CONNECTIONS

# Low-cost plastic connector speeds the polishing of fiber-bundle ends

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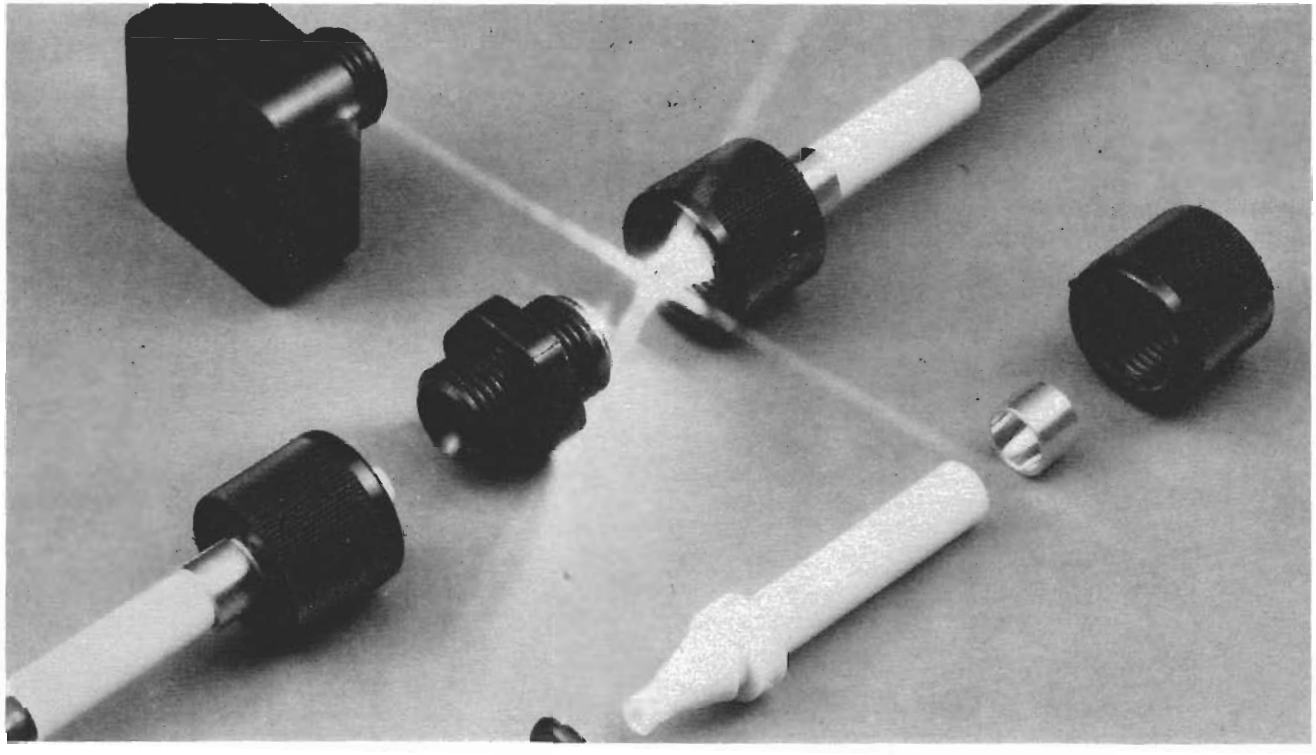
Molded thermoplastic connectors are an inexpensive, fast, and reliable way of terminating fiber-optic bundles. Economically mass-produced, they weigh much less than metal parts and also interfere less with the optical polishing of the bundle ends. Any plastic smeared across the fiber surface during the polishing will be too soft to score them, unlike metal, and can easily be removed.

The connector shown in Fig. 1 is one of a series designed to further simplify the polishing process—in fact, as will be explained later, it can be installed in the field by people without special skills or training. Equally important, it optimizes packing fraction—the ratio of active cross-sectional area of optical-fiber cores to the total end-surface area of the bundle—and can handle the full range of fiber-bundle types and size from most major fiber-cable manufacturers.

It mates with either an input/output bushing that can house many standard light sources and detectors or with a splice bushing for terminating cables. For a dry splice—two face-to-face terminations separated only by air—insertion loss is about 3 decibels, a figure that falls to about 2 dB when an index-of-refraction-matching fluid is added as a coupling medium.

Before this connector can be attached to an optical-fiber cable, the cable's jacket must be stripped away and a generous amount of an epoxy or a cyanoacrylate adhesive applied to the exposed fibers. The connector assembly then slides easily onto the bundle, and the crimp ring attaches it to the jacket. The closing action of the specially contoured polishing bushing radially compresses the nose end of the ferrule, squeezing all the fibers together. This spreads the adhesive thinly,



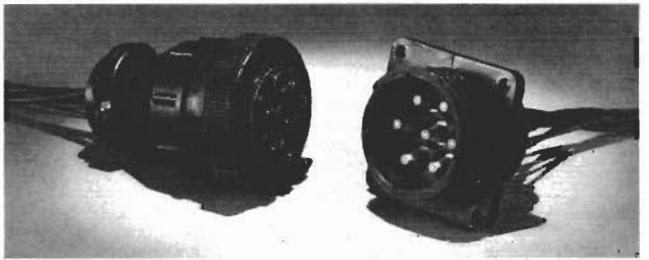
**1. Plastic housing.** This connector assembly can handle fiber bundles with diameters from 0.02 to 0.075 inch. The termination mates with a splice bushing for fibers (middle) or a bushing (top) that houses several standard light sources or detectors.

allowing it to set up instantly and lock the fibers.

Next, with the special bushing still attached, the bundle is polished by being wiped across three separate grades of sandpaper with abrasiveness ranging from 320 grit to 600 grit. Then the fibers are simply wiped clean and the polishing bushing discarded. Extra polishing gains only a couple of tenths of a decibel.

In terminating plastic optic fibers, as in the DuPont PFX bundle, the process is even simpler. There is no need to remove the jacket or immobilize the fibers with adhesive or epoxy—the jacket material extruded around the soft plastic fibers holds them tight enough. In fact, because the connector assembly is attached to the jacket with a crimp ring, the use of adhesive can be eliminated from the end-termination procedure entirely. The remaining procedure is then the same as for the more brittle glass-fiber bundles.

Mating bushings provide the necessary alignment mechanism for source-to-bundle and bundle-to-detector coupling. To protect the optical interfaces from contaminents, an O-ring seated on the ferrule engages the face of the bushing when the parts are mated.



**2. More than one.** Without any modifications, several end terminations can be used to form multiposition connectors. With two fibers face to face in a splice bushing, insertion loss is about 3 decibels. This drops to 2 dB with an index-matching fluid.