# THE KNIGHT CAPACITOR CHECKER

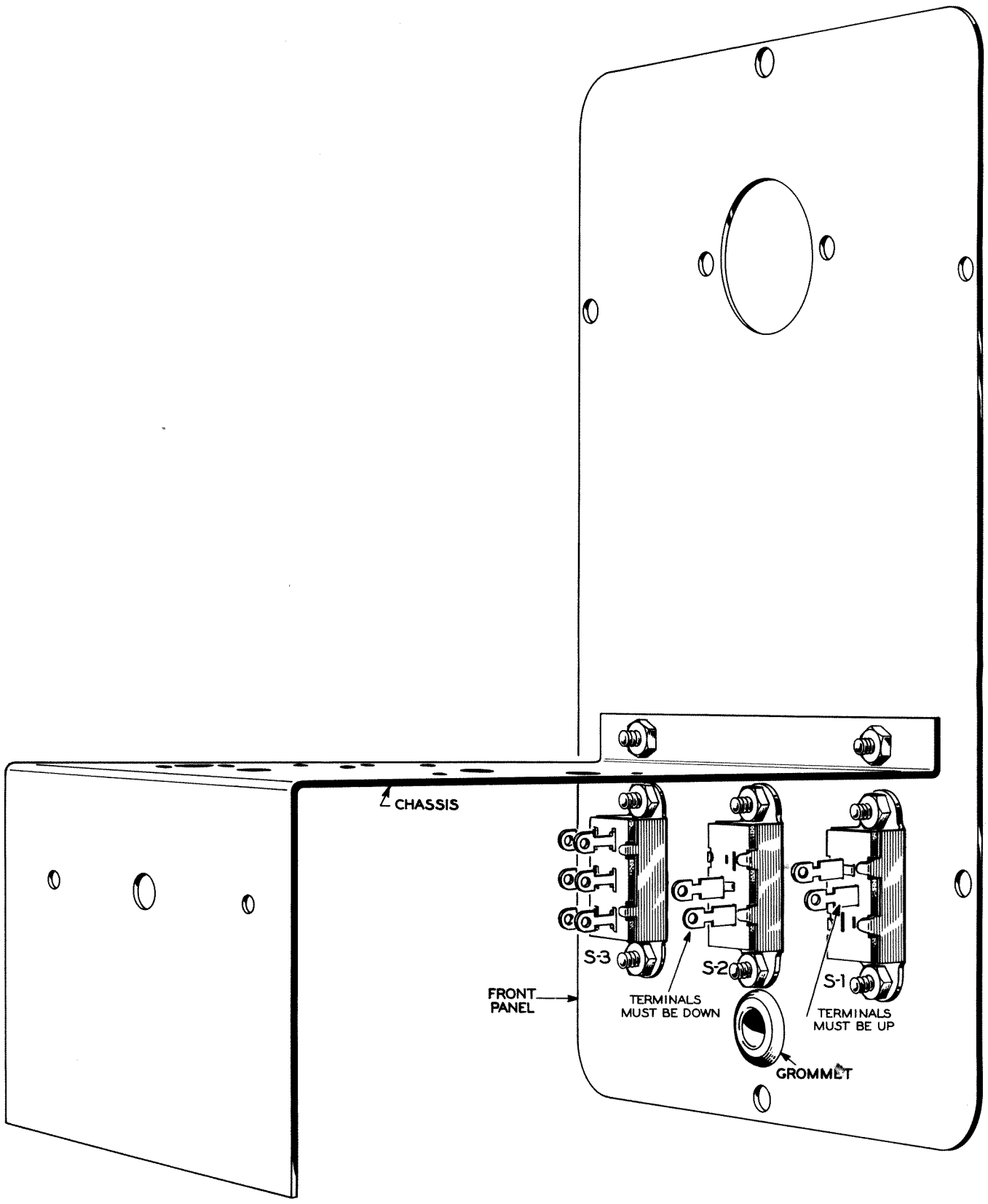



**FIGURE 1. HOW TO MOUNT PARTS ON THE FRONT PANEL**

# THE KNIGHT CAPACITOR CHECKER

## SPECIFICATIONS

**Open Test**..... Any value 20 MMFD or more.

**Short Test**..... Any value to 2,000 MFD.

**Power Supply**..... Transformer and selenium rectifier.

**Operating Power**....105 to 125 V, 50 or 60 cycles AC ONLY.

The KNIGHT Capacitor Checker is designed to test capacitors for shorts and open circuits without disconnecting them from the circuit. These tests can be made even though the capacitor is in parallel with a resistor as low as 50 ohms.

## CHECKING YOUR KIT

Before starting to build your kit, check each part in the kit against the Parts List on page 13. If you cannot identify some of the parts by sight, locate them on the various pictorial diagrams. Capacitor and resistor values, if not printed on the part, can be found with the aid of the Color Code Chart.

## CONSTRUCTION HINTS

You will need the following tools to construct your KNIGHT Capacitor Checker: A pair of long nose pliers, a pair of diagonal cutters, a medium size screwdriver, a ¼" hex nut driver, and a 40-watt soldering iron. Should you wish to order any of these tools from Allied Radio, you will find their stock numbers and prices at the end of the Parts List.

The step-by-step instructions were prepared by a skilled technician while he was actually building the KNIGHT Capacitor Checker. Therefore, they are the best and fastest way of assembling this unit. We urge that you read the instructions thoroughly before you build the Capacitor Checker. This will enable you to familiarize yourself with the procedure and avoid possible errors. We suggest that you use the blank parentheses, ( ), to check off each construction step after you have completed it.

Each step is clearly illustrated on an accompanying line drawing. Some builders prefer to cross out, with a colored pencil, each wire and component on the drawing after it is installed.

You are now ready to build your KNIGHT Capacitor Checker.

## MOUNTING THE PARTS ON THE FRONT PANEL AND CHASSIS

**SEE FIGURE 1.**

( ) Install S-1 (one of the switches with 2 terminals) in the hole marked ON-OFF. Position the switch so that the terminals are up toward ON. Fasten S-1 with two of the shorter screws and nuts.

( ) In the same way mount S-2 (use the other switch with 2 terminals on the back) in the hole marked TEST. Position the switch so the terminals are down towards TEST.

( ) Mount S-3 in the hole marked OPEN-SHORT in the same way. This switch may be positioned either way.

( ) Insert one grommet in the hole below the TEST switch.

( ) Fasten the chassis to the front panel using 2 short screws and nuts.

**SEE FIGURE 2.**

( ) Hold the "Magic Eye" escutcheon in position on the front panel, the half moon cutout should be towards the bottom. Put the magic eye tube mounting bracket in back of the panel. Line up the screw holes with the holes in the escutcheon. Fasten the escutcheon, front panel and mounting bracket together with 2 small sheet metal screws.

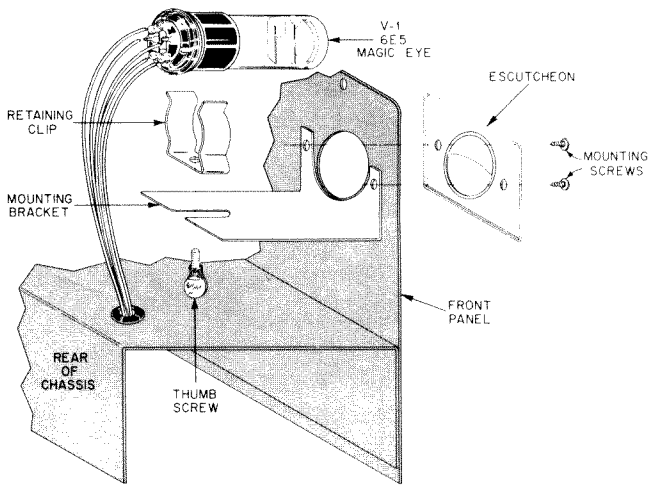



**FIGURE 2. HOW TO MOUNT THE MAGIC EYE BRACKET**

( ) Put the thumb screw in the magic eye retaining clip and put the clip in position on the mounting bracket.

**SEE FIGURE 3.**

( ) Position the chassis as shown in Figure 3. Mount the socket for V-2, from the inside, in the lower right corner of the chassis. Position the keyway, or wide open space between two of the pins, to the right. Use two of the shorter screws and nuts. Mount a solder lug between the socket and the chassis with the lower left screw.

( ) Install the four grommets in the holes indicated in Figure 3.

( ) Mount TS-2, a strip with two terminals, as shown in Figure 3. Use a shorter screw and nut to fasten it.

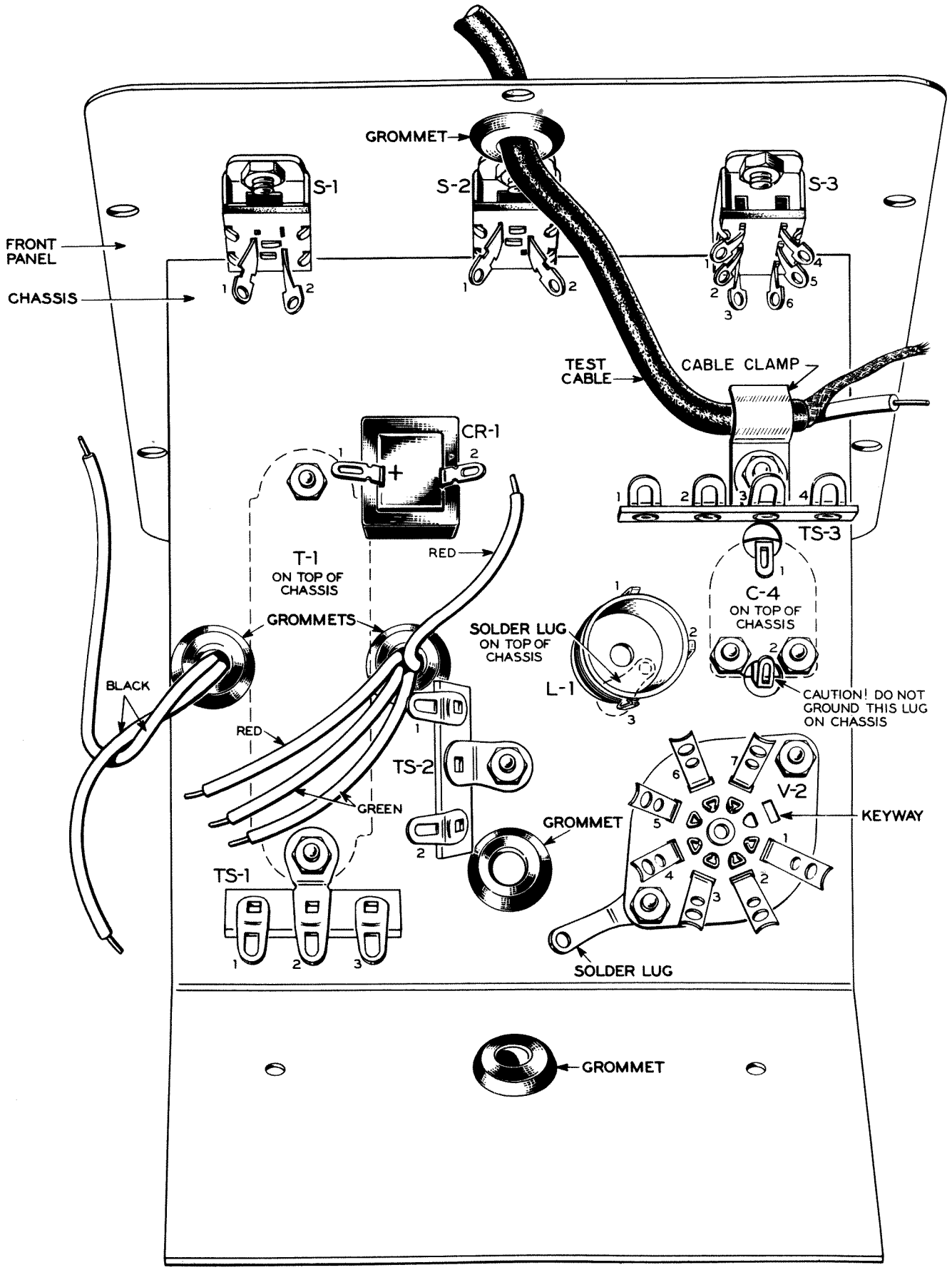



**FIGURE 3. HOW TO MOUNT PARTS ON THE CHASSIS**

( ) Push the 2 black leads from T-1 (the power transformer) through the left, center grommet. Push the 2 red and 2 green leads from T-1 through the grommet to the right. Fasten the upper mounting tab of T-1 with a shorter screw and nut. Mount TS-1 as shown in Figure 3 with the other short screw and nut used to mount T-1.

( ) Bend the terminals of C-4 to fit through the holes in the chassis as shown in Figure 3. Mount C-4, the ceramic trimmer capacitor ,on top of the chassis with 2 long, thin screws and nuts. Do not allow the terminals to touch the chassis.

( ) Mount the coil, L-1, as shown in Figure 3. Position L-1 with terminal 2 to the right. Tighten a nut on the front mounting screw of L-1. Use a solder lug and nut on the other mounting screw of L-1. Position the solder lug as shown in Figure 3.

( ) Mount CR-1, the rectifier, in the hole just to the right of the front mounting screw of T-1. Position CR-1 so the "plus" terminal is to the left. Use a large nut to fasten CR-1.

**CAUTION: The length of the shielded test cable is a critical part of the circuit of the KNIGHT Capacitor Checker. Do not change the length of the test cable.**

( ) Carefully cut one inch of the outer insulation from one end of the test cable. Unravel the braided shielding as far as the insulation is cut off. Twist the unravelled shielding tightly. Cut off ¼ inch of the insulation from the inner wire.

( ) Mount TS-3 and the Cable Clamp with the same screw and nut in the hole above C-4. Before tightening the nut put the Test Cable under the Cable Clamp as shown in Figure 3. The Cable Clamp must hold the insulated part of the Test Cable.

( ) Put the free end of the test cable through the grommet by S-2.

## WIRING AND SOLDERING HINTS

How well a piece of electronic equipment works often depends on the quality of workmanship used in its construction. It is for this reason that the following suggestions are made. These hints are mainly for the beginner, however, even experienced persons may benefit from a brief preview.

The insulated wire furnished with this kit is cut to length and the ends are stripped, thus saving the builder this tedious task. Each different colored wire is a different length, therefore, be sure to use the color specified in each of the wiring steps.

The flexible tubing supplied is called "spaghetti". Spaghetti is used to cover the bare end leads of some of the components when there is danger they will touch other bare wires or the chassis.

The proper way to connect a wire or lead to a terminal is shown in Figure 4. To insure a good mechanical connection, squeeze the wire against the terminal with your long nose pliers after it has been hooked on. Make sure the wires, leads, and terminals are clean before connecting them. If necessary scrape them with

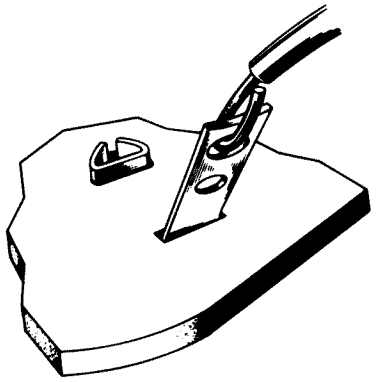


**FIGURE 4. HOW TO CONNECT A WIRE TO A TERMINAL**

a pocket knife until any foreign substance, such as wax, is removed. Be extremely careful not to nick the wire with the knife or it may break when it is bent. Unless otherwise stated, all leads on the resistors, capacitors, chokes, etc. should be as short as possible. Figure 5 illustrates the best way to connect a component. As shown, the end leads should be pulled through the terminals so that the parts are tightly mounted. After a lead is pulled through a terminal, bend it around the terminal and cut off the excess wire.

Some parts, such as power transformers are used in more than one kit. This allows us to buy large quantities, at lower cost and pass the savings along to the kit builders. The wire leads on such parts must be long enough to accommodate all of the kits in which they are used. These leads should be carefully trimmed to the correct length as given in the manual.

A sufficient amount of rosin core solder is furnished to completely assemble your KNIGHT Capacitor Checker. However, if you prefer to use your own . . .

## USE ONLY ROSIN CORE SOLDER

**IF YOU ARE IN DOUBT ABOUT THE SOLDER YOU MAY ALREADY HAVE, WE STRONGLY RECOMMEND THAT YOU OBTAIN A NEW ROLL PLAINLY MARKED "ROSIN CORE SOLDER". KITS WIRED WITH ACID CORE SOLDER OR ACID FLUX WILL CORRODE AND WILL NOT WORK LONG. SUCH KITS ARE NOT ELIGIBLE FOR SERVICE OR REPAIR.**

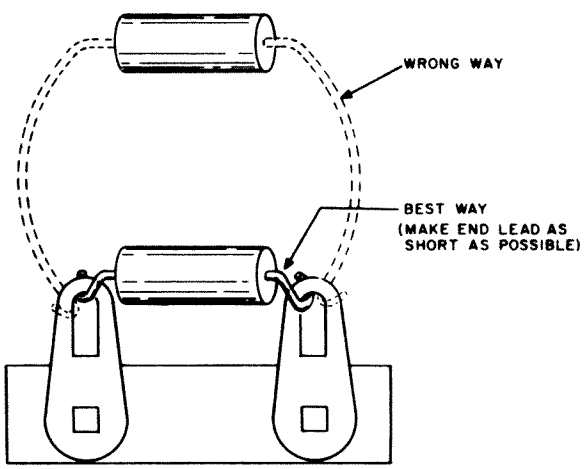



**FIGURE 5. THE BEST WAY TO CONNECT A COMPONENT**

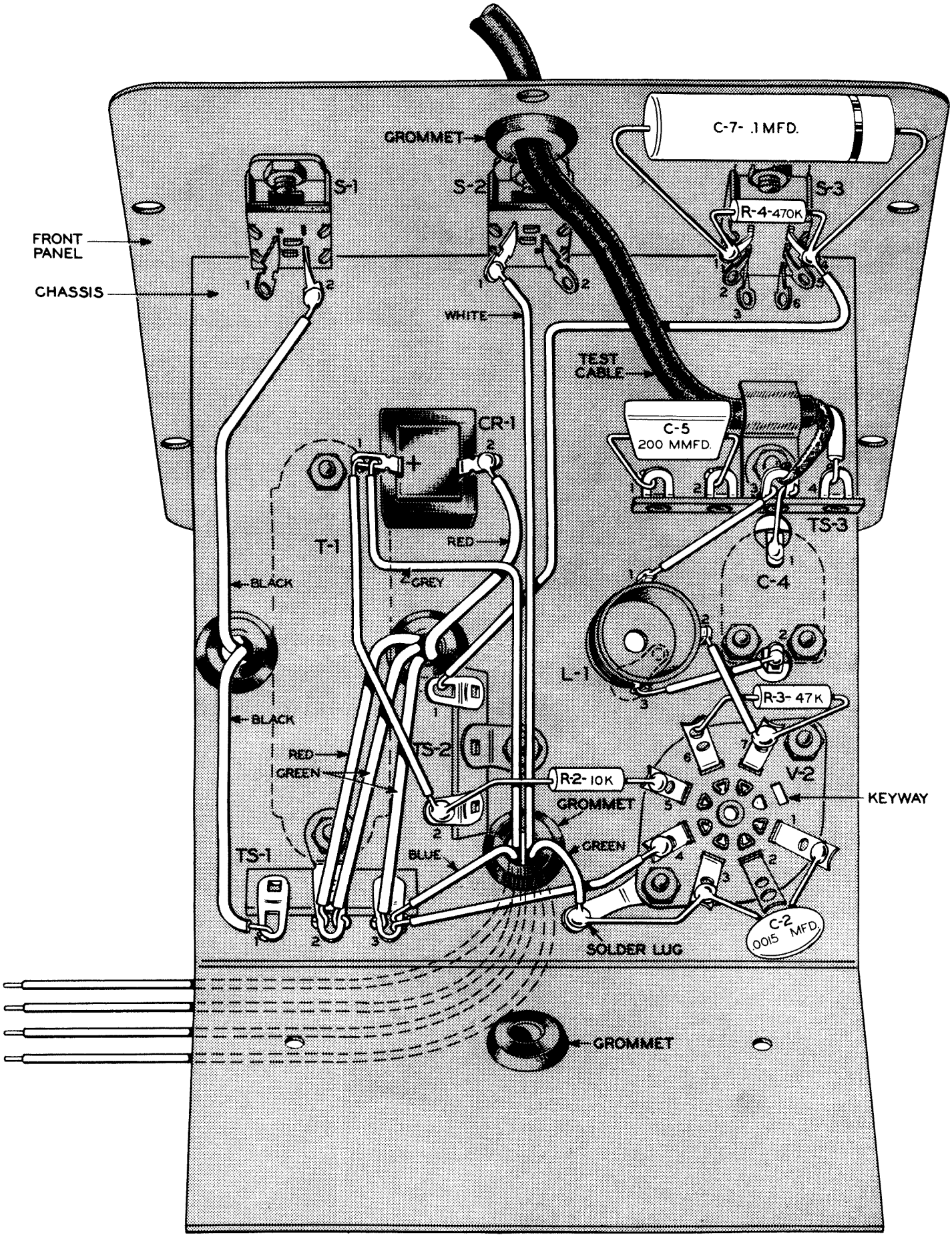



FIGURE 6. FIRST WIRING VIEW

Before soldering, the tip of your soldering iron must be properly tinned. To do this, clean the tip surface with steel wool, or a fine file, until the bright copper surface is exposed. Plug the iron in and allow it to heat until it melts solder. Apply solder to the tip until it is well covered with a thin coat. Wipe off the excess solder with a rag. The tip should now be "shiny". Re-tin the tip whenever it becomes covered with scale (flakes of gray matter).

Before soldering a connection, be sure the iron is hot enough to melt solder. Pre-heat the CONNECTION by holding the tip of the iron against the joint to be soldered. After the joint is heated, apply solder to the joint, not to the iron tip. Use only enough solder to fill the crevices between the wires, leads and terminals.

After you have soldered a connection, push the insulation or spaghetti on the wires or leads as close to the joint as possible. This will prevent close connections from touching one another and causing a short.

You are now ready to begin wiring your KNIGHT Capacitor Checker. As you are wiring, we would like you to keep the following in mind: Place all long wires close to the chassis, do your best to position parts as shown in the wiring diagrams, and, above all, **USE ONLY ROSIN CORE SOLDER.**

## WIRING THE KIT

**SEE FIGURE 6.**

( ) Trim the leads on T-1 to the following lengths:

One black 2″
Other black 2½″
Both green 2″
Both red 2″

Remove ⅜″ insulation from each lead, twist, and coat with solder.

( ) Solder the 2½″ black lead to terminal 2 of S-1.

( ) Connect, but do not solder, the other black lead from T-1 to terminal 1 of TS-1.

( ) Solder either red lead to terminal 2 of CR-1.

( ) Connect, but do not solder, the other red lead to terminal 2 of TS-1.

( ) Connect, but do not solder, either green lead to terminal 2 of TS-1. Connect, but do not solder, the other green lead to terminal 3 of TS-1.

( ) Solder a white wire to terminal 1 of S-2. Push the other end of this wire through the grommet next to V-2. The other end will be connected later.

( ) Solder one lead of R-2, a 10K ohm resistor, (brown, black, orange) to pin 5 of V-2. Connect, but do not solder, the other lead to terminal 2 of TS-2.

( ) Solder a red wire to terminal 2 of C-4. Connect, but do not solder, the other end to terminal 3 of L-1.

( ) Connect, but do not solder, one lead of R-3, a 47K ohm resistor, (yellow, violet, orange) to pin 6 of V-2. Connect, but do not solder, the other lead to pin 7 of V-2.

( ) Solder a red wire to pin 7 of V-2. Solder the other end to terminal 2 of L-1.

( ) Solder one lead of C-2, a .0015 MFD disc capacitor to pin 1 of V-2. Connect, but do not solder, the other lead to pin 3 of V-2.

( ) Solder a 1½ inch bare wire to pin 3 of V-2. Connect, but do not solder, the other end to the solder lug under the rear V-2 mounting nut.

( ) Solder an orange wire to pin 4 of V-2. Connect, but do not solder, the other end to terminal 3 of TS-1.

( ) Solder a 1 inch bare wire to terminal 1 of C-4. Connect, but do not solder, the other end to terminal 3 of TS-3.

( ) Solder a red wire to terminal 1 of L-1. Connect, but do not solder, the other end to terminal 3 of TS-3.

( ) Connect, but do not solder, one lead of C-5, a 200 MMFD mica capacitor, to terminal 2 of TS-3. Connect, but do not solder, the other lead to terminal 1 of TS-3.

( ) Lightly coat the twisted shielding of the test cable with solder. Connect, but do not solder, the shielding to terminal 3 of TS-3.

( ) Connect, but do not solder, the inner insulated wire of the Test Cable to terminal 4 of TS-3.

( ) Connect, but do not solder, one lead of R-4, a 470K ohm resistor, (yellow, violet, yellow) to terminal 1 of S-3. Connect, but do not solder, the other lead to terminal 4 of S-3.

( ) Solder one lead of C-7, a .1 MFD paper capacitor, to terminal 1 of S-3. Connect, but do not solder, the other lead to terminal 4 of S-3.

( ) Solder a green wire to terminal 4 of S-3. Connect, but do not solder, the other end to terminal 1 of TS-2. Push this wire down close to the chassis.

( ) Solder a green wire to the solder lug under the V-2 mounting nut. Push this wire through the grommet with the white wire. The other end will be connected later.

( ) Solder a yellow wire to terminal 2 of TS-2. Connect, but do not solder, the other end to terminal 1 of CR-1.

( ) Connect, but do not solder, a gray wire to terminal 1 of CR-1. Push the other end through the grommet with the white and green wires.

( ) Connect, but do not solder, a blue wire to terminal 3 of TS-1. Push the other end through the grommet with the white, green and gray wires.

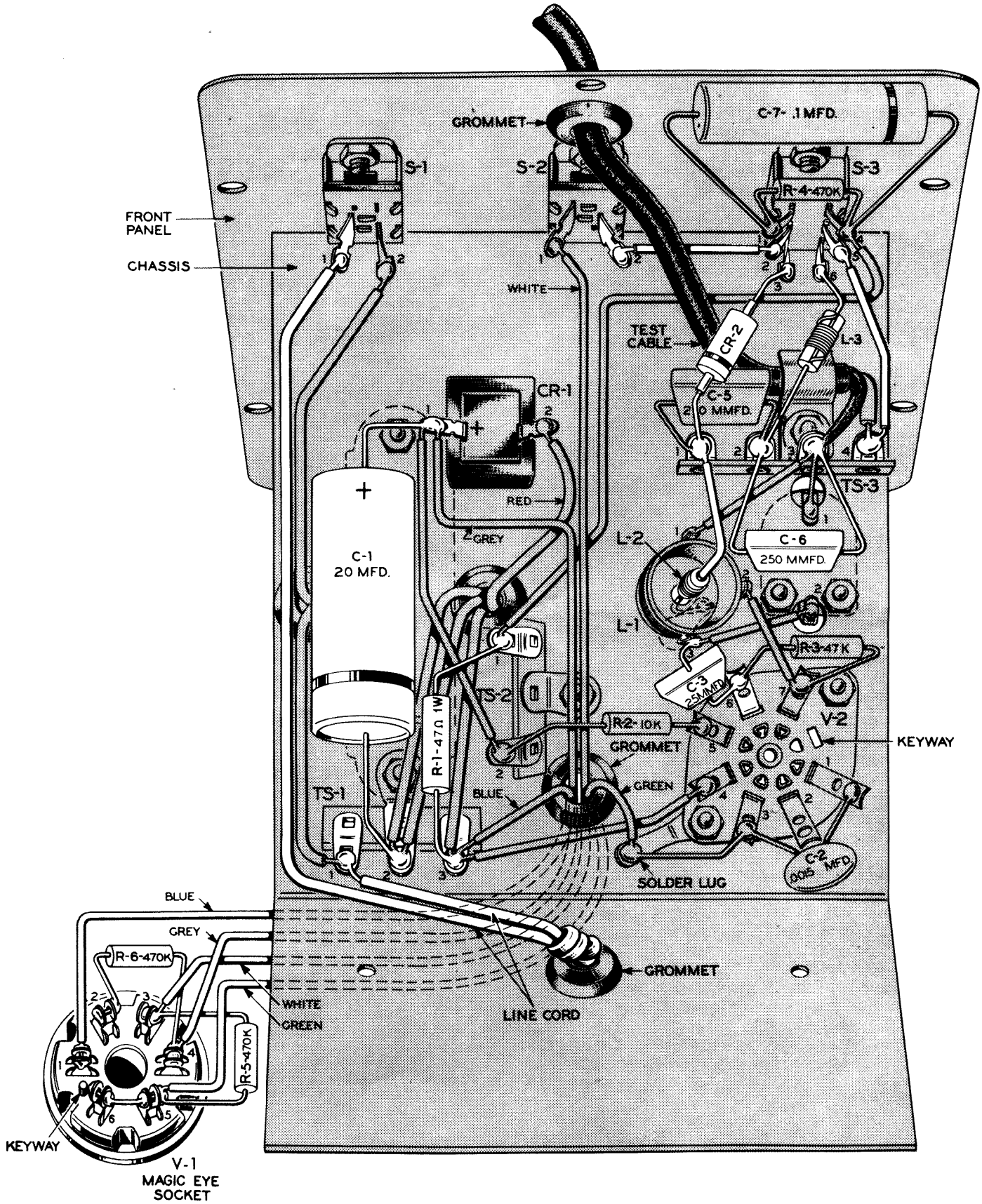



FIGURE 7. SECOND WIRING VIEW

**SEE FIGURE 7.**

( ) Put about one foot of the bare ends of the line cord through the grommet in the back of the chassis. Tie a knot inside the chassis 7 inches from the bare ends. Split the line cord back to the knot. Solder one lead of the line cord to terminal 1 of S-1. Cut off the other lead of the line cord to within 2½ inches of the knot. Remove ⅜" of insulation. Twist the fine wires and coat them with solder. Solder the wire to terminal 1 of TS-1.

( ) Solder the lead from the "plus" end of C-1, a 20 MFD. 150 V, electrolytic capacitor to terminal 1 of CR-1. Solder the lead from the banded end of C-1 to terminal 2 of TS-1.

( ) Solder one lead of R-1, a large, 47 ohm, 1 watt, resistor, (yellow, violet, black), to terminal 1 of TS-2. Solder the other lead of R-1 to terminal 3 of TS-1.

( ) Solder one lead of C-3, a 25 MMFD (.000025 MFD) mica capacitor to pin 6 of V-2. Solder the other lead to terminal 3 of L-1.

( ) Solder one lead of C-6, a 250 MMFD (.00025 MFD) molded capacitor, to terminal 3 of TS-3. Connect, but do not solder, the other lead to terminal 2 of TS-3.

( ) L-2 and L-3, the small coils, are identical. Solder one lead of L-3 to terminal 2 of TS-3. Solder the other lead to terminal 6 of S-3.

( ) CR-2, a crystal diode, is marked with a band around one end, with an arrow pointing toward one end, or a dot on one end. Connect, but do not solder, the marked end to terminal 1 of TS-3. Solder the other lead to terminal 3 of S-3.

( ) Solder a red wire to terminal 5 of S-3. Solder the other end to terminal 4 of TS-3.

( ) Solder a red wire to terminal 2 of S-3. Solder the other end to terminal 2 of S-2.

**SEE FIGURES 7 AND 8.**

( ) Place L-2 inside and in the center of L-1 as shown in Figure 8. The turns on each coil must be in line. Proper positioning of L-2 requires that you use the full length of the end lead which will be connected to TS-3. Insert this end lead through a 1⅜ inch length of spaghetti. Solder it to terminal 1 of TS-3. Solder the other lead to the solder lug on the outside of the chassis.

**SEE FIGURES 7 AND 2.**

( ) Put the 6-pin tube socket on V-1, the magic eye tube. Note that 2 of the pins on the tube are larger than the others and that there are corresponding large holes in the socket.

( ) Put the magic eye tube, with its socket attached, in position in the retaining clip and push it gently up to the escutcheon.

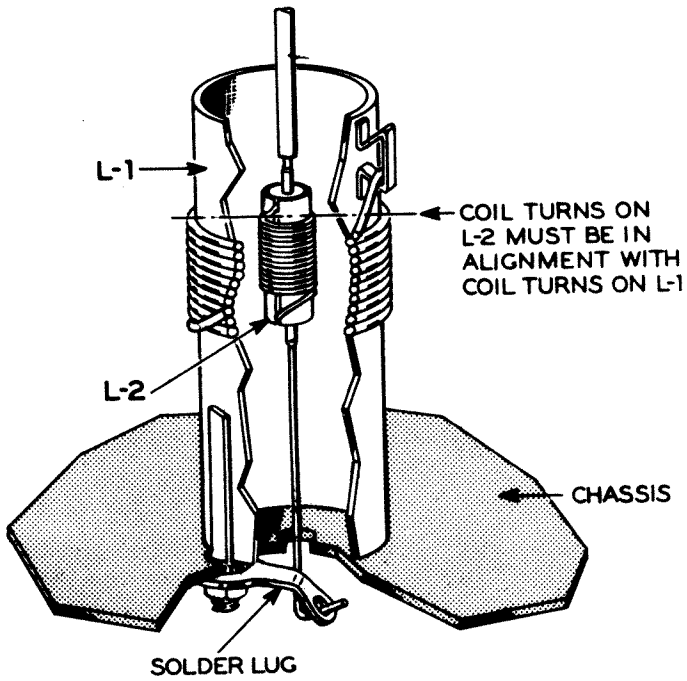



**FIGURE 8. HOW TO WIRE L-2**

Note the raised dot on the bottom of the V-1 tube socket, between the two larger pins. This dot is the keyway for this socket. The first pin clockwise from this dot is pin 1, the next pin clockwise is pin 2, and so forth for pins 3, 4, 5, and 6.

( ) Solder one lead of R-6, a 470K ohm resistor, (yellow, violet, yellow) to pin 2 of V-1. Connect, but do not solder, the other lead to pin 4 of V-1.

( ) Connect, but do not solder, one lead of R-5, a 470K ohm resistor, (yellow, violet, yellow) to pin 3 of V-1. Connect, but do not solder, the other lead to pin 5 of V-1.

( ) Solder a 1 inch bare wire to pin 6 of V-1. Connect, but do not solder, the other end to pin 5 of V-1.

( ) There are 4 wires coming through the grommet. Solder the green wire to pin 5 of V-1.

( ) Solder the gray wire to pin 4 of V-1.

( ) Solder the white wire to pin 3 of V-1.

( ) Solder the blue wire to pin 1 of V-1.

## ASSEMBLING THE TEST CABLE

You are now ready to assemble the alligator clips to the test cable.

**SEE FIGURE 9.**

**CAUTION: The test cable is supplied 48 inches long and must be kept this length because it is a critical part of the electronic circuit.**

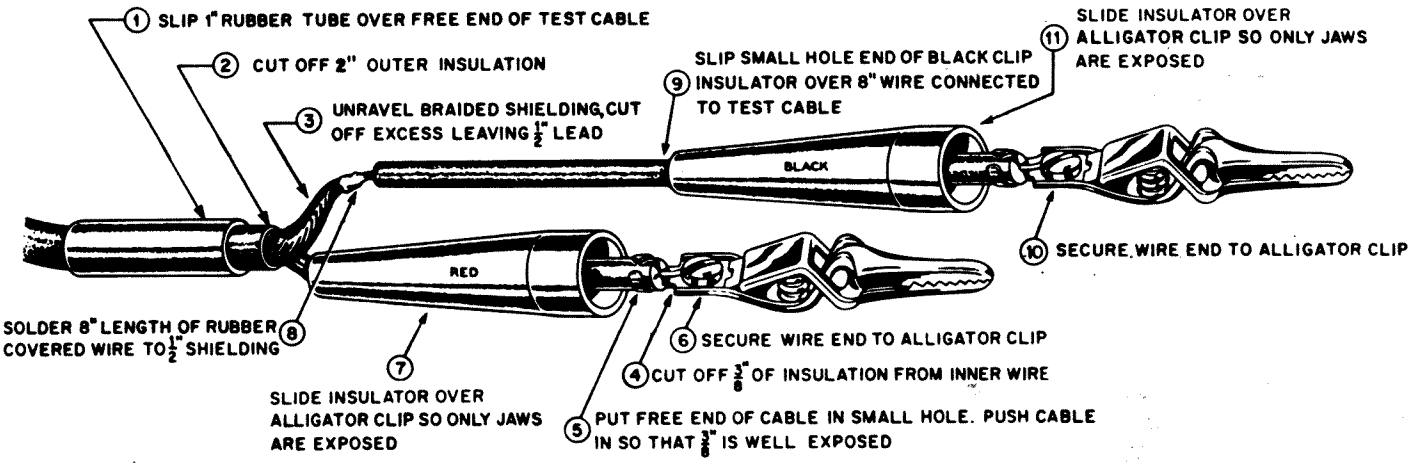



**FIGURE 9. HOW TO PREPARE THE TEST CABLE**

( ) Slip the 1 inch length of rubber tubing over the free end of the test cable and push it up to the front panel out of the way.

( ) Carefully cut off 2 inches of the outer insulation from the free end of the cable.

( ) Unravel the braided shielding all the way back to the cut off insulation. Cut off all but ½ inch of the braid.

( ) Cut off ⅜ inch of the insulation from the inner wire.

( ) Put the free end of the cable in the small hole of the red clip insulator and push the cable in so that the ⅜ inch of the bare end of the inner wire is well exposed.

( ) Connect an alligator clip to the inner wire by making a hook in the end of the wire and fastening the hook clockwise under the head of the screw. Tighten the screw and squeeze the tabs over the insulation with longnose pliers. The red insulator can be rolled back for convenience.

( ) Pull the red insulator over the alligator clip to cover all but the jaws.

( ) Trim ½ inch of the insulation from both ends of the 8 inch piece of heavy, rubber insulated wire. Twist the exposed wire ends tight and lightly coat them with solder.

( ) Make a small hook on one end of the wire. Solder this hook to the ½ inch of the twisted shielding braid on the end of the test cable.

**CAUTION: This connection must be carefully soldered using as little heat from the soldering iron as possible to avoid melting the insulation of the wire. If this insulation is melted it will cause a short circuit.**

( ) Slip the small hole end of the black clip insulator over the 8 inch wire connected to the test cable.

( ) Connect the other alligator clip to the 8 inch wire in the same way the first clip was connected to the test cable.

( ) Pull the black clip insulator over the clip.

( ) Pull the 1 inch rubber tube over the connection of the 8 inch wire and the shielded braid of the test cable.

## ADJUSTMENTS

You are now ready to adjust and check the operation of your KNIGHT Capacitor Checker.

( ) Put V-2, the 6C4 tube, in its socket.

( ) Check over the wiring carefully for short circuits and any obvious mistakes.

( ) Plug the line cord into a 117 volt, 50 or 60 cycle AC power outlet. Do NOT attempt to use this unit on DC (direct current).

### Adjustment Procedure

Place the front panel switches in the following positions

| Switch | Position |
|---|---|
| ON-OFF | at "ON" |
| TEST | at "TEST" |
| OPEN-SHORT | at "OPEN" |

Allow 15 minutes for "warm-up". **Be sure the test leads are NOT shorted together.** Let them hang free—do not hold them. Using a small screwdriver, adjust the trimmer, C-4, for maximum shadow on the magic eye tube. There are two positions of adjustment of C-4 where the eye will be open (maximum shadow). Either position is correct. There should be little or no difference noticed in the amount of shadow when the test switch is switched back and forth.

## FINAL ASSEMBLY

With the adjustment procedure finished, the KNIGHT Capacitor Checker is ready for final assembly.

( ) Push the handle mounting studs through the holes in each end of the handle. Insert a stud through a hole in one side of the cabinet. Use a flat washer, a lockwasher, and one of the large hex nuts to fasten the handle. Put the other stud through the side of the cabinet and fasten it in the same way.

( ) Push the line cord through the hole in the back of the cabinet. Put the completed KNIGHT Capacitor Checker into the case. Match the holes in the front panel with the holes in the case. Fasten the instrument in the case with the self-tapping screws supplied. Note the holes in the back of the case which are matched with the holes in the chassis and secured with large self-tapping screws.

## HOW TO USE THE CAPACITOR CHECKER

The KNIGHT Capacitor Checker will test capacitors, WITHOUT REMOVING THEM FROM THE CIRCUIT, for opens or shorts. Any capacitor from 20 MMFD up may be checked for open or short condition even if it is in parallel with a resistor as low as 50 ohms. Any capacitor from .1 MFD up may be checked for shorts even if it is in parallel with a resistor as low as 20 ohms. Good capacitors lower than 20 MMFD will show as "open".

To check a suspected capacitor follow the steps listed below.

1. Plug the KNIGHT Capacitor Checker into an AC power outlet and push the **ON-OFF** switch to **ON.**

2. Allow a few minutes for the unit to warm up.

3. Disconnect the unit with the suspected capacitor from the power outlet.

4. Connect the test leads across the capacitor to be checked.

5. For the Open test, place the **OPEN-SHORT** switch in the **OPEN** position. Push the **TEST** switch. If the eye remains open, the capacitor is open. If the eye closes, even partially for capacitors less than 20 MMFD the capacitor is not open.

6. For the Short test, place the **OPEN-SHORT** switch in the **SHORT** position. Push the **TEST** switch. If the eye remains open the capacitor is shorted. If the eye closes, even partially for big capacitors with small resistors in parallel, the capacitor is not shorted.

In both the short and open tests, tap the capacitor. If the eye flutters, it is intermittent.

## CIRCUIT DESCRIPTION

**SEE FIGURE 10.**

The KNIGHT Capacitor Checker uses two different basic circuits to test capacitors for shorts and opens.

For the open test, V-2 operates as a Hartley oscillator on a frequency of approximately 20 mc. L-2 is a coupling coil from the oscillator. The circuit of C-5, C-6, L-3 and the Test Cable is designed to appear to L-2 as a quarter-wave line. This circuit uses a characteristic of a quarter-wave line; that is, an open circuit on one end (such as an open capacitor) appears as a short circuit on the other end, and a short circuit (such as a capacitor that is not open) appears as an open circuit on the other end. A good capacitor connected to the test leads reflects an open circuit to the junction of L-2 and CR-2, which in turn presents a voltage for CR-2 to rectify. Therefore, when the test switch is closed, a negative voltage is applied to the grid of V-1 causing the eye to close.

In the short test circuit, if the test leads are connected to a good capacitor, the AC voltage from the filament winding of T-1 appears at the grid of V-1 causing the magic eye tube to close. If the test leads are connected to a shorted capacitor, the AC voltage from the filament winding of T-1 is shorted across R-1, and no voltage appears at the grid of V-1. This allows the eye to remain open.

## SERVICE HINTS

If you have followed all of the instructions and diagrams carefully, your KNIGHT Capacitor Checker should operate properly.

If the unit does not function well, recheck all the wiring carefully. Most difficulties are the result of incorrect wiring. Often it is helpful to have the wiring checked by someone else, preferably someone with radio, TV, or amateur radio experience. If a tube does not light up and you are quite sure wiring on its socket is correct, the filament may be open. Replace the tube with a new one of the same type.

## ALLIED'S SERVICE FACILITIES

In the event that the kit does not operate properly, we recommend the following:

Please write our Kit Department with full details and include the stock number and the date of purchase of the kit. We may be able to determine any wiring error or replace a component which may be at fault.

This wired KNIGHT kit may be returned for inspection within 1 year after purchase for a special service charge of $2.50. Parts within the standard RETMA 90-day warranty period will be replaced without charge for the parts. An additional charge will be made for parts damaged in construction or because of a wiring error, or for parts which are beyond the 90-day warranty period. After the one year period, service charges, plus cost of parts, are based on the length of time required to repair the unit.

**PLEASE NOTE: KITS WIRED WITH ACID CORE SOLDER OR ACID FLUX ARE NOT ELIGIBLE FOR REPAIR OR SERVICE AND WILL BE RETURNED NOT REPAIRED AT YOUR EXPENSE.**

Allied's facilities primarily provide an inspection and trouble-shooting service. Kits not completed which require extensive work, will be returned collect with a letter of explanation.

If you do return this kit, pack it well in the original carton or use another suitable carton with plenty of padding. Send the kit prepaid and insured. We will return the repaired kit to you C.O.D. as soon as the repairs are completed. If you wish to save C.O.D. fees, your advance remittance may be enclosed for standard repair charges plus transportation costs. Any excess payment by you will be refunded.

## ALLIED'S GUARANTEE ON KNIGHT KITS

Allied extends these firm guarantees on KNIGHT kits:

We guarantee that the circuits in all KNIGHT kits have been carefully engineered and tested.

We guarantee that only high-quality components are supplied. All parts are covered by the standard RETMA 90-day warranty. Any faulty component will be replaced prepaid and without charge, if reported within the warranty period. We reserve the right to request the return of defective parts.

The designs and components selected for KNIGHT kits represent over a quarter of a century of experience in the field of kit development. KNIGHT kits are easy to assemble, even for the beginner. Instructions are complete, panels are drilled, the chassis is punched and formed, and every part is included as listed.

If your kit was shipped by parcel post and received in damaged condition, please write us at once describing the state in which the shipment was received. If your kit was part of a Railway Express shipment that was damaged in transit, please notify the Railway Express agent at once and then write us.

Allied Radio cannot accept responsibility or liability for injury or damage sustained in the assembly or operation of the kit.

The efficiently engineered KNIGHT kits are moderately priced. When you purchase a KNIGHT kit you get the finest in design, quality, and value. Recommend KNIGHT kits to your friends.

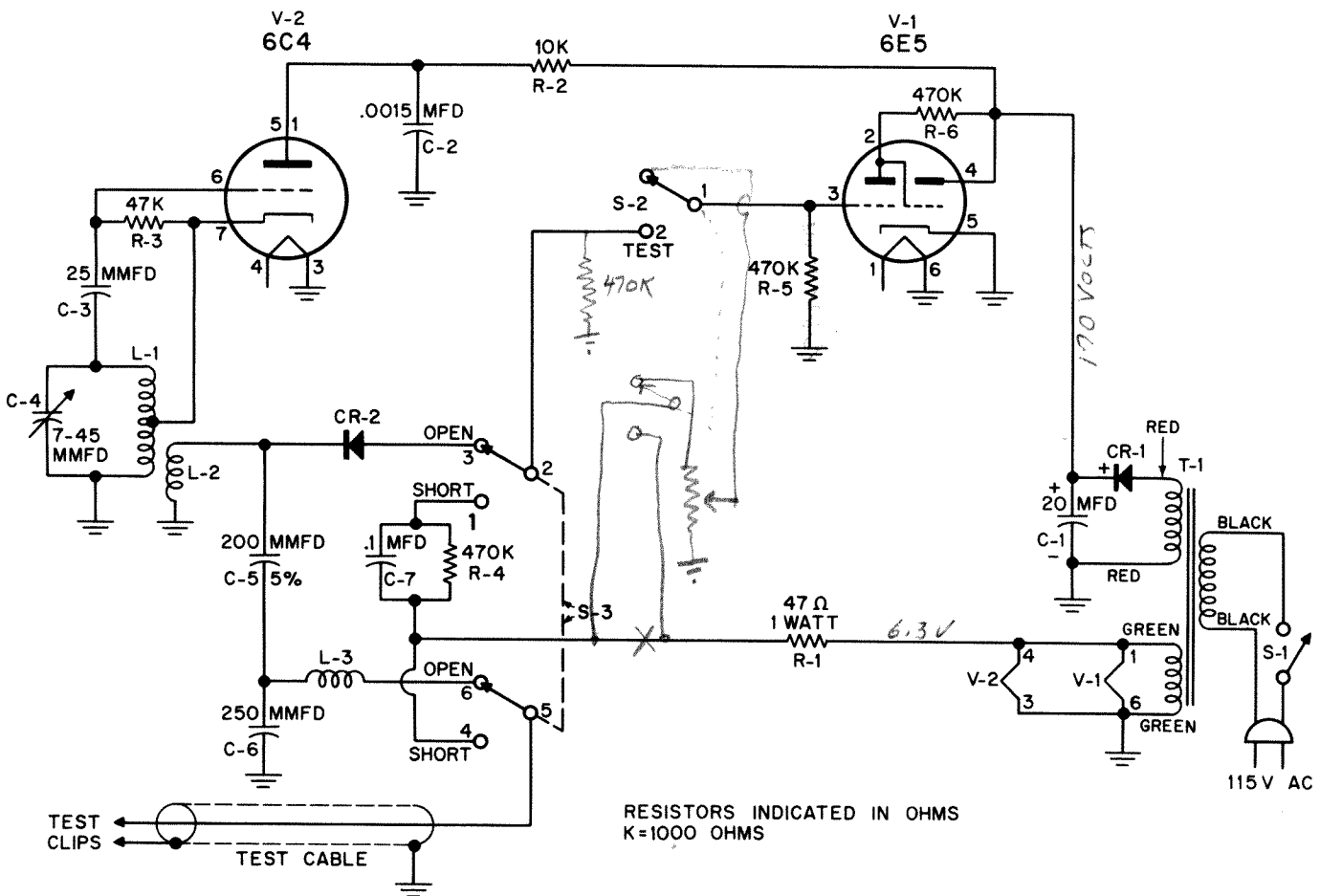



FIGURE 10. SCHEMATIC DIAGRAM

## VOLTAGE CHART

All measurements made with 20,000 ohm/volt VOM from point indicated to chassis.

Test switch in up position.

Test leads not connected.

| TUBE | PIN | | | | | | |
|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| V-1 6E5 | AC 6.3 | 33 | NS | 170 | 0 | 0 | |
| V-2 6C4 | 123 | NC | 0 | 6.3AC | 123 | —21 | 0 |

NC—Not connected

NS—Nonsignificant voltages

## RESISTANCE CHART

All measurements made with 20,000 ohm/volt VOM from point indicated to chassis.

Test switch in up position.

Test leads not connected.

| TUBE | PIN | | | | | | |
|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| V-1 6E5 | NS | 470K* | 470K | 0* | 0 | 0 | |
| V2 6C4 | 10K* | NC | 0 | NS | 10K* | 47K | 0 |

* —Resistances measured to B+ rather than ground

NC—Not connected

NS—Nonsignificant resistances

## PARTS LIST FOR THE KNIGHT CAPACITOR CHECKER

| Symbol Number | Description | Allied Part No. |
|---|---|---|
| C-1 | Capacitor, Electrolytic, 20 MFD 150 V | 13L443 |
| C-2 | Capacitor, Disc, .0015 MFD | 15L671 |
| C-3 | Capacitor, Mica, 25 MMFD | 74L069 |
| C-4 | Capacitor, Trimmer, 7-45 MMFD | 12L188 |
| C-5 | Capacitor, Mica, 200 MMFD ±5% | 14L392 |
| C-6 | Capacitor, Mica, 250 MMFD | 74L088 |
| C-7 | Capacitor, Paper, .1 MFD 200 V | 15L814 |
| CR-1 | Rectifier, Selenium, 50 ma | 4A631 |
| CR-2 | Diode, Crystal | 7E246 |
| L-1 | Coil, Oscillator | RK-606 |
| L-2 | Coil, Choke | 152001 |
| L-3 | Coil, Choke | 152001 |

**Note: When ordering resistors, give part number and description.**

| | | |
|---|---|---|
| R-1 | Resistor, 47 ohm, 1 Watt | 2M060 |
| R-2 | Resistor, 10K ohm, ½ Watt | 2M040 |
| R-3 | Resistor, 47K ohm, ½ Watt | 2M040 |
| R-4 | Resistor, 470K ohm, ½ Watt | 2M040 |
| R-5 | Resistor, 470K ohm, ½ Watt | 2M040 |
| R-6 | Resistor, 470K ohm, ½ Watt | 2M040 |
| S-1 | Switch, SPST Slide | RK-724 |
| S-2 | Switch, SPST Slide | RK-724 |
| S-3 | Switch, DPDT Slide | 34B424 |
| T-1 | Transformer, Power | RK-583 |
| TS-1 | Strip, Terminal | RK-241 |
| TS-2 | Strip, Terminal | RK-321 |
| TS-3 | Strip, Terminal | RK-127 |
| V-1 | 6E5 Tube | 6E5 |
| V-2 | 6C4 Tube | 6C4 |

## TOOLS YOU MAY NEED

| Allied Stock No. | Description | Price* |
|---|---|---|
| 46N505 | 40 Watt Soldering Iron | $1.15 |
| 46N401 | 6" Long Nose Pliers | 2.50 |
| 45N796 | 6" Screwdriver | .63 |
| 46N403 | 6" Diagonal Cutters | 2.50 |
| 43N831 | Set-screw Driver | .24 |

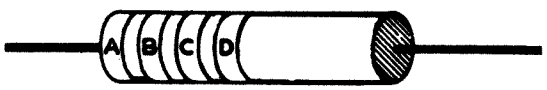
*** All prices subject to change without notice.**

| Description | Quantity | Allied Part No. |
|---|---|---|
| Assembly, Bracket & Escutcheon | 1 | RK-672 |
| Cable, Coaxial Test 48" | 1 | 803001 |
| Case | 1 | 700001 |
| Chassis | 1 | 461301 |
| Clamp, Cable | 1 | 44N713 |
| Clip, Alligator | 2 | 45N060 |
| Cord, Line | 1 | 49T211 |
| Grommet, ⅜" | 5 | 44N620 |
| Handle, Leather | 1 | RK-719 |
| Insulator, Black Rubber | 1 | 45N130 |
| Insulator, Red Rubber | 1 | 45N130 |
| Lug, Solder | 2 | 44N607 |
| Manual, Instruction | 1 | 750001 |
| Nut, 6-32 Hex | 17 | RK-62 |
| Nut, 4-36 Hex | 2 | RK-10 |
| Nut, #10 Hex | 2 | 44N585 |
| Panel | 1 | 462201 |
| Screw, #4 Sheet Metal | 8 | RK-390 |
| Screw, #6 Sheet Metal | 2 | RK-434 |
| Screw, 6-32 x ¼" B.H. | 14 | 44N576 |
| Screw, 4-36 x ⅜" B.H. | 2 | RK-9 |
| Socket, Tube, 6-pin | 1 | 40H056 |
| Socket, Tube, 7-pin miniature | 1 | RK-229 |
| Solder, ROSIN CORE | 12" | RK-438 |
| Spaghetti, Black | 2" | RK-436 |
| Stud, Handle Mtg. | 2 | RK-542 |
| Tubing, 1" Rubber | 1 | RK-607 |
| Washer, Flat #10 | 2 | 580501 |
| Washer, #10 Internal | 2 | 44N599 |
| Wire, #20 Insulated Hookup | | |
| 2" Red | 5 | RK-448 |
| 3" Orange | 1 | RK-449 |
| 4" Yellow | 1 | RK-450 |
| 5" Green | 2 | RK-451 |
| 6" Blue | 1 | RK-452 |
| 8" Gray | 1 | RK-454 |
| 9" White | 1 | RK-455 |
| Wire, #20 Bare | 4" | RK-473 |
| Wire, Black Rubber Stranded | 8" | 804001 |

# HOW TO READ COLOR CODE ON RESISTORS AND CONDENSERS

All carbon resistors are produced and color-coded under standards set by the RTMA (Radio and Television Manufacturers' Association). Under these standards the user is assured of a wide range of values and of a universal color-coding system that permits easy identification of any carbon resistor. To determine the value of a resistor, hold it with the colored bands reading from the left end, as illustrated, and refer to the chart.

| BAND A | | BAND B | | BAND C | | BAND D | |
|---|---|---|---|---|---|---|---|
| Color | Value | Color | Value | Color | Decimal Multiplier | Color | Tolerance |
| Black | 0 | Black | 0 | Black | 0 | None | ± 20% |
| Brown | 1 | Brown | 1 | Brown | X10 | Silver | ± 10% |
| Red | 2 | Red | 2 | Red | X100 | Gold | ± 5% |
| Orange | 3 | Orange | 3 | Orange | X1,000 | | |
| Yellow | 4 | Yellow | 4 | Yellow | X10,000 | | |
| Green | 5 | Green | 5 | Green | X100,000 | | |
| Blue | 6 | Blue | 6 | Blue | X 1 Million | | |
| Violet | 7 | Violet | 7 | Violet | X 10 Million | | |
| Grey | 8 | Grey | 8 | Gold | ÷ 10 | | |
| White | 9 | White | 9 | Silver | ÷ 100 | | |



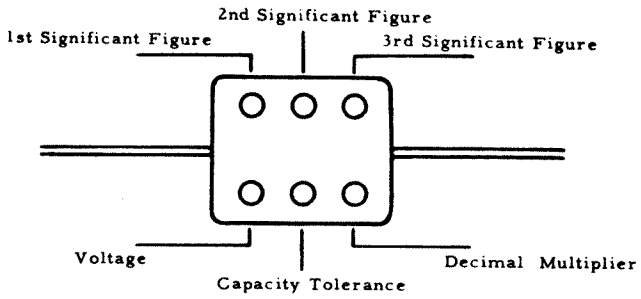

The first band (A) shows the first figure of the resistor value, the second band (B) shows the second figure, the third band (C) indicates the number of zeros to add. The fourth band (D), which is not included on all resistors, merely indicates tolerance: silver for ± (plus or minus) 10%, gold for ± 5%. If the (D) band is omitted, the tolerance is ± 20%.

Here is an example: Band A yellow, band B violet, band C yellow, band D silver = (4) (7) (X10,000) (±10%) or 470,000 ohms, ± 10% tolerance.

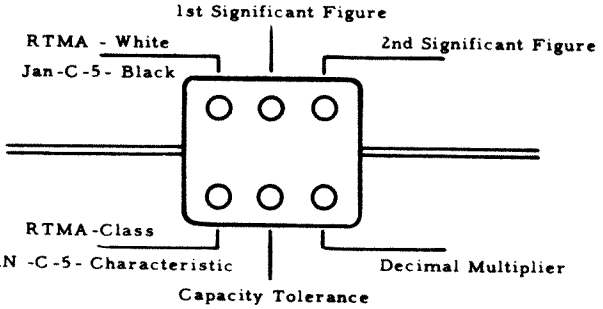
---

Mica condensers are frequently color-coded. The colored dots have the same figure meaning as for resistors (that is, black is 0, brown is 1, etc.) but there are three systems for reading the complete values.

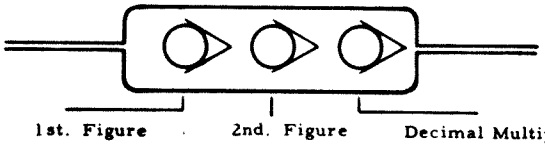
## OLD RMA SIX DOT SYSTEM




## RTMA PROPOSED AND JAN-C-5




## THREE DOT SYSTEM



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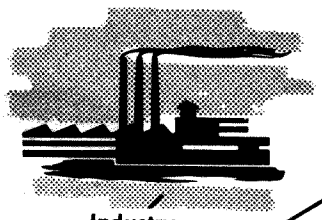

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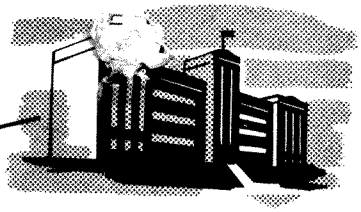

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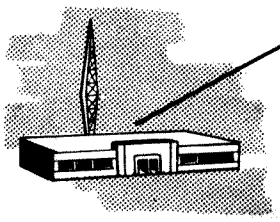

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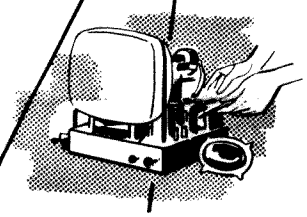

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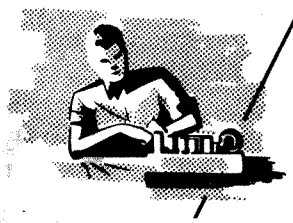

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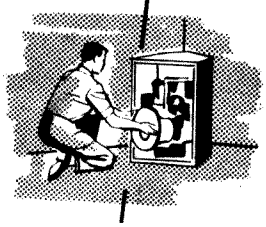

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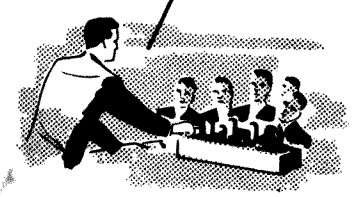

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