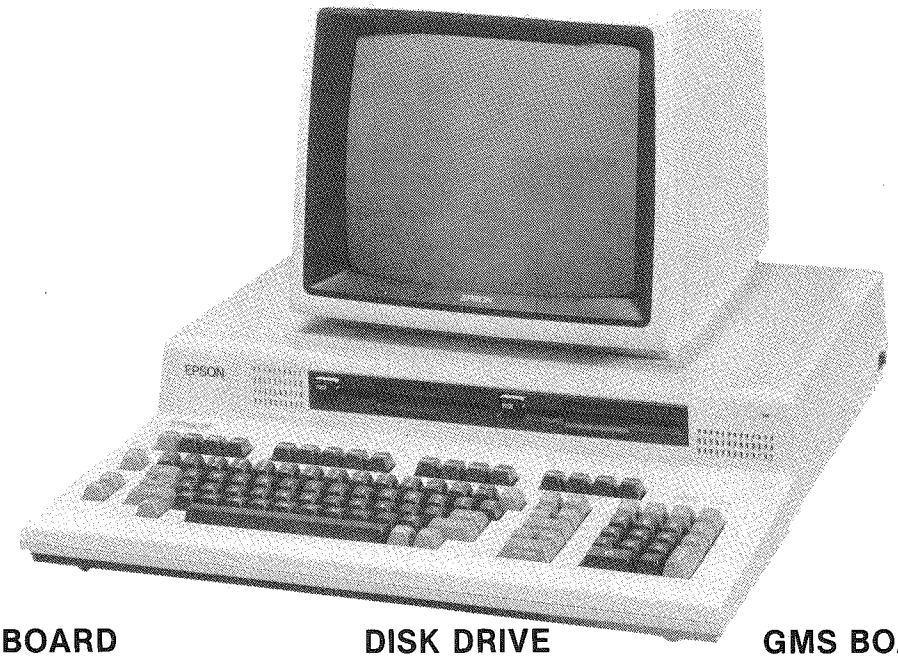
ASCII, HASCI KEYBOARDS
SYSTEM BOARD
POWER SUPPLY



GGS BOARD
See Folder CSCS4-A

DISK DRIVE
See Folder CSCS4-C

GMS BOARD
See Folder CSCS4-B

MONITOR
See Folder CSCS4-D

SAFETY PRECAUTIONS
See page 16

PRELIMINARY SERVICE CHECKS
ENCLOSED

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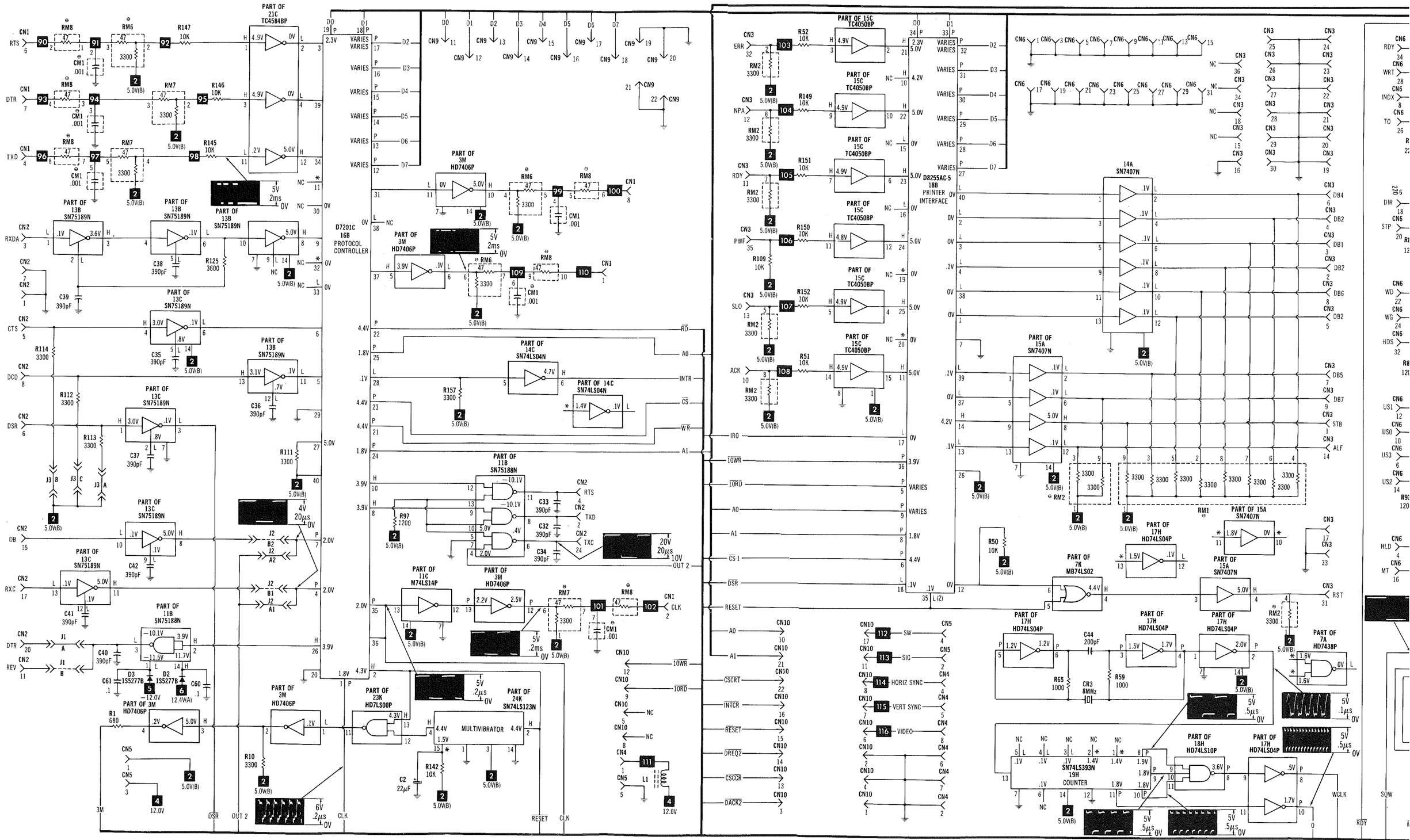
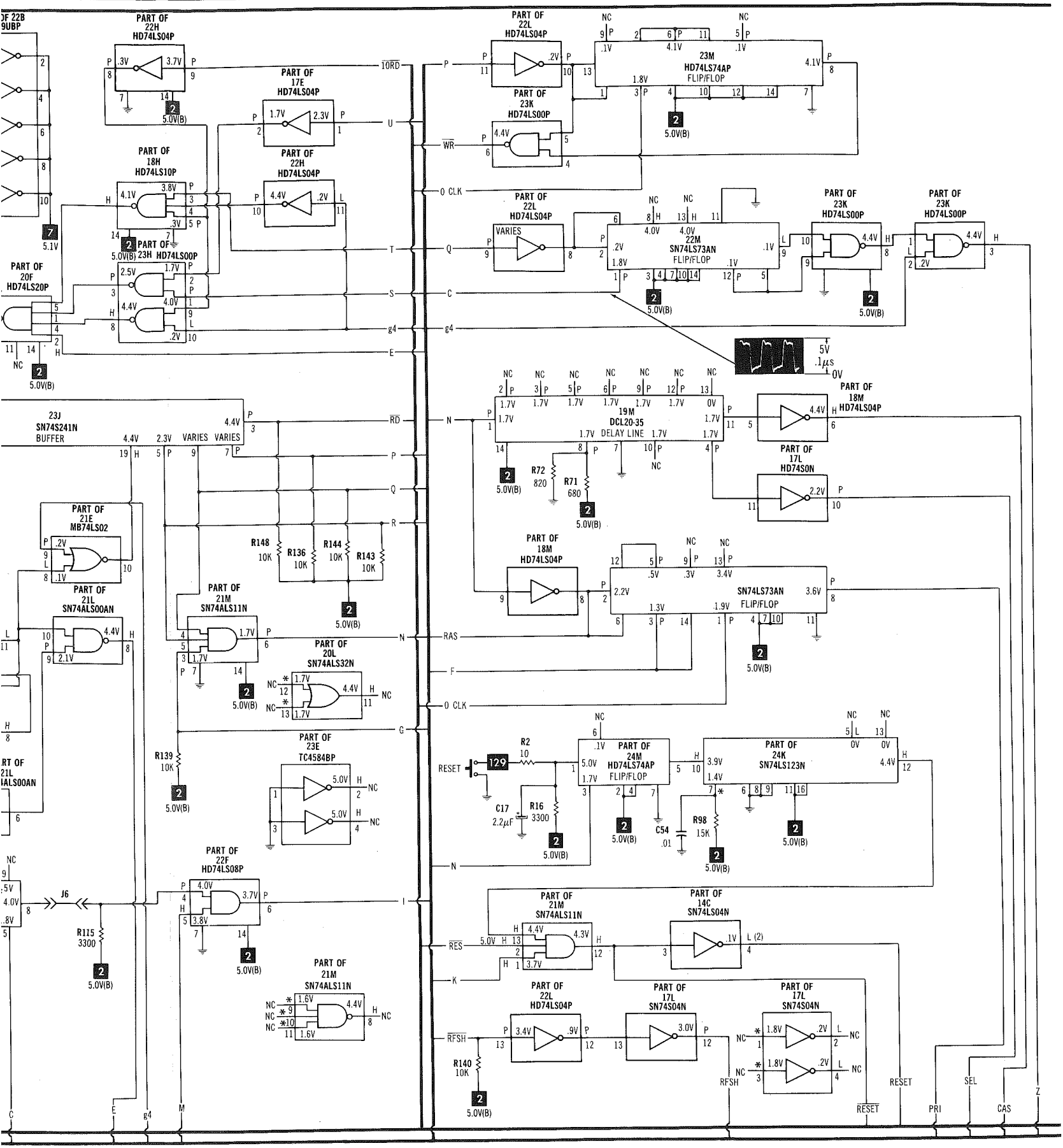
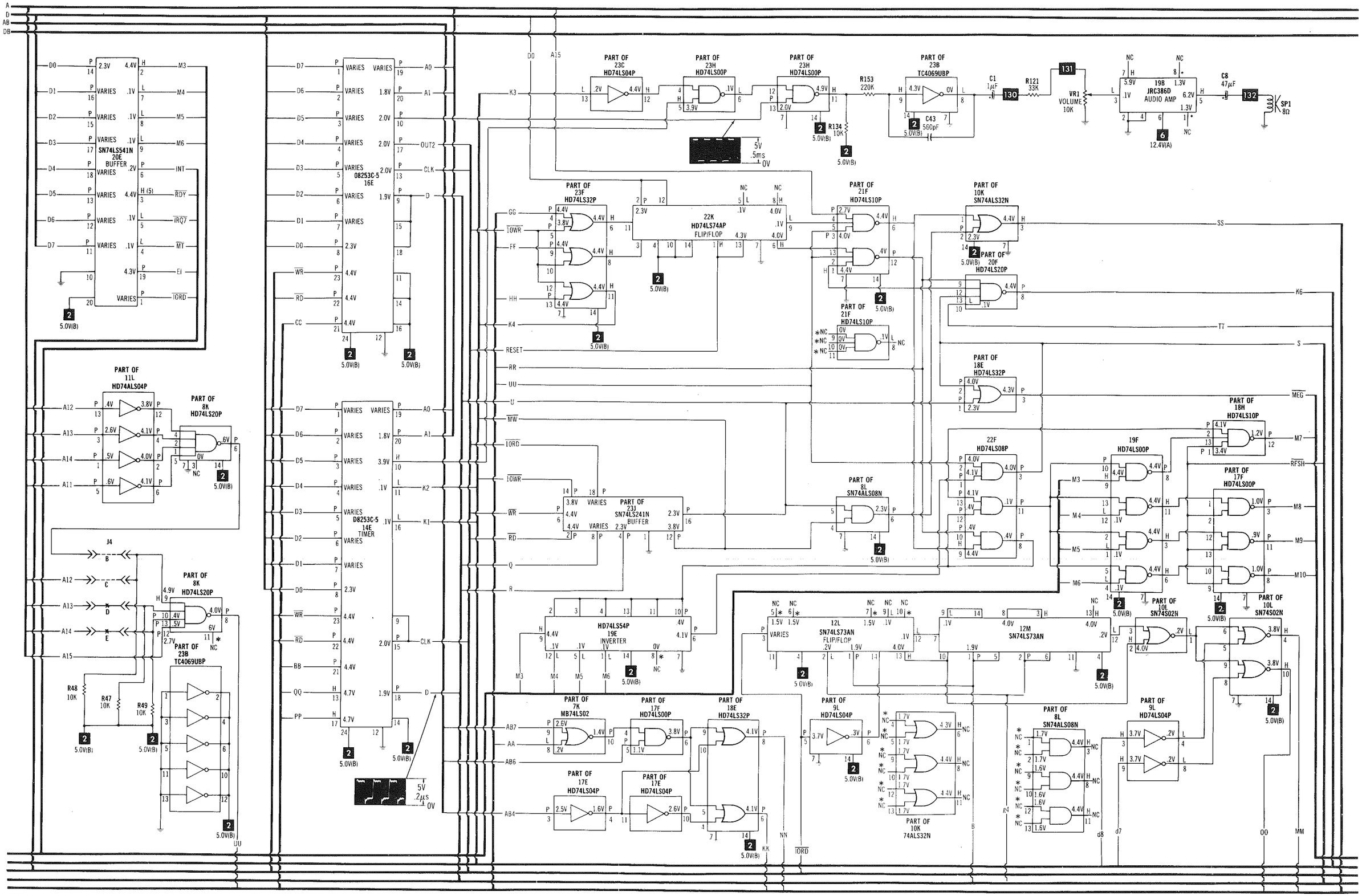


A PHOTOFACT STANDARD NOTATION SCHEMATIC WITH CIRCUITRACE™



SYSTEM BOARD

16H HD74LS154P DEMULTI-PLEXER
PART OF 22C SN74ALS32N
16K SN74LS373N LATCH
PART OF 9K HD74LS27P
21J D8237AC-5 DMA CONTROLLER
PART OF 22H HD74LS04P
PART OF 22L HD74LS04P
19J D8237AC-5 DMA CONTROLLER
PART OF 20L SN74ALS32N
PART OF 21L SN74ALS00AN
PART OF 21E MB74LS02
PART OF 9L HD74LS04P
12E D8259AC INTERRUPT CONTROLLER
PART OF 24M HD74LS74AP FLIP/FLOP
PART OF 17E HD74LS04P
10E D8259AC INTERRUPT CONTROLLER
14M D27160-Q1X-0 EPROM
16M M16010C RAM
19C SN74LS541N BUFFER
18F SN74LS273N FLIP/FLOP
SW2
RM9
R40 10K
J5



A
B
DB

SN74S541N 6J BUFFER

SN74LS245N 8H TRANSCEIVER

SN74LS541N 6K BUFFER

SN74LS541N 5M BUFFER

SN74LS541N 5K BUFFER

SN74LS541N 6L BUFFER

SN74LS244N 7H BUFFER

SN74LS244N 6H BUFFER

RM3

RM4

RM5

PART OF 9K HD74LS27P

PART OF 21H HD74LS30P

9L HD74LS04P

PART OF 7K MB74LS02

PART OF 9L HD74LS04P

PART OF 9K HD74LS27P

PART OF 11L HD74LS04P

11H SN74ALS10N

PART OF 12H SN74ALS10N

12J SN74ALS10N

11K SN74ALS00AN

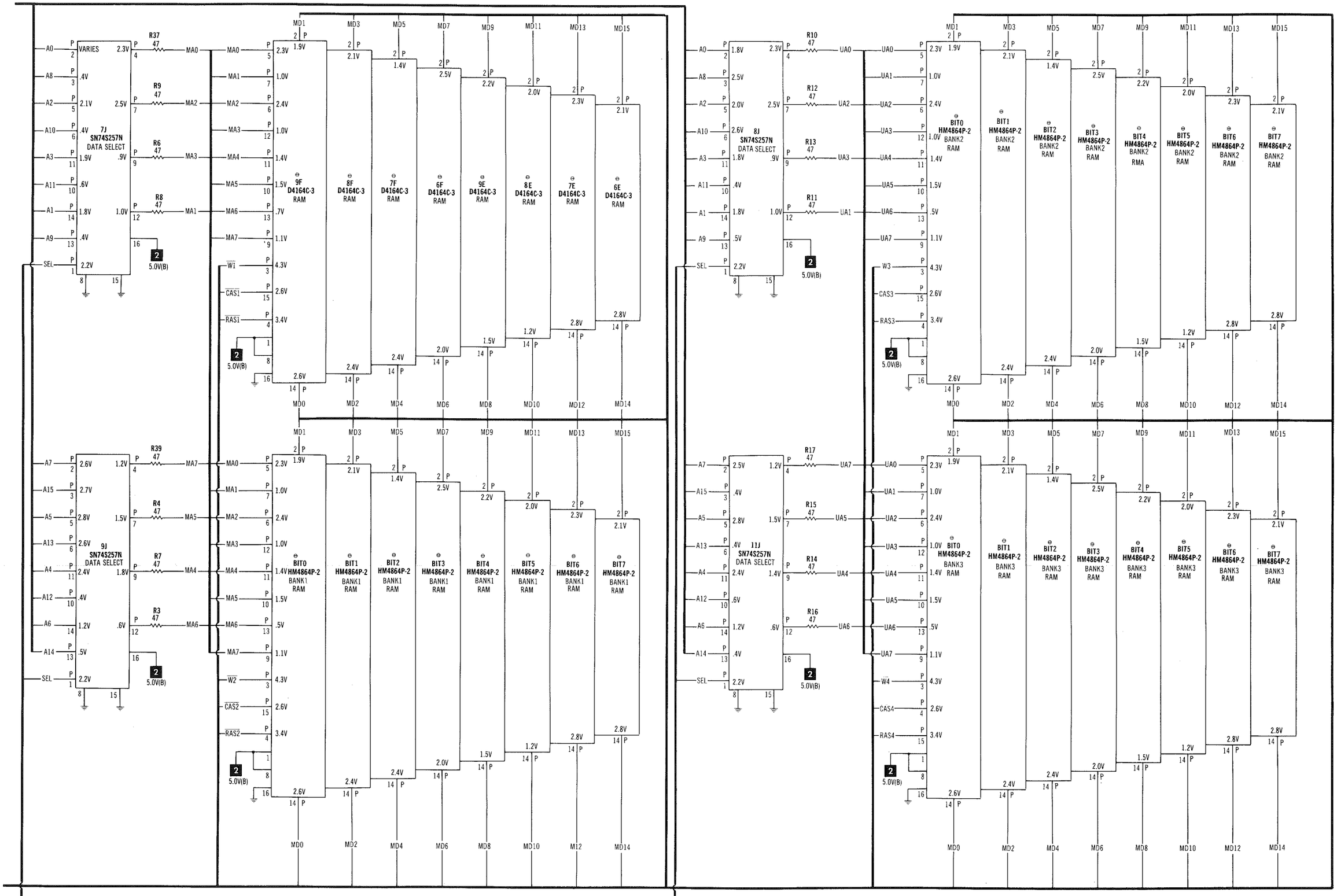
OPTION 1

OPTION 2

OPTION 3

OPTION 4

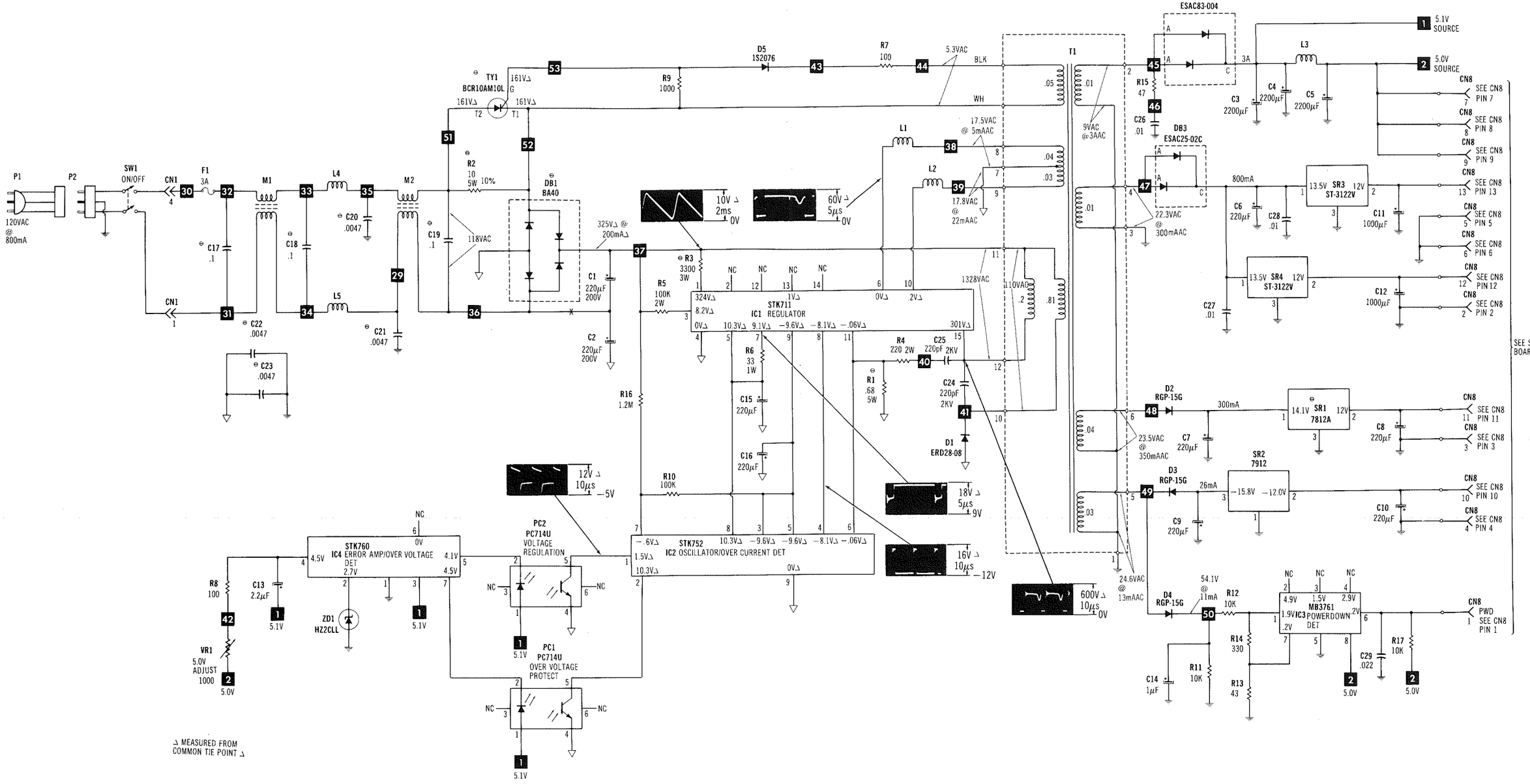
OPTION 5



A PHOTOFACT STANDARD NOTATION SCHEMATIC WITH CIRCUITRACE

SYSTEM BOARD

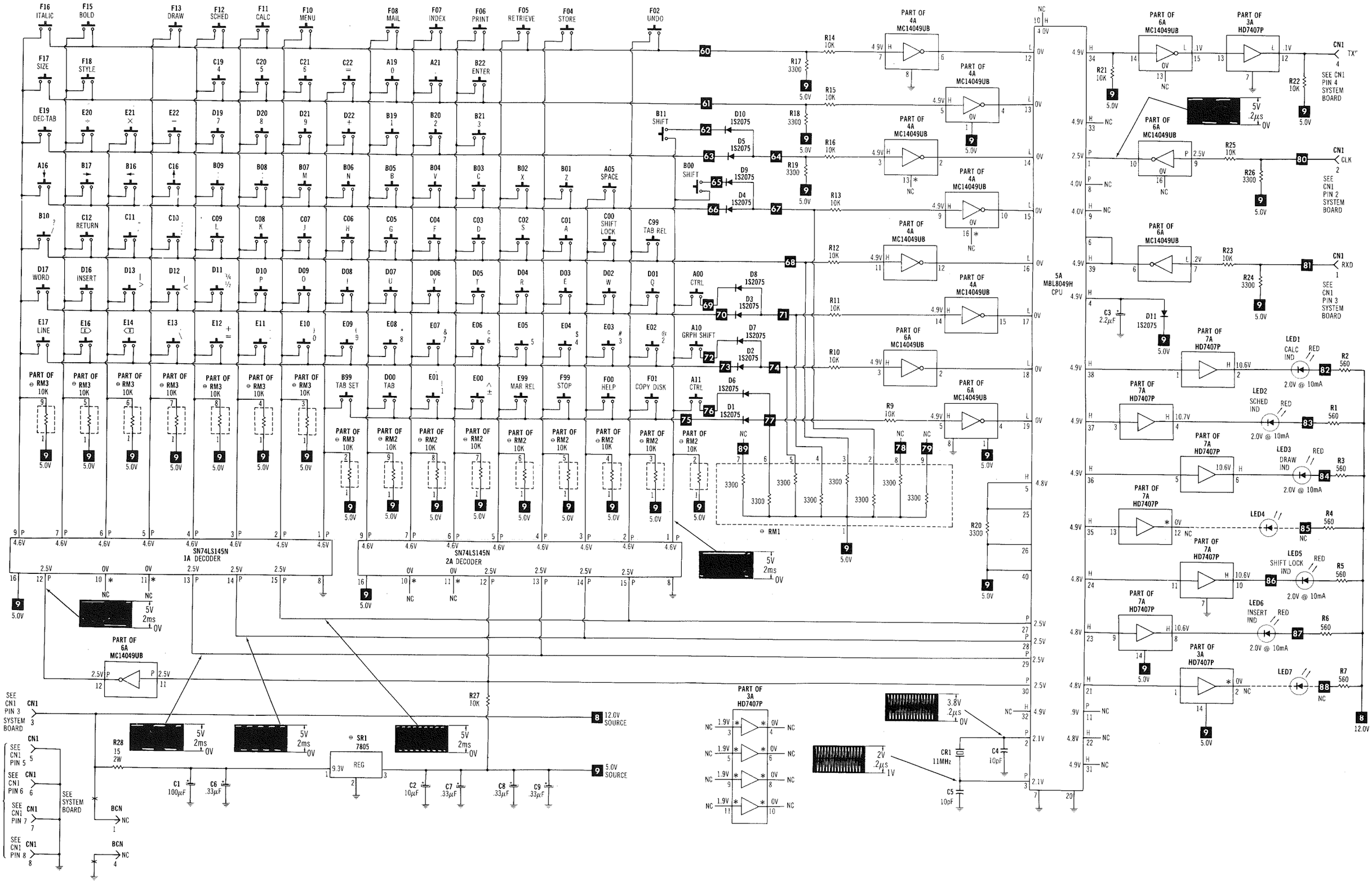
SYSTEM BOARD



A PHOTOFACT STANDARD NOTATION SCHEMATIC WITH CIRCUITRACE

POWER SUPPLY

POWER SUPPLY

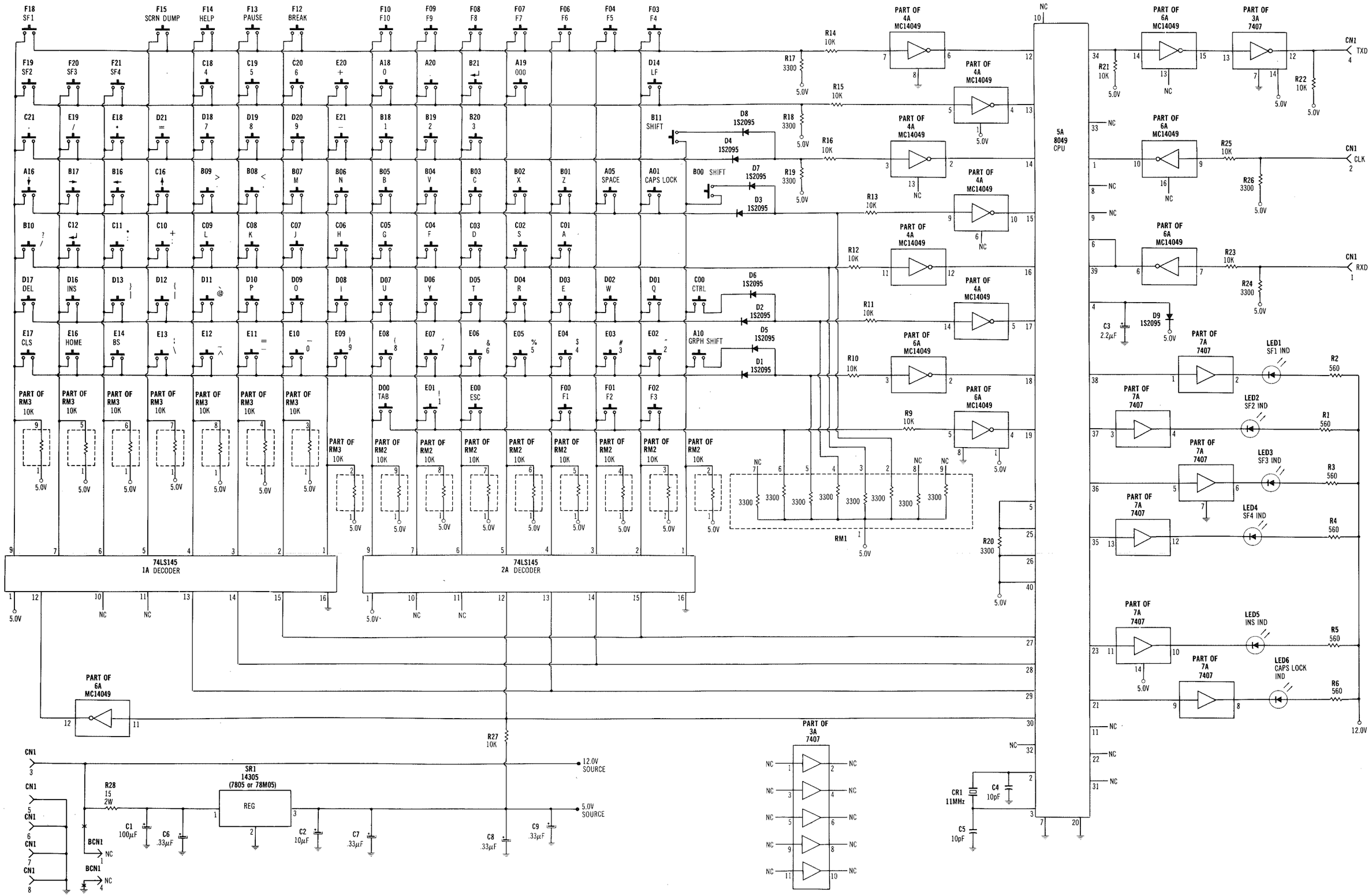


EPSON
MODEL QX-10

HASCI KEYBOARD

HASCI KEYBOARD

CSCS4



A PHOTOFACT STANDARD NOTATION SCHEMATIC

ASCII KEYBOARD

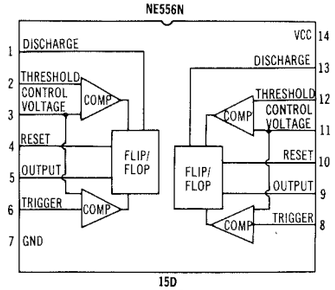
ASCII KEYBOARD

LINE DEFINITIONS

A0 Thru A15 ..... Address Lines
AA
AAB
AB
AB0 Thru AB15
ACK ..... Acknowledge
AD0 Thru AD15 ..... Bidirectional Address Lines
ADR0 Thru ADR15 ..... Address Lines
ALF ..... Autoline Feed
B
BA
BB
BB1
BBA
BD0 Thru BD7 ..... Bidirectional Data Lines
BD0A Thru BD15A ..... Bidirectional Data Lines
BSAK ..... Bus Acknowledge
C
CA
CA0 Thru CA7
CCA
CASA
CAS1 Thru CAS4
CAS
CC
CD0 Thru CD15
CE ..... Control Enable
CES
CLK
CLKA
CS ..... Chip Select
CS-1
CSCCR ..... CRT Drive Board Select
CSCRT ..... CRT Drive Board Select
CTS ..... Clear to Send
d
d6 Thru d8
D
D0 Thru D7 ..... Data Lines
DA
DAA
DACK ..... Data Acknowledge
DACK-2 ..... DMA Acknowledge
DAK ..... Acknowledge
DAK1 Thru DAK4
DAKF ..... DMA Acknowledge
DAKS1 Thru DAKS4 ..... DMA Acknowledge
DB
DB1 Thru DB7 ..... Data Line
DBIN ..... Data Buffer Input
DCD ..... Data Carrier Detect
DD
DLATCH ..... Data Latch
DIR ..... Direction
DOTA Thru DOTH
DREQ ..... Data Request
DREQ-1 Thru DREQ-2 ..... DMA Transfer Request
DRQF ..... DMA Request
DRQS1 THru DRQS4 ..... DMA Request
DSR
DTB0 Thru DBT7 ..... Data Lines
DTR ..... Data Terminal Ready
e1 Thru e3
E1
E
EA
EB
EE
EEA
EOP
EOPF ..... End of Process
EOPS ..... End of Process
ERR ..... Error
F
FA
FF
FFA
g1
g4
G
GA
GG
GGA
HA
HDS ..... Side Select
HH
HHA
HLD ..... Head Load
HSYNC ..... Horizontal Sync
I
IA
II
IIA
IMAG
INT ..... Interrupt Request
INDX ..... Index
INTCR ..... Light peninterrupt request
INTF1 & INTF2
INTR ..... Interrupt Request
INTSL1 Thru INTSL4
IORD ..... Input/Output Read
IOWD ..... Input/Output Write
IRD ..... I/O Read
IR0
IRQ7
IWR ..... I/O Write
IWS
J1 Thru J7
J
JA
JJ
JJA
K1 Thru K6
K
KA
KK
KKA
L
LA
LC0 Thru LC3
LGT1
LL
LLA

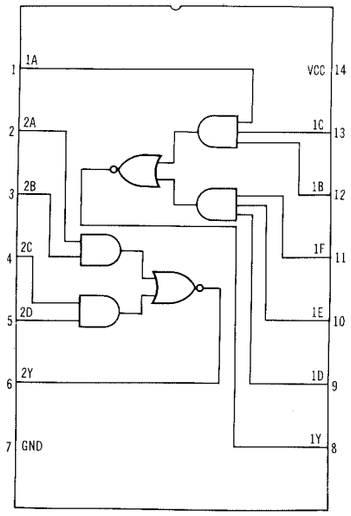
IC PINOUTS & TERMINAL GUIDES

NE556N



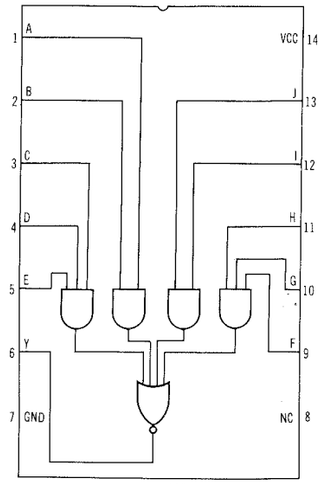
15D
TIMER
TOP VIEW

SN74LS51N



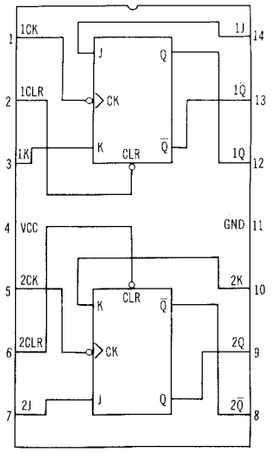
10D
INVERTER
TOP VIEW

HD74LS54P



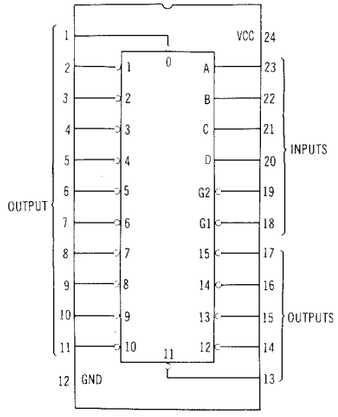
19E
INVERTER
TOP VIEW

SN74LS73AN



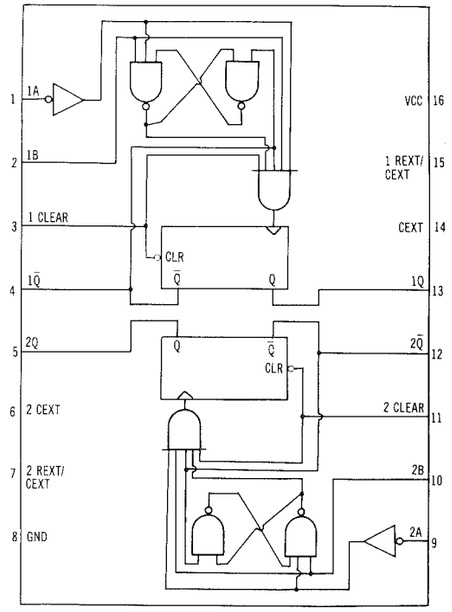
20H, 12L, 12M, 20M, 22M
FLIP/FLOP
TOP VIEW

HD74LS154P



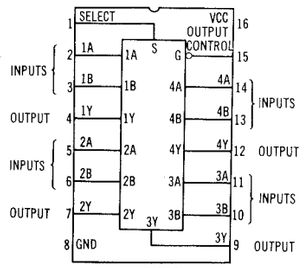
16H
DEMULTIPLEXER
TOP VIEW

SN74LS221N



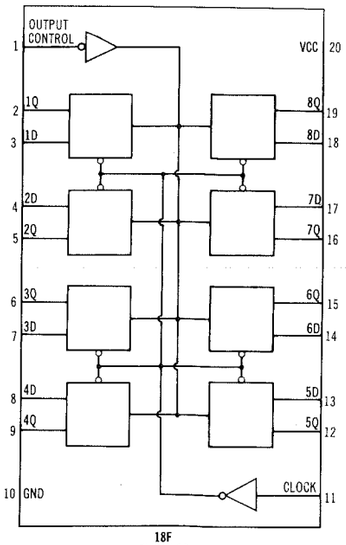
8A, 8D
MULTIVIBRATOR
TOP VIEW

SN74S257N



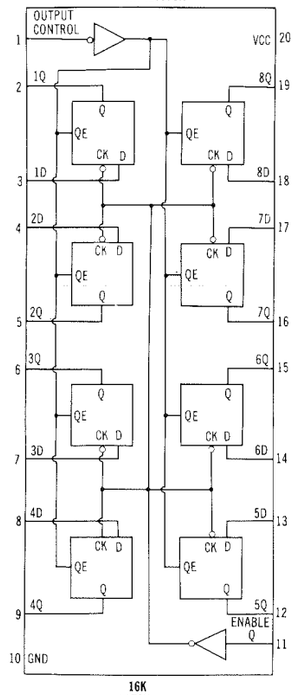
7J, THRU 9J, 11J
DATA SELECT
TOP VIEW

74LS273PC



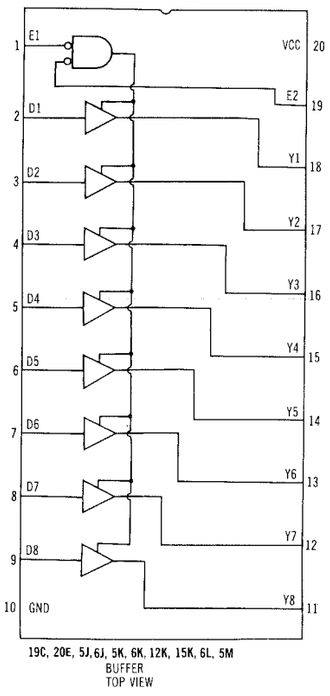
18F
FLIP/FLOP
TOP VIEW

SN74LS373N



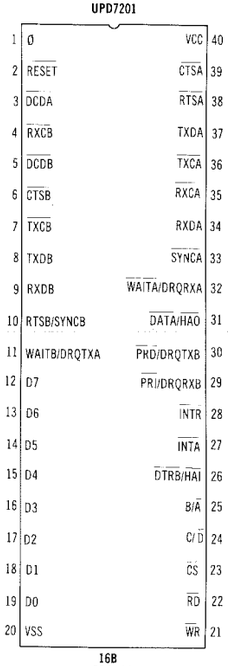
16K
LATCH
TOP VIEW

SN74LS541N



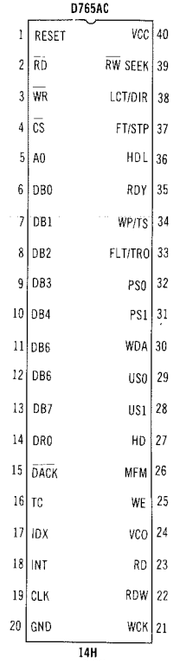
19C, 20E, 5J, 6J, 5K, 6K, 12K, 15K, 6L, 5M
BUFFER
TOP VIEW

UPD7201



16B
PROTOCOL
CONTROLLER
TOP VIEW

D765AC



14H
DISK
CONTROLLER
TOP VIEW

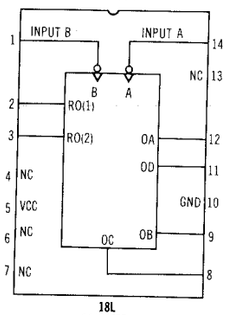
D780C-1

17J
MICROPROCESSOR
TOP VIEW

D8237AC-5

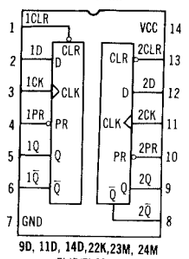
19J, 21J
MEMORY ACCESS
TOP VIEW

SN74LS93N



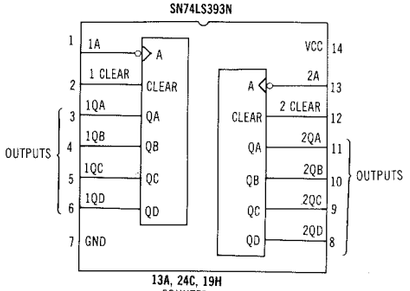
18L
COUNTER
TOP VIEW

HD74LS74AP



9D, 11D, 14D, 22K, 23M, 24M
FLIP/FLOP
TOP VIEW

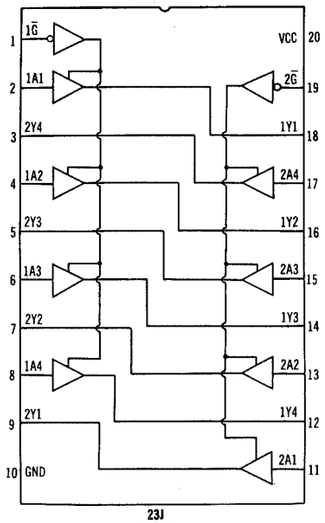
SN74LS393N



13A, 24C, 19H
COUNTER
TOP VIEW

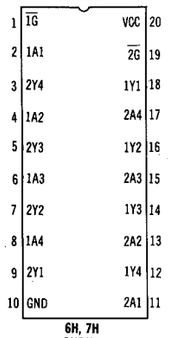
IC PINOUTS & TERMINAL GUIDES (Continued)

SN74LS241N



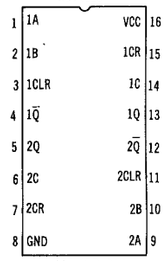
23J
BUFFER
TOP VIEW

SN74LS244N



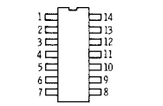
6H, 7H
BUFFER
TOP VIEW

HD74123

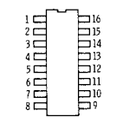


10A, 13D, 24K
MULTIVIBRATOR
TOP VIEW

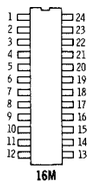
19B
TOP VIEW



7A, 14A, 15A, 7B, 8B, 11B, 13B, 22B, 23B, 7C, 9C, THRU, 11C, 14C, 21C, 22C, 17E, 18E, 21E, 11H, 12H, 17H, 18H, 21H, THRU
23H, 12J, 7K THRU 11K, 23K, 8L, THRU 11L, 17L, 19L, THRU 22L, 3M, 18M, 19M, 21M
TOP VIEW



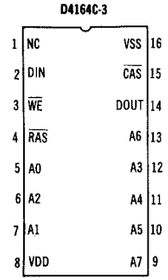
BANK1-BITO THRU BIT7,
BANK2-BITO THRU BIT7,
BANK3-BITO THRU BIT7
15C
TOP VIEW



16M

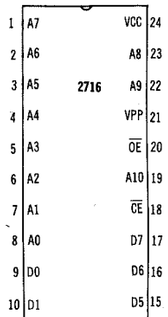
Q1, Q4 THRU Q7
BOTTOM VIEW

D4164C-3



6E THRU 9E
6F THRU 9F
RAM
TOP VIEW

2716



14M
EPROM
TOP VIEW

Q2, Q3
FRONT VIEW

SR1
FRONT VIEW

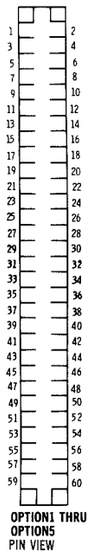
J1
TOP VIEW

J3
TOP VIEW

J2
TOP VIEW

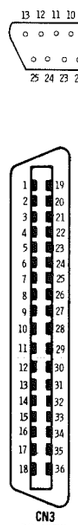
J4
TOP VIEW

J5
TOP VIEW



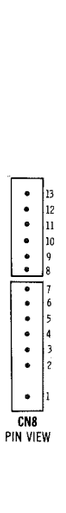
OPTION1 THRU
OPTION5
PIN VIEW

CN7
PIN VIEW



CN3
PIN VIEW

CN6
PIN VIEW



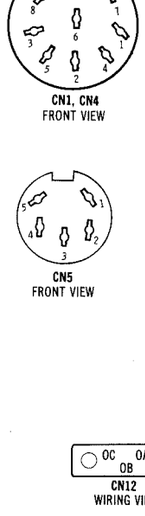
CN8
PIN VIEW

CN10
PIN VIEW

CN11
PIN VIEW

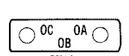
CN9
PIN VIEW

CN2
WIRING VIEW



CN1, CN4
FRONT VIEW

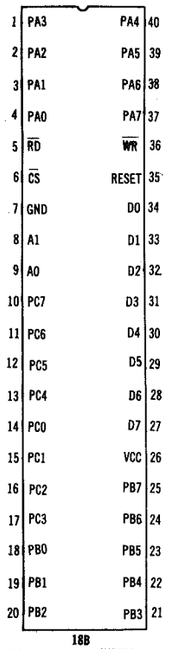
CN5
FRONT VIEW



CN12
WIRING VIEW

CN13
PIN VIEW

UPD8255A

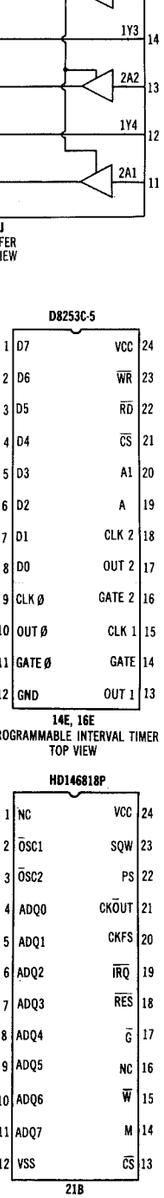


18B
PROGRAMMABLE INTERFACE
TOP VIEW

D8253C-5

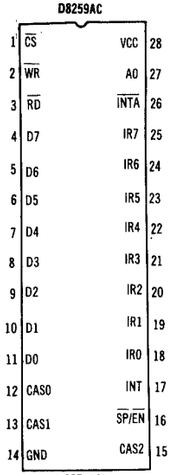
14E, 16E
PROGRAMMABLE INTERVAL TIMER
TOP VIEW

HD146818P



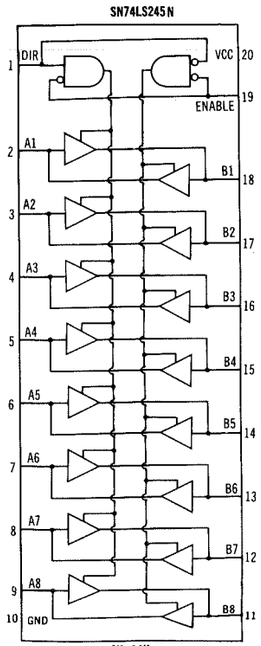
21B
REAL-TIME CLOCK/RAM
TOP VIEW

D8259AC

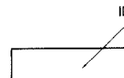


10E, 12E
CONTROLLER
TOP VIEW

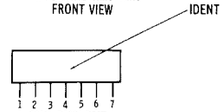
SN74LS245N



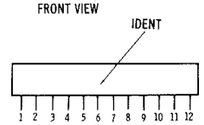
8H, 14K
TRANSCEIVER
TOP VIEW



RM1 THRU RM5, RM9
FRONT VIEW



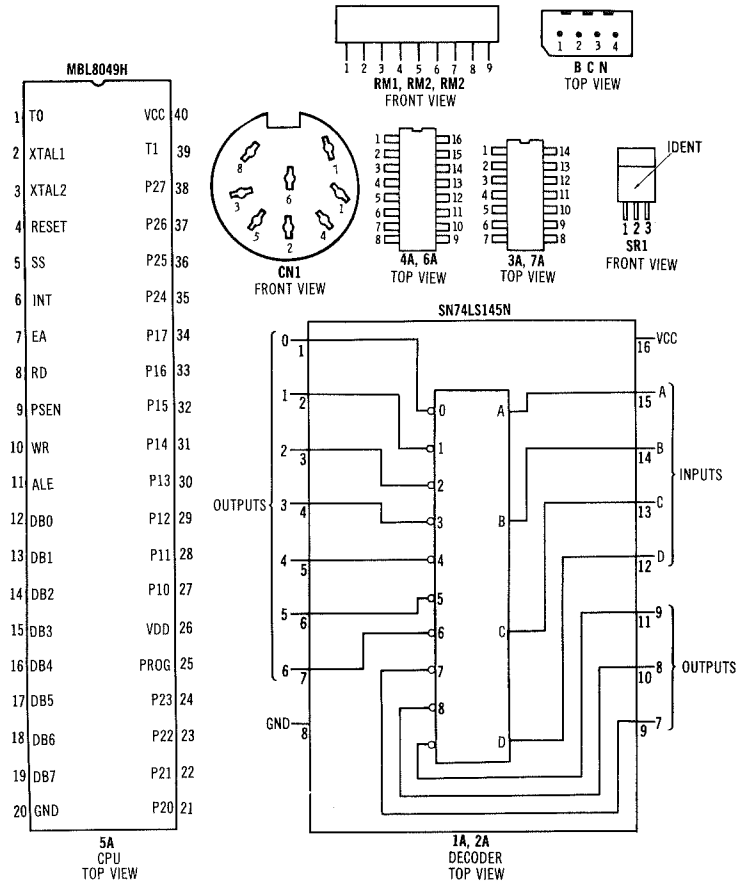
CM1, RM6, RM7
FRONT VIEW



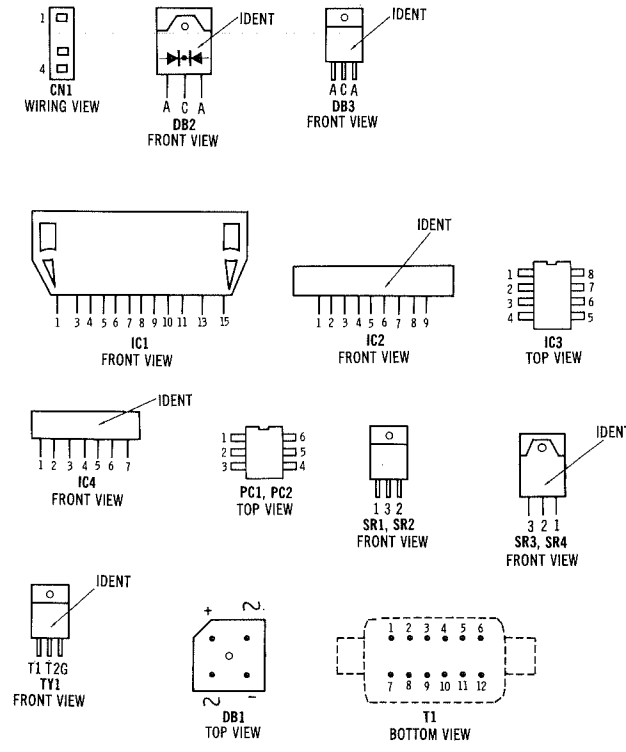
RM8
FRONT VIEW

IC PINOUTS & TERMINAL GUIDES (Continued)

HASCI KEYBOARD



POWER SUPPLY BOARD



TROUBLESHOOTING

POWER SUPPLY BOARD

POWER SUPPLY

NOTE: Use an isolation transformer when troubleshooting the power supply. Unplug the power supply from System Board to prevent possible damage to System Board from high voltages that may occur with a defective power supply. Use 47 Ohm, 5 Watt resistors for loads, if needed.

Check AC Fuse (F1). If the fuse is open, check for a short at Diode DB1 and also check for a possible short beween pin 11 and pin 15 of Regulator IC (IC1). If the fuse is good, check for 118V AC across the AC inputs at Diode DB1. If 118 VAC is missing, check Resistor R2 and Coils M1, M2, L4 and L5. If Resistor R2 is hot, check the voltages and components associated with Triac TY1. Check for 325V between the negative and the positive outputs of Diode DB1. If 325V is missing, check Diode DB1 and Capacitors C1 and C2. If 325V is present, check for oscillations by checking for a waveform at pin 4 of Oscillator/Overcurrent Detector (IC2). If the waveform is missing, check for approximately 8V at pin 5 of IC1. NOTE: Resistor R3 may overheat and blow if the power supply is On for more than two minutes without oscillating. If 8V is missing at pin 5 of IC1, check Resistors R3 and R4 and IC1. If Resistor R3 is bad, replace it and turn On the power supply for no more than one minute at a time while making checks to determine why the power supply is not oscillating. Turn Off the power supply long enough to allow Resistor R3 to cool.

If 8V is present at pin 5 of IC1, check the voltages and components associated with Overvoltage Protect Photo Cell (PC1) and Voltage Regulation Photo Cell (PC2) and Oscillator/Overcurrent Detector (IC2).

If the waveform is good at pin 4 of IC2, check the voltages and components associated with pins 6 thru 11 and 15 of IC1 and check the windings of Power Transformer (T1) for possible open or shorted circuits.

Check for 5.0V at pin 7 of Connector CN8. If 5.0V is not regulated, check the adjustment of the 5V ADJ Control (VR1), see "5V Adjust" section of the Miscellaneous Adjustment, and check the voltages and components associated with Error Amp/Over Voltage Detector (IC4) and Photo Cell PC2.

If 5.0V is missing at pin 7 of Connector CN8, check the winding from pin 1 to 2 of Transformer T1, Didoe DB2, Electrolytics C3, C4 and C5 and Coil L3. If 5.0V is present at pin 7 of Connector CN8, check for 12.0V at pin 13 of Connector CN8. If 12.0V is missing at pin 13 of Connector CN8, check the winding from pin 3 to pin 4 of Transformer T1, Diode DB3, Electrolytics C6, C11, Capacitor C27 and 12V Regulator IC (SR3). If 12.0V is present at pin 13 of Connector CN8, check for 12.0V at pin 12 of Connector CN8. If 12.0V is missing at pin 12 of Connector CN8, check Electrolytic C12 and 12V Regulator IC (SR4). If 12.0V is present at pin 12 of Connector CN8, check for 12.4V at pin 11 of Connector CN8. If 12.4V is missing at pin 11 of Connector CN8, check the winding from pin 1 to pin 6 of Transformer T1, Diode D2, Electrolytics C7 and C8 and 12V Regulator IC (SR1). If 12.4V is present, at pin 11 of Connector CN8, check for – 12.0V at pin 10 of Connector CN8. If – 12.0V is missing at pin 10 of Connector CN8, check the winding from pin 1 to pin 5 of Transformer T1, Diode D3, Electrolytics C9 and C10 and – 12V Regulator IC (SR2).

Check for 5.7V at the Out pin of the 5V Regulator IC (SR1) on the System Board. If 5.7V is missing, check Capacitors C167 and C168 and IC SR1. Check for 12.4V at the collector of Transistor Q2 on the System Board. If 12.4V is missing, check the voltages and components associated with Transistor Q2, pins 1 thru 4 of IC 3M, pins 11, 12 and 13 of IC 23K and pins 2, 3, 4, 14 and 15 of IC 24K.

The power supply has a Power Down Detector (IC3) circuit. The output (pin 6 of IC 3) will go High whenever the AC power line voltage drops below 80V AC. The high output causes an interrupt of the highest priority in the CPU IC (17J). If pin 6 of IC3 has a voltage of 1.0V or higher when the AC power line is 90V AC or higher, check the voltages and components associated with pins 1, 7 and 8 of IC3 and check Diode D4.

The power supply has an overvoltage protection circuit Photo Cell (PC1) and (IC4) which shuts down the power supply whenever the 5V source goes over 8V. If the power supply is in shutdown, all the source voltages will measure 0V, pin 2 of (IC2) will measure .1V, the waveform at pin 1 of IC2 will still be present and the waveform at pin 4 of IC2 will be missing.

NOTE: Unplug the power supply from system board when troubleshooting an overvoltage problem.

The overvoltage protection circuit can be defeated by removing Photo Cell (PC1) from the circuit. Use an isolation transformer, with a step-down voltage control and troubleshoot the power supply and use the lowest setting on the voltage control.

SYSTEM

MICROPROCESSOR (CPU) OPERATION

Check the operation of the reset pin (pin 26 of CPU IC 17J). Pin 26 should read a Logic Low for about .3 second after the computer is turned on, then go Logic High. If the reading is incorrect, refer to the "Reset Circuit" section of this Troubleshooting guide.

Check the clock waveform at pin 6 of IC 17J. If the waveform is missing, refer to the "System Clock and Dividers" section of this Troubleshooting guide. Use a Logic probe to check for pulses at the Address pins (pins 1 thru 5 and 30 thru 40 of IC 17J) and Data pins (pins 7 thru 10 and 12 thru 15 of IC 17J). If all the pins read open and the Reset pin (pin 26 of IC 17J) reads a Logic Low, check the power down signal at pin 1 of Connector CN8. If the signal reads a Logic High, refer to the "Power Supply" section of this Troubleshooting guide. If the address and data pins read open and the reset pin reads a Logic High, check the BUS Request signal at pin 25 of IC 17J. If the BUS Request signal reads a Logic Low, check DMA Controller IC (21J) and ICs 17J and 22L by substitution.

GENERAL OPERATING INSTRUCTIONS

BOOT UP

To boot up on CP/M (or any bootable program on diskette), put a diskette containing CP/M in Disk Drive A and turn On the Computer, or by pressing the Reset button if the Computer is already On. Loading of CP/M has been completed when the prompt A> appears on the Monitor screen.

RESET BUTTON

Pressing the Reset Button on the Computer will reset the Computer but any program in memory will be lost. The Reset Button is located under Disk Drive B on the front panel.

MBASIC™

To load MBASIC from CP/M, place a diskette containing MBASIC into Disk Drive A, type MBASIC and press the RETURN key. To load a program from a diskette, type LOAD and the name of the program enclosed in quotes, then press the RETURN key. To save a program on a diskette, type SAVE and the name of the program enclosed in quotes, then press the RETURN key. To list the programs on the diskette in the current Disk Drive, type FILES and press the RETURN key. Use FILES "A:*.*" for Disk Drive A or FILES "B:*.*" for Disk Drive B if that drive is not the current drive. To get back to CP/M from MBASIC, type SYSTEM and press the RETURN key.

CP/M

To list the programs on the diskette in the current Disk Drive, type DIR and press the RETURN key. Use DIR A: for Disk Drive A or DIR B: for Disk Drive B if that drive is not the current drive.

The type of data stored on a diskette is identified by the three letters after the program name (ASM = Assembly Language, BAS = Basic Program, COM = Command File, DAT = Data File, etc. . .)

To make Disk Drive B the current drive, type B: and press the RETURN key. To make Disk Drive A the current drive again, type A: and press the RETURN key. To load a program, type the name of the program and press the RETURN key.

FORMATTING A DISKETTE

A blank diskette must be formatted before it can be used to save data. Boot up on CP/M and use the Format section of the Copy Disk program to format a new diskette.

DISK DRIVE SELECT SWITCHES

On the back of each Disk Drive is a 4 Section DIP Switch (SS1) used to select the drive number (0 thru 3). Use the following chart to determine the proper switch setting.

	SS1	
	ON	OFF
Drive 0 (A)	1	2,3,4
Drive 1 (B)	2	1,3,4
Drive 2 (C)	3	1,2,4
Drive 3 (D)	4	1,2,3

DISASSEMBLY INSTRUCTIONS

MAIN UNIT

Remove two screws located at rear of cabinet that hold access cover for optional circuit boards. Remove access cover and disconnect Connectors CN6 and CN7 from SYM Board. Using a screwdriver, remove two screw hole caps located on the right side of cabinet top. Remove four screws holding cabinet top. Lift cabinet top and flip over so cabinet top and bottom are facing each other. NOTE: Cabinet top and bottom are connected together with a ground strap.

To remove GGS Board, remove four screws holding board and lift straight up to disconnect Connectors CN9 and CN10.

To remove SYM Board, first remove GGS Board. Disconnect Connectors (CN8, CN12 and CN13), and ground strap. Remove seven screws holding SYM Board to cabinet bottom. Release four plastic claws holding board at the side and lift board from cabinet bottom.

To remove Power Supply Board, disconnect AC input Connector CN1 and Connector CN8 on the SYM Board. Remove four screws holding board to cabinet bottom and lift board from cabinet.

To remove disk drives, disconnect two connectors at the rear of each drive. Remove three screws holding each drive. Slide drive through the front of cabinet.

KEYBOARD

Remove six screws from bottom of keyboard and lift bottom cover from keyboard. To replace a defective key, remove nineteen screws holding circuit board to button assembly. Lift button assembly from circuit board. Unsolder and replace defective keyswitch on circuit board.

SAFETY PRECAUTIONS

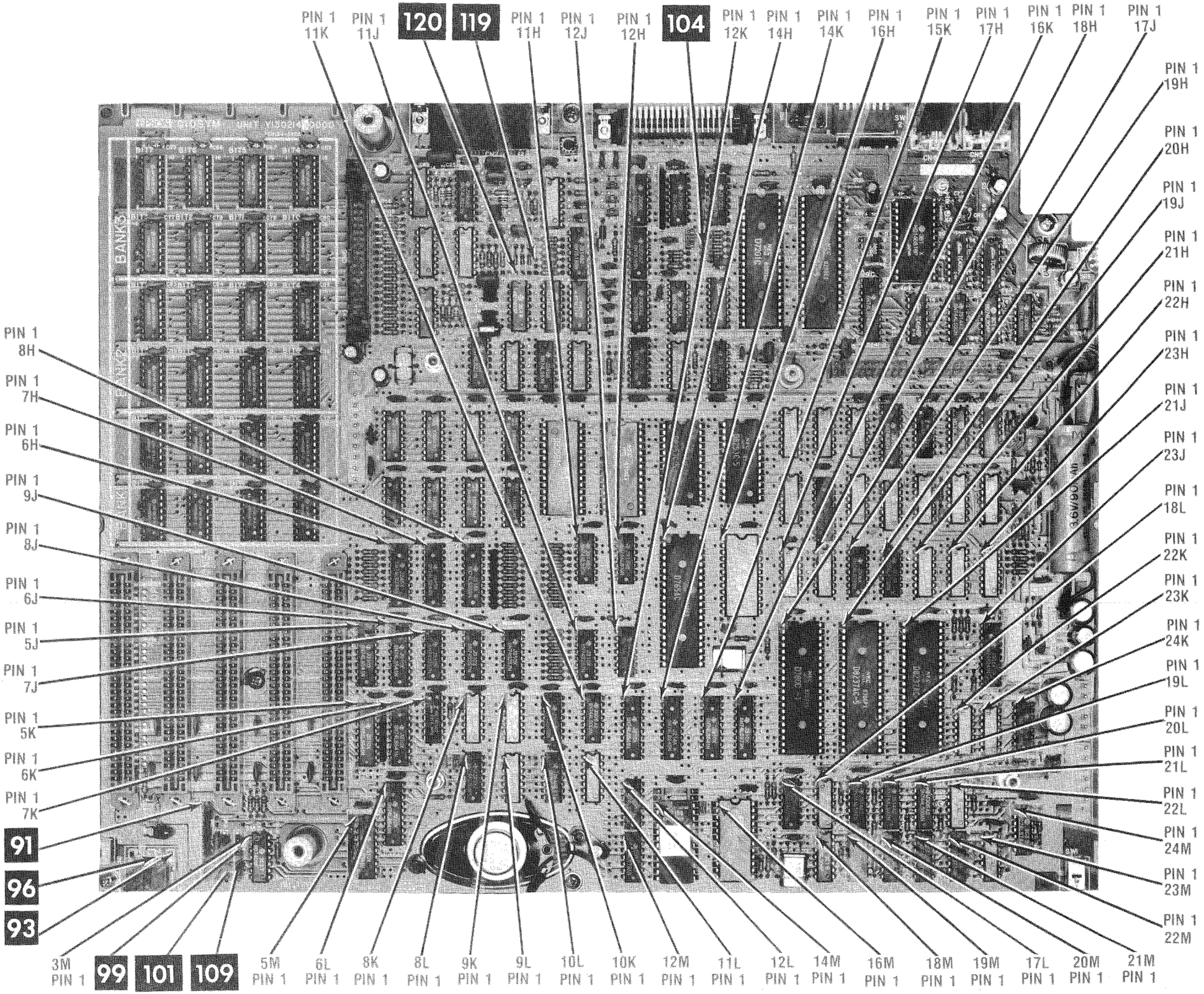
1. Use an isolation transformer for servicing.
2. Maintain AC line voltage at rated input.
3. Remove AC power from the computer system before servicing or installing electrostatically sensitive devices. Examples of typical ES devices are integrated circuits and semiconductor "chip" components.
4. Use 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-tip, low voltage soldering iron.
6. Use an isolation (times 10) probe on scope.
7. Do not remove or install boards, floppy disk drives, printers, or other peripherals with computer 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 form 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.

SCHEMATIC NOTES

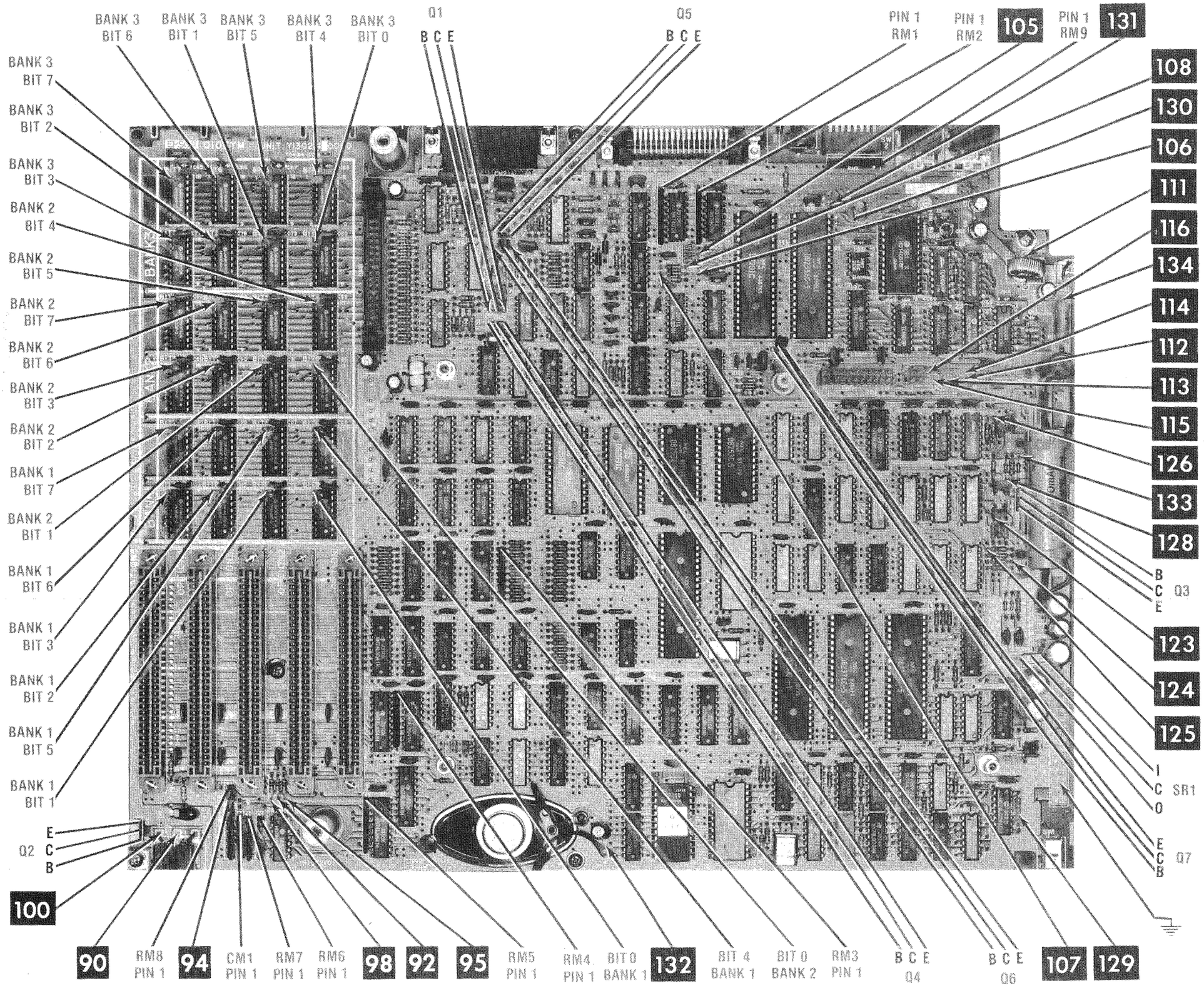
—✖— Circuitry not used in some versions
--- Circuitry used in some versions
⊖ See parts list
⏚ Ground
Chassis
Waveforms and voltages taken from ground, unless noted otherwise
Voltages, Waveforms and Logic Probe readings for main board taken with Computer in Power Up mode, no keys pressed, unless otherwise noted.
Waveforms taken with triggered scope and Sweep/Time switch in Calibrate position, scope input set for DC coupling on 0 reference voltage waveforms. Switch to AC input to view waveforms after DC reference is measured when necessary. Each waveform is 7 cm. width with DC reference voltage given at the bottom line of each waveform.
Time in μsec. per cm, given with p-p reading at the end of each waveform.
Item numbers in rectangles appear in the alignment/adjustment instructions.
Supply voltages maintained as shown at input.
Controls adjusted for normal operation.
Terminal identification may not be found on unit.
Capacitors are 50 volts or less, 5% unless noted.
Electrolytic capacitors are 50 volts or less, 20% unless noted.
Resistors are ½W or less, 5% unless noted.
Value in ( ) used in some versions.
Measurements with switching as shown, unless noted.

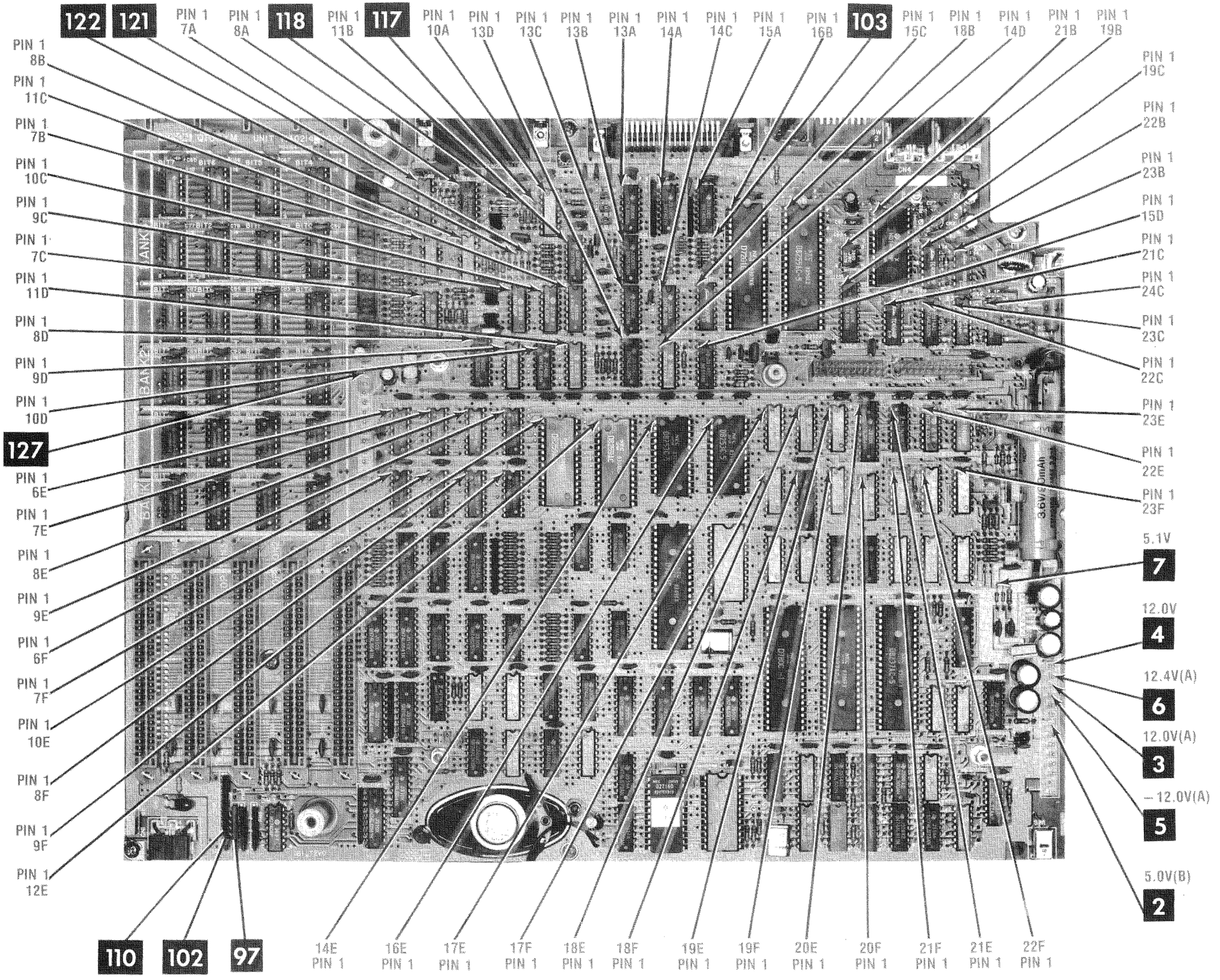
(1) Logic probe readings taken while running the following program.
(2) Probe indictes P when pressing the RESET button.
(3) Probe indicates H if diskette is write protected.
(4) Probe indicates P if diskette is write protected.
(5) Probe indicates P when Head Position Motor is operating.
(6) Probe indicates P when Head is moving out from center of diskette.
(7) Probe indicates P when Head is moving in toward center of diskette.
(8) Probe indicates H when Head is on track 00 and L when off track 00.
(9) Probe indicates L when Head is on track 00 and H when off track 00.

A Howard W. Sams GRIDTRACE™ Photo

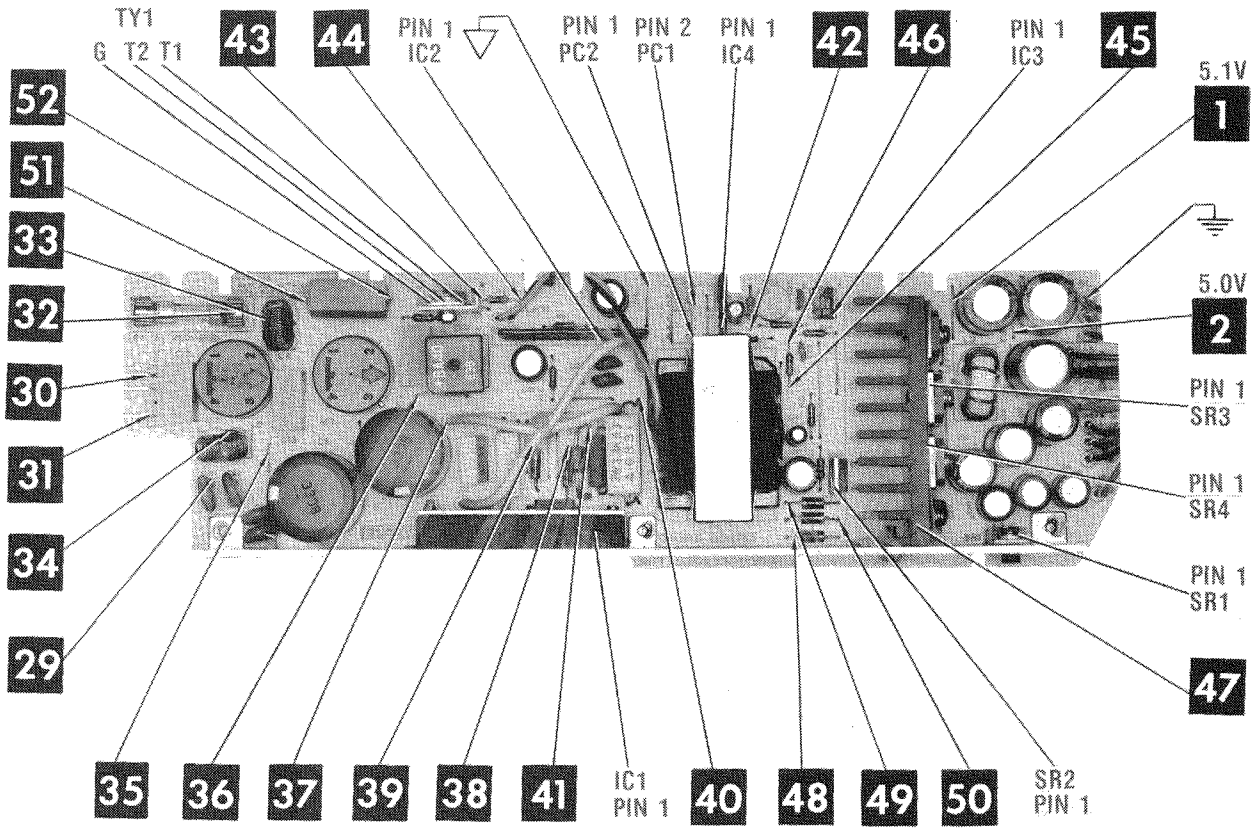


A Howard W. Sams CIRCUITRACE® Photo


BANK 3 BIT 6
BANK 3 BIT 1
BANK 3 BIT 5
BANK 3 BIT 4
BANK 3 BIT 0
Q1 B C E
Q5 B C E
PIN 1 RM1
PIN 1 RM2
105
PIN 1 RM9
131
BANK 3 BIT 7
BANK 3 BIT 2
BANK 3 BIT 3
BANK 2 BIT 4
BANK 2 BIT 5
BANK 2 BIT 7
BANK 2 BIT 6
BANK 2 BIT 3
BANK 2 BIT 2
BANK 1 BIT 7
BANK 2 BIT 1
BANK 1 BIT 6
BANK 1 BIT 3
BANK 1 BIT 2
BANK 1 BIT 5
BANK 1 BIT 1
Q2 E C B
100
108
130
106
111
116
134
114
112
113
115
126
133
128
B C E Q3
123
124
125
I C O SR1
E C B Q7
90
RM8 PIN 1
94
CM1 PIN 1
RM7 PIN 1
RM6 PIN 1
98
92
95
RM5 PIN 1
RM4 PIN 1
BIT 0 BANK 1
132
BIT 4 BANK 1
BIT 0 BANK 2
RM3 PIN 1
B C E Q4
B C E Q6
107
129



A Howard W. Sams CIRCUITRACE® Photo



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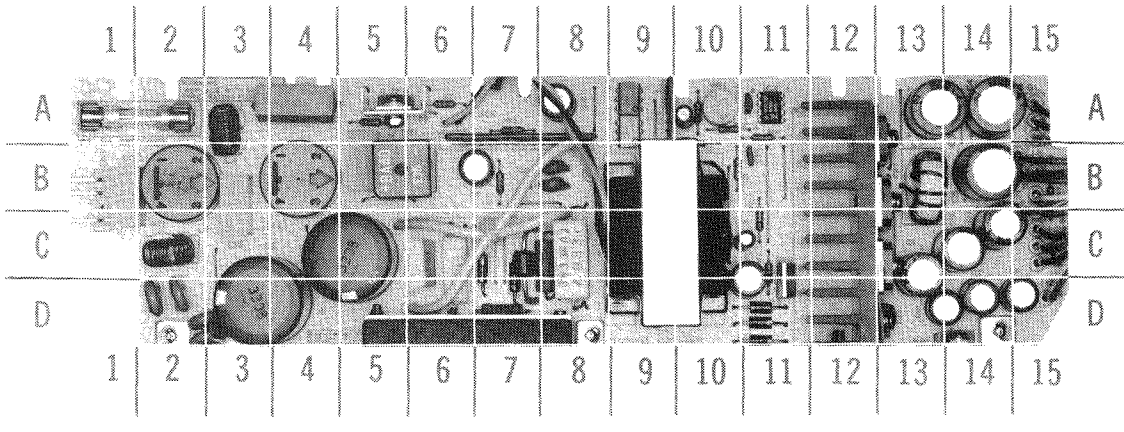
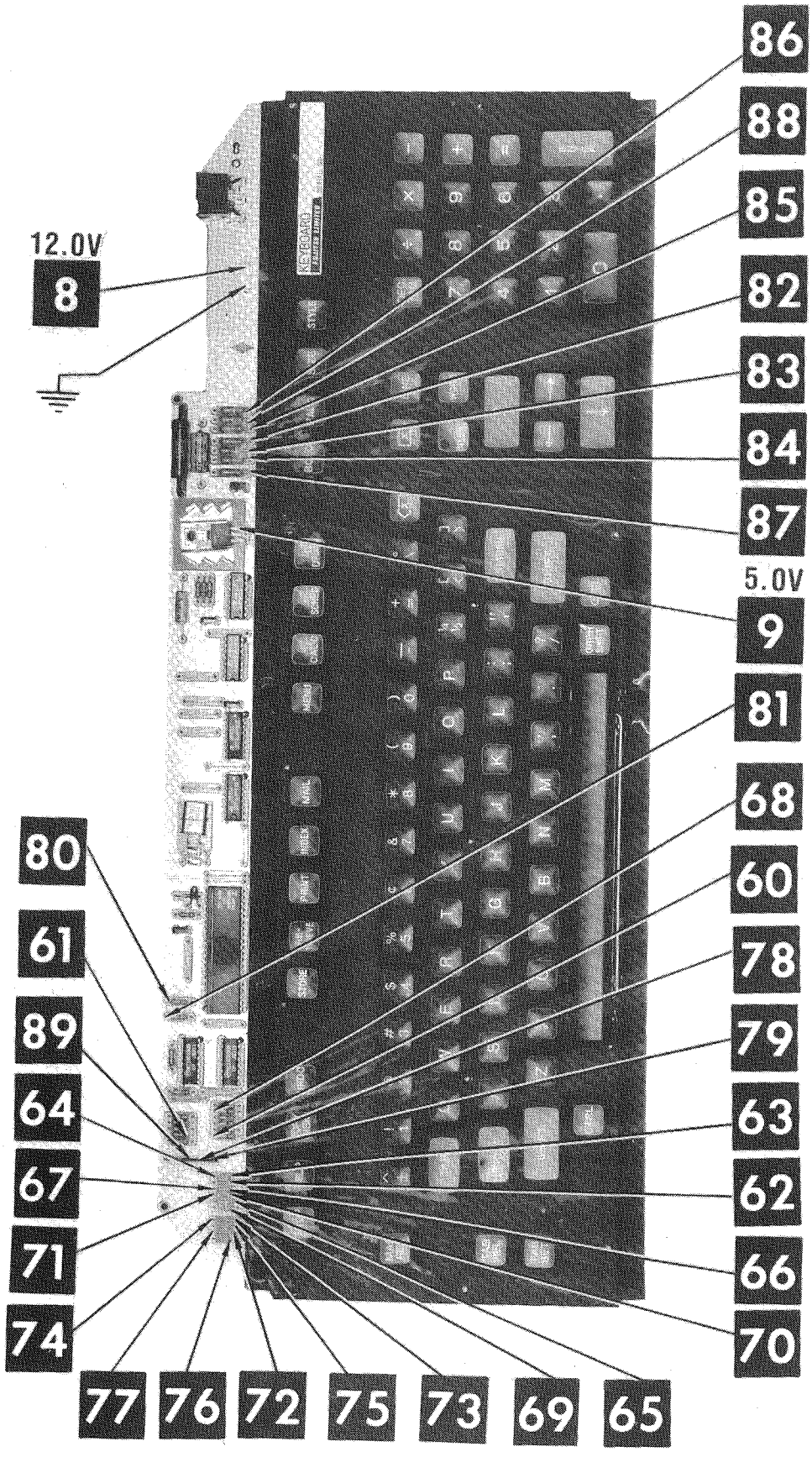
CSCS4

EPSON
MODEL QX-10

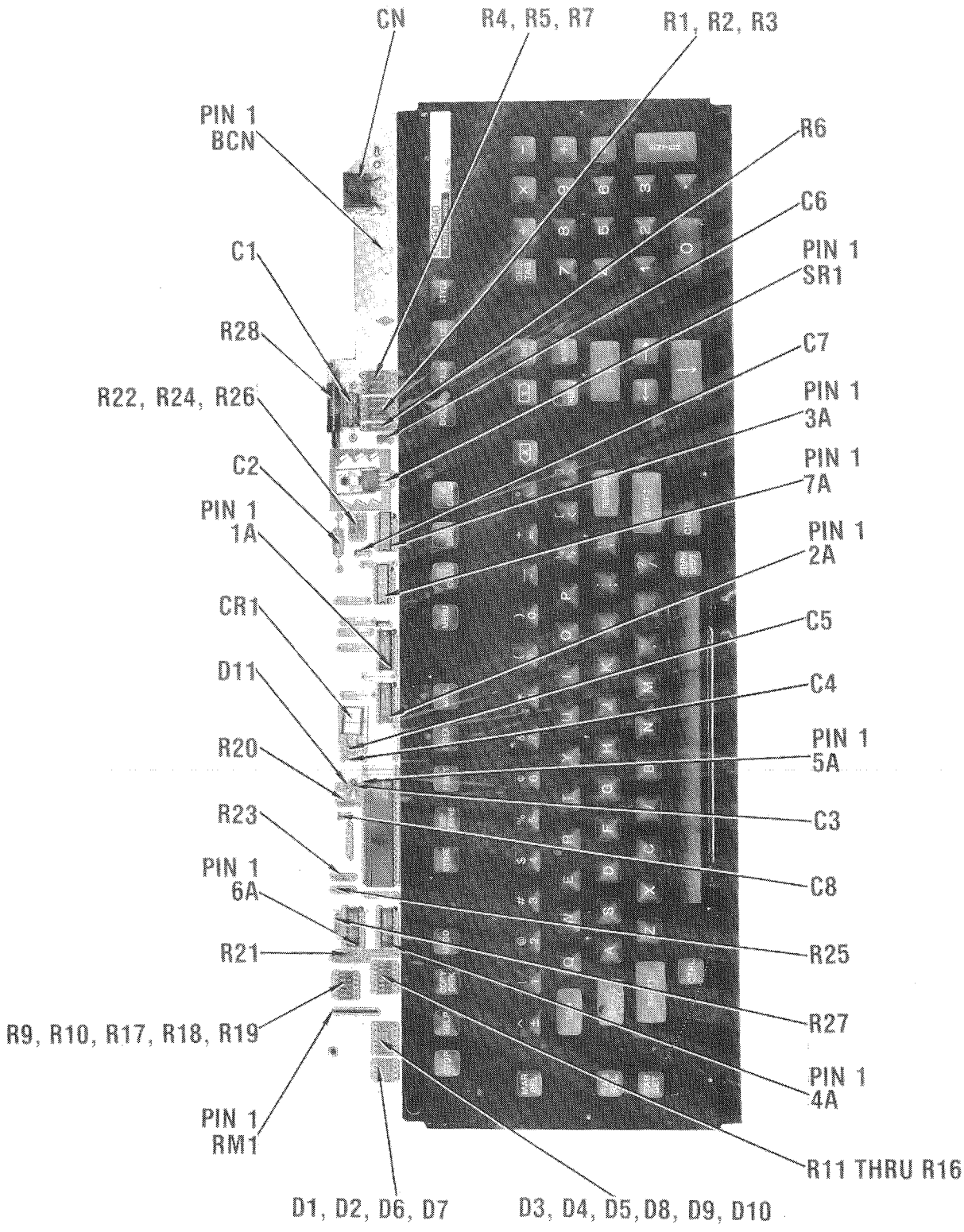


A Howard W. Sams GRIDTRACE™ Photo

POWER SUPPLY BOARD



HASCI KEYBOARD A Howard W. Sams CIRCUITRACE® Photo


CN
R4, R5, R7
R1, R2, R3
PIN 1
BCN
R6
C6
C1
PIN 1
SR1
R28
C7
R22, R24, R26
PIN 1
3A
C2
PIN 1
7A
PIN 1
1A
PIN 1
2A
CR1
C5
D11
C4
R20
PIN 1
5A
C3
R23
C8
PIN 1
6A
R25
R21
R27
R9, R10, R17, R18, R19
PIN 1
4A
PIN 1
RM1
R11 THRU R16
D1, D2, D6, D7
D3, D4, D5, D8, D9, D10

GridTrace LOCATION GUIDE
SYSTEM BOARD

BANK 1	
Bit0	J-5
Bit1	J-4
Bit2	J-3
Bit3	J-2
Bit4	H-5
Bit5	H-4
Bit6	H-3
Bit7	H-2
BANK 2	
Bit0	G-5
Bit1	G-4
Bit2	G-3
Bit3	G-2
Bit4	E-5
Bit5	E-4
Bit6	E-3
Bit7	E-2
BANK 3	
Bit0	C-5
Bit1	C-4
Bit2	C-3
Bit3	C-2
Bit4	B-5
Bit5	B-4
Bit6	B-3
Bit7	B-2
C1	C-19
C2	P-24
C3	H-23
C4	E-24
C5	B-23
C6	C-23
C7	F-7
C9	B-7
C10	G-7
C11	M-24
C12	N-24
C13	O-24
C14	M-24
C15	P-24
C16	F-19
C17	Q-22
C18	R-2
C19	F-13
C20	B-10
C22	F-17
C23	B-10
C24	E-10
C25	B-9
C26	F-10
C27	C-21
C28	B-11
C29	R-17
C30	B-11
C31	H-13
C32	B-13
C33	B-12
C34	E-13
C35	E-13
C36	D-14
C37	E-13
C38	D-13
C39	E-14
C40	B-13
C41	E-14
C42	F-12
C43	E-24
C44	M-16
C45	O-2
C46	O-3
C47	O-4
C48	O-6
C49	Q-2
C50	Q-3
C51	F-16
C52	F-16
C53	F-17
C54	Q-24
C55	J-23
C58	H-8
C59	I-7
C60	C-12
C61	C-12
C63	J-23
C64	L-23
C65	A-2
C66	A-3
C67	A-4
C68	A-6
C69	B-8
C70	B-9
C71	B-11
C72	B-14
C73	B-14
C74	B-15
C75	B-17
C76	B-18
C77	C-2
C78	C-3
C79	C-4
C80	C-6
C81	C-19
C82	C-21
C83	E-2
C84	E-3
C85	E-4
C86	E-5
C87	D-16
C88	E-24
C89	F-2
C90	F-3
C91	F-4
C92	F-5
C93	F-20
C95	H-2
C96	H-3
C97	H-4
C98	H-5
C99	H-8
C100	H-9
C101	H-10
C102	H-11
C103	H-11
C104	H-12
C105	H-14
C106	H-14
C107	H-15
C108	H-16
C109	H-19
C110	H-20
C111	H-21
C112	H-21
C113	H-22
C114	J-2
C115	J-3
C116	J-4
C117	J-5
C118	I-8
C119	I-9
C120	I-10
C121	I-11
C122	I-18
C123	I-22
C124	K-8
C125	K-9
C126	K-10
C127	K-12
C128	K-13
C129	K-14
C130	K-16
C131	M-7
C132	M-8
C134	M-9
C135	M-10
C136	M-11
C137	M-17
C138	M-19
C139	M-21
C140	O-7
C141	O-8
C142	O-9
C143	O-10
C144	O-11
C145	O-11
C146	O-12
C147	O-13
C148	O-14
C149	O-15
C150	O-16
C151	O-23
C152	Q-8
C153	Q-14
C154	Q-17
C155	Q-18
C156	Q-19
C157	Q-20
C158	Q-20
C159	Q-21
C160	Q-7
Q161	Q-16
C162	Q-23
C163	R-22
C164	Q-4
C165	Q-6
C166	C-20
C169	M-23
C170	D-19
C171	K-17
C172	D-11
C173	D-22
CM1	S-3
CN1	R-3
CN2	A-10
CN3	A-15
CN4	A-21
CN5	A-22
CN6	C-7
CN7	G-7
CN8	O-24
CN9	G-19
CN10	G-21
CN11	M-24
CN12	G-24
CN13	D-24
CN14	M-2
CR1	S-17
CR2	C-21
CR3	N-16
CV1	B-21
D1	D-11
D2	D-13
D3	D-13
D4	M-23
D5	I-23
D6	M-23
D7	D-11
D8	D-11
D9	D-10
D11	C-10
D12	C-10
D13	I-23
J1	B-13
J2	C-13
J3	C-13
J4	P-9
J5	R-15
J6	J-21
L1	D-22
L2	G-7
Option 1	L-6
2	L-5
3	L-4
4	L-2
5	L-1
Q1	E-10
Q2	S-1
Q3	J-23
Q4	F-10
Q5	C-10
Q6	D-9
Q7	F-17
R1	Q-2
R2	R-23
R3	M-12
R4	L-10
R5	L-12
R6	L-11
R7	N-12
R8	L-10
R9	L-10
R10	M-12
R11	L-10
R12	N-12
R13	M-10
R14	N-12
R15	N-12
R16	N-12
R17	N-12
R18	L-7
R19	L-7
R20	L-7
R21	K-7
R22	L-7
R23	L-7
R24	K-7
R25	L-7
R26	M-12
R27	L-12
R28	L-12
R29	L-12
R30	L-12
R31	K-10
R32	K-10
R33	K-11
R34	L-12
R35	K-11
R36	L-12
R37	L-10
R38	D-10
R39	L-10
R40	S-17
R41	O-21
R42	M-13
R43	F-24
R44	K-23
R45	L-23
R46	H-23
R47	O-8
R48	O-8
R49	Q-9
R50	F-18
R51	D-14
R52	D-15
R53	F-8
R54	E-8
R55	D-8
R56	F-8
R57	F-8
R58	C-7
R59	N-18
R60	K-23
R63	L-23
R64	Q-17
R65	M-16
R66	E-9
R67	D-10
R68	C-10
R69	D-10
R70	K-23
R71	R-19
R72	S-19
R73	D-11
R74	D-11
R76	D-11
R77	F-9
R78	I-23
R79	E-9
R80	R-2
R81	D-10
R82	S-17
R83	E-8
R84	D-8
R85	F-8
R86	E-8
R87	E-8
R88	E-8
R89	E-8
R90	D-8
R91	D-8
R92	D-8
R93	D-8
R94	G-16
R95	C-11
R96	R-17
R97	C-12
R99	I-23
R100	G-13
R101	G-13
R102	G-15
R103	C-11
R104	G-13
R105	F-9
R106	C-7
R107	C-7
R108	C-9
R109	D-15
R110	R-5
R112	D-13
R113	D-13
R114	B-12
R115	J-21
R116	Q-22
R117	Q-17
R118	L-23
R119	D-11
R120	M-24
R121	B-19
R122	K-23
R123	H-23
R124	C-20
R125	D-14
R126	D-11
R127	F-9
R128	G-16
R129	C-11
R130	G-13
R131	C-9
R132	C-9
R133	G-16

SYSTEM BOARD

R134	F-24	12K	O-13
R135	R-20	12L	Q-13
R136	M-21	12M	R-13
R137	Q-19	13A	B-13
R138	Q-18	13B	D-13
R139	S-18	13C	E-13
R140	Q-22	13D	F-13
R141	R-21	14A	B-14
R142	P-24	14C	E-14
R143	M-21	14D	F-14
R144	O-22	14E	H-14
R147	O-9	14H	K-14
R148	O-9	14K	O-14
R149	D-15	14M	Q-14
R150	D-15	15A	B-15
R151	D-15	15C	E-15
R152	D-14	15D	F-15
R153	F-24	15K	O-15
R154	D-22	16B	C-16
R155	F-9	16E	H-16
R156	E-24	16H	K-16
R157	B-17	16K	O-16
R167	N-23	16M	R-16
R168	N-23	17E	H-17
3M	R-4	17F	J-17
5J	M-7	17H	K-17
5K	O-7	17J	M-17
5M	R-7	17L	Q-17
6E	H-7	18B	C-18
6F	J-7	18E	H-18
6H	K-8	18F	J-18
6J	M-8	18H	K-18
6K	O-8	18L	Q-18
6L	Q-7	18M	R-18
7A	B-8	19B	D-19
7B	D-8	19C	E-19
7C	E-8	19E	H-19
7E	H-8	19F	J-19
7F	J-8	19H	K-19
7H	K-8	19J	M-19
7J	M-8	19L	Q-19
7K	O-8	19M	R-19
8A	B-9	20E	H-20
8B	D-9	20F	J-20
8D	F-10	20H	K-20
8E	H-9	20L	Q-20
8F	J-9	20M	R-20
8H	K-8	21B	C-20
8J	M-8	21C	E-20
8K	O-10	21E	H-20
8L	P-9	21F	J-20
9C	E-11	21H	K-20
9D	F-10	21J	M-20
9E	H-10	21L	Q-20
9F	J-10	21M	R-20
9J	M-9	22B	B-21
9K	O-10	22C	E-21
9L	P-10	22E	H-21
10A	B-11	22F	J-21
10C	E-11	22H	K-21
10D	F-11	22K	O-21
10E	H-11	22L	Q-21
10K	O-11	22M	R-21
10L	P-11	23B	D-22
11B	D-12	23C	E-22
11C	E-13	23E	H-22
11D	F-12	23F	J-22
11H	K-12	23H	K-22
11J	M-10	23J	M-22
11K	O-12	23K	O-22
11L	P-12	23M	R-22
12E	H-12	24C	E-22
12H	K-13	24K	O-22
12J	M-13	24M	R-23

POWER SUPPLY BOARD

C1	C-5	T1	C-9
C2	D-3	TY1	A-5
C3	A-13	VR1	A-10
C4	A-14	ZD1	B-10
C5	B-14		
C6	C-13		
C7	D-14		
C8	D-15		
C9	C-11		
C10	D-13		
C11	C-14		
C12	C-14		
C13	A-10		
C14	C-11		
C15	B-7		
C16	A-8		
C17	B-1		
C18	B-3		
C19	B-5		
C20	D-2		
C21	D-2		
C22	D-3		
C23	D-3		
C24	B-8		
C25	B-8		
C26	B-11		
C27	B-13		
C28	D-13		
C29	A-11		
CN1	B-1		
D1	C-7		
D2	D-11		
D3	D-11		
D4	D-11		
D5	A-6		
DB1	B-5		
DB2	A-13		
DB3	D-12		
F1	A-1		
IC1	D-7		
IC2	A-8		
IC3	A-11		
IC4	A-9		
L1	C-7		
L2	C-7		
L3	B-13		
L4	A-3		
L5	C-2		
M1	B-2		
M2	B-4		
PC1	A-9		
PC2	A-9		
R1	C-6		
R2	A-4		
R3	C-8		
R4	C-6		
R5	C-8		
R6	D-7		
R7	A-6		
R8	A-10		
R9	A-5		
R10	A-7		
R11	C-11		
R12	C-11		
R13	A-10		
R14	A-11		
R15	B-10		
R16	B-7		
R17	B-15		
SR1	D-14		
SR2	C-11		
SR3	B-13		
SR4	C-13		

CSCS4 EPSON MODEL QX-10

PARTS LIST AND DESCRIPTION

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

SEMICONDUCTORS (Select replacement transistor for best results)

ITEM No.	TYPE No.	MFGR. PART No.	REPLACEMENT DATA					
			GENERAL ELECTRIC PART No.	NTE PART No.	PHILIPS ECG PART No.	RCA PART No.	WORKMAN PART No.	ZENITH PART No.
ACSII KEYBOARD								
D1 thru D9	1S2095	X320010070	GE-514	NTE519	ECG519	SK3100/519	WEP925/519	103-131
SR1	14305	X440063050	GEVR-102	NTE960	ECG960	SK3591/960		221-Z9043
	7805		GEIC-190	NTE960	ECG960	SK3591/960		221-Z9043
	78M05		GEVR-102	NTE960	ECG960	SK3591/960		221-Z9043
1A,2A	74LS145	X420301450		NTE74LS145	ECG74LS145			HE-443-889
3A	7407	X420100070		NTE7407	ECG7407	SK7407		
4A	MC14049	X440070490	GE-4049	NTE4049	ECG4049	SK4049UB		221-Z9074
5A	8049							
6A	MC14049	X440070490	GE-4049	NTE4049	ECG4049	SK4049UB		221-Z9074
7A	7407	X420100070		NTE7407	ECG7407	SK7407		
HASCI KEYBOARD								
D1 thru D11	1S2075	X320010070	GE-514	NTE519	ECG519	SK3100/519	WEP925/519	103-131
SR1	7805		GEIC-190	NTE960	ECG960	SK3591/960		221-Z9043
	78M05		GEVR-102	NTE960	ECG960	SK3591/960		221-Z9043
	14305	X440063050	GEVR-102	NTE960	ECG960	SK3591/960		221-Z9043
1A,2A	SN74LS145N	X420301450		NTE74LS145	ECG74LS145			HE-443-889
3A	HD7407P	X420100070		NTE7407	ECG7407	SK7407		
4A	MC14049UB	X440070490	GE-4049	NTE4049	ECG4049	SK4049UB		221-Z9074
5A	MBL8049H							
6A	MC14049UB	X440070490	GE-4049	NTE4049	ECG4049	SK4049UB		221-Z9074
7A	HD7407P	X420100070		NTE7407	ECG7407	SK7407		

PARTS LIST AND DESCRIPTION (Continued)

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

SEMICONDUCTORS (Select replacement transistor for best results)

ITEM No.	TYPE No.	MFGR. PART No.	REPLACEMENT DATA					
			GENERAL ELECTRIC PART No.	NTE PART No.	PHILIPS ECG PART No.	RCA PART No.	WORKMAN PART No.	ZENITH PART No.
POWER SUPPLY BOARD								
D1	ERD28-08	X320010430	GE-511	NTE506	ECG506	SK9098/515	WEP172/506	103-287
D2 thru	RGP-15G	X320010190		NTE506	ECG506	SK3318A	WEP172/506	
D4								
D5	1S2076	X320010080	GE-514	NTE519	ECG519	SK3100/519	WEP925/519	103-131
DB1	BA40		GE-5314	NTE5314	ECG5314	SK3987/5314		
	DBA40E	X340300010	GE-5314	NTE5314	ECG5314	SK3987/5314		
DB2	ESAC83-004	X340200040						
DB3	ESAC25-02C	X340200010						
IC1	STK711	X440757110						
IC2	STK752	X440757520						
IC3	MB3761	X440167610						
IC4	STK760	X440757600						905-584
PC1,2	PC714U	X440137140						
SR1	7812A		GEVR-111	NTE966	ECG966	SK3592/966	WEP966L/966	HE-442-674
	7812	X440058120	GEVR-111	NTE966	ECG966	SK3592/966	WEP966L/966	HE-442-674
SR2	7912	X440079120	GEIC-247	NTE967	ECG967	SK3673/967		HE-442-675
SR3,4	SI-3122V	X440762120						
TY1	BCR10AM10L			NTE56008	ECG56008	SK3660/56008		
	BCR10AM8L	X350030030		NTE56006	ECG56006	SK3659/56006		
ZD1	HZ2CLL	X330000320		NTE5000A	ECG5000A	SK2A4/5000A	WEP1400/5000	

PARTS LIST AND DESCRIPTION (Continued)

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

SEMICONDUCTORS (Select replacement transistor for best results)

ITEM No.	TYPE No.	MFGR. PART No.	REPLACEMENT DATA					
			GENERAL ELECTRIC PART No.	NTE PART No.	PHILIPS ECG PART No.	RCA PART No.	WORKMAN PART No.	ZENITH PART No.
SYSTEM BOARD								
Bank 1	HM4864P-2		4164-15		ECG2164			
Bit 0	uPD4164-3	X400141640(2)	4164-15		ECG2164			
thru 7	uPD416	Y130201002(1)		NTE2117	ECG2117			HE-443-904
Bank 2	HM4864P-2		4164-15		ECG2164			
Bit 0	uPD4164-3	X400141640(2)	4164-15		ECG2164			
thru 7	uPD416	Y130201002(1)		NTE2117	ECG2117			HE-443-904
Bank 3	HM4864P-2		4164-15		ECG2164			
Bit 0	uPD4164-3	X400141640(2)	4164-15		ECG2164			
thru 7	uPD416	Y130201002(1)		NTE2117	ECG2117			HE-443-904
D2,3	1S5277B	X320010240	GE-504A	NTE116	ECG116	SK3311	WEP155	212-76-02
D4 thru D13	1S2075K	X320010079	GE-514	NTE519	ECG519	SK3100/519	WEP925/519	103-131
Q1	2SA733	X300073360	GE-48	NTE290A	ECG290A	SK3114A/290A	WEP62/159*	121-Z9067
Q2,3	2SA1069	X300106930		NTE378	ECG378	SK9367/55		
Q4 thru Q7	2SC945	X302094530	GE-212	NTE85	ECG85	SK3124A/289A	WEP736/123A*	121-972
SR1	HA178M05		GEVR-102	NTE960	ECG960	SK3591/960		221-Z9043
	78M05	X440140050	GEVR-102	NTE960	ECG960	SK3591/960		221-Z9043
3M	HD7406P	X420300050	GE-7406	NTE7406	ECG7406	SK7406		HE-443-698
5J,K	SN74LS541N	X420305410		NTE74LS541	ECG74LS541			
5M	SN74LS541N	X420305410		NTE74LS541	ECG74LS541			
6E,F	D4164C-3		4164-15		ECG2164			
	uPD4164-3	X400141640(2)	4164-15		ECG2164			
6H	SN74LS244N	X420302440	74LS244	NTE74LS244	ECG74LS244	SK74LS244		HE-443-791
6J,K,L	SN74LS541N	X420305410		NTE74LS541	ECG74LS541			
7A,B,C	HD7438P	X420100380		NTE7438	ECG7438	SK7438		HE-443-77
7E,F	D4164C-3		4164-15		ECG2164			
	uPD4164-3	X400141640(2)	4164-15		ECG2164			

PARTS LIST AND DESCRIPTION (Continued)

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

SEMICONDUCTORS (Select replacement transistor for best results)

ITEM No.	TYPE No.	MFGR. PART No.	REPLACEMENT DATA					
			GENERAL ELECTRIC PART No.	NTE PART No.	PHILIPS ECG PART No.	RCA PART No.	WORKMAN PART No.	ZENITH PART No.
7H	SN74LS244N	X420302440	74LS244	NTE74LS244	ECG74LS244	SK74LS244		HE-443-791
7J	SN74S257N	X420202570						
7K	MB74LS02	X420300020	74LS02	NTE74LS02	ECG74LS02	SK74LS02		HE-443-779
8A	SN74LS221N	X420302210		NTE74LS221	ECG74LS221	SK74LS221		
8B	HD74LS04P	X420300040	74LS04	NTE74LS04	ECG74LS04	SK74LS04		HE-443-755
8D	SN74LS221N	X420302210		NTE74LS221	ECG74LS221	SK74LS221		
8E,F	D4164C-3		4164-15		ECG2164			
	uPD4164-3	X400141640(2)	4164-15		ECG2164			
8H	SN74LS245N	X420302450	74LS245	NTE74LS245	ECG74LS245	SK74LS245		HE-443-885
8J	SN74S257N	X420202570						
8K	HD74LS20P	X420300200	74LS20	NTE74LS20	ECG74LS20	SK74LS20		HE-443-798
8L	SN74ALS08N	X420500080						
9C	HD7403P	X420100030		NTE7403	ECG7403	SK7403		HE-443-54
9D	HD74LS74AP	X420300740	74LS74A	NTE74LS74A	ECG74LS74A	SK74LS74A		HE-443-730
9E,F	D4164C-3		4164-15		ECG2164			
	uPD4164-3	X400141640(2)	4164-15		ECG2164			
9J	SN74S257N	X420202570						
9K	HD74LS27P	X420300270	74LS27	NTE74LS27	ECG74LS27	SK74LS27		HE-443-800
9L	HD74LS04P	X420300040	74LS04	NTE74LS04	ECG74LS04	SK74LS04		HE-443-755
10A	HD74123P	X420101230	GE-74123	NTE74123	ECG74123	SK74123		221-Z9086
10C	HD74LS00P	X420300000	74LS00	NTE74LS00	ECG74LS00	SK74LS00		HE-443-728
10D	SN74LS51N	X420300510	74LS51	NTE74LS51	ECG74LS51	SK74LS51		
10E	D8259AC	X400082591						
10K	SN74ALS32N	X420500320						
10L	SN74S02N	X420200020		NTE74S02	ECG74S02			HE-443-896
11B	SN75188N	X440751880		NTE75188	ECG75188	SK5188/75188		HE-443-794
11C	M74LS14P	X420300140	74LS14	NTE74LS14	ECG74LS14	SK74LS14		HE-443-872
11D	HD74LS74AP	X420300740	74LS74A	NTE74LS74A	ECG74LS74A	SK74LS74A		HE-443-730
11H	SN74ALS10N	X420500100						
11J	SN74S257N	X420202570						

PARTS LIST AND DESCRIPTION (Continued)

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

SEMICONDUCTORS (Select replacement transistor for best results)

ITEM No.	TYPE No.	MFGR. PART No.	REPLACEMENT DATA					
			GENERAL ELECTRIC PART No.	NTE PART No.	PHILIPS ECG PART No.	RCA PART No.	WORKMAN PART No.	ZENITH PART No.
11K	SN74ALS00AN	X420500000						
11L	HD74ALS04P	X420500040						
12E	D8259AC	X400082591						
12H	SN74ALS10N	X420500100						
12J	SN74ALS10N	X420500100						
12K	SN74LS541N	X420305410		NTE74LS541	ECG74LS541			
12L,M	SN74LS73AN	X420300730		NTE74LS73	ECG74LS73	SK74LS73A		HE-443-828
13A	SN74LS393N	X420303930	74LS393	NTE74LS393	ECG74LS393	SK74LS393		
13B,C	SN75189N	X440751890		NTE75189	ECG75189	SK5189/75189		HE-443-795
13D	SN74LS123N	X420301230	74LS123	NTE74LS123	ECG74LS123	SK74LS123		HE-443-942
14A	SN7407N	X420100070		NTE7407	ECG7407	SK7407		
14C	SN74LS04N	X420300040	74LS04	NTE74LS04	ECG74LS04	SK74LS04		HE-443-755
14D	HD74LS74AP	X420300740	74LS74A	NTE74LS74A	ECG74LS74A	SK74LS74A		HE-443-730
14E	D8253C-5	X400082530						
14H	D765AC	X400007650						
14K	SN74LS245N	X420302450	74LS245	NTE74LS245	ECG74LS245	SK74LS245		HE-443-885
14M	D2716D-Q1X-0	Y130801401						
	D2716D-Q1P-4	Y130801001						
	uPD2732A							
	uPD2732D							
	uPD2732D-4							
	2764							
15A	SN7407N	X420100070		NTE7407	ECG7407	SK7407		
15C	TC4050BP	X460405000	GE-4050	NTE4050B	ECG4050B	SK4050B		221-Z9163
15D	NE556N	X440055560		NTE978	ECG978	SK3689/978		221-Z9152
15K	SN74LS541N	X420305410		NTE74LS541	ECG74LS541			
16B	D7201C	X400072010						
16E	D8253C-5	X400082530						
16H	HD74LS154P	X420301540						
16K	SN74LS373N	X420303730	74LS373	NTE74LS373	ECG74LS373	SK74LS373		HE-443-867
16M	M16010C							
	uPD449	X400004491						

PARTS LIST AND DESCRIPTION (Continued)

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

SEMICONDUCTORS (Select replacement transistor for best results)

ITEM No.	TYPE No.	MFGR. PART No.	REPLACEMENT DATA					
			GENERAL ELECTRIC PART No.	NTE PART No.	PHILIPS ECG PART No.	RCA PART No.	WORKMAN PART No.	ZENITH PART No.
17E	HD74LS04P	X420300040	74LS04	NTE74LS04	ECG74LS04	SK74LS04		HE-443-755
17F	HD74LS00P	X420300000	74LS00	NTE74LS00	ECG74LS00	SK74LS00		HE-443-728
17H	HD74LS04P	X420300040	74LS04	NTE74LS04	ECG74LS04	SK74LS04		HE-443-755
17J	D780C-1	X400007801		NTE3880	ECG3880	SK2880/3880		HE-443-881
17L	SN74S04N	X420200040	74S04	NTE74S04	ECG74S04	SK74S04		HE-443-897
18B	D8255AC-5	X400082550						
18E	HD74LS32P	X420300320	74LS32	NTE74LS32	ECG74LS32	SK74LS32		HE-443-875
18F	SN74LS273N	X420302730	74LS273	NTE74LS273	ECG74LS273	SK74LS273		HE-443-805
18H	HD74LS10P	X420300100	74LS10	NTE74LS10	ECG74LS10	SK74LS10		HE-443-797
18L	HD74LS93P	X420300930	74LS93	NTE74LS93	ECG74LS93	SK74LS93		
18M	HD74LS04P	X420300040	74LS04	NTE74LS04	ECG74LS04	SK74LS04		HE-443-755
19B	JRC386D							
	NJM386	X440073860						
19C	SN74LS541N	X420305410		NTE74LS541	ECG74LS541			
19E	HD74LS54P	X420300540		NTE74LS54	ECG74LS54			
19F	HD74LS00P	X420300000	74LS00	NTE74LS00	ECG74LS00	SK74LS00		HE-443-728
19H	SN74LS393N	X420303930	74LS393	NTE74LS393	ECG74LS393	SK74LS393		
19J	D8237AC-5	X400082371						
19L	SN74ALS32N	X420500320						
20E	SN74LS541N	X420305410		NTE74LS541	ECG74LS541			
20F	HD74LS20P	X420300200	74LS20	NTE74LS20	ECG74LS20	SK74LS20		HE-443-798
20H	SN74LS73AN	X420300730		NTE74LS73	ECG74LS73	SK74LS73A		HE-443-828
20L	SN74ALS32N	X420500320						
20M	SN74LS73AN	X420300730		NTE74LS73	ECG74LS73	SK74LS73A		HE-443-828
21B	HD146818P							
	HD46818P	X400014680						
21C	TC4584BP	X460458400						
21E	MB74LS02	X420300020	74LS02	NTE74LS02	ECG74LS02	SK74LS02		HE-443-779
21F	HD74LS10P	X420300100	74LS10	NTE74LS10	ECG74LS10	SK74LS10		HE-443-797
21H	HD74LS30P	X420300300	74LS30	NTE74LS30	ECG74LS30	SK74LS30		HE-443-732
21J	D8237AC-5	X400082371						

PARTS LIST AND DESCRIPTION (Continued)

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

SEMICONDUCTORS (Select replacement transistor for best results)

ITEM No.	TYPE No.	MFGR. PART No.	REPLACEMENT DATA					
			GENERAL ELECTRIC PART No.	NTE PART No.	PHILIPS ECG PART No.	RCA PART No.	WORKMAN PART No.	ZENITH PART No.
21L	SN74ALS00AN	X420500000						
21M	SN74ALS11N	X420500110						
22B	TC4069UBP	X460406901		NTE4069	ECG4069	SK4069UB	WEP4069/4069	905-260
22C	SN74ALS32N	X420500320						
22E	HD74LS00P	X420300000	74LS00	NTE74LS00	ECG74LS00	SK74LS00		HE-443-728
22F	HD74LS08P	X420300080	74LS08	NTE74LS08	ECG74LS08	SK74LS08		HE-443-780
22H	HD74LS04P	X420300040	74LS04	NTE74LS04	ECG74LS04	SK74LS04		HE-443-755
22K	HD74LS74AP	X420300740	74LS74A	NTE74LS74A	ECG74LS74A	SK74LS74A		HE-443-730
22L	HD74LS04P	X420300040	74LS04	NTE74LS04	ECG74LS04	SK74LS04		HE-443-755
22M	SN74LS73AN	X420300730		NTE74LS73	ECG74LS73	SK74LS73A		HE-443-828
23B	TC4069UBP	X460406901		NTE4069	ECG4069	SK4069UB	WEP4069/4069	905-260
23C	HD74LS04P	X420300040	74LS04	NTE74LS04	ECG74LS04	SK74LS04		HE-443-755
23E	TC4584BP	X460458400						
23F	HD74LS32P	X420300320	74LS32	NTE74LS32	ECG74LS32	SK74LS32		HE-443-875
23H	HD74LS00P	X420300000	74LS00	NTE74LS00	ECG74LS00	SK74LS00		HE-443-728
23J	SN74S241N	X420202410						
23K	HD74LS00P	X420300000	74LS00	NTE74LS00	ECG74LS00	SK74LS00		HE-443-728
23M	HD74LS74AP	X420300740	74LS74A	NTE74LS74A	ECG74LS74A	SK74LS74A		HE-443-730
24C	SN74LS393N	X420303930	74LS393	NTE74LS393	ECG74LS393	SK74LS393		
24K	SN74LS123N	X420301230	74LS123	NTE74LS123	ECG74LS123	SK74LS123		HE-443-942
24M	HD74LS74AP	X420300740	74LS74A	NTE74LS74A	ECG74LS74A	SK74LS74A		HE-443-730

(1) 16K Memory Kit, Banks 1, 2, & 3 (24 ea.)
(2) 64K Memory Kit (8 ea).

PARTS LIST AND DESCRIPTION (Continued)

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

CAPACITORS

ITEM No.	RATING	MFGR. PART No.
	POWER SUPPLY BOARD	
C17	.1 250VAC .1 400V	X230411046
C18	.1 250VAC .1 400V	X230411046
C19	.1 125VAC .1 400V	X230411046
	SYSTEM BOARD	
C26	330 2%	X241113311

ITEM No.	RATING	MFGR. PART No.
C20	.0047 125VAC .0047 400V	X220804721
C21	.0047 125VAC .0047 400V	X220804721
C22	.0047 125VAC .0047 400V	X220804721
C23	.0047 125VAC .0047 400V	X220804721
CM1	Capacitor Network (1)	X223261020
CV1	Trimmer 3.5-28.5pF 250V	X260005020

(1) Contains six (6ea.) .001 50V.

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

ITEM NO.	FUNCTION	RESISTANCE	MFGR. PART NO.	NOTES
	POWER SUPPLY BOARD			
VR1	+5V Adjust	1000	X180040130	
	SYSTEM BOARD			
VR1	Volume	10K	X180040150	
VR2	VFO Adjust	10K	X180020030	

COILS (RF-IF)

ITEM No.	FUNCTION	MFGR. PART No.
	POWER SUPPLY BOARD	
L1	RF Choke	Y130203005
L2	RF Choke	Y130203005
L3	RF Choke	Y130203004
	SYSTEM BOARD	
L1	RF Choke	Y310210020

ITEM No.	FUNCTION	MFGR. PART No.
L4	RF Choke	Y310210020
L5	RF Choke	Y310210020
M1	Line Choke	Y122202002
M2	Line Choke	Y122202002
L2	RF Choke	Y130214002

COILS & TRANSFORMERS

ITEM No.	FUNCTION	MFGR. PART No.	OTHER IDENTIFICATION	NOTES
	POWER SUPPLY BOARD			
T1	Switching	Y130203002	PT-Q50A	

PARTS LIST AND DESCRIPTION (Continued)

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

RESISTORS (Power and Special)

ITEM No.	RATING	REPLACEMENT DATA		
		MFGR. PART No.	NEW-TONE PART No.	WORKMAN PART No.
	ACSII KEYBOARD			
RM1	Resistor Network (5)	Y130212002		
RM2	Resistor Network (6)	Y130212003		
RM3	Resistor Network (6)	Y130212003		
	HASCI KEYBOARD			
RM1	Resistor Network (5)	Y130212002		
RM2	Resistor Network (6)	Y130212003		
RM3	Resistor Network (6)	Y130212003		
	POWER SUPPLY BOARD			
R1	.68 10% 5W WW	X160320070		
R2	10 10% 5W WW	X160311000	5W010	WT68
R3	3300 5% 3W WW	X140333320		24-3030
	SYSTEM BOARD			
R127	4530 1% 1/4W Metal Film			
R131	12K 1% 1/4W Metal Film	X141411222		
R132	6810 1% 1/4W Metal Film			
R133	9090 1% 1/4W Metal Film			
RM1	Resistor Network (1)	X110883321		
RM2	Resistor Network (1)	X110883321		
RM3	Resistor Network (2)	X110881031		
RM4	Resistor Network (1)	X110883321		
RM5	Resistor Network (1)	X110883321		
RM6	Resistor Network (3)	X118868970		
RM7	Resistor Network (3)	X118868970		
RM8	Resistor Network (4)	X115464701		
RM9	Resistor Network (1)	X110883321		

(1) Contains eight (8ea.) 3300 10% 1/8W.
(2) Contains eight (8ea.) 10K 10% 1/8W.
(3) Contains three (3ea.) 47 and three (3 ea.) 3300.
(4) Contains six (6ea.) 47 10% and 1/4W.
(5) Contains eight (8ea.) 3300.
(6) Contains eight (8ea.) 10K.

FUSE DEVICES

ITEM NO.	DESCRIPTION	MFGR. PART NO.		NOTES
		DEVICE	HOLDER	
	POWER SUPPLY BOARD			
F1	3A @ 250V Fast Acting	X502018010	X502100030	
	1.6 A	X502014040(1)		

(1) Used in European models.

SPEAKER

ITEM No.	TYPE	REPLACEMENT DATA		NOTES
		MFGR. PART No.	QUAM PART No.	
SP1	1" X 2" PM 8 Ohms	X510620020		

PARTS LIST AND DESCRIPTION (Continued)

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

MISCELLANEOUS

ITEM No.	PART NAME	MFGR. PART No.	NOTES
	ACSII KEYBOARD		
CR1	Crystal	X504004500	11MHz
LED 1	LED		SF1
LED 2	LED		SF2
LED 3	LED		SF3
LED 4	LED		SF4
LED 5	LED		INS
LED 6	LED		Caps Lock
A01	Switch		Part of Keyboard
A05	Switch		Part of Keyboard
A10	Switch		Part of Keyboard
A16	Switch		Part of Keyboard
A18	Switch		Part of Keyboard
A19	Switch		Part of Keyboard
A20	Switch		Part of Keyboard
B00 thru B11	Switch		Part of Keyboard
B16 thru B21	Switch		Part of Keyboard
C00 thru C12	Switch		Part of Keyboard
C16	Switch		Part of Keyboard
C18 thru C21	Switch		Part of Keyboard
D00 thru D14	Switch		Part of Keyboard
D16 thru D21	Switch		Part of Keyboard
E00 thru E14	Switch		Part of Keyboard
E16 thru E21	Switch		Part of Keyboard
F00 thru F04	Switch		Part of Keyboard
F06 thru F10	Switch		Part of Keyboard
F12 thru F15	Switch		Part of Keyboard
F18 thru F21	Switch		Part of Keyboard
	HASCI KEYBOARD		
CR1	Crystal	X504004500	11MHz
LED 1	LED		CALC, Red (2.0V @ 10mA)
LED 2	LED		SCHED, Red (2.0V @ 10mA)
LED 3	LED		DRAW, Red (2.0V @ 10mA)
LED 4	LED		SF2, Red (2.0V @ 10mA)
LED 5	LED		SHIFT LOCK, Red (2.0V @ 10mA)
LED 6	LED		INSERT, Red (2.0V @ 10mA)
LED 7	LED		CAP LOCK, Red (2.0V @ 10mA)
A00	Switch		Part of Keyboard
A01	Switch		Part of Keyboard
A05	Switch		Part of Keyboard
A10	Switch		Part of Keyboard

PARTS LIST AND DESCRIPTION (Continued)

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

MISCELLANEOUS (cont)

ITEM No.	PART NAME	MFGR. PART No.	NOTES
	HASCI KEYBOARD (Continued)		
A11	Switch		Part of Keyboard
A16	Switch		Part of Keyboard
A19	Switch		Part of Keyboard
A21	Switch		Part of Keyboard
B00 thru B11	Switch		Part of Keyboard
B16	Switch		Part of Keyboard
B17	Switch		Part of Keyboard
B19 thru B22	Switch		Part of Keyboard
B99	Switch		Part of Keyboard
C00 thru C12	Switch		Part of Keyboard
C16	Switch		Part of Keyboard
C19 thru C22	Switch		Part of Keyboard
C99	Switch		Part of Keyboard
D00 thru D13	Switch		Part of Keyboard
D16	Switch		Part of Keyboard
D17	Switch		Part of Keyboard
D19 thru D22	Switch		Part of Keyboard
E00 thru E14	Switch		Part of Keyboard
E16	Switch		Part of Keyboard
E17	Switch		Part of Keyboard
E19 thru E22	Switch		Part of Keyboard
E99	Switch		Part of Keyboard
F00	Switch		Part of Keyboard
F01	Switch		Part of Keyboard
F02	Switch		Part of Keyboard
F04 thru F08	Switch		Part of Keyboard
F10 thru F13	Switch		Part of Keyboard
F15 thru F18	Switch		Part of Keyboard
	POWER SUPPLY BOARD		
SW1	Switch		Power
	SYSTEM BOARD		
CR1	Quartz Oscillator	X504002900	
CR2	Quartz Oscillator	X504000600	32.768kHz
CR3	Quartz Oscillator	X504002300	
SW1	Switch	X620100270	Reset
SW2	Switch	X620400830	Set Up, 8 Section
	Battery	Y111301000	C-Mos, back-Up with cables
	P.C. Board	Y130214100	Base Plate B version, without RAM & ROM
	P.C. Board	Y130201100	Base Plate A version, without RAM & ROM
	P.C. Board	Y130201000	ASCII, without ROM, European version
	P.C. Board	Y130214000	ASCII, without ROM, European version
	Fan Unit	Y130501000	
	Speaker	X510620020	

PARTS LIST AND DESCRIPTION (Continued)

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

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

ITEM	PART No.
ACSII KEYBOARD	
Cabinet, Bottom	Y131000001
Cabinet, Top	Y131003101
KEY TOP (LED) "SF1"	Y131502001
KEY TOP (LED) "SF2"	Y131502002
KEY TOP (LED) "SF3"	Y131502003
KEY TOP (LED) "SF4"	Y131502004
KEY TOP (LED) "INS"	Y131502005
KEY TOP (LED) "CAPSLOCK"	Y131502006
KEY TOP "F1"	Y131502007
KEY TOP "F2"	Y131502008
KEY TOP "F3"	Y131502009
KEY TOP "F4"	Y131502010
KEY TOP "F5"	Y131502011
KEY TOP "F6"	Y131502012
KEY TOP "F7"	Y131502013
KEY TOP "F8"	Y131502014
KEY TOP "F9"	Y131502015
KEY TOP "F10"	Y131502016
KEY TOP "BREAK"	Y131502017
KEY TOP "PAUSE"	Y131502018
KEY TOP "HELP"	Y131502019
KEY TOP "SCRN DUMP"	Y131502020
KEY TOP "ESC"	Y131502021
KEY TOP "!, 1"	Y131502022
KEY TOP "", 2"	Y131502023
KEY TOP "#, 3"	Y131502024
KEY TOP "$, 4"	Y131502025
KEY TOP "%, 5"	Y131502026
KEY TOP "&, 6"	Y131502027
KEY TOP " ', 7"	Y131502028
KEY TOP "(, 8"	Y131502029
KEY TOP "), 9"	Y131502030
KEY TOP "-, 0"	Y131502031
KEY TOP "=, _ "	Y131502032
KEY TOP "~, ^ "	Y131502033
KEY TOP "¦, \ "	Y131502034
KEY TOP "BS"	Y131502035
KEY TOP "HOMZ"	Y131502036
KEY TOP "CLS"	Y131502037
KEY TOP "*"	Y131502038
KEY TOP "/"	Y131502039
KEY TOP "+"	Y131502040
KEY TOP "-"	Y131502041
KEY TOP "TAB"	Y131502042
KEY TOP "Q"	Y131502043
KEY TOP "W"	Y131502044
KEY TOP "E"	Y131502045
KEY TOP "R"	Y131502046
KEY TOP "T"	Y131502047
KEY TOP "Y"	Y131502048
KEY TOP "U"	Y131502049
KEY TOP "I"	Y131502050

ITEM	PART No.
KEY TOP "O"	Y131502051
KEY TOP "P"	Y131502052
KEY TOP " ` , @"	Y131502053
KEY TOP "{ , ["	Y131502054
KEY TOP " } ,] "	Y131502055
KEY TOP "7"	Y131502056
KEY TOP "8"	Y131502057
KEY TOP "9"	Y131502058
KEY TOP "LF"	Y131502059
KEY TOP "DEL"	Y131502060
KEY TOP "="	Y131502061
KEY TOP CTRL	Y131502062
KEY TOP "4"	Y131502063
KEY TOP "5"	Y131502064
KEY TOP "6"	Y131502065
KEY TOP "1"	Y131502066
KEY TOP "2"	Y131502067
KEY TOP "3"	Y131502068
KEY TOP "0"	Y131502069
KEY TOP "000"	Y131502070
KEY TOP "."	Y131502071
KEY TOP "A"	Y131502072
KEY TOP "S"	Y131502073
KEY TOP "D"	Y131502074
KEY TOP "E"	Y131502075
KEY TOP "G"	Y131502076
KEY TOP "H"	Y131502077
KEY TOP "J"	Y131502078
KEY TOP "K"	Y131502079
KEY TOP "L"	Y131502080
KEY TOP "+", ;"	Y131502081
KEY TOP "*, :"	Y131502082
KEY TOP "."	Y131502083
KEY TOP "↵"	Y131502084
KEY TOP "] "	Y131502085
KEY TOP "SHIFT"	Y131502086
KEY TOP "SHIFT"	Y131502087
KEY TOP "↑"	Y131502088
KEY TOP "↓"	Y131502089
KEY TOP "Z"	Y131502090
KEY TOP "X"	Y131502091
KEY TOP "C"	Y131502092
KEY TOP "V"	Y131502093
KEY TOP "B"	Y131502094
KEY TOP "N"	Y131502095
KEY TOP "M"	Y131502096
KEY TOP "< ,,"	Y131502097
KEY TOP ">, :"	Y131502098
KEY TOP "?, /"	Y131502099
KEY TOP "GRPH SHIFT"	Y131502100
KEY TOP SPACER BAR	Y131502101
KEY TOP " "	Y131502102
KEY TOP " "	Y131502103
KEY TOP THROUGH F1 TO F10 ECT	Y131502104

WIRING DATA

Shielded Hook-up Wire	Use BELDEN No.	8401 or 8421 (Single-Conductor) 8208 (Two-Conductor)
General-use Unshielded Hook-up Wire	Use BELDEN No.	8529 (Solid) Available in 13 Colors 8522 (Stranded) Available in 13 Colors

PARTS LIST AND DESCRIPTION (Continued)

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

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

ITEM	PART No.
HASCI KEYBOARD	
Cabinet, Bottom	Y131000001
Cabinet, Top	Y131003001
KEY TOP (LED) SHIFT LOCK	Y131501002
KEY TOP (LED) "INSERT"	Y131501003
KEY TOP (LED) "CALC"	Y131501004
KEY TOP (LED) "SCHED"	Y131501005
KEY TOP (LED) "DRAW"	Y131501006
KEY TOP "STOP"	Y131501007
KEY TOP "HELP"	Y131500008
KEY TOP "COPY DISK"	Y131501009
KEY TOP "UNDO"	Y131501010
KEY TOP "STORE"	Y131501011
KEY TOP "RE-TRIEVE"	Y131501012
KEY TOP "PRINT"	Y131501013
KEY TOP "INDEX"	Y131501014
KEY TOP "MAIL"	Y131501015
KEY TOP "MENU"	Y131501016
KEY TOP "BOLD"	Y131501017
KEY TOP "ITALIC"	Y131501018
KEY TOP "SIZE"	Y131501019
KEY TOP "STYLE"	Y131501020
KEY TOP "MARREL "	Y131501021
KEY TOP "⌫ "	Y131501022
KEY TOP "⌦ "	Y131501023
KEY TOP "LINE"	Y131501024
KEY TOP "DEC. TAB"	Y131501025
KEY TOP " ÷ "	Y131501026
KEY TOP "X"	Y131501027
KEY TOP "−"	Y131501028
KEY TOP " ^ ± "	Y131501029
KEY TOP "!, 1"	Y131501030
KEY TOP "@, 2"	Y131501031
KEY TOP "#, 3"	Y131501032
KEY TOP "$, 4"	Y131501033
KEY TOP "%, 5"	Y131501034
KEY TOP "¢, ="	Y131501035
KEY TOP "&, 7"	Y131501036
KEY TOP "*, 8"	Y131501037
KEY TOP "(, 9"	Y131501038
KEY TOP "), 0"	Y131501039
KEY TOP "−, ¯"	Y131501040
KEY TOP "+, ="	Y131501041
KEY TOP "°, \ "	Y131501042
KEY TOP "TAB"	Y131501043
KEY TOP "Q"	Y131501044
KEY TOP "W"	Y131501045
KEY TOP "E"	Y131501046
KEY TOP "R"	Y131501047
KEY TOP "T"	Y131501048
KEY TOP "Y"	Y131501049
KEY TOP "U"	Y131501050
KEY TOP "I"	Y131501051
SYSTEM UNIT	
Cabinet, Bottom	Y130000001
Cabinet, Top	Y130002001

ITEM	PART No.
KEY TOP "0"	Y131501052
KEY TOP "P"	Y131501053
KEY TOP "1/4, 1/2"	Y131501054
KEY TOP " [, < "	Y131501055
KEY TOP "] , > "	Y131501056
KEY TOP "7"	Y131501057
KEY TOP "8"	Y131501058
KEY TOP "9"	Y131501059
KEY TOP "WORD"	Y131501060
KEY TOP "+"	Y131501061
KEY TOP "TABREL"	Y131501062
KEY TOP "A"	Y131501063
KEY TOP "S"	Y131501064
KEY TOP "D"	Y131501065
KEY TOP "F"	Y131501066
KEY TOP "G"	Y131501067
KEY TOP "H"	Y131501068
KEY TOP "J"	Y131501069
KEY TOP "K"	Y131501070
KEY TOP "L"	Y131501071
KEY TOP ":, ;"	Y131501072
KEY TOP "", ' "	Y131501073
KEY TOP "4"	Y131501074
KEY TOP "5"	Y131501075
KEY TOP "6"	Y131501076
KEY TOP " = "	Y131501077
KEY TOP "CTRL"	Y131501078
KEY TOP "GRPH SHIFT"	Y131501079
KEY TOP "CTRL"	Y131501080
KEY TOP "RETURN"	Y131501081
KEY TOP "TABSET"	Y131501082
KEY TOP "Z"	Y131501083
KEY TOP "X"	Y131501084
KEY TOP "C"	Y131501085
KEY TOP "V"	Y131501086
KEY TOP "B"	Y131501087
KEY TOP "N"	Y131501088
KEY TOP "M"	Y131501089
KEY TOP ","	Y131501090
KEY TOP "."	Y131501091
KEY TOP "?, /"	Y131501092
KEY TOP SPACER BAR	Y131501093
KEY TOP "SHIFT"	Y131501094
KEY TOP ":"	Y131501095
KEY TOP "0"	Y131501096
KEY TOP "ENTER"	Y131501097
KEY TOP " ↓ "	Y131501098
KEY TOP " ↑ "	Y131501099
KEY TOP "←"	Y131501100
KEY TOP "→"	Y131501101
KEY TOP "1"	Y131501102
KEY TOP "2"	Y131501103
KEY TOP "3"	Y131501104
KEY TOP "."	Y131501105
Connector Cover A	Y130025001
Connector Cover B	Y130026001
Option Cover	Y130004001

LOGIC CHART
SYSTEM BOARD

BANK 1									BANK 2				
PIN NO.	IC BIT0	IC BIT1	IC BIT2	IC BIT3	IC BIT4	IC BIT5	IC BIT6	IC BIT7	PIN NO.	IC BIT0	IC BIT1	IC BIT2	IC BIT3
1	H	H	H	H	H	H	H	H	1	H	H	H	H
2	P	P	P	P	P	P	P	P	2	P	P	P	P
3	P	P	P	P	P	P	P	P	3	P	P	P	P
4	P	P	P	P	P	P	P	P	4	P	P	P	P
5	P	P	P	P	P	P	P	P	5	P	P	P	P
6	P	P	P	P	P	P	P	P	6	P	P	P	P
7	P	P	P	P	P	P	P	P	7	P	P	P	P
8	H	H	H	H	H	H	H	H	8	H	H	H	H
9	P	P	P	P	P	P	P	P	9	P	P	P	P
10	P	P	P	P	P	P	P	P	10	P	P	P	P
11	P	P	P	P	P	P	P	P	11	P	P	P	P
12	P	P	P	P	P	P	P	P	12	P	P	P	P
13	P	P	P	P	P	P	P	P	13	P	P	P	P
14	P	P	P	P	P	P	P	P	14	P	P	P	P
15	P	P	P	P	P	P	P	P	15	P	P	P	P
16	L	L	L	L	L	L	L	L	16	L	L	L	L

BANK 2 (Continued)					BANK 3								
PIN NO.	IC BIT4	IC BIT5	IC BIT6	IC BIT7	PIN NO.	IC BIT0	IC BIT1	IC BIT2	IC BIT3	IC BIT4	IC BIT5	IC BIT6	IC BIT7
1	H	H	H	H	1	H	H	H	H	H	H	H	H
2	P	P	P	P	2	P	P	P	P	P	P	P	P
3	P	P	P	P	3	P	P	P	P	P	P	P	P
4	P	P	P	P	4	P	P	P	P	P	P	P	P
5	P	P	P	P	5	P	P	P	P	P	P	P	P
6	P	P	P	P	6	P	P	P	P	P	P	P	P
7	P	P	P	P	7	P	P	P	P	P	P	P	P
8	H	H	H	H	8	H	H	H	H	H	H	H	H
9	P	P	P	P	9	P	P	P	P	P	P	P	P
10	P	P	P	P	10	P	P	P	P	P	P	P	P
11	P	P	P	P	11	P	P	P	P	P	P	P	P
12	P	P	P	P	12	P	P	P	P	P	P	P	P
13	P	P	P	P	13	P	P	P	P	P	P	P	P
14	P	P	P	P	14	P	P	P	P	P	P	P	P
15	P	P	P	P	15	P	P	P	P	P	P	P	P
16	L	L	L	L	16	L	L	L	L	L	L	L	L

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

Note: Logic probe readings taken with computer turned On, no keys pressed, unless otherwise noted.

(1) Logic probe readings taken while running the following program.

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

(2) Probe indictes P when pressing the RESET button.

(3) Probe indicates H if diskette is write protected.

(4) Probe indicates P if diskette is write protected.

(5) Probe indicates P when Head Position Motor is operating.

(6) Probe indicates P when Head is moving out from center of diskette.

(7) Probe indicates P when Head is moving in toward center of diskette.

(8) Probe indicates H when Head is on track 00 and L when off track 00.

(9) Probe indicates L when Head is on track 00 and H when off track 00.

(10) Probe indicates H when drive motor is not running.

(11) Probe indicates L when Head is moving in and H when Head is moving out from the center of the diskette.

(12) Probe indicates H when Head is moving in and L when Head is moving out from the center of diskette.

(13) Logic reading not taken.

LOGIC CHART (Continued)
SYSTEM BOARD

PIN NO.	IC 3M	IC 5J	IC 5K	IC 5M	IC 6E	IC 6F	IC 6H	IC 6J	IC 6K	IC 6L	IC 7A(1)	IC 7B(1)	IC 7C(1)	IC 7E
1	L	L	L	L	H	H	P	L	L	L	*	L(5)	L(7)	H
2	H	P	P	H	P	P	P	P	H	H	*	H(5)	P	P
3	H	P	H	H	P	P	P	P	H	H	L	H(5)	H(7)	P
4	L	P	P	H	P	P	P	P	H	H	P	H(5)	P	P
5	H	P	P	H	P	P	P	P	H	H	H	H(5)	H	P
6	L	P	P	H	P	P	P	P	H	H	P	L(5)	P	P
7	L	P	P	H	P	P	P	P	H	H	L	L	L	P
8	H	P	H	H	H	H	P	P	H	H	L	H(5)	P	H
9	L	P	P	H	P	P	P	P	H	H	H	L(5)	P	P
10	H	L	L	L	P	P	L	L	L	L	H	L(5)	H	P
11	L	P	P	H	P	P	P	P	H	H	L(5)	H(5)	H	P
12	P	P	H	H	P	P	P	P	H	H	H(5)	H(5)	P	P
13	P	P	P	H	P	P	P	P	H	H	H	L(5)	P	P
14	H	P	P	H	P	P	P	P	H	H	H	H	H	P
15		P	P	H	P	P	P	P	H	H				P
16		P	P	H	L	L	P	P	H	H				L
17		P	H	H			P	P	H	H				
18		P	P	H			P	P	H	H				
19		L	L	L			L	L	L	L				
20		H	H	H			H	H	H	H				

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

LOGIC CHART (Continued)
SYSTEM BOARD

PIN NO.	(1) IC 9D	IC 9E	IC 9F	IC 9J	IC 9K	IC 9L	(1) IC 10A	(1) IC 10C	(1) IC 10D	PIN NO.	IC 10E	PIN NO.	IC 10E
1	P	H	H	P	L	L	L	P	P	1	P	15	L
2	P	P	P	P	L	H	P	P	*	2	P	16	L
3	P	P	P	P	P	H	H	P	*	3	P	17	L
4	H	P	P	P	P	L	P	P	*	4	P	18	L
5	P	P	P	P	L	P	P	P	*	5	P	19	H
6	P	P	P	P	L	P	P	P	L	6	P	20	L
7	L	P	P	P	L	L	P	L	L	7	P	21	H
8	P	H	H	L	L	L	L	P	P	8	P	22	H
9	P	P	P	P	H	H	L	P	P	9	P	23	H
10	H	P	P	P	L	P	P	P	P	10	P	24	H
11	P	P	P	P	L	P	H	P	H	11	P	25	H
12	P	P	P	P	H	H	P	P	H	12	L	26	H
13	P	P	P	P	L	L	P	P	P	13	L	27	P
14	H	P	P	P	H	H	P	H	H	14	L	28	H
15		P	P	L			P						
16		L	L	H			H						

PIN NO.	IC 10K	IC 10L	IC 11B	(1) IC 11C	(1) IC 11D	IC 11H	IC 11J	IC 11K	IC 11L	PIN NO.	IC 12E	PIN NO.	IC 12E
1	H	L	L	P	P	P	P	P	P	1	P	15	L
2	P	H	H	P	H	P	P	H	P	2	P	16	H
3	H	L	L	H(9)	P	P	P	P	P	3	P	17	H
4	*	H	P	L(8)	H	P	P	H	P	4	P	18	L
5	*	L	H	P	P	P	P	L	P	5	P	19	H
6	H	L	P	P	P	P	P	P	P	6	P	20	H
7	L	L	L	L	L	L	P	L	L	7	P	21	H
8	H	L	L	H(5)	P	P	L	P	H	8	P	22	H
9	*	L	H	L(5)	P	P	P	P	L	9	P	23	L
10	*	H	H	L(4)	H	P	P	H	P	10	P	24	L
11	H	P	L	H(4)	P	P	P	P	P	11	P	25	L
12	*	P	H	P	H	P	P	H	P	12	L	26	H
13	*	L	H	P	P	P	P	P	P	13	L	27	P
14	H	H	H	H	H	H	P	H	H	14	L	28	H
15							L						
16							H						

LOGIC CHART (Continued)
SYSTEM BOARD

PIN NO.	IC 12H	IC 12J	IC 12K	IC 12L	IC 12M	(1) IC 13A	IC 13B	IC 13C	(1) IC 13D	IC 14A	IC 14C	(1) IC 14D	IC 14E	
1	P	P	L	P	P	P	L	H	L	L	*	H	P	
2	P	P	P	L	L	L	L	L	P	L	L	P	P	
3	P	P	P	P	H	P	H	L	H	L	H	P	P	
4	P	P	P	H	H	P	H	H	P	L	L	H	P	
5	P	P	P	*	P	P	L	L	P	L	L	P	P	
6	P	P	P	*	L	P	L	L	L	L	H	P	P	
7	L	L	P	*	L	L	L	L	P	L	L	L	P	
8	H	P	P	H	H	P	H	H	L	L	H	H	P	
9	P	P	P	L	L	P	L	L	P	L	L	P	P	
10	H	P	L	*	H	P	L	L	H	L	H	P	H	
11	L	P	P	L	L	P	L	H	H	L	L	P	L	
12	P	P	P	L	L	P	L	L	P	L	H	L	L	
13	P	P	P	H	H	P	H	L	P	L	L	P	H	
14	H	H	P	P	L	H	H	H	L	H	H	H	H	
15			P						P				P	
16			P						H				L	
17			P										H	
18			P										P	
19			L										P	
20			H										P	
21													P	
22													P	
23													P	
24													H	

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

LOGIC CHART (Continued)
SYSTEM BOARD

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

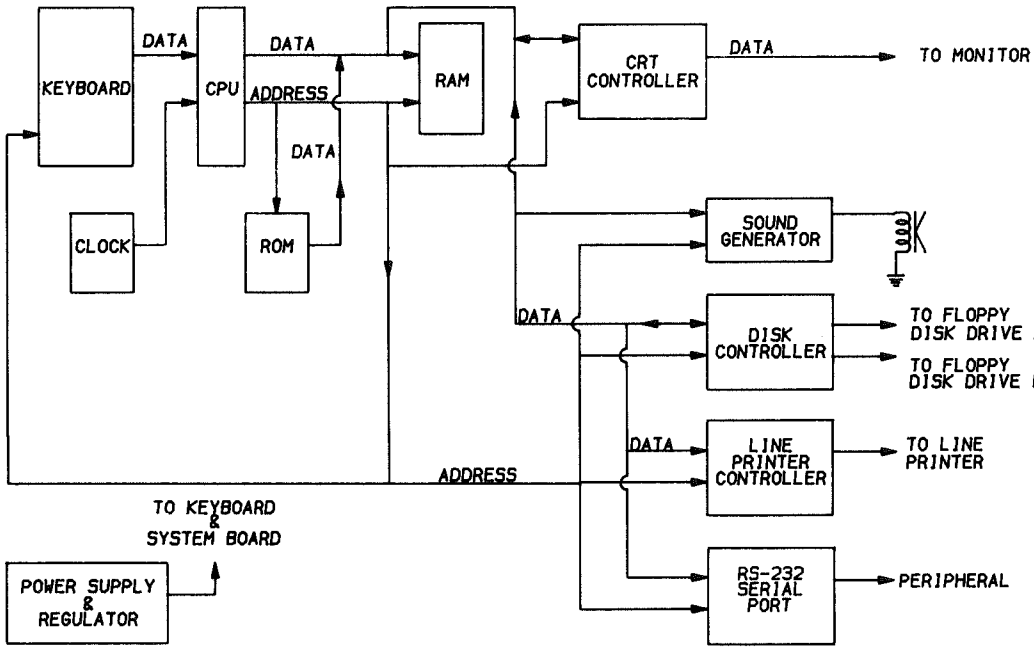
PIN NO.	IC 18B	PIN NO.	IC 18B	PIN NO.	IC 18E	IC 18F	IC 18H	IC 18L	IC 18M	IC 19B	IC 19C	IC 19E	IC 19F
1	L	21	H	1	P	H	P	P	*	*	P	L	L
2	L	22	H	2	P	L	P	L	P	L	H	P	P
3	L	23	H	3	P	P	P	L	P	L	L	P	H
4	L	24	H	4	P	P	H	*	P	L	L	P	L
5	P	25	H	5	P	L	P	H	P	H	L	L	P
6	P	26	H	6	P	L	P	*	H	H	L	P	H
7	L	27	P	7	L	P	L	*	L	H	L	L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

LOGIC CHART (Continued)

SYSTEM BOARD

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

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



BLOCK DIAGRAM

LOGIC CHART (Continued)
SYSTEM BOARD

PIN NO.	IC 22C	(1) IC 22E	IC 22F	(1) IC 22H	IC 22K	IC 22L	IC 22M	IC 23B	(1) IC 23C
1	P	*	P	H	H	P	P	L	P
2	P	*	P	L	P	P	P	H	P
3	H	L(5)	P	H	H	L	H	L	P
4	P	P	P	L	H	H	H	H	P
5	L	P	H	H	L	L	P	L	H
6	P	P	P	L	H	H	P	H	L
7	L	L	L	L	L	L	H	L	L
8	H	H	P	P	H	P	H	L	L
9	*	L(8)	H	P	L	P	L	H	H
10	*	P	P	H	H	P	H	H	L
11	H	P	P	L	H	P	L	L	H
12	P	P	P	L	P	P	P	H	H
13	P	H	P	H	H	P	P	L	L
14	H	H	H	H	H	H	H	H	H

PIN NO.	IC 23E	IC 23F	IC 23H	IC 23J	IC 23K	IC 23M	IC 24C	IC 24K	IC 24M
1	L	P	P	L	H	P	P	L	H
2	H	P	P	P	L	P	P	H	H
3	L	P	P	P	H	P	L	H	P
4	H	P	H	P	P	H	L	H	H
5	L	P	H	P	P	P	L	L	H
6	H	H	L	P	P	P	L	L	L
7	L	L	L	P	L	L	L	*	L
8	L	H	H	P	H	P	L	L	H
9	H	P	P	P	P	P	L	L	L
10	H	P	L	L	L	H	L	H	H
11	L	H	H	P	L	P	L	H	P
12	L	P	L	P	H	H	P	H	L
13	H	P	P	P	H	P	L	L	H
14	H	H	H	P	H	H	H	L	H
15				P				*	
16				P				H	
17				P					
18				P					
19				H					
20				H					

HASCI KEYBOARD

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

SYSTEM CLOCK AND DIVIDERS

Check for a frequency of 15.9744MHz at pin 11 of System Clock IC (18M). If the System Clock is off frequency, check Crystal CR1 and Capacitor C29. If the System Clock is not working, check IC 18M by substitution and also check the Crystal (CR1), Capacitor C29 and Resistors R82 and R96.

If the System Clock is normal, check the waveforms at pins 1, 8 and 9 of Counter IC (18L). If any of the waveforms are missing, check IC 18L by substitution. Check the waveform at pin 6 of IC 17L. If the waveform is missing, check IC 17L by substitution.

RESET CIRCUIT

Check the operation of the power On reset signal at pin 26 of the CPU IC (17J) while turning On the Computer and then pressing the Reset Switch (SW1). The reset signal should read a Logic Low for approximately .3 second after the Computer is turned On and then change to a Logic High reading. There should be a pulse at pin 26 of IC 17J whenever the Switch SW1 is pressed.

If the power On reset does not work but Reset Switch SW1 operates normally, check for 5.0V at the collector of Power On Reset Transistor (Q3) and also check for 5.0V at pin 8 of IC 3M. If 5.0V is missing at the collector of Transistor Q3, check for .22V at pin 1 of Connector CN8. If pin 1 of Connector CN8 reads more than 1.0V, refer to the "Power Supply" section of this Troubleshooting guide. If pin 1 of Connector CN8 reads .22V, check Transistor Q3 and Resistors R60 and R78. If 5.0V is missing at pin 8 of IC 3M and pin 9 of IC 3M reads a Logic Low, check Capacitor C3, Resistors R44 and R63 and also check IC 3M by substitution.

If pin 9 of IC 3M reads a Logic High, check ICs 23C and 21C by substitution. Also check Capacitors C55 and C63 and Resistors R45, R46, R70 and R123. If 5.0V is present at the collector of Transistor Q3 and at pin 8 of IC 3M, check for a momentary Low Logic reading at pin 10 of IC 23E when turning On the Computer. If the Logic reading is incorrect, check Capacitor C3, Resistor R122 and check IC 23E by substitution. If the reading is correct, check for a High Logic reading at pins 1 and 13 of IC 21M. If pins 1 and 13 read High, check IC 21M by substitution. If pin 1 of IC 21M reads a Logic Low, check Buffer IC (6K) by substitution. If pin 13 of IC 21M reads Logic Low, check IC 24K by substitution.

If the power On reset works, but the Reset Switch (SW1) does not, check for a Low Logic reading at pin 5 of IC 24M while pressing the Switch SW1. If the Logic reading is incorrect, check Switch SW1, Capacitor C17, Resistors R2 and R116 and also check IC 24M by substitution. If the reading is correct at pin 5 of IC 24M, check for a pulse at pin 12 of IC 24K while pressing Switch SW1. If the pulse is missing, check Capacitor C54, Resistor R98 and also check IC 24K by substitution. If the pulse is present at pin 12 of IC 24K, check IC 21M by substitution.

KEYBOARD

If the keyboard is dead, check the keyboard cable and connectors for good connections. If the cable is good, check for 12.0V at pin 3 of Connector CN1. If 12V is missing, check for a Low Logic reading at pin 4 of IC 3M. If the reading is correct, check Switch Transistor (Q2) and Resistors R1 and R80. If pin 4 of IC 3M does not read a Logic High, check for a Low Logic reading at pin 1 of IC 3M. If the reading is correct, check IC 3M by substitution. If pin 1 of IC 3M does not read Logic Low, check ICs 23K and 24K by substitution.

If 12V is present at pin 3 of Connector CN1, check for clock pulses at pin 2 of Connector CN1. If the pulses are missing, check for pulses at pin 13 of IC 3M. If pulses are present at pin 13, check IC 3M by substitution. Also check resistance between pins 6 and 7 of Resistor RM7, pins 11 and 12 of Resistor RM8, and the capacitance between pins 7 and 8 of Capacitor CM1. If pulses are missing at pin 13 of IC 3M, check IC 11C by substitution.

If clock pulses are present at pin 2 of Connector CN1, check for pulses at pin 4 of Connector CN1 while pressing the Space Bar key. If pulses are missing at pin 4, check for pulses at pin 34 of CPU IC (5A) on the Keyboard while pressing the Space Bar key. If pulses are present at pin 34, check for pulses at pin 15 of IC 6A. If pulses are missing at pin 15, check IC 6A by substitution. If pulses are present at pin 15 of IC 6A, check IC 3A by substitution and check Resistor R22. If pulses are missing at pin 34 of IC 5A, check for 5V at pin 40 of IC 5A. If 5V is missing, check 5V Regulator IC (SR1), Capacitors C1, C2 and C6 thru C9 and Resistor R28 on the keyboard. If 5V is present at pin 40 of IC 5A, check the Logic reading at pin 4 of IC 5A while turning On the Computer. The Logic reading should be Low for about .5 second after Computer is turned On and then go High to reset IC 5A. If the Logic readings are incorrect, check Diode D11 and Electrolytic C3. If the reset for IC 5A is working, check the clock waveform at pin 2 of IC 5A. If the waveform is missing, check Crystal (CR1), Capacitors C4 and C5 and also check IC 5A by substitution. If the waveform is present at pin 2 of IC 5A, check the waveform at pin 1 of IC 5A. If the waveform is missing, check IC 6A by substitution. Also check Resistors R25 and R26. If the waveform is present at pin 1 of IC 5A, check the waveforms at pins 27 thru 30 of IC 5A. If the waveforms are missing, check IC 5A by substitution. If the waveforms are present, check the waveforms at pins 1 thru 7 and 9 of Decoder ICs (1A and 2A). If any waveform is missing, check the IC with the missing waveform by substitution.

If pulses are present at pin 4 of Connector CN1 while pressing the Space Bar key, check for pulses at pin 10 of IC 21C on the System board while pressing the Space Bar key. If pulses are missing, check IC 21C by substitution. If pulses are present at pin 10 of IC 21C, check Protocol Controller IC (16B) by substitution.

If any one key does not work, check the contacts of the bad key for good contact when the key is pressed. If the key contacts seem dirty, clean the contacts with a spray contact cleaner.

If one group of keys do not work and they all connect to the same pin of IC 1A, 2A, 4A or 6A, check the IC to which they are connected by substitution. If the IC is good, check IC 5A by substitution.

If a key fails to repeat when held down, check IC 5A by substitution.

SYSTEM

VIDEO ATTRIBUTES

The following program can be used to check the operation of the video attributes available on the video display board. The program will display the normal, highlight, reverse video and blink attributes on the Monitor screen.

```
10 FOR Y = 1 TO 4
20 READ A$, X
30 PRINT CHR$(27) CHRS(X);
40 PRINT A$;
50 NEXT Y
60 PRINT CHR$(27) CHR$(113)
70 DATA NORMAL,41, HIGHLIGHT,40, REVERSE,106,
   BLINK,94
```

SOUND

No sound from the internal Speaker SP1. Check the setting of the Volume Control (VR1), located on the back panel of the Computer, and check the Speaker SP1 for 8 Ohms. If the volume control and speaker are normal, check the waveform at pin 13 of IC 23H. If the waveform is missing, check Timer ICs (14E and 16E) by substitution. If the waveform checks good, load MBASIC into the computer (see "MBASIC" section of the General Operating Instructions). Type and run the following program to produce a continuous sound signal to the speaker.

```
1 PRINT CHR$(7): GOTO 1
```

While the program is running, check for a High Logic reading at pin 12 of IC 23H. If the Logic reading is Low, check for a Low Logic reading at pin 5 of IC 23H. If the Logic reading at pin 5 of IC 23H is High, check Timer IC (14E) by substitution. If the Logic reading at pin 5 of IC 23H is High, check for a High Logic reading at pin 4 of IC 23H. If the Logic reading is High, check IC 23H by substitution. If the Logic reading at pin 4 of IC 23H is Low, check for a Low Logic reading at pin 13 of (IC 23C). If the Logic reading at pin 13 of IC 23C is High, check Flip/Flop IC (18F) by substitution. If the Logic reading at pin 13 of IC 23C is Low, check IC 23C by substitution.

If the Logic reading at pin 12 of IC 23H is High, check for pulses at pin 11 of IC 23H. If pulses are missing, check IC 23H by substitution. If pulses are present, check for pulses at pin 8 of IC 23B. If pulses are missing at pin 8 of IC 23B, check Capacitor C43, Resistor R153 and check IC 23B by substitution. If pulses are present at pin 8 of IC 23B, check Electrolytics C1 and C8, Resistor R121, Volume Control (VR1) and also check Audio Amp IC (19B) by substitution.

PRINTER PORT

Printer port is not working properly. Check Connector CN3 for good connections and also check ICs 7K, 14A, 15A, 15C and Printer Interface IC (18B) by substitution.

SERIAL PORT

Serial port is not working properly. Check Connector CN2 for good connections and check ICs 11B, 13B, 13C, and Protocol Controller IC (16B) by substitution.

REAL TIME CLOCK (TIME AND CALENDAR)

Time and calendar function does not work properly. Check the frequency (32.768kHz) at pin 2 of the Real Time Clock IC (21B). If the frequency is incorrect, check the adjustment of the Oscillator Trimmer Capacitor (CV1) (see "Real Time Clock Oscillator" section of Miscellaneous Adjustments). Check Capacitor C27, Trimmer (CV1), and Resistors R124 and R154. Also check IC 22B by substitution. If the oscillator checks good, check IC 21B by substitution.

MISCELLANEOUS ADJUSTMENTS

5V ADJ (POWER SUPPLY BOARD)

Connect the input of a voltmeter to pin 7 of Connector CN8. Adjust the 5V ADJ Control (VR1) for 5.0V.

REAL TIME CLOCK OSCILLATOR

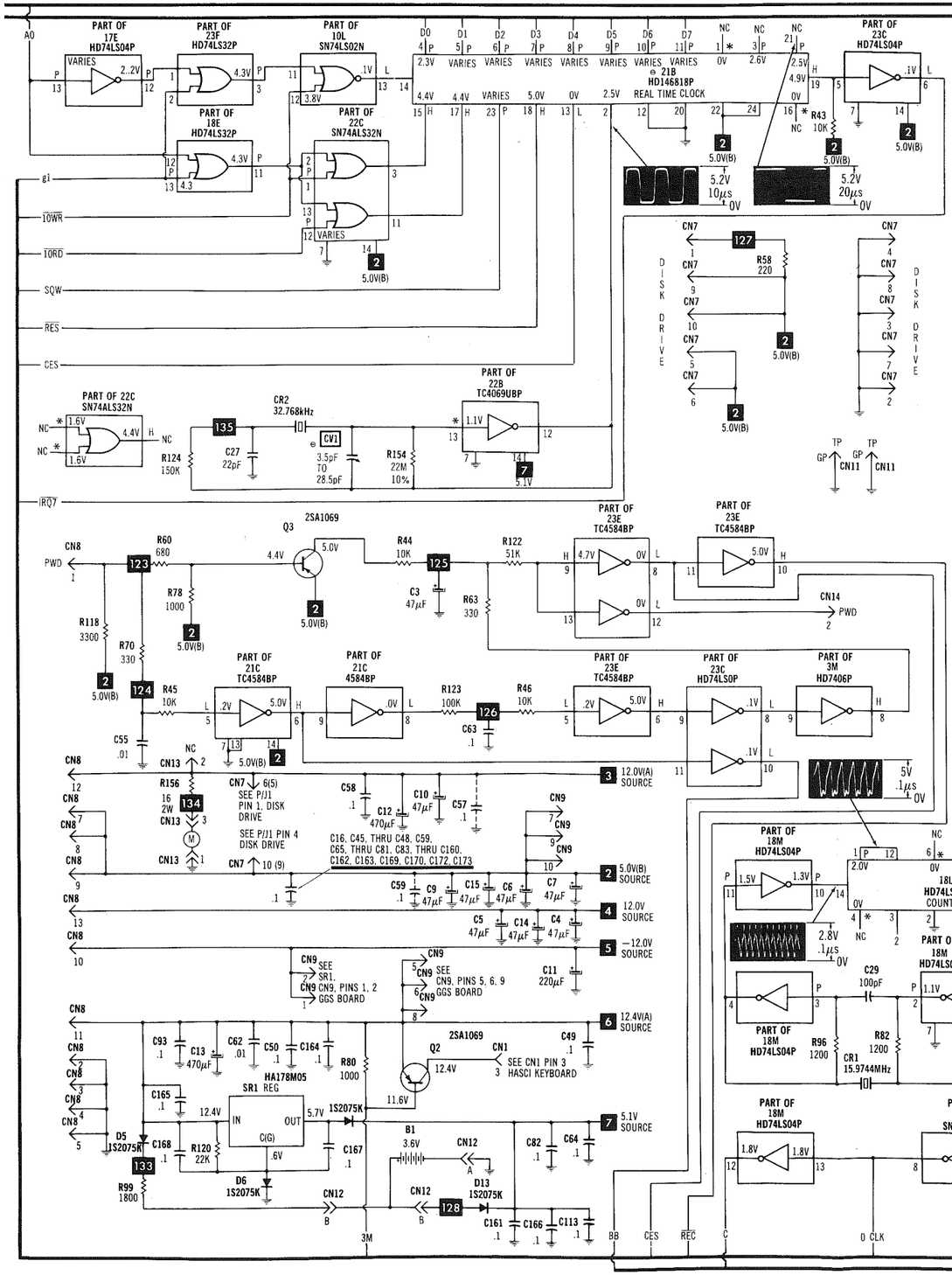
Connect the input of a Frequency Counter to pin 12 of IC 22B. Adjust the Oscillator Trimmer Capacitor (CV1) for a frequency of 32.768kHz.

ALIGNMENT TOOLS	GC ELECTRONICS
CV1	5000, 8376, 9089

LINE DEFINITIONS (Continued)

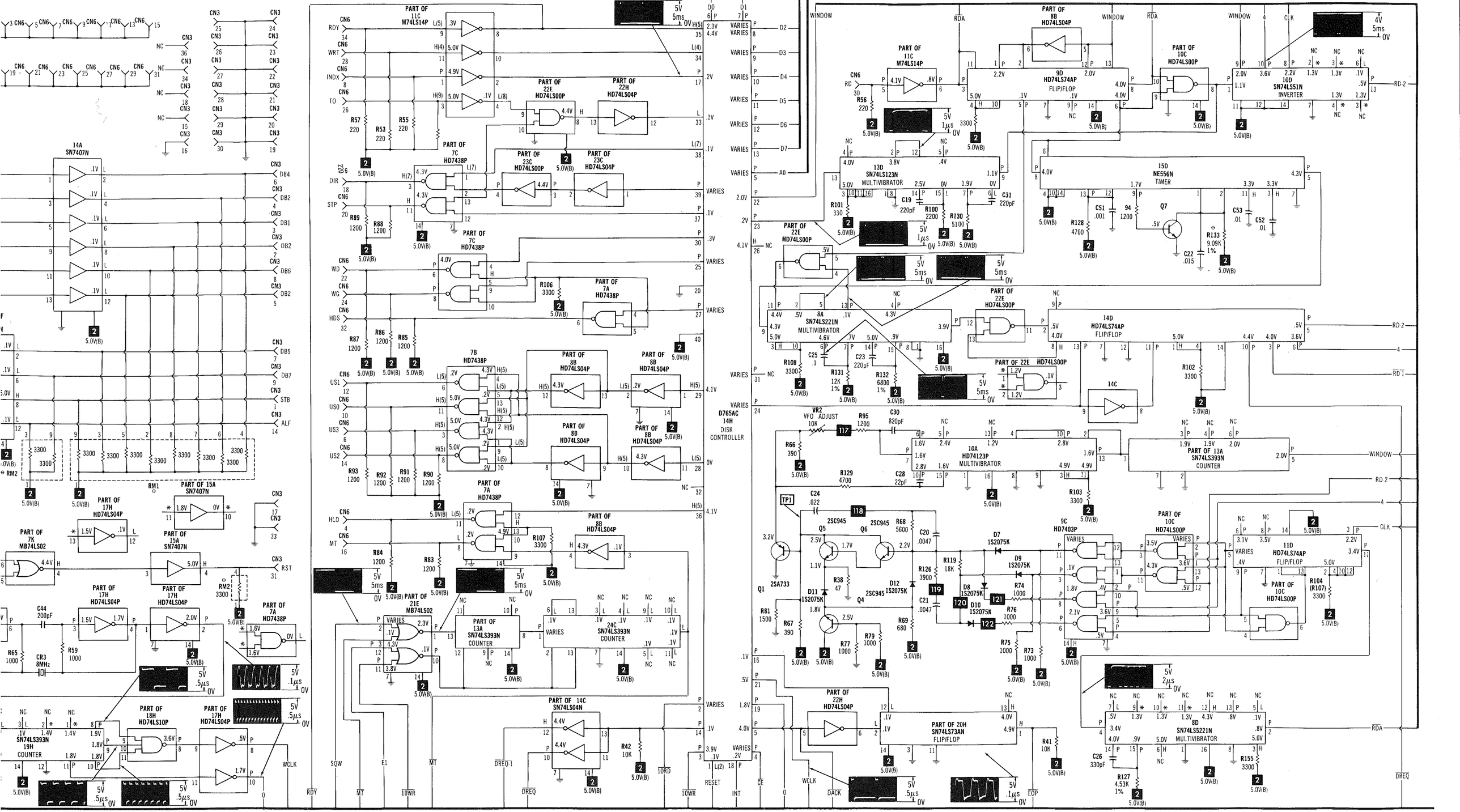
M3 Thru M10 ..... Memory Lines
M
MA
MA0 Thru MA7 ..... Memory Address Lines
MD0 Thru MD15 ..... Data Lines
MEG
MEMX ..... External Memory select
MM
MMA
MRD ..... Memory Read
MT ..... Motor On
MW
MWR ..... Memory Write
N
NA
NN
NNA
OA
OC
OO
OOA
OUT2
P
PA
PP
PPA
PRI ..... Priority Output
PWF ..... Power Failure
PWD ..... Power Failure Detection
Q
QA
QE
QQ
QQA
R
RA
RAS ..... Row Address Strobe
RAS1 Thru RAS4
RD ..... Read Data
RD-1 & RD2 ..... Read Data
RDY ..... Ready
RDYF ..... DMA Ready
RDYS ..... DMA Ready
RES
RESET ..... Reset
RESET-1 & RESET-2 ..... Reset
REV ..... Reverse Channel
RFSH ..... Refresh
RFSH-1 & H-2 ..... Refresh
RSIN ..... Reset Input
RST ..... Reset
RR
RTS ..... Request to Send
RXC ..... Receive Clock
RXD ..... Received Data
RXDA
RUS
S
SA
SEL ..... Select
SIG ..... Light Pen Signal
SCRT
SLO ..... Select Out
SS
STB ..... Strobe
SQW
SW ..... Light Pen Switch
STP ..... Step
T
TA
TO ..... Track 0
TXD ..... Transmitted Data
TT
U
UA
UA0 Thru UA7
UB0 Thru UB15
UD0 Thru UD7
US0 Thru US3
VA
VSYNC ..... Vertical Sync
W
W1 Thru W4
WA
WAIT ..... Wait
WCLK ..... Write Clock
WD ..... Write Data
WG ..... Write Gate
WINDOW
WR ..... Write
WRT ..... Write
X
Y
Z
ZA
Ø ..... Single Phase Clock
ØCLK ..... Phase Clock
3M
4
10RD ..... Read Data
10WR ..... Write Data Strobe

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



A PHOTOFACT STANDARD NOTATION SCHEMATIC WITH CIRCUITRACE™

SYSTEM BOARD



SYSTEM BOARD

EPSON
MODEL QX-10