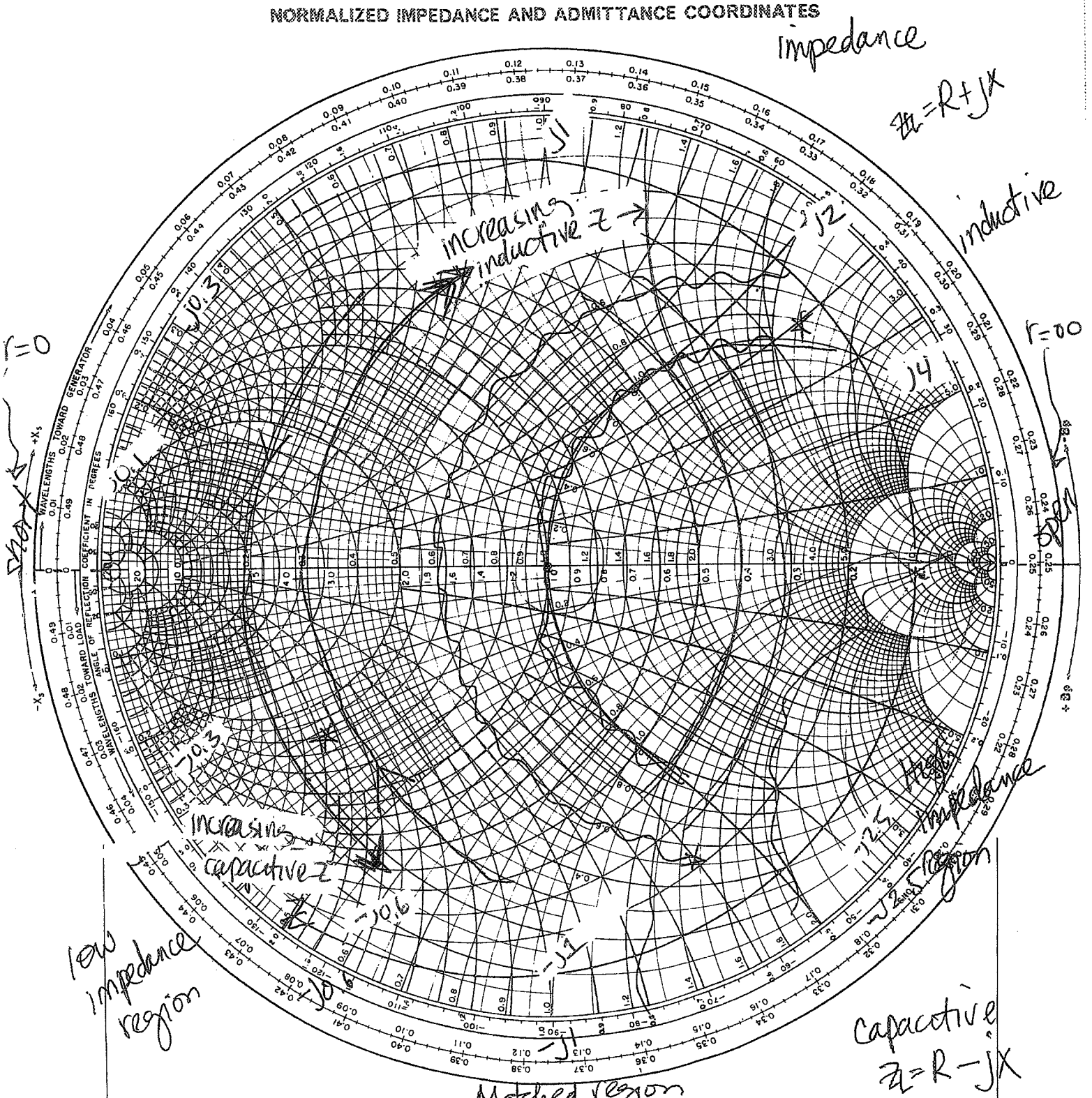
09/30/09 Part 2 Notes

Pg 1

NAME	TITLE	DWG. NO.
SMITH® CHART FORM ZY-01-N	ANALOG INSTRUMENTS COMPANY, NEW PROVIDENCE, N.J. 07974	DATE

NORMALIZED IMPEDANCE AND ADMITTANCE COORDINATES



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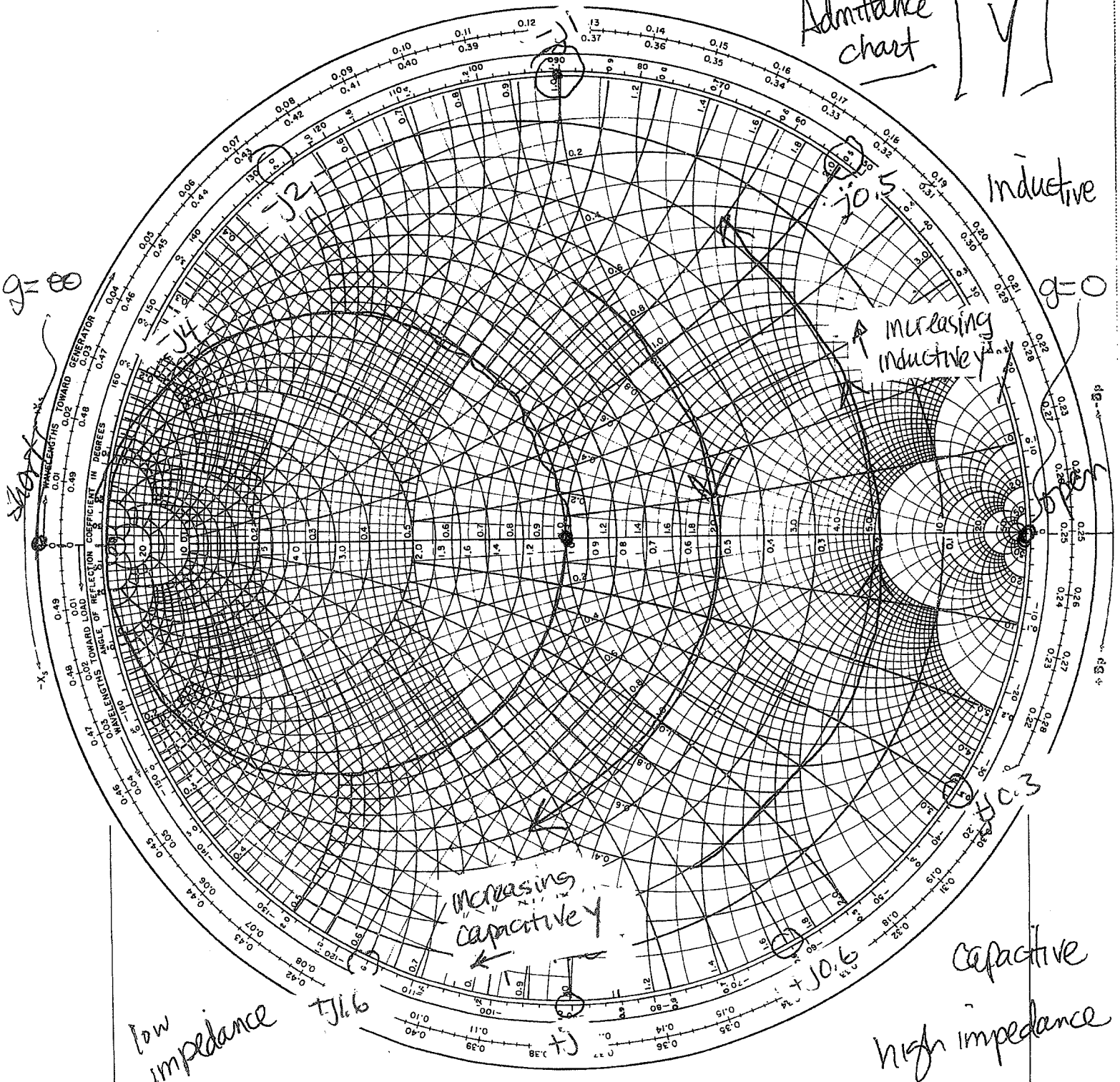
Pg 2

NAME	TITLE	DWG. NO.
SMITH® CHART FORM ZY-01-N	ANALOG INSTRUMENTS COMPANY, NEW PROVIDENCE, N.J. 07974	DATE

NORMALIZED IMPEDANCE AND ADMITTANCE COORDINATES



RADIALLY SCALED PARAMETERS

STANDING WAVE VOL. RATIO | TRANSM. LOSS IN DB STEPS | LOSS COEFF. | TOWARD GENERATOR | TOWARD LOAD | REFLECTION COEFF. VOL. | PWR. RETN. | LOSS IN DB

CENTER

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Michael steer's notes will be available to download.

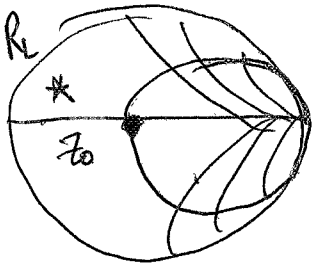
starts w) R_s and R_L ⇒ develops how reactive elements can be used for matching

Pozar discusses arbitrary loads (real or complex) matched to a transmission line

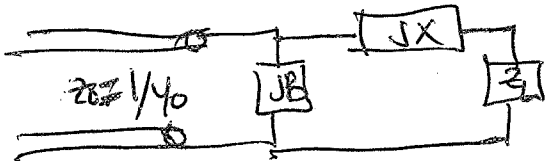
Let's assume we have R_s which we can call z_0 (TML) and then our load, R_L.

Case 1

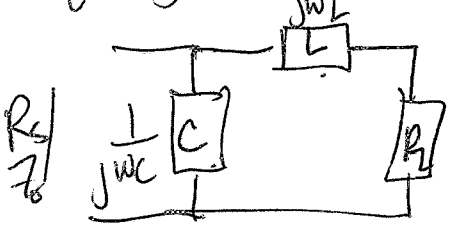
$R_s/z_0 > R_L$



According to Pozar; outside 1+jX circle

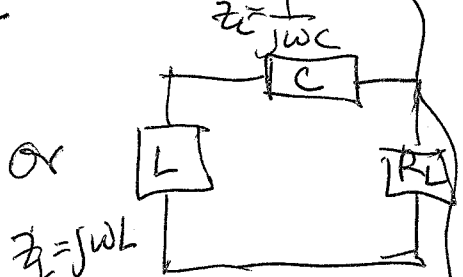


These components are going to be L, C



Low pass design

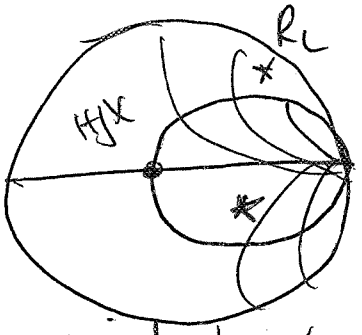
or



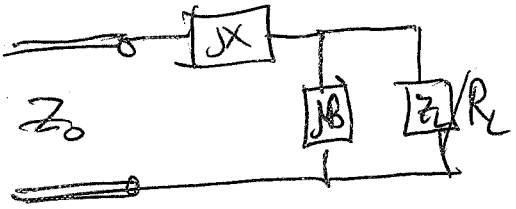
High pass design

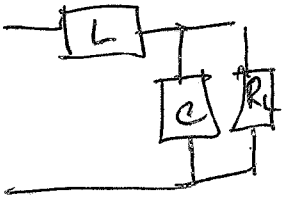
Case 2

$R_s/z_0 < R_L$

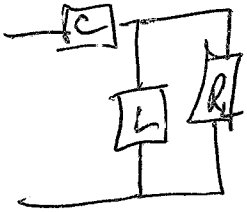


inside 1+jX circle



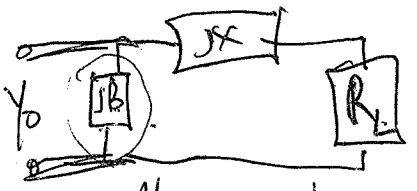


Low pass



High pass

If R_L is smaller than $R_s/Z_0 \Rightarrow$



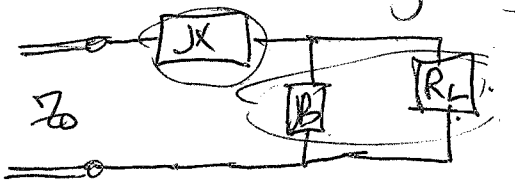
1) Use a series reactive element to transform a smaller resistance up to a larger value, w/ a real part equal to the desired resistance value

2) Use a shunt reactive element to resonate or cancel the imaginary part of the impedance from step 1

If $R_L > R_s/Z_0$ R_L is larger $\Rightarrow$ From larger (R_L) to smaller (R_s)

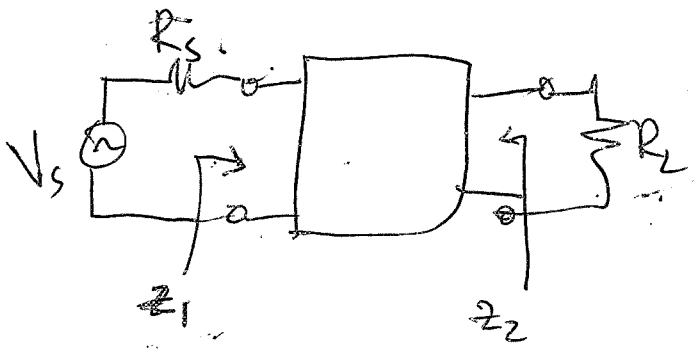
1) Use a shunt reactive element to transform to larger resistance down to a smaller value w/ a real part equal to the desired resistance value

2) Use a series reactive element to resonate the imaginary part of impedance from step 1 (out)



Example 2 element MN $R_S = 25\Omega$
$R_L = 200\Omega$

Objective: Present conjugate matched impedances to the source and load



Maximum power transfer due to conjugate match

$Z_1 = R_L^*$
$Z_2 = R_S^*$
$Z_0 = 50\Omega$

$z_S = 0.5$
$z_L = 4$

$R_S = 25\Omega$
$R_L = 200\Omega$

Normalize impedances $z_S = \frac{R_S}{Z_0} = 0.5$ $\quad z_L = \frac{200}{50} = 4$

Note: I made an error on the video wrt matching the example above. Please use the Smith Chart following. It contains the correct reactance and susceptance values.

NAME	TITLE Example source to load matching	DWG. NO. pg 6
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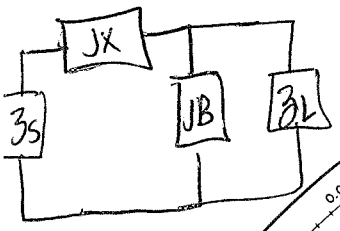
NORMALIZED IMPEDANCE AND ADMITTANCE COORDINATES

Soln 1

$x_B = 1.323$ (x at point B); series L

$b_C = 0.65$; shunt C



Soln 2

$x_B = -1.3$, series C

$b_C = -0.65$, shunt L

RADIALLY SCALED PARAMETERS

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CENTER

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