

## APPENDIX

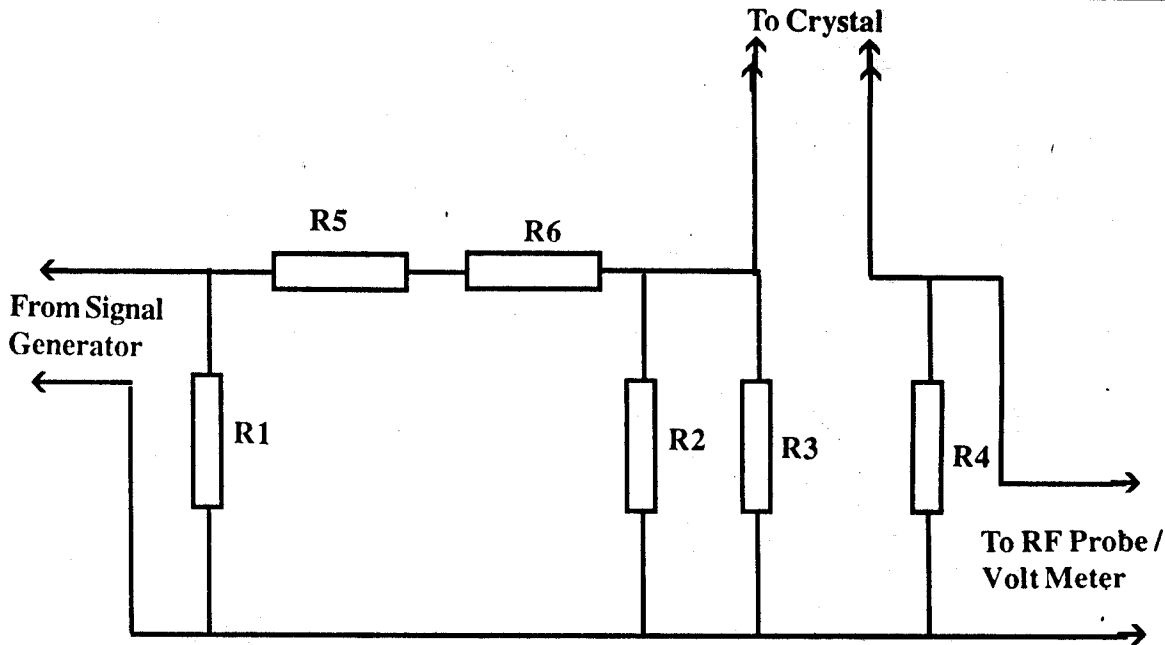
### EQUIVALENT SERIES RESISTANCE TESTER

The crystals selected for signal filter must lie their frequencies within the tolerance of (50 HZ. (Actual frequency is not important.). The effective series resistance of every crystal must be very low. It is recommended not to use the crystal if its ESR is greater than 50 ohms. Lower the ESR, better will be the performance. If you purchase crystals in large quantities, you can group the crystals according to their frequency including tolerance and the ESR so that almost all can be usefull. For example, I have noticed that only one crystal was having very low (6 ohms) ESR. Almost all crystals showed ESR within 15 to 25 ohms. I was able to group the crystals according to their frequency and ESR, and obtained 6 groups to construct 6 SSB filters. The remaining crystals were still usable as carrier oscillators.

#### **Test setup and testing.**

The test circuit is shown in the figure . Test procedure is as follows:

Insert the crystal in the circuit and feed RF signal with the frequency near to the crystal frequency (printed on the body of crystal). Give sufficient RF voltage to get a deflection on



CIRCUIT DIAGRAM OF ESR TESTER

the RF meter or RF probe.

Vary the frequency of the signal source to peak the RF strength read on the meter. Note down the frequency and the peak reading. This is the center frequency of the crystal. Note down the frequency also .

Now replace the crystal with a carbon potmeter of say 500 ohms. With the wiper contact shorted to one end terminal of the potentiometer. Please do not disturb any other setup. Note down the RF meter reading. Adjust the potentiometer if there is any any change in reading compare to the previous reading. After setting the potentiometer, carefully remove the potmeter from circuit and measure the value of the resistance of potmeter with a good multimeter. This resistance is equal to the ESR of that crystal.

Repeat the steps 1,2, and 3 for all crystals you have and note down the readings. Compare the crystals with the readings thus obtained to group the crystals.

### COMPONENT LIST FOR ESR TESTER

Resistors		
No.	Item ID.	Description
1.	R1	82 ohm 1/2 W
2.	R2	220 ohm 1/2 W
3.	R3	82 ohm 1/2 W
4.	R4	50 ohm 1/2 W
5.	R5	39 ohm 1/2 W
6.	R6	270 ohm 1/2 W