Instructions for Continued Airworthiness

for a

Dual Cargo Hook System

on the

Bell 429

System Part Numbers
200-483-XX
200-490-XX
200-493-XX
200-494-XX

STC SR02806SE

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RECORD OF REVISIONS

Revision	Date	Page(s)	Reason for Revision
0	04/09/2024	All	Initial Release
1	05/28/2024	18	Added a check for fluid leaks in the hydraulic release system at the annual/100 hour inspection.
2	01/14/2025	14	Added definition for lift cycle.
		15	Added note that there is no maintenance to be performed on C-40 Indicator.
		19, 27	Added note to return pin load cell to factory at 5 year/1000-hour interval.
		33	Revised instructions for re-assembly of Attach Point Assembly to the Frame Assembly.
		51	Updated Master Cylinder Lockout Adjustment dimension.
		53	Added CAUTION statement for Reservoir Glass being fragile.
		57	Added NOTICE to thoroughly clean and remove excess hydraulic fluid.

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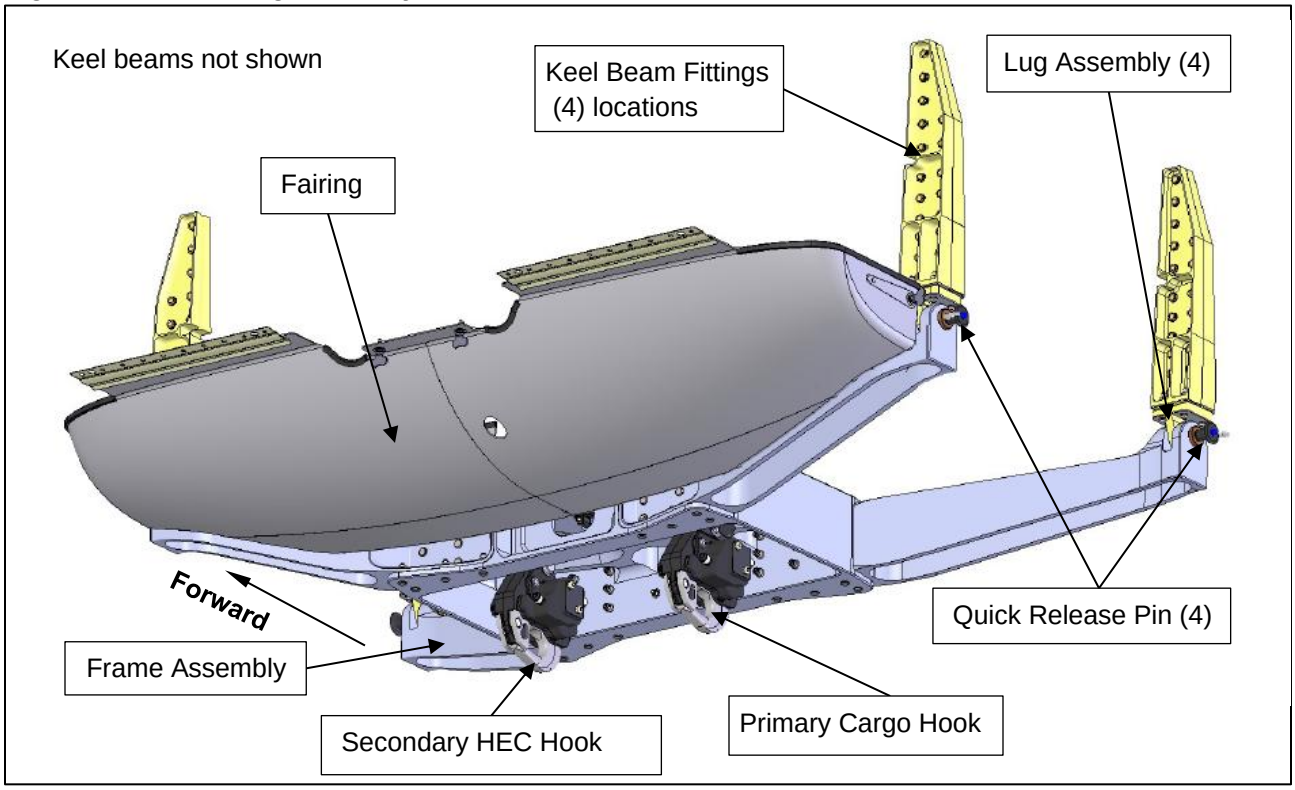
0.4 Scope

The information in this Instructions for Continued Airworthiness is necessary to carry out the service, maintenance, and inspection of Dual Cargo Hook System P/N series 200-483, 200-493, and 200-494 and Long Line Kit P/N series 200-490.

The complete Dual Cargo Hook System (P/N 200-483 series) includes the following.

1. A Frame Assembly which supports a primary cargo hook (referred to as Cargo Hook) and a secondary cargo hook (referred to as HEC Hook) to which a supplied Y-rope is connected to for carrying of HEC. These cargo hooks are Onboard Systems 528-028 series of cargo hooks with hydraulic release. The structural Frame Assembly attaches to four Lug Assemblies attached to the belly of the helicopter (two at STA 212.99 and two at 233.24). The Lug Assemblies and the internal Keel Beam Fittings, to which the Lug Assemblies are attached to, are provided as part of the complete dual cargo hook system. Kit P/Ns 200-493 and 200-494 series are retrofit kits that interface with the Bell TC approved Lug Assemblies and Keel Beam Fittings.

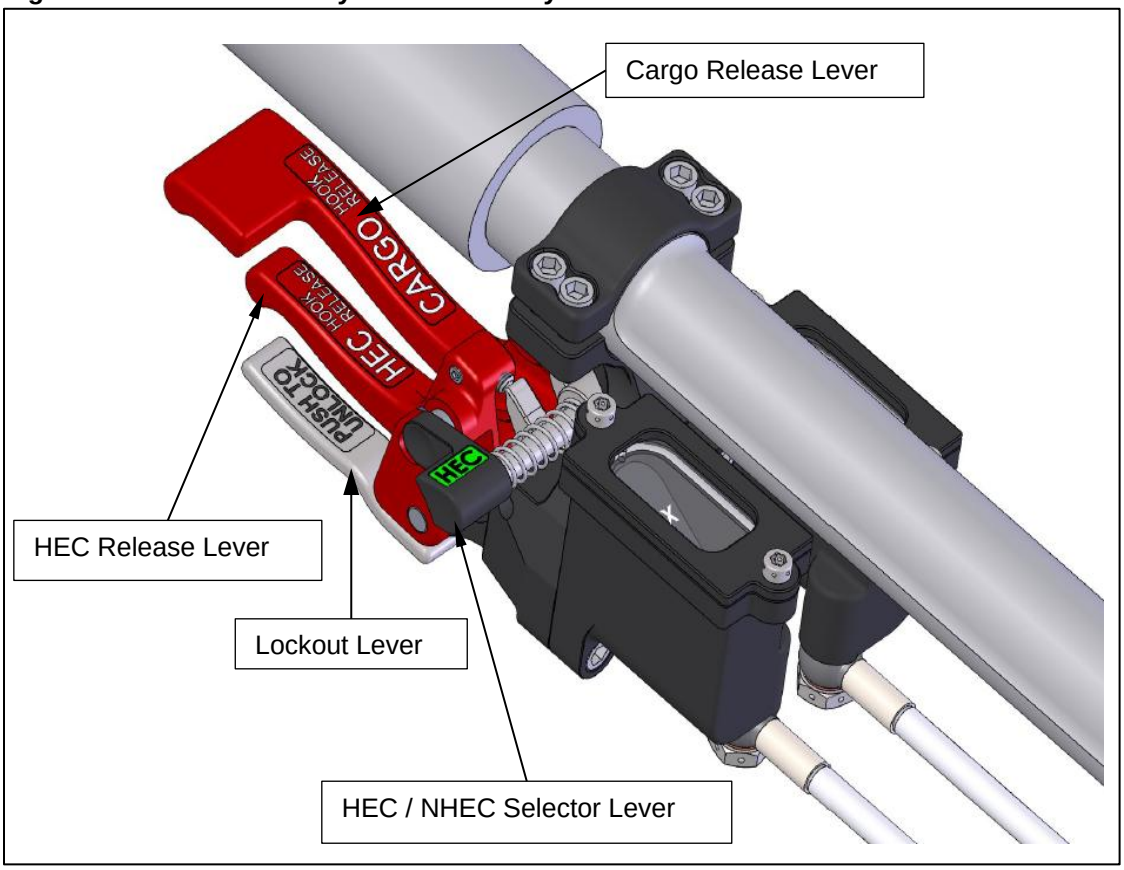
Figure 0.4.1 Dual Cargo Hook System Overview



2. Backup quick release sub-systems (BQRS) for the primary Cargo Hook and secondary HEC Hook. These systems are independently actuated by a Dual Master Cylinder Assembly installed on the collective (reference Figure 0.4.2). The assembly features a lockout lever and sequential release for increased safety during HEC

operation with the system in HEC mode. The sequential release feature prevents both levers from being pulled simultaneously. To release an external load attached to both cargo hooks: (1) push the lockout lever down, (2) pull the HEC release lever (this action unlocks the Cargo Release lever) (3) pull the Cargo Release lever (or pull both levers simultaneously). In NHEC mode, pushing the Lockout Lever down unlocks both levers.

Figure 0.4.2 Dual Master Cylinder Assembly Overview



3. Complete primary quick release sub-systems (PQRS) for the secondary (HEC) cargo hook and the primary cargo hook with the exception of the push-button switches on the cyclic and collective. This installation requires that the Bell push-button switches be present (wire harnesses are provided to interface with connectors at the base of the flight controls).

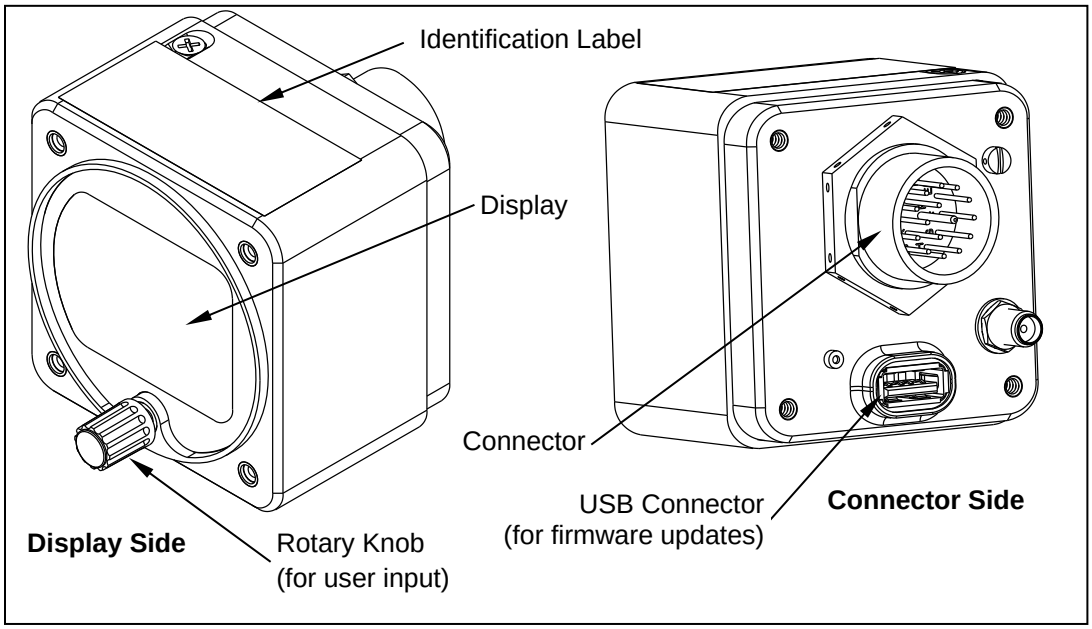
4. A Fairing is located forward of the Dual Cargo Hook Frame. The Fairing attaches to ¼ turn receptacles at left-hand and right-hand sheet metal brackets and in the forward fuel sump cover.

5. An optional load weigh system provides the pilot with an indication of the weight of the load being carried on the cargo hook. It includes the pin load cell assembly at the cargo hook which also serves as the bolt within the structural linkage to connect the cargo hook to the frame assembly, and a C-40 model load weigh indicator. The pin

load cell delivers an mV level bridge signal to the C-40 indicator that is proportional to the amount of weight on the cargo hook.

The C-40 indicator is a cockpit mounted instrument that displays the weight of the external load on the cargo hook and includes an interface to adjust units, adjust brightness, set calibration code, etc.

Figure 0.4.3 C-40 Indicator Overview

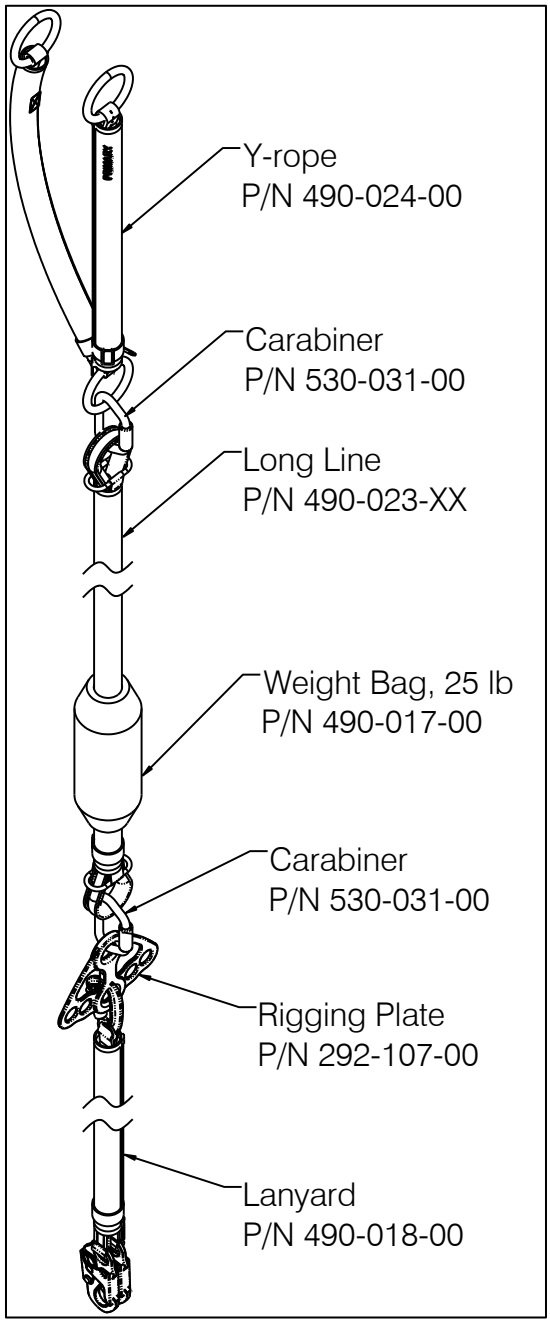


Retrofit Kit P/N 200-493 series and P/N 200-494 series utilize fixed provisions components of the Bell cargo hook systems that are approved under the type certificate. Refer to the Bell maintenance documentation for instructions applicable to these components.

The Long Line Kit (P/N 200-490-XX*) includes the components shown in the figure below. The Y-rope is the only component of the long line kit that is required to be used with the dual cargo hook kit as it is designed to provide a controlled interface with the cargo hooks. For the components below the Y-rope (carabiner to lanyard), an alternative configuration or components approved by the local Aviation Authority may be used.

*The kit P/N is completed by replacing the XX by a two-digit number which is multiplied by 10 to define the length of the included long line, for example – kit P/N 200-490-10 includes a 100-foot long line (P/N 490-023-10), Kit P/N 200-490-15 includes a 150-foot long line (P/N 490-023-15), etc.

Figure 0.4.4 Long Line Kit



0.5 Arrangement

The manual is arranged in the general order that maintenance personnel would use to maintain and operate the cargo hook kits in service.

The arrangement is:

Section 0 Introduction

Section 4 Airworthiness Limitations

Section 5 Inspection and Overhaul Schedule

Section 11 Placards and Markings

Section 12 Servicing

Section 25 Equipment and Furnishings

0.6 Applicability

These Instructions for Continued Airworthiness are applicable to Dual Cargo Hook System P/N 200-483 series, 200-493 series, 200-494 series and Long Line Kit P/N 200-490 series for the Bell 429 model.

P/N 200-493 series are retrofit kits for a Bell 429 that was originally equipped with a Bell Dual Cargo Hook System. They utilize the complete internal electrical release wiring for both cargo hooks as provided under the type certificate. In addition, they use the TC approved internal Keel Beam Fittings and the external Lug Assemblies (these parts are shown in Section 0.4).

P/N 200-494 series are retrofit kits for a Bell 429 that was originally equipped with a Bell TC Single Cargo Hook System. They utilize the internal structural components and the external Lug Assemblies of the TC system.

0.9 Abbreviations

CMM Component Maintenance Manual

ICA Instructions for Continued Airworthiness

TC Type Certificate

0.12 Safety labels

The following definitions apply to safety labels used in this manual.

Indicates a hazardous situation which, if not avoided, will result in death or serious injury.

Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

Draws the reader's attention to important or unusual information not directly related to safety.

Used to address practices not related to personal injury.

0.19 Distribution of Instructions for Continued Airworthiness

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Section 4 Airworthiness Limitations

The Airworthiness Limitations section is FAA approved and specifies inspections and other maintenance required under Secs. 43.16 and 91.403 of the Federal Aviation Regulations unless an alternative program has been FAA approved.

4.1 Long Line Kit

The following items of the Long Line Kit P/N 200-490-XX are life-limited. Captured metal parts (load rings, snap hooks, etc.) of the assemblies are also scrapped at retirement.

Part Number	Description	Maximum Service Life**	Maximum Life***
490-024-00	Y-Rope	4 years	6 years
490-023-XX*	Long Line	4 years	6 years
490-018-00	Lanyard	4 years	6 years

*The XX represents length of the long line in feet divided by 10, e.g. - a 100-foot Long Line is part number 490-023-10, a 150-foot Long Line is part number 490-023-15, etc.

** Service life begins when the item is placed into service. This date must be marked by the operator in the reserved location on the component ID tag or using another method such as recording in a log book.

*** Maximum life is from the “MFG Date” as marked on the component ID tag (“maximum life” accounts for shelf-life).

4.2 Cargo Hook/Frame Assembly

Cargo Hook P/N 528-028-05 is life-limited by lift cycles and the Frame Assembly P/N 232-875-00 is life-limited by lift cycles and hours of external load operations. Refer to Section 5.1 for definition of “hours of external load operations”.

Part Number	Description	Maximum Life
232-875-00	Frame Assembly	175,000 Lift Cycles** or 5,000 hours of external load operations (whichever comes first).
528-028-05	Cargo Hook*	175,000 Lift Cycles

*Cycle counting is applicable only to the primary Cargo Hook. The HEC Hook (in the right position) is only for use in HEC operations and is not loaded during normal operation.

**Record each occurrence of external cargo being lifted. For example: during flight, an operator picks up and releases 5 external cargo loads, then 5 lift cycles should be recorded.

FAA Approval: Digitally signed by JAMES N SUTHERLAND Date: 2024.08.19 15:31:10 -07'00' Date: See electronic signature

for Manager, West Certification Branch

Section 5 Inspection and Overhaul

The scheduled inspection intervals noted below are maximums and are not to be exceeded. If the cargo hook is subjected to unusual circumstances, extreme environmental conditions, etc., it is the responsibility of the operator to perform the inspections more frequently to ensure proper operation. Refer also to the Component Maintenance Manual (CMM) 122-015-00 for additional maintenance information specific to the Cargo Hook.

For inspection of the cargo hook installation refer to Section 5.1 (annual/100 hour) and 5.2 (5 year/1000 hour). For inspection of the long line kit, refer to Section 5.3 for annual inspection.

There is no maintenance to be performed on the C-40 Indicator. Do not open the enclosure. If repair is needed, return it to the factory. If a low battery indication is displayed on the screen at startup, see Owner's Manual, 120-152-00, for further information regarding a low battery.

5.1 Annual/100 Hour Inspection – Dual Cargo Hook System

Annually or 100 hours of external load operations, whichever comes first, inspect the dual cargo hook system per this section. Refer to Section 5.3 for Long Line Kit Inspection.

NOTICE

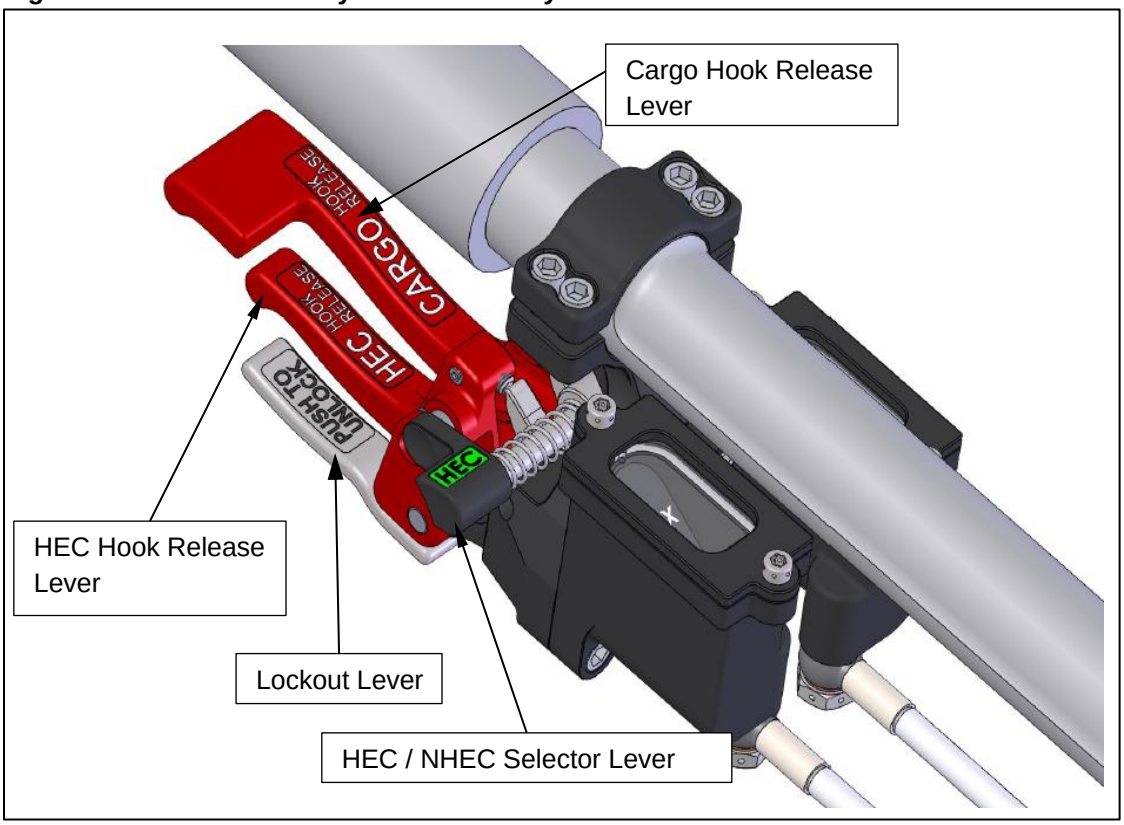
Hours of external load operations should be interpreted to be (1) anything is attached to the primary cargo hook (whether or not a useful load is being transported) and (2) the aircraft is flying. If these conditions are NOT met, time does NOT need to be tracked.

1. Check the function of each cargo hook's electrical release system per the following,

   - With no load on the cargo hook, press the CARGO REL switch on the cyclic, the primary cargo hook load beam should fall to the open position.
   - With no load in the cargo hook, press the HEC HOOK REL switch on the collective, the HEC cargo hook load beam should fall to the open position.
   - Manually return the load beams to the closed position and verify that each one latches and the hook lock indicator is aligned with the engraved lines on the outside of the cargo hook (see Figure 5.1.4).

2. Check the function of each cargo hook's hydraulic release system per the following. For HEC operations (with the selector lever in HEC mode) the levers are protected from inadvertent release by a lockout lever and are sequenced. Sequencing prevents both levers from being pulled at the same time, the lever on the left (HEC HOOK RELEASE) must be pulled first and then the CARGO HOOK RELEASE can be pulled.

Figure 5.1.1 Dual Master Cylinder Assembly



- Operate the NON-HEC/HEC Selector Lever by switching between modes (reference Figure 5.1.2 and Figure 5.1.3). From NON-HEC mode push the Selector Lever to the right, rotate it forward until it stops and allow the spring to push it left and lock it in HEC mode. From HEC mode, push the lever to the right until it stops and then rotate it back to lock it in NON-HEC mode. The lever should move smoothly between each position with no binding.

Figure 5.1.2 Selector Lever in HEC Mode

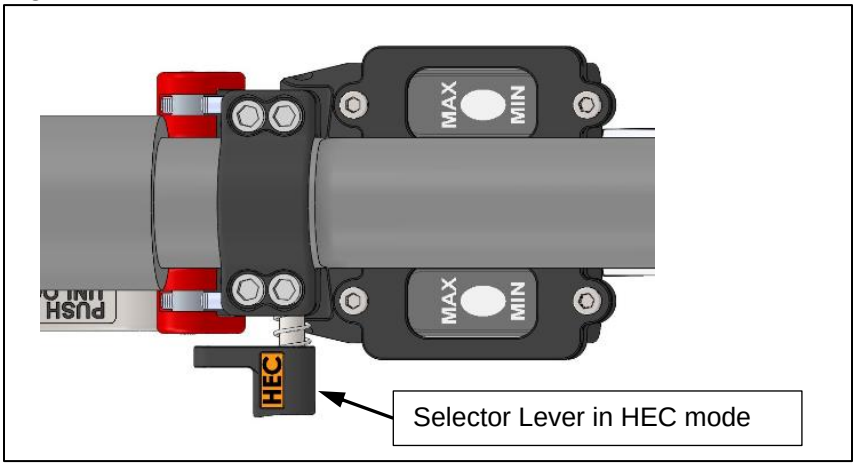
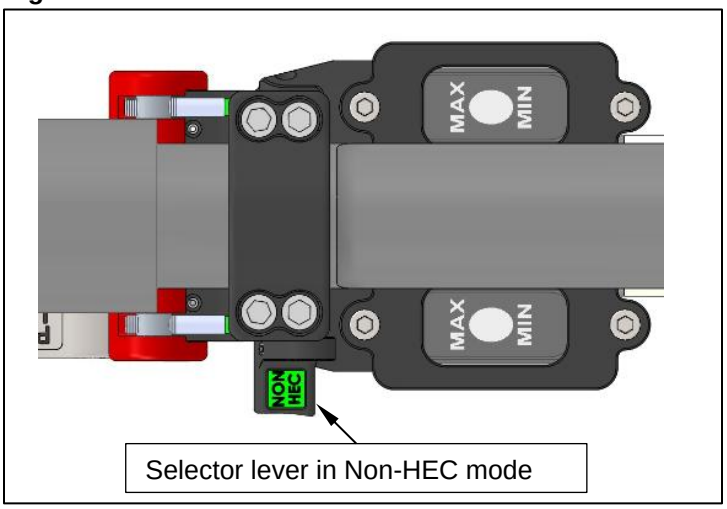


Figure 5.1.3 Selector Lever in NON-HEC Mode



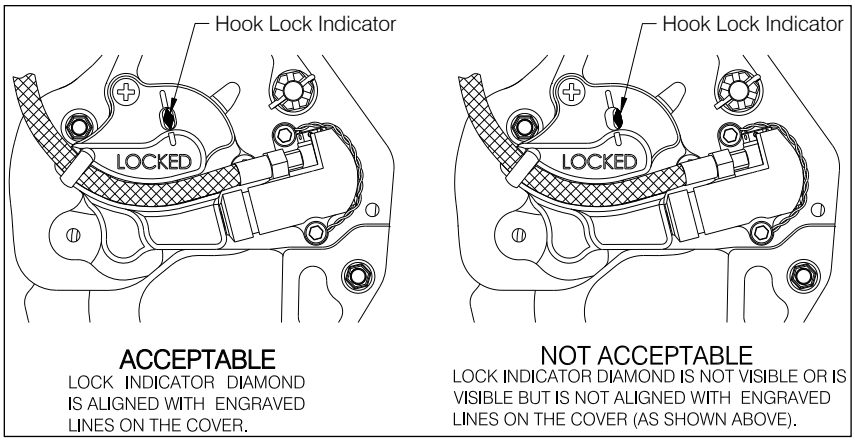
- In HEC mode, disengage the Lockout Lever on the collective mounted release assembly by pushing it down. It should snap past the detent and fall to the open position. If the Lockout Lever falls open with little or no resistance, refer to Section 12 for adjustment instructions.

- With no load on the cargo hooks, pull the HEC HOOK RELEASE lever on the collective, the HEC Hook load beam should fall to the open position. In HEC mode, pulling the HEC HOOK RELEASE lever should unlock the CARGO HOOK RELEASE lever and allow the next step to be performed.

- Pull the CARGO HOOK RELEASE lever and the Cargo Hook load beam should fall to the open position.

- Manually return the load beams to the closed position and verify that each one latches, and that the hook lock indicator is aligned with the engraved lines on the outside of the cargo hook.

Figure 5.1.4 Hook Lock Indicator



3. Visually check for fluid leaks in the hydraulic release system. Any leakage of fluid is unacceptable. See Section 12 to determine the course of action to address the leakage.

4. Check the fluid level in the master cylinder with the collective in the “park” position. The Master Cylinder features a transparent lid through which the fluid level can be checked. Hydraulic fluid level must be within the Min/Max circle (reference Figure 12.1.1).

5. Check the hydraulic release system for air by pulling each lever firmly until it bottoms out. Check the push rod position (reference Figure 12.3.5). If some of the green ring on the push rod is visible, the system is adequately bled. If some of the green on the push rod is NOT visible with the lever completely pulled, the system has too much air in it and must be bled, see Section 12 for bleeding instructions.

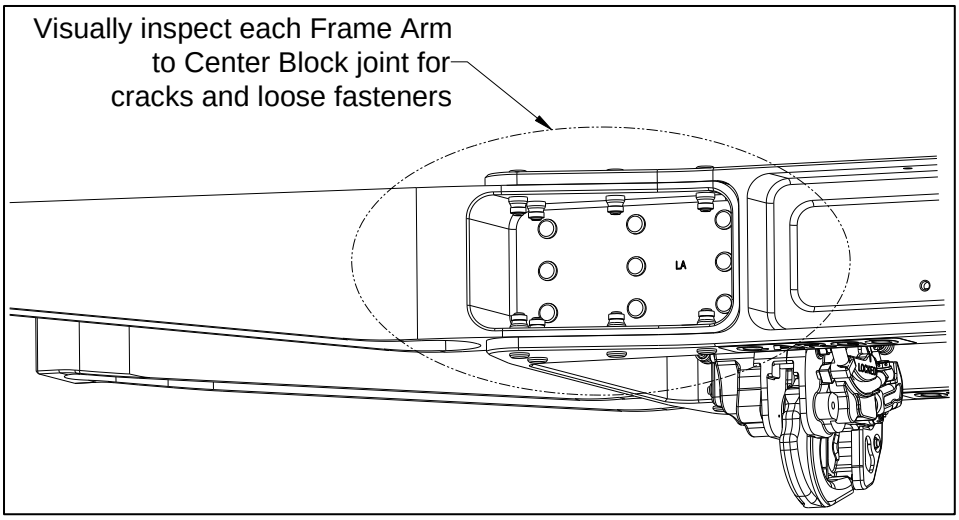
6. Move each cargo hook throughout its full range of motion and observe the hydraulic hose and electrical harnesses to ensure that they have enough slack. The hoses or harnesses must not be the stops that prevent the cargo hook from moving freely in all directions.

7. Visually inspect each cargo hook for presence and security of fasteners.

8. Visually inspect each cargo hook housing and load beam for corrosion, cracks and damage. If damage is observed refer to the cargo hook CMM for limits.

9. Visually inspect the Cargo Hook Frame Assembly for corrosion, cracks, and damage with emphasis on each joint between the Frame Arms and Center Block (ref Figure 5.1.5). If damage is observed, refer to Section 5.2 herein.

Figure 5.1.5 Frame Arm/Center Block Joint



10. Visually inspect for presence and security of the four (4) quick release pins attaching the frame assembly to the hardpoints on the belly.

11. Remove the Fairing from the belly of the helicopter and visually inspect it for damage.

12. Visually inspect each external electrical harness and its connectors at the bracket on the belly for damage and security.

13. Visually inspect each hydraulic hose and its connection at the cargo hook and its connection at the mating connector on the bracket at the belly for damage and security.

5.2 5 Year/1000 Hour Inspection

Every 5 years or 1000 hours of external load operations, whichever comes first, remove the Cargo Hook/Frame Assembly from the aircraft, disassemble and inspect per this section.

If the load weigh system is present, return the Pin Load Cell Assembly (1) to the factory for inspection and calibration. The factory will inspect the condition of the load cell and perform acceptance test procedures including calibration and zero balance, repairing as necessary.

Refer to Figure 5.2.1 through Figure 5.2.5 for part identification for the numbers referenced in parentheses ( ).

5.2.1 Removal from Aircraft

1. Remove the Fairing (43) from the belly of the helicopter by disengaging the four ¼ turn fasteners and sliding it aft while pivoting the aft end downward.

2. Disconnect the two electrical release connectors, load cell connector (if installed) and the two hydraulic hose fittings at the bracket on the belly.

3. Remove the Cargo Hook Frame Assembly per the following.

    - Removing the safety pins (20) from the ends of the quick release pins (7) at the four Lug Assemblies on the belly of the helicopter.

    - With two people (on at each side) or a floor jack to support the frame, remove the quick release pins from each attachment to the Lug Assemblies and carefully lower the Frame Assembly straight down.

5.2.2 Disassembly

1. Remove all spiral wrap from around the hoses and electrical harnesses.

2. Remove the two cushioned loop clamps (24, 25) that secure the hoses and harnesses to the Frame Assembly (3).

3. Remove the cotter pins (19) at the Cargo Hook (8) and HEC Hook (10) attach points and remove the nuts (18), and washers (16, 17). Remove the attach bolt (4) from the HEC Hook and the Pin Load Cell (1) at the Cargo

Hook. Note: If the Pin Load Cell (1) is not installed at the Cargo Hook, it is replaced by an attach bolt (4) and washer (16) under the attach bolt head.

4. Remove the four nuts (15), washers (14), and bolts (13) attaching each Attach Point Assembly (2) to the Frame Assembly.

5. Disassemble the Cargo Hook Attach Point (2): remove the cotter pin (2.7) and nut (2.8) from the end of the bolt (2.6) and slide the bolt out, separating the Pivot Link (2.5) from the Pillow Block (2.4).

6. Remove the bushings (2.2 and 2.3) if they are outside of their wear limits as defined Table 5.2.1.

7. Remove the inspection panels on the aircraft to visually inspect the Keel Beam Fittings (31, 32). The Lug Assemblies (29) and Keel Beam Fittings do not need to be removed unless damage outside of the limits is observed.

Figure 5.2.1 Installation Overview

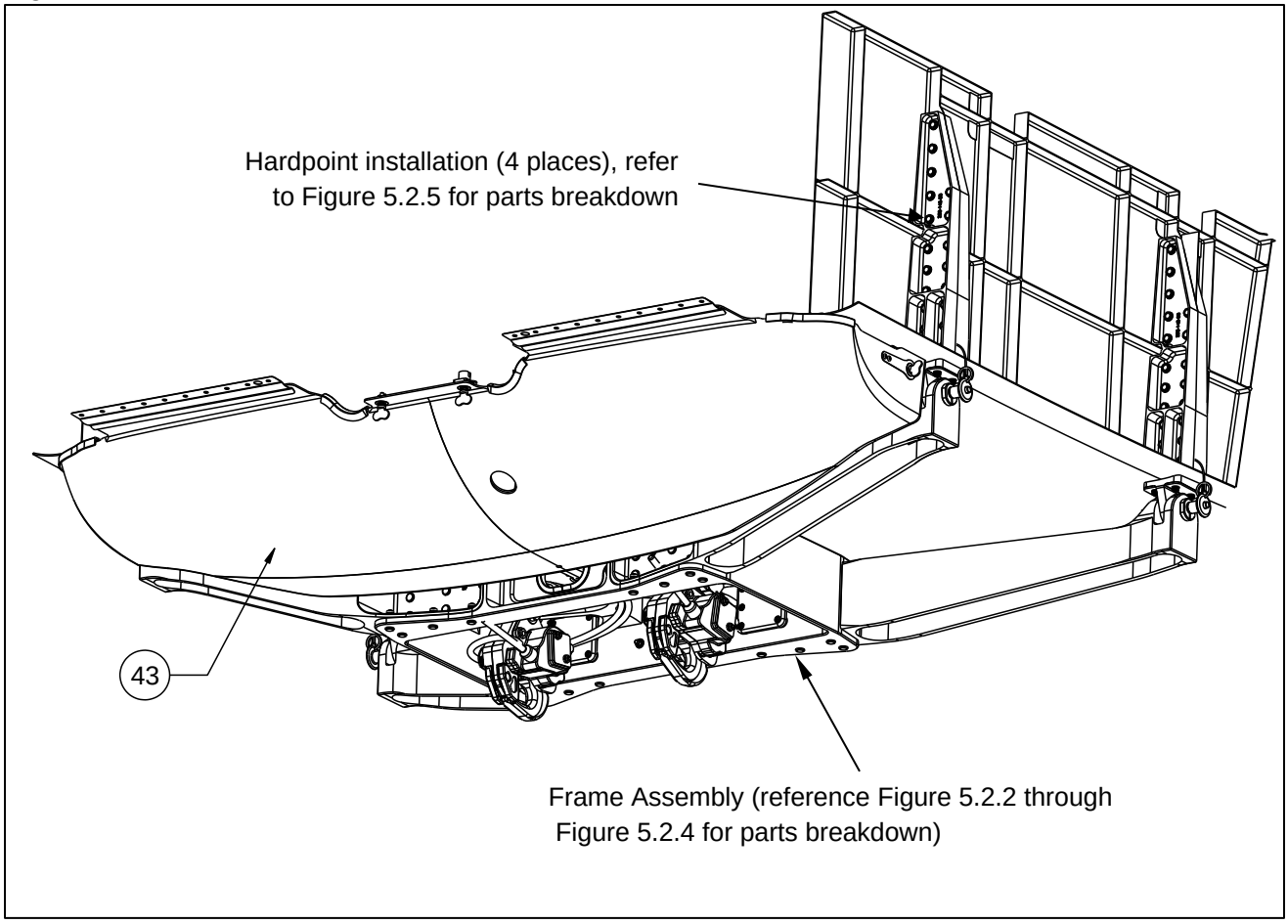


Figure 5.2.2 Frame Assembly (P/N 232-892-00, -01) Parts

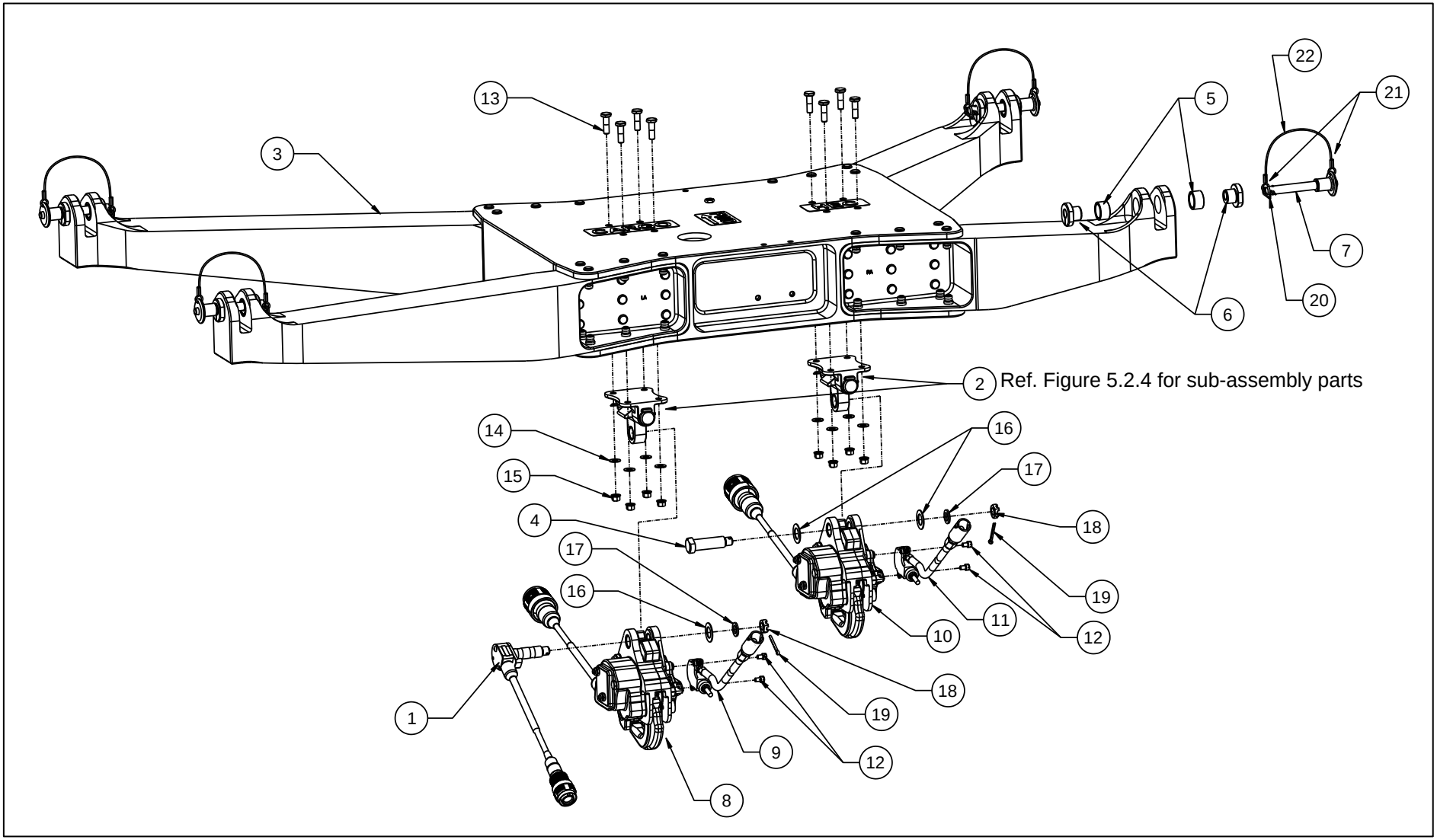


Figure 5.2.3 Frame Assembly Hardware for Hose and Harness Routing

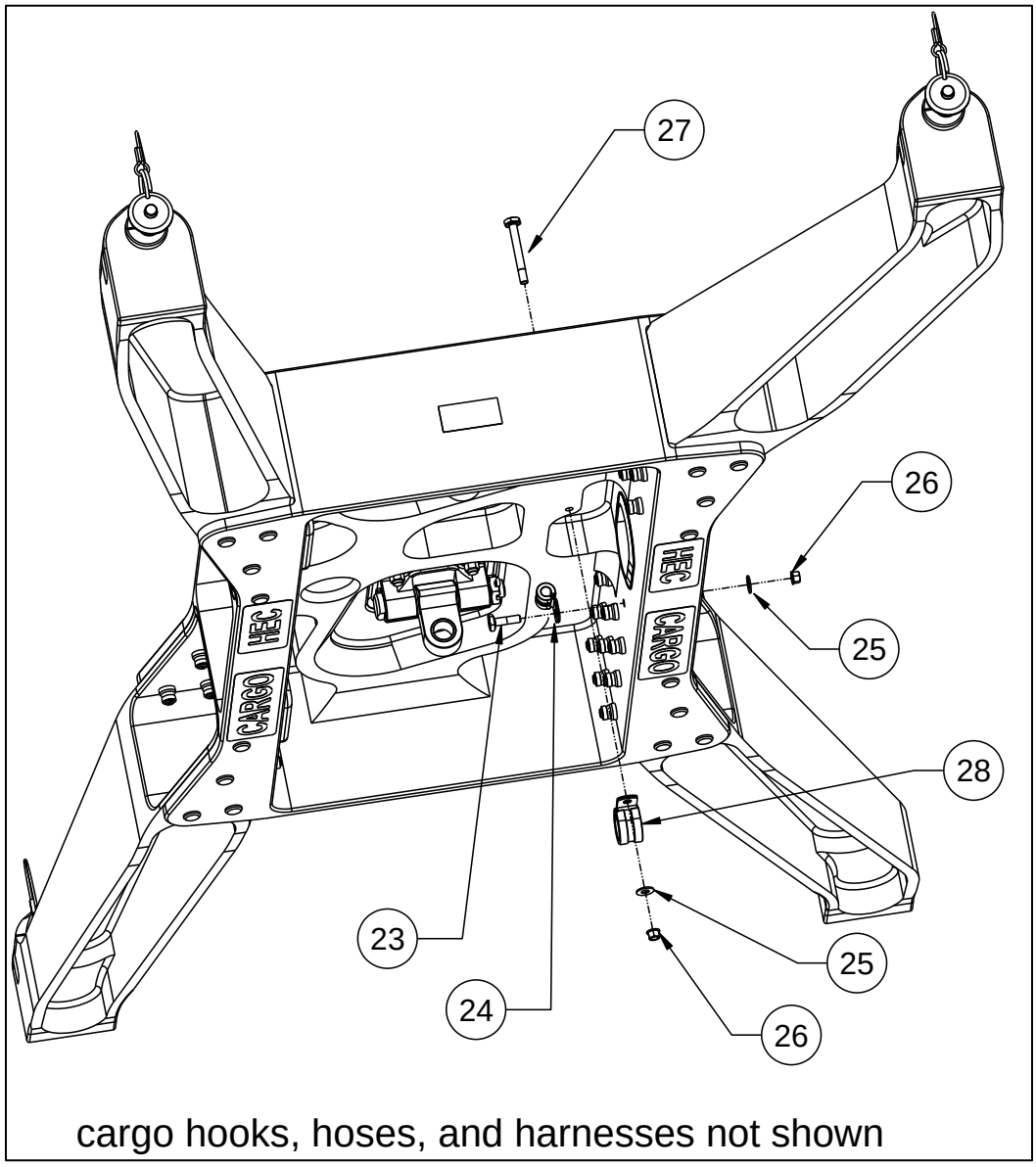


Figure 5.2.4 Attach Point Assembly

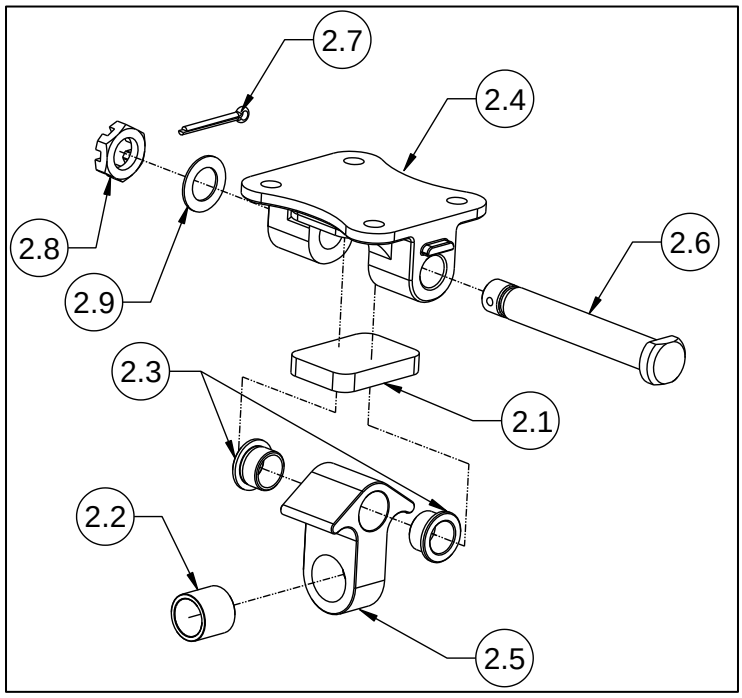
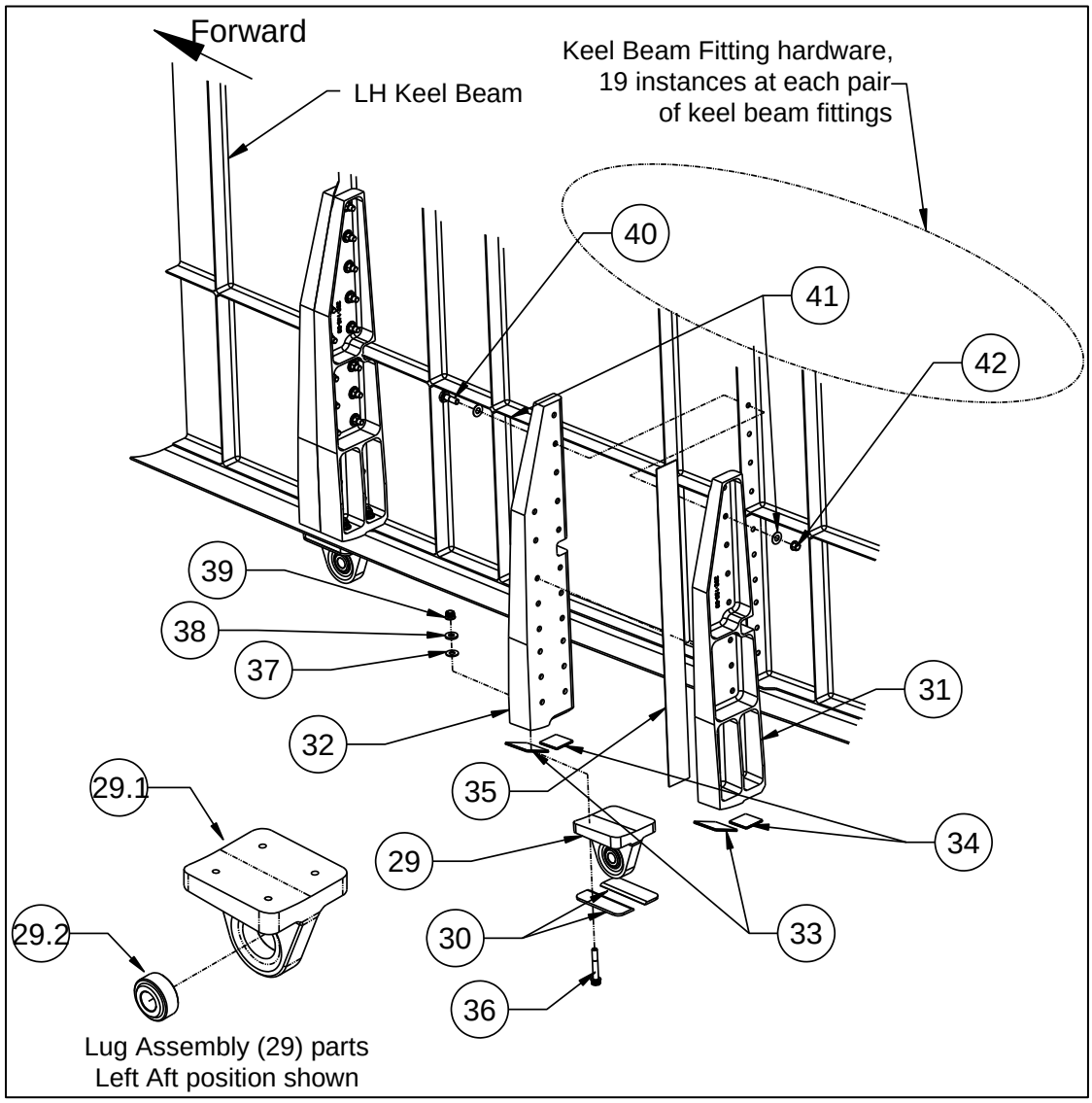


Figure 5.2.5 Hardpoint Installation Parts*



NOTICE

**If a retrofit kit (P/N 200-493 series or 200-494 series) is installed, the hardpoint parts of the Bell type certificate installation are used. Refer to the Bell maintenance documentation for inspection/maintenance requirements for these parts.*

Item	Part No.	Description	Qty
1	210-327-00	Pin Load Cell Assembly	1
2	232-875-00	Cargo Hook Attach Point Assembly	2
2.1	220-053-00	Bumper, Attach Point	1
2.2	290-364-00	Bushing	1
2.3	291-486-00	Flanged Bushing	2
2.4	292-166-00	Pillow Block	1
2.5	292-167-00	Pivot Link	1
2.6	292-168-00	Attach Bolt .4375	1
2.7	510-222-00	Cotter Pin	1
2.8	511-015-00	Nut	1
2.9	511-252-00	Washer	1
3	232-890-00	Frame	1
4	290-332-01	Attach Bolt	1
5	292-163-00	Bushing	8
6	292-164-00	Eccentric Bushing	8
7	292-165-00	Quick Release Pin	4
8	528-028-05	Cargo Hook Assembly, Primary	1
9	232-899-00	Slave Cylinder with Plumbing, Primary	1
10	528-028-06	Cargo Hook Assembly, HEC	1
11	232-902-00	Slave Cylinder with Plumbing, HEC	1
12	510-531-00	Screw	4
13	510-447-00	Bolt	8
14	510-100-00	Washer	8
15	510-114-00	Nut	8
16	510-497-00	Washer	4
17	510-870-00	Washer	2
18	510-780-00	Nut	2
19	510-178-00	Cotter pin	2
20	514-048-00	Locking Safety Pin	4
21	531-016-00	Crimp Sleeve	8
22	531-015-00	Cable (lanyard)	4 @ 5.5” lg.
23	510-335-00	Bolt	1
24	512-010-00	Cushioned Loop Clamp	1
25	510-419-00	Washer	2
26	510-102-00	Nut	2
27	511-270-00	Bolt	1
28	512-071-00	Cushioned Loop Clamp	1
29*	232-886-00	Lug Assembly, FWD	2
29.1	292-153-00	Lug, FWD	1
29.2	517-059-00	Spherical Bearing	1
29*	232-887-00	Lug Assembly, Left, Aft	1
29.1	292-153-00	Lug, Left, Aft	1
29.2	517-059-00	Spherical Bearing	1

29*	232-888-00	Lug Assembly, Right, Aft	1
29.1	292-153-00	Lug, Left, Right, Aft	1
29.2	517-059-00	Spherical Bearing	1
30*	235-318-00	Radius Block	8
31*	292-146-00	Keel Beam Fitting, Left, Fwd, Rear	1
	292-148-00	Keel Beam Fitting, Right, Fwd, Rear	1
	292-150-00	Keel Beam Fitting, Left, Aft, Rear	1
	292-152-00	Keel Beam Fitting, Right, Aft, Rear	1
32*	292-145-00	Keel Beam Fitting, Left, Aft, Front	1
	292-147-00	Keel Beam Fitting, Right, Fwd, Front	1
	292-149-00	Keel Beam Fitting, Left, Aft, Front	1
	292-151-00	Keel Beam Fitting, Right, Aft, Front	1
33*	292-156-00	Shim, Outboard	8
34*	292-157-00	Shim, Inboard	8
35*	235-317-00	Laminated Shim	4
36*	511-321-00	Bolt	16
37*	510-419-00	Washer	16
38*	510-785-00	Washer	16
39*	511-273-00	Nut	16
40*	510-456-00	Bolt	76
41*	510-910-00	Washer	152
42*	510-478-00	Nut	76
43	232-894-00	Fairing Assembly	1

*If a retrofit kit (P/N 200-493 series or 200-494 series) was installed, these are Bell TC parts. Refer to the applicable Bell documentation for the Bell part numbers and the maintenance/inspection requirements.

Carefully inspect detail parts in accordance with the instructions in Table 5.3.2. Inspect the parts in a clean, well-lighted room using standard dimensional measuring tools and visual methods. Repair parts found within inspection limits. Replace any part found beyond limits.

If the load weigh system is present, return the Pin Load Cell Assembly (1) to the factory for inspection and calibration. The factory will inspect the condition of the load cell and perform acceptance test procedures including calibration and zero balance, repairing as necessary.

Table 5.2.1 Inspection Criteria for Frame Assembly/Fairing

Seq	Component	Inspection Criteria and Limit	Repair Action	Finish
1.	Cargo Hook (8, 10)	Refer to CMM 122-015-00		
2.	Pin Load Cell (1)	Wear on OD – 0.495 in. (12.57 mm)	None	N/A
3.	Attach Bolt (4)	Wear on OD – 0.495 in. (12.57 mm)	None	N/A
4.	Bumper (2.1)	Cut or Tear > .04 in. [1.0 mm] deep Missing portion > .04 in. [1.0 mm] in any direction.	None	N/A
5.	Pillow Block (2.4)	Nicks, dents, scratches, corrosion – 0.030 in. (0.254 mm) deep	If > .010 in. [0.25 mm]: Blend at 20:1 ratio, length to depth, to provide smooth transitions.	Passivate per AMS-QQ-P-35 or ASTM A967.
		Wear on ID: Ø.439 in. [11.15 mm] Visual cracks	None.	N/A
6.	Pivot Link (2.5)	Nicks, dents, scratches, corrosion – 0.030 in. (0.254 mm) deep	If > .010 in. [0.25 mm]: Blend at 20:1 ratio, length to depth, to provide smooth transitions.	Passivate per AMS-QQ-P-35 or ASTM A967.
		Visual cracks	None.	N/A
7.	Attach Bolt (2.6)	Wear on OD: < Ø .4335 in. [11.01 mm] Visual cracks	None	N/A
8.	Bushing (2.2)	Wear on ID: 0.520 in. (13.21 mm)	None.	N/A
9.	Frame Assembly (3) (Center Block and Frame Arms)	Dents, gouges, scratches, and corrosion > .030 in. [0.76 mm] deep	If > .010 in. [0.25 mm]: Blend at 20:1 ratio, length to depth, to provide smooth transitions.	Apply to affected area: Alodine: MIL-DTL-5541, Primer: MIL-PRF-23377 or equivalent. Top-Coat: MIL-PRF-85285 Type 1 or equivalent.

Seq	Component	Inspection Criteria and Limit	Repair Action	Finish
		Visual cracks	None	N/A
	Frame Assembly (3) CARGO and HEC Decals	Illegible, peeling	None	N/A
10.	Eccentric Bushing (6)	Wear on ID: > Ø .386 in. [9.80 mm] Wear on OD: < Ø .614 in. [15.60 mm] Wear on Flange: < .220 in. [5.59 mm]	None	N/A
11.	Quick Release Pin (7)	Wear on OD: < Ø .370 in. [9.40 mm] Visual cracks on (Ø .375 in. [9.53 mm]) pin surface Ball detents do not extend to locked position.	None	N/A
12.	Lug (29.1)	Dents, gouges, scratches, and corrosion greater than .030 in. [0.76 mm] deep	If > .010 in. [0.25 mm]: Blend at 20:1 ratio, length to depth, to provide smooth transitions.	Apply to affected area: Alodine: MIL-DTL-5541, Primer: MIL-PRF-23377 or equivalent. Top-Coat: MIL-PRF-85285 Type 1 or equivalent.
		Visual cracks	None	N/A
13.	Spherical Bearing (29.2)	Wear on ID: > Ø .377 in. [9.58 mm] Ball seized in outer ring Noticeable play between ball and outer ring.	None	N/A
14.	Keel Beam Fitting (31, 32)	Dents, gouges, scratches, and corrosion greater than .030 in. [0.76 mm] deep	If > .010 in. [0.25 mm]: Blend at 20:1 ratio, length to depth, to provide smooth transitions.	Apply to affected area: Alodine: MIL-DTL-5541, Primer: MIL-PRF-23377 or equivalent.
15.	Fairing Assembly (43)	Scratches or scuffs of any length that have penetrated through the paint and primer finish, but have not penetrated into the composite laminate	None.	Primer per MIL-PRF-23377, Type II, Class C1 or equivalent
		Scratches, scuffs, gouges, cracks, or dents of any length which have penetrated the laminate by less than .018 in. [0.45mm]	Coat with Hysol EA9394, sand and blend after 24 hours cure.	Primer per MIL-PRF-23377, Type II, Class C1 or equivalent

Seq	Component	Inspection Criteria and Limit	Repair Action	Finish
		Reference Figure 5.2.6, Zone 1: Scratches, scuffs, gouges, cracks, or dents maximum 2.5 in. [63.5mm] in length, and deeper than .018in. [0.45mmm], but that has NOT penetrated through the entire laminate	1. Scarf laminate with a gradual transition to .38in. - .50 in. [9.7mm – 12.7mm] on either side of the damaged area as shown in Figure 5.2.7. 2. Apply film adhesive to the scarfed area. 3. Lay up replacement material according to guidance in Figure 5.2.8. If using dry fabric, 3K2X2 twill carbon fiber comparable to AX5201M is acceptable. 4. Wet out fabric with EA956 adhesive. 5. Cure laminate at 150°F for 3 hours. 6. Sand repaired area, blending into the surrounding geometry.	Primer per MIL-PRF-23377, Type II, Class C1 or equivalent
		Reference Figure 5.2.6, Zone 1: Any damaged area longer than 2.5 in. [63.5mm] or that has penetrated through the entire laminate	Replace Fairing Assembly	N/A
		Reference Figure 5.2.6, Zone 2: Scratches, scuffs, gouges, cracks, or dents of any length which have penetrated the laminate by less than .050 in. [1.27mm]	Coat with Hysol EA9394, sand and blend after 24 hours cure.	Primer per MIL-PRF-23377, Type II, Class C1 or equivalent

Seq	Component	Inspection Criteria and Limit	Repair Action	Finish
		Reference Figure 5.2.6, Zone 2: Scratches, scuffs, gouges, cracks, or dents maximum 2.5 in. [63.5mm] in length and deeper than .050 in. [1.27mm]	1. Scarf laminate with a gradual transition to .38 in. - .50in. [9.7mm – 12.7mm] on either side of the damaged area as shown in Figure 5.2.7 2.Apply film adhesive to the scarfed area. 3. Layup replacement material according to guidance in Figure 5.2.8. If using dry fabric, 3K2X2 twill carbon fiber comparable to AX5201M is acceptable. 4. Wet out fabric with EA956 adhesive. 5. Cure laminate at 150°F for 3 hours. 6. Sand repaired area, blending into the surrounding geometry.	Primer per MIL-PRF-23377, Type II, Class C1 or equivalent
		Reference Figure 5.2.6, Zone 2: Any damaged area longer than 2.5 in. [63.5mm] or that has penetrated through the entire laminate	Replace Fairing Assembly	N/A
16.	Fasteners (nuts, bolts, cotter pins, washers, etc.)	Wear, corrosion or deterioration	None	N/A

Figure 5.2.6 Fairing Repair Zones

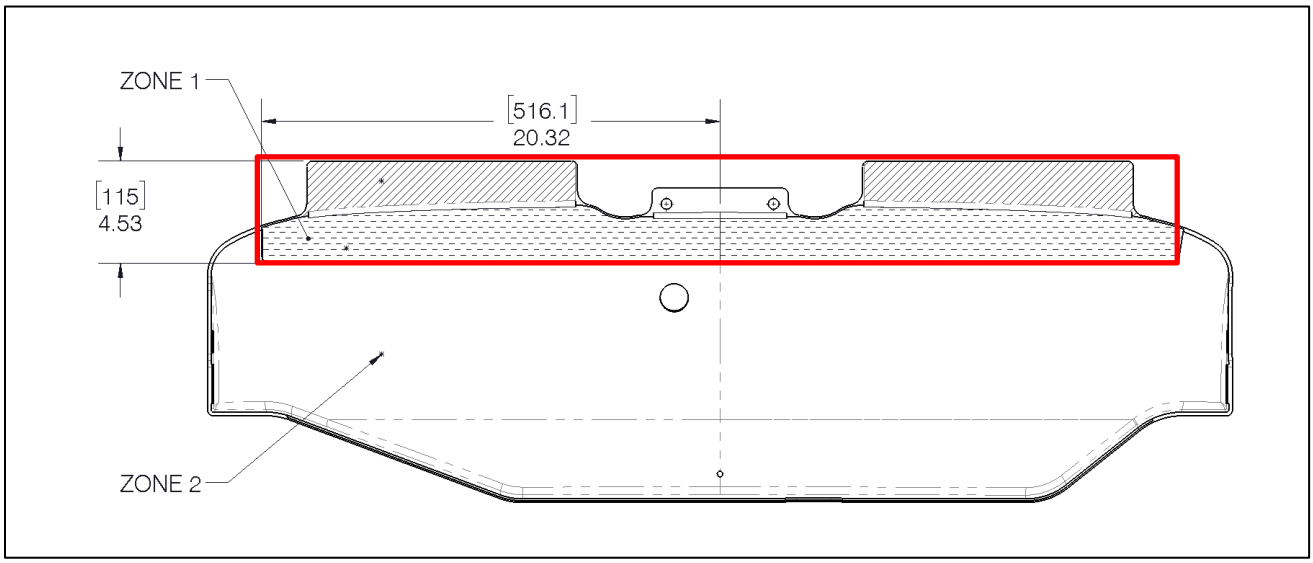


Figure 5.2.7 Typical Scarf Joint Repair Diagram

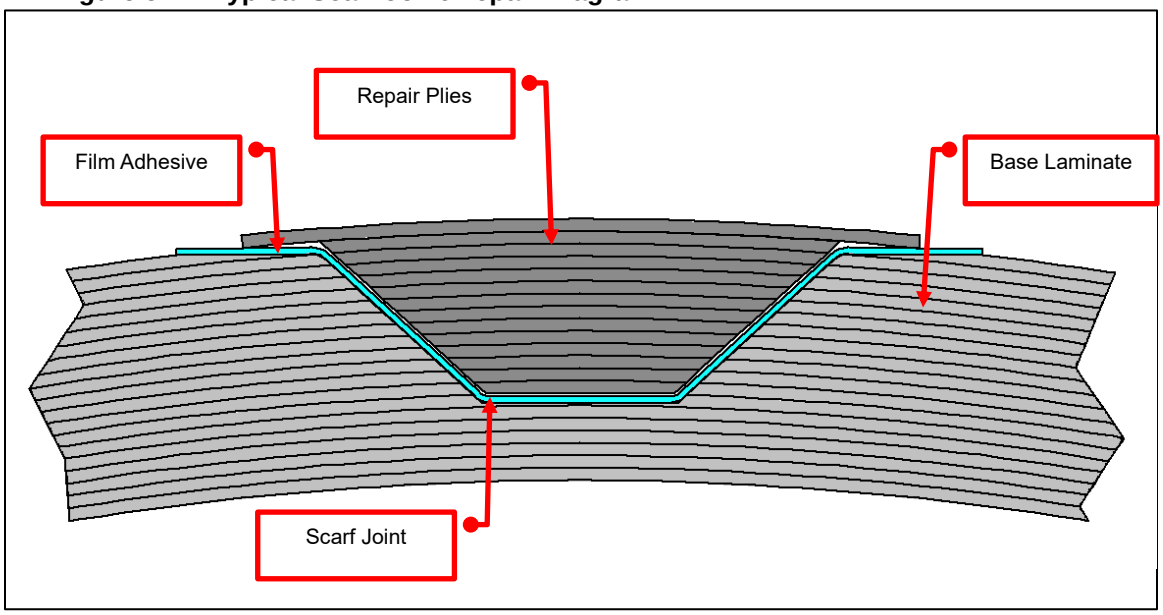


Figure 5.2.8 Fairing Material Detail

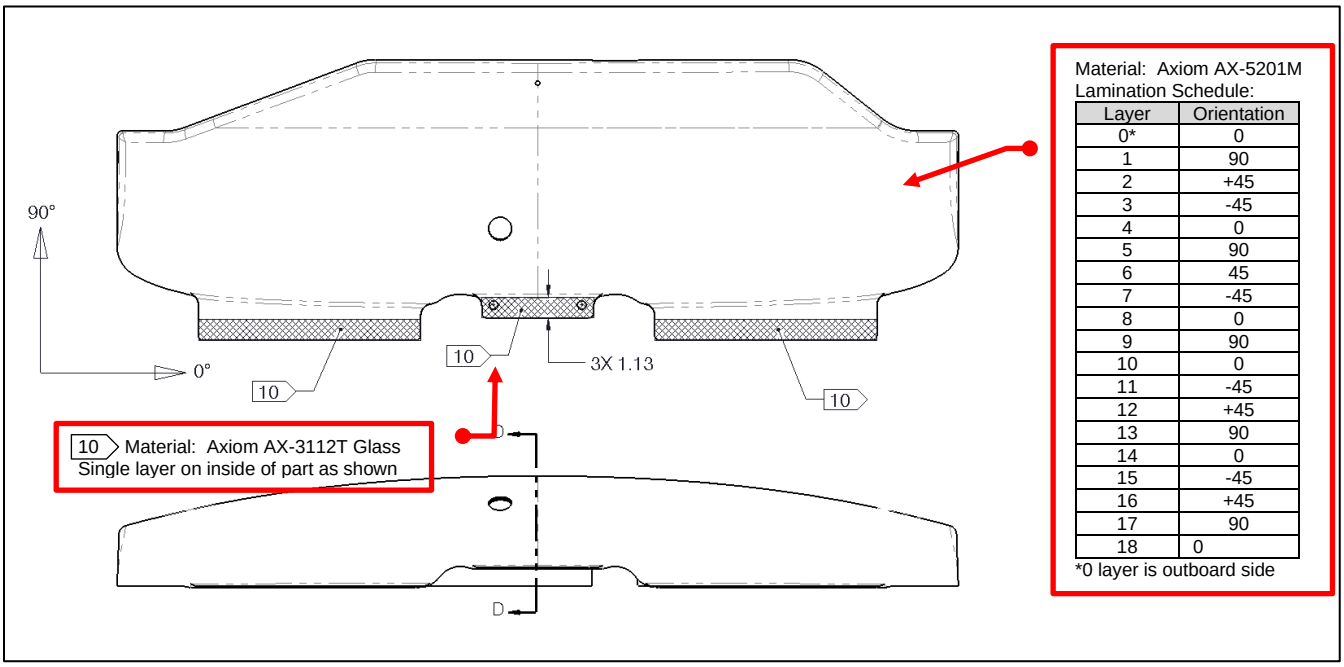


Figure 5.2.9 Fairing Laminate Detail

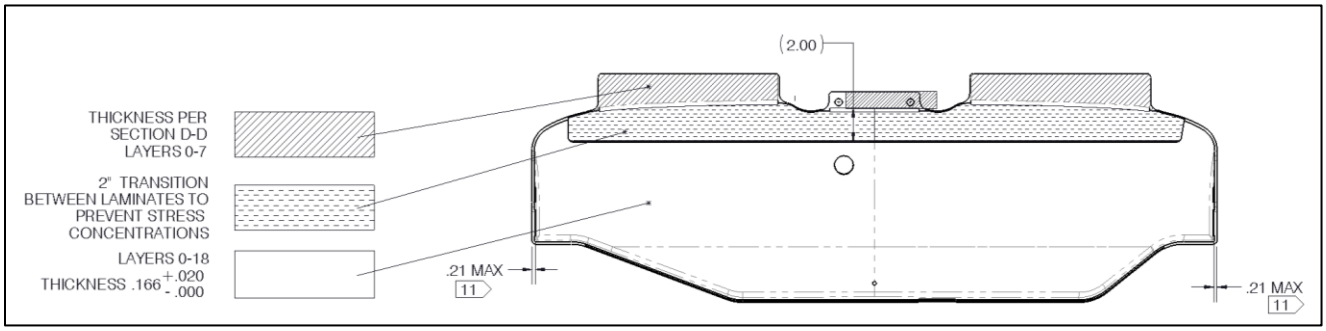
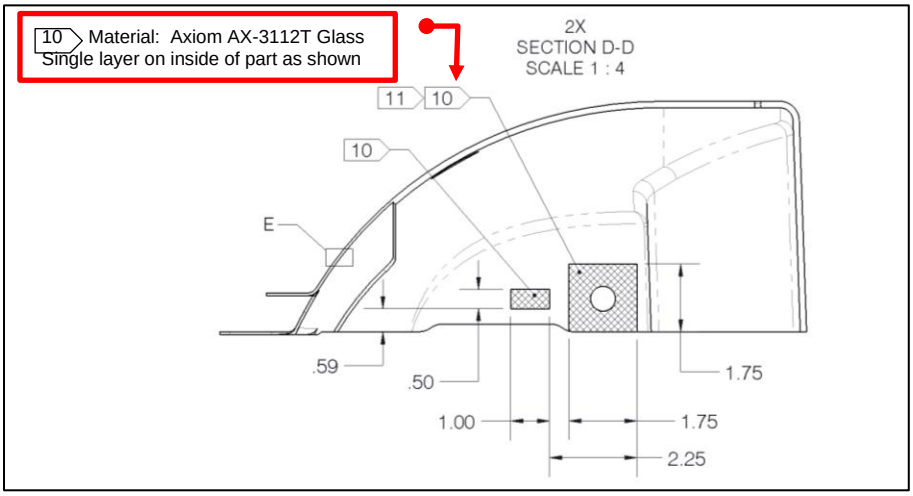


Figure 5.2.10 Fairing Section D-D



5.2.3 Re-assembly

Re-assemble the Attach Point Assemblies:

1. If bushings (2.2, 2.3) in the Pivot Link required replacement, press in new bushings with primer (MIL-PRF-23377, Type II, Class C).
2. If the bumper (2.1) requires replacement, assemble the new bumper into the pocket of the Pillow Block (6.4) with sealant (P/S 870 Class B).
3. Apply grease to the shank of the Attach Bolt (2.6).
4. Position the Pivot Link w/ bushings within the lugs of the Pillow Block and insert the Attach Bolt through from the side as shown in Figure 5.2.3, aligning the flat of the bolt with the “key” on the Pillow Block.
5. Position the washer (2.9) over the end of the Attach Bolt, thread the nut (6.8) on until seated and then rotate to next castellation to install cotter pin (2.7).

Re-assemble each Attach Point Assembly onto the Frame Assembly:

6. Position the Attach Point Assembly on the underside of the Frame Assembly with the Attach Bolt (2.6) head aft.
7. Apply a low-adhesion sealant (PR-1773) to the bolt (10) shanks and a small bead to perimeter of the side of the Pillow Block that goes up against the underside of the Frame Assembly. The Pillow Blocks are intended to be electrically bonded to the Frame Assembly so the sealant is to be limited to the perimeter of the faying surface.
8. Align the holes and insert four bolts (13) through from the top side.
9. Assemble washers (14) and nuts (15) over each bolt and tighten the nuts to 75-95 in-lbs. Fillet the sealant squeeze-out around the Pillow Block and encapsulate the bolt heads, nuts and washers with sealant.

Re-assemble the Cargo Hook and HEC Hook onto the Cargo Hook Attach Point Assemblies per Section 25.17.1.

If the spherical bearings (29.2) were removed, re-assemble into the Lugs (29.1):

10. Apply primer (Loctite 7471) and retaining compound (Loctite 640) to the bore of the Lug.
11. Apply retaining compound (Loctite 640) to the outside diameter of the spherical bearing.
12. Press the spherical bearing into the Lug with an arbor press or similar.

If a Lug Assembly or Keel Beam Fitting requires replacement, refer to the original installation instructions provided with the Dual Cargo Hook System.

5.3 Long Line Kit Inspection

Inspection of the long line kit includes a check before each use (not a maintenance activity) and an annual inspection. **Refer also to the manufacturer's Long Line User Manual. All of the manufacturer's inspection requirements must be observed.**

Items 1.1, 2, 3, 5, and 6 are critical safety items. Unauthorized repairs or modifications of these parts may have hazardous consequences.

For critical safety items, practice careful handling and protection against damage during handling and inspection.

The following figure shows the components of the long line kit P/N 200-490-XX. The Y-rope (item 1, 1.1) interfaces with the dual cargo hooks and is the only required component of the long line kit for carrying of HEC. For items connected below the Y-rope, locally approved alternate configurations may be used. If an alternate configuration is used refer to its maintenance documentation.

Figure 5.3.1 Long Line Kit

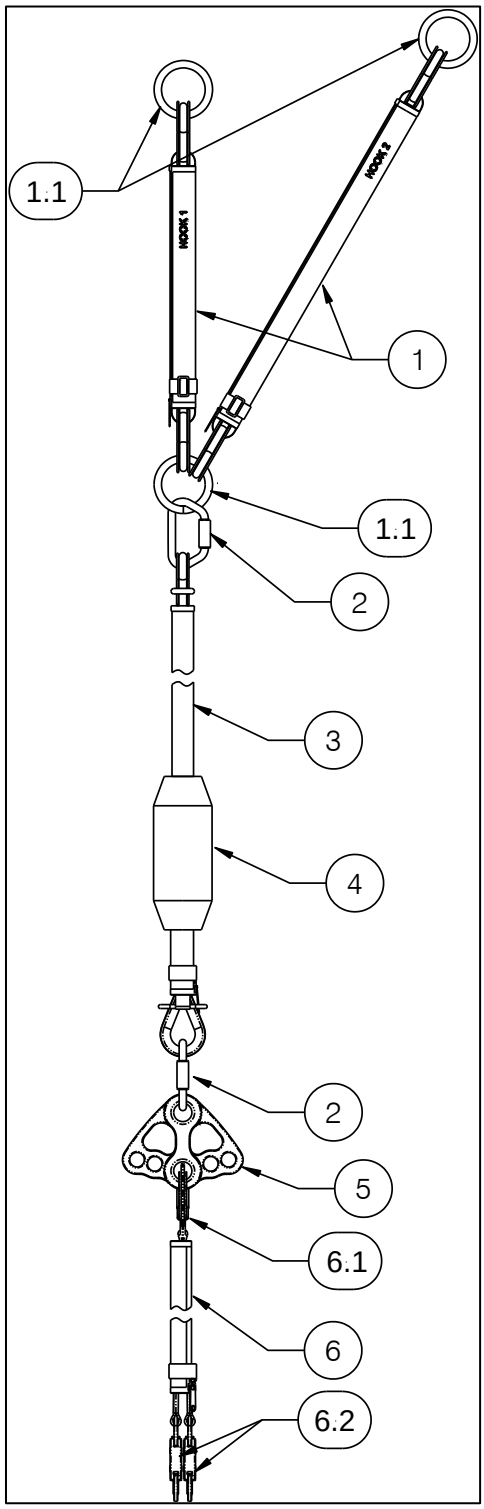


Table 5.3.1 Long Line Kit Components

Item	Part No.	Description	Qty
1	490-024-00	Y-rope	1
1.1	N/A**	Load Ring	3
2	530-031-00	Carabiner	2
3	490-023-XX*	Long Line	1
4	490-017-00	Weight Bag, 25 lb.	1
5	292-107-00	Rigging Plate	1
6	490-018-00	Lanyard	1
6.1	N/A**	Carabiner (Lanyard)	1
6.2	N/A**	Snap Hook (Lanyard)	2

*Long Line P/N is completed by replacing the “XX” with the length divided by 10, for example a 100-foot long line is P/N 490-023-10 and a 150-foot long line is P/N 490-023-15, etc.

**The Load Rings (1.1), Carabiner (6.1) and Snap Hooks (6.2) are integral to the Y-rope and Lanyard respectively.

Prior to a flight involving external load operations that includes use of long line kit components check the condition of the equipment and check the condition of the equipment after each use.

Use the criteria defined in the annual inspection as a guide for the check. Also, consult the Long Line User’s Manual provided by the rope manufacturer.

Annually inspect the long line kit components per the following.

Inspection of the Y-rope (1), Long Line (3), and Lanyard (6) must be conducted by a qualified person. In addition to the instructions below, consult the Long Line User's Manual provided by the rope manufacturer.

5.3.1 Y-rope Inspection

Inspect the Y-rope (1) per the following.

1. Open the covers and inspect them on the inside and outside per the following.
    - Loose, cut or pulled zipper stitching.
    - Torn, cut or otherwise damaged cover material.
    - Legibility and security of "CARGO" and "HEC" ID tags.
    - Condition and function of zipper.
    - Condition of strap and buckle at each end of cover.
    - Condition and function of hook and loop closure strap.
    - Legibility and security of ID tag.
2. Inspect each length of rope and the end terminations of the rope per the following.
    - Security of thimble, verify it is securely captured by the eye splice.
    - Condition of thimbles, inspect for signs of damage including corrosion, cracks, distortion, nicks, or rough surfaces.
    - Condition of the rope's lockstitch thread and whipping thread at each eye splice, inspect for broken, cut or frayed threads.
    - Legibility and security of ID tag.
    - Externally observed abrasion, cut strands or areas of extensive fiber breakage.
    - Fiber breakage, fused or melted fibers observed internally (observed by prying or twisting to open the strands). Remove from service if an estimated 10% of fiber in any strand or the rope as a hole is damaged.
    - Uniform fiber breakage along the length of rope such that the entire rope appears covered with fuzz or whiskers.

- Consistent diameter of the ropes. Measure the rope diameter in several locations and inspect for flat areas, bumps, or lumps. Remove from service if the diameter has been reduced by more than 10% in any area.
- Discoloration, brittle fibers and hard or stiff areas that may indicate chemical, ultraviolet or heat damage.
- Melted, hard or charred areas which may be evidence of excessive heat. Remove from service if areas in this condition affect more than 10% of the rope diameter or affect several adjacent strands along the length that affect more than 10% of strand diameters.
- Cleanliness of the ropes, stiffness of the ropes may indicate dirt or grit embedded within their fibers.
- Wear on Load Ring, inspect per criteria in Table 5.3.2.

5.3.2 Long Line Inspection

Inspect the Long Line (3) per the following.

Lay out the long line on a clean surface as it should be thoroughly inspected both visually and by feel over its entire length.

1. Unzip the cover and inspect it inside and outside per the following.
   - Loose, cut or pulled zipper stitching
   - Torn, cut or otherwise damaged loops (attaching each end of cover to thimbles).
   - Torn, cut or otherwise damaged cover material.
   - Condition and function of zipper.
   - Condition and function of hook and loop closure strap.
2. Inspect the rope and end terminations of the Long Line for the following.
   - Security of thimble, verify it is securely captured by the eye splice.
   - Condition of thimbles, inspect for signs of damage including corrosion, cracks, distortion, nicks, or rough surfaces.
   - Condition of the rope’s lockstitch thread and whipping thread at each eye splice, inspect for broken, cut or frayed threads.
   - Legibility and security of ID tag.

3. Along the entire length of the rope, inspect for the following.
    - Externally observed abrasion, cut strands or areas of extensive fiber breakage.
    - Fiber breakage, fused or melted fibers observed internally (observed by prying or twisting to open the strands). Remove from service if an estimated 10% of fiber in any strand or the rope as a hole is damaged.
    - Uniform fiber breakage along the length of rope such that the entire rope appears covered with fuzz or whiskers.
    - Consistent diameter of the rope. Measure the rope diameter in several locations and inspect for flat areas, bumps, or lumps. Remove from service if the diameter has been reduced by more than 10% in any area.
    - Discoloration, brittle fibers and hard or stiff areas that may indicate chemical, ultraviolet or heat damage.
    - Melted, hard or charred areas which may be evidence of excessive heat. Remove from service if areas in this condition affect more than 10% of the rope diameter or affect several adjacent strands along the length that affect more than 10% of strand diameters.
    - Cleanliness of the rope, stiffness of the rope may indicate dirt or grit embedded within its fibers.

5.3.3 Lanyard Inspection

Inspect the Lanyard (6) per the following.

1. Unzip the cover and inspect the inside and outside per the following.
    - Loose, cut or pulled zipper stitching
    - Loose, cut or pulled stitching of cover to webbing.
    - Torn, cut or otherwise damaged cover material.
    - Condition and function of zipper.
    - Condition and function of hook and loop closure strap.
2. Inspect the load carrying webbing material of the Lanyard Assembly for the following.
    - Legibility and security of ID tag.
    - Acid or caustic burns.
    - Holes, tears, cuts or snags.

- Broken or worn stitching in the load bearing splices.
- Excessive abrasive wear.
- Knots in any part of the sling.
- Discoloration and brittle or stiff areas on any part of the sling.

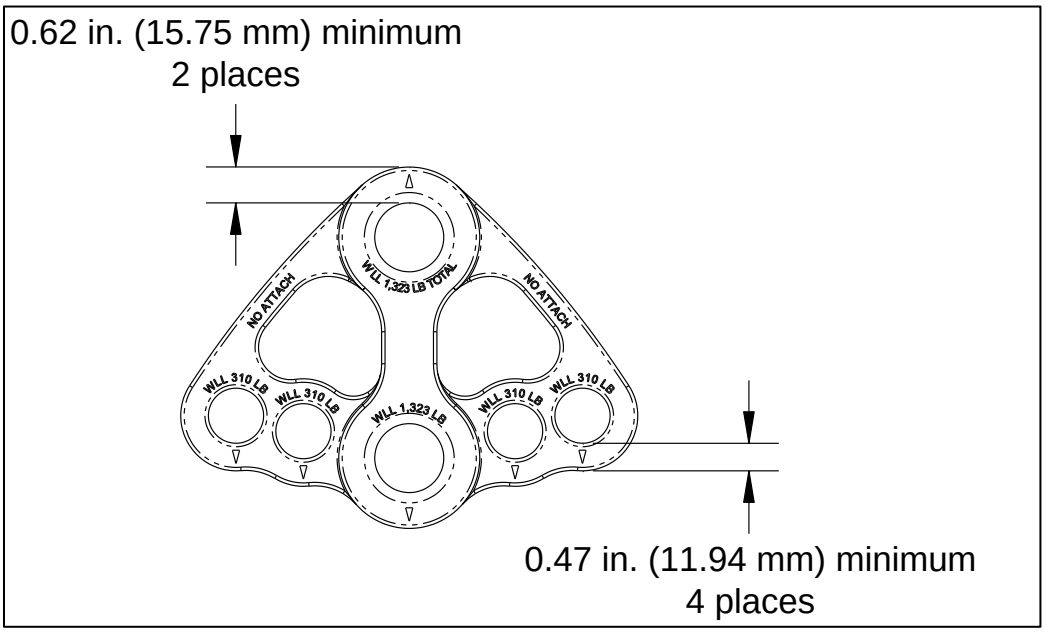
3. Inspect the captive carabiner and the two snap hooks of the Lanyard Assembly per Table 5.3.2.

Carefully inspect detail parts in accordance with the instructions in Table 5.3.2. Inspect the parts in a clean, well-lit room using standard dimensional measuring tools and visual methods. Repair parts found within inspection limits. Replace any part found beyond limits.

Table 5.3.2 Inspection Criteria for Long Line Kit

Seq	Component	Inspection Criteria and Limit	Repair Action	Finish
17.	Load Ring (1.1, integral to Y-rope Assembly)	Wear on inside of ring – minimum thickness of cross section of ring - 0.50 in. (12.7 mm)	Blend at 10:1 ratio as required to provide smooth transitions.	N/A
18.	Carabiner (2)	Nicks, dents, scratches, corrosion – 0.020 in. (0.127 mm) deep	Blend at 10:1 ratio as required to provide smooth transitions.	N/A
		Proper engagement of latching mechanism, 3-stage opening action should be free of any binding that may be an indication of deformation.	None.	N/A
19.	Rigging Plate (3)	Nicks, dents, scratches, corrosion – 0.020 in. (0.127 mm) deep	Glass bead blast at less than 30 PSI to remove corrosion.	Passivate per AMS-QQ-P-35 or ASTM A967
		Wear on inside diameter of holes for attachment to long line and loads. – See Figure 5.3.2.	None.	N/A
20.	Carabiner (6.1, integral to Lanyard)	Nicks, dents, scratches, corrosion – 0.020 in. (0.127 mm) deep.	Blend at 10:1 ratio as required to provide smooth transitions.	N/A
		Proper engagement and operation of latching mechanism, 3-stage opening action should be free of any binding that may be an indication of deformation.	None.	N/A
21.	Snap Hook (6.2, integral to Lanyard)	Nicks, dents, scratches, corrosion – 0.020 in. (0.127 mm) deep	Blend at 10:1 ratio as required to provide smooth transitions.	N/A
		Proper engagement and operation of gate mechanism, 2-stage opening action should be free of any binding that may be an indication of deformation.	None.	N/A

Figure 5.3.2 Rigging Plate Inspection Criteria



5.4 Cargo Hook Overhaul

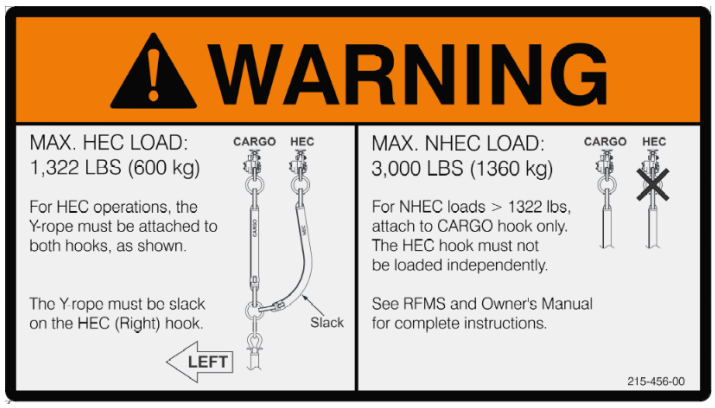
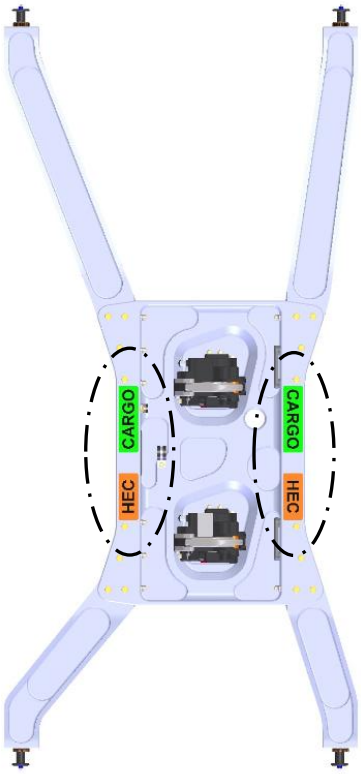
Time Between Overhaul (TBO) for the cargo hook: 1000 hours of external load operations or 5 years, whichever comes first.

Overhaul instructions for the cargo hook are contained in CMM 122-015-00. Contact Onboard Systems for guidance to locate authorized overhaul facilities.

Section 11 Placards and Markings

The following placards are included with the cargo hook kits

Table 5.4.1 Placards

Placard part number (P/N) and appearance	Location
P/N 215-456-00 	Located on belly of helicopter, adjacent to the cargo hook frame assembly.
P/N 215-459-00 – "HEC" Decal  P/N 215-460-00 – "CARGO" Decal 	Located on underside of Cargo Hook Frame (circled below). 

continued

Placard part number (P/N) and appearance	Location
Placard P/N 215-452-00 	Located on the collective mounted dual master cylinder's Cargo Hook release lever.
Placard P/N 215-452-00 	Located on the collective mounted dual master cylinder's HEC Hook release lever.
Placard P/N 215-452-00 	Located on the collective mounted dual master cylinder's lockout lever.
Placard P/N 215-451-00 	Located on the collective mounted dual master cylinder's mode selector lever.
Placard P/N 215-451-00 	Located on the collective mounted dual master cylinder's mode selector lever.

Section 12 Servicing

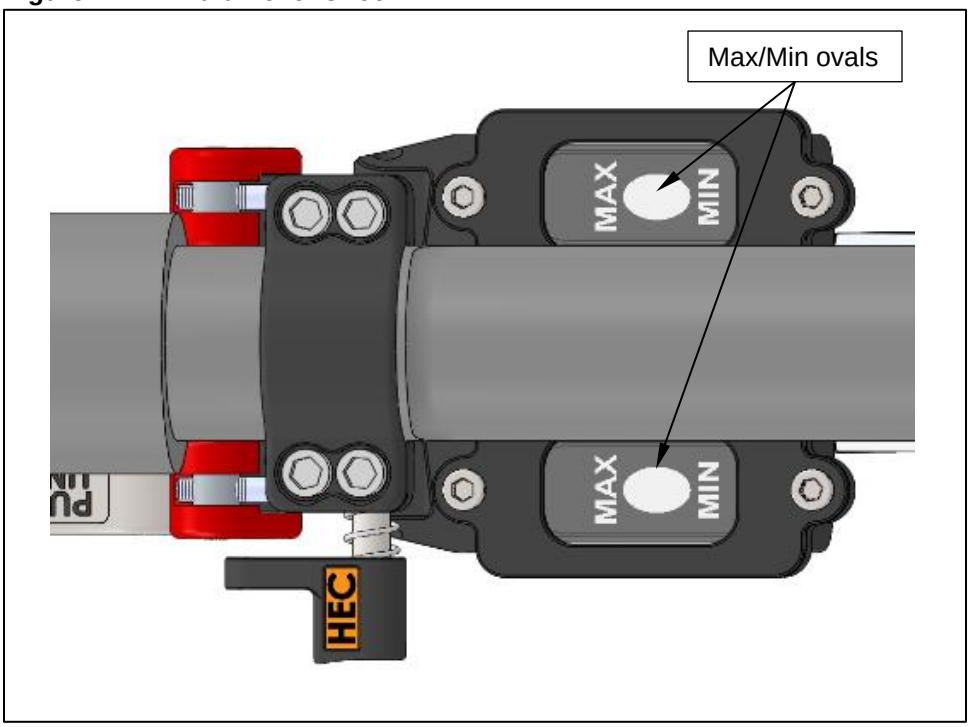
12.1 Maintenance of the Hydraulic Release System

The system is filled with fluid at installation and does not consume fluid unless it leaks out. If any leakage is detected, the fluid level should be immediately checked.

To check the fluid level:

1. Position the collective against the lower stop.
2. The Master Cylinder features a transparent lid through which the fluid level can be checked. Hydraulic fluid level should be within the Min/Max circle on the baffle plate within the reservoir (see Figure 12.1).
3. Remove lid and add MIL-PRF-87257 hydraulic fluid as required until the level is within the Min/Max circle.

Figure 12.1.1 Fluid Level Check



If leakage is noted around any plumbing fittings, the fittings may be tightened until the leakage quits. If leakage is noted around the pistons in either the master or slave cylinders the leaking cylinder must be repaired. See the instructions for repair in this section.

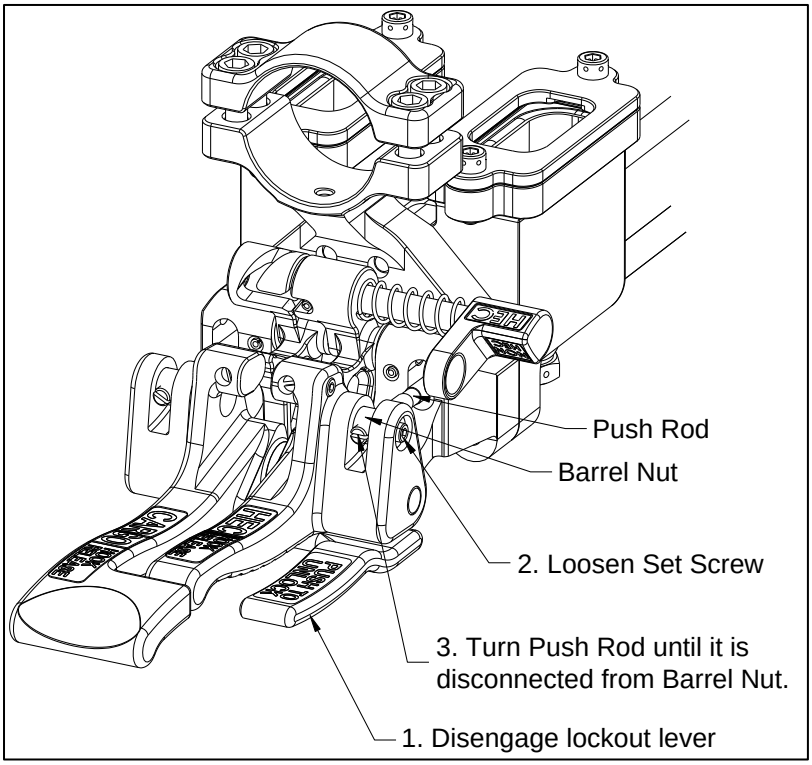
12.1.2 Master Cylinder Repair

If fluid is leaking around one of the pistons, the only repair is to remove and replace the cup seal and O-ring. The master cylinder must be disassembled, inspected and then re-assembled with new seals. Drain the hydraulic fluid from the system and remove the master cylinder from the aircraft.

Disassemble per the following.

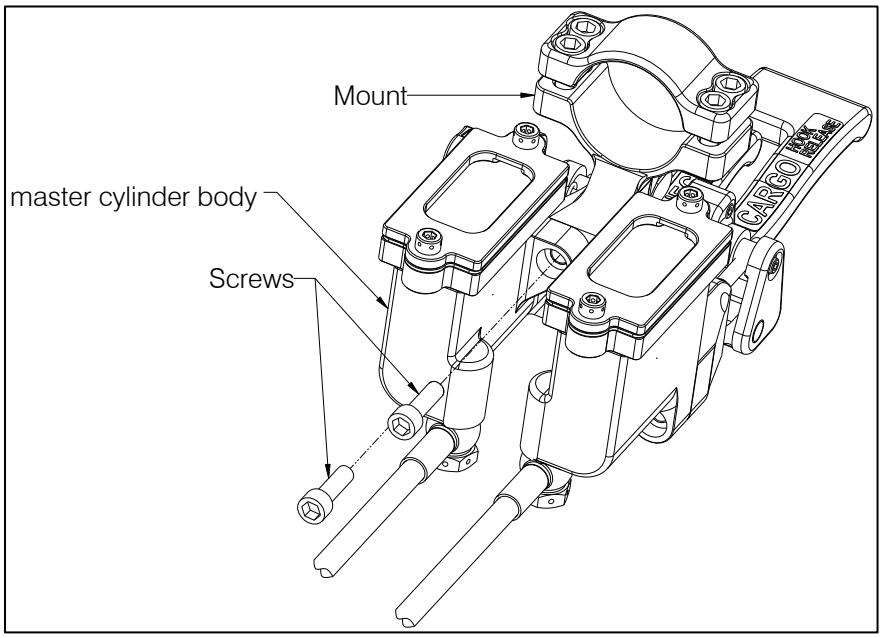
1. Loosen the set screw and disconnect barrel nut within from the push rod. See Figure 12.1.2.

Figure 12.1.2 Disconnecting Master Cylinder Levers



2. Separate the Master Cylinder body from the Mount by removing the two hex head screws (shown below).

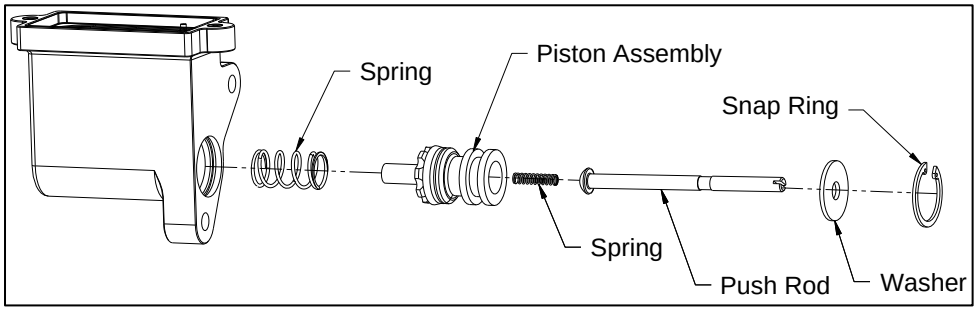
Figure 12.1.3 Separation of Master Cylinder Body



3. Remove snap ring from end of the master cylinder bore. Use caution when removing the snap ring since the piston is spring loaded against the washer and snap ring. The piston will pop out of the housing when the snap ring is removed.

4. Remove the piston assembly (piston, O-ring and cup seal) and springs. See Figure 12.1.4 for parts breakdown.

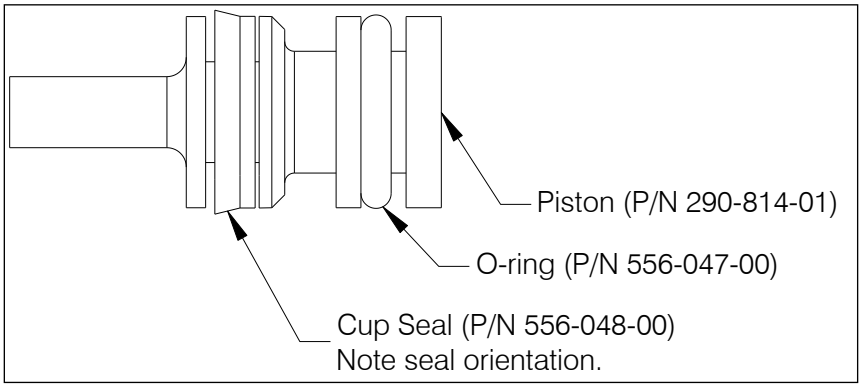
Figure 12.1.4 Piston Removal



5. Inspect the master cylinder bore for scratches. If any scratches or gouges are visible in the bore, the master cylinder must be replaced.

If the bore condition is acceptable replace the cup seal and O-ring on the piston and re-assemble per the following. Orient the cup seal as shown in Figure 12.1.5.

Figure 12.1.5 Seal Orientation



6. To prepare the piston assembly for insertion, lubricate the outside of the cup seal and O-ring and the master cylinder bore generously with hydraulic fluid.
7. Place the spring into the cylinder bore.
8. Pass the push rod through the washer.
9. Insert the small spring into the small bore on the outward facing side of the piston and insert the piston assembly into the bore. Use caution to avoid nicking the cup seal and O-ring.
10. Use the push rod to compress the spring and hold the piston in place while using snap ring pliers to install the snap ring.
11. Secure push rod threads by tightening the set screw.

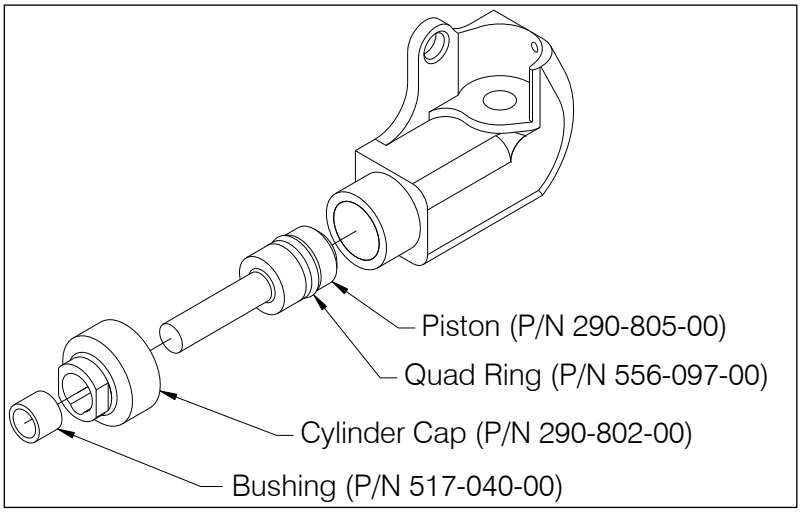
12.1.3 Slave Cylinder Repair

If the slave cylinder is leaking fluid around the piston rod, the only repair possible is to remove and replace the quad ring or cup seal (earlier production units of the slave cylinder assembly used a cup seal instead of the quad ring).

Disassemble the slave cylinder per the following.

1. Remove cap, piston, and seal (see Figure 12.1.6).
2. Inspect bore of slave cylinder for scratches or gouges. If any are present the assembly must be replaced.
3. Remove bushing in cap by pressing it out.
4. Remove quad ring (or cup seal) by stretching it over the piston.

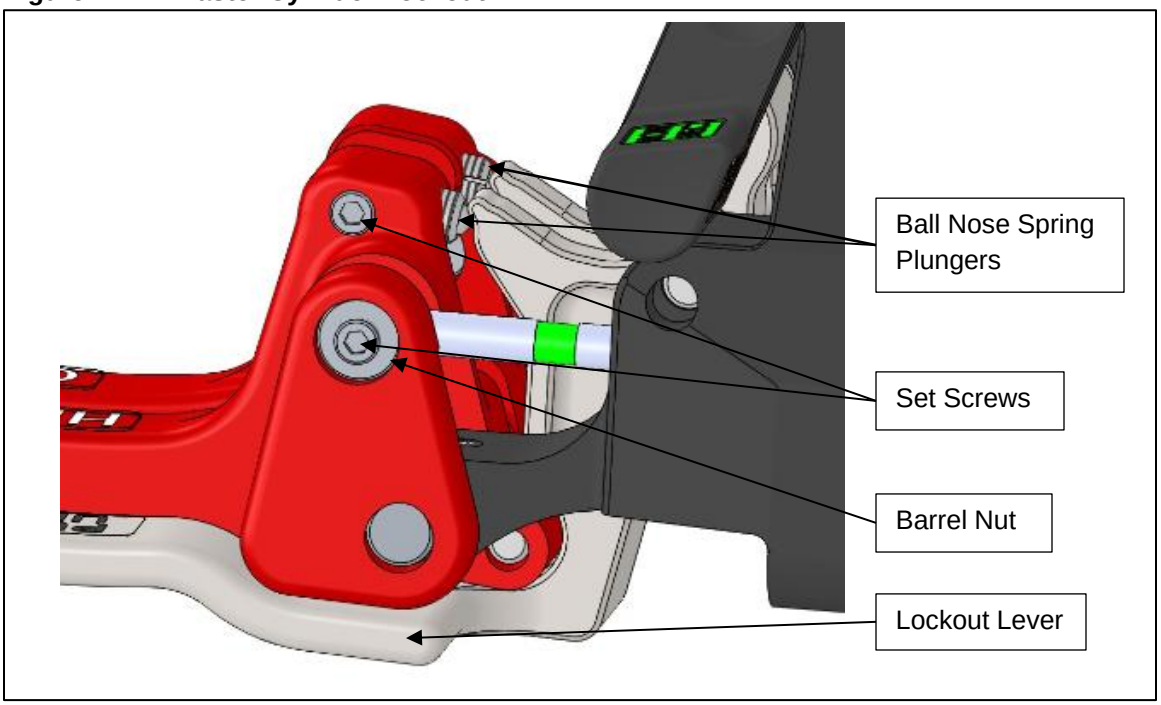
Figure 12.1.6 Slave Cylinder Piston Removal



12.2 Master Cylinder Lockout Adjustment

If the lockout levers are out of adjustment (either they fall to the unlocked position without actuation or they are bound and do not open easily), adjust them per the following instructions. The parts of the lockout adjustment are labeled in the figure below.

Figure 12.2.1 Master Cylinder Lockout



In NHEC mode, pushing down the lockout lever unlocks both levers. In HEC mode, pushing down the lockout lever unlocks only the HEC Hook Release lever. Pulling the HEC Hook Release lever then unlocks the Cargo Hook Release lever.

1. Set the Dual Master Cylinder into HEC mode (refer to Section 5.1).

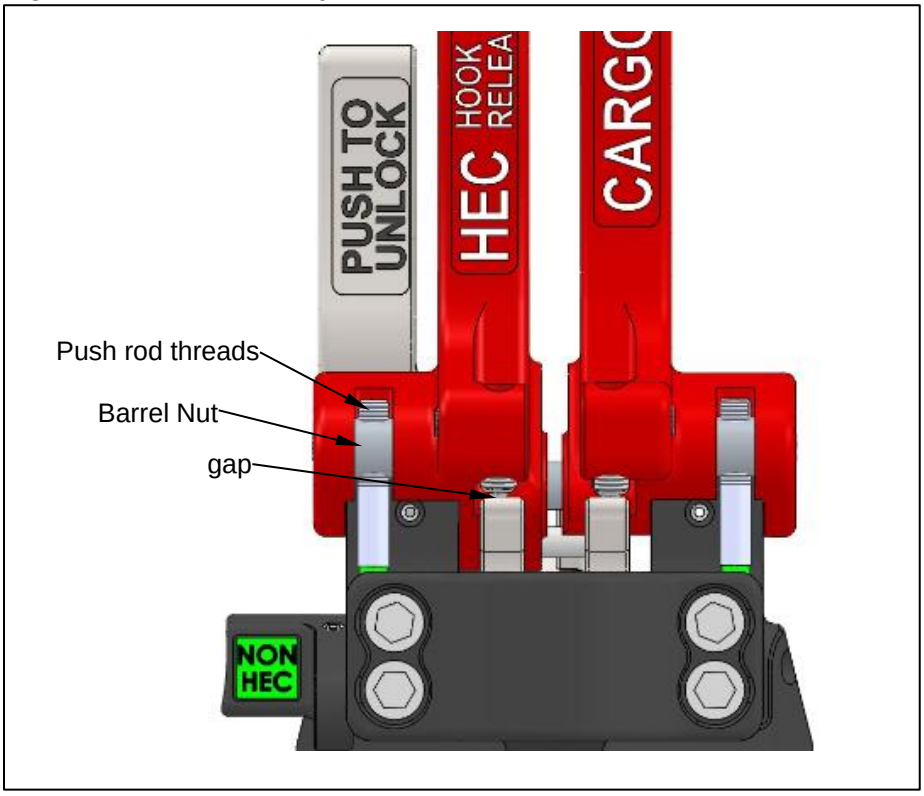
2. At the HEC Hook Release Lever, check the adjustment of the Push Rod with respect to the Barrel Nut. The threads should extend approximately .10” past the Barrel Nut (see figure). If this needs adjustment, loosen the set screw in the end of the Barrel Nut and turn the Push Rod in the direction needed to achieve .10”. Re-tighten set screw.

3. Loosen the set screw from the Spring Plunger.

4. Turn the Spring Plunger in to provide more engagement and more security or back it out for less engagement with the Lockout Lever tip. The gap between the end of the threaded housing (not the ball) of the Spring Plunger and the mating tip of the Lockout Lever should be no gap up to a maximum of .006 in. (see Figure 12.2.2). Use a feeler gauge to verify this gap.

5. Push down on the lockout lever. It should require approximately 2 – 4 lb. of force to disengage it. There must be a distinct snap-over when the Lock passes over the Spring Plunger ball. If this is weak, tighten the Spring Plunger a small amount and check it again. When this is satisfactory, tighten the set screw.

Figure 12.2.2 Lockout Adjustment Features



6. Pull the HEC Hook Release lever and the lock for the Cargo Hook Release lever should fall to the open position allowing the Cargo Hook Release lever to be pulled.

7. Set the Dual Master Cylinder into NON-HEC mode and perform the same checks and adjustments as needed as above except make the adjustment at the Cargo Hook Release Lever.

8. Tighten all set screws.

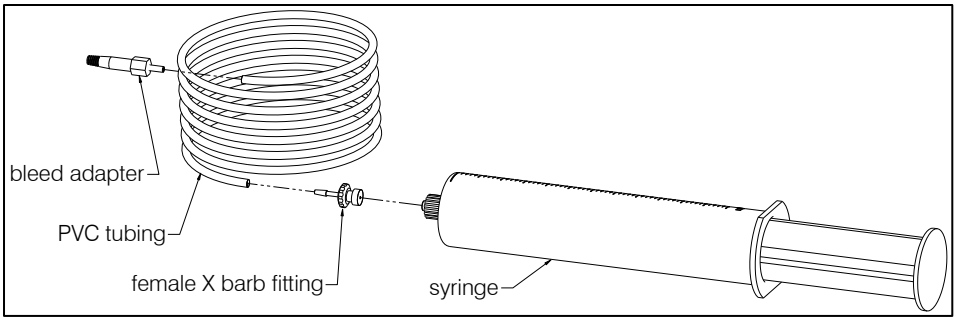
12.3 Bleeding the Hydraulic System

Filling and bleeding the hydraulic release system is most easily accomplished on the bench, prior to installation on the aircraft. This process may also be accomplished after the system is installed. Filling and bleeding requires two persons, one to inject hydraulic fluid through the system and the other to observe the reservoir.

Bleeding procedure:

1. Obtain the hydraulic hook bleed kit, 212-014-02. This kit consists of 2 ounces of MIL-PRF-87257 fluid, a syringe, a female barb fitting, a length of PVC tubing, and a bleed adapter fitting. The bleed kit is included in new hydraulic hook kits. Assemble the bleed kit by press fitting each component together as shown.

Figure 12.3.1 Bleed Kit Components



2. Place an absorbent towel under the master cylinder.

NOTICE

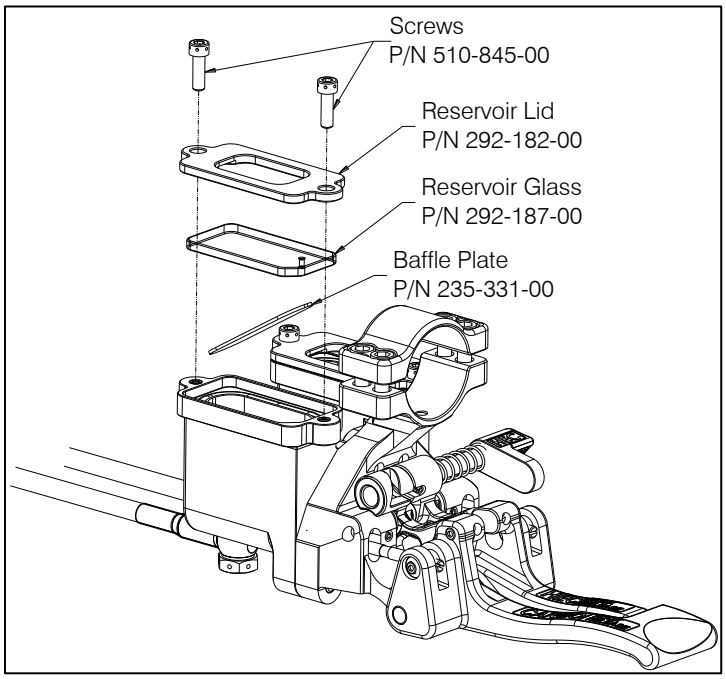
Use best shop practices to keep foreign material out of the hydraulic system. FOD will plug orifices, damage seals and/or scratch sealing surfaces necessitating system rebuild. Use only clean hydraulic fluid from sealed containers.

3. Remove screws, reservoir lid, reservoir glass and baffle plate from each master cylinder reservoir as shown in Figure 12.3.2.

CAUTION

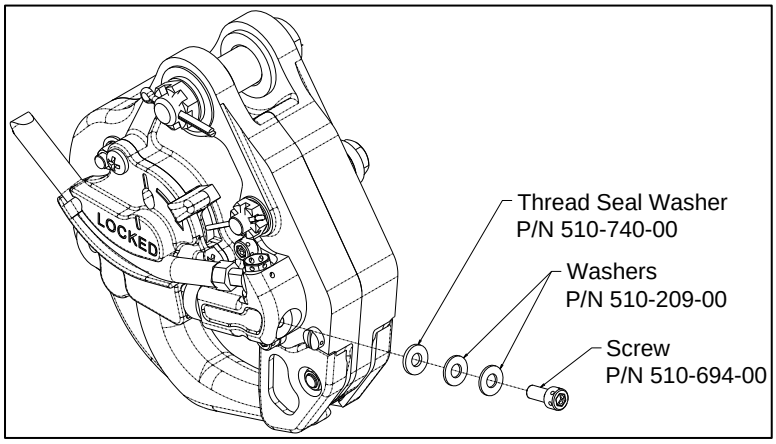
FRAGILE - Reservoir Glass is made from glass (not polycarbonate as with other master cylinder designs from Onboard Systems). Handle with care.

Figure 12.3.2 Reservoir Lid Removal



4. Remove the screw and thread-seal washer and washers on the slave cylinder, ref. Figure 12.3.3.

Figure 12.3.3 Screw and Washer Removal

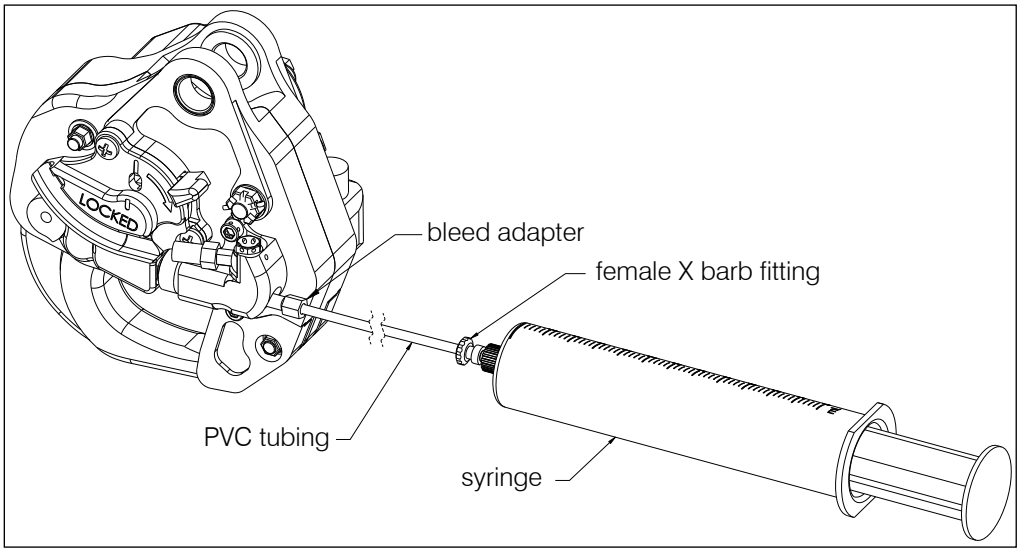


5. Fill the syringe with approximately 35 cc of hydraulic fluid and purge any remaining air in the syringe and tubing. Screw the end of the bleed adapter into the screw hole on the slave cylinder to create a tight seal.
6. While observing the reservoir, slowly push on the syringe plunger to force fluid through the slave cylinder, hydraulic hose and up to the master cylinder reservoir. There will be some resistance during filling – this is normal.

CAUTION

Injecting the fluid into the system too rapidly may cause the fluid to spray up and out of the master cylinder reservoir. Wear safety glasses when observing fluid reservoir while filling.

Figure 12.3.4 Injecting Hydraulic Fluid



7. Continue to force fluid into the master cylinder reservoir until the reservoir is approximately half-full.

NOTICE

If bleeding a filled system, you may need to draw fluid from the master cylinder reservoir during this step to prevent overflow.

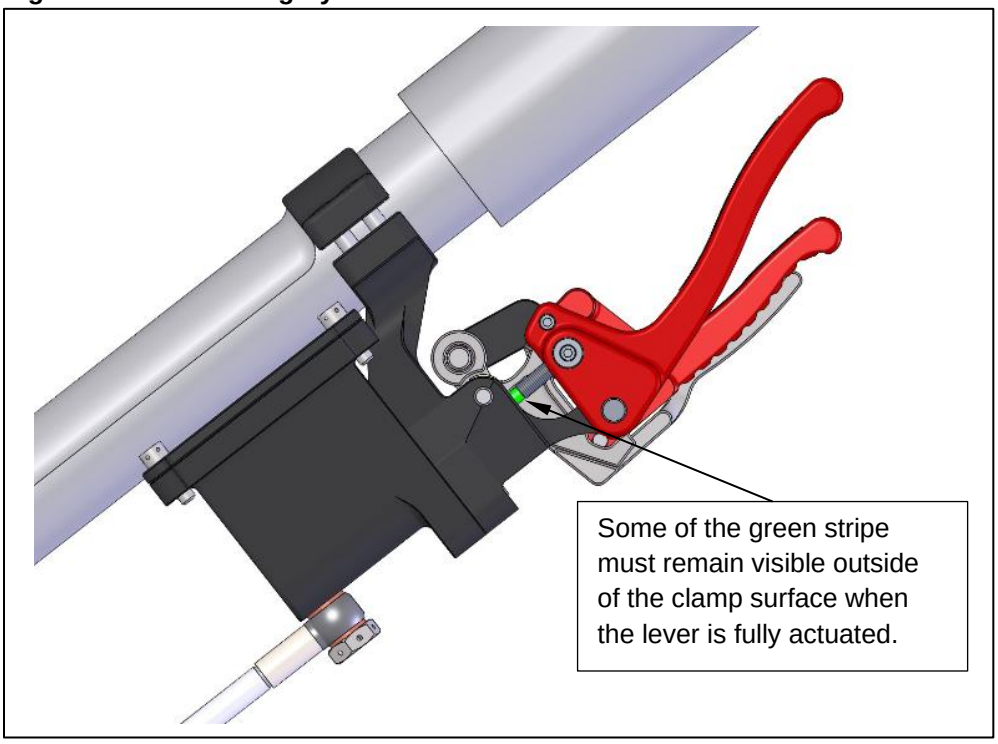
8. Have the thread-seal washer, the two plain washers, and screw ready to install and then remove the bleed adapter from the screw hole. Quickly, to minimize fluid leakage, install the washers and screw.
9. Allow the system to rest for several minutes. This will allow any air to rise through the system.
10. Very slowly pull the release lever on the master cylinder and watch for bubblies. If bubbles are observed rising with the reservoir, continue to slowly cycle the lever until there are no more. Actuating the lever releases air trapped within the master cylinder.

CAUTION

Pull the lever very slowly! When the reservoir is not baffled and capped, a hard pull will cause fluid to erupt over the edge of the reservoir.

11. Check the system for air by actuating the lever firmly until it bottoms out. Check the push rod position (see Figure 12.3.5). If some of the green stripe on the push rod is visible, proceed to step 13. If some of the green on the push rod is not visible with the lever completely pulled, the system has too much air in it and needs further bleeding. To do this, repeat steps 5 – 11.

Figure 12.3.5 Checking System for Air



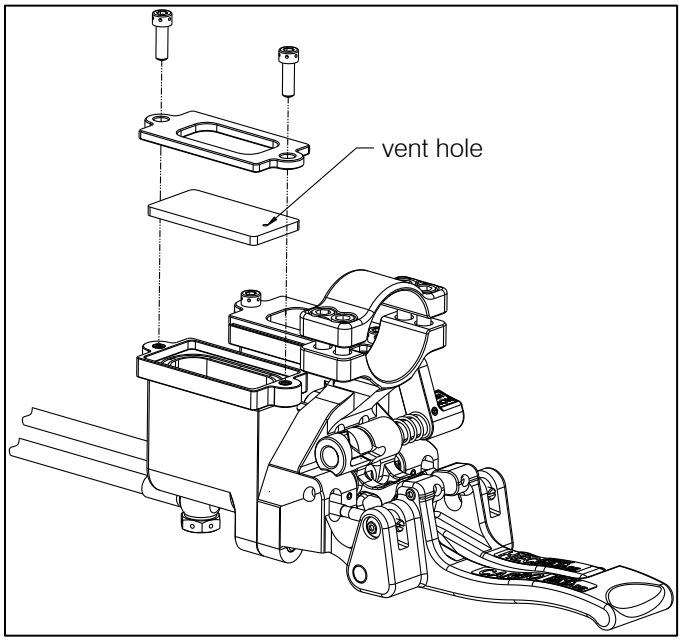
12. After the system is properly bled, place the Baffle Plate back into the reservoir and verify that the fluid level is within the Max-Min oval with the collective in its lowest position. Add or draw fluid out as necessary.

NOTICE

Before re-assembling the lids onto the reservoirs, remove any excess hydraulic fluid from the O-ring grooves and around the grooves with a lint free swab. The exterior of the reservoirs can be cleaned with isopropyl alcohol and a clean cloth.

13. Ensure the O-ring (P/N 556-110-00) is in position and re-install the Reservoir Glass (with the vent hole oriented as shown in the figure below, the Glass is also keyed to prevent incorrect orientation) and Reservoir Lid and secure with the two screws.
14. Tighten the screws to 12-15 in-lb.

Figure 12.3.6 Lid Re-assembly



15. Check the system for proper operation. Fully actuate each release lever. Each cargo hook must open and the levers must have a firm feel.
16. Secure the reservoir lid screws with safety wire.
17. Disassemble and thoroughly clean the bleed kit with isopropyl alcohol. Allow it to dry. Not cleaning the syringe will render is unusable. Re-assemble and store for next use.

Section 25 Equipment and Furnishings

25.5 Component Weights and CG

The weight and cg of the dual cargo hook system components are listed in the table below.

Table 25.5.1 Component Weights and CGs

Item	Weight Lb. (kg)	Station
Cargo Hook Frame Assembly	53.0 (24.0)	225
Fairing	8.9 (4.0)	210
Lug Assemblies/Keel Beam Fittings	6.5 (2.95)	225
Dual Master Cylinder w/ Plumbing	3.5 (1.6)	*

*Dual Master Cylinder is installed on either LH or RH collective with the hose being routed back to the Connector Bracket.

25.12 Storage Instructions

For temporary storage the dual master cylinder must be stored with the reservoir lids up. The lid contains an air vent that will allow hydraulic fluid to drain out if left inverted. If long term storage or shipping must be done where the orientation of the master cylinder cannot be controlled, the reservoir must be drained. Remove the hose attached to the master cylinder and drain it as well. Seal the hydraulic parts in a plastic bag for shipping or storage to prevent dirt contamination. The slave cylinder end needs no special handling.

Clean the exterior Frame Assembly components thoroughly of excess dirt and grease with a rag before storing

Refer to the CMM 122-015-00 for Cargo Hook storage instructions. For storage of the long line kit ropes, consult the Long Line User's Manual provided by the rope manufacturer.

The components of the long line kit are critical safety items. Practice careful handling and protection against damage and corrosion (metallic parts) during storage.

25.15 Trouble Shooting

Table 25.15.1 is provided with the intention of isolating the cause of malfunctions within the system. Sections 25.16 and 25.17 include instructions for removing and replacing defective components.

Table 25.15.1 Trouble Shooting

Malfunction	Probable Cause	Corrective Action
Cargo hook does not operate electrically or manually.	Defective internal mechanism.	Remove and replace cargo hook (see Section 25.16.3 and Section 25.17.1) or repair per CMM 122-015-00.
Cargo hook does not operate electrically, hydraulic release operates normally.	Open electrical release or arming circuit, faulty wiring, circuit breaker, relay, or solenoid.	Using multi-meter, check for 3.0 to 4.0 Ω between pins G and C of electrical connector. If open indication is obtained, remove and replace cargo hook or repair per CMM 122-015-00. Check the aircraft circuit for opens and shorts by using a multi-meter on the cargo hook connector mounted to the connector bracket. When the release switch is pressed 28V aircraft voltage should be seen on the connector pins.
Load beam fails to re-latch after being reset, hook lock indicator does not align.	Defective latch mechanism. Slave cylinder piston isn't fully retracting (i.e. – jammed in extended position).	Remove and replace cargo hook or repair per CMM 122-015-00. Remove slave cylinder from cargo hook and check that the piston extends and fully retracts while actuating the release lever on the collective.
Cargo hook operates electrically, but not manually.	Leaks in hydraulic hose system. Air in hydraulic hose system. Jammed slave cylinder.	Check system for excess air per Section 12. Check for leaks in hydraulic hose system and correct defects if found. Bleed hydraulic system per this manual. Remove slave cylinder from cargo hook and check for proper operation while actuating the release lever on the collective.
Force required to release cargo hook with lever on collective exceeds 20 lbs.	Friction in internal mechanism or defective hydraulic system.	Remove slave cylinder from hook and manually operate master cylinder. If operation feels free and force is less than 5 lbs. remove and replace the cargo hook or repair per the CMM 122-015-00.
Hydraulic fluid leaks at hose fittings.	Loose fittings	Tighten fittings. Check fluid level in reservoir. Bleed hydraulic system per Section 12.2.
Hydraulic fluid leaks around master or slave cylinder pistons.	Leaking seals	Remove and replace master cylinder or slave cylinder assembly (see Section 25.16 and Section 25.17) 25.16.4or repair per Section 12 of this manual.

Malfunction	Probable Cause	Corrective Action
Cargo hook fails to open or re-lock properly.	Failure to open or re-lock properly.	Remove and replace cargo hook or repair per CMM 122-015-00.
Circuit breaker opens when cargo hook is energized.	Short in the system, faulty wiring, circuit breaker or solenoid.	Check for shorts to ground along length of wire harnesses, refer to Section 98 for wiring diagrams. Check solenoid resistance (must be between 3 - 4 Ω across pins G and C), repair or replace defective parts.
C-40 Indicator does not come on.	Faulty wiring or circuit breaker.	Check the circuit breaker and wiring. If this doesn't help, remove and replace indicator per Sections 25.16.6 and 25.17.6.
C-40 Indicator displays large negative load.	Indicator was zeroed under load.	Un-zero indicator. Refer to the Owner's Manual for the C-40 Indicator for instructions.
Indicator displays incorrect load.	Calibration code entered doesn't match the calibration code of load cell or load cell damaged.	Check calibration code of the load cell and set the indicator to the same calibration code. Refer to the Owner's Manual for the C-40 Indicator for instructions.
Analog bar not in sync with displayed load.	Indicator is zeroed; analog bar always displays un-zeroed load.	Un-zero indicator. Refer to the Owner's Manual for the C-40 Indicator for instructions.

25.16 Component Removal

25.16.1 Pin Load Cell Removal

The Pin Load Cell (P/N 210-327-00) is installed at the primary Cargo Hook.

1. Remove the Fairing in front of the Frame Assembly by disengaging the four ¼ turn fasteners (two at front and one at each side) and rotating the aft end downward while sliding it aft while to disengage the front tabs from the sheet metal clips on the belly.
2. Disconnect the LOAD CELL connector on the connector bracket and separate the electrical harness from the bundle by removing the spiral wrap and cable ties along its route.
3. Remove the cushioned loop clamp inside the frame which secures the harness bundle and separate the load cell harness from it.
4. At the Cargo Hook, remove the cotter pin securing the nut to the pin load cell. Remove the nut and washers and while supporting the cargo hook, pull the pin load cell out.

25.16.2 Frame Assembly Removal

1. Remove the Fairing Assembly in front of the Frame Assembly by disengaging the four ¼ turn fasteners (one on each side) and two at the forward center flange and rotating it downward while sliding it aft to disengage the front tabs from the sheet metal Retainers on the belly.
2. Disconnect the electrical release connectors, load cell connector (if load weigh system is installed), and the hydraulic release connectors at the bracket on the belly.
3. Support the Frame Assembly and remove the quick release pins at each hardpoint and lower the Frame Assembly vertically.

25.16.3 Cargo Hook Removal

The following instructions are applicable to both the primary cargo hook and the secondary (HEC) cargo hook.

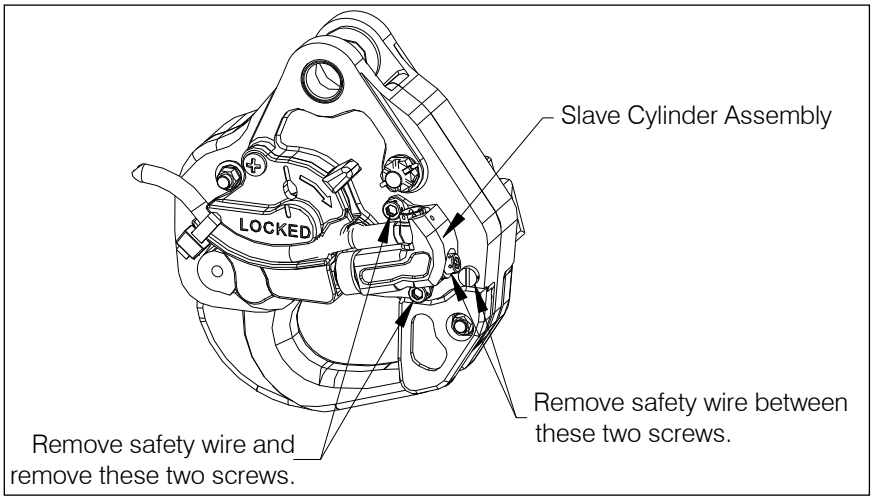
1. Remove the Fairing Assembly in order to access and disconnect the cargo hook’s electrical harness connector at the connector bracket on the belly.
2. Separate the slave cylinder assembly with hose from the cargo hook per section 25.16.4 or disconnect the hose at the quick disconnect fitting on the bracket on the belly.
3. Disconnect the electrical release connector from the mating connector at the bracket on the belly.

4. Remove the cables ties, spiral wrap, and cushioned loop clamps supporting the hose and harness routing from the connector bracket to the cargo hook.
5. Remove the cotter pin (P/N 510-178-00) from the attach bolt (P/N 290-332-01) or pin load cell (P/N 210-327-00) securing the cargo hook to the Frame Assembly.
6. Remove the castellated nut (P/N 510-170-00) from the attach bolt (or pin load cell) and remove attach bolt (or pin load cell) and washers.
7. Remove the cargo hook from the Frame Assembly while feeding the electrical harness through the slot in the frame.

25.16.4 Slave Cylinder and Plumbing Assembly Removal

1. Remove the Fairing Assembly in order to access connections on the connector bracket of the belly.
2. Disconnect the hydraulic hose at the quick disconnect fitting at the connector bracket.
3. Cut safety wire and remove the two screws that attach the slave cylinder assembly to the cargo hook (ref. Figure 25.16.1).
4. Remove the cable ties that secure the hydraulic hose to the manual release cover of the cargo hook and the bumper.
5. Remove spiral wrap and cushioned loop clamps that secure the hydraulic hose along its routing from the cargo hook to the bracket.

Figure 25.16.1 Slave Cylinder Assembly Removal



25.16.5 Dual Master Cylinder Removal

1. Drain the hydraulic fluid from the system by cutting the safety wire at the bleed screws on the Cargo Hook and HEC Hook and removing the screws.
2. Remove the master cylinder assembly from the collective by removing the four screws that secure the clamp around the collective tube.
3. Separate the hydraulic hoses from the master cylinder assembly by removing the banjo bolts and crush washers (reference Figure 25.17.8)
4. Disconnect the hydraulic hose at the quick disconnect fitting on the connector bracket on the belly by loosening the jam nut and sliding it to the large end of the slot.

If the hoses are to be removed from the helicopter, they must be removed by either (1) feeding the collective end through the airframe down to the connector bracket or (2) removing the quick disconnect fitting at the connector bracket end and feeding that end forward to the collective and up through the opening at the base of the collective.

5. Gently pull the hose through the holes in the airframe and remove the cushioned loop clamps along its route to the connector bracket from the master cylinder location on the collective.

25.16.6 Load Indicator Removal

The C-40 Indicator (210-293-00 or P/N 210-293-01) is mounted above the air vent on either the RH or LH door post (depending on the installation configuration).

1. Disconnect the electrical connector from the back of the C-40 Indicator.
2. Remove the four (4) screws (P/N 511-223-00) at the front of the C-40 Indicator which secure it to its Mount Bracket.

25.16.7 Relay Removal

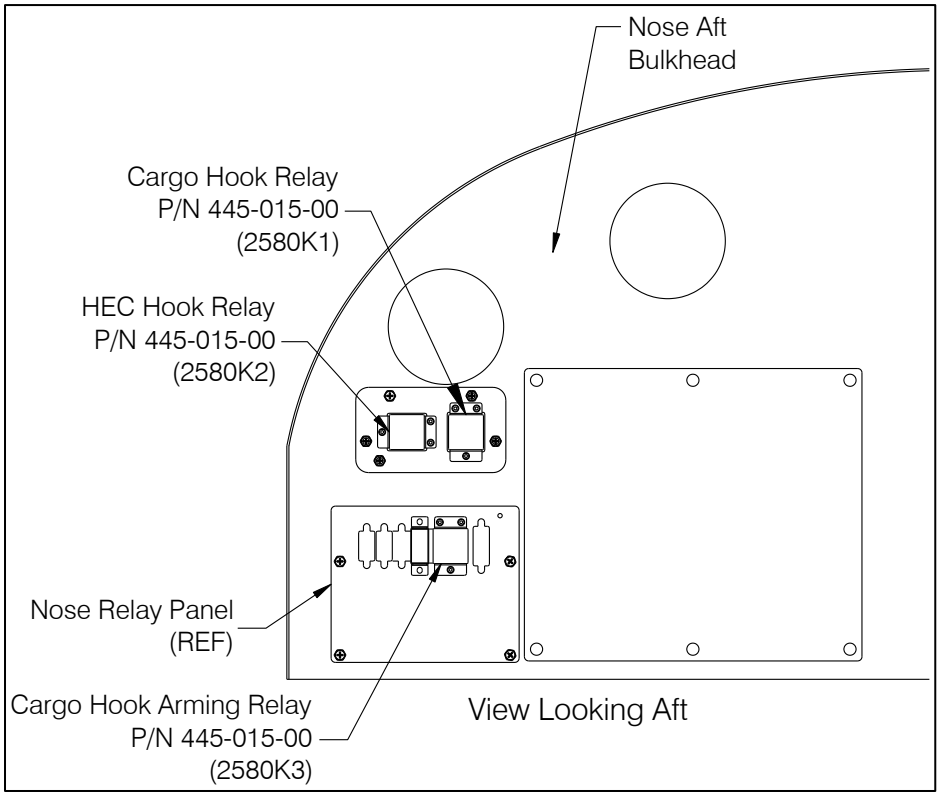
There are three (3) relays in the dual cargo hook system: a relay (2580K1) for the HEC Cargo Hook release system, a relay (2580K2) for the Cargo Hook release system and an arming relay (2580K3). These relays are located on the right side of the aft bulkhead in the nose of the aircraft (see Figure 25.16.2).

NOTICE

If a 200-493 series retrofit kit is installed, the relays as provided by Bell under the type certificate are used. Refer to the Bell maintenance documentation.

To remove a relay, remove the three nuts and washers from the threaded studs of the relay socket and “unplug” it from the relay socket.

Figure 25.16.2 Dual Cargo Hook System Relays



25.17 Component Re-installation

25.17.1 Cargo Hook and Pin Load Cell Re-installation

Cargo Hook P/N 528-028-05 (labeled as CARGO) is installed at the left position on the Frame Assembly and P/N 528-028-06 (identified as HEC) is installed at the right position. Other than some differences in routing of the hoses/harnesses, these install the same. The Pin Load Cell is part of the optional load weigh system, thus may not be present and is replaced by Attach Bolt P/N 290-332-01.

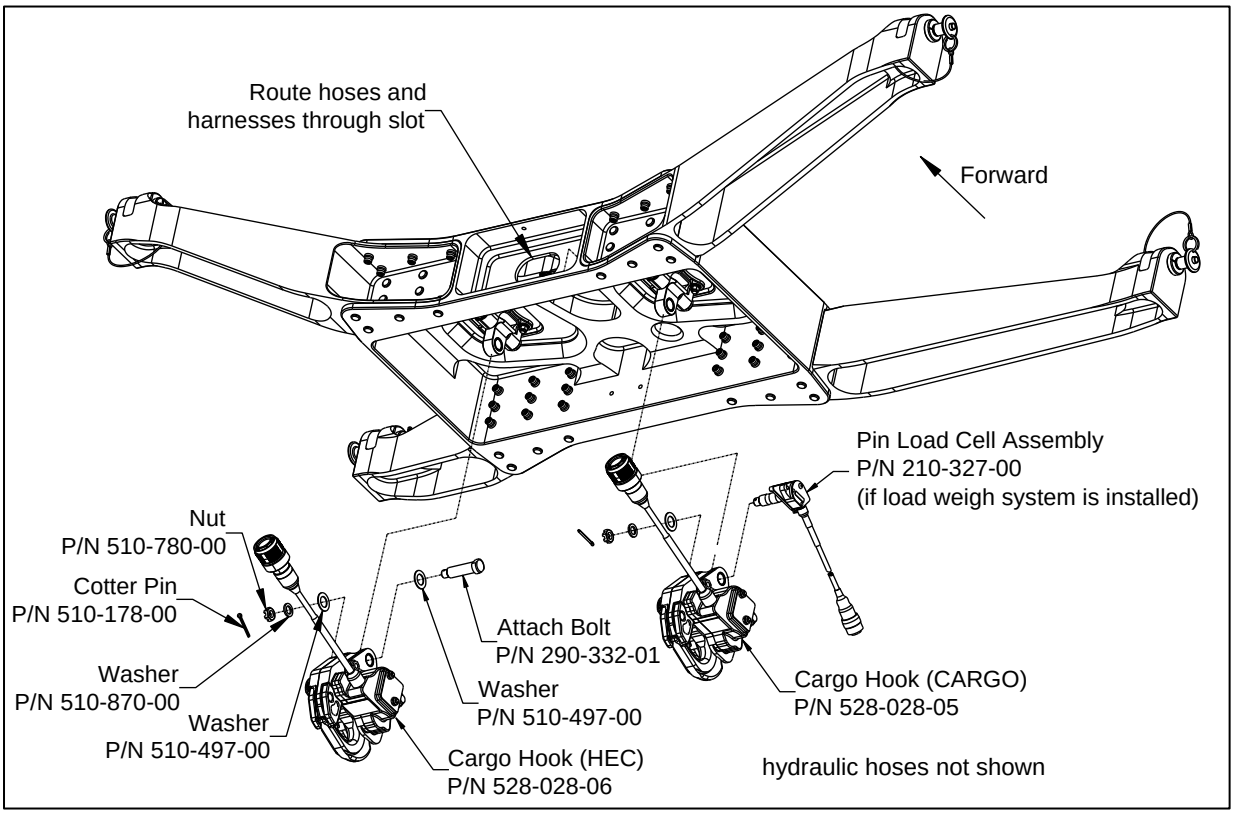
1. Attach the Slave Cylinder w/ Plumbing to the Cargo Hook per Section 25.17.2.

2. Route the cargo hooks' electrical harnesses and hydraulic hoses and the pin load cell harness (if installed) through the slot in the forward side of the Frame Assembly (reference Figure 25.17.1)

3. Apply Mobilgrease 28 (or similar aerospace grade grease) to the shank of the Pin Load Cell and Attach Bolt.

4. Attach each Cargo Hook to their respective attach points on the Frame Assembly with the hardware shown in Figure 25.17.1. If the load weigh system is installed, the Attach Bolt is replaced with the pin load cell at the CARGO Hook (this installation is shown in Figure 25.17.1). The hardware for the Pin Load Cell is the same as used with the Attach Bolt with the exception that a washer (P/N 510-497-00) is not installed (ref Figure 25.17.1).

Figure 25.17.1 Cargo Hook Re-installation



5. Tighten the nut on the Attach Bolts (or Pin Load Cell if installed) until fully seated, finger tight only. Back off nut to previous castellation, if needed, when aligning cotter pin for installation. Install and secure cotter pin.

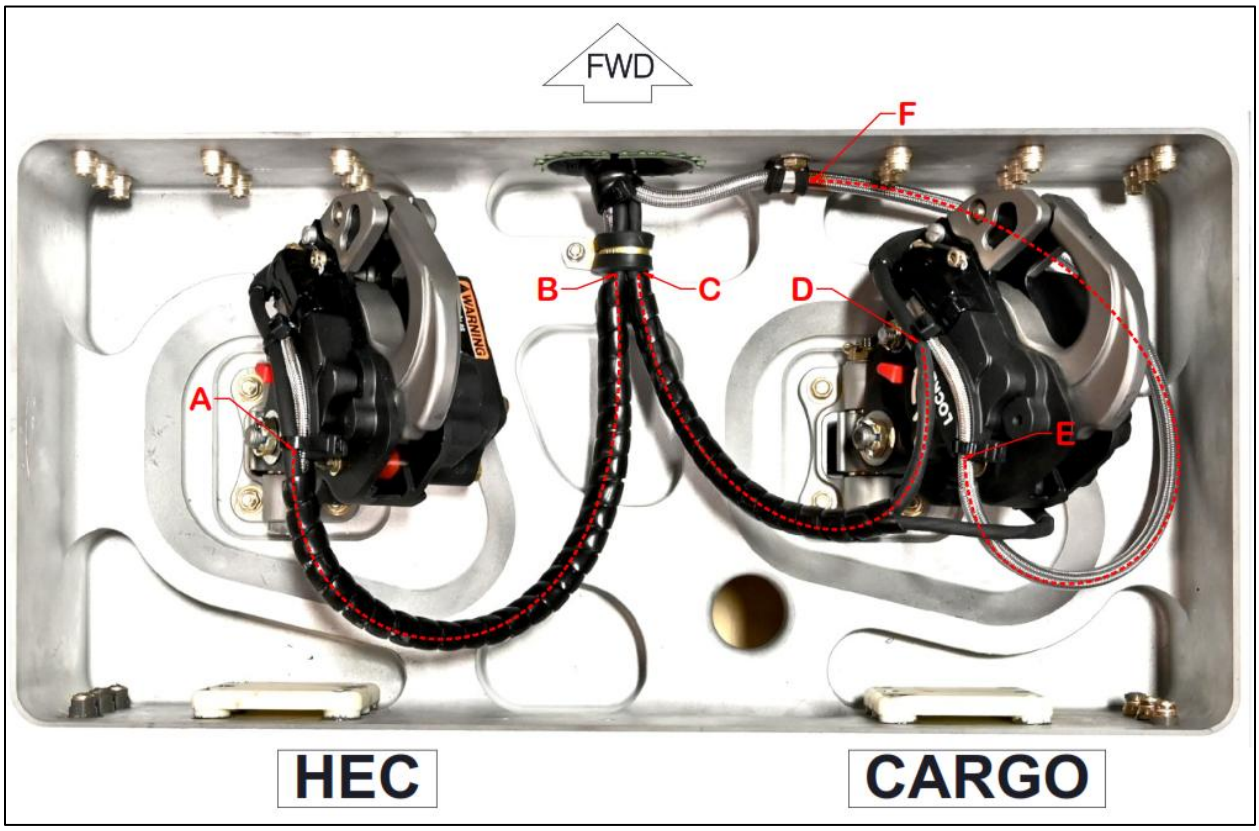
6. Route and secure the hoses and harnesses, referring to Figure 25.17.2. For optimal routing and termination of the connectors at the bracket on the belly use the following guidelines. To use the arc lengths, straighten the hoses and harnesses, measure from the reference point, and mark them with masking tape or a marker at the point which they will enter the loop clamps.

   - From A to B, the HEC Hook's hose and electrical harness are routed and the arc length is 12.75 ±.50". Point A is at the cable tie at the end of the groove.

   - From D to C, the Cargo Hook's electrical release harness and pin load cell harness (if installed) are routed and the arc length is 10.50 ±.50". The pin load cell harness is routed around the aft side of the Cargo Hook to the electrical release harness.

   - From E to F, the Cargo Hook's hose is routed and the arc length is 15.25 ±.50". Point E is at the cable tie at the end of the groove.

Figure 25.17.2 Routing of Hoses and Harnesses with Frame



7. After exiting the slot in the forward side of the frame, wrap the hose/harness bundle with approximately 16” (or just until it passes through the slot in the fairing) of spiral wrap (P/N 590-046-00).

25.17.2 Slave Cylinder Assembly Re-installation

Connect the slave cylinder assembly to the cargo hook per the following instructions:

1. Ensure that the piston is in the retracted position. If the piston needs to be retracted connect the quick disconnect fitting and push the piston in.

NOTICE

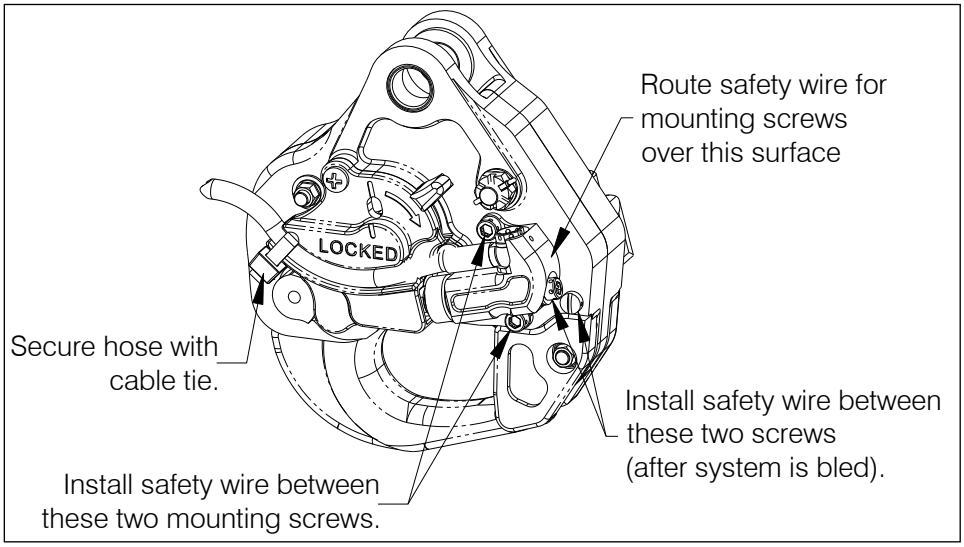
The piston will not be able to be retracted if the hydraulic hose is not connected at the quick disconnect.

2. Insert the piston end of the slave cylinder assembly into the side of the cargo hook as shown in Figure 25.17.3 and install the mounting screws (P/N 510-531-00). Torque screws to 12-15 in-lbs.

3. Install safety wire between these screws around the backside of the slave cylinder.

4. Route the hydraulic hose along the manual release cover and secure with a cable tie through the hole at the end of the groove in the manual release cover.

Figure 25.17.3 Slave Cylinder Assembly Installation



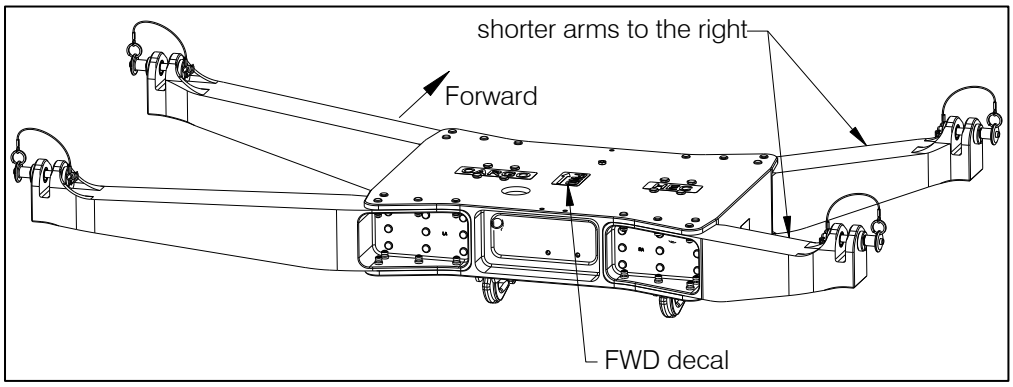
25.17.3 Cargo Hook/Frame Assembly Re-installation

The removable provisions installation consists of attaching the Cargo Hook/ Frame Assembly (P/N 232-892-00) to the four Lug Assemblies installed previously (or the Bell Lug Assemblies) and attaching the Fairing.

1. As a precaution, it is recommended to place a soft mat underneath the helicopter in the event the Frame Assembly falls during positioning to the belly.

2. Orient the Frame Assembly with the shorter arms to the right side of the aircraft (as shown below). The forward side is also indicated by the FWD decal on the top side of the frame.

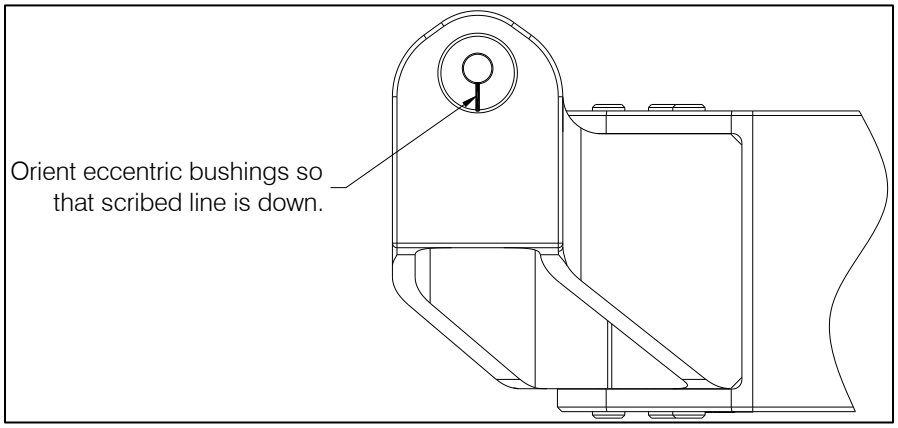
Figure 25.17.4 Frame Assembly Orientation



3. Remove the pre-assembled quick release pins from the four lugs of the Frame Assembly.

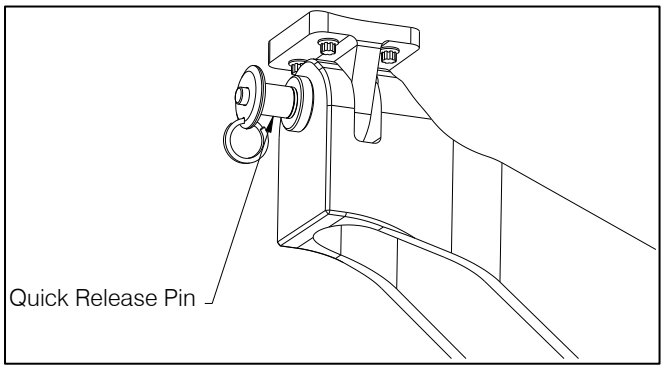
4. Rotate the eccentric bushings at the forward up arms so the scribed lines are pointing down (as shown below).

Figure 25.17.5 Bushing Orientation



5. With a person at each side or using a floor jack with a fixture to support the frame (refer to Owner's Manual provided with cargo hook kit for a fixture drawing that could be used), lift the frame straight upwards to the four lugs. Position the clevises of the four arms over the lugs. Rotate the eccentric bushings as necessary to align with the holes in the lugs and insert the quick release pins through.

Figure 25.17.6 Quick Release Pin



6. Secure each quick release pin by inserting the attached safety pin.

7. Route the electrical harness/hydraulic hose bundle forward and to the right over to the connector bracket. Connect the HEC Hook electrical connector to the HEC HOOK connector on the bracket and the Cargo Hook connector to the CARGO HOOK connector (these connectors are of alternate pin arrangement to prevent mismatched connections).

8. Connect the hydraulic hoses from the cargo hooks to the mating quick disconnect fittings from the master cylinder in the cockpit.

9. If the pin load cell is installed, connect its connector to the mating fixed provisions connector of the internal harness.

25.17.4 Fairing Re-installation

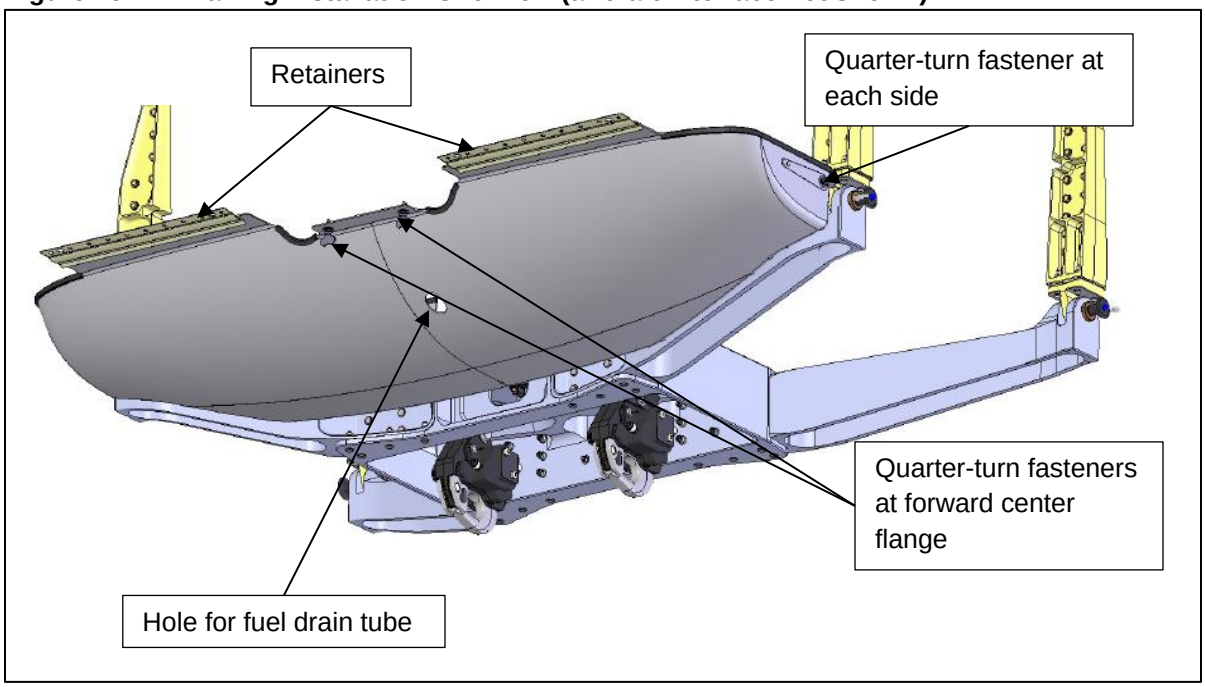
Re-install the Fairing after the Frame Assembly has been re-installed and the hoses and harnesses connected to the respective fixed connectors at the bracket on the belly. Install per the following, referring to Figure 25.17.7.

1. While pivoting the aft side of the fairing upward, slide the forward outer flanges under the retainers that are fastened with screws to the belly. Guide the fuel drain through the access hole in the fairing and guide the hose and harness bundle through the slot in the aft side of the fairing.

2. Slide the fairing forward until the quarter-turn fasteners in the forward center flange align with the receptacles in the fuel sump cover. Engage the quarter turn fasteners to secure.

3. At each side, push up on the fairing to align the holes in the fairing with the holes in the angle brackets mounted to the belly. Engage the quarter-turn fasteners to secure the fairing in place.

Figure 25.17.7 Fairing Installation Overview (aircraft interface not shown)



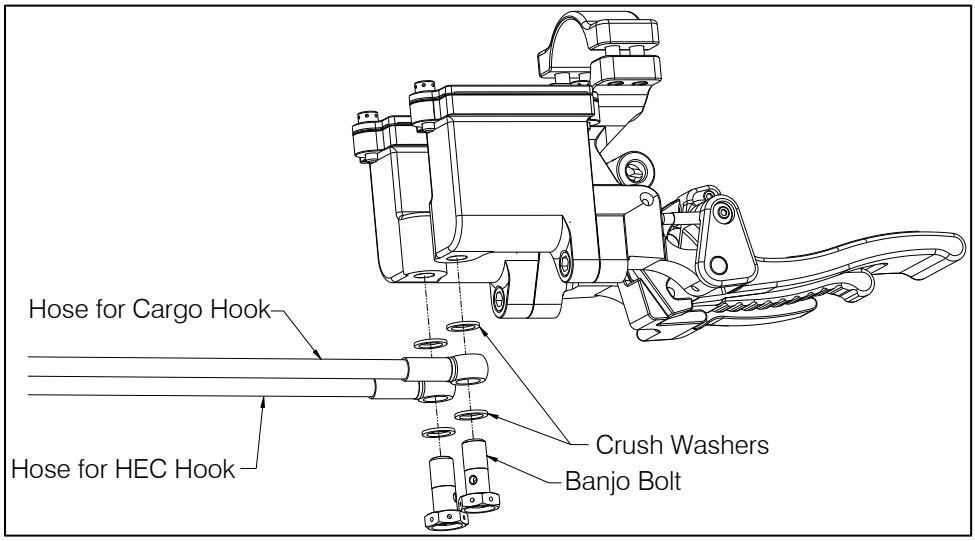
25.17.5 Dual Master Cylinder Re-installation

1. If removed for routing, re-attach the hoses routed through the slot at the base of the collective to their respective threaded holes on the Master Cylinder Assembly by positioning a crush washer on either side of the banjo fitting at the end of the hose and inserting the banjo bolt through and threading it into the Master Cylinder. The “HEC Hook” hose is attached on the left side.

2. Tighten the banjo bolts to 10-11 ft-lb.

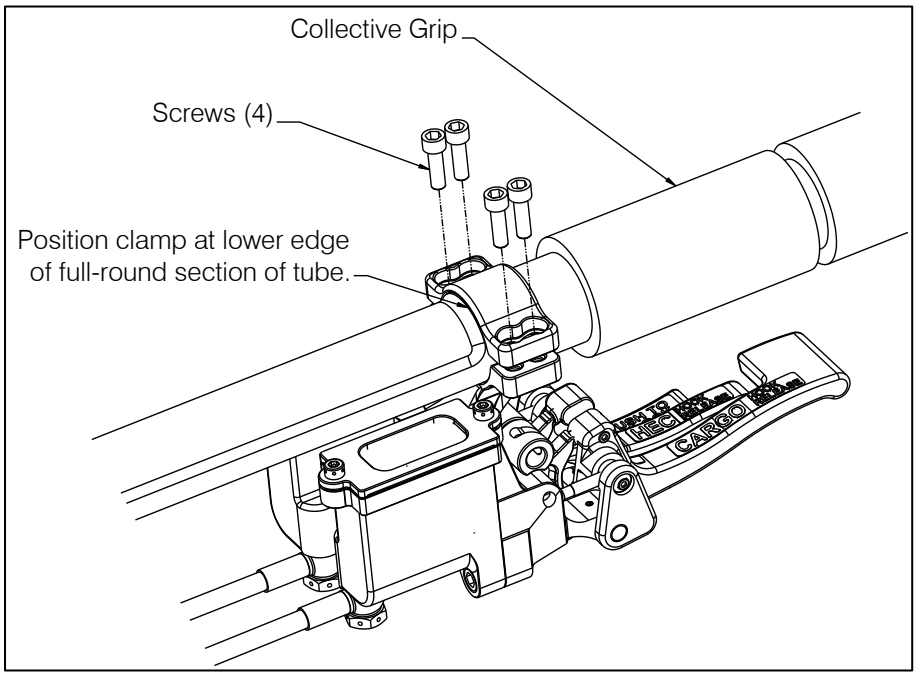
3. Secure the banjo bolts by installing lock wire between them.

Figure 25.17.8 Hose Re-attachment



4. Position the master cylinder mounting interface such that the edge of the clamp is at the lower edge of the full round section of the collective tube as shown below.

Figure 25.17.9 Master Cylinder Location



25.17.6 Load Indicator Re-installation

The C-40 Indicator is mounted on the forward door post, just above the air vent. Depending on the installation configuration, it can be mounted on the LH or RH door post and these installations are mirrored.

1. Position the C-40 Indicator behind the Mount Bracket, align its mounting holes with the holes in the bracket and secure with four screws (P/N 511-223-00).

2. Connect the electrical connector from the harness to the C-40 Indicator's connector.

25.17.7 Relay Re-installation

There are three (3) relays in the dual cargo hook system: a relay (2580K1) for the HEC Hook release system, a relay (2580K2) for the Cargo Hook release system and an arming relay (2580K3). These relays are located on the right side of the aft bulkhead in the nose of the aircraft (see Figure 25.16.2).

NOTICE

If a 200-493 series retrofit kit is installed, the relays as provided by Bell under the type certificate are used. Refer to the Bell maintenance documentation.

To re-install a relay, plug the relay into the socket on right side of the aft bulkhead. Secure it to the threaded studs of the relay socket with the three nuts and washers removed previously.

CAUTION

Use caution to not overtighten the nuts which can bend the relay mounting flanges or break the relay socket studs. Tighten only until the washers contact the mounting flange of the relay and prevent the relay from rattling.

25.18 General Procedural Instructions – Testing

After re-installation of a cargo hook, electrical release harness or hydraulic release system component perform the following.

1. Check the function of each cargo hook electrical release system per the following,

    - With no load on the cargo hook, press CARGO REL switch on the cyclic. The Cargo Hook's load beam should fall to the open position (the Cargo Hook is at aircraft centerline).

    - With no load on the cargo hook, press the HEC HOOK REL on the collective. The HEC Hook's load beam should fall to the open position (the HEC Hook is right of aircraft centerline).

    - Manually return the load beams to the closed position and verify that it latches and the hook lock indicator is aligned with the engraved lines on the outside of the cargo hook (see Figure 5.1.4).

2. Check the function of the cargo hooks' manual release systems per the following.

    - Disengage the lockout lever on the release system on the collective by pushing it down. It should distinctly snap past the detent and fall to the open position.

    - With no load on the HEC Hook, pull the HEC HOOK RELEASE lever. The HEC Hook's load beam should fall to the open position.

    - With no load on the Cargo Hook, pull the CARGO HOOK RELEASE lever. The cargo hook load beam should fall to the open position.

    - Manually return each cargo hook load beam to the closed position and verify that it latches and the hook lock indicator is aligned with the engraved lines on the outside of the cargo hook.

Section 98 Wiring Diagrams

Figure 25.18.1 Cargo Release Schematic (1 of 3)

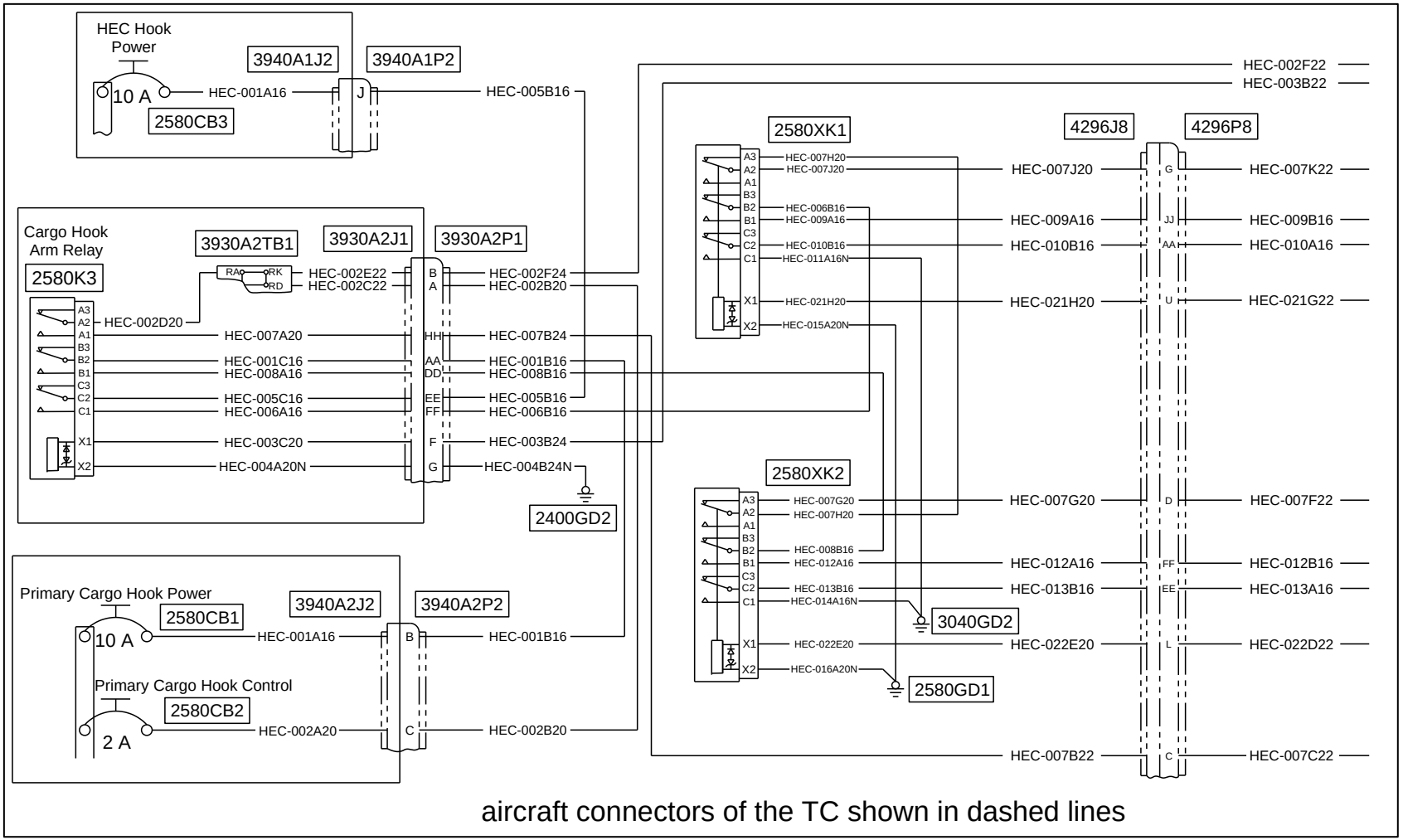


Figure 98.1 Cargo Release Schematic (2 of 3)

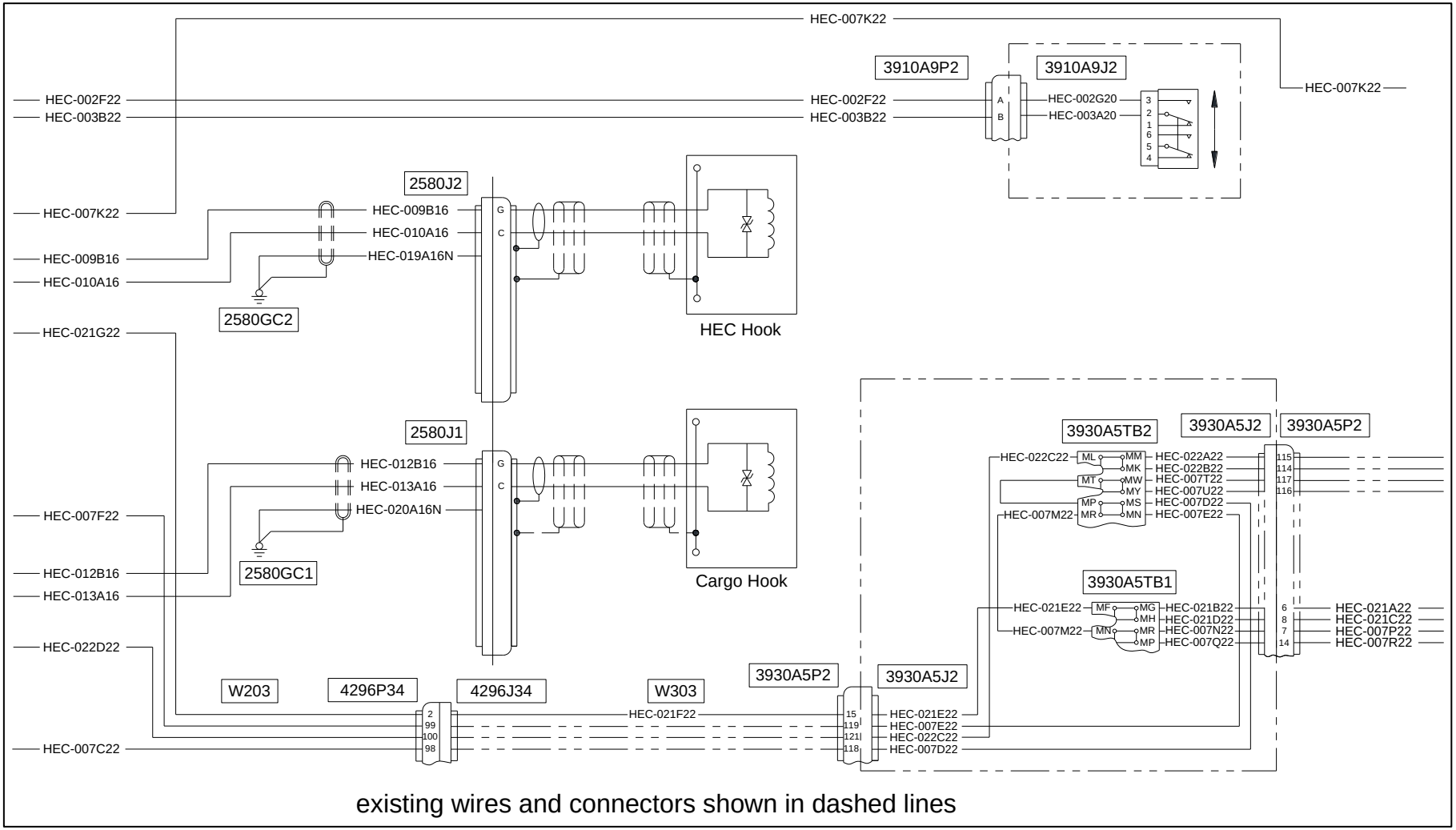


Figure 98.1 Cargo Release Schematic (3 of 3)

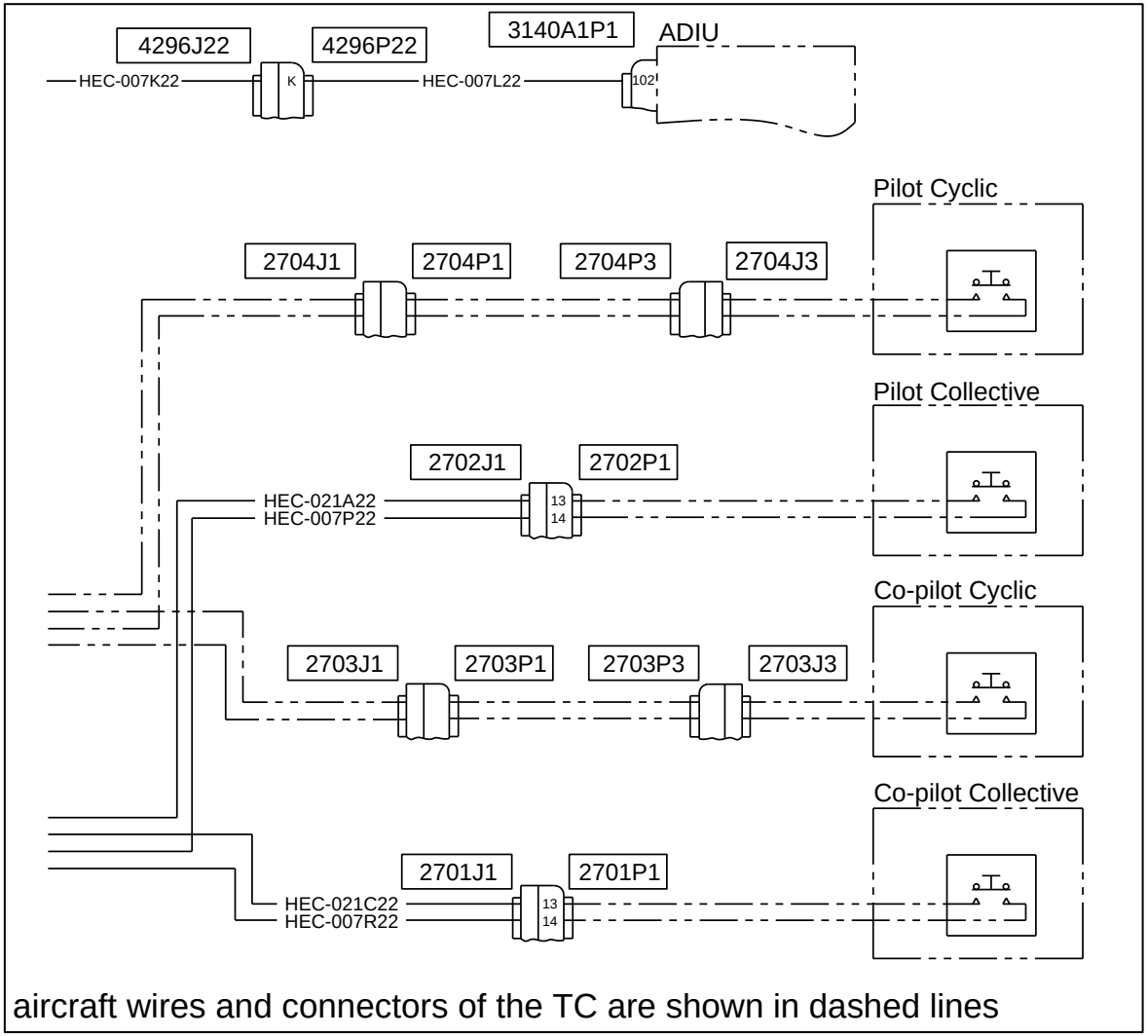


Figure 25.18.2 Load Weigh System Schematic, RH PIC Installation

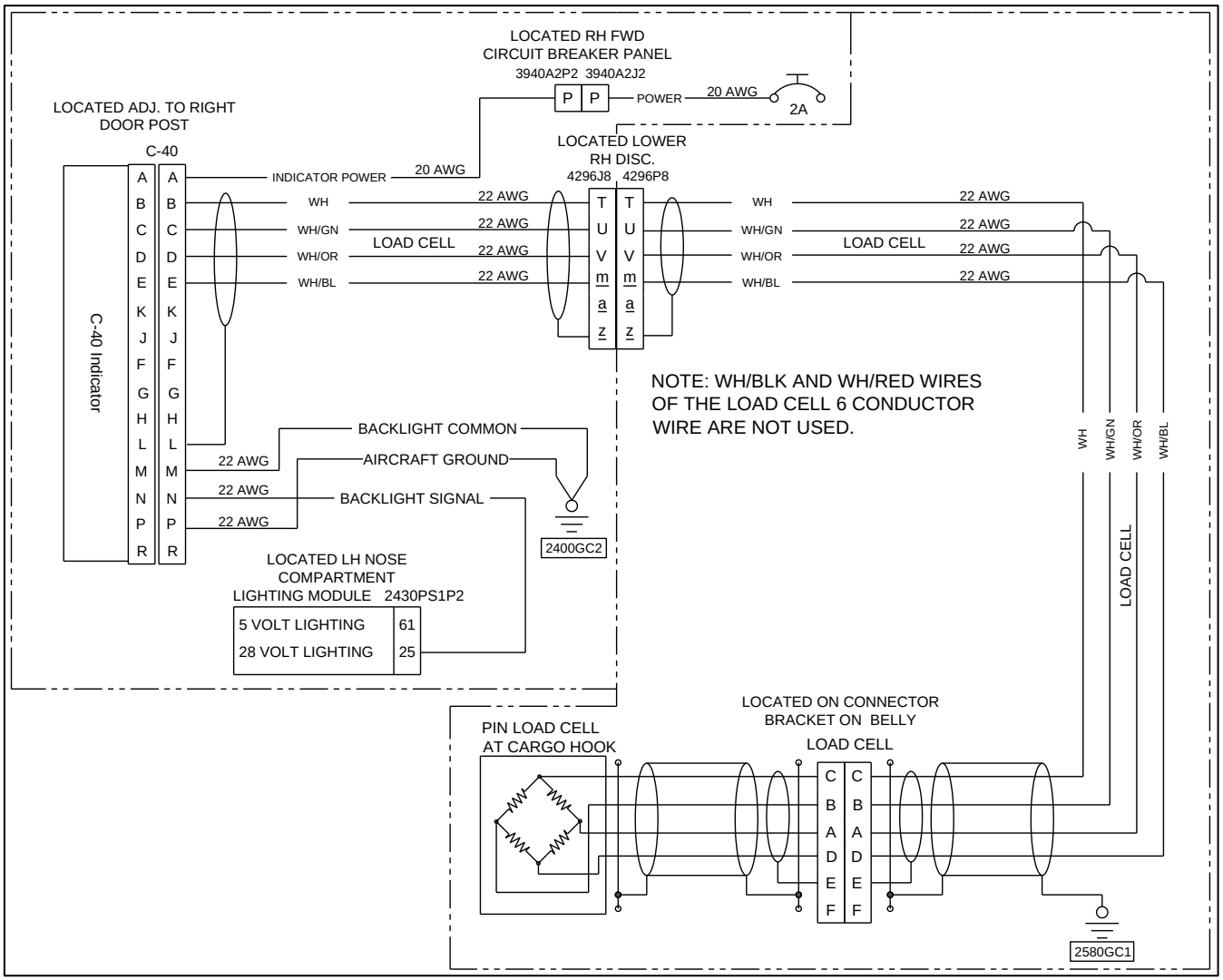


Figure 25.18.3 Load Weigh System Schematic, LH PIC Installation