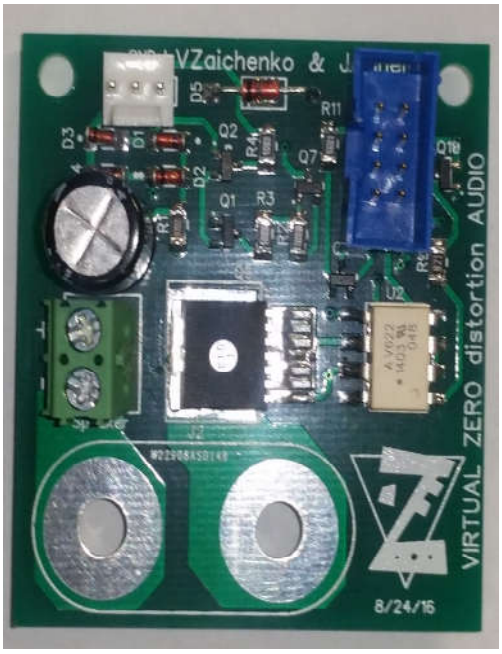
DC Detection 4.3



DC Detection 4.3 is a DC offset detection board with an integrated solid state speaker relay designed to mount on the power studs of a standard ¾" center 5 way binding post assemblies. It communicates with an Amp Control board to operate. The speaker output from the amplifier is completely optically isolated from the control board to eliminate the possibility of damage to the control board, as well as eliminating the possibility of ground loops between amplifier channels.

Operation

A small signal from the speaker input connection is fed past a low pass filter, which removes any AC from the signal. In normal operation of a correctly working amplifier, no signal would remain, but on a damaged amplifier producing DC on its output, a small voltage will remain.

There is a constant current source fed by the amplifier rail feeds that powers the input of an optoisolator. This optoisolator signals the solid state relay, and also signals the Amp Control board that all is good. If DC signal makes it past the low pass filter, it causes feed to the optoisolator to be interrupted, turning off the speaker relay, and also signaling the Amp Control board of trouble at the

same time. If rail power were to be interrupted, again the optoisolator would turn off, disconnecting the speaker and signaling problems to the Amp Control board again.

The solid state relay also requires a go signal from the Amp Control board to turn on. This allows the Amp Control board to control on delay and off muting of the speaker.

Quantity	RefDes	Name	Value
1	C1	CAP_1206	1uF 100V
1	C3	CAP200RP	47uF non-polar
5	D1, D2, D3, D4, D6	PMLL4148L	PMLL4148L
1	D5	1n5352	1n5352
1	J1	Speaker Connector	282836-2
1	J3	Control Connector	90131-0124
1	J4	Rail Connector	22-23-2031
1	Q1	MMBTA42	MMBTA42
1	Q2	MMBTA92	MMBTA92
4	Q3, Q4, Q5, Q6	MMBT5551	MMBT5551
2	Q7, Q10	MMBT5401	MMBT5401
2	Q8, Q9	MOSFETN_D	IPB025N-10N3 G
1	R1	RES_1206	47k
2	R2, R5	RES_1206	100k
2	R3, R4	RES_1206	10k
1	R6	RES_1206	15k
2	R7, R12	RES_2512	See Assembly Instructions
1	R8	RES_2512	1k2
1	R9	RES_1206	820R
2	R10, R14	RES_1206	12k
1	R11	RES_1206	5k6
1	R13	RES_1206	470k
2	R15,R15	RES_1206	1M
1	U1	HCPL2530S	HCPL2530
1	U2	Mosfet Driver	ASSR-V622-302E

Assembly and Testing

The DC detection circuit is designed to operate at 15VDC from the rail feeds, and is regulated by R7, R12 and D5. R7 and R12 need to be selected to deliver approximately 16mA (8mA each) to the circuit. Their value is calculated by subtracting 15(V) from the rain voltage and dividing the remainder by 0.008(A). If the amplifier's rail voltage is high (> +/-70V) R7 and R12 may run hot, so the DC detection circuit should be altered to operate at 24V, by changing the following values.

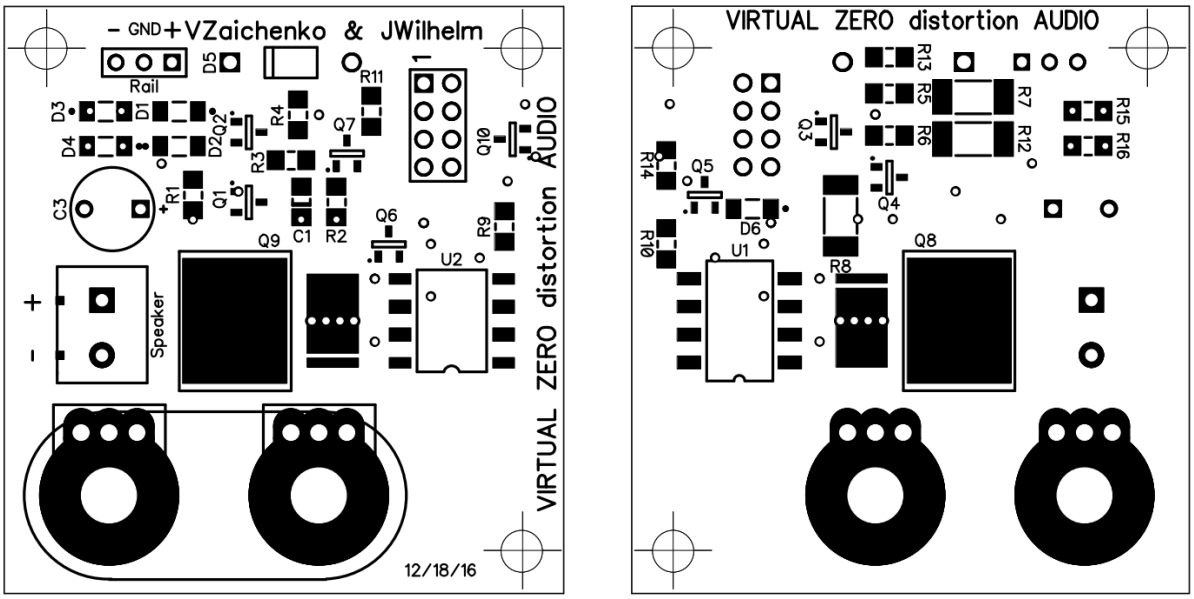
D5	1N4749A
R6	2k4
R8	2k7

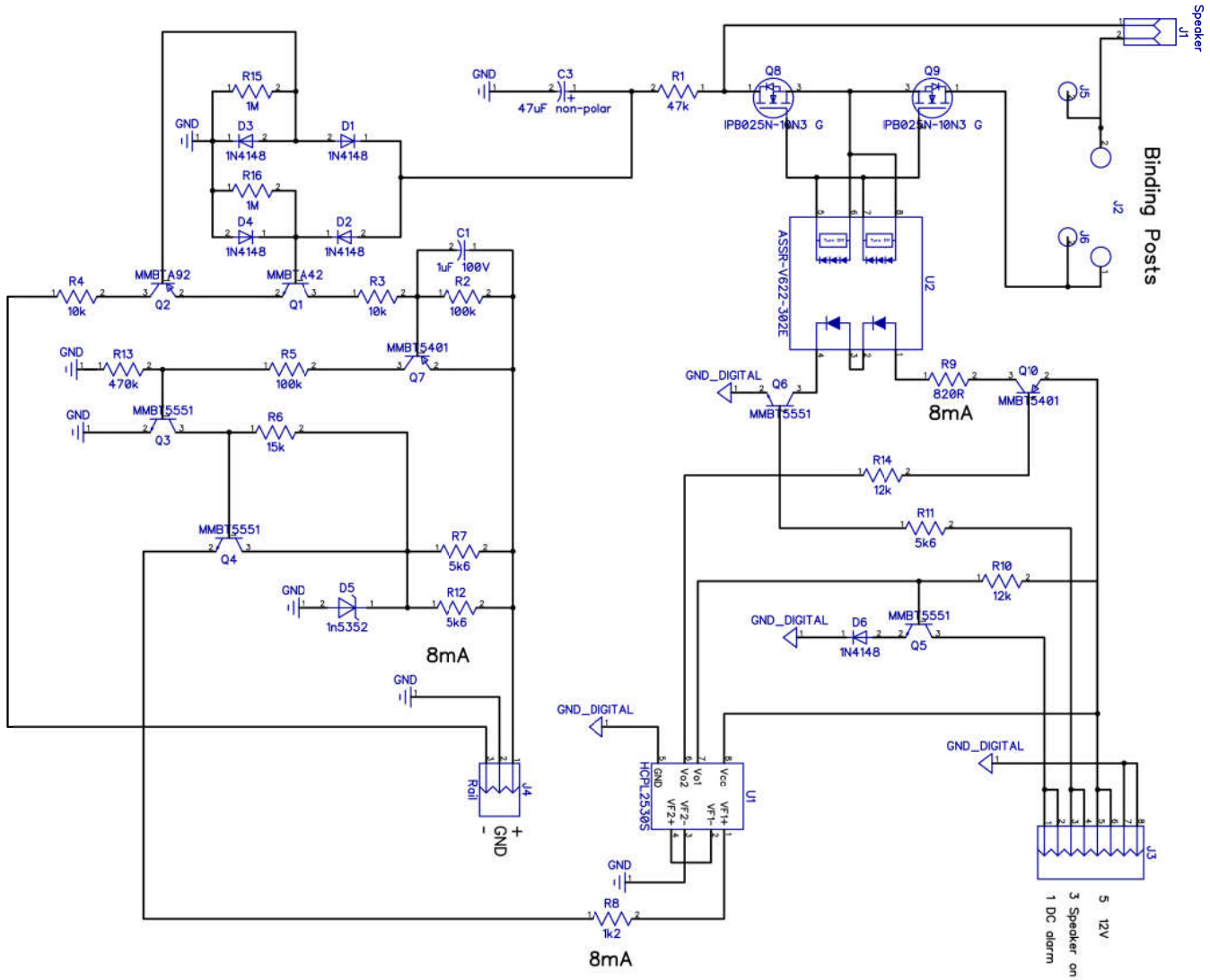
R7 and R12 would be calculated in the same manner, except you would subtract 24(V) from rail voltage instead of 15.

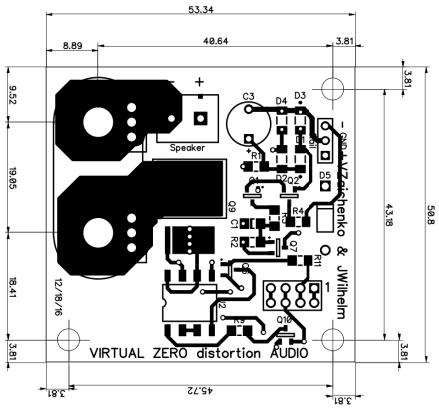
With no DC present on the speaker input connector, current flow through R8 should be approximately 8mA.

Once the DC detection board is assembled and connected to an Amp Control board and is receiving the speaker on signal from the Amp Control board, current flow through R9 should measure approximately 8mA. Drain to source resistance should be very close to zero ohms when on, and very high when off.

To test operation, apply low voltage to the speaker power input connection. Slowly increase this until the protection system is activated. This should happen at less than 2VDC. Power cycle the protection board and repeat the test with the voltage source reversed. Again, it should trigger a shutdown at less than 2VDC.




Speaker
J1
Binding Posts
J2
J5
J6
GND
C3
47uF non-polar
R1
47k
Q8
Q9
IPB025N-10N3 G
IPB025N-10N3 G
ASSR-V622-302E
U2
R15
1M
R16
1M
D3
1N4148
D1
1N4148
D4
1N4148
D2
1N4148
C1
1uF 100V
R4
10k
MMBTA92
Q2
MMBTA42
Q1
R3
10k
R2
100k
GND
R13
470k
R5
100k
MMBT5401
Q7
GND
MMBT5551
Q3
R6
15k
MMBT5551
Q4
R7
5k6
GND
D5
1n5352
R12
5k6
8mA
GND
Rail
J4
- GND +
GND_DIGITAL
Q6
MMBT5551
R9
820R
Q10
MMBT5401
8mA
R14
12k
R11
5k6
R10
12k
GND_DIGITAL
D6
1N4148
MMBT5551
Q5
GND_DIGITAL
HCPL2530S
U1
GND
R8
1k2
8mA
GND_DIGITAL
J3
1 DC alarm
3 Speaker on
5 12V


53.34
8.89
40.64
3.81
3.81
9.52
19.85
18.41
3.81
43.18
50.8
3.81
45.72
3.81
12/18/16
Speaker
C3
D4
D3
D5
D2
Q1
R4
Q3
C1
R2
Q2
R1
Q4
Q5
Q6
1
- and +V Zelchenko & JWilhelm
VIRTUAL ZERO distortion AUDIO