

# Henry RF Amplifier Troubleshooting Tips

**EXCESSIVE PLATE CURRENT** - This symptom is usually caused by a defective 3-500Z tube, and the only cure is to replace the tube. The amplifier can not be operated with just one tube because the filaments are in series - - 10 volts at 15 amps (5 volts per tube).

Excessive resting plate current can often be caused by a failure of D1, the bias diode. Replace the diode to solve the problem.

**GRID/FILAMENT SHORT** - A failure of this nature in the 3-500Z can cause the amplifier to show plate current even when it is not keyed. Another indication of this problem is negative grid current on the meter. Again the tube must be replaced to correct the problem.

**PLATE SHORT** - A failure of this nature will cause the circuit breaker to blow. Other high voltage shorts can cause the same symptom so you must isolate the cause. If the shorted condition causes excessive plate current, the cathode fuse will blow.

**LOW OUTPUT** - A 3-500Z can offer many years of reliable service, but if you operate the amplifier out of resonance the tubes will eventually go "soft" making it impossible to drive the amplifier to full output.

**RESTING CURRENT WHEN AMPLIFIER NOT KEYED** - If the relay is keyed you will see normal tube resting current, therefore you must suspect that the relay cable, exciter's relay, or one of the relays is malfunctioning. Isolate the problem by disconnecting the relay cable. If the problem persists, the cause is in the amplifier. If the problem disappears the cause is in the exciter or cable. A problem in the amplifier would normally be caused by a short in the 12 VDC circuit or a defective relay.

**THE AMPLIFIER WILL NOT KEY** - Suspect first the relay cable, then check the exciter's relay circuit. Henry amplifiers key with 12 VDC and some modern exciters use diode switching. This combination sometimes causes a voltage drop in the relay line so that the relays will not key. Measure the resistance across the exciter's relay contact. Any resistance can cause a voltage drop. If this is the case, a higher voltage external relay may be required or a modification might be required to the exciter. Another cause could be the relay power supply is not providing the 12 VDC. Check the voltage at the center pin of the relay jack, it should be between 12 and 20 VDC. If there is not voltage check first the 3 AG fuses, then the components in the relay power supply. A last cause of the problem could be a defective relay.

The high voltage in your amplifier can be lethal! Always disconnect the amplifier from its AC power source and turn off the power switch before repairing it.

**NO PLATE CURRENT WITH HIGH GRID CURRENT** - This is a sure indication of a break in the high voltage line between the power supply and the tube. You must unplug the amplifier and trace the circuit with an ohm meter to find the break.

**HIGH VOLTAGE SHORT** - A high voltage short will usually result in the circuit breaker turning the amplifier off. Also there will often be an arc indicating the source of the short. Isolate the short by disconnecting the high voltage lead between the RF section and the power supply. If the short persists, the problem is in the power supply. If it disappears the problem is in the RF section. If the short is in the RF section, remove the top cover and search for visible evidence. Then use an ohm meter to trace the circuit from the high voltage input socket to the blocking capacitors, including the tubes. If the problem exists in the power supply you will again have to use an ohm meter to trace the circuit to find the location of the short. Bad rectifier diodes can often be isolated by measuring their resistance. Good diodes have infinite reverse resistance and bad diodes have a very low reverse resistance. Some of the components such as the transformer, choke, and diodes may only short when the high voltage is applied. To isolate the problem here you will have to progressively disconnect components from the circuit until the short no longer happens. Start with the filter capacitor, progress to the filter choke, then the diodes, then the power transformer. Remember, a short in the RF section may require replacement of the 1.5 amp cathode fuse.

**LOW HIGH VOLTAGE** - This problem is usually an indication of low AC line voltage.

**EXCESSIVE HIGH VOLTAGE** - This is a problem that can be seen when the filter choke is out of resonance. A resonated filter choke is used because of the superb linearity and voltage regulation provided. However, the choke must be resonated by a capacitor. If that capacitor fails, or changes value the choke is no longer resonated and the voltage regulation becomes poor. The result

will be excessive high voltage when the amplifier is not transmitting and excessive voltage drop during transmit. This means the power supply is set up for 60 Hz operation but is operating at 50 Hz. Additional capacitance is required to resonate the choke at 50 Hz.

**NO HIGH VOLTAGE METER READING** - The most likely cause is a failure of the 8 AG, 1-1/2 amp meter protection fuse. Another cause is a failure or value change in the high voltage multiplier resistors in the power supply.

The blower is one of the most susceptible parts to transportation damage. Henry amplifiers use squirrel cage blowers because of their exceptional air blowing capability in a small size. But the blower assembly can be easily damaged if the amplifier is dropped during shipment. Therefore when the amplifier is installed make certain that a strong flow of air is coming out the top of the amplifier when it is turned on. Other indications of blower damage can be a resonance in the amplifier cabinet caused by an unbalanced fan, or an unequal flow of air between the two tubes.

If the blower is not operating, check the 3 AG fuses. A good indication that they are blown is that the pilot lights are not working.

The first thing to check if there is low output is the check for adequate drive from the exciter. Eimac 3-500Z tubes will give approximately 10 dB of gain (about 10 times amplification). Some modern solid state exciters have power drop off on some bands so therefore the output from the amplifier will put out correspondingly less power. Since the amplifier is a superbly linear device its output varies directly with its input.

The next thing to check is input and output cabling. An intermittent or shorted drive cable can cause low input or no input to the amplifier. This will usually show up by operating the exciter through the amplifier (in standby) and measuring the power. Low drive power can be seen as low grid current during transmit. Also check the output cables. Shorted coax is not uncommon and a poor job of installing coax connectors can cause severe output problems.

Other problems that can reduce output are low plate current, insufficient filament voltage, low AC line voltage, or bad tubes.

The transformers in your amplifier have taps to compensate for unusual AC line voltage at the operating location. Normally the transformers are wired for 220 VAC operation. If your AC line voltage is far different from the norm then most of the operating parameters of your amplifier will be different. To help

compensate for this difference the power transformers have taps for 200 VAC, 220 VAC, or 240 VAC operation on their primary. The primaries of the transformers should be wired to the following taps:

200 VAC	220 VAC	240 VAC
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2K-D Classic....	Taps 2 and 5..	Taps 1 and 6.....	none.....
2K-Classic.....	none.....	none.....	none.....
2K-Classic X....	Taps 1 and 2..	Taps 1 and 3..	Taps 1 and 4

**AMPLIFIER WILL NOT TURN ON** - The most likely cause is the circuit breaker. Check the continuity of the circuit breaker with an ohm meter if the amplifier will not turn on or off. Another possible cause is the improper installation of the power plug on to the power cable. If the high voltage turns on, but the pilot lights, blower, and relay supply do not come on the 3 AG fuse has blown.

**ALC CIRCUIT SHORTED** - A defect in the ALC circuit can prevent the tubes from being driven properly.

**FILAMENT VOLTAGE FAILURE** - Check the tubes when the amplifier is first turned on to make certain that they are lighting. If they are not check the filament connection between the power supply and RF deck, and then the filament transformer or filament windings of the power transformer on the 2KD-Classic and the 2K-Classic.