*Here is Your*

# SHURE REACTANCE SLIDE RULE

*Complete with Instructions*

We are happy to offer you the Shure Reactance Slide Rule. You will find it very helpful. It is a real time-saving means for solving resonant frequency, capacitive reactance, inductive reactance, coil "Q", and dissipation factor problems that cover a frequency range from 5 cycles per second to 10,000 megacycles. One simple setting of the slide and you obtain your answer. This easy way of solving these problems will make the Slide Rule a convenient and useful tool in your work.

Shure Brothers, Inc., is the largest independent manufacturer and designer of Microphones and Acoustic Devices. Pictured here are some of the microphones, pickups, and cartridges used in the finest acoustic installations throughout the world.

"Shure Products are the Field-Proved
Standard in Acoustic Devices"

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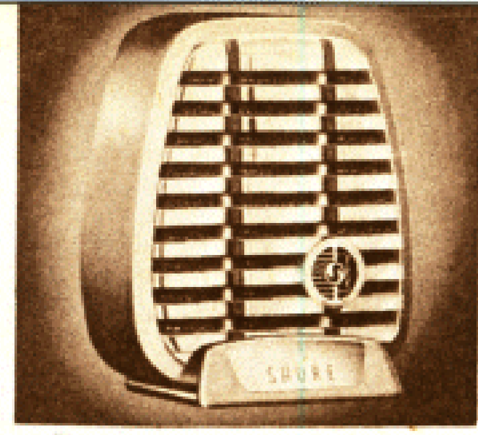



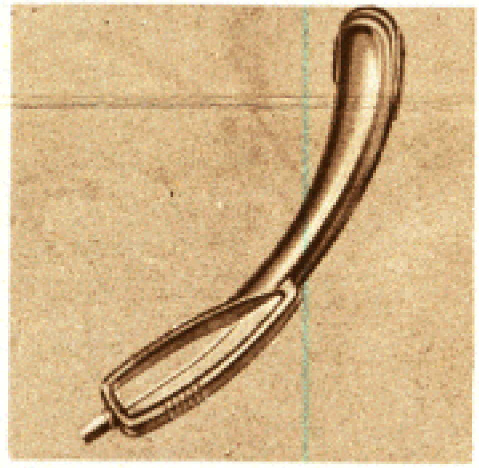
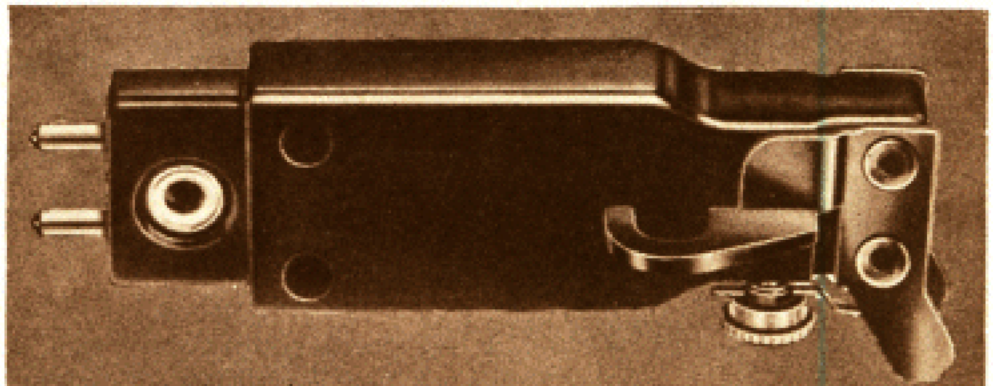


# INSTRUCTIONS FOR USE OF THE SHURE REACTANCE SLIDE RULE

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 cycles per second) use scales a,b,c, for capacity, inductance, and frequency, respectively.

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

Reverse Side of the Slide Rule

Use for solution of the equations:

$X_L = 2\pi fL$

Coil-Q $= \frac{2\pi fL}{R}$

$X_C$ = capacitive reactance $\frac{1}{2\pi fC}$

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 cycles per second.)

Blue frequency scale p and blue D-Q scale o are to be used with all calculations of $X_L$, Xc, Q and D involving high frequency range (.001 to 10,000 megacycles per second).

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 micro-microfarads) 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 megacycles, divide cycles per second by 1,000,000. To obtain megacycles, divide kilocycles per second by 1,000.

The letter m following a number indicates that the number is to be multiplied by 1,000. For instance, on scale s (designated megohms) 50 M means 50,000 megohms.

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 cycles per second. Find the required capacity.

**SOLUTION:** Set 1500 c.p.s. 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 micro-microfarad condenser and a 1.5 micro-henry 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 megacycles against arrow on scale "f".

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

## EXAMPLE 3

**PROBLEM:** In the design of a grid transformer for a Microphone with 35 ohms output impedance, find primary inductance if transformer reactance is to equal microphone impedance at 50 c.p.s.

**SOLUTION:** $X_L = 35$ ohms at 50 cycles per second. Set arrow on scale "n" to 50 c.p.s. 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 condenser for a 2500 ohm cathode resistor in an amplifier which is to have a substantially flat response down to 30 c.p.s. Assume the reactance of the condenser 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 c.p.s. 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 cycles per second. 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 condenser if grid resistance is 0.2 megohms and capacitive reactance must equal resistance at 150 cycles per second.

**SOLUTION:** $X_C = 0.2$ megohms. Set arrow on scale "n" to 150 cycles per second on scale "m". Under .2 megohms on scale "k" read 5300 micro-microfarads, or .0053 microfarads. (Use .005 microfarad condenser on scale "l".)

## EXAMPLE 7

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

**SOLUTION:** $X_C = \frac{72}{10} = 7.2$ ohms. Set arrow on scale "o" to 7 megacycles per second on scale "p". Under 7.2 ohms on scale "j" read 3200 micro-microfarads on scale "L".

(Use .003 microfarad condensers.)

## EXAMPLE 8

**PROBLEM:** A .075 microfarad mica condenser is switched in and out of the circuit. Find maximum permissible switch contact and lead resistance if dissipation factor is to be not more than .0003 at 125,000 c.p.s.

**SOLUTION:** 125,000 c.p.s. equals .125 megacycles per second; set .0003 on scale "o" to .125 on scale "p". At .075 on scale "g" read .0049 ohms on scale "i".

NOTE: Scale "g" increases from right to left.

## EXAMPLE 9

**PROBLEM:** A 35,000 ohm dynamic microphone is connected to the amplifier through a 50 foot cable having a capacity of 40 micro-microfarads per foot. This results in some loss of highs. Find the frequency at which high frequency loss equals 3 db.

**SOLUTION:** 3 db occurs when $X_C = R = 35{,}000$. $C = 50 \times 40 = 2000$ micro-microfarads; 35,000 ohms = .035 megohms. Set .035 megohms on scale "k" against 2000 micro-microfarads on scale "L". Against arrow on scale "n" read 2300 cycles per second on scale "m".

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