SAMS

CD12 08983

COMPUTERFACTS™

TECHNICAL SERVICE DATA

COMMODORE®
MODEL 1571
DISK DRIVE

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

PRELIMINARY SERVICE CHECKS

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

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

Always turn the Disk Drive off before connecting or disconnecting connectors or boards.

Disconnect all external peripherals from Disk Drive to eliminate possible external malfunctions.

Replacement or repair of the Power Supply, Disk Drive Board or Connectors may be necessary after the malfunction has been isolated.

CD12 COMMODORE MODEL 1571

TEST EQUIPMENT AND TOOLS

TEST EQUIPMENT

Digital Volt/Ohm Meter
Logic Probe
Frequency Counter
Disk Drive Tester or Test Program

TOOLS

Head Cleaning Equipment
Contact and Switch Cleaner (non spray type)
Phillips Screwdriver
Flat Blade Screwdriver
IC Insertion and Removal Tools 20, 24 and 40 pin 14, 16
Low Wattage Soldering Iron
Desoldering Equipment

REPLACEMENT PARTS

Item	Description
F101	Fuse 2A
M1	Head Position Motor
Y1	16MHz Oscillator Module

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

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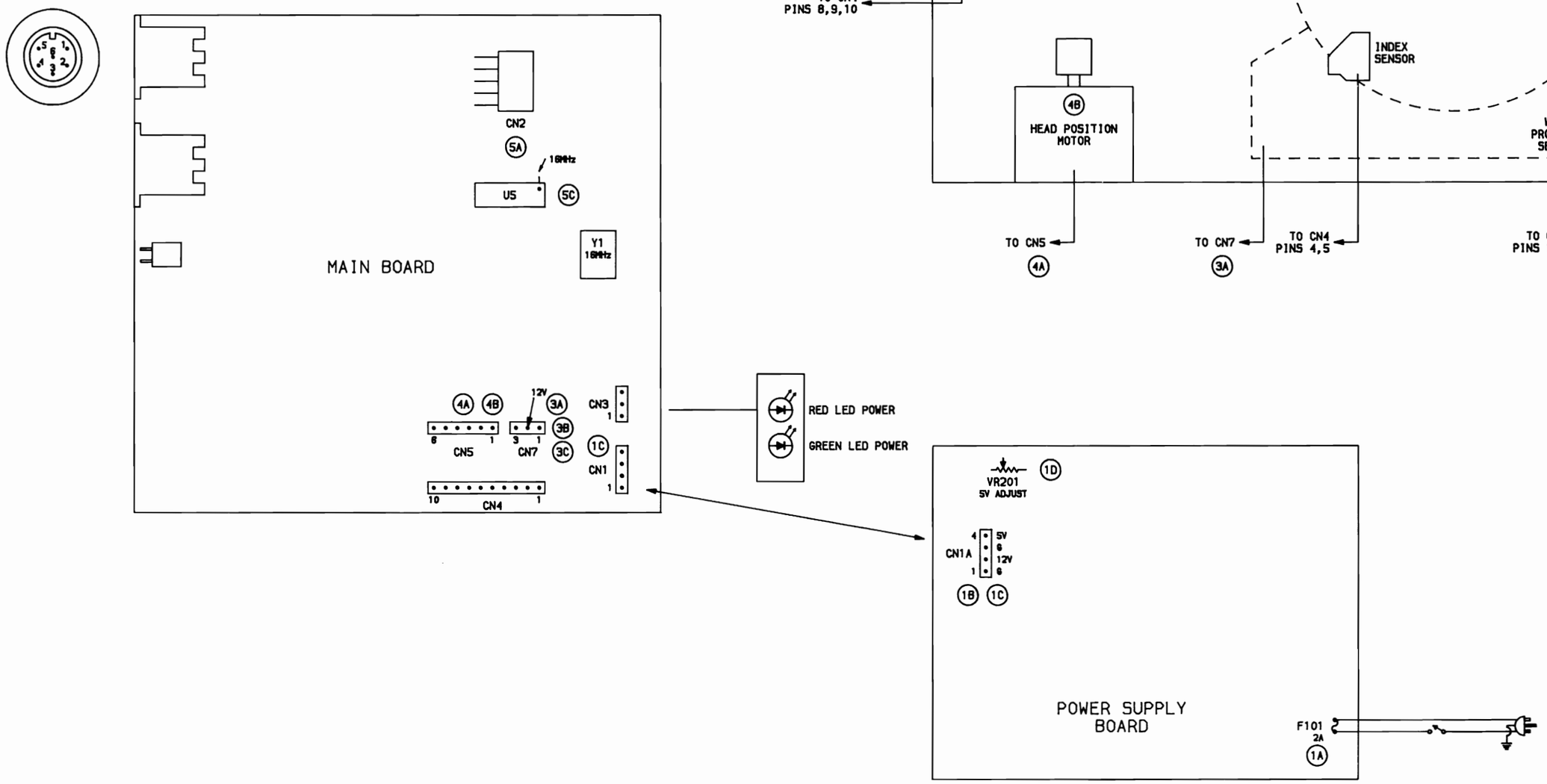


INTERCONNECTING DIAGRAM

II

INTERCONNECTING DIAGRAM

PRELIMINARY SERVICE CHECKS (Continued)

SERVICE CHECKS

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

(1) DISK DRIVE DEAD

(A) Check Fuse F101. If Fuse is bad, replace or troubleshoot Power Supply.

(B) If Fuse is good, check for 12.0V at pin 2 and 5.0V at pin 4 of Connector CN1A. If voltages are missing, troubleshoot Power Supply.

(C) If voltages are present, check Connectors CN1 and CN1A for good connections.

(D) If 5V Source is not correct, check adjustment of 5V Adjust Control (VR201), see "Miscellaneous Adjustments."

(2) DRIVE OPERATION IS ERRATIC

(A) Clean Head with a cotton swab or lint free cloth dampened with 91% isopropyl alcohol.

NOTE: Head cleaning diskettes are not recommended because they may be too abrasive.

(B) Check Spindle Speed Control (VR1) adjustment, see "Miscellaneous Adjustments".

(3) DRIVE MOTOR NOT WORKING

(A) Check Connector CN7 for good connections.

(B) Check for 12V at pin 2 of Connector CN7. If 12V is missing refer to "Power Supply" section.

(C) If 12V is present at Connector CN7, connect a jumper from pin 3 of Connector CN7 to ground. The drive motor should start running. If motor does not start running, troubleshoot Motor Control Board. If motor does start running, troubleshoot the Main Board.

(4) HEAD POSITION MOTOR INOPERATIVE

(A) Check Connector CN5 for good connections.

(B) Disconnect Connector CN5 and check for 75 ohms between pin 1 and each of pins 3, 4, 5 and 6. If resistance readings of the Head Position Motor (M1) are not correct, replace Motor.

(5) READ/WRITE FUNCTION INOPERATIVE

(A) Check Head Connector CN2 for good connections.

(B) Check resistance of the Read/Write sections of both Heads, Head 0 and Head 1. Check for a resistance of about 11 ohms between pins 2 and 4, 4 and 10, 4 and 6, 1 and 3, 3 and 9 and between pins 3 and 5 of Connector CN2.

(C) Check for 16MHz at pin 1 of IC U5. If frequency is not correct check Oscillator Module (Y1).

PRELIMINARY SERVICE CHECKS (Continued)
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 (Green) (CR98) 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,E$,T,S
30 PRINT "ERROR #";EN,E$
40 PRINT "TRACK #";T,"SECTOR #";S
50 CLOSE 15
```

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.

MISCELLANEOUS ADJUSTMENTS

DISK DRIVE DEVICE NUMBER

Number 8 used in Load and Save procedure is device number assigned to Disk Drive. Device number can be set to any number from 8 to 11 by setting two Switches on back of Disk Drive. Use chart to select device number. Note: Left and right viewed from rear of drive.

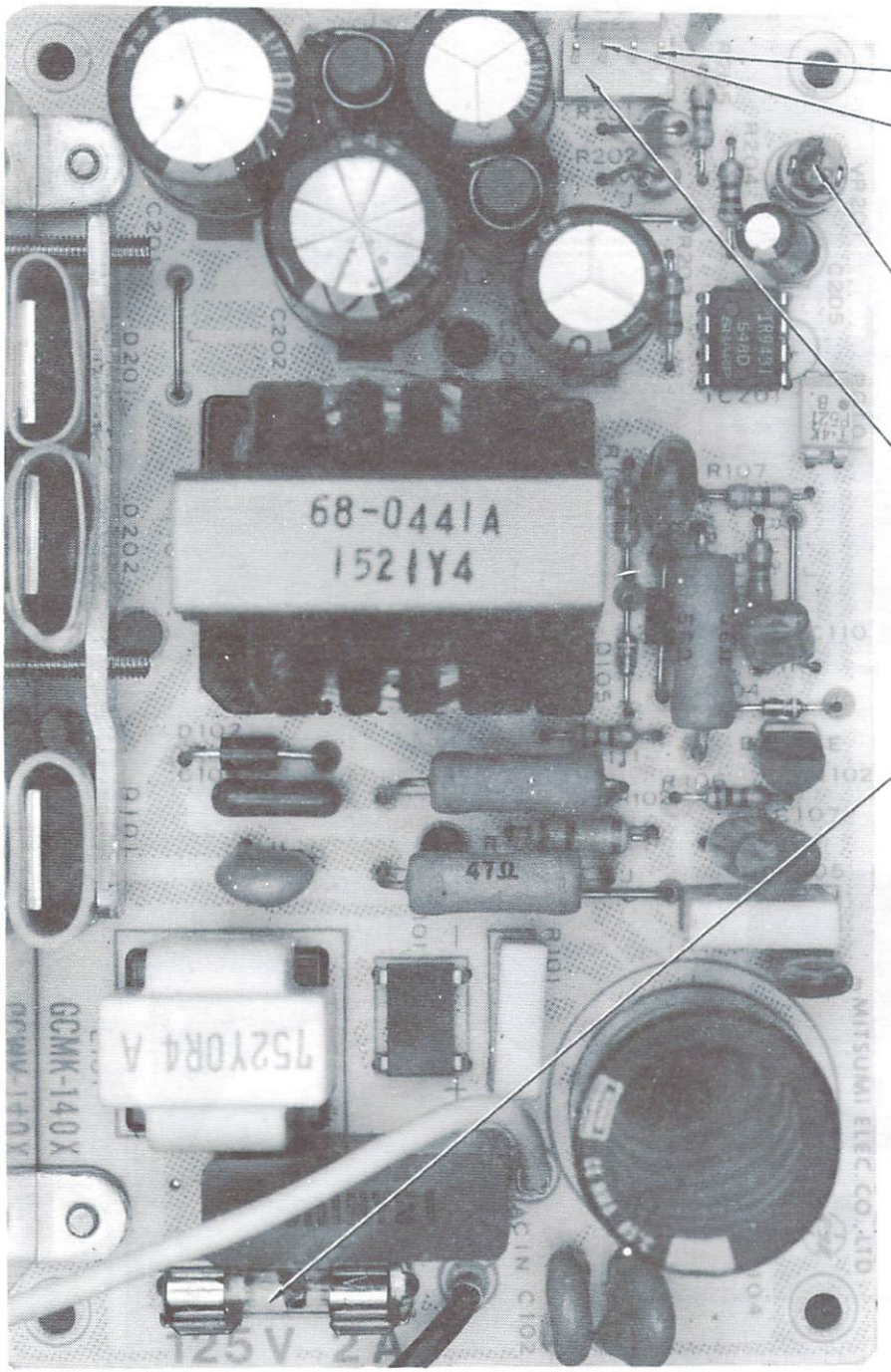
Device Number	Left Switch	Right Switch
8	UP	UP
9	DOWN	UP
10	UP	DOWN
11	DOWN	DOWN

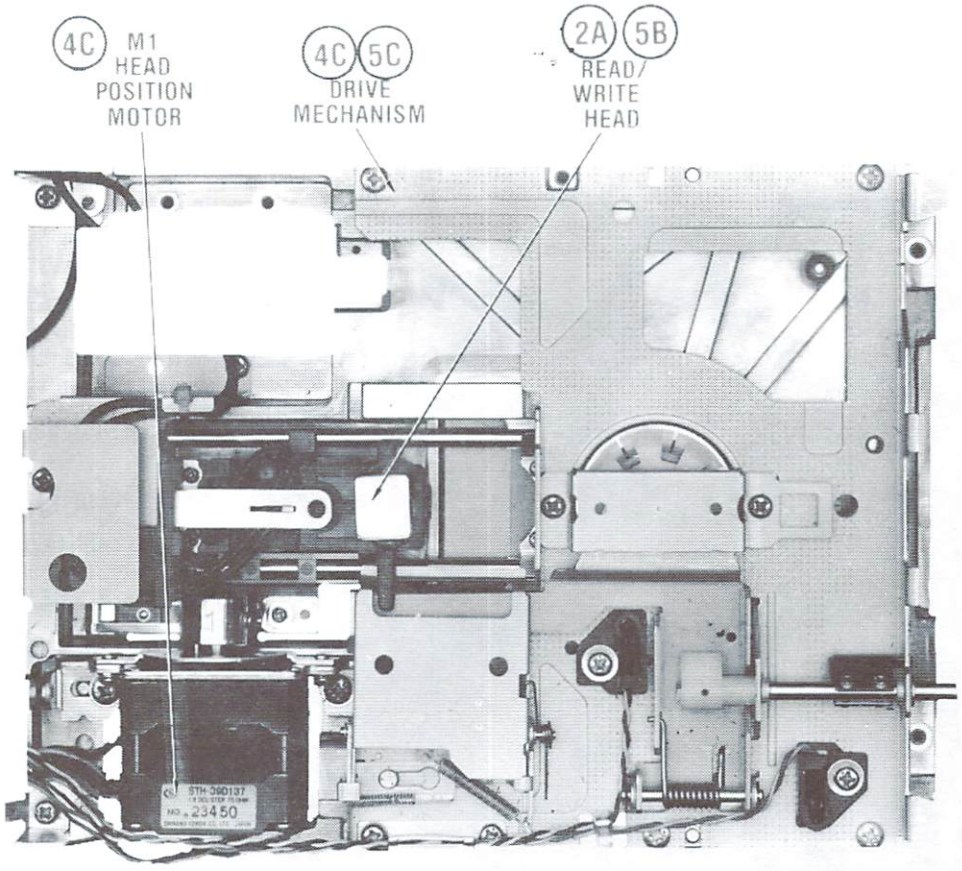
VOLTAGE ADJUSTMENT

Connect positive lead of voltmeter to 5.0V Source (pin 4 of Connector CN1), negative lead to ground. Turn Disk Drive On. Adjust 5V Adjust Control (VR201) for 5.0 volts.

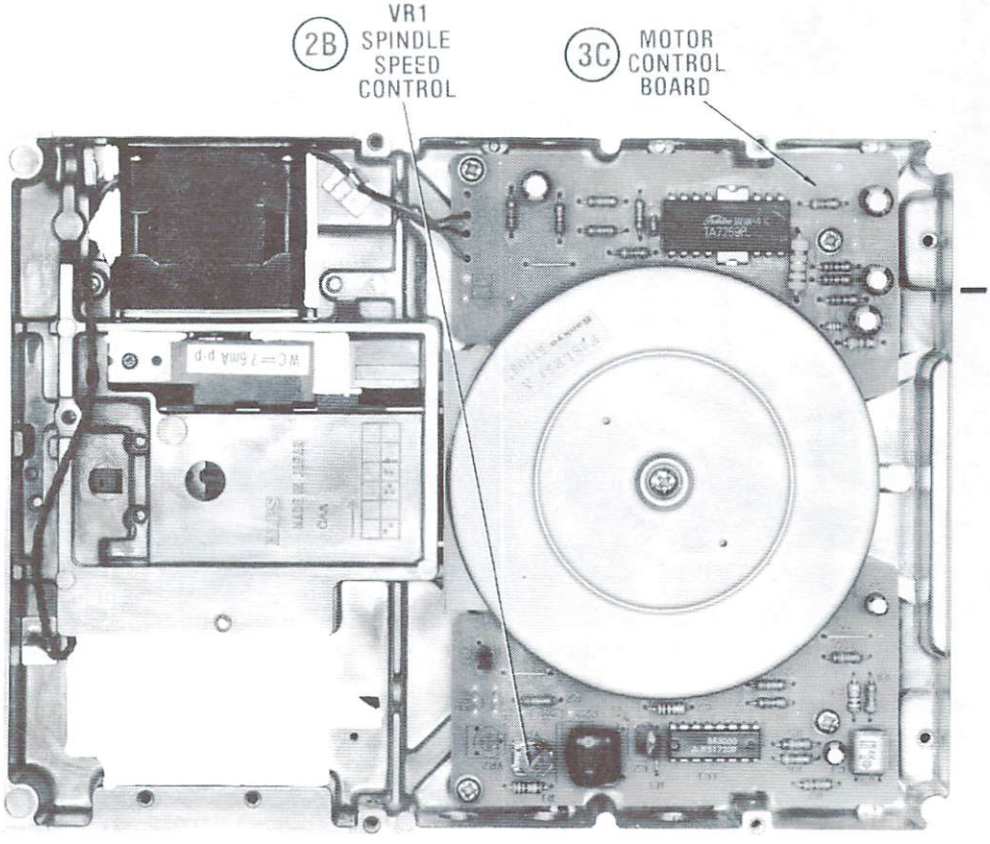
HEAD CLEANING INSTRUCTIONS

Use a lint free cloth or swab dampened with 91% isopropyl alcohol to clean the disk drive heads and dry with a lint free cloth.


5V
1B
12V
5V
ADJUST
VR201
1D
CN1A
1C
F101
1A
68-0441A
GCMK-140X
125V 2A

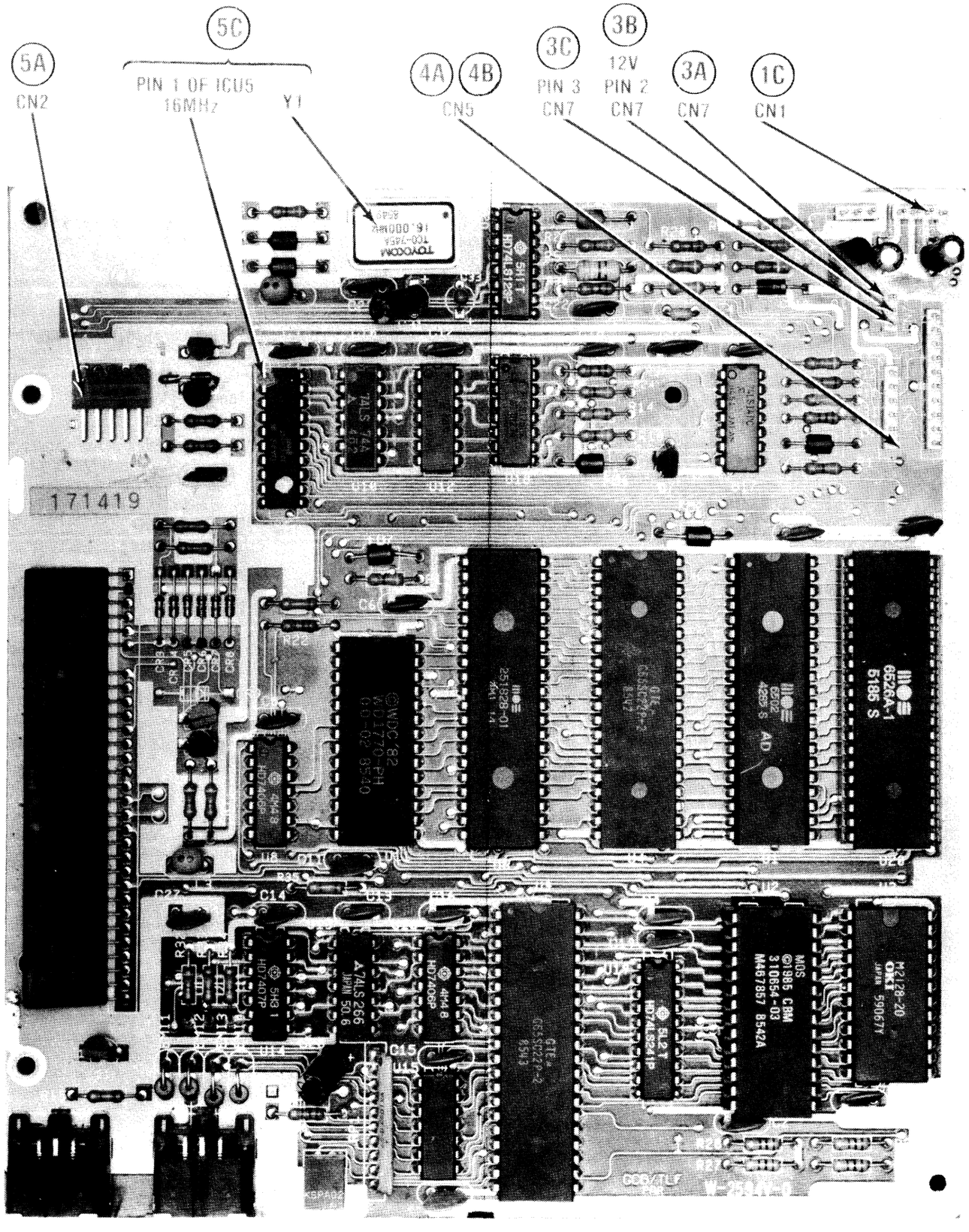


CHASSIS - TOP VIEW



CHASSIS - BOTTOM VIEW

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 mantain a smoke-free area around the Computer. Do not block cabinet vents of Computer, Monitor, Printer, or other power devices.

ELECTRICAL POWER

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

KEYBOARD

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

DISK DRIVES

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

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

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

PRINTERS

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

STATIC ELECTRICITY

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

MONITOR

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

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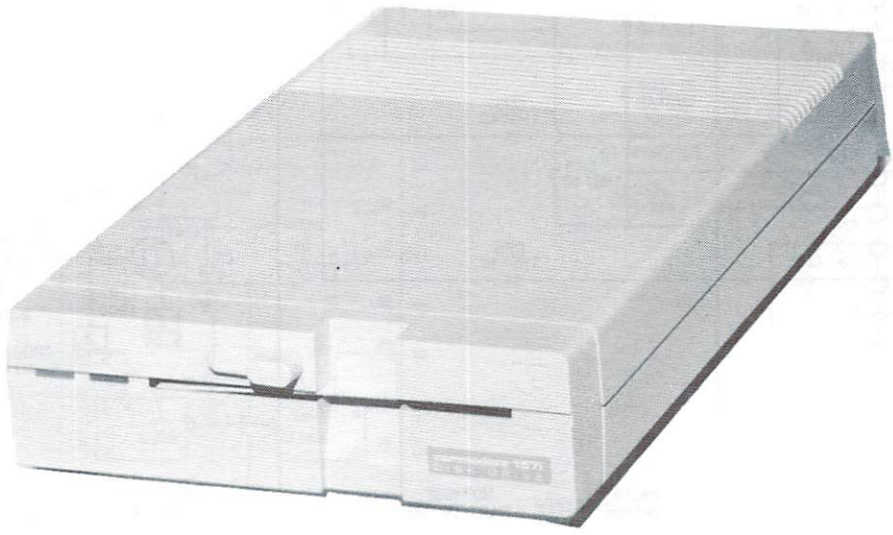

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SAFETY PRECAUTIONS

See Page 25

PRELIMINARY SERVICE CHECKS

ENCLOSED

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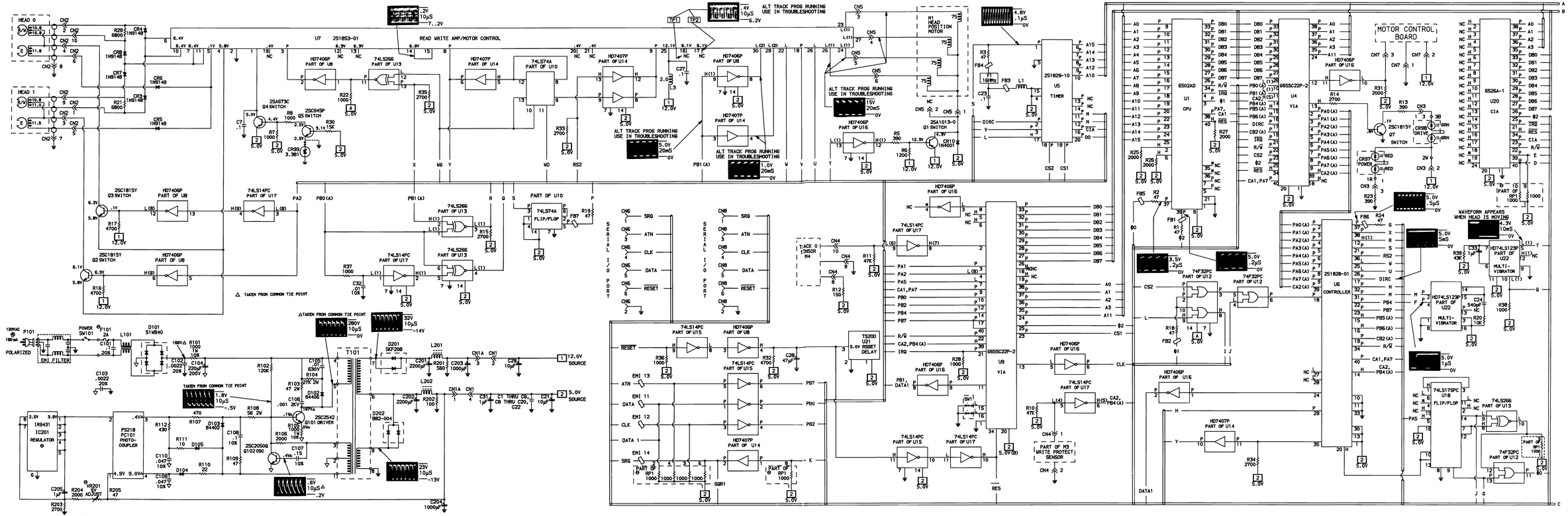
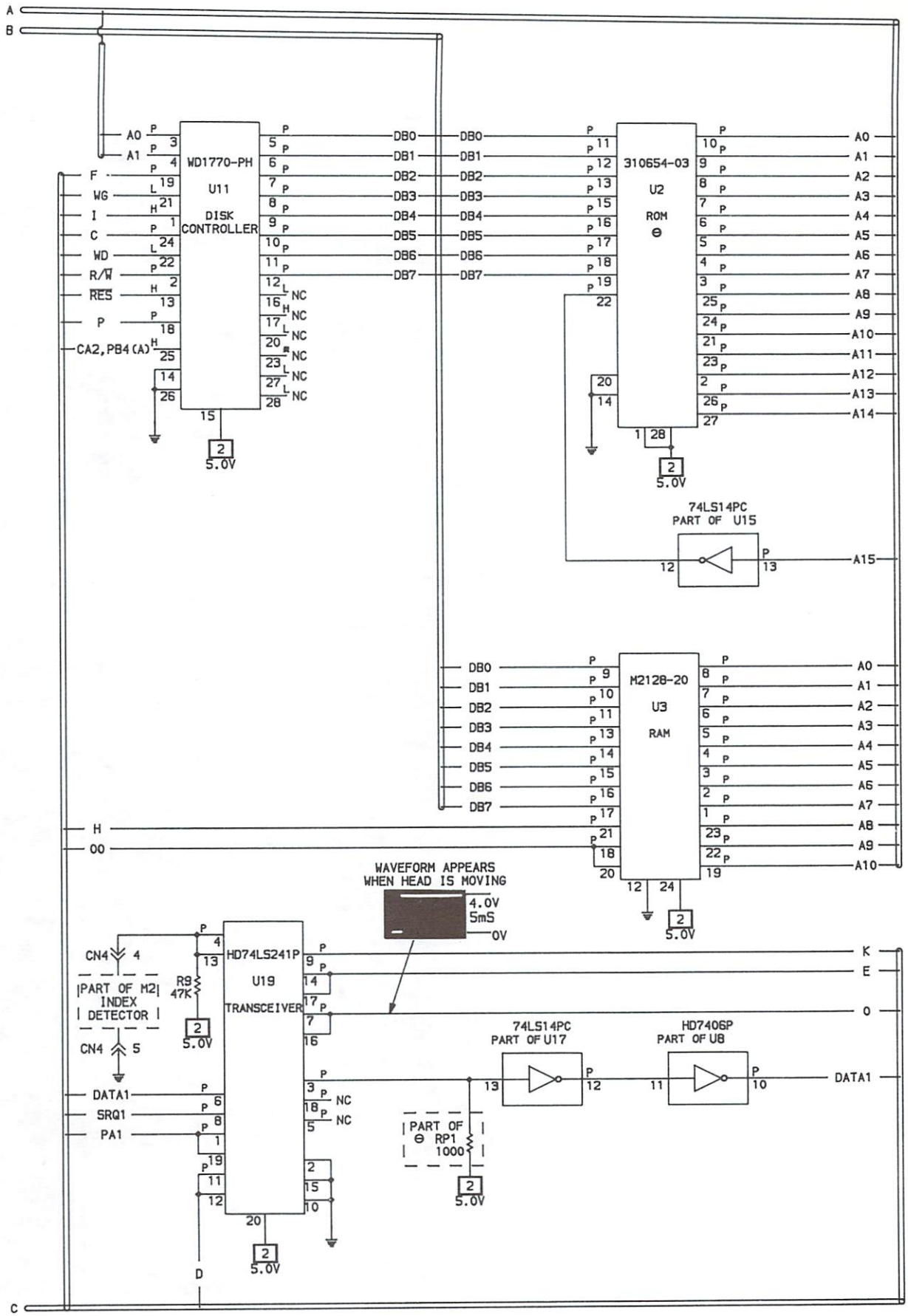


COMMODORE
MODEL 1571



A PHOTOFACT STANDARD NOTATION SCHEMATIC
WITH CIRCUITRACE®

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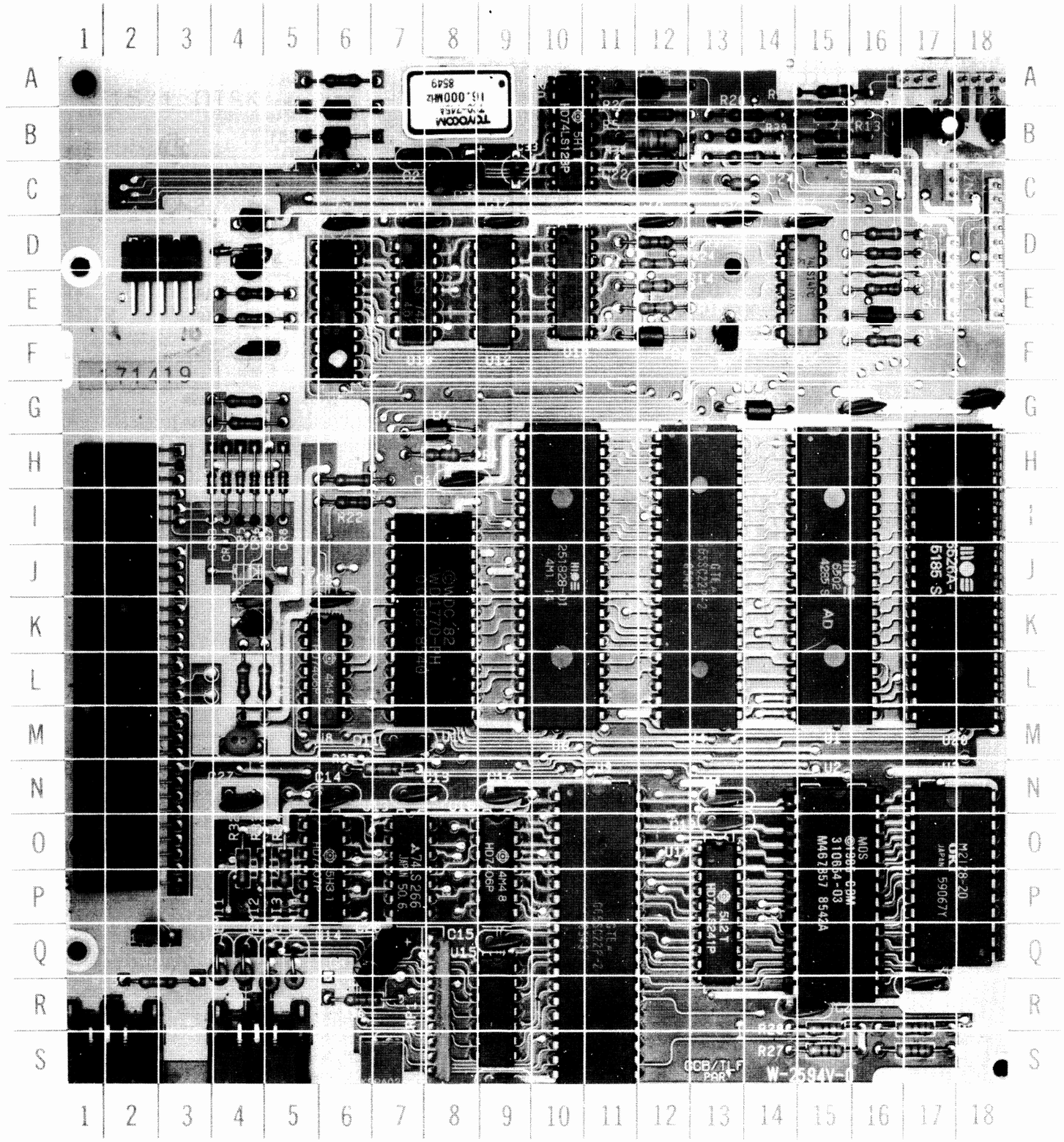

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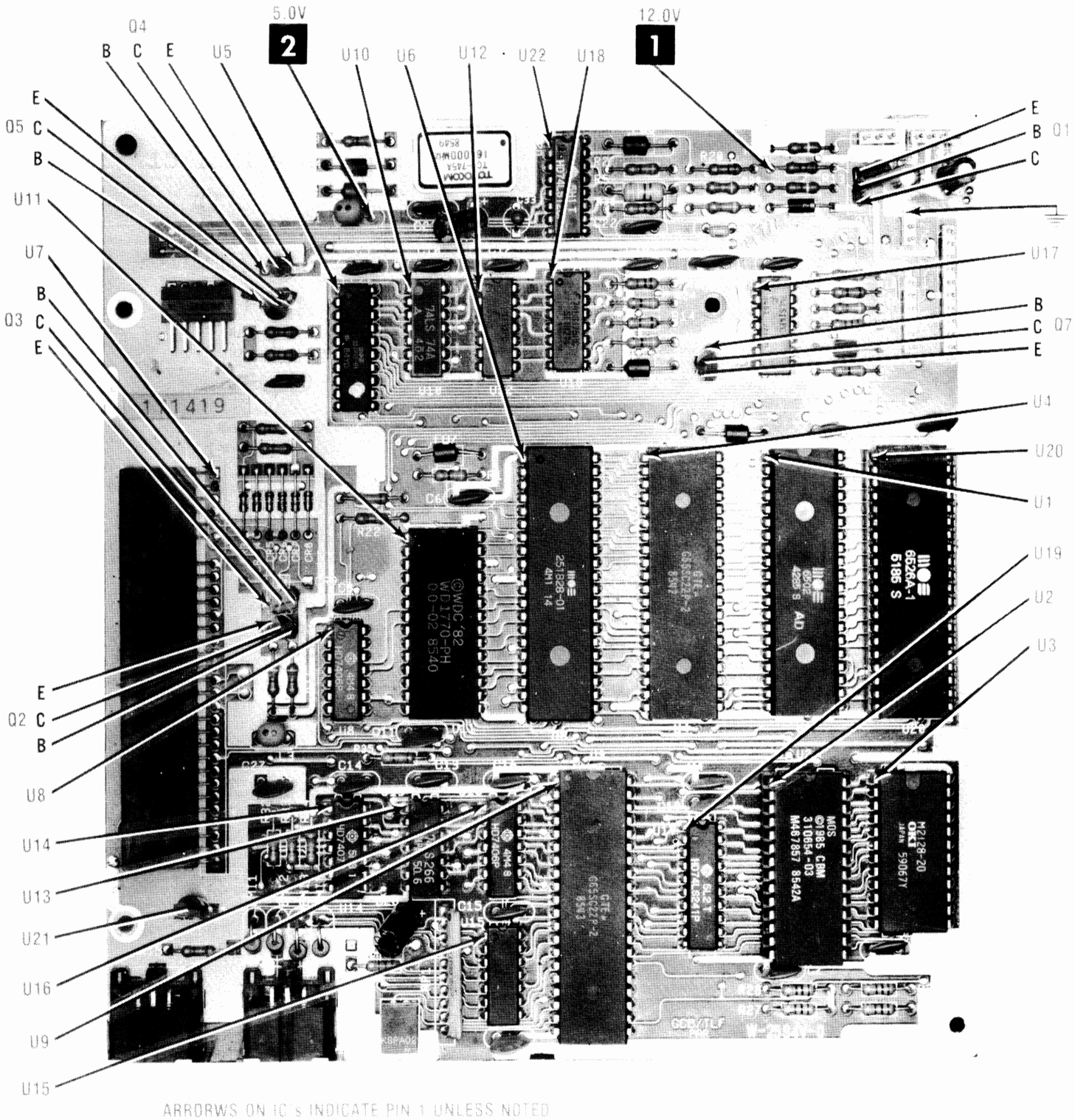
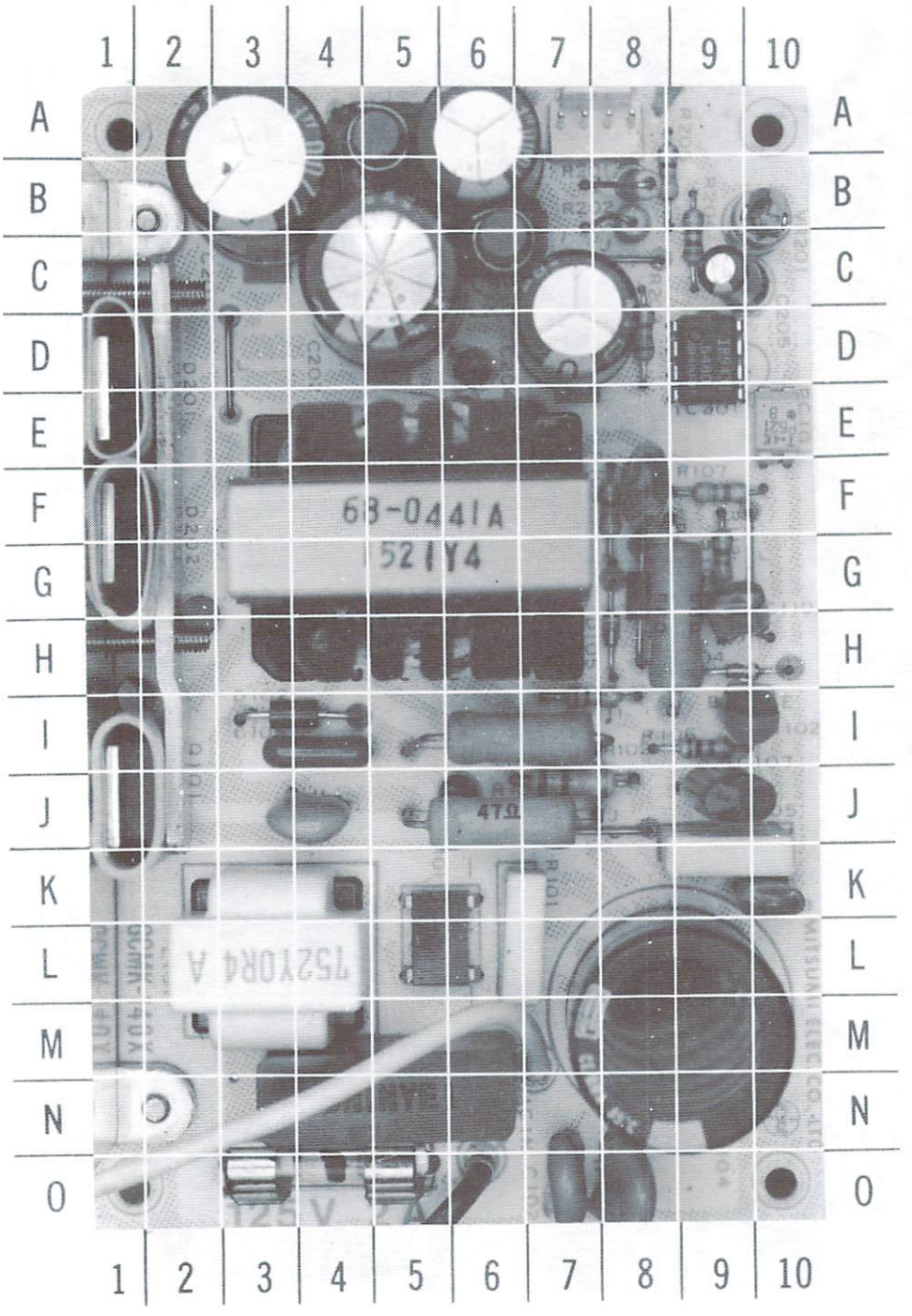
MAIN BOARD GridTrace LOCATION GUIDE

C1	G-16
C2	R-15
C3	R-17
C4	N-13
C5	D-6
C6	H-8
C7	F-4
C8	K-6
C9	S-9
C10	D-7
C11	M-7
C12	D-9
C13	N-7
C14	N-6
C15	Q-9
C16	N-9
C17	D-15
C18	D-12
C19	O-13
C20	G-18
C21	B-17
C22	C-12
C23	B-8
C24	C-14
C27	N-4
C28	Q-7
C29	B-18
C31	C-8
C32	C-13
C33	C-9
CN1	A-18
CN2	D-3
CN3	A-17
CN4	D-18
CN5	E-17
CN6	S-4
CN7	C-17
CN8	S-2
CR3	H-3
CR4	H-4
CR5	H-4
CR6	H-4
CR7	H-5
CR8	H-5
CR10	B-15
CR99	D-4
EMI11	Q-4
EMI12	Q-4
EMI13	R-5
EMI14	R-5
FB1	E-16
FB2	G-14
FB3	B-6
FB4	B-6
FB5	A-12
FB6	F-12
FB7	G-8
L1	B-6
L3	M-4
Q1	B-17
Q2	K-4
Q3	J-4
Q4	D-4
Q5	D-4
Q7	F-13
R1	F-16
R2	B-12
R3	A-6
R5	B-12
R6	B-15
R7	E-4
R8	E-4
R9	D-16
R10	B-14
R11	E-16
R12	D-16
R13	B-15
R14	E-12
R15	R-2
R16	L-4
R17	L-5
R18	E-12
R19	H-8
R20	B-14
R21	G-4
R22	I-6
R23	A-15
R24	D-12
R25	R-17
R26	S-17
R27	S-17
R28	R-15
R29	E-4
R30	H-6
R31	E-16
R32	O-4
R33	O-4
R34	O-5
R35	N-7
R36	R-6
R37	D-12
R38	B-12
R39	B-14
RP1	R-8
SW1	O-7
U1	J-15
U2	P-15
U3	O-17
U4	J-13
U5	E-6
U6	J-10
U7	K-2
U8	L-6
U9	P-11
U10	E-7
U11	K-8
U12	E-9
U13	O-7
U14	O-6
U15	R-9
U16	O-9
U17	E-15
U18	E-10
U19	P-13
U20	J-18
U21	Q-2
U22	B-10
Y1	A-8



ARRORWS ON IC s INDICATE PIN 1 UNLESS NOTED



C101	N-5
C102	O-7
C103	O-8
C104	M-9
C105	I-4
C106	J-4
C107	J-9
C108	F-8
C109	K-10
C110	G-9
C201	B-3
C202	C-5
C203	A-6
C204	D-7
C205	C-9
CN1A	A-8
D101	L-5
D102	I-4
D103	G-8
D104	H-9
D105	H-8
D201	D-1
D202	F-1
F101	O-4
IC201	D-9
L101	L-3
L201	A-5
L202	C-6
PC101	E-10
Q101	J-1
Q102	I-10
R101	L-7
R102	J-7
R103	J-6
R104	I-7
R105	K-9
R106	I-9
R107	F-9
R108	H-9
R109	F-8
R110	G-9
R111	I-7
R112	G-9
R201	B-8
R202	B-8
R203	D-8
R204	C-9
R205	B-9
T101	F-5
VR201	B-10

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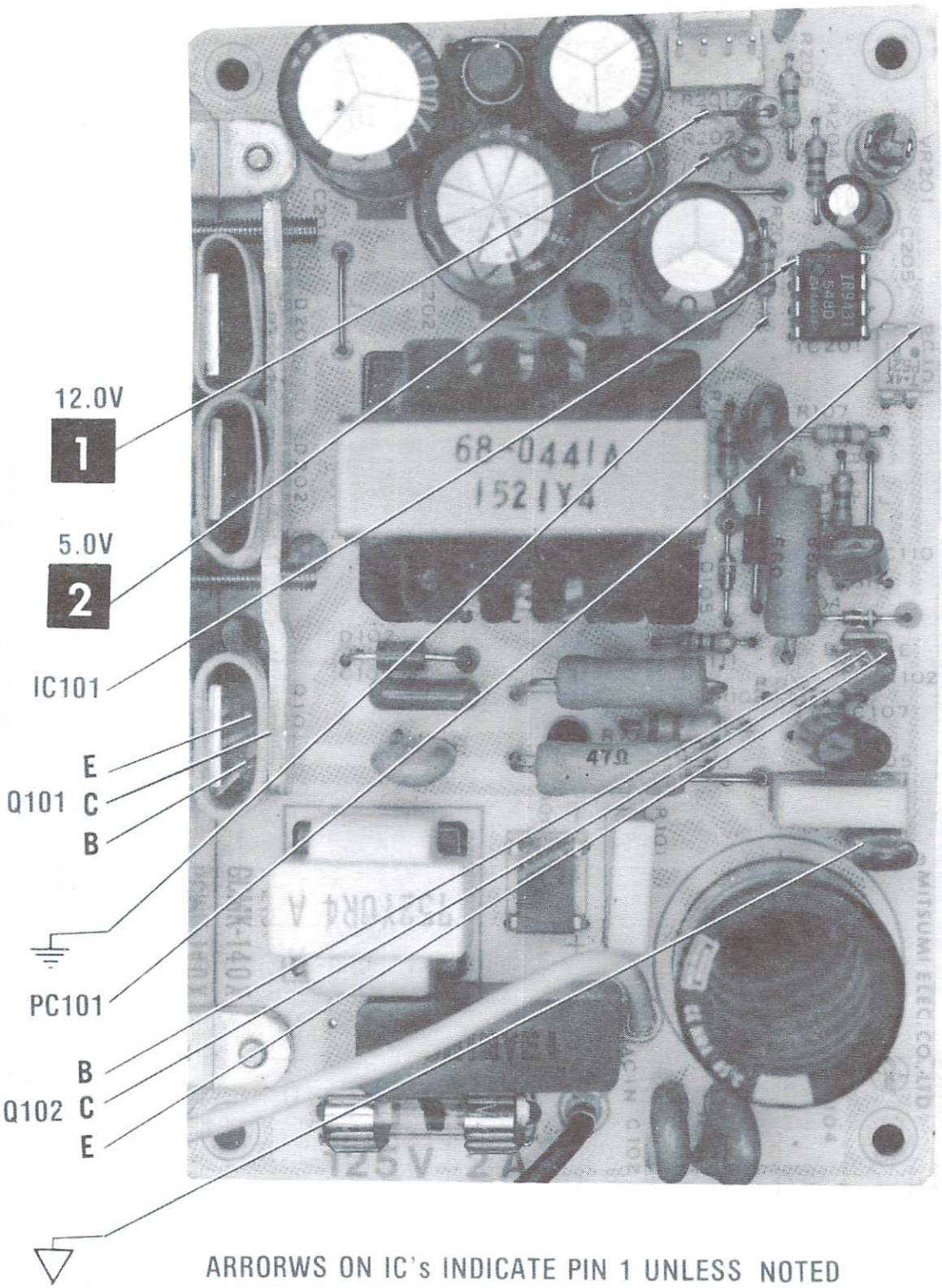


POWER SUPPLY BOARD

A Howard W. Sams CIRCUITRACE® Photo

ALIGNMENT

ALIGNMENT TEST SETUP

NOTE: Use a Dysan Analog Alignment Diskette 208-10 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.

```
10 OPEN 15,8,15,"I"
20 OPEN 8,8,8"#"
30 PRINT "TYPE 99 TO EXIT"
40 INPUT "TRACK";T
50 IF T = 99 THEN 90
60 T = T + 1
70 PRINT#15,"U1:"8,0,T,0
80 GOTO 30
90 CLOSE 15: CLOSE 8
```

NOTE: Do not put any spaces in line 70.

Turn Disk Drive On. Run above program and step head to specified track with NO diskette in Disk Drive. The Disk Drive will try to find the track, then it will go back to Track 00 and pause. It will then go to the track specified and stop. After Disk Drive stops, insert Alignment Diskette into Disk Drive and close door. Connect a jumper from pin 3 of Plug CN7 to ground to keep Disk Drive running and perform alignment procedure. Whenever head must be set to a different track, remove jumper from pin 3 of Plug CN7 to stop Disk Drive, and remove Alignment Diskette. NOTE: If program does not work after removing diskette, type 99 to stop program, then type RUN to start program.

SPINDLE SPEED ADJUSTMENT

Center and paste strobe pattern, see Figure 1 on Drive Motor on bottom of Disk Drive. Insert a diskette into Drive and close Drive door. Load a program from diskette or connect a jumper from pin 3 of Connector CN7 to ground to turn the motor On. Use outer section of pattern if 60Hz AC power is being used and inner section of pattern if 50Hz AC power is being used. Use a fluorescent light to view pattern and adjust Speed Control (VR1) until pattern appears to stand still.

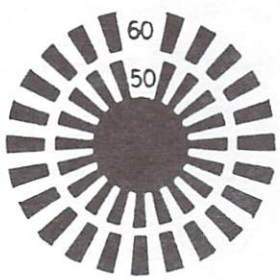


Figure 1

RADIAL HEAD ALIGNMENT

Connect channel A input of a dual trace scope to TP1 (pin 16 of IC U7) and channel B input to TP2 (pin 17 of IC U7). Set scope for external trigger mode and connect external trigger input to pin 4 of Transceiver IC (U4). Set scope to positive trigger slope, add mode with channel B inverted, sweep time to 20mSec, voltage to .2V/cm range and scope inputs to AC input. Set head to Track 16, see "Alignment Test Setup". Insert an Alignment Diskette into Disk Drive and connect a jumper from pin 3 of Connector CN7 to ground to keep Drive running. Observe cats-eye pattern, see Figure 2. The peak to peak amplitude of lobes should be within 70% of each other. If lobes are out of tolerance, loosen two screws holding Head Position Motor (M1) mounting bracket and slide motor forward or backward until lobes are within 90% of each other. Tighten mounting bracket screws.

Remove jumper from pin 3 of Connector CN7. Remove Alignment Diskette from Disk Drive and insert a formatted diskette which as been formatted on a Disk Drive that is in alignment. Use the Track Seek program, see "Alignment Test Setup" section to set head to Track 34 and back to Track 16. Remove formatted diskette and insert Alignment Diskette into Disk Drive. Connect jumper from pin 3 of Connector CN7 to ground and verify lobes are within tolerance when head is On Track 16. Repeat procedure again stepping head to Track 00 and back to Track 16. Check Track 00 Stop and Detector adjustments.

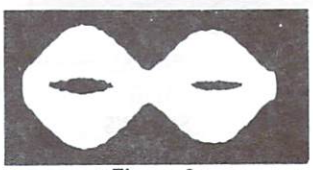


Figure 2

TRACK 00 STOP AND DETECTOR

Check "Radial Head Alignment" before making Track 00 adjustments. Connect input of scope to TP1 (pin 16 of IC U7). Set sweep time to 10μSec and voltage range to .2V. Set head to Track 00, see "Alignment Test Setup". Insert Alignment Diskette and close Drive door. Connect a jumper from pin 3 of Connector CN7 to ground to keep drive running. Verify head is On Track 00 by checking for a 125kHz waveform at TP1, see Figure 3. If 125kHz signal is not present, step head forward or back until 125kHz signal is present.

To check Track 00 Stop Adjustment, manually push head back until Track 00 post on Head Position Motor pulley hits stop. Head should move about .025 inches. If Track 00 stop is out of adjustment, loosen two screws holding Track 00 stop bracket and adjust bracket so head moves .025 inches from Track 00 position or where Track 00 post hits the stop. Tighten Track 00 stop bracket screws.

To check Track 00 Detector Adjustment, connect positive lead of voltmeter to pin 9 of IC U17. Check for 5.0V when head is On Track 00 and .2V when head is On Track 1. If Detector is out of adjustment, set head to Track 00 and looosen screws holding Track 00 Detector bracket. Adjust Track 00 Detector backward until voltmeter indicates .2V, then adjust it forward until voltmeter indicates 5.0V and tighten Track 00 bracket screw.

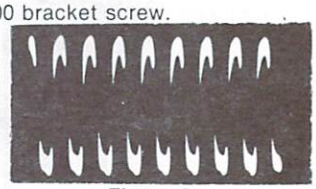


Figure 3

ALIGNMENT (Continued)

INDEX SENSOR ADJUSTMENT

Connect channel A input of a dual trace scope to TP1 (pin 16 of IC U7) and channel B input to TP2 (pin 17 of IC U7). Set scope for external trigger mode and connect external trigger input to pin 4 (index pulse) of Transceiver IC (U4). Set scope to negative trigger slope, add mode with channel B inverted, sweep time to 50μSec, voltage range to .2V/cm and scope input to AC input. Set Drive head to Track 34, see "Alignment Test Setup". Insert Alignment Diskette into drive and close door. Connect jumper from pin 3 of Connector 7 to ground to keep drive running. Confirm timing between start of sweep (negative going edge of index pulse at pin 4 of IC U4) and first pulse of timing burst is 200μSec ± 100μSec, see Figure 5. If timing is not within tolerance, loosen screw holding Index Sensor (M2). Adjust Index Sensor until timing is correct and tighten screw.

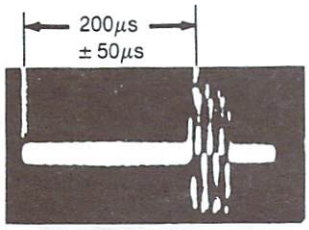


Figure 5

AZIMUTH CHECK

Connect channel A input of a dual trace scope to TP1 (pin 16 of IC U7) and channel B input to TP2 (pin 17 of IC U7). Set scope for external trigger mode and connect external trigger input to pin 4 of Transceiver IC (U4). Set scope to negative trigger slope, add mode with channel B inverted, sweep time to .5mSec, voltage range to .2V/cm and scope inputs to AC input. Set Drive head to Track 34, see "Alignment Test Setup". Insert an Alignment Diskette into drive and close drive door. Connect a jumper from pin 3 of Connector CN7 to ground to keep drive running. Pattern shown in Figure 4 should be displayed on scope.

Amplitude of bursts 1 and 4 must be equal to or less than the amplitude of bursts 2 and 3.

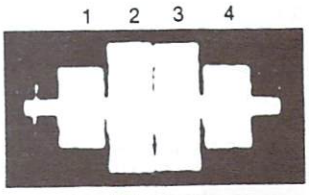
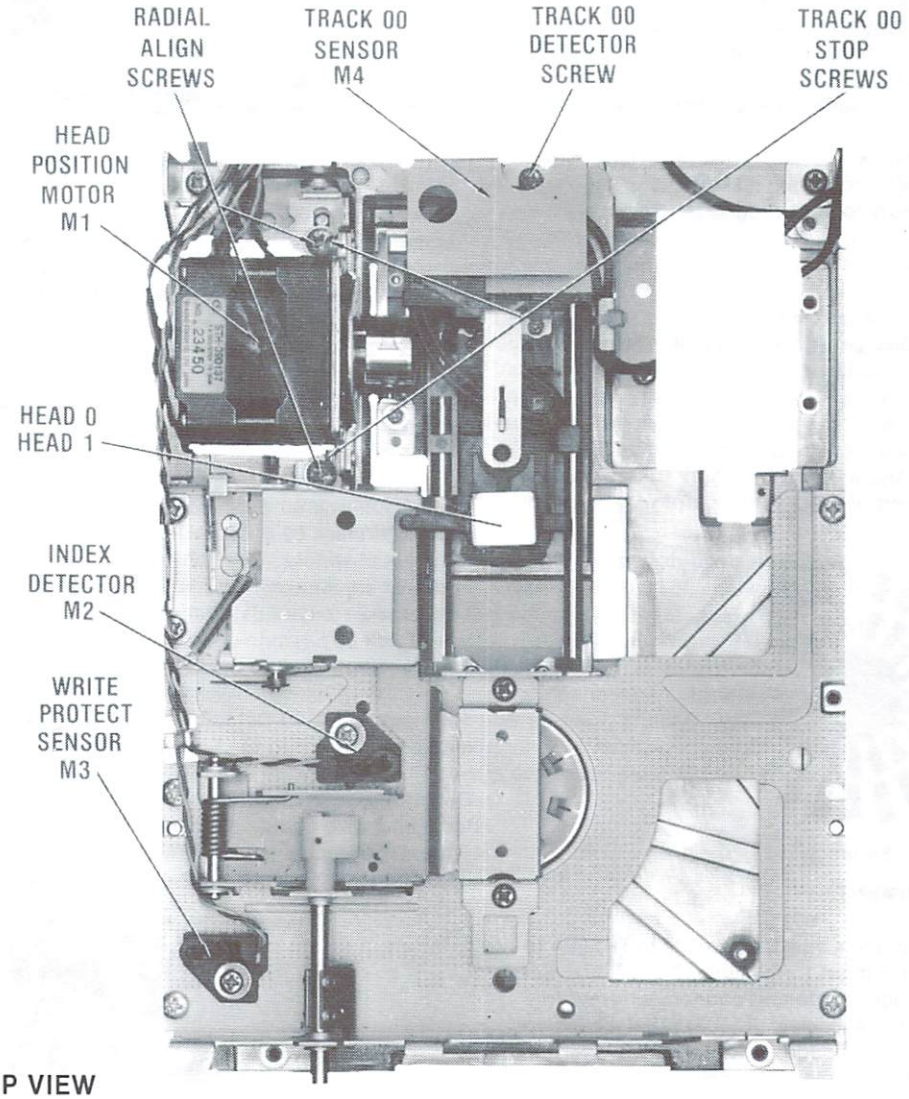


Figure 4



CHASSIS - TOP VIEW

PARTS LIST AND DESCRIPTION

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

SEMICONDUCTORS (Select replacement for best results)

ITEM No.	TYPE No.	MFGR. PART No.	REPLACEMENT DATA				NOTES
			NTE PART No.	ECG PART No.	RCA PART No.	ZENITH PART No.	
	MAIN BOARD						
CR3 thru CR8	1N914B		NTE519	ECG519	SK3100/519	103-131	
CR10	1N4001		NTE116	ECG116	SK3311	212-76-02	
CR99	3.3B1(ZENER)		NTE5005A	ECG5005A	SK3A3/5005A		
Q1	(2S)A1013-O		NTE32	ECG32	SK3867A/32		
Q2,3	(2S)C1815Y		NTE85	ECG85	SK3124A/289A	121-Z9065	
Q4	(2S)A673C		NTE290A	ECG290A	SK9132	121-Z9003*	
Q5	(2S)C945P		NTE85	ECG85	SK3124A/289A	121-972*	
Q7	(2S)C1815Y		NTE85	ECG85	SK3124A/289A	121-Z9065	
U1	6502AD		NTE6502	ECG6502			
U2	310654-03 M467857						
U3	M2128-20		NTE2128	ECG2128			
U4	G65SC22P-2						
U5	251829-01						
U6	251828-01						
U8	HD7406P		NTE7406	ECG7406	SK7406	HE-443-698	
U9	G65SC22P-2						
U10	74LS74A		NTE74LS74A	ECG74LS74A	SK74LS74A	HE-443-730	
U11	WD1770-PH						
U12	74F32PC						
U13	74LS266		NTE74LS266	ECG74LS266	SK74LS266	HE-443-719	
U14	HD7407P		NTE7407	ECG7407	SK7407	HE-443-1020	
U15	74LS14PC		NTE74LS14	ECG74LS14	SK74LS14	HE-443-872	
U16	HD7406P		NTE7406	ECG7406	SK7406	HE-443-698	
U17	74LS14PC		NTE74LS14	ECG74LS14	SK74LS14	HE-443-872	
U18	74LS175PC		NTE74LS175	ECG74LS175	SK74LS175	HE-443-752	
U19	HD74LS241P		NTE74LS241	ECG74LS241	SK74LS241	HE-443-824	

PARTS LIST AND DESCRIPTION

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

SEMICONDUCTORS (Select replacement for best results)

ITEM No.	TYPE No.	MFGR. PART No.	REPLACEMENT DATA				NOTES
			NTE PART No.	ECG PART No.	RCA PART No.	ZENITH PART No.	
U20	6526A-1						
U21	T520D						
U22	HD74LS123P		NTE74LS123	ECG74LS123	SK74LS123	HE-443-942	
	POWER SUPPLY						
D101	S1WB40		NTE5332	ECG5332	SK9232/5332	903-725	
D102	B4406						
D103	B4402						
D104			NTE519	ECG519	SK3100/519	103-131	
D105			NTE519	ECG519	SK3100/519	103-131	
D201	5KF20B						
D202	B82-004		NTE6085	ECG6085			
IC201	IR9431						
	548D						
Q101	(2S)C2542		NTE379	ECG379	SK9085/379	121-Z9111	
Q102	(2S)C2060Q		NTE293	ECG293	SK3849/293	121-Z9066	

* Lead configuration may vary from original.

WIRING DATA

General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8529 (Solid) Available in 13 Colors
8522 (Stranded) 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

ITEM No.	RATING	MFGR. PART No.
C33	1uF Tantalum	

ITEM No.	RATING	MFGR. PART No.

RESISTORS (Power and Special)

ITEM No.	RATING	REPLACEMENT DATA		
		MFGR. PART No.	NTE PART No.	WORKMAN PART No.
RP1	Resistor Network (1)	(1) Contains nine (9 each) 1000 ohm 5%.		

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

ITEM NO.	FUNCTION	RESISTANCE	MFGR. PART NO.	NOTES
VR1 VR201	Spindle Speed 5V Adjust	30K 1000		

COILS & TRANSFORMERS

ITEM No.	FUNCTION	MFGR. PART No.	OTHER IDENTIFICATION	NOTES
L1 L3 L101 L201 L202 T101	Choke RF Choke Line Filter RF Choke RF Choke Power			

FUSE DEVICES

ITEM NO.	DESCRIPTION	MFGR. PART NO.		NOTES
		DEVICE	HOLDER	
F101	2 Amp @ 125V Fast Acting			

MISCELLANEOUS

ITEM No.	PART NAME	MFGR. PART No.	NOTES
CR97	LED		Power, Red
CR98	LED		Drive, Green
EMI11 thru EMI14	Ferrite Bead		
FB1 thru FB7	Ferrite Bead		
Head 0	Head		Read/Write/Erase
Head 1	Head		Read/Write/Erase
M1	Motor		Head Position
M2	Detector		Index
M3	Sensor		Write Protect
M4	Sensor		Track 00
P101	Cord		AC Power
PC101	Photo-Coupler		
SW1	Switch		DIP
SW101	Switch		Power
U7	Module		Read, Write Amp/Motor Control
Y1	Module		16MHz Oscillator

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 (Green) (CR98) 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,E$,T,S
30 PRINT "ERROR #";EN,E$
40 PRINT "TRACK #";T,"SECTOR #";S
50 CLOSE 15
```

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.

MISCELLANEOUS ADJUSTMENTS

DISK DRIVE DEVICE NUMBER

Number 8 used in Load and Save procedure is device number assigned to Disk Drive. Device number can be set to any number from 8 to 11 by setting two Switches on back of Disk Drive. Use chart to select device number. Note: Left and right viewed from rear of drive.

Device Number	Left Switch	Right Switch
8	UP	UP
9	DOWN	UP
10	UP	DOWN
11	DOWN	DOWN

VOLTAGE ADJUSTMENT

Connect positive lead of voltmeter to 5.0V Source (pin 4 of Connector CN1), negative lead to ground. Turn Disk Drive On. Adjust 5V Adjust Control (VR201) for 5.0 volts.

HEAD CLEANING INSTRUCTIONS

Use a lint free cloth or swab dampened with 91% isopropyl alcohol to clean the disk drive heads and dry with a lint free cloth.

TEST EQUIPMENT

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

TEST EQUIPMENT (COMPUTERFACTS)

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

TROUBLESHOOTING

POWER SUPPLY

NOTE: Use an Isolation Transformer with a step down voltage control when servicing Power Supply. Disconnect Connector CN1 from Disk Drive Board before troubleshooting Power Supply to avoid possible damage to Disk Drive Board from high voltage that may be produced while servicing Power Supply. To load Power Supply, connect a 10 ohm, 5 watt Resistor from 5V Source (pin 4 of Connector CN1) to ground and a 50 ohm, 5 watt Resistor from 12V Source (pin 2 of Connector CN1) to ground.

Disk Drive dead. Check Fuse F101. If Fuse is open check Bridge Rectifier (D101) and Driver Transistor (Q101) for possible shorts. Also check Capacitors C101, C102 and C104 for possible shorts. If Fuse is good, check for 120V AC across Rectifier D101 at input pins. If 120V AC is missing, check EMI Filter, Power Switch (SW101) and Coil L101 for possible open circuits. If 120V AC is present, check for 166V at DC output pin of Rectifier Diode (D101). If 166V is missing, check D101. If 166V is present, check waveforms at base and collector of Oscillator Transistor (Q102). If waveforms are missing, check voltages and components associated with Driver Transistor (Q101), Transistor Q102 and check windings on Transformer T101 for possible opens or shorts. If waveforms are present, check for 12.0V at source 1 and 5.0V at source 2. If voltages are missing, check Diodes D201 and D202. Check Transformer T101 windings (pins 6 and 7 and pins 8 and 9) and Coils L201 and L202 for possible opens.

If 5.0V at source 2 is not regulated, check adjustment of 5V Adjust Control (VR201), see "Miscellaneous Adjustments". If adjusting VR201 has no effect, check voltages and components associated with pins 1 thru 8 of Regulator IC (IC201) and pins 1 thru 4 of Photo-Coupler (PC101).

MICROPROCESSOR (CPU) OPERATION

Check operation of Reset circuit by checking logic reading at pin 40 of CPU IC (U1). Reading should be Low when drive is turned On then immediately go High and stay High. If reading is not correct, check for a momentary High, then Low reading at pin 11 of IC U17 while turning drive On. If reading is correct, check IC U17. If reading is not correct, check for a momentary Low, then High logic reading at pin 11 of IC U15 while turning drive On. If reading is correct, check IC U15. If reading is not correct, check Capacitor C28, Resistor R32 and Regulator IC (U21). When drive is On, logic reading at pin 11 of IC U15 should go Low momentarily whenever a Computer, connected to drive, is turned On. If reading is not correct, check IC's U8 and U15 and Resistor R36.

Check 1MHz clock waveform at pins 3, 37 and 39 of IC U1. If waveform is missing at pin 37 of IC U1, refer to "Oscillator and Dividers" section of this Troubleshooting guide. If waveform is missing at pins 3 or 39 of IC U1, check IC U1.

OSCILLATOR AND DIVIDERS

Check 16MHz waveform at pin 1 of Timer IC (U5). If waveform is missing, check Crystal Y1, Capacitor C23, IC U5, Coil L1 and Resistor R3. If waveform is present, check waveform at pin 37 of Controller IC (U6). If waveform is missing, check IC U6. If waveform is present check waveform at pin 11 of IC U12 and check for a logic Low at pin 12 of IC U12. If reading is correct at pin 12 and waveform is missing at pin 11, check IC U12. If logic reading is not correct at pin 12 of IC U12, check IC's U13 and U18.

TROUBLESHOOTING (Continued)

READ CIRCUIT

Connect a jumper from pin 3 of Connector CN7 to ground to keep Disk Drive running.

Insert a diskette into Disk Drive and close door. Diskette must contain several programs and head must be positioned on a track containing information. Check for a logic Low at pins 12 and 13 of IC U13. If reading is not correct at pin 13, check Controller IC (U6). If reading is not correct at pin 12, check Disk Controller IC (U11). If readings are correct, check for a logic High at pin 11 of IC U13. If reading is not correct, check IC U13. If reading is correct, check for a logic Low at pin 2 of IC U8. If reading is not correct, check IC U8. If reading is correct, use a scope to check for pulses at pin 18 of Read-Write Amp/Motor Control IC (U7). There should be a noticeable change in the pulses when drive door is opened and closed, check head windings for continuity, check Connector CN2 for good connections, and check Diodes CR3 thru CR8 and IC U7.

WRITE CIRCUIT

Verify Write Protect Circuits are working properly, see "Write Protect". Use a TTL signal generator (1kHz square waves) to inject pulses at pin 1 of IC U8. While injecting pulses, check for pulses at pin 2 of IC U8. If pulses are missing, check IC U8. If pulses are present, check for pulses at pins 4, 5, 6 and 7 of Read-Write Amp/Motor Control IC (U7). If pulses are missing, check IC U7. If pulses are present, disconnect TTL signal generator and connect a jumper from pin 1 of IC U8 to ground. This puts IC U7 in write mode. While using a logic pulser to inject pulses at pins 8 and 9 of IC U8, check for pulses at pins 6 and 7 of IC U7. If pulses are missing, check IC U7. If pulses are present, disconnect jumper from pin 1 of IC U8. Use a logic pulser to inject pulses at pin 5 of IC U14 and check for pulses at pin 6, then inject pulses at pin 9 and check for pulses at pin 8 and inject pulses at pin 13 and check for pulses at pin 12. If pulses are missing at any pins, check IC U14.

WRITE PROTECT

Write protect does not function. Check for a logic Low at pin 5 of IC U17 when a diskette that is not write protected is inserted in drive and a logic High when a write protected diskette is used. If readings are not correct, check Write Protect Sensor, Resistor R10, and check pins 1 and 2 of Connector CN4 for good connections. If readings are correct, check for a logic High at pin 6 of IC U17 when a diskette is used that is not write protected and a logic Low when a write protected diskette is used. If readings are not correct, check IC U17.

HEAD POSITION MOTOR

Check Connector CN5 for good connections. If connections are good, type in and run the following program to activate Head Position 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
```

Note: Do not put any spaces in lines 30 or 40.

While program is running, check for pulses at pins 10 and 11 of VIA IC (U4). If pulses are missing, check IC U4. If pulses are present, check for pulses at pin 8 of IC U8. If pulses are missing, check IC U8. If pulses are present, check for pulses at pin 4 of IC U14. If pulses are missing, check IC U14. If pulses are present, check for pulses at pin 2 of IC U17. If pulses are missing, check Capacitor C32, Resistor R37 and IC U17. If pulses are present, check for pulses at pins 3 and 4 of IC U13. If pulses are missing, check IC U13. If pulses are present, check for pulses at pin 5 of Multivibrator IC (U22). If pulses are missing, check Capacitor C33, Resistor R39, and IC U22. If pulses are present, check for pulses at pin 12 of IC U16. If pulses are missing, check IC U16. If pulses are present, check Switch Transistor (Q1), Diode CR10, and Motor M1. Check for pulses at pins 23, 24, 26 and 27 of IC U7. If pulses are missing, check IC U7.

DRIVE MOTOR

Drive Motor does not run. Run program listed under "Head Position Motor". While program is running, check for a logic High at pin 12 of IC U4. If reading is not correct, check IC U4. If reading is correct, check for a logic Low at pin 10 of IC U16. If reading is not correct, check IC U16. If reading is correct, check Connector CN7 for good connections. If Connector checks good, troubleshoot Motor Control Board.

TRACK 00 SENSOR

Drive head bangs against Track 00 stop. Verify Track 00 Sensor is working by manually pushing head back to Track 00 and checking for a logic High at pin 9 of IC U17, then push head away from Track 00 and check for a logic Low at pin 9 of IC U17. If readings are not correct, check Connector CN4 for good connections and check Resistor R12 and Track 00 Sensor. If readings are correct, push head back to Track 00 and check for a logic Low at pin 8 of IC U17. If reading is not correct, check IC U17. If reading is correct, check VIA IC (U9).

INDEX SENSOR

Insert a diskette in drive and close drive door. Connect a jumper from pin 3 of Connector CN7 to ground to keep drive running. Check for pulses at pins 4 and 7 of Transceiver IC (U19). If pulses are missing at pin 4, check Index Sensor, Resistor R9 and check pins 4 and 5 of Connector CN4 for good connections. If pulses are present at pin 4 and missing at pin 7, check for a logic Low at pin 1 of IC U19. If reading is not correct at pin 1, check VIA IC (U9). If reading is correct at pin 1 of IC U19, check IC U19.

LOGIC CHART

PIN NO.	IC U1	PIN NO.	IC U1	PIN NO.	IC U2	PIN NO.	IC U2	PIN NO.	IC U3	PIN NO.	IC U3
1	L	21	L	1	H	15	P	1	P	13	P
2	H	22	P	2	P	16	P	2	P	14	P
3	P	23	P	3	P	17	P	3	P	15	P
4	P	24	P	4	P	18	P	4	P	16	P
5	*	25	P	5	P	19	P	5	P	17	P
6	H	26	P	6	P	20	L	6	P	18	P
7	P	27	P	7	P	21	P	7	P	19	P
8	H	28	P	8	P	22	P	8	P	20	P
9	P	29	P	9	P	23	P	9	P	21	P
10	P	30	P	10	P	24	P	10	P	22	P
11	P	31	P	11	P	25	P	11	P	23	P
12	P	32	P	12	P	26	P	12	L	24	H
13	P	33	P	13	P	27	P				
14	P	34	P	14	L	28	H				
15	P	35	*								
16	P	36	*								
17	P	37	P								
18	P	38	P								
19	P	39	P								
20	P	40	H								

PIN NO.	IC U4	PIN NO.	IC U4	PIN NO.	IC U5	PIN NO.	IC U6	PIN NO.	IC U6	PIN NO.	IC U7	PIN NO.	IC U7
1	L	21	P	1	P	1	H	21	P	1	5V	21	L
2	P	22	P	2	P	2	P	22	P	2	L.02V	22	L
3	P	23	P	3	P	3	P	23	P	3	P	23	L(1)
4	P	24	P	4	H	4	P	24	P	4	5.8V	24	L(1)
5	P	25	P	5	L	5	P	25	L	5	.1V	25	12.1
6	P	26	P	6	P	6	P	26	L	6	6.4	26	L(1)
7	P	27	P	7	P	7	P	27	L	7	6.4	27	L(1)
8	P	28	P	8	P	8	P	28	L	8	P	28	L
9	P	29	P	9	P	9	P	29	P	9	P	29	L
10	L(1)	30	P	10	P	10	L	30	H	10	6.4	30	L
11	L(1)	31	P	11	P	11	L	31	P	11	6.4		
12	H	32	P	12	P	12	H(1)	32	P	12	6.3		
13	H	33	P	13	P	13	H	33	L	13	6.3		
14	H(5)	34	H	14	P	14	H	34	P	14	6.9		
15	H	35	P	15	H	15	H	35	H	15	6.9		
16	H	36	P	16	P	16	H	36	P	16	6.1		
17	P	37	P	17	H	17	P	37	P	17	6.1		
18	H	38	P	18	P	18	P	38	P	18	P		
19	P	39	H	19	P	19	P	39	L	19	.4		
20	H	40	P	20	P	20	L	40	p	20	.4		

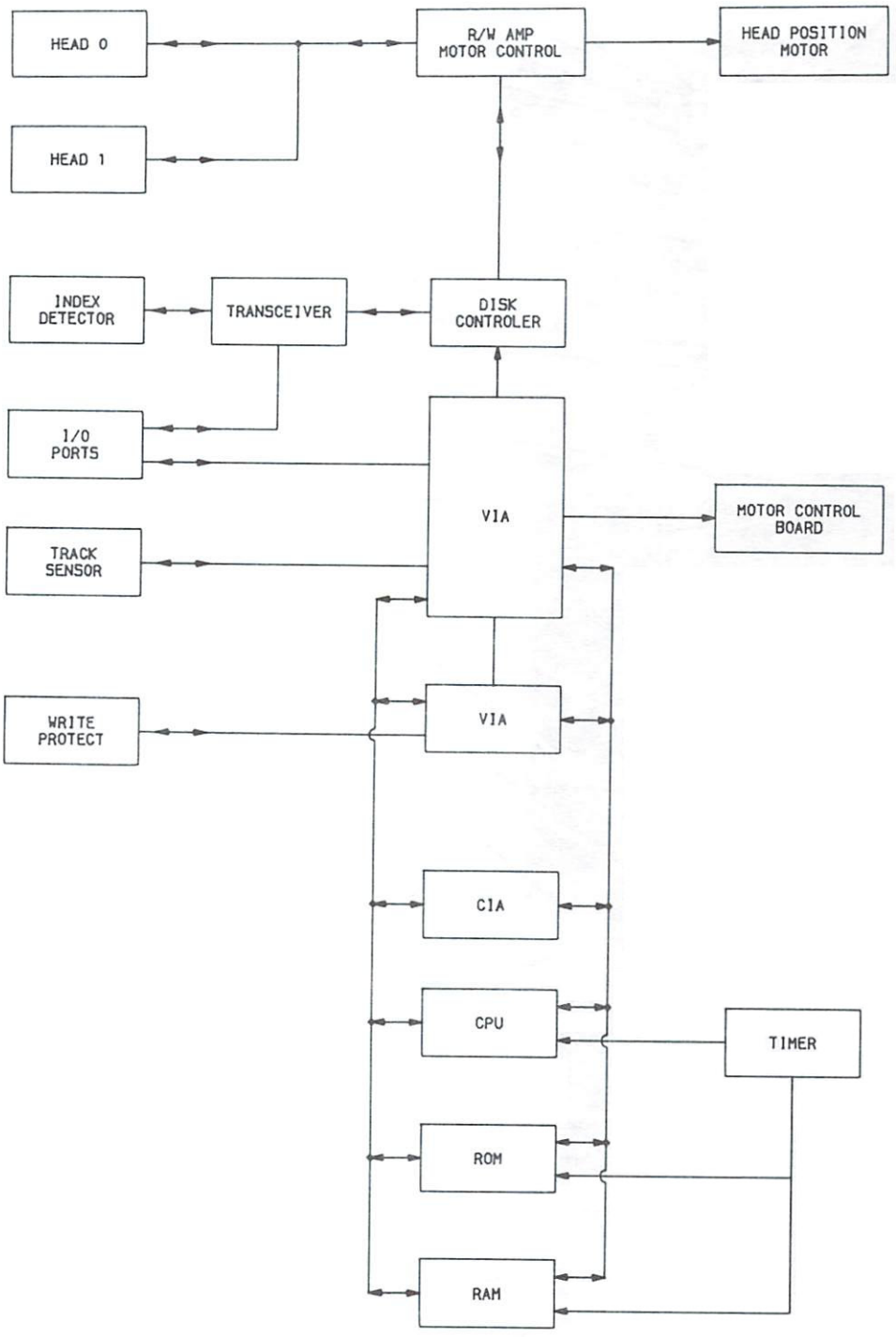
LOGIC CHART (Continued)

PIN NO.	IC U8	PIN NO.	IC U9	PIN NO.	IC U9	PIN NO.	IC U10	PIN NO.	IC U11	PIN NO.	IC U11	PIN NO.	IC U12	IC U13
1	P	1	L	21	P	1	H	1	H	15	H	1	P	L(1)
2	P	2	H(7)	22	P	2	P	2	P	16	L	2	P	H(1)
3	L	3	P	23	P	3	P	3	P	17	H	3	P	L(1)
4	H	4	L(8)	24	P	4	H	4	P	18	P	4	L	L(1)
5	L(8)	5	H	25	P	5	P	5	P	19	P	5	P	H(1)
6	H(9)	6	H	26	P	6	P	6	P	20	L	6	P	L(1)
7	L	7	L	27	P	7	L	7	P	21	L	7	L	L
8	L(2)	8	L	28	P	8	H	8	P	22	L	8	H	H
9	H(1)	9	P	29	P	9	H	9	P	23	*	9	H	L
10	P	10	P	30	P	10	L	10	P	24	P	10	P	L
11	P	11	P	31	P	11	L	11	P	25	H	11	P	P
12	L(8)	12	P	32	P	12	H	12	P	26	L	12	L	L
13	H(9)	13	L	33	P	13	L	13	H	27	L	13	P	P
14	H	14	P	34	H	14	H	14	L	28	L	14	H	H
15		15	L	35	P									
16		16	L	36	P									
17		17	P	37	P									
18		18	H	38	P									
19		19	H	39	H									
20		20	H	40	P									

PIN NO.	IC U14	IC U15	IC U16	IC U17	IC U18	IC U19	PIN NO.	IC U20	PIN NO.	IC U20	PIN NO.	IC U22
1	P	P	P	L(1)	H	P	1	L	21	P	1	L
2	P	P	P	H(1)	H	L	2	H	22	P	2	P
3	H(1)	P	L	L(8)	H	P	3	H	23	P	3	H
4	L(2)	P	*	H(9)	*	P	4	H	24	*	4	P
5	H	P	L	L(4)	H	P	5	H	25	P	5	L(1)
6	P	P	P	H(5)	L	P	6	H	26	P	6	
7	L	L	L	L	H	P	7	H	27	P	7	
8	P	L	P	H(7)	L	P	8	H	28	P	8	L
9	H	H	P	L(6)	P	P	9	H	29	P	9	L
10	P	L	L	H	H	L	10	H	30	P	10	L(1)
11	P	H	H	L	L	P	11	H	31	P	11	H
12	P	P	H(1)	P	H	P	12	H	32	P	12	H(1)
13	P	P	L(1)	P	H	P	13	H	33	P	13	P
14	H	H	H	H	L	P	14	H	34	H	14	
15					H	L	15	H	35	P	15	
16					H	P	16	H	36	P	16	H
17						P	17	H	37	P		
18						P	18	H	38	P		
19						P	19	*	39	P		
20						H	20	H	40	H		

(1) Probe indicates P when head is moving.
(2) Use a scope to check for pulses when the head is moving.
(3) Probe indicates L when head is on track 17 or higher and H when head is on track 16 or lower.
(4) Probe indicates H if diskette is write protected.
(5) Probe indicates L if diskette is write protected.
(6) Probe indicates H when the head is on track 00 and L when off track 00.
(7) Probe indicates L when the head is on track 00 and H when off track 00.
(8) Probe indicates L when head 0 is selected, H when head 1 is selected.
(9) Probe indicates H when head 0 is selected, L when head 1 is selected.

SEE PAGE 6



BLOCK DIAGRAM

SEE PAGE 4

LINE DEFINITIONS

A0 THRU A15 . . . . . Address Bits 0 Thru 15
ATN . . . . . Attention, Serial I/O Port Recognition
CIA . . . . . Complex Interface Adapter, Chip Select
CLK . . . . . Clock
CS1,CS2 . . . . . Chip Selects 1 and 2
DATA,DATA1 . . . . . Data
DB0 THRU DB7 . . . . . Data Bits 0 Thru 7
DIRC . . . . . Stepper Motor Direction
IRQ . . . . . Interrupt Request
O0 . . . . . Clock Frequency Used to Set CPU On-Board Clock
O1,O2 . . . . . Clock Frequency's, Phase 1 and Phase 2
PA0(A) THRU PA7(A) . . . . . Port A Bits 0 Thru 7
PB4 THRU PB7 . . . . . Port B Bits 4 Thru 7
R/W . . . . . Read/Write
RESET,RES . . . . . Reset State
WD . . . . . Write Data, Clock and Data for Diskette Writing
WG . . . . . Write Gate, Validation Before Diskette Writing

SCHEMATIC NOTES

—✱— Circuitry not used in some versions
- - - Circuitry used in some versions
↳ See parts list
⏚ Ground

Voltages measured with digital meter.

Waveforms and voltages are 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 7.5cm width with DC reference voltage given at the bottom line of each waveform.

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

Supply voltage maintained as shown at input.

Controls adjusted for normal operation.

Terminal identification may not be found on unit.

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

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

Resistors are ½W or less, 5% unless noted.

Value in ( ) used in some versions.

Measurements taken with switching as shown, unless noted.

All measurements taken while running the following Basic program. Readings shown taken when Disk Drive Heads not moving unless noted.

NOTE: Insert a formatted diskette (not write protected) in Drive before running program.

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

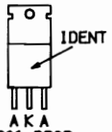
NOTE: Do not put any spaces in PRINT#3 line 30.

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

(1) Probe indicates P when Head is moving.
(2) Use scope to check for Pulses when Head is moving.
(3) Probe indicates L when Head is ON Track 17 or higher and H when ON Track 16 or lower.
(4) Probe indicates H if diskette is write protected.
(5) Probe indicates L if diskette is write protected.
(6) Probe indicates H when Head is ON Track 00 and L when OFF Track 00.
(7) Probe indicates L when Head is ON Track 00 and H when OFF Track 00.
(8) Probe indicates L when Head 0 is selected, H when Head 1 is selected.
(9) Probe indictes H when Head 0 is selected, L when Head 1 is selected.

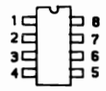
IC PINOUTS & TERMINAL GUIDES

POWER SUPPLY

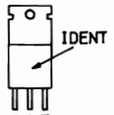


AKA
D201,D202
FRONT VIEW

Q102
BOTTOM VIEW

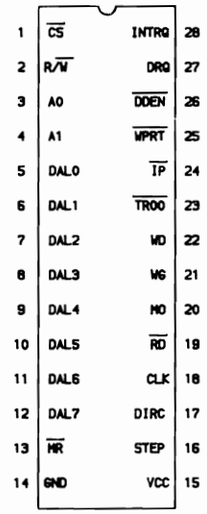


IC201
TOP VIEW



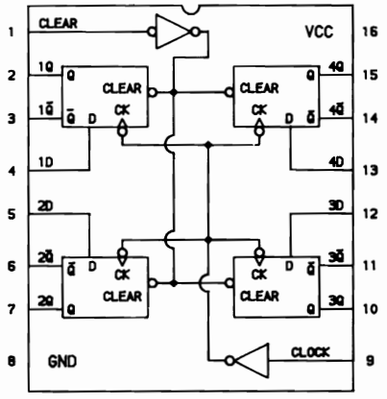
Q101
FRONT VIEW

WD1770-PH



U11
FLOPPY
DISK CONTROLLER
TOP VIEW

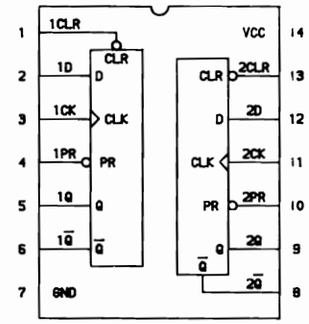
74LS175PC



U18
FLIP/FLOP
TOP VIEW

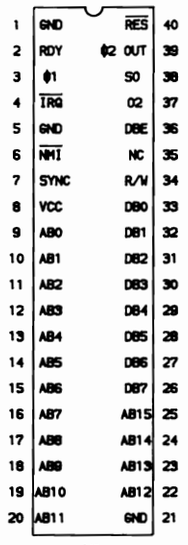
Q1 THRU Q5,Q7
BOTTOM VIEW

74LS74A

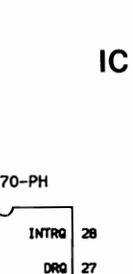


U10
FLIP/FLOP
TOP VIEW

6502AD

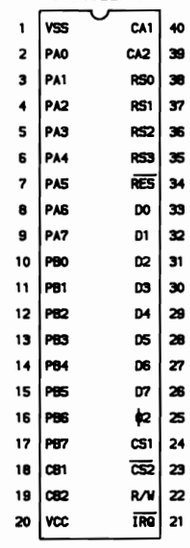


U1
CPU
TOP VIEW



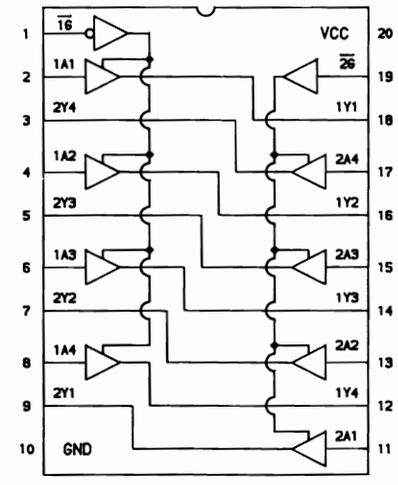
U21
BOTTOM VIEW

G65SC22P-2



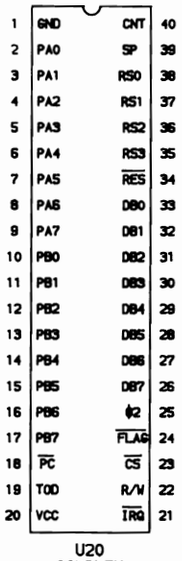
U4,U9
VERSATILE INTERFACE ADAPTER
TOP VIEW

HD74LS241P



U19
TRANSCEIVER
TOP VIEW

6526A-1

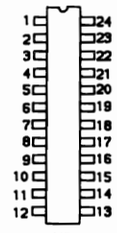


U20
COMPLEX
INTERFACE ADAPTER
TOP VIEW

U5
TOP VIEW

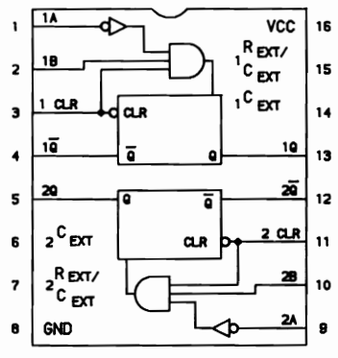
U6
TOP VIEW

U2
TOP VIEW

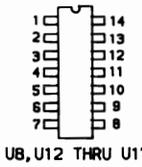


U3
TOP VIEW

HD74LS123P



U22
MONOSTABLE MULTIVIBRATOR
TOP VIEW



U8,U12 THRU U17
TOP VIEW

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. The 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.

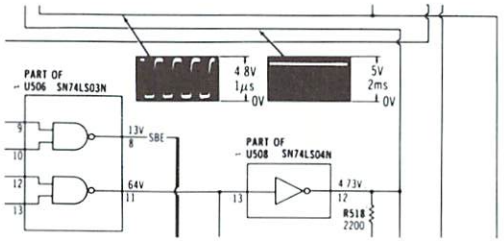
SAMS

Remove staples and use cover for file folder.

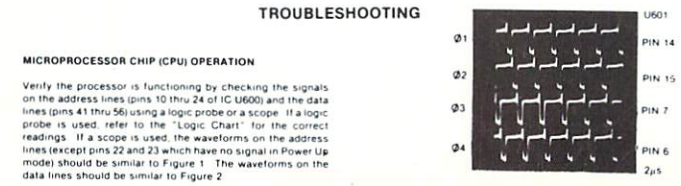
COMPUTERFACTS™ put easy to use, informative technical data right at your fingertips. Each edition includes specific service information on the individual component, along with some overall troubleshooting hints.

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 CIRCUITRACE®, GRIDTRACE ™, waveforms, voltages and stage identification.



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

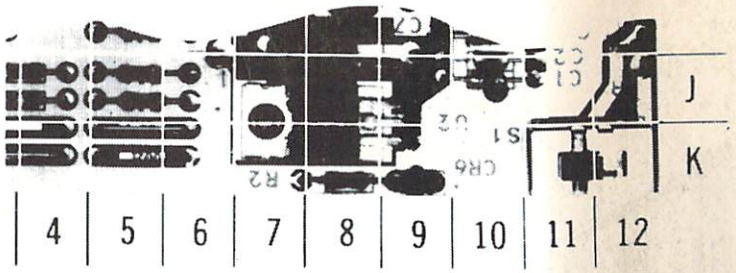


- Logic Chart containing logic probe readings to isolate defective circuitry and components.

LOGIC

PIN NO.	IC U100	PIN NO.	IC U100	PIN NO.	IC U102	IC U103	IC U104	IC U105	IC U106	IC U107	IC U108	IC U109
1	P	21	P	1	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

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



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

SEMICONDUCTORS (Select replacement for best results)

ITEM No.	TYPE No.	MFGR. PART No.	REPLACEMENT DATA						
			ECG PART No.	GENERAL ELECTRIC PART No.	MOTOROLA PART No.	NTE PART No.	RCA PART No.	WORKMAN PART No.	ZENITH PART No.
D102	1SS53	1149-2576	ECG519	GE-514	1N4935	NTE519	SK9091/177	WEP925/519	103-131
D103	1N60FM	1149-2527	ECG109	1N60		NTE109	SK3088	WEP134/109	103-Z9001
D201	1N4004GP	1201-4205	ECG116	GE-504A	1N4004	NTE116	SK3312	WEP157	212-76-02
D501 thru D503	1SS53	1149-2576	ECG519	GE-514	1N4935	NTE519	SK9091/177	WEP925/519	103-131

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