Instructions for Continued Airworthiness

System Part Numbers
200-470-00
200-470-01
200-470-02

STCs
SR02719SE
SR02762SE

Onboard Systems International, LLC
13915 NW 3rd Court
Vancouver, WA 98685 United States of America
Cage Code: 1Y921

Toll Free Phone: (800) 275-0883
Phone: (360) 546-3072

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RECORD OF REVISIONS

Revision	Date	Section(s)/ Page(s)	Reason for Revision
0	03/04/21	All	Initial Release
1	01/26/23	1	Listed STCs SR02719SE and SR02762SE on title page.
2	06/21/24	Section 5	Added disassembly and inspection of upper load cell joint to the annual/100 hour inspection.
3	08/06/25	Section 5	Listed additional part numbers.
4	10/02/25	34-35, 57-58	Updated slave cylinder repair instructions to provide instructions for replacing o-rings at banjo bolt. Updated instructions for protecting cables/hoses from wear (replaced spiral wrap with abrasion resistant sleeving held in place with adhesive heat shrink)
5	11/25/25	21, 24, 34, 36	Updated Figure 5.4 to show the parts that make up sub-assembly P/N 232-145-26. Updated Table 5.2.1 parts list notes to clarify this. Added part numbers to Master Cylinder repair section. Added Section 12.1.2 to include master cylinder lid and o-ring part numbers and replacement instructions.
6	04/02/26	22, 23, 24	Added nut P/N 510-226-00 as an alternate for nut P/N 510-718-00.
7	08/12/26	19 65	Added special inspection for torsional loads. Updated Load Weigh System schematic to show additional aircraft interface at Post Mod 0720207.

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Section 0 Introduction

0.4 Scope

The information in this manual is necessary to carry out the service, maintenance, and inspection of Cargo Swing Suspension System P/N's 200-470-00, 200-470-01, and 200-470-02. These systems provide the means for an Airbus Helicopters AS350B3 to transport and release external loads.

The Cargo Swing Suspension Systems consist of a fixed provisions kit (P/N 200-468-00) and a removable provisions kit (P/N 200-455-00, 200-455-01 or 200-455-02). The fixed provisions kit consists of all items internal to the aircraft and the shackle assemblies (shown in figure below) at the landing gear cross tubes. The removable provisions consist of items external to the aircraft and can be easily removed when not needed on a mission.

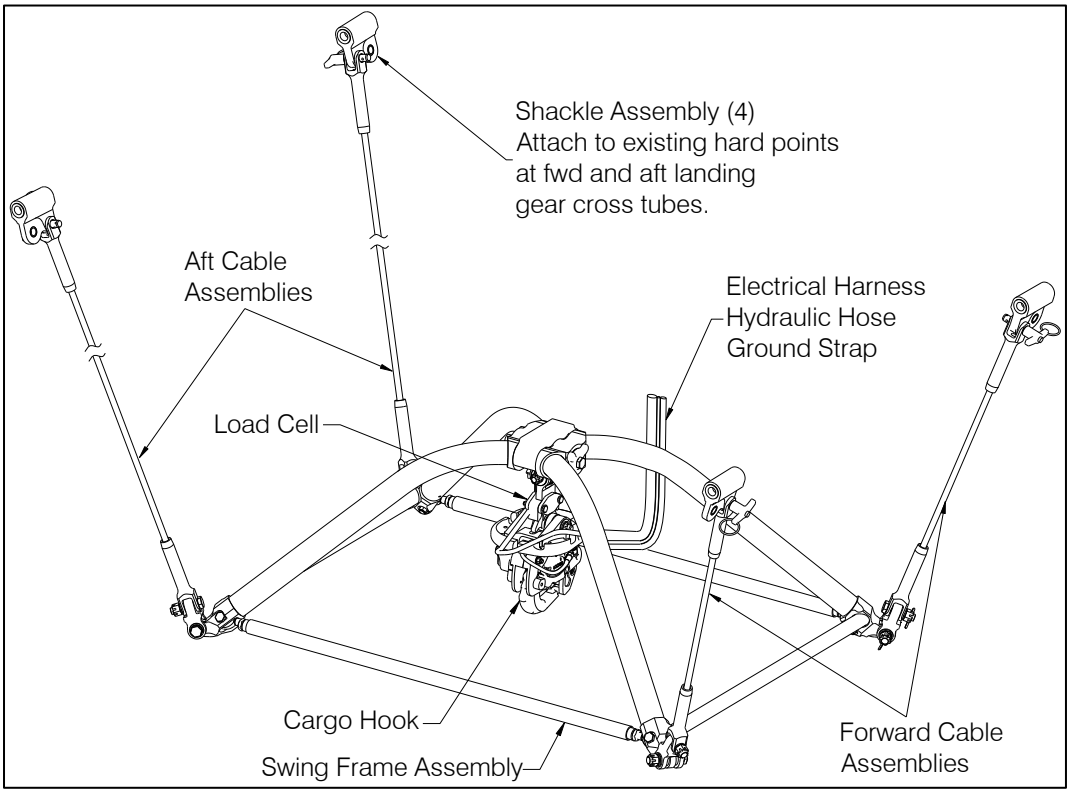
The removable provisions kits (P/N 200-455 series) are also compatible and certified to be used with the Airbus TC fixed provisions kit (defined by Airbus mod. OP-20070). The Airbus fixed provisions kit shares some of the same P/Ns as the Onboard Systems fixed provisions kit P/N 200-468-00. Before performing maintenance on the fixed provisions verify whether the fixed provisions are installed per the TC or STC as inspection may vary. Refer to the Airbus maintenance documentation for TC installed parts.

The Cargo Swing Suspension System P/N 200-470 series includes the following.

1. The Cargo Swing Suspension (Figure 0.1), which consists of a pyramid-shaped swing frame assembly that supports the cargo hook and load cell and four structural cable assemblies that suspend it from shackle assemblies. The shackle assemblies are part of the fixed provisions and are mounted to existing hardpoints at the forward and aft landing gear cross tubes.

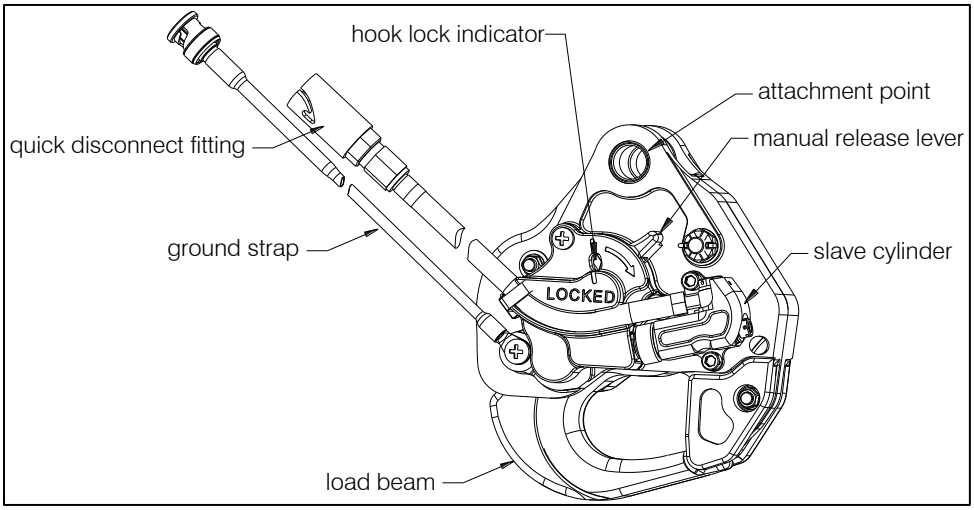
   The Cargo Swing Suspension also includes a retraction system to pivot it forward when it is not loaded. This system uses two elastic cords attached between brackets at the forward hardpoints and a bracket at the upper pivot joint of the swing frame assembly.

Figure 0.1 Cargo Swing Suspension Overview



2. The cargo hook is attached to the load cell on the cargo swing suspension. The cargo hook functions as a means of attaching an external load, retaining it during transport and releasing it at a drop site. The external load is attached to the cargo hook by sliding a load ring, for example, over the open load beam and pushing it up to latch the cargo hook. The cargo hook features a hook lock indicator which provides a visual indication that the load beam is closed and latched.

Figure 0.2 Cargo Hook Overview



3. An electrical release system that interfaces with the existing Airbus Helicopters push-button release switch on the cyclic. It includes the external harness from the cargo hook to a connector mounted on a bracket at the belly of the helicopter and an internal harness to interface with a relay, aircraft power and ground in addition to the release switch circuit. The Airbus fixed provisions kit also includes an internal harness, reference Airbus maintenance documentation if the Airbus fixed provisions kit is installed.

   Kit P/N 200-455-02 includes cargo hook P/N 528-028-02 which features Surefire Release. Surefire Release is a time delay circuit built into the cargo hook's electrical release system. This feature is a safety enhancement to protect against inadvertent release due to accidental contact with the release switch. It makes the electrical release a more deliberate pilot command by requiring that the release switch be depressed and held for more than ½ second to open the cargo hook.

4. A self-contained hydraulic release system, which provides a backup means of releasing a cargo hook load in the event of an electrical release system failure. The system is actuated by the pilot with a release lever assembly mounted on the collective. It includes a hose assembly from the collective down to a quick disconnect fitting mounted at a bracket on the belly of the helicopter and an external hose assembly with mating quick disconnect fitting to connect to the slave cylinder on the cargo hook.

   The Airbus fixed provisions kit also includes the same internal hydraulic release system part number as supplied under the STC, reference Airbus maintenance documentation if the Airbus fixed provisions kit is installed.

5. A load weigh system, which is comprised of an indicator mounted to the RH cabin door post, a load cell above the cargo hook on the swing frame assembly, and an interconnecting wire harness. This system provides the pilot with an indication of the weight of the external load being carried on the cargo hook. On AS350B3s with mod 07-4716 incorporated, the C-40 model indicator (P/N 210-293-00 or P/N 210-293-01) can be connected to the VEMD to increase the main rotor RPM when 150 kg or greater load is carried.

0.5 Arrangement

The manual is arranged in the general order that maintenance personnel would use to maintain and operate the Cargo Swing Suspension Systems in service.

The arrangement is:

Section 0 Introduction

Section 4 Airworthiness Limitations (None apply to this System.)

Section 5 Inspection and Overhaul Schedule

Section 11 Placards and Markings

Section 12 Servicing

Section 25 Equipment and Furnishings

Section 98 Wiring Diagrams

0.6 Applicability

These Instructions for Continued Airworthiness are applicable to Cargo Swing Suspension Systems (P/N's 200-470-00, 200-470-01 and 200-470-02) on Airbus Helicopters AS350B3 models.

0.7 Abbreviations

CMM Component Maintenance Manual

ICA Instructions for Continued Airworthiness

FAA Federal Aviation Administration

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

Before performing maintenance ensure that the Instructions for Continued Airworthiness (ICA) in your possession is the most recent revision. Current revision levels of all manuals are posted on Onboard Systems International website at www.onboardsystems.com.

Onboard Systems also offers a free automated notification service for documentation updates via fax or e-mail for product alerts and documentation updates. By registering Onboard Systems products on the web site, you will be notified if a service bulletin is issued or if the applicable documentation is updated.

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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.

No airworthiness limitations are associated with this type design change.

Section 5 Inspection and Overhaul

The scheduled inspections are detailed herein. 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.

Inspection intervals are:

- Annual/100 Hour, see Section 5.1 for details. See Special Inspection for Torsion in this section if the system is subject to torsional loads.
- 5 Year/1000 Hour, see Section 5.2 for details.
- Cargo Hook Overhaul, see Section 5.3 (details are in Cargo Hook CMM 122-015-00).

NOTICE

There is no maintenance to be performed on the C-40 Load Weigh Indicator. Do not open the enclosure, if repair is needed return it to the factory.

5.1 Annual/100 Hour Inspection

Annually or 100 hours of external load operations, whichever comes first, inspect the cargo swing suspension system per Sections 5.1.1 through 5.1.4. A one-month or 10-hour grace period can be applied if needed for maintenance scheduling convenience. No additional extension is allowed beyond this grace period.

NOTICE

Hours of external load operations should be interpreted as (1) anything is attached to the primary cargo hook (whether 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.

NOTICE

The C-40 Indicator also records and displays external load time accumulated on the cargo hook to assist in timely inspection and overhaul of the cargo hook. Refer to the Owner's Manual for the Indicator for details and using this function.

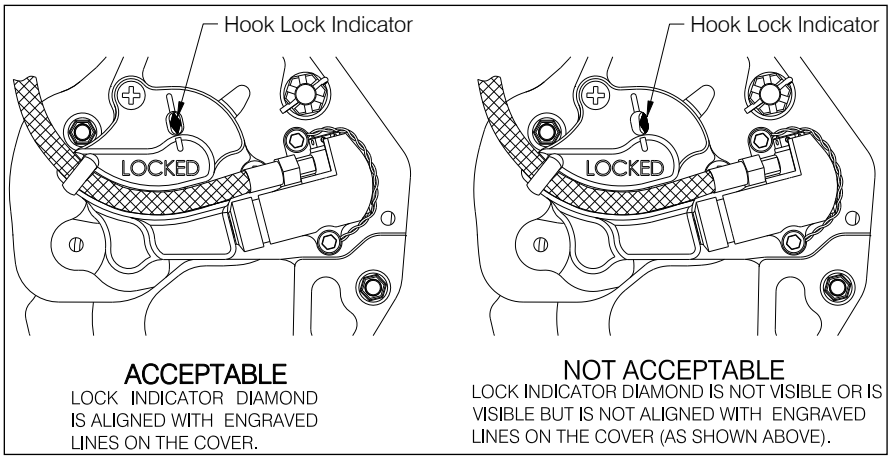
5.1.1 Cargo Hook Functional Check

1. Check the function of the cargo hook's electrical release system per the following.
    - With no load on the cargo hook, press the Cargo Release switch on the cyclic and verify the cargo hook's load beam falls to the open position. Manually return the load beam to its closed and locked position and verify that the hook lock indicator (located adjacent to the manual release lever) is aligned with the engraved lines on the outside of the cargo hook (see Figure 5.1).

The following instructions are applicable to cargo hook P/N 528-028-02 which is equipped with Surefire release. With no load on the cargo hook perform the following.

- Very briefly press the Cargo Release switch on the cyclic, the cargo hook solenoid should NOT actuate, and the load beam should remain closed.
- With no load on the cargo hook, press and hold the Cargo Release switch on the cyclic for a few seconds, the cargo hook's load beam should fall to the open position and its solenoid should continue to cycle repeatedly.
- Push up on the load beam and verify that it latches and the hook lock indicator is aligned with the engraved lines on the outside of the cargo hook.

Figure 5.1 Hook Lock Indicator



2. Check the function of the cargo hook's hydraulic release system by pulling the release lever on the collective. The lever should operate smoothly, and the cargo hook load beam must fall open with no load on it. Return the load beam to the closed position and verify the hook lock indicator aligns.

5.1.2 Hydraulic Release System

1. Visually check for fluid leaks in the hydraulic release system. Some seeping or dampness is acceptable, but if drips or areas cleaned by fluid leaking are present the cargo hook must not be used until the condition is repaired. See the troubleshooting section to determine the course of action.
2. Check the fluid level in the Master Cylinder with the collective against the lower stop. Hydraulic fluid level must be within the Min/Max circle (reference Figure 12.1) or above the baffle surface (depending on Master Cylinder installed).
3. Check the hydraulic release system for air by pulling the lever firmly until it bottoms out. Check the push rod position (reference Figure 12.13). 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.

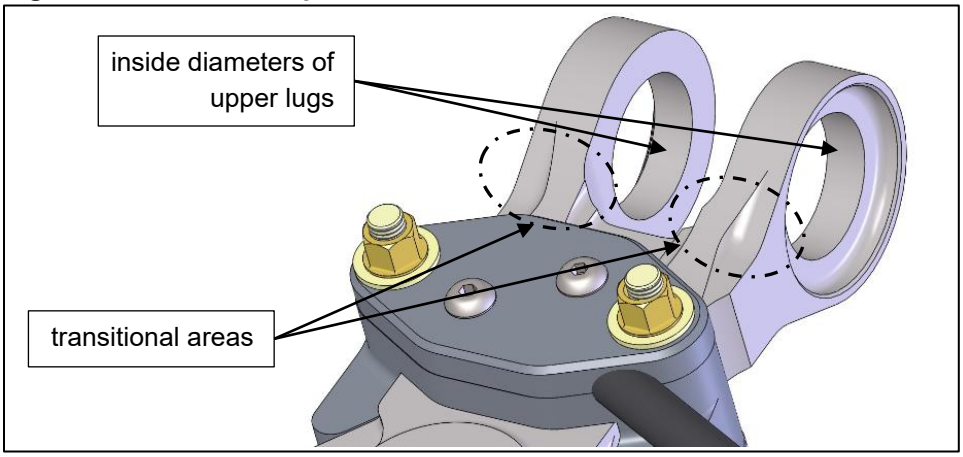
5.1.3 Cargo Hook/Swing Frame Assembly

1. Move the cargo hook and swing frame throughout their full ranges of motion and observe the hydraulic hose and electrical harnesses to ensure that they have enough slack. The hose or harnesses must not be the stops that prevent the cargo hook or swing frame from moving freely in all directions.
2. Rotate each pivoting joint by hand to ensure that it rotates freely.
3. Visually inspect for presence and security of fasteners.
4. Visually inspect the external electrical harness and ground strap and their connections for security and damage including worn or chafed sleeving/insulation which expose conductors.
5. Visually inspect the hydraulic hose and its connection at the cargo hook and the mating connector on the bracket at the belly for damage and security.
6. Visually inspect the cargo hook and swing frame bumpers for damage and security.
7. Visually inspect for cracks in swing frame tubular structure. Pay special attention to the areas around the welds. The tubes contain a corrosion preventative compound, which may leak out through a crack and also provide an indication.
8. Visually inspect for dents, scratches and gouges in the swing frame tubular structure. Refer to Table 5.2.3 for limits.
9. Inspect suspension cables for broken strands. Pass a cloth over the cables. This will clean the cables for a visual inspection and detect broken wires if the cloth snags on the cable. Ten randomly distributed broken strands in one cable lay (one complete rotation around the wire) or five broken strands in one strand in cable lay are considered unacceptable.

10. Visually inspect the suspension cables for crushing, un-stranding, kinking, loss of rope diameter in short lengths, unevenness of outer strands or other damage. Visually inspect for corrosion.
11. Visually inspect the two bungee cords for damage and each hook end for security to brackets. Visually inspect the brackets at each end of the bungee cords for damage and security.
12. Disassemble and inspect the upper joint of the load cell (17) per the following, referring to Figure 5.5 for item numbers in parentheses ( ). If Swing Frame Assembly has been subjected to torsional loading, see Special Inspection for Torsion involving further disassembly and inspection instructions in step 13.
    a. Remove the cotter pin (26), washer (24), retaining washer (22), and nut (25) from the end of the bolt (23).
    b. While supporting the load cell and cargo hook (32), remove the bolt and the other retaining washer (22) and slide the Gimbal Shaft (21) out of the joint, separating the load cell from the Gimbal (1.1).
    c. Visually inspect the Gimbal Shaft for signs of wear, such as pitting, galling, or reduction in diameter. If reduction in diameter is observed, refer to the criteria in Table 5.2.3. There should be no visible wear, except for light burnishing of the outside diameter surface. If the burnishing can be removed using Scotch Brite (3M P/N 7447), it is considered light.
    d. Inspect the inside diameters of the upper lugs of the load cell for signs of wear such as pitting, galling, or elongation of the holes. If elongation is observed, refer to the criteria in Table 5.2.3. There should be no visible wear, aside from light burnishing of the inside diameter surfaces. If the burnishing can be removed using Scotch Brite, it is considered light.

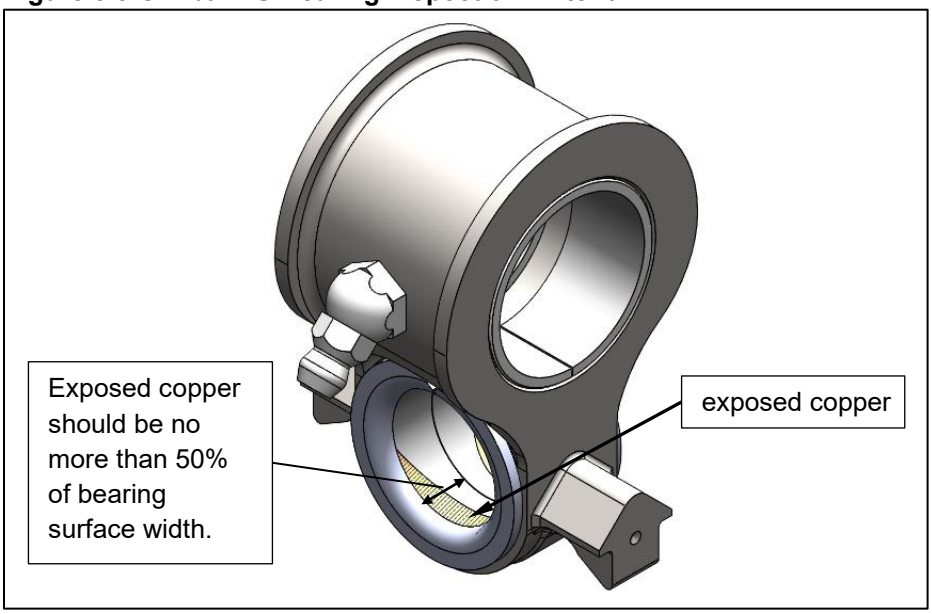
       Visually inspect for cracks around both lugs, including the transitional areas (indicated below) where the lugs transition into the flat portion of the load cell. Inspect these areas on both sides.

Figure 5.2 Load Cell Inspection



e. Inspect the flanged DU bearings (1.2) of the Gimbal (1.1) that interface with the Gimbal Shaft. As these bearings wear, the low-friction PTFE layer is removed, exposing the copper layer below. Across the width of the bearing surface, no more than 50% should be the exposed copper layer.

Figure 5.3 Gimbal DU Bearing Inspection Criteria



f. Replace worn or damaged parts. If DU bearings require replacement (refer to Section 5.2.1 for further disassembly instructions), press in with wet zinc chromate primer (TTP-1757 or equivalent) applied to the inside diameter of the mating hole.

g. Re-assemble the load cell to the Gimbal per Section 25.18.4.

Special Inspection for Torsional Loads

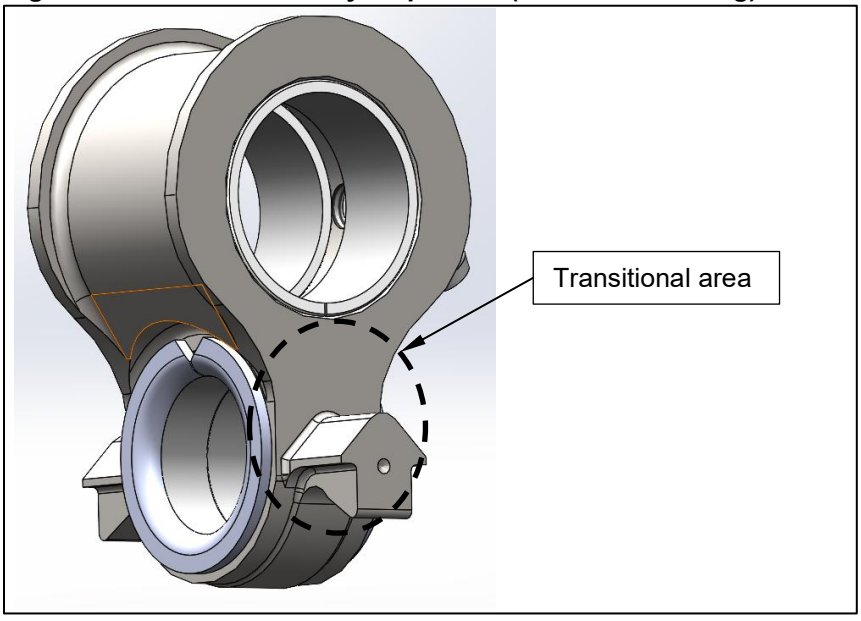
If the swing frame assembly is used with torsional loads (such as a fertilizer slinger bucket) that are attached directly to the cargo hook via a spreader bar (without any additional restraints), perform additional inspections as specified in this below.

WARNING

Loads attached to the cargo hook with a spreader bar (such as a typical fertilizer bucket) cause the swing frame assembly to react high torsional loads. Repetitive high torsional loads are damaging to the swing frame assembly and require an additional inspection as defined in the following step.

13. Disassemble the upper pivoting joint of the swing frame assembly to remove and inspect the Gimbal Assembly per the following.
    a. Remove the cotter pin (9), nut (10), Shaft Cap (6) and remove the bolt (11), Bracket (4), and the other Shaft Cap.
    b. Remove the Pivot Shaft while supporting each Swing Frame Half.
    c. Remove the Gimbal Assembly (1) and the Thrust Washers (16).
    d. Perform a visual inspection for cracks in the Gimbal (1.1), with specific attention on the transitional areas (on both sides) as shown in Figure 5.4 including around the base of the arrow shaped feature.
    e. Re-assemble per Section 5.2.3.

Figure 5.4 Gimbal Assembly Inspection (Torsional Loading)



5.1.4 C-40 Indicator

1. Visually inspect for security of load indicator mounting.
2. If connected, check the C-40 indicator's function to signal the VEMD to send N2 datum of 400 rpm to the FADEC when the measured external load is 331 lb (150 kg) or more. This function is applicable to AS350B3s with MOD 07-4716 incorporated. Check this function per the following.
    - From the Load screen rotate the rotary push button knob to enter the C-40 Settings screen.
    - Press the knob to enter the Settings menu.
    - Scroll down the menu to the Analog Test setting by rotating the knob and press the knob again.
    - A simulated load of 475 lbs is output for 3 seconds, verify this load is displayed on the VEMD (if the engine is running in FLIGHT mode this also temporarily sends an N2 datum of 400 rpm to the FADEC resulting in a slight acceleration and deceleration of NR).

5.2 5 Year/1000 Hour Inspection

Every 5 years or 1000 hours of external load operations, whichever comes first, remove the swing suspension from the aircraft, disassemble and inspect per this section. A six-month or 100-hour grace period can be applied if needed for maintenance scheduling convenience. No extension to maintenance is allowed beyond this tolerance grace period.

Perform the annual/100-hour inspection and then remove the suspension by removing the quick release pins at the cable attachments to the shackle assemblies at the landing gear cross tubes and unhooking the bungee cords from the bracket on the aircraft. Remove the four Shackle Assemblies (49) from the aircraft. Refer to Figure 5.5, Figure 5.6, and Figure 5.7 for Swing Suspension parts and Figure 5.8 for the Shackle Assembly.

5.2.1 Disassembly

1. Remove the four suspension cable assemblies from the swing frame feet (reference Figure 5.6) by removing the cotter pin (40), nut (39), two washers (38) and bolt (36). Remove the Standoff Bushings (37).
2. Separate the Gimbal Assembly (41.1, 41.2, 41.3) from each suspension cable assembly (reference Figure 5.7) by removing the cotter pin (40), nut (39), washer (38), and bolt (44).
3. Separate the Load Cell (35) and Cargo Hook (32) from the Swing Frame by removing the cotter pin (26), nut (25), washer (24), and Shaft Retaining Bushing (22) and sliding the Pivot Shaft (21) and bolt out with the other Shaft Retaining Bushing (22).
4. At each foot of the swing frame remove the cotter pin (26), nut (8), washer (20) and bolt (13) that secure the rod end fittings (14) to the swing frame feet.
5. At the upper pivoting joint of the swing frame remove the cotter pin (9) and nut (10) from the end of the bolt (11) and remove the Shaft Cap (6).
6. Slide the Swing Frame Half (3) off the Pivot Shaft (5) and remove the bumper (7), thrust washers (16), and Gimbal Assembly (1.1, 1.2, 1.3).
7. Slide the Pivot Shaft out of the opposite Swing Frame Half (3) and remove the other Shaft Cap (6), Bracket (4) and bolt (11).
8. Separate the Cargo Hook and Hook Bumper (27) from the Load Cell by removing the cotter pin (9), nut (31), and washers (29, 30) from the end of the Attach Bolt (28) and slide the Attach Bolt out, removing the other washer (29).
9. Remove spiral wrap (17) from around the frame tubes and Braided Sleeve (18) and heat shrink (19) from around the LH Frame Strut Weldment (2).
10. Remove and replace bushings as necessary. All self-lubricating bushings use an interference fit to hold them in place. Use an arbor press or similar to press the bushings out of the bore they are mounted in. Do NOT use heat.

Figure 5.5 Swing Hook Frame Assembly (P/N 232-844-00, -01, -02) Parts

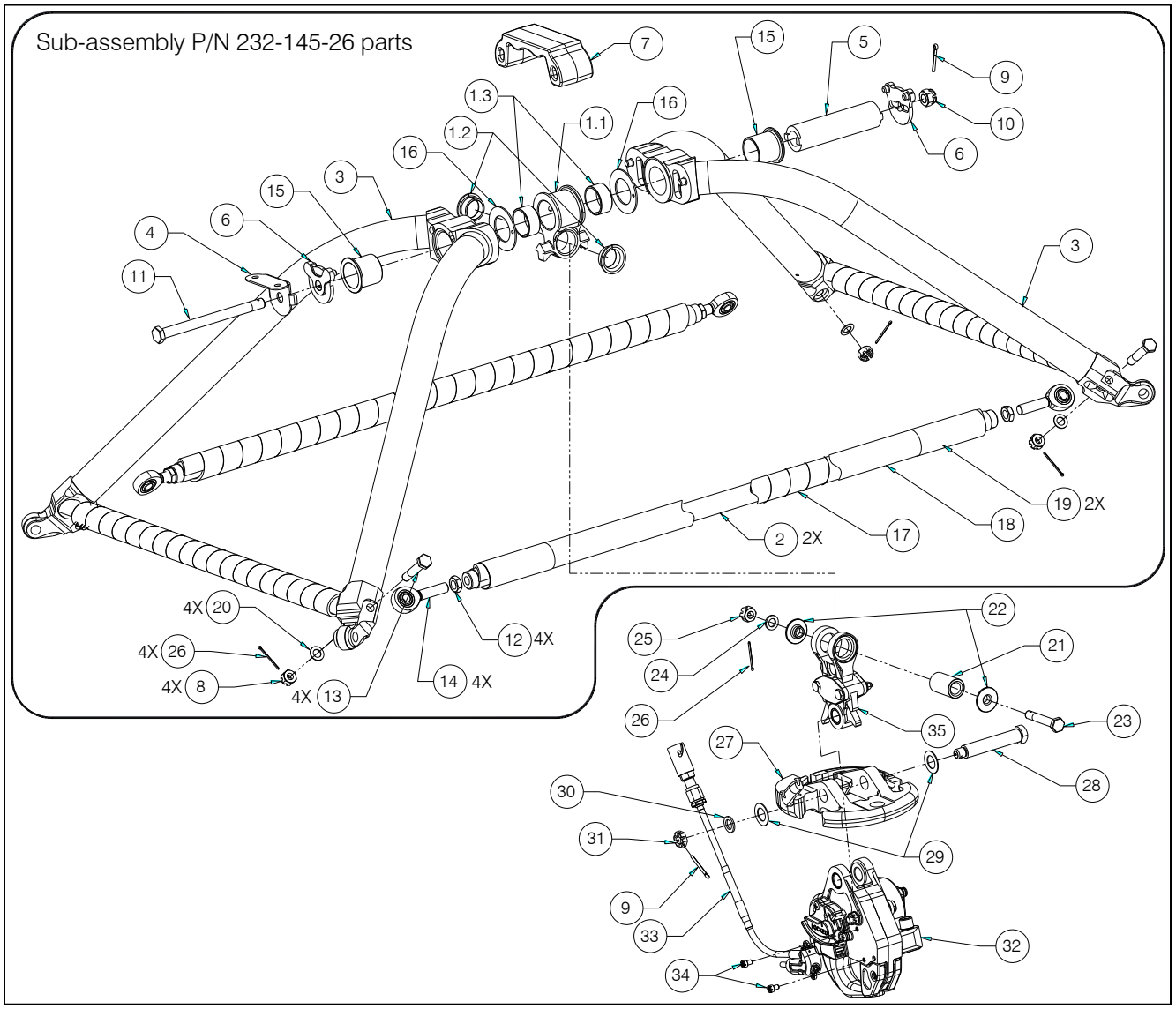


Figure 5.6 Suspension Cable to Swing Frame Attachment Hardware

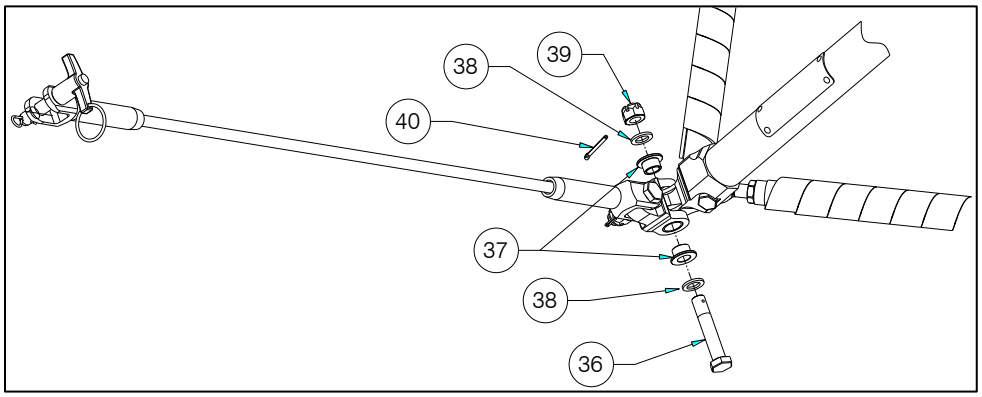


Figure 5.7 Suspension Cable Parts

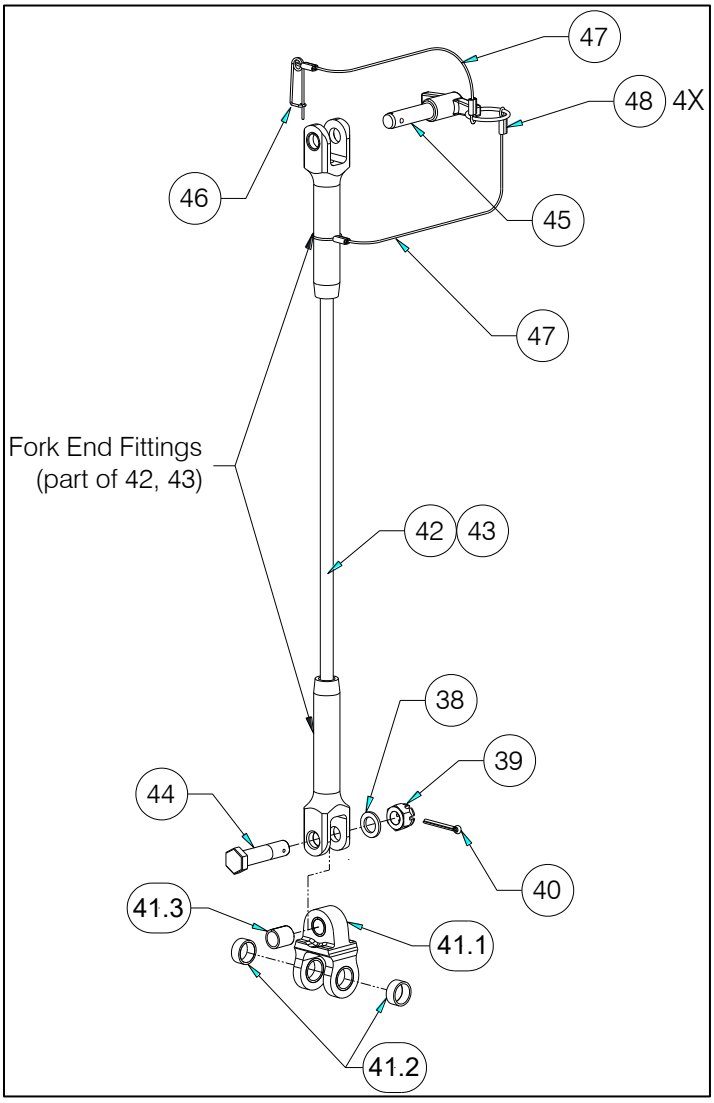


Figure 5.8 Shackle Assembly Parts

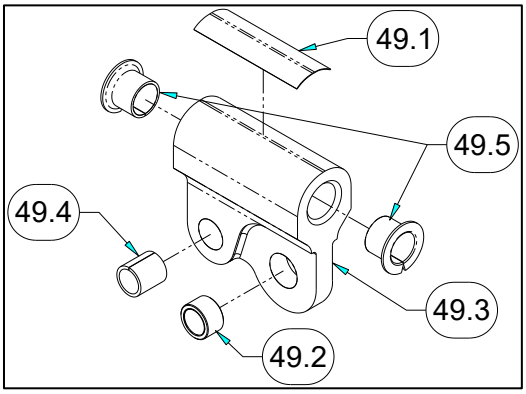


Table 5.2.1 Swing Suspension Parts List

Item	Part No.	Description	Qty
Swing Hook Frame Assembly (Figure 5.5)			
1[1]	232-143-01	Load Cell Gimbal Assembly	1
1.1	290-841-00	Gimbal	1
1.2	517-046-00	Flanged DU Bearing	2
1.3	517-056-00	DU Bearing	2
1.4[3]	518-003-00	Grease Fitting	1
2	235-116-00	Frame Strut Weldment	2
3	235-117-00	Swing Frame Half	2
4	235-170-00	Bracket	1
5	290-842-00	Pivot Shaft	1
6	290-843-00	Shaft Cap	2
7	290-862-00	Bumper	1
8	510-719-00	Nut	4
9	510-178-00	Cotter Pin	2
10	510-718-00 or 510-226-00	Nut	1
11	510-676-00	Bolt	1
12	510-510-00	Jam Nut 3/8-24 Thread	4
13	511-239-00	Bolt	4
14	517-055-00	Spherical Rod End	4
15	517-057-00	Flanged DU Bearing	2
16	517-058-00	Thrust Washer	2
17	590-011-00	Spiral Wrap	12 ft.
18	450-162-00	Kevlar Braided Sleeve	20 in.
19	450-161-00	Heat Shrink	2 @ 3 in.
20	510-239-00	Washer	4
21	290-739-00	Gimbal Shaft	1
22	290-740-00	Retaining Bushing - Shaft	2
23	510-443-00	Bolt	1
24	510-220-00	Washer	1
25	510-320-00	Nut	1
26	510-115-00	Cotter Pin	5
27	290-839-02	Hook Bumper	1
28	290-775-00	Long Attach Bolt	1
29	510-183-00	Washer	2
30	510-174-00	Washer	1
31	510-170-00	Nut	1
32	528-028-00	Cargo Hook	1
	528-028-02	Cargo Hook w/ Surefire	
	528-028-04	Cargo Hook	
33	232-829-00	Slave Cylinder Assembly w/ Plumbing	1
34	510-531-00	Screw	2

35	210-312-00[4]	Load Cell Assembly w/ Y-Harness	1
Suspension Cable Parts and Attachment Hardware (Figure 5.6 **and** Figure 5.7**)**			
36	510-439-00	Bolt	4
37	290-749-00	Standoff Bushing	8
38	510-221-00	Washer	12
39	510-718-00 or 510-226-00	Nut	8
40	510-178-00	Cotter Pin	8
41[1]	232-142-00	Lower Attach Gimbal Assembly	4
41.1	290-746-00	Gimbal	1**
41.2	517-048-00	DU Bearing	2**
41.3	517-016-00	DU Bearing	1**
42	232-177-00	Forward Suspension Cable	2
43	232-178-00	Aft Suspension Cable	2
44	510-438-00	Bolt	4
45	290-851-00	Quick Release Pin	4
46	514-048-00	Safety Pin	4
47	531-015-00	Lanyard Cable	15 in.**
48	531-016-00	Crimp Sleeve	4**
Shackle Assembly Parts (Figure 5.8)			
49[1]	232-137-01	Shackle Assembly	4
49.1	215-396-00	Shackle Assembly Placard	1**
49.2	290-750-00	Attach Fitting Bushing	1**
49.3	290-850-00	Shackle	1**
49.4	517-016-00	DU Bearing	1**
49.5	517-047-00	Flanged DU Bearing	2**
Items not shown in figures:			
-	270-285-00	Ground Strap	1
-	510-391-00	Screw (for attaching Ground Strap to cargo hook)	1
-	490-021-00	Bungee Cord Assembly	2
-	512-011-00	Cable Tie	4

Notes:

[1]Item not shown assembled.

**Quantity is per assembly.

[3] Not shown.

[4] If cargo swing system was retrofitted from P/N 200-280 series of STC SR01164SE with retrofit kit P/N 200-469-00 or 200-479-00, Load Cell Assembly P/N is 210-249-03.

[5] Swing Frame Assembly P/N 232-145-26 is a sub-assembly of 232-844-00, -01, and -02. See Figure 5.5 for breakdown of parts.

[6] 232-844-00, 232-844-01, and 232-844-02 are the same except for the cargo hook P/N. P/N 232-844-00 includes cargo hook P/N 528-028-04, P/N 232-844-01 includes cargo hook P/N 528-028-00, P/N 232-844-02 includes cargo hook P/N 528-028-02.

5.2.2 Inspection

1. Return the Load Cell Assembly (35) 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.

2. In addition, carefully inspect, and if necessary, repair or replace*, the detail parts in accordance with the instructions in Table 5.2.3. Inspect the parts in a clean, well-lit room.

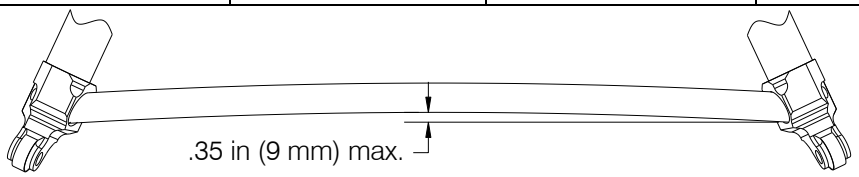
*Overhaul Kit P/N 212-040-01 (see Table 5.2.2) is recommended to use for re-assembly of the swing suspension and shackle assemblies. The overhaul kit contains fasteners, DU bearings and other recommended items to be replaced. The cargo hook has its own Overhaul Kit, refer to its CMM.

Table 5.2.2 Overhaul Kit 212-040-01 Parts

Item	P/N	Description	QTY
1	510-115-00	Cotter Pin	5
2	510-170-00	Nut	1
3	510-174-00	Washer	1
4	510-178-00	Cotter Pin	10
5	510-183-00	Washer	2
6	510-220-00	Washer	1
7	510-221-00	Washer	12
8	510-239-00	Washer	4
9	510-320-00	Nut	1
10	510-438-00	Bolt	4
11	510-439-00	Bolt	4
12	510-443-00	Bolt	1
13	510-510-00	Jam Nut	4
14	510-676-00	Bolt	1
15	510-718-00*	Nut	9
16	510-719-00	Nut	4
17	511-239-00	Bolt	4
18	514-048-00	Safety Pin	4
19	517-016-00	DU Bearing	8
20	517-046-00	Flanged DU Bearing	2
21	517-047-00	Flanged DU Bearing	8
22	517-048-00	DU Bearing	8
23	517-056-00	DU Bearing	2
24	517-057-00	Flanged DU Bearing	2
25	517-058-00	Thrust Bearing	2

*Nut P/N 510-226-00 may be supplied as an alternate.

Table 5.2.3 Swing Suspension Inspection Criteria

Seq	Component	Inspection Criteria & Limit	Repair Action	Finish	Recommended replacement at overhaul
1.	Gimbal (1.1), Gimbal (41.1)	Surface cracks – inspect under illuminated magnification (minimum 2X / 4 diopter).	None. Cracks of any size are cause for part replacement.	N/A	No
2.	Frame Strut Weldment (2)	Dents, gouges, and scratches – 0.020 in. (0.51 mm) deep.	Blend at 10:1 ratio as required to provide smooth transitions.	Protect affected surfaces with MIL-PRF-23377 Type 1 primer or equivalent and MIL-PRF-85285 Type 1 coating or equivalent.	No
		Surface cracks – inspect under illuminated magnification (minimum 2X / 4 diopter).	None. Cracks of any size are cause for part replacement.	N/A	
3.	Swing Frame Weldment (3)	Dents, gouges, and scratches – 0.020 in. (0.51 mm) deep.	Blend at 10:1 ratio as required to provide smooth transitions.	Protect affected surfaces with MIL-PRF-23377 Type 1 primer or equivalent and MIL-PRF-85285 Type 1 coating or equivalent.	No
		Surface cracks – inspect under illuminated magnification (minimum 2X / 4 diopter).	None. Cracks of any size are cause for part replacement.	N/A	
		Bent lateral tube, gap measured along a straight edge is greater than .35” (see figure below).	None.	N/A	
					
4.	Bracket (4)	Dents, gouges, and scratches – 0.030 in. (0.76 mm) deep.	Blend at 10:1 ratio as required to provide smooth transitions.	Parts are 304 stainless steel, no touch up finish required.	No

Seq	Component	Inspection Criteria & Limit	Repair Action	Finish	Recommended replacement at overhaul
5.	Pivot Shaft (5)	Wear on outside diameter, diameter less than 0.990" (25.1 mm).	None	N/A	No
6.	Shaft Cap (6)	Dents, nicks, cracks, gouges, scratches and corrosion – 0.060 in. (1.52 mm) deep	Blend at 10:1 ratio as required to provide smooth transitions.	Passivate per AMS-QQ-P-35 or ASTM A967.	No
7.	Bumper (7)	Gouges and scratches greater than .060" deep. Splitting.	None.	N/A	No
8.	DU Bearing (1.2, 1.3, 15, 41.2, 41.3, 49.4, 49.5)	Wear – more than 50% copper showing.	None	N/A	Yes
9.	Rod End (14)	Wear on or elongation of inside diameter of spherical bearing, diameter greater than .330 in. (8.4 mm). Binding of spherical bearing in its housing.	None	N/A	No
10.	DU Thrust Washer (16)	Wear on side facing Gimbal – more than 50% copper showing.	None.	N/A	Yes
11.	Load Cell Assembly (35)	Dents, gouges, and scratches greater than .020 in. deep in the load link.	Blend at 10:1 ratio as required to provide smooth transitions.	Passivate per AMS-QQ-P-35 or ASTM A967.	No
		Elongation of or wear on inside diameter of upper lugs, diameter greater than .759 in. (19.3 mm). Galling, pitting on inside diameter.	None.	N/A	
		Dents, gouges, and scratches greater than .060 in. (1.5 mm) deep in the Covers.	Blend at 10:1 ratio as required to provide smooth transitions.	Apply conversion coating (MIL-DTL-5541) to affected Cover surfaces.	
		Wear on ID of bushing - 0.520 in. (13.2 mm)	None.	N/A	

Seq	Component	Inspection Criteria & Limit	Repair Action	Finish	Recommended replacement at overhaul
12.	Gimbal Shaft (21)	Wear on OD - .732 in. (18.6 mm) Galling, pitting.	None	N/A	No
13.	Retaining Bushing (22)	Wear on OD - .487 in. (12.4 mm)	None	N/A	No
14.	Hook Bumper (27)	Gouges and scratches greater than .060 in (1.5 mm) deep.	None	N/A	No
15.	Attach Bolt (25)	Wear on OD - .495 in. (12.6 mm)	None	N/A	No
16.	Suspension Cable (42, 43) Fork End Fittings	Wear on ID of clevis holes - 0.397 in. (10.1 mm)	None	N/A	No
		Dents, gouges and scratches – 0.020 in. (0.51 mm) deep	Blend at 10:1 ratio to provide smooth transitions.	Parts are 303 stainless steel, no touch up finish required.	No
		Surface cracks – inspect under illuminated magnification (minimum 2X / 4 diopter).	None	N/A	No
17.	Suspension Cable (42, 43) Wire Rope	Inspect for damage as detailed in 100 Hour/Annual Inspection	None	N/A	No
18.	Quick Release Pin (45)	Wear on OD - 0.362 in. (9.2 mm)	None	N/A	No
19.	Shackle (49.3)	Dents, gouges and scratches – 0.020 in. (0.51 mm) deep	Blend at 10:1 ratio to provide smooth transitions.	Protect affected surfaces with MIL-PRF-23377 Type 1 epoxy primer or equivalent and MIL-PRF-85285 Type 1 coating or equivalent.	No
20.	All remaining nuts, bolts, cotter pins, washers	Wear, corrosion or deterioration.	None	N/A	Yes
21.	S/N Plate	Damaged or illegible	None	N/A	No

5.2.3 Swing Suspension Re-assembly

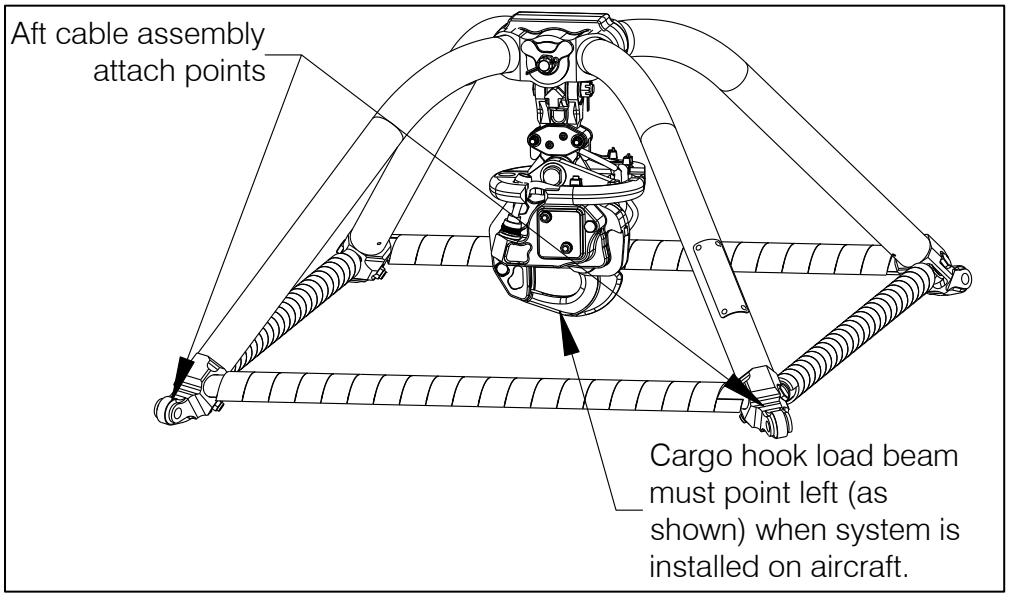
Re-assemble the suspension frame per the following (refer to Figure 5.5 through Figure 5.8).

1. Install replacement self-lubricating bushings with wet zinc chromate primer (TTP-1757 or equivalent) applied to the bushing OD.
2. Apply a light film of grease (Mobilgrease 28 is recommended) to the outside diameter of the Pivot Shaft (5) and insert it through one frame half, thrust washer* (16), Gimbal Assembly, thrust washer* (16) and through second frame half. Do not fully seat frame halves yet.

   * Ensure Teflon impregnated wear surfaces (darker sides) of thrust washers are facing gimbal.
3. Rotate the Pivot Shaft so that the raised “keys” at each end are horizontal.
4. Align the rod ends (14) to seat in the pockets of the swing frame feet.
5. Before fully seating and securing the frame halves together position the bumper (7) in between them.
6. Capture each end of the Pivot Shaft with Shaft Caps (6), place the Bracket (4) over the forward Shaft Cap, insert bolt (11) through, and thread the nut (10) on. Ensure that the rod ends are aligned with the holes in both feet.
7. Torque the nut (10) to 20 ft-lbs. Rotate the nut to the next castellation, not to exceed 30 ft-lbs.
8. Install and secure cotter pin (9).
9. Secure rod ends to frame feet with bolt (13), washer (20) and nut (8). Torque to 8 – 12 ft-lbs. rotate to nearest castellation and insert cotter pin (26).
10. Ensure the rod ends at each end of the frame struts are parallel, i.e.- the rod ends should be able to be rotated within the limits of the pockets in the frame feet. If necessary, loosen a jam nut (12), rotate the strut so the tightened rod end is against the pocket, rotate other rod end in the same direction (to be parallel), and tighten its jam nut.
11. Attach the Load Cell Assembly (35) to the Gimbal Assembly (1) per section 25.18.4.
12. Attach the Cargo Hook (32) and Hook Bumper (27) to the Load Cell and route electrical harness, ground strap and hydraulic hose per section 25.18.6.
13. Apply grease (Mobilgrease 28 is recommended) to the holes of the Fork End Fittings of the Forward and Aft Suspension Cable Assemblies (42, 43).
14. Assemble the Gimbal Assemblies (41) onto the Fork End Fittings with bolt (44), washer (38), and nut (39).

15. Tighten nut (39) to finger tighten then rotate to next castellation if necessary to insert cotter pin. Ensure the Gimbal Assembly pivots freely on the bolt (back off to previous castellation if it does not). Install cotter pin (40).
16. Apply grease (Mobilgrease 28 is recommended) to the shank of the bolts (31).
17. Fasten the Gimbal Assemblies of the two longer Aft Suspension Cable Assemblies onto the aft feet of the Swing Frame Assembly and the two shorter Aft Suspension Cable Assemblies onto the forward feet of the Swing Frame Assembly (reference Figure 5.9 for orientation). At each joint assemble with bolt (36), washers (38), Standoff Bushings (37), and nut (39). Tighten nut to 95-110 in-lb and rotate to next castellation to insert cotter pin (40).

Figure 5.9 Swing Frame Orientation



18. Re-install the suspension system on the aircraft per Section 25.18.8.

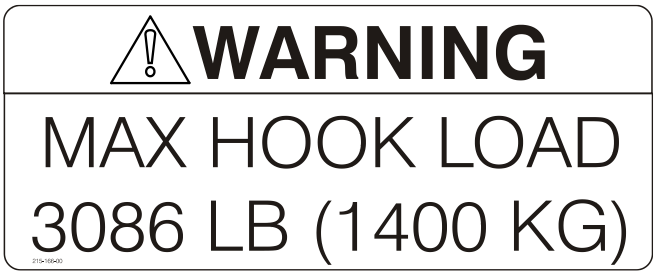
5.3 Cargo Hook Overhaul

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 swing suspension system.

Placard part number (P/N) and appearance	Location
P/N 215-343-00 	Located adjacent to the cargo hook release switch on the cyclic (primary release only).
P/N 215-336-00 	Mounted on the bottom of solenoid housing of cargo hook P/N 528-028-02 (included with kit P/N 200-470-02 only).
P/N 215-166-00 	Located on the belly of the aircraft near the cargo hook suspension in clear view of the ground support personnel.

Section 12 Servicing

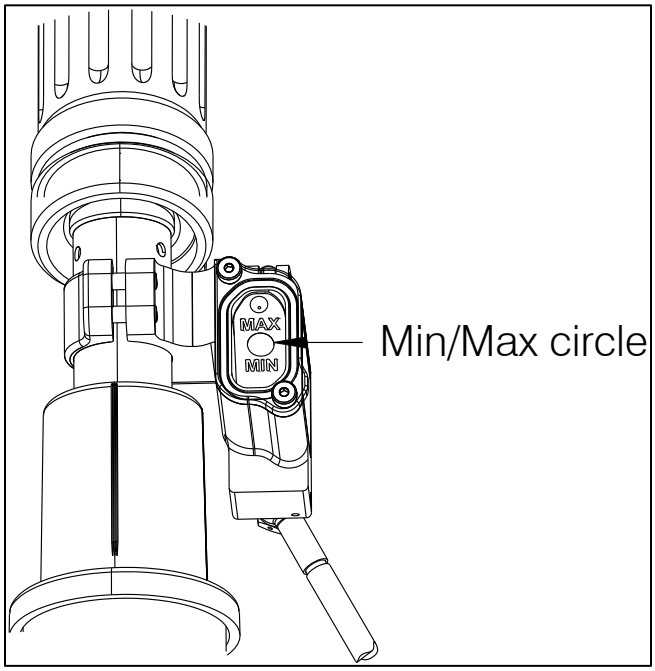
12.1 Maintenance of the Hydraulic Release System

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 with the reservoir (see Figure 12.1).
3. Remove lid and add MIL-PRF-87257 hydraulic fluid as required until the baffle surface is partially or fully submerged.

Figure 12.1 Fluid Level Check



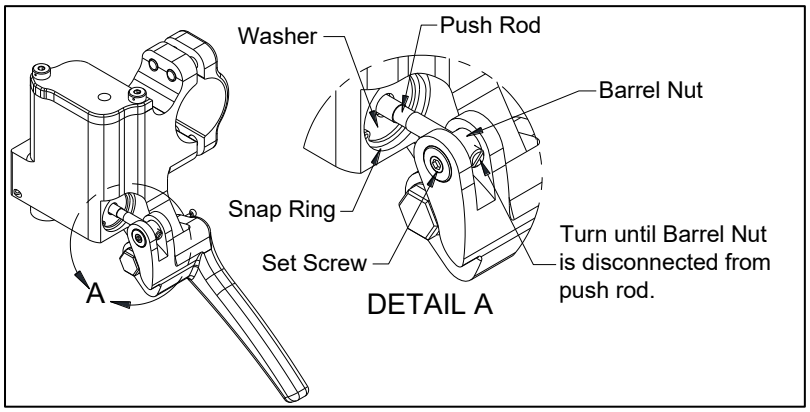
If leakage is noted around any plumbing fittings, the fittings may be tightened until the leakage quits. If leakage is noted around the pistons in either the master or slave cylinders the leaking cylinder must be repaired. See the instructions for repair in this section.

12.1.1 Master Cylinder Repair

If fluid is leaking around the piston, the only repair is to remove and replace the cup seal and O-ring. Drain the hydraulic fluid from the system and disassemble, inspect, and reassemble with new seals/parts as necessary per the following.

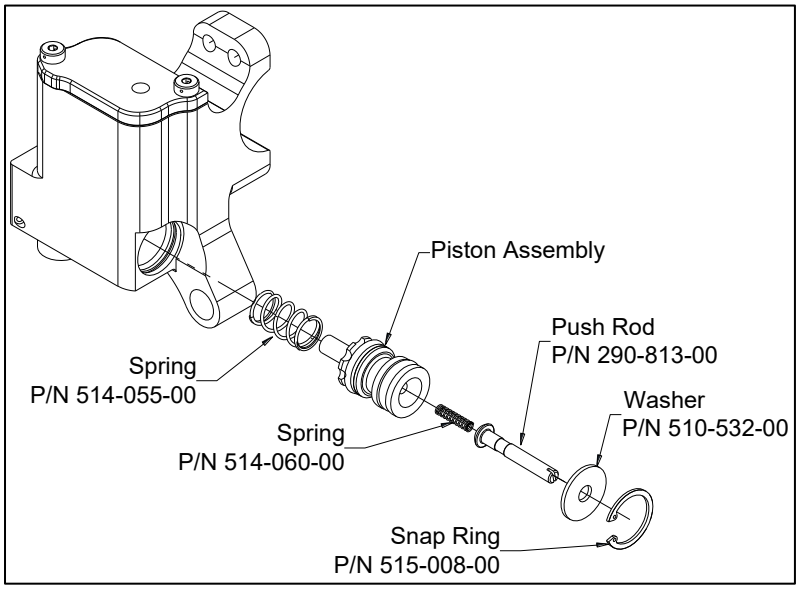
1. Remove snap ring. Use caution when removing the snap ring since the piston is spring loaded against the washer and snap ring. The piston will pop out of the housing when the snap ring is removed. Use the lever to put pressure on the piston while removing snap ring.
2. Loosen the set screw and disconnect barrel nut from the push rod. See Figure 12.2.

Figure 12.2 Disconnecting Master Cylinder Lever



Remove the piston assembly (piston, O-ring and cup seal) and springs. See Figure 12.3 for parts breakdown. See Figure 12.4 piston assembly parts.

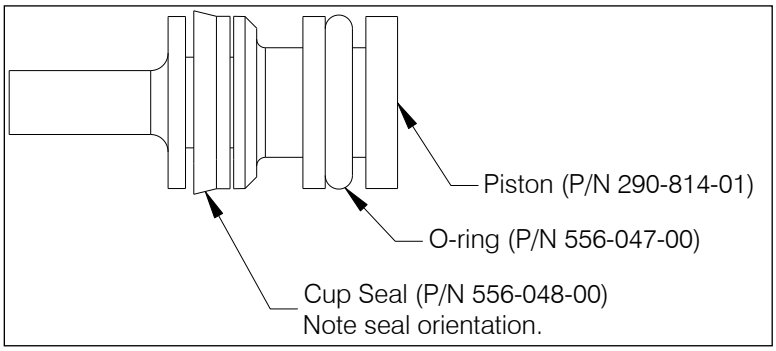
Figure 12.3 Piston Removal



3. 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 12.4.

Figure 12.4 Piston Assembly Parts and Seal Orientation

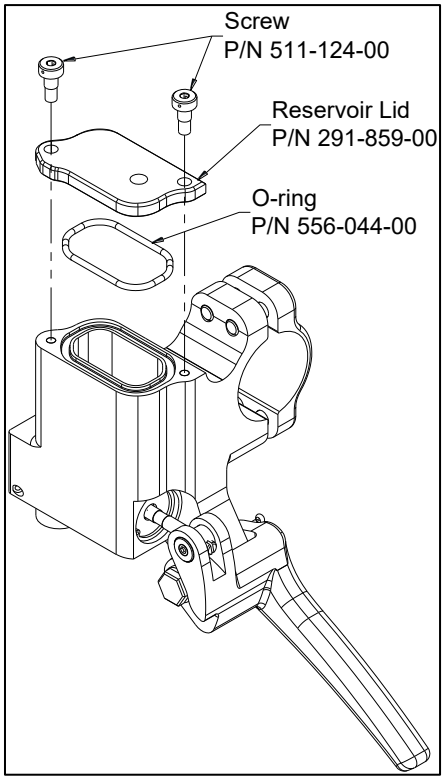


4. To prepare the piston assembly for insertion, lubricate the outside of the cup seal and O-ring and the master cylinder bore generously with hydraulic fluid.
5. Place the spring into the cylinder bore.
6. Insert the push rod through the washer.
7. Thread the push rod into the barrel nut until approximately 1/16” of thread is visible through the opposite side of the barrel nut.
8. Insert the small spring into the small bore on the outward facing side of the piston and insert the piston assembly into the bore using a firm rocking motion. Use caution to avoid nicking the cup seal and O-ring.
9. Use the lever and push rod to compress the spring and hold the piston in place while using snap ring pliers to install the snap ring.
10. Secure push rod threads by tightening the set screw.

12.1.2 Master Cylinder Lid and O-ring Replacement

If fluid is leaking from around the master cylinder's reservoir lid, remove the lid (ref. Figure 12.5) and inspect it for cracks and inspect the O-ring for nicks or gouges. Replace parts as needed. Reassemble and torque the shoulder screws to 4-5 in-lb. Thoroughly clean any hydraulic fluid residue from the outside of the master cylinder to isolate any further leakage.

Figure 12.5 Master Cylinder Lid Parts



12.1.3 Slave Cylinder Repair

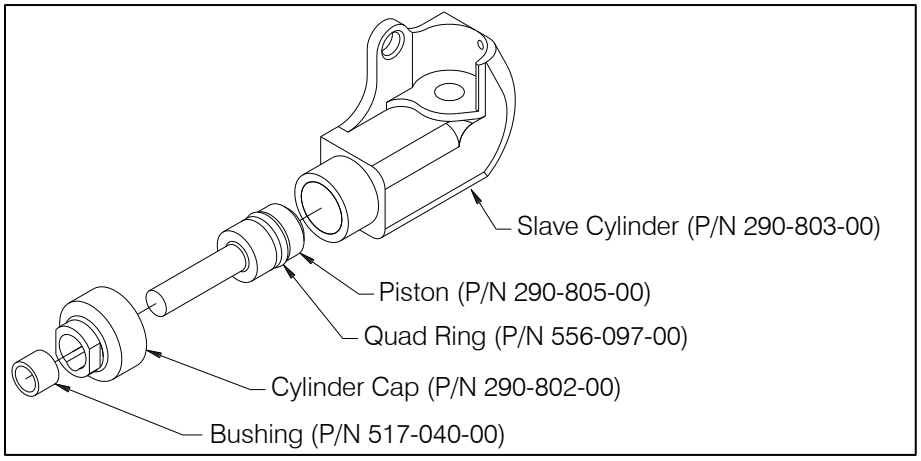
If the slave cylinder is leaking fluid around the piston rod, the only repair possible is to remove and replace the quad ring or cup seal (earlier production units of the slave cylinder assembly used a cup seal instead of the quad ring).

Remove the slave cylinder assembly from the cargo hook per section 25.17.3 and disassemble it per the following.

1. Remove cap, piston, and seal (see Figure 12.6).
2. Inspect bore of slave cylinder for scratches or gouges. If any are present the assembly must be replaced.
3. If bushing has more than 50% of its copper sub-layer exposed, remove it by pressing it out.
4. Remove quad ring (or cup seal) by stretching it over the piston.

5. Re-insert piston into bore. Apply zinc chromate primer or equivalent to threads of cylinder cap and thread on cylinder cap and tighten securely.

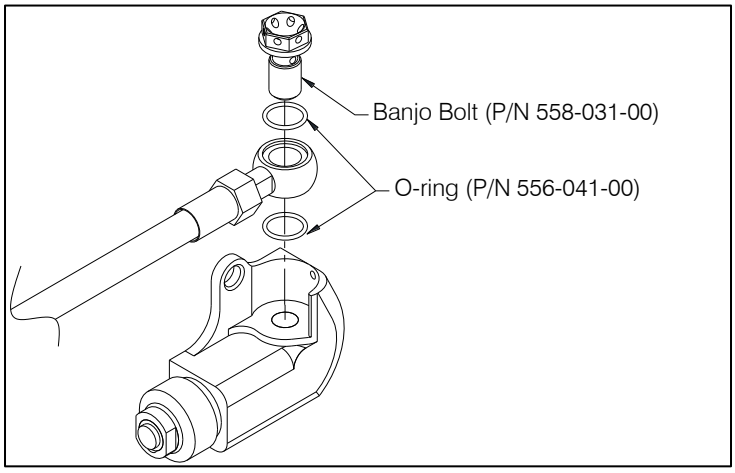
Figure 12.6 Slave Cylinder Piston Removal



If fluid is leaking at the banjo fitting, the most likely solution is to remove and replace the O-rings. Note the angle of the hose on the slave cylinder and disassemble per the following, referencing Figure 12.7.

1. Cut safety wire securing the banjo bolt to the slave cylinder.
2. Unthread and remove the banjo bolt and O-rings from the slave cylinder.
3. Inspect O-ring sealing surfaces for any scratches or other damage that could be the cause of the leak. Replace parts as needed.
4. Reassemble with new O-rings, orient the hose as before, and tighten the banjo fitting to 20-30 in-lb.
5. Secure the banjo bolt to the hole in the slave cylinder with safety wire.

Figure 12.7 Banjo Bolt Removal



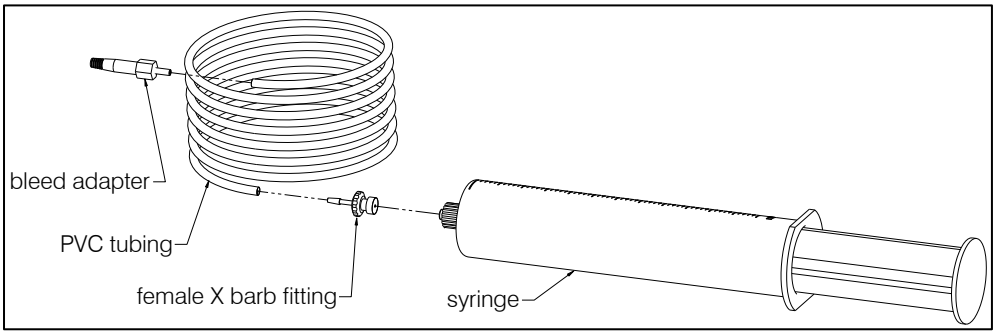
12.1.4 Bleeding the Hydraulic System

Filling and bleeding of the hydraulic release system is most easily accomplished on the bench, prior to installation on the aircraft. This process may also be done after the system is installed. It is recommended to use two people, 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 12.8 Bleed Kit Components



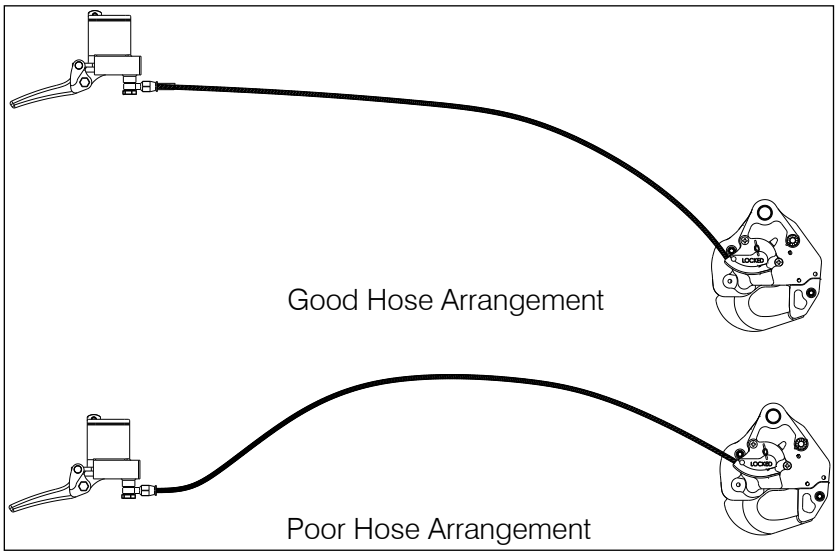
2. If the system is already installed on the aircraft, place an absorbent towel under the master cylinder. If the master cylinder is not installed on the aircraft, lightly clamp the master cylinder in a vise to hold it in a vertical position and position the slave cylinder so that its level is below the level of 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.

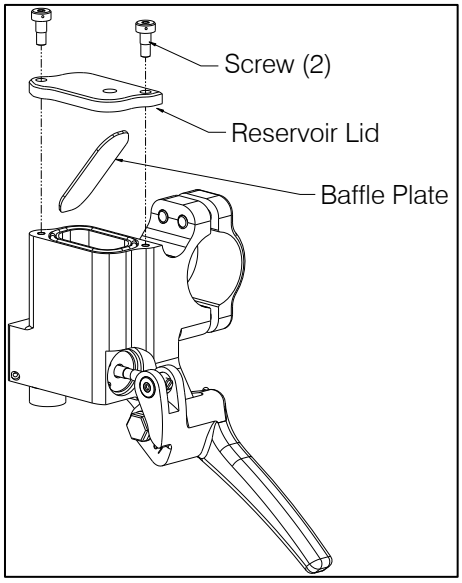
3. Connect the master cylinder hose to the slave cylinder hose. If filling and bleeding on the bench, as much as possible, arrange the hoses uncoiled, straight and running uphill to the master cylinder.

Figure 12.9 Hose Arrangement for Bleeding



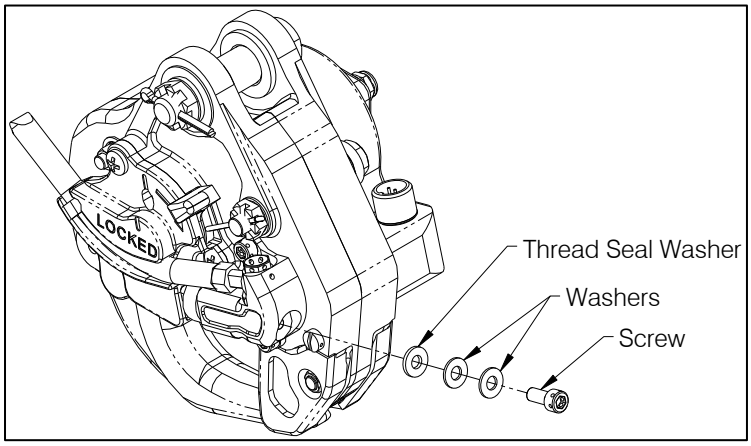
4. Remove screws, reservoir lid, and baffle from the master cylinder reservoir as shown in Figure 12.10.

Figure 12.10 Reservoir Lid Removal



5. Remove the screw and thread-seal washer and washers on the slave cylinder, ref. Figure 12.11.

Figure 12.11 Screw and Washer Removal



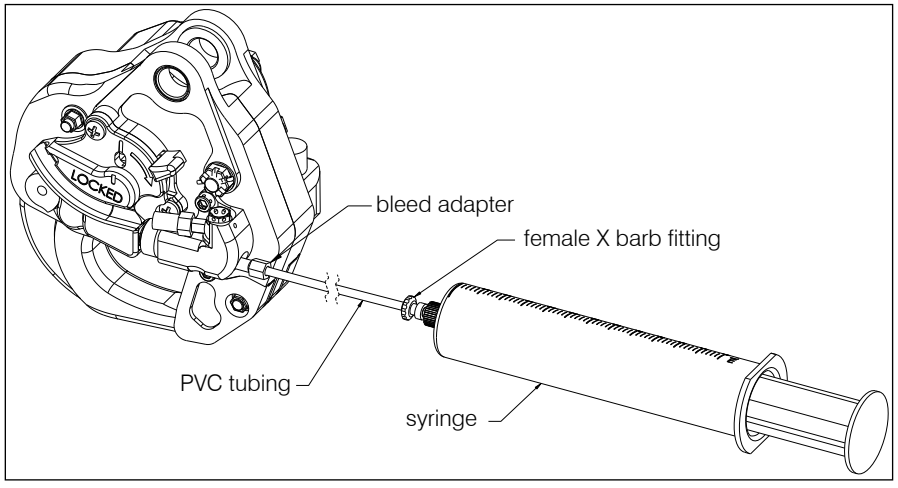
6. Fill the syringe with approximately 35 cc of hydraulic fluid and purge any remaining air in the syringe and tubing. Screw the end of the bleed adapter into the screw hole on the slave cylinder to create a tight seal.

7. 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 12.12 Injecting Hydraulic Fluid



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

NOTICE

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

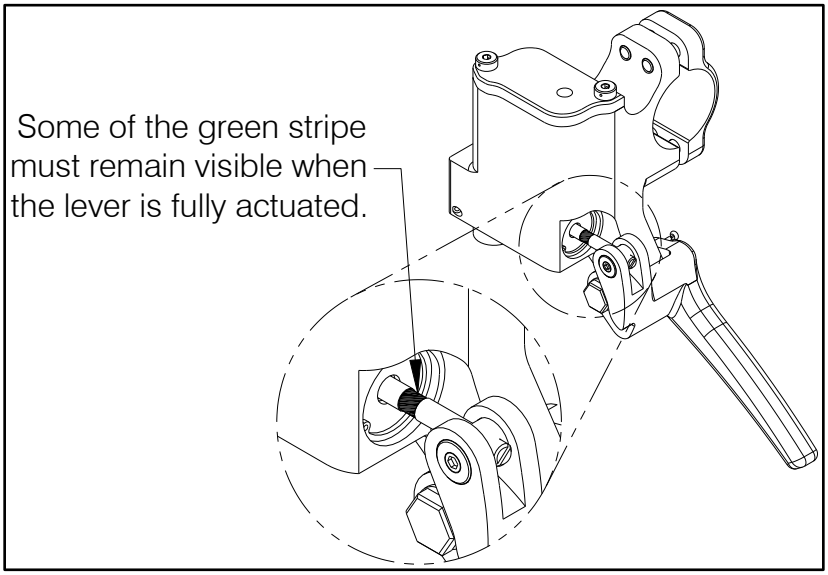
9. Have the thread-seal washer, the two plain washers, and screw ready to install and then remove the bleed adapter from the screw hole. Quickly, to minimize fluid leakage, install the washers and screw.
10. Allow the system to rest for several minutes. This will allow any air to rise through the system.
11. 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.

12. Check the system for air by actuating the lever firmly until it bottoms out. Check the push rod position (see Figure 12.13). If some of the green area 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 12.13 Checking System for Air



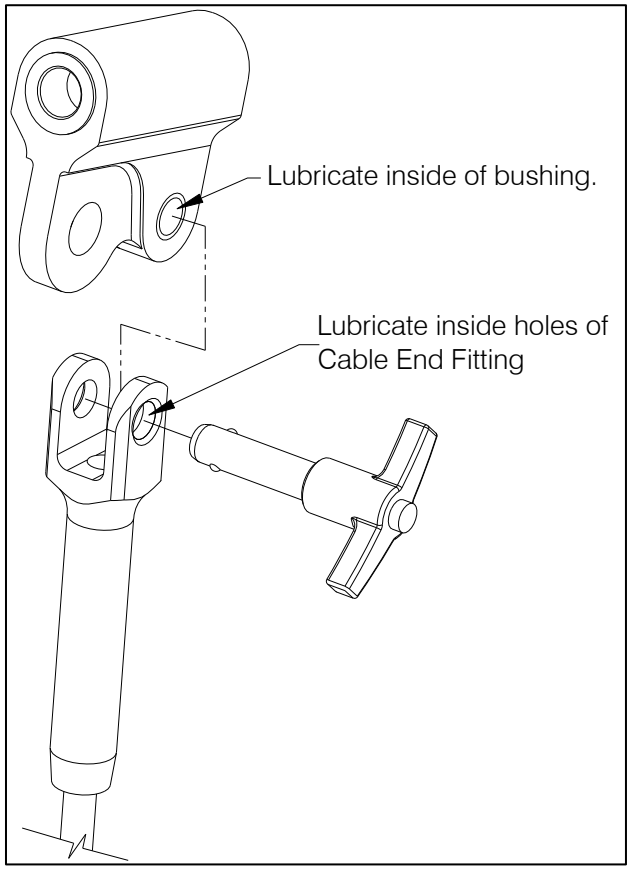
13. After the system is properly bled, verify that the reservoir is approximately half full of hydraulic fluid. Fluid should be visible above the baffle.
14. Re-install the baffle and the reservoir lid.
15. Check the system for proper operation. Fully actuate the release lever. The cargo hook must open and the lever 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 it unusable. Re-assemble and store for next use.

12.2 Lubrication

Lubrication of the Cargo Hook Swing Suspension system is required every 500 hours of operation. To obtain maximum life under severe duty conditions such as logging or seismic work, it is recommended to lubricate every 250 hours. Recommended lubricant is Mobilgrease 28 (MIL-PRF-81322). Lubricate per the following.

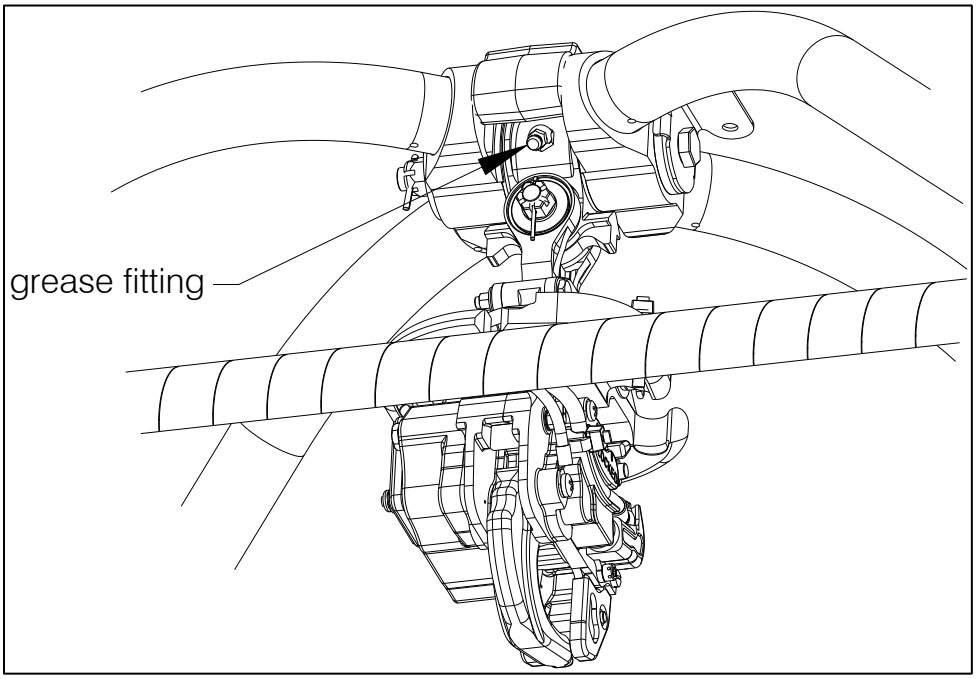
1. Separate the four suspension cables from the Shackle Assemblies and lubricate at points noted in Figure 12.14.

Figure 12.14 Shackle/Cable End Lubrication



2. Rotate the cargo hook to access the grease fitting (see Figure 12.15) at the upper pivot joint of the swing frame assembly. Pump until fresh grease comes out around ends of the gimbal fitting.

Figure 12.15 Grease Fitting



Section 25 Equipment and Furnishings

25.5 Component Weights and CG

The weights and CGs of the systems are listed in Table 25.5.1.

Table 25.5.1 System Weights and CGs

Item	Weight	Station
Removable Provisions*	30.0 lbs (13.6 kg)	133 in (3375 mm)
Fixed Provisions**	5.5 lbs (2.5 kg)	110 in (2794 mm)
Total	35.5 lbs (16.1 kg)	129.4 in (3288 mm)

* The removable provisions consist of the external components including the swing suspension with cargo hook. These items are easily removed if they are not needed on the helicopter's mission. Refer to Suspension System Removal in Section 25.16 for removal instructions.

** The fixed provisions are those items of the kit that remain on the aircraft. These include the fixed hydraulic release system, internal electrical wire harnesses, the load weigh indicator, and the miscellaneous brackets that support these items. These components would typically be left on the aircraft when configuring the aircraft for non-external load work.

25.12 Storage Instructions

For temporary storage, the master cylinder must be stored with the reservoir lid 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 Cargo Hook and Swing Frame components thoroughly of excess dirt and grease with a rag before storing. Refer to the Cargo Hook Component Maintenance Manual for storage instructions for the cargo hook.

It is recommended that the cables be removed from the Swing Frame for shipping or storage to reduce the possibility of the cables being kinked. Package the Swing Frame in a suitable fiberboard box and cushion the unit to prevent shifting. Seal the fiberboard box with tape and mark the box with the contents and date of packaging.

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 sections 25.17 and 25.18) or repair per CMM 122-015-00.
Cargo hook does not operate electrically, hydraulic release operates normally.	Open electrical circuit, faulty wiring, circuit breaker, relay, or solenoid.	Using multi-meter, check for 3.0 to 4.0 Ω between pins A and B of electrical connector. If open indication is obtained, remove and replace cargo hook (see sections 25.17 and 25.18) 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. When the release switch is pressed 28V aircraft voltage should be seen on the connector pins.
Cargo hook P/N 528-028-02 (includes Surefire time delay circuit) does not operate electrically, hydraulic release operates normally.	Release switch not held down long enough. Open electrical circuit, faulty wiring, circuit breaker, switch or solenoid.	Hold the release switch for a longer time. The time delay circuit incorporates an electronic delay of approximately ½ second after which time the hook solenoid will activate repeatedly. If the release switch is not held down long enough the cargo hook's solenoid will not activate. Check the aircraft circuit for opens and shorts by using a multi-meter on the hook connector. When the release switch is pressed 28V aircraft voltage should be present on the connector pins. Check the aircraft connector polarity. The time delay circuit is polarity sensitive and protected against reverse polarity. +28V should be on pin B and ground on pin A. Check the power pins on the hook itself. A multi-meter set to the kilo-ohms range should read between 2-8 KΩ. Some auto-ranging meters will not read properly so be sure to try a manual kilo-ohms range. If the meter reads open or short there is a problem with the solenoid module itself and the hook should be replaced or repaired per CMM 122-015-00.
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 (see sections 25.17 and 25.18) 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.

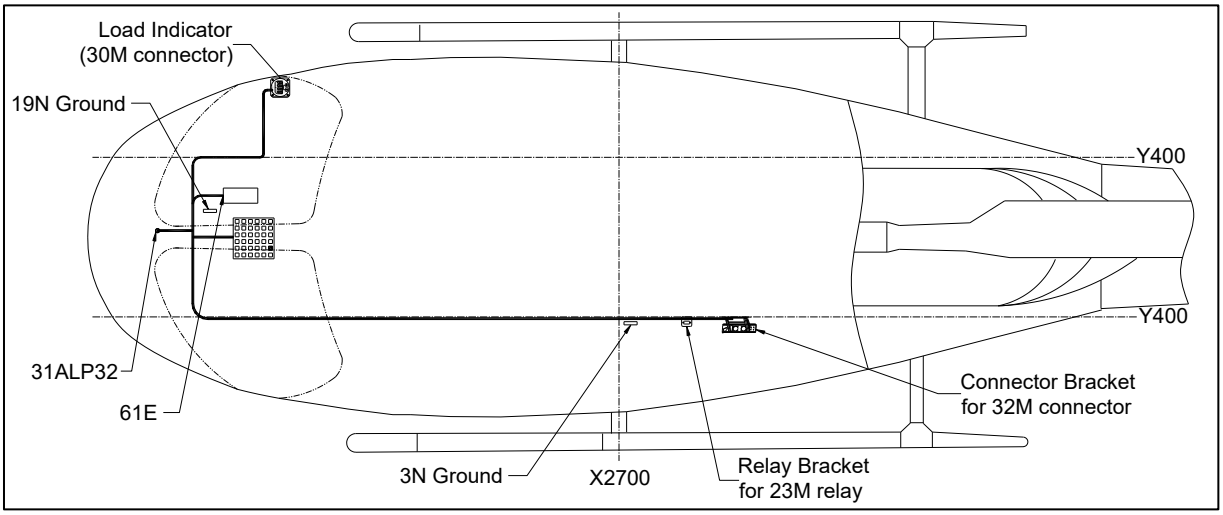
Malfunction	Probable Cause	Corrective Action
Cargo hook operates electrically, but not manually.	Leaks in hydraulic hose system. Air in hydraulic hose system. Jammed slave cylinder.	Check system for excess air per Section 12. Check for leaks in hydraulic hose system and correct defects if found. Bleed hydraulic system per this manual. Remove slave cylinder from hook and check for proper operation while actuating the release lever on the collective. Repair as required.
Force required to release hook with lever on collective exceeds 14 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 (see Sections 25.17 and 25.18) 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	Replace master or slave cylinder assembly or repair per Section 12 of this manual.
Cargo hook fails to open or re-lock properly.	Failure to open or re-lock properly.	Remove and replace cargo hook (see Sections 25.17 and 25.18) 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 harness, see Note 1. Check solenoid resistance (must be between 3 - 4 Ω across pins A and B), repair or replace defective parts.
Load Weigh Indicator does not light up.	Faulty wiring or circuit breaker.	Check the circuit breaker (refer to Airbus Helicopter maintenance manual) and wiring, see Note 1. If this doesn't help, remove and replace indicator per sections 25.17 and 25.18.
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.

Troubleshooting Notes:

1. As appropriate, before working on a circuit, e.g. – inspection, removal/installation of components, check that the aircraft system is not energized.

   The load weigh system and electrical release system wire harnesses are routed with existing aircraft wire bundles located approximately as shown below. Termination points of these harnesses are also shown. Refer also to the wiring diagrams in Section 98.

Figure 25.1 Wire Harness Routing



25.17 Component Removal

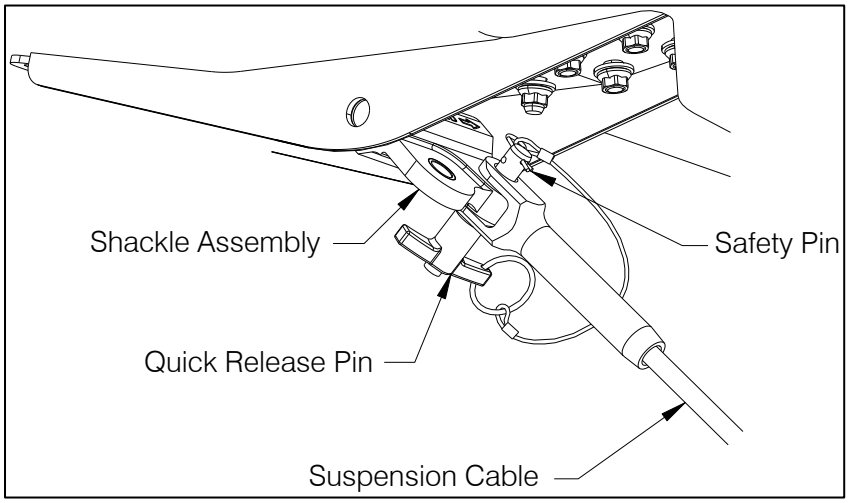
25.17.1 Cargo Hook Removal

1. Separate the slave cylinder assembly and its hose assembly from the cargo hook per section 25.17.3.
2. Remove the screw securing the ground strap terminal to the cargo hook.
3. Cut the cable ties (P/N 512-011-00) securing the electrical harnesses, ground strap, and slave cylinder hose to the Hook Bumper.
4. Remove the cotter pin (P/N 510-178-00) from the attach bolt (P/N 290-775-00) securing the cargo hook to the load cell.
5. Remove the castellated nut (P/N 510-170-00) from the attach bolt and remove the attach bolt and all washers.
6. Separate the Cargo Hook from the load cell.
7. Remove the Hook Bumper from the cargo hook.
8. Disconnect the electrical release harness connector from the cargo hook connector.

25.17.2 Suspension System Removal

1. Unhook the two bungee cord assemblies (P/N 490-021-00) from the bracket on the swing frame assembly.
2. Disconnect the electrical Y-harness connector at the connector bracket mounted to the LH keel beam.
3. Disconnect the ground strap connector at the connector bracket.
4. Disconnect the hydraulic hose at the quick disconnect fitting at the connector bracket.
5. Remove the safety pins from the end of the quick release pins at the 4 joints (ref. Figure 25.2) where the suspension cable ends mate with the Shackle Assemblies.

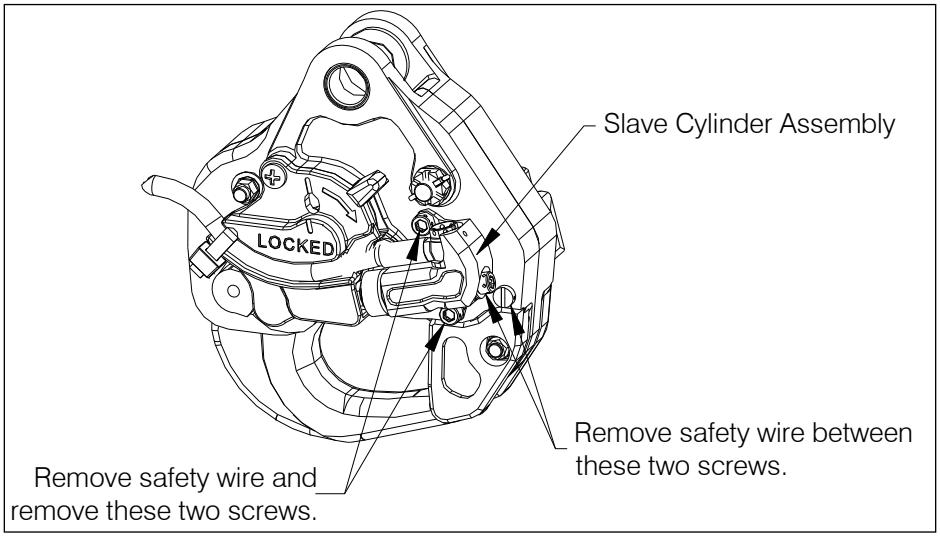
Figure 25.2 Suspension Cable Attachment



25.17.3 Slave Cylinder and Plumbing Assembly Removal

1. Disconnect the hydraulic hose at the quick disconnect fitting at the connector bracket in the LH keel beam.
2. Cut safety wire and remove the two screws that attach the slave cylinder assembly to the cargo hook (ref. **Figure 25.3**).
3. Remove the cable ties that secures the hydraulic hose to the manual release cover of the cargo hook and the bumper.

Figure 25.3 Slave Cylinder Assembly Removal



25.17.4 Fixed Hydraulic Release System Removal

1. Remove the master cylinder assembly from the collective by removing the four screws that secure the clamp around the collective tube.
2. Disconnect the external hydraulic hose at the quick disconnect fitting on the connector bracket at the LH keel beam.
3. Loosen the jam nut on the quick disconnect fitting on the bracket and unthread the quick disconnect fitting from the mating fitting at the end of hose assembly.
4. Moving forward along the hose, remove all cable ties and the cushioned loop clamp at the bracket at frame at STA 1790.15.
5. Feed the hose forward and up through the slot in the floor.

25.17.5 Load Weigh Indicator Removal

The C-40 Indicator is located on the RH forward door pillar.

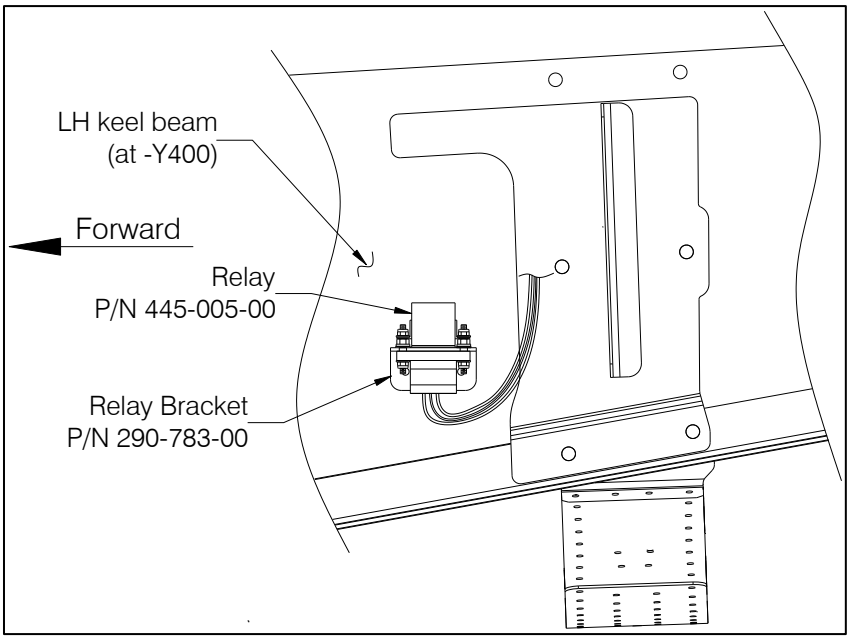
1. Disconnect electrical connector from the back of indicator.
2. Cut lock wire and remove the mounting screws that secure the indicator to the mounting bracket and remove the indicator.

25.17.6 Relay Removal

The relay is located on the outboard side of the LH keel beam (Y400) at X3039, just forward of the attachment of the forward fuel tank cradle.

1. Remove the nuts and washers securing the relay (P/N 445-005-00) to the relay bracket and “unplug” the relay from the relay socket of the internal harness.

Figure 25.4 Relay Location



25.17.7 Load Cell Removal

The load cell harness and cargo hook electrical release harness are combined into a single connector at the connector bracket on the keel beam.

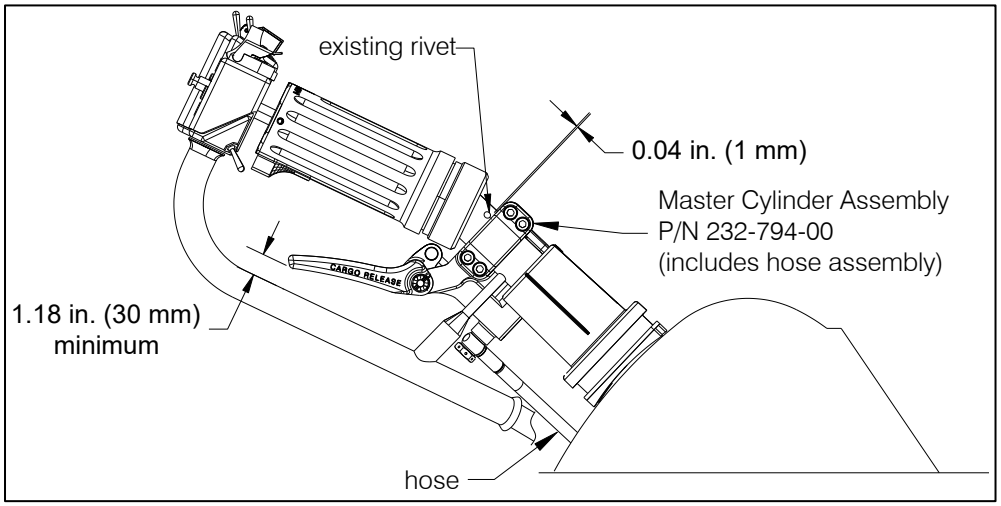
1. Remove the cargo hook per the instructions in this section.
2. Disconnect the connector at the connector bracket on the LH keel beam.
3. Disconnect the electrical release connector at the cargo hook.
4. At the load cell’s upper pivot point, remove the cotter pin securing the nut.
5. Remove the nut, washer and retaining bushing from the end of the bolt and remove the bolt and remaining hardware and remove the load cell.

25.18 Component Re-installation

25.18.1 Master Cylinder w/ Plumbing Re-installation

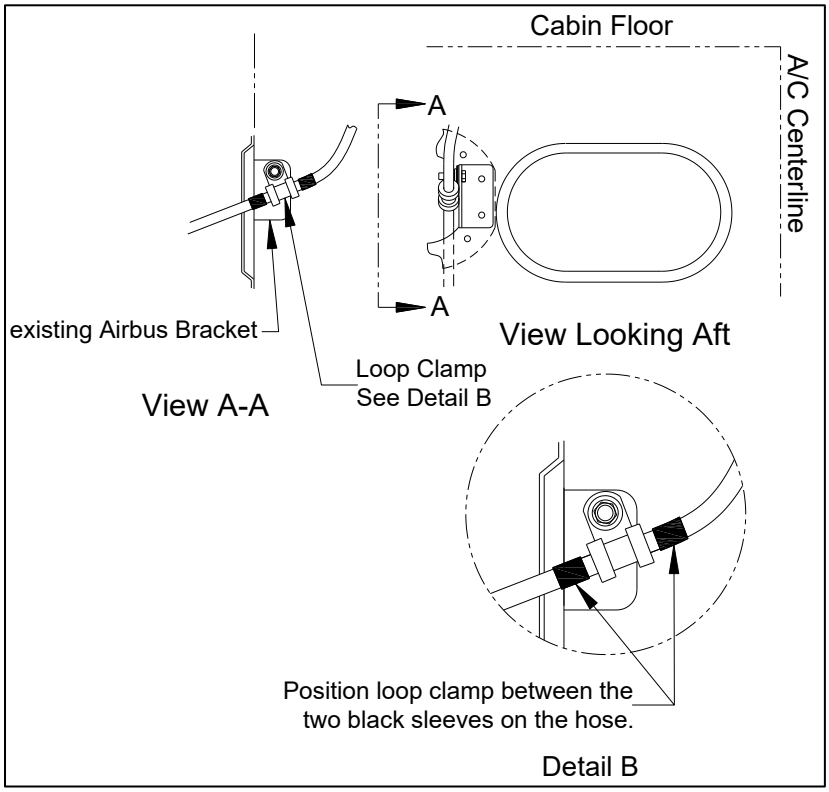
1. Feed the hose down through the slot in the floor located to the right of the collective base.
2. Attach the Master Cylinder Assembly to the collective with the Clamp Half (P/N 292-007-00) and four screws (P/N 511-170-00), locating it as shown below. Tighten the screws until the Master Cylinder Assembly is secure, without exceeding 17 in-lbs.
3. Adjust lever if necessary to achieve the 1.18” minimum spacing shown.

Figure 25.5 Master Cylinder Assembly Installation



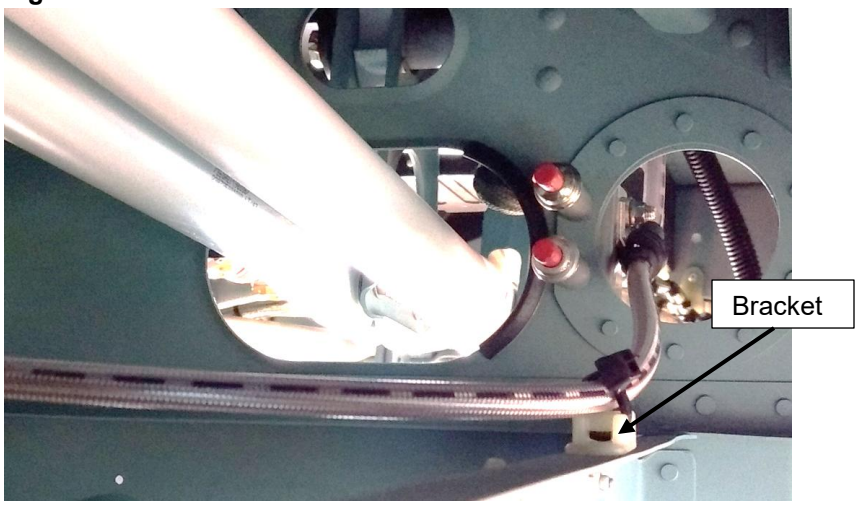
4. Under the floor route the hose aft through the hole in the frame outboard from the slot for the flight control rods and re-attach to the bracket with the P/N 512-005-00 loop clamp and hardware.

Figure 25.6 Hydraulic Hose Support at X1790.15



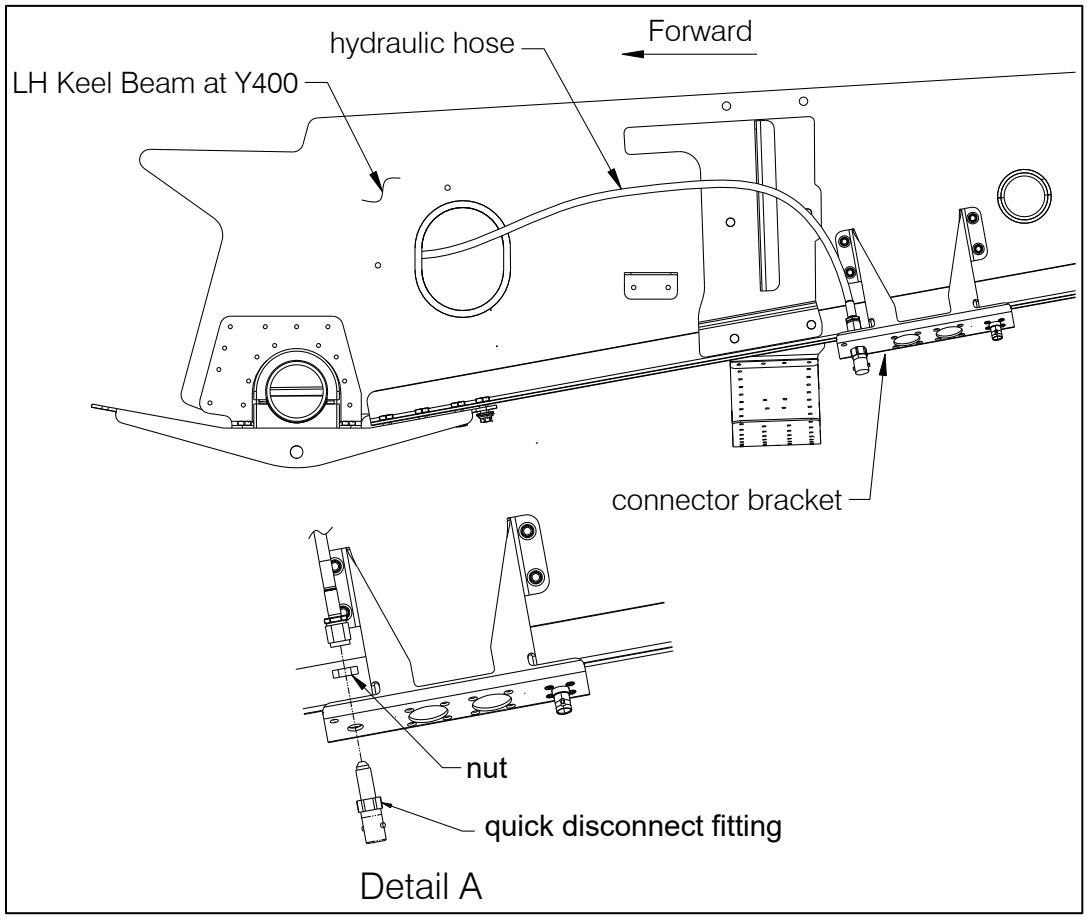
5. Aft of the frame at X1790.15 re-attach the hose to the Bracket at the longitudinal frame with a cable tie (P/N 512-011-00).

Figure 25.7 Hose Attachment aft of X1790.15 Frame



6. Route the hose inboard across centerline to the identical longitudinal frame on the left side.
7. Along the left side frame re-attach the hose to the two existing Brackets with cable ties and then route up through the hole in the aft bulkhead, re-inserting the Grommet (P/N 505-014-00) after the hose is routed through.
8. Aft of the aft bulkhead route the hose outboard through the hole in the keel beam (ref. Figure 25.8) and then aft to the connector bracket, re-attaching it along the wire bundle with the Cable Tie Mounts and Cable Ties (P/N 512-011-00). Attach the hose fitting to the connector bracket per Detail A.

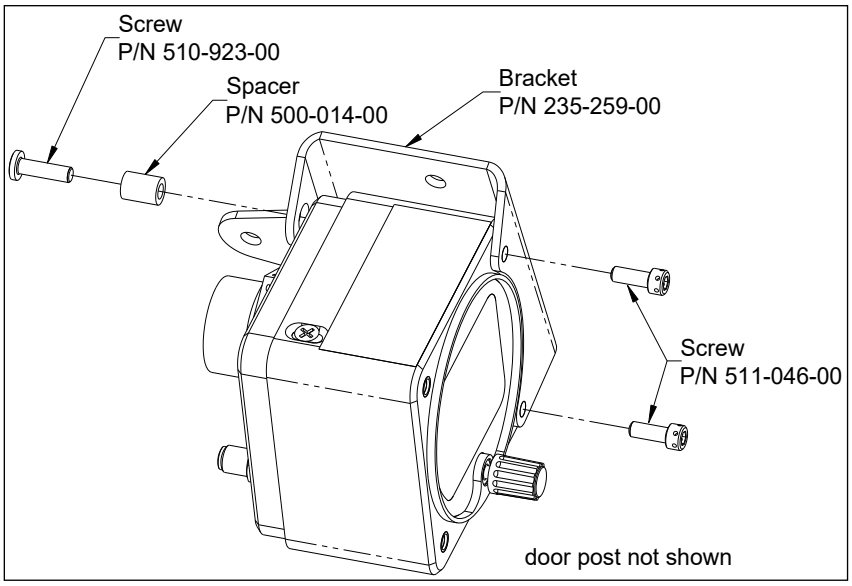
Figure 25.8 Hose Routing to Bracket



25.18.2 Load Indicator Re-installation

1. Place the Load Weigh Indicator into the mounting bracket on the RH door pillar and secure with two screws (P/N 511-046-00) on the display side and a spacer (P/N 500-014-00) and screw (P/N 510-923-00) on the connector side. Safety-wire the screws on the display side per MS33540.
2. Connect the electrical connector on the wiring harness to the connector on the back of the indicator.

Figure 25.9 C-40 Indicator Re-installation



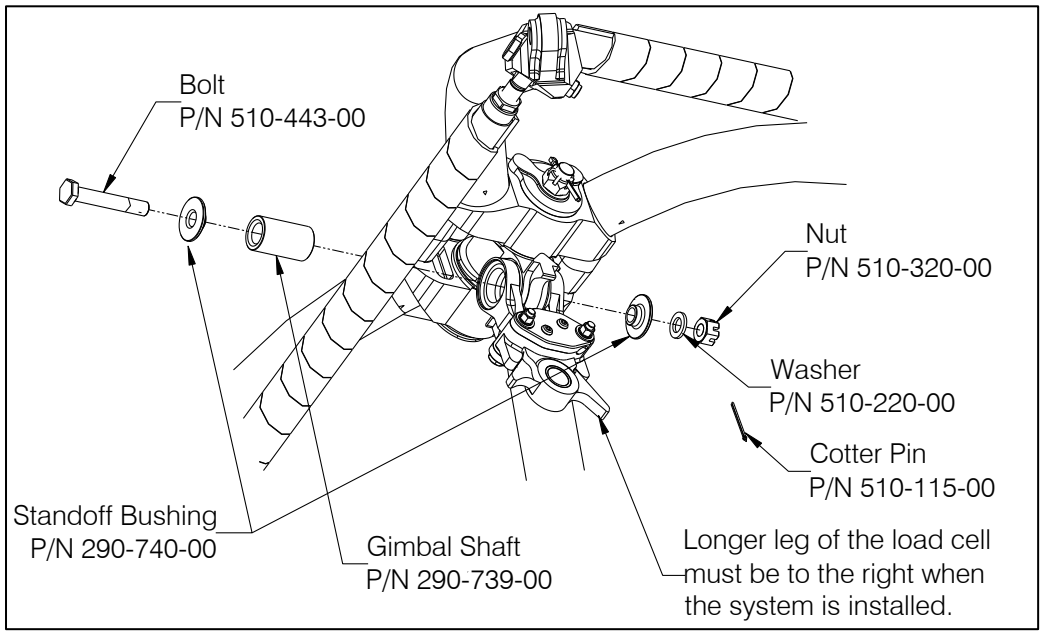
25.18.3 Relay Re-installation

1. Plug the relay into the relay socket mounted to the relay bracket on the LH keel beam.
2. Secure the relay with the hardware provided with the relay.

25.18.4 Load Cell Re-installation

1. Attach the load cell assembly to the gimbal fitting on the suspension frame with hardware as illustrated in Figure 25.10.

Figure 25.10 Load Cell Re-installation



2. Tighten nut to 60-70 in-lbs. and rotate to next castellation if necessary to insert cotter pin. Verify that the load cell pivots independently of the bolt and nut at its upper attachment point.

CAUTION

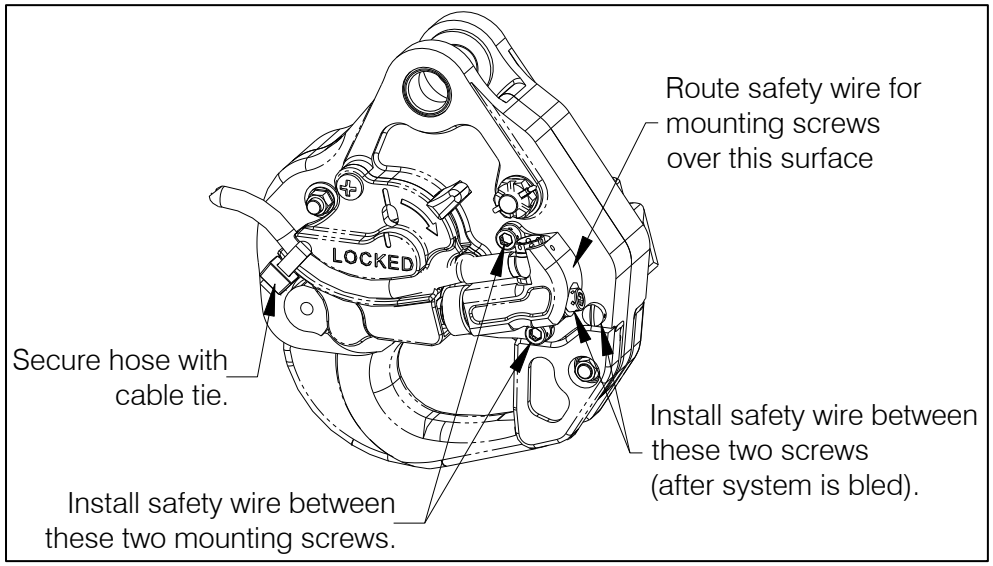
The load cell must pivot freely about its upper attach point independently of the bolt and nut at this pivot point. If necessary, back the nut off to the previous castellation to achieve this.

3. Re-install the cargo hook per section 25.18.6.

25.18.5 Slave Cylinder w/ Plumbing Re-installation

1. Ensure the piston is in the retracted position. If the piston needs to be retracted connect the quick disconnect fitting and push the piston in.
2. Insert piston end of the slave cylinder assembly into the opening of the manual release cover and secure it in position with two screws (P/N 510-531-00).
3. Install safety wire between the two screws and route it around the outside of the slave cylinder body.
4. Route the hose through the groove in the manual release cover and up through the bumper.

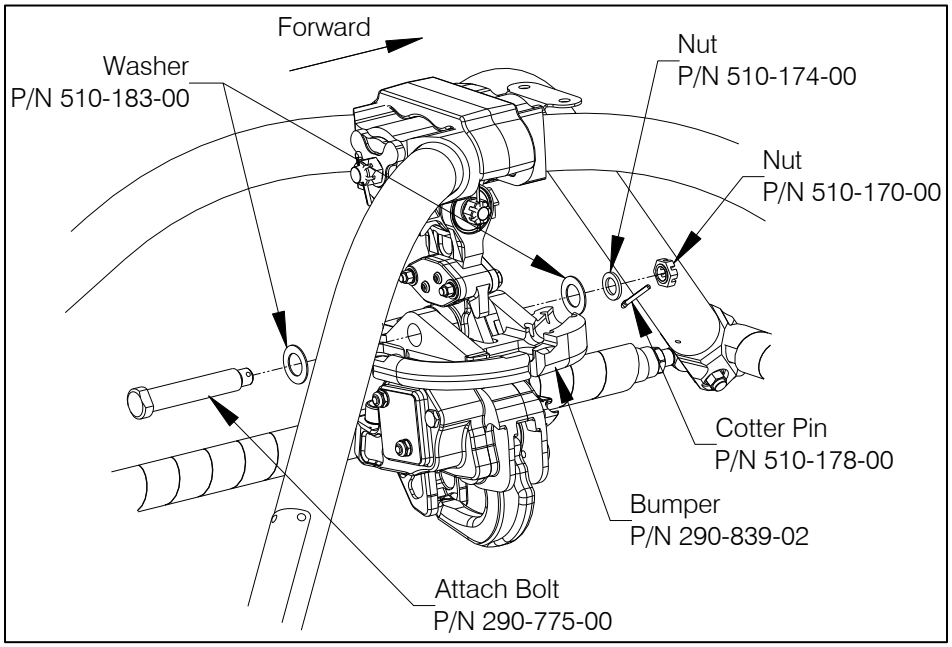
Figure 25.11 Slave Cylinder Attachment to Cargo Hook



25.18.6 Cargo Hook Re-installation

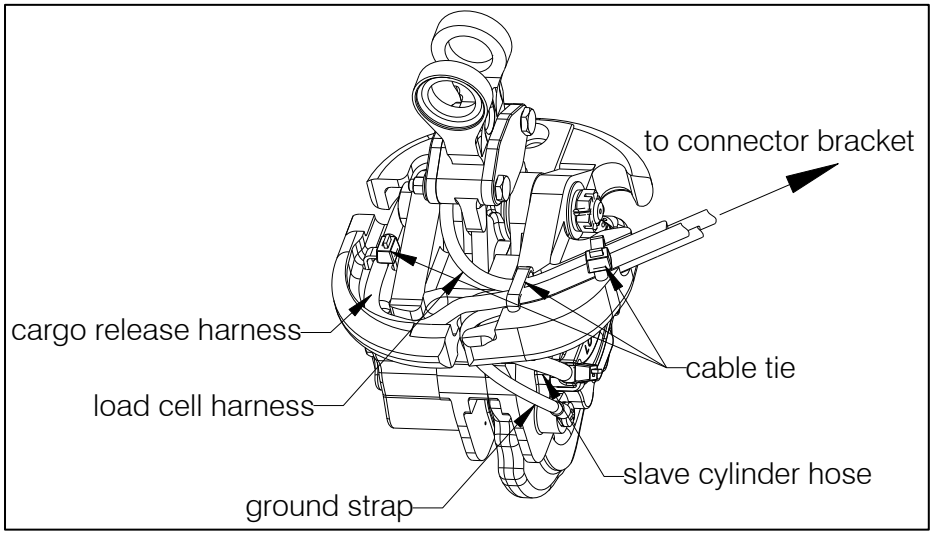
1. Install the Slave Cylinder Assembly w/ Plumbing (P/N 232-829-00) to the cargo hook per Section 25.18.5.
2. Attach the ground strap (P/N 270-285-00) to the cargo hook with screw (P/N 510-391-00).
3. Connect the electrical release connector of the Y-harness to the cargo hook connector.
4. Attach the cargo hook to the load cell on the suspension system by placing the Bumper over the cargo hook and installing the attach bolt (with washer under the head) through the load cell and bumper.
5. Install washers and nut over bolt.
6. Tighten nut to finger tight until fully seated, then rotate to previous castellation if needed to insert cotter pin.

Figure 25.12 Cargo Hook Re-installation



7. Route the two legs of the Y-harness through the bumper grooves along with the slave cylinder plumbing and ground strap and secure with cable ties (P/N 512-011-00) to the bumper.

Figure 25.13 Hose and Harness Routing through Bumper

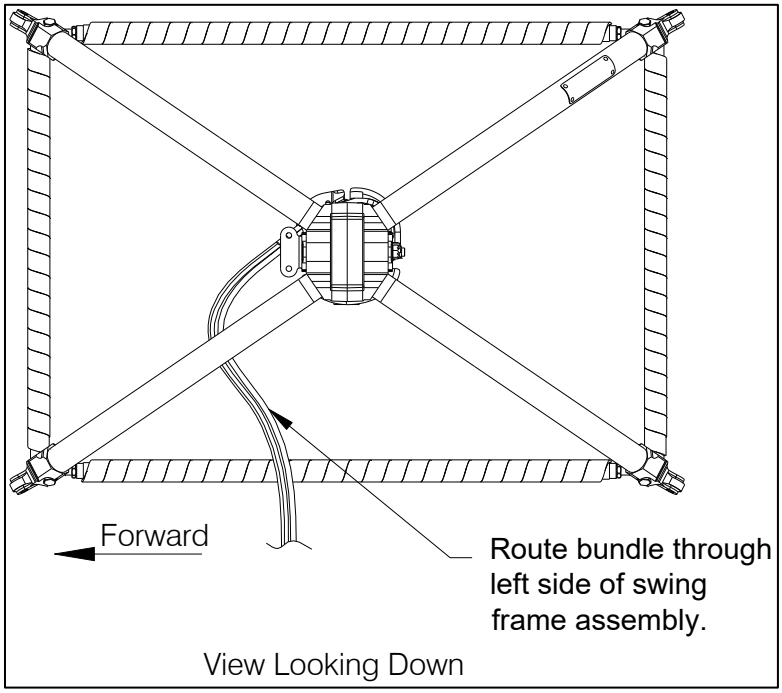


8. Slide a 20” length of woven abrasion resistant sleeving (P/N 450-163-00) over the electrical harnesses, slave cylinder plumbing, and ground strap. Position the sleeve 4” from where cables exit the bumper and fix in place with a 3” length of heat shrink (P/N 450-155-00). Overlap heat shrink and sleeve 1.5” and shrink in place on both ends. (Alternatively, if spiral wrap was

present during the disassembly process, re-wrap that around the electrical harnesses, slave cylinder plumbing, and ground strap starting at the bumper)

9. Route the harness/hose/ground strap bundle through the left side of the swing frame assembly (ref. Figure 25.14) to the connector bracket on the LH keel beam.

Figure 25.14 Routing from Cargo Hook to Bracket

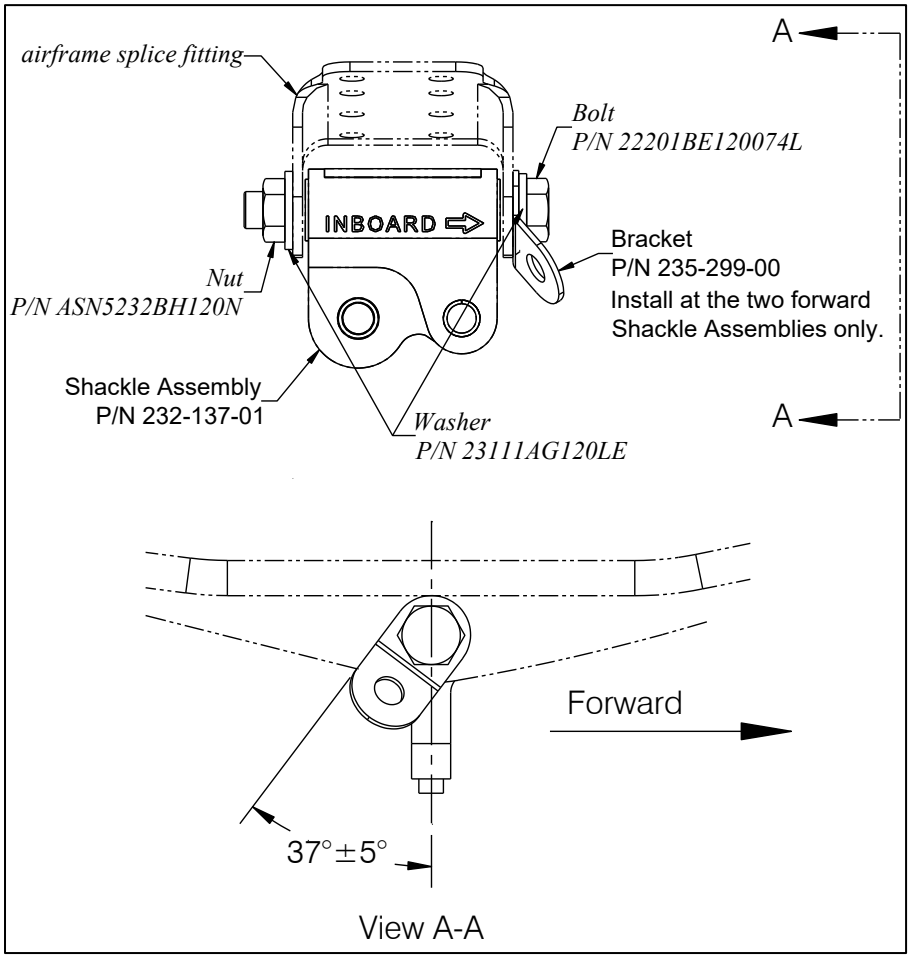


10. Connect the electrical connector to the connector on the connector bracket.
11. Connect the slave cylinder plumbing quick disconnect fitting to the mating fitting on the connector bracket.
12. Connect the ground strap at the connector bracket.

25.18.7 Shackle Assembly Re-installation

1. Attach a Shackle Assembly (P/N 232-137-01) and Bracket (P/N 235-299-00) to each of the two airframe splice fittings at the forward landing gear using Airbus hardware (Airbus Helicopters part numbers are shown in italics). Attach each Bracket on the inboard side of the respective airframe splice fitting with them angled as shown. Tighten nuts to 12.5 to 17 ft-lbs (17 – 23 Nm) and check that the Shackle Assembly freely pivots about the bolt.
2. Attach a Shackle Assembly to each of the two half-clamps at the aft landing gear cross tube using the same orientation and hardware as used for the forward Shackle Assemblies (no Bracket is installed at the aft positions).

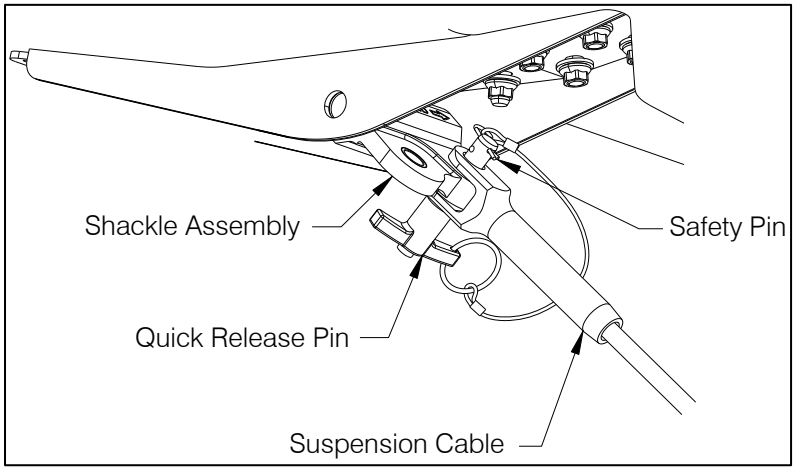
Figure 25.15 Shackle Assembly Re-installation (forward shown)



25.18.8 Suspension Re-installation

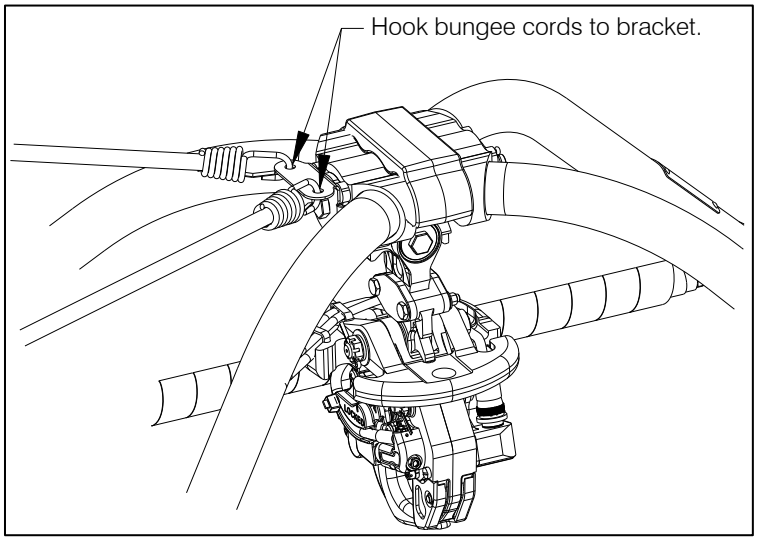
1. Install the swing suspension by attaching the pair of shorter suspension cables to the forward shackle assemblies and the longer suspension cables to the aft shackle assemblies with the quick release pins. Secure the quick release pins with the attached safety pins.

Figure 25.16 Suspension Cable Attachment



2. Connect the electrical Y-harness connector (combined load cell and cargo release), slave cylinder plumbing quick disconnect, and the ground strap connector to the mating connectors at the bracket on the LH keel beam.
3. Hook one end of each bungee cord assembly (P/N 490-021-00) to the bracket at the swing frame assembly (see Figure 25.17) and the other end to the brackets at the inboard side of the airframe splice fittings (at the forward suspension cable attachment points),

Figure 25.17 Bungee Cord Attachment to Swing Frame



Section 98 Wiring Diagrams

The schematic for the electrical release system is shown in Figure along with the aircraft's interface points. Airbus Helicopters modification #'s 07-4280 and 07-3450 are reflected below. Refer to the applicable Airbus Helicopters Wiring Diagrams Manual for additional information and for other cargo hook aircraft side wiring configurations that may not be shown.

Figure 98.1 Cargo Hook Electrical Release System Schematic

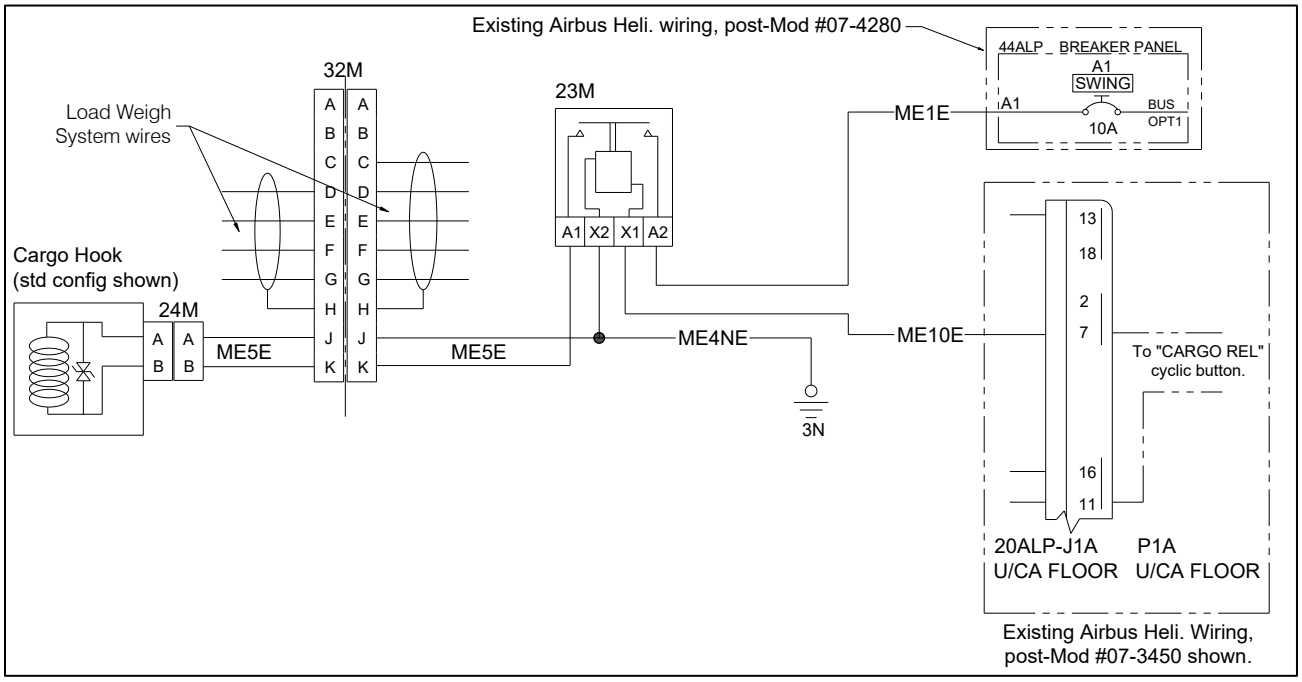
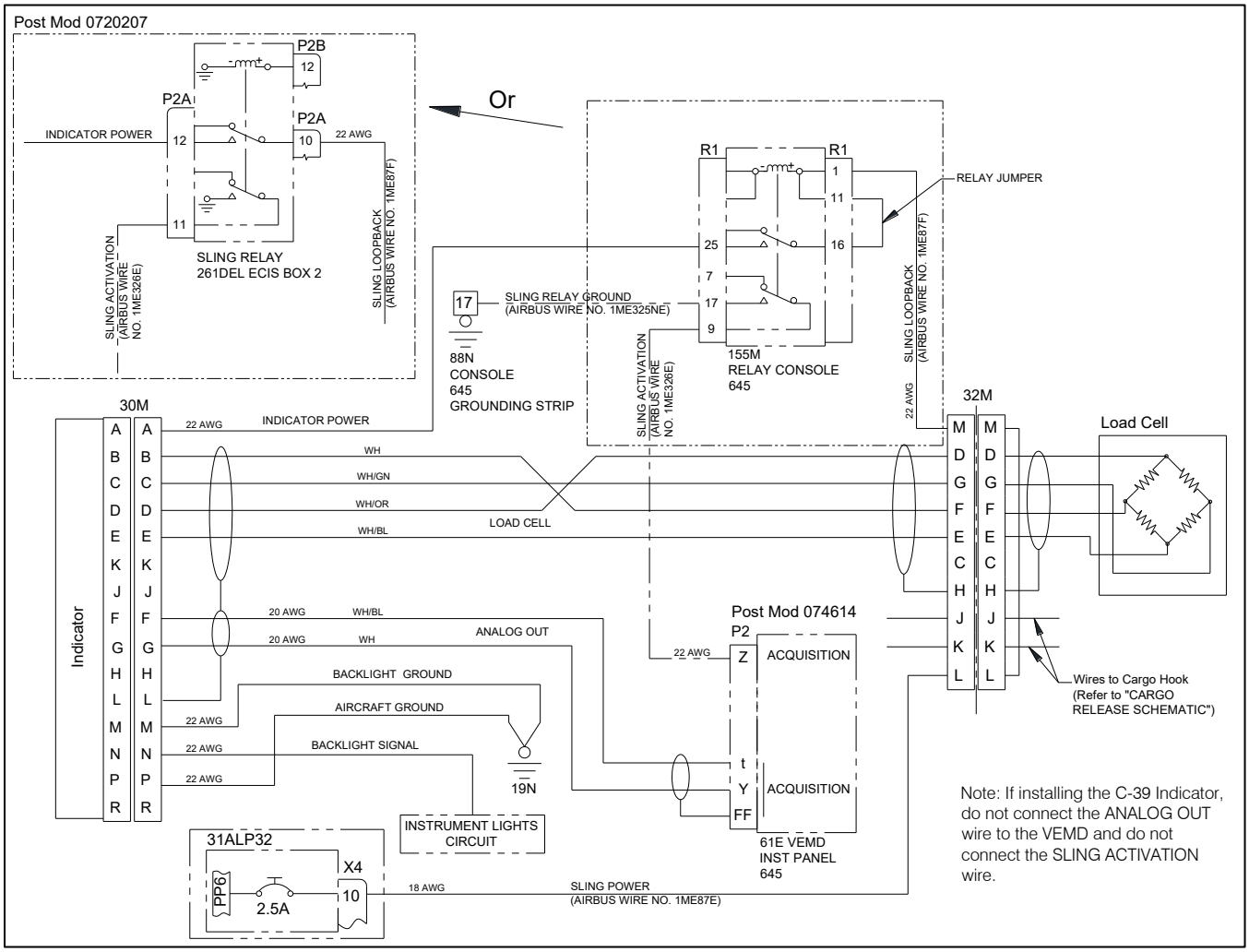


Figure 98.2 Load Weigh System Schematic



For AS350B3s, originally equipped with Onboard Systems cargo swing kit P/N 200-280-03 installed per STC SR01164SE and modified with Retrofit Kit P/N 200-469-00 per this STC the following schematic is applicable for the cargo release/load weigh system.

Figure 98.3 Wiring Diagram for 200-280-03 modified by 200-469-00 Retrofit kit

