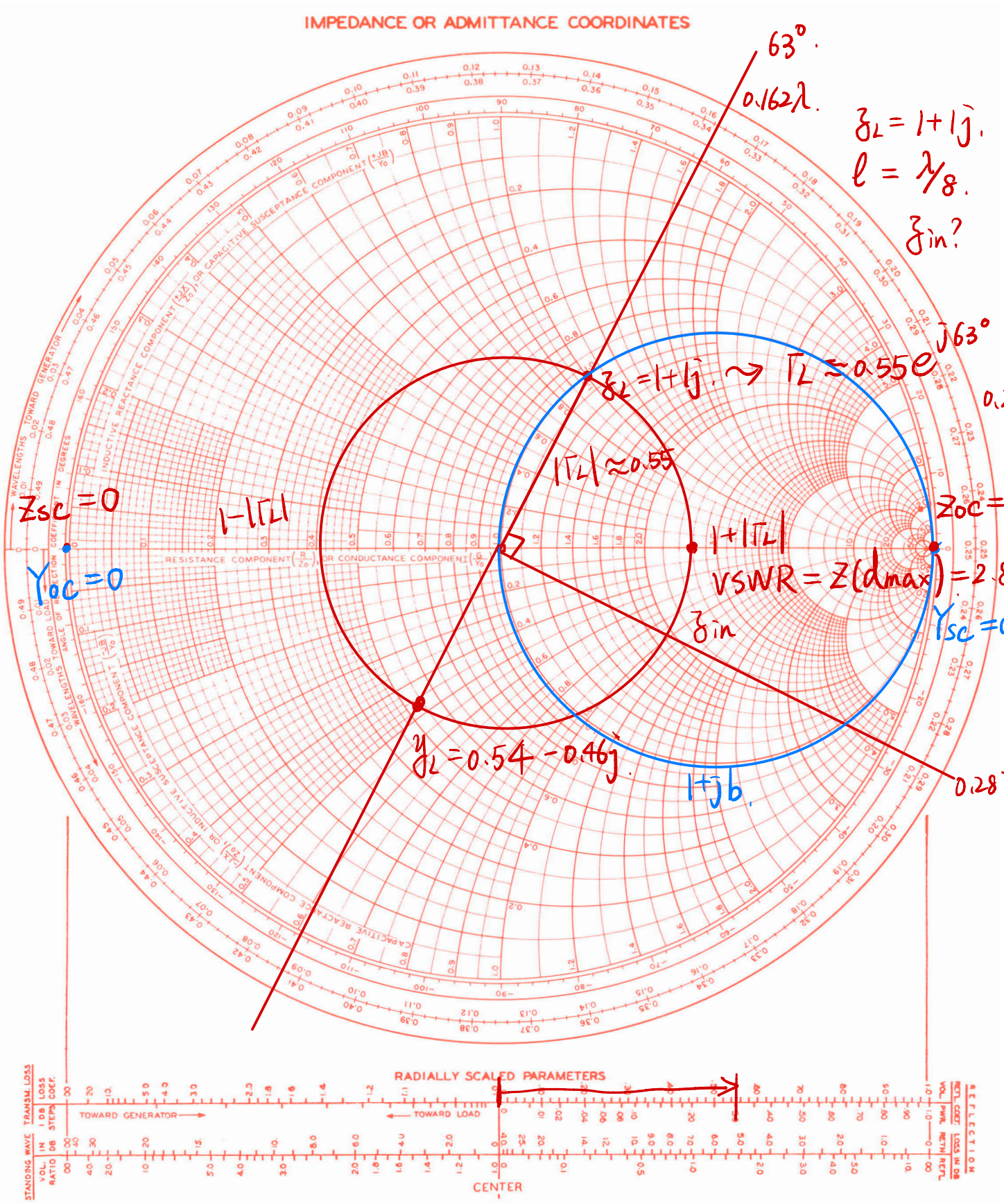
Lecture 40

1 Smith Chart Review

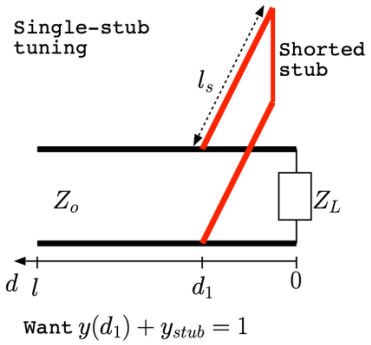
1. Load impedance Z_L is purely resistive (neither short nor open is considered as a resistor)
2. Load impedance Z_L is purely reactive
3. The load is shorted
4. The load is open
5. Find Γ_L from Z_L
6. Find Z_L from Γ_L

$$\Gamma_L = \frac{z_L - z_0}{z_L + z_0} = \frac{\zeta_L - 1}{\zeta_L + 1} \qquad z_L = \frac{1+\Gamma_L}{1-\Gamma_L}.$$

7. Find input impedance from load impedance
8. Find load impedance from input impedance
9. Given normalized load impedance z_L, find VSWR
10. Reflected voltage phasor is $\tilde{V}^- = 0$ for all $\tilde{V}^+$ $\rightarrow \zeta_L = 1$.
11. Matched impedance $(1 + jb)$ cycle
12. Load admittance $Y_L = 0$
13. Load admittance $Y_L = \infty$
14. Find normalized load admittance y_L from normalized load impedance z_L
15. Matched impedance using single/double stub tuning $z = 1$.

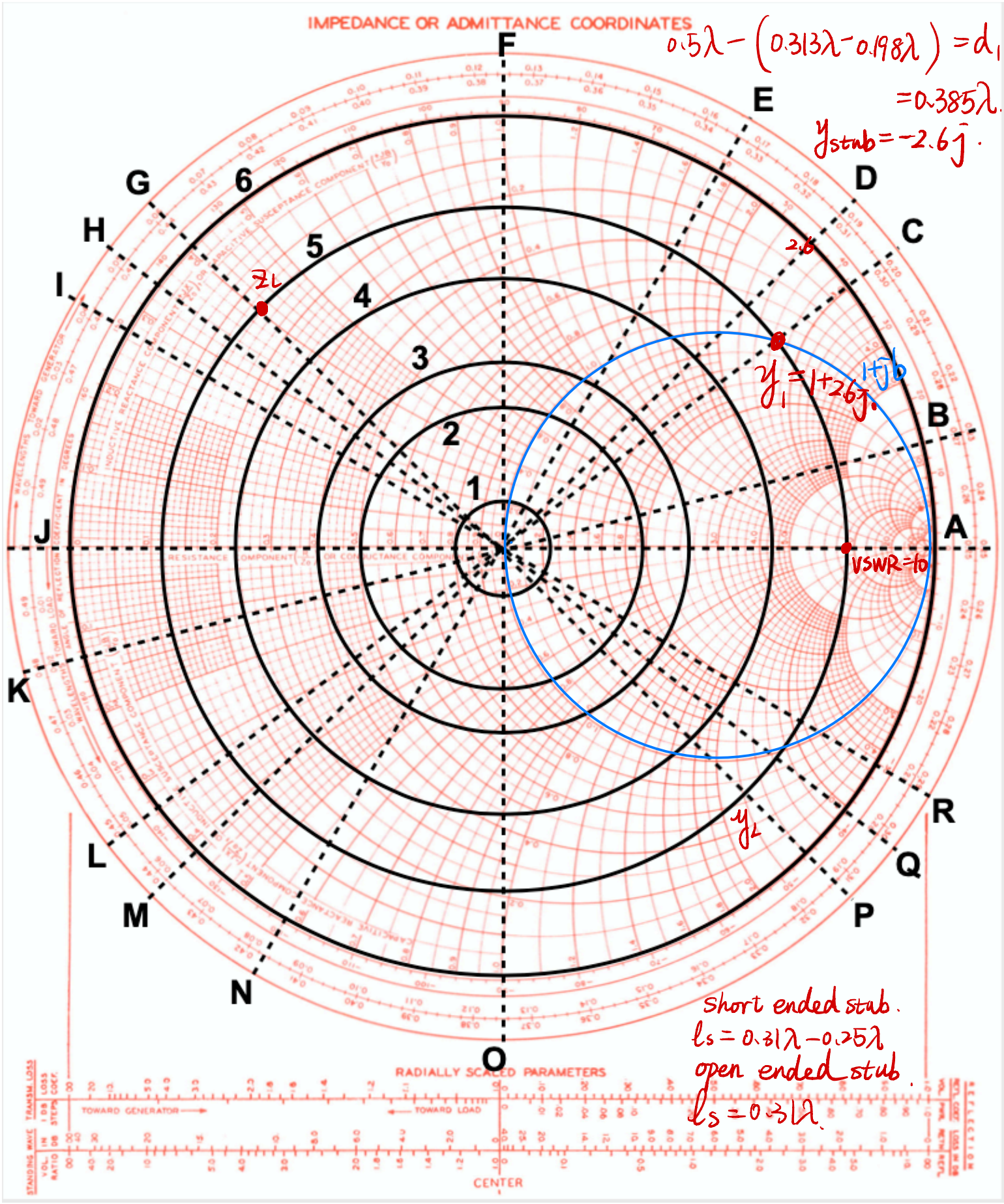


2 Single stub matching



Want $y(d_1) + y_{stub} = 1$

1. The normalized load impedance is $z_L = 0.14 + 0.4j$. What is its corresponding point? G5.
2. What is its corresponding point y_L? P5
3. VSWR on black transmission line A5 VSWR=10.
4. Insert location d_1 (shortest) $d_1 = 0.385\lambda$.
5. Normalized admittance $y_{stub} = -2.6j$.
6. For short-ended stub, find shortest stub length $l_s = 0.06\lambda$
7. For open-ended stub, find shortest stub length $l_s = 0.31\lambda$.
8. VSWR on red transmission line VSWR $= \infty$
9. Normalized parallel impedance (admittance) at position d_1


IMPEDANCE OR ADMITTANCE COORDINATES
$0.5\lambda - (0.313\lambda - 0.198\lambda) = d_1$
$= 0.385\lambda$.
$y_{stub} = -2.6j$.
F
E
D
C
B
A
G
H
I
J
K
L
M
N
O
P
Q
R
6
5
4
3
2
1
2.6
z_L
$y_1 = 1 + 2.6j$
$1+jb$
VSWR=10
y_L
RESISTANCE COMPONENT
RADIALLY SCALED PARAMETERS
TOWARD GENERATOR
TOWARD LOAD
CENTER
Short ended stub.
$l_s = 0.31\lambda - 0.25\lambda$
open ended stub.
$l_s = 0.31\lambda$.