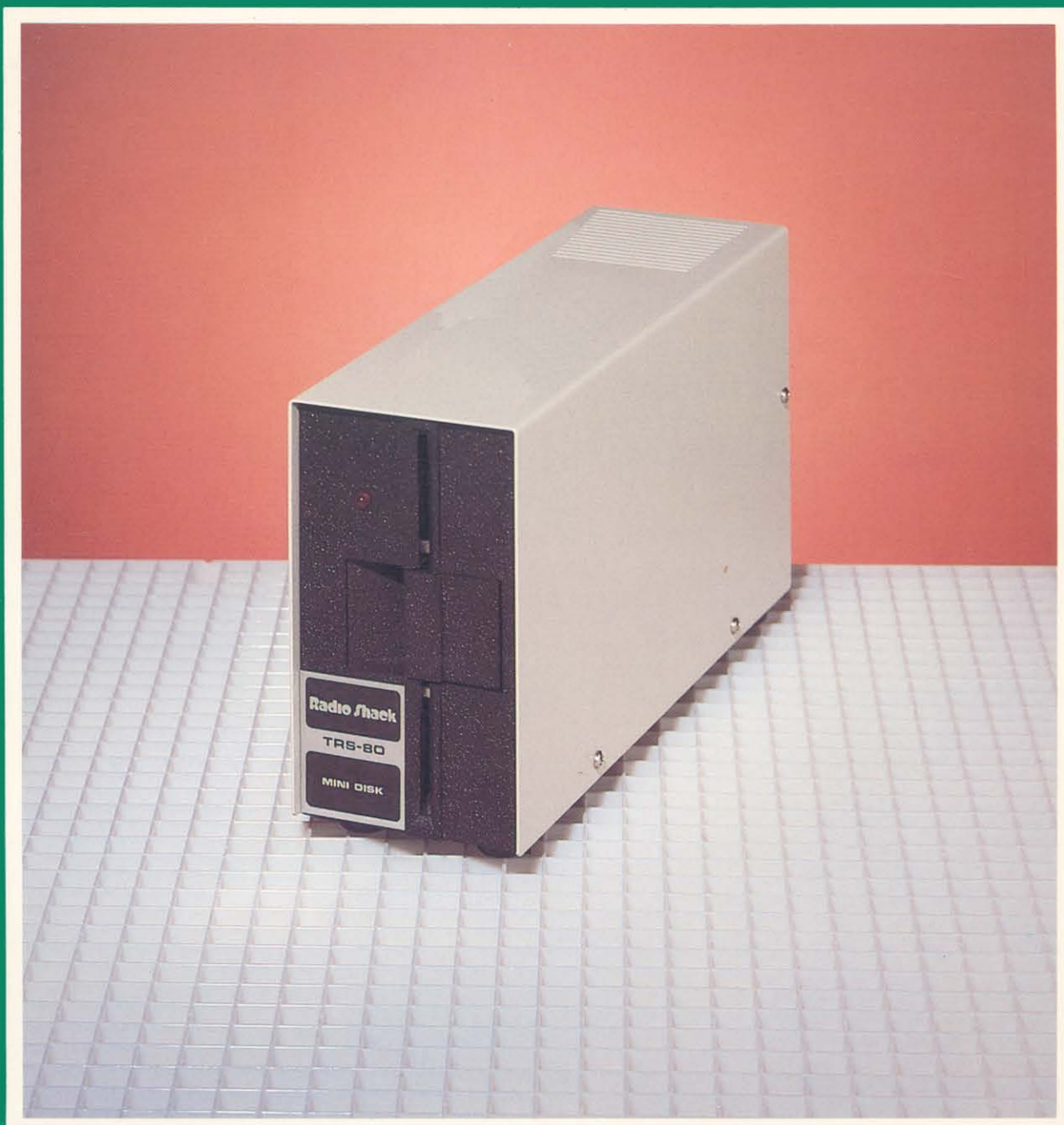


DISK DRIVE:

RADIO SHACK TRS-80®

MODELS 26-1160, 26-1161



TECHNICAL SERVICE DATA FOR YOUR DISK DRIVE

PRELIMINARY SERVICE CHECKS

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

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

GENERAL OPERATING INSTRUCTIONS

POWER UP SEQUENCE (WHEN USING DISK DRIVE)

1. Turn on the Expansion Interface.
2. Turn on the Disk Drives (Terminal Drive first) and any other peripherals.
3. Put a diskette (containing DOS, Disk Operating System) into Disk Drive 0. Turn the Computer On. The Computer will automatically boot up from Disk Drive 0. The version of the Disk Operating System will appear on the Monitor screen along with the words "DOS READY" and a prompt character.

DISK OPERATING SYSTEM (DOS)

Type DIR and press the ENTER key to get a directory of programs that are on the diskette in Disk Drive 0. For other drives, type DIR : and the number of the drive from which the information is desired. Example: Type and enter DIR :2 to list programs on diskette in Drive 2.

To load a program from a diskette in DOS mode, type the name of the program and press the ENTER key. Use a colon and the number of the Disk Drive which contains the program to be loaded. If no number is given, the system will assume Drive 0.

NOTE: Basic programs will not load from diskette unless the Computer is in the Disk Basic mode.

To get back to the DOS from the Disk Basic, type CMD"S" and press the ENTER key. Any program in memory will be lost when leaving Basic mode by using CMD"S".

BASIC

To load Disk Basic into the Computer, boot up on DOS, put a diskette into Drive 0 containing Disk Basic (usually a part of the DOS diskette), type BASIC and press the ENTER key and follow prompts. To go from Disk Basic to DOS, type CMD"S" and press the ENTER key, any program in memory will be lost.

To load a program from a diskette when in Disk Basic mode, type LOAD and the program name enclosed in quotes and press the ENTER key. To load from a Disk Drive other than Drive 0, add a colon and the drive number at the end of the program name. Example: LOAD "SAMS:1" for Drive 1.

To save a program onto a diskette when in Disk Basic mode, type SAVE and the program name in quotes and press the ENTER key. To save a program onto a diskette in a Disk Drive other than Drive 0, add a colon and the drive number at the end of the program name. Example: SAVE "SAMS:1" for Drive 1.

FORMATTING A DISKETTE

NOTE: This procedure does not copy Disk Operating System sections required for normal disk operations. A diskette thus formatted must be used only with systems containing 2 or more drives. Use "Back-up" function to format a diskette containing DOS information.

A blank diskette must be formatted before it can be used for saving data. To format a diskette, boot up on DOS, put a diskette in the drive with the format program on it (usually part of the DOS diskette), type FORMAT and press the ENTER key. After the program has been loaded, put a blank diskette into the drive and follow the instructions on the Monitor screen.

DISASSEMBLY INSTRUCTIONS

CABINET REMOVAL

Remove six screws, three from each side of cabinet. Slide cabinet from unit. Most components are now accessible for service.

HEAD CLEANING INSTRUCTIONS

Lightly wipe the Head with a cotton swab or a lint-free cloth dampened with 91% Isopropyl alcohol. After the alcohol has evaporated, lightly polish the Head with a dry lint-free cloth.



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84CD14944

DATE 5-85

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) Check AC Fuse (F1) and replace if open.
- (B) If Fuse F1 is open, check for shorted Diodes CR1A thru CR4A and replace any defective part. Also check Capacitors C1A and C2A.
- (C) Apply 120VAC power and check for 14.0VAC between the two red leads of the secondary of Power Transformer (T1).
- (D) If the 14.0VAC is missing, check Power Cord (P1), Power Switch (SW1), Fuse F1 and Transformer T1.
- (E) If 14.0VAC is present, check for 12.0V at pin 3 of Regulator IC (VR2). If 12.0V is missing, check for 19.0V at pin 1 of IC VR2. If 19.0V is present, check IC VR2 by substitution. Also check Capacitor C4A.
- (F) Check for 9.4V at pin 1 of Regulator IC (VR1) and check for 5.0V at pin 3 of IC VR1. If the 5.0V is missing, check IC VR1 by substitution. Also check Capacitor C3A.
- (D) Check the hub ring (collet), it may be broken.
- (E) Check for 11.2V at pin 8 of IC 1A in the motor-on condition.
- (F) Check for 12.0V at the emitter of Motor Drive Transistor (Q1).
- (G) Check for 5.6V at the collector of Motor Drive Transistor (Q1).

2 DRIVE OPERATION IS ERRATIC

Check for possible interference from the Monitor or other electronic equipment. Position the Disk Drive away from the Monitor and other equipment, then check operation of the Drive.

- (A) Clean the Head with a cotton swab or lint-free cloth dampened with 91% Isopropyl alcohol and dry with a lint-free cloth. NOTE: Head cleaning diskettes are not recommended because they may be too abrasive.

3 DRIVE MOTOR DOES NOT TURN DISK

- (A) Check for a loose Drive Belt.
- (B) Check for correct motor speed and adjust Speed Adjust (R59) if not correct.
- (C) Remove the belt, turn power On and see if the Drive Motor (M1) turns freely. If the motor starts, then stops, check the Drive Motor by substitution.

4 WRITE FUNCTION INOPERATIVE

- (A) Check the radial Head alignment and Track 00 Switch adjustment. See "Head Radial Alignment" and "Track 00 Switch Adjustment" sections of the Alignment procedure.
- (B) Check speed of the Drive, see "Spindle Speed Alignment" section of Alignment procedure.
- (C) Check the Write Protect Switch (S9).

5 WRITE PROTECT DOES NOT FUNCTION

- (A) Check Write Protect Switch (S9). Check for shorts at pins D and 4 of Connector (P3). Check for 5.0V at pin D of Connector P3.

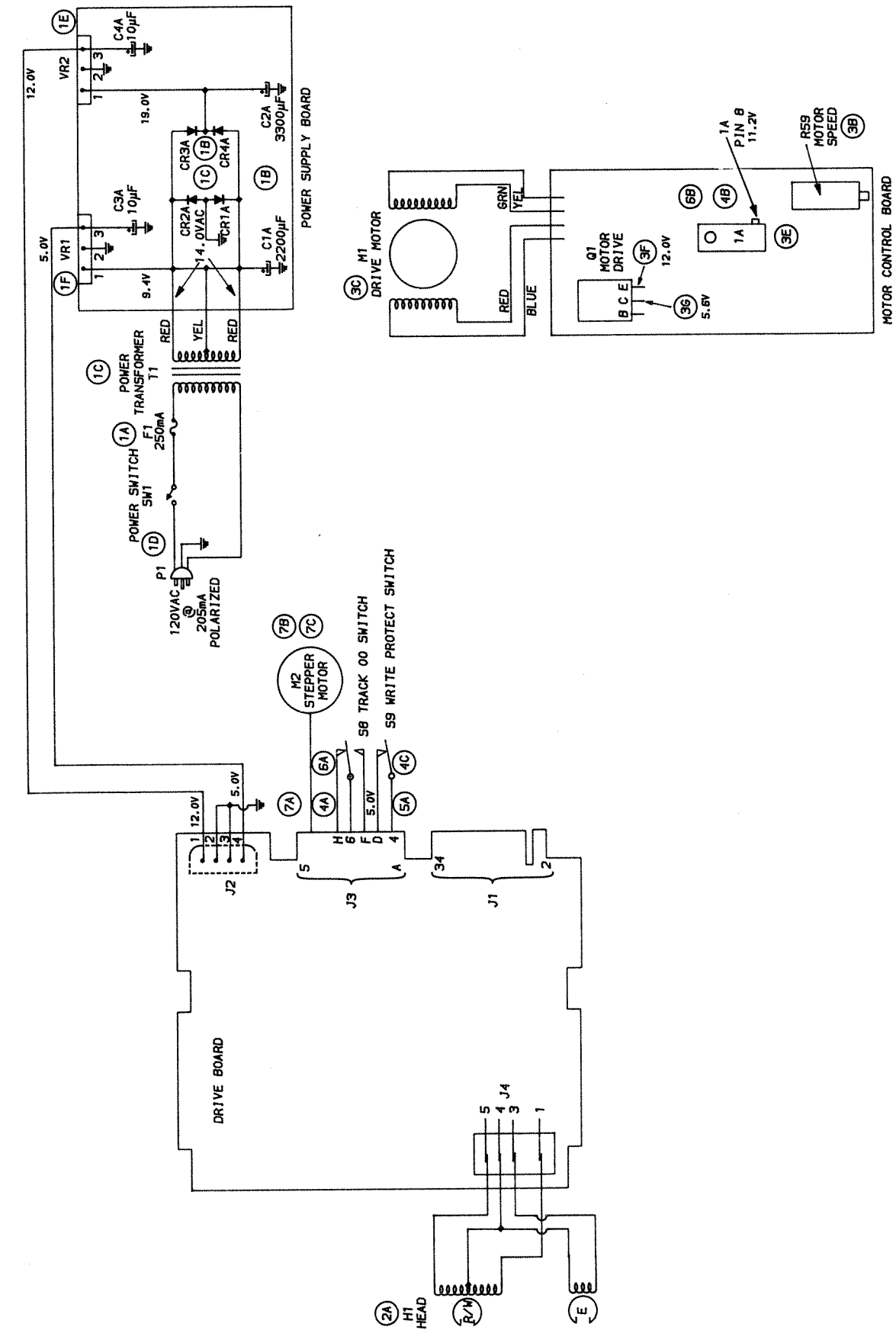
6 READ FUNCTION INOPERATIVE

- (A) Check alignment of Track 00. See "Head Radial Alignment" and "Track 00 Switch Adjustment" sections of the Alignment procedure.
- (B) Check speed of the drive. See "Spindle Speed Adjustment" section of the Alignment procedure.

7 STEPPER MOTOR INOPERATIVE

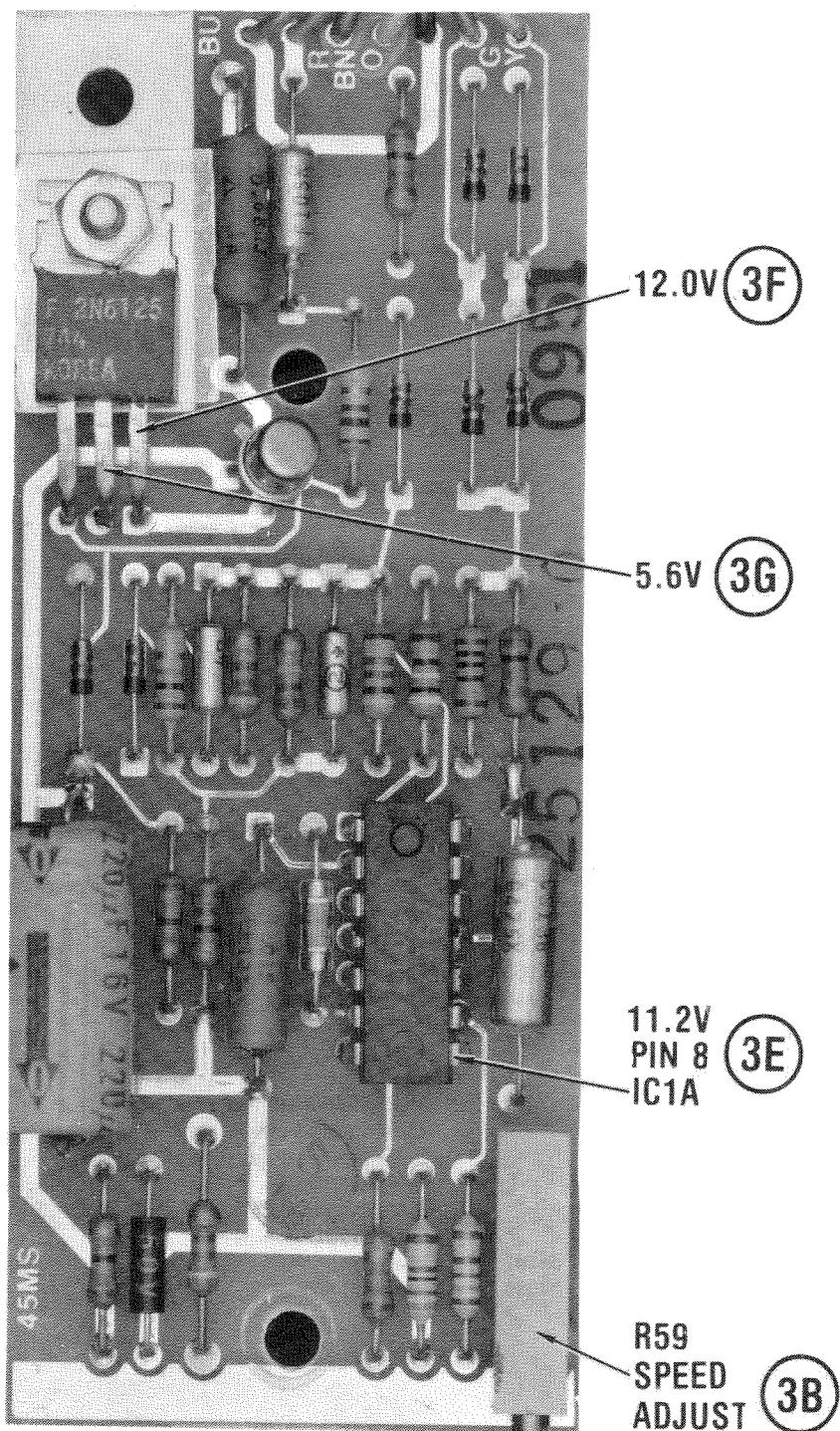
- (A) Check Connector J3.
- (B) Check Stepper Motor (M2) windings for continuity.
- (C) Check Stepper Motor by substitution. Also see "Stepper Motor" section of Troubleshooting guide.

PRELIMINARY SERVICE CHECKS (Continued)



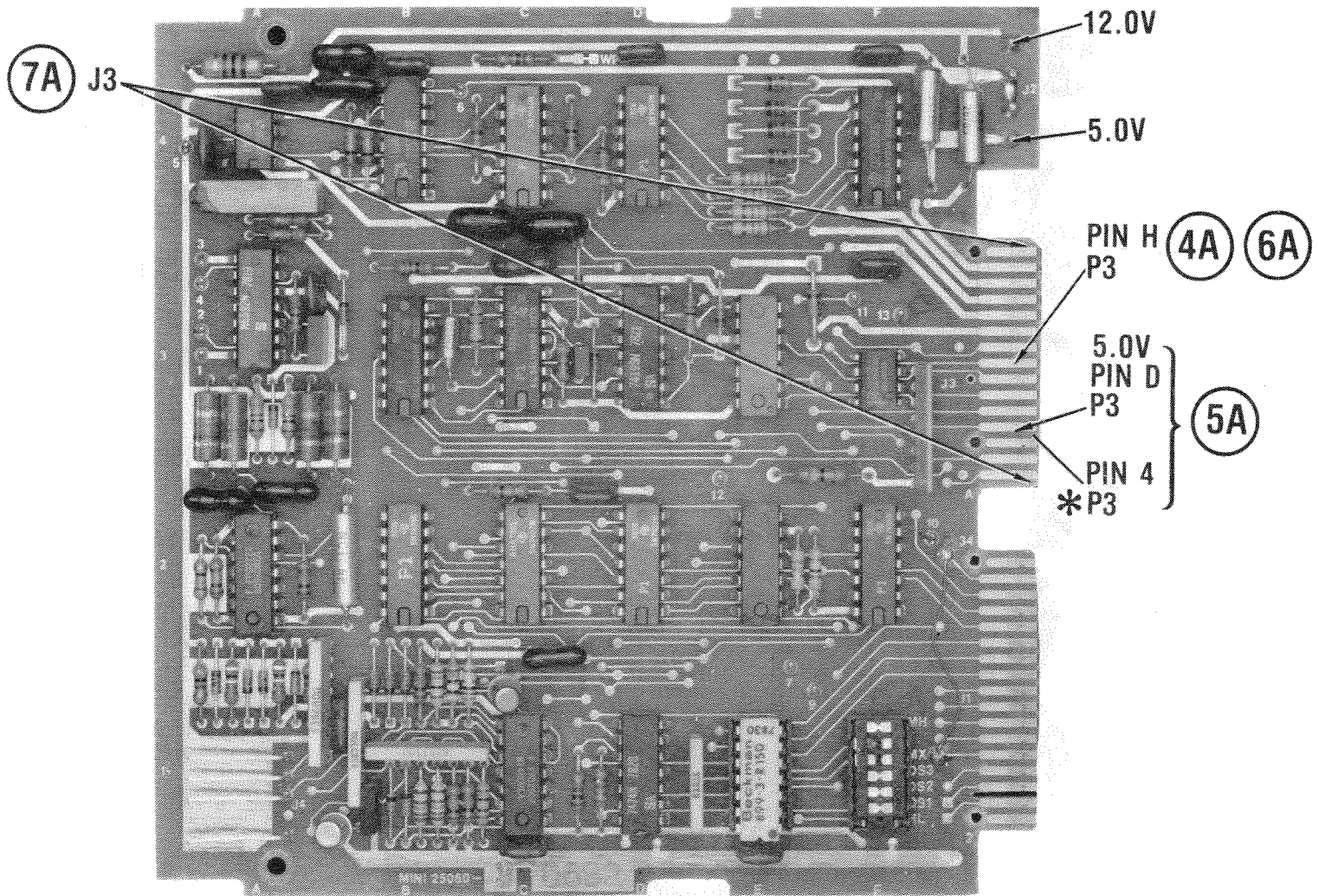
INTERCONNECTING DIAGRAM

PRELIMINARY SERVICE CHECKS (Continued)



MOTOR CONTROL BOARD

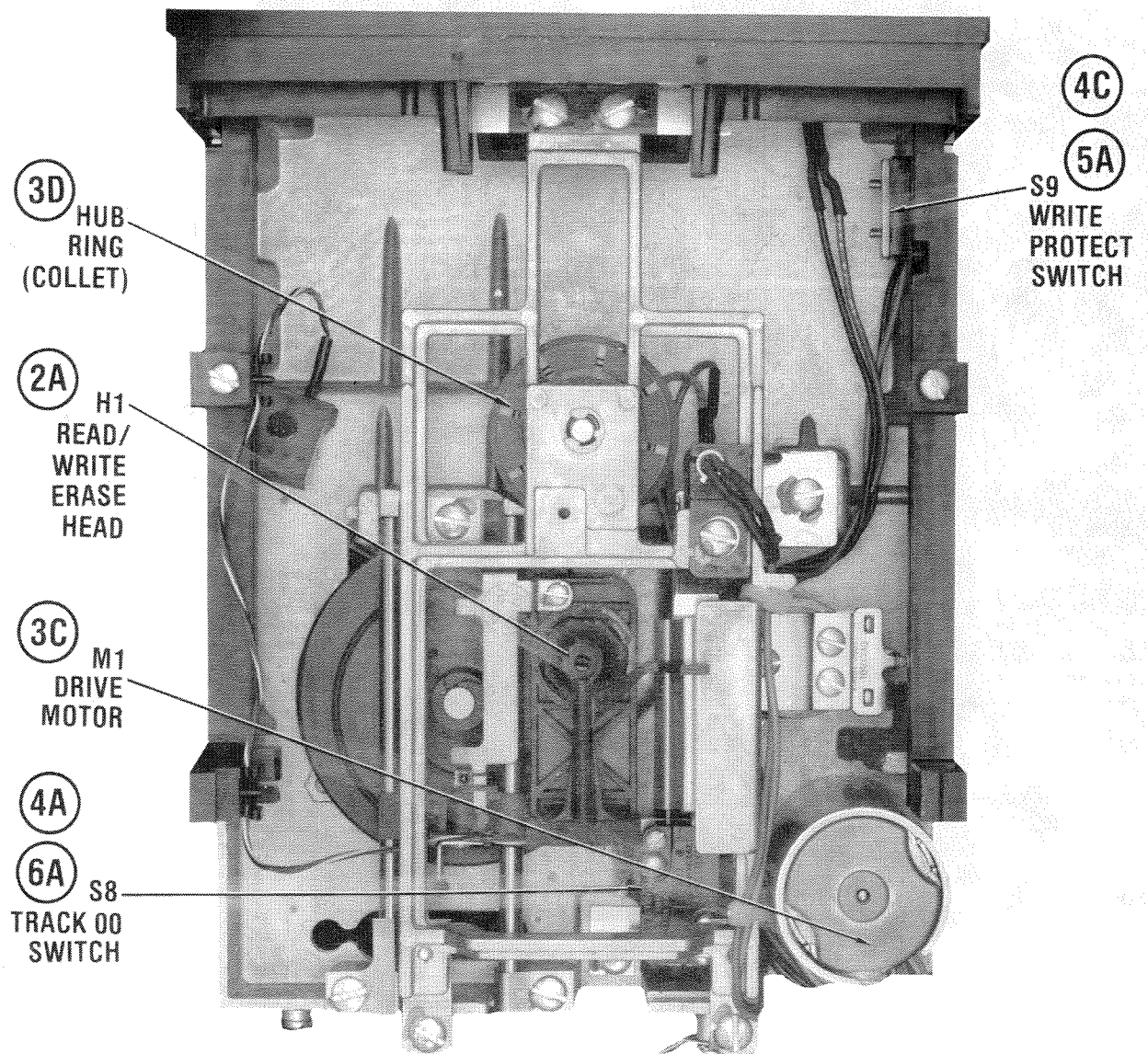
PRELIMINARY SERVICE CHECKS (Continued)



* LOCATED ON OTHER SIDE OF BOARD

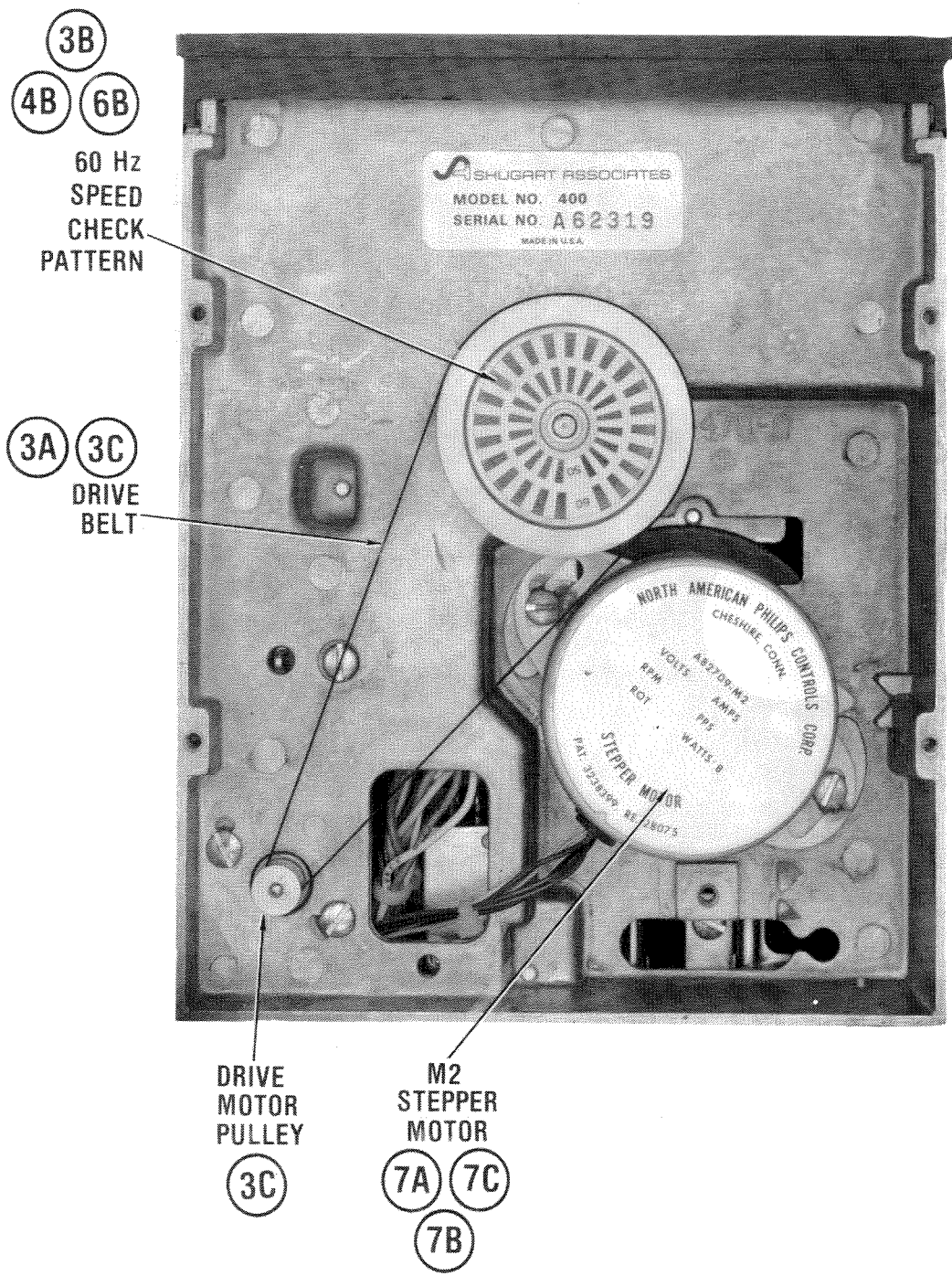
DRIVE BOARD

PRELIMINARY SERVICE CHECKS (Continued)



MECHANICAL-TOP VIEW

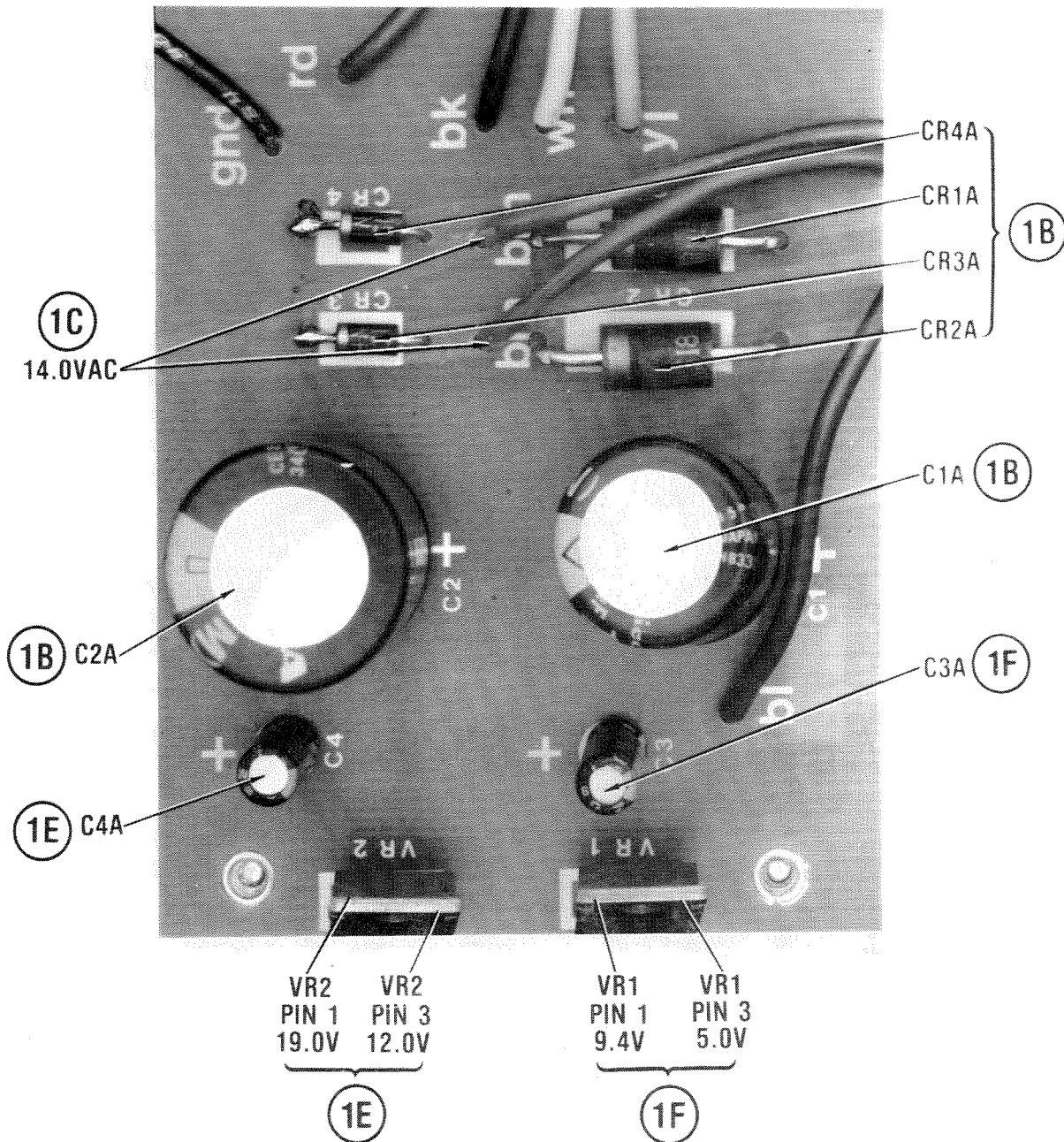
PRELIMINARY SERVICE CHECKS (Continued)



RADIO SHACK
TRS-80 MODELS 26-1160/61

MECHANICAL-BOTTOM VIEW

PRELIMINARY SERVICE CHECKS (Continued)



POWER SUPPLY BOARD

VI

PRELIMINARY SERVICE CHECKS (Continued)

TEST EQUIPMENT AND TOOLS

TEST EQUIPMENT

Digital Volt/Ohm Meter
Disk Drive Analyzer Program
or
Disk Drive Tester that uses a Digital Test Diskette

TOOLS

60/50 Cycle Fluorescent Lamp
Soldering Iron
Phillips Screwdriver
Small Screwdriver
Desoldering Tool

PARTS LIST AND DESCRIPTION

ITEM	PART NO.	DESCRIPTION
C1A		Capacitor, Electrolytic, 2200 μ F @ 25V
C2A		Capacitor, Electrolytic, 3300 μ F @ 16V
C3A, C4A		Capacitor, Electrolytic, 10 μ F @ 35V
CR1A, CR2A		Diode, Rectifier, 1N5402
CR3A, CR4A		Diode, Rectifier, 1N4002
F1		Fuse, 250mA @ 250V Slow-Blow
M1	54047	Motor, Disk Drive Assembly
M2	54068	Motor, Stepper
Q1		Transistor, Motor Drive, 2N6125
SW1		Switch, Power
S8	17211	Switch, Track 00
S9	17212	Switch, Write Protect
T1		Transformer, Power
VR1		IC, Voltage Regulator, UA7805UC
VR2		IC, Voltage Regulator, UA7812UC
5	54161	Drive Belt
38	54066	Hub Ring (Collet)

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-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 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.

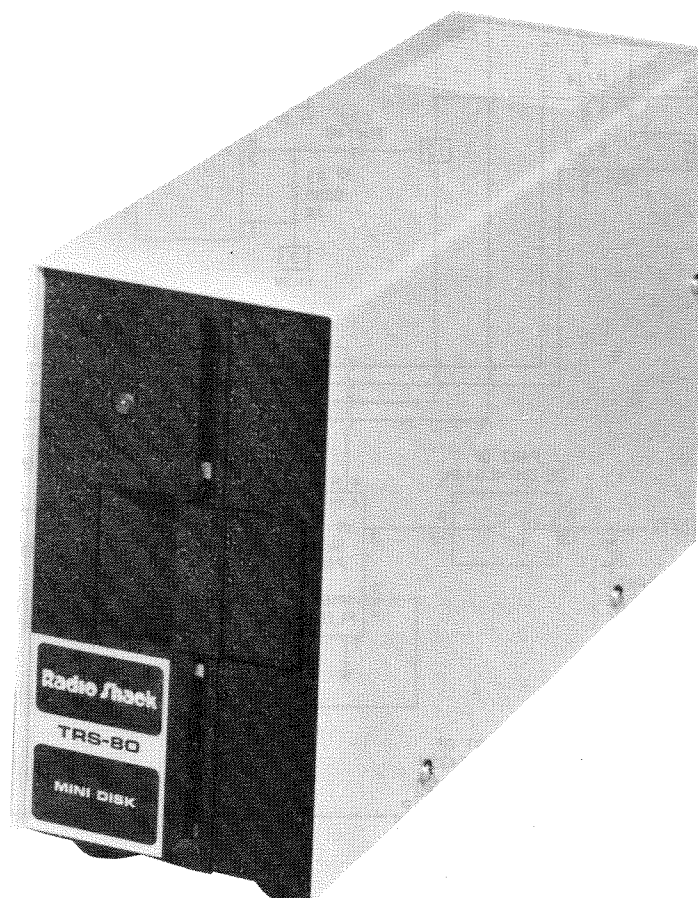
STATIC ELECTRICITY

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.

CD7 RADIO SHACK
TRS-80 MODELS 26-1160/61



CD7 RADIO SHACK
TRS-80 MODELS 26-1160/61

PRELIMINARY SERVICE CHECKS

ENCLOSED

SAFETY PRECAUTIONS

See page 25.

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SAMS™

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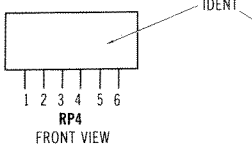
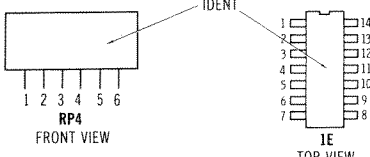
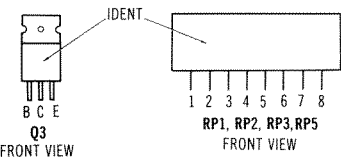
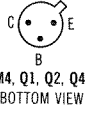
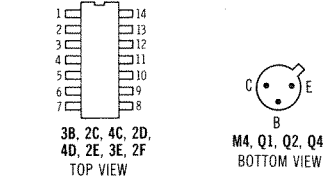
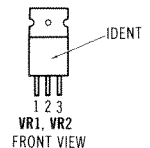
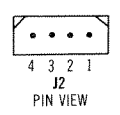
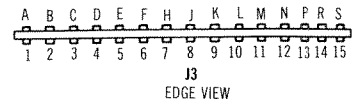
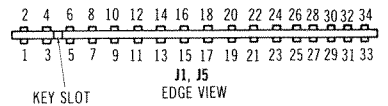
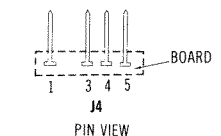
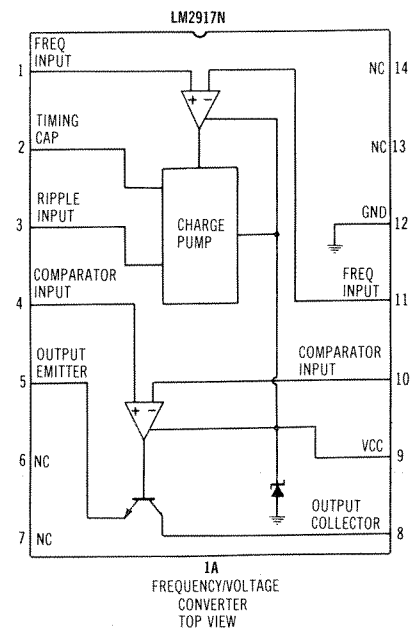
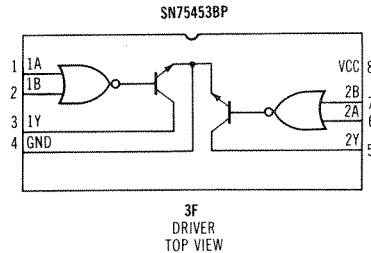
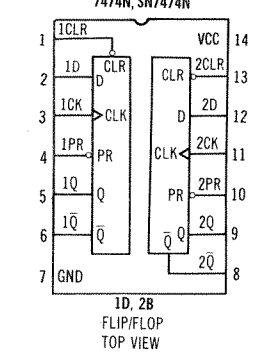
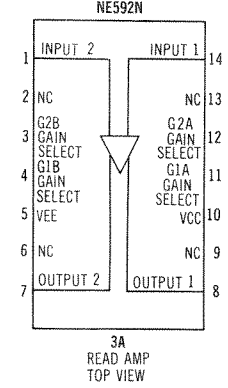
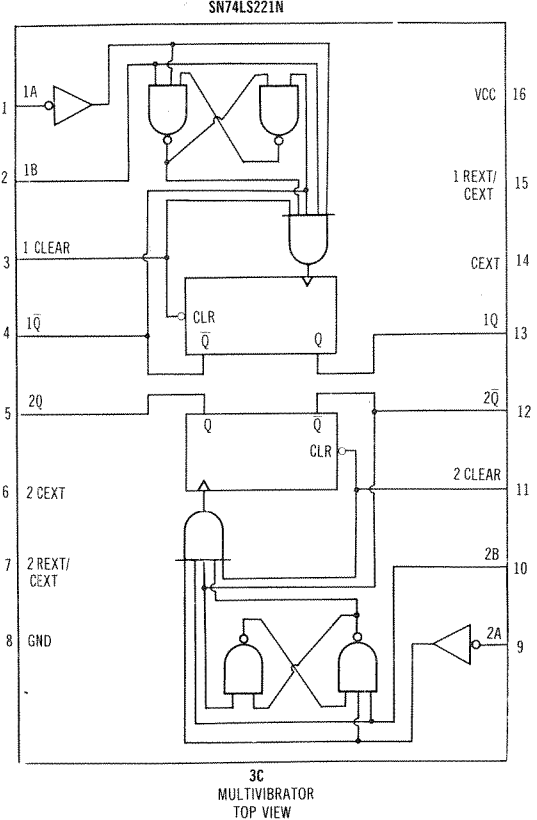
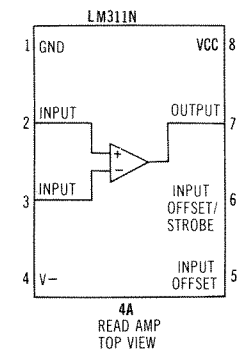
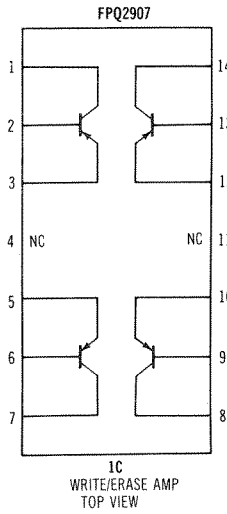
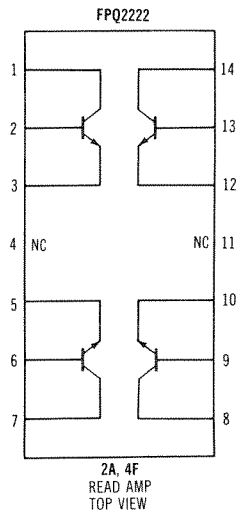
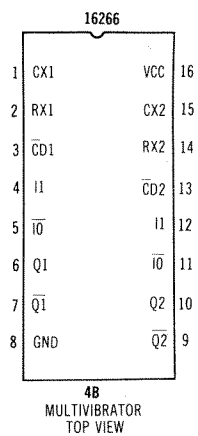
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DATE 5-85

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.
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 8 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.
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 with switching as shown, unless noted.
Logic Probe Display
L = Low
H = High
P = Pulse
* = Open (No light On)
Voltages, Waveforms and Logic Probe readings taken while running the following program:
10 OPEN "0", 1, "SAMS"
20 FOR X = 1 TO 300
30 PRINT #1, "THIS IS A TEST"
40 NEXT X
50 CLOSE 1
60 GOTO 10

GENERAL OPERATING INSTRUCTIONS

POWER UP SEQUENCE (WHEN USING DISK DRIVE)

1. Turn on the Expansion Interface.
2. Turn on the Disk Drives (Terminal Drive first) and any other peripherals.
3. Put a diskette (containing DOS, Disk Operating System) into Disk Drive 0. Turn the Computer On. The Computer will automatically boot up from Disk Drive 0. The version of the Disk Operating System will appear on the Monitor screen along with the words "DOS READY" and a prompt character.

DISK OPERATING SYSTEM (DOS)

Type DIR and press the ENTER key to get a directory of programs that are on the diskette in Disk Drive 0. For other drives, type DIR : and the number of the drive from which the information is desired. Example: Type and enter DIR :2 to list programs on diskette in Drive 2.

To load a program from a diskette in DOS mode, type the name of the program and press the ENTER key. Use a colon and the number of the Disk Drive which contains the program to be loaded. If no number is given, the system will assume Drive 0.

NOTE: Basic programs will not load from diskette unless the Computer is in the Disk Basic mode.

To get back to the DOS from the Disk Basic, type CMD"S" and press the ENTER key. Any program in memory will be lost when leaving Basic mode by using CMD"S".

BASIC

To load Disk Basic into the Computer, boot up on DOS, put a diskette into Drive 0 containing Disk Basic (usually a part of the DOS diskette), type BASIC and press the ENTER key and follow prompts. To go from Disk Basic to DOS, type CMD"S" and press the ENTER key, any program in memory will be lost.

To load a program from a diskette when in Disk Basic mode, type LOAD and the program name enclosed in quotes and press the ENTER key. To load from a Disk Drive other than Drive 0, add a colon and the drive number at the end of the program name. Example: LOAD "SAMS:1" for Drive 1.

To save a program onto a diskette when in Disk Basic mode, type SAVE and the program name in quotes and press the ENTER key. To save a program onto a diskette in a Disk Drive other than Drive 0, add a colon and the drive number at the end of the program name. Example: SAVE "SAMS:1" for Drive 1.

FORMATTING A DISKETTE

NOTE: This procedure does not copy Disk Operating System sections required for normal disk operations. A diskette thus formatted must be used only with systems containing 2 or more drives. Use "Back-up" function to format a diskette containing DOS information.

A blank diskette must be formatted before it can be used for saving data. To format a diskette, boot up on DOS, put a diskette in the drive with the format program on it (usually part of the DOS diskette), type FORMAT and press the ENTER key. After the program has been loaded, put a blank diskette into the drive and follow the instructions on the Monitor screen.

DISASSEMBLY INSTRUCTIONS

CABINET REMOVAL

Remove six screws, three from each side of cabinet. Slide cabinet from unit. Most components are now accessible for service.

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		

HEAD CLEANING INSTRUCTIONS

Lightly wipe the Head with a cotton swab or a lint-free cloth dampened with 91% Isopropyl alcohol. After the alcohol has evaporated, lightly polish the Head with a dry lint-free cloth.

ADJUSTMENTS

EQUIPMENT REQUIRED

A test program or a Disk Drive Tester is required which will turn On the Disk Drive and step the head to the track specified in the alignment procedures. Use a Dysan Analog Alignment Diskette 224/2A when an Alignment Diskette is specified in the alignment procedures. NOTE: This alignment diskette has only alignment patterns on it and does not contain any alignment programs.

SPINDLE SPEED ADJUSTMENT

Insert the diskette into the Disk Drive and close the door. Turn the Drive on its side to make the strobe pattern on the flywheel visible. Adjust the Speed Adjust Control (R59) on the Motor Control Board until the 60Hz pattern appears to stand still under a 60Hz fluorescent light. If 50Hz fluorescent lighting is being used, use the 50Hz pattern on the flywheel.

Adjust Speed Adjust Control (R59) for a speed of 300rpm, ± 5 rpm, if a Disk Drive Tester, which provides spindle speed readout in rpm, is being used.

READ/WRITE HEAD PRESSURE BUTTON ADJUSTMENT

Connect Channel A of a dual trace scope to TP1, Channel B to TP2, and scope ground to TP5. Connect external trigger to TP7. Set scope to Add mode with Channel B inverted. Set the sweep time to $2\mu\text{s}$ and the voltage to the .1V range. Insert an Alignment Diskette, turn On the Disk Drive and set the Head to Track 33. While observing the signal on the scope (Figure 1), rotate the Head Pressure Button counter-clockwise in small increments (10°) until Maximum signal amplitude is obtained. See Mechanical-Alignment photo.

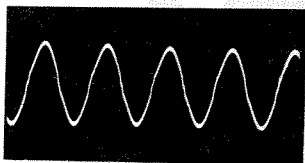


Figure 1

RADIAL HEAD ALIGNMENT

Connect the Channel A input of a dual trace scope to TP1, Channel B input to TP2, external trigger input to TP7, and scope ground to TP5. Set the scope to Add mode with Channel B inverted, AC inputs, voltage range to .1V, sweep time to 20ms, and external trigger on positive slope. Insert the Alignment Diskette and turn On the Disk Drive. Set the Head to Track 16. Observe the cats-eye pattern shown in Figure 2. The amplitude of each of the two lobes must be within 70% of the other.

If the lobes are out of tolerance, loosen the two mounting screws which mount the Stepper Motor (M2) to the drive casting. Rotate Motor M2 to radially move the Head in or out. If the left lobe is less than 70% of the right, turn the Motor M2 clockwise as viewed from the Motor M2 of the Drive. See Mechanical-Bottom View photo. If the right lobe is less than 70% of the left lobe, turn the Motor M2 counter-clockwise as viewed from the Motor (M2) side of the drive. When the lobe amplitudes are equal, tighten the Motor M2 mounting screws.

Move the head to Track 34 and back to Track 16. Then move the Head to Track 00 and back to track 16. Make certain the lobes are within tolerance when the Head is on Track 16.



Figure 2

TRACK 00 ADJUSTMENT

Check Radial Head Alignment before performing Track 00 Adjustment. Remove the Drive Board from the drive unit. Disconnect the head cable from the board but leave the interface and drive connectors installed. Rotate the Head Cam Actuator so that the Track00 dimple is under the Cam Follower (See Mechanical-Alignment photo). Adjust the Track 00 Switch (S8) by moving its mounting bracket so that it just actuates. When making the switch adjustment, make certain the Activator is located against the 45° angled surface of the carriage.

To verify the Track 00 Switch (S8) adjustment, connect a logic probe to TP8, turn On the Disk Drive and set the Head to Track 01. The reading at TP8 should go logic High and if it does not, readjust Switch S8. Step the Head to Track 00 and if TP8 does not change to a logic Low reading, readjust Switch S8. After adjusting the Switch S8, step the Head to Track 01 and make sure that TP8 goes logic High again. Step the Head to Track 02. TP8 should remain logic High.

INDEX/SECTOR SENSOR ADJUSTMENT

Connect the Channel A input of a dual trace scope to TP1, Channel B to TP2 and the scope ground to TP5. Connect the external trigger input to TP7. Set the voltage range of both channels to 0.2V and set the sweep time $50\mu\text{s}$. Set the scope inputs to Add with one channel inverted.

Insert the Alignment Diskette into the Disk Drive and close the door. Turn On the Drive and set the Head to Track 01. Confirm that the timing between the start of the sweep and the first peak of the timing burst is $200\mu\text{s} \pm 50\mu\text{s}$ (See Figure 3). If the Index/Sector Sensor is out of adjustment, loosen the sensor mounting screw until it is just possible to move the Index/Sector Sensor block. Adjust the Index/Sector Sensor block until the timing is $200\mu\text{s} \pm 50\mu\text{s}$. Be certain the Index/Sector Sensor assembly is against the registration surface of the hub frame (See Mechanical-Top View Photo). Tighten the mounting screw and recheck the timing.

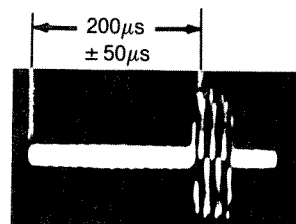


Figure 3

CD7
TRS-80 MODELS 26-1160/61
RADIO SHACK

ADJUSTMENTS (Continued)

AZIMUTH CHECK

Connect the Channel A input of a dual trace scope to TP1, Channel B to TP2, external trigger input to TP7, and scope ground to TP5. Set the scope to Add mode with Channel B inverted, AC inputs, voltage range to .1V, sweep time to .5ms and external trigger on positive slope.

Insert the Alignment Diskette and close the door. Turn On the Disk Drive and set the Head to Track 34. The pattern on the scope should appear as shown in Figure 4. The amplitude of bursts 1 and 4 must be equal to or less than the amplitude of bursts 2 and 3.

No adjustment is provided for the Head azimuth. If the azimuth is out of tolerance, the Head may need replacement.

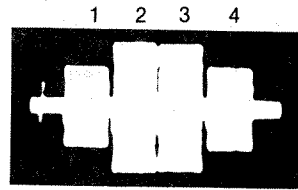
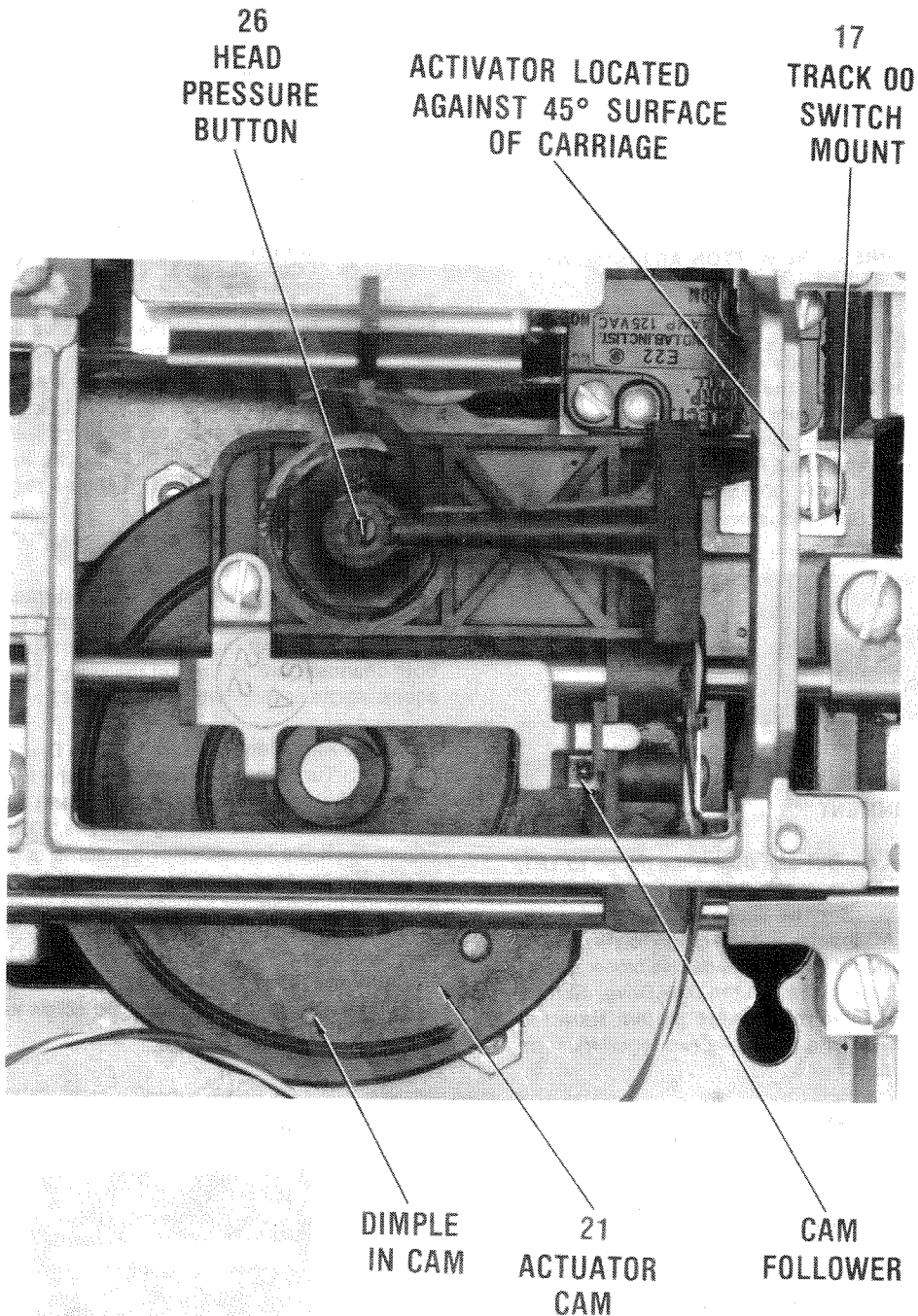


Figure 4



MECHANICAL-ALIGNMENT

TROUBLESHOOTING

POWER SUPPLY

Check AC Fuse (F1) and if open, check Diodes CR1A thru CR4A. Check Regulator ICs VR1 and VR2. Also check Capacitors C1A Thru C4A. Also check Capacitors C1A and C2A.

Check for 19.0V at the cathode of Diode CR4A. If the 19.0V is missing at the cathode of Diode CR4A, check for 14.0VAC across the secondary of Power Transformer (T1). If the 14.0VAC is missing, check Fuse F1, Power Switch (SW1), and Transformer T1. If the 14.0VAC is present, check Diodes CR1A thru CR4A. Check for 19.0V at pin 1 of IC VR2 and if present, check for 12.0V at pin 3 of IC VR2. Check Capacitor C4A. If the 12.0V is missing, check IC VR2 by substitution. Check for 9.4V at pin 1 of IC VR1. If the 9.4V is missing, check Transformer T1. If the 9.4V is present, check for 5.0V at pin 3 of IC VR1. If the 5.0V is missing, check IC VR1 by substitution. Also check Capacitor C3A.

DISK DRIVE CONTINUOUS OPERATION PROGRAM

To operate the Disk Drive using the TRS-80 Model 1 Computer, type and run the following program:

10 POKE 14304,255: GOTO 10

This program will turn On and Enable Disk Drives 0 thru 3 at the same time. To select only one drive, change the number 255 in the program as follows:

241 to select Drive 0, 242 to select Drive 1, 244 to select Drive 2 or 248 to select Drive 3.

STEPPER MOTOR

If the Stepper Motor (M2) is not operating properly, check for continuity across each motor winding (measure between pin 12 and pins N, M, R and P of Connector P3). Also check Connector P3 for good connections. Use a Disk Drive Test Program which will step the Head back and forth or connect the Disk Drive to a Disk Drive Tester which can step the Head to specified Track. Use a test mode that will step the Head back and forth continuously and check for pulses at pins 8, 7, 1 and 14 of Driver IC (4F). If the pulses are missing at the driver outputs, check for pulses at pins 2, 4, 6 and 12 of IC 4D. If the pulses are present, check Driver 4F by substitution. Also check Diodes CR14, CR15, CR17 and CR18.

If the pulses are missing at the outputs of IC 4D, check for pulses at input pins 1, 3, 5 and 13 of IC 4D. If the input pulses are present, check IC 4D by substitution. If IC 4D input pulses are missing, check for pulses at pin 10 of IC 3D. There should be a very narrow pulse followed 10 ms later by a slightly wider pulse. These pulses occur approximately every 40 ms. If the wider pulse is missing, check the pulse-shaping circuit consisting of IC's 3C, 3B and 2D. If the narrow pulse is missing, use a logic probe to check for pulses at pins 8 thru 11 of IC 2E. If the pulse is present at the input of a particular gate but missing at the output, check the appropriate IC (2E or 3E) by substitution. If the pulses at pin 10 of IC 3D are correct, check IC 3D by substitution.

If the Head will not move in the opposite direction after reaching either extreme of travel, check the logic level at

pin 9 of IC 3D while attempting to step the Head back and forth. If the logic level at pin 9 of IC 3D does not change, check IC 1D by substitution. The logic level at pin 9 should be logic Low when the Head is moving toward the spindle and it should be logic High when the Head is moving away from the spindle.

DISK DRIVE MOTOR MALFUNCTION

If the Disk Drive does not run, check for 12.0V at pin 1 of Connector J2 and 5.0V at pin 4 of Connector J2. If either voltage is missing, check Connector J2 and the cable for good connections. Also check the power supply. If the voltages are normal at Connector J2, type and run this basic program:

10 POKE 14304,255: GOTO 10

Check for a logic Low reading at pin 1 of IC 2C. If pin 1 is not logic Low, check for a good connection at pin 16 of Connector J1. Also check the drive interface cable. If pin 1 of IC 2C is logic Low, check for a logic Low at pin 2 of IC 2E. If pin 2 is not logic Low, check IC 2E by substitution. If pin 2 of IC 2E is logic Low, check for a logic Low on pin 10 of IC 1A on the Drive Motor Control Board. If pin 10 is not logic Low, check Resistor R56 and Diode CR24. If pin 10 of IC 1A is Low, check for approximately 11.2V at pin 8 of IC 1A. If pin 8 is 11.2V, check IC 1A by substitution. Also check for a shorted Diode CR26. If pin 8 of IC 1A is 11.2V, check for an open Motor Drive Transistor (Q3) or a shorted Regulator Transistor (Q4). Also check for an open Resistor (R58) in the emitter circuit of the Driver Transistor.

If the Disk Drive Spindle speed is incorrect, perform the "Spindle Speed Adjustment" procedure in the Miscellaneous Adjustments. If the Spindle speed cannot be correctly adjusted, connect a scope between the cathodes of Diodes CR20 and CR22 on the Drive Motor Control Board. Set scope time base to 2ms and check for the 10.8V peak-to-peak tach signal shown in Figure 5. If the tach signal is missing, check for an open tach winding in Drive Motor (M1). If the tach signal is present, check the waveform at pin 1 of IC 1A. If the waveform at pin 1 of IC 1A is incorrect, check Diodes CR20 thru CR23, Resistors R43, R44 and R45; and Capacitor C32. If the correct waveform appears at pin 1 of IC1A, check for approximately 1.9V at pin 4 of IC 1A. If the voltage at pin 4 of IC 1A is abnormal, check the components in the Speed Adjustment circuit. If the voltage at pin 4 of IC 1A is normal, check IC 1A by substitution.

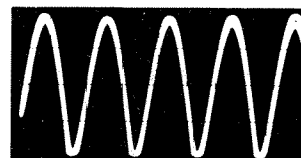


Figure 5

TROUBLESHOOTING (Continued)

DISK INDEX DETECTOR

Run the Disk Drive with a diskette inserted and the door closed. Check for pulses at pin 6 of IC 2F. If pulses are present at pin 6, check pin 8 of Connector J1 for a good connection. Also check the drive interface cable. If pulses are missing at pin 6 of IC 2F, check for pulses at pin 5 of IC 2F. If there are pulses at pin 5, check IC 2F by substitution. If pulses are missing at pin 5 of IC 2F, check for pulses at pin 3 of IC 2E. If there are pulses present at pin 3, check IC 2E by substitution. If pulses are missing at pin 3 of IC 2E, check the Index/Sector Detector (M4), the Index/Sector LED and Resistor R35. Also check Pin E of Connector J3 for a good connection.

WILL NOT READ

Insert a diskette containing data into the Disk Drive and close the door. Type and run the following program:

```
10 POKE 14304,255: GOTO 10
```

The above program makes the drive run continuously in the Read mode. Check for a logic High at pin 13 of IC 4B to verify that the Disk Drive is in the Read mode.

NOTE: When troubleshooting the Read circuit, pulses will appear in the circuit from pin 12 of IC 4C to pin 3 of IC 3F when the Disk Drive is turned On even though data is not being read from the diskette. To determine if data pulses are present in this portion of the Read circuit, open and close the Disk Drive door while the Drive is running with a diskette containing data inserted. At the same time observe the waveform at pin 12 of IC 4C. If the scope is synchronized to the data pulses, there will be a noticeable shift in the waveform when the door is opened. If there is no change, data pulses are probably missing at pin 12 of IC 4C.

If data pulses are present at pin 12 of IC 4C, check for pulses at pin 3 of IC 3F. If pulses are present at pin 3, check for pulses at pin 1 of IC 3F. If pulses are present at pin 1, check IC 3F by substitution. If there are no pulses present at pin 1 of IC 3F, check for pulses at pin 12 of IC 4B. If the pulses are present at pin 12, check IC 4B by substitution. If there are no pulses at pin 12 of IC 4B, check for pulses at pin 9 of IC 4C. If there are pulses at pin 9, check IC 4C by substitution. If the pulses are missing at pin 9 of IC 4C, check for pulses at pin 11 of IC 2B. If pulses are present at pin 11, check IC 2B by substitution. If the pulses are missing at pin 11 of IC 2B, check for pulses at pin 4 of IC 4B. Check IC 4B by substitution if the pulses are present at pin 4. If the pulses are missing at pin 4, check for pulses at pin 12 of IC 4C. If the pulses are present at pin 12, check IC 4C by substitution.

If the data pulses are missing at pin 12 of IC 4C, check for data pulses at pin 3 of IC 4A. If pulses are present at pin 3, check IC 4A by substitution. If the pulses are missing at pin 3 of IC 4A, check for pulses at test points TP1 and TP2. If the pulses are present at TP1 and TP2, check IC 3A by substitution. If the pulses are missing at either TP1 or TP2, check the pulses at pins 7 and 8 of IC 2A. If the pulses are present at pin 8 of IC 2A but missing at TP1, check Coils L1 and L2. If the pulses are present at pin 7 of IC 2A but missing at TP2, check Coils L1 and L2. If the pulses are present at pin 7 of IC 2A but missing at TP2, check Coils L3 and L4. If

the data pulses are missing at pins 7 and 8 of IC 2A, check IC 2A by substitution. Also check Diodes CR1 thru CR4 on the Drive Board. Check both windings of the Read/Write Head (H1) for continuity (pin 1 to pin 5 of Connector P4).

WILL NOT WRITE

Verify that the Write Protect circuit is functioning properly by inserting a diskette that is not write protected into the Disk Drive and checking for a logic High at pin 11 of IC 2F. If the reading is not logic High, see the "Write Protect Does Not Function" section of this Troubleshooting guide.

If the write protect circuit is not functioning, type and run the following program:

```
10 OPEN "0", 1, "SAMS"  
20 FOR X=1 TO 300  
30 PRINT #1, "THIS IS A TEST"  
40 NEXT X  
50 CLOSE 1  
60 GOTO 10
```

With the program running, check for pulses at pins 1 and 14 of IC 1C. If pulses are present, check Diodes CR5 and CR6. Also check the Read/Write Head (H1) for continuity. If there are no pulses present at pins 1 and 14 of IC 1C, check for pulses at pins 10 and 12 of IC 2C. If pulses are present at pins 10 and 12, check Resistors R16 and R17. Also check IC 1C by substitution. If pulses are missing at pins 10 and 12 of IC 2C, check for pulses at pins 11 and 13 of IC 2C. If pulses are present at pins 11 and 13, check IC 2C by substitution. If pulses are missing at pins 11 and 13 of IC 2C, check for pulses at pin 3 of IC 2B. If the pulses are present at pin 3, check IC 2B by substitution. If pulses are missing at pin 3 of IC 2B, check for pulses at pin 13 of IC 2E. If pulses are present at pin 13, check IC 2E by substitution. If there are no pulses at pin 13 of IC 2E, check pin 22 of Connector J1.

If the write data circuit is functioning normally, check the Read/Write Switch circuit. With the test program running, check for a pulse at the collector of Erase Switch Transistor (Q1). If there are pulses at the collector of Transistor Q1, the Read/Write Switch circuit is probably working. Check the connection at pin 4 of Connector P4 and the white lead going to the Read/Write Head. If there are no pulses at the collector of Transistor Q1, check for pulses at the base of Transistor Q1. If pulses are present at the base of Transistor Q1, check Transistor Q1 by substitution. If there are no pulses at the base of Transistor Q1, check for pulses at pin 6 of IC 1C. If there are pulses at pin 6, check IC 1C by substitution. Also check RP3 and RP2 between pin 7 of IC 1C and the base of Transistor Q1. If pulses are missing at pin 6 of IC 1C, check for pulses at pin 10 of IC 2D. If there are pulses at pin 10 of IC 2D, check Write Amp Transistor (Q2), Diodes CR7 and CR8, and Resistor RP2 in the collector and emitter circuits of Transistor Q2. If there are no pulses at pin 10 of IC 2D, check for pulses at pin 8 of IC 2D. If pulses are present at pin 8, check IC 2D by substitution. If there are no pulses at pin 8 of IC 2D, check the cable and connection at pin 24 of Connector J1.

TROUBLESHOOTING (Continued)

WRITE PROTECT DOES NOT FUNCTION

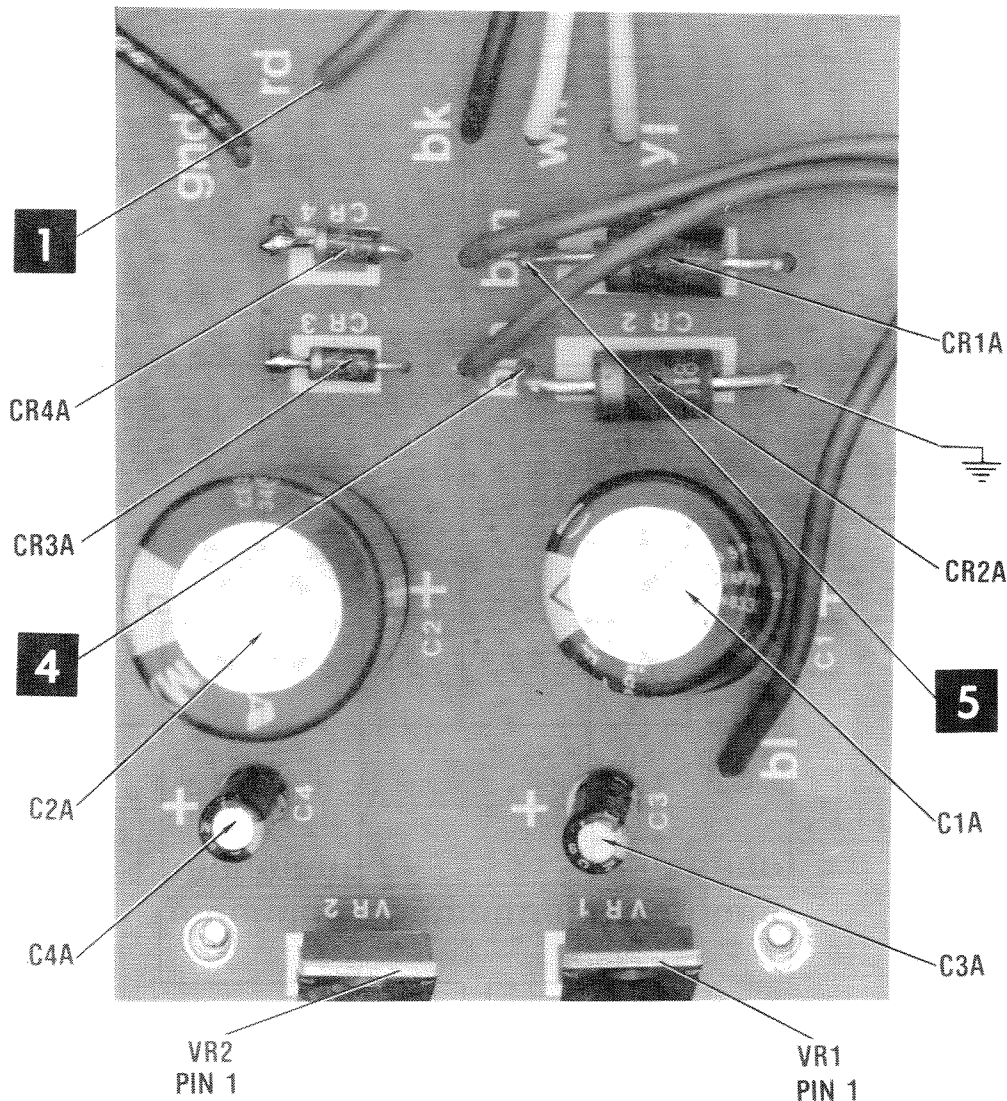
If writing to a write protected disk, use the following procedure to check the Write Protect circuit. Insert a write protected disk into the Disk Drive and close the door. Type and run the following program:

```
10 POKE 14304,255: GOTO 10
```

Check for a logic Low reading at pin 11 of IC 2F. If pin 11 of IC 2F is logic Low, the Write Protect circuit is working. If pin 11 of IC 2F is logic High, check for a logic High on pin 3 of IC 4C. If pin 3 of IC 4C is logic High, check IC 2F by substitution. If pin 3 is logic Low, check for a logic High at pin 1 of IC 4C. If pin 1 is logic High, check IC 4C by substitution. If pin 1 of IC 4C is logic Low, check for a logic High at pin 9 of IC 2C. If pin 9 is logic High, check IC 2C by substitution. If pin 9 of IC 2C is logic Low, check Write Protect Switch (S9) and the connections at Connector P3. Also check Resistor RP5 at pin 9 of IC 2C.

ERASE HEAD

Verify that the Erase Head is not open by checking for continuity between pins 3 and 4 of Connector P4. Type and run the program given in the "Will Not Write" section of this Troubleshooting guide. Check for pulses at pin 8 of IC 1C. If pulses are present at pin 8 of IC 1C, check Diode CR9 and the cable and connection at pin 3 of Connector P4. If pulses are missing at pin 8, check for pulses at pin 9 of IC 1C. If pulses are present at pin 9, check IC 1C by substitution. If there are no pulses at pin 9 of IC 1C, check for pulses at pin 10 of IC 2F. If pulses are present at pin 10, check IC 2F by substitution. Also check Resistor R22. If pulses are missing at pin 10 of IC 2F, the Read/Write Switch circuit is not working. See the troubleshooting procedure for the Read/Write Switch circuit in the "Will Not Write" section of this Troubleshooting guide.



CD7 RADIO SHACK
TRS-80 MODELS 26-1160/61



PARTS LIST AND DESCRIPTION

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

SEMICONDUCTORS (Select replacement transistor for best results)

ITEM No.	TYPE No.	MFGR. PART No.	REPLACEMENT DATA					
			GENERAL ELECTRIC PART No.	NTE PART No.	PHILIPS ECG PART No.	RCA PART No.	WORKMAN PART No.	ZENITH PART No.
CR1	1N4148		GE-514	NTE519	ECG519	SK3100/519	WEP925/519	103-131
CR1A	1N5402		GE-504A	NTE5802	ECG5802	SK9005/5802	WEP4002/5802	212-Z9000
CR2	1N4148		GE-514	NTE519	ECG519	SK3100/519	WEP925/519	103-131
CR2A	1N5402		GE-504A	NTE5802	ECG5802	SK9005/5802	WEP4002/5802	212-Z9000
CR3	1N4148		GE-514	NTE519	ECG519	SK3100/519	WEP925/519	103-131
CR3A	1N4002	ADX1148	GE-504A	NTE116	ECG116	SK3311	WEP155	212-76-02
CR4	1N4148		GE-514	NTE519	ECG519	SK3100/519	WEP925/519	103-131
CR4A	1N4002	ADX1148	GE-504A	NTE116	ECG116	SK3311	WEP155	212-76-02
CR5 thru CR13	1N4148		GE-514	NTE519	ECG519	SK3100/519	WEP925/519	103-131
CR14 thru CR18	1N4003		GE-504A	NTE116	ECG116	SK3311	WEP156	212-76-02
CR19 thru CR26	1N4148		GE-514	NTE519	ECG519	SK3100/519	WEP925/519	103-131
M4	T1L99	54136(2)						
Q1, 2	2N2222A		GE-20	NTE123A	ECG123A	SK3444/123A	WEP736/123A	121-Z9000A
Q3	2N6125			NTE378	ECG378	SK3274/153		
	D45H-5			NTE378	ECG378	SK3274/153		
Q4	10060-0							
	2N2907		GE-82	NTE159	ECG159	SK3466/159	WEP62/159	121-Z9003
VR1	UA7805UC	3100004	GEVR-102	NTE960	ECG960	SK3591/960	WEP966L/966	221-Z9043
VR2	UA7812UC		GEVR-111	NTE966	ECG966	SK3592/966		HE-442-674
1A	LM2917N	AMX4181		NTE995	ECG995	SK9209/995		
1C	FPQ2907				ECG2322			
	2QT2905							
1D	7474N		GE-7474	NTE7474	ECG7474	SK7474	WEP7474/7474	HE-443-6
2A	FPQ2222				ECG2321			
	2QT2222							
2B	SN7474N		GE-7474	NTE7474	ECG7474	SK7474	WEP7474/7474	HE-443-6
2C	SN7407N	AMX3684		NTE7407	ECG7407	SK7407		

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					
			GENERAL ELECTRIC PART No.	NTE PART No.	PHILIPS ECG PART No.	RCA PART No.	WORKMAN PART No.	ZENITH PART No.
2D 2E 2F 3A	SN7433N DM74LS14N SN7438N NE592N NE592A	AMX3716 AMX3683 AMX3688	74LS14	NTE7433 NTE74LS14 NTE7438 NTE927D	ECG7433 ECG74LS14 ECG7438 ECG927D	SK7433 SK74LS14 SK7438 SK7617/927D		HE-443-872 HE-443-77
3B 3C	SN7402N SN74LS221N 74221	AMX3810	GE-7402	NTE7402 NTE74LS221 NTE74LS221	ECG7402 ECG74LS221 ECG74LS221	SK7402 SK74LS221 SK74LS221	WEP7402/7402	HE-443-46
3D 3E	74195N DM7400N	74195 GE-7400		NTE74195 NTE7400	ECG74195 ECG7400	SK74195 SK7400	WEP7400/7400	221-Z9075
3F 4A 4B	SN75453BP LM393 LM311N 16266 9602	7753DMP(1)		NTE75453B NTE922M	ECG75453B ECG922M	SK3668/922M		HE-442-75
4C 4D 4F	SN7486N SN7407N Q2T3725 MPQ3725	AMX3684	GE-7486	NTE7486 NTE7407	ECG7486 ECG7407 ECG2321	SK7486 SK7407		HE-443-698

(1) Number on unit.

(2) Assembly, Includes mounting bracket.

WIRING DATA

General-use Unshielded Hook-up wire Use BELDEN No. 8529 (Solid) Available in 13 Colors
Low-loss Shielded Lead (Interconnections). Use BELDEN No. 8401 or 8421

PARTS LIST AND DESCRIPTION (Continued)

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

ELECTROLYTIC CAPACITORS Items Not Listed Are Normally Available At Local Distributors.

ITEM No.	RATING	MFGR. PART No.
C3	1.6 15V 20% NP	
C27	4.7 50V 10%	
C28	4.7 50V 10%	

ITEM No.	RATING	MFGR. PART No.
C32	4.7 50V 10%	
C37	1 10%	

CAPACITORS Items Not Listed Are Normally Available At Local Distributors.

ITEM No.	RATING	MFGR. PART No.
C13	750 300V 1% 750 300V 5%	

ITEM No.	RATING	MFGR. PART No.
C18	750 300V 1% 750 300V 5%	

RESISTORS (Power and Special)

ITEM No.	RATING	REPLACEMENT DATA		
		MFGR. PART No.	NTE PART No.	WORKMAN PART No.
R2	9090 1% 1/8W Metal Film			
R3	9090 1% 1/8W Metal Film			
R8	845 1% 1/8W Metal Film			
R9	845 1% 1/8W Metal Film			
R16	2260 1% 1/8W Metal Film			
R17	2260 1% 1/8W Metal Film			
R20	604 1% 1/8W Metal Film			
R22	274 1% 1/8W Metal Film			
R23	909 1% 1/8W Metal Film			
R24	75 1% 1/8W Metal Film			
R25	14.3K 1% 1/8W Metal Film			
R43	100 1% 1/8W Metal Film			
R44	909 1% 1/8W Metal Film			
R47	40.2K 1% 1/8W Metal Film			
R52	23.2K 1% 1/8W Metal Film			
R53	7500 1% 1/8W Metal Film			
RP1	Resistor Network (1)			
RP2	Resistor Network (2)			
RP3	Resistor Network (2)			
RP4	Resistor Network (3)			
RP5	Resistor Network (4)			
1E	Resistor Network (5)			

(1) Contains four (4 ea.) 680

(2) Contains four (4 ea.) 330

(3) Contains five (5 ea.) 1000 10%

(4) Contains four (4 ea.) 150 2%

(5) Contains seven (7 ea.) 150, remove except for Drive 0.

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

ITEM NO.	FUNCTION	RESISTANCE	MFGR. PART NO.	NOTES
R13	Balance	100K 50K	560150-302	
R59	Speed Adjust	5000		

COILS (RF-IF)

ITEM No.	FUNCTION	MFGR. PART No.
L1	Peaking (390uH)	461391-010
L2	Peaking (390uH)	461391-010
L3	Peaking (5.6uH)	461506-010

ITEM No.	FUNCTION	MFGR. PART No.
L4	Peaking (5.6uH)	461506-010
L5	Filter	

RADIO SHACK
TRS-80 MODELS 26-1160/61

PARTS LIST AND DESCRIPTION (Continued)

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

TRANSFORMER (Power)

ITEM No.	RATING			REPLACEMENT DATA		
	PRI.	SEC. 1	SEC. 2	MFGR. PART No.		NOTES
T1	120V AC @ 205mA	14.0V AC @ 600mA DC				

FUSE DEVICES

ITEM No.	DESCRIPTION	REPLACEMENT DATA				NOTES
		MFRG. PART No.		BUSS PART No.		
		DEVICE	HOLDER	DEVICE	HOLDER	
F1	250mA @ 250V Slow Blow					

MISCELLANEOUS

ITEM No.	PART NAME	MFGR. PART No.	NOTES
H1	Head and Carriage Assembly	54055	
LED1	LED	15915	Red, Activity
LED2	LED	54137	Clear, Index Sensor
M1	Motor/Generator	54047	Drive
M2	Motor	54068	Stepper
M3	Solenoid Assembly	54064	Head Load
P1	Power Cord		AC, Polarized
SW1	Switch		Power, On-Off
SW8	Switch	17211	Track 00
SW9	Switch	17212	Write Protect
	PC Board	25060	Drive
	PC Board	25129	Motor Control
	PC Board	870-9434	Power Supply (PC-A-P-86V-0)

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

ITEM	PART No.
Faceplate	
Baseplate	54077

ITEM	PART No.
Cover	
Activity Light Holder	11312

MECHANICAL PARTS LIST

REF. NO.	PART NO.	DESCRIPTION
2	54097	Long Spacer
3	10804	Bearing
4	54138	Spindle Pulley
5	54161	Drive Belt
17	54038	Switch Mount (Track 00 Switch)
21	54003	Actuator Cam
22	54055	Head and Carriage Assembly
24	54474	Carriage Stop Clamp
25	54473	Guide Rod Clamp
26	54145	Load Button
27	54475	Diskette Guide, Right Side
28	54006	Guide Rod

REF. NO.	PART NO.	DESCRIPTION
30	54078	Guide Rod Keeper
35	54073	Door, Hinge
36	54057	Stop Disk
37	54132	Spring Clamp
38	54066	Collet Hub
39	54131	Hub Collar
40	54032	Spindle
41	10805	Flanged Bearing
42	54135	Load Ball
49	54125	Platen
62	54024	Spring Hinge
63	54070	Hub

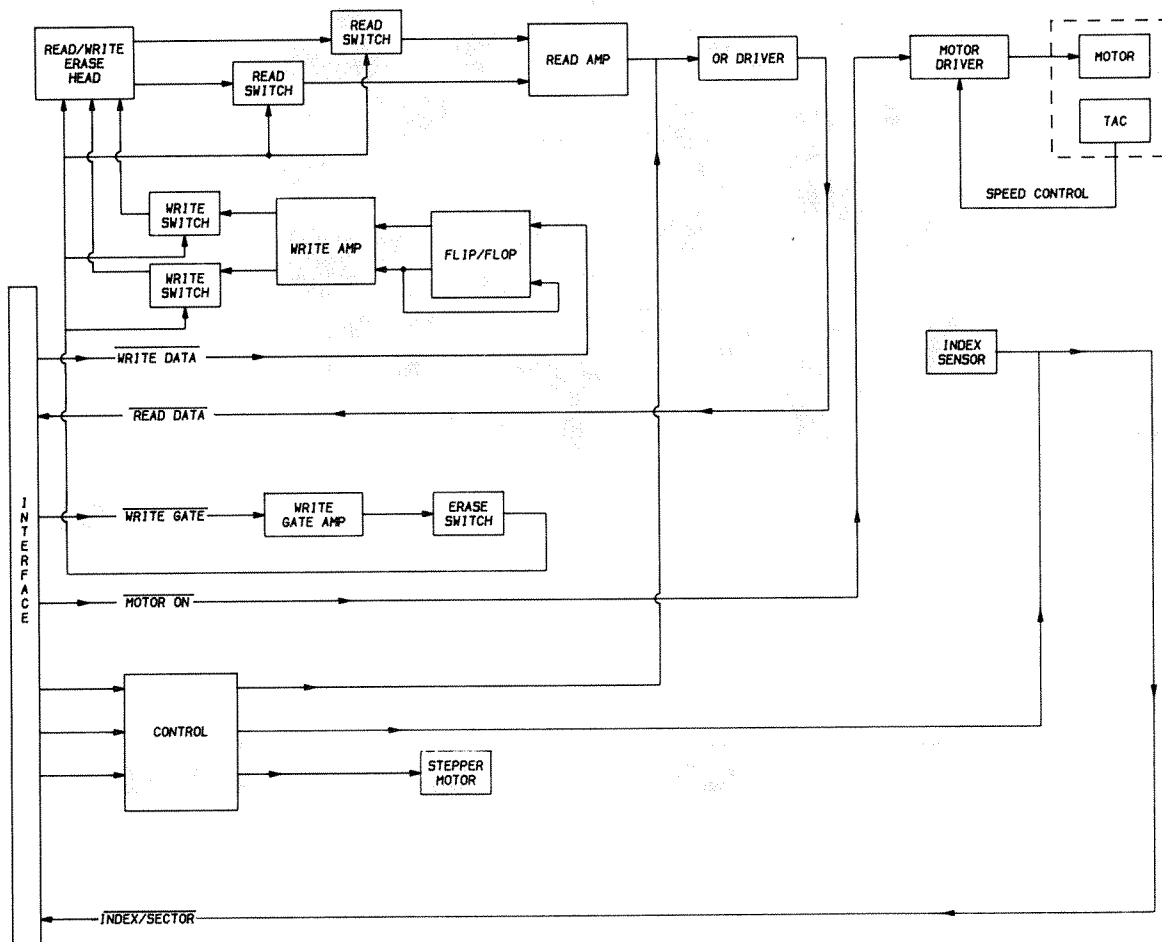
PARTS LIST AND DESCRIPTION (Continued)

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

MINI-DISK POWER SUPPLY

REF. NO.	PART NO.	DESCRIPTION
C1	1500071	2,200uF, 25V, Electrolytic
C2	1500072	2,200uF, 35V, Electrolytic
C3	1500073	0.001uF, 100V,
C4	1500069	220uF, 16V, Electrolytic
C5	1500069	220uF, 16V, Electrolytic
C6	1500070	220uF, 35V, Electrolytic
CR1	4800028	1N5392, 100V, Silicon
CR2	4800028	1N5392, 100V, Silicon
CR3	4800028	1N5392, 100V, Silicon
CR4	4800028	1N5392, 100V, Silicon
CR5	4800027	1N4002, 100V, Silicon
CR6	4800027	1N4002, 100V, Silicon
CR7	4800028	1N5392, 100V, Silicon
CR8	4800028	1N5392, 100V, Silicon
CR9	4800028	1N5392, 100V, Silicon
CR10	4800028	1N5392, 100V, Silicon
P1	2100045	Socket, Connector Plug, Power (4 ea.)

REF. NO.	PART NO.	DESCRIPTION
	1700078	Printed Circuit Board
Q1	3100004	I.C. Voltage Regulator, 7805
Q2	4824004	MJE3055, Power Transistor
R1	4717004	0.33 Ohm, 2W, 5%
R2	4704068	10K, 1/4W, 5%
R3	4704041	560 ohm, 1/4W, 5%
R4	4704054	2.2K, 1/4W, 5%
R5	4704058	3,300 ohm, 1/4W, 5%
R6	4704050	1,500 ohm, 1/4W, 5%
R7	4750019	1K, 30% Variable
S1	5106001	Switch, DPDT
T1	4000005	Transformer, 117V/60Hz
Z1	3100001	Voltage Regulator

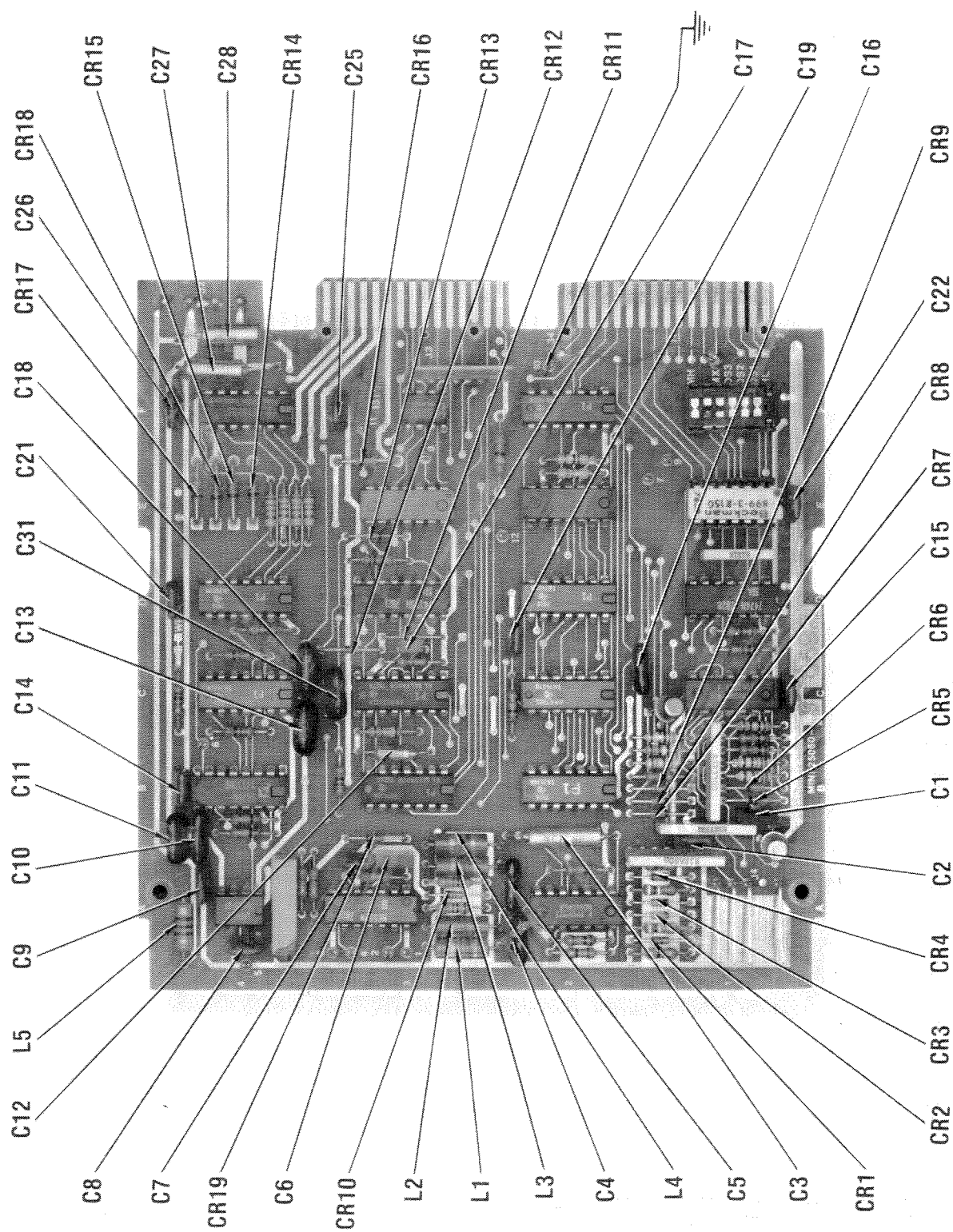


RADIO SHACK
TRS-80 MODELS 26-1160/61

BLOCK DIAGRAM

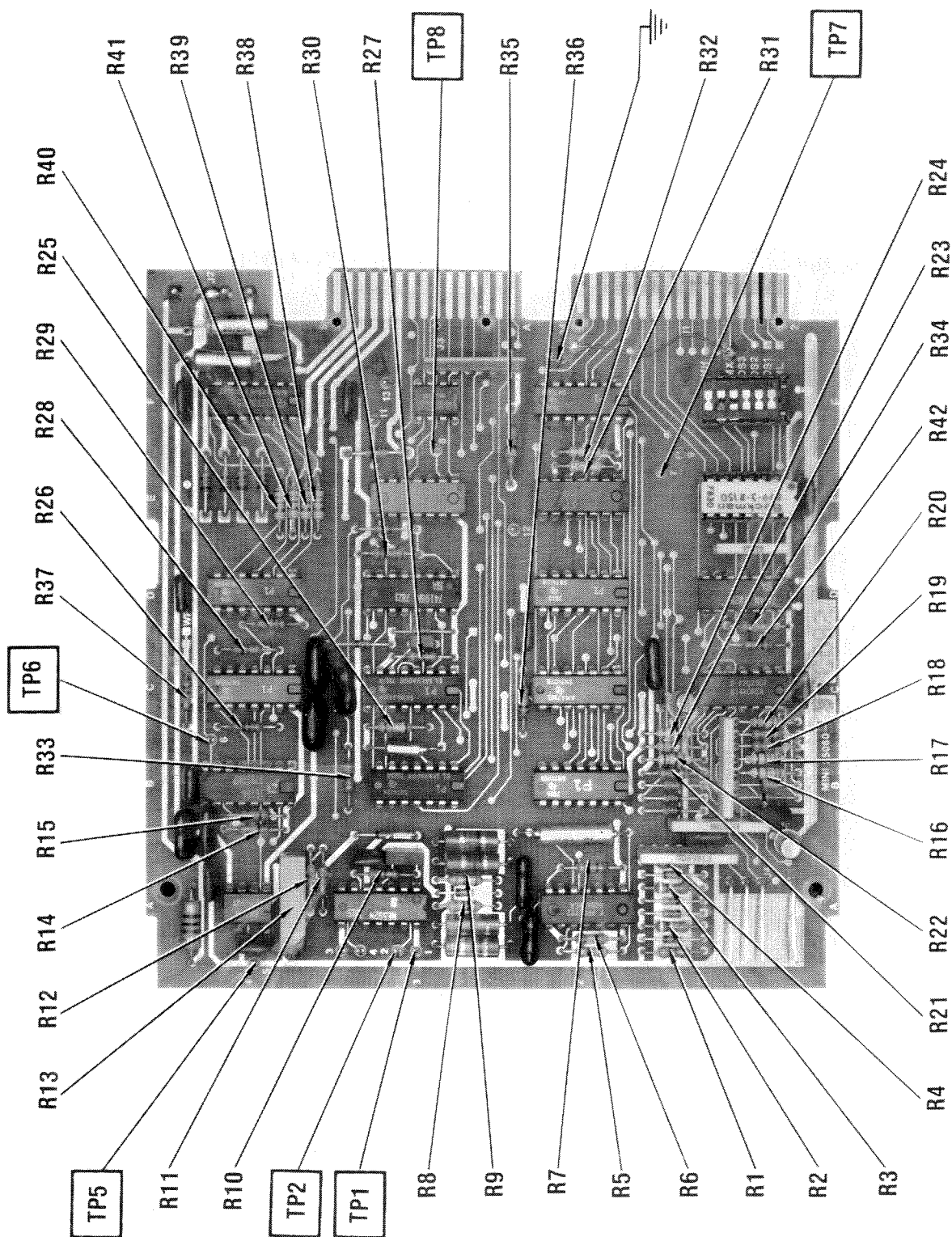
DRIVE BOARD

A Howard W. Sams **CIRCUITRACE®** Photo



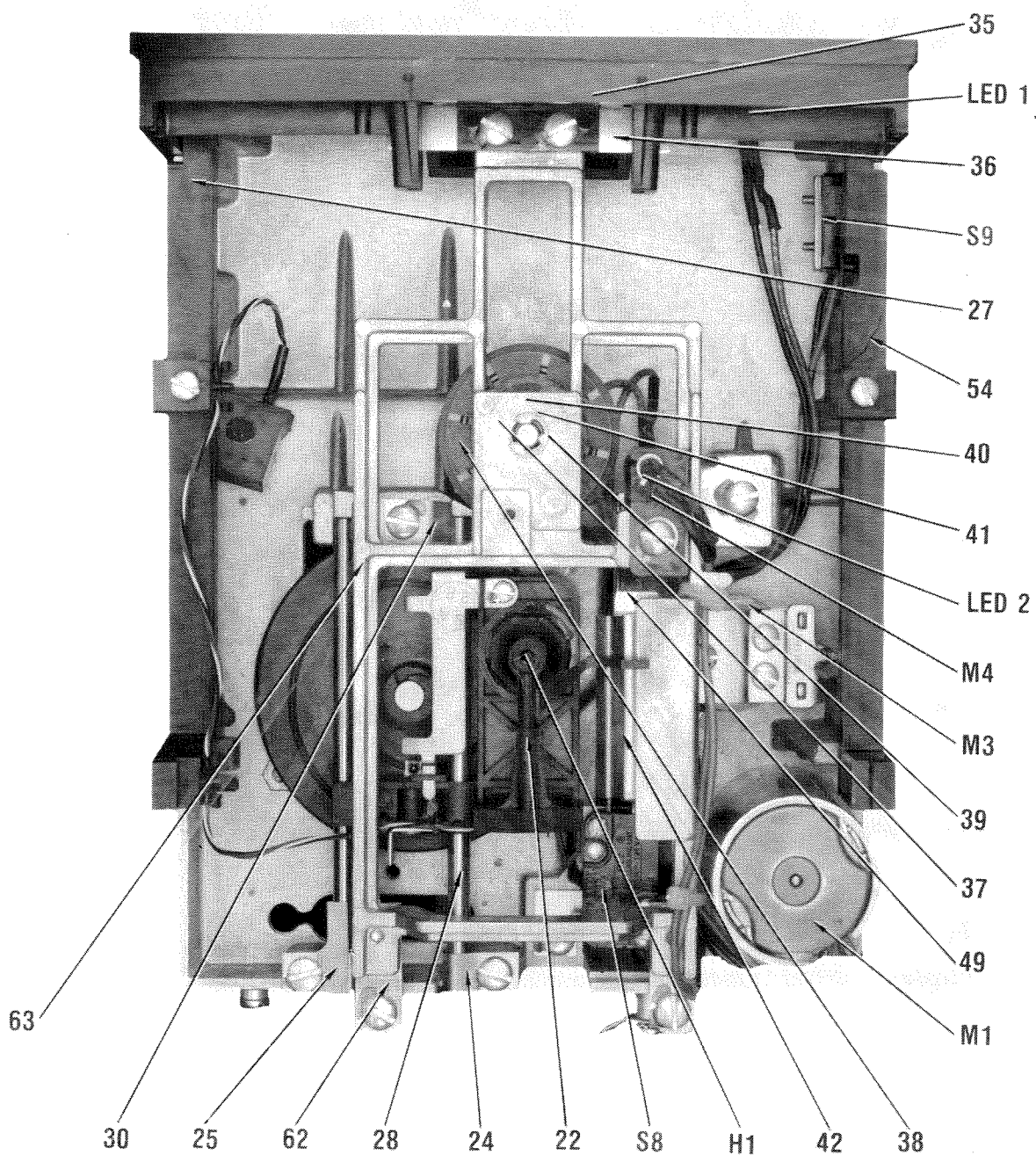
RADIO SHACK
TRS-80 MODELS 26-1160/61
19/06/61

DRIVE BOARD

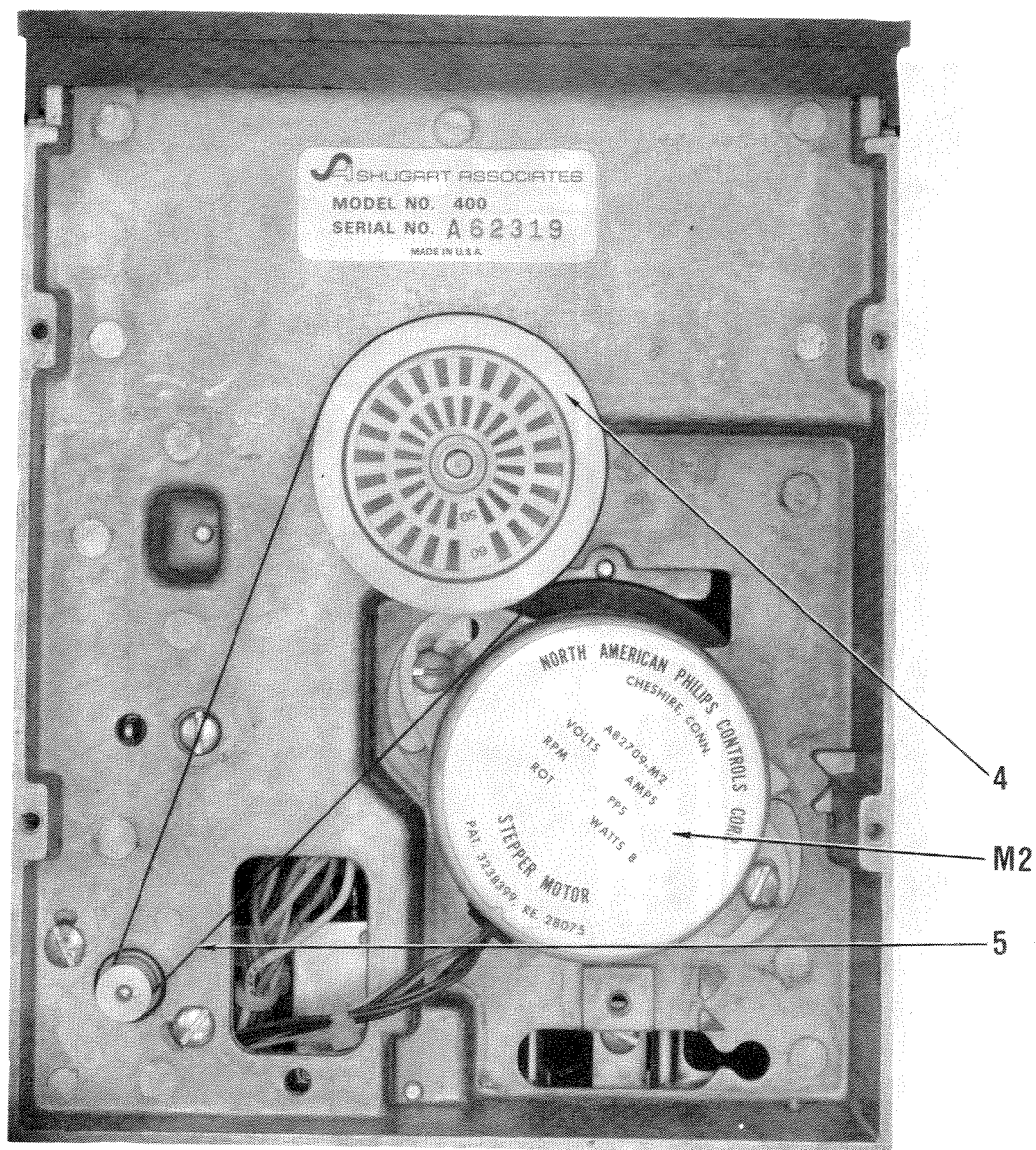


DRIVE BOARD

RADIO SHACK
TRS-80 MODELS 26-1160/61



MECHANICAL-TOP VIEW



MECHANICAL-BOTTOM VIEW

LOGIC

PIN NO.	IC 1A	IC 1C	IC 1D	IC 2A	IC 2B	IC 2C	IC 2D	IC 2E	IC 2F	IC 3A
1	(1)	P	*	H	H	L	P	P	L	P
2		P	*	H	P	L	P	P	H	*
3		P	*	P	P	L	P	H	H	H
4		*	L	P	H	L	P	P	H	P
5		H	H	P	P	L	P	P	P	L
6		P	L	P	P	L	P	P	P	*
7		P	L	P	L	L	L	L	L	P
8		P	P	P	P	L	P	P	L	P
9		P	P	P	P	L	P	P	P	*
10		P	H	P	H	P	P	P	P	H
11		*	P	P	P	P	L	P	H	H
12		P	P	P	P	P	P	P	P	H
13		P	H	H	P	P	P	P	H	*
14		P	H	H	H	H	H	H	H	P
PIN NO.	IC 3B	IC 3C	IC 3D	IC 3E	IC 3F	IC 4A	IC 4B	IC 4C	IC 4D	IC 4F
1	P	L	P	H	P	L	P	L	P	P
2	P	P	P	H	P	P	P	L	P	P
3	P	P	P	L	P	P	H	P	P	L
4	L	P	P	L	L	L	P	L	P	*
5	H	P	P	L	L	H	H	P	P	L
6	P	P	P	H	L	H	P	L	P	P
7	L	P	P	L	L	P	P	L	*	P
8	P	L	L	P	H	H	L	P	*	P
9	P	L	P	P			P	P	*	P
10	P	P	P	P			P	P	*	L
11	L	P	P	H			H	P	*	*
12	P	P	P	L			P	P	P	L
13	P	P	P	L			P	P	P	P
14	H	P	P	H			P	H	H	P
15		P	P				P			
16		H	H				H			

Voltages, Waveforms and Logic Probe readings taken while running the following program:

```

10 OPEN "0", 1, "SAMS"
20 FOR X = 1 TO 300
30 PRINT #1, "THIS IS A TEST"
40 NEXT X
50 CLOSE 1
60 GOTO 10

```

Logic Probe Display

L = Low

H = High

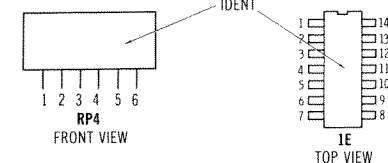
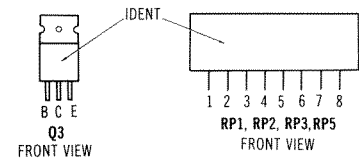
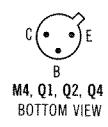
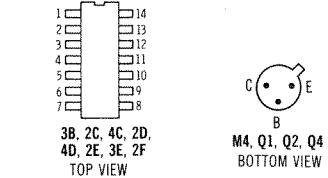
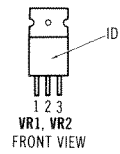
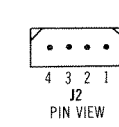
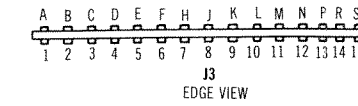
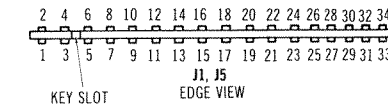
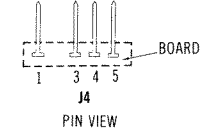
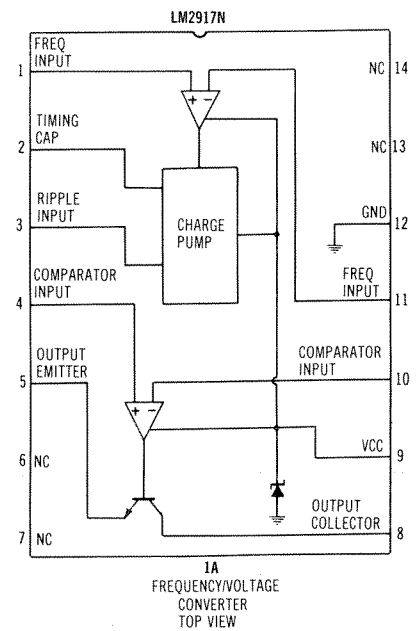
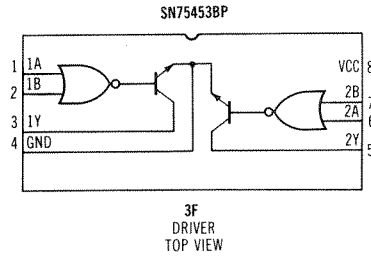
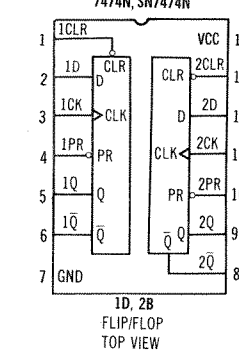
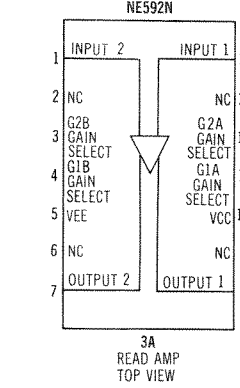
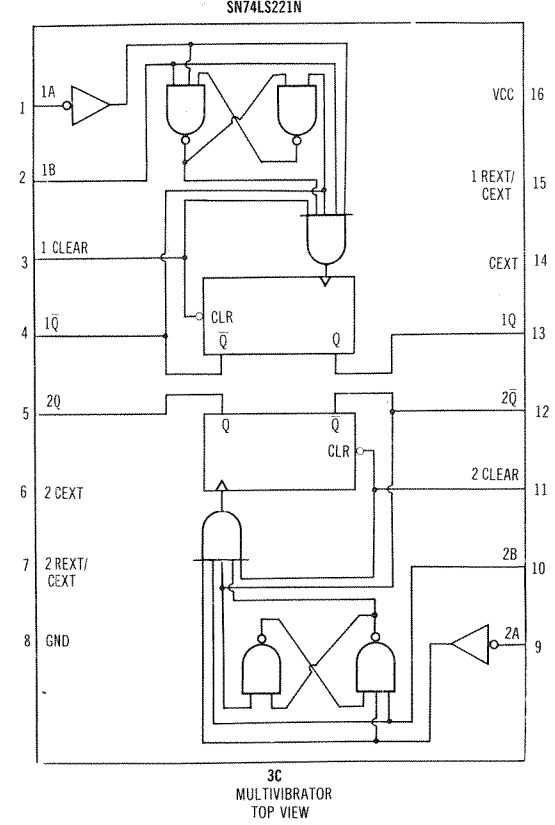
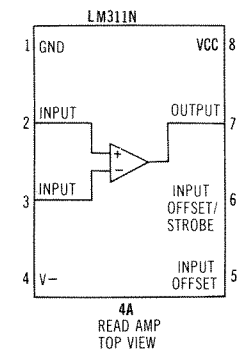
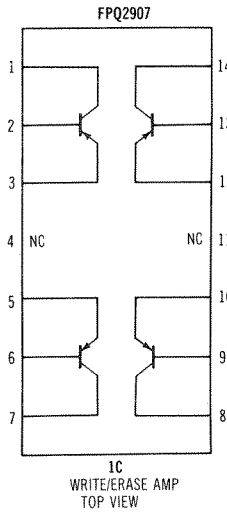
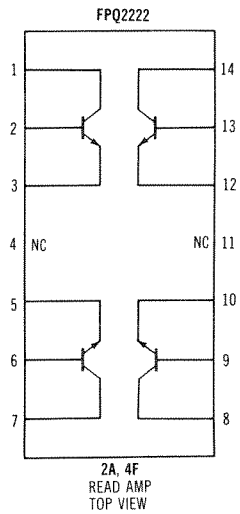
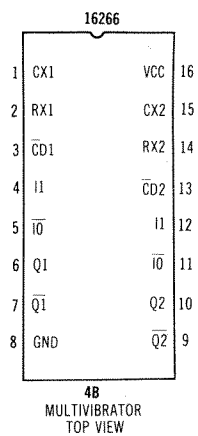
P = Pulse

* = Open (No lights On)

(1) Logic readings not taken.

RADIO SHACK
 TRS-80 MODELS 26-1160/61

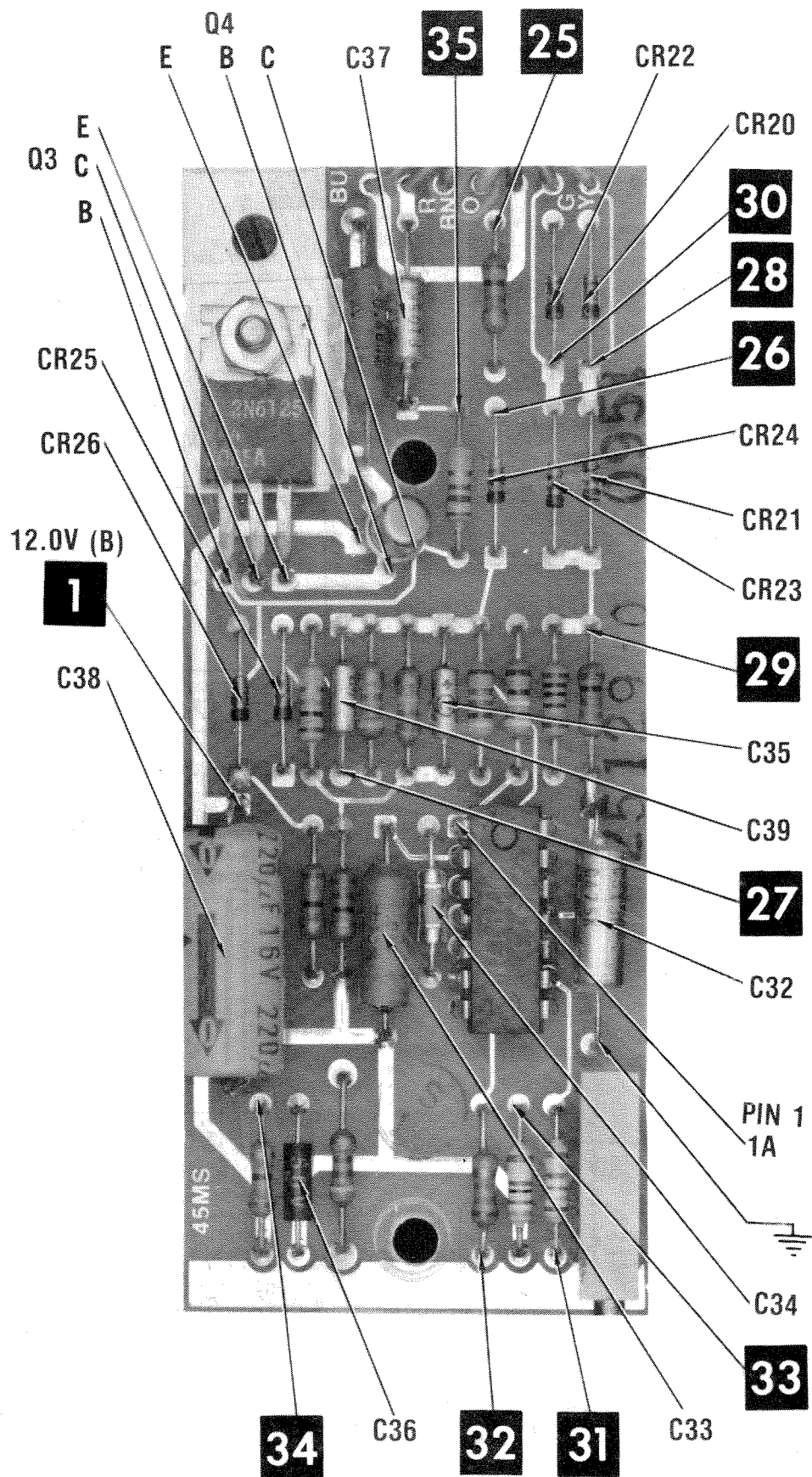
IC PINOUTS, TERMINAL GUIDES & SCHEMATIC NOTES



SCHEMATIC NOTES

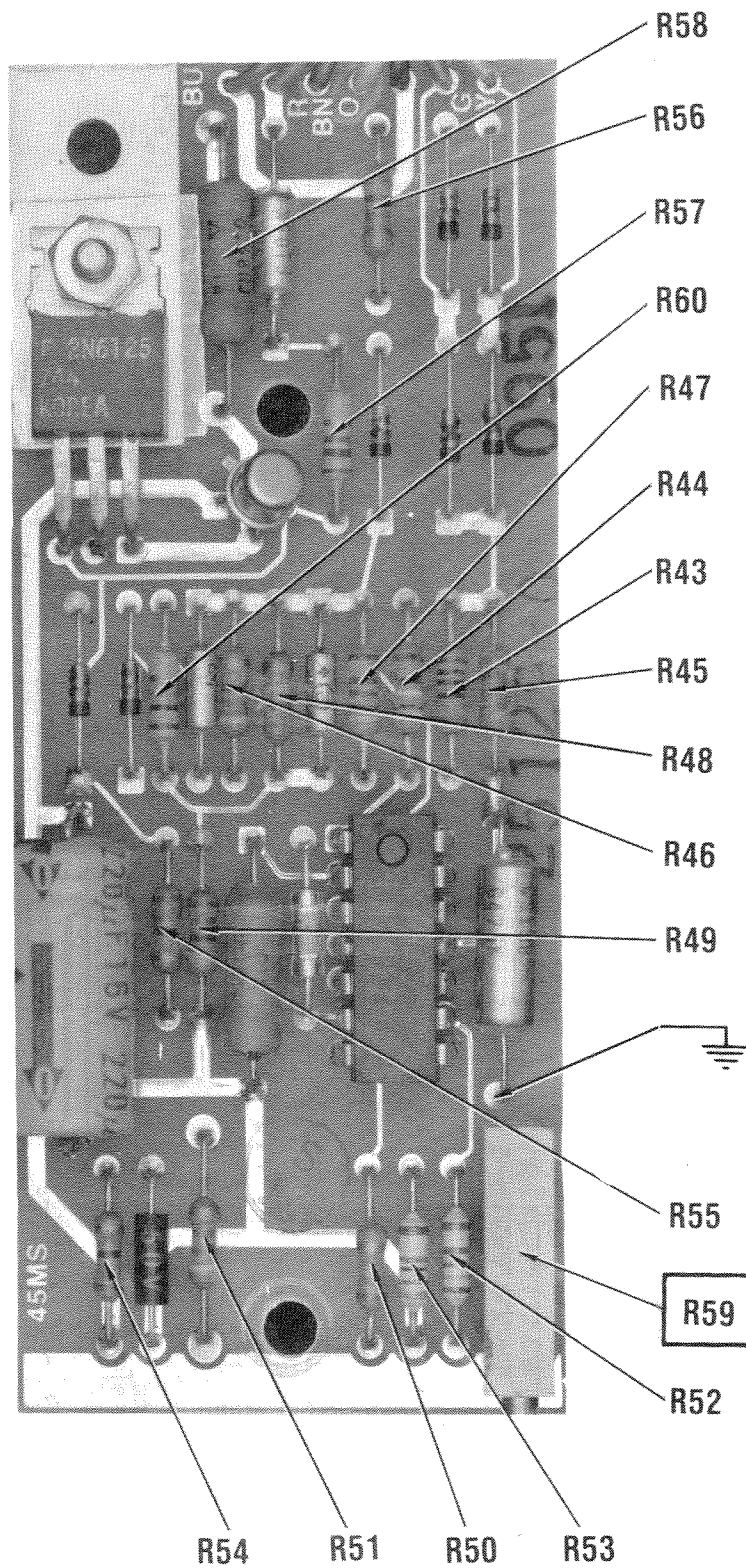
--- Circuitry not used in some versions
--- Circuitry used in some versions
⊕ See parts list
⊕ Ground
⊕ Chassis
Waveforms and voltages taken from ground, unless noted otherwise.
Waveforms taken with triggered scope and Sweep/Time switch in Calibrate position, scope input set for DC coupling on 0 reference voltage waveforms. Switch to AC input to view waveforms after DC reference is measured when necessary. Each waveform is 8 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.
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 with switching as shown, unless noted.
Logic Probe Display
L = Low
H = High
P = Pulse
* = Open (No light On)
Voltages, Waveforms and Logic Probe readings taken while running the following program:
10 OPEN "0", 1, "SAMS"
20 FOR X = 1 TO 300
30 PRINT #1, "THIS IS A TEST"
40 NEXT X
50 CLOSE 1
60 GOTO 10



MOTOR CONTROL BOARD

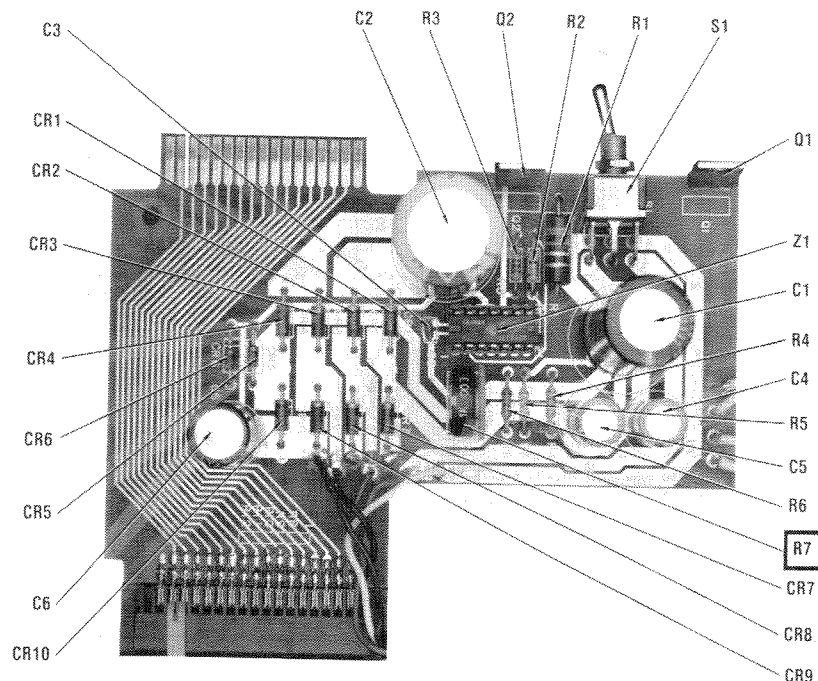
A Howard W. Sams **CIRCUITRACE** Photo



MOTOR CONTROL BOARD

SAFETY PRECAUTIONS

1. Use an isolation transformer for servicing.
2. Maintain AC line voltage at rated input.
3. Remove AC power from the Disk Drive 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 with AC power On.
8. Do not use freon-propelled sprays. These can generate electrical charges sufficient to damage semiconductor devices.
9. This Disk Drive 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 Disk Drive 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 Disk Drive to water. If exposed to water turn the unit Off. Do not place the Disk Drive near possible water sources.
14. Never leave the Disk Drive 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 Disk Drive.
17. Never use liquids or aerosols directly on the Disk Drive. Spray on cloth and then apply to the Disk Drive cabinet. Make sure the Disk Drive is disconnected from the AC power line.



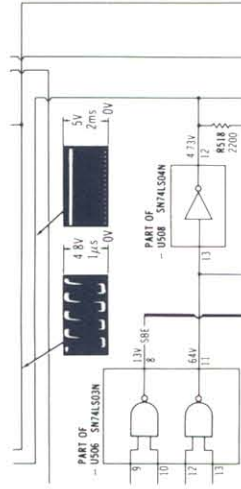
ALTERNATE POWER SUPPLY BOARD



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.

- 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.



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

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	L	L	L	L	L	L	L	L
2	P	22	P	2	P	P	P	P	P	P	P	P
3	P	23	P	3	H	H	H	H	H	H	H	H

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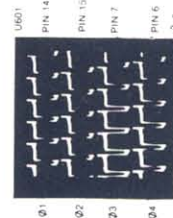
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- Step by Step Troubleshooting guides the technician through the necessary procedures to quickly locate the problem.

TROUBLESHOOTING



MICROBIOLOGICAL CHINA (CHINA) 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 waveforms on 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.

- 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.	MFGR. PART No.	REPLACEMENT DATA						
			EGG PART No.	GENERAL ELECTRIC PART No.	MOTOROLA PART No.	NTE PART No.	RCA PART No.	WORKMAN PART No.	ZENITH PART No.
0102	15553	1149-2576	EGC519	GE-514	1N4935	NTE519	SK9091/177	WE925/519	103-131
0201	15554	1201-4205	EGC116	GE-504A	1N4004	NTE116	SK3312	WE157	212-76-02
0501	15553	1149-2576	EGC519	GE-514	1N4935	NTE519	SK9091/177	WE925/519	103-131