



COMMANDER II 2 METER VHF LINEAR AMPLIFIER

Owner's Manual



PALSTAR, INC.
Command Technologies Division
9676 N. Looney Road
Piqua, Ohio 45356
U.S.A.

Customer Service and Sales Telephone: 800-773-7931

Fax: 937-773-8003

E-mail: info@palstar.com

Table of Contents

Introduction	3
Inside View	4
Specifications	5
Unpacking Instructions	6
HV Transformer Installation	6-8
Safety Warnings and Precautions	9
Front & Rear Layout	10
Installation Preparation	11
Operating Procedure	12
Operating Hints	13
Typical Operating Conditions Table	13
Warranty, Service, and Returns	14
RF Deck Schematic	15
Control and Bias Board Schematic	16
High Voltage Power Supply Schematic	17

INTRODUCTION

The Commander II is a grounded grid class AB2 linear power amplifier that operates on the Amateur 2 meter band (144 to 148 MHz).

A single CPI/Eimac 3CPX800A7 pulse-rated external anode triode with forced air cooling and modern stripline circuitry ensures efficient and conservative operation.

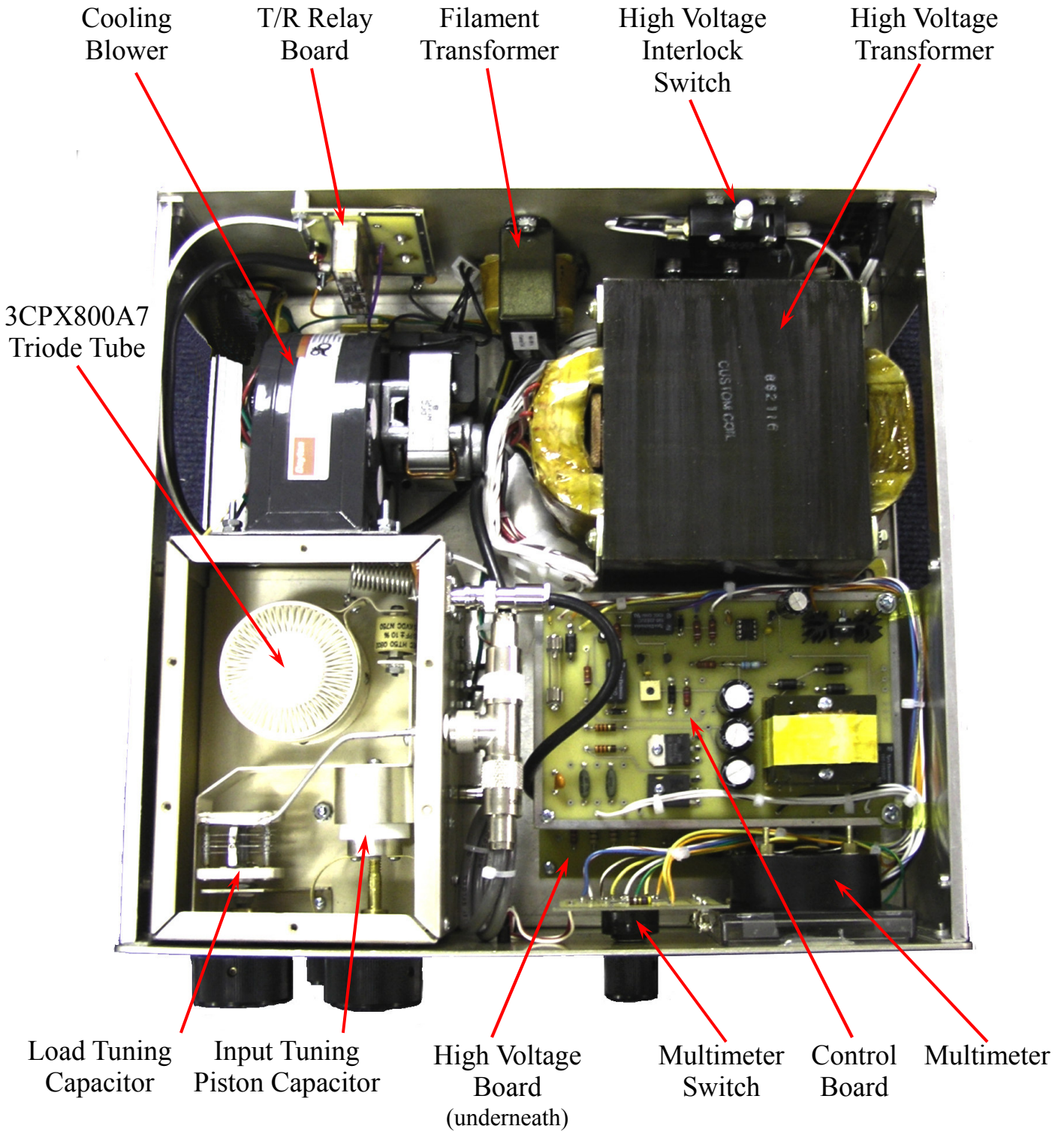
The 6:1 ratio vernier reduction drives on all tuning controls allow smooth and easy tune up, while the front panel input tuning control allows a higher input circuit "Q" for excellent linearity and to present a low input VSWR to the exciter all across the entire 2 meter band.

An automatic delay circuit, for proper cathode conditioning before RF drive can be applied, extends tube life. A 200 ohm resistor in the plate supply negative lead protects the tube in the event of an arc.

The Commander II features a full compliment of control and metering functions for easy on-air operation.

A dual primary power transformer allows 117VAC, 200VAC or 234VAC operation.

Commander II Inside Layout



Specifications

Commander II

2 Meter VHF Linear Power Amplifier

- Frequency Range: 144 to 148 MHz.
- Modes: USB, LSB, RTTY, FM, CW.
- Power Requirements: 117/200/234VAC 50/60 Hz.
- RF Drive Power: 10 to 15 Watts nominal; 30 Watts maximum, for full 1 KW (CW) output.
- RF Output: +15db gain; > 650 Watts (USB, LSB); 450 Watts maximum. (FM or RTTY).
- Input Impedance: 50 Ohms unbalanced, front panel adjustable.
- Output Impedance: 50 Ohms nominal.
- Antenna Load (VSWR): 2:1 maximum.
- Harmonic Suppression: better than 60db down at rated output.
- Intermodulation Distortion: better than 35 dB down at rated output.
- Weight (with transformer): 60 lbs. (27.3 Kg).
- Cabinet Size: 14.5" x 14.5" x 6" (36.8cm x 36.8 cm x 15.2 cm).
- Tube Compliment: one 3CPX800A7 ceramic metal triode.
- Cooling: pressurized chassis forced air.
- Antenna Relay: DPDT; .1 dB insertion loss.
- Fuse: Type SFE; 234VAC and 200VAC operation: 15 Amp; 117VAC operation: 30 Amp.

UNPACKING INSTRUCTIONS

Carefully remove your Commander II from its shipping carton making sure there is no damage evident from shipping. If there is any damage, notify the delivering shipper immediately, fully describing the damage.

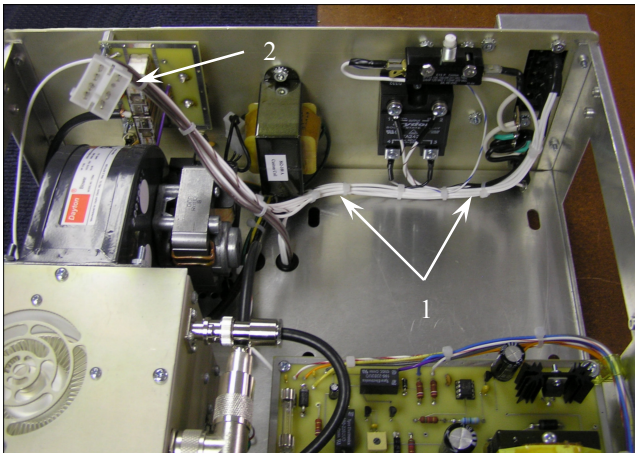
Do not destroy the packing material, since it may be reusable later, should you require factory service, or need to transport the Amplifier for any other reason.

TRANSFORMER INSTALLATION

Due to its weight, the power transformer is shipped separately to prevent damage to the amplifier cabinet, and it must be installed by purchaser.

In order to install the HV transformer, both the top and bottom covers amplifier covers must be removed. The small plastic bag (shipped with amplifier) contains the transformer mounting hardware.

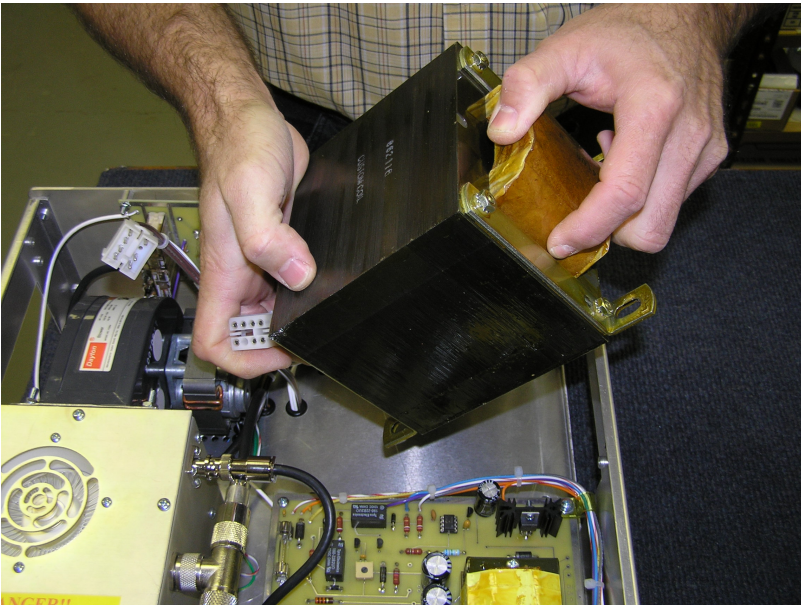
The following photographs illustrate the proper HV transformer installation:



This is the area the transformer mounts in. Pay attention to the wiring harness (1) at the rear and be careful not to pinch any of the wiring under transformer during installation. Note that the connector (2) has been moved to the side, out of the way



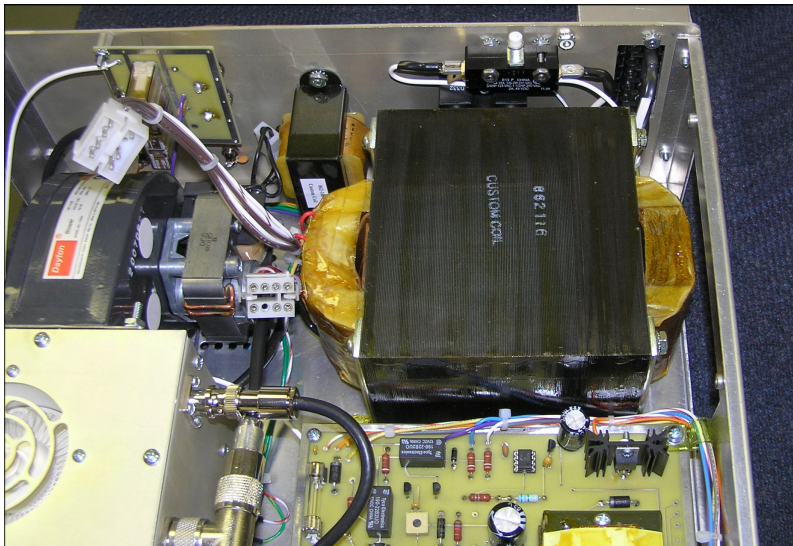
Position the HV transformer with the wires and connector as shown.



Lift the HV transformer and tilt it as shown in the picture. Gently lower the transformer until the side with the connector is resting on the amplifier chassis. Make sure that none of the wiring is pinched under the transformer.

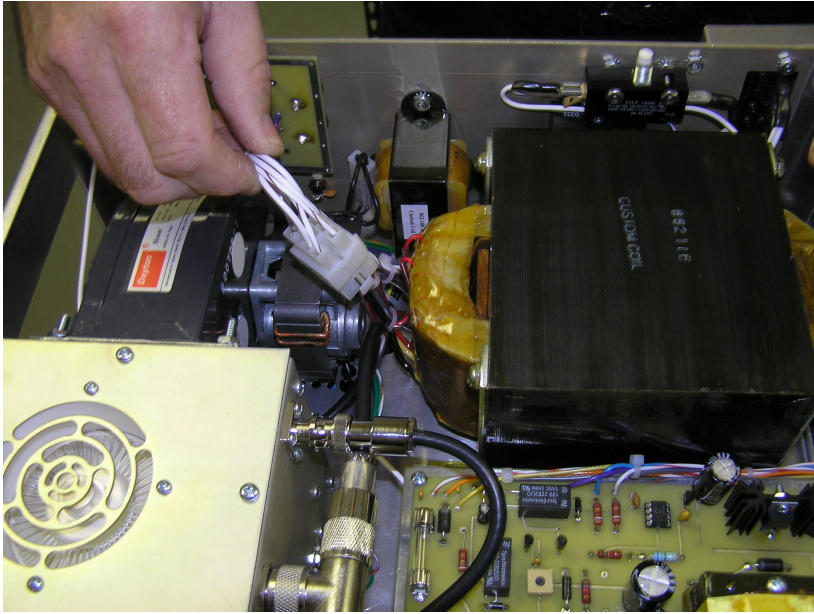


While supporting the raised side of the transformer, gently lower it in place until it, too, is resting on the chassis. The large opening in the side of the chassis allows access to do this.

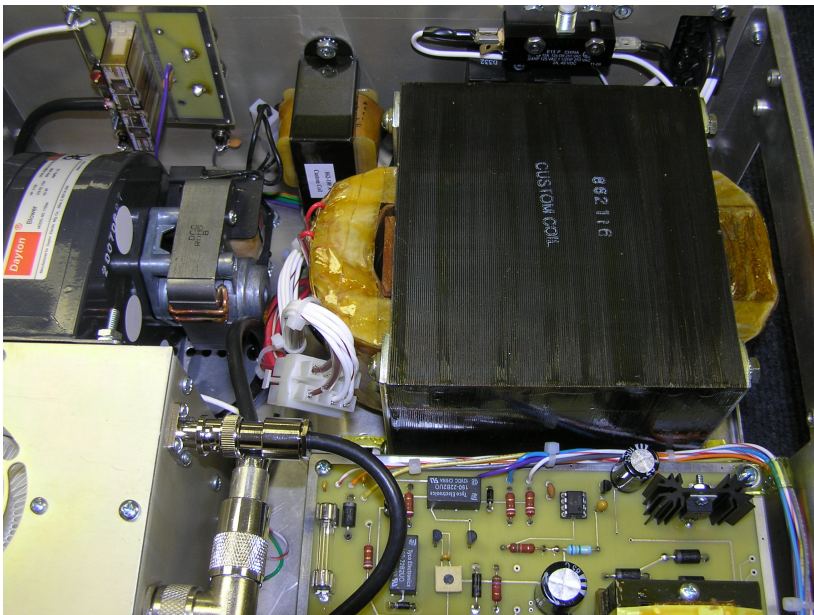


The transformer is now in place and can be fastened to the chassis. Insert the provided carriage bolts in from the top, through the transformer mounting tabs and chassis slots. Next, slightly lift the chassis and place a flat washer and KEPS nut on the bottom side of each bolt and tighten.

Caution: before tightening, be sure that none of the wiring harness is pinched under the transformer!



Plug the connector on the transformer into the one on the wiring harness. It is keyed so that it cannot be plugged in backwards. Make sure that the connector halves are pressed together until the lock tabs snap in place.



Dress the wiring down out of the way, as shown. Re-install the top and bottom covers and the unit is ready for use.

Be sure to read the safety cautions on the next page before operating!

!! WARNING !!

CONTACT WITH VOLTAGES IN THIS AMPLIFIER CAN BE

!!! FATAL!!!

CAUTIONS:

- DO NOT attempt any type of service or repair on this amplifier without first removing the AC power and allowing **AT LEAST 60 MINUTES FOR THE HIGH VOLTAGE CAPACITORS TO BLEED OFF !**
- DO NOT operate this amplifier with the top or bottom covers removed. DO NOT operate this amplifier with the internal RF tube compartment covers removed. Never place any objects into the top ventilation holes. **CONTACT WITH VOLTAGES IN THE CABINET CAN BE FATAL ! CLOSE QUARTERS EXPOSURE TO UNSHIELDED RF AT THESE POWER LEVELS IS HAZARDOUS TO YOUR HEALTH !**
- Never attempt operation without first connecting an appropriate antenna (2:1 VSWR Max) or a 50 ohm dummy load with sufficient rating or **SERIOUS DAMAGE TO THE AMPLIFIER MAY RESULT.**
- Never operate the amplifier with more drive than required to produce the rated output for the operating mode used.
- Do not place the Commander II in repeater operation. This amplifier is not designed for unattended service. Extensive modification would be required for this type of service.
- Never operate any amplifier using an extension cord.
- Never cover the top of the amplifier cabinet with books, papers or other equipment as **OVERHEATING MAY RESULT.**

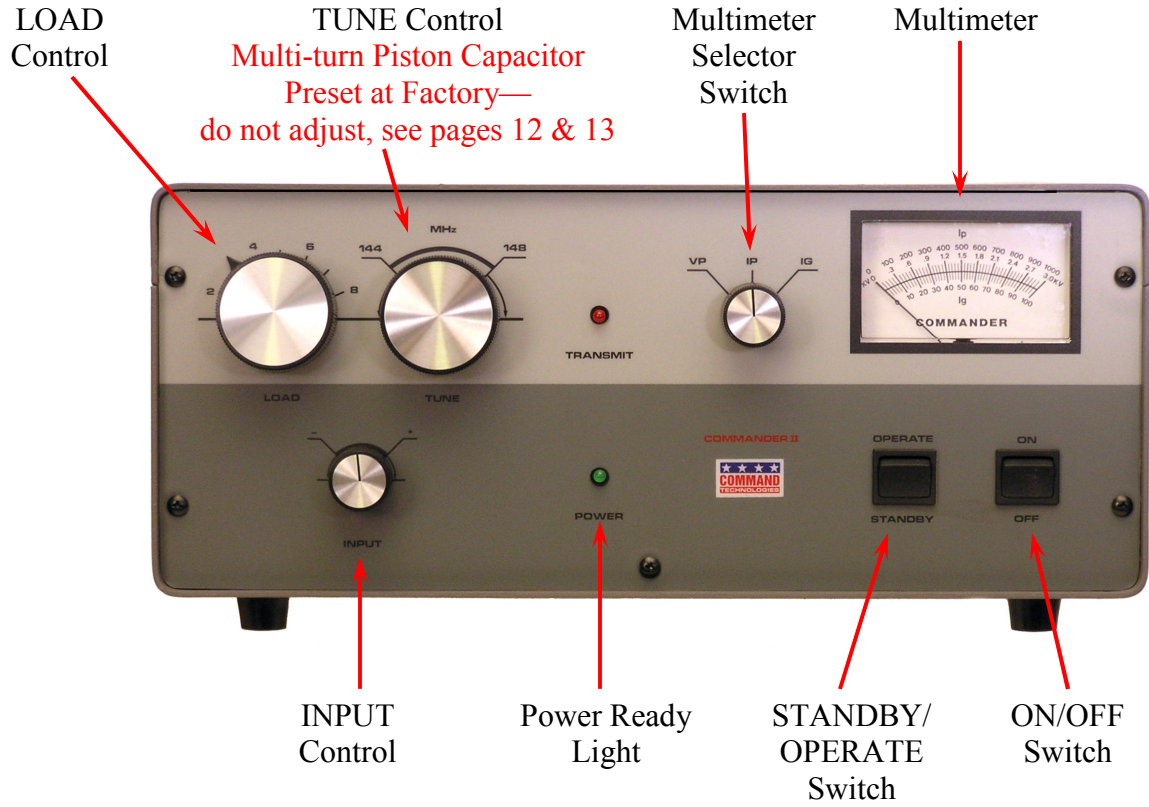
**IF ANY SITUATION YOU ARE NOT SURE ABOUT OCCURS,
PLEASE CONTACT MANUFACTURER FOR ASSISTANCE.**

Telephone: 800-773-7931

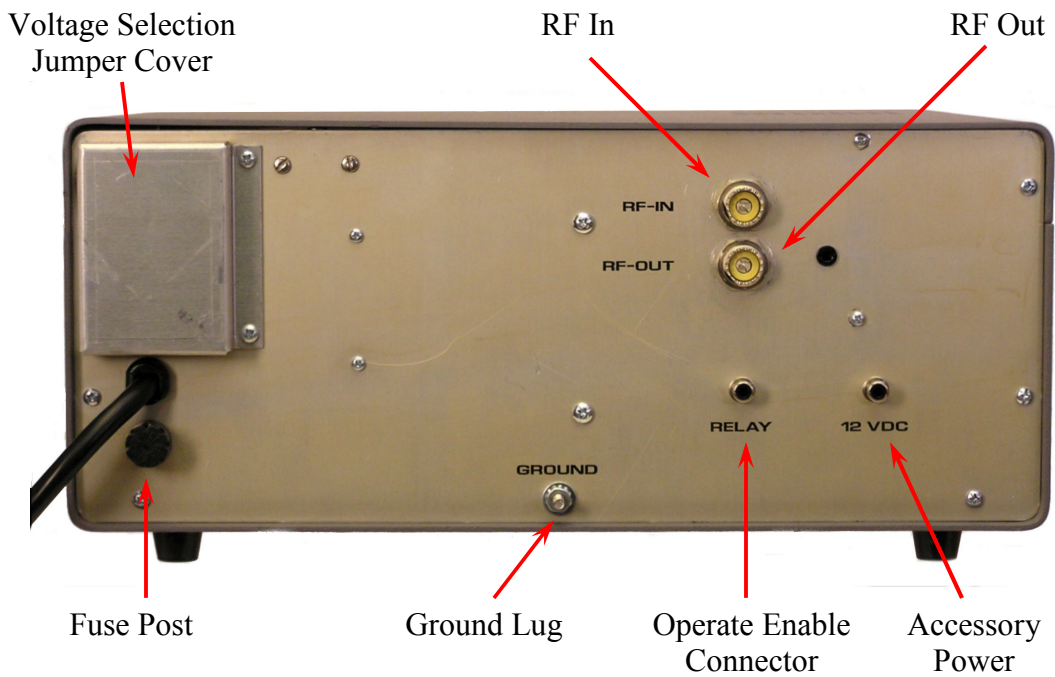
Fax: 937-773-8003

E-mail: info@palstar.com

Front Panel Layout



Rear Panel Layout



INSTALLATION PREPARATION

The Commander II is factory wired for operation from an 234VAC line. Operation at the full rated output should not be attempted unless this line is capable of supplying at least 15 amps of peak current. It is strongly recommended that you operate this amplifier from a 234VAC line. The amplifier may be operated from a 117VAC power source capable of supplying at least 30 Amperes.

To configure the amplifier for 117VAC or 200VAC operation, remove the voltage selection jumper cover on the rear panel of the amplifier and install appropriate jumpers (see illustration below). **CAUTION.... BE SURE YOU HAVE REMOVED THE LINE CORD PLUG FROM YOUR WALL SOCKET BEFORE REMOVING THE JUMPER COVER. IF YOU FAIL TO UNPLUG YOUR AMPLIFIER, YOU WILL EXPOSE YOURSELF TO LETHAL VOLTAGES.** Install an appropriate plug on the power cord to mate with your wall receptacle.

If you change the operating voltage as described above, be sure to install the proper fuse. The fuse is a type SFE, 15 Amp for 234 VAC & 200 VAC operation, 30 Amp for 117 VAC operation

All Commander II amplifiers manufactured for export are wired for 200 or 234VAC, 50 or 60 Hz, depending on the final destination. No plug is supplied.

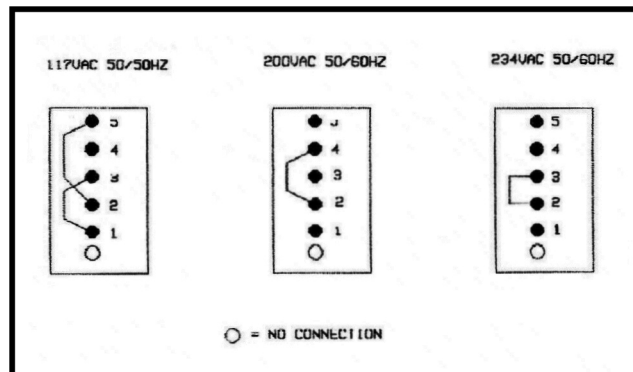
Location of your Commander II requires that no equipment be placed directly above it, as air expelled from the tube exhaust can become quite hot. Allow at least 3 inches clearance on either side of the unit and between other equipment. Extending the tilt bail located on the bottom of the chassis improves the cooling airflow.

To switch from transmit to receive the Commander II requires a contact closure or keying circuit capable of sinking 55ma of positive voltage (12 VDC open circuit) to ground. This connection is made to the RCA jack on the rear panel marked RELAY. Read the manual that came with your transceiver to determine the proper external connections. On some transceivers, this is not provided, and an alternate circuit will be required. Always use shielded cable for these connections.

Connect a good quality thru-line Wattmeter between the amplifier output jack and the antenna or dummy load using RG8 or better coax.

Connect the exciter (transceiver) RF output to the amplifier input using 50 ohm coax.

Connect a ground lead, as short as possible, from earth ground to the Commander II's rear panel ground terminal.



OPERATING PROCEDURE

After reading this manual and completing the Installation/Preparation Instructions, position the Commander II front panel controls as follows:

- ON/OFF — OFF
- OPERATE/SSTANDBY — STANDBY
- MULTIMETER SWITCH — V_p (PLATE VOLTAGE)
- INPUT — CENTER ON SCALE
- LOAD — MINIMUM (COUNTER-CLOCKWISE)
- TUNE — LEAVE AT FACTORY SETTING (NOTE: the TUNE control is a multi-turn piston capacitor and was factory preset for operation at 144.200 MHz. See page 13 for more information.)

After presetting these controls, switch the ON/OFF switch to the ON position. The meter lamps will illuminate, the blower will be running and plate voltage will be approximately 2700 VDC.

The 3CPX800A7 used in this amplifier requires a warm up period before RF drive may be applied, to prevent damage to the tube. A 2 minute warm up is provided by a solid state timer circuit. At the end of the warm up period, the green POWER LED on the front panel illuminates and the unit is ready for operation.

Switch the meter switch to the I_p (plate current) position.

Switch the OPERATE/STANDBY switch to the OPERATE position and key the exciter with ZERO RF drive applied. The Red Transmit light should illuminate, the tube will be biased “on”, and plate idling current should approximately 80 ma. as displayed on the I_p meter.

Apply a very low RF drive (less than 5 watts) and adjust the INPUT control for a peak in the plate current (I_p) on the meter. Next adjust the TUNE control for maximum output as indicated on an external Wattmeter. DO NOT adjust the LOAD control at this time. **COMPLETE THESE ADJUSTMENTS AS QUICKLY AS POSSIBLE TO AVOID STRESSING THE TUBE.**

Place the meter switch in the I_g (grid) position. Key the exciter, and while increasing the RF drive, adjust the LOAD control clockwise in order to keep the grid current below 40ma. and to obtain a peak in output power on an external wattmeter (see chart: Typical Operating Conditions chart on the next page).

Re-peak the TUNE control for maximum output.

Return the meter switch to the I_p position and the Commander II is ready for SSB or CW on the air operation. Normal SSB operation is indicated by plate current readings on voice peaks of approximately 1/3 to 1/2 of the CW key down value.

For FM or other high duty cycle modes, limit drive to 15 watts maximum.

OPERATING HINTS

The Commander II TUNE control is a high "Q" piston-type tuning capacitor with a 6:1 ratio vernier reduction drive. This control requires about 15 revolutions to tune the unit from 144 to 148 MHz. No pointer or logging scale is provided.

Unless you have specified another band segment, the unit is factory tuned at 144.200, the national SSB calling frequency. If you use the Commander II mainly for CW and SSB, and after having tuned the unit to your antenna, you will be able to QSY up or down the CW/SSB band segment without making any tuning adjustments. Unless someone changes these adjustments, it will not be necessary to retune the amplifier each time you operate it. Just turn the unit on, wait for the green light and begin transmitting.

If you decide later to operate in the FM portion of the band, it is best done by tracking up the band about 500 KHz at a time. To do this, key the exciter with low drive (5 watts or less), re-tune INPUT for a peak in plate current (Ip), and readjust TUNE control for maximum output, repeating this procedure as you move up the band. This is also useful if you happen to forget where you left it tuned. **The scale for the TUNE control on the front panel is correct in that clockwise is increasing frequency and counter-clockwise is decreasing frequency.**

TYPICAL OPERATING CONDITIONS

DRIVE	GRID CURENT	PLATE CURENT	POWER OUTPUT
12.5 Watts	15 ma	400 ma	450 Watts
18.5 Watts	25 ma	500 ma	650 Watts
30 Watts	35 ma	600 ma	1000 Watts

Limited Warranty

Palstar Inc. warrants the Commander II to be free from defects in material and workmanship under normal use and service **for a period of one (1) year from the date of delivery to the first buyer** (the “Warranty Period”). Palstar Inc.’s obligation under this warranty is limited to repair or replacement of the product at it’s option at the Palstar factory in Piqua, OH.

This warranty is effective only when the product is returned to the factory with all transportation charges prepaid and examination of the product discloses, in Palstar’s judgment, to have been defective during the Warranty Period.

The Warranty Period shall not extend beyond its original term with respect to interim in-warranty repairs by Palstar. This Warranty Period shall not apply to any product which has been repaired or altered by anyone other than Palstar without prior written authorization. Warranty does not extend to any products which have been subject to damage from improper installation, application or maintenance in accordance with the operating specifications. Palstar neither assumes nor authorizes any person to assume for it any obligation or liability other than herein stated.

Shipping Your Amplifier Back to the Factory

Due to the necessity of shipping the amplifier with the HV transformer removed, please contact the factory for instructions before sending an amplifier back to us. There are circumstances in which it may not be necessary to return the HV transformer, thereby saving you shipping charges. When you call, Palstar will inform if transformer return is necessary. If transformer return is necessary, remove it from the amplifier cabinet and ship it separately, preferably in its original crate.

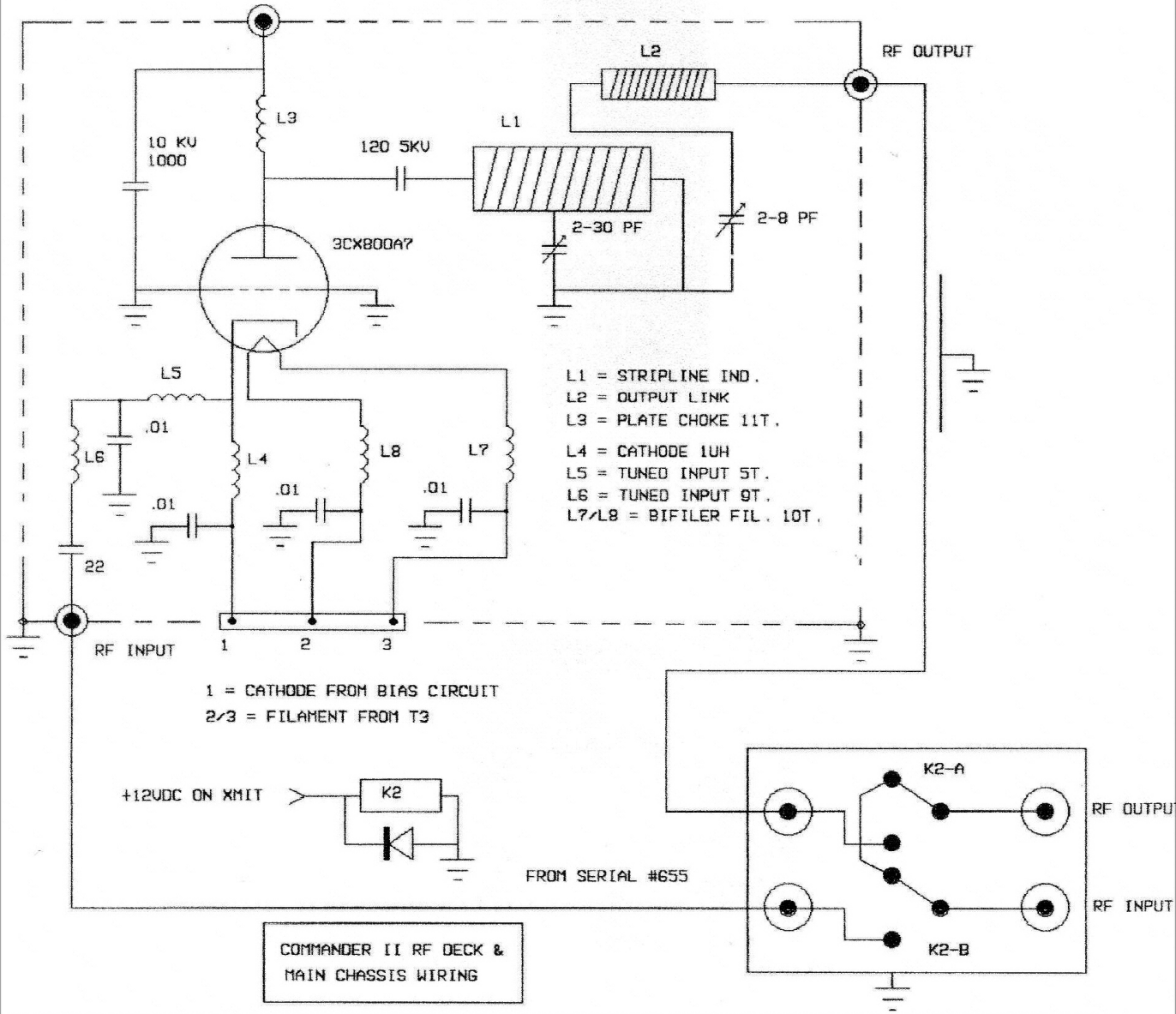
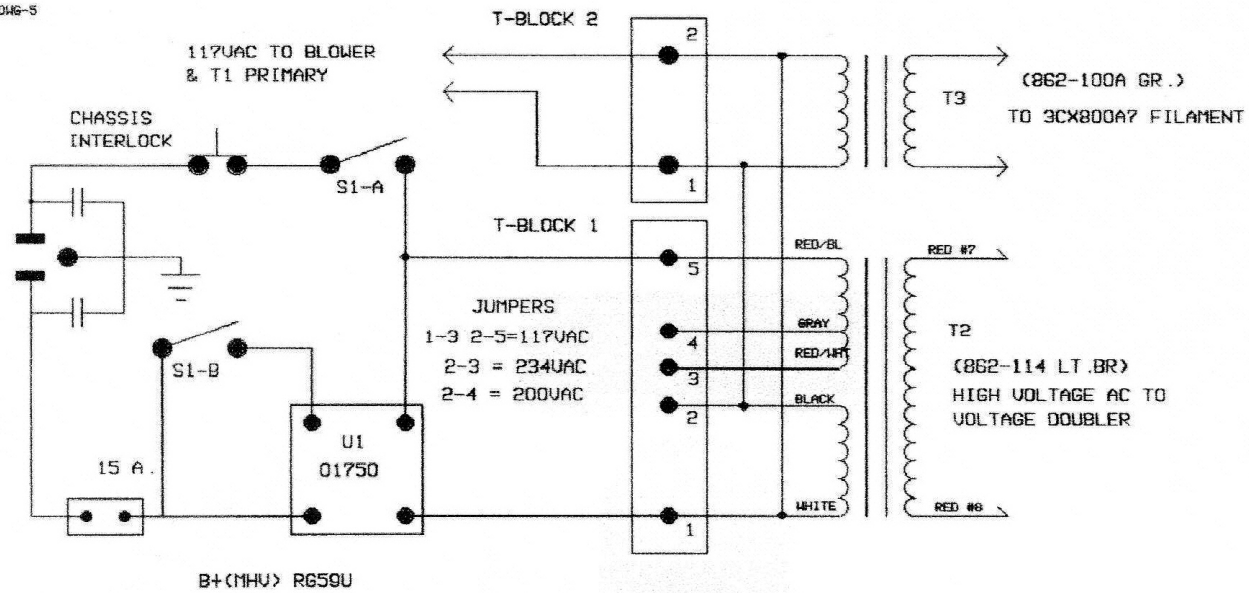
Repair Policy

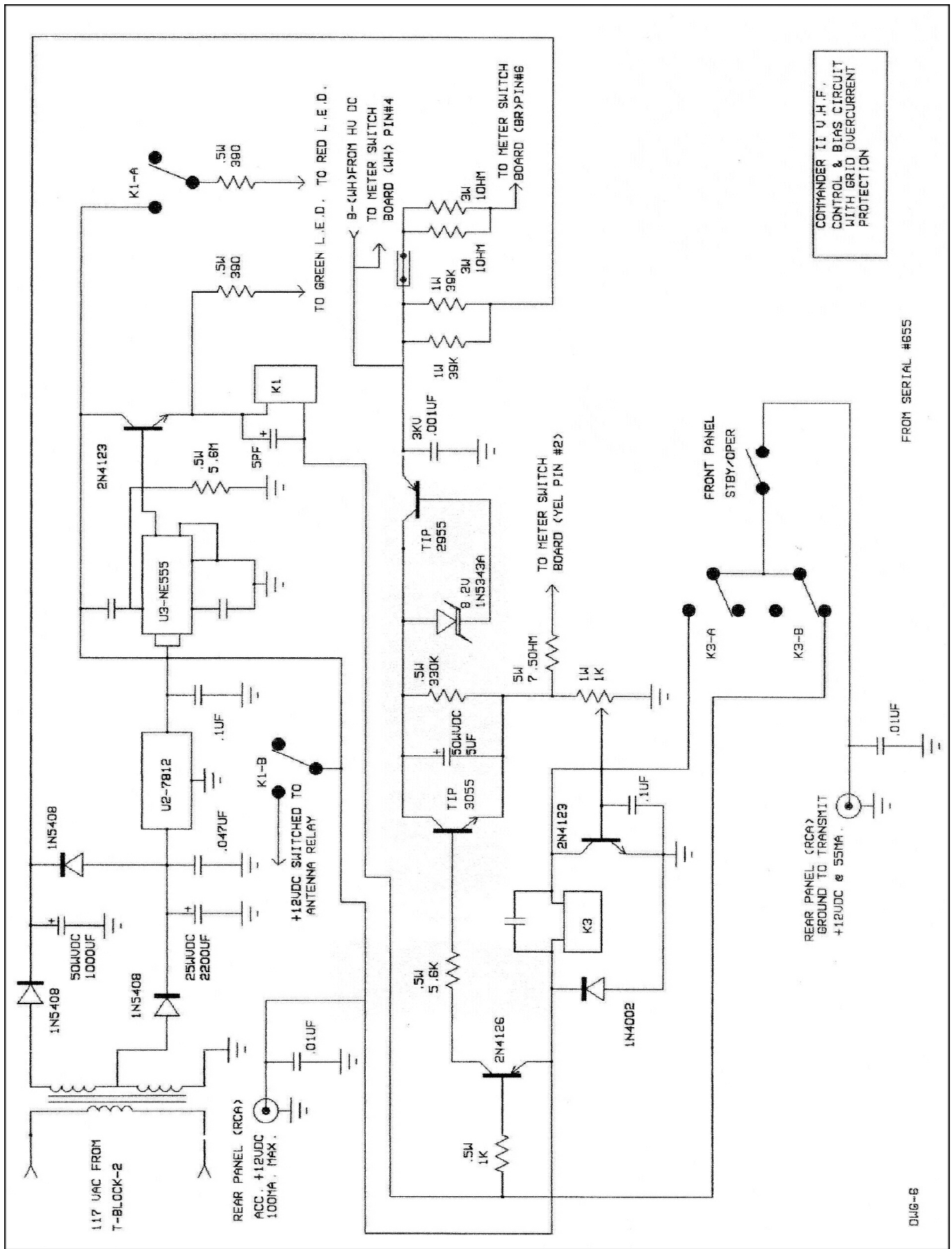
When sending in a product for service, see the section above. If not using the original packing materials, please “double” box it carefully and ship it insured for your protection. Please include a note clearly describing the problem, how you wish the item returned and how you wish to pay for the service. Package your unit properly. Palstar, Inc. is not responsible for merchandise damaged in shipment. Our service rate is \$30 per hour (1/2 hr. minimum).

Return Policy

All returns must receive prior authorization from Palstar. Returned items must be received in original—AS SHIPPED—condition including the original box, manuals, accessories, and copy of sales receipt. Returns must be within 14 days of purchase. Returned items are subject to a 25% restocking fee. Shipping is not refundable.

DWG-5





DMB-4

