A Textron Company

ALERT SERVICE BULLETIN **412-21-186**

28 July 2021
Revision A, 3 November 2021
Revision B, 11 November 2021

MODEL AFFECTED: **412EP**

SUBJECT: **FLEXIBLE TUBING 130-056C13-1680 AND M81914/3-013, REMOVAL OF**

HELICOPTERS AFFECTED: **Serial numbers 36242 through 36550 having the subject flexible tubing installed by Bell customizing drawing and/or STC no. SR09600RC (if applicable).**

Serial numbers 36551 through 36999, 37002 through 37999, 38001 and 39101 through 39103.

[Serial number 38002 through 38999 and 39104 through 39999 will have the intent of this bulletin accomplished prior to delivery.]

COMPLIANCE: **PART 1:** For all affected helicopter serial numbers, within the next 25 flight hours or 30 days after the release date of the Revision B of this bulletin, whichever comes first.

PART 2: For serial numbers 36242 through 36549 having the subject flexible tubing installed per Bell customizing drawing, 36551 through 36561, 36563 through 36611, 36613, 36615 through 36647, 36650 through 36657, 36660 through 36999, 37002 through 37999, 38001 and 39101 through 39103, within the next 600 flight hours or 24 months after the release date of the Revision B of this bulletin, whichever comes first.

PART 3: For helicopter serial numbers 36550, 36562, 36612, 36614, 36648, 36649, 36658 and 36659 (412EP converted to 412EPI configuration per STC no. SR09600RC) within the next 300 flight hours or 12 months after the release date of the Revision B of this bulletin, whichever comes first.

DESCRIPTION:

Bell has received reports of electrical wires found with chafing damage through the insulation. In one case, two damaged wires have shorted causing a multi-function Display Unit (DU) inflight failure followed by a burning smell and smoke in the cockpit.

The wires that were found with the chafing damage were routed in a flexible plastic tubing installed at the time of manufacture to facilitate customizing installation. The investigation following this incident indicates that wires inadequately protected and secured when routed in a flexible tubing may be susceptible to chafing damage with time in service. Factors such as quantity of loose wires routed in the tubing, number and severity of bends, total length of the tubing, moisture accumulation and the helicopter's inherent vibrations can contribute to the wiring chafing damage.

The subject plastic flexible tubing 130-056C13-1680 was introduced as part of the basic helicopter design on the model 412EP, serial number 36551 and subsequent. Prior to S/N 36551, the tubing 130-056C13-1680 may have been installed on some helicopters in accordance with a Bell customizing drawing. On some helicopters, if no customization was performed, the subject tubing installed as part of the basic design would contain no wire at aircraft delivery.

As part of the Model 412EP conversion to the 412EPI configuration per the Supplemental Type Certificate (STC) no. SR09600RC, several wires for basic aircraft systems have been routed in the basic aircraft flexible tubing 130-056C13-1680. In addition to the basic aircraft tubing, a second flexible tubing M81914/3-013 was installed on the left-hand side of the cabin, under the floor, for routing of various electrical system's wiring.

To mitigate the risk of wire chafing damage that could lead to failure of an electrical system, this ASB mandates the removal of the subject flexible tubing from all affected helicopters. The removal of empty flexible tubing is also required to prevent future use.

PART 1 of this bulletin mandates the inspection of the flexible tubing 130-056C13-1680 installed per Bell customizing drawing or as part of the basic helicopter design for presence of water. The tubing M81814/3-013 installed per the STC no. SR09600RC (EPI conversion) is not affected by PART 1. **PART 1** requires accomplishment if the flexible tubing cannot be removed immediately.

PART 2 of this bulletin provides the instructions for the removal of the flexible tubing 130-056C13-1680 and provides guidance for the securing and clamping of the wiring if any has been routed in the flexible tubing for the helicopters listed in the **COMPLIANCE** section of this bulletin under **PART 2**.

PART 3 of this bulletin provides the instructions for the removal of both flexible tubing 130-056C13-1680 and M81914/3-013 and provides guidance for the securing and clamping of the wiring that have been routed in the flexible tubing for the helicopters listed in the **COMPLIANCE** section of this bulletin under **PART 3**.

The revision A of this bulletin includes the helicopter serial number 38001 that has been omitted in the **PART 2** of the **COMPLIANCE** section. In addition, since Bell used different customizing drawings to perform the installation of the affected flexible tubing, the customizing drawing number reference has been removed to avoid confusion. Regardless of the Bell customizing drawing used for the installation of the flexible tubing, the same removal and securing/clamping of wiring guidelines apply. For helicopters that have no wiring in the tubing 130-056C13-1680, a plug button is installed in the bulkhead at Station 102 after the tubing removal. For helicopters that have wiring in the tubing, the securing of the wiring going through the bulkhead at Station 102 has been improved with the installation of a rubber grommet. Revision A also included other minor changes in the Accomplishment Instructions to improve clarity. Operators that have complied with the original release of this bulletin and have secured the wiring as instructed are not required to accomplish the revision A or B of this bulletin. Due to additional work that may be required in some cases, revision A changed the original compliance time of the **PART 1** and **PART 2** of this bulletin. The intent was to also change the compliance of **PART 3** but this change was omitted. Revision B of this bulletin adjusts the compliance of all three parts.

APPROVAL:

The engineering design aspects of this bulletin are FAA approved.

CONTACT INFO:

For any questions regarding this bulletin, please contact:

Bell Product Support Engineering
Tel: 1-450-437-2862 / 1-800-363-8023 / productsupport@bellflight.com

MANPOWER:

Approximately 40 man-hours are required to complete this bulletin. This estimate is based on hands-on time and may vary with personnel and facilities available.

WARRANTY:

There is no warranty credit applicable for parts or labor associated with this bulletin.

MATERIAL:

Consumable Material:
The following material is required to accomplish this bulletin, but may not require ordering, depending on the operator's consumable material stock levels. This material may be obtained through your Bell Supply Center.

Part Number	Nomenclature	Qty (Note)	Reference *
AS33671	STRAP	A/R (1)	C-592
MS21919WDG	CLAMP	A/R (2)	
2000-00088-00	SEALANT	2 oz	C-308
2000-08634-00	ADHESIVE	2 oz	C-325
2000-00678-00	ADHESIVE	2 oz	C-331
NAS451-35	PLUG BUTTON	1 (3)	
MS35489-53 or -56	GROMMET (Rubber)	1 (4)	
MS21266-1N/-2N/-3N/-4N	GROMMET (Plastic)	A/R (5)	

Notes:

1. Suitable size and length of AS33671 straps to be determined during installation.
2. Size of MS21919WDG clamps to be determined during installation.
3. Required for helicopters listed in **Part 2** with no wire in the tubing. Plug button 100-046S128A1 and NAS-451-35 are acceptable alternates.
4. Dash number to be determined by wire bundle size. The -53 grommet has an ID of 1.000 inch (25.4 mm) and the -56 has an ID of 1.500 inch (38.1 mm).
5. May be required in some areas to allow for proper protection of the wires passing through a bulkhead. The dash number required will vary based on the sheet metal thickness. Refer to the table below.

Dash No.	Sheet Thickness
-1N	0.015 – 0.052 inch (0.38 – 1.32 mm)
-2N	0.052 – 0.085 inch (1.32 – 2.46 mm)
-3N	0.085 – 0.128 inch (2.46 – 3.25 mm)
-4N	0.128 – 0.192 inch (3.25 – 4.9 mm)

* C-XXX numbers refer to the consumables list in the BHT-ALL-SPM, Standard Practices Manual

SPECIAL TOOLS:

None required.

WEIGHT AND BALANCE:

Not affected.

ELECTRICAL LOAD DATA:

Not affected.

REFERENCES:

BHT-412-IPB Illustrated Parts Breakdown
BHT-412-IPBS-EPI Illustrated Parts Breakdown Supplement
AA-11044 412EPI STC ICA Instructions Continued Airworthiness
AA-14045 412EPI STC IPB Illustrated Parts Breakdown
BHT-ELEC-SPM

PUBLICATIONS AFFECTED:

BHT-412-IPB Illustrated Parts Breakdown
AA-14045 412EPI STC IPB Illustrated Parts Breakdown

ACCOMPLISHMENT INSTRUCTIONS:

-NOTE-

If the flexible tubing does not contain any wires, accomplishment of PART 1 is not required.

PART 1. Inspection of the flexible tubing 130-056C13-1680 for presence of water.

1. Prepare the helicopter for maintenance.

2. Disconnect the helicopter battery.

3. Gain access to the flexible tubing and inspect the section of the tubing located in the pylon compartment for presence of water (Figure 5 Detail B).

-NOTE-

The flexible tubing installation that has the aft end of the tubing located in the tail rotor servo compartment is more prone to water ingress (Figure 5, Detail A).

4. If the tubing shows accumulation of water, the water must be drained using suitable equipment. A suitable vacuum or compressed air can be used.

5. Seal the aft end of the tubing to prevent any further water ingress with sealant (C-308).

PART 2. Removal of the flexible tubing and securing of wiring as required for helicopters listed in the COMPLIANCE section under **PART 2**.

-NOTE-

Wire harnesses with less than 0.375 inch (9.53 mm) clearance to the structure (such as through a bulkhead routing hole), are protected by a grommet bonded to the structure. Refer to the BHT-ELEC-SPM chapter 6 for additional information.

1. Prepare the helicopter for maintenance.

2. Disconnect the helicopter battery.

3. Remove floor panels (1 and 2, Figure 1). Removal of other access panels may be required to ease access to the flexible tubing.

4. Remove door assembly (1, Figure 2).

-NOTE-

Figure 4, View A-A, Detail A, shows different flexible tubing installations that have been done as part of the basic helicopter design or by Bell customizing drawings. The main differences between these installations are the total length of the tubing and the aft section routing. Regardless of the Bell customizing drawing used for the installation of the flexible tubing, the same removal and securing/clamping of wiring guidelines apply.

5. If there are wires installed in the tube (1), go to step 11, otherwise proceed with the following steps (Figure 4, View A-A, Detail A).

6. Remove and discard tube holding clamps and the existing hardware. If applicable, re-install clamping that secure existing wires using suitable hardware.

7. Remove sealant (3) from the periphery of tube (1) and bulkhead (5) lightening hole. (Detail A, View C).

8. Remove and discard tube (1) by cutting the tube lengthwise. Remove plastic grommet (4) from the bulkhead and remove all sealant residue.

9. Install plug button NAS451-35 using sealant (C-308) to close and seal the bulkhead (5) lightening hole.

10. Proceed to step 19.

11. Remove, and discard tube (1) holding clamps and retain the existing hardware. Note the clamping arrangement configuration for future reference (Figure 4, View A-A, Detail A).

12. Remove sealant (3) from the periphery of tube (1) and bulkhead (5) lightening hole (Detail A, View C).

-NOTE-

Use diagonal cutting pliers or scissors to cut the tube and tube end. Use of knife or similar tool can result in damage to wire insulation.

13. Remove and discard tube (1) by cutting the tube lengthwise. Remove plastic grommet (4) from the bulkhead and remove all sealant and adhesive residue.

-NOTE-

Select MS21919WDG clamp size to hold wiring in place without damaging the insulation. The uses of any additional equipment to support or protect wires to comply with BHT-ELEC-SPM requirements is recommended.

14. Inspect wires for possible chafing damage to the insulation. Pay particular attention to wires between station 129 and 178. Wires that have been routed in the flexible tubing between these stations are more prone to chafing damage.

15. Repair or replace any wire having chafing damage through the insulation (BHT-ELEC-SPM).

16. In place of removed clamps, install a suitable size MS21919WDG clamps on the existing harness using same clamping arrangement previously noted with retained hardware.

17. Select the proper size grommet MS35489-53 or -56 for the wire bundle size and make a diagonal cut in the grommet to allow for installation on the wire bundle. Install grommet with adhesive (C-325) and apply sealant (C-308) to overcoat the grommet as well as the wire bundle. Ensure no gaps remain between the grommet and the wire bundle.

18. Install plastic ties (7) on the harness between support clamps as required to provide adequate secondary support.

19. Install floor panels (1 and 2, Figure 1) and any other access panels that has been removed.

20. Install door assembly (1, Figure 2).

21. Connect helicopter battery.

22. Make an entry in the helicopter logbook and historical service records indicating compliance with **PART 2** of this Alert Service Bulletin.

PART 3. Removal of the flexible tubing and securing of wiring as required for helicopters listed in the COMPLIANCE section under **PART 3** (EPI STC).

-NOTE-

Wire harnesses with less than 0.375 inch (9.53 mm) clearance to the structure (such as through a bulkhead routing hole), are protected by a grommet bonded to the structure. Refer to the BHT-ELEC-SPM chapter 6 for additional information.

1. Prepare the helicopter for maintenance.

2. Disconnect the helicopter battery.

3. Remove floor panels (1, 2, 3, 4, 5 and 6, Figure 1). Removal of other access panels may be required to ease access to the flexible tubing.

4. Remove door assembly (1, Figure 2).

5. Remove LH FWD avionic compartment Gyro shelf (1, Figure 3, View E).

6. Remove, and discard tube (1) holding clamps and retain the existing hardware. Note the clamping arrangement configuration for future reference (Figure 4, View A-A, Detail A).

7. Remove sealant (3) from the periphery of tube (1) and bulkhead (5) lightening hole (Detail A, View C).

-NOTE-

Use diagonal cutting pliers or scissors to cut the tube and tube end. Use of knife or similar tool can result in damage to wire insulation.

8. Remove and discard tube (1) by cutting the tube lengthwise. Remove plastic grommet (4) from the bulkhead and remove all sealant residue.

9. Inspect wires for possible chafing damage to the insulation. Pay particular attention to wires between station 129 and 178. Wires that have been routed in the flexible tubing between these stations are more prone to chafing damage.

10. Repair or replace any wire having chafing damage through the insulation (BHT-ELEC-SPM).

-NOTE-

Select MS21919WDG clamp size to hold wiring in place without damaging the insulation. The uses of any additional equipment to support or protect wires to comply with BHT-ELEC-SPM requirements is recommended.

11. In place of removed clamps, install a suitable size MS21919WDG clamps on the existing harness using same clamping arrangement previously noted with retained hardware.

12. Select the proper size grommet MS35489-53 or -56 for the wire bundle size and make a diagonal cut in the grommet to allow for installation on the wire bundle. Install grommet with adhesive (C-325) and apply sealant (C-308) to overcoat the grommet as well as the wire bundle. Ensure no gaps remain between the grommet and the wire bundle.

13. Install plastic ties (7) on the harness between support clamps as required to provide adequate secondary support.

14. Remove and discard tube holding clamps as identified in P-1 through P-4 from clamping arrangement and retain existing hardware. Note the clamping arrangement configuration for future reference (Figure 4, View A-A, Detail B).

-NOTE-

Use diagonal cutting pliers or scissors to cut the tube and tube end. Use of knife or similar tool can result in damage to wire insulation.

15. Remove and discard tube by cutting the tube lengthwise.

16. Inspect wires for possible chafing damage to the insulation.

17. Repair or replace any wire having chafing damage through the insulation (BHT-ELECT-SPM).

-NOTE-

Select MS21919WDG clamp size to hold wiring in place without damaging the insulation. The uses of any additional equipment to support or protect wires to comply with BHT-ELEC-SPM requirements is recommended.

18. Refer to P-1 through P-4, In place of removed clamps, install a suitable size MS21919WDG clamps on existing harness using same clamping arrangement previously noted with retained hardware.

19. Install plastic ties on the harness between support clamps as required to provide adequate secondary support.

20. Remove and discard tube holding clamps as identified in P-5 through P-15 from clamping arrangement and retain existing hardware. Note the clamping arrangement configuration for future reference (Figure 4, View A-A, Detail C).

-NOTE-

Use diagonal cutting pliers or scissors to cut the tube and tube end. Use of knife or similar tool can result in damage to wire insulation.

21. Remove and discard tube by cutting the tube lengthwise.

22. Inspect wires for possible chafing damage to the insulation.

23. Repair or replace any wire having chafing damage through the insulation (BHT-ELEC-SPM).

-NOTE-

Select MS21919WDG clamp size to hold wiring in place without damaging the insulation. The uses of any additional equipment to support or protect wires to comply with BHT-ELEC-SPM requirements is recommended.

24. Refer to P-5 through P-15 and in place of removed clamps, install a suitable size MS21919WDG clamps on existing harness using same clamping arrangement previously noted with retained hardware.

25. Install plastic ties on the harness between support clamps as required to provide adequate secondary support.

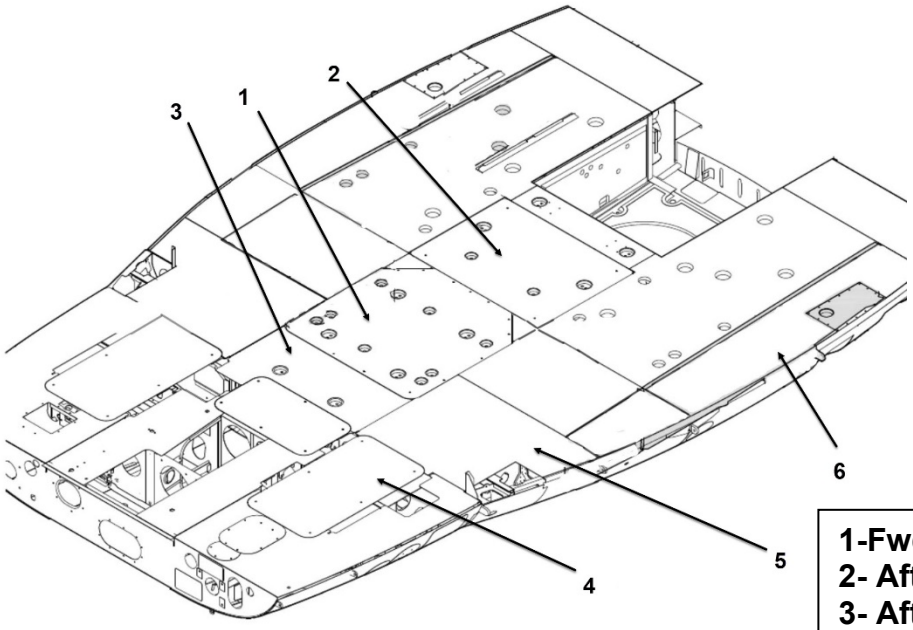
26. Install floor panels (1, 2, 3, 4, 5, 6, Figure 1) and any other access panel that has been removed.

27. Install door assembly (1, Figure 2).

28. Install Gyro shelf (1, Figure 3, View E).

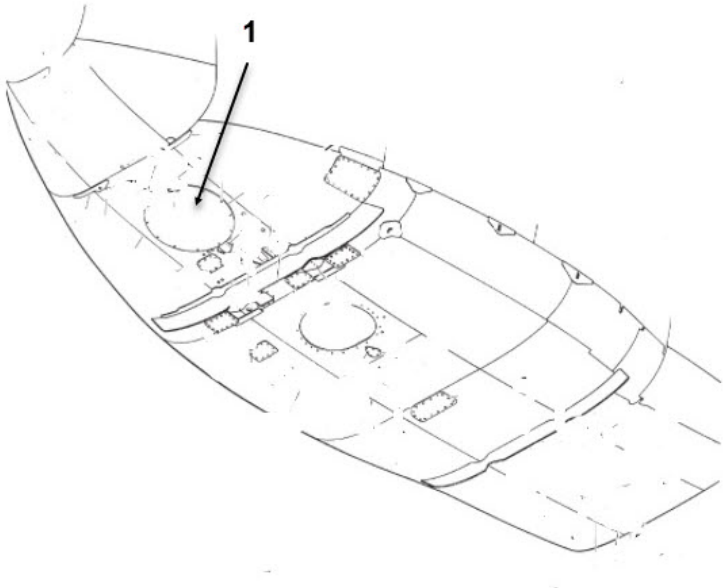
29. Connect helicopter battery.

30. Make an entry in the helicopter logbook and historical service records indicating compliance with the applicable Parts of this Alert Service Bulletin.



1-Fwd Cabin floor panel
2- Aft Cabin floor panel
3- Aft Pedestal center floor panel
4- Co-pilot seat door assembly
5- Aft Co-pilot seat floor panel
6- L/H side cabin floor panel

Figure 1



1-Door assembly

Figure 2

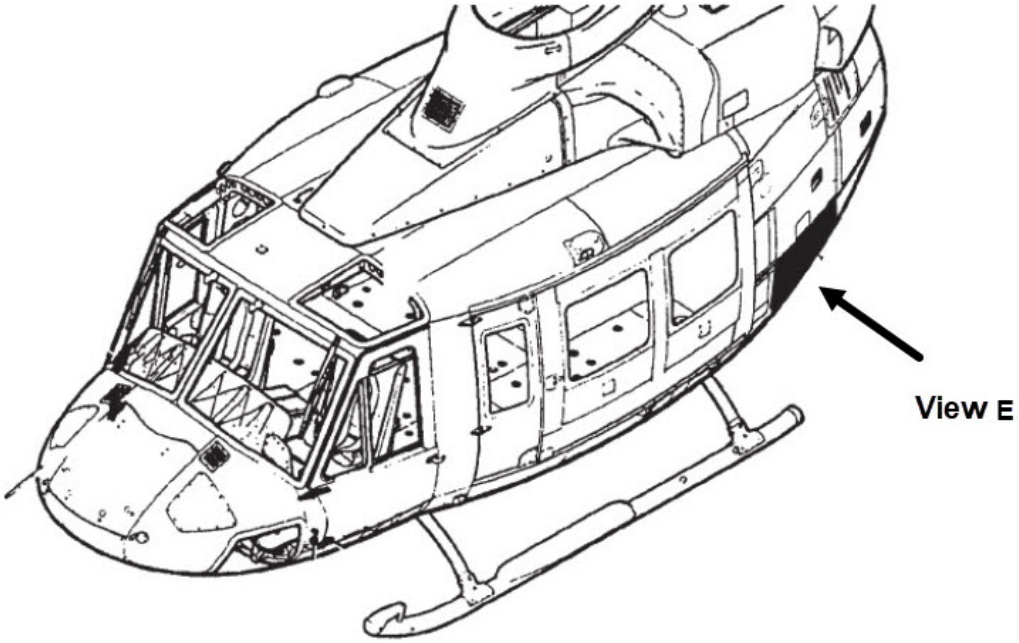
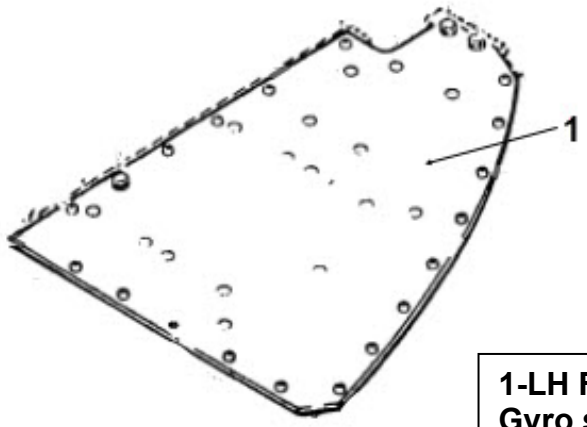


Figure 3



1-LH FWD Avionic compartment Gyro shelf

Figure 3, View E

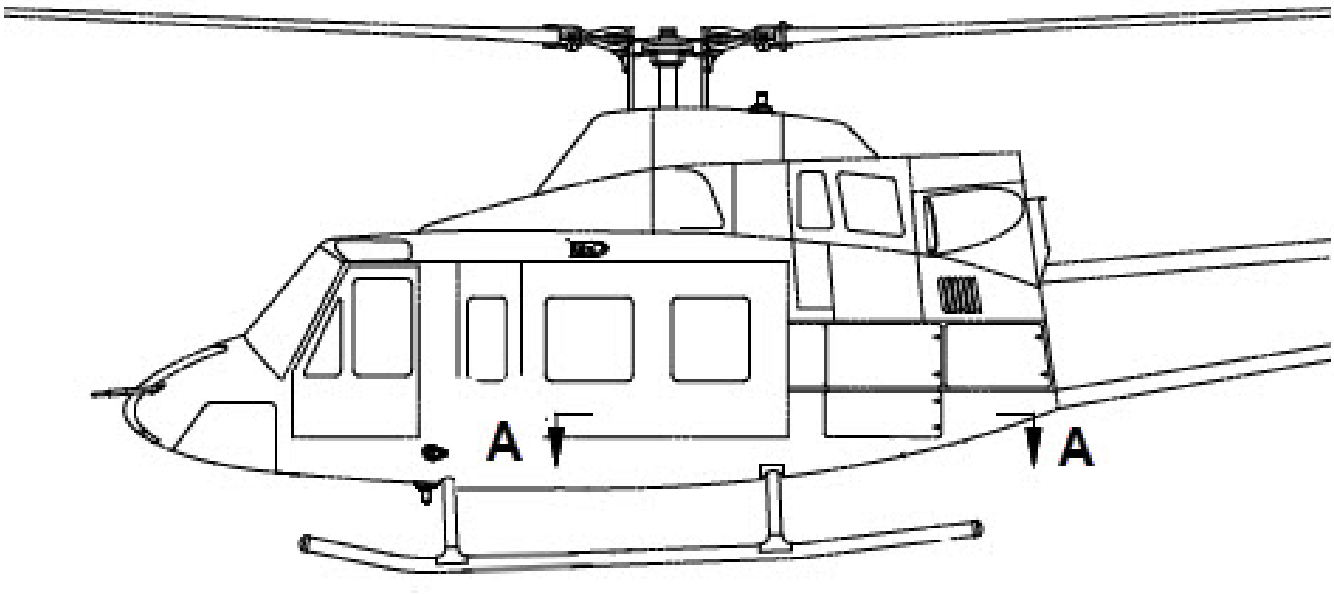


Figure 4

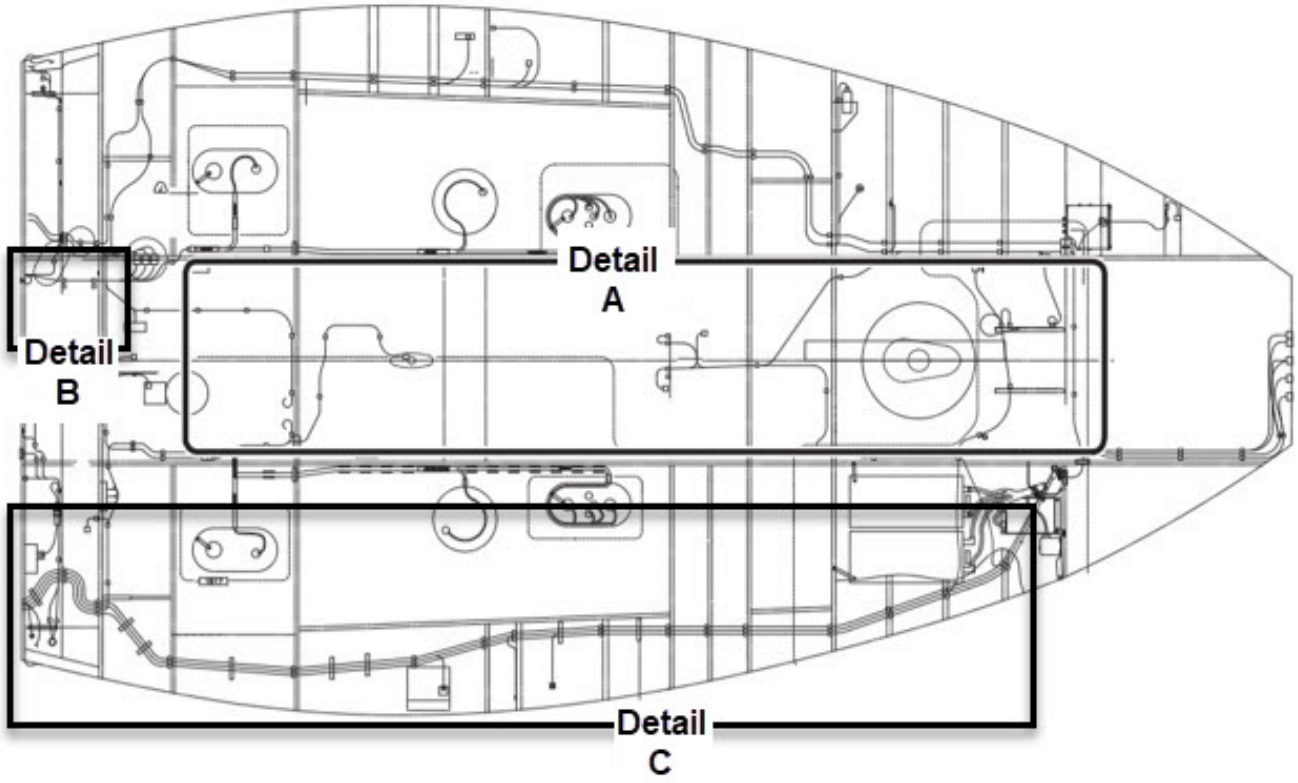
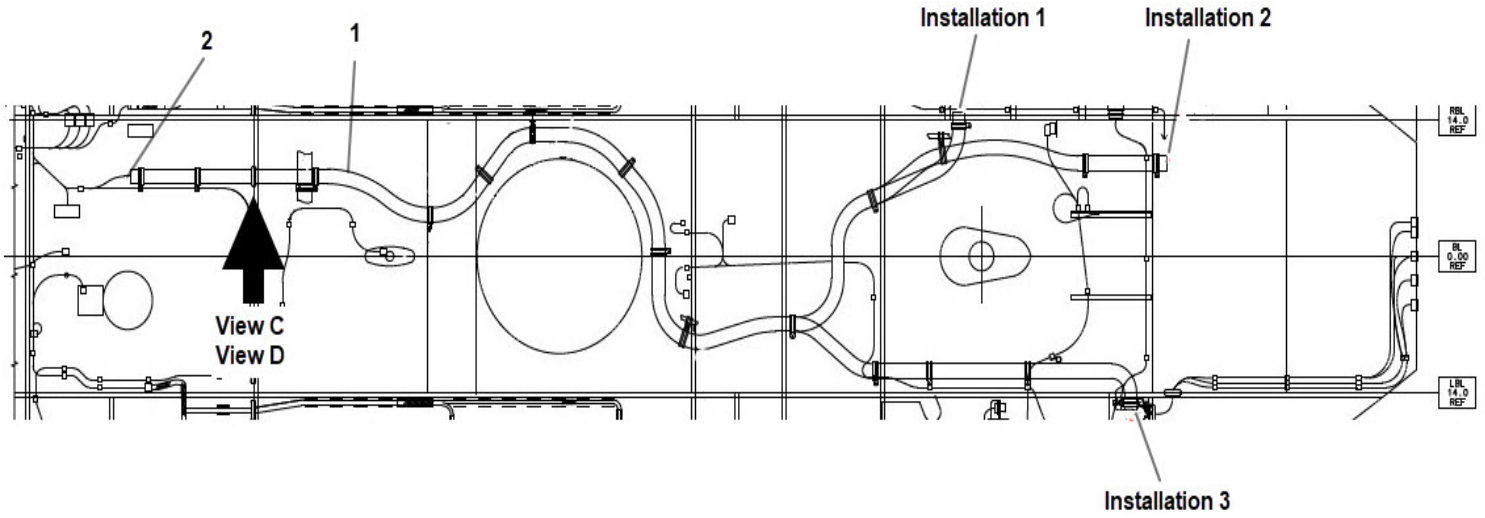
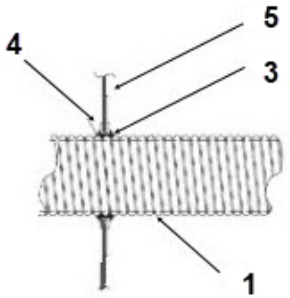
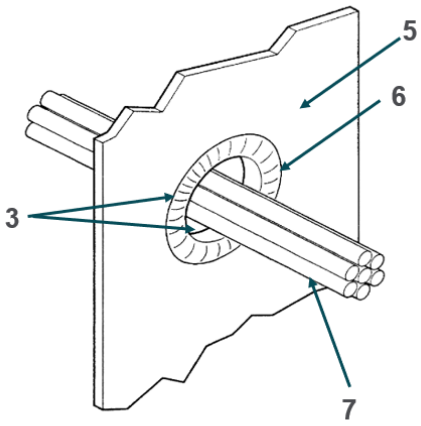


Figure 4, View A-A





Detail A
View C



Detail A
View D

1-Tube
2-Tube End
3-Sealant
4-Grommet (MS21266)
5-Bulkhead
6-Grommet (MS35489)
7- Wire bundle

Figure 4, Detail A

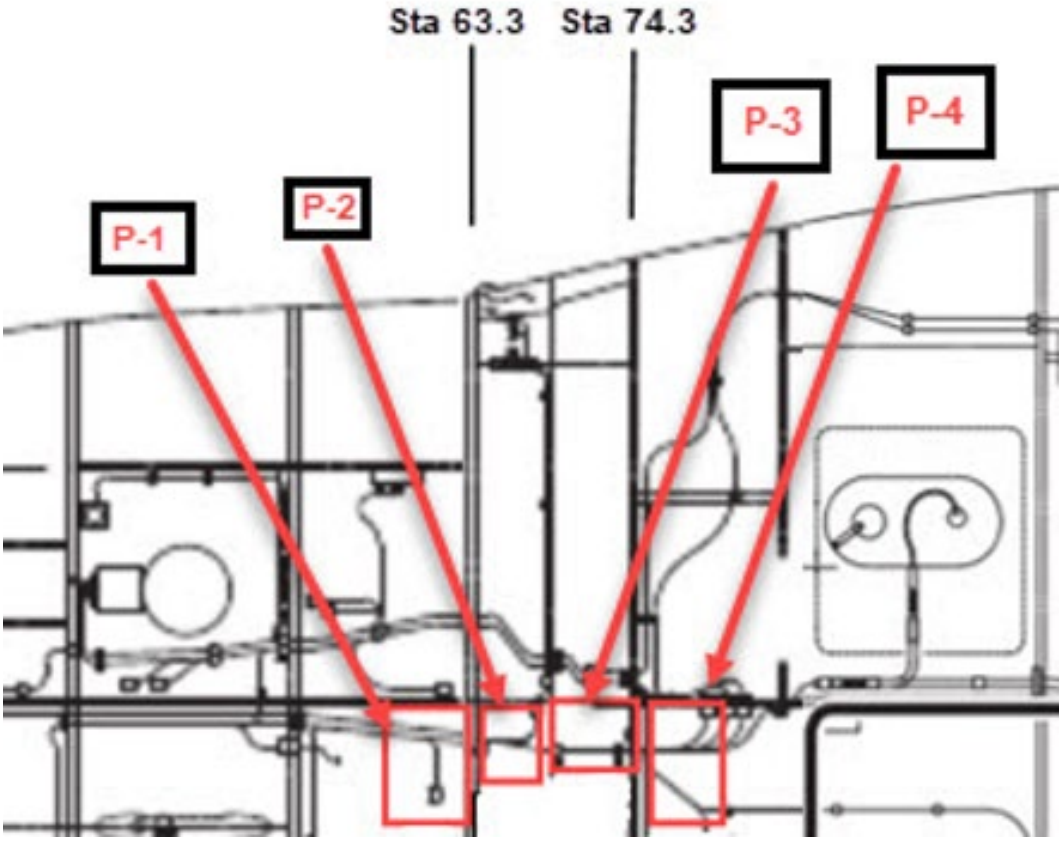


Figure 4, Detail B

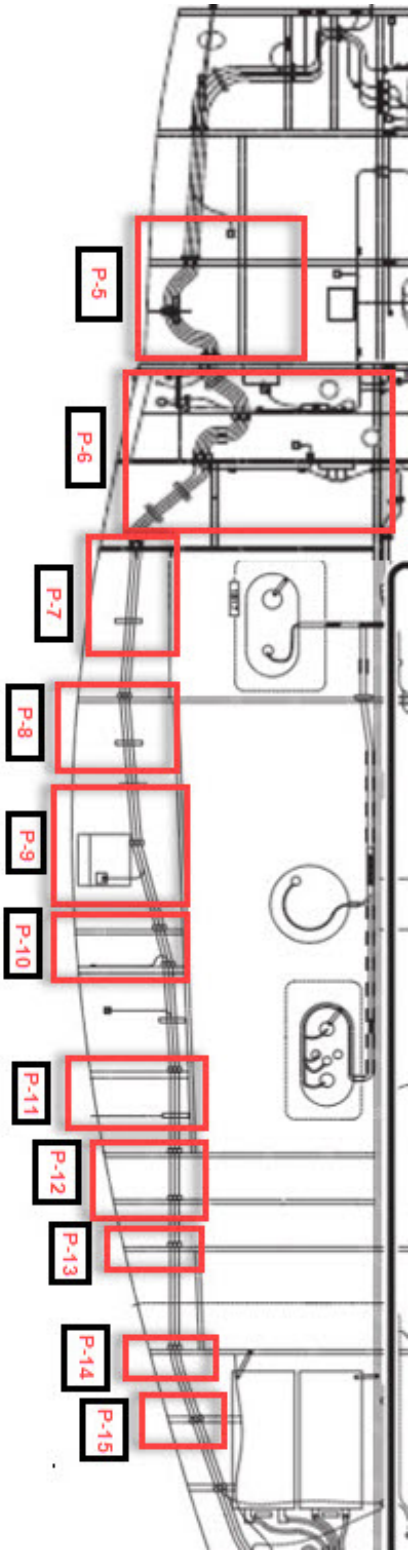
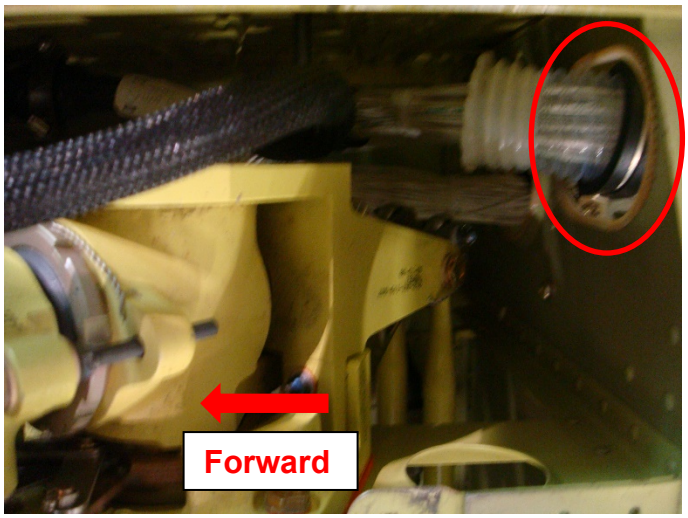
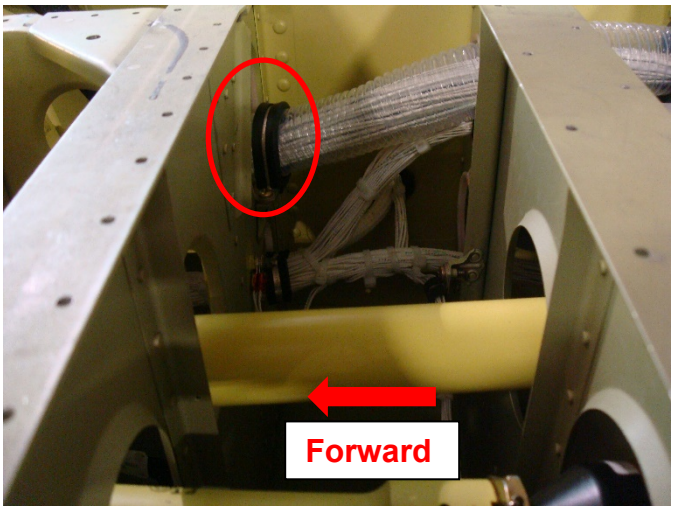


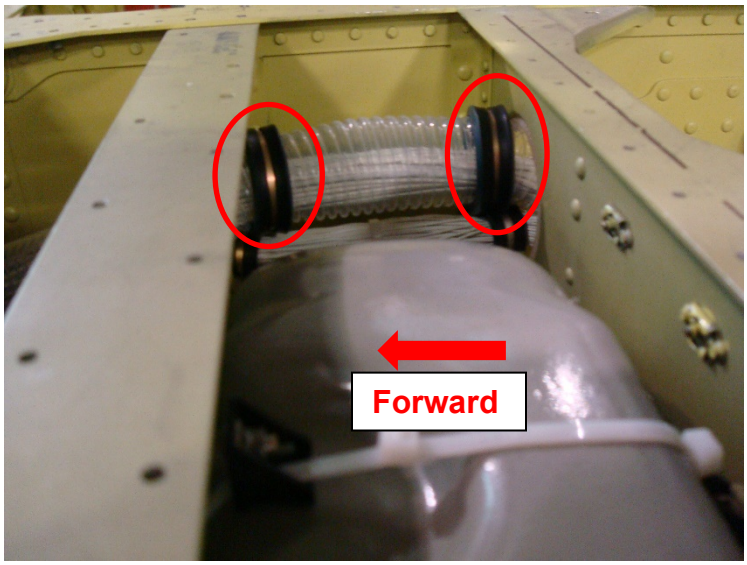
Figure 4, Detail C



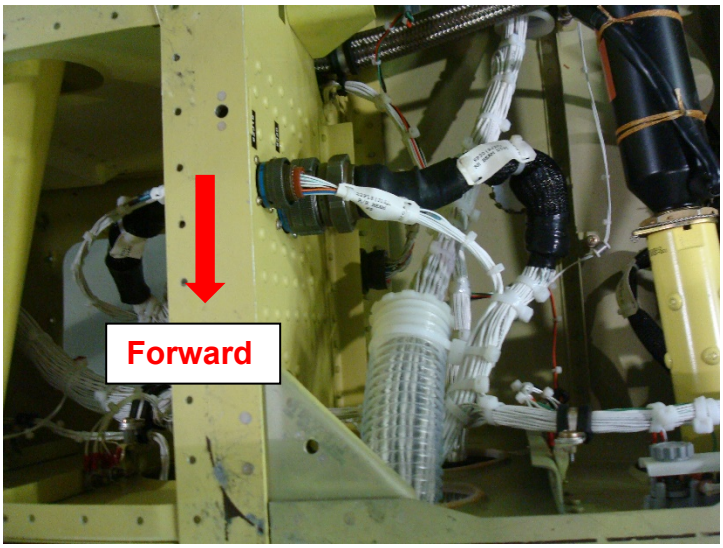
P-1



P-2

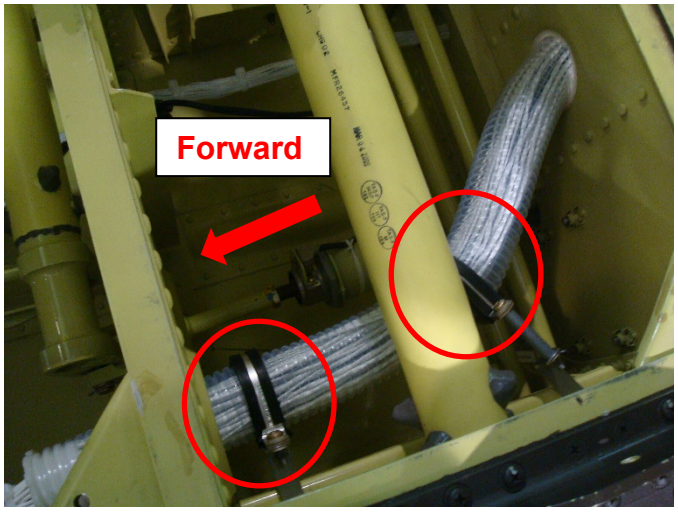


P-3

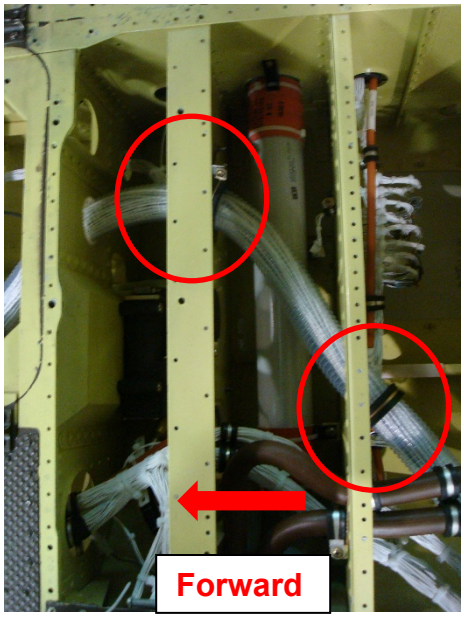


P-4

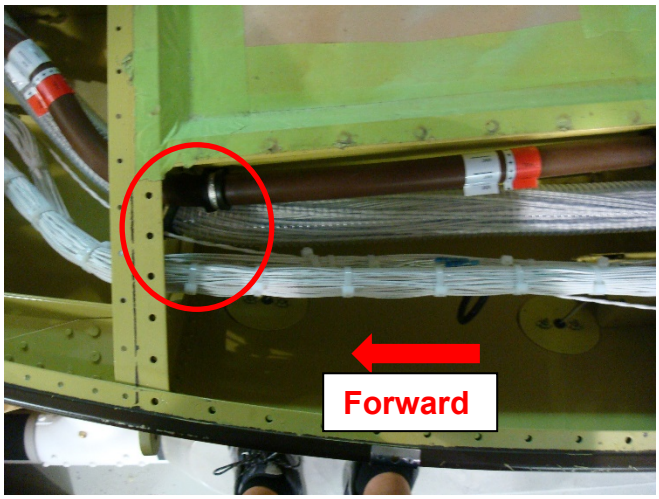
Figure 4, Detail B (P-1, P-2, P-3, P-4)



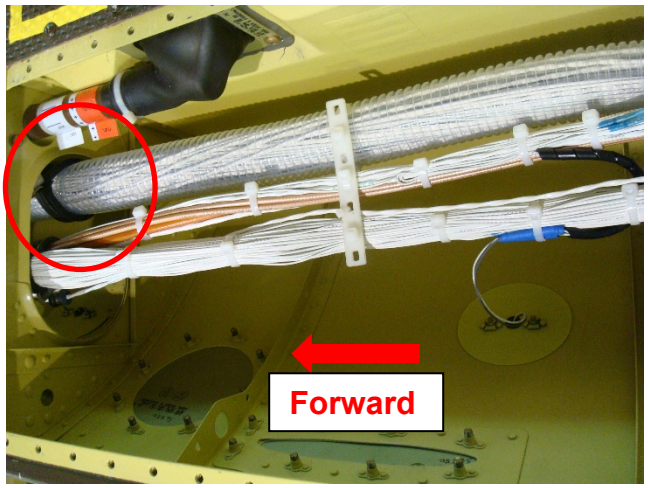
P-5



P-6

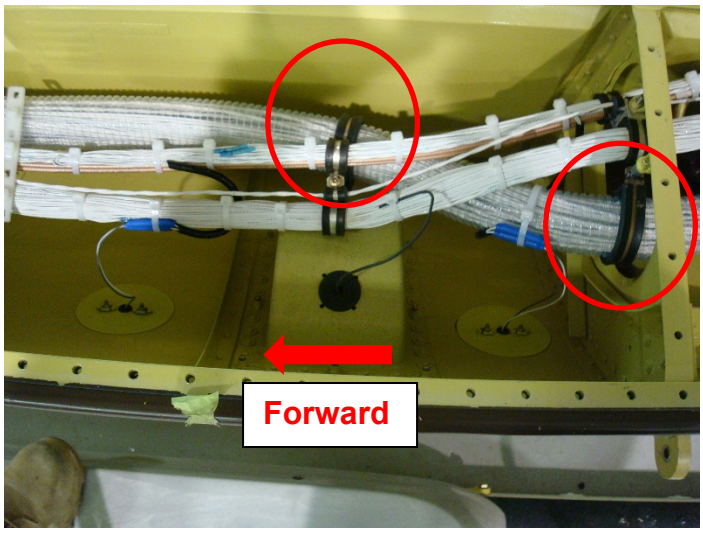


P-7

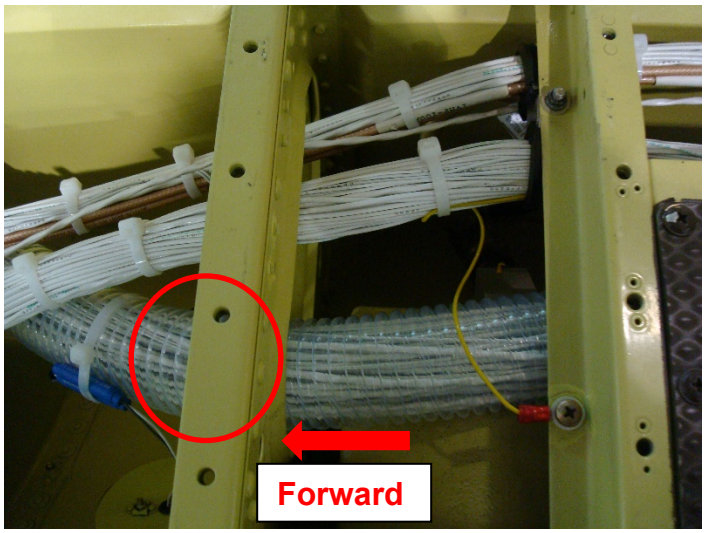


P-8

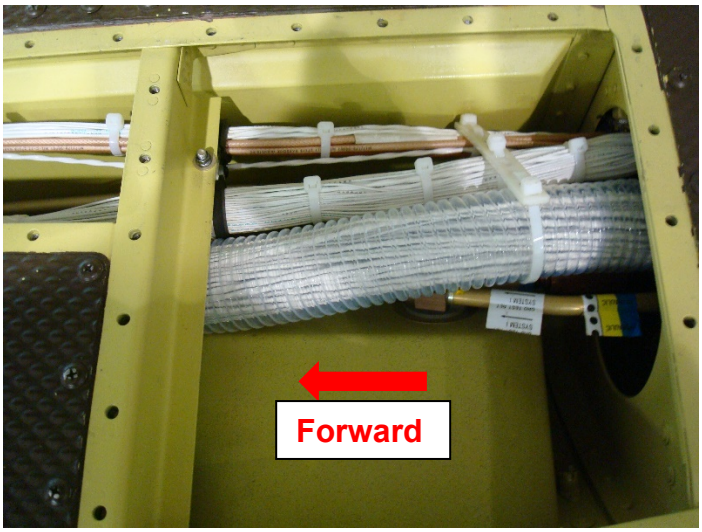
Figure 4, Detail C (P-5, P-6, P-7, P-8)



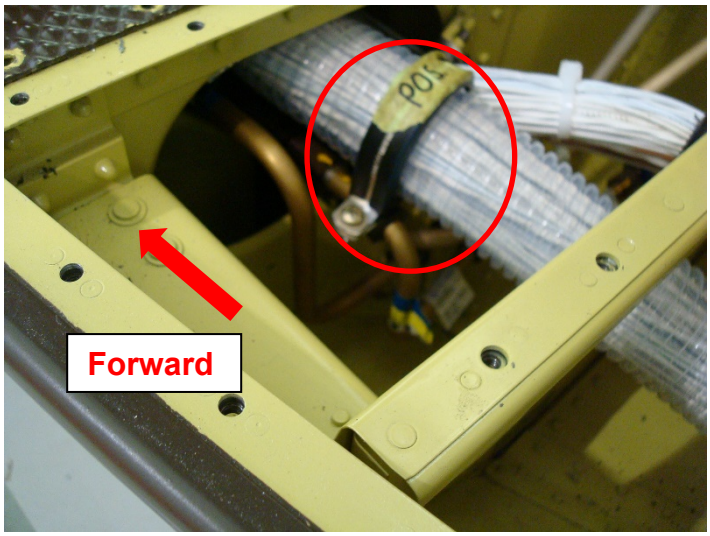
P-9



P-10

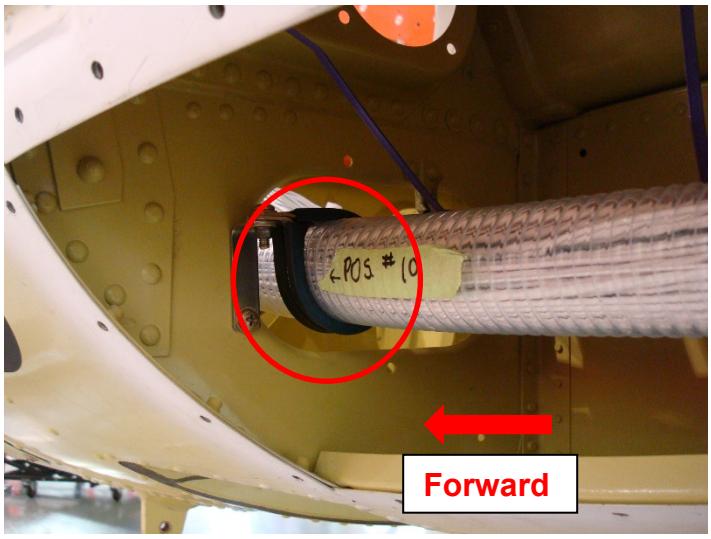


P-11

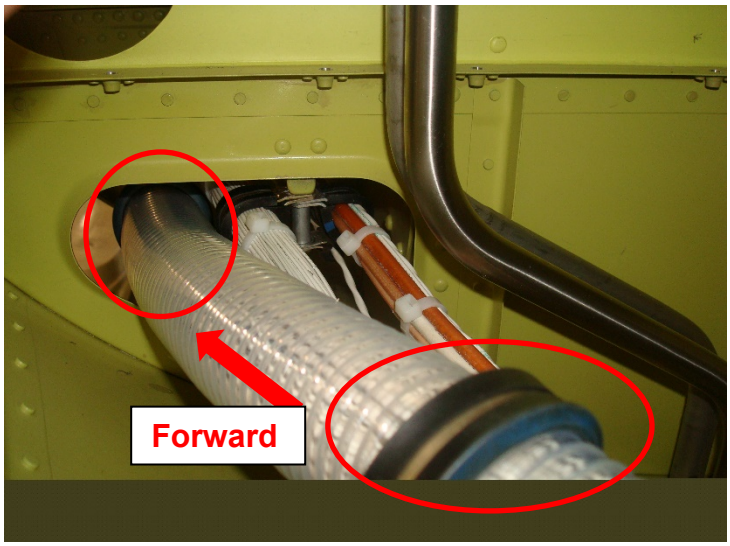


P-12

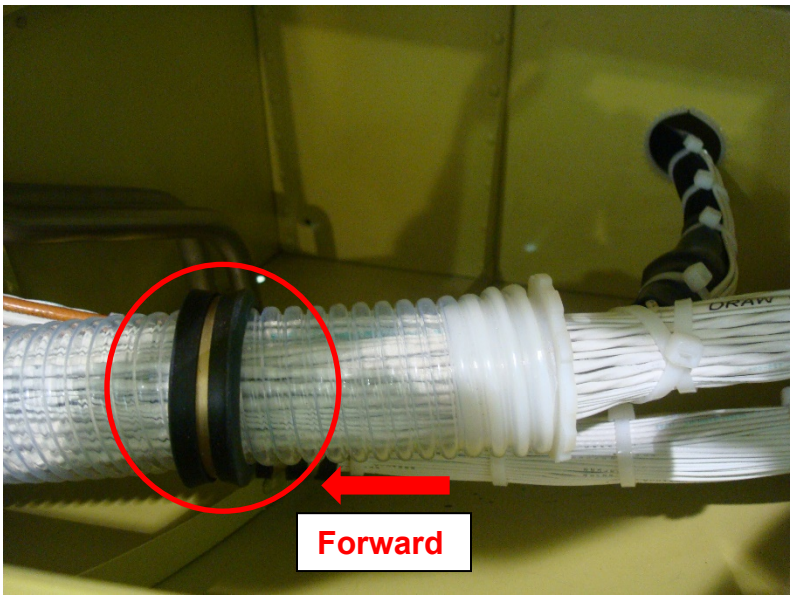
Figure 4, Detail C (P-9, P-10, P-11, P-12)



P-13



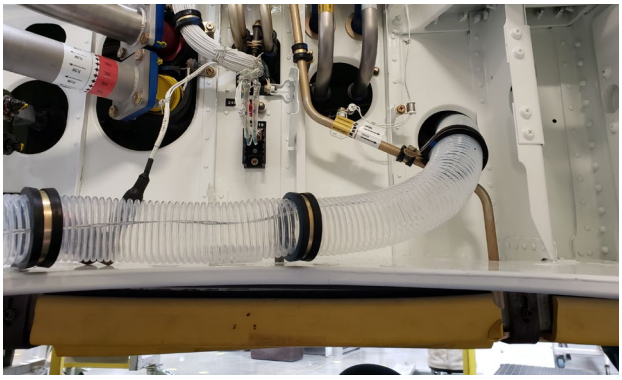
P-14

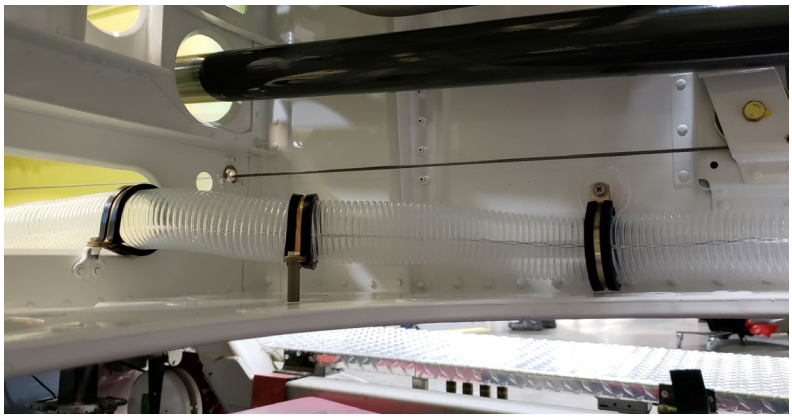


P-15

Figure 4, Detail C (P-13, P-14, P-15)

Detail A





Detail B

Figure 5. Flexible Tubing 130-056C13-1680 Inspection.