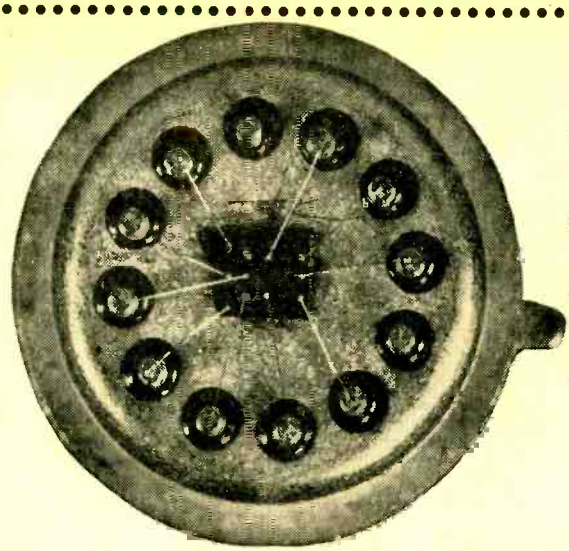


By James Fred

Mini Mix

Little mixer with big performance using the first low-cost experimenter's IC

Integrated circuits, or IC's as they are now called, are the epitome of electronic technology today. A typical integrated circuit consists of a 25-mil square of semiconductor material with a number of transistors, diodes, resistors, and, in some cases, capacitors deposited thereon. These components are interconnected and packaged in a small transistor can or other container with external leads for circuit connection.

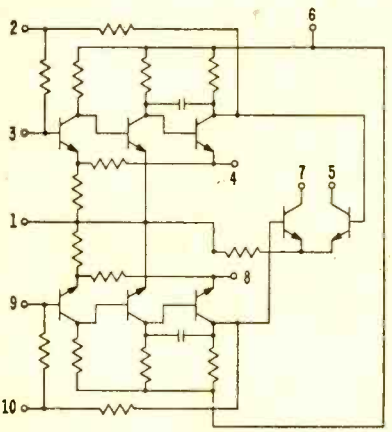
One of the first integrated circuits available to the experimenter was the Westinghouse WC183. It's available as the WC183G in a ten lead plastic package or as the WC183T in a TO5-style transistor can.

The WC183 is a general-purpose low-level audio amplifier consisting of an 8 transistor balanced circuit with internal DC feedback. It is fabricated on a silicon chip about 20 mils square.

The photograph shows the silicon chip and interconnections to the hermetic glass sealed leads. (The photograph is highly magnified to show it more clearly.) The circuit is shown in the diagram and consists of a 3-stage class "A" amplifier followed by a class "B" output stage. Note that the amplifier must be used in a push-pull output arrangement and not as two separate amplifiers.

Gobs Of Gain. Under ideal laboratory conditions, the overall circuit gain of the IC is given as 90 dB with a 4.5 volt power source. (90 dB represents a voltage gain of

Mini Mix is compact professional looking unit that's easy to build using IC whose tiny "chip" contains circuit at right.



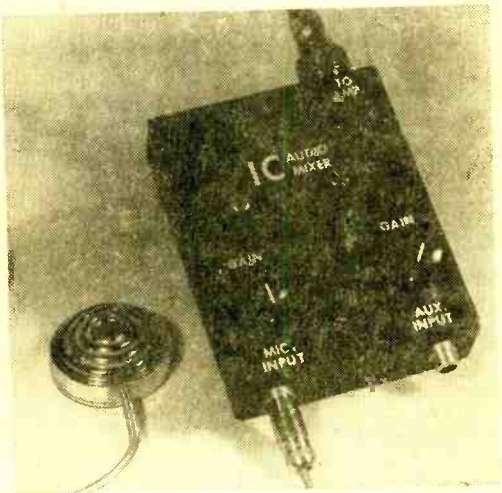
PIN NUMBERS REFER TO G PACKAGE

something in the area of 39,000 times.)

In the circuit shown, with 50,000 ohms input impedance, undistorted voltage gain of 20 times (26 dB) was obtained. This is adequate gain for most applications.

Mini Mix has an output transformer that will provide a 75- or 150-ohm output impedance. This will enable you to use microphone cables up to 100 ft. long between the mixer and the power amplifier. Of course, the power amplifier must have a low impedance input.

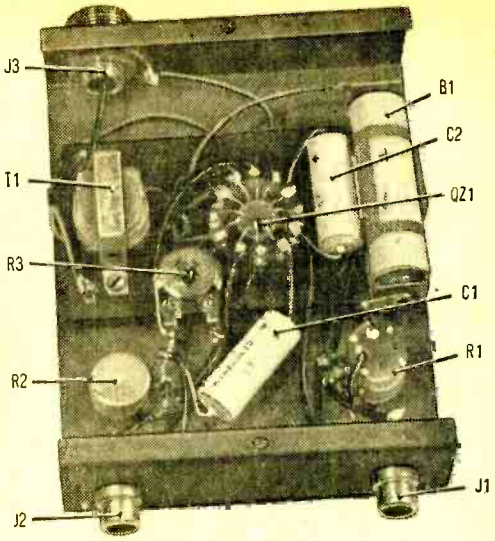
Mini Mix has two inputs with individual gain controls. Two microphones can be connected, their gains controlled individually and their outputs mixed in the output stage of the IC amplifier. The 50,000-ohm impedance of most crystal microphones is a good match to the 40,000-ohm input impedance of the IC amplifier. The gain controls are also 50,000 ohms and won't degrade the input impedance.



Completed Mini Mix all hooked up and ready to go. Unit's small size and good performance makes it welcome anywhere.

Making Mini Mix. The entire mixer is self-contained in an aluminum box 3¼ x 4 x 1 in. It can easily be held in one hand or slipped into a jacket pocket. The box is made from a miniature aluminum chassis with a homemade aluminum cover. The input and output connectors, gain controls, and amplifier assembly are mounted on the chassis.

The cover has four rubber feet attached and is actually the bottom of the box. The two box halves are carefully cleaned with steel wool and sprayed with two coats of



Internal layout of unit is simple and uncluttered thanks to IC. Most components including IC mount on phenolic board.

zinc chromate. They are then wet sanded and spray-painted with flat black lacquer. The decals are applied and a clear flat spray is given it to protect the lettering.

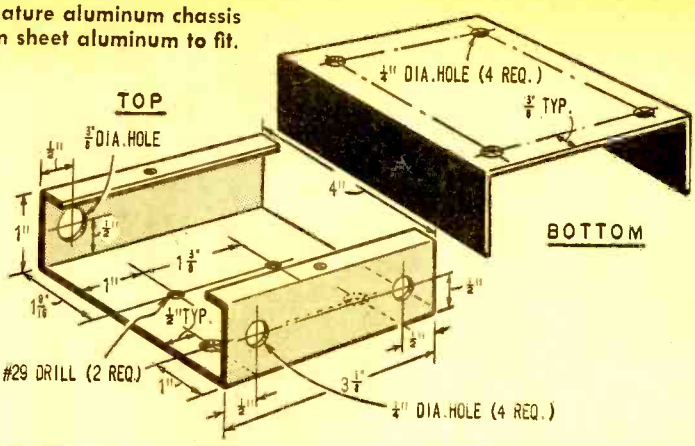
Sans Socket. The IC has 12 leads on .200-in. diameter centers. IC sockets are difficult to find and expensive to buy so the alternate method of mounting shown in the photo was used. A center clearance hole 11/32 in. in diameter is made in a phenolic board and a circle of twelve holes .093-in. diameter is drilled around it. The phenolic board is laid out and drilled approximately as shown and the turret terminals and two short stand-offs are staked into place. The TO5 IC can is inserted in the hole upside down and the leads are attached to turret terminals staked into the .093 holes.

The standoffs on the bottom of the board are for mounting board to chassis. The battery holder is riveted in place and the out put transformer is held in place by two 2–56 screws and nuts. Two 2–56 screws hold the box halves together. The two additional turret terminals near the transformer are for the secondary leads that provide the two different output impedances.

The connectors and the IC board assembly are mounted into the box half and then the wiring is installed. It is not necessary to use shielded wire since all the leads are short and the unit is completely shielded.

Buss wire, number 22, was used with plastic insulating sleeving where necessary

Top of Mini Mix is miniature aluminum chassis and bottom is made from sheet aluminum to fit.



for circuit wiring. The IC can is pushed into the mounting hole in the phenolic board and the leads crimped to the terminals as shown.

The locating tab on the IC can should be positioned as shown. Additional leads are fastened to the terminals before being soldered. Use extreme care when soldering so as not to overheat the IC junctions.

Sink The Heat. Each turret terminal should be held with needle nose pliers to draw off the excess heat from soldering.

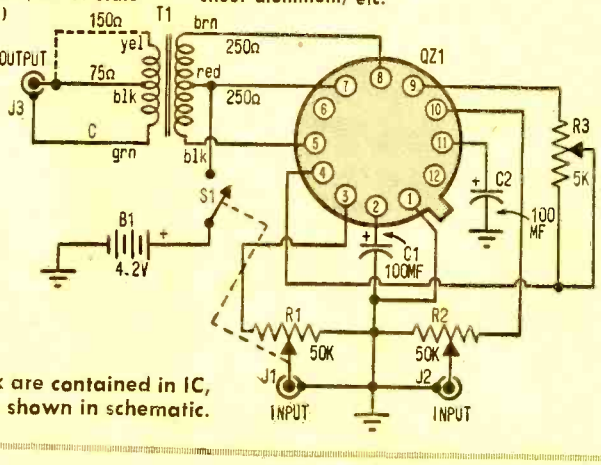
The output transformer has a tapped secondary. One wire is connected to ground and the other two to turret terminals. A wire from the output connector can then be soldered to either terminal to get either 75 or 150 ohms output impedance.

The miniature trimmer resistor is used to control the gain of the circuit. It can be set to its maximum value unless distortion occurs. The battery should be installed after all the wiring is completed and checked for errors.

Try-Outs. After the unit is completed, it can be tested by connecting one or two crystal microphones to Mini Mix and connecting its output to the low impedance input of an audio amplifier. If an audio signal generator and oscilloscope is available, a check can be made for distortion. Our unit was free of distortion at normal input levels. Mini Mix will work nicely when connected to just about any public address amplifier. ■

PARTS LIST FOR MINI MIX

B1—Mercury battery, 4.2 volts (Mallory TR153, Allied Radio 18B5938, or equiv.)
C1, C2—100-uF, 15-VDC electrolytic capacitor (Mallory MTA110E15 or equiv.)
J1, J2—phono jacks (Radio Shack 274-346 or equiv.)
J3—Microphone connector (Keystone 505 or equiv.)
QZ—Integrated circuit (Westinghouse WC-183T, available from Tridac Electronics Corp., Box 313, Alden Manor Br., Elmont, N. Y. 11003 for $8.95 postpaid, N. Y. State residents add appropriate tax.)
R1—50,000-ohm variable resistor with switch (Lafayette 32C7367 or equiv.)
R2—50,000-ohm variable resistor (Lafayette 32C7359 or equiv.)
R3—5000-ohm miniature trimmer resistor (Mallory MTC-53L1 or equiv.)
S1—Switch on R1
T1—Transistor output transformer (Argonne AR163, Lafayette 33C8554 or equiv.)
2—Knobs (Mallory 1910K or equiv.)
1—Battery holder for mercury battery, B1 (Keystone Electronics 137 or 106, Allied Radio 18B5909, or equiv.)
1—Miniature chassis (Bud CB1617, Allied 4ZA7816 or equiv.)
2—Standoffs, ¼-in. high, threaded 6-32 (Keystone 1591-2 or equiv.)
14—Turret terminals (Keystone 1502-2 or equiv.)
Misc.—Phenolic board, 6-32 screws, 2-56 screws and nuts, buss wire, insulating tubing, sheet aluminum, etc.



Most components in Mini Mix are contained in IC, remaining parts are wired as shown in schematic.