INCH–POUND

MIL–DTL–28803/4D
7 September 2013
SUPERSEDING
MIL–D–28803/4C
3 August 1990

DETAIL SPECIFICATION SHEET

DISPLAY, OPTOELECTRONIC, SEGMENTED READOUT, BACKLIGHTED, STYLE I (INCANDESCENT), DOT PATTERN AND BAR PATTERN, TYPE R04 (REPLACEMENT PARTS FOR TYPE R03 DISPLAY ASSEMBLY)

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.

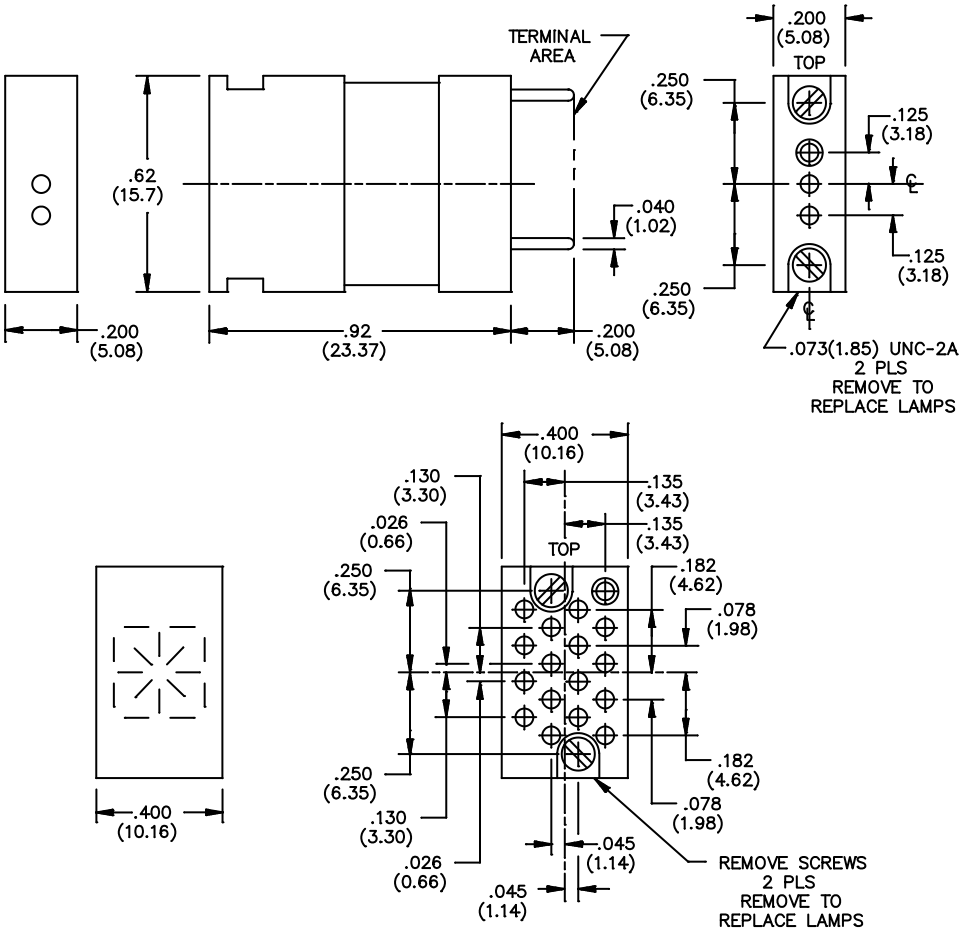
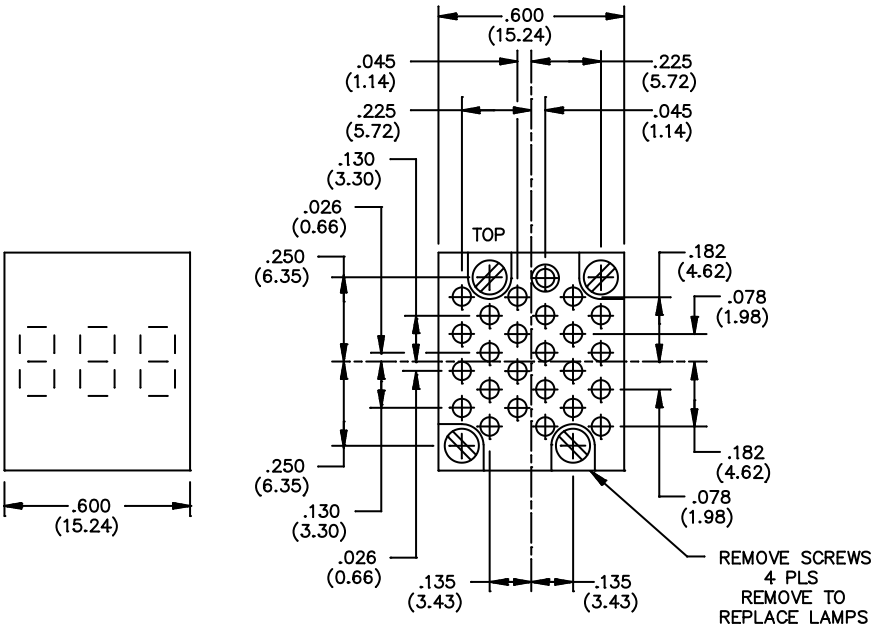


FIGURE 1. Type R04 display module sub-assembly.



NOTES:

1. Dimensions are in inches. Millimeter equivalents are given for general information only.
2. Unless otherwise specified, tolerances are ±.02 inch (0.51 mm) for two place decimals and ±.010 inch (0.25 mm) for three place decimals.
3. Design configuration optional within envelope as shown.
4. For segment dimensions, see figure 4.

FIGURE 1. Type R04 display module sub-assembly – Continued.

REQUIREMENTS:

Design and construction:

Dimensions and configurations. See figures 1 through 7 and tables I through XI.

Weight: See table X.

Light source: T–3/4 incandescent bulb (see figure 5).

Operating:

Dot to dot ratio:

Segment to segment: 3 to 1 maximum.

Digit to digit: 3 to 1 maximum.

Operating temperature: –55°C to +71°C.

Storage temperature: –55°C to +85°C.

Optical:

Chromaticity: Method I in accordance with MIL–DTL–28803.

Contrast ratio (prior to life (electrical)): 10 to 1 minimum.

Luminance: Average 300 foot-lamberts (1027.9 Candela per square meter) minimum with a supply of 5 volts.

Physical and mechanical:

Mechanical endurance, solderability, and terminal strength: Not applicable.

Electrical:

Supply voltage: 5 volts maximum.

Supply current (each lamp): .025 ampere maximum.

Circuit configurations: All circuit configurations (1 through 6) are direct wired. The segments displayed are in accordance with the truth tables I through IX.

Truth tables. The following conventions are used in the truth tables (tables I through IX) herein:

"0" = 5.0 V dc.

"Δ" = Segment lit.

Environmental:

Shock (when installed): Method I in accordance with MIL–DTL–28803.

Vibration (when installed): Grade 2 in accordance with MIL–DTL–28803.

TABLE I. Truth table for 1 or 2 dot direct wire display (circuit configuration 1).

Input		Display	Type of module	Segment lit	
A	B			A	B
O	O	:	Colon	Δ	Δ
	O	•	Decimal		Δ
	O	•	Degree 1/		Δ

1/ Degree is a flipped decimal point.

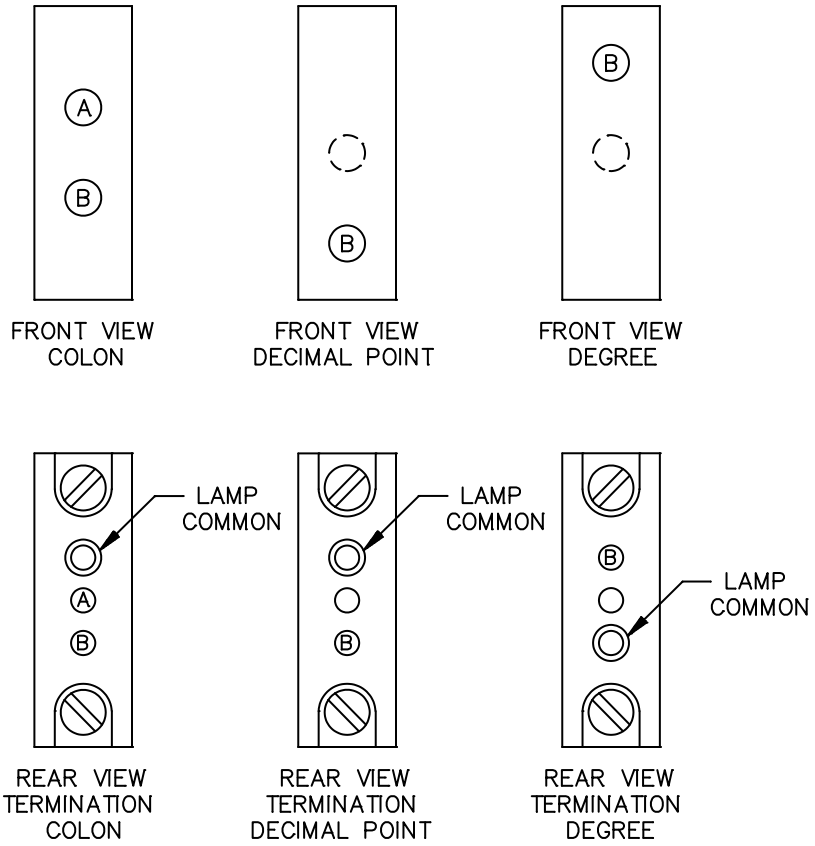


FIGURE 2. All 1 or 2 dot direct wire display configurations and terminations.

TABLE II. Truth table for four segment sign display (dot matrix) (circuit configuration 2).

Input				Display	Output (Δ = segment lit)			
H	J	K	L	1/	H	J	K	L
R	S	T	U	2/	R	S	T	U
O	O	O	O	⋯⋮⋯	Δ	Δ	Δ	Δ
	O		O	·····		Δ		Δ

1/ See figure 3 for four segment sign display output letter assignments.
2/ See figure 4 (4 SEG and 2-7 SEG pattern) for four segment sign display output letter assignments.

TABLE III. Truth table for four segment sign display (bar matrix) (circuit configuration 2).

Input		Display	Output (Δ = segment lit)	
J	L	1/	J	L
S	U	2/	S	U
O	O	+	Δ	Δ
O		--	Δ	

1/ See figure 3 for four segment sign display output letter assignments.
2/ See figure 4 (4 SEG and 2-7 SEG pattern) for four segment sign display output letter assignments.

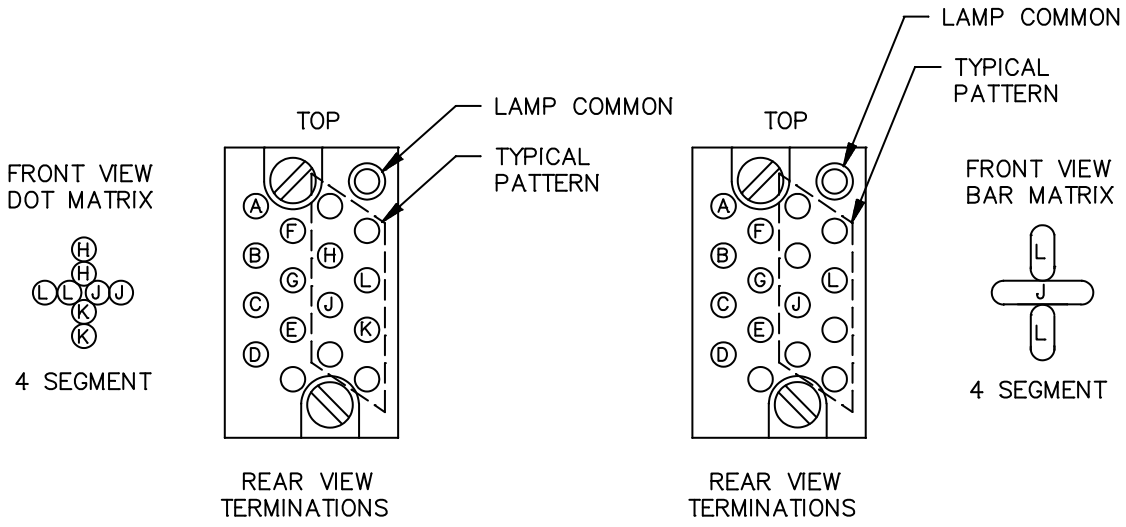


FIGURE 3. Four segment sign display (dot matrix and bar matrix).

TABLE IV. Truth table for seven segment direct wire display (circuit configuration 3).

Input							Display	Output (Δ = segment lit)						
A	B	C	D	E	F	G	1/	A	B	C	D	E	F	G
H	J	K	L	M	N	P	2/	H	J	K	L	M	N	P
R	S	T	U	V	W	X	3/	R	S	T	U	V	W	X
O	O	O	O	O	O		0	Δ	Δ	Δ	Δ	Δ	Δ	
	O	O					1		Δ	Δ				
O	O		O	O		O	2	Δ	Δ		Δ	Δ		Δ
O	O	O	O			O	3	Δ	Δ	Δ	Δ			Δ
	O	O			O	O	4		Δ	Δ			Δ	Δ
O		O	O		O	O	5	Δ		Δ	Δ		Δ	Δ
O		O	O	O	O	O	6	Δ		Δ	Δ	Δ	Δ	Δ
O	O	O					7	Δ	Δ	Δ				
O	O	O	O	O	O	O	8	Δ	Δ	Δ	Δ	Δ	Δ	Δ
O	O	O	O		O	O	9	Δ	Δ	Δ	Δ		Δ	Δ
O	O	O		O	O	O	A	Δ	Δ	Δ		Δ	Δ	Δ
		O	O	O	O	O	b			Δ	Δ	Δ	Δ	Δ
O			O	O	O		C	Δ			Δ	Δ	Δ	
	O	O	O	O		O	d		Δ	Δ	Δ	Δ		Δ
O			O	O	O	O	E	Δ			Δ	Δ	Δ	Δ
O				O	O	O	F	Δ				Δ	Δ	Δ

1/ Pattern used on first 7 segment module.
2/ Pattern used on second 7 segment module (if present).
3/ Pattern used on third 7 segment module (if present).

NOTE: Typical 7 segment pattern repeats as A through G, H through P, and R through X (see figure 4).

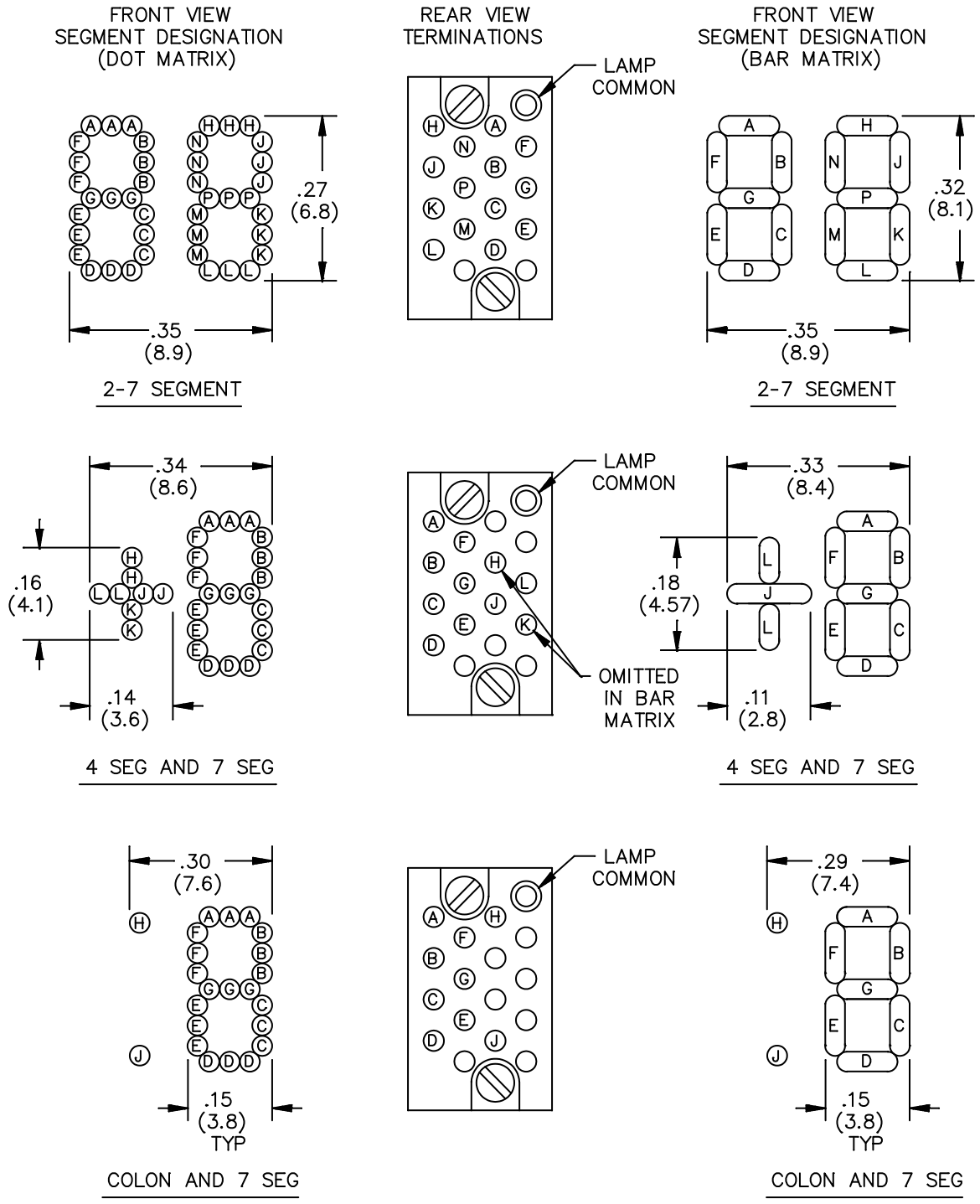


FIGURE 4. Segment dimensions and terminations for direct wired alpha-numeric display.

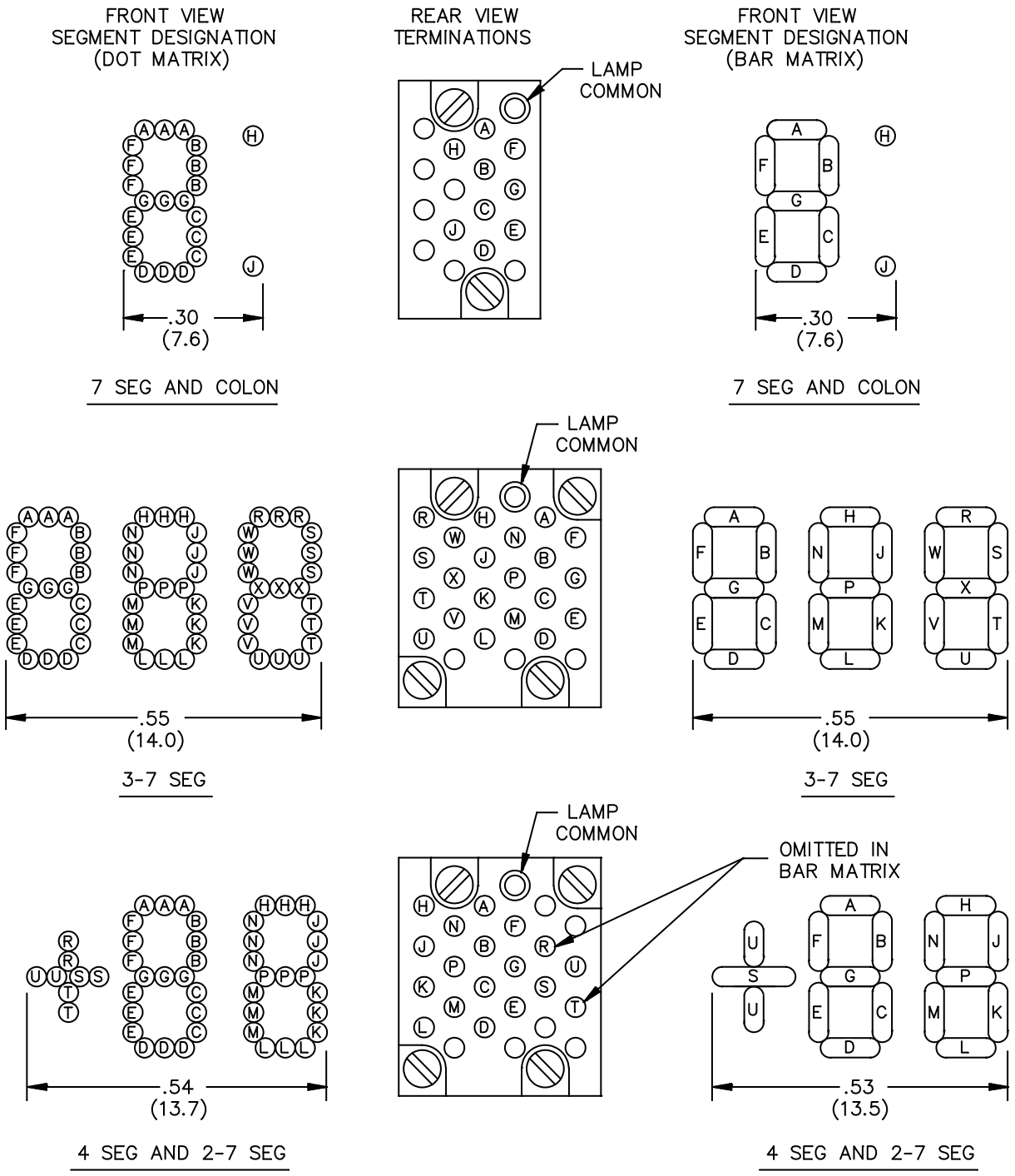


FIGURE 4. Segment dimensions and terminations for direct wired alpha-numeric display – Continued.

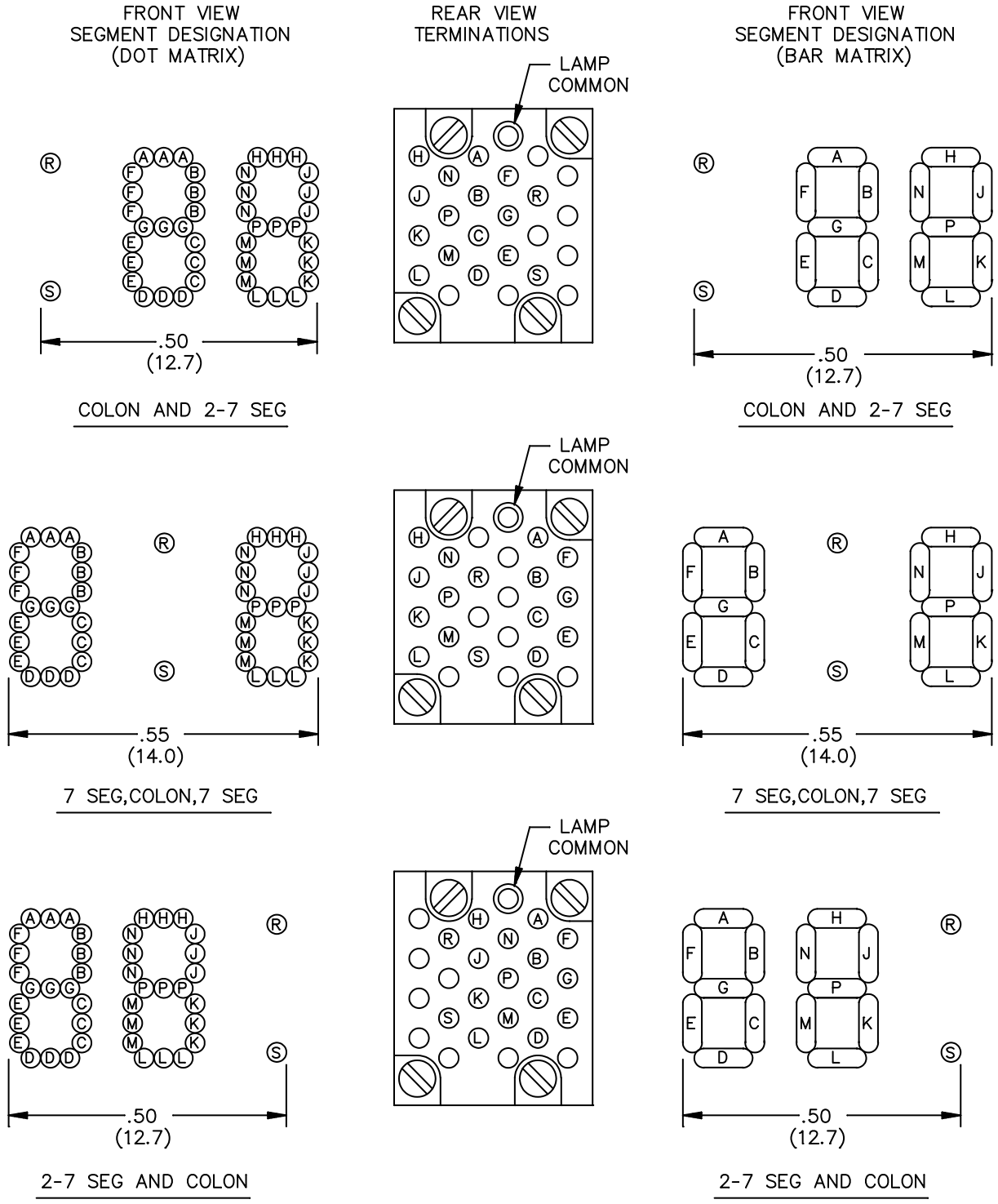


FIGURE 4. Segment dimensions and terminations for direct wired alpha-numeric display – Continued.

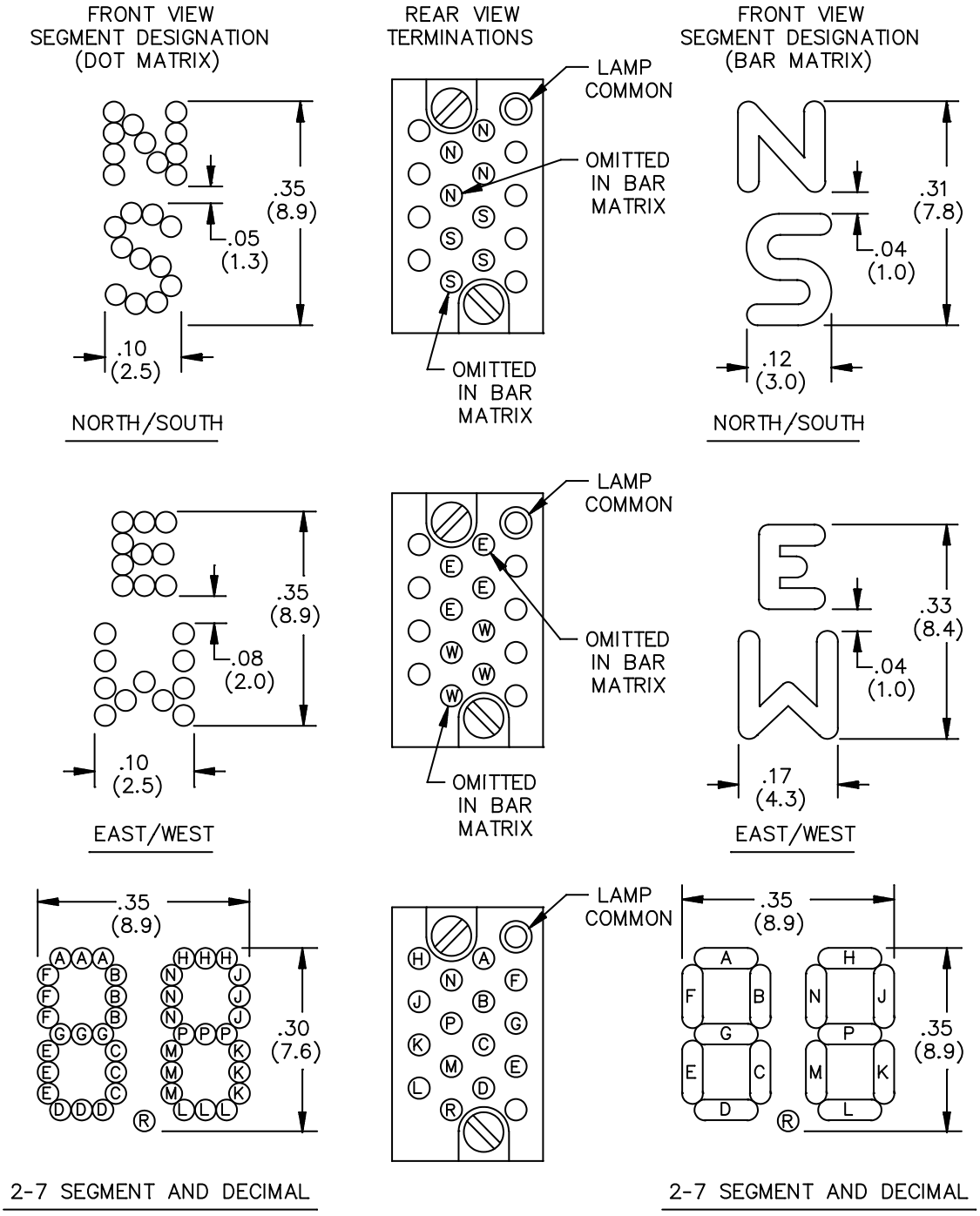


FIGURE 4. Segment dimensions and terminations for direct wired alpha-numeric display – Continued.

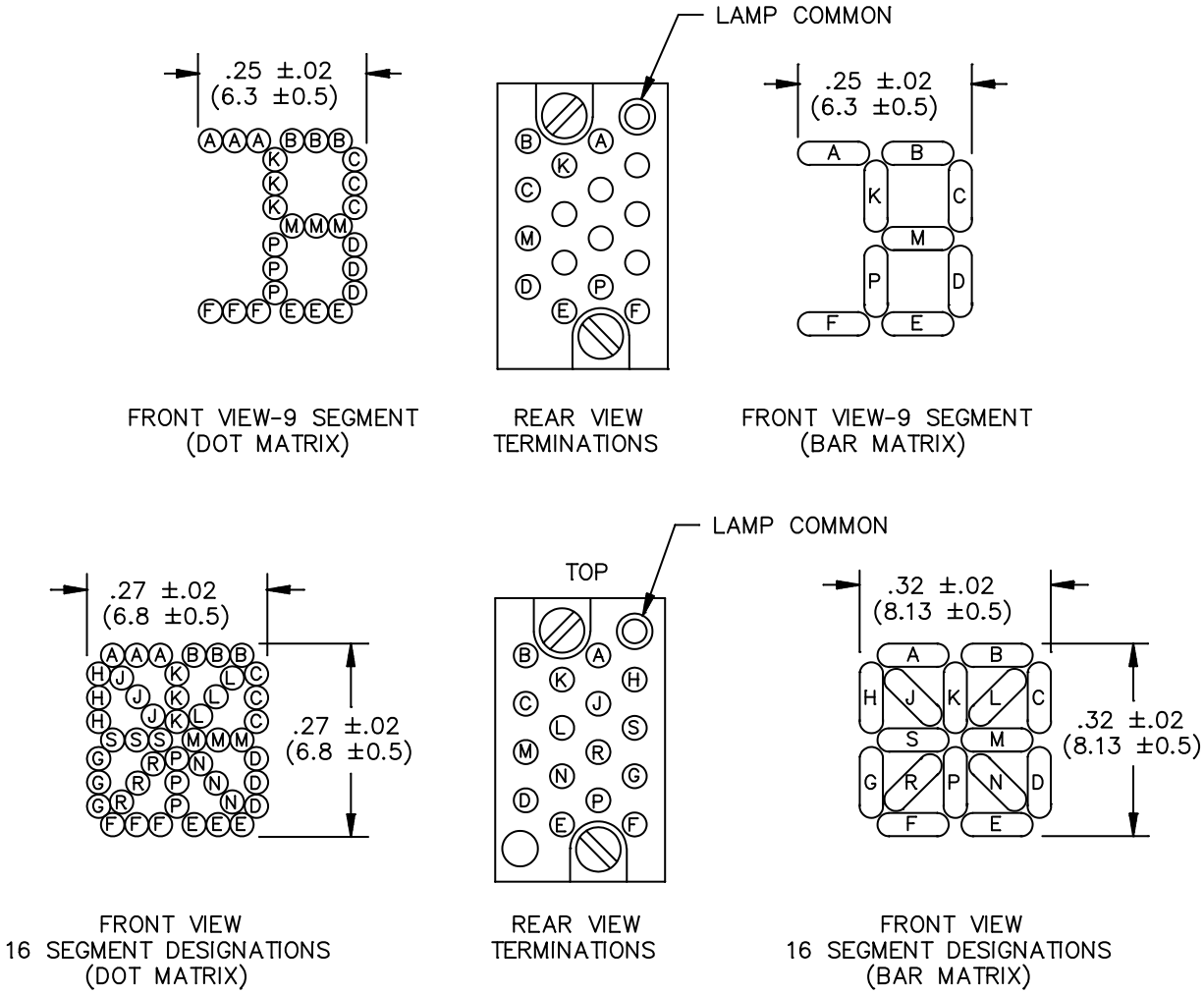


FIGURE 4. Segment dimensions and terminations for direct wired alpha-numeric display – Continued.

TABLE V. Truth table for sixteen segment direct wire display (circuit configuration 4).

Display	A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	S
A	Δ	Δ	Δ	Δ			Δ	Δ				Δ				Δ
B	Δ	Δ	Δ	Δ	Δ	Δ				Δ		Δ		Δ		
C	Δ	Δ			Δ	Δ	Δ	Δ								
D	Δ	Δ	Δ	Δ	Δ	Δ				Δ				Δ		
E	Δ	Δ			Δ	Δ	Δ	Δ				Δ				Δ
F	Δ	Δ					Δ	Δ				Δ				Δ
G	Δ	Δ		Δ	Δ	Δ	Δ	Δ				Δ				
H			Δ	Δ			Δ	Δ				Δ				Δ
I	Δ	Δ			Δ	Δ				Δ				Δ		
J			Δ	Δ	Δ	Δ	Δ									
K							Δ	Δ			Δ		Δ			Δ
L					Δ	Δ	Δ	Δ								
M			Δ	Δ			Δ	Δ	Δ		Δ					
N			Δ	Δ			Δ	Δ	Δ				Δ			
O	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ								
P	Δ	Δ	Δ				Δ	Δ								
Q	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ								
R	Δ	Δ	Δ				Δ	Δ				Δ	Δ			Δ
S	Δ	Δ										Δ				Δ
T	Δ	Δ								Δ				Δ		
U			Δ	Δ	Δ	Δ	Δ	Δ								
V							Δ	Δ			Δ				Δ	
W			Δ	Δ			Δ	Δ					Δ		Δ	
X									Δ		Δ		Δ		Δ	
Y									Δ		Δ			Δ		
Z	Δ	Δ			Δ	Δ					Δ				Δ	

TABLE VI. Truth table for sixteen segment direct wire display (circuit configuration 5).

Display	A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	S
0	Δ	Δ	Δ	Δ						Δ				Δ		
1										Δ				Δ		
2	Δ	Δ		Δ								Δ		Δ		
3	Δ	Δ	Δ	Δ								Δ				
4			Δ	Δ						Δ		Δ				
5		Δ		Δ	Δ					Δ		Δ				
6		Δ		Δ	Δ					Δ		Δ		Δ		
7		Δ	Δ	Δ												
8		Δ	Δ	Δ	Δ					Δ		Δ		Δ		
9		Δ	Δ	Δ	Δ					Δ		Δ				
10		Δ	Δ	Δ	Δ		Δ	Δ		Δ				Δ		
11			Δ	Δ			Δ	Δ								
12		Δ	Δ		Δ		Δ	Δ				Δ		Δ		
13		Δ	Δ	Δ	Δ		Δ	Δ				Δ				
14			Δ	Δ			Δ	Δ		Δ		Δ				
15		Δ		Δ	Δ		Δ	Δ		Δ		Δ				
16		Δ		Δ	Δ		Δ	Δ		Δ		Δ		Δ		
17		Δ	Δ	Δ			Δ	Δ								
18		Δ	Δ	Δ	Δ		Δ	Δ		Δ		Δ		Δ		
19		Δ	Δ	Δ	Δ		Δ	Δ		Δ		Δ				
+										Δ		Δ		Δ		Δ
--												Δ				Δ
/											Δ				Δ	
\									Δ				Δ			
96	Δ	Δ		Δ	Δ	Δ		Δ		Δ		Δ		Δ		Δ
▷							Δ	Δ	Δ						Δ	
◁			Δ	Δ							Δ		Δ			

TABLE VII. Truth table for nine segment direct wire display (circuit configuration 6).

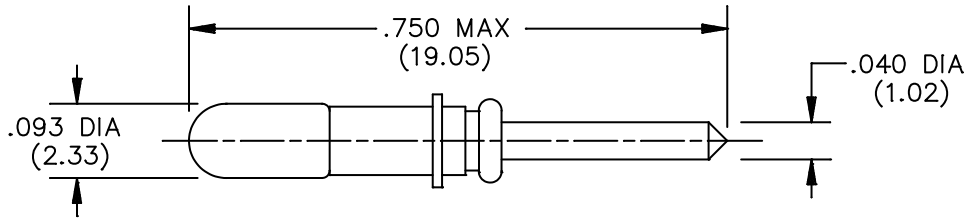
Display	A	B	C	D	E	F	K	M	P
0		Δ	Δ	Δ	Δ		Δ		Δ
1			Δ	Δ					
2		Δ	Δ		Δ			Δ	Δ
3		Δ	Δ	Δ	Δ			Δ	
4			Δ	Δ			Δ	Δ	
5		Δ		Δ	Δ		Δ	Δ	
6				Δ	Δ		Δ	Δ	Δ
7		Δ	Δ	Δ					
8		Δ	Δ	Δ	Δ		Δ	Δ	Δ
9		Δ	Δ	Δ			Δ	Δ	
A		Δ	Δ	Δ			Δ	Δ	Δ
b	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ
C		Δ			Δ		Δ		Δ
d	Δ	Δ	Δ	Δ	Δ	Δ	Δ		Δ
E		Δ			Δ		Δ	Δ	Δ
F		Δ					Δ	Δ	Δ

TABLE VIII. Truth table for North-South direct wire display (circuit configuration 7).

Input		Display	Segment lit	
N	S		N	S
O		N	Δ	
	O	S		Δ

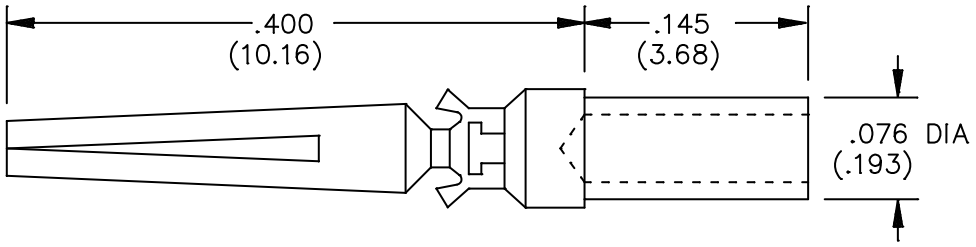
TABLE IX. Truth table for East-West direct wire display (circuit configuration 7).

Input		Display	Segment lit	
E	W		E	W
O		E	Δ	
	O	W		Δ



NOTES:
1. Dimensions are in inches. Millimeter equivalents are given for general information only.
2. Unless otherwise specified, tolerances are ±.010 inch (0.25 mm) for three place decimals.
3. Design configuration optional within envelope as shown.

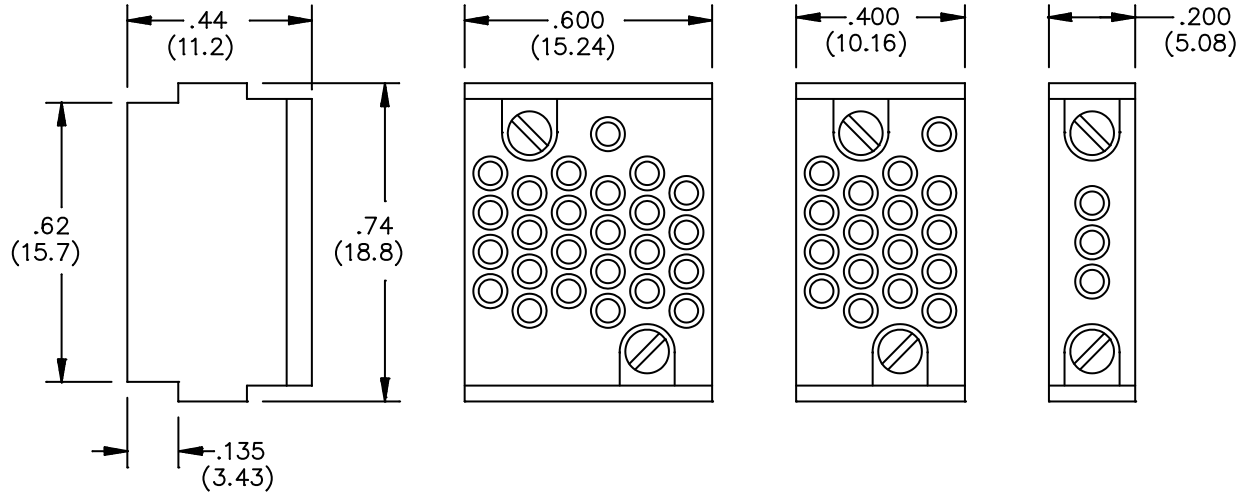
FIGURE 5. Lamp assembly.



NOTES:
1. Dimensions are in inches. Millimeter equivalents are given for general information only.
2. Unless otherwise specified, tolerances are ±.010 inch (0.25 mm) for three place decimals.
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

FIGURE 6. Terminal, crimp style.



NOTES:
1. Dimensions are in inches. Millimeter equivalents are given for general information only.
2. Unless otherwise specified, tolerances are ±.02 inch (0.51 mm) for two place decimals and ±.010 inch (0.25 mm) for three place decimals.
3. Design configuration optional within envelope as shown.

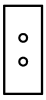
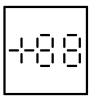
FIGURE 7. Connector blocks.

TABLE X. Weight of modules or component parts by code letter. 1/

Module code letter	Maximum weight in grams	Module or part code letter	Maximum weight in grams
A or A1	6.0	M or M1	8.0
B or B1	8.0	N	2.0
C or C1	8.0	P	6.0
D or D1	8.0	Q	8.0
E or E1	8.0	R	2.0
F or F1	8.0	S	0.2
G or G1	11.0	T or T1	8.0
H or H1	11.0	U or U1	8.0
J or J1	11.0	V or V1	8.0
K or K1	11.0	W or W1	8.0
L or L1	11.0		

1/ Code letters are listed in table XI.

TABLE XI. Code letters for type of module assembly or associated parts.

Code letter		Display	Type of module
Dot matrix	Bar matrix		
A	A1		Colon, degree, or decimal
B	B1		16 segment alpha-numeric
C	C1		Two 7 segment numeric
D	D1		One 4 segment sign and 7 segment numeric
E	E1		Colon and 7 segment numeric
F	F1		7 segment numeric and colon
G	G1		Three 7 segment numeric
H	H1		One 4 segment sign and two 7 segment numeric
J	J1		Colon and two 7 segment numeric
K	K1		7 segment numeric, colon, and 7 segment numeric

See footnote at end of table.

TABLE XI. Code letters for type of module assembly or associated parts – Continued.

Code letter		Display	Type of module
Dot matrix	Bar matrix		
L	L1	88:	Two 7 segment numeric and colon
M	M1	88-	Two 7 segment numeric and one 4 segment sign
N	N	N/A	Connector block, .200 inch (5.08 mm) wide 1/
P	P	N/A	Connector block, .400 inch (10.16 mm) wide 1/
Q	Q	N/A	Connector block, .600 inch (15.24 mm) wide 1/
R	R	N/A	Terminals, 10 to a package (see figure 6)
S	S	N/A	Lamp assembly (see figure 5)
T	T1	N S	North – South
U	U1	E W	East – West
V	V1	8.8	7 segment numeric, decimal, and 7 segment numeric
W	W1	8.8.	7 segment numeric, decimal, 7 segment numeric, and decimal

1/ For Government acquisitions, connector blocks shall be furnished with the required number of terminals plus two extra terminals.

QUALIFICATION:

Extent of qualification: See MIL–DTL–28803/3.

Part or Identifying Numbers (PIN): The PIN shall consist of the letter "M" followed by the basic number of the specification sheet, and a one or two digit symbol indicating the type of modules, connector block, terminal, or lamp, as specified. See example:

EXAMPLE

M28803/4– A1

Military designator and specification sheet number

One or two digit code indicating type of module, connector block, terminal, or lamp (see table XI).

Reference documents. In addition to MIL–DTL–28803, this document references the following:

MIL–C–22520/1
MIL–PRF–22885/80
MIL–DTL–28803/3

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

Review activities:
Army– AR, AT, AV, CR4, MI
Navy – AS, MC, OS, SH
Air Force – 99

Preparing activity:
DLA – CC

Project 5980–2013–004

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