

BASS REFLEX EQUALIZER 575 UPDATE

by Pat Snyder and Doug Kramer

We have made three changes to the equalizer design that improve its performance slightly and make it easier to use. We call the improved design the Bass Reflex Equalizer 575 to avoid confusion. In place of 747's we now use Raytheon 4739 dual operational amplifier integrated circuits. The 4739 has lower noise and also has a different pin arrangement.

In place of the 1K peak-height pot (R4) we now use a 100 ohm pot with a 1K fixed resistor (R6) in series. Thus the total resistance is variable from 1000 to 1100 ohms. All the control action was in the last tenth of the old pot's range anyway, so the new setup gives you finer adjustment ability over the desired range. We also have added an extra filtering section in the power supply to get the hum level way down. See the new schematic (attached) for these three changes.

Doug laid out a printed circuit card for the-equalizer. This and the parts layout on the card are also shown on attachments. Note: the card pattern is reproduced here by Xerox which is not perfectly accurate. Check the IC pin holes carefully if you trace our layout.

We are making up some of the etched, drilled cards and are offering them for sale for \$4.50 each (subject to availability).* We also have Raytheon 4739's available if you can't get them locally (\$1.50 each). Two 4739's are required for-each unit. We do not offer complete kits.

Some of you may wish to use other types of IC op amps in the circuit. Here are a few tips on using op amps:

- 1) Do not assume if an op amp has two positive (or negative) supply pins that they are internally connected. Wire them all. Also do not assume "NC" points may be used as tie points.
- 2) IC models of the same family (e.g. 747) by different makers (National, Fairchild, Motorola, etc.) are similar but not identical. When considering the fine points on the data sheet, you have to use the sheet issued by the maker of the IC you have.
- 3) Beginners should use only first-quality parts. "Bargain" integrated circuits supplied by electronics hobby stores and mail order outfits usually owe their low price to the fact that they were rejected by somebody for substandard performance. Nothing I have received from Poly Paks (Lynnfield, Mass.) has ever worked right for me. Electric current is invisible, so unless you have test equipment (and the experience to use it) you will not be able to debug a circuit that does not work because of a defective part.



5500 35th N.E. Seattle, WA 98105

*NOTE: We recommend you use the circuit card--hand wiring nearly always leads to at least one mistake, and unless you are an experienced troubleshooter, you won't be able to get it to work. The printed circuit card is much safer.

circuits

- 4) Make sure that you use the right input and output for each stage-- inputs and outputs of the same op amp.
- 5) Most IC op amps are fairly noisy, except for ones specially made for low noise (like the 4739). LM900's are extremely noisy.
- 6) 709's are very inexpensive and offer superior performance in some ways, but are not very "foolproof"-- they oscillate easily, burn out easily, etc. Internally compensated types (741, 747, 1558, 4739, etc.) are probably the most foolproof.
- 7) Troubleshooting--if no signal comes through, measure the voltage at the IC's output pin. It should 0+ 1 volt if the IC is biased properly. If it isn't, the IC will probably be "locked up" close to either the + or - supply voltage. If so, check the biasing.

If the bias is OK (output voltage near 0 on each op amp) and the dang critter still don't work, put a test signal on the input (a sine or square generator is handy here) and follow the signal through the circuit with an oscilloscope. At some point the signal will disappear-- check that stage carefully.

In a two-stage circuit, a little hiss 'noise at the output suggests that the second device is active (properly biased and amplifying), so the first is probably not working. If the noise is a buzz, it may be power supply hum coming through because the second device is locked up at one supply side. Most of the bugs I find are simple mechanical problems-- shorts between IC pins or to the chassis, one supply side not connected, etc. Have a friend look at the thing--he might see something you can't.

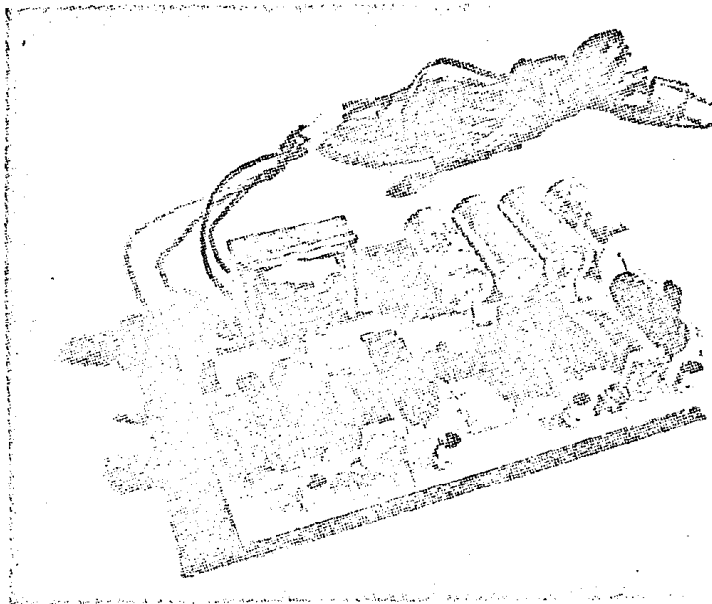
- 8) For circuits of your own design: if you use high value (above 1 to 10K) resistors in an op amp's bias circuit (parts going to the inputs), electrolytics on the input can leak through enough current to mess up the bias. Try to use solid dielectric capacitors or keep bias resistors below 10K.

BASS REFLEX EQUALIZER 575 PARTS LIST

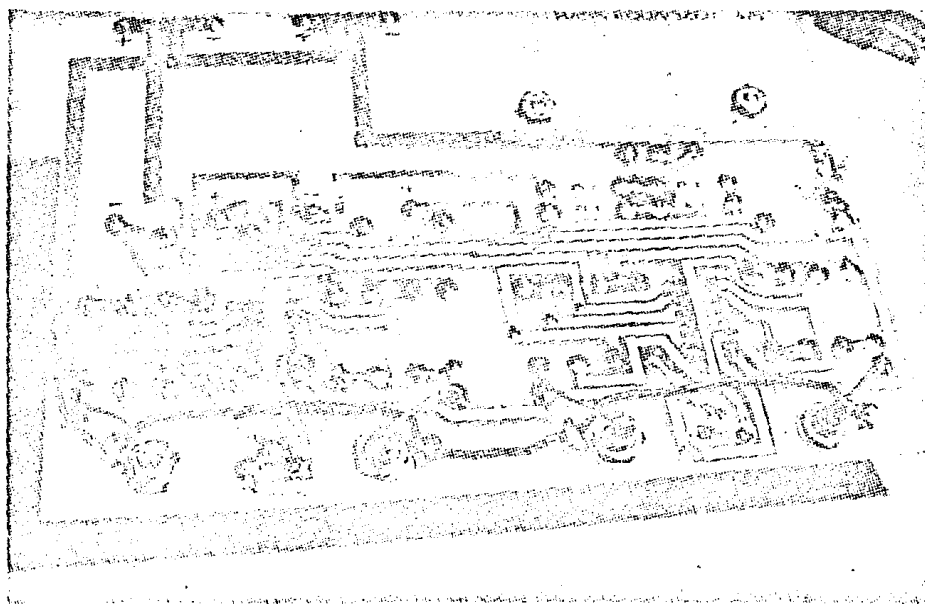
You will need these parts to build the 575 circuit:

- 1- Circuit card (optional).
- 1 - 117 V primary, 24 or 25 VCT secondary, 200 mA (or more) transformer.
- 4 - 1N4002 or other 100 V, 1 A (or greater) rectifying diodes.
- 4 - 1000 uF, 25 V or greater electrolytic capacitors.
- 1 - LED (Light Emitting Diode).
- 2 - Raytheon 4739 integrated circuit operational amplifiers.
- 2 - 14-pin dual-in-line IC sockets (optional).
- 2 - 100 ohm trim pots for mounting directly on printed circuit board (alternatively YOU can use one 100 ohm dual-ganged, $\frac{1}{4}W$ or greater, Pot for panel-mounting).
- 2 - 150 ohm 5%, $\frac{1}{4}W$ carbon film resistor.
- 4 - 1 Kohm, 5%, $\frac{1}{4}W$ carbon film resistor.
- 1 - 1 Kohm 5% $\frac{1}{2}W$ carbon composition (or film) resistor.

- 2 - 47 Kohm, 5%, $\frac{1}{4}$ W carbon film resistor
- 4 - 100 Kohm, 5%, $\frac{1}{4}$ W carbon film resistor
- 2 - .10 μ F, 25V or greater capacitor
- 2 - .47 μ F, 25V or greater capacitor
- 4 - .68 μ F, 25V or greater capacitor
- 4 - phono jacks for inputs and outputs
- 1 - on-off switch
- 1 - fuseholder and 1A fuse
- 1 - line cord and plug



BASS REFLEX EQUALIZER shown in a very compact form, with phono jacks and trim pots directly on circuit card.



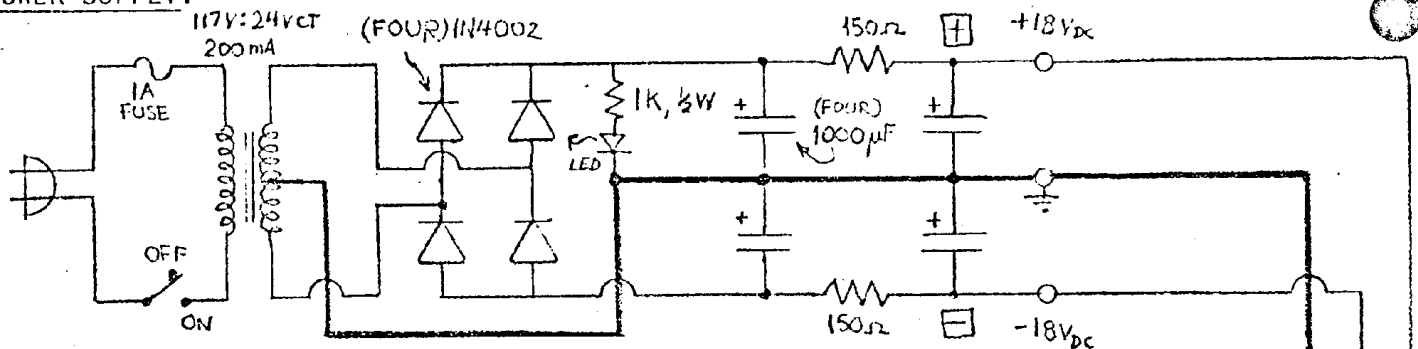
PRINTED CIRCUIT CARD showing underside connections to the phono jacks. The lettering on the card identifies inputs and outputs.

BASS REFLEX EQUALIZER 575
Parts Layout

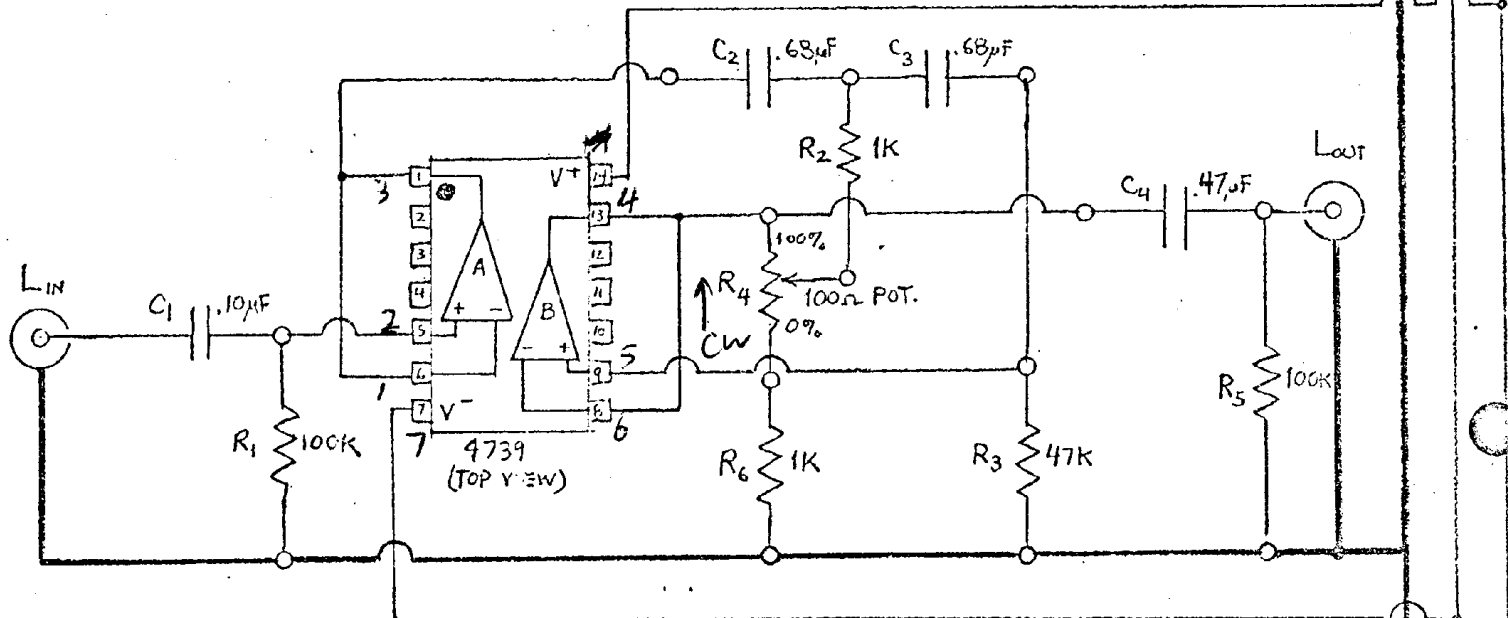
Notes:

- i) all resistors are $\frac{1}{4}$ W, 5% tolerance, except the LED's series resistor is $\frac{1}{2}$ W.
- ii) all capacitors are rated at least 40V except the electrolytics are 25V.

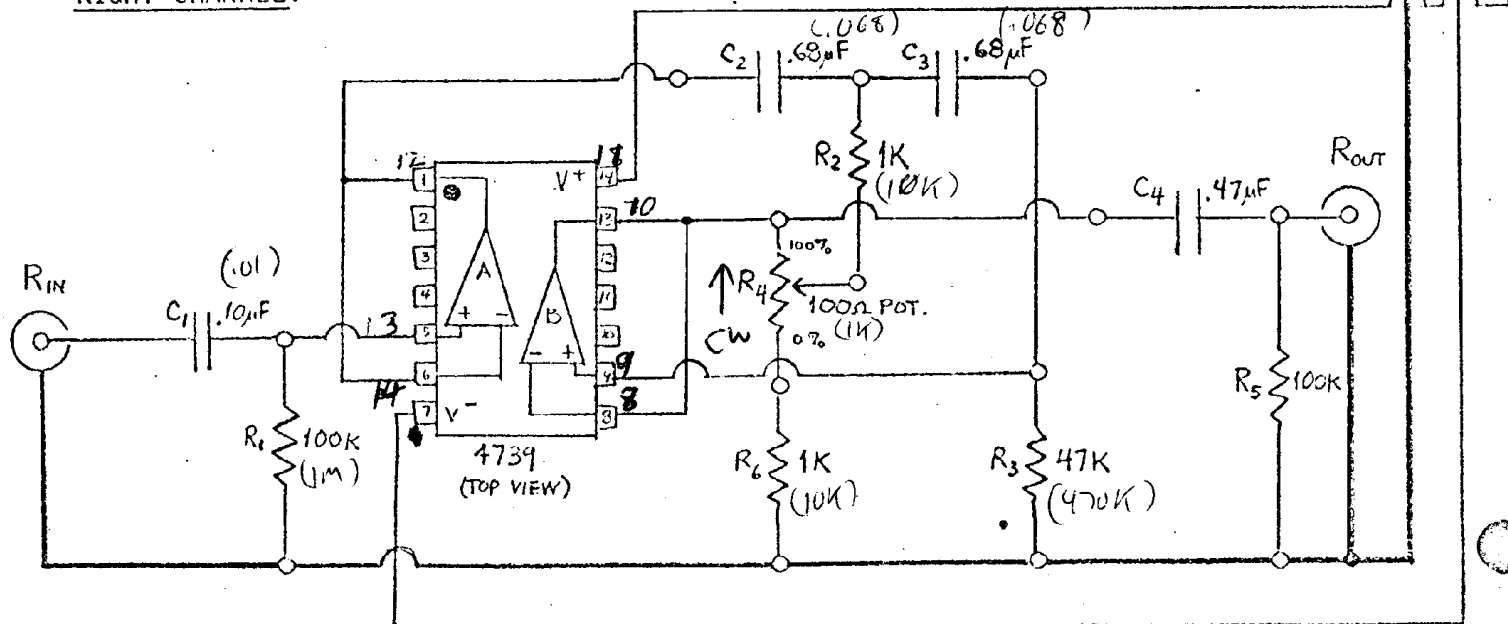
POWER SUPPLY:



LEFT CHANNEL:



RIGHT CHANNEL:



USE LM833 IC