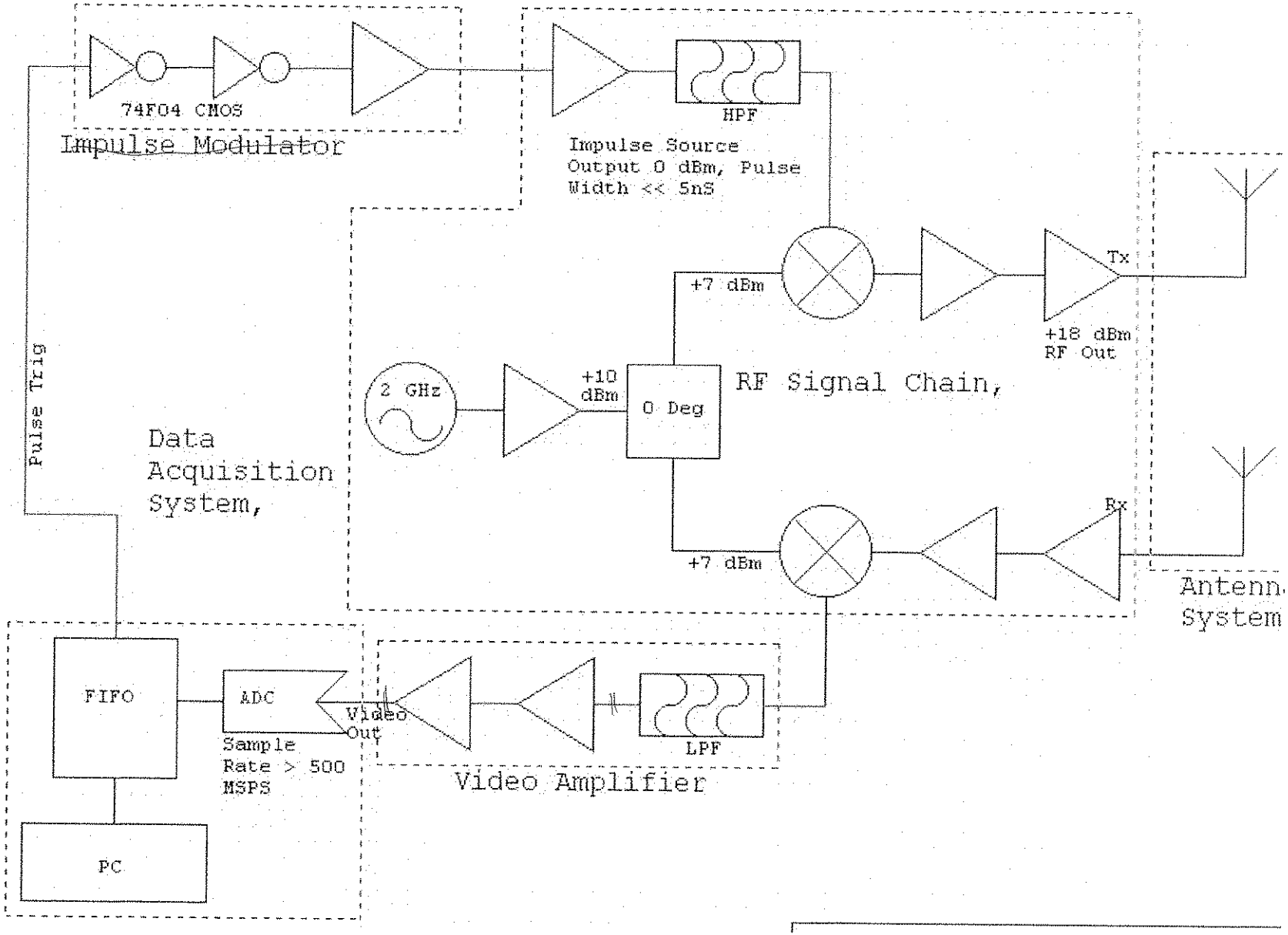
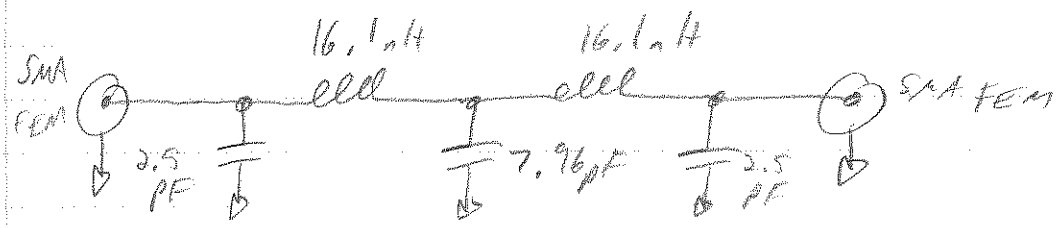
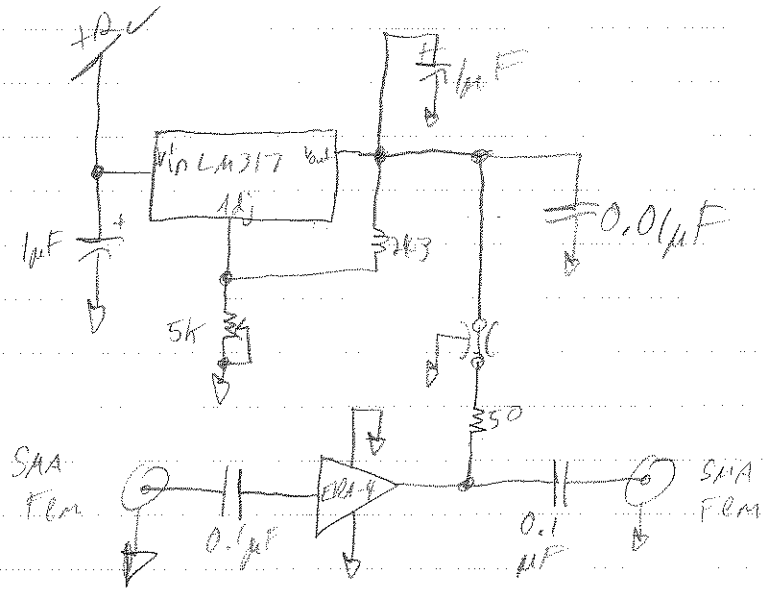
ECE 480 Project

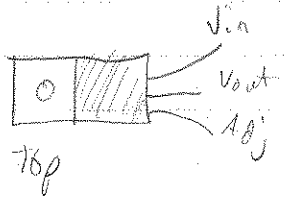




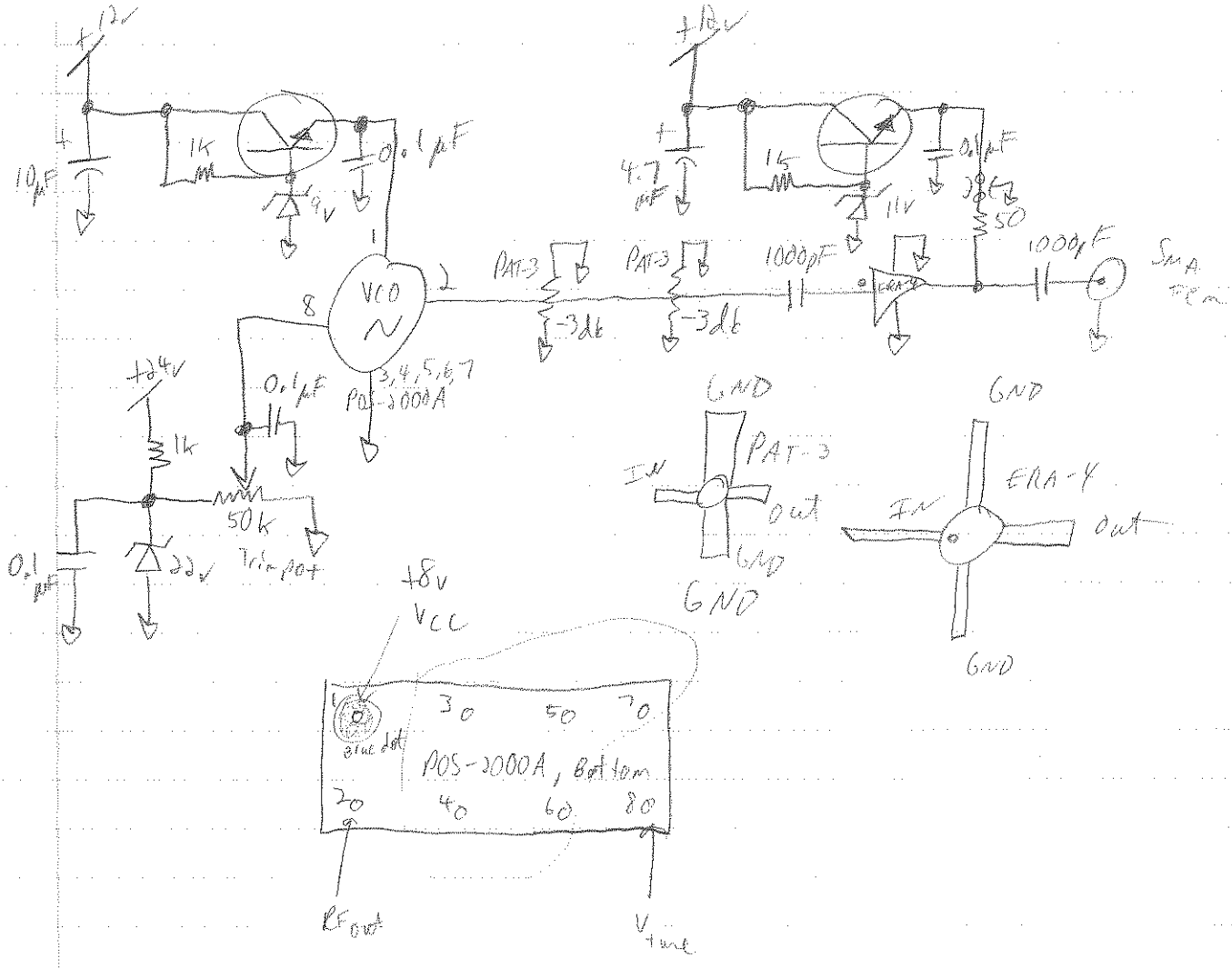
5th order Butterworth
800 MHz LPF

IF Filter

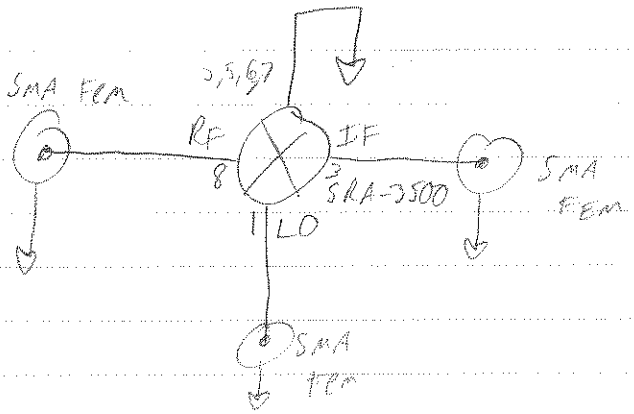


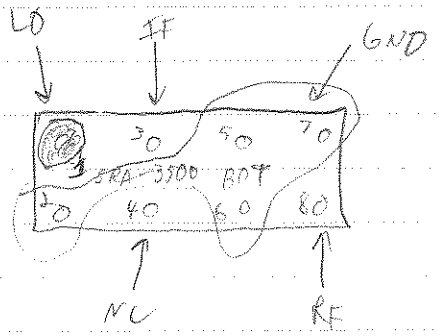


Adjustable Bias Amp

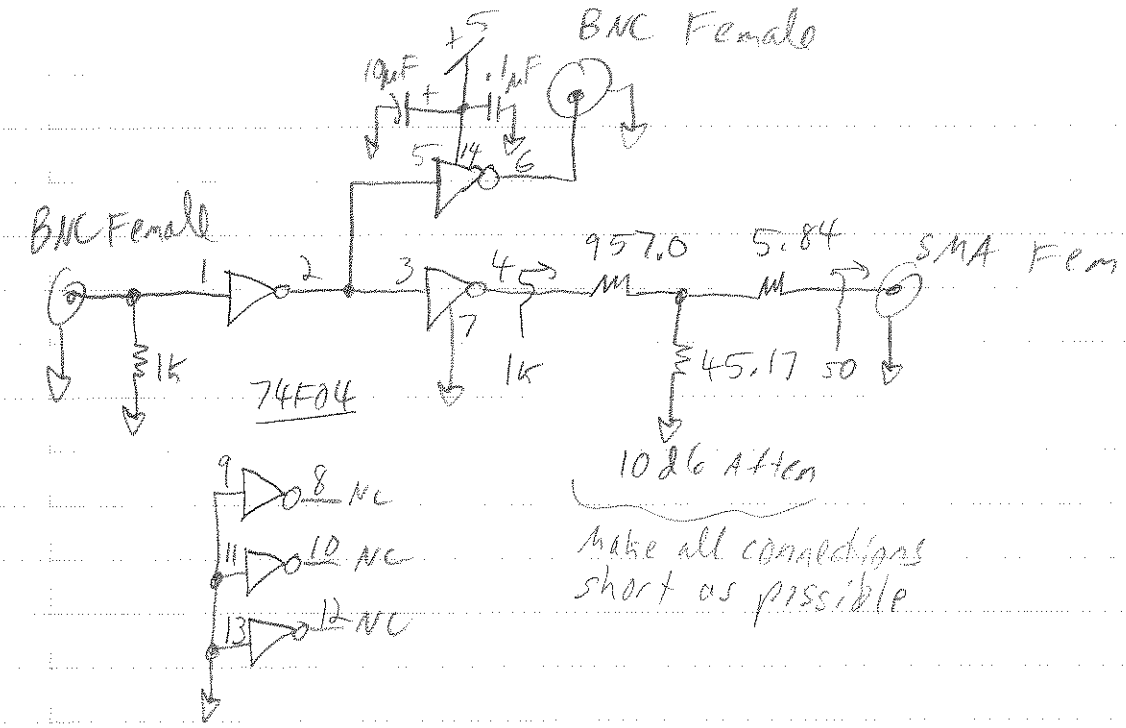

+12v
10μF
1K
9v
0.1μF
VCO
8
1
2
3,4,5,6,7
POS-3000A
0.1μF
+8v
1K
50K
Trim-pot
22v
0.1μF
PAT-3
-3db
PAT-3
-3db
1000pF
ERA-4
+10v
4.7μF
1K
11v
0.1μF
50
1000pF
SMA
GND
PAT-3
IN
out
GND
GND
ERA-4
IN
out
GND
+8v
Vcc
30
50
70
Blue dot
POS-3000A, Bottom
20
40
60
80
RF out
V tune

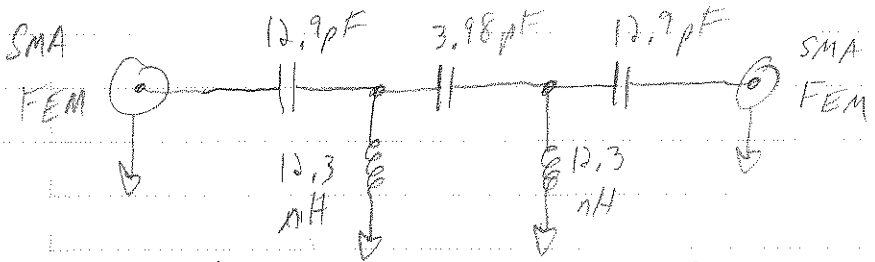
VCO
1.5 - 2 GHz


SMA FEM
2,5,6,7
RF
8
IF
3
SRA-3500
SMA
FEM
1
LO
SMA
FEM


LO
IF
GND
3
SRA-3500
BOT
NC
RF

tx/Rx Mixer



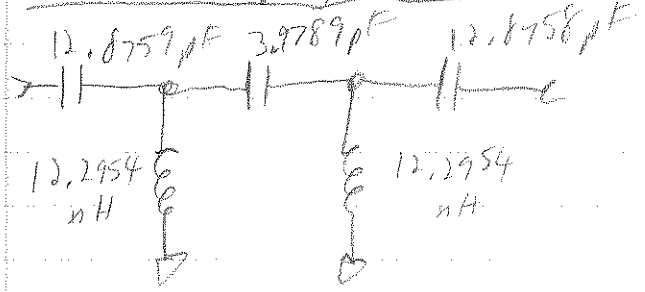


5th order 400 MHz HP
Butterworth response
→ Build on microstrip

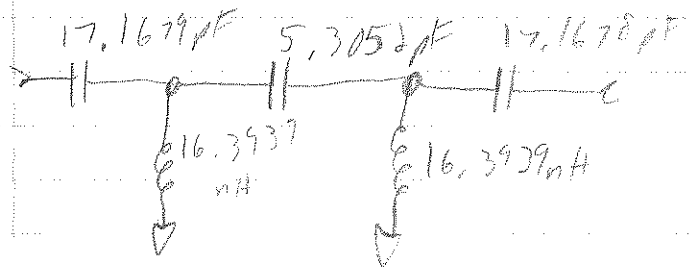
Impulse Source

Butterworth Filter calculations

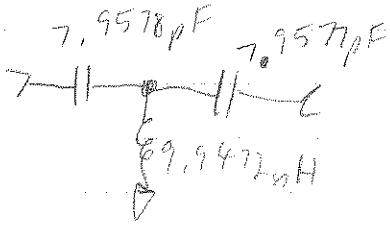
400 MHz HP, 5th order



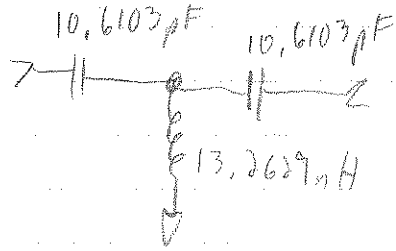
300 MHz HP, 5th order



400 MHz HP, 3rd order



300 MHz HP, 3rd order

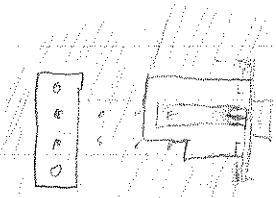


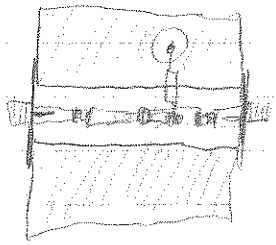
Monday, Have to go to

SPAC

at Kellog center

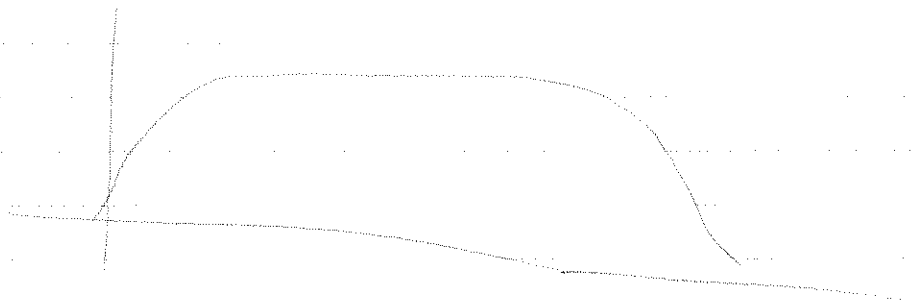
2	ZEM-4300	Mixer	79.95	159.90
30	ERA-4	AMP	3.85	115.5
1	ZN2PD-96	Splitter	69.95	69.95
5	POS-2000A	VCO	14.95	74.75
				420.10





just need 2

just need 1?



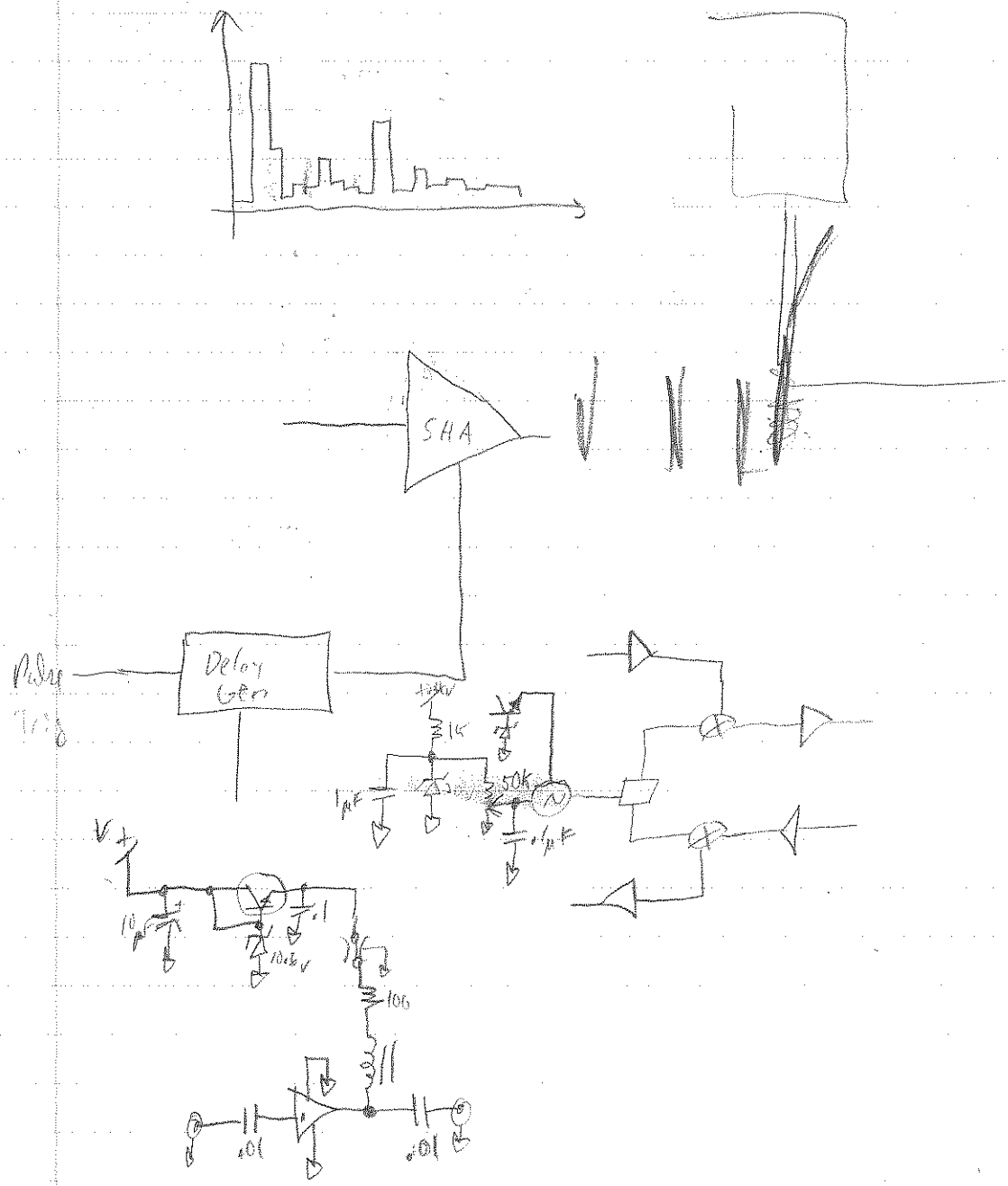
Design Specifications

Carrier freq 2 GHz
Pulse width ≤ 5 ns
Tx Power +20 dbm
Coherent Radar structure
Proof of concept. Prototype, size, power supplies, etc not considered yet.

Budget

- Transmitter and Receiver — $400
- short pulse generator — $50
- Antennas — $25
- Video Amplifier — $25
- Data Acquisition system — $0 (use existing scopes in Lab)

— Get a project, write a small report
more solder it better



Part C

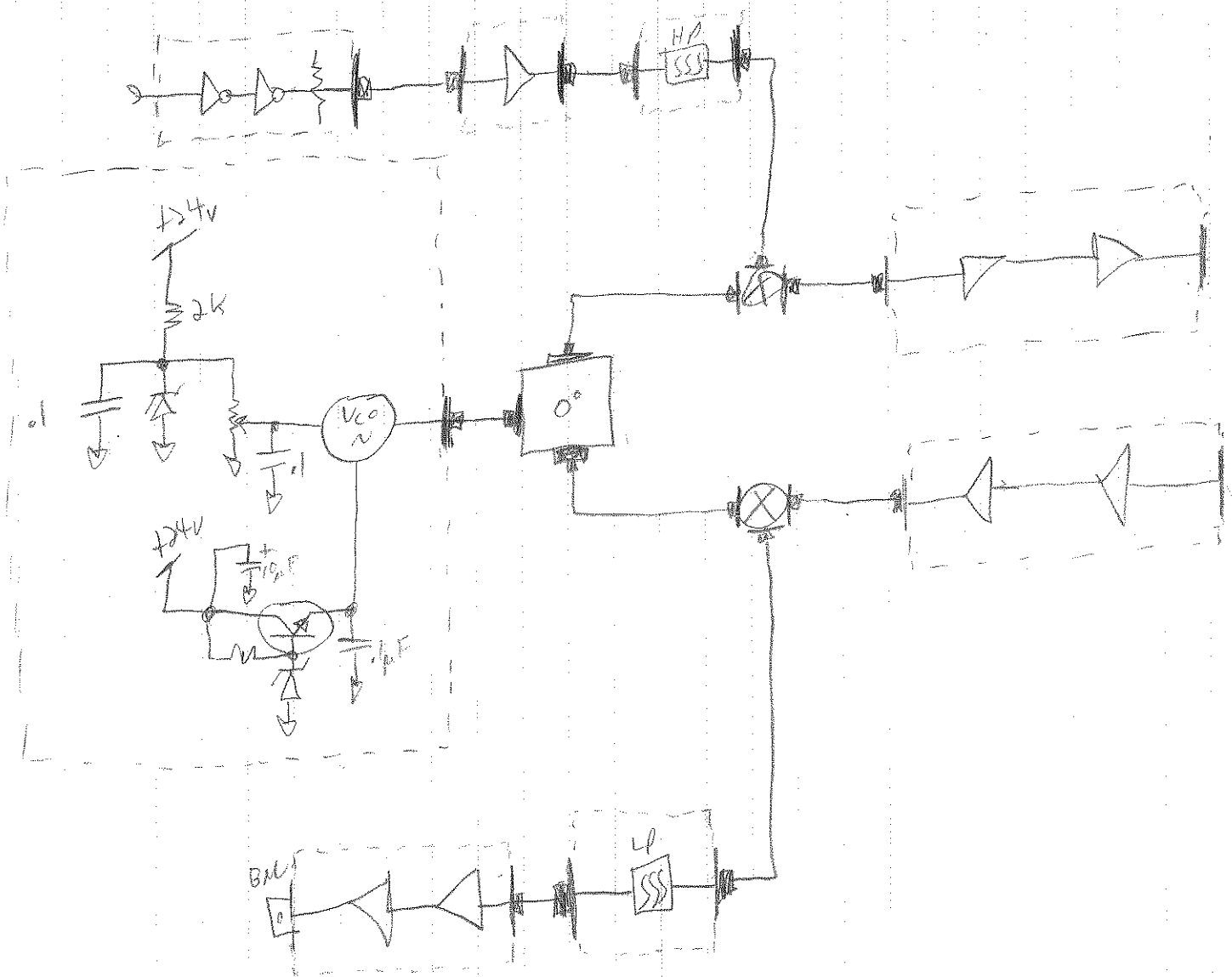
RC7	RC6	RC5	RC4	RC3	RC2	RC1	RC0	
0	0	0	0	0	0	1	1	3
0	0	0	0	0	0	0	1	1
					1	1	1	7

Digi-Key (800) 344 4539

4	12nH Inductor	PCD1295CT-ND	1.03	4.12
4	15nH Inductor	PCD1296CT-ND	1.03	4.12
4	22nH Inductor	PCD1298CT-ND	1.03	4.12
10	2.7pF cap	399-1005-1-ND		0.66
10	3.3pF cap	399-1007-1-ND		0.66
10	8.2pF cap	399-1009-1-ND		3.41
10	10pF cap	399-1011-1-ND		0.65
10	12pF cap	399-1013-1-ND		0.68
22	SMA Female connector	J493-ND	4.71	103.62
10	11v zener	1N5241BDICT-ND		2.10
1	8.7v zener	1N5238BDICT-ND		0.38
1	22v zener	1N5251BDICT-ND		0.38

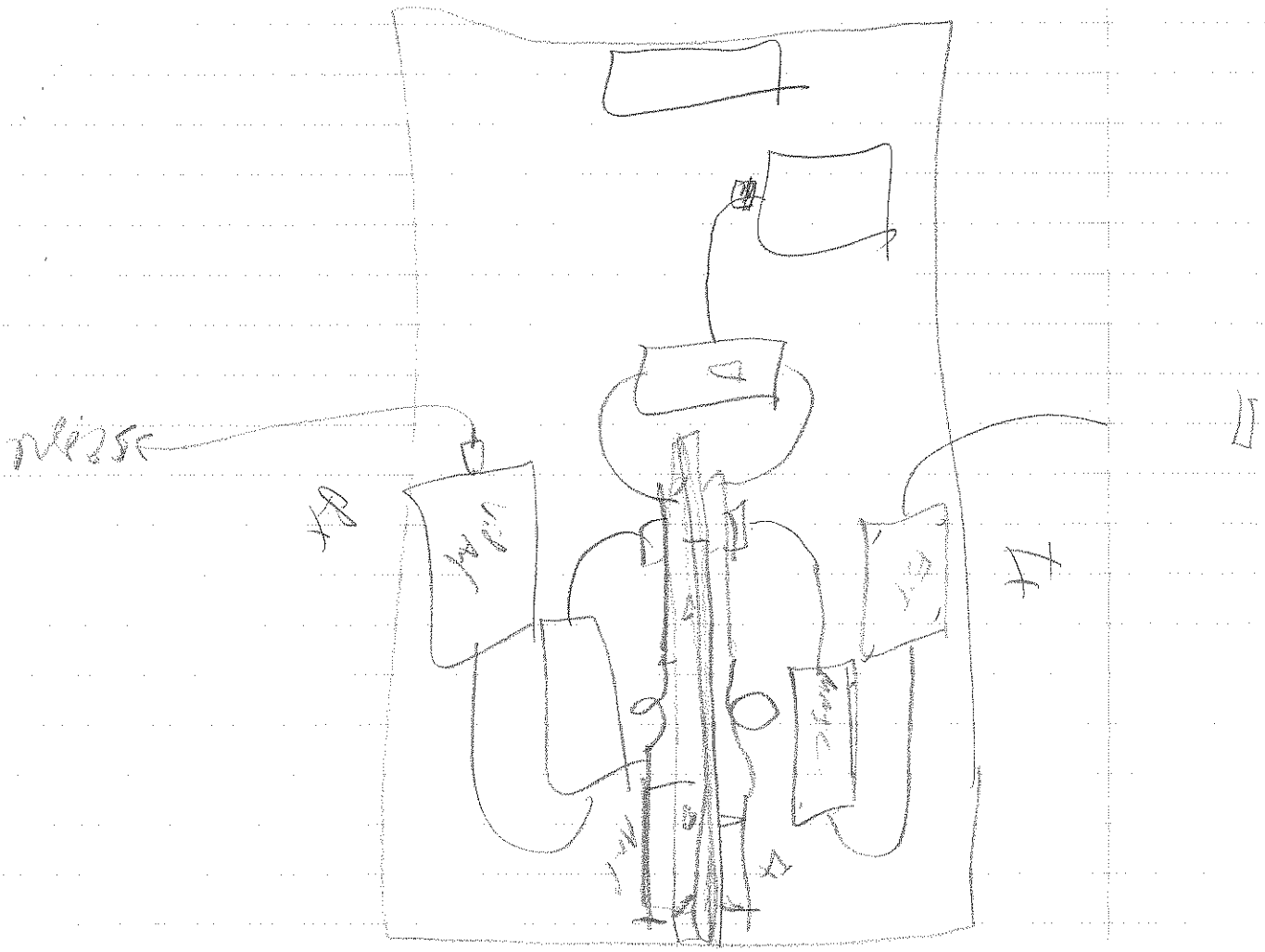
Surplus sales of Nebraska (402) 346-4750

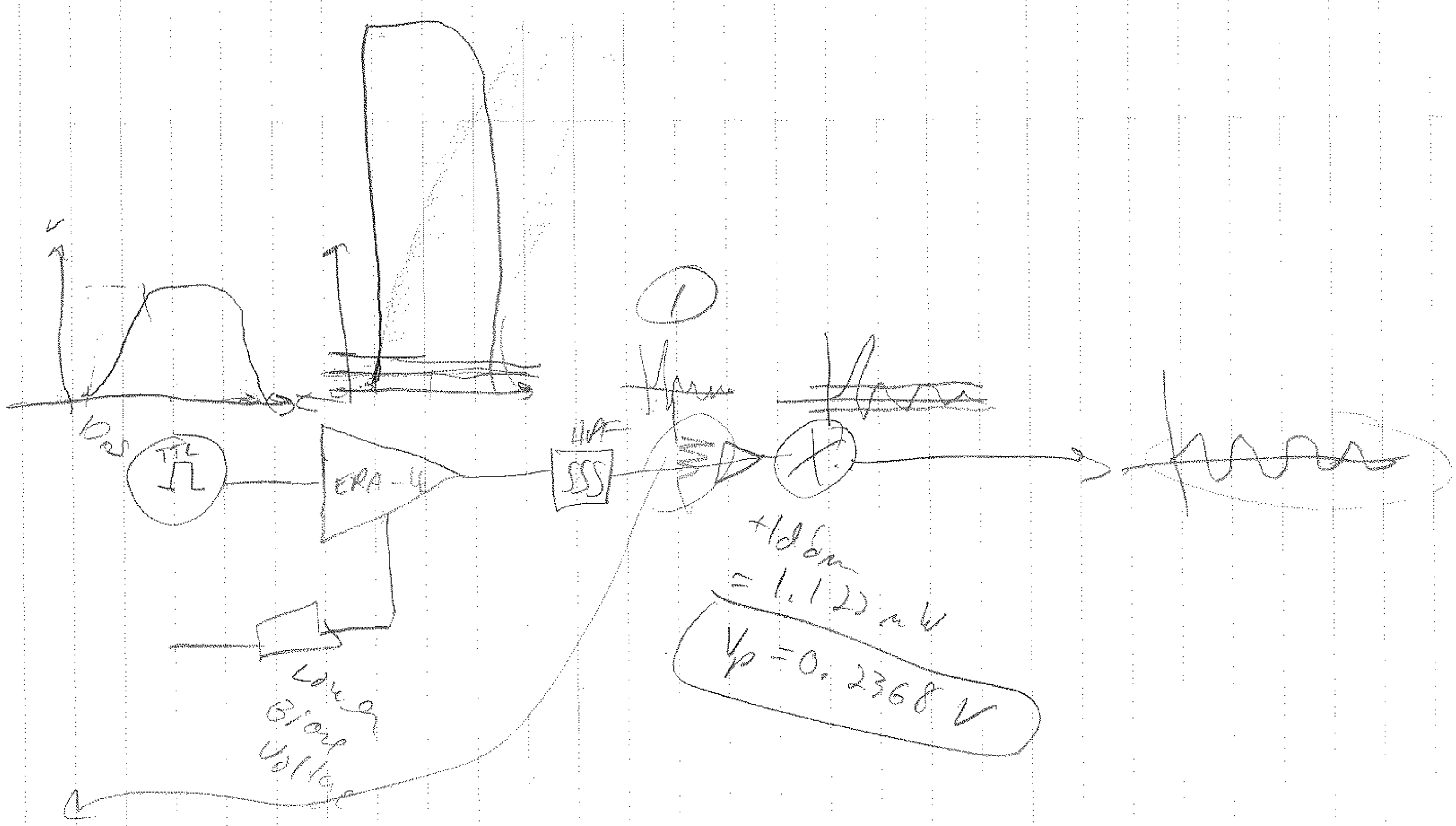
7	Feed through capacitor	(FRI) 514C1	3.50


HP
+24V
2K
.1
VCO
0°
.1
+24V
.1μF
.1μF
LP

Antenna
- 2 weeks after break

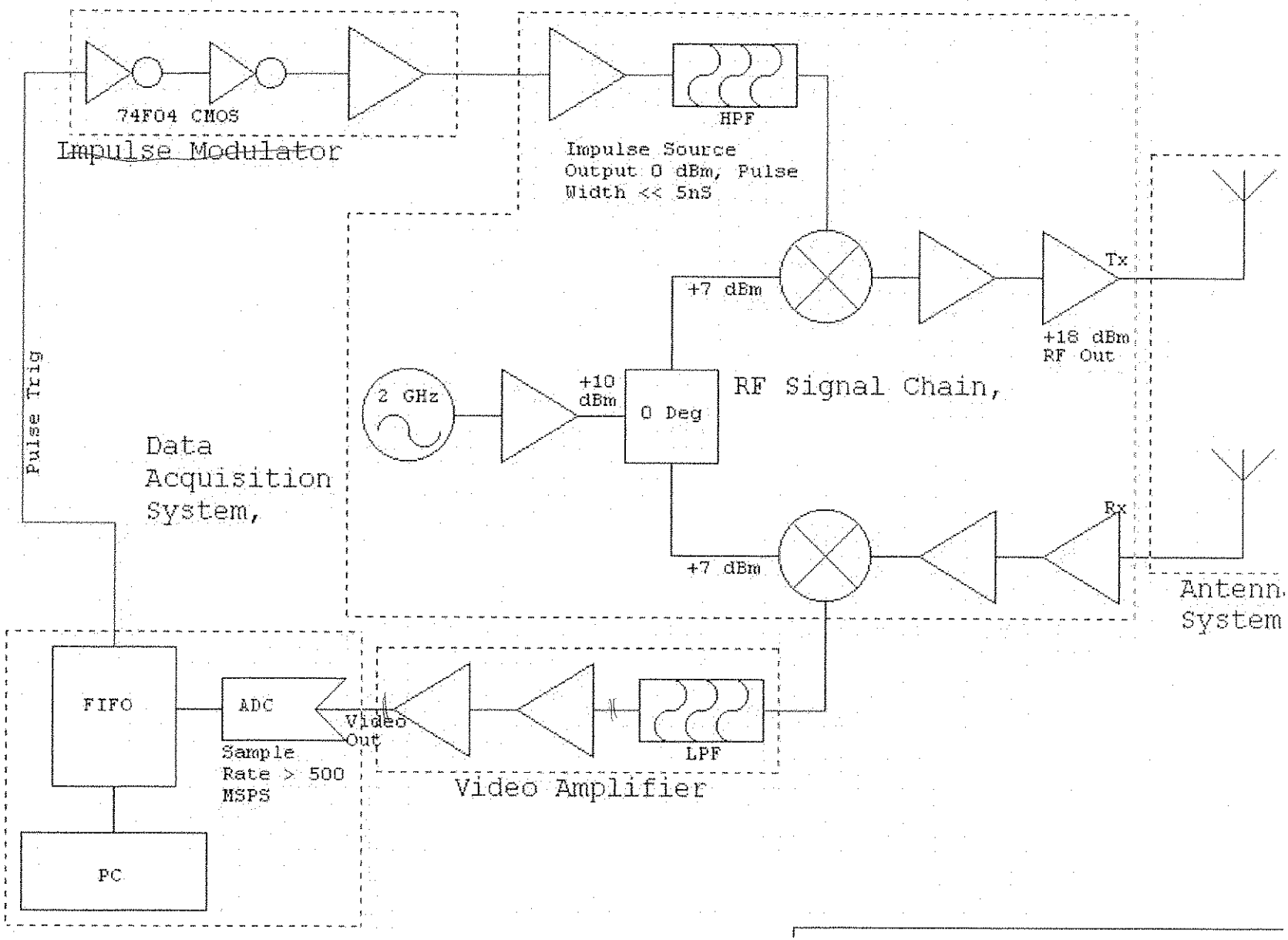
Short pulse
- 3 weeks after break

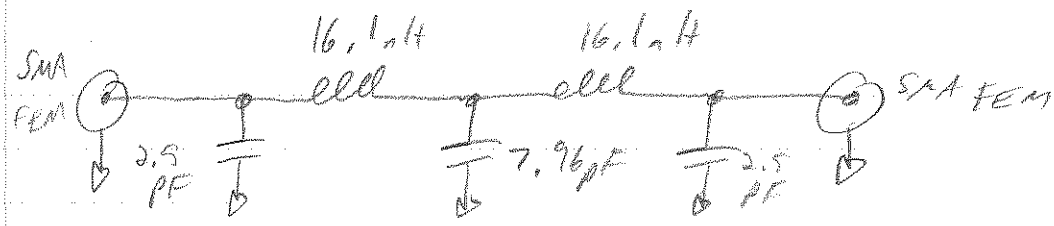




1. Measure peak Ampltd
2. Lower Amp Bias
3. out reads

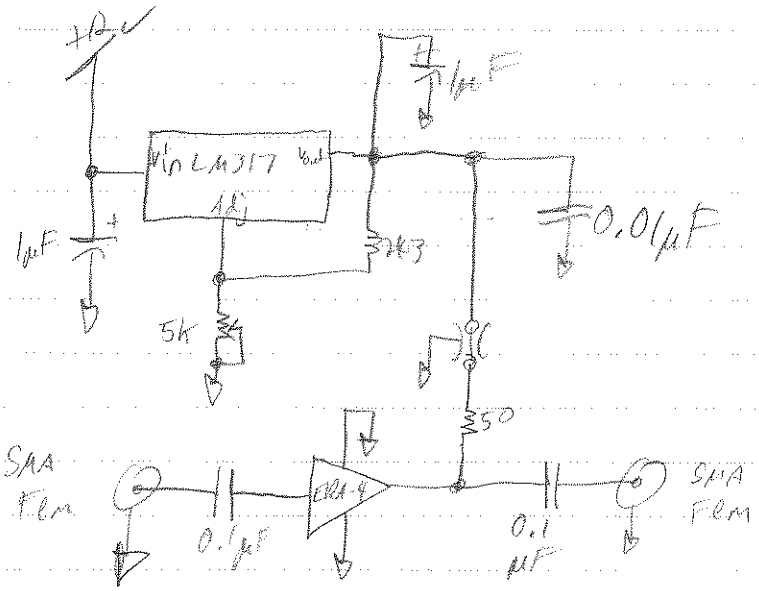
ECE 480 Project

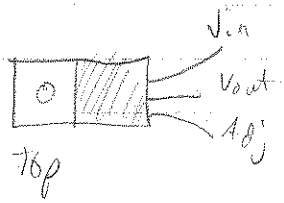




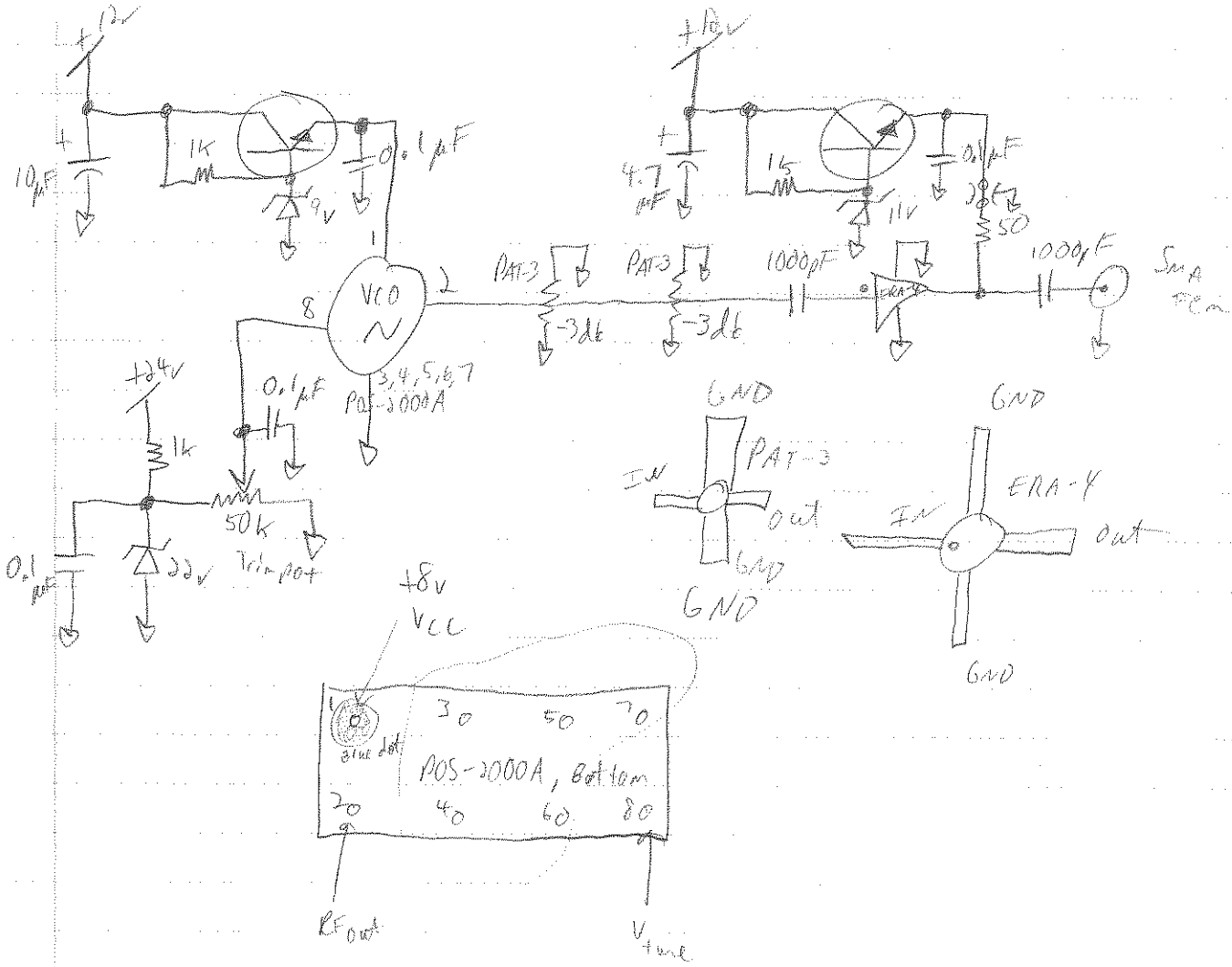
5th order Butterworth
800 MHz LPF

IF Filter

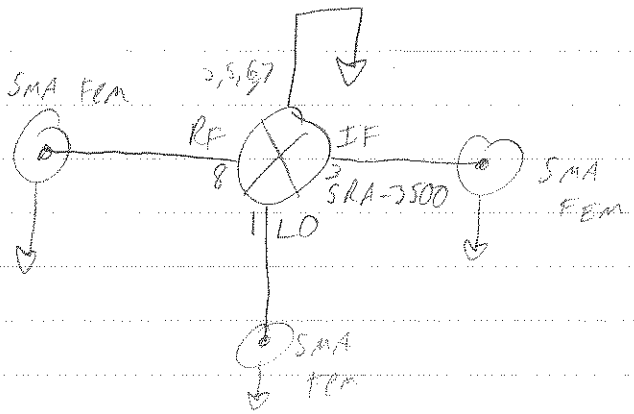


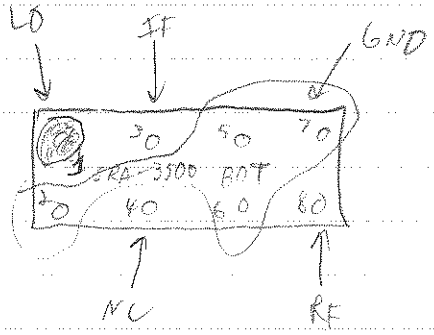


Adjustable Bias Amp

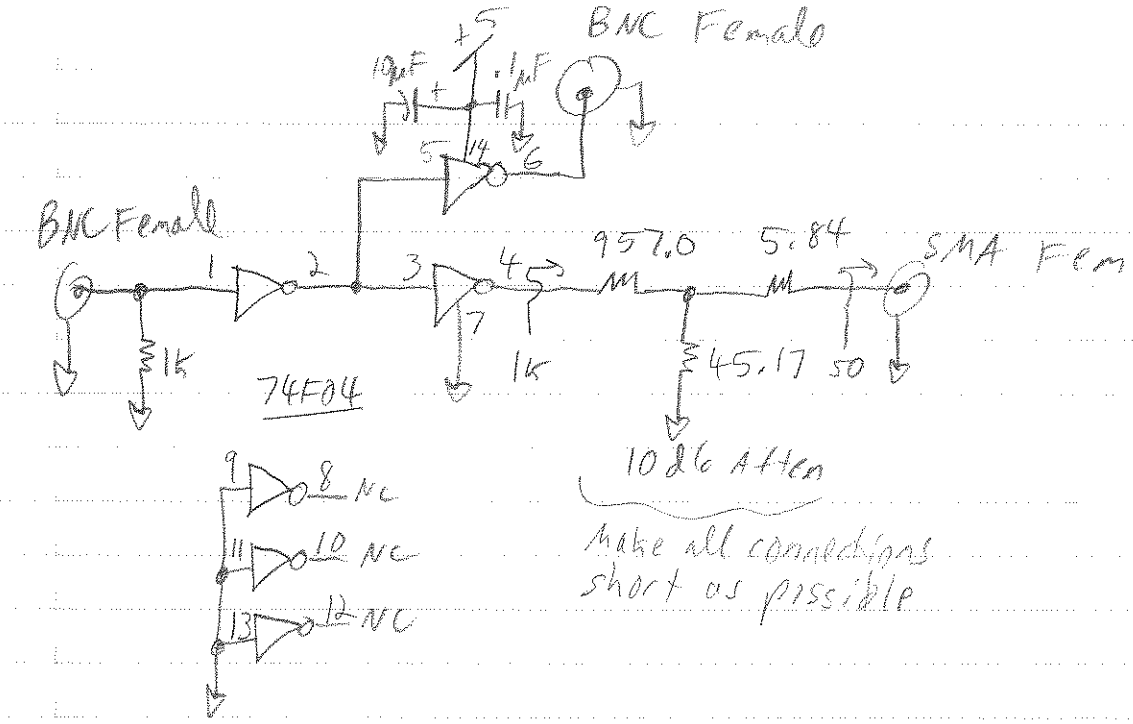

+12v
10µF
1K
9v
0.1µF
VCO
8
1
2
3,4,5,6,7
POS-2000A
+24v
1k
0.1µF
50k
Trim Pot
33v
0.1µF
PAT-3
-3dB
PAT-3
-3dB
+15v
4.7µF
1K
11v
0.1µF
50
1000pF
ERA-4
1000pF
SMA RFout
GND
IN
PAT-3
out
GND
GND
IN
ERA-4
out
GND
+8v
Vcc
BLUE dot
3 0
5 0
7 0
POS-2000A, Bottom
2 0
4 0
6 0
8 0
RFout
Vtune

VCO
1.5 - 2 GHz

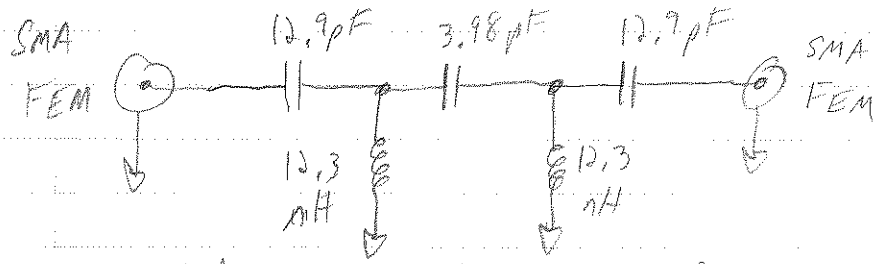

SMA FEM
2,5,6,7
RF
8
IF
3
SRA-3500
SMA
FEM
1
LO
SMA
FEM


LO
IF
GND
20
50
70
SRA-3500
BOT
30
40
60
NC
RF

TX/Rx Mixer



Make all connections short as possible

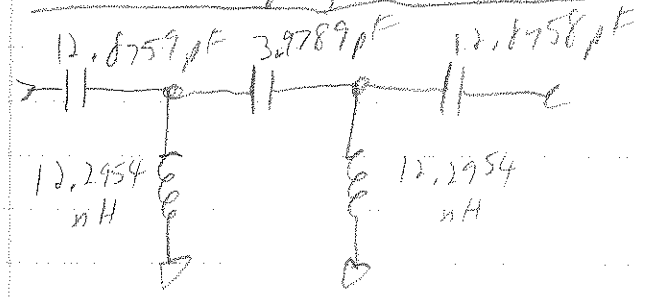


5th order 400 MHz HP
Butterworth response
→ Build on Microstrip

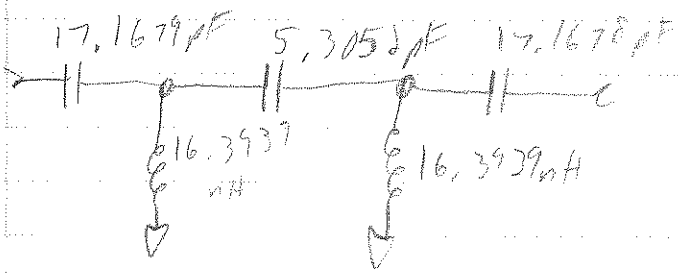
Impulse Source

Butterworth Filter calculations

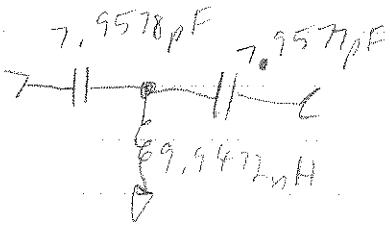
400 MHz HP, 5th order



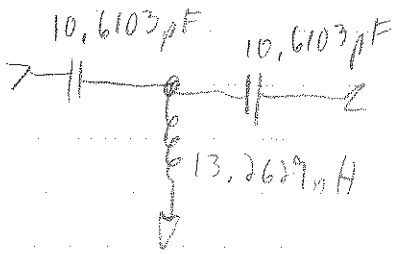
300 MHz HP, 5th order



400 MHz HP, 3rd order



300 MHz HP, 3rd order



Monday, time to go

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at kellog center

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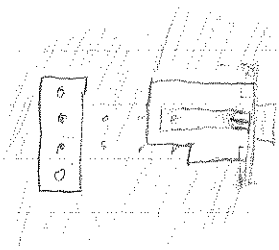
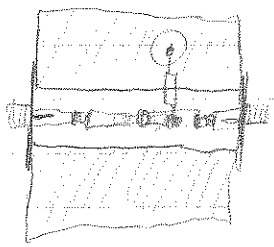
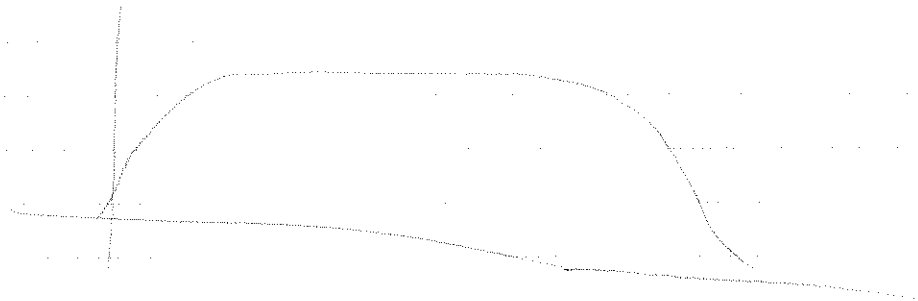




just need 2

just need 1?



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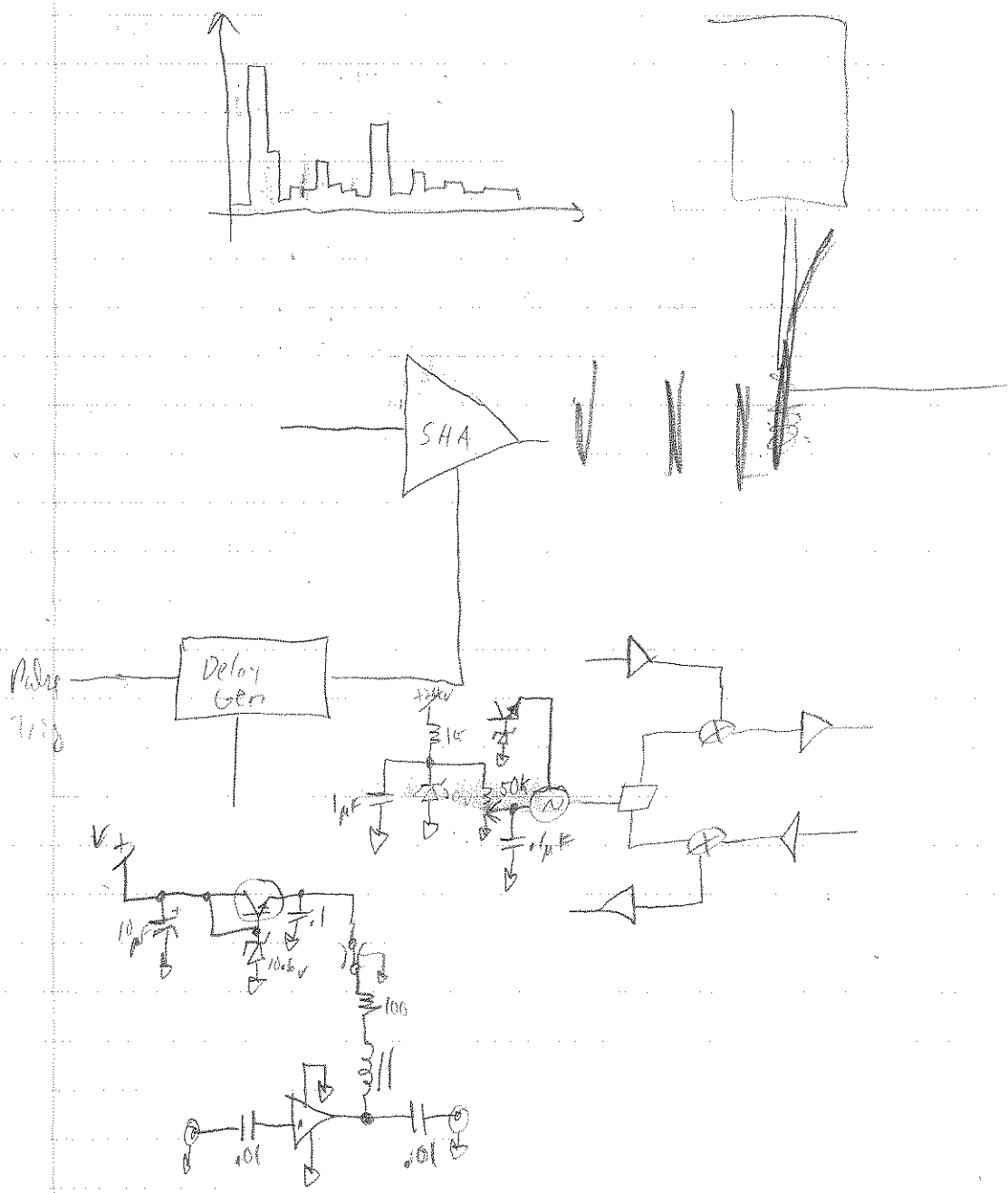
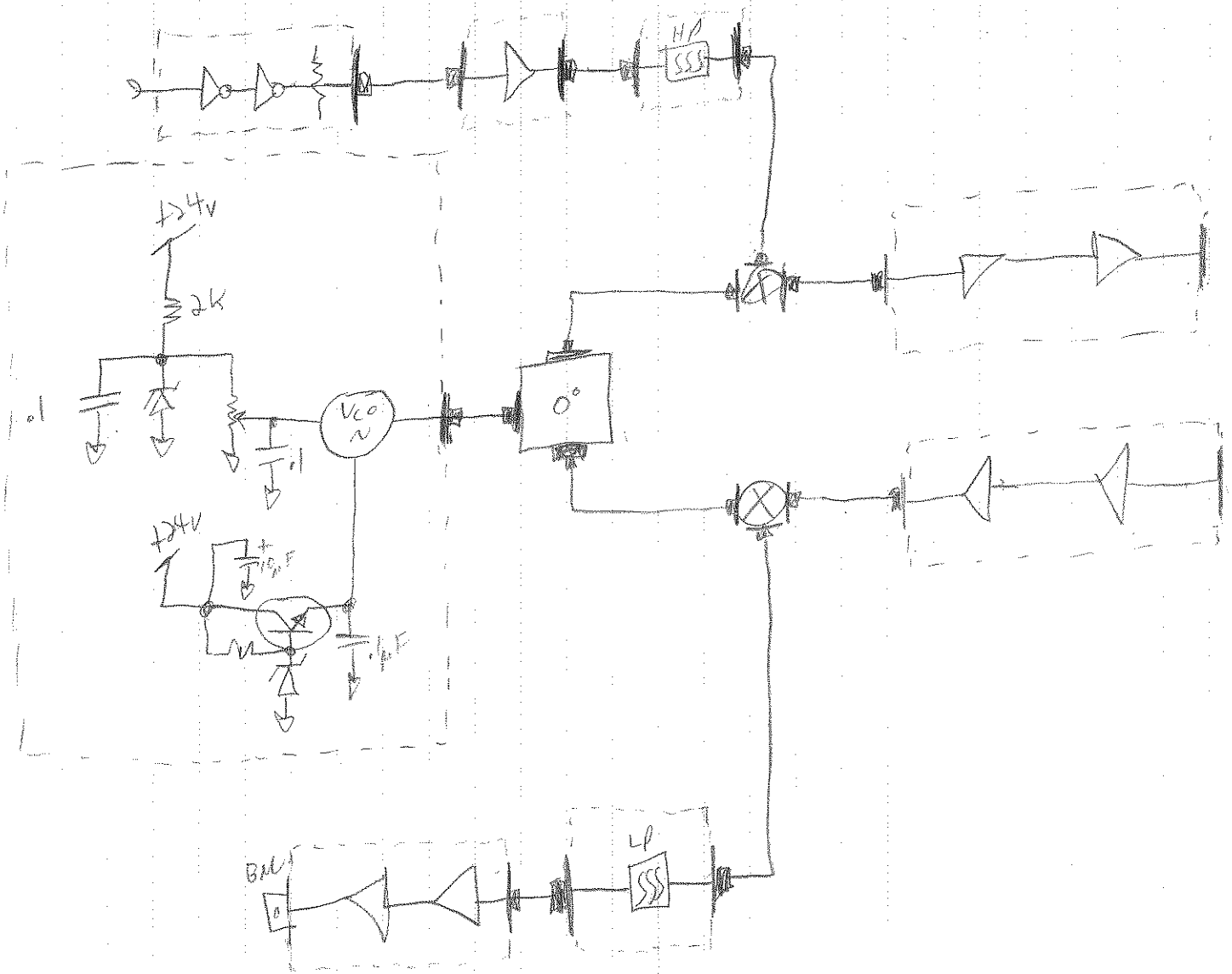
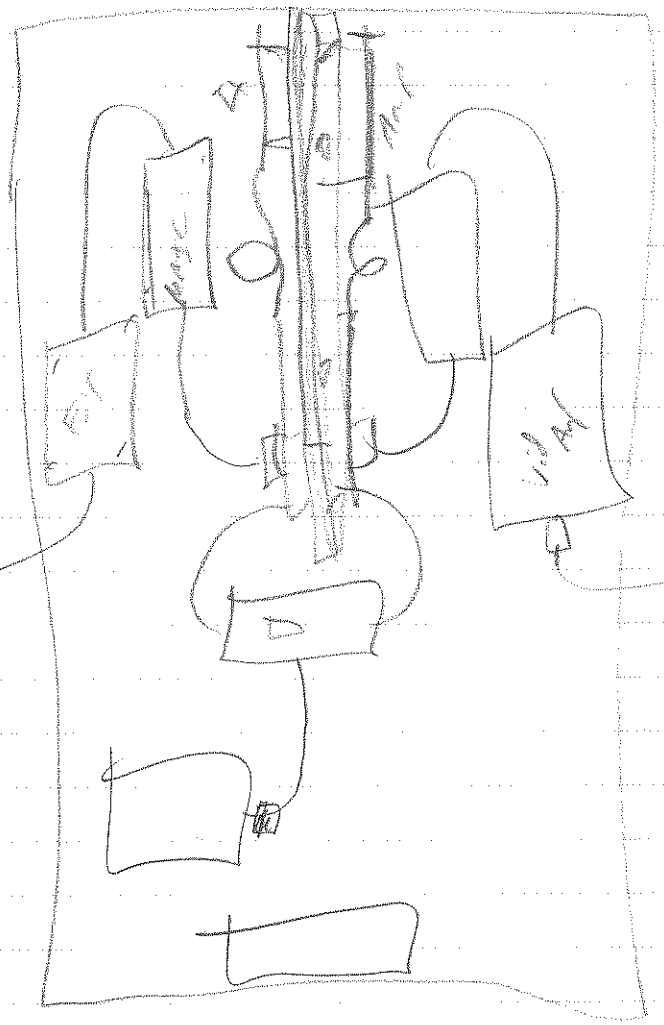
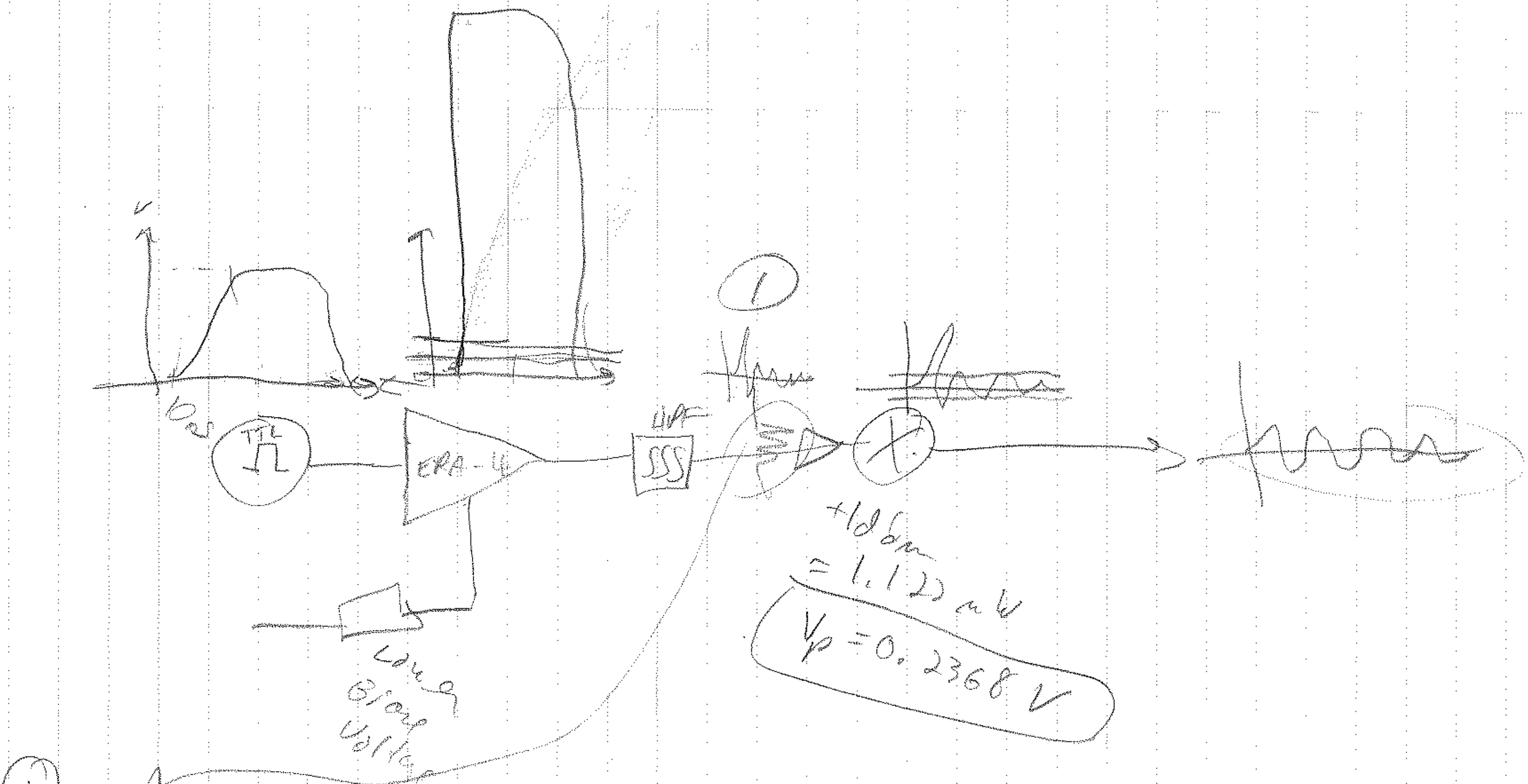
How solder it better




HP
+5V
2K
.01
VCO
0°
.1
+5V
15pF
.1μF
LP
BNC





1. Measure peak Ampl
2. Lower Amp Bias
3. put pads

1.74 GHz = f_{LO}

Circulator attenuation = 20db