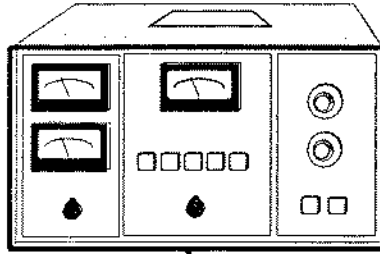


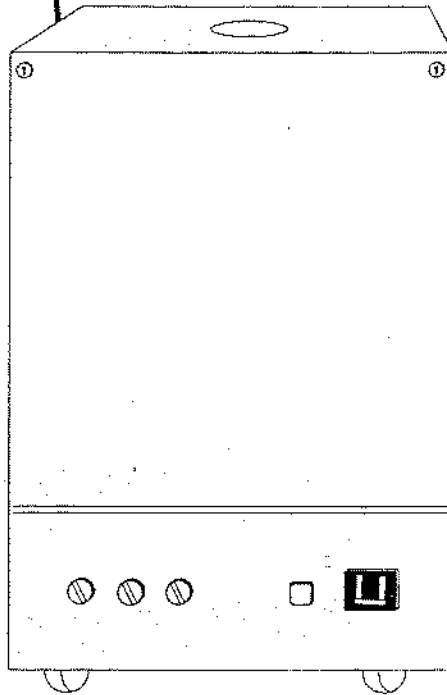
65-445

Desk top controller (no RF components)



4th Edition
October, 1999

Remote amplifier and
power supply console



3K ULTRA and 8K ULTRA Operating and Maintenance Manual

HF LINEAR COMMUNICATION AMPLIFIERS

HENRY RADIO, INC.

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The Importance of Amplifier Tuning

A grounded grid linear amplifier should be tuned so that most of the electrons emitted by the cathode reach the anode circuit. Electrons that fail to reach the anode are lost to grid current. This condition occurs when the amplifier is loaded too lightly - the result of setting the loading capacitor for too much capacitance during tune-up. As grid current rises and fewer electrons reach the anode, distortion increases and output power decreases. Thus, a triode amplifier can be tuned up with fair accuracy by simply applying maximum drive power and quickly adjusting the amplifier's TUNE and LOAD controls for maximum power output. After the amplifier has been tuned for maximum output, a slight increase in linearity can usually be secured by increasing the amplifier loading - that is, by decreasing the loading capacitance - until output power decreases by a few percent. Note, however, that this small improvement in linearity is seldom detectable in practice because the IMD performance of tube amplifiers is usually significantly better than the IMD performance of the bipolar-transistor-output transceivers commonly used nowadays as exciters.

Electrons are negatively charged. Positive charges attract them. The more positive the charge, the stronger the attraction. The 0-V potential of a grounded control grid is more positive than the negative charge of an electron leaving the cathode of a vacuum tube. This causes excessive current to flow in the control-grid circuit unless the tube anode is substantially more positive than the control grid throughout the anode-voltage cycle.

The output of a grounded-grid RF amplifier tube appears at the tube anode as RF AC superimposed on the DC anode supply. As a rule of thumb, successful attraction of most of the cathode's electrons requires that the instantaneous anode voltage not fall below about +200 to +300 V (relative to the grounded grid) during the lowest point of its downward voltage swing (that is, during the anode-current peak). Loading the amplifier too lightly - that is, adjusting the amplifier LOAD control for too much loading capacitance - causes the minimum anode voltage to fall below this level. The result is a dramatic increase in grid current and distortion, and a reduction in peak power output. Loading the amplifier too heavily - insufficient loading capacitance - also causes the output power to decrease because the amplifier output network is not adjusted to the impedance-transformation ratio necessary for maximum power transfer between the amplifier and its load.

Reprinted from March, 1989 QST - Richard L. Measures, AG6K

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LIMITED WARRANTY: Henry Radio warrants each new product to be free from defective material and workmanship. Henry Radio agrees to remedy any such defect or to furnish a new part in exchange for any part of any unit which under normal installation, use, and service discloses such defect. The equipment or part must be delivered by the original owner to us intact for our examination, with all transportation charges prepaid to our factory, within 1 year from the date of sale to the original purchaser. Provided that our evaluation discloses, in our judgement, such a defect, Henry Radio will repair at no charge, or replace at their discretion, such defective part or equipment.

EXCLUSIONS: Henry Radio does not warrant any vacuum tube used in their equipment. These are warranted by the tube manufacturer. Warranty claims must include proof of the date of purchase. The warranty does not extend to damage or failure caused by transportation damage, misuse, neglect, accident, incorrect installation, acts of nature, or to equipment modified or repaired without our prior approval.

This warranty does not include incidental or consequential damages and the Henry Radio warranty disclaims any liability for any such damage. All implied warranties, if any, are limited in duration to the above stated 1 year.

Henry Radio reserves the right to make any improvements to its products which it may deem desirable without obligation to install such improvements in its previously sold products.

Radio Frequency Interference Statement

Manufacturer's Instructions

The operator must observe the following precautions in installing and operating this unit:

1. Operate the equipment in strict accordance with the manufacturer's instructions.
2. Plug the unit into a grounded wall outlet with the AC cord supplied with the unit without modification.
3. Always operate the unit with all factory installed covers in place.
4. Never modify the equipment in any way that would affect its specifications.
5. Always maintain the equipment in a satisfactory state of repair
6. Use a quality shielded RF coax cable on the input and output of the equipment.

User's Responsibility

The user has the ultimate responsibility to correct any problem arising from harmful radio frequency interference from equipment under his control. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment on and off, the user is encouraged to try to correct the interference by one of the following measures. All of these responsibilities and any others not mentioned are exclusively at the expense of the user.

** Change the orientation of the receiving device antenna. ** Change the orientation of the transmitting equipment ** Change the location of the equipment ** Change the equipment power source.

If these attempts are unsuccessful, install one or all of the following devices: *** Line isolation transformer *** Line filters *** Electromagnetic shielding *** Input/Output filters.

If necessary, the operator should consult the dealer, or an experienced radio/television technician for added suggestions. The user may find the following book, prepared by the Federal Communications Commission, to be helpful: "How to Identify and Resolve Radio-TV Interference Problems". The book is available from the U.S. Government Printing Office - Stock Number 004-000-00345-5.

Note: The operator of equipment causing RFI may be required to stop operating his equipment upon finding that the device is causing harmful interference and it is in the public interest to stop operation until the problem is corrected.

Section 1. Henry 3K Ultra and 8K Ultra Specifications

Type and Function of Equipment: The 3K Ultra and 8K Ultra are remote tuning communications amplifiers capable of transmitting at 1500 or 5000 watts PEP output on most frequencies between 1.8 and 30 MHz. With optional channelizing features, the amplifier can offer 8, 16 or 24 pretuned operating frequencies.

Type of Emission: SSB, AM, CW FM, RTTY or pulse.

Output Power: 3K - 1500 watts PEP or DC nominal.

8K - 5000 watts PEP or 2500 watts DC nominal.

Gain: 15 or more times input power nominal.

Drive Power: 3K - 100 watts, 8K - up to 200 watts nominal.

Frequency Range: 1.8 to 24 MHz (1.8 to 30 MHz outside the United States).

Tube Complement: 3K - 3CX1200D7 ceramic triode.

8K - 3CX3000A7 Ceramic triode.

Duty Cycle: Continuous duty at rated output.

Dimensions: Controller - 17.5" W x 10" H x 10.5" D.

Console - 20" W x 32" H x 22" D.

Weight: Controller - 30 pounds. 3K Console - 250 pounds.

8K Console - 350 pounds.

Cooling: Forced air cooling built in.

AC Mains: 3 wire, single phase, 60 H, 230 VAC 30 amp.

Note: Any amplifier can be manufactured for 50 Hz, or 200VAC, or 2 wire 220VAC, or optional 3 phase operation - but you must specify your requirement at the time of order.

ALC Circuit: An ALC feedback circuit is provided for drive feedback.

Input/Output Impedance: 50 ohms unbalanced.

Noise Level: 40 dB down nominal below one tone carrier at 1KW output.

Metering: Power Meter (Forward or Reflected), Plate Current Meter, Multimeter - Grid Current, HV, Filament VAC.

Harmonic/Spurious Output: Better than 50 dB down on harmonics. 3rd Order IMD better than 35 dB down.

Controls: Band Switch, Multimeter Switch, Tune and Load Controls, Forward/Reflected Switch, Circuit Breaker On/Off, Band Switch.

RF Connectors: BNC Input, N Output.

Other Connectors: ALC (RCA), Relay Control (RCA).

Relay Keying: Each amplifier requires a shorting relay contact to ground during transmit, 26 VDC at approximately 300 ma.

Protection Circuits: HV shorting switch, air flow switch, AC fuses, cathode fuse, circuit breaker.

Plate Voltage: 3K - 3800-4500VDC nominal.

8K - 5000-5800VDC nominal.

Power Meter: Built-in Bird dual line section and elements.

Antenna Relay: Built-in vacuum relay.

Power Supply: Resonant choke, full bridge rectifier with oil filled filter capacitor.

Cabinetry: All aluminum cabinetry with double shielded RF chassis.

Tank Circuit: Pi-L type with silver flashed variable inductors.

Options: 8, 16, 24 channel memory, 10KW LPF, low current relay box.

Warranty: 1 year. Made in the U.S.A.

Section 2: 3K/8K Ultra Features

REMOTE AMPLIFIER OPERATION	These models are the only amplifiers available that allow the operating position to be remoted from the amplifier, isolating the noise and heat generated by any high power amplifier.
METERING	Three panel meters monitor tube plate current, tube plate voltage, tube grid current, tube filament voltage, forward power, output power.
ALC CIRCUIT	All models have an adjustable ALC feedback circuit to prevent overdrive from a high powered transceiver.
CONTROLLERS	There are several configurations of desk top controllers available - Manually tuned - 8 preset tuning channels - external 8 channel controller (up to 24 channels maximum).
FRONT PANEL CONTROLS	BAND switch, LOAD control, TUNE control, METER switch, SSB/CW switch, AC mains fuses, POWER switch.
REAR PANEL CONTROLS	RF input (BNC), RF output (N), ALC feedback jack (RCA), Relay control jack (RCA).
RELAY KEYING	A built-in 26 VDC supply activates the antenna relay when the relay control jack is shorted to ground. An optional low current (less than 10 ua) interface box is available.
POWER SUPPLY OPTIONS	All models are available for single phase 3 wire operation, single phase 2 wire operation, or optionally for any 3 phase configuration.
PROTECTIVE DEVICES	One high voltage shorting switch, primary AC fuses, primary circuit breaker, air flow switch on blower, and cathode fuse.
POWER SUPPLY	Conservatively rated components guarantee superb dynamic regulation in the high voltage supply and reliable, trouble-free performance. An oil filled capacitor is used in the high voltage supply. Diode rectifiers in the supply are rated at 15KV PIV, 3 amps.
STANDBY OPERATION	All models allow "barefoot" operation by leaving the amplifier off, bypassing the transceiver to the antenna.
ANTENNA RELAYS	All models use a Jennings vacuum relay in the output combined with a fast acting open frame relay on the input allowing full break-in keying for CW and RTTY operation.
CABINETS	All aluminum cabinets provide double shielding in the RF section to minimize cabinet leakage and radiation.
HISTORY	Henry amplifiers are backed by a 30 year history of providing the finest RF equipment available to the amateur service.

Section 3: Introduction

The 3K Ultra and 8K Ultra are a family of high quality, console model, single stage linear RF amplifiers designed around rugged and economical ceramic triode power tubes. All models employ the same grounded grid design to insure simplicity of concept and all employ conservatively rated components to insure years of reliable operation. The amplifiers are completely self-contained and use the highest quality RF, DC and AC components available today. All that is necessary for operation is an HF transceiver, a 230 VAC AC mains source (other voltages available) and a 50 ohm antenna system.

The 3K Ultra uses a single 3CX1200D7 tube offering about 11 to 13 dB of power gain (the output power is approximately 20 times the input power). This makes it easy to drive to full output with most popular low power solid state transceivers. It will deliver 1500 watts PEP and 1500 watts continuous wave into a 50 ohm load. FCC regulations require that the units supplied in the United States can not be capable of operating above 25 MHz.

The 8K Ultra uses a single 3CX3000A7 tube offering about 13 dB of power gain which will deliver a minimum of 3500 watts PEP in SSB service and 2500 watts in a CW mode. It is not available for sale to amateur radio operators in the United States.

With proof of a valid amateur service license, Henry Radio will give a United States purchaser information on how to extend the frequency coverage to 30 MHz. All other customers are considered export customers and their units will be supplied with coverage through 30 MHz.

The 3K Ultra and 8K Ultra are for amateur, industrial, scientific, medical, commercial and export users in the 1.8 through 30 MHz frequency range.

All models are designed around the same basic RF chassis which employs a pair of unique rotary tank inductors not found in any other line of production amplifiers. All models can be used for AM, FM, SSB, CW RTTY or pulse operation.

Frequency coverage is instantaneously in any 200 KHz segment between 1.8 and 30 MHz and can be tuned to any frequency between 1.8 and 30 MHz.

The amplifiers are shipped with their tubes installed at the factory. No tube installation is required.

CAUTION: Please read the instruction manual carefully before operating your new equipment. Your amplifier can be damaged by operating it out of resonance!

CAUTION: There are dangerous high voltages present inside the amplifier when it is plugged in and turned on! Never remove the equipment covers when the amplifier is plugged into its AC source!

CAUTION: Always exercise extreme caution when servicing any amplifier. Henry Radio recommends that any servicing be performed by returning your unit to the factory!

CAUTION: The voltages from the high voltage power supply can be **LETHAL!** Always unplug the amplifier and turn off the circuit breaker before working inside the cabinet of your amplifier.

Section 4: Installation

Section 4.1: UNPACKING

When you first receive your amplifier, you must carefully inspect both of the boxes, the control console and the amplifier for shipping damage. If you see any shipping damage, save the box and packing material, and notify the transportation company immediately. In any case it is a good idea to save the box and packing material because they are expensive to replace, and are useful in protecting the amplifier should you ever decide to ship it or move it to another location.

Remove both parts of the amplifier from their box and crate. All amplifiers are shipped less a power plug on the AC cable. A power plug that mates with the AC socket at the operating location must be properly installed as described in Section 4.3 before the unit can be operated. The amplifier is completely assembled at the factory, and it is shipped with the tube installed.

The following accessories should be included with your amplifier:

- 1 Instruction Manual and warranty card
- 1 N type Coax Connector (RG213 coax type)
- 2 RCA-RCA Cables (Relay and ALC)
- 1 20 foot remote control cable
- 1 RF drive cable (RG58)
- 1 Set spare fuses

Section 4.2: OPERATING LOCATION

The amplifier may be located wherever you wish provided there is a proper AC mains supply and provisions for adequate air flow from the bottom of the amplifier chassis up through the top of the amplifier. Do not restrict the air flow of the amplifier, and never place it too close to a wall that might restrict the airflow into the back of the unit. A location which avoids environmental extremes of temperature, humidity, and dust will keep your amplifier looking and running like new for many years of reliable operation.

SECTION 4.3: CABLING.

All of the following cables must be connected before operation of your amplifier:

POWER CABLE - The amplifier is equipped with a three wire AC power cable that is factory wired to accept 230 VAC, 2 wire, 60 Hz, single phase power unless special instructions were given at the time you ordered your amplifier. A factory modification is required for 3 phase operation, or for 50 Hz operation, or 200 VAC operation, or 2 wire European operation.

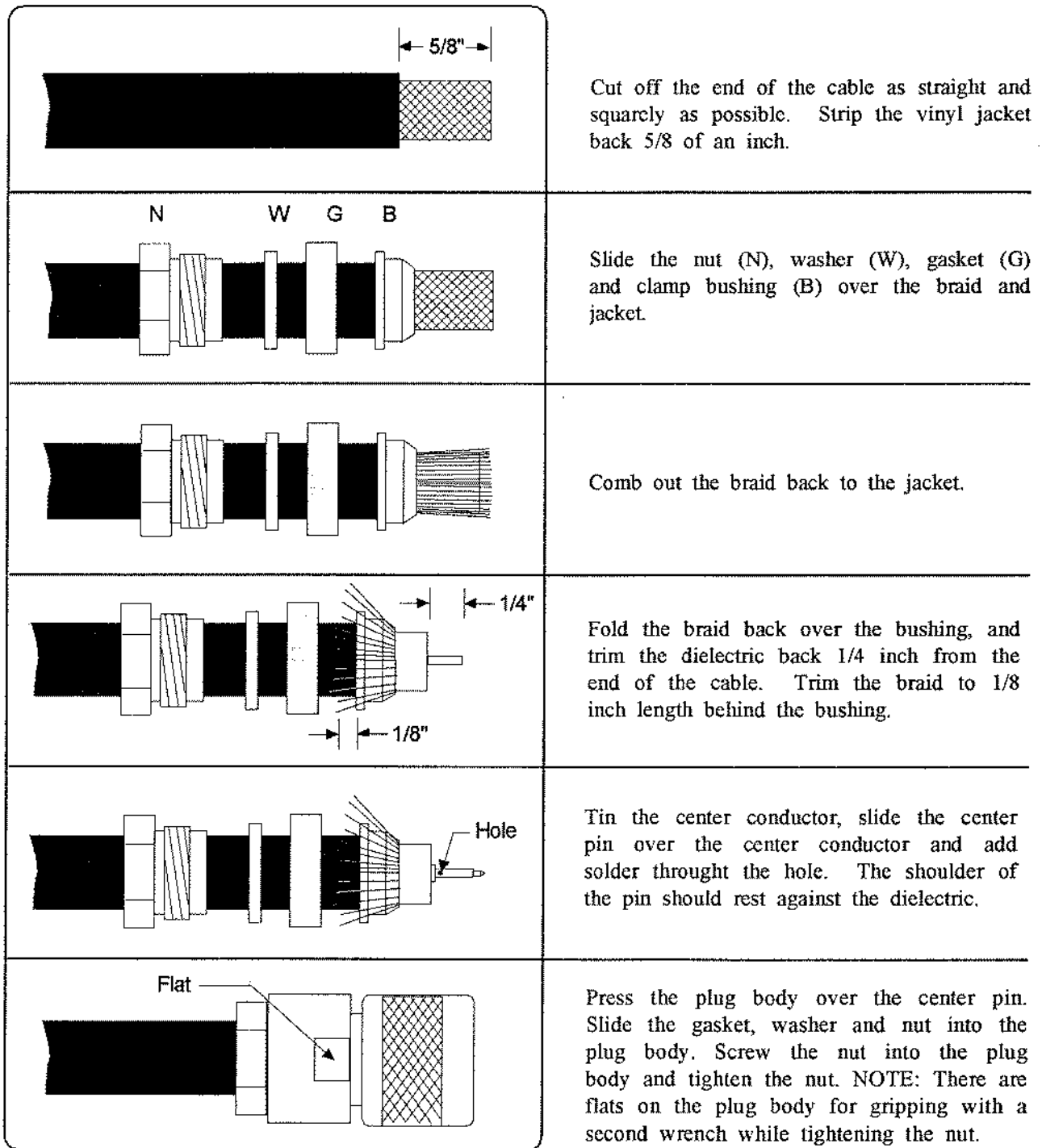
The green wire (ground) is not counted in the standard definition of power wiring, hence the 2 wire designation earlier. (2 wire European operation does not have a ground wire.) The three wires in the power cable are black, white, and green. The green wire is chassis ground and the neutral on all 230 VAC single phase plugs. The black and white wires connect to the hot 230 VAC circuits. A power plug is not provided because there are many different types of 230 VAC outlets. We suggest that you consult with your local electrician about proper installation of your plug.

CAUTION: The amplifier will be damaged if the green wire is connected to the 230 VAC terminal! Always make sure that the green wire is connected to the ground terminal!

ANTENNA COAX - You must select a 50 ohm coax cable for connection of your amplifier to your antenna system. This choice will depend on the desired operating power of the amplifier. At a minimum you should select RG213 type coax. If you are operating an 8K at its full output capability, you may need to look at hard line type coax.

An N type connector is included in the accessory kit. Prepare the cable as shown in Figure 1 below. The N connector mates with the coax jack marked OUTPUT on the rear panel of the floor console (Female N jack).

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Cut off the end of the cable as straight and squarely as possible. Strip the vinyl jacket back $5/8$ of an inch.

Slide the nut (N), washer (W), gasket (G) and clamp bushing (B) over the braid and jacket.

Comb out the braid back to the jacket.

Fold the braid back over the bushing, and trim the dielectric back $1/4$ inch from the end of the cable. Trim the braid to $1/8$ inch length behind the bushing.

Tin the center conductor, slide the center pin over the center conductor and add solder through the hole. The shoulder of the pin should rest against the dielectric.

Press the plug body over the center pin. Slide the gasket, washer and nut into the plug body. Screw the nut into the plug body and tighten the nut. NOTE: There are flats on the plug body for gripping with a second wrench while tightening the nut.

Figure 4.1. Connector Installation.

CAUTION: Never operate your amplifier unless it is connected to a matching antenna or a 50 ohm dummy load! Your antenna, coax, or load must be capable of handling the RF output of your amplifier.

You will damage the equipment if you operate the

amplifier into a load with an SWR of greater than 2.0:1, (a reflected power greater than 10% of the forward power). Measure the SWR of your antenna with the built-in RF power meter using only your transceiver's output - before operating the amplifier. With the amplifier on, but the relay control cable not

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connected, the transceiver will be directly connected to your load (antenna or dummy load) so that you can perform this test. After checking your SWR, turn off the amplifier and reconnect the relay control cable.

REMOTE CONTROL CABLE: The standard interconnection cable between the controller and the amplifier is 20 feet long. Longer cables are optionally available from Henry. Plug the 30 pin TRW connectors into the back panel of the controller and amplifier. Be sure to connect the separate ground lead at each end.

DRIVE CABLE: An RG58/U drive cable is supplied with the amplifier. Connect the BNC end of the cable into the RF INPUT connector on the rear panel of the amplifier. The other end has a PL259 connector designed to plug into your transceiver. An adapter will be required if your transceiver does not have a matching SO239 output connector.

ALC CABLE (Automatic Level Control): A shielded cable with RCA connectors is supplied to connect an ALC feedback connection between your transceiver and the controller to limit the drive power to the amplifier. You will have to check the manual of your transceiver to find how to interface this cable. If your transceiver has no provision for ALC feedback, no connection is necessary.

RELAY CABLE: A shielded cable with RCA connectors is supplied to connect the relay signal between the transceiver and controller. This cable conducts the keying signal from the transceiver to switch the amplifier to the transmit condition and must be connected to the socket marked ANTENNA RELAY or ACCESSORY on the transceiver. The transceiver needs to supply a shorting relay contact, grounded during transmit to key the amplifier. Most modern transceivers use DIN type plugs, while older transceivers use RCA type jacks. It may be necessary to solder the cable to a DIN plug for this function. All modern HF transmitters and transceivers have provisions for a relay control connection. If the connection is not obvious to you, check the

operating manual for the transceiver to find an available unused relay contact that is normally closed during transmit.

CAUTION: Never apply any voltage to the relay jack of the dest top controller!

Some modern transceivers use diode switching rather than relay switching. This may cause a problem with the voltage drop across the diode preventing sufficient voltage drop across the relay coil to activate the relay in the Henry amplifier. These amplifiers used a 26 VDC relay control voltage. If your transceiver will not key the amplifier, you should check the resistance across the contact you are using. If there is too much resistance, contact the transceiver's manufacturer about possible solutions to this problem.

SECTION 4.4 TRANSFORMER TAPS.

HIGH VOLTAGE/FILAMENT TRANSFORMER: The 3K Ultra is normally supplied with an ECA 1214A HV transformer, and the 8K Ultra is normally supplied with an ECA 1504 HV transformer. These transformers are factory wired for 230 VAC operation, with the actual primary voltage being selectable by the proper tapping of the terminal strip on the transformer. The proper taps for each transformer is shown in Figure 4.2.

Both the high voltage and filament transformers must be tapped for the correct AC mains line voltage. The filament voltage ranges that are recommended for proper performance and optimum tube life are as follows:

3CX1200D7 - - - 5.98 to 6.62 VAC
3CX3000A7 - - - 7.12 to 7.87 VAC

The taps for each transformer are shown in Figure 4.2.

RELAY SUPPLY TRANSFORMER: The relay power supply transformers do not have variable taps at their input, and experience has shown that even under worst case conditions, there is sufficient voltage to activate the relays.

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Figure 4.2. Transformer Tap Diagram.

<p>ECA 1214A High Voltage 3K Ultra P: 208-240V S: 4000V 1A</p>	<p>ECA 26142 3 Ph High Voltage 8K Ultra P: 380 3PH S: 5000 V 1 A</p>
<p>ECA 1228 Filament 3CX1200D7 3K Ultra P: 208-250V S: 6.3V 30 amps</p>	<p>ECA 1504 High Voltage 8K Ultra 1 PH P: 208-240V S: 5500V 1A</p>
<p>ECA 1188 Relay Supply P: 230V S: 24V 2A</p>	<p>ECA 1102 Filament 3CX3000A7 8K Ultra P: 208-250V S: 7.5V 52A</p>
<p>ECA 1347 Stepdown P: 230V S: 120V 2.5 A</p>	
<p>ECA 5020 Choke 3K Ultra 8 Henry 1 Amp</p>	<p>ECA 5024 Choke 8K Ultra 8 Henry 1 Amp</p>

Section 5: Operating Controls

SECTION 5.1: FRONT PANEL CONTROLS - CONTROLLER

POWER SWITCH: This switch is used to turn the AC power to the console on and off. When the power is turned off, the output of the transceiver feeds through the amplifier, directly to the load.

MULTIMETER SWITCH: This rotary switch selects the function of the multimeter.

MULTIMETER: The multimeter reads three different tube parameters, depending on the position of the multimeter switch, as follows:

Grid Current (IG): 0 to 1000 ma
High Voltage (HV): 0 to 10,000 VDC
Filament (VF): 0 to 10 VAC

PLATE CURRENT METER: This meter continuously monitors the plate current of the amplifier tube on a 0 to 1 amp scale (3K Ultra) or a 0 to 2 amp scale (8K Ultra).

POWER METER: This meter monitors either the forward power to your load, or the reflected power from you load, depending on the position of the SWR switch. In the forward power mode the meter scale is 0 to 2500 watts (3K Ultra) or 0 to 5000 watts (8K Ultra). In the reflected power mode, the meter scale is 0 to 250 watts (3K Ultra) or 0 to 500 watts (8K Ultra).

LOAD CONTROL: This control matches the amplifier's output network to your load. A calibration chart at the end of this manual shows initial settings for the frequency of operation that you have selected. A dial setting of zero (0) corresponds to a minimum loading with the capacitor's plates unmeshed. A dial setting of one hundred (100) corresponds to maximum loading, with the capacitor's plates fully meshed. The LOAD control you turn is actually a 10-turn potentiometer, part of a Wheatstone bridge circuit. When this circuit is unbalanced, it provides a signal to drive a DC servo-motor which is connected to the vacuum loading capacitor.

TUNE CONTROL: The TUNE control is also a 10-turn potentiometer which operates as the LOAD control described above. The signal from this circuit drives the motor connected to the rotary inductor PI and L coils.

BANDSWITCH: The BAND switch selects the appropriate capacitors on the output circuit for the frequency of operation. Guidelines for the BAND switch position versus frequencies are listed below:

160	- - - -	1.8 to 3.0 MHz
80	- - - -	3.0 to 5.0 MHz
40	- - - -	5.0 to 10.0 MHz
20	- - - -	10.0 to 17.0 MHz
15/10	- - - -	17.0 to 30.0 MHz

CAUTION: Never change the BAND switch when the amplifier is keyed! You will destroy many of the components in the amplifier and it will cause you to have an expensive repair bill!

CW SWITCH AND SSB SWITCH: The CW and SSB switches select two different plate voltages on single-phase power supplies. They are not used in three-phase power supplies.

3K Ultra - CW: 2800-3200V SSB: 3800-4200V
8K Ultra - CW: 3800-4200V SSB: 5000-5800V
8K Ultra (three-phase): 4800-5800V

The above numbers are approximate, in an unkeyed condition. They may vary considerably depending on the AC mains at the operating location.

SECTION 5.2 REAR PANEL CONTROLS AND JACKS - CONTROLLER

ALC POTENTIOMETER: This potentiometer controls the sensitivity of the amplifier's ALC feedback circuit. See Section 6.3 for instructions on how to adjust the ALC feedback.

REMOTE SOCKET: This 30 pin Cinch style socket connects the controller and console through

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a 20 foot cable provided with the unit. Optional cables up to 100 feet long are available.

ALC JACK - This RCA type socket connects the feedback voltage from the amplifier to the transceiver. No connection is necessary if your transceiver has no provisions for ALC feedback.

RELAY CONTROL JACK - This RCA type socket connects the amplifier to your transceiver to key the amplifier when your transceiver is transmitting. An interconnect cable is supplied in the accessory kit for this purpose. When the socket is shorted to ground, the amplifier's antenna relay closes. If the amplifier is turned off, the relay cannot be keyed.

CAUTION: Never apply any voltage to the relay control socket! There is a built-in power supply that provides the proper voltage to actuate the relay! You only need to supply a shorting contact to activate the T/R relay!

SECTION 5.3: FRONT PANEL CONTROLS - CONSOLE

MAIN CIRCUIT BREAKER: The main circuit breaker for the amplifier system is on the front panel of the console on the bottom right. There is an indicator light marked AC MAINS to the left of the circuit breaker.

FUSES: Two fuses protect all the AC circuits other than the high voltage supply. They protect the blower, and control circuits. A third fuse protects only the relay supply.

SECTION 5.5: REAR PANEL CONNECTIONS - CONSOLE

RF INPUT JACK: This BNC type jack accepts the drive cable from your transceiver. The input impedance of the amplifier is nominally 50 ohms unbalanced. A drive cable is supplied in the accessory kit. It is an RG58/U type coax cable with a BNC plug on one end and a PL259 plug on the other end.

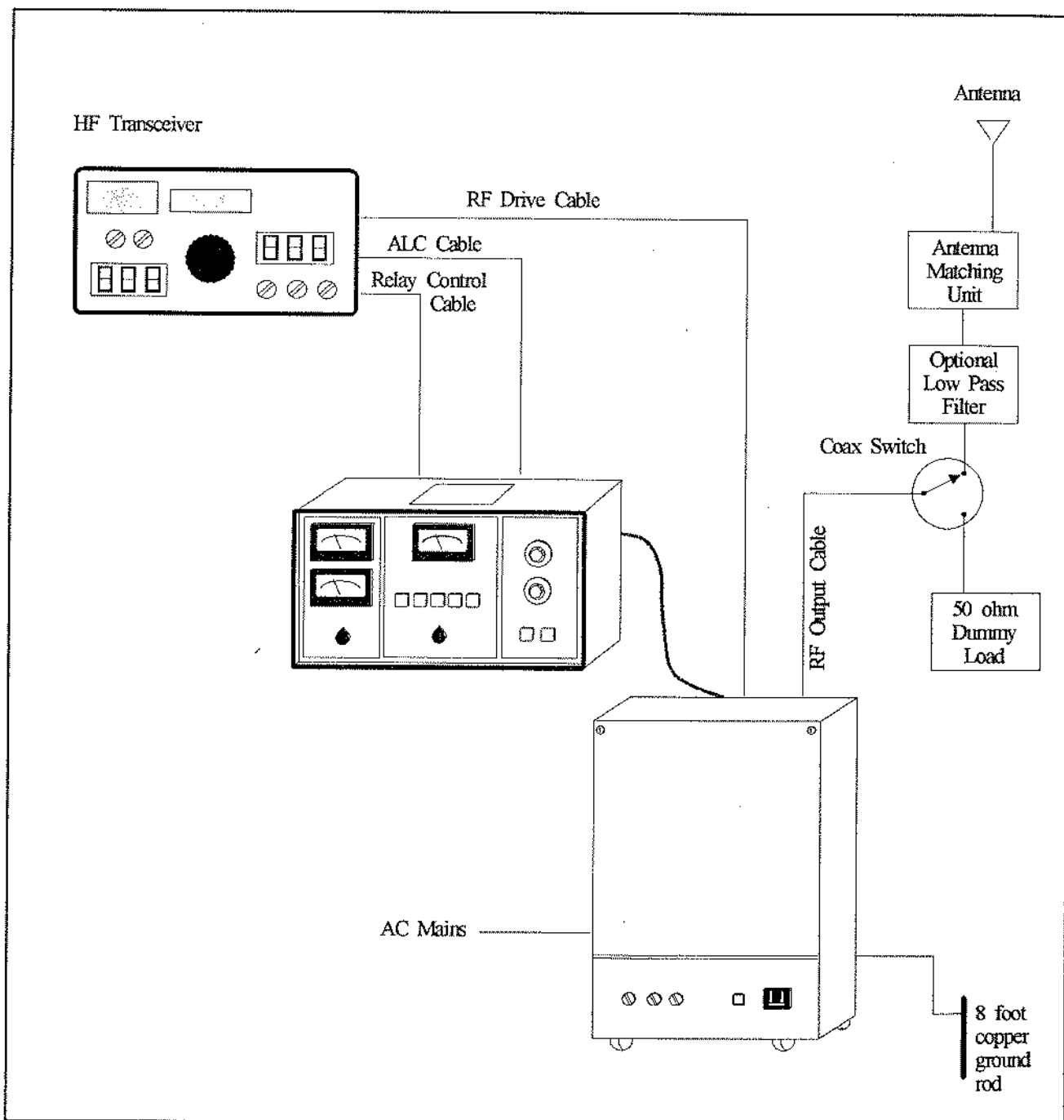
RF OUTPUT JACK: This N female type coax connector transfers power from the amplifier to the output coax and ultimately to your antenna or dummy load. The output impedance of the amplifier is nominally 50 ohms unbalanced. The load VSWR should never exceed 2:1. This means the reflected power from the load should never exceed 10% of the forward or incident power. It is the user's responsibility to choose a cable type that will handle the expected operating power from the amplifier at the frequency of operation. A minimum choice of coax would be RG8 or RG213 type.

GROUND LUG: This lug is provided for an earth ground for the amplifier's chassis. A good earth ground is required for safety reasons and to minimize cabinet radiation. An 8 foot ground rod is a good choice for a grounding system.

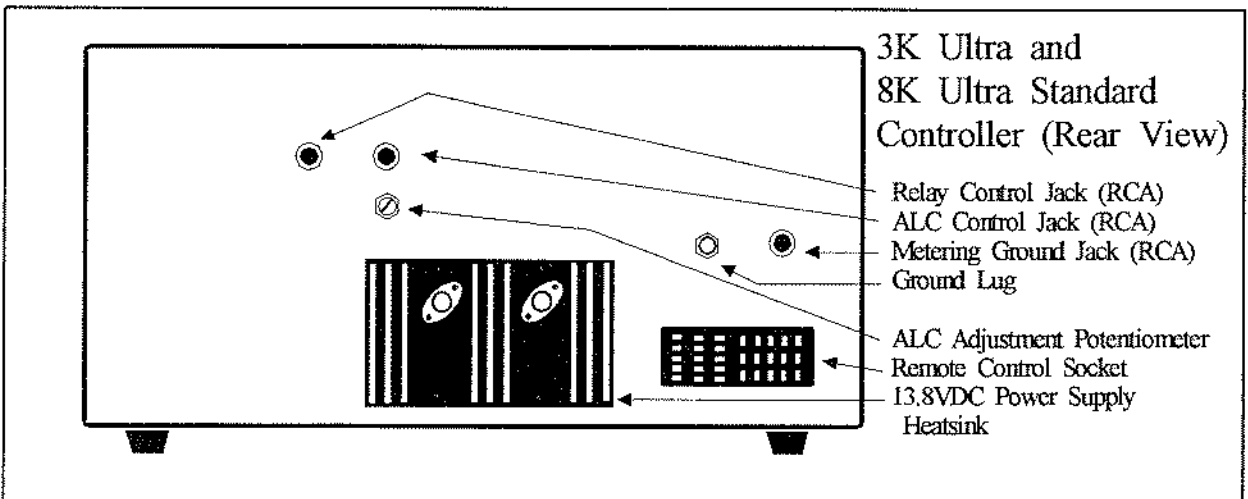
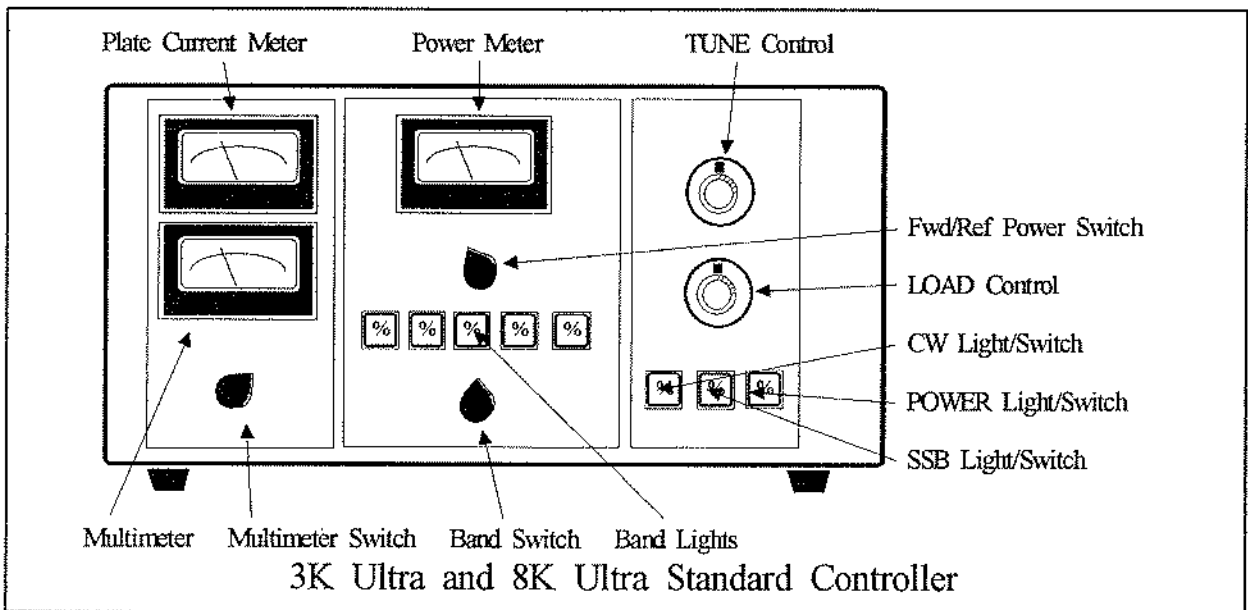
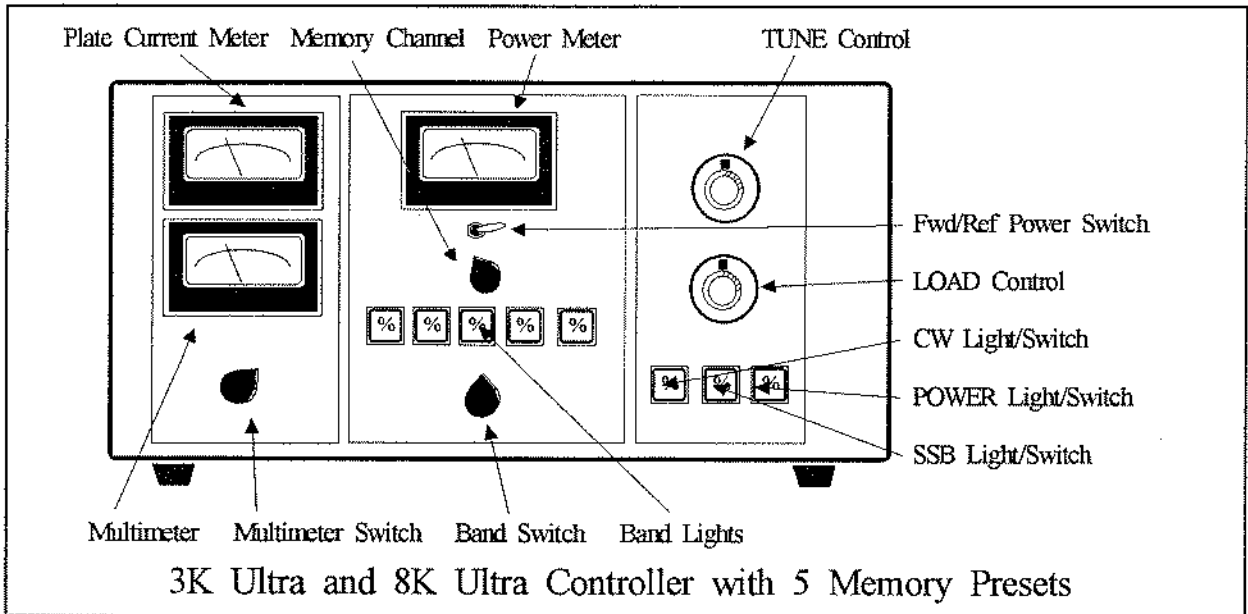
REMOTE SOCKET: This 30 pin Cinch type socket is the mate for the control cable from the controller. Be sure to ground the external ground connection from the cable.

POWER CORD: The AC power cable must be connected to an AC power source capable of supplying the necessary voltage and current required by the amplifier. No AC power plug is provided because there is no standard 220 VAC socket used in the United States. Consult your local electrician as to the proper plug for your operating location.

Henry 3K Ultra and 8K Ultra Interconnect Diagram

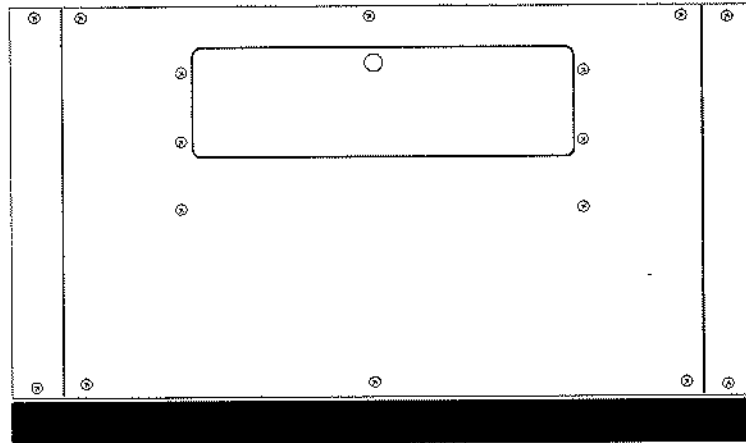


Henry 3K Ultra and 8K Ultra Operating Controls



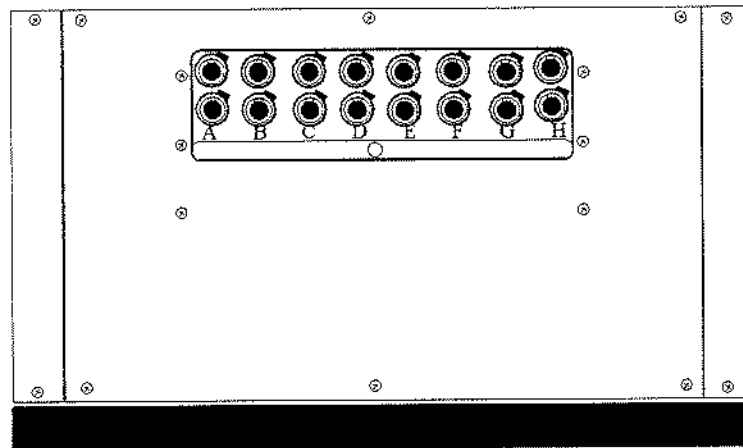
Henry 3K Ultra and 8K Ultra Operating Controls (Continued)

Controller Top with Access Door Closed



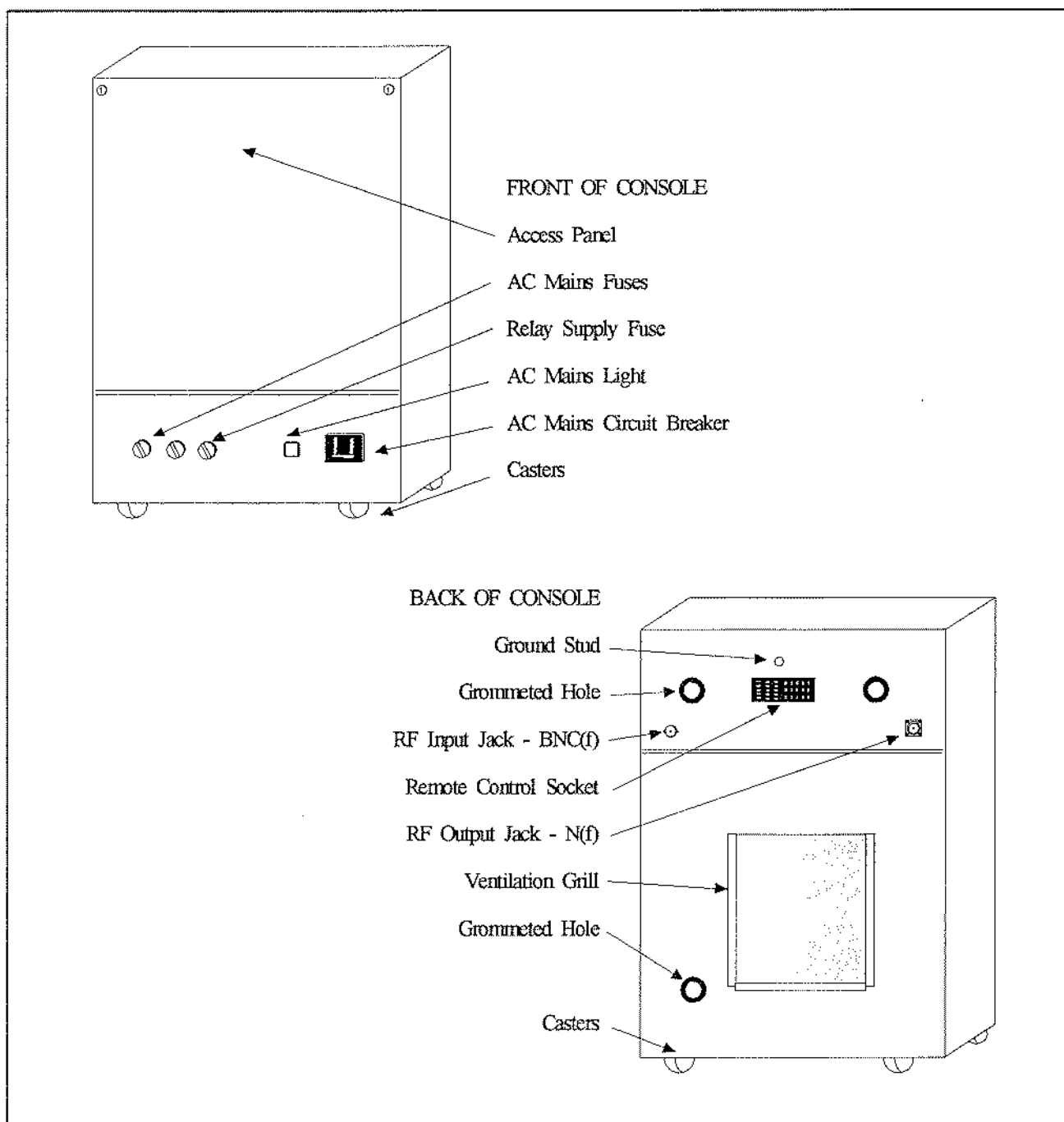
3K Ultra and 8K Ultra Controller with 8 Memory Presets (Top)

Controller Top with Access Door Open



3K Ultra and 8K Ultra Controller with 8 Memory Presets (Top)

Henry 3K Ultra and 8K Console Operating Controls



Section 6: Operation

SECTION 6.1: PRELIMINARY SETTINGS

Set the BAND switch to the desired band based on the table in Section 5.1. With the amplifier turned off, tune your transceiver to the desired operating frequency and set the output to zero. Set the TUNE and LOAD controls to the calibrated settings recommended in the table at back of this manual. If your amplifier has a controller with the 5 memory option, set the preset select switch in the M (manual) position. When the amplifier is turned off, the transceiver is directly connected to your antenna.

Turn the amplifier on using the main circuit breaker on the front of the console. The AC MAINS light should come on if you are properly connected to the AC mains. Neither the 3CX1200D7 or the 3CX3000A7 require any warm up time, so you may use the amplifier within a few seconds of turning it on. When you push the POWER button on the controller, the blower will come on, and high voltage is applied to the tube. With ceramic tubes there is no visual indication of power, but you should feel heat in the exhaust air. Turn on the amplifier by pushing the POWER switch. Key your transceiver to switch the amplifier into the transmit mode, but do not apply drive yet. Check that the operating parameters in both the CW and SSB position are approximately as follows:

3K Ultra

	SSB	CW
Grid Current	0 ma	0 ma
Plate Current	120 ma	65 ma
HV (no drive)	4200 VDC	3200 VDC

8K Ultra

Grid Current	0 ma	0 ma
Plate Current	150 ma	70 ma
HV (no drive)	5800 VDC	4200 VDC

If the values of the high voltage and the resting current are significantly different than above, then there may be a problem with the amplifier, or the taps on the high voltage and filament transformer may need to be changed.

SECTION 6.2: CW OPERATION

Push the POWER button to turn off the amplifier. Set the transceiver's output to zero and set the BAND switch on the amplifier to the correct operating range. Set the transceiver into the CW mode and set the wattmeter select switch to read FWD PWR.

STEP 1: Preset the TUNE and LOAD controls of the amplifier using the calibration settings in the table at the back of the manual. Turn the multimeter switch to the position marked IG to read the tube's grid current. Press the POWER button to turn the amplifier on, then press the CW button to switch the HV to the CW mode. The band light for the band selected will blink, indicating that the drive motors are operating. Wait until the light stops blinking and stays on.

STEP 2: Slowly increase the drive from your transceiver until the amplifier draws about 200 ma of plate current. If the operating frequency is close to the factory tested frequency, the wattmeter should indicate some output power. Adjust the TUNE and LOAD controls alternately for maximum output power. For fine tuning, the speed of the TUNE motor can be reduced by push in the 15/10m band light and holding it in while turning the TUNE control. Slowly increase the power out of the transceiver and continue to alternately adjust the TUNE and LOAD controls to peak the output power of the amplifier. Watch the grid current reading and try not to exceed:

3K Ultra - - - 200 ma
8K Ultra - - - 350 ma

With 100 watts of drive, the 3K Ultra should supply 1500 watts out with about 800 ma of plate current.

CAUTION: Do not drive the amplifier for more than 10 seconds when it is not tuned to resonance! Ten seconds tune and 10 seconds off is a good operating habit when tuning up.

When the amplifier has been tuned to resonance and loaded up properly, write down the control

settings so that you can return to that frequency again without retuning. As long as the tube is in good condition and your load stays constant, the dial settings should stay constant.

Switch the transceiver into the SSB mode, key the microphone, and speak into the microphone to drive the amplifier. Since the meter reads average power (rather than peak power), the meter reading will be different than the readings seen in the CW tune-up.

The ALC circuit is designed to prevent overdrive and distortion for a high power transceiver. The control (on the back panel of the controller) is adjusted off at the factory (fully counterclockwise). If the ALC circuit is used, you need only adjust the control during initial setup.

If you want to use the ALC circuit, tune up the amplifier for SSB operation at the desired output level. Rotate the ALC potentiometer clockwise until the grid current just begins to decrease. This feedback circuit prevents the transceiver from driving the amplifier with any greater power. Once the adjustment is made, use the locknut on the control shaft to lock it in place. If your transceiver is unable to drive the amplifier to full output, there is no need to use the ALC circuit.

SECTION 6.3: SSB OPERATION

Tune the amplifier as described in Section 6.2. Then push the SSB switch to select the higher HV circuit. As long as your load has not changed, the amplifier should still be in tune. You can fine tune by alternately adjusting the TUNE and LOAD controls while driving the amplifier with a constant input.

SECTION 6.4: OPERATING PRECAUTIONS

Please keep the following precautions in mind when you operate your amplifier to insure its safe and reliable operation for years to come.

Voltages inside the amplifier can be **LETHAL!** Never disable the protection or interlock circuits built into the amplifier. **NEVER** operate the amplifier with any of the panels removed.

ALWAYS tune the amplifier to resonance at the operating frequency and load it into your antenna or dummy load before transmitting.

NEVER switch the BAND switch when the amplifier is keyed. You will have a very expensive repair bill. Hot switching can burn and melt the contacts on the remote relays. It can also melt, crack, or destroy capacitors, chokes or tuning inductors in the output circuit. Even the tube can be damaged. Only a lightning strike can produce equivalent damage.

Get in the habit of pushing the POWER switch off before changing bands. Always retune the amplifier whenever you change frequencies.

NEVER operate the amplifier into a load with SWR greater than 2:1 (The reflected power is 10% of the forward power.)

The components in the amplifier are specifically rated for the service and operating parameters listed in Section 1. Excessive drive will cause excessive output and will shorten the life of the tube and other components.

SECTION 6.5: PRESET OPTION

Your amplifier is available with a factory option of 8 preset channels, designated A through H on the controller panel. The preset select switch is located below the RF power meter in the center of the front panel of the controller. An additional 16 channels can be installed externally.

If you specified frequencies when you placed your order, the presets were set at the factory. To use a preset channel, select the proper band and the associated preset and turn on the amplifier. The band light will begin blinking and will stop once the TUNE and LOAD motors have reached their proper positions.

SECTION 6.6: PRESET TUNING

The preset tuning can be changed at any time. Turn the preset select switch to M for manual tuning. Tune up the amplifier as previously described for the desired frequency. When the amplifier is tuned correctly, unkey it, and move the preset select switch to the desired channel. Slide open the access door on the top of the con-

troller and locate the controls for the selected channel. Set the dials to the same readings as the front panel TUNE and LOAD controls. Key the amplifier and fine tune the preset TUNE and LOAD controls for maximum output. Lock the dials with the dial locks when you are finished tuning the preset controls, and close the access door.

SECTION 7: Maintenance/Troubleshooting**SECTION 7.1: MAINTENANCE PROCEDURES**

Any time you have a problem with your amplifier, be certain to check that it is properly connected to the AC mains and that all the fuses are good. There are two AC mains fuses, and a cathode protection fuse. **NEVER** replace a fuse with one of higher value than specified. You could cause extensive equipment damage!

SECTION 7.2: INPUT MISMATCH

The Ultra series of amplifiers are built with a broadband, unum type input circuit. The input SWR to the amplifier should always be better than 2:1. Experience has shown that some transceivers with automatic tuners have trouble matching this circuit. If you turn off the tuner, the transceiver should be able to drive the amplifier directly.

SECTION 7.3: RELAY PROBLEMS

SYMPTOM: High input SWR all bands.

- Possible Cause: Input relay is bad.
- Possible Cause: Input relay out of socket.
- Possible Cause: Bad drive cable.

SYMPTOM: Reduced receiver sensitivity.

- Possible Cause: Input relay is bad.
- Possible Cause: Output relay stuck.
- Possible Cause: Input relay out of socket.
- Possible Cause: Bad input or output cable.

SYMPTOM: Resting current - amp not keyed.

- Possible Cause: Relay cable shorted.
- Possible Cause: Transceiver connection incorrect.
- Possible Cause: Transceiver malfunctioning.
- Possible Cause: Band bias relay.
- Possible Cause: Short in relay supply.

SYMPTOM: Amplifier will not key.

- Possible Cause: Bad relay cable.
- Possible Cause: Transceiver connection incorrect.
- Possible Cause: Transceiver malfunctioning.
- Possible Cause: High resistance relay contact in transceiver.
- Possible Cause: Relay supply failed (no pilot lights). Voltage should measure between 20 and 30 VDC. Check AC mains fuse.

SECTION 7.4 TUBE PROBLEMS

SYMPTOM: Excessive plate current.

- Probable Cause: A bad tube. The normal failure mode is a short, but a failing tube can draw excessive current.
- Probable Cause: A failure of the cathode bias circuit. It is not simple to test diode D1 without special test equipment. It is not a zener diode. The failure of the resistor in the circuit is also a possibility.

SYMPTOM: Negative grid current.

- Probable Cause: Grid-to-filament tube short.
- Probable Cause: A failure of the cathode bias circuit.

SYMPTOM: Excess plate current when amplifier is not keyed.

- Probable Cause: Grid-to-filament tube short.

SYMPTOM: Low Output:

- Probable Cause: Tube is worn out. Ceramic triodes can offer many years of reliable service when operated properly, but they will eventually wear out.

SYMPTOM: Circuit breaker blows.

- Probable Cause: Plate short in the tube.

SECTION 7.5 HIGH VOLTAGE PROBLEMS

CAUTION: The high voltage in your amplifier can be lethal! Always disconnect the amplifier from the AC mains and turn off the power at the main circuit breaker before you work on the equipment!

SYMPTOM: High grid current - no plate current.

- Probable Cause: No high voltage to the tube.
With the amplifier unplugged, use an ohmmeter to find the circuit fault.

SYMPTOM: Circuit breaker trips.

- Probable Cause: A high voltage short.

- Probable Cause: A short in the RF chassis.
Confirm by unplugging the high voltage lead to the chassis to see if problem goes away. Make sure the HV shorting switch is properly engaged. If the short still exists, the problem is in the power supply. With the amplifier unplugged, look for arc traces or burned components. If necessary use an ohmmeter to trace the short. Remove the tube to eliminate it as a source of the short. If necessary unsolder components until the short disappears.
- Probable Cause: HV short in the power supply.
The usual suspect in the power supply is the HV rectifiers. If necessary, unplug the amplifier, and one-by-one unsolder components from the HV circuit until the short disappears.

NOTE: A high voltage short will probably blow the cathode protection fuse.

SYMPTOM: No high voltage meter reading.

- Probable Cause: A blown cathode fuse.
- Probable Cause: A defective meter.
- Probable Cause: An open resistor in the HV measuring circuit.

SYMPTOM: Low HV reading.

- Probable Cause: A failure in the step start circuit in the power supply.
- Probable Cause: The HV transformer is incorrectly tapped.

SECTION 7.6: BLOWER PROBLEMS

SYMPTOM: Blower is noisy or rough.

- Probable cause: The bearings on the blower should be lubricated twice a year.
- Probable Cause: The blower was knocked out of balance because of shipping damage.

SYMPTOM: Blower does not operate.

- Probable Cause: Blown AC mains fuse.
- Probable Cause: Bad blower motor.

SYMPTOM: Blower not operating.

- Possible Cause: AC cable wired incorrectly.
- Possible Cause: Shipping damage to blower.

SYMPTOM: Blower is noisy or cabinet shakes.

- Possible Cause: Shipping damage, blower out of balance.

SECTION 7.7 OUTPUT PROBLEMS

SYMPTOM: Low output.

- Possible Cause: Low drive from transceiver. Indicated by low grid current.
- Possible Cause: Bad drive cable.
- Possible Cause: Bad output cable.
- Possible Cause: Low filament voltage.
- Possible Cause: Bad tube.

SECTION 7.8 AC LINE VOLTAGE PROBLEMS

SYMPTOM: Amplifier will not turn on.

- Possible Cause: Incorrectly wired AC plug.
- Possible Cause: Bad circuit breaker.

SYMPTOM: High voltage readings out of spec.

- Possible Cause: AC mains too low or high - you must retap the transformer.

SECTION 7.9 OTHER PROBLEMS

SYMPTOM: Blower operates, but not lights.

- Possible Cause: Amplifier still in warmup mode.
- Possible Cause: Warmup relay defective or out of its socket.
- Possible Cause: Relay supply defective.

SYMPTOM: Amplifier will not turn on or off.

- Possible Cause: Defective circuit breaker.
- Possible Cause: AC plug wired incorrectly.

SECTION 7.10 MAINTENANCE

Many Henry amplifiers still remain in the field after more than 30 years of service. To insure maximum reliability you should unplug the unit, remove the top cover and make sure that the interior of the console is free of dust, lint, and dirt. If necessary, vacuum the interior to clean it. Also make sure that the airflow in and out of the amplifier is unrestricted.

SECTION 7.11 FACTORY SUPPORT

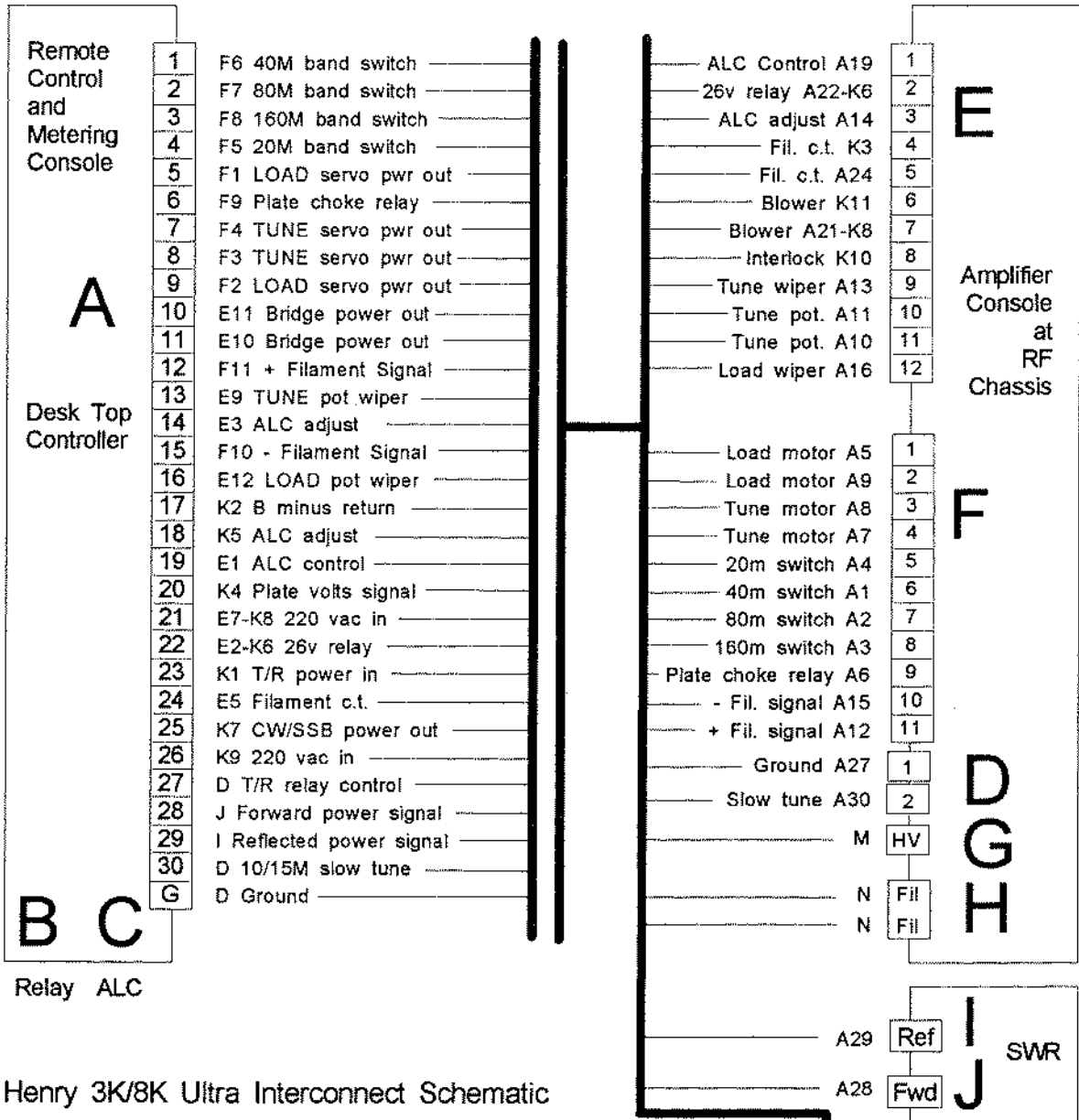
If you have questions about servicing your equipment, you should mail, fax, or e-mail your questions to:

Henry Radio
2050 South Bundy Drive
Los Angeles, CA 90025 USA
Fax: 310-826-7790
e-mail: henryradio@earthlink.net

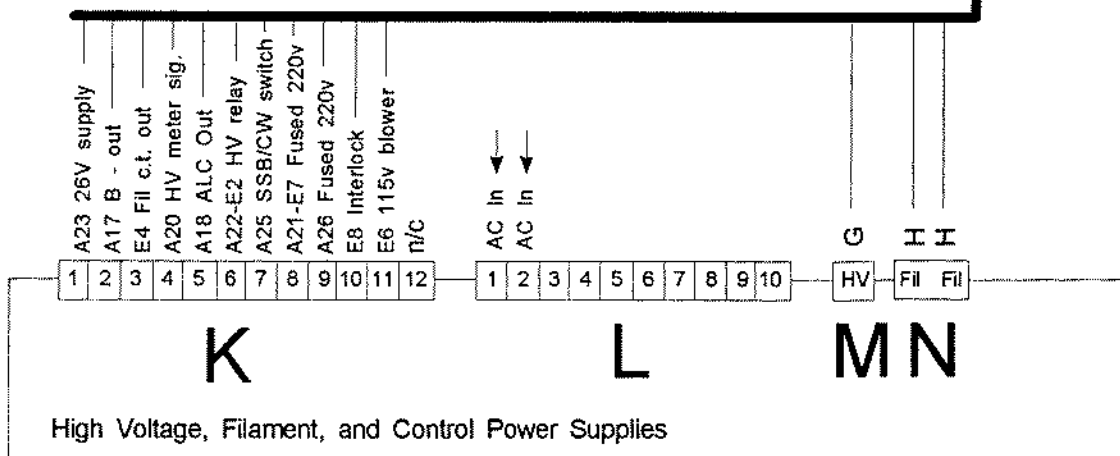
Should it ever be necessary to return your amplifier to the factory for repair, please call for authorization first. Also consider the possibility of returning just the RF chassis to save transportation costs.

If you return your equipment to the factory, pack it extremely well to avoid shipping damage. Include a short description of the problem and insure the package for the replacement cost of the amplifier. Ceramic tubes may be shipped in their socket. Glass tubes should be removed for shipment. The shipping address will be given when you call for authorization.

HENRY 3K/8K ULTRA OPERATING AND MAINTENANCE MANUAL

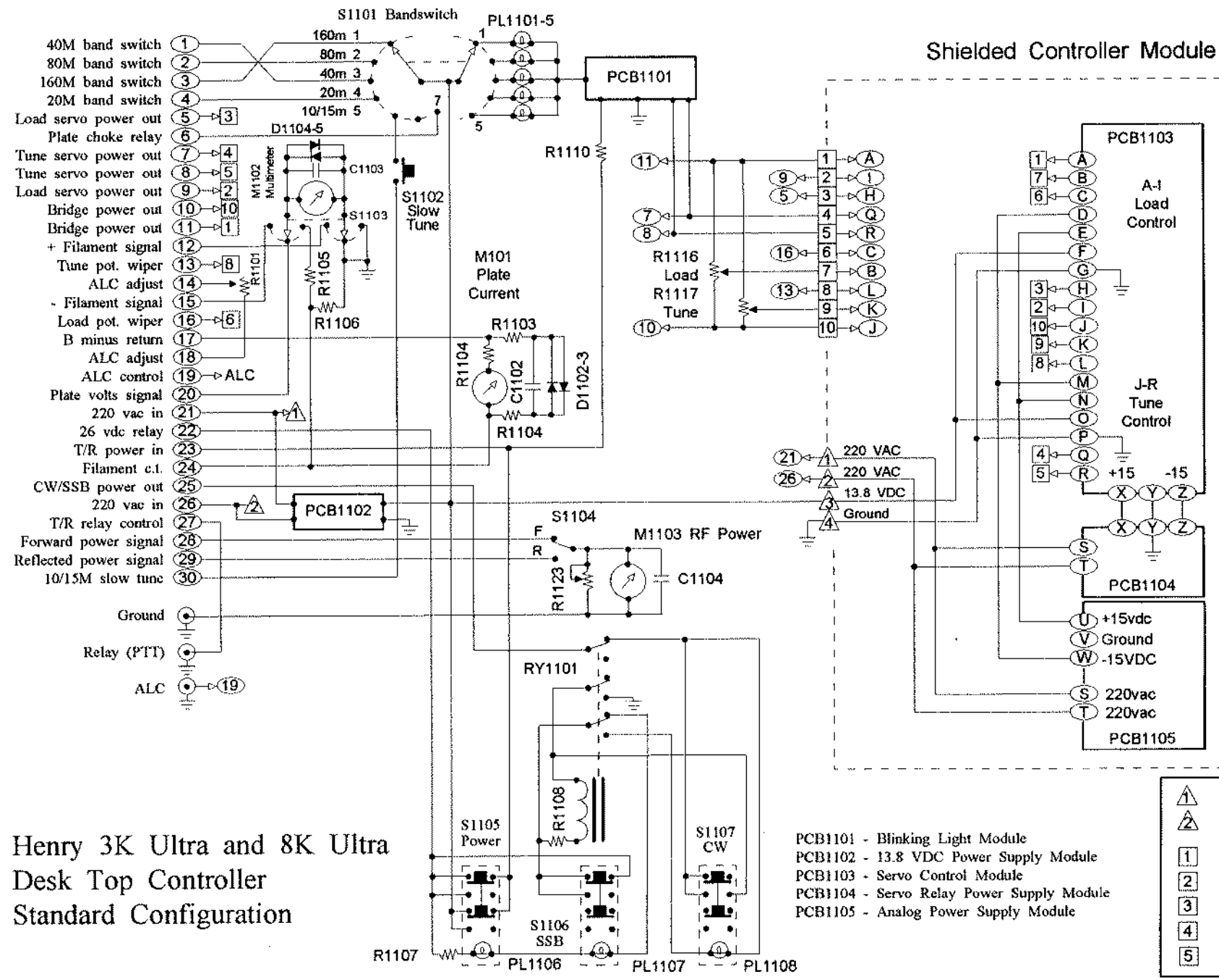


Henry 3K/8K Ultra Interconnect Schematic



Henry 3K Ultra and 8K Ultra Control Cable Pin Wiring
30 Pin Female Socket (S330CCT)

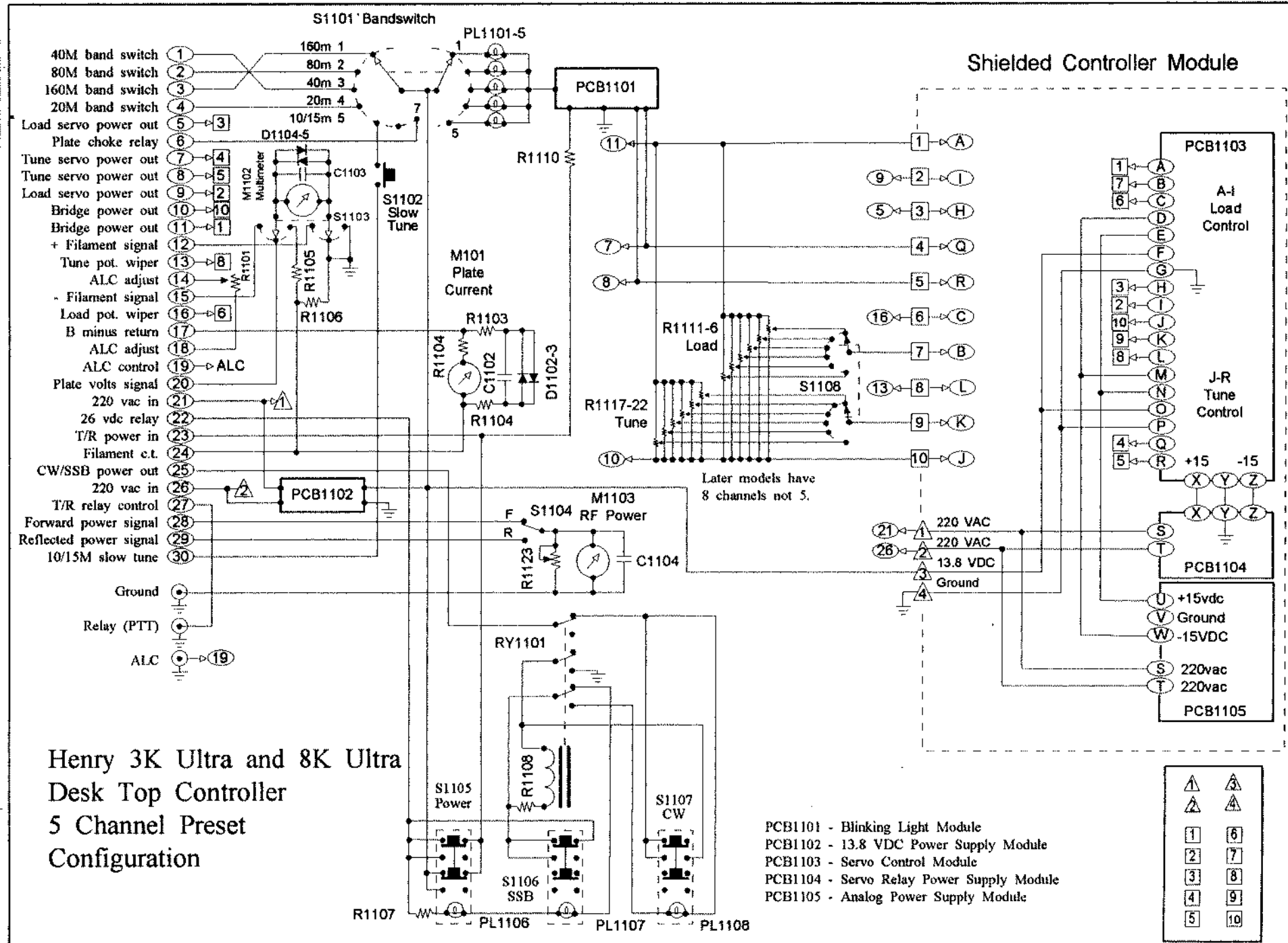
Pin Number	Color	Description
Pin 1	White/Blue	16 gauge
Pin 2	White/Violet	16 gauge
Pin 3	White/Grey	16 gauge
Pin 4	White/Black/Violet	16 gauge
Pin 5	White/Black/Grey	16 gauge
Pin 6	White/Black/Brown	16 gauge
Pin 7	White/Black/Blue	16 gauge
Pin 8	White/Brown/Red	16 gauge
Pin 9	White/Black/Red	16 gauge
Pin 10	Black Coax (conductor)	Coax
Pin 11	Black/Red Coax (conductor)	Coax
Pin 12	Blue	22 gauge
Pin 13	Black/Green Coax (conductor)	Coax
Pin 14	Green	22 gauge
Pin 15	White	22 gauge
Pin 16	Black/Yellow Coax (conductor)	Coax
Pin 17	Brown	22 gauge
Pin 18	Yellow	22 gauge
Pin 19	Orange	22 gauge
Pin 20	White/Green	22 gauge
Pin 21	White/Black/Orange	16 gauge
Pin 22	Violet	22 gauge
Pin 23	White/Brown and White/Black	22 gauge x 2
Pin 24	Black	22 gauge
Pin 25	Grey	22 gauge
Pin 26	White/Black/Yellow	16 gauge
Pin 27	White/Red	22 gauge
Pin 28	Red	22 gauge
Pin 29	White/Yellow	22 gauge
Pin 30	White/Orange	22 gauge
RCA Plug Center	White/Black/Green	16 gauge
RCA Plug Ground	White/Black + 4 coax Shields	16 gauge



Henry 3K Ultra and 8K Ultra
Desk Top Controller
Standard Configuration

- PCB1101 - Blinking Light Module
- PCB1102 - 13.8 VDC Power Supply Module
- PCB1103 - Servo Control Module
- PCB1104 - Servo Relay Power Supply Module
- PCB1105 - Analog Power Supply Module

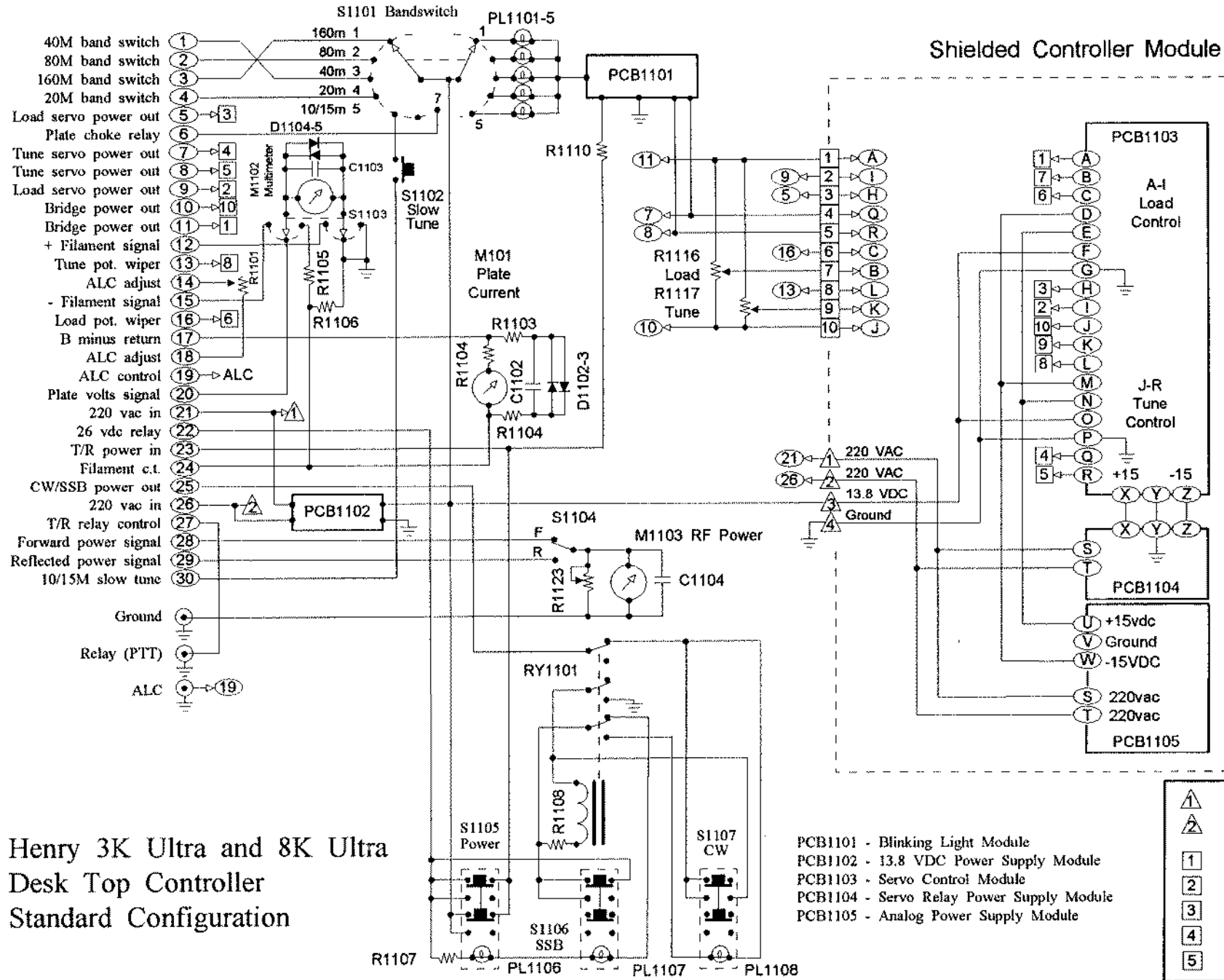
⚡	⚡
⚡	⚡
1	6
2	7
3	8
4	9
5	10



**Henry 3K Ultra and 8K Ultra
Desk Top Controller
5 Channel Preset
Configuration**

- PCB1101 - Blinking Light Module
- PCB1102 - 13.8 VDC Power Supply Module
- PCB1103 - Servo Control Module
- PCB1104 - Servo Relay Power Supply Module
- PCB1105 - Analog Power Supply Module

⚡	⚡
⚡	⚡
1	6
2	7
3	8
4	9
5	10



Henry 3K Ultra and 8K Ultra
Desk Top Controller
Standard Configuration

PCB1101 - Blinking Light Module
PCB1102 - 13.8 VDC Power Supply Module
PCB1103 - Servo Control Module
PCB1104 - Servo Relay Power Supply Module
PCB1105 - Analog Power Supply Module

HENRY 3K/8K ULTRA OPERATING AND MAINTENANCE MANUAL

Parts List for 3K Ultra Desk Top Controller

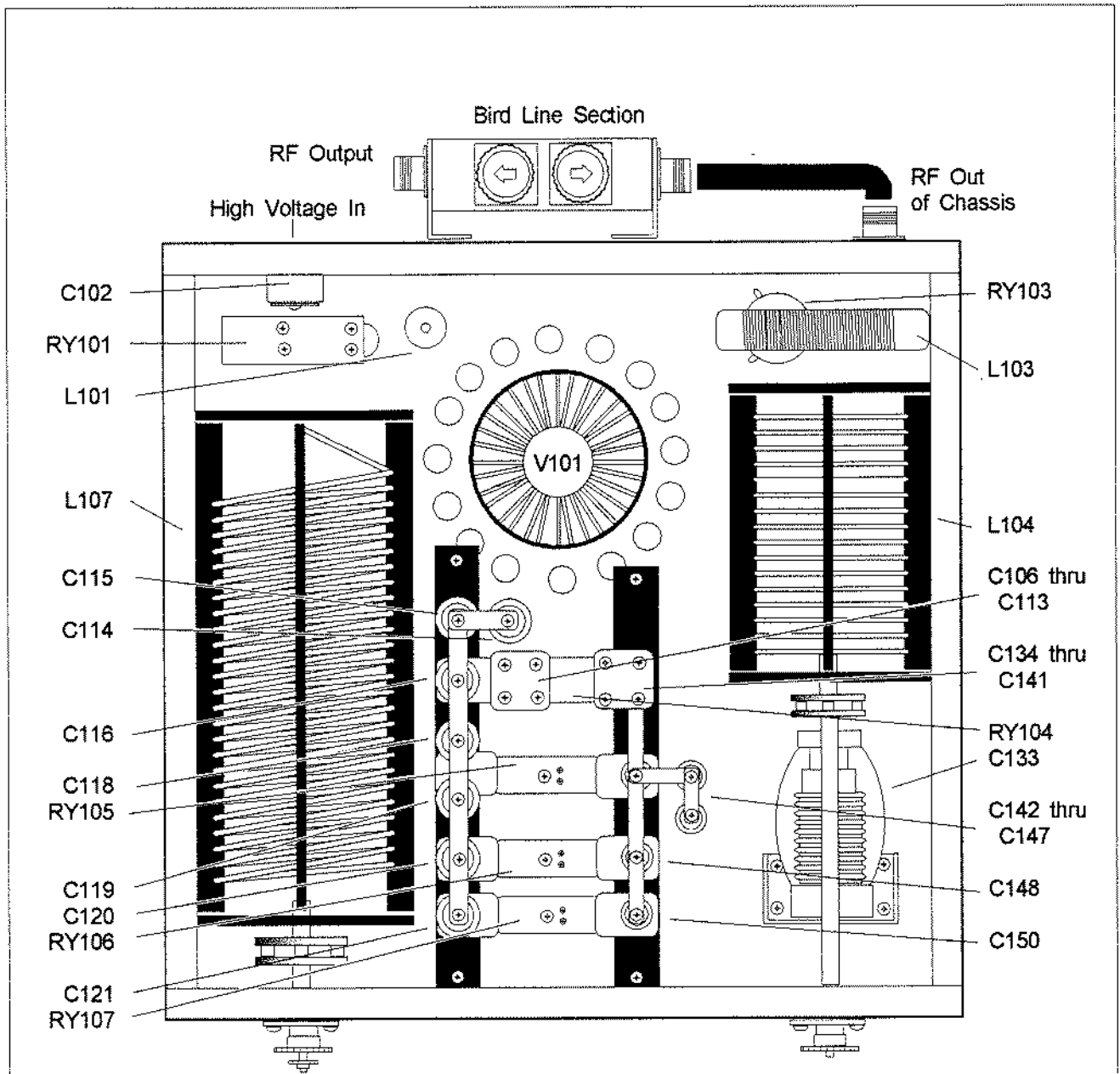
C1101-3	Capacitor: Ceramic disc, 0.1uf, 50 volt.	Centralab CK104
R1101	Potentiometer: 100K ohm, 5 watt, 5%	Resistor
R1102-3	Potentiometer: 10K ohm, 2 watt, 5%, 10T.	Resistor
R1104	Resistor: Carbon, 150 ohm, 1 watt, 5%	Resistor
R1105-6	Resistor: Carbon, 0.1 ohm, 1 watt, 5%	Resistor
R1107	Resistor: Carbon, 470 ohm, 2 watt, 5%	Resistor
R1108	Resistor: Carbon, 0.51 ohm, 1 watt, 5%	Resistor
R1110-12	Resistor: Carbon, 150 ohm, 2 watt, 5%	Resistor
S1101	Switch: Band, dual ceramic, position.	Centralab 2510/PS284
S1103	Switch: Meter, ceramic.	Centralab PA1003
S1104/PL1106	Switch: POWER light and switch.	Switchcraft L8940-125X
S1105/PL1107	Switch: SSB light and switch.	Switchcraft L8940-125X
S1106/PL1108	Switch: CW light and switch.	Switchcraft L8940-125X
S1107/PL1101	Switch: 160M light and switch.	Switchcraft L8940-125X
S1108/PL1102	Switch: 80M light and switch.	Switchcraft L8940-125X
S1109/PL1103	Switch: 40M light and switch.	Switchcraft L8940-125X
S1110/PL1104	Switch: 20M light and switch.	Switchcraft L8940-125X
S1111/PL1105	Switch: 15/10M light and switch.	Switchcraft L8940-125X
RY1101	Relay: TPDT, 12 VDC.	P&B KA14DY-12VDC
M1101	Meter: PLATE CURRENT, 0-1 ma.	Yokogawa 260300
M1102	Meter: MULTIMETER, 0-1 ma.	Yokogawa 260300
M1103	Meter: POWER, 0-30 ua.	Yokogawa 260300
PS1101	Power Supply: 7 amp, 13.8VDC, 220.	Astron Henry-7A-220
PS1102	Power Supply: +/-15 VDC IC supply.	Henry PSD15
PS1103	Assembly: Blinking light generator.	Henry 3KU-BLG
PS1104	Assembly: PEP wattmeter.	Henry 3KU-PEPWM
PS1105	Assembly: Wheatstone bridge.	Henry 3KU-WB

HENRY 3K/8K ULTRA OPERATING AND MAINTENANCE MANUAL

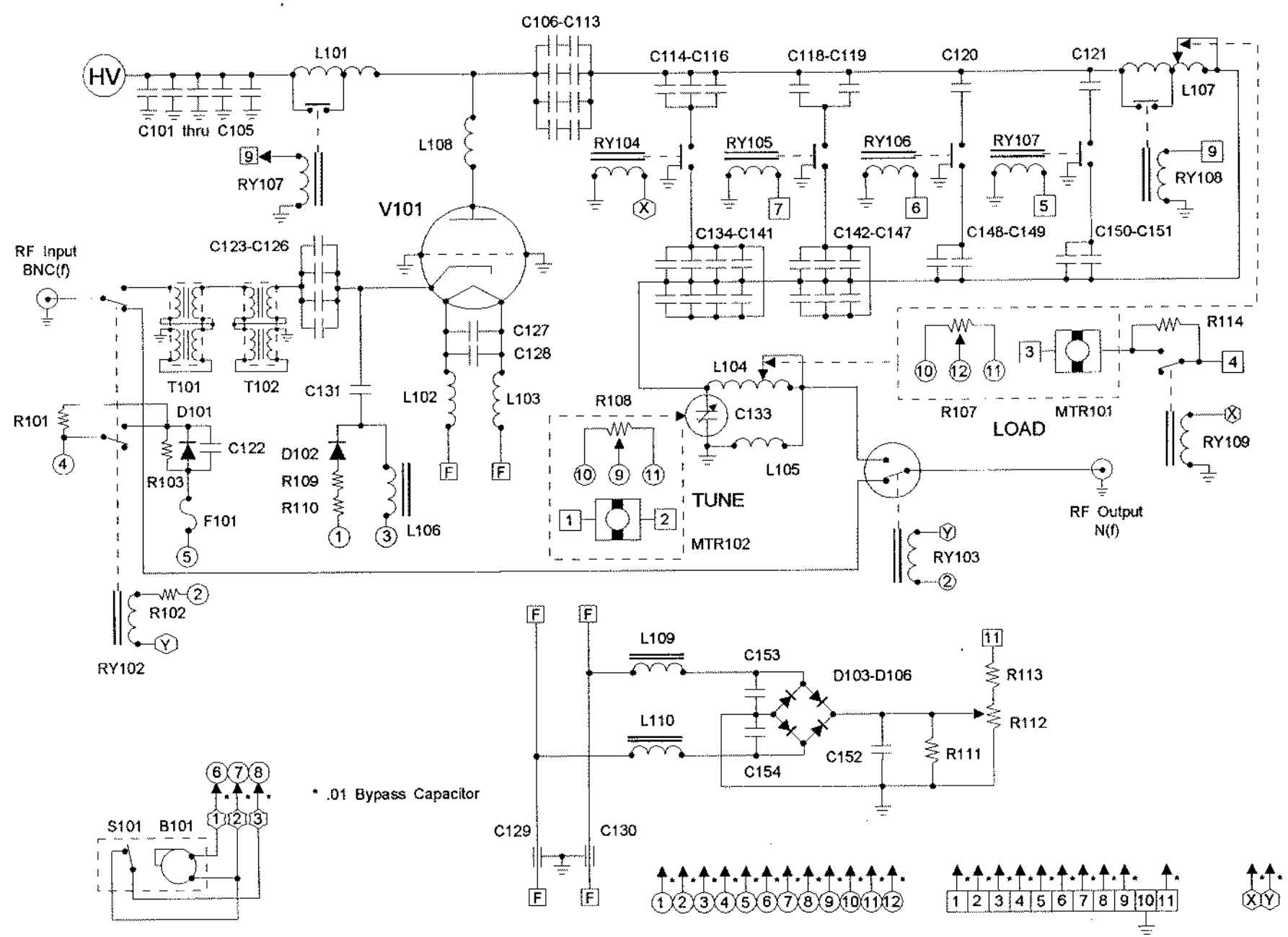
Parts List for 8K Ultra Desk Top Controller

CI101-3	Capacitor: Ceramic disc, 0.1uf, 50 volt.	Centralab CK104
RI101	Potentiometer: 100K ohm, 5 watt, 5%.	Resistor
RI102-3	Potentiometer: 10K ohm, 2 watt, 5%, 10T.	Resistor
RI104	Resistor: Carbon, 150 ohm, 1 watt, 5%.	Resistor
RI105-6	Resistor: Carbon, 0.1 ohm, 1 watt, 5%.	Resistor
RI107	Resistor: Carbon, 470 ohm, 2 watt, 5%.	Resistor
RI108	Resistor: Carbon, 0.51 ohm, 1 watt, 5%.	Resistor
RI110	Resistor: Carbon, 150 ohm, 2 watt, 5%.	Resistor
RI111-RI122	Potentiometer: 10K ohm, 2 watt, 5%, 10T.	Resistor
S1101	Switch: Band, dual ceramic, position.	Centralab 2510/PS284
S1102	Switch: Slow tune.	Switchcraft L8940-125X
S1103	Switch: Meter, phenolic.	Centralab PA1003
S1104	Switch: FWD/REF power switch.	Toggle switch
S1105/PL1106	Switch: POWER light and switch.	Switchcraft L8940-125X
S1106/PL1107	Switch: SSB light and switch.	Switchcraft L8940-125X
S1107/PL1108	Switch: CW light and switch.	Switchcraft L8940-125X
PL1101	Switch: 160M light and switch.	Switchcraft L8940-125X
PL1102	Switch: 80M light and switch.	Switchcraft L8940-125X
PL1103	Switch: 40M light and switch.	Switchcraft L8940-125X
PL1104	Switch: 20M light and switch.	Switchcraft L8940-125X
PL1105	Switch: 15/10M light and switch.	Switchcraft L8940-125X
RY1101	Relay: TPDT, 12 VDC.	P&B KA14DY-12VDC
M1101	Meter: PLATE CURRENT, 0-1 ma.	Yokogawa 260300
M1102	Meter: MULTIMETER, 0-1 ma.	Yokogawa 260300
M1103	Meter: POWER, 0-30 ua.	Yokogawa 260300
PS1101	Power Supply: 7 amp, 13.8VDC, 220.	Astron Henry-7A-220
PS1102	Power Supply: +/-15 VDC IC supply.	Henry PSD15
PS1103	Assembly: Blinking light generator.	Henry 3KU-BLG
PS1104	Assembly: PEP wattmeter.	Henry 3KU-PEPWM
PS1105	Assembly: Wheatstone bridge.	Henry 3KU-WB

Henry 3K Ultra RF Deck Schematics and Parts List



Henry 3K Ultra RF Chassis Layout



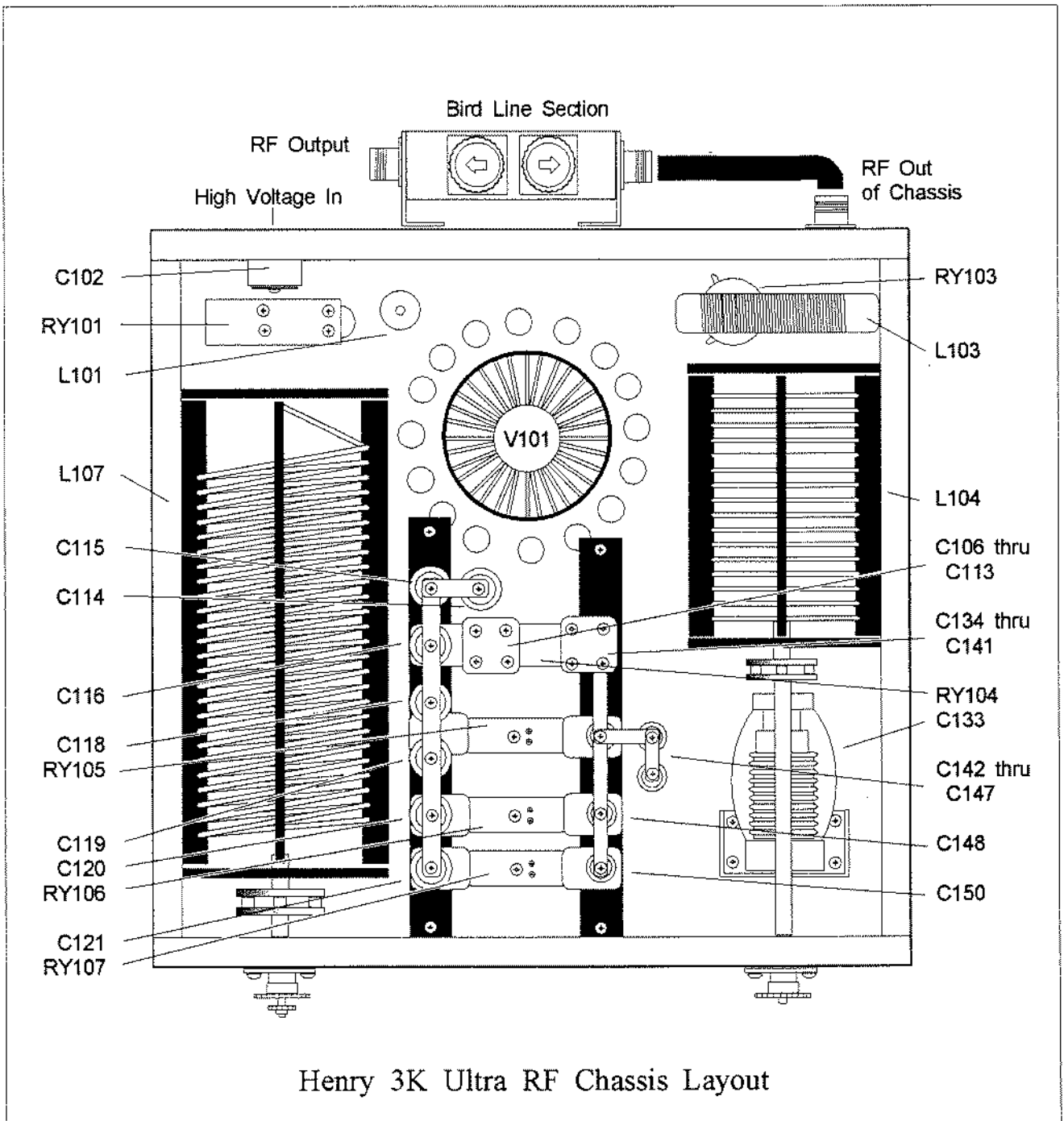
3K Ultra RF Deck Schematic

HENRY 3K/8K ULTRA OPERATING AND MAINTENANCE MANUAL

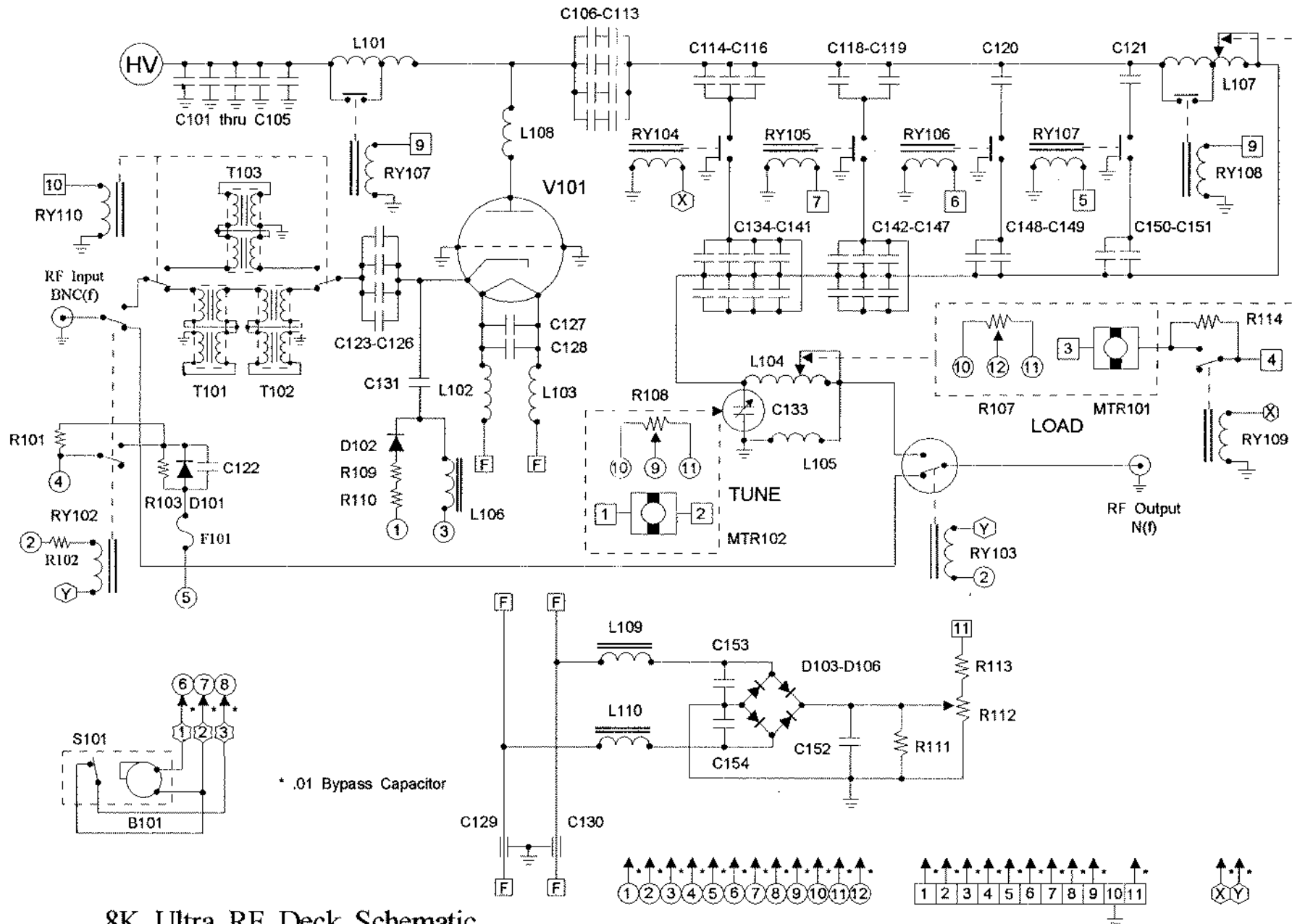
Parts List for 3K Ultra RF Chassis

B101	Blower: 230vac, 50/60 Hz, squirrel cage.	Dayton 2C915A
C101, C104, C105	Capacitor: Ceramic disc, .0047 uf, 6kvdc.	Sprague 60GAD47
C102-3	Capacitor: Bypass, 500 pf, 20kvdc.	Sprague 20DKT5
C106-13	Capacitor: Ceramic, 1000 pf, 7.5kvdc.	HEC HH50v102MA
C114-16, C119, C120	Capacitor: Ceramic, 100 pf, 15kvdc.	HEC HT57Y101MA
C118	Capacitor: Ceramic, 50 pf, 15kvdc.	HEC HT57Y500MA
C121	Capacitor: Ceramic, 25 pf, 7.5kvdc.	HEC HT50V250MA
C122-28	Capacitor: Ceramic disc, .01 mf, 1kvdc.	Centralab DDI03
C129-30	Capacitor: Feedthrough, .5mf, 50vdc, 60 amp.	NWL 907-245301
C131-2, C153-4	Capacitor: Ceramic disc, .01mf, 1kvdc.	Centralab DD103
C133	Capacitor: Vacuum variable, 465 pf, 5kvdc.	Jennings USLS465-5D
C134-48	Capacitor: Ceramic, 100 pf, 7.5kvdc.	HEC HT50V101MA
C150	Capacitor: Ceramic, 50 pf, 7.5kvdc.	HEC HT50V500MA
C152	Capacitor: Electrolytic, 10 mf, 16vdc.	CDE WBR10-16
D101	Diode: Cathode bias.	EMI 12105408
D102	Diode: Rectifier, 200piv, 1 amp.	1N458
D103-6	Diode: Rectifier, 1000piv, 1 amp.	1N4007
F101	Fuse: 8AG, 1.5 amp, 250vac.	Littelfuse 361-001.5
	Fuseholder: 8AG type.	Littelfuse 372-001A
L101	Choke: Plate, center tapped.	Henry 3KU-L101
L102-3	Choke: Filament.	Henry 3KU-L02
L104	Inductor: Roller, output L network.	Henry 3KU-L104
L106, L109, L110	Choke: RF.	Miller 6302
L107	Inductor: Roller, lare, Output Pi network.	Henry 3KU-L107
L108	Choke: Parasitic suppressor.	Henry 3KU-L108
MTR101	Motor: Gear motor for loading capacitor C133.	Dayton 4Z837
MTR102	Motor: Gear motor for roller inductor L104-7.	Dayton 4Z835
R101	Resistor: Wirewound, 10K ohm, 10 watt, 5%.	Resistor
R102	Resistor: Carbon, 130 ohm, 2 watt, 10%.	Resistor
R103	Resistor: Carbon, 220 ohm, 2 watt, 10%.	Resistor
R107-8	Resistor: Precision, 150 ohm, 5 watt, 1%.	Resistor
R109	Resistor: Carbon, 1K ohm, 1 watt 5%.	Resistor
R110	Resistor: Carbon, 68 ohm, 1 watt, 5%.	Resistor
R111	Resistor: Carbon, 2.2K ohm, 1 watt, 5%.	Resistor
R112	Resistor: Potentiometer, 2.5K ohm, 5 watt, 5%.	Resistor
R113	Resistor: Carbon, 220 ohm, 1/2 watt, 10%.	Resistor
R114	Resistor: Wirewound, 10 ohm, 25 watt, 5%.	Resistor
RY101	Relay: DPST, solenoid, 26vdc.	Henry 3KU-RY101
RY102	Relay: DPDT, 12 vdc.	Guardian 1365PC
RY103	Relay: SPDT vacuum relay, 26 vdc.	Jennings R2B
RY104-8	Relay: DPST, solenoid, 26vdc.	Henry 3KU-RY104
RY109	Relay: SPDT, 12 vdc.	P&B KA5DY-12vdc
S101	Switch: Air flow.	Henry 3KU-S101
VI01	Electron Tube: Ceramic/metal power grid triode.	3CX1200D7
	Socket: Ceramic	Johnson 122-0275-001
	Chimney: Teflon.	Henry 3KU-Chimney
T101-2	Transformer: Input match, unum type 1:1.56.	Henry 3KU-T101

Henry 3K Ultra RF Deck Schematics and Parts List



Henry 3K Ultra RF Chassis Layout



8K Ultra RF Deck Schematic

* .01 Bypass Capacitor

HENRY 3K/8K ULTRA OPERATING AND MAINTENANCE MANUAL

Parts List for 8K Ultra RF Chassis

B101	Blower: 230vac, 50/60 Hz, squirrel cage.	Dayton 2C915A
C101, C104, C105	Capacitor: Ceramic disc, .0047 uf, 6kvdc.	Sprague 60GAD47
C102-3	Capacitor: Bypass, 500 pf, 20kvdc.	Sprague 20DKT5
C106-13	Capacitor: Ceramic, 1000 pf, 7.5kvdc.	HEC HH50v102MA
C114, C120	Capacitor: Ceramic, 50 pf, 15kvdc.	HEC HT57Y500MA
C115, C118	Capacitor: Ceramic, 100 pf, 15kvdc.	HEC HT57Y101MA
C116	Capacitor: Ceramic, 200 pf, 7.5kvdc.	HEC HT57Y201MA
C121	Capacitor: Ceramic, 25 pf, 7.5kvdc.	HEC HT50V250MA
C122-28	Capacitor: Ceramic disc, .01 mf, 1kvdc.	Centralab DD103
C129-30	Capacitor: Feedthrough, .5mf, 50vdc, 60 amp.	NWL 907-245301
C131-2, C153-4	Capacitor: Ceramic disc, .01mf, 1kvdc.	Centralab DD103
C133	Capacitor: Vacuum variable, 465 pf, 5kvdc.	Jennings USLS465-5D
C134-45, C148, C150	Capacitor: Ceramic, 100 pf, 7.5kvdc.	HEC HT50V101MA
C146	Capacitor: Ceramic, 50 pf, 7.5kvdc.	HEC HT50V500MA
C152	Capacitor: Electrolytic, 10 mf, 16vdc.	CDE WBR10-16
D101	Diode: Cathode bias.	EMI 12105408
D102	Diode: Rectifier, 200piv, 1 amp.	1N458
D103-6	Diode: Rectifier, 1000piv, 1 amp.	1N4007
F101	Fuse: 8AG, 1.5 amp, 250vac.	Littelfuse 361-001.5
	Fuseholder: 8AG type.	Littelfuse 372-001A
L101	Choke: Plate, center tapped.	Henry 8KU-L101
L102-3	Choke: Filament.	Henry 8KU-L02
L104	Inductor: Roller, output L network.	Henry 8KU-L104
L105	Choke: Output choke.	Miller RFC28
L106, L109, L110	Choke: RF.	Miller 6302
L107	Inductor: Roller, large, Output Pi network.	Henry 8KU-L107
L108	Choke: Parasitic suppressor.	Henry 8KU-L108
MTR101	Motor: Gear motor for loading capacitor C133.	Dayton 4Z837
MTR102	Motor: Gear motor for roller inductor L104-7.	Dayton 4Z835
R101	Resistor: Wirewound, 10K ohm, 10 watt, 5%.	Resistor
R102	Resistor: Carbon, 130 ohm, 2 watt, 10%.	Resistor
R103	Resistor: Carbon, 220 ohm, 2 watt, 10%.	Resistor
R107-8	Resistor: Potentiometer, 10K ohm, 10T, 2 watt, 5%.	Resistor
R109	Resistor: Carbon, 1K ohm, 1 watt 5%.	Resistor
R110	Resistor: Carbon, 68 ohm, 1 watt, 5%.	Resistor
R111	Resistor: Carbon, 2.2K ohm, 1 watt, 5%.	Resistor
R112	Resistor: Potentiometer, 2.5K ohm, 5 watt, 5%.	Resistor
R113	Resistor: Carbon, 220 ohm, 1/2 watt, 10%.	Resistor
R114	Resistor: Wirewound, 10 ohm, 25 watt, 5%.	Resistor
RY101	Relay: DPST, solenoid, 26vdc.	Henry 8KU-RY101
RY102	Relay: DPDT, 12 vdc.	Guardian 1365PC
RY103	Relay: SPDT vacuum relay, 26 vdc.	Jennings R2B
RY104-8	Relay: DPST, solenoid, 26vdc.	Henry 8KU-RY104
RY109	Relay: SPDT, 12 vdc.	P&B KA5DY-12vdc
S101	Switch: Air flow.	Henry 3KU-S101
V101	Electron Tube: Ceramic/metal power grid triode.	3CX3000A7
	Socket: Ceramic	Henry 3CX3000A7 Sekt
	Chimney: Teflon.	Henry 8KU-Chimney
T101-2	Transformer: Input match, unum type 1:1.56.	Henry 8KU-T101

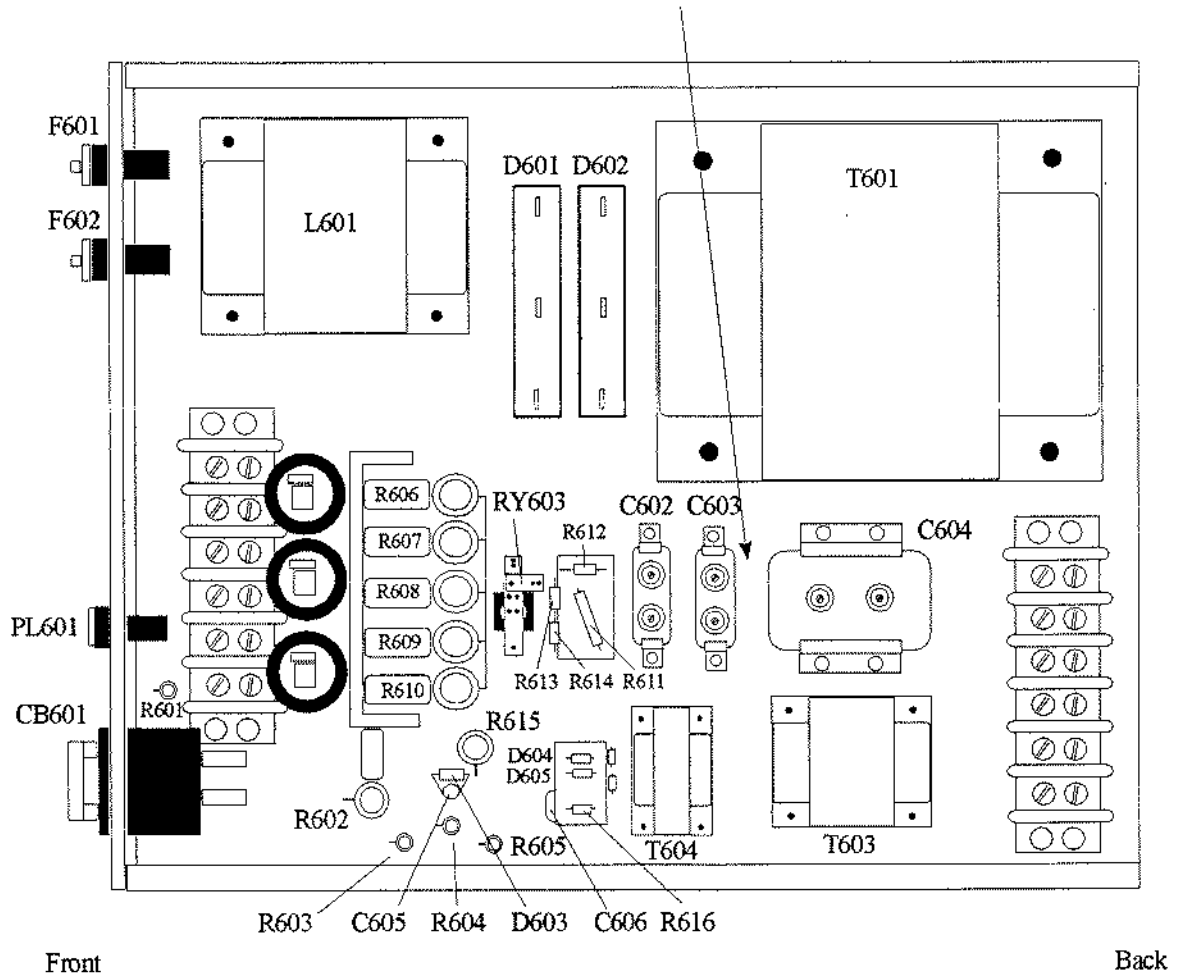
HENRY 3K/8K ULTRA OPERATING AND MAINTENANCE MANUAL

Parts List for 3K Ultra Power Supply

T601	Transformer: HV, 4500VAC/230VAC, 1 ph.	ECA 1214A
T602	Transformer: Stepdown, 220/110 VAC	ECA 1347
T603	Transformer: Filament.	ECA 1228
T604	Transformer: Relay Supply.	ECA 1188
L601	Choke: HV filter.	ECA 5020
C601 (60 Hz)	Capacitor: Oil filled, 0.2uf, 15kv.	High Energy CC610
C601 (50 Hz)	Capacitor: Oil filled, 0.3uf, 15kv.	High Energy CC621
C604	Capacitor: Oil filled, 16uf, 7.5kv.	High Energy CC634
C605	Capacitor: Ceramic disc, 0.05uf, 16v.	Centralab UK16-503
C606	Capacitor: Electrolytic, 1000uf, 50v.	Capacitor
CB601	Circuit Breaker: 40 amps, 250 VAC.	Heinemann AM2-A3-A40
F601-2	Fuse: 3AG type, 6 amps, 250 VAC.	Littelfuse 312-006
	Fuseholder: 3AG type, indicating.	Littelfuse 344-250
RY601	Contact: Mercury, 480 VAC, 35 amp.	MDI 235NO12D
RY602	Contact: Mercury, delay relay, 0.5 sec.	MDI SP1072
RY603	Solenoid: SSB/CW HV select.	Henry 3KU-RY603
PL601	Pilot Light: AC Mains.	Switchcraft L8940-1255
R602	Resistor: Wirewound, 50 ohm, 100 watt, 5%	Resistor
R603	Resistor: Wirewound, 25 ohm, 10 watt, 5%	Resistor
R604	Resistor: Wirewound, 75 ohm, 10 watt, 5%	Resistor
R605	Resistor: Wirewound, 12 ohm, 10 watt, 5%	Resistor
R606-10	Resistor: Wirewound, 20K ohm, 100 watt, 5%	Resistor
R611	Resistor: Precision, 10M ohm, 7.5 watt, 1%	Resistor
R612	Resistor: Carbon, 10K ohm, 2 watt, 5%	Resistor
R613-14	Resistor: Carbon, 470K ohm, 2 watt, 5%	Resistor
R615	Resistor: Wirewound, 25 ohm, 25 watt, 5%	Resistor
R616	Resistor: Carbon, 470 ohm, 2 watt, 5%	Resistor
D601-2	Diode: HV rectifier, 15K VDC, 3 amp.	EMI 120257
D603	Diode: Rectifier, 1000 PIV, 3 amp.	Motorola 1N4720
D604-7	Diode: Rectifier, 1000 PIV, 1 amp.	Motorola 1N4004

Henry 3K Ultra Power Supply Schematics and Parts List

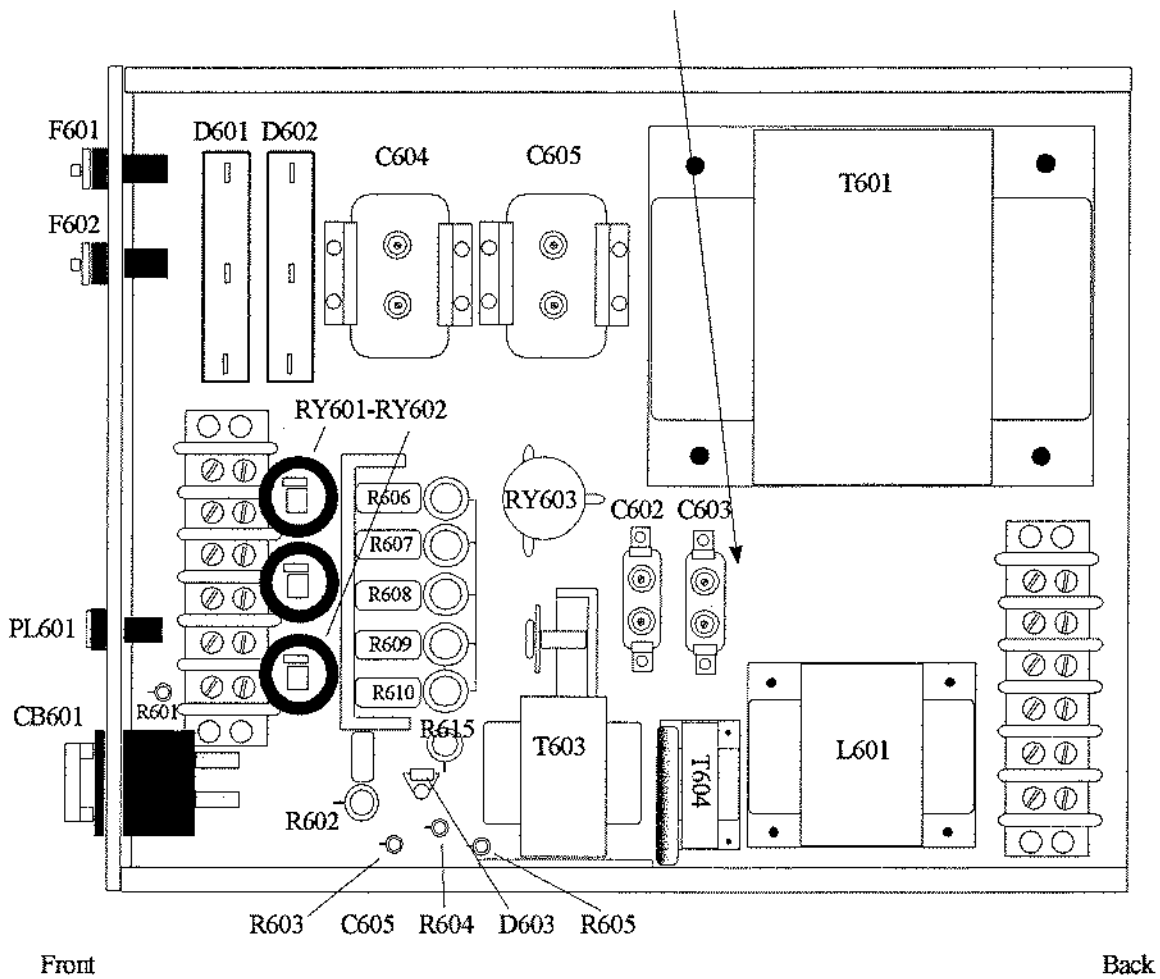
Note: There is an extra capacitor (C601)
for 50 Hz power supplies.



Henry 3K Ultra Power Supply Layout 60 Hz Single Phase

Henry 8K Ultra Power Supply Schematics and Parts List

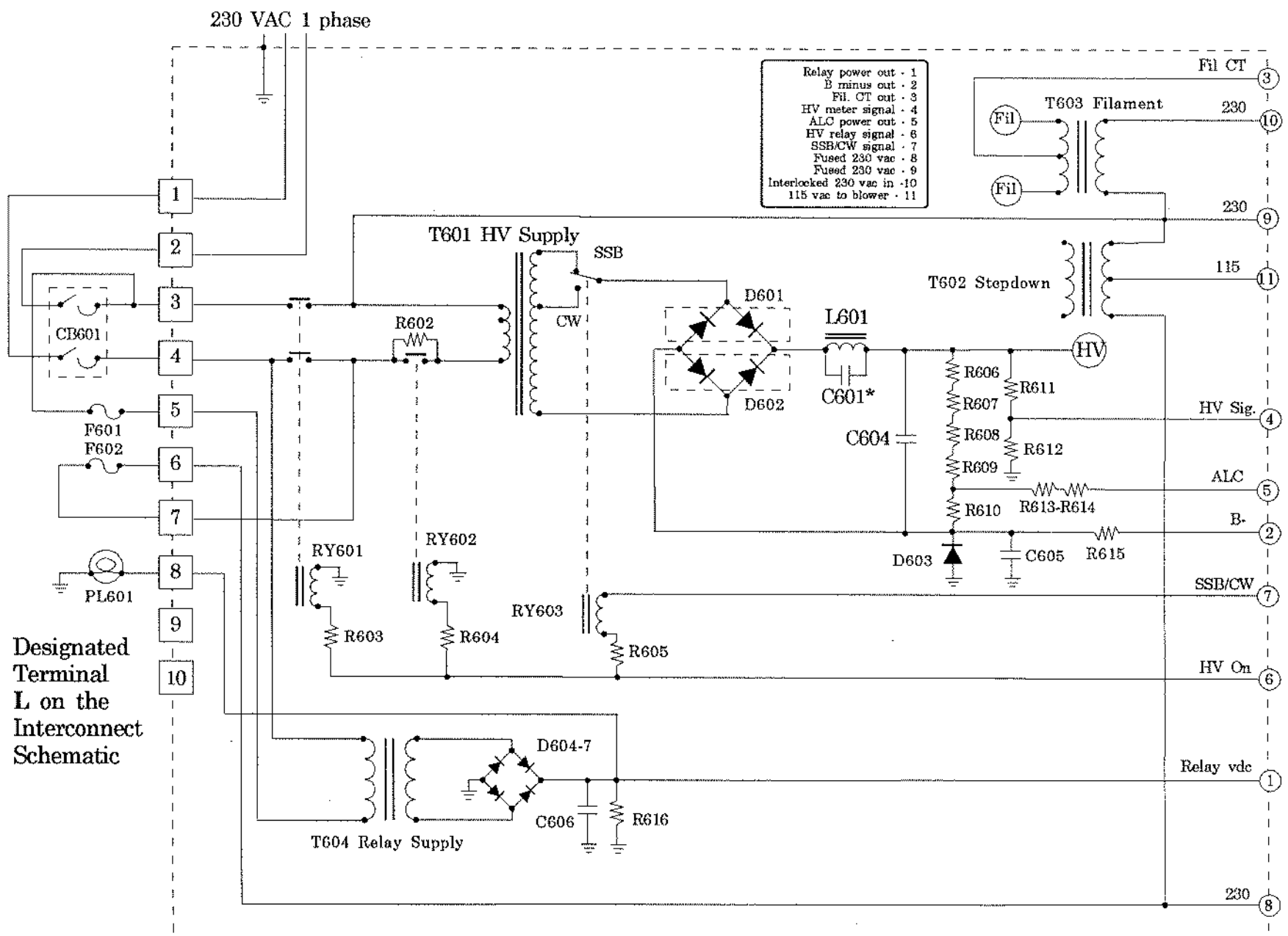
Note: There is an extra capacitor (C601)
for 50 Hz power supplies.



Henry 3K Ultra Power Supply Layout 60 Hz Single Phase

See terminal K on Interconnection Schematic for Connection Details

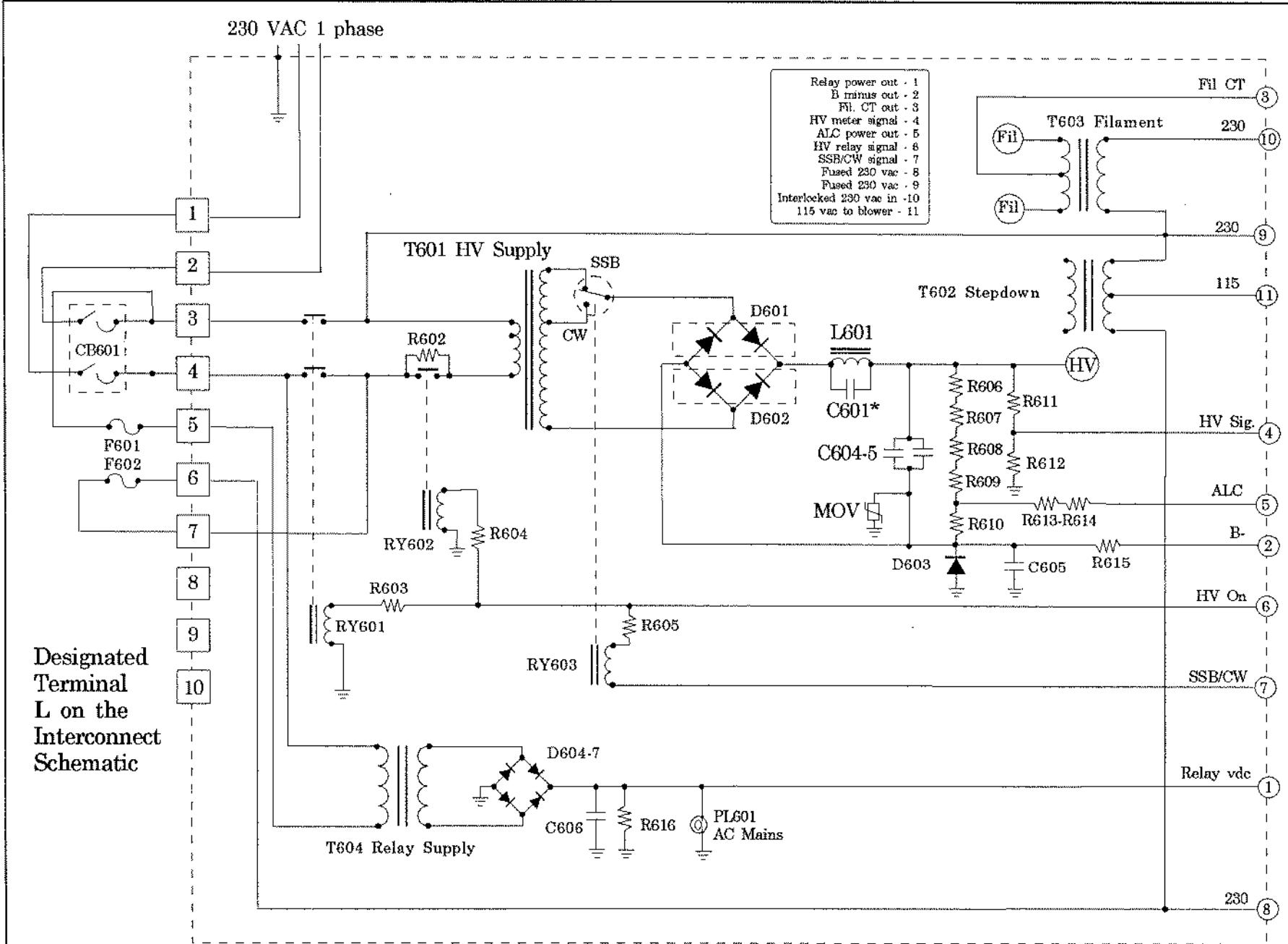
- Relay power out - 1
- B minus out - 2
- Fil. CT out - 3
- HV meter signal - 4
- ALC power out - 5
- HV relay signal - 6
- SSB/CW signal - 7
- Fused 230 vac - 8
- Fused 230 vac - 9
- Interlocked 230 vac in - 10
- 115 vac to blower - 11



3K Ultra Power Supply Schematic (1 Phase)

* C601 - .02 mf (60 Hz), .03 mf (50 Hz).

See terminal K on Interconnection Schematic for Connection Details



8K Ultra Power Supply Schematic (1 Phase)

* C601 - .02 mf (60 Hz), .03 mf (50 Hz).

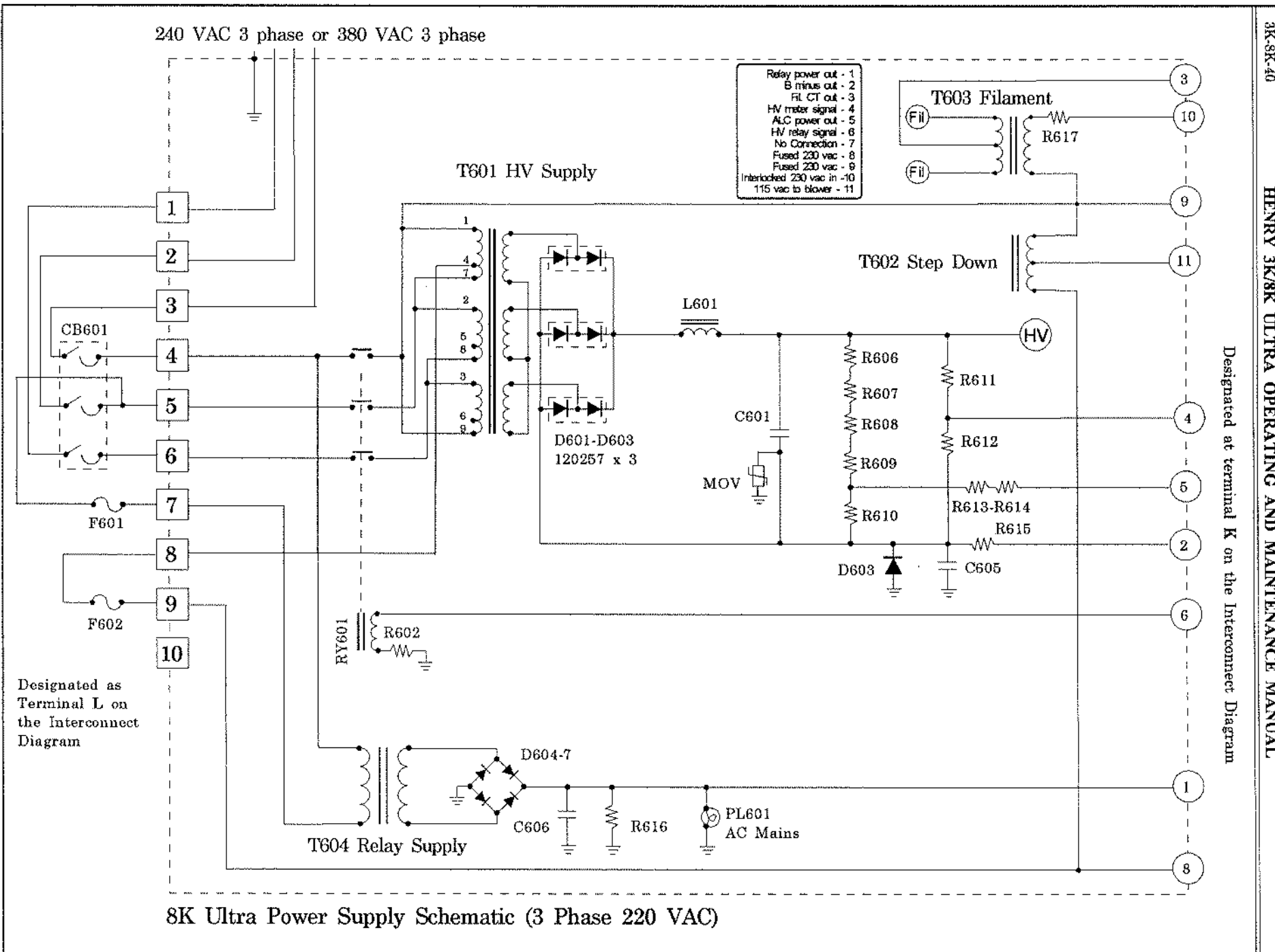
Parts List for 8K Ultra Power Supply

C601-3	Capacitor: Oil filled, .1 mf, 7.5kv.	Plastic Cap. LK80-104
C604-5	Capacitor: Oil filled, 16 mf, 7.5kv.	Aerovox BX15D8
C606	Capacitor: Ceramic disc, .05 mf, 16vdc.	Centralab UK16-503Arco
C607	Capacitor: Electrolytic, 470 mf, 50vdc.	ME470-50
CB601	Circuit Breaker: 40 amp, 250vac.	Heinemann AM2-A3-A40
D601-2	Diode: HV rectifier, 15kvdc, 3 amp.	EMI 120257
D603	Diode: Rectifier, 100piv, 3 amp.	Motorola 1N4720
D604-7	Diode: Rectifier, 1000piv, 1 amp.	GE 509
F601-2	Fuse: 3AG, 6 amp, 250vac.	Littelfuse 312-006
	Fuseholder: 3AG type, indicating.	Littelfuse 344-250A
L601	Choke: HV filter choke.	ECA 5020
PL601	Pilot Light: AC Mains.	Switchcraft L8940-1255
R601	Resistor: Wirewound, 2.5K ohm, 25 watt, 5%	Resistor
R602	Resistor: Wirewound, 50 ohm, 100 watt, 5%	Resistor
R603	Resistor: Wirewound, 25 ohm, 10 watt, 5%	Resistor
R604	Resistor: Wirewound, 75 ohm, 10 watt, 5%	Resistor
R605	Resistor: Wirewound, 12 ohm, 10 watt 5%	Resistor
R606-10	Resistor: Wirewound, 20K ohm, 100 watt, 5%	Resistor
R611	Resistor: Precision, 10M ohm, 7.5 watt, 1%	Resistor
R612	Resistor: Carbon, 10K ohm, 2 watt, 5%	Resistor
R613-4	Resistor: Carbon, 470K ohm, 2 watt, 5%	Resistor
R615	Resistor: Wirewound, 25 ohm, 25 watt, 5%	Resistor
R616	Resistor: Carbon, 470 ohm, 2 watt, 5%	Resistor
RY601	Relay: Mercury contactor, 35amp, 12vdc coil.	MDI 235NO12
RY602	Relay: Mercury flow, .5 second delay relay.	MDI SP1072
RY603	Relay: SSB/CW HV switch.	Jennings RE6B
T601	Transformer: HV, single phase, 6000v/230v.	ECA 1504
T602	Transformer: Blower supply, 230vac/115vac.	ECA 1347
T603	Transformer: Filament, 230vac/7.5vac.	ECA 1102A
T604	Transformer: Relay Supply.	ECA 1188

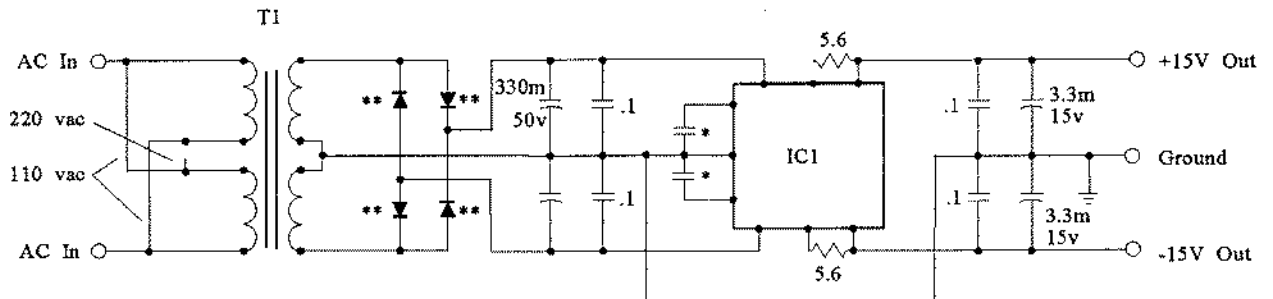
Parts List for 8K Ultra Power Supply (3 Ph)

C601	Capacitor: Oil filled, 16 mf, 7.5kv.	Aerovox BX15D8
C602	Capacitor: Ceramic disc, .05 mf, 16vdc.	Centralab UK16-503Arco
C603	Capacitor: Electrolytic, 470 mf, 50vdc.	ME470-50
CB601	Circuit Breaker: 40 amp, 250vac.	P&B W92X11-2-40
D601-3	Diode: HV rectifier, 15kvdc, 3 amp.	EMI 120257
D604	Diode: Rectifier, 100piv, 3 amp.	Motorola 1N4720
D605-8	Diode: Rectifier, 1000piv, 1 amp.	GE 509
F601-2	Fuse: 3AG, 6 amp, 250vac. Fuseholder: 3AG type, indicating.	Littelfuse 312-006 Littelfuse 344-250A
L601	Choke: HV filter choke.	ECA 5016
PL601	Pilot Light: AC Mains.	Switchcraft L8940-1255
R601	Resistor: Wirewound, 2.5K ohm, 25 watt, 5%	Resistor
R602	Resistor: Wirewound, 50 ohm, 100 watt, 5%	Resistor
R603	Resistor: Wirewound, 25 ohm, 10 watt, 5%	Resistor
R604	Resistor: Wirewound, 75 ohm, 10 watt, 5%	Resistor
R605	Resistor: Wirewound, 12 ohm, 10 watt 5%	Resistor
R606-10	Resistor: Wirewound, 20K ohm, 100 watt, 5%	Resistor
R611	Resistor: Precision, 10M ohm, 7.5 watt, 1%	Resistor
R612	Resistor: Carbon, 10K ohm, 2 watt, 5%	Resistor
R613-4	Resistor: Carbon, 470K ohm, 2 watt, 5%	Resistor
R615	Resistor: Wirewound, 25 ohm, 25 watt, 5%	Resistor
R616	Resistor: Carbon, 470 ohm, 2 watt, 5%	Resistor
RY601	Relay: Mercury contactor, 35amp, 12vdc coil.	MDI 335NO12
T601	Transformer: HV, three phase, 6000v/230v.	ECA 26077
T602	Transformer: Blower supply, 230vac/115vac.	ECA 1347
T603	Transformer: Filament, 230vac/7.5vac.	ECA 1102A
T604	Transformer: Relay Supply.	ECA 1188
T605	Transformer: Stepdown, 380/230.	ECA 1501

Designated at terminal K on the Interconnect Diagram

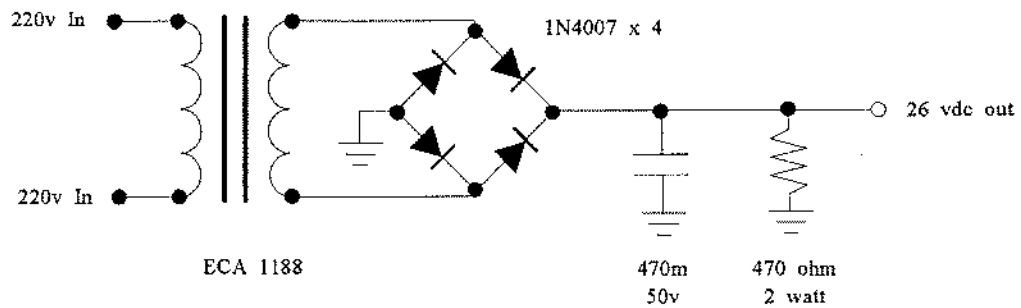


Henry PCB1104 Wheatstone Bridge Servo Motor Controller Power Supply



* = 0.0015 mf
** = 1N4004

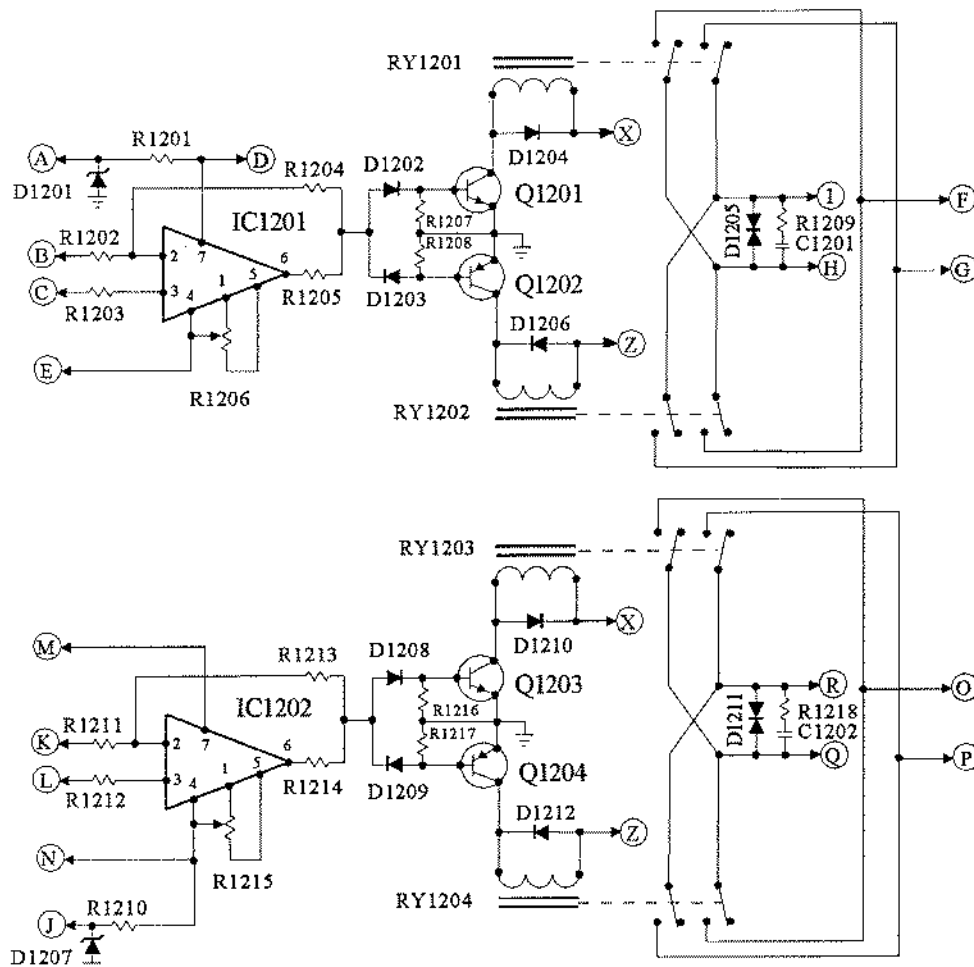
Henry PCB1105 26v Relay Supply



+Bridge Power (A) →
 Load Control Pot. (B) →
 Load Motor Pot. (C) →
 +15 VDC (D) →
 -15 VDC (E) →
 +13.8 VDC (F) →
 Ground (G) →
 Load Motor Power (H) →
 Load Motor Power (I) →

- Bridge Power (J) →
 Tune Control Pot. (K) →
 Tune Motor Pot. (L) →
 +15 VDC (M) →
 -15 VDC (N) →
 +13.8 VDC (O) →
 Ground (P) →
 Tune Motor Power (Q) →
 Tune Motor Power (R) →

+15 VDC (X) →
 Ground (Y) →
 -15 VDC (Z) →



Henry PCB1104 Wheatstone Bridge Servo Motor Controller

C1201, C1202

Capacitor: Ceramic disc, 0.22uf, 400v.

Sprague

R1201, R1210
 R1202-3, R1211-2
 R1204, R1213
 R1205, R1214
 R1206, R1215
 R1207-8, R1216-17
 R1209, R1219

Resistor: Carbon, 150 ohm, 1/4 watt, 5%.
 Resistor: Carbon, 2K ohm, 1/4 watt, 5%.
 Resistor: Carbon, 499K ohm, 1/4 watt, 5%.
 Resistor: Carbon, 2K ohm, 1/4 watt, 5%.
 Potentiometer: 10K ohm, 1/4 watt, 5%.
 Resistor: Carbon, 10K ohm, 1/4 watt, 5%.
 Resistor: Wirewound, 10 ohm, 5 watt, 5%.

Resistor
 Resistor
 Resistor
 Resistor
 Potentiometer
 Resistor
 Resistor

D1201, D1207
 D1202-3, D1208-9
 D1204, D1206, D1210, D1212
 D1205, D1211
 Q1201, Q1203
 Q1202, Q1204
 IC1201-2

Diode: Zener, 8.2 volt regulator.
 Diode: Rectifier, 1000 PIV, 2 amp.
 Diode: Rectifier, 1000 PIV, 1 amp.
 Varistor: Metal oxide, 130 volt.
 Transistor: Bipolar, NPN.
 Transistor: Bipolar, PNP.
 IC: Op-amp.

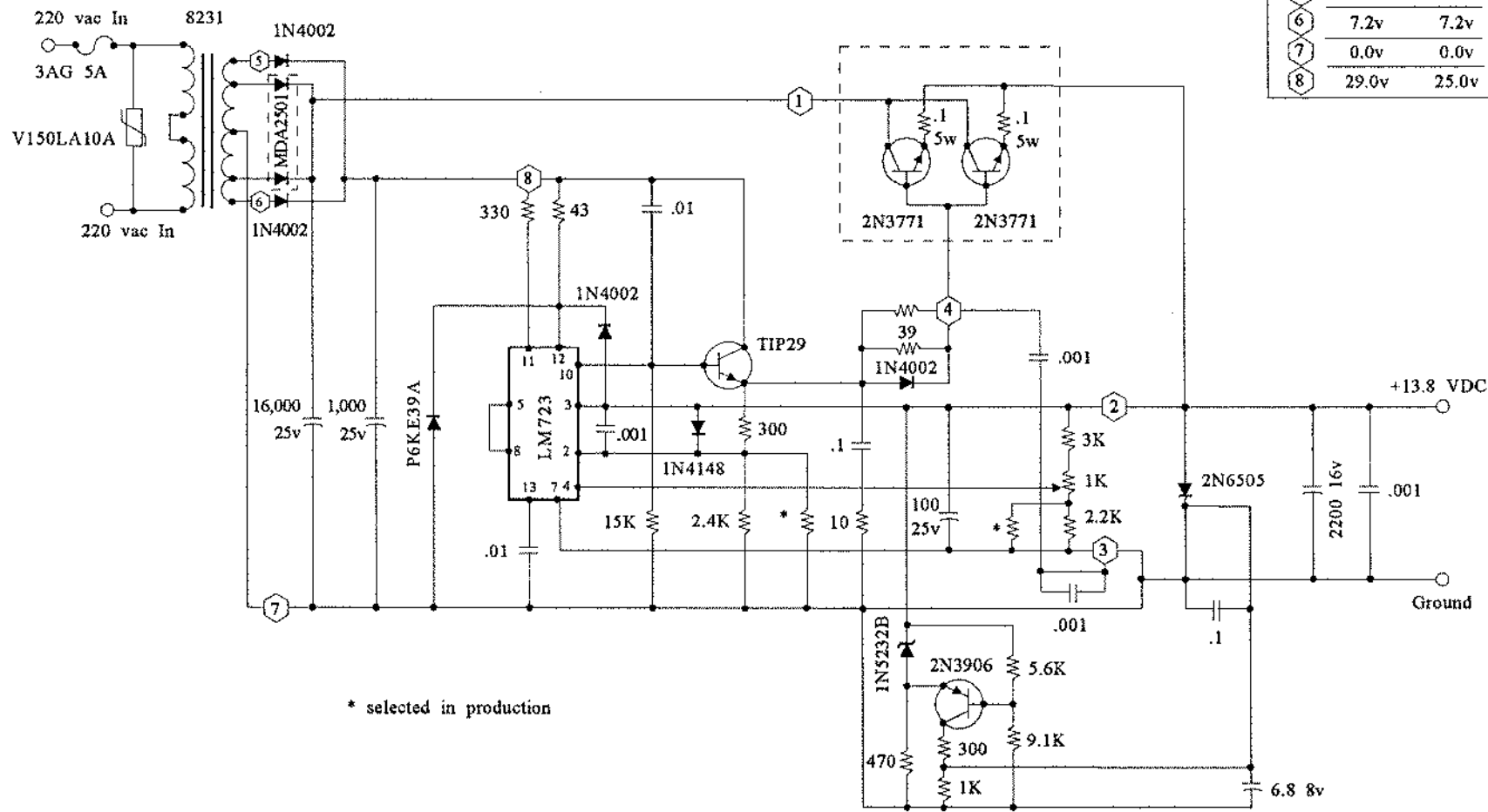
Motorola IN4738
 GE IN458
 Motorola IN4004
 GE V130LAs
 Motorola 2N4124
 Motorola 2N4126
 Motorola MC1741

RY1201-4

Relay: DPDT, 12 VDC.

Guardian 1365

Henry PCB1102 13.8 VDC Power Supply



	No Load	Load
①	23.0v	18.0v
②	13.1v	14.0v
③	13.8v	13.7v
④	7.2v	7.2v
⑤	7.2v	7.2v
⑥	7.2v	7.2v
⑦	0.0v	0.0v
⑧	29.0v	25.0v

* selected in production

Astron Part Number: Henry 12A-220

Henry 3K Ultra and 8K Ultra Tube Specifications

8K Ultra - 3CX3000A7

The 3CX3000A7 is a high-mu air cooled ceramic power triad electron tube. It is a coaxial based, plug in tube with instant on operation, operating in a grounded grid circuit.

FILAMENT

Thoriated Tungsten - 7.5 +/- 0.37 VAC, 52 amps nominal.

FREQUENCY OF MAXIMUM RATING - 110 MHz.

DIMENSIONS - 9" Long x 4.156" Diameter.

OPERATING POSITION

Vertical only, base up or base down.

COOLING - Forced air.

MAXIMUM OPERATING TEMPERATURE - 250 deg. C.

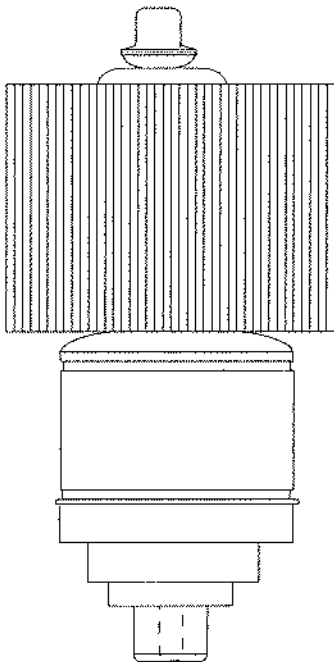
MAXIMUM DC PLATE VOLTAGE - 5000 VDC.

MAXIMUM DC PLATE CURRENT - 2.5 Amps.

MAXIMUM PLATE DISSIPATION - 4000 watts.

MAXIMUM GRID DISSIPATION - 225 watts.

AIR FLOW (4000 WATT DISSIPATION)
67 CFM at 1.2" pressure drop at sea level.



3K Ultra - 3CX1200D7

The 3CX1200D7 is a high-mu, forced air cooled ceramic/metal power triode electron tube. It is a pin based, plug in tube with instant on operation, operating in a grounded grid circuit.

FILAMENT

Thoriated Tungsten - 6.3 +/- 0.3 VAC, 25 amps nominal.

FREQUENCY OF MAXIMUM RATING - 50 MHz.

DIMENSIONS - 5.625" Long x 3.42" Diameter.

OPERATING POSITION

Vertical only, base up or base down.

COOLING - Forced air.

MAXIMUM OPERATING TEMPERATURE - 250 deg. C.

MAXIMUM DC PLATE VOLTAGE - 5500 VDC.

MAXIMUM DC PLATE CURRENT - .8 Amps.

MAXIMUM PLATE DISSIPATION - 1200 watts.

MAXIMUM GRID DISSIPATION - 50 watts.

AIR FLOW (1200 WATT DISSIPATION)
50 CFM at .45" pressure drop at sea level.

