

## **VTA ST-120 with CCS driver board amp KIT assembly manual**

Congratulations on your purchase of the VTA ST-120 amp kit. Every effort has been made to give you the finest sounding, most reliable and best looking 60 watt per channel tube amplifier kit presently available. Your VTA amp kit features the following items which are all upgrades from the original Dynaco kits.

1. A new STAINLESS STEEL chassis that is identical in size, shape and markings to the older original nickel plated steel frame. This chassis is NON-MAGNETIC and removes any magnetic interference effects of a steel chassis on the audio circuitry.
  2. Quality USA made A-260-120 custom wound output transformers which are interleaved/layer-wound and incorporate high quality M-6 grain oriented laminations.
  3. A more robust PA-060-120 power transformer rated at 120 volts, having 410-0-410 secondaries and a 450 milliamp current transfer capability.
  4. All stainless steel screws with zinc plated kep nuts
  5. Heat resistant Celanex™ octal tube sockets
  6. An 80, 40, 30, 20 uF main power supply electrolytic cap.
  7. An all triode VTA driver board made of mil-spec epoxy fiberglass. This board also contains an on board bias supply for the output tubes.
  8. Gold plated input and output terminals.
  9. A dual choke system rated at 480 milliamps
  10. Triode/pentode switches to allow the amp to run in two modes of operation
  11. A supplementary cap module (SCM) with an ESL reduction capacitor
- Your KIT comes with a very easy to follow instruction manual and a clear pictorial specific to the VTA driver board. All you need to complete the kit is a soldering pencil, some rosin core solder, a screwdriver, pliers and a wire cutter/stripper to build your own VTA ST-120. The kit takes about 10-12 hours to build depending on your skill level and any previous experience with kit building.

### **List of Parts**

- 1 - 16 gauge heavy duty stainless steel chassis frame with bottom cover
  - 1 - VTA driver board with parts set
  - 7 - Celanex™ octal tube sockets
  - 7 - grounding lugs (in with tube sockets)
  - 1 - USA made PA-060-120 power transformer
  - 4 - hard rubber isolation washers for power transformer
  - 2 - USA made A-260-120 custom interleave/layer wound output transformers
  - 2 - C24-X chokes
  - 1 - multi section (80, 40, 30, 20 uF) quadruple capacitor
  - 1 - three lug terminal strip
  - 1 - pair of gold plated RCA input jack jacks with mounting board
  - 2 - pair of gold plated 3 post output binding posts with mounting board
  - 1 - rubber grommet
  - 1 - fuse post with 5 amp SLO-BLO fuse (inside the fuse holder)
  - 2 - 11 amp rated SPST slide switches
  - 1 - 13 amp rated AC power cord
  - 2 - .022 Mfd 100 volt capacitors
  - 4 - 1000 ohm 1 watt resistors
  - 4 - 10 ohm 2 watt bias resistors
  - 1 - 4.7K ohm 3 watt resistor for quad cap
  - 1 - Supplementary Cap Module (SCM)
  - 1 - ESL reduction capacitor
  - 1 - hardware kit for amp
  - 1 - 22 foot coil of 20 gauge tinned solid core copper wire
  - 1 - triode/pentode kit (2 DPDT switches, two 2 lug terminal strips, 4 X 100 ohm 1 watt resistors)
- OPTIONAL > One tube set - 4 X 6550 output tubes, 3 X 12AU7 (or 12BH7, 5963, 6189, 5814), 1 X 5AR4 rectifier

## **Optionally painting the transformers**

Power and output transformers come from the factory with minor surface imperfections. You may, as an option, paint your transformers for a better appearance. (recommended) To most people a semi-gloss paint looks best on transformers. Use a spray can – don't brush it on.

Recommended paints for the transformers are the following paints ..

Krylon # 2421 "Fusion" Satin black (my favorite)

Krylon # 51613 Satin black indoor/outdoor

Any type of semi-gloss automobile engine enamel in a spray can.

The Krylon paints are carried by Wal-Mart and many other stores. Go to an auto supply store for engine enamel. Suggestion below on how to paint the transformers.

1. Obtain SIX 8 X 32 machine screws 2 3/4 to 3 inches long with nuts.
2. Remove one transformer 8 X 32 nut, nylon spacer(s) and screw and replace it with one of the six machine screws and nut. Tighten the nut securely.
3. Do the same for the transformer screw on the opposite diagonal corner of the transformer.
4. Remove the other two 8 X 32 screws, nylon spacers and nuts on that transformer.
5. Repeat steps 2 through 4 for the other two transformers.
6. Sand off any imperfections in the factory finish on the three transformers with 100 grit paper. Usually the "bells" have few to no imperfections but the "plates" have varnish drips which should be sanded out. Sand again with 220 grit paper.
7. Remove all sanding dust from the outer surface of the transformer. Rubbing alcohol on a paper towel works well.
8. Cover the transformer wires by placing them in a plastic bag. Use some masking tape near the transformer to hold the bag on the wires.
9. Spray 3 light coats on each transformer and allow to dry overnight.
10. Remove the plastic bags that cover the wires.
11. Reinstall all the original screws, spacers and nuts.

## INSTRUCTIONS

**NOTE –** You may or may not want to construct the VTA driver board BEFORE or AFTER you attach the chassis parts. If you wish to construct the VTA driver board at this time skip ahead to the VTA driver board instructions which are inside the VTA package and proceed with its construction. When you are through come back to this point and begin mounting the chassis parts.

Obtain the chassis. Unscrew the four 6-32 chassis screws and remove the bottom cover. Taped inside the bottom cover are four round black rubber “feet”. Remove the paper cover from each of the rubber feet to access the sticky bottom of each foot. Attach firmly each rubber foot to the outside of the chassis bottom cover directly over each of the four holes in the bottom cover. Orient the chassis with the power transformer cutout facing you and mark “V1”, “V2”, “V3”, “V6” and “V7” with a felt tip marker on the inside of the chassis next to the appropriate tube socket. (tube socket numbers shown on the pictorial) After completing each assembly instruction place a check beside the assembly instruction number.

1. Mount the FIVE octal sockets that fit on the chassis TOP from the **BOTTOM OF THE CHASSIS** with ¼ inch long 4-40 stainless steel screws and 4-40 kep nuts. Use the pictorial to orient the keyway of each tube properly. On V2, V3 and V6 mount a single GROUND LUG around the outside screw closest to the side of the chassis and face the lug towards pin 8. On V7 mount ONE ground lug around the outside screw and face this ground lug towards pin 8. Mount the other ground lug around the inside screw and face this second ground lug towards the back of the amp. Tighten all nuts securely. Don't lose the extra two grounding lugs.
2. Disassemble the three gold plated speaker binding posts from each of the two mounting plates. Attach the LEFT and RIGHT mounting plates to the back **INSIDE** of the amp with 4-40 hardware. Reassemble the three speaker binding posts on each of the mounting plates. One of the round plastic colored spacers (red or black) goes **INSIDE** the chassis and the other spacer (with the binding post attached) goes **OUTSIDE** the chassis. Make sure that the **BLACK** terminal is on the side that says “G” on the outside of the chassis frame and the two **RED** terminals are on the side that says “4 8 16”. Back off on the red or black plastic nut on the OUTSIDE of the chassis on each binding post and rotate each post so the hole on the outer binding post faces UP. Place the flat washer up against the inside spacer, then the star washer, then the two nuts. Tighten the three studs on the left and right sides with the gold plated nuts. Use a slim screwdriver through the hole in the outer post to keep the post facing UP as you tighten the nuts. NOTE - The outer plastic spacer with binding post will lock up against the chassis and NOT the mounting board.
3. Mount the rubber grommet in the 3/8 inch hole in the back **CENTER** of the chassis.
4. Mount the fuse holder in the “D” shaped hole in the back of the chassis. The slim black washer goes on the **OUTSIDE** of the chassis. Tighten the large nut on the inside of the chassis but do not over tighten as this may cause the plastic threads to strip. Check and make sure that the 5 amp SLO-BLO fuse is inside the fuse holder. (press IN and rotate the cap counterclockwise)
5. Mount the SPST on/off switch on the **REAR** of the chassis with 4-40 hardware. Make sure that the two terminals on this switch are close to the **UNDERSIDE OF THE CHASSIS TOP SURFACE**. Check the pictorial.
6. Place the 4 rubber isolation washers on the ends of each of the four bolts of the PA-060-120 power transformer. Mount the power transformer in the large center cut out. The wires should face the **FRONT** of the chassis. Fasten the power transformer to the chassis with four 8-32 kep nuts. In the original amp a metal cable clamp was used on each of the two front bolts as seen on the pictorial. These clamps are not really necessary as the wires will stay in place fine when soldered.
7. Assemble and mount the Supplementary Cap Module (SCM)
  - A. Obtain the five lug terminal strip from the SCM kit plastic bag

- B. Hold the strip with the grounded lug that attaches to the chassis towards your RIGHT - The lug closest to you is lug 1 and the next four lugs are lugs 2, 3, 4 and 5.
  - C. Connect one 330K 1 watt resistor (found in SCM bag) between lugs 1 and 2 - have the resistor straight in line with the terminal strip and not on the side of the lug.
  - D. Connect a jumper wire between lugs 2 and 4 - have the jumper straight in line with the terminal strip and not on the side of the lug. Arch the jumper over the top of lug 3.
  - E. Connect one 330K 1 watt resistor between lugs 4 and 5 - have the resistor straight in line with the terminal strip and not on the side of the lug.
  - F. Connect a 6 inch wire to lug 1 on the side of lug 1 which faces the strip's chassis attachment hole.
  - G. Connect a 3 inch wire to lug 5 on the side of lug 5 which faces the strip's chassis attachment hole.
  - H. Obtain one of the two supplementary caps and connect the NEGATIVE terminal of this cap (the terminal with the GRAY STRIPE next to it) to lug 1 of the terminal strip. Connect it on the side OPPOSITE the chassis attachment hole. You can straighten the capacitor pins to better fit the terminal holes. (S) Fit the other lug of this cap into lug 2 of the terminal strip (S)
  - I. Fit the OTHER supplementary cap with the NEGATIVE terminal (the terminal with the GRAY STRIPE next to it) in lug 4 (S) and the POSITIVE terminal in lug 5. You can straighten the capacitor pins to better fit the terminal holes (S). Connect it like the other cap on the side OPPOSITE the chassis attachment hole.
8. Mount the RIGHT C24-X choke and the SCM on the RIGHT side of the chassis with two of the larger 8-32 screws and matching kep nuts. Place the choke on first and the SCM mount hole on top of the choke. When you mount the SCM, have the two SCM capacitors face the power transformer. Tighten the two nuts. The two SCM caps may touch the chassis. This is OK.
  9. Mount the THREE lug terminal strip on the LEFT side of the chassis with a single 4-40 screw and kep nut as shown on the pictorial. Use the screw hole closest to the power transformer. NOTE - If the OPTIONAL VTA-TDR (Time Delay Relay) was shipped with your kit, you will install the TDR INSTEAD OF the 3 lug terminal strip. Remove the VTA-TDR instruction sheets from the TDR parts bag. Assemble the TDR and install it in place of the 3 lug terminal strip as instructed under the "B" section of the TDR manual.
  10. Mount the RIGHT A-260-120 output transformer with 8-32 hardware. The side of the transformer with the YELLOW-ORANGE-BROWN-BLACK leads must face the BACK of the amp. Mount the LEFT output transformer and fit the SECOND C24-X choke under the far left nut closest to the FRONT of the chassis. NOTE – This choke mounts with just that ONE nut and screw and may not sit perfectly parallel to the side of the chassis as seen in the photo. The two wires on the choke should face the INSIDE of the chassis. Check the pictorial and/or photo.
  11. Mount the quadruple section filter capacitor in the special cutout. It is IMPORTANT that the quad cap be properly oriented. The 80 Mfd SECTION which is designated with a HALF CIRCLE symbol must face the BACK of the amp. Fasten by twisting each of the four mounting tabs one-quarter turn with pliers.
  12. Mount the two remaining grounding lugs in the single hole just to the left of the quad cap. Mount them at a slight angle as seen in the pictorial. This will be your main grounding point for the entire amp.
  13. Obtain the two DPDT switches from the triode/pentode kit bag. Install the switches in the two chassis holes where the original Dynaco ST-70 bias controls use to be. These two 3/8" holes are not shown on the main pictorial. The switches are a loose fit in the holes and must be centered in the hole before they are tightened.

14. Remove the outside nut and larger flat washer from the switch. The smaller flat washer goes against the **INSIDE** of the chassis. Place the larger flat washer on the chassis **TOP** and nut on top of the flat washer. On the inside of the chassis make sure that the six terminals on the switch face from the front to the back of the amp so that the switch toggle on the top may be switched from **FRONT** to **BACK** and not side to side. Refer to the triode/pentode pictorial for help if needed.
15. Center the two switches in the holes and tighten the nuts lightly with square nosed slip-joint pliers. Check alignment of the two switches. If alignment is not correct move the switches slightly until alignment is correct. Make your final tightening but **DO NOT OVERTIGHTEN THIS NUT** or you could break the switch.
16. Mount the two **TWO** lug terminal strips back to back in the single central 4-40 hole between the two triode/pentode switches. Try to keep the strips straight and parallel to the sides of the amp as you tighten the screw. Check the color photo.
17. **NOTE – At this time DO NOT MOUNT the two front power takeoff sockets, the front slide switch (or stepped attenuator if you have the stepped attenuator option) which fits into the stereo/mono slot or the input jacks.** These three items must be mounted after installation of the VTA driver board.

**WIRING –** Each length of hookup wire specified should have approximately ¼ inch of insulation stripped from each end unless otherwise specified. Wires from the three transformers should be shortened appropriately to the correct length to reach their terminal point. If you see the symbol “(S)”, this means to solder that connection at that time. If the symbol is not there **DO NOT SOLDER** that connection at that time. The 20 gauge tin coated solid core copper wire supplied with this kit is the recommended wire to use. Only rosin core solder is recommended for soldering. Always make a solid mechanical connection with your pliers to the terminal point before soldering. Always keep the chassis and transformers on a soft surface like a towel so they won’t get scratched. Orient the chassis so that the power transformer is towards you. Oriented this way the, the LEFT channel is on your LEFT and the RIGHT channel is on your RIGHT.

1. Twist the pair of **WHITE** leads from the power transformer together and extend the wires to socket V1. Connect one lead to pin #2 of V1 (S) and one lead to pin #8 of V1.
2. Twist the pair of **RED** leads from the power transformer together and extend the wires to socket V1. Connect one lead to pin # 4 of V1 (S). Connect the other lead to pin # 6 of V1 (S). **NOTE - If you have the OPTIONAL VTA-TDR (Time Delay Relay) then do steps 5, 6 and 7 on the TDR manual under "Wiring to the board" instead.**
3. Twist the pair of **GREEN** leads from the power transformer together and extend the wires to socket V2. Connect one green lead to pin # 2 of V2 and one green lead to pin # 7 of V2.
4. Twist the pair of **BROWN** leads from the power transformer together and extend the wires to socket V7. Connect one brown lead to pin #2 of V7 and the other brown lead to pin #7 of V7.
5. Twist the **BROWN/YELLOW** and **GREEN/YELLOW** wires from the power transformer and extend the wires to the 3 lug terminal strip. Connect the **BROWN/YELLOW** lead to lug # 3 - the lug closest to the power transformer. Connect the **GREEN/YELLOW** wire to lug # 1 – the lug furthest from the power transformer. **NOTE - If you have the OPTIONAL VTA-TDB (Time Delay board) connect these two wires to the proper eyelets on the TDB board instead - as instructed in steps 2, 3 and 4 of the TDB manual under "Wiring to the board".**
6. Connect the **RED/YELLOW** lead to one of the grounding lugs next to the quad cap filter capacitor.

7. Extend the RED lead from the LEFT OUTPUT TRANSFORMER and the RED lead from the RIGHT OUTPUT TRANSFORMER to the 80 Mfd terminal on the QUAD CAP having the HALF CIRCLE symbol. This is the terminal that faces the REAR of the amp.
8. Shorten (if necessary) and connect the 3 inch wire from lug 5 of the Supplementary Cap Module (SCM) to the same 80 Mfd terminal on the quad cap having the HALF CIRCLE symbol as described in the step above. Connect the 6 inch wire coming from lug 1 of the SCM to one of the two main grounding lugs next to the quad cap.
9. Twist together the two CHOKE leads from right side choke. Connect one choke lead to 80 Mfd terminal on the quad cap having the HALF CIRCLE symbol and the other choke lead to the 40 Mfd terminal on the quad cap having the SQUARE symbol. Lengthen the two leads from the second LEFT SIDE choke by adding about 4 inches of wire to each of the two leads. After you lengthen these two leads solder each connection (S) and be sure to insulate the two connections with black electrical tape or insulated shrink tubing. (500 Volts DC here!) Twist together and connect the two choke leads from the LEFT side choke to the same two 80 and 40 Mfd terminals on the quad cap as you did with the right side choke.
10. Extend the two BLACK leads from the power transformer around the power transformer as shown in the pictorial. Connect one BLACK lead to lug "A" of the fuse post (S) and one BLACK lead to lug # 1 of the on/off switch (S).
11. Connect the BLACK lead from the RIGHT OUTPUT TRANSFORMER to the SMALL GROOVE near the end of the RIGHT BLACK speaker terminal. Connect one end of a wire to the right BLACK speaker terminal's small groove (S). Connect the other end of this wire to one of the grounding lugs next to the quad cap. Connect the BROWN (4 ohm) wire to the SMALL GROOVE near the end of red binding post that is closest to the black post. (S) Connect the ORANGE wire (8 ohms) to the SMALL GROOVE near the end of red binding post that is furthest away from the black post. (S)  
\* The remaining YELLOW wire from the output transformer will be connected at a later step in construction.
12. Repeat step 11 above for the LEFT OUTPUT TRANSFORMER and the LEFT speaker terminal.
13. Connect the BLUE wire from the LEFT OUTPUT TRANSFORMER to pin 3 of V3. Connect the BLUE/WHITE wire from the LEFT OUTPUT TRANSFORMER to pin 3 of V2. Connect the BLUE wire from the RIGHT OUTPUT TRANSFORMER to pin 3 of V6. Connect the BLUE/WHITE wire from the RIGHT OUTPUT TRANSFORMER to pin 3 of V7.

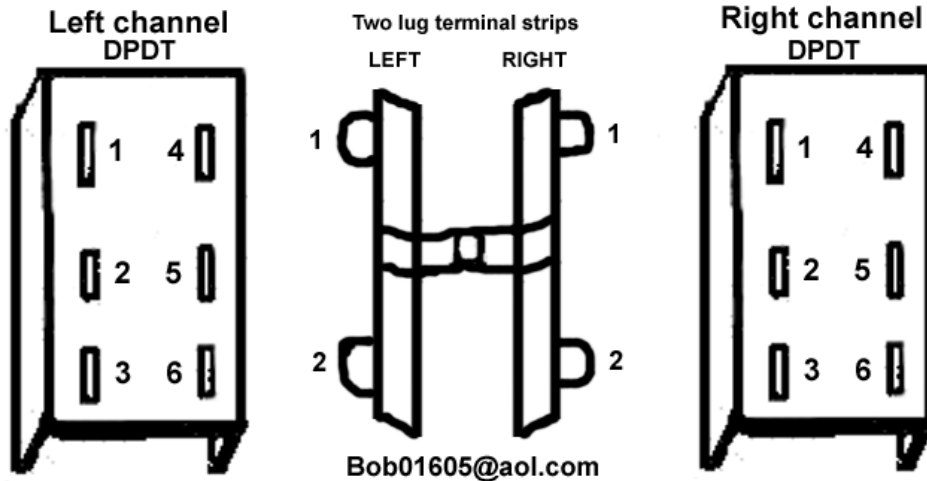
**This is an incomplete VTA ST-120 manual**

## Triode/Pentode switch pictorial

**NOTE:** Disregard any pin number markings on the switches themselves and use the pin numbers listed below.

↑  
PCB cutout

### DPDT Triode/pentode switches



Pin 1 - green wire from LOPT  
Pin 2 - wire to pin 4 of V3  
Pin 3 - 100 ohm to pin 1 of LTS  
Pin 4 - grn/wht wire from LOPT  
Pin 5 - wire to pin 4 of V2  
Pin 6 - 100 ohm to pin 2 of LTS

LOPT = LEFT output transformer  
LTS = LEFT terminal strip

LEFT terminal strip  
pin 1 - 100 ohm from pin 3 of left DPDT  
and wire TO pin 3 of V3  
pin 2 - 100 ohm from pin 6 of left DPDT  
and wire TO pin 3 of V2

Pin 1 - green wire from ROPT  
Pin 2 - wire to pin 4 of V6  
Pin 3 - 100 ohm to pin 1 of RTS  
Pin 4 - grn/wht wire from ROPT  
Pin 5 - wire to pin 4 of V7  
Pin 6 - 100 ohm to pin 2 of RTS

ROPT = Right output transformer  
RTS = RIGHT terminal strip

RIGHT terminal strip  
pin 1 - 100 ohm from pin 3 of right DPDT  
and wire TO pin 3 of V6  
pin 2 - 100 ohm from pin 6 of right DPDT  
and wire TO pin 3 of V7

Power Transformer





