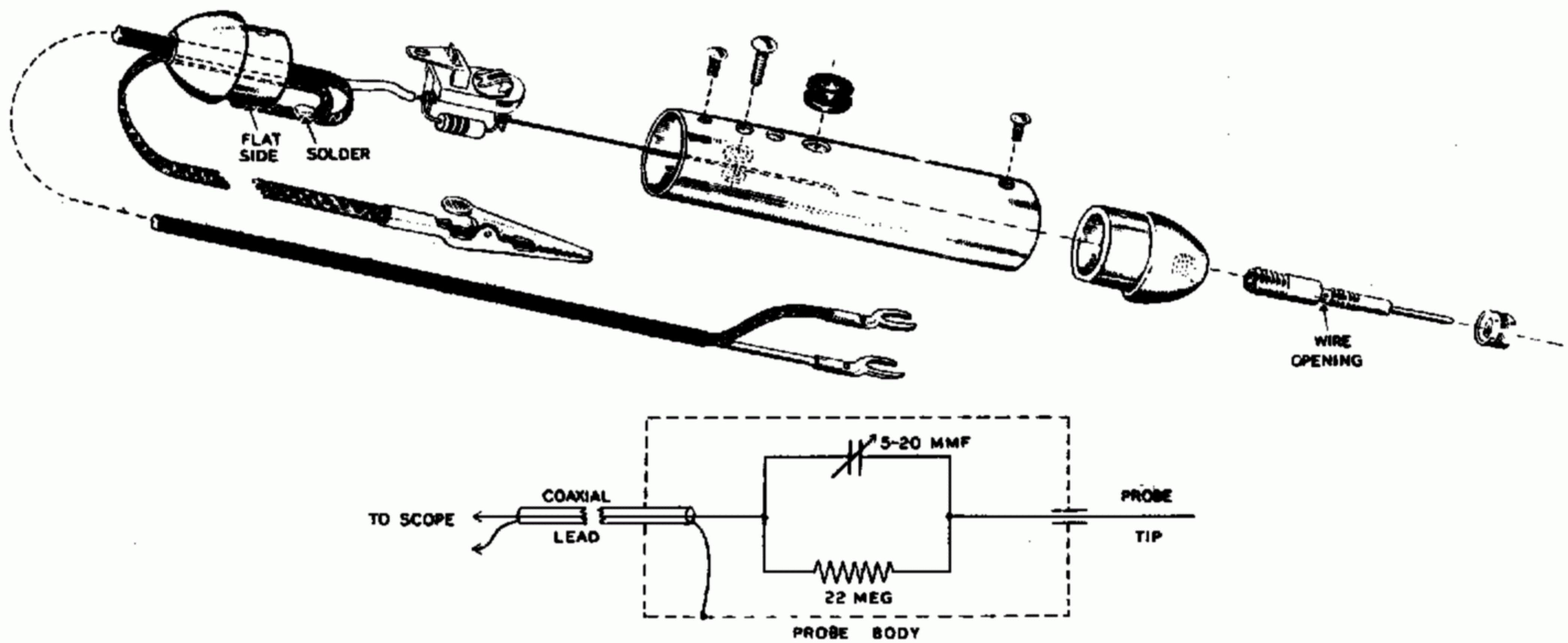


## HEATHKIT LOW CAPACITY PROBE KIT #342

When investigating high frequency, high impedance, or broad bandwidth circuits such as encountered in television service work, it is essential that the capacity of the probe used be sufficiently low so that distortion or loss of gain in the circuit will not occur. The Heathkit Low Capacity Probe, used with an oscilloscope having moderate to high input capacity, will permit accurate oscilloscope display of the wave form under observation. A variable capacitor in the probe furnishes the degree of flexibility necessary to permit probe use with the input of practically any oscilloscope. It is only necessary to adjust the trimmer for the instrument with which the probe is to be used. The probe can then be used repeatedly without further adjustment. When the same probe is used with other instruments, it will be necessary to readjust the trimmer with each instrument change.



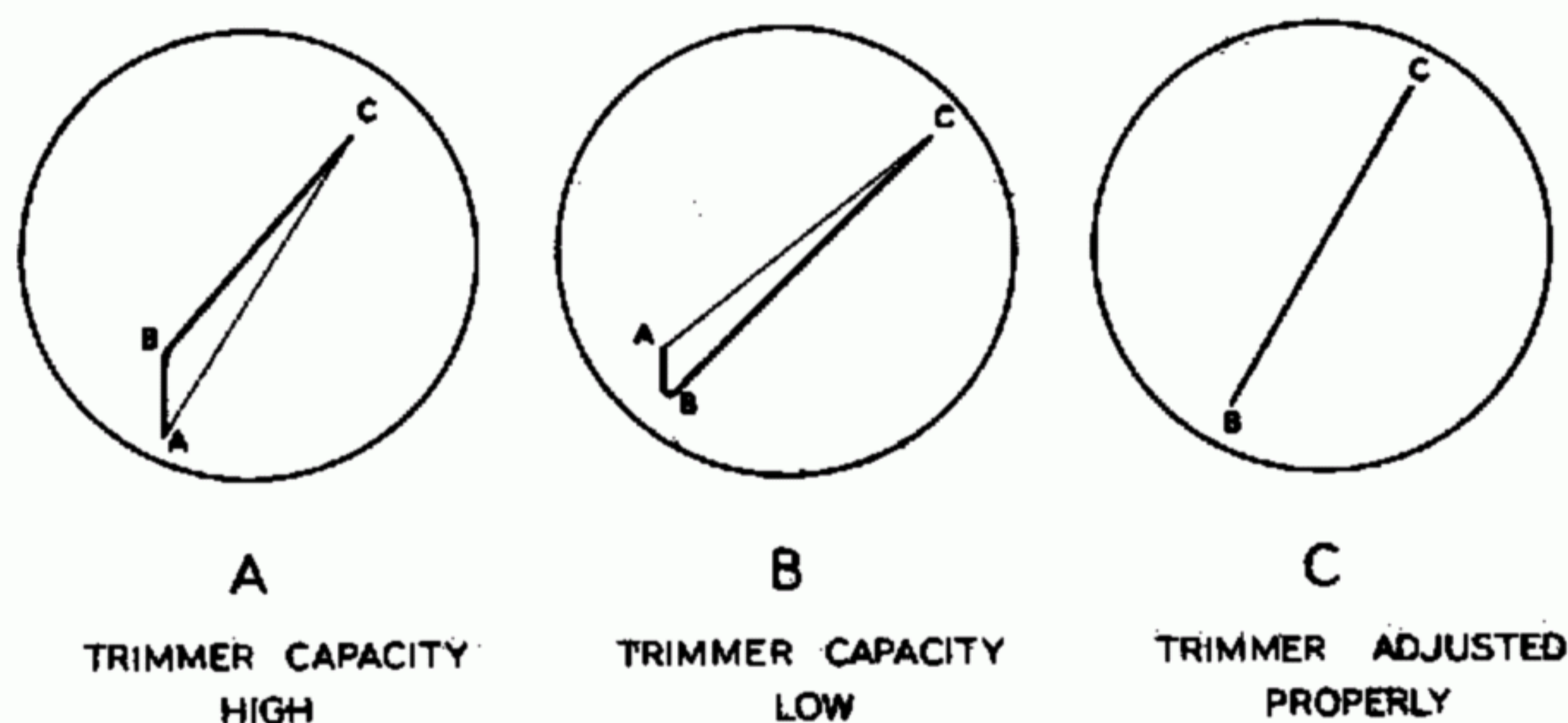
### PROBE CONSTRUCTION

The pictorial clearly shows the assembly detail of the Low Capacity Probe. The assembly will be further simplified if the resistor and bare wire are first assembled to the trimmer condenser and the shielded test lead connected to the solder lug closest to the mounting bracket of the trimmer. The two probe ends can be readily identified by their color, red polystyrene for the tip end and black polystyrene for the shielded wire end. The red probe end should be assembled to the probe body using a self-tapping screw. The solderless tip can then be firmly screwed into the probe end, the bare wire dressed through the probe body and the opening in the solderless tip, then pulled through until the trimmer condenser assembly is approximately aligned with the drilled openings in the probe body. Surplus bare wire should be trimmed off and the collar of the solderless phone tip firmly tightened. The trimmer condenser is secured to the probe body by using a 6-32 screw, lockwasher, and nut. The black insulated probe end should then be slipped over the test lead. The flat flexible braid also should be slipped through the opening in the probe end, and the braid soldered to the shielded braid covering of the test lead. When the insulated probe end is attached to the probe body, the short length of shielded covering on the test lead should be dressed along the flat portion on the shank of the probe end in such a manner that the actual mechanical assembly of the probe end to the probe body will result in jamming the braid against the probe wall. This procedure will properly ground the probe body and also provide strain relief for the test lead. The probe end should then be secured with a self-tapping screw. Final assembly involves the installation of the spade lugs on the end of the shielded cable, the alligator clip to the end of the flat braid, and slipping the 1/4" rubber grommet in place in the probe body.

## TEST AND ADJUSTMENT

The variable capacitor in the probe can be adjusted in a number of ways, and as a matter of convenience either of the following methods can be used. If a square wave generator is available, connect the probe tip to the generator output and the ground clip of the probe to the ground terminal of the generator. The spade lugs of the probe cable should be connected to the oscilloscope vertical input terminals. The exact frequency output of the square wave generator is not too important, and any frequency between 10,000 and 50,000 cycles can be used. Adjust the oscilloscope so that two or three cycles of the square wave form are observed. Then with a screw driver (insulated or alignment type preferred) adjust the trimmer in the probe body for the ideal square wave reproduction. Of course, the oscilloscope used must be capable of reasonably good square wave response. Improper adjustment of the probe trimmer will be revealed as badly peaked or rounded square waves. When the adjustment is properly made for the correct square wave shape, the probe is ready for use with the oscilloscope. If the oscilloscope has a step attenuator, it may be necessary to readjust the probe each time attenuation is altered, thereby changing the scope input impedance.

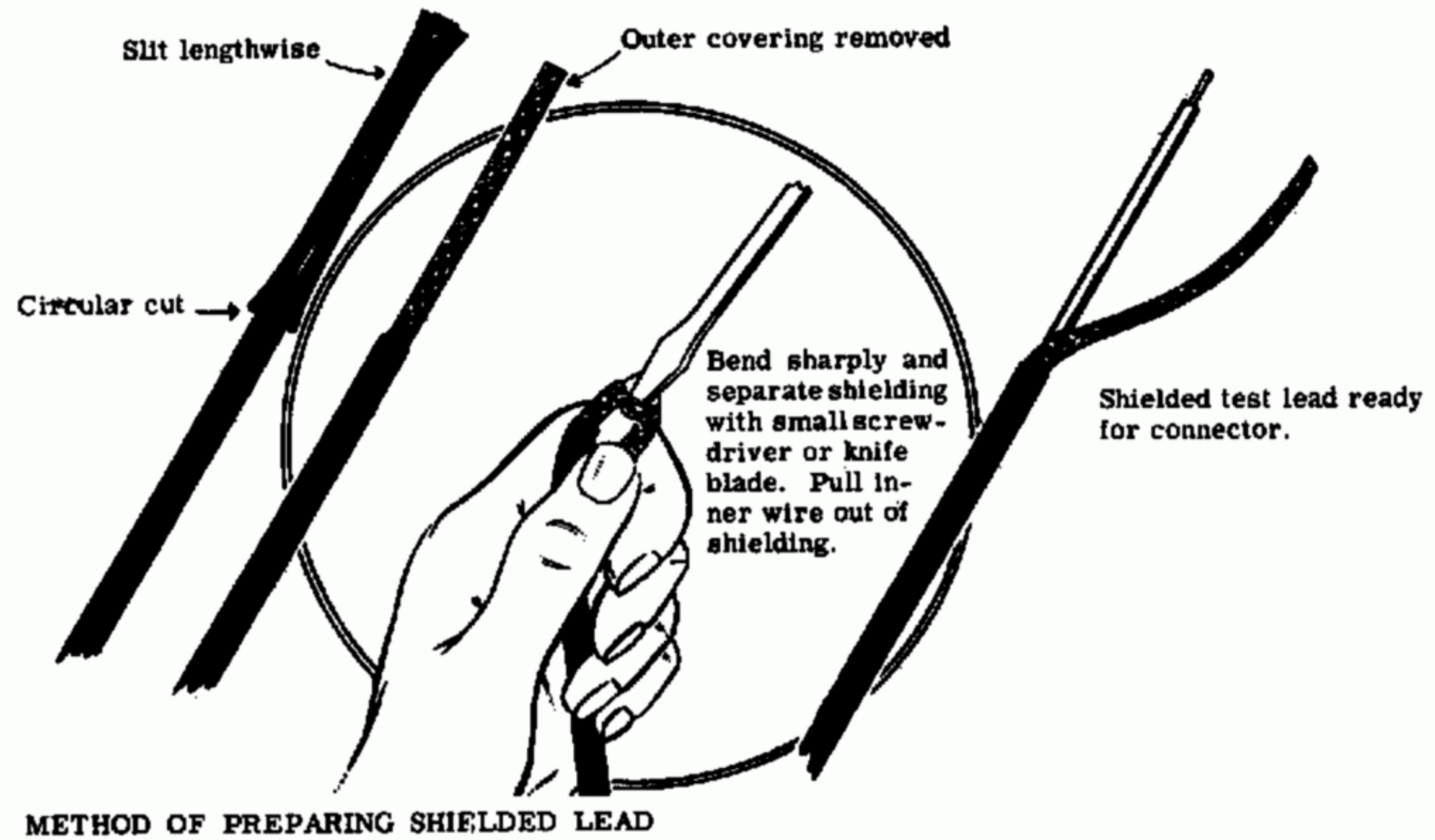
In the event a square wave generator is not available, the probe trimmer can be adjusted by utilizing the saw-tooth output of the oscilloscope multivibrator sweep generator. The Heathkit Models O-7 and O-8 Oscilloscopes can be used with the Low Capacity Probe in the following manner: Connect the spade lugs to the vertical input, set the frequency selector in the switch position which will allow a sweep frequency in the range of 180 to 1800 cycles. The frequency vernier control should be turned to zero. The tip of the Low Capacity Probe is then connected to the input grid #2 of the 12AT7 tube used in the horizontal push-pull output stage. A wave form similar to that shown in Figure A or B will be observed by regulating the vertical and horizontal gain controls of the oscilloscope. The probe trimmer should now be adjusted until a straight line as shown in Figure C is obtainable. The probe is now correctly compensated for the input circuit of the oscilloscope.



Since the Low Capacity Probe presents a high impedance input along with a low capacity input, there is necessarily some degree of attenuation present. It is necessary to obtain an approximate indication of the degree of attenuation, and this can be quickly determined in the following manner. Using a calibrated graph screen with the oscilloscope, the Low Capacity Probe should be connected to the oscilloscope vertical input terminals, and the probe tip connected to the output of a sine wave generator source. Next connect a jumper wire from the oscilloscope vertical input to the same output terminal of the sine wave generator source. The exact frequency of the sine wave generator is not critical, and usually a 1,000 cycle sine wave will be satisfactory. Advance the oscilloscope vertical gain control until a vertical deflection of a given convenient value is obtained. For example, deflection covering ten vertical squares of the graph screen. Assuming that ten squares are used for a reference and with the vertical gain control carefully adjusted, the jumper wire should be removed and then without touching any of the controls, note the number of vertical squares now covered by the wave form. If, for example, only two squares are covered, the ratio of attenuation is of course 5 to 1. If one square is covered, the attenuation is 10 to 1. The Low Capacity Probe will prove a useful oscilloscope accessory and can be used quite satisfactorily up to frequencies of 12 to 15 megacycles.

## SPECIFICATIONS

All prices are subject to change without notice. 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.



## WARRANTY

The Heath Company limits its warranty of parts supplied with any kit (except tubes, meters, and rectifiers where the original manufacturer's guarantee only applies) to a period of three (3) months from the date of purchase. Replacement will be made only when said part is returned postpaid, with prior permission and in the judgment of the Heath Company was defective at the time of sale. This warranty does not extend to any Heathkits which have been subjected to misuse, neglect, accident, and improper installation or applications. Material supplied with a kit shall not be considered as defective even though not in exact accordance with specifications if it substantially fulfills performance requirements. This warranty is not transferable and applies only to the original purchaser. This warranty is in lieu of all other warranties, and the Heath Company neither assumes nor authorizes any other person to assume for them any other liability in connection with the sale of Heathkits.

The assembler is urged to follow instructions exactly as provided. The Heath Company assumes no responsibility or liability for any damages or injuries in the assembly of the device or in the operation of the completed instrument.

## PARTS LIST

### #342 LOW CAPACITY PROBE KIT

PART No.	PARTS Per Kit	DESCRIPTION
1-70	1	22 megohm 1/2 watt resistor
31-6	1	5-20 $\mu\text{f}$ trimmer condenser
340-2	1	6" length #20 bare wire
477-3	1	Solderless phone tip
476-M7	1	Aluminum probe body
459-M2	1	Probe tip end-drilled and tapped
459-M3	1	Probe body end-drilled (not tapped)
343-2	1	36" length shielded test lead
259-7	2	Spade lug
260-1	1	Alligator clip
345-1	1	12" length flat braid
250-9	1	6-32 x 3/8" screw
252-3	1	6-32 nut
250-1	2	Self tapping screw
254-1	1	Lockwasher
73-4	1	Rubber grommet
595-58	1	Instruction sheet

**NOTE:** When the Low Capacity Probe is used with instruments whose input impedance is not compatible with the circuit constants used, there is no objection to altering the resistance value of 1-70

