

ALIGNMENT PROCEDURE FOR EML-101 (AFTER S/N 300)

- WARNING:
1. The system must be operating functionally prior to any adjustments.
 2. Internal adjustments not performed by the factory are discouraged.

EQUIPMENT NEEDED:

1. Scope - capable of X-Y display
DC - coupled vertical amplifier
1 mV/div. sensitivity
2. Frequency counter (Heath IB-101 typical) or;
frequency standard w/87.3 hz & 1046.5 hz or 440.0 hz or;
Strob-o-tuner.
3. 3/32" Allen wrench (for panel screws before S/N 900)
4. Key wedge

PROCEDURE OUTLINE:

- I Knob settings & panel removal
- II Oscillator 2 linearity
- III Keyboard tuning (KB-1)
- IV Oscillator tracking and KB-2 tuning
- V Filter tuning
- VI Filter tracking and AC null
- VII VCA thump null

I. KNOB SETTINGS AND PANEL REMOVAL

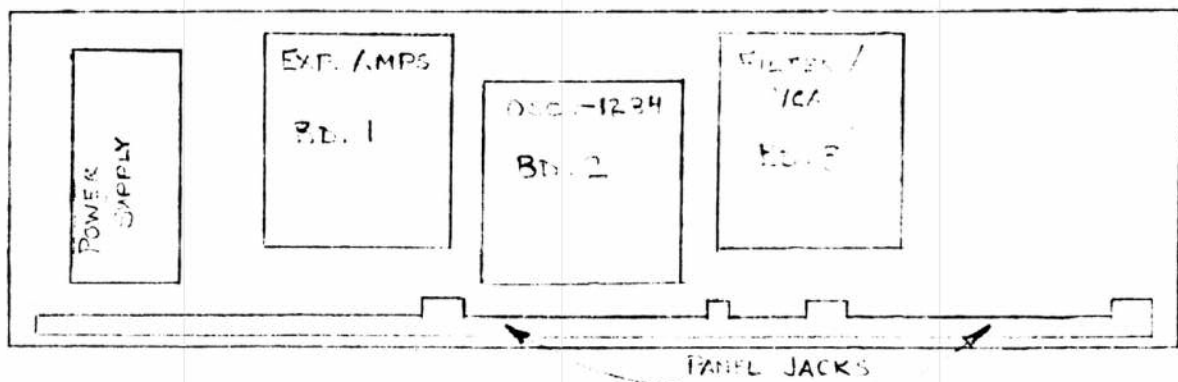
Set knobs as shown in diagram.

Remove 5 Allen screws (marked X on panel facsimile) from front panel. Note; after S/N 900 panel screws are philips head.

Pull right side out about 2", and slide panel to right.

Be careful not to break oscillator 1 "color" switch.

Familiarize yourself with the backside of the panel.



BACKSIDE VIEW OF PANEL

POWER SUPPLY

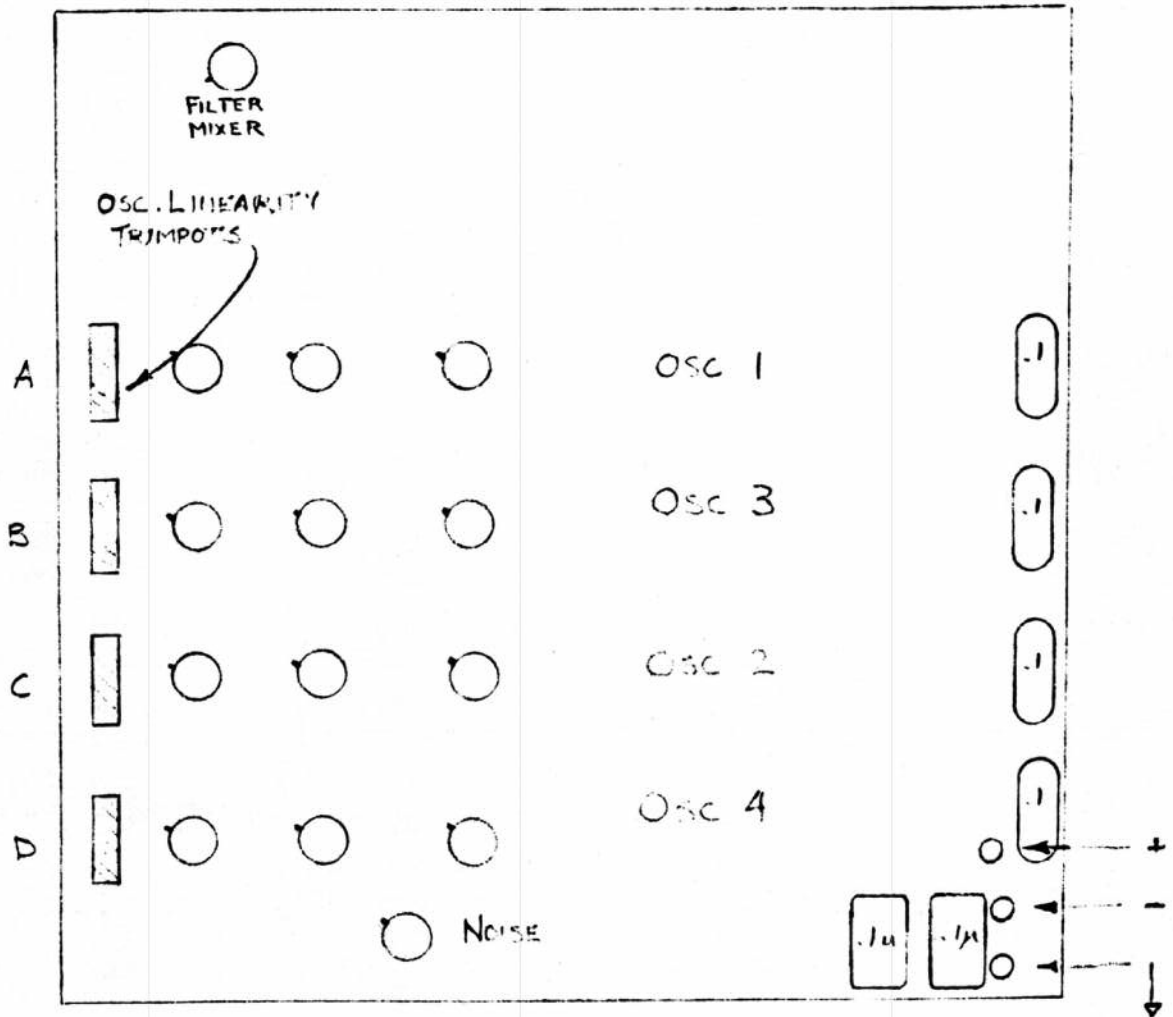
+15 V (RED)

-15 V (BLUE)

GND (BLACK)

II OSCILLATOR 2 LINEARITY

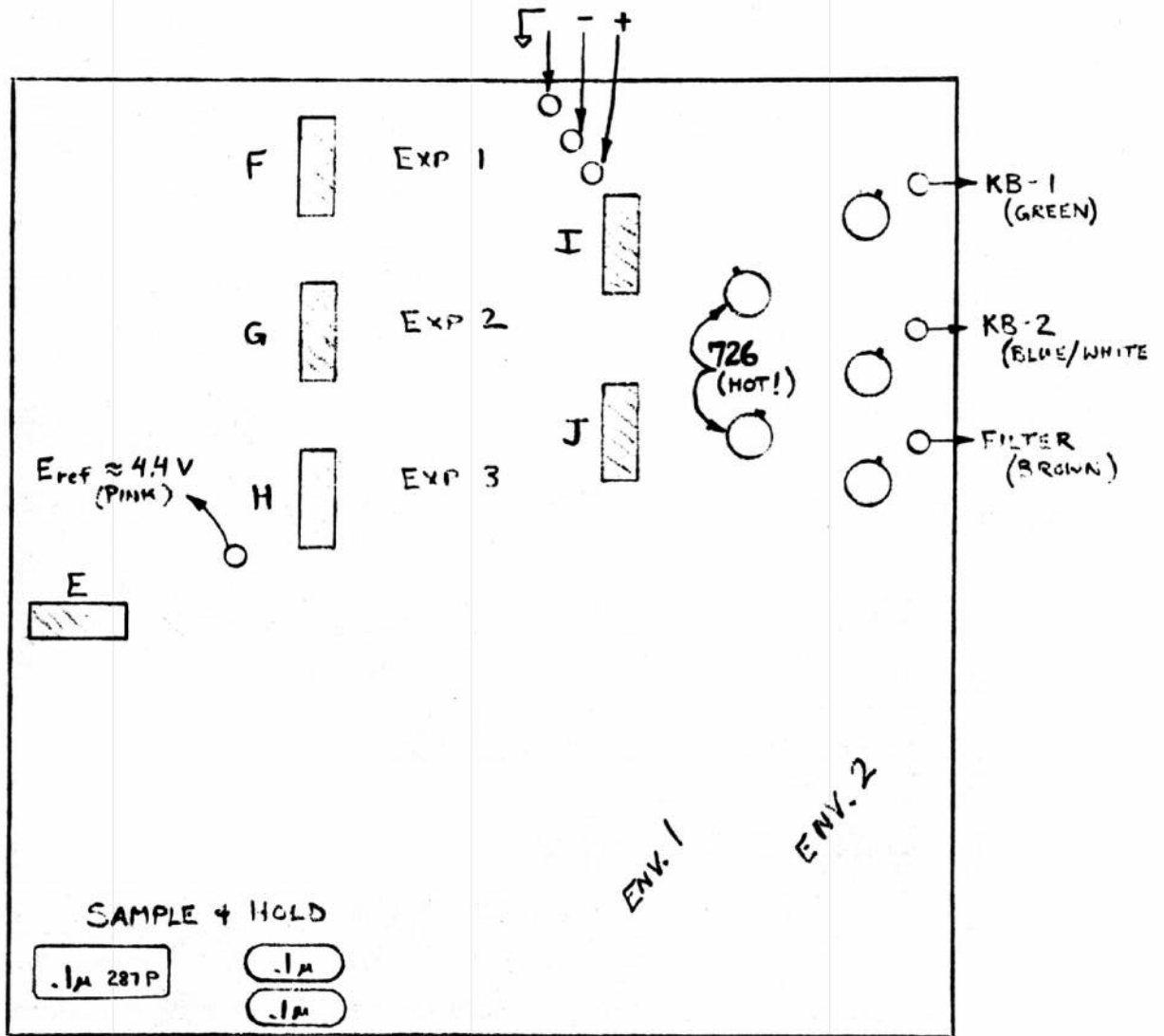
Familiarize yourself with the oscillator board layout.



OSCILLATOR BOARD #2

III. KEYBOARD TUNING (KB-1)

Familiarize yourself with the Exp. Amp board layout.



EXP. AMP/ENV. GENERATOR - BOARD 1

If you have a frequency counter, connect it to oscillator 2 output jack. Be certain to let the counter warm-up; and when taking a reading, let the display stabilize.

If you have a standard (87.3/1046.5 hz or 440.0 hz) - connect it to the horizontal amplifier of your scope. Connect the vertical Amp to Osc. 2 output jack.

If you have a strobotuner - direct connection to Osc. 2 is possible, but you can patch Osc. 2 into an amplifier and use the tuner's Mic.

Allow the synthesizer to warm-up at least 30 minutes before making any adjustments.

Hold the low key (F note) and adjust Osc. 2 tune knob to 87.3 hz. Release low key and hold high key (C note) down. Use the "keys/oct fine" knob to produce 1046.5 hz.

CHECK OCTAVE INTERVALS: THESE SHOULD BE -

<u>Keyboard</u>	<u>C Note</u>	<u>F Note</u>	<u>A Note</u>
Highest	1046.5	698.5	880.0
	523.2	349.2	440.0
	261.6	174.6	220.0
Lowest	130.8	87.3 hz	110.0

If the upper end of the keyboard is not linear (greatest error is usually in the upper end); hold the highest F note which should be 698.5 hz. If the error is within ± 4.0 hz; it may be best to leave it alone, the linearity could be acceptable. However, most units can be made linear to ± 1.0 hz.

To improve linearity use the blue trimpot C on board 2. Move to increase the error of the F note.

Now - repeat above procedure; hold low F - tune oscillator 2 to 87.3 - hold high C - fine octavation to 1046.5, again check octaves. Repeat trimpot adjustment and retuning until oscillator 2 is linear.

Note - If you are using a single frequency standard such as "A" 440.0 - the linearity adjustment may not improve as the lower octave "A" has its error increased. You will have to experiment with adjustments to trimpot C to achieve best linearity.

Check all oscillator tune knobs to be sure they are rotation centered on pot shafts. If not, position and tighten.

Set oscillator 2 tune and key/oct fine to "zero". Hold low F key and adjust blue trimpot F for 87.3. Then hold high C and adjust blue trimpot E for 1046.5.

Oscillator 2 should now be tuned and linear. You will no longer need the counter or standard.

IV. (A) OSCILLATOR TRACKING

With vertical amp of scope on oscillator 2 connect horizontal amp. to oscillator 3 (verify CM-3 switch is in CM-2 position). Hold high C and tune oscillator 3 to standstill display.

Hold low F and adjust trimpot B to stop any roll. Retune high C and recheck low F. Oscillator 3 should now track with oscillator 2.

Repeat above steps for oscillator 4 (using trimpot D) and oscillator 1 (using trimpot A).

IV (B) KB-2 TUNING

With scope display Osc. 2 vs. Osc. 3, tuned to high C standstill; switch Osc. 3 to follow KB-2. Hold high C, adjust trimpot I for a standstill pattern.

Hold low F, adjust trimpot G for a standstill. Readjust I for high C - repeat low F and high C adjustments until keyboard is standstill for any note. KB-2 now tracks KB-1 and there should be little or no change when Osc. 3 is switched from CM-2 to KB-2.

NOTE - Overshooting the adjustment of trimpot G (for low F) will speed up the tuning.

V. FILTER TUNING

Disconnect the brown wire from filter Exp. Amp on board 1 and pull the blue/white wire from KB-2. Push the blue/white wire onto the filter pin.

With oscillator 2 on KB-1 switch to -1 octave and oscillator 3 on KB-2 switch to +1 octave.

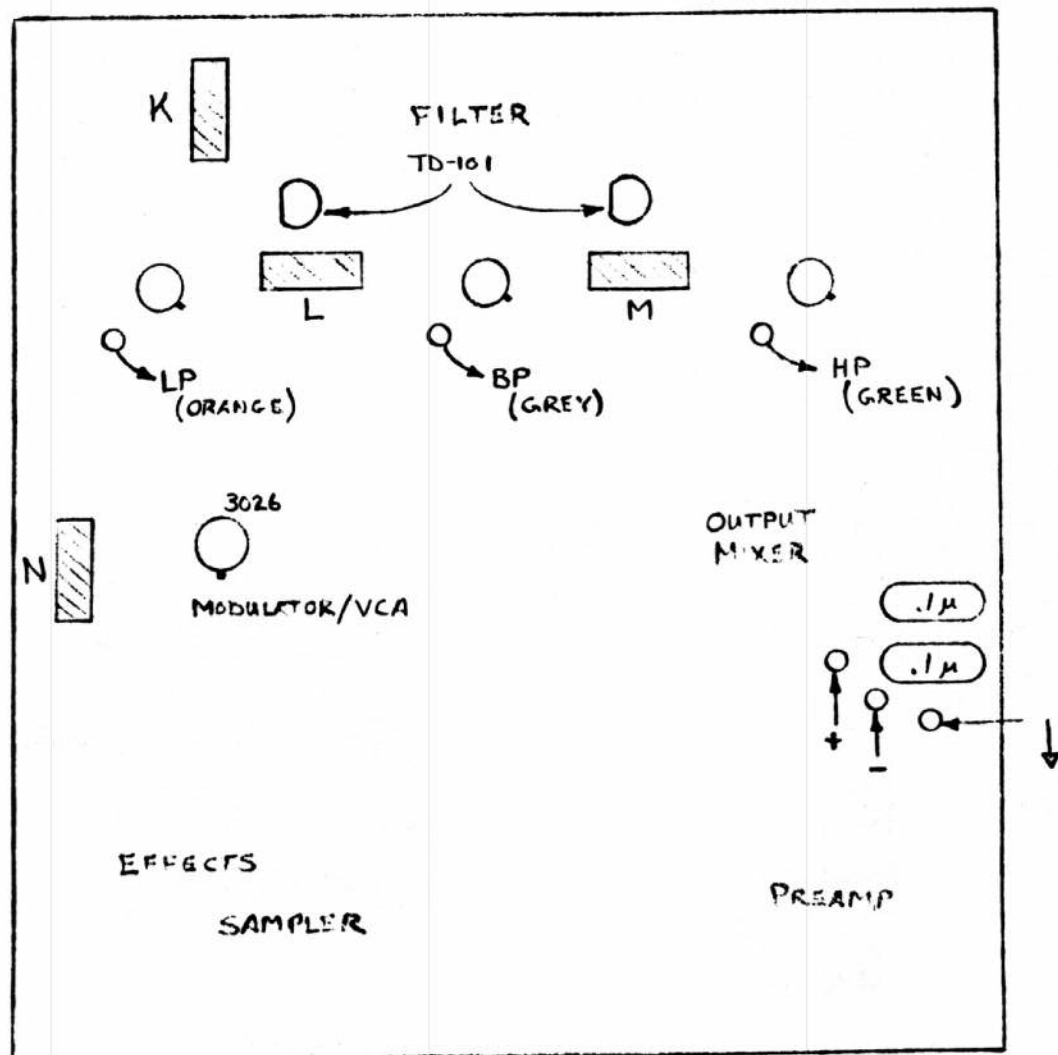
Using the same procedure for tuning KB-2; use trimpot J for high C standstill and trimpot H for low F standstill.

Filter drive should now follow the keyboard.

Reconnect the blue/white wire to KB-2 pin, and the brown wire to filter pin.

VI. FILTER TRACKING AND AC NULL

Familiarize yourself with filter board layout.




FILTER/VCA - BOARD 3

Set scope to .5 V/div. vertical sensitivity and about 2 msec/div. horizontal display. Connect vertical input to filter output.

Turn Osc. 2 filter input mixer level knob about $\frac{1}{2}$ way. Strike high C and use filter tune knob to peak signal (should be near "0" if Osc. 2 is on zero octave). Adjust level for 4 div. peak-to-peak display.

Strike low F, adjust trimpot K for peak. Strike high C, repeak filter tune. Slide up and down keyboard - signal should not dip or shift DC level more than 50%. If so, check first for 748 op amp scream (look at HP, BP, and LP pins with scope @ 20 mV/div, and no signal into filter). Then check TD-101 devices for failure.

Switch Osc. 2 through -1, 0, +1 octaves and check for reasonable tune peaks and tracking levels of filter.

Turn Osc. 2 input level off (no signal), with filter tune on "0" peak turn resonance to Lo (full counterclockwise). Switch Osc. 1 to square () and filter control to full Osc. 1.

With scope on .1 V/div. look at LP pin (orange wire), adjust trimpot L for minimum signal. Now look at HP pin (green wire), adjust trimpot M for minimum signal.

Repeat until upper end of keyboard is best nulled. Some increase in level toward lower octaves is normal.

Filter should be tuned, tracking and nulled.

VII. VCA THUMP NULL

Turn Osc. 1 off of filter control (still no signal). Set all envelope controls to minimum (full ccw) for spike.

With scope still on .1 V/div. look at modulator/amp shaper output.

Rapidly pulse a key with a finger, adjust trimpot N for minimum spike.

You should be able to have a straight line at .1 V/div.

All adjustments are complete on EML-101.

KEYBOARD BUSS CLEANING - GENERAL INFORMATION

SYMPTOMS - Multiple envelopes with single, slow key depression.

Condition: Minimum attack
Minimum decay
Sustain off

CAUSE - Dirt on gate buss.

SYMPTOMS - Pitch change as key is depressed or pitch change as key is released.

Condition: Minimum attack
Slow decay
Any sustain

CAUSE - Dirty sampler buss.

CLEANING PROCEDURE

Tool - Twisted pipe-cleaner
Cleaning agent
TV Tuner spray

Apply spray to pipe-cleaner. Clean one key at a time while listening to instrument.

100 AND 101 KEYBOARD CLEANING PROCEDURE

Keyboard Removal -

1. Remove all 5 pan-head screws and 3 woodscrews from bottom of case. Note where they went.
2. Remove the two screws from the top keyboard brace.
3. Remove the brace (it may be in tight) and carefully lift out the keyboard.

Cleaning -

1. Rest the keyboard on its back edge, front end of keys pointing up, spring contacts facing you.
2. Press a key and notice the action that takes place. A clear plastic bar moves up pulling with it the ends of two gold springs against two gold buss bars. Sometimes dirt accumulates at the point where the spring touches the buss bar causing erratic pitch variations and/or multiple triggering of the envelope generators (or none at all) during a single key stroke. The top row of contacts relate to pitch voltage, and the bottom row triggers the envelopes and keyboard sampling circuitry.
3. When handling the contacts, extreme care must be taken not to stretch or in any way deform the springs. Dirt can be removed from springs and buss bars at the point of contact by using the end of a pipe cleaner moistened with TV tuner and control spray cleaner or tape recorder head cleaner. Very carefully swab the contact area and when finished, make sure the clear bar is resting vertically and not turned to one side.
4. Notice that when a key is not pressed, the lower spring is resting against a buss that is not used electrically and cleaning this lower buss is not necessary.

Special Problems -

1. If thorough cleaning of a particular keys contacts does not remedy the problem, here are some probable causes:

On a particular key only -

Envelopes trigger intermittantly or not at all and no new pitch is heard

(Check the solder connections directly below the defective key)

One last note on keyboard problems -

KB2 voltage will be unstable if the keyboard plug is not making good contact with the socket on the front panel. This is usually caused by dirt and oxide in the socket and can be cleaned by inserting a pipe cleaner end moistened with the cleaners mentioned earlier into each hole in the socket and scrubbing thoroughly. Do this with the system unplugged from power of course.

Re-installing keyboard -

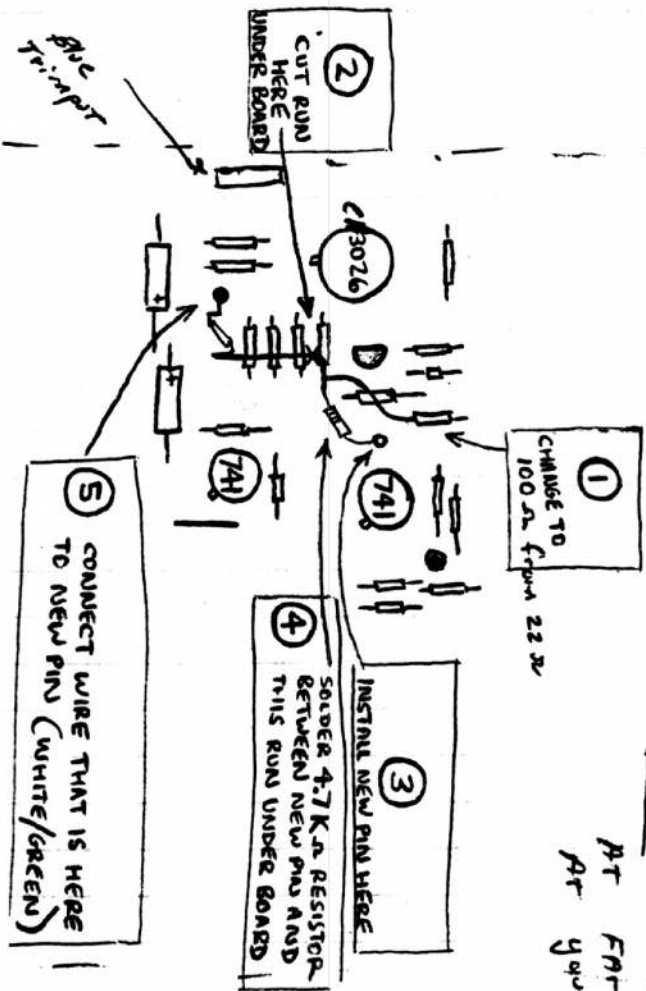
Gently put the keyboard into the box and install the five bottom screws. If there were three washers along the front between the keyboard and case, make sure they are in place first. Position the wood brace along the top and install the two top screws and the three bottom wood screws.

101 VCA INDUCTIVE LEAKAGE FIX

1-29-74 Jy.

#3 BOARD TOP VIEW

AT FR. RIGHT WHEN JACKS POINTED
AT YOUR TUMMY - BOARD UP



JACKS

The above change will reduce leakage of oscillator 4 to outputs for early 101's. Problem was pick up of Brown wire signal where original circuit run passed beneath the 4 parallel resistors. Watch lead dress.

electronic music laboratories, inc.

P.O. Box H, Vernon, Connecticut 06066 Tel: (203) 875-0751

On model 101's built between 2 and 9 months ago some customers may find objectionable feed thru of signals at the low output jacks of the output mixer. This is a problem when the customer is using a guitar type amplifier. The cure takes less than 10 minutes.

