

instructions

FOR THE
HEATHKIT UNIVERSAL OSCILLOSCOPE PROBE
MODEL PK-1



SPECIFICATIONS

Input Impedance.	Direct position: 2.4 megohms shunted by 100 pf. X10 position: 2.4 megohms shunted by 20 pf when wired for use with 3.6 megohms input, 10 megohms shunted by 20 pf when wired for use with a 1 megohm input.
Maximum DC Voltage.	600 volts.

The Heath Company reserves the right to discontinue instruments and to change specifications at any time without incurring any obligation to incorporate new features in instruments previously sold.

INTRODUCTION

The Heathkit Model PK-1 Universal Oscilloscope Probe permits you to observe signals that would otherwise be affected by the relatively high input capacitance of an oscilloscope and its coaxial input lead. The signal attenuation in the X10 position is accurate to within 5% when the Probe

is used with an oscilloscope with the proper input impedance (either 3.6 megohm or 1 megohm, depending upon the wiring of the Probe). Two types of connectors are supplied for the other end of the coaxial cable.

PARTS LIST

PART No.	PARTS Per Kit	DESCRIPTION	PART No.	PARTS Per Kit	DESCRIPTION
2-52	1	9 megohm 1/2 watt 1% precision resistor	250-4	2	4-40 x 3/8" screw
1-37	1	2.2 megohm 1/2 watt 10% resistor (red-red-green)	259-7	2	Spade lug
1-99	1	240 K Ω 1/2 watt 5% resistor (red-yellow-yellow-gold)	260-1	2	Alligator clip
31-6	1	5-20 pf trimmer capacitor	343-2	1	Coaxial cable
60-7	1	Slide switch	344-59	1	Hookup wire
70-5	1	Nylon sleeve for banana plug, black	345-1	1	Flat braid
70-6	1	Nylon sleeve for banana plug, red	438-13	3	Banana plug
73-4	1	3/16" rubber grommet	459-2	1	Probe end, red
75-27	1	Terminal board	459-3	1	Probe end, black
250-212	4	2-56 x 1/8" self-tapping screw	476-12	1	Probe body
			477-3	1	Solderless phone tip
				1	Instruction sheet (See Page 1 for part number.)
					Solder

STEP-BY-STEP ASSEMBLY

- () Fasten the slide switch (#60-7) and the ceramic trimmer (#31-6) together with a 4-40 x 3/8" screw as shown in Figure 1. Be sure to position the switch as shown.
- () Place the phenolic board over the capacitor and switch lugs as shown in Figure 1. Bend the lugs slightly outward to hold the switch in place on the board.

NOTE: If the Probe is to be used with an oscilloscope that has a 3.6 megohm input impedance, such as the Heathkit Model IO-12, follow the steps on Figure 2. If the Probe is to be used with an oscilloscope that has a 1 megohm input impedance, such as the Heathkit Model IO-14, follow the steps on Figure 3.

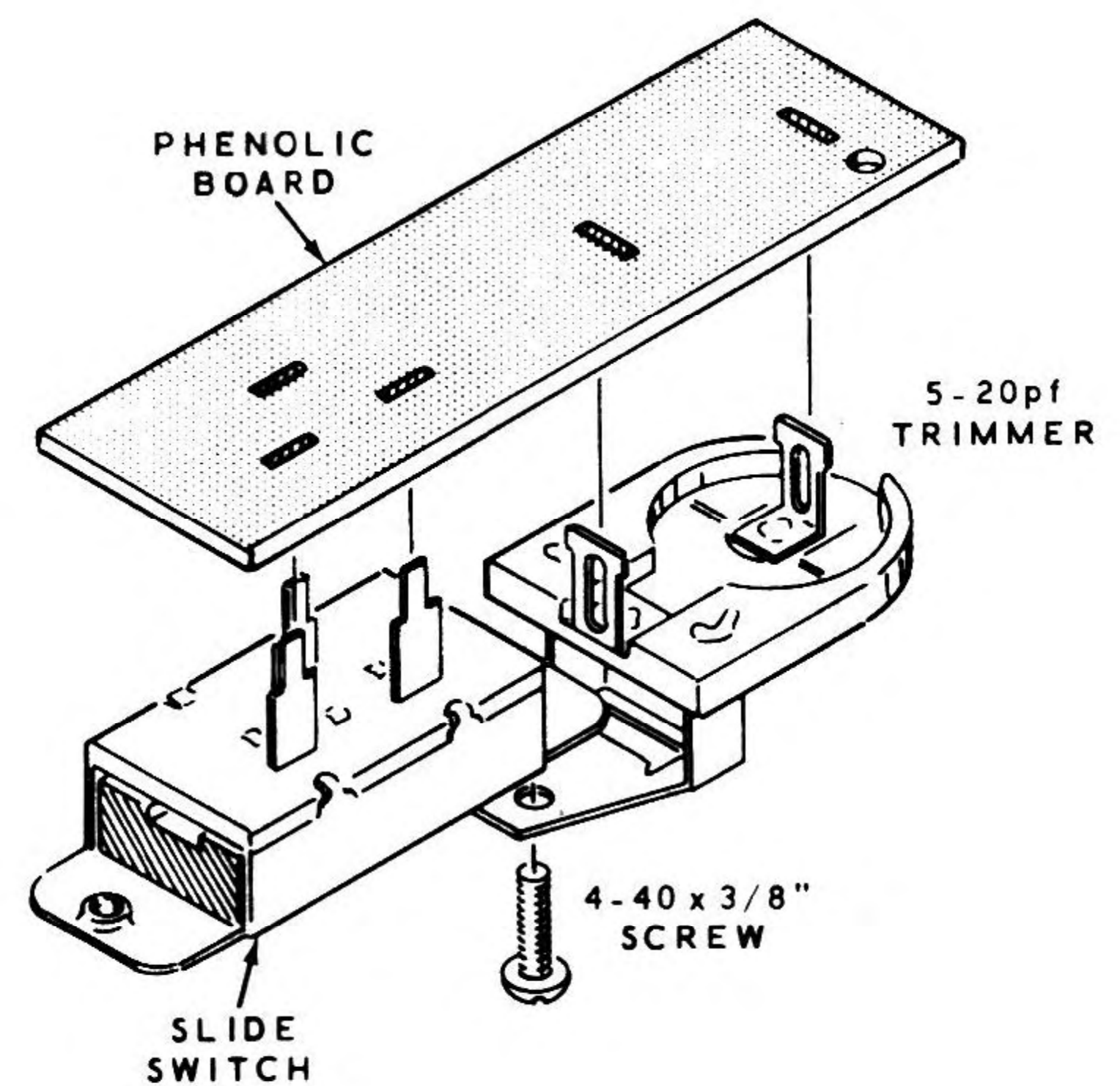


Figure 1

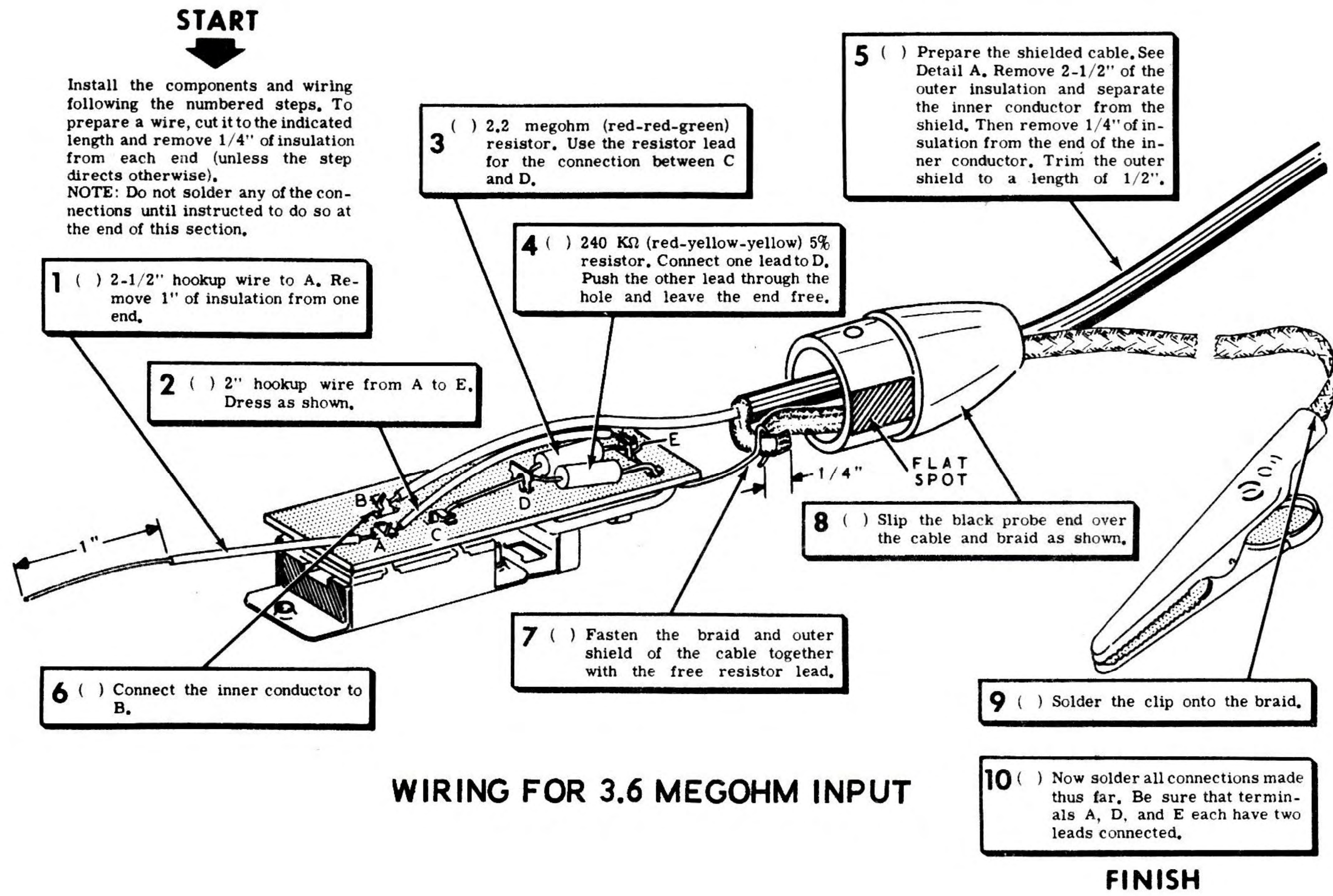


Figure 2

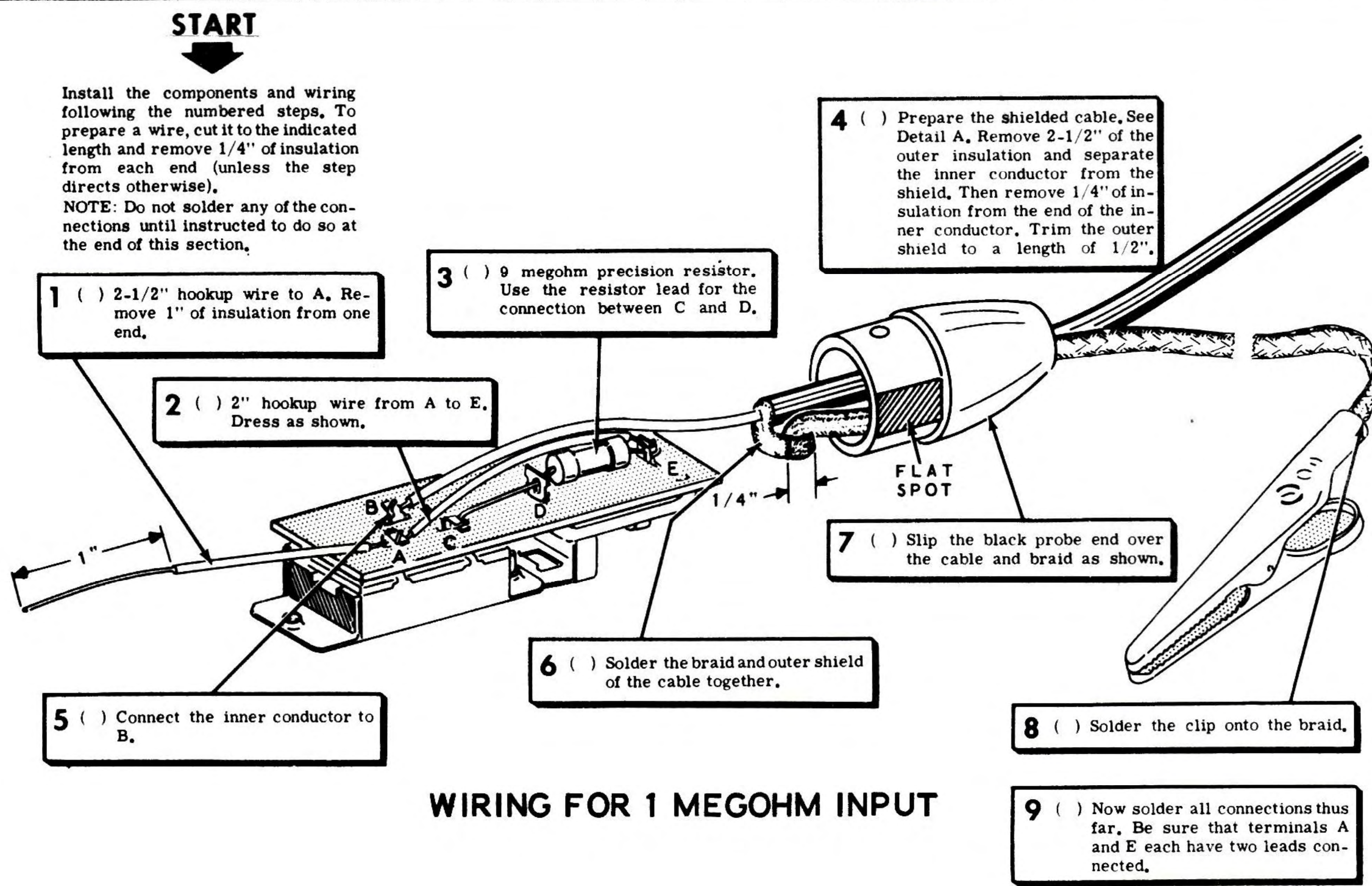


Figure 3

- () 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 x 3/8" screws.
- () Secure the black probe end to the probe body 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 Figures 2, 3, and 4.)
- () Install the rubber grommet in the trimmer adjustment hole.

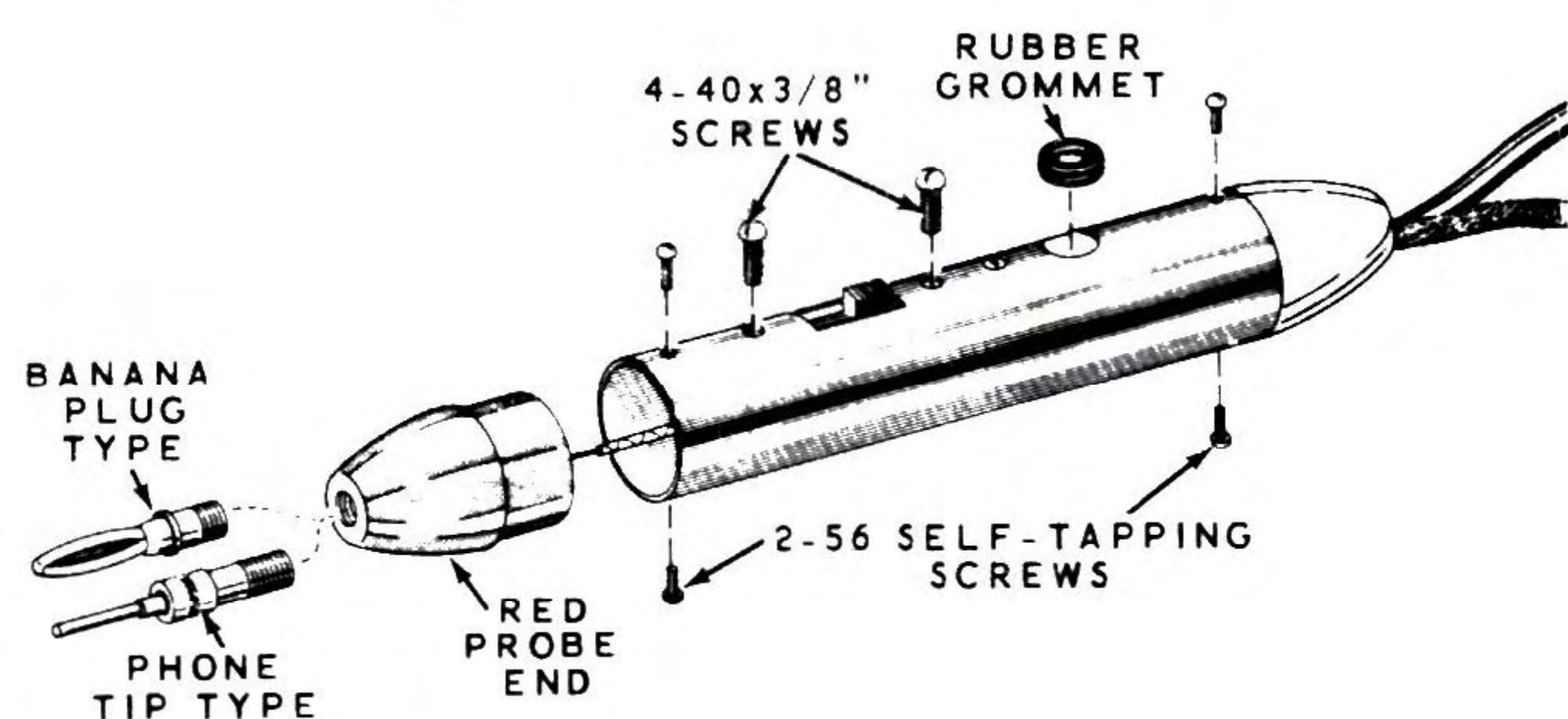
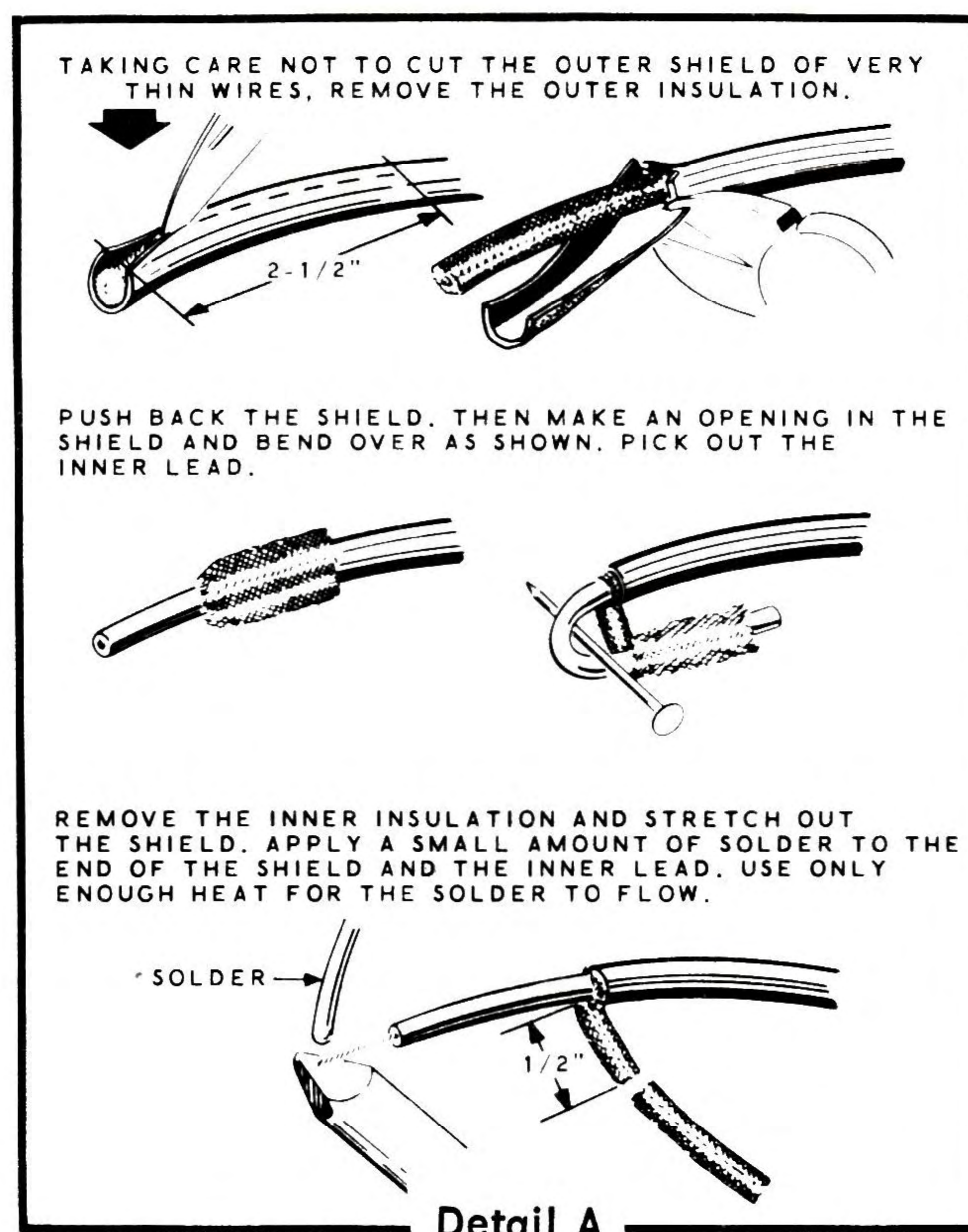


Figure 4

NOTE: Two different types of tips can be installed in the red probe end. Determine which type you wish to use and follow the appropriate step below.

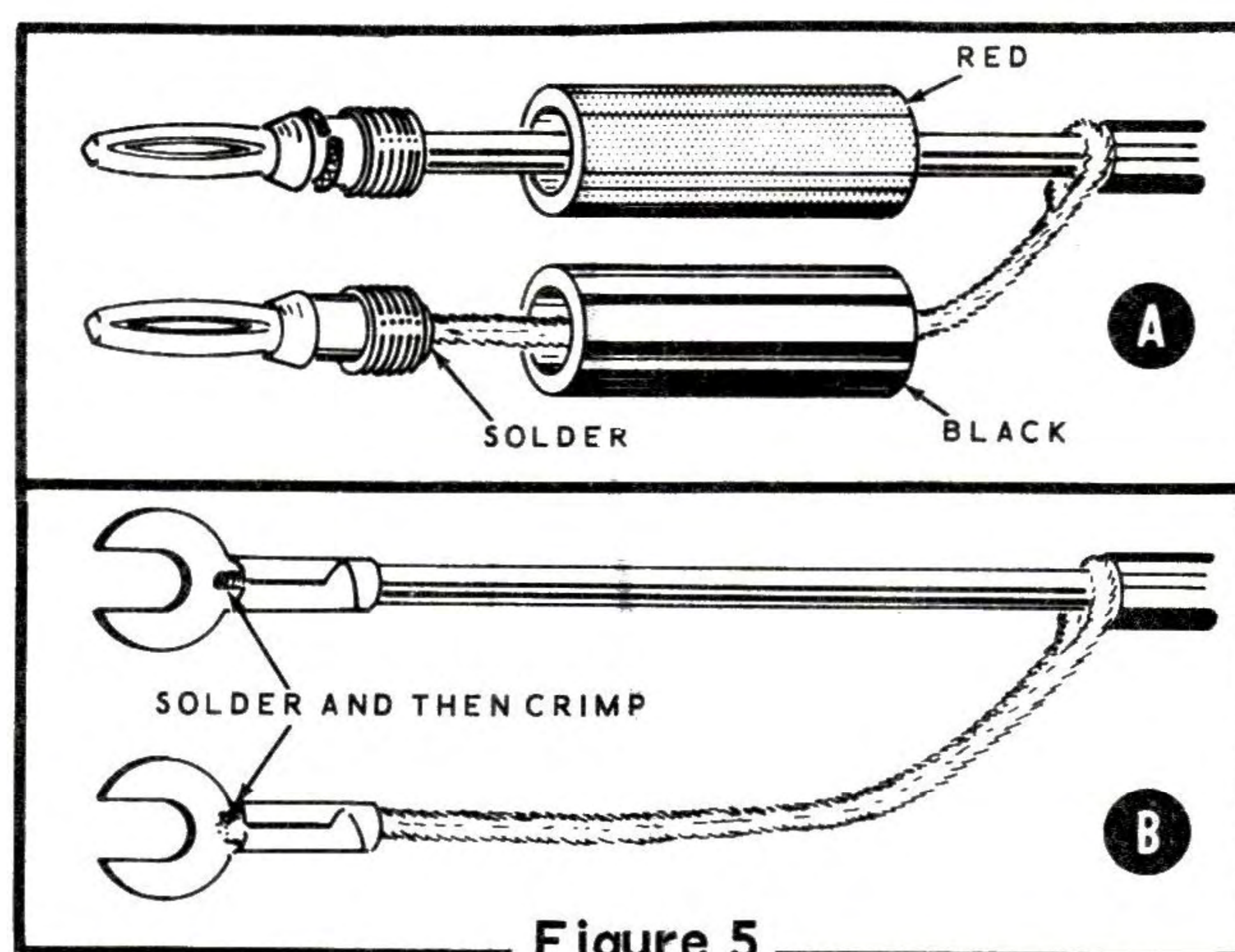
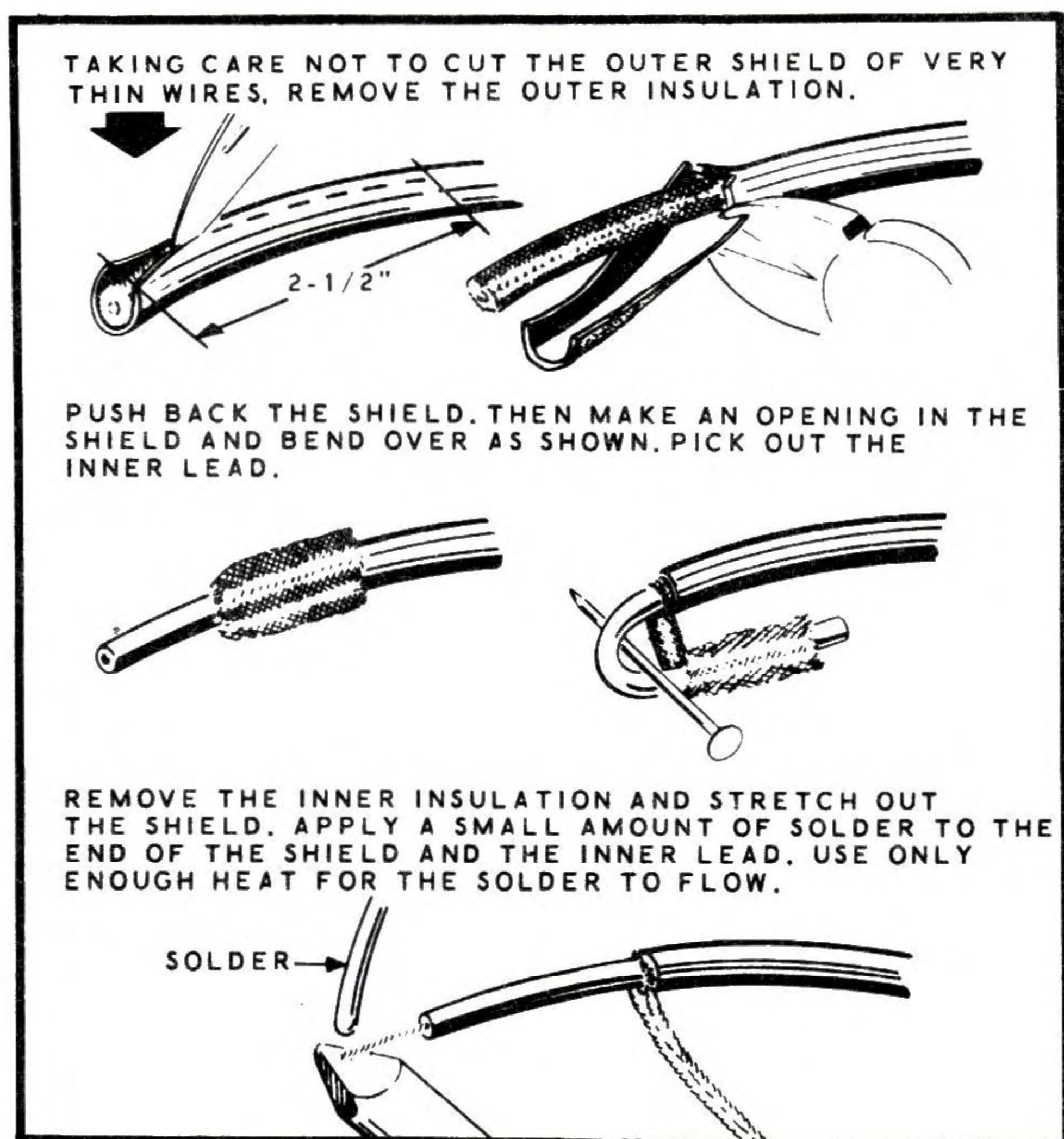
Phone Tip Type

- () 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, as you push the probe end into place, thread the bare lead protruding from the front of the probe through the hole in the center of the banana plug. 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.



- () Two types of output connectors have been supplied with your Probe. Determine which type will work best with your Oscilloscope. Then refer to Figure 5 and install either the banana plugs or spade lugs.

This completes the assembly of your Heathkit Universal Oscilloscope Probe.

TEST AND CALIBRATION

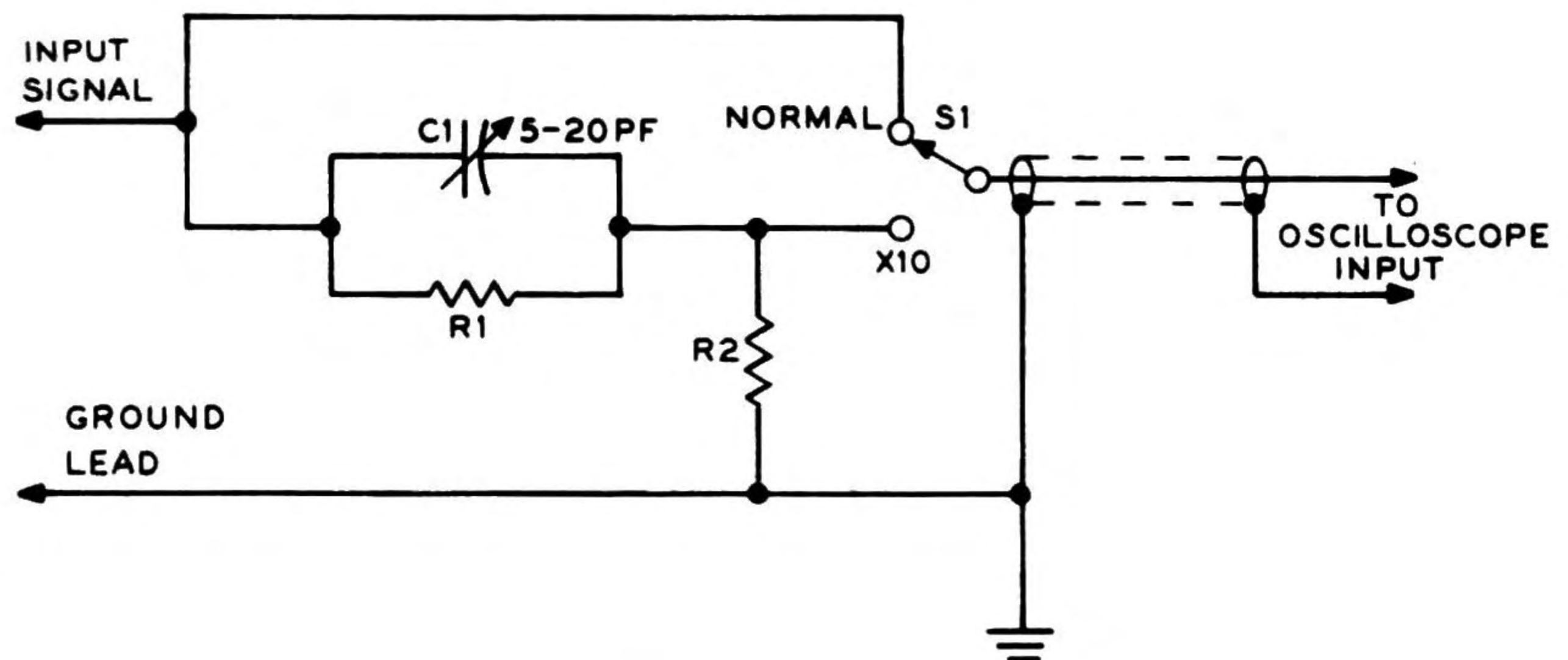
Connect the Probe to your oscilloscope and slide the switch in the Probe to its Normal position, toward the probe tip. This is the direct or unattenuated position. Connect the Probe to a source of 1 kHz square waves* and observe the pattern. Now switch to the X10 position and adjust the trimmer in the probe body for an identical wave shape; remember that the amplitude will be only one tenth of the original signal. Your Probe is now completed and may be put into service.

* If a suitable square wave signal is not available and you have a Heathkit Model IO-12 or

similar oscilloscope, you may use the sawtooth voltage generated within your oscilloscope. (This is not possible, however, with the Heathkit Model IO-14 Oscilloscope.) An easy place to obtain this signal is from the horizontal deflection plate connections on the cathode ray tube socket. Adjust the oscilloscope's sweep frequency controls to produce a sweep of approximately 1000 Hz. With the 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 point which gives the straightest diagonal line is the proper setting.

CIRCUIT DESCRIPTION

A signal at the input of the Probe is applied directly to the input of the oscilloscope when switch S1 is in the Normal position. When S1 is in the X10 position, the signal at the junction of resistors R1 and R2 is applied to the input of the oscilloscope. The values of R1 and R2 have been selected so that 9/10 of the signal is dropped across R1 and 1/10 across R2. When the Probe is wired for use with a 1 megohm input oscilloscope, R2 is actually the input resistance of the Oscilloscope.



NOTE:

NOTES: THE VALUE OF RESISTORS R1 AND R2 DEPEND ON DESIRED OUTPUT IMPEDANCE. SEE CHART BELOW:

3.6 MEGOHM	1 MEGOHM
R1 = 2.2 MΩ	R1 = 9 MΩ
R2 = 240 KΩ	R2 = NOT USED

SCHEMATIC DIAGRAM

Capacitor C1 is one leg of a capacitive voltage divider; the capacitance of the coaxial cable and the oscilloscope input forms the other leg. When C1 is properly adjusted, 9/10 of the signal is across C1 and 1/10 is across the capacitance of the coaxial cable and the oscilloscope input.

REPLACEMENTS

Replacement parts for your kit can be obtained by writing to the Heath Company. Mention part number, kit model number, and date of purchase; give the reason for requesting the replacement part. Do not return the original part until requested to do so.

SERVICE

If the unit does not function properly, recheck the wiring and solder connections. Also check the connector (s) on the end of the cable. Be sure the connections are made correctly and that there are no short circuits. If necessary, the completed instrument may be returned to the Heath Company Service Department for repair. You will be charged a nominal service fee plus the price of any replacement parts not covered by the Warranty.

WARRANTY

The Heath Company warrants parts in its kits for 90 days after shipment. Under this warranty, we will exchange any defective part returned prepaid within the 90 days. If a part is defective, its replacement is shipped prepaid by us anywhere in the continental United States or to APO and FPO addresses. Shipments to all other areas are FOB factory. Heath's obligation is limited to such replacement or repair by Heath, and Heath is not responsible under this warranty or otherwise for any consequential damage or other loss in connection with the purchase, assembly, or use of the kit or parts. Use the Parts Order Form in the kit to notify us of the defective part and return instructions will be sent to you, or contact any Heathkit Electronic Center.

Questions relating to repairs or warranty replacement in the continental United States (APO and FPO included) should be addressed to Heath Company, attention: Customer Relations, or the nearest Heathkit Electronic Center. In all other areas please contact the authorized Heathkit representative in your country, or Heath Company, attention: International Division.

HEATH COMPANY
Benton Harbor, Michigan 49022

REPLACEMENT PARTS PRICE LIST

PART No.	PRICE Each	DESCRIPTION	PART No.	PRICE Each	DESCRIPTION
2-52	.35	9 megohm 1/2 watt 1% pre- cision resistor	438-13	.20	Banana plug
1-37	.10	2.2 megohm 1/2 watt 10% resistor	459-2	.15	Probe end, red
1-99	.15	240 K Ω 1/2 watt 5% resistor	459-3	.10	Probe end, black
31-6	1.20	5-20 pf trimmer capacitor	476-12	.55	Probe body
60-7	.20	Slide switch	477-3	.15	Solderless phone tip
70-5	.10	Nylon sleeve for banana plug, black	331-6	.15	Solder
70-6	.10	Nylon sleeve for banana plug, red			Instruction sheet (See Page 1 for part number.)
73-4	.10	3/16" rubber grommet			
75-27	.10	Terminal board			
250-212	.05	2-56 x 1/8" self-tapping screw			
250-4	.05	4-40 x 3/8" screw			
259-7	.05	Spade lug			
260-1	.15	Alligator clip			
343-2	.10/ft	Coaxial cable			
344-59	.05/ft	Hookup wire			
345-1	.10/ft	Flat braid			

The above prices apply only on purchases from the Heath Company where shipment is to a U.S.A. destination. Add 10% (minimum 25 cents) to the price when ordering from a Heathkit Electronic Center to cover local sales tax, postage and handling. Outside the U.S.A. parts and service are available from your local Heathkit source and will reflect additional transportation, taxes, duties and rates of exchange.