Active Crossover

Assembly Manual

designed by:

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Reveille Active Crossover

The Reveille Active Crossover is designed primarily for use with the Oris Horn however we have thrown in a few extra capabilities to hopefully make it usable for other applications. This is a two-way crossover intended for bi-amp applications.

The High Pass Section:

The high pass section contains no active circuitry. You can run the full signal straight through to the high pass amplifier or we have included the option of using a single series in-line capacitor to create a passive 1st order (6dB/octave) high pass filter on the input of your high pass amplifier. Using this capacitor is a trade-off. Yes, you are adding another capacitor to the signal path, but then using this cap to roll off the low frequencies going to the high pass amplifier may make a noticeable improvement in the midrange clarity. The choice is yours.

The Low Pass Section:

The low pass section contains one gain stage, two filter sections using high speed Burr Brown buffers, a level control for matching the high and low pass gain, and finally a high speed -- high current Burr Brown buffer for the output stage.

I chose a solid-state circuit design over tubes for several reasons however the main driving force was linearity, low noise and good current drive. My philosophy has always been to start with as clean a signal as possible and then tailor as needed from there. Solid state circuits are ultra-quiet, and if designed properly can provide a very natural sound with great resolution, detail and pitch-black backgrounds. The Reveille Active Crossover won’t get in the way of the music.

The Oris Horn rolls off naturally with a high pass 2nd order slope (12dB/octave) and does so at approximately 180Hz. So the components chosen for this low pass section are intended to match this slope with an indentical cutoff frequency of 180Hz. This is the recommended setting for the Oris Horn when mated to our Onken or Cabaz bass cabinet designs.

As mentioned above, we have “built-in” some added versatility for those of you choosing to use the Reveille in a similar application, i.e. a bi-amp system with a straight-thru high pass section. Thus, the Reveille’s low pass section can be configured as a 1st, 2nd, 3rd or 4th order filter. We have also laid out the crossover circuit board to accept different size capacitors in order to aid your component selection. Consult the following section for information on selecting the appropriate component values for these additional configurations.

High quality components are used throughout. Wiring is provided through Kimber Kable OFC hookup wire and input/output connections are via the Cardas silver/rhodium rca jacks.

The Power Supply:

The Reveille Active Crossover is completely dual mono including separate power transformers and on-off switches for each channel. Each crossover channel has its own onboard voltage regulators which are fed by separate ultra-low noise power supplies. The toroidal power transformers are isolated from the rest of the circuitry providing the necessary shielding for the crossover circuit as well as adjacent audio equipment. The power cord is detachable.

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Crossover Network Calculations:

The following equation and coefficients are used for calculating resistor and capacitor values for the low pass network.
Note: If you have purchased this crossover for use with the Oris Horn you can skip this section.

$$Fc = \frac{1}{2 \times \pi \times R_o \times C_o} \qquad \text{equation (1)}$$

Coefficients:	m	q
Order		
1st Order (6dB/Octave)	0	0
2nd Order (12dB/Octave)	$m_1 = 0.707$	$q_1 = 1.414$
3rd Order (18dB/Octave)	$m_1 = 0.500$ $m_2 = 1.000$	$q_1 = 2.000$
4th Order (24dB/Octave)	$m_1 = 0.924$ $m_2 = 0.383$	$q_1 = 1.082$ $q_2 = 2.613$

Table (1)

Let’s do an Example Calculation:

Let’s choose a cutoff frequency of 100Hz.

According to equation (1) we have:

$$100 = \frac{1}{2 \times 3.1416 \times R_o \times C_o}$$

Solving the equation for $R_o \times C_o$:

$$R_o \times C_o = \frac{1}{6.2832 \times 100} = 0.00159 \qquad \text{equation (2)}$$

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Network Calculation (continued)

1st Order Low Pass

Let's choose a value for C_o = 0.1uf (0.1×10^{-6}). Then according to equation (2), R_o = 15,900 ohms.
So in our circuit (refer to figure 1) C_o = C2 = 0.1uf and R_o = R5 = 15.9kohm. A jumper wire would be installed in place of R4. C1 would be left open. The output of IC2 would be connected directly to pot VR1 bypassing IC3 and its associated circuitry.

2nd Order Low Pass

We will use the coefficients for this calculation. From Table (1): m_1 = 0.707 and q_1 = 1.414
From figure (1): C2 = m_1C_o and C1 = q_1C_o. Rearranging these equations and substituting the above coefficients we can see that C1 = 2C2
Once again we will choose a value of 0.1uf for capacitor C2 and so C1 = 0.2uf (0.22uf is close enough).
C2 = m_1C_o so C_o = 0.14×10^{-6} and therefore equation (2) gives R_o = 11,357 ohms. (11.4Kohms is close enough).
So in our circuit of figure (1): C1 = 0.22uf, C2 = 0.1uf and R4 = R5 = 11.4Kohms.
Once again, the output of IC2 would be connected directly to pot VR1 bypassing IC3 and its associated circuitry.

3rd Order Low Pass

We will also use the coefficients for this calculation. From Table (1): m_1 = 0.5, m_2 = 1 and q_1 = 2
From figure (1): C2 = m_1C_o , C4 = m_2C_o and C1 = q_1C_o. Rearranging these equations and substituting the above coefficients we can see that C1 = 2C4 = 4C2
We will choose a value of 0.2uf for capacitor C1 and so C4 = 0.1uf and C2 = .05uf (.047uf is close enough)
C2 = m_1C_o so C_o = 0.09×10^{-6} and therefore equation (2) gives R_o = 16,900 ohms.
So in our circuit of figure (1): C1 = 0.22uf, C2 = 0.047uf, C4 = 0.1uf and R4 = R5 = R7 = 16.9Kohms. A jumper wire would be installed in place of R6. C3 would be left open. The output of IC3 would be connected directly to pot VR1.

4th Order Low Pass

The easiest way to implement a 4th order crossover is to create a Linkwitz Riley filter which is made by connecting two of our 2nd Order filters in series.
So in our circuit of figure (1): C1 = 0.22uf, C2 = 0.1uf and R4 = R5 = 11.4Kohms and:
C3 = 0.22uf, C4 = 0.1uf and R6 = R7 = 11.4Kohms.

1st Order High Pass

If you decide that you want to use the series in-line capacitor C6 to create a passive 1st Order high pass filter for your high pass amplifier we will also use equation (1)

In this case, C_o will be the series in-line capacitor C6 and R_o will be the input impedance of your high pass amplifier. You can consult the amplifier manufacturer's specifications to determine this value. For our example let's assume it is 100Kohms. Then according to equation (2), C_o = C6 = 0.0159uf (a .018 - .022uf is probably close enough).

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Setup and Operation

Setup is relatively straight forward.

1. Connect the signal cables from your preamp into the Reveille's rear panel input jacks.

2. Connect the low pass outputs to your bass cabinet amplifier.

3. Connect the high pass outputs to your Oris Horn amplifier.

4. Plug the power cord into the IEC connector on the rear panel of the Reveille.

5. You are now ready to apply power. There is one on-off power switch for each channel.

6. Adjust the gain control potentiometer so that the output level of the bass cabinet matches that of the Oris Horn. You can do this by listening to familiar pieces of music and adjusting the bass level to your tastes or you can use a decibel meter with test tones and adjust the levels through measurement.

Words of Caution

Always keep in mind that you are the manufacturer of this crossover. The final appearance of this equipment and its sound quality will largerly depend upon the care taken during the assembly of this kit. We recommend that your work surface be padded, clean of debris and kept clean during assembly. This will prevent the chassis from becoming accidentally scratched. Keep finger prints to a minimum (wear white cotton gloves when handling the chassis). This chassis design is very heavy so be careful and don't drop it on your dining room table! Don't create antennas out of the hookup wire by making big loops and arches. Keep all wiring neat, lead lengths short and routed close to the chassis. Believe us when we say “neat wiring sounds mo better”.

Tools Required for Assembly

Soldering Iron
Solder
Solder Wick™ or Solder-Removing Device
Pliers
Wire Strippers
Hex Drivers
Screw Drivers
Multimeter
Cotton Gloves

Before Beginning

The next few pages include the schematics and parts lists. Check the components delivered to you against those on the parts list. Notify us immediately if there are any missing pieces.

Please read through the manual thoroughly before beginning assembly. This will give you with a rough idea of the entire assembly process and how much detail is provided herein.

Welborne Labs reserves the right to ocassionally change or substitute parts of equal or greater quality.

Crossover Parts List (one channel)

Resistors

R1	47.0k	Dale metal film
R2	15.0k	Dale metal film
R3	3.16k	Dale metal film
R4, R5	6.81K	Dale metal film (for Oris 150)
R4, R5	5.11K	Dale metal film (for Oris 200) *******
R6, R7 (n/a for Oris)		Dale metal film
R8	45.0	Dale metal film
R9, R10	10.5k	Dale metal film
R11, R12, R13, R14, R15, R16	1.00k	Dale metal film
VR1	100k	Level Control

Capacitors

C1	.22uf/160V	Wima (for Oris 150 and 200)
C2	.10uf/160V	Wima (for Oris 150 and 200)
C3 (n/a for Oris)		Wima
C4 (n/a for Oris)		Wima
C5	1.0uf/200V	Wima
C6		(option 1st Order High Pass)
C7, C8, C9, C10 C11, C12, C19, C20	.1uf/63V	Wima
C13, C14, C15, C16 C17, C18, C21, C22	10uf/63V	Low Impedance Electrolytic

Semiconductors

IC1	OP27A	Burr Brown Op Amp
IC2	BUF634P	Burr Brown High Speed Buffer
IC3 (n/a for Oris)	BUF634P	Burr Brown High Speed Buffer
IC4	BUF634T	Burr Brown High Speed High Current Buffer
IC5	LM317	Positive Regulator
IC6	LM337	Negative Regulator

Miscellaneous

PCB	Xover Circuit Board (1)
ST	Standoffs & Hardware (4)
RCA	Gold rca jacks (6)
Wire	Teflon OFC hookup Wire

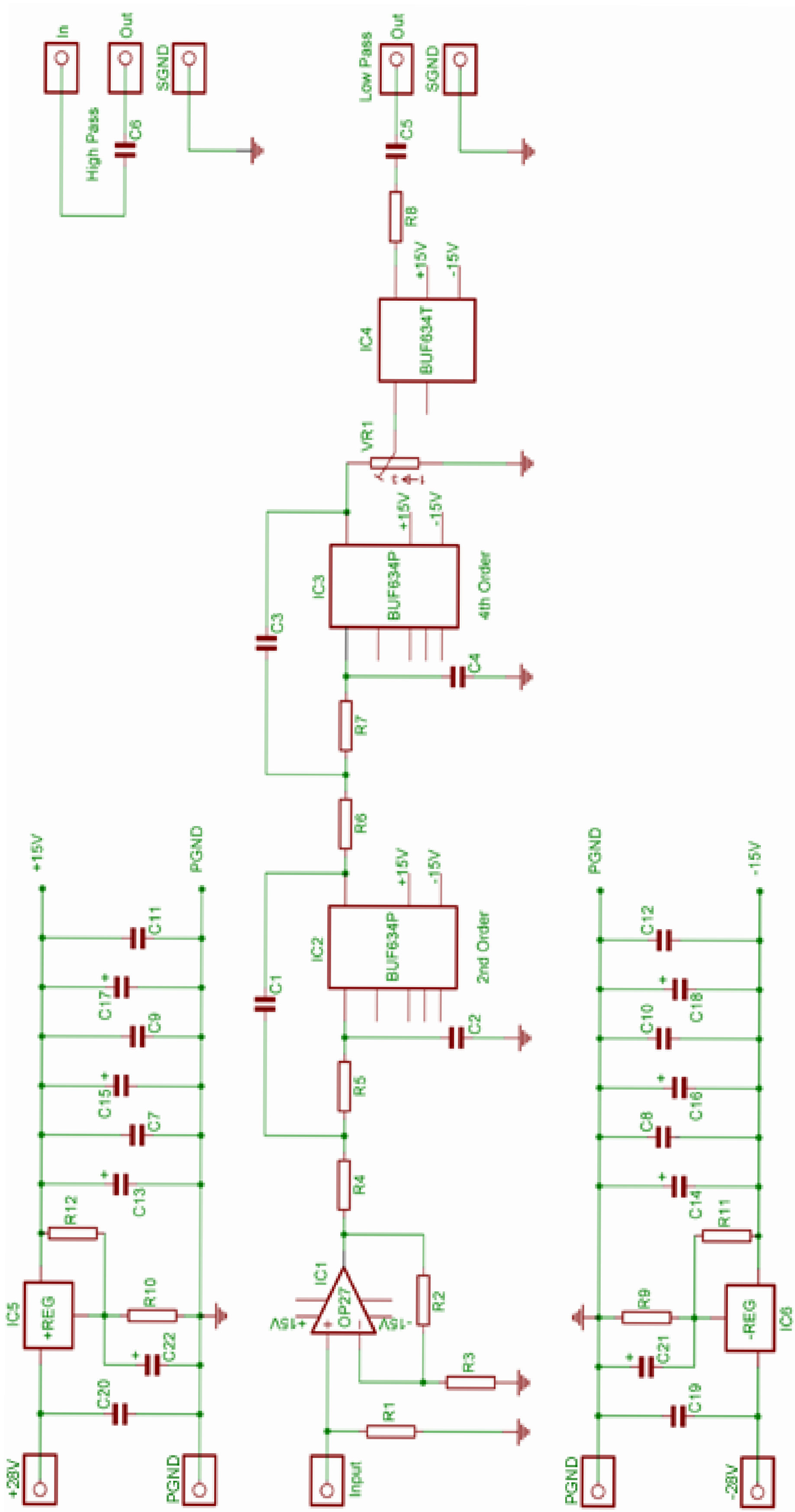

In
Out
SGND
High Pass
C6
Low Pass
Out
SGND
C5
R8
+15V
-15V
IC4
BUF634T
VR1
+15V
-15V
IC3
BUF634P
4th Order
C3
C4
R7
R6
+15V
-15V
IC2
BUF634P
2nd Order
C1
C2
R5
R4
IC1
OP27
+15V
-15V
R2
R3
R1
Input
+15V
PGND
C11
C17
C9
C15
C7
C13
R12
IC5
+REG
R10
C22
C20
+28V
PGND
PGND
-15V
C12
C18
C10
C16
C8
C14
R11
R9
-REG
IC6
C21
C19
PGND
-28V

Figure 1.

Power Supply Parts List (both channels)

Resistors

R1,R2	1kohm	1/2W metal film

Capacitors

C1,C2,C3,C4, C5,C6,C7,C8	.01uf/63V	Wima FKP
C9,C10,C11,C12	3300uf/35V	Elna
C13,C14	.01uf/1000V	Ceramic

Semiconductors

D1,D2,D3,D4, D5,D6,D7,D8	3A/600V	HEXFRED Diodes
LED		Blue Led w/harness (2)

Miscellaneous

T1,T2		Avel toroid power transformer w/screws & nuts (4)
STD		Standoffs (5) with screws (10)
IEC		IEC connector w/screws & nuts (2)
SW1,SW2	SPST	Toggle switch
Fuse	1A/250V	Fuse Holder and Fuse
ICORD		IEC power cord
H/W		Power Transformer Hardware 8-32 x 1/2 (4)
Wire		Hookup wire
CB		Power Supply circuit board (1)

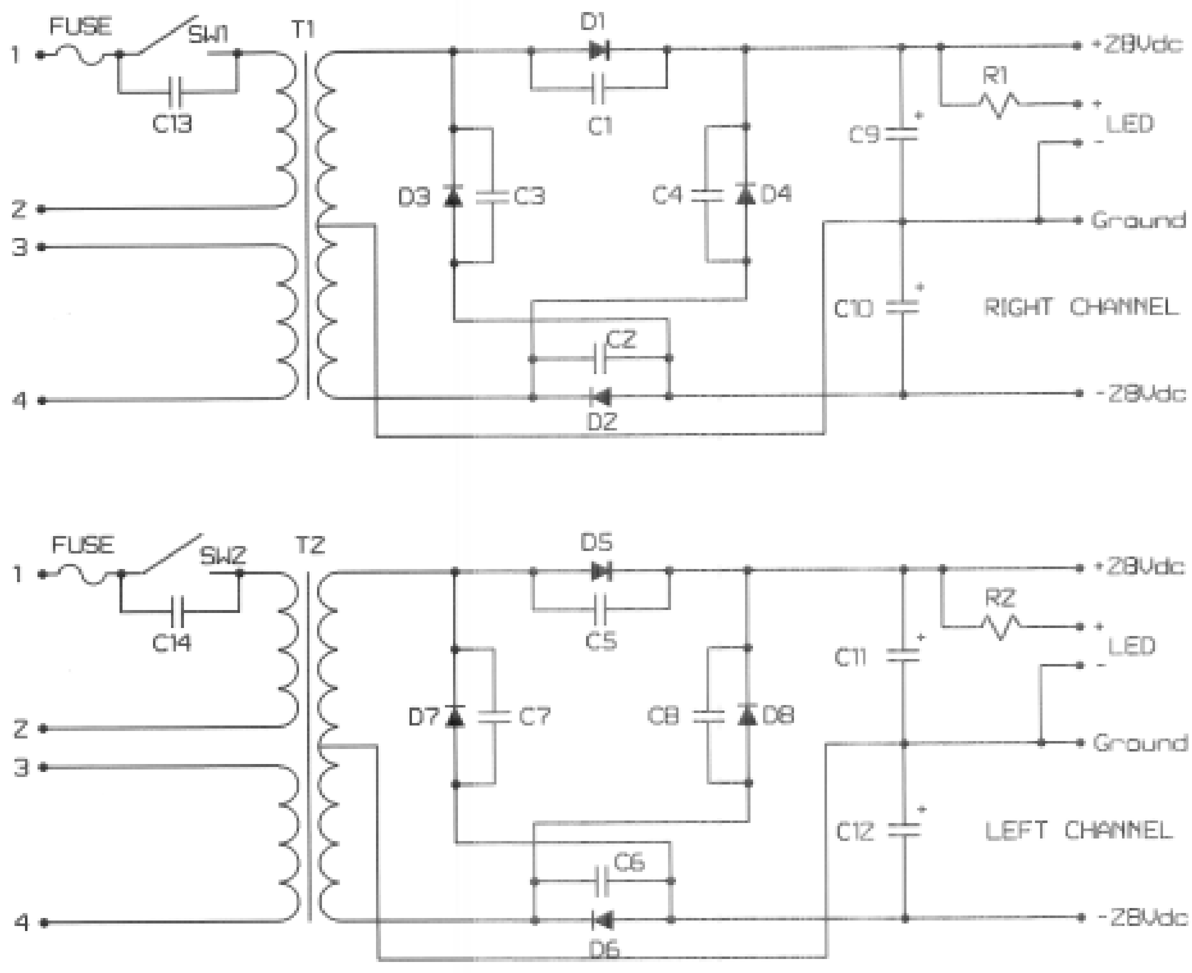

FUSE
SW1
T1
D1
C13
C1
R1
+28Vdc
LED
C9
D3
C3
C4
D4
Ground
C10
RIGHT CHANNEL
C2
D2
-28Vdc
1
2
3
4
FUSE
SW2
T2
D5
C14
C5
R2
+28Vdc
LED
C11
D7
C7
C8
D8
Ground
C12
LEFT CHANNEL
C6
D6
-28Vdc
1
2
3
4

Figure 2.

Power Supply Assembly

Locate the large bag marked “Power Supply Parts”. Check the parts in the bag against the Parts List located on page 10 of this manual. Make sure all parts have been supplied before beginning assembly.

Locate the power supply circuit board. Turn the board upside down so the silver foil traces are visible.

Refering to figure 3, notice there are 6 places where the circuit board traces have been broken. We have labeled them on figure 3 as A, B, C, D, E & F. Some of these broken traces will be bridged depending upon your ac voltage requirements. (*yeah, I know, kind of a Kludge way of doing it, but as you will soon see, space is very tight inside the chassis.*)

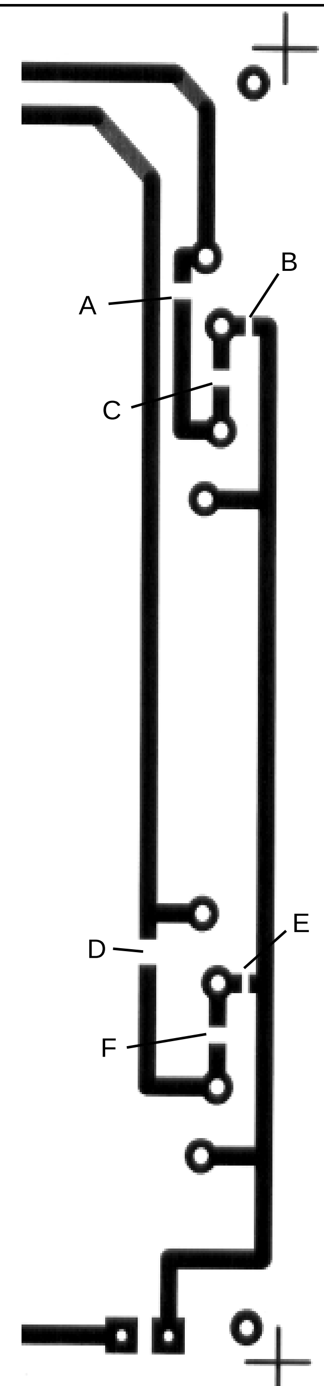


Figure 3.

A small bare piece of wire 1/4 inch in length will be used for each jumper. You can trim off the end of a resistor lead or use some of the solid core wire provided with the kit. You will need to scratch off some of the green solder mask from the circuit traces. Place the jumper across the broken circuit board trace. Place your soldering iron tip on top of the jumper wire and flow solder until a bridge is made. Allow the joint to cool.

For 115Vac operation solder jumpers at locations A, B, D and E only.

For 230Vac operation solder jumpers at locations C and F only.

Next locate the bag marked “R1/R2”. Turn the board over so the white component patterns are visible and locate the positions for R1 and R2. Bend the leads of resistors R1 and R2 and insert these leads through the holes. Push the resistor leads all of the way through the board so that the resistors are mounted flat against the circuit board. Turn the board over and solder the leads. Allow to cool and trim the leads.

Locate the bag marked “C1-C8”. In a similar manner as you installed the above resistors, install these capacitors in their designated locations, turn the board over and solder. Make sure the capacitors are sitting flat on the surface of the circuit board.

Let’s take a quick timeout and make sure you are mounting these parts correctly. Refer to figure 4 below. Are your parts mounted nice and straight? If not resolder them.

Figure 4.

How about your solder joints? You’re not using too much solder are you?

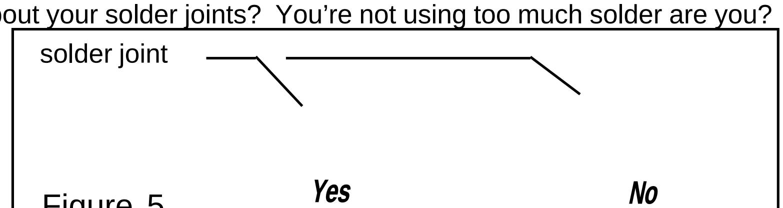


Figure 5.

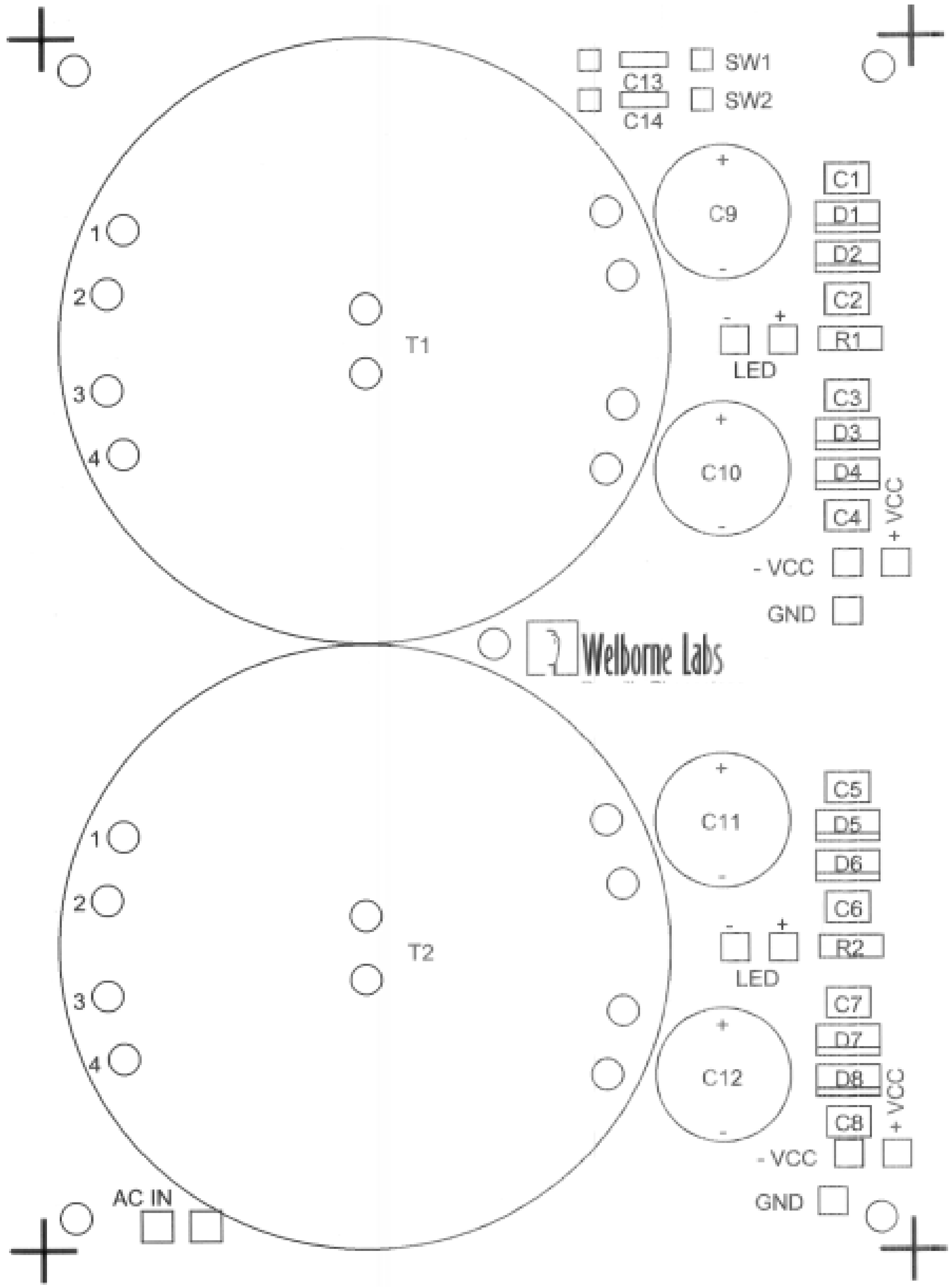

C13
SW1
SW2
C14
C9
C1
D1
D2
C2
R1
LED
1
2
T1
3
4
C3
D3
D4
C10
C4
+ VCC
- VCC
GND
Welborne Labs
C11
C5
D5
D6
C6
R2
LED
1
2
T2
3
4
C7
D7
D8
C12
C8
+ VCC
- VCC
GND
AC IN

Figure 6.

Power Supply Assembly (continued)

There are two pads marked J1 and two marked J2. Use a short piece of wire and jumper these two pads by soldering the wire between them.

Install capacitors C9, C10, C11 and C12. Note the polarity of these components. The negative (-) terminal is identified on the capacitor body by the white stripe. Install and solder.

Install capacitors C13 and C14. These capacitors have no polarity.

Next install the power transformer T1 and T2. The terminals labeled 1 through 4 will be positioned towards the outside of the circuit board. Because of the terminal spacing the transformers can only be installed in the correct direction. Locate the bag marked "H/W" containing four screws. Two of these screws will be installed from the bottom side of the board up through the transformers thereby firmly attaching each transformer to the circuit board. You can now solder the transformer terminals to the circuit board.

Next install the 8 diodes D1-D8. These diodes have polarity and must be installed in the correct orientation. On the component diagram each rectangle, representing the diode, has a smaller rectangle inside it. This smaller rectangle represents the metal tab on the back of the actual diode. So install the diodes so their metal tab is oriented with the smaller rectangle.

Locate the bag marked "STD". Install the 5 standoffs to the circuit board using the chrome plate screws. There is one standoff installed at each corner of the board and one installed in the middle of the board located between the two transformers.

Locate the black teflon coated hook up wire. Cut two pieces 3 inches in length and strip 1/4" of insulation from one end of both wires. Insert these wires through the two pads marked "AC IN", turn the board over and solder. Trim the excess lead wire.

Cut two more pieces of black wire 8 inches in length and strip 1/4" of insulation from one end of both wires. Insert these wires through the two pads marked "GND", turn the board over and solder. Trim the excess lead wire.

Locate the red teflon coated hook up wire. Cut two pieces 8 inches in length and strip 1/4" of insulation from one end of both wires. Insert these wires through the two pads marked "+ VCC", turn the board over and solder. Trim the excess lead wire.

Locate the white teflon coated hook up wire. Cut two pieces 8 inches in length and strip 1/4" of insulation from one end of both wires. Insert these wires through the two pads marked "- VCC", turn the board over and solder. Trim the excess lead wire.

Cut one piece of white hookup wire to a length of 3 inches. Strip 1/4" of insulation from one end, insert into the pad marked "SW1" and solder.

Cut one piece of white hookup wire to a length of 5 inches. Strip 1/4" of insulation from one end, insert into the pad marked "SW2" and solder.

Cut one piece of black hookup wire to a length of 3 inches. Strip 1/4" of insulation from one end, insert into the remaining pad next to C13 and solder.

Cut one piece of black hookup wire to a length of 5 inches. Strip 1/4" of insulation from one end, insert into the remaining pad next to C14 and solder.

Locate the bag marked "LED" and remove the two black/white wire harnesses. Measured from the small black cup end, cut the black and white wire of one harness to a length of 4". Solder this harness to the pads marked "LED" located

Power Supply Assembly (continued)

between C9 and C10. The white wire is inserted into the pad marked " + " and the black is inserted into the pad marked " - ".

Measured from the small black cup end, cut the black and white wire of the remaining harness to a length of 9". Solder this harness to the pads marked "LED" located between C11 and C12. The white wire is inserted into the pad marked " + " and the black is inserted into the pad marked " - ".

This completes the assembly of the power supply circuit board. Turn the board over and closely inspect your solder joints under a bright light. Make sure there are no voids in the solder joints. If there are any voids you can reflow the solder with your soldering iron.

Power Supply Board Installation

Remove the chassis from its box and remove the top cover. Be very careful when handling the chassis and using tools around the chassis so as not to scratch its surface. Refer to figure 7 for the next assembly steps.

On the rear panel, install the IEC connector using the supplied hardware.

Install the fuse holder on the rear panel using the supplied hardware.

Locate the bag marked "RCA". Remove the washers and nut from each RCA jack. Cut 8 pieces of blue Kimber hookup wire to a length of 6" each, strip the ends and solder them into the center barrel on the back of four of the RCA jacks. Solder two of the blue wires into the center barrel of the remaining two RCA jacks.

Locate the two RCA jacks that you soldered the two blue wires to. Cut 2 pieces of black Kimber hookup wire to a length of 6" each, strip the ends and insert them into the small hole on the back plate of the RCA jack and solder. Cut 2 more pieces of black Kimber hookup wire to a length of 6" each, strip the ends and insert them into the other small hole and solder. These two RCA jacks will be designated the "Input Jacks". Temporarily install them onto the rear panel and loosely tighten the nuts. Install two more RCA jacks into the high-pass output rear panel holes and loosely tighten the nuts. One black wire from each of the input jacks will be soldered to its respective (left/right channel) high-pass output jacks so measure and cut each wire to length. Remove the RCA jacks, solder the black wires to the small hole on each jack and allow to cool. Once cooled, you can re-install these jacks and tighten the nuts securely.

Cut 2 more pieces of black Kimber hookup wire to a length of 6" each, strip the ends and insert them into the small hole on the remaining RCA jacks and solder. Cut one extra wire to a length of 8" and solder it into the small hole on the back of one of these RCA jacks.

Install the remaining jacks to the rear panel of the crossover chassis. One teflon washer should be on the outside of the chassis and one washer placed on the inside of the chassis. Note: the washers have very small "shoulders" on one side. This shoulder should be inserted into the rear panel's mounting hole. Normally a red washer should be visible on the outside of the chassis for the "right" channel and a white washer visible for the "left" channel. Tighten the locking nuts securely. The rca jack with the extra ground wire should be installed as one of the Low Pass Output connectors. Route this extra ground wire over to the middle pin of the IEC power connector, strip the end and solder.

Power Supply Board Installation (continued)

Cut a piece of black hookup wire to a length of 2" strip the ends and solder one end to the side terminal of the fuse holder. Solder the other end to the adjacent terminal of the IEC connector.

Locate the power switches SW1 and SW2. Install them on the front panel (don't forget to wear the gloves when handling the chassis) by slowly screwing them into the threaded holes. Try installing the switches first without the jam nuts. Thread the switches as far as they will go. Do not over-tighten and strip the threads. The goal is to have the switch tight enough that it won't become loose and rotate but you also want the switch oriented such that the body of the switch is vertical. If you are unable to position all of the switches vertically and secured tightly, remove the switches and install one jam nut onto the threaded bushing of the switch. Then install the switches back into the panel. By adjusting the jam nuts you will eventually be able to position the switches vertically and secured tightly. Make sure all of the switch toggles protrude out in front of the panel approximately the same distance. *This procedure will be a very iterative process but patience will pay off. If you run out of patience, you can cheat by applying a very very small amount of super glue to the threads at the base of the switch. Caution: too much glue and you may not be able to remove the switch should you need to.* Install the front panel onto the chassis.

Now we are ready to install the power supply circuit board. Position the board as shown in figure 7.

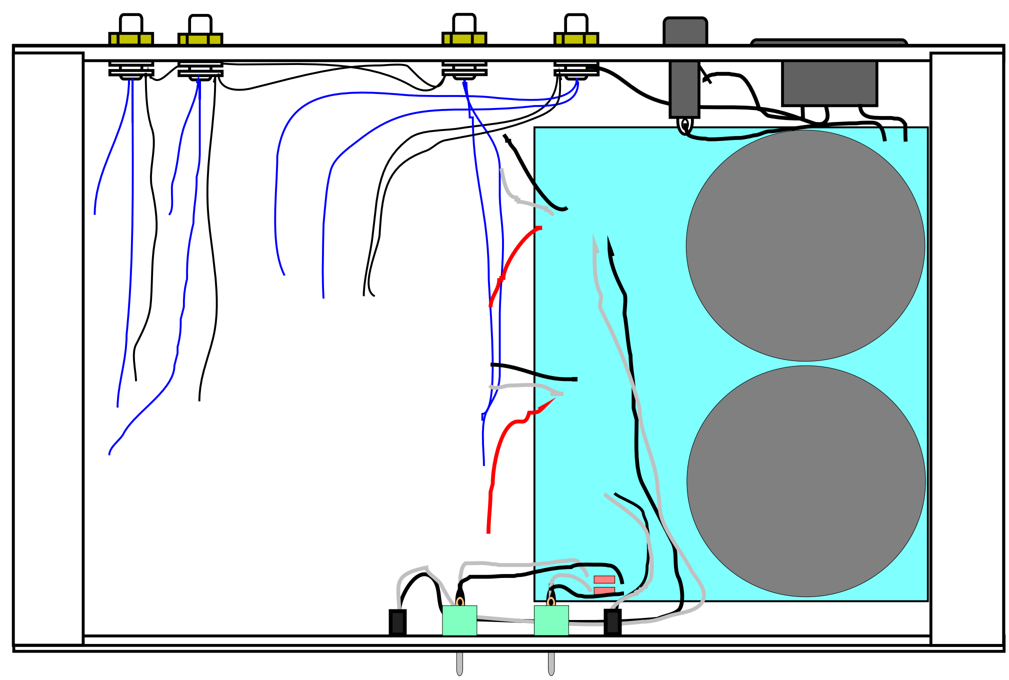


Figure 7.

Use the black screws to secure the power supply board. Feed them from the bottom of the chassis and into the plastic standoffs on the bottom of the circuit board.

Solder one wire from the pad marked "AC IN" to the remaining unused IEC terminal. Solder the other "AC IN" wire to the rear terminal of the fuse holder.

Locate the white wire and black wire emerging from each side of capacitor C13 on the circuit board. Twist these two wires together and route towards the "right" channel power switch. Cut the wires to proper length and solder the black wire to the center terminal on the back of the switch and the white wire to the bottom terminal.

Power Supply Board Installation (continued)

Locate the white wire and black wire emerging from each side of capacitor C14 on the circuit board. Twist these two wires together and route towards the “left” channel power switch. Cut the wires to proper length and solder the black wire to the center terminal on the back of the switch and the white wire to the bottom terminal.

Install the LEDs into the front panel. The LEDs are a “press fit” so push them in as far as they will go without exerting too much force. You will note that the LED has a long lead and a short lead. The long lead is the positive terminal the short lead the negative. Install the LED harness by inserting the LED leads into the black connector cup. The positive LED lead corresponds to the white wire on the LED harness and the negative lead is the black wire. You may need to shorten the LED leads so that the black connector cup can be pushed up flush to the back of the rear panel. A very tiny drop of super glue added to the connector cup lip will firmly hold it against the rear of the front panel. Don’t use too much in case you need to remove the LED at a later date.

You are now ready to test the power supply operation. Install the fuse in the fuse holder. Place the power switch toggles in the “down” position. Install the power cord and plug it into an ac outlet.

Test one channel at a time and use a volt meter to measure the voltages. Test the right channel first. Set the meter for DC volts at a scale of 30 volts or greater. Connect the red (+) test probe of the voltmeter to the yellow wire (+VCC) and the black (-) test probe of the meter to the black wire (GND). Flip the power switch. You should measure approximately 28 volts +/- 0.5 volts. Disconnect the red test probe, change the polarity of your meter and then connect this probe to the white wire (-VCC). You should measure 28 volts once again. Turn off this channel and allow the voltage to drain down to zero volts. Make sure both the +28 volts and -28 volts drain down to zero volts.

Repeat the above procedure for the left channel.

Troubleshooting Problems

Did you have any problems with the above measurements?

Did the LEDs turn on? If not, maybe you got the polarity reversed.

Did any capacitors explode? If yes, after changing your underwear, go back and check the polarity, you most likely have the capacitor installed backwards.

Other problems? Give us a call or e-mail.

Crossover Board Assembly

There are two completely separate crossover channels located on one circuit board (left and right channel). The directions will be given for the assembly of one channel. Repeat these instructions for the second channel.

Install the 4 plastic standoffs, one on each corner of the board, using the chrome plated screws.

Note: This circuit board uses "plated-thru" holes. Basically what this means is; there are two pads for every component lead, one on top of the board and one directly beneath it on the bottom of the board. These pads are electrically connected to each other thru the board via a copper barrel. Therefore it is not necessary to solder each component lead to the top and bottom pads as soldering the lead to one pad will automatically insure that it is electrically connected to the other pad.

It is recommended to start the assembly of the board with the voltage regulators and then test its operation before proceeding. Install the following regulator parts: R9, R10, R11, R12, C7, C8, C13, C14, C19-C22, IC5 and IC6. Note that capacitors C13, C14, C21 and C22 have polarity and the negative terminal is identified by the gold stripe on the capacitor's side.

Temporarily connect the power supply to the crossover board. We recommend you use jumper clips as opposed to soldering wires to the pads. The +VCC output on the power supply board connects to the +28V pad on the crossover board. The -VCC output on the power supply board connects to the -28V pad on the crossover board. The GND output on the power supply board connects to the PGND pad on the crossover board.

Power up each channel and measure the dc voltages. Connect the red (+) test probe of your meter to the resistor lead of R12 on the side closest to C5. Connect the black (-) test probe to ground. You should measure 15 volts. Turn off the power.

Reverse the polarity on the meter and connect the red (+) test probe to the resistor lead of R11 on the side opposite of C21 Connect the black (-) test probe to ground. You should measure 15 volts.

If the above voltages test OK you can proceed with the installation of the remaining components.

We generally install the low profile components first (resistors, opamps, etc.) followed by the high profile components (capacitors, high current buffer, etc.). Note that capacitors C15-C18 have polarity and the negative terminal is identified by the gold stripe on the capacitor's side. Note: the opamps IC1, IC2 and IC3 have a notch on one end of their package. This notch corresponds to the one depicted in figure 8 and indicates the correct orientation for these devices.

IC3 is not used in the Oris Horn application and therefore a jumper wire will be used to connect the output of IC2 to the level control VR1. This jumper wire will be soldered to the bottom of the circuit board. Cut a small piece of wire approximately 2 inches in length. Strip 1/8" of insulation from one end and solder it to the pad of resistor R6 that is connected to pin 6 of IC2. Cut the wire to proper length, strip 1/8" of insulation from the opposite end and solder it to one of capacitor C3's pads that connect to pin 6 of IC3.

If you will be using the series in-line capacitor C6 to create a passive 1st order filter, install this capacitor now. If you will not be using C6, solder a wire in its place.

This concludes the assembly of the crossover circuit board. Now is a good time to inspect all solder joints under a bright light.

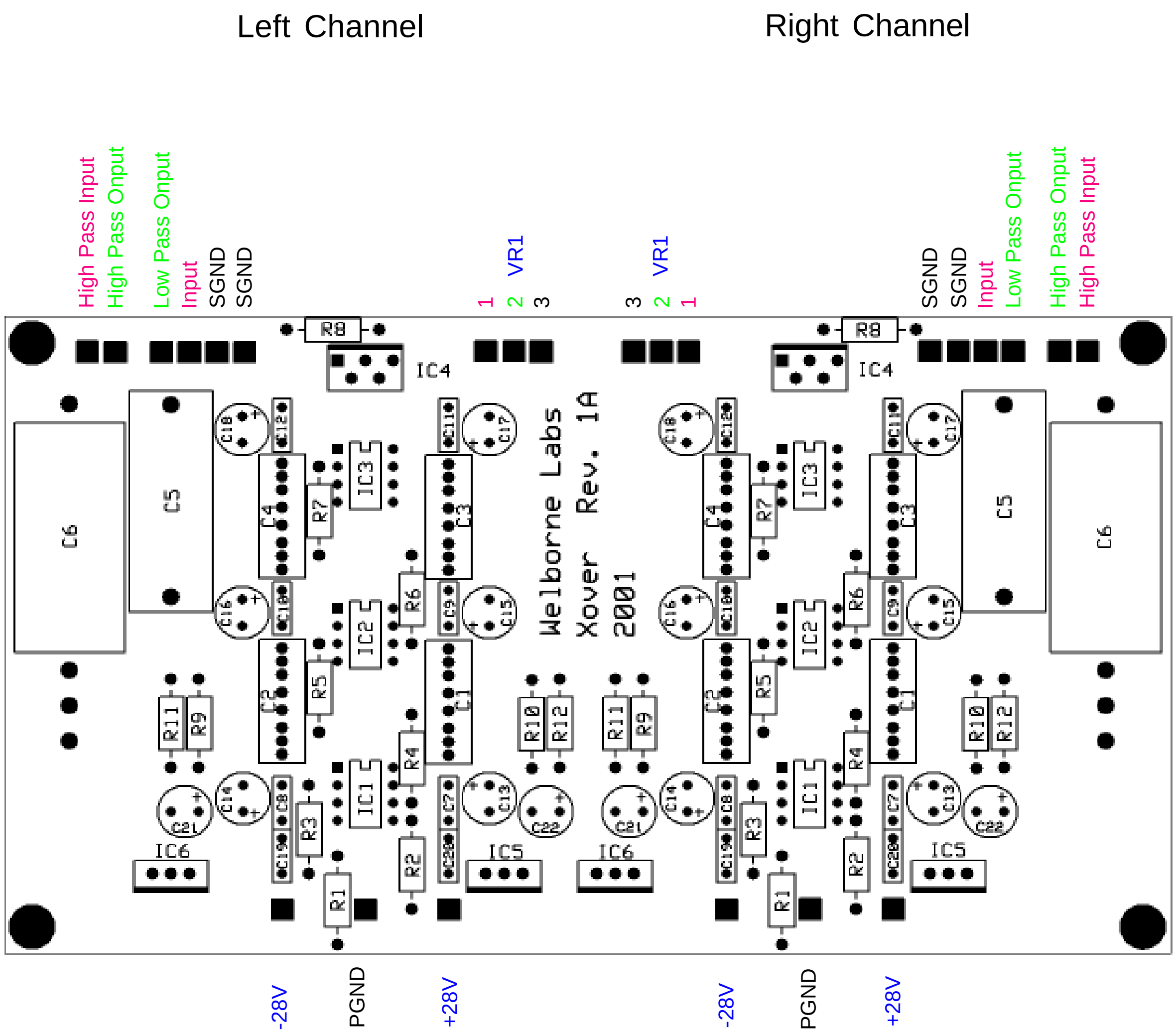

Left Channel
Right Channel
High Pass Input
High Pass Onput
Low Pass Onput
Input
SGND
SGND
1
2
3
VR1
3
2
1
VR1
SGND
SGND
Input
Low Pass Onput
High Pass Onput
High Pass Input
Welborne Labs
Xover Rev. 1A
2001
-28V
PGND
+28V
-28V
PGND
+28V

Figure 8.

Crossover Board Assembly (continued)

Locate the level control VR1 and the 28ga. hookup wire. Cut two pieces of each color to a length of 1.5" each. Strip the ends and solder to the level control VR1 and shown below in figure 9.

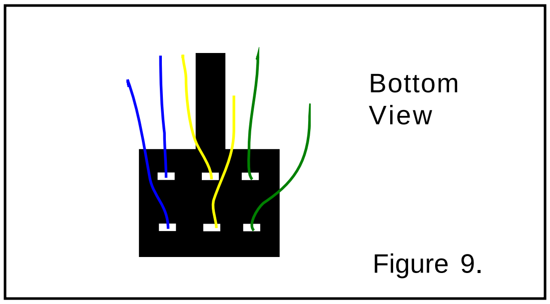


Figure 9.

Install the level control to the circuit board as shown in figure 9B. We have provided a pot with an extra long shaft to possibly make it easier for you to reach around the back of the chassis and adjust the low pass gain. Once you achieve the correct gain match between the high pass and low pass sections you shouldn't have to adjust the gain again. Thus we have positioned this pot on the rear of the unit to preserve the front panel cosmetics. You can shorten the shaft of the pot if you like. You can also drill a hole in the front panel and mount the pot up front for easier access if you prefer.

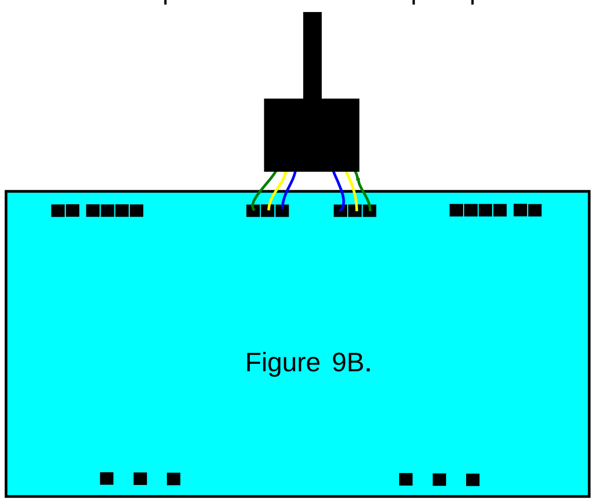


Figure 9B.

It is now time to install the circuit board into the chassis. Refer to figure 8 and 10 for the following assembly steps.

Install the board and secure the standoffs with the supplied screws. Secure the level control.

Connect the power supply wires and solder. These wires can be installed on the top side of the board and soldered from the top as well.

Install the Input wires and solder. Once again, these may be soldered from the top side of the board. One blue input wire connects to the "Input" pad and the other blue wire connects to the "High Pass Input" pad. Be careful not to burn any adjacent components with your soldering iron. Solder the input ground wire to the left and right pads marked SGND.

Install the high pass output wires and solder.

Install the Low Pass Output wires and solder. Solder the Low Pass ground wire to the remaining left and right pads marked SGND.

That completes the assembly of the Reveille Active Crossover.

Refer to page 6 for the Setup and Operation procedures.

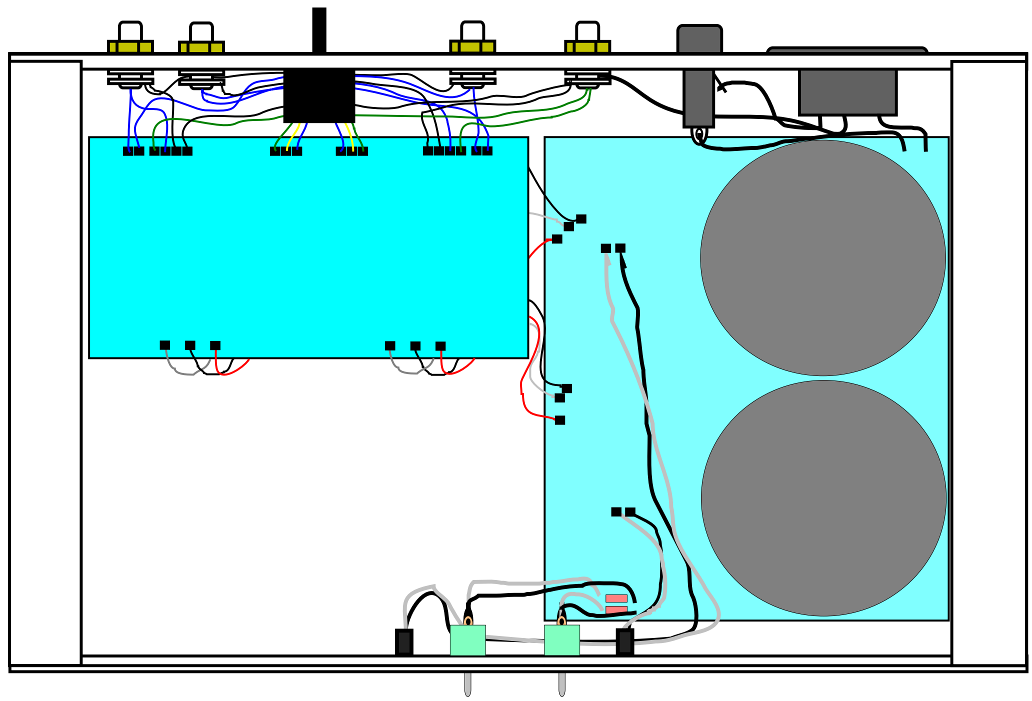


Figure 10.

If you have difficulty building or troubleshooting your equipment, give us a call. We will be glad to help you get your equipment running. We have a very high success rate at troubleshooting equipment problems over the telephone however phone calls can be expensive and they will be on your nickel, not ours. A letter or e-mail might be more appropriate, but in either case it will help if you have taken the time to write down as many symptoms as possible and also take and record some resistance measurements at key nodes in the circuit. If all else fails, you can send your crossover to us, however this should be your last resort.

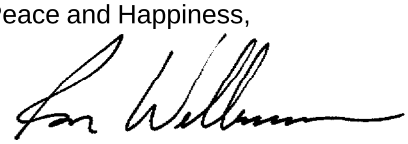
We have built and tested this crossover many times over and it works and therefore we have to assume that if your crossover does not work, it is most likely something you did wrong during assembly. Please be prepared to pay a flat rate fee of $35 per hour for repairs. Assuming you did a good job of assembling the unit but overlooked a step or installed a component incorrectly, our repair time should be minimal and your charges will most likely be under $100.00. Whatever the case may be, don't give up, please give us a call. We really want you to complete this project.

Final Notes

The Reveille Crossover is designed to require a minimum amount of maintenance. A light application of a window cleaner, such as Windex, 409, etc., can be used to remove dust, dirt and fingerprints from the chassis. I recommend you ocassionally clean the rca connectors with a good quality cleaner/conditioner.

Have fun with your experimentation and listening. I hope you receive many years of enjoyment from your purchase.

Peace and Happiness,



Ron Welborne