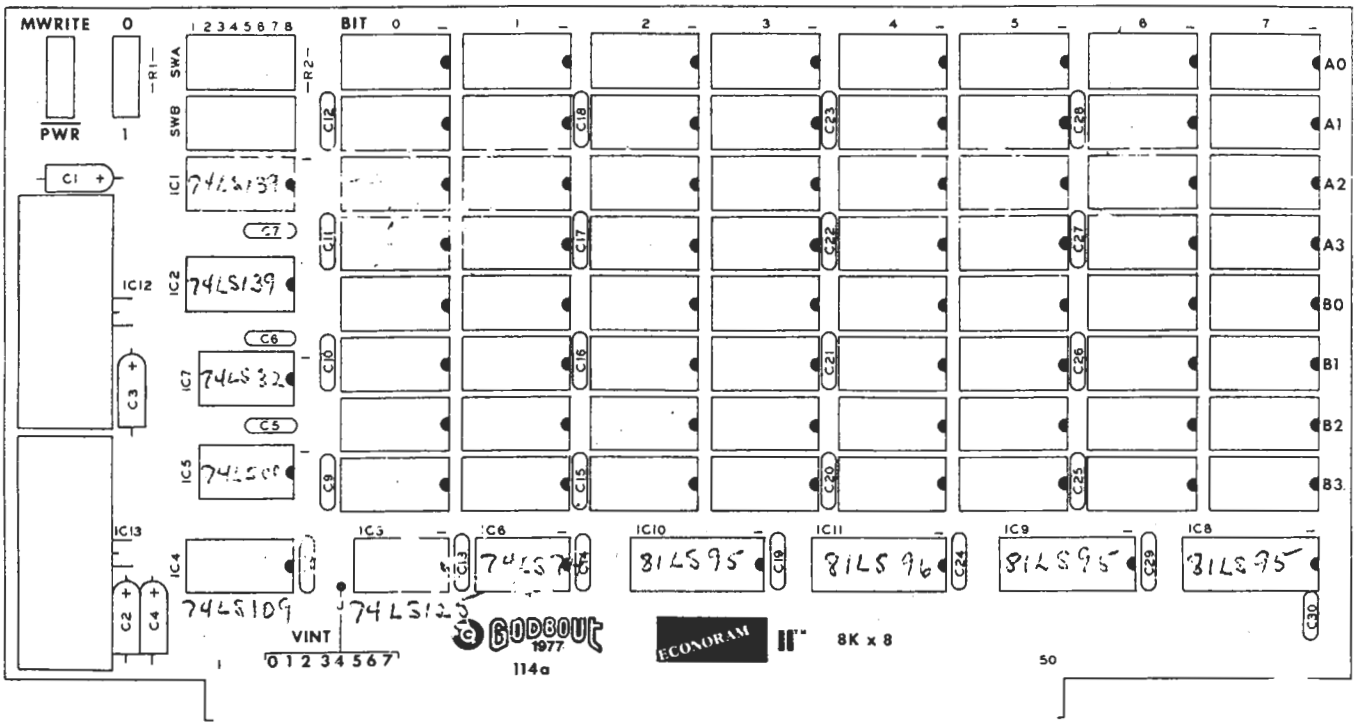
8k/4k ECONORAM II™ DATA SHEET

PROJECT 114A



ORDER OF ASSEMBLY: Read these instructions carefully, take your time, and don't rush. This board accomodates 8K worth of memory; if you have ordered the 4K version, it may be expanded to a full 8K at a later date by adding more parts.

PRELIMINARIES: Check off the parts in your kit against the parts list to familiarize yourself with the various components. Note that the rounded ends of the 39 uF tantalum capacitors are the (+) ends.

SOLDERING: Use a fine tip soldering iron, rated at about 25 Watts. Use only rosin core solder; using any other type of solder invalidates the warranty. Solder every pin of every socket. This board uses a solder mask to reduce the chances of bridges and solder shorts; be sparing with your solder, and heat both the lead and pad while soldering.

(1) Mount resistors R1 and R2; then solder, and remove excess lead lengths.
(2) Mount the sockets for support ICs (IC1-IC11) and solder them. To prevent the sockets from falling out as you turn the board over to solder, put a piece of cardboard over the top of the sockets, and turn the board over while holding the cardboard against the sockets to keep them in place.
(3) Mount and solder the 64 remaining 16 pin sockets. (NOTE: In the 4K version, only 32 sockets will be left. Mount and solder them in rows AØ, A1, A2, and A3, leaving rows BØ, B1, B2, and B3 unpopulated.)
(4) Mount and solder C1 - C4; observe polarity. (NOTE: In the 4K version, omit C2 and C4)
(5) Mount and solder all other capacitors in place. (NOTE: In the 4K version, do not solder capacitors into locations C9, C10, C15, C16, C20, C21, C25, and C26.)
(6) Check for solder shorts before proceeding by attaching an ohmmeter across C3+C4. A reading of 0 ohms indicates a problem---check your work over if this is the case.
(7) Mount the regulators (IC12 & IC13) on to the board by pushing their leads into the designated holes on the board; then bend them over on top of the heat sinks, as shown in figure 1. Although not required, adding some silicone heat sink compound between the regulator and heat sink improves the efficiency of the heat sink. Bolt the regulator/heat sink combinations into place using the hardware provided. (NOTE: In the 4K version, IC13, along with associated hardware/heat sink, is not required.) Finally, solder the regulator leads.
(8). To check the card and regulators, plug this board into your system. Measure the voltages across C3+C4 (NOTE: C4 not included on 4K board) with an ohmmeter. If you obtain readings other than 5V ±5%, recheck your work.
(9) Orient the board with the component side facing you and the edge connector pointing down. Solder the two slide switches into place in the upper left hand corner of the board.
(10) Solder the two DIP switches into place, making sure that the numbers on the DIP switches correspond with the numbers screened on the board. (NOTE: In the 4K version, DIP switch B is not used.)
(11) Carefully check your solder connections for bridges, cold joints, or other potential causes of difficulty. Once satisfied with your work, plug in the various ICs as shown on the component layout diagram. This completes assembly of your unit.

SETTING THE DIP SWITCHES: The ICs contained in rows AØ - A3 form a 4K block of memory, designated "Block A". The ICs contained in rows BØ - B3 form another 4K block of memory, designated "Block B". Either block may be configured anywhere in the 64K range directly addressable by your computer via setting the appropriate DIP switch---switch A corresponds to block A, switch B corresponds to block B. On both switches, the four right hand toggles (5-8) choose one of 4 16K blocks; the left hand toggle switches (1-4) choose a 4K block within the chosen 16K block. Table 1 shows which toggles must be "ON" in order to select the desired block of memory. Note two points of interest: unlike some other memory boards, blocks A & B need not be configured next to each other. Additionally, having all switches in the "OFF" position makes it impossible to either read from or write into the memory. This can be useful if you want to have two blocks of memory occupying the same space, and need to disable one or the other as the need arises.

SETTING THE SLIDE SWITCHES: Orient the board with the component side facing you and the edge connector pointing down. The right hand slide switch should normally be in the UP position (0 wait states). For machines using the Z-80 processor, driven by a 4 MHz clock, 1 wait state is required. In this instance, slide the switch into the DOWN position.

The left hand switch is the write strobe select switch. For most conventional systems employing a front panel, this switch should be in the UP position, which selects MWRITE as the write strobe. If you have a system with no front panel (and therefore no MWRITE signal) the switch should be in the DOWN position, which selects $\overline{\text{PWR}}$ as the write strobe.

VECTOR INTERRUPT OPTION: This board has provisions to provide your system with a vectored interrupt (by strobing one of the vector interrupt lines) when an attempt is made to write into any protected memory. The vector interrupt is generated if $\overline{\text{PS}}$ goes low while the write strobe signal is present. It should be noted that this option is not uniquely associated with the board on which it is implemented, and will also generate the vectored interrupt if $\overline{\text{PS}}$ is produced by any other board in the system during a write attempt.

Your system must be configured so that it can latch this interrupt signal during the write attempt, which requires appropriate hardware and software. Unless your system is specifically designed to accomodate this option, do not attempt implementation; standard S-100 buss systems do not require implementation of this feature for proper functioning.

Vector interrupts Ø - 7 correspond to like numbered holes on the circuit board. To select the desired vector interrupt, simply add a jumper from hole J to the hole associated with the appropriate vector interrupt.

OTHER NOTES: Tri-state outputs are employed so that this memory may also be used with bi-directional busses as well as the S-100 buss. Also, all parts are warranted for 1 year from date of purchase against defects in manufacturing. Should any part be defective, send it back to us for a free replacement. We also maintain a repair service for malfunctioning boards. Describe the problem as accurately and completely as possible, and return the board to us c/o Repairs Department. We strongly recommend insuring the board when you send it back to us.

Your comments and feedback enable us to constantly upgrade both our products and out service; all letters are welcome and all comments carefully read. We hope you enjoy using your ECONORAM II™.

PARTS LIST --- ELECTRONIC ITEMS

R1, R2	2.7K resistor (red/violet/red)
C1, C3	39 uF @ 10V tantalum capacitor
C2, C4*	39 uF @ 10V tantalum capacitor
C5 - C30**	0.05 uF green disc ceramic capacitor
IC1, IC2	74LS139 dual 2-to-4 line decoder/demult
IC3	74LS125 quad tri-state non-inverting buffer
IC4	74LS109 dual JK flip-flop w/ preset & clear
IC5	74LS00 quad 2-input NAND gate
IC6	74LS74 dual D pos-edge-triggered flip-flop
IC7	74LS32 quad 2-input OR gate
IC8-IC10	81LS95 octal tri-state non-inverting buffer
IC11	81LS96 octal tri-state inverting buffer
IC12	LM340/ST (7805) 5V regulator (TO-220 pack)
IC13*	LM340/ST (7805) 5V regulator (TO-220 pack)
IC14-IC45	2102-L1 1K static low power RAM (450 ns)
IC46-IC77*	2102-L1 1K static low power RAM (450 ns)

*not included in 4K board
**C9, 10, 15, 16, 20, 21, 25, 26 not included in 4K board

PARTS LIST --- MECHANICAL ITEMS

(2)	Slide switches, SPDT
(2)*	DIP switches, 8 position
(2)*	Heat sinks, #THN-6070
(1)	PC board, #114A
(4)	Socket, IC 14 pin low profile
(67)**	Socket, IC 16 pin low profile
(4)	Socket, IC 20 pin low profile
(2)*	Screws 6-32 x 5/16
(2)*	Hex nuts 6-32 x 1/4
(2)*	Lockwashers #6

*(1) included in 4K board
**(35) included in 4K board

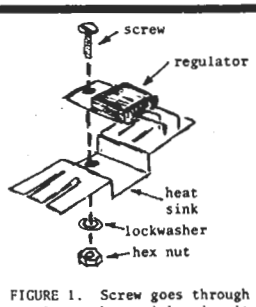


FIGURE 1. Screw goes through regulator, heat sink, circuit board; assembly is secured to board with hex nut and lockwasher.

TABLE #1

1st 4K	1 + 5
2nd 4K	2 + 5
3rd 4K	3 + 5
4th 4K	4 + 5
5th 4K	1 + 6
6th 4K	2 + 6
7th 4K	3 + 6
8th 4K	4 + 6
9th 4K	1 + 7
10th 4K	2 + 7
11th 4K	3 + 7
12th 4K	4 + 7
13th 4K	1 + 8
14th 4K	2 + 8
15th 4K	3 + 8
16th 4K	4 + 8

GODBOUT
BILL GODBOUT ELECTRONICS
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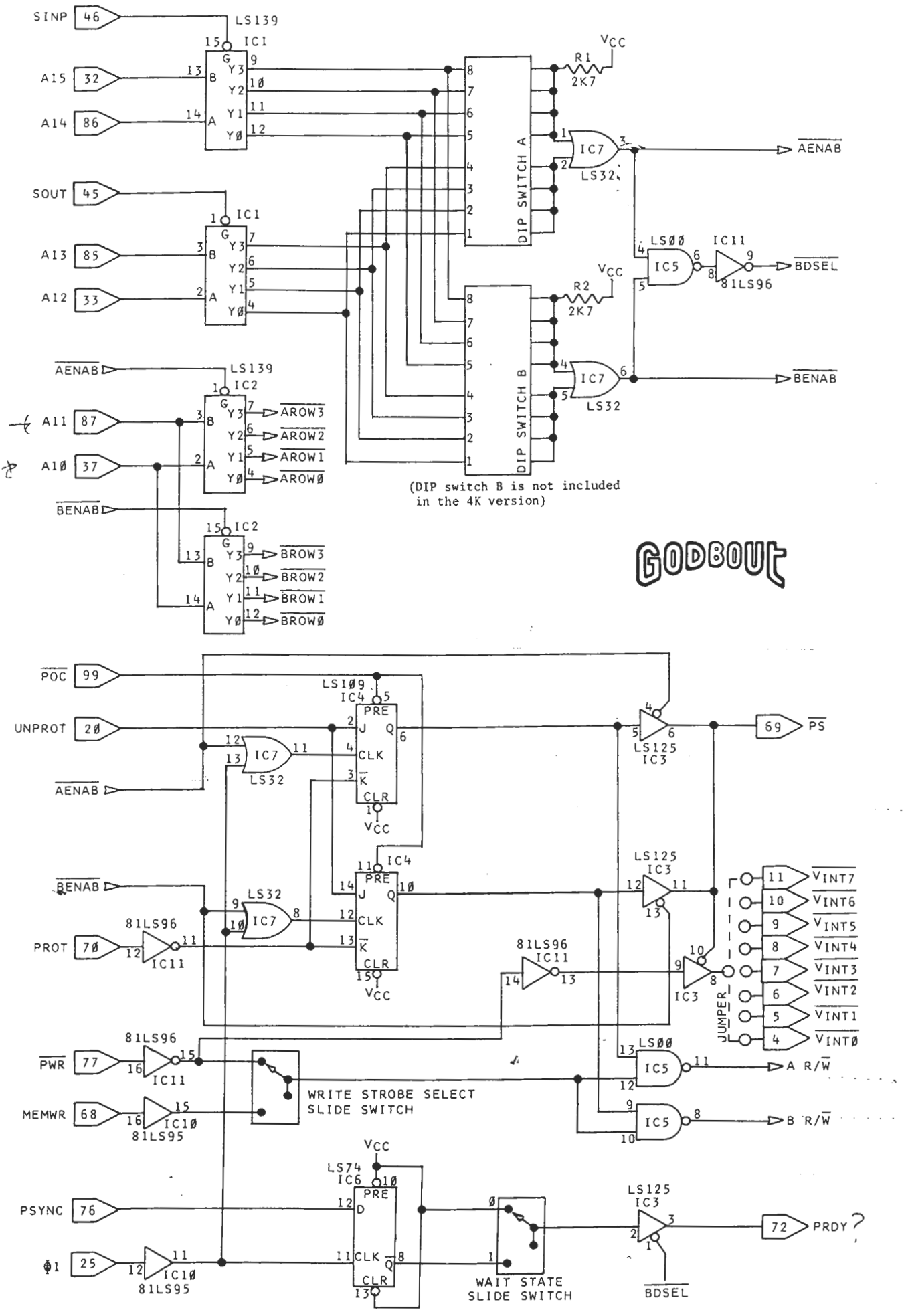
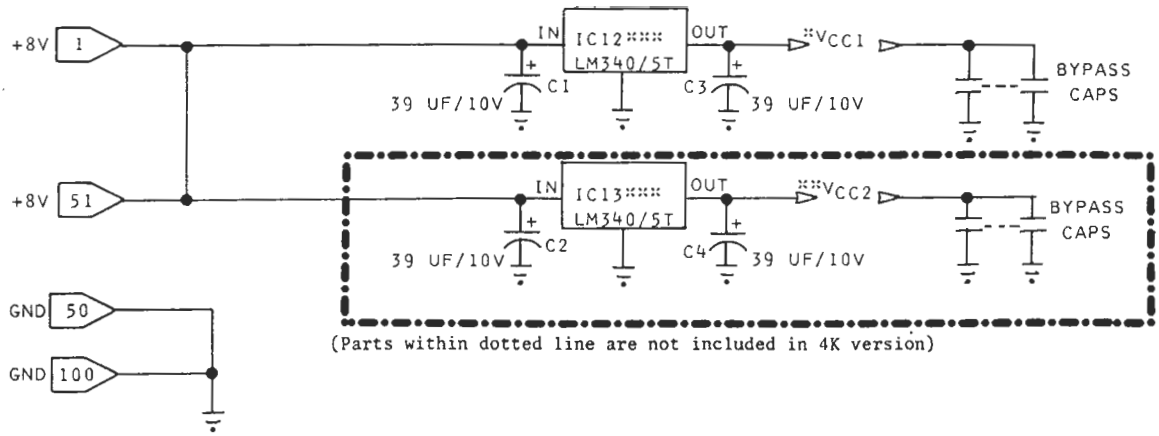

SINP 46
LS139
IC1
A15 32
A14 86
SOUT 45
A13 85
A12 33
R1
2K7
R2
2K7
DIP SWITCH A
DIP SWITCH B
IC7
LS32
AENAB
BENAB
LS00
IC5
IC11
81LS96
BDSEL
(DIP switch B is not included in the 4K version)
A11 87
A10 37
AROW3
AROW2
AROW1
AROW0
BROW3
BROW2
BROW1
BROW0
POC 99
UNPROT 20
LS109
IC4
PRE
CLK
CLR
PS
LS125
IC3
PROT 70
PWR 77
MEMWR 68
WRITE STROBE SELECT SLIDE SWITCH
JUMPER
VINT7
VINT6
VINT5
VINT4
VINT3
VINT2
VINT1
VINT0
A R/W
B R/W
PSYNC 76
Φ1 25
LS74
IC6
WAIT STATE SLIDE SWITCH
PRDY
72

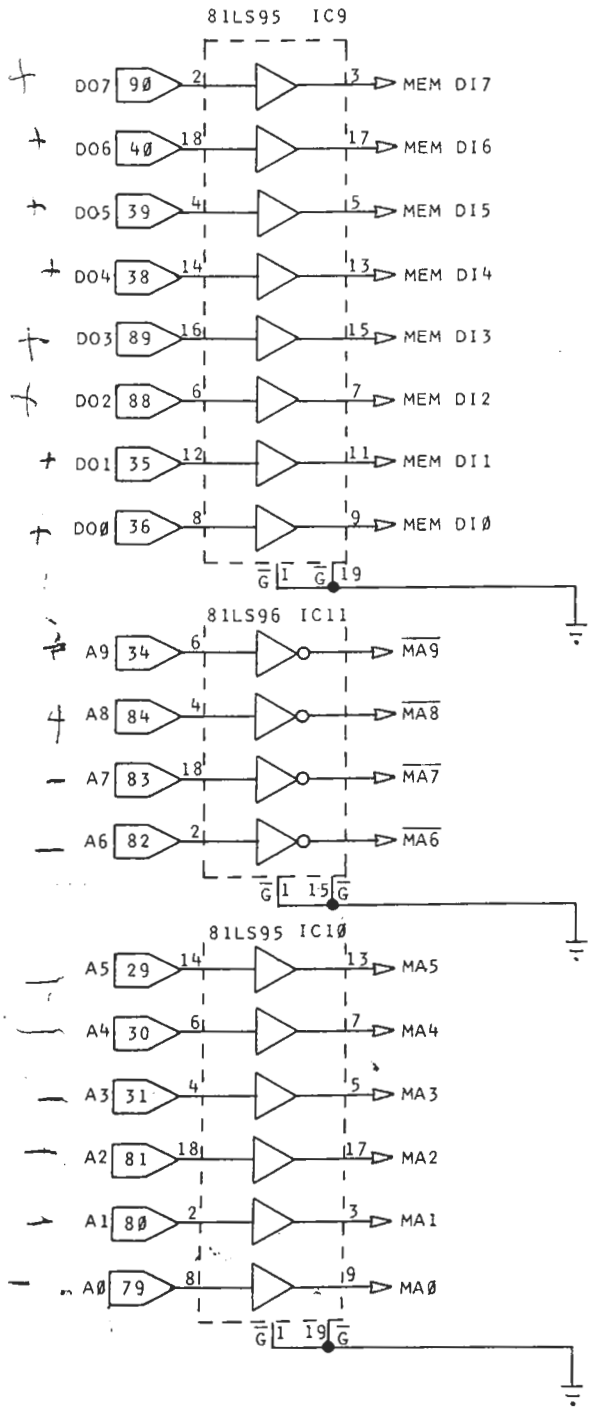


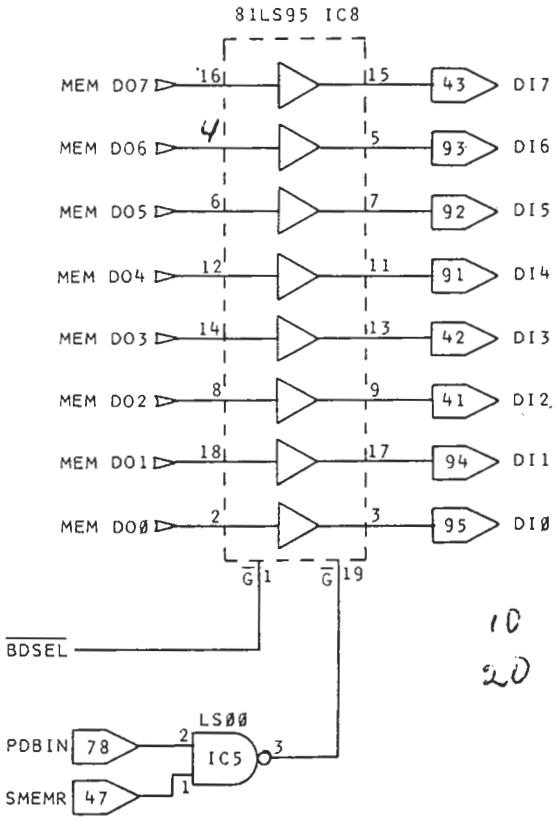
(Parts within dotted line are not included in 4K version)

NOTES: *VCC1 TO ALL SUPPORT CHIPS AND MEMORY BANK 'A'

**VCC2 TO MEMORY BANK 'B'

*** BOTH REGULATORS MOUNT ON HEAT SINKS





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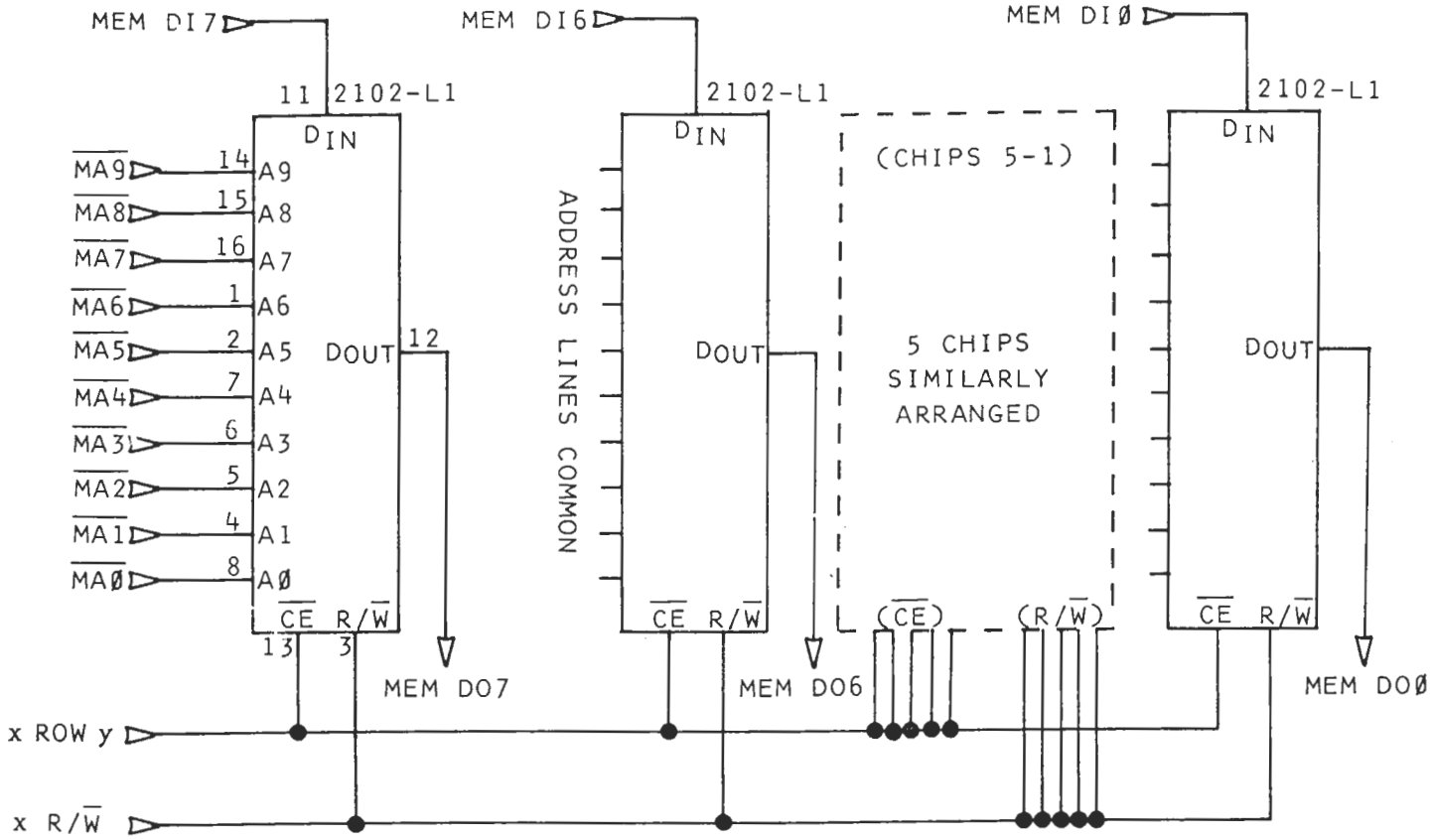
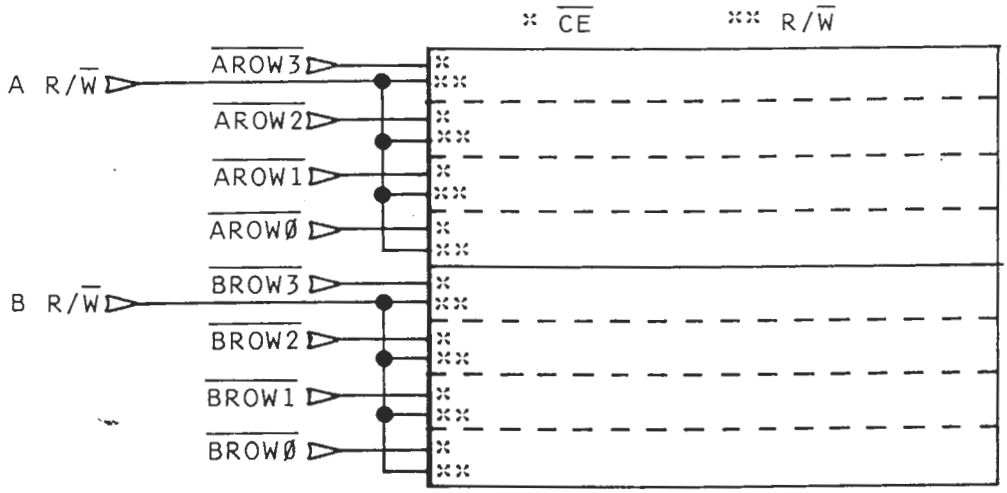
GODBOUT





IC 14-77

EACH ROW CONSISTS OF 8 2102s AS DETAILED ABOVE

GODBOUT

THANK YOU FOR CHOOSING THIS MEMORY BOARD. MUCH TIME AND EFFORT HAVE GONE INTO MAKING THIS UNIT NOT JUST ANOTHER MEMORY BOARD, BUT ONE WITH A FULL RANGE OF OPTIONS...LIKE THE VECTOR INTERRUPT PROVISION, THE TRI-STATE OUTPUTS, ABILITY TO CONFIGURE AS TWO SEPARATE BLOCKS, AND SO ON. STATIC RAMS AND CONSERVATIVE ENGINEERING CONTRIBUTE TO A BOARD THAT WILL NOT JUST WORK, BUT WORK FOR A LONG TIME IN YOUR SYSTEM. IF WE CAN BE OF ANY HELP TO YOU IN APPLYING THIS BOARD, LET US KNOW.