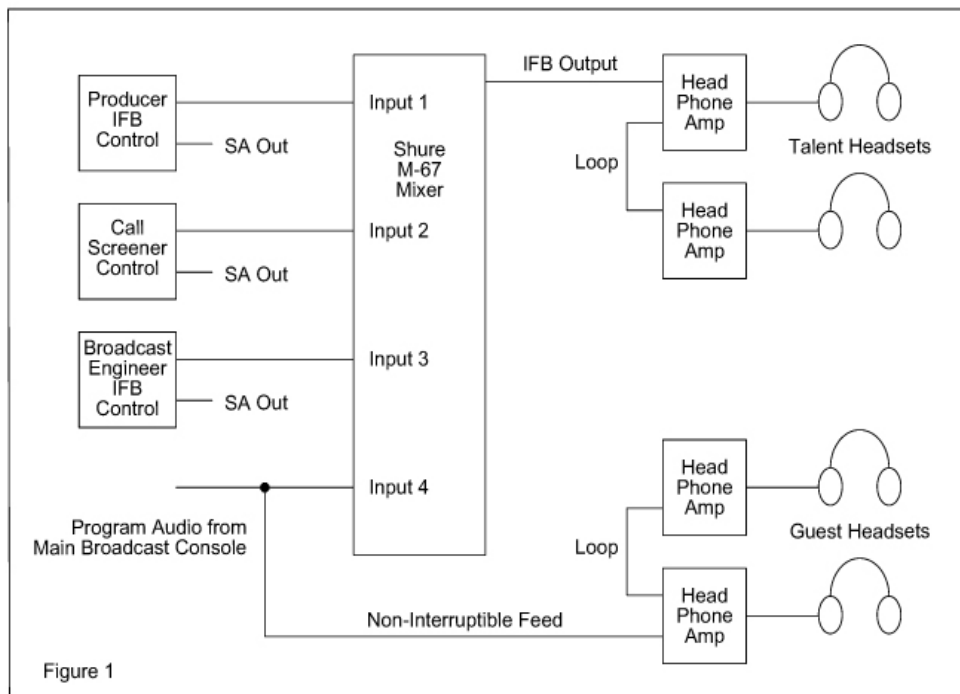


Radio World Magazine Sept. 16, 2005 pages 48-50

With a little effort, building the Simple IFB system will give your remotes studio-quality performance and convenience on a poor man's budget.

## Build a Simple IFB System

by Gary Palamara



In its simplest form, an interruptible fold-back system or IFB, allows air talent to hear their own audio (fold-back) mixed in with other program sources like incoming telephone calls or remote feeds. The interruptible part happens when a producer, telephone coordinator or broadcast engineer breaks into the talent headset system to deliver needed information.

In the studio, some broadcast consoles have IFB circuitry

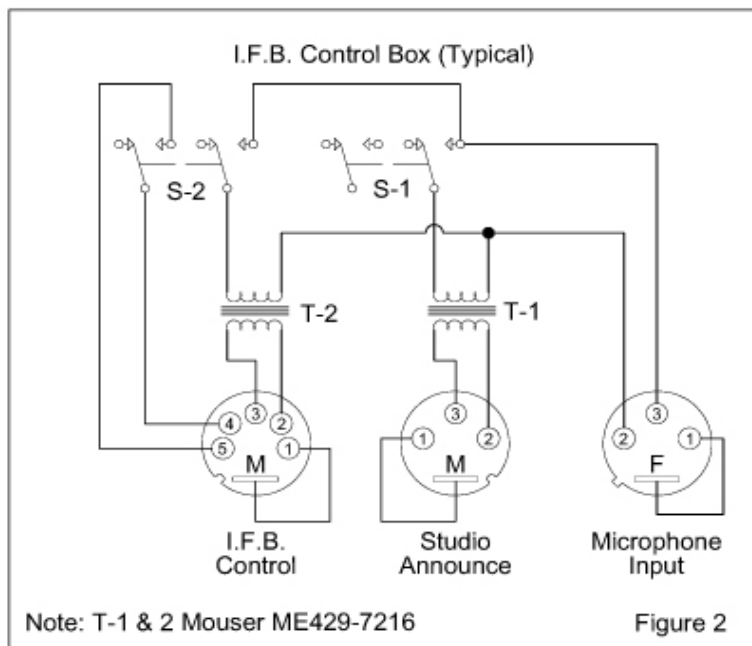
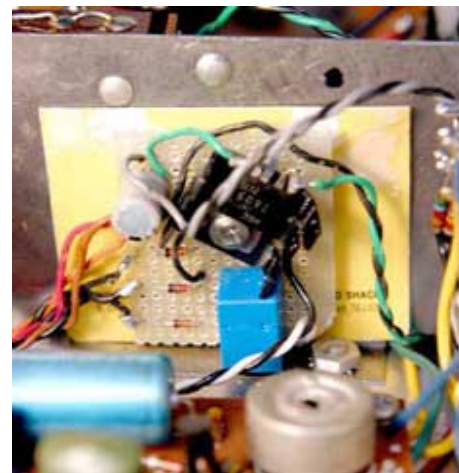
built in. But for work in the field or for smaller studios, IFB cueing is quite often a luxury. Commercial systems are available, but many engineers under budget constraints are either forced to home-brew a system, or worse yet, they do without IFB.

Sometimes, a producer's IFB microphone can be sent through a spare channel of the broadcast console, but that means you run the risk of crosstalk or IFB audio accidentally entering the on-air signal path. Not good.

What's needed is a stand-alone system that is easy to set up and simple to operate. The Simple IFB satisfies all of these requirements and has enough flexibility for producers and technical crew, while also providing a program interrupt channel, all in a small, stand-alone package. Figure 1 shows the block diagram for the Simple IFB System.

**The Basics** - Three components make up the system: microphone switching, audio source mixing and headphone amplification. With the bottom line in mind, I looked around the shop and decided to design everything around a longtime audio classic that happened to be sitting on a storeroom shelf.

Although it is no longer manufactured by Shure Bros, the M67 four-input audio mixer is legendary for its reliability and ease of use. The M67 was probably the first mass-market field audio mixer, when it entered production in 1968. Tens of thousands of M-67s were made over the two decades of its manufacture and many are still in use today. The M67 is reliable, easy to use, and when repair is needed, its discrete circuitry is simple to fix. It also has a fair amount of extra room inside the chassis, which helps when making modifications to the circuitry. The mixer's four inputs, tone generator and VU metering make setting up and monitoring the IFB system relatively easy.



Naturally, your particular setup might vary from what I have designed, but the basic idea is straightforward. If you don't happen to own an M67 mixer or even its newer big brother, the Shure M267, either unit may be purchased for a \$100 or less on the surplus market. But most frugal engineers will probably have a long-forgotten spare mixer sitting on a shelf somewhere, just ready to use.

Figs. 2 & 3 shows the complete system setup. Most of the IFB circuitry is built inside the M67. Relay K-1 and other small parts were pre-assembled onto a small,



Both in the studio and in the field, the technical crew normally works fairly close together; so cable runs between the control boxes and the IFB mainframe are usually not very long. My system was made for fieldwork, and for ease of setup, I chose to build “special” cables that carry both the IFB audio and program mute switching in the same cable.

Five or six cables of varying lengths were built to give me some options during setup. To interconnect the IFB system to the control boxes I used Canare brand, star quad cable and five-pin XLR connectors. The quad cable has a total of five conductors: two twisted white wires, two twisted blue wires plus a shield. I used the two white wires to carry microphone audio to the mixer and the two blue cables switch the mute relay. The shield connects to ground on pin 1 of the XLR.

With short cable runs, crosstalk between the microphone audio and K-1s DC voltage doesn't seem to be a problem. Referring to Fig/ 3, one reason for this is the reversed biased diode D-4 and capacitor, C-4 that are connected across relay K-1. When relay K-1 de-energizes, its magnetic field collapses suddenly, and the D4, C4 combination help dampen any back voltage.

**Cable-ready** - One drawback of building “special” cables to work this system is the inevitability of not having the right cable at the right time for making the interconnections in the field. So make sure to carry a few spares of various lengths when you go out on the road. To identify the five-pin XLR cables, all of the wiring for the IFB system is a nice bright orange color.



While the Shure M67 is a great mixer, one of the problem areas of its early design is the rather poor voltage regulation of its power supply. Trying to run relay K-1 off of the main voltage source that also runs the electronic circuitry inevitably will cause the mixer's DC voltage to sag to a very low, unacceptable level. Luckily, there is another option.

The secondary of the 67's 120-volt transformer has two independent windings. While the center-tapped, high-voltage winding operates the mixer's electronics, another low-voltage winding provides approximately 6-volts AC to only run the two # 47 lamps that illuminate the VU meter. Fig. 3 also shows a partial view of the M67 circuitry. You might notice that one side of the green 6-volt winding is already at chassis ground potential. By adding diode D-5 and capacitor C-3 to the non-grounded end of the winding, you'll end up with plenty of DC power to run K-1 without affecting the audio circuitry. A 5-volt regulator and LED indicator were added to help stabilize the relay voltage and provide a visual indication of IFB switching.

**I've used this simple IFB system many times with good results. The entire package with mixer, control boxes, headphone amps and cables fit into a single small road case and only takes a few minutes to set up and test out. You can modify and expand this system with more channels and to meet other needs. Just remember the KISS principle.**

**With a little effort, building the Simple IFB system will give your remotes studio-quality performance and convenience on a poor man's budget. Drop me a line and let me know how you made out.**

***About the Author - Gary Palamara, AF1US, is a radio amateur and a freelance audio engineer. He began his career with Armed Forces Radio and has spent three decades working in audio and video production. He owns Morningstar Sound, a professional sound services company. Reach him at [www.morningstar938@verizon.net](mailto:www.morningstar938@verizon.net)***

**copyright 2005**