

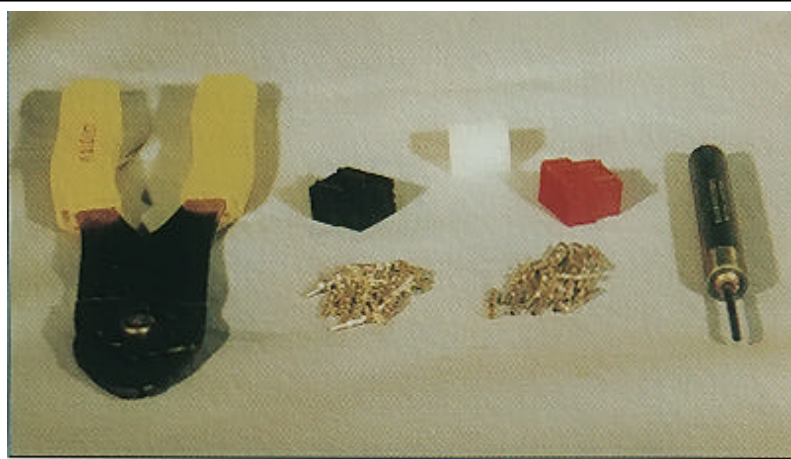
AERO 'LECTRICS

Let's push the envelope by setting the *Karmic Standards*.

By Jim Weir

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This is the first of a series of articles that proposes standards for avionic interconnects in homebuilt aircraft. Taking it a step further, in case you Spamp-can drivers want to port along with these standards, I'll write so you can get them blessed for your standard airworthiness craft (with the usual caveat to have your installing mechanic approve the concept *before* you bend metal and cut wires).



Intermediate connectors: Black is male; red is female.

MCA and have them plug compatible. That is, they wanted to be able to pull out a broken radio from one manufacturer, slap a replacement from another manufacturer in its place, and get back on line.

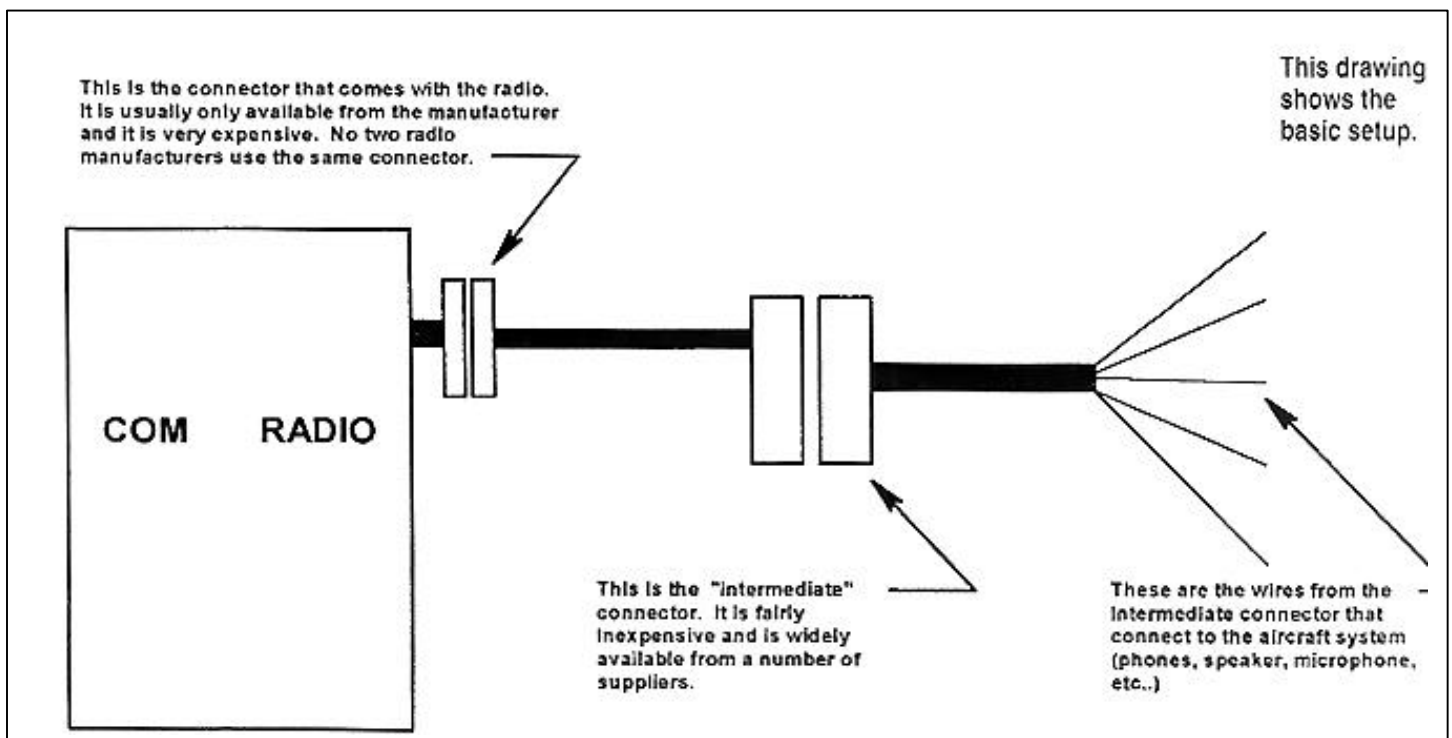
So the airlines all got together and invented a new company called Aeronautical Radio Incorporated, long since shortened to the acronym Arinc. Each airline that founded Arinc had a seat at the table when these

new standards were being developed.

Setting the Scene

Let me take you into another world for a moment—the world of big long aluminum tubes with kerosene-belching engines. The airline industry a long time ago came to the conclusion that they wanted to buy radios from Culluns or Spyrle or

It works great. Arinc standards that were set back in the days of tripletail Connies and Douglas airplanes with round engines carry through to this very day. I can take an old tube-type radio from my days at PSA (a long-departed airline) and slap it into a brand new transistorized Baby Boeing just out



of the hangar in Renton and it will work just fine, thanks to the Arinc standards that the airline industry has had for more than 50 years.

Is this true in the world of general aviation? Not on your tintype. The Big Three in general aviation (formerly Cessna, Beech and Piper and more recently companies with names like RANS, SkyStar and Neico) never got it together to set standards. What Nerky, Queen, and Turra (and admittedly, my company—RST) did was each pick the connector that each company thought would do the job and chose the pinouts totally at random.

There is nothing wrong with that, but when I go to upgrade my old Superhomer with the newest, greatest whizbang box, I don't have a ghost of a chance of having them plug-compatible.

The Result

Of course this makes it possible for your friendly local radio shop owner to personally know which are the best hotels on Maui. You are paying \$50-\$90 an hour for some poor avionics technician to lie belly up under your panel and painstakingly remove each wire from your old radio, label it so (s)he knows which wire is which, put your new radio in, make a harness for it, wire that harness wire by wire to where the old harness hooks in, and then test the whole shebang.

If you have two radios wired through a switch panel, abandon wallet all ye who enter here. Not only does the radio get rewired, but the switch panel too.

A Solution

There is an answer. It is 15 minutes of work and \$5 worth of parts to implement, and it means that when you buy your shiny new whizbang radio, it will be 10 minutes between the time you open the package until you have it in your airplane ready for testing (mechanical installation not included). It is a technique that we used in the space program, in the professional broadcasting industry, in the two-way land communications field, and in the auto radio field.

It is simply called the *Intermediate Connector* technique. Since it is proposed and documented right here, right now in KITPLANES for the first time, we get to choose a name. If the airlines can have Arinc, we can certainly have the *KITPLANES Aircraft Radio InterMediate Connector* or *Karrnic* solution to the problem. (Yeah, I know it ought to be *Karimc*, but it just doesn't flow off the tongue that way.)

Life After Karmic

Karmic solves a whole universe of problems. Let's say you are having radio problems in your Long-EZ. If the entire light aircraft industry adopts Karmic (fat chance), then I could pull my known good radio out of my Cessna, loan it to you, and you could run a simple comparison test with my radio in your air-

plane *without* having to make an adapter cable to fit your harness.

Get the idea? It is what the PC world has had with computers for the last 20 years; I don't care who makes the hard disk drive—everybody uses the same pinout. I can pull out the suspect Eastern Dinkical drive, slap in a Baygate, and keep on cybertrumping without missing a byte.

There are several advantages to an intermediate connector. First, as noted, radios now become generically portable from

airplane to airplane without wiring changes. Second, new radios can be installed in a matter of minutes rather than hours. Third, the radio's original connector isn't compromised; the wiring to the intermediate connector comes from the original radio connector. And, when you get around to selling your homebuilt airplane, being able to advertise that the radio stack conforms to the Karmic industry standard should add to the value of the sale.

Mechanizing It

Thought needs to be given to the pinout...and to the style of connector. We need some consid-

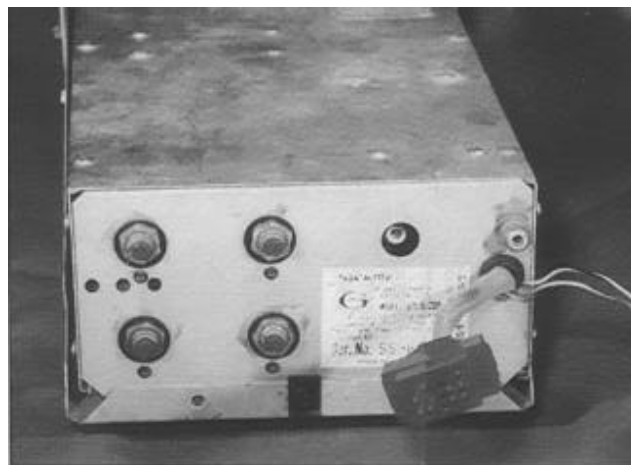
eration given so that any of the parts in the system can be purchased from any one of a dozen suppliers. The parts chosen should not be so new that they haven't had a goodly amount of field experience nor so old as to be nearing the end of their lives. The parts should not only be available from several suppliers, but from several manufacturers as well.

The tools necessary for construction ought to cost not more than the airframe on which they are being used. The parts themselves ought not to weigh more than the radio that they are being installed on. Finally, they ought to be repairable in East Egypt with baling wire and chewing gum if necessary.

This proposal standardizes on the nylon-shell 0.062-inch diameter pin series that is used as a power connector in everything from washing machines to space hardware. So far as I know, they have been around for 25+ years, there are three major manufacturers of them, several dozen suppliers handle them, they are lightweight nylon with hollow tin-brass pins, they come in all configurations from 1 to 24 pins, the crimp tool to assemble them is less than \$10, the extractor tool to disassemble them is about the same price, and you can fix them in the field with pliers, a soldering iron, and a chunk of brass tubing from a toy model shop.

Ta-Daa!

This, then, is the Karmic proposal: Use the power/signal connector that came with your radio. Within 6 inches (15 cm) of the radio, install a 15-pin Karmic connector pair wired in accordance with Figure 1 (schematic drawing). Wire the mating connector of the pair into the aircraft system as you would wire any radio. If you should ever want to replace that radio with another radio, simply wire the new radio with the Karmic-



Here is an intermediate connector pair installed on an older radio.

dio-side connector, plug it in to the mating aircraft side connector, and you are *on the air*.

There are bound to be refinements of this system that will evolve over the years. Perhaps other manufacturers will pick up on the system and offer it as an option on their radios, and there will be things in coming generations of radios that we of the old school never even thought about.

The system needs to be flexible enough to adapt to all these new changes without abandoning the basic premise that started this whole thing. When I write the KITPLANES column for July, 2056, I want it plug-compatible with October, 1997.

What Do You Think?

At this time this is a proposal only. It is up for comment and consideration, but it is something whose time is long overdue. Your letters and *especially* your e-mail and newsgroup comments would be most welcome. Copies of the schematics in this article will be available on website www.rst-engr.com for your download at any time. **KP**

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