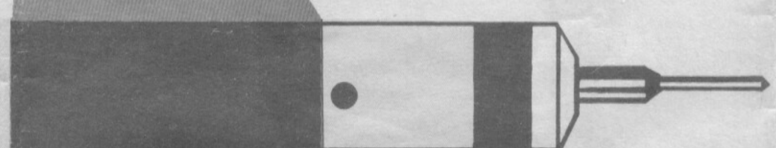
EICO

VTVM & Oscilloscope Probes

INSTRUCTION BOOK



VTVM RF PROBES
VTVM PEAK-TO-PEAK PROBES
For all 11 & 25 megohm DC input VTVMS

OSCILLOSCOPE DEMODULATOR PROBE
OSCILLOSCOPE LOW CAPACITY PROBE
OSCILLOSCOPE DIRECT PROBE
For all oscilloscopes

EICO VTVM and OSCILLOSCOPE PROBES

VTVM RF PROBE: Two models PRF--11 and PRF--25, to accommodate most VTVMS in current use.
Model PRF--11 may be used with any 11 MΩ* VTVM including the following: Electronic Designs 100, Heath V6, Hickock 215, Jackson 709, RCA WV 77A - WV 87A - WV 97A, RCP 655, Simpson 303, Triplett 650.
Model PRF-25 may be used with any 25 MΩ** VTVM including the following: EICO 214-221, RCP 345.

VTVM PEAK-TO-PEAK PROBE: Two models, PTP-11 and PTP-25, to accomodate most VTVMS in current use.
Model PTP-11 may be used with any 11 MΩ* VTVM requiring adaptation for peak-to-peak voltage readings including the following: Electronic Designs 100, Heath V6, RCA WV 77A, Simpson 303.
Model PTP-25 may be used with any 25 MΩ** VTVM including the following: EICO 214-221, RCP 345.

SCOPE DEMODULATOR PROBE: One model, PSD, may be used with any oscilloscope.

SCOPE LOW CAPACITY PROBE: One model, PLC, may be used with any oscilloscope.

SCOPE DIRECT PROBE: One model, PD, may be used with any oscilloscope.

* DC input resistance - 10 MΩ internal plus 1 MΩ in the regular DC or AC/DC probe.
** DC input resistance - 10 MΩ internal plus 15 MΩ in the regular DC or AC/DC probe.

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LOW - CAPACITY PROBE CONSTRUCTION

Unpack the kit and check each part against the following parts list.

PARTS LIST

Stock #	Description	Amt.	Stock #	Description	Amt.	Stock #	Description	Amt.
9507	probe shell (L-C)	1	42019	rubber washer	1	10401	res., 33 MΩ	1
89511	nose-piece	1	51500	alligator clip	1	29506	trimmer cap., 6-30 mmf	1
89512	probe tip	1	58403	co-axial cable	1	89514	trimmer ring	1
54506	term. board (L-C)	1	58002	stranded wire	pc	46001	1/4" grommet	1
47001	spring	1	58000	hook-up wire	pc			

NOTE: When ordering replacement parts, please include the stock number of the part and the description given in the parts list.

Follow the step-by-step assembly and wiring procedure that follows closely and carefully for best results. IMPORTANT: USE THE BEST GRADE OF ROSIN CORE SOLDER ONLY, preferably one containing the new activated fluxes such as Kester "Resin-Five", Ersin "Multicore" or similar types. UNDER NO CONDITION USE ACID CORE SOLDER OR ACID FLUX since acid flux can cause serious corrosion. If for any reason it is necessary to resolder a joint, be sure to use new solder.

Construction is begun by mounting the parts on the terminal board as shown in Figs. 3 and 4. First, install the trimmer capacitor on side A of the board (Fig. 3--same side solder lug is on) as shown in Fig. 1. To do this, hold the top and bottom plates of the trimmer in the board as indicated and then slide the retaining terminal clip in place to secure the assembly*. Bend the terminal lugs away from each other on side B of the board. Then press fit the probe tip into the rectangular notch at one end of the board as shown in Fig. 2.

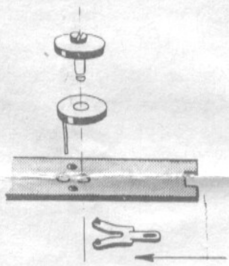

Fig. 1

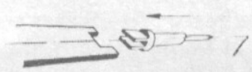

Fig. 2

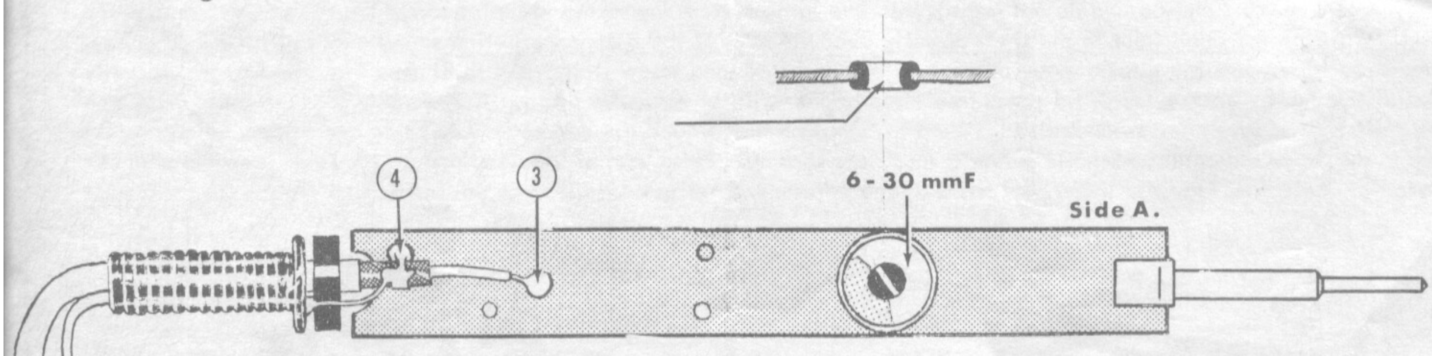

Fig. 3

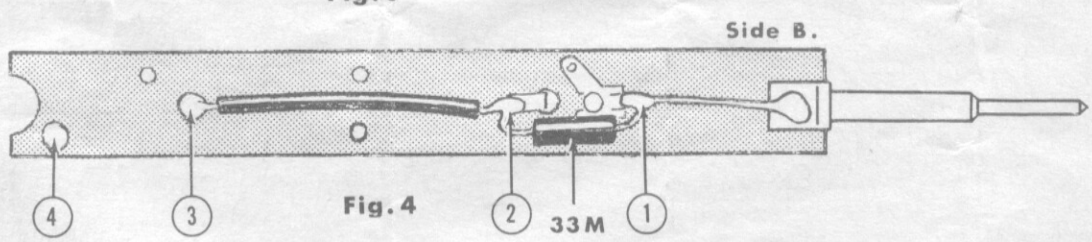

Fig. 4

NOTE: The trimmer capacitor as found in the kit has been pre-assembled to a small bakelite board to permit factory testing. Before proceeding with assembly to the probe terminal board as instructed, the trimmer capacitor must be disassembled by sliding out the retaining terminal clip. Discard the small board.

LOW-CAPACITY PROBE ADJUSTMENT

The low-capacity probe, of necessity, attenuates the signal by a factor as great as the factor by which it multiplies the oscilloscopes input resistance. The resistor supplied in the probe is 33 MΩ; therefore, if the input resistance of the scope is 3.3 MΩ (EICO Model 470), the attenuation factor is 33/3.3 = 10. If the input resistance of your scope is 2.2 MΩ, the attenuation factor is 33/2.2 = 15, and if the input resistance of your scope is 1 MΩ, the attenuation factor is 33/1 = 33. An attenuation factor of 10 is considered to give the best compromise on the factors of input impedance and attenuation, besides being most convenient when a scope calibrator is used. It is therefore recommended that a resistor of value ten times greater than the input resistance of your oscilloscope's vertical amplifier be substituted for the resistor supplied in the probe (unless, of course, your scope's input resistance is 3.3 MΩ such as EICO Model 470). There is no objection to using other resistor values to obtain any desired attenuation factor, but it should be kept in mind that perfect frequency compensation will generally not be possible if the attenuation factor greatly exceeds 15.

The low-capacity probe frequency compensation may be adjusted in several ways. If a square wave generator is available, connect the spade lugs of the probe cable to the vertical input terminals of the oscilloscope and the probe tip and ground lead to the output terminals of the generator. Set the square wave generator at a frequency between 10,000 and 50,000 cps. (An oscilloscope should have flat response to a frequency ten times greater and ten times smaller than the fundamental frequency of a square wave in order to reproduce it with good fidelity.) Then use a screwdriver or an insulated alignment tool, if one is available, to adjust the probe trimmer (accessible through an opening in the shell) until the square wave is reproduced properly. Incorrect trimmer adjustment is indicated by a badly rounded or a badly peaked square wave. Another method to adjust the probe trimmer is to use the saw-tooth output of the oscilloscope multivibrator sweep generator. If the sawtooth is available at a front panel jack as in the EICO Model 470, this procedure is very easy. If it is not available, the oscilloscope chassis may be removed from the cabinet and an input grid of the horizontal output stage used as a take-off point. In either case set the scope for internal sweep and the sweep frequency to about 1000 cps. Connect the spade lugs of the probe cable to the vertical input terminals of the scope and place the probe tip at the sawtooth output jack or a grid of the horizontal output stage. Adjust the vertical and horizontal gain controls until a pattern that occupies about two-thirds of the screen is obtained. With the probe trimmer adjusted improperly, the trace will appear as in Fig. A or B. If this is the case, adjust the probe trimmer until the hook disappears and the trace appears as in Fig. C.

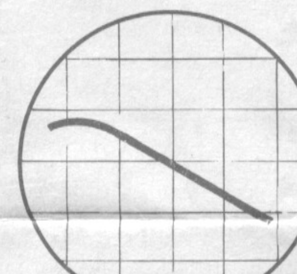

Fig. A - sawtooth exhibiting rounding

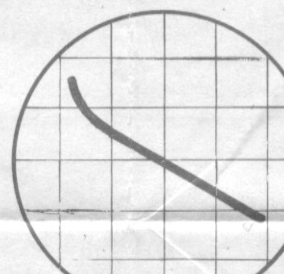

Fig. B - sawtooth exhibiting overpeaking

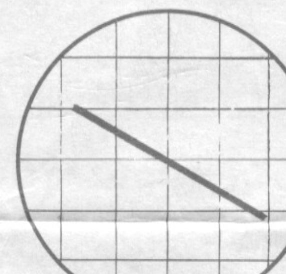

Fig. C - sawtooth exhibiting correct adjustment

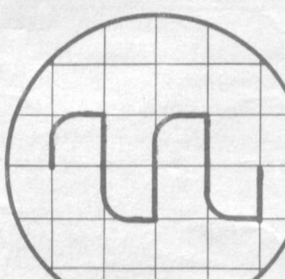

Fig. D - square wave exhibiting rounding

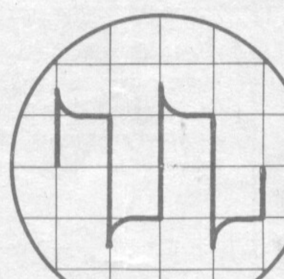

Fig. E - square wave exhibiting overpeaking

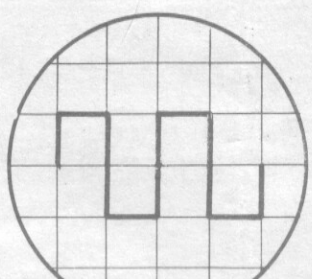

Fig. F - square wave exhibiting correct adjustment

To measure the value of the probe attenuation, connect a pair of jumpers between the vertical input terminals of the scope and a sine wave generator set at about 1000 cps. Adjust the peak-to-peak deflection to a convenient number of divisions on the scope graph screen. Without further adjustment of the generator or scope controls, disconnect the jumpers. Then connect the spade lugs of the probe cable to the vertical input terminals of the scope and the probe tip and ground lead to the generator output terminals. A smaller deflection will be obtained. Divide the number of vertical divisions occupied by the pattern when direct connections were used by the number of divisions occupied by the pattern when the probe is used. The value attained is the probe attenuation.

NOTES: 1) The statements and calculations regarding probe attenuation are good approximations when the attenuation factor is 10 or greater. 2) On some scopes, the waveforms shown above will be found transposed from left to right, or inverted, or both.

On side B of the board (Fig. 4), solder one end of a bare wire jumper to the flat shank of the probe tip and connect the other end to the retaining terminal clip of the trimmer (terminal 1). Then connect the 33 MΩ resistor** between terminal 1 and terminal 2 (other trimmer capacitor terminal). On side B also, connect a hook-up wire jumper between terminal 2 of the trimmer and terminal 3 on the board. Solder trimmer terminals 1 & 2 and then lay terminal board aside.

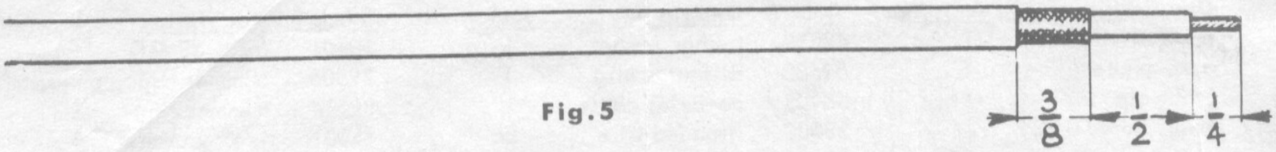

Fig.5

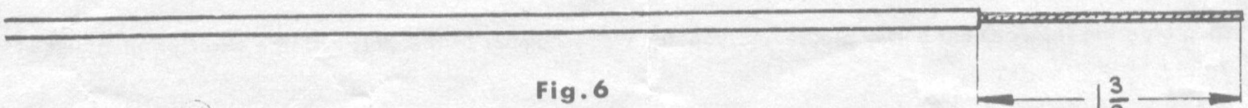

Fig.6

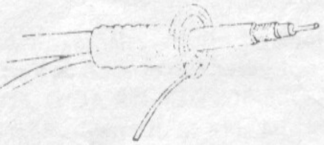

Fig.7

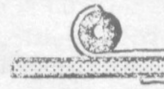

Fig.8

Strip the co-axial cable and the ground lead (stranded wire) as shown in Figs. 5 and 6. Position the ground lead in the spring as shown in Fig. 7, and solder it to the spring, as shown, at the point indicated in the drawing. Then insert the co-axial cable in the spring as shown in Fig. 7. Push the rubber washer over the stripped end of the co-axial cable on to the outside insulation and position it as shown in Fig. 3. Next position the stripped end of the co-axial cable so that the end of the outside insulation rests inside the semi-circular notch in the end of the terminal board and the outside braid lays across the solder lug. (Check to see that the inner co-axial conductor reaches eyelet 3.) Then bend the solder lug over to grip the cable braid (Fig. 8 is a profile view) and solder the connection, keeping in mind that overheating will soften the inner co-axial insulation with the consequent danger of a short. Bring the stripped end of the ground lead (extending from the solder point on the spring) around the outside of the rubber washer and insert it in eyelet 4 (Fig. 3), after which solder eyelet 4. Insert the inner conductor of the co-axial cable in eyelet 3 (Fig. 3), after which solder eyelet 3. Next, Place the trimmer ring around the body of the trimmer. This insulating ring prevents accidental shorting between the trimmer and the probe shell.

To complete the construction, pass the free ends of the co-axial cable and the ground lead through the probe shell from the threaded end. Then grasp the probe tip with one hand, and with the other hand move the shell down over the probe body (use a rocking motion and do not force) until the large end of the spring is flush against the rolled-over end of the shell. Position the small hole in the shell directly over the head of the trimmer adjusting screw and insert the 1/4" rubber grommet. Then pass the plastic nose-piece over the probe tip and screw it into the shell (see Fig. 9). At the opposite end of the cable, strip away 3" of outer insulation and 2 1/2" of the outer braid. Cut off 3 1/2" of stranded wire and strip off 1/2" of insulation from one end. Wrap the stripped end around the exposed cable braid and solder, being careful not to overheat the cable. Finally solder a spade lug to the opposite end of this lead and to the inner conductor of the co-axial cable (see Fig. 9). Now proceed with the adjustment instructions given in the instruction sheet.

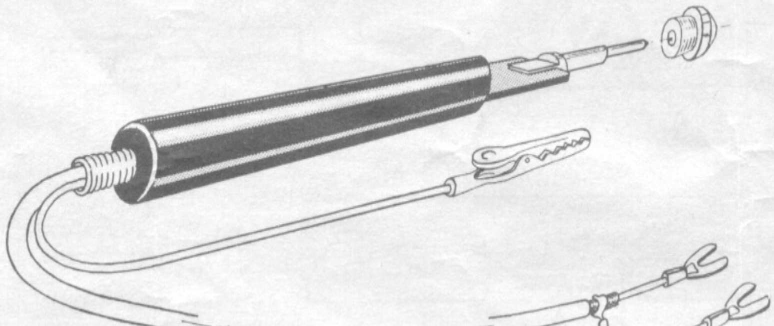

Fig.9

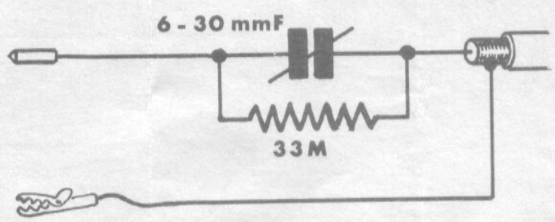

Fig.10

** Refer to "Low-Capacity Probe Adjustment" in your instruction sheet before performing this step.

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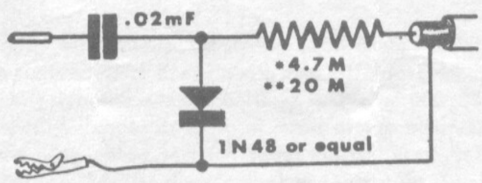
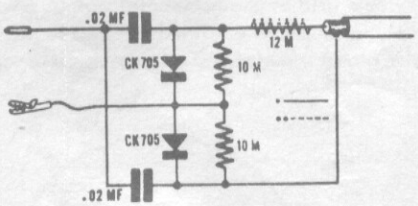
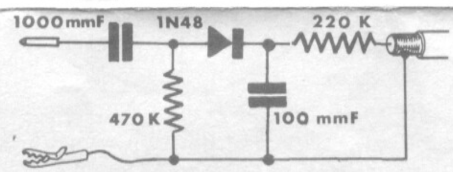
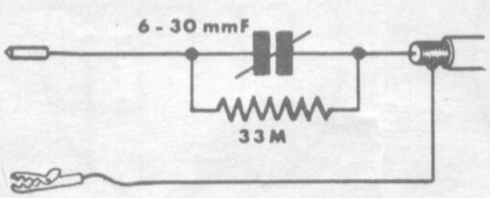
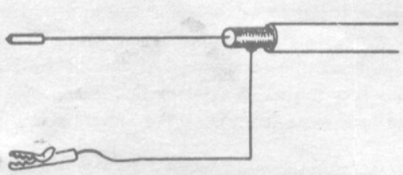
EICO VTVM & OSCILLO

<table>
<tr><th>PROBE TYPE</th><th>FUNCTION</th><th>MA</th></tr>
<tr><td>VTVM
RF


•MODEL PRF-11 — ••MODEL PRF-25</td><td>RF voltage measurement to 250 mc. Very useful for measurements in all TV & radio RF & IF stages.</td><td>30
an
60</td></tr>
<tr><td>VTVM
PEAK TO PEAK


•MODEL PTP-11 — ••MODEL PTP-25</td><td>Peak-to-peak voltage measurement of complex TV waveforms. Operations over frequency range from 5 kc to 5 mc to cover all TV servicing requirements.</td><td>80
to.
an
60</td></tr>
<tr><td>SCOPE
DEMODULATOR


MODEL PSD</td><td>Demodulates amplitude-modulated carriers between 150 kc and 250 mc. Permits your scope to be used as a waveform tracer, gain analyzer, and alignment indicator in all TV & radio RF & IF stages. Audio response practically flat from 20 cps to 6 kc includes both high and low frequency components of demodulated 60 cycle square wave to make this probe particularly good for observation of sweep curve response.</td><td>30
an
30</td></tr>
<tr><td>SCOPE
LOW CAPACITY


MODEL PLC</td><td>High impedance--low capacity probe, extremely useful for tracing waveforms in high impedance, high frequency, and wide-band circuits (such as are found in TV) without distortion from overloading or frequency discrimination. (A variable ceramic capacitor provides adjustable frequency compensation.) Particularly valuable for TV sync signal tracing and general tests in video, sync, and sweep circuits.</td><td></td></tr>
<tr><td>SCOPE
DIRECT

MODEL PD</td><td>Direct test probe for use in low frequency or low impedance circuits where direct connection to the test point is required in order to utilize maximum scope sensitivity and where the added input capacity contributed by the co-axial cable is unimportant.</td><td></td></tr>
</table>

...LLOSCOPE PROBES

MAX. INPUT	PROBE OUTPUT	REMARKS
30 volts RMS, and/or 600 VDC	Negative DC volts equal to RMS value of RF voltage.	1) Set VTVM for reading negative DC volts. RMS value of RF voltage read directly on DC scales without any need for multiplying factors. 2) If the peak value of an RF voltage is desired, multiply the RMS value by 1.414. 3) To measure AC voltages with frequencies below 1000 cps, use the regular VTVM AC voltage measurement facilities as readings with the probe below this frequency are low.
80 volts peak-to-peak and/or 600 VDC	Negative DC volts equal to peak-to-peak voltage of any waveform, complex or sine.	1) Set VTVM for reading negative DC volts. Peak-to-peak volts read directly on DC scales without any need for multiplying factors. 2) Special calibration required to read voltages below 5 volts peak-to-peak as non-linearity of crystal diodes causes low probe readings at low voltages. 3) Do not make any connection with VTVM common lead.
30 volts RMS, and/or 300 VDC	Low-frequency modulating signal (envelope of carrier) plus DC proportional to amplitude of RF carrier.	In general, standard RF signal tracing methods may be used. However, if signal tracing is required in TV RF circuits, it will usually be necessary to use a swept signal instead of the TV station signal to obtain adequate deflection on the scope.
	Same as input but reduced by probe attenuation.	See description of techniques for frequency compensation and possible adjustment of probe attenuation.
	Same as input.	Two terminals are riveted to the terminal board of this probe. If a direct probe (straight-through connection) is desired, these terminals are not used. If a resistive isolating probe is desired, connect a 50 K Ω, 1/2W resistor between these terminals and then solder the inner conductor of the probe cable and a jumper soldered to the probe tip to opposite ends of the 50 K Ω resistor. The resistive isolating probe is used for testing at the converter grid or TV front ends (the resistor suppresses any tendency toward oscillation due to feed back) and may also be used to filter out the high-frequency components from beat markers to yield a sharp marker on the scope screen.