

## GENERAL RADIO COMPANY

The distance  $d$  varies somewhat from unit to unit. A calibration curve of  $d$  vs frequency is plotted in Figure 2.

The impedance at any point on the 50-ohm line to which the termination is attached can be calculated from the VSWR of the termination and the electrical length of line between the location of the pure resistive termination and the point in question using transmission-line equations or a Smith Chart (see Paragraph 2.3 in the Type 874-LBA Slotted Line Operating Instructions or Paragraphs 2.3124 in the Type 1602-B Admittance Meter Operating Instructions. Here the load impedance is known and the impedance at some other point on the line nearer the generator is desired. Therefore,  $\ell$  in Equations (11) or (12) in the Type 1602-B instruction book should be negative and the WAVELENGTHS TOWARD GENERATOR scale on the Smith Chart should be used. When calculating  $\theta$  or  $\ell$ , remember to consider the difference in the locations of the resistance termination and any short- or open-circuit termination used.

For example, at 300Mc the VSWR is 2.0, and if  $d=0.71$ cm, the impedance at A, the front face of the bead, can be determined using transmission-line equations as follows:

$$\begin{aligned} \ell_e &= 3.2 + 0.71 = 3.91 \text{ cm.} \\ \theta &= \frac{\ell_e}{\lambda} = \frac{3.91}{100} = .0391 \text{ wavelengths} = 14.08^\circ \\ Z_p &= Z_o \times \frac{Z_s + jZ_o \tan \theta}{Z_o + jZ_s \tan \theta} = 50 \times \frac{100 + j 50 \tan 14.08^\circ}{50 + j 100 \tan 14.08^\circ} \\ &= 84.0 - j29.7 \text{ ohms} \end{aligned}$$

If admittance is desired,

$$\begin{aligned} Y_p &= Y_o \times \frac{Y_s + jY_o \tan \theta}{Y_o + jY_s \tan \theta} = 20 \times \frac{10 + j20 \tan 14.08^\circ}{20 + j10 \tan 14.08^\circ} \quad \begin{array}{l} \text{Equation (10b) from} \\ \text{874-LBA} \\ \text{Instruction Book} \end{array} \\ &= 10.46 + j3.71 \text{ mmhos} \end{aligned}$$

The same calculation using the Smith Chart is shown in Figure 3 along with the calculated impedance 20 cm farther along the line.

### SPECIFICATIONS

**D-C Resistance:** 100 ohms  $\pm$  1%

**Maximum Power:** 1/3 watt

**Net Weight:** 3 ounces (90 g)

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