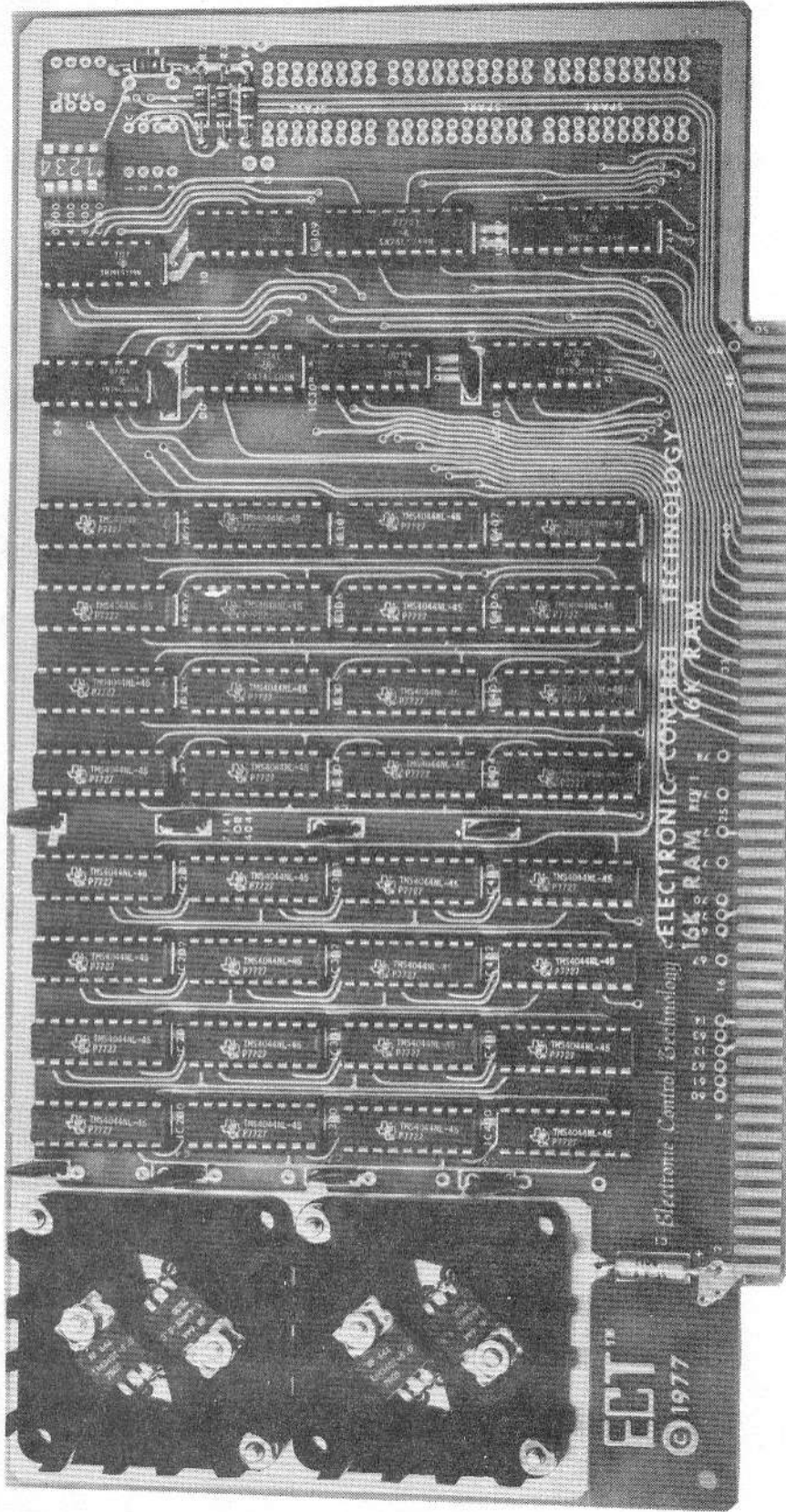


16K RAM 16K FULLY STATIC MEMORY BOARD



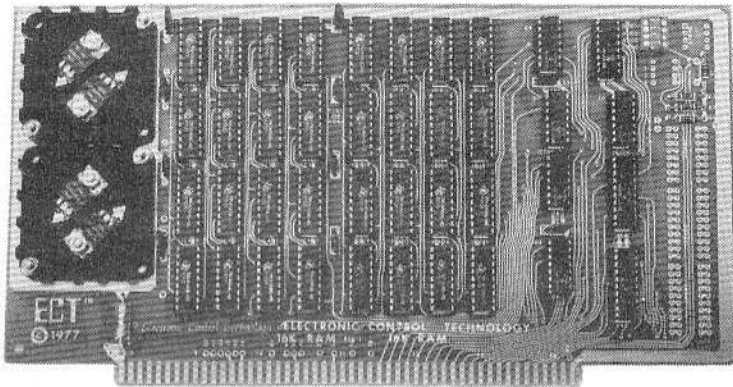
Electronic Control Technology

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16K RAM 16K x 8-BIT FULLY STATIC MEMORY



- * FULLY STATIC
- * FULLY BUFFERED
- * S-100 BUS
- * 16K x 8 BITS

ELECTRONIC CONTROL TECHNOLOGY's 16K RAM memory board is a fully static 16K S-100 bus memory board which utilizes a 4K fully static memory IC like the 2102 except that it has four times the capacity per IC package and less power per bit. Being fully static eliminates the incompatibility with DMA devices or other devices which sometimes occurs with dynamic or clocked static memory. All signals to MOS devices are buffered by low power TTL to prevent damage by static electricity and to minimize capacitive loading on the bus.

No wait states are required for 8080 or Z80 or other CPU operation at 2 MHz (4 MHz optional). A DIP switch is provided for address selection in 16K blocks. Spare IC spaces are provided for user customized circuits, such as memory protect, bank selection, wait states, 16 bit operation or other special features. Battery back-up can be wired in. Low profile IC sockets are provided for all IC's.

SPECIFICATIONS

MEMORY SIZE: 16,384 x 8 bits
MEMORY TYPE: 4,096 x 1-bit static RAM 4044, 7141 or equal
IC ACCESS TIME: 450 nS standard (other speeds optional)
BUS LOADING: 1 low power TTL load per line used.
POWER (TYPICAL): 1.5 A at +8V
SIZE: 5.3" x 10" x 1/16"
PC MATERIAL: G10 or FR4 double sided 2 oz. copper with plated through holes
EDGE CONTACTS: 50 per side on 0.125" spacing, gold over nickel plated
FINISH: Solder mask both sides with silk screened legend
SOCKETS: Low profile sockets for all IC's

Specifications subject to change without notice. 8/77

ELECTRONIC CONTROL TECHNOLOGY 763 Ramsey Ave. Hillside, NJ 07205 (201)686-8080

CAUTION

FAILURE TO OBSERVE THESE IMPORTANT PRECAUTIONS WILL VOID WARRANTY

1. Read all material before beginning assembly.
2. Use only electronic quality 60-40 rosin-core solder.
3. Use only a low-wattage soldering iron - 25 watts.
4. Use extreme care with MOS IC's to prevent static discharge damage.
5. Do not plug or unplug boards while power is applied.
6. Do not plug boards in backwards.
7. Do not install IC's before all voltages are verified.
8. Do not attempt repairs beyond your level of skill. Some repairs can damage the PC board or other components.
9. Do not solder on a board while power is applied.
10. Do not plug or unplug an IC from a socket while power is applied.

16K RAM

PARTS LIST

SEMICONDUCTORS

1	74LS00	1	74LS139
3	74LS04	2	74LS244
1	74LS10	32	4044 or 7141

IC SOCKETS

5	14 pin	32	18 pin
1	16 pin	2	20 pin

CAPACITORS

10	.1 MF	10 V	Disc	1	6.8 MF	35 V	Tantalum
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RESISTORS

4 4.7K 1/4 W

MISCELLANEOUS

1	PC Board	16K RAM	8	4-40 x 1/2 Screws
2	Heat Sinks		8	4-40 Nuts
1	DIP Switch		8	#4 Lockwashers
1	Instruction Manual			Solder

16K RAM Rev 1

Sept. 1977

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16K RAM

ASSEMBLY INSTRUCTIONS

CAUTION

This device uses MOS integrated circuits which can be damaged by static electricity. Avoid unnecessary handling of the MOS IC's. Keep all IC's in their protective containers until instructed to do otherwise (part of test procedure) and wear cotton clothing, rather than synthetics when handling the MOS IC's. Read the instructions entirely before starting assembly.

- () Check all parts against the parts list.
- () Visually inspect the PC board for shorts, especially in the area of lands between IC pads. It is easier to repair, if necessary, before the components are mounted.
- () Orientation. The component side has the fingers of the 100 pin edge connector marked with 1 and 50. The heat sink area will be located in the upper left-hand corner of the board when the 100 pin edge connector is on the lower edge of the board. All DIP IC's will then be oriented with pin #1 in the upper left. (Do not install IC's yet).

NOTE: Assembly will probably be easiest if the board is assembled in order of component height. This allows installation of a group of components of the same height, then turning the board over, soldering all of those components while the weight of the board is holding the components in place, flush against the board.

NOTE: Holes for the discrete components are larger than holes for feed-throughs or IC's.

- () Install the 1/4 W resistors; see the component placement diagram. Push the resistors flush against the board and then bend the leads out slightly. Turn the board over and place on a flat surface so that all of the resistors are held flush against the board while soldering. Trim the leads.
- () Install C 1 the Tantalum capacitor, in a similar manner. Observe polarity.

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- () Install all of the IC sockets. A piece of cardboard will hold the sockets in place while turning the board over. The sockets have an identification notch or chamfer for pin #1. IC's 108, 208, 209, 308 & 408 are 14 pin; IC 109 is 16 pin; IC 309 & 409 are 20 pin; and IC's 100-107, 200-207, 300-307 & 400-407 are 18 pin.
- () Install the DIP switch. Orient it such that the 'ON' position of the switches are on the same side as the address identification. (On an SAE DIP switch the plus sign is at pin 4).
- () Install the disc capacitors C 2-11 .1 MF.
- () Position the heat sinks, flat side to the board, over the foil area on the left side of the board. Orient the heat sinks such that 3 holes are visible in each of the triangular cut-outs of the heat sinks. Using 4-40 screws, nuts and lockwashers fasten the heat sinks at two corners to the PC board, inserting the screws from the back side of the board.
- () Install the four voltage regulators (all 340T-5 / 7805) on the heat sinks. Bend the leads so that they do not contact the heat sink when the regulator is flat against the heat sink and the mounting hole aligns with the hole in the heat sink. Apply heat sink compound. Fasten the regulators to the heat sink by inserting the screws from the back side of the board and using lockwashers and nuts. Solder and trim the leads.

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16K RAM TEST PROCEDURE

- () Inspect the board for solder bridges.
- () The only semiconductors on the board at this time should be the voltage regulators. Plug the board into the computer, turn the power on and measure the power supply voltages at the IC sockets - there are 4 separate +5 Volt supplies. If all 4 supplies are not correct, find out why and correct the problem before proceeding. Turn off the power and remove the board from the computer.

DO NOT PROCEED UNTIL ALL PREVIOUS STEPS HAVE BEEN COMPLETED & ARE CORRECT

- () Refer to the component placement diagram. Install the TTL IC's - IC 108, 109, 208, 209, 308, 309, 408 & 409. Note the proper location of pin 1; the upper left corner.
- () Install only the first 4K of memory IC's - IC 100-107. Pin 1 is in the upper left corner. The pins of the 18 pin IC sockets are tight. If an old TTL IC is inserted and removed from the pins of these sockets, it will make insertion of the memory IC's easier.
- () Address the board to an unused block of memory. Only one address switch should be 'ON' at a time. Plug the board into a computer, turn power on and try changing the information in the 4K block under test. Note that a program (ROM Monitor) which finds its own stack at the top of memory may have a problem finding the top of memory, if the board under test is the top of memory - the 4K blocks without the memory IC's produce unknown outputs because they are floating and could produce the required byte to set the stack (in the wrong location - non-existent memory). Use known good memory above the board under test with this type of program.
- () Change each bit individually Bit 0 through Bit 7 and verify that there is no interaction between IC's.

DO NOT PROCEED UNTIL ALL PREVIOUS STEPS HAVE BEEN COMPLETED & ARE CORRECT

FAILURE TO FOLLOW THIS PROCEDURE WILL VOID THE WARRANTY

MEMORY IC'S ARE EXPENSIVE!

- () Only if the first 4K of memory IC's operate properly then proceed. Turn the computer off and remove the board.
- () Install the rest of the memory IC's. IC 200-207, 300-307 and 400-407. Plug the board into the computer and test each block of memory. Deposit into each IC individually and check for interaction with other bits in the same byte as well as interaction with the other 3 blocks of the same bit at the same location within the 4K block. If there is a problem with an individual IC, return it for a replacement. If a problem cannot be isolated to a memory IC, return the entire kit for repair.

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16K RAM

DISABLE OF UNUSED 4K BLOCKS FOR USE WITH LESS THAN 16K

If all 16K is not to be used - 4K, 8K or 12K can be disabled. Cut the trace on the solder side of the board between pads 'A' & 'B'. Then add the appropriate jumper or jumpers for the 4K block or blocks being used. Always use pad 'E' (it does not have a pull-up resistor on it). Use pads 'C' and/or 'D' to enable additional 4K blocks. Pads 1, 2, 3 & 4 correspond to the 1st, 2nd, 3rd & 4th 4K blocks of memory of the addressed 16K block. To connect the 1st 4K block - jumper pad 1 to pad 'E'. To connect the 1st 8K - jumper pad 1 to pad 'C' and pad 2 to pad 'E'. To connect the 1st 12K - jumper pad 1 to pad 'C', pad 2 to pad 'D' and pad 3 to pad 'E'.

PROTECT

The entire 16K may be protected (write inhibited) by applying a logic '0' (ground) to pad 'G'. A switch can be used from pad 'G' to pad 'H' or a Flip-Flop can be wired in one of the spare spaces for protect/unprotect.

SPARE SPACES

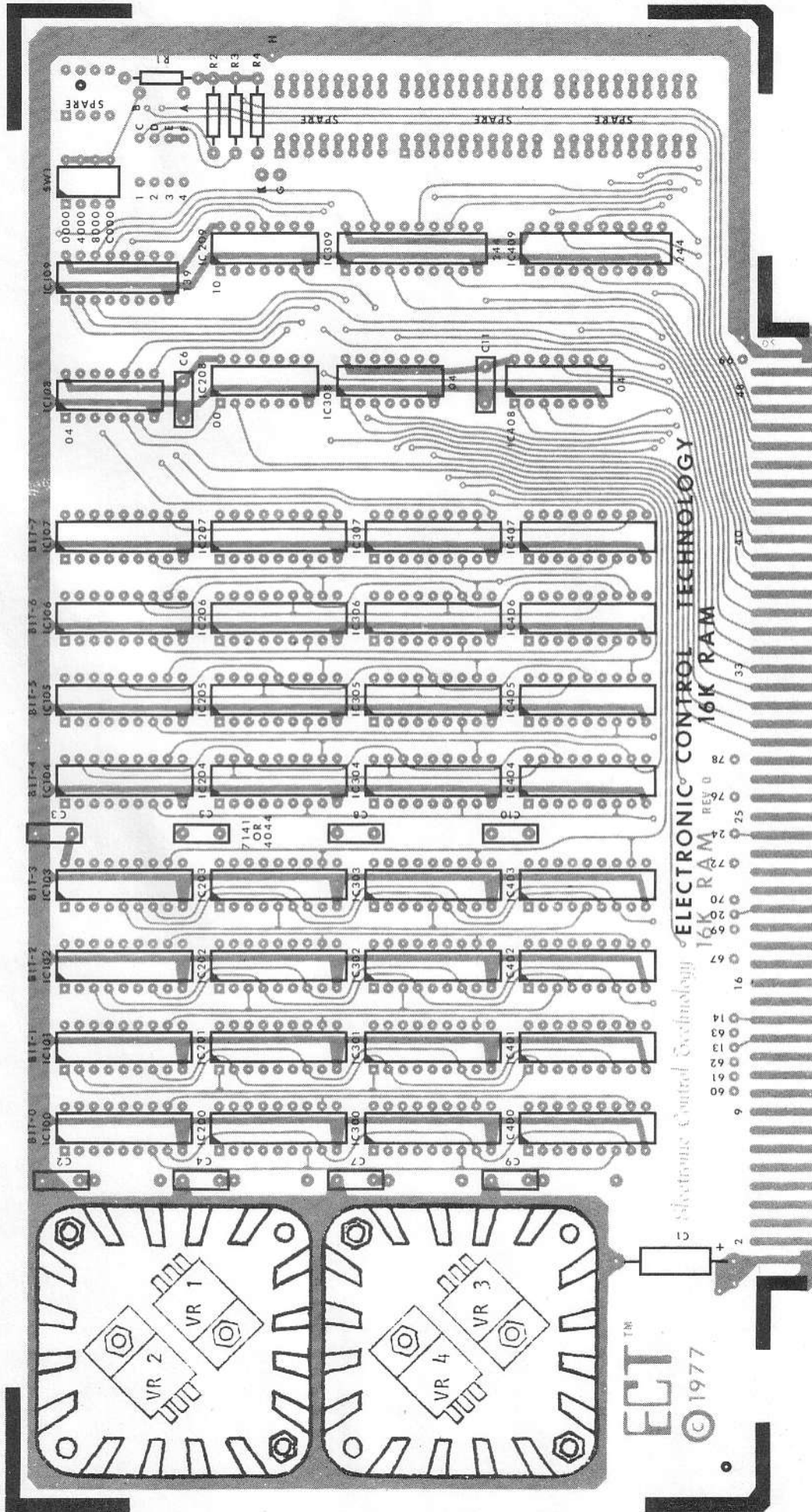
Spare spaces can be used for custom circuits such as protect, bank selection, wait states, 16 bit operation or other special features.

BOARD INHIBIT

Pad 'K' can be used to inhibit the board by applying a logic '0'.

USE WITH THE IMSAI 8080

The IMSAI MPU discharges a capacitor directly on the 'RESET' line which produces spurious signals induced on several other bus lines, which can change data in the location addressed at the time of reset as well as at location zero. To correct this situation modify the MPU board by inserting a 100 Ohm resistor in series with the discharging of the reset capacitor, that is, break the land between the capacitor and finger 75 and install a 100 Ohm resistor in series.



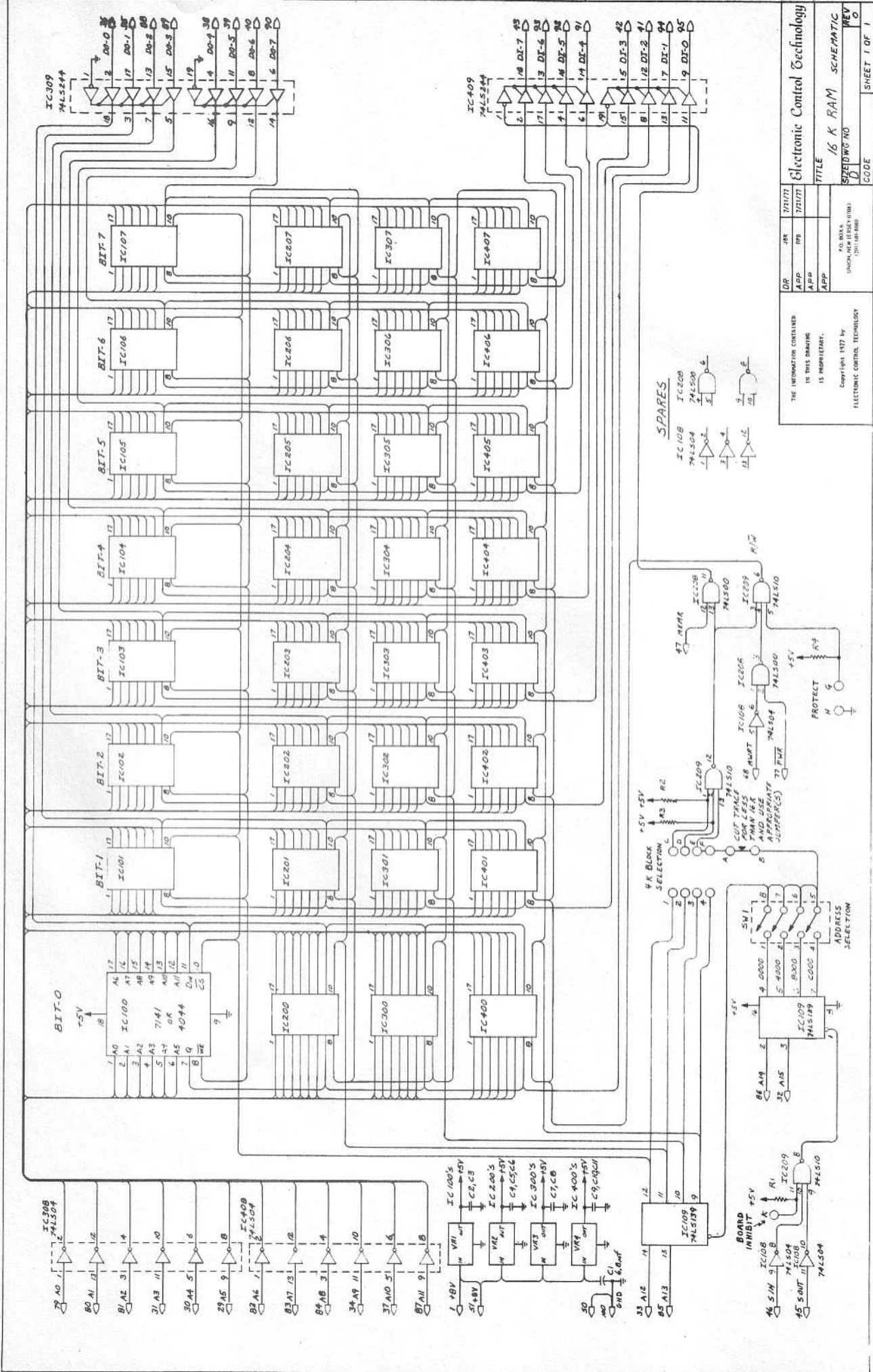
16K RAM

- C 1 6.8 MF 35 V
- C 2-11 .1 MF 10 V
- R 1-4 4.7K 1/4 W
- SI 1 DIP Switch
- VR 1-4 340T-5 / 7805

- IC 100-107, 200-207 4044 or 7141
- IC 300-307 & 400-407 74LS04
- IC 108, 308 & 408 74LS139
- IC 109 74LS00
- IC 208 74LS10
- IC 209 74LS244
- IC 309 & 409

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 ELECTRONIC CONTROL TECHNOLOGY

TITLE 16 K RAM SCHEMATIC
 SIZE/DWG NO. D
 CODE
 SHEET 1 OF 1

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WARRANTY

ELECTRONIC CONTROL TECHNOLOGY, hereinafter referred to as ECT, in an effort to assure its customers that it is providing them with quality products, components and workmanship, hereby warrants its products as follows:

All products both in kit form and assembled units and all components sold by ECT are purchased through factory distribution and any part which fails because of defects in workmanship or material will be replaced at no charge for a period of three (3) months following the date of purchase. The defective part must be returned postpaid to ECT within the warranty period.

Any fully assembled kit, which fails to perform satisfactorily, may be returned to ECT within the warranty period, and if in the judgement of ECT it has been assembled with care and has not been subjected to electrical or mechanical abuse, it will be restored to proper operating condition and returned, regardless of the cause of malfunction, with a minimal charge to cover shipping and handling.

Any unit purchased as a kit and returned to ECT and which in the judgement of ECT is not covered by this warranty will be repaired and returned at a cost commensurate with the work required. In no case will this charge exceed twenty dollars (\$20.00) without prior notification to and approval by the owner.

Any product purchased as an assembled unit is guaranteed against defects in materials and workmanship and is further guaranteed for a period of three (3) months to meet the specifications in effect at the time of manufacture. All warranted factory assembled units returned to ECT postpaid will be repaired and returned without charge.

This warranty is made in lieu of all other warranties expressed or implied and is limited in any case to repair or replacement of the ECT product involved.

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