

SILTRONIX

MODEL LA-600 RF Amplifier

OPERATING/SERVICE MANUAL

SILTRONIX
330 VIA EL CENTRO
OCEANSIDE, CALIFORNIA 92054

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Artwork and Diagrams by Bennie Bolin

1.0 INTRODUCTION:

In putting together this manual, I used what limited information I could compile. The new updated schematic, drawings and PCB layout were drawn by B. Bolin and were verified against a LA-600.

The Siltronix Model LA-600 is designed for operation in the 26 to 30 megacycle range. Due to the high efficiency of the "Single Band" design, it is an excellent amplifier for the Ten Meter Amateur Radio Operator, or for other services outside the United States.



Figure 1-1 Front Panel

The LA-600 features a High/Low RF transmit output selection and a pre-amplifier which provides approximately 6 db gain on received signals. The LA-600 is designed with the best of components available to provide years of trouble free service. It is important, however, the Operating Instructions should be followed. The RF drive requirements to the amplifier should not be exceeded. Once the unit has been installed and tuned for proper operation, retuning of the amplifier should not be required. Even though the rugged 8950's should provide years of trouble free operation, the most severe conditions for the tubes exist during the tune-up procedure where the possibility of Off-Resonance condition allows relatively large amounts of current to be drawn through the tubes. Unnecessary tune-ups will reduce the life of the 8950's. Once the unit is properly tuned for operation, major readjustments should rarely be necessary. Occasional minor touch-up of the "PLATE" tuning to verify peak performance is recommended. Both "PLATE" and "LOAD" controls may require small adjustment when changing antennas or switching to and from a dummy load.

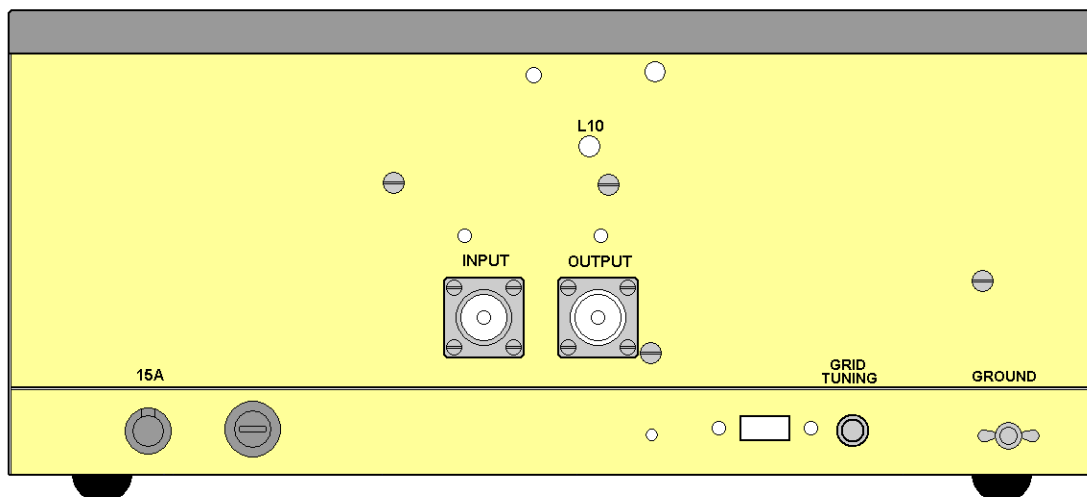


Figure 1-2 Rear Panel

1.1 SPECIFICATIONS:

Power Ratings:

SSB 800 Watts Nominal PEP Output on High Power
AM 500 Watts Nominal Output on High Power
AM 300 Watts Nominal Output on Low Power

Frequency Coverage:

26.0 to 30.0 MC

Tube Complement:

Four 8950's in grounded grid and one 8950 Driver in grounded cathode.

RF Drive Requirements:

AM Operation - Nominal 3 Watts
Single Sideband - Nominal 7 Watts PEP

Meter:

Reads relative output RF voltage.

Relay Keying:

In SSB position, automatically switches the amplifier into the "Transmit" mode when SSB modulation is present. Returns to receive mode after a short delay when no modulation is present.

In AM position, the AM carrier of the transmitter keeps the amplifier in the "Transmit" mode as long as the transmitter is keyed.

"PI" Output Circuit:

Matches 52 to 75 ohm load and other impedances where the SWR does not exceed 2.5:1

Pre-Amplifier:

Provides approximately 6 db gain for received signals.

Power Supply:

Computer grade electrolytic capacitors and conservatively rated silicon rectifiers together with a heavy duty power transformer provide a reliable power source.
AC Input: 117 Volts, 50-60 Hz

Front Panel Controls:

PLATE, LOAD, RELATIVE OUTPUT Meter, Power On Indicator, AC POWER Switch, MODE Switch, RF POWER Switch, DELAY Switch, PRE-AMP Switch

Rear Panel:

L10 Access Hole, INPUT Jack, OUTPUT Jack, Fuse Holder, GRID TUNING Coil, GROUND Lug

Dimensions:

13" Wide x 5-3/4" High x 10-3/4" Deep

Weight:

27 Pounds

2.0 INSTALLATION:

CAUTION: Lethal voltages are present in this amplifier! DO NOT REMOVE the bottom cover or cabinet while the AC power cord is connected to the wall outlet.

Before removing the covers for any reason, allow at least one minute for the filter capacitors to discharge after turning amplifier off and disconnecting the AC line cord. Then short the driver and final plate circuit to ground with an insulated screwdriver before touching any of the components.

1. Select a location for your amplifier. RF amplifiers need ventilation, so choose a location that will not restrict the air flow around the amp. While turned on, the unit will generate a lot of heat so do not lay anything on top of the amplifier.
2. Do not exceed the nominal input RF drive requirements listed under "Specifications" by more than 15 percent. Check RF output specifications of the exciter (or, measure the power output with a wattmeter).
3. Connect a short length of coaxial cable (RG-58 or RG-8) from the exciter (transceiver or transmitter) to the "INPUT" jack on the rear of the LA-600. A PL-259 connector is required to connect the coax cable to the amplifier. Coax cable should be as short as possible.
4. Connect antenna or suitable high power dummy load to the "OUTPUT" connector on the rear of the LA-600 using RG8/U coax or similar type coax with a PL-259 connector.
5. The unit should be grounded for R.F. by attaching a ground strap of coaxial shield or 10-12 gauge wire to the ground post on the amplifier. This should be connected by a short run to a ground rod or cold water pipe. The idea is to have a short direct earth ground to keep the chassis at radio frequency ground. In many cases normal operation can be had without such a ground, but a good ground can help prevent television interference, and make tuning straightforward.
6. The A.C. line cord should be plugged into a three-wire outlet. The electrical circuit should be capable of handling a 15 ampere load.

3.0 CONTROLS:

3.1 Front Panel

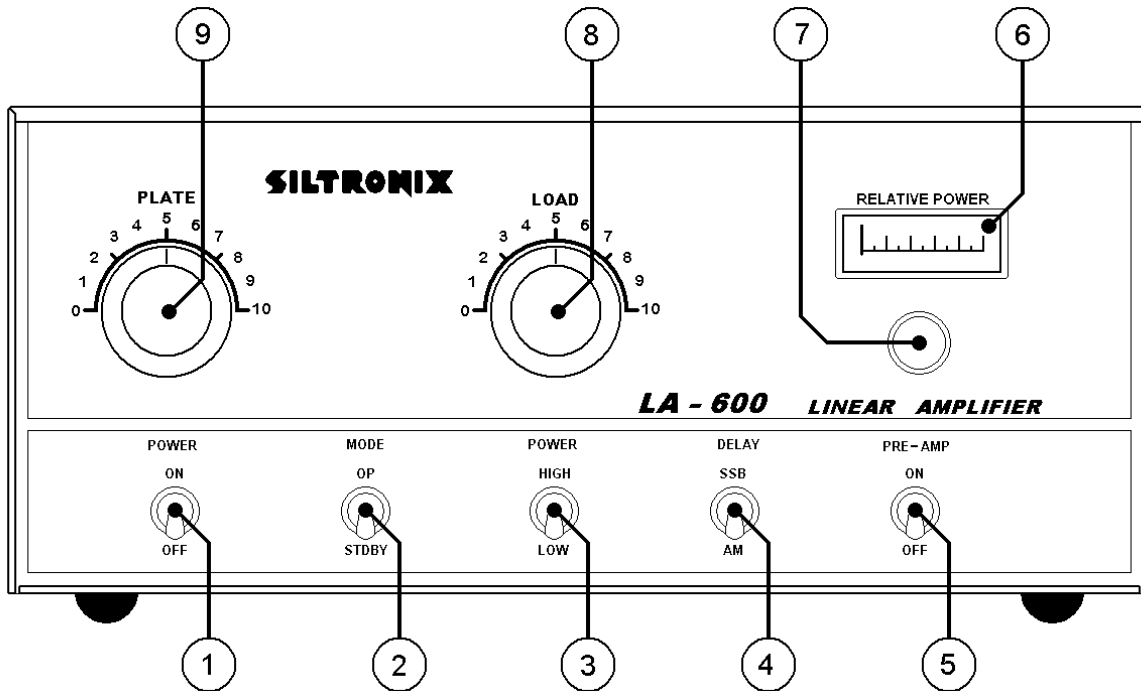


Figure 2-1 Front Controls

1. **POWER:** Switches AC power "On" and "Off"
2. **MODE:** STDBY Position: Exciter operated directly into the antenna on transmit.
OP Position: Transmitting amplifier will be switched in when the exciter is in AM and keyed or when the exciter is keyed in SSB with modulation applied.
3. **POWER:** LOW Position: Provides 300 Watts AM RF Output for the nominal 3 watts input.
HIGH Position: Provides 500 Watts AM RF Output for the nominal 3 watts input.
4. **DELAY:** SSB Position: Allows the relay to remain in "Transmit" mode during short pauses while transmitting.
AM Position: Continuously keeps the LA-600 in the transmit mode so long as the exciter is in transmit.
5. **PRE-AMP:** OFF Position: Exciter receives signal directly from antenna.
ON Position: Exciter receives signal from PRE-AMP which provides approximately 6 db gain. The PRE-AMP switch operates independently of the mode switch. The PRE-AMP is disabled during transmit.
6. **RELATIVE POWER METER:** Reads relative output RF power.
7. **PILOT LIGHT:** Red lamp indicator shows when amplifier is powered on.
8. **LOAD:** Used to properly match the amplifier plate circuit to the antenna.
9. **PLATE:** Used to tune the PA output to resonance.

3.2 Rear Panel

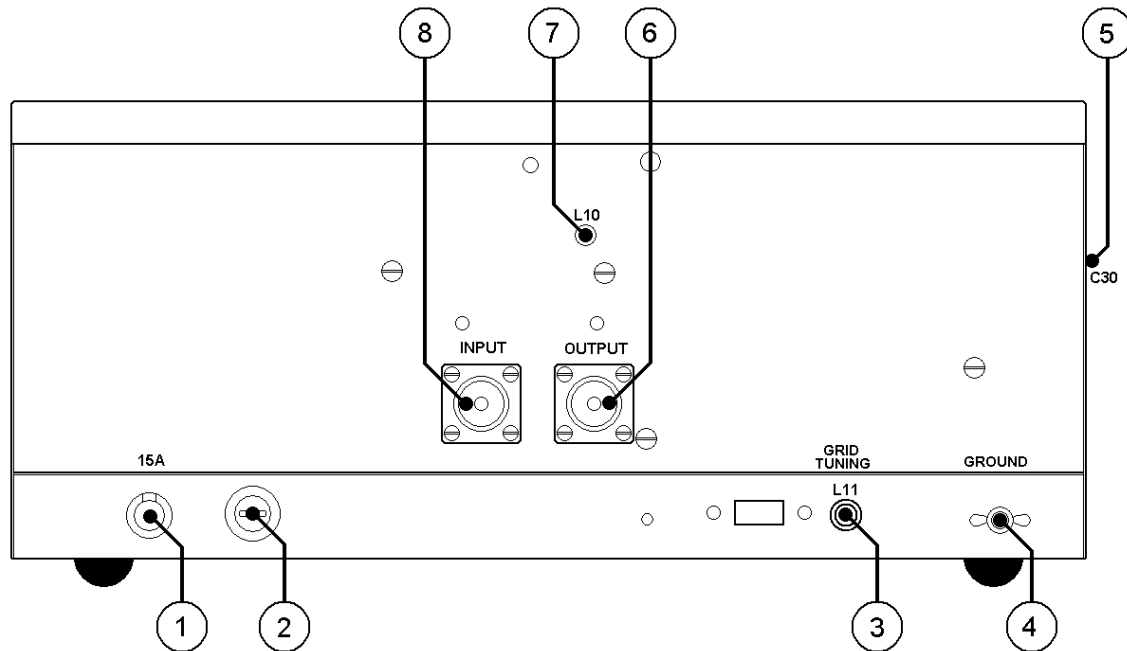


Figure 2-2 Rear Controls and Connections

1 AC Line Cord

2 **FUSE Holder:** Accepts Type 3AG 15 Amp fuse.

3 **GRID TUNING:** Tunes input grid circuit of the 8950 Driver tube.

4 **GROUND:** Ground Lug for attaching ground wire from the chassis of the unit to earth ground.

5. **C30:** Tunes output plate circuit of the 8950 Driver tube.

6 **OUTPUT:** Connects RF output of the amplifier to the antenna coax feed line.

7 **L10 Access Hole:** L10 is for tuning RF input to the Preamp circuit.

8 **INPUT:** Connects RF Drive from exciter to input of amplifier.

4.0 OPERATION:

1. Setting the "**MODE**" switch to the "**STDBY**" position (or the main "**POWER**" switch to "Off") permits the exciter (transceiver) to operate directly into the antenna. This also allows any adjustment to be made to the exciter before operating the LA-600. Use this setting for checking drive power.
2. Initial tune-up should be accomplished with the exciter (transceiver) set at the middle range of the frequencies to be operated. This allows operation over the entire range without re-tuning the amplifier.
3. The tune-up procedure should initially be accomplished by applying the exciter driving power for short periods of time, not longer than 30 seconds. Release the push-to-talk button on the microphone for about 30 seconds between each adjustment. During the final fine adjustments of the tuning controls the drive may be held on for longer periods, provided only minor adjustments are made. This method of tune-up will prevent the tubes from overheating during adjustments. Once the tune-up procedure has been completed, the cooling fan, plus the high quality components, will provide normal operation indefinitely with only an occasional minor tune-up.

4.1 INITIAL TUNE-UP:

Read all of these tune-up instructions before turning the power on or attempting tune-up. It is very important that the amplifier be properly tuned if it is to provide long life and good performance. Never operate the amplifier if it is not properly tuned.

1. Set "DELAY" switch to the "AM" position.
2. Set "POWER" switch to the "LOW" position.
3. Set "PLATE" control to "5".
4. Set "LOAD" control to "5".
5. Place AC "POWER" switch in the "ON" position. The red pilot light should be on. Always allow at least one minute warm-up before proceeding with tune-up or operation.
6. Key exciter (transceiver) in transmit mode (AM). If single sideband is the only mode available, tune-up of the LA-600 can be accomplished by a sustained whistle into the microphone while holding the push-to-talk button down. In the AM mode, it is only necessary to press the push-to-talk button on the microphone (do not talk into the microphone in this mode). Either method will provide the RF drive required for tuning the LA-600.
7. Quickly adjust "PLATE" control for maximum meter reading. There should be a definite maximum meter reading and as the "PLATE" control is moved in either direction the reading should decrease.
8. Quickly adjust the "LOAD" control for maximum meter reading.
9. Steps #7 and #8 should be repeated several times until no greater reading can be obtained. Do this as rapidly as possible.
10. Now switch RF "POWER" switch to "HIGH" and repeat Steps #7 and #8 several times until a maximum reading is again obtained.
11. The "POWER" switch can now be used to select "LOW" or "HIGH" power output.

4.2 OPERATION AFTER TUNE-UP:

AM Operation: "DELAY" switch should be in the AM position. When the exciter (transceiver) is keyed into the transmit mode, the LA-600 will automatically go into transmit. During AM modulation a slight downward deflection may be noted on the meter. This is a normal state and will not affect the audio quality of the transmitted signal.

SSB Operation: "DELAY" switch should be in the SSB position. If there is a long pause between words during a transmission, the antenna switching relay in the LA-600 will return to the receive position. Talking into the microphone will automatically return the antenna switching relay to the transmit position. This relay action is normal.

5.0 CIRCUIT DESCRIPTION:

The LA-600 is a classic TV Sweep Tube Amplifier using five 8950 tubes. One of the tubes is a grid driven driver stage and the other four are the PA tubes in grounded grid final operation. It has a low and high power output setting and features a pre-amplifier which provides approximately 6 db gain on received signals.

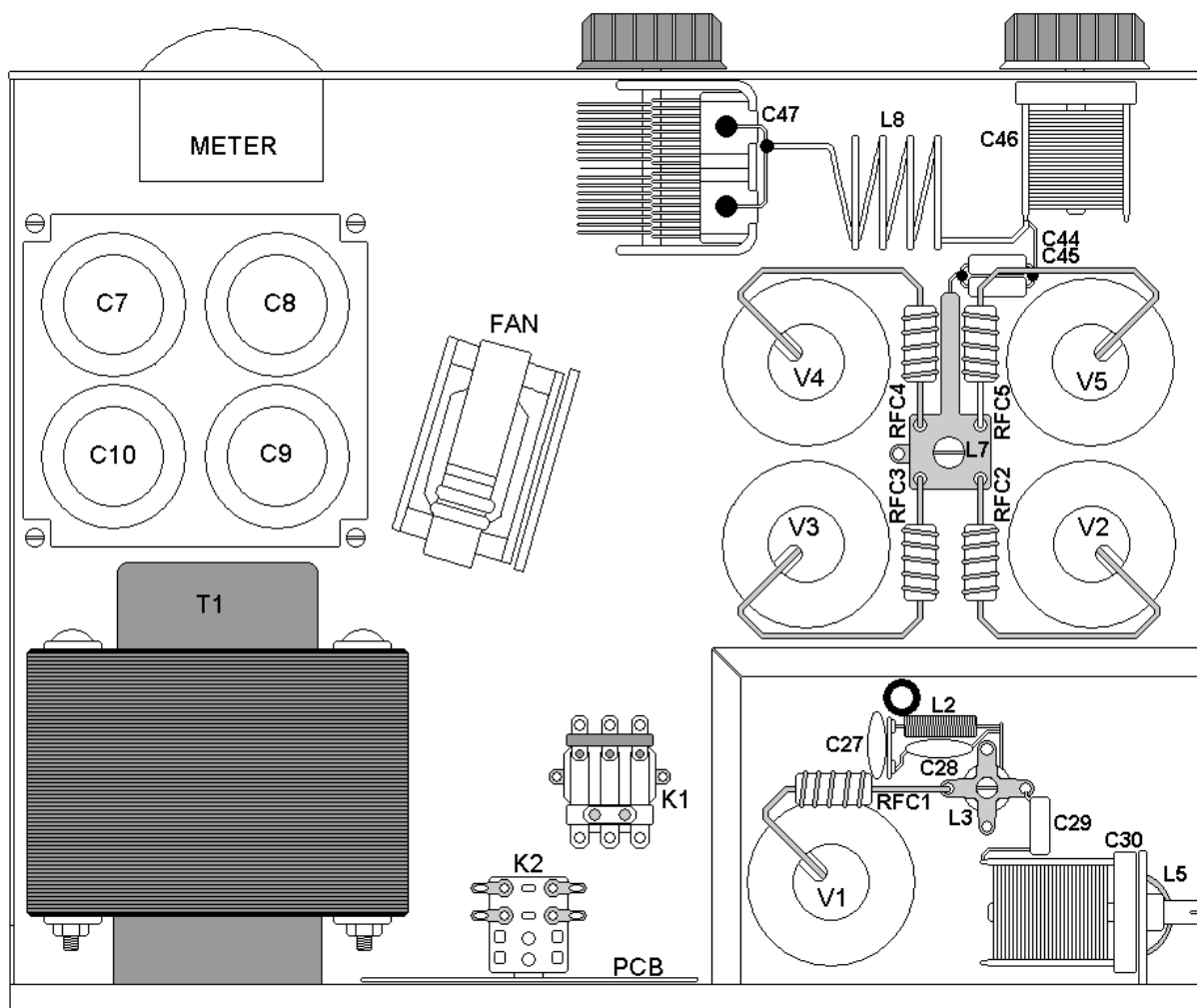


Figure 5-1 Chassis Layout

In the figure above, you can see the Driver Section in the lower right corner. The variable capacitor C30 to the right of the Driver tube is for tuning the Driver output and is accessed thru a small hole in the side of the top cover. The four PA Tubes are just above the driver section. You can see the Plate Cap connections with their Plate Parasitic Suppressors. Above them you will find the Plate Load and Plate Tune capacitors used for tuning the finals for proper operation. In the bottom center, K1 is the main relay for switching the PA in and out of line. K2 is mounted on the PCB and it functions to switch the Preamp in and out of line as the PA is keyed. To the left is the main Power Transformer. Above it are the four capacitors that make up the high voltage power supply filter. The Fan in the center of the chassis runs continuously as long as the Amplifier is turned on providing air circulation for the tubes.

6.0 PCB LAYOUT:

The PCB is mounted on the back wall of the amplifier. It contains the Receive Preamplifier Q1, Transmit detector Q2, Power Amp relay driver Q3, Preamp relay driver Q4, and Relay K2 for switching the preamp in and out of the circuit. There are 12 points shown in the drawing by a number inside a circle. These points are connections from the PCB to various points in the LA-600 as indicated by the labeling.

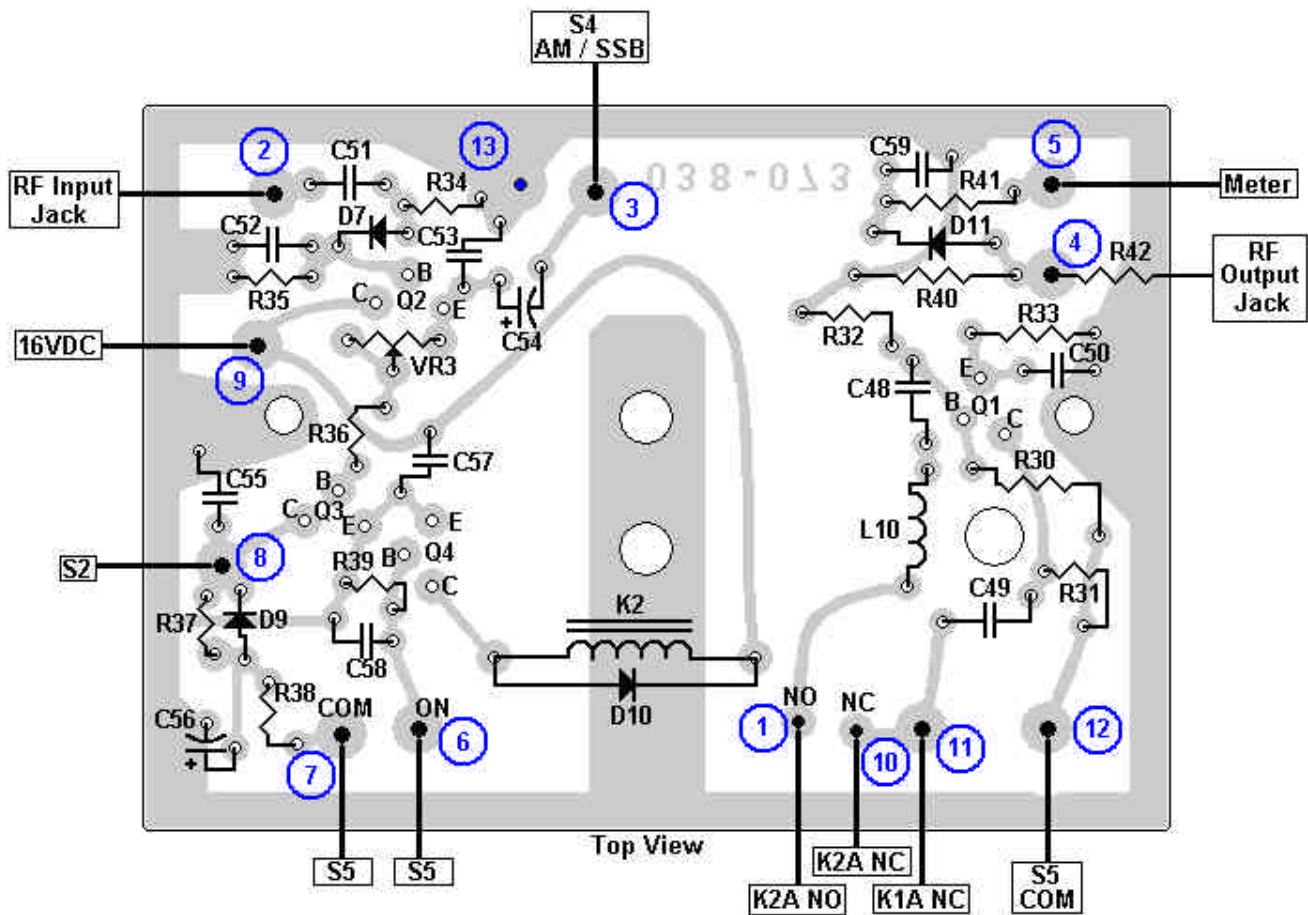


Figure 6-1 PCB

The wire connections to the PCB are as listed below:

1. Wire from PCB to relay K2 NO contact.
2. Connects to RF Input Jack.
3. Connects to Delay switch SSB contact.
4. Connects one end of R42, the other end of R42 is connected to the RF Output Jack.
5. Connects to the front panel meter.
6. Connects to Preamp switch.
7. Connects to Preamp switch.
8. Connects to the common contact of the Mode switch.
9. Connects to the +16V line.
10. Wire from PCB to relay K2 NC contact.
11. Connects to Relay K1A NC contact.
12. Connects to Preamp switch.
13. Hole on PCB ground trace that is unused.

7.0 ALIGNMENT:

ALIGNMENT – LA-550, LA-600, LA-650

This alignment procedure applies to the LA-550, LA-600, and LA-650 amplifiers.

1. Driver Neutralization

- A. Connect RF Voltmeter to the cathodes of the four PA tubes. If a RF Voltmeter is not available, an Oscilloscope with a bandwidth over 30 Mhz can be used with a 10X Probe.
- B. With linear amplifier off, key your transmitter, depress relay K-1 with an insulated tool, and adjust the neutralization trimmer (it is under the driver tube) for a dip or minimum reading on the RF Voltmeter or Oscilloscope. The amplifier is now neutralized.

2. Bias (Driver)

- A. Connect a DC Voltmeter to Pin 2 of the driver tube (the cathode).
- B. Turn linear amplifier on, set to high power position.
- C. Adjust bias pot (one closest to power supply) for a .5 VDC reading on Pin 2.

3. Bias (Power Amp)

- A. Connect DC Voltmeter across the one ohm, 10 watt resistor in the cathode of the power amp.
- B. Turn linear amplifier on, set to high power position.
- C. Depress relay using insulated tool. Adjust power amplifier bias pot for a .05 reading on your voltmeter.

4. Tune Up:

- A. Adjust Driver Grid Tuning and Plate tune output capacitor for maximum power out.
- B. Adjust power amplifier front panel Plate and Load for maximum power out.

8.0 PARTS LIST:

Capacitors

Ref#	Description	NOTES:
C1	.01uF Ceramic Disc	AC Input bypass
C2	.01uF Ceramic Disc	AC Input bypass
C3	.0022uF Ceramic Disc	HV Section
C4	.0022uF Ceramic Disc	HV Section
C5	.0022uF Ceramic Disc	HV Section
C6	.0022uF Ceramic Disc	HV Section
C7	225uF 300VDC Electrolytic	HV Section, CG2250T300B1
C8	225uF 300VDC Electrolytic	HV Section, CG2250T300B1
C9	225uF 300VDC Electrolytic	HV Section, CG2250T300B1
C10	225uF 300VDC Electrolytic	HV Section, CG2250T300B1
C11	100uF 150VDC Electrolytic	Bias Power Supply
C12	100uF 150VDC Electrolytic	Bias Power Supply
C13	250uF 20VDC Electrolytic	LV Power Supply
C14	.002uF Ceramic Disc	PA Section V2 socket
C15	.002uF Ceramic Disc	PA Section V3 socket
C16	.002uF Ceramic Disc	PA Section V4 socket
C17	.002uF Ceramic Disc	PA Section V5 socket
C18	.002uF Ceramic Disc	Driver Section
C19	1.5 – 20 pF Compression Trimmer	Driver Section, Marked 404
C20	50pF Mylar	Driver Section
C21	100uF 250VDC Electrolytic	HV Section, Bottom chassis term strip
C22	.002uF Ceramic Disc	Driver socket pin 11
C23	.002uF Ceramic Disc	Driver socket pin 3
C24	.002uF Ceramic Disc	Driver socket pin 2
C25	3.3pF 3KV Ceramic Disc	Driver Section
C26	3.3pF 3KV Ceramic Disc	Driver Section
C27	.002uF 2KV Ceramic Disc	Driver Section
C28	.002uF 2KV Ceramic Disc	Driver Section
C29	270pF 2.5KV Mica, CM35FK271JN3	Driver Section
C30	46pF, Air Variable	Driver Section, Marked 074-063
C31	120pF, Compression Trimmer	PA Section, Marked 302M
C32	.002uF Ceramic Disc	PA Section
C33	.002uF Ceramic Disc	PA Section
C34	.002uF Ceramic Disc	PA Section V2 socket
C35	.002uF Ceramic Disc	PA Section V2 socket
C36	.002uF Ceramic Disc	PA Section V3 socket
C37	.002uF Ceramic Disc	PA Section V3 socket
C38	.002uF Ceramic Disc	PA Section V4 socket
C39	.002uF Ceramic Disc	PA Section V4 socket
C40	.002uF Ceramic Disc	PA Section V5 socket
C41	.002uF Ceramic Disc	PA Section V5 socket
C42	.002uF 2KV Ceramic Disc	PA Section
C43	.002uF 2KV Ceramic Disc	PA Section
C44	270pF 2.5KV Mica, CM35FK271JN3	PA Section
C45	270pF 2.5KV Mica, CM35FK271JN3	PA Section

Capacitors

Ref#	Description	NOTES:
C46	105pF, Air Variable, PA TUNE	PA Section
C47	710pF, Air Variable, PA LOAD	PA Section, Marked 074-062ASP7341
C48	39 pF Ceramic Disc	On PCB
C49	33 pF Ceramic Disc	On PCB
C50	.01uF Ceramic Disc	On PCB
C51	10 pF Ceramic Disc	On PCB
C52	.01uF Ceramic Disc	On PCB
C53	.002uF Ceramic Disc	On PCB
C54	30 MFD 15V Electrolytic	On PCB
C55	.002uF Ceramic Disc	On PCB
C56	30 MFD 15V Electrolytic	On PCB, SSB delay cap
C57	.002uF Ceramic Disc	On PCB
C58	.002uF Ceramic Disc	On PCB
C59	.002uF Ceramic Disc	On PCB

Resistors

Ref#	Description	NOTES:
R1	470K 1W	HV Section
R2	470K 1W	HV Section
R3	470K 1W	HV Section
R4	470K 1W	HV Section
R5	39K 6W, DALE FP33 6W	HV Section
R6	39K 6W, DALE FP33 6W	HV Section
R7	39K 6W, DALE FP33 6W	HV Section
R8	39K 6W, DALE FP33 6W	HV Section
R9	1K 1W	Bias Power Supply
R10	4.7K 1W	VR1 and term strip
R11	4.7K 1W	Across VR1
R12	6.8K 1W	Tied to VR1
R13	10K 1/2W	Driver Section, Bottom chassis term strip
R14	12K 10W	HV Section, Bottom chassis term strip
R15	10K 10W	HV Section, Bottom chassis term strip
R16	100 5W	Driver Section, Bottom chassis term strip
R17	27K 1W	On bottom chassis terminal strip
R18	4.7K 1W	By VR2
R19	4.7K 1W	By VR2
R20	47K 1W	PA Grid resistor V5
R21	47K 1W	PA Grid resistor V4
R22	47K 1W	PA Grid resistor V3
R23	47K 1W	PA Grid resistor V2
R24	100 5W	Mounted behind Preamp Switch
R25	1 10W	Mounted behind Preamp Switch
R26	75 20W	Mounted behind Mode and Power Switch
R27	47K 1/2W	Mounted by K1
R28	12K 2W	Driver Section

Resistors

Ref#	Description	NOTES:
R29	2.2K 2W	Driver Section
R30	68K 1/2W	On PCB
R31	1K 1/2W	On PCB
R32	10K 1/2W	On PCB
R33	220 1/2W	On PCB
R34	470 1/4W	On PCB
R35	22K 1/4W	On PCB
R36	220 1/2W	On PCB
R37	6.8K 1/4W	On PCB
R38	3.3K 1/2W	On PCB
R39	22K 1/4W	On PCB
R40	1K 1/4W	On PCB
R41	15K 1/4W	On PCB
R42	10K 2W	One end connected to PCB
R43	150 1/2W	On Terminal Strip

Potentiometers

Ref#	Description	NOTES:
VR1	5K	Bottom Chassis
VR2	25K	Bottom Chassis
VR3	10K	On PCB

Diodes

Ref#	Description	NOTES:
D1	1N4822	HV Section
D2	1N4822	HV Section
D3	1N4822	HV Section
D4	1N4822	HV Section
D5	1N4005	Bias Power Supply, On Terminal Strip
D6	1N4005	LV Power Supply, On Terminal Strip
D7	1N914	On PCB, Keying detector
D8	1N4005	Across K1
D9	1N914	On PCB
D10	1N4005	On PCB Across K2
D11	1N34A	On PCB, Meter detector

Transistors

Ref#	Description	NOTES:
Q1	2N5814	On PCB, Preamp
Q2	2N5814	On PCB, Keying control
Q3	2N5814	On PCB, Relay driver
Q4	2N5814	On PCB, Relay driver

Tubes

Ref#	Description	NOTES:
V1	8950	Driver Section
V2	8950	PA Section
V3	8950	PA Section
V4	8950	PA Section
V5	8950	PA Section

Switches, Fuses, Relays, Lamp, Misc

Ref#	Description	NOTES:
F1	15 Amp	
S1	SPST	AC POWER Switch
S2	SPDT	MODE Switch
S3	DPST	RF POWER Switch
S4	SPDT	DELAY Switch
S5	DPST	PREAMP Switch
K1	3PDT	
K2	DPDT	Potter Brumfield, 12V, KT11D
K3	DPDT	AZ531-09-1
LAMP	# 1815	14V 200Ma, 2.8 Watts, T3.25
SCREW	Top Cover, 8-32 x 1/4" Binder Head	6 each
SCREW	Bottom Cover,	6 each

Inductors, RFC, Transformer

Ref#	Description	NOTES:
L1	4 uH	Filament Choke
L2	17 uH	Driver Plate HV Choke
L3	55 uH	Driver Plate HV Choke
L4	55 uH	PA Cathode Choke
L5	Wire Coil	Driver Section, Pi Network
L6	17 uH	PA Plate HV Choke
L7	55 uH	PA Plate HV Choke
L8	Wire Coil	PA Section, Pi Network
L9	30 uH	PA Section, Mounted under C49
L10	Preamp Tuning Coil	On PCB, Tunes Preamp Input
L11	GRID TUNING Coil	Access on back of chassis
RFC 1	47 2W with 4 Turns Metal Strip	Driver Section
RFC 2	100 2W with 5 Turns 14ga Wire	PA Section
RFC 3	100 2W with 5 Turns 14ga Wire	PA Section
RFC 4	100 2W with 5 Turns 14ga Wire	PA Section
RFC 5	100 2W with 5 Turns 14ga Wire	PA Section
T1	Power Transformer	271-025

9.0 POWER TRANSFORMER:

USING TRANSFORMER 271-025 (10 LEADS) WITH LA-550, LA-600, and LA-650

The original power transformer used in the LA-550, 600 and 650 series linear amplifiers was the 9 or 8 lead version of the 271-025. If the linear uses 6LF6 tubes it has the 9 lead version, because of the requirement to provide 6 volts to the filament of the driver tube. If the linear uses 8950 tubes the 8 lead version may have been used as there is no requirement for a 6 volt center tap. The 8950 has a 12 volt filament.

Because the 10 lead version of 271-025 has no 6 volt filament tap it cannot be used to replace the transformer in a linear with 6LF6 unless a simple modification is performed. This consist of replacing the driver tube with an 8950 and re-wiring the filament pin (pin #1) to the 12 VAC filament source. The other socket pin connections remain the same. The driver stage must be re-aligned and re-neutralized because the internal capacitances of the two different tube types are not the same.

Also when using the 10 lead transformer, the two primary windings must be wired in parallel. For the 110V AC source the 2 windings are (1) orange and brown and (2) yellow and green. To wire them in the proper phase the orange and yellow leads are both connected to the unswitched line cord lead at the term strip (this is the line cord lead that is not connected to the fuse holder). The green and brown leads are both connected to the adjacent terminal. This terminal has a wire leading to the power switch.

10.0 REPAIR TIP:

SWITCH REPAIR TIP

If you have a switch like this and it is being intermittent or not working at all, it probably just needs cleaning. This is a DPST switch and if you cannot find a suitable replacement, this is how to disassemble and clean the old one. When removing switch, make sure you remember to identify which wire connects to which terminal. Word of caution, the AC POWER and the PREAMP switch are used to secure the front panel to the chassis.

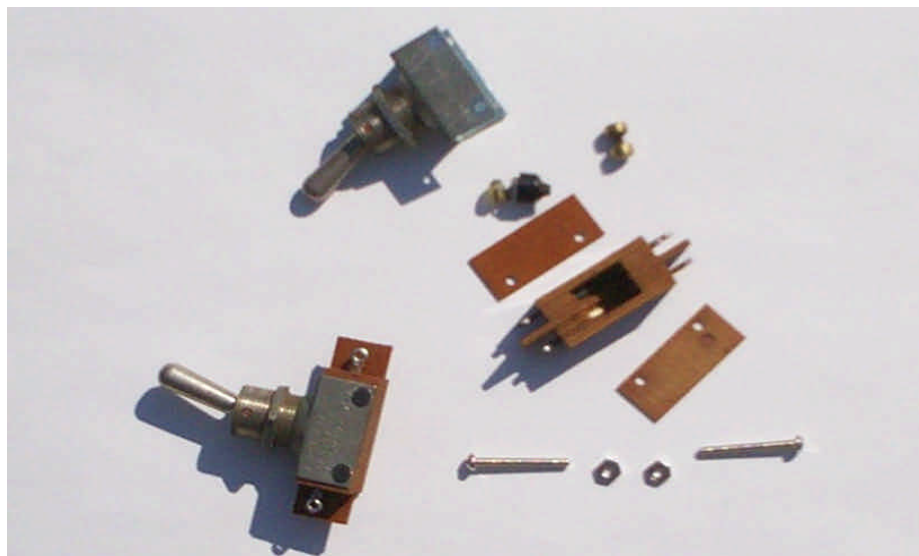


Figure 10-1

Disassembly: Carefully drill off the braded end of the two rivets holding the switch together using a small drill bit. Then push the rivets out of the switch while holding the switch front and back. Once the rivets are removed, the internal spring will be pushing the switch apart. Lift the top cover off while watching where all the pieces are located. The picture above shows a switch before repairing and one disassembled showing all the parts and the two bolts to put it back together with. Remove the three piece part (cap, spring, and guide) and lay to the side. Remove the brass roller that looks like a mini dumbbell and clean it to remove any oxidation. Next using a Q-tip and alcohol, clean the contacts inside the switch housing. It's possible the bottom contacts have worn down some over time. If so, the raised track running down the middle of the housing may now be holding the brass roller up preventing it from making firm connection with the bottom contacts. Using a small knife point, carefully scrape both sides of the track a small amount by the contacts. You can also scrape down the top a very small amount. Do not remove much material, just scrape a little off. The track also acts as a wall between the contacts. This should allow the roller better contact if the track was holding it up.

Reassembly: Put brass roller back into the housing and push it to the end with the side contacts. Put the three piece part back in with the grooved guide end riding on the middle of the brass roller. Place the two insulators back on the sides of the housing. Move toggle on top cover to the side labeled "ON". While holding the housing and insulators together, slide the top cover down over the housing. The bottom of the toggle lever fits into the top plastic cup of the three piece part as it goes together. If you have it backwards, the "ON" position will be "OFF". Just turn the top around if needed to put it right. Two small nails that will fit thru the holes will hold it together while finishing up. You can check the "ON and "OFF" with an ohmmeter at this point easily. The two bolts and nuts needed to replace the rivets are size 2-56. The bolt is 2-56 x 3/4in. The bolts will fit the holes in the top cover, but will have to be threaded thru the housing. Remove one of the nails and insert a bolt. Screw it in all the way down and watch the housing bottom as you tighten it. You only want to tighten enough to barely compress the housing. Place a nut on the end and tighten only enough to barely compress the housing from that side. If tightened too much, you may distort the housing where the brass roller may bind and not move freely. Now put in the other bolt and nut. Tighten the same way. You only need them snug to hold the switch together properly. Verify the switch is working properly. You can use a drop of nail polish to secure the nuts if needed.

Of course, no manual would be complete without the manufacturer's equipment warranty.

WARRANTY POLICY

SILTRONIX CORPORATION warrants, to the original purchaser, this equipment to be free of defects in material or workmanship, except for tubes, transistors and diodes, under normal service for a period of six months from the date of original purchase. Tubes, transistors and diodes are covered under the warranty policy for a period of 90 days. This warranty is valid only if the enclosed card is properly filled out and mailed to the factory within ten days of purchase.

Do not ship equipment to the factory without prior authorization. This warranty is limited to repairing or replacing only the defective parts, and is not valid if the equipment has been tampered with, misused, or damaged. All returns for repairs must be freight prepaid. This equipment is manufactured for use on such frequencies as authorized by the FCC. Siltronix does not accept any responsibility for un-authorized use of such equipment.