RIVERA MUSIC SERVICES

MODULE AR-343

DUAL VC AMPLIFIERS ASSEMBLY INSTRUCTIONS

IT IS RECOMMENDED THAT YOU DO THE FOLLOWING BEFORE YOU PROCEED:

* Find a place where you can work through to completion without disturbing your set-up.
* Use adequate lighting.
* Wash your hands before starting. This removes contaminating oils and perspiration and makes assembly more comfortable.
* Check off each step with a pencil as you proceed

PLEASE ALSO READ THE GENERAL ASSEMBLY INSTRUCTIONS BEFORE BEGINNING THE ASSEMBLY OF THIS MODULE.

PRINTED CIRCUIT BOARD ASSEMBLY INSTRUCTIONS

( ) A. PREPARATION:
Lay the circuit board down on a sheet of white paper. PLACE THE METAL FOIL SIDE DOWN! Turn board so that connector strip is on top.
Place the AR-343 Component Layout Diagram near the board so that it can be viewed during assembly.
Unpack the parts carefully and place in a large box or tray SO THEY WON'T GET LOST.

HAVE THE FOLLOWING TOOLS NEARBY:

* Pencil tip soldering iron, 25 watt, hot and tinned (solder coated)
* Solder; USE ONLY THIN ROSIN-CORE SOLDER! (SN60, 22 AWG)
* Small diagonal wire cutters
* Small wire strippers
* Small long-nose pliers
* No. 1 Phillips screw driver.
* ½" or #16 nut driver
* 5/16" or #10 nut driver
* ¼" or # 8 nut driver
* 1/16" hex driver

A pair of household pliers can be substituted for the nut drivers but will not be as easy to use and may scratch the front panel.

( ) B. Mount all four 50K ohm trimpots as shown on the Component Layout Drawing. Bend the larger leads down so that they touch the circuit board foil. Solder the leads.

C. Mount the integrated circuits paying particular attention to their orientation. The notch in the IC package and/or the dot in the upper left hand corner should correspond with the indication on the AR-343 Component Layout Drawing.

( ) 1. Mount the four 1458 dual op-amps U3,3,4,4, and solder.
( ) 2. Mount the two TL082 dual op-amps U2,2 and solder.
( ) 3. Mount the SSM 2020 dual VCA U1 and solder.

D. Carefully install all resistors on the circuit board. Double check your installation against the P.C. board component layout drawingto be sure that the correct value is in the correct location. To prepare the resistor for insertion hold the body of the resistor between the thumb and index finger of your left hand. With the thumb and index finger of your right hand bend both leads of the resistorat once to form right angles with the body. The resistor will now insert easily into the P.C. board. Once the resistor is inserted, bend the leads on the foel side outward to hold the resistor in place. Solder the resistors to the board and cut the leads about 1/16 of an inch away from the board. For ease in reading the resistor values after installation, install the resistors with the gold band facing either the bottom or the right hand side of the board.

( ) 1. Mount all twenty 100K resistors, brown black yellow, R7,7,8,8,11,11, 12,12,14,14,16,16,21,21,22,22,25,25,27,27. Solder and cut the leads.
( ) 2. Mount all six 270K resistors, red violet yellow, R 4,4,23,23,28,28. (Solder and cut the leads after installing each value.)
( ) 3. Mount all four 1K resistors, brown black red, R 1,1,20,20.
( ) 4. Mount all four 47 K resistors, yellow violet orange, R5,5,2,2.
( ) 5. Mount all four 150K resistors, brown green yellow, R 10,10,13,13.
( ) 6. Mount all four 1M resistors, black brown green, R 3,3,17,17.
( ) 7. Mount both 3.3K resistors, orange orange red, R 6,6.
( ) 8. Mount both 3.9K resistors, orange white red, R 19,19.
( ) 9. Mount both 19.1K 1% resistors, brown white brown red, R 15,15.
( ) 10. Mount both 22K resistors, red red orange, R 24,24.
( ) 11. Mount both 3.3M resistors, orange orange green, R 26,26.
( ) 12. Mount both 10M resistors, brown black blue, R 18,18.

E. Install both jumpers.

( ) 1. Use 1.25 inches of 22 ga. bus wire to install J1. Solder and cut the leads.
( ) 2. Use 1 inch of 22 ga. bus wire to install J2. Solder and cut the leads.

F. Mount all six diodes. Orient the black band on each diode as shown in the drawing.

G. Install the capacitors.

( ) Mount both 22pf disc capacitors C1,1.
( ) Mount both 5pf disc capacitors C2,2.
( ) Mount both 1uf tantalum capacitors C3,4. Observe the polarity of the two tantalum capacitors when mounting. The positive lead is the lead closest to the red dot or "+".

( ) H. Snap both wire saddles into the PC board with the loop on the component side of the board. Orient as shown in the drawing.

This completes the assembly of the printed circuit board. For the time being, lay it aside and go on to the next section.

FRONT PANEL ASSEMBLY

( ) A. Install the jacks orienting them as shown on the Front Panel Wiring Diagram. Consult the drawing so that the tip and shunt of the jacks are in the correct position. Mount the washers on the front side of the face panel, mount the nuts onto the bushings and tighten the nuts with the #10 nut driver. Be careful to not mar the face panel or the nuts.

B. Install the jack grounds. First, carefully unfold the bus wire so that no sharp kinks are formed. Then grip one end with pliers and pull the wire through your fingers to smooth and straighten the wire.

( ) 1. Insert a 5.5 inch length of 22 gauge bus wire through the ground terminals of jacks X Audio 1, X Audio 2, X AM 1, and X AM 2. Pull the wire through until only 1 inch of wire protrudes beyond the top terminal of jack X Audio 1.

( ) 2. Bend the protruding inch of wire to the left and connect it to the top ground terminal of Y Audio 1.

( ) 3. Bend the lower portion of the bus wire to the left and connect it to the lower ground terminal of Y Out 2. Be sure the bus wire touches the lower ground terminals of jacks X Out 2 and Y AM 2. The wire will later be soldered to the ground terminals of these jacks.

( ) 4. Insert a 3.5 inch length of 22 gauge bus wire through the ground terminals of jacks Y Audio 1 and Y Audio 2; and through the top terminal only of Y AM 1.

( ) 5. Pull the wire almost all the way through and connect the top end of the wire to the top ground terminal of Y Audio 1.

( ) 6. Bend the lower portion of the bus wire to the left and connect it to the top ground terminal of Y Out 1. Be sure the bus wire touches the upper ground terminals of jacks X Out 1 and Y AM 1.

( ) 7. Solder the ground terminal of the jacks as follows. Solder the lower terminals of all the jacks with the exception of these three, Y AM 1, X Out 1, and Y Out 1. On these three jacks solder the upper terminal.

C. Install the pots. First prepare the pots for installation by bending the pot terminals so they form a 90 degree angle. If the pots have a small flange which prevents them from being mounted flush against the face panel, bend the flange back and forth with pliers until the flange breaks off. Place a thick lockwasher over the shaft of the two single pots before installing them on the panel. Place a thin lockwasher over the shaft of the four lower dual pots. (Consult the Front Panel Wiring Diagram for the correct part numbers of these pots.) The two upper dual pots will not receive a lockwasher. Insert the shafts of the pots through the panel from the rear. Place the nut over the shaft and tighten with a #16 nut driver. Make sure the pot terminals line up as shown in the front panel wiring diagram.

1. Mount the AM1/Amplitude pots for both channels. (100K dual linear, EF 1869) These two pots will be removed later when the panel is assembled to the frame. Tighten the nuts just enough to secure the pots so that they don't rotate when you wire them. The remaining pots should be tightened fully.
2. Mount the AM2 pots for both channels. (100K linear, FM7922)
3. Mount the Offset/Lin-Exp pots for both channels. (100K dual linear, EF1869)
4. Mount the Audio1/Audio2 pots for both channels. (100K dual log, EF1870)

D. Install the ground jumpers on the dual pots. Cut six 1 inch pieces of 22 gauge bus wire. Using one wire for each pot, make the following connections for both channels.

Channel X

( ) 1. Connect the counter-clockwise terminal of P1, CCW-P1, to the counter-clockwise terminal of P2, CCW-P2. Solder CCW-P1 only.

( ) 2. Connect the counter clockwise terminal of P3, CCW-P3, to the center tap of P4, CT-P4. Solder CCW-P3 only.

( ) 3. Connect the counter clockwise terminal of P6, CCW-P6, to the counter-clockwise terminal of P7, CCW-P7. Solder CCW-P6 only.

Channel Y (The same connections will be made on the Y channel as on the X.)

( ) 4. CCW-P1 to CCW-P2. Solder CCW-P1 only.

( ) 5. CCW-P3 to CT-P4. Solder CCW-P3 only.

( ) 6. CCW-P6 to CCW-P7. Solder CCW-P6 only.

E. Install the jack to jack jumpers. When connecting insulated wires, strip no more than 3/16 of an inch of insulation from the measured length of wire. Twist the strands of wire together to form a single tight unit. Cut off any excess wire after the connection has been made and soldered. Run each wire straight down to the panel surface and them over to the next terminal to which it is to be connected. After each wire has been connected it should be madeto rest flat against the surface of the panel. When soldering to the tip terminals of the jacks, make sure that no solder or solder flux flows down into the jack. If this happens the normalling connections inside the jack could become intermittent at a later date. Either be careful or stand the panel on its side when soldering.
N.B. All specified wire lengths allow for the stripping of up to 1/4 inch of insulation from each end.

( ) 1. Connect a 1.5 inch piece of brown wire to the tip of X Audio 1 and then to the shunt of Y Audio 1. Solder only the shunt of Y Audio 1.

( ) 2. Connect a 1.5 inch piece of orange wire to the tip of X Audio 2 and then to the shunt of Y Audio 2. Solder only the shunt of Y Audio 2.

( ) 3. Connect a 1.25 inch piece ofwhite wire to the tip of Y Out 1 and then to the tip of Y Out 2. Solder only the tip of Y Out 2.

( ) 4. Connect a 1.25 inch piece of white wire to the tip of X Out 1 and then to the tip of X Out 2. Solder only the tip of X Out 2.

F. Install pot grounds. For each channel we will thread a single piece of bus wire through all the appropriate terminals to be grounded on each set of pots. When finished the wire should lie exactly as shown on the front panel wiring diagram.

Channel X

1. Attach a 9.75 inch length of 22 ga. bus wire to the CCW terminal of P7. Crimp and solder. Pass the free end across the back of the pots and through the CCW terminal of P5. Allow about 6.5 inches of wire to protrude beyond the CCW terminal. Bend the wire protruding from the CCW terminal of P5 up and back so it lies across the back of the pots. Crimp the bus wire tightly around the terminal and solder.
2. To connect the next pot, pass the free end of the wire extending from the CCW of P5 across the back of the pots and through the CT terminal of P4. This time allow 4.5 inches to protrude beyond the CT terminal. Bend the wire up and back, and crimp and solder as above.
3. To connect the last pot, Use the same technique to connect the bus wire to the CCW of P2 allowing 3.25 inches to project beyond the terminal. Bend, crimp, and solder as above.
4. Bring the wire from the back of P2 straight down to the face panel, then across and up to the upper ground terminal of the X Audio 1 jack. Crimp but do not solder.

( ) 5. Flatten the wire loops against the backs of the pots as shown in the front panel wiring diagram. Be sure that the bus wire is not touching any of the other pot terminals.

Channel Y

To connect the pot grounds, attach a 11.75 inch length of 22 ga. bus wire to the CCW of P7 and follow the procedure that was used to wire channel X. the lengths of wire that should protrude beyond the pot terminals are listed below - some lengths are different:

( ) 6. CCW-P5 6.5 inches
( ) 7. CT-P4 5.5 inches
( ) 8. CCW-P2 4.0 inches
( ) 9. After making the connection to the CCW terminal of P2, Xonnect the wire to the upper ground terminal of the Y Audio 1 jack. Crimp and solder. As with channel X, bring the wire straight down to the face panel, then over and up to the jack ground terminal. Solder this connection.
( ) 10. Flatten the wire loops against the backs of the pots.

G. Install the pot to pot connections. N.B All wire lengths are calculated to allow the wire to run flat against the surface of the front panel.

( ) 1. Connect a 3.25 inch piece of red wire from the CW-P3(X channel) to the CW-P7(X channel). Solder CW-P3 only.
( ) 2. Connect a 5.75 inch piece of red wire from CW-P7(X channel)to CW-P7 (Y channel). Solder CW-P7(X channel) only.
( ) 3. Connect a 3.25 inch piece of red wire from the CW-P7(Y channel) to the CW-P3(Y channel). Solder CW-P7(Y channel) only.

H. Install the wires connecting the jacks to the pots. Solder each connection after it's been made.

Channel X

( ) 1. Connect a 2.5 inch piece of brown wire from the tip of the XAudio 1 jack to the CW terminal of P1.
( ) 2. Connect a 4.25 inch piece of orange wire from the tip of X Audio 2 to the CW terminal of P2.
( ) 3. Connect a 6.5 inch piece of yellow wire from the tip of X AM 1 to the CW terminal of P6.

Channel Y

( ) 4. Connect a 5 inch piece of brown wire from the tip a Y Audio 1 to the CW terminal of P1.
( ) 5. Connect a 6.25 inch piece of orange wire from the tip of Y Audio 2 to the CW terminal of P2.
( ) 6. Connect an 8.25 inch piece of yellow wire from the tip of Y AM 1 to the CW terminal of P6.

I. Install the pot to PC board wires. Solder each connection as it is made. Cut off any excess wire.

( ) 1. Connect a 7 inch piece of red wire to CT-P7.
( ) 2. " " 7 " " yellow " " CT-P6.
( ) 3. " " 5.5 " " violet " " CT-P5.
( ) 4. " " 4.5 " " violet " " CW-P5.
( ) 5. " " 3.75 " " white " " CCW-P4.
( ) 6. " " 3 " " black " " CW-P4.
( ) 7. " " 4 " " red " " CT-P3.
( ) 8. " " 4.5 " " orange " " CT-P2.

( ) 9. Connect a 5 inch piece of brown wire to the CT-P1.

Channel Y

( ) 1. Connect a 6 inch piece of red wire to the CT-P7.
( ) 2. " " 6 " " yellow " " CT-P6.
( ) 3. " " 3.75 " " violet " " CW-P5.
( ) 4. " " 5.75 " " violet " " CT-P5.
( ) 5. " " 4 " " black " " CW-P4.
( ) 6. " " 5 " " white " " CCW-P4.
( ) 7. " " 5.75 " " red " " CW-P3.
( ) 8. " " 9.25 " " red " " CT-P3.
( ) 9. " " 6.75 " " orange " " CT-P2.
( ) 10. " " 8 " " brown " " CT-P1.

J. Install the jack to printed circuit board wires.
(Remember not to let the solder or flux flow down into the jack.)

( ) 1. Connect a 8.5 inch piece of black wire to the top ground terminal of the X Audio 1 jack.
( ) 2. Connect a 6.5 inch piece of yellow wire to the tip of X AM 1.
( ) 3. " " 5 " " green " " tip " X AM 2.
( ) 4. " " 7 " " blue " " shunt " Y AM 1.
( ) 5. " " 5.5 " " grey " " shunt " Y AM 2.
( ) 6. " " 8 " " green " " tip " Y AM 2.
( ) 7. " " 7 " " white " " tip " X Out 1.
( ) 8. " " 11 " " white " " tip " Y Out 1.

K. Install the cable ties.

Channel X

( ) Pull all nine wires from the X Channel pots straight back away from the panel. Then, bend them down over the back of the pots toward dual pot P1/P2 (X channel). Also bring the following six jack wires over to dual pot P1/P2 (X channel).

( ) 1. Blue wire from jack Y AM 1.
( ) 2. Yellow wire from jack X AM 1.
( ) 3. Grey wire from jack Y AM 2.
( ) 4. Green wire from jack X AM 2.
( ) 5. White wire from jack X Out 1.
( ) 6. Black wire from jack X Audio 1.

( ) Now bend all 15 wires up 90 degrees from dual pot P1/P2 and attach a cable tie around the wires about ½ inch above the back of P2. Tighten the tie and clip the excess plastic.

Channel Y

( ) Pull all ten wires on the Y channel pots straight back away from the panel and bend them over the backs of the pots toward pot P5 (Y channel). Also bring the green wire from jack Y AM 2 and the white wire from jack Y Out 1 over to pot P5. Bend all 12 wires up 90 degrees from pot P5 and attach a cable tie around the wires about ½inch above the back of P5. Tighten the tie and clip the excess plastic.

Make sure the terminals on the pots are still at right angles to the panel. If they are not straighten them so that they are. No portion of the assembly should extend over the edges of the front panel.

This completes the assembly of the front panel. Lay it aside for the time being.

FINAL ASSEMBLY INSTRUCTIONS
Please refer to the module assembly drawing.

Install the front panel and the printed circuit board onto the frame.

( ) 1. Snap the two plastic card guides into the holes in the frame. Be sure that the pairs of tabs point toward the rear as shown.

( ) 2. Slide the printed circuit board into the frame. holding top and botom of the frametogether against the board. The board will fit snugly into the card guides between the tabs.

( ) 3. Using the 4-40 x 3/8" screws and nuts, mount the two angle brackets to the frame as shown. The brackets should be on the component side of the board. The nuts should be on the inside of the frame against the bracket.

( ) 4. Now screw the board to the brackets. Insert the 4-40 x 3/8" screw from the foil side of the board.

( ) 5. Mount the top of the front panel to the frame by using the two upper pots as follows. First remove the two upper pots from the front panel. Let them hang by their wires. Insert the pot shafts From behind, insert the two pot shafts through the two large holes at the top of the frame. Now place the front panel against the frame so the pot shafts extend through the two AM 1 / Amplitude holes in the front panel. Replace the nuts over the shafts and tighten firmly. Prevent the pots from rotating as you are tightening them by holding them carefully with your fingers or a pair of large pliers. Make sure the pot terminals remain oriented as shown on the front panel wiring diagram.

( ) 6. Attach the bottom of the panel to the frame using the remaining 4-40 x 3/8" screws and nuts.

Wire the front panel to the printed circuit board. Connect the wires from the face panel to the board in the order given below. Strip each wire, pass it through the appropriate wire saddle, and solder the wire to the board. un the wires around the periphery of the board whenever possible. Wiring the board neatly will facilitate trimming and troubleshooting.

Run these wires through Channel X wire saddle to the X side of the board.

( )	1.	Connect a	black	wire from	P4	to board	Lin.
( )	2.	"	violet	"	CW-P5	"	Lin/Exp.
( )	3.	"	blue	"	Jack Y AM 1	"	Y AM 1 shunt.
( )	4.	"	white	"	P4	"	Exp.
( )	5.	"	yellow	"	jack X AM 1	"	X AM 1 tip.
( )	6.	"	grey	"	jack Y AM 2	"	Y AM 2 shunt.
( )	7.	"	green	"	jack X AM 2	"	X AM 2 tip.
( )	8.	"	red	"	P3	"	Offset.
( )	9.	"	violet	"	CT-P5	"	AM 2.
( )	10.	"	yellow	"	P6	"	AM 1.
( )	11.	"	red	"	P7	"	AMPL.
( )	12.	"	orange	"	P2	"	AUD 2.
( )	13.	"	brown	"	P1	"	AUD 1.
( )	14.	"	white	"	jack X Out 1	"	OUT X.
( )	15.	"	black	"	jack X Audio 1	"	M GROUND.

Run these wires through the channel Y wire saddle to the Y side of the board.

( )	1.	Connect a	green	wire from	jack Y AM 2	to board Y AM 2 tip.
( )	2.	"	red	"	CT-P3	" OFFSET.
( )	3.	"	black	"	P4	" Lin.
( )	4.	"	violet	"	CW-P5	" Lin/Exp.
( )	5.	"	white	"	P4	" Exp.
( )	6.	"	violet	"	CT-P5	" AM 2.
( )	7.	"	yellow	"	P6	" AM 1.
( )	8.	"	red	"	P7	" AMPL.
( )	9.	"	orange	"	P2	" AUD 2.
( )	10.	"	brown	"	P1	" AUD 1.
( )	11.	"	white	"	jack Y Out 1	" OUT Y.
( )	12.	"	red	"	CW-P3	" +15V at pin A.

C. Turn all pot shafts fully counter-clockwise and mount the knobs with the pointers at the lower left. Mount the knobsso that there is a very small space between the knob and the panel and each of the dual knobs. This will alow each knob to turn freely on it's shaft without causing the other knob to turn. Install the knobs and tighten the hex nuts in the following order.

Channel X

( ) 1. Audio 1
( ) 2. Audio 2
( ) 3. Offset
( ) 4. Lin-Exp
( ) 5. AM 2
( ) 6. AM 1
( ) 7. Amplitude

( ) Attach the knobs to Channel Y in the same order.

DOUBLE CHECK ALL OF YOUR WORK TO THIS POINT!
THIS COMPLETES ASSEMBLY OF YOUR AR-343 DUAL VCA MODULE. THE MODULE IS NOW READY TO BE CALIBRATED.

AR-343 CALIBRATION PROCEDURE

To calibrate the AR-343 you will need the following:

* A 10 volt sawtooth such as that available from the AR317,338, or 341.
* A method of monitoring the output of the VCA. Either of the following will do:
  * a DC coupled oscilloscope
  * a low noise audio amplifier and speaker
* A power supply for the AR-343. +15v, -15v, and ground.

1. Connect the AR-343 to the supply. Do not turn on the supply until all connections have been made. Once the connections have been made turn on the supply. Touch each of the ICs. If they feel hot turn off the supply and check your module for poor connections, solder bridges which may be shorting connections, and misplaced or improperly oriented components. If you find no problems, continue.
2. Turn all knobs on the front panel fully counter-clockwise.
3. Monitor the output from the X OUT jack.
4. Connect a 10 volt audio frequency sawtooth (0 to 10V) to the X Audio 1 jack. Turn the X Audio 1 attenuator knob fully clockwise.
5. Turn trim pot T1 on the X channel until you get a signal at the X OUT 1 jack. Back off T1 until that signal just disappears. Turn up the gain on the audio monitor or oscilloscope to make sure there is no signal.
6. Turn the Audio 1 knob fully counter-clockwise. T1 has been trimmed.

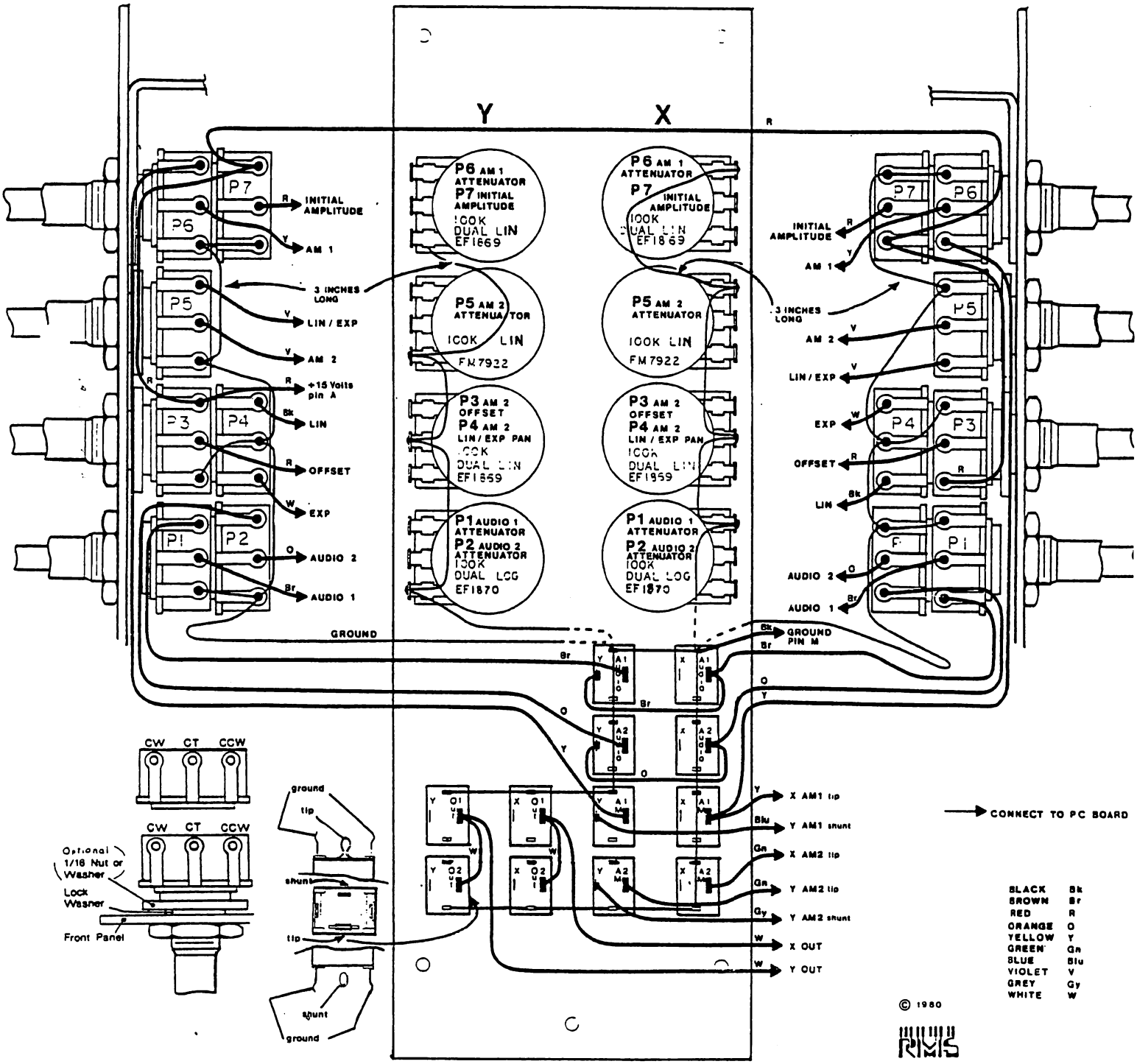
7. Continue to monitor the X OUT jack.
8. Remove the 10 volt sawtooth from the X Audio 1 jack and connect it to the X AM 1 jack.
9. Turn the X AM 1 attenuator knob fully clockwise.
10. Turn trim pot T2 CV Rejection on the X channel until the amplitude of the signal at the X OUT 1 jack is at a minimum. Turn up the gain to make sure the signal is at a minimum.

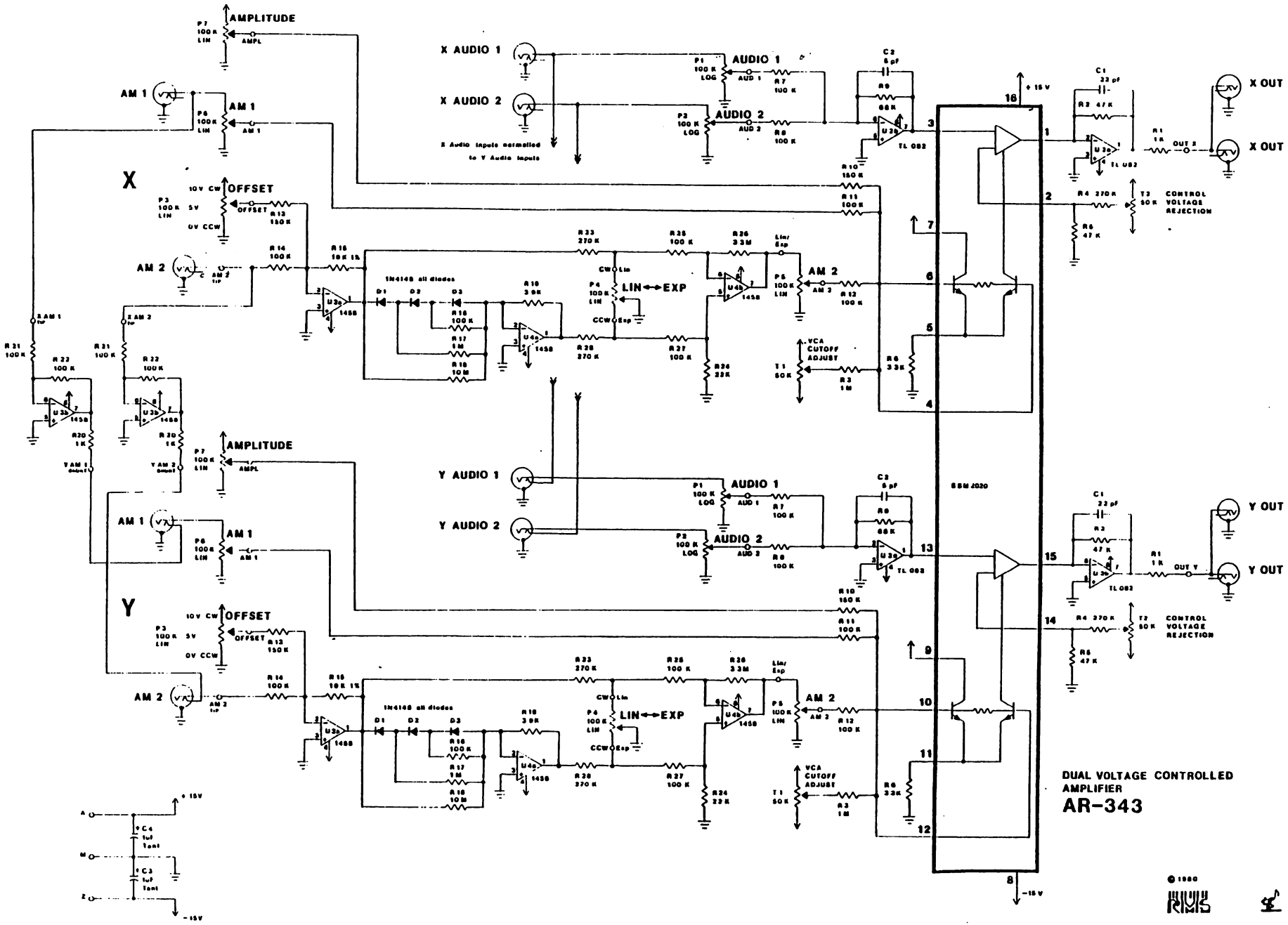
11. To calibrate the Y channel. Disconnect all cables from the X channel. Repeat steps 2 through 10 this time making all connections and adjustments to the Y channel.

HOORAY!

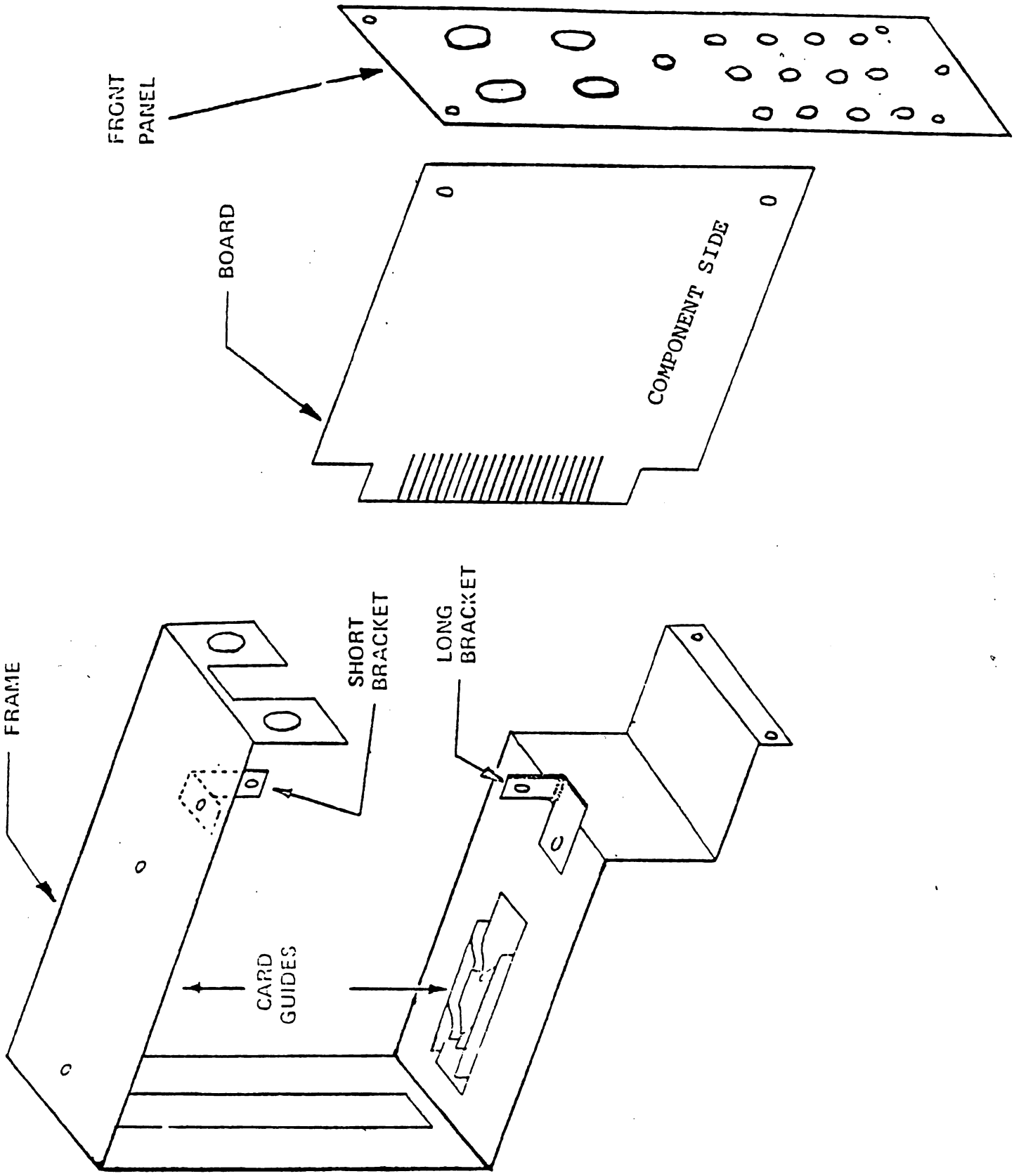
YOUR AR-343 AMPLIFIERS MODULE IS ASSEMBLED, CALIBRATED, AND READY TO USE.

AR-343 Dual VC Amplifiers
Front Panel Wiring Diagram





AR-343 Amplifiers MODULE ASSEMBLY DRAWING



RIVERA MUSIC SERVICES
AR-343
AMPLIFIERS

PARTS LIST

2	Dual 100K log pot	EF1870
4	Dual 100K lin pot	EF1869
2	100K lin pot	FM7922
4	50K lin trim pot	
1	SSM 2020 dual vca	
2	TL082CP or LF353 dual fet op amp	
4	1458 dual op amp	
6	1N4148 diodes (selected)	
2	5pf ceramic disc capacitors	
2	22pf ceramic disc capacitors	
2	1 uf tantalum 35 volt capacitors	
4	1K	5% carbon film resistor
2	3.3K	" "
2	3.9K	" "
2	22K	" "
4	47K	" "
2	68K	" "
20	100K	" "
4	150K	" "
6	270K	" "
4	1M	" "
2	3.3M	" "
2	10M	" "
2	19.1K	1% metal film resistor
1	AR-343 printed circuit board	
1	AR-343 front panel	
1	module frame with mounting brackets	
2	pc board card guides	
2	wire saddles	
6	4-40 x 3/8" black Phillips mounting screws	
6	4-40 nuts	
3	6-32 x 1/4" black Phillips mounting screws	
12	Switchcraft 142A jacks	
6	dual knobs	
2	single knobs	
40	inches of 22 gauge tinned copper bus wire	
2	black 14" lengths of 24 ga. wire	1 green " "
2	brown " "	1 blue " "
4	red " "	2 violet " "
2	orange " "	1 grey " "
3	yellow " "	3 white " "