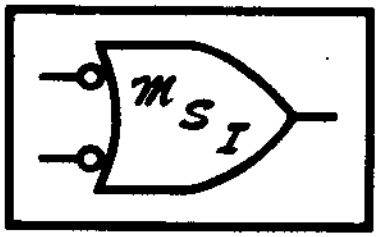


RAM-68

8K RAM BOARD

Midwest Scientific Instruments, Inc.
Olathe, Kansas

PARTS LIST

6800 8K RAM BOARD

MSI Part #	Quantity	Description
		Resistors
030	9 (R1 - R9)	6.8K
		Capacitors
178	1 (C1)	25 mfd @ 25 v.
156	60 (C2 - C61)	.01 mfd
		Semiconductors
102	13 (D1 - D13)	1N4003
125	4 (Q1 - Q4)	7805
419	3 (IC1 - IC3)	8T98
339	2 (IC4 - IC5)	74S138
420	2 (IC6 - IC7)	8T97
201	1 (IC8)	7400
414	64 (IC9 - IC13)	21L02
		Hardware
967	1	Circuit Board
844	1	8 - SPST DIP Switch
1822	4	Heat Sink
716	4	4-40 x 3/8 BHMS
744	4	#4 ITLW
714	4	4-40 Hexnut
1029	5	10 Pin edge socket

INTRODUCTION

The RAM-68 is an 8K Memory Board which is designed to be compatible with the SS-50 bus structure employed by Southwest Technical Products and MSI 6800 computer systems. The board contains 8,192 eight-bit bytes of fully buffered static memory, having an access time of less than 500 ns. The base address of the board is switch selectable and can be set to begin at any desired 8K increment of memory from 0 to 64K. A convenient DIP switch assembly on the board has eight toggle switches. Only one of the toggle switches may be in the "ON" position at a given time. The remaining seven must be turned off. The table below indicates the appropriate switch setting in order to address the desired memory segment.

MEMORY SEGMENT	SWITCH SETTINGS							
	1	2	3	4	5	6	7	8
0000 - 1FFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON
2000 - 3FFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF
4000 - 5FFF	OFF	OFF	OFF	OFF	OFF	ON	OFF	OFF
6000 - 7FFF	OFF	OFF	OFF	OFF	ON	OFF	OFF	OFF
8000 - 9FFF	OFF	OFF	OFF	ON	OFF	OFF	OFF	OFF
A000 - BFFF	OFF	OFF	ON	OFF	OFF	OFF	OFF	OFF
C000 - DFFF	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF
E000 - FFFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF

NOTE: Switch must be mounted as shown in Figure 1 below:

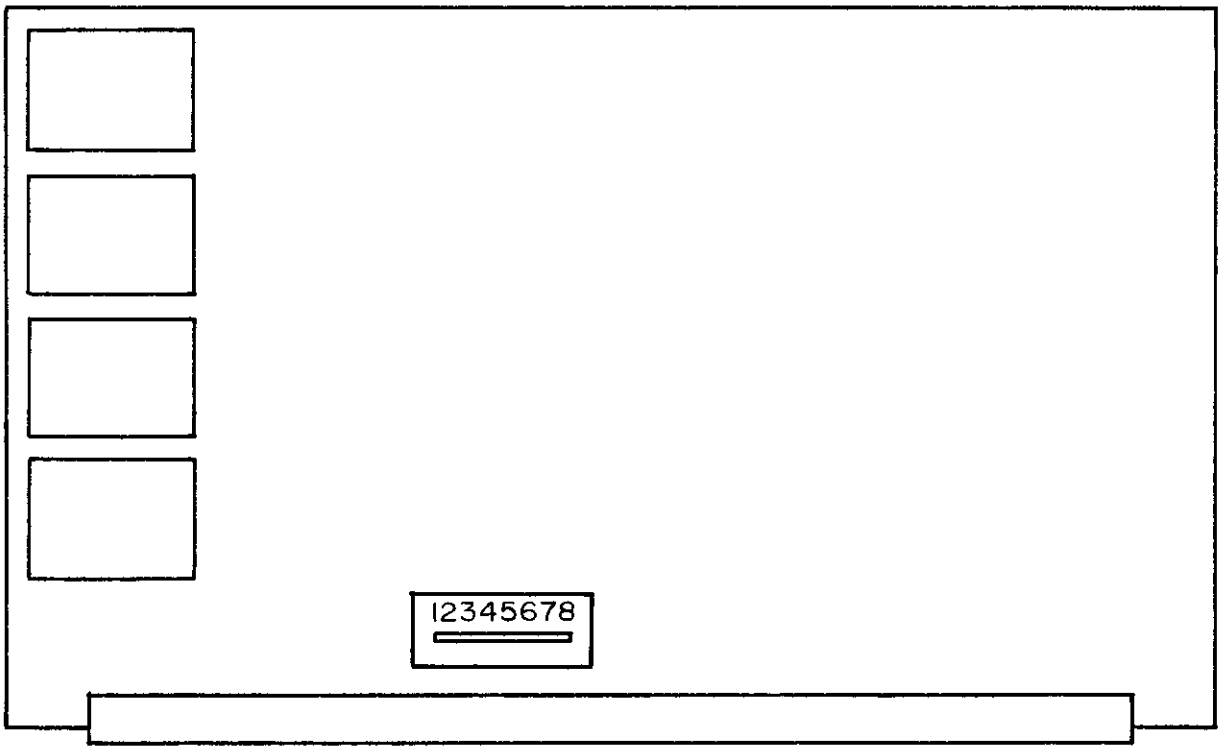


Figure 1

A network of diodes and pull-up resistors is included so that back up Vcc power may be supplied from a battery pack, if desired. This network insures that Vcc remains applied to all memory chips and that the chip select lines are also held in a high state so as to prevent loss of memory during a power failure. Four on-board 7805 regulator chips supply Vcc to the board. The bus must carry an unregulated supply of approximately +8V in order to power the board.

THEORY OF OPERATION

Address lines are brought to the RAM chips through buffer packages IC6 and IC7. These are non-inverting buffers (8T97) which remain permanently enabled at all times. The address lines are active high. Decoder package IC5 (74S138) is used to decode the three highest order address bits along with the valid memory address signal (VMA) and Phase II clock. The output of this decoder is fed to the DIP switch assembly in order to select the desired memory segment. The output of this decoder is, in turn, used to enable IC4 which decodes the lower order address lines in order to select a 1K memory segment on the board. The chip select outputs from decoder IC4 (74S138) are pulled up through a resistor and diode network to the standby Vcc power supply, if used. This network insures that the chip select lines remain high via the battery power supply during power failure.

Data lines are buffered bi-directionally using integrated circuits IC1, IC2, and IC3 (8T98) which are tri-state bus driver packages. Appropriate segments of these packages are enabled depending upon whether a read or write operation is taking place.

The memory chips used in the RAM-68 Board are low-power 2102 static RAMs having an access time of less than 500 ns.

ASSEMBLY

We recommend using a 30 watt soldering iron for all construction. Use only solder with a resin core. Do not use any type of acid based core solders. A 60/40 or 63/37 alloy is recommended.

Care should be taken when soldering semi-conductors and integrated circuits, as overheating of the leads can destroy the device.

All of the necessary hardware and components for assembly is provided. Before beginning construction, check the parts list for any deficiencies.

The use of IC sockets is advisable, especially for mounting the 21L02s. Use a high quality socket such as the Texas Instruments Low Profile.

The PC board is silk screened to show the placement of all major components. The unmarked IC symbols on the board are the locations of the 21L02 memory chips. Refer to the component layout diagram for correct placement and orientation of all parts.

Note that the layout diagram shows more .01 bypass capacitors than shown on the PC board silk screen. These extra bypass capacitors have been included in the kit.

Provisions for the connection of an external back up battery power pack have been made. The point of connection for the battery is located at the upper left-hand corner of the PC board. Refer to the printed sheet for the exact location and polarity markings.

When installing the components on the PC board, be sure to follow the polarity markings of all diodes and electrolytic capacitors. After you have finished construction of the kit, check the board very closely for solder bridges.

NOTE: The DIP switch assembly should be installed in an upright position so that it will correspond with the instructions in the Introduction. See Figure 1.

WARRANTY

All components sold by Midwest Scientific Instruments, Inc. are purchased through normal 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 months following the date of purchase. The defective part must be returned, postage prepaid, to Midwest Scientific Instruments, Inc. within the warranty period along with a description of the defect.

Sockets may be used on the RAM-68 Memory Board, if desired. However, be sure to use only the highest quality IC sockets available, such as the low profile version available from Texas Instruments. The use of poor quality sockets can create more problems than they solve and may void your warranty on the memory board.

If you have trouble getting your RAM-68 to work properly, it may be returned to the factory for service. Any malfunctioning RAM-68 purchased as a kit, and returned to Midwest Scientific Instruments within the warranty period, which in the judgement of MSI has been assembled with care and not subjected to electrical or mechanical abuse, will be restored to proper operating condition and returned with a minimal charge. Any modules which, in the judgement of MSI, are not covered by the above conditions will be repaired and returned at a cost commensurate with the time and materials required to restore the unit to operating condition. In no case will this charge exceed $100 without prior notification and approval of the owner. Units should be shipped prepaid to MSI along with a letter describing the problem in detail. Be certain to adequately insure the unit as MSI accepts no responsibility for either shipping damages or losses.

INTRODUCTION

The 64K STATIC RAM you have just purchased is one of the best RAM bargains on the SS-50 market today. We have gone to great lengths to combine the right mix of features that are most often required on the high density RAM boards for SS-50 systems.

FEATURES:

STATIC! STATIC! STATIC!

FULLY SS-50C COMPATIBLE

USES THE POPULAR 24-PIN "2716" STYLE 2K X 8 RAM DEVICES

ON BOARD EXTENDED ADDRESSING

BOARD ACCESS TIMES UNDER 250 NS. (WITH 200 NS. RAMs)

PC BOARD IS SOLDER MASKED AND SILK SCREENED

ALL DATA AND ADDRESS LINES FULLY BUFFERED

LOW POWER DISSIPATION (<500 MA. TYP.)

TOP 16K MAY BE DISABLED IN 2K BLOCKS TO ELIMINATE CONFLICTS WITH OTHER MEMORY OR I/O THAT MAY RESIDE IN THESE LOCATIONS

RAMs AND 2716 STYLE EPROMS ARE FULLY INTERCHANGEABLE ON ONE BOARD.

2 MHZ OPERATION IS STANDARD

MAY BE PARTIALLY POPULATED AS A 16K BOARD

BOARD IS CONFIGURED AS 3-16K BLOCKS AND 8-2K BLOCKS (WITHIN ANY 64K BANK) FOR MAXIMUM FLEXIBILITY

PARTS LIST:

7	14 PIN SOCKETS
5	16 PIN SOCKETS
2	20 PIN SOCKETS
32	24 PIN SOCKETS
5	MOLEX 10 PIN CONNECTORS #09-52-3101
1	MOLEX INDEXING PIN #15-04-0219
96	JUMPER PINS OR 32 SHORTING BLOCKS AND 32 3 PIN POSTS
2	HEATSINKS (THM 6106-14) WITH HARDWARE
38	.01-.1 MFD 10V OR GREATER DISK BYPASS CAPS
4	1 MFD 16V OR GREATER TANTALUM CAPACITORS
1	220 OHM 1/4 WATT RESISTOR
5	2.2K TO 5.6K 10 PIN SIP RESISTOR PACKS
2	7805 VOLTAGE REGULATORS
32	TMM 2016, HM6116, OR EQV.
1 - U6 -	74LS00
1 - U5 -	74LS04
1 - U3 -	74LS20
1 U7	74LS30
5 U4/9/10/	74LS138
2 13/16/	74LS242 — [illegible] — ?
2	74LS244 (U12/U15)
1 — U1 —	74LS266
2	8 POSITION DIP SWITCH
1	RED LED

GENERAL CONSTRUCTION HINTS

For soldering we recommend a 32 watt soldering pencil. Do not use a soldering gun!!! Use small diameter (such as 22 gauge) rosin core 60/40 alloy solder.

Keep the soldering pencil clean with a wet sponge or cloth.

After such components as resistors or capacitors have been soldered, use a small pair of diagonal cutters to remove the excess lead length.

Observe polarities on all tantalum caps and LEDs.

If you notice any discrepancies between the parts received and those listed, please notify us.

LIMITED WARRANTY

Read the enclosed yellow sheet for a statement of our LIMITED WARRANTY as relates to this kit.

Also note that when this product is purchased as a blank board, all that is covered by the limited warranty is the PC board itself.

ASSEMBLY INSTRUCTIONS

[] Give the pc board a good visual inspection for any obvious shorts or opens. There should be none, but a few minutes spent here could save hours later.

[] Using an ohmmeter, insure that there are no shorts between +8 and ground on the buss.

[] Install and solder the 24 pin sockets for IC locations X1 though X32. Note that all pin #1 on all RAMs is oriented to the top.

[] Install and solder the two 20 pin sockets at locations U12 and U15.

[] Install and solder the five 16 pin sockets at locations U4, U9, U10, U13, and U16.

[] Install and solder the seven 14 pin sockets at locations U1, U3, U5, U6, U7, U18, and U19.

[] If your kit contains the jumper pins install and solder the 96 pins into the 3-hole jumper area near the bypass caps at each memory location.

[] If your kit contains the shorting blocks then install the terminal posts in the jumper areas. It may be necessary to cut the posts into groups of three from a strip, use an old pair of diagonal cutters for this.

[] Install and solder two dip switches at locations S1 and S2.

[] Install and solder the five 10 pin SIP resistors at locations U2, U8, U11, U14, and U17.

[] Install and solder the 5 10 pin MOLEX sockets into the holes at the edge of the board.

[] Install the indexing pin into the Molex socket hole directly below C39.

[] Install and solder the bypass caps in locations C5-C42.

[] Install and solder the 220 ohm resistor at location R1.

[] Install and solder the LED at location DS1. The cathode (denoted by the flat side) goes toward the right side of the board.

[] Using the heatsinks and hardware install and solder the two 7805 regulators.

[] Install and solder the 4 tant. caps in locations C1-C4. Note the polarity as marked on the board.

[] Using any of the regulator mounting tabs as ground, measure the output of each 7805 under power in your system. The output is measured on the right pin of the 7805. The measured voltage should be between 4.75 and 5.25 VDC. Any regulator out of spec must be replaced.

[] Install a 74LS00 in socket location U6. All pin #1 are up.

[] Install a 74LS04 in socket location U5.

[] Install a 74LS20 in socket location U3.

[] Install a 74LS30 in socket location U7.

[] Install a 74LS138 in socket locations U4, U9, U10, U13, and U16.

[] Install a 74LS244 in socket locations U12 and U15.

[] Install a 74LS266 in socket location U1.

[] Remeasure the voltage regulator outputs on the 7805s now to insure proper operation.

SET UP AND USE

[] Determine which locations you need to be RAM and which need to be 2716 EPROMs. Using 24 gauge wire (clipped leads from monolythic caps are usually perfect) or shorting blocks, jumper the center pin at each location to either RAM (right) or ROM (left).

[] You must have properly jumpered all locations that you are using to insure that none of the RAMs or EPROMs are damaged.

[] Install your RAMs and EPROMs at their predetermined locations. Note that X1 is the first memory location and X32 is the last. Block A includes X1-X7, block B includes X8-X15, block C includes X16-X23, and C000H is X24, C800H is X25, etc. Normally a partially populated system is populated starting at location 0000H and continuing until all memory devices are installed.

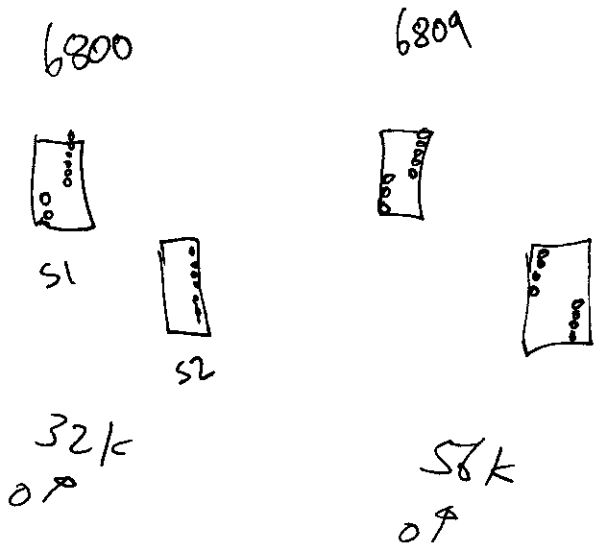
[] Note that the functions for each dip switch are shown next to the switch position.

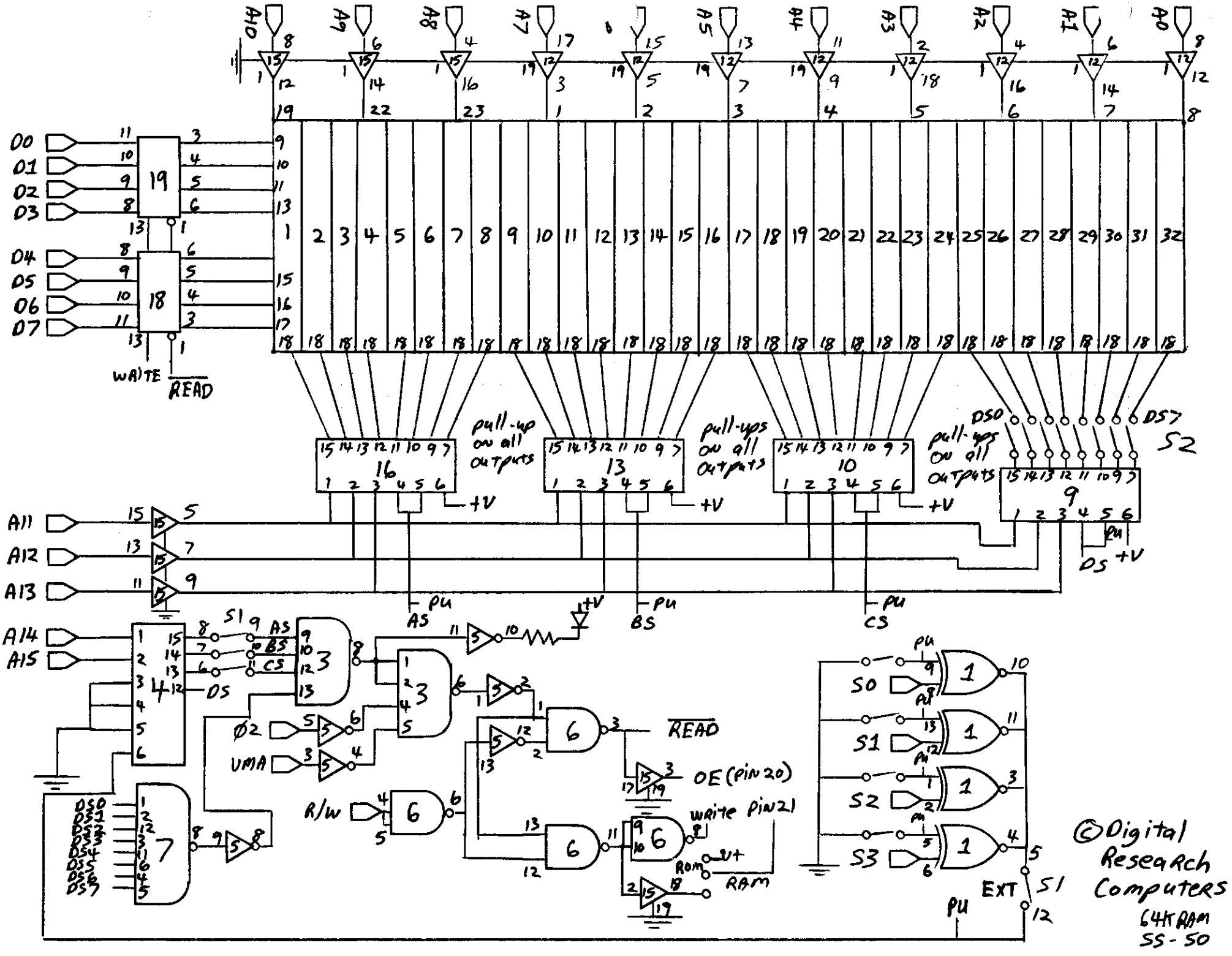
[] S1 is the multifunction switch. Positions 1 through 4 are the extended addressing switches. Position 5 is used to enable the extended addressing (off is disabled). Position 6 through 8 are enables for the lower 48K of ram where A is the first 16K, B is the second 16K, and C is the third 16K (ON is enabled).

[] S2 is used to enable the top 8 memory locations (16K). Each location is labeled with the memory address that corresponds to the switch position.

[] Unless your system supports the S0 through S3 lines (extended addressing) make sure S1 position 5 is open.

[] By using the A, B, and C switches and switch S2 properly you may populate this board in increments of 16K through 48K and in 2K increments to the end of ram. An ON switch is enabled.




A10
A9
A8
A7
A6
A5
A4
A3
A2
A1
A0
D0
D1
D2
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D4
D5
D6
D7
WRITE
READ
pull-up on all outputs
+V
A11
A12
A13
A14
A15
S1
AS
BS
CS
DS
Ø2
VMA
R/W
DS0
DS1
DS2
DS3
DS4
DS5
DS6
DS7
S2
pu
OE (PIN 20)
write pin21
Rom
RAM
S0
S1
S2
S3
EXT
S1
PU
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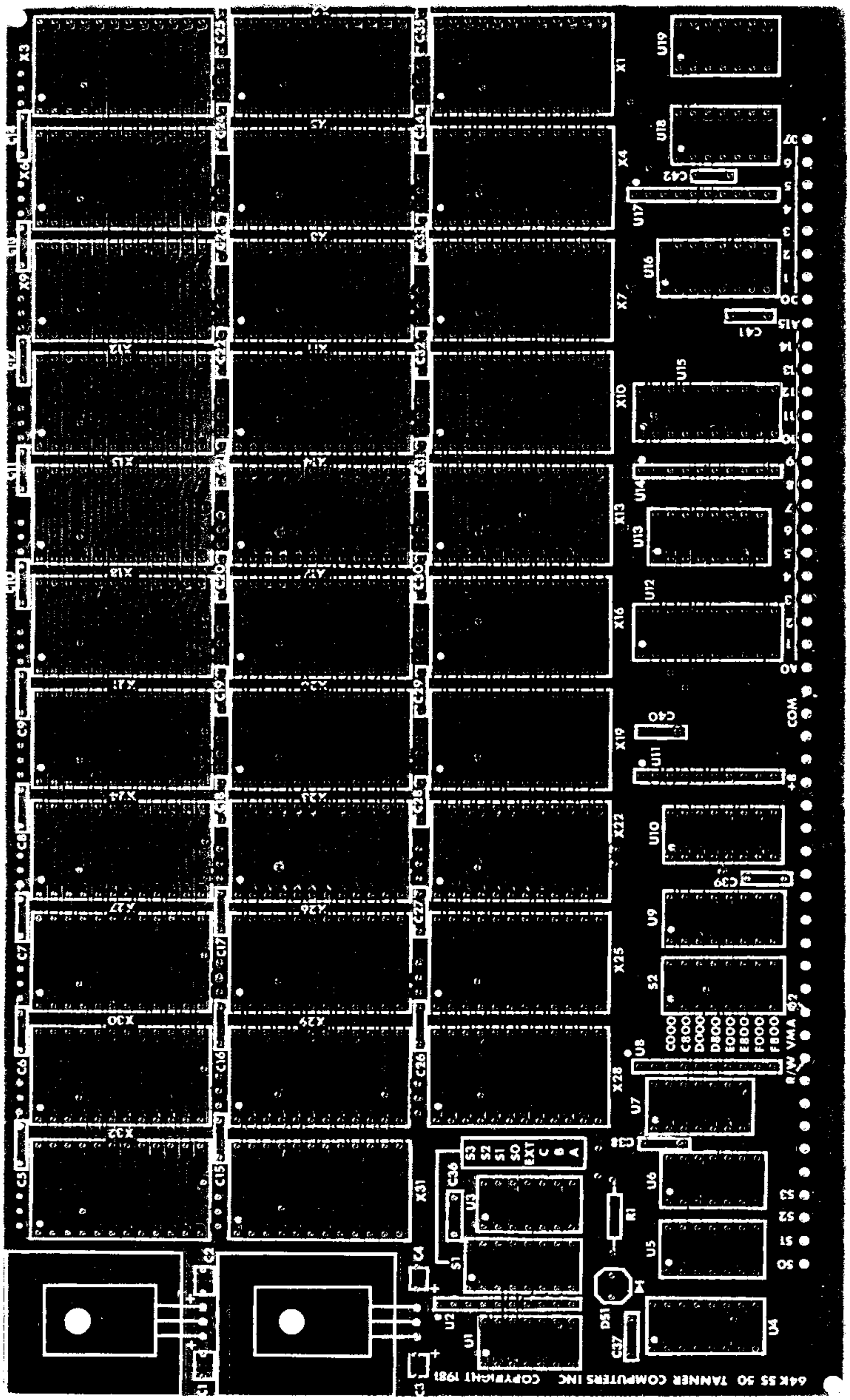
64K RAM
SS-50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