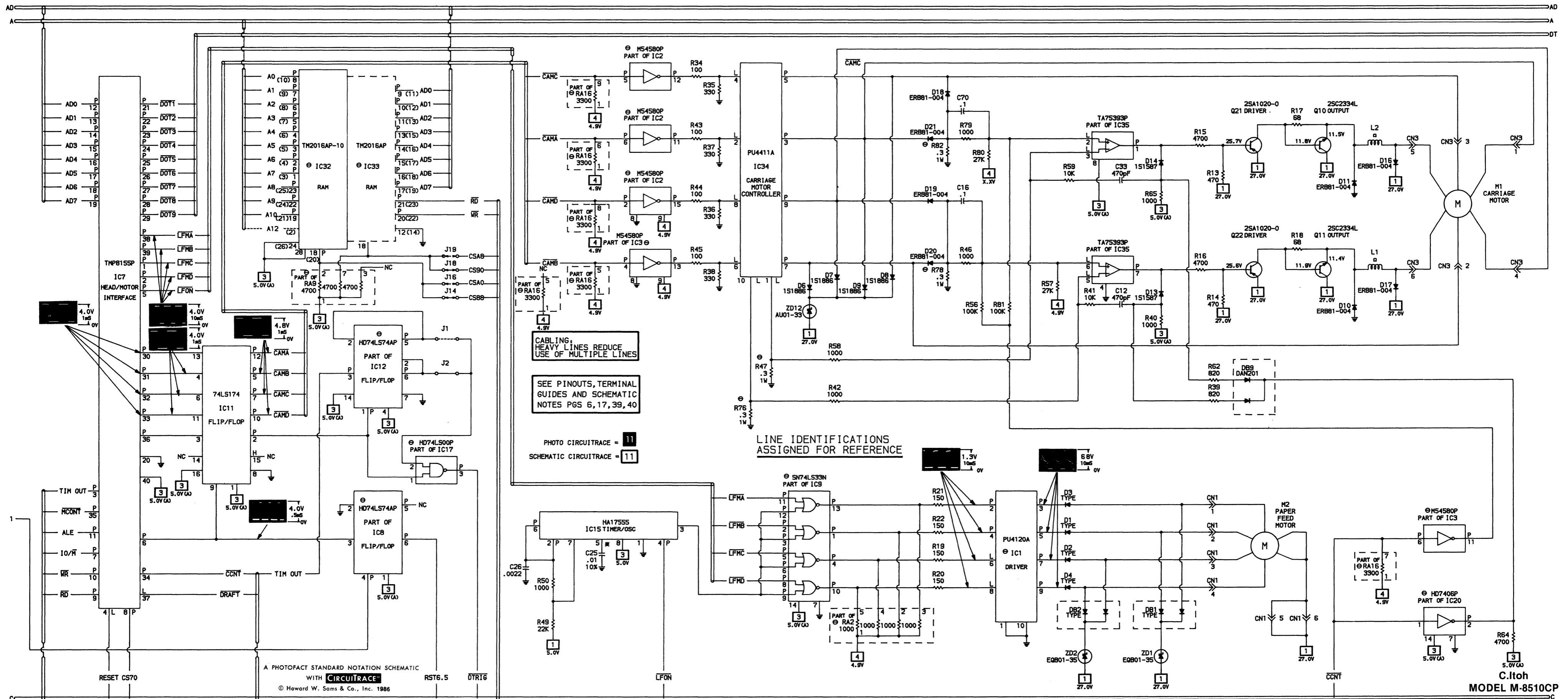
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NOTE: ARROWS ON IC'S INDICATE PIN 1 UNLESS NOTED

CP18
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MAIN BOARD

MAIN BOARD