

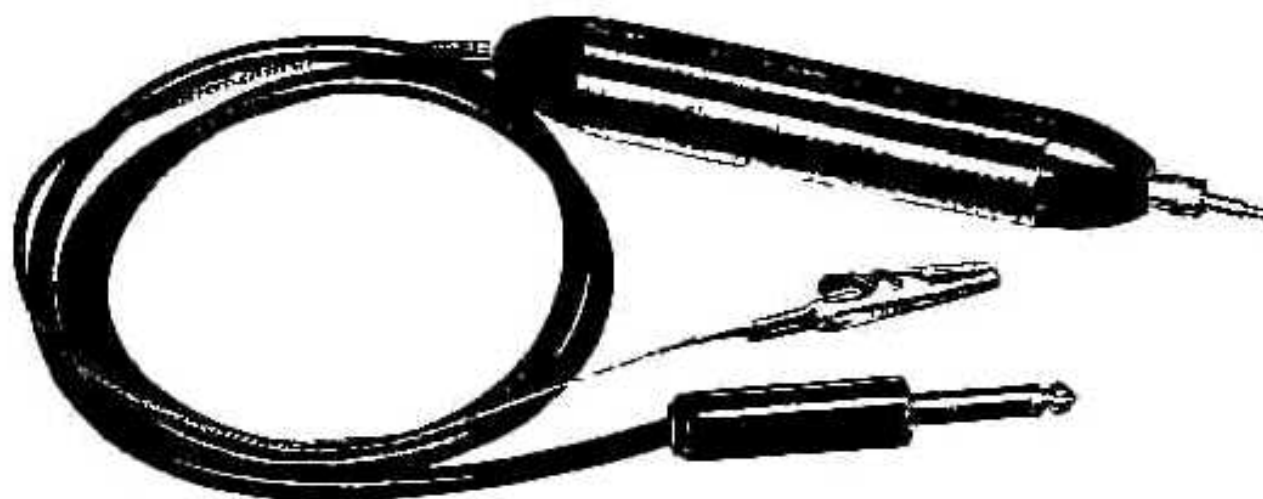
# instructions

FOR THE



## RF PROBE

Model PK-3



## INTRODUCTION

The Heathkit Model PK-3 RF Probe expands the usefulness of any 11 megohm DC input voltmeter by providing an RF voltage measurement capability. The crystal diodes provide a frequency response that is flat and linear from 1000 hertz to over 100 megahertz. Printed circuit board wiring reduces circuit capacitance, improving high frequency response. The grounded probe body housing and short input leads prevent hand capacitance effects and extraneous signal pickup from producing false voltage readings.

All readings obtained will be in rms (root-mean-square) volts. RF voltages of 90 volts or less can be easily measured, as well as RF voltages superimposed on DC potentials of 1000 volts or less. Accuracy of the Probe is maintained within approximately 10%, which is adequate for most RF work. Provisions for improved accuracy at low RF voltages (less than 1 volt) are explained in the Step-By-Step Assembly. If this change is incorporated, the maximum RF voltage that can be measured will be 30 volts rms.

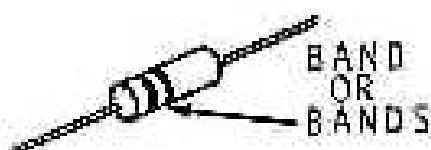


(✓) 2" bare wire. Solder this wire to the foil and cut off the excess lead length. The other end will be connected later.

(✓) .001  $\mu$ F disc capacitor.

( ) 4.7 M $\Omega$  (yellow-violet-green).

NOTE When mounting crystal diodes in the next steps, position the cathode end of each diode as shown. The cathode end is marked with a band or bands.



( ) Crystal diode.

NOTE If all applications for which you plan to use this probe involve RF voltages of less than 30 volts rms, substitute a length of bare wire (excess lead cut from the resistor) in place of each of the next two diodes. This will increase the accuracy of the probe at very low voltages (less than 1 volt), but will limit the maximum RF voltage to 30 volts rms.

(✓) Crystal diode or bare wire.

(\*) Crystal diode or bare wire.

( ) Solder all leads to the foil and cut off the excess lead lengths. Do not cut off the length of bare wire.



Proceed to the Cable and Probe Body Assembly

## APPLICATION

The PK-3 RF Probe can be connected to any 11 megohm input DC voltmeter. The output voltage of the Probe is negative DC, and the voltmeter should be set accordingly. It may be used as a signal tracer and gain analyzer, as well as an RF voltage measuring device. Also, because this Probe is designed primarily for RF applications, signals below 1000 hertz will read low. Disconnect the RF Probe and use the AC section of the voltmeter for these low frequencies. (NOTE: The capacitive effect of the AC test leads will be negligible at frequencies below 1000 hertz.)

If a receiver is not functioning properly, the Probe can be used as a signal tracer in the following manner: First, connect the Probe to the plates of the second detector stage and note the amount of RF energy that is present there. If there is no indication, move the Probe back to the plate of the last IF stage and observe the meter again. If there still is no indication, move the Probe to the grid of this stage and, if necessary, further forward toward the RF input in this step-by-step manner. The point at which RF energy first appears will indicate that the trouble is in the circuit immediately following

this point. (Local oscillator operation can be checked by connecting the Probe to the grid or cathode of the oscillator tube.) Transistor circuits may also be tested in a similar manner. Remember that probe sensitivity is limited by the sensitivity of the voltmeter, so it is unlikely that you will obtain satisfactory indications in the RF and mixer stages of a receiver.

Use this same procedure to check RF or IF amplifier gain. Write down the readings you obtain and divide the output voltage by the input

voltage. The answer you obtain will be the gain of the stage or stages.

RF signals present in transmitters can also be measured, providing the ratings of the probe are not exceeded.

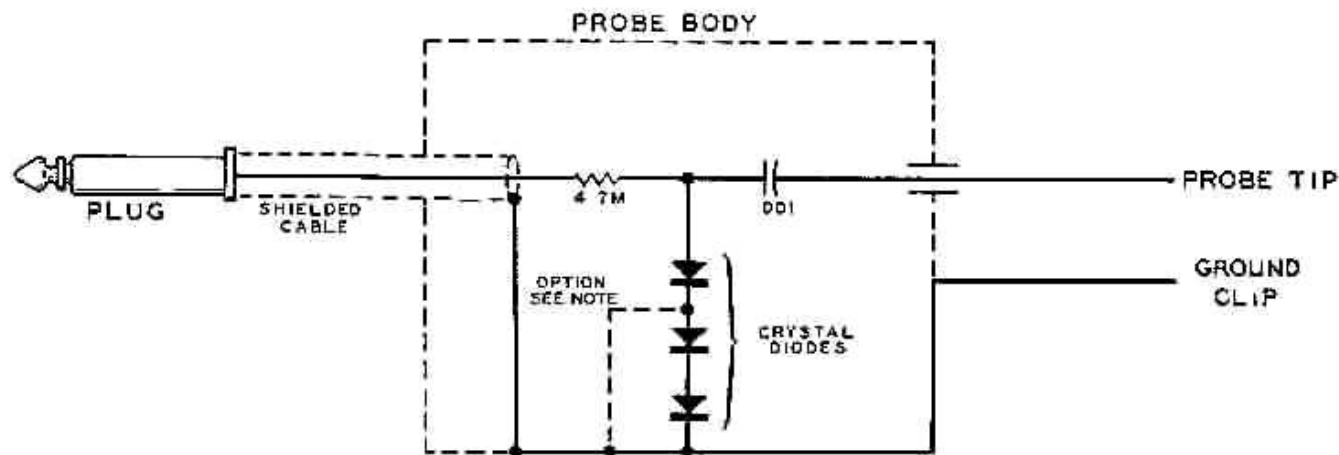
Remember that 90 volts is the maximum AC voltage that should be applied to the Probe. DC voltages up to 1000 volts can be connected to the Probe safely as long as the superimposed RF voltage does not exceed the 90 volt limit.

## CIRCUIT DESCRIPTION

DC isolation is provided by the .001  $\mu$ F capacitor. Since this input capacitor is rated at 1000 volts DC, the Probe must not be applied to circuits where DC voltages are higher than this.

An RF signal at the probe tip will be coupled through the low impedance of the input capacitor to the 4.7 megohm resistor and the crystal

diodes. The positive half-cycles of the RF signal are grounded through the crystal diodes. The remaining negative half-cycles are filtered by the 4.7 megohm resistor and the cable capacitance, and appear at the input of the meter as a negative DC voltage. The filter resistor forms a voltage divider with the input resistance of the meter to provide an rms voltage (70% of the negative peak) to the meter input.



NOTE REFER TO PICTORIAL 1 OF THE STEP-BY-STEP ASSEMBLY FOR OPTIONAL WIRING