

# TEGAM® MODEL 1750

HIGH SPEED MICRO-OHMMETER



Advanced Energy's TEGAM model 1750 High Speed Micro-ohmmeter is the first breakthrough in high-speed production test since the laser trimmer. The 1750 is the first fully integrated, multi-mode, bus controllable, high-speed, digital ohmmeter designed to outperform all other ohmmeters and enhance the performance of the world's fastest laser trimmers and material handlers.

## PRODUCT HIGHLIGHTS

- "True-speed" high-speed testing capability fast and accurate
- 100 nΩ resolution
- Automatic thermal and electromagnetic noise rejection
- Programmable reference currents
- GPIB, RS-232C and RS-422 compatibility

## SAFETY

- EMC: EN 61326-1:2013

## AT A GLANCE

### Display

3½ Digit Alpha Numeric Readout

2x16 Characters

Backlit LCD

### Input Protection

± 15 V Dcontinuous

### Noise Rejection

60 dB Typical at Line Frequency



### OVERVIEW

#### Fast

The 1750 accelerates the high-speed production line with “true-speed” performance. In the Fast Mode the 1750 can set-up, zero-out thermal errors, acquire data and make its first reading in less than 12 ms with an accuracy of up to 0.05%. That’s “true-speed” performance. Subsequent readings are provided every 10 ms at a true rate of 100 readings per second! “true-speed” allows you to maximize the speed of your PLCs, material handlers and production line machinery.

The 1750 provides speed and accuracy while automatically rejecting thermal and line noise. Proprietary circuitry eliminates thermal and electromagnetic measurement errors caused by contact between device handlers and the device- under-test. The 1750 rejects DC and AC noise offsets while maintaining its high speed test performance. This unique feature is only found on the TEGAM 1750.

#### High Powered

The 1750’s power is in the user’s ability to quickly configure it through a selection of standard setup menus. With the 1750 you select your measurement mode, (resistance, ohms comparator or percentage comparator), and measurement ranges, (from 2 mΩ to 20 MΩ). You have your choice of reference currents and triggering methods. You can also configure delay times, settling times and automatic thermal and noise rejection. If you don’t need all this flexibility, just hit the AUTO RANGE button and enjoy the ride.

#### Easy to Operate

The 1750 is the state-of-the-art programmable ohmmeter that operates via front-panel or over the bus. Clearly labeled multifunction keys provide front panel control of range selection, reading modes, delays, triggers and measurement HOLD. Clear menu driven options provide easy setup for more sophisticated operation. The front panel includes a manual TRIGGER and HOLD function and HI/GO/LO indicators for the open collector TTL output.

#### Easy to Integrate

The 1750 is unbelievably easy to program. The 1750 contains a full complement of interfaces including IEEE-488, RS-232C and RS-422. To maximize your programming efficiency, each of these interfaces is operated using the same programming command set and front panel indicators to provide continuous status of all operations.

#### Easy to Calibrate

Front panel calibration makes it easy to maintain the 1750 traceability right on the product floor and in less time than it takes to reload a resistor reel.

#### Ready for Any Applications

The 1750 provides the speed and accuracy desired for automated production test requirements as well as bench top quality control and inspection applications. Not only is the 1750 perfect for high speed production test of low resistance electronic components, but the low current capability and “true-speed” performance make the 1750 excellent for dry circuit testing of switches, relays and connector contacts without disturbing the device’s contact surfaces. 1750 fits most resistor, wire, fuse, thermistor and trimmer testing applications.

## PRODUCT SPECIFICATIONS

Table 1: Full Scale Voltage and Maximum Lead Resistance as a Function of Reference Current

Range	Resolution	Reference Current (Available Selection)							
		1A	100 mA	10 mA	1 mA	100 $\mu$ A	10 $\mu$ A	1 $\mu$ A	100 nA
2 m $\Omega$	100 n $\Omega$	2 mV							
20 m $\Omega$	1 $\mu$ $\Omega$	20 mV	2 mV						
200 m $\Omega$	10 $\mu$ $\Omega$	200 mV	20 mV						
2 $\Omega$	100 $\mu$ $\Omega$		200 mV	20 mV					
20 $\Omega$	1 m $\Omega$			200 mV	20 mV				
200 $\Omega$	10 m $\Omega$			2 V	200 mV	20 mV			
2 k $\Omega$	100 m $\Omega$				2 V	200 mV			
20 k $\Omega$	1 $\Omega$					2 V	200 mV		
200 k $\Omega$	10 $\Omega$						2 V		
2 M $\Omega$	100 $\Omega$							2 V	
20 M $\Omega$	1 k $\Omega$								2 V
Max Lead Resistance		500 m $\Omega$	5 $\Omega$	50 $\Omega$	100 $\Omega$				

Table 2: Delayed Mode Accuracy (In terms of full scale voltage)

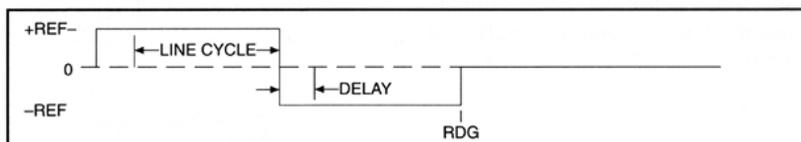
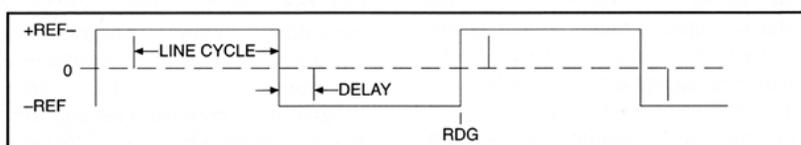
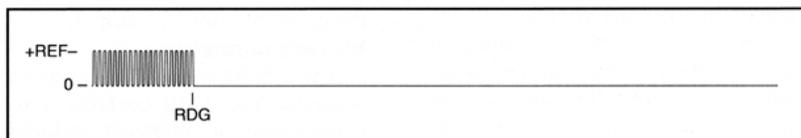
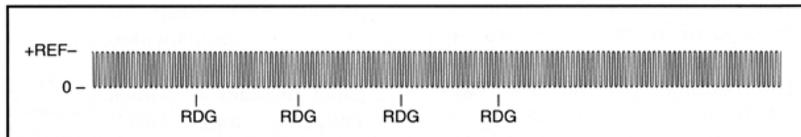
Full Scale Voltage	( $\pm$ ) Accuracy (18-28°C, 1 yr.)
2 mV	0.02 % rdg + 5 counts
20 mV	0.02 % rdg + 4 counts
200 mV	0.02 % rdg + 2 counts
2 V	0.02 % rdg + 2 counts
2 V (2 M $\Omega$ & 20 M $\Omega$ ranges)	0.02 % rdg + 2 counts

Table 3: Temperature Coefficients (In terms of full scale voltage)

Full Scale Voltage	( $\pm$ ) Temperature Coefficient (18-28°C & 28-50°C)
2 mV	0.004 % rdg + 1 count
20 mV	0.004 % rdg + 0.5 counts
200 mV	0.002 % rdg + 0.1 counts
2 V	0.002 % rdg + 0.1 counts
2 V (2 M $\Omega$ & 20 M $\Omega$ ranges)	0.008 % rdg + 0.5 counts

PRODUCT SPECIFICATIONS

Fast Mode Accuracy (0.05 % + 5 COUNTS)



REFERENCE CURRENT MODES:

**Fast Continuous:**  
Pulsing reference current (+REF/0), with automatic thermal and noise rejection

**Fast One-Shot:**  
Triggered single cycle of fast continuous mode.

**Delayed Continuous:**  
Alternating reference current (+REF/-REF) with programmable settling time for reference current and line-cycle digitization.

**Delayed One-Shot:**  
Triggered single cycle of delayed continuous mode.

Table 4: Measurement Times

Range	Fast Mode v. Full Scale Voltage				Delayed Mode v. Full Scale Voltage			
	2 mV	20 mV	200 mV	2 V	2 mV	20 mV	200 mV	2 V
2 mΩ					D			
20 mΩ					D	D		
200 mΩ			F			D	D	
2 Ω			F			D	D	
20 Ω			F			D	D	
200 Ω			F	F		D	D	D
2 kΩ			F	F			D	D
20 kΩ				F			D	D
200 kΩ								D
2 MΩ								D
20 MΩ								D

Note:

1. Fast mode available on range and full scale voltage combinations shown (F)
2. Delayed mode available on combinations shown (D).
3. Delayed Mode Measurement Times = 2 x (line period + programmed delay + 1.7 ms processing time). e.g. 60 Hz line frequency and 10 ms delay, Time = 55.0 ms.
4. Delays are programmable from 1 ms to 250 ms in 1 ms increments.

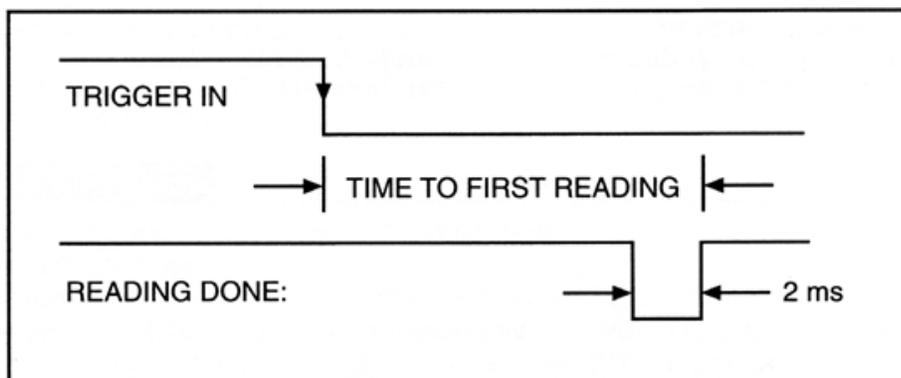
PRODUCT SPECIFICATIONS

Specification	
Display Modes	Resistance, ohms comparator, % comparator (auto-ranging available in resistance mode)
Digital Interfaces	IEEE-488.1, RS-232C, RS-422, TRIGGER IN and READING DONE via BNC connectors
Display	4½-digit alpha numeric readout, 2x16 characters, backlighted LCD
Measurement Method	4 - terminal connection to the Device-Under-Test, (DUT)
Input Connector	Heavy duty LEMO type for interface integrity and long life
Input Protection	± 15 V continuous
Overload Current	Delay mode: 100 % overshoot, < 25 µs Fast mode: 200 % overshoot, < 30 µs
Noise Rejection	60 dB typical at line frequency
Environmental	Operating: 0°C to +50°C, < 80 % RH; Storage: -35°C to +60°C, < 90 % RH
EMC	EN 61326-1:2013
Power Requirement	<100 VA, 108-132 VAC or 216-250 VAC
Dimensions (H x W x L)	13.3 cm x 21.7 cm x 33.0 cm (5.2 x 8.5 x 13.0 in)
Weight	4.2 kg (9 lb. 4 oz)
Calibration	Full front panel calibration requires no internal adjustments and can be easily achieved on the production floor.
Recommended Calibration Cycle	1 year

Table 5: Reading Rates

	Measurement Times	Reading Rate	Time To First Reading
Fast Mode	10 ms	100 rdg/s	12 ms
Delay Mode			
Delay = 1 ms	36 ms	27 rdg/s	38 ms
Delay = 5 ms	45 ms	22 rdg/s	47 ms
Delay = 10 ms	55 ms	18 rdg/s	57 ms

Time To First Reading



## ORDERING INFORMATION

### MKP/1750-5 Kelvin Probe

These probes are excellent for making four-wire surface resistance measurements on films and other flat metallic surfaces. The probes are marked indicating the sense pins, ensuring an operator error free measurement. Each probe has two spring-loaded, replaceable tips that can be easily removed and replaced. Variety of probe tips available. The test leads are 5 feet long and are terminated with a Lemo connector. Pin center to pin center is 0.11 in (0.28 cm).

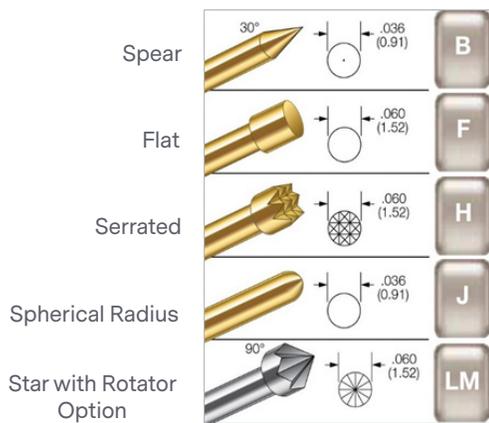
Cable Length - 5 ft

Available Pin Options: P/N MKP-B, MKP-F, MKP-H, MKP-J, MKP-LM (4 pins)

Note: Pins are not included with the probe set and need to be ordered separately.



MKP/1750-5 Probe with "B" Style Pins



MKP/1750-5 Pin Options

### MCP/1750-5 Kelvin Coaxial Probe

Ideal for precision resistance measurements in tighter spaces. The probe has a spring-loaded center pin for voltage detection, while the outer pin provides the reference current. The probe comes with two pins installed. The pins are replaceable. The test leads are 5 feet long and are terminated with a Lemo connector. Outer pin diameter is 0.06 in (0.15 cm). The inner tip diameter is 0.4 mm.

Cable length – 5 ft

Replaceable Pin Option: P/N MCP-A (2 pins)



MCP/1750-5 Probe with Coaxial Pins Installed

## ORDERING INFORMATION

Model Number	Description	Diagram
17501 Kelvin Klip Leads	Provides a solid four-terminal connection to components under test. These clips are particularly useful for manual resistance measurement. Max jaw opening is 0.65 in. Cable length – 3 ft	
KK100 Kelvin Klip Rebuild Kit	Kelvin Klip replacements for construction or repair of Kelvin Klip leads. The Kit includes slip shrink sleeving, tubing, Klip halves, and insulating spools to build two Kelvin Klips.	
17502 Spade Lug Adapter	Used for connections between the 1740/1750 front panel LEMO and existing test fixtures. Cable length – 3 ft	
17503 Sorting Fixture	This sorting fixture allows for efficient four-wire measurement of leaded parts. The test fixture features spring action contacts for easy insertion and removal of test components. Cable length – 3 ft	
17505 Male LEMO Connector & Strain Relief	For the repair or construction of 1740/1750 test leads.	
17506-5 LEMO to Bare Wire	These probes have a Lemo connector at one end and four bare wires on the other. Cable length – 5 ft	
17507 Large Kelvin Klip Leads	Provides a solid 4-terminal connection to large components that cannot be measured with conventional Kelvin clips. It is robust in construction, ensuring a firm grip. Used for connection with large bolts, cables, plates, etc. Cable length – 8 ft	
SKT/1750-5 Chip Tweezers	Four-terminal tweezers make solid connections to chip components in manual sorting applications. Capacity of jaws is 12.7 mm (0.5 in). Contact tips are replaceable. Cable length – 5 ft Available Tip Kits: P/N: 47422 (two wire straight), P/N: 47423 (four wire straight), P/N: 47424 (four wire angled) Note: A tip kit includes 12 tips, two screws, and one Allen wrench.	
CA-22-36 RS-232 Straight Cable	Male to Female DB9-DB9 straight cable used to connect the 1740/GPIB or 1750 to a PC via RS-232. Cable length – 3 ft	
1583 GPIB (IEEE-488) Cables	The cable can be used to connect the 1740/GPIB or 1750 to a PC via GPIB. 1583-3 – 3 ft GPIB buss cable 1583-6 – 6 ft GPIB buss cable 1583-9 – 9 ft GPIB buss cable	



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## ABOUT ADVANCED ENERGY

Advanced Energy (AE) has devoted more than four decades to perfecting power for its global customers. AE designs and manufactures highly engineered, precision power conversion, measurement and control solutions for mission-critical applications and processes.

Our products enable customer innovation in complex applications for a wide range of industries including semiconductor equipment, industrial, manufacturing, telecommunications, data center computing, and medical. With deep applications know-how and responsive service and support across the globe, we build collaborative partnerships to meet rapid technological developments, propel growth for our customers, and innovate the future of power.

PRECISION | POWER | PERFORMANCE | TRUST

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