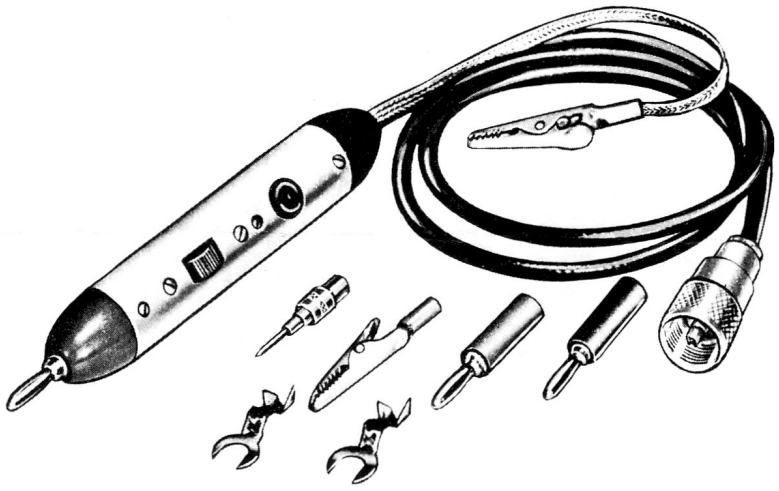
ASSEMBLY AND OPERATION OF THE HEATHKIT UNIVERSAL SCOPE PROBE

MODEL PK-1

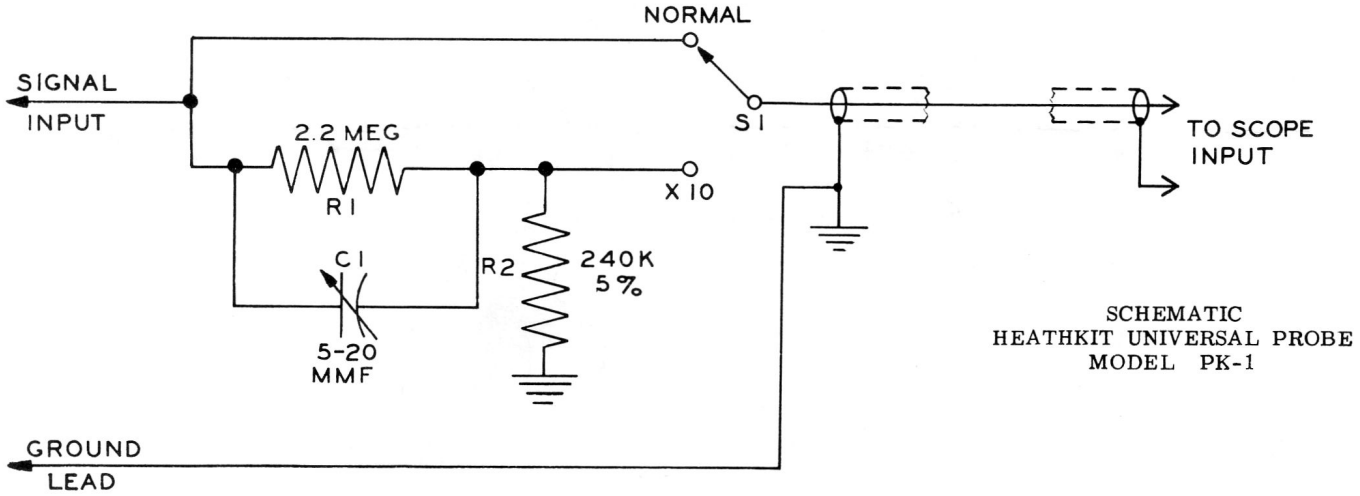


SPECIFICATIONS

Direct Position: ..... Input impedance: 2.4 megohms shunted by 100 $\mu\mu$f.
X10 Position:..... Input impedance: 2.4 megohms shunted by 20 $\mu\mu$f.
Maximum DC Voltage:..... 600 volts.

INTRODUCTION

The Model PK-1 Universal Scope Probe permits observation of signals which otherwise would be affected by the relatively high input capacity of the Scope and its shielded input lead. The signal attenuation in the X10 position is accurate to within 5% (when used with an oscilloscope with a 3.6 megohm input impedance). Several types of connectors are supplied for the end of the shielded cable to make the Probe universally adaptable to a wide variety of oscilloscopes.



SCHEMATIC
HEATHKIT UNIVERSAL PROBE
MODEL PK-1

CIRCUIT DESCRIPTION

When a signal is applied to the input of the Probe, and switch S-1 is in the "normal" position, the signal passes directly into the oscilloscope. If switch S-1 is in the X10 position, the signal available at the juntion of R_1 and R_2 is fed into the oscilloscope. The values of R_1 and R_2 are so chosen that 9/10 of the signal is across R_1 and 1/10 across R_2 (the scope input). C_1 (in parallel with R_1) is actually one leg of a capacitive voltage divider, with the capacity of the shielded lead and the scope input capacity forming the other leg. When C_1 is properly adjusted, 9/10 of the signal will be across C_1 and 1/10 across the capacity of the shielded cable (the scope input).

( ) Begin the assembly by securing the switch (#60-7) and the 5-20 $\mu\mu$f trimmer (#31-6) together with one of the 4-40 screws. Do not tighten the screw at this time. Be sure the switch is oriented as shown.

( ) Slip the phenolic terminal board over the switch and trimmer terminals, and bend the switch terminals outward to secure the board firmly to the switch. Now tighten the 4-40 screw.

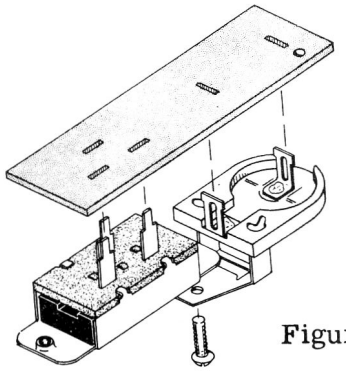


Figure 1

START INSTALLING COMPONENTS AND WIRING AS FOLLOWS. NOTE: DO NOT SOLDER ANY OF THE CONNECTIONS UNTIL INSTRUCTED TO DO SO AT THE END OF THIS SECTION.

1. ( ) 2 1/2" LENGTH HOOKUP WIRE. PREPARE AS SHOWN.

2. ( ) 2" LENGTH HOOKUP WIRE. DRESS AS SHOWN.

3. ( ) 2.2 MEG RESISTOR. USE RESISTOR LEAD FOR CONNECTION BETWEEN TRIMMER AND SWITCH

4. ( ) 240 K 5% RESISTOR. PUSH LEAD THROUGH HOLE AND LEAVE END FREE.

5. ( ) PREPARE THE SHIELDED CABLE NEXT. REMOVE 2 1/2" OF THE OUTER INSULATION AND SEPARATE THE INNER CONDUCTOR FROM THE SHIELD. STRIP THE INNER CONDUCTOR 1/4" AND TRIM THE OUTER SHIELD TO A LENGTH OF 1/2". SEE DETAIL A.

6. ( ) CONNECT INNER CONDUCTOR TO SWITCH LUG.

7. ( ) SECURE BRAID AND OUTER SHIELD OF CABLE TOGETHER WITH RESISTOR LEAD.

8. ( ) SLIP THE BLACK PROBE END OVER THE CABLE AND BRAID AS SHOWN.

9. ( ) SOLDER CLIP ONTO BRAID.

10 ( ) NOW SOLDER ALL CONNECTIONS MADE THUS FAR. BE SURE THAT TERMINALS A, D, AND E EACH HAVE TWO LEADS CONNECTED.

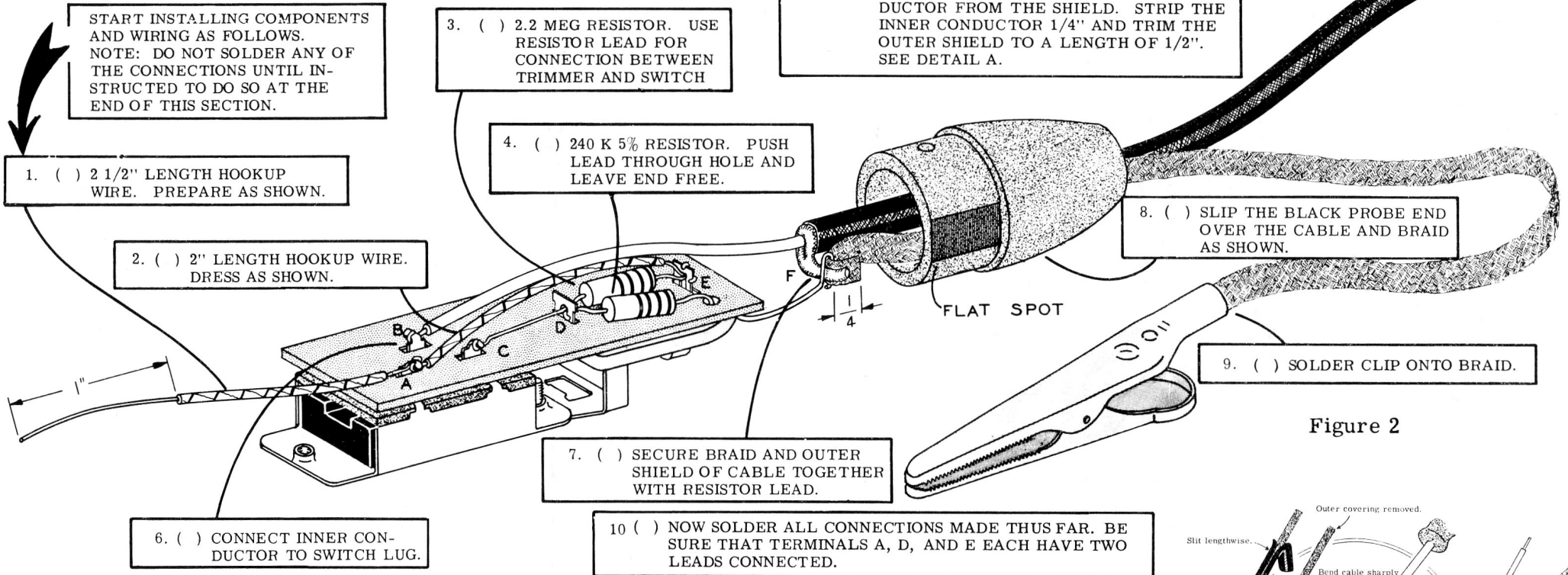
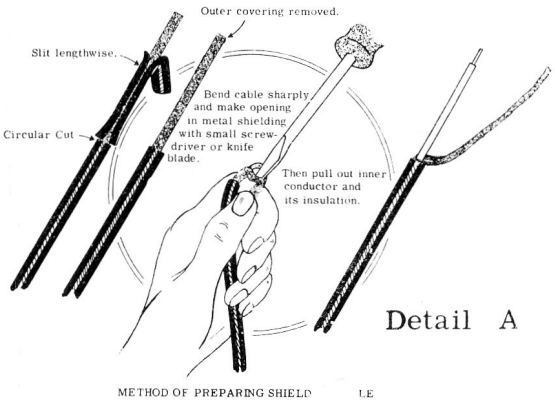


Figure 2



Detail A

METHOD OF PREPARING SHIELD LE

( ) Remove the screw used to hold the switch and trimmer together during assembly.

( ) Now slip the completed switch-trimmer assembly into the probe body and secure the switch with two 4-40 screws. Secure the black probe end with two 2-56 self-tapping screws. Be sure the ends of the shielded lead and flat braid are between the black probe end and the probe body, to provide a ground connection for the probe body. The "flat spot" on the probe end will provide the necessary clearance. (Refer to Figure 3.)

Install the rubber grommet in the trimmer adjustmei ole.

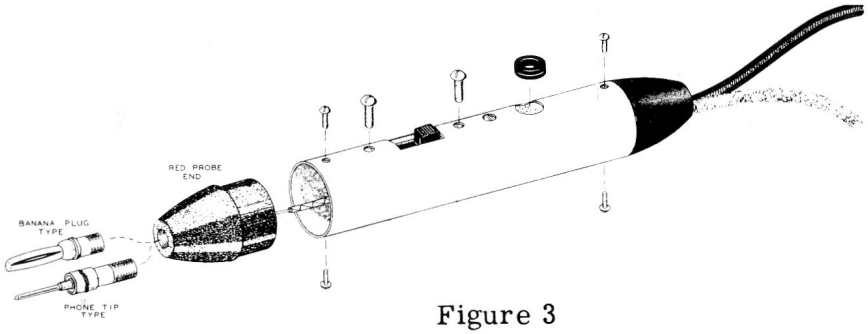


Figure 3

PHONE TIP TYPE: Screw the phone tip securely into the red probe end. Remove the knurled collar and thread the bare lead protruding from the front of the probe through the hole in the center of the phone tip as you push the probe end into place. Secure with two 2-56 self-tapping screws. Reinstall the knurled collar, and tighten to secure the lead.

BANANA PLUG TYPE: Screw the banana plug about halfway into the red probe end and thread the bare lead protruding from the front of the probe through the hole in the center of the banana plug, as you push the probe end into place. Secure with two 2-56 self-tapping screws. Now bend the lead around the base of the banana plug and tighten the plug, securing the lead between the banana plug base and the probe end.

( ) The red probe end will be installed next. (Use applicable step.)

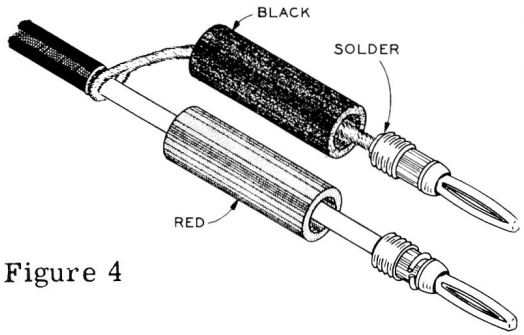


Figure 4

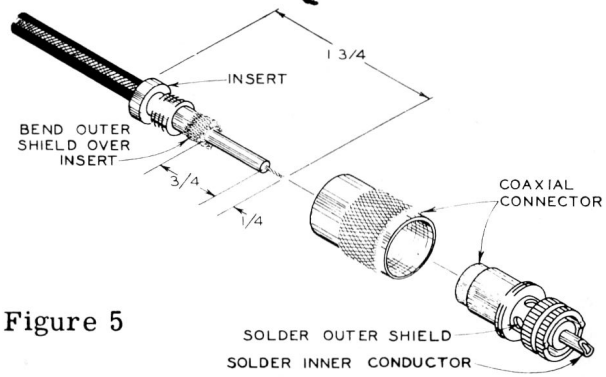


Figure 5

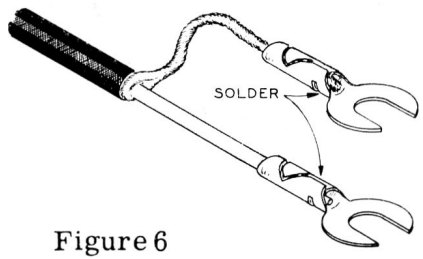


Figure 6

( ) Refer to Figures 4, 5 and 6. Select the type of terminals best suited to your oscilloscope's input connectors. Install the connector of your choice as shown in the Figure.

This completes the construction of your Model PK-1 Universal Oscilloscope Probe.

CALIBRATION AND TEST

Connect the Probe to your oscilloscope and slide the switch in the Probe to the forward position (nearest the probe tip). This is the direct or unattenuated position. Connect the Probe to a source of 1 kc square waves* and observe the pattern. Now switch to the X10 position and adjust the trimmer in the probe body for an identical wave shape, remembering, of course, that the amplitude will be only one tenth of the original signal. Your PK-1 Probe is now completed and may be put into service.

* If no suitable source of square wave signal is available, you may use the sawtooth voltage generated within your oscilloscope. An easy place to obtain this signal is from the horizontal deflection plate connections on the cathode ray tube socket. Adjust the scope's sweep frequency controls to produce a sweep of approximately 1000 cps. With the scope's horizontal and vertical gain controls properly adjusted, a diagonal line will result. With the Probe in the X10 position, carefully observe the ends of this diagonal line as you adjust the trimmer. The proper setting will be the point which gives the straightest diagonal line.

IN CASE OF DIFFICULTY

1. Recheck the wiring and solder connections.

2. Check the connector(s) on the end of the cable to be sure that the polarity is correct and no shorts exist.

3. If the above checks do not clear up the difficulty, contact the Heath Company, giving the kit model number and name (PK-1 Universal Scope Probe). Describe your difficulty as clearly as possible.

REPLACEMENTS

Material supplied with Heathkits has been carefully selected to meet design requirements and ordinarily will fulfill its function without difficulty. Should inspection reveal the necessity for replacement, write to the Heath Company and supply all of the following information:

A. Thoroughly identify the part in question by using the part number and description found in the manual Parts List.

B. Identify the type and model number of kit in which it is used.

C. Mention date of purchase.

D. Describe the nature of defect or reason for requesting replacement.

The Heath Company will promptly supply the necessary replacement. Please do not return the original component until specifically requested to do so. Do not dismantle the component in question as this will void the guarantee. This replacement policy does not cover the free replacement of parts that may have been broken or damaged through carelessness on the part of the kit builder.

SERVICE

In event continued operational difficulties of the completed instrument are experienced, the facilities of Daystrom, Limited Service Department are at your disposal. Your instrument may be returned for inspection and repair. You will be charged a minimal service fee, plus the price of any additional parts or material required. However, if the completed kit is returned within the Warranty period, parts charges will be governed by the terms of the Warranty. State the date of purchase, if possible. THIS SERVICE POLICY APPLIES ONLY TO COMPLETED INSTRUMENTS CONSTRUCTED IN ACCORDANCE WITH THE INSTRUCTIONS AS STATED IN THE MANUAL. Instruments that are not entirely completed or instruments that are modified in design will not be accepted for repair. Instruments showing evidence of acid core solder or paste fluxes will be returned not repaired.

PARTS LIST

PART No.	PARTS Per Kit	DESCRIPTION
1-37	1	2.2 megohm 1/2 watt 10% resistor (red-red-green)
1-99	1	240 KΩ 1/2 watt 5% resistor (red-yellow-yellow-gold)
31-6	1	5-20 μμf trimmer capacitor
60-7	1	Slide switch
70-5	1	Nylon sleeve for banana plug, black
70-6	1	Nylon sleeve for banana plug, red
73-4	1	3/16" rubber grommet
75-27	1	Terminal board
250-1	4	2-56 x 1/8" self-tapping screw
250-4	2	4-40 x 3/8" machine screw
259-4	2	Spade lug
260-1	2	Alligator clip
343-2	1	Length coaxial cable
344-1	1	Length hookup wire
345-1	1	Length flat braid
438-9	1	Coaxial plug
438-12	1	Coaxial plug insert
438-13	3	Banana plug
459-M2	1	Probe end, red
459-M3	1	Probe end, black
476-12	1	Probe body
477-3	1	Solderless phone tip
595-238	1	Instruction sheet