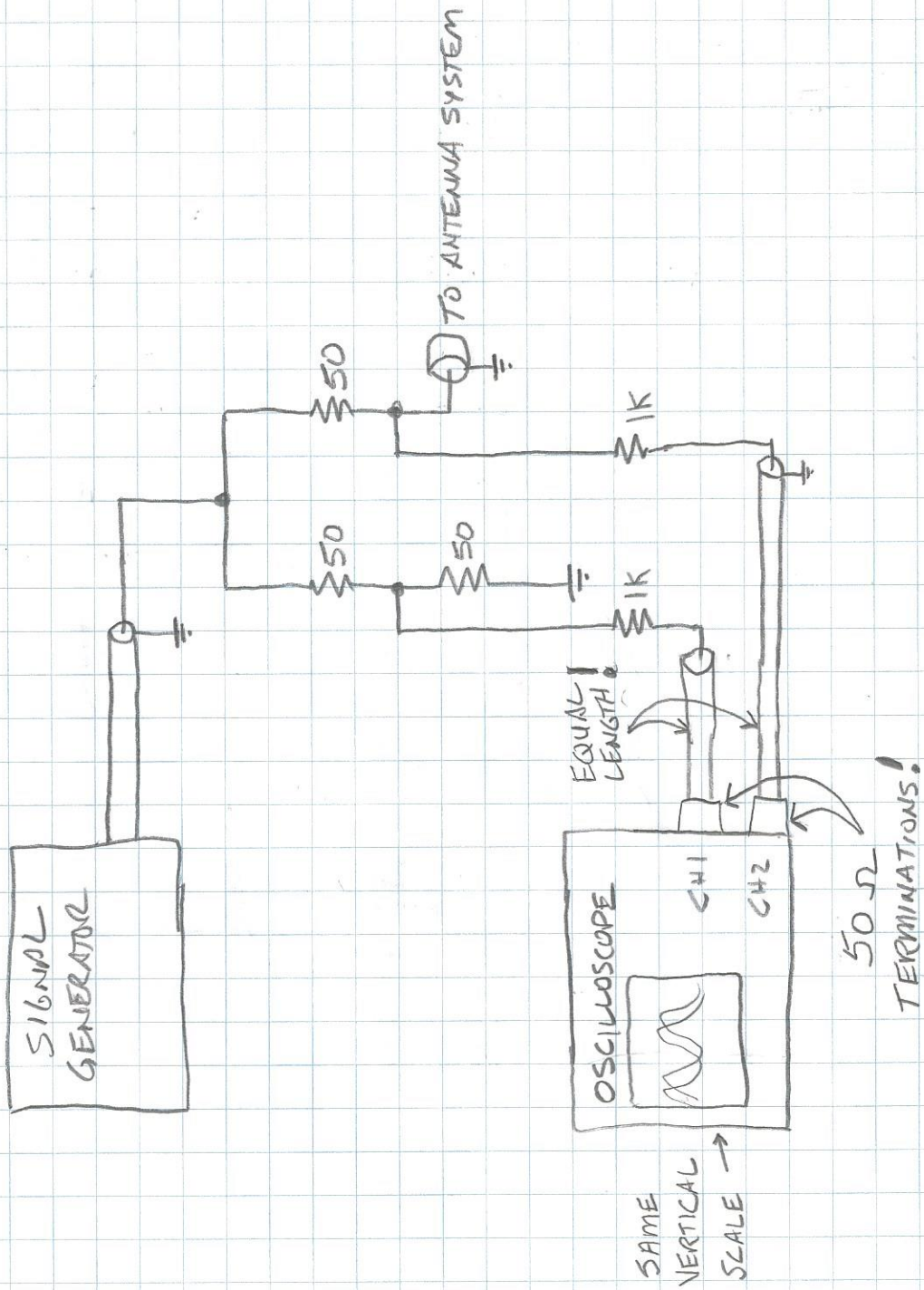


USE A SCOPE & SIGNAL GENERATOR  
TO TUNE YOUR HF ANTENNA

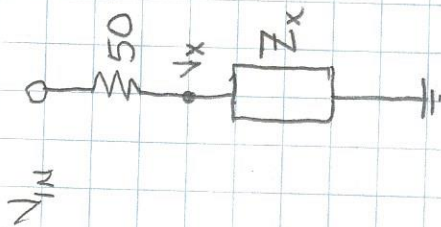
W2AEW



WZAEU

## COMPLEX IMPEDANCE MEASUREMENT

- POOR ACCURACY DUE TO:
  - PARASITICS
  - DIFFICULTY IN GETTING PRECISE PHASE MEASUREMENTS
  - NON-LINEAR DIVIDER RELATIONSHIP (SMALL  $\Delta V \Rightarrow$  BIG  $\Delta Z$ )
  - CABLE + OTHER MISMATCHES

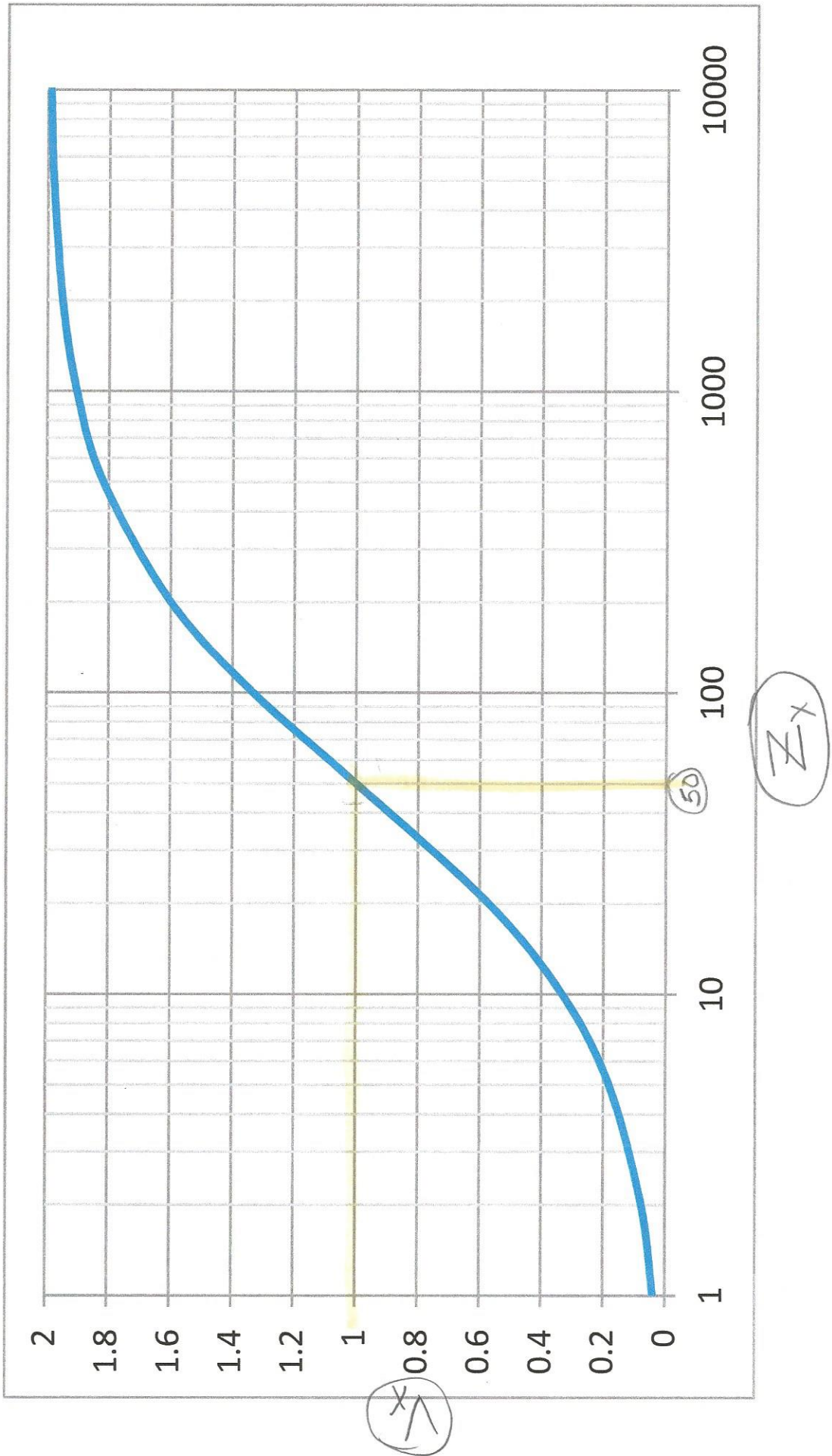
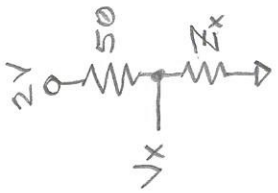


$$V_X = \frac{V_{IN} * Z_X}{Z_X + 50}$$

SOLVING FOR  $Z_X$  ...

$$Z_X = \frac{50 * V_X}{V_{IN} - V_X}$$

WZAEU



EXAMPLE 18.130 MHz

$$V_{REF} = 32.0 \text{ mV}, \text{ THUS } V_{IN} = 64.0 \text{ mV} \angle 0$$

$$V_X = 27.8 \text{ mV}, \text{ DELAY} = 2 \text{ ns} \quad \text{PHASE} = 2 \text{ ns} * 18.130 \text{ MHz} * 360 = 13^\circ$$

$$= 27.8 \text{ mV} \angle +13^\circ = 27.09 + j6.254$$

$$Z_X = \frac{50 * 27.8 \angle +13^\circ}{64.0 - (27.09 + j6.254)}$$

$$= \frac{1390 \angle +13^\circ}{36.91 - j6.254}$$

$$= \frac{1390 \angle +13^\circ}{37.44 \angle -9.62^\circ}$$

$$Z_X = 37.1 \angle 22.6^\circ = 34.2 + j14.26$$