

TANDY  
MODEL 1000TX(25-1600)REV.A,C  
**CSCS30**



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MODEL 1000TX(25-1600)REV.A,C

## SAFETY PRECAUTIONS

See Page 15

## PRELIMINARY SERVICE CHECKS

ENCLOSED

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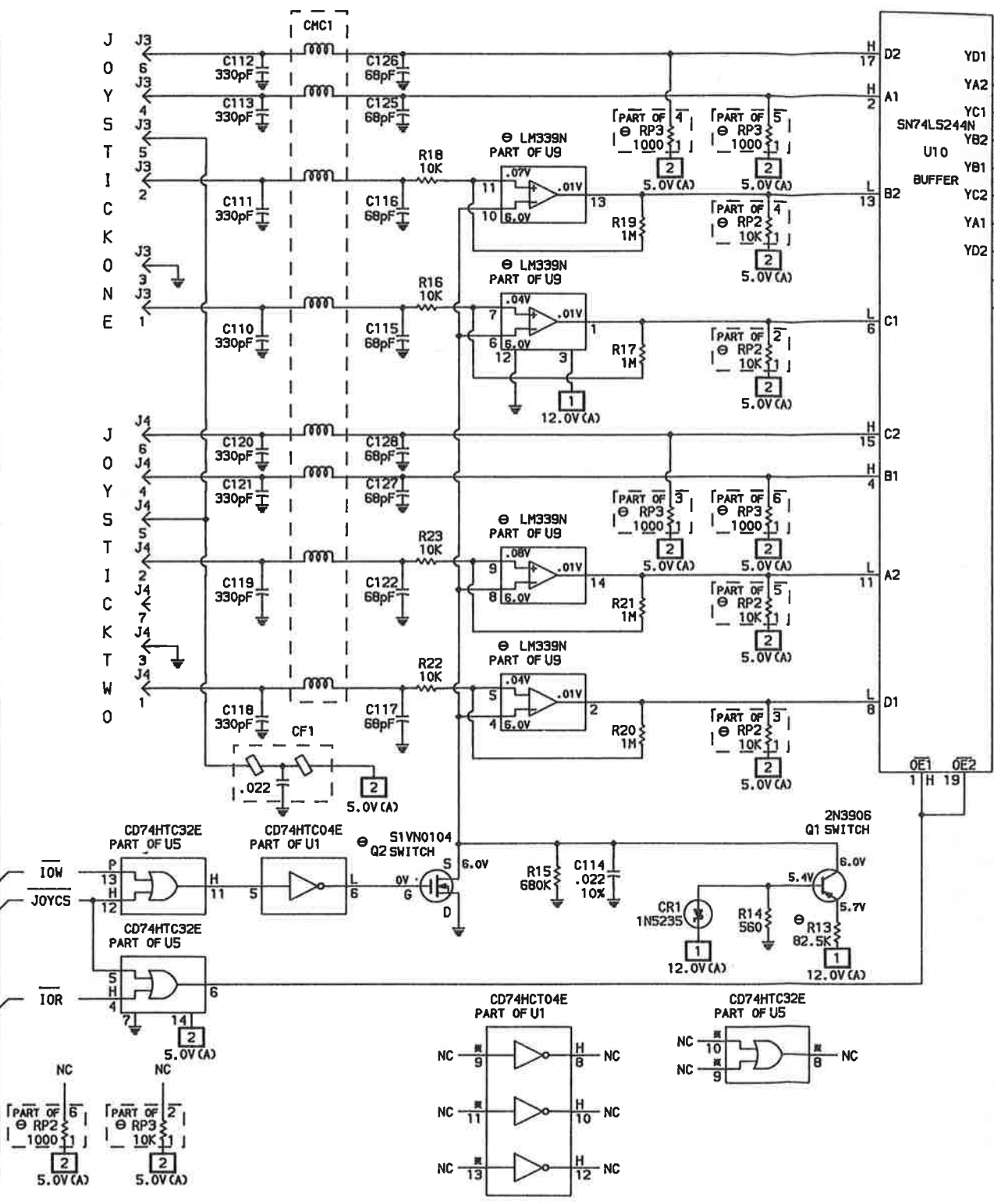
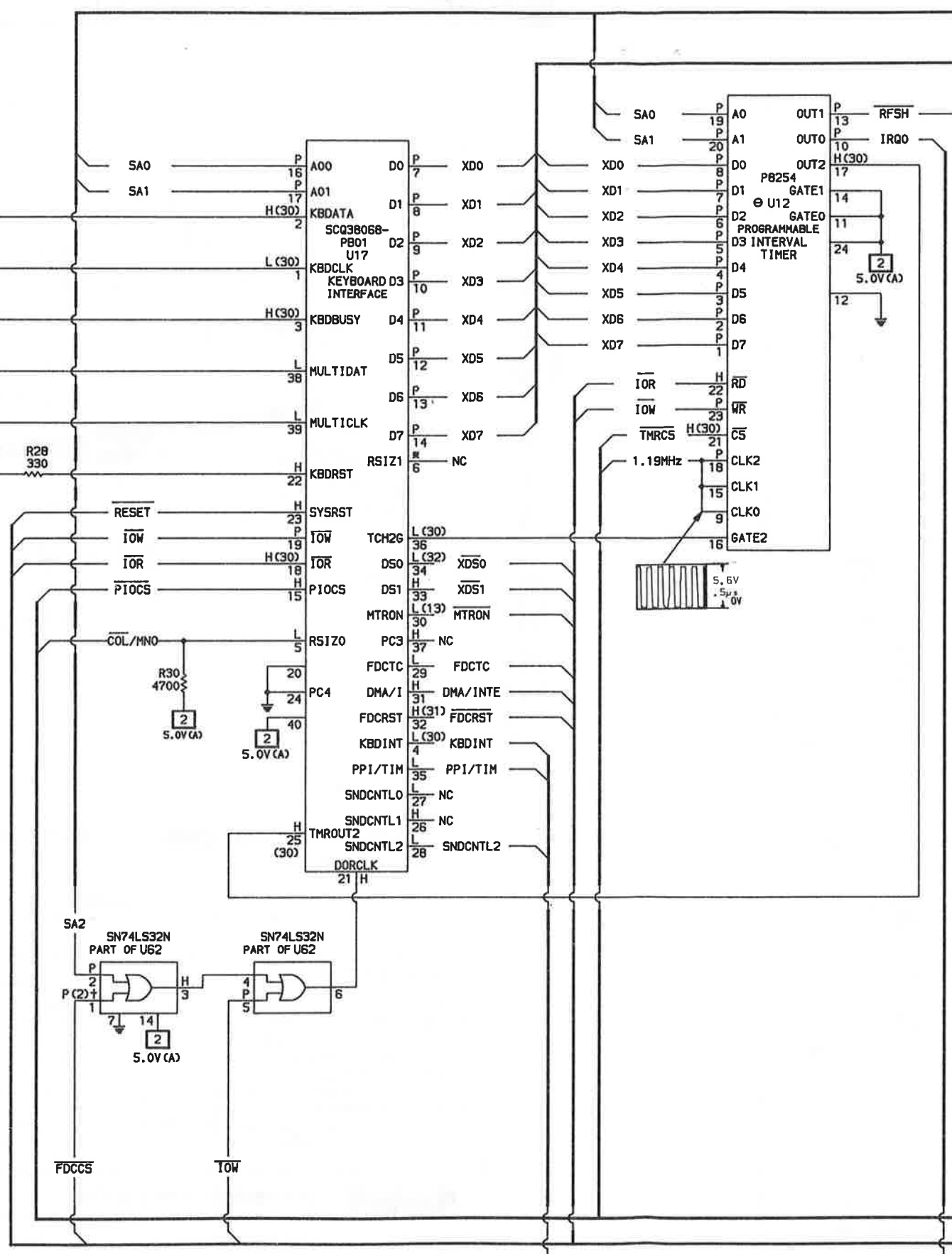
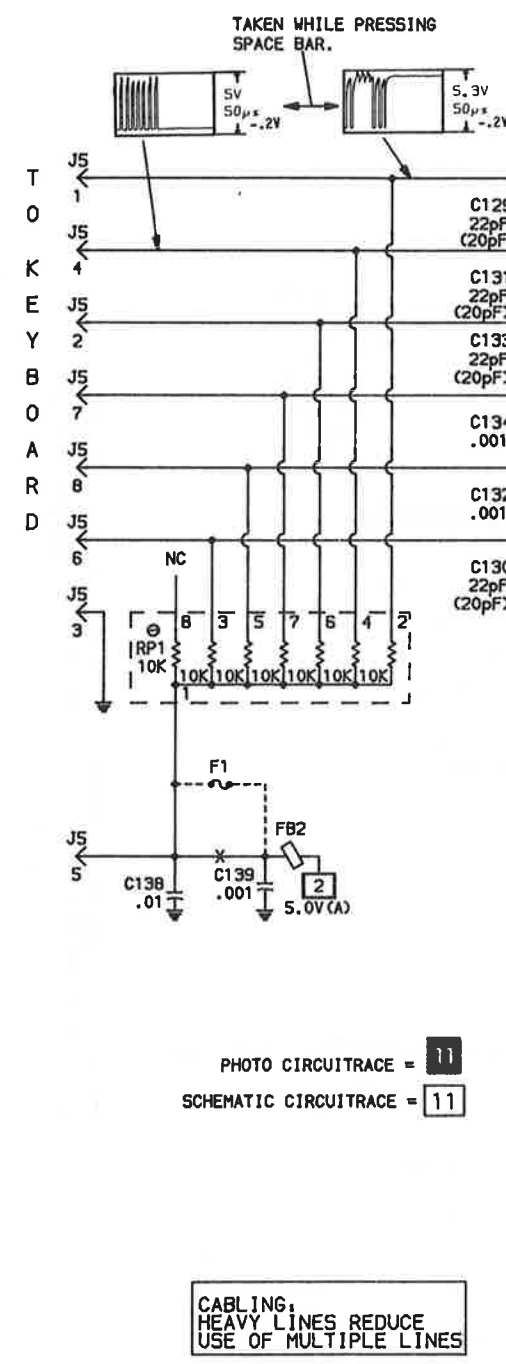
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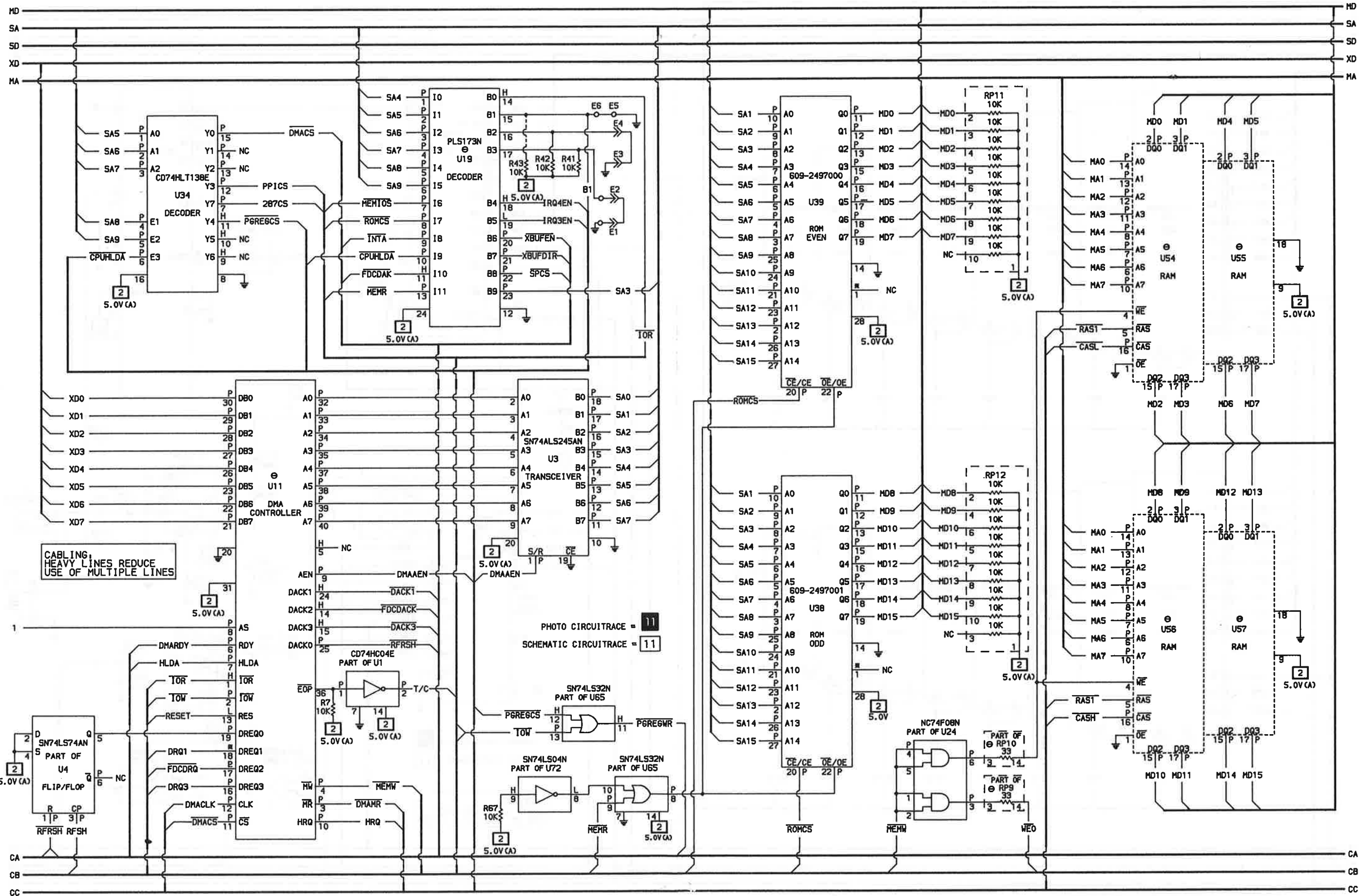
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A PHOTOFACIT STANDARD NOTATION SCHEMATIC  
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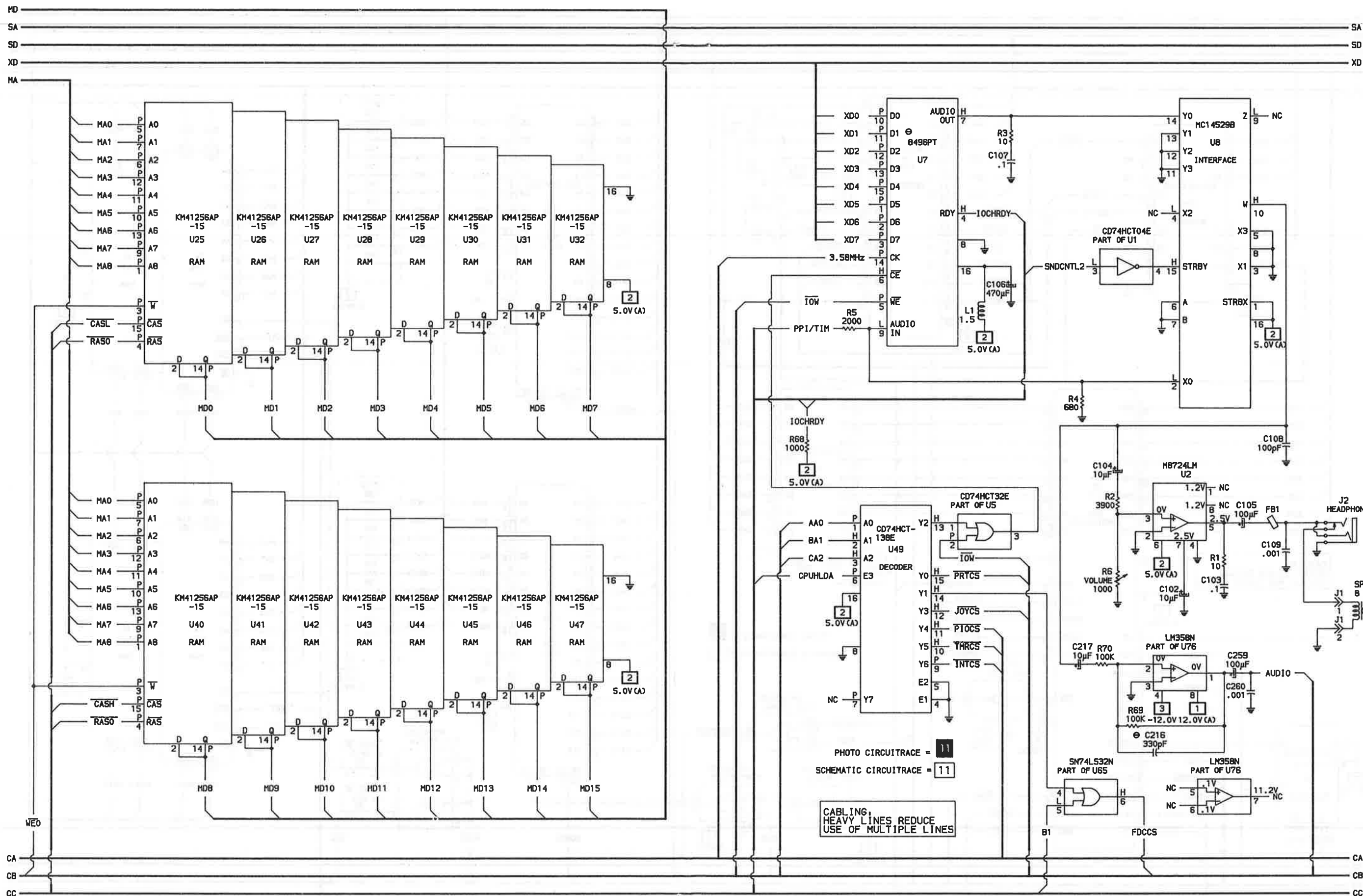
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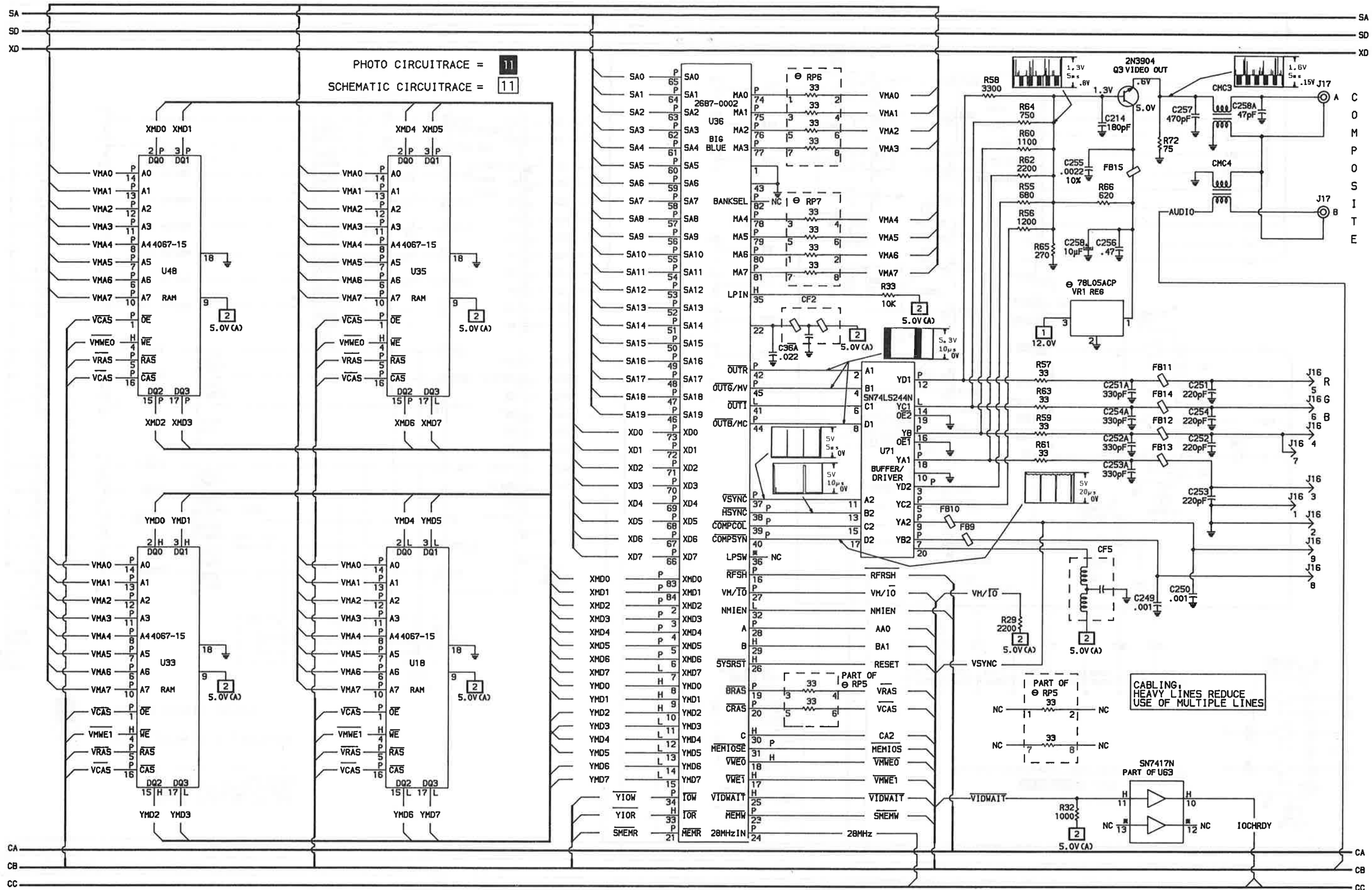
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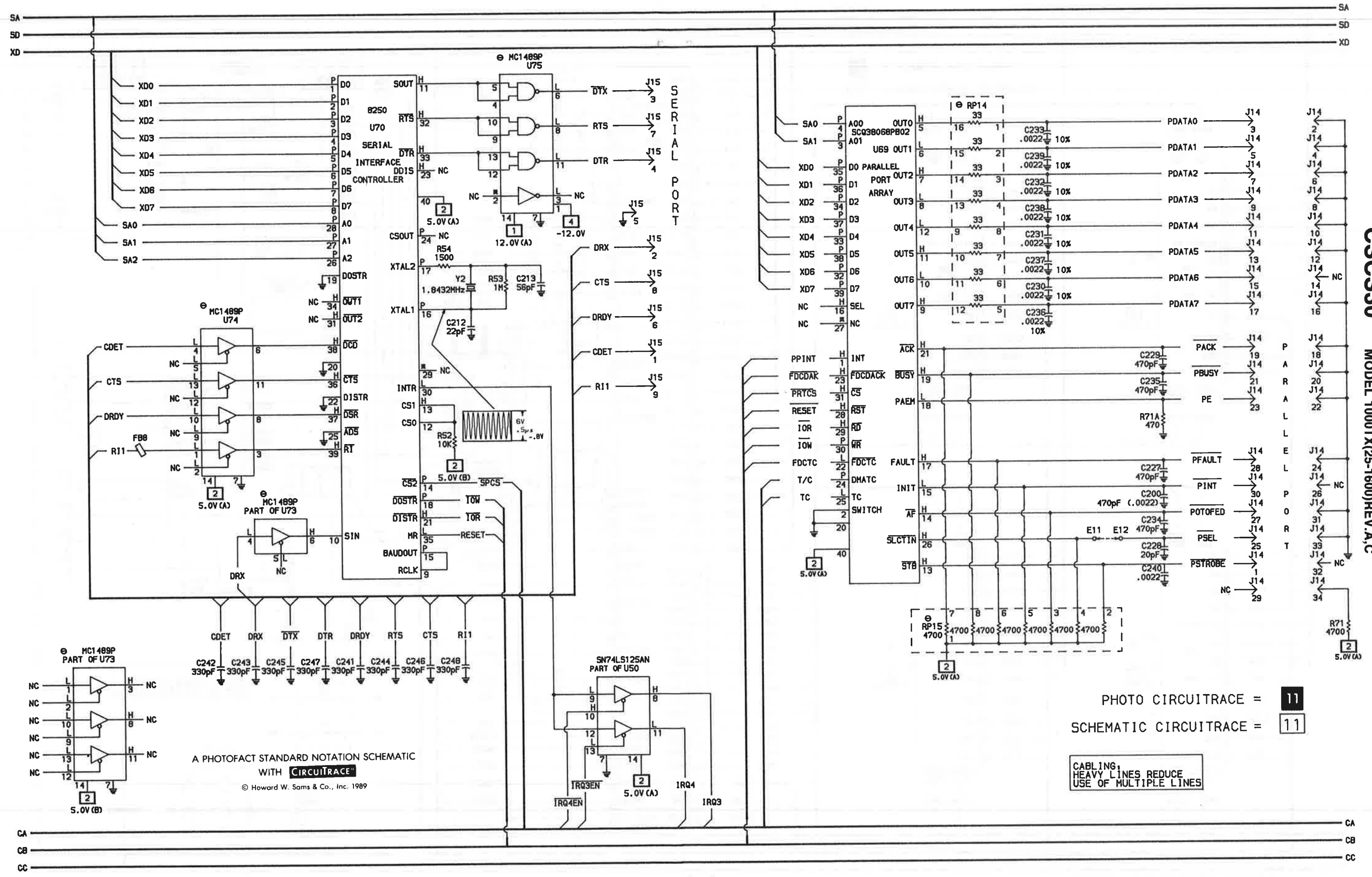
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A PHOTOFAC STANDARD NOTATION SCHEMATIC  
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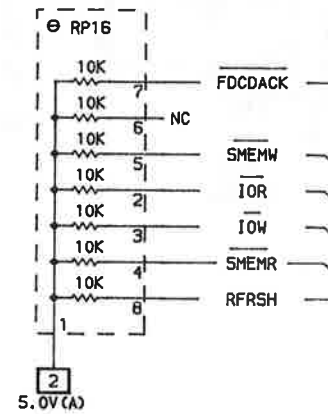
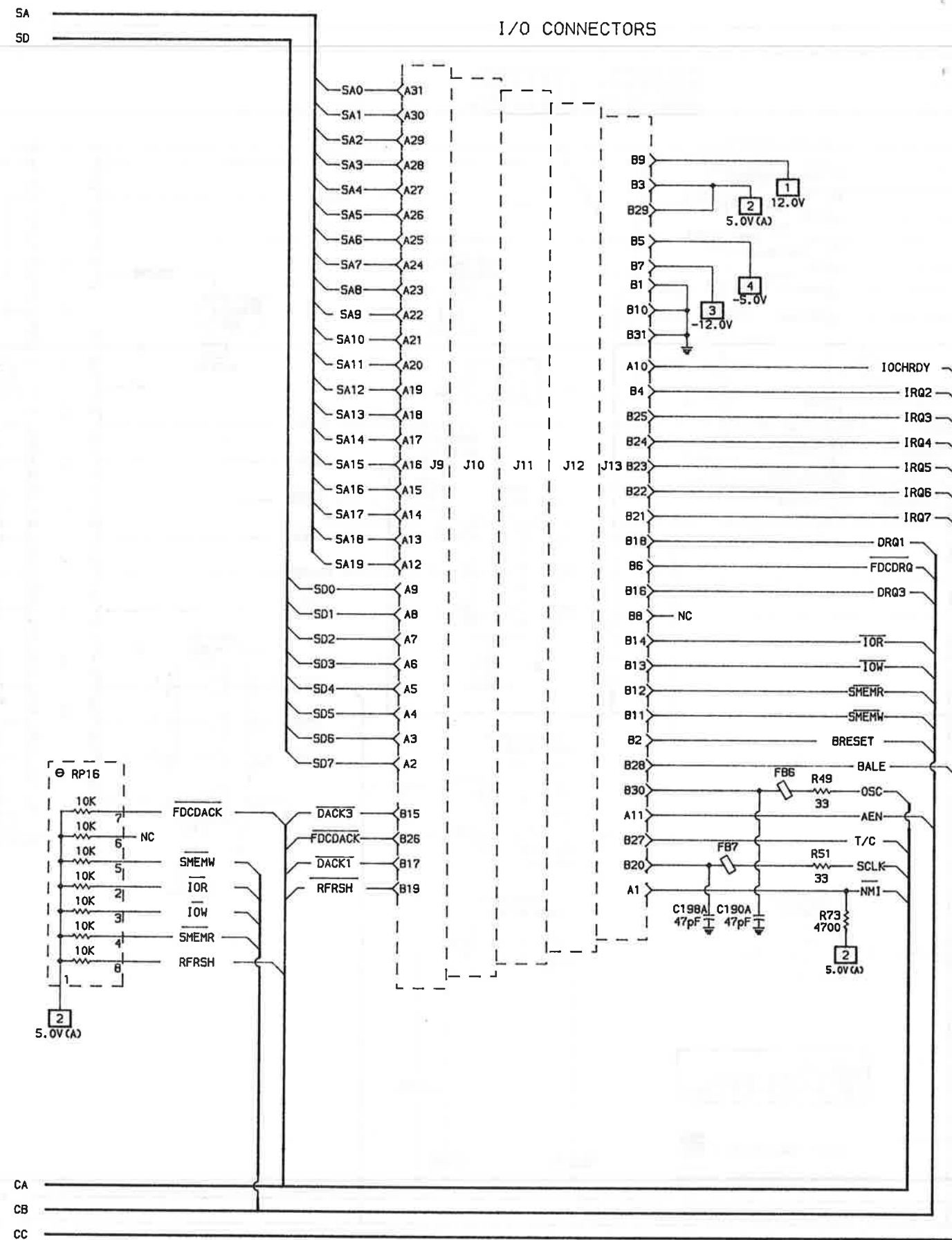
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PHOTO CIRCUITRACE = 11  
SCHEMATIC CIRCUITRACE = 11  
CABLING, HEAVY LINES REDUCE USE OF MULTIPLE LINES



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A PHOTOFAC STANDARD NOTATION SCHEMATIC  
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SEE POWER SUPPLY

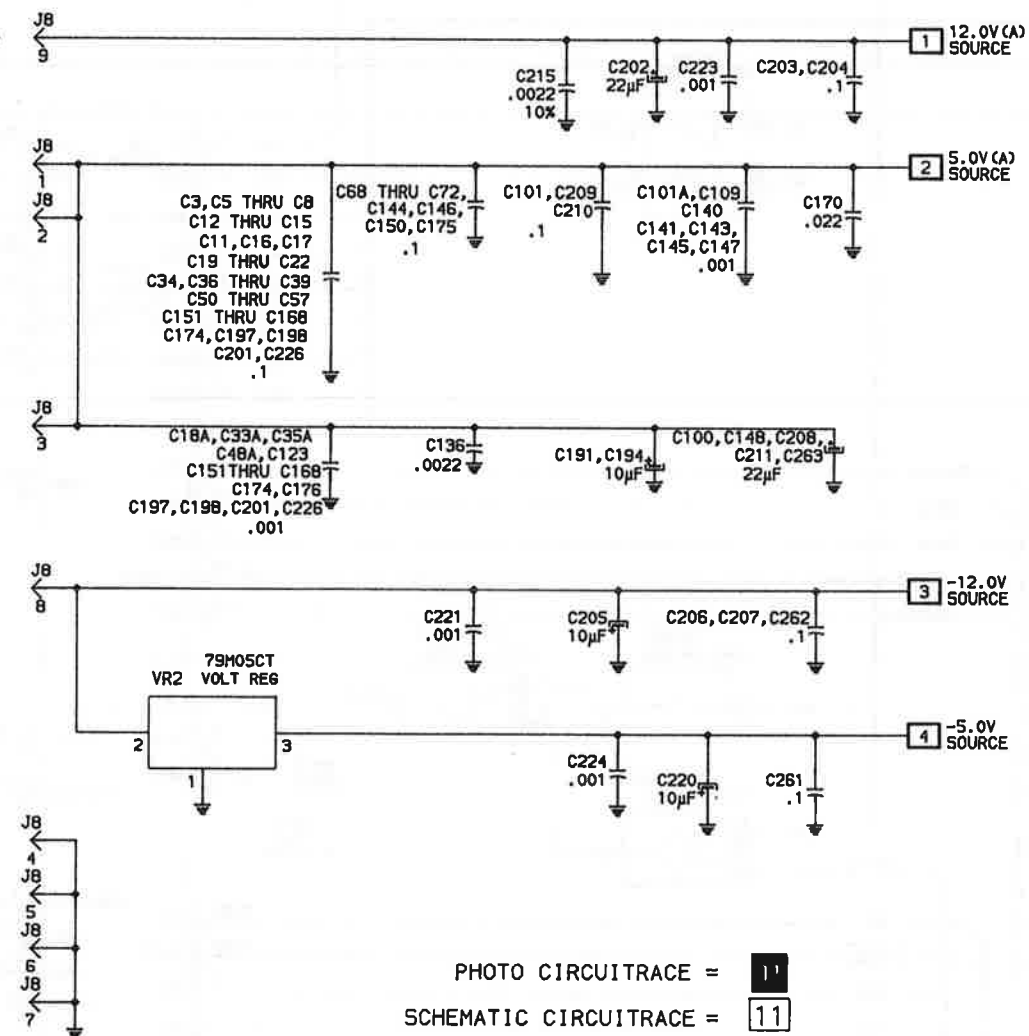


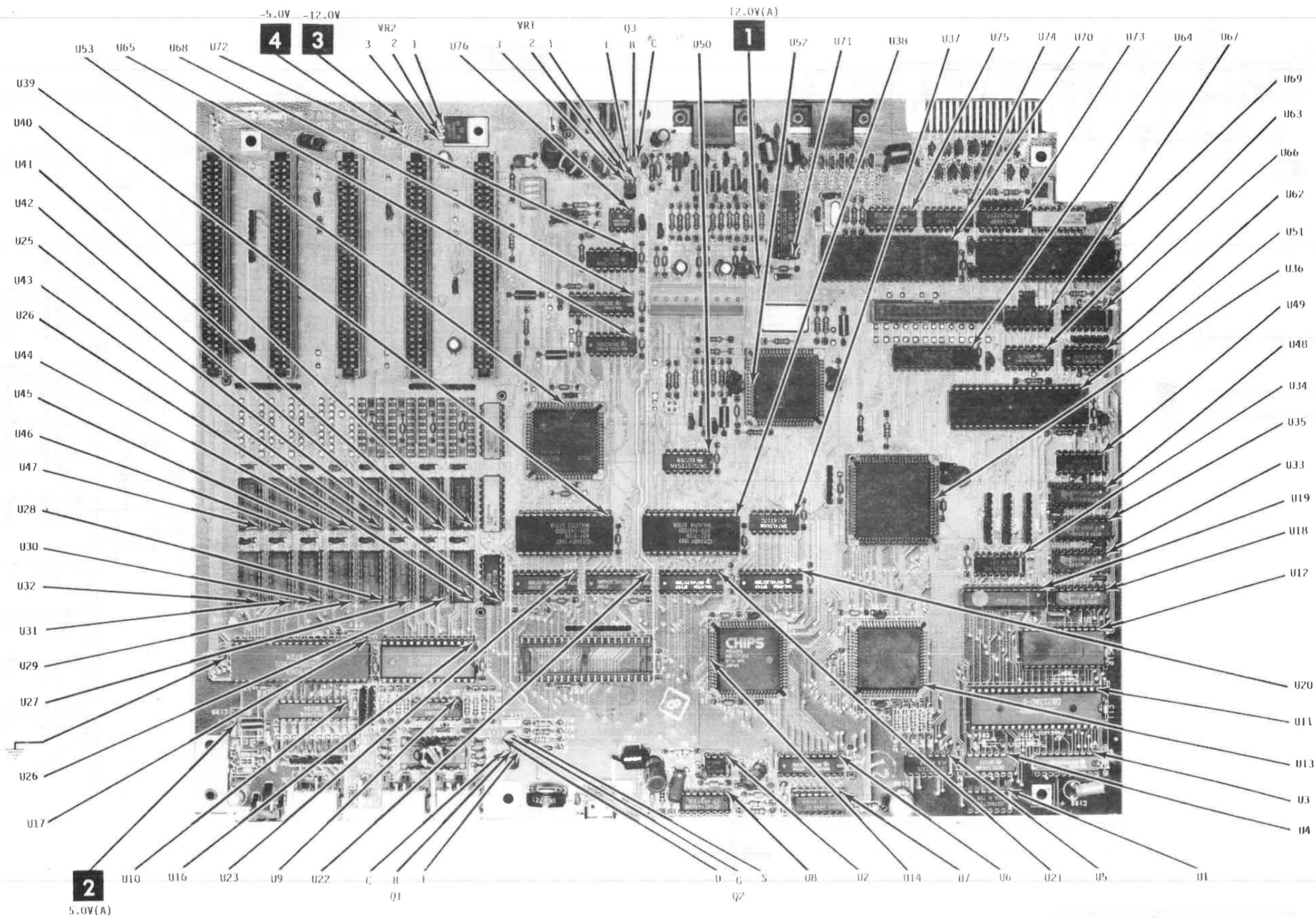
PHOTO CIRCUITRACE = **11**  
SCHEMATIC CIRCUITRACE = **11**

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49



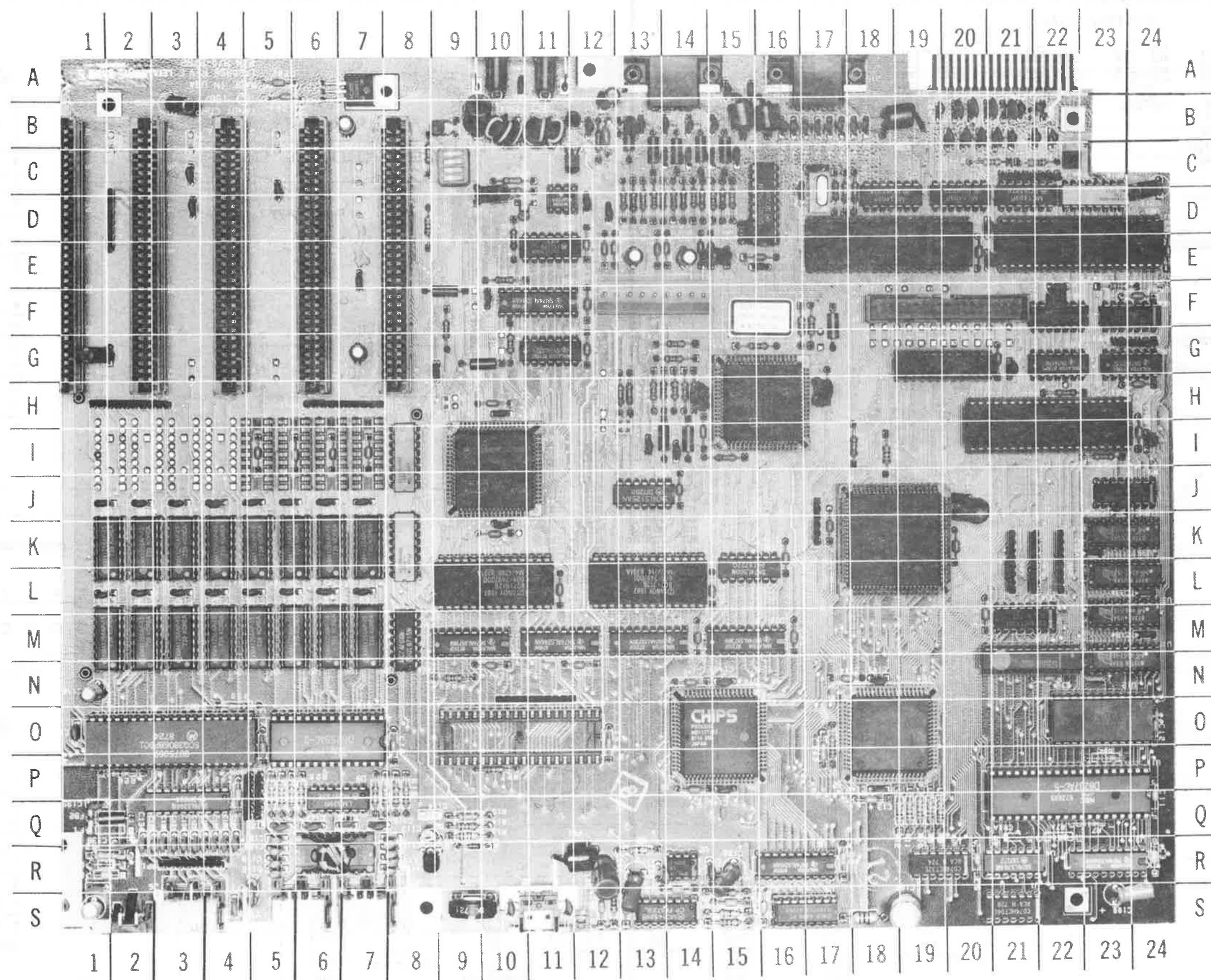




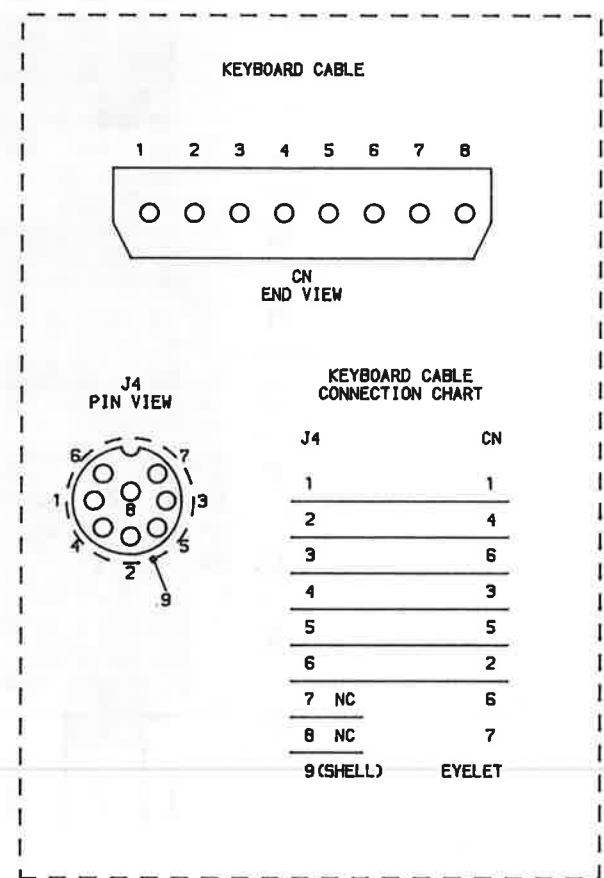
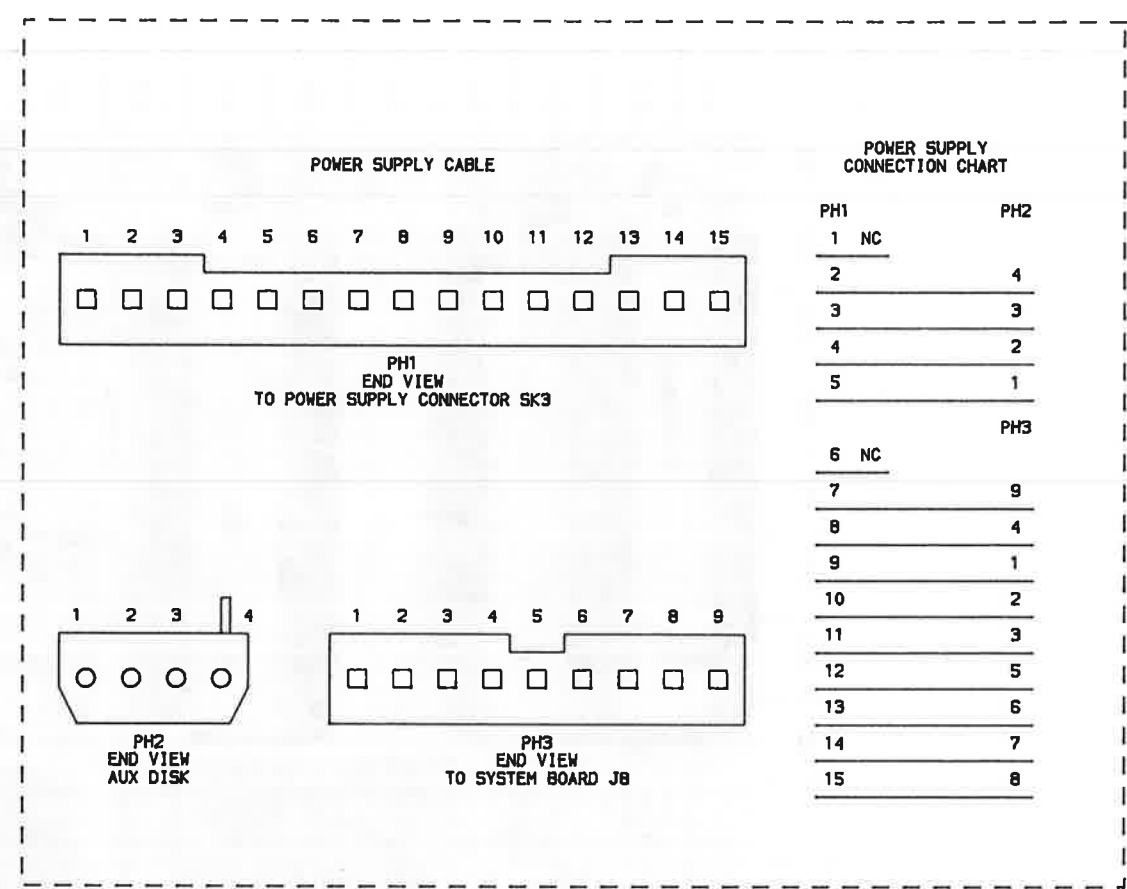
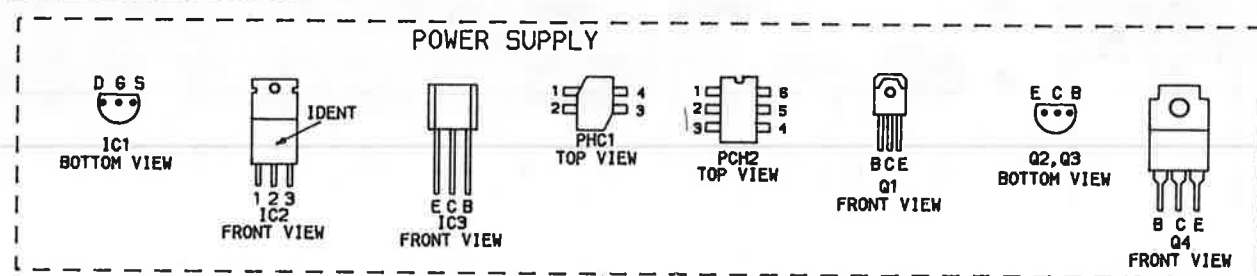
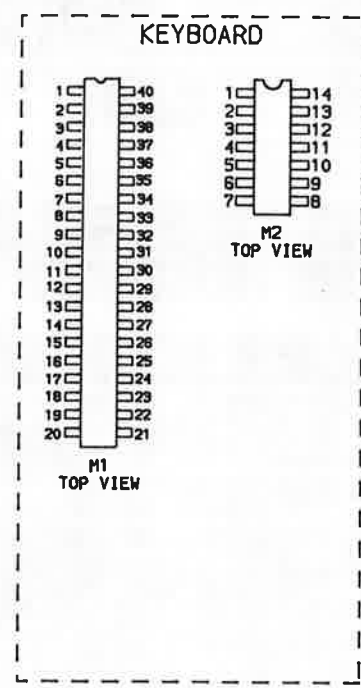
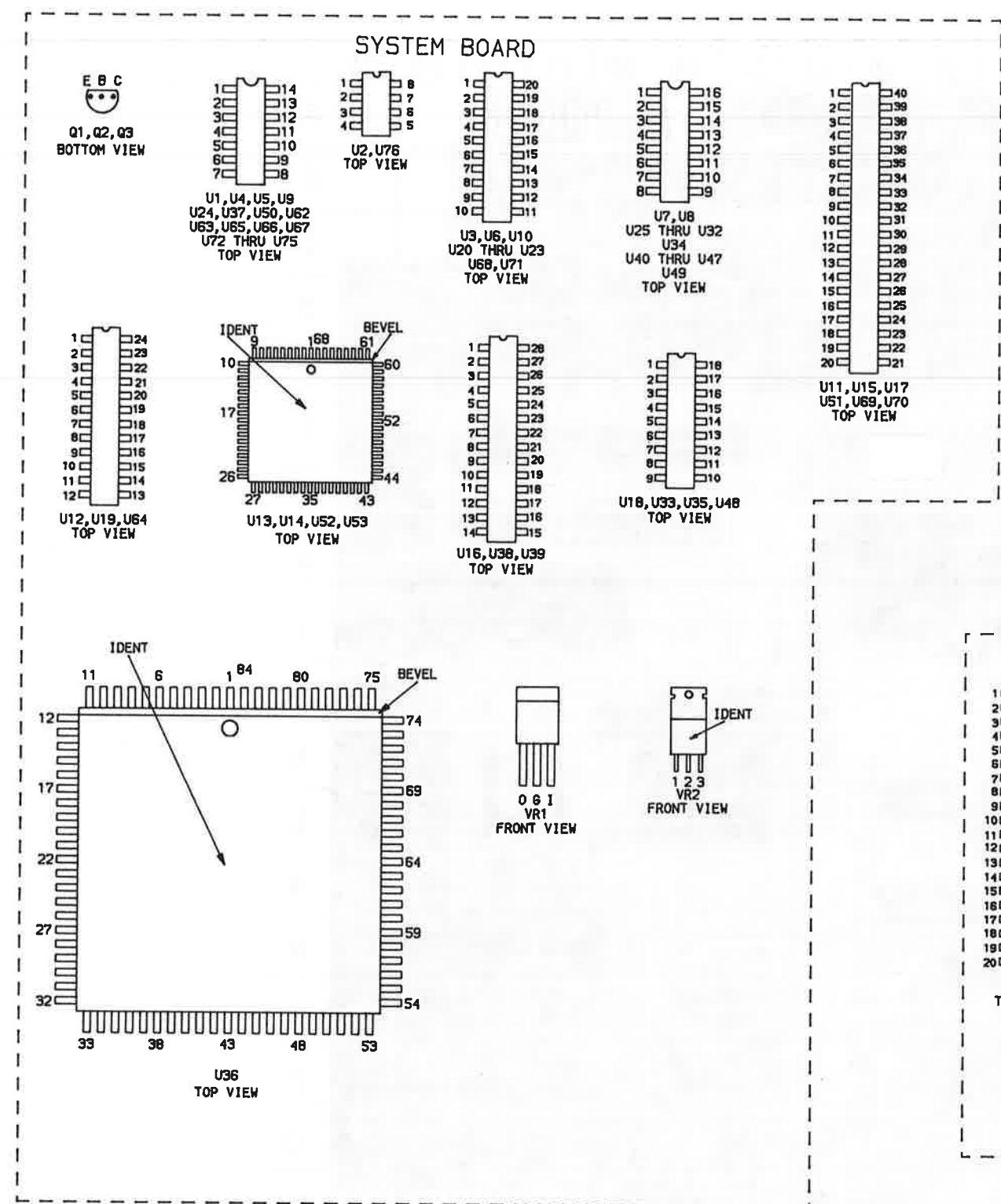


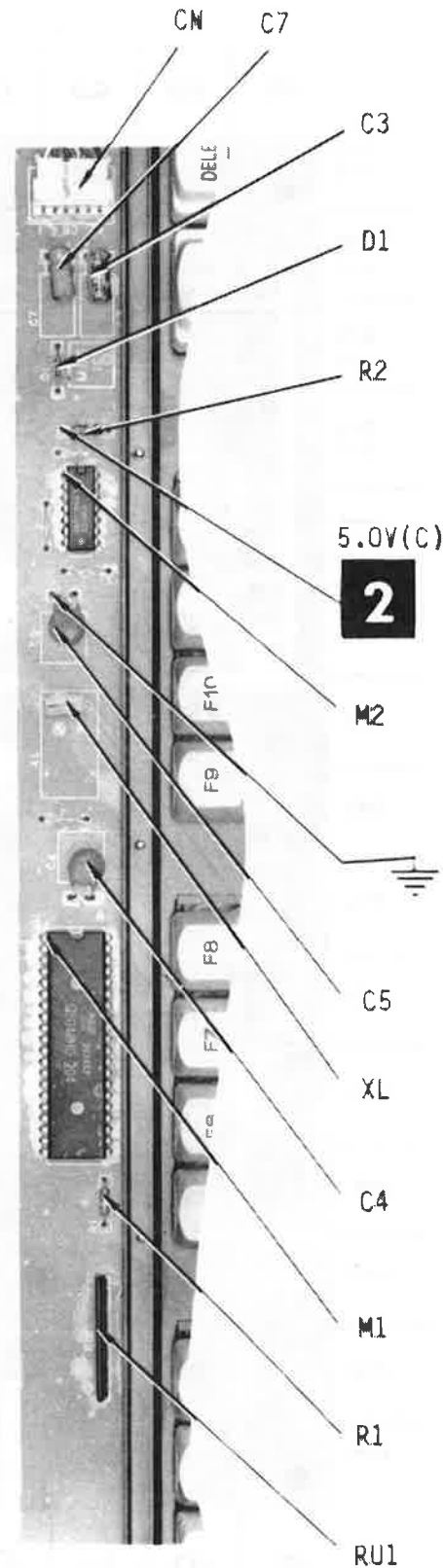
SYSTEM BOARD - GRIDTRACE LOCATION GUIDE

C3	R-24	C128	Q-4	C221	C-3	FB12	C-14	R49	G-10	U31	M-2
C5	R-20	C129	Q-3	C223	D-3	FB13	C-14	R50	F-9	U32	M-1
C6	R-17	C130	Q-3	C224	C-3	FB14	C-13	R51	E-10	U33	M-23
C7	S-16	C131	Q-3	C227	B-22	FB15	B-13	R52	C-18	U34	M-21
C8	S-13	C132	Q-3	C228	B-22	J1	S-12	R53	D-17	U35	L-23
C10	P-4	C133	Q-2	C229	B-21	J2	S-11	R54	C-17	U36	K-18
C11	Q-24	C134	Q-2	C230	B-21	J3	S-7	R55	D-15	U37	L-15
C12	O-24	C135	S-1	C231	B-20	J4	S-6	R56	D-15	U38	L-13
C13	Q-18	C136	R-1	C232	B-20	J5	S-3	R57	D-15	U39	L-10
C14	P-14	C137	R-1	C233	B-20	J7	F-20	R58	D-14	U40	K-7
C15	O-12	C138	Q-2	C234	B-22	J8	F-13	R59	D-14	U41	K-6
C16	O-8	C139	Q-1	C235	B-21	J9	E-8	R60	D-14	U42	K-6
C17	O-5	C140	P-18	C236	B-21	J10	E-6	R61	D-14	U43	K-5
C18A	M-24	C141	P-15	C237	B-21	J11	E-4	R62	D-14	U44	K-4
C19	N-22	C142	O-17	C238	B-20	J12	E-2	R63	D-13	U45	K-3
C20	M-16	C143	N-18	C239	B-20	J13	E-1	R64	D-13	U46	K-2
C21	M-14	C144	N-18	C240	B-19	J14	A-21	R65	D-13	U47	K-1
C22	N-12	C145	N-15	C241	B-18	J15	A-17	R66	D-13	U48	K-23
C23	N-10	C146	N-14	C242	B-18	J16	A-14	R67	D-10	U49	J-23
C33A	L-24	C147	O-1	C243	B-17	J17	A-10	R68	D-8	U50	J-13
C34	M-20	C148	N-1	C244	B-17	L1	S-18	R69	C-10	U51	I-22
C35A	K-23	C150	K-17	C245	B-17	Q1	R-8	R70	C-10	U52	H-16
C36	K-20	C151	K-10	C246	B-17	Q2	Q-8	R71	C-22	U53	I-10
C36A	J-20	C152	L-7	C247	B-16	Q3	B-12	R71A	C-21	U62	G-24
C37	K-13	C153	L-6	C248	B-16	R1	S-12	R72	B-12	U63	G-22
C38	L-15	C154	L-5	C249	A-15	R2	R-13	R73	C-8	U64	G-20
C39	L-11	C155	L-5	C250	A-15	R3	S-15	RP1	R-3	U65	G-11
C48A	J-23	C156	L-4	C251	B-15	R4	S-15	RP2	P-5	U66	F-24
C50	J-14	C157	L-3	C251A	C-15	R5	S-15	RP3	P-4	U67	F-22
C51	I-24	C158	L-2	C252	B-14	R6	S-9	RP4	N-11	U68	F-11
C52	G-17	C159	L-1	C252A	C-15	R7	Q-23	RP5	L-22	U69	E-23
C53	K-10	C160	J-7	C253	B-14	R7A	R-22	RP6	K-21	U70	E-18
C54	I-5	C161	J-6	C253A	C-14	R8	Q-19	RP7	K-21	U71	D-16
C55	I-6	C162	J-5	C254	B-13	R9	Q-19	RP8	K-18	U72	E-11
C56	I-6	C163	J-5	C254A	C-14	R10	Q-19	RP9	K-8	U73	D-21
C57	I-7	C164	J-4	C255	B-13	R11	Q-19	RP10	I-8	U74	D-20
C62	H-24	C165	J-3	C256	B-12	R12	Q-19	RP11	H-7	U75	D-18
C64	G-21	C166	J-2	C257	B-12	R13	Q-9	RP12	H-2	U76	D-11
C65	G-12	C167	J-1	C258	A-12	R14	Q-9	RP13	G-24	VR1	C-12
C66	F-24	C168	I-24	C258A	A-10	R15	Q-9	RP14	D-23	VR2	A-7
C68	F-12	C170	H-14	C259	B-10	R16	P-8	RP15	C-21	Y1	F-16
C69	E-24	C171	I-13	C260	B-9	R17	P-8	RP16	D-2	Y2	C-17
C70	E-20	C173	I-14	C261	A-5	R18	P-7	S1	S-2		
C71	E-16	C174	H-10	C262	A-5	R19	P-7	S2	C-9		
C72	D-12	C175	H-10	C263	A-3	R20	P-6	U1	S-21		
C100	S-23	C176	G-21	CF1	S-5	R21	P-5	U2	R-14		
C101	S-14	C177A	F-22	CF2	J-20	R22	P-5	U3	R-23		
C101A	R-14	C178	G-21	CF3	H-14	R23	P-5	U4	R-21		
C102	R-15	C190A	G-9	CF4	H-17	R24	R-1	U5	R-19		
C103	S-12	C191	G-7	CF5	D-15	R25	P-23	U6	R-16		
C105	R-12	C194	G-2	CMC1	R-6	R26	P-17	U7	S-16		
C106	S-19	C197	F-10	CMC3	B-11	R27	P-10	U8	S-14		
C107	S-15	C198A	E-7	CMC4	B-10	R28	P-2	U9	Q-6		
C108	R-13	C199	E-21	CR1	R-9	R29	N-9	U10	Q-3		
C109	S-11	C200	D-20	CR1A	R-21	R30	O-4	U11	Q-23		
C109A	S-10	C201	E-16	CR2	R-1	R31	I-23	U12	O-23		
C110	R-8	C202	E-15	E1	I-13	R32	I-18	U13	O-18		
C111	R-8	C203	E-15	E2	H-13	R33	I-18	U14	O-15		
C112	R-8	C204	E-14	E3	I-13	R34	I-15	U16	O-6		
C113	Q-8	C205	E-14	E4	H-13	R35	H-22	U17	O-3		
C114	Q-8	C206	E-14	E7	H-9	R36	H-14	U18	N-23		
C115	Q-7	C207	E-13	E8	H-9	R37	H-14	U19	N-21		
C116	Q-7	C208	E-13	FB1	R-12	R38	H-14	U20	M-15		
C117	Q-6	C209	E-12	FB2	Q-1	R39	H-14	U21	M-13		
C118	R-5	C210	E-12	FB3	I-14	R40	H-13	U22	M-11		
C119	R-5	C211	O-24	FB4	I-14	R41	H-13	U23	M-9		
C120	R-5	C212	C-16	FB5	F-17	R42	H-13	U24	N-8		
C121	Q-5	C213	C-17	FB6	G-10	R44	G-16	U25	M-7		
C122	Q-5	C214	D-12	FB7	F-9	R45	G-14	U26	M-6		
C123	S-4	C215	D-12	FB8	B-19	R46	G-14	U27	M-5		
C125	Q-4	C216	D-10	FB9	B-16	R47	F-17	U28	M-5		
C126	Q-4	C217	D-10	FB10	B-15	R47A	F-23	U29	M-4		
C127	Q-4	C220	B-7	FB11	C-35	R48	F-16	U30	M-3		



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

## SAFETY PRECAUTIONS

1. Use an isolation transformer for servicing.
2. Maintain AC line voltage at rated input.
3. Remove AC power from the Computer system 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-tilt, low voltage soldering iron.
6. Use an isolation (times 10) probe on scope.
7. Do not remove or install Boards, Floppy Disk Drives, Printers or other peripherals with Computer system AC power On.
8. Do not use freon-propelled sprays. These can generate electrical charges sufficient to damage semiconductor devices.
9. This Computer system is equipped with a grounded three-pronged AC plug. This plug must fit into a grounded AC power outlet. Do not defeat the AC plug safety feature.
10. Periodically examine the AC power cord for damaged or cracked insulation.
11. The Computer system cabinet is equipped with vents to prevent heat build-up. Never block, cover or obstruct these vents.
12. Instructions should be given, especially to children, that objects should not be dropped or pushed into the vents of the cabinet. This could cause shock or equipment damage.
13. Never expose the Computer system to water. If exposed to water, turn the unit Off. Do not place the Computer system near possible water sources.
14. Never leave the Computer system unattended or plugged into the AC outlet for long periods of time. Remove AC plug from AC outlet during lightning storms.
15. Do not allow anything to rest on AC power cord.
16. Unplug AC power cord from outlet before cleaning Computer system.
17. Never use liquids or aerosols directly on the Computer system. Spray on cloth and then apply to the Computer system cabinet. Make sure the Computer system is disconnected from the AC power line.



GENERAL OPERATING INSTRUCTIONS

BOOT UP

Insert a bootable diskette into Disk Drive A and turn On the Computer. The Computer will automatically boot up using the diskette in Disk Drive A. If a MS-DOS (Microsoft Disk Operating System) diskette is used, the Computer will display the date and time and ask for a new date and time. After the date time have been entered, the version of DOS will be displayed on the Monitor screen along with an A> which indicates the DOS is running.

MS-DOS

Boot up DOS. For a list of file names on the diskette in the current Disk Drive, type DIR and press the ENTER key. To specify Disk Drive that is not current (default), use DIR A: for Disk Drive A or DIR B: for Disk Drive B.

To run a (COM,EXE,SYS) program from a diskette while in DOS, type the program name and press the ENTER key.

A blank diskette must be formatted before it can be used to save information which is in memory. A formatted diskette must contain a DOS or a Start-up program before the Computer will boot up using that diskette.

Insert a diskette containing "FORMAT.COM" into Disk Drive A. Type FORMAT and press the ENTER key. Follow the instructions on the Monitor screen to format the unformatted diskette. NOTE: Formatting a diskette will wipe out any programs previously placed on the diskette. The Computer automatically defaults to Disk Drive A if the destination Disk Drive is not specified. Be sure to specify the destination Disk Drive of the diskette to be formatted, or insert a blank disk in Drive A as instructed by the message on the monitor, or the original diskette may be ruined by the default action.

BASIC

The manufacturer supplies Disk Basic on diskette. To load Disk Basic, first boot up DOS. Insert a diskette with a BASIC.COM program on it. Type BASIC and press the RETURN key or type BASICA and press the RETURN key to load advanced Disk Basic. To return to DOS from Basic, type SYSTEM and press the ENTER key.

To view a list of the names of programs on a diskette in the current Drive, type FILES and press the ENTER key. Type FILES "B": and press the ENTER key to list programs from Disk Drive B. Type FILES "A": to list programs from Disk Drive A if it is not the current (default) drive.

To load a program in Disk Basic or Advanced Disk Basic from the diskette, type LOAD, the program name enclosed in quotes, and press the ENTER key.

To save a program, type SAVE, the program name enclosed in quotes, and press the ENTER key.

To run a loaded program from Basic mode, type RUN and press the ENTER key. To stop a program, press the CTRL and BREAK keys at the same time. NOTE: Some programs will disable or not recognize the CTRL and BREAK keys to prevent the user stopping the program while it is running.

RESETTING COMPUTER

Press the CTRL, ALT, and DEL keys, all three at the same time, to reset the Computer. The Computer can also be reset by pressing the Reset button on lower left front panel.

CHANGING OPERATING MODES

The Video, Disk Drive, and CPU speed modes can be changed by pressing Function Keys F1 thru F4 immediately after the Computer beeps when it is turned On. Use the following chart to determine the function of each Key:

F1 - Changes the Video mode to Monochrome mode. (Computer normally comes up in Color Graphics mode.)

F2 - Changes the Video mode to TV mode.

F3 - Swaps Disk Drive references. Drive A becomes Drive B and Drive B becomes Drive A. The Computer will boot up from Drive B.

F4 - Changes CPU speed to 4MHz. The Computer normally comes up with a CPU speed of 8MHz.

VOLUME CONTROL

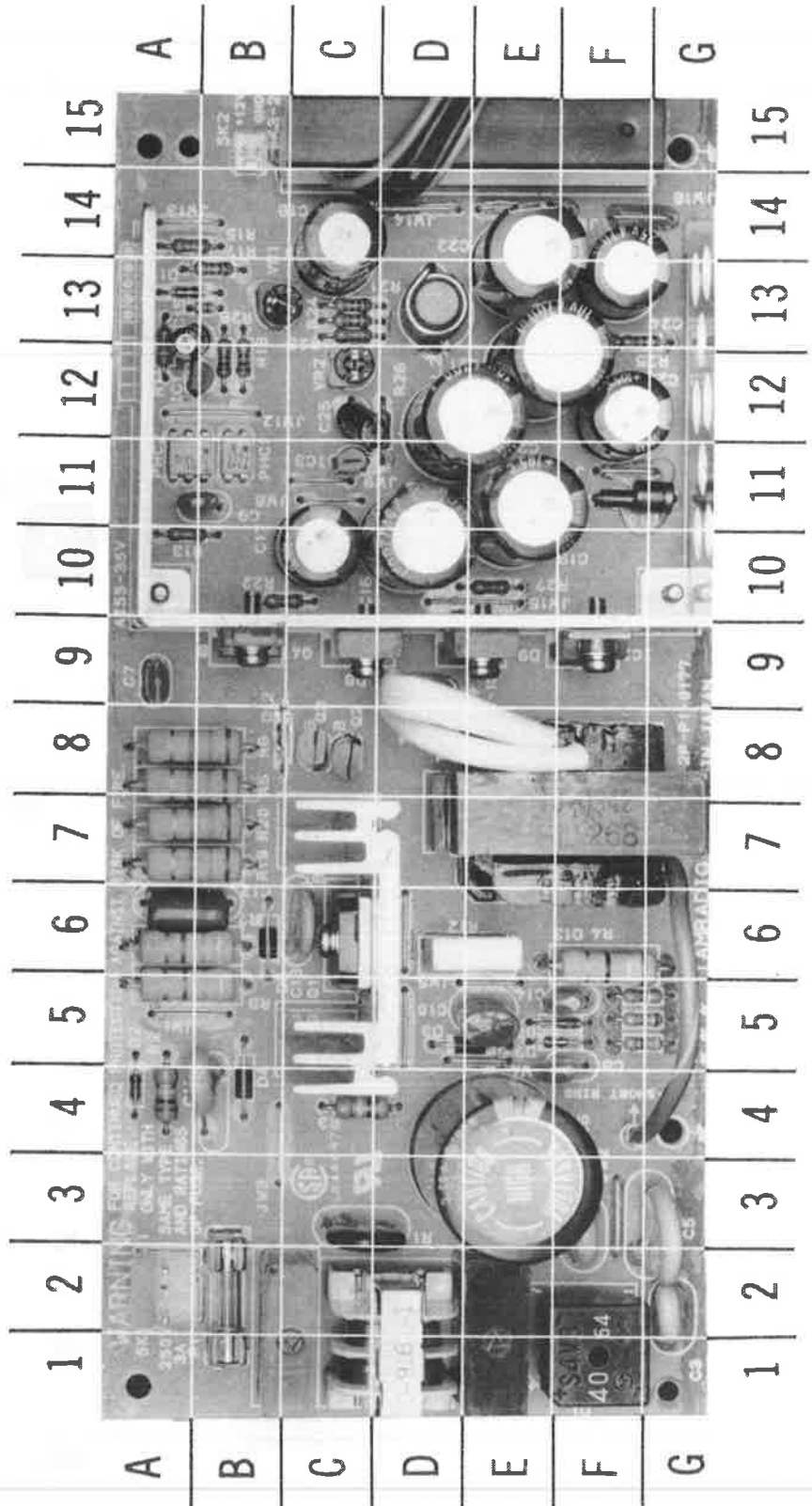
A Volume Control (R6) is provided on the Main System Board to set the volume of the earphone or internal speaker.

SELF-TEST

Normal Power-up sequence when the computer is turned on, when the Reset button is pressed and released, or when CTRL-ALT-DELETE key combination is pressed: Fan runs immediately if Power Supply 12V is working and "Memory Size = 640k" is output to the monitor; 5 seconds later, if no errors are found, the speaker beeps and the disk drive activates. With no disk in the drive, the DOS ROM version and copyright information is output in six lines to the monitor, and the prompt "Insert System Diskette and Strike any key when ready" is output a line below the copyright lines. If a DOS boot disk is latched in the drive, the DOS will load from the disk into the computer. The Tandy licensed version of MS-DOS will output a 5-line version and copyright notice to the monitor. Loaded DOS will then prompt for new date, and then new time. After new date and time is entered or defaults accepted by pressing the ENTER key, another DOS version and copyright notice is output, followed by the A> prompt to indicate operation in DOS.

POWER SUPPLY BOARD-GridTrace LOCATION GUIDE

C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11
C-1	E-1	G-2	F-3	G-3	E-3	A-9	F-5	A-11	E-5	B-4
C12	C13	C14	C15	C16	C17	C18	C19	C20	C21	C22
A-6	C-6	F-5	A-13	D-10	C-10	C-14	E-11	E-12	E-13	E-14
C23	C24	C25	D1	D2	D3	D4	D5	D6	D7	D8
F-12	F-13	C-12	F-1	A-4	E-5	B-4	F-5	F-5	C-9	
D9	D10	D11	D12	D13	F1	FB1	GA	GB	IC1	IC2
E-9	F-11	A-13	B-8	F-6	B-2	G-11	F-14	F-4	A-12	F-9
IC3	L1	L2	PHC1	PHC2	Q1	Q2	Q3	Q4	R1	R2
C-11	D-1	D-13	B-11	A-11	C-6	C-8	C-8	B-9	C-3	A-4
R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13
C-4	F-6	A-8	A-8	A-6	A-5	F-5	F-5	F-5	E-6	A-10
R14	R15	R16	R17	R18	R19	R20	R21	R22	R23	R24
A-12	A-14	B-12	B-13	B-12	A-7	C-13	B-10	C-13	C-13	C-13
R25	R26	R27	R28	SK1	SK2	SK3-1	SK3-2	T1	VR1	VR2
F-13	D-12	E-10	B-13	A-2	B-15	C-15	E-15	E-7	B-13	C-12



LOGIC CHARTS (Continued)

KEYBOARD

PIN NO.	IC M1	PIN NO.	IC M1	PIN NO.	IC M2
1	*	21	P	1	H(30)
2	P	22	P	2	L(30)
3	P	23	P	3	L(30)
4	H	24	P	4	H(30)
5	H(30)	25	H	5	H(30)
6	L(30)	26	H	6	L(30)
7	L	27	P	7	L
8	P	28	P	8	L(30)
9	H	29	P	9	H(30)
10	H	30	P	10	H
11	P	31	P	11	L
12	H	32	P	12	H
13	H	33	P	13	L
14	H	34	P	14	H
15	H	35	L		
16	H	36	L		
17	H	37	H(30)		
18	H	38	H(30)		
19	H	39	*		
20	L	40	H		

GENERAL OPERATING INSTRUCTIONS (Continued)

RAM ERROR

If self testing finds a memory flaw, the first line output to the monitor will indicate 128K memory size. A chart of the self test results will be output to the monitor. To determine the failing IC, note the difference between the written column values and the Read column values. If one character position in the Read column is bad, first note if the bad character is one of the left pair (High Byte) or the right pair (Low Byte) of the 4-character (word) value. The left pair indicates RAM IC U40 through U47, the right pair indicates RAM IC U25 through U32. If the error character is the left one of the pair, the failing IC will be one of the higher numbered half of the range of ICs, and the right would indicate the lower numbered half. The value difference between the character Written and the character Read indicates the failing IC of the four in the determined half of the range. If the difference is one, the lower numbered IC is the failing IC, a difference of two indicates the next to lower, four indicates next to higher, and eight indicates the higher numbered IC.

Example:

U47	U46	U45	U44	U43	U42	U41	U40	LEFT PAIR
8	4	2	1	8	4	2	1	
U32	U31	U30	U29	U28	U27	U26	U25	RIGHT PAIR
LEFT HALF				RIGHT HALF				
Written	Read	Base	Offset	Written	Read	Base	Offset	
A5A4	A4A4	0000	FFFE	A5A2	A4A2	0000	FFFC	

Left pair of the Read column value has character different from Written. Left pair indicates RAM IC numbers U40 through U47. Right character of left pair indicates lower numbered half of range (U40 through U43). A difference of one indicates the lowest numbered IC, U40. If the last line of the Memory Err Info shows a different value difference, a second IC failed the test.

If the left pair and the right pair of Read column values vary the same amount, system memory buffering/multiplexing is a possible cause (MA0 through MA6 lines). If Read is all FFFF, Jumper E9-E10 may be missing in a 640K system, or RAS0 line may be faulty. FF as the left pair may be CASH line faulty, and FF as the right pair may be CASL line faulty.

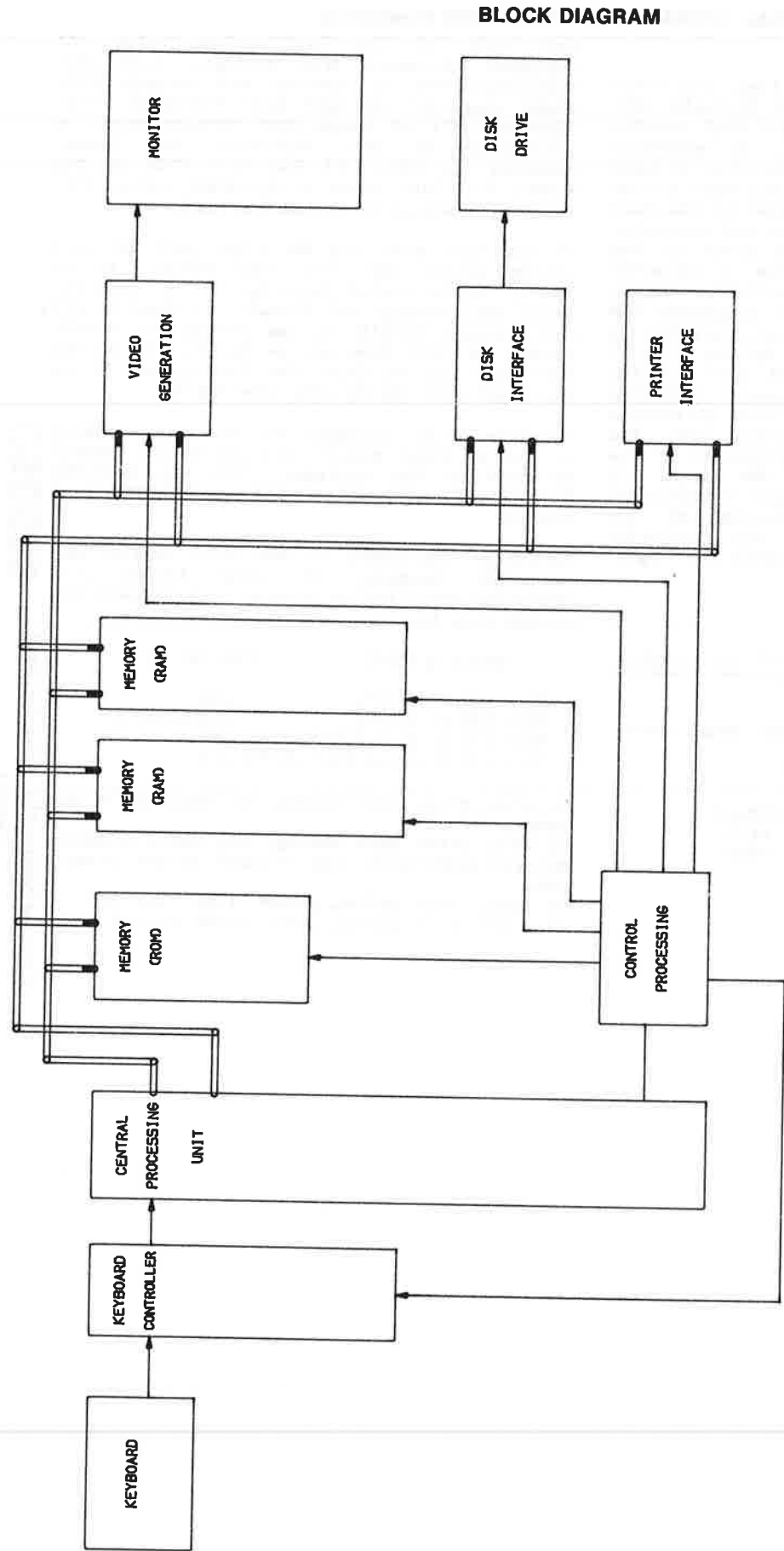
Two-line error messages may not be readable, or may be clear enough to read "Video Memory" as part of the message. This may indicate failing U16, U33, U35 or U48, or XMD/YMD lines faulty.

Scrambled characters in ROM BIOS version and copyright message, or error tables with character-substitution errors, can be produced by VMA line faults.

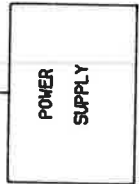
ERROR MESSAGE	FAILING IC
"Err I/O of 8259";	U16
"Err I/O of 8253";	U12(8254IC)
"Err I/O of port 378h";	U69
"Err I/O from kbd Port 61H";	U17

No Disk drive head homing, no response to key entry; U51.  
No Disk drive head homing, key entry produces delayed additional disk request screen prompt; U64.  
No Beep, Disk Drive select light lit but no head motion or spindle motor rotation; U11.

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TO PROVIDE POWER FOR ALL ACTIVE COMPONENTS



TO ALL CLOCKING FUNCTIONS



**LOGIC CHARTS (Continued)**

PIN NO.	IC U65	IC U66	IC U67	IC U68	IC U69	PIN NO.	IC U69	PIN NO.	IC U70	PIN NO.	IC U70
1	L	P†	P(10)†	P	H	21	H	1	P	21	H
2	P(2)†	P†	P(11)†	P	L	22	L	2	P	22	L
3	P(2)†	H†	P(3)†	P	P	23	H	3	P	23	H
4	H	L†	P(2)†	P	P	24	P	4	P	24	P
5	L	H	P(4)†	L	H	25	L	5	P	25	L
6	H	L	P(5)†	*	L	26	H	6	P	26	P
7	L	L	L	P	H	27	*	7	P	27	P
8	P	L	H	*	L	28	H	8	P	28	P
9	P	*	L	P	H	29	H	9	P	29	*
10	L	L	L	L	L	30	P	10	H	30	L
11	H	H	*	P	H	31	H	11	H	31	H
12	H	L	L	H	L	32	P	12	H	32	H
13	P	*	*	P	H	33	P	13	H	33	H
14	H	H	H	H	H	34	P	14	P	34	H
15				L	L	35	P	15	P	35	L
16				P	H	36	P	16	P	36	H
17				P	H	37	P	17	P	37	H
18				P	L	38	P	18	P	38	H
19				L	H	39	P	19	L	39	H
20				H	L	40	H	20	L	40	H

PIN NO.	IC U71	IC U72	IC U73	IC U74	IC U75
1	L	L	L	L	L
2	P	H	L	L	*
3	P	P	H	H	L
4	P	P	L	L	H
5	P	H	L	L	H
6	L	L	H	H	L
7	P	L	L	L	L
8	P	L	H	H	L
9	P	H	L	L	H
10	L	L	L	L	H
11	P	H	H	H	L
12	P	P	L	L	H
13	P	P	L	L	H
14	L	H	H	H	H
15	P				
16	P				
17	P				
18	P				
19	L				
20	H				

LOGIC CHARTS (Continued)

PIN NO.	IC U51	PIN NO.	IC U51	PIN NO.	IC U52	PIN NO.	IC U52	PIN NO.	IC U52	PIN NO.	IC U52
1	L†	21	P†	1	H	21	P	41	H	61	L
2	P†	22	P†	2	P	22	H	42	L	62	P
3	P†	23	P†	3	P	23	P	43	P	63	P
4	P(2)†	24	X†	4	P	24	P	44	L	64	P
5	P†	25	P(3)†	5	P	25	P	45	P	65	P
6	P†	26	H†	6	P	26	P	46	L	66	P
7	P†	27	H(10)†	7	P	27	L	47	P	67	P
8	P†	28	L(1)†	8	P	28	P	48	H	68	P
9	P†	29	L(1)†	9	P	29	P	49	L		
10	P†	30	P†	10	P	30	P	50	H		
11	P†	31	P(3)†	11	P	31	P	51	H		
12	P†	32	P(3)†	12	P	32	P	52	H		
13	P†	33	L(8)†	13	P	33	P	53	*		
14	P(3)†	34	L†	14	H	34	L	54	H		
15	P(2)†	35	H†	15	H	35	H	55	P		
16	P(3)†	36	H(3)†	16	P	36	H	56	P		
17	P†	37	P†	17	P	37	L	57	P		
18	P†	38	L(4)†	18	P	38	P	58	P		
19	P†	39	L(2)†	19	P	39	P	59	P		
20	L	40	H	20	P	40	P	60	P		

PIN NO.	IC U53	PIN NO.	IC U53	PIN NO.	IC U53	PIN NO.	IC U53	PIN NO.	IC U62	IC U63	IC U64	PIN NO.	IC U64
1	P	21	P	41	P	61	L	1	P(2)†	L†	P†	21	H†
2	P	22	P	42	L	62	P	2	P	L†	P†	22	P(3)†
3	P	23	P	43	P	63	P	3	H	L†	P†	23	L†
4	P	24	P	44	H	64	P	4	H	L†	P†	24	H†
5	P	25	P	45	P	65	P	5	P	H†	P†		
6	P	26	P	46	P	66	P	6	H	*†	P†		
7	P	27	L	47	P	67	P	7	L	L	P†		
8	P	28	P	48	P	68	P	8	P†	L	L(2)†		
9	P	29	P	49	P			9	P†	L	L(2)†		
10	P	30	P	50	P			10	P†	H	L(9)†		
11	H	31	P	51	P			11	P†	H	H(1)†		
12	L	32	P	52	H			12	H	*	L		
13	P	33	P	53	P			13	P	*	P(2)†		
14	H	34	P	54	P			14	H	H	P(3)†		
15	H	35	P	55	P			15			P†		
16	H	36	P	56	L			16			P(3)†		
17	P	37	P	57	P			17			P(3)†		
18	H	38	P	58	P			18			P(3)†		
19	P	39	P	59	P			19			P(3)†		
20	P	40	P	60	P			20			P(3)†		

DISASSEMBLY INSTRUCTIONS

CABINET REMOVAL

Remove two screws from lower front of cabinet. Slide cabinet forward and lift up to remove.

REAR PANEL REMOVAL

Remove Cabinet. Remove three screws from lower rear of rear panel. Pull rear panel tab clear of power switch button and pivot the bottom of the rear panel away from the chassis. Slide the rear panel up to clear tabs along top, and remove panel.

DISK DRIVE REMOVAL

Remove the Cabinet. Remove one screw from left front and one screw from inside left rear flange of system shield. Slide shield up from channel in left edge of chassis and tip to right to disengage tabs from slots in disk drive shield. Remove two screws from front flange to the left of the drive, one screw from the bottom tab at the right side of the drive and two screws from the top back edge of the left side of the drive. Lift the drive assembly and turn it slightly to the right to free the left side of the drive assembly. Disconnect the cable from the drive. Remove four screws from beneath drive and slide the drive back out of the drive bracket. Slightly spread the sides of the top cover to free the cover from the four detent bumps, and remove the cover.

POWER SUPPLY REMOVAL AND DISASSEMBLY

Remove Cabinet, Rear Panel, and Disk Drive. Disconnect cable from System Board. Remove four screws from back. Disconnect connector next to fuse. Release tabs on AC socket and switch panel and remove panel. Remove four screws holding fan and pivot fan clear of mounting. Disconnect fan connector and remove fan. Remove four screws and slide board out open end of power supply chassis, threading wiring harness thru slot in chassis.

NOTE: If operated with the board removed from the chassis, jumper the power switch assembly to Power Supply Board ground, and Jumper T1 Short Ring to JW16.

SYSTEM BOARD REMOVAL

Remove Disk Drive and Power Supply. Remove hairpin holding knob to Volume Control and remove knob. Disconnect speaker connector. Remove six screws from the System Board. Remove four hex extension bolts, two each from Monitor and Serial connectors. Lift the front edge of the System Board and slide forward and out.

MISCELLANEOUS ADJUSTMENTS

POWER SUPPLY

NOTE: Do not operate the Power Supply without a load. Connect point GA (T1 Short Ring) to point GB (JW16) if operated while disconnected from grounding plate.

5V ADJUSTMENT

Connect the Input of a DC voltmeter to 5V at coil L2. Adjust the 5V Adjust Control (VR1) for a voltage of 5.0V.

12V ADJUSTMENT

NOTE: Perform the 5V Adjustment first. Connect the Input of a DC voltmeter to 12V at Jumper JW8. Adjust the 12V Adjust (VR2) for a voltage of 12V.

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## TROUBLESHOOTING

## POWER SUPPLY

NOTE: Do not operate the Power Supply without a load. A #1129 lamp may be used as a load for the 5.0V Source and a #93 lamp used for the 12.0V Source. Use an Isolation Transformer with a stepdown control when servicing the Power Supply. Disconnect the power Supply from the System Board and Disk Drives to avoid possible damage to the System from high voltages that may be produced while servicing Power Supply. Connect Point GA to Point GB if operated while disconnected from Grounding Plate.

The Power Supply has a shutdown circuit, Zener Diode D11, Optoisolator PHC2 and Shutdown Transistor (Q3). The circuit will shut down the Power Supply if the 5.0V Source goes too high. To determine if the Power Supply is in shutdown, check for .67V at the base of Transistor Q3. The shutdown can be defeated by removing Zener Diode D11 from the circuit.

WARNING: Defeating shutdown may allow high voltages and currents to occur that may do further damage to Power Supply. Use a current limiting voltage stepdown AC Power Supply to supply AC power to the defective Power Supply when shutdown is defeated.

When shutdown occurs, the charge on Capacitor C9 will keep the Power Supply in shutdown if it is turned Off and immediately turned back On. Turn the power Supply Off and wait at least two minutes before turning it back On to allow the charge on Capacitor C9 to discharge.

Power Supply Dead. Check Fuse F1. If F1 open, check for possible shorts at Diode D1 and check for a possible shorted Power Amp Transistor (Q1). If Fuse F1 is good, apply AC power and check for 120V AC across the AC Input pins of Bridge D1. If 120V AC is missing, check Coils L1 and L3, Switch S1 and Connector SK1. If 120V AC is present, check for 163V between D1 negative and the collector of Transistor Q1. If 163V is missing, check Bridge D1, Thermistor R1 and check the winding on Transformer (T1) from pin 4 to pin 6 for continuity. If 163V is present, check the waveform at the base of Transistor Q1. If the waveform is missing, check the voltages and components associated with Oscillator Transistor (Q2) and Transistor Q1 and check the winding on Transformer T1 from pin 2 to pin 3 for continuity.

No -12.0V at pin 15 of Connector SK3-1. Check the winding on Transformer T1 from pin 8 to pin 9 for continuity and check the -12V Regulator IC (IC2), Diode D10, Capacitors C23, C24 and Resistor R25.

No 12.0V at pin 7 of Connector SK3-1. Check for 13.3V at the emitter of the 12V Regulator Transistor (Q4). If 13.3V is missing, check the winding on Transformer T1 from pin 13 to pin 14 for continuity and check Diode D8 and Capacitors C16 and C17. If 13.3V is present, check Error Amp IC (IC3), Transistor Q4, Capacitors C18, C25, Resistors R22 thru R24, R26 and Control VR2.

No 5.0V at pin 9 of Connector SK3-1. Check the winding on Transformer T1 from pin 11 to pin 13 for continuity and check Diode D9, Capacitors C19 thru C22 and Coil L2.

## MICROPROCESSOR (CPU) OPERATION

Microprocessor IC (U13) not working. Check for a 16MHz waveform at pin 31 of IC U13. If the waveform is missing, refer to the "Oscillators and Dividers" section of this Troubleshooting guide. If the waveform checks good, check the logic reading at pin 29 (Reset) of IC U13 while turning the Computer On. The reading should be High when the Computer is turned On, then go Low. If the reading is not correct, check the logic reading at pin 34 of IC U52 while turning the Computer On. The reading should be High when the Computer is turned On, then go Low. If the reading is not correct check the logic reading at pin 36 of U52 while turning the Computer On. The reading should be Low when the Computer is turned On, then go High. If the reading is correct, check IC U52. If the reading is not correct, check the logic reading at pin 9 of U67 while turning the Computer On. The reading should start Low, Pulse, then stay Low. If the reading is correct check IC U67, Capacitors C135, C137, Diode CR2, Resistor R24 and Switch S1. If the reading is not correct, check the logic reading at pin 10 of U66. The reading should start High then go Low. If the reading is correct check IC U4. If the reading is not correct check IC U66, Capacitor C177A and Resistor R47A.

## OSCILLATORS AND DIVIDERS

Verify Oscillator Module (Y1) is working properly by checking for a 28.636MHz signal at pin 60 and 16.0MHz signal at pin 62 of IC U52. If either signal is missing or frequency is not correct, check Oscillator Module Y1.

If the Oscillator Module checks good, check the dividers in IC U52 by checking for a 1.9MHz signal at pin 57, 8.0MHz signal at pin 64, 14.328MHz signal at pin 59, 3.5795MHz signal at pin 58, 4.0MHz signal at pin 65, and 16MHz signal at pin 63. If any of the signals are not correct, check IC U52.

## KEYBOARD

Keyboard does not function. Check Keyboard Connector J5 on the System Board and Connector CN on the Keyboard for good connections, and check the Keyboard Cable for broken wires. If the Connectors and cable check good, check the waveforms at pins 1 and 4 of Connector J5 on the System Board while pressing the Space Bar on the Keyboard. If the waveforms check good, check IC 17 on the System Board. If the waveforms are missing, check the waveforms at pins 2, 21 thru 24 and 27 thru 34 of Keyboard Controller IC (M1) on the Keyboard. If the waveform is missing at pin 1, check the 6.0MHz Crystal (XL) and IC M1. If any of the other waveforms are missing, check IC M1. If the waveforms check good, check for pulses at pins 37 and 38 of IC M1 while pressing a key. If pulses are missing, check IC M1. If pulses are present, check IC M2.

## LOGIC CHARTS (Continued)

PIN NO.	IC U37	IC U38	PIN NO.	IC U38	PIN NO.	IC U39	PIN NO.	IC U39	PIN NO.	IC U40
1	H	*	21	P	1	*	21	P	1	P
2	H	P	22	P	2	P	22	P	2	P
3	L	P	23	P	3	P	23	P	3	P
4	*	P	24	P	4	P	24	P	4	P
5	*	P	25	P	5	P	25	P	5	P
6	L	P	26	P	6	P	26	P	6	P
7	L	P	27	P	7	P	27	P	7	P
8	L	P	28	H	8	P	28	H	8	H
9	*	P			9	P			9	P
10	*	P			10	P			10	P
11	L	P			11	P			11	P
12	*	P			12	P			12	P
13	*	P			13	P			13	P
14	H	L			14	L			14	P
15		P			15	P			15	P
16		P			16	P			16	L
17		P			17	P			17	
18		P			18	P			18	
19		P			19	P				
20		P			20	P				

PIN NO.	IC U41	IC U42	IC U43	IC U44	IC U45	IC U46	IC U47	IC U48	IC U49	IC U50
1	P	P	P	P	P	P	P	P	P	L
2	P	P	P	P	P	P	P	P	H	P(3)†
3	P	P	P	P	P	P	P	P	H	P(3)†
4	P	P	P	P	P	P	P	H	L	L†
5	P	P	P	P	P	P	P	P	L	P(3)†
6	P	P	P	P	P	P	P	P	P	P(3)†
7	P	P	P	P	P	P	P	P	P	L
8	H	H	H	H	H	H	H	P	L	L
9	P	P	P	P	P	P	P	H	P	L
10	P	P	P	P	P	P	P	P	H	H
11	P	P	P	P	P	P	P	P	H	
12	P	P	P	P	P	P	P	P	H	
13	P	P	P	P	P	P	P	P	H	
14	P	P	P	P	P	P	P	P	H	
15	P	P	P	P	P	P	P	P	H	
16	L	L	L	L	L	L	L	P	H	
17								P		
18								L		

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LOGIC CHARTS (Continued)

PIN NO.	IC U20	IC U21	IC U22	IC U23	IC U24	IC U25	IC U26	IC U27	IC U28	IC U29	IC U30	IC U31	IC U32
1	P	P	P	P	P	P	P	P	P	P	P	P	P
2	P	P	P	P	P	P	P	P	P	P	P	P	P
3	P	P	H	P	P	P	P	P	P	P	P	P	P
4	P	P	P	P	P	P	P	P	P	P	P	P	P
5	P	P	P	P	P	P	P	P	P	P	P	P	P
6	P	P	P	P	P	P	P	P	P	P	P	P	P
7	P	P	H	*	L	P	P	P	P	P	P	P	P
8	P	P	*	*	L	H	H	H	H	H	H	H	H
9	P	P	P	*	L	P	P	P	P	P	P	P	P
11	P	P	P	H	H	P	P	H	P	P	P	P	P
12	P	P	H	H	*	P	P	P	P	P	P	P	P
13	P	P	H	H	*	P	P	P	P	P	P	P	P
14	P	P	P	H	H	P	P	P	P	P	P	P	P
15	P	P	P	P	P	P	P	P	P	P	P	P	P
16	P	P	P	P	P	L	L	L	L	L	L	L	L
17	P	P	*	P									
18	P	P	P	P									
19	P	P	P	P									
20	H	H	H	H									

PIN NO.	IC U33	IC U34	IC U35	IC U36	PIN NO.	IC U36	PIN NO.	IC U36	PIN NO.	IC U36	PIN NO.	IC U36
1	P	P	P	L	21	P	41	L	61	P	81	P
2	H	P	P	P	22	H	42	P	62	P	82	P
3	H	P	P	P	23	P	43	L	63	P	83	P
4	H	P	H	P	24	P	44	P	64	P	84	P
5	P	P	P	P	25	H	45	P	65	P		
6	P	P	P	P	26	H	46	P	66	P		
7	P	P	P	L	27	P	47	P	67	P		
8	P	L	P	H	28	P	48	P	68	P		
9	H	H	H	H	29	H	49	P	69	P		
10	P	H	P	H	30	H	50	P	70	P		
11	P	H	P	L	31	P	51	P	71	P		
12	P	P	P	L	32	L	52	P	72	P		
13	P	P	P	L	33	H	53	P	73	P		
14	P	P	P	L	34	P	54	P	74	P		
15	H	P	P	L	35	H	55	P	75	P		
16	P	H	P	P	36	*	56	P	76	P		
17	L		L	H	37	P	57	P	77	P		
18	P		L	H	38	P	58	P	78	P		
19				P	39	P	59	P	79	P		
20				P	40	P	60	P	80	P		

TROUBLESHOOTING (Continued)

Individual keyswitch failure. Check power-off key-down resistance for .5 ohm to 3 ohms between IC M1 Scan In and Scan out pins (see chart). Bridge between Scan In and Scan out to verify circuit function. Example; Bridge between IC M1 pins 18 and 30. Monitor should display the letter "A" or "a", depending on the state of the CAPS/SHIFT keys.

KEYBOARD IC M1 KEY MATRIX

PINS	12	13	14	15	16	17	18	19
21	F6	F7	F8	F9	F10	NUM LOCK	HOLD	7(1)
22	8(1)	9(1)	F8	4(1)	5(1)	6(1)	→	1(1)
23	2(1)	3(1)	0(1)	DELETE	BREAK	INSERT	.(1)	ENTER(1)
24	HOME	F11	F12					
27	ESC	1	2	3	4	5	BACK	6
28	7	8	9	0	=	=	S SPACE	TAB
29	Q	W	E	R	T	Y	U	I
30	O	P	I	J	ENTER	CTRL	A	S
31	D	F	G	H	J	K	L	;
32	,	↑	L.SHIFT	←	Z	X	C	;
33	B	N	M	,	.	/	R.SHIFT	PRINT
34	ALT	BAR	CAPS	F1	F2	F3	F4	F5

(1) Numeric Keypad Area  
Closed Key Resistance; .5 ohm to 3 ohm.

SOUND

No Sound. If there is no sound from the internal speaker, check the setting of the Volume Control (R6). The Control should be set to Maximum clockwise for Maximum volume. Check connection of Jack J1 and check Speaker SP1 for continuity. Check switching contacts of Headphone Jack J2 for continuity.

If Speaker and connections check good and the Control is set properly, type in and run the following Basic program:

10 PRINT CHR\$(7): GOTO 10

The program produces a continuous audio tone of about 800 hertz. While the program is running, check for pulses at pin 13 of IC U49. If pulses are missing, check IC U49. If pulses are present, check for pulses at pin 3 of IC U5. If pulses are missing, check IC U5. If pulses are present, check for pulses at pin 14 of IC U7. If pulses are missing check IC U52. If pulses are present, check for the waveform shown in Figure 1 at pin 7 of IC U3. If the waveform is missing, check IC U7. If the waveform is present, check for a logic Low at pin 28 of IC U17. If the reading is not correct, check IC U17. If the reading is correct, check for a logic High at pin 4 of IC U1. If the reading is not correct, check IC Y1. If the reading is correct, check for the waveform shown in Figure 1 at pin 10 of IC8.

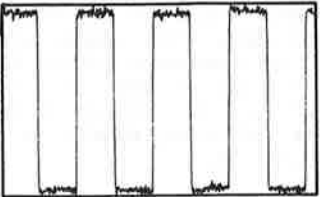


Figure 1

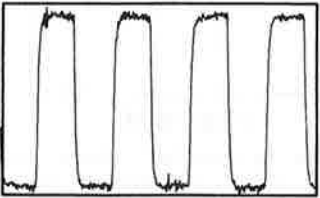


Figure 2

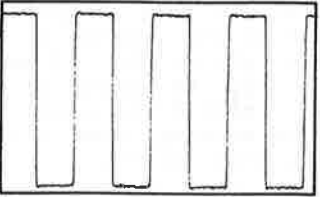


Figure 3

CSCS30

MODEL 1000TX(25-1600)REV.A,C

TANDY

TROUBLESHOOTING (Continued)

CPU CLOCK SPEED

To check the CPU clock switching circuits, type In and run the following program:

```
10 OUT 98,32: PRINTR "SLOW (8MHz)"
20 A$=INKEY$: IF A$="" THEN 20
30 OUT 98,40: PRINT "FAST(16MHz)"
40 A$=INKEY: IF A$="" THEN 40 ELSE 10
```

The program changes the clock speed each time a key is pressed. Set the speed to "Slow" and check for a frequency of 8MHz at pin 63 of IC U52. Then set the speed to "Fast" and check for a frequency of 16MHz at pin 63 of IC U52. If the frequency does not switch at pin 63, check IC U52.

SERIAL PORT

Serial port does not work. Check Connector J15 for good connections. If the connector checks good, make sure jumper is installed on jumper pins E1 and E2 and is making good connections. If the jumper checks good, check for a 1.843MHz signal at pin 16 of Serial Controller IC U70. If the signal is missing or the frequency not correct, check Crystal Y2, Capacitors C212, C213 and Resistors R53 and R54. If the signal is present, type In and run the following Basic program:

```
10 OUT 1019,131
20 OUT 1016,128:OUT 1017,1
30 OUT 1019,3
40 OUT 1020,0:OUT 1020,15
50 OUT 1016,255:GOTO 40
```

The program sets the baud rate to 300 baud and causes pulses to appear at pins 11, 30, 31, 32, 33 and 34 of IC U70. The baud clock waveform at pin 15 of IC U70 should look like Figure 4 when the program is running.

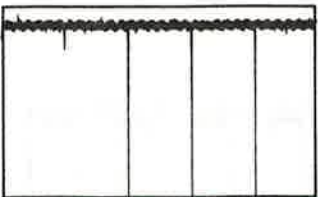


Figure 4

While the program is running, check for pulses at pin 14 of IC U70. If pulses are missing, check IC U19. If pulses are present, check for pulses at pins 11, 32 and 33 of IC U70. If pulses are missing, check IC U70. If pulses are present, check for pulses at pins 6, 8 and 11 of IC U75. If pulses are missing, check IC U75. If pulses are present, turn the Computer off and plug a Serial Test Loopback plug (female DB-9 connector with the following jumper connections: pin 1 to pins 7 and 8, pin 2 to 3, pin 4 to pins 6 and 9) into connector J3. Turn the Computer back On and run the above program. While the program is running, check for pulses at pin IC U73. If pulses are missing, check IC U73. If pulses are present, check for pulses at pins 3, 6, 8, and 11 of IC Y74. If pulses are missing, check IC U74. If pulses are present, check IC U70.

PARALLEL PORT

Parallel Port does not work. Check Connector J14 for good connections. If the connector checks good, disconnect any equipment connected to Connector J14 and type In and run the following Basic program:

```
10 CLS
20 LOCATE 1,1
30 OUT 888,0:OUT 890,0
40 PRINT"A=";INP(888)
50 PRINT"B=";(INP(889) AND 248)
60 PRINT"C=";INP(890)
70 OUT 888,255:OUT 890,255
80 PRINT"D=";INP(888)
90 PRINT"E=";(INP(889) AND 248)
100 PRINT"F=";INP(890)
110 GOTO 20
```

The program continuously checks the Parallel Port circuits and displays six numbers (A thru F) on the Monitor screen. With nothing connected to Connector J14, the following numbers should appear on the monitor screen:

```
A=0
B=88
C=11
D=255
E=88
F=52
```

Make a parallel loopback test plug by connecting together pins 17, 19, 21, 23 and 28 of a 34-pin female edge connector. Connect the test plug to Connector J7 and run the above program. The following numbers should appear on the Monitor screen:

```
A=0
B=144
C=11
D=127
E=144
F=52
```

If any of the numbers are not correct, check for pulses at pin 15 of IC U49 while the above program is running. If pulses are missing, check IC U49. If pulses are present, check IC U69, Capacitors C200 and C227 thru C240, Resistor R71A and Resistor Packs RP14 and RP15.

JOYSTICK PORTS

Joystick Ports do not work. Type In and run the following Basic program:

```
10 CLS
20 LOCATE 2,2
30 OUT 513,255
40 A=0:A=INP(513)
50 PRINT A
60 GOTO 20
```

The program displays the number 240 on the Monitor screen when Joystick Connectors J2 or J3 are not being used. The number will change when pin 1 or 2 of Connector J2 or J3 is connected to 5.0V (Jn-5) or when pin 4 or 6 of Connector J2 or J3 is connected to ground (Jn-3). Use the following charts to determine what the number will be.

LOGIC CHARTS (Continued)

PIN NO.	IC U14	PIN NO.	IC U14	PIN NO.	IC U14	PIN NO.	IC U14	PIN NO.	IC U16	PIN NO.	IC U16
1	L	21	P	41	P	61	P	1	P	21	H
2	P	22	P	42	P	62	P	2	P	22	L
3	P	23	P	43	P	63	P	3	H	23	P
4	P	24	P	44	P	64	P	4	P	24	L
5	P	25	P	45	P	65	P	5	P	25	H
6	P	26	P	46	P	66	P	6	P	26	P
7	P	27	P	47	P	67	P	7	P	27	P
8	P	28	P	48	P	68	P	8	P	28	H
9	P	29	P	49	P			9	P		
10	P	30	P	50	L			10	P		
11	P	31	P	51	P			11	P		
12	P	32	P	52	H			12	L		
13	P	33	P	53	L			13	L		
14	P	34	P	54	H			14	L		
15	P	35	L	55	P			15	L		
16	P	36	P	56	H			16	*		
17	P	37	P	57	L			17	P		
18	H	38	P	58	P			18	P		
19	P	39	P	59	L			19	L		
20	P	40	P	60	P			20	H		

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



LOGIC CHARTS

PIN NO.	IC U1	IC U3	IC U4	IC U5	IC U6	IC U7	IC U8	IC U10	IC U11	PIN NO.	IC U11
1	P	P	P	H	P	P	H	H	H	21	P
2	P	P	P	H	P	P	L	H	P	22	P
3	L	P	P	H	P	P	L	P	P	23	P
4	H	P	H	H	P	H	L	H	P	24	H
5	H	P	P	H	P	P	L	P	H	25	P
6	L	P	P	H	P	H	L	L	P	26	P
7	L	P	L	L	P	H	L	P	P	27	P
8	H	P	H	H	P	L	L	L	P	28	P
9	*	P	L	*	P	L	L	P	P	29	P
10	H	L	H	*	L	P	H	L	P	30	P
11	*	P	P	H	P	P	L	L	P	31	H
12	H	P	L	H	P	P	L	P	P	32	P
13	*	P	H	P	P	P	L	L	L	33	P
14	H	P	H	H	P	P	H	P	H	34	P
15		P			P	P	H	H	H	35	P
16		P			P	H	H	P	*	36	P
17		P			P			H	L	37	P
18		P			P			P	*	38	P
19		L			P			H	P	39	P
20		H			H			H	L	40	P

PIN NO.	IC U12	PIN NO.	IC U12	PIN NO.	IC U13	PIN NO.	IC U13	PIN NO.	IC U13	PIN NO.	IC U13
1	P	21	H(30)	1	P	21	P	41	P	61	L
2	P	22	H	2	*	22	P	42	P	62	H
3	P	23	P	3	*	23	P	43	P	63	P
4	P	24	H	4	P	24	P	44	P	64	P
5	P			5	P	25	P	45	P	65	P
6	P			6	H	26	P	46	P	66	P
7	P			7	P	27	P	47	P	67	P
8	P			8	P	28	P	48	P	68	P
9	P			9	L	29	L	49	P		
10	P			10	P	30	H	50	P		
11	H			11	P	31	P	51	P		
12	L			12	P	32	P	52	L		
13	P			13	P	33	P	53	H		
14	H			14	P	34	P	54	H		
15	P			15	P	35	L	55	*		
16	L(30)			16	P	36	P	56	*		
17	H(30)			17	P	37	P	57	P		
18	P			18	P	38	P	58	*		
19	P			19	P	39	P	59	L		
20	P			20	P	40	P	60	L		

TROUBLESHOOTING (Continued)

Connected to 5.0V (Jn-5)	Number	Connected To Ground (Jn-3)	Number
J2-1	244	J2-4	176
J2-2	248	J2-6	112
J3-1	241	J3-4	224
J3-2	242	J3-6	208

If the numbers are not correct, make the following checks while the above program is running. Check for pulses at pin 12 of IC U49. If pulses are missing, check IC U49. If pulses are present, check for pulses at pin 6 of IC U5. If pulses are missing, check IC U5. If pulses are present, check for pulses at pin 6 of IC U1. If pulses are missing, check IC U1. If pulses are present, check for the waveform shown in Figure 5 at pin 4 of IC U9. If waveform is not correct, check Transistors Q1 and Q2, Zener Diode CR1, Capacitor C114 and Resistors R13, R14 and R15. If waveform is correct, connect pins 1 and 2 of Connectors J2 and J3 to 5.0V and check for pulses at pins 1, 2, 13, and 14 of IC U9. If pulses are missing, check the voltages and components associated with IC U9. If pulses are present, check IC U10, Capacitors C110, C111, C118 and C119 and Resistor Packs RP1 and RP2.

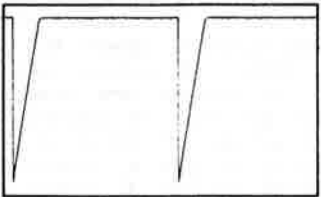


Figure 5

USING A PRINTER FOR DISPLAY

If there is a defect in the CRT Controller Circuitry, information that is normally displayed on the Monitor screen may not be visible or readable. In such cases, it may be possible to send the Monitor screen information to a Printer that is connected to the Computer. While the Computer is in MS-DOS or GWBasic, the Printer output can be turned On by pressing the Print Key. The Monitor screen information will continue to be printed out until the Print Key is pressed again to turn the Printer Off. It is also possible to get a printout of the entire screen display by holding the Shift Key down and pressing the Print Key.

Any Basic program that used the PRINT command to send information to the Monitor screen can be made to send the information to a Printer by changing the PRINT command to LPRINT.

VIDEO

No Video. Check waveforms at pins 2, 4, 8 and 11 of IC U71. If any waveforms are missing, check IC U36. If waveforms are good, check waveform at the base of Video Out Transistor (Q3). If waveform is missing or not correct, check IC U71, Capacitor C214 and Resistors R55, R60, R62 and R64. If waveform is good, check waveform at the emitter of Transistor Q3. If waveform is missing, check the voltages and components associated with

VIDEO SYNC

No vertical or horizontal sync on an RGB Monitor. Check for a vertical waveform at pin 11 and a horizontal waveform at pin 13 of IC U71. If either waveform is missing, check IC U36. If waveforms are good, check IC U71, Capacitors C249 and C250 and check pins 8 and 9 of Connector J16 for good connections.

No vertical and horizontal sync on a Monitor connected to the Composite Video Jack (J17). Check composite sync waveform at pin 17 of IC U71. If waveform is missing, check IC U36. If waveform is present, check for sync pulses in waveform at the base of Video Out Transistor (Q3). If pulses are missing, check IC U71 and Resistor R55. If sync pulses are present, check Transistor Q3, Capacitors C257 and C258A, Resistor R72, Coil CMC3 and Jack J17.

COLOR

No color or some colors missing. Type in and run the following Basic program:

NOTE: Put four spaces between the quotes in line 70.

```
10 DATA 9, 10, 12
20 SCREEN 0,1:WIDTH 80
30 KEY OFF:CLS
40 FOR Y=1 TO 3
50 READ C:COLOR 0,C
60 FOR X=1 TO 160
70 PRINT " ";
80 NEXT X:NEXT Y
90 GOTO 90
```

The program puts blue, green and red horizontal bars on the Monitor screen. While the program is running, check for the waveform shown in Figure 6 at pins 2, 4, 8, 12, 16 and 18 and the waveform shown in Figure 7 at pins 5 and 15 of IC U71.

If waveforms are missing at pin 2, 4, 8 or 15 of IC U71, check IC U36. If waveforms are present at pins 2, 4, 8 and 15 and missing at pins 5, 12, 16 and 18, check IC U71. If waveforms are good at pin 5, 12, 16 and 18, check Resistors R57 thru R62, R65 and R66, and Capacitors C251 thru C254, C251A thru C254A and Jack J16.

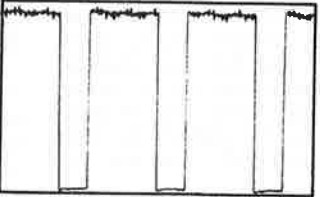


Figure 6

DISK DRIVE INTERFACE

WARNING: It is possible for a defective Disk Drive to write on or erase information on a diskette, even if the diskette is write protected. Check the Disk Drive by first using a diskette that has programs that have been backed up on another diskette. Do not leave the alignment diskette in the drive while checking

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TROUBLESHOOTING (Continued)

voltages and waveforms unless specified in the alignment procedures. The test equipment may cause the Disk Drive circuits to erase sections of the alignment diskette even if the diskette is write protected.

Check all setup jumpers and switches for correct positions and check all interconnecting cables for good connections.

WILL NOT READ

Insert a diskette in Disk Drive B and close the door. Press and release the Reset button (S1). Make the following checks between 5 1/2 and 7 seconds after releasing Reset. Check for index pulses at pin 17 of Floppy Disk Controller IC (U51). If pulses are missing, refer to the "Index Sensor" section of this Troubleshooting guide. If pulses are present, check for a logic Low at pin 3 and logic High at pin 4 of IC U67. If reading is not correct at pin 3, check IC U51. If reading is correct at pin 3 and not correct at pin 4, check IC U67. If readings are correct at IC U67, check for pulses at pins 4 and 5 of IC U64. If pulses are missing at pin 4, check pin 30 of Connector J7 for good connections and check the Drive cable. If the connector and cable check good, refer to the "Disk Drive Troubleshooting" in the Disk Drive Folder.

If pulses are present at pin 4 of IC U64 and missing at pin 5, check IC U64. If pulses are present at pin 5, check for pulses at pins 4 and 19 of IC U51.

If pulses are missing at pin 19, check IC U64. If pulses are missing at pin 4, check for pulses at pin 12 of IC U62. If pulses are present at pin 12 check for pulses at pin 13 of IC U62 and pin 12 of IC U72. If pulses are present on both pins, check IC U62. If pulses are missing from pin 12 of IC U72 check IC U72. If pulses are missing at pin 12 of IC62, check for pulses at pin 4 of IC U65. If pulses are found check IC U65. If pulses are missing, check IC U49.

WILL NOT WRITE

Boot DOS and load Basic (see General Operating Instructions). Insert a blank diskette into the Disk Drive and close the door. Type in and run the following Basic program which writes continuously to the Diskette and displays a number on the upper left corner of the Monitor screen. The number should be 0 when the Diskette is not write protected and change to 2 when no disk in in the drive or a write protected Diskette is inserted into the Drive. If the numbers are not correct, refer to the "Write Protect Does Not Function" section of this Troubleshooting guide.

10 CLS
20 OUT 1014,128:OUT 1010,16:OUT 1010,20
30 S=INP(1012)
40 OUT 1013,77:S=INP(1012)
50 OUT 1013,Y:S=INP(1012)
60 OUT 1013,1:S=INP(1012)
70 OUT 1013,12:S=INP(1012)
80 OUT 1013,12:S=INP(1012)
90 OUT 1013,0:S=INP(1012)
100 S=INP(1013):S=INP(1012)

110 PRINT INP(1013) AND 2:S=INP(1012)
120 FOR X=1 TO 5
130 S=INP(1013):S=INP(1012)
140 NEXT X:LOCATE 1,1
150 IF Y=1 THEN Y=5 ELSE Y=1
160 GOTO 20

NOTE: This program will not write to the diskette if the diskette index sensor circuits are not working. Check for index pulses at pin 1 of Buffer IC U66 while the Drive is running with a blank diskette inserted. If pulses are missing, refer to the "Index Sensor" section of this Troubleshooting guide.

While the above program is running, check for pulses at pins 4, 19, 25 and 30 of Floppy Disk Controller IC U51. If pulses are missing at pin 19, check IC U64. If pulses are missing at pin 4, check for pulses at pin 12 of IC U62. If pulses are present at pin 12 check for pulses at pin 13 of IC U62 and pin 12 of IC U72. If pulses are present on both pins, check IC U62. If pulses are missing from pin 12 of IC Y72 check IC U72. If pulses are missing at pin 12 of IC62, check for pulses at pin 4 of IC U65. If pulses are found check IC U65. If pulses are missing, check IC U49.

If pulses are present at pins 4 and 19 and missing at pins 25 or 30, check IC U51. If all readings are correct, check for pulses at pin 13 of IC Y64. If pulses are missing, check IC U64. If pulses are present, check connection of J7 pin 22. If connection checks good, check for pulses at pin 4 of IC 67. If pulses are missing at pin 4, check IC67. If pulses are present at pin 4, check pin 22 of Connector J7 for good connections and check the Drive cable. If the connector and cable check good, refer to the "Disk Drive Troubleshooting" in the Disk Drive Folder.

WRITE PROTECT DOES NOT FUNCTION

Type in and run the program listed under the "Will Not Write" section of this Troubleshooting guide. The program will display the number 0 on the left upper corner of the Monitor screen if a diskette that is not write protected is inserted into the Drive and the number 2 if the diskette is write protected.

WARNING: This program also writes on the diskette. Do not use a diskette that has data on it that is important. Insert a blank write protected diskette into the Drive and close the door.

If the numbers on the Monitor screen are not correct, make the following checks with a blank write protected diskette in the Drive and the program running.

Check for a logic Low at pin 3 and logic High at pin 4 of IC U66. If reading is not correct a pin 3, check pin 28 of Connector J7 for good connections and check the Drive Cable. If the connector and cable check good, refer to the "Disk Drive Troubleshooting" in the Disk Drive Folder. If reading is correct at pin 3 of IC66 and not correct at pin 4, check IC U66. If reading is correct at pin 4 and the number on the Monitor screen is not correct, check the Floppy Disk Controller IC (U51).

LINE DEFINITIONS (Continued)

TMRINT.....TIMER INTERRUPT REQUEST
TRKO.....DISK, TRACK 00 SENSOR
VCAS.....VIDEO COLUMN ADDRESS STROBE
VIDWAIT.....VIDEO WAIT
VIOR.....VIDEO INPUT/OUTPUT READ
VIOW.....VIDEO INPUT/OUTPUT WRITE
VMA0 THRU VMA7.....VIDEO MEMORY ADDRESS BITS 0 THRU 7
VM/IO.....SELECT,DISTINGUISHING VIDEO MEMORY OR IO
VMWEO, VMWE1.....VIDEO MEORY ENABLE
VRAS.....VIDEO ROW ADDRESS STROBE
VSYNC.....VERTICAL SYNC
WEO.....WRITE ENABLE,LOW
WRDATA.....WRITE DATA
WREN.....WRITE ENABLE
WRPRT.....WRITE PROTECT
XBUFEN.....BUFFER ENABLE
XBUFDIR.....BUFFER BUS DIRECTION
XD0 THRU XD7.....DATA BITS 0 THRU 7
XDS0,XDS1.....DISK SELECT
XMD0 THRU XMD7.....EXTERNAL MEMORY DATA BITS 0 THRU 7
YMD0 THRU YMD7.....EXTERNAL MEMORY DATA BITS 0 THRU 7
287CS.....287 CHIP SELECT
28MHZ.....CLOCK PULSE 28MHz
16MHZ.....CLOCK PULSE 16MHz
3.58MHZ.....CLOCK PULSE 3.58MHz
1.19MHZ.....CLOCK PULSE 1.19MHz

SWITCHES AND JUMPERS

Switches	ON	OFF
S2-1	Color Video	Composite Monochrome
S2-2	Interrupt 5 Internal Sync	Interrupt 5 External Sync
S2-3	Interrupt 6 On-board Floppy Disk Controller	Interrupt 6 Optional Controller
S2-4	Enable Printer Interrupt 7	Disable Printer Interrupt 7
Jumpers	INSTALLED	REMOVED
E1-E2	Enable Serial port (Com1)	Serial Port disabled
E3-E4	Change on-board serial to Com 2	Serial Port is Com 1
E9-E10	640K Memory	Enable Added 128K RAM (768K total)

LINE DEFINITIONS

AAO.....ENCODED I/O SELECT  
AEN.....ADDRESS ENABLE  
AF16.....16 BIT MEMORY ACCESS CONTROL SIGNAL  
ALE.....ADDRESS LATCH ENABLE  
AUDIO.....AUDIO INPUT SIGNAL  
BA1.....ENCODED I/O SELECT  
BALE.....BUFFERED ADDRESS LATCH ENABLE  
BHE.....BYTE HIGH ENABLE  
BRESET.....RESET EXPANSION LOGIC  
BUSY 287.....BUSY 287  
CA2.....ENCODED I/O SELECT  
CASH.....COLUMN ADDRESS STROBE,HIGH  
CASL.....COLUMN ADDRESS STROBE,LOW  
CDET.....CARRIER DETECT  
CHGRST.....CHANGE RESET  
COL/MNO.....COLOR/MONOCHROME  
CNTLOFF.....CONTROL OFF, COMMAND  
                  ENABLE/ADDRESS ENABLE  
CPUHLDA.....CPU HOLD ACKNOWLEDGE  
CPUHRQ.....CPU REQUEST  
CRDD.....CONTROLLER READ DATA  
CRDW.....CONTROLLER READ/WRITE  
CTS.....CLEAR TO SEND  
CTRKO.....TRACK 00 SENSOR  
DACK1,DACK3.....DIRECT MEMORY ACCESS  
                  ACKNOWLEDGE LINES  
DIR.....DIRECTION,DISK READ/WRITE HEAD  
DIRHLB.....DIRECTION HIGH TO LOW BYTE  
DMACKL.....DIRECT MEMORY ACCESS CLOCK  
CMACS.....DIRECT MEMORY ACCESS CHIP SELECT  
DMAEN.....DIRECT MEMORY ACCESS ADDRESS ENABLE  
DMAMR.....DIRECT MEMORY ACCESS MEMORY READ  
DMARDY.....DIRECT MEMORY ACCESS READY  
DMA/INTE.....DIRECT MEMORY ACCESS REQUEST/FDC  
                  INTERRUPT ENABLE  
DRDY.....DATA READY  
DREQ3Q.....DMA REQUEST  
DRX.....DATA RECEIVE  
DSDENO.....DATA STROBE DATA ENABLE  
DSKCHG.....DISK CHANGE  
DT/R.....DATA TRANSMIT/RECEIVED  
DTR.....DATA TERMINAL READY  
DTX.....DATA TRANSMIT  
ENHLB.....ENABLE HIGH TO LOW BYTE  
ERROR.....ERROR/STATUS UNMASKABLE  
                  ERROR CONDITION  
FDCAK.....FLOPPY DISK CONTROLLER ACKNOWLEDGE  
FDCDRQ.....FLOPPY DISK CONTROLLER DMA REQUEST  
FDCCS.....FLOPPY DISK CONTROLLER CHIP SELECT  
FDCLK.....FLOPPY DISK CONTROLLER CLOCK  
FDCDACK.....FLOPPY DISK CONTROLLER  
                  DMA ACKNOWLEDGE  
FDCTC.....FLOPPY DISK CONTROLLER TERMINAL COUNT  
VDCINT.....FLOPPY DISK CONTROLLER INTERRUPT  
FDCRST.....FLOPPY DISK CONTROLLER REST  
FDCWCK.....FLOPPY DISK CONTROLLER TIMING PULSE  
HLDA.....HOLD ACKNOWLEDGE  
HRQ.....HOLD REQUEST  
INDEX.....INDEX SENSOR  
INT287.....INTERRUPT 287  
INTA.....INTERRUPT ACKNOWLEDGE  
INTCS.....INTERRUPT CHIP SELECT

INTR.....INTERRUPT REQUEST  
IOCHRDY.....INPUT/OUTPUT READY  
IOR.....INPUT/OUTPUT READ  
IOW.....INPUT/OUTPUT WRITE  
IRQ0, IRQ2 THRU IRQ7.....INTERRUPT REQUEST LINES  
IRQ3EN, IRQ4EN.....INTERRUPT REQUEST ENABLE  
JOYCS.....JOYSTICK CHIP SELECT  
KBDINT.....KEYBOARD INTERRUPT  
LMEGCS.....MEMORY BUFFER CHIP SELECT  
MAO THRU MA7.....MEMORY ACCESS BITS 0 THRU 7  
MBDEN.....MEMORY DATA BUS ENABLE  
MDO THRU MD15.....MEMORY DATA 0 THRU 15  
MEMCYC.....MEMORY CYCLE  
MEMIOS.....MEMORY/INPUT-OUTPUT SELECT  
MEMR.....MEMORY READ  
M/IO.....SELECT, DISTINGUISHING MEMORY OR IO  
MTRON.....MOTOR ON,DISK DRIVE  
NMI.....NONMASKABLE INTERRUPT  
NMIE.....NONMASKABLE INTERRUPT ENABLE  
NPCS.....NUMERICAL PROCESSOR CHIP SELECT  
OSC.....OSCILLATOR  
PACK.....PARALLEL PORT ACKNOWLEDGE  
PBUSY.....PARALLEL PORT BUSY  
PDATA0 THRU PDATA7.....PARALLEL PORT DATA  
                  BITS 0 THRU 7  
PE.....PAPER EMPTY  
PFAULT.....PARALLEL PORT FAULT STATE  
PGREGWR.....PAGE REGISTER INPUT/OUTPUT WRITE  
PINT.....PARALLEL PORT INITIALIZE,  
                  SET UP SEQUENCE  
PIOCS.....CHIP SELECT STROBE  
POTOFED.....AUTO PAPER FEED  
PPICS.....PROGRAMMABLE PERIFERAL INTERFACE  
                  CHIP SELECT  
PPI/TIM.....VIDEO SIGNAL TIMING  
PRCLK,PRCLKA,PRCLKB.....PROCESSOR CLOCK  
PRTCS.....PORT CHIP SELECT  
PSEL.....PORT SELECT  
PSTROBE.....PARALLEL PORT TIMING STROBE  
RASO,RAS1.....ROW ADDRESS STROBE  
RESET.....RESET  
RESET 287.....RESET 287  
RESCPU.....RESET CPU  
RD DATA.....READ DATA  
RFSH.....REFRESH DYNAMIC MEMORY ACCESS  
RI1.....RING INDICATOR  
ROMCS.....ROM CHIP SELECT  
RTS.....REQUEST TO SEND  
SAO THRU SA19.....ADDRESS BITS 0 THRU 19  
SBHE.....BYTE HIGH ENABLE  
SCLK.....SERIAL CLOCK  
SELO THRU SEL3.....SELECT LINES  
SIDESEL.....FLOPPY DISK SIDE SELECT  
SMEMW.....SERIAL MEMORY WRITE  
SMEMER.....SERIAL MEMORY READ  
SNDCNTL2.....SOUND CONTROL BIT  
S0, S1.....STATUS LINES  
SPCS.....SERIAL PORT CHIP SELECT  
STEP.....STEPPING MOTOR  
TC.....TERMINAL COUNT  
T/C.....TRANSMITTING COMPLETE  
TMRCS.....TIMER CHIP SELECT

TROUBLESHOOTING (Continued)

INDEX SENSOR

To check the Index Detector circuits, insert a diskette into Drive A and close the door. Type in and run the following basic program to keep the drive running.

10 OUT 1014,128:OUT 1010,20:GOTO 10

While the Drive is running, check for pulses at pins 1 and 2 of IC U55. If pulses are missing at pin 1, check pin 8 of Connector J5 for good connections and check the Drive cable. If pulses are present at pin 5 and missing at pin 6, check IC U66.

TRACK 00 SENSOR

Disk Drive Heads chatter at disk hub end of Head travel. Check for a momentary logic Low at IC U64 pin 9 just before the Disk Drive chatters. If reading is not correct, check connection of J7 pin 26 and check Disk Drive. If reading is correct check IC U64.

DRIVE SELECT AND DRIVE MOTOR

Disk Drive Spindle Motor does not turn disk. Press the Reset Button (S1). Check for Logic Low at IC U63 pins 1 and 2 while Reset is

pressed. If pin 1 reads Low and pin 2 does not, check IC U63. If pin 1 does not read Low, check IC U17. If both pins read Low, check for periods of Logic Low at IC U63 pins 3 and 4, 5 1/2 seconds after releasing Reset. If pin 3 cycles Low and pin 4 does not, check IC U63. If pin 3 does not cycle Low, check IC U17. If both pins cycle Low check connection of J7 pins 10 and 16 and check the Disk Drive.

HEAD POSITION MOTOR

Head Motor does not turn. Press and release the Reset button (S1). Check for a period of Logic High on IC U67 pin 5, 5 1/2 seconds after releasing the Reset button, and a similar period of Logic Low on IC U67 pin 6. If there is no Logic High on pin 5, check IC U51. If there is Logic High on pin 5 but no Low on pin 6, check IC U67. If both pins check good, check for periods of pulses on IC U64 pin 7, 5 1/2 seconds after releasing the Reset button, and similar periods of pulses on IC U64 pin 11. If there are no pulses at pin 7, check IC U51. If there are pulses at pin 7 and not at pin 11, check IC U64. If all pins check good, check the connection of J7 pins 18 and 20 and check the Disk Drive.

TEST EQUIPMENT

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

Equipment	B&K Precision Equipment No.	Sencore Equipment No.	Notes
OSCILLOSCOPE	1541A, 2120, 2125, 2160	SC61	
LOGIC PROBE	DP51, DP21		
LOGIC PULSER	DP101, DP31		
DIGITAL VOM	388HD, 2800 SERIES, 2900 SERIES	DVM37, DVM56A, SC61	
ANALOG VOM	114, 117, 177, 214		
ISOLATION TRANSFORMER	TR110, 1604, 1653, 1655	PR57	
FREQUENCY COUNTER	1803, 1804, 1805	FC71, SC61	
COLOR BAR GENERATOR	1211B, 1251, 1260, 1249	CG25, VA62A, NT64	
RGB GENERATOR	1260, 1249	RG67	
FUNCTION GENERATOR	3020, 3011A, 3026, 3030		
HI-VOLTAGE PROBE VOM/DMM Accessory probes	HV-44 PR-28(HV)	HP200 TP212	
TEMPERATURE PROBE	TP-28, TP-30		
CRT ANALYZER	467, 470, 480, 490	CR70	
DIGITAL IC TESTER	560, 550, 552		
CAPACITANCE ANALYZER	810, 820, 830	LC76, LC101, LC102	
INDUCTANCE ANALYZER		LC76, LC101, LC102	
TRANSISTOR TESTER		TF46	
FLYBACK-YOKE TESTER		LC76, LC101, LC102	

CSCS30

TANDY  
MODEL 1000TX(25-1600)REV.A,C

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.

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

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

Value in ( ) used in some versions.

Measurements with switching as shown, unless noted.

Supply voltage maintained as shown at input.

Voltages measured with digital meter.

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, 5% unless noted.

If the Power Supply is operated while disconnected from grounding plate, connect Point GA ("T1 SHORT RING") to Point GB (JW16).

Logic Probe Indicates:

- (1) P when head is moving.
- (2) H when head is moving.
- (3) L when head is moving.
- (4) H when head is moving in and L when head is moving out from the center of the diskette.
- (5) L when head is moving in and H when head is moving out from the center of the diskette.

Waveforms taken with triggered scope and Sweep /Time switch in Calibrate position, scope input set for DC coupling or 0 reference voltage waveforms. Switch to AC input to view waveforms after DC reference is measured when necessary. Each waveform is 10cm. width with DC reference voltage given at the bottom line of each waveform.

T Voltages, waveforms and logic readings for the Disk Drive Interface taken while running the following Basic program to operate Drive B. Readings were taken when the disk drive head is not moving (drive is in read or write mode) unless noted. NOTE: Insert a formatted diskette (not write protected) in Drive B before running the program.

```
10 OPEN "B:SAMS.DAT" FOR OUTPUT AS #1
20 FOR X=1 TO 300
30 PRINT #1, "HOWARD W SAMS"
40 NEXT X
50 CLOSE #1
60 GOTO 10
```

Voltages, waveforms and logic readings taken with no external devices connected except a video monitor and the keyboard, all expansion slots empty, system in power-up condition with no disk in the drive. The prompt on the screen is "Insert System Diskette and Strike any key when ready."

Logic Probe Display  
L = Low  
H = High  
P = Pulse  
\* = Open (no lights On)  
X = May be High or Low

- (8) H when the head is on track 00 and L when off track 00.
- (9) L when the head is on track 00 and H when off track 00.
- (10) L when head 0 is selected, H when head 1 is selected.
- (11) H when head 0 is selected, L when head 1 is selected.
- (13) H when drive motor is off.
- (14) L when Drive A is on.

PARTS LIST AND DESCRIPTION (Continued)

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

COILS (RF-IF)

ITEM No.	FUNCTION	MFR. PART No.	ITEM No.	FUNCTION	MFR. PART No.
	POWER SUPPLY			SYSTEM BOARD	
L1	Line Filter		CMC1	Choke	
L2	RF Choke		CMC3	Choke	
T1	Switching	TO-4342	CMC4	Choke	
			L1	Choke 1.5 Ohm	

MISCELLANEOUS

ITEM No.	PART NAME	MFR. PART No.	NOTES
	CHASSIS		
M1	Motor		Stepping
M2	Motor		Capstan
M5	Head		Read/Write/Erase
	KEYBOARD		
XL	Crystal		(6MHz)
	POWER SUPPLY		
F1	Fuse		3 Amp 250V
FB1	Ferrite Bead		Power
SW1	Switch		
	SYSTEM BOARD		
CF1 thru CF5	Composition Component		
FB1 thru FB15	Ferrite Bead		
S1	Switch		Reset
S2	Switch		Configuration
Y1	Crystal		16.0-28.6MHz
Y2	Crystal		1.8432

PARTS LIST AND DESCRIPTION (Continued)

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

CAPACITORS

ITEM No.	RATING	MFGR. PART No.
C1 C2	POWER SUPPLY	
	.1 250VAC 20% .22 250VAC 20%	

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

ITEM NO.	FUNCTION	RESISTANCE	MFGR. PART NO.	NOTES
VR1 VR2 VR101	POWER SUPPLY			
	+5V Adj +12V Adj Delay	2200 Ohm 2200 Ohm 100K		
R6	SYSTEM BOARD			
	Volume	1000		

RESISTORS (Power and Special)

ITEM No.	RATING	REPLACEMENT DATA		
		MFGR. PART No.	NTE PART No.	
R13 RP1 RP2 RP3 RP4 RP5 RP6 RP7 RP8 RP9 RP10 RP11 RP12 RP13 RP14 RP15 RP16	SYSTEM BOARD			
	82.5K 1% 1/4CF			
	Resistor Network 10K x 7			
	Resistor Network 10K x 5			
	Resistor Network 1K x 5			
	Resistor Network 4.7K x 9			
	Resistor Network 33 x 4			
	Resistor Network 33 x 4			
	Resistor Network 33 x 4			
	Resistor Network 10K x 5			
	Resistor Network 33 x 8			
	Resistor Network 33 x 8			
	Resistor Network 10K x 9			
	Resistor Network 10K x 9			
	Resistor Network 150 x 5			
	Resistor Network 33 x 8			
	Resistor Network 4.7K x 7			
	Resistor Network 10K x 7			
RU1	KEYBOARD			
	Resistor Network 33K 5% x 10			

PARTS LIST AND DESCRIPTION

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

SEMICONDUCTORS (Select replacement for best results)

ITEM No.	MFGR. PART No./ TYPE No.	NOTES			
		NTE PART No.	ECG PART No.	TCE PART No.	
POWER SUPPLY					
D1	S4VB40	NTE5314	ECG5314	SK3987/5314	
D2	HZ5B3				
D3, 4, 5	F1-06	NTE519	ECG519	SK3100/519	
D6, 7	DS446	NTE6240	ECG6240	SK5060/6240	
D8	D5LCA20	NTE6085	ECG6085	SK9798	
D9	D10SC4M				
D10	F1-06				
D11	HZ5B3				
D12, 13	DS446	NTE519	ECG519	SK3100/519	
IC1	L5431				
IC2	L78M12	NTE966	ECG966	SK3592/966	
IC3	M5236L				
PHC1	P521	NTE3081	ECG3081	SK4929	
PHC2	TLP541G	NTE3091	ECG3091		
Q1	C3833	NTE2311	ECG2311	SK9131/2311	
Q2, 3	Z5C3833	NTE2311	ECG2311	SK9131/2311	
Q4	D1207S				
	2SD1207S				
	A1441L				
	2SA1441L				
KEYBOARD					
D1					
M1	P8048AH				
M2	M74LS04P	NTE74LS04	ECG74LS04	SK74LS04	
MAIN BOARD					
CR1	1N5235	NTE5014A	ECG5014A	SK6A8/5014A	
CR1A	1N4148	NTE519	ECG519	SK3100/519	
CR2	1N4148	NTE519	ECG519	SK3100/519	
Q1	2N3906	NTE159	ECG159	SK3465/159	
Q2	SI VNO104				
	VNO104A				
Q3	2N3904	NTE123AP	ECG123AP	SK3854/123AP	



PARTS LIST AND DESCRIPTION (Continued)

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

SEMICONDUCTORS (Select replacement for best results)

ITEM No.	MFGR. PART No./ TYPE No.	NOTES			
		NTE PART No.	ECG PART No.	TCE PART No.	
U1	CD74HCT04E	NTE74LS74A	ECG74LS74A	SK7CT04	
U2	M8724LM				
U3	SN74ALS245AN				
U4	SN74LS74AN				
U5	CD74HCT32E				
U6	SN74ALS245AN	NTE4529B NTE4529B NTE834 NTE834 NTE74LS244 NTE74LS244	ECG4529B ECG4529B ECG834 ECG834 ECG74LS244 ECG74LS244	SK4529B SK4529B SK3569/834 SK3569/834 SK74LS244 SK74LS244	
U7	8496PT				
U8	76496				
U9	MC14529B				
U10	14529				
U11	LM339N	P8254 8254-2 N80286-8 80286 P82A05 82A205 80287 D8259AC-2 8259A SCQ38068PB01 4067-15 PLS173N PLS173			USED SOME VERSIONS
U12	LM339				
U13	SN74ALS244N				
U14	74LS244				
U15	D8237AC-5				
U16	8237A-5	SN74ALS573BN SN74ALS244AN SN74ALS573BN MC74F08N KM41256AP-15 4067-15			
U17	P8254				
U18	8254-2				
U19	N80286-8				
U20, 21	80286				
U22	P82A05	NTE74LS00	ECG74LS00	SK74LS00	
U23	82A205				
U24	80287				
U25 THRU U32	D8259AC-2				
U33	8259A				

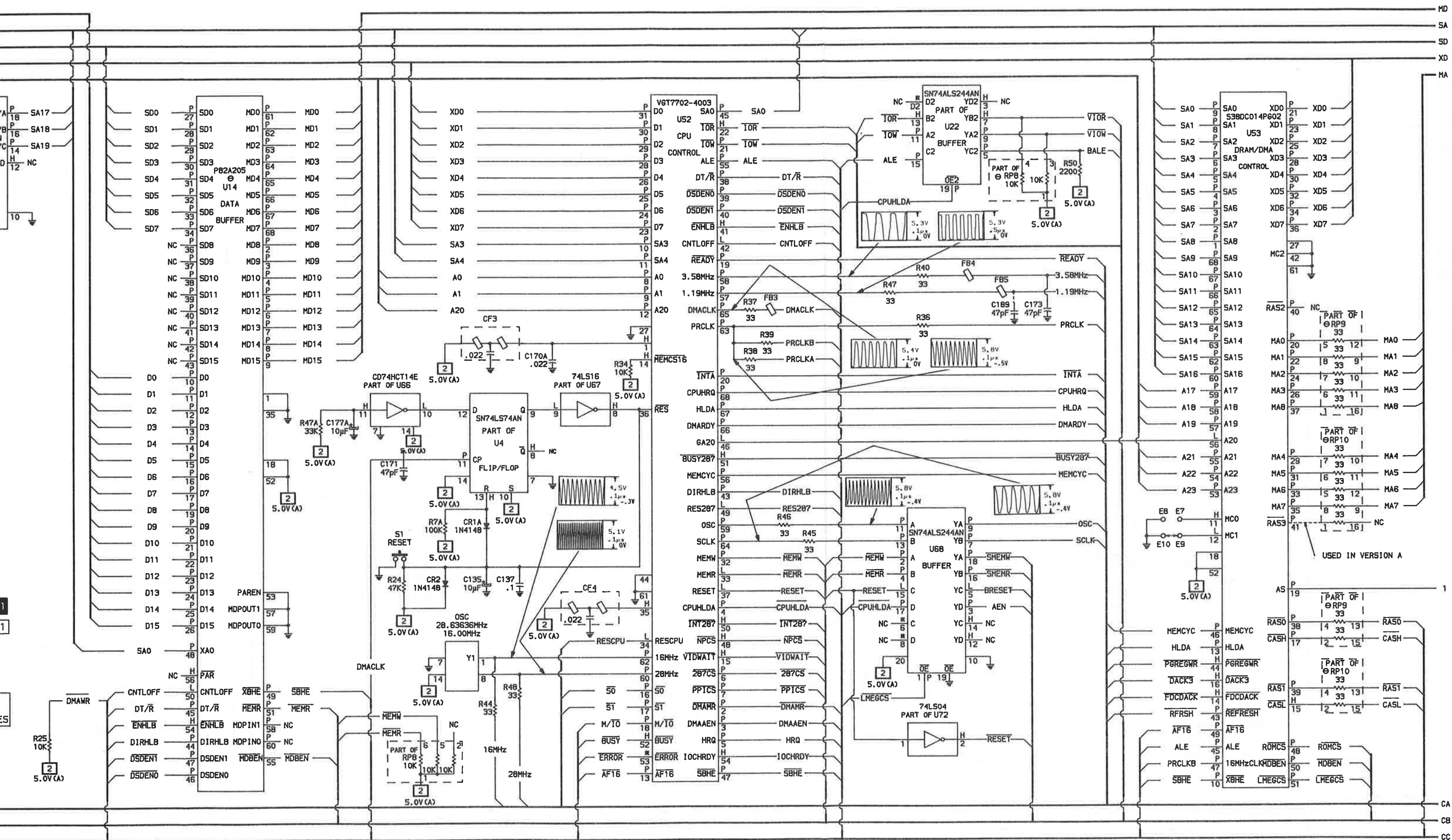
PARTS LIST AND DESCRIPTION (Continued)

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

SEMICONDUCTORS (Select replacement for best results)

ITEM No.	MFGR. PART No./ TYPE No.	NOTES			
		NTE PART No.	ECG PART No.	TCE PART No.	
U34	CD74HCT138E	NTE74LS00	ECG74LS00	SK7CT138	
U35	4067-15				
U36	2684-0002				
U37	SN74LS00N				
U38	609-2497001				
U39	609-2497000	NTE74LS125A	ECG74LS125A	SK7CT138 SK74LS125A	
U40 THRU U47	KM41256AP-15				
U48	4067-15				
U49	CD74HCT138E				
U50	SN74LS125AN				
U51	R6765-5P	NTE74LS32 NTE7417	ECG74LS32 ECG7417	SK74LS32 SK7417	USED SOME VERSIONS
U52	UPD765A				
U53	1uPD765A1				
U54 THRU U57	VGT7702-4003				
U58	S38DC014PG02				
U59	SN74LS32N	NTE74LS244	ECG74LS244	SK74LS244	
U60	SN7417N				
U61	NCR609-0380855				
U62	SN74LS32N				
U63	CD74HCT14E				
U64	7416N	NTE74LS04 NTE75189 NTE75189 NTE928M	ECG74LS04 ECG75189 ECG75189 ECG928M	SK74LS04 SK5189/75189 SK5189/75189 SK3692/928M	
U65	SN74ALS244AN				
U66	SCQ38068PB02				
U67	NS8250AN				
U68	INS8250AN				
U69	8250	NTE977 NTE977 NTE961	ECG977 ECG977 ECG961	SK3462/977 SK3462/977 SK3462/977	
U70	SN74LS244N				
U71	SN74LS04N				
U72	MC1489P				
U73, 4, 5	MC1489				
U76	LM358N	NTE977 NTE977 NTE961	ECG977 ECG977 ECG961	SK3462/977 SK3462/977 SK3462/977	
VR1	78L05AQP				
VR2	78L05				
	78L05				
	LM605CCT				





PRELIMINARY SERVICE CHECKS (Continued)  
PREVENTATIVE MAINTENANCE

ENVIRONMENT

Computers perform best in a clean, cool area that is below 80 degrees Fahrenheit and free of dust and smoke particles. Even though home Computers are not affected by cigarette smoke as much as commercial Computers are affected, it is better to maintain a smoke-free area around the Computer. Do not block cabinet vents of Computer, Monitor, Printer, or other power devices.

ELECTRICAL POWER

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

KEYBOARD

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

DISK DRIVES

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

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

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

PRINTERS

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

STATIC ELECTRICITY

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

MONITOR

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

PRELIMINARY SERVICE CHECKS

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

Check all interconnecting cables for good connection and correct hookup before making service checks.

Be sure the Power is OFF before connecting or disconnecting connectors, boards or other replaceable parts.

Disconnect all peripherals except the Monitor from the Computer to eliminate possible external malfunctions.

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

TEST EQUIPMENT AND TOOLS

TEST EQUIPMENT

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

TOOLS

Contact and Switch Cleaner (non-spray type)  
Desoldering Equipment  
Flat Blade Screwdriver  
Head Cleaning Equipment  
IC Insertion and Removal Tools: 16, 24, 28  
and 40 pin DIP; 68 and 84 PLCC.  
Low Wattage Soldering Iron  
Phillips Screwdriver  
#93 lamp  
#1129 lamp

REPLACEMENT PARTS

IC U7 (System Board)  
IC U13 (System Board) CPU  
IC U17 (System Board)  
IC's U18, U33, U35, U48 (System Board)  
IC's U25 thru U32 (System Board) RAM  
IC U36 (System Board)  
IC U38 (System Board) ROM  
IC U39 (System Board) ROM  
IC U51 (System Board)  
IC U52 (System Board)  
IC U64 (System Board)  
IC U69 (System Board)  
Power Supply Fuse  
SP1 Speaker 8 Ohm z

TANDY  
MODEL 1000TX(25-1600)REV.A,C  
CSCS30

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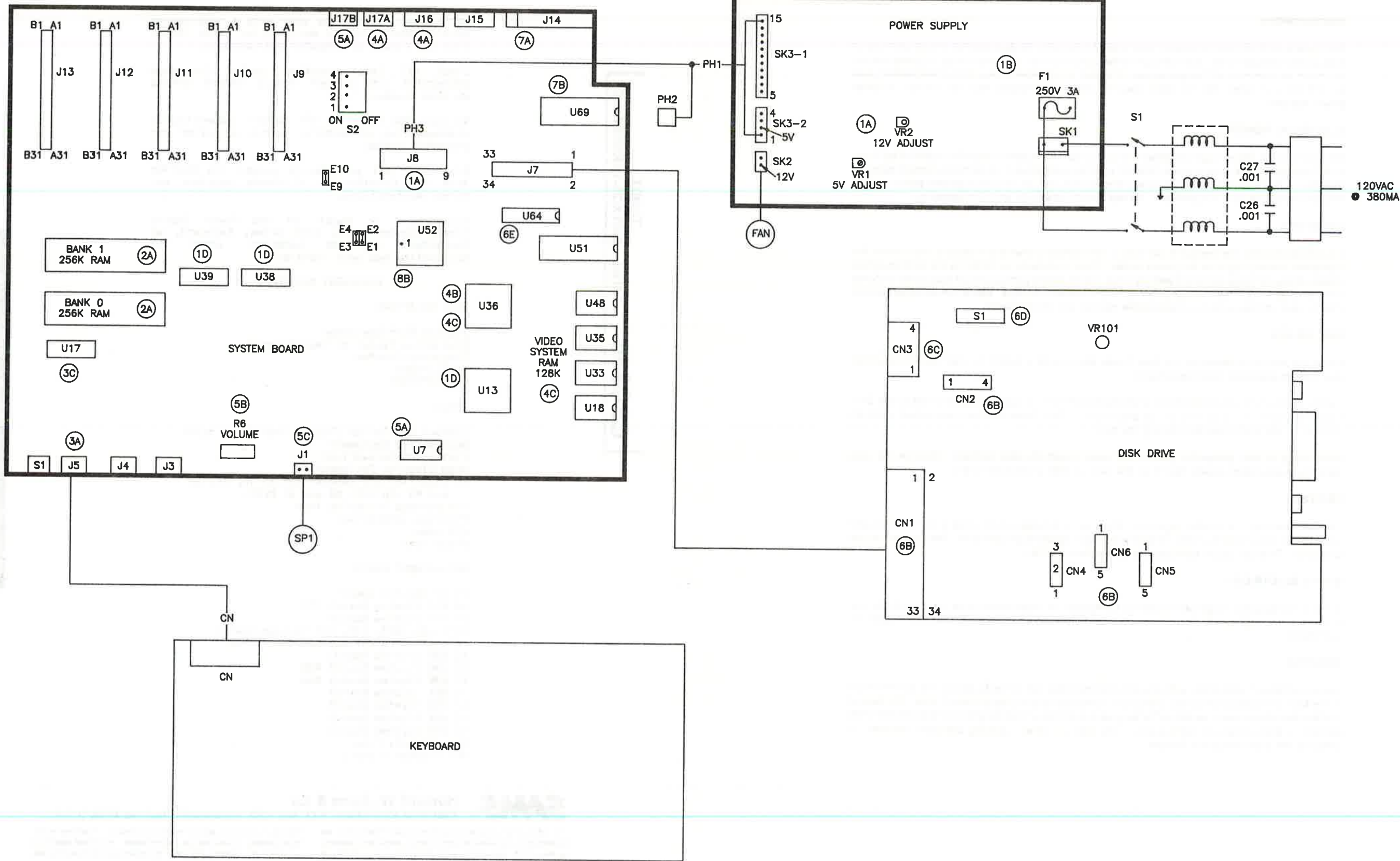
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PRELIMINARY SERVICE CHECKS (Continued)

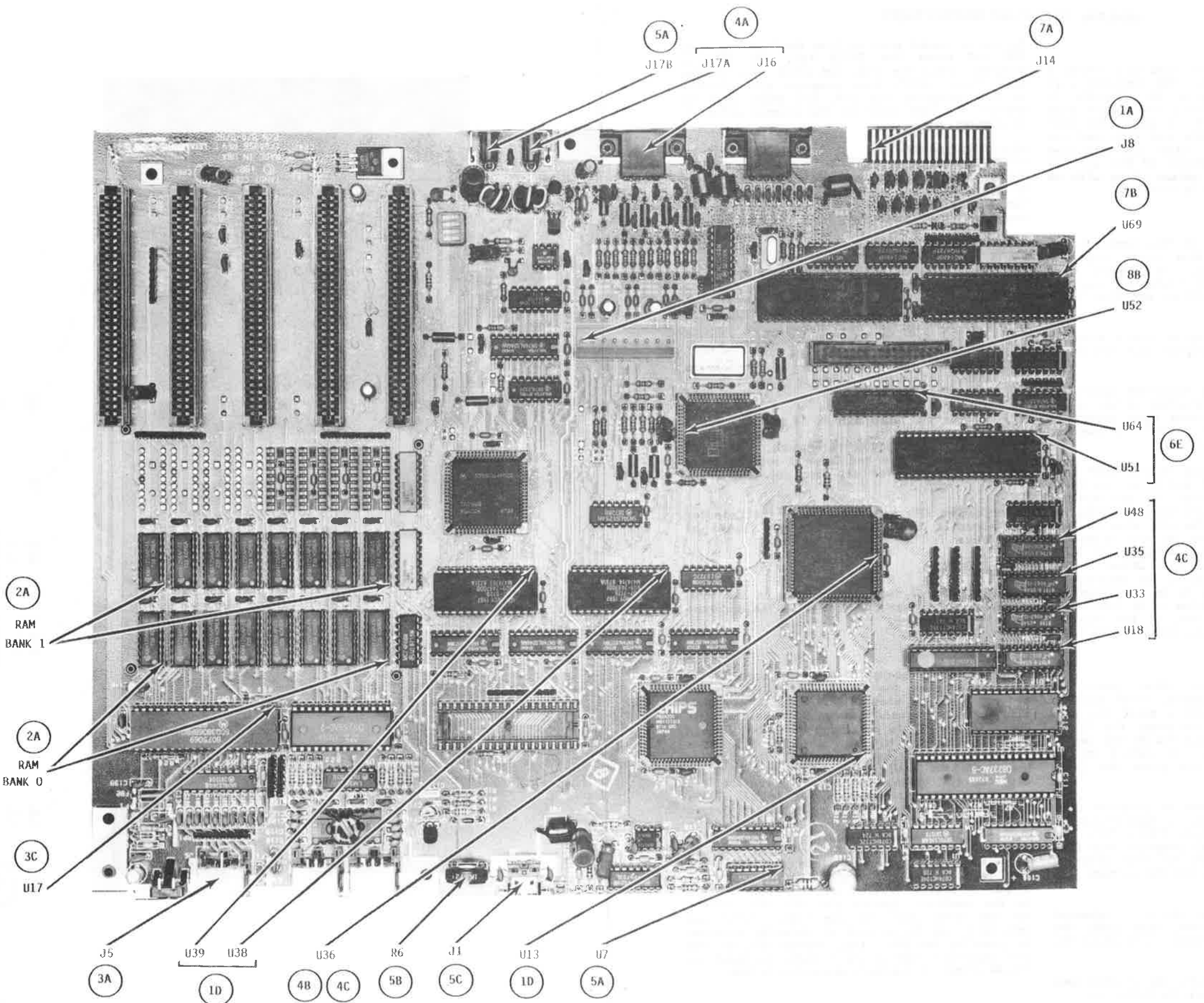


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PRELIMINARY SERVICE CHECKS (Continued)



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## PRELIMINARY SERVICE CHECKS (Continued)

### GENERAL OPERATING INSTRUCTIONS

#### BOOT UP

Insert a bootable diskette into Disk Drive A and turn On the Computer. The Computer will automatically boot up using the diskette in Disk Drive A. If a MS-DOS (Microsoft Disk Operating System) diskette is used, the Computer will display the date and time and ask for a new date and time. After the date time have been entered, the version of DOS will be displayed on the Monitor screen along with an A> which indicates the DOS is running.

#### MS-DOS

Boot up DOS. For a list of file names on the diskette in the current Disk Drive, type DIR and press the ENTER key. To specify Disk Drive that is not current (default), use DIR A: for Disk Drive A or DIR B: for Disk Drive B.

To run a (COM, EXE, SYS) program from a diskette while in DOS, type the program name and press the ENTER key.

A blank diskette must be formatted before it can be used to save information which is in memory. A formatted diskette must contain a DOS or a Start-up program before the Computer will boot up using that diskette.

Insert a diskette containing "FORMAT COM" into Disk Drive A. Type FORMAT and press the ENTER key. Follow the instructions on the Monitor screen to format the unformatted diskette. NOTE: Formatting a diskette will wipe out any programs previously placed on the diskette. The Computer automatically defaults to Disk Drive A if the destination Disk Drive is not specified. Be sure to specify the destination Disk Drive of the diskette to be formatted, or insert a blank disk in Drive A as instructed by the message on the monitor, or the original diskette may be ruined by the default action.

#### BASIC

The manufacturer supplies Disk Basic on diskette. To load Disk Basic, first boot up DOS. Insert a diskette with a BASIC COM program on it. Type BASIC and press the RETURN key or type BASICA and press the RETURN key to load advanced Disk Basic. To return to DOS from Basic, type SYSTEM and press the ENTER key.

To view a list of the names of programs on a diskette in the current Drive, type FILES and press the ENTER key. Type FILES "B": and press the ENTER key to list programs from Disk Drive B. Type FILES "A": to list programs from Disk Drive A if it is not the current (default) drive.

To load a program in Disk Basic or Advanced Disk Basic from the diskette, type LOAD, the program name enclosed in quotes, and press the ENTER key.

To save a program, type SAVE, the program name enclosed in quotes, and press the ENTER key.

To run a loaded program from Basic mode, type RUN and press the ENTER key. To stop a program, press the CTRL and BREAK keys at the same time. NOTE: Some programs will disable or not recognize the CTRL and BREAK keys to prevent the user stopping the program while it is running.

#### RESETTING COMPUTER

Press the CTRL, ALT, and DEL keys, all three at the same time, to reset the Computer. The Computer can also be reset by pressing the Reset button on lower left front panel.

#### CHANGING OPERATING MODES

The Video, Disk Drive, and CPU speed modes can be changed by pressing Function Keys F1 thru F4 immediately after the Computer beeps when it is turned On. Use the following chart to determine the function of each Key:

- F1 - Changes the Video mode to Monochrome mode. (Computer normally comes up in Color Graphics mode.)
- F2 - Changes the Video mode to TV mode.
- F3 - Swaps Disk Drive references. Drive A becomes Drive B and Drive B becomes Drive A. The Computer will boot up from Drive B.
- F4 - Changes CPU speed to 4MHz. The Computer normally comes up with a CPU speed of 8MHz.

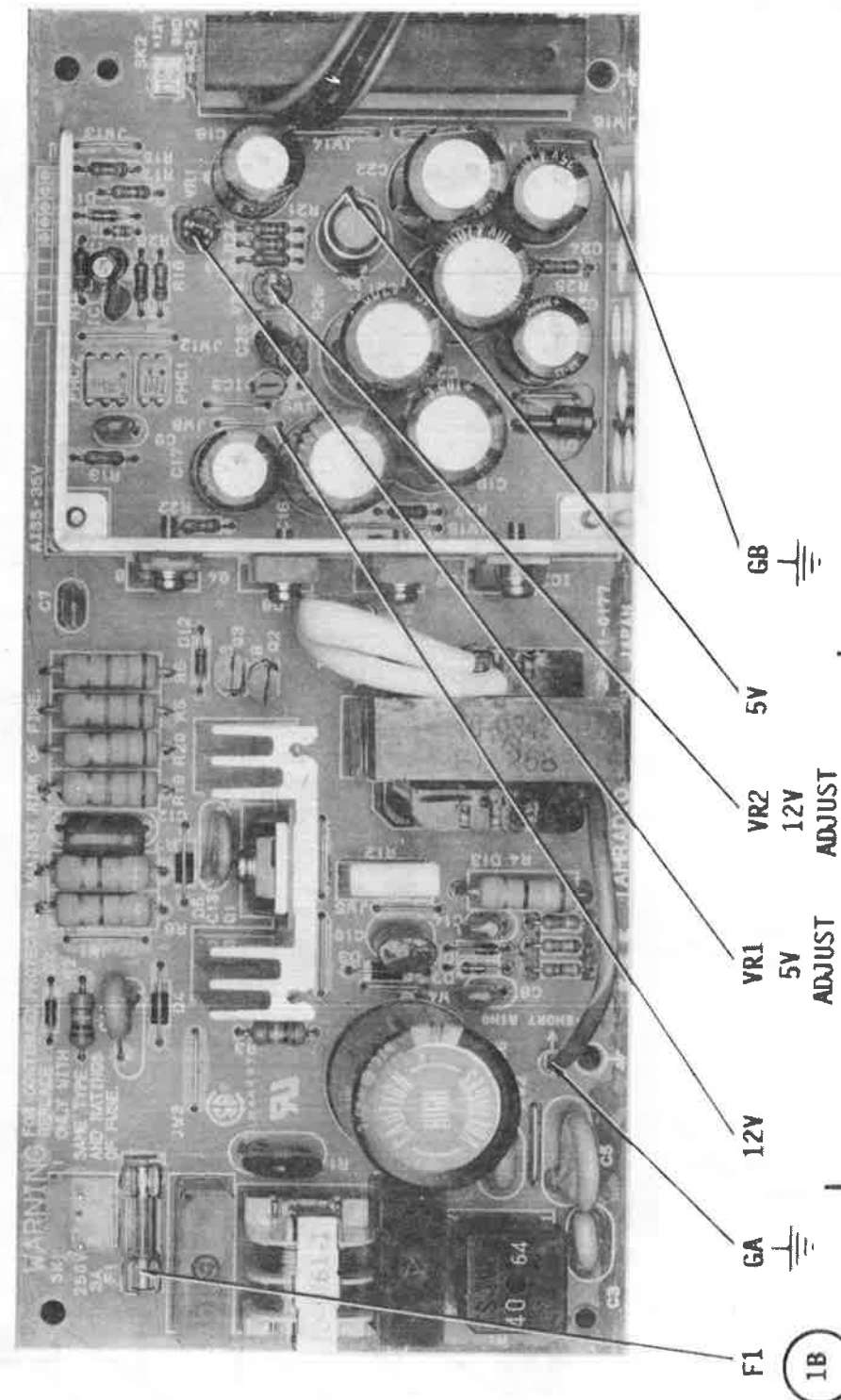
#### VOLUME CONTROL

A Volume Control (R6) is provided on the Main System Board to set the volume of the earphone or internal speaker.

#### SELF-TEST

Normal Power-up sequence when the computer is turned on, when the Reset button is pressed and released, or when CTRL-ALT-DELETE key combination is pressed: Fan runs immediately if Power Supply 12V is working and "Memory Size = 640k" is output to the monitor; 5 seconds later, if no errors are found, the speaker beeps and the disk drive activates. With no disk in the drive, the DOS ROM version and copyright information is output in six lines to the monitor, and the prompt "Insert System Diskette and Strike any key when ready" is output a line below the copyright lines. If a DOS boot disk is latched in the drive, the DOS will load from the disk into the computer. The Tandy licensed version of MS-DOS will output a 5-line version and copyright notice to the monitor. Loaded DOS will then prompt for new date, and then new time. After new date and time is entered or defaults accepted by pressing the ENTER key, another DOS version and copyright notice is output, followed by the A> prompt to indicate operation in DOS.

## PRELIMINARY SERVICE CHECKS (Continued)



NOTE: CONNECT POINT GA (T1 SHORT RING) TO POINT GB (JW16) IF OPERATED WHILE DISCONNECTED FROM GROUNDING PLATE.

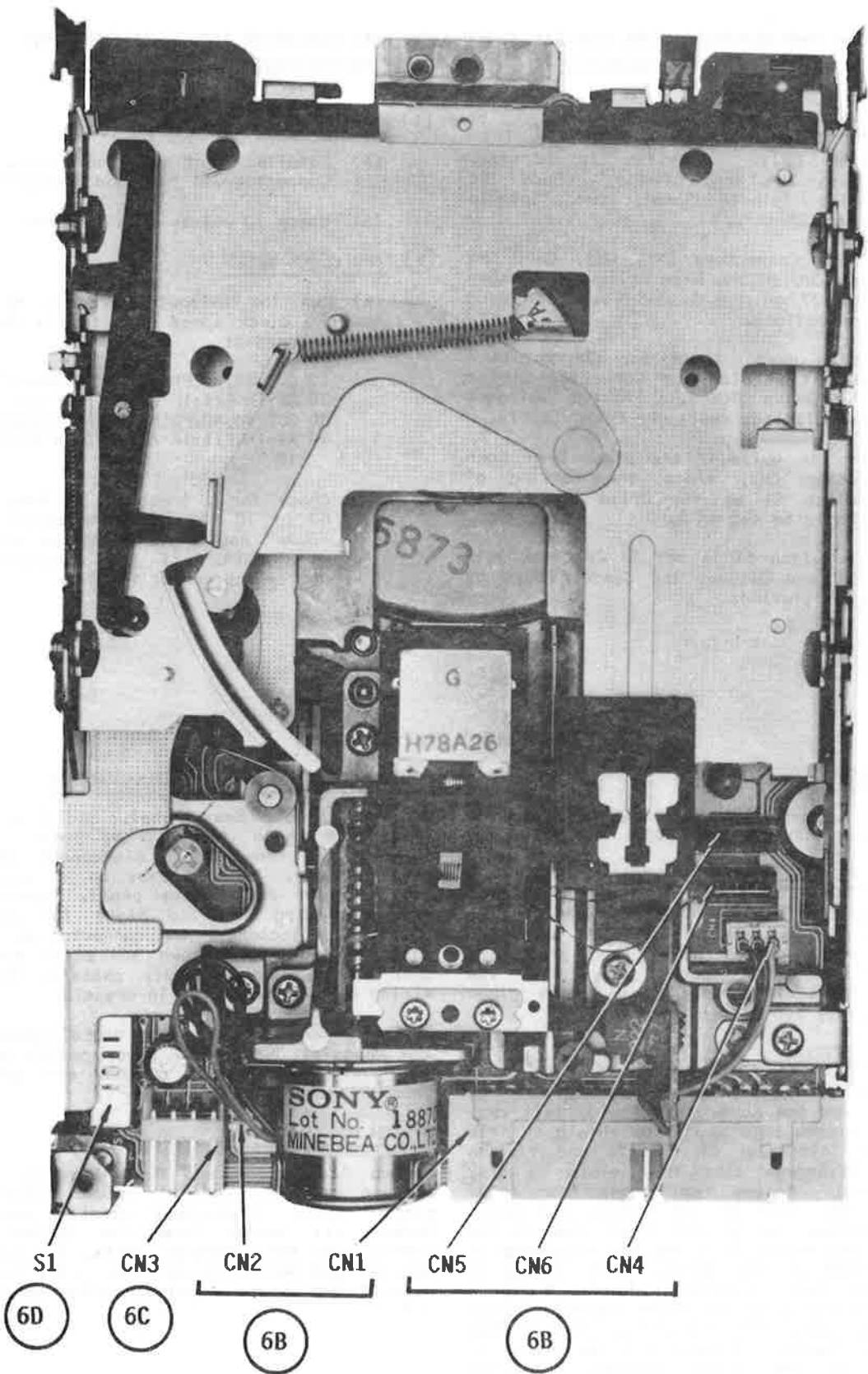
POWER SUPPLY BOARD

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PRELIMINARY SERVICE CHECKS (Continued)



PRELIMINARY SERVICE CHECKS (Continued)

GENERAL OPERATING INSTRUCTIONS (Continued)

RAM ERROR

If self testing finds a memory flaw, the first line output to the monitor will indicate 128K memory size. A chart of the self test results will be output to the monitor. To determine the failing IC, note the difference between the written column values and the Read column values. If one character position in the Read column is bad, first note if the bad character is one of the left pair (High Byte) or the right pair (Low Byte) of the 4-character (word) value. The left pair indicates RAM IC U40 through U47, the right pair indicates RAM IC U25 through U32. If the error character is the left one of the pair, the failing IC will be one of the higher numbered half of the range of ICs, and the right would indicate the lower numbered half. The value difference between the character Written and the character Read indicates the failing IC of the four in the determined half of the range. If the difference is one, the lower numbered IC is the failing IC, a difference of two indicates the next to lower, four indicates next to higher, and eight indicates the higher numbered IC.

Example:

U47	U46	U45	U44	U43	U42	U41	U40	LEFT PAIR
8	4	2	1	8	4	2	1	
U32	U31	U30	U29	U28	U27	U26	U25	RIGHT PAIR
LEFT HALF				RIGHT HALF				
Written	Read	Base	Offset					
A5A4	A4A4	0000	FFFE					
A5A2	A4A2	0000	FFFC					

Left pair of the Read column value has character different from Written. Left pair indicates RAM IC numbers U40 through U47. Right character of left pair indicates lower numbered half of range (U40 through U43). A difference of one indicates the lowest numbered IC, U40. If the last line of the Memory Err Info shows a different value difference, a second IC failed the test.

If the left pair and the right pair of Read column values vary the same amount, system memory buffering/multiplexing is a possible cause (MA0 through MA6 lines). If Read is all FFFF, Jumper E9-E10 may be missing in a 640K system, or RAS0 line may be faulty. FF as the left pair may be CASH line faulty, and FF as the right pair may be CASL line faulty.

Two-line error messages may not be readable, or may be clear enough to read "Video Memory" as part of the message. This may indicate failing U16, U33, U35 or U48, or XMD/YMD lines faulty.

Scrambled characters in ROM BIOS version and copyright message, or error tables with character-substitution errors, can be produced by VMA line faults.

ERROR MESSAGE	FAILING IC
"Err I/O of 8259";	U16
"Err I/O of 8253";	U12(8254IC)
"Err I/O of port 378h";	U69
"Err I/O from kbd Port 61H";	U17
No Disk drive head homing, no response to key entry; U51.	
No Disk drive head homing, key entry produces delayed additional disk request screen prompt; U64.	
No Beep, Disk Drive select light lit but no head motion or spindle motor rotation; U11.	

MISCELLANEOUS ADJUSTMENTS

POWER SUPPLY

NOTE: Do not operate the Power Supply without a load. Connect point GA (T1 Short Ring) to point GB (JW16) if operated while disconnected from grounding plate.

5V ADJUSTMENT

Connect the Input of a DC voltmeter to 5V at coil L2. Adjust the 5V Adjust Control (VR1) for a voltage of 5.0V.

12V ADJUSTMENT

NOTE: Perform the 5V Adjustment first. Connect the Input of a DC voltmeter to 12V at jumper JW8. Adjust the 12V Adjust (VR2) for a voltage of 12V.

CSCS30

MODEL 1000TX(25-1600)REV.A,C

TANDY



# 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 COMPUTER DEAD

- (A) Check for 5.0V at pin 1, -12.0V at pin 8 and 12.0V at pin 9 of Connector J8 on the System Board. If the voltages are correct, go to part (D). If the voltages are not correct, check the adjustment of the 5V Adjust (VR1) and 12.0V Adjust (VR2) Controls on the Power Supply Board, see "Miscellaneous Adjustments."
- (B) If the voltages are missing at Connector J8, turn the Computer Off and disconnect the power connectors from the System Board and Disk Drive. Connect a #1129 lamp to the 5.0V Source (pin 1 of Connector J8) and a #93 lamp to the 12.0V Source (Pin 9 of Connector J8). WARNING: Operating the Power Supply without a load may damage it. Turn the Power Supply On and recheck the voltages. If the voltages are still missing, check Fuse F1.
- (C) If the correct voltages return, reconnect the power Supply to the System Board, then the Power Supply to the Disk Drive to see if the Board or Drive is causing the Power Supply to shut down. WARNING: Be sure Power supply is turned Off when connecting to the System Board or Disk Drive.
- (D) Check the CPU IC (U13) and ROM IC's (U38, U39) by substitution.

### 2 SYSTEM BOARD

- (A) A program runs for a while, then suddenly stops or becomes erratic in operation. Check RAM IC Banks 0 and 1 (IC's U25 thru U32 and U40 thru U47).

### 3 KEYBOARD

- (A) Keyboard dead. Check Connector J5 on the System Board for good connections.
- (B) Check the Keyboard cable and check Connector CN on the Keyboard for good connections.
- (C) Check IC U17 on the System Board by substitution.

### 4 VIDEO

- (A) No video. Check Connectors J16 and J17 for good connections and check the Video cable going to the Monitor.
- (B) Check Video IC (U36) by substitution.
- (C) Video display is not correct. Check Video IC (U36) and Video RAM IC's (U18, U33, U35 and U48).

### 5 SOUND

- (A) No sound from the Internal Speaker (SP1) and no audio at Connector J17B. Check IC U7 by substitution.
- (B) No sound from the Internal Speaker (SP1). Check the setting of the Volume Control (R6) on the System Board.
- (C) If Volume Control is set properly, check Connector J1 on System Board for good connections and check Speaker (SP1) voice coil for continuity.

# 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.

### 6 DISK DRIVE

- (A) Disk Drive operation is erratic. Clean the Drive heads. Check the Drive Spindle Speed, see "Spindle Speed Check".
- (B) Check Connectors CN1, CN2, CN4, CN5 and CN6 on the Disk Drive and Connector J7 on the System Board for good connections.
- (C) Drive dead. Check for 12V at pin 4 and 5V at pin 1 of Connector CN3 on the Drive Board. If the voltages are missing, check the Power Supply.
- (D) If the voltages are present at Connector CN3, check the setting of Switch S1 on the Drive Board. It should be set to 0.
- (E) If Switch S1 is set to 0, check IC's U51 and U64 on the System Board by substitution.

### 7 PARALLEL PORT

- (A) Parallel Port does not work. Check Connector J14 for good connections.
- (B) Check IC U69 by substitution.

### 8 CPU CLOCK SPEED

- (A) Run the following program to switch the CPU clock speed each time a character key is pressed:  

```
10 OUT 98,32:PRINT "SLOW(8MHz)"
20 A$=INKEY$:IF A$="" THEN 20
30 OUT 98,40:PRINT "FAST(16MHz)"
40 A$=INKEY$:IF A$="" THEN 40 ELSE
  10
```
- (B) Check for a frequency of 8MHz at pin 63 of IC U52 with the speed set to "SLOW" and 16MHz with the speed set to "FAST". If the frequency does not switch, check IC U52.

## DISASSEMBLY INSTRUCTIONS

### CABINET REMOVAL

Remove two screws from lower front of cabinet. Slide cabinet forward and lift up to remove.

### REAR PANEL REMOVAL

Remove Cabinet. Remove three screws from lower rear of rear panel. Pull rear panel tab clear of power switch button and pivot the bottom of the rear panel away from the chassis. Slide the rear panel up to clear tabs along top, and remove panel.

### DISK DRIVE REMOVAL

Remove the Cabinet. Remove one screw from left front and one screw from inside left rear flange of system shield. Slide shield up from channel in left edge of chassis and tip to right to disengage tabs from slots in disk drive shield. Remove two screws from front flange to the left of the drive, one screw from the bottom tab at the right side of the drive and two screws from the top back edge of the left side of the drive. Lift the drive assembly and turn it slightly to the right to free the left side of the drive assembly. Disconnect the cable from the drive. Remove four screws from beneath drive and slide the drive back out of the drive bracket. Slightly spread the sides of the top cover to free the cover from the four detent bumps, and remove the cover.

### POWER SUPPLY REMOVAL AND DISASSEMBLY

Remove Cabinet, Rear Panel, and Disk Drive. Disconnect cable from System Board. Remove four screws from back. Disconnect connector next to fuse. Release tabs on AC socket and switch panel and remove panel. Remove four screws holding fan and pivot fan clear of mounting. Disconnect fan connector and remove fan. Remove four screws and slide board out open end of power supply chassis, threading wiring harness thru slot in chassis.

NOTE: If operated with the board removed from the chassis, jumper the power switch assembly to Power Supply Board ground, and jumper T1 Short Ring to JW16.

### SYSTEM BOARD REMOVAL

Remove Disk Drive and Power Supply. Remove hairpin holding knob to Volume Control and remove knob. Disconnect speaker connector. Remove six screws from the System Board. Remove four hex extension bolts, two each from Monitor and Serial connectors. Lift the front edge of the System Board and slide forward and out.

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**CSCS30A****DISK DRIVE****CSCS30A**  
TANDY  
MODEL 1000TX(25-1600)REV.A,C**SAFETY PRECAUTIONS**

See Page 15

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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.

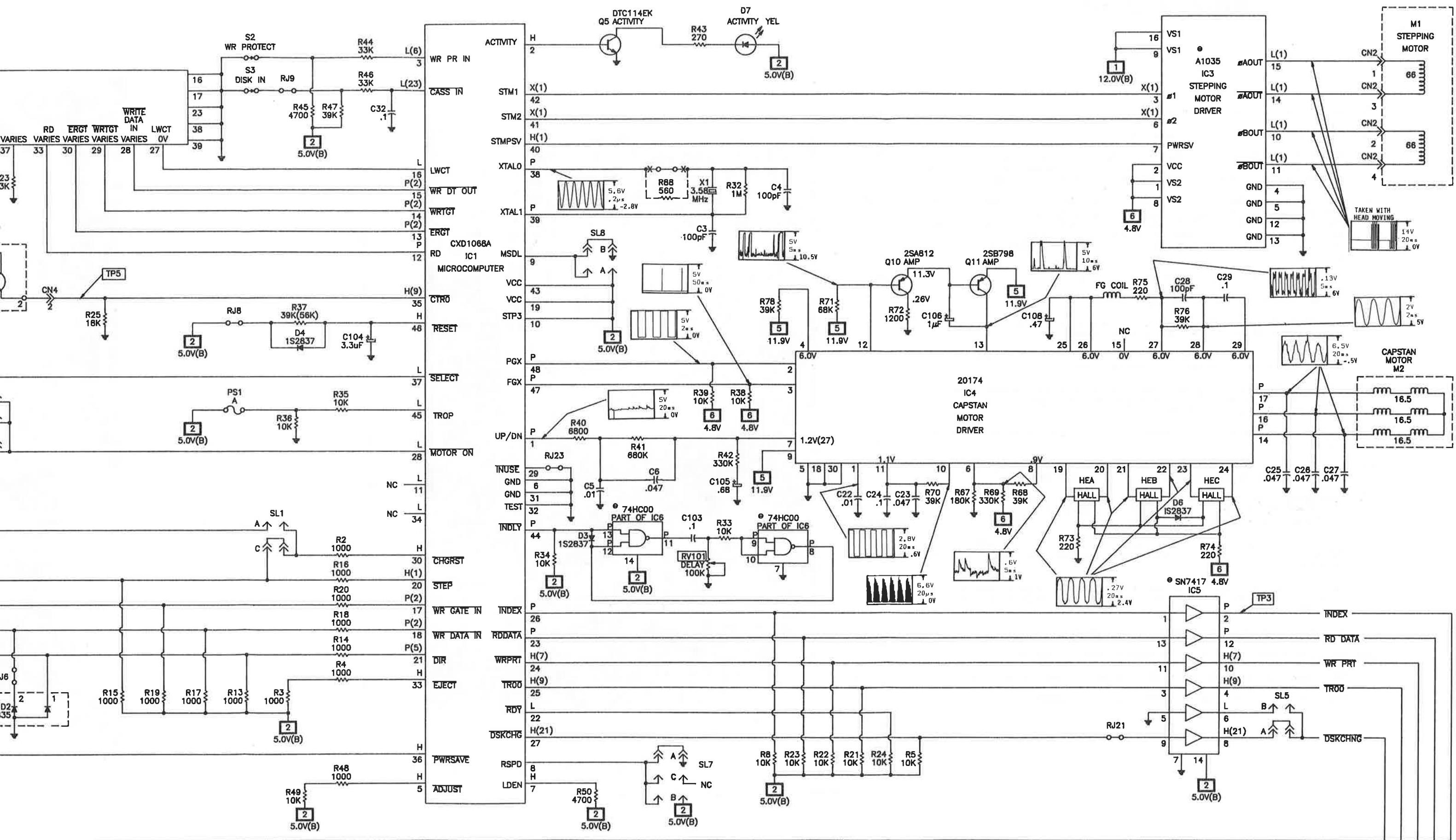
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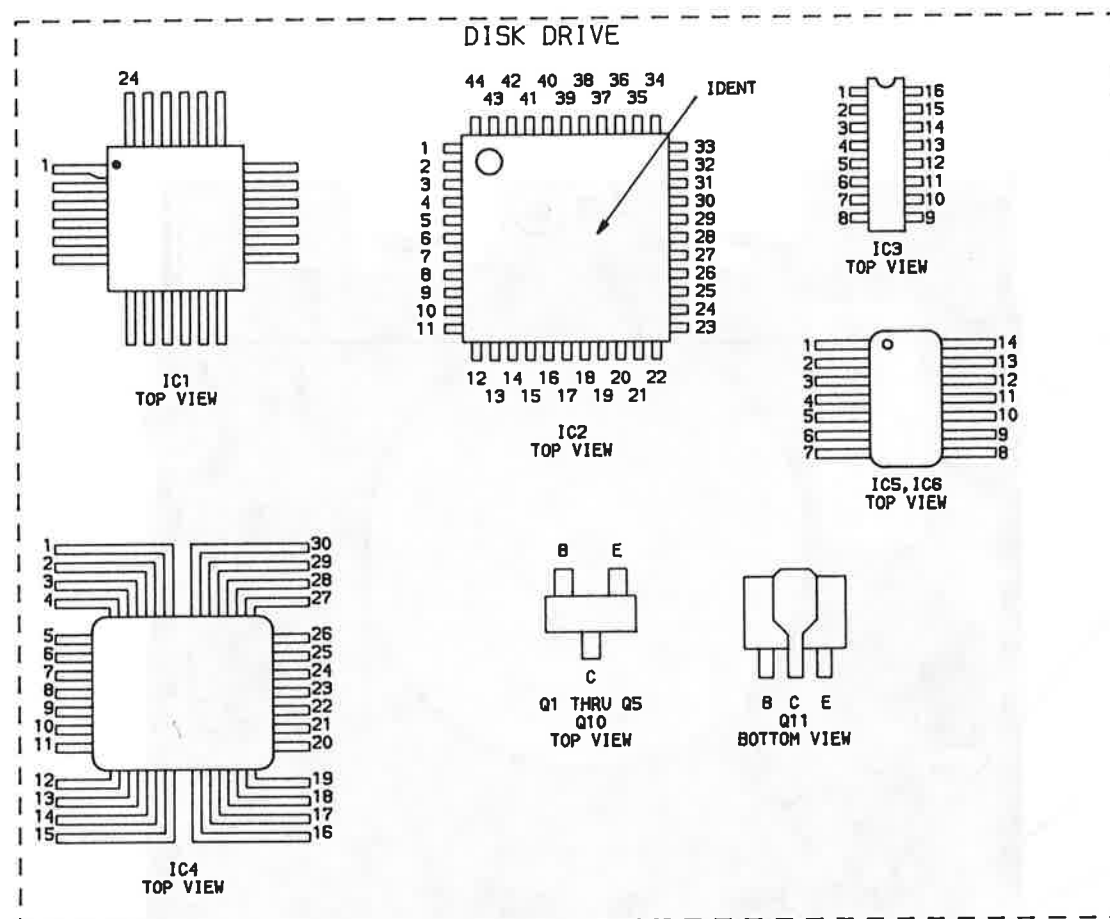
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# IC PINOUTS AND TERMINAL GUIDES



## DISK DRIVE 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.

Time in m/uSec. per cm., given with p-p reading at end of each waveform.

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

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

Value in ( ) used in some versions.

Measurements with switching as shown, unless noted.

Supply voltage maintained as shown at input.

Voltages measured with digital meter.

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, 5% unless noted.

Waveforms taken with triggered scope and Sweep/Time switch in Calibrate position, scope input set for DC coupling or 0 reference voltage waveforms. Switch to AC input to view waveforms after DC reference is measured when necessary. Each waveform is 10cm. width with DC reference voltage given at the bottom line of each waveform.

Voltages, waveforms and logic readings for the Disk Drive Interface taken while running the following Basic program to operate Drive A. Readings were taken when the disk drive head is not moving (drive is in read or write mode) unless noted. NOTE: Insert a formatted diskette (not write protected) in Drive before running the program.

```

10 OPEN "A:SAMS.DAT" FOR OUTPUT AS #1
20 FOR X=1 TO 300
30 PRINT #1, "HOWARD W SAMS"
40 NEXT X
50 CLOSE #1
60 GOTO 10

```

Logic Probe Display

L = Low

H = High

P = Pulse

\* = Open (no lights on)

X = May be High or Low in test conditions

Logic Probe Indicates:

- (1) P when head is moving.
- (2) H when head is moving.
- (5) L when head is moving in and H when head is moving out from the center of the diskette.
- (6) H if diskette is write protected.
- (7) L if diskette is write protected.
- (9) L when the head is on track 00 and H when off track 00.
- (21) L with no diskette in the drive.
- (23) H with no diskette in the drive.

**CSCS30A**

**MODEL 1000TX(25-1600)REV.A,C**

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## DISK DRIVE ALIGNMENT

### EQUIPMENT REQUIRED

A working computer system to run the Disk Drive Tester program, or a Disk Drive Tester to turn on the Disk Drive, step the heads to specified tracks, and select head 0 or 1 (Side 0 or 1). Alignment procedures call for test pattern tracks as found on Dysan Analog Alignment Diskette model 350/2A. NOTE: This alignment diskette has only alignment patterns on 11 and does not have any alignment programs.

### DISK DRIVE TESTER PROGRAM

The head positioning circuitry will respond with no disk in the Drive, but the Capstan Motor (M2) will not activate without a disk. The following Basic program can be used to step the Disk Drive heads to a track specified by the user. The user can then choose to switch to Side 1 (Head 1) from Side 0. If Side 1 is chosen, the next key entry will reset the Heads to Track 0, Side 0. After each track number entry, the user must press ENTER. After the Disk Drive has been sent the signals to turn on the Drive and step the Heads to the specified Track, the Drive will be kept turned on until the next two prompts have been answered. The first prompt will switch to Side 1 if a "Y" or "y" key is pressed, and send "SIDE 1" to the monitor to let you know it has been done. If other than "Y" or "y" is entered, or after side 1 has been selected, the second prompt will state "PRESS ANY KEY TO STOP". After the next keypress, (and reset to Track 0, Side 0 if Side 1 was selected) the Drive will be allowed to "time out" and shut off after 1 to 12 seconds.

Begin each test with a cycle thru Side 1 and reset to Track 0, Side 0, to recalibrate after shutting off.

### (DISK DRIVE TESTER PROGRAM)

```
10 CLS:PRINT"TRACK 0, SIDE 0"
20 OUT 1014,128:OUT 1010,16:OUT 1010,20
30 OUT 1013,7:S=INP(1012)
40 OUT 1013,1:S=INP(1012)
50 INPUT "ENTER TRACK NUMBER ";TR
60 IF TR>79 THEN 50
70 OUT 1013,15:S=INP(1012)
80 OUT 1013,1:S=INP(1012)
90 OUT 1013,TR:S=INP(1012)
100 PRINT"SWITCH TO SIDE 1? (Y/N)"
110 A$=INKEY$:OUT 1010,20:IF A$=""THEN 110
120 IF A$<>"Y" AND A$<>"y" THEN 190
130 PRINT"SIDE 1"
140 OUT 1014,128:OUT 1010,16:OUT 1010,20
150 OUT 1013,2:S=INP(1012)
160 OUT 1013,5:FOR T=1 TO 400:NEXT
    T:S=INP(1013)
170 PRINT"PRESS ANY KEY TO STOP "
180 A$=INKEY$:OUT 1010,20:IF A$=""THEN 180
    ELSE 10
190 PRINT"PRESS ANY KEY TO STOP "
200 A$=INKEY$:OUT 1010,20:IF A$=""THEN 200
    ELSE 50
```

### SPINDLE SPEED CHECK

If a Disk Drive Tester with rpm readout is used, check for a speed of 300rpm  $\pm$ 4.5rpm.

To check speed without a Tester, apply a strobe pattern to the flywheel of the Drive, activate the Drive and look at the strobe pattern under fluorescent lighting. The pattern should appear steady. The outer ring of segments in Figure 1 is a usable strobe pattern. Copy or cut out, and connect to the flywheel by a loop of tape, looped sticky side out. Use the Tester Program or the following one line Basic program to activate the Drive.

```
10 OUT 1014,128:OUT 1010,20:GOTO 10
```

A disk must be in the Drive for the motor to run.

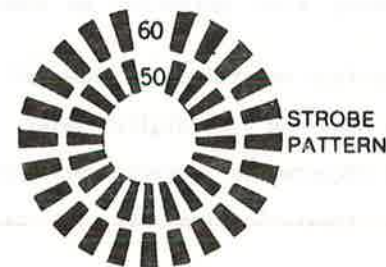


Figure 1

### RADIAL HEAD ALIGNMENT

Connect the channel A (CH1) vertical input of a dual trace scope to TP1 (RF), the channel B (CH2) input to TP2 (RF), and the external trigger input to TP3. Connect scope ground(s) to TP4. Set the scope to add mode with one channel inverted, sweep time to 20mSec and both channels voltage/division to 50mV. Set both channel inputs to AC mode. Insert the Alignment Diskette. Activate the Disk Drive and step the heads to track 40. The cats-eye pattern shown in Figure 2 should be displayed on the scope. If no cats-eye appears, enter "Y" for Side 1, press ENTER to recalibrate at track 0, then key in 40 ENTER. The lobe amplitudes must be within 70% of each other. If the lobes are out of tolerance, loosen the allen screw above CN2 and rotate Motor (M1) for best match of lobe amplitudes. Tighten the Screw and recheck. Check Side 1. If necessary, make compromise adjustment for Side 1. After performing Radial Alignment, check Track 00 Detector adjustment.

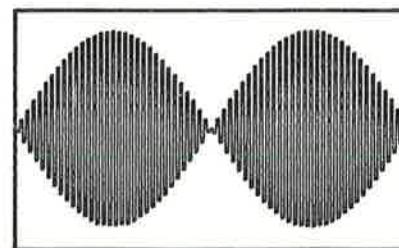
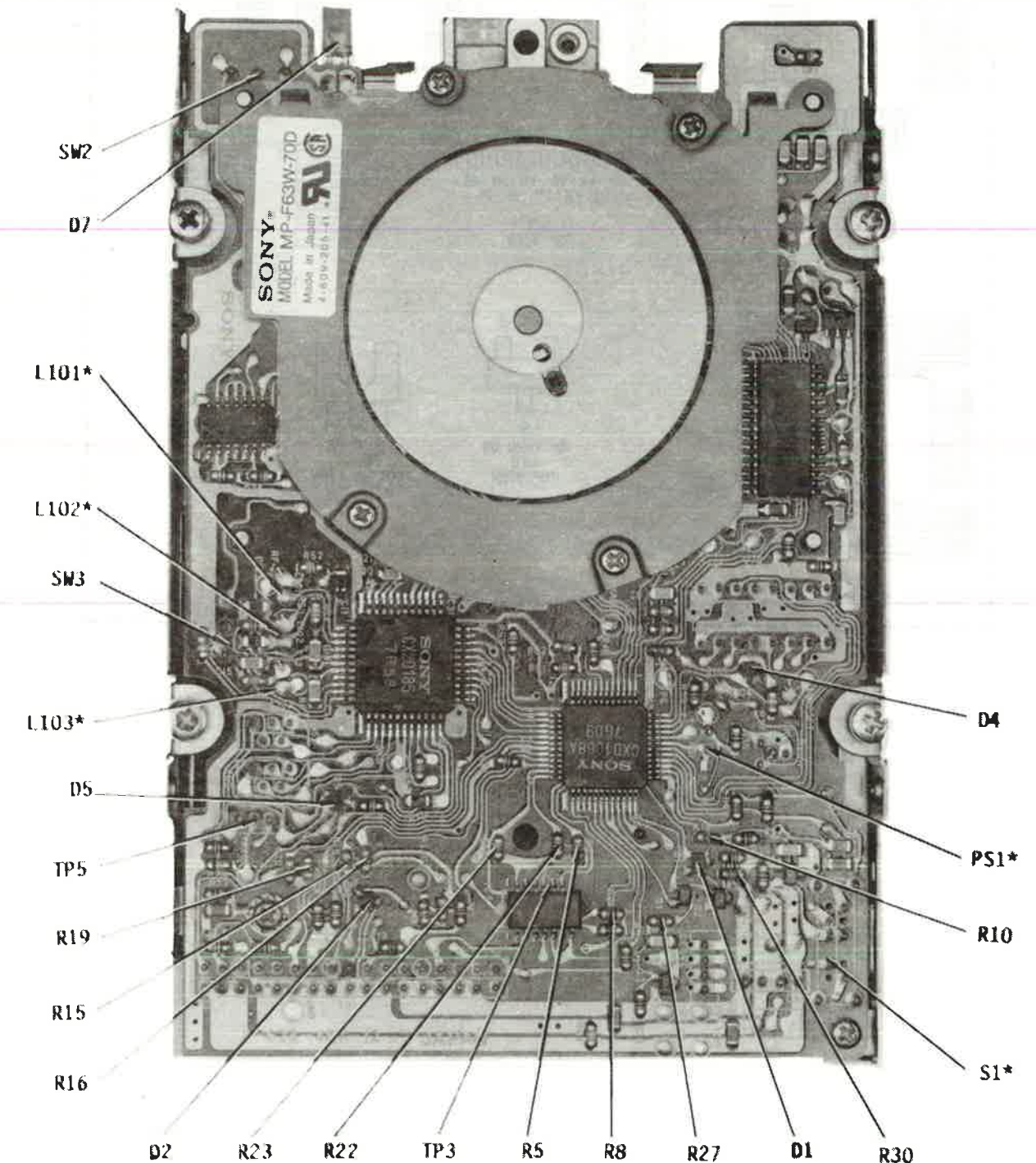


Figure 2



\*COMPONENTS LOCATED ON BOTTOM OF BOARD

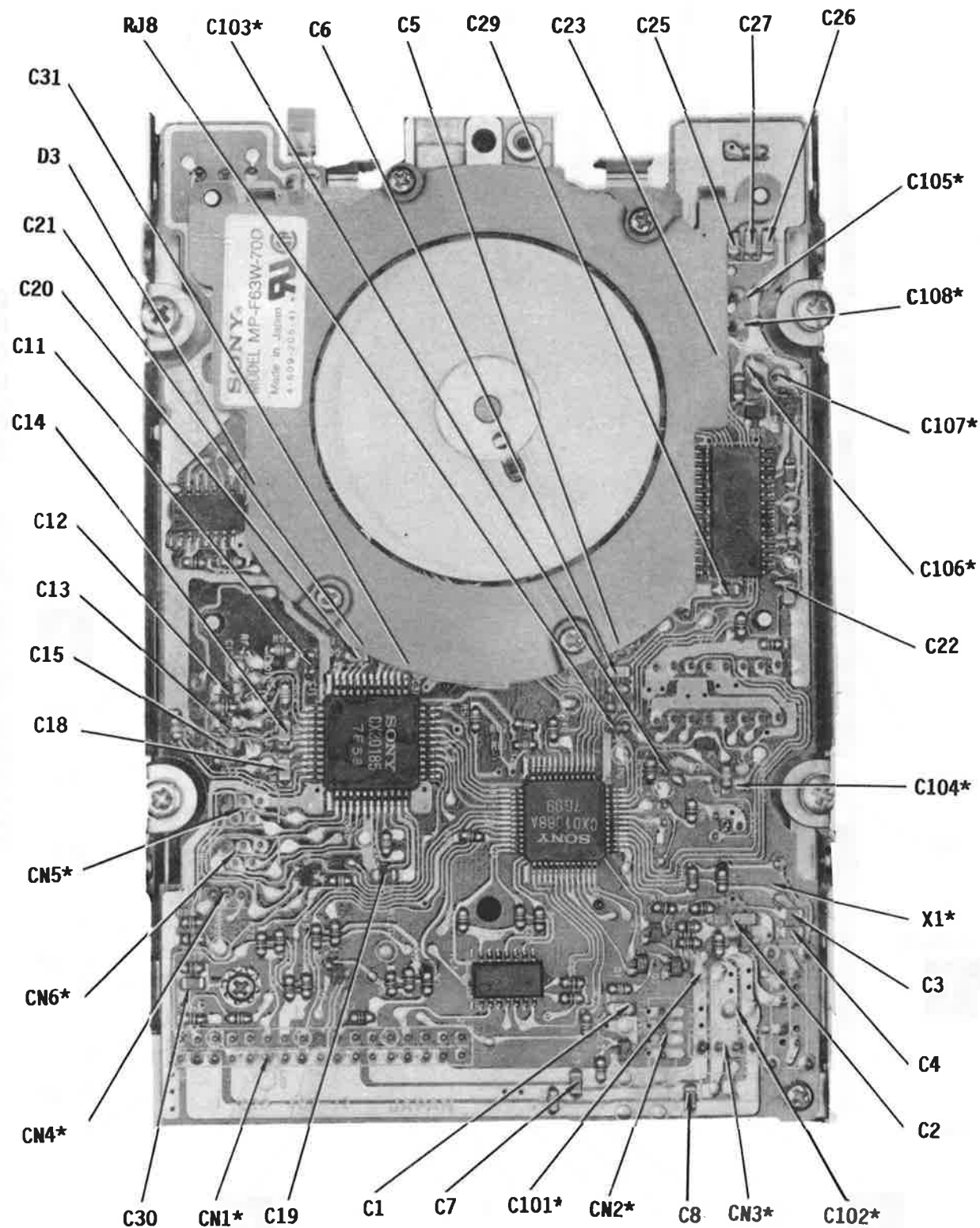
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MODEL 1000TX(25-1600)REV.A,C

TANDY

MAIN BOARD





\*COMPONENTS LOCATED ON BOTTOM OF BOARD

## DISK DRIVE ALIGNMENT (Continued)

### TRACK 00 DETECTOR ADJUSTMENT

Perform Radial Head Alignment. Connect the scope as for Radial Head Alignment. Change the Sweep time to 10uSec. Select track 0 and check for a 62.5kHz signal on the scope. If the signal is not present, loosen the screw holding Track 0 Sensor (M3) and slide the sensor forward or back slightly. Cycle the head to track 40, Side 1, and verify the cats-eye pattern. Select track 0 and check for the 62.5kHz signal. Repeat the sensor adjustment, cats-eye, 62.5kHz cycle until the 62.5kHz signal appears. Check TP5 for logic Low. Select track 2 and check for logic High at TP5. Make fine adjustment of Track 0 Sensor if necessary, until TP5 Logic is Low for track 0 and 1, and Logic High for track 2.

### INDEX DELAY ADJUSTMENTS

Connect scope as for Radial Head Alignment. Change the sweep time to 100uSec. Select negative trigger slope. Insert the Alignment Disk and select track 40. Adjust Delay Control (RV101) for 400uSec  $\pm$  200uSec from the beginning of the trace to the first peak of the timing burst. Select side 1 and make compromise adjustment if necessary. See Figure 3.

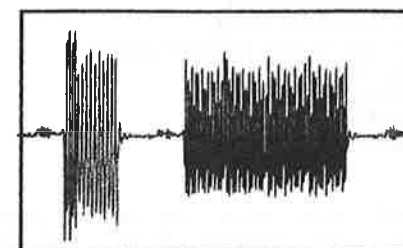
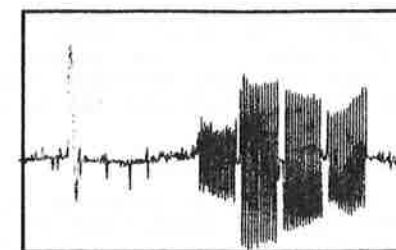


Figure 3

### AZIMUTH HEAD ALIGNMENT

Verify Radial Head Alignment and Index Delay Adjustment. Connect scope as for Radial Head Alignment. Change the sweep time to .5mSec. Insert the Alignment Disk and select track 40, side 0. Check the four-burst pattern for both end bursts equal or less than the burst next toward the middle. If either end burst is greater than the burst next to it, replace the heads. If bursts check good, select Side 1. If Side 1 bursts are not good, slightly loosen the two spline head screws holding Head 1 (M6) and shift the Head 1 arm slightly clockwise or counterclockwise for best symmetry of the burst pattern, with end bursts no greater than adjacent inner bursts. See Figure 4.

Figure 4



If Azimuth is changed, change scope sweep time to 20mSec and verify Radial Head Alignment, then change scope sweep time to 100uSec and verify Index Delay. Move Head 1 arm (see Figure 5) to correct each adjustment. Tighten Screws and recheck Side 0 Radial Head Alignment and Index Delay.

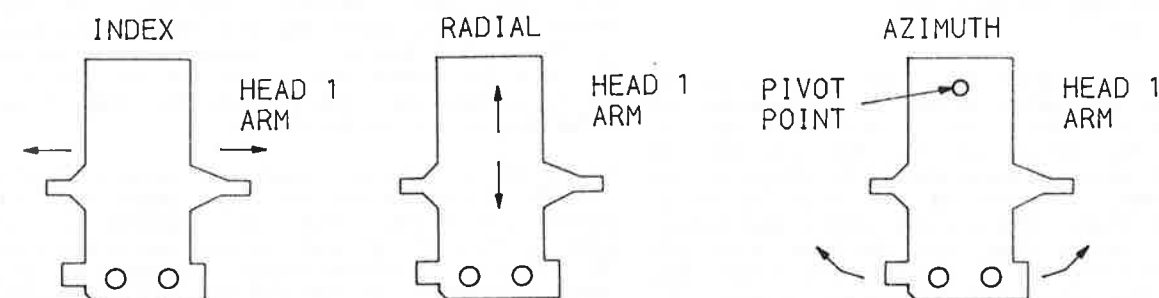


Figure 5

CS30A

MODEL 1000TX(25-1600)REV.A.C

TANDY

## TROUBLESHOOTING

## TEST SETUP

Connect a known good Disk Drive to the Computer and start Basic. (See General Operating Instructions.) Load or key in the test programs as needed. Carefully swap the defective Disk Drive for the known good Drive. Confirm Switch and Jumpers for correct positions, and connectors and cables for good connections.

WARNING: It is possible for a defective Disk Drive to damage, overwrite or erase a test disk, even if the write protect window is open. Use a disk with no special programs or data as a first test disk. Actuate the Drive (FILES, In Basic), then check the disk surface for scratches. If no damage is found, save a program to the disk, then load it back. Clear the program from memory (NEW, In Basic) and load it again. If the program loads, the drive must not have destroyed the disk file, and the Alignment Test Disk can be used.

## HEAD CLEANING INSTRUCTIONS

Use a cotton swab or lint-free cloth dampened with 91% Isopropal alcohol and dry with a lint-free cloth, or use a non-abrasive cleaning Diskette.

## OSCILLATOR

Verify the 3.58MHz waveform at pin 38 of IC1. If the waveform is missing or the frequency wrong, check Crystal X1, Capacitors C3 and C4, and Resistors R32 and R88.

WILL NOT READ

Check CN1 pin 8 for a period of pulses during power up. If no pulses are found, see the INDEX SENSOR section. If pulses appear, key in the following Basic program.

```

10 CLS
20 OUT 1014,128:OUT 1010,16:OUT 1010,20
30 OUT 1013,74:S=INP(1012)
40 OUT 1013,Y:S=INP(1012)
50 FOR X=1 TO 7
60 S=INP(1013):S=INP(1012):PRINT S
70 NEXT X:LOCATE 1,1
80 IF Y=1 THEN Y=5 ELSE Y=1
90 GOTO 20

```

The program actuates the drive continuously in Read mode, and sends values to the monitor as read from the disk. Put a disk with data on it into the Drive and run the program. A column of seven numbers should be displayed on the monitor, changing as the disk is read. Eject the disk. The spindle motor, and number changing, should stop, but the Disk Drive LED (D7) should stay lit. Numbers should all show 16 with disk ejected and program running. If the numbers do not change, check CN1 pin 24 for Logic High to verify the Disk Drive is in Read mode. If reading is not correct, check the Disk Drive Interface on the System Board, and pin 24 of connecting cable and connectors. If reading is good, reinsert the disk and check IC1 pin 14 for Logic High. If reading is not good check IC1. If reading is good check for pulses at IC5 pin 12. If pulse are

found check the Disk Drive Interface on the System Board, and pin 30 of connecting cable and connectors. If no pulses are found, check for pulses at IC5 pin 13. If pulses are found, check IC5. If no pulses are found, check for pulses at IC1 pin 12. If pulses are found check IC1. If no pulses are found, compare the waveform at TP1 (IC2, pin 4) when a disk with data is Inserted, to the waveform when a blank unformatted disk is Inserted. If a difference is noted, check IC2. If no difference is noted, check the head windings for continuity. Check connectors CN5, CN6, and check voltages and components associated with pins 3 thru 11, 14, 15 and 18 thru 22 of IC2. If connections, head continuity, and components check good, check IC2.

~~WILL NOT WRITE~~

NOTE: This procedure writes to the disk regardless of current disk data. Use a blank disk. Key in the following Basic program.

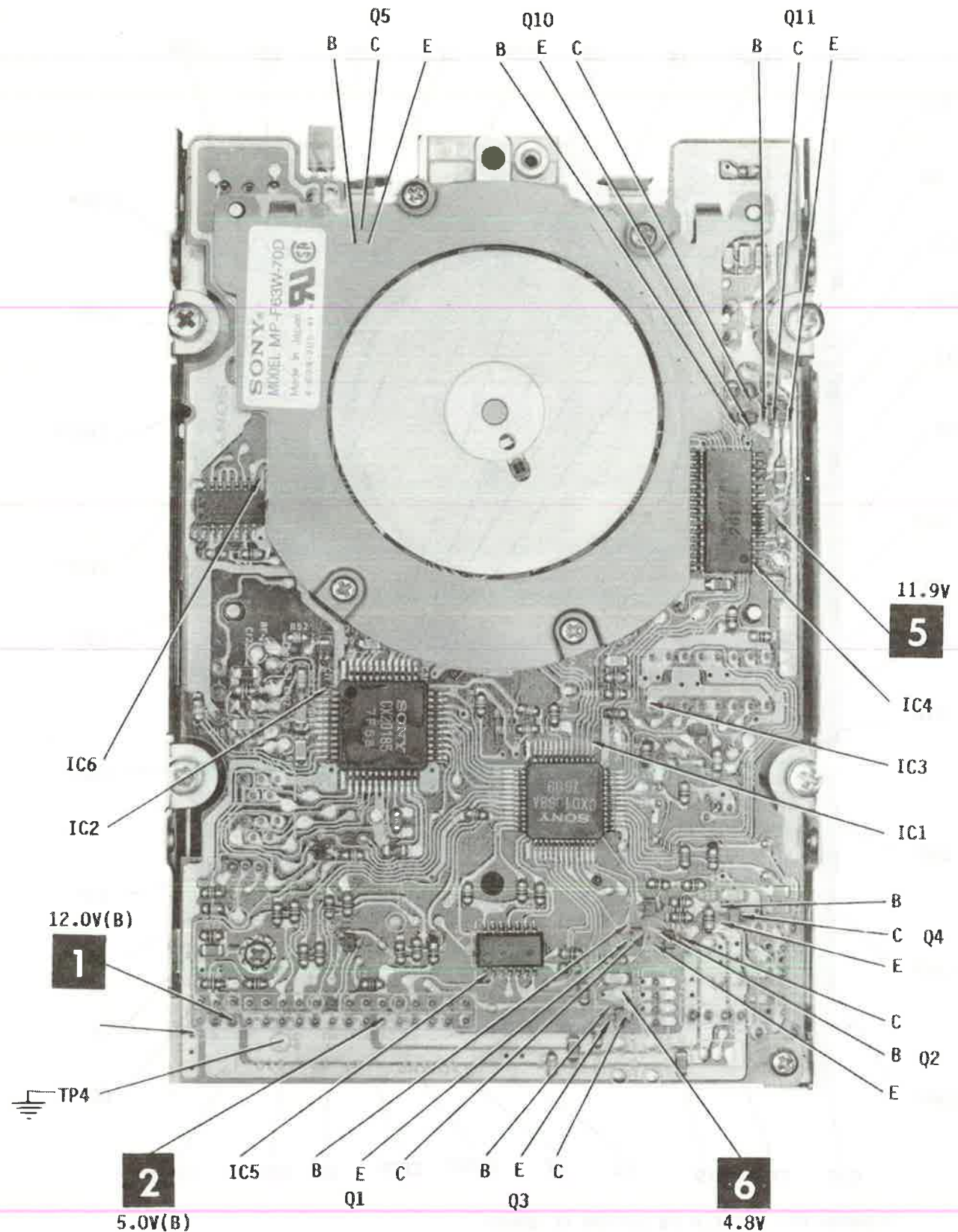
```

10 CLS
20 OUT 1014,128:OUT 1010,16:OUT 1010,20
30 S=INP(1012)
40 OUT 1013,77:S=INP(1012)
50 OUT 1013,Y:S=INP(1012)
60 OUT 1013,1:S=INP(1012)
70 OUT 1013,12:S=INP(1012)
80 OUT 1013,12:S=INP(1012)
90 OUT 1013,0:S=INP(1012)
100 S=INP(1013):S=INP(1012)
110 PRINT INP(1013) AND 2:S=INP(1012)
120 FOR X=1 TO 5
130 S=INP(1013):S=INP(1012)
140 NEXT X:LOCATE 1,1
150 IF Y=1 THEN Y=5 ELSE Y=1
160 GOTO 20

```

Insert a blank disk with the write protect window closed. The program checks the write protect status and displays a "0" on the monitor if the disk is not write protected and a "2" if the disk is write protected. The program will continuously write bursts to the disk if the program does not find the disk to be write protected. Run the program and check Connector CN1 pin 24 for pulses. If no pulses are found, check the number on the monitor. If the number is not zero, see the "WRITE PROTECT DOES NOT FUNCTION" section. If the number is zero, check the Disk Drive Interface on the System Board. If pulses are found at CN1 pin 24, check for pulses at CN1 pin 22. If no pulses are found, check the Disk Drive Interface on the System Board.

If pulses are found, check for pulses at IC1 pin 15. If no pulses are found check IC1. If pulses are found, check the waveforms at IC2 pins 12 thru 15, 20 and 22, and the cathode of D5. If some waveforms appear and some do not, check connection of CN5 and CN6 and continuity of Heads M5, M6. If no waveforms are found, check voltages and components associated with IC1 pins 25 thru 31, and 33. If components check good, check IC2.



\*COMPONENTS LOCATED ON BOTTOM OF BOARD

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



DISK DRIVE LOGIC CHART

IN NO.	IC 1	PIN NO.	IC 1	PIN NO.	IC 1	PIN NO.	IC 3	IC 5	IC 6
1	P	21	P(5)	41	X(1)	1	H	P	L
2	H	22	L	42	X(1)	2	H	P	L
3	L(6)	23	P	43	H	3	X(1)	H(9)	H
4	L	24	H(7)	44	P	4	L	H(9)	H
5	H	25	H(9)	45	L	5	L	L	H
6	L	26	P	46	H	6	X(1)	L	L
7	H	27	H(21)	47	P	7	H(1)	L(21)	L
8	L	28	L	48	P	8	H	H(21)	P
9	L	29	L			9	H	H	P
10	H	30	H			10	L(1)	H(7)	P
11	L	31	L			11	L(1)	H(7)	P
12	P	32	L			12	L	P	P
13	P(2)	33	H			13	L	P	P
14	P(2)	34	L			14	L(1)	H	H
15	P(2)	35	H(9)			15	L(1)		
16	L	36	H			16	H		
17	P(2)	37	L						
18	P(2)	38	P						
19	H	39	P						
20	H(1)	40	H(1)						

TROUBLESHOOTING (Continued)

WRITE PROTECT DOES NOT FUNCTION

NOTE: This procedure writes to the disk regardless of current disk data. Use a blank disk.

Key In the Basic program listed in the "WILL NOT WRITE" section. Insert a blank disk with the write protect window open and run the program. Check for a number "2" displayed on the monitor. If "2" is not displayed, check IC1 pin3 for a Logic High. If reading is bad, check Switch (SW2) for shorting. If reading is good, check IC1 pin 24 for Logic Low. If reading is bad, check IC1. If reading is good, check IC5 pin 10 for Logic Low. If reading is not correct, check IC5. If reading is correct, check continuity of CN1 pin 28, and connecting cable and connectors to Disk Drive Interface on System Board.

INDEX SENSOR

Key In the following Basic program.

10 OUT 1014,128:OUT 1010,20:GOTO 10

Insert a blank disk and run the program. Check CN1 pin 8 for pulses. If no pulses are found, check for pulses at IC1 pin 26. If pulses are found, check IC5. If no pulses are found, check for the waveform at IC4 pin 2. If the waveform is found, check IC1. If no waveform is found, check voltages and components associated with IC4 pins 19 thru 29. If components check good, check IC4.

TRACK 00 SENSOR

Disk Drive Heads chatter at disk hub end of Head Travel on Computer power up. Check for momentary Logic Low at Connector CN1, pin 26, just before head chatter by removing the disk, and turning power off, then on, to actuate the drive. If momentary Low is found, check connecting cable and connectors to Disk Drive Interface on System Board. If no momentary Low is found, press ENTER, SPACE, or any character key to actuate the drive and check for 4.8V at Connector CN4 pin 3. If reading is not correct check connection of Connector CN4 pin 3. If reading is correct, actuate drive and check for 3.8V at CN4 pin 1. If voltage is 1V or more off, check Track 00 Sensor (M3). If voltage is good, actuate drive and check for Logic High at CN4 pin 2 while the Heads are off track 0. If reading is not correct, check connection of Connector CN4 pin 2, check R25, and check Track 00 Sensor M3. If reading is correct, slip a light blocker (such as black electrical tape on a strip of notepaper) in the gap of Track 00 Sensor M3, actuate the drive and check for Logic Low at CN4 pin 2. If the reading is not correct, check Track 00 Sensor M3. If reading is correct, check IC5 and IC1.

CAPSTAN MOTOR

Drive Motor will not run. Insert a disk and check IC1 pin 4 for Logic Low. If logic is not Low, check Switch (SW3) and Resistor R46. If Low is found, key in and run the following Basic program.

10 OUT 1014,128:OUT 1010,20:GOTO 10

Check IC1 pin 28 for Logic Low. If reading is bad check for Jumper at SL4, A, check Resistor R12, and check for good connections from CN1 pin 20 to Disk Drive Interface on System Board. If IC1 pin 28 checks Logic Low, check IC1 pin 37 for Logic Low. If reading is not correct, check position and continuity of Switch (S1), and check for good connections from CN1 pin 10 to Disk Drive Interface on System Board. If IC1 pin 37 checks Logic Low, check IC1 pin 36 for Logic High. If reading is bad check IC1. If reading is good, check for 11.9V at IC4 pin 9. If voltage is not correct, check voltages and components associated with Q2 and Q4. If voltage is correct, check for 4.8V at Q3 collector. If voltage is not correct check voltages and components associated with Q1 and Q3. If voltage is correct, check continuity of Capstan Motor (M2) and voltages and components associated with IC4.

STEPPING MOTOR

Head Position Motor (M1) not working. Key in and run the following Basic program. The program continuously alternates the heads between tracks 00 and 16, regardless of there being a disk in the drive or not. Press CTRL-BREAK to stop.

10 OUT 1014,128:OUT 1010,16:OUT 1010,20  
20 OUT 1013,7:S=INP(1012)  
30 OUT 1013,1:S=INP(1012)  
40 OUT T=1 TO 500:NEXT T  
50 OUT 1010,20  
60 OUT 1013,15:S=INP(1012)  
70 OUT 1013,1:S=INP(1012)  
80 OUT 1013,16:S=INP(1012)  
90 FOR T=1 TO 500:NEXT T  
100 GOTO 10

While the program is running, check for pulses at pins 18 and 20 of Connector CN1. If pulses are missing, check for good connections of connectors and cable to Disk Drive Interface on System Board. If pulses are present, check for pulses at IC3 pins 3, 6 7. If pulses are missing, check IC1. If pulses are present, check for pulses at IC3 pins 10, 11, 14, 15. If pulses are present, check continuity of Stepping Motor (M1). If pulses are missing check IC3.

CSCS30A

MODEL 1000TX(25-1600)REV.A,C

TANDY

8 PARTS LIST AND DESCRIPTION

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

SEMICONDUCTORS (Select replacement for best results)

ITEM No.	MFGR. PART No./ TYPE No.	NTE PART No.	ECG PART No.	TCE PART No.	NOTES
DISK DRIVE					
D1	1S2837	NTE595	ECG595		
D2	1S2835	NTE596	ECG596		
D3,4,5,6	1S2837	NTE595	ECG595		
IC1	CXD1068A				
IC2	CX20185				
IC3	A1035				
IC4	TA7774P				
	20174				
IC5	CX20174				
	SN7417(SM)				
IC6	SN7417NS(SM)				
	74HC00				
	TC74HC00F				
Q1,2	DTC114EK	NTE2414	ECG2414		
Q3,4	2SB624-BV4	NTE2407	ECG2407		
Q5	DTC114EK	NTE2414	ECG2414		
Q10	2SA812	NTE2409	ECG2409		
Q11	2SB798	NTE2429	ECG2429		

PARTS LIST AND DESCRIPTION (Continued)

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

COILS (RF-IF)

ITEM No.	FUNCTION	MFGR. PART No.
	DISK DRIVE	
L101	PeakIng (3.9uH)	
L102	PeakIng (560uH)	
L103	PeakIng (560uH)	

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

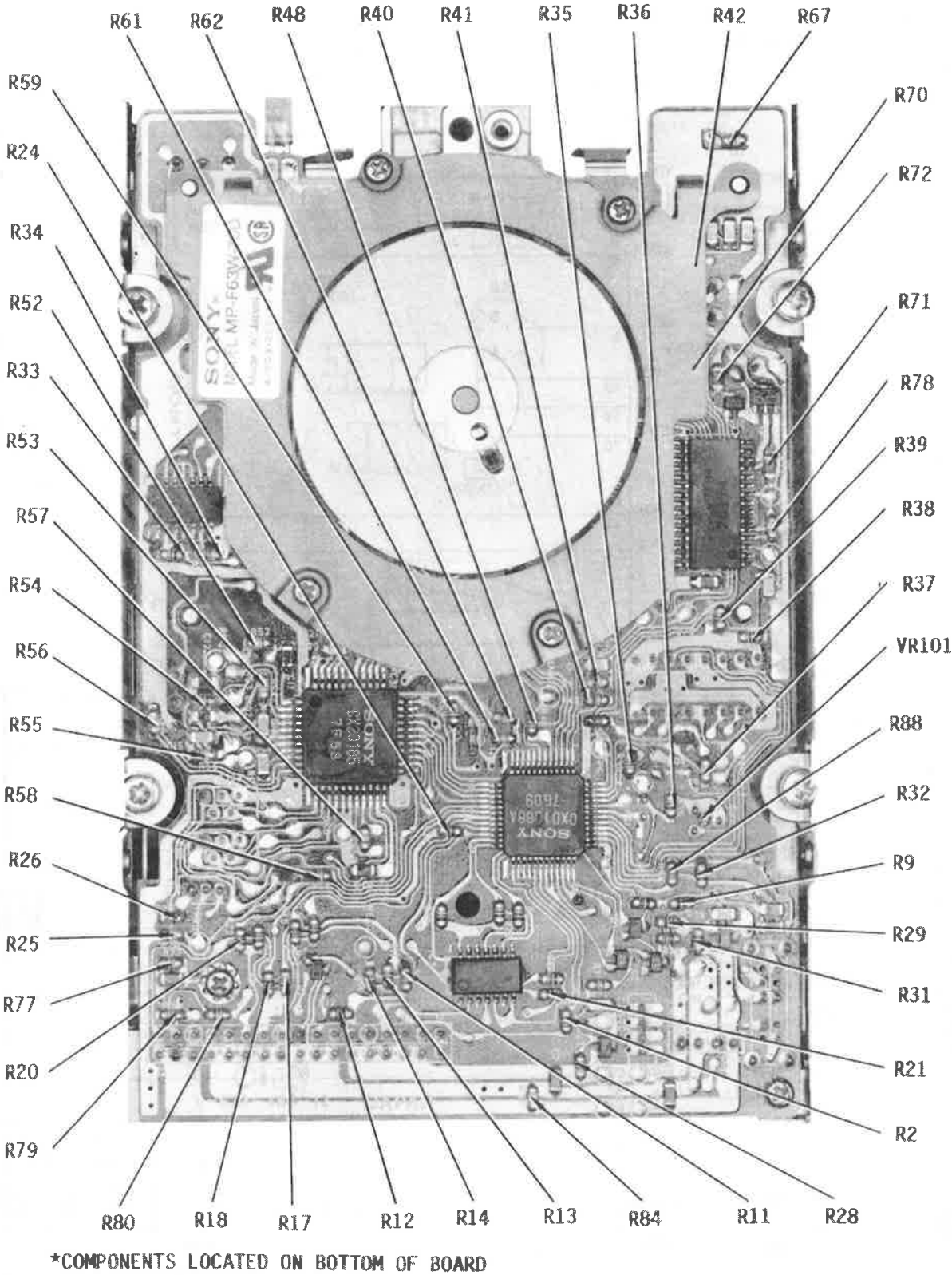
ITEM NO.	FUNCTION	RESISTANCE	MFGR. PART NO.	NOTES
	DISK DRIVE			
VR101	Delay	100K		

MISCELLANEOUS

ITEM No.	PART NAME	MFGR. PART No.	NOTES
	DISK DRIVE		
D7	LED		Activity (Yellow)
PS1	Fuse		
S1	Switch		Drive Select
SW2	Switch		Write Protect
SW3	Switch		Disk Sense
X1	Crystal		(3.58MHz)

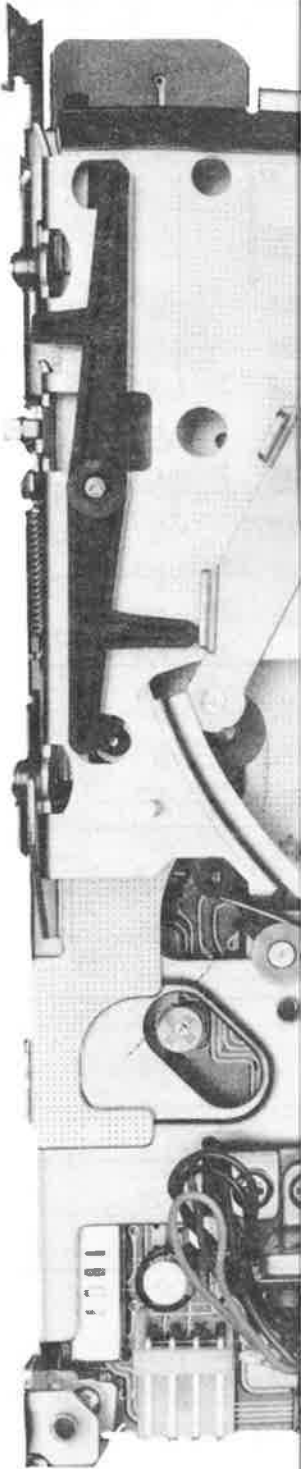
**SAFETY PRECAUTIONS**

1. Use an Isolation transformer for servicing.
2. Maintain AC line voltage at rated input.
3. Remove AC power from the Computer system 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-tilt, low voltage soldering iron.
6. Use an Isolation (times 10) probe on scope.
7. Do not remove or install Boards, Floppy Disk Drives, Printers or other peripherals with Computer system AC power On.
8. Do not use freon-propelled sprays. These can generate electrical charges sufficient to damage semiconductor devices.
9. This Computer system is equipped with a grounded three-pronged AC plug. This plug must fit into a grounded AC power outlet. Do not defeat the AC plug safety feature.
10. Periodically examine the AC power cord for damaged or cracked insulation.
11. The Computer system cabinet is equipped with vents to prevent heat build-up. Never block, cover or obstruct these vents.
12. Instructions should be given, especially to children, that objects should not be dropped or pushed into the vents of the cabinet. This could cause shock or equipment damage.
13. Never expose the Computer system to water. If exposed to water, turn the unit Off. Do not place the Computer system near possible water sources.
14. Never leave the Computer system unattended or plugged into the AC outlet for long periods of time. Remove AC plug from AC outlet during lightning storms.
15. Do not allow anything to rest on AC power cord.
16. Unplug AC power cord from outlet before cleaning Computer system.
17. Never use liquids or aerosols directly on the Computer system. Spray on cloth and then apply to the Computer system cabinet. Make sure the Computer system is disconnected from the AC power line.



\*COMPONENTS LOCATED ON BOTTOM OF BOARD

**MAIN BOARD**



**MECHANICAL VIEW**

servicing or install-  
 mple of typical ES  
 "chip" components.

circuit boards. Some  
 static electricity.  
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 charging wrist strap  
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Drives, Printers or  
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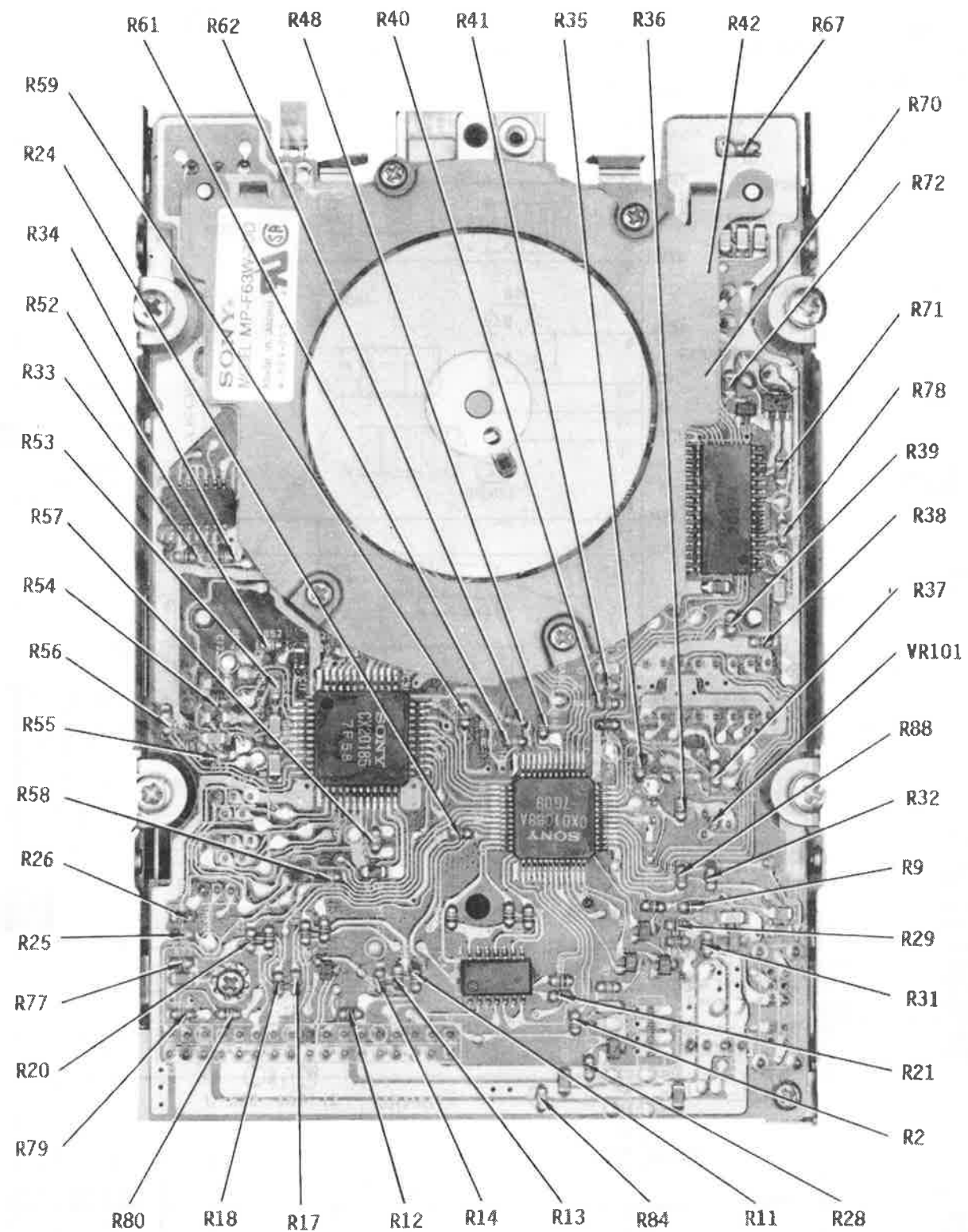
ildren, that objects  
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 n near possible water

plugged into the AC  
 from AC outlet dur-

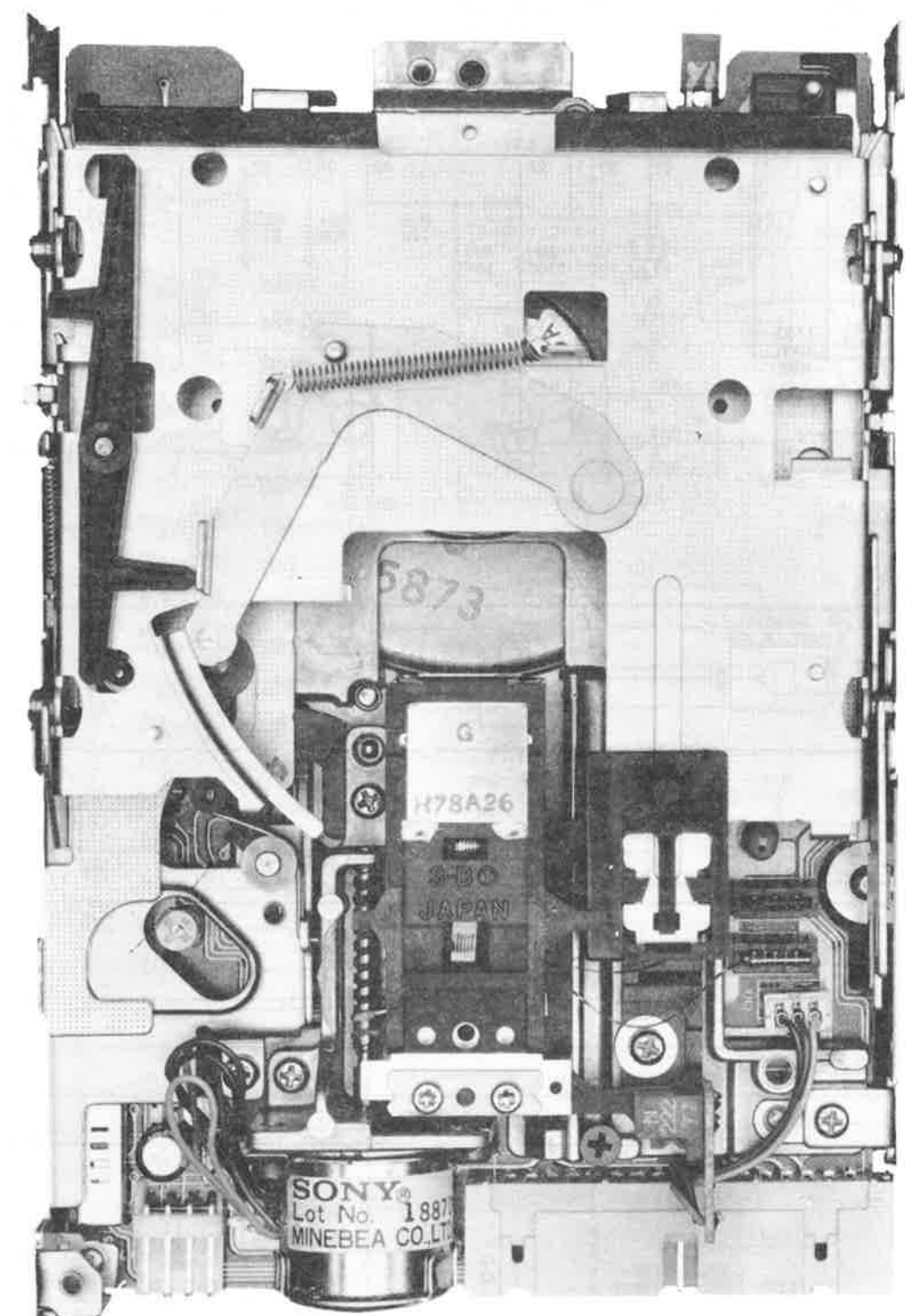
Computer system.

mputer system. Spray  
 cabinet. Make sure  
 power line.



\*COMPONENTS LOCATED ON BOTTOM OF BOARD

MAIN BOARD



MECHANICAL VIEW