

HENRY ELECTRONICS, INC.

**2K-4 OPERATING
AND
MAINTENANCE MANUAL**

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	H E N R Y 2 K - 4	
	OPERATING AND MAINTENANCE MANUAL	
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S P E C I F I C A T I O N S

TYPE AND FUNCTIONS OF EQUIPMENT	The 2K-4 is a 2000 watt PEP input (1200 watt nominal output) linear amplifier, covering the 80, 40, 20, 15, and 10 meter bands. Plug in input modules permit operation on any frequency from 3.5 to 30 MHz.
TUBE COMPLIMENT	Two 3-500Z grounded grid triodes.
FREQUENCY RANGE (Standard Configuration)	Any frequency from 3.5 to 30 MHz by retuning the input circuits. 80 Meters — 3.5 to 4.0 MHz 40 Meters — 7.0 to 7.3 MHz 20 Meters — 14.0 to 14.4 MHz 15 Meters — 21.0 to 21.45 MHz 10 Meters — 28.0 to 29.7 MHz
TYPE OF EMISSION	SSB, AM, CW, FM, and RTTY.
DUTY CYCLE	Continuous duty in all modes.
POWER REQUIREMENTS	230 VAC, 3 wire, 15 amperes, single phase, or 115 VAC, 30 amperes.
DRIVE POWER REQUIRED	SSB, CW, AM — 80 to 150 watts.
INPUT POWER	2 KW PEP SSB 1 KW CW, AM, FSK
OUTPUT POWER	1 KW PEP minimum
PLATE POWER INPUT: SSB	Nominal average input of 1000 watts with speech. Distortion products are at least 35 db down from the signal.
OUTPUT IMPEDANCE	52 ohms unbalanced with SWR not to exceed 2:1.
INPUT IMPEDANCE	52 ohms
HARMONIC AND OTHER SPURIOUS RADIATION	Second Harmonic — 60 db. Third order distortion — 35 db at full power output.
NOISE LEVEL	—40 db or better below one tone carrier at 1 KW.
ALC CIRCUIT	Prevents overdrive from today's high power exciters and boosts average talk power.
PROTECTIVE DEVICES	All removable panels are interlocked. The input line is fused with 15 amp circuit breakers on each side. Electrical reset high voltage overload relay.
METERING	Plate Meter — 0-1 amperes plate current Multimeter — 0-4000 volts plate voltage or Reflected Power or Forward RF Power or 0-400 ma grid current.
FRONT PANEL CONTROLS	Band selector — PA Load — PA Tune — Meter Switch: Plate Voltage, Reflected Power, Forward Power, and Grid Current — Off-On Power Switch.
REAR CONNECTIONS	RF Input, Antenna relay, ALC, RF Output (PL-259).
DIMENSIONS	32½" h x 16 " w x 20 " d - Console 15¾" h x 15½" w x 13 " d - Power supply 13 " h x 16 " w x 18½" d - RF Deck
WEIGHT	135 pounds (150 pounds packed)



Figure 1. 2K-4 Console.



Figure 2. 2K-4 Desk Model.

TABLE OF CONTENTS			LIST OF ILLUSTRATIONS	
	Specifications		Figure 1. 2K-4 Console	
Section 1.	Introduction	1	Figure 2. 2K-4 Desk Model	
Section 2.	Installation	1	Figure 3. Power Input Terminals	3
Section 3.	Operation	3	Table 1. Troubleshooting	8
Section 4.	Protective System	6	Figure 4. RF Deck Components	13
Section 5.	Service	7	Figure 5. Power Supply Components	14
	Warranty	9	Desk Model Power Supply	15
	Parts List	10	2K-4 RF Deck Schematic	16
			2K-4 Power Supply Schematic	17
			Table 2. Tune and Load Settings	18

SECTION 1 INTRODUCTION

The 2K-4 is a one stage amplifier designed for SSB, CW, FSK, and AM operation on the amateur bands from 3.5 to 29.7 MHz and on frequencies outside the amateur bands. On the frequencies outside the amateur bands it may be necessary to retune the appropriate cathode input module. These plug-in modules are located next to the 3-500Z tubes and carry the individual band designations 10 through 80 meters on the top of their shields.

The 2K-4 is a one piece floor console or a two piece desk model consisting of a complete RF deck and a separate power supply. The amplifier is normally supplied for operation from a three wire 220 volt 50/60 Hz circuit. It can be adapted for operation from 110 volts 50/60 Hz by rewiring the terminal block on the lower deck of the power supply.

SECTION 2 INSTALLATION

2.1 UNPACKING

Remove the amplifier from its carton and packing material and examine it for visible damage. If the unit has been damaged in shipment, save the box and packing materials and notify the transportation company. It is a good idea to save the box and packing in any case because they are expensive and very convenient when the amplifier is going to be moved. The two 3-500Z tubes and their chimneys, shipped in a second carton, must be installed before operating the amplifier.

2.2 INSTALLATION OF THE 3-500Z TUBES AND CHIMNEYS

Remove the perforated top cover of the cabinet and the interior top shield, giving access to the interior of the RF deck.

Now put the 3-500Z tubes into their sockets. Next set the air system chimneys in place, making certain the pyrex cylinders are pushed down flush against the chassis and gripped on the outside of the glass by the spring clips mounted on the chassis. When the chimneys are in place check that the formed tops of the chimney allow at least $\frac{1}{4}$ " clearance from the envelope of the tube so that air can circulate freely from the bottom to the top of each tube for efficient air cooling of the tubes. Now fasten each plate lead to its appropriate anode connector. Remove the screw in the top of each anode connector on top of the tube and flex the parasitic choke and plate lead until the mounting hole in the plate is positioned directly above the screw hole in the anode connector. Insert the screw and hold the plate lead firmly while tightening the screw.

CAUTION

Do not exert too great a pressure or twist on the anode connection. Excessive pressure can cause a hairline fracture in the tube's glass envelope, destroying the tube. The tube pins are particularly delicate, and can easily break if the tube is not inserted and removed very carefully.

There are five cathode input plug-in modules for the amateur bands (labeled 10, 15, 20, 40, and 75-80) located in a line directly adjacent to the 3-500Z tubes. Check the modules to see that they are firmly seated in their sockets.

Replace the top shield but leave the outside cover off until the amplifier has been connected and tested.

2.3 CABLING

ANTENNA- The coaxial antenna lead should be plugged into the SO-239 RF output connector on the rear 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.

INPUT- The RG-58A/U input cable connects to the RF INPUT connector on the back of the amplifier. The other end of this cable is terminated by a phono plug and should be inserted in the RF output socket 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 ALC cable into the phono socket marked ALC OUTPUT and into the ALC socket of the exciter. If the exciter does not have provision for feed back 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 socket marked RELAY CONTROL on the back 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 volt DC relay supply.

The relay cable can be plugged directly into the socket marked ANTENNA RELAY on the exciter. When the 2K-4 is excited by a driver unit without an antenna relay socket it may be necessary to consult the circuit diagram of the exciter to find an available unused relay contact that is normally open in the receive condition and closed in the transmit condition. All current SSB transmitters and transceivers have a relay contact available for amplifier control, and most have the contact at a terminal board or jack on the back panel of the exciter.

POWER- The AC power cable is a three-conductor cable. The green lead connects directly to ground and the black and white leads connected to 220 volts 50/60 Hz at 15 amps. Select a three-prong plug that matches the power receptacle at the operating position and fasten the plug to the power cable. Be sure the 220 volts is applied to the black and white wires and the neutral lead is connected to the green wire of the power cable.

CAUTION

The amplifier will be damaged if the green wire is connected to one of the 220 volt power leads.

2.4 OPERATION AT 110 VOLTS

The 2K-4 is normally supplied for operation from a three-wire 220 volt 50/60 Hz circuit. The unit can be adapted for operation from 110 volt 50/60 Hz by changing the wiring of TB201 on the lower deck of the power supply, as follows:

Disconnect the green wire from terminal 10. It may be left free of any connection or secured to chassis ground. Preferably it should be secured to ground.

Remove the jumper connecting terminals 8 and 9 so they are no longer connected.

Use the jumper to connect terminals 7 and 8 together. Use additional jumpers to connect terminals 9, 10 and 11 together.

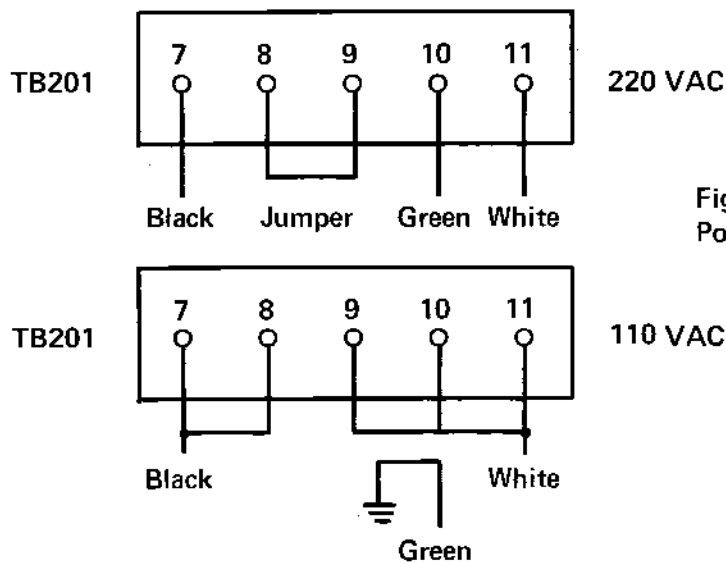


Figure 3.
Power Input Terminal Connections

SECTION 3 OPERATION

3.1 PRELIMINARY SETTINGS

Set the band selecting switch to the desired band.

Set the TUNE and LOAD controls, on the front panel, to the calibration readings for the selected band as shown on the final test sheet.

When the amplifier is turned off its internal relay automatically connects the output of the exciter directly into the antenna transmission line. With the amplifier off, tune the exciter to the desired frequency. Then switch the exciter to its standby condition.

Turn the 2K-4 on. The TUNE and LOAD dials should be lighted, and the blower operating. Look down through the top shield to verify that the filaments of the 3-500Z tubes are lighted and place your hand directly above each tube to make certain air is circulating in the cooling system.

Set the multiswitch to the VOLT X 10 position. The multimeter reading should be between 280 and 320, indicating a plate voltage of 2800 to 3200 VDC. With normal line voltage and no RF drive applied, the plate meter should show a resting current between 150 and 200 ma.

NOTE

The 3-500Z tubes should show color, glowing a dull cherry red with 400 ma plate current, and possibly a bright orange at 800 ma. When so operated, the tubes are well within their rated operating limits and no damage will result, provided the plate current has been dipped to a minimum reading using the TUNE control. Do not operate the tubes with 800 ma current in an off-resonance condition, and do not operate the tubes with 400 ma for long periods of time in an off-resonance condition. Depending on the line voltage at 1 KW output, the plate current will be between 650 and 800 ma.

3.2 TUNING PROCEDURE

Set the multiswitch to the GRID MA position. With the exciter set for zero RF output, press the push-to-talk switch of the exciter, causing the exciter and 2K-4 to be in the transmit mode. The

plate meter should show a resting plate current between 150 and 200 ma. Gradually increase the RF output of the exciter until the 2K-4 has grid current of 100 to 125 ma.

Adjust the TUNE control for the lowest dip. The minimum meter reading indicates resonance.

If the LOAD control is properly set the plate current will read 400 ma. If the plate current is less than 400 ma, increase the load slightly by moving the LOAD control for a lower number reading. If the plate current is more than 425 ma, decrease the loading slightly.

Be sure to redip the TUNE control each time the LOAD control is changed. The resonance point of the TUNE control is affected by any change in the setting of the LOAD control.

Check that the GRID MA reading on the multimeter is 100 to 125 ma. If the grid current has changed, readjust the output of the exciter until the grid current reading is 100 to 125 ma.

NOTE

This series of tuning and loading adjustments may have to be repeated several times until the desired readings of 100 to 125 ma grid current and 400 ma plate current are obtained. This reading should be $\pm 10\%$. The higher the frequency, the more precisely the load and tune adjustments must be made. Conversely, the lower the frequency, the broader the adjustments can be made.

In the reduced drive condition (grid current of 100 to 125 ma, and plate current of 400 ma) the plate meter dip is sluggish if the LOAD control is at an overcoupled setting. Should there be any difficulty in determining the dip point, turn the LOAD control counterclockwise to obtain less loading, permitting an easier determination of the dip point. The LOAD control can then be increased by rotating it clockwise, until the properly coupled condition of 400 ma is obtained.

3.3 VERIFYING PEAK POWER CONDITIONS

Increase the RF output of the exciter for a plate current reading of 800 ma. With full drive the grid current should be about 280 ma. Do not leave the amplifier in the full drive, full load condition for more than a few seconds at a time. This procedure is only for test purposes to verify peak power conditions.

3.4 ALTERNATE TUNING METHOD

When the tune and load dial calibrations have been verified for each band and the operator feels comfortable with the amplifier, the entire tuning procedure can be completed in a few seconds.

This alternate method (tuning for maximum output) is done by applying RF drive from the exciter to the amplifier and then bringing the FORWARD POWER reading of the multimeter up to about two-thirds of full scale. Then adjust the TUNE and LOAD controls to peak the amplifier output reading as indicated on the multimeter. The 2K-4 will now be properly adjusted for operation. Under normal conditions of operation with single-sideband speech, the PLATE meter will peak at about 400 ma. With the multiswitch set to GRID MA the multimeter will show peaks of 50 to 100 ma.

3.5 F.C.C. LEGAL POWER LIMITATIONS

To avoid exceeding the F.C.C. legal power limitation of 1 KW metered input (2 KW PEP input), calculate the DC power input to the amplifier. To do this, multiply the plate voltage times the plate current (as indicated by the plate meter on voice peaks) and then add the DC power input of the final stage of the exciter. The DC power is added because most of the driving power applied to a grounded-grid amplifier bypasses the tubes, adding to the amplifier's output. The maximum legal input will normally be found at a voice peak plate current reading of slightly less than 400 ma.

DC power input to amplifier = [(plate voltage) x (plate current)] + DC input power to final stage of exciter

The plate voltage is read from the multimeter, set to the VOLT X 10 position.

The plate current is read from the plate meter on voice peaks.

3.6 AM LINEAR OPERATION

To operate AM linear, the amplifier should be tuned and loaded as in Section 3, parts 3.1 and 3.2. For actual operation, the drive should be reduced to a 100 ma reading on the multimeter, set to the GRID MA position, where the linear will operate at 1 KW input and about 350 watts AM linear output.

3.7 CW OPERATION

The 2K-4 will operate CW at its full two kilowatt rating. To operate the unit on CW most efficiently at the F.C.C. allowable 1 KW input, tune and load the amplifier as in Section 3, parts 3.1 and 3.2. Maintain the full 250 to 300 ma of grid drive, as indicated at the GRID MA setting of the multimeter, and reduce power by adjusting the LOAD control clockwise until a maximum of 1 KW input is obtained. For each change of the LOAD control, the TUNE control must be readjusted for lowest dip of the plate current. Power output in this condition will be in the 600 watt range.

3.8 FSK OPERATION

The 2K-4 is designed for continuous operation at 1 KW input. For RTTY, adjust for 1 KW input as described in part 3.7.

3.9 SSB OPERATION

With the exciter and 2K-4 adjusted as described in parts 3.1 and 3.2, the voice peaks indicated on the PLATE meter should be about 400 ma under normal operating conditions. With the multimeter switch set to GRID MA, the multimeter should indicate peaks of 50 to 100 ma.

3.10 FORWARD POWER ADJUSTMENT

The FWD PWR ADJUST control, on the back panel of the 2K-4 RF deck, has been factory preadjusted. If the FWD PWR reading on the multimeter is not near the full-scale reading when the 2K-4 is properly tuned, the control can be recalibrated as follows:

Set the multimeter switch to FWD PWR and turn the FWD PWR ADJUST control fully counterclockwise.

Tune the 2K-4 and its exciter as described in part 3.3. Then rotate the FORWARD POWER ADJUST control clockwise to obtain a full-scale reading on the multimeter.

3.11 ALC ADJUSTMENT

The ALC ADJUST control is on the rear panel of the RF deck. Should adjustment be necessary proceed as follows:

Tune the exciter and the 2K-4 to your favorite operating band. Normally, the 20 meter band should be used for this adjustment because it is at the center of the frequency ranges for which the 2K-4 has been designed.

Loosen the ALC ADJUST locknut, and rotate the ALC ADJUST control fully counterclockwise.

With the output of the exciter at a normal level, with 280 ma grid current and 800 ma plate current, gradually rotate the ALC ADJUST control clockwise, until grid current just starts to decrease.

3.12 POWER READINGS

The multiswitch has positions for forward power output (FWD PWR) and reflected power (REF PWR). After all previously described adjustments have been completed, the switch should be placed in the FWD PWR position and the FWD PWR ADJUST control rotated for a full-scale multimeter reading with low drive from the exciter. With no change of exciter output, and with the multimeter reading still at full scale, set the multiswitch to REF PWR. With a good antenna system there should be almost no reflected power. In no case should the 2K-4 be operated into an antenna with a reflected power reading of more than 200. If there is any doubt concerning the SWR of the antenna, turn the 2K-4 off and check the SWR with only the output of the exciter. Then turn the 2K-4 on.

SECTION 4 PROTECTIVE SYSTEM

4.1 PRIMARY CIRCUIT

A 15 amp circuit breaker is used to protect the primary circuit. Normally this breaker will not be tripped by a high voltage short because the overload relay will be tripped before the circuit breaker. However, certain short circuit conditions in the power transformer or the primary circuit can occur in front of the overload relay.

4.2 HIGH VOLTAGE CIRCUIT

The high voltage circuit is protected by a reset relay. Any high voltage short will automatically trip the overload relay, de-energize the primary power relay, and light the red lamp. When the red reset button switch is pushed, the overload relay is reset and the red lamp goes off.

4.3 AC POWER CIRCUIT

The 2K-4 uses 110 volts AC, 50/60 Hz, to power the blower and the relay power supply. This circuit is protected by two 3 amp fuses.

Certain countries have 220 volt, two wire, AC mains. The 2K-4 may be operated from such mains, but a 100 watt, 220 volt to 110 volt, step-down isolation transformer must be used to provide the required 110 volts to run the blower and relay power supply. When the 2K-4 is operated from a conventional 220 volt, three-wire system, this 110 volt requirement is taken from the neutral wire.

4.4 INTERLOCK CIRCUIT

A magnetic interlock is in series with the 12 volt relay supply. When the cabinet back is removed from the amplifier the interlock is opened, de-energizing the primary power supply.

4.5 HIGH VOLTAGE SHORTING SWITCH

A high voltage shorting switch is located in the RF section. When the top shield is removed the high voltage is shorted to ground.

SECTION 5 SERVICE

CAUTION

Whenever it is necessary to remove the top shield from the power amplifier, make certain the high voltage is off. An automatic shorting bar will ground the high voltage when the top shield is removed.

5.1 CALIBRATION OF THE GRID CURRENT

Turn the amplifier off, remove the top cover from the cabinet, remove the top shield from the RF section, and remove the junction box cover. Disengage the high voltage shorting switch. Disconnect the B+ from the RF section and the ground lead going to the negative side of D1.

Connect a calibrated reference meter, with a 0-500 ma scale, between the negative side of D1 and ground. Turn the amplifier on and adjust the driver output for a midscale reading on the reference meter. Apply drive for short periods of time, about 10 seconds at a time.

Compare the multimeter grid current reading with the reference meter. If the readings do not coincide, adjust the grid current meter adjustment, R13, located between the 3-500Z tubes, until the multimeter coincides with the reference meter. Turn the amplifier off, remove the reference meter, reconnect the B+ connection, and reconnect the ground to D1.

CAUTION

To operate the amplifier with the top shield removed, disengage the shorting bar from its center pin before turning on the high voltage. To operate with the back cover off the amplifier, short the interlock switch. Do not make a practice of operating the amplifier with the top shield or the back cover off and the high voltage exposed. Do so only for purposes of checking, adjusting, or servicing. EXERCISE CAUTION AT ALL TIMES.

5.2 ADJUSTMENT OF THE OVERLOAD RELAY

A low voltage, variable, metered DC supply of 1 ampere is needed for this adjustment. The 2K-4 should stay off during this adjustment.

Connect the DC supply to the slider of R103 and to ground and increase the current of the supply to 1 amp. RY101 should trip. If the relay does not trip, adjust R103 until the relay trips at about 1 amp. When adjusting the overload relay, reset and check the overload current several times to get an average setting. R103 should be about 3 to 4 ohms.

5.3 CALIBRATION OF THE PI-CATHODE INPUT MODULES

The 2K-4 uses individual 50 ohm to 50 ohm pi-cathode input matching modules to achieve low input SWR and maximum drive efficiency. These modules are labeled 10, 15, 20, 40, and 75-80.

The modules are individually adjusted at the factory for the center frequency on each band. They are broadly tuned and will not normally need retuning. The units are plug-in and may be removed from their sockets for servicing.

If the amplifier is to be operated on a frequency outside the amateur bands, it may be advisable to retune the appropriate input module. To retune the module, place an SWR bridge in the drive cable between the exciter and the amplifier. Operate the amplifier in the normal manner to determine the SWR of the circuit.

If the ratio is higher than 1.5:1, loosen the lock nut on the input module to be adjusted and

TABLE 1. TROUBLESHOOTING

PROBLEM	CAUSE	REPAIR
The amplifier does not come on when the ON/OFF switch is turned on.	Improperly Connected AC line. The 3 amp fuse is blown. The 12 volt relay power supply has no voltage output. The power switch is not closing. The interlock switch is open.	Reconnect the line properly. Replace the fuse. Examine for a bad relay. Check it with an ohm meter. Check it with an ohm meter.
The amplifier turns on as soon as the cable is plugged in and will not turn off	The power switch is shorted or inoperative.	Replace the power switch.
There is not high voltage indication on the multimeter.	The overload relay is tripped, as indicated by the red light. The meter circuit is inoperative.	Reset it by pressing the red push-button switch. Check the circuit for malfunction.
No plate current indicated when the amplifier is on and the exciter is transmitting with not RF drive applied.	The relay control cable from the exciter to the 2K-4 may be bad. RY1 may not be operating. If the exciter operates RY1, suspect a poor contact by the center pole of the relay.	Check the cable's continuity. Check for component malfunction. Burnish it and bend the relay center arm slightly to increase the closed pressure.
The plate meter shows current as soon as the high voltage is turned on and the exciter is not transmitting.	RY1 is probably actuating, showing a resting current of 150-100ma on the plate meter, caused by a short in the relay control circuit. If RY1 is not actuated, suspect a grid-filament short in one tube.	Unplug the relay control cable, if RY1 stays actuated the trouble is not in the exciter. Check the relay circuit. Replace the tube.
Excessive plate current.	Bad tube. If one tube fails, it must be replaced before the 2K-4 will operate. The filaments are operated in series resulting in a total filament supply of 10 volts at 15 amps, dividing to 5 volts at 15 amps at each tube.	Replace the tube
The 2K-4 operates normally but no plate current shows.	Bad meter circuit.	Check the meter circuit for any malfunction.
The overload relay will not reset.	A high voltage short. The resistance across the overload relay is wrong.	Check the circuit. (See below) Adjust R103 for a resistance of 3 to 4 ohms.
An arc indicates a high voltage short: Unplug the high voltage plug from the RF amplifier and exciter. If the short persists it is located in the power supply. If the short is in the RF deck.	A power supply high voltage short. An RF deck high voltage short.	Check for visible evidence, an arc usually chars or blackens an area. Make an ohm meter check. Start with the filter condenser and check through the circuit toward the power transformer. Check interconnecting leads for a ground short. Check the filter choke and .1 mf resonating capacitor. Check the reverse resistance of D201-D204. When disconnected, good diodes have infinite resistance and bad diodes read less than 2 ohms resistance in either direction. Check for visible evidence. Make an ohm meter check. Check the high voltage leads.
The circuit breaker is actuated by a short.	Shorted power transformer primary. A shorted rectifier diode.	Check for a short and replace. Check with ohm meter as above and replace.
No plate current and excessive grid current.	Open high voltage circuit.	Examine the circuit and repair.
No grid current and the plate meter does not drive up. Intermittant Grid current.	Exciter malfunction. Cable between exciter and 2K-4 bad. Bad socket connection in that cable. Bad input module.	Turn the 2K-4 off, switch to FWD PWR, operate exciter to antenna and check its operation Check cable continuity. Repair the socket connection. Operate on a different band to isolate the problem Check the exciter output.
Low grid current	Low output from the exciter.	

use an insulated alignment tool to adjust the tuning slug. Tune the slug until the SWR reaches a minimum. The SWR will normally be less than 1.5:1.

CAUTION
Exercise caution when adjusting the tuning slugs. THE HIGH VOLTAGE IS EXPOSED.

For frequencies midway between the amateur bands, it may be necessary to order special input modules from the factory.

5.4 TROUBLESHOOTING

Table 1 on the opposite page is designed to help service the 2K-4 if some malfunction should occur.

HENRY ELECTRONICS STANDARD 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.

2K-4 PARTS LIST

SCHEMATIC NO.	DESCRIPTION	NUMBER
B1	BLOWER: 115 VAC, 1600 RPM.	00 04168
Box	Accessory packing box for the 2K-4.	57 02001
Box	Shipping box and packing for the 2K-4.	57 00400
C1 and C2	CAPACITOR: Ceramic disc, .01 mf, 600 V, GMV.	08 06103
C3 and C4	CAPACITOR: Silver mica, 27 pf, 500 VDCW, 5%.	08 15270
C5 and C6	CAPACITOR: Silver mica, 110 pf, 500 VDCW, 5%.	08 15111
C7	CAPACITOR: Silver mica, 91 pf, 500 VDCW, 5%.	08 15910
C8	CAPACITOR: Silver mica, 82 pf, 500 VDCW, 5%.	08 15820
C9 and C10	CAPACITOR: Silver mica, 160 pf, 500 VDCW, 5%.	08 15161
C11 and C12	CAPACITOR: Silver mica, 150 pf, 500 VDCW, 5%.	08 15151
C13 and C14	CAPACITOR: Silver mica, 390 pf, 500 VDCW, 5%.	08 15391
C15 and C16	CAPACITOR: Silver mica, 360 pf, 500 VDCW, 5%.	08 15361
C17 through C20	CAPACITOR: Silver mica, 620 pf, 500 VDCW, 5%.	08 15621
C21 through C26	CAPACITOR: Ceramic disc, .003 mf, 1000 VDC, GMV.	08 00302
C27 and C28	CAPACITOR: Ceramic transmitting, 1000 pf, 5 K VDCW, 20%.	08 85813
C29A and C29B	VARIABLE CAPACITOR: Tune, air, 20-145 pf, 4.5 KV.	09 15415
C30 through C35	CAPACITOR: Ceramic disc, .003 mf, 1000 VDC, GMV.	08 00302
C36 through C39	CAPACITOR: Ceramic disc, .01 mf, 600 V, GMV.	08 06103
C40 and C41	CAPACITOR: Ceramic disc, .1 mf, 50 V, +80%, -20%.	08 00104
C42 through C47	CAPACITOR: Ceramic disc, .003 mf, 1000 VDC, GMV.	08 00302
C48	CAPACITOR: Ceramic disc, .0047 mf, 6000 VDCW, 20%.	08 60047
C49	CAPACITOR: Ceramic disc, .0022 mf, 6000 VDCW, 20%.	08 60222
C50A and C50B	VARIABLE CAPACITOR: Load, air, 19-488 pf, 2 K V.	09 15403
C51	CAPACITOR: Ceramic disc, .01 mf, 600 V, GMV.	08 06103
C52	CAPACITOR: Feedthrough ceramic, 2000 pf, 500 VDCW, 20%.	08 00202
C53	CAPACITOR: Ceramic disc, .01 mf, 600 V, GMV.	08 06103
C54	CAPACITOR: Feedthrough ceramic, 2000 pf, 500 VDCW, 20%.	08 00202
C55 through C58	CAPACITOR: Ceramic disc, .01 mf, 600 V, GMV.	08 06103
C59	CAPACITOR: Feedthrough ceramic, 2000 pf, 500 VDCW, 20%.	08 00202
C60 and C61	CAPACITOR: Silver mica, 47 pf, 500 VDCW, 5%.	08 15470
C62 through C67	CAPACITOR: Ceramic disc, .01 mf, 600 VDCW, 5%.	08 06103
C101	CAPACITOR: Electrolytic tubular, 500 mf, 25 V.	08 01290
C102	CAPACITOR: Oil filled, 20 mf, 5000 V test.	08 15053
C201	CAPACITOR: Filter, oil filled, .1 mf, 7500 V test.	08 17500
CB1	CIRCUIT BREAKER: 15 amp, 220 VAC.	12 00215
	CABLE: 6', phono plug to phono plug.	04 25025
	CABLE: 10', radio frequency coaxial cable.	04 00010
	CATHODE INPUT MODULES: Specify frequency.	
	CATHODE INPUT MODULE SOCKETS: 4 pin.	16 07804
	CHIMNEY: Air cooling chimney for 3-500Z tubes, glass.	89 00400
D1	DIODE: Rectifier, 10 V, 1.2 amp.	73 00010
D2	DIODE: Silicon rectifier, axial lead, 400 PIV, 1 amp.	73 00157
D101 and D102	DIODE: Auto diode, 150 V, 20 amp.	73 00100
D201 through D204	DIODE: Rectifier, 12 K V, 1.5 amp, RMS.	73 00012
Dial	Tune dial.	36 00400
Dial	Load dial.	36 00401
F1 and F2	FUSE: 3 AG, 3 amp, 250 V.	24 30301
Feet	2K-4 feet, white nylon with 1/4" studs.	36 00402
Fuse Clip	Beryllium Copper, 5 AG to hold D101 and D102.	36 00403
Fuse Holder	3 AG, extractor post.	25 34204
Gears	96 teeth, diameter- 1.5".	28 06496
Gears	192 teeth, diameter- 3.0".	28 64192
Handles	Black plastic cabinet handles.	36 00404
Hardware	Write with a full description if any hardware is required.	
High Voltage Plug	Low loss high voltage terminal and thru-bushing.	16 37501
J1	CONNECTOR: Coax connector, type SO-239/U.	16 00239
J2 and J3	JACK: Chassis jack, male, RF IN and ALC OUT.	16 35010
J4	CONNECTOR: Coax connector, type UG-290A/U BNC.	16 00290
Knob	Band switch knob, black plastic.	36 00405
Knob	Multiswitch and power knob, black plastic.	36 00406
Knob	Tune and load knob, black plastic.	36 00407
L1	COIL: 10 meter cathode input coil.	32 00401
L2	COIL: 15 meter cathode input coil.	32 00402

SCHEMATIC NO.	DESCRIPTION	NUMBER
L3	COIL: 20 meter cathode input coil.	32 00403
L4	COIL: 40 meter cathode input coil.	32 00404
L5	COIL: 75-80 meter cathode input coil.	32 00405
L6	CHOKE: Silver flashed copper strap, parasitic choke.	85 22222
L7	CHOKE: Toroidal wound filament choke.	85 11111
L8	COIL: Silver flashed copper strap, 10 meter coil.	32 11111
L9	CHOKE: Silver flashed copper strap, parasitic choke.	85 22222
L10	CHOKE: Radio frequency filter, 50 uh, 2 amp, 20%.	85 05240
L11	CHOKE: Plate choke, radio frequency, wound on a teflon rod.	85 33333
L12	COIL: Tank coil, silver flashed copper tubing.	32 23255
L13	COIL: L-Section Coil, silver flashed copper tubing.	32 01608
L14	CHOKE: Radio frequency, 1.7-30 MHz, 1.0 mh, 500 ma.	85 02752
L15	CHOKE: Radio frequency, 2.5 mh ferrite core, 160 ma.	85 06302
L201	CHOKE: 8 henry, 700 ma.	85 16327
Light Sockets	Miniature bayonet w/bracket, dial light bracket.	41 14661
M1	METER: Multimeter, 0-400 ma scale, and 0-4000 V scale.	52 09990
M2	METER: Plate meter, 0-1 amp scale.	52 09991
Manual	Operating and Maintenance Manual - 2K-4.	92 00400
Metal Work	Write with a full description if any metal work is required.	
P1	PLUG: 11 pin CP plug w/shield.	16 86011
Plate Caps	Plate cooling cap for 3-500Z tubes.	89 03506
Plug	Plug for connections to SWR Bridge	16 03504
Power Cord	8', black 14/3, three wire cable.	04 00143
PL1 and PL2	PILOT LIGHT: Dial pilot lamp, 12 volt, bayonet base.	40 18500
PL3	LIGHT: Reset light, neon, red, miniature light assembly.	40 85802
R1	RESISTOR: Carbon, 150 K ohm, 2 watt, 10%.	68 61503
R2 through R5	RESISTOR: Carbon, 10 ohm, 1/2 watt, 10%.	68 40100
R6 and R7	RESISTOR: Carbon, 150 ohm, 2 watt, 10%.	68 40100
R8 through R11	RESISTOR: Carbon, 10 ohm, 2 watt, 5%.	68 40100
R12	RESISTOR: Carbon, 150 ohm, 2 watt, 5%.	68 51500
R13	POTENTIOMETER: Wire wound, 250 ohm, 5 watt.	60 00251
R14 and R15	RESISTOR: Carbon, 150 ohm, 2 watt, 10%.	68 61500
R16 through R19	RESISTOR: Carbon, 10 ohm, 1/2 watt, 10%.	68 40100
R20	POTENTIOMETER: Wire wound, 10 K ohm, 1/2 watt.	60 10100
R21	RESISTOR: Vitreous, fixed, 75 ohm, 10 watt.	68 80750
R22	RESISTOR: Vitreous, fixed, 10 K ohm, 25 watt.	68 90103
R23	POTENTIOMETER: Wire wound, 100 K ohm, type J.	60 01041
R24	RESISTOR: Carbon, 1 K ohm, 1 watt, 10%.	68 20013
R25	RESISTOR: Carbon, 150 ohm, 2 watt, 10%.	68 20683
R101	RESISTOR: Carbon, 150 ohm, 2 watt, 10%.	68 61500
R102	RESISTOR: Carbon, 5 ohm, 2 watt, 10%.	68 60050
R103	RESISTOR: Vitreous, adjustable, 7.5 ohm, 25 watt.	68 00750
R104	RESISTOR: Vitreous, 1 ohm, 25 watt.	68 90010
R105 through R107	RESISTOR: Vitreous, 20 K ohm, 100 watt, bleeder resistors.	68 00203
R109 through R113	RESISTOR: Carbon, 1 M ohm, 2 watt, 1%.	68 00016
R114 and R115	RESISTOR: Carbon, 470 K ohm, 2 watt, 5%.	68 54703
R116	RESISTOR: Carbon, 910 ohm, 1 watt, 10%.	68 29100
RY1	RELAY: 3PDT, 12 VDC, 10 amp, antenna relay.	64 01025
RY101	RELAY: 4PDT, 6 VDC, 5 amp.	64 00170
RY201	RELAY: 2PDT, 12 VDC, 25 amp.	64 00004
S1	SWITCH: Power, rotary, SPST, 3 amp, 250 V.	76 01561
S2	SWITCH: Reset, SPDT, push button, momentary action.	76 00903
S3	SWITCH: Magnetic High Voltage interlock.	76 00039
S4	SWITCH: Multiswitch, rotary, 4 position.	76 32340
S5 (A, B, C, D)	SWITCH: Band switch assembly.	76 11111
S6	SWITCH: High Voltage shorting switch.	76 22222
SK1	SOCKET: 11 pin female connector.	16 78011
SWR	SWR BRIDGE ASSEMBLY: See the next page.	56 11111
T101	TRANSFORMER: Relay step down, primary 220 VAC, secondary 12 VAC, center tap.	84 70739
T201	TRANSFORMER: Power, primary 115/230 VAC, secondary 2500 VAC at 400 ma, and 10.2 VAC at 15 amp.	84 70581
TB101 and TB201	TERMINAL BOARD: Heavy duty 12 terminal, w/marker.	80 14212
Tube Sockets	5 pin socket, with ventilating holes, for 3-500Z tubes.	89 22275
V1 and V2	ELECTRON TUBE: 3-500Z high mu power triode.	88 03500

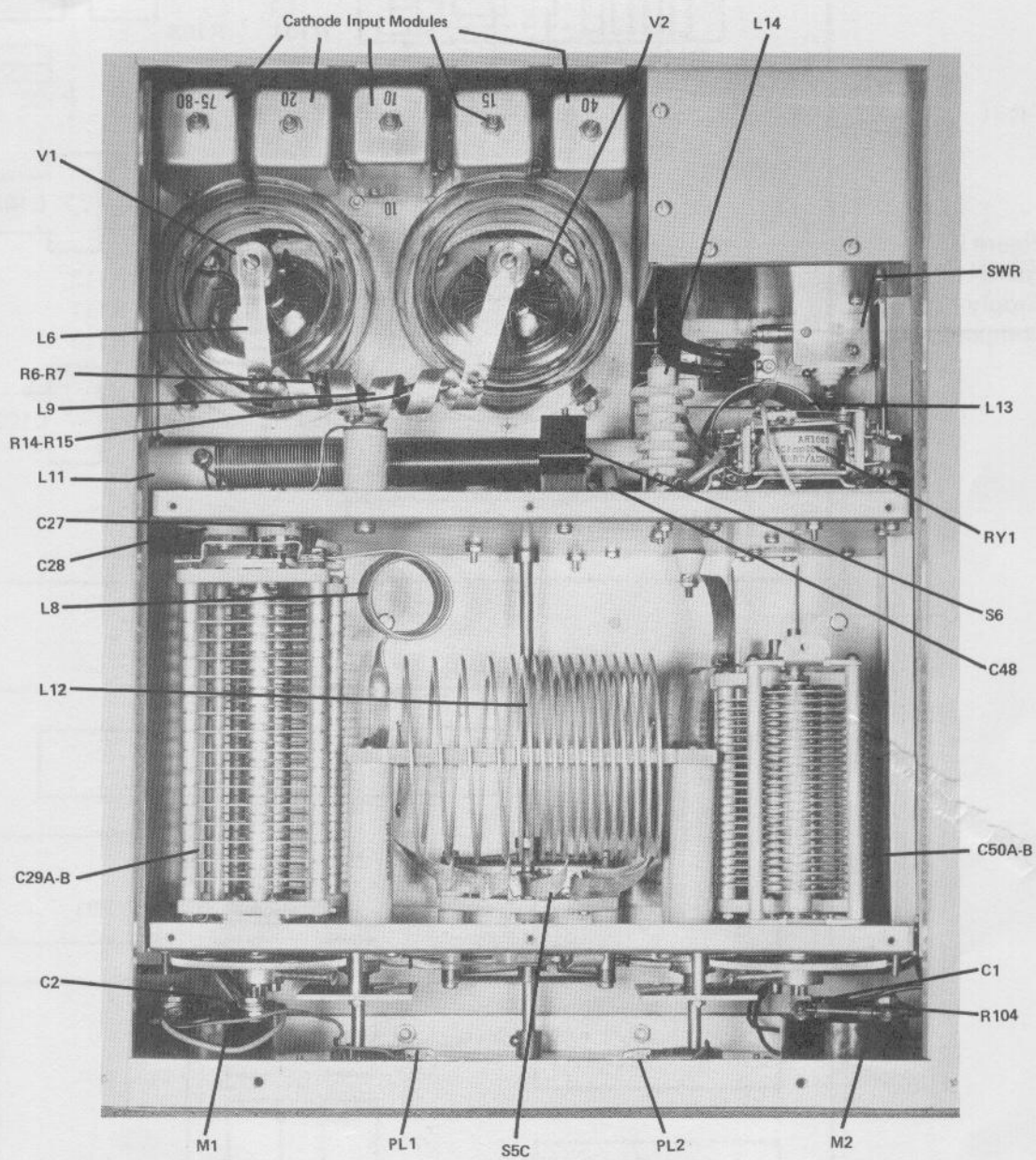
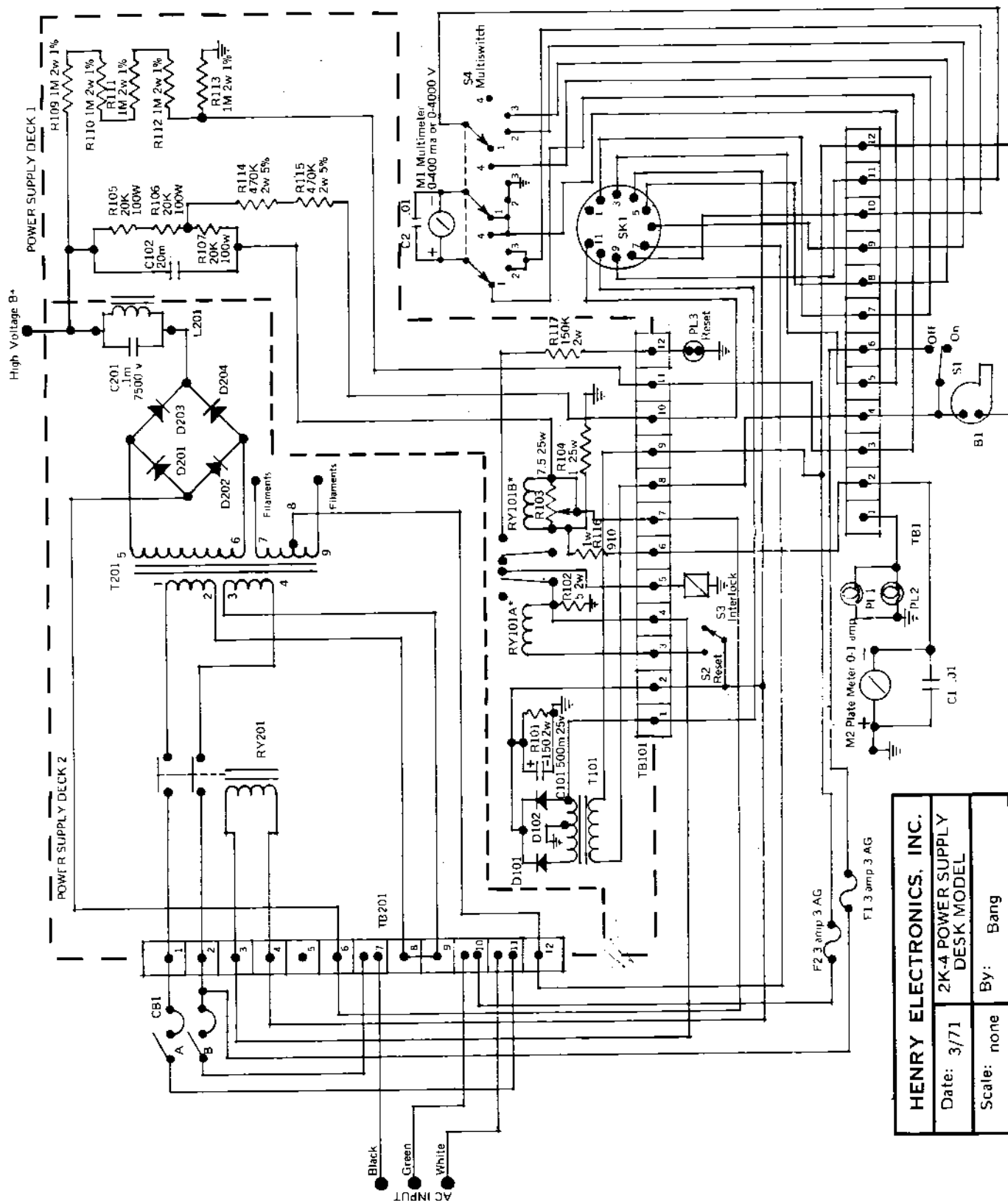


Figure 4. RF Deck Components.



NOTES:

(1) All capacitor values are in microfarads unless a p denotes picofarads.

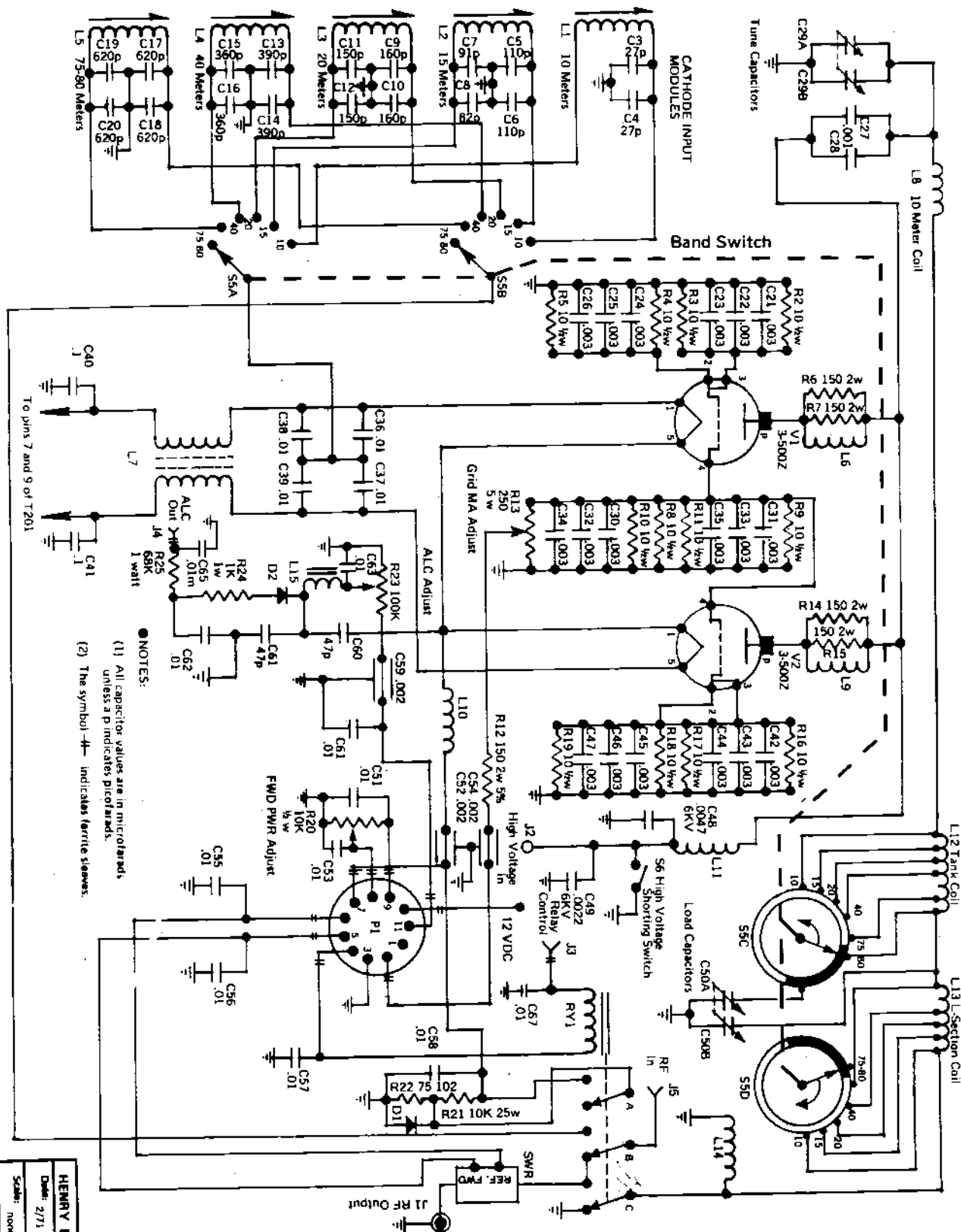
(2) On each relay one set of terminals is not used and not indicated on the schematic.

(3) All 200 schematic numbers are located on deck 2 of the power supply, and all 100 schematic numbers are located on deck 1 of the power supply and all other parts are on the REF deck or the front panel.

(4) Multiswitch Positions.

1. VOLTS X 10
2. FOLD PWR
3. REF PWR
4. GRID MA

HENRY ELECTRONICS, INC.	
Date: 3/71	2K-4 POWER SUPPLY DESK MODEL
Scale: none	By: Bang



HENRY ELECTRONICS, INC.			
Date:	2/71	2K-4 RF DECK	
Scale:	none	By:	Bang

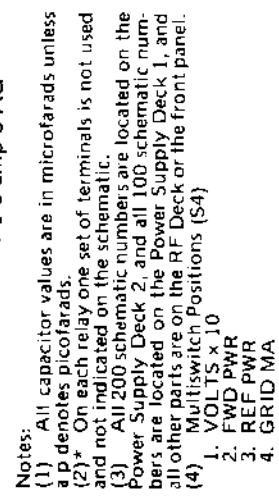


TABLE 2. TUNE AND LOAD SETTINGS.

Serial Number A145E1

These are approximate settings for a 52 ohm load.

$$I_p = 800 \text{ mA}$$

BAND	TUNING DIAL	LOAD DIAL	GRID CURRENT	OUTPUT WATTS
80	142	181	280 ma.	1000+
40	88	102	"	"
20	54	114	"	"
15	22	112	"	"
10	18	95	"	"

BAND	TUNING DIAL	LOAD DIAL	GRID CURRENT	OUTPUT WATTS
			ma.	
80				
40				
20				
15				
10				

