

COMMANDER HF-1250

LINEAR AMPLIFIER

MADE IN THE U.S.A. BY HAMS FOR HAMS

COMMAND TECHNOLOGIES, inc.
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BRYAN, OHIO 43506
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TNX TO IKOPEA

SPECIFICATIONS COMMANDER HF-1250 LINEAR AMPLIFIER

Band coverage: 160, 80, 40, 20, 17, and 15 meter amateur radio bands, 12 and 10 meter Export model; also usable in U.S.A. upon proof of proper license.

Types of Emissions: SSB, FM, CW, AM, RTTY, SSTV

Driving power required: 40 to 60 watts nominal at rated continuous carrier output

Maximum Output Power: 750 watts Continuous Carrier, 1,000 watts CW, 1,250 watts Single Side Band

Duty Cycle: 100 percent at 750 watts output power

Harmonic Suppression: Exceeds all F.C.C. Requirements

Keying: Requires contact closure of sinking +12 v dc at 55 ma. dc.

Input Impedance: 50 ohms unbalanced

Output impedance: 50 ohms unbalance: SWR 2:1 or less

Metering: Plate Voltage & Plate Current (switchable), Grid Current (continuous)

A.L.C.: Negative going, adjustable from rear panel
Negative feedback in cathode circuit

Front Panel Controls: Plate Voltage & Current Switch, On/Off Switch, Tune, Load, Band Selector Switch

Rear Panel Controls: Tuned Input Adjustment, A.L.C. Adjustment, R.F. Input, R.F. Output, A.L.C. Output, Keying, +12v dc Auxiliary Source, Ground Connection, Line Cord, Fuse

Tube Complement: One Eimac 3CX800A7 Ceramic/Metal Triode

Power Requirement: 117/200/234 Vac, 50/60 hz, 15/30 amperes

THE COMMAND TECHNOLOGIE'S PHILOSOPHY

The company was founded upon the guiding principal of providing amateur radio operators with better equipment at a lower cost.

That principal is evident in the company's products which have become known throughout the world for their superior value.

Value is defined by the company as a ratio of quality plus performance over cost. The higher the quality and/or performance or the lower the cost, the better the value.

Obviously, the limits of each parameter of the equation are subjective. For the company, quality limits are those which provide longevity and unquestioned performance benefits to the user without unnecessary cost burden. Performance is partly defined by governmental regulations and partly by the company's integrity of specifications. For example, power for Command Technologies linear amplifiers is specified by continuous carrier ratings - solid, meaningful figures which can be translated into benefits in the real world of amateur radio.

State-of-the-art technology has come to be a trite phrase, meaning different things to different people. To the company it means today's proven technology, not gimmicks, which offer a facade with little of worth, or need, behind it. We may push the leading edge of technology in various ways, but it will be founded upon its value to the user in terms of performance and cost.

We appreciate your purchase of a Command Technologies product and assure you of continued factory support of your investment at all times.

Sincerely,

Patrick J. Stein
N8BRA

Introduction

The Commander HF-1250 is a class AB2 linear power amplifier. It has been designed for operation on all amateur frequencies from 1.80 Mhz to 21.450 Mhz excluding the 30 meter band. One Eimac 3CX800A7 ceramic-metal triode, configured in a grounded grid circuit, allows for conservative operation at 750 watts continuous carrier output. A pressurized forced air cooled chassis, including the high voltage supply, insures cool operation with high duty cycle emission modes. The output circuit utilizes extra heavy duty components with reduced ratio drives on all tuning controls. Easily accessed rear panel controls allow for operator adjustment of input VSWR and ALC. An automatic time delay circuit, insures proper cathode conditioning before R.F. drive can be applied. A protection resistor, located in the high voltage B+ circuit, protects the tube in the event of an internal tube arc. Metering function includes plate voltage, plate current, and grid current.

Unpacking instructions

Carefully remove the Commander HF 1250 from its shipping carton. Make sure no shipping damage exists. If damage exists, **NOTIFY THE DELIVERING CARRIER IMMEDIATELY.** Describe fully the damage. Do not destroy the shipping carton or packing material. In the event you need to return your unit or wish to ship it to another location, the original shipping carton and packing material works best. Please retain your sales invoice. Should you ever need warranty service, it may be required to prove your date of purchase.

!! WARNING !!
CONTACT WITH VOLTAGES
IN THIS AMPLIFIER CAN BE
!!! FATAL !!!

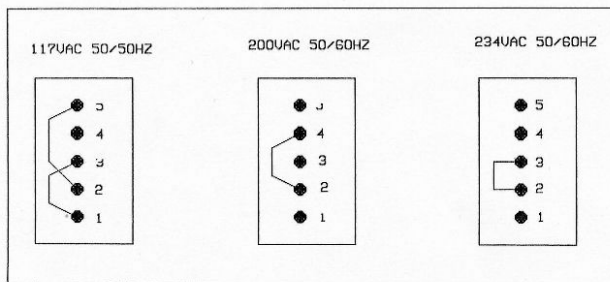
117 Volt Or 234 Volt Operation

The Commander HF-1250 comes factory wired for 117 volt operation. For best 117 volt operation, you should use a dedicated 117 volt line capable of supplying 30 Amps of peak AC current.

All Commander Amplifiers manufactured for export are wired for 234 vac or 200 vac depending on the final destination.

You will obtain best operating performance using a 234 volt 20 ampere line. To convert the HF-1250 to 234 volt operation, remove the rear panel connector cover located on the top left hand corner. **CAUTION.... BE SURE YOU HAVE REMOVED THE LINE CORD PLUG FROM YOUR WALL SOCKET. IF YOU FAIL TO UNPLUG YOUR AMPLIFIER, YOU WILL EXPOSE YOURSELF TO LETHAL VOLTAGES.** After the cover has been removed, do the following steps:

1. Loosen the screws and remove the jumper wire going from the terminal block position 1 to 3. See illustration.
2. Unscrew and remove jumper connection at terminal block position 5 and place it at terminal block position 3. Secure all screws. See illustration.
3. Replace rear panel connector cover
4. Remove the 117 volt three prong power cord plug and replace it with an appropriate 3 prong 234 volt power cord plug.



Cautions and Warnings

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 !**

Make no attempt to put this Amplifier in service with the top or bottom covers removed. **CONTACT WITH VOLTAGES IN THE CABINET CAN BE FATAL !**

Never attempt operation without first connecting your amplifier to an appropriate antenna or dummy load. The antenna SWR should not exceed 2:1. The dummy load should have an impedance of 50 ohms with sufficient power handling capability. **DAMAGE TO THE AMPLIFIER MAY RESULT IF OPERATED WITHOUT A CONNECTION TO A PROPER LOAD.**

Never operate this amplifier without the ALC connected. Most modern transceivers have sufficient output power to seriously overdrive this amplifier. **THIS MAY RESULT IN DAMAGE TO EXPENSIVE COMPONENTS SUCH AS THE 3CX800A7 TRIODE TUBE.**

NEVER OPERATE THIS AMPLIFIER WITHOUT AN EARTH GROUND CONNECTED TO THE REAR PANEL GROUND TERMINAL.

Do not obstruct the ventilation holes located on the top, bottom, and sides of the cabinet. These holes provide sufficient intake and exhaust of cooling air.

SEVERE OVERHEATING AND SERIOUS DAMAGE WILL RESULT IF SUFFICIENT VENTILATION IS NOT PROVIDED.

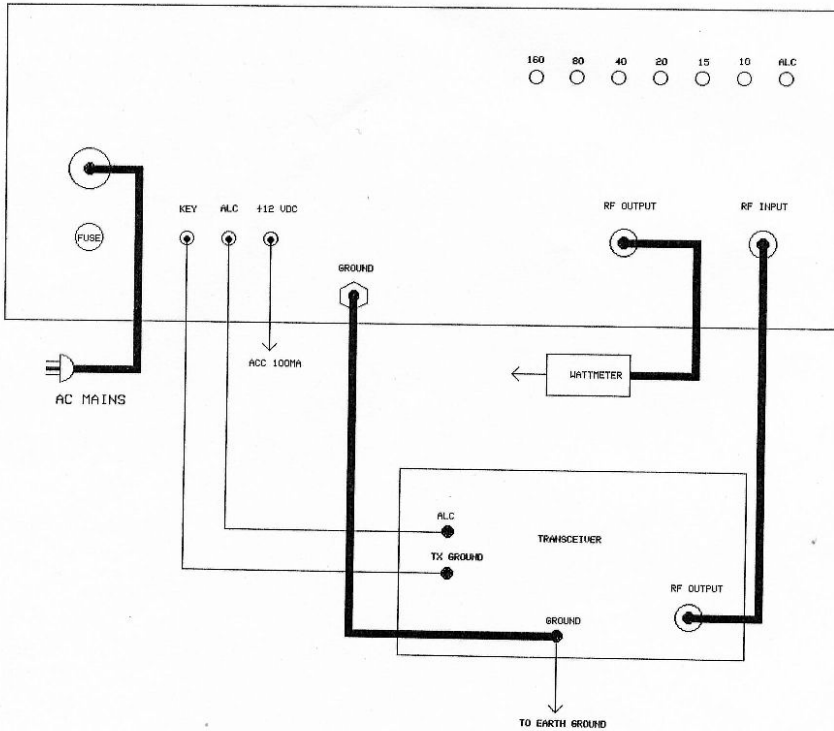
If any problem occurs which can not easily be corrected, contact the manufacturer for assistance.

Accessory warnings

Your new Commander HF-1250 has the capability of 750 watts output continuous carrier without time limit. Many accessories such as power meters, traps, and baluns have power ratings for the old 1,000 watt input (600 watt output) power restriction. The 750 watt continuous carrier output capability of the Commander HF-1250 may destroy these accessories. If you are in doubt about the power handling capability of a particular accessory, contact the original manufacturer, or use the accessory at reduced output power. When in doubt, do not use an accessory with this amplifier. **FAILURE OF AN ACCESSORY MAY CAUSE DAMAGE TO THE COMMANDER HF-1250.**

Connection Diagram NON QSK

Connect the RF output of your transceiver to the RF IN connector on the rear of the HF-1250 with 50 ohm coax. Connect the existing station antenna system to the RF OUT connector on the HF-1250 with RG-8 type coax. Connect the RELAY phono jack on the rear of the HF-1250 to the normally open terminal of the RELAY jack on your transceiver. The RELAY jack on the HF-1250 has positive 12 VDC open circuit and requires the sinking of 55 MA of current when pulled to ground. Connect as short a ground lead as possible from a good earth ground to the GROUND post on the HF-1250. The 12 VDC phono jack on the HF-1250 rear panel provides 12 VDC at 100 MA maximum to operate external accessories or dial lamps. Connect the ALC phono jack to the ALC connection on your transceiver using a shielded type cable. Consult your transceiver manual for proper ALC connection details.



TUNING PROCEDURE

1. Set the front panel controls to the following positions:

ON - OFF Switch.....OFF

STANDBY - OPERATE.....STANDBY

METER SWITCH.....Vp

BAND SWITCH.....DESIRED BAND

TUNE CONTROL.....LOG SCALE ON DATA SHEET

LOAD CONTROL.....LOG SCALE ON DATA SHEET

2. After you have preset the above controls and the amplifier is properly connected to a suitable load, switch the ON - OFF to the on position. The blower should be running and the meter lamps should also be lit. The should read a plate voltage of approximately 2600 volts DC.

3. After a little more than 2 minutes the green power lamp should come on signifying the amplifier is ready for operation. Place the meter switch in the Ip position and the standby - operate to the operate position. Key the exciter with no rf drive applied. The red transmit lamp should light, and an indication of approximately 150 ma plate current on the meter. Apply 5 to 10 watts of rf drive, the plate current should rise slightly. If the plate current rises above 400 ma. reduce drive. Adjust the tune control for a peak on the grid meter and maximum output as indicated on an external wattmeter.

4. Adjust the load control for maximum output as indicated on an external wattmeter. Next, while increasing the drive in small increments adjust the load control counter clockwise for maximum output and to keep the grid current below 60 ma. Readjust the tune control clockwise to again peak the reading on the grid meter. If the meter rises above 60 ma quickly reduce drive and adjust the load control counterclockwise to reduce grid current. Never exceed 60 ma of grid current. Repeat these adjustments as required to achieve the desired output up to 1000 watts. Note that when increasing output power the tune scale will always read higher and the load will read lower. Also the supplied inspection sheet has all the of these settings and they should be used as a guide for this procedure. If your settings vary widely from these you have something wrong and should start over.

TUNING PROCEDURE CONTINUED

5. If your planned operation is on SSB you should adjust the load control slightly counter-clockwise reducing the output slightly about 30 to 50 watts. This adjustment is necessary to insure that the amplifier is sufficiently loaded to handle the plate current peaks caused by the complex voice patterns during SSB operation. Nominal plate and grid current readings during SSB operation will be about 30 to 40% of the key down CW readings.

CAUTION: THE TUNE AND LOAD AIR VARIABLE CAPACITORS MAY ARC IF MAXIMUM DRIVE IS APPLIED BEFORE THE AMPLIFIER IS PROPERLY TUNED. ALWAYS FOLLOW THE DESCRIBED TUNE UP PROCEDURE TO AVOID CAPACITOR ARCING. ARCING MAY ALSO OCCUR IF YOU ATTEMPT TO TUNE INTO AN ANTENNA WITH A VSWR GREATER THAN 2:1.

If you should need any further assistance tuning this amplifier, feel free to call us here at 1-800-736-0443 and our staff will be happy to help you. If you are outside the United States we are available at 011-419-0443 or you can fax us at 011-419-2269

Theory Of Operation

The Commander HF-1250 uses a single Varian Eimac 3CX800A7 ceramic/metal triode in a class AB2 grounded grid configuration. Nominal drive power of 50 to 70 watts will deliver 1000 to 1250 watts of clean RF output power. This amplifier will operate on the following amateur bands: 160,80,40,20,17, and 15 meters. (12 and 10 meters with authorized modification) . File copy of proper license is required for these instructions. Operation of this amplifier on the 11 meter (citizen band) is not possible as this unit employs RF chokes with series resonances within this band. Attempted operation will cause serious damage that will not be covered under warranty.

Metering Functions

The Commander HF-1250 has two illuminated panel meters. The Grid Current meter provides a continuous reading of the 3CX800-A7 grid current. The meter scale is 2 MA per division, the range is 0 to 100 MA. **DO NOT EXCEED 60 MA OF GRID CURRENT. DAMAGE TO YOUR TUBE COULD RESULT.** Under typical operating conditions the grid current will be 20-45 MA . Plate voltage and Plate current are shown on the second meter. A function switch on the front panel switches the meter from plate voltage to plate current. Plate current is shown on the top scale. Each division is 20 MA, and full scale is 1,000 MA. The typical plate current under nominal rated output should range from 500 MA to 600 MA. with an absolute maximum of 800 Ma. for SSB. Plate voltage is indicated on the bottom scale with each division reflecting .06 KV. The scale has a range from 0-3.0 KV. The nominal no-load plate voltage should read approximately 2,600 volts. Plate voltage under nominal full load should read approximately 2,300 volts.

AUTOMATIC DRIVE LIMITING CONTROL

An adjustable automatic level control (ALC) circuit limits the peak output power. When properly set, this circuit insures that the amplifier can not be overdriven. Rear panel access allows for easy manual adjustment . A sample of the RF input derives the ALC voltage. Additionally this amplifier has an RF negative feedback resistance in the cathode circuit to help cancel excessive RF drive without reducing the amplifier's gain.

A.L.C. ADJUSTMENTS

Your transceiver's internal ALC will maintain linearity. The amplifier's ALC will prevent overdriving the amplifier. The HF-1250's ALC circuit was designed for negative going ALC voltage. Proper adjustment is as follows:

1. Use an insulated tool when making these adjustments.
2. Tune the amplifier for operation on the 20 meter band for full 1,250 watts output.
3. With your transceiver set for 20 meter SSB operation, set the transceiver's microphone gain for normal operation as specified in its owners manual.
4. While speaking louder than normal into the microphone, adjust the ALC POT on the rear panel thru the access hole. Adjust for 1,250 watts maximum output as indicated on an external peak reading wattmeter. If an average reading wattmeter is used, adjust for approximately 600 watts output on voice peaks.

TUNED INPUT CIRCUITS

The tuned input circuits utilize an L-C-L or "T" impedance matching circuit with a high "Q" design. These circuits employ RF phase compensating capacitors to reduce intermodulation products. The use of mica trimmer type capacitors allows adjustments to precisely match the transceiver to the amplifier. The rear panel provides easy access to these trimmer capacitors. A front panel switch selects the proper input filter by grounding an associated relay coil.

Tuned Input Adjustments

Your Commander amplifier has mica trimmer capacitors which are easily accessed thru holes located on the rear panel. The tuned input circuits are factory tuned and should not require any readjustment. You can easily make adjustments for any change in your preference for operating frequency range. Also, slight adjustments may be necessary because of slight variances in impedances between your transceiver and the tuned input circuitry of the amplifier.

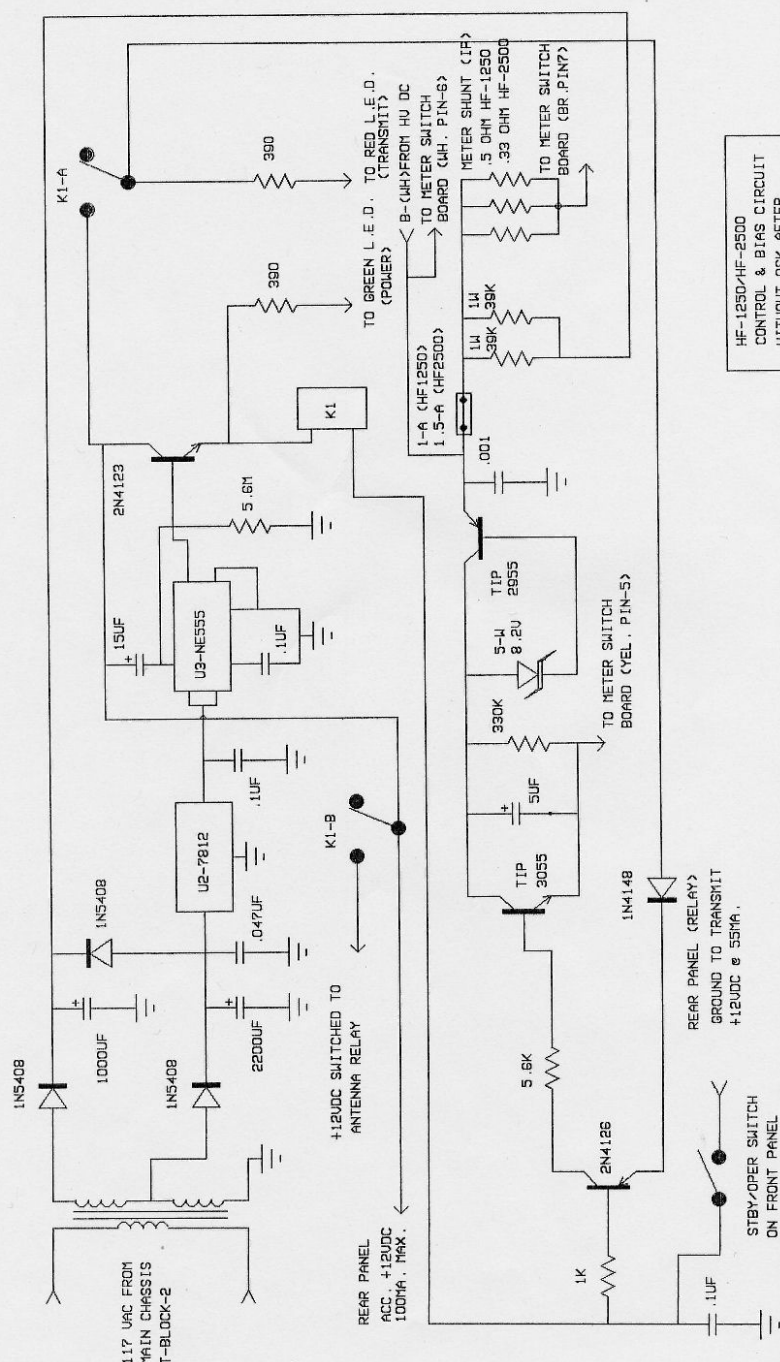
1. Install a SWR meter between the transceiver and the amplifier.
2. Make sure the Operate/Standby switch is in the operate position and the band switch is set to the same band as the one for which you are making adjustments. Your amplifier should also be properly tuned and loaded.
3. Apply drive and observe the SWR, and adjust the trimmer capacitor for minimum SWR. Be careful not to overdrive the amplifier.
4. Repeat this procedure each band.

OUTPUT FILTER CIRCUIT

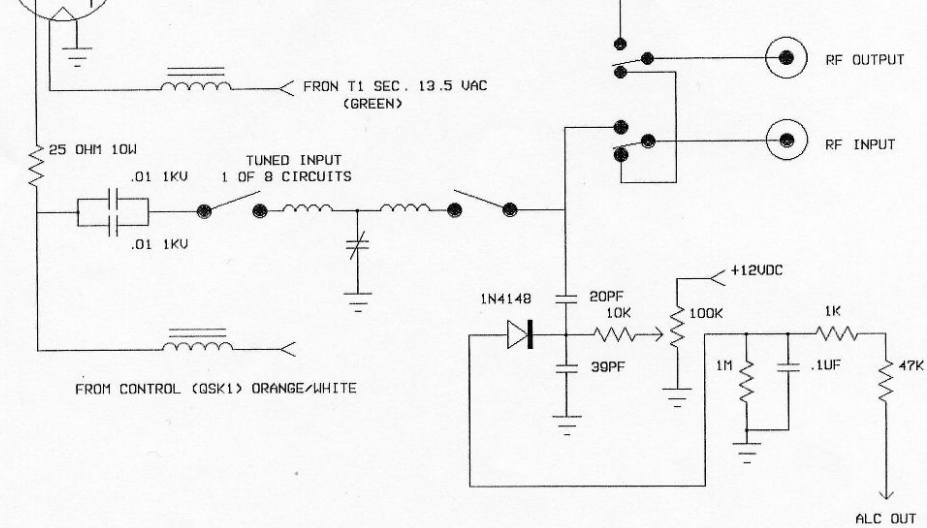
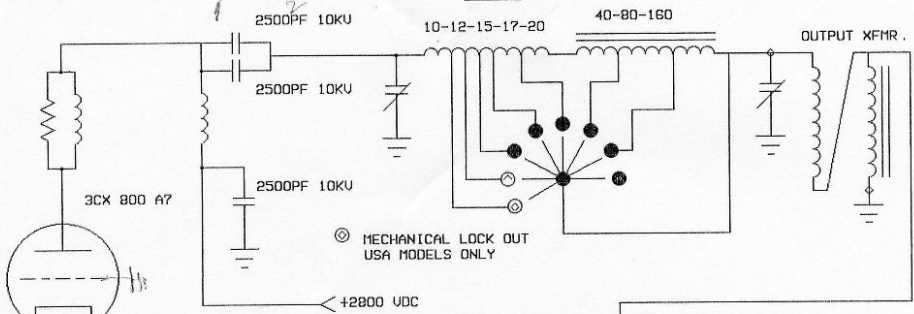
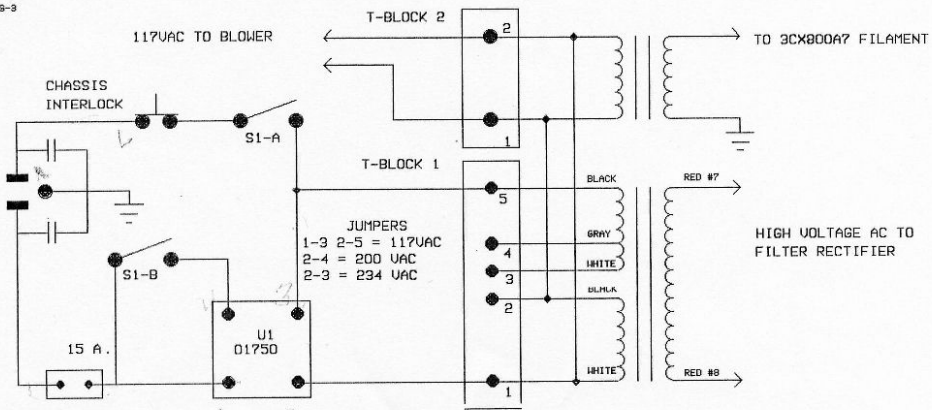
The PI variable network filter transforms the plate load impedance from approximately 2,500 ohms down to 200 ohms. Two air variable capacitors and an associated inductor accomplish this transformation. A heavy duty bandswitch selects the proper inductance from two high "Q" inductors. Each inductor contains taps for the desired band. A design "Q" of 14 allows for good harmonic attenuation on all bands. The utilization of a special reactance tuned ferrite core 4 to 1 Transmission line transformer transforms the nominal 50 ohm antenna impedance up to the 200 ohm output of the PI circuit. This also achieves further harmonic attenuation of the output in the same manor as an "L" coil in a Pi - L network.

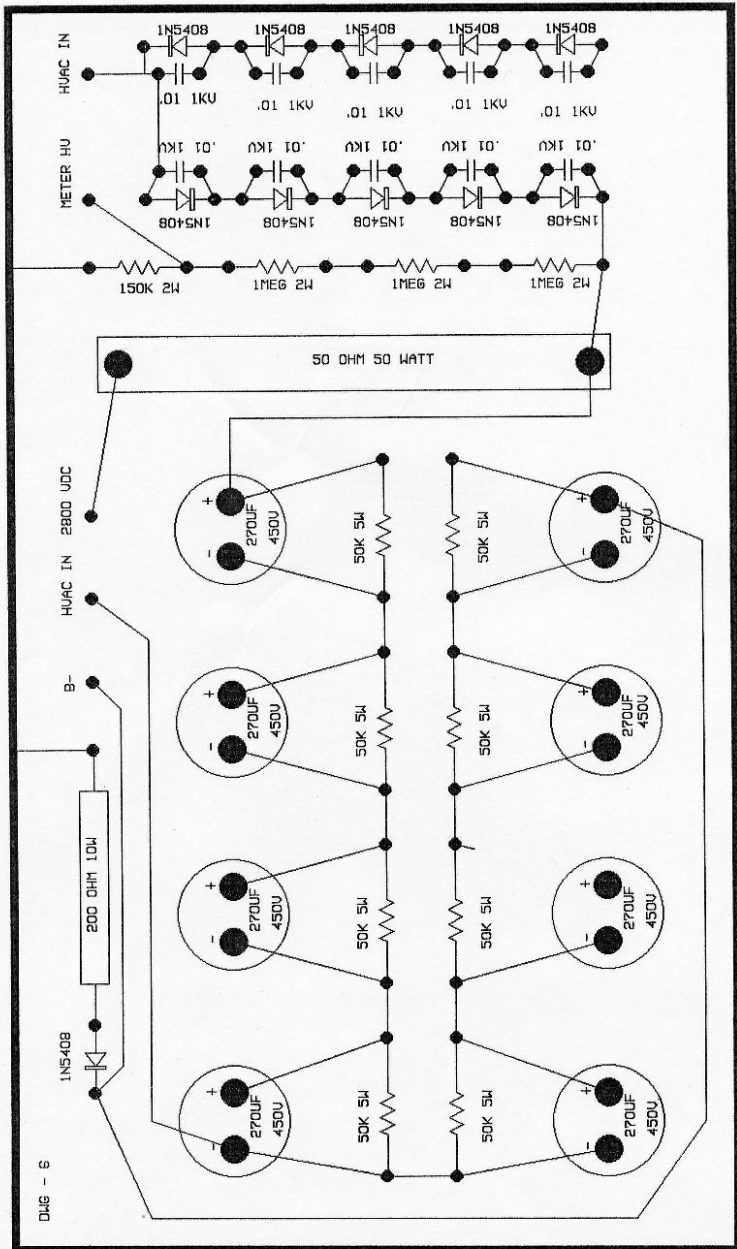
HIGH VOLTAGE SUPPLY

The high voltage supply operates from 117/200/234 Vac 20/30 ampere line. The primary of the high voltage transformer is switched on/off with a solid state relay that only conducts when the phase angle of the AC power line is at zero degree crossover. This minimizes line surge and inrush current while the high voltage filter capacitors charge. The front panel on/off switch activates the solid state relay with 2ma AC to turn the unit on. Approximately 900 volts AC is fed to a full wave voltage doubler rectifier circuit. This supplies approx. 2600 volts DC to the 3cx800a7 anode. Metering of the tube anode and grid current accomplished by shunt resistors located in the negative return of the 3cx800a7 cathode. Plate voltage metering is accomplished by a resistor multiplier network in the B+ line of the high voltage circuit.



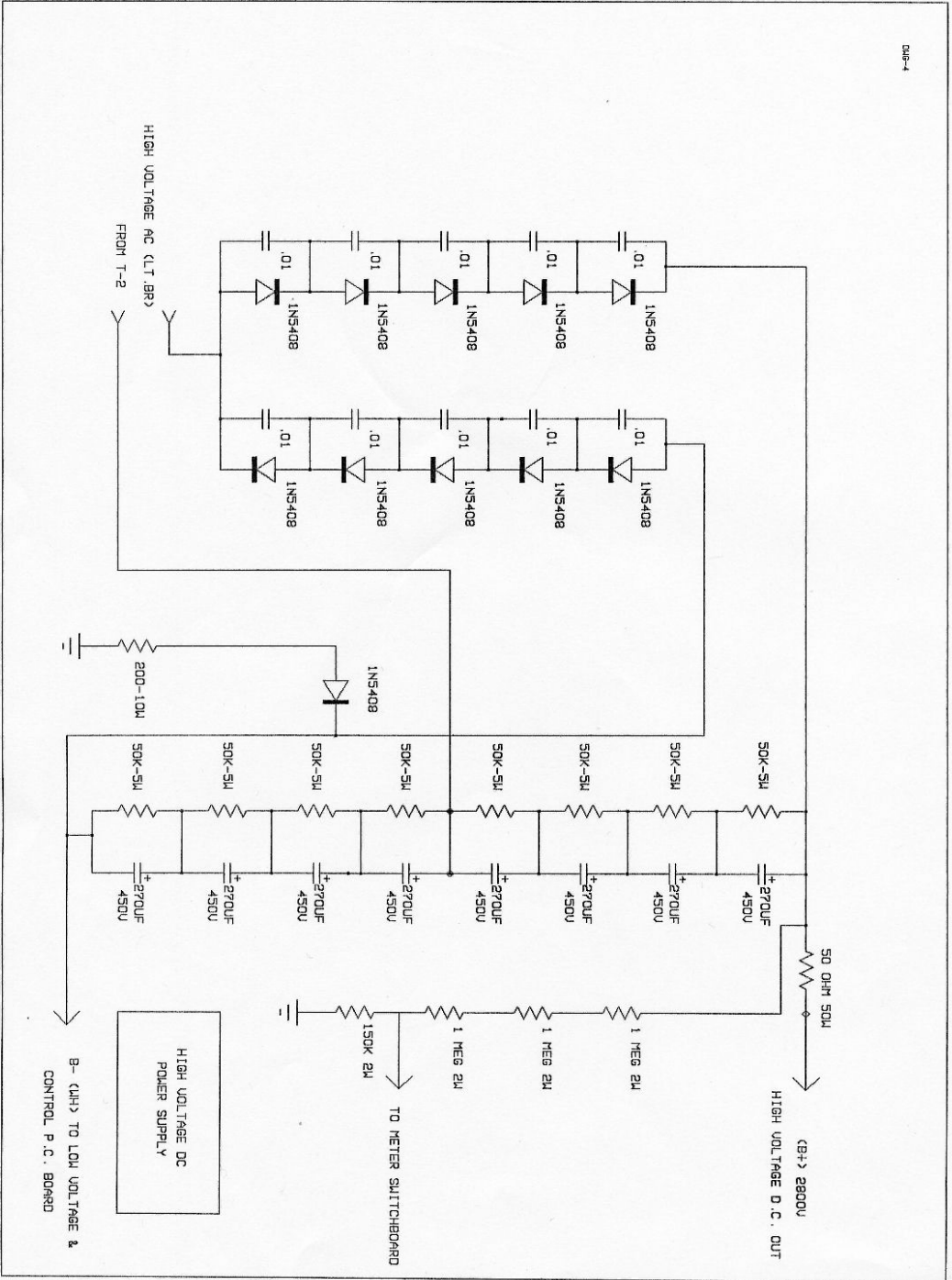
HF-1250/HF-2500 CONTROL & BIAS CIRCUIT WITHOUT OSK AFTER

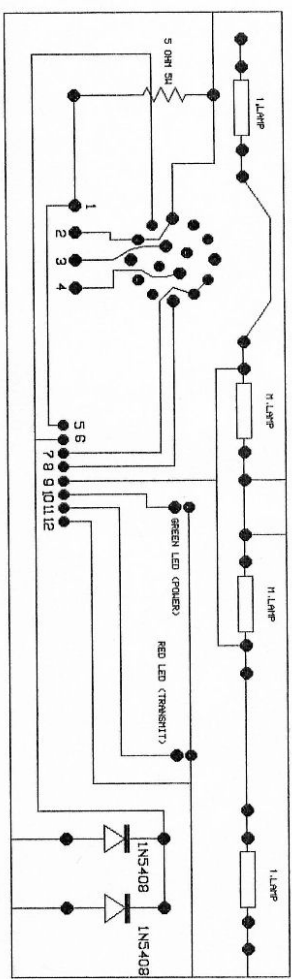




DIAG - 6

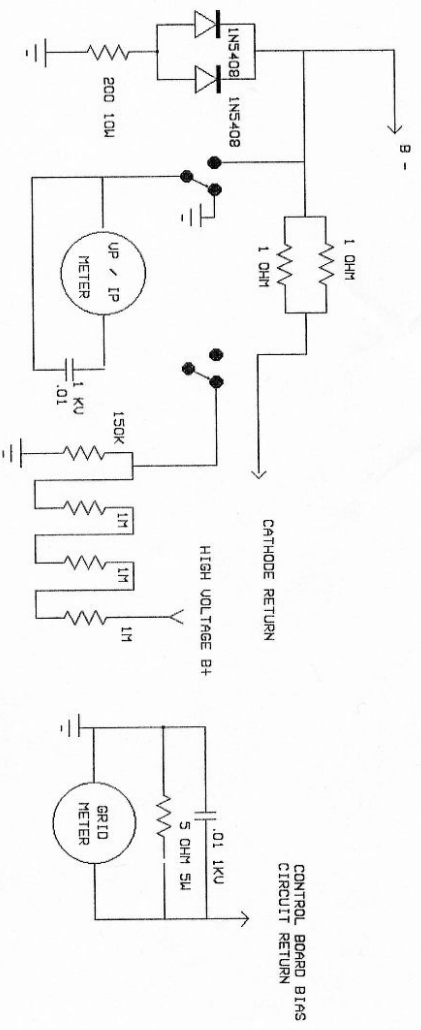
HIGH VOLTAGE CIRCUIT
DETAIL 6 - 1985





- 1 - ORANGE GRID METER +
- 2 - YELLOW GRID METER -
- 3 - UP/IP METER -
- 4 - UP/IP METER +
- 5 - YELLOW GRID FROM CONTROL BOARD
- 6 - WHITE B- FROM CONTROL BOARD
- 7 - BROWN PLATE CURRENT SHUNT
- 8 - YELLOW HU MULTIPLIER
- 9 - ORANGE +12 VDC
- 10 - BLUE POWER LED
- 11 - PURPLE TRANSMIT LED
- 12 - GREEN GROUND

SWITCH BOARD DETAIL



METER CIRCUIT DETAIL
6/16/95

Limited Warranty

Command Technologies, Inc. warrants to the original purchaser, that the Commander HF-1250 shall be free from defects in material, except Eimac 3CX800A7 tube, or workmanship for five (5) years from the date of original purchase. Tubes are covered by warranty granted from their manufacturer.

During the warranty period, Command Technologies, Inc. will correct defects in material and workmanship. Original purchaser will pay all shipping charges. Command Technologies, Inc. provides warranty parts and services according to the following schedule:

1st year.....	100% parts and labor
2nd year.....	50% parts and labor
3rd,4th and 5th year.....	25% parts and labor

to obtain such warranty service, the purchaser must:

1. Notify Command Technologies as soon as possible after the discovery of possible defect of:
 - a. The model number and serial number
 - b. Approximate date of purchase
 - c. A detailed description of the problem
2. Deliver the product to Command Technologies service facility, or ship the same in its original container or equivalent, fully insured and shipping charges prepaid.

Correct maintenance, repair, and use are important to obtain proper performance from this product. Therefore, carefully read the Instruction Manual. This warranty does not apply to any defect that Command Technologies, Inc. determines is due to :

1. Improper maintenance or repair including the installation of parts or accessories that do not conform to the quality and specifications of the original parts.
2. Misuse, abuse, neglect or improper installation.
3. Accidental or intentional damage.

All implied warranties, if any, terminate five years from the date of the original purchase.

The foregoing constitutes Command Technologies entire obligation with respect to the product, and the original purchaser and any user or owner shall have no other remedy and no claim for incidental or consequential damages. Some states do not allow limitations on how long an implied warranty lasts or do not allow the exclusion or limitation of incidental or consequential damage, so the above limitation and exclusion may not apply to you.

This warranty gives specific legal rights, and you may also have other rights which vary from state to state.