

PRINTER:

APPLE® MODEL A9M0303



TECHNICAL SERVICE DATA FOR YOUR PRINTER

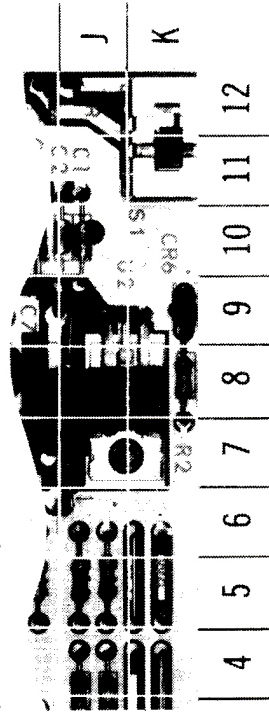
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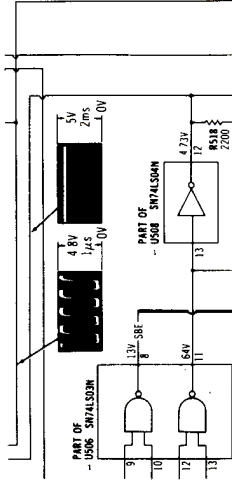
If seal is broken, nonreturnable.

COMPUTERFACTS™ put easy to use, informative technical data right at your fingertips. Each edition includes specific service information on the individual component, along with some overall troubleshooting hints.

- **Quick Component Location** using the SAMS exclusive GRIDTRACE, CIRCUITRACE, and component photographs.



- **Preliminary Service Checks** section is an easy to use, step by step guide for the experienced technician or hobbyist, and even beginners.
- **SAMS famous industry accepted standardized notation** schematics containing CIRCUITRACE®, GRIDTRACE™, waveforms, voltages and stage identification.

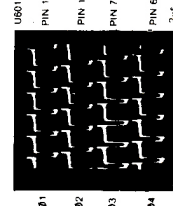


- **Step by Step Troubleshooting** guides the technician through the necessary procedures to quickly locate the problem.

TROUBLESHOOTING

MICROPROCESSOR CHIP (CPU) OPERATION

Verify the processor is functioning by checking the signals on the address, data, and control lines. The logic probe or logic analyzer is used to check the signals on the address, data, and control lines. If a logic probe is used, refer to the "Logic Chart" for the correct readings. If a scope is used, the waveforms on the address lines (except pins 22 and 23 which have no signal in Power Up mode) should be similar to Figure 2.

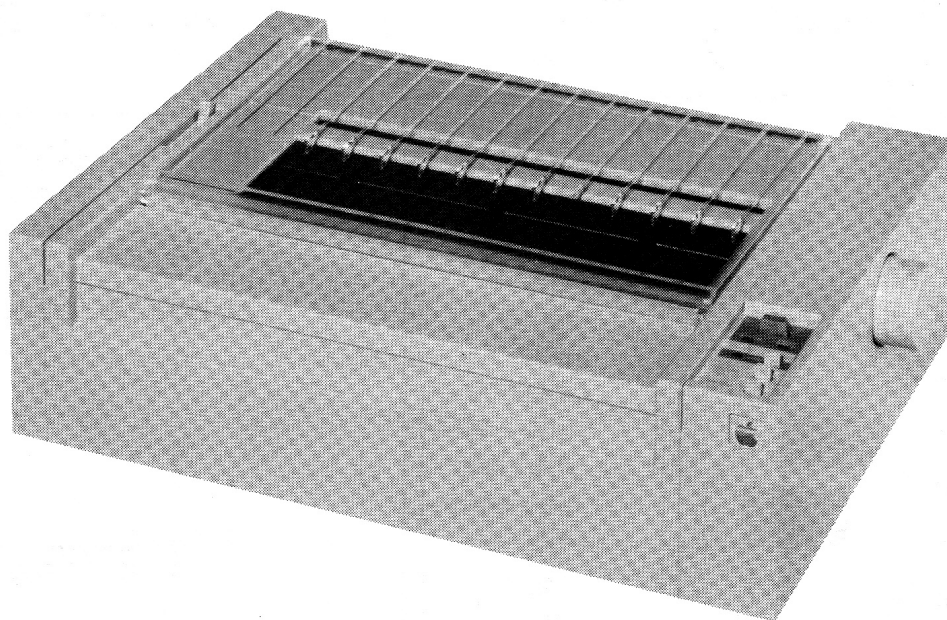


- **Complete Components Parts List** in an easy to use format with field replacements shown when possible. SAMS unique semiconductor, chip and IC cross-reference gives you many replacements to choose from and is available at your Electronic Distributor.

SEMICONDUCTORS (Select replacement for best results)

ITEM No.	TYPE No	MFR. 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.
0102	15553	1149-2576	EC0519	GE-514	1N4935	NTE519	SK9091/177	WEF928/519	103-131
0103	15553	1149-2576	EC0519	GE-514	1N4935	NTE519	SK9091/177	WEF134/109	103-2001
0201	1N4004	1201-4205	EC0519	GE-504A	1N4004	NTE116	SK3312	WEF157	103-276-02
0501 thru 0503	15553	1149-2576	EC0519	GE-514	1N4935	NTE519	SK9091/177	WEF925/519	103-131

APPLE
MODEL A9M0303
CP8



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PRELIMINARY SERVICE CHECKS

ENCLOSED

SAFETY PRECAUTIONS

See page 23.

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SAMS™

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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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GENERAL OPERATING INSTRUCTIONS

SELECT, LINE FEED, AND FORM FEED BUTTONS

Printer is in Select mode (Ready to receive data from the Computer) when the green Select LED is On and not in Select mode when the LED is Off. Pressing the Select button once puts the Printer in Deselect mode and pressing it again puts the Printer back in Select mode. The Printer must be in the Deselect mode for the Form Feed and Line Feed buttons to function.

SELF-TEST

The Printer has a built-in Self-Test. To start the test, hold the Form Feed button down while turning the Printer On. The Printer will print a complete character set. To temporarily stop the test, press the Line Feed button once. The Line Feed and Form Feed buttons will now work. Press the Select button to continue the test. To get out of the Self-Test mode, turn the Printer Off and back On again.

Note: The carrier cover must be in place to close the Cover Interlock Switch before the Printer will operate.

EXTENDER CABLES

When servicing this unit the following extender cables are required.

NEC DRAWING NO.	DESCRIPTION
CLEBK-03201	3 pin Connector
CLEBK-03401	6 pin Connector (two needed)
CLEBK-03501	7 pin Connector
CLEBK-03601	12 pin Connector
CLEBK-03801	13 pin Connector
CLEBK-03701	Head Connector
	14 pin Connector
	5 pin Power Connector

DIP SWITCH SETTINGS

NOTE: The Dip switches are accessible from the top of the Printer. Remove the printer cover and move the Print (Dot) Head to the left. The access holes are located on the right.

SWITCH SW1

SW1-1	SW1-2	SW1-3	
Open	Open	Open	American
Closed	Closed	Open	British
Open	Open	Closed	German
Open	Closed	Closed	French
Closed	Open	Closed	Swedish
Closed	Open	Open	Italian
Closed	Closed	Closed	Spanish
Open	Closed	Open	American

SW1-4
Open
Closed

Page Length: 66 lines
Page Length: 72 lines

SW1-5
Closed
Open

Ignores 8th data bit
Recognizes 8th data bit

SW1-6
Open
Closed
Open

SW1-7
Open
Open
Closed

Pica (10 chars. per inch)
Elite (12 chars. per inch)
Ultracondensed (17 chars. per inch)
Elite proportional (144 dots per inch)

Closed

Closed

SW1-8
Closed

Adds line feed after every carriage return
No line feed after carriage return

Open

SWITCH SW2

SW2-1
Open
Closed
Open
Closed

SW2-2
Open
Open
Closed
Closed

300 Baud
1200 Baud
2400 Baud
9600 Baud

SW2-3
Open
Closed

Data terminal ready
XON/XOFF

SW2-4
Open

(Not used)

DISASSEMBLY INSTRUCTIONS

CABINET TOP

Remove the carrier cover. Remove two screws from inside the cabinet located at the front corners. Remove the paper feed knob at the right side of cabinet. Disconnect the control panel Connector CN2A. Carefully lift the cabinet front for enough clearance to slide the cabinet backward and release the rear tabs. Disconnect the Carrier Cover Switch (S8) Connector CN10.

CPU BOARD

Remove the carrier cover. Place the Printer on its back and remove four nuts holding the cabinet bottom plate. Remove

four screws holding the CPU board. Pull the CPU board out and disconnect nine connectors from the CPU board. CPU board can now be removed.

MECHANICAL ASSEMBLY

Remove paper cover, carrier cover and top cover. Remove CPU board. Disconnect the ground straps from the side frame. Remove two screws securing noise filter and carefully pull it away from frame. Remove screw from power switch plate and lift power switch out of slot. Remove four screws securing mechanical assembly to Printer base. Lift assembly out of the Printer base. Reinstall in reverse order.

TROUBLESHOOTING

TROUBLESHOOTING PRE-CHECK

Check the Paper End Switch (SW3), Carrier Cover Switch (SW8) and Return Position Switch (SW6) for proper operation. The Paper End and Carrier Cover Switches must be closed for the Printer to work properly. The Return Position Switch acts as a safety switch to stop the Printer if the Print (Dot) Head travels all the way to the right and does not reverse to go back to the Home Position. The Return Position Switch should be normally open.

Check all connectors for good connections and for possible broken wires.

POWER SUPPLY

Printer is dead, Power Indicator is not On. Check AC Fuse (F1). If Fuse F1 is open, check for shorts at the windings of Power Transformer (T1) and at the Bridge Rectifiers (S1 and S2). If Fuse F1 is good, check for 120V AC from the white lead to the black lead of Transformer T1 primary. If 120V AC is missing, check the Power Switch (S1), Noise Filter (L1) and AC cord. If 120V AC is present at Transformer T1 primary, check for 25.2V at the output of Rectifier S12 and 12.0V at the output of Rectifier S11. If 25.2V is missing at Rectifier S12, check Fuse FU3, Rectifier S12, Transformer T1 and check Connector CN9 (Pins 1 and 2) for good connection. If 12.0V is missing at Rectifier S11, check Fuses FU1 and FU2, Rectifier S11, Transformer T1, Zener Diode ZD20, Capacitor C42 and check Connector CN9 (Pins 3, 4 and 5) for good connections. If the voltages check good at Rectifiers S11 and S12, check for 5.0V at the collector of Regulator Transistor (Q35) and 10.2V at the collector of Regulator Transistor (Q32). If 5.0V is missing at Transistor Q35, check the voltages and components associated with Transistor Q35. If 10.2V is missing at Transistor Q32, check the voltages and components associated with Transistor Q32.

MICROPROCESSOR (CPU) OPERATION

Check the operation of the Reset circuit by checking the logic reading at the Reset In, pin 36 of Microprocessor IC (IC10), while turning the Printer On. The logic probe should read logic Low when the Printer is turned On, then immediately go to logic High and stay High. If the reading is not correct, check for a logic High to logic Low transition at pin 5 of IC4 while turning the Printer On. If the reading is correct at pin 5 of IC4, check IC4. If the reading is not correct at pin 5 of IC4, check for a logic Low to logic High transition at pin 5 of IC16 while turning the Printer On. If the logic reading is correct at pin 5 of IC16, check IC16. If the logic reading is not correct at pin 5 of IC16, check the voltages and components associated with Transistors Q26 and Q27 and pin 1 of IC1.

If the logic reading is correct at pin 36 of IC10, check for a logic High to logic Low transition at the Reset Out, pin 3 of IC10, while turning the Printer On. If the logic reading is not correct, check IC10.

Check the operation of the Clock circuit by checking for a 9.8304MHz waveform at pin 1 of IC10 and a 4.9152MHz waveform at pin 37 of IC10. If the waveform is missing or off frequency at pin 1 of IC10, check the Crystal X1, Capacitors C19 and C21 and IC10. If the waveform is missing at pin 37 of IC10, check IC10.

Check the logic readings on pins 7, 8, 9 and 35 of IC10 for conditions that may keep the CPU from operating properly. If any pin does not read correctly, check the IC's connected to the pin with the incorrect reading.

Check for pulses on pins 12 thru 19 of IC10 while turning the Printer On. If pulses appear then suddenly stop, check the ROM IC (IC21), Decoder IC's (IC14 and IC18), CPU IC (IC10) and IC16 and IC20.

Pins 12 thru 19, 21 thru 28, 31, 32 and 34 of IC10 can also be checked by disconnecting pin 39 of IC10 from ground and connecting a jumper from pin 39 of IC10 to the 5.0V source. Pins 12 thru 19 and 21 thru 28 should all read a logic High and pins 31, 32 and 34 should read a logic Open. If any of the readings are not correct, check the IC's that are connected to the defective pin of IC10.

WILL NOT PRINT BY COMPUTER COMMAND (SELF-TEST WORKS)

NOTE: Be sure the Paper End Switch (SW3) and Carrier Cover Switch (SW8) are closed. With the Printer in Select mode, check for a logic High reading at Connector CN7, pin 4 (RTS), pin 14 (FAULT) and pin 20 (DTR). If the reading is not correct at pin 4 of Connector CN7, check for a logic Low reading at pin 4 of IC27. If pin 4 of IC27 does not read correctly, check IC28. If pin 4 of IC27 is correct, check IC27.

If pin 14 of Connector CN7 does not read logic High, check for a logic Low reading at pin 2 of IC27. If the reading is correct at pin 2 of IC27, check IC27. If the reading is not correct at pin 2 of IC27, check IC10.

If the logic reading is not correct at pin 20 of Connector CN7, check for a logic Low reading at pin 13 of IC27. If the reading is correct at pin 13 of IC27, check IC27. If the reading is not correct at pin 13 of IC27, check IC28.

If the logic readings check good at pins 4, 14 and 20 of Connector CN7, check for pulses at pins 4 and 6 of IC24 while sending data from the Computer to the Printer. If pulses are present at pin 4 and missing at pin 6 of IC24, check Capacitor C51 and IC24. If pulses are present at pin 6 of IC24, check IC28.

PRINT (DOT) HEAD MALFUNCTIONING

Print (Dot) Head (M3) not printing. Check Connector CN4 for good connections. Check for 25.2V at pin 9 of Connector CN4. If 25.2V is missing, refer to the "Power Supply" section of this Troubleshooting guide. Check for pulses at pin 36 of the Head/Motor Controller IC (IC7) while printing. If pulses are missing at pin 36 of IC7, check IC7. If pulses are present at pin 36 of IC7, check for pulses at pin 10 of IC4 while printing. If pulses are missing at pin 10 of IC4, check IC4. If pulses are present at pin 10 of IC4, check for pulses at pin 9 of Multivibrator IC (IC13) while printing.

If pulses are missing at pin 9 of IC13, check the Switch Controller/Timer/RAM IC (IC9). If pulses are present at pin 9 of IC13, check for pulses at pin 5 of IC13 while printing. If pulses are missing at pin 5 of IC13, check Capacitor C25, Resistor R54, Control VR1 and IC13. If pulses are present at pin 5 of IC13, check for pulses at pin 4 of IC13 while printing. If pulses are missing at pin 4 of IC13, check Resistors R41 and R56 and IC13. If pulses are present at pin 4 of IC13, check for pulses at pin 3 of IC6 while printing.

TROUBLESHOOTING (Continued)

If pulses are missing at pin 3 of IC6, check the voltages and components associated with pins 2, 3, 5, 6 and 7 of IC6 and check IC6. If pulses are present at pin 3 of IC6, check for pulses at pin 8 of IC4 while printing. If pulses are missing at pin 8 of IC4, check IC4. If pulses are present at pin 8 of IC4, check for pulses at the collector of Switch Transistor (Q24) while printing. If pulses are missing at Transistor Q24, check the voltages and components associated with Transistors Q23 and Q24. If pulses are present at Transistor Q24, check for pulses at pins 21 thru 29 of IC7 while printing. If pulses are missing at pins 21 thru 29 of IC7, check IC7.

Some dots are missing. Check for dirt on the Print (Dot) Head and clean the Head if necessary. Check Connector CN4 for good connections. Check the Print (Dot) Head Coil of the missing dot for continuity. Check the voltages and components associated with the Head Driver Transistors (Q5 thru Q13), Switch Transistors (Q14 thru Q22) and Buffer IC's (IC3 and IC4). (See Schematic to determine which circuit components control the missing Print (Dot) Head pin).

CARRIER MOTOR MALFUNCTIONING

Print (Dot) Head (M3) will not move (Line Feed Motor (M2) works). Check Connector CN3 for good connections. Check the Print (Dot) Head pulleys and cables for binding. Check the windings of the Carrier Motor (M1) for continuity (10 ohms each winding). Check for pulses at pins 30 thru 33 of the Head/Motor Controller IC (IC7) while printing. If pulses are missing at pins 30 thru 33 of IC7, check IC7. If pulses are present at pins 30 thru 33 of IC7, check for pulses at pins 6, 8, 10 and 12 of IC11 while printing. If pulses are missing at pins 6, 8, 10 and 12 of IC11, check IC11. If pulses are present at IC11, check the voltages and components associated with Switch Transistors (Q28 thru Q31) and Driver Transistors (Q36 thru Q39).

LINE FEED MOTOR MALFUNCTIONING

Line Feed Motor (M2) will not move (Carrier Motor (M1) works). Check Connector CN1 for good connections. Check the windings of the Line Feed Motor for continuity (66 ohms each winding).

Press the Select button (SW9) once to put the Printer in De-select mode. Press the Form Feed button (SW7) and check for pulses at pins 1, 2, 38 and 39 of the Head/Motor Controller IC (IC7). Also, check for a logic Low at pin 5 of IC7. If the logic readings are not correct at IC7, check IC7 and the Switch Controller/Timer/RAM IC (IC9). If the readings are

correct at IC7, check for a logic Low at pin 3 of the Timer/Oscillator IC (IC8) after pressing the Form Feed button (SW7). If the reading is not correct at pin 3 of IC8, check Capacitors C9 and C10, Resistors R28 and R29 and IC8. If the logic reading is correct at pin 3 of IC8, check for a voltage of 5.0V at the collector of the Motor Control Transistor (Q25) after pressing the Form Feed button. If the voltage is not correct, check Resistors R30 and R38 and Transistor Q25. If the voltage is correct at Transistor Q25, check for pulses at pins 4, 6, 8 and 10 of IC2 after pressing the Form Feed button. If pulses are missing at IC2, check IC2. If pulses are present at IC2, check the voltages and components associated with Driver Transistors (Q1 thru Q4).

PAPER END SWITCH

Printer does not stop when out of paper. Check the Paper End Switch (SW3) and check pins 4 and 5 of Connector CN6 for good connections. Check for a logic High reading at pin 27 of the Switch Controller/Timer/RAM IC (IC9) with no paper in the Printer. If the reading is not correct at pin 27 of IC9, check Capacitor C36, Resistor R61 and IC2. If the reading is correct at pin 22 of IC9, check IC9.

If the Paper Error LED (D100) does not light, check pins 1 and 2 of Connectors CN2 and CN2A for good connections and check Resistor R1, IC2 and the Paper Error LED (D100).

PRINT (DOT) HEAD HOME SENSOR

Print (Dot) Head (M3) does not stop at Home position. Check the operation of the Home Detector Sensor (M4) by checking the logic reading at pin 21 of the Switch Controller/Timer/RAM IC (IC9) while inserting a piece of paper in and out of the slot on the Sensor M4. The logic reading should be logic Low with the paper inserted and logic High with the paper removed. If the reading is not correct at pin 21 of IC9, check Capacitor C37, Resistors R62 and R63, pins 1 and 2 of Connector CN6, Sensor M4 and IC16. If the reading is correct at pin 21 of IC9, check IC9.

RETURN POSITION SWITCH

Check the operation of the Return Position Switch (SW6) by pressing the switch while the Print (Dot) Head is moving to the right. The Print (Dot) Head should immediately go back to Home position and stop. If the Return Position Switch is not working properly, check the Switch SW6, pins 7 and 8 of Connector CN2 for good connections and the Switch Controller/Timer/RAM IC (IC9).

MECHANICAL REMOVAL AND REPLACEMENT

RIBBON CARTRIDGE

Remove carrier cover. Carefully push outward on the cassette latch arms (1) while lifting up on the cassette. Place new cassette on the ribbon support plate (2) and push downward until it snaps in place. Turn the knob on the cassette until a click is heard. The ribbon is now tight. Replace carrier cover.

PRINT (DOT) HEAD

Remove carrier cover and ribbon cartridge. Rotate outward the two Print (Dot) Head latches (3) to disengage the latches from the locating pins (4). Pull the Print (Dot) Head (M3) straight up using care not to break the printed board attached to the Head. The printed board fits securely into the

cable socket and may require a hard pull to remove the Head.

Position replacement Head over the two locating pins and the cable socket and push into place. Rotate the two Print (Dot) head latches inward to lock the Head in place. See "Miscellaneous Adjustments" for Print (Dot) Head Adjustment.

RIBBON WIRE

Remove platen knob, top cover and Ribbon Cassette. Remove four screws securing Ribbon Cassette Mount Plate (2). Slowly lift the mount plate straight up to prevent losing any of the spring loaded components under the mount plate.

MECHANICAL REMOVAL AND REPLACEMENT (Continued)

Lift out the Ratchet Gear (6) and Ratchet Spring (7). Lift out the Ribbon Cassette Drive Gear (8) and Ribbon Spring (9) taking care to note how the Ribbon Wire (10) is wrapped around the Ribbon Pulley Gear (11). Also, make note of how the Ribbon Wire goes through the carrier assembly.

At the left side of the Printer loosen the screw holding the Ribbon Wire Arm (12) to relieve Ribbon Wire tension. Remove the wire from the Ribbon Wire Arm (13) at the right side of Printer and then from the left side Wire Arm. Carefully remove the wire from the Ribbon Pulley Gear and out of the Printer.

To install replacement Ribbon Wire, attach one end of wire to the right side Wire Arm and thread the wire around the Ribbon Pulley Gear. Attach the loose end of wire to the left side Wire Arm and tighten the screw securing the left Wire Arm.

Reinstall Ratchet Spring, Ratchet Gear, Ribbon Spring and Ribbon Cassette Drive Gear, Ribbon Cassette Mount Plate, Ribbon Cassette, top cover and platen knob.

CARRIER WIRE

Remove platen knob, top cover, Print (Dot) Head and Ribbon Wire (See "Ribbon Wire Removal"). Remove the left and right set screws of the Carrier Guide Shaft (14) and remove shaft by pulling it toward the front of Printer. Move Carrier to the center position. Remove the screw from the Carrier Motor shaft securing the Carrier Motor Pulley (15).

Loosen the screw holding the Idler Pulley Tension Arm (16) and remove Carrier Wire (17) from the Idler Pulley (18). Disengage Carrier Wire from top of Motor Pulley and remove pulley from Carrier Motor shaft with pulley remover. Make sure two copper shims are on the arms of the shaft. Unwind the Carrier Wire and disengage it from the bottom of the Motor Pulley.

Raise the Carrier to gain access to the carrier wire attachment. Use a wrench to hold the nut on the right side of the Carrier Wire while removing the wire nut on the left side of the Carrier Wire with needlenose pliers. Remove the wire after pushing out the metal shim inside, then the two nuts. Remove the black rubber sleeve from the slot at the bottom of the carrier assembly.

When installing new Carrier Wire be certain the long end of the wire is toward the right side of the Printer and that two copper shims are still on the arms of the Motor Pulley shaft. Reinstall the black rubber sleeve and metal shim into the slot at bottom of carrier assembly. Tighten the wire nut. Wrap long end of wire around Idler Pulley at the right side of

Printer. Thread wire back under carrier assembly to the left side of Printer. Insert long end of wire into bottom slot of the Motor Pulley. Seat pulley and turn it clockwise to wind up wire. Insert short end of wire into top slot of the Motor Pulley and wrap wire in a clockwise direction.

Replace Motor Pulley screw, Carrier Guide Shaft and screws. Tighten tension screw of Idler Pulley Tension Arm to make wire taut. Replace Ribbon Wire, Print (Dot) Head, top cover and platen knob.

CARRIER MOTOR

Remove mechanical assembly from Printer. (See "Disassembly Instructions"). Loosen the tension on the Ribbon Wire (10). Disconnect the Ribbon Wire from the two end points and tie it in a loose knot over the Carrier. Remove Motor Pulley (15). Disconnect Connector CN3. Remove the three screws holding the Carrier Motor (M1) taking care to hold onto it as it drops free. Note the motor cable position before removing the motor. Install replacement Carrier Motor in reverse order. Do not overtighten the three motor mounting screws.

LINE FEED MOTOR

Remove mechanical assembly from Printer. (See "Disassembly Instructions"). Stand chassis on right end. Disconnect Connector CN5. Remove two screws securing Line Feed Motor (M2) to right side frame. Carefully lift Motor M2 with attached drive gear out of gear train assembly. Install replacement motor in reverse order.

TRACTOR FEED ASSEMBLY

Remove platen knob and top cover. Remove E ring at left end of square Tractor Feed Shaft (23). Remove the screw at each end of Tractor Feed Guide Shaft (24). Grasp the Tractor Feed Drive Gear (25) and lift the Tractor Feed Shaft just out of the right side frame. Pull the square shaft out of the Left Tractor Feed Roller (26) and the Right Tractor Feed Roller (27). Slide Guide Shaft rearward out of the support bracket for the Paper End Switch (SW3). The Feed Rollers can be removed from the Guide Shaft. Reassemble in reverse order.

PLATEN

Remove platen knob and top cover. Rotate Platen (19) until hole in Paper Feed Gear (20) at the right side of Printer lines up with retaining screw that secures the Right Platen Shaft Holder (21). Remove that screw and the screw securing the Left Platen Shaft Holder (22). Pull the Platen straight up and out of the Printer. Replace in reverse order.

LINE DEFINITIONS

A0 THRU A15	Address Lines
ALE	Address Latch Enable
CLK1	Clock 1
CLK2	Clock 2
CS	Chip Select
CS1	Chip Select 1
CS2	Chip Select 2
DATA OUT	Data Output
D0 THRU D7	Data Lines
DOT1 THRU DOT9	Dot 1 Thru Dot 9
DTR	Data Terminal Ready
FAULT	Fault
IO/M	I/O Memory

LFMA THRU	
LFME	Line Feed Motor Phase A Thru Phase E
OE	Output Enable
PB6	Port B 6
RD	Read
RESET	Reset
RST 5.5	Restart Interrupt
RST 6.5	Restart Interrupt
RST 7.5	Restart Interrupt
RTS	Request-To-Send
SOD	Serial Output Data
WR	Write

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

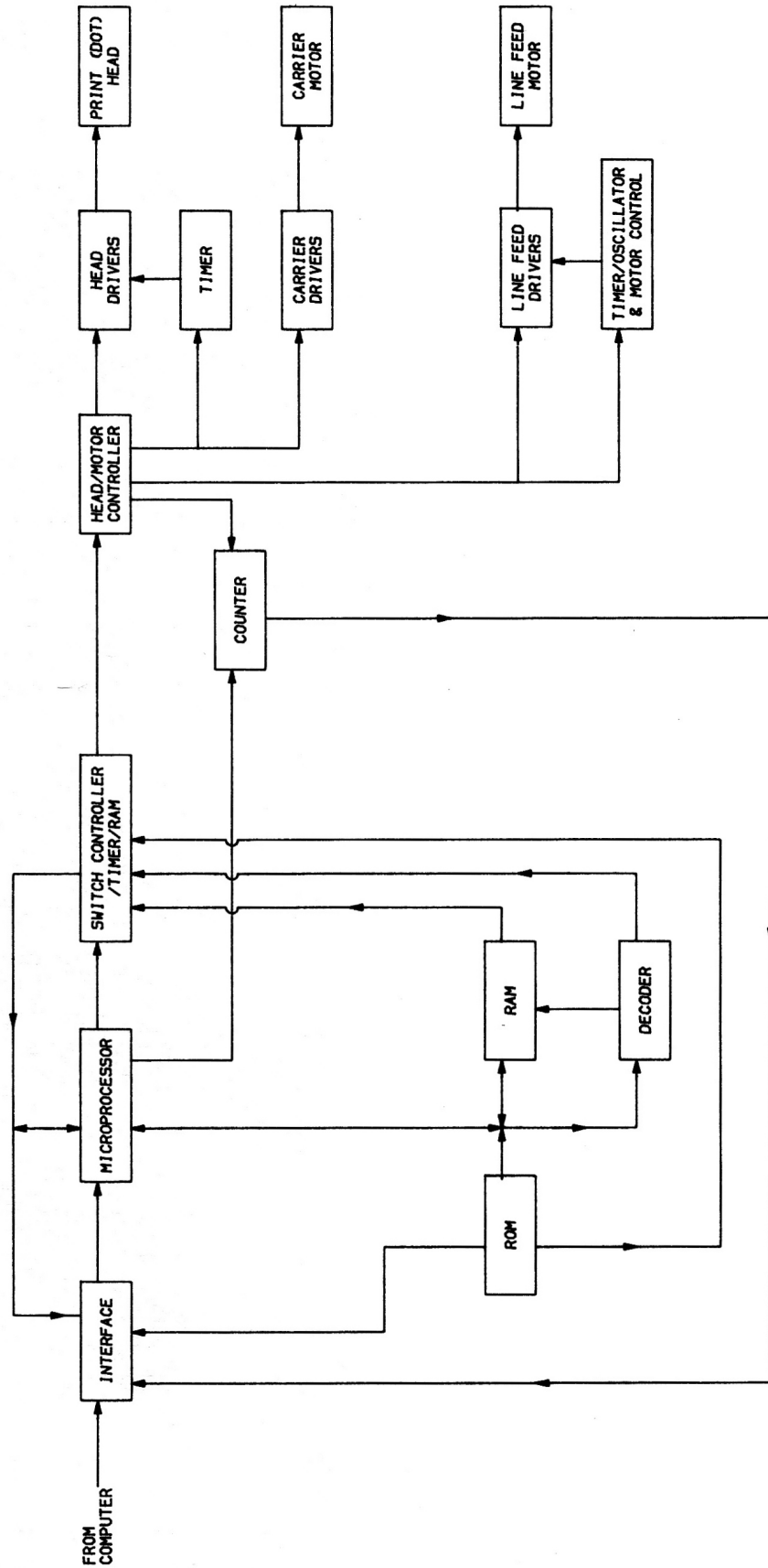
MAIN BOARD GridTrace LOCATION GUIDE

C1	R-4	D13	B-6	Q29	B-11	R67	F-17
C2	R-4	D14	C-6	Q30	C-12	R68	C-16
C3	Q-4	D15	C-7	Q31	B-12	R69	L-20
C4	K-5	D16	B-7	Q32	Q-18	R70	K-19
C5	N-6	D17	C-7	R1	R-3	R71	J-19
C6	S-7	D18	B-7	R2	R-3	R72	J-19
C7	P-7	D19	C-8	R3	R-3	R73	S-14
C8	T-7	D20	B-8	R4	Q-3	R74	P-14
C9	G-6	D21	B-8	R5	P-3	R75	Q-16
C10	Q-5	D22	P-7	R6	L-3	RA1	P-3
C11	S-8	D23	F-13	R7	K-3	RA2	Q-4
C12	T-8	FU1	C-19	R8	J-3	RA3	N-3
C13	I-9	FU2	C-19	R9	H-3	RA4	R-4
C14	T-9	FU3	B-19	R10	G-3	RA5	S-5
C15	Q-8	IC1	P-4	R11	F-3	RA6	J-10
C16	F-9	IC2	Q-4	R12	E-3	RA7	C-9
C18	F-10	IC3	L-5	R13	C-3	RA8	H-14
C19	T-10	IC4	J-5	R14	B-3	RA9	N-14
C20	S-10	IC5	R-7	R15	Q-5	SI1	B-13
C21	L-10	IC6	Q-7	R16	Q-5	SI2	B-16
C22	I-10	IC7	K-7	R17	Q-5	SW1	R-6
C23	F-11	IC8	H-7	R18	P-5	SW2	R-5
C24	E-11	IC9	Q-9	R19	P-5	TP1	I-5
C25	S-12	IC10	K-8	R20	Q-5	TP2	F-5
C26	Q-11	IC11	E-9	R21	T-5	VR1	Q-6
C27	Q-12	IC12	R-10	R22	C-5	VR2	N-6
C28	I-10	IC13	P-10	R23	T-5	X1	M-10
C29	E-12	IC14	H-10	R24	P-6	ZD1	Q-1
C30	D-12	IC15	R-12	R25	P-6	ZD2	P-1
C31	S-14	IC16	P-12	R26	P-6	ZD3	Q-2
C32	P-14	IC17	M-12	R27	I-6	ZD4	P-2
C33	M-14	IC18	H-12	R28	I-5	ZD5	M-3
C34	I-14	IC19	F-12	R29	H-5	ZD6	L-3
C35	F-14	IC20	R-14	R30	H-5	ZD7	J-3
C36	E-14	IC21	Q-14	R31	H-5	ZD8	I-3
C37	F-14	IC23	H-14	R32	G-5	ZD9	H-3
C38	S-15	IC24	R-15	R33	F-6	ZD10	F-3
C39	Q-15	IC25	N-15	R34	F-6	ZD11	E-3
C40	M-15	IC26	K-16	R35	E-6	ZD12	D-3
C41	H-16	IC27	R-17	R36	P-8	ZD13	C-3
C42	Q-16	IC28	Q-17	R37	Q-8	ZD14	B-5
C43	E-15	IC29	K-17	R38	T-7	ZD15	B-6
C45	Q-17	Q1	Q-1	R39	H-8	ZD16	B-8
C46	M-17	Q2	Q-1	R40	H-8	ZD17	B-9
C47	H-19	Q3	Q-2	R41	P-10	ZD19	D-10
C48	E-19	Q4	Q-2	R42	L-9	ZD20	H-16
C49	S-18	Q5	M-2	R43	H-9	ZD21	H-17
C50	R-18	Q6	L-2	R44	G-9	ZD22	P-12
C51	Q-15	Q7	J-2	R45	E-10		
CN1	S-2	Q8	I-2	R46	E-10		
CN2	Q-2	Q9	H-2	R47	E-10		
CN3	A-3	Q10	G-2	R48	D-10		
CN4	E-5	Q11	E-2	R49	C-10		
CN5	D-11	Q12	D-2	R50	Q-10		
CN6	D-13	Q13	C-2	R51	B-10		
CN7	P-20	Q14	M-3	R52	Q-10		
CN8	A-11	Q15	L-3	R53	P-11		
CN9	A-19	Q16	K-3	R54	T-10		
D1	S-4	Q17	I-3	R55	N-10		
D2	S-4	Q18	H-3	R56	L-12		
D3	S-4	Q19	G-3	R57	L-12		
D4	S-5	Q20	E-3	R58	Q-12		
D5	C-4	Q21	D-3	R59	F-13		
D6	B-4	Q22	C-3	R60	E-13		
D7	C-5	Q23	F-8	R61	E-13		
D8	B-4	Q24	E-8	R62	C-14		
D9	C-5	Q25	F-8	R63	R-16		
D10	C-5	Q26	G-10	R64	F-16		
D11	B-5	Q27	F-10	R65			
D12	C-6	Q28	C-11	R66			

MAIN BOARD GridTrace LOCATION GUIDE

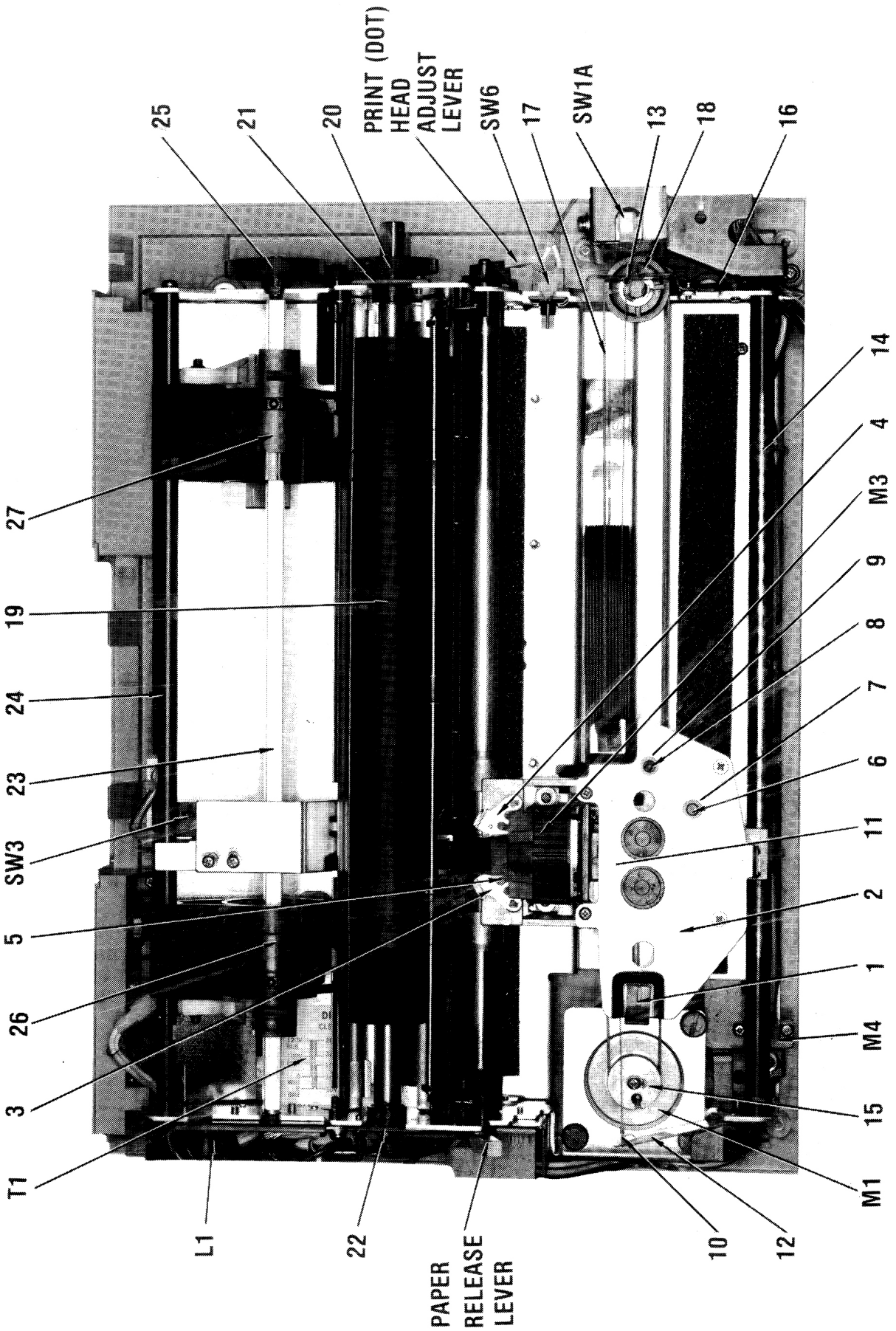
C1	R-4	D13	B-6	Q29	B-11	R67	F-17
C2	R-4	D14	C-6	Q30	C-12	R68	C-16
C3	Q-4	D15	C-7	Q31	B-12	R69	L-20
C4	K-5	D16	B-7	Q32	Q-18	R70	K-19
C5	N-6	D17	C-7	R1	R-3	R71	J-19
C6	S-7	D18	B-7	R2	R-3	R72	J-19
C7	P-7	D19	C-8	R3	R-3	R73	S-14
C8	N-7	D20	B-8	R4	Q-3	R74	P-14
C9	G-6	D21	B-8	R5	P-3	R75	Q-16
C10	G-5	D22	P-7	R6	L-3	RA1	P-3
C11	S-8	D23	F-13	R7	K-3	RA2	Q-4
C12	N-8	FU1	C-19	R8	J-3	RA3	N-3
C13	I-9	FU2	Q-19	R9	H-3	RA4	R-4
C14	H-9	FU3	B-19	R10	G-3	RA5	S-5
C15	G-8	IC1	P-4	R11	F-3	RA6	J-10
C16	F-9	IC2	O-4	R12	E-3	RA7	Q-9
C18	F-10	IC3	L-5	R13	C-3	RA8	H-14
C19	N-10	IC4	J-5	R14	B-3	RA9	N-14
C20	S-10	IC5	R-7	R15	Q-5	SI1	B-13
C21	L-10	IC6	O-7	R16	Q-5	SI2	B-16
C22	I-10	IC7	K-7	R17	Q-5	SW1	R-6
C23	F-11	IC8	H-7	R18	P-5	SW2	R-5
C24	E-11	IC9	Q-9	R19	P-5	TP1	I-5
C25	S-12	IC10	K-8	R20	Q-5	TP2	F-5
C26	O-11	IC11	E-9	R21	N-5	VR1	Q-6
C27	O-12	IC12	R-10	R22	Q-5	VR2	N-6
C28	I-10	IC13	P-10	R23	N-5	X1	N-10
C29	E-12	IC14	H-10	R24	P-6	ZD1	Q-1
C30	D-12	IC15	R-12	R25	P-6	ZD2	P-1
C31	S-14	IC16	P-12	R26	P-6	ZD3	Q-2
C32	P-14	IC17	M-12	R27	I-6	ZD4	P-2
C33	M-14	IC18	H-12	R28	I-5	ZD5	N-3
C34	I-14	IC19	F-12	R29	H-5	ZD6	L-3
C35	F-14	IC20	R-14	R30	H-5	ZD7	J-3
C36	E-14	IC21	Q-14	R31	H-5	ZD8	I-3
C37	E-14	IC23	H-14	R32	G-5	ZD9	H-3
C38	S-15	IC24	R-15	R33	F-6	ZD10	F-3
C39	Q-15	IC25	N-15	R34	F-6	ZD11	F-3
C40	M-15	IC26	K-16	R35	E-6	ZD12	Q-3
C41	H-16	IC27	R-17	R36	P-8	ZD13	Q-3
C42	G-16	IC28	Q-17	R37	Q-8	ZD14	B-5
C43	E-15	IC29	K-17	R38	N-7	ZD15	B-6
C45	Q-17	Q1	Q-1	R39	H-8	ZD16	B-8
C46	M-17	Q2	Q-1	R40	H-8	ZD17	B-9
C47	H-19	Q3	Q-2	R41	P-10	ZD19	Q-10
C48	E-19	Q4	Q-2	R42	L-9	ZD20	H-16
C49	S-18	Q5	M-2	R43	H-9	ZD21	H-17
C50	R-18	Q6	L-2	R44	Q-9	ZD22	P-12
C51	Q-15	Q7	J-2	R45	E-10		
CN1	S-2	Q8	I-2	R46	E-10		
CN2	Q-2	Q9	H-2	R47	E-10		
CN3	A-3	Q10	G-2	R48	D-10		
CN4	E-5	Q11	E-2	R49	Q-10		
CN5	D-11	Q12	D-2	R50	Q-10		
CN6	D-13	Q13	Q-2	R51	B-10		
CN7	P-20	Q14	M-3	R52	B-10		
CN8	A-11	Q15	L-3	R53	Q-10		
CN9	A-19	Q16	K-3	R54	P-11		
D1	S-4	Q17	I-3	R55	N-10		
D2	S-4	Q18	H-3	R56	N-10		
D3	S-4	Q19	Q-3	R57	L-12		
D4	S-5	Q20	E-3	R58	L-12		
D5	C-4	Q21	D-3	R59	Q-12		
D6	B-4	Q22	C-3	R60	F-13		
D7	C-5	Q23	F-8	R61	E-13		
D8	B-4	Q24	E-8	R62	E-13		
D9	C-5	Q25	F-8	R63	E-13		
D10	C-5	Q26	Q-10	R64	C-14		
D11	B-5	Q27	F-10	R65	R-16		
D12	C-6	Q28	C-11	R66	F-16		

APPLE
MODEL A9M0303

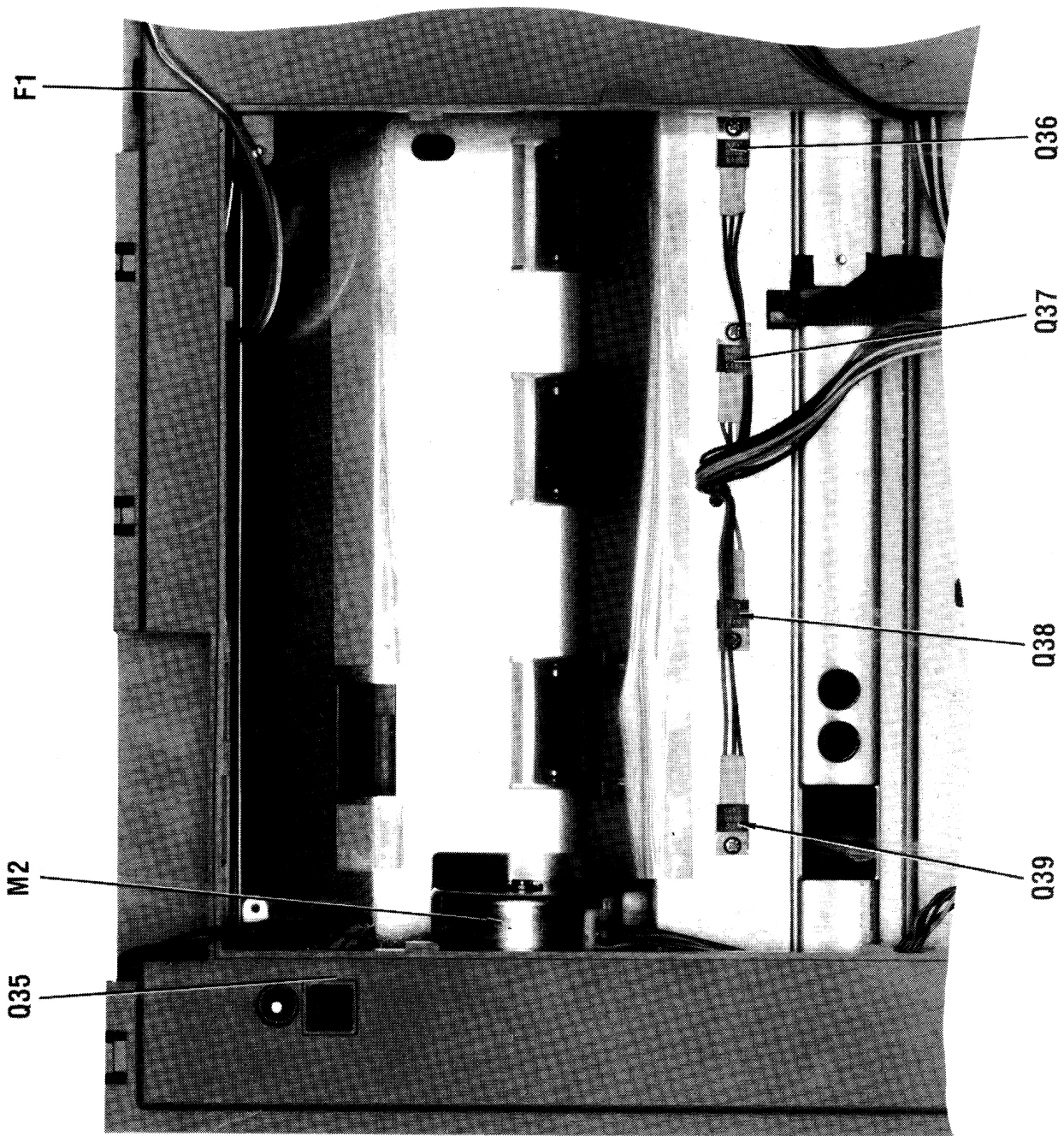


BLOCK DIAGRAM

APPLE
MODEL A9M0303



MECHANICAL-TOP VIEW



MECHANICAL-BOTTOM VIEW

PARTS LIST AND DESCRIPTION

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

SEMICONDUCTORS (Select replacement transistor for best results)

ITEM No.	TYPE No.	MFG. PART No.	REPLACEMENT DATA						
			GENERAL ELECTRIC PART No.	NTE PART No.	ECG PART No.	RCA PART No.	WORKMAN PART No.	ZENITH PART No.	
D1 thru D21	B12	613128P (1)	GE-7406	NTE7406	ECG7406	SK7406		HE-443-698	
D22	B12		74LS157	NTE74LS157	ECG74LS157	SK74LS157		HE-443-799	
D23	TA75393P		GE IC-269	NTE955M	ECG955M	SK3564/955M	WEP2119/955M	221-29042	
IC1									
IC2 thru IC4	SN7406N			GE IC-269	NTE955M	ECG955M	SK3564/955M	WEP2119/955M	221-29042
IC5	HD74LS157P			8085AC	NTE7406	ECG7406	SK7406		HE-443-698
IC6	HA17555PS			74LS393	NTE74LS393	ECG74LS393	SK74LS393		
IC7	TMP8155P			74LS123	NTE74LS123	ECG74LS123	SK74LS123		HE-443-942
IC8	HA17555PS			74LS163A	NTE74LS163A	ECG74LS163A	SK74LS163		HE-443-782
IC9	TMP8155P			74LS14	NTE74LS14	ECG74LS14	SK74LS14		HE-443-934
IC10	D8085AC-2								HE-443-872
IC11	SN7406N								
IC12	SN74LS393N								
IC13	HD74LS123P								
IC14	HD74LS155P								
IC15	HD74LS163P								
IC16	SN74LS14N								
IC17	TC40H074P								
IC18	HD74LS156P								
IC19	7805			GE IC-190	NTE74LS156	ECG74LS156	SK74LS156		221-29043
IC20	HD74LS74AP			74LS74A	NTE960	ECG960	SK3591/960		HE-443-730
IC21	TECEC-0913				NTE74LS74A	ECG74LS74A	SK74LS74A		
IC22	HM6116P-4			6116P-3					
IC23	SN74LS373N			74LS373	NTE74LS373	ECG74LS373	SK74LS373		HE-443-867
IC24	SN75189AN				NTE75189	ECG75189	SK5189/75189		HE-443-795
IC25, 26	HM6116P-4			6116P-3					
IC27	MC1488/75188N				NTE75188	ECG75188	SK5188/75188		HE-443-794
IC28	D8251AC			8251AC					

CP8
MODEL A9M0303
APPLE

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.	MFG. PART No.	REPLACEMENT DATA					ZENITH PART No.
			GENERAL ELECTRIC PART No.	NTE PART No.	ECG PART No.	RCA PART No.	WORKMAN PART No.	
IC29	HM6116P-4		6116P-3					
M4	ON1102		GE-345	NTE261	ECG261	SK3896/261	WEP261/261	121-Z9085
Q4	2SD837B		GE-345	NTE261	ECG261	SK3896/261	WEP261/261	121-Z9085
Q5 thru Q13	2SD1276B							
Q14 thru Q22	2SC2458Y		GE-210	NTE85	ECG85	SK3124/289	WEP910/289	921-1114
Q23 thru Q25	2SA950-0		GE-269	NTE290A	ECG290A	SK3841/294	WEP911/290A	121-Z9003
Q26, 27	2SC1815Y		GE-62	NTE85	ECG85	SK3124A/289A	WEP66/199	121-Z9065
Q28 thru Q31	2SC2458Y		GE-210	NTE85	ECG85	SK3124/289	WEP910/289	921-1114
Q32	2SA950-0		GE-269	NTE290A	ECG290A	SK3841/294	WEP911/290A	121-Z9003
Q35	2SB688-0			NTE37	ECG37	SK9415/37		
Q36 thru Q39	2SD560							
S11, 2	S5VB							
ZD1 thru ZD13	EQB01-15		GEZD-15	NTE5313 NTE145A	ECG5313 ECG145A	SK3986/5313 SK15V/145A	WEP1114/145	103-Z9013
ZD14 thru ZD17	RD47FBD		GEZD-47	NTE5088A	ECG5088A	SK47V/5088A	WEP1126/5088	
ZD19	6.8B1							
ZD20	094K							
ZD21	104K							
ZD22	6.8B1							

(1) Number on unit.

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
VR1	Character	50K		
VR2	Deviation Charge Time	50K		

RESISTORS (Power and Special)

ITEM No.	RATING	REPLACEMENT DATA		
		MFGR. PART No.	NTE PART No.	WORKMAN PART No.
R66	62 10% 5W WW			
R67	62 10% 5W WW			
RA1	Resistor Network (1)			
RA2	Resistor Network (2)			
RA3	Resistor Network (3)			
RA4	Resistor Network (4)			
RA5	Resistor Network (5)			
RA6	Resistor Network (6)			
RA7	Resistor Network (2)			
RA8	Resistor Network (6)			
RA9	Resistor Network (5)			

(1) Contains five (5 ea.) 4700 10%

(2) Contains four (4 ea.) 1000 10%

(3) Contains nine (9 ea.) 470 10%

(4) Contains four (4 ea.) 10K 10%

(5) Contains eight (8 ea.) 10K 10%

(6) Contains eight (8 ea.) 33K 10%

TRANSFORMER (Power)

ITEM No.	RATING			REPLACEMENT DATA	
				MFGR. PART No.	NOTES
	PRI.	SEC. 1	SEC. 2		
T1	120V AC @ 500mA AC	20.7V AC @ 1.5A AC	20.6V AC CT @ 500mA AC		
	SEC. 3	SEC. 4	SEC. 5		

FUSE DEVICES

ITEM NO.	DESCRIPTION	MFGR. PART NO.		NOTES
		DEVICE	HOLDER	
F1	2A @ 250V Fast Acting			
FU1	3A @ 125V AC Slow Blow			
FU2	3A @ 125V AC Slow Blow			
FU3	5A @ 125V AC Slow Blow			

APPLE
MODEL A9M0303

PARTS LIST AND DESCRIPTION (Continued)

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

MISCELLANEOUS

ITEM No.	PART NAME	MFGR. PART No.	NOTES
L1	Noise Filter		
M1	Motor		Carrier
M2	Motor		Line Feed
M3	Print (Dot) Head		
P1	Cord		AC Power
SW1	Switch		DIP, 8 Sections
SW1A	Switch		Power, On/Off
SW2	Switch		DIP, 4 Section
SW3	Switch		Paper End
SW6	Switch		Return Position
SW7	Switch		Form Feed
SW8	Switch		Cover Interlock
SW9	Switch		Select
SW10	Switch		Line Feed
X1	Crystal		9.8304MHz
	Magnet		Part of SW8
	P.C. Board		Main Board

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

MECHANICAL PARTS LIST (Item numbers/description assigned for reference)

REF. NO.	PART NO.	DESCRIPTION	REF. NO.	PART NO.	DESCRIPTION
1		Ribbon Cassette Latch Arms	16		Idler Pulley Tension Arm
2		Ribbon Cassette Mount Plate	17		Carrier Wire
3		Print (Dot) Head Latch, Left	18		Idler Pulley
4		Print (Dot) Head Latch, Right	19		Platen
5		Print (Dot) Head Locating Pin	20		Paper Feed Gear
6		Ratchet Gear	21		Platen Shaft Holder, Right Side
7		Ratchet Spring	22		Platen Shaft Holder, Left Side
8		Ribbon Cassette Drive Gear	23		Tractor Feed Shaft
9		Ribbon Spring	24		Tractor Feed Guide Shaft
10		Ribbon Wire	25		Tractor Feed Drive Gear
11		Ribbon Pulley Gear	26		Left Tractor Feed Roller
12		Left Ribbon Wire Arm	27		Right Tractor Feed Roller
13		Right Ribbon Wire Arm			
14		Carrier Guide Shaft			
15		Carrier Motor Pulley			

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.

Equipment Name	B & K Precision Equipment No.	Simpson Equipment No.		
OSCILLOSCOPE	1570A,1590A,1596	454		
LOGIC PROBE	DP51			
LOGIC PULSER	DP101			
DIGITAL VOM	2830	463,467,470,474		
ANALOG VOM	277	260-7		
ISOLATION TRANSFORMER	TR110,1604,1653,1655			
FREQUENCY COUNTER	1803,1805	710		
COLOR BAR GENERATOR	1211A,1248,1251,1260	431		
DISK DRIVE ANALYZER				
FUNCTION GENERATOR	3020	420A,420D		
HI-VOLTAGE PROBE	HV-44	248		

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.

MISCELLANEOUS ADJUSTMENTS

CHARACTER DEVIATION

Adjust the Character Deviation Control (VR1) for a vertical deviation of .3mm or less from one line to the next line (See Figure 1). If the deviation is larger than .3mm check the Carrier Wire Tension Adjustment.

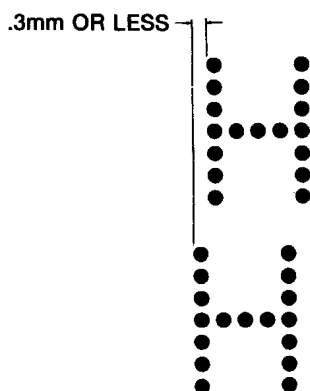


Figure 1

PRINT (DOT) HEAD CHARGING TIME

Connect the input of a scope to pin 3 of Timer IC (IC6). Set the scope to 2V, .1ms sweep time and positive trigger slope. Put the Printer in Self-Test mode (See "General Operating Instructions"). Adjust the Charge Time Control (VR2) for a pulse width of .2ms.

NOTE: Controls VR1 and VR2 are accessible from the top of the Printer. Remove the Printer cover and move the Print (Dot) Head to the left. The access holes are located on the bottom right, next to the access holes for the DIP Switches.

HOME POSITION SENSOR ADJUSTMENT

Loosen the screw holding the Home Position Sensor (M4) to the chassis. Insert some paper into the Printer. Turn the Printer On while holding down the Form Feed button to start the Self-Test. Adjust the Sensor so the left margin of the printed copy lines up with the left red mark on the paper roller shaft.

PRINT (DOT) HEAD

Ribbon Guide must be removed to set proper gap clearance between Print (Dot) Head and Platen. Loosen the screw holding the Print (Dot) Head Adjust Lever at the right end of the carrier shaft. Also, loosen the middle screw that secures the Adjust Lever to the Notch-set lever. Move Adjust Lever to position Head for a clearance of .6mm between the Head needle and the Platen. Tighten the middle screw and the carrier shaft end screw. Replace Ribbon Guide.

Alternate adjustment is accomplished with Ribbon Guide in place by setting gap clearance to a single sheet of paper. Set adjustment for a slight drag on paper as it is pulled between the Print (Dot) Head and Platen. Clearance for many copies (about 5 pieces of paper) should be adjusted to .85mm between the Head needle and the Platen.

APPLE
MODEL A9M0303

LOGIC CHART

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

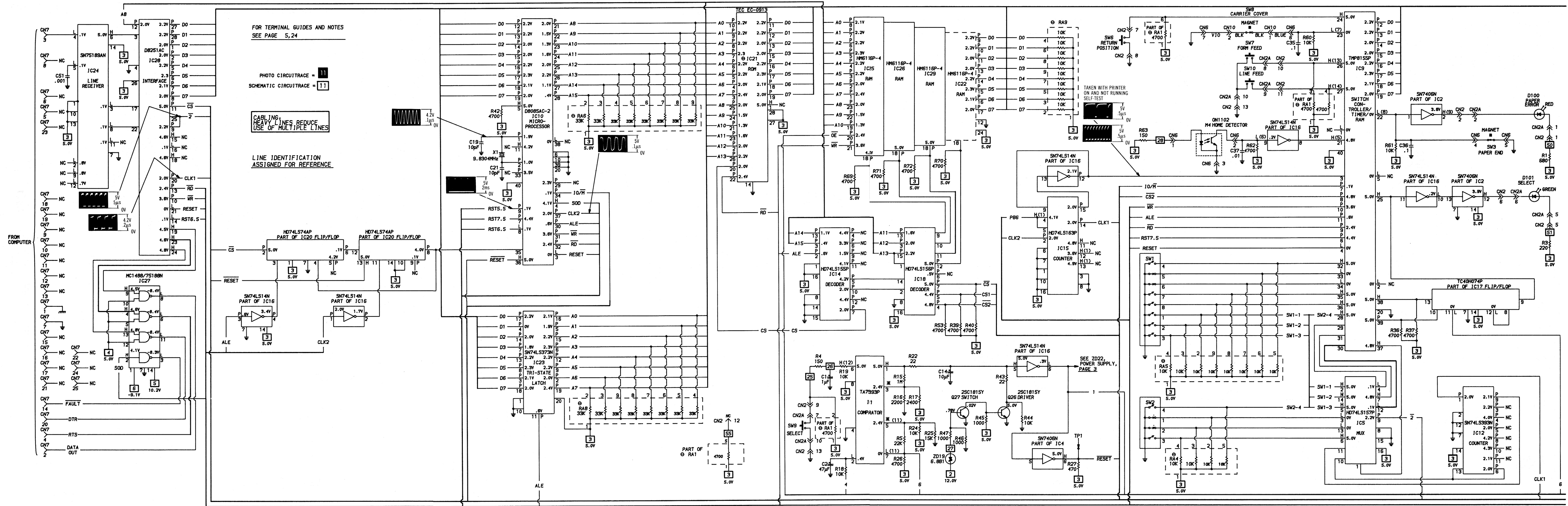
APPLE
MODEL A9M0303

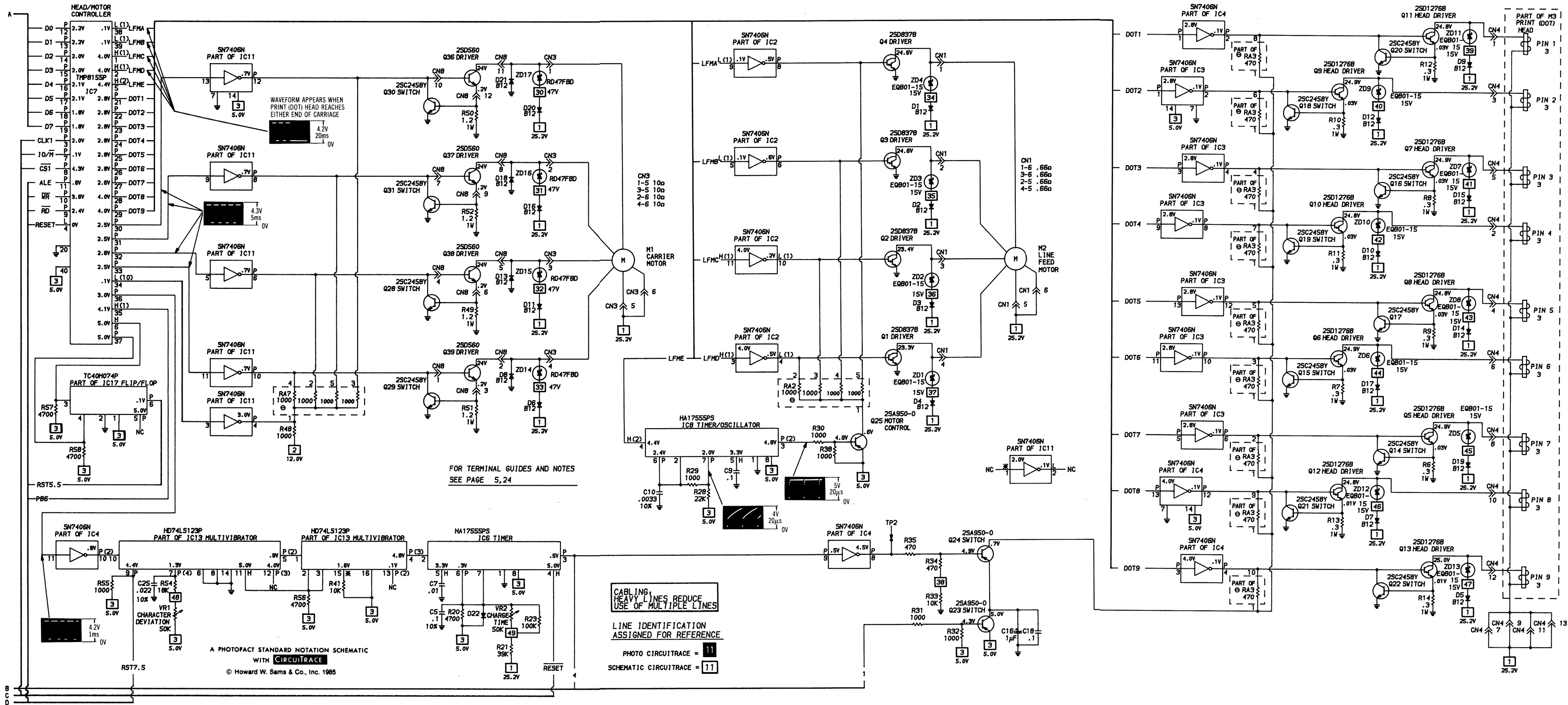
FOR LOGIC CHART NOTES
SEE SCHEMATIC NOTES ON PAGE 5

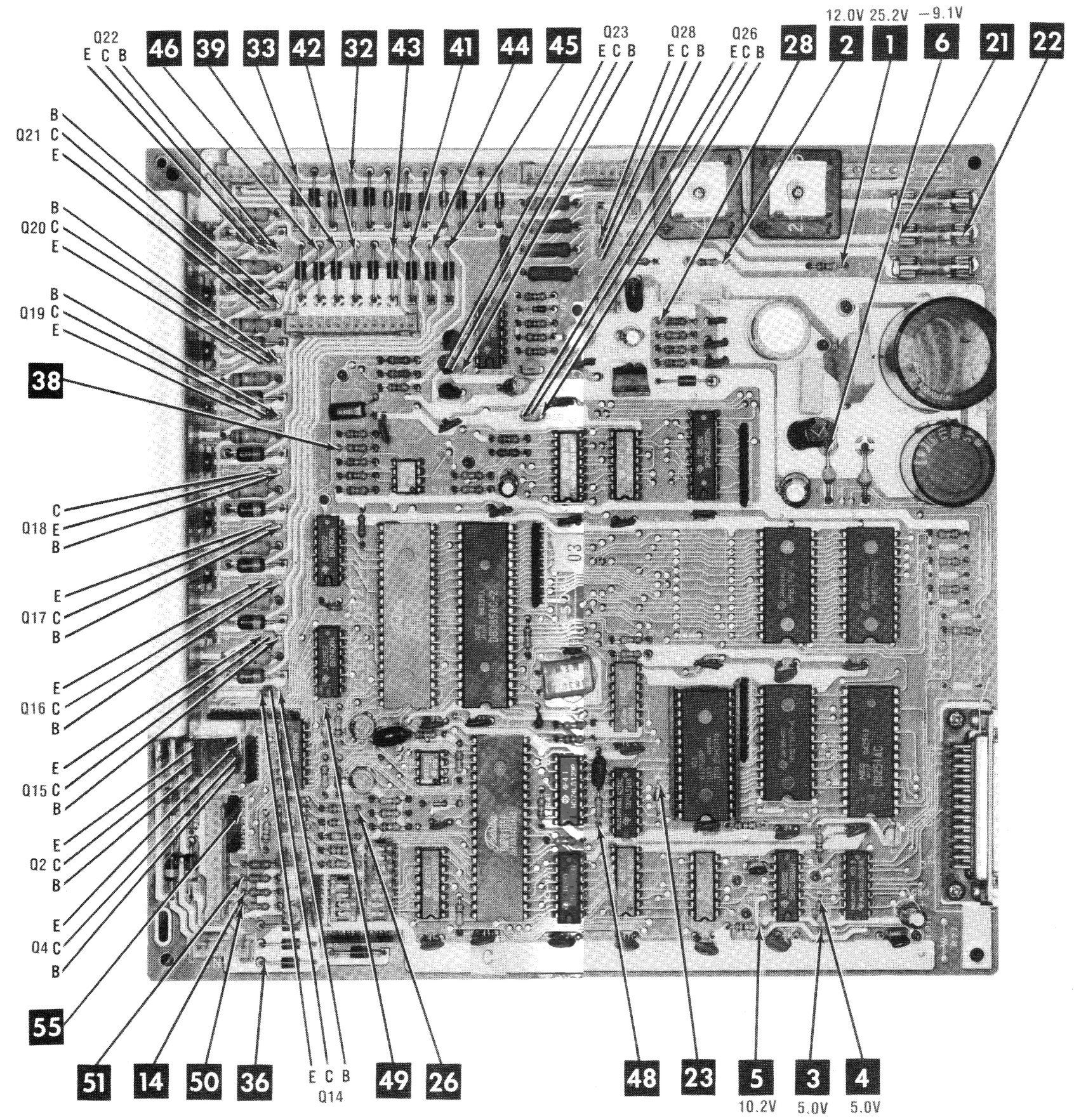
LOGIC CHART (Continued)

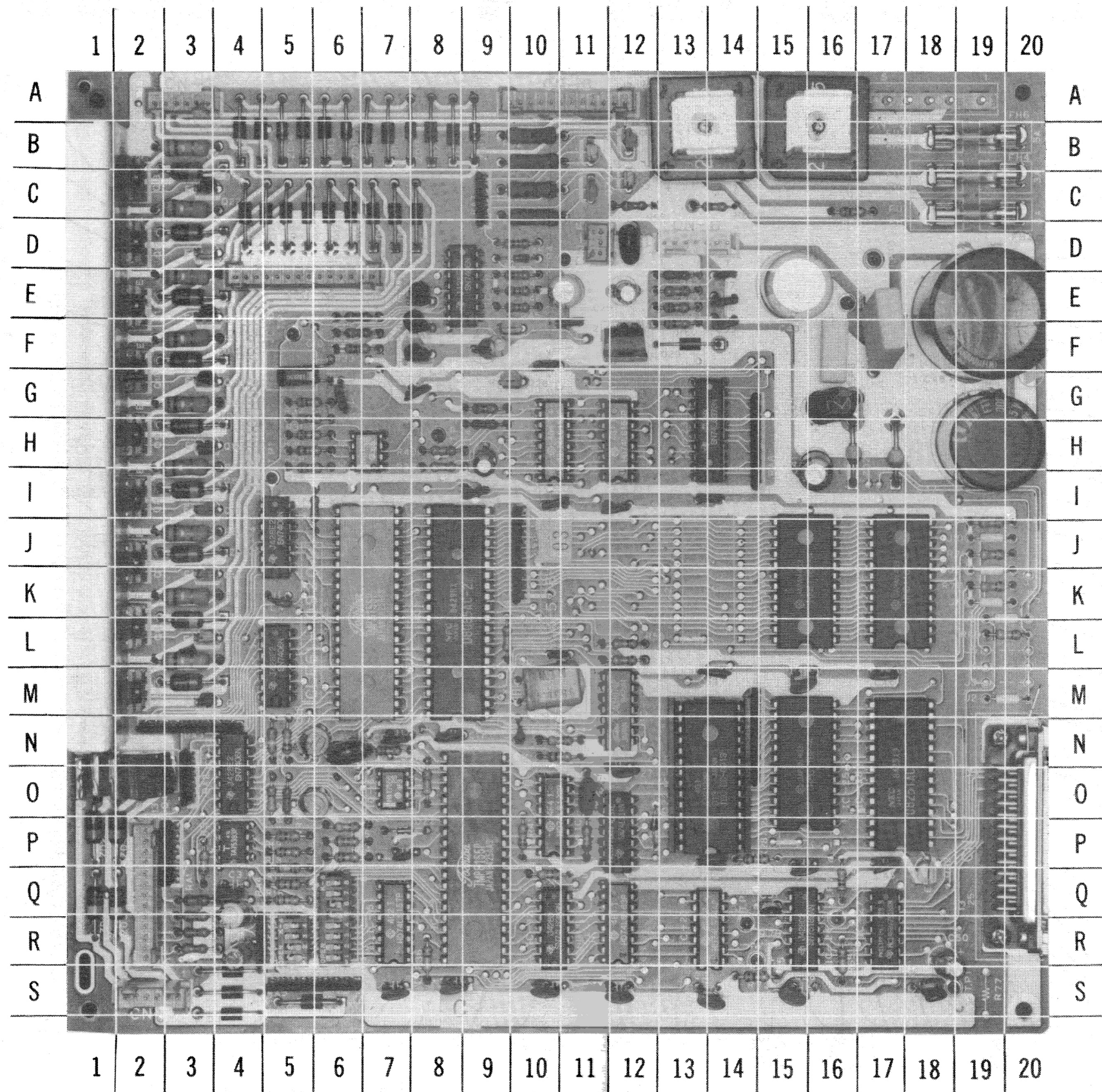
PIN NO.	IC 15	IC 16	IC 17	IC 18	IC 19	IC 20	PIN NO.	IC 21	PIN NO.	IC 21	PIN NO.	IC 22
1	H	P	H	P	(15)	H	1	H	15	P	1	P
2	P	P	L	P		P	2	P	16	P	2	P
3	L	P	H	P		P	3	P	17	P	3	P
4	H(1)	P	P	P		P	4	P	18	P	4	P
5	H(1)	H	P	P		P	5	P	19	P	5	P
6	H	L	P	P		P	6	P	20	P	6	P
7	H	L	L	P		L	7	P	21	P	7	P
8	L	H(5)	L	L		P	8	P	22	P	8	P
9	P	L(6)	H	P		P	9	P	23	P	9	P
10	H	L	P	P		H	10	P	24	P	10	P
11	H	H	L	P		P	11	P	25	P	11	P
12	H(1)	P	L	P		P	12	P	26	P	12	L
13	H(1)	P	H	P		H	13	P	27	H	13	P
14	P	H	H	P		H	14	L	28	H	14	P
15	P			P							15	P
16	H			H							16	P
											17	P
											18	P
											19	P
											20	P
											21	P
											22	P
											23	P
											24	H
PIN NO.	IC 23	IC 24	IC 25	IC 26	IC 27	PIN NO.	IC 28	PIN NO.	IC 28	PIN NO.	IC 29	
1	L	H	P	P	L	1	P	15	H	1	P	
2	P	L	P	P	H	2	P	16	L	2	P	
3	P	L	P	P	L	3	H	17	L	3	P	
4	P	L	P	P	H	4	L	18	H	4	P	
5	P	L	P	P	H	5	P	19	H	5	P	
6	P	H	P	P	L	6	P	20	P	6	P	
7	P	L	P	P	L	7	P	21	L	7	P	
8	P	L	P	P	L	8	P	22	L	8	P	
9	P	L	P	P	H	9	P	23	H	9	P	
10	L	H	P	P	H	10	P	24	H	10	P	
11	P	L	P	P	L	11	P	25	P	11	P	
12	P	L	L	L	H	12	P	26	H	12	L	
13	P	H	P	P	H	13	P	27	P	13	P	
14	P		P	P		14	L	28		14	P	
15	P		P	P						15	P	
16	P		P	P						16	P	
17	P		P	P						17	P	
18	P		P	P						18	P	
19	P		P	P						19	P	
20	H		P	P						20	P	
21			P	P						21	P	
22			P	P						22	P	
23			P	P						23	P	
24			H	H						24	H	

FOR LOGIC CHART NOTES
SEE SCHEMATIC NOTES ON PAGE 5

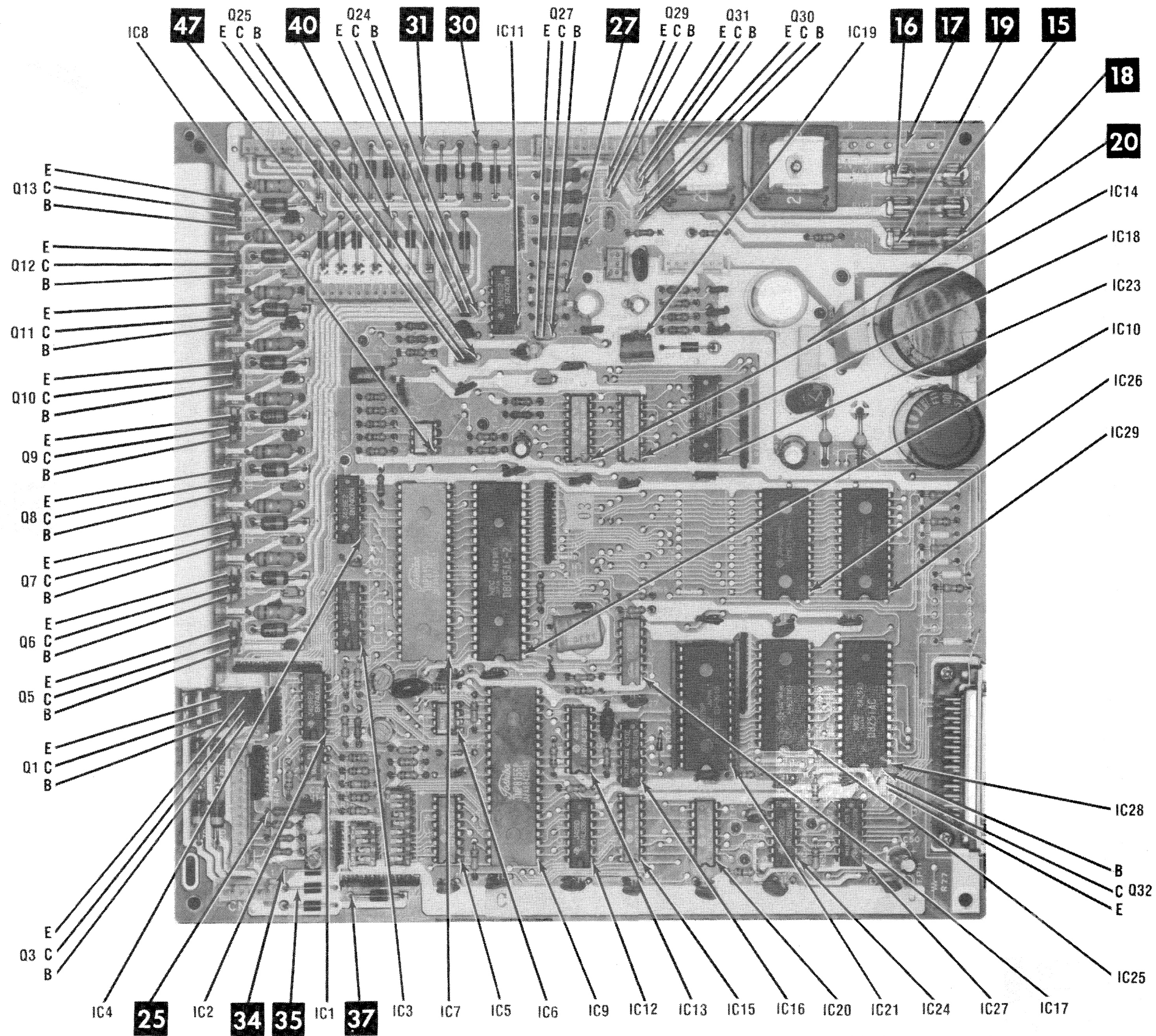








CP8
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APPLE



ARROWS ON IC'S INDICATE PIN 1 UNLESS NOTED

IC PINOUTS, TERMINAL GUIDES & SCHEMATIC NOTES

SCHEMATIC NOTES

- Circuitry not used in some versions
 - Circuitry used in some versions
 - See parts list
 - ⊥ Ground
 - Chassis
- Waveforms and voltages taken from ground, unless noted otherwise.
- Logic Probe, Voltages and Waveforms taken with Printer in Self-Test mode. DIP Switches SW1 and SW2 set as follows:

SW1	SW2
1 Open	1 Closed
2 Open	2 Closed
3 Open	3 Open
4 Open	4 Open
5 Closed	
6 Closed	
7 Open	
8 Open	

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 cm. width with DC reference voltage given at the bottom line of each waveform.

Time in μ sec. per cm, given with p-p reading at the end of each waveform.

Item numbers in rectangles appear in the alignment/adjustment instructions.

Supply voltages maintained as shown at input.

Voltages measured with digital meter, no signal.

Terminal identification may not be found on unit.

Capacitors are 50 volts or less, 5% unless noted.

Value in () used in some versions.

Measurements with switching as shown, unless noted.

Logic Probe Display

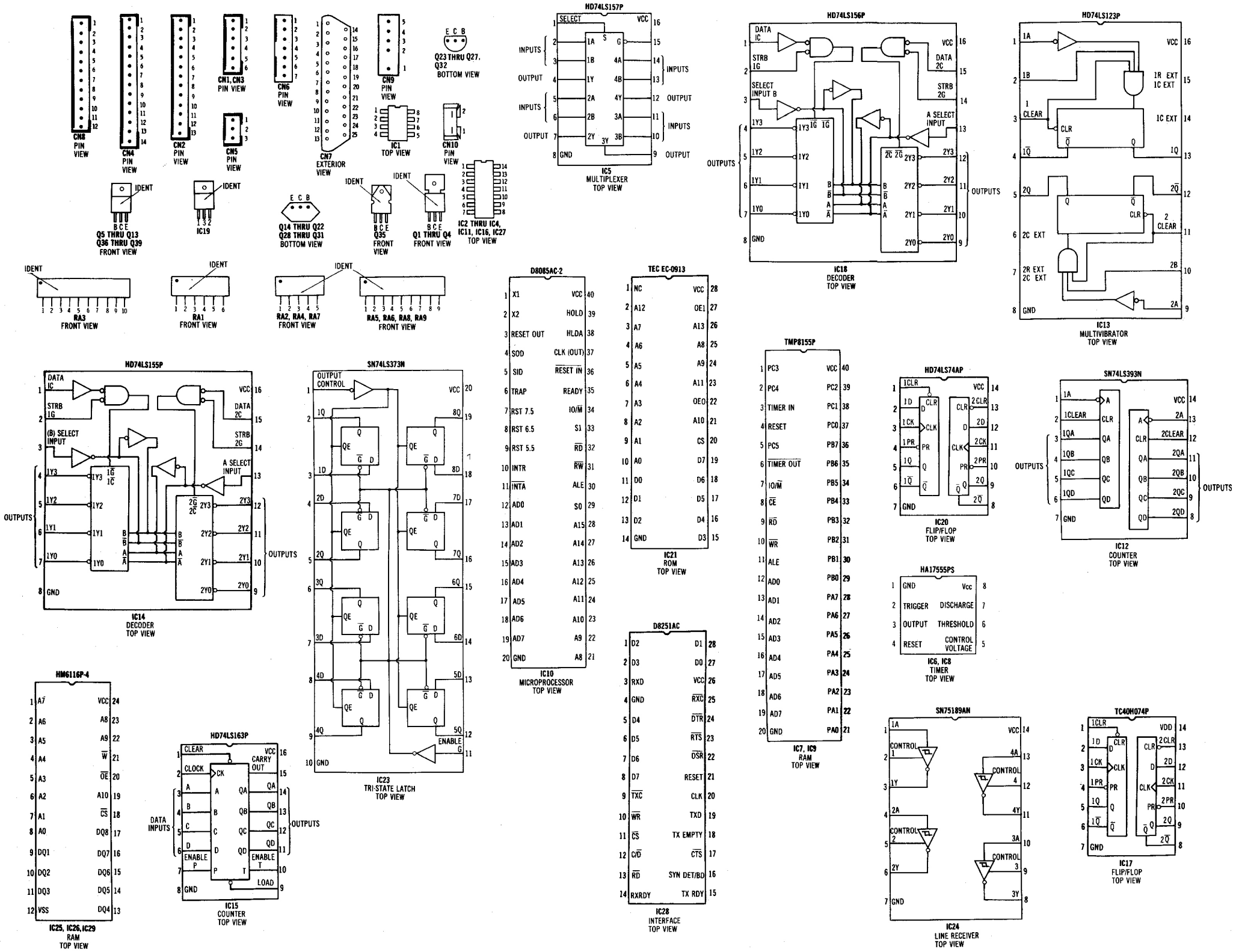
L = Low

H = High

P = Pulse

* = Open (No light On)

- (1) Probe indicates P when Print (Dot) Head reaches each end of carriage.
- (2) Probe indicates L when Print (Dot) Head reaches each end of carriage.
- (3) Probe indicates H when Print (Dot) Head reaches each end of carriage.
- (4) Probe indicates * (Open) when Print (Dot) Head reaches each end of carriage.
- (5) Probe indicates L when Print (Dot) Head reaches left end of carriage (Home Position).
- (6) Probe indicates H when Print (Dot) Head reaches left end of carriage (Home Position).
- (7) Probe indicates H when carrier cover is removed.
- (8) Probe indicates H when out of paper.
- (9) Probe indicates L when out of paper.
- (10) Probe indicates H when not printing.
- (11) Probe indicates H when Select button pressed.
- (12) Probe indicates L when Select button pressed.
- (13) Probe indicates L when Form Feed button pressed.
- (14) Probe indicates L when Line Feed button pressed.
- (15) Logic reading not taken.



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 hookup before making service checks.

Replacement or repair of the Main Board or connectors may be necessary after the malfunction has been isolated.

MISCELLANEOUS ADJUSTMENTS

CHARACTER DEVIATION

Adjust the Character Deviation Control (VR1) for a vertical deviation of .3mm or less from one line to the next line (See Figure 1). If the deviation is larger than .3mm check the Carrier Wire Tension Adjustment.

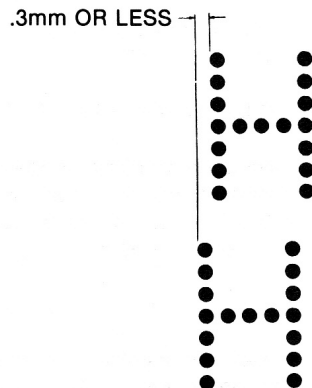


Figure 1

NOTE: Controls VR1 and VR2 are accessible from the top of the Printer. Remove the Printer cover and move the Print (Dot) Head to the left. The access holes are located on the bottom right, next to the access holes for the DIP Switches.

HOME POSITION SENSOR ADJUSTMENT

Loosen the screw holding the Home Position Sensor (M4) to the chassis. Insert some paper into the Printer. Turn the Printer On while holding down the Form Feed button to start the Self-Test. Adjust the Sensor so the left margin of the printed copy lines up with the left red mark on the paper roller shaft.

PRINT (DOT) HEAD

Ribbon Guide must be removed to set proper gap clearance between Print (Dot) Head and Platen. Loosen the screw holding the Print (Dot) Head Adjust Lever at the right end of the carrier shaft. Also, loosen the middle screw that secures the Adjust Lever to the Notch-set lever. Move Adjust Lever to position Head for a clearance of .6mm between the Head needle and the Platen. Tighten the middle screw and the carrier shaft end screw. Replace Ribbon Guide.

Alternate adjustment is accomplished with Ribbon Guide in place by setting gap clearance to a single sheet of paper. Set adjustment for a slight drag on paper as it is pulled between the Print (Dot) Head and Platen. Clearance for many copies (about 5 pieces of paper) should be adjusted to .85mm between the Head needle and the Platen.

PRINT (DOT) HEAD CHARGING TIME

Connect the input of a scope to pin 3 of Timer IC (IC6). Set the scope to 2V, .1ms sweep time and positive trigger slope. Put the Printer in Self-Test mode (See "General Operating Instructions"). Adjust the Charge Time Control (VR2) for a pulse width of .2ms.

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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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PRELIMINARY SERVICE CHECKS (Continued)

SERVICE CHECKS

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

① POWER SUPPLY

- (A) Printer Dead. Check AC Fuse (F1). If open, check for shorts at Power Transformer (T1) and at Bridge Rectifiers (SI1 and SI2) before replacing fuse and turning the Printer On.
- (B) Check for 120VAC from the White lead to the Black lead of Transformer T1 primary. If missing, check Power Switch SW1A, Noise Filter L1 and the AC cord.
- (C) Check Fuse FU3. If open, check for shorts at Bridge Rectifier SI2 before replacing fuse and turning the Printer On.
- (D) Check Fuses FU1 and FU2. If open, check for shorts at Bridge Rectifier (SI1) before replacing the fuses and turning the Printer On.
- (E) Check for 20.7VAC from pin 1 to pin 2 of Connector CN9 and 10.3VAC from pin 3 to pin 4 and pin 3 to pin 5 of Connector CN9. If any of the voltages are missing, check Power Transformer (T1).

② WILL NOT PRINT

- (A) Check for possible shorted Return Position Switch (SW6) at pins 7 and 8 of Connector CN2.
- (B) Check the Paper End Switch (SW3) for continuity at pins 4 and 5 of Connector CN6 with paper inserted in the Printer. If there is no continuity, check the Paper End Switch and leads.
- (C) Check the operation of the Home Detector Sensor (M4). Check for a logic High reading at pin 9 of IC16 while inserting a piece of paper into the slot of Sensor M4. If the reading is incorrect, check Sensor M4 and check pins 1, 2 and 3 of Connector CN6 for good connections.
- (D) Check the Carrier Cover Switch (SW8) for continuity at pins 6 and 7 of Connector CN6 with the Carrier Cover on the Printer (or use a magnet to activate the Switch SW8).
- (E) Check the ROM IC (IC21) by substitution.

③ MISSING DOTS IN PRINT PATTERN

- (A) Check for dirty or clogged Print (Dot) Head (M3) face. Clean if necessary.
- (B) Check Connector CN4 for good connections.
- (C) Check the Print (Dot) Head (M3) Coil windings for continuity (3 ohms each winding). Check from pin 9 to pins 1 thru 6, 8, 10 and 12 of Connector CN4.

④ CARRIER MOTOR MALFUNCTIONING

- (A) Check the Carrier Motor (M1), pulleys and Carrier Wire for binding.
- (B) Check the Carrier Motor (M1) windings for continuity (10 ohms each winding). Check from pin 5 to pins 1 and 3 and from pin 6 to pins 2 and 4 of Connector CN3.
- (C) Check Connectors CN3 and CN8 for good connections.

⑤ LINE FEED MOTOR MALFUNCTIONING

- (A) Check the windings on the Line Feed Motor (M2) for continuity (66 ohms each winding). Check from pin 5 to pins 2 and 4 and from pin 6 to pins 1 and 3 of Connector CN1.
- (B) Check Connector CN1 for good connections.
- (C) Check the operation of the Drive Gear Assembly on the right side of the Platen for possible broken gears.

⑥ WILL NOT PRINT BY COMPUTER COMMAND (SELF-TEST WORKS)

- (A) Check the settings of the Baud Rate Switches (SW2-1 and SW2-2) of DIP Switch (SW2). (See General Operating Instructions).
- (B) Check Connector CN7 for good connections.

⑦ PRINT DOES NOT LINE UP VERTICALLY

- (A) Check the Carrier Wire and pulleys for smooth operation and proper tension.
- (B) Check the adjustment of the Character Deviation Control (VR1). (See Miscellaneous Adjustments).

PRELIMINARY SERVICE CHECKS (Continued)

GENERAL OPERATING INSTRUCTIONS

SELECT, LINE FEED, AND FORM FEED BUTTONS

Printer is in Select mode (Ready to receive data from the Computer) when the green Select LED is On and not in Select mode when the LED is Off. Pressing the Select button once puts the Printer in Deselect mode and pressing it again puts the Printer back in Select mode. The Printer must be in the Deselect mode for the Form Feed and Line Feed buttons to function.

SELF-TEST

The Printer has a built-in Self-Test. To start the test, hold the Form Feed button down while turning the Printer On. The Printer will print a complete character set. To temporarily stop the test, press the Line Feed button once. The Line Feed and Form Feed buttons will now work. Press the Select button to continue the test. To get out of the Self-Test mode, turn the Printer Off and back On again.

Note: The carrier cover must be in place to close the Cover Interlock Switch before the Printer will operate.

EXTENDER CABLES

When servicing this unit the following extender cables are required.

NEC DRAWING NO.	DESCRIPTION
CLEBK-03201	3 pin Connector
CLEBK-03401	6 pin Connector (two needed)
CLEBK-03501	7 pin Connector
CLEBK-03601	12 pin Connector
CLEBK-03801	13 pin Connector
CLEBK-03701	Head Connector
	14 pin Connector
	5 pin Power Connector

DIP SWITCH SETTINGS

NOTE: The Dip switches are accessible from the top of the Printer. Remove the printer cover and move the Print (Dot) Head to the left. The access holes are located on the right.

SWITCH SW1

SW1-1	SW1-2	SW1-3	
Open	Open	Open	American
Closed	Closed	Open	British
Open	Open	Closed	German
Open	Closed	Closed	French
Closed	Open	Closed	Swedish
Closed	Open	Open	Italian
Closed	Closed	Closed	Spanish
Open	Closed	Open	American

SW1-4

Open
Closed

Page Length: 66 lines
Page Length: 72 lines

SW1-5

Closed
Open

Ignores 8th data bit
Recognizes 8th data bit

SW1-6

Open
Closed
Open

SW1-7

Open
Open
Closed

Pica (10 chars. per inch)
Elite (12 chars. per inch)
Ultracondensed (17 chars. per inch)
Elite proportional (144 dots per inch)

Closed

Closed

SW1-8

Closed

Adds line feed after every carriage return
No line feed after carriage return

Open

SWITCH SW2

SW2-1

Open
Closed
Open
Closed

SW2-2

Open
Open
Closed
Closed

300 Baud
1200 Baud
2400 Baud
9600 Baud

SW2-3

Open
Closed

Data terminal ready
XON/XOFF

SW2-4

Open

(Not used)

DISASSEMBLY INSTRUCTIONS

CABINET TOP

Remove the carrier cover. Remove two screws from inside the cabinet located at the front corners. Remove the paper feed knob at the right side of cabinet. Disconnect the control panel Connector CN2A. Carefully lift the cabinet front for enough clearance to slide the cabinet backward and release the rear tabs. Disconnect the Carrier Cover Switch (S8) Connector CN10.

CPU BOARD

Remove the carrier cover. Place the Printer on its back and remove four nuts holding the cabinet bottom plate. Remove

four screws holding the CPU board. Pull the CPU board out and disconnect nine connectors from the CPU board. CPU board can now be removed.

MECHANICAL ASSEMBLY

Remove paper cover, carrier cover and top cover. Remove CPU board. Disconnect the ground straps from the side frame. Remove two screws securing noise filter and carefully pull it away from frame. Remove screw from power switch plate and lift power switch out of slot. Remove four screws securing mechanical assembly to Printer base. Lift assembly out of the Printer base. Reinstall in reverse order.

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.

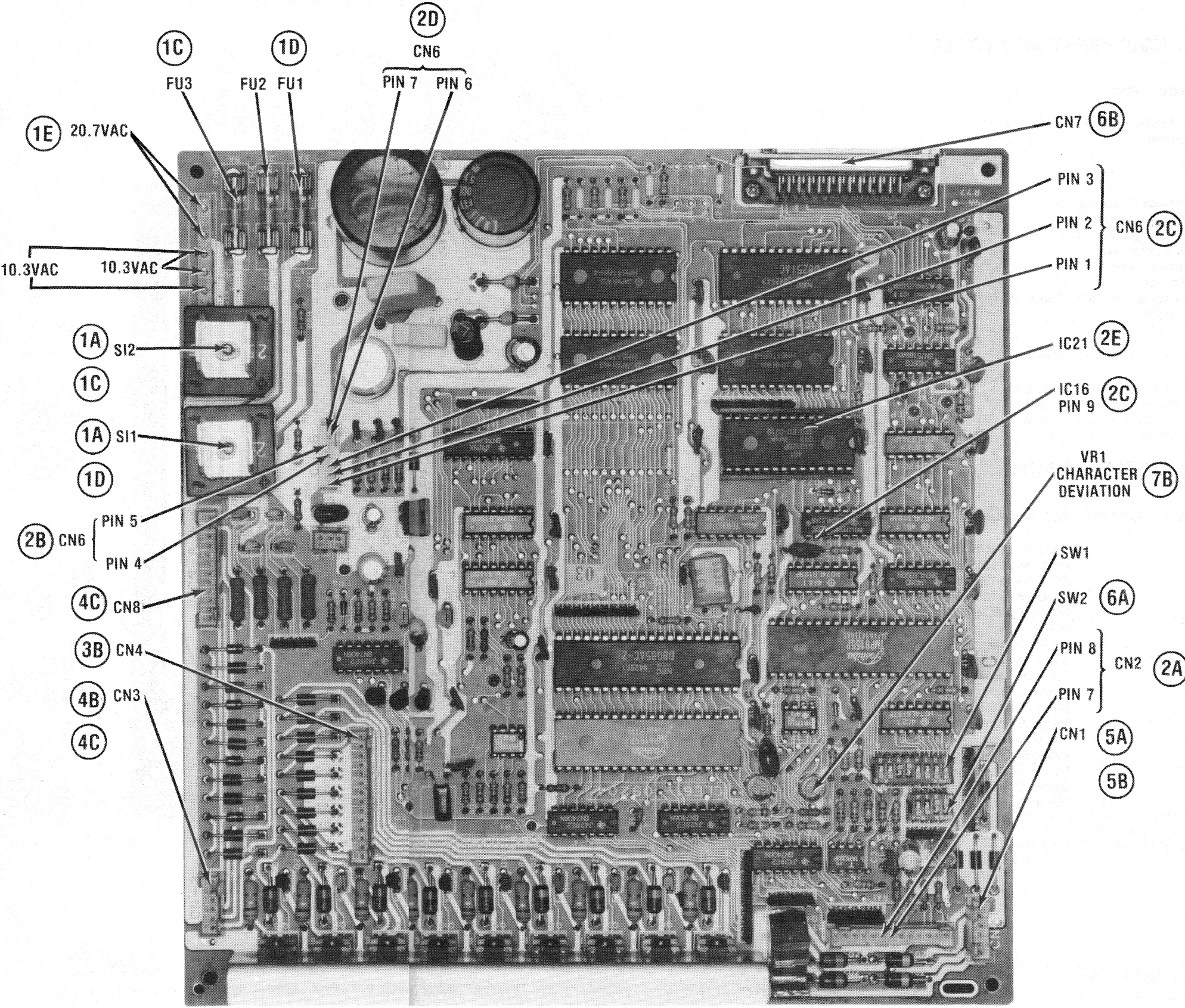
MONITOR

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.

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PRELIMINARY SERVICE CHECKS (Continued)

PRELIMINARY SERVICE CHECKS (Continued)



PRELIMINARY SERVICE CHECKS (Continued)

TEST EQUIPMENT AND TOOLS

TEST EQUIPMENT

Digital Volt/Ohm Meter
Logic Probe

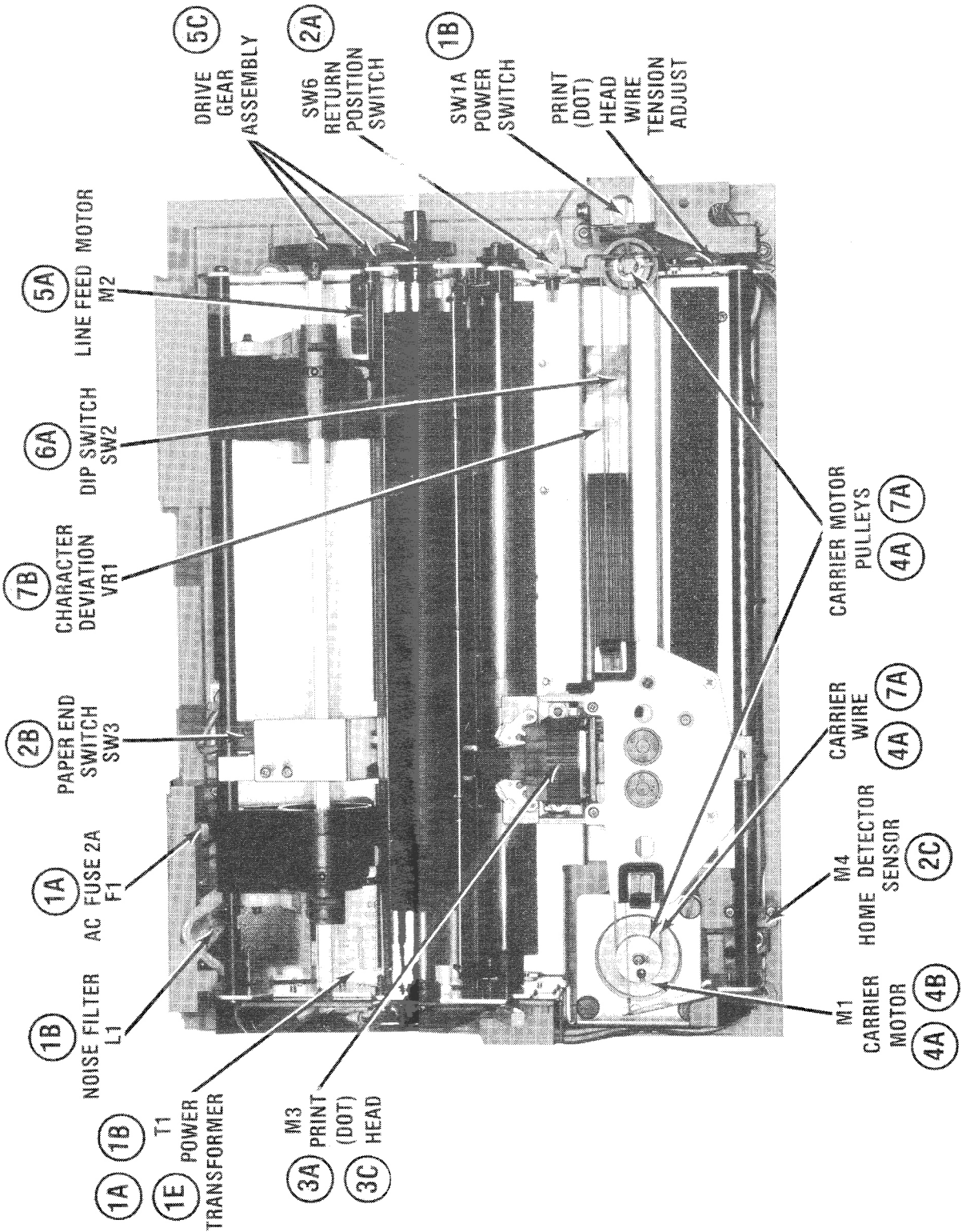
TOOLS

Low Wattage Soldering Iron
Desoldering Equipment
Head Cleaning Equipment
Phillips Screwdriver
Flat Blade Screwdriver
9/32" Socket
IC Insertion and Removal Tools 28 pin
Small Magnet

REPLACEMENT PARTS

ITEM NO.	PART NO.	DESCRIPTION
F1		Fuse, 2A @250V Fast Acting
FU1		Fuse, 3A @125V Slow Blow
FU2		Fuse, 3A @125V Slow Blow
FU3		Fuse, 5A @125V Slow Blow
IC21		ROM (TEC EC-0913)
L1		Noise Filter
M1		Carrier Motor
M2		Line Feed Motor
M3		Print (Dot) Head
M4		Home Detector Sensor (ON1102)
SI1		Bridge Rectifier (S5VB)
SI2		Bridge Rectifier (S5VB)
SW1A		Power Switch
SW3		Paper End Switch
SW6		Return Position Switch
SW8		Carrier Cover Switch
T1		Power Transformer

PRELIMINARY SERVICE CHECKS (Continued)



MECHANICAL-TOP VIEW

PRELIMINARY SERVICE CHECKS (Continued)



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