

Example: For a frequency of 72 kc, set the 0-100 knob to 70, the 0-10 knob to 2 and the multiplier to X1000.

To select the desired output amplitude into a high impedance load (10 K Ω or more): Set the LOAD switch to internal, the ATTENUATOR to the nearest full scale value above the desired output; adjust the OUTPUT control to give the desired output on the appropriate meter scale.

Example: Desired voltage 7.3 volts. Set ATTENUATOR to 10 volts full scale. Turn OUTPUT to give a 7.3 volt reading on the 0-10 volt scale.

Example: Desired voltage .025 volts. Set ATTENUATOR to .03 volts full scale. Turn OUTPUT to give a 2.5 volt reading on the 0-3 volt scale.

To select the desired output amplitude into an external 600 Ω load (1 volt maximum): Set the LOAD switch to external and proceed as above.

USING THE DB SCALE

The decibel is a ratio of two power levels and is used in comparative expressions. It may be applied to voltage levels if the impedances are identical. It may be used as a quantitative indication for one power or voltage level if the other level is defined. In this instrument, the db scale is based on a reference or standard level of 0 db = 1 milliwatt in 600 Ω . If used with a 600 Ω external load, the meter reading is expressed in dbm and the reference level is automatically defined.

If the instrument is used with loads differing from 600 Ω but substantially less than 10 K Ω , correction factors for the voltage reduction in the attenuator and for the db level may be calculated.

If the instrument is used with high impedance loads, the relation between two signal levels may be expressed as a number of db difference.

Example: A device requires a signal of .61 volts on one input jack for a certain output. It requires a signal of .012 volts on another input jack for the same output. How many db difference between the two input jacks?

$$\begin{aligned} .61 \text{ volts is } & -2 \text{ db (on meter) } \pm 0 \text{ db (on attenuator) } = -2 \\ .012 \text{ volts is } & -6 \text{ db (on meter) } -30 \text{ db (on attenuator) } = -36 \\ \text{level difference is } & (-2) - (-36) = 34 \text{ db.} \end{aligned}$$

NOTE: Theoretically the input impedances should be equal in the above example. The method described is generally more useful than calculating the power level at each input (using voltage and input impedance and using the formula:

$$\text{db} = 10 \log \frac{P_1}{P_2} = 10 \log \frac{E_1^2/R_1}{E_2^2/R_2}$$

for equal impedances this reduces to:

$$\text{db} = 10 \log \frac{(E_1)^2}{(E_2)^2} = 20 \log \frac{E_1}{E_2}$$

Although theoretically correct, erroneous impression may be gained by using the above approach: Changing a 10 K Ω grid resistor to 10 megohm decreases the power level by a factor of 100 or 20 db. Yet the input voltage is unchanged.

For further information see: Langford-Smith; Radiotron Designer's Handbook, 4th Ed. Ch. 19