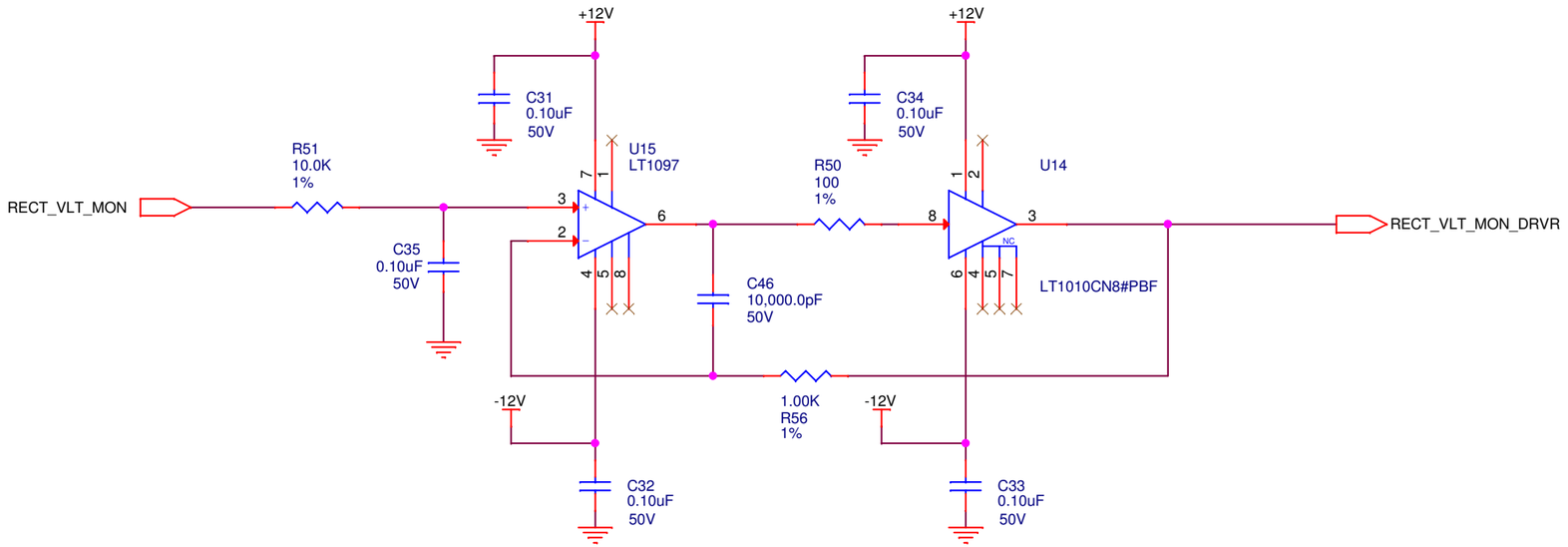
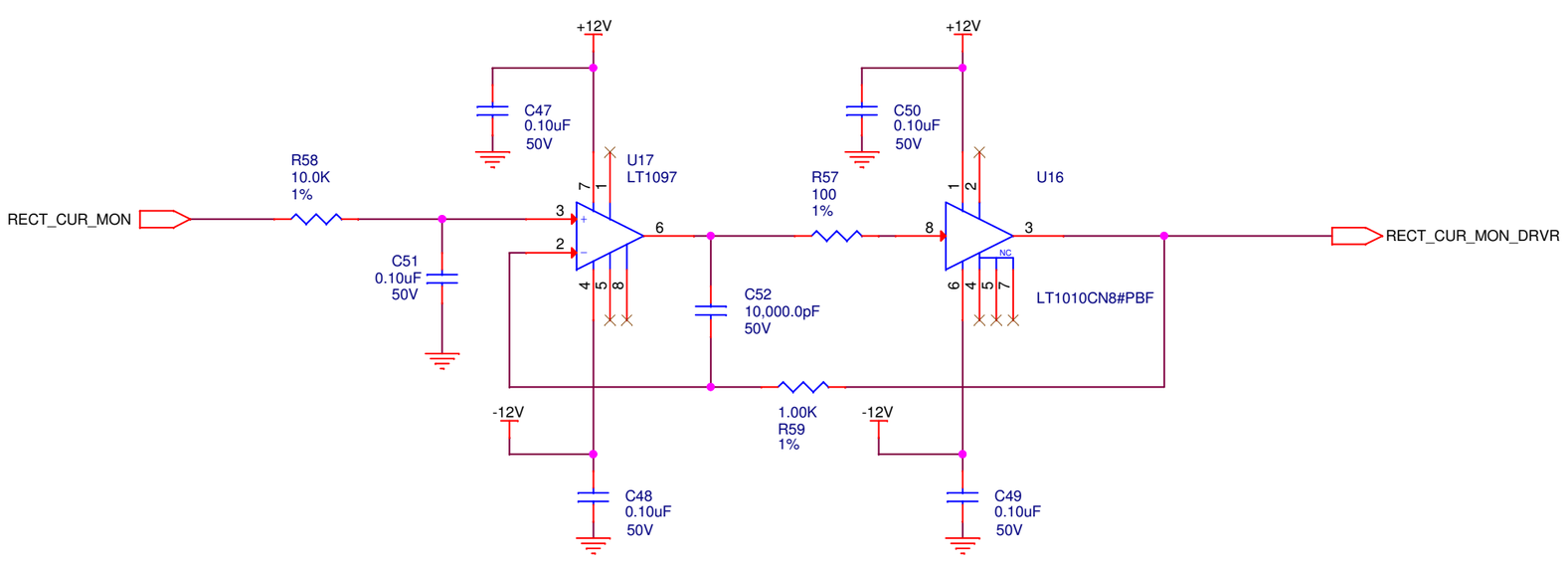
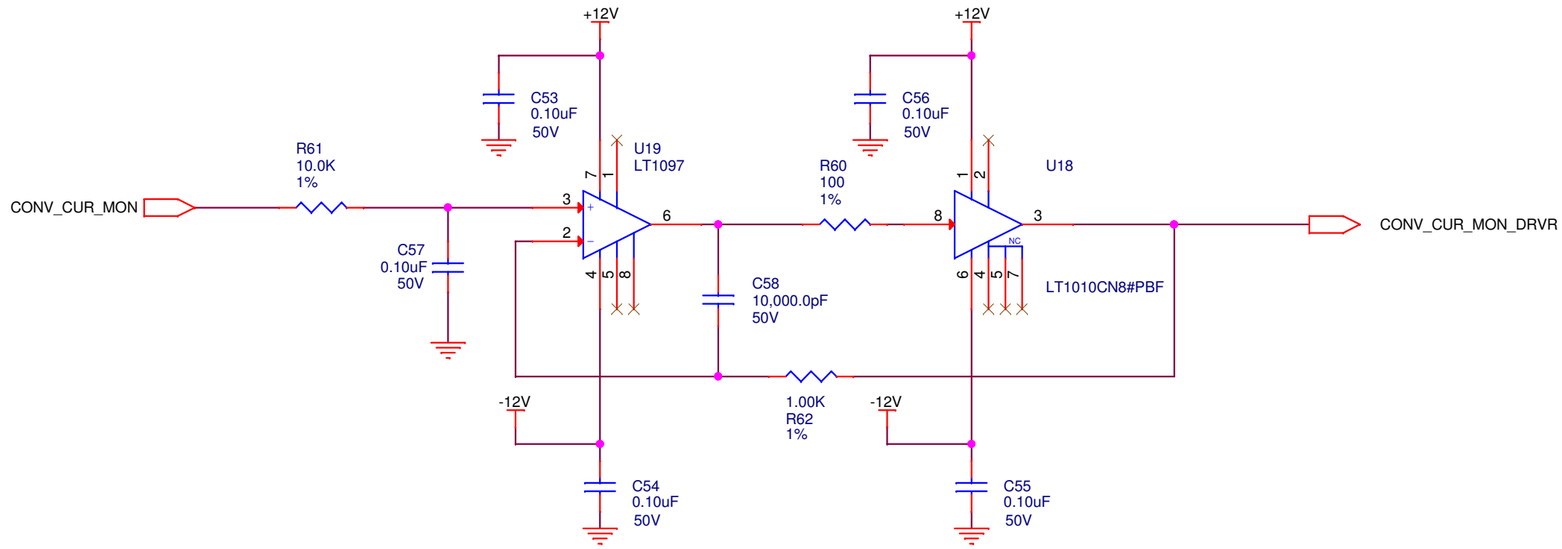
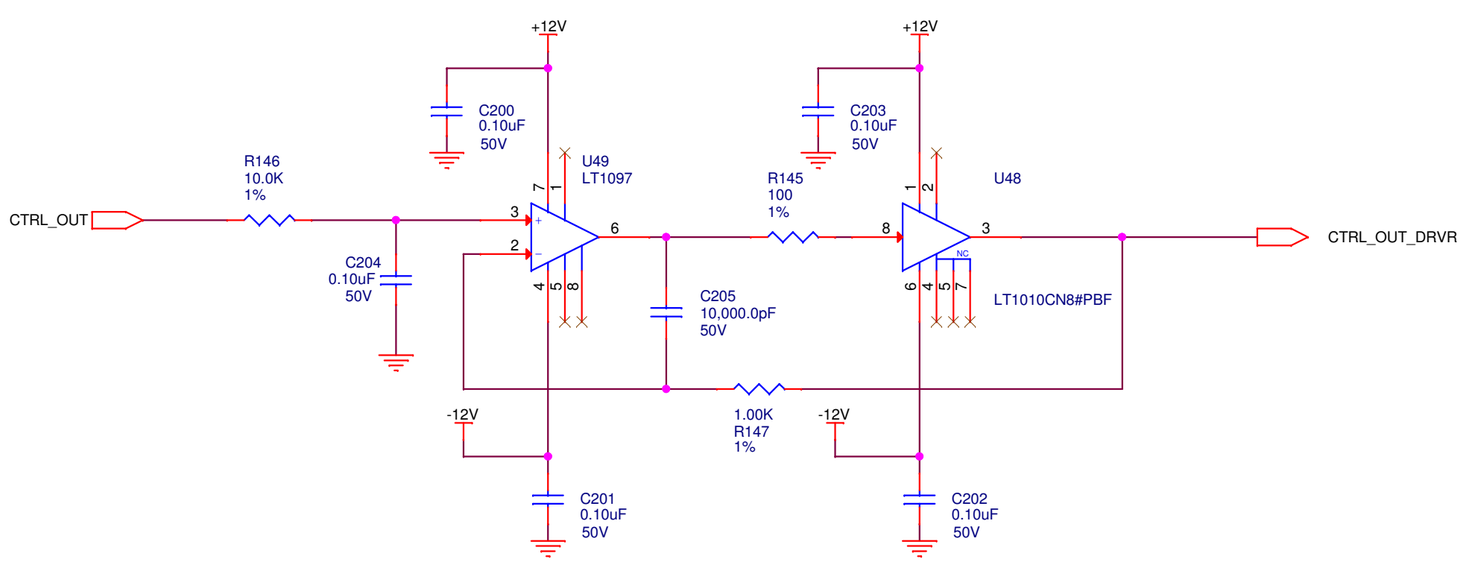




Monterey Bay Aquarium Research Institute 7700 Sandhold Road, Moss Landing, CA 95039			
Title Power Buoy: COTS SMPS: Output Drivers A			
Engineer McGill	Size B	Document Number 10020788	Layout File <Layout File> / Rev 1.0.0
Layout <Layout>	Date: Friday, February 17, 2012		Sheet 2 of 10





Monterey Bay Aquarium Research Institute 7700 Sandhold Road, Moss Landing, CA 95039			
Title Power Buoy: COTS SMPS: Output Drivers B			
Engineer McGill	**Size** B	**Document Number** 10020788	**Layout File** <Layout File> / **Rev** 1.0.0
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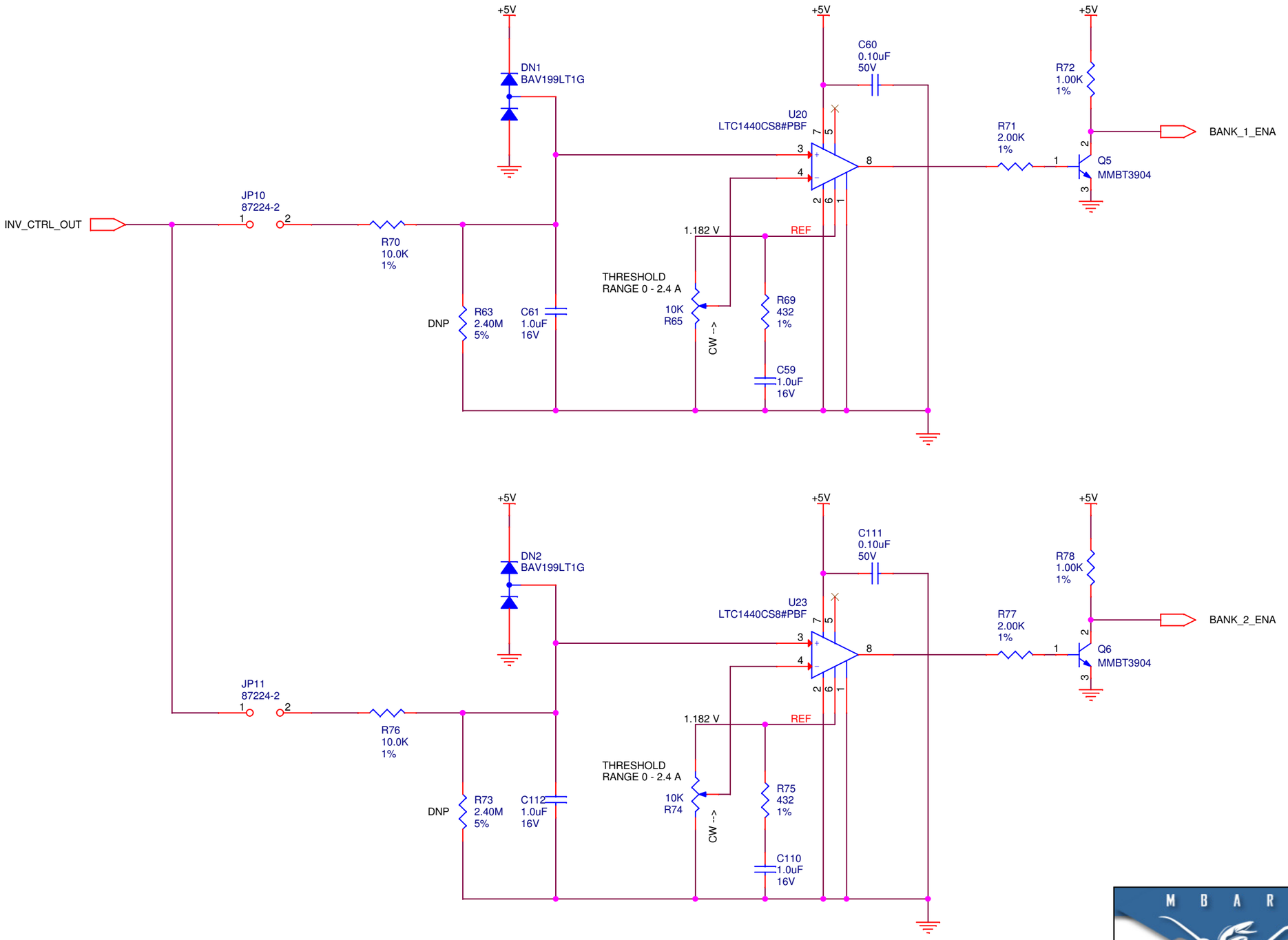

Monterey Bay Aquarium Research Institute 7700 Sandhold Road, Moss Landing, CA 95039			
Title: Power Buoy: COTS SMPS: Bank Enables			
Engineer: McGill	Size: B	Document Number: 10020788	Layout File: <Layout File> Rev: 1.0.0
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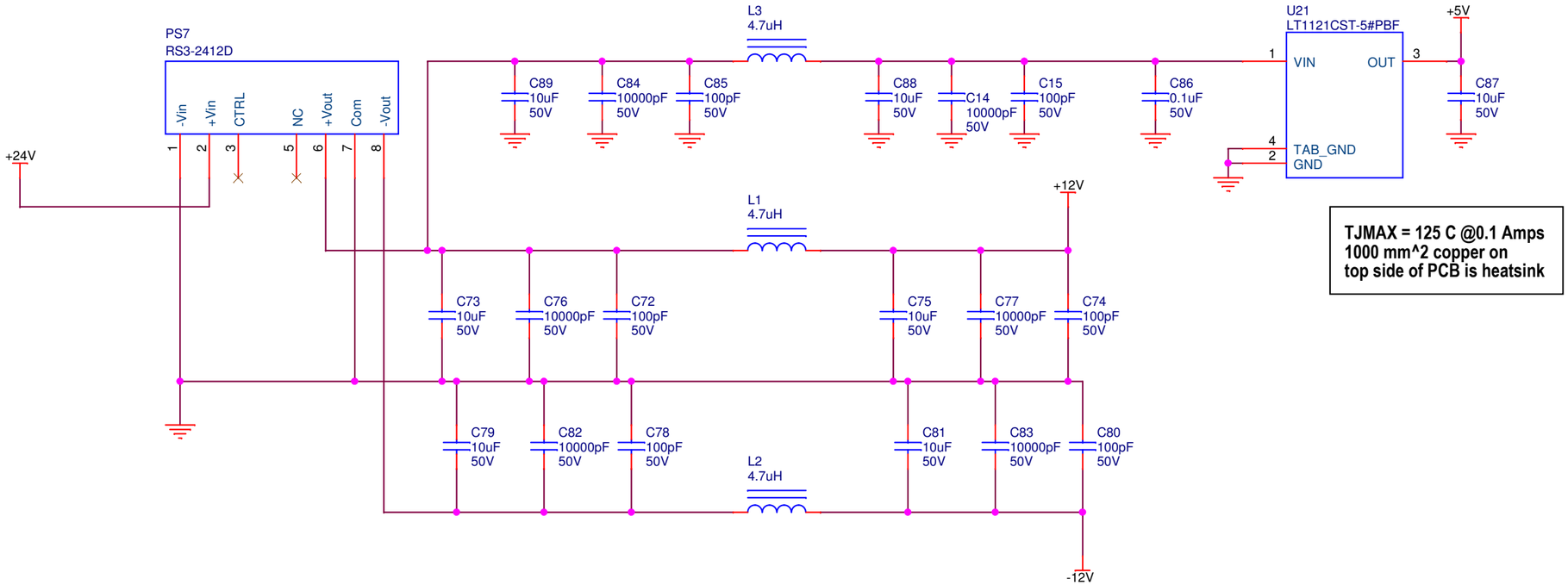

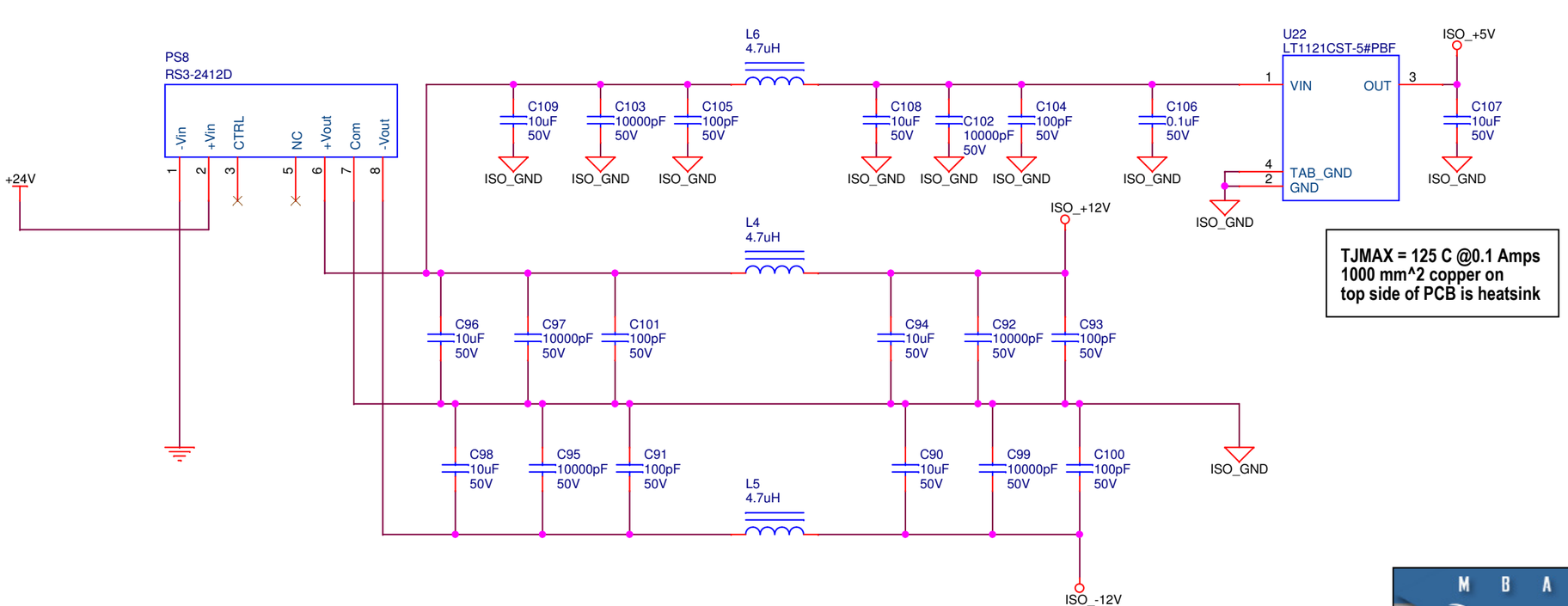

M B A R I			*Monterey Bay Aquarium Research Institute* 7700 Sandhold Road, Moss Landing, CA 95039
			Title Power Buoy: COTS SMPS: Aux Power Supplies
Engineer Radochonski/McGill	Size B	Document Number 10020788	Layout File <Layout File>
Layout <Layout>	Date: Friday, February 17, 2012		Rev 1.1.0
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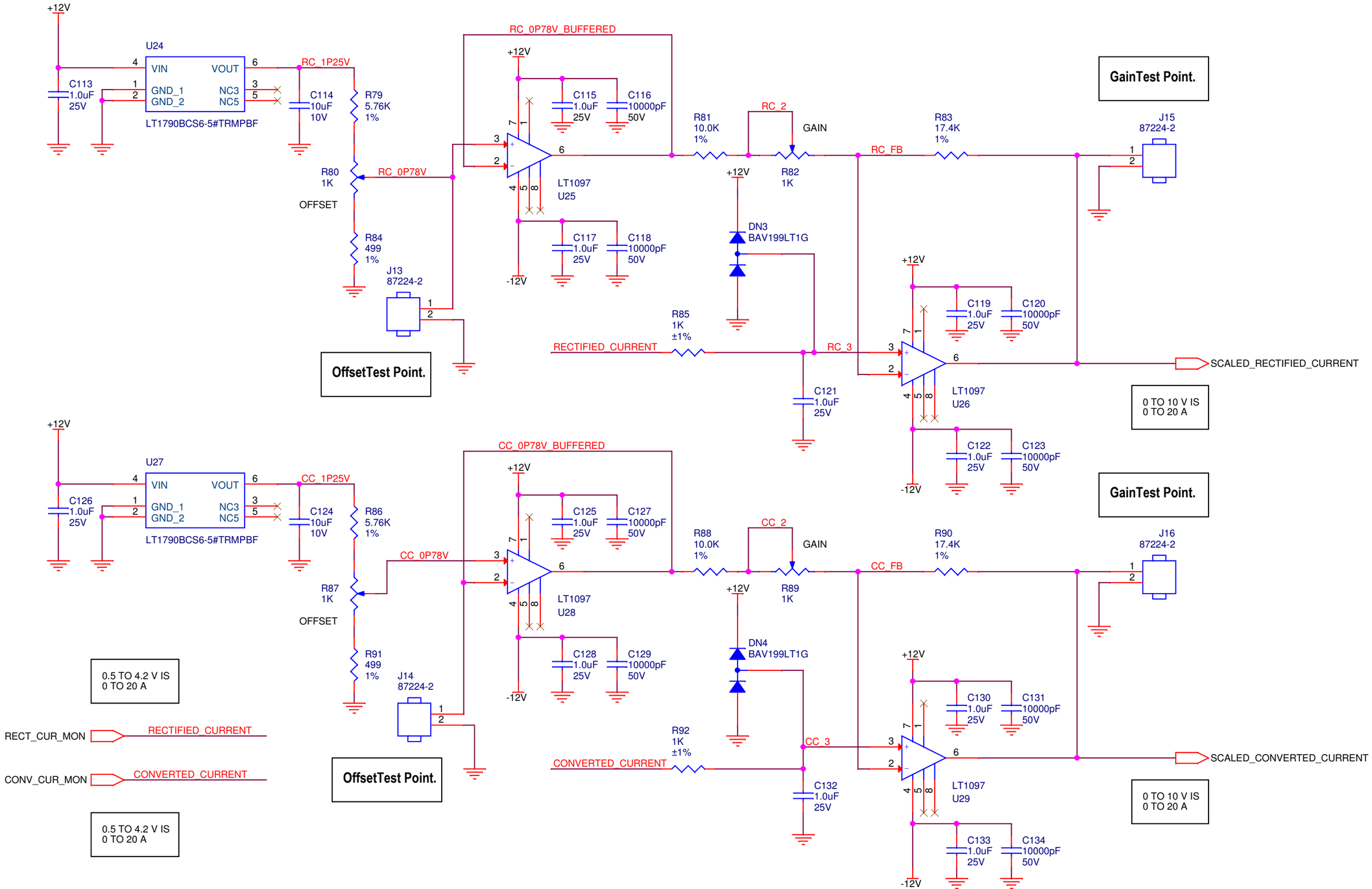

M B A R I	*Monterey Bay Aquarium Research Institute* 7700 Sandhold Road, Moss Landing, CA 95039		
	Title Power Buoy: COTS SMPS: Current Sensor Offset and Gain		
Engineer <Engineer>	Size B	Document Number 10020788	Layout File <Layout File> / Rev 1.1.0
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PWM from PID Controller
25% duty cycle is 0 A
75% duty cycle is 20 A

+5V
DN5
BAV199LT1G
R93
1.02K
1%
TGT_CUR_PWM
R148
100.0K
1%
U30
V+
IN
GND
NO
COMMON
NC
TS5A3159ADBVR
+5V
C137
0.1uF
50V
5P0
+12V
U32
VIN
VOUT
GND_1
GND_2
NC3
NC5
LT1790ACS6-5#TRMPBF
C142
1.0uF
25V
C140
10uF
10V
R94
115.0K
1%
PWM_FILT_1
R95
115.0K
1%
PWM_FILT_2
PWM_FILT_3
C135
10000pF
50V
C136
10000pF
50V
C141
10000pF
50V
+12V
C138
1.0uF
25V
C139
10000pF
50V
U31
OPA132U
C143
1.0uF
25V
C144
10000pF
50V
-12V

Filter output is 1.25 to 3.75 V

100HZ_LPF

R96
10K
±0.1%
R97
10K
±0.1%
PWM_FILT_4
R98
40.2K
1%
PWM_FILT_7
+12V
U33
VIN
VOUT
GND_1
GND_2
NC3
NC5
LT1790BCS6-1.25#TRMPBF
C149
1.0uF
25V
1P25V
C150
10uF
10V
R99
10K
±0.1%
PWM_FILT_5
R101
10K
±0.1%
C145
1.0uF
25V
C146
10000pF
50V
PWM_FILT_6
LT1097
U34
C153
1.0uF
25V
C154
10000pF
50V
-12V
R100
10K
±0.1%
C147
1.0uF
25V
C148
10000pF
50V
LT1097
U35
C151
1.0uF
25V
C152
10000pF
50V
SCALED_TARGET_CURRENT

Subtract off 1.25 V offset
Output is 0.0 to -2.5 V

Gain of -4
Output is 0 to 10 V

0 to 10 V is
0 to 20 A

M B A R I

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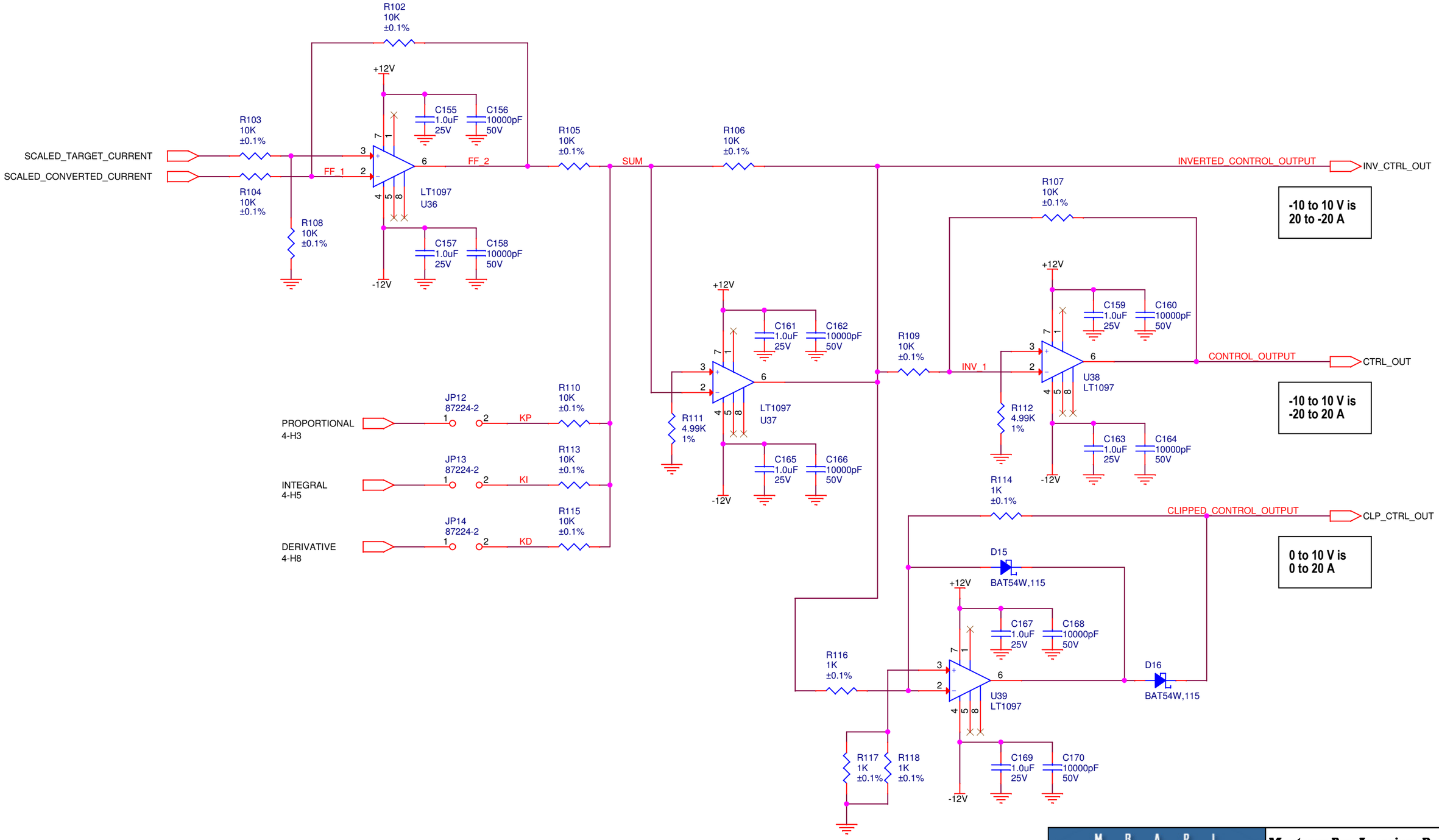
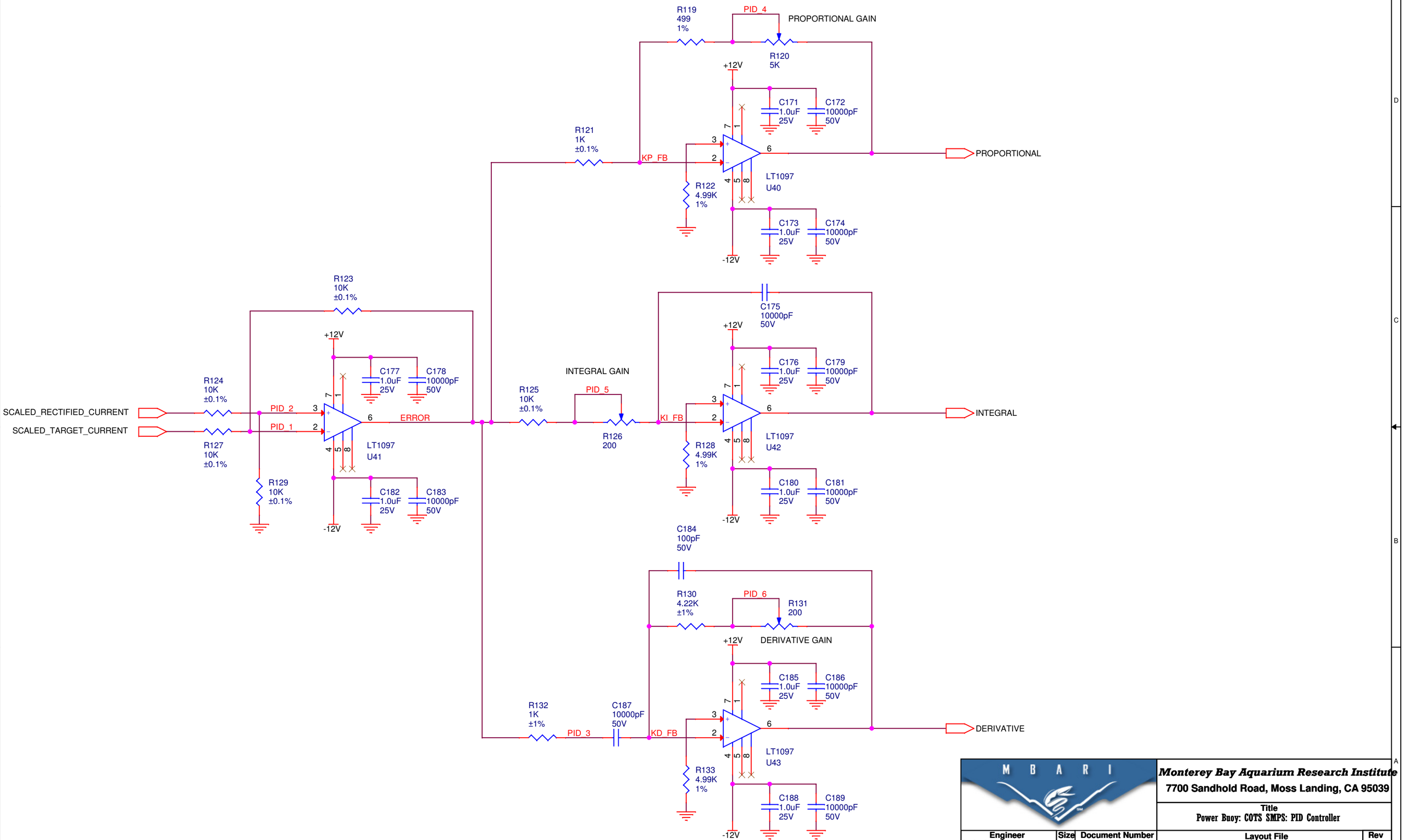
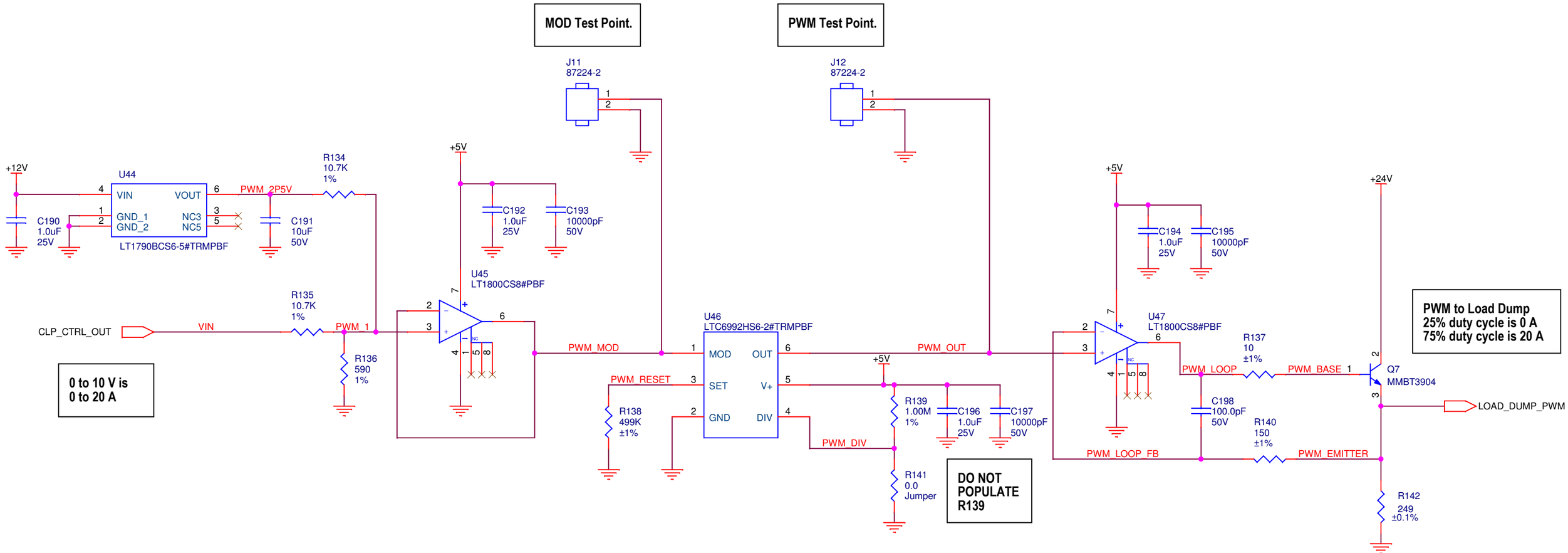
Title
Power Buoy: COTS SMPS: PWM Filter



M B A R I	Monterey Bay Aquarium Research Institute 7700 Sandhold Road, Moss Landing, CA 95039		
	Title Power Buoy: COTS SMPS: Feedforward Controller		
Engineer Radochonski	Size B	Document Number 10020788	Layout File <Layout File> / Rev 1.2.0
Layout <Layout>	Date: Friday, February 17, 2012	Sheet 8 of 10	



MBARI	Monterey Bay Aquarium Research Institute 7700 Sandhold Road, Moss Landing, CA 95039		
	Title: Power Buoy: COTS SMPS: PID Controller		
Engineer: Radochonski	Size: B	Document Number: 10020788	Layout File: <Layout File> — Rev: 1.2.0
Layout: <Layout>	Date: Friday, February 17, 2012	Sheet 9 of 10	



M B A R I	*Monterey Bay Aquarium Research Institute* 7700 Sandhold Road, Moss Landing, CA 95039		
	Title Power Buoy: COTS SMPS: PWM Generator		
Engineer Radochonski	Size B	Document Number 10020788	Layout File <Layout File> / Rev 1.2.0
Layout <Layout>	Date: Friday, February 17, 2012		Sheet 10 of 10