V . F . O .

VARIABLE FREQUENCY OSCILLATOR

722 CONSTRUCTION MANUAL

EICO ELECTRONIC INSTRUMENT CO. INC. 33-00 NORTHERN BLVD. L.I.C.1, N.Y. EICO

stk.no. 66371 COPYRIGHT© 1962 EICO ELECTRONIC INSTRUMENT COMPANY, Inc.

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 Variable Frequency Oscillator to be constructed from the finest components available anywhere.

The following Construction Manual 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 VFO and a personal inner satisfaction from a job well done.

The Construction Manual: Beginning with the first figure on this page, and throughout the rest of your Construction Manual, the figure numbers are followed by a "C" (1C, 2C, etc). The Instruction Manual, detailing the installation, operation and maintenance of your VFO, 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 Manual. 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 Variable Frequency Oscillator.

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 after 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 is helpful to keep these sorted pieces separated in 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 - 3/16" to 1/4" blade
2. Screwdriver - 1/8" blade
3. Longnose pliers - 5" or 6"
4. Gas Pliers
5. Diagonal wire cutters
6. Small soldering iron or pencil iron (35 watts or less).
7. High quality 60-40 rosin core radio solder

CAUTION

Under no circumstances use acid core solder or acid flux in constructing this instrument. 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 unrepaired any instrument in which acid core solder or acid 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

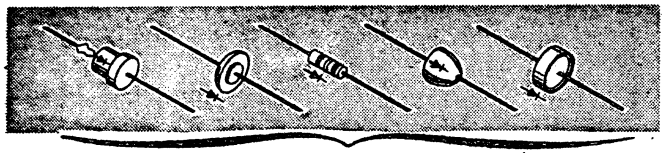
Unpacking the kit: The ensuing steps serve two purposes. First it permits you to become acquainted with the various types of components. Second, it enables you to ascertain if you received all the parts required to build the kit. This is your opportunity to have any packing errors corrected.

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 completely checked all components. Check each part against the "Parts List" which you will find in your Instruction Manual. Check the packing for any small parts.

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, a tube has been assigned the "reference

designation" letter "V", and a transformer the letter "T". Thus, if you have three tubes and one transformer in your kit, these parts would be identified by the designations V1 through V3 and T1, respectively.

The rectifier symbol CR, designates solid state diodes. One end is the cathode. The second end is the anode. Some popular shapes of rectifiers are illustrated. The cathode end is pointed out in each case.



CATHODE SIDE

When other shapes of rectifiers are supplied, the symbol for the rectifier, shown in the figure, is usually printed on the unit. The lead near the end indicated by the symbol as the cathode, protrudes from the cathode side of the rectifier. If there is no symbol, a red dot or a colored band will indicate the cathode. Connect the cathode lead of any of these rectifiers to the proper lug, when so indicated in the construction step as shown.

The reference designation assigned to capacitors is C.

The unit of capacitance is the "Farad". 1/1,000,000 of a Farad is the microfarad (abbreviated MF or MFD). 1/1,000,000 or a microfarad is a micro-microfarad (abbreviated MMF or MMFD). 1000 micro-microfarads is denoted by the letter "K". Thus 0.1mfd = 100Kmmf = 100,000mmf.

At the ends of some capacitors, such as electrolytics, the outer case is marked plus (+) and/or a minus (-). These are the only capacitors that must be mounted in a specific direction. Follow the direction for mounting described in the appropriate steps below. When no direction is mentioned, mount the capacitor either way. Some molded and paper capacitors have a black line near one end. Although these can be mounted without any concern for direction, it is preferable that you follow the direction for the black line shown in the drawing. If there is no black line on the drawing or on the capacitor, mount the capacitor in either direction.

The peak or working voltages are important capacitor characteristics. A capacitor marked with a higher voltage may be substituted for a lower voltage unit. Thus a 50 volt capacitor may be used in place of a 10 volt unit. The reverse is obviously not true. You cannot use a 10 volt unit as a substitute for a 50 volt capacitor. Where more than one capacitor of identical value but different breakdown voltages are used, the unit you are to use is indicated in the appropriate construction step.

Ceramic capacitor tolerance may be noted by a letter rather than a number. "K" is 10%. "M" is 20%. "P" or "GMV" means guaranteed minimum value.

Ceramic capacitors have specific temperature characteristics — percent and degree of variation of capacity with temperature. These variations are indicated by means of a code number stamped on most capacitors. Thus, a capacitor marked 68 Z5E indicates a 68mmf capacitor having a Z5E temperature characteristic. The actual meaning of Z5E, or any other characteristic, is important to the engineer. When building the kit, be sure to use the capacitor with the characteristic specified by the engineer, if it is indicated in the construction steps. If no value is indicated in the construction book, use any of the ceramic capacitors of proper value, tolerance and voltage characteristics, supplied with the kit.

Resistors are denoted by the symbol letter R.

The unit of resistance is the "ohm". The letter "K" indicates multiplication by 1000 and the letter "M" indicates multiplication by 1,000,000. Thus 1000 ohms = 1K or 1 kilohm. 1,000,000 ohms = 1M or 1 megohm.

On some resistors, the resistance value is stamped on the surface of the resistor body. However, other fixed resistors are coded with color bands which indicate their value. The actual color code of these resistors is noted in the parts list. In some instances, even the color code is noted in the book, the actual resistor value, rather than the color code, may be stamped on the body.

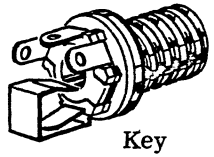
The tolerance of a resistor is the amount the resistance can vary around its marked value. Thus, if 1KΩ (1000 ohms) resistor has a ±10% tolerance, its actual value can be between 900Ω and 1100Ω. If the

same resistor has a ±5% tolerance, its actual value can be between 950Ω and 1050Ω. In all cases, the tolerance is always stated or given as part of the color code when the resistor is listed. If the resistor is marked with a number rather than a color code, the tolerance is stamped on the body. In your kit, 5% resistors are substituted for the 20% ones. However, be certain that you do not use a 10% resistor when a 5% resistor is required or a 20% resistor when a 10% or 5% resistor is specified.

Resistors are capable of dissipating power. Large resistors handle more power while smaller ones handle less. A 1/4 watt resistor is usually smaller than a 1/2 watt unit, while a 1/2 watt resistor is usually smaller than a 1 watt unit. If like valued resistors are used in the kit, differing in power rating, the proper resistor to use is designated in the particular construction step.

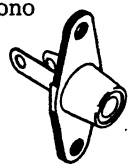
The reference designation assigned to receptacles (often referred to as jacks) is the letter J. The different types of jacks used in this kit are so lettered and illustrated here as well as in the construction steps. In some cases, more than one jack is mounted on one bakelite strip and it is so noted.

JACKS



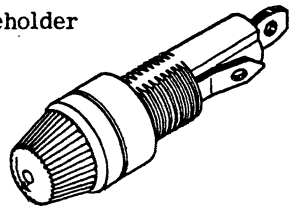
Key

Single Phono



The fuse has been assigned the reference designation, F1, while the fuseholder is denoted by XF1.

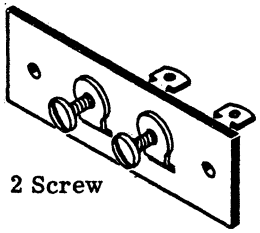
Fuseholder



Fuse
1 Amp

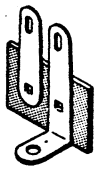
The various types of terminal strips are assigned the designation letters TB. The types used in this kit are illustrated and denoted in this figure.

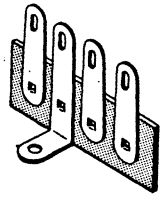
TERMINAL STRIPS



2 Screw

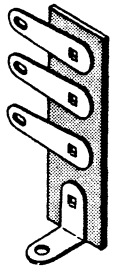
1 Post Left
With Ground

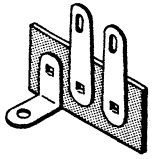




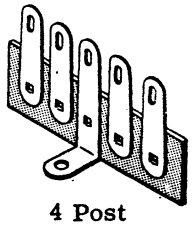
3 Post, 2 Right
With Ground

3 Post Left,
Upright





2 Post Right



4 Post
With Ground

Switches are designated by the letter "S".

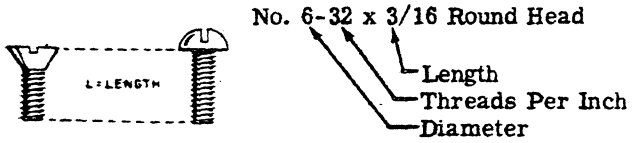
S1 refers to the switch assigned number 1, S2 refers to the switch assigned number 2. Switches may take several forms. In the 722 the rotary switch S1 has one ceramic wafer. The front of the wafer, looking in at the shaft, has the initial A, while the rear of the wafer has the initial B.

The lever switch, S2 also has one wafer, but lugs appear only on one side of the wafer and therefore does not have either an A or B side.

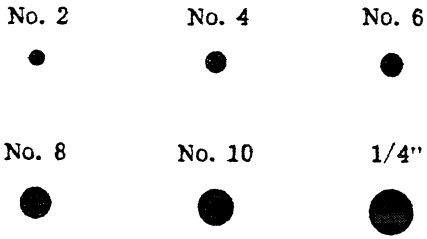
HARDWARE

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. 2, No. 4, No. 6), 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.

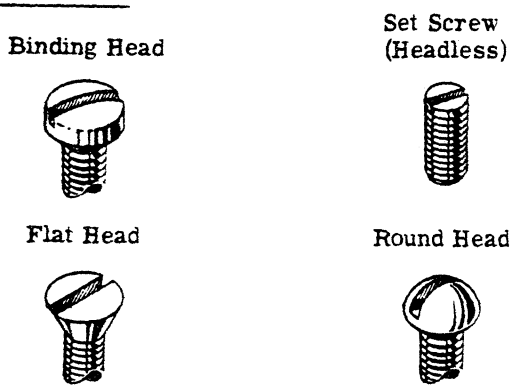
EXAMPLE:



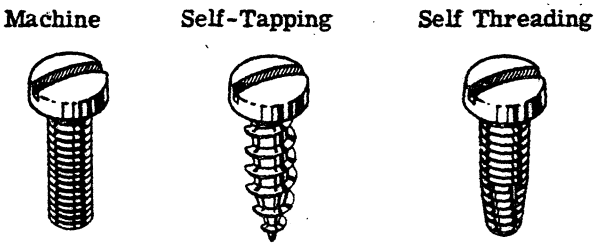
ACTUAL SCREW DIAMETERS



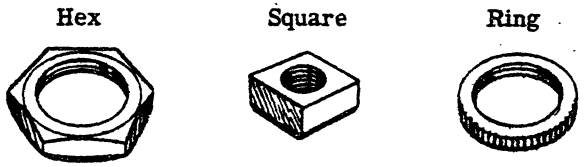
SCREW HEADS



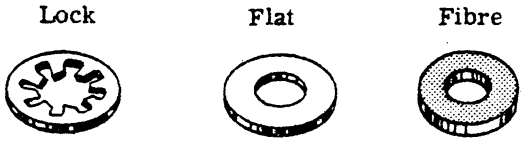
SCREW THREADS

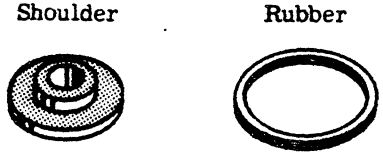


NUTS

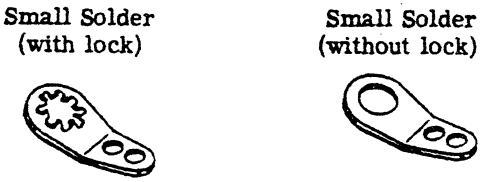


WASHERS





LUGS



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 or plastic.

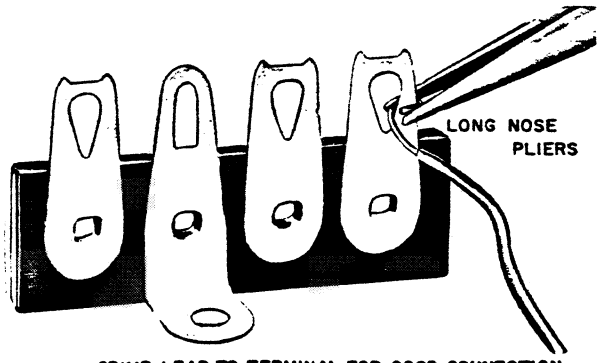
Self tapping and self cutting screws are used where it is not desirable to hold the screw to the chassis by a nut. The screw actually taps the threads in the metal into which it is screwed. The sizes are designated by numbers similar to those used for machine screws, with the smaller number indicating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

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

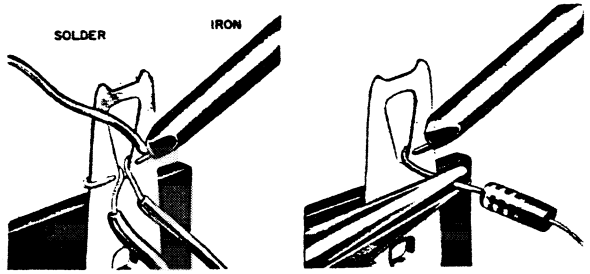
If after having checked all your components against the parts list, you find a shortage, please write us at:

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

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.



CRIMP LEAD TO TERMINAL FOR GOOD CONNECTION



APPLY SOLDER TO LUG, WIRE AND IRON

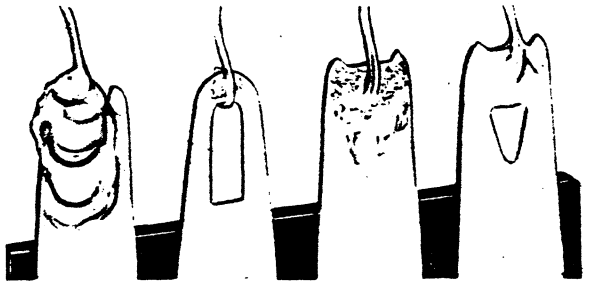
USE CLIPS TO CONDUCT HEAT AWAY

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.


TOO MUCH SOLDER

TOO LITTLE SOLDER

COLD JOINT

GOOD CONNECTION

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. Now solder this wire. Place the tip of a 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 sufficiently, the solder will flow into and over the joint. Remove the iron when the solder starts to flow and remove the solder immediately thereafter. Use only enough solder to cover the wire at the connection point.

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.

Shielded wire sizes are also indicated in the specific construction step. In the particular step, you will be told just how much of the outer insulation must be removed and just how long the shield strands and inner conductor (s) must be.

Components such as resistors and neon indicator lamps, may have longer leads than specified. Cut the leads to the length indicated in the particular construction step. This length is to be measured from the body of the component. In the case of insulated leads, strip 1/4" of insulation off from the ends and twist the strands (if any) of the wire together.

As an example, one step may specify that each lead on a resistor be cut to 1/2". 1/4" of each lead is used to make a mechanical connection to the solder lug. The other 1/4" is between the terminal board and the component so that the component will not be overheated when soldering.

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), (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 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.

When wiring, lay the component in close to the chassis and dress it 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 usually gets wired in first. The next layer of wires are to be soldered in next. In each case, dress the leads and components as close to the chassis as possible.

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. 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.

The following steps refer to figure 1C.

In the succeeding two steps mount the following components using two No. 4-40 x 1/4 screws, two No. 4 lockwashers and two No. 4-40 hex nuts.

( ) 1. Mount the single phono jack, J2.

( ) 2. Mount the 7 pin miniature tube socket, XV2.

( ) 3. Mount the 2 screw terminal board, TB1, as shown.
Secure assembly by using two No. 6-32 x 1/4 screws, one No. 6 lockwasher, one No. 6 lug and two No. 6-32 hex nuts.

( ) 4. Mount the No. 6 lug assembly, "S", as shown.
Use one No. 6-32 x 1/4 screw, and one No. 6-32 hex nut.

( ) 5. Place one No. 6 lug and the ceramic male bushing over the body of the No. 6-32 x 3/4" screw and insert into the hole provided for this assembly.
Secure assembly by using the ceramic female bushing, one No. 6 lug and one No. 6-32 hex nut. Note orientation on figure 7C.

( ) 6. Snap the 26uh coil, L4, into the chassis as shown.
Note orientation of coil. The head snaps into the larger hole while the tip is inserted into the smaller hole. (35063)

( ) 7. In a similar manner as step 6, snap the 7uh coil, L5, into the chassis, as shown. (36061)

( ) 8. Mount the key jack, J1, as shown.
Secure J1 using one 3/8" lockwasher, one 3/8" flatwasher and one 3/8" hex nut.

( ) 9. Mount the fuseholder, XF1, as shown.
Secure XF1 using one 1/2" rubber washer and one 1/2" hex nut.

( ) 10. Orientate the switch bracket, as shown.
Secure to the front of the chassis using two No. 6-32 x 1/4 screws, two No. 6 lockwashers and two No. 6-32 hex nuts.

( ) 11. Place the line cord about 3-1/2" from the tinned ends onto the groove of the larger section and between the two sections of the two piece strain relief with the tinned ends toward the smaller section.

Bend the smaller section over the line cord and position in the channel of the larger section. Compress the two sections together with a plier grasping the larger diameter end of the strain relief.

Pass the tinned ends of the line cord through the hole on the printed side of the rear panel. See detail "A".

FIGURE 1C BOTTOM CHASSIS MOUNTING

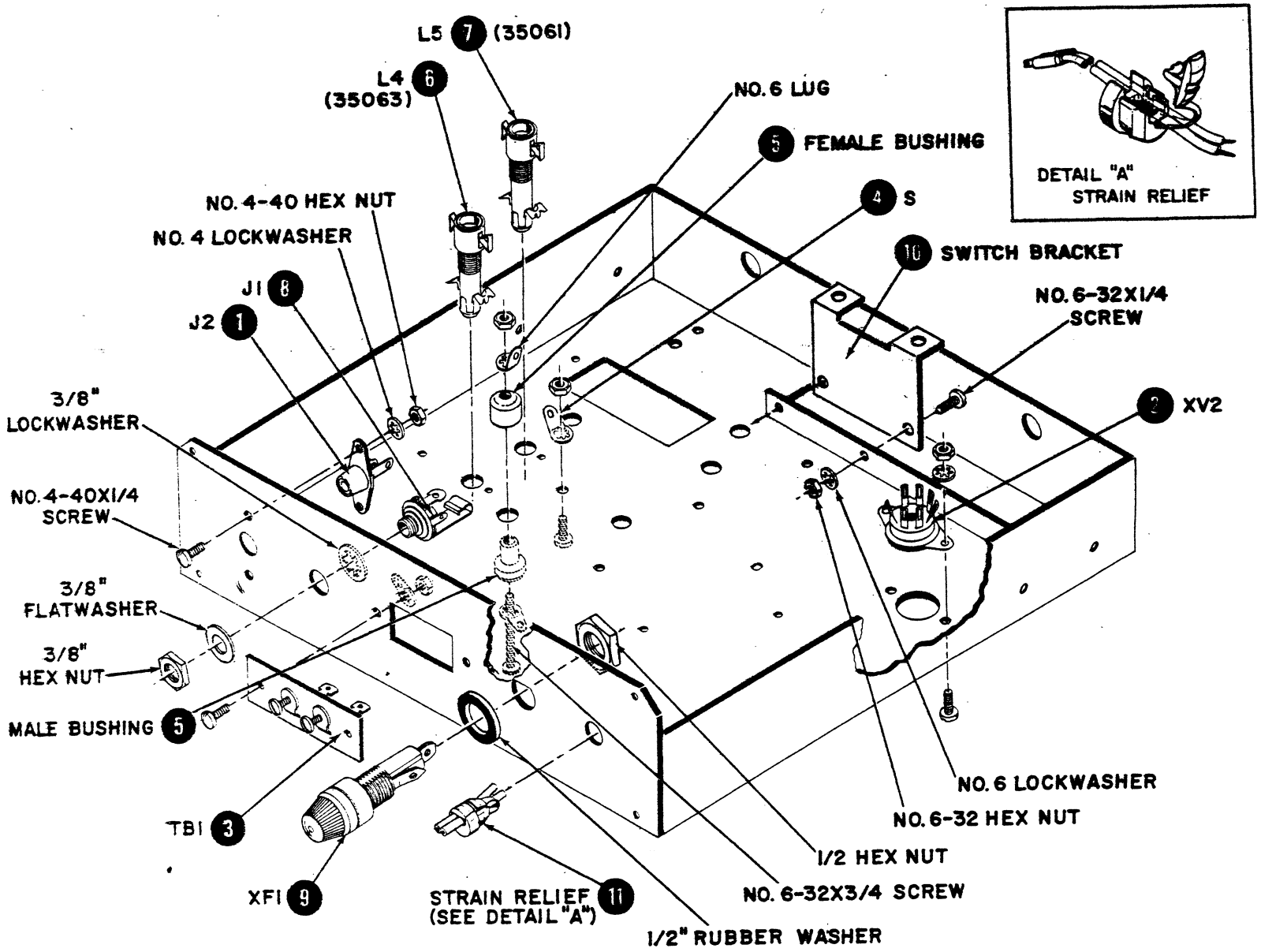

L5 7 (35061)
L4 (35063) 6
NO. 6 LUG
5 FEMALE BUSHING
4 S
DETAIL "A" STRAIN RELIEF
NO. 4-40 HEX NUT
NO. 4 LOCKWASHER
10 SWITCH BRACKET
J1 8
J2 1
NO. 6-32X1/4 SCREW
3/8" LOCKWASHER
2 XV2
NO. 4-40X1/4 SCREW
3/8" FLATWASHER
3/8" HEX NUT
MALE BUSHING 5
TB1 3
XF1 9
STRAIN RELIEF (SEE DETAIL "A") 11
NO. 6 LOCKWASHER
NO. 6-32 HEX NUT
1/2 HEX NUT
NO. 6-32X3/4 SCREW
1/2" RUBBER WASHER

FIGURE 2C BOTTOM CHASSIS MOUNTING

The following steps refer to figure 2C.

(✓) 1. Cut the leads on the 5h choke, L6, to 3". Strip and tin both leads.

(✓) 2. Mount L6 to the top of the chassis as shown. Pass the leads through hole "C".

Insert one No. 6-32 x 5/16 screw through the end of choke closer to the rear of the chassis.

Place the four post with ground terminal strip, TB5, over the body of the screw and secure the assembly using one No. 6 lockwasher and one No. 6-32 hex nut.

Insert one No. 6-32 x 5/16 screw through the remaining end of the choke.

Place the 3 post, 2 right with ground terminal strip, TB4, over the body of the screw and secure by using one No. 6 lockwasher and one No. 6-32 hex nut.

(✓) 3. Cut the leads on the power transformer, T1, as follows:

Two black to 4"

One red to 7-1/2"

One red to 3-1/2"

One green to 2-1/2"

One green to 2"

Strip and tin all leads.

(✓) 4. Mount T1 to the top of the chassis as shown. Pass the black leads through hole "A" and the remaining four leads through hole "B".

Secure T1 to the chassis using one No. 6-32 x 5/16 screw, one No. 6 lockwasher and one No. 6-32 hex nut in the closest to the chassis edge.

Insert one No. 6-32 x 5/16 screw through the remaining hole of T1.

Place the 2 post right terminal strip, TB3, over the body of the screw and secure by using one No. 6 lockwasher and one No. 6-32 hex nut.

(✓) 5. Mount the one post left with ground terminal strip, TB2, as shown.
Use one No. 6-32 x 1/4 screw, one No. 6 lockwasher and one No. 6-32 hex nut.

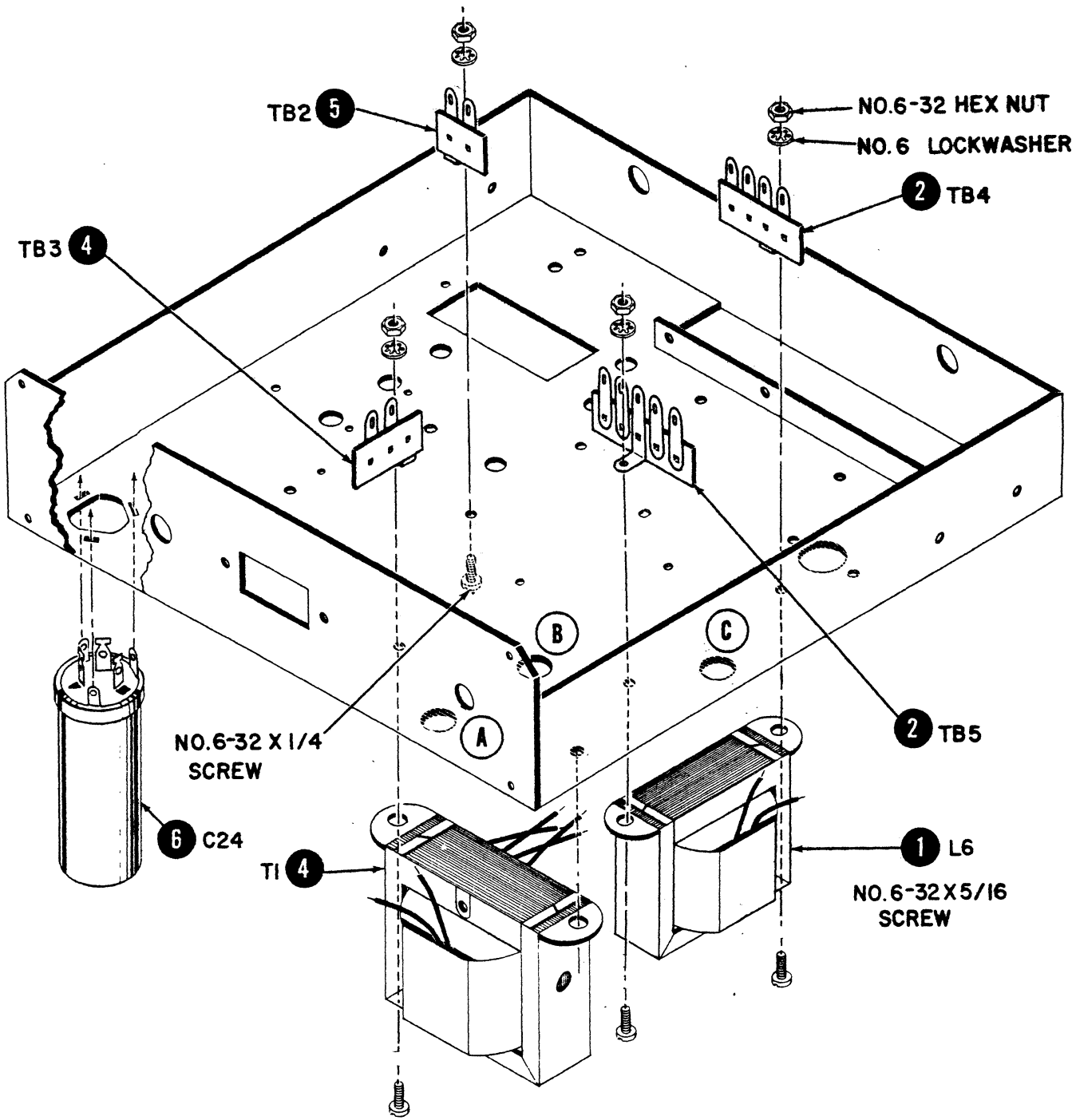
(✓) 6. Mount the 20/20/20mfd, 250V/350V/350 volt electrolytic can capacitor, C24, to the top of the chassis, as shown.

Next to one lug is a square, next to a second lug is a triangle and the third lug is blank.

Orientate the capacitor so that all the symbols appear at the respective locations shown in alternate reference figure 7C.

Insert the capacitor mounting tabs into the slots in the chassis and twist the tabs a little less than a quarter of a turn.

CAUTION: DO NOT twist the tabs excessively or they will shear off.


TB2 5
NO.6-32 HEX NUT
NO.6 LOCKWASHER
2 TB4
TB3 4
B
C
A
NO.6-32 X 1/4
SCREW
2 TB5
6 C24
T1 4
1 L6
NO.6-32 X 5/16
SCREW

The following steps refer to figure 3C.

In the succeeding two steps mount the components to the chassis using two No. 4-40 x 1/4 screws, one No. 4 lug, two No. 4 lockwashers and two No. 4-40 hex nuts.

( ) 1. Mount the seven pin miniature socket, XV1. Orientate the No. 4 lug as shown in alternate reference figure 7C.

( ) 2. Mount the seven pin miniature socket, XV3. Orientate the No. 4 lug as shown in alternate reference figure 7C.

( ) 3. Mount the three trimmer capacitors, C3, C6, and C11 to the top of the chassis, as shown. Remove both hex nuts that are on the shaft.

Secure each with the large hex nut supplied.

Place the remaining hex nut (small one) on the bushing, but do not tighten this nut. It has a special locking device that prevents the shaft from turning once the capacitor has been tuned properly.

( ) 4. Mount the 3 post left, upright, terminal strip, TB6, to the chassis as shown.

Secure by using one No. 6-32 x 1/4 screw, one No. 6 lockwasher and one No. 6-32 hex nut.

( ) 5. Orientate the capacitor bracket, as shown.

Secure it to the front of the chassis near the large cutout using two No. 6-32 x 1/4 screws, two No. 6 lockwashers and two No. 6-32 hex nuts.

( ) 6. Mount the 28.5uh coil, L1, to the top of the chassis.

Use the hardware supplied with the coil.

Orientate the coil as shown in alternate reference figure 10C.

( ) 7. Remove the hardware from the shaft of the variable capacitor, C2, with the exception of one flatwasher.

Place the shaft of the capacitor into the slot on the bracket, making certain the flatwasher is between the CAPACITOR and the BRACKET.

Secure C2 to the bracket with the flatwasher and the hex nut previously removed. Insert from the bottom of the chassis, one No. 6-32 x 1/4 screw into the threaded base of the capacitor.

Pull CAPACITOR as far back as possible, THEN TIGHTEN SCREW.

( ) 8. Place the drum assembly over the shaft of the variable capacitor.

Tighten the screws on the pulley just enough as to hold it on the shaft.

In figure 6C the screws must be loosened to permit final adjustment into the drive mechanism.

FIGURE 3C TOP CHASSIS MOUNTING

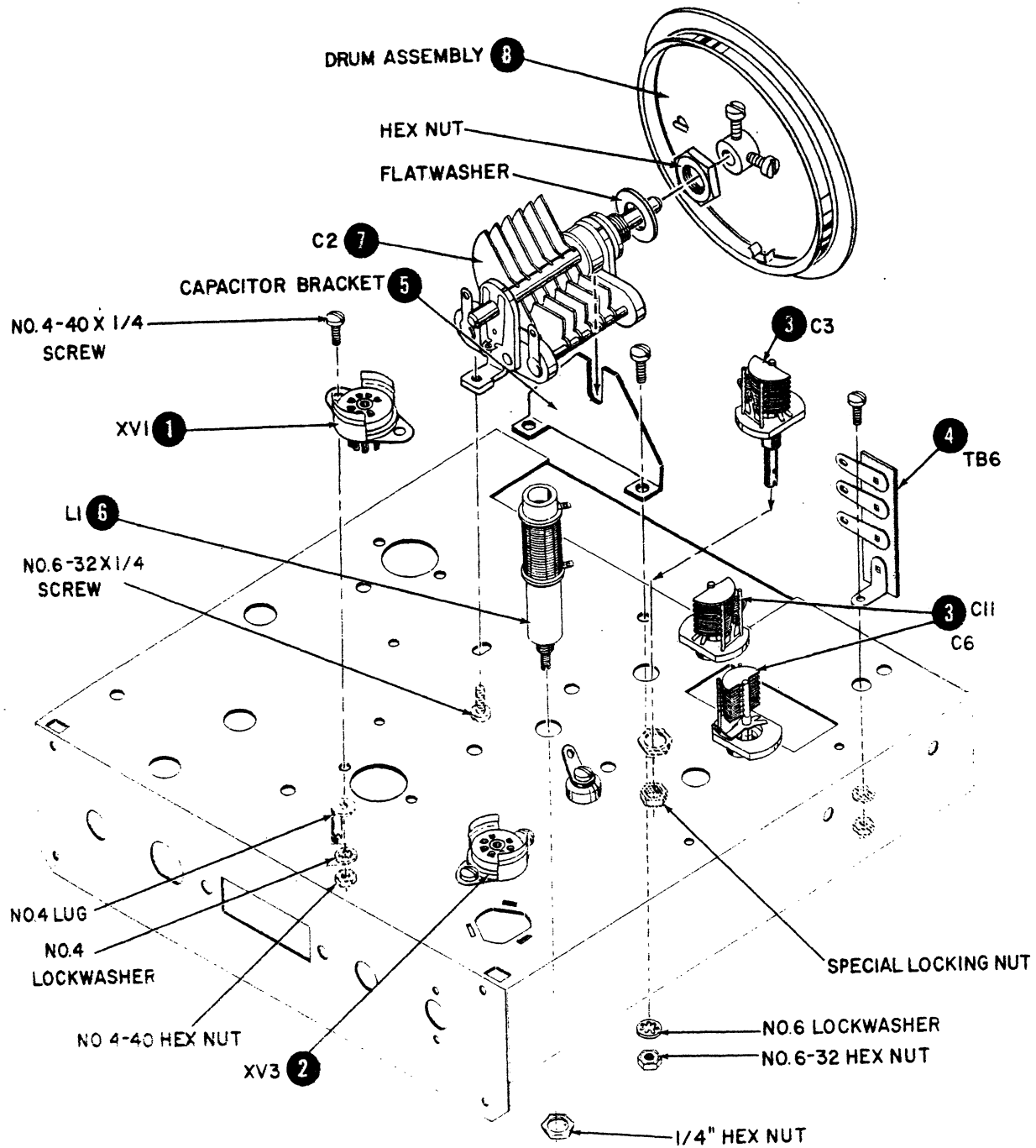

DRUM ASSEMBLY 8
HEX NUT
FLATWASHER
C2 7
CAPACITOR BRACKET 5
NO. 4-40 X 1/4 SCREW
XV1 1
3 C3
4 TB6
LI 6
NO.6-32X1/4 SCREW
3 CII
C6
NO.4 LUG
NO.4 LOCKWASHER
NO 4-40 HEX NUT
XV3 2
SPECIAL LOCKING NUT
NO.6 LOCKWASHER
NO.6-32 HEX NUT
1/4" HEX NUT

FIGURE 4C DIALPAN ASSEMBLY

The following steps refer to figure 4C.

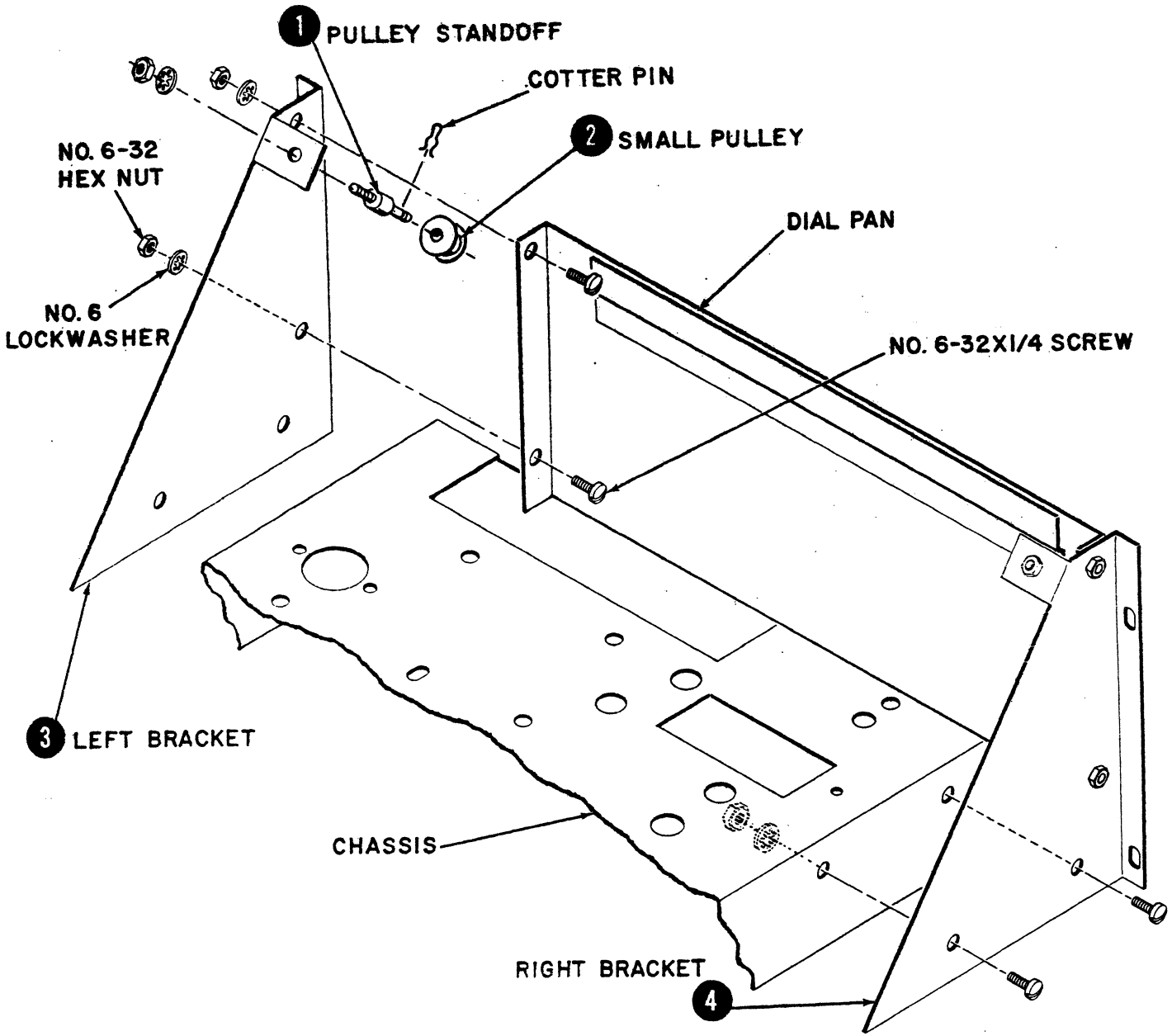
( ) 1. Insert the pulley standoffs into the holes provided for them on both the left and right brackets, as shown.
Secure each standoff using one No. 6 lockwasher and one No. 6-32 hex nut.

( ) 2. Place a small pulley on each of the two standoffs just mounted.
Secure each pulley using the small cotter pins provided.

( ) 3. Mount the left bracket to the dial pan as shown.
Secure the bracket using two No. 6-32 x 1/4 screws, two No. 6 lockwashers and two No. 6 hex nuts.

( ) 4. Mount the right bracket to the dial pan, as shown.
Secure the bracket using two No. 6-32 x 1/4 screws, two No. 6 lockwashers and two No. 6 hex nuts.

( ) 5. Mount the dial pan assembly to the chassis, as shown.
Secure both sides using four No. 6-32 x 1/4 screws, four No. 6 lockwashers and four No. 6 hex nuts.


1 PULLEY STANDOFF
COTTER PIN
2 SMALL PULLEY
NO. 6-32
HEX NUT
DIAL PAN
NO. 6
LOCKWASHER
NO. 6-32X1/4 SCREW
3 LEFT BRACKET
CHASSIS
RIGHT BRACKET
4

The following step refers to figure 5C.

(✓) 1. Place the frame on your table with the tapped holes facing up.

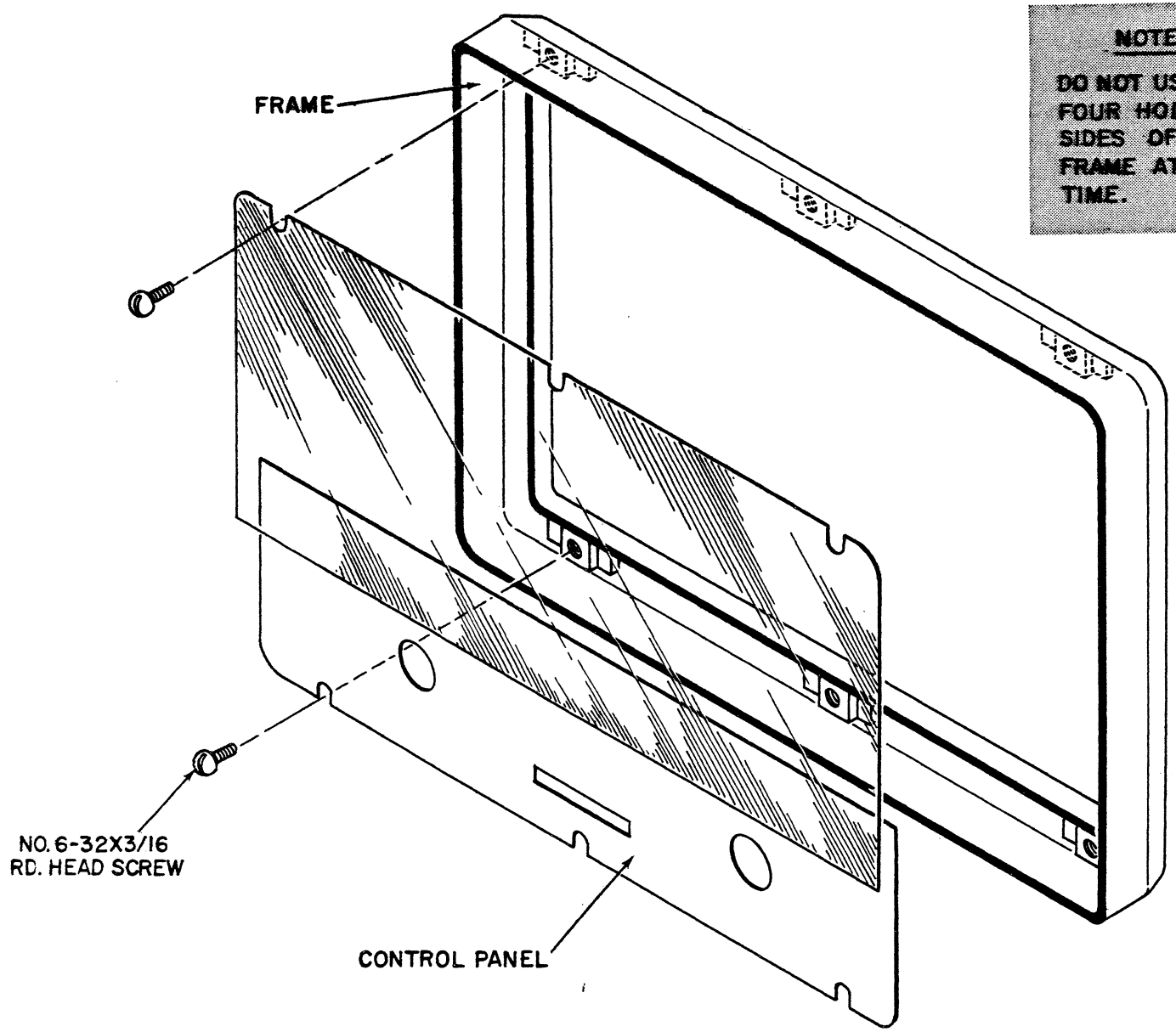
Insert the control panel into the frame with the nomenclature side, FACE DOWN.

Place the plastic window into the frame so that it rests on the control panel.

Secure both the control panel and the plastic window using six No. 6-32 x 3/16 round head screws on top and bottom of the frame.

DO NOT USE THE FOUR HOLES ON THE SIDES OF THE FRAME. They will be used to mount the chassis.

FIGURE 5C FRAME ASSEMBLY



NOTE:

DO NOT USE THE FOUR HOLES AT SIDES OF THE FRAME AT THIS TIME.

The following steps refer to figure 6C.

(√) 1. Place the pointer on the dial pan, as shown in detail drawing.

Tape the pointer to the rear of the dial pan.

DO NOT put any tape on the SCREENED surface of the dial pan.

(√) 2. Mount the lever switch, S2 to the bracket, as shown.

Secure S2 using two No. 4-40 x 5/16 screws, two flat fibre washers, two No. 4 lockwashers and two No. 4-40 hex nuts.

(√) 3. Lay the assembled frame on your table with nomenclature facing down.

Place the pre-assembled chassis into the frame as shown.

Secure the frame to the chassis using four No. 6-32 x 3/16 round head screws.

(√) 4. Mount the rotary switch, S1, as shown.

Secure S1 using one 3/8" lockwasher, one 3/8" flatwasher and one 3/8" hex nut.

(√) 5. Remove one hex nut from the bushing of the drive shaft assembly.

Place a 3/8" lockwasher over the bushing and the assembly into the front panel. Secure assembly using one 3/8" flatwasher and the hex nut removed previously.

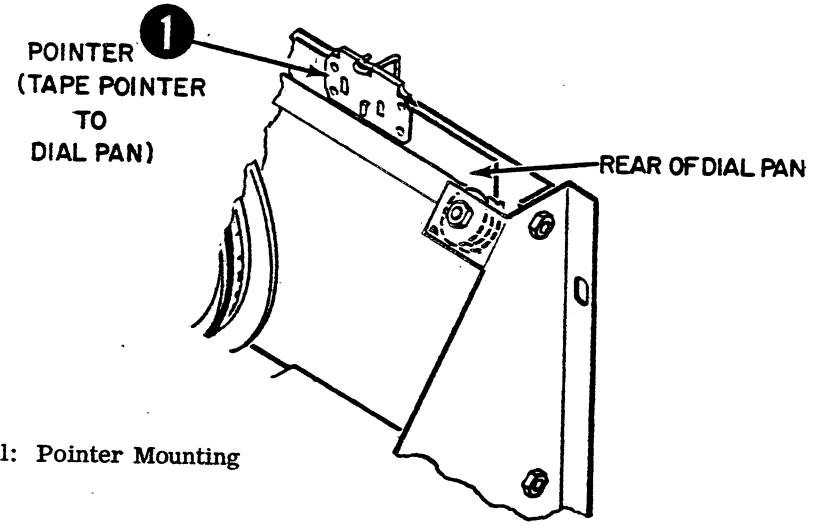


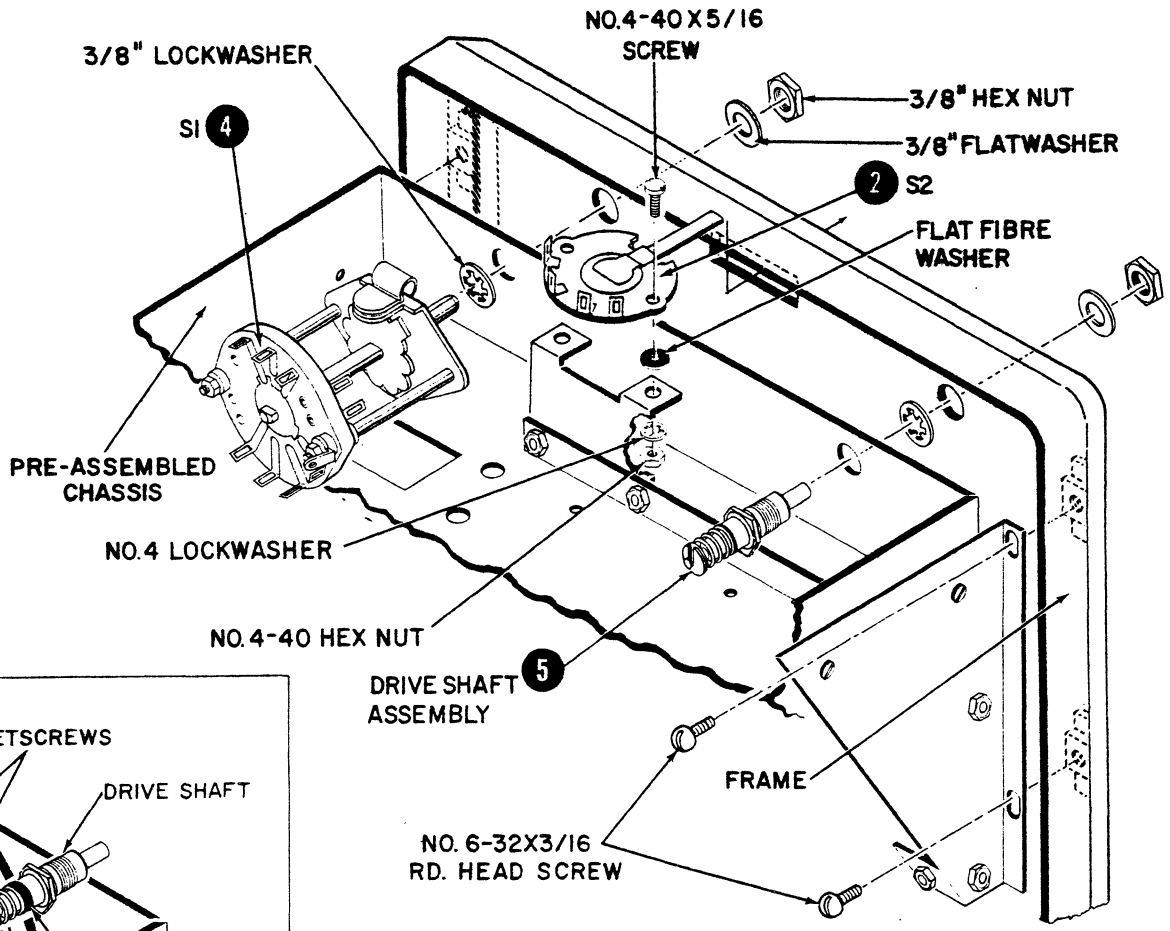
Figure 6C Detail: Pointer Mounting

(√) 6. From the top of the chassis, adjust the drum assembly so that its edge falls into the grooved section of the drive shaft. Press in to overcome spring tension.

Tighten the setscrews on the large pulley.

Make certain that the large pulley moves freely and smoothly within the drive shaft as shown in the detail drawing.

FIGURE 6C CHASSIS TO FRAME MOUNTING



DETAIL OF DRUM ASSEMBLY

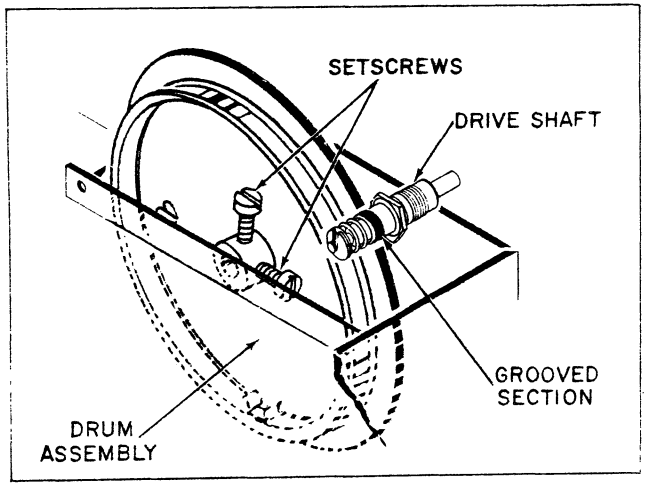


FIGURE 7C BOTTOM WIRING

The following steps refer to figure 7C.

( ) 1. From the power transformer, T1, make the connections as follows:

(✓) Twist both black leads from hole "A" together. Connect one lead to TB5-4 (C) and the other wire to TB5-5 (C).

(✓) Run the longer red wire from hole "B" along the chassis as shown. Connect to C24-C (S1).

(✓) Connect the remaining red lead from hole "B" to TB4-4 (C).

(✓) Connect the longer green lead from hole "B" to XV1-4 (C).

(✓) Connect the remaining green lead from hole "B" to TB5-3 (C).

(✓) 2. From the choke, L6, twist both wires from hole "C" together. Connect one lead to TB4-1 (C) and the remaining lead TB4-3 (C).

(✓) 3. Connect a 2" piece of bare wire to the center post of XV1 (S1).

Feed the free end through XV1-2 (C), through XV1-3 (S1) and to lug "Z" (S1).

(✓) 4. Connect a 4" piece of yellow wire from XV1-4 (S2) to XV3-4 (S1).

(✓) 5. Connect a 7-1/2" piece of red wire from XV1-6 (C) to XV2-1 (C).

(✓) 6. Connect a 2" piece of bare wire to XV3-3 (S1).

Feed the free end through the center post of XV3 (S1), through XV3-7 (C) to lug "Y" (C).

(✓) 7. Strip 3/4" from the outer insulation of a 6" piece of 2-conductor cable. Strip 1/4" from both ends of the inner conductor.

Connect the inner conductor of one end to XV3-5 (C) and the bare lead of the same end to lug "X" (S1).

Connect the inner conductor of the remaining lead to S1B-3 (S1) and the bare lead of the same end to lug "W" (S1) on S1.

(✓) 8. Connect a 4-1/2" piece of red wire from XV3-6 (C) to TB3-1 (C).

(✓) 9. Connect a 7" piece of red wire from C24-A (S1) to TB5-1 (C).

(✓) 10. Connect a 12" piece of red wire from C24-B (S1) to TB4-1 (C).

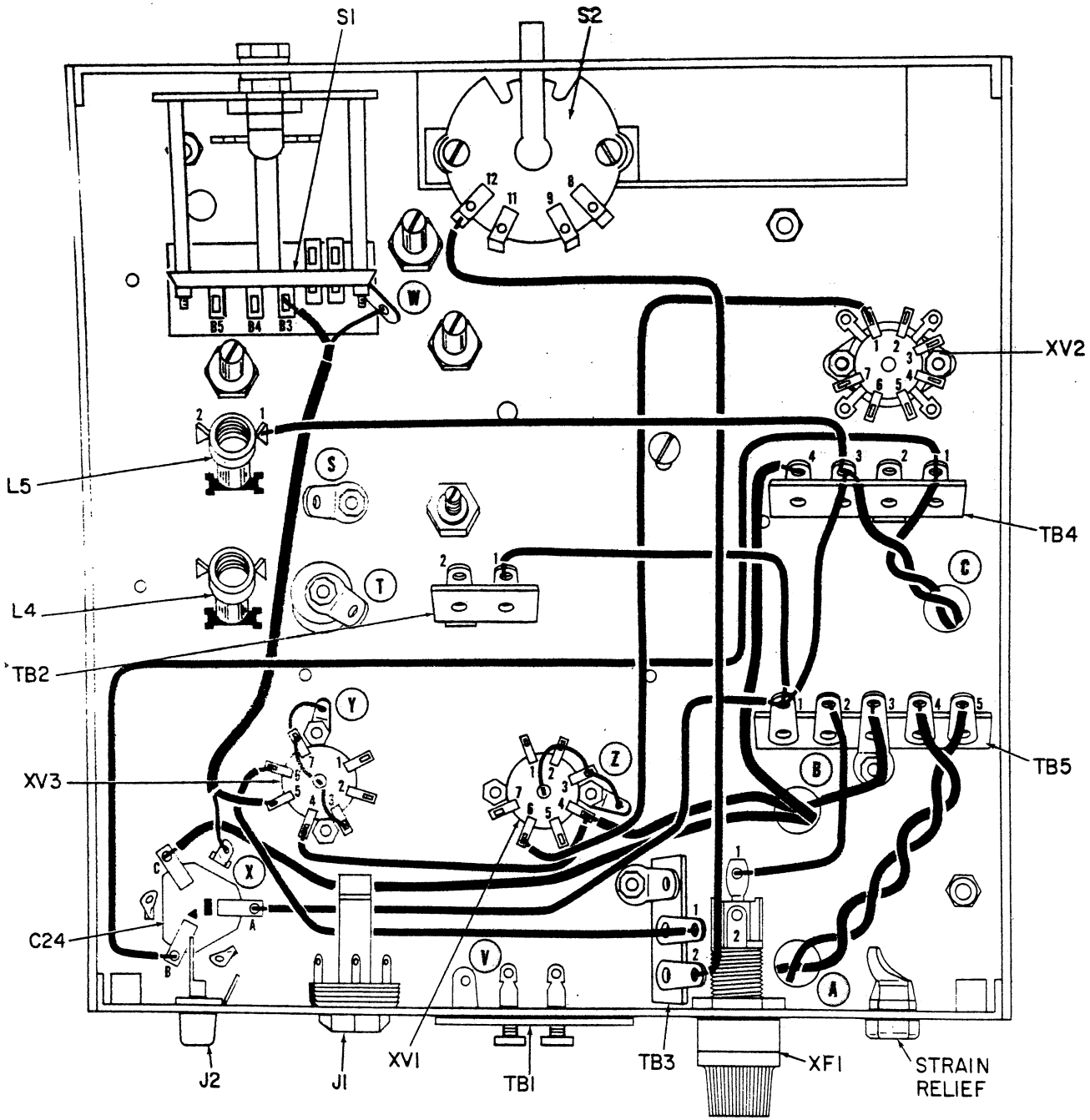
(✓) 11. Connect a 3-1/2" piece of red wire from TB2-1 (C) to TB5-1 (C).

(✓) 12. Connect a 12" piece of grey wire from TB3-2 (C) to S2-12 (S1).

(✓) 13. Connect a 2-1/2" piece of red wire from TB4-3 (C) to TB5-1 (C).

(✓) 14. Connect a 6-1/2" piece of red wire from TB4-3 (C) to L5-1 (C).

(✓) 15. Connect a 2-1/2" piece of black wire from TB5-2 (C) to XF1-1 (S1).


S1
S2
W
XV2
L5
S
TB4
L4
T
C
TB2
Y
Z
XV3
TB5
B
X
C24
V
A
J2
J1
XV1
TB1
TB3
XF1
STRAIN
RELIEF

The following steps refer to figure 8C.

1. Cut one piece of black wire and a piece of orange wire to 10-1/2" and a piece of blue wire to 12-1/2".

   Connect the black wire TB5-2 (C) and the other orange wire to TB5-5 (S2). Connect the blue wire to TB5-4 (C).

   Twist the THREE wires together and run them along the chassis as shown.

   Connect the orange wire to S1A-1 (C) and the black wire to S1A-2 (S1). Pass the blue wire through the cutout to the top of the chassis. It will be connected later.

2. Connect a 3-1/2" piece of orange wire to S1A-1 (S2). Pass the other end through the cutout to the top of the chassis. It will be connected later.

3. Connect a 1-3/4" piece of white wire from S2-8 (C) to S2-11 (S1).

4. Connect an 8" piece of purple wire to S2-8 (S2) and an 8" piece of green wire to S2-9 (S1).

   Twist them together and run them along the chassis as shown.

   Connect the purple wire to J1-3 (C) and the green wire to TB1-2 (S1).

5. Connect a 3-1/2" piece of purple wire from S1B-4 (S1) to L4-2 (C).

6. Connect a 2-1/2" piece of green wire from S1B-5 (S1) to L5-2 (S1).

7. Connect a 3" piece of green wire to S1B-11 (S1). Pass it through the cutout to the top of the chassis. It will be connected later.

8. Connect a 3" piece of brown wire to S1B-12 (S1).

   Pass it through the cutout to the top of the chassis. It will be connected later.

9. Connect a 1" piece of bare wire from TB1-1 (S1) to lug "V" (S1).

10. Connect a 1" piece of bare wire from J1-3 (S1) to J1-2 (C).

11. Connect a 1/2" piece of bare wire from XV2-7 (S1) to lug "U" (S1) on XV2.

12. Connect a 1-1/2" piece of bare wire from L4-1 (C) to L5-1 (S2).

13. Cut both leads on a .01mfd (10K or 10,000mmf) disc capacitor, C15, to 1/2". Connect from XV1-2 (S2) to XV1-6 (S2).

14. Cut both leads on a 10mmf disc capacitor, C17, to 1". Cover each lead with a 3/4" piece of tubing. Connect from XV1-5 (C) to XV3-1 (C).

15. Cut both leads on a .001mfd (rectangular) mica capacitor, C9, to 3/4. Cover each lead with a 1/2" piece of tubing. Connect from XV1-7 (C) to lug "T" (C).

16. Cut both leads on a .001mfd (rectangular) mica capacitor, C10, to 3/4". Connect from XV1-7 (C) to TB2-2 (C).

17. Cut both leads on a .002mfd (2K or 2000mmf) disc capacitor, C18, to 1/2". Connect from XV3-2 (C) to XV3-7 (C).

18. Cut both leads on a 100mmf disc capacitor, C22, to 1". Cover both leads with a 3/4" piece of tubing. Connect from XV3-5 (S2) to J2-1 (S1).

19. Cut both leads on a .002mfd (2K or 2000mmf) disc capacitor, C19, to 1/2". Connect from XV3-6 (S2) to XV3-7 (S3).

20. Cut both leads on a .002mfd (2K or 2000mmf) disc capacitor, C14, to 1/2". Connect from J1-2 (S2) to J1-3 (S2).

21. Cut both leads on a .01mfd (10K or 10,000mmf) disc capacitor, C16, to 1/2". Connect from TB2-1 (C) to TB2-2 (C).

22. Cut the three leads on the 2 x .005mfd (5K or 5000mmf) disc capacitor, C20-C21, to 3/4". Connect one END lead to TB5-2 (S3) and the other END to TB5-4 (C). Connect the CENTER lead (common) to TB5-3 (S2).

23. Cut both leads on a .01mfd (10K or 10,000mmf) disc capacitor, C23, to 3/4". Connect from L4-1 (C) to lug "S" (S1).

FIGURE 8C BOTTOM WIRING

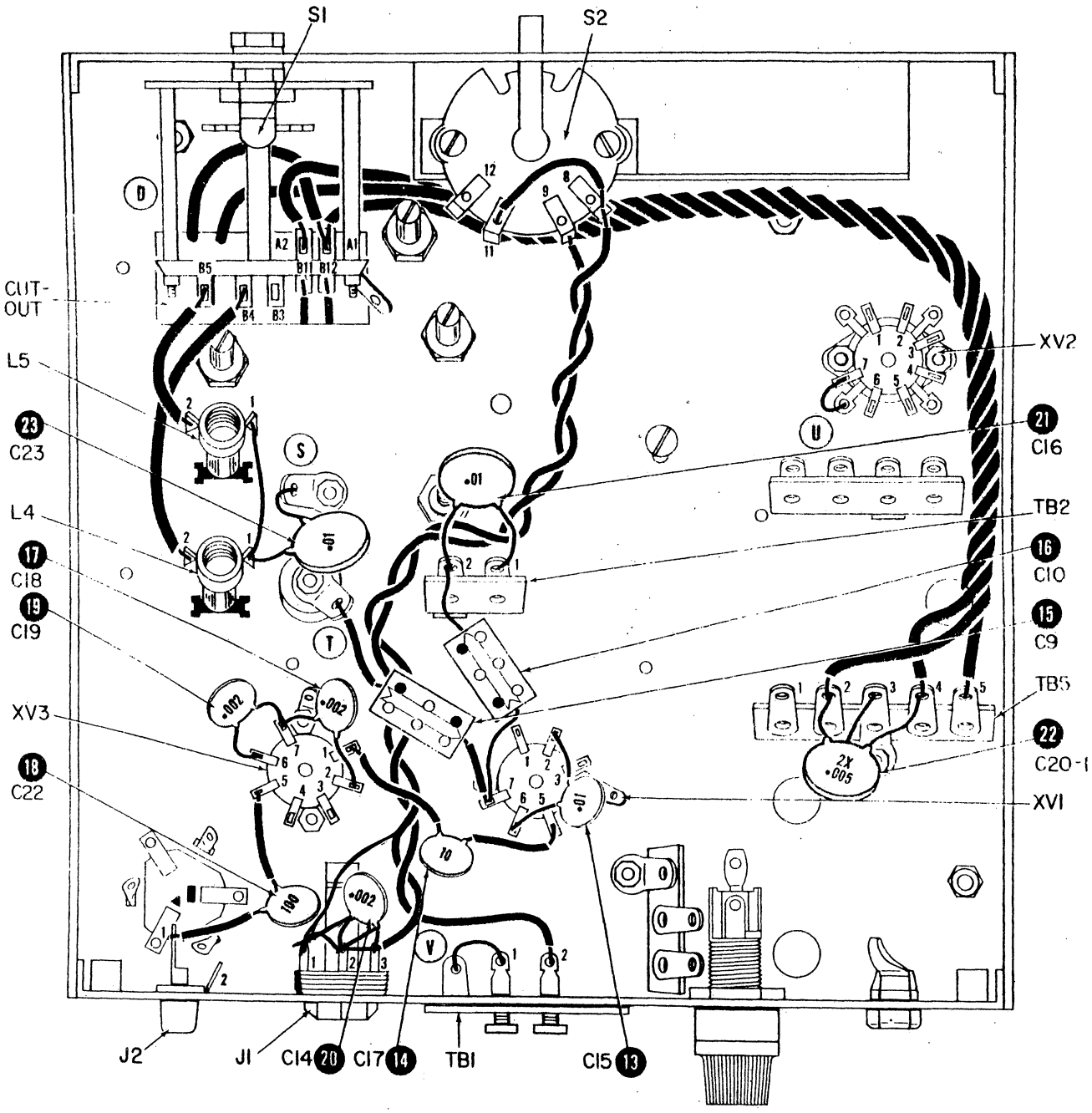

S1
S2
CUT-OUT
L5
23
C23
L4
17
C18
19
C19
XV3
18
C22
XV2
21
C16
TB2
16
C10
15
C9
TB5
22
C20-1
XV1
J2
J1
C14 20
C17 14
TBI
C15 13

FIGURE 9C BOTTOM WIRING

The following steps refer to figure 9C.

( ) 1. Cut both leads on a 22Ω, 1/2 watt, 20%, (red, red, black) resistor, R1, to 3/4". Connect from XV1-1 (C) to lug "T" (S2).

( ) 2. Cut both leads on a 47KΩ, 1/2 watt, 10%, (yellow, violet, orange, silver) resistor, R2, to 1/2". Connect from XV1-1 (S2) to TB2-2 (S3).

( ) 3. Cut both leads on a 1mh choke, L3, to 3/4". Connect from XV1-5 (S2) to TB2-1 (S2).

( ) 4. Cut both leads on a 1mh choke, L2, to 3/4". Connect from XV1-7 (S3) to TB3-2 (S2).

( ) 5. Cut both leads on a 22KΩ, 1/2W, 10%, (red, red, orange, silver) resistor, R4, to 3/4". Connect from XV3-1 (S2) to lug "Y" (C).

( ) 6. Cut both leads on a 470Ω, 1W, 10% (yellow, violet, brown, silver) resistor, R5, to 3/4". Connect from XV3-2 (S2) to lug "Y" (S3).

( ) 7. Cut both leads on a 8200Ω, 2 watt, 10% (grey, red, red, silver) resistor, R3, to 3/4". Connect from XV2-1 (S2) to TB4-3 (S4).

( ) 8. Cut both leads on a 22KΩ, 1 watt, 10% (red, red, orange, silver) resistor, R6, to 1". Cover each lead with a 3/4" piece of tubing. Connect from TB3-1 (S2) to TB5-1 (S4).

( ) 9. Cut both leads on a 10KΩ, 1/2 watt, 10%, (brown, black, orange, silver) resistor, R7, to 1/2". Connect from L4-1 (S3) to L4-2 (S2).

( ) 10. Do not cut the leads on CR1 and CR2 rectifiers. Cover each lead on both rectifiers with a 1" piece of tubing.

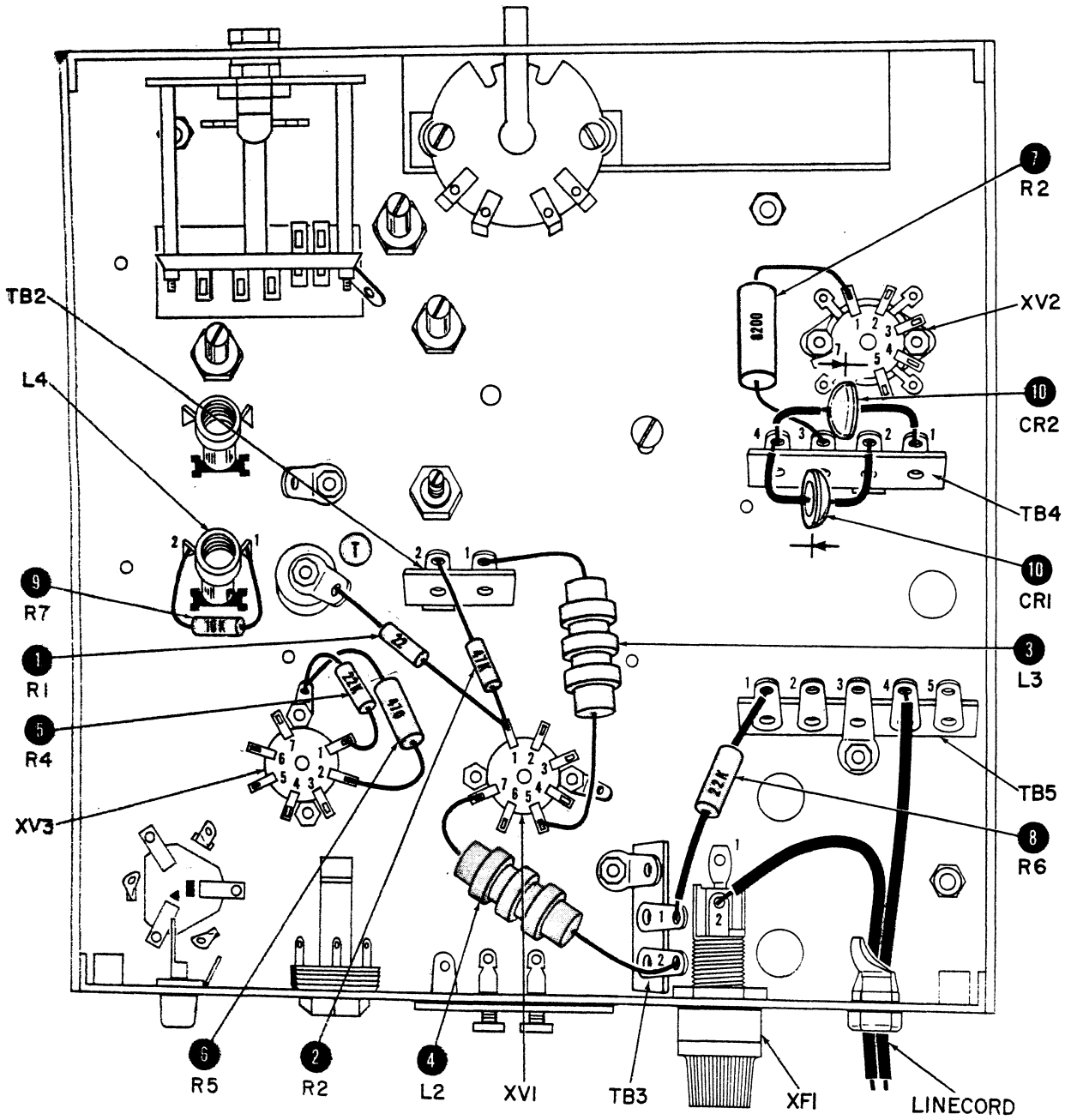
( ) Connect the cathode lead of CR1 to TB4-4 (C) and the other lead to TB4-2 (S1).

( ) Connect the cathode lead of CR2 to TB4-1 (S3) and the other lead to TB4-4 (S3).

CAUTION: Excess heat on the leads of the rectifiers can ruin them. While soldering the rectifier leads, place a pair of long nose pliers on the lead between the junction to be soldered and the rectifiers. This procedure will help to conduct the excess heat away from the rectifiers.

( ) 11. Connect one lead of the line cord to XF1-2 (S1) and the other lead to TB5-4 (S4).

DO NOT CONNECT UNIT TO YOUR POWER SOURCE AT THIS TIME!


TB2
L4
9
R7
1
R1
5
R4
XV3
7
R2
XV2
10
CR2
TB4
10
CR1
3
L3
TB5
8
R6
6
R5
2
R2
4
L2
XV1
TB3
XF1
LINECORD

The following steps refer to figure 10C.

1. Connect the orange wire from the cutout to TB6-1 (C).

2. Connect the blue wire from the cutout to TB6-3 (C).

3. Cut both leads on the neon bulb, I1, to 3/4". Cover both leads with a 1/2" piece of tubing. Connect from TB6-3 (S2) to TB6-2 (C). Note placement of leads.

4. Cut both leads on a 33KΩ, 1/2 watt, 10% (orange, orange, orange, silver) resistor, R8, to 1/2". Connect from TB6-2 (S2) to TB6-1 (S2).

5. Connect the brown wire from the large cutout (S1-B12) to C11-1 (C).

6. Connect the green wire from the large cutout (S1-B11) to C6-1 (C).

7. Connect a 2" piece of purple wire from S1B-10 (C) to C3-1 (C).

8. Connect a 3-1/2" piece of grey wire from S1B-9 (S1) to L1-1 (C).

9. Connect a 3" piece of green wire from L1-2 (S1) to lug "S" (S1).

10. Connect a 2" piece of green wire from C3-1 (C) to C2 (S1).

11. Cut both leads on a 12mmf, disc capacitor, C12, to 1/2". Connect from C11-1 (C) to C11-2 (C).

12. Cut both leads on a 5mmf, (violet, green, black, white, green) tubular capacitor, C13, to 1/2". Connect from C11-1 (S3) to C11-2 (S2).

13. Cut both leads on a 27mmf, disc capacitor, C4, to 3/4". Connect from C3-2 (C) to S1B-10 (C).

14. Cut both leads on a 10mmf, (violet, brown, black, black, green) tubular capacitor, C5, to 3/4". Connect from C3-2 (S2) to S1B-10 (S3).

15. Cut both leads on a 22mmf, ±20% molded capacitor, C7, to 1/2". Connect from C6-1 (C) to C6-2 (C).

16. Cut both leads on a 5mmf, (violet, green, black, white, green) tubular capacitor, C8 to 1/2". Connect from C6-1 (S3) to C6-2 (S2).

17. Cut both leads on a 110mmf, (red, brown, brown, brown, brown) tubular capacitor, C1, to 3/4". Connect from L1-1 (S2) to C3-1 (S3).

18. Place neon bulb, I1, in back of TB6 so that it is wedged between the terminal strip and the dial pan. Adjust the bulb so that it rests against the hole.

FIGURE 10C TOP WIRING

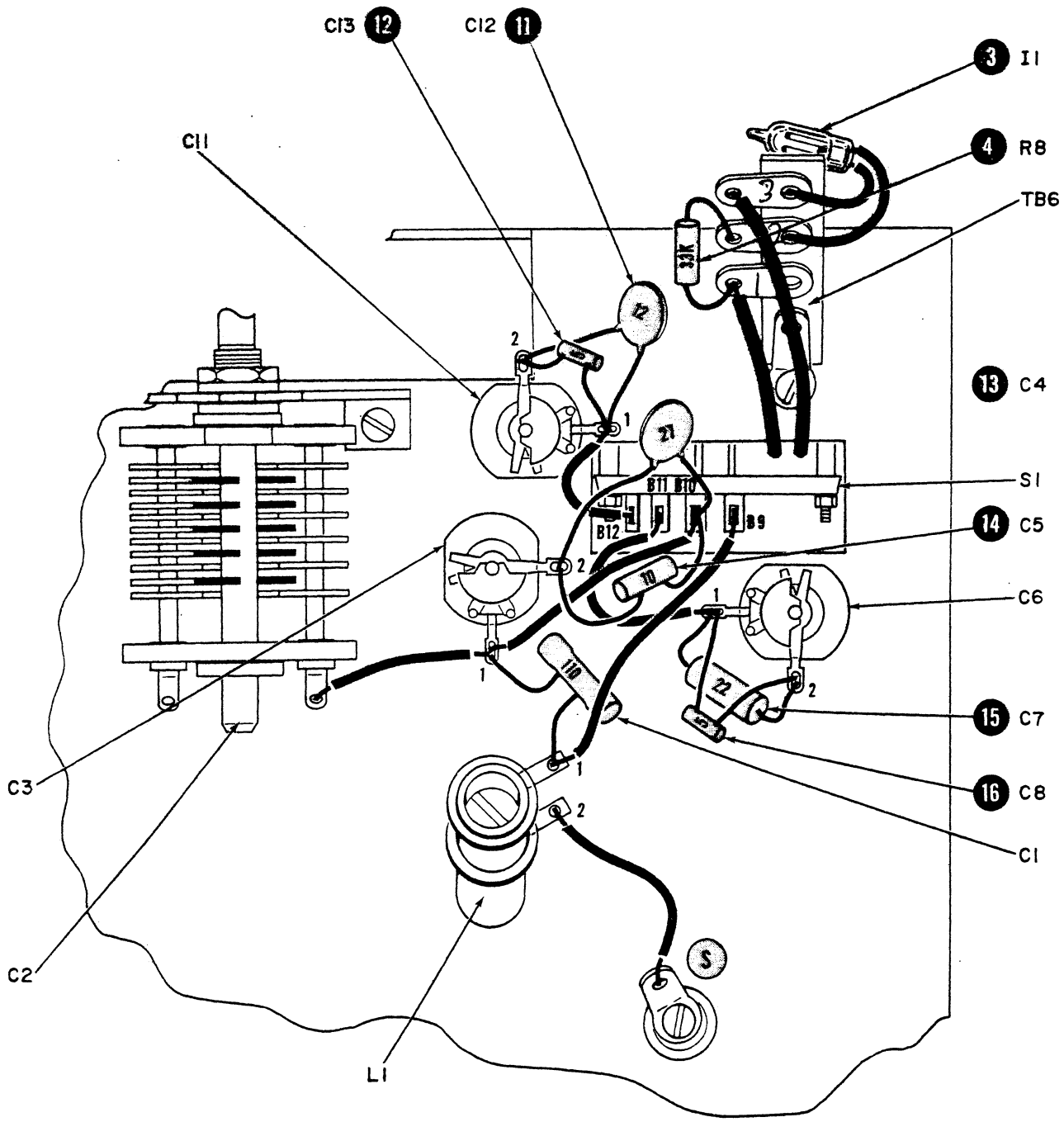

C13 12
C12 11
3 I1
4 R8
TB6
C11
13 C4
S1
14 C5
C6
15 C7
16 C8
C1
C3
C2
L1
S
33K
B11 B10
B12
B9

FIGURE 11C DIALCORD STRINGING

The following steps refer to figure 11C.

Orientate the chassis as shown in the drawing. Dip the ends of a 36" piece of dial cord in nail laquer or shellac to prevent fraying.

( ) 1. On one end of the dial cord, make a loop knot. (See Detail).

( ) 2. Place the POINT of a pencil into the loop. Stretch the dial cord so that it becomes taut.

Now mark off EXACTLY 30"

( ) 3. Tie the dial cord AT THE 30" MARK, to ONE end of the spring. Make a double knot.

( ) 4. Loosen the setscrews on the drum assembly. With C2 OPEN, rotate the drum assembly so that the SETSCREWS are orientated as INDICATED IN FIGURE 11C.

Once the line up of drum assembly and C2 is made, tighten the setscrews.

( ) 5. Place the looped end of the dial cord over the spring lug on the drum assembly.

Feed the spring through the hole in the drum assembly's rim.

Loop the cord around pulley "B" 1/2 a turn, then 1/2 a turn around pulley "C".

From Pulley "C" string the cord CLOCKWISE around the drum assembly.

Feed the spring back again through the hole in the drum assembly's rim and hook the open end onto the SPRING LUG.

( ) 6. Cut off any excess cord leaving approximately 1/2".

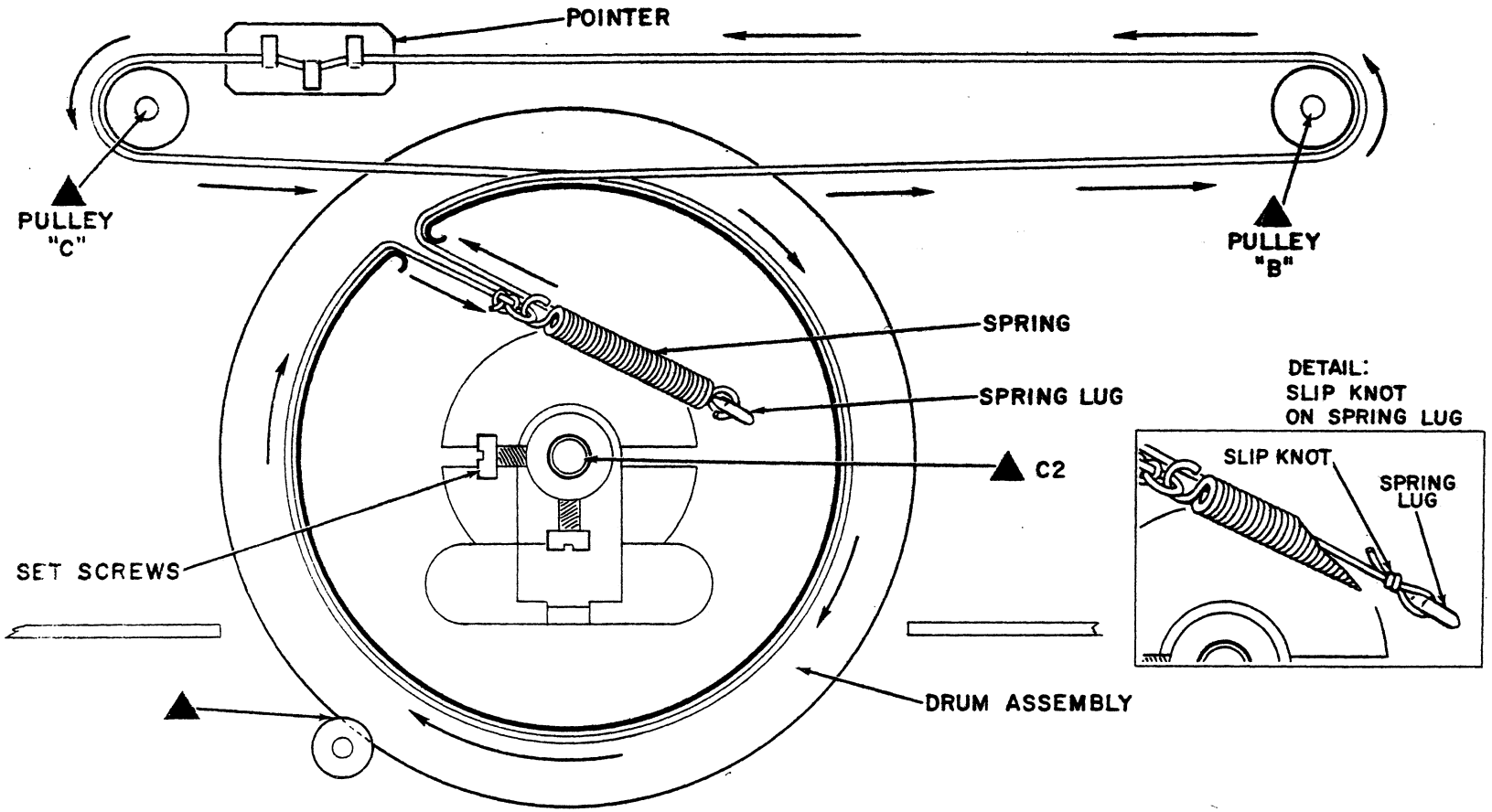
( ) 7. Lubricate all the points marked with a ▲ using the tube of lubriplate supplied. For point markings see figure 11C.

Make certain to lubricate the channel on the dial pan and the moving parts of C2. These points are not shown in the figure.

( ) 8. Close capacitor, C2, and slide the pointer to approximately 3.5mc on the 80 meter scale.

( ) 9. Place the dial cord on the rear of the pointer as shown in figure 11C.

( ) 10. See Alignment Section in Instruction Manual for proper pointer adjustment. Open all Trimmer Capacitors, C3, C6 and C11 to HALF their full rotation.


POINTER
PULLEY "C"
PULLEY "B"
SPRING
SPRING LUG
C2
SET SCREWS
DRUM ASSEMBLY
DETAIL: SLIP KNOT ON SPRING LUG
SLIP KNOT
SPRING LUG

FINAL STEPS

You have now completed the assembly and wiring of your VFO. When you have completed the following steps your unit will be ready for operation.

( ) 1. To catch any wiring errors, it is suggested that the entire wiring be checked point-by-point 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 switch contacts. Remove excess with a stiff brush dipped in Safe-Tee Solvent, F.O. 178.

( ) 2. Insert all tubes in the appropriate sockets indicated in the tube layout diagram of the instruction manual. Attach the two tube shields over tubes V1 and V3 and insert the 1 amp fuse, F1, into the fuseholder.

( ) 3. Turn the "BAND" control to the extreme counter-clockwise position. Place a large knob onto the shaft so that the marker points to the word "OFF". Tighten the setscrew.

Place another large knob over the "TUNING" shaft and tighten the setscrew.

Push the remaining small knob onto the shaft of the "MODE" switch shaft.

The following steps refer to figure 12C.

( ) 4. Mount the shield to chassis using five No. 6 self-tapping screws.

( ) 5. Place the shield cover on the shield and secure by using six No. 6 self-tapping screws.

( ) 6. The four plastic feet are to be mounted to the bottom of the cabinet. The large diameter of each foot fits against the bottom. Push a No. 6-32 x 5/16 screw from the inside of the cabinet through the hole in the center of the rubber foot. From the outside of the cabinet, secure the rubber foot to the bottom of the cabinet using one No. 6 lock-washer and one No. 6-32 hex nut. In a similar manner, mount the other three rubber feet to the bottom of the cabinet.

( ) 7. Insert the nomenclature label into the embossed area on the rear of the cabinet.

( ) 8. Slide the VFO into the cabinet passing the line cord through the rectangular cutout at the rear of the cabinet. When it is properly mounted in the cabinet, the front bezel will fit snugly against the lip around the cabinet. Secure the chassis to the cabinet with four No. 6 brown self-tapping screws in the four holes near the corners of the rectangular cutout at the rear at of the cabinet.

( ) 9. Strip 1" of the outer insulation from the 3 ft. piece of cable.

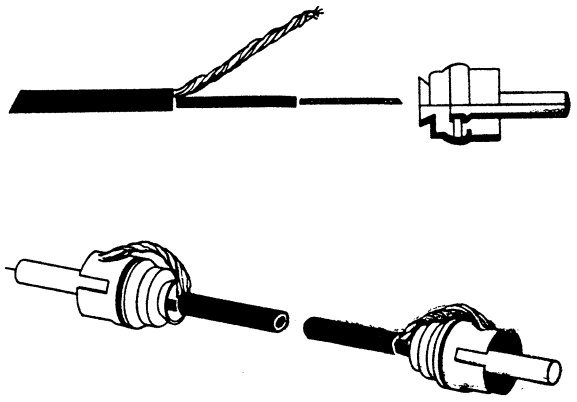
Separate the braided outer shield and pull the center out. Strip off 1/2" of insulation.

Insert the center conductor into the shaft of one RCA type phono plug and solder.

Solder the braided shield to the outside of the plug. See detail drawing "B".

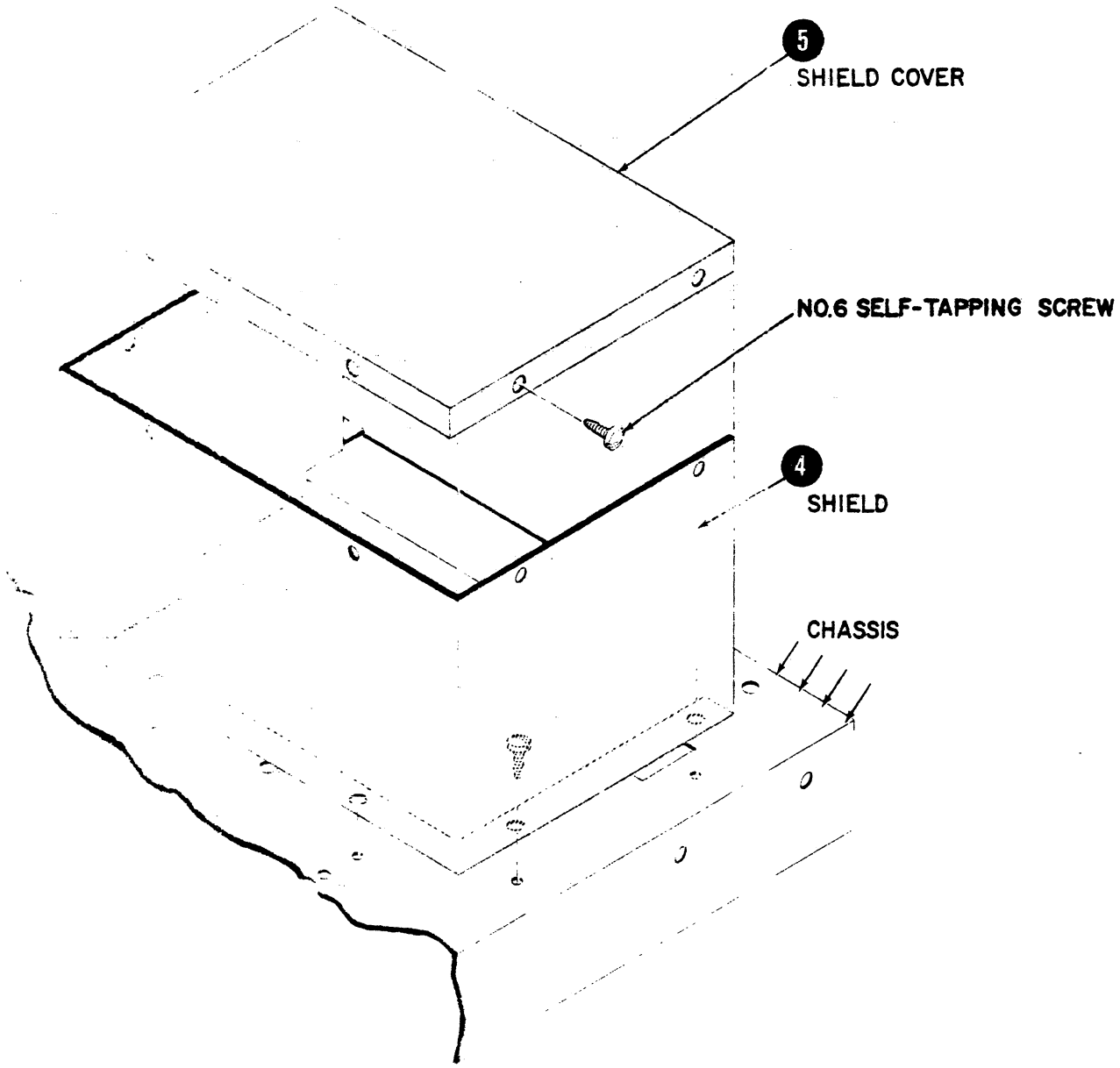
In a similar manner solder the remaining plug to the other end of the cable.

( ) 10. Proceed to the Alignment Section in your Instruction Manual.



Detail "B" Plug Wiring

FIGURE 12C SHIELD ASSEMBLY


5
SHIELD COVER
NO.6 SELF-TAPPING SCREW
4
SHIELD
CHASSIS

MODEL 722 ADDENDA

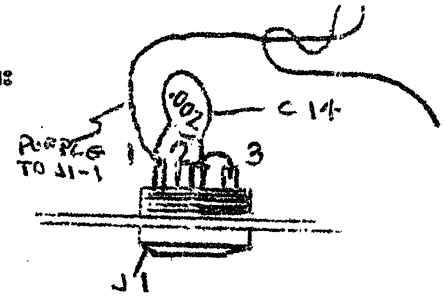
If you have the 722 kit, make the following changes in your CONSTRUCTION MANUAL:

Page 22, Step 4 (3rd Paragraph). Connect the PURPLE wire to J1-1 (C) instead of J1-3 (C).

Page 22, Step 10. Connect a 1" piece of BARE wire from J1-3 (S1) to J1-2 (C) instead of J1-1 (S1) to J1-2 (C).

Page 22, Step 20. Connect the .002mfd CAPACITOR, C19 from J1-2 (S2) to J1-1 (S2) instead of J1-2 (S2) to J1-3 (S2).

Page 23, Figure 8C, Change according to drawing shown:



I. E. 1445 EICO Electronic Instrument Co. Inc., 33-00 Northern Blvd., L. I. C. 1, N. Y.

MODEL 722 ADDENDA

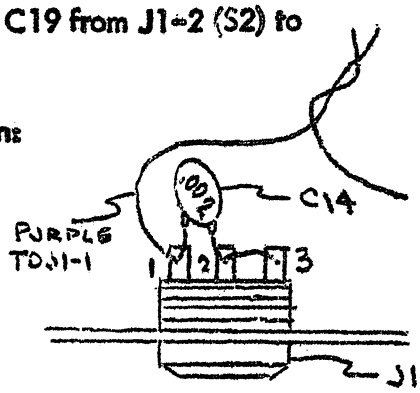
If you have the 722 kit, make the following changes in your CONSTRUCTION MANUAL:

Page 22, Step 4 (3rd Paragraph). Connect the PURPLE wire to J1-1 (C) instead of J1-3 (C).

Page 22, Step 10. Connect a 1" piece of BARE wire from J1-3 (S1) to J1-2 (C) instead of J1-1 (S1) to J1-2 (C).

Page 22, Step 20. Connect the .002mfd CAPACITOR, C19 from J1-2 (S2) to J1-1 (S2) instead of J1-2 (S2) to J1-3 (S2).

Page 23, Figure 8C, Change according to drawing shown:



I. E. 1445 EICO Electronic Instrument Co. Inc., 33-00 Northern Blvd., L. I. C. 1, N. Y.

EICO

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.