

THE KNIGHT LOW CAPACITY PROBE



ALLIED RADIO
CORPORATION

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INTRODUCTION

The input system of an oscilloscope contains a certain amount of resistance shunted by capacitance. This is called the input impedance of the oscilloscope. To the input impedance of the oscilloscope is also added the capacity of the test leads. This total shunting capacitance and resistance, when connected across a high impedance, high frequency, or broad band width circuit, may be sufficient to detune the resonant circuit or to load the test circuit and seriously distort the waveforms under observation.

For this reason a low capacity (high impedance)

probe is used to isolate the input of the oscilloscope from the circuit under test when waveforms are to be observed in any audio, video, sweep or sync circuit.

When you unpack your probe kit, check all of the parts against the Parts List. Study the diagrams so you understand the assembly of the parts.

USE ONLY 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 REPAIR OR SERVICE.

PROBE HEAD ASSEMBLY

SEE FIGURE 1.

- Cut off $1\frac{1}{4}$ " from one lead of R-1, 13 Megohm (brown, orange, blue) resistor.
- Cut off $\frac{7}{8}$ " from the other lead of R-1.
- Connect, but do not solder, the short lead on R-1 to terminal 2 of C-1, the trimmer capacitor.
- Pass the other lead of R-1 through terminal 1 of

C-1 and then solder it to terminal 3 on the 3-pin socket. The distance between terminal 1 of C-1 and terminal 3 on the socket should be $\frac{1}{2}$ ".

- Position the adjustment slot on C-1 so that it is facing in the same direction as the small screw hole in the side of the 3-pin socket. The finished assembly must be this way so that the adjustment will be accessible through the hole in the side of the probe head.

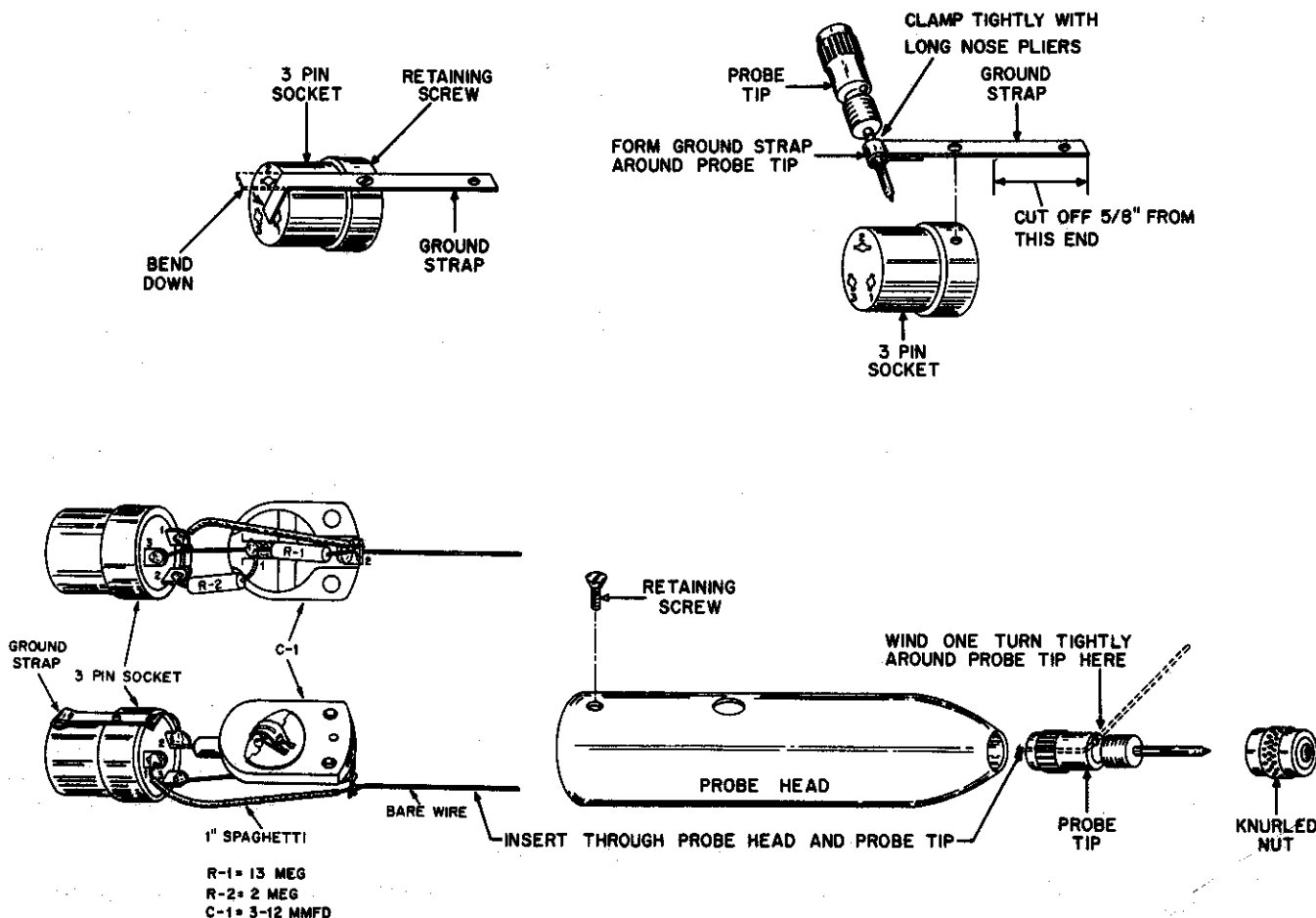


FIGURE 1. PROBE HEAD ASSEMBLY

- Cut 1" from one lead of R-2, 2 Megohm (red, black, green) resistor.
- Solder this lead to terminal 1 of C-1. Position R-2 as shown.
- Pass the other lead through terminal 2 of the 3-pin socket. Solder this terminal. The body of the resistor should almost touch the terminal. Do not clip off the excess lead as it will be connected to another point.
- Pass one end of a 4" bare wire through terminal 2 of C-1. Place 1" of spaghetti on this end of the wire and then solder it to terminal 1 of the 3-pin socket.
- Solder terminal 2 of C-1.
- Attach the ground strap to the 3-pin socket. Bend one end down over the edge of the socket as shown. Remove the ground strap from the socket. Form the ground strap around the probe tip as shown.
- Cut off $\frac{5}{8}$ " from the other end of the ground strap.
- Reattach the ground strap to the 3-pin socket.
- Pass the lead from terminal 2 of the 3-pin socket across the end of the ground strap. Fold the end of the ground strap over the lead and solder. Cut off the excess lead.
- Remove the screw holding ground strap to socket.
- Insert the assembled parts into the probe head. The small hole in the side of the 3-pin socket must line up with the small hole in the probe head. Tighten a small screw into this hole. The trimmer adjustment must be located directly under the large hole in the side of the probe head.
- Remove the knurled nut from the probe tip. Pass the bare wire through the hole in the probe tip and then press the tip into the end of the probe head. Wrap the wire once around the shoulder on the probe tip. Cut off the excess wire and replace the knurled nut.

CABLE ASSEMBLY

SEE FIGURE 2.

- Place the cable and plug housing over one end of the shielded cable.
- From this end of the shielded cable, remove $1\frac{1}{8}$ " of the outer insulation. Unravel the braided shielding. Wrap the unraveled shielding around the end of the cable's outer insulation.
- Remove about $\frac{1}{4}$ " of insulation from both ends of the 8" ground wire. Hold one end of the ground wire on the shielding. Take a 6" length of bare wire and wrap 3 turns around the shielding and the bare end of the ground wire.
- Place the small hole of the ground strap over the two ends of the bare wire.
- Coat the end of the ground strap, the bare wire, and the shielding with solder. Be careful not to apply too much heat or you will melt the insulation around the inner conductor.
- Remove $\frac{7}{8}$ " of insulation from the inner conductor. Insert the inner conductor into the pin of the 1-pin plug and solder.
- Fold the ground strap back toward the 1-pin plug and line up the hole in the ground strap with the hole in the plug.
- Remove the tape wrapped around the probe housing shield. Wrap the tape around the cable and ground lead. Insert the ground lead through the top of the cable and plug housing.
- Slide the cable and plug housing down onto the plug. Line up the hole in the end of the cable and plug housing with the holes in the ground strap and the plug. Tighten a small screw into this hole.
- Insert the cable and plug housing into the probe housing shield. Push back the plastic cover and fasten the parts together with a small screw.
- Connect the free end of the ground lead under the screw on the alligator clip. Clamp the two small lugs on the end of the clip down on the wire's insulation.
- Remove $1\frac{5}{8}$ " of outer insulation from the other end of the cable. Unbraid the shielding and twist it together to form a ground lead. Coat the end of the shield lead lightly with solder.
- Remove about $\frac{3}{8}$ " of insulation from the inner conductor. Fold the end of the inner conductor back about $\frac{1}{8}$ ".
- Place the black banana plug on the shield lead and tighten the screw.
- Place the red banana plug on the inner conductor and tighten the screw.

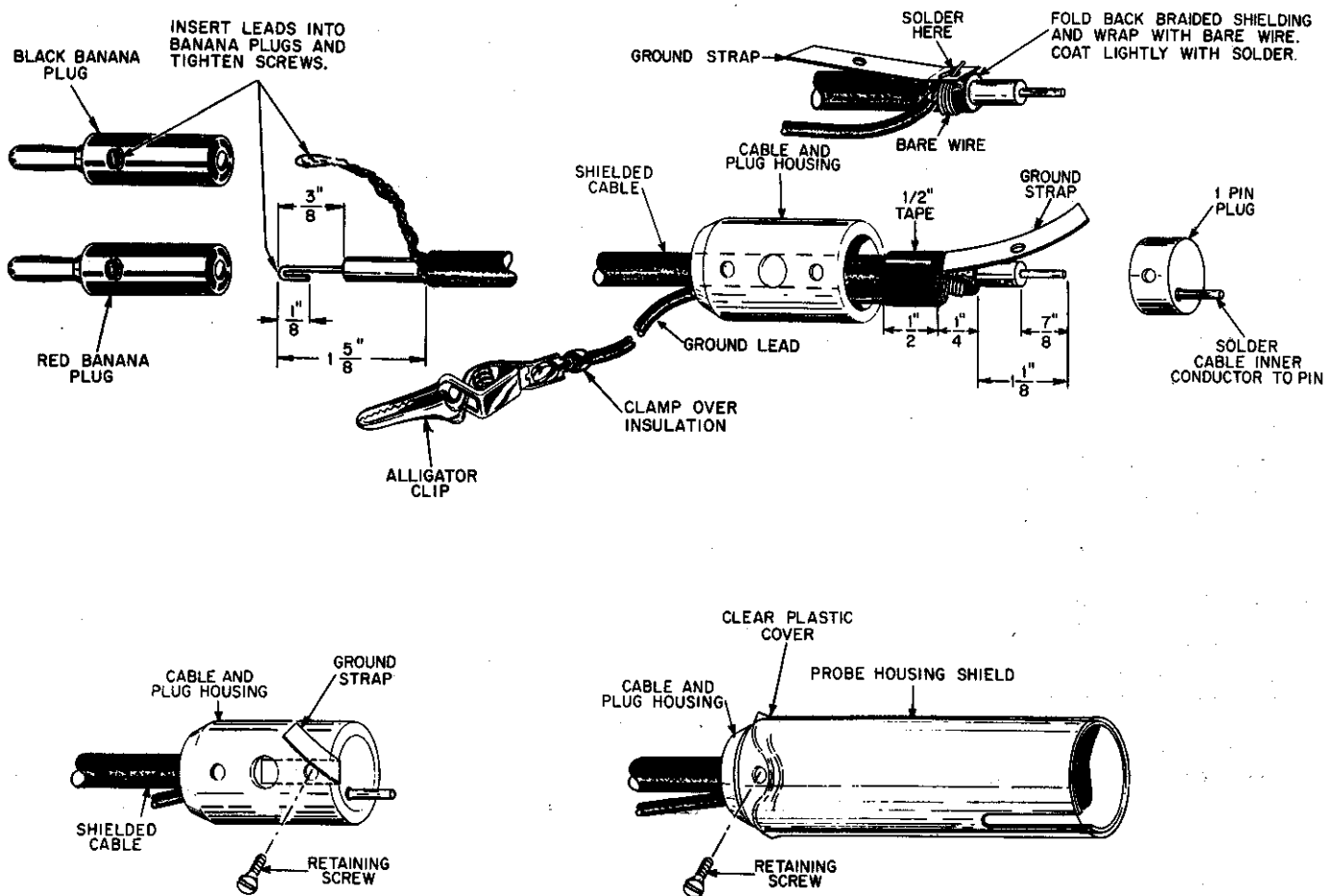


FIGURE 2. CABLE ASSEMBLY

FINAL ASSEMBLY

Insert the probe head assembly into the probe shield. The pin on the plug inside the shield must fit into one of the holes of the socket on the probe head. Only the two holes corresponding to **DIRECT** and

LO-CAP positions marked on the probe head are used. The probe position in use is indicated in the slot on the probe shield. To change the probe function, pull out the probe head and rotate it.

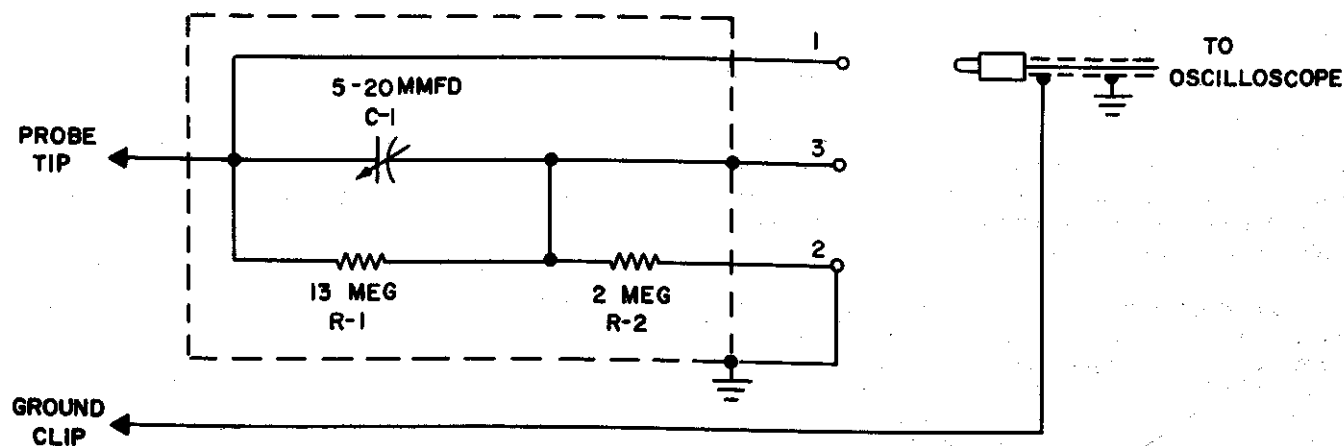


FIGURE 3. PROBE SCHEMATIC DIAGRAM

PROBE ADJUSTMENT

The trimmer capacitor in the probe must be adjusted so that the time constant of the probe is equal to the time constant of the oscilloscope. If the trimmer is not properly adjusted distortion of the waveform under observation will result. There are two convenient methods of adjusting the probe. One is with a square-wave generator. The other makes use of the saw-tooth sweep of the oscilloscope.

TO ADJUST THE PROBE WITH A SQUARE-WAVE GENERATOR:

SEE FIGURE 4:

1. Set the generator's output to 60 cycles and feed its output to the vertical input terminals of the oscilloscope. Adjust the oscilloscope controls to provide a square-wave trace of two or three cycles. Note the shape of the waveform.
2. Disconnect the generator from the oscilloscope. Connect the probe to the vertical input of the oscilloscope. Rotate the probe head so that LO-CAP is visible in the slot on the side of the probe. Pull out the probe head until the trimmer adjustment is just barely accessible from underneath the shield. Connect the output of the generator to the probe tip and ground lead. It may be necessary to increase the output of the generator, due to the attenuation of the probe. Using an insulated screwdriver, turn the trimmer adjustment until the square-wave appears the same as when it was connected directly to the oscilloscope. See Figure 4.

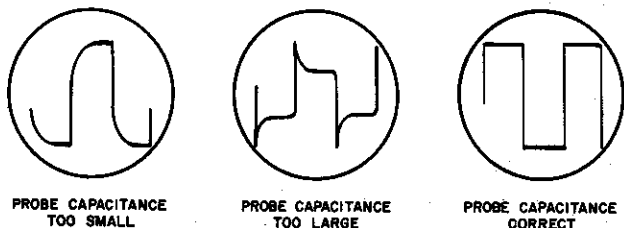


FIGURE 4. PROBE ADJUSTMENT WAVEFORMS

In the event that the kit does not operate properly, 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 \$1.00. 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

3. Repeat steps 1 and 2 with the generator set to 10KC. A slight compromise adjustment may be necessary.

In case a square-wave generator is not available, the trimmer can be adjusted by using the horizontal saw-tooth sweep from the oscilloscope.

1. Set the oscilloscope horizontal sweep frequency in the range of 1 KC to 10 KC. Turn the SWEEP VERNIER control fully counterclockwise.
2. Connect the tip of the LO-CAP probe to point "G" on the oscilloscope's circuit board. You should see a trace similar to that shown in Figure 5A.

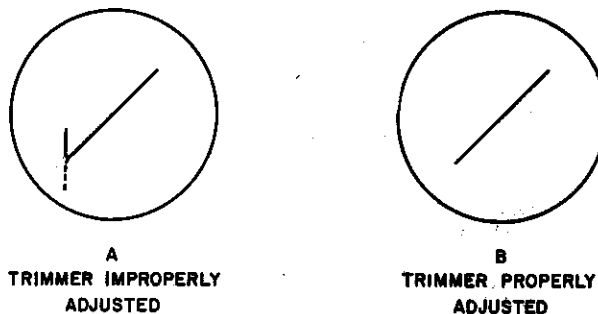


FIGURE 5. PROBE ADJUSTMENT WAVEFORMS

3. Adjust the trimmer capacitor with an insulated screwdriver until the curved portion of the trace disappears and only a straight sloping line remains. Figure 5B.

The probe is now correctly compensated for the input circuit of this oscilloscope.

This probe has an attenuation ratio of 10 to 1 which must be taken into consideration when using the probe with an oscilloscope to make voltage measurements.

ALLIED'S SERVICE FACILITIES

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 WOULD HAVE TO 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 must return this kit, pack it well. Use the original packing carton with cushioning material

around the probe. Send the kit prepaid and insured. We will return the repaired kit to you C.O.D. as soon as 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 remittance will be refunded.

ALLIED'S GUARANTEE ON KNIGHT KITS

The designs and components selected for KNIGHT kits represent over a quarter of a century of experience in 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 last part is included as listed.

Allied extends these firm guarantees on KNIGHT kits:

We guarantee that the circuits on 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 components will be replaced prepaid and without charge if reported to us within the warranty period. We reserve the right to request the return of defective parts.

If your kit was shipped by parcel post and received in a damaged condition, please write us at once describing the condition. 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 buy a KNIGHT kit you get the best in design, quality, and value. Recommend KNIGHT kits to your friends.

PARTS LIST

Legend	Description	Allied Part No.
C-1	Trimmer capacitor, 5 to 20 MMFD.....	284001
Note: When ordering resistors give part number and description of resistor.		
R-1	Resistor, 13 Megohm, 1/2 Watt.....	1M005
R-2	Resistor, 2 Megohm, 1/2 Watt.....	1M006

Description	Quantity	Allied Part No.
Probe head.....	1	870015
Probe tip.....	1	502118

Socket, 3-pin.....	1	502230
Plug, 1-pin.....	1	502130
Cable and plug housing.....	1	870016
Probe housing shield.....	1	470052
Retaining screw.....	3	568230
Ground strap.....	2	470048
Alligator clip.....	1	45N080
Banana plug, red.....	1	41H405
Banana plug, black.....	1	41H410
4' Shielded cable RG 58/U.....	1	49W486
1' Spaghetti.....	1	812001
8" Ground lead.....	1	48T901
10" Bare wire.....	1	806010
4" Tape.....	1	811001
7" Solder.....	1	880001
Instruction manual.....	1	750011