

INCH-POUND

MIL-DTL-28803/2B
5 September 2013
SUPERSEDING
MIL-D-28803/2A
3 August 1990

DETAIL SPECIFICATION SHEET

DISPLAY, OPTOELECTRONIC, SEGMENTED READOUT, BACKLIGHTED, STYLE I
(INCANDESCENT LAMPS) RFI SHIELDED, MOISTURE SEALED, HIGH IMPACT SHOCK, TYPE R02

This specification sheet is approved for use by all Departments and Agencies of the Department of Defense.

The requirements for acquiring the product described herein shall consist of this specification sheet and [MIL-DTL-28803](#).

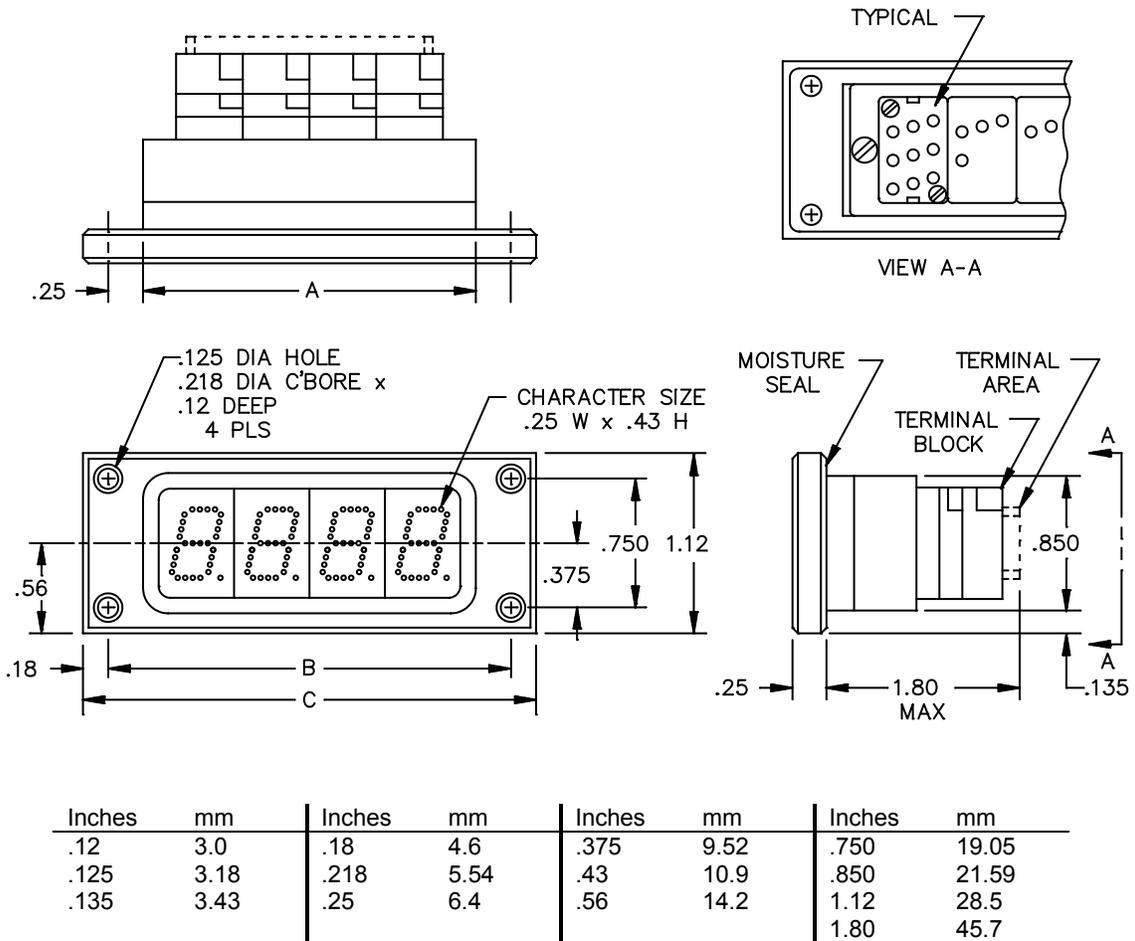


FIGURE 1. Type R02 display.

NOTES:

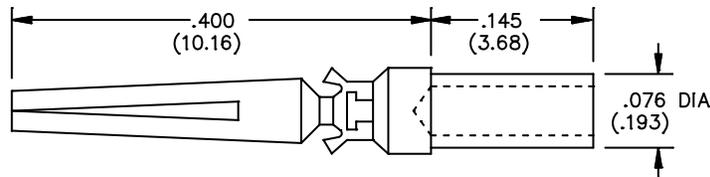
1. Dimensions are in inches. Millimeter equivalents are given for general information only.
2. Unless otherwise specified, tolerances are ± 0.02 inch (0.51 mm) for two place decimals and ± 0.010 inch (0.25 mm) for three place decimals.
3. Design configuration optional within envelope as shown.
4. The values for dimensions A, B, and C are listed in table I.

FIGURE 1. Type R02 display – Continued.

TABLE I. Display assembly dimensions. ^{1/} ^{2/} ^{3/}

Number of units per assembly	A	B	C	Weight maximum
3	2.00 (50.8)	2.50 (63.5)	2.87 (72.9)	4.5 (127.6)
4	2.50 (63.5)	3.00 (76.2)	3.27 (83.1)	5.0 (141.7)
5	3.00 (76.2)	3.50 (88.9)	3.87 (98.3)	5.5 (155.9)
6	3.50 (88.9)	4.00 (101.6)	4.37 (110.0)	6.0 (170.0)
7	4.00 (101.6)	4.50 (114.3)	4.87 (123.7)	6.5 (184.3)
8	4.50 (114.3)	5.00 (127.0)	5.37 (136.4)	7.0 (198.4)
9	5.00 (127.0)	5.50 (139.7)	5.87 (149.1)	7.5 (212.6)
10	5.50 (139.7)	6.00 (152.4)	6.87 (174.5)	8.0 (226.8)

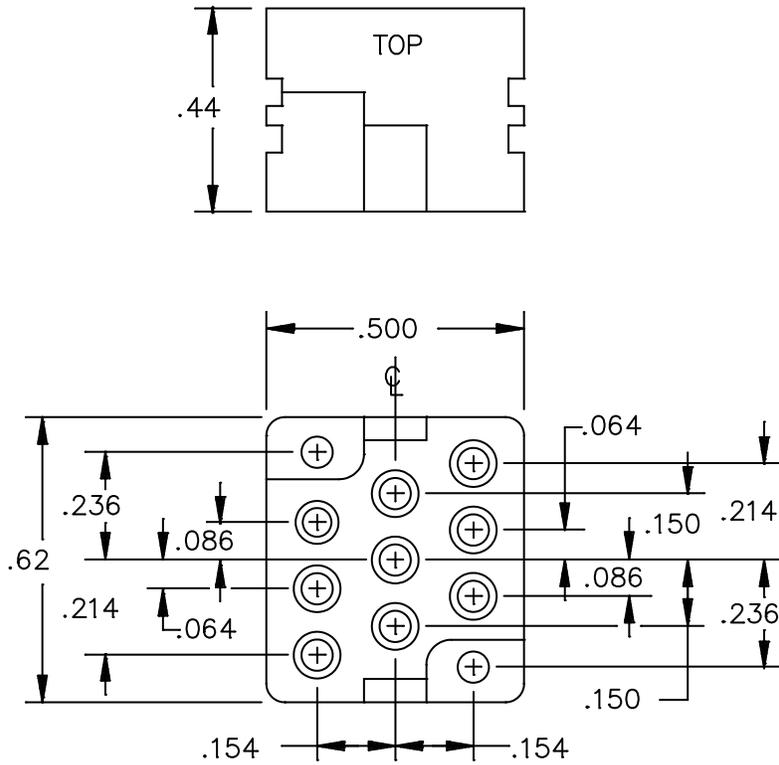
- ^{1/} Dimensions are in inches. Millimeter equivalents are given for general information only.
- ^{2/} Weights are in ounces. Gram equivalents are given for general information only.
- ^{3/} Unless otherwise specified, tolerances are ± 0.02 inch (0.51 mm) for two place decimals and ± 0.010 inch (0.25 mm) for three place decimals.



NOTES:

1. Dimensions are in inches. Millimeter equivalents are given for general information only.
2. Unless otherwise specified, tolerances are ± 0.010 inch (0.25 mm).
3. Design configuration optional within envelope as shown.
4. Terminal part number (package of 25 terminals): M22885/80-50 of [MIL-PRF-22885/80](#).
5. Application information:
 - Crimp tool: M22520/1-01 of [MIL-C-22520/1](#).
 - Positioner: M22520/1-02 of [MIL-C-22520/1](#).
 - Insertion tool: Eaton Aerospace (CAGE 96182) 800-3191
 - Extraction tool: Eaton Aerospace 800-P7
 - Locator tool: Eaton Aerospace 800-3191-L20
6. Terminals can be installed in terminal blocks without the use of special tools, but tool part number 800-P2 (CAGE 96182) is required for removal.

FIGURE 2. Terminal, crimp type.

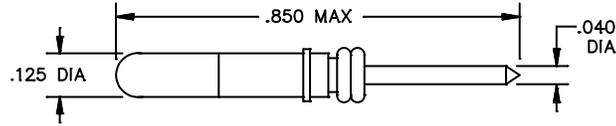


Inches	mm	Inches	mm	Inches	mm
.064	1.63	.154	3.91	.44	11.2
.086	2.18	.214	5.44	.500	12.70
.150	3.81	.236	5.99	.62	15.7

NOTES:

1. Dimensions are in inches. Millimeter equivalents are given for general information only.
2. Unless otherwise specified, tolerances are ± 0.02 inch (0.51 mm) for two place decimals and ± 0.010 inch (0.25 mm) for three place decimals.
3. Design configuration optional within envelope as shown.

FIGURE 3. Connector block.



Inches	mm
.040	1.02
.125	3.18
.850	21.59

NOTES:

1. Dimensions are in inches. Millimeter equivalents are given for general information only.
2. Unless otherwise specified, tolerances are ± 0.010 inch (0.25 mm).
3. Design configuration optional within envelope as shown.

FIGURE 4. Lamp assembly.

TABLE II. Truth table for seven segment numeric alpha display (direct wired).

Input								Display	Output (Δ = Segment lit)							
DPT	A	B	C	D	E	F	G		A	B	C	D	E	F	G	DPT
	0	0	0	0	0	0		0	Δ	Δ	Δ	Δ	Δ	Δ		
		0	0					1		Δ	Δ					
	0	0		0	0		0	2	Δ	Δ		Δ	Δ		Δ	
	0	0	0	0			0	3	Δ	Δ	Δ	Δ			Δ	
		0	0			0	0	4		Δ	Δ			Δ	Δ	
	0		0	0		0	0	5	Δ		Δ	Δ		Δ	Δ	
	0		0	0	0	0	0	6	Δ		Δ	Δ	Δ	Δ	Δ	Δ
	0	0	0					7	Δ	Δ	Δ					
	0	0	0	0	0	0	0	8	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ
	0	0	0			0	0	9	Δ	Δ	Δ			Δ	Δ	
	0	0	0		0	0	0	A	Δ	Δ	Δ		Δ	Δ	Δ	
			0	0	0	0	0	b			Δ	Δ	Δ	Δ	Δ	
	0			0	0	0		c	Δ			Δ	Δ	Δ		
		0	0	0	0		0	d		Δ	Δ	Δ	Δ		Δ	
	0			0	0	0	0	e	Δ			Δ	Δ	Δ	Δ	
	0				0	0	0	f	Δ				Δ	Δ	Δ	
0								.								Δ

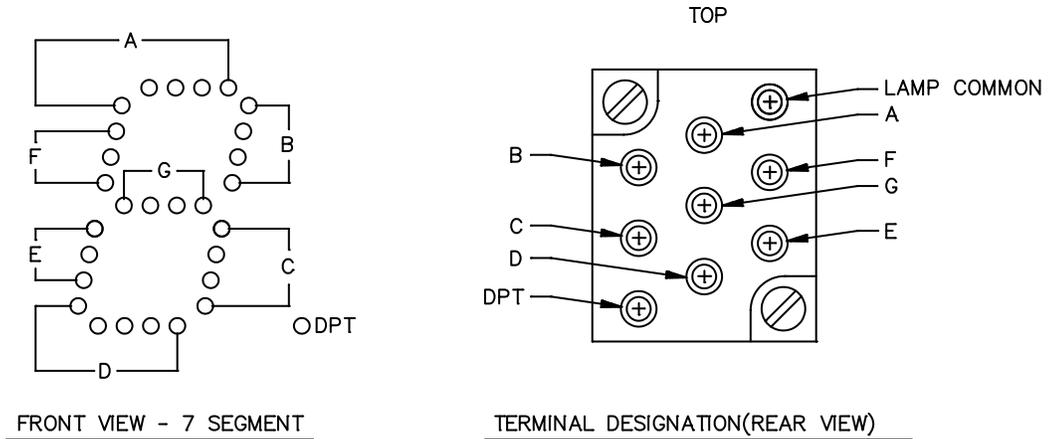


FIGURE 5. Truth table letter assignments for seven segment alpha-numeric display with decimal point.

TABLE III. Truth table for a four segment sign display with decimal point (direct wired).

Input					Display	Δ = Segment lit				
DPT	B	C	E	F		B	C	E	F	DPT
	O	O	O	O	⋈	Δ	Δ	Δ	Δ	
	O		O		Δ		Δ		
O					•					Δ

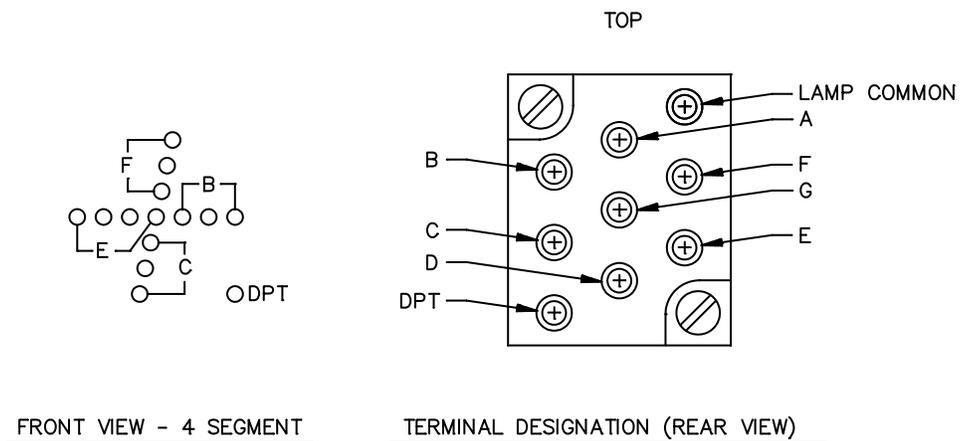


FIGURE 6. Truth table letter assignments for four segment sign display with decimal point.

REQUIREMENTS:

Design and construction:

Dimensions and configurations. See [figures 1 through 6](#) and [tables I through V](#).

Display assembly. The display assembly shall be assembled and shall include the following:

- a. Display modules.
- b. Bezel assembly with lens, panel gasket, and fasteners.
- c. Lamp assemblies (see [figure 4](#)).
- d. Connector blocks (see [figure 3](#)).
- e. Insertable crimp type terminals (packaged separately) (see [figure 2](#)).

Front lens plate: Lens material used to convert clear incandescent lamps to colored lights.

Light source: T-1 incandescent lamps.

Operating:

Dot to dot ratio: 1 to 1 maximum.

Code letters for module combinations and color and luminance: See [figures 5 and 6](#) and [tables IV and V](#).

Optical:

Chromaticity: Method I in accordance with [MIL-DTL-28803](#).

Contrast ratio: $C = 5$ to 1 minimum.
 $C^2 = 4$ to 1 minimum.

Physical and mechanical:

Mechanical endurance and solderability: Not applicable.

Terminal strength: The terminals shall be tested in accordance with Method 211 of [MIL-STD-202](#), with the following details and exceptions: Test condition A and the applied force shall be 5 pounds (2.27 Kg).

Electrical:

Supply current: $5\text{ V} \pm .25\text{ V}$.

Supply voltage (for each lamp): $.020\text{ ampere} \pm .002\text{ ampere}$.

Environmental:

Shock: Method II (high impact) in accordance with [MIL-DTL-28803](#).

Vibration grade 2: Displays shall be tested in accordance with Method 204, test condition A (10-500 Hz) of [MIL-STD-202](#).

TABLE IV. Code letters for number, type and arrangements of modules.

Code letter	Number of modules	Type of module and arrangement
A	3 module assembly	All 7 segment modules
B	4 module assembly	All 7 segment modules
C	5 module assembly	All 7 segment modules
D	6 module assembly	All 7 segment modules
E	7 module assembly	All 7 segment modules
F	8 module assembly	All 7 segment modules
G	9 module assembly	All 7 segment modules
H	10 module assembly	All 7 segment modules
J	3 module assembly	One 4 segment followed by two 7 segments
K	4 module assembly	One 4 segment followed by three 7 segments
L	5 module assembly	One 4 segment followed by four 7 segments
M	6 module assembly	One 4 segment followed by five 7 segments
N	7 module assembly	One 4 segment followed by six 7 segments
P	8 module assembly	One 4 segment followed by seven 7 segments
Q	9 module assembly	One 4 segment followed by eight 7 segments
R	10 module assembly	One 4 segment followed by nine 7 segments

TABLE V. Code letters for color and luminance combinations.

Code letter	Color	2100° Kelvin limits of chromaticity		Luminance value in foot-lamberts (Candela/m ²) minimum
		X	Y	
A	White	<u>1/</u>	<u>1/</u>	300 (1027.9)
B	Red	.695 .703 .655 .660	.285 SL <u>2/</u> .325 SL <u>2/</u>	50 (171.3)
C	Green	.260 .335 .018	.570 SL <u>2/</u> SL <u>2/</u>	25 (85.6)
D	Yellow	.562 .570 .596 .605	.415 SL <u>2/</u> .382 SL <u>2/</u>	200 (685.3)

1/ Unfiltered, incandescent light.2/ SL-Spectrum locus (where intersected by other coordinates pair).

QUALIFICATION:

Extent of qualification: If suppliers are qualified to [MIL-DTL-28803/1](#), table VI applies. If manufacturers are not qualified [MIL-DTL-28803/1](#), then table VII applies.

TABLE VI. Extent of qualification for suppliers qualified to [MIL-DTL-28803/1](#).

PIN	Number of samples required	Tests of MIL-DTL-28803	Extent of approval
M28803/2-RA	2	Group I	All
M28803/2-R <u>1/</u>	10	Group IV	

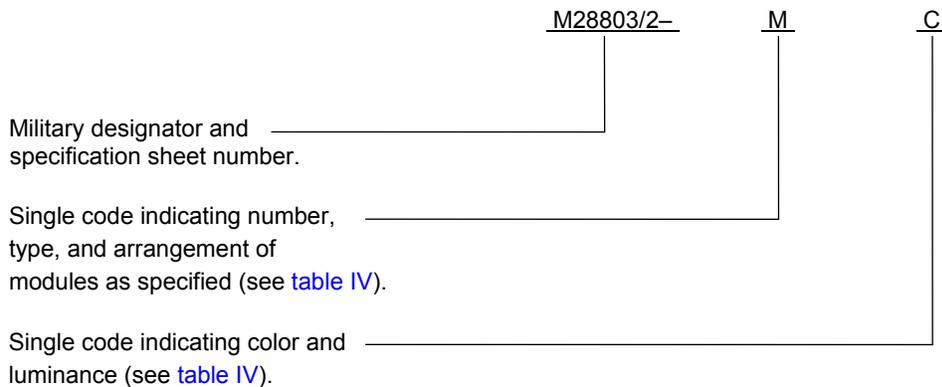
1/ Two sample units for each color.

TABLE VII. Extent of qualification for suppliers not qualified to [MIL-DTL-28803/1](#).

PIN	Number of samples required	Tests of MIL-DTL-28803	Extent of approval
M28803/2-JA	4	Complete in accordance with qualification inspection of MIL-DTL-28803	All
M28803/2-PB	2		
M28803/2-A <u>1/</u>	10		

1/ Two sample units for each color.

Part or Identifying Numbers (PIN): The PIN shall consist of the letter "M" followed by the basic number of the specification sheet and a coded two-letter symbol indicating the number, type, and arrangement of the modules, and color and luminance, as specified. See example below:



PIN for terminals (see [figure 2](#)) (package of 25): [MIL-PRF-22885/80-50](#).

PIN for connector block (see [figure 3](#)) and terminals (see [figure 2](#), 11 each): M28803/2-WR.

PIN for lamp assembly (see [figure 4](#)): M28803/2-WS.

Reference documents. In addition to [MIL-DTL-28803](#), this document references the following:

[MIL-STD-202](#)

[MIL-C-22520/1](#)

[MIL-PRF-22885/80](#)

[MIL-DTL-28803/1](#)

The margins of this specification sheet are marked with vertical lines to indicate where changes from the previous issue were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the last previous issue.

Custodians:

Army – CR

Navy – EC

Air Force – 85

DLA – CC

Preparing activity:

DLA – CC

Project 5980-2013-002

Review activities:

Army – AR, AT, AV, CR4, MI

Navy – AS, MC, OS

Air Force – 99

NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at <https://assist.dla.mil>.