Connector Replacement Service Tips *

How to remove damaged connectors without damaging the pc boards on which they are mounted

Frequent insertion and removal of circuit cards on which connectors, such as the Amphenol types commonly used in personal computers, are mounted can result in broken plastic edges or/and broken or bent fingers or pins (see Fig. 1). Replacement of such connectors entails desoldering and possible heat damage to the boards. However, if you go about the job in the correct way, you should never encounter this problem.
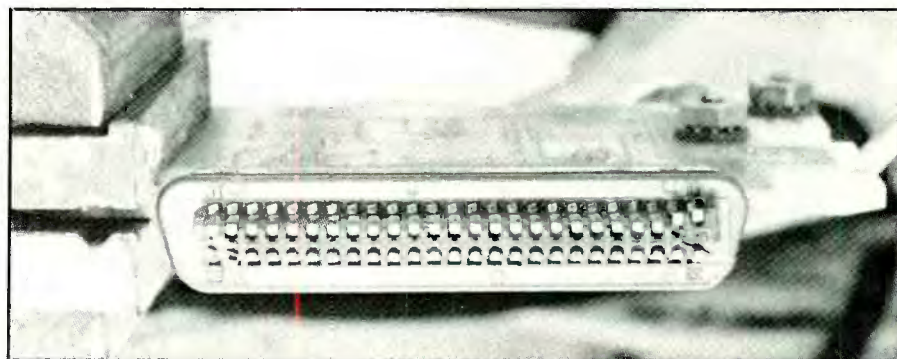
A procedure that will not damage pc boards has been developed at Hewlett Packard's Mountain View Service Center. Though the procedure was developed for use in a well-equipped service center, the tools required to do the job are common items in most small shops and on many home workbenches. What you need to perform the procedure properly are: a Dremel Moto-Tool™ or similar rotary tool; a grinding disc; an adjustable vise, such as those designed by Panavise for electronics use; a 60-watt soldering iron; long-nose or similar pliers; and perhaps a solder-sucking tool and/or desoldering braid. Also, since the work to be performed involves grinding of metal, which can pose a hazard to your

Fig. 1. A typical example of a damaged Amphenol connector.

eyes, you should use a faceplate or, at the very least, safety goggles.

Connector Removal. The first thing you do is clamp the board from which a connector is to be removed in the vise. Orient the board so that the connector will always be in full view during the grinding operation as shown in the Fig. 2 photo.

Cutting away the connector is done in two stages. With the grinding disc chucked into the rotary tool, grind completely through each connector pin, just below the connector housing, as shown in Fig. 3. Remove the board from the vise, flip it over, and repeat for the pins on the other side of the board. This done, remove any machine hardware that anchors the connector to the board. Discard the damaged connector.

Cleaning Characteristics of Various Solutions			
Cleaner type	Concentration	Times tested	Times satisfactory
NH4OH	29.5% NH3 by weight	18	16
IPA only	99.5% assay	8	0
IPA/H2O	50:50, 99.5% assay	10	1
IPA/H2O	80:20, 99.5% assay	18	7
KOH	45.0% to 46.0%	18	5

Fig. 2. Connector removal setup.

Fig. 3. Cutting tool position.

You now have the stubs of the connector pins protruding from the surface of the board. (If you removed an Amphenol connector like that shown in the photos, there will be a row of such stubs on both sides of the board. With other types of connectors, you might have only one row or two parallel rows of such stubs. In any case, the procedur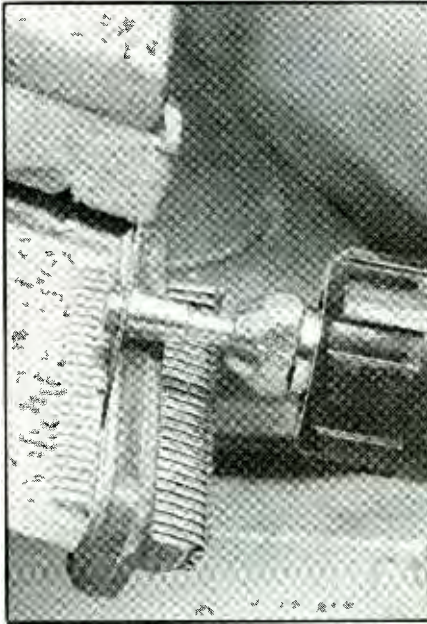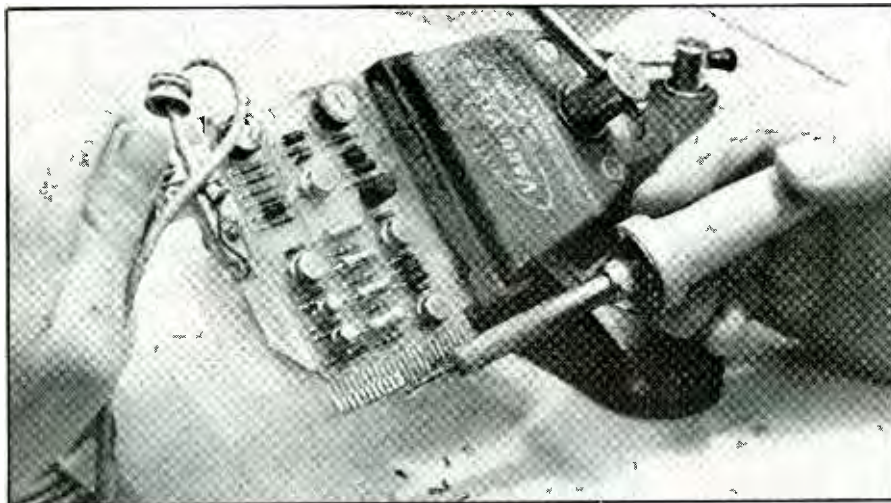e that follows is basically the same.) Make sure your soldering iron tip is up to operating temperature. With your pliers, firmly grasp a pin stub, apply heat to the connection, and when the solder flows, gently pull the pin stub out of the hole. Wait for the solder to be completely molten before you pull on the pin stub; otherwise, you might still damage the board by lifting the foil trace. Also, use a relatively high-wattage soldering iron so that the

time it takes for the solder to flow is very short. Repeat the procedure for each remaining pin stub.

Connector Replacement. Having removed the pin stubs from the board, you will probably note that some or all of the holes are clogged with solder. Before you can install a new connector on the board, you must clear the holes of this solder. This involves reheating each solder pad until the solder flows and either sucking the solder up with a solder sucker or wicking it up with solder wick. Again, heat each pad only as long as necessary to insure against damage to the board's substrate or lifting of the foil traces.

Install the new connector on the board, carefully aligning its pins with the appropriate holes and making sure the connector is properly oriented. Anchor the connector to the board with appropriate machine hardware. Finally, solder each connection point. Use heat and solder sparingly (you need only enough to assure good electrical and mechanical joints). Take care to avoid creating solder bridges.

If you follow this procedure in every detail, you will find that connector removal and replacement is indeed a simple and easy task to perform.

Fig. 4. Removing the pin stubs.

Clean Fingers. In a related matter, the subject of dirty or/and corroded or oxidized foil "fingers" on the edges of pc boards designed to plug into connectors can be a very real problem, especially in personal computers. Many computers and other electronic products sent to service facilities for repair need nothing more than a good cleaning (and protection from causes of dirt and oxide contamination) to put them back into service. Again, the people at Hewlett Packard have devised a solution that can be used in any repair and maintenance facility, including the home workshop.

In the HP Labs, a number of popular cleaning solutions for edge-connector fingers were studied to determine their effectiveness. The results are summarized in the table. Note that the three solutions that performed the best were ammonium hydroxide (NH_4OH), an 80:20 mix of isopropyl alcohol and water (IPA/H_2O), and potassium hydroxide (KOH). Ammonium hydroxide was obviously best, doing a good job of cleaning, improving cosmetic appearance, and providing no decay in resistance to atmospheric corrosion in tests following cleaning. A moderately successful second choice was the 80:20 alcohol/water solution.

From these results, one can conclude that the alcohol/water solution, though not ideal, is the better choice of cleaner, basically because it does not require special handling procedures or special ventilation.

The cleaning procedure is relatively simple, too. Simply saturate a cotton swab with the alcohol/water solution and vigorously scrub the connector fingers to remove dirt, oxidation and corrosion. Thereafter, just let the circuit board air dry. **ME**