

COMPUTERFACTS™

Technical Service Data

OKIDATA® OKIMATE 20 (MODEL EN3211) PRINTER



FEATURES COMPLETE SCHEMATICS • PRELIMINARY SERVICE CHECKS • TROUBLESHOOTING TIPS •
EASY-READ WAVEFORMS • REPLACEMENT PARTS LISTS • SEMICONDUCTOR CROSS-REFERENCE

PRELIMINARY SERVICE CHECKS

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

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

Always turn Printer Off before connecting or disconnecting connectors, boards or Computer.

Replacement or repair of the Power Supply, Driver Board, Interface Board or connectors may be necessary after the malfunction has been isolated.

TEST EQUIPMENT

Digital Volt/Ohm Meter
Resistor, 390 Ohms, 1/2W
Resistor, 30 Ohms, 10W

TOOLS

Head Cleaning Equipment (Ethyl Alcohol)
Contact and Switch Cleaner (non-spray type)
Phillips Screwdriver
Flat-Blade Screwdriver
IC Insertion and Removal Tools 28 pin
Low Wattage Soldering Iron
Desoldering Equipment

REPLACEMENT PARTS AND DESCRIPTION

| | |
|-----|---------------------------------|
| F | Fuse 2A |
| Q1 | Transistor (Power Supply Board) |
| SI1 | Bridge Rectifier |
| SW | On-Off Switch |
| L1 | Coil |
| R1 | Resistor, 5.1 Ohms 3W |
| M7 | Print Head |
| Q1 | ROM IC |
| M1 | Line Feed Motor |
| M5 | Home Position Sensor |
| M2 | Carriage Motor |
| SW3 | Ribbon End Switch |
| M4 | Paper End Sensor |

PRELIMINARY SERVICE CHECKS (Continued)

DISASSEMBLY INSTRUCTIONS

CABINET REMOVAL

Remove ribbon cartridge and carriage assembly cover. Remove two screws located in front of Carriage assembly holding cabinet top to chassis. Push cabinet top toward rear to release tabs on inside rear edge and lift up rear. When rear edge is clear of chassis, move top forward to clear front tabs and lift top from Printer.

PRINTER MECHANISM REMOVAL

Remove Control Panel cover. Disconnect Connectors CN4 thru CN8.

NOTE: Lift up cap on Connector CN6 before pulling flat ribbon cable out.

Remove three screws holding mechanism to cabinet bottom.

POWER SUPPLY AND DRIVER BOARD REMOVAL

Remove cabinet top and Printer mechanism. Remove two screws holding Power Supply Board to cabinet bottom. Push back tabs holding front of Driver Board and lift Driver and Power Supply Boards from cabinet.

CARRIAGE MOTOR ASSEMBLY REMOVAL

Remove cabinet top. Disconnect Connector CN6 from Driver Board. Remove two screws holding motor assembly and remove assembly.

PAPER FEED MOTOR REMOVAL

Remove Printer mechanism. Disconnect Connector CN8 from Driver Board. Remove two screws holding Paper Feed Motor and remove Motor.

BELT REMOVAL

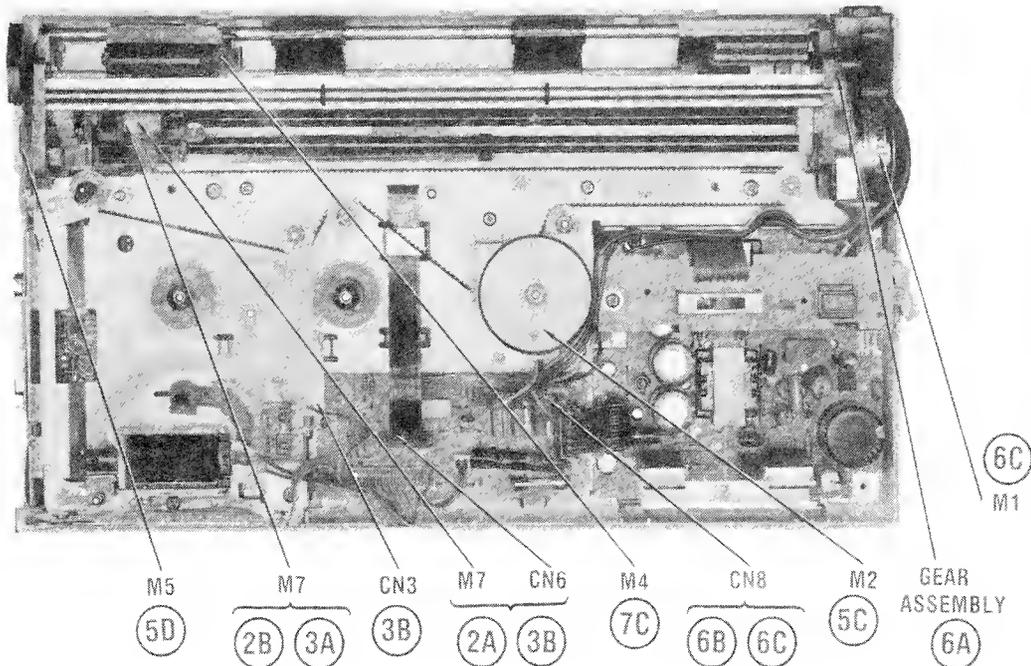
Remove cabinet top and Control Panel cover. Remove Carriage Motor assembly. Remove two springs from metal linkage going from Head Hold Solenoid to left belt gear (one spring at each end of the link). Insert a flat-blade screwdriver between left belt gear and metal link. Pry link and ribbon stop lever off gear post, note position of ribbon stop lever for reassembly. Remove belt from Print Head assembly and gear pulleys.

RIBBON REMOVAL

Turn Power Off. Lift ribbon access cover. Pull back on Print Head assembly until it snaps back. Lift used ribbon cartridge out. Place new cartridge into compartment, rear end first. While lowering front end, make sure ribbon is in front of Print Head and behind ribbon guides. Snap head back into printing position.

REPLACING PRINT HEAD

Remove ribbon cartridge. Pull back on Print Head Lock Lever, directly behind Print Head. Lift Print Head straight up out of holder.



CHASSIS-OVERALL VIEW

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.

PRINTER DEAD

- ① (A) Check Fuse F on Power Supply Board. If open, check for possible shorts at Diode S11 and Oscillator Transistor (Q1).
- (B) If Fuse F is good, apply power and check for 167V at the cathode of Diode S11. If 167V is missing, check On-Off Switch (SW), Coil L1, Resistor R1 and Diode S11.
- (C) If 167V is present at Diode S11, check for 14.4V at pin 1 of Connector CN9 on Driver Board. If reading is not correct, check adjustment of Voltage Adjust Control (VR).
- (D) If 14.4V is missing at pin 1 of Connector CN9, turn Power Off, disconnect Connector CN9 and connect a 390 Ohms resistor from pin 3 to pin 4 and a 30 Ohms 10W load from pin 1 to pin 6 of Connector CN on Power Supply. Apply power and recheck Power Supply output voltages. If voltages are still missing, troubleshoot Power Supply Board. If voltages return, troubleshoot Driver and Interface Boards.

② PRINT HEAD WILL NOT PRINT

- (A) Check Print Head (M7) connections and Connector CN6. Check Print Head Ribbon Cable.
- (B) Examine element points on Print Head. If elements appear dirty, clean Head with a soft cloth dampened with ethyl alcohol. If elements appear white, substitute Print Head.

③ MISSING DOTS IN THE PRINT PATTERN

- (A) Clean Print Head face with a soft cloth dampened with ethyl alcohol.
- (B) Check Print Head connections and Connectors CN3 and CN6.

④ PRINTER WILL NOT PRINT BY COMPUTER COMMAND

- (A) Check Connector CN2 on Interface Board.
- (B) Check settings of DIP Switches SW1 and SW2 on Interface Board. See "Switch Settings" for a list of the various settings.

- (C) Check ROM IC (Q1) by substitution.

⑤ PRINTER CARRIAGE ASSEMBLY

- (A) Carriage assembly does not move. Check carriage assembly belt, gears and pulleys.
- (B) Check Connectors CN3, CN5, CN7 and CN9.
- (C) Check Carriage Motor (M2) windings for continuity. Check for 14 Ohms from pin 1 to pin 5, pin 3 to pin 5, pin 2 to pin 6 and pin 4 to pin 6 of Connector CN7.
- (D) Carriage assembly moves to right only and stops. Check operation of Home Position Sensor. Check for 4.5V at pin 8 of Connector CN5 when Print Head is at Home Position and 0V when Head is not at Home Position. If readings are not correct, check pins 6, 7 and 8 of Connector CN5 and the Home Position Sensor (M5).

⑥ LINE FEED WILL NOT OPERATE

- (A) Check Line Feed gear assembly on right side of platen.
- (B) Check Connector CN8.
- (C) Check windings of Line Feed Motor (M1) for continuity. Check for 7 Ohms from pin 1 to pin 5, pin 3 to pin 5, pin 2 to pin 6 and pin 4 to pin 6 of Connector CN8.

⑦ READY LED BLINKS

- (A) Ready LED blinks, pressing Select Switch has no effect. Check pins 1 thru 5 of Connector CN5.
- (B) Turn Printer Off. Check operation of Ribbon End Switch (SW3) with an ohmmeter at pins 1 and 2 of Connector CN5. The reading should be zero ohms with Switch activated and Infinity with Switch not activated.
- (C) Turn Printer On and check operation of the Paper End Sensor (M4). Check for 5.0V at pin 1 of Connector CN5 with paper in Printer and 0V with no paper.

NOTE: The Ribbon End Switch must not be activated.

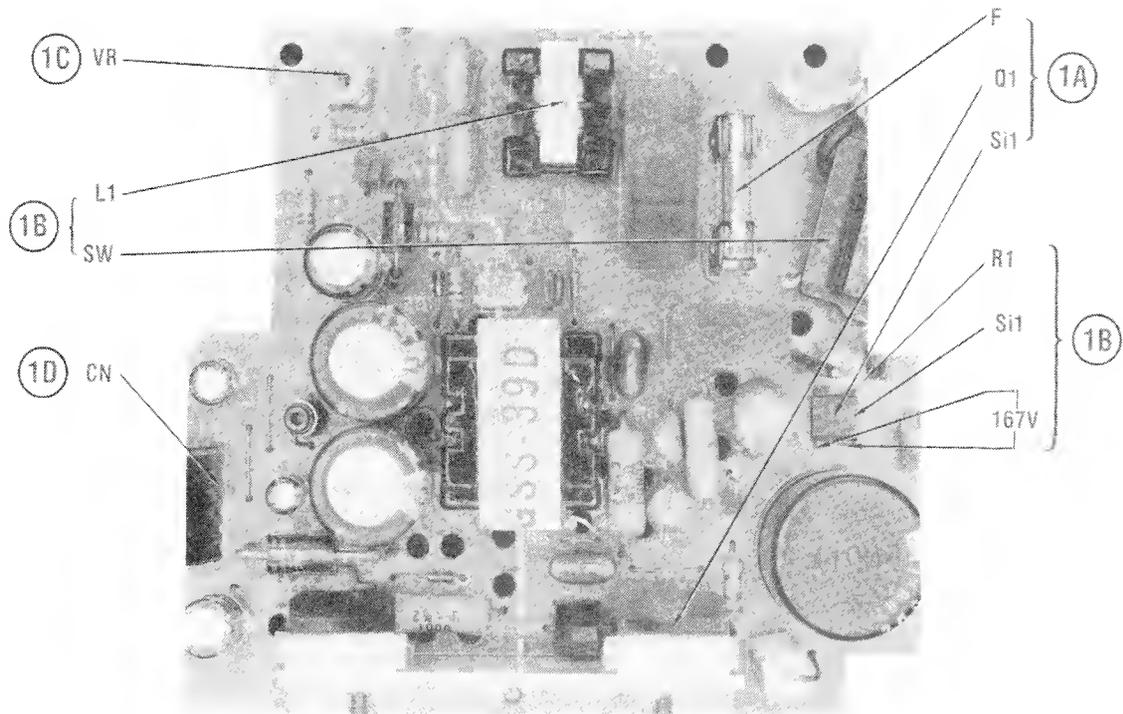
If readings are not correct, check Paper End Sensor (M4).

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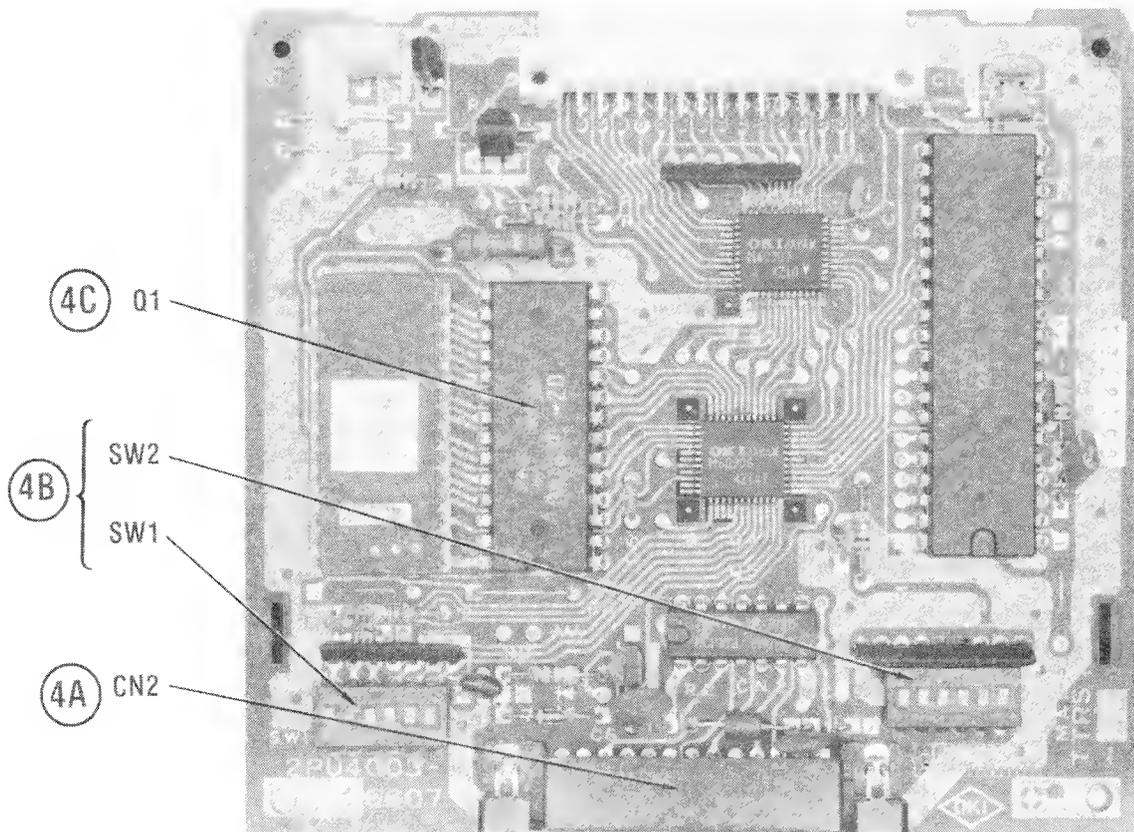
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PRELIMINARY SERVICE CHECKS (Continued)

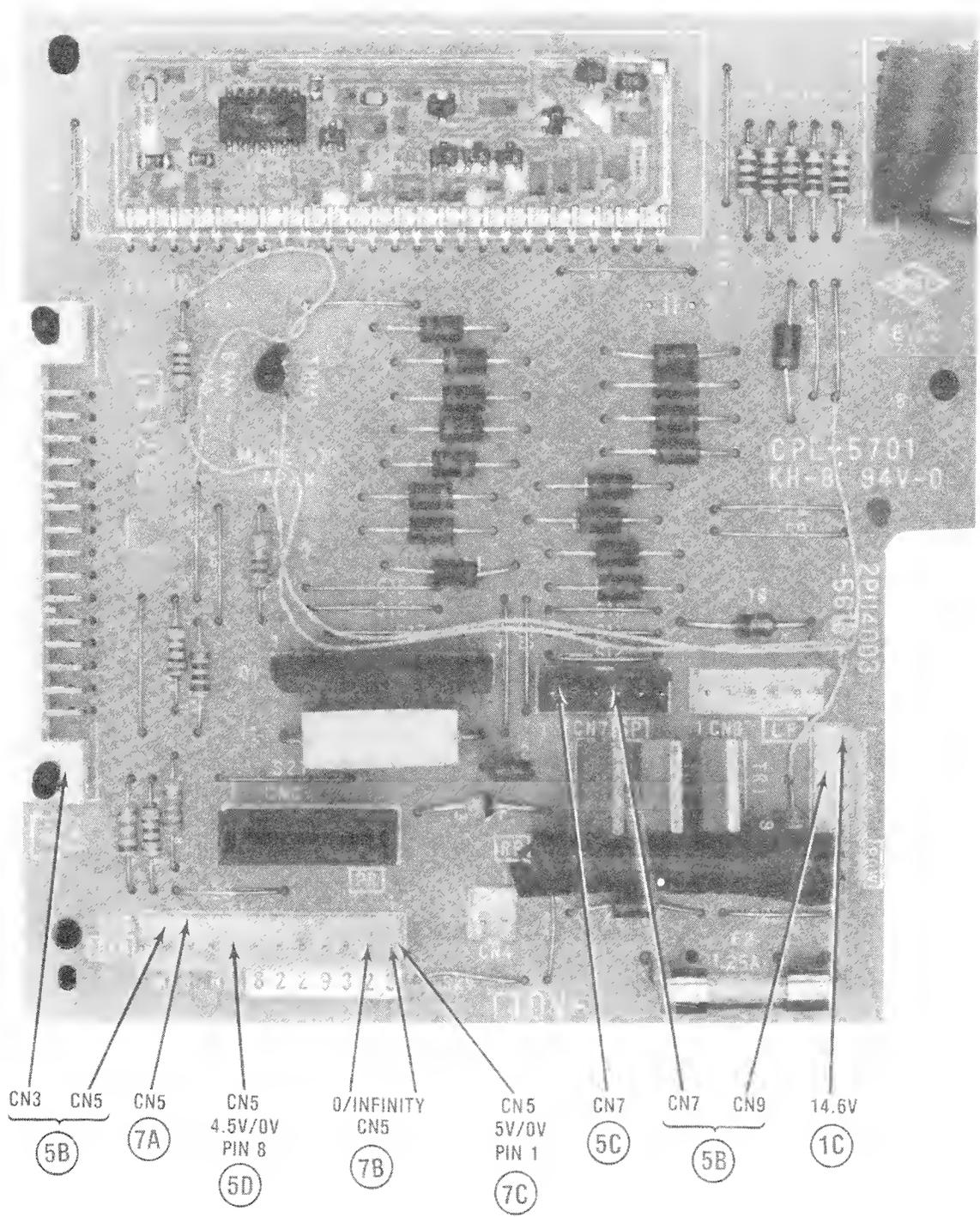


POWER SUPPLY BOARD



INTERFACE BOARD

PRELIMINARY SERVICE CHECKS (Continued)



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PRELIMINARY SERVICE CHECKS (Continued)

GENERAL OPERATING INSTRUCTIONS

SELF-TEST

Self-Test continuously prints the character set. To start test, hold Select button down while turning Printer On. Continue to hold Select button for two seconds, then release it. To stop test, press Select button.

NOTE: Do not use a colored ribbon when running Self-Test.

DARKNESS BUTTON

Slide Darkness button to left to print lighter, to right to print darker.

SELECT BUTTON

Press Select button once to pause, ready LED will start blinking. To Form Feed, pause Printer, press and hold Select button for two seconds.

SWITCH SETTINGS

Serial Interface Board Switches

| <u>SWITCH SW1</u> | <u>ON</u> | <u>OFF</u> | <u>SWITCH SW2</u> | <u>ON</u> | <u>OFF</u> |
|-------------------------------------------|-----------|------------|--------------------------------|-----------|------------|
| 300 Baud | | 1,2 | Spanish Characters | 1 | |
| 1200 Baud | 1 | 2 | ASCII Characters | | 1 |
| 4800 Baud | 2 | 1 | 17.1 CPI (Characters per inch) | 2 | |
| 9600 Baud | 1,2 | | 10 CPI | | 2 |
| 7 Bit with parity | 3,4 | | Auto LF (linefeed) On | 3 | |
| 8 Bit with parity | 3 | 4 | Auto LF Off | | 3 |
| 8 Bit without parity | | 3,4 | IBM Character Set #1 | | 4 |
| Even parity | 5 | | IBM Character Set #2 | 4 | |
| Odd parity | | 5 | Draft Quality | 6 | |
| X-ON/X-OFF Protocol | | 6 | Correspondence Quality | | 6 |
| Ready/Busy Protocol | 6 | | | | |
| Space at printer ready (Ready=High, +) | 5 | | | | |
| Mark at printer ready (Ready=Low, -) | | 5 | | | |

MISCELLANEOUS ADJUSTMENTS

POWER SUPPLY VOLTAGE ADJUSTMENT

Connect input of a DC voltmeter to pin 1 of Connector CN9 on Driver Board. Adjust Voltage Adjust Control (VR) for 14.4V.

PRINT HEAD CLEARANCE

Remove cabinet top. Loosen Phillips screw holding Head Hold Solenoid to Printer chassis. Move Solenoid to align metal slide-bar index marker with index marker on plastic end piece.

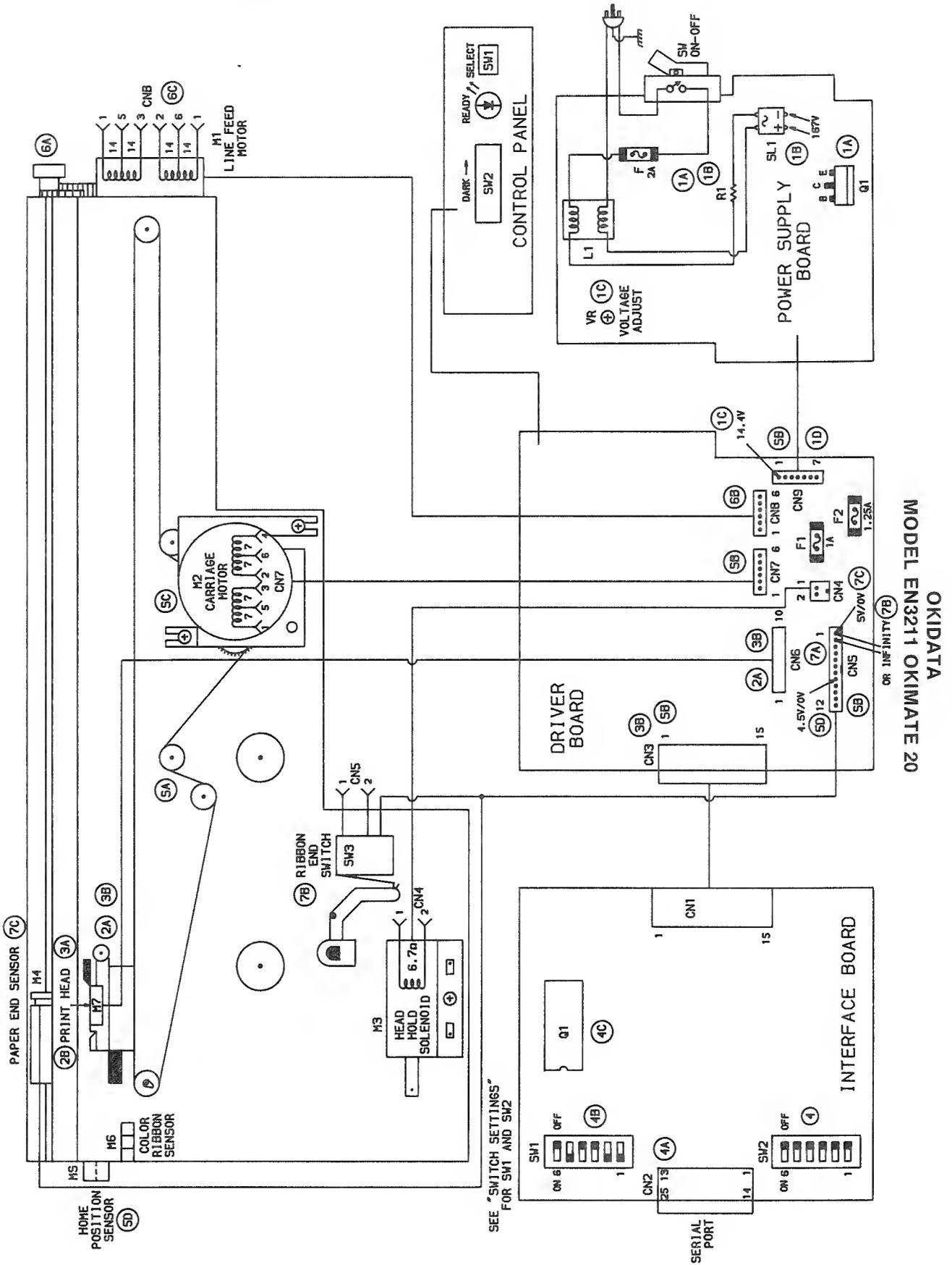
NOTE: Head Hold Solenoid is not activated while making this adjustment.

Clearance between ribbon guide and platen and between ribbon guide and ribbon stop rubber should be .02 to .04 inch (5 to 1mm). Tighten Solenoid mounting screw.

BELT TENSION

Remove cabinet top. Loosen two screws holding Carriage Motor. Measure tension of belt by hooking a tension gauge in hole located on left front of the Carriage Motor. Pull gauge until a tension of $.66 \pm .066$ pounds (300 ± 30 grams) is reached and tighten Motor mount screws.

PRELIMINARY SERVICE CHECKS (Continued)



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SEE "SWITCH SETTINGS"
FOR SW1 AND SW2

INTERCONNECTING DIAGRAM

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 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-interruptible 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 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.

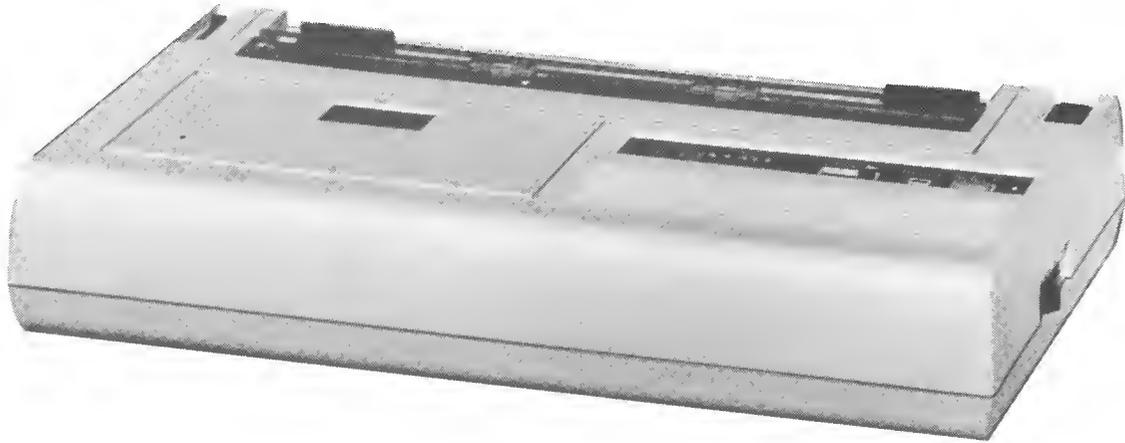
STATIC ELECTRICITY

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 period 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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SAFETY PRECAUTIONS

See Page 29

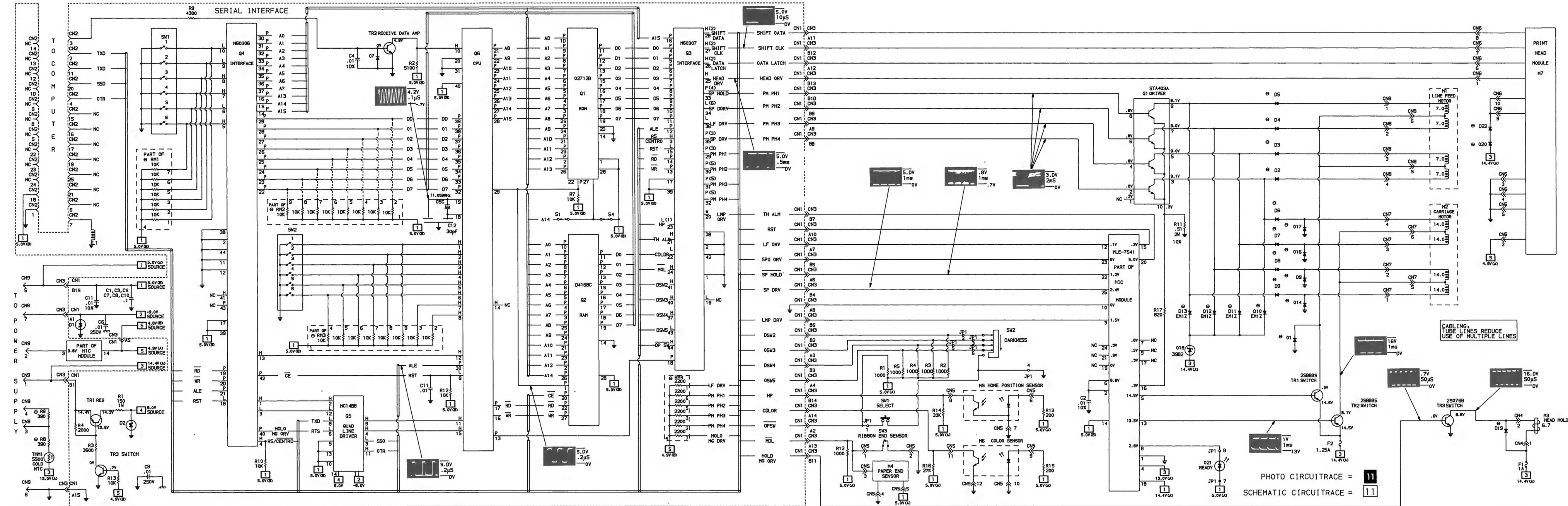
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The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co. as to the quality and suitability of such replacement part. The numbers of these parts have been compiled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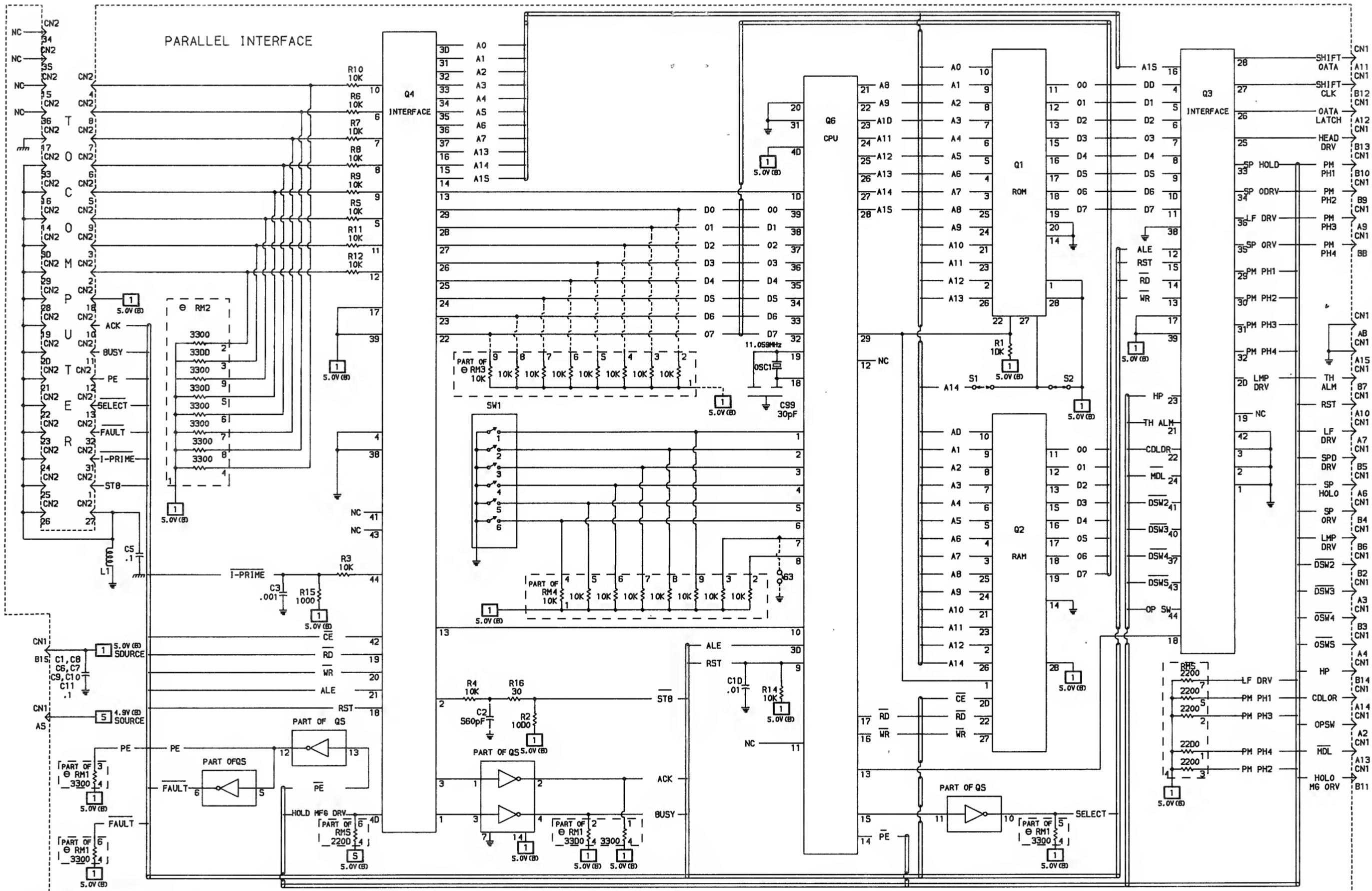


A PHOTOFACIT STANDARD NOTATION SCHEMATIC

WITH CIRCUITRACE

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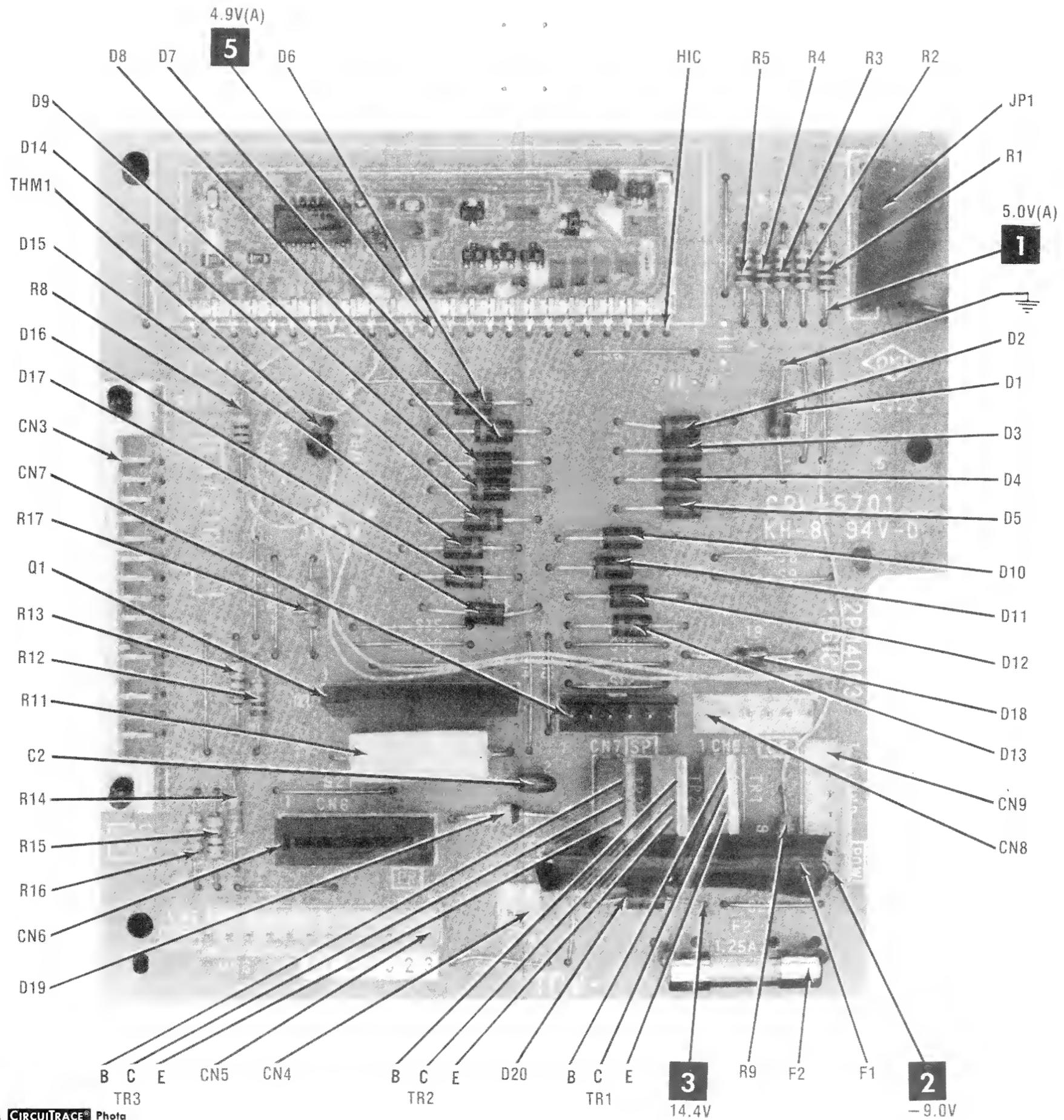


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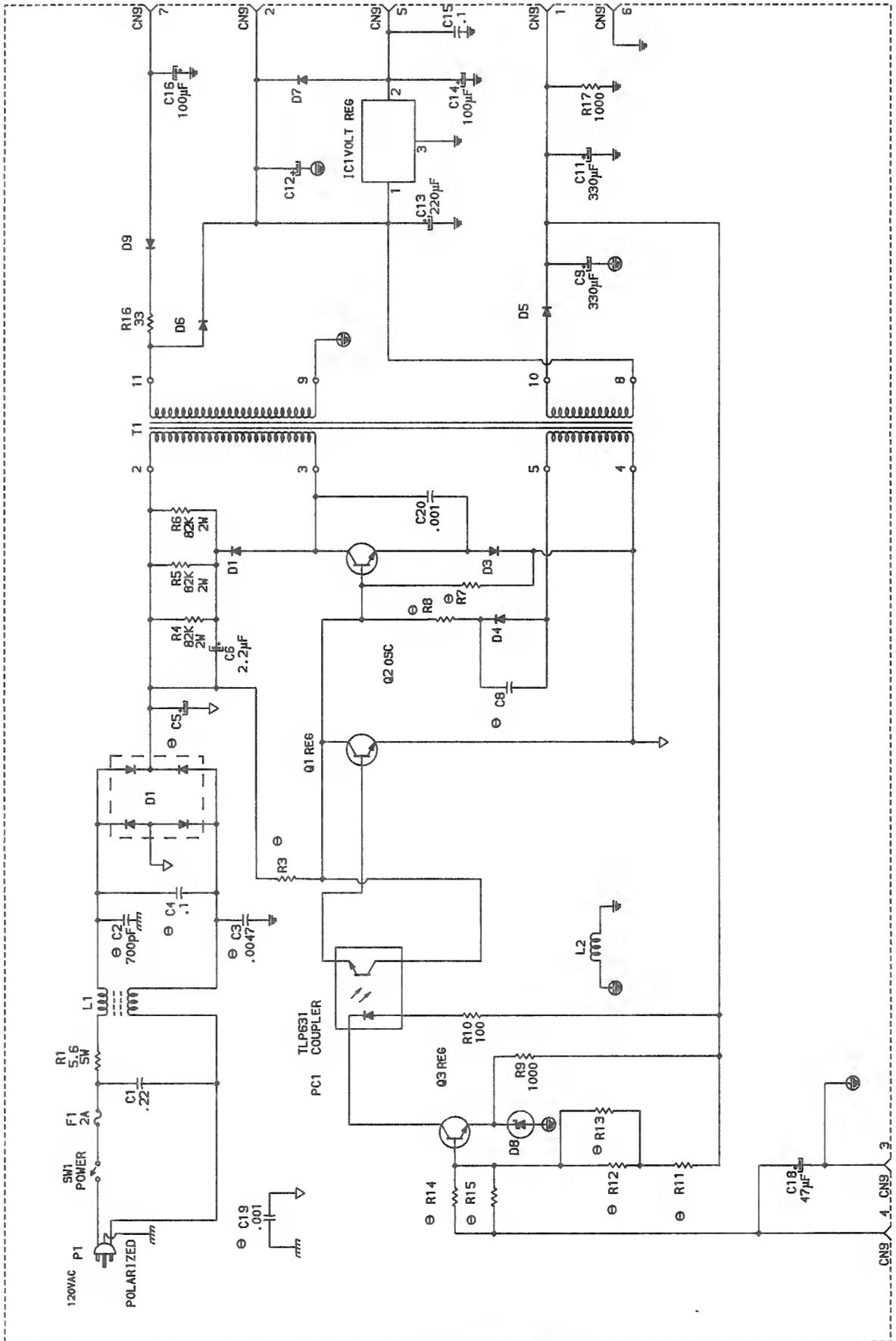
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A PHOTOFACIT STANDARD NOTATION SCHEMATIC

WITH **CIRCUITRACE**



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A PHOTOFAC STANDARD NOTATION SCHEMATIC

WITH **CIRCUTRACE**

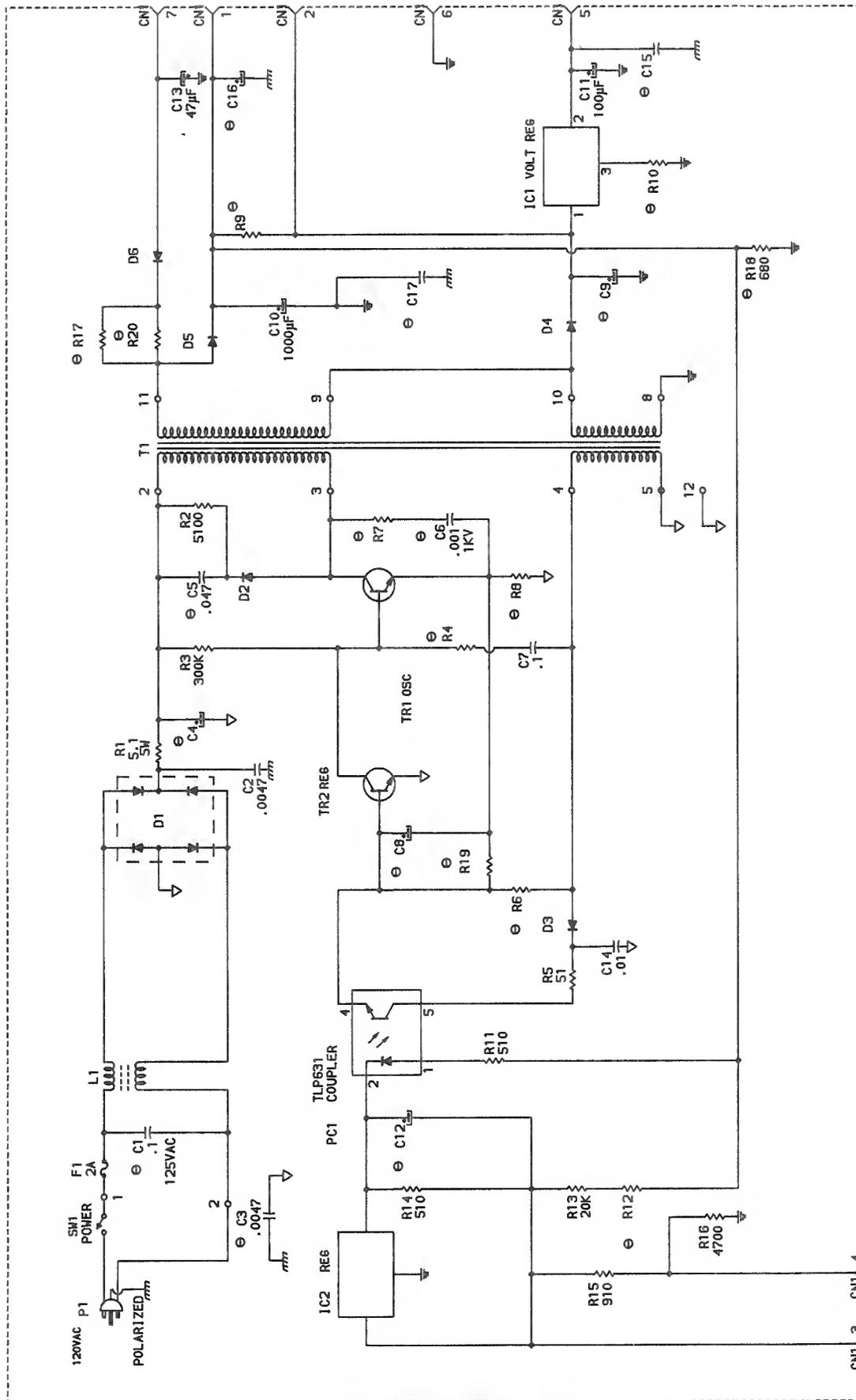
ALTERNATE POWER SUPPLY

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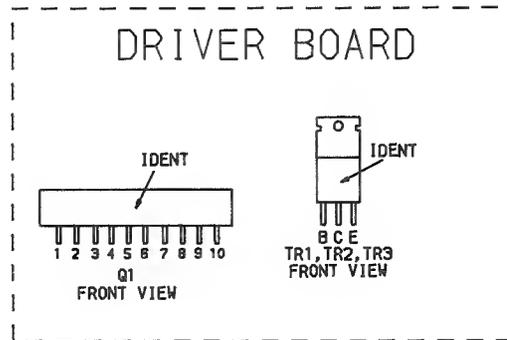
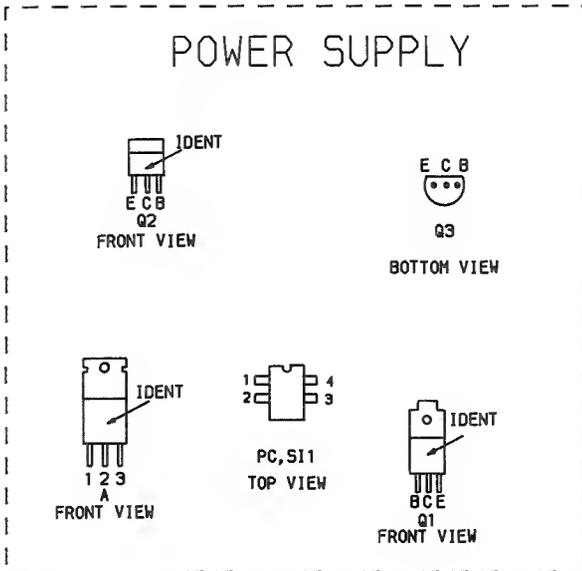
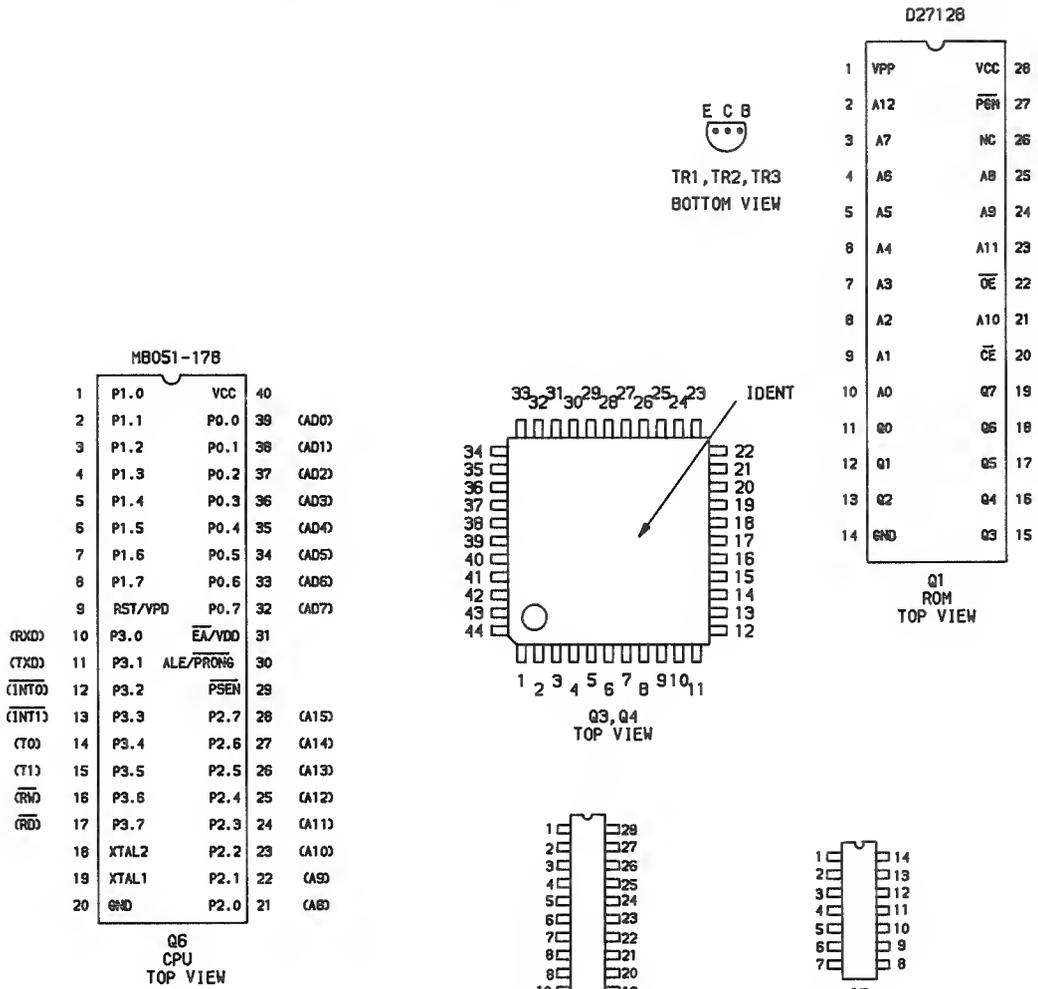
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ALTERNATE POWER SUPPLY

IC PINOUTS & TERMINAL GUIDES



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 | B & K Precision Equipment No. | Sencore Equipment No. | Notes |
|-------------------------------------------------|-------------------------------|------------------------|-------|
| OSCILLOSCOPE | 1570A,1590A,1596 | SC61 | |
| LOGIC PROBE | DP51,DP21 | | |
| LOGIC PULSER | DP101,DP31 | | |
| DIGITAL VOM | 2830,2806 | DVM37,DVM56,SC61 | |
| ANALOG VOM | 277,111,116 | | |
| ISOLATION TRANSFORMER | TR110,1604,1653,1655 | PR57 | |
| FREQUENCY COUNTER | 1803,1805 | FC71,SC61 | |
| COLOR BAR GENERATOR | 1211A,1251,1260,1249 | CG25,VA62 | |
| RGB GENERATOR | 1260,1249 | | |
| FUNCTION GENERATOR | 3020,3011,3030 | | |
| HI-VOLTAGE PROBE VOM/DMM Accessory probes | HV-44 PR-28(HV) | HP200 | |
| TEMPERATURE PROBE | TP-28,TP-30 | | |
| CRT ANALYZER | 467,470 | CR70 | |
| DIGITAL IC TESTER | 560,550,552 | | |
| CAPACITANCE ANALYZER | | LC53,LC75,LC76 LC77 | |
| INDUCTANCE ANALYZER | | LC53,LC75,LC76 LC77 | |

TROUBLESHOOTING

POWER SUPPLY

NOTE: Use an isolation transformer with a step down control when servicing power supply.

Disconnect Connector CN9 from Driver Board to avoid possible damage to Printer from high voltage that may be produced while servicing Power Supply.

NOTE: Power Supply will not operate properly if Connector CN9 is disconnected from Driver Board unless the proper bias and load Resistors are connected to Connector CN9.

Connect a 390 ohms 1/2W bias Resistor from pin 3 to pin 4 and 4700 ohms 1/2W bias Resistor from pin 3 to pin 5 of Connector CN9. Also connect a 30 ohms, 10W load Resistor from pin 1 to pin 6 and a 10 ohms, 10W load Resistor from pin 5 to pin 6 of Connector CN9.

POWER SUPPLY DEAD

Check Fuse F. If fuse is open, check for possible shorts at Bridge Rectifier S11 and Oscillator Transistor (Q1). If fuse is good, apply AC power and check for 120V AC at the AC Input pins of S11. If 120V AC is missing, check Resistor R1, Coil L1 and Switch SW. If 120V AC is present, check for 167V at the cathode of S11. If 167V is missing, check S11. If 167V is present, check waveform at base of

Oscillator Transistor (Q1). If waveform is missing, check voltages and components associated with Q1 and Regulator Transistor (Q2) and check Transformer TR.

The 14.4V Source is missing. Check Coil L2, Diode Si2, Capacitor C11 and check the winding on Transformer TR from pin 6 to pin 7 for continuity.

The 14.6V source is not correct and adjusting voltage Adjust Control VR has no affect. Check voltage and components associated with Error Amp Transistor (Q3) and Optoisolator (PC).

Regulated 5.0V source is not correct or missing. Check 5V Regulator IC (A), Diode Si3, Capacitors C14 and C15 and check winding on Transformer TR from pin 8 to pin 9 for continuity.

The -9.0V source is missing at pin 7 of Connector CN9 on Driver Board. Check Diode Si4, Capacitor C16 and Resistor R15 on Power Supply Board and Zener Diode D1 and Capacitor C6 on Interface Board.

The 9.0V source is missing on the Interface Board (cathode of Zener Diode D2). Check Zener Diode D2 and the voltages and components associated with Regulator Transistor (TR1) and Switch Transistor (TR3) on Interface Board.

TROUBLESHOOTING (Continued)

CPU OPERATION

Check for a 11.059MHz waveform at pin 19 of CPU IC (Q6) on the Interface Board. If waveform is missing or frequency not correct, check Crystal X1, Capacitor C12 and IC Q6. Check Reset logic at pin 9 of IC Q6 while turning Printer On. The logic should be High then immediately go Low and stay Low. If logic is not correct, check Capacitors C11 and C2, Resistor R12, IC Q6 and Module HIC.

PRINT HEAD

Print Head not printing or dots are missing (Head Hold Solenoid works). Examine element points on Print Head. If element points appear dirty, clean Head with a soft cloth dampened with ethyl alcohol. If element points appear white, Print Head may be bad. Substitute Print Head and check Printer operation. If Print Head is good, check Print Head contacts, pins 1 thru 10 of Connector CN6 on Driver Board and pins A11, A12, B12 and B13 of Connector CN3 on Driver Board and CN1 on Interface Board for good connections. If connections are good, check for 14.2V at pin 10 of Connector CN6. If 14.2V is missing, check Diode D20. If 14.2V is present, check Interface IC (Q3) on the Interface Board.

PRINT HEAD HOLD SOLENOID DOES NOT WORK

Check Fuse F1 on the Driver Board. If Fuse is open, check for a possible shorted Head Hold Solenoid (M3), Diode D19 or Solenoid Switch Transistor (TR3). If Fuse is good, check Connector CN4 and pin B11 of Connector CN3 for good connections and check Solenoid M3 winding for continuity (6.7 ohms). If Connectors and Solenoid are good, run Printer in Self-Test mode and check waveform at the base of Transistor TR3. If waveform is missing, check Interface IC (Q4) on the Interface Board. If waveform is present, check Transistor TR3 and Diode D19.

CARRIAGE MOTOR

Carriage assembly moves to right and stops or moves to left and bangs against left stop. Check operation of Home Position Sensor (M5), refer to the "Sensor" section of this Troubleshooting guide.

Carriage assembly does not move. Check belt, pulleys and carriage mechanism for smooth operation with no binding. If no problem is found, check Fuse F2 on Driver Board. If Fuse is open, check Switch Transistors (TR1 and TR2), Diode D1 and Driver Transistor Array (Q1) for possible shorts. If Fuse F2 is good, turn Printer On and check for 14.4V at pin 1 of Connector CN9 on Driver Board. If 14.4V is missing, refer to the "Power Supply" section of this Troubleshooting guide. If 14.4V is present, check waveforms at pins B4, B8, B9, B10, A6 and A9 of Connector CN3 on Driver Board. If waveforms are missing, check Interface IC (Q3) on Interface Board. If waveforms are present, check waveform at pin 13 of Module HIC on Driver Board. If waveform is missing, check Module HIC. If waveform is

present, check Switch Transistor (TR2), Diodes D6 thru D17 and Driver Transistor Array (Q1). Check Carriage Motor (M2) windings for continuity, and check Connector CN7 for good connections.

LINE FEED MOTOR

Line Feed Motor (M1) does not work. Check Fuse F2. If Fuse is open, check Switch Transistors (TR1 and TR2), Diode D1 and Driver Transistor Array (Q1) for possible shorts. If Fuse is good, check Connector CN3 for good connections. If Connector is good, check for 14.4V at pin 1 of Connector CN9 on Driver Board. If 14.4V is missing, refer to the "Power Supply" section of this Troubleshooting guide. If 14.4V is present, check for waveform shown in Figure A at pins B8, B9, B10 and A9 of Connector CN3 during Form Feed. If waveform is missing, check pins B8, B9, B10 and A9 of Connector CN3 for good connections and check Interface IC (Q3) on Interface Board. If waveform is present, check for 3.0V at pin



Figure A

12 of Module HIC during Form Feed. If voltage is not correct, check IC Q3 on Interface Board. If voltage is correct, check for 12.7V at base of Transistor TR1 during Form Feed. If voltage is not correct, check Module HIC. If voltage is correct, check Transistor TR1, Diodes D1 thru D5, Transistor Array Q1 and check Line Feed Motor (M1) windings for continuity.

RIBBON END SWITCH AND PAPER END SENSOR

Check voltage at pin 1 of Connector CN5. The voltage should be 5.0V with paper in Printer and Ribbon End Switch not activated. The voltage should drop to 0V if there is no paper in Printer or Ribbon End Switch is activated. If readings are not correct, check pins 1 thru 5 of Connector CN5 for good connections, check Resistor R12 and check Switch or Sensor that is not operating properly.

HOME POSITION SENSOR

Check voltage at pin 8 of Connector CN5. The voltage should be 4.5V when Print Head in Home position and 0V when head not in home position. If readings are not correct, check Resistors R13 and R14, Home Position Sensor (M5), and check pins 6, 7 and 8 of Connector CN5 for good connections.

COLOR RIBBON SENSOR

Check voltage at pin 11 of Connector CN5. The voltage should be 4.4V with a piece of black paper inserted in Sensor notch and 0V with no paper in notch. If readings are not correct, check Resistors R15 and R16, Color Sensor (M6)

TROUBLESHOOTING (Continued)

and check pins 9 thru 12 of Connector CN5 for good connections. If all the sensors check good and a problem still exists, check pins A13, A14 and B14 of Connector CN3 on Driver Board and Connector CN1 and IC Q3 on Interface Board.

PRINTER WILL NOT RECEIVE DATA (SELF-TEST WORKS)

Use a logic pulser and logic probe to check operation of IC Q5 and Receive Data Amplifier Transistor (TR2). Use pulser to inject pulses at input pins 2, 4, 9 or 12 of IC Q5, and

check the corresponding output pins 3, 6, 8 or 11 for pulses. To check Transistor TR2, inject pulses at pin 3 of Connector CN2 and check for pulses at collector of TR2. If pulses are not appearing at outputs of IC Q5, check for -9.2V at pin 1 and 9.2V at pin 14 of IC Q5. If either voltage is missing, refer to the "Power Supply" section of this Troubleshooting guide. If voltage is good, substitute IC Q5. If pulses are not appearing at collector of Transistor TR2, check Capacitor C4, Diode D7, Transistor TR2 and Resistors R2 and R9. If IC Q5 and Transistor TR2 check good, check CPU IC (Q6) and Interface IC (Q4).

LINE DEFINITIONS

A0 THRU A15 Address Bits 0 Thru 15
ACK Acknowledge, Input Data Received
ALE Address Latch Enable
BUSY Busy, Off Line, Data Entry, Paper Feed, Printing
CE Chip Enable, ROM Memory
COLOR Color Sensor
D0 THRU D7 Data Bits 0 Thru 7
DATA LATCH Data Latch
DTR Data Terminal Ready
DW2 THRU DW5 Darkness Level Lines 2 Thru 5
FAULT Error State
HEAD DRV Print Head Driving Pulses
HOLD MG DRV Hold Print Head, Vertical Positioning
HP Home Position Sensor
I-PRIME Input Prime, Brings Control To Initial State, Resets System
LF DRV Line Feed Motor Driving Pulses
LMP DRV Lamp Drive, Ready
MDL Paper End/Ribbon End Sensors

OPSW Select Switch Status
PE Paper Empty Sensor
PM PH1 THRU PM PH4 Carriage Motor/Line Feed Motor Driving Pulses
RD Read, Memory Or I/O Device
RS/CENTRO Reset
RST Reset Signal To Interface Circuit
RTS Request To Send
SELECT Select Line Indicates On Line Status
SHIFT CLOCK Print Head Timing Pulses
SHIFT DATA Print Head Printing Pulses
SP DRV Carriage Motor Driving Pulses
SP HOLD Carriage Motor Hold
SPO DRV Carriage Motor Drive Control
SSD Send Data From Printer
STB Strobe
THALM Power Level Status
TXD Transmitted Data
WR Write, Data Bus Info Stored In Memory Or I/O

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 MODEL EN3211 OKIMATE 20
 OKIDATA

2 PARTS LIST AND DESCRIPTION

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

SEMICONDUCTORS (Select replacement for best results)

| ITEM No. | MFGR. PART No./ TYPE No. | PART No. | | | | NOTES |
|-----------------|--------------------------|--------------|--------------|--------------|-----------------|-------|
| | | NTE PART No. | ECG PART No. | RCA PART No. | ZENITH PART No. | |
| DRIVER BOARD | | | | | | |
| D1 THRU D17 | | | | | | |
| D18 | 39B2 | NTE116 | EGG116 | SK3311 | 212-76-02 | |
| D19 | | NTE5068A | EG5068A | SK39W/5086A | 103-270 | |
| D20 | | NTE552 | EG552 | SK5002 | 103-287 | |
| D22 | | NTE116 | EGG116 | SK3311 | 212-76-02 | |
| HIC | MLE-7541 | NTE116 | EGG116 | SK3311 | 212-76-02 | |
| Q1 | STA403A | | | | | |
| TR1,2 | B885 (JAPAN) | | | | | |
| TR3 | D768 (JAPAN) | | | | | |
| INTERFACE BOARD | | | | | | |
| D1,2 | | | | | | |
| D7 | | NTE139A | EGG139A | SK9V1/139A | 103-272 | |
| Q1 | D27128 | NTE519 | EGG519 | SK3100/519 | 103-131 | |
| Q2 | D4168C | | | | | |
| Q3 | M60307 | | | | | |
| Q4 | M60306 | | | | | |
| Q5 | MC1488 | | | | | |
| Q6 | M8051-178 | | | | | |
| TR1 | A952L (JAPAN) | | | | | |
| TR2,3 | C458B (JAPAN) | | | | | |
| POWER SUPPLY | | | | | | |
| A | 7805 | | | | | |
| D1 | DF64D | NTE960 | EGG960 | SK3591/960 | 221-Z9043 | |
| D2 | | NTE125 | EGG125 | SK3032A | 212-Z9000 | |
| D3 | | NTE519 | EGG519 | SK3100/519 | 103-131 | |
| PC | T-4HP521 | NTE519 | EGG519 | SK3100/519 | 103-131 | |
| Q1 | C3310 (JAPAN) | NTE379 | EGG379 | SK9085/379 | 121-Z9111 | |

* Lead configuration may vary from original.

PARTS LIST AND DESCRIPTION (Continued)

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

SEMICONDUCTORS (Select replacement for best results)

| ITEM No. | MFR. PART No./ TYPE No. | PART No. | | | | NOTES |
|----------|-------------------------------------------------|----------|----------|--------------|-----------|-------|
| | | NTE | ECG | RCA | ZENITH | |
| Q2 | D571K(JAPAN) C945P(JAPAN) Tg4.C 1R30DF | NTE315 | ECG315 | SK3250/315 | 921-1010 | |
| Q3 | | NTE85 | ECG85 | SK3124A/289A | 121-972 | |
| S11 | | NTE5332 | ECG5332 | SK9231 | | |
| S12 | | NTE156 | ECG156 | SK3051/156 | 212-Z9000 | |
| S13 | S2K49 6.2B2 | NTE156 | ECG156 | SK3051/156 | 212-Z9000 | |
| S14 | | NTE519 | ECG519 | SK3100/519 | 103-131 | |
| ZD | | NTE5013A | ECG5013A | SK6A2/5013A | 103-Z9008 | |

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

ELECTROLYTIC CAPACITORS

| ITEM No. | RATING | MFR. PART No. |
|----------|----------------------------------|---------------|
| C4 | 220 200V 180 200V | |
| C5 | 100 200V 120 200V 150 200V | |
| C8 | 1 50V .47 50V | |

| ITEM No. | RATING | MFR. PART No. |
|----------|--------------------------------|---------------|
| C11 | 1000 25V 100 10V 330 25V | |
| C12 | 1000 25V 4.7 50V 10 50V | |
| C13 | 100 10V 47 35V 220 16V | |
| C14 | 330 25V 100 25V | |
| C15 | 47 10V | |
| C16 | 47 35V 100 25V | |

CAPACITORS

| ITEM No. | RATING | MFR. PART No. |
|----------|-------------------------------------------------------------------------|---------------|
| C1 | .22 250VAC 20% .1 125VAC | |
| C2 | .1 250VAC .0047 250VAC .1 250VAC .0047 630VAC | |
| C3 | 700 125VAC .0047 250VAC .1 250VAC .0047 630VAC .0047 125VAC | |
| C4 | .047 250VAC 20% .0047 125VAC | |
| C5 | .001 1KV 470 1KV | |

| ITEM No. | RATING | MFR. PART No. |
|----------|--------------------------------------|---------------|
| C6 | .047 50V .001 1KV | |
| C7 | .1 50V 10% .001 100V .047 100V | |
| C8 | 470 1KV 10% .01 100V .1 100V | |
| C9 | .1 10% | |
| C10 | .001 10% .001-.047 10% | |

COILS & TRANSFORMERS

| ITEM No. | FUNCTION | MFR. PART No. | OTHER IDENTIFICATION | NOTES |
|----------------|-----------------------------------------------------------|---------------|----------------------|-------|
| L1 L2 TR | POWER SUPPLY AC Input RF Choke Power Transformer | | | |
| L1 | INTERFACE BOARD RF Choke | | | |

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

| ITEM NO. | FUNCTION | RESISTANCE | MFR. PART NO. | NOTES |
|----------|----------------------------------------|------------|---------------|-------|
| VR | POWER SUPPLY Voltage Adjust Control | 10K | | |

PARTS LIST AND DESCRIPTION (Continued)

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

RESISTORS (Power and Special)

| ITEM No. | RATING | REPLACEMENT DATA | | |
|------------------|-------------------------------------------------------------------------------------|------------------|--------------|------------------|
| | | MFGR. PART No. | NTE PART No. | WORKMAN PART No. |
| R8 R9 THM1 | DRIVER BOARD 390 1% 1/4W Carbon Film 390 1% 1/4W Carbon Film NTC 5500 Cold | | | FR1007 |
| | INTERFACE BOARD | | | |
| RM1 | Resistor Network | (1) | | |
| | Resistor Network | (2) | | |
| RM2 | Resistor Network | (3) | | |
| RM3 | Resistor Network | (4) | | |
| RM4 | Resistor Network | (5) | | |
| | Resistor Network | (4) | | |
| | POWER SUPPLY | | | |
| R1 | 5.1 5% 3W WW | | 5W5D1 | |
| | 5.6 5% 5W WW | | QW415 | 22-1148 |
| | 5.1 5% 5W WW | | 2W251 | |
| R2 | 150K 5% 1/4W Carbon Film | | | |
| | 5100 5% 2W Metal Film | | | |
| R3 | 47K 5% 3W WW | | | |
| R4 | 2200 5% 1/4W Carbon Film | | QW222 | 22-1104 |
| | 51 5% 2W Metal Film | | 2W051 | |
| | 100 5% 2W Carbon Film | | 2W110 | 22-4072 |
| | 82K 5% 2W Metal Film | | 2W382 | 22-4142 |
| R5 | 1000 5% 1/4W Carbon Film | | QW210 | 22-1096 |
| | 51 5% 1/4W Carbon Film | | QW051 | |
| R6 | .68 10% 2W WW | | | WS.68 |
| | 510-2000 5% 1/4W Carbon Film | | | |
| R7 | 100 5% 2W Metal Film | | 2W110 | 22-4072 |
| | 5.1 5% 2W Metal Film | | 2W5D1 | |
| | 10 5% 2W Metal Film | | 2W010 | 22-4048 |
| | 1000-10K 5% 1/4W Carbon Film | | | |
| R8 | 47 5% 2W Metal Film | | 2W047 | 22-4064 |
| | 1 5% 3W Metal Film | | 3W1D0 | |
| | .47 5% 3W Metal Film | | | |
| | 30-300 5% 1/2W Carbon Film | | | |
| R9 | 10 5% 1/4W Carbon Film | | QW010 | 22-1048 |
| | 250 5% 1/4W Carbon Film | | | |
| | 150 5% 1/4W Carbon Film | | QW115 | 22-1076 |
| | 1000 5% 1/4W Carbon Film | | QW210 | 22-1096 |
| | 240 5% 1/4W Carbon Film | | QW124 | |
| R10 | 2200 5% 1/4W Carbon Film | | QW222 | 22-1104 |
| | 10 5% 1/4W Carbon Film | | QW010 | 22-1048 |
| | 39 5% 1/4W Carbon Film | | QW039 | 22-1062 |
| | 51 5% 1/4W Carbon Film | | QW051 | |
| | 100 5% 1/4W Carbon Film | | QW110 | 22-1072 |
| R11 | 1000 5% 1/4W Carbon Film | | QW210 | 22-1096 |
| | 510 5% 1/4W Carbon Film | | QW151 | |
| | 15K to 20K 5% 1/4W Carbon Film | | | |
| R12 | 22K 5% 1/4W Carbon Film | | QW322 | 22-1128 |
| | 3000 5% 1/4W Carbon Film | | QW230 | |
| | 2700 5% 1/4W Carbon Film | | QW227 | 22-1106 |
| | 3300 5% 1/4W Carbon Film | | QW233 | 22-1108 |
| | 0-5600 5% 1/4W Carbon Film | | | |
| R13 | 15K 5% 1/4W Carbon Film | | QW315 | 22-1124 |
| | 20K 5% 1/4W Carbon Film | | QW320 | |
| | 3900-10K 5% 1/4W Carbon Film | | | |
| R14 | 100 5% 2W Metal Film | | 2W110 | 22-4072 |
| | 15K-20K 5% 1/4W Carbon Film | | | |
| R15 | 150 5% 2W Metal Film | | 2W115 | 22-4076 |
| | 910 5% 1/4W Carbon Film | | QW191 | |
| | 100K-220K 5% 1/4W Carbon Film | | | |

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PARTS LIST AND DESCRIPTION (Continued)

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

FUSE DEVICES

| ITEM NO. | DESCRIPTION | MFGR. PART NO. | | NOTES |
|----------|-----------------------------------------------|----------------|--------|-------|
| | | DEVICE | HOLDER | |
| F1 | DRIVER BOARD 1 Amp @ 250VAC Fast Acting | | | |
| F2 | 1.25 Amp @ 125VAC Fast Acting | | | |
| F | POWER SUPPLY 2 Amp @ 125VAC Fast Acting | | | |

MISCELLANEOUS

| ITEM No. | PART NAME | MFGR. PART No. | NOTES |
|----------|------------------|----------------|-------------------|
| M1 | CHASSIS Motor | | Line Feed |
| M2 | Motor | | Carriage |
| M3 | Solenoid | | Head Hold |
| M4 | Sensor | | Paper End |
| M5 | Sensor | | Home Position |
| M6 | Sensor | | Color Ribbon |
| M7 | Print Head | | |
| SW3 | Switch | | Ribbon End Sensor |
| | CONTROL PANEL | | |
| SW1 | Switch | | Select |
| SW2 | Switch | | Darkness |
| | INTERFACE BOARD | | |
| SW1 | Switch | | DIP |
| SW2 | Switch | | DIP |
| X1 | Crystal | | 11.059 MHz |
| | POWER SUPPLY | | |
| SW | Switch | | Power |

LOGIC CHART

INTERFACE BOARD

| PIN NO. | IC Q1 | PIN NO. | IC Q1 | PIN NO. | IC Q2 | PIN NO. | IC Q2 | PIN NO. | IC Q3 | PIN NO. | IC Q3 | PIN NO. | IC Q3 |
|---------|-------|---------|-------|---------|-------|---------|-------|---------|-------|---------|-------|---------|-------|
| 1 | H | 21 | P | 1 | P | 21 | P | 1 | L | 21 | H | 41 | H |
| 2 | P | 22 | P | 2 | P | 22 | P | 2 | L | 22 | L | 42 | L |
| 3 | P | 23 | P | 3 | P | 23 | P | 3 | H | 23 | L(1) | 43 | L |
| 4 | P | 24 | P | 4 | P | 24 | P | 4 | P | 24 | H | 44 | H |
| 5 | P | 25 | P | 5 | P | 25 | P | 5 | P | 25 | H | | |
| 6 | P | 26 | P | 6 | P | 26 | P | 6 | P | 26 | H(2) | | |
| 7 | P | 27 | H | 7 | P | 27 | P | 7 | P | 27 | H(2) | | |
| 8 | P | 28 | H | 8 | P | 28 | H | 8 | P | 28 | H(2) | | |
| 9 | P | | | 9 | P | | | 9 | P | 29 | P(3) | | |
| 10 | P | | | 10 | P | | | 10 | P | 30 | P(5) | | |
| 11 | P | | | 11 | P | | | 11 | P | 31 | P(5) | | |
| 12 | P | | | 12 | P | | | 12 | P | 32 | P(5) | | |
| 13 | P | | | 13 | P | | | 13 | P | 33 | P(4) | | |
| 14 | L | | | 14 | L | | | 14 | P | 34 | L(6) | | |
| 15 | P | | | 15 | P | | | 15 | L | 35 | P(3) | | |
| 16 | P | | | 16 | P | | | 16 | P | 36 | L | | |
| 17 | P | | | 17 | P | | | 17 | H | 37 | H | | |
| 18 | P | | | 18 | P | | | 18 | P | 38 | L | | |
| 19 | P | | | 19 | P | | | 19 | L | 39 | H | | |
| 20 | L | | | 20 | P | | | 20 | * | 40 | H | | |

| PIN NO. | IC Q4 | PIN NO. | IC Q4 | PIN NO. | IC Q4 | PIN NO. | IC Q5 | PIN NO. | IC Q6 | PIN NO. | IC Q6 |
|---------|-------|---------|-------|---------|-------|---------|-------|---------|-------|---------|-------|
| 1 | H | 21 | P | 41 | H | 1 | L | 1 | H | 21 | P |
| 2 | L | 22 | P | 42 | P | 2 | H | 2 | H | 22 | P |
| 3 | L | 23 | P | 43 | P | 3 | L | 3 | H | 23 | P |
| 4 | H | 24 | P | 44 | L | 4 | H | 4 | H | 24 | P |
| 5 | H | 25 | P | | | 5 | H | 5 | H | 25 | P |
| 6 | L | 26 | P | | | 6 | L | 6 | H | 26 | P |
| 7 | H | 27 | P | | | 7 | L | 7 | H | 27 | P |
| 8 | H | 28 | P | | | 8 | L | 8 | H | 28 | P |
| 9 | L | 29 | P | | | 9 | H | 9 | L | 29 | P |
| 10 | L | 30 | P | | | 10 | H | 10 | H | 30 | P |
| 11 | L | 31 | P | | | 11 | H | 11 | H | 31 | L |
| 12 | L | 32 | P | | | 12 | L | 12 | H | 32 | P |
| 13 | H | 33 | P | | | 13 | H | 13 | P | 33 | P |
| 14 | P | 34 | P | | | 14 | H | 14 | H | 34 | P |
| 15 | P | 25 | P | | | | | 15 | H | 35 | P |
| 16 | P | 36 | P | | | | | 16 | P | 36 | P |
| 17 | H | 37 | P | | | | | 17 | P | 37 | P |
| 18 | L | 38 | L | | | | | 18 | P | 38 | P |
| 19 | P | 39 | H | | | | | 19 | P | 39 | P |
| 20 | P | 40 | P | | | | | 20 | L | 40 | H |

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MODEL EN3211 OKIMATE 20

GENERAL OPERATING INSTRUCTIONS

SELF-TEST

Self-Test continuously prints the character set. To start test, hold Select button down while turning Printer On. Continue to hold Select button for two seconds, then release it. To stop test, press Select button.

NOTE: Do not use a colored ribbon when running Self-Test.

DARKNESS BUTTON

Slide Darkness button to left to print lighter, to right to print darker.

SELECT BUTTON

Press Select button once to pause, ready LED will start blinking. To Form Feed, pause Printer, press and hold Select button for two seconds.

SWITCH SETTINGS

Serial Interface Board Switches

| <u>SWITCH SW1</u> | <u>ON</u> | <u>OFF</u> | <u>SWITCH SW2</u> | <u>ON</u> | <u>OFF</u> |
|-------------------------------------------|-----------|------------|--------------------------------|-----------|------------|
| 300 Baud | | 1,2 | Spanish Characters | 1 | |
| 1200 Baud | 1 | 2 | ASCII Characters | | 1 |
| 4800 Baud | 2 | 1 | 17.1 CPI (Characters per inch) | 2 | |
| 9600 Baud | 1,2 | | 10 CPI | | 2 |
| 7 Bit with parity | 3,4 | | Auto LF (linefeed) On | 3 | |
| 8 Bit with parity | 3 | 4 | Auto LF Off | | 3 |
| 8 Bit without parity | | 3,4 | IBM Character Set #1 | | 4 |
| Even parity | 5 | | IBM Character Set #2 | 4 | |
| Odd parity | | 5 | Draft Quality | 6 | |
| X-ON/X-OFF Protocol | | 6 | Correspondence Quality | | 6 |
| Ready/Busy Protocol | 6 | | | | |
| Space at printer ready (Ready=High, +) | 5 | | | | |
| Mark at printer ready (Ready=Low, -) | | 5 | | | |

MISCELLANEOUS ADJUSTMENTS

POWER SUPPLY VOLTAGE ADJUSTMENT

Connect input of a DC voltmeter to pin 1 of Connector CN9 on Driver Board. Adjust Voltage Adjust Control (VR) for 14.4V.

PRINT HEAD CLEARANCE

Remove cabinet top. Loosen Phillips screw holding Head Hold Solenoid to Printer chassis. Move Solenoid to align metal slide-bar index marker with index marker on plastic end piece.

NOTE: Head Hold Solenoid is not activated while making this adjustment.

Clearance between ribbon guide and platen and between ribbon guide and ribbon stop rubber should be .02 to .04 inch (5 to 1mm). Tighten Solenoid mounting screw.

BELT TENSION

Remove cabinet top. Loosen two screws holding Carriage Motor. Measure tension of belt by hooking a tension gauge in hole located on left front of the Carriage Motor. Pull gauge until a tension of $.66 \pm .066$ pounds (300 ± 30 grams) is reached and tighten Motor mount screws.

SCHEMATIC NOTES

- Chassis
- *- 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.

Voltages, waveforms and logic readings taken with Printer running in Self-Test mode.

Waveforms taken with triggered scope and Sweep/Time Switch in Calibrate position, scope input set for DC coupling on "0" reference voltage waveforms. Switch to AC input to view waveforms after DC reference is measured when necessary. Each waveform is 7.5cm width with DC reference voltage given at the bottom line of each waveform.

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

Supply voltage maintained as shown at Input.

Controls adjusted for normal operation.

Terminal identification may not be found on unit.

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

Electrolytic capacitors are 50 volts or less, 20% unless noted.

Resistors are 1/2W or less, 5% unless noted.

Value in () used in some versions.

Measurements taken with switching as follows, unless noted:

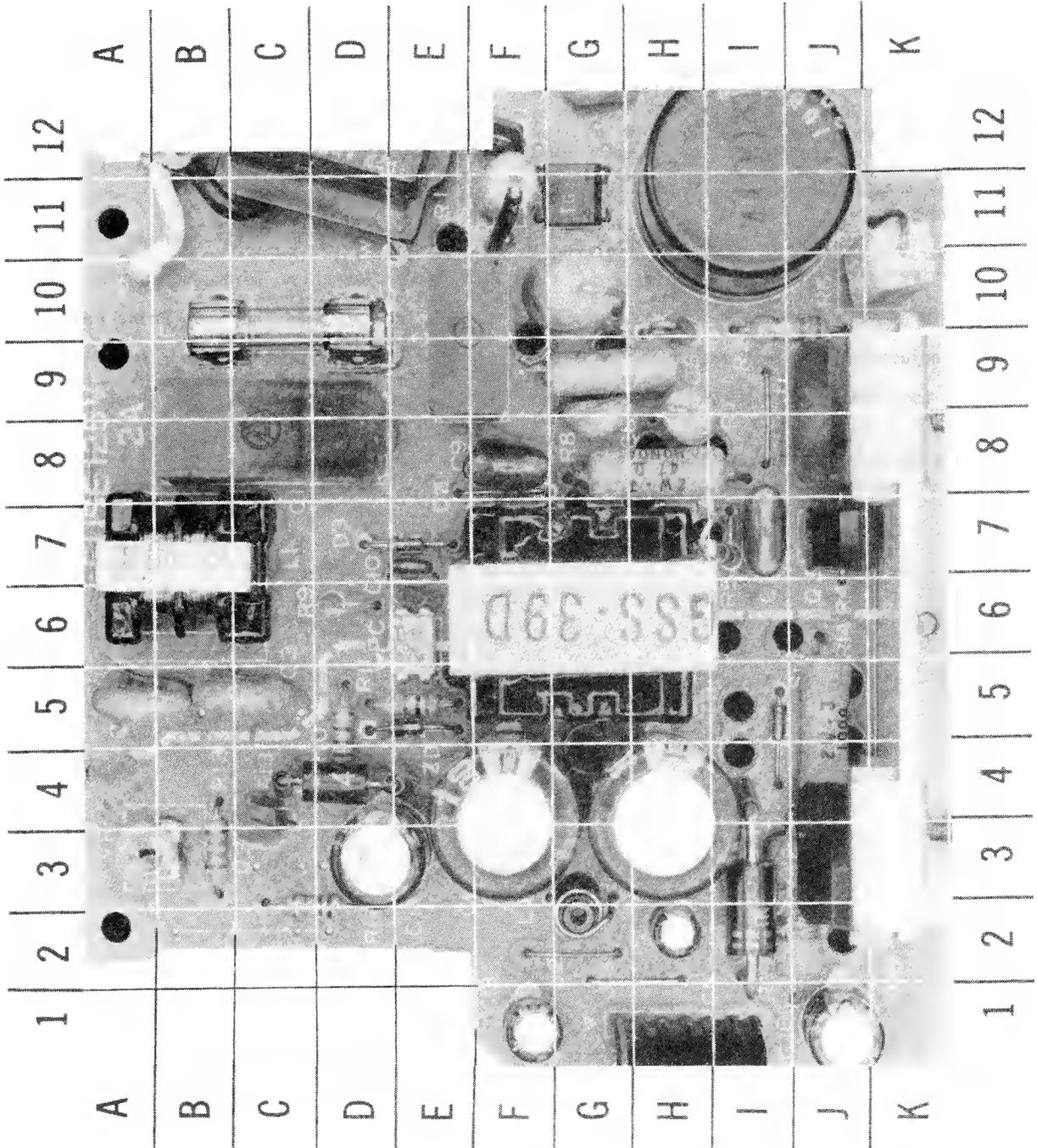
SW2 Darkness set to Maximum Darkness
 DIP Switch SW1: 1, 2, 5, ON
 3, 4, 6 OFF
 DIP Switch SW2: All Off

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

- (1) Probe indicates High when Print Head is at Home position.
- (2) Probe indicates High when Print Head is not printing.
- (2) Probe indicates Low when Print Head is at Home position.
- (4) Probe indicates Low when Print Head is not printing.
- (5) Probe indicates Low when Print Head is not moving.
- (6) Probe indicates pulse while Print Head is returning to Home position.

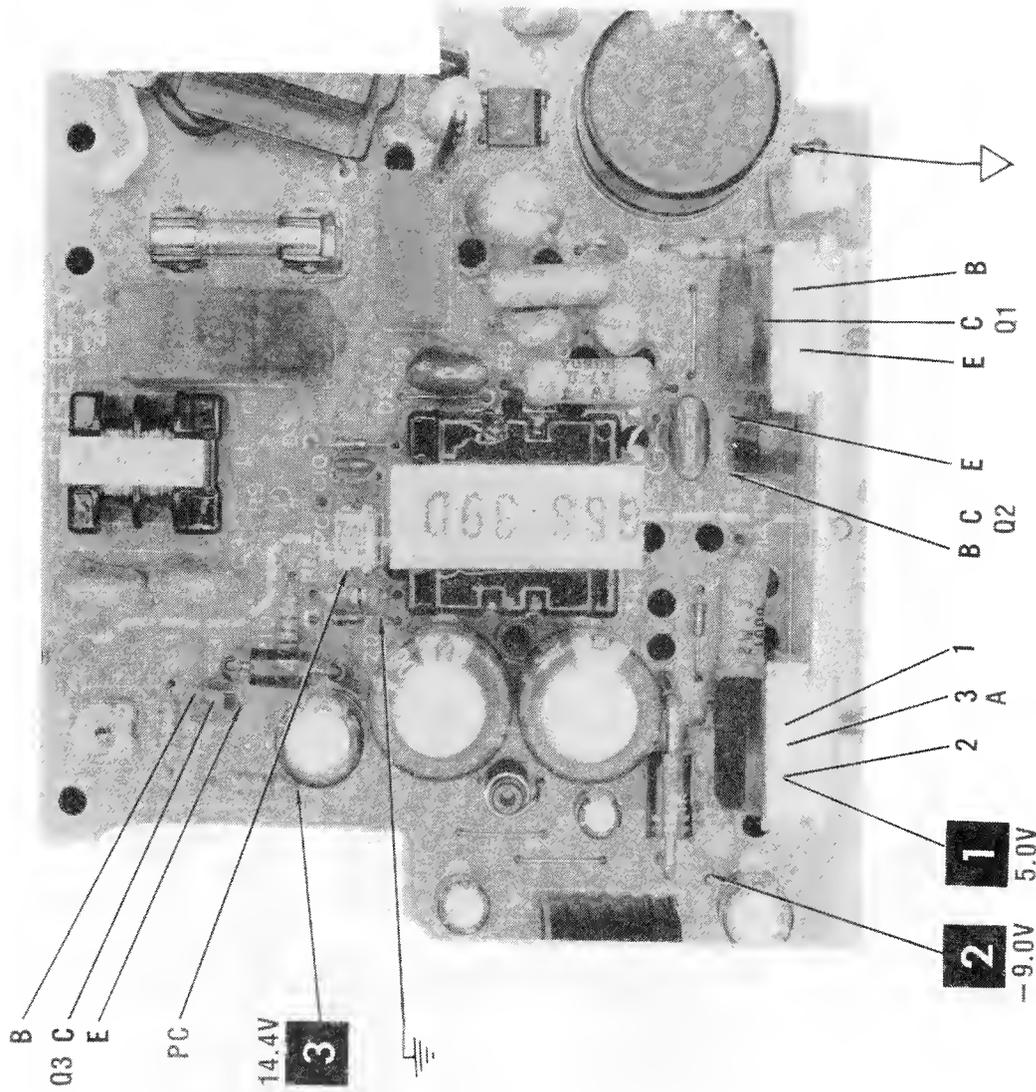
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 MODEL EN3211 OKIMATE 20

GridTrace LOCATION GUIDE



- A C1 C2 C3 C4 C5 C6 C7 C8 C9 C10 C11 C12 C13 C14 C15 C16 C19
- D1 D5 F1 L1 L2 L3 PC Q2 Q3 R1 R2 R3 R4 R5 R6 R7 R8 R9 R10 R11 R12 R13 R14 R15
- S11 S12 S13 S14 TR VR ZD

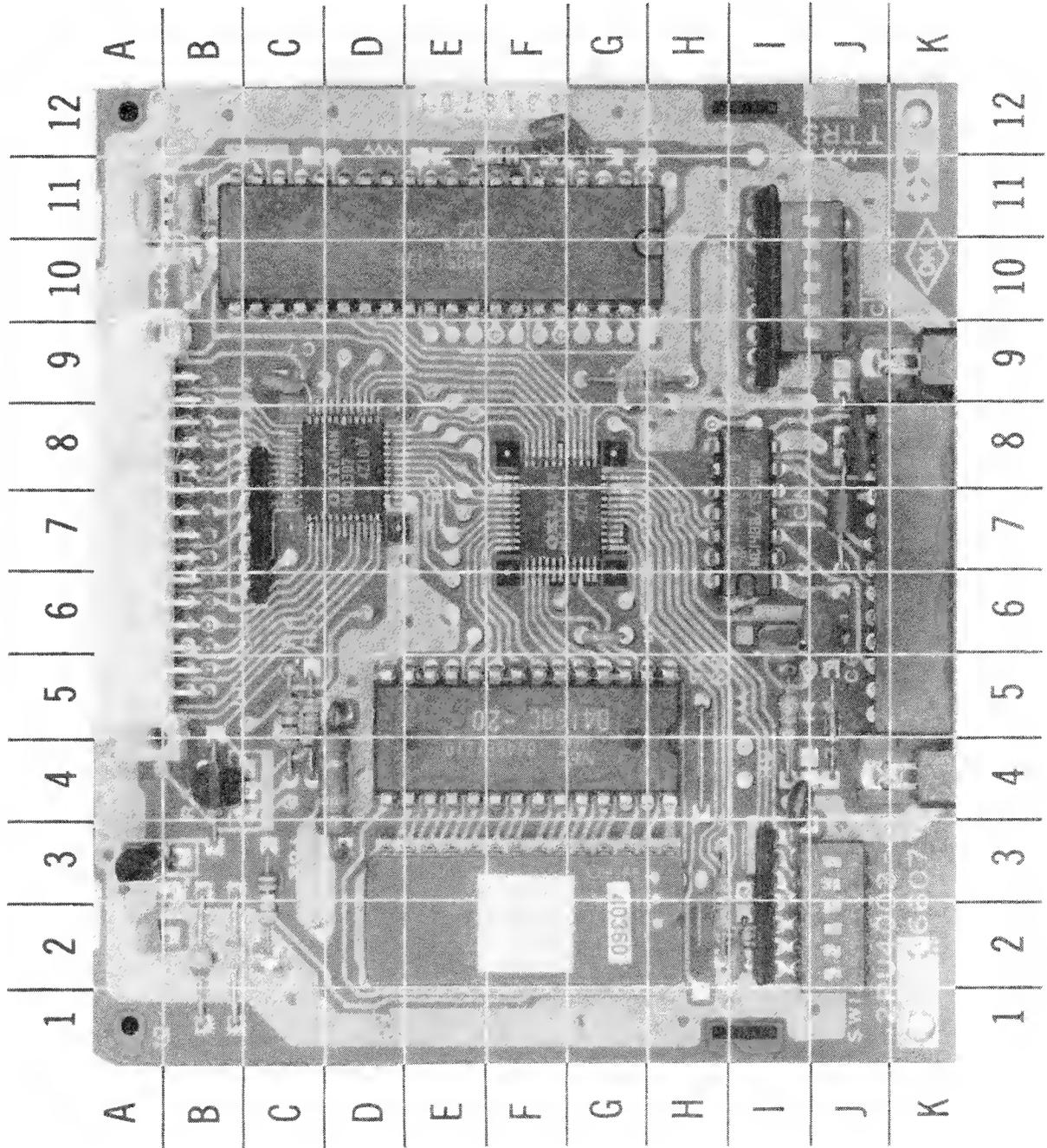
- K-3 C-8 A-5 B-5 E-9 I-11 I-7 G-8 F-8 E-7 H-4 F-4 F-1 D-3 H-2 J-1 G-12 H-10 E-7 C-10 B-7 G-2 E-6 J-7 C-4 F-11 J-10 G-10 J-7 I-7 K-10 H-9 H-8 D-6 D-5 E-5 C-3 B-3 J-5 J-2 G-11 I-2 D-4 I-5 G-6 A-3 E-5



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

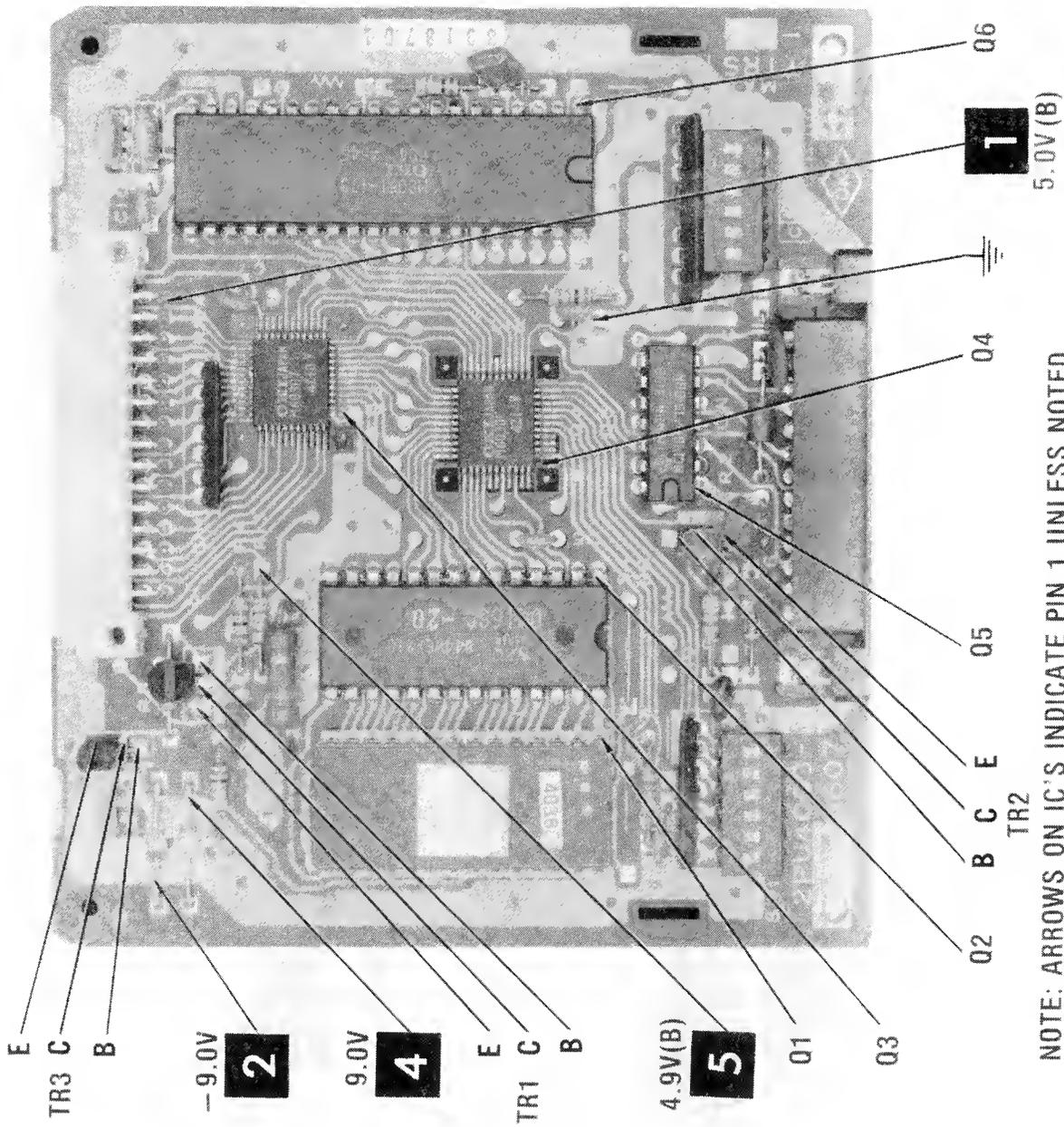
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GridTrace LOCATION GUIDE

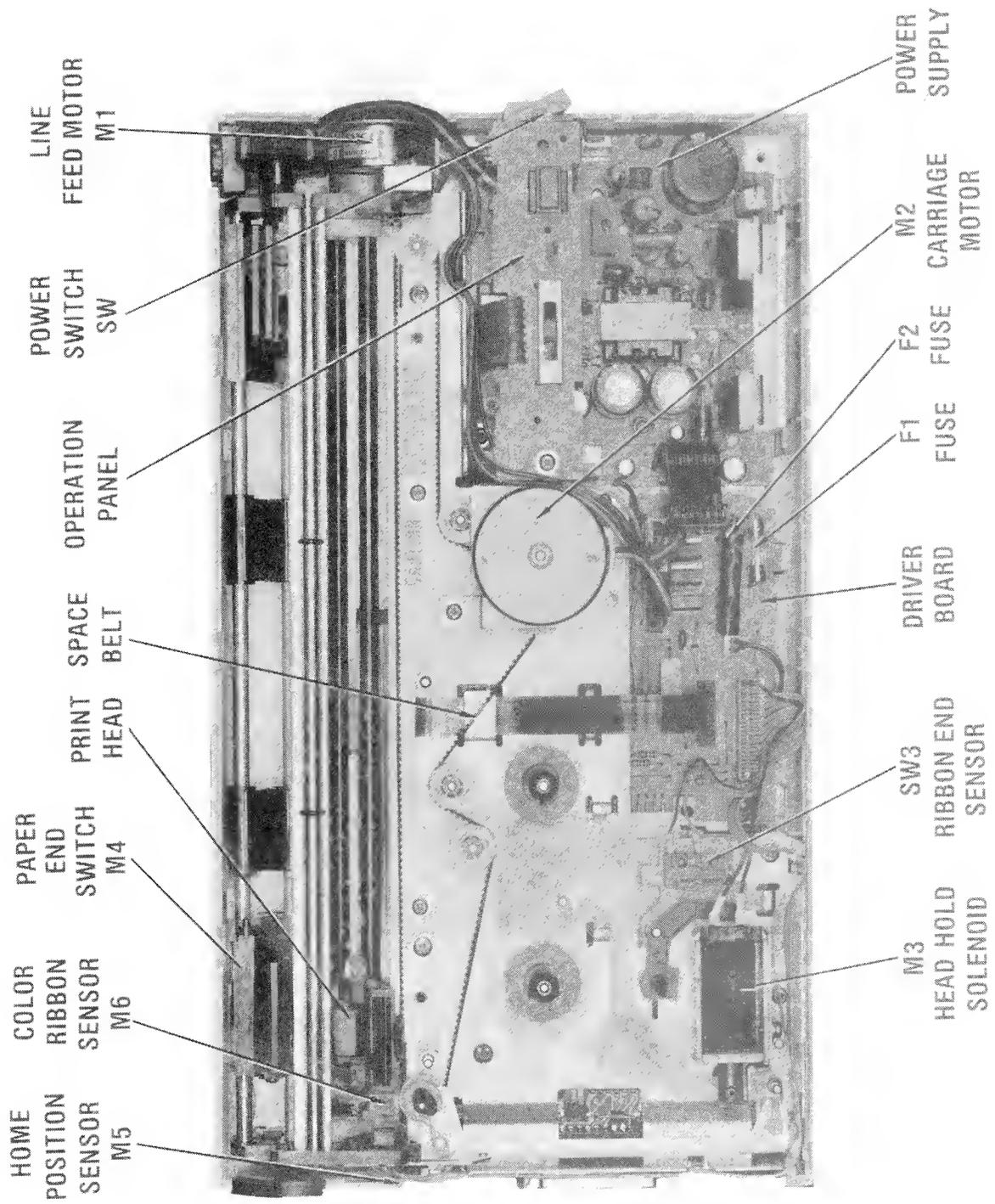


- C1
- C3
- C4
- C5
- C6
- C7
- C8
- C9
- C10
- C11
- C12
- CN1
- CN2
- D1
- D2
- D7
- L1
- OSC
- Q1
- Q2
- Q3
- Q4
- Q5
- Q6
- R1
- R2
- R3
- R4
- R5
- R6
- RM1
- RM3
- RM4
- SW1
- SW2
- TR1
- TR2
- TR3

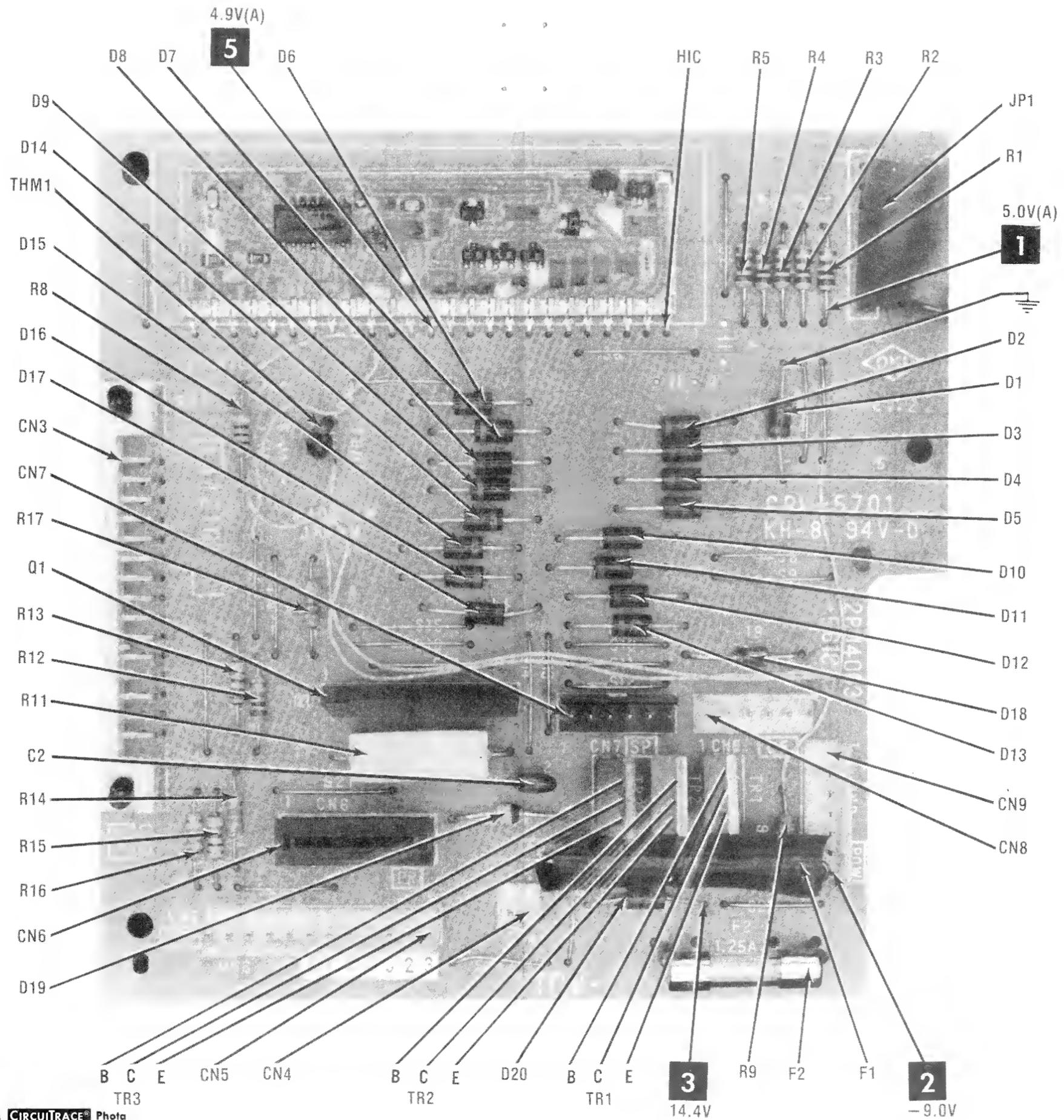
- A-2
- I-2
- I-4
- G-6
- J-6
- C-9
- G-9
- J-8
- B-10
- F-12
- A-11
- A-7
- K-7
- B-2
- B-2
- J-5
- J-7
- B-11
- F-2
- F-4
- D-8
- F-7
- I-7
- D-10
- D-4
- H-2
- B-4
- F-7
- I-7
- D-10
- I-2
- I-10
- C-7
- J-2
- J-10
- B-4
- I-6
- A-3



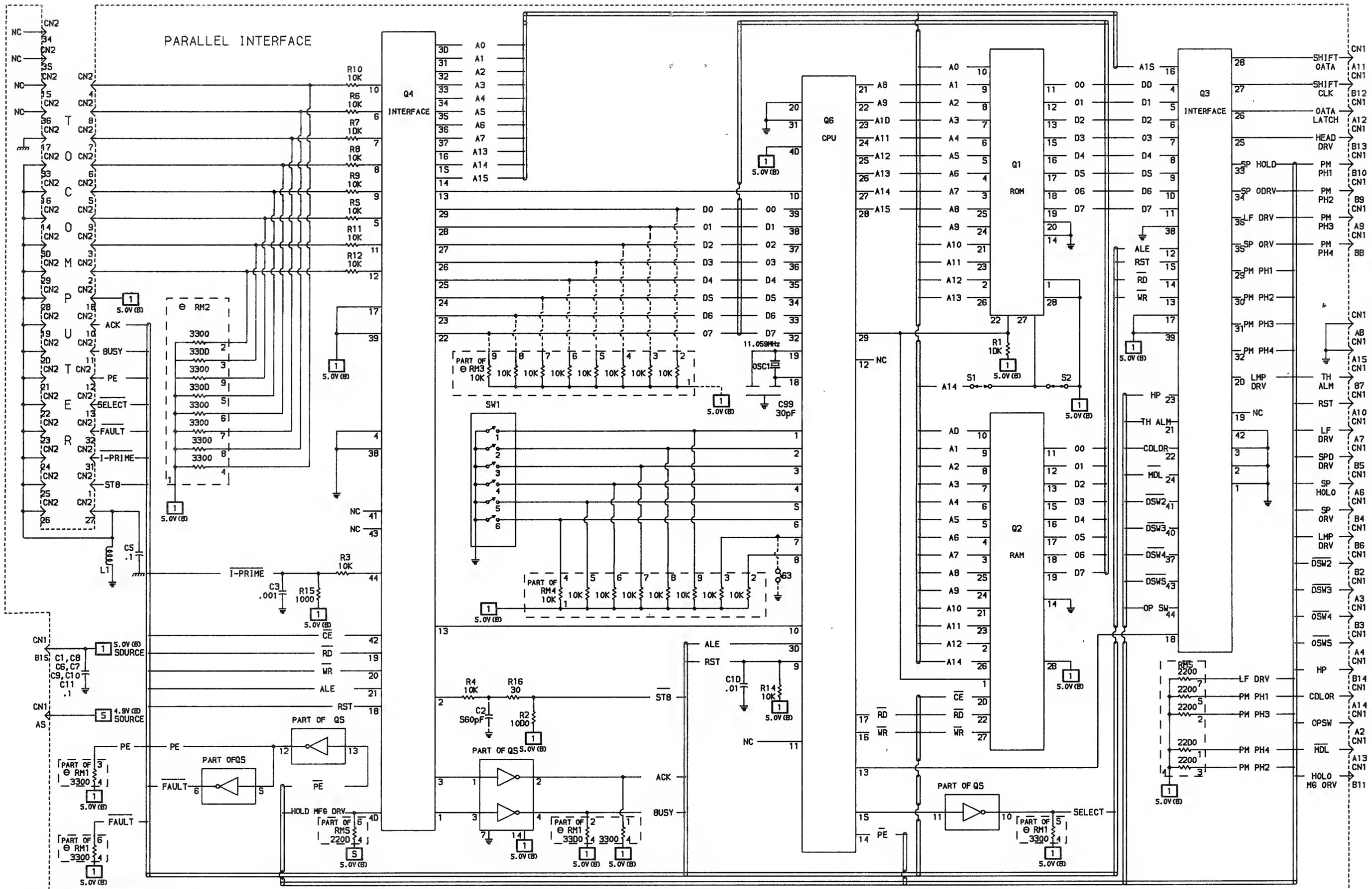
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CHASSIS-OVERALL VIEW



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MODEL EN3211 OKIMATE 20



CP34
 MODEL EN3211 OKIMATE 20

OKIDATA

A PHOTOFACIT STANDARD NOTATION SCHEMATIC

WITH **CIRCUITRACE**

DISASSEMBLY INSTRUCTIONS

CABINET REMOVAL

Remove ribbon cartridge and carriage assembly cover. Remove two screws located in front of Carriage assembly holding cabinet top to chassis. Push cabinet top toward rear to release tabs on inside rear edge and lift up rear. When rear edge is clear of chassis, move top forward to clear front tabs and lift top from Printer.

PRINTER MECHANISM REMOVAL

Remove Control Panel cover. Disconnect Connectors CN4 thru CN8.

NOTE: Lift up cap on Connector CN6 before pulling flat ribbon cable out.

Remove three screws holding mechanism to cabinet bottom.

POWER SUPPLY AND DRIVER BOARD REMOVAL

Remove cabinet top and Printer mechanism. Remove two screws holding Power Supply Board to cabinet bottom. Push back tabs holding front of Driver Board and lift Driver and Power Supply Boards from cabinet.

CARRIAGE MOTOR ASSEMBLY REMOVAL

Remove cabinet top. Disconnect Connector CN6 from Driver Board. Remove two screws holding motor assembly and remove assembly.

PAPER FEED MOTOR REMOVAL

Remove Printer mechanism. Disconnect Connector CN8 from Driver Board. Remove two screws holding Paper Feed Motor and remove Motor.

BELT REMOVAL

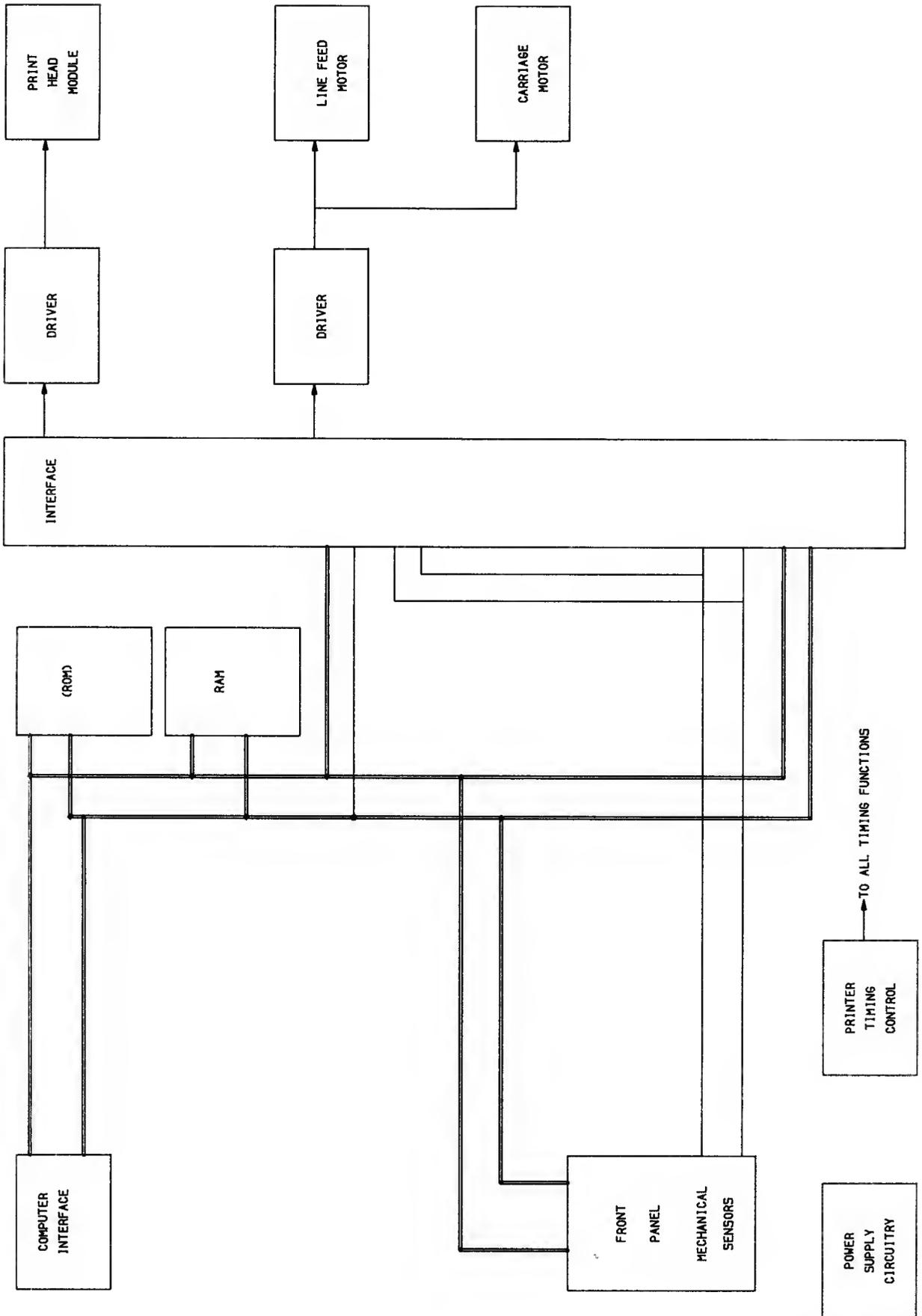
Remove cabinet top and Control Panel cover. Remove Carriage Motor assembly. Remove two springs from metal linkage going from Head Hold Solenoid to left belt gear (one spring at each end of the link). Insert a flat-blade screwdriver between left belt gear and metal link. Pry link and ribbon stop lever off gear post, note position of ribbon stop lever for reassembly. Remove belt from Print Head assembly and gear pulleys.

RIBBON REMOVAL

Turn Power Off. Lift ribbon access cover. Pull back on Print Head assembly until it snaps back. Lift used ribbon cartridge out. Place new cartridge into compartment, rear end first. While lowering front end, make sure ribbon is in front of Print Head and behind ribbon guides. Snap head back into printing position.

REPLACING PRINT HEAD

Remove ribbon cartridge. Pull back on Print Head Lock Lever, directly behind Print Head. Lift Print Head straight up out of holder.



BLOCK DIAGRAM

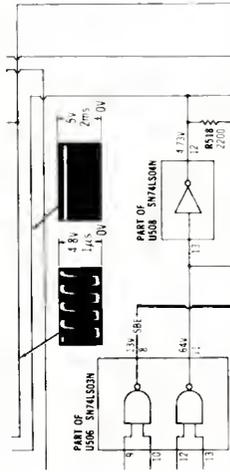
SAFETY PRECAUTIONS

1. Use an isolation transformer for servicing.
2. Maintain AC line voltage at rated input.
3. Remove AC power from the Computer before servicing or installing electrostatically sensitive devices. Examples of typical ES devices are integrated circuits and semiconductor "chip" components.
4. Use extreme caution when handling the printed circuit boards. Some semiconductor devices can be damaged easily by static electricity. Drain off any electrostatic charge on your body by touching a known earth ground. Wear a commercially available discharging wrist strap device. This should be removed prior to applying power to the unit under test.
5. Use a grounded-tip, low voltage soldering iron.
6. Use an isolation (times 10) probe on scope.
7. Do not remove or install Boards, Floppy Disk Drives, printers, or other peripherals with Computer AC power On.
8. Do not use freon-propelled sprays. These can generate electrical charges sufficient to damage semiconductor devices.
9. This Computer 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 Computer 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 Computer to water. If exposed to water turn the unit Off. Do not place the computer near possible water sources.
14. Never leave the Computer 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 Computer.
17. Never use liquids or aerosols directly on the Computer cabinet. Spray on cloth and then apply to the Computer cabinet. Make sure the Computer is disconnected from the AC power line.

HOWARD W. SAMS & COMPANY

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.

- The following information is just a sample of the many valuable time saving features contained in this exclusive Sams COMPUTERFACTS publication:
- 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 CIRCUITTRACE®, GRIDTRACE™, waveforms, voltages and stage identification.

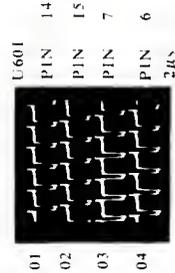


- Step by Step Troubleshooting guides the technician through the necessary procedures to quickly locate the problem.

TROUBLESHOOTING

MICROPROCESSOR CHIP (CPU) OPERATION

Verify the processor is functioning by, checking the signals on the address lines (pins 10 thru 24 of IC U600) and the data lines (pins 41 thru 56) using a logic probe or a scope. If a logic probe is used, refer to the logic chart for the correct readings. If a scope is used, the address lines (except pins 22 and 23 which have no signal in Power Up mode) should be similar to Figure 1. The waveforms on the data lines should be similar to Figure 2.



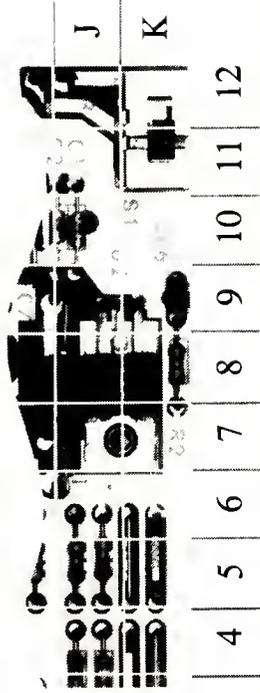
- Logic Chart containing logic probe readings to isolate defective circuitry and components.

LOGIC

| PIN NO | IC U100 | PIN NO | IC U100 | PIN NO | IC U102 | IC U103 | IC U104 | IC U105 | IC U106 | IC U107 | IC U108 | IC U109 |
|--------|---------|--------|---------|--------|---------|---------|---------|---------|---------|---------|---------|---------|
| 1 | P | 21 | P | 1 | H | L | L | L | L | L | L | L |
| 2 | P | 22 | P | 2 | H | L | L | L | L | L | L | L |
| 3 | P | 23 | P | 3 | H | L | L | L | L | L | L | L |

Remove staples and use cover for file folder.

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



- 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. | MFG. Part No. | ECC Part No. | NIF Part No. | REPLACEMENT DATA | | NOTES |
|----------------|----------|---------------|--------------|--------------|------------------|-----------------|-------|
| | | | | | RCA Part No. | ZENITH Part No. | |
| D102 | 18S53 | 1149-2576 | ECC519 | NTE519 | SK9091 177 | 103-131 | |
| D103 | 2N60EM | 1149-2527 | ECC109 | NTE109 | SK3088 | 103-7900 | |
| D201 | 1N404GIP | 1201-4205 | ECC116 | NTE116 | SK3312 | 212-76-02 | |
| D501 thru D503 | 18S53 | 1149-2576 | ECC519 | NTE519 | SK9091 177 | 103-131 | |

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4300 West 62nd Street
Indianapolis, Indiana 46268 USA

CP34
09015

ISBN: 0-672-09015-5