

GENERAL INTRODUCTION

The EICO kit you are about to assemble and wire has been designed to meet the highest standards of performance. It is a high quality Tube Tester Adapter to be constructed from the finest components available anywhere.

The following Construction Book has been written to carefully guide you through the construction of your kit. If you follow all the instructions implicitly and work carefully without haste, you will be rewarded with many years of fine performance from this instrument and a personal inner satisfaction from a job well done.

The Construction Section: Beginning with the number on this page, and throughout the rest of the Construction Book, the page numbers are followed by a "C" (1C, 2C, etc.). The Instruction Manual, detailing the installation, operation and maintenance of your instrument, are identified by numerals only, without any letters following these numerals.

After you are certain that you have successfully completed the wiring of your kit, you no longer need the Construction Book. Keep the Instruction Manual for information as to the installation and operation,

as well as for any maintenance that may be necessary in the future, on your Tube Tester Adapter.

Choosing a Workbench and Tools: To avoid the accidental loss or misplacement of components, choose a convenient workbench before unpacking your new kit. You will find it most advantageous to choose a corner on a table that will not be used for any other purpose until you have completed the construction of your kit. Proper precautions should be observed to prevent damage to any table top from a soldering iron or heavy tools.

When you check the component parts against the Parts List later on, it will be convenient to separate the various pieces into types of components and hardware sizes. It will be helpful to keep these sorted pieces separated in the compartments of specially made trays. Small cartons, egg trays or a refrigerator ice tray with dividers serve equally well.

Several basic tools are required to construct this kit. They are:

1. Screwdriver - 1/8" blade
2. Longnose pliers - 5" or 6"
3. Diagonal wire cutters
4. Small soldering iron or pencil iron (35 watts or less).
5. High quality 60-40 rosin core radio solder.

CAUTION

Do not under any circumstances use acid core solder or acid flux in constructing this unit. Use only the best grade of rosin core solder. When in doubt about the solder you have, do not use it; instead buy a new roll which is plainly identified as "ROSIN CORE RADIO SOLDER". All performance and service guarantees are voided by the use of acid core solder or acid flux. Furthermore, we will not service and return unrepai red, any instrument in which acid core solder or flux is used.

The following tools are useful, but are not absolutely necessary to construct this kit.

1. Socket wrench set
2. Open end wrench set
3. Wire stripper

Unpacking the Kit: This procedure serves two purposes. First, it lets you get acquainted with the various types of components. Second, it enables you to ascertain if you have received all the parts required to build the kit. This is your opportunity to have any packing errors corrected.

When unpacking, handle all parts carefully so that you will not damage any fragile components. Do not throw any packing material away until you have completed the checking of all components. Check each part off against the "Parts List" which you will find in your Instruction Manual. Check the packing for any small parts.

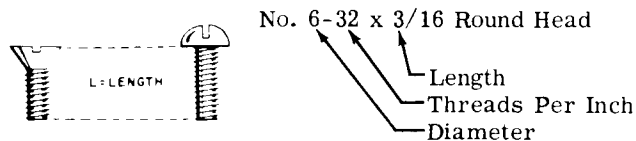
From time to time, due to modernization or possible error, it may be necessary to correct your Parts List. If there are any changes to be made, they will be listed on the loose addenda sheets included with this book. Make the corrections, if any, before checking the components. If no corrections of your Parts List are noted on the addenda sheets, or if there are no addenda sheets, assume that your Parts List is correct and commence to check all components against this list.

To enable rapid identification of electronic parts, each part has been assigned one or two letters of the alphabet called a "reference designation". These "reference designations" are nothing more than an initial letter or two representing the name of the part. For example, the tube sockets have been assigned the "reference designation" letters "XV". The 610 has five tube sockets. These parts are identified by the designations XV1 to XV5, respectively.

The nine pin plug has been assigned the reference designation "P1".

Hardware is a general term for mechanical parts used in the assembly of EICO kits. Such items are usually screws, nuts and washers. Machine screws are sized in accordance with the diameters of the threaded portion (No. 4, No. 6, No. 8), with the smaller number denoting the smaller diameter. The second number indicates the number of threads to an inch. Thus, a No. 6-32 screw has a No. 6 diameter with 32 threads per inch. The final number indicates the length of the threaded portion. A No. 6-32 x 3/8 screw has a 3/8" long threaded portion. The diameters are shown in the figure.

EXAMPLE:



ACTUAL SCREW DIAMETERS

No. 4



No. 6

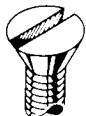


SCREW HEADS

Binding Head



Flat Head



Set Screw
(Headless)



Round Head



WASHERS

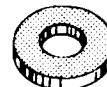
Lock



Flat



Fibre



Shoulder



Rubber



LUGS

Small Solder
(with lock)



Potentiometer
(ground)



The figure also shows the various head types in which these screws are supplied. Use the type specified in the particular step.

Washers and nuts are sized in accordance with the diameter of the screws they are used with.

Various types of washers are supplied. A lock-washer may have internal or external teeth. A flat washer is made out of flat metal. Fiber and bakelite washers are used for insulating devices. They generally separate two metallic pieces of hardware.

Self tapping screws are used where it is not desirable to hold the screw to the chassis by a nut. The screw actually taps the threads in the metal into which it is screwed. The sizes are designated by numbers similar to those used for machine screws, with the smaller number indicating a smaller diameter screw.

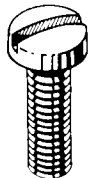
Most of the other component parts used with the kit are self-evident and require little further explanation or description.

If after having checked all your components against the parts list, you find a shortage, please write us at:

Customer Service
EICO Electronic Instrument Co., Inc.
33-00 Northern Blvd.
Long Island City 1, N. Y.

SCREW THREADS

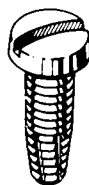
Machine



Self-Tapping

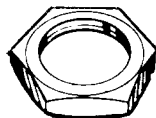


Self Threading

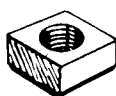


NUTS

Hex



Square



Ring

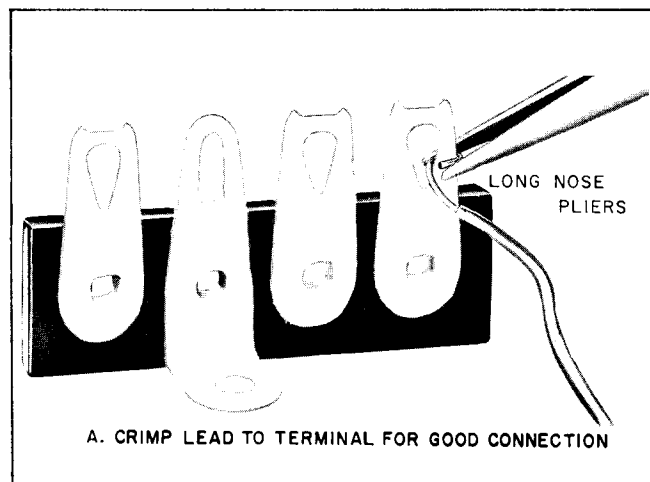


Include the inspection slip, with your letter, describing the shortage. If there is a slight hardware shortage, you can expedite matters by purchasing these pieces at your local jobber or hardware store.

SOLDERING

Soldering Techniques: To get a good, clean connection, use the soldering techniques described below. **USE THE BEST GRADE OF ROSIN CORE RADIO SOLDER ONLY. UNDER NO CIRCUMSTANCES SHOULD ACID CORE SOLDER OR ACID FLUX BE USED.** The use of acid core solder or acid paste fluxes can cause serious corrosion and will void all the repair and service guarantees.

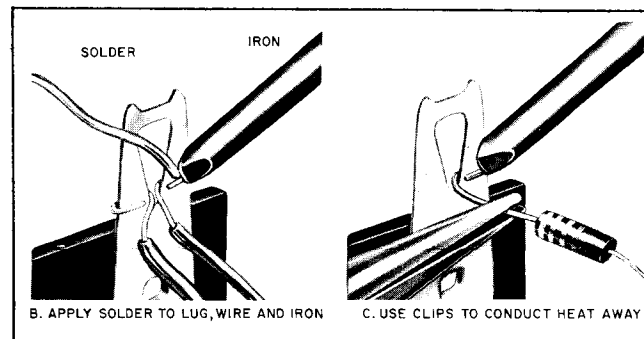
The soldering and wiring techniques described below should be practiced several times before attempting to wire or solder components in the actual kit.



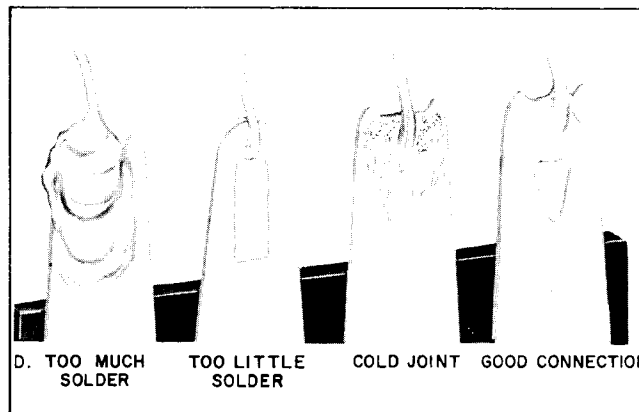
Practice several connections with a spare piece of wire and a socket or terminal strip that can be purchased at your local jobber.

First make a good mechanical connection. Remove 1/4" of insulation from the end of the wire. Feed the wire through the solder lug opening so that the wire insulation just touches the lug. With the long-nose pliers, bend the wire lead around the lug and crimp the wire lead to the lug. To solder the connection, place the tip of the hot soldering iron on the lug or terminal at a point close to the wire being soldered. Apply the solder to the junction of the lug, wire and soldering iron. When the lug and wire have been heated to the correct temperature, the solder will flow into and over the joint. Remove the iron when the solder

starts to flow and remove the solder immediately after. Use only enough solder to cover the wire at the connection point. To get good heat conduction from the iron to the joint, remove scales from the iron tip with steel wool and keep the iron freshly tinned.



A poor solder connection is obvious by its appearance. A grainy or pitted joint is a poor connection due to insufficient heat. Blobs on the wire or solder lug is also due to insufficient heat. Solder should flow as a result of the heated lug and wire. Do not solder by applying solder to the iron tip and then wiping the hot solder onto the joint. A well soldered joint is indicated by a smooth shiny finish on the soldered connection.



Construction Hints: The various lengths of wire to be used in the kit are specified in the construction steps. After cutting the wire to the length specified, strip the insulation off 1/4" from each end. The exposed wire will be used to make the actual connection to the solder lug.

When a connection is indicated, a (C) or an (S) will appear next to the lug involved, when appropriate. The (C) indicates that the connection should be simply mechanical without soldering, since other leads are to be connected to this same lug. The (S) indicates that the connection should be made and soldered immediately. However, the (S) is always followed by a number, such as (S1), (S2), (S3), etc. This number indicates the number of connections made to the lug. It is a check on the accuracy of your work.

As an example, if it says (S3) you should count three leads going to the lug to be soldered. If there are less than three leads at this particular lug, you will know that you have forgotten one or more leads, or connected them to the wrong lugs. If there are more than three leads, you can be certain you have connected an extra wire to this lug, which should probably go elsewhere.

When wiring, dress the leads and components as shown in the drawing. Be careful to avoid shorts at the lugs. The book is written so that the wiring closest to the chassis will usually be wired first. A second and third layer of wires will be connected in sequence and placed above these.

When you assemble the parts in your unit, mark the symbol of each component on the chassis near the part, with a crayon. This will facilitate your wiring operation.

Next to each step number you will find a parenthesis (). After you have completed each step, make a check mark in the parenthesis so that you will have a record of your work. On the figure there will be a dark circle with a number that corresponds to the particular step. This is used for easier identification of the component that is to be mounted. Follow the steps in the sequence given in the book. Do not skip steps or pages.

If any addendas are included in your book to modernize your instrument or to make corrections or part substitutions, be sure to correct the Construction Book first before you start to assemble and wire your kit.

You are now ready to construct your fine instrument.

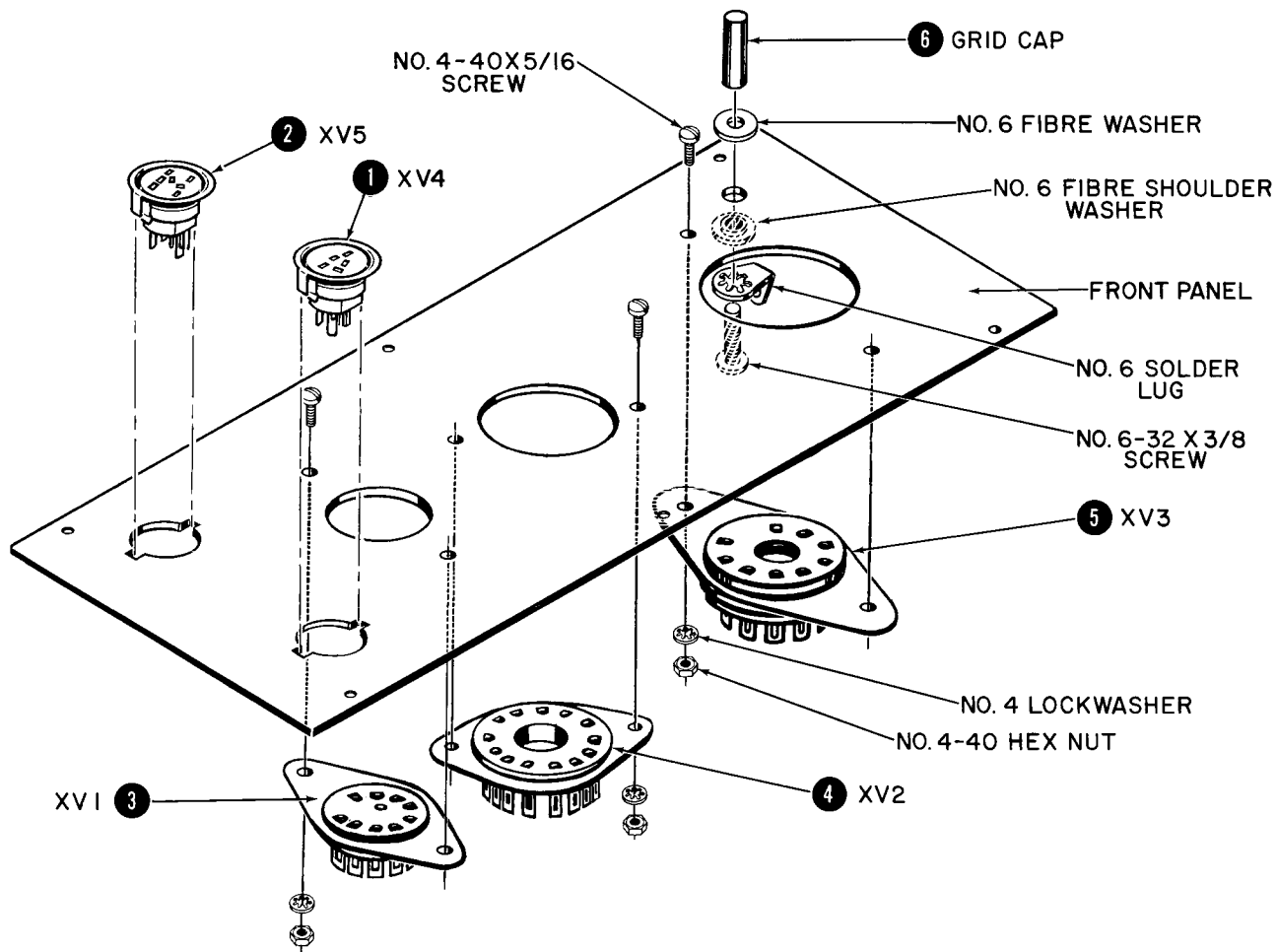
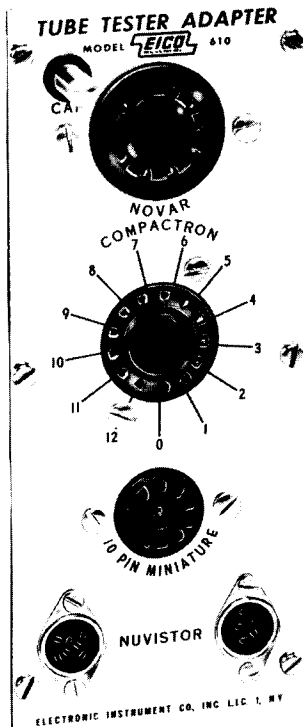


Figure 1C. Front Panel Mounting



Mounted Front Panel

The following steps refer to figure 1C.

In the succeeding two steps mount the components to the front panel. Orientate the sockets in the keyway by rotating them until they sit flush with the panel. From the rear, bend both the large and small clips away from the socket with a long nose pliers.

- () 1. The 5 pin NUVISTOR socket, XV4.
- () 2. The 7 pin NUVISTOR socket, XV5.

(Note location of pins on Fig. 2C.)

In the succeeding three steps mount the components to the front panel with two No. 4-40 x 5/16 screws, two No. 4 lockwashers and two No. 4-40 hex nuts each.

- () 3. The 10 PIN MINIATURE socket, XV1.
- () 4. The 12 pin COMPACTRON socket, XV2.
- () 5. The 9 pin NOVAR socket, XV3.

(Note location of pins on Fig. 2C.)

In the succeeding step mount the threaded metal cap to the front panel.

- () 6. Place a No. 6 solder lug and a No. 6 fibre shoulder washer over a No. 6-32 x 3/8 screw. Insert this assembly through the bottom of the hole marked CAP. On the printed side of the front panel place a No. 6 fibre washer. Secure and tighten the assembly by using the threaded metal cap.

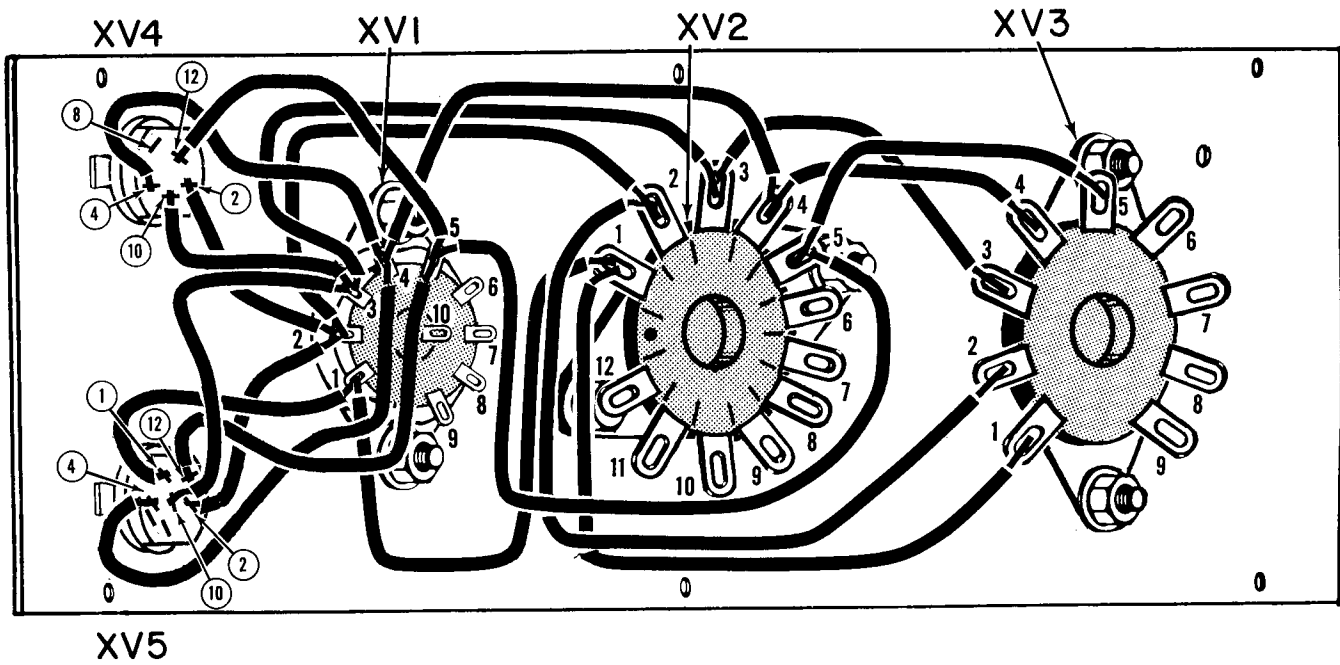


Figure 2C. Front Panel Wiring

The following steps refer to figure 2C.

- () 1. Connect a 4" piece of brown wire from XV3-1 (S1) to XV2-1 (C).
- () 2. Connect a 3" piece of brown wire from XV2-1 (C) to XV1-1 (C).
- () 3. Connect a 2" piece of brown wire from XV1-1 (S2) to XV5-1 (S1).
- () 4. Connect a 4-1/2" piece of red wire from XV3-2 (S1) to XV2-2 (C).
- () 5. Connect a 2-1/2" piece of red wire from XV2-2 (C) to XV1-2 (C).
- () 6. Connect a 1-1/2" piece of red wire from XV1-2 (C) to XV4-2 (S1).
- () 7. Connect a 1-1/2" piece of red wire from XV1-2 (S3) to XV5-2 (S1).
- () 8. Connect a 2-1/2" piece of orange wire from XV3-3 (S1) to XV2-3 (C).
- () 9. Connect a 3" piece of orange wire from XV2-3 (C) to XV1-3 (C).
- () 10. Connect a 2-1/2" piece of orange wire from XV1-3 (C) to XV5-10 (S1).
- () 11. Connect a 1-1/2" piece of orange wire from XV1-3 (S3) to XV4-10 (S1).
- () 12. Connect a 2-1/2" piece of yellow wire from XV3-4 (S1) to XV2-4 (C).
- () 13. Connect a 3-1/2" piece of yellow wire from XV2-4 (C) to XV1-4 (C).
- () 14. Connect a 2" piece of yellow wire from XV1-4 (C) to XV4-4 (S1).
- () 15. Connect a 2-1/2" piece of yellow wire from XV1-4 (S3) to XV5-4 (S1).
- () 16. Connect a 2-1/2" piece of green wire from XV3-5 (S1) to XV2-5 (C).
- () 17. Connect a 3-1/2" piece of green wire from XV2-5 (C) to XV1-5 (C).
- () 18. Connect a 2-1/2" piece of green wire from XV1-5 (C) to XV5-12 (S1).
- () 19. Connect a 2" piece of green wire from XV1-5 (S3) to XV4-12 (S1).

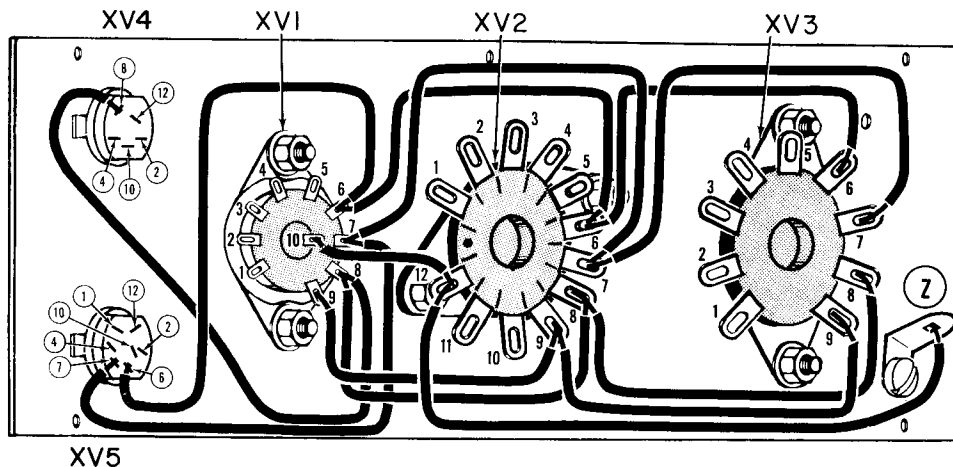


Figure 3C. Front Panel Wiring (Cont'd.)

The following steps refer to figure 3C.

- () 1. Connect a 3" piece of blue wire from XV3-6 (S1) to XV2-6 (C).
- () 2. Connect a 3-1/2" piece of blue wire from XV2-6 (C) to XV1-6 (C).
- () 3. Connect a 3-1/2" piece of blue wire from XV1-6 (S2) to XV5-6 (S1).
- () 4. Connect a 4" piece of violet wire from XV3-7 (S1) to XV2-7 (C).
- () 5. Connect a 4" piece of violet wire from XV2-7 (C) to XV1-7 (C).
- () 6. Connect a 3" piece of violet wire from XV1-7 (S2) to XV5-7 (S1).
- () 7. Connect a 3-1/2" piece of grey wire from XV3-8 (S1) to XV2-8 (C).
- () 8. Connect a 3" piece of grey wire from XV2-8 (C) to XV1-8 (C).
- () 9. Connect a 3-1/2" piece of grey wire from XV1-8 (S2) to XV4-8 (S1).
- () 10. Connect a 3" piece of white wire from XV3-9 (S1) to XV2-9 (C).
- () 11. Connect a 3" piece of white wire from XV2-9 (C) to XV1-9 (S1).
- () 12. Connect a 4-1/2" piece of black wire from solder lug "Z" (S1) to XV2-12 (C).
- () 13. Connect a 1-3/4" piece of black wire from XV2-12 (S2) to XV1-10 (S1).

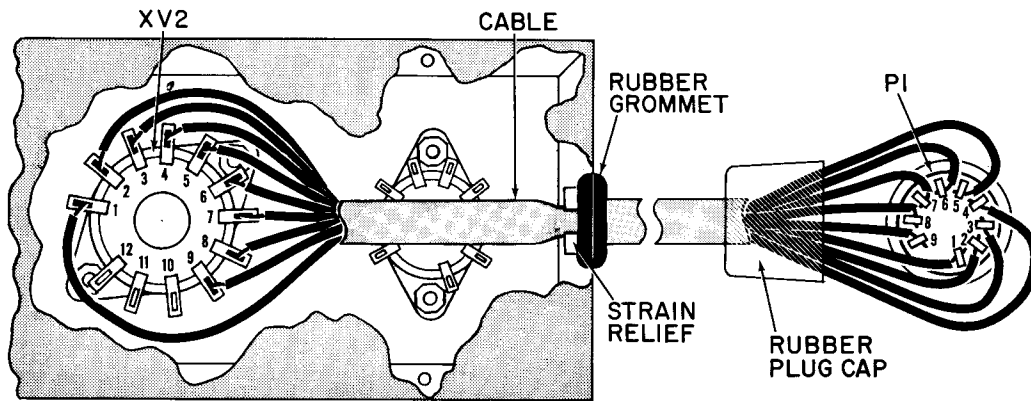


Figure 4C. Final Wiring (Detail on Page 12 C).

The following steps refer to figure 4C and Detail.

- () 1. On both ends of the cable strip off 1" of the outer insulation. Strip 1/4" off of all nine leads. Twist and tin. From one end of the cable:
- Connect the brown lead to XV2-1 (S3).
 - Connect the red lead to XV2-2 (S3).
 - Connect the orange lead to XV2-3 (S3).
 - Connect the yellow lead to XV2-4 (S3).
 - Connect the green lead to XV2-5 (S3).
 - Connect the blue lead to XV2-6 (S3).
 - Connect the violet lead to XV2-7 (S3).
 - Connect the grey lead to XV2-8 (S3).
 - Connect the white lead to XV2-9 (S3).

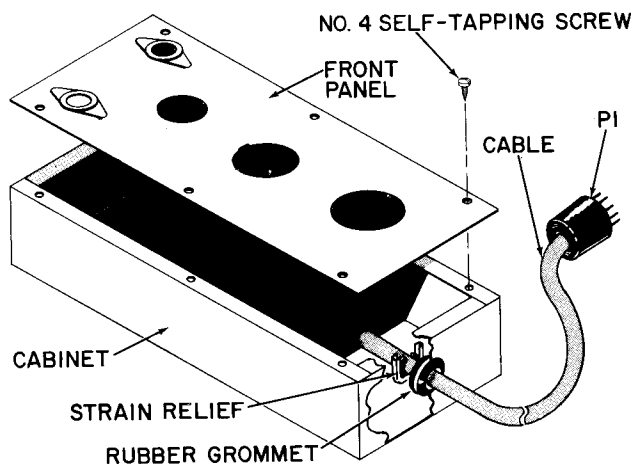
Note: Pins 10 & 11 on XV2 are not used.

- () 2. Insert the rubber grommet into the hole provided for it on the cabinet.

- () 3. Place the "U" shaped clamp 4" from XV2. With a pliers compress the clamp together as shown. From the inside of the cabinet pass the remaining end of the cable through the rubber grommet. See detail drawing for securing the front panel. Slip the rubber plug cap over the remaining end of the cable, as shown.

- () 4. Connect the brown lead to P1-1 (S1).
 Connect the red lead to P1-2 (S1).
 Connect the orange lead to P1-3 (S1).
 Connect the yellow lead to P1-4 (S1).
 Connect the green lead to P1-5 (S1).
 Connect the blue lead to P1-6 (S1).
 Connect the violet lead to P1-7 (S1).
 Connect the grey lead to P1-8 (S1).
 Connect the white lead to P1-9 (S1).

Figure 4C. Detail Assembly



- () 5. Slip the rubber plug cap over the plug.
- () 6. Mount the wired front panel to the cabinet using six No. 4 self-tapping screws.

FINAL STEP

You have now completed the assembly and wiring of your Tube Tester Adaptor. When you have completed the following step your unit will be ready for use.

- () 1. To catch any wiring errors, it is suggested that the entire wiring be checked point-by-point against the wiring instructions (and preferably also against the schematic wiring diagram) in order to become more familiar with the component layout and circuitry. While doing so, check for rosin joints, loose lumps of solder, poor lead dress, and accidental shorts or leakage paths arising from the flow of rosin between contacts. Remove any rosin with a stiff brush dipped in carbon tetrachloride.
- () 2. Check the continuity between the plug and the corresponding pins on the sockets with a VOM or VTVM. You have now completed building your fine instrument.

IN CASE OF DIFFICULTY

If the completed kit does not operate properly, refer to the MAINTENANCE section and read it thoroughly. The information provided may itself lead to a solution of the problem without outside assistance, and also includes the course of action you may take to obtain assistance from EICO. In any case, do not neglect the checking procedures which usually correct 90% of the difficulties that may be encountered. If you omitted to perform step 1 of the Final Steps "To catch any wiring errors.....", do it now, and do it thoroughly. Often, a person is unable to detect his own errors because he misunderstands an instruction. For this reason, have a friend go over the wiring with you, if possible. Also, do not neglect the obvious kind of mistake or trouble such as tubes or transistors placed incorrectly, shields not making proper contact, accidental shorting of leads or parts to the bottom plate, line cord plug making improper contact in outlet, blown fuse, etc.