

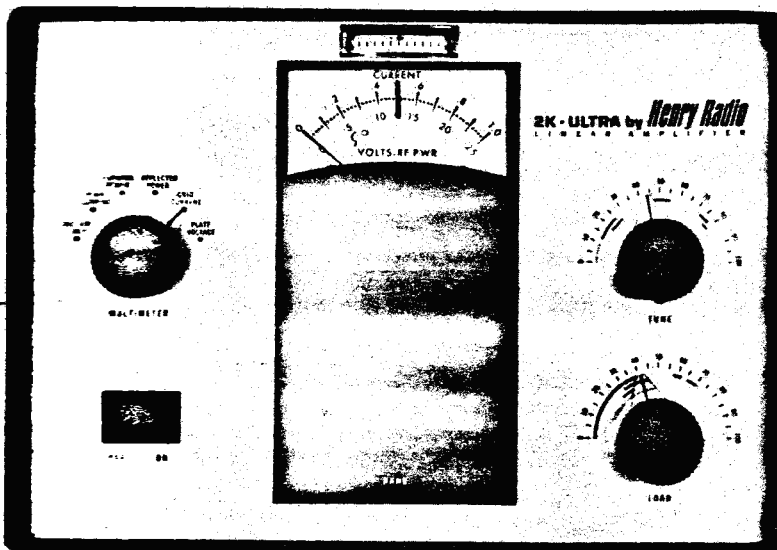
# HENRY RADIO'S

## 2K ULTRA

### LINEAR AMPLIFIER

#### OPERATING AND MAINTENANCE MANUAL

**Henry Radio**



# S P E C I F I C A T I O N S

## TYPE AND FUNCTIONS OF EQUIPMENT

The 2K ULTRA is a 2000 watt PEP (1000 watt nominal output) one stage linear amplifier using conductively cooled, highly linear, grounded grid triodes. The ULTRA operates on all amateur bands between 3.5 and 30 MHz.

## TUBE COMPLEMENT

Two Eimac 8873 grounded grid triodes

## FREQUENCY RANGE

All of the amateur bands between 3.5 and 30 MHz

80	3.500 to 3.750 MHz
75	3.750 to 4.000 MHz
40	7.000 to 7.300 MHz
20	14.000 to 14.350 MHz
15	21.000 to 21.450 MHz
10	28.000 to 29.700 MHz

## TUBE COOLING

Conductively cooled with a thermostat controlled fan for high dissipation modes.

## TYPE OF EMISSION

SSB, CW, RTTY

## DUTY CYCLE

Continuous duty in all modes

## POWER REQUIREMENTS

230 VAC, 50/60 Hz, 15 amps or  
115 VAC, 50/60 Hz, 30 amps

## DRIVE POWER REQUIRED

SSB, CW, RTTY — 75 watts

## INPUT POWER

2 kilowatts PEP SSB  
1 kilowatt CW, RTTY

## OUTPUT POWER

1 kilowatt PEP minimum

## PLATE POWER DISSIPATION

Plate power dissipation depends entirely on the ventilation of the heat sink. The tube is rated at 400 watts but it will be much less if the heat sink can not dissipate the heat, and much more if the heat sink is well ventilated.

## OUTPUT IMPEDANCE

52 ohms unbalanced with SWR not to exceed 2:1

## INPUT IMPEDANCE

52 ohms

## HARMONIC AND OTHER SPURIOUS RADIATION

Second harmonic: —50 db  
Third order distortion: —30 db at full power output

## NOISE LEVEL

—40 db or better below one tone carrier at 1 kilowatt

## ALC CIRCUIT

Prevents overdrive from today's high power exciters and boosts average talk power.

## PROTECTIVE DEVICES

The input line is protected by a 15 amp circuit breaker, which also acts as a power switch. There are also cathode and relay supply fuses.

## METERING

TUNE Meter — Used to tune the amplifier  
MULTIMETER —

- 0 - 1 amp PLATE CURRENT
- FORWARD RF POWER Indicator
- REFLECTED RF POWER Indicator
- 0 - 100 ma GRID CURRENT
- 0 - 2500 volts PLATE VOLTAGE

## FRONT PANEL CONTROLS

Power switch — MULTIMETER switch — TUNE meter — Multimeter — BAND switch — TUNE control — LOAD control

## REAR PANEL CONTROLS

ALC ADJUST — ALC OUT — RELAY CONTROL — RF IN — Cathode fuse — HIGH VOLTAGE — POWER — RF OUT — FWD PWR ADJUST

## DIMENSIONS

RF Deck: 8.75" high x 12.0" wide x 11.0" deep  
Power Supply: 7.5" h x 12.5" w x 10.5" d

## WEIGHT

RF Deck: 20 pounds  
Power Supply: 61 pounds  
Shipping Weight: 100 pounds.

$\rightarrow = K_1, 9, 1$   
 $= K_2 45, 26$

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### WARRANTY

Henry Electronics warrants each new radio product manufactured by it to be free from defective material and workmanship and agrees to remedy any such defect or to furnish a new part in exchange for any part of any unit of its manufacture which under normal installation, use, and service discloses such defect, provided the unit, or part, is delivered by the owner to us intact, for our examination, with all transportation charges prepaid to our factory, within ninety days from the date of sale to the original purchaser and provided that such examination discloses in our judgment that it is thus defective. Should a malfunction be suspected, write in detail to our service department for suggestions concerning the operation, repair or return of your unit if it should prove necessary.

This warranty does not extend to any of our radio products which have been subjected to misuse, neglect, accident, incorrect wiring not our own, improper installation, or to use in violation of instructions furnished by us, nor extend to units which have been repaired or altered outside of our factory, nor in cases where the serial number thereof has been removed or defaced or changed, nor to units used with accessories not manufactured or recommended by us.

Any part of a unit approved for remedy or exchange hereunder will be remedied or exchanged by Henry Electronics without charge to the owner.

This warranty is in lieu of all other warranties expressed or implied and no representative or person is authorized to assume for us any other liability in connection with the sale of our radio products.

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

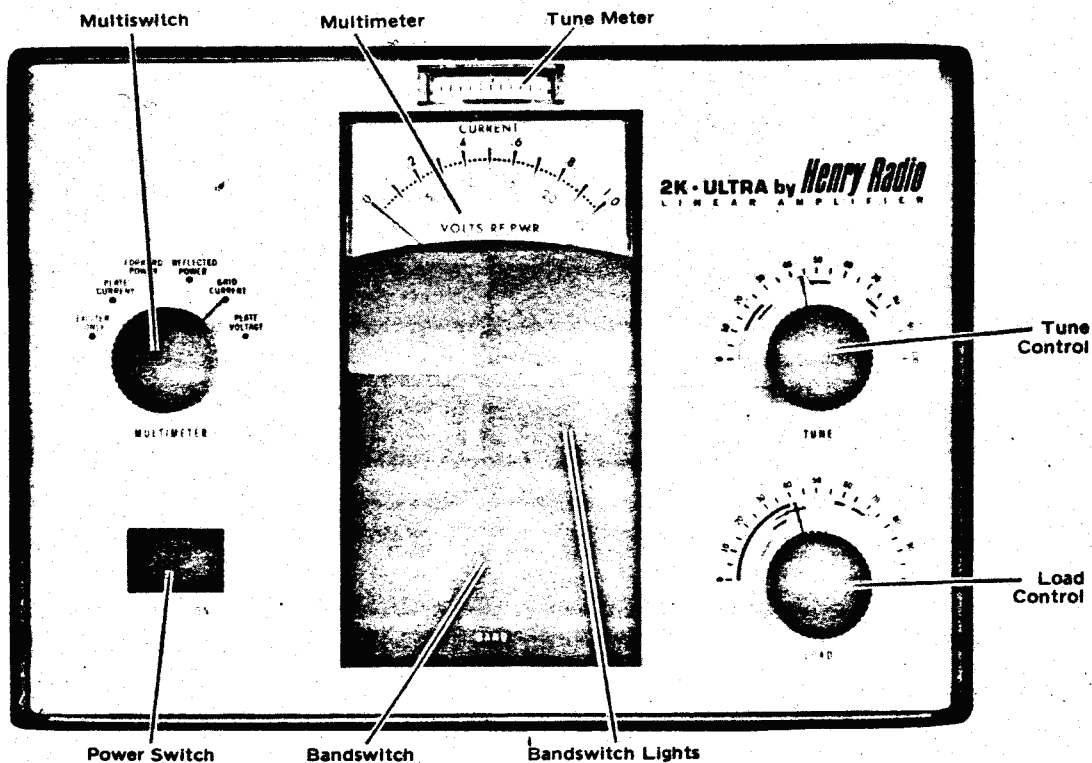


FIGURE 1. 2K ULTRA Front Panel.

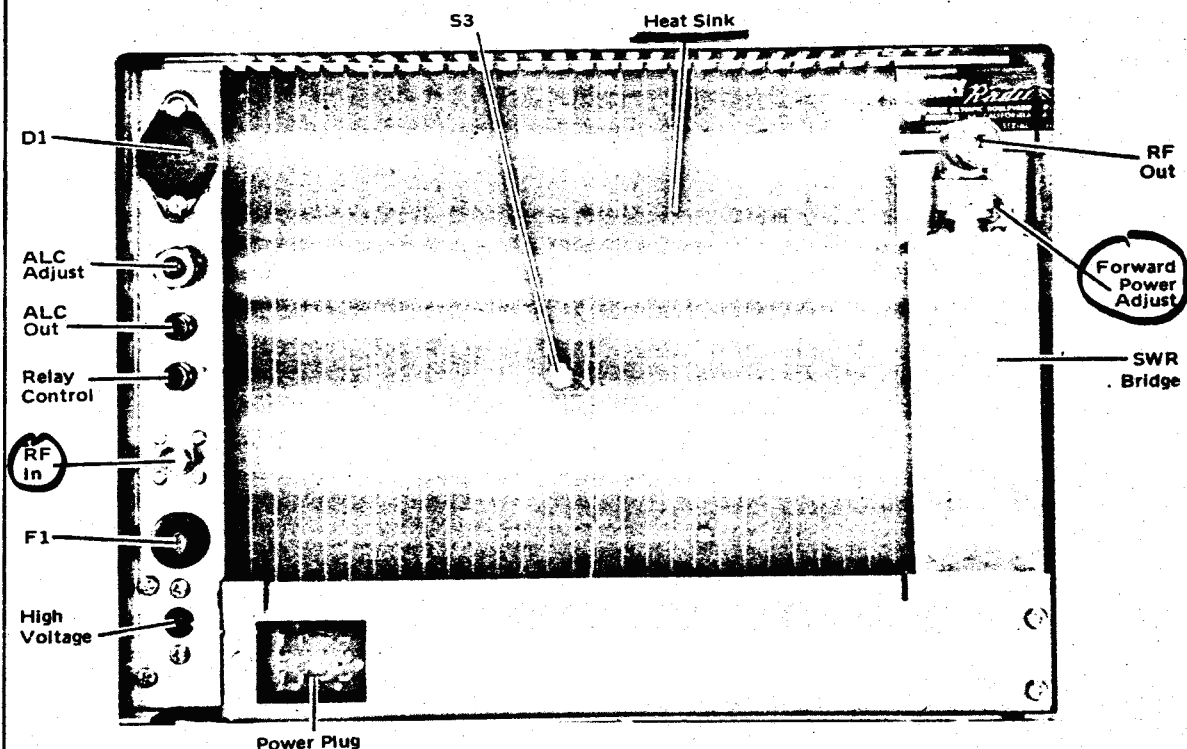


FIGURE 2. 2K ULTRA Back Panel.

# 2K ULTRA OPERATING AND MAINTENANCE MANUAL

## SECTION 1 INTRODUCTION

The 2K ULTRA is a highly sophisticated one stage linear amplifier employing conductively cooled tubes. The ULTRA is designed for SSB, CW, and FSK operation on the amateur bands between 3.5 and 30 MHz. The amplifier is compact and light weight, but still delivers a full 2000 watts PEP input for SSB and full legal output on CW too. The ULTRA delivers continuous duty performance for all specified modes. The two piece configuration of the equipment puts only the small, stylish RF deck at the operator's position. A seven foot interconnecting cord is provided with the linear so the power supply can be set away from the desk. The ULTRA comes factory wired to operate from 230 VAC but it can be easily jumpered for operation from 115 VAC.

### CAUTION

Because the 2K ULTRA's design is a highly unusual and unique approach to the amateur amplifier market, the operator should read the entire manual before operating the linear. THE 8873 TUBES CAN EASILY BE DAMAGED IF THE AMPLIFIER IS NOT OPERATED PROPERLY. DANGEROUS HIGH VOLTAGES ARE PRESENT INSIDE THE AMPLIFIER WHEN IT IS TURNED ON. PAINFUL TEMPERATURES ARE PRESENT ON THE HEAT SINK DURING OPERATION. The blocks that conduct heat from the tubes are made of beryllium oxide. NEVER ATTEMPT TO DRILL, FILE, OR WORK THE HEAT CONDUCTING BLOCKS. BERYLLIUM OXIDE IN A POWDERED FORM IS A DEADLY POISON.

## SECTION 2 INSTALLATION

### 2.1 UNPACKING

Remove the amplifier from its shipping carton and packing material and examine it carefully for visible damage. If the linear has been damaged in shipment, save the box and packing material and notify the transportation company immediately. It is a good idea to save the box and packing material in any case, because the box is expensive to replace and very useful for shipping or moving the amplifier. The ULTRA is shipped fully assembled, so to get on the air simply locate the amplifier in a proper location, make sure the rig is jumpered for the proper line voltage, connect the cables, and be sure to fully understand the operating instructions.

The following accessories should be included with the ULTRA.

1	Instruction Manual	1	Number 8 Bristol Wrench
1	Warranty Card	2	Switchcraft 25AK25 cords
1	PL 259 Coax Connector	5	3 AG, 6 amp Fuses
1	RF Input Cable (phono-BNC)	5	8 AG, 1 amp Fuses

### 2.2 OPERATING LOCATION

Because the ULTRA develops high temperatures at the heat sink during operation, and because the amplifier depends on air movement for cooling, the operating location is particularly important.

The heat sink at the back of the RF deck should be at least six inches from the nearest surface. Also both the RF deck and the power supply must be kept free from any obstructions which would impede air flow. This means the top, bottom, and sides of both pieces must be kept free. The cooling fan on the bottom of the RF deck is thermostatically controlled to cool the tubes in high dissipation modes, and if any paper is sucked up to obstruct the fan, the tubes will be damaged. The fan should probably never come on during SSB operation unless the ventilation is inadequate. The blower is wired to remain operating even when the amplifier is turned off, if the heat sink is hotter than 210° F (1)

### CAUTION

The cooling fan will turn on when the heat sink reaches 210° F. The fan will only be necessary at high power CW or FSK operation. The heat sink will be cooler in the SSB mode. AVOID TOUCHING THE HEAT SINK WHEN THE AMPLIFIER IS TURNED ON. IT CAN CAUSE PAINFUL BURNS.

(1)  $210^{\circ}\text{F} = 99^{\circ}\text{C. approx} \quad ^{\circ}\text{C} = \frac{5}{9} (^{\circ}\text{F} - 32); \quad ^{\circ}\text{C} = \frac{5}{9} \cdot 178 = 98.88$

The power supply has no blower but still depends on air circulation for component cooling. Do not obstruct the air flow to the power supply.

For highest heat dissipation efficiency, the heat sink on the RF deck should overhang the edge of the operating desk. This is not absolutely necessary, but will aid heat transfer.

## 2.3 CABLING

The following cables should be connected before operation of the amplifier.

**ANTENNA**— The coaxial antenna lead must be plugged into the M-359 RF OUTPUT connector on the top of the SWR bridge on the back of the amplifier. A PL-259 coax plug is provided in the accessory kit in case the antenna lead of the station does not have such a plug.

**RF INPUT**— The RG-58A/U input cable connects to the RF INPUT connector on the back of the amplifier. This connector is the BNC jack. The other end of the cable is terminated by a phono plug and should be inserted in the RF output of the exciter. An adapter may have to be used if the exciter does not have a matching socket.

**ALC (Automatic Level Control)**— Plug the grey ALC cable into the ALC OUTPUT phono socket on the back panel of the ULTRA and into the ALC socket of the exciter. If the exciter does not have provision for feedback of ALC voltage from the amplifier, simply ignore the amplifier ALC socket and cable.

**RELAY**— The grey relay control cable should be plugged into the phono RELAY CONTROL socket on the back panel of the amplifier. This cable activates the amplifier to a transmit condition. It requires only a shorting relay contact to ground to be activated.

### CAUTION

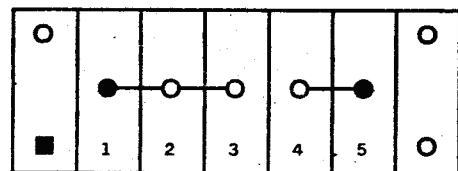
Do not apply any voltage to this relay control circuit. The amplifier's internal relay is activated by a self-contained 12 VDC relay supply.

The relay cable can be plugged directly into the socket marked ANTENNA RELAY on the exciter. When the ULTRA is excited by a driver unit without an antenna relay socket it may be necessary to examine the circuit diagram of the exciter to find an available unused relay contact that is normally open in the receive condition. All current SSB transmitters and transceivers have a relay contact at a terminal board or jack on the back panel.

**INTERCONNECTING POWER CABLE**— Connect the 12 pin plug on the power supply's interconnecting cable to the 12 pin plug on the back panel of the RF deck. The power supply is shipped with an aluminum back panel in place. To release the interconnecting cord and the power cable for operation, you must unscrew the four Phillips head screws on the back panel and pull the panel off. To move or ship the amplifier, the cords can be wound into the back of the power supply and the panel can be put back into place. The high voltage cable comes out of the power plug and must be plugged into the HIGH VOLTAGE socket on the back of the RF deck.

**POWER CABLE**— The ULTRA is shipped jumpered for operation from 230 VAC. A three conductor power cable is standard with the linear. To re-jumper the unit for 115 VAC, see the diagram below. All of the required jumpers are shipped attached to the terminal board found on the back

115 VAC

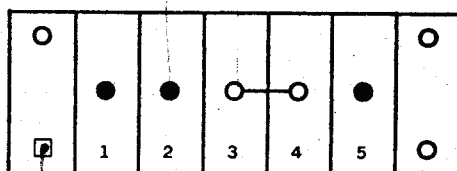


green  
(ground)

black

white

230 VAC



black

green  
(neutral)

white

FIGURE 3. Power Input Terminal Connections.

panel of the power supply. The aluminum shipping panel will have to be removed before the terminal board is exposed. The power source should be 50/60 Hz, capable of supplying 15 amps (30 amps at 115 VAC). Select a three-prong power plug that matches the power receptacle at the operating position and fasten the plug to the cable.

### CAUTION

The amplifier will be damaged if the green wire is connected incorrectly.

## SECTION 3 OPERATING CONTROLS

### 3.1 FRONT PANEL CONTROLS

**OFF-ON Switch**— This switch serves the double purpose of turning the ULTRA on and off and acting as a protective circuit breaker.

**MULTIMETER Switch**— This six position switch selects which function the multimeter is displaying when the amplifier is turned on. The following positions are available on the switch:

**EXCITER ONLY**— With the switch in this position, the exciter feeds through the ULTRA to the antenna. The exciter also feeds directly through when the amplifier is not turned on. The meter is disconnected in this position.

**PLATE CURRENT**— The full scale reading in this position is 1 amp. For SSB the plate current will read between .4 and .5 amps and for CW the plate current will be no more than .5 amp. This reading is off of the top, black scale.

**FORWARD POWER**— This switch position shows relative power output on the multimeter. The meter should read about 10 on the green meter scale for 1000 watts out. However the meter is not linear below that reading so a meter reading of 5 does not mean an output power of 500 watts.

**REFLECTED POWER**— With the switch in this position, the multimeter indicates relative reflected power on the green meter scale. A full scale reading shows 250 watts.

**GRID CURRENT**— The multimeter shows grid current with the switch in this position. The full scale reading is 100 ma on the black scale. A peak power level on CW occurs with a grid current of about 80 ma.

**PLATE VOLTAGE**— The full scale reading in this position is 2500 volts on the green scale. The average plate voltage will be between 2000 and 2200 volts under load, depending on the line voltage at the operating position.

**TUNE Meter**— The small tune meter on the top of the front panel is used for tuning the ULTRA. For SSB the amplifier is tuned to bring the needle to the center scale SSB mark and for CW the linear is tuned to bring the needle to the far left scale CW mark.

**MULTIMETER**— The multimeter functions are explained above under MULTIMETER switch discription.

**BAND Switch**— The BAND switch selects one of the following frequency ranges for operation.

80	3.500 to 3.750 MHz	20	14.000 to 14.350 MHz
75	3.750 to 4.000 MHz	15	21.000 to 21.450 MHz
40	7.000 to 7.300 MHz	10	28.000 to 29.700 MHz

The band switch light shows behind the number of the band which has been selected.

**TUNE Control**— The TUNE control tunes the amplifier to the frequency range selected. The color bars indicate the approximate position of the TUNE needle for the band of the same color. The dial numbers can be used also to help the operator calibrate the TUNE control position to the band selected. See the Calibration Table at the back of the manual.

**LOAD Control**— The LOAD control loads the amplifier to the frequency range selected. As with the TUNE control, the color bars or the numbers can be used to calibrate your position.

### 3.2 REAR PANEL CONTROLS

**RELAY CONTROL**— The RELAY CONTROL socket is used to connect the ULTRA to its exciter

to control the antenna relay in the amplifier.

**ALC ADJUST**— This potentiometer adjusts the automatic level control feedback of the ULTRA to the characteristics of its driver. The amplifier is designed for a maximum drive power of 75 watts and can be damaged if the drive power is too high. See the operating section for instructions.

**ALC OUT**— This phono socket is connected to the ALC socket on the exciter. The ALC control cable is included in the accessory kit of the amplifier.

**RF IN**— This socket is a BNC connector used to connect the ULTRA to the RF Output connector of the exciter. A cable with a phono plug at the other end is provided with the amplifier.

**F1**— This is an 8 AG, 1 amp fuse.

**HIGH VOLTAGE**— The high voltage from the power supply comes through the interconnecting cord to the power plug and then comes out the side of the plug. This separate cord must be plugged into the HIGH VOLTAGE socket.

**POWER**— The interconnecting power cord between the power supply and the RF deck is plugged into this 12 pin Jones plug.

**RF OUT**— This is an M-359 coax connector located on the top of the SWR bridge on the back of the RF deck.

**FWD PWR ADJUST**— This potentiometer next to the RF Output connector is used to adjust the forward power reading of the multimeter. The control is factory adjusted. If adjustment should ever be necessary the instructions are in the operating section.

## SECTION 4 OPERATION

### 4.1 PRELIMINARY SETTINGS

→ Tune your exciter to the desired frequency and then turn the drive to zero.

#### CAUTION

Exciter drive exceeding 75 watts may damage the ULTRA's tubes. Please read all of the instructions before operating the amplifier.

Turn the ULTRA on. The BAND switch light, which will be lighted behind the band number to which the amplifier is switched, will flash on and off for about 60 seconds. When the light stops flashing the linear has switched from the warmup to the load mode and is ready to be tuned.

→ Set the BAND switch to the desired band and then turn the TUNE and LOAD controls to the lower end of the color bars (counterclockwise direction) which correspond to the color of the lighted BAND switch light. Or find the dial calibrations on page 17.

Turn the MULTIMETER switch to PLATE CURRENT.

### 4.2 SSB OPERATION

1) With the exciter set for zero RF output, press the push-to-talk switch of the exciter, causing the ULTRA and the exciter to be in the transmit mode. Advance the exciter's drive slowly until the multimeter shows a plate current of .4 to .5 amp on the black scale.

2) Adjust the ULTRA's TUNE control for a dip in either the plate current (multimeter) or the TUNE meter. If the needle of the TUNE meter is left of the center scale SSB position, increase (clockwise) the LOAD control in small steps while readjusting the TUNE control for a dip or minimum reading on the meters. Continue this procedure until the needle on the TUNE meter reaches the SSB position of the scale.

The plate current should reach .4 to .5 amps on voice peaks for 2000 watts PEP input on SSB.



### 4.3 CW OPERATION

Follow the procedure described in Section 4.1.

With the exciter set for zero RF output (zero drive), key the exciter, causing the ULTRA and the exciter to be in the transmit mode. Advance the exciter's drive slowly until the multimeter shows a plate current of about .5 amp on the black scale.

Adjust the ULTRA's TUNE control for a dip in either the plate current (multimeter) or the TUNE meter. If the ULTRA's TUNE meter is to the right of the left scale CW position, decrease the LOAD control in small steps while readjusting the TUNE control for a dip or minimum reading on the meters. Continue this procedure until the needle on the TUNE meter reaches the CW position on the scale.

The peak power level on CW is indicated by a grid current of about 80 ma and a plate current reading of .5 amp. The ULTRA is designed for continuous operation at 1 kilowatt input. On the 80 meter band the grid current will vary from 80 ma.

### 4.4 FSK OPERATION

The ULTRA is designed for continuous duty operation at 1 kilowatt input. For RTTY, adjust the amplifier as described in Section 4.3.

### 4.5 AM OPERATION

We do not recommend the ULTRA for AM operation. If you do operate AM, tune the amplifier for SSB operation and then reduce the amplifier's input power to 600 watts by decreasing the exciter's drive for a MULTIMETER reading of .3 amps of plate current. The life of the 8873 tubes will be considerably shortened by running more than 600 watts input for AM operation. The cooling system of the ULTRA is not designed for adequate cooling for high power AM operation.

### 4.6 ALC ADJUSTMENT

The ULTRA is shipped with the ALC ADJUST potentiometer fully clockwise (off) and the locknut on the shaft locks the control in that position. The ALC should only need adjustment when the amplifier is being used with a different exciter. So after initial adjustment, the potentiometer should be locked into place and not touched unless you change exciters.

With the ALC ADJUST control fully clockwise, tune the ULTRA for SSB operation. Leaving the MULTIMETER switch in the PLATE CURRENT position, slowly increase the exciter's drive to increase the amplifier's plate current to between .55 and .60 amp on voice peaks, as indicated on the multimeter. Loosen the locknut on the ALC ADJUST shaft, and adjust the potentiometer until voice peaks during transmit do not exceed .5 amp of plate current. The shaft should be turned counterclockwise to decrease drive.

If the exciter can not drive the ULTRA over .5 amps of plate current, leave the ALC ADJUST control fully clockwise. Retighten the nut to lock the potentiometer in place.

The ALC will prevent overdrive from high power exciters when it is adjusted properly. For the cleanest, sharpest signal, avoid driving the plate current beyond .5 amp.

### 4.7 FORWARD POWER ADJUSTMENT

The FWD PWR ADJUST control, on the back panel of the ULTRA, has been factory preadjusted. If the FORWARD POWER reading on the multimeter is not near the 10-12 range on the RF POWER scale of the multimeter, the control can be recalibrated as follows.

Set the MULTIMETER switch to FORWARD POWER and turn the FWD PWR ADJUST control fully counterclockwise.

Tune the ULTRA and the exciter as described in Sections 4.1 and 4.2. Then with the exciter keyed, rotate the FWD PWR ADJUST potentiometer until the multimeter reads about 10-12. For an accurate adjustment a wattmeter is required. The RF POWER scale is not linear below 10 so the FORWARD POWER reading is accurate only for maximum power indications.

## 4.8 POWER READINGS

### CAUTION

The amplifier may be damaged if operated into a load with SWR exceeding 2.5:1.

The MULTIMETER switch has positions for FORWARD POWER and REFLECTED POWER readings on the multimeter. After all of the previously described adjustments have been completed, the switch should be placed in the FORWARD POWER position, and if the FWD PWR ADJUST control is adjusted properly, the voice peak meter reading should be between 10 and 12.

With no change of exciter output, and with the multimeter reading still about 10, set the MULTIMETER switch to REFLECTED POWER. With a good antenna system there should be almost no reflected power. In no case should the ULTRA be operated into an antenna with a reflected power reading of more than half scale on the multimeter (about 125 watts). If there is any doubt about the SWR of the antenna, turn the ULTRA off and check the SWR with only the output of the exciter.

## SECTION 5 MAINTENANCE AND ADJUSTMENTS

### CAUTION

DANGEROUS HIGH VOLTAGES ARE PRESENT INSIDE THE AMPLIFIER WHEN IT IS TURNED ON. The blocks that conduct heat from the tubes are made of beryllium oxide. NEVER ATTEMPT TO DRILL, FILE, OR WORK THE HEAT CONDUCTION BLOCKS. BERYLLIUM OXIDE IN A POWDERED FORM IS A DEADLY POISON.

### 5.1 CHANGING THE TUBES

Remove the top cover of the ULTRA. Then remove the screw that holds the tube clamp in place. There are three screws on each tube socket, holding the tube in place. Loosen each screw 1 to 2 turns.

Remove the plate leads, move the tubes away from the conduction blocks and remove the tubes from their sockets. Use lacquer thinner to remove the old thermal compound from the conduction blocks. Before installing the new tubes, coat the contact surface of each tube with a thin, even film of thermal compound. This compound is supplied with the replacement tubes.

### NOTE

DO NOT USE SILICONE GREASE!

Insert the new tubes in their sockets. Reinstall the tube clamp bar and screw and tighten the clamp screw until the clamp bar just begins to flex. Retighten the six tube socket screws and then reconnect the plate leads and then replace the cover of the amplifier.

### 5.2 ADJUSTING THE TUNE METER

Load and Tune the ULTRA on the 20 meter band to a meter reading of 1 amp plate current and 60 ma of grid current. The meter is factory adjusted and should need no further adjustment.

### CAUTION

Do not operate the ULTRA at this power level for more than 10 seconds at a time. Give the amplifier 30 seconds to cool off. BE SURE - 30 SECONDS OFF FOR EACH 10 SECONDS ON.

Reduce the drive to 400 ma plate current without readjusting the LOAD control.

Remove the hole plug from the bottom of the ULTRA's RF deck to expose C33. Adjust C33 to bring the TUNE meter to the mid-scale SSB position. When you have adjusted the meter for the SSB reading, the CW reading will automatically be adjusted also.

### 5.3 FORWARD POWER ADJUSTMENT

Place a wattmeter capable of reading 1000 watts in the output line. On 20 meters, tune and load the ULTRA to 1000 watts on the wattmeter. Do not operate at this power level for more than 10 seconds at a time. See the caution on page 7. Adjust the forward power adjust potentiometer, above the SWR bridge on the back of the RF deck, for a FORWARD POWER meter reading of 10.

### 5.4 INPUT COIL ADJUSTMENT

The input coils of the ULTRA are tuned at the factory for the middle of the frequency range for each band. With the coils adjusted like this you can operate approximately  $\pm 1$  MHz of the tuned frequency. By retuning the appropriate input coil, you can retune the coil about  $\pm 3$  MHz of the rated frequency.

Install an SWR bridge in the input line, between the exciter and the ULTRA. Tune the exciter for a frequency in the middle of the band to be adjusted. Adjust the corresponding input coil for the lowest SWR on the SWR bridge. For operation in the normal amateur bands, the input coils should never need adjustment.

### 5.5 MULTIMETER GRID CURRENT READING ADJUSTMENT

You must remove the ULTRA's RF deck wraparound cover to make this adjustment. Remove the ground from R11 and insert a 0-100 ma meter between ground and R11. Drive the ULTRA to a grid current reading of 25 ma on the test meter. Adjust the calibration pot, R7 until the ULTRA's grid current meter reading corresponds to the reading of the test meter.

### 5.6 MULTIMETER PLATE CURRENT READING ADJUSTMENT

Remove the RF deck wraparound. Place a 500-1000 ma test meter in series with the high voltage lead of the ULTRA.

**CAUTION: BEWARE OF THE HIGH VOLTAGE**

Drive the ULTRA to 500 ma of plate current, as shown on the test meter. Adjust R8 until the ULTRA's MULTIMETER PLATE CURRENT reading is 500 ma.

### 5.7 GENERAL MAINTENANCE

Be sure to keep both the power supply and the RF deck free from dust. The heat sink especially should be kept free of dust.

If the time delay relay fails, the antenna relay will not switch over at the end of the warm-up period. The relays plug into 9 pin sockets in the power supply module.

If the flasher relay fails, the pilot lights will not flash during the warm-up period.

The tube life is warranted for 1000 hours. All warranty claims must be accompanied by a completed Eimac warranty claim form. All warranty claims must be filed with the company from which you purchased the tubes.

All orders for replacement or spare parts should include the type of unit, the serial number of the amplifier, the schematic number of the part, and the Henry part number. This information will insure quick and correct service.

## 2K ULTRA PARTS LIST

SCHEMATIC NO.	DESCRIPTION	NUMBER
B1	BLOWER: 115 VAC. airflow 25 CFM, rack mounting fan.	00 20000
Bearing	Coupler and bearing	28 39016
Box	RF deck with packing material	57 20000
Box	Power supply with packing material	57 20001
C1	CAPACITOR: Ceramic disc, .01 mf, 150 volts, 20%.	08 10103
C2 through C4	CAPACITOR: Silver mica, 100 pf, 500 VDCW, 5%.	08 15101
C5 and C6	CAPACITOR: Silver mica, 22 pf, 500 VDCW, 5%.	08 15220
C7 and C8	CAPACITOR: Silver mica, 82 pf, 500 VDCW, 5%.	08 15820
C9 and C10	CAPACITOR: Silver mica, 50 pf, 500 VDCW, 5%.	08 15500
C11 and C12	CAPACITOR: Silver mica, 330 pf, 500 VDCW, 5%.	08 15331
C13 and C14	CAPACITOR: Silver mica, 220 pf, 500 VDCW, 5%.	08 15221
C15 and C16	CAPACITOR: Silver mica, 470 pf, 500 VDCW, 5%.	08 15471
C17 and C18	CAPACITOR: Silver mica, 1500 pf, 500 VDCW, 5%.	08 15152
C19 and C20	CAPACITOR: Silver mica, 1000 pf, 500 VDCW, 5%.	08 15102
C21 through C24	CAPACITOR: Ceramic disc, .01 mf, 600 volts, GMV.	08 06103
C25 and C27	CAPACITOR: Ceramic disc, .01 mf, 150 volts, 20%.	08 10103
C28 and C29	CAPACITOR: Silver mica, 47 pf, 500 VDCW, 5%.	08 15470
C30 and C31	CAPACITOR: Ceramic feed through, 2000 pf, 500 volt, 20%.	08 00202
C32	CAPACITOR: Ceramic disc, .01 mf, 600 V, GMV.	08 06103
C33	VARIABLE CAPACITOR: Air, 33 pf, 50 volt.	09 00050
C34 and C35	CAPACITOR: Ceramic disc, .01 mf, 600 V, GMV.	08 06103
C36 through C38	CAPACITOR: Ceramic disc, .01 mf, 150 V, 20%.	08 10103
C39	CAPACITOR: Ceramic disc, .01 mf, 600 V, GMV.	08 06103
C40	CAPACITOR: Ceramic disc, .1 mf, 50 V, 20%.	08 00104
C41	CAPACITOR: Ceramic disc, .01 mf, 150 V, 20%.	08 10103
C42	CAPACITOR: Air, 1 pf, 500 V, special.	08 20000
C43	CAPACITOR: Ceramic transmitting, 1000 pf, 5 K VDC, GMV.	08 85813
C46	VARIABLE CAPACITOR: Tune, 350 pf, air.	09 15410
C47	VARIABLE CAPACITOR: Load, 19-488 pf, 2 KV, air.	09 15403
C48	CAPACITOR: Ceramic feedthrough, 470 pf, 500 V.	08 20470
C49	CAPACITOR: Ceramic disc, .0047 mf, 6 K VDCW, 20%.	08 60047
C50	CAPACITOR: Ceramic disc, .0022 mf, 6 K VDCW, 20%.	08 60222
C51A,B,C	CAPACITOR: Ceramic, transmitting, 100 pf, 5000 v, 20%.	08 85012
C52 through C55	CAPACITOR: Ceramic transmitting, 100 pf, 5KV, 20%.	08 85712
C56 and C57	CAPACITOR: Ceramic disc, .02 mf, 150V, 60%.	08 10203
C58	CAPACITOR: Ceramic disc, .01 mf, 150V, 20%.	08 10103
C59	CAPACITOR: Ceramic disc, .01 mf, 600V, GMV.	08 06103
C60	CAPACITOR: Ceramic disc, .01 mf, 150V, 20%.	08 10103
C61 through C64	CAPACITOR: Ceramic disc, .01 mf, 600 V, GMV.	08 06103
C65	CAPACITOR: Ceramic disc, .01 mf, 150 V, 20%.	08 10103
C66	CAPACITOR: Ceramic disc, .01 mf, 600V, GMV.	08 06103
C67	CAPACITOR: Silver mica, 5 pf, 500 VDCW, 5%.	08 10050
C101	CAPACITOR: Filter, oil filled, .1 mf, 7500V.	08 17500
C102	CAPACITOR: Oil filled, 15 mf, 3000 VWDC.	08 15052
C103	CAPACITOR: Electrolytic tubular, 500 mf, 50 V, 20%.	08 01390
Cable	Relay control and ALC control, 6' phono plug to phono plug.	04 25025
Cable	Power cable, 5½ feet, 3 conductor, 14 guage, 300 V.	04 21430
Cable	Interconnecting cable, 12 conductor.	04 20000
Cable	RF input, 10' BNC connector to phono plug, RG 58A/U.	04 00010
CB1	CIRCUIT BREAKER: 2 pole, 50/60 Hz, 15 amp, black, 230 VAC 50 watt.	12 11161
D1	DIODE: Silicon, zener, 10 volts, 50 watts.	73 12808
D2	DIODE: Silicon rectifier, axial lead, 400 PIV, 1 amp.	73 00157
D3	DIODE: Silicon, UHF hot carrier diode.	73 00700
D4	DIODE: Hot carrier diode, HP-82.	73 28004
D101 and D102	DIODE: Not used.	73 00240
D103	DIODE: Silicon rectifier, 1 amp, 1000 PIV.	73 00509
D104 through D107	DIODE: Rectifier, 10,000 PIV, 1.2 amp.	73 20000
D108 through D110	DIODE: Silicon rectifier, 1 amp, 1000 PIV.	73 00509
Escutcheon	Black plastic.	49 20000
F1	FUSE: 8 AG, 1 amp, 250 VAC.	24 80101

SCHEMATIC NO.	DESCRIPTION	NUMBER
F101	FUSE: 3AG, 5 amp, 250 VAC.	24 30501
Feet	RF Deck, power supply, black rubber.	36 00103
Fuse Holder	RF Deck, extractor post, 8AG fuse holder.	25 37201
Fuse Holder	Power supply, open clip fuse holder.	25 99062
Handle	Fold down aluminum handle assembly for power supply.	48 04202
Hardware	Write with complete description of desired hardware.	
Heat Block	Heat transfer block for 8873 tubes, Beryllium Oxide.	89 01920
Heat Sink	Heat dissipating sink for 8873 tubes.	48 04601
Heat Sink	Heat dissipating sink for rectifying diodes.	48 04600
J1	JACK: ALC OUT, chassis jack, male.	16 35010
J2	JACK: HIGH VOLTAGE, male, pin jack.	16 20000
J3	JACK: RF IN, coax connector, UG 290 A/U, BNC.	16 00290
J4	JACK: RF OUT, coax connector, M-359.	16 00359
J5	JACK: RELAY CONTROL, chassis jack, male.	16 35010
Knob	Multiswitch, load, tune, black plastic knobs	36 12512
Knob	Bandswitch, black plastic knob	36 00407
L1	INDUCTOR: 10 meter input coil, .3 uh.	32 20001
L2	INDUCTOR: 15 meter input coil, .47 uh.	32 20002
L3	INDUCTOR: 20 meter input coil, .7 uh.	32 20003
L4	INDUCTOR: 40 meter input coil, 1.1 uh.	32 20004
L5	INDUCTOR: 75 meter input coil, 2.8 uh.	32 44002
L6	INDUCTOR: 80 meter input coil, 2.8 uh.	32 44002
L7	INDUCTOR: 75 meter coil, 15 turns.	32 24382
L8	INDUCTOR: 80 meter coil, 14 turns.	32 24381
L9	INDUCTOR: RF choke, 2.5 mh, 160 ma, 300 turn, 5%.	85 06302
L10	INDUCTOR: RF choke.	85 20000
L11	INDUCTOR: Toroidal wound filament choke.	85 11111
L12 and L13	INDUCTOR: Parasitic choke, silver flashed copper strap.	85 20001
L14	INDUCTOR: 10 meter coil, silver flashed copper strap.	32 11112
L15	INDUCTOR: Plate choke, wound on teflon core.	85 33332
L16	INDUCTOR: Tank coil, silver flashed copper strap, 17 turns.	32 23257
L17	INDUCTOR: L-section coil, 13 turn, silver flashed copper wire.	32 01608
L18	INDUCTOR: RF choke, 2.5 mh, 115 ma, 10%.	85 21000
L19 and L20	INDUCTOR: RF choke, 2.5 mh, 160 ma, 300 turn, 5%.	85 06302
L101	INDUCTOR: Filter choke, 10 h.	85 16137
Light Bracket and Socket	Sectioned compartments and perforated mounting board	41 20000
M1	METER: Tune meter, center 0, 0-100 ma movement.	52 00111
M2	METER: Multimeter, 0-1 ma movement, 0-1 amp scale and 0-2500 volt scale.	52 00035
Manual	2K Ultra operating and maintenance manual.	92 20000
Metalwork	Please write with a complete description.	
P1	PLUG: Interconnecting, 12 contacts, recessed.	16 00312
P101	PLUG: High voltage, tip jack.	16 20002
PL1 through PL6	LIGHT: Band switch lights	40 06038
Plate Caps	Aluminum plate clamps for 8873 tubes.	89 15652
Plugs	SWR Bridge, male phono plug.	16 03504
Pointers	Tune, load, and multimeter plastic pointers.	36 20000
R1 and R2	RESISTOR: Carbon, 47 ohm, 2 watt, 10%.	68 60470
R3	POTENTIOMETER: 100 K ohm, 2 watt, linear.	60 01011
R4	RESISTOR: Carbon, 1 K ohm, 1 watt, 5%.	68 10013
R5	RESISTOR: Carbon, 68 K ohm, 1 watt, 10%.	68 20683
R6	RESISTOR: Carbon, 220 ohm, 2 watt, 10%.	68 62200
R7 and R8	POTENTIOMETER: 500 ohm, type F.	60 20000

SCHEMATIC NO.	DESCRIPTION	NUM
R9 and R10	not used	
R11	RESISTOR: Precision, 4.7 ohm, ½ watt, 1%.	68 04
R12	RESISTOR: Precision, .511 ohm, 1 watt, 1%.	68 05
R13 and R14	RESISTOR: Carbon, 39 K ohm, ½ watt, 10%.	68 40
R15	RESISTOR: Carbon, 680 ohm, ½ watt, 10%.	68 46
R16	POTENTIOMETER: SWR ADJUST, wirewound, 10 K ohm, ½ watt.	60 10
R17	RESISTOR: Vitreous enamel, 10 K ohm, 10 watt, 5%.	68 80
R101	RESISTOR: Carbon, 2.2 ohm, ½ watt, 10%.	68 40
R102	RESISTOR: Vitreous enamel, wirewound, 25 ohm, 10 watt, 5%.	68 80
R103	RESISTOR: Vitreous enamel, wirewound, 12 ohm, 10 watt, 5%.	68 80
R104	RESISTOR: Vitreous enamel, wirewound, 25 ohm, 25 watt, 5%.	68 00
R105 through R107	RESISTOR: Vitreous enamel, wirewound, 20 K ohm, 50 watt, 5%.	68 00
R108	RESISTOR: Vitreous enamel, wirewound, 75 ohm, 25 watt, 5%.	68 90
R109 through R112	RESISTOR: Precision, 1 M ohm, 2 watts, 1%.	68 00
R113	RESISTOR: Carbon, 10 K ohm, 2 watt, 10%.	68 60
R114	RESISTOR: Carbon, 470 K ohm, 2 watt, 10%.	68 64
RY1	RELAY: 3PDT, 12 VDC, 10 amp, antenna relay.	64 01
RY101	RELAY: Time delay, 60 seconds, 6 volts.	64 06
RY102	RELAY: Flasher, 90 seconds, 6 volts.	64 06
S1A	SWITCH: Multiswitch, index assembly for S1B and S1C.	76 20
S1B	SWITCH: Multiswitch, ceramic wafer, 6 position, non-shorting.	76 20
S1C	SWITCH: Multiswitch, phenolic wafer, 6 position, shorting.	76 20
S2A	SWITCH: Bandswitch, lights, phenolic wafer, 6 position, non-shorting.	76 20
S2B	SWITCH: Bandswitch, L-section, ceramic, 6 position, shorting.	76 20
S2C	SWITCH: Bandswitch, tank coil, ceramic, 6 position assembly.	76 11
S2D and S2E	SWITCH: Bandswitch, input section, ceramic, 6 position, non-shorting.	76 20
S3	SWITCH: Thermal sensor, 210°F, NO.	76 34
Shaft	Bandswitch, ¼ inch brass rod.	48 20
Shaft	Load Control, ¼ inch micarta rod.	48 20
SK1	SOCKET: 12 contact, w/clamp, modified.	16 20
SK101 and SK102	SOCKET: 9 pin, for relays.	65 20
SWR	SWR BRIDGE ASSEMBLY: See separate parts list.	56 11
T101	TRANSFORMER: Primary-115/230, secondary-2400V, 6.3V, 18V.	84 75
TB101	TERMINAL BOARD: Heavy duty, 5 position, with jumpers and marker strip.	80 20
Tube Sockets	For 8873 tubes w/ring.	89 08
Tube		
V1 and V2	ELECTRON TUBE: 8873	88 08
Verniers	Tune and Load dials verniers.	56 11

### SWR BRIDGE PARTS LIST

The parts listed below can be ordered separately as replacement parts for the SWR Bridge.

C81	CAPACITOR: Silver mica, .01 mf, 500 WVDC, 5%.	08 30
C82	CAPACITOR: Not used.	08 15
C83	CAPACITOR: Ceramic disc, .01 mf, 600 WVDC, GMV.	08 06
C84	CAPACITOR: Not used.	08 15
C85	CAPACITOR: Silver mica, .01 mf, 500 WVDC, 5%.	08 30
C86	CAPACITOR: Ceramic disc, .01 mf, 600 WVDC, GMV.	08 06
D80 and D81	DIODE: Germanium, type 1N34, 100 PIV, 800 ua rev., 8.5 ma.	73 00
J1	ANTENNA CONNECTOR: Type SO-239.	16 02
R80 and R81	RESISTOR: Carbon, 20 ohm, 1 watt, 10%.	68 20
The remaining parts can only be ordered as an assembled SWR-Bridge with the following number:		
SWR	SWR BRIDGE ASSEMBLY	56 11

FIGURE 4. 2K ULTRA RF DECK PARTS DIAGRAM

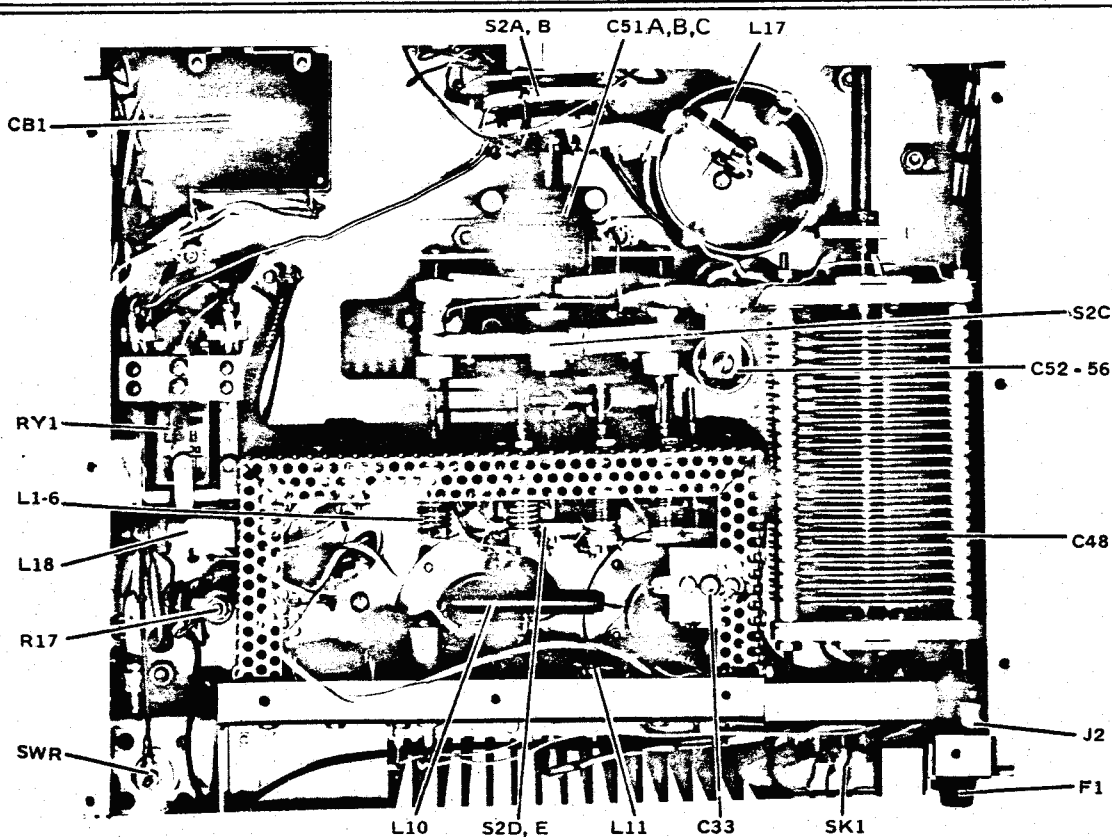
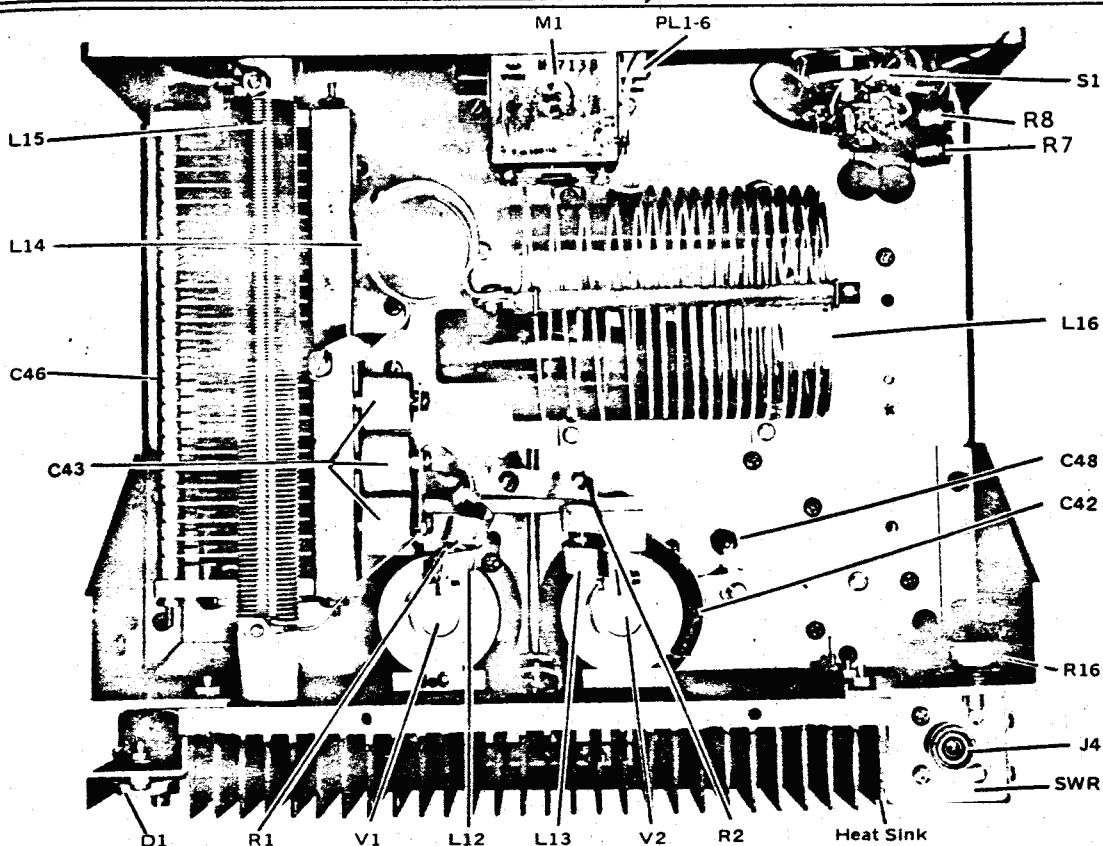
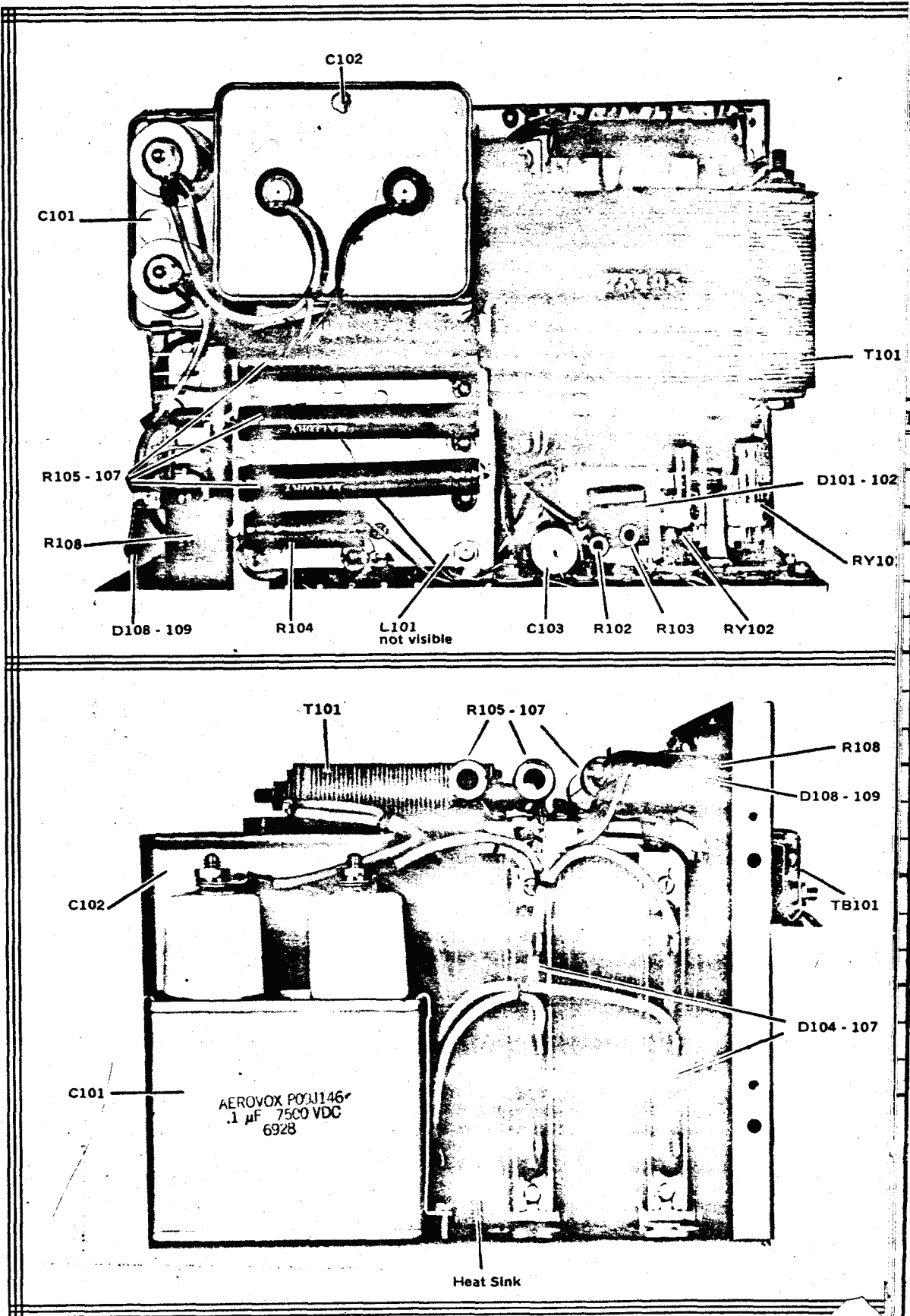
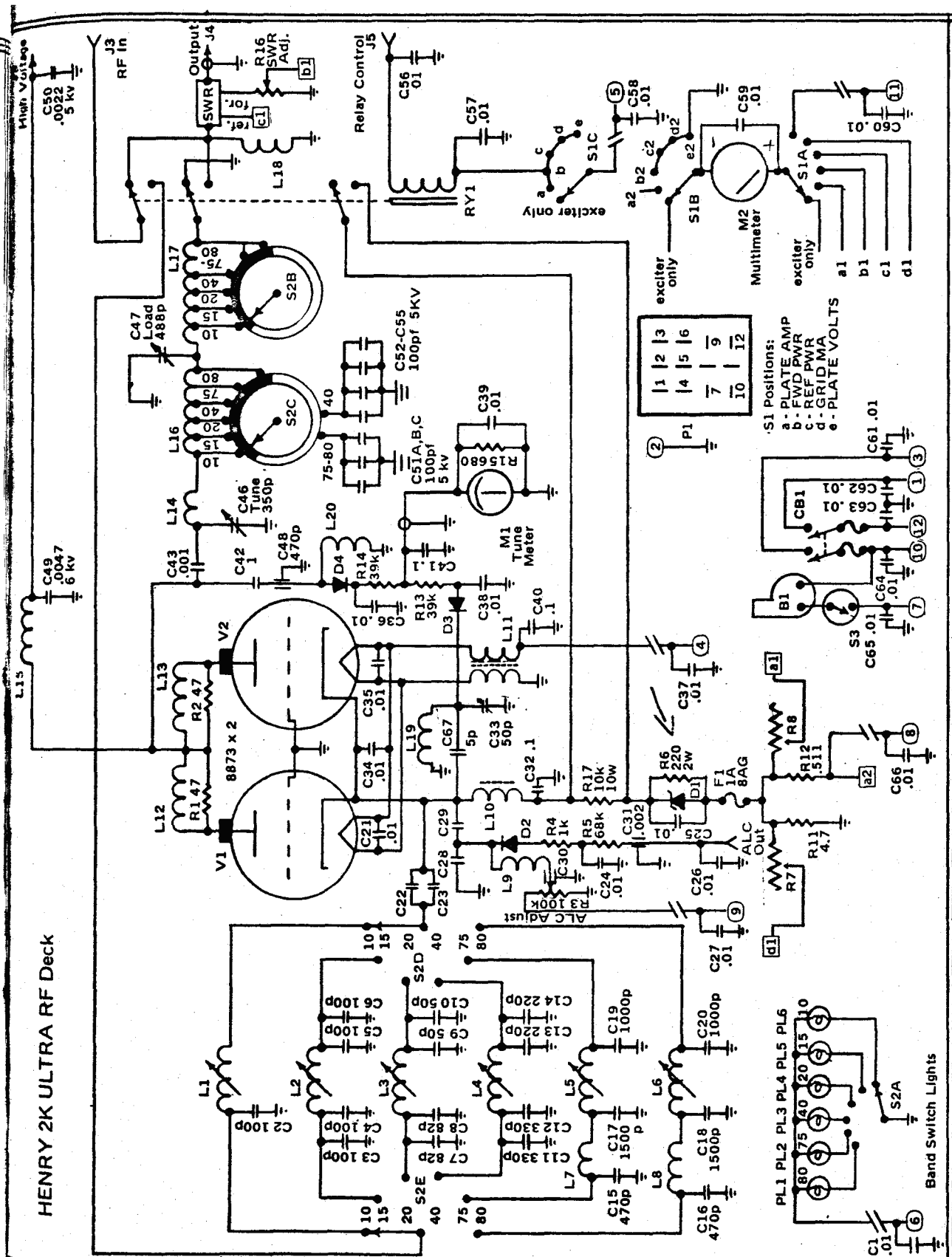


FIGURE 5. 2K ULTRA POWER SUPPLY PARTS DIAGRAM

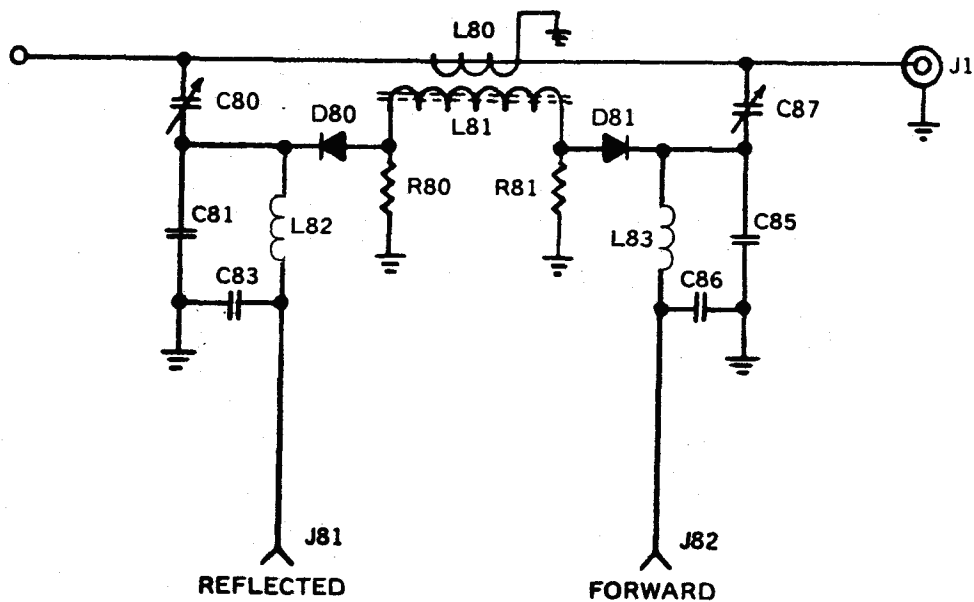








## SWR BRIDGE



# TUNE AND LOAD SETTINGS.

Serial Number 04-218

These are approximate settings for a 52 ohm load.

FACTORY DATA      SSB Settings       $I_p = 400 \text{ ma}$

BAND	TUNE DIAL	LOAD DIAL
80	4	86
75	0	62
40	20	55
20	51	31
15	75	56
10	78	62

These readings are approximate settings for the middle of the frequency range of each band.

## USER DATA

BAND	TUNE DIAL	LOAD DIAL	GRID MA	OUTPUT WAT
80				
75				
340 40	19	30		
20				
15				
10				