



## How to Change a Color Picture Tube

**B**IGGEST contributor to the high price of a color TV set is the picture tube. Set owners pray as much for its long and healthy life as they do for better programs. On the day the tube goes West and has to be replaced, you're likely to suffer mild vertigo when the serviceman gives you an estimate for a new tube plus installation. You can save your crying towel a tear or two by doing the job yourself. Almost anyone with a little electronics know-how can replace a color picture tube successfully. No great skills or special tools are required.

Replacement tubes can be purchased from electronic parts distributors or from mail-order houses. A new tube will run from \$90 to \$170 but you can get a \$5 to \$25 allowance on your old dud, provided it is still under vacuum and the glass is reusable. The new



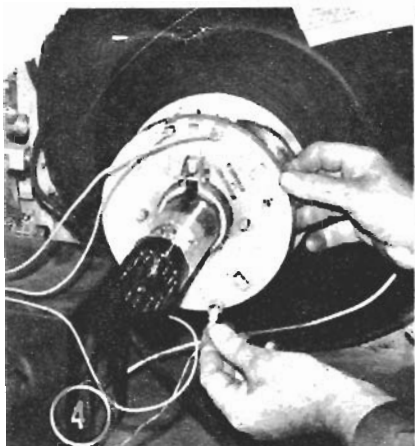
Band is attached to new tube. Be careful to see that the hole in the band is between glass ridges. The ridges indicate the top of the round tube.



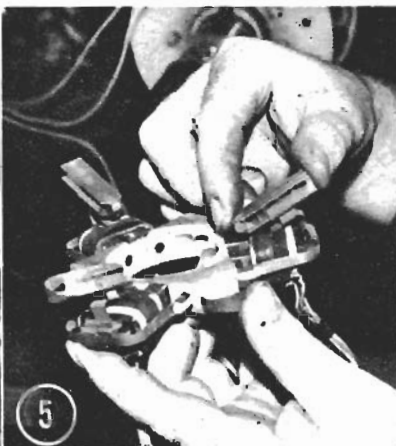
Tube with straps and brackets attached is lowered into cabinet. Safety goggles and gloves were worn at all times when handling picture tube.



Tube is in the cabinet and the brackets are fastened down. The straps were carefully tightened on tube after brackets were attached to cabinet.



Slide deflection yoke on neck so it's perpendicular to neck and in same location as on old tube.



Convergence magnets are put in the convergence yoke. These magnets should be equidistant from center.



Slide convergence yoke to the same point as on old tube. Convergence board will be used later.

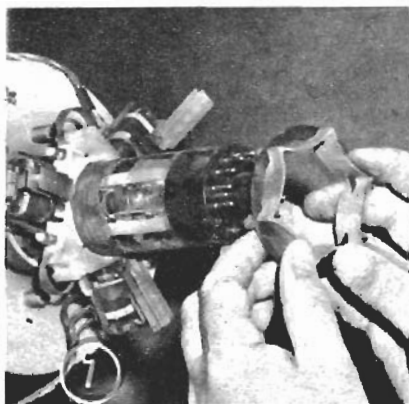
tube may not have the same number as your old one because manufacturers change the number when a tube is improved. You're in for a bonus if you get one of the new rare-earth-phosphor tubes. They provide brightness never possible from older tubes.

The physical care of a picture tube is of prime consideration. Older tubes and their replacements are subject to implosion and you should wear gloves and goggles when handling them. Newer tubes are implosion-proof and can be handled less delicately—but care should be taken, anyway.

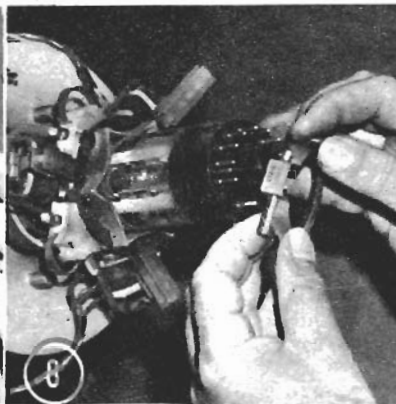
There is no specific way to proceed once you have the set lying on its face with its back off. Like a woman, each set is different

in its own way. Your set itself will provide you with the necessary instructions. Make copious sketches of the position of the parts on the tube's neck. If your color TV is a kit, like the Heathkit GR-53 shown here, so much the easier because you simply reverse the order of the installation instructions when removing the old tube. Make careful measurements of distances between all parts and note the exact positions on the neck relative to, say, the edge of the tube's base.

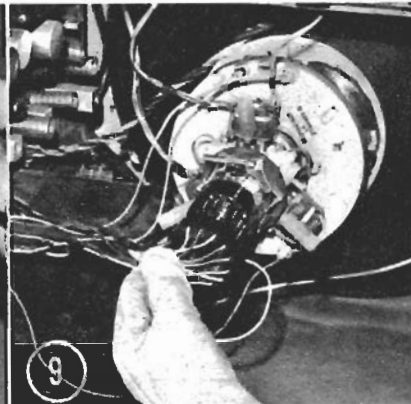
Keep writing and sketching as you disassemble. What you're really putting together with words and diagrams is your own assembly manual because reading backwards through the notes later will give you the pro-



Slide purity magnet on neck and align the tab on it with the tab that is on the convergence yoke.



Put blue lateral magnet on neck of tube over blue gun, which is at the 12 o'clock position on tube's neck.

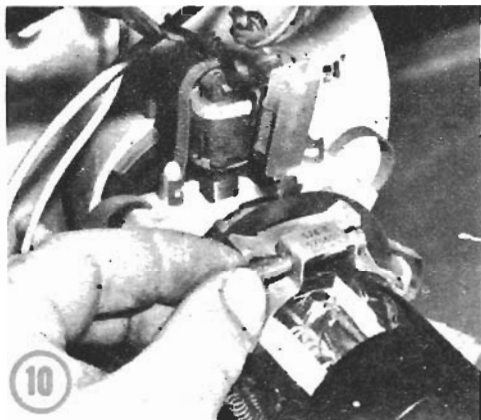


CRT socket is finally plugged on the end of tube. Carefully recheck placement of parts at this time.

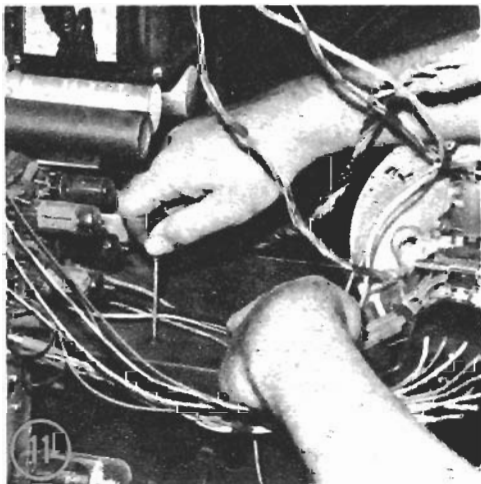
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cedure for putting the rig together again.

First remove the CRT's socket. Attach a heavy wire to a screwdriver and connect the other end of the wire to an earth ground, such as a cold-water pipe. After making sure your fingers are clear of the shaft of the screwdriver, discharge the CRT's side anode



Blue lateral magnet is adjusted during static convergence with blue, red and green convergence magnets to produce white dots in center of screen.



Focus coil in the high-voltage compartment is shown being adjusted here. Object is to obtain the sharpest trace lines in center of picture tube.

by sliding the shaft under the rubber-cap and against and prongs of the connector.

Disconnect the high-voltage lead. Now (making notes as you go) remove all parts remaining on the neck. After this is accomplished loosen the ground wire and brackets around the CRT, lift the tube out of the set and place it on its face. Remove the metal strap from the tube. (You also may be dealing with a loop of wire that is the automatic degaussing coil.)

Take the new tube out of the box and place it face down on soft material next to the old tube. Never pick up or hold either tube by the neck. Instead, grasp the outside edges of the heavy glass face plate. Place the old tube in the box and out of the way.

The procedure for installing the new tube is the reverse of the steps you followed to remove the old tube. Begin by mounting the straps and brackets on the new tube (Fig. 1). In the case of a round tube, be sure that the two ridges on the rim of the tube will be pointed up when the brackets are attached in the cabinet (Fig. 2). Then put the tube in the cabinet (Fig. 2) and secure the brackets (Fig. 3). If your set has a built-in degaussing coil, install it at this time.

The last thing to come off the neck of the old tube was the deflection yoke, so it is the first to go on the new tube (Fig. 4). Be careful to position it on the neck exactly as it sat on the old tube; make sure it is perpen-

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Dynamic convergence begins for new tube; a dot generator is necessary for this. Check a color program to see if this was done correctly.

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dicular to the neck.

Proceed to the convergence yoke (Fig. 5) taking care to position the DC convergence magnets correctly. The magnets should be equidistant from the center. Now take the assembled convergence yoke and slip it on the neck parallel to the deflection yoke in the spot as on the old tube (Fig. 6).

The last step and the next couple may not be in this exact order with some sets (e.g., one particular Zenith model already would have the purity rings on at this point) but this was the order for this particular set.

Take the purity ring and slide it on so it is flat against the convergence yoke (Fig. 7). Now install the blue lateral magnet (Fig. 8). Be careful to position this directly over the blue gun, which is at the 12 o'clock position. Place the socket on the CRT as in Fig. 9.

You now must make convergence adjustments. In sets other than kits, you'll need a dot generator to make them. Static convergence is made by adjusting the static-convergence magnets and the blue lateral magnet (Fig. 10). A focus adjustment will have to

be made as shown in Fig. 11. Remove the dynamic-convergence board and place it at the top of the set, as shown in Fig. 12 to make dynamic-convergence adjustments. For detailed information on convergence refer to THE ABC'S OF COLOR TV SERVICING in the Nov. '69 and Jan. '70 issues of EI.

## Coming! . . . The Video Gramophone

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sumer version of EVR, these specs are open to change.) Motorola is now under license to manufacture EVR players for schools and industry at \$795, but this could drop to about \$400 for a home equivalent.

What about recording on EVR? It's not practical in the home, and the company frankly states it's not interested in it. The medium is for entertainment and training, says CBS, and it expects to offer programs of more sophistication than feature films.

**SelectaVision.** This is RCA's entry in the race and easily the most novel in concept. The company deserves special mention for technical derring-do since SelectaVision operates with lasers and holograms. Instead

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