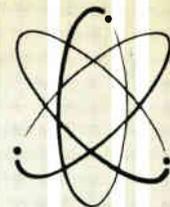




Techni-talk

COMPLETE ELECTRONIC SERVICING INFORMATION
radio • tv • hi-fi



VOL. II NO. 5

SEPT.-OCT. 1959

SERVICING PRINTED CIRCUITS III

In the two previous issues several types of defects which may occur in printed circuits as well as the repair of these defects were described. In this issue another type of repair and additional servicing hints will be given.

Cracked Board and Conductor

Occasionally, but not very often, a board will show up which will have a crack both in the conductor and the phenolic material. In most cases breaks of this type are caused by negligence and abuse in servicing. However, since breaks of this type do occur, it may be helpful to describe an easy service correction that can be made to preserve the board and eliminate the need to replace the entire board.

With a drill slightly larger in diameter than ordinary hook-up wire, drill a hole through the conductor and board about 1/4 inch on each side of the break. Scrape solder "resist" from conductor between holes. Insert from the component side of the board a 1 1/4-inch piece of stripped hook-up wire. If the wire is preformed into a squared "U" prior to insertion, with the bottom of the "U" about 1/2 inch long, insertion is simplified. However, the wire's flexibility will permit insertion without preforming. After insertion, fold ends of hook-up wire over printed conductor to bridge the break. Flowing solder across the break will complete the job if the break is minor. If a long break is involved, this may be done in several places. It is not practical to perform this repair, however, if the board is broken in two. Fortunately, this seldom occurs.

There are undoubtedly many other and alternate techniques that can be used on "printed circuits." The foregoing should cover the majority of repairs that may become necessary in the course of general service work. Boards are not subject to breakage with normal care and when mounted properly. Reasonable care must also be exercised when inserting or removing tubes. At least as much care should be given to the "printed circuit" board in soldering to it or un-

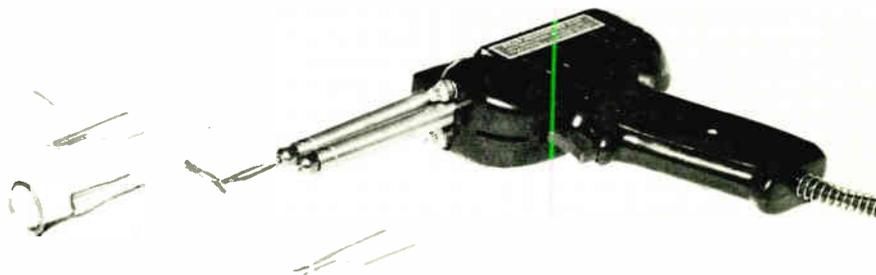


Fig. 1 Several soldering aids that can be made from wire.

soldering from it as is given to an ordinary wired receiver.

Servicing Printed Circuits

It should be remembered that fundamentally the removal of any component from a printed circuit board consists of melting out the solder fillet on the conductor pattern and withdrawing the component lead from the board. Due to the constructional advantages of General Electric television receivers, access is provided to both sides of the printed circuit board which permits component removal by this preferred method. With some other printed circuit boards which are not accessible on both sides, the method of replacement by soldering to stub leads of the old component as outlined in the May-June 1959 issue may be used. It should be pointed out that in this last method considerable care must be taken not to overheat the stub leads, while obtaining a satisfactory joint with the new component. Overheating produces a problem of "fish-tailing" or running of the solder fillet over the conductor pattern. This latter condition may introduce shorts across the conductors, which may not be detected at the time. In many cases the removal of a component is necessary for testing purposes only and destruction of a good component is unnecessary when its leads are unsoldered directly from the printed circuit board.

Servicing Aids

It is seldom necessary to obtain new tools for servicing printed circuits. However, there are a few items

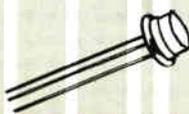
which will materially aid in this type of service work.

One such item may be obtained from a surgical supply house, hospital, or a doctor. This is a surgical type hemostat of the small version called a "mosquito" which is made in various sizes and shapes. Most hospitals simply throw old hemostats away when worn out and they still have many years of useful life in service work. Hemostats are most handy in removing condensers and other components from printed circuit boards.

Pictured in Fig. 1 is a group of soldering aids that can be attached to soldering guns. By using heavy tinned copper wire and a little ingenuity, the service technician can form tips for soldering guns that will facilitate removal of tube sockets, volume controls and bullplates.

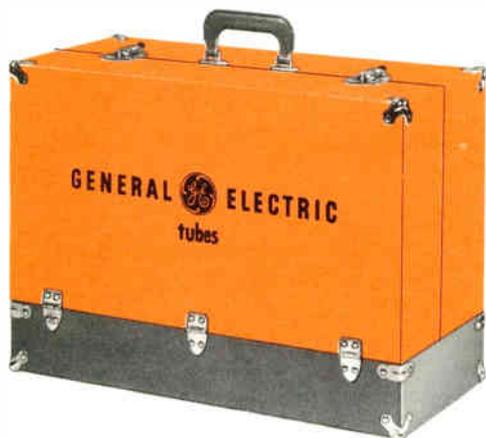
The items shown can be made from Alpha No. 289 or Belden No. 8011 wire. These were found to be easy to make and very useful when removing large components. A little time spent in installing a new tip of this type is greatly rewarded. Many different shapes and sizes can be bent to meet most any need. When using tips of this type, they become hot very readily. Care should be used when removing components with this type of tip as too much heat on the circuit board could cause damage.

One of the most important points to remember in "printed circuit" servicing is that there should be very little difference to the service man whether he has to perform a repair
(Continued on page five)



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SELECT THE TYPES THAT MEET YOUR PERSONAL REQUIREMENTS



NEW GIANT ETR-2071

This combination tube-tool case GIANT is a striking new addition to G-E's growing family of matched service cases. It packs efficiency, for there is room for 365 tubes, plus tools. Service technicians can answer home calls quickly, ready to solve any problem. Profits will grow by assembling a "field shop" in the new GIANT.

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Provides lightweight utility in the field. It weighs less than $4\frac{1}{2}$ pounds and carries a tube complement of 210. Its ease of carrying, plus rugged construction and modern two tone styling, characteristic of all G-E service cases, give this model popularity among service dealers.

Tool Case ETR-1479

Have the tools at hand for any home service job. Case is divided into compartments to provide an orderly, timesaving arrangement of service tools. Size, 16" x 8" x $6\frac{3}{16}$ ". Like others in the matched service case set, it has reinforced corners, and leatherette-type finish for plenty of hard wear.

"160" Model ETR-1478

Holds over 160 tubes. To make your service set complete, this junior size can be used with Tool Case ETR-1479. It also can be used as a small parts case and used with ETR-1477. Size, $17\frac{7}{8}$ " x $8\frac{3}{8}$ " x $11\frac{7}{16}$ ". All cases are of rugged construction. Their quality is built to last.

"240" Model ETR-1477

Holds over 240 tubes. As the size closest to the new GIANT it still carries a practical tube inventory. Thus it reduces costly time consuming trips back to the shop. Size, $22\frac{1}{8}$ " x $8\frac{9}{16}$ " x $12\frac{3}{4}$ ". General Electric Matched Service cases allow you to streamline your home service call operation.

SERVICE NOTES

TELEVISION

Color Receiver —

Models: 21T500, 21C700 and 21C701

Symptom: Intermittent loss of horizontal sync, although receiver will often operate normally for days at a time. Frequently on a camera change, though many times without warning, the horizontal will drop out to 5 or 6 bars. Sync may be restored by adjustment of L601 horizontal oscillator coil, although the coil may have to be restored to its original setting the next time the problem occurs.

Correction:

1. Check for defective tubes.
2. Replace C608, the 10 mfd. electrolytic capacitor from the cathode of the horizontal reactance tube to ground. It is highly unlikely that any practical test will show this capacitor to be faulty, even though it is causing the problem.

3. Using carbon tetrachloride and a brush, scrub the printed board to remove any possibility of contaminated flux which has been found in some cases. The entire area surrounding the horizontal oscillator, reactance tube and phase detector circuits should be treated.

Symptom: Intermittent loss of color sync.

Correction: Replace C613, 100 mmf. capacitor from plate of V-115A to junction of C614 and R615. This component has not been a frequent offender, but is reported since the resulting problem is difficult to locate.

Symptom: Loss of color sync, when hue control is rotated across its range.

Correction: Increase tension of spring contact to insure satisfactory ground for tube shield of V127.

RADIO

Models P715, P765 Rubber Antenna Support

Sponge rubber antenna support mountings that are lost or misplaced can be replaced by using the sponge rubber material (Catalog No. XV2X-490) used in General Electric vacuum cleaners. This sponge rubber ring can be cut into small pieces to fit the desired position in the receiver.

Models P715, P765 Securing Loose Leatherette

Minnesota Mining and Manufacturing Corporation glue #EC917 secures

loose leatherette to cabinet very satisfactorily. This should be available at all stores that carry the "3M" product line.

Model P745 — Low Sensitivity

It has been found that a variable amount of neutralization may be introduced around TR2 through C4 and C6, thereby lowering the over-all receiver sensitivity.

These two capacitors are mounted side by side and in some instances are quite close together, in which case the sensitivity may be lessened. The sensitivity in most cases can be improved by bending these two capacitors apart.

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SERVICING PRINTED CIRCUITS III (con't from page one)

on an ordinary wired set or a "printed circuit" set. The techniques used on the majority of repairs that are made to television receivers are common to both "printed circuit" sets and ordinary wired sets. The prime exception is that it is easier to change components on a "printed circuit" board since no untwisting of leads is necessary.

With the servicing techniques described in this as well as other publications, together with techniques developed in service work, plus the many "service-ease" features which manufacturers are designing into their receivers, trouble-shooting and repairing of "printed wiring" receivers can be easier and more profitable than ordinary wired receivers.

THE STEREO HUM PROBLEM V

In the last issue grounding and cartridge isolation were discussed. In this issue some wiring modifications which may be required to minimize hum in stereo record changers will be described.

Some of the tone arm wiring methods likely to be encountered in initial models of stereo changers will be illustrated in this issue and future issues. Comparison of a particular changer's wiring with these diagrams will identify the diagram which applies to that changer if it is included. Because of variations in design quality of currently available changers, not all changers are included in this diagram series. Wiring diagrams for later model changers which are suitable for use with G-E cartridges will be made available on request.

As a trial, the manufacturer's connection method shown in Fig. 1A should be used. If the adverse conditions of power-line current in the signal wiring should exist and hum from this source is encountered, then the minimum modifications shown in Figure 1B are recommended.

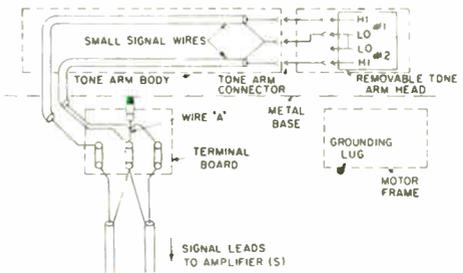


Fig. 1A Original wiring changer "A".

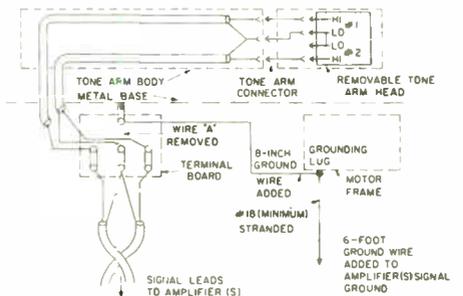


Fig. 1B Minimum wiring changes on "A".

Modification required to minimize hum from AC ground currents:

1. Locate and remove wire braid connecting signal ground lug. (WIRE A)
2. Connect an 8-inch single-conductor ground wire from the ground lug to the motor ground lug located on the motor frame.
3. Connect a 6-foot single conductor ground wire from the motor ground lug to the amplifier grounding point.
4. Twist the two signal leads to the amplifier together before connecting to the amplifier input jacks.

The modifications required for four-wire cartridge connection on changer "A" plus modifications to a changer "B" will be described in the next issue.

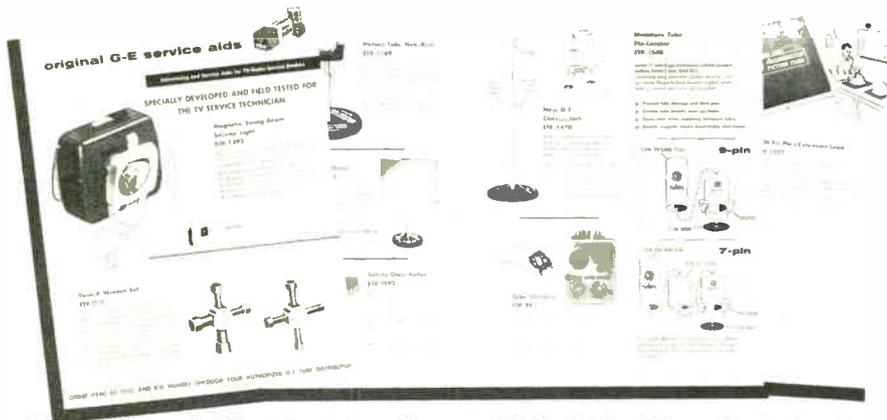
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- ETR-1469 Pic Tube Pillow
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