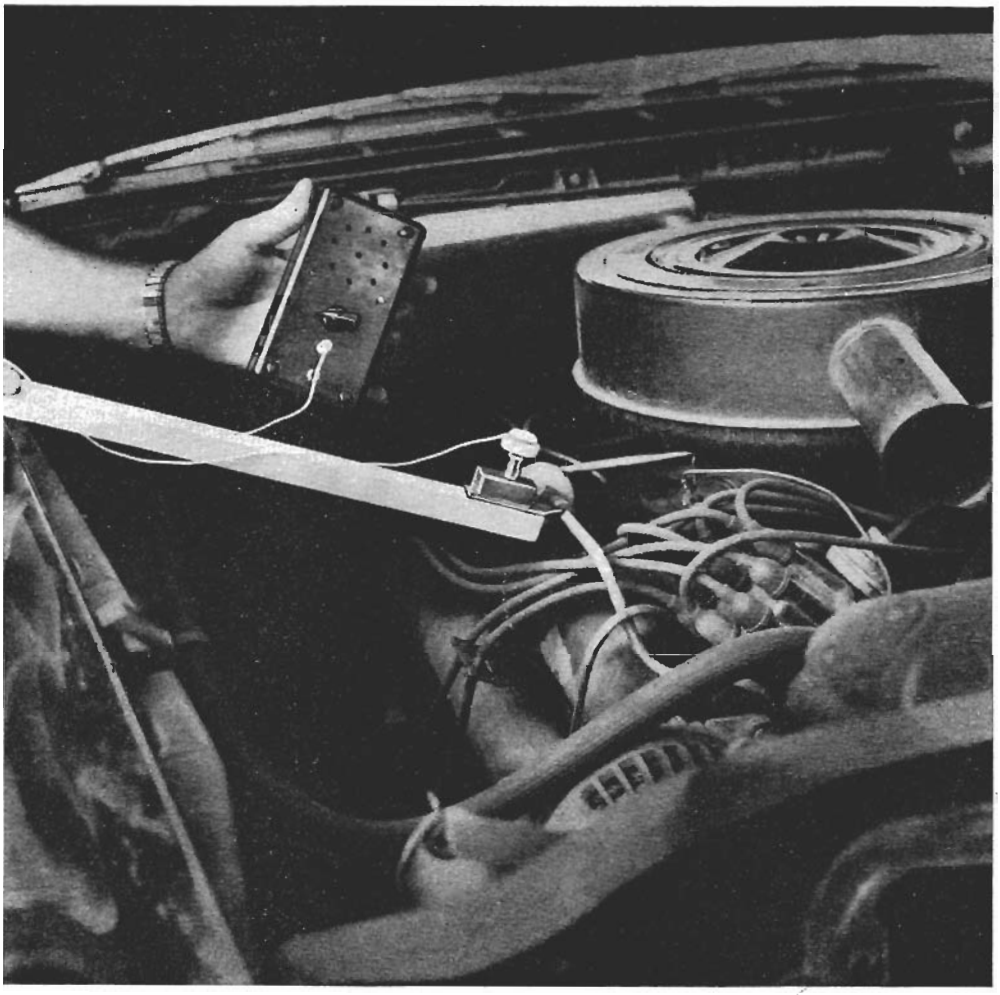


BUILD THE "ELECTRONIC STETHOSCOPE"

SOUND AMPLIFIER HELPS PINPOINT TROUBLES IN MACHINERY, TRACK DOWN MECHANICAL VIBRATIONS, AND LISTEN TO WEAK SOUNDS

By SAL STELLA

WITH THE "Electronic Stethoscope" to help sharpen your hearing, you can quickly trace a trouble in a car's engine to its source, locate a faulty bearing in an electric motor, or check the flow of liquids through pipes, feed lines, and valves. As a matter of fact, the applications of the unit are limited only by your imagination.

The stethoscope is used to amplify weak sounds or other mechanical vibrations. As the pickup end of the stethoscope approaches the sound source, the output "signal" from the pickup becomes stronger. Because the signal is strongest at the closest point to the source, it is

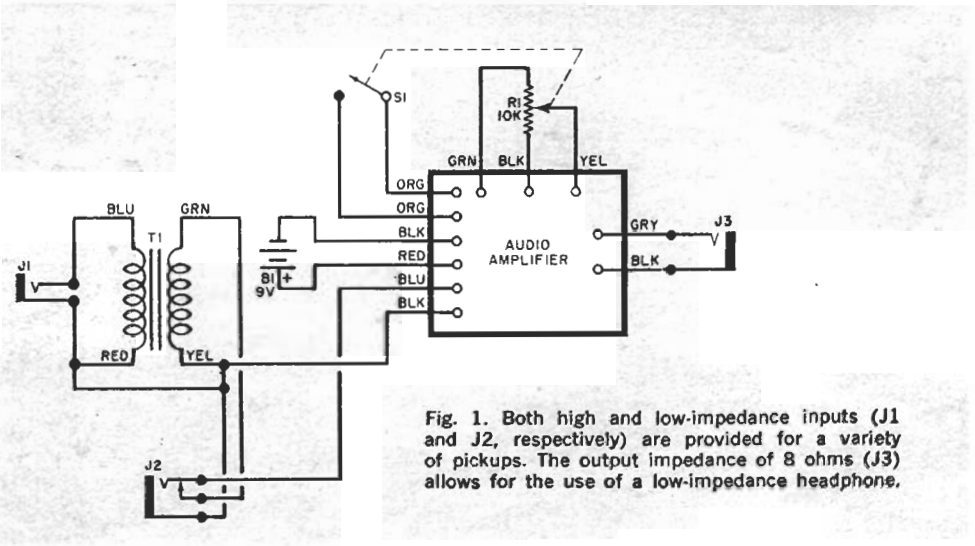


Fig. 1. Both high and low-impedance inputs (J1 and J2, respectively) are provided for a variety of pickups. The output impedance of 8 ohms (J3) allows for the use of a low-impedance headphone.

PARTS LIST

B1—9-volt battery
J1, J3—Miniature open-circuit phone jack
J2—Miniature closed-circuit phone jack
R1—10,000-ohm potentiometer (with switch)
S1—S.p.s.t. switch (mounted on R1)
T1—Impedance-matching transformer (Lafayette Radio Electronics 99 C 6034 or similar)
1—Five-transistor audio amplifier module (Lafayette Radio Electronics 99 C 9037 or similar)
1—Under-the-chin low-impedance dynamic headphone
1—High-impedance headphone for pickup—see text
1—Crystal or dynamic phono cartridge
1—5" x 3" x 2" (approx.) plastic or metal box
Misc.—Sheet metal, wood, magnet, solder, flat piece of iron or steel, nuts, bolts, spacers, etc.

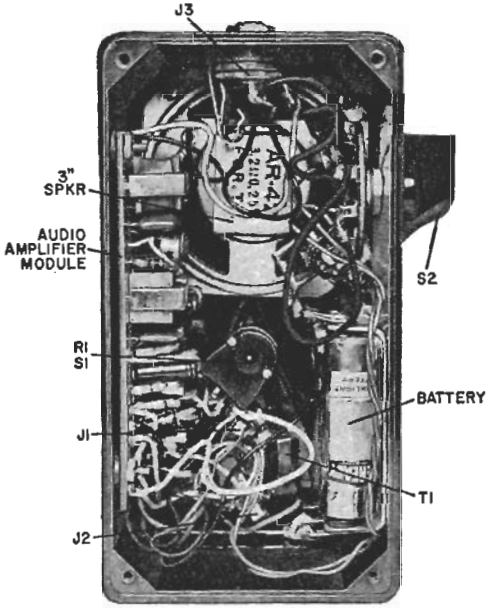


Fig. 2. A miniature 8-ohm speaker and a selector switch can be mounted on the case to provide a choice of either headphone or speaker output.

easy to pinpoint a noisy or defective mechanical component.

Construction time for the "Electronic Stethoscope" shouldn't be longer than three hours. And the cost of the unit is only about $10—a considerable saving over the prices of many commercially available electronic stethoscopes.

How It Works. As shown in Fig. 1, the "Electronic Stethoscope" is built around an audio amplifier module. Power for the amplifier is supplied by a 9-volt battery, *B1*; potentiometer *R1* functions as a volume control; and jacks *J2* and *J1* serve as inputs for a low-and a high-impedance signal source, respectively. The purpose of transformer *T1* is to match a high-impedance source to the amplifier's low-impedance input. In order to obtain a continuous circuit when the low-impedance input is not in use, *J2* must be a closed-circuit jack.

The device used as a microphone to pick up sound is a small crystal head-

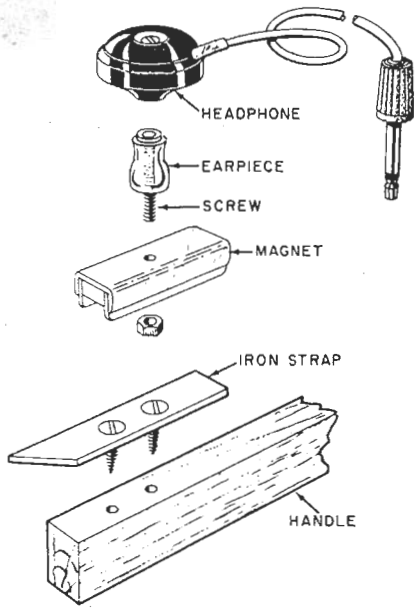


Fig. 3. The pickup should be mounted on a small but strong magnet. The probe consists of a wood handle with a flat piece of iron bolted to one end.

spacers or some washers to maintain a suitable clearance between the amplifier and case. Another small case can be used to store the pickups and magnets.

To make a hands-free mount for the sound pickup (microphone), attach the small headphone unit to a magnet. Cut the head off a 1½″-long #6 or #8 machine screw (whichever will make a better fit), and insert the screw into the earpiece as shown in Fig. 3. Secure it in place with a drop of cement. Bolt the earpiece assembly to the magnet, being careful not to overtighten it. The magnet shown can be obtained from most hardware and department stores.

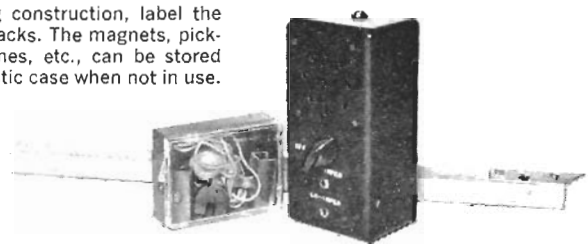
You can make a suitable probe for getting into hard-to-reach places with the pickup by attaching a small flat piece of steel or iron to one end of a 24″ x 1″ x 1″ piece of wood (see Fig. 3). The size of the metal is not important, but it should be large enough to accommodate the magnet. The end of the metal should be cut to a point to obtain maximum resolution of the trouble area.

An inexpensive crystal or ceramic phono cartridge connected to the amplifier's high-impedance input can be used to pick up mechanical vibrations. Attach the cartridge to another long piece of wood to make a convenient probe.

If you attach a metal clip to the stethoscope, you'll be able to hang the unit on your belt. The clip can be made from a 1″-wide by about 3″-long piece of 22-gauge sheet metal that has been bent to a shape roughly resembling a money clip. In fact, you can use a money clip. Mount the clip on the back of the amplifier case.

With only a little practice, diagnosing mechanical troubles with the "Electronic Stethoscope" should be second-nature to you. -30-

After finishing construction, label the controls and jacks. The magnets, pickups, headphones, etc., can be stored in a small plastic case when not in use.



phone of the type used with pocket-sized portable radios. An old crystal or ceramic phono cartridge will make a relatively inexpensive mechanical vibration sensor. Sounds or other mechanical vibrations sensed by the pickup are amplified and fed through *J3* to a low-impedance under-the-chin headphone.

Construction. Either a plastic or a metal case measuring about 5″ x 3″ x 2″ can be used to house the battery and amplifier module. Transformer *T1* can be mounted by soldering one of its mounting tabs to the outer conductor lug of *J2* as shown in Fig. 2. Use ½″-long