

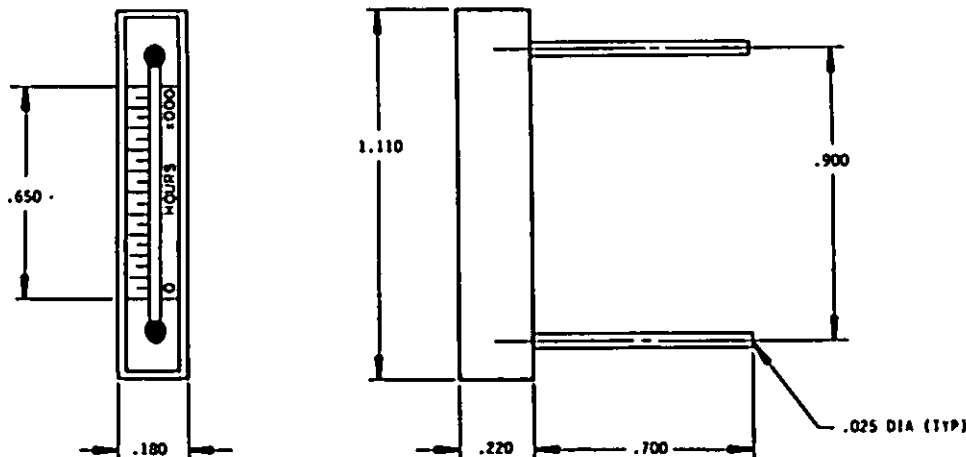
FED. SUP CLASS  
6645

TABLE 1

| DASH NO | OPERATING CURRENT (MICROAMPERES DC) $\pm 1\%$ | TIME RANGE (HOURS) | V CELL MAX (MILLIVOLTS DC) | SHOCK CLASS (g) | THERMAL SHOCK CLASS |
|---------|---|--------------------|----------------------------|-----------------|---------------------|
| -1      | 4.21  | 1000               | 10                         | 50              | 5 CYCLES            |
| -2      | 0.841   | 5000               | 4                          | 50              | 5 CYCLES            |
| -3      | 0.421   | 10000              | 3                          | 50              | 5 CYCLES            |
| -101    | 4.16  | 1000               | 40                         | 100             | 10 CYCLES           |
| -102    | 0.832   | 5000               | 20                         | 100             | 10 CYCLES           |
| -103    | 0.416   | 10000              | 10                         | 100             | 10 CYCLES           |

**REQUIREMENTS:**

ALL DIMENSIONS ARE IN INCHES, UNLESS OTHERWISE SPECIFIED, TOLERANCES ARE  $\pm .015$ ".

POWER CONSUMPTION - THE POWER CONSUMPTION OF THE INDICATING CELL AND RESISTOR SHALL NOT EXCEED ONE MILLI-WATT WHEN MEASURED FOR VOLTAGE SOURCES FROM 3 TO 230 VOLTS DC.

LIFE ACCURACY - ACCURACY SHALL BE  $\pm 1\%$  FROM  $-20^{\circ}\text{C}$  TO  $85^{\circ}\text{C}$ . THIS ACCURACY SHALL BE MAINTAINED UNDER THE FOLLOWING CONDITIONS:

3 TO 230 VOLTS DC AT RATED OPERATING CURRENT FROM TABLE 1

WEIGHT: WEIGHT SHALL NOT EXCEED 0.1 OUNCE.

TIME RANGE: THE TOTAL TIME READOUT OF THE INDICATOR SHALL BE IN ACCORDANCE WITH VALUES FROM TABLE 1.

THERE SHALL BE TWENTY SCALE DIVISIONS, WITH EACH DIVISION ONE TWENTIETH OF FULL SCALE VALUE.

OPERATIONAL CHECK: OPERATION OF THE INDICATING CELL SHALL BE DETERMINED AT  $25^{\circ}\text{C}$  BY MEASURING THE VOLTAGE ACROSS THE INDICATOR CELL TERMINALS AT RATED OPERATING CURRENT FROM TABLE 1. A VISUAL CHECK SHOULD BE MADE THAT THE INDICATING GAP IS ON SCALE AND IS OF NORMAL SIZE.

OPERATING VOLTAGE RATING: 3 TO 230 VOLTS DC OPERATING IN SERIES WITH AN EXTERNAL BALLAST RESISTOR (SEE NOTES 4 AND 5).

OPERATING TEMPERATURE RANGE:  $-20^{\circ}\text{C}$  TO  $85^{\circ}\text{C}$  (SEE NOTE B)

STORAGE TEMPERATURE RANGE:  $-80^{\circ}\text{C}$  TO  $85^{\circ}\text{C}$

(A) REVISED AND REDRAWN

|   |  |  |
|---|--|--|
| P.A.<br>NAVY - AS<br>Other Cust               | TITLE<br>INDICATOR, ELAPSED TIME, ELECTROCHEMICAL<br>(MERCURY INDICATING CELL) | MILITARY STANDARD<br><b>MS3311(AS)</b> |
| PROCUREMENT SPECIFICATION<br>MIL-1-81219 (AS) | SUPSEDES:  | SHEET 1 OF 2                           |

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 ANSC M/A

APPROVED 2 JAN 1969  
 REVISED (A) 7 OCT 1987

FED. SUP CLASS  
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MECHANICAL SHOCK - 50g UNIT SHALL BE TESTED IN ACCORDANCE WITH MIL-STD-202, METHOD 213, TEST CONDITION A (50g, 11ms).  
100g UNIT SHALL BE TESTED IN ACCORDANCE WITH MIL-STD-202, METHOD 213, TEST CONDITION C.

THERMAL SHOCK: MIL-STD-202 METHOD 107 FOR THE FOLLOWING NUMBER OF CYCLES:  
MS3311-1 TO -3 5 CYCLES  
MS3311-101 TO -103 10 CYCLES

THE FOLLOWING DATA SHALL APPEAR ON THE OUTER SURFACE OF THE CASE:

|                          |                     |
|--------------------------|---------------------|
| MANUFACTURER'S NAME      | MILITARY NUMBER     |
| MANUFACTURER'S MODEL NO. | CODED DATE          |
|                          | POLARITY SYMBOL (+) |

THE COLORS SHALL BE AS SHOWN BELOW:

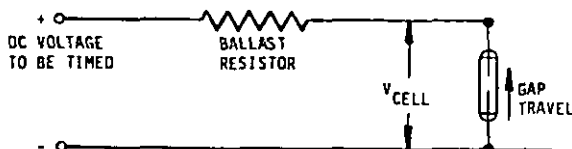
CASE: BLACK  
SCALE: BLACK LINES ON WHITE BACKGROUND

NOTES:

1. THE INDICATING CELL COVERED IN THIS MILITARY STANDARD IS INTENDED FOR USE ONLY ON REPLACEABLE MODULES AND SUB-MODULES OF ELECTRONIC EQUIPMENT WHERE THERE IS A REQUIREMENT TO RECORD THE NUMBER OF HOURS THAT THE MODULES AND SUB-MODULES HAVE BEEN OPERATED.
2. INDICATION OF ELAPSED TIME SHALL BE READ FROM THE SCALE USING THE LOWER EDGE OF THE BLACK INDICATOR GAP SEPARATING THE MERCURY COLUMNS. ELAPSED TIME IS READ FROM THE INDICATOR WITH THE SCALE GRADUATIONS TO THE LEFT OF THE GAP (SEE OUTLINE DRAWING ON PAGE 1).
3. FOR OPERATION AS A TIMER, THE INDICATING CELL MUST BE SUPPLIED WITH A CONSTANT DC CURRENT PER TABLE I. MS3311 INDICATORS ARE CURRENT REGULATED INDICATORS.
4. FOR OPERATION FROM REGULATED DC VOLTAGE SOURCE: PLACE A STABLE BALLAST RESISTOR IN SERIES WITH THE INDICATING CELL (ACCURACY OF THE INDICATOR IS DEPENDENT ON THE STABILITY AND ACCURACY OF THE INDICATORS OPERATING CURRENT AS DETERMINED BY THE VOLTAGE OF THE VOLTAGE SOURCE AND THE RESISTANCE OF THE EXTERNAL RESISTOR). THE RESISTOR VALUE CAN BE COMPUTED AS FOLLOWS:

$$\text{BALLAST RESISTOR (Meg. Ohms)} = \frac{\text{DC VOLTAGE (VOLTS)}}{\text{OPERATING CURRENT (MICROAMPS)}}$$

5. THE WIRING SCHEMATIC IS AS FOLLOWS:



CAUTION: THE INDICATING GAP WILL ALWAYS TRAVEL FROM NEGATIVE TO POSITIVE.

6. THERE IS NO PREFERRED MOUNTING ATTITUDE. THE INDICATING CELL MAY BE MOUNTED ON ANY AXIS AND READ WITHOUT REMOVAL. THE CELL SHALL BE MECHANICALLY AND RIGIDLY ATTACHED TO THE MODULE OR SUBMODULE, e.g. EPOXY ADHESIVE.
7. MS3311-1, -2 AND -3 ARE INACTIVE FOR NEW DESIGN. HIGHER SHOCK VERSIONS MS3311-101, -102 AND -103 SHOULD BE USED FOR NEW DESIGN. MS3311-101, -102 AND -103 ARE DIRECT REPLACEMENTS FOR MS3311-1, -2 AND -3 MECHANICALLY, DIMENSIONALLY AND ELECTRICALLY EXCEPT FOR AN APPROXIMATE 1% DECREASE IN DESIGN CURRENT AND HIGHER MAXIMUM CELL VOLTAGES WHICH ARE USUALLY INSIGNIFICANT WHEN CONSIDERING MS3311-101, -102 AND -103 AS REPLACEMENTS FOR MS3311-1, -2 AND -3 IN EXISTING DESIGNS.
8. INDICATORS MAY BE INSTALLED IN EQUIPMENT WITH AN OPERATING TEMPERATURE RANGE OF -55 C TO 85 C WITH ACCURATE OPERATION FROM -20°C TO 85°C WHEN ENERGIZED.
9. IN THE EVENT OF A CONFLICT BETWEEN THE TEXT OF THIS STANDARD AND THE REFERENCES CITED HEREIN, THE TEXT OF THIS STANDARD SHALL TAKE PRECEDENCE.
10. REFERENCED GOVERNMENT (OR NON-GOVERNMENT) DOCUMENTS OF THE ISSUE LISTED IN THAT ISSUE OF THE DEPARTMENT OF DEFENSE INDEX OF SPECIFICATIONS AND STANDARDS (DoDISS) SPECIFIED IN THE SOLICITATION FORM A PART OF THIS STANDARD TO THE EXTENT SPECIFIED HEREIN.

REVISED (A) FOR CHANGES SEE SHEETS 1 AND 2

APPROVED 2 JAN 1969

P.A.  
NAVY -- AS  
Other Cust

TITLE

INDICATOR, ELAPSED TIME, ELECTROCHEMICAL  
(MERCURY INDICATING CELL)

MILITARY STANDARD

MS3311 (AS)

PROCUREMENT SPECIFICATION  
MIL-I-81219 (AS)

SUPERSEDES:

SHEET 2 OF 2