

MIL-M-10304/18A(SHIPS)  
9 February 1962  
~~SUPERSEDING~~  
MIL-M-10304/18(SHIPS)  
7 December 1961

**MILITARY SPECIFICATION**  
**METERS, MULTISCALE, DC, PANEL TYPE,**  
**RUGGEDIZED (ROUND FLANGE, 3-1/2 INCH,**  
**STYLE 36)**

**1. SCOPE**

1.1 This specification covers the detail requirements for style 36, 3-1/2 inch, round flange, ruggedized, panel-type meters.

**2. APPLICABLE DOCUMENTS**

2.1 The following documents, of the issue in effect on date of invitation for bids, forms a part of this specification to the extent specified herein.

**SPECIFICATION**

**MILITARY**

MIL-M-10304-Meters, Electrical Indicating, Panel Type,  
Ruggedized, General Specification for.

**STANDARD**

**FEDERAL**

FED-STD-595-Colors.

(Copies of specifications required by contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

**3. REQUIREMENTS**

3.1 General requirements. - Meters shall be in accordance with Specification MIL-M-10304, and as specified herein.

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3.2 Design and construction. - The meter shall be of the design, construction, and physical dimensions specified on figure 1.

3.2.1 Scale angle. - The scale angle shall be 80 degrees minimum.

3.2.2 Scale length. - The scale length shall be not less than 2 inches.

3.2.3 Color scheme. - The color scheme shall be as specified in table I.

3.2.4 Full-scale ranges. - Full-scale ranges shall be as specified in table I.

3.2.5 OFF-Battery marking. - When applicable, the scale marking line separating "off" and "battery" shall be located at the mid-scale position.

3.2.6 Letters and numerals. - Except as specified in table I, letters and numerals shall be black.

3.3 Zero adjustment. - The zero adjuster shall be rotatable through 360 degrees.

3.4 Shaft rotation. - When tested as specified in 4.3.1, the scale changing shaft shall rotate 30 degrees for each scale position, at which position the scale shall be legible.

3.4.1 Shaft torque. - When tested as specified in 4.3.1 the scale change shaft shall operate with a torque of no greater than 12 inch ounces, nor less than 5 inch ounces.

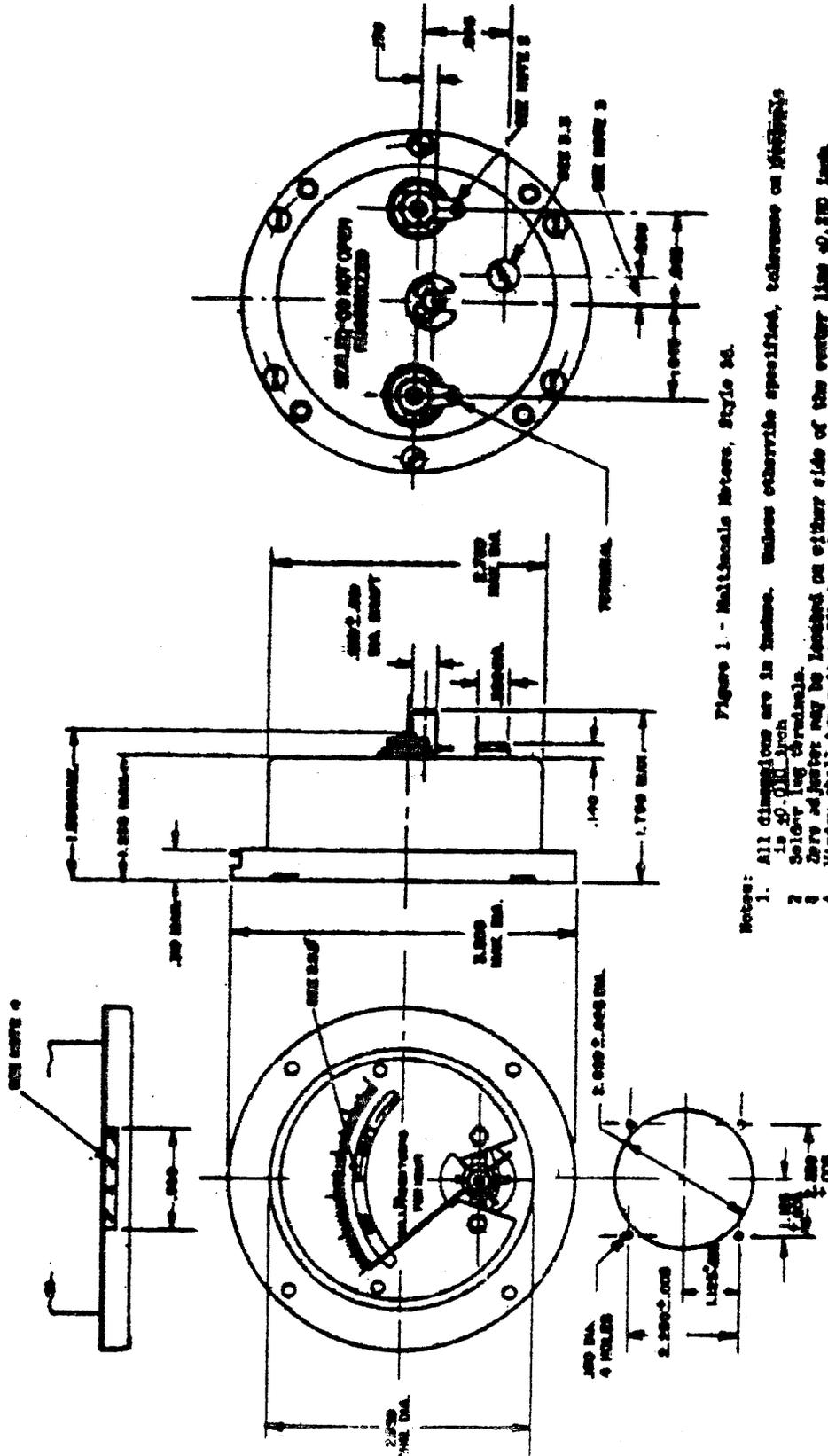


Figure 1 - Multiscala Meters, Style 36.

Notes:

1. All dimensions are in inches. Unless otherwise specified, tolerances on drawings is  $\pm 0.010$  inch.
2. Solenoid leg threads are 1/8 inch.
3. Zero adjuster may be located on either side of the center line  $\pm 0.500$  inch.
4. Window shall transmit sufficient light to permit easy reading of the scale.

Table I - Full-scale ranges and colors.

Type designation	MR36M200SPECR	MR36M201 SPECR	MR36M202 SPECR	MR36M203SPECR
Scale units	Counts per minute	Millicurrents per Hr.	Roentgens per hour	Roentgens per hr.
Full scale range	20 microamperes	50 microamperes	50 microamperes	500 microamperes
Terminal resistance	3000 OHMS $\pm$ 20%	1175 OHMS $\pm$ 20%	1175 OHMS $\pm$ 20%	200 OHMS $\pm$ 20%
	Scale	Scale	Scale	Scale
Scale colors and Range selection	Range <sup>1</sup> : Color <sup>2</sup> : Range <sup>3</sup> : Color <sup>2</sup> : Range <sup>1</sup> : Color <sup>2</sup> : Range <sup>1</sup> : Color <sup>2</sup> : Range <sup>1</sup> : Color <sup>2</sup>	Range <sup>1</sup> : Color <sup>2</sup> : Range <sup>3</sup> : Color <sup>2</sup> : Range <sup>1</sup> : Color <sup>2</sup> : Range <sup>1</sup> : Color <sup>2</sup> : Range <sup>1</sup> : Color <sup>2</sup>	Range <sup>1</sup> : Color <sup>2</sup> : Range <sup>3</sup> : Color <sup>2</sup> : Range <sup>1</sup> : Color <sup>2</sup> : Range <sup>1</sup> : Color <sup>2</sup> : Range <sup>1</sup> : Color <sup>2</sup>	Range <sup>1</sup> : Color <sup>2</sup> : Range <sup>3</sup> : Color <sup>2</sup> : Range <sup>1</sup> : Color <sup>2</sup> : Range <sup>1</sup> : Color <sup>2</sup> : Range <sup>1</sup> : Color <sup>2</sup>
	OFF-BATT : 37875 : OFF-BATT : 37875 : OFF : 37875 : OFF : 37875	OFF-BATT : 37875 : OFF-BATT : 37875 : OFF : 37875 : OFF : 37875	OFF-BATT : 37875 : OFF-BATT : 37875 : OFF : 37875 : OFF : 37875	OFF-BATT : 37875 : OFF-BATT : 37875 : OFF : 37875 : OFF : 37875
	0-1M : 31158 : 0-500 : 33655 <sup>3</sup> : 0-100 : 32248 : 0-500 : 37875	0-1M : 31158 : 0-500 : 33655 <sup>3</sup> : 0-100 : 32248 : 0-500 : 37875	0-1M : 31158 : 0-500 : 33655 <sup>3</sup> : 0-100 : 32248 : 0-500 : 37875	0-1M : 31158 : 0-500 : 33655 <sup>3</sup> : 0-100 : 32248 : 0-500 : 37875
	0-100K : 32358 : 0-50 : 34552 : 0-1K : 31168 : 0-500 : 21105 <sup>3</sup>	0-100K : 32358 : 0-50 : 34552 : 0-1K : 31168 : 0-500 : 21105 <sup>3</sup>	0-100K : 32358 : 0-50 : 34552 : 0-1K : 31168 : 0-500 : 21105 <sup>3</sup>	0-100K : 32358 : 0-50 : 34552 : 0-1K : 31168 : 0-500 : 21105 <sup>3</sup>
	0-10K : 32358 : 0-5 : 38414 : 0-10K : 21105 <sup>3</sup> : 0-50 : 21158 <sup>3</sup>	0-10K : 32358 : 0-5 : 38414 : 0-10K : 21105 <sup>3</sup> : 0-50 : 21158 <sup>3</sup>	0-10K : 32358 : 0-5 : 38414 : 0-10K : 21105 <sup>3</sup> : 0-50 : 21158 <sup>3</sup>	0-10K : 32358 : 0-5 : 38414 : 0-10K : 21105 <sup>3</sup> : 0-50 : 21158 <sup>3</sup>
	0-1K : 33655 <sup>3</sup> : 0-0.5 : 38414 : Blank : 37875 : 0-5 : 32356	0-1K : 33655 <sup>3</sup> : 0-0.5 : 38414 : Blank : 37875 : 0-5 : 32356	0-1K : 33655 <sup>3</sup> : 0-0.5 : 38414 : Blank : 37875 : 0-5 : 32356	0-1K : 33655 <sup>3</sup> : 0-0.5 : 38414 : Blank : 37875 : 0-5 : 32356

<sup>1</sup> In the order shown on counterclockwise rotator of the scale change shaft, when viewed from the rear of the meter.

<sup>2</sup> All colors shall be in accordance with Standard FED-STD-595.

<sup>3</sup> Lusterless.

3.5 Position influence. - The position influence shall not exceed 3 percent of the full-scale length, maximum change for a 60-degree rotation from normal operating position.

3.6 Initial accuracy. - The initial accuracy error shall not exceed 2 percent of full-scale value.

3.7 Damping factor. - The damping factor shall be not less than 2.5.

3.8 Response time. - The response time shall not exceed 2.0 seconds.

3.9 Heat effect at 65°C. - The change in indication at 65°C. shall not exceed 4 percent of full-scale value. The permanent change in indication shall not exceed 2 percent of full-scale value.

3.10 Temperature influence. - Temperature influence shall be +1 percent maximum.

3.11 Exposure to extreme temperatures. - The change in indication at -55°C. shall not exceed 5 percent of full-scale value. The permanent change in indication after exposure shall not exceed 3 percent of full-scale value.

3.12 Short-time overload. - The change in indication shall not exceed 1 percent of full-scale value.

3.13 Sustained overload. - The meter shall meet the following requirements after subjection to the sustained overload test:

	Percent of full-scale value
Temporary zero shift, maximum	1
Permanent zero shift, maximum	1
Permanent change in indication, maximum	2

3.14 Dielectric withstanding voltage. - The meter shall withstand 1,500 volts root mean square, without damage from flashover.

3.15 Insulation resistance. - Insulation resistance shall be 100 megohms.

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3.16 Endurance. - When tested as specified in 4.3.2, the meter shall operate normally and internal inspection shall show no moisture penetration or loose particles of material. The shaft torque shall be no greater than 12 ounce inches.

4. QUALITY ASSURANCE PROVISIONS

4.1 Sampling and inspection shall be in accordance with MIL-M-10304.

4.2 Qualification tests<sup>1</sup>. - Qualification tests shall be conducted at a laboratory satisfactory to the Bureau of Ships. Qualification tests shall consist of the tests specified in 4.3 and MIL-M-10304.

4.3 Test procedures.

4.3.1 Shaft rotation and torque. - A test shall be performed to determine the shaft rotation required to easily read scale and the torque required to rotate the shaft. This test shall be conducted as the final test in groups I, III and V for qualification, in group A inspection, and after the shock test in group C inspection.

4.3.2 Endurance. - The scale change shaft shall be rotated for 10,000 cycles (one cycle being defined as that rotation which displays each scale once), after which the watertightness test and shaft rotation and torque test shall be conducted. This test shall be conducted before the thermal shock test in group III for qualification, and the first test before the thermal shock test in group C inspection.

5. PREPARATION FOR DELIVERY

5.1 Preparation for delivery shall be in accordance with MIL-M-10304.

6. NOTES

6.1 In addition to the notes specified herein, the notes specified in MIL M-10304 are applicable to this specification.

6.2 With respect to products requiring qualification, awards will be made only for such products as have, prior to the time set for opening of bids, been tested and approved for inclusion in Qualified Products List QPL-10304/18, whether or not such products have actually been so listed by that date. The attention of the suppliers is called to this requirement, and manufacturers are

<sup>1</sup>Application for Qualification tests shall be made in accordance with "Provisions Governing Qualification" (see 6.2 and 6.3).

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urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification, in order that they may be eligible to be awarded contracts or orders for the products covered by this specification. The activity responsible for the qualified products list is the Bureau of Ships, Department of the Navy, Washington 25, D. C., and information pertaining to qualification of products may be obtained from that activity. Application for Qualification tests shall be made in accordance with "Provisions Governing Qualification" (see 6.3).

6.3 Copies of "Provisions Governing Qualification" may be obtained upon application to Commanding Officer, Naval Supply Depot, 5801 Tabor Avenue, Philadelphia 20, Pennsylvania.

Notice. - When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

Preparing activity:  
Navy - Ships  
(Project 6625-N227Sh)

**SPECIFICATION ANALYSIS SHEET**

Form Approved  
Budget Bureau No. 119-R004

**INSTRUCTIONS**

This sheet is to be filled out by personnel either Government or contractor, involved in the use of the specification in procurement of products for ultimate use by the Department of Defense. This sheet is provided for obtaining information on the use of this specification which will insure that suitable products can be procured with a minimum amount of delay and at the least cost. Comments and the return of this form will be appreciated. Fold on lines on reverse side, staple in corner, and send to preparing activity (as indicated on reverse hereof).

SPECIFICATION

ORGANIZATION (of submitter)

CITY AND STATE

CONTRACT NO.

QUANTITY OF ITEMS PROCURED

DOLLAR AMOUNT

\$

MATERIAL PROCURED UNDER A

DIRECT GOVERNMENT CONTRACT

SUBCONTRACT

1. HAS ANY PART OF THE SPECIFICATION CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE?

A. GIVE PARAGRAPH NUMBER AND WORDING.

B. RECOMMENDATIONS FOR CORRECTING THE DEFICIENCIES.

2. COMMENTS ON ANY SPECIFICATION REQUIREMENT CONSIDERED TOO RIGID

3. IS THE SPECIFICATION RESTRICTIVE?

YES

NO IF "YES", IN WHAT WAY?

4. REMARKS (Attach any pertinent data which may be of use in improving this specification. If there are additional papers, attach to form and place both in an envelope addressed to preparing activity)

SUBMITTED BY (Printed or typed name and activity)

DATE

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