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## PRIMARY QUALIFICATION TEST REPORT ABSTRACT FOR SWING-ARM BACKSHELL

REPORT NO. GT-06-08 ABSTRACT



90°, 45°, and Straight  
Swing-Arm Orientations

PREPARED BY: \_\_\_\_\_

A handwritten signature in black ink, appearing to read 'Meghan Taylor'.

Meghan Taylor

DATE: 02/15/2022

UPDATED BY: \_\_\_\_\_

A handwritten signature in black ink, appearing to read 'Meghan Taylor'.

DATE: 2/24/2023

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1.0 Product Description/Application

The Glenair Swing-Arm Backshell strain relief clamp and EMI shield termination with strain relief are circular connector strain relief accessories intended for application on aerospace equipment, tactical military equipment, and harsh environment commercial equipment. Swing-Arm products have an articulating arm that allows the Backshell to quickly adjust and lock into three positions—straight, 45°, and 90°. Made of injection-molded, high temperature thermoplastic composite Ultem (PEI) reinforced with fiber glass, the Swing-Arm is available as a strain relief clamp, or in two EMI shield sock options: nickel-plated copper braid or metalized composite thermoplastic braid.

1.1 Purpose

Testing was performed on Glenair Swing-Arm Backshell strain relief clamps and EMI shield terminations with strain relief to determine its conformance to specified performance requirements.

1.2 Scope

This report summarizes the electrical, mechanical, and environmental performance testing of Glenair Swing-Arm Backshell strain relief clamps and EMI shield terminations with strain relief. The information in this report was obtained from tests conducted by the providers listed below. The documents listed below are on file at Glenair and are available upon request.

| Applicable Test Reports                                |                                |                                  |
|--------------------------------------------------------|--------------------------------|----------------------------------|
| Test Report Number                                     | Provider                       | Date Tested                      |
| 576-4617                                               | National Testing Systems (NTS) | November 11, 2005                |
| LT-06-2613                                             | Lightning Technologies         | March 20, 2006                   |
| D022Z001-03 Rev NEW                                    | Boeing Company                 | April 25, 2005                   |
| GT-06-08                                               | Glenair Inc.                   | July 19 and 27, 2006             |
| OC17901-1112713B<br>OC18631-1013308<br>OC18461-0713174 | Environment Associates         | October 16 and November 17, 2006 |

1.3 Conclusion

Glenair Swing-Arm Backshell strain relief clamps and EMI shield terminations with strain relief has been shown to be capable of meeting specified performance requirements.



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1.4 Test Specimen

| Test Specimen Descriptions                                                                       |             |
|--------------------------------------------------------------------------------------------------|-------------|
| Description                                                                                      | Part Number |
| 38999 Series III, shell size 11, electroless nickel interface                                    | 319HxxxXO11 |
| 38999 Series III, shell size 17, electroless nickel interface                                    | 319HxxxXO17 |
| 38999 Series III, shell size 25, electroless nickel interface                                    | 319HxxxXO25 |
| Shell size 10, interface I.A.W AS85049 Figure 4A, cadmium/electroless nickel selectively plated  | 319AxxxXN10 |
| Shell size 16, interface I.A.W AS85049 Figure 4A, cadmium/electroless nickel selectively plated  | 319AxxxXN16 |
| Shell size 124, interface I.A.W AS85049 Figure 4A, cadmium/electroless nickel selectively plated | 319AxxxXN24 |
| 38999 Series III, shell size 11 strain relief clamp                                              | 627HxxxXO11 |
| 38999 Series III, shell size 17 strain relief clamp                                              | 627HxxxXO17 |
| 38999 Series III, shell size 25 strain relief clamp                                              | 627HxxxXO25 |

1.5 Inspection Procedure

All tests were performed with the test specimen at standard laboratory conditions and within procedural parameters as defined below.

1. Temperature between 15°C and 35°C
2. Relative humidity: Room ambient up to 90% maximum
3. Barometric pressure between 711 and 813 mm of mercury absolute



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## 2.0 Qualification Test Summary

| Preparation of Specimens |                                   |                   |                                                                               |                                       |                       |
|--------------------------|-----------------------------------|-------------------|-------------------------------------------------------------------------------|---------------------------------------|-----------------------|
| Group                    |                                   | Specimen          | Connector                                                                     | Cable Type                            | Solder Sleeve Pigtail |
| 1                        |                                   | 319H***XO**       | NONE                                                                          | NONE                                  | N/A                   |
| 2, 3                     |                                   | 319H***XO**       | Dummy Test Connector<br>AT44H( )XM<br>Composite / Nickel Finish               | MS27500-<br>20SB2T23 OR<br>Equivalent | TIN                   |
| 2, 3                     |                                   | 319H***XO**       | Dummy Test Connector<br>AT44IH( )ZM<br>Stainless Steel / Nickel Finish        | MS27500-<br>20SB2T23 OR<br>Equivalent | TIN                   |
| 2, 3                     |                                   | 319A***XN**       | Dummy Test Connector<br>AT439BA( )NF<br>Aluminum / Cadmium Finish             | MS27500-<br>20SB2T23 OR<br>Equivalent | TIN                   |
| 4                        | HYDROLYTIC STABILITY              | 627H***XO**       | NONE                                                                          | NONE                                  | NONE                  |
|                          | FLUID RESISTANCE                  | 319HXO**          | D38999/2( )M or Equivalent<br>Mil-DTL-38999 Series III<br>Composite Connector | NONE                                  | NONE                  |
|                          | FLAMMABILITY, SMOKE, AND TOXICITY | Coupons (Samples) | NONE                                                                          | NONE                                  | NONE                  |
|                          | INDIRECT LIGHTNING STRIKE         | 319H**XO***       | Dummy Test Connector<br>AT44IH( )ZM<br>Stainless Steel / Nickel Finish        | MS27500-<br>20SB2T23 OR<br>Equivalent | TIN                   |

| Test Summary Groups |                                                                                            |         |         |         |                                                                                       |         |         |                                                         |
|---------------------|--------------------------------------------------------------------------------------------|---------|---------|---------|---------------------------------------------------------------------------------------|---------|---------|---------------------------------------------------------|
| Product             | Swing-Arm Backshell EMI Shield Termination Strain Relief for Mil-DTL-38999 Series III & IV |         |         |         | Swing-Arm Backshell EMI Shield Termination Strain Relief for I.A.W. AS85049 Figure 4A |         |         | Swing-Arm Backshell Strain Relief for Series III and IV |
| Part Number         | Group 1                                                                                    | Group 2 | Group 3 | Group 4 | Group 1                                                                               | Group 2 | Group 4 | Group 4                                                 |
| 319HxxxXO11         | 2                                                                                          | 4       | 2       | 1       |                                                                                       |         |         |                                                         |
| 319HxxxXO17         | 2                                                                                          | 4       | 2       | 1       |                                                                                       |         |         |                                                         |
| 319HxxxXO25         | 2                                                                                          | 4       | 1       | 1       |                                                                                       |         |         |                                                         |
| 319AxxxXN10         |                                                                                            |         |         |         | 1                                                                                     | 1       | 1       |                                                         |
| 319AxxxXN16         |                                                                                            |         |         |         | 1                                                                                     | 1       | 1       |                                                         |
| 319AxxxXN24         |                                                                                            |         |         |         | 1                                                                                     | 2       | 1       |                                                         |
| 627HxxxXO11         |                                                                                            |         |         |         |                                                                                       |         |         | 1                                                       |
| 627HxxxXO17         |                                                                                            |         |         |         |                                                                                       |         |         | 1                                                       |
| 627HxxxXO25         |                                                                                            |         |         |         |                                                                                       |         |         | 1                                                       |



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| Test Sequence                            |                                                                                                     |         |         |   |                                                                                                |         |         |                                                                  |
|------------------------------------------|-----------------------------------------------------------------------------------------------------|---------|---------|---|------------------------------------------------------------------------------------------------|---------|---------|------------------------------------------------------------------|
| Product                                  | Swing-Arm Backshell EMI<br>Shield Termination Strain<br>Relief for Mil-DTL-38999<br>Series III & IV |         |         |   | Swing-Arm Backshell EMI<br>Shield Termination Strain<br>Relief for I.A.W.<br>AS85049 Figure 4A |         |         | Swing-Arm<br>Backshell<br>Strain Relief for<br>Series III and IV |
| Test                                     | Test Group                                                                                          |         |         |   | Test Group                                                                                     |         |         | Test Group                                                       |
|                                          | 1                                                                                                   | 2       | 3       | 4 | 1                                                                                              | 2       | 3       | 4                                                                |
|                                          | Test Sequence                                                                                       |         |         |   | Test Sequence                                                                                  |         |         | Test Sequence                                                    |
| Braid Retention                          | 9                                                                                                   |         |         |   | 9                                                                                              |         |         |                                                                  |
| Corrosion Resistance (salt<br>spray)     | 6                                                                                                   |         | 4       |   | 6                                                                                              |         | 4       |                                                                  |
| Coupling Thread Strength                 | 5                                                                                                   |         |         | 2 | 5                                                                                              |         |         | 2                                                                |
| External Bending Moment                  | 8                                                                                                   |         |         |   | 8                                                                                              |         |         |                                                                  |
| Flammability                             |                                                                                                     |         |         |   |                                                                                                |         |         | 6                                                                |
| Fluid Resistance                         |                                                                                                     |         |         |   |                                                                                                |         |         | 5                                                                |
| Hydrolytic Stability<br>(composite only) |                                                                                                     |         |         | 3 |                                                                                                |         |         | 3                                                                |
| Indirect Lightning Strike                |                                                                                                     |         |         |   |                                                                                                |         |         | 4                                                                |
| Life Cycling                             | 4                                                                                                   |         |         |   | 4                                                                                              |         |         |                                                                  |
| Magnetic Permeability                    | 2                                                                                                   |         |         |   | 2                                                                                              |         |         |                                                                  |
| Screw Hardware Durability                |                                                                                                     | 3, 10   |         |   |                                                                                                | 3, 10   |         |                                                                  |
| Shell Conductivity                       | 3, 7                                                                                                | 2, 5, 9 | 2, 5, 7 |   | 3, 7                                                                                           | 2, 5, 9 | 2, 5, 7 |                                                                  |
| Shock                                    |                                                                                                     | 7       |         |   |                                                                                                | 7       |         | 7                                                                |
| Smoke                                    |                                                                                                     |         |         |   |                                                                                                |         | 3       |                                                                  |
| Temperature Cycling                      |                                                                                                     | 4       | 3       |   |                                                                                                | 4       |         |                                                                  |
| Toxicity                                 |                                                                                                     |         |         |   |                                                                                                |         |         | 8                                                                |
| Vibration                                |                                                                                                     | 6       |         |   |                                                                                                | 6       |         |                                                                  |
| Visual and mechanical<br>examination     | 1, 10                                                                                               | 1, 8    | 1, 6    | 1 | 1                                                                                              | 1, 8    | 1, 6    | 1, 4                                                             |

## 3.0 Qualification Testing Details

### 3.1 **Initial examination of product**

All specimens submitted for testing were representative of standard production lots. All specimens were accepted by Glenair Quality Assurance prior to submittal to testing. Testing agencies visually examined specimens for mechanical damage, workmanship, and markings.

### 3.2 **Braid Retention**

#### 3.2.1 Test Method

Backshell shall be tested for braid retention to a tensile load of 50 pounds minimum for shell sizes 9-16 and 100 pounds minimum for shell sizes 17-28. Backshell shall be mounted to a suitable fixture and the load shall be applied for 15 seconds minimum.



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3.2.2 Requirement

When tested as specified, the braid shall not pull out nor shall slippage exceed 0.025 inch. Breakage of braid shall not be considered a failure.

3.2.3 Results

Braid did not pull out on any of the test samples and slippage did not exceed 0.025 inch.

3.2.4 Test Anomalies/Deviations

N/A

3.3 **Corrosion Resistance (Salt Spray)**

3.3.1 Test Method

Backshells shall be tested in accordance with EIA 364-026. The samples shall not be mounted but shall be suspended from the top of the chamber using waxed twine or strong, glass rods, or glass cord.

Salt Spray – Composite Backshells – Component Level

The duration for the test for unassembled backshells shall be 1000 hours.

Salt Spray – System Level

Backshells shall be assembled to connectors with shielded wire terminated to Shield Sock. Test sample sizes shall be configured as shown in Figure 1 in Section 3.5.2 below. The duration of the test shall be 500 hours.

3.3.2 Requirement

Salt Spray – Component Level

When tested, backshell shield sock and interface ring shall not exhibit excessive corrosion or exposure of base material detrimental to normal operation of the backshell. Backshells without connectors or wire shall be tested to the component level tests.

Salt Spray – System Level

When tested, cable shield connection points, backshell shield sock and interface ring shall not exhibit excessive corrosion exposure of base material detrimental to normal operation of the backshell. Backshells installed on specimens that terminate shields shall be tested to the system level tests.

3.3.3 Results

No excessive corrosion or exposure of base material detrimental to normal operation of the test samples.



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3.3.4 Test Anomalies/Deviations  
N/A

3.4 **Coupling Thread Strength**

3.4.1 Test Method

A counterpart connector or dummy connector shall be mounted in a suitable fixture. The backshell shall be threaded onto the fixture and a torque wrench used to apply the coupling thread strength torque as indicated in the table below at a rate of approximately 10 inch pounds per second. The required load shall be held for one minute minimum.

| Coupling Thread Strength |                                                 |       |                                      |       |
|--------------------------|-------------------------------------------------|-------|--------------------------------------|-------|
| Shell Size               | Coupling Installation Torque<br>± 5 Inch Pounds |       | Coupling Strength<br>± 5 Inch Pounds |       |
|                          | Composite                                       | Steel | Composite                            | Steel |
| 8 thru 11                | 35                                              | 85    | 45                                   | 100   |
| 12 thru 19               | 40                                              | 120   | 50                                   | 150   |
| 20 thru 28               | 80                                              | 165   | 100                                  | 200   |

3.4.2 Requirement

When tested, backshell coupling threads shall withstand the torque specified without damage. The coupling threads shall be inspected with 3 times magnification for damage.

3.4.3 Results

Test samples were subjected to visual examination with 3X magnification. There was no visible evidence of physical damage noted.

3.4.4 Test Anomalies/Deviations  
N/A

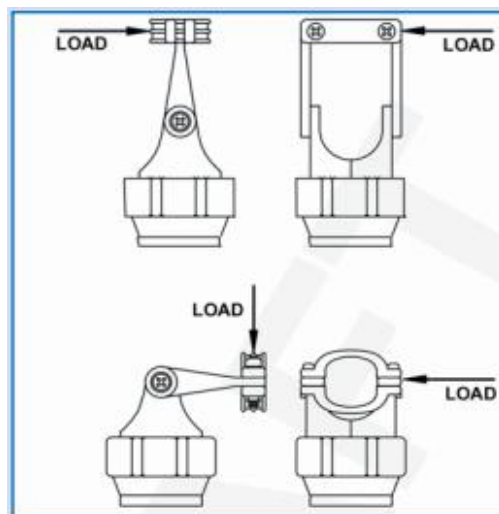
3.5 **External Bending Moment**

3.5.1 Test Method

The backshell shall be mounted to a receptacle or a plug as required. A dummy receptacle or fixture simulating a mated connector pair may be used to perform the test. The receptacle or fixture shall be mounted to a rigid surface to resist deflection. A load shall be applied to the backshell in two axes 90° apart as shown in Figure 1 below. The load shall be as indicated in the table below and shall be applied at a rate of approximately 10 pounds per second until the required load is achieved. The applied load shall be held for 1 minute.

| External Bending Moment Load |                   |     |
|------------------------------|-------------------|-----|
| Shell Size                   | Load (pounds min) |     |
|                              | Straight          | 90° |
| 8 and 9                      | 15                | 20  |
| 10 and 11                    | 25                | 30  |
| 12 and 13                    | 25                | 30  |
| 14 and 5                     | 30                | 40  |
| 16 and 17                    | 40                | 50  |
| 18 and 19                    | 40                | 50  |
| 20 and 21                    | 40                | 50  |
| 22 and 23                    | 40                | 50  |
| 24 and 25                    | 50                | 50  |
| 28                           | 50                | 60  |

Figure 1 External Bending Moment



### 3.5.2 Requirement

When tested, the backshells shall show no evidence of damage detrimental to their normal operation

### 3.5.3 Results

No visible damage to the normal operation of the test samples noted.

### 3.5.4 Test Anomalies/Deviation

N/A





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### 3.6 Flammability

#### 3.6.1 Test Method

Non-metallic materials considered for use in items covered by this specification shall be tested under the 12-second ignition vertical method.

#### 3.6.2 Requirement

Materials used in items covered by this specification shall be materials that do not sustain combustion when tested as specified.

#### 3.6.3 Results

Backshells passed test requirements as shown below.

| Flammability Test Results |                     |          |                        |            |                          |          |
|---------------------------|---------------------|----------|------------------------|------------|--------------------------|----------|
| Sample No.                | Exiting Time (secs) |          | Burned Length (inches) |            | Drip Exiting Time (secs) |          |
|                           | Max allowed         | Actual   | Max allowed            | Actual     | Max allowed              | Actual   |
| 1                         | 15                  | 0        | 8                      | 0.4        | 5                        | No drip  |
| 2                         | 15                  | 0        | 8                      | 0.2        | 5                        | No drip  |
| 3                         | 15                  | 0        | 8                      | 0.4        | 5                        | No drip  |
| <b>Average</b>            | <b>15</b>           | <b>0</b> | <b>8</b>               | <b>0.3</b> | <b>5</b>                 | <b>0</b> |

#### 3.6.4 Test Anomalies/Deviations

N/A

### 3.7 Fluid Resistance

#### 3.7.1 Test Method

The test shall be performed in accordance with EIA-364, Test Procedure 10, using the fluids defined in the table below.



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**Fluid Resistance Results**

| Test Fluid                                                | Test Cycle (Times ± 10 percent) |              |                |                  |           | Number of Cycles |
|-----------------------------------------------------------|---------------------------------|--------------|----------------|------------------|-----------|------------------|
|                                                           | Test Fluid Temperature          |              | Drainage Time  | Oven Cure, Mated |           |                  |
|                                                           | Temp ±3°C                       | Time Minutes | Free Air Hours | Time Hours       | Temp ±3°C |                  |
| BMS 3-11 Type IV, Class 1 Hydraulic Fluid, Fire Resistant | 70                              | 5            | 1              | 6                | 100       | 7                |
| Isopropyl Alcohol                                         | 23                              | 5            | 24             | --               | --        | 5                |
| Methyl Propyl Ketone, BMS11-9, Grade 1                    | 23                              | 5            | 1              | --               | --        | 7                |
| Anti-Icing Fluid                                          | 23                              | 60           | 1              | 6                | 100       | 7                |
| Lubricating Oil, MIL-PRF-23699                            | 120                             | 5            | 1              | 6                | 125       | 7                |
| Alkaline Detergent, pH 10.0-10.5                          | 23                              | 5            | 1              | 6                | 100       | 7                |
| Fuel Jet A, ASTM D 1655                                   | 23                              | 5            | 1              | 6                | 55        | 7                |
| Hydraulic Fluid, MIL-PRF-5606                             | 70                              | 5            | 1              | 6                | 100       | 7                |
| Hydraulic Fluid, MIL-PRF-87257                            | 70                              | 5            | 1              | 6                | 100       | 7                |
| Dow Frost 60 Heat Transfer Fluid                          | 23                              | 5            | 1              | 6                | 100       | 7                |
| Potassium Formate Runway De-icer                          | 23                              | 5            | 1              | 6                | 55        | 7                |

**3.7.2 Requirement**

When tested, the test sample shall show no evidence of damage that will affect performance. Any evidence of cracking, loosening of parts, or missing parts shall be cause for rejection.

**3.7.3 Results**

Backshells meet the requirements of the fluid immersion qualification test for composite connectors and backshells, except as noted in 3.7.4 Test Anomalies/Deviations below.

**3.7.4 Test Anomalies/Deviations**

The backshells were visually examined per the final examination requirements in section 4.2, D022Z001-01 and section 7.0, Z43S0-WAB. 5X magnification maximum was allowed during the final examination.

The following visual observations were noted: Test article #01, which was soaked in BMS 3-11, type IV, class 1 hydraulic fluid, fire resistant, was missing the part number and date code that was stamped on each of the backshells.

On test article #04, which was soaked in heat transfer fluid, Dow Frost 60, the backshell from the receptacle connector side appears to have a crack around the tightening portion. It was determined that the backshell had cracked before testing. Therefore, a new backshell was used to retest the Dow Frost 60 fluid. The retest passed all requirements.



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**3.8 Hydrolytic Stability**

**3.8.1 Test Method**

Composite backshells shall be tested for water absorption in accordance with ASTM D 570, paragraph 7.4, long term immersion.

**3.8.2 Requirement**

When tested, there shall be no increase in weight greater than 5%. Backshells shall meet the coupling thread strength requirements.

**3.8.3 Results**

All samples met coupling strength requirements. The average two-week weight gain for all samples was less than 1%.

**3.8.4 Test Anomalies/Deviations**

N/A

**3.9 Indirect Lightning Strike**

**3.9.1 Test Method**

Th backshell shall be tested as specified per EIA-364-75, Waveform 5B for the ability to conduct lightning currents except as follows:

Time T1 shall be 50  $\mu$ sec +20 percent

Time T2 shall be 500  $\mu$ sec +20 percent

Test level shall be 6,000 Amps. Ten positive polarity transients shall be applied followed by ten negative polarity transients. The time between individual transients is not critical. All transients shall be applied at the applicable peak amplitude level.

**3.9.2 Requirement**

The objective of this test is to ensure that the composite backshell does not show any evidence of damage that would prevent proper functioning of the connector assembly. Backshells shall be tested for the ability to conduct indirect lightning currents through the metallic finish without damaging the base materials or causing the metallic finish to blister or char. The parts should be visually inspected for any damage to the metallic plating. There shall be no evidence of blistering or charring. The backshell shall also be inspected to ensure that the thermoplastic material was not damaged by the thermal energy developed during testing.

**3.9.3 Results**

No sign of physical damage to the connector was observed after the completion of the lightning tests. Bonding resistance decreased after transients had been applied to the connector.



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3.9.4 Test Anomalies/Deviation  
N/A

3.10 **Life Cycling**

3.10.1 Test Methods

Backshells shall be coupled and uncoupled from their connectors 10 cycles at a coupling thread strength torque followed by 10 cycles at coupling installation torque as shown in the table below.

3.10.2 Requirement

After being subjected to the test specified, backshells shall pass succeeding tests. The backshells shall show no evidence of damage detrimental to normal operation.

3.10.3 Results

All samples passed test requirements as indicated in the table below.

| Life Cycling Results |                                             |                                                 |        |
|----------------------|---------------------------------------------|-------------------------------------------------|--------|
| Part Number          | Coupling Thread Strength $\pm 5$ inch pound | Coupling Installation Torque $\pm 5$ inch pound | Result |
| 319HxxxXO11          | 45                                          | 35                                              | PASSED |
| 319HxxxXO11          | 45                                          | 35                                              | PASSED |
| 319HxxxXO17          | 50                                          | 45                                              | PASSED |
| 319HxxxXO17          | 50                                          | 45                                              | PASSED |
| 319HxxxXO25          | 100                                         | 80                                              | PASSED |
| 319HxxxXO25          | 100                                         | 80                                              | PASSED |
| 319AxxxXN10          | 45                                          | 35                                              | PASSED |
| 319AxxxXN16          | 50                                          | 45                                              | PASSED |
| 319AxxxXN24          | 100                                         | 80                                              | PASSED |

3.10.4 Test Anomalies/Deviations  
N/A

3.11 **Magnetic Permeability**

3.11.1 Test Methods

The relative permeability shall be tested in accordance with EIA-364-54

3.11.2 Requirement

When tested as specified, the relative permeability of the backshell shall be less than 2.0Mu for the composite and less than 5.0Mu for stainless steel.

3.11.3 Results

All samples met the test requirements.

3.11.4 Test Anomalies/Deviations  
N/A



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### 3.12 Screw Hardware Durability

#### 3.12.1 Test Method

The saddle clamp screws, and the swing arm pivot screws shall be installed into and removed from their respective nut 15 times. Parts were retested following six additional test procedures.

#### 3.12.2 Requirement

The locking capability values recorded of the saddle nuts and swing arm pivot nuts shall not be greater than the maximum locking torque nor less than the minimum breakaway torque specified in the table below. The backshells shall show no evidence of damage detrimental to normal operation.

| Self Locking Nut Torque |                                         |                                           |
|-------------------------|-----------------------------------------|-------------------------------------------|
| Screw Size              | Maximum Locking Torque<br>(inch pounds) | Minimum Breakaway Torque<br>(inch pounds) |
| 4                       | 5                                       | 0.5                                       |
| 6                       | 10                                      | 1.0                                       |
| 8                       | 15                                      | 1.5                                       |
| 10                      | 18                                      | 2.0                                       |

#### 3.12.3 Results

Samples were visually examined following the initial and subsequent tests. There was no visible evidence of damage detrimental to normal operation of the test samples.

#### 3.12.4 Test Anomalies/Deviations

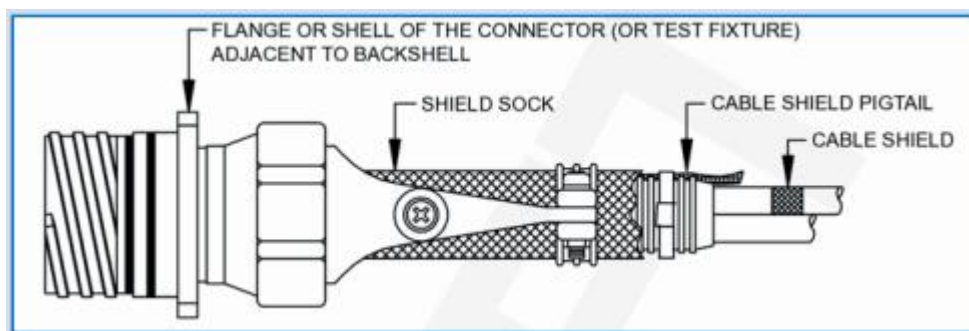
N/A

### 3.13 Shell Conductivity

#### 3.13.1 Test Method

Shell conductivity shall be measured with an applied potential of 1.5 volts maximum. A resistance shall be in series with the test circuit to limit the current to .100 ampere  $\pm$ .010. Measurement locations are shown in Figure 2 below. For the component level test, measurements shall be made from the shield sock to the connector shell. For the system level test, measurements shall be made from the cable shield or cable shield pigtail to the connector shell as shown in Figure 2 below. Samples are tested twice or three times within the test sequence of each group 1, 2, and 3.

Figure 2 Test Measurement Points



### 3.13.2 Requirement

#### Shell Conductivity – Component Level

When tested as specified, the resistance between the backshell shield sock and the connector shall not exceed 2.5 milliohm for composite backshells and 5.0 milliohm for stainless steel backshells.

#### Shell Conductivity – System Level

When tested as specified, the resistance between the cable shield and the connector shall be measured, recorded, and submitted in the qualification test report.

### 3.13.3 Results

Shell conductivity was less than 2.5 mΩ on all test samples.

### 3.13.4 Test Anomalies/Deviations

On the third retest of Group 2, two backshells failed as a result of a technician repositioning the swing arms without loosening clamp saddle screws. Glenair added a notation to the relevant assembly procedures to caution that saddle clamp screws must be loosened prior to repositioning.

## 3.14 **Shock**

### 3.14.1 Test Method

A counterpart receptacle connector, mounted on a suitable fixture, shall be attached to the shock machine. The wired mating plug connector and backshell shall be engaged to the receptacle connector by normal locking means. The cable shall be clamped to a fixed point at least 8 inches from the rear of the backshell. The assembly shall be subjected to the shock test requirements of EIA 364-27, Condition C, calling for 3 shocks in the positive direction, 3 shocks in the negative direction, repeated in each of three axes for a total of 18 shocks per specimen. Monitoring for discontinuity is not required.

### 3.14.2 Requirement

When tested as specified, backshells shall not be damaged, nor should there be any loosening of parts.



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3.14.3 Results

Samples passed the requirements of EIA 364-27, Condition C with no anomalies noted.

3.14.4 Test Anomalies/Deviations

N/A

3.15 **Smoke**

3.15.1 Test Method

ASTM F814-83

3.15.2 Requirement

Materials used in items covered by this specification, when tested in accordance with ASTM F814-83, shall not emit smoke having Specific Optical Density (DS) of 200 or more, as specified.

3.15.3 Results

Average results below show no emissions of smoke density at or above Specific Optical Density (DS) of 200.

| Specific Optical Density (DS) |                     |      |      |      |       |       |                              |                 |
|-------------------------------|---------------------|------|------|------|-------|-------|------------------------------|-----------------|
| Specimen No.                  | ----- Minutes ----- |      |      |      |       |       | Max in 1 <sup>st</sup> 4 min | Time of Maximum |
|                               | 1:00                | 1:50 | 2:00 | 3:00 | 4:00  | 5:00  |                              |                 |
| 1                             | 0.10                | 0.74 | 1.72 | 6.62 | 15.38 | 32.74 | 15.38                        | 4.00            |
| 2                             | 0.73                | 0.92 | 1.63 | 3.07 | 5.45  | 8.75  | 5.45                         | 4.00            |
| 3                             | 0.24                | 0.73 | 1.25 | 2.98 | 5.97  | 12    | 5.97                         | 4.00            |
| AVG:                          | 0.36                | 0.80 | 1.53 | 4.22 | 8.93  | 17.67 | 8.93                         | 4.00            |
| Sid Dev                       | 0.33                | 0.11 | 0.25 | 2.07 | 5.59  | 13.12 | 5.59                         |                 |

3.15.4 Test Anomalies/Deviations

N/A

3.16 **Temperature Cycling (composite only)**

3.16.1 Test Method

Composite backshells shall be tested in accordance with EIA 364-32, Condition I, 5 cycles, except that steps 2 and 4 shall be of 2 minutes maximum duration. The temperature of step 1 shall be -65 +0, -5°C and the temperature of step 3 shall be 200 +5, -0°C.

3.16.2 Requirement

When tested as specified, there shall be no blistering, peeling, or separation of plating, or other damage detrimental to the normal operation of the backshell.

3.16.3 Results

Samples were visually examined following tests. There was no visible evidence of damage detrimental to normal operation of the test samples.



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3.16.4 Test Anomalies/Deviations

N/A

3.17 **Toxicity**

3.17.1 Test Method

Ion chromatography as specified.

3.17.2 Requirement

Materials used in backshells, or other parts covered by this specification shall liberate only non-toxic fumes when tested as specified. The average value of toxic gas emissions in parts per million (PPM) after four minutes shall not exceed the values indicated in the table below.

3.17.3 Results

| Toxicity Results |                       |              |
|------------------|-----------------------|--------------|
| Component        | Maximum Allowed (PPM) | Actual (PPM) |
| HCN              | 150                   | 2.0          |
| HF               | 200                   | 1.0          |
| HCL              | 500                   | 1.0          |
| SO <sub>2</sub>  | 100                   | -            |
| NO <sub>x</sub>  | 100                   | -            |

3.17.4 Test Anomalies/Deviations

N/A

3.18 **Vibration**

3.18.1 Test Method

The backshell shall be tested in accordance with EIA 364-28, Condition VI, test condition letter I (AS85049 Medium Duty). The duration of the test shall be 8 hours in the longitudinal direction and 8 hours in the perpendicular direction. Parts were tested at maximum installed torque and recommended torque values.

3.18.2 Requirements

When tested as specified, the test sample shall show no evidence of damage that will affect performance. Any evidence of cracking, loosening of parts, or missing parts shall be cause for rejection. Monitoring for electrical continuity shall not be used for pass/fail criteria.

3.18.3 Results

Samples met the requirements of EIA 364-28, Condition VI, at maximum intalled torque and recommended values, with no anomalies noted.





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| Life Cycling Results |               |                                    |                      |        |
|----------------------|---------------|------------------------------------|----------------------|--------|
| Part Number          | Sample Number | Minimum (recommended) Torque Value | Maximum Torque Value | Result |
| 319HxxxXO11          | 001           |                                    | 35                   | PASSED |
| 319HxxxXO11          | 002           |                                    | 35                   | PASSED |
| 319HxxxXO11          | 13A           | 25                                 |                      | PASSED |
| 319HxxxXO11          | 14A           | 25                                 |                      | PASSED |
| 319HxxxXO17          | 006           |                                    | 45                   | PASSED |
| 319HxxxXO17          | 007           |                                    | 45                   | PASSED |
| 319HxxxXO17          | 15A           | 30                                 |                      | PASSED |
| 319HxxxXO17          | 16A           | 30                                 |                      | PASSED |
| 319HxxxXO25          | 008           |                                    | 80                   | PASSED |
| 319HxxxXO25          | 009           |                                    | 80                   | PASSED |
| 319HxxxXO25          | 17A           | 35                                 |                      | PASSED |
| 319HxxxXO25          | 18A           | 35                                 |                      | PASSED |
| 319AxxxXN10          | 022           |                                    | 35                   | PASSED |
| 319AxxxXN16          | 021           |                                    | 45                   | PASSED |
| 319AxxxXN24          | 020           |                                    | 80                   | PASSED |
| 319AxxxXN24          | 023           |                                    | 80                   | PASSED |

3.18.4 Test Anomalies/Deviation  
N/A

3.19 **Visual and Mechanical Examination**

3.19.1 Test Methods

Backshells shall be examined to ensure conformance with all requirements of this specification and the applicable detail documents. Examination shall be performed to ensure compliance with dimensions, materials, and identification markings.

3.19.2 Requirement

Backshells shall be examined as specified

3.19.3 Results

Observations are shown in the table below. Markings on all test samples were legible. Note that group 3 samples were subjected to 500 hours salt spray prior to visual examination



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## **Visual and Mechanical Examination Results**

| Part Number | Group | Sample Number | Observations                                                                                                                                              |
|-------------|-------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| 319HxxxXO11 | 1     | 011           | None                                                                                                                                                      |
| 319HxxxXO11 | 1     | 012           | Minor stains (after salt spray)                                                                                                                           |
| 319HxxxXO17 | 1     | 013           | None                                                                                                                                                      |
| 319HxxxXO17 | 1     | 014           | Minor stains (after salt spray)                                                                                                                           |
| 319HxxxXO25 | 1     | 015           | Traces of stains (after salt spray)                                                                                                                       |
| 319HxxxXO25 | 1     | 016           | Minor stains (after salt spray)                                                                                                                           |
| 319AxxxXN10 | 1     | 017           | Traces of stains—white deposit on mating receptacle (after salt spray)                                                                                    |
| 319AxxxXN16 | 1     | 018           | Minor stains (after salt spray)                                                                                                                           |
| 319AxxxXN24 | 1     | 019           | Minor stains—some exposure of base metal on mating receptacle (after salt spray)                                                                          |
| 319HxxxXO11 | 2     | 001           | None                                                                                                                                                      |
| 319HxxxXO11 | 2     | 002           | None                                                                                                                                                      |
| 319HxxxXO17 | 2     | 006           | None                                                                                                                                                      |
| 319HxxxXO17 | 2     | 007           | Swing-Arm screw loose due to ultra-sonic insert fastening to the arm. Testing anomaly.                                                                    |
| 319HxxxXO25 | 2     | 008           | None                                                                                                                                                      |
| 319HxxxXO25 | 2     | 009           | None                                                                                                                                                      |
| 319AxxxXN24 | 2     | 020           | Shield sock separated from coupling ring due to test technician repositioning Swing-Arm without loosening saddle screw.                                   |
| 319AxxxXN16 | 2     | 021           | None                                                                                                                                                      |
| 319AxxxXN10 | 2     | 022           | None                                                                                                                                                      |
| 319AxxxXN24 | 2     | 023           | Swing-Arm screw insert loose. Partial separation of shield sock from coupling ring. Both due to ultra-sonic insert fastening to the arm. Testing anomaly. |
| 319HxxxXO25 | 3     | 01A           | Minor corrosion of pivot arm and clamp screws.                                                                                                            |
| 319AxxxXN16 | 3     | 02A           | Minor corrosion of pivot arm and clamp screws.                                                                                                            |
| 319AxxxXN10 | 3     | 03A           | Minor corrosion of pivot arm and clamp screws.                                                                                                            |
| 319HxxxXO11 | 3     | 003           | Minor discoloration of Swing-Arm screws. Shield sock and mating shell show minor stains.                                                                  |
| 319HxxxXO17 | 3     | 005           | Minor discoloration of Swing-Arm screws and saddle clamp screws. Shell discolored.                                                                        |
| 319AxxxXN24 | 3     | 010           | Stains on Sing-Arm and saddle clamp screws.                                                                                                               |
| 319HxxxXO11 | 3     | 028           | Minor discoloration of saddle clamp screws. Shield sock stained, minor stains on mating shell.                                                            |
| 319HxxxXO17 | 3     | 029           | Stain on Swing-Arm screws. Mating shell discolored. Minor discoloration on shield sock.                                                                   |
| 319HxxxXO25 | 3     | 030           | Swing-Arm screws and saddle clamp screws discolored. Some local deposit (evidence of leaching) near coupling nut. Mating shell discolored.                |

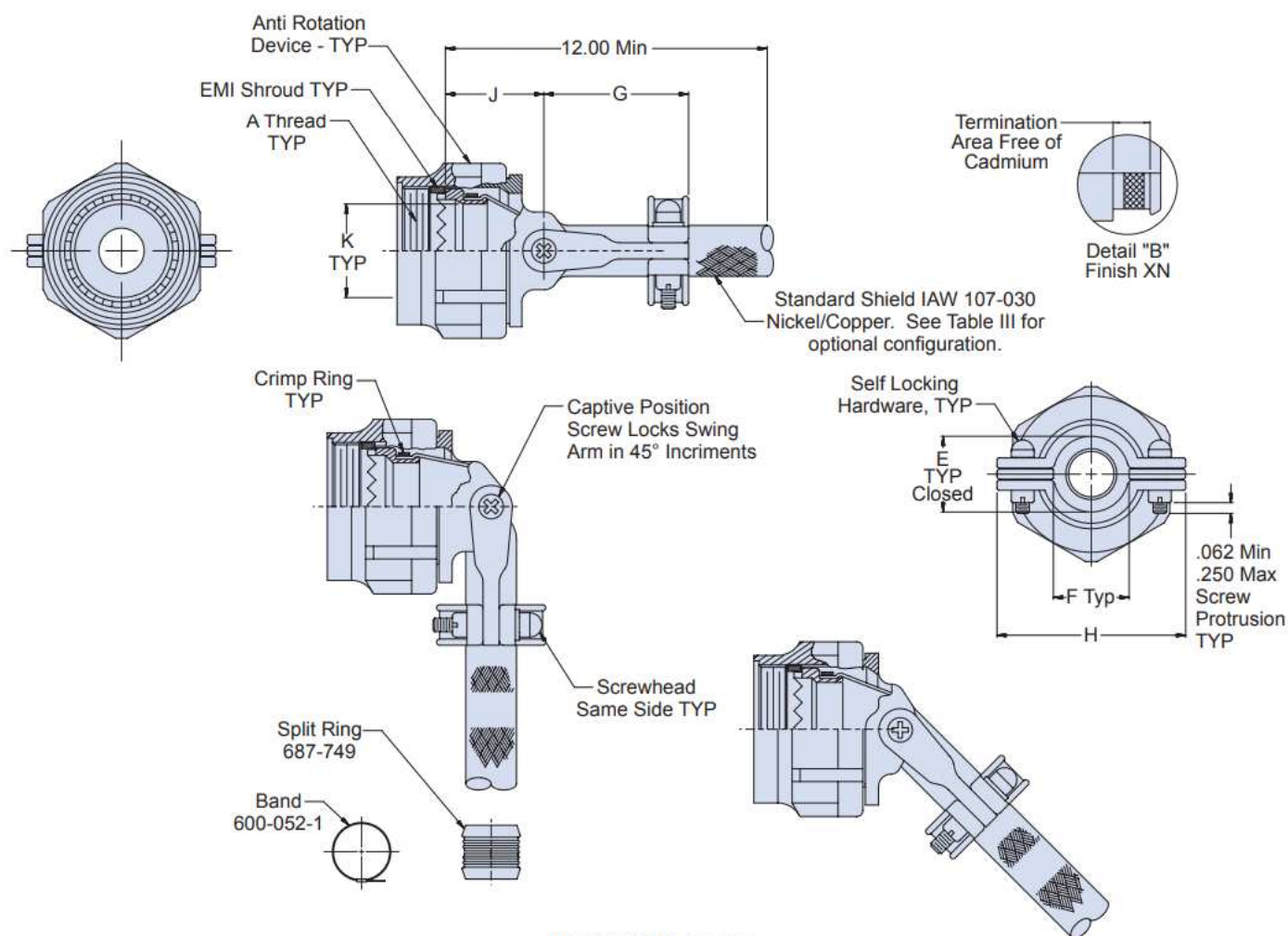
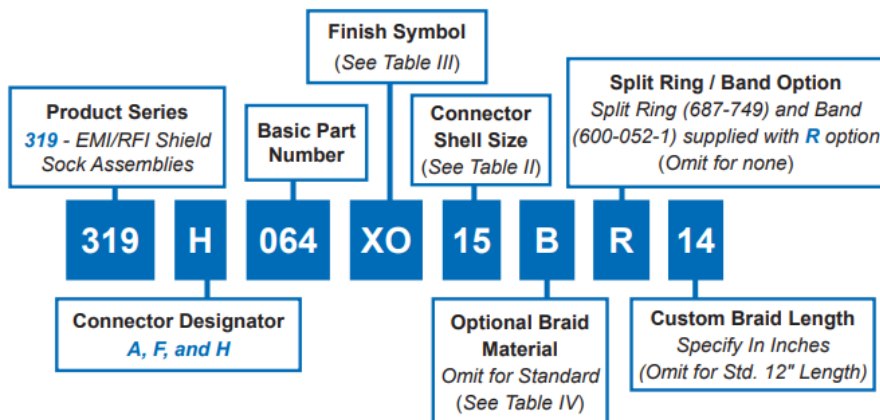
### 3.19.4 Test Anomalies/Deviations N/A



**319-064**

# Composite Swing-Arm Backshell with Shield Sock and Self-Locking Rotatable Coupling

| CONNECTOR DESIGNATOR |                                                             |
|----------------------|-------------------------------------------------------------|
| A                    | MIL-DTL-5015, -26482 Series II, and -83723 Series I and III |
| F                    | MIL-DTL-38999 Series I, for Series II See Note 3            |
| H                    | MIL-DTL-38999 Series III and IV                             |
| SELF-LOCKING         |                                                             |
| ROTATABLE COUPLING   |                                                             |



U.S. PATENT NO. 6419519



**319-064**

Composite Swing-Arm Backshell  
with Shield Sock and Self-Locking Rotatable Coupling

| SHELL SIZE |    |             |            |             |             |             |              |              |              |
|------------|----|-------------|------------|-------------|-------------|-------------|--------------|--------------|--------------|
| Shell Size |    | E           | F          | G           | H           | J           | K            | K            | K            |
| A, F       | H  | ± .031      | Min.       | Max.        | Max.        | ± .06       | (H Code)     | (A Code)     | (F Code)     |
| 08         | 09 | .265 (6.7)  | .22 (5.6)  | 1.06 (26.9) | .98 (24.9)  | .94 (23.9)  | .264 (6.7)   | .265 (6.7)   | .275 (7.0)   |
| 10         | 11 | .310 (7.9)  | .27 (6.9)  | 1.09 (27.7) | 1.05 (26.7) | .97 (24.6)  | .390 (9.9)   | .370 (9.4)   | .412 (10.5)  |
| 12         | 13 | .390 (9.9)  | .35 (8.9)  | 1.18 (30.0) | 1.20 (30.5) | 1.03 (26.2) | .504 (12.8)  | .506 (12.9)  | .526 (13.4)  |
| 14         | 15 | .506 (12.9) | .47 (11.9) | 1.24 (31.5) | 1.30 (33.0) | 1.09 (27.7) | .630 (16.0)  | .580 (14.7)  | .657 (16.7)  |
| 16         | 17 | .591 (15.0) | .55 (14.0) | 1.32 (33.5) | 1.44 (36.6) | 1.12 (28.4) | .756 (19.2)  | .705 (17.9)  | .776 (19.7)  |
| 18         | 19 | .661 (16.8) | .62 (15.7) | 1.39 (35.3) | 1.56 (39.6) | 1.15 (29.2) | .843 (21.4)  | .784 (19.9)  | .872 (22.1)  |
| 20         | 21 | .744 (18.9) | .70 (17.8) | 1.49 (37.8) | 1.69 (42.9) | 1.18 (30.0) | .969 (24.6)  | .909 (23.1)  | 1.007 (25.6) |
| 22         | 23 | .826 (21.0) | .78 (19.8) | 1.55 (39.4) | 1.77 (45.0) | 1.25 (31.8) | 1.091 (27.7) | 1.034 (26.3) | 1.132 (28.8) |
| 24         | 25 | .896 (22.8) | .85 (21.6) | 1.61 (40.9) | 1.28 (48.0) | 1.28 (32.5) | 1.217 (30.9) | 1.149 (29.2) | 1.257 (31.9) |

| FINISH     |                                                                                                                                         |
|------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| Symbol     | Finish                                                                                                                                  |
| <b>XB</b>  | Composite Material--No-Plating, Color Black, Brass Interface Shroud and Adapter-Nickel Plated.                                          |
| <b>XMT</b> | 2000 Hour Corrosion Resistant Ni-PTFE, Nickel-Fluorocarbon Polymer.<br><i>1000 Hour Grey™</i>                                           |
| <b>XN</b>  | Composite Material--No Plating, Color Black and Brown, Brass Interface Shroud and Adapter--Selectively Cadmium Plated<br>(See Detail B) |
| <b>XO</b>  | Composite Material--No-Plating, Color Black and Brown, Brass Interface Shroud and Adapter--Nickel Plated                                |

| CONNECTOR DESIGNATOR |                            |
|----------------------|----------------------------|
| Symbol               | Braid Type                 |
| A                    | 100% AmberStrand®          |
| B                    | 75%/25% AmberStrand® Blend |
| L                    | 100% ArmorLite™            |
| <i>Standard</i>      | Nickel/Copper 34awg        |
| T                    | Tin/Copper 34awg           |

Notes

1. Contact Glenair for front-end dimensional details
2. See composite thermoplastic shield sock assembly procedure for detailed installation instructions
3. Add mod code -475 to end of part number for use with Series II connectors. Backshell to be supplied less shroud.
4. Coupling nut supplied unplated.