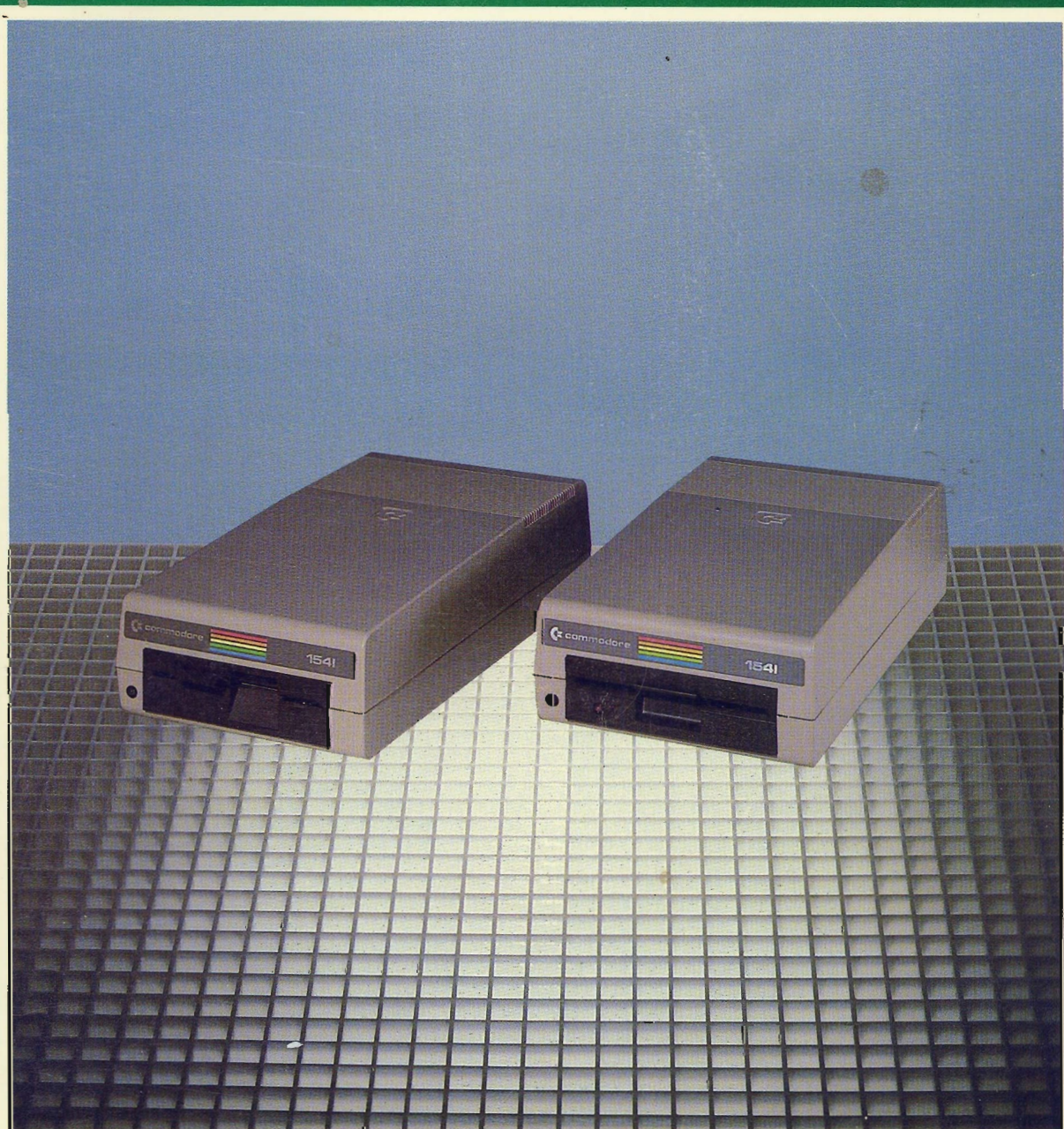


DISK DRIVE: COMMODORE VIC 1541/1541™



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 hookup before making service checks.

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

DISASSEMBLY INSTRUCTIONS

CHASSIS REMOVAL

Remove four screws from cabinet bottom which hold cabinet top. Lift cabinet top from unit. Remove two screws from side of chassis holding shield over main circuit board. Remove six screws holding chassis to cabinet bottom and lift chassis from cabinet.

To remove drive unit from chassis, disconnect Connectors P5 thru P8. Remove four screws, two from each side of chassis holding drive unit to chassis. Remove seven screws holding main circuit board and lift out of the way. Carefully remove drive unit from chassis.

GENERAL OPERATING INSTRUCTIONS

DIRECTORY

To get a Directory (list of programs on a diskette) type LOAD "\$",8 and press the RETURN key. After the Directory is loaded, type LIST and press the RETURN key to list the Directory on the Monitor screen.

INITIALIZING THE DRIVE (RESET)

To initialize the Disk Drive, type OPEN 15,8,15,"I":CLOSE 15 and press the RETURN key. If a FILE OPEN error message appears on the screen, it means that file 15 has been already opened by a previous operation and was not properly closed. Type CLOSE 15 and press the RETURN key, then repeat the initializing procedure.

LOADING PROGRAMS

To load a program from the Disk Drive, type LOAD with the Program Name enclosed in quotes, followed by a ,8 and press the RETURN key. Example: LOAD "SAMS" ,8.

SAVING PROGRAMS

To save a program to the Disk Drive, type SAVE with the Program Name enclosed in quotes, followed by a ,8 and press the RETURN key. Example: SAVE "SAMS" ,8.

FORMATTING A DISKETTE

A blank diskette must be formatted before it will work in the Disk Drive. To format a diskette, insert a blank diskette into the Disk Drive and close the door. Type the following with a name for the diskette and a two character identification code enclosed in the quotes with NO:. Then, press the RETURN key. Example: OPEN 1,8,15,"NO:NAME,ID" CLOSE 1

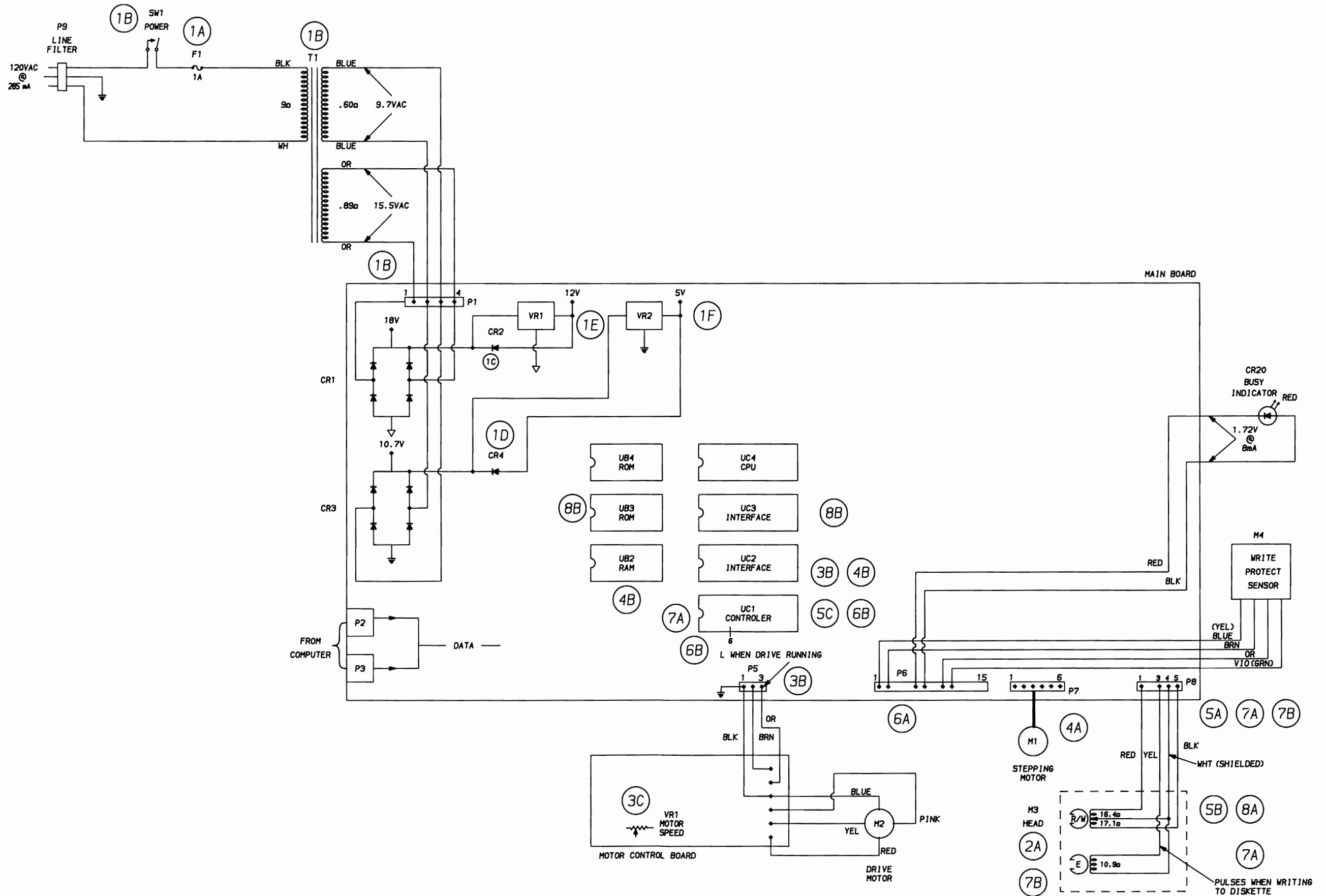
DISK DRIVE ERROR SIGNAL (BLINKING LED)

If the LED (RED) (CR20) on the front panel of the Disk Drive starts blinking, it means an error in operation has occurred and an error message has been stored in the Disk Drive memory. Use the following program to read and display the error message. The program displays the error number, message, track and sector where the error has occurred.

```
10 OPEN 15,8,15
20 INPUT #15,EN,ES,T,S
30 PRINT "ERROR #";EN,ES
40 PRINT "TRACK #";T,"SECTOR #";S
50 CLOSE 15
```

PRELIMINARY SERVICE CHECKS (Continued)

PRELIMINARY SERVICE CHECKS (Continued)



COMMODORE
MODELS VIC-1541, 1541

PRELIMINARY SERVICE CHECKS (Continued)

SERVICE CHECKS

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

1 POWER SUPPLY

- (A) Check the Fuse (F1). Replace if open.
- (B) Check for 15.5VAC from pin 1 to pin 4 and 9.7VAC from pin 2 to pin 3 of Plug P1. If voltages are missing check the Power On-Off Switch (SW1) and Power Transformer (T1).
- (C) Check for 18V at the cathode of Diode CR2. If missing check Diode CR1.
- (D) Check for 10.7V at the cathode of Diode CR4. If missing check Diode CR3.
- (E) Check for 12V at the anode of Diode CR2. If missing, check Regulator IC (VR1).
- (F) Check for 5V at the anode of Diode CR4. If missing, check Regulator IC (VR2).

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 and then check operation of the drive.

- (A) Clean the Head (M3) 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 drive belt.
- (B) Check for a Low logic reading on pin 3 of Connector P5 when Disk Drive is in a load or save mode. If logic reading is wrong, check Controller IC (UC1) and Interface IC (UC2) by substitution.
- (C) Check the Motor Speed Adjustment (VR1).

4 STEPPING MOTOR INOPERATIVE

- (A) Check Connector P7 for open or intermittent connections.

- (B) Check Controller IC (UC1) and Interface IC (UC2) by substitution.

5 WRITE FUNCTION INOPERATIVE

- (A) Check the Head Connector P8 for open or intermittent connections.
- (B) Check the resistance of the Read/Write sections of Head (M3). Resistance of 16.4 Ohms should be measured between pins 1 and 4, and 17.1 Ohms between pins 4 and 5 of Connector P8.
- (C) Check Controller IC (UC1) and Interface IC (UC2) by substitution.

6 WRITE PROTECT DOES NOT FUNCTION

- (A) Check Connector P6 for good connections.
- (B) Check for a High logic reading at pin 6 of Controller (UC1) while no diskette is in the Disk Drive and then for a Low logic reading with a write protected diskette in the Disk Drive. If the readings are correct, check IC UC1 and Interface IC (UC2) by substitution.

7 ERASE PULSE VARIES

- (A) Verify that pulses are present on pin 3 of Connector P8 while the Head (M3) is writing to a diskette. If there are no pulses, check Controller IC (UC1) by substitution.
- (B) Verify that the Erase section of Head (M3) is not open by checking for a resistance of 10.9 Ohms between pins 3 and 4 of Connector P8. Also, check Connector P8 for good connections.

8 READ FUNCTION INOPERATIVE

- (A) Check the resistance of the Read/Write section of Head (M3). The measurement should be 16.4 Ohms between pins 1 and 4 and 17.1 Ohms between pins 4 and 5 of Connector P8. Check Connector P8 for good connections.
- (B) Check Interface ICs (UC3), (UC2), CPU IC (UC4), RAM IC (UB2), ROM ICs (UB3), (UB4), and Controller IC (UC1) by substitution.

MISCELLANEOUS ADJUSTMENTS

DISK DRIVE DEVICE NUMBER

The number 8 used in the load and save procedures is the device number assigned to the Disk Drive. The device number can be set to any number from 8 to 11 by cutting jumpers 1 and 2 located near the front center of the Disk Drive board. Use the following chart to determine the proper jumper to cut for the desired device number.

DEVICE NUMBER	JUMPER 1	JUMPER 2
8	DO NOT CUT	DO NOT CUT
9	CUT	DO NOT CUT
10	DO NOT CUT	CUT
11	CUT	CUT

PRELIMINARY SERVICE CHECKS (Continued)

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.

TEST EQUIPMENT AND TOOLS

TEST EQUIPMENT

Digital Volt/Ohm Meter
Logic Probe

TOOLS

Phillips Screwdriver
24 and 40 pin IC Extractors and Inserters
Contact Cleaner
91% Isopropyl Alcohol
Lint free cloth or cotton swabs
Low Voltage Soldering Iron

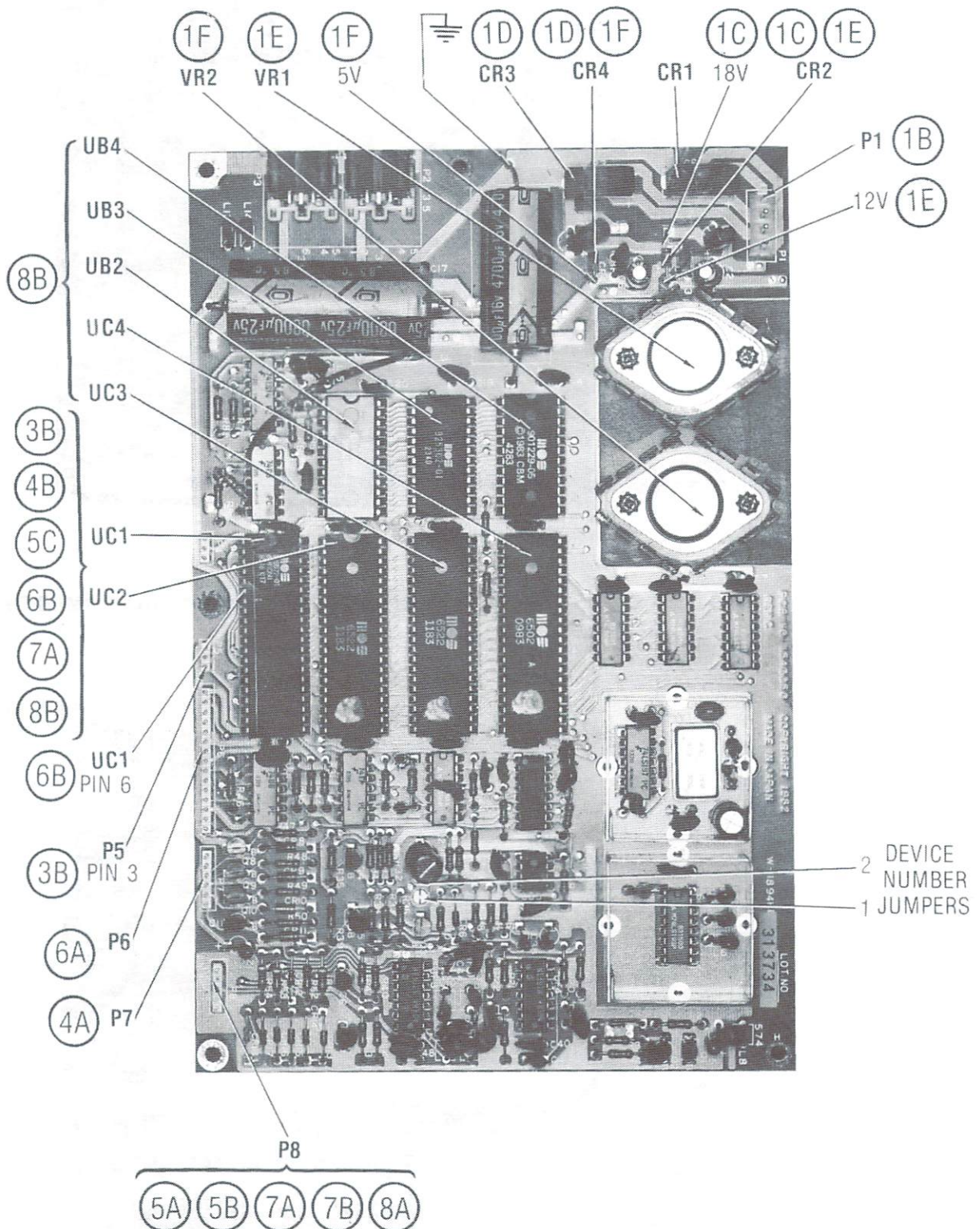
REPLACEMENT PARTS

ITEM	PART NO.	DESCRIPTION
CR1	900756-01	Diode, Bridge Rect.
CR2	900750-02	Diode, 1N4002
CR3	900756-01	Diode, Bridge Rect.
CR4	900750-02	Diode, 1N4002

REPLACEMENT PARTS (Continued)

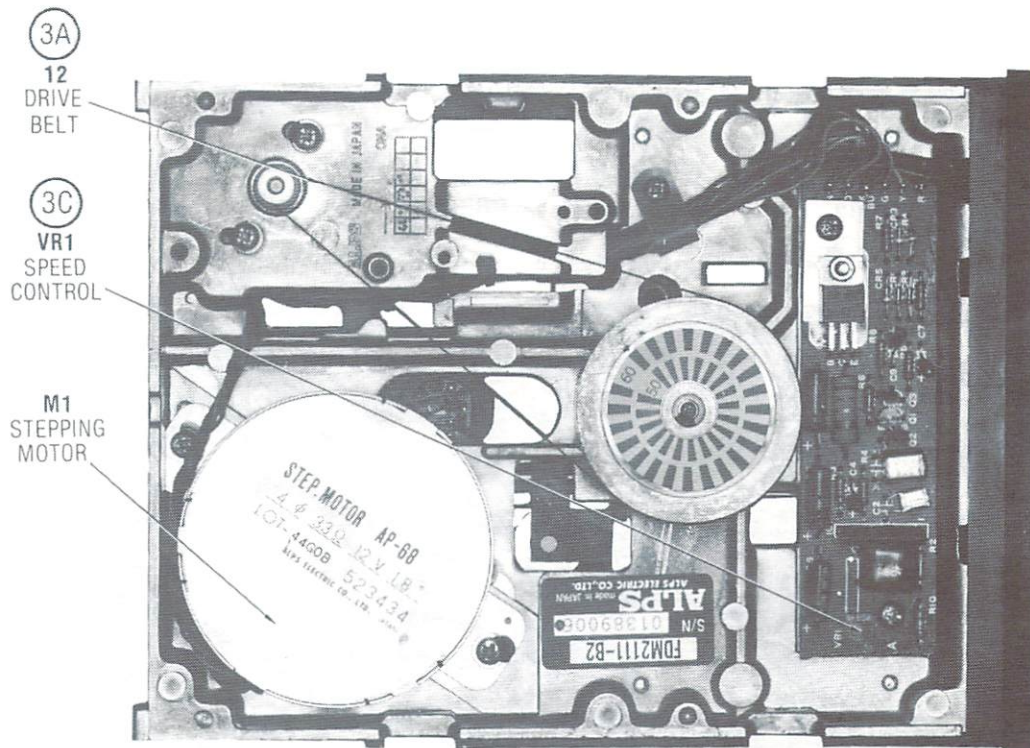
F1	903555-20	AC Fuse, 1A/250V
M1	523434	Motor, Stepping (ALPS Drive)
	142651	Motor Stepping (NEWTRONICS Drive)
M3		Head, Read/Write/Erase
SW1	904509-01	Switch, Power On/Off
T1	1540009-02C	Power Transformer
UB2		IC, RAM TMM2116AP-15
	325502-03	IC, RAM, TMM2016P
	325502-01	IC, RAM, M58725P
UB3	325302-01	IC, ROM, 2364-130
UB4	901229-05	IC, ROM
UC1	325572-01	IC, Controller
UC2	901437-01	IC, INTERFACE, MPS6522 (MOS6522)
UC3	901437-01	IC, INTERFACE, MPS6522 (MOS6522)
UC4	901435-01	IC, CPU, MOS6502 (MOS6502)
VR1		Control, Motor Speed (Located on Motor Control Board)
VR1	901528-04	IC, 12 Volt Regulator
VR2	901528-03	IC, 5 Volt Regulator

PRELIMINARY SERVICE CHECKS (Continued)

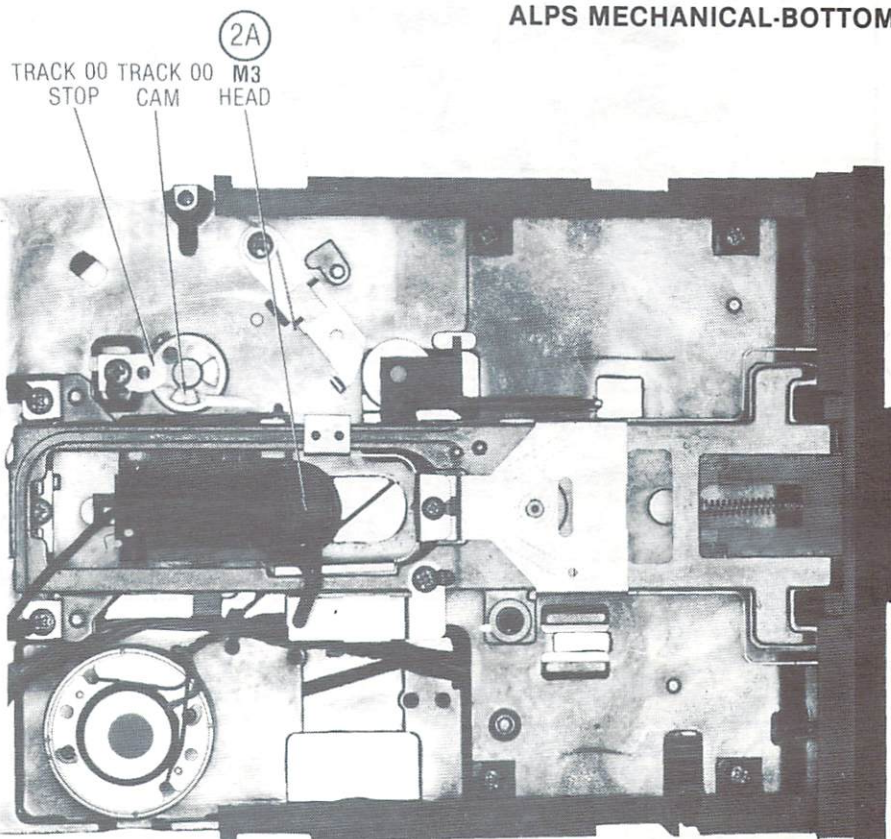


MAIN BOARD

PRELIMINARY SERVICE CHECKS (Continued)



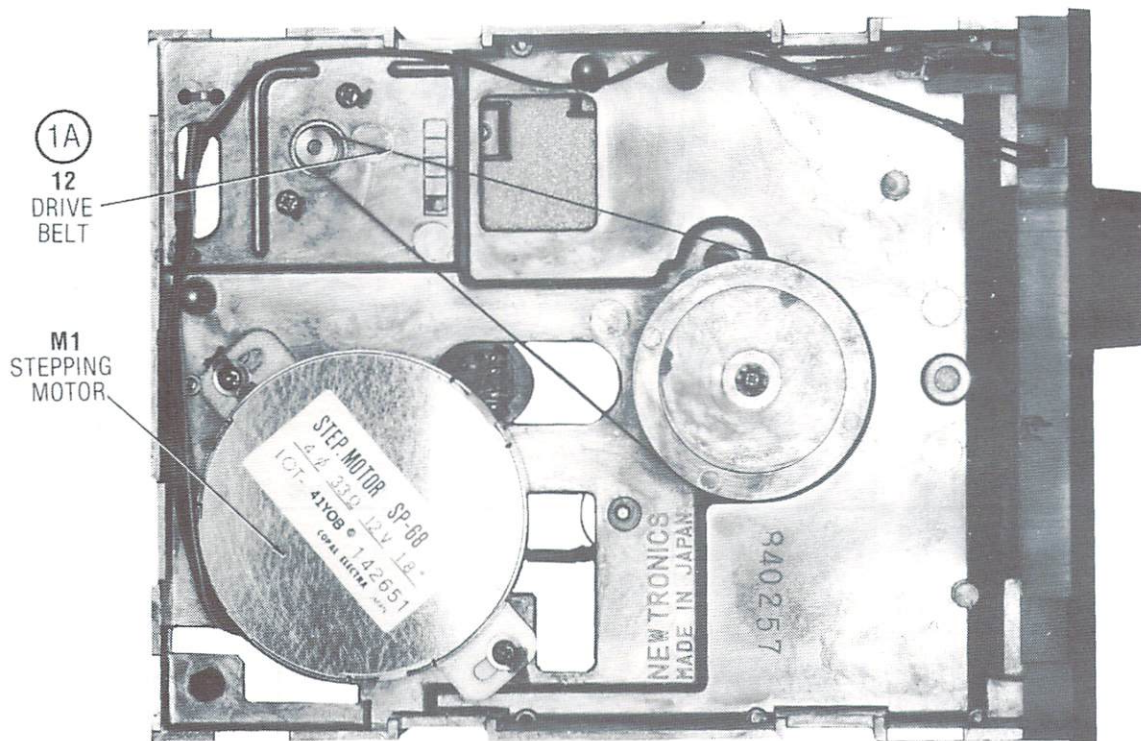
ALPS MECHANICAL-BOTTOM VIEW



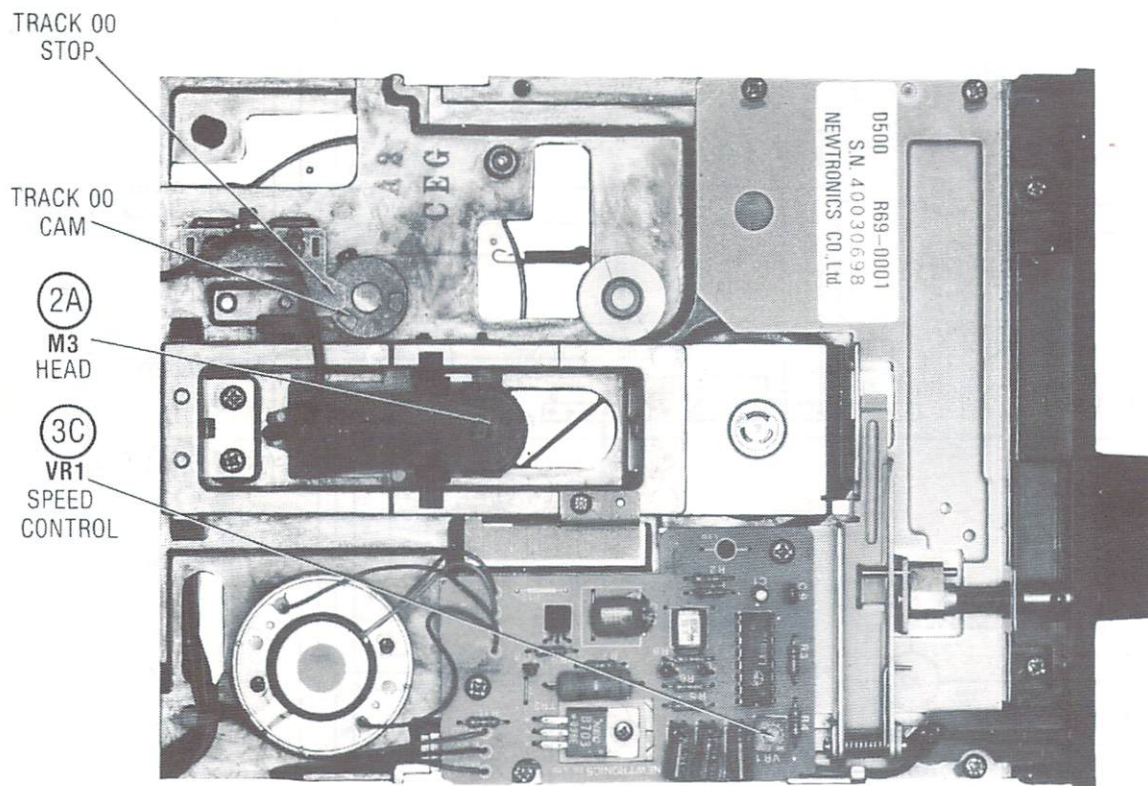
ALPS MECHANICAL-TOP VIEW

COMMODORE
MODELS VIC-1541, 1541

PRELIMINARY SERVICE CHECKS (Continued)



NEWTRONICS MECHANICAL-BOTTOM VIEW



NEWTRONICS MECHANICAL-TOP VIEW



NEWTRONICS DRIVE

ALPS DRIVE

MODELS VIC-1541, 1541

SAFETY PRECAUTIONS

See Page 4.

PRELIMINARY SERVICE CHECKS

ENCLOSED

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

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

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MODELS VIC-1541, 1541



WITH **CIRCUITRACE™**

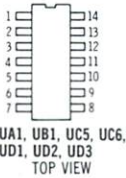
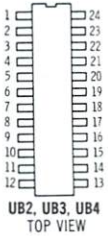
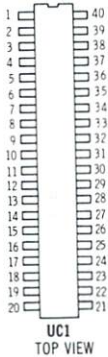
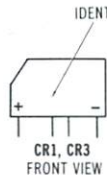
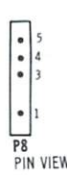
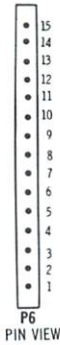
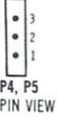
NEWTRONICS MOTOR CONTROL BOARD

SAFETY PRECAUTIONS

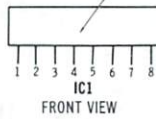
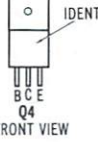
1. Use an isolation transformer for servicing.
2. Maintain AC line voltage at rated input.
3. Remove AC power from the Disk Drive before servicing or installing electrostatically sensitive devices. Examples of typical ES devices are integrated circuits and semiconductor "chip" components.
4. Use extreme 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.

IC PINOUTS & TERMINAL GUIDES

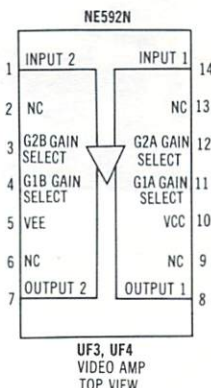
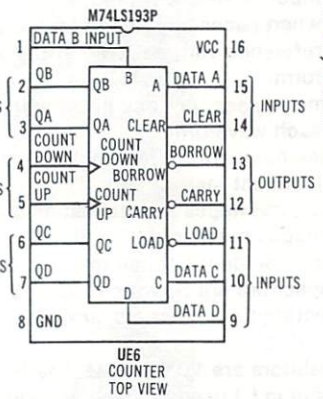
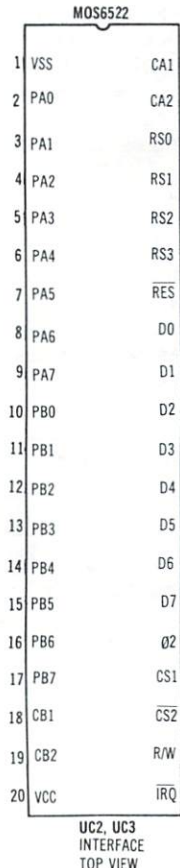
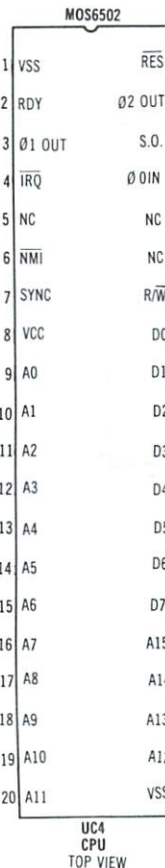
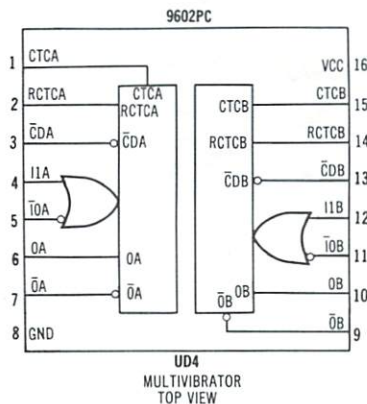
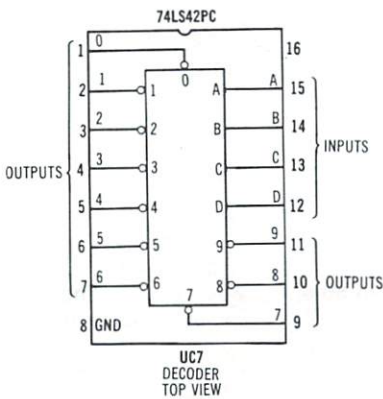
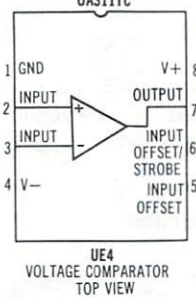
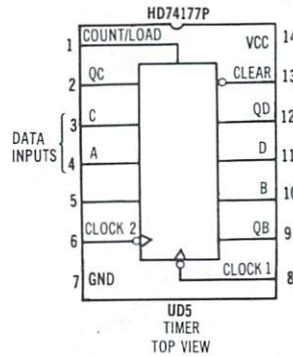
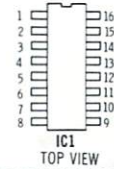
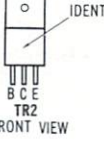
PIN OUTS
MAIN BOARD



TERMINAL GUIDES
ALPS MOTOR CONTROL BOARD



TERMINAL GUIDES
NEWTRONICS MOTOR CONTROL BOARD



CD4
MODELS VIC-1541, 1541

COMMODORE

LINE DEFINITIONS

A0 thru A15 Address Lines
 D0 thru D7 Data Lines
 IRQ Interrupt Request
 RES Reset
 R/W Read/Write

SO Set Overflow
 WPS Write Protect Sensor
 Ø2 Phase 2
 1MHz 1MHz

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

SCHEMATIC NOTES

—*— Circuitry not used in some versions

--- Circuitry used in some versions

• See parts list

⊕ Ground

⏏ Chassis

▽ Common tie point

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 7cm. width with DC reference voltage given at the bottom line of each waveform.

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

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

Supply voltages maintained as shown at input.

Voltages measured with digital meter, no signal.

Terminal identification may not be found on unit.

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

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

Resistors are $\frac{1}{2}W$ or less, 5% unless noted.

Value in () used in some versions.

Measurements with switching as shown, unless noted.

NOTE: Voltages, waveforms and logic probe readings taken on Disk Drive while running the following Basic program. Readings taken while the Stepping Motor (M1) was not operating unless otherwise noted. Use a single sided formatted diskette that has no programs on it and is not write protected.

```
10 OPEN 3,8,3,"@0:TEST,S,W"
20 FOR X=1 TO 50
30 PRINT#3,"THIS IS A TEST"
40 NEXT X
50 CLOSE 3
60 GOTO 10
```

Logic Probe Display

L = Low

H = High

P = Pulse

* = Open (No Light On)

- (1) Probe indicates H if diskette is write protected.
- (2) Probe indicates L if diskette is write protected.
- (3) Probe indicates P when Stepping Motor is operating.
- (4) Probe indicates H when Head is moving In and L when Head is moving Out from center of diskette.
- (5) Probe indicates L when Head is moving In and H when Head is moving Out from center of diskette.
- (6) Probe indicates H when Drive Motor is not running.
- (7) Probe readings not taken.

DISASSEMBLY INSTRUCTIONS

CHASSIS REMOVAL

Remove four screws from cabinet bottom which hold cabinet top. Lift cabinet top from unit. Remove two screws from side of chassis holding shield over main circuit board. Remove six screws holding chassis to cabinet bottom and lift chassis from cabinet.

To remove drive unit from chassis, disconnect Connectors P5 thru P8. Remove four screws, two from each side of chassis holding drive unit to chassis. Remove seven screws holding main circuit board and lift out of the way. Carefully remove drive unit from chassis.

GENERAL OPERATING INSTRUCTIONS

DIRECTORY

To get a Directory (list of programs on a diskette) type LOAD "\$",8 and press the RETURN key. After the Directory is loaded, type LIST and press the RETURN key to list the Directory on the Monitor screen.

INITIALIZING THE DRIVE (RESET)

To initialize the Disk Drive, type OPEN 15,8,15,"1":CLOSE 15 and press the RETURN key. If a FILE OPEN error message appears on the screen, it means that file 15 has been already opened by a previous operation and was not properly closed. Type CLOSE 15 and press the RETURN key, then repeat the initializing procedure.

LOADING PROGRAMS

To load a program from the Disk Drive, type LOAD with the Program Name enclosed in quotes, followed by a ,8 and press the RETURN key. Example: LOAD "SAMS" ,8.

SAVING PROGRAMS

To save a program to the Disk Drive, type SAVE with the Program Name enclosed in quotes, followed by a ,8 and press the RETURN key. Example: SAVE "SAMS" ,8.

FORMATTING A DISKETTE

A blank diskette must be formatted before it will work in the Disk Drive. To format a diskette, insert a blank diskette into the Disk Drive and close the door. Type the following with a name for the diskette and a two character identification code enclosed in the quotes with NO:. Then, press the RETURN key. Example: OPEN 1,8,15,"NO:NAME,ID" CLOSE 1

DISK DRIVE ERROR SIGNAL (BLINKING LED)

If the LED (RED) (CR20) on the front panel of the Disk Drive starts blinking, it means an error in operation has occurred and an error message has been stored in the Disk Drive memory. Use the following program to read and display the error message. The program displays the error number, message, track and sector where the error has occurred.

```
10 OPEN 15,8,15
20 INPUT #15,EN,ES,T,S
30 PRINT "ERROR #";EN,ES
40 PRINT "TRACK #";T,"SECTOR #";S
50 CLOSE 15
```

MISCELLANEOUS ADJUSTMENTS

DISK DRIVE DEVICE NUMBER

The number 8 used in the load and save procedures is the device number assigned to the Disk Drive. The device number can be set to any number from 8 to 11 by cutting jumpers 1 and 2 located near the front center of the Disk Drive board. Use the following chart to determine the proper jumper to cut for the desired device number.

DEVICE NUMBER	JUMPER 1	JUMPER 2
8	DO NOT CUT	DO NOT CUT
9	CUT	DO NOT CUT
10	DO NOT CUT	CUT
11	CUT	CUT

TROUBLESHOOTING

POWER SUPPLY

Check the AC line Fuse (F1) and if open, check the Bridge Rectifier Diodes (CR1, CR3) for shorts. Check Voltage Regulator ICs (VR1, VR2) for a short to ground and also check Capacitors C1, C4, C16 and C17.

Check for a reading of 18V at the cathode of Diode CR2. If the voltage at Diode CR2 is missing, check for 9.7V AC across pins 1 and 4 of connector P1. If the 9.7V AC is present, check Diode CR1. If 9.7V AC is still missing, check Power Transformer (T1).

Check for 10.7V at the cathode of Diode CR4. If the voltage is missing, check for 15.5V AC across pins 2 and 3 of Connector P1. If the 15.5V AC is present, check Diode CR3. If 15.5V AC is still missing, check Transformer T1.

Check for 11.8V at the anode of Diode CR2 and if missing, check IC VR1. Check for 5.00V at the anode of Diode CR4 and if missing, check IC VR2.

Check for 11.5V at the collector of Voltage Regulator Transistor (Q1). If 11.5V is missing, check Transistor Q1, Voltage Regulator Transistor (Q2), Diode CR5 and all associated circuitry.

MICROPROCESSOR IC (CPU) OPERATION

Make certain the reset circuit is operating properly by checking the logic level on pin 40 of CPU IC (UC4) when the Disk Drive is turned On. The logic reading should be Low for about .2 seconds, then go High and stay High. If the reset is not working, check the logic readings on pins 4, 5 and 6 of IC UD3 and pins 1, 2 and 5 of IC UB1. Also check capacitor C46, Diode CR7 and Resistors R25, R60, R61.

Check the 1MHz clock waveforms at pins 37 and 39 of CPU IC (UC4). If the waveform is missing at pin 37 of IC UC4, refer to the "Oscillator and Dividers" section of this Troubleshooting guide. If the waveform is missing at pin 39 of IC UC4, check IC UC4 by substitution.

Check for pulses on the Data lines (pins 26 thru 33) and Address lines (pins 9 thru 20 and 22 thru 33) of IC UC4. If pulses are missing and pin 2 of IC UC4 measures logic High, check IC UC4 by substitution. If pulses are present, check the waveforms at pin 20 of RAM IC (UB2) and ROM ICs (UB3 and UB4) while turning the Disk Drive Off then On again. The waveform at pin 20 of IC UB2 should look like Figure 6. The waveform at pin 20 of IC UB3 should look like Figure 7 and the waveform at pin 20 of IC UB4 should look like Figure 5. The waveforms at ICs UB2 and UB4 should appear for about one second after Disk Drive is turned On and then change. The waveform at IC UB3 should appear momentarily after about a one second delay after Disk Drive is turned On. If the waveforms are missing from pin 20 of ICs UB2 and UB4, but pulses appear, then disappear, check ICs UB2 and UB4 by substitution.

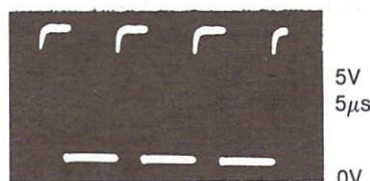


Figure 5

DC Reference

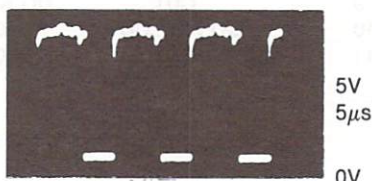


Figure 6

DC Reference

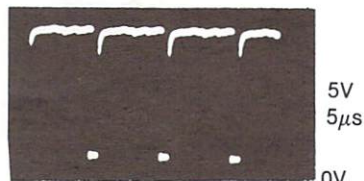


Figure 7

DC Reference

If there is no change at pin 20 of IC UB4 when the Disk Drive is turned On and the waveform in Figure 5 does not change after one second, and there are pulses at pins 9 and 10 of IC UC6, check IC UC6 by substitution. If there is no change at pin 20 of IC UB2 when the Disk Drive is turned on and the waveform in Figure 6 does not change after one second, check for pulses at pin 11 of IC UC5 while the Disk Drive is turned On. If pulses are present, check IC UC5 by substitution. If no pulses are present at pin 11 of IC UC5, check for pulses at pins 12 and 13 of IC UC6. If pulses are present at pins 12 and 13 of IC UC6, check IC UC6 by substitution. If pulses are missing, check IC UC7 by substitution. If the waveform at pin 20 of IC UB3 is missing and the waveforms are good at pin 20 of ICs UB2 and UB3, check ICs UC5 and UC6 by substitution.

OSCILLATOR AND DIVIDERS

Check for a 5V reading at pin 14 of Timer IC (UD5). If the 5V reading is missing, check Coil L1 for possible open circuit. Check for 16MHz oscillator frequency at pin 8 of IC UD5. If the oscillator is off frequency, check the 16MHz Oscillator Crystal Module (Y1). Also check for a 1MHz clock signal at pin 12 of IC UD5. If the 1MHz signal is missing, check IC UD5 by substitution. Check the waveform at pin 11 of Counter IC (UE6). If the waveform is missing, check IC UE6 by substitution.

DISK DRIVE INOPERATIVE

Check for 11.8V at pin 2 of Connector P5. If the voltage is missing, see the "Power Supply" section of this Troubleshooting guide. Check for a Low Logic reading at pin 3 of Connector P5 when a Load command is given. If the logic reading is correct, check the voltages and components of the Motor Speed Control circuit, and check the Drive Motor (M2). If the logic reading is High, check for a Low logic reading at pin 5 of Controller IC (UC1). If Low logic reading is correct, check Buffer IC (UD2) by substitution. If the logic reading is High at pin 5 of IC UC1, check for a High logic reading at pin 8 of IC UC1. If High logic reading is correct, check IC UC1 by substitution. If reading is Low, check Interface IC (UC2) by substitution. If the Motor (M2) still does not run, check ICs UB2, UB3, UB4, UC3 and UC4 by substitution, one at a time, until the defective stage is isolated.

READ FUNCTION INOPERATIVE

Connect a jumper from pin 3 of Plug P5 to ground to keep the Disk Drive running in Read mode. Check for a High logic reading at pin 2 of Controller IC (UC1). If the reading is not correct, check IC UC1 by substitution.

Insert a diskette into the Disk Drive and close the door. The diskette must contain several programs and the head must be positioned on a track containing information. Check the waveforms at pins 1 and 14 of Video Amp IC (UF4). If the waveforms are missing, check windings of Read/Write Erase Head (M3) for continuity. Check Plug P8 for good

TROUBLESHOOTING (Continued)

connections and the voltages and components associated with pins 1, 3, 5, 7, 8, 10, 12 and 14 of Video Amp IC (UF3). If the waveforms are good at pins 1 and 14 of IC UF4, check the waveforms at pins 2 and 5 of Voltage Comparator IC (UE4). If the waveforms are missing at IC UE4, check the voltages and components associated with pins 1, 3, 5, 7, 8, 10, 12 and 14 of IC UF4. If the waveforms are good at pins 2 and 5 of IC UE4, check the waveform at pin 7 of IC UE4. The waveform should be present at pin 7 of IC UE4 even when the Disk Drive is not running. There should be a noticeable change in the waveform when the Disk Drive door is opened and closed with a diskette in the drive and the drive is running. If there is no change in the waveform, check the voltages and components associated with pins 1 thru 8 of IC UE4. If the waveform is good at pin 7 of IC UE4, check for pulses at pins 7 and 10 of Multivibrator IC (UD4). These pulses should be present even when the Disk Drive is not running.

If pulses are missing at pin 7 of IC UD4 and there are pulses at pin 4 of IC UD4, check IC UD4 by substitution. If pulses are missing from pin 4 of IC UD4, check IC UD3 by substitution. If pulses are present at pin 7 of IC UD4, check for pulses at pin 12 of IC UD3 and pins 10 and 12 of IC UD4. These pulses should be present even when the Disk Drive is not running. If pulses are missing at pin 12 of IC UD3, check IC UC1 by substitution. If pulses are present at pin 12 of IC UD3 but missing at pin 12 of IC UD4, check IC UD3 by substitution. If pulses are present at pin 12 and missing at pin 10 of IC UD4, check IC UD4 by substitution. If pulses are present at pin 10 of IC UD4, check ICs UC1 and UC2 by substitution.

WRITE FUNCTION INOPERATIVE

Check for a Low logic reading on the WR Protect Line, pin 12 of Connector P6, without a diskette inserted into the Disk Drive. Insert a Write Protected diskette into the Disk Drive. The logic reading should go from Low to High. If the logic readings are wrong, check the Write Protect Sensor (M4).

If the logic reading at pin 12 of P6 is correct, check for a High logic reading on pin 6 of Inverter IC (UA1) without a Write Protected diskette inserted and a Low logic reading with a Write Protected diskette inserted into the Disk Drive. If the readings are wrong, check IC UA1 by substitution. Check the resistance of the Read/Write section of Head (M3). It should read 16.4 Ohms between pins 1 and 4 and 17.1 Ohms between pins 4 and 5 of Connector P8.

Check for Low logic reading on pins 10 thru 14 and pin 40 of Interface IC (UC3) while formatting a diskette. If the readings are incorrect, check Inverter ICs (UA1 and UB1) and Exclusive OR IC (UD3).

Check for a Low logic reading on the Interrupt Request Line at pin 21 of IC UC3 while formatting a diskette. If the reading is incorrect, check IC UC3 by substitution. If the reading at pin 2 of IC UC3 is good, check RAM IC (UB2), CPU IC (UC4) and Interface IC (UC2) by substitution, one at a time, to isolate the defective stage.

Check the waveforms on the collectors of Write Amp and Erase Transistors (Q4 and Q5) while formatting a diskette. If the waveforms are missing, check Write Switch/Amp and Erase Transistors (Q3 thru Q5) and all associated circuitry. Also check Buffer IC (UD2) and Controller IC (UC1) by substitution.

Check the Erase Transistor (Q6) and associated components. Check Write Amp Transistor (Q7) and associated components.

STEPPING MOTOR INOPERATIVE

Check Plug P7 for good connections. If Plug P7 connections are good, type and run the following program to activate the Stepping Motor circuits.

```
10 OPEN 15,8,15,"I"
20 OPEN 8,8,8,"#"
30 PRINT#15,"U1:"8;0;1;0
40 PRINT#15,"U1:"8;0;30;0
50 GOTO 30
```

While the program is running, check for pulses at pins 10 and 11 of Interface IC (UC2). If pulses are missing, check IC UC2 by substitution. If pulses are present at pins 10 and 11 of IC UC2, check for pulses at pins 15 thru 18 of Controller IC (UC1). If pulses are missing, check IC UC1 by substitution.

If pulses are present at IC UC1, use a scope to check for .6V peak to peak pulses at pins 4, 6, 8 and 10 of IC UD1 and if they are missing, check IC UD1 by substitution. If pulses are present at IC UD1, check for 13V peak to peak pulses at the collectors of Motor Drive Transistors (Q8 thru Q11). If the pulses are missing, check the Stepping Motor (M1), Diodes CR8 thru CR11 and Transistors Q8 thru Q11.

ALIGNMENT

ALIGNMENT TEST SETUP

NOTE: Use a Dysan Analog Alignment Diskette 224/2A when an alignment diskette is specified in the alignment procedures. This alignment diskette has only alignment patterns on it and does not contain any alignment programs.

Use the following Track Seek program and procedure to step the head to a track when specified in the alignment procedure.

```
1 OPEN 15,8,15,"I":REM TRACK SEEK PROGRAM
2 OPEN 8,8,8,"#"
3 PRINT "TYPE 99 to EXIT"
4 INPUT "TRACK";T
5 IF T = 99 THEN 90
6 T = T + 1
7 PRINT #15,"U1:"8;0;T;0
8 GOTO 3
9 CLOSE 15:CLOSE 8
```

Disconnect Plug P6 and turn the Disk Drive On. Run the above program and step the head to the specified track with NO diskette in the Disk Drive. The Disk Drive will try to find the track, then it will go back to the Track 00 and pause. It will then go to the track specified and stop. After the Disk Drive stops, insert the Alignment Diskette into the Disk Drive and close the door. Connect a jumper from pin 3 of Plug P5 to ground to keep the Disk Drive running and perform the alignment procedure. Whenever the head must be set to a different track, remove the jumper from pin 3 of Plug P5 to stop the Disk Drive. Remove the Alignment Diskette.

MOTOR SPEED ADJUSTMENT

Insert a diskette into the Disk Drive and close the door. Load program from diskette or connect a jumper from pin 3 of Plug P5 to ground to start motor. Use the outer trace of the pattern on the spindle pulley if 60Hz AC power is being used and the inner trace of the pattern if 50Hz AC power is being used. Use a fluorescent light to view the pattern and adjust the Speed Control VR1 until the pattern appears to barely move or stand completely still.



Figure 1

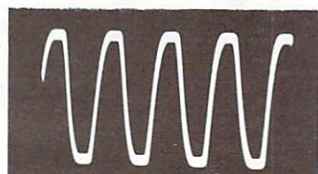


Figure 2.

0V
DC Reference

RADIAL HEAD ALIGNMENT

Connect the channel A input of a dual trace scope to pin 7 of Video Amp IC (UF4) and the channel input to pin 8 of IC UF4. Set the scope to add mode with channel B inverted, sweep time to 20msec, voltage to 2v/cm range and scope input to AC input. Set the head to Track 16 (See Alignment Test Setup). Insert an Alignment Diskette into the Disk Drive and connect a jumper from pin 3 of Plug P5 to ground to keep the Disk Drive running. Observe the cats-eye pattern (See Figure 1). The lobes (Peak to Peak Amplitude) should be within 70% of each other. If the lobes are out of tolerance, loosen the two Stepping Motor (M2) mounting screws on the bottom of the Disk Drive and turn the Motor M2 until the lobes are within 90% of each other. Tighten the Motor M2 mounting screws.

Remove the jumper from pin 3 of Plug P5. Remove the Alignment Diskette from the Disk Drive and insert a formatted diskette which has been formatted on a Disk Drive that is being aligned. Use the Track Seek program (see Alignment Test Setup section) to set the head to Track 34 and back to Track 16. Remove the formatted diskette and insert the Alignment Diskette into the Disk Drive. Connect the jumper from pin 3 of Plug P5 to ground and verify that the lobes are within tolerance when the head is on Track 16. Repeat the procedure again stepping the head to Track 00 and back to Track 16.

TRACK 00 STOP ADJUSTMENT

Connect the input of a scope to pin 7 of Video Amp IC (UF4). Set the scope sweep time to 5μs, voltage range to 2v/cm and scope input to AC Input. Use the Track Seek program (See Alignment Test Setup) to set the head to Track 00.

Insert an Alignment Diskette into the Disk Drive and connect a jumper from pin 3 of Plug P5 to ground to keep the Disk Drive running. Verify that the head is on Track 00 by checking for the 125Hz waveform shown in Figure 2.

With the head on Track 00, loosen the screw holding the Track 00 Stop and adjust the Stop for a clearance of .01 inch or less between the Stop and the cam located on the right side of the head assembly (See Figure 3).

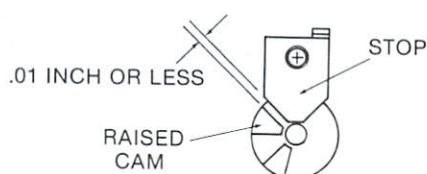


Figure 3.

ALIGNMENT (Continued)

AZIMUTH CHECK

Connect the input of a scope to pin 7 of Video Amp IC (UF4). Set the scope sweep to .5ms, voltage range to 1v/cm and scope input to AC Input. Use the Track Seek program (See Alignment Test Setup) to set the head to Track 34.

Insert the Alignment Diskette into the Disk Drive and connect a jumper from pin 3 of Plug P5 to ground to keep the

Disk Drive running. Confirm that the pattern appears as shown in Figure 4. The amplitude of bursts 1 and 4 must be equal to or less than the amplitudes of bursts 2 and 3. Optimum alignment is indicated when bursts 1 and 4 are equal in amplitude and bursts 2 and 3 are equal in amplitude.

There is no adjustment provided for head azimuth. If the azimuth alignment is out of tolerance, the head may need replacement.

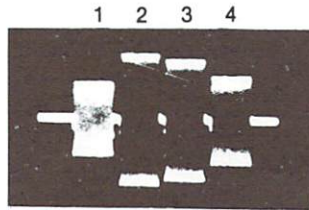


Figure 4.

MAIN BOARD GridTrace LOCATION GUIDE

C1	B-9	CR1	A-9	Q5	M-3	R44	K-3
C2	B-9	CR2	B-9	Q6	N-3	R45	K-2
C3	B-9	CR3	A-7	Q7	0-3	R46	K-1
C4	B-7	CR4	B-7	Q8	L-1	R47	L-2
C5	B-8	CR5	0-8	Q9	L-1	R48	L-2
C6	B-8	CR6	M-5	Q10	M-2	R49	M-2
C7	H-10	CR7	K-4	Q11	M-2	R50	M-2
C8	H-8	CR8	L-2	R1	K-8	R51	N-3
C9	H-8	CR9	L-2	R2	0-9	R52	N-3
C10	J-8	CR10	M-2	R3	0-8	R53	N-2
C11	K-9	CR11	M-2	R4	0-8	R54	N-2
C12	K-9	CR12	N-2	R5	E-3	R55	F-1
C13	K-9	CR13	0-3	R6	E-2	R60*	F-1
C14	L-9	CR14	0-4	R7	E-1	R61*	D-2
C15	0-9	CR15	0-2	R8	E-1	UA1	D-2
C16	B-6	CR16	0-2	R9	G-6	UB1	E-2
C17	C-4	CR17	0-2	R10	H-6	UB2	E-3
C18	D-7	CR18	0-2	R11	K-7	UB3	E-5
C19	D-5	DNJ1	L-4	R12	K-6	UB4	E-6
C20	D-4	DNJ2	M-4	R14	L-7	UC1	G-2
C21	N-2	L1	J-9	R16	M-6	UC2	G-3
C22	F-3	L2	J-10	R17	M-6	UC3	G-5
C23	G-6	L3	K-8	R18	M-5	UC4	G-6
C24	G-5	L4	M-9	R19	N-7	UC5	H-8
C25	G-3	L5	M-9	R20	N-7	UC6	H-9
C26	G-2	L6	M-9	R21	N-6	UC7	H-10
C27	J-6	L7	M-8	R22	N-6	UD1	J-2
C28	J-5	L8	0-10	R23	0-6	UD2	J-3
C29	J-3	L9	N-5	R24	K-5	UD3	J-5
C30	J-2	L10	N-5	R25	K-4	UD4	J-6
C31	K-7	L11	0-5	R26	K-4	UD5	J-8
C32	K-6	L12	0-5	R27	L-5	UE4	L-6
C33	K-5	L13	B-1	R28	L-5	UE6	M-9
C34	K-5	L14	B-2	R29	L-5	UF3	N-4
C35	M-6	L15	D-3	R30	M-5	UF4	N-6
C36	L-6	L16	D-3	R31	K-3	VR1	D-9
C37	M-6	P1	A-10	R32	L-4	VR2	F-9
C38	M-6	P2	A-3	R33	L-4	Y1	J-9
C39	0-7	P3	A-4	R34	L-4		
C40	0-6	P4	G-1	R35	L-3		
C41	0-6	P5	I-1	R36	M-4		
C42	0-6	P6	I-1	R37	M-4		
C43	N-5	P7	L-1	R38	M-4		
C44	N-5	P8	N-1	R39	M-3		
C45	0-5	Q1	0-9	R40	N-4		
C46	L-4	Q2	0-8	R41	N-4		
C47	0-4	Q3	M-4	R42	0-4		
C48	0-4	Q4	L-3	R43	0-4		

* Located other side of board.

PARTS LIST AND DESCRIPTION

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

SEMICONDUCTORS (Select replacement transistor for best results)

ITEM No.	TYPE No.	MFR. PART No.	REPLACEMENT DATA						
			GENERAL ELECTRIC PART No.	MOTOROLA PART No.	NEW-TONE NTE PART No.	PHILIPS ECG PART No.	RCA PART No.	WORKMAN PART No.	ZENITH PART No.
MAIN BOARD									
CR1	KBP02		GE-167	3N255	NTE167	ECG167	SK3647/167	WEP1052/167	212-Z9001
	KBP-005	900756-01	GE-166	3N254	NTE166	ECG166	SK9075/166	WEP1051/166	212-Z9001
	1N4002	900750-02	GE-504A	1N4002	NTE116	ECG116	SK3311	WEP155	212-76-02
	KBP02		GE-167	3N255	NTE167	ECG167	SK3647/167	WEP1052/167	212-Z9001
	KBP-005	900756-01	GE-166	3N254	NTE166	ECG166	SK9075/166	WEP1051/166	212-Z9001
CR4	1N4002	900750-02	GE-504A	1N4002	NTE116	ECG116	SK3311	WEP155	212-76-02
	3.3Y		GEZD-3.3	1N5226B	NTE5005A	ECG5005A	SK3A3/5005A	WEP1405/5005	
	HZ3C-2	325505-01	GEZD-3.3	1N5226B	NTE5005A	ECG5005A	SK3A3/5005A	WEP1405/5005	
	HZ4A-1	325505-02	GEZD-3.6	1N5227B	NTE5006A	ECG5006A	SK3A6/5006A	WEP1406/5006	103-Z9005
	1NS226B	900948-06							
CR6, 7	1N4148	900850-01	GE-514	1N4935	NTE519	ECG519	SK3100/519	WEP925/519	103-131
	WG-713C	900850-05	GE-300	1N4935	NTE177	ECG177	SK9091/177	WEP1062/177	103-131
	1N4002	900750-02	GE-504A	1N4002	NTE116	ECG116	SK3311	WEP155	212-76-02
CR8 thru CR11	1N4148	900850-01	GE-514	1N4935	NTE519	ECG519	SK3100/519	WEP925/519	103-131
	WG-713C	900850-05	GE-300	1N4935	NTE177	ECG177	SK9091/177	WEP1062/177	103-131
	HZ5C-2	325506-01	GEZD-5.1	1N5231B	NTE5010A	ECG5010A	SK5A1/5010A	WEP1411/5010	103-279-10
CR13	1N5231	900948-11	GEZD-5.1	1N5231B	NTE5010A	ECG5010A	SK5A1/5010A	WEP1411/5010	103-279-10
	1N4148	900850-01	GE-514	1N4935	NTE519	ECG519	SK3100/519	WEP925/519	103-131
	WG-713C	900850-05	GE-300	1N4935	NTE177	ECG177	SK9091/177	WEP1062/177	103-131
Q1	2SA673D		GE-269	2N4403*	NTE290A	ECG290A	SK9132	WEP911/290A	121-Z9003*
	2SA673	902720	GE-269	2N4403*	NTE290A	ECG290A	SK9132	WEP911/290A	121-Z9003*
	2SC1815-0	902693-01	GE-62	MPSA05*	NTE85	ECG85	SK3124A/289A	WEP66/199	121-Z9065
	2SC945	902671	GE-212	MPSA18*	NTE85	ECG85	SK3124A/289A	WEP736/123A*	121-972*
Q3, 4	2SA1015Y		GE-269	2N4403*	NTE290A	ECG290A	SK9132	WEP911/290A	121-Z9003*
	2SA1015	902744-01	GE-269	2N4403*	NTE290A	ECG290A	SK9132	WEP911/290A	121-Z9003*
	2SA733	902717	GE-48	2N4403*	NTE290A	ECG290A	SK3114A/290A	WEP62/159*	121-Z9067
	2SA1015GR		GE-269	2N4403*	NTE290A	ECG290A	SK9132	WEP911/290A	121-Z9003*
Q5	2SA1015	902744-01	GE-269	2N4403*	NTE290A	ECG290A	SK9132	WEP911/290A	121-Z9003*
	2SA733	902717	GE-48	2N4403*	NTE290A	ECG290A	SK3114A/290A	WEP62/159*	121-Z9067
Q6	2SA1015Y	902744-01	GE-269	2N4403*	NTE290A	ECG290A	SK9132	WEP911/290A	121-Z9003*
	2SA733	902717	GE-48	2N4403*	NTE290A	ECG290A	SK3114A/290A	WEP62/159*	121-Z9067

PARTS LIST AND DESCRIPTION (Continued)

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SEMICONDUCTORS (Select replacement transistor for best results)

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			GENERAL ELECTRIC PART No.	MOTOROLA PART No.	NEW-TONE NTE PART No.	PHILIPS ECG PART No.	RCA PART No.	WORKMAN PART No.	ZENITH PART No.
Q7	2SC1815-0 2SC945	902693-01 902671	GE-62 GE-212	MPSA05* MPSA18*	NTE85 NTE85	ECG85 ECG85	SK3124A/289A SK3124A/289A	WEP66/199 WEP736/123A*	121-29065 121-972*
Q8 thru Q11	2SC1959GR 2SD467	902679 902682	GE-210 GE-243	2N4401* 2N3019*	NTE85 NTE85	ECG85 ECG85	SK9229/85 SK3449/297	WEP910/289 WEP99/128*	921-1114 121-792
UA1	2SC2120 T74LS14B1 74LS14	901521-30	GE-289A	2N4401* SN74LS14N SN74LS14N	NTE289A NTE74LS14 NTE74LS14	ECG289A ECG74LS14 ECG74LS14	SK3849/293 SK74LS14 SK74LS14	WEP914/297	921-1114 HE-443-872 HE-443-872
UB1 UB2	7406PC TMM2116AP-15 TMM2016P	901522-06 325502-03 325502-01 325302-01	GE-7406		NTE7406	ECG7406	SK7406		HE-443-698
UB3	M58725P 2364-130	901229-05 901229-03 325572-01							
UB4	2364-197	901437-01							
UC1 UC2,3	MOS6522 MPS6522	901435-01							
UC4	MOS6502 MPS6502								
UC5	HD74LS04P 74LS04P	901521-02		SN74LS04N SN74LS04N	NTE74LS04 NTE74LS04	ECG74LS04 ECG74LS04	SK74LS04 SK74LS04		HE-443-755 HE-443-755
UC6	74LS00PC 74LS00	901521-01		SN74LS00N SN74LS00N	NTE74LS00 NTE74LS00	ECG74LS00 ECG74LS00	SK74LS00 SK74LS00		HE-443-728 HE-443-728
UC7	74LS42PC 74LS42	901521-17		SN74LS42N SN74LS42N	NTE74LS42 NTE74LS42	ECG74LS42 ECG74LS42	SK74LS42 SK74LS42		HE-443-807 HE-443-807
UD1	7406PC 7406	901522-06	GE-7406 GE-7406		NTE7406 NTE7406	ECG7406 ECG7406	SK7406 SK7406		HE-443-698 HE-443-698
UD2	SN7417N 7417 7407	901522-01 901522-30	GE-7417 GE-7417		NTE7417 NTE7407	ECG7417 ECG7407	SK7417 SK7407		HE-443-72 HE-443-72
UD3	M74LS86P 74LS86	901521-32		SN74LS86N SN74LS86N	NTE74LS86 NTE74LS86	ECG74LS86 ECG74LS86	SK74LS86 SK74LS86		HE-443-891 HE-443-891
UD4	9602PC 9602	901510-01			NTE9602 NTE9602	ECG9602 ECG9602			

PARTS LIST AND DESCRIPTION (Continued)

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

SEMICONDUCTORS (Select replacement transistor for best results)

ITEM No.	TYPE No.	MFR. PART No.	REPLACEMENT DATA						
			GENERAL ELECTRIC PART No.	MOTOROLA PART No.	NEW-TONE NTE PART No.	PHILIPS ECG PART No.	RCA PART No.	WORKMAN PART No.	ZENITH PART No.
UD5	HD74177P 74177 74LS197	901522-03 901521-54		SN74LS197N	NTE74177 NTE74177 NTE74LS197	ECG74177 ECG74177 ECG74LS197	SK74177 SK74177		
UE4	UA311TC LM311	901523-04			NTE922M NTE922	ECG922M ECG922	SK3668/922M SK3567A/922		HE-442-75
UE6	M74LS193P 74LS193	901521-26		SN74LS193N SN74LS193N	NTE74LS193 NTE74LS193	ECG74LS193 ECG74LS193	SK74LS193 SK74LS193		HE-443-815 HE-443-815
UF3, 4	NE592N NE592	901523-08		MC1733CP MC1733CP	NTE927D NTE927D	ECG927D ECG927D	SK7617/927D SK7617/927D		
VR1	UA7812KC LM340-12	901528-04				ECG1914	SK9331/1914		
VR2	UA7809KC LM340-5	901528-03	GE-309K	LM309K	NTE309K	ECG309K	SK3629/309K	WEP2319/309K	HE-442-30
ALPS MOTOR CONTROL BOARD									
CR1 thru CR5									
IC1 Q1, 2 Q3 Q4	CX065B 2SC1815Y 2SA1015GR 2SB703A		GE-62 GE-82* GE-303	MPSA05* 2N4403* MJE15031	NTE85 NTE290A NTE292	ECG85 ECG290A ECG292	SK3124A/289A SK9132 SK3441/292	WEP66/199 WEP911/290A WEP781/292	121-Z9065 121-Z9003* 121-Z9048
NEWTRONICS MOTOR CONTROL BOARD									
IC1 TR1 TR2	LAG570 2SA733 2SB633E		GE-48 GE-250	2N4403* D45H11	NTE290A NTE378	ECG290A ECG378	SK3114A/290A SK3934/381	WEP62/159* WEP757/197	121-Z9067 121-988-03

* Lead configuration may vary from original.

WIRING DATA

Shielded Hook-up Wire	Use BELDEN No. 8401 or 8421 (Single-Conductor)
General-use Unshielded Hook-up Wire	8208 (Two-Conductor)
	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 Items not listed are normally available at local distributors.

ITEM No.	RATING	MFGR. PART No.
MAIN BOARD		
C11	1 16V 3%	900402-14
C15	10 25V 3%	900402-15

ITEM No.	RATING	MFGR. PART No.
C21	4.7 25V 3%	900402-08
C37	.47 25V 15%	900402-17
C38	.47 25V 15%	900402-17
C44	3.3 25V 3%	900402-11

For SAFETY use only equivalent replacement part.
Item numbers not listed are normally available at local distributors.

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

ITEM NO.	FUNCTION	RESISTANCE	MFGR. PART NO.	NOTES
ALPS MOTOR CONTROL BOARD				
VR1	Speed	20K		
NEWTRONICS MOTOR CONTROL BOARD				
VR1	Speed	20K		

RESISTORS (Power and Special)

ITEM No.	RATING	REPLACEMENT DATA		
		MFGR. PART No.	NEW-TONE PART No.	WORKMAN PART No.
	MAIN BOARD			
R28	100 1% 1/4W Metal Oxide	901751-18		
R29	137 1% 1/4W Metal Oxide			
	150 1% 1/4W Metal Oxide	901751-44		
R51	56 1% 1/4W Metal Oxide			
	91 1% 1/4W Metal Oxide	901751-43		
R53	9100 1% 1/4W Metal Oxide	901751-45		
R54	9100 1% 1/4W Metal Oxide	901751-45		
	ALPS MOTOR CONTROL BOARD			
R2	68K 1% 1/4W Carbon Film			
R9	.68 5% 3W Metal Oxide			
R10	5100 3% 1/4W Carbon Film		QW251	
	NEWTRONICS MOTOR CONTROL BOARD			
R3	5100 3% 1/4W Carbon Film			
R4	68K 1% 1/4W Carbon Film		QW251	
R10	.68 5% 3W Metal Oxide			

PARTS LIST AND DESCRIPTION (Continued)

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

COILS (RF-IF)

ITEM No.	FUNCTION	MFGR. PART No.
L1	RF Choke (2.2uH)	325513-01
L8	RF Choke (100uH)	325513-03
L9	Peaking (22uH)	325513-02

ITEM No.	FUNCTION	MFGR. PART No.
L10	Peaking (22uH)	325513-02
L11	Peaking (100uH)	325513-03
L12	Peaking (100uH)	325513-03

TRANSFORMER (Power)

ITEM No.	RATING			REPLACEMENT DATA		
				MFGR. PART No.	THORDARSON PART No.	NOTES
T1	PRI.	SEC. 1	SEC. 2	1540009-02C		
	120V AC @ 285mA AC	9.7V AC @ 690mA DC	15.5V AC @ 700mA DC			
	SEC. 3	SEC. 4	SEC. 5			

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FUSE DEVICES

ITEM NO.	DESCRIPTION	MFGR. PART NO.		NOTES
		DEVICE	HOLDER	
F1	1A @ 250V Fast-Acting 1A @ 250V Slow-Blow	903555-20	903614-01 903614-01	

PARTS LIST AND DESCRIPTION (Continued)

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

MISCELLANEOUS

ITEM No.	PART NAME	MFR. PART No.	NOTES
L2 thru L7, and L13 thru L16	Ferrite Bead	325563-01	
M1	Stepping Motor (AP-68)	523434	ALPS Drive
	Stepping Motor (SP-68)	142651	NEWTRONICS Drive
M2	Drive Motor	LC-177B	ALPS Drive
	Drive Motor	LC-177	NEWTRONICS Drive
M3	Read/Write Head		
M4	Write Protect Sensor		LED-Photo/Transistor Assembly
P9	Filter	325552-01	Power Connector
P10	Cord		AC Power, Polarized
SW1	Switch	904509-01	Power, On-Off
Y1	Crystal	325563-01	16MHz
	P.C. Board	1540050	Main Board
	P.C. Board	PY117	ALPS Motor Control Board
	P.C. Board	TDK-T12V	NEWTRONICS Motor Control Board (69-0172-1)

MECHANICAL PARTS LIST

REF. NO.	PART NO.	DESCRIPTION
	ALPS DISK DRIVE	
1		Door Assembly
10		Door Spring
12		Drive Belt
13		Hub Support
14		Hub Frame
17		Arm Support Assembly
19		Pad Plate Assembly
24		Tension Pulley
36		Head Assembly
38		Eject Spring
39		Eject Plate
42		Carriage Stopper
56		Tension Spring
58		Stepper Pulley

REF. NO.	PART NO.	DESCRIPTION
	NEWTRONICS DISK DRIVE	
1		Door Assembly
10		Door Spring
12		Drive Belt
13		Hub Support
14		Hub Frame
19		Pad Plate Assembly
24		Tension Pulley
36		Head Assembly
42		Carriage Stopper
56		Tension Spring
58		Stepper Pulley

MAIN BOARD LOGIC

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MODELS VIC-1541, 1541

PIN NO.	IC UA1	IC UB1	IC UB2	IC UB3	IC UB4	PIN NO.	IC UC1	PIN NO.	IC UC1	PIN NO.	IC UC2	PIN NO.	IC UC2	PIN NO.	IC UC3	PIN NO.	IC UC3
1	H	L	P	P	P	1	H	21	P	1	L	21	P	1	L	21	P
2	L	H	P	P	P	2	P	22	P	2	P	22	P	2	L	22	P
3	P	L	P	P	P	3	P	23	P	3	P	23	P	3	L	23	P
4	P	P	P	P	P	4	P	24	P	4	P	24	H	4	L	24	H
5	L(1)	L	P	P	P	5	L(6)	25	P	5	P	25	P	5	L	25	P
6	H(2)	H	P	P	P	6	H(2)	26	P	6	P	26	P	6	L	26	P
7	L	L	P	P	P	7	*	27	P	7	P	27	P	7	L	27	P
8	L	L	P	P	P	8	H	28	*	8	P	28	P	8	L	28	P
9	H	*	P	P	P	9	*	29	P	9	P	29	P	9	L	29	P
10	P	P	P	P	P	10	H(4)	30	P	10	L	30	P	10	P	30	P
11	P	P	P	P	P	11	*	31	P	11	H(4)	31	P	11	P	31	P
12	P	P	L	L	L	12	L(3)	32	P	12	H	32	P	12	P	32	P
13	P	P	P	P	P	13	*	33	*	13	H	33	P	13	L	33	P
14	H	H	P	P	P	14	*	34	P	14	H(2)	34	H	14	P	34	H
15			P	P	P	15	H	35	P	15	H	35	P	15	L	35	P
16			P	P	P	16	L(5)	36	P	16	H	36	P	16	L	36	P
17			P	P	P	17	H(3)	37	P	17	P	37	P	17	P	37	P
18			P	P	P	18	H(4)	38	P	18	H	38	P	18	H	38	P
19			P	P	P	19	P	39	P	19	P	39	P	19	H	39	H
20			P	P	P	20	L	40	P	20	H	40	P	20	H	40	H
21			P	P	P												
22			P	P	P												
23			P	P	P												
24			H	H	H												

Note: Logic probe readings taken while running the following Basic program. Use a single sided formatted diskette that has no programs on it and is not write protected.

```
10 OPEN 3,8,3" @0:TEST,S,W"
20 FOR X=1 TO 50
30 PRINT#3,"THIS IS A TEST"
40 NEXT X
50 CLOSE 3
60 GOTO 10
```

Logic Probe Display

L = Low

H = High

P = Pulse

* = Open (No Light On)

- (1) Probe indicates H if diskette is write protected.
- (2) Probe indicates L if diskette is write protected.
- (3) Probe indicates P when Stepping Motor is operating.
- (4) Probe indicates H when Head is moving In and L when Head is moving Out from center of diskette.
- (5) Probe indicates L when Head is moving In and H when Head is moving Out from center of diskette.
- (6) Probe indicates H when Drive Motor is not running.
- (7) Probe readings not taken.

MAIN BOARD LOGIC (Continued)

PIN NO.	IC UC4	PIN NO.	IC UC4	PIN NO.	IC UC5	IC UC6	IC UC7	IC UD1	IC UD2	IC UD3	IC UD4	IC UD5	IC UE4	IC UE6	IC UF3	IC UF4
1	L	21	L	1	P	P	P	*	L(6)	P	*	*	(7)	H	(7)	(7)
2	H	22	P	2	P	P	P	L	L	P	*	P		P		
3	P	23	P	3	P	P	P	H(3)	P	P	H	*		P		
4	P	24	P	4	P	P	H	L(3)	P	L	P	*		H		
5	*	25	P	5	*	P	P	L(5)	P	H	P	P		P		
6	H	26	P	6	L	P	H	L	P	H	P	P		P		
7	P	27	P	7	L	L	P	L	L	L	P	L		P		
8	H	28	P	8	P	P	L	L	P	L	L	L		P		
9	P	29	P	9	P	P	P	H(4)	P	P	P	P		L		
10	P	30	P	10	P	P	H	L	P	P	P	*		L		
11	P	31	P	11	P	P	H	H	P	P	H	*		L		
12	P	32	P	12	P	P	P	L	P	P	P	P		P		
13	P	33	P	13	P	P	P	H	P	H	H	H		H		
14	P	34	P	14	H	H	P	H	H	H	*	H		L		
15	P	35	*	15			P				*			H		
16	P	36	*	16			H				H			H		
17	P	37	P	17												
18	P	38	P	18												
19	P	39	P	19												
20	P	40	H	20												
				21												
				22												
				23												
				24												

ALPS MOTOR CONTROL BOARD LOGIC

PIN NO.	IC IC1
1	(7)
2	
3	
4	
5	
6	
7	
8	

Note: Logic probe readings taken while running the following Basic program. Use a single sided formatted diskette that has no programs on it and is not write protected.

```
10 OPEN 3,8,3" @0:TEST,S,W"
20 FOR X = 1 TO 50
30 PRINT#3,"THIS IS A TEST"
40 NEXT X
50 CLOSE 3
60 GOTO 10
```

Logic Probe Display

L = Low

H = High

P = Pulse

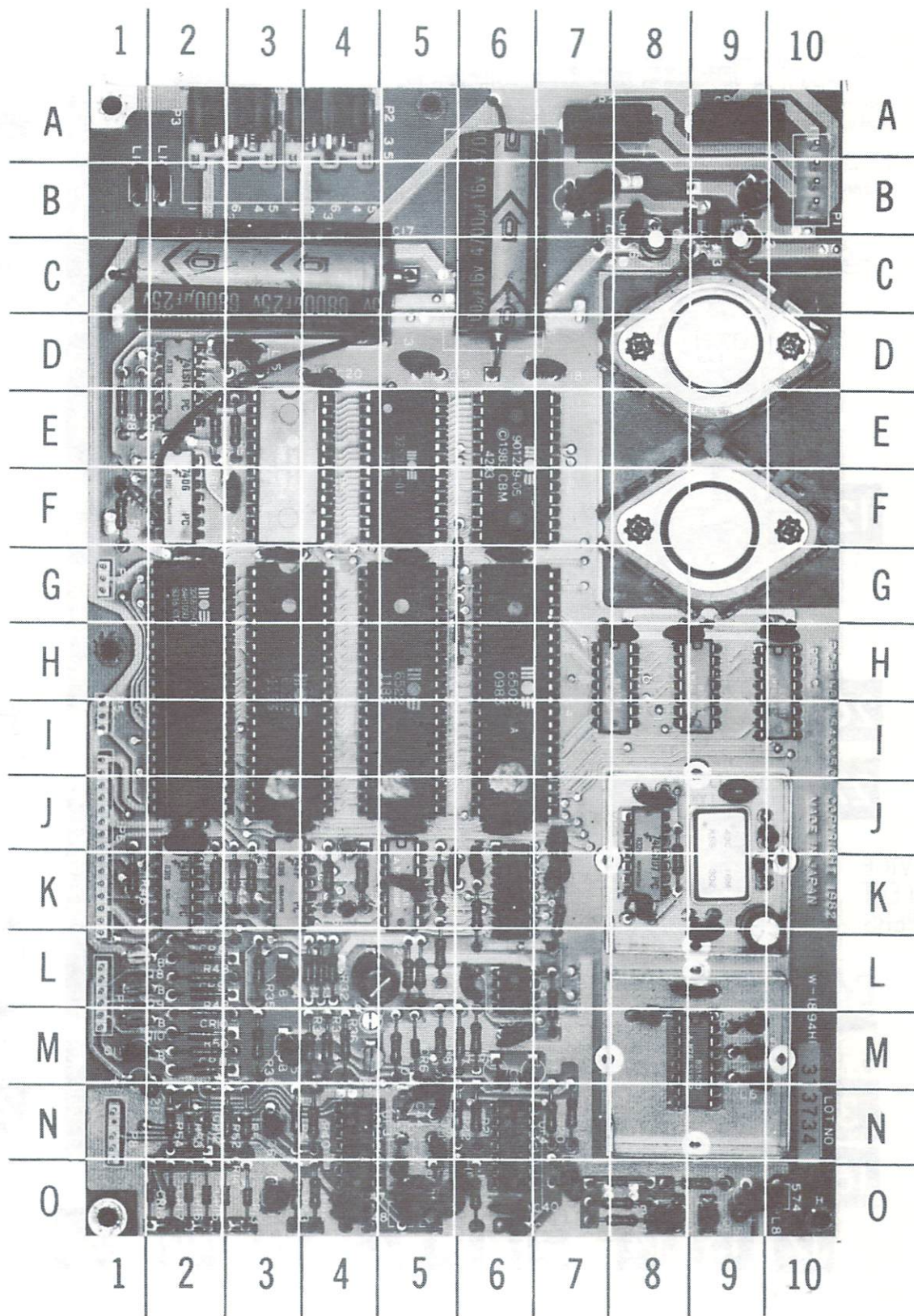
* = Open (No Light On)

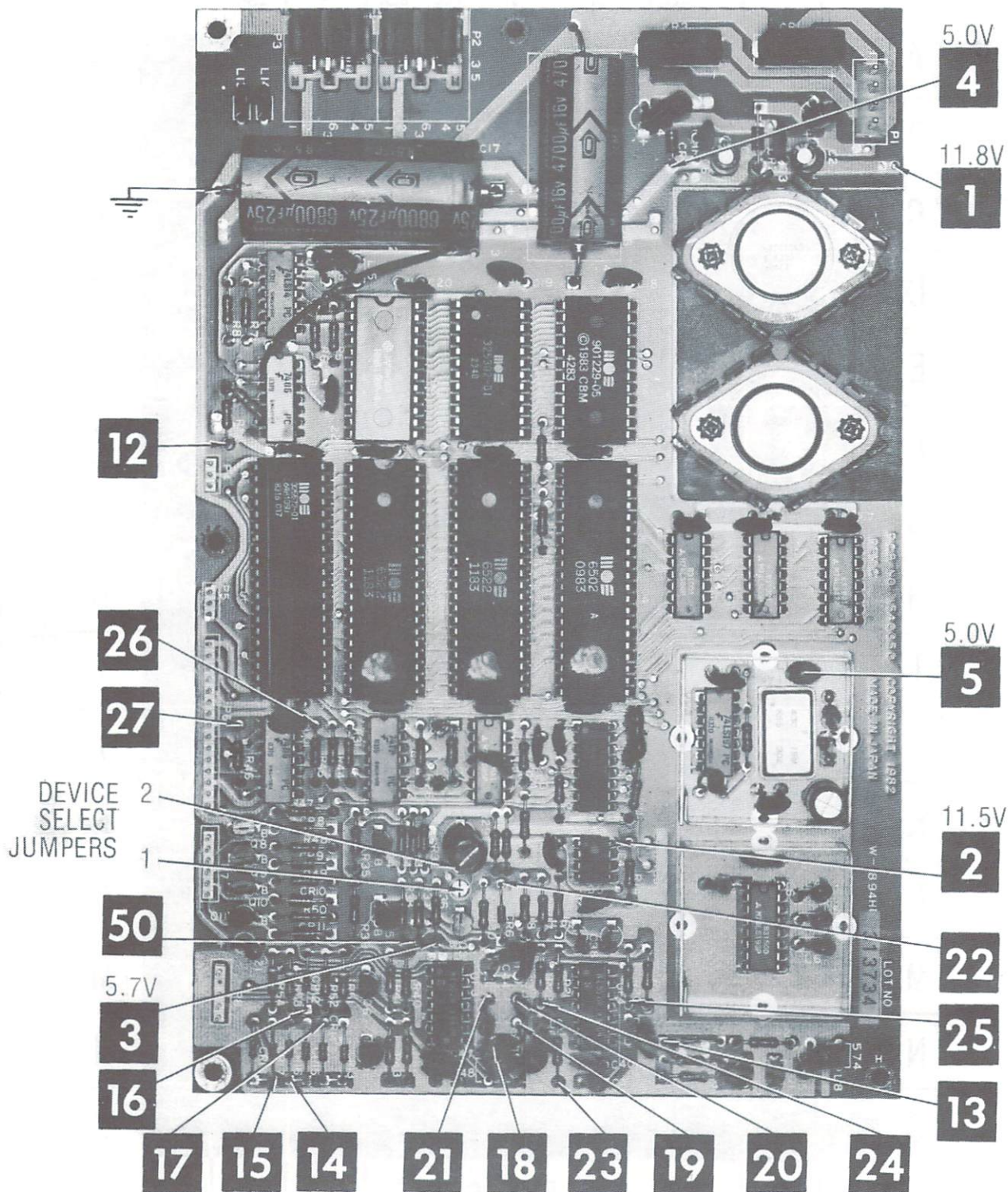
NEWTRONICS MOTOR CONTROL BOARD LOGIC

PIN NO.	IC IC1
1	(7)
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	

- (1) Probe indicates H if diskette is write protected.
- (2) Probe indicates L if diskette is write protected.
- (3) Probe indicates P when Stepping Motor is operating.
- (4) Probe indicates H when Head is moving In and L when Head is moving Out from center of diskette.
- (5) Probe indicates L when Head is moving In and H when Head is moving Out from center of diskette.
- (6) Probe indicates H when Drive Motor is not running.
- (7) Probe readings not taken.

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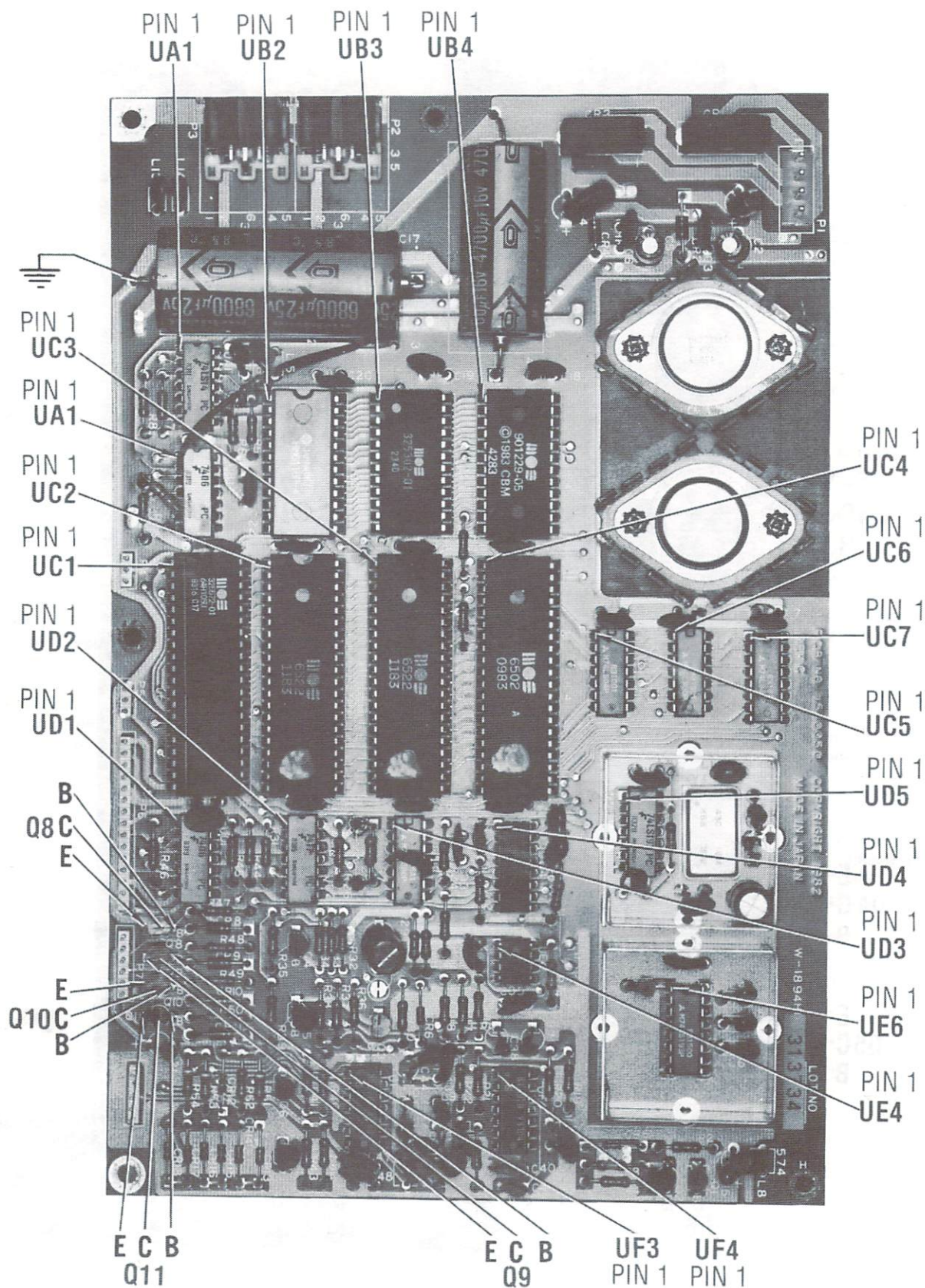


MAIN BOARD

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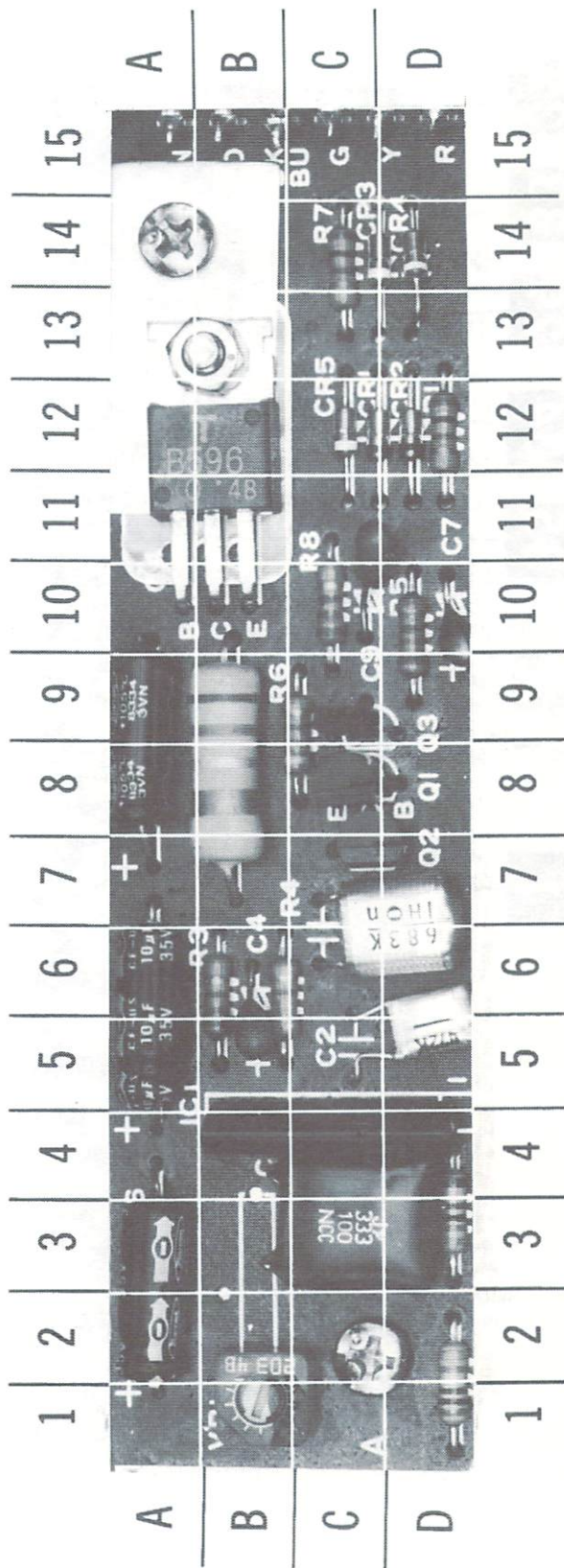


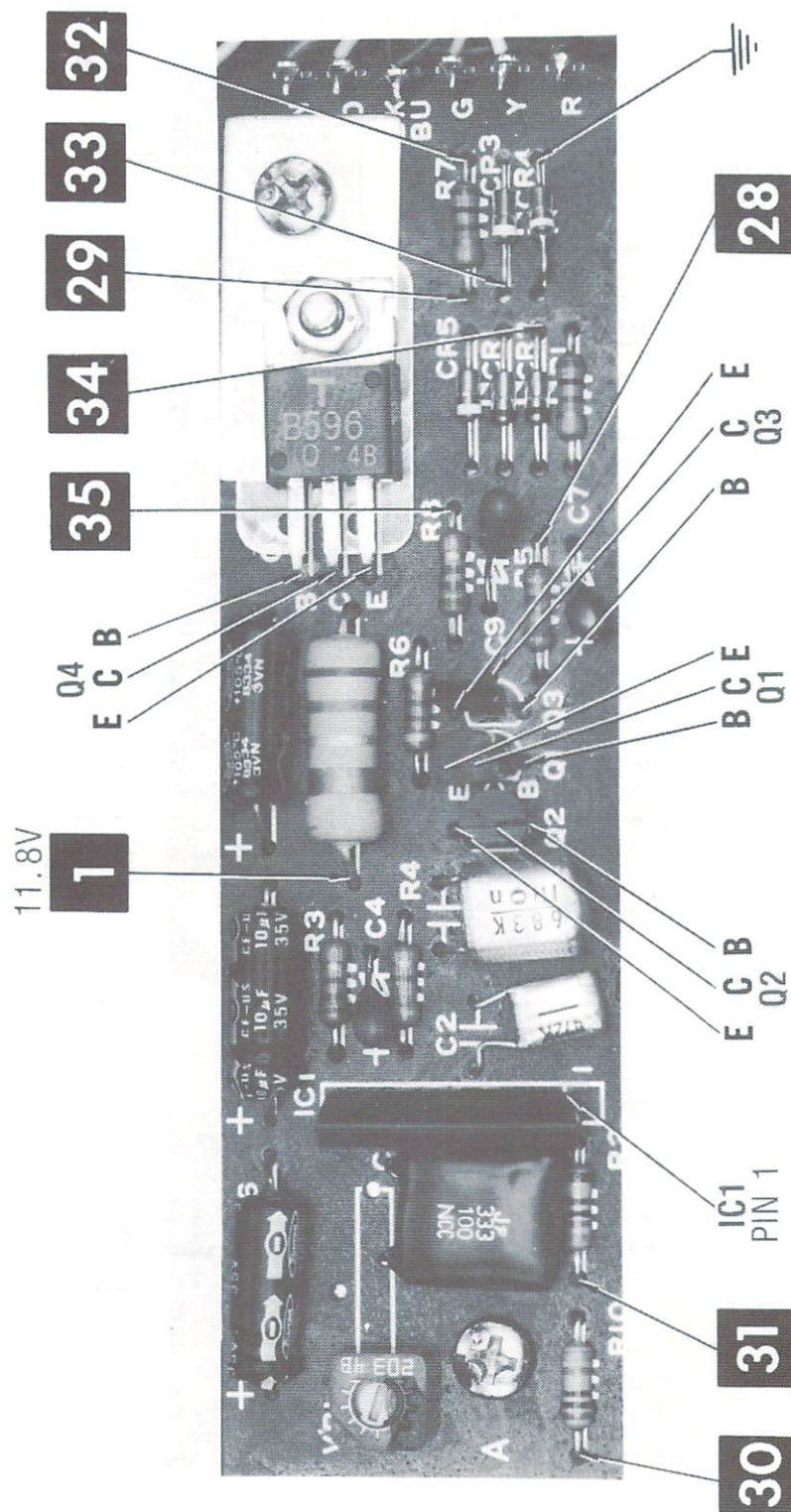


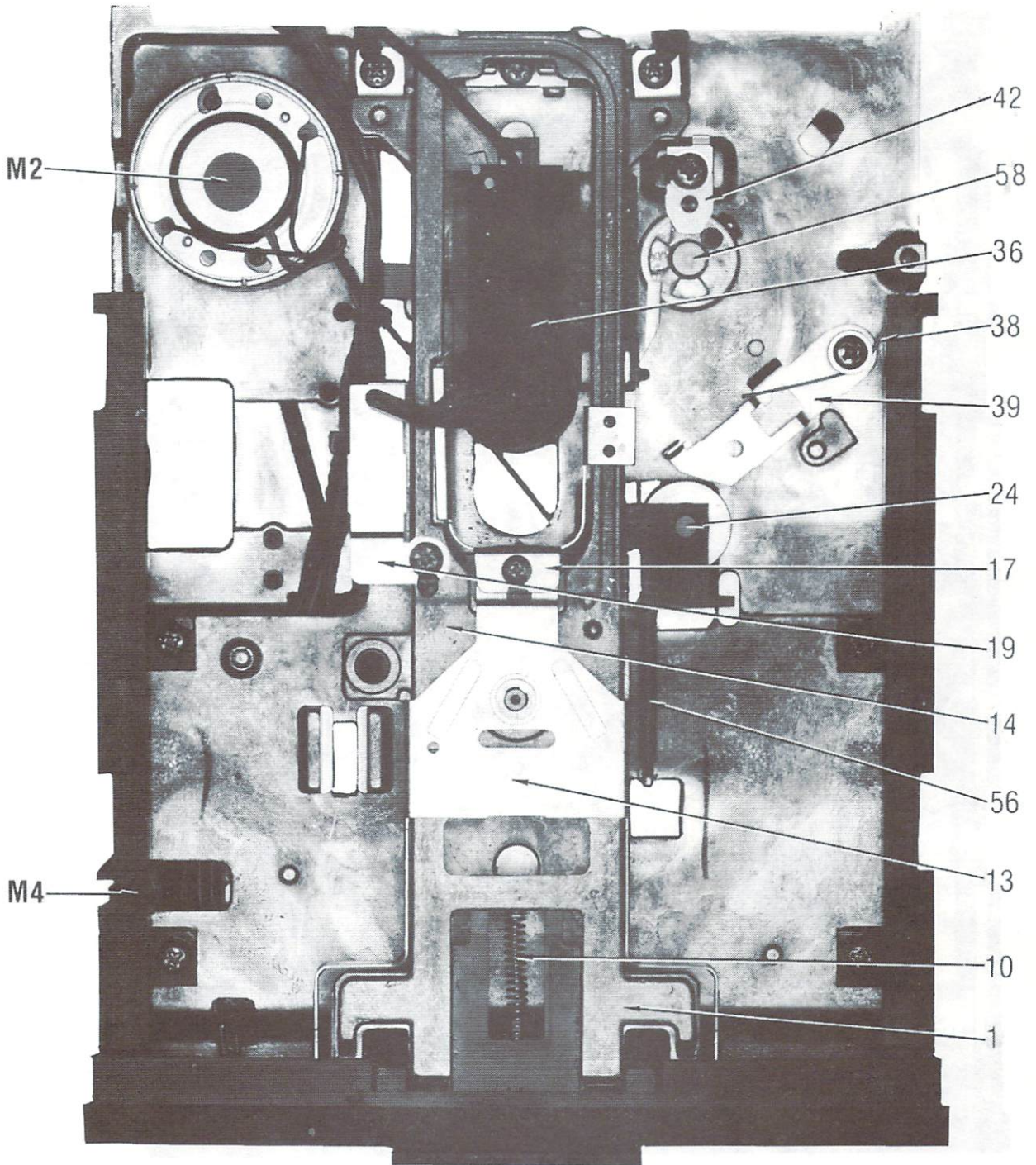
MAIN BOARD

ALPS GridTrace LOCATION GUIDE

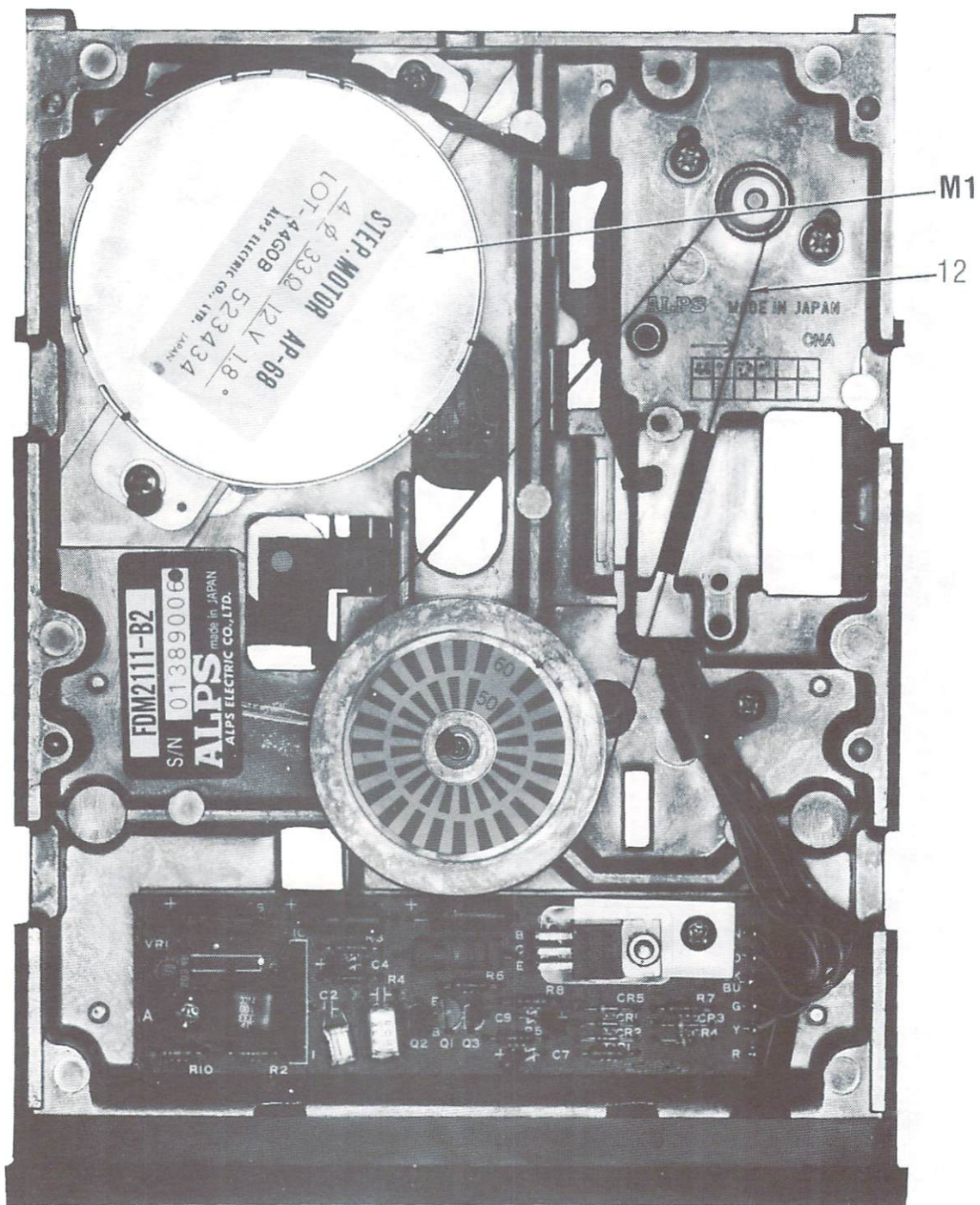
C1	A-8	CR2	D-12	R2	D-3
C2	D-5	CR3	C-14	R3	B-6
C3	C-3	CR4	D-14	R4	B-6
C4	B-5	CR5	C-12	R5	D-10
C5	A-5	IC1	D-4	R6	C-9
C6	A-2	Q1	C-8	R7	C-14
C7	D-10	Q2	C-7	R8	C-10
C8	D-6	Q3	C-9	R9	B-8
C9	C-11	Q4	B-12	R10	D-2
CR1	C-12	R1	D-12	VR1	B-1





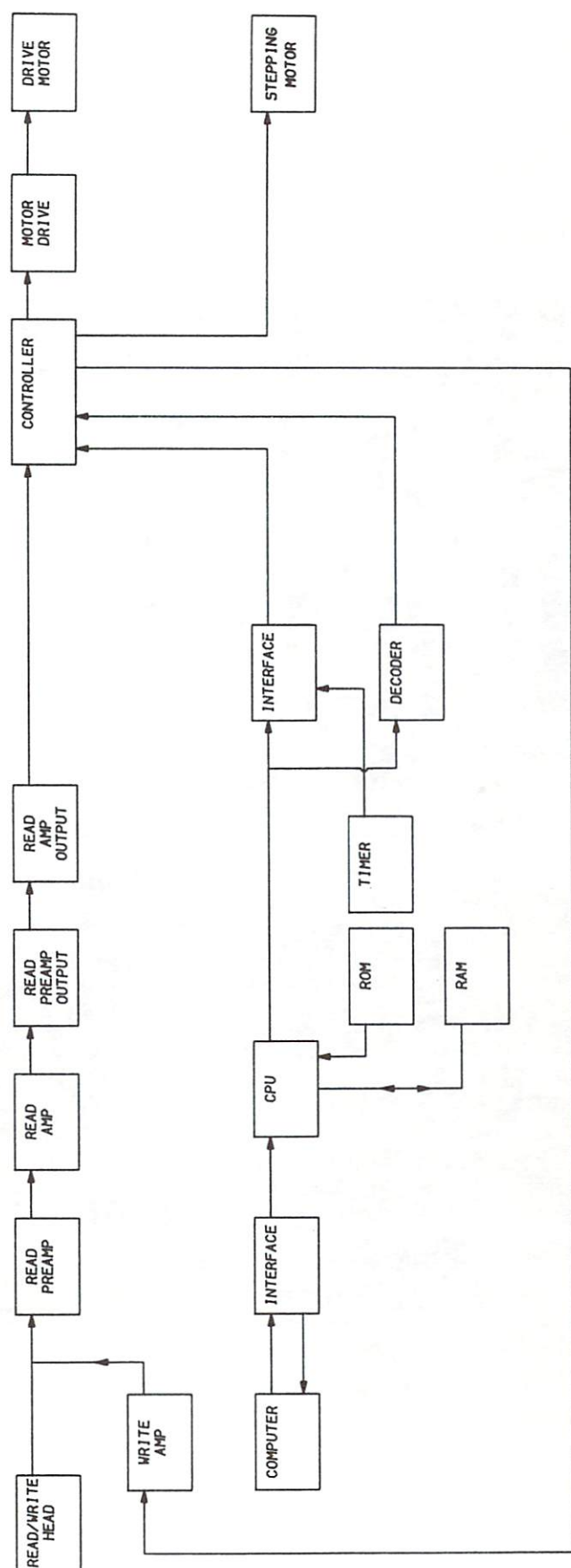


ALPS MECHANICAL-TOP VIEW



ALPS MECHANICAL-BOTTOM VIEW

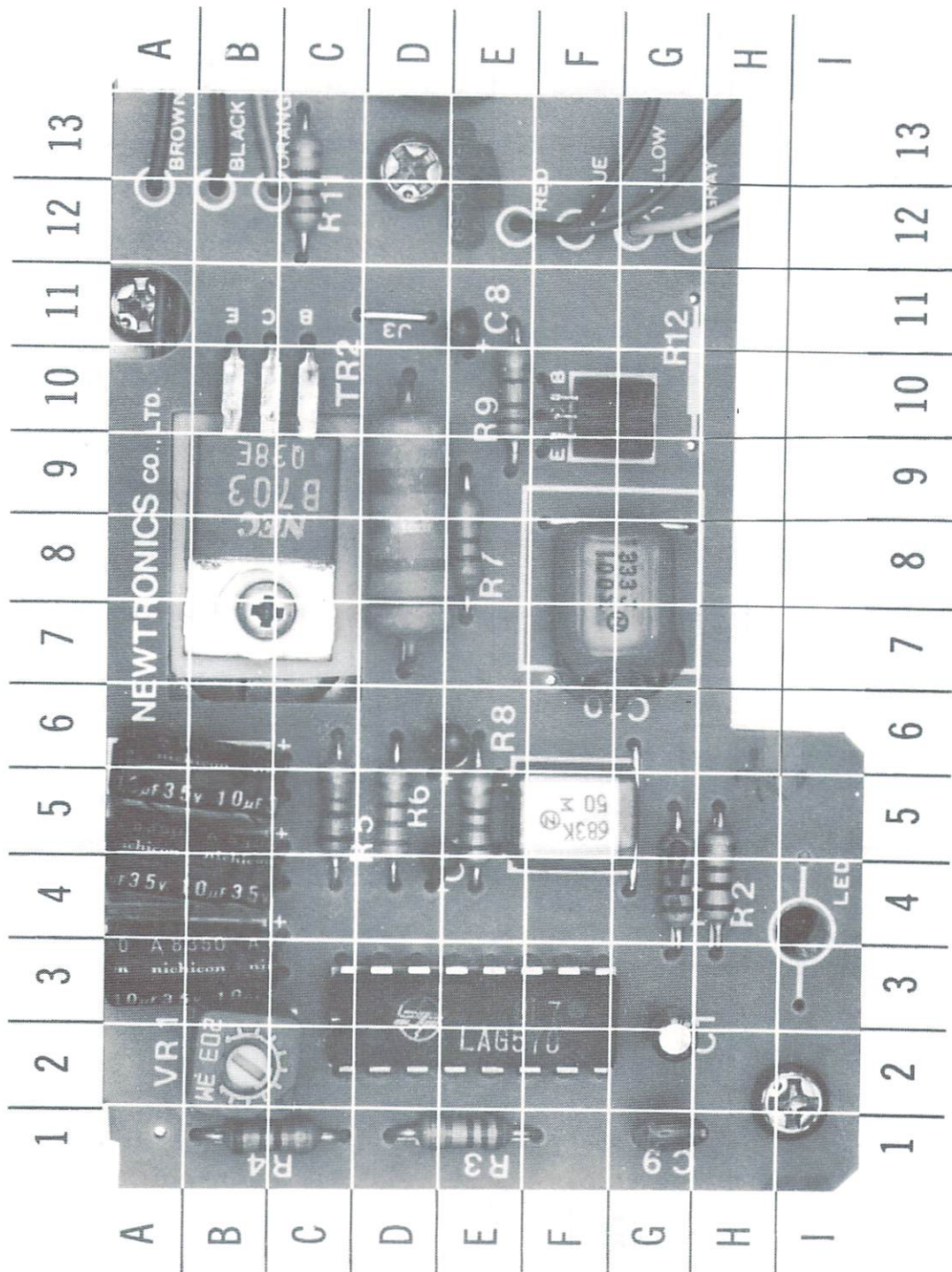
COMMODORE
MODELS VIC-1541, 1541

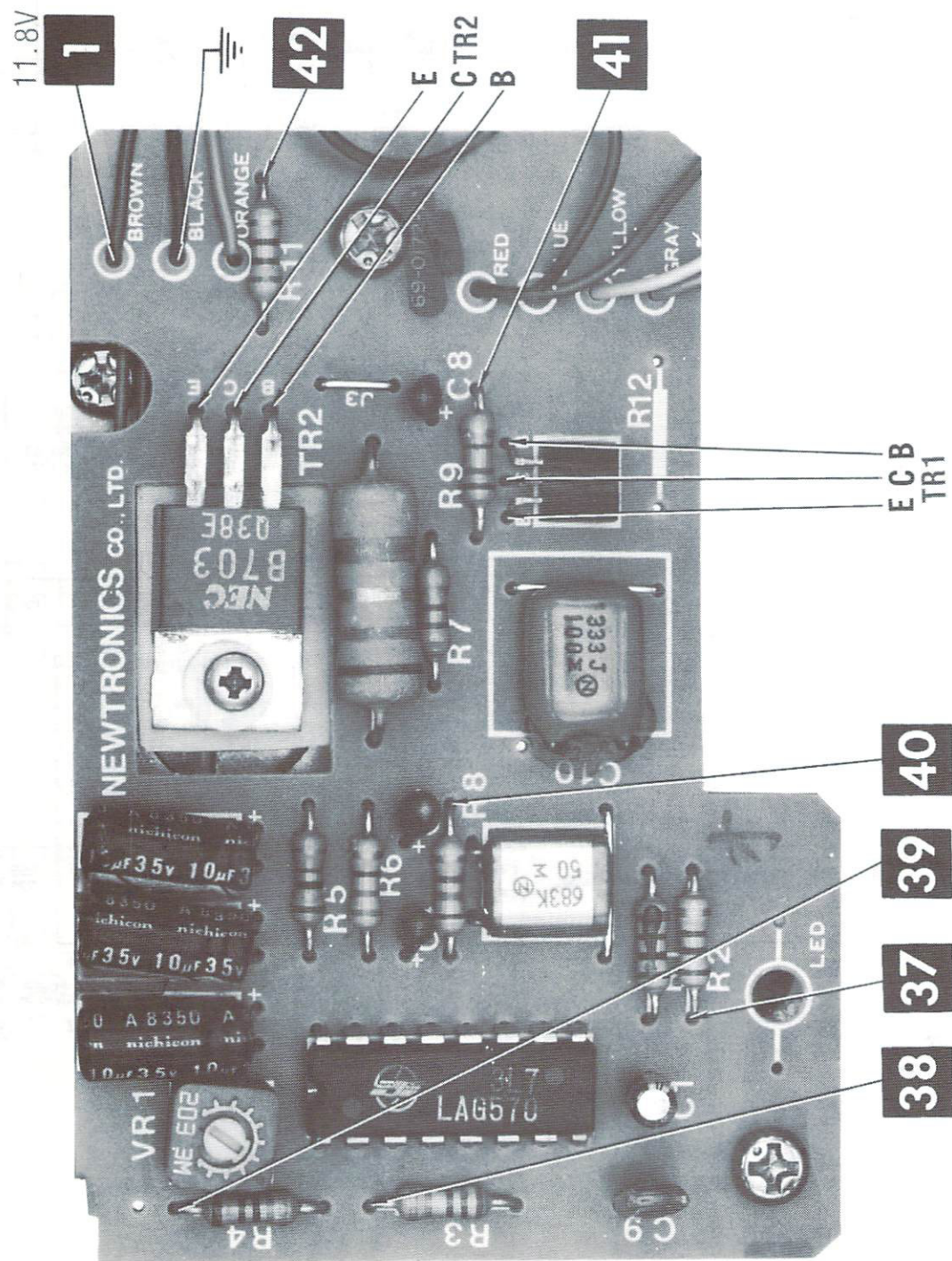


BLOCK DIAGRAM

NEWTRONICS GridTrace LOCATION GUIDE

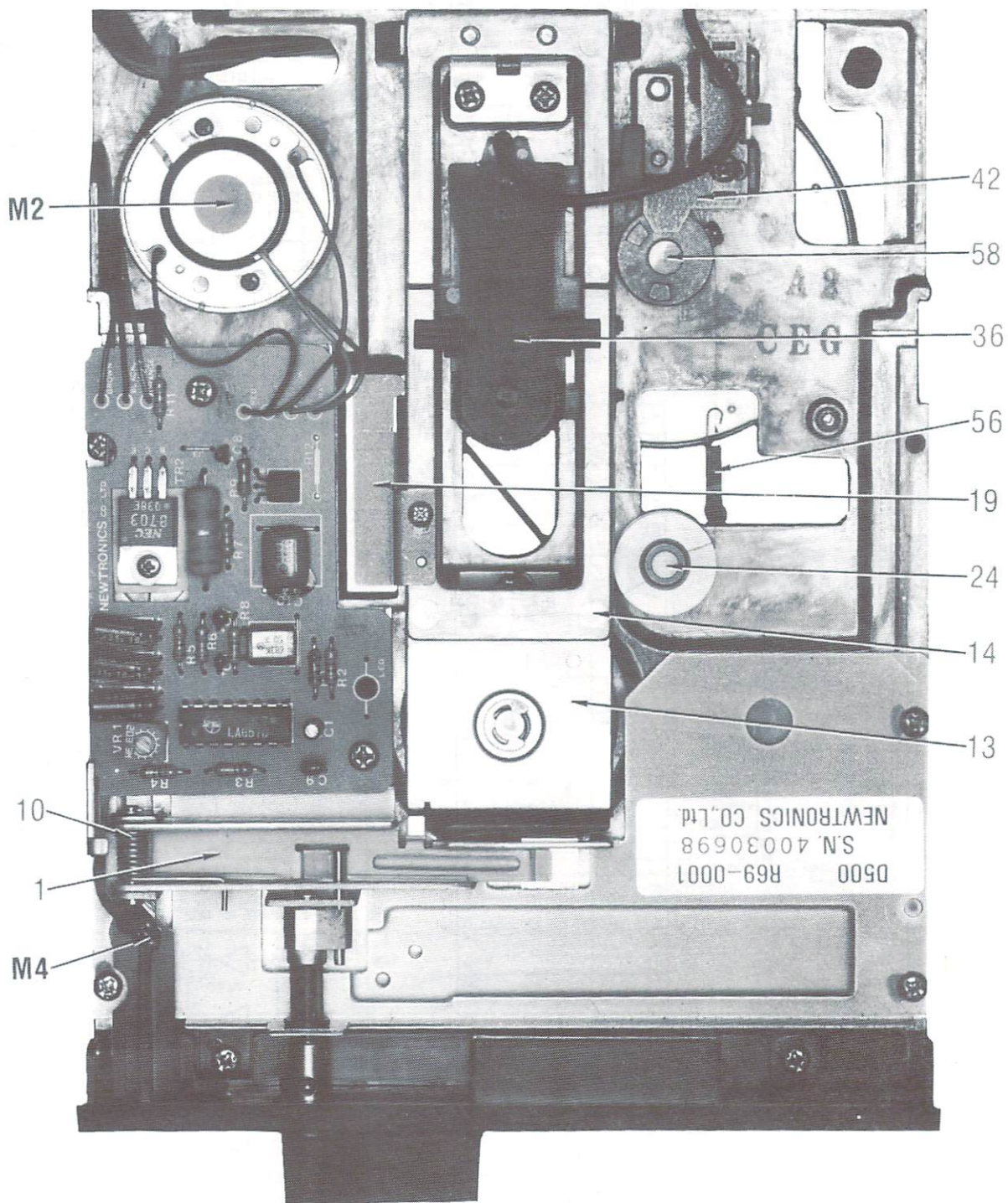
C1	G-2	C6	F-5	IC1	E-3	R5	C-5	R10	D-8
C2	B-3	C7	E-6	R1	G-4	R6	D-5	R11	C-12
C3	B-4	C8	E-11	R2	H-4	R7	E-8	IR1	F-10
C4	D-5	C9	G-1	R3	E-1	R8	E-5	IR2	B-9
C5	A-5	C10	G-7	R4	B-1	R9	E-10	VR1	B-2





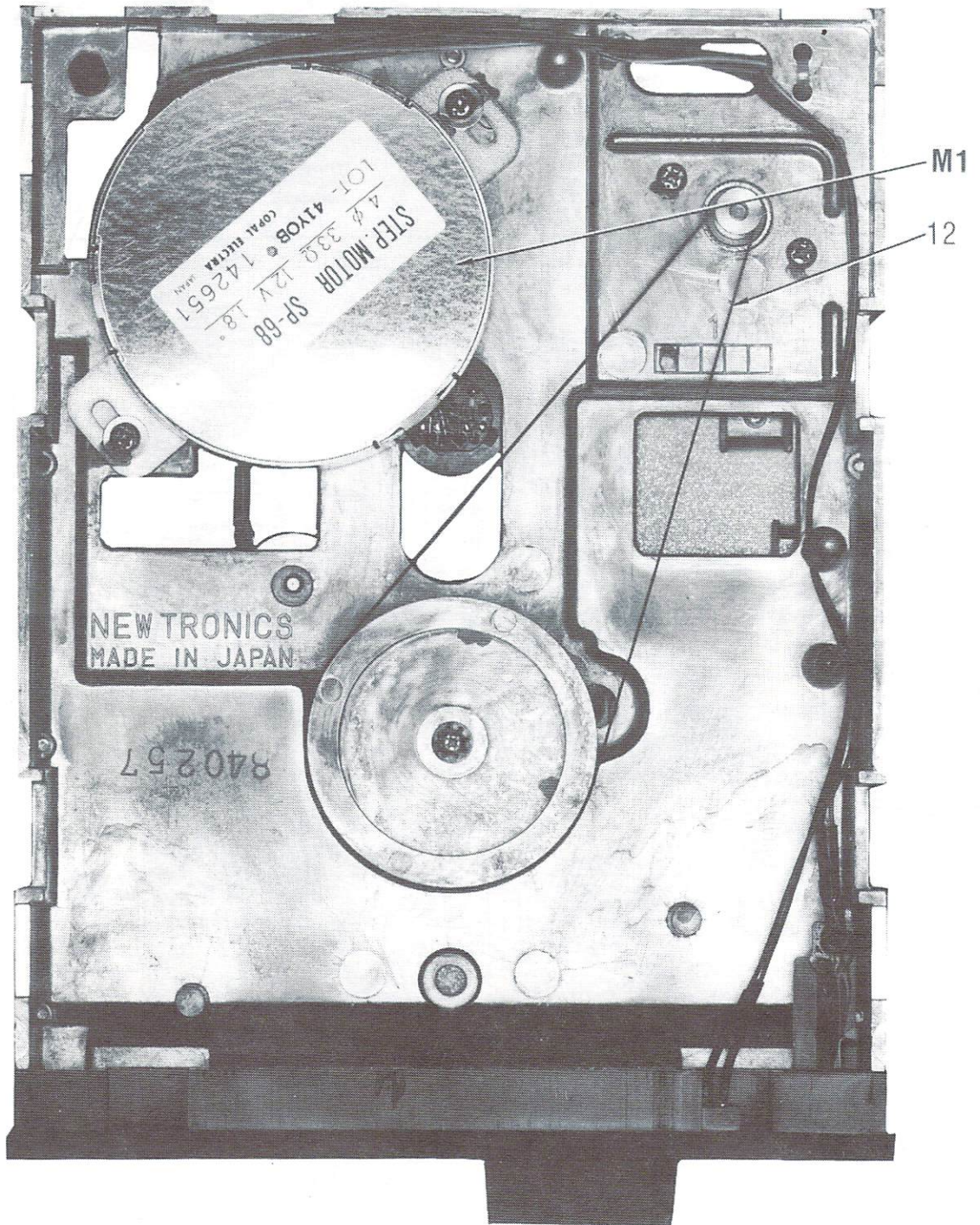
NEWTRONICS MOTOR CONTROL BOARD

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NEWTRONICS MECHANICAL-TOP VIEW



NEWTRONICS MECHANICAL-BOTTOM VIEW

