INCH-POUND

MIL-DTL-28748/9G
10 October 2001
SUPERSEDING
MIL-DTL-28748/9F
17 July 2001

DETAIL SPECIFICATION SHEET

# CONNECTORS, ELECTRICAL, RECTANGULAR, RACK AND PANEL, POLARIZED CENTER JACKSCREW OR GUIDEPIN STYLE CRIMP TYPE REMOVABLE PIN CONTACTS, SIZE 16

This specification 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 and MIL-DTL-28748.

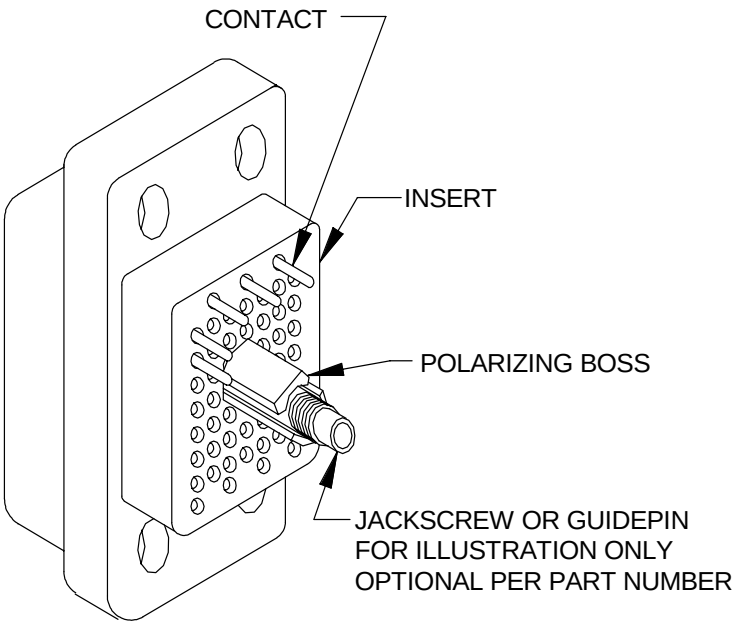



FIGURE 1. Connector.

TABLE I. Polarization type.

| Type | A | B |
|---|---|---|
| 1 | 90° | 135° |
| 2 | 85° | 137°30’ |

Center polarizing hardware may be rotated by removing retaining ring and spacer or removing cap (left-hand thread) at rear of insert.

POLARIZATION TYPE
(SEE TABLE I)

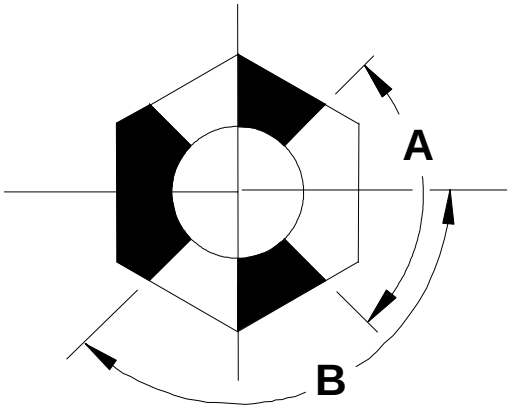
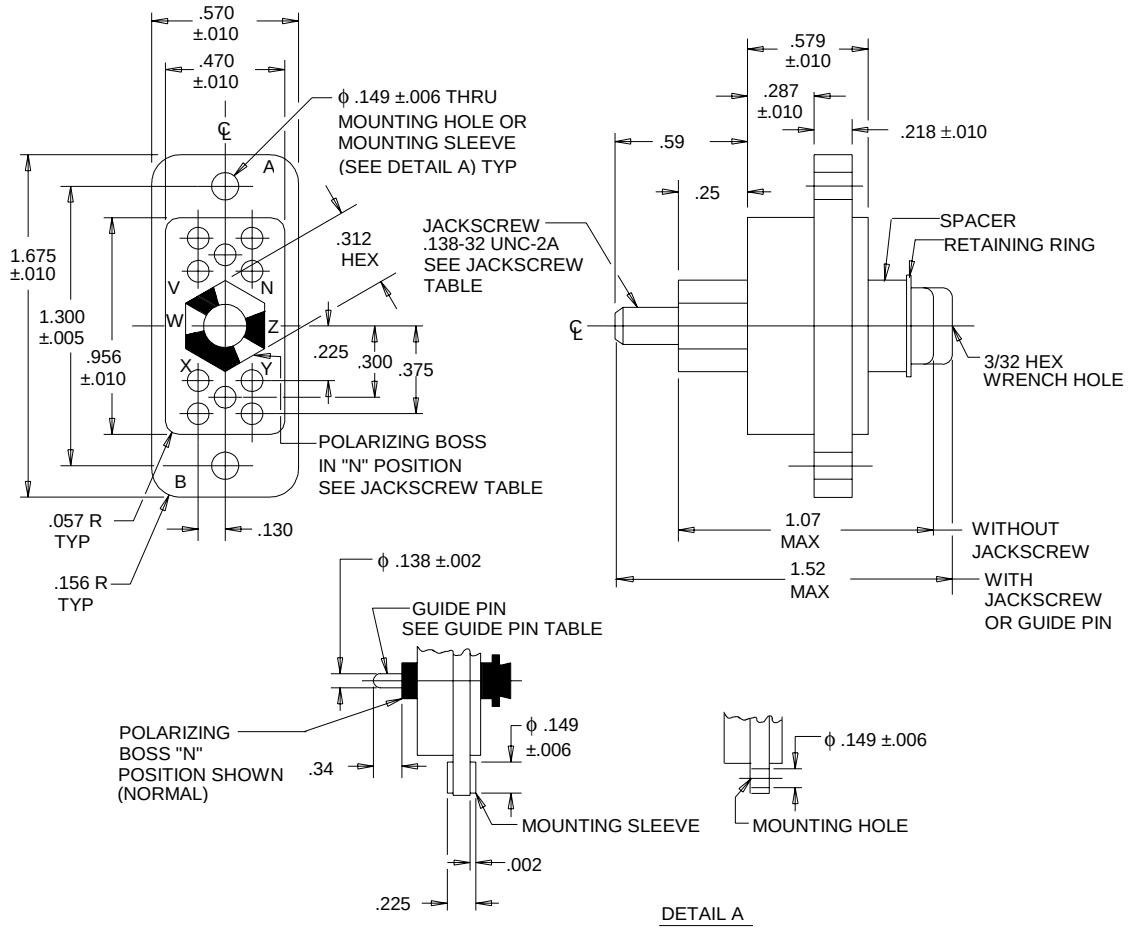



FIGURE 2. Polarization type.




| Inches | mm | Inches | mm |
|---|---|---|---|
| .002 | 0.05 | .287 | 7.29 |
| .005 | 0.13 | .300 | 7.62 |
| .006 | 0.15 | .312 | 7.92 |
| .010 | 0.25 | .340 | 8.64 |
| .057 | 1.45 | .375 | 9.53 |
| .094 | 2.39 | .470 | 11.94 |
| .130 | 3.30 | .570 | 14.48 |
| .138 | 3.51 | .579 | 15.71 |
| .149 | 3.78 | .956 | 24.28 |
| .156 | 3.96 | 1.03 | 26.16 |
| .218 | 5.54 | 1.070 | 27.18 |
| .225 | 5.72 | 1.300 | 33.02 |
| .250 | 6.35 | 1.50 | 38.10 |
| | | 1.675 | 42.55 |

Insert with through hole configuration A.
Insert with mounting sleeve configuration J.

FIGURE 3. Insert configuration 10 position insert .

Polarization positions - Jackscrew.

| Type (see table I) | Polarization 1/ | Jackscrew |
|---|---|---|
| 1 | N | Supplied with connector |
| 1 | V | |
| 1 | W | |
| 2 | X | |
| 2 | Y | |
| 2 | Z | |
| 1 | N | Not supplied with connector polarizing boss threaded internally .138-32 UNC-2B |
| 1 | V | |
| 1 | W | |
| 2 | X | |
| 2 | Y | |
| 2 | Z | |

1/ Large opening in polarization boss must be adjacent to polarization letter on connector body.

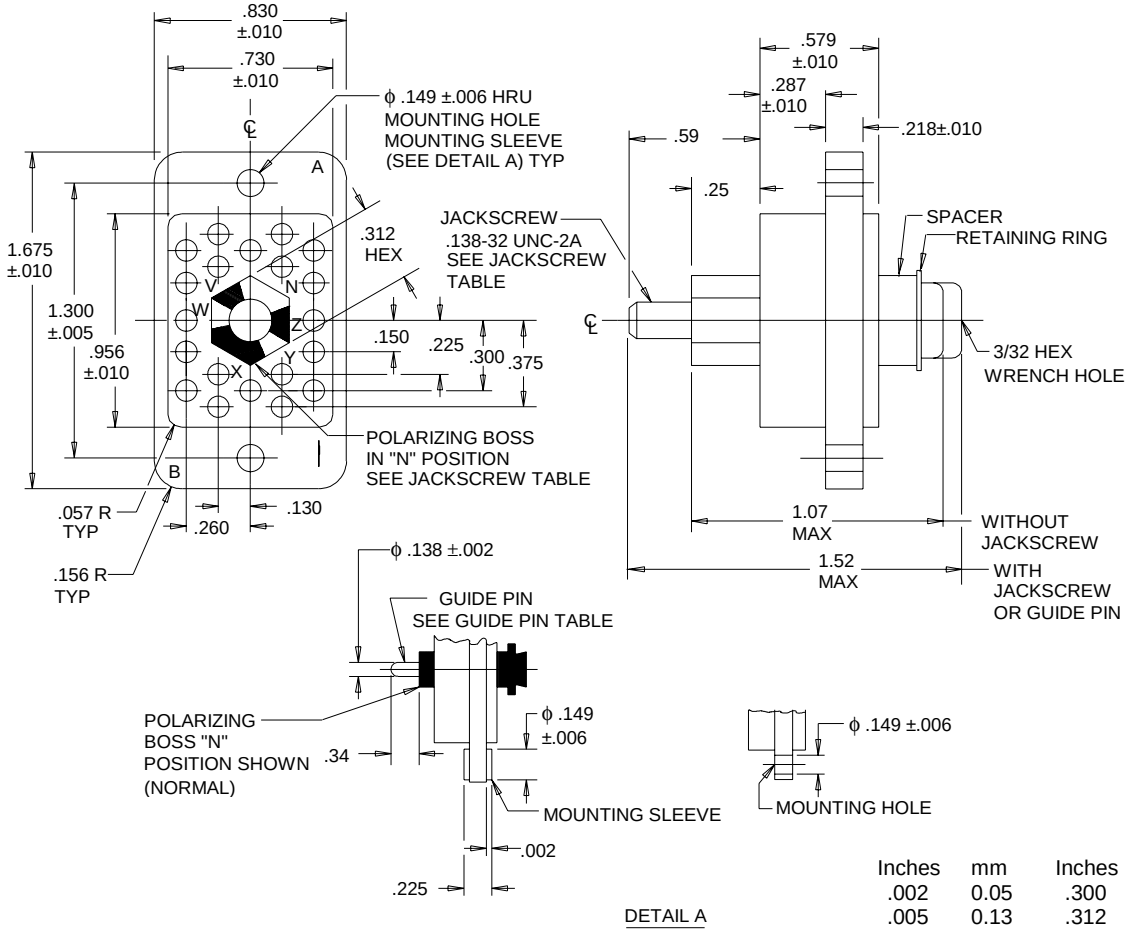
Polarization positions - Guide pin.

| Type (see table I) | Polarization 1/ | Guide pin |
|---|---|---|
| 1 | N | Supplied with connector |
| 1 | V | |
| 1 | W | |
| 2 | X | |
| 2 | Y | |
| 2 | Z | |
| 1 | N | Not supplied with connector polarizing boss with .144 ± .002 (3.66 ± .051 mm) inch I.D to accept guide pin |
| 1 | V | |
| 1 | W | |
| 2 | X | |
| 2 | Y | |
| 2 | Z | |

1/ Large opening in polarization boss must be adjacent to polarization letter on connector body.

NOTES:
1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Unless otherwise specified, tolerances are ± .02 (0.51 mm) inch for two place decimals, and ±.015 (0.38 mm) inch for three place decimals.
4. Tolerance between any two adjacent contact centers shall be ± .004 (0.10 mm) inch. Tolerance between any two contact centers, other than adjacent contacts, shall be ±.006 (0.15 mm) inch.
5. Dimensions symmetrical about centerlines.
6. Contact identification may be located on either side of the contact hold but shall appear on the front and rear face of the contact insert.
7. Flatness, squareness and parallelism shall be within dimensional tolerances.
8. Maximum insertion and withdrawal force (connector assembly) shall be 9 lbf (40 N).
9. Maximum torque required at jackscrew to properly engage or disengage connector shall be 1.5 in lbf (0.17 N m).
10. Jackscrew wrench size 3/32 hex.

FIGURE 3. Insert configuration 10 position insert - Continued.




Insert with through mounting hole configuration B.
Insert with mounting sleeve configuration K.

| Inches | mm | Inches | mm |
|---|---|---|---|
| .002 | 0.05 | .300 | 7.62 |
| .005 | 0.13 | .312 | 7.92 |
| .006 | 0.15 | .340 | 8.64 |
| .010 | 0.25 | .375 | 9.53 |
| .057 | 1.45 | .579 | 15.71 |
| .130 | 3.30 | .590 | 14.99 |
| .149 | 3.78 | .730 | 18.54 |
| .150 | 3.81 | .830 | 21.08 |
| .156 | 3.96 | .956 | 24.28 |
| .218 | 5.54 | 1.070 | 27.18 |
| .225 | 5.72 | 1.300 | 33.02 |
| .250 | 6.35 | 1.520 | 38.61 |
| .260 | 6.60 | 1.675 | 42.55 |
| .287 | 7.29 | | |

NOTES:
1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Unless otherwise specified, tolerances are ±.02 (0.51 mm) inch for two place decimals. and ±.015 (0.38 mm) inch for three place decimals.
4. Tolerance between any two adjacent contact centers shall be ±.004 (0.10 mm) inch. Tolerance between any two contact centers, other than adjacent contacts, shall be ±.006 (0.15 mm) inch.
5. Dimensions symmetrical about centerlines.
6. Contact identification may be located on either side of the contact hold but shall appear on the front and rear face of the contact insert.
7. Flatness, squareness and parallelism shall be within dimensional tolerances.
8. Maximum insertion and withdrawal force (connector assembly) shall be 18 lbf (80 N).
9. Maximum torque required at jackscrew to properly engage or disengage connector shall be 2 in lbf (0.23 N m).
10. Jackscrew wrench size 3/32 hex.

FIGURE 4. Insert configurations Insert with 20 positions.

Polarization positions -Jackscrew.

| Type (see table I) | Polarization 1/ | Jackscrew |
|---|---|---|
| 1 | N | Supplied with connector |
| 1 | V | |
| 1 | W | |
| 2 | X | |
| 2 | Y | |
| 2 | Z | |
| 1 | N | Not supplied with connector polarizing boss threaded internally .138-32 UNC-2B |
| 1 | V | |
| 1 | W | |
| 2 | X | |
| 2 | Y | |
| 2 | Z | |

1/ Large opening in polarization boss must be adjacent to polarization letter on connector body.

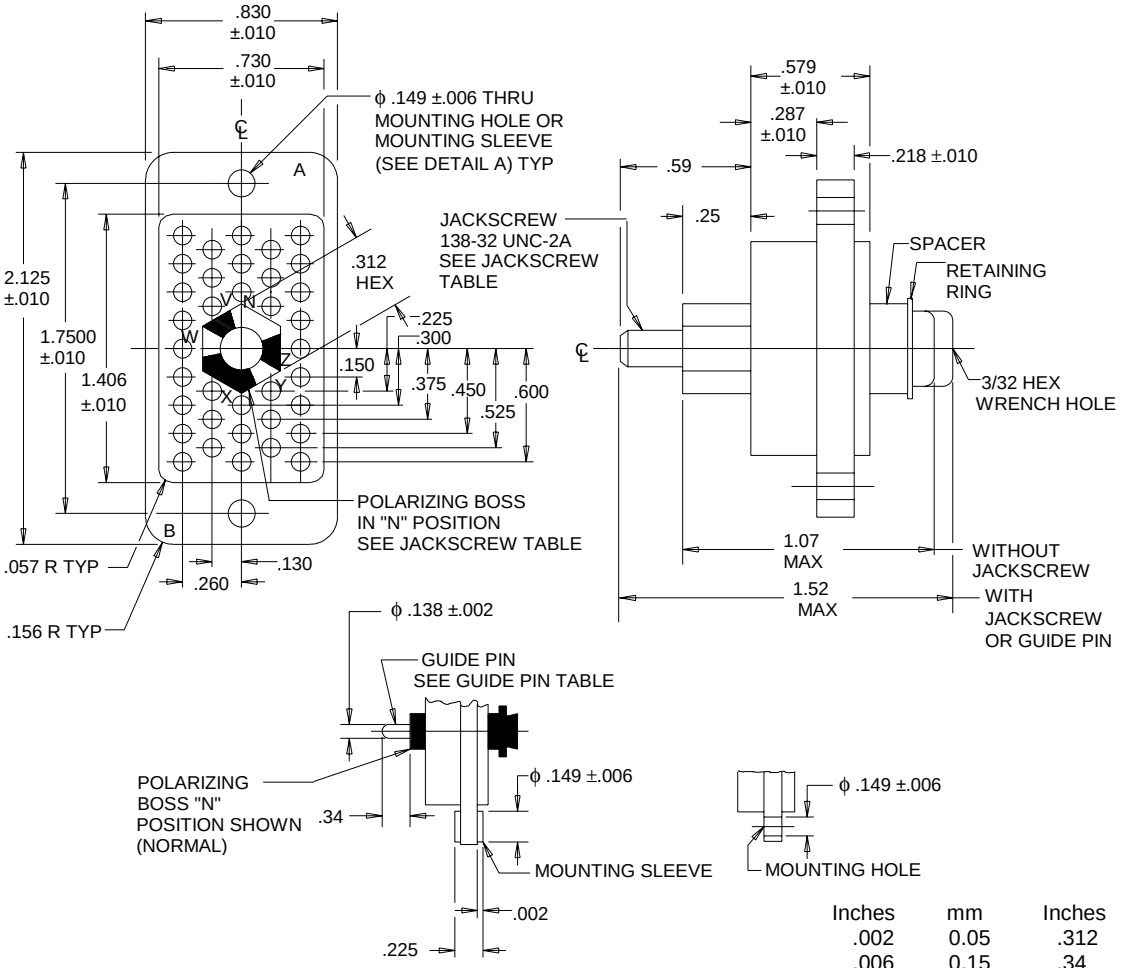
Polarization positions - Guide pin.

| Type (see table I) | Polarization 1/ | Guide pin |
|---|---|---|
| 1 | N | Supplied with connector |
| 1 | V | |
| 1 | W | |
| 2 | X | |
| 2 | Y | |
| 2 | Z | |
| 1 | N | Not supplied with connector polarizing boss with .144 ± .002 (3.66 ± .051 mm) inch I.D to accept guide pin |
| 1 | V | |
| 1 | W | |
| 2 | X | |
| 2 | Y | |
| 2 | Z | |

1/ Large opening in polarization boss must be adjacent to polarization letter on connector body.

Insert with through mounting hole configuration B.
Insert with mounting sleeve configuration K.

FIGURE 4. Insert configuration with 20 positions - Continued.




DETAIL A

Insert with through mounting hole configuration C.
Insert with mounting sleeve configuration L.

| Inches | mm | Inches | mm |
|---|---|---|---|
| .002 | 0.05 | .312 | 7.92 |
| .006 | 0.15 | .34 | 8.64 |
| .010 | 0.25 | .375 | 9.53 |
| .057 | 1.45 | .450 | 11.43 |
| .130 | 3.30 | .525 | 13.34 |
| .138 | 3.51 | .579 | 15.71 |
| .149 | 3.78 | .59 | 14.99 |
| .150 | 3.81 | .600 | 15.24 |
| .156 | 3.96 | .730 | 18.54 |
| .218 | 5.54 | .830 | 21.08 |
| .225 | 5.72 | 1.07 | 27.18 |
| .25 | 6.35 | 1.406 | 35.71 |
| .260 | 6.60 | 1.520 | 38.61 |
| .287 | 7.29 | 1.750 | 44.45 |
| .300 | 7.62 | 2.125 | 53.98 |

NOTES:
1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Unless otherwise specified, tolerances are ±.02 (0.51 mm) inch for two place decimals and ±.015 (0.38 mm) inch for three place decimals.
4. Tolerance between any two adjacent contact centers shall be ±.004 (0.10 mm) inch. Tolerance between any two contact centers, other than adjacent contacts, shall be ±.006 (0.15 mm) inch.
5. Contact identification may be located on either side of the contact hold but shall appear on the front and rear face of the contact insert.
6. Dimensions symmetrical about center lines.
7. Flatness, squareness and parallelism shall be within dimensional tolerances.
8. Maximum insertion and withdrawal force (connector assembly ) shall be 34 lbf (151 N).
9. Maximum torque required at jackscrew to properly engage or disengage connector shall be 3 in lbf (0.339 N m).
10. Jackscrew wrench size 3/32 hex.

FIGURE 5. Insert configurations Insert with 36 positions.

Polarization positions - Jackscrew.

| Type (see table I) | Polarization 1/ | Jackscrew |
|---|---|---|
| 1 | N | Supplied with connector |
| 1 | V | |
| 1 | W | |
| 2 | X | |
| 2 | Y | |
| 2 | Z | |
| 1 | N | Not supplied with connector polarizing boss threaded internally .138-32 UNC-2B |
| 1 | V | |
| 1 | W | |
| 2 | X | |
| 2 | Y | |
| 2 | Z | |

1/ Large opening in polarization boss must be adjacent to polarization letter on connector body.

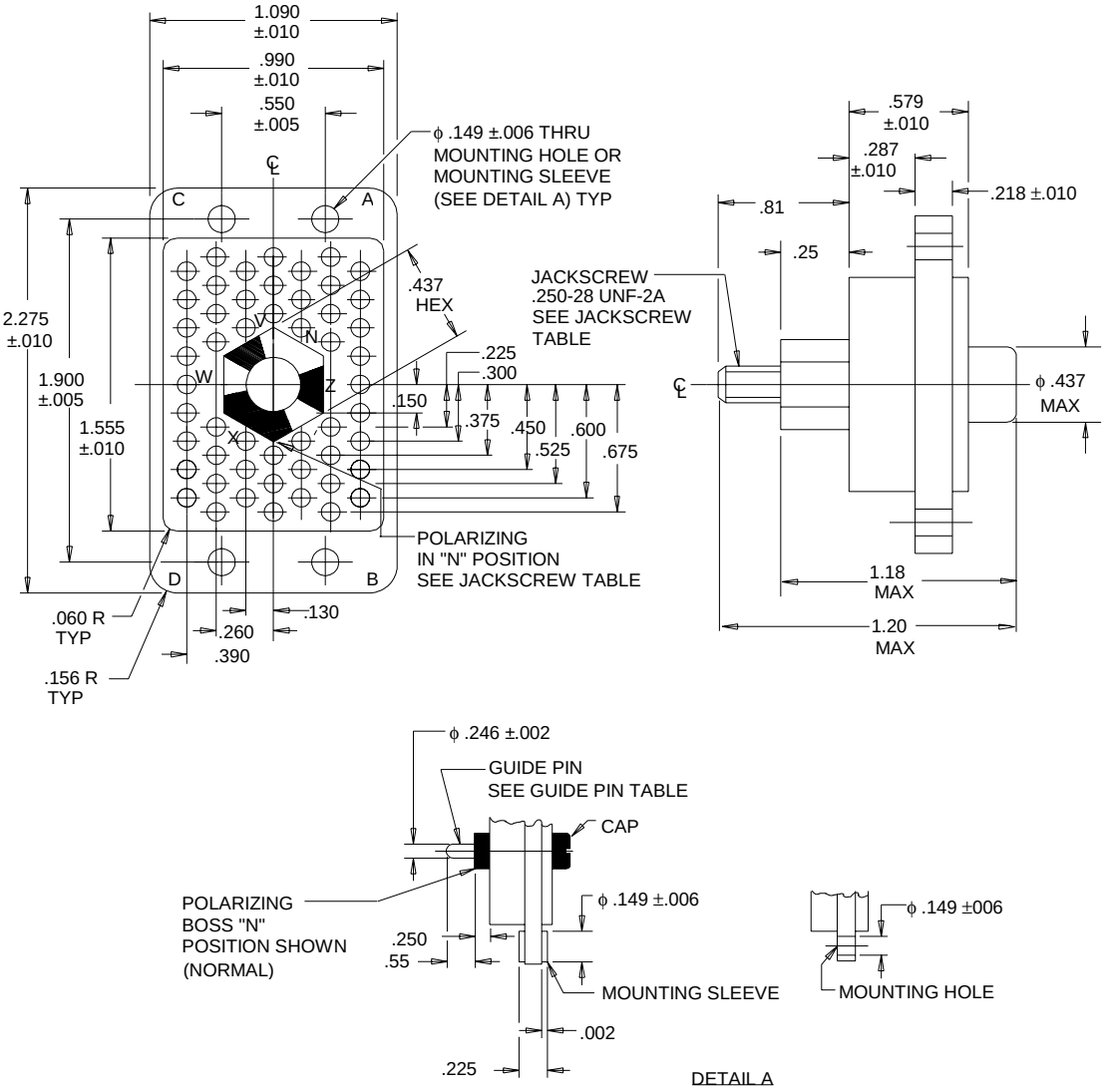
Polarization positions - Guide pin.

| Type (see table I) | Polarization 1/ | Guide pin |
|---|---|---|
| 1 | N | Supplied with connector |
| 1 | V | |
| 1 | W | |
| 2 | X | |
| 2 | Y | |
| 2 | Z | |
| 1 | N | Not supplied with connector polarizing boss with .144 ± .002 (3.66 ± .051 mm) inch I.D to accept guide pin |
| 1 | V | |
| 1 | W | |
| 2 | X | |
| 2 | Y | |
| 2 | Z | |

1/ Large opening in polarization boss must be adjacent to polarization letter on connector body.

Insert with through mounting hole configuration C.
Insert with mounting sleeve configuration L.

FIGURE 5. Insert configuration Insert with 36 positions - Continued.




| Inches | mm | Inches | mm | Inches | mm |
|---|---|---|---|---|---|
| .002 | 0.05 | .246 | 6.25 | .550 | 13.97 |
| .005 | 0.13 | .250 | 6.35 | .579 | 15.71 |
| .006 | 0.15 | .260 | 6.60 | .590 | 14.99 |
| .010 | 0.25 | .287 | 7.29 | .600 | 15.24 |
| .060 | 1.52 | .300 | 7.62 | .675 | 17.15 |
| .130 | 3.30 | .375 | 9.53 | .810 | 20.57 |
| .149 | 3.78 | .390 | 9.91 | .990 | 25.15 |
| .150 | 3.81 | .450 | 11.43 | 1.05 | 26.67 |
| .156 | 3.96 | .473 | 12.01 | 1.090 | 27.69 |
| .218 | 5.54 | .525 | 13.34 | 1.555 | 39.50 |
| .225 | 5.72 | .545 | 13.84 | 1.900 | 48.26 |
| | | | | 2.275 | 57.79 |

Insert with through mounting hole configuration D.
Insert with mounting sleeve configuration M.

FIGURE 6. Insert configuration with 52 positions.

Polarization positions - Jackscrew.

| Type (table I) | Polarization 1/ | Jackscrew |
|---|---|---|
| 1 | N | Supplied with connector |
| 1 | V | |
| 1 | W | |
| 2 | X | |
| 2 | Y | |
| 2 | Z | |
| 1 | N | Not supplied with connector polarizing boss threaded internally .250-28 UNF-2B |
| 1 | V | |
| 1 | W | |
| 2 | X | |
| 2 | Y | |
| 2 | Z | |

1/ Large opening in polarization boss must be adjacent to polarization letter on connector body.

Polarization positions - Guide pin.

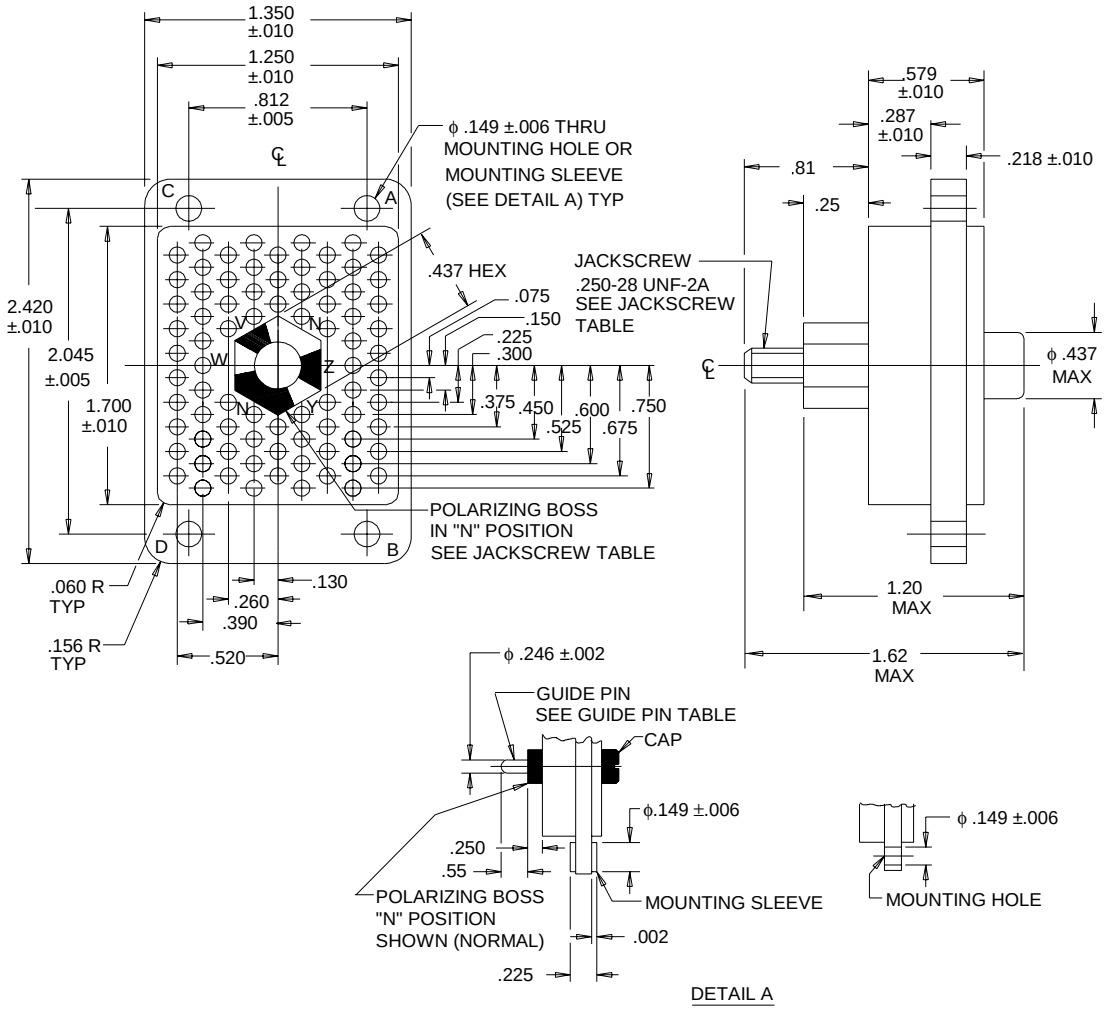
| Type (see table I) | Polarization 1/ | Guide pin |
|---|---|---|
| 1 | N | Supplied with connector |
| 1 | V | |
| 1 | W | |
| 2 | X | |
| 2 | Y | |
| 2 | Z | |
| 1 | N | Not supplied with connector polarizing boss with .254 ± .002 (3.66 ± .051 mm) inch I.D to accept guide pin |
| 1 | V | |
| 1 | W | |
| 2 | X | |
| 2 | Y | |
| 2 | Z | |

1/ Large opening in polarization boss must be adjacent to polarization letter on connector body.

Insert with through mounting hole configuration D.
Insert with mounting sleeve configuration M.

NOTES:
1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Unless otherwise specified, tolerances are ±.02 (0.51 mm) inch for two place decimals. and ±.015 (0.38 mm) inch for three place decimals.
4. Tolerance between any two adjacent contact centers shall be ±.004 (0.10 mm) inch. Tolerance between any two contact centers, other than adjacent contacts, shall be ±.006 (0.15 mm) inch.
5. Dimensions symmetrical about centerlines.
6. Contact identification may be located on either side of the contact hold but shall appear on the front and rear face of the contact insert.
7. Flatness, squareness and parallelism shall be within dimensional tolerances.
8. Maximum insertion and withdrawal force shall be 48 lbf (216 N).
9. Maximum torque required at jackscrew to properly engage or disengage connector shall be 4 in lbf (0.45 N m).
10. Jackscrew wrench size 5/32 hex.

FIGURE 6. Insert configuration Insert with 52 positions - Continued.




| Inches | mm | Inches | mm | Inches | mm |
|---|---|---|---|---|---|
| .002 | 0.05 | .246 | 6.25 | .579 | 15.71 |
| .005 | 0.13 | .250 | 6.35 | .590 | 14.99 |
| .006 | 0.15 | .260 | 6.60 | .600 | 15.24 |
| .010 | 0.25 | .287 | 7.29 | .675 | 17.15 |
| .060 | 1.52 | .300 | 7.62 | .750 | 19.05 |
| .075 | 1.90 | .375 | 9.53 | .810 | 20.57 |
| .130 | 3.30 | .390 | 9.91 | .812 | 20.62 |
| .149 | 3.78 | .437 | 11.10 | 1.180 | 29.97 |
| .150 | 3.81 | .450 | 11.43 | 1.250 | 31.75 |
| .156 | 3.96 | .520 | 13.21 | 1.350 | 34.29 |
| .218 | 5.54 | .525 | 13.34 | 1.700 | 43.18 |
| .225 | 5.72 | .545 | 13.84 | 2.045 | 51.94 |
| | | .550 | 13.97 | 2.420 | 61.67 |

Insert with through mounting hole configuration E.
Insert with mounting sleeve configuration N.

FIGURE 7. Insert configuration with 80 positions.

Polarization positions - Jackscrew.

| Type (see table I) | Polarization 1/ | Jackscrew |
|---|---|---|
| 1 | N | Supplied with connector |
| 1 | V | |
| 1 | W | |
| 2 | X | |
| 2 | Y | |
| 2 | Z | |
| 1 | N | Not supplied with connector polarizing boss threaded internally .250-28 UNF-2B |
| 1 | V | |
| 1 | W | |
| 2 | X | |
| 2 | Y | |
| 2 | Z | |

1/ Large opening in polarization boss must be adjacent to polarization letter on connector body.

TABLE II. Polarization positions.

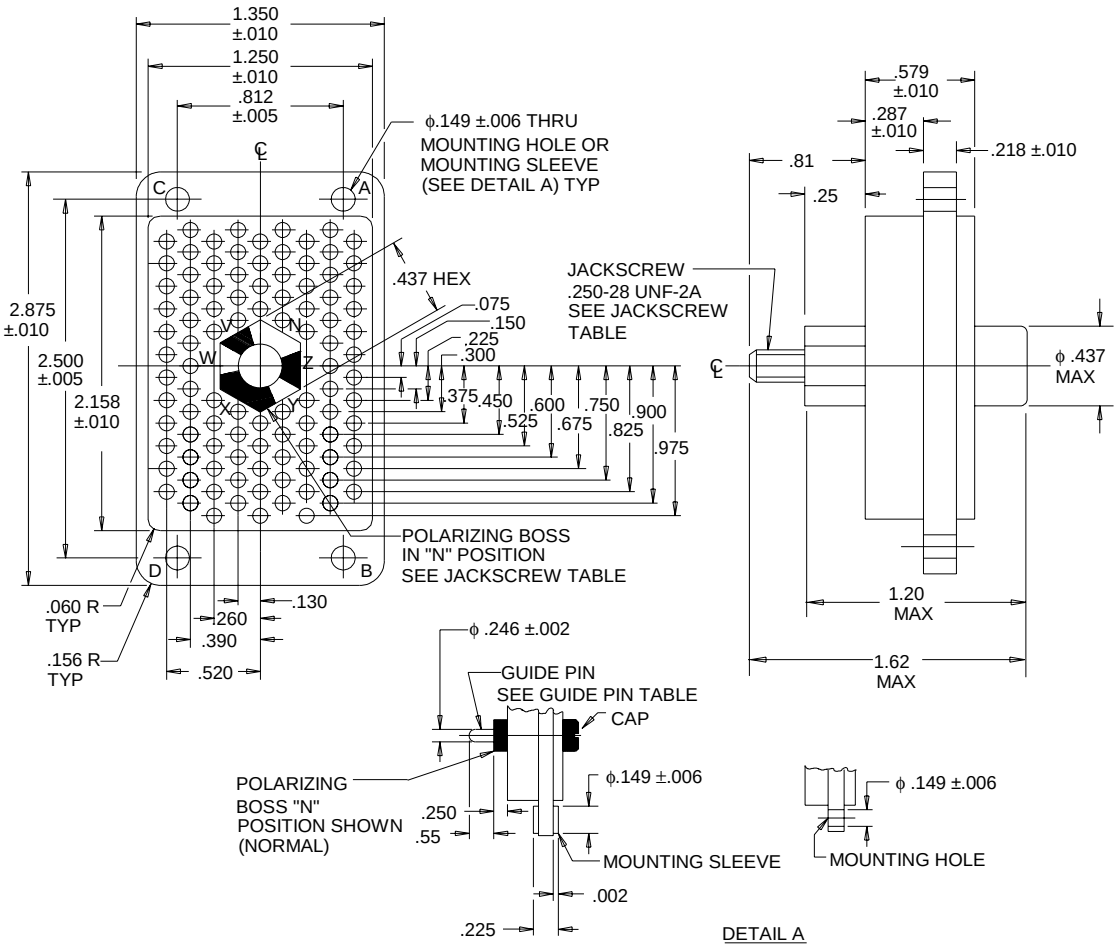
| Type (see table I) | Polarization 1/ | Guide pin |
|---|---|---|
| 1 | N | Supplied with connector |
| 1 | V | |
| 1 | W | |
| 2 | X | |
| 2 | Y | |
| 2 | Z | |
| 1 | N | Not supplied with connector polarizing boss with .254 ± .002 (3.66 ± .051 mm) inch I.D to accept guide pin |
| 1 | V | |
| 1 | W | |
| 2 | X | |
| 2 | Y | |
| 2 | Z | |

1/ Large opening in polarization boss must be adjacent to polarization letter on connector body.

Insert with through mounting hole configuration E.
Insert with mounting sleeve configuration N.

NOTES:
1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Unless otherwise specified, tolerances are ±.02 (0.51 mm) inch for two place decimals. and ±.015 (0.38 mm) inch for three place decimals.
4. Tolerance between any two adjacent contact centers shall be ±.004 (0.10 mm) inch. Tolerance between any two contact centers, other than adjacent contacts, shall be ±.006 (0.15 mm) inch.
5. Dimensions symmetrical about centerlines.
6. Contact identification may be located on either side of the contact hold but shall appear on the front and rear face of the contact insert.
7. Flatness, squareness, and parallelism shall be within dimensional tolerances.
8. Maximum insertion and withdrawal force (connector assembly) shall be 75 lbf (334 N).
9. Maximum torque required at jackscrew to properly engage or disengage connector shall be 6 in lbf (0.68 N m)
10. Jackscrew wrench size 5/32 hex.

FIGURE 7. Insert configuration Insert with 80 positions - Continued.




| Inches | mm | Inches | mm | Inches | mm |
|---|---|---|---|---|---|
| .002 | 0.05 | .250 | 6.35 | .675 | 17.15 |
| .005 | 0.13 | .260 | 6.60 | .750 | 19.05 |
| .006 | 0.15 | .287 | 7.29 | .810 | 20.57 |
| .010 | 0.25 | .300 | 7.62 | .812 | 20.63 |
| .060 | 1.52 | .375 | 9.53 | .825 | 20.96 |
| .130 | 3.30 | .390 | 9.91 | .900 | 22.86 |
| .149 | 3.78 | .437 | 11.10 | 1.180 | 29.97 |
| .150 | 3.81 | .450 | 11.43 | 1.250 | 31.75 |
| .156 | 3.96 | .520 | 13.21 | 1.350 | 34.29 |
| .218 | 5.54 | .525 | 13.34 | 1.438 | 36.53 |
| .225 | 5.72 | .550 | 13.97 | 2.158 | 54.81 |
| .246 | 6.25 | .579 | 15.71 | 2.500 | 63.50 |
| | | .600 | 15.24 | 2.875 | 73.03 |

Insert with through mounting hole configuration F.
Insert with mounting sleeve configuration P.

FIGURE 8. Insert configuration with 104 positions.

Polarization positions - Jackscrew.

| Type (see table I) | Polarization 1/ | Jackscrew |
|---|---|---|
| 1 | N | Supplied with connector |
| 1 | V) | |
| 1 | W | |
| 2 | X | |
| 2 | Y | |
| 2 | Z | |
| 1 | N | Not supplied with connector polarizing boss threaded internally .250-28 UNF-2B |
| 1 | V | |
| 1 | W | |
| 2 | X | |
| 2 | Y | |
| 2 | Z | |

1/ Large opening in polarization boss must be adjacent to polarization letter on connector body.

Polarization positions - Guidepin.

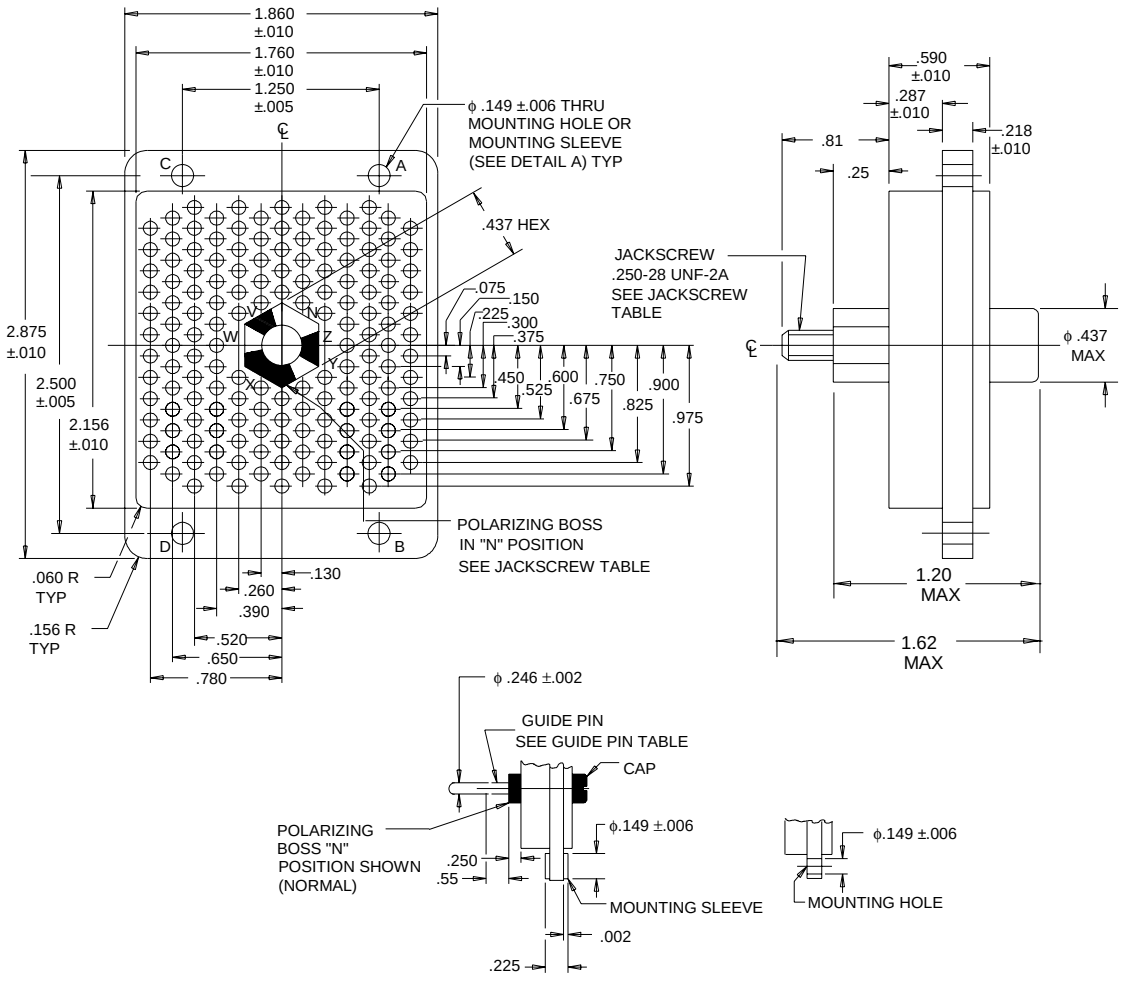
| Type (see table I) | Polarization 1/ | Guide pin |
|---|---|---|
| 1 | N | Supplied with connector |
| 1 | V | |
| 1 | W | |
| 2 | X | |
| 2 | Y | |
| 2 | Z | |
| 1 | N | Not supplied with connector polarizing boss with .254 ± .002 (3.66 ± .051 mm) inch I.D to accept guide pin |
| 1 | V | |
| 1 | W | |
| 2 | X | |
| 2 | Y | |
| 2 | Z | |

1/ Large opening in polarization boss must be adjacent to polarization letter on connector body.

Insert with through mounting hole configuration F.
Insert with mounting sleeve configuration P.

NOTES:
1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Unless otherwise specified, tolerances are ±.02 (0.51 mm) inch for two place decimals and ±.015 (0.38 mm) inch for three place decimals.
4. Tolerance between any two adjacent contact centers shall be ±.004 (0.10 mm) inch. Tolerance between any two contact centers, other than adjacent contacts, shall be ±.006 (0.15 mm) inch.
5. Dimensions symmetrical about centerlines.
6. Contact identification may be located on either side of the contact hold but shall appear on the front and rear face of the contact insert.
7. Flatness, squareness, and parallelism shall be within dimensional tolerances.
8. Maximum insertion and withdrawal force (connector assembly) shall be 100 lbf (445 N).
9. Maximum torque required at jackscrew to properly engage or disengage connector shall be 7 in lbf (0.79 N m)
10. Jackscrew wrench size 5/32 hex.

FIGURE 8. Insert configuration with 104 positions - Continued.




| Inches | mm | Inches | mm | Inches | mm |
|---|---|---|---|---|---|
| .002 | 0.05 | .260 | 6.60 | .750 | 19.05 |
| .005 | 0.13 | .287 | 7.29 | .780 | 19.81 |
| .006 | 0.15 | .300 | 7.62 | .810 | 20.57 |
| .010 | 0.25 | .375 | 9.53 | .825 | 20.96 |
| .060 | 1.52 | .390 | 9.91 | .900 | 22.86 |
| .075 | 1.91 | .437 | 11.10 | .930 | 23.62 |
| .130 | 3.30 | .450 | 11.43 | .975 | 24.77 |
| .149 | 3.78 | .520 | 13.21 | 1.180 | 29.97 |
| .150 | 3.81 | .525 | 13.34 | 1.250 | 31.75 |
| .156 | 3.96 | .550 | 13.97 | 1.438 | 36.53 |
| .218 | 5.54 | .579 | 14.71 | 1.760 | 44.70 |
| .225 | 5.72 | .600 | 15.24 | 1.860 | 47.24 |
| .246 | 6.25 | .650 | 16.51 | 2.158 | 54.81 |
| .250 | 6.35 | .675 | 17.15 | 2.500 | 63.50 |
| | | | | 2.875 | 73.03 |

Insert with through mounting hole configuration G.
Insert with mounting sleeve configuration R.

FIGURE 9. Insert configuration with 158 positions.

Polarization positions - Jackscrew.

| Type (see table I) | Polarization 1/ | Jackscrew |
|---|---|---|
| 1 | N | Supplied with connector |
| 1 | V | |
| 1 | W | |
| 2 | X | |
| 2 | Y | |
| 2 | Z | |
| 1 | N | Not supplied with connector polarizing boss threaded internally .250-28 UNF-2B |
| 1 | V | |
| 1 | W | |
| 2 | X | |
| 2 | Y | |
| 2 | Z | |

1/ Large opening in polarization boss must be adjacent to polarization letter on connector body.

Polarization positions - Guide pin.

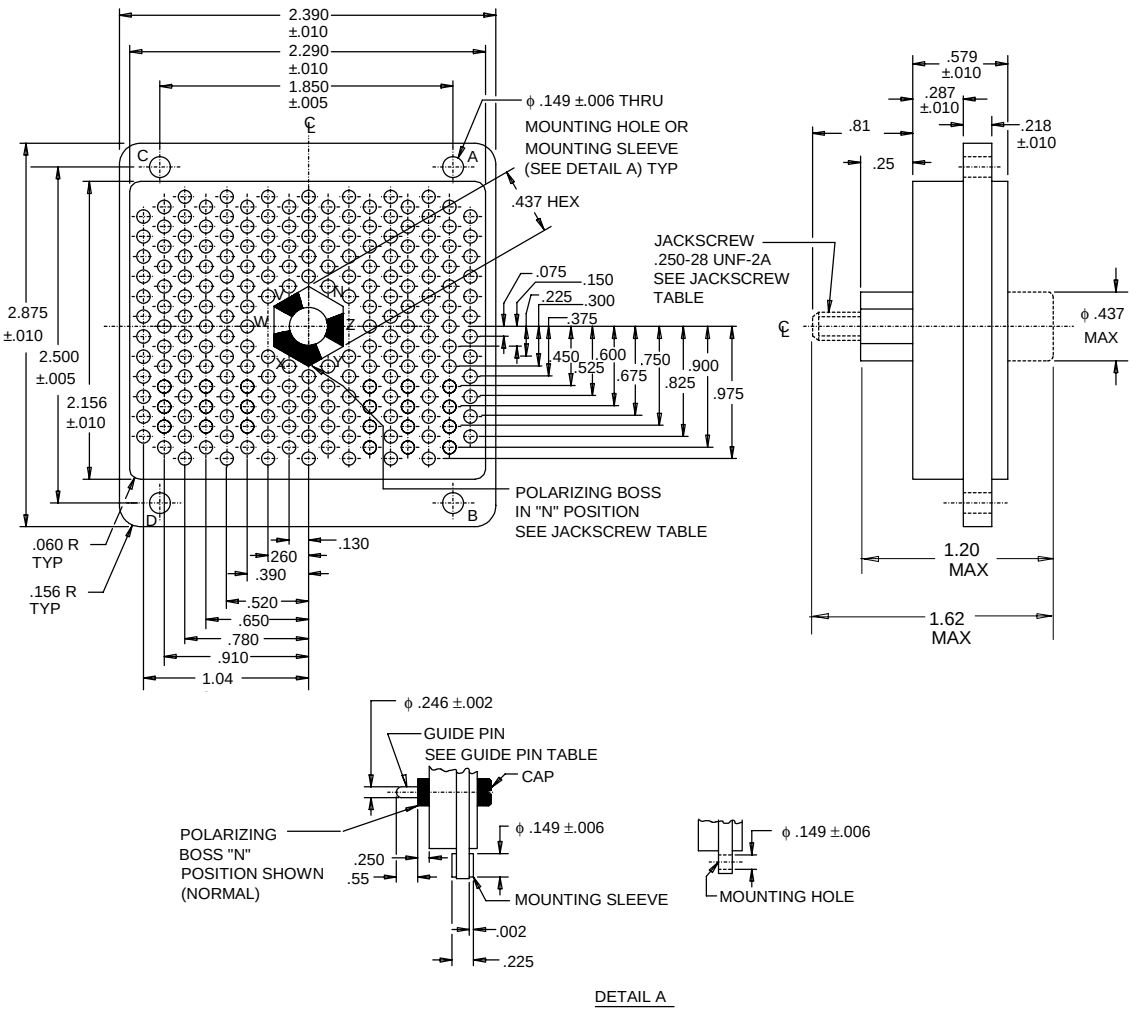
| Type (see table I) | Polarization 1/ | Guide pin |
|---|---|---|
| 1 | N | Supplied with connector |
| 1 | V | |
| 1 | W | |
| 2 | X | |
| 2 | Y | |
| 2 | Z | |
| 1 | N | Not supplied with connector polarizing boss with .254 ± .002 (3.66 ± .051 mm) inch I.D to accept guide pin |
| 1 | V | |
| 1 | W | |
| 2 | X | |
| 2 | Y | |
| 2 | Z | |

1/ Large opening in polarization boss must be adjacent to polarization letter on connector body.

Insert with through mounting hole configuration G.
Insert with mounting sleeve configuration R.

NOTES:
1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Unless otherwise specified, tolerances are ±.02 (0.51 mm) inch for two place decimals. and ±.015 (0.38 mm) inch for three place decimals.
4. Tolerance between any two adjacent contact centers shall be ±.004 (0.10 mm) inch. Tolerance between any two contact centers, other than adjacent contacts, shall be ±.006 (0.15 mm) inch.
5. Dimensions symmetrical about centerlines.
6. Contact identification may be located on either side of the contact hold but shall appear on the front and rear face of the contact insert.
7. Flatness, squareness, and parallelism shall be within dimensional tolerances.
8. Maximum insertion and withdrawal force (connector assembly) shall be 148 lbf (658 N).
9. Maximum torque required at jackscrew to properly engage or disengage connector shall be 10 in lbf (1.13 N m).
10. Jackscrew wrench size 5/32 hex.

FIGURE 9. Insert configuration with 158 positions - Continued.




DETAIL A

| Inches | mm | Inches | mm | | |
|---|---|---|---|---|---|
| .002 | 0.05 | .287 | 7.29 | .810 | 20.57 |
| .005 | 0.13 | .300 | 7.62 | .825 | 20.96 |
| .006 | 0.15 | .375 | 9.53 | .900 | 22.86 |
| .010 | 0.25 | .390 | 9.91 | .910 | 23.11 |
| .060 | 1.52 | .437 | 11.10 | .975 | 24.77 |
| .075 | 1.91 | .450 | 11.43 | 1.040 | 26.42 |
| .130 | 3.30 | .520 | 13.21 | 1.05 | 26.67 |
| .149 | 3.78 | .525 | 13.34 | 1.195 | 30.35 |
| .150 | 3.81 | .550 | 13.97 | 1.438 | 36.53 |
| .156 | 3.96 | .579 | 14.71 | 1.850 | 46.99 |
| .218 | 5.54 | .600 | 15.24 | 2.156 | 54.76 |
| .225 | 5.72 | .650 | 16.51 | 2.290 | 58.17 |
| .246 | 6.25 | .675 | 17.15 | 2.390 | 60.71 |
| .250 | 6.35 | .750 | 19.05 | 2.500 | 63.50 |
| .260 | 6.60 | .780 | 19.81 | 2.875 | 73.03 |

Insert with through mounting hole configuration H.
Insert with mounting sleeve configuration S.

FIGURE 10. Insert configuration with 212 positions.

Polarization positions - Jackscrew.

| Type (see table I) | Polarization 1/ | Jackscrew |
|---|---|---|
| 1 | N | Supplied with connector |
| 1 | V | |
| 1 | W | |
| 2 | X | |
| 2 | Y | |
| 2 | Z | |
| 1 | N | Not supplied with connector polarizing boss threaded internally .250-28 UNF-2B |
| 1 | V | |
| 1 | W | |
| 2 | X | |
| 2 | Y | |
| 2 | Z | |

1/ Large opening in polarization boss must be adjacent to polarization letter on connector body.

Polarization positions - Guide pin.

| Type (see table I) | Polarization 1/ | Guide pin |
|---|---|---|
| 1 | N | Supplied with connector |
| 1 | V | |
| 1 | W | |
| 2 | X | |
| 2 | Y | |
| 2 | Z | |
| 1 | N | Not supplied with connector polarizing boss with .254 ± .002 (3.66 ± .051 mm) inch I.D to accept guide pin |
| 1 | V | |
| 1 | W | |
| 2 | X | |
| 2 | Y | |
| 2 | Z | |

1/ Large opening in polarization boss must be adjacent to polarization letter on connector body.

Insert with through mounting hole configuration H.
Insert with mounting sleeve configuration S.

NOTES:
1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Unless otherwise specified, tolerances are ±.02 (0.51 mm) inch for two place decimals. and ±.015 (0.38 mm) inch for three place decimals.
4. Tolerance between any two adjacent contact centers shall be ±.004 (0.10 mm) inch. Tolerance between any two contact centers, other than adjacent contacts, shall be ±.006 (0.15 mm) inch.
5. Dimensions symmetrical about centerlines.
6. Contact identification may be located on either side of the contact hold but shall appear on the front and rear face of the contact insert.
7. Flatness, squareness, and parallelism shall be within dimensional tolerances.
8. Maximum insertion and withdrawal force (connector assembly) shall be 198 lbf (881 N).
9. Maximum torque required at jackscrew to properly engage or disengage connector shall be 13 in lbf (1.47 N m)
10. Jackscrew wrench size 5/32 hex.

FIGURE 10. Insert configuration with 212 positions - Continued.

REQUIREMENTS:

Dimensions and configuration: See figures 1 through 10 for inserts and table II for contact sizes.

Insert material shall be in accordance with MIL-DTL-28748.

Contact hole details shall be in accordance with MIL-DTL-28748.

Mating connectors: MIL-DTL-28748/10.

Part or Identifying Number (PIN) as shown in the following example:

EXAMPLE of PIN:

| M28748/9 | A | 0 | A | L | 1A |
|---|---|---|---|---|---|
| Basic Number of specification sheet | Insert | Shield and shield clamp location or retaining plate | Shell type (polarization) | Jackscrews or guidepins | Contacts (see table II) |

PIN code:

| Insert with through mounting hole | Number of contacts |
|---|---|
| A | 10 |
| B | 20 |
| C | 36 |
| D | 52 |
| E | 80 |
| F | 104 |
| G | 158 |
| H | 212 |

| Insert with mounting sleeve | Number of contacts |
|---|---|
| J | 10 |
| K | 20 |
| L | 36 |
| M | 52 |
| N | 80 |
| P | 104 |
| R | 158 |
| S | 212 |

Shield and shield clamp location or retaining plate
0 - None included 1/
1 - Insert identifier for piece parts 2/

Shell type (polarization) see table I 3/ 4/ 5/ 6/
A - 1 N
B - 1 V
C - 1 W
D - 1 X
E - 1 Y
F - 1 Z
N - 2 N
V - 2 V
W - 2 W
X - 2 X
Y - 2 Y
Z - 2 Z
G - 3 N
H - 3 V
J - 3 W
K - 3 X
L - 3 Y
M - 3 Z
P - 4 N
Q - 4 V
R - 4 W
S - 4 X
T - 4 Y
U - 4 Z
0 - None included 1/

Jackscrews or guidepins
L - Long jackscrew
G - Guidepin
O - Boss for jackscrew
B - Boss for guidepin
N - None included

1/ The number zero (0) is used to indicate which parts are not included.
2/ No insert included, use the number 1 in conjunction with insert designator to order jackscrew, guidepins, or polarization boss piece parts.
3/ A through F are for use with jackscrews, supplied with connector.
4/ N through Z are for use with the boss for jackscrews, not supplied with connector.
5/ G through M are for use with guidepins, supplied with connector.
6/ P through U are for use with the boss for guidepins, not supplied with connector.

TABLE II. Contact size percent.

| Contact designator | Size 16 - 16 M39029/36-278 1/ (percent) | Size 16 - 20 M39029/36-277 1/ (percent) | Size 20 - 20 M39029/79-436 2/ M39029/79-437 2/ (percent) |
|---|---|---|---|
| 1A | 100 | 0 | 0 |
| 1B | 90 | 0 | 10 |
| 1C | 80 | 0 | 20 |
| 1D | 70 | 0 | 30 |
| 1E | 60 | 0 | 40 |
| 1F | 50 | 0 | 50 |
| 1G | 40 | 0 | 60 |
| 1H | 30 | 0 | 70 |
| 1J | 20 | 0 | 80 |
| 1K | 10 | 0 | 90 |
| 1L | 0 | 0 | 100 |
| 1Z | 0 | 0 | 0 |
| 2A | 0 | 100 | 0 |
| 2B | 0 | 90 | 10 |
| 2C | 0 | 80 | 20 |
| 2D | 0 | 70 | 30 |
| 2E | 0 | 60 | 40 |
| 2F | 0 | 50 | 50 |
| 2G | 0 | 40 | 60 |
| 2H | 0 | 30 | 70 |
| 2J | 0 | 20 | 80 |
| 2K | 0 | 10 | 90 |

1/ Basic crimp tool: M22520/1-01
Positioner: M22520/1-03(A).
Installing tool: M81969/18-01.
Removal tool: M81969/20-01.

2/ Basic crimp tool: TMDC16CX4 (Delphi Connection Systems).
Installing tool: M81969/17-04.
Removal tool: M81969/19-08.

Superseding data: See table III.

TABLE III. Superseded MS sheets to M28748 designator.

| MS sheet | Number of contacts | M28748/9 designator 1/ 2/ |
|---|---|---|
| Jackscrew | | Jackscrew |
| MS18155-1(N, V, W) | 10 | M28748/9(A or J)0(A, B, or C)L1Z |
| MS18155-1(X, Y, Z) | 10 | M28748/9(A or J)0(D, E, or F)L1Z |
| MS18157-1(N, V, W) | 20 | M28748/9(B or K)0(A, B, or C)L1Z |
| MS18157-1(X, Y, Z) | 20 | M28748/9(B or K)0(D, E, or F)L1Z |
| MS18159-1(N, V, W) | 36 | M28748/9(C or L)0(A, B, or C)L1Z |
| MS18159-1(X, Y, Z) | 36 | M28748/9(C or L)0(D, E, or F)L1Z |
| MS18161-1(N, V, W) | 52 | M28748/9(D or M)0(A, B, or C)L1Z |
| MS18161-1(X, Y, Z) | 52 | M28748/9(D or M)0(D, E, or F)L1Z |
| MS18163-1(N, V, W) | 80 | M28748/9(E or N)0(A, B, or C)L1Z |
| MS18163-1(X, Y, Z) | 80 | M28748/9(E or N)0(D, E, or F)L1Z |
| MS17778-1(N, V, W) | 104 | M28748/9(F or P)0(A, B, or C)L1Z |
| MS17778-1(X, Y, Z) | 104 | M28748/9(F or P)0(D, E, or F)L1Z |
| MS18165-1(N, V, W) | 158 | M28748/9(G or R)0(A, B, or C)L1Z |
| MS18165-1(X, Y, Z) | 158 | M28748/9(G or R)0(D, E, or F)L1Z |
| MS18157-1(N, V, W) | 212 | M28748/9(H or S)0(A, B, or C)L1Z |
| MS18157-1(X, Y, Z) | 212 | M28748/9(H or S)0(D, E, or F)L1Z |
| MS sheet jacksocket | Number of contacts | Jacksocket |
| MS18155-2(N, V, W) | 10 | M28748/9(A or J)0(A, B, or C)O1Z |
| MS18155-2(X, Y, Z) | 10 | M28748/9(A or J)0(D, E, or F)O1Z |
| MS18157-2(N, V, W) | 20 | M28748/9(B or K)0(A, B, or C)O1Z |
| MS18157-2(X, Y, Z) | 20 | M28748/9(B or K)0(D, E, or F)O1Z |
| MS18159-2(N, V, W) | 36 | M28748/9(C or L)0(A, B, or C)O1Z |
| MS18159-2(X, Y, Z) | 36 | M28748/9(C or L)0(D, E, or F)O1Z |
| MS18161-2(N, V, W) | 52 | M28748/9(D or M)0(A, B, or C)O1Z |
| MS18161-2(X, Y, Z) | 52 | M28748/9(D or M)0(D, E, or F)O1Z |
| MS18163-2(N, V, W) | 80 | M28748/9(E or N)0(A, B, or C)O1Z |
| MS18163-2(X, Y, Z) | 80 | M28748/9(E or N)0(D, E, or F)O1Z |
| MS17778-2(N, V, W) | 104 | M28748/9(F or P)0(A, B, or C)O1Z |
| MS17778-2(X, Y, Z) | 104 | M28748/9(F or P)0(D, E, or F)O1Z |
| MS18165-2(N, V, W) | 158 | M28748/9(G or R)0(A, B, or C)O1Z |
| MS18165-2(X, Y, Z) | 158 | M28748/9(G or R)0(D, E, or F)O1Z |
| MS18167-2(N, V, W) | 212 | M28748/9(H or S)0(A, B, or C)O1Z |
| MS18167-2(X, Y, Z) | 212 | M28748/9(H or S)0(D, E, or F)O1Z |
| MS sheet guide pin | Number of contacts | Guide pin |
| MS18155-3(N, V, W) | 10 | M28748/9(A or J)0(A, B, or C)G1Z |
| MS18155-3(X, Y, Z) | 10 | M28748/9(A or J)0(D, E, or F)G1Z |
| MS18157-3(N, V, W) | 20 | M28748/9(B or K)0(A, B, or C)G1Z |
| MS18157-3(X, Y, Z) | 20 | M28748/9(B or K)0(D, E, or F)G1Z |
| MS18159-3(N, V, W) | 36 | M28748/9(C or L)0(A, B, or C)G1Z |
| MS18159-3(X, Y, Z) | 36 | M28748/9(C or L)0(D, E, or F)G1Z |
| MS18161-3(N, V, W) | 52 | M28748/9(D or M)0(A, B, or C)G1Z |
| MS18161-3(X, Y, Z) | 52 | M28748/9(D or M)0(D, E, or F)G1Z |
| MS18163-3(N, V, W) | 80 | M28748/9(E or N)0(A, B, or C)G1Z |
| MS18163-3(X, Y, Z) | 80 | M28748/9(E or N)0(D, E, or F)G1Z |
| MS17778-3(N, V, W) | 104 | M28748/9(F or P)0(A, B, or C)G1Z |
| MS17778-3(X, Y, Z) | 104 | M28748/9(F or P)0(D, E, or F)G1Z |
| MS18165-3(N, V, W) | 158 | M28748/9(G or R)0(A, B, or C)G1Z |
| MS18165-3(X, Y, Z) | 158 | M28748/9(G or R)0(D, E, or F)G1Z |
| MS18167-3(N, V, W) | 212 | M28748/9(H or S)0(A, B, or C)G1Z |
| MS18167-3(X, Y, Z) | 212 | M28748/9(H or S)0(D, E, or F)G1Z |

See notes at end of table.

TABLE III. Superseded MS sheets to M28748 designator - Continued

| MS sheet<br>Guide socket | Number of contacts | M28748/9 designator 1/ 2/<br>Guide Socket |
|---|---|---|
| MS18155-4(N, V, W) | 10 | M28748/9(A or J)0(A, B, or C)B1Z |
| MS18155-4(X, Y, Z) | 10 | M28748/9(A or J)0(D, E, or F)B1Z |
| MS18157-4(N, V, W) | 20 | M28748/9(B or K)0(A, B, or C)B1Z |
| MS18157-4(X, Y, Z) | 20 | M28748/9(B or K)0(D, E, or F)B1Z |
| MS18159-4(N, V, W) | 36 | M28748/9(C or L)0(A, B, or C)B1Z |
| MS18159-4(X, Y, Z) | 36 | M28748/9(C or L)0(D, E, or F)B1Z |
| MS18161-4(N, V, W) | 52 | M28748/9(D or M)0(A, B, or C)B1Z |
| MS18161-4(X, Y, Z) | 52 | M28748/9(D or M)0(D, E, or F)B1Z |
| MS18163-4(N, V, W) | 80 | M28748/9(E or N)0(A, B, or C)B1Z |
| MS18163-4(X, Y, Z) | 80 | M28748/9(E or N) 0(D, E, or F)B1Z |
| MS17778-4(N, V, W) | 104 | M28748/9(F or P)0(A, B, or C)B1Z |
| MS17778-4(X, Y, Z) | 104 | M28748/9(F or P)0(D, E, or F)B1Z |
| MS18165-4(N, V, W) | 158 | M28748/9(G or R)0(A, B, or C)B1Z |
| MS18165-4(X, Y, Z) | 158 | M28748/9(G or R)0(D, E, or F)B1Z |
| MS18167-4(N, V, W) | 212 | M28748/9(H or S)0(A, B, or C)B1Z |
| MS18167-4(X, Y, Z) | 212 | M28748/9(H or S)0(D, E, or F)B1Z |

1/ Reference PIN code for insert and polarization options.
2/ PIN constructed represent complete connectors without contacts.

CONCLUDING MATERIAL

Custodians:
Army - CR
Navy - EC
Air Force - 11
DLA -CC

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

Preparing activity:
DLA - CC

(Project 5935-4515-01)