

**TWTA Caution and Info** **UPDATED** -- September 16, 2017 ---

General Precautions for TWTA Operation, Most of these items are contained in the operation Manuals. However, some may not be obvious:

1. When an Amplifier has not been used for some time, more than 6 months, the unit may not produce full power. In this case, operate the Amplifier at about 1/2 of it's rated power for 12 hours and retest. If power is still not to specification, the unit will need service.
2. **Helix Current:** If the Amplifier trips OFF for Helix Current when RF is applied restart unit without RF applied; turn on RF at a low level (approx. 10 dB less than rated input) allowing helix current to stabilize, may take 10 minutes. Gradually increase input power allowing helix current to stabilize at each level. This is most important for high power (> 20 Watts) or high frequency (> 18 GHz) units when they have been in storage for a long time.
3. The longest life for a TWTA is when the unit is operated near its full RF power output or in storage. CAUTION when the unit is turned ON, it should be put to the OPERATE mode (OPERATE, RF ON, BEAM ON) within a short time. A few minutes is OK but long periods of STANDBY operation will dramatically shorten the life of the TWT, deplete cathode, contaminate vacuum envelope
4. TWT Amplifiers should not be operated outside their normal RF Band, if such operation requires the input drive be increased higher than normal. The Amplifier may produce good power. However, the high input drive (low gain) is likely to damage the Helix. Should be OK if the Helix I is within normal range.
5. Some RF Amplifiers have very high gain. It is recommended to start with RF input very low, -20dBm or less if you are not sure of the drive level required.
6. **Lifetime of a TWT:** There is a very big difference in the expected life of TWT's. Most often the failure mode is a depleted cathode. This is because many manufactures built with low cost materials, these are about 2,000 hour cathodes. The high cost materials, Tungsten matrix, are about 50,000 hour cathodes. Space tubes can be 100,000 hours.
7. **Common Failure Modes:**
  - A. Depleted Cathode results in low electron emission, low power output.
  - B. Contaminated vacuum envelope from micro leaks or from the Heater/Cathode hot on and HV off for extended periods of time.
  - C. Internal Arcing, most common with pulse tubes that are driven very hard.

**CAUTION --- DO NOT ALLOW AMPLIFIERS TO REMAIN IN STANDBY MODE LONGER THAN 1/2 HOUR. BE SURE THE RF INPUT AND OUTPUT PORTS ARE PROPERLY TERMINATED.**

