

**CTI.ComTec      PLA-800 Power Amplifier**

**Serial Number 1010**

**CTI.ComTec      PSL-1000 Power Supply**

**Serial Number 1010**

**Test Report for Grant of Certification  
For Use in Part 97 Amateur Service Under  
The Rules of the Federal Communications Commission**

**PLA-800 OPERATIONAL  
DESCRIPTION**

**Appendix C**

**March 16, 2002**

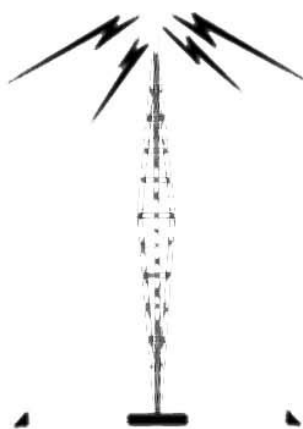
**Submitted by:**

**CTI.ComTec, Inc.**

**1 Classic Court, North  
Palm Coast, Florida 32137**

**386-445-5545**

**APPENDIX C**  
**COPY OF SETUP AND OPERATING INSTRUCTIONS**



***CTI ComTec, Inc.***  
***RF and Audio Communications***  
***Equipment***

**1 Classic Court North,  
Palm Coast, Fl., 32137**

**Tel. 386 445 5545**

**Fax. 386 446 0964**

**E-Mail. [info@cticomtec.Com](mailto:info@cticomtec.Com)**



**Please Read Before Operating**  
**Caution: Lethal High Voltage Present**

Before operating both the PLA 800 and the PSL 1000, certain precautions should be taken.

The PSL 1000 Power Supply generates over 2000 volts Direct Current at a current capacity of over .6000 amperes. It also generates 350 Volts Direct Current at .150 amperes. Both voltages are **Lethal** and will cause death upon contact with the human body.

Although there are several built-in safety features to protect YOU from exposure to high voltage, the following steps should be followed at all times.

**NEVER OPERATE, EITHER THE PLA 800 OR PSL 1000, REMOVED FROM THEIR INDIVIDUAL ENCLOSURES.**

**NEVER REMOVE ANY CONNECTORS FROM EITHER UNIT WHILE POWER IS APPLIED.**

**NEVER INSERT METAL OBJECTS INTO THE COOLING VENT HOLES ON TOP OR BELOW EITHER UNIT, WHILE POWER IS APPLIED.**

**WARNING**

**THE VOLTAGES USED IN THIS EQUIPMENT ARE SUFFICIENTLY HIGH TO ENDANGER LIFE. ALL PERSONNEL ARE ADVISED TO BE THOROUGHLY FAMILIAR WITH THESE UNITS BEFORE TROUBLESHOOTING THEM IN A POWER-ON CONDITION. ALWAYS USE CAUTION.**

## INTRODUCTION

The PLA-800 Linear Amplifier uses a pair of 4CX250's tetrodes as final amplifier tubes. These tubes have been used and are still used today by the military because of its compact size and ability to put out power in a compact space. They also have the ability to amplify signal from .1 MHz to 500 MHz. Therefore their power bandwidth is approximately 500 MHz.

The 4CX250B's have a control screen grid. The voltage and regulated current for the screens are supplied by the PSL 1000 Power Supply. Using screen voltage regulation, the grids have the advantage of self-limiting the current flow to the plates of the tubes. As a result, the tubes cannot be driven into saturation causing distortion. The maximum allowable screen current is regulated by the power supply. Once that point of current demand is reached, the screen limits the plate current flow to its maximum. Therefore, an ALC circuit, to prevent driver overload, is not required.

The maximum plate and cathode current flow is measured by the 0-500 ma. meter on the front panel. The screen current only, is measured by the 0-50 ma. meter located also on the front panel.

The band switch and plate and loading capacitors are also located on the front panel. The capacitors use a 6:1 vernier ball drive to give smooth, easy tuning. Also located on the front panel are the two lights indicating filament voltage on and plate current on. The filament supply is contained in the PLA-800 and is protected by the 3 AG fuse next to the indicator light. These bulbs are tungsten elements, with a life of 50,000 hours. The plate on and off switch is located in the middle of both lamps.

Both the amplifier and power supply are inter-locked for your safety. The removal of the FOUR (4) thumbscrews will allow you to slide the units forward and out of their respective enclosures. NEVER open either unit with the AC and DC power applied. As an added safety feature, the power supply has a mechanical shorting rod, which, upon sliding the unit out of the enclosure beyond 1/4 of an inch, will ground the high voltage capacitor bank. This is done for your safety and should NOT be defeated.

Built into the PSL 1000 power supply is a maximum current overload circuit. If more than 600 ma. is delivered to the load, the circuit will activate, opening the plate relay and removing the high voltage. At the same time, the current overload indicator lamp on the front panel of the power supply will light and an audible alarm will sound. To reset the high voltage back, simply push the reset button on the panel. The power supply is also equipped with a voltmeter allowing you to monitor the high voltage (0-500 vdc) and the screen voltage (0-500 vdc).

Under normal loading conditions, the PLA-800 will deliver 600 watts key down or 1200 watts PEP output. However, the key down power level should not be maintained for more than 10 seconds. In cases where RTTY or AM is used, the amplifier should be operated at one-half power level. 1200 watts PEP can be operated at any time.

## Tuning Procedure

On the rear panel of the PLA-800 you will see the Power Output Connector or RF Out (SO239), a High Voltage connector, a Control Voltage Connector, a Push-to-Talk jack, a Ground Connector, and the Power Input Connector (SO239) or RF In.

Connect the Control Voltage Connector and High Voltage Connector between the amplifier and power supply. The power supply has the appropriate mating connectors along with the AC input power plug. The AC input power can be adapted to 115 VAC or 230 VAC service (See power change over section).

Apply the RF in coax connector from your transceiver. A transceiver with a variable output control should be used. That is, one which can vary the amount of drive power to the amplifier. Set your drive control on the transceiver to minimum. Connect the PTT (push-to-talk) connection using the RCA jack to your transceiver. This will put the amplifier into the circuit when you transmit from your transceiver. In the receive mode, the amplifier will be in by-pass.

Connect a coax line from the RF OUT to your tuner or directly into your antenna load. An output power watt meter should be used, in-line with the antenna. This should be used to tune the amplifier correctly.

Upon completion of the above, double check all connections to make sure they are installed correctly and tightly.

Apply AC power by switching on the Main Power Switch on the power supply front panel. The green indicator light will illuminate and the yellow filament light on the amplifier will illuminate. Be certain that the plate switch on the amplifier is OFF. You will hear the fans in the amplifier also begin to operate. Let the amplifier warm up for approximately 60 seconds. This will ensure that the filaments of the 4CX250Bs will come up to temperature.

After 60 seconds of warm up, turn on the plate switch located on the front panel of the amplifier. Observe the meter readings on the amplifier. The plate meter should come off of the Zero position by about 10 ma. and the screen current meter should read 0 ma. These are the resting currents for both circuits without drive applied.

Select the desired band for both amplifier and driver. Simply turn the band switch on the amplifier to the desired band. Place the driver (transceiver) in the CW mode. If you have a transceiver with an Auto Tune Control, press the auto-tune function.

With the key down on the transceiver, begin to increase the drive control on the transceiver and bring the plate current on the amplifier to approximately 300 ma. Begin tuning the plate turning control and the loading control for a maximum reading on the power watt meter. If you have a tuner with an SWR meter in the circuit, be sure to tune the SWR for minimum. Remember, the maximum output with minimum SWR. Continue to tune at this power level until you are confident that the amplifier is adjusted properly. It is possible to tune the amplifier too heavily. Continue to adjust the output for maximum by alternating

between the Plate Tuning and Loading Controls. Do NOT exceed the 300 ma. current on the plate meter in CW.

DO NOT DRIVE AT THIS CURRENT LEVEL FOR MORE THAN 10 SECONDS AT A TIME. Release the carrier for 10 seconds and then key down again to optimize output. Once at maximum output, remove the drive and let the amplifier cool down for about 10 seconds. Increase the drive level on your exciter to show a 500 ma. reading on the Plate Meter. Screen Current should be at 30 ma. If the screen current is showing a negative downturn on the meter, the plate loading is too heavy. Simply back off the loading control until the screen current reads 30 ma. Tetrodes do exhibit negative screen current. This is OK. Depending upon the load value, it is possible to show negative screen current with maximum output. You should be at the maximum output of the amplifier.

If there is excessive drive and plate current, the overload circuit will activate. Reset it by pushing in on the reset button on the Power Supply.

At this point you should be ready to transmit SSB or CW. Place your driver into SSB and modulate normally. You will see the Plate Meter kick up to 500 ma. and the output will exceed 1200 watts PEP. If RTTY is used, you must reduce the plate current to 250 ma. as a maximum operating plate current.

## **Bias Adjustment**

On the rear panel of the PLA-800 is a RED square push button and an ORANGE colored test point jack. To adjust the bias on the 4CX250Bs follow the steps below.

1. Remove the high voltage RED connector to the amplifier on the rear panel.
2. Place the PLATE SWITCH on the front panel to OFF.
3. Place a multimeter in DC Volts position and on a scale of 0-2—volts. Insert the negative lead of the multimeter into the orange test point jack. Ground the positive lead of the multimeter to chassis ground on the amplifier.
4. Turn the PSL 1000 Main Power Switch to ON.
5. Push in on the RED square button switch and read the bias voltage on the multimeter.
6. To adjust the bias voltage, use a straight blade screwdriver in the pot control on the rear of the amplifier, next to the test point jack.
7. You must continue to push in on the red switch to adjust the bias.
8. The correct voltage for the 4CX250Bs is –57 volts DC.
9. Once adjusted, release the red button switch and the bias voltage will climb to the cutoff voltage which will be above –100 Volts DC.
10. The bias is now adjusted for AB1 service and the amplifier can be operated.

## **Power Change Over**

Both the PLA-800 and PSL 1000 can be used for 115 volt C/50-60 Hz operation or 230 volts AC/50-60 Hz operation. The units are supplied for 115 VAC operation unless specifically requested.

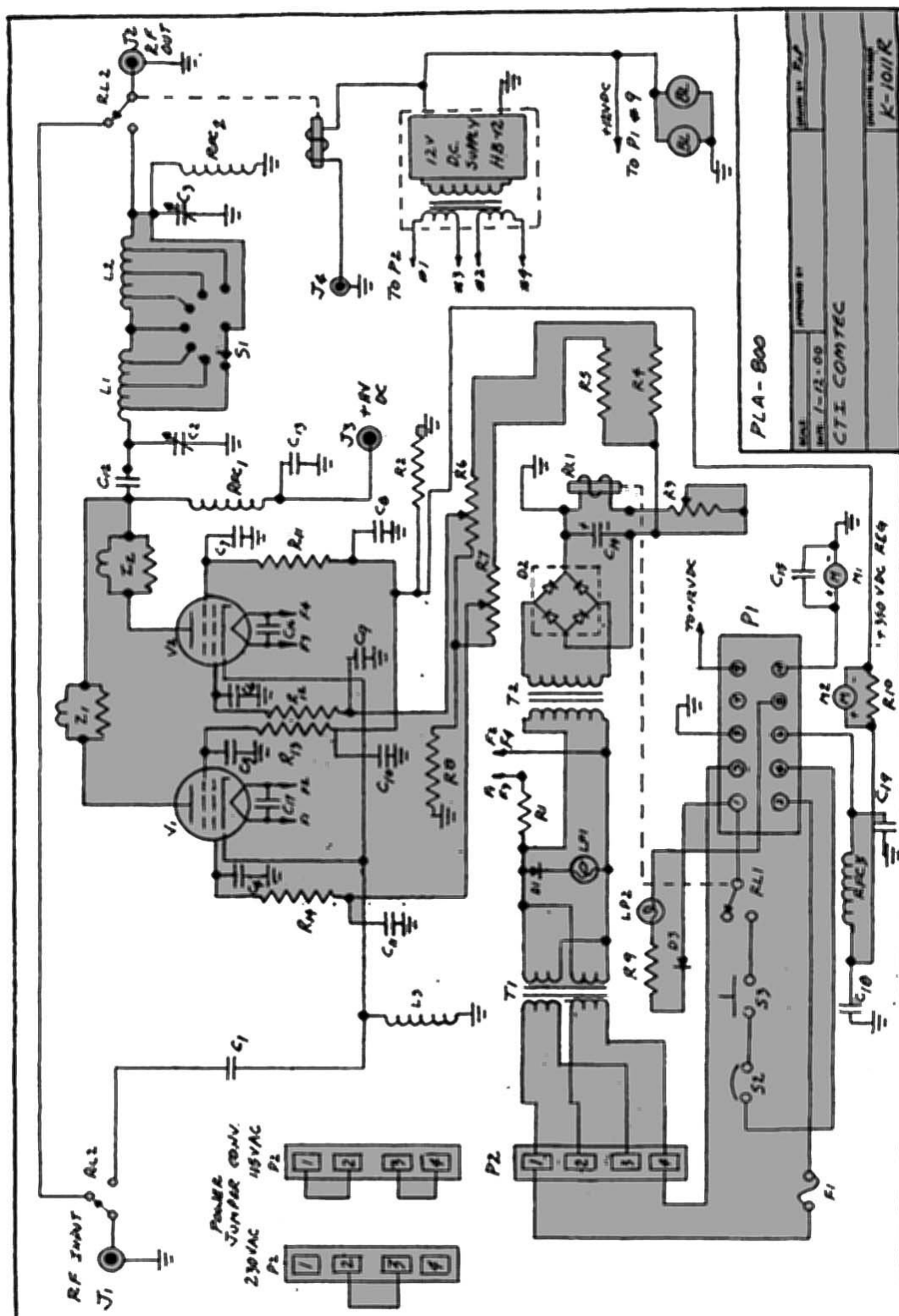
Change over to 230 VAC is simple.

1. Remove the PLA-800 from it's enclosure by removing the four (4) thumbscrews on the front panel and slide the unit out by pulling on the front grab handle.
2. Turn the PLA-800 over exposing the underneath chassis compartment. In the lower right rear, from the front panel end, there is a four (4) pin terminal block with push on connectors. You can count the pins on the block from 1 (one) through 4 (four) in either direction. There are two black jumpers connecting pins 1, 2, 3, and 4. Remove the two jumpers from their respective pins by grabbing the insulated portion of the connector pins.
3. Replace ONE jumper back onto the terminal block, by pushing each end of the jumper onto pins 2 and 3.

This completes the change over of the PLA-800 to 230 VAC.

For the PSL 1000 Power Supply change over follow these steps.

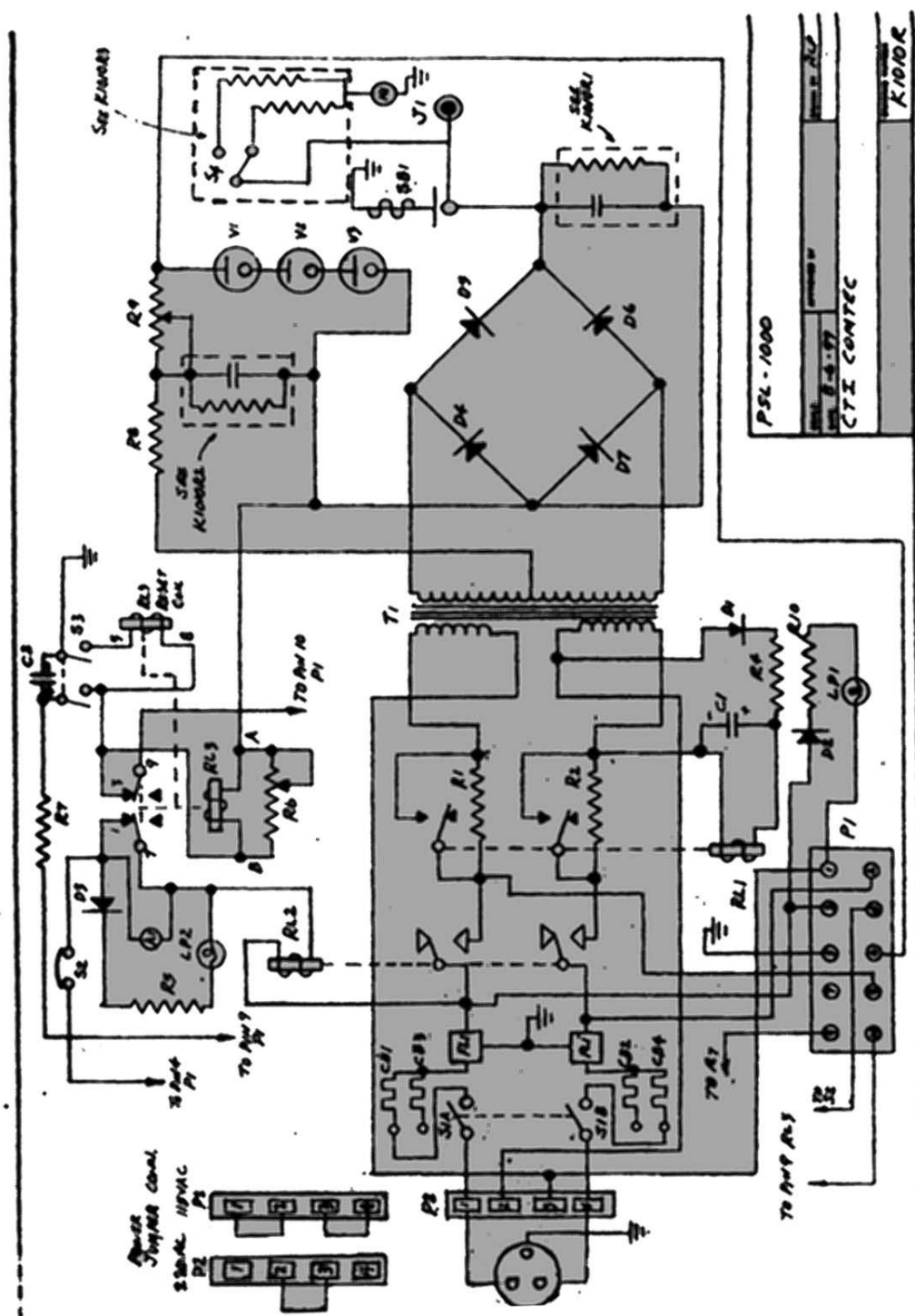
1. Remove the PSL 1000 from it's enclosure in the same way as the PLA-800. Turn the power supply over, exposing the underneath chassis.
2. At the bottom left rear of the chassis is the same type four (4) pin terminal block as in the PLA-800. Remove the two (2) jumpers and replace one (1) jumper to pins 2 and 3.
3. Find the push on the terminal connected to chassis ground (green wire with push-on terminal). Connect it to terminal 2 as well. (The same procedure was used with the PLA-800 with the exception of the ground push-on connector.)
4. Next, you will change over pins located in the front underneath portion of the power supply. You will see four (4) breaker overloads. Two (2) for 115 Volt AC (10 AMP) and two (2) for 230 Volt AC (5 AMP). Pull the WHITE WIRE connector from the 10 AMP Breaker and push it onto the 5 AMP Breaker. Do the same for the BLACK WIRE connector. Make sure that the white wire is attached to the breaker with the white wire already attached on the breaker. The same for the black wire to the breaker with the black wire already attached. This completes the internal change over for both the PLA-800 and the PSL 1000. Return the units back to their respective enclosures and replace the four (4) thumbscrews securely.
5. Finally, replace the male connector on the line cord with an appropriate 230 VAC plug. Since there are many types of connectors for primary power, it is recommended that you consult your local electrician or if you are familiar with an existing plug arrangement already in operation, use the plug required. Make sure that the GREEN wire in the line cord, normally used for ground at 115 VAC operation, now becomes the neutral for 230 VAC operation.

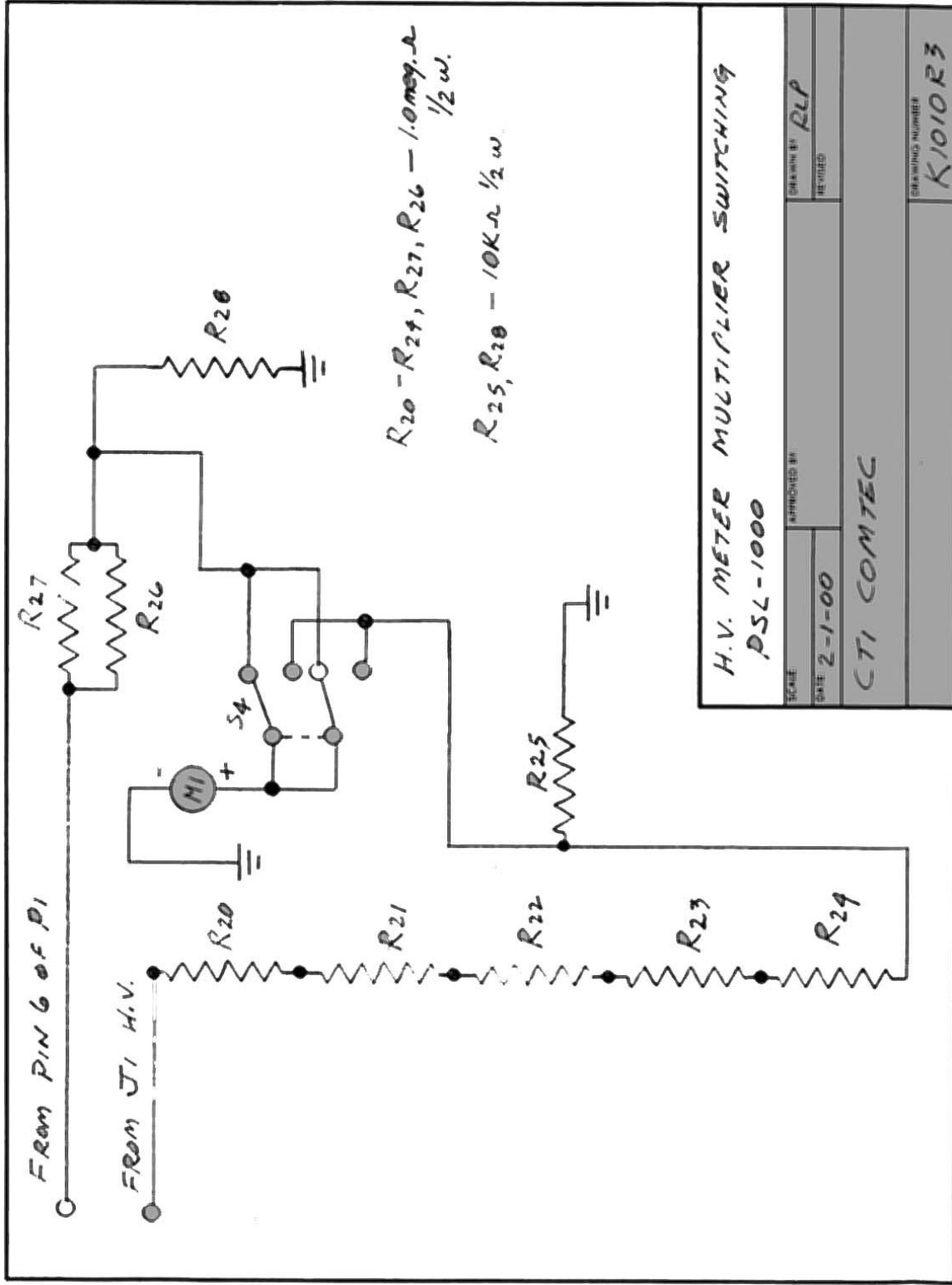


## Parts List Model PLA-800

| Symbol                                   | Description                       | Function              | CTI Part #           |
|------------------------------------------|-----------------------------------|-----------------------|----------------------|
| C1                                       | Capacitor, .01 uf 600VDC          | RF Coupling           | C101B                |
| C2                                       | Capacitor, 37-250pf variable air  | Plate tune            | 73-1-80-37 M73       |
| C3                                       | Capacitor, 65-1500pf variable air | Output Tune           | 73-1-32-65 M73       |
| C4,C5,C6,C7,C8<br>C9,C10,C11,C18,<br>C19 | Capacitor,<br>.001uf@1000VDC      | RF Decoupling         | Ceramic<br>.001/1000 |
| C12                                      | Capacitor, .001uf@12,500VDC       | RF Blocking           | Mylar .001/12.5K     |
| C13                                      | Capacitor, .01uf@5000VDC          | RF Decoupling         | Oil .002/5k          |
| C14                                      | Capacitor, 33uf@450VDC            | Bias Filter           | CTE1.33.450          |
| C15,C16,C17                              | Capacitor, .01uf@1000VDC          | RF Decoupling         | Ceramic .01/1000     |
|                                          |                                   |                       |                      |
| R1                                       | Resistor, .25ohm/25watts          | Filament<br>drop/6V   | RC .25GF             |
| R2                                       | Resistor, 25Kohm/10watts          | Screen Bleeder        | RC25KGF              |
| R3                                       | Resistor, 1.5K/25watts            | Relay Dropping        | RC 1.5KGV            |
| R4,R5,R8                                 | Resistor, 1.0K/2watts             | Bias Dropping         | RC 1.5KGF            |
| R6,R7                                    | Resistor Variable, 5.0K/2watts    | Bias Adjust           | RC 5.0KGV            |
| R9                                       | Resistor 3.0K 3watts              | Lamp Dropping         | RC3.0KGF3            |
| R10                                      | Resistor, 1.0ohm 1/2 watt         | Screen Meter<br>Shunt | RC 1.00KG            |
| R11,R12,R13,R14                          | Resistor, 100ohm 1/2 watt         | Limiting<br>Resistor  | RC 100               |
|                                          |                                   |                       |                      |
| D1,D3                                    | Diode Silicon,800VDC@1.0a         | Lamp Rectifier        | DS4007               |
| D2                                       | Diode Bridge,200VDC@1.0a          | Bias Rectifier        | BS 2001              |
|                                          |                                   |                       |                      |
| RL1,RL2                                  | DPDT Relay12VDC30aCont.           | Bias and PTT          | PBT92S11D22-12       |
|                                          |                                   |                       |                      |
| M1                                       | Meter, 0-500 ma. DC               | Total DC<br>current   | H635-.50             |
| M2                                       | Meter, 0-50 ma. DC                | Screen Current        | H635-.05             |
|                                          |                                   |                       |                      |
| RFC2,3                                   | RF Choke2.5mh@.15a                | RF Decoupling         | RFCH 2.5MH           |
| RFC1                                     | RF Choke 120uh@1.5a               | Plate Choke           | RFCH 1201            |
|                                          |                                   |                       |                      |
| LP1                                      | Lamp Indicator 6.0V               | Fil. Indicator        | CT14-030.006         |
| LP2                                      | Lamp Indicator 60V                | Plate Indicator       | CT14-030.060         |
|                                          |                                   |                       |                      |
| F1                                       | Fuse 3AG/3.0a                     | Filament Fuse         | CTFH-3AG             |
|                                          |                                   |                       |                      |
| S1                                       | Rotary7 pos. sw. 4,500 Volts      | Plate Band Sw.        | CTR802A07            |

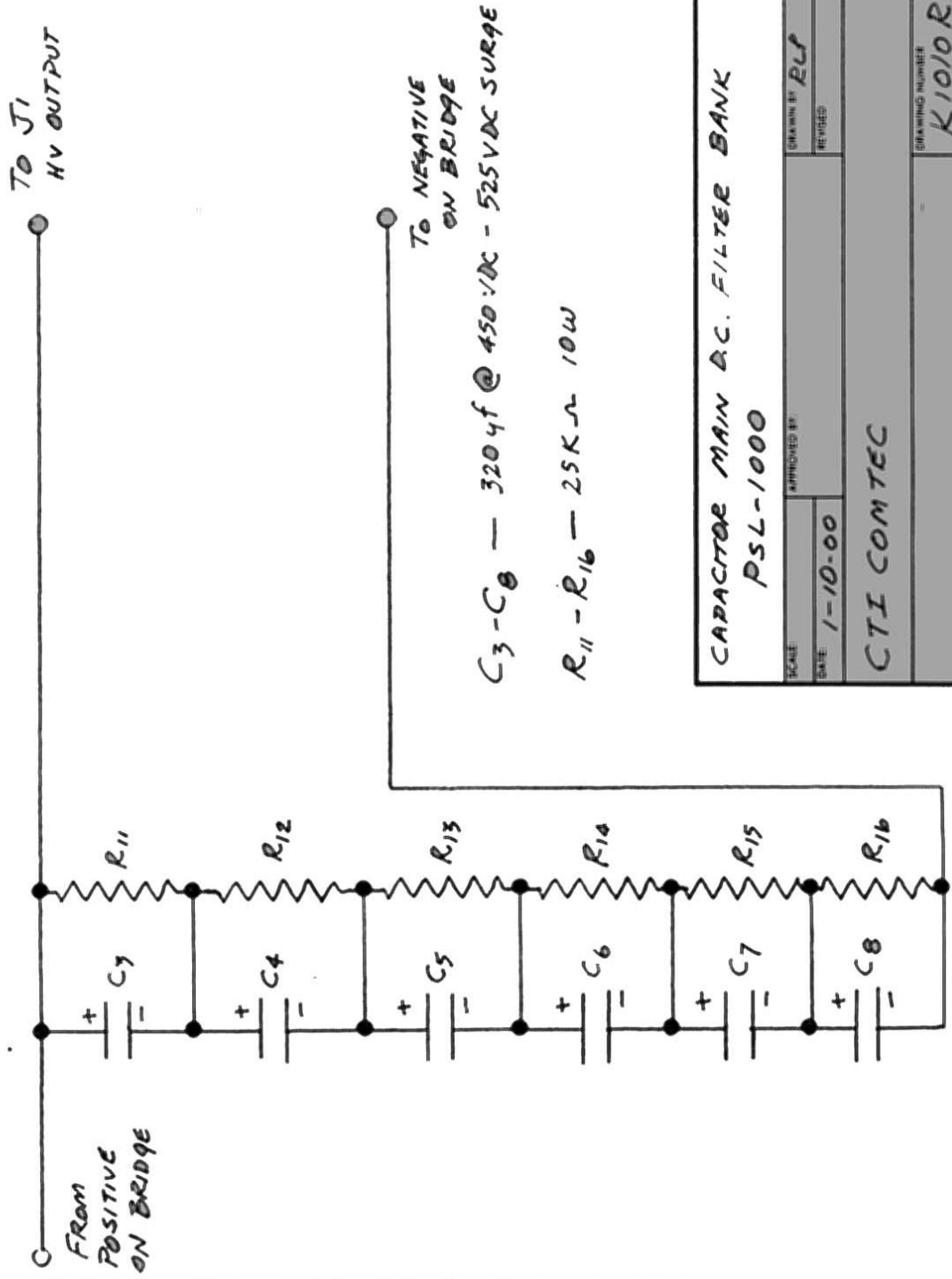
| Symbol  | Description                    | Function               | CTI Part # |
|---------|--------------------------------|------------------------|------------|
| S2      | SPST 250V/10a                  | Plate ON?OFF Switch    | CTSP-10    |
| S3      | SPST Microswitch               | Interlocking SW        |            |
|         |                                |                        |            |
| L1      | Coil 14.0-24.5MHz              | Final Tank Coil        | TC-6-10    |
| L2      | Coil 1.5-7.0MHz                | Final Tank Coil        | TC-6-20    |
| L3      | Coil 85uh                      | Input Load Coil        | LC-.5-85   |
|         |                                |                        |            |
| J1,J2   | SO 239 Coax Connector          | Input/Output Coax      | SO239      |
| J3      | Female Chassis Connector       | High Voltage Connector | CTM-7500M  |
| J4      | Female Chassis Connector       | RCA/PTT                | RCA Phono  |
|         |                                |                        |            |
| P1      | Jones10 Male Chassis Connector | Control interconnector |            |
| P2      | 4 Pin Push-On Strip            | Primary Power Selector |            |
|         |                                |                        |            |
| T1      | 115/230VAC Pirm. 6.3VAC Sec    | Filament Transformer   |            |
| T2      | 115VAC/6.3VAC                  | Bias Transformer       |            |
|         |                                |                        |            |
| V1, V2  | 4CX250B Tetrodes               | Power tubes            | CT4CX250B  |
|         |                                |                        |            |
| BL1,BL2 | 12VDC 2.38”Sq. Fans 17cfm      | Cooling tubes          |            |
|         |                                |                        |            |
| Z1, Z2  | 50 ohm, 2 w/3 turns, 1/2 dia.  | Parasitic Surpressor   |            |
|         |                                |                        |            |
| HB-12   | 12VDC@1.5a Power Supply        | Relay and Fan power    |            |
|         |                                |                        |            |





H.V. METER MULTIPLIER SWITCHING  
DSL-1000

|                |             |          |
|----------------|-------------|----------|
| SCALE          | APPROVED BY | DRAWN BY |
| DATE 2-1-00    |             | RLP      |
| CTI COMTEC     |             |          |
| DRAWING NUMBER |             |          |
| K1010R3        |             |          |

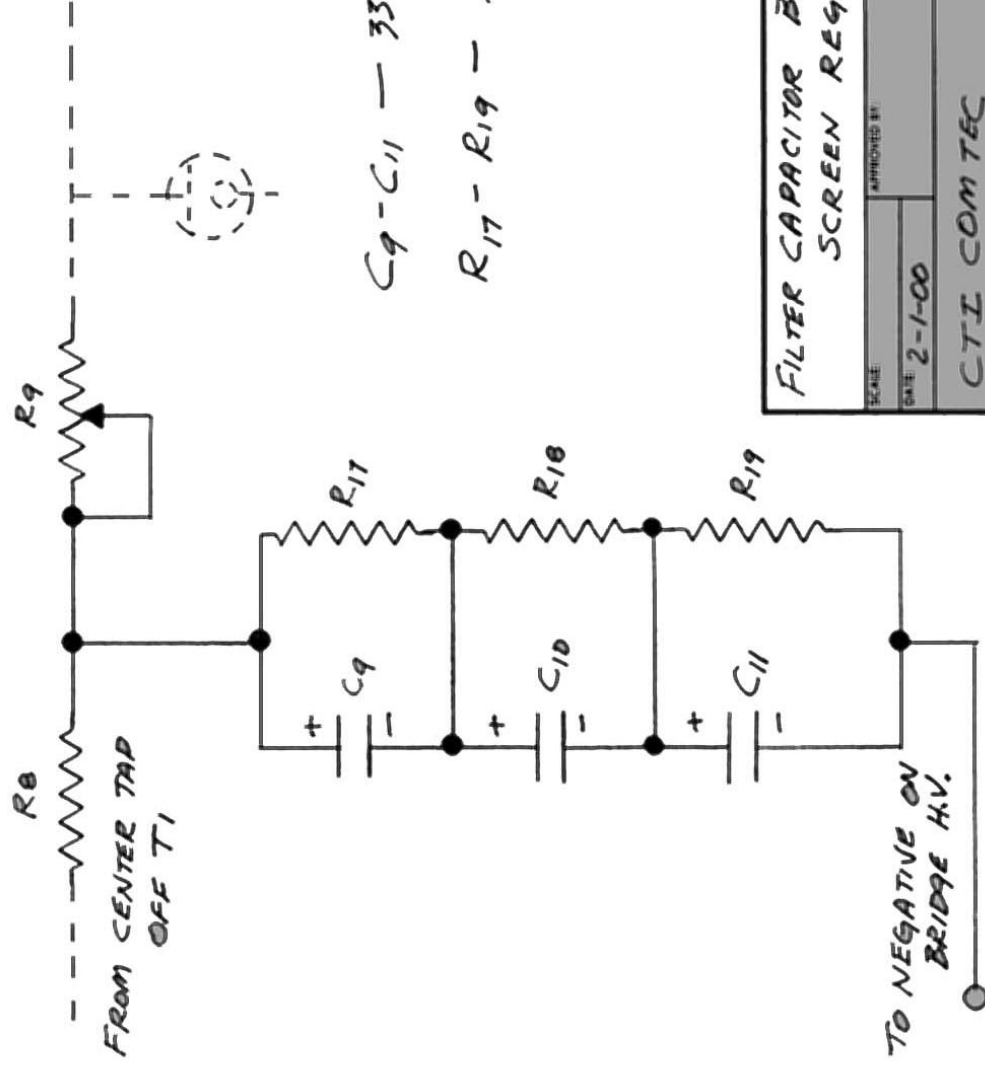


CAPACITOR MAIN DC FILTER BANK  
PSL-1000

|              |             |          |
|--------------|-------------|----------|
| SCALE        | APPROVED BY | DRAWN BY |
| DATE 1-10-00 |             | RLP      |

CTI COMTEC

|                |
|----------------|
| DRAWING NUMBER |
| K1010R1        |



$C_9 - C_{11} - 33\mu f @ 450 VDC$

$R_{17} - R_{19} - 33K \Omega 2W$

# FILTER CAPACITOR BANK FOR (PSL-1000) SCREEN REGULATOR VOLTAGE

|                |              |               |
|----------------|--------------|---------------|
| SCALE:         | APPROVED BY: | DRAWN BY: RLP |
| DATE: 2-1-00   | REVIEWED:    |               |
| CTI COMTEC     |              |               |
| DRAWING NUMBER |              | K1010R2       |



**CTI.ComTec, Inc.**

**1 Classic Court North Palm Coast, FL 32137**



## **Warranty**

CTI.ComTec, hereinafter referred to as CTI, warrants the equipment (except electron tubes, fuses, lamps, batteries and articles made of glass or other fragile or other expendable materials) purchased hereunder to be free from defect in materials and workmanship under normal use and service, when used for the purposes for which the same is designed, for a period of one year from the date of delivery F.O.B. factory. CTI further warrants that the equipment will perform in a manner equal to or better than the published technical specifications as amended by any additions or corrections thereto accompanying the formal equipment offer.

CTI will replace or repair any such defective items, F.O.B. factory, which may fail within the stated warranty period, PROVIDED;

1. That any claim of defect under this warranty is made within sixty (60) days after discovery thereof and that inspection by CTI, if required, indicates the validity of such claim to CTI's satisfaction.
2. That the defect is not the result of damage incurred in shipment from or to the factory.
3. That the equipment has not been altered in any way either as to design or use whether by replacement parts not supplied or approved by CTI, or otherwise.
4. That any equipment or accessories furnished but not manufactured by CTI, or not of CTI design shall be subject only to such adjustments as CTI may obtain from the supplier thereof.

Electron tubes\* furnished by CTI, but manufactured by others, bear only the warranty given by such other manufacturers. Electron tube warranty claims should be made directly to the manufacturer of such tubes.

CTI's obligation under this warranty is limited to the repair or replacement of defective parts with the exception noted above.

At CTI's option, any defective part or equipment which fails within the warranty period, shall be returned to CTI's factory for inspection, properly packed with shipping charges prepaid. No parts or equipment shall be returned to CTI, unless a return authorization is issued by CTI. If, for any reason, any equipment is returned for a full refund, there will be a 20% restocking charge deducted from the selling price.

No warranties, express or implied, other than those specifically set forth herein shall be applicable to any equipment manufactured or furnished by CTI and the foregoing warranty shall constitute the Buyers sole right and remedy. In no event does CTI assume any liability for consequential damages, or for loss, damage or expense directly or indirectly arising from the use of CTI products, or any inability to use them either separately or in combination with other equipment or materials or from any other cause.

\*Electron tubes also includes semi-conductor devices

## **PROCEDURE FOR RETURN OF MATERIAL OR EQUIPMENT**

Should it be necessary to return equipment or material for repair or replacement, whether within warranty or otherwise, a return authorization must be obtained from CTI prior to shipment. The request for return authorization should include the following instructions:

1. Model Number of Equipment
2. Serial Number of Equipment
3. CTI Part Number
4. Nature of defect or cause of failure
5. The contact or purchase order under which equipment was delivered

## **PROCEDURE FOR ORDERING REPLACEMENT PARTS**

When ordering replacement parts, the following information must be included in the order as applicable:

1. Quantity required
2. CTI Part Number
3. The Equipment Model Number in which part(s) are used
4. Brief Description of the Item

## **PROCEDURE IN THE EVENT OF DAMAGE INCURRED IN SHIPMENT**

CTI's Warranty specifically excludes damage incurred in shipment to or from the factory. In the event equipment is received in damaged condition, the carrier should be notified immediately. Claims for such damage should be filed with the carrier involved and not CTI.

All correspondence pertaining to Warranty Claims, return, repair, or replacement and all material or equipment returned for repair or replacement, within Warranty or otherwise, should be addressed as follows:

***CTI.ComTec, Inc.***  
Engineering Services Department  
1 Classic Court North  
Palm Coast, FL 32137

# *CTI ComTec, Inc.*

## **PLA800 H.F. Linear Amplifier**

### **Triodes are Good, Tetrodes are Better....**

Unlike triode amplifiers, the PLA800 uses tetrode tubes, which have a control screen grid. The screen grid not only adds to the amplification factor of the tube, but also controls the electron flow to the plate. When voltage regulation is used for the screen grid and with the plate overload circuit, as with the PLA800, plate and screen currents are limited to their maximum value. As a result you will not overdrive the PLA800 creating sideband distortion or splatter. Increasing the drive power beyond 50 watts, does not increase the power output. Because of this self-limiting feature, an ALC circuit is not needed. The amplified audio, as in SSB service, is clear and clean, void of sibilance and distortion.

### **PLA800 Technical Specifications.....**

|                        |                                                                                    |
|------------------------|------------------------------------------------------------------------------------|
| Frequency Coverage     | 160,80,40,20,17,15 and<br>10 meter bands<br>(Ten meter band with license)          |
| Output Power           | 800-PEP or 600-CW<br>300-RTTY                                                      |
| Input Power            | 50 watts nominal                                                                   |
| Operating Modes        | CW, SSB RTTY                                                                       |
| Tuning                 | All tuning and band-switch controls on front panel.                                |
| Output Impedance       | 50 ohms                                                                            |
| Input Impedance        | <70 ohms                                                                           |
| Input/Output Connector | SO-239                                                                             |
| Power Requirements     | Directly from PSL1000<br>Primary power is changeable 115/230 volts AC<br>50/60 Hz. |
| Cooling                | Filtered forced air fans                                                           |



The entire PLA800 is hand wired, point to point to ensure solid contacts from component to component. With its heavy frame and solid construction, the PLA800 will give years of trouble-free use.

*If you would like to increase the power output from 800 watts PEP to 1200watts PEP, we can replace the 4CX250Bs with 4CX250Rs. The "R" version is the military version and will put out an additional 400 watts PEP without any changes to the power supply or the amplifier itself. Just ask for the "R" version. The price difference is an additional \$150.00.*