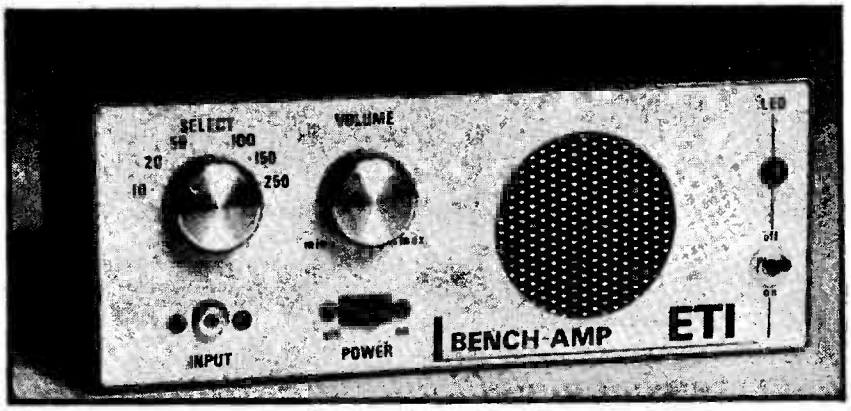
Short Circuits

BENCH AMP



How it works

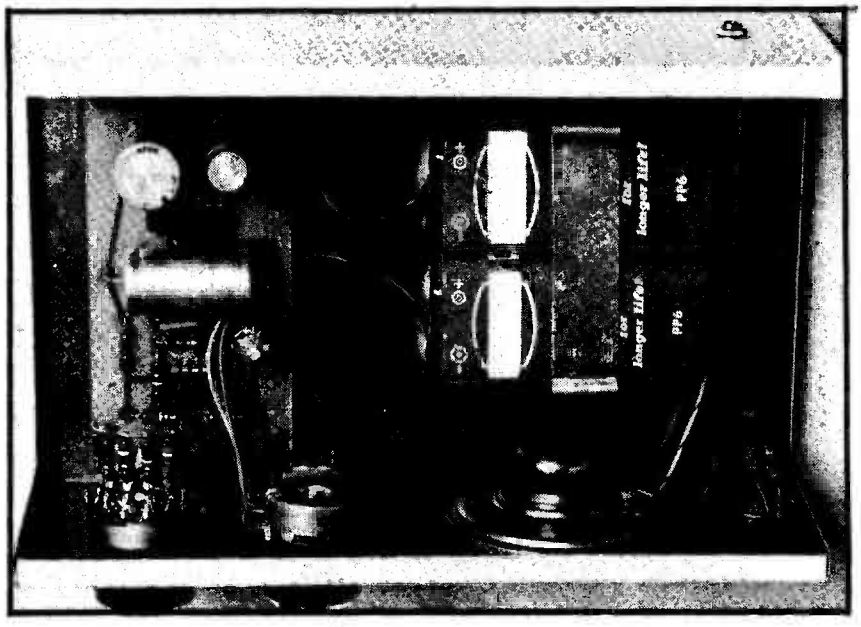
The gain of IC1 is set by the ratio R9/R1 - 6 Resistors R1 - 6 vary this from ≈20 to ≈0.5. Thus to produce 100mV across RV1, inputs from 5mV to 200mV are required. R7 and R8 bias the non-inverting input to 4.5V and R10 is included to protect the chip. Since D.C. gain of the circuit is unity, the output will set at +4.5V D.C., providing maximum swing capability. To minimize output offset due to bias current, the value of R7 and R8 in parallel should be approxinately the same value at R9. Bear this in mind if you intend to alter the supply voltage.

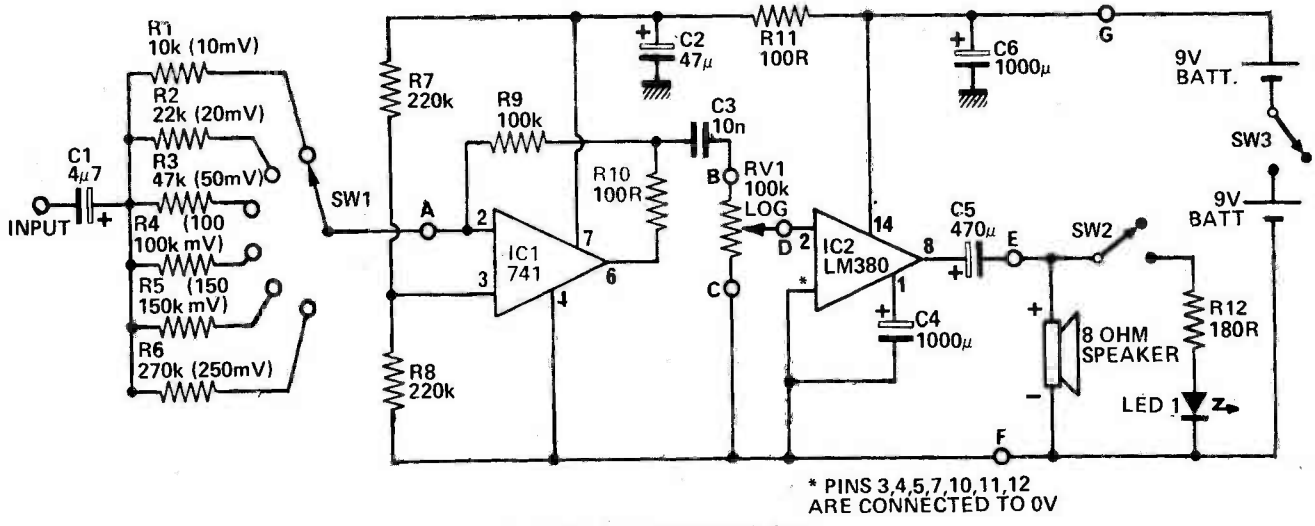
R11 and C2 provide decoupling for the 741 rail, as C6 does for the LM380. This capacitor can be increased in value to advantage with a supply not entirely stable. If another value of impedance speaker is employed, R12 will have to be altered to maintain the conditions.

THE AMPLIFIER TO BE described here differs in one major respect to most others - it can be used as an accurate millivoltmeter! One of the most awkward things to measure in a lab is an audio signal of less than a volt. Specialist meters are expensive, and rarely justifiable for an amateur: hence this project. This provides at least an 'order of magnitude' reading, and in most cases an accurate value can be assigned to the signal.

The circuit is basically an audio pre- and power amplifier combination, with switchable preamp gain. Depending on which sensitivity is selected, the gain of the 741 is so adjusted as to produce the specified input to drive the LM380 to the point of clipping. This voltage in turn is just sufficient to cause the LED to light.

To measure an A.C. signal, turn the volume control to maximum, and apply the input to the socket and work down from the lowest sensitivity until LED just comes on. The value of the input is now indicated by the switch. We tried several 380s and several dozen LEDs to see if our results were repeatable: they were. In all cases we were within 10% of the value of the signal!

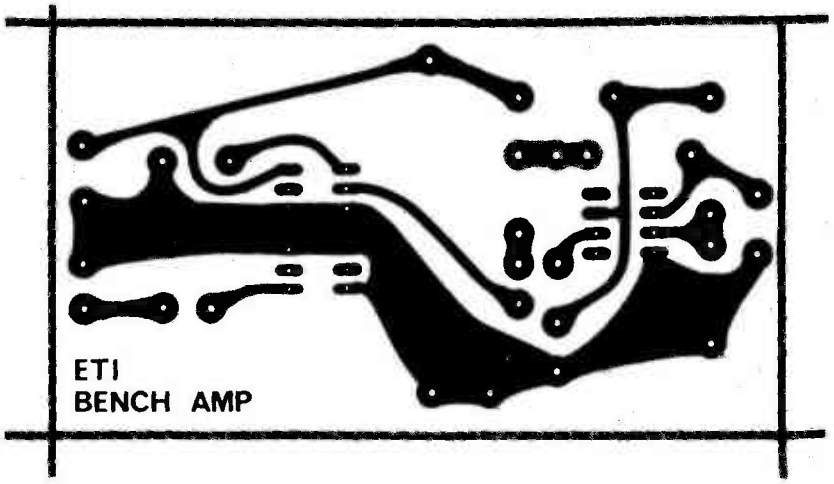




Circuit diagram of the Bench Amp

Construction is not critical, but a metal box is a good idea to help screen the amplifier from extraneous radiations etc. Ours came from Doram, and very nice they were too. Battery power was chosen so as to leave as much bench supply free as possible.

Further sensitivities can be easily added by using a larger switch with more poles, and adding the appropriate resistors. The quality of the circuit is good enough to feed an external loudspeaker, and a socket is provided to enable this to be accomplished. ●



Parts List

RESISTORS
R1 10K
R2 22K
R3 47K
R4,9 100K
R5 150K
R6 270K
R7,8 220K
R10,11 100R
R12 180R
All ½W 5%

POTENTIOMETER
RV1 100K Log rotary

SEMICONDUCTORS
IC1 741 op-amp
IC2 LM380 power amp
LED1 0.2" type

MISCELLANEOUS
Phono socket
Nuts, bolts, etc.
3.5mm jack socket

CAPACITORS

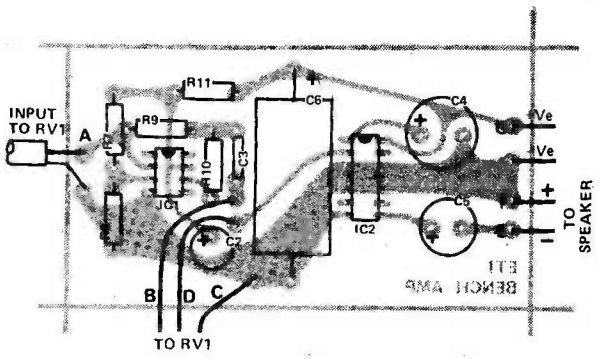
C1	4u7	16V electrolytic
C2	47u	16V electrolytic
C3	10n	ceramic or similar
C4	1000u	16V electrolytic
C5	470u	16V electrolytic
C6	1000u	25V electrolytic

SWITCHES

SW1	1 pole 6-way rotary
SW2	single pole / Off-On toggle
SW3	single pole / Off-On rocker

CASE
Samos S7 Doram

SPEAKER
LS1 2¼" 8Ω type



Component overlay for the Bench Amp

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