



Ballantine Laboratories, Inc.

BALLANTINE MODEL 9601M

AN/USM-413

CONTRACT #F41608-75-D-0258

YOU HAVE JUST RECEIVED YOUR VOLTMETER, ELECTRONIC TYPE AN/USM-413, COMPLETE WITH ACCESSORIES AND PACK-UP DATA.

THE MANUAL FOR THIS UNIT, TO#33A1-12-1083-1, IS NOT SUPPLIED BY THE CONTRACTOR, BUT IS SUPPLIED BY THE AIR FORCE.

WE HOPE YOU LIKE AND GET GOOD SERVICE FROM YOUR BALLANTINE INSTRUMENT.

Nancy E. Bergersen  
Contract Administrator

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CAUTION:

- 1) Always use the input probe supplied with the instrument.
- 2) The input probe is calibrated with this instrument and MUST be used with this instrument to assure calibration accuracy.
- 3) The AN/USM-413 uses Triax Connectors to assure operation safety. Use ONLY triax mating connectors. DO NOT use BNC connectors.
- 4) Charge internal batteries 16 hours before using.
- 5) Avoid extended battery charge in excess of 24 hours.

9601A



## A SAFE ENVIRONMENTALIZED AC VOLTMETER 9601A Provides Maximum Operator Safety in High Hazard Applications

- EXPLOSION PROOF
- CONFORMS TO OSHA AND INDUSTRY SAFETY REQUIREMENTS
- FULLY PORTABLE LINE AND BATTERY POWERED
- RAIN, DUST, SALT FOG RESISTANT
- RMS RESPONDING ON DISTORTED WAVE FORMS FROM 10Hz TO 1MHz
- MAINTAINS ACCURACY FROM -40°C TO 71°C

The Ballantine 9601A is an industrial ac rms-responding voltmeter and amplifier that conforms to OSHA and industry safety requirements for operation in hazardous locations and hostile environments.

The meter is the industrial model of the U.S. Air Force AN/USM-413, a class 2 military environmentalized instrument. The instrument was developed for testing electronic and electrical equipment in an uncontrolled flight line environment where service usage demands explosion proof performance in heavy gasoline vapor atmospheres. The voltmeter is constructed to promote the safety of operating and maintenance personnel. It is an ideal instrument for many heavy duty industrial applications where maximum protection for both the operator, the environment and the meter are primary requisites.

The Model 9601A covers six decade ranges from 5 millivolts to 500 volts full scale over a bandwidth from 10Hz to beyond 1MHz. It is rms responding and can measure waveforms with the kind of distortion commonly encountered in industrial testing without change in its basic accuracy of  $\pm 3\%$  of reading. The meter is also usable as a wideband precision amplifier providing six 20dB steps of gain over an absolute range of 124 dB total.

Operation in completely unsheltered environments is reliable and fast. The 9601A is immediately usable under any combination of operational and environ-

mental conditions called out by MIL-T-21200 for Class 2 equipment. Temperature coefficient of accuracy is less than  $\pm 0.05\%/^{\circ}\text{C}$  from  $-40^{\circ}\text{C}$  to  $+15^{\circ}\text{C}$  and from  $+35^{\circ}\text{C}$  to  $+55^{\circ}\text{C}$ . Use it with confidence out of doors in the arctic or in hot steel mills. Its explosion proof qualities are assured by full compliance to the stringent explosive atmosphere tests of MIL-STD-810B, Method 511, Procedure 1.

Further safety provisions for the user result from the 9601A's capability of operating without damage while floating off-ground to  $\pm 500$  volts peak. Additionally the unit is internally protected against input overloads to 1500 volts on all ranges above 5 volts and to 500 volts on all lower ranges. The instrument will recover from an overload within 10 seconds. Use it with confidence on power lines, on top of poles or in manholes.

The tough, shock resistant, flame retardant thick-walled LEXAN case is metallized internally to provide conformance with the EMI characteristics of MIL-STD-461 for Class C1 equipment. The case is gasketed at the front panel and all shafts, making it rain proof, dust proof, and salt-fog resistant, and switches are sealed. A gasketed front cover includes a storage compartment for probes and ac power cable. A piggyback battery pack is built into a separate compartment in a gasketed cover secured to the rear of the meter case, completely isolating the batteries to avoid

*(continued on other side)*



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FOUR DECADES OF INNOVATION IN ELECTRONIC INSTRUMENTATION

damage to internal circuitry in the event of battery leakage. The unit meets severe military shock and vibration specs.

An important feature when using battery power is the availability of 8-hours of continuous use in temperatures from 0°C to 55°C and a full 4-hours when operating at -40°C.

All characteristics of the Ballantine 9601A make it the safest instrument to use in such high risk plants and applications as:

Explosive Atmospheres  
Mining

Power Distribution and Generation  
Railroad Switchyards  
Electroplating  
Processing Mills and Refineries  
Pumping Stations  
Airfield Flight Lines  
Petroleum Processing  
Tank Farms  
Gas Production and Pipe Lines  
Flour and Food Processing  
Chemical and Mineral Processing  
Marine LPG and Oil Tankers

## 9601A SPECIFICATIONS

**Voltage Range:** 5mV full scale to 500V full scale in 6 decade steps. Usable from 500 $\mu$ V to 500 volts.

**Voltage Accuracy:**  $\pm 3\%$  of reading.

Specified accuracy includes *all* effects of: Frequency from 10Hz to 1MHz; ac power line changes up to  $\pm 10\%$  nominal voltage and  $\pm 5\%$  of nominal frequencies of 50/60/400 Hz; battery pack supply voltage; internal noise; common mode signals to 300V (peak ac and dc); dc voltage component to  $\pm 300$ V; input signal waveform distortion (*see rms response following*).

**Response:** RMS responding - Total harmonic signal distortion can be up to 10%, with no individual harmonic greater than 5%.

**Temperature Coefficient of Accuracy:**  $\pm 0.05\%/^{\circ}\text{C}$  from +15°C and from +35°C to +71°C.

**Meter Scales:** Logarithmic voltage scale uppermost. Marked from below 0.5 to above 5, length 8.125 cm (3.2 in.). Linear dB scale, marked from below -5 to above +15, length 6.350 cm (2.5 in.). Mirror backed.

**AC Signal Input Probe:** Uses removable high impedance test probe connected at instrument through a BNC TRIAX connector. Accessory tips and BNC adapter are provided.

**Input Impedance:** Greater than 10 megohms, paralleled by 25 pF maximum, including probe input test leads.

**Overvoltage Protection:** Withstands, without damage, continuous overloads at probe input of 1500V rms on all ranges from 500 mV, and 500 V rms on ranges from 5 mV to 500 mV.

**DC Blocking Voltage:** DC voltage component in signal input of  $\pm 300$  V will not affect performance.

**Overload Recovery Time:** Within 10 seconds of removal of overload.

**Floating Operation:** May float, without damage to unit, by  $\pm 500$  V off-ground (dc + pk ac).

**AC Amplifier Output:** Directly proportional to input signal. 600 ohm source impedance. Minimum of 1 V rms into open circuit for full scale meter deflection on any range. Meter operable simultaneously with ac output and meter accuracy not impaired when amplifier works into any load from 500 $\Omega$  to 10M $\Omega$ . Amplifier output may be short-circuited without damage to instrument. Front panel connector is BNC TRIAX with removable captive shield cap.

Frequency response of AC Amplifier is  $\pm 5\%$  from 10 Hz to 100 kHz and  $\pm 8\%$  to 1 MHz when working into 600 ohms.

**Distortion:** Less than 0.5%.

**Environmental Characteristics:** Complies fully with requirements of MIL-T-21200, Class 2, tested per MIL-STD-810.

**Temperature:**

Operating: -40°C to +55°C;  
Non-Operating: -62°C to +85°C.

All U.S.A. sales prices shown are net fob Boonton, New Jersey  
Specifications and prices subject to change without notice.



**Ballantine Laboratories, Inc.**

P.O. Box 97, Boonton, New Jersey 07005, U.S.A.  
Telephone: 201-335-0900 TWX: 710-987-8380

**Humidity:** 0 to 95% RH to +55°C.

**Altitude:**

Operating: 0 to 3 km (10,000 ft.).  
Non-Operating: 0 to 15 km (50,000 ft.).

**EMI:** Requirements CE-01 thru 05; CS-01, 02, 06; RE-01, 02; RS-01 thru 04. MIL-STD-461.

**Explosive Atmosphere:** Explosive vapor Method 511, Procedure I.

**Vibration:** Per Method 514, Procedure X.

**Shock:** 15g, per Method 516, Procedure I, fig. 516.1-2.

**Drop:** Multiple 30" drops on all corners and faces.

**Watertightness:** Immersion in 3 ft. water with covers in place.

**Drip Proof:** Rain simulation Method 506.

**Dust:** Blown dust Method 510, Procedure I.

**Salt Fog:** Exposure to salt fog, Method 509, Procedure I.

Specification for Methods and Procedures noted above  
is MIL-STD-810.

**Power:**

**AC:** 115V or 230V rms (internally wired), 48 to 420 Hz.  
2 W. Input receptacle, 3-pin male Type MS3102A10SL-3P.

**DC:** Battery pack (NiCad) supplied. Packaged in external rear cover compartment secured to back of meter case. Internal charger included. Operating time 8 hrs. in temperatures from 0°C to +55°C and 4 hrs. from 0°C to -40°C. Full charge in less than 14 hours (0°C to 50°C). Power during charge 7W. "BAT CHK" front panel switch indicates battery voltage on meter.

**Dimensions:** 197 mm (7-3/4 in.) W 213 mm (8-3/8 in.) H x 152 mm (6 in.) D (includes adjustable handle and front and rear covers.)

**Weight:** 4.3kg (9.5 lbs.).

**Shipping Weight:** 4.8 kg (10.5 lbs.).

**Supplied Accessories:**

89-10348-1A Test Lead: with ac probe and alligator ground clip, 102 cm (40 in.) long with BNC TRIAX connector.  
85-10065-0A Retractable Tip: for ac probe.  
89-10414-1A AC Power Cable: with type MS3106A10SL-3S connector to meter. 3-prong UL type male power plug.  
19-10023-0A Spare 1/4A plug-in microfuse. (2 each). (All above store under lid in top cover.)

**Price:** \$995.

Ballantine also offers the military AN/USM413 (Ballantine Model 9601M) FSN 6625-165-5790 (JCA) fully certified to MIL-Spec. MIL-V-83780 (USAF) at \$1,450.00. Both the 9601A and 9601M are available on the Federal Supply Schedule under Ballantine's Contract No. GS-00S-04619.

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