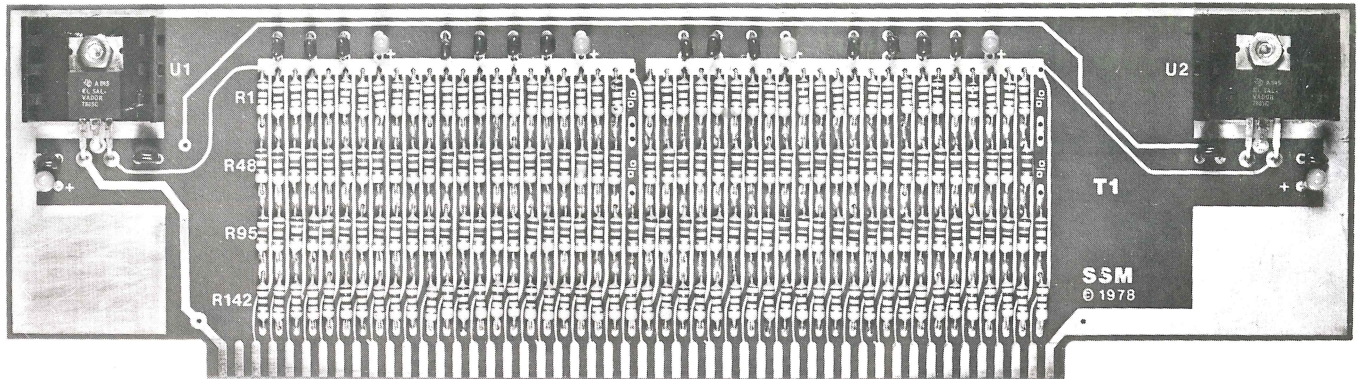




Microcomputer Products, 2116 Walsh Avenue, Santa Clara, CA 95050, (408) 246-2707

T-1 TERMINATOR BOARD



Features:

- Terminates the end of the S100 bus to reduce cross-coupled noise and signal reflections.
- Active load of +2.75 volts with an impedance of approx. 275 ohms.
- No adjustments needed.
- Solder masked PC board with gold plated edge connector contacts.
- Board dimensions 10 x 2.5 inches.

CONTENTS

- 1.0 Assembly Instructions
- 2.0 Functional Check
- 3.0 Theory of Operation
- 4.0 Warranty
- 5.0 Assembly Drawing
- 6.0 Parts List

TI - TERMINATOR BOARD

1.0 ASSEMBLY INSTRUCTIONS (refer to Assembly Dwg.)

- Check kit contents against parts list.
- Check PC board for possible warpage and straighten, if required. To straighten the board, bend with the hands (not a vise) against the warp. Sight down the edge of the board after bending to check if the warp was removed, if not then try bending again.
- Insert and solder 92-510 ohm resistors in the rows marked "R1" and "R142", and 92-620 ohm resistors in the rows marked "R48" and "R95". Do not place a resistor at the position marked "%".
- NOTE: Keep soldering iron tip clean to prevent rosin and sludge from being deposited on traces. Wipe tip frequently on a damp cloth or damp sponge. Too much heat can cause separation of pad and trace from the board. A 600 degree tip is recommended.
- Observing polarity (small + sign on part), insert and solder 6 Tantalum Droplet capacitors (4.7mF). One capacitor is on the far left, one is on the far right and four are across the top, but all are marked on the board with a plus sign.
- Insert and solder 18-0.1mF ceramic capacitors.
- Place regulator on the board so the mounting hole in the regulator is in-line with the hole in the board. Mark leads for proper bending to match the board's holes. Allow for a bend radius.
- Bend regulator's leads to match holes in board.
- If available, apply thermal compound to the back side of each regulator case (the side that will contact the heatsink). Use just a little thermal compound, since too much is worse than none at all.
- Next, position heatsinks and insert regulators. Finally, position nut and lockwasher on top of regulator and secure from behind with screw through mounting hole. Be sure regulator and heatsink fits flat on the board, then solder all regulator leads.

2.0 FUNCTIONAL CHECK

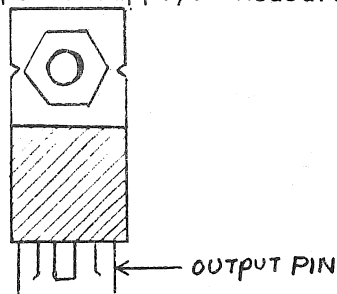
WARNING! DO NOT INSTALL OR REMOVE BOARD WITH POWER ON. DAMAGE TO THIS AND OTHER BOARDS COULD OCCUR.

2.1 IF an ohmmeter is available, measure the resistance between the following pins:

<u>Negative Probe</u>		<u>Positive Probe</u>	<u>Resistance</u>
Bus pin 50	to	Bus pin 1	greater than 20
Bus pin 50	to	Bus pin 2	greater than 1 meg.
Bus pin 50	to	Bus pin 52	greater than 1 meg.

If your reading is below these values, check for electrical shorts on your card.

2.2 Apply power (+8v to +10v) to the board by plugging into the computer or by connection to a suitable power supply. Measure the output of the +5v regulators (U1 & U2).



The voltage should be between +4.8v and +5.2v. If the regulator doesn't meet this test, then check the board for shorts or errors.

CAUTION: WHILE IT HAS NEVER HAPPENED TO US, SHORTED REGULATORS HAVE BEEN KNOWN TO EXPLODE WITH POSSIBLE INJURY TO EYES OR HANDS. BETTER SAFE THAN SORRY --- KEEP FACE AND HANDS CLEAR OF THE REGULATOR SIDE OF THE BOARD DURING THIS TEST.

2.3 With a voltmeter, check the voltages at 45 points on the row of resistor junctions between R1 and R48. The voltage should be $2.75v \pm 0.25v$. Also check the voltages at 47 points on the row of resistor junctions between R95 and R142 for the same voltage. (Note: If the terminator card is plugged into the computer's bus for this voltage test, very few of the junctions will read 2.75v since they will be driven by the front panel or other S-100 boards.)

If the voltage is wrong, inspect the area on the board in error and check the resistors for errors.

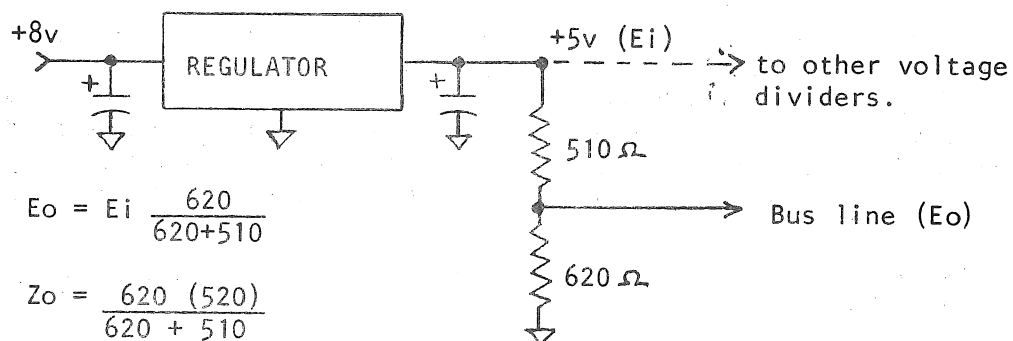
3.0 THEORY OF OPERATION

The S100 bus can suffer from cross-coupled noise or high-frequency ringing on each of its signal lines due to the high-switching speeds of the TTL driving these lines. The noise or ringing can prematurely make some status signals become valid to a S100 board, and cause the board's operation to malfunction in the mainframe. As the processor's speed increases (2MHZ to 4MHZ) the noise and timing problems will increase, if the bus is NOT terminated.

The TI was designed to provide three factors in improving the S100 bus:

- 1) Reduce cross-couple noise.
The TI increases the load on each line, so that capacitive element between each line can not couple as much energy across during a signal transition. The capacitance between each line varies by the type of mother-board, and the number and type of S100 boards installed.
- 2) Reduced ringing.
The complex impedance of the boards and the bus can ring (damped oscillation), overshoot or undershoot standard logic levels when driven by a bus driver. The TI provides a load in parallel with the complex impedance to damp out these effects.
- 3) Provide a TTL level.
Floating bus lines eliminated. Each signal line is pulled up to 2.75 volts, if not driven by a master or slave S100 board in the computer. This provides a know logic state to all undriven pins to reduce the random activation of a card when not wanted.

The basic circuit is as follows:



The effective output voltage to each bus line is >2.7 volts. The impedance of this termination is about 275 ohms.

For best results the terminator board (T1) should be placed in the last S100 connector position of the mother board, furthest away from the CPU board.

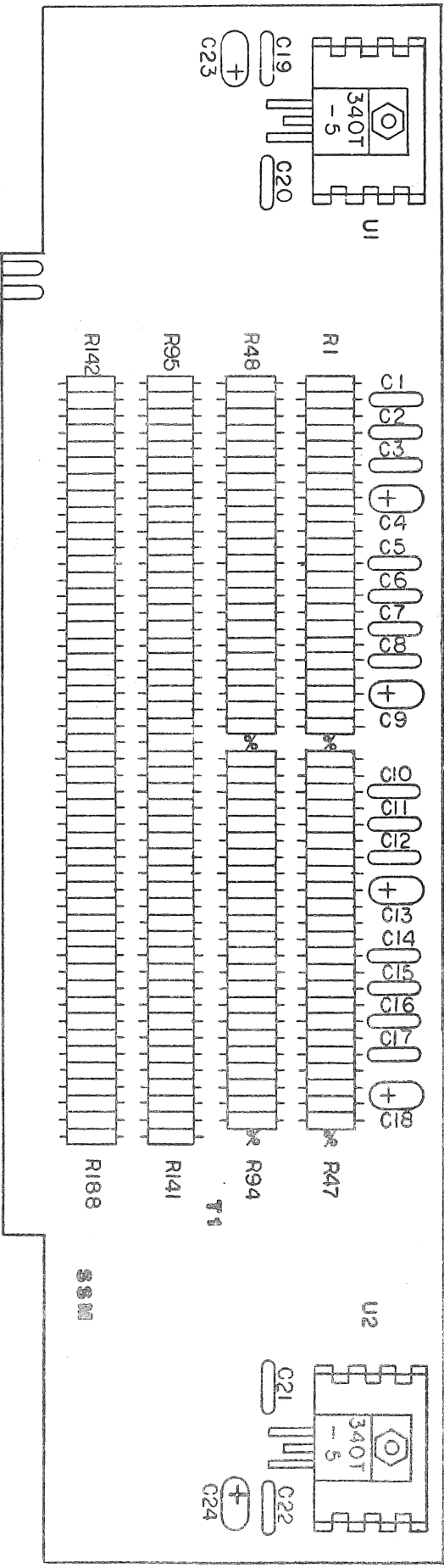
4.0 Warranty

SSM warrants its products to be free from defects in materials and/or workmanship for a period of 90 days for kits and bare boards, and one (1) year for factory assembled boards. In the event of malfunction or other indication of failure attributable directly to faulty workmanship and/or material, then, upon return of the product (postage paid) to SSM at 2116 Walsh Ave., Santa Clara, California, 95050 "Attention Warranty Claims Department", SSM will, at its option, repair or replace the defective part or parts to restore said product to proper operating condition. All such repairs and/or replacements shall be rendered by SSM without charge for parts or labor when the product is returned within the specified period of the date of purchase. This warranty applies only to the original purchaser.

This warranty will not cover the failure of SSM products which at the discretion of SSM, shall have resulted from accident, abuse, negligence, alteration, or misapplication of the product. While every effort has been made to provide clear and accurate technical information on the application of SSM products, SSM assumes no liability in any events which may arise from the use of said technical information.

This warranty is in lieu of all other warranties, expressed or implied, including warranties of mercantability and fitness for use. In no event will SSM be liable for incidental and consequential damages arising from or in any way connected with the use of its products.

REVISIONS		DATE	APPROVED
LTR	DESCRIPTION		



%-DO NOT INSTALL RESISTORS IN THESE POSITIONS

FORWARDED UNITED STATES AIR FORCE ELECTRONIC CENTER WRIGHT-PATTERSON AFB, OHIO		SSM 1979	
APPROVALS DATE	DATE	T1 - TERMINATOR	
SCALE 2:1	SHEET C	DRAWING NO. 1 OF 1	DO NOT SCALE DRAWING

TI PARTS LIST

Resistor Pack #1

94 - R1-47, R142-188

510 ohm, $\frac{1}{4}$ w (green, brown, brown)

Resistor Pack #2

94 - R48-141

620 ohm, $\frac{1}{4}$ w (blue, red, brown)

Capacitor Pack

18 - C1,2,3,5,6,7,8,10,11,
C12,14,15,16,17,19,20,
C21,22

0.1uf Capacitor

6 - C4,9,13,18,23,24

4.7uf Dipped Tan. Cap.

Regulator Pack

2 - U1,2

7805/340T-5

2

Heatsinks

2

Sets #6 Hardware

Misc.

1

Manual

1 - TI

PC Board