

THE TRIODE BOARD TM

*Control and Protection
for your
Triode RF Power Amplifier*

Application Note 5

Higher Cathode Bias

This Application Note explains how to modify the existing bias circuit for the higher voltages required by the Russian GS31 and GS35 triodes.



WARNING

These notes are intended for users who have sufficient experience to work safely with high-voltage circuits.

Use at your own risk! We cannot accept responsibility for any damage or injury.

REVISION NOTES

AN-5 Issue No	Changes
1.0, April 2002	First issue

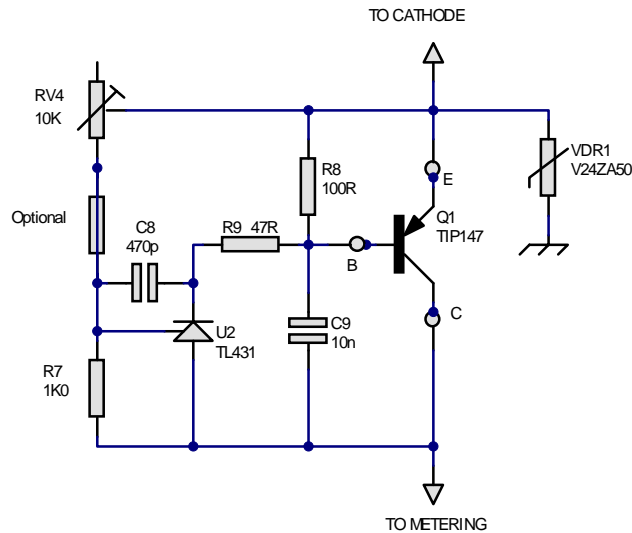
COMMENTS AND QUESTIONS

Please e-mail to boards@ifwtech.co.uk

1. Original Bias Circuit

As you know, the Triode Board uses a **true constant-voltage bias regulator** which is **fully adjustable**, so you can set the idling current exactly as the manufacturer recommends. The circuit is taken from the data sheet for the industry-standard TL431 'adjustable zener' (U2). Voltage regulation is within a few millivolts, from idling currents of <50mA up to at least 2.5A.

An inexpensive Darlington power transistor Q1 handles the power dissipation, and is rated to survive major current surges. The Varistor VDR1 provides further circuit protection.



The cathode bias voltage is normally adjustable in the range from 3 to 27V, which suits most tubes including the 3-500Z, 3CX800 and 8877.

For tubes such as the GS35b and GS31b, which can require more than 30V bias at high anode voltages, you can insert an extra resistor as shown. However, experience shows that the voltage required is higher than anticipated, and can exceed the 36V breakdown voltage of the TL431.

2. Increasing the Bias Voltage

This note gives a simple modification to moves the range of bias adjustment up to 27–45V. This is plenty high enough for the Russian triodes, even at extreme anode voltages.

The modification is simply to insert a zener diode in series with U2. This reduces the voltage across U2, but it does not affect the voltage regulation because the zener is inside the DC feedback loop. The schematic is shown on the next page.

ZD is a BZX79C15 zener diode, and C is a 100nF bypass capacitor to remove any avalanche noise from the diode. The resistor R (inserted by cutting the track as shown in the manual) is increased to 10kΩ.

The optimum VDR combination for this bias voltage is two V24ZA50s in series. This combination will not start to conduct over the available voltage range (which could be a problem with some samples of the 33V VDR previously recommended).

