

INTRODUCTION:

The EPROM kit you have just purchased allows you to have up to 16K of software ON-LINE at all times. This eliminates the hassle of loading paper tapes or cassettes every time you turn on your computer.

This board is designed for use in S-100 Buss compatible computer systems. The board provides all necessary buffering (address and data) and decoding required between the S-100 Buss and the 2708 EPROMS.

FEATURES:

S-100 Buss Compatible

Uses popular 2708 (1K x 8) EPROMS

FULLY BUFFERED !!!

Addressable on 16K boundaries.

Any or all of the 2708 EPROMS may be disabled

Selectable WAIT states (0-4)

On board regulators with adequate heatsinking

P.C. Board is solder masked and silked screened

Gold plated contact fingers

ALL supply lines extensively bypassed

Z-80 or 8080 compatible

ALL sockets are included

GENERAL:

Some possible uses of this board include:

Storing high level languages such as BASIC, APL, FORTRAN, etc.

Storing of your System Monitor or Operating System

Storing of System Utility programs (i.e. Memory tests, etc.)

Programming of 2708 EPROMS is available at most full service computer stores. The Cromemco Bytesaver is also a very capable PROM burner, ask around at the next computer club meeting. We do, however, recommend that any PROMS burned on the Bytesaver be programmed TWICE.

ASSEMBLY INSTRUCTIONS:

[] Using an ohmmeter insure that there are no shorts between Buss pins 1 and 50, 1 and 2, 51 and 52, 2 and 50, 52 and 50, and 2 and 52.

[] Install and solder 24 pin sockets in IC locations 1 through 17. Note that there is a notch or indentation on all of the IC sockets. This should be oriented in the same direction as the notch shown on the silk screened component legend.

[] Similarly install and solder the 14 and 16 pin sockets for IC locations 18 through 25.

[] Install and solder resistors R1 through R4 and R7 (2.2K OHM)

[] Install and solder power resistors R5 and R6 (2.2 or 3.3 OHMS).

[] Install and solder capacitors C1 through C52 (.01 mfd disc).

[] Install and solder tantalum capacitors C53 through C58 (10 mfd). Pay careful attention to the polarities marked on both the capacitors and the P.C. board.

[] Install and solder IC26 (7812 voltage regulator). Note that heatsinks are supplied and should be mounted between the regulators and the P.C. board using enclosed hardware.

[] Install and solder IC27 (7905 negative voltage regulator). Notice that the tab on this regulator is NOT at ground potential and should not touch the P.C. board ground plane or the other heatsinks.

[] Install and solder IC28 (7805 voltage regulator) using the same procedure as above.

INITIAL TESTS:

[] Noting that system ground is available at the mounting tabs of IC26 or IC28, measure the output voltage of IC26 (12VDC +/- 5%) and IC28 (5VDC +/- 5%). The regulated output from these regulators is on the lead closest to the top of the P.C. board.

[] Measuring between system ground and the output lead of IC27 (top lead) should give a reading of -5VDC +/- 5%.

[] If the output voltages of IC 26-28 do not fall within the above mentioned ranges then DO NOT proceed with kit assembly. A defective regulator can destroy ANY or ALL IC's on this board. Determine the cause of any out of spec voltages. If it turns out that one of the regulators supplied by DRC is defective, telephone us for a replacement.

[] Install into their respective sockets the following ICs:

IC17-74154	IC18-8T97	IC19-8T97
IC20-8T97	IC21-8T97	IC22-74LS20
IC23-74LS20	IC24-74LS04	IC25-74175

Be sure to check that all of the IC pin #1's are oriented in the proper direction as shown by the notches on the silk screened component layout (or sockets).

[] Install and solder a 14 pin socket in the location marked WAIT.

[] Install and solder an 8 pin socket in the location marked SELECT.

This completes assembly of the 16K EPROM kit.

OPERATION:

Assuming that you have a 2708 EPROM that is already programmed with your software, it is necessary to do the following.

ADDRESS SELECT: The board may reside in one of four locations as determined by the SELECT socket jumpers. Figure 1 shows each of the four possible Jumper configurations which correspond to the four different 16K blocks that are available in your system memory. Determine where you want your EPROMS to reside, and Jumper the SELECT socket for the appropriate 16K block.

WAIT STATES: Figure 2 shows which pins on the 14 pin socket correspond to the various number of WAIT states which may be selected. Note that some of the pins of the socket are not used. 0 to 4 WAIT states may be selected.

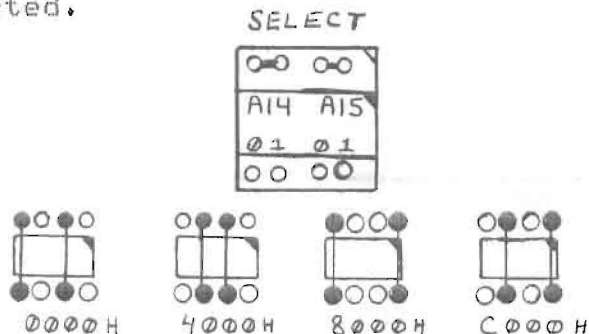


Figure 1

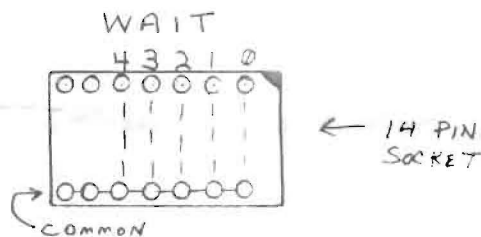


Figure 2

Any EPROMS with access times over 450 ns require WAIT states. One wait state adds a 500 ns delay to allow the EPROM adequate time to output data.

Now that the board has been jumpered for the proper board address and correct number of WAIT states, the 2708 may be inserted into the appropriate socket. IC1 is the first 1K of the selected 16K block and IC 16 is the last 1K. For example, if your EPROM is written to reside at the 1K starting at F000 then the board would have to be jumpered for C000 (i.e the last 16K block) and the EPROM would be inserted into IC13.

DISABLING AN EPROM:

Often it is required that some portion of memory within the 16K block of ROM occupied by the EPROM board be made available for other uses. A good example would concern using the PROCESSOR TECH. VDM-1 board. The VDM has 1K of on board RAM which is normally located at C000. Considering the above example where the EPROM board starts at C000, the VDM RAM would conflict with the 1K at IC4. To prevent this problem the location at IC4 must be disabled. This is accomplished by installing diode D4 with the cathode band to the right. Any EPROM now inserted in the IC4 location cannot be accessed by the CPU. Any number of EPROM locations can be disabled as required by your particular system configuration. IC1 is disabled by D1, IC2 by D2, etc.

THEORY OF OPERATION:

The D.R.C. 16K EPROM card can be divided into three major circuit areas:

POWER SUPPLY- The 2708 requires three voltages: +5VDC, +12VDC, and -5VDC. These are provided by IC's 26 through 28. Note that R5 and R6 drop some of the excess voltage on the unregulated -18 VDC line feeding the -5 VDC regulator (7905). The three regulated voltages are common to all 16 of the 2708's. The combination of tantalum and disc caps provide bypassing for the regulators and all IC's. This assures a noise free environment for the board components.

DECODING- Board select is accomplished by decoding address lines (A14, A15). Two gates of IC24 invert A14 and A15 to allow the four possible combinations of board SELECT. The lower half of IC23 combines these two signals with status memory read (SMEMR), and Board Disable (defined later). This combination is inverted then NANDed with processor data buss in (PDBIN) (i.e. the CPU data IN strobe) which enables the data in (data buss into the CPU) buffers driving buss signals DI0 through DI7. This buffer enable signal (IC24 pin10) is Board Select.

The upper half of IC22 combines A14 and A15 to enable the chip select decoder (74154). The inputs to the 74154 are A10 through A13. Being a four bit binary to one of 16 decoder the outputs select 1 of the 16 2708's.

Diodes D1 through D16 are normally not used but may be installed to disable a particular 2708. If the diode is in the circuit this allows that corresponding chip select output to generate Board Disable (IC24 pin 2) which inhibits the data in buffers when the CPU addresses the disabled EPROM.

Wait states are generated by a quad D flip flop (74175). If a wait state has been jumpered then upon Board Select the ready line (PRDY) goes low (active low) temporarily stopping the CPU. The 74175 counts phase 2 clock pulses until it is cleared by a PSYNC pulse. A PSYNC cannot occur until the wait state condition has been terminated. Depending upon which wait state jumper is installed determines how many

Phase 2 clock pulses are counted before the Q output of the 74175 goes high releasing the ready line allowing the CPU to continue to run.

BUFFERING- Address line A0 through A13 are buffered by continuously enabled buffers IC 20,21, and top half of IC 19. The Data In signals are buffered by IC 18 and the bottom half of IC 19, enabled by Board Select NANDed with PDBIN.

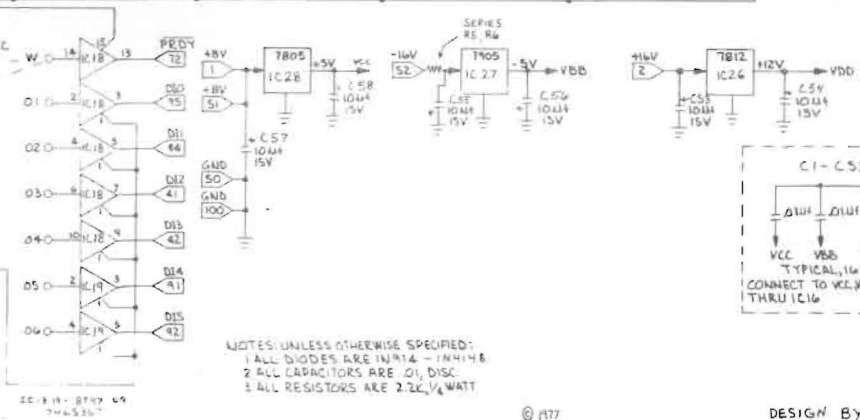
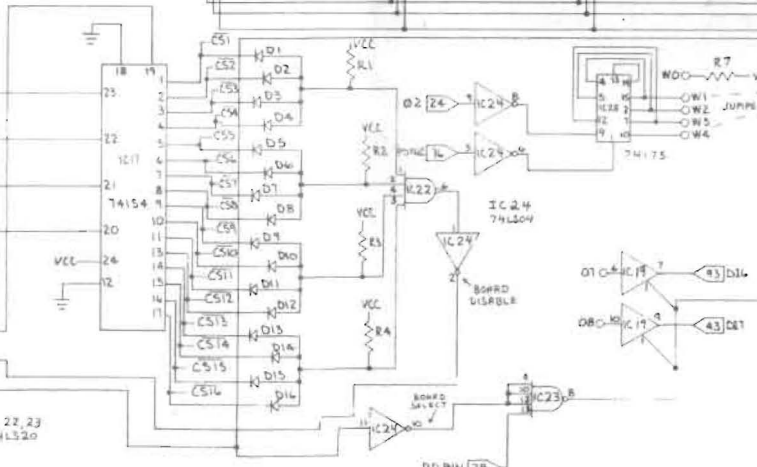
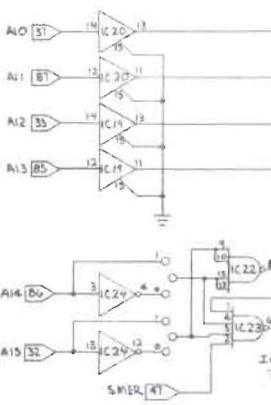
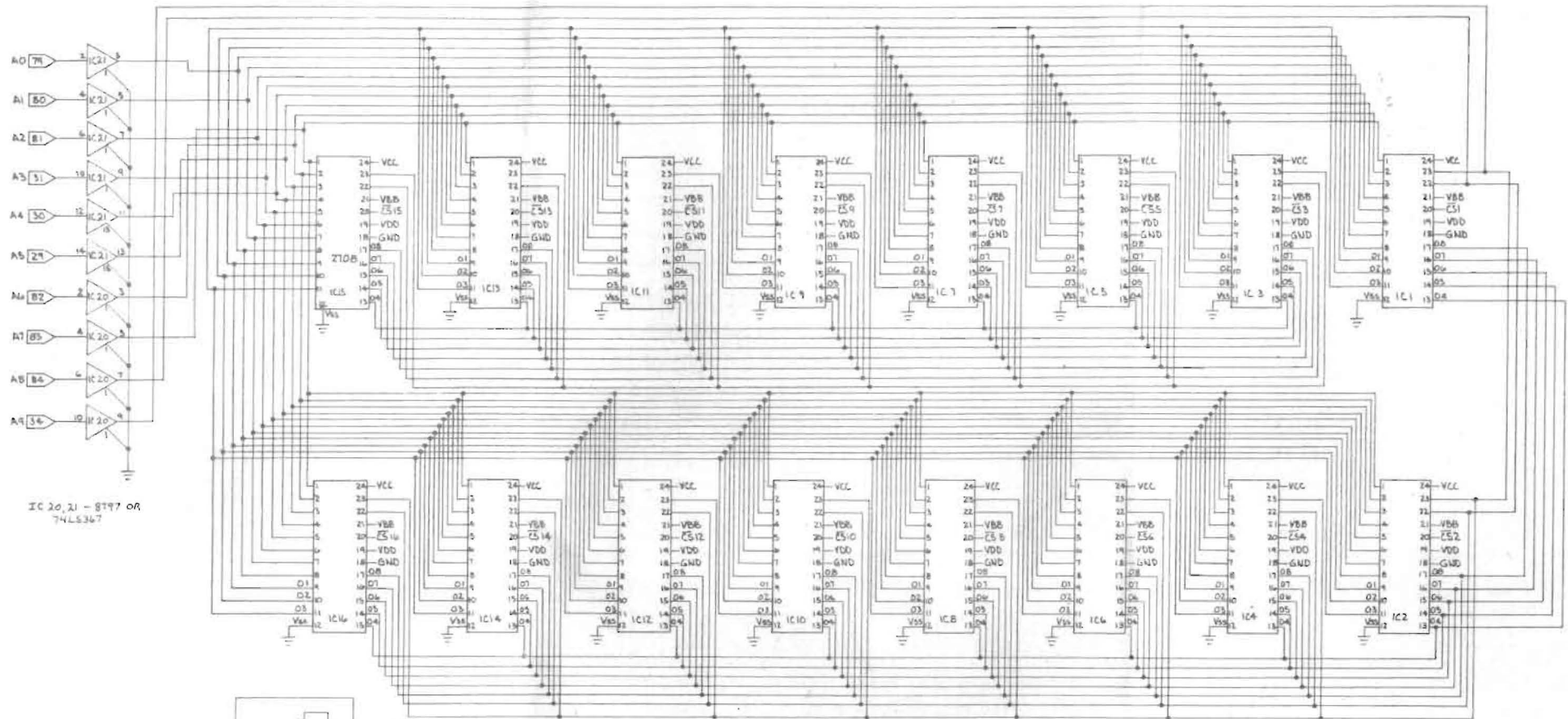
LIMITED WARRANTY

DRC Electronics warrants all components in this kit to be free from defects in material or workmanship for a period of 90 days. The defective part must be returned to DRC and will be replaced at no charge. Any board purchased as a kit which malfunctions during the warranty period which has not been subject to abuse and that has been assembled with reasonable care will be repaired or replaced at no charge.

Any unassembled kit purchased from DRC may be returned within 14 days of receipt for a full "no questions asked" refund. The above 90 day warranty also applies to assembled kits sold by DRC.

Any board which is not covered by the above warranty will be repaired at a cost commensurate with the work required. This charge will not exceed \$20 without prior approval.

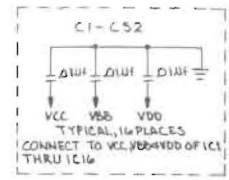
This warranty is made in lieu of any other warranty either expressed or implied, and is limited in all cases to the repair or replacement to the kit involved.



NOTES: UNLESS OTHERWISE SPECIFIED:
 1 ALL DIODES ARE 1N914 - 1N4148
 2 ALL CAPACITORS ARE 01 DISC
 3 ALL RESISTORS ARE 2.2K 1/4 WATT

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 D.R.C.

DESIGN BY
 E.W.
 G.C.



DRC 16K EPROM KIT-PARTS LIST

17	24 PIN LOW PROFILE SOCKETS
5	16 PIN " " "
4	14 PIN " " "
1	8 PIN " " "
3	HEATSINKS (W/HDWR) FOR REGULATORS
52	.01 MFD. DISC CAPS
6	10 MFD. TANTALUM CAPS.
5	2.2K OHM RESISTORS
2	2.2 OR 3.3 OHM DROPPING RESISTORS
16	1N4148 SWITCHING DIODES
1	7805 5VDC REGULATOR
1	7812 12VDC REGULATOR
1	7905 -5VDC NEG. REGULATOR
1	74175 TTL HEX D F.F.
1	74LS04 TTL HEX INVERTER
2	74LS20 TTL DUAL 4 INP. NAND
4	8T97 OR 74LS367 TRI-STATE BUFFERS
1	74154 TTL 1 OF 16 DECODER
1	PRINTED CIRCUIT BOARD