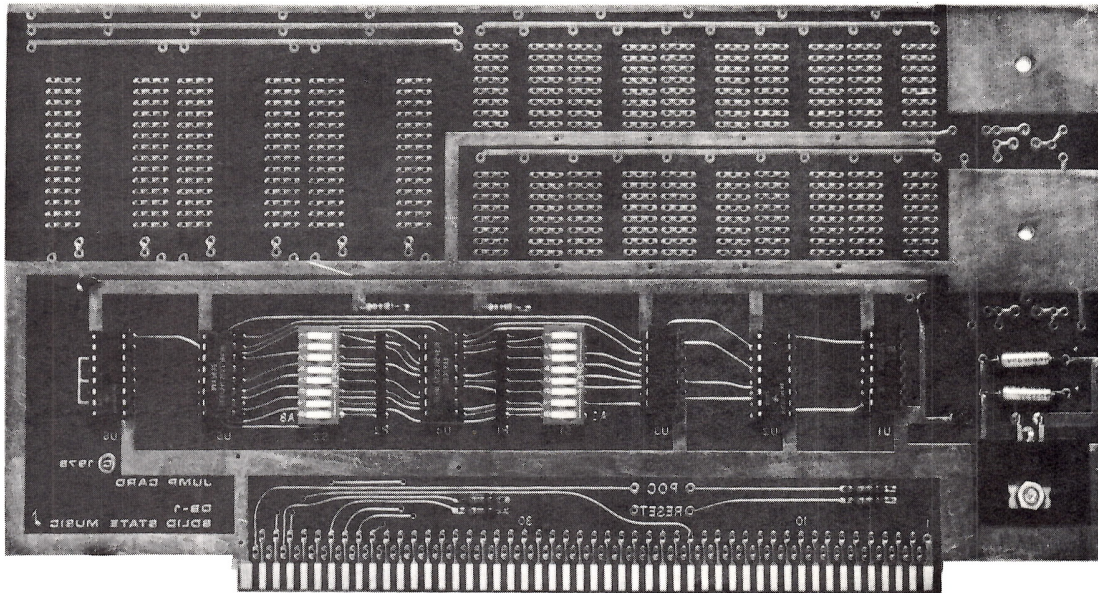




## OB1 VECTOR JUMP & PROTOTYPING BOARD



### FEATURES:

#### SYSTEM COMPATIBILITY

- . S-100 bus computer systems.

#### VECTOR JUMP

- . DIP switch selection of vector jump address in 1 byte increments; Range -- 64 bytes.
- . Can be set to jump on power-on and/or reset.
- . Will work with systems equipped or not equipped with Phantom Disable.

#### PROTOTYPING AREA

- . Ten 16 pin patterns.
- . Three 24 or 28 pin patterns.
- . Two spare regulator patterns.

#### OTHER FEATURES

- . High grade glass epoxy PC board with gold plated edge connector contacts.
- . Low profile sockets provided for all ICs.
- . Power requirements -- +8V @ 150mA typical.

# Solid State Music

2116 Walsh Avenue  
SANTA CLARA, CALIFORNIA 95050  
(408) 246-2707

## OB-1 - Jump Board

### 1.0 ASSEMBLY INSTRUCTIONS (refer to Figure 1)

Check kit contents against parts list.

Check PC board for possible warpage and straighten if required.

Insert 4 16-pin sockets into the component side for the board with the "pin 1" index toward the top of the board. (The component side is the side on which "Solid State Music" is printed.)

Insert 2 14-pin sockets. DON'T SOLDER!

Place a flat piece of stiff cardboard of appropriate size on top of the sockets to hold them in place.

Holding the cardboard in place against the sockets, turn the board over and lay it on a flat surface. (Be sure that all of the sockets pins are through the holes.)

Note: Keep soldering iron tip clean to prevent rosin and sludge from being deposited on traces... Wipe tip frequently on a damp cloth or steel wool.

On each socket, solder two of the corner pins, choosing two that are diagonally opposite of each other.

Once the sockets are secured, lift the board and check to see if they are flat against the board. If not, seat the sockets by pressing on top while reheating each soldered pin.

Complete soldering the remaining pins of each socket. Touch pin and pad with iron tip, allowing enough solder to flow to form a fillet between pin and pad. Keep the tip against the pin and pad just long enough to produce the fillet. Too much heat can cause separation of pad and trace from the board.. A 600 degree iron tip is recommended.

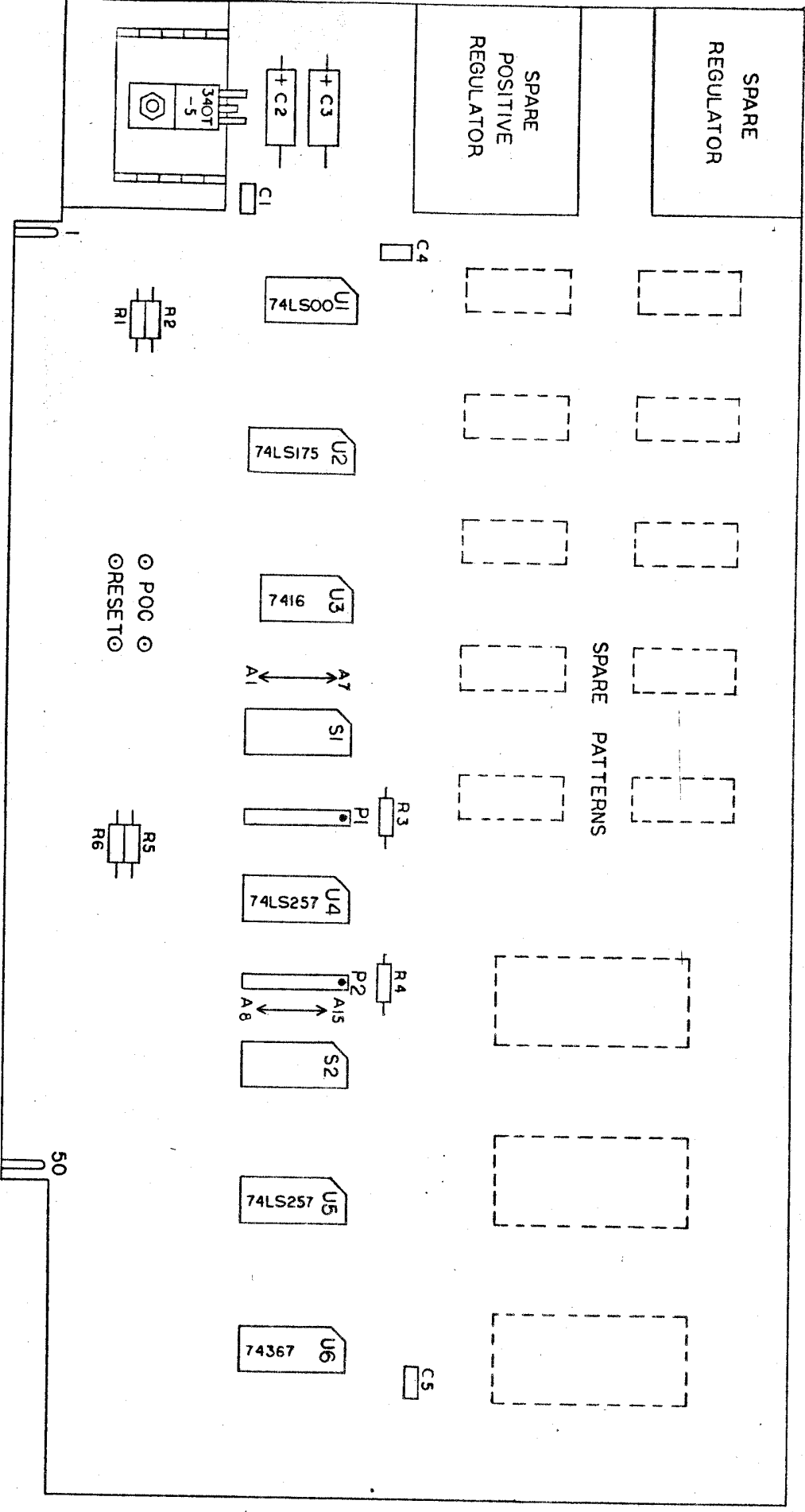
Insert and solder 2 2.7K SIP (P1 & P2), 2 2.7K resistors, and 4 10K resistors.

Insert and solder 3 01.uF ceramic capacitors.

Observing polarity, insert and solder 2 tubular tantalum capacitors.

Insert 2 DIP switches with the word "open" toward the right side of the board, then solder.

REVISIONS		
1.1.R	DESCRIPTION	DATE



TALFORDS LIMITED		COPYRIGHT 1978	
OFTENBERG DESIGN		SOLID STATE MUSIC	
FUNCTION	DEC	ANALYST	
APPROVALS	DATE		
	1-9-78		
	1-9-78		
SCALE	NONE	SIZE	C
		DRAWING NO	
DO NOT SCALE DRAWING SHEET 1 OF 1			

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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 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 heat sink). Use just a little thermal compound. Too much is worse than none at all.

Next position heatsink and insert regulator. Finally, position nut and lockwasher on top of regulator and secure from behind with screw in case. Be sure regulator and heatsink fit flat on board and 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.

Apply power (+8 volts approx.) to board by plugging into computer or by connection to a suitable power supply. Measure the output of U21. If less than 4.8 volts is measured (allowing for meter accuracy) check for shorts or wiring 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 AND SUBSEQUENT TESTS!

Finally, insert the IC's into their sockets, observing polarity.

Now, look the board over carefully. Check for poor solder joints or bridges. Using the component layout drawing, look for improper part location or polarity. A few minutes of careful inspection may save a few hours of troubleshooting.

## 3.0 SET-UP

The OB-1 card is set-up to operate when (1) power-on clear or (2) reset is sensed on the S-100 Bus. Place a jumper wire between the horizontal pads at the bottom edge of the card marked "POC" (for a power-on jump) or "reset" (for reset switch control). Two jumpers can be used to connect up both options with no problems.

The two 8 position dip switches on the card are used to set the 16 bit address of the jump instruction this card generates. Switch S1 (left switch) sets the lower 8 bits of the jump address, and the first switch pole at the bottom is marked "A0", for the first address bit.

Switch S2 (right switch) sets the upper 8 bits of the jump address, and the first switch pole at the bottom is marked "A8", for the ninth address bit. The address bits are in increasing value starting from the bottom, A0 up to A7 and A8 up to A15. When a switch pole is "open" (off), a logic 1 bit is set. If the switch pole is "closed" (on), then a logic 0 is set.

Addressing is easy. If both S1 & S2 are set to all poles "on" (closed), the jump address 0000 Hex is generated. If S1 is set all "on" and S2 has the lower four poles "on" and the upper four "open", then the jump address is F000 Hex.

HEX	starting increment	A15	SWITCH 2 Ø = switch closed 1 = switch open						A8	A7	SWITCH 1 Ø = switch closed 1 = switch open						AØ
0000	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø
0400	1K	Ø	Ø	Ø	Ø	Ø	1	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø
0800	2K	Ø	Ø	Ø	Ø	1	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø
0C00	3K	Ø	Ø	Ø	Ø	1	1	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø
1000	4K	Ø	Ø	Ø	1	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø
1400	5K	Ø	Ø	Ø	1	Ø	1	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø
1800	6K	Ø	Ø	Ø	1	1	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø
1C00	7K	Ø	Ø	Ø	1	1	1	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø
2000	8K	Ø	Ø	1	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø
4000	16K	Ø	1	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø
6000	24K	Ø	1	1	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø
8000	32K	1	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø
A000	40K	1	Ø	1	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø
C000	48K	1	1	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø
E000	56K	1	1	1	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø
*F000	60K	1	1	1	1	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø

\*----Jump entry point for SOLID STATE MUSIC'S 2K Monitor version 1.  
Program is available on 2708 or 1702A ROMs.

#### 4.0 TROUBLE SHOOTING HINTS

- a. Check for proper settings of DIP switches.
- b. Verify that all ICs are in the correct sockets.
- c. Visually inspect all ICs to be sure that leads are in the sockets and not bent under.
- d. Verify that the output voltage of each regulator is correct.
- e. Inspect back side of board for solder bridges, running a small sharp knife blade between traces that appear suspicious. A magnifying glass is a must for this.
- f. If you have a front panel, you can check the following:  
(push stop switch on computer, then push reset switch.  
Card should have reset option jumper connected.)
  - 1) Check the data lights for a "C3" code. If the code is incorrect, check the signals on U2, U4 & U5.
  - 2) Check the status lights for:

SMEMR = 0	STACK = 0	$\overline{W0} = 1$
SINP = 0	INTA = 0	
SMI = 1	HLTA = 0	

If this pattern is incorrect, check the signals on U1, U2 & U6.

#### 5.0 THEORY OF OPERATION

##### Useage

- 1) The OB-1 uses PSYNC to clock U2, Quad D Flip-Flop (74LS175), which is connected up as a 4-bit shift register. U2 is the sequencer for controlling the gates that output the jump instruction (3 bytes).
- 2) U4 & U5, Quad two-input multiplexers (74LS257), are used to select one of the byte codes of the jump instruction and place them on the data input Bus of the computer.
- 3) U6, Hex tri-state buffer (74LS367), is used to disable the CPU's status signals and set-up a unique status code.
- 4) U3, an open-collector Hex inverter (7416), is used to generate a "C3" code (jump) and control the PHANTOM line, if the computer system needs that signal.



- 5) U1, Quad two-input NAND (74LS00) is used as a buffer for PSYNC, power-on clear and reset.

### Operation

If the power-on clear or reset signal goes low and is connected with one of the two jumper wires, power-on clear or reset, then U2 is cleared. The "Q" outputs of U2 will now be at a logic zero. The reset signal will also force the CPU's program counter (16 bit address) to zero. U2, pin 15 will be low causing U6 to send a disable status signal and place on the status line a new binary pattern. SMEMR and SINP will be pulled low, disabling memory read and input ports from driving the data input bus of the computer. The OB-1 card can now put a jump instruction on the data input bus.

The CPU will issue a PSYNC pulse to read the first byte of the new instruction. U2 will clock in the logic one on pin 4 to its output pin 2. A logic zero on U2, pin 7 will turn-off U3, pin 8 and a logic one on U2, pin 6 will turn-on U3, pin 2, pin 4, pin 6 & pin 10. U3 will set-up a "C3" code on the "A" inputs of U4 & U5 to be transferred to the computer's Bus. (The Tri-state outputs of U4 & U5 were enabled when U2 was cleared, because U2, pin 15 went to a logic zero.

The CPU now sends out a second PSYNC pulse. The logic one on U2, pin 5 is pulsed in, making U2, pin 7 a logic one. The logic zero on U2, pin 6 will turn-off U3, pin 2, pin 4, pin 6 & pin 10 and logic one on U2, pin 7 will turn-on U3, pin 8 (logic zero). The switch settings of S1 is now present on the inputs of U4 & U5, and the computer receives the lower 8 bits of the jump address.

The CPU sends out a third PSYNC signal. The logic one on U2, pin 12 is pulsed in, making U2, pin 10 a logic one. U4, pin 1 & U5, pin 1 is now a logic one, which selects the "B" inputs of these IC's for output. The switch settings of S2 is now sent to the computer through U4 & U5. Computer has now received the upper 8 bits of the jump address.

The CPU now sends out a fourth PSYNC signal. The logic one on U2, pin 13 is pulsed in, making U2, pin 15 a logic one. This will send a disable signal to U4 & U5, and enable the computer's normal status again. This completes the jump instruction sequence.

### 6.0 WARRANTY

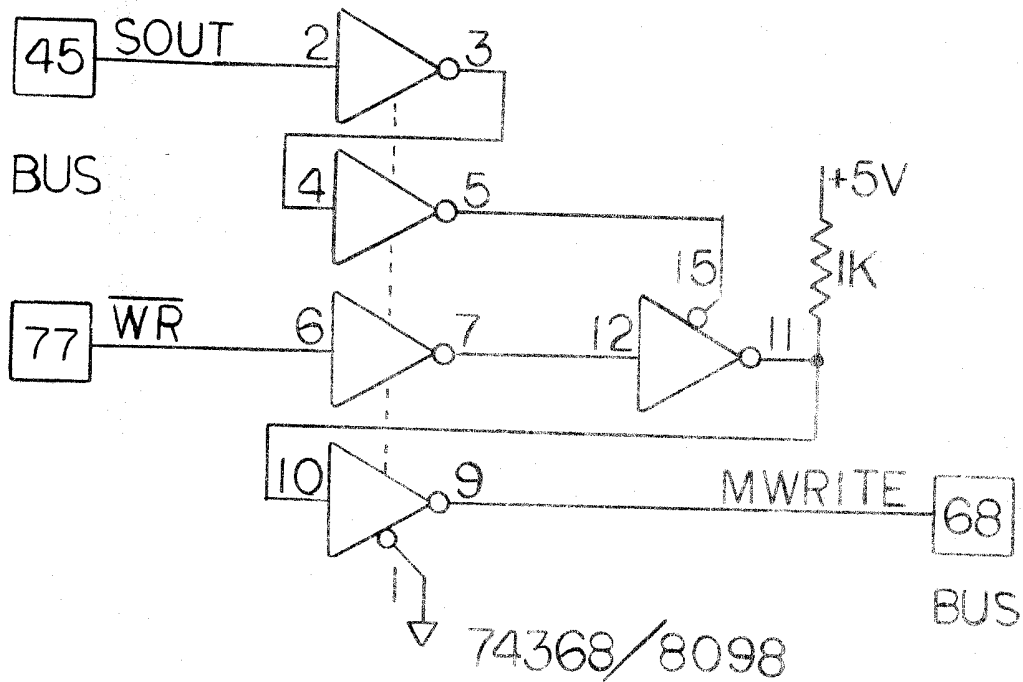
Parts guaranteed to original purchaser for 90 days, unless failure is due to misuse or failure of purchaser to exercise caution in assembly and operation. Registration card must be returned at time of purchase to validate warranty.

Assembled boards may be returned for service. A service charge will be made unless, in our judgement, the problem is due to a defective board or parts.



## 7.0 ADDENDUM

If your computer doesn't have a front panel display/control circuit card, then you are probably missing an S-100 signal called 'MWRITE'. If CPU doesn't provide MWRITE, then just add one IC (74368) and one resistor to the OB-1 card. Circuit below.



If you do not have a MWRITE signal on the S-100 Bus, then you will not be able to deposit to some of the S-100 memory cards.

## OBI Parts List

### Chip and Socket Pack

1 - U1	74LS00
1 - U2	74LS175/74175
1 - U3	7416/7406
2 - U4,5	74LS257
1 - U6	74367/8097
2 - S1,2	8 position DIP switch
4	16 pin sockets
2	14 pin sockets

### Resistor Pack

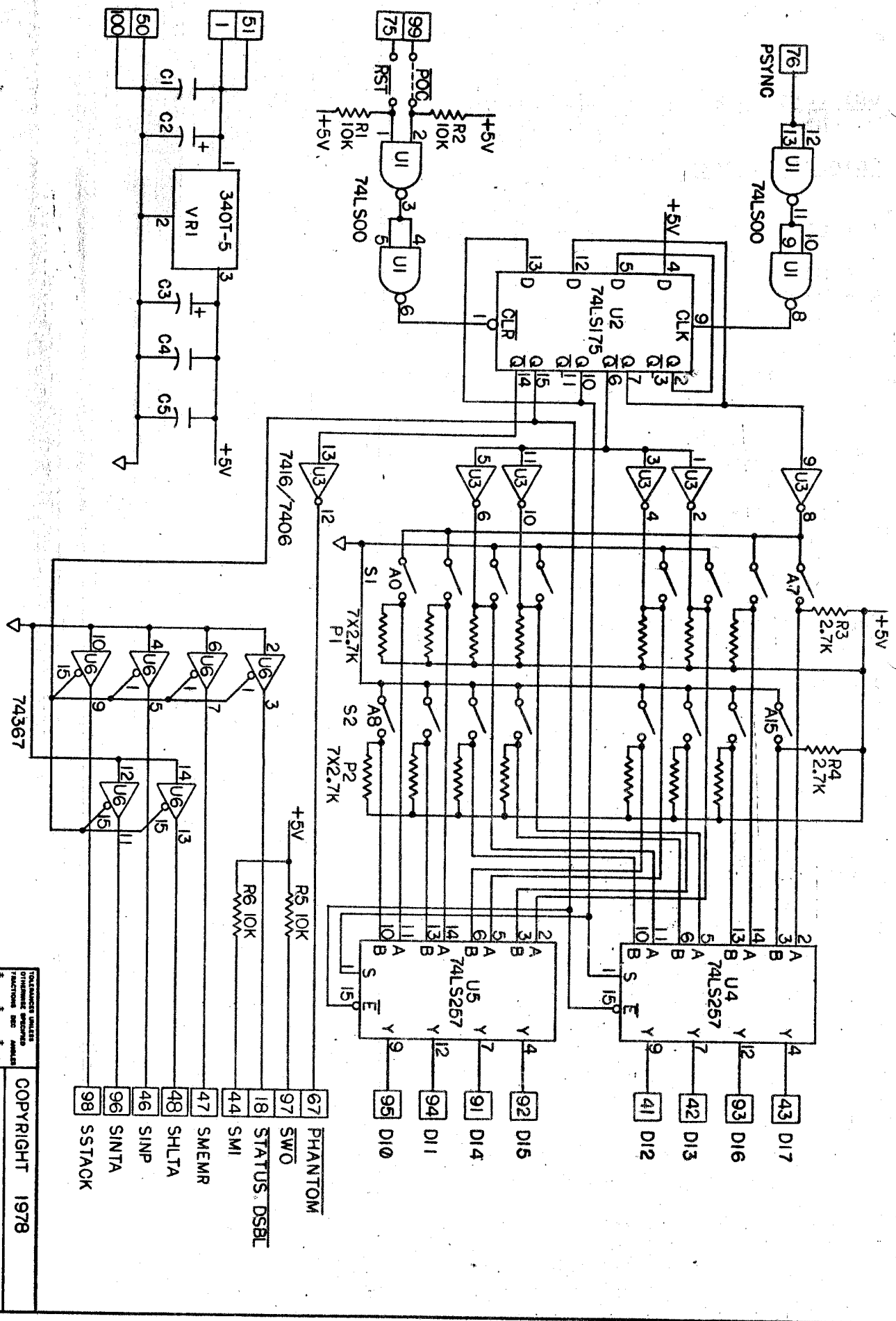
4 - R1,2,5,6	10K 1/4w 5%
2 - R3,4	2.7K 1/4w 5%
2 - P1,2	2.7K x 7 SIP/2.2K x 7 SIP

### Capacitor/Regulator Pack

2 - C2,3	2.7uf to 33uf 20v Tant
3 - C1,4,5	0.1uf disc
1 - VR1	7805/340T-5
1	heatsink
1	set #6 hardware

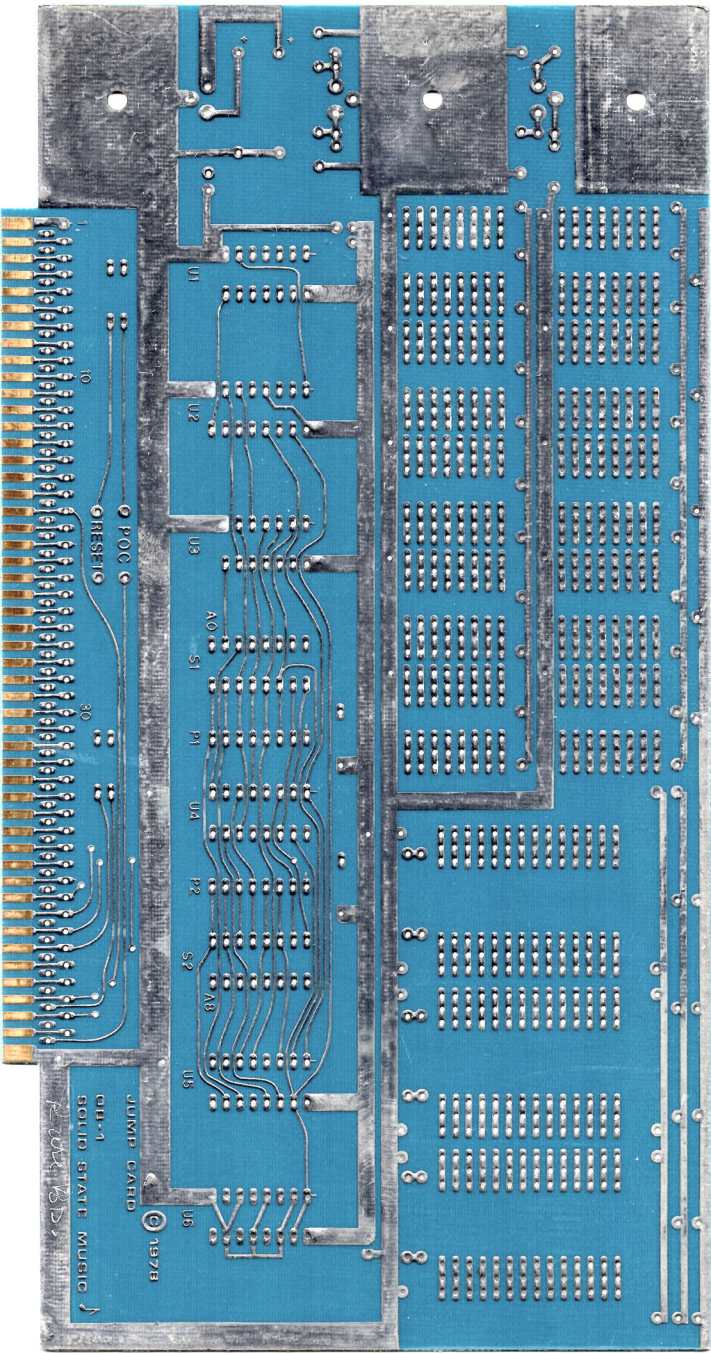
### Misc.

1	PC board
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PERFORMANCE LIMITED DIMENSIONS SHOWN TOLERANCES UNLESS OTHERWISE SPECIFIED		APPROVALS DATE		DRAWING NO. 1-4-72	
SOLID STATE MUSIC OB-1 SCHEMATIC		SCALE NONE		SIZE DRAWING NO.	
COPYRIGHT 1978		DO NOT SCALE DRAWING		SHEET	

- 67 PHANTOM
- 97 SWO
- 18 STATUS\_DSBL
- 44 SMI
- 47 SMEMR
- 48 SHLTA
- 46 SINP
- 96 SINTA
- 98 SSTACK



JUMP CARD  
GB-1  
SOLID STATE MUSIC  
© 1978

POC  
RESET

1

10

30

U1

U2

U3

A0

S1

P1

U4

P2

S2

A8

U5

U8

2048D