SAE International

SURFACE VEHICLE RECOMMENDED PRACTICE

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Superseding J1378 JUL1998

Electric Hourmeter Specification

RATIONALE

This document has been determined to contain basic and stable technology which is not dynamic in nature.

STABILIZED NOTICE

This document has been declared "Stabilized" by the SAE Marine Technical Steering Committee and will no longer be subjected to periodic reviews for currency. Users are responsible for verifying references and continued suitability of technical requirements. Newer technology may exist.

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***Foreword*—**This Document has also changed to comply with the new SAE Technical Standards Board format. In 5.3 and 5.6, µ was changed to m. References were added as Section 2. All other section numbers have changed.

***1. Scope*—**This SAE Recommended Practice establishes minimum requirements for electric hourmeters for general vehicular applications.

2. References

2.1 Applicable Publication—The following publication forms a part of this specification to the extent specified herein. Unless otherwise indicated, the latest revision of SAE publications shall apply.

2.1.1 SAE PUBLICATION—Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

SAE J1113—Electromagnetic Susceptibility Measurement Procedures for Vehicle Components (Except Aircraft)

NOTE—SAE J1113 is cancelled and is superseded by SAE J1113 Parts 1, 2, 3, 4, 11, 12, 13, 21, 22, 23, 25, 26, 27, 41, and 42.

***3. Electric Hourmeter Description*—**A typical electric hourmeter is a true operating time indicator which functions when electrically energized. The hourmeter is a DC operated device. There are three basic electromechanical types among which are: Stepper Solenoids, Stepper Motors, and Electrically Operated Clocks.

***4. Calibration*—**The hourmeter indication shall be within ±2% of the elapsed time or ±0.1 h, whichever is greater, with nominal voltage applied at a temperature of 24 °C ± 3 °C.

5. Effects of Environmental Conditions

5.1 Temperature

5.1.1 OPERATING—With nominal voltage applied, the time indication shall not vary more than ±1% of elapsed time in addition to the calibration error obtained in Section 4, while the unit is operating over the range of –7 to +54 °C. No permanent damage shall result from operating the unit in a range of –40 to +82 °C.

5.1.2 STORAGE—A 4-h exposure of the instrument to a temperature of –40 to +85 °C shall result in no more than an additional ±1% of elapsed time permanent change from calibration error obtained in Section 4. The rate of temperature change during this test shall not exceed 2 °C/min.

5.2 Voltage Variations—The time indication shall not change more than ±1% of elapsed time in addition to the calibration error obtained in Section 4 due to a voltage change of a nominal 12-V system from 12 to 16 VDC and a nominal 24-V system from 24 to 32 VDC. Twelve and 24-V hourmeters shall not change more than ±3% from the reading obtained in Section 4 at 11 and 22 V respectively.

5.3 Abnormal Voltage Conditions

5.3.1 TRANSIENT PROTECTION—The instrument shall be capable of withstanding supply voltage transients without permanent damage and shall remain within the calibration specification of Section 4 at the conclusion of this test. The instrument shall be connected and operated for a total of 1 h with a means provided to impress upon the nominal battery voltage a repetitive rectangular voltage pulse of plus and minus six times nominal battery voltage with a duration of 300 ms and 1% duty cycle with a current of no more than 1.0 A. For some applications which may have transient voltages having a magnitude, duration or duty cycle exceeding the previous requirements, contact the instrument manufacturer for recommendations. Further information on transients may be found in SAE J1113.

5.3.2 OVERVOLTAGE AND REVERSE POLARITY—Provisions for protection against booster starts with double battery voltage and/or reversed polarity must be negotiated between the user and the manufacturer.

5.4 Humidity—Instrument shall not have its function impaired due to exposure to 95% relative humidity at 38 °C for 48 h.

5.5 Vibration Test—The electric hourmeter shall be capable of withstanding without mechanical or electrical failure 6 h of vibration, 2 h along each of the three mutually perpendicular axes, one axis to be perpendicular to mounting plane. The vibration tests shall be run at a double amplitude of 1.52 mm with the frequency varying from 10–80–10 Hz (20 g max) at intervals of 1 min. After completion of test, the calibration shall remain within tolerances as specified in Section 4.

5.6 Shock Test—The instrument shall be capable of withstanding without mechanical or electrical failure, the following series of shocks and still maintain the calibration tolerances specified in Section 4.

The unit shall be subjected to 12 shocks in each direction along each of the three mutually perpendicular axes (72 total shocks), one axis to be perpendicular to the mounting plane. Each shock shall have an amplitude of 44 to 55 g, half sine of 9 to 13 ms duration.

6. Design Detail Recommendations

6.1 Unless otherwise specified by user, dial printing shall be white, dial background shall be low gloss black, and visible portions of the instrument should exhibit low reflectivity; the indicating wheels or drums shall have white numerals on a low gloss black background, except for the tenths indicator, which shall have black numerals on a white background.

6.2 All exposed surfaces shall be corrosion resistant for limited exposure.

NOTE—If instruments are required for installations in extreme environments, contact manufacturer for recommendations.

6.3 Instruments shall be moisture and dust resistant. (See note in 6.2.)

6.4 The hourmeter case may be provided with studs for mounting by suitable U-clamps or similar means. Some hourmeters may have a flange for mounting.

6.5 Typical envelope, mounting studs, mounting flange, panel cutout, and terminal designations are displayed in Figures 1A to 4.

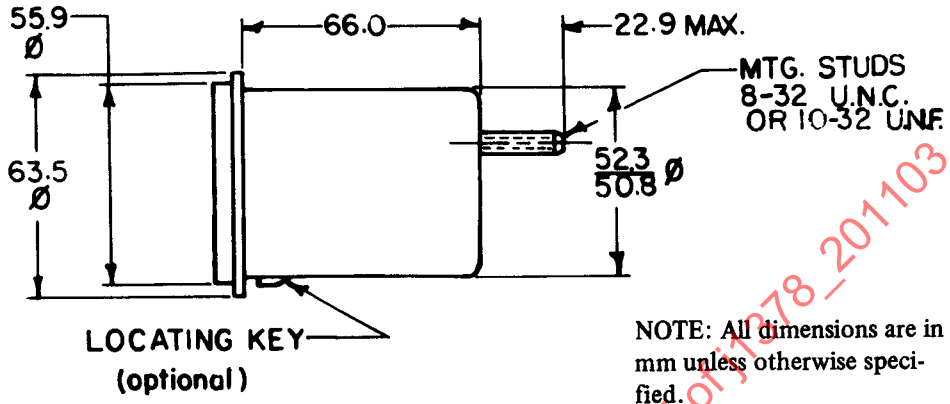

FIGURE 1A—(ENVELOPE) U-CLAMP MOUNT

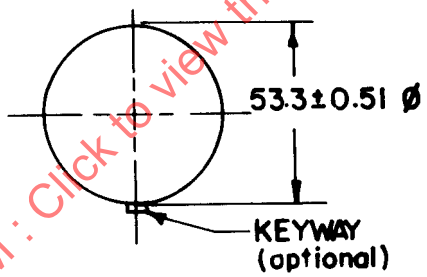

FIGURE 1B—PANEL CUTOUT

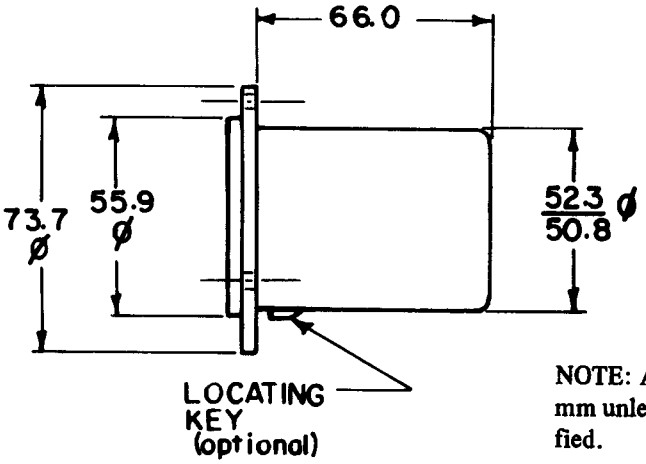

FIGURE 2A—(ENVELOPE) FLANGE MOUNT

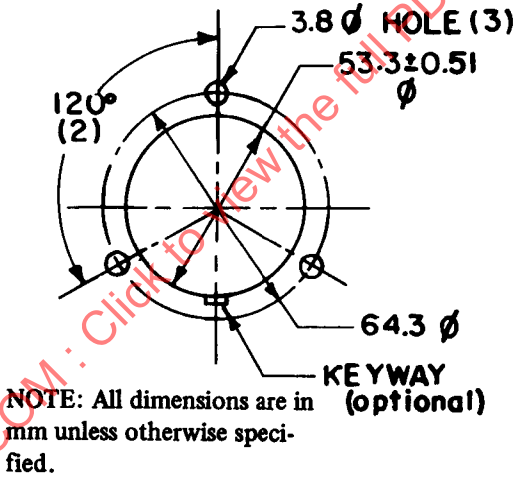

FIGURE 2B—PANEL CUTOUT