

SHURE**MICROPHONES AND ELECTRONIC COMPONENTS**

AREA CODE 312/328-9000 • CABLE SHUREMICRO

DATA SHEET**MODEL RSR-1
REACTANCE
SLIDE RULE**

INSTRUCTION SHEET

Specific operating instructions are printed on the Slide Rule but the following should be kept in mind:

Front Side of the Slide Rule

Use for solution of resonant frequency equation $(2\pi f)^2 LC = 1$.

For low frequency (5 to 50,000 hertz) use scales a, b, c, for capacity, inductance, and frequency, respectively.

For high frequency (.05 to 500 megahertz) use scales d, e, f, for capacity, inductance, and frequency, respectively.

Reverse Side of the Slide Rule

Use for solution of the equations:

$$X_L = 2\pi fL \quad \text{Coil } Q = \frac{2\pi fL}{R}$$

$$X_C = \text{capacitive reactance} \quad \frac{1}{2\pi fc}$$

$$\text{Dissipation factor } D = 2\pi fCR$$

Yellow frequency scale m and *yellow* D-Q scale n are to be used with *all* calculations of X_L , X_C , Q and D involving low frequency range (.1 to 1,000,000 hertz).

Blue frequency scale p and *blue* D-Q scale o are to be used with *all* calculations of X_L , X_C , Q and D involving high frequency range (.001 to 10,000 megahertz).

Capacity scale g (.01 to 100 microfarads) is for use *only* with Resistance-Reactance scales h and i for low and high frequency ranges respectively. Use for calculation of X_C and D.

Capacity scale 1 (1 to 10,000 picofarads) is for use *only* with Resistance-Reactance scales k and j for low and high frequency ranges respectively. Use for calculation of X_C and D.

Inductance scale q (.01 to 100 henrys) is for use *only* with Resistance-Reactance scales r and s for low and high frequency ranges, respectively. Use for calculation of X_L and Q.

Inductance scale v (.001 to 10 millihenrys) is for use *only* with Resistance-Reactance scales u and t for low and high frequency ranges, respectively. Use for calculation of X_L and Q.

To obtain megahertz, divide hertz by 1,000,000. To obtain megahertz, divide kilohertz by 1,000.

The expression MEG following a number means that the number should be multiplied by a million. For instance, on scale r (designated ohms) 5 MEG means 5 megohms.

EXAMPLE 1

PROBLEM: In the design of a filter section it is desired to resonate a 0.13 henry inductance at a frequency of 1500 hertz. Find the required capacity.

SOLUTION: Set 1500 hertz on scale "c" opposite arrow; opposite .13 henry on scale "b" read capacity .087 microfarads on scale "a."

NOTE: The inductance scale "b" increases from right to left.

EXAMPLE 2

PROBLEM: In a high frequency oscillator, the tank circuit consists of a 35 picofarad capacitor and a 1.5 microhenry coil. Find the frequency of oscillations.

SOLUTION: 1.5 microhenrys equals .0015 millihenrys. Set .0015 millihenrys on scale "e" to 35 micro-microfarads on scale "d." Read 22 megahertz against arrow on scale "f."

NOTE: The inductance scale "e" increases from right to left.

EXAMPLE 3

PROBLEM: In the design of an input transformer for a Microphone with 35 ohms output impedance, find primary inductance if transformer reactance is to equal microphone impedance at 50 hertz.

SOLUTION: $X_L = 35$ ohms at 50 hertz. Set arrow on scale "n" to 50 hertz on scale "m"; opposite 35 ohms on scale "r" read .11 henrys on scale "q."

EXAMPLE 4

PROBLEM: Determine the size of a by-pass capacitor for a 2500 ohm emitter resistor in an amplifier which is to have a substantially flat response down to 30 hertz. Assume the reactance of the capacitor to be equal to 1/10 the value of the resistance.

SOLUTION: $X_C = 2500/10 = 250$ ohms. Set arrow on scale "n" to 30 hertz on scale "m." Opposite 250 ohms on scale "h" read 21 microfarads on scale "g."

EXAMPLE 5

PROBLEM: In the design of .1 henry low frequency air core inductance it is desired to have a minimum Q of 30 at 1000 hertz. Find maximum coil resistance.

SOLUTION: Set 30 on scale "n" to 1000 on scale "m." Under .1 on scale "q," read 21 ohms on scale "r."

EXAMPLE 6

PROBLEM: Find the size of an interstage coupling capacitor if input resistance is 0.2 megohms and capacitive reactance must equal resistance at 150 hertz.

SOLUTION: $X_C = 0.2$ megohms. Set arrow on scale "n" to 150 hertz on scale "m." Under .2 megohms on scale "k" read 5300 picofarads, or .0053 microfarads. (Use .005 microfarad capacitor on scale "I.")

EXAMPLE 7

PROBLEM: In coupling tank circuit taps of a 7 megahertz transmitter to a 72 ohms transmission line, find the size capacitor required, if capacitive reactance of each capacitor equals 1/10 the line impedance.

SOLUTION: $X_C = \frac{72}{10} = 7.2$ ohms. Set arrow on scale "o" to 7 megahertz on scale "p."

Under 7.2 ohms on scale "j" read 3200 picofarads in scale "L."

(Use .003 microfarad capacitor.)