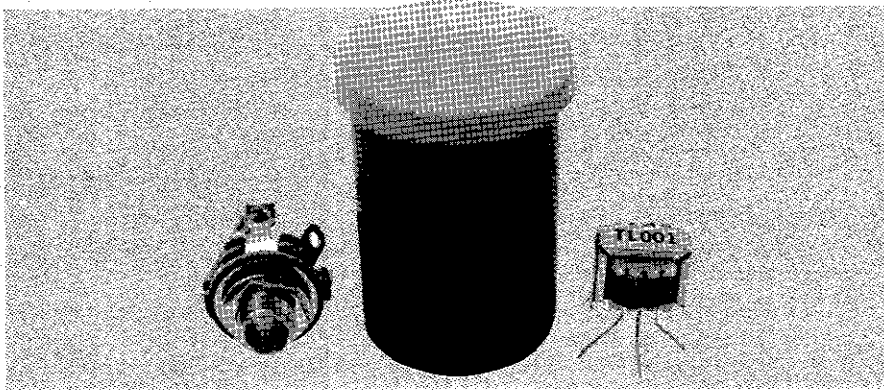


# The \$10 Aircraft Headphone

Kodak and The Shack are back to save your ears and wallet.

BY JIM WEIR



**Photo 1: components of the \$10 headphone (left to right): stereo headphone jack, film canister chassis and transformer.**

**W**hat would you say if I told you that I could help you keep your FAA medical unwaivered, make the folks on Unicorn easier to hear, reduce your piloting fatigue and win the love of a beautiful girl, all for the piddling small sum of \$10? Well, Bunky, the girl is

**Author (right) wearing \$150 aircraft headset and his friend (left) wearing \$15 'Shack headset—both can hear equally well. Note that friend is not supplied with microphone —this can be to advantage on occasion.**

your problem, but I *can* do all the others for a pittance.

You see, wearing headphones while flying reduces your exposure to a sound level that the OK City medicos tell us will harm your hearing in as little as a couple of hundred hours. Do you know why nothing seems to rattle the ten-thousand-hour pilots? Heck, they can't even *hear* the thunder, much less be



**Photo 2: the first try at assembling the converter was unsuccessful, because the wire leads of the transformer broke very early during testing.**

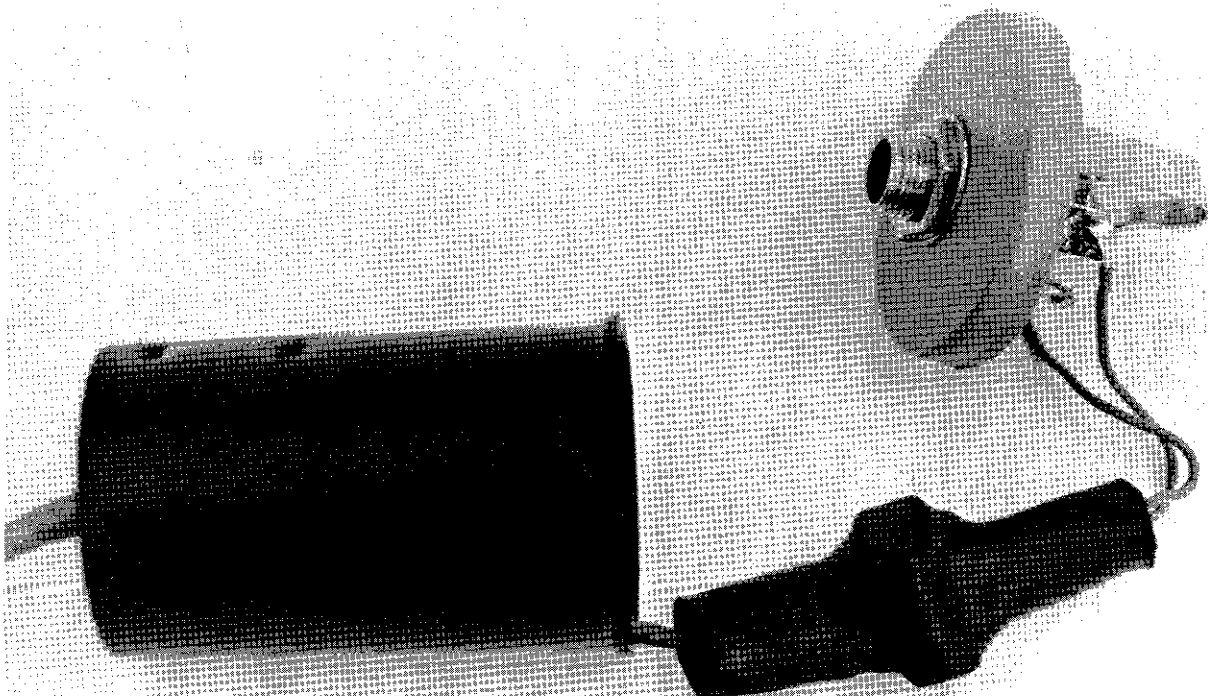
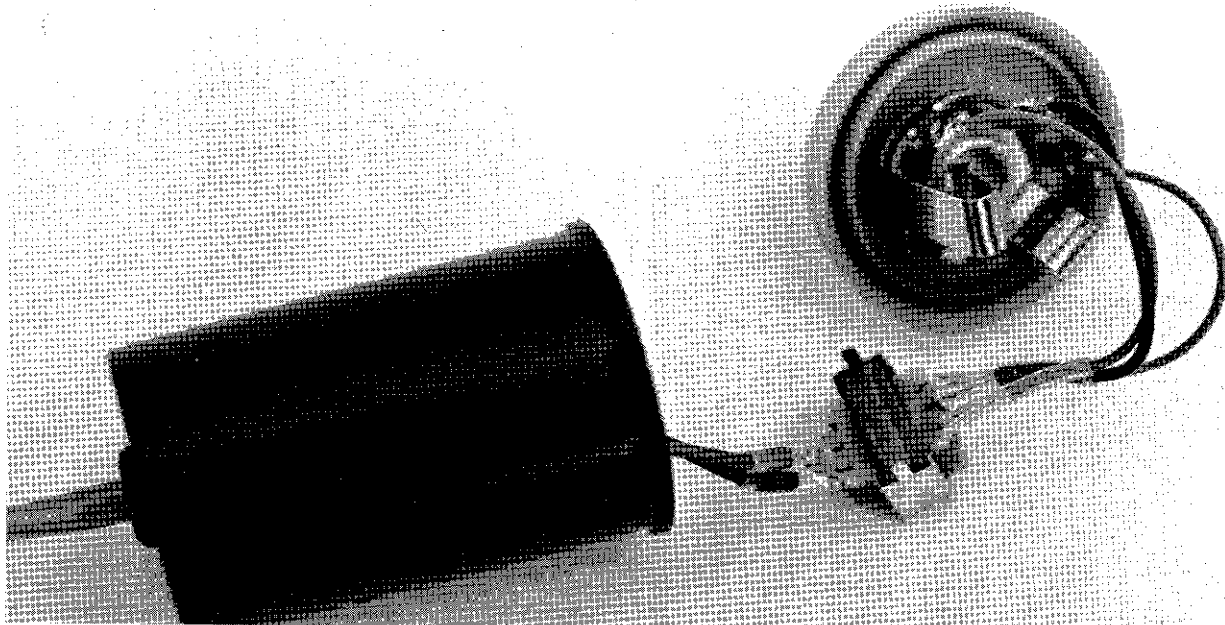
scared of it. As the hearing goes, so goes the medical.

Headphones also make the job of listening to the radio a piece of cake. Now, speakers are fine instruments for your home stereo, but trying to listen to a crackerbox radio on a tinny speaker with a cockpit noise level of 110 dB or so is just not the right way to go about it. Not only does the confusion coefficient go up by trying to listen to the radio on the speaker, so does the fatigue factor.

All of which points us to the logical premise that headphones in an aircraft are a very desirable thing. Unfortunately, any time the word "airplane" is mentioned, the price goes up by a factor somewhere between three and ten. Bluntly, aircraft headphones ain't cheap. To the rescue come what may appear to be strange bedfellows: Kodak and Radio Shack (with a little help from those kit avionics folks in Grass Valley, Radio Systems Technology).

I'm sure you know that you can go down to your friendly local 'Shack and buy a good set of stereo headphones for less than \$20. Most people even have a set or three laying around the house. The problem is that the stereo phones are low impedance and the aircraft radio is high impedance. Just putting the stereo 'phones in the aircraft radio jack will load the aircraft radio down, could damage the radio innards and will not give you near enough volume to hear. It's a little like

**Photo 3: Shrink sleeving was placed over the transformer to keep leads from breaking during the second attempt—the fit was too tight.**



# SKY PUP

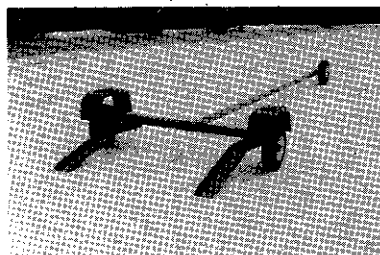
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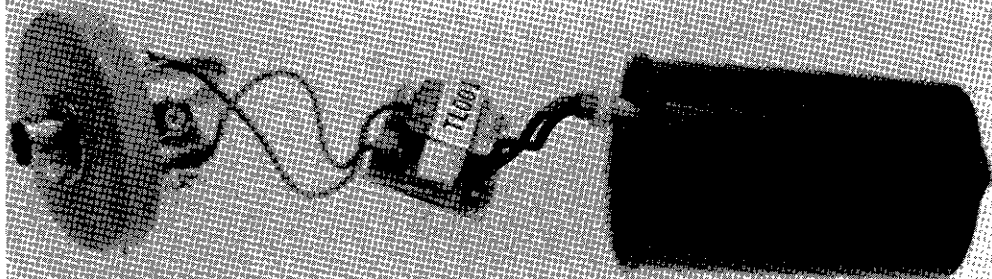
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## HEADPHONES

continued

towing a 747 with a motor scooter; the plane isn't going to move and you stand a good chance of breaking the motor scooter's transmission.

The solution—in both the case of the motor scooter and the stereo 'phones—is to gear the thing down. Electronically, we call this an impedance transformation and (mirabili dictu) the device we use is called a transformer. Find a transformer that will drop the relatively high (150-600 ohms) impedance of the radio to the 8 ohms or so of the headset and the problem is solved. Almost.

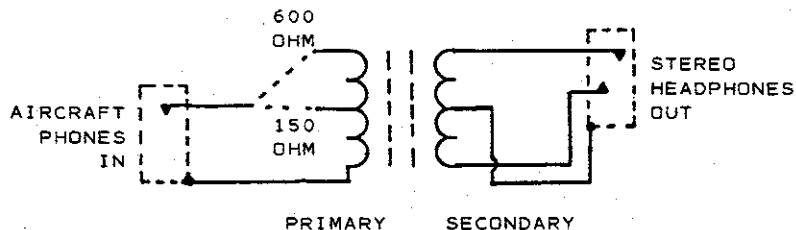
First, such transformers are not carried down at the local 'Shack. Second, it would be kind of nice if we

Photo 4: final solution is to mount the transformer on a fiberglass PC board and wire to the board. The board is bolted to the chassis for rigidity.

could make a neat little housing for the transformer and the 'phones jack to fit in. Last, we need to make a good, rigid connection between all of the wires involved.

Figure 1 is the schematic of this device. Note that the primary of the transformer can be connected as a 150- or a 600-ohm load to the radio. Either one is OK—if you connect to the 150-ohm point, the phones will be louder than if you connect to the 600-ohm point. To identify the primary

**FIGURE 1: schematic diagram of a simple modification for using stereo headphones as aircraft headphones.**



and secondary of the transformer, look at the transformer case. One side will be marked "P" or "PRI" or "PRIMARY?" The unmarked side should then be the secondary.

How about a cute little housing? How about a *free* cute little housing? Since the '60s, Kodak (and others) have been packaging their film in a little plastic canister that just barely has room to house a transformer and a 'phones jack. See Photo 1. (Yes, yes, you cheap doctors, you *can* use a pill bottle if you want!)

We tried several different ways of hooking the transformer up to the aircraft phones plug and the stereo phone jack. First (Photo 2) we tried wiring directly to the leads of the transformer and using plastic sleeving to insulate the connections. With no support for the fairly fragile transformer leads, they broke about the second time we opened the lid to look inside. Suspicion was that they might last an hour or two in turbulence.

Then we tried putting shrink sleeving over the whole kit and caboodle (Photo 3). We had to use a hammer to put the thing together, but then it became very difficult to plug the phones in.

Finally, we gave in and designed a little fiberglass PC board for the transformer to fit on and mount to the "chassis" (canister) (Photo 4). With this setup we have not broken anything in the long hours of testing we have undergone (including a couple of unscheduled stress tests when the fool thing fell onto the floor).

Anyway, that's it: one transformer, one film canister, one stereo phone jack, one mono phone plug, some wire and you've got the equivalent of an \$85 noise-deadening aircraft headphone.

To boot, those fine folks at Radio Systems Technology have made this bundle of parts (less, of course, the "chassis") available at the title price—\$10 plus shipping gets you a PC board, transformer, stereo headphone jack, mono aircraft phone plug, and wire. What a deal.

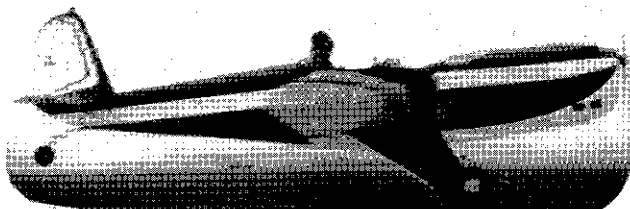
I'm just as sure that we could use another film canister, a teeny-tiny microphone element and some fancy electronics to rig up a boom microphone onto this headset, but where are we going to get the gooseneck tubing? I'm open to suggestions. □

**FOR MORE INFORMATION, contact Radio Systems Technology, 13281 Grass Valley Ave., Grass Valley, CA 95945; 916/272-2203.**



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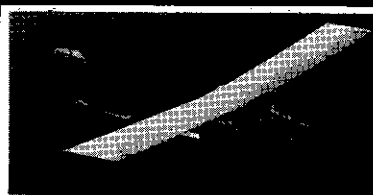
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