

# Traveling Wave Tube (TWT) Testers

Automation Systems

Embedded Systems

▶ **Test Systems**

Engineering Services

▶ **Systems and Products**

General Purpose ATE

▶ **Specialized ATE**

Yelo employs engineers with over 40 years of combined experience testing TWT and Klystron electron tubes, gained through major global players such as STC and ITT in the United Kingdom. Yelo supplies turnkey test systems for the Traveling Wave Tube (TWT) market. A provider of complete solutions, we can produce customizable, state-of-the-art test stations that include all specialized power supplies, microwave source and measurement equipment, hot/cold plates, jigs and fixtures, thermal management, PLC and PC control and safety systems.

## Technical Summary

### Test station high-level overview:

- ▶ A rugged PLC is used to control all voltages and perform all monitoring functions
- ▶ User interface and data logging functions are provided by a supervisory PC that is fully electrically isolated from the PLC
- ▶ All safety interlocks are hardwired
- ▶ Power supplies are solid state with optical fiber barriers to ensure that all control/monitoring is carried out at safe voltages and with the maximum noise immunity possible
- ▶ Only production-hardened high-voltage supplies are used; an extensive list of reference customers is available to confirm long-term reliability
- ▶ Test system operator interface and test software are developed in the National Instruments LabView™ graphical programming environment

## Specification Highlights

### Typical examples of power supply requirements:

- ▶ Cathode supplies 0-40kV at 0.5A mean, 10A peak. Higher or lower voltages and currents are available upon request
- ▶ Stabilized supplies are suitable for tube rise/fall times in the area of 0.1 to 20μs
- ▶ Pulse Repetition Frequency (PRF) of 50Hz to 20kHz, with supported range up to 1.5MHz
- ▶ Cathode energy limiting and current limiting for TWT protection
- ▶ Full flashover protection with fast-acting crowbars
- ▶ Multiple collector supplies, including option of two quadrants (*i.e.* sink and source)
- ▶ Grid modulators up to 1.5MHz are available

## Supported Tube Types

**Rely on Yelo for systems suitable for testing:**

- ▶ Modulated grid TWT
- ▶ Pulsed TWT
- ▶ Klystrons (linear-beam tubes)

## Levels of Automation

Yelo can develop all or part of your TWT testing requirements:

- ▶ Automated power supply systems complete with safety interlocking and data logging. These solutions are suitable for companies who wish to perform their functional measurement(s) manually
- ▶ Fully-automated measurement systems, suitable for retrofitting manufacturing stations that are already equipped with power supplies
- ▶ Fully-automated test stations, including PC-controlled power supplies and test and measurement instrumentation

# Traveling Wave Tube (TWT) Testers

## Specification Highlights

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- ▶ Can be used for testing, focusing and ageing, via continuous or pulsed operation
- ▶ All supplies are protected against over current
- ▶ All supplies are modular and easily replaced or repaired
- ▶ Additional supply modules available for; Heaters, Ion pumps, Grid Bias, Bi-Polar Pulse, Helix, and multiple Collectors.

## Power Supplies

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The TWT Test System provides up to ten computer controlled and monitored DC and pulsed supply rails that are used to focus, test and age TWT's in either the pre-package or final package state.

The power supply uses pulsed HT operation, this allows the duty cycle of the TWT to be increased from low levels up to full CW operation during the preliminary focusing of the tube, reducing the risk of damage to the electrodes, and speeding up the focus operation.

The computer-controlled system has a Programmable Logic Controller built into the TWT PSU, to monitor all of the safety aspects of the system.

The power supply's control functions are remotely operated by the PC; no user front panel controls are provided, other than those for safety isolation.

- ▶ Cathode supplies (multiple) 0-40 kV
- ▶ Supply pulsing 0.1 to 20 $\mu$ s rise and fall times
- ▶ Cathode energy limiting and current limiting for TWT protection
- ▶ Full flash-over protection with fast-acting crowbars
- ▶ All supplies are protected against over current

## Instrumentation and Measurements

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**Possible test and measurement requirements include:**

- ▶ Swept frequency measurements on TWT up to 40GHz in coax or waveguide
- ▶ Small signal gain
- ▶ Gain flatness
- ▶ Maximum output power
- ▶ Saturation
- ▶ Noise figure
- ▶ Match

## The Complete Solution

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**Yelo's market-leading TWT test stations feature:**

- ▶ Full data-capture capabilities and logging to a network
- ▶ Avera-supplied fixturing or an adaptation of your existing fixturing
- ▶ Safety interlock, emergency shutdown and charge dumping
- ▶ Complete and thorough documentation, commissioning and training
- ▶ Various support packages are available, including remote (LAN) access for software, diagnosis and on-site support