MIL-STD-1279
10 September 1970

MILITARY STANDARD

METERS, ELECTRICAL INDICATING
SELECTION AND USE OF

FSC 6625

DEPARTMENT OF DEFENSE
Washington, D C. 20301

Meters, Electrical Indicating, Selection and Use of

MIL-STD-1279

1 This Military Standard is mandatory for use by all Departments and Agencies of the Department of Defense

2. Recommended corrections, additions, or deletions should be addressed to Commanding General, U S. Army Electronics Command, ATTN AMSEL-PP-EM-2, Fort Monmouth, New Jersey 07703

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SECTIONS

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1 SCOPE

1 1 Scope This standard consists of the following

(a) Selected standard electrical indicating meter types, detailed by sections, chosen jointly by the Departments of the Army, the Navy, and the Air Force for use in new design and manufacture of military equipment under the jurisdiction of the Departments.

(b) Guides for the choice and application of electrical indicating meters in military equipment.

Detailed requirements of these meters are covered in the latest issue of the applicable specification (see 2. 1).

1. 2 Purpose of standard

(a) To provide the equipment designer with a selection of preferred meters for use in most military applications.

(b) To restrict and minimize the variety of meters used in military equipment in order to facilitate logistic support of the equipment in the field.

(c) To outline criteria pertaining to the use, choice, and application of meters in military equipment.

2. REFERENCED DOCUMENTS

2.1 The following documents of the issue in effect on the date of invitation for bids or request for proposal form a part of this standard to the extent specified herein.

SPECIFICATIONS

MILITARY

MIL-M-7793	-	Meter, Time Totalizing
MIL-M-10304	-	Meters, Electrical Indicating, Panel Type, Ruggedized, General Specification For.
MIL-M-17275	-	Meters, Electrical Indicating, Direct Current, 1 Inch, General Specification For

STANDARDS

FEDERAL

FED-STD-595	-	Colors

(Copies of specifications, standards, drawings, and publications required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

3. DEFINITIONS

3.1 A list of terms commonly used in connection with meters follows

(a) Accuracy. The accuracy classification of the instrument is given as the limit, expressed as a percentage of full-scale value, that errors will not exceed when the instrument is used under reference conditions.

(b) Damping factor. The damping factor is the ratio of the steady deflection to the difference between maximum momentary deflection and steady deflection produced by a sudden application of constant electric power (high impedance source) All deflections are measured in angular degrees.

(c) Decibel. A decibel (dB) is a logarithmic unit for expressing the ratio of two amounts of power, the number of dB denoting such a ratio being 10 times the logarithm to the base 10 of this ratio.

Example With P_1 and P_2 designating two amounts of power and N the number of dB denoting their ratio

$$N = 10 \log_{10} (P_1/P_2) \text{ dB}$$

(d) End-scale value. The end-scale value is the maximum value of the actuating electrical quantity which corresponds to end-scale indication.

(e) Error. The error is the difference between the indication and the true value of the quantity measured It is the quantity which, when algebraically subtracted from the indication, gives the true value A positive error denotes that the indication of the meter is greater than the true value.

(f) Free indication. Free indication is the condition whereby the pointer of the meter under test moves simultaneously with the pointer of the reference standard with which it is being compared, when the electrical energy supplied to both meters is gradually increased from zero to an amount sufficient to produce end-scale deflection of the meter under test

(g) Full-scale value The full-scale value is the largest actuating electrical quantity which can be indicated on the scale, or, for a meter having its zero between the ends of the scale, the full-scale value is the arithmetic sum of the values of the actuating electrical quantity corresponding to the two ends of the scale

(h) Meter. The term "meter" includes the case, terminals, and all parts within the case or made a corporate part thereof

(i) Meter, DBM A DBM meter is a decibel meter having a zero power level of 0.001 watt dissipated in a 600-ohm load.

(j) Meter, decibel. A meter having a scale calibrated to read directly in decibel values at a specified reference level (usually 1 milliwatt equals zero dB).

(k) Meter, electrical indicating An electrical-indicating meter is an electrically energized device for measuring the present value of the quantity under observation by visual means

(l) Meter, rectifier A rectifier meter is a combination of a meter sensitive to direct current and a rectifying means whereby alternating current may be measured.

(m) Meter, sealed. A sealed meter is a meter so constructed as to prevent the entrance of moisture or vapor into the meter under specified inspection conditions

(n) Meter, self-contained A self-contained meter is a meter which includes within the case all of the necessary accessories as integral parts of the meter.

(o) Moving element. The moving element of a meter is comprised of those parts which move as a direct result of a variation in the electrical quantity which the meter is measuring

(p) Normal operating position. The normal operating position for meters is that in which the meter is mounted on a vertical panel in the position in which it is normally viewed

(q) Position influence. The position influence is the maximum displacement of the pointer which is caused solely by a 60° rotation, in a vertical plane, from the normal operating position of the meter, in the direction which produces the most unfavorable conditions as to position.

(r) Power consumption (loss) Power consumption (loss) is the electric power required to produce end-scale deflection of the meter. Power consumption (loss) may be expressed in terms of units other than units of power, such as milliamperes (ma), millivolts (mv), volt amperes (va), or ohms, which are more useful in determining the suitability of a particular meter for a desired application.

(1) Alternating current meters

a Current- and voltage-measuring meters In current- and voltage-measuring meters, the power consumption (loss) is expressed in va.

(2) Direct-current meters.

a Current-measuring meters. In current-measuring meters, the power consumption (loss) is expressed in mv

b. Voltage-measuring meters. In voltage-measuring meters, the power consumption (loss) is expressed in ma or microamperes (ua).

(3) Rectifier meters

a. Voltage-measuring meters. In voltage-measuring meters, including power and volume-level indicators, the power consumption (loss) is expressed in ohms

(s) Response time. Response time is the time in seconds required for the pointer to come to rest after a change in the value of the measured quantity.

(t) Scale division. A scale division is the increment between the centers of two consecutive scale marks.

(u) Scale length. Scale length is the length of the path described by the tip of the pointer in moving from one end of the scale to the other. In the case of pointers extending beyond the scale-division marks, the pointer shall be considered as ending at the outer end of the shortest scale-division marks For multiple-scale meters, the longest scale shall be used to determine the scale length

(v) Temperature influence Temperature influence is the change (percentage of full-scale value) in the indication caused by a difference in ambient temperature of ±10° C from a reference temperature.

4. GENERAL REQUIREMENTS

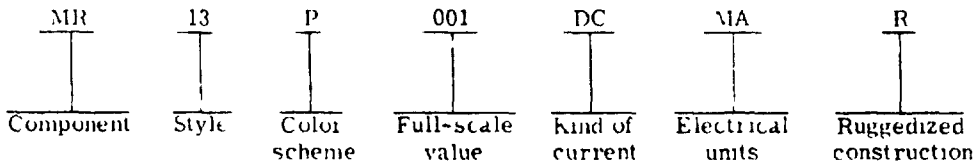
4.1 Choice of meter types. There probably exists, or has been developed, a style of meter which would be suitable for most equipment now being designed. The variety of meter types used in any particular equipment shall be the minimum necessary to obtain satisfactory performance. The accuracy, operating environment, size, operating characteristics, and cost must all be considered when selecting the proper meter for any given application. The meters identified in this standard meet all the criteria for standard types.

4.1.1 Qualified products. After a preliminary selection of the desired meter has been made, reference should be made to the applicable qualified products list for listing of qualified products.

4.2 Item identification. The type designation is used for identifying and describing the meter. It is constructed as indicated in the following examples.

MIL-M-10304 TYPE DESIGNATION EXAMPLE

Type designation. The type designation for meters under MIL-M-10304 is in the following form:



Component. Meters are identified by the two-letter symbol "MR".

Style. The style is identified by a two-digit number which signifies the size of the meter, shape of the flange, and degree of enclosure.

The first digit identifies the nominal size of the meter, as follows:

0 - - - - - - - - - 1 inch
1 - - - - - - - - - 1-1/2 inches
2 - - - - - - - - - 2-1/2 inches
3 - - - - - - - - - 3-1/2 inches
4 - - - - - - - - - 4-1/2 inches

The second digit identifies the shape of flange, and degree of enclosure, as follows:

3 - - - Square flange, watertight.
4 - - - Round flange, watertight, long scale
6 - - - Round flange, watertight

Color scheme. The color scheme of the dial background, and of the markings and pointer is identified by a single letter as follows:

W - - - White dial background, black markings and pointer
B - - - - Black dial background, white markings and pointer
Y - - - - Buff dial background, black markings and pointer
F - - - - Black dial background, fluorescent (yellow) markings and pointer
P - - - - Phosphorescent markings and pointer, black dial background
M - - - - Multicolored markings. Color of the dial background and of the markings and pointer shall be as specified
A - - - - Additional or other dial markings, ie, a colored line at a particular reading, a colored segment, or segments on the dial embracing two or more readings, etc

Full-scale value.

Zero left The full-scale value for meters with zero at left is identified by three digits designating the units indicated. When the full scale is less than three digits, zeros are inserted at the left to fill out to three digits. Where the letter "R" is used in this group between two digits, it represents a decimal point. Example 1R5 represents 1.5

Offset-zero The full-scale value of offset-zero meters, including zero-center meters, is identified by two digits with a letter between which gives the decimal value of the digits, as follows

D - - - Tenths.
U - - - Units.
T - - - Tens.
H - - - Hundreds.

Example 5H5 represents 500-0-500.

Kind of current. The kind of current for which the meter is designed is identified by two letters, as follows

AC - - - Alternating current (60 Hz), nominal frequency 25 to 125 Hz, operating frequency), of the iron vane type only.
AR - - - Alternating current (60 to 1000 Hz), rectifier type.
AE - - - Alternating current (800 Hz, nominal frequency), of the iron vane type only.
AF - - - Alternating current (400 Hz, nominal frequency), of the iron vane type only.
DC - - - Direct current.
RF - - - Radiofrequency (50 kHz or above), conventional scale
RL - - - Radiofrequency (50 kHz or above), linear expanded scale.

Electrical units. The electrical units indicated by the meters are identified by two letters, as follows

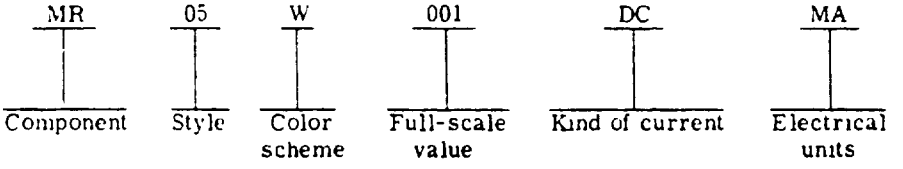
UA - - - Microamperes
MA - - - Milliamperes
AA - - - Amperes.
KA - - - Kiloamperes.
MV - - - Millivolts.
KV - - - Kilovolts.
VV - - - Volts.

Ruggedized construction. The letter "R" designates that the meter is of ruggedized construction

Special meters. The four letters "SPEC" are used in place of the letters for "kind of current" and "electrical units" for meters having special features, such as adjusted resistance, special scale marks, and so forth. Serial numbers which are to be used in place of the full-scale value identifier are assigned to these meters by the Government.

MIL-M-17275 TYPE DESIGNATION EXAMPLE

Type designation The type designation for meters under MIL-M-17275 is in the following form



Component Meters are identified by the two-letter symbol "MR."

Style. The style is identified by a two-digit number which signifies the size, shape of flange, case material, nominal scale length in angular degrees, and the type of panel for which calibrated.

The first digit identifies the barrel diameter, as follows

0 - 1 inch

The second digit identifies the shape of flange, case material, nominal scale length in angular degrees, and the type of panel for which calibrated, as follows

4 - Round flange, molded thermosetting plastic or metal case, 90° nominal scale, and calibrated for use on a steel panel 0.09 inch thick.
5 - Round flange, molded thermosetting plastic or metal case, 90° nominal scale, and calibrated for use on a nonmagentic panel.
6 - Round flange, molded thermosetting plastic or metal case, 90° nominal scale, and calibrated for use on a nonmagnetic panel, and on a steel panel 0.09 inch thick

Color scheme The color scheme of the dial background, and of the pointer and markings is identified by a single letter, as follows

W - - - White dial background, black markings and pointer.
B - - - Black dial background white markings and pointer
A - - - Additional or other dial markings, i.e., a colored line at a particular reading, a colored segment, or segments on the dial embracing two or more readings, etc.
F - - - Fluorescent (yellow) markings and pointer, black dial background.
P - - - Phosphorescent markings and pointer, black dial background
M - - - Multicolored markings Color of the dial background, and of the markings and pointer shall be as specified

Full-scale value.

Zero-left. The full-scale value for meters with zero at left is identified by three digits designating the units indicated. When the full scale is less than three digits, zeros are inserted at the left to fill out to three digits

U - Units
T - Tens
H - Hundreds

Example 5H5 represents 500-0-500.

Kind of current. The letters "DC" signify that direct current energizes the meter.

Electrical units. Two letters designate the electrical units indicated by the meter as follows:

UA - Microamperes.
MA - Milliamperes.
MV - Millivolts.
VV - Volts.
AA - Amperes.

4.3 Conflict of requirements. In the event of conflict between technical requirements of meters described in this standard and the applicable specification, the latter shall govern.

4.4 Criteria for inclusion in this standard. The criteria for the inclusion of meters in this standard are as follows

(a) The meter shall be the best type available for general use in military equipment.

(b) Military specifications shall be available

(c) Meters shall be or shall have been in production.

(d) There shall be at least one source having qualification approval.

(e) They shall be designed to read the commonly used values of current, voltage, etc, and these values shall be located on the upper portion of the scale, especially on ac meters, in order to afford greater reading accuracy.

5. DETAILED REQUIREMENTS

5.1 The detailed requirements for standard meter types are contained in the applicable specification and the applicable section of this standard.

6 APPLICATION INFORMATION

6.1 General. This standard is intended to outline the main technical details pertaining to electrical indicating meters. It applies primarily to the three military departments' high-use-rate meters which can be grouped in four general categories tactical, switchboard, portable and aircraft There are separate specifications for procurement purposes for these general categories of instruments, and many of the attributes for which they are tested during qualification and production are quite different. The accuracies of these meters and the levels of resistance to shock, vibration, and other hostile environments vary with the basic design covered by these specifications

6.2 Types of meters.

6 2 1 Meters, 1-inch These meters are nonruggedized but are used in many equipments as a go-no-go type of instrument They have a 1-inch barrel diameter, and are either shielded or unshielded, and are calibrated for use on both magnetic and nonmagnetic panels The preferred ranges are listed in MIL-M-17275

6.2.2 Meters, 1-1/2-inch The 1-1 2-inch meters are available for all of the standard voltmeter and ammeter ranges.

6.2.3 Preferred meters, 2-1 2-inch. The preferred meters for use in tactical field equipment such as radio receivers, transmitters, radar, meteorological equipment, tanks and automotive installations are the 2-1/ 2-inch ruggedized panel meters. This document lists the "ruggedized" meter types preferred in tactical equipment, and the styles and sensitivities thereunder are readily available from several suppliers for the commonly used ranges. The preferred ranges, established after many years of standardization effort, are listed in MIL-M-10304. The end scale value should be selected so that the majority of the readings will be at approximately two-thirds of the total pointer deflection These meters are designed to withstand vibration, shock, and high and low temperature cycling, and are sealed and shielded so as to be not affected by stray fields. They are nominally 2 percent accuracy meters which is sufficient for most operating applications and consist of both ammeters and voltmeters in a wide selection of ranges ac, dc, rf, etc.

6.2.4 Meters, 3-1/2-inch. The 3-1/2-inch meters are available for all of the standard voltmeter and ammeter ranges

6 2.5 Meters, 4-1/2-inch. The 4-1/2-inch meters are available for all of the standard voltmeters and ammeter ranges.

6.3 Special marking. Many equipment designers require special markings, which may not be absolutely essential, such as red and green colored areas above and below a certain reading, etc, on the dials of otherwise standard meters. These special markings became deviations from the standard stock descriptions. therefore, meters with special markings require new stock numbers and descriptions in order to identify for stocking, procurement, and maintenance purposes in the supply depots.

6.4 Precautions. Care should be taken that meters are not accidentally overloaded electrically or exposed to excessive environmental conditions for which they were not designed, such as shock, vibration, immersion, and extreme temperatures.

6.5 Watertightness. Some meters are classed as "watertight," but only for limited exposures

7 SUPPLEMENTAL INFORMATION

7 1 Drawing notes. The following notes apply to all drawings in this standard

(a) Dimensions are in inches.

(b) Metric equivalents (to the nearest 01 mm) are given for general information only and are based upon 1 inch = 25.4 mm.

Custodians
Army - EL
Navy - EC
Air Force - 82

Review activities
Army - EL, ME
Navy - SH, MC
Air Force - 11, 67
DSA - ES

User activities
Army - MI
Navy - CG, MC
Air Force - None

Preparing activity
Army - EL

Agent
DSA - ES

(Project 6625-0487)

SECTION 100

1- AND 1-1/2-INCH AMMETERS AND VOLTMETERS

SPECIAL METERS, AND TIME METERS

SECTION 101

METERS, ELECTRICAL INDICATING, DIRECT CURRENT, 1-INCH, STYLES 04, 05 and 06

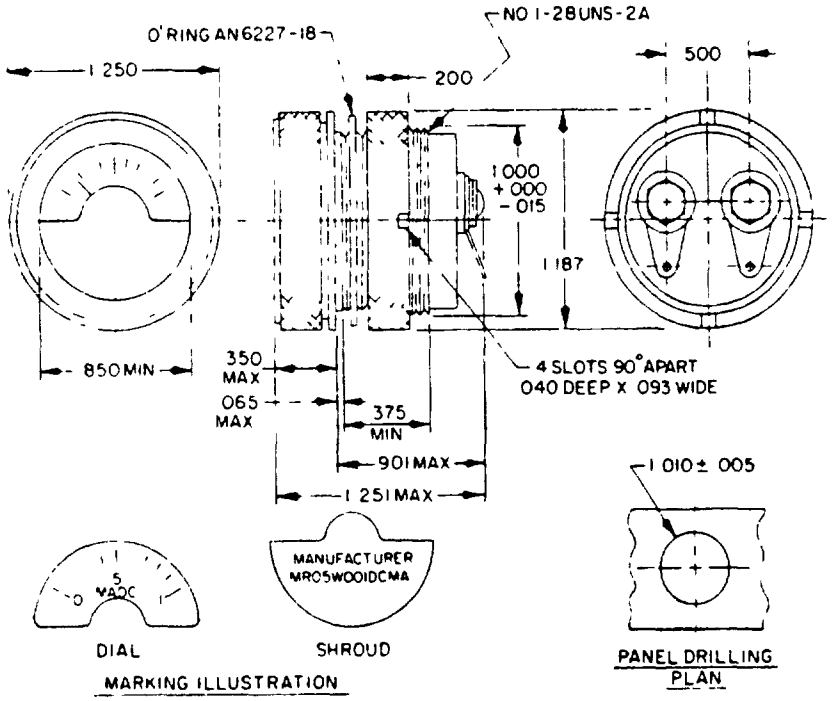
(Applicable specification: MIL-M-17275)

This section covers the following meters:

Meters, electrical indicating, dc, millivoltmeter, panel type, flush mounting, round flange, 1-inch, styles 04, 05, and 06.
Meters, electrical indicating, dc, milliammeter, panel type, flush mounting, round flange, 1-inch, styles 04, 05, and 06.
Meters, electrical indicating, dc, microammeter, panel type, flush mounting, round flange, 1-inch, styles 04, 05, and 06.
Meters, electrical indicating, dc, voltmeter, panel type, flush mounting, round flange, 1-inch, styles 04, 05, and 06.

Meters shall conform to the applicable specification sheet.

Type designations and applicable specification sheets are listed in table 101-I



INCHES	MM	INCHES	MM	INCHES	MM
.005	.13	.350	8.89	1.010	25.65
.015	.38	.375	9.53	1.187	30.15
.040	1.02	.500	12.70	1.250	31.75
.065	1.65	.850	21.59	1.251	31.78
.093	2.36	.901	22.89		
.200	5.08	1.000	25.40		

TABLE 101-I Type designation and applicable specification sheets

Type designation 1/	Specification sheet number
MR06*050DCMV	MIL-M-17275/1
MR06*001DCVV	MIL-M-17275/4
MR06*005DCVV	MIL-M-17275/4
MR06*010DCVV	MIL-M-17275/4
MR06*050DCVV	MIL-M-17275/4
MR06*100DCVV	MIL-M-17275/4
MR06*100DCUA	MIL-M-17275/3
MR06*500DCUA	MIL-M-17275/3
MR06*5H5DCUA	MIL-M-17275/3
MR06*001DCMA	MIL-M-17275/2

*A, B, F, P, or W

1/ Type designations for styles 04 and 05 are not listed, since style 06 meters are the preferred meters, however, ranges for styles 04, 05, and 06 meters are the same.

SECTION 102

METERS, RUGGEDIZED, PANEL TYPE, SEALED, 1-1/2 INCH, STYLE 13

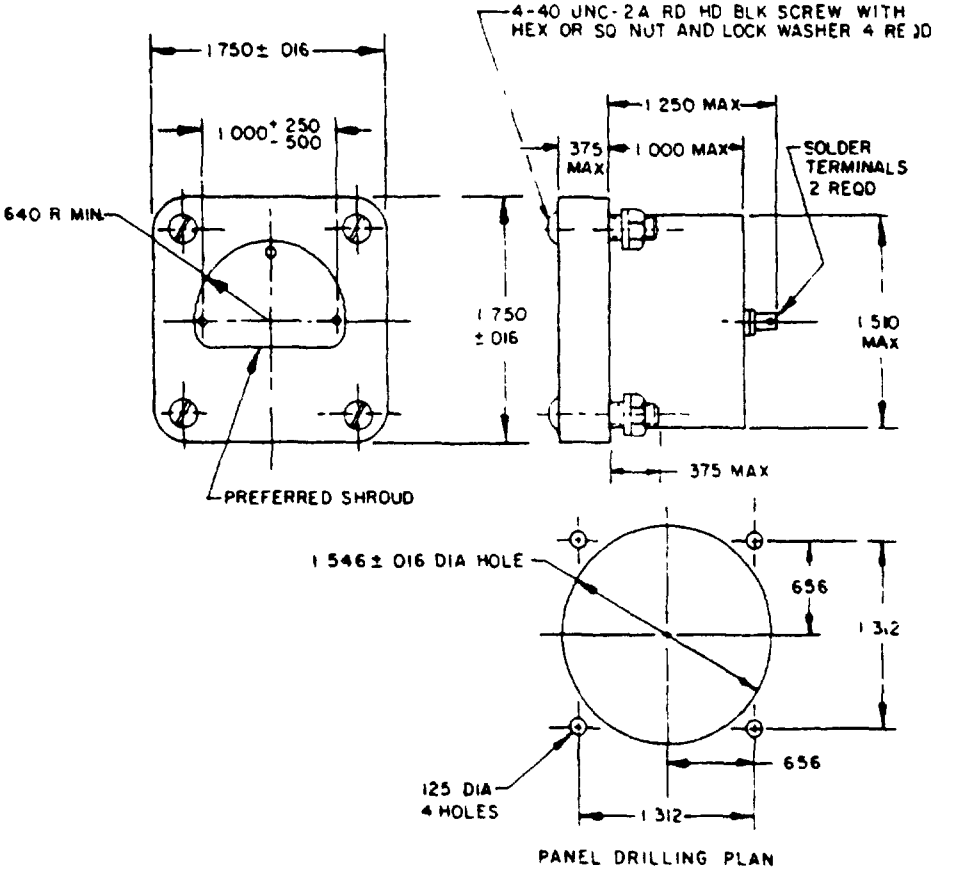
(Applicable specification MIL-M-10304)

This section covers the following meters

Meters, electrical indicating, ammeters, rf, panel type, ruggedized (square flange, 1-1/2 inch) style 13.
Meters, electrical indicating, voltmeters, dc, panel type, ruggedized (square flange, 1-1/2 inch) style 13.
Meters, electrical indicating, ammeters, dc, panel type, ruggedized (square flange, 1-1/2 inch) style 13.

Meters shall conform to the applicable specification sheet.

Type designations and applicable specification sheets are listed in table 102-I.



INCHES	MM
.016	.41
.125	3.18
.250	6.35
.375	9.53
.500	12.70
.640	16.26
.656	16.66
1.000	25.40
1.250	31.75
1.312	33.32
1.510	38.35
1.546	39.27
1.750	44.45

TABLE 102-1 Type designations and applicable specification sheets.

Type designation	Specification sheet number
MR13*500DCMVR	MIL-M-10304/21
MR13*002DCVVR	MIL-M-10304 21
MR13*010DCVVR	MIL-M-10304/21
MR13*020DCVVR	MIL-M-10304 21
MR13*050DCVVR	MIL-M-10304 21
MR13*100DCVVR	MIL-M-10304/21
MR13*200DCVVR	MIL-M-10304 21
MR13*5T5DCVVR	MIL-M-10304/21
MR13*1H1DCVVR	MIL-M-10304/21
MR13*050DCUAR	MIL-M-10304'24
MR13*100DCUAR	MIL-M-10304, 24
MR13*200DCUAR	MIL-M-10304/24
MR13*500DCUAR	MIL-M-10304/24
MR13*5T5DCUAR	MIL-M-10304/24
MR13*1H1DCUAR	MIL-M-10304/24
MR13*5H5DCUAR	MIL-M-10304/24
MR13*001DCMAR	MIL-M-10304/24
MR13*005DCMAR	MIL-M-10304/24
MR13*010DCMAR	MIL-M-10304, 24
MR13*050DCMAR	MIL-M-10304/24
MR13*100DCMAR	MIL-M-10304/24
MR13*200DCMAR	MIL-M-10304/24
MR13*500DCMAR	MIL-M-10304/24
MR13*1U1DCMAR	MIL-M-10304/24
MR13*5U5DCMAR	MIL-M-10304/24
MR13*1T1DCMAR	MIL-M-10304/24
MR13*1H1DCMAR	MIL-M-10304/24
MR13*5H5DCMAR	MIL-M-10304/24
MR13*005RLAAR	MIL-M-10304/3

SECTION 103

METERS, SPECIAL DECIBEL, PANEL TYPE, 1-1/2-INCH, STYLE 13

(Applicable specification MIL-M-10304)

This section covers the following meters

Meters, electrical indicating, special decibel, panel type (flush mounting, square flange, 1-1/2-inch), style 13.

Meters shall conform to the applicable specification sheet.

Type designation MR13B100 SPEC R.
Applicable specification sheet MIL-M-10304/19.
Range -8 to +22 db.
Figure Same as in section 102

SECTION 104

METERS, TIME, RUGGEDIZED, 1-1/2-INCH

(Applicable specification MIL-M-7793)

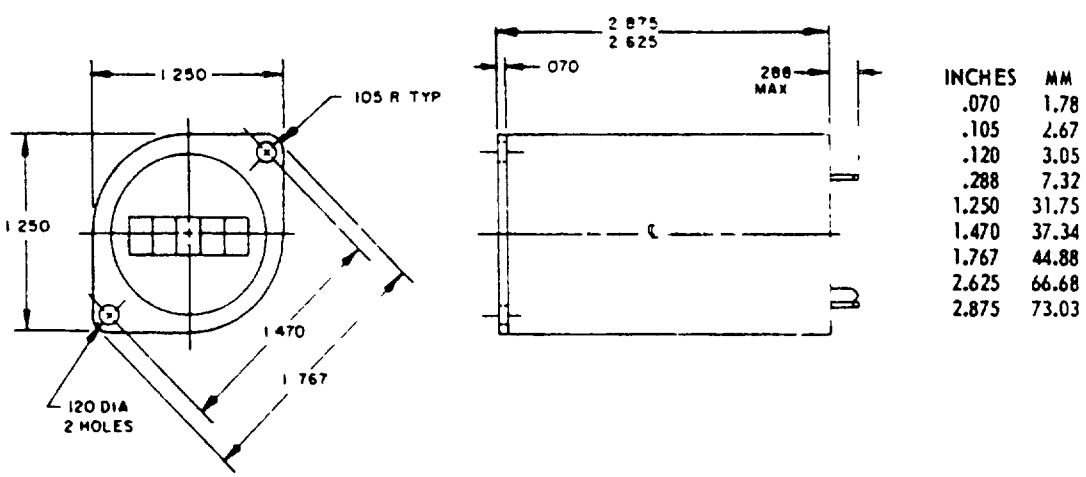
This section covers the following meter

Meter, time totalizing digital, 115 volt, 60 or 400 Hz.

Meter shall conform to MS17325.

MS part no.	Type	Range-hours *
MS17325-1	w/flange 400 Hz	10,000
MS17325-2	w/flange 60 Hz	10,000
MS17325-3	w/flange 60 Hz	100,000

*Maximum readout will be 9999 9 or 99999, as applicable.



INCHES	MM
.070	1.78
.105	2.67
.120	3.05
.288	7.32
1.250	31.75
1.470	37.34
1.767	44.88
2.625	66.68
2.875	73.03

NOTE

Unless otherwise specified, tolerances are ±.015 (.38 mm).

SECTION 200

2-1/2-INCH RUGGEDIZED AMMETERS, VOLTMETERS, AND TIME METERS

SECTION 201

METERS, RUGGEDIZED, PANEL TYPE, SEALED, 2-1/2 INCH, STYLE 26

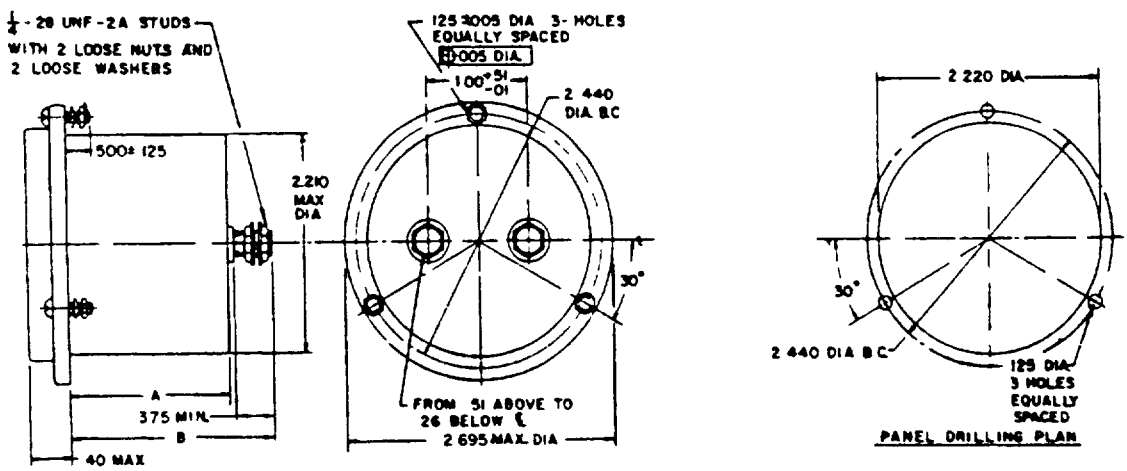
(Applicable specification MIL-M-10304)

This section covers the following meters

Meters, electrical indicating, voltmeters, dc, panel type, ruggedized (flush mounting, round flange, 2-1/2-inch), style 26.
Meters, electrical indicating, ammeters, dc, panel type, ruggedized (flush mounting, round flange, 2-1/2-inch), style 26.
Meters, electrical indicating, voltmeters, ac, panel type, ruggedized (flush mounting, round flange, 2-1/2-inch), style 26.
Meters, electrical indicating, ammeters, ac, panel type, ruggedized (flush mounting, round flange, 2-1/2-inch), style 26.
Meters, electrical indicating, ammeters, rf, panel type, ruggedized (flush mounting, round flange, 2-1/2-inch), style 26.
Meters, electrical indicating, rectifier-type, voltmeters, ac, panel type, ruggedized (flush mounting, round flange, 2-1/2-inch), style 26.

Meters shall conform to the applicable specification sheet.

Type designations and applicable specification sheets are listed in table 201-I.



INCHES	MM	INCHES	MM
005	13	.500	12 70
01	25	51	12 95
.12	3 05	1 00	25 40
125	3 18	2 210	56 13
26	6 60	2 220	56 39
.375	9 53	2.440	61 98
.40	10 16	2 695	68 45

TABLE 201-1 Type designations, dimensions, and applicable specification sheets

	Type designation	Specification sheet number	Max inches A	Max inches B
	MR26*020DCUAR	MIL-M-10304 5	1 60	2 25
	MR26*050DCUAR	MIL-M-10304 5	1.60	2.25
	MR26*100DCUAR	MIL-M-10304 5	1.60	2 25
	MR26*200DCUAR	MIL-M-10304 5	1.60	2 25
	MR26*500DCUAR	MIL-M-10304 5	1.60	2 25
	MR26*5T5DCUAR	MIL-M-10304 5	1.60	2.25
	MR26*1H1DCUAR	MIL-M-10304 5	1.60	2 25
	MR26*5H5DCUAR	MIL-M-10304 5	1 60	2 25
	MR26*001DCMAR	MIL-M-10304 5	1 60	2.25
	MR26*005DCMAR	MIL-M-10304 5	1.60	2 25
	MR26*010DCMAR	MIL-M-10304 5	1.60	2.25
	MR26*050DCMAR	MIL-M-10304 5	1.60	2 25
	MR26*100DCMAR	MIL-M-10304 5	1 60	2.25
	MR26*200DCMAR	MIL-M-10304/5	1 60	2.25
	MR26*500DCMAR	MIL-M-10304 5	1 60	2.25
	MR26*1U1DCMAR	MIL-M-10304 5	1.60	2 25
	MR26*5U5DCMAR	MIL-M-10304 5	1 60	2 25
	MR26*1T1DCMAR	MIL-M-10304 5	1.60	2.25
	MR26*5T5DCMAR	MIL-M-10304/5	1.60	2.25
	MR26*1H1DCMAR	MIL-M-10304/5	1.60	2.25
	MR26*5H5DCMAR	MIL-M-10304 5	1.60	2.25
1/	MR26*001DCAAR	MIL-M-10304 5	1.60	2.25
1/	MR26*002DCAAR	MIL-M-10304/5	1.60	2.25
1/	MR26*005DCAAR	MIL-M-10304/5	1.60	2.25
1/	MR26*010DCAAR	MIL-M-10304 5	1 60	2.25
1/	MR26*020DCAAR	MIL-M-10304 5	1.60	2 25
1/	MR26*050DCAAR	MIL-M-10304/5	1.60	2 25
1/	MR26*100DCAAR	MIL-M-10304/5	1.60	2.25
1	MR26*200DCAAR	MIL-M-10304/5	1 60	2.25
1/	MR26*500DCAAR	MIL-M-10304/5	1 60	2.25
1	MR26*5U5DCAAR	MIL-M-10304/5	1.60	2 25
1/	MR26*1T1DCAAR	MIL-M-10304/5	1.60	2.25
1	MR26*1T3DCAAR	MIL-M-10304 5	1 60	2.25
1	MR26*2T2DCAAR	MIL-M-10304 5	1.60	2 25
1	MR26*3T3DCAAR	MIL-M-10304 5	1.60	2.25
1/	MR26*001DCKAR	MIL-M-10304 5	1 60	2 25
1/	MR26*1R2DCKAR	MIL-M-10304/5	1.60	2.25
	MR26*002DCVVR	MIL-M-10304/4	1.60	2.25
	MR26*005DCVVR	MIL-M-10304/4	1.60	2.25
	MR26*010DCVVR	MIL-M-10304/4	1.60	2.25
	MR26*020DCVVR	MIL-M-10304 4	1.60	2.25
	MR26*030DCVVR	MIL-M-10304/4	1 60	2.25
	MR26*050DCVVR	MIL-M-10304/4	1 60	2.25
	MR26*100DCVVR	MIL-M-10304 4	1.60	2.25
	MR26*150DCVVR	MIL-M-10304 4	1 60	2 25
	MR26*200DCVVR	MIL-M-10304 4	1 60	2.25
	MR26*300DCVVR	MIL-M-10304 4	1 60	2.25
1	MR26*500DCVVR	MIL-M-10304 4	1 60	2.25
	MR26*5T5DCVVR	MIL-M-10304 4	1 60	2 25
	MR26*1H1DCVVR	MIL-M-10304 4	1 60	2 25
	MR26*2H2DCVVR	MIL-M-10304 4	1.60	2.25
1	MR26*001DCKVR	MIL-M-10304/4	1 60	2 25
1/	MR26*002DCKVR	MIL-M-10304 4	1 60	2.25

1/ See footnote at end of table.

TABLE 201-I Type designations, dimensions, and applicable specification sheets - Continued

	Type designation	Specification sheet number	Max inches A	Max inches B
1/	MR26*005DCKVR	MIL-M-10304/4	1.60	2.25
1/	MR26*010DCKVR	MIL-M-10304/4	1.60	2.25
1/	MR26*020DCKVR	MIL-M-10304/4	1.60	2.25
1/	MR26*030DCKVR	MIL-M-10304/4	1.60	2.25
	MR26*010ACMAR	MIL-M-10304/7	1.75	2.40
	MR26*020ACMAR	MIL-M-10304/7	1.75	2.40
	MR26*050ACMAR	MIL-M-10304/7	1.75	2.40
	MR26*100ACMAR	MIL-M-10304/7	1.75	2.40
	MR26*200ACMAR	MIL-M-10304/7	1.75	2.40
	MR26*500ACMAR	MIL-M-10304/7	1.75	2.40
	MR26*001ACAAR	MIL-M-10304/7	1.75	2.40
	MR26*002ACAAR	MIL-M-10304/7	1.75	2.40
	MR26*005ACAAR	MIL-M-10304/7	1.75	2.40
	MR26*010ACAAR	MIL-M-10304/7	1.75	2.40
	MR26*020ACAAR	MIL-M-10304/7	1.75	2.40
	MR26*030ACAAR	MIL-M-10304/7	1.75	2.40
	MR26*050ACAAR	MIL-M-10304/7	1.75	2.40
	MR26*100ACAAR	MIL-M-10304/7	1.75	2.40
	MR26*200ACAAR	MIL-M-10304/7	1.75	2.40
	MR26*500ACAAR	MIL-M-10304/7	1.75	2.40
	MR26*002ACVVR	MIL-M-10304/6	1.75	2.40
	MR26*003ACVVR	MIL-M-10304/6	1.75	2.40
	MR26*005ACVVR	MIL-M-10304/6	1.75	2.40
	MR26*008ACVVR	MIL-M-10304/6	1.75	2.40
	MR26*010ACVVR	MIL-M-10304/6	1.75	2.40
	MR26*015ACVVR	MIL-M-10304/6	1.75	2.40
	MR26*030ACVVR	MIL-M-10304/6	1.75	2.40
	MR26*080ACVVR	MIL-M-10304/6	1.75	2.40
	MR26*150ACVVR	MIL-M-10304/6	1.75	2.40
	MR26*300ACVVR	MIL-M-10304/6	1.75	2.40
1/	MR26*800ACVVR	MIL-M-10304/6	1.75	2.40
	MR26*100RFMAR	MIL-M-10304/8	1.60	2.25
	MR26*200RFMAR	MIL-M-10304/8	1.60	2.25
	MR26*500RFMAR	MIL-M-10304/8	1.60	2.25
	MR26*001RFAAR	MIL-M-10304/8	1.60	2.25
	MR26*002RFAAR	MIL-M-10304/8	1.60	2.25
	MR26*005RFAAR	MIL-M-10304/8	1.60	2.25
	MR26*010RFAAR	MIL-M-10304/8	1.60	2.25
	MR26*020RFAAR	MIL-M-10304/8	1.60	2.25
	MR26*002ARVVR	MIL-M-10304/25	1.60	2.25
	MR26*010ARVVR	MIL-M-10304/25	1.60	2.25
	MR26*020ARVVR	MIL-M-10304/25	1.60	2.25
	MR26*050ARVVR	MIL-M-10304/25	1.60	2.25
	MR26*100ARVVR	MIL-M-10304/25	1.60	2.25
	MR26*200ARVVR	MIL-M-10304/25	1.60	2.25
1	MR26*500ARVVR	MIL-M-10304/25	1.60	2.25
	MR26*001ARKVR	MIL-M-10304/25	1.60	2.25
1/	MR26*002ARKVR	MIL-M-10304/25	1.60	2.25
1/	MR26*005ARKVR	MIL-M-10304/25	1.60	2.25
1/	MR26*010ARKVR	MIL-M-10304/25	1.60	2.25
1/	MR26*020ARKVR	MIL-M-10304/25	1.60	2.25
1/	MR26*030ARKVR	MIL-M-10304/25	1.60	2.25

1/ Used with external resistor (not supplied). These meters shall have a full scale deflection of 1 milliampere with 150 millivolts maximum terminal drop.

SECTION 202

METERS, RUGGEDIZED, TIME, 2-1/2-INCH

(Applicable specification MIL-M-7793)

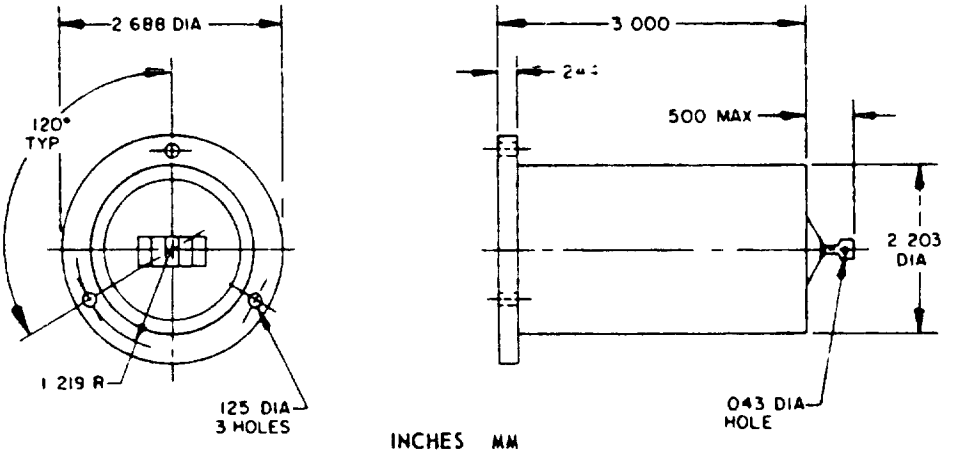
This section covers the following meter

Meter, time totalizing digital, 115 volts, 60 Hz.

This meter shall conform to MS17324.

MS part no.	Type	Range-hours*
MS17324-1	w/flange	10, 000
MS17324-2	w/flange	100, 000

*Maximum readout will be 9999. 9 or 99999, as applicable.



INCHES	MM
.043	1.09
.125	3.18
.244	6.20
.500	12.70
1.219	30.96
2.203	55.96
2.688	68.28
3.000	76.20

NOTE

Unless otherwise specified, tolerances are ± 015 (.38 mm), angles ±1°

SECTION 300

3-1/2-INCH RUGGEDIZED AMMETERS AND VOLTMETERS

SECTION 301

METERS, RUGGEDIZED, PANEL TYPE, SEALED, 3-1/2-INCH, STYLES 34 AND 36

(Applicable specification MIL-M-10304)

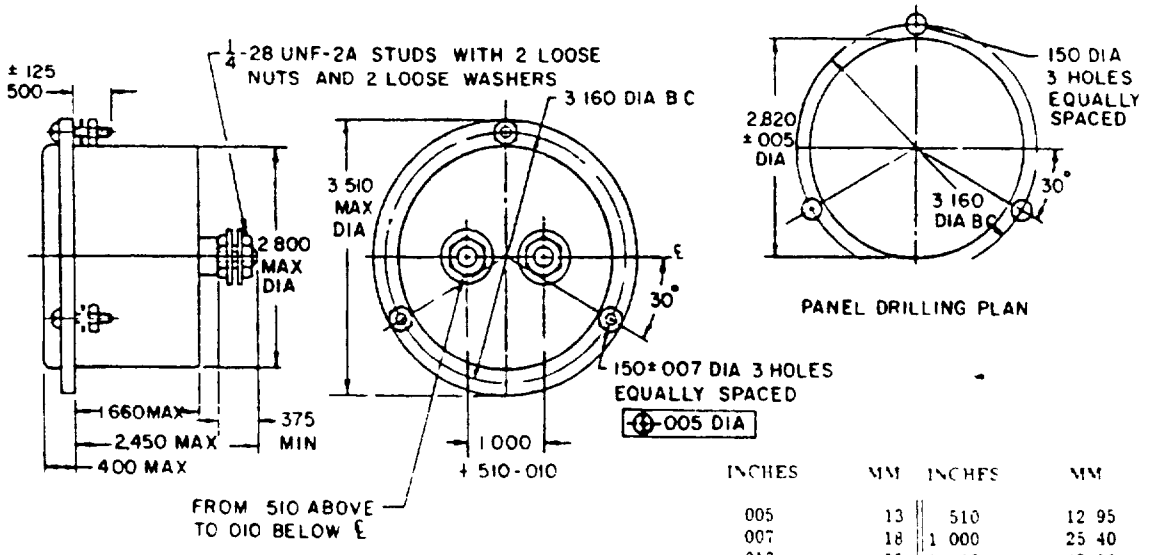
This section covers the following meters

Meters, electrical indicating, voltmeters, dc, panel type, ruggedized (flush mounting, round flange, 3-1/2-inch), style 36.
Meters, electrical indicating, ammeters, dc, panel type, ruggedized (flush mounting, round flange, 3-1/2-inch), style 36.
Meters, electrical indicating, voltmeters, ac, panel type, ruggedized (flush mounting, round flange, 3-1/2-inch), style 36.
Meters, electrical indicating, ammeters, ac, panel type, ruggedized (flush mounting, round flange, 3-1/2-inch), style 36.
1/ Meters, electrical indicating, ammeters, rf, panel type, ruggedized (flush mounting, round flange, 3-1/2-inch), style 36.
1/ Meters, electrical indicating, voltmeters and ammeters, long scale, dc, panel type, ruggedized (flush mounting, round flange, 3-1/2-inch), style 34.
1/ Meters, electrical indicating, rectifier-type, voltmeters, ac, panel type, ruggedized (flush mounting, round flange, 3-1/2-inch), style 36.

Meters shall conform to the applicable specification sheet.

Type designations and applicable specification sheets are listed in table 301-I, unless otherwise specified (see note 1/)

1/ Type designations for these meters are not included in the standard at this time, applicable specification sheets are listed in table 301-II



INCHES	MM	INCHES	MM
005	13	510	12 95
007	18	1 000	25 40
010	25	1 660	42 16
125	3 18	2 450	62 23
150	3 81	2 800	71 12
375	9 53	2 820	71 63
400	10 16	3 160	80 26
500	12 70	3 510	89 15

TABLE 301-I. Type designations and applicable specification sheets.

Type designation	Specification sheet number
MR36*020DCUAR	MIL-M-10304/12
MR36*050DCUAR	MIL-M-10304 12
MR36*100DCUAR	MIL-M-10304 12
MR36*200DCUAR	MIL-M-10304 12
MR36*500DCUAR	MIL-M-10304/12
MR36*5T5DCUAR	MIL-M-10304/12
MR36*1H1DCUAR	MIL-M-10304/12
MR36*5H5DCUAR	MIL-M-10304/12
MR36*001DCMAR	MIL-M-10304/12
MR36*005DCMAR	MIL-M-10304/12
MR36*010DCMAR	MIL-M-10304 12
MR36*050DCMAR	MIL-M-10304/12
MR36*100DCMAR	MIL-M-10304/12
MR36*200DCMAR	MIL-M-10304/12
MR36*500DCMAR	MIL-M-10304/12
MR36*1U1DCMAR	MIL-M-10304/12
MR36*5U5DCMAR	MIL-M-10304 12
MR36*1T1DCMAR	MIL-M-10304/12
MR36*5T5DCMAR	MIL-M-10304/12
MR36*1H1DCMAR	MIL-M-10304/12
MR36*5H5DCMAR	MIL-M-10304/12
MR36*001DCAAR	MIL-M-10304/12
MR36*002DCAAR	MIL-M-10304/12
MR36*005DCAAR	MIL-M-10304/12
MR36*010DCAAR	MIL-M-10304/12
1/ MR36*020DCAAR	MIL-M-10304/12
1/ MR36*050DCAAR	MIL-M-10304 12
1/ MR36*100DCAAR	MIL-M-10304/12
1/ MR36*200DCAAR	MIL-M-10304/12
1/ MR36*500DCAAR	MIL-M-10304/12
MR36*5U5DCAAR	MIL-M-10304/12
MR36*1T1DCAAR	MIL-M-10304/12
1/ MR36*1T3DCAAR	MIL-M-10304/12
1/ MR36*2T2DCAAR	MIL-M-10304/12
1/ MR36*3T3DCAAR	MIL-M-10304/12
1/ MR36*001DCKAR	MIL-M-10304/12
1/ MR36*1R2DCKAR	MIL-M-10304/12
MR36*002DCVVR	MIL-M-10304/11
MR36*010DCVVR	MIL-M-10304/11

1/ See footnote at end of table.

TABLE 301-I Type designations and applicable specification sheets - Continued

	Type designation	Specification sheet number
	MR36*020DCVVR	MIL-M-10304 11
	MR36*050DCVVR	MIL-M-10304 11
	MR36*100DCVVR	MIL-M-10304 11
	MR36*200DCVVR	MIL-M-10304 11
	MR36*500DCVVR	MIL-M-10304 11
	MR36*800DCVVR	MIL-M-10304 11
	MR36*5T5DCVVR	MIL-M-10304 11
	MR36*1H1DCVVR	MIL-M-10304 11
	MR36*2H2DCVVR	MIL-M-10304 11
1	MR36*001DCKVR	MIL-M-10304 11
1	MR36*002DCKVR	MIL-M-10304 11
1	MR36*005DCKVR	MIL-M-10304 11
1	MR36*010DCKVR	MIL-M-10304 11
1	MR36*020DCKVR	MIL-M-10304 11
1	MR36*030DCKVR	MIL-M-10304 11
	MR36*001ACMAR	MIL-M-10304 14
	MR36*020ACMAR	MIL-M-10304 14
	MR36*050ACMAR	MIL-M-10304 14
	MR36*100ACMAR	MIL-M-10304 14
	MR36*200ACMAR	MIL-M-10304 14
	MR36*500ACMAR	MIL-M-10304 14
	MR36*001ACAAR	MIL-M-10304 14
	MR36*002ACAAR	MIL-M-10304 14
	MR36*005ACAAR	MIL-M-10304 14
	MR36*010ACAAR	MIL-M-10304 14
	MR36*020ACAAR	MIL-M-10304 14
	MR36*050ACAAR	MIL-M-10304 14
	MR36*100ACAAR	MIL-M-10304 14
	MR36*200ACAAR	MIL-M-10304 14
	MR36*500ACAAR	MIL-M-10304 14
	MR36*1R5ACVVR	MIL-M-10304 13
	MR36*003ACVVR	MIL-M-10304 13
	MR36*008ACVVR	MIL-M-10304 13
	MR36*015ACVVR	MIL-M-10304 13
	MR36*030ACVVR	MIL-M-10304 13
	MR36*080ACVVR	MIL-M-10304 13
	MR36*150ACVVR	MIL-M-10304 13
	MR36*300ACVVR	MIL-M-10304 13
	MR36*800ACVVR	MIL-M-10304 13

1 Used with external resistor (not supplied). These meters shall have a full scale deflection of 1 milliampere with 150 millivolts maximum terminal drop.

TABLE 301-II. Meters and applicable specification sheets.

Meters	Specification sheet number
Meters, electrical indicating, ammeters, rf, panel type, ruggedized (flush mounting, round flange, 3-1/2-inch), style 36	MIL-M-10304/15
Meters, electrical indicating, voltmeters and ammeters, long scale, dc, panel type, ruggedized (flush mounting, round flange, 3-1/2-inch), style 34.	MIL-M-10304/22
Meters, electrical indicating, rectifier-type, voltmeters, ac, panel type, ruggedized (flush mounting, round flange, 3-1/2-inch), style 36.	MIL-M-10304/26

SECTION 400

4-1/2-INCH RUGGEDIZED AMMETERS AND VOLTMETERS

SECTION 401

METERS, RUGGEDIZED, PANEL TYPE, SEALED,
4-1 2-INCH, STYLES 44 AND 46

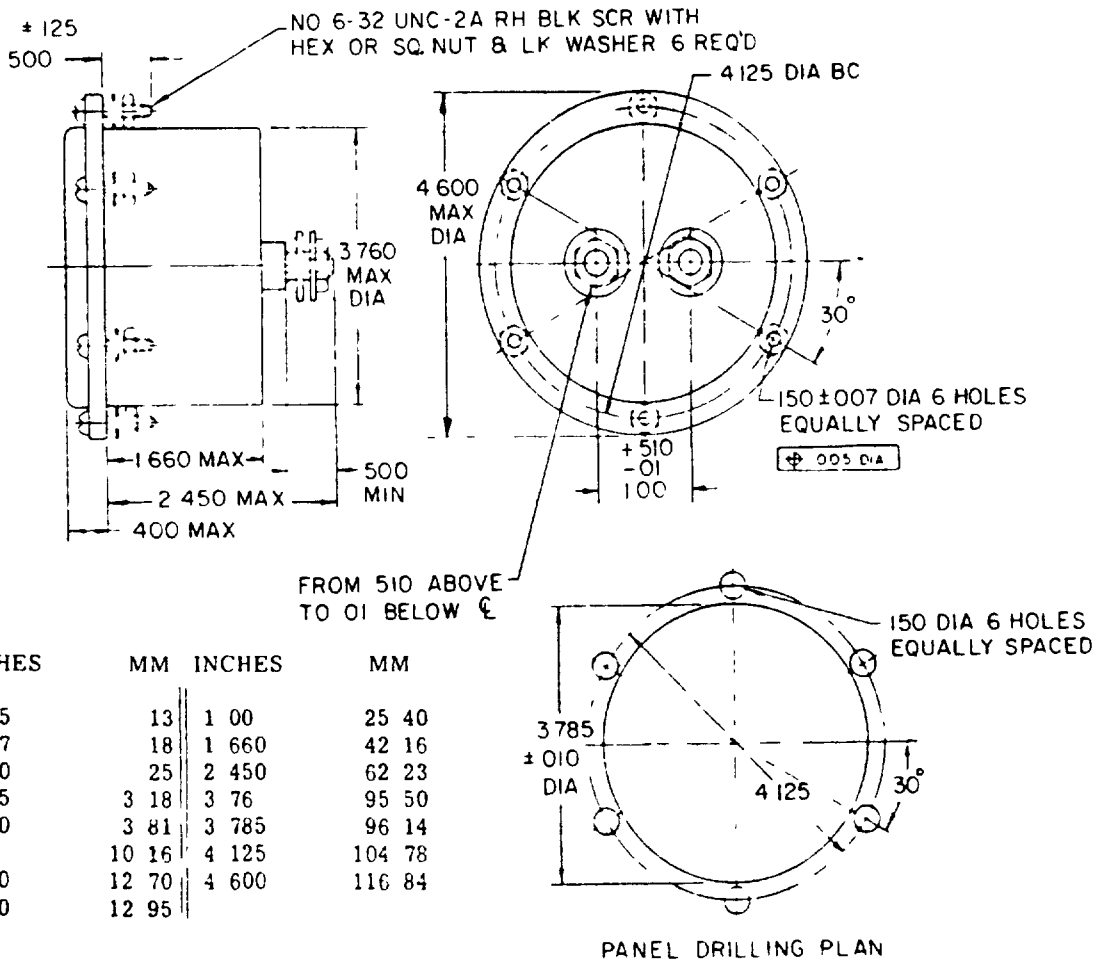
(Applicable specification MIL-M-10304)

This section covers the following meters

Meters, electrical indicating, ammeters, dc, panel type, ruggedized (flush mounting, round flange, 4-1-2-inch), style 46
Meters, electrical indicating, voltmeters and ammeters, long scale, dc, panel type, ruggedized (flush mounting, round flange, 4-1 2-inch), styles 44 and 46.

Meters shall conform to the applicable specification sheet.

Type designations and applicable specification sheets are listed in table 401-I.



PANEL DRILLING PLAN

INCHES	MM	INCHES	MM
005	13	1 00	25 40
007	18	1 660	42 16
010	25	2 450	62 23
125	3 18	3 76	95 50
150	3 81	3 785	96 14
40	10 16	4 125	104 78
500	12 70	4 600	116 84
510	12 95		

TABLE 401-I Type designations and applicable specification sheets.

Type designations	Specification sheet number
MR4-W050DCUAR	MIL-M-10304/17
MR4-*200DCUAR	MIL-M-10304 23
MR4-*500DCUAR	MIL-M-10304 23
MR4-*1H1DCUAR	MIL-M-10304 23
MR4-*5H5DCUAR	MIL-M-10304/23
MR4-*001DCMAR	MIL-M-10304/17 and 23
MR4-*005DCMAR	MIL-M-10304/23
MR4-*010DCMAR	MIL-M-10304/23
MR4-*5U5DCMAR	MIL-M-10304 23
MR44*001DCVVR	MIL-M-10304/23
MR44*002DCVVR	MIL-M-10304/23
MR44*010DCVVR	MIL-M-10304 23
MR44*050DCVVR	MIL-M-10304/23
MR44*100DCVVR	MIL-M-10304 23
MR44*200DCVVR	MIL-M-10304/23
MR44*500DCVVR	MIL-M-10304/23
MR44*1T1DCVVR	MIL-M-10304 23
MR44*5T5DCVVR	MIL-M-10304/23
MR44*1H1DCVVR	MIL-M-10304/23