PLEASE CHECK WEB SITE AT WWW.ONBOARDSYSTEMS.COM FOR THE LATEST REVISION OF THIS MANUAL

Instructions for Continued Airworthiness

Cargo Hook Suspension System
For the
Agusta A109, A119, and AW119 MKII
Helicopter

System Part Numbers
200-355-00, 200-356-00, 200-357-00, 200-369-00

STC SR02139SE

13915 NW 3rd Court Vancouver, Washington 98685 USA
Phone: 360-546-3072 Fax: 360-546-3073 Toll Free: 800-275-0883
www.OnboardSystems.com

THIS PAGE INTENTIONALLY LEFT BLANK

Record of Revisions

Revision	*Date*	*Page(s)*	*Reason for Revision*
0	05/05/11	All	First Issue
1	12/16/11	i-viii Section 5 page 11 Section 12 page 3,4 Section 25 page 7, 8	Clarified "hours of external load operations" definition. Changed Cup Seal P/N 556-038-00 to Quad Ring P/N 556-097-00 on Slave Cylinder Assembly. Changed wire no. of wire to pin 52 of pilots cyclic disc to M366A22 in Figures 25.15.3 and 25.15.4.
2	12/02/13	Section 0 page 5 Section 25 pages 19, 26	Changed tightening instructions for nut on attach bolt and pin load cell. Updated section 0.19.
3	07/23/15	Section 0 page 3, Section 5 page 3, 4, 7, 8, 11 Section 25 page 26	Added pin load cell P/N 210-301-02, clarified suspension system inspection interval, updated definition for "hours of external load operations".
4	10/10/17	Section 5 pages 1, 2; Section 12 pages 1, 2, 5, 6; Section 25 page 3	Added references to CMM 122-015-00, added MIL-PRF-87257 as eligible hydraulic fluid and updated bleed kit to 212-014-02 (uses MIL-PRF-87257).
5	12/17/18	Section 5, pages 7 thru 9	Removed requirements for NDT at 1000 hour/5 years, inserted instructions to return the pin load cell to the factory at 1000 hour/5 year interval for inspection and calibration.

THIS PAGE INTENTIONALLY LEFT BLANK

List of Effective Pages

Title	Pages	Revision
Cover	i, ii Blank	5
Record of Revisions	iii, iv Blank	5
List of Effective Pages	v, vi Blank	5
Table of Contents	vii, viii	1
Section 0 Introduction	1, 2	0
Section 0 Introduction	3	3
Section 0 Introduction	4	0
Section 0 Introduction	5	2
Section 0 Introduction	6	0
Section 4 Airworthiness Limitations	1, 2 Blank	0
Section 5 Inspection and Overhaul Schedule	1, 2	4
Section 5 Inspection and Overhaul Schedule	3, 4	3
Section 5 Inspection and Overhaul Schedule	5, 6	4
Section 5 Inspection and Overhaul Schedule	7 through 9	5
Section 5 Inspection and Overhaul Schedule	10	0
Section 5 Inspection and Overhaul Schedule	11	3
Section 5 Inspection and Overhaul Schedule	12 Blank	0
Section 11 Placards and Markings	1, 2 Blank	0
Section 12 Servicing	1, 2	4
Section 12 Servicing	3, 4	1
Section 12 Servicing	5, 6	4
Section 12 Servicing	7 through 10	0
Section 25 Equipment and Furnishings	1, 2	0
Section 25 Equipment and Furnishings	3	4
Section 25 Equipment and Furnishings	4 through 6	0
Section 25 Equipment and Furnishings	7, 8	1
Section 25 Equipment and Furnishings	9 through 18	0
Section 25 Equipment and Furnishings	19	2
Section 25 Equipment and Furnishings	20 through 25	0
Section 25 Equipment and Furnishings	26	3
Section 25 Equipment and Furnishings	27, 28	0

THIS PAGE INTENTIONALLY LEFT BLANK

CONTENTS

Figures ***continued***

Tables

Section 0
Introduction

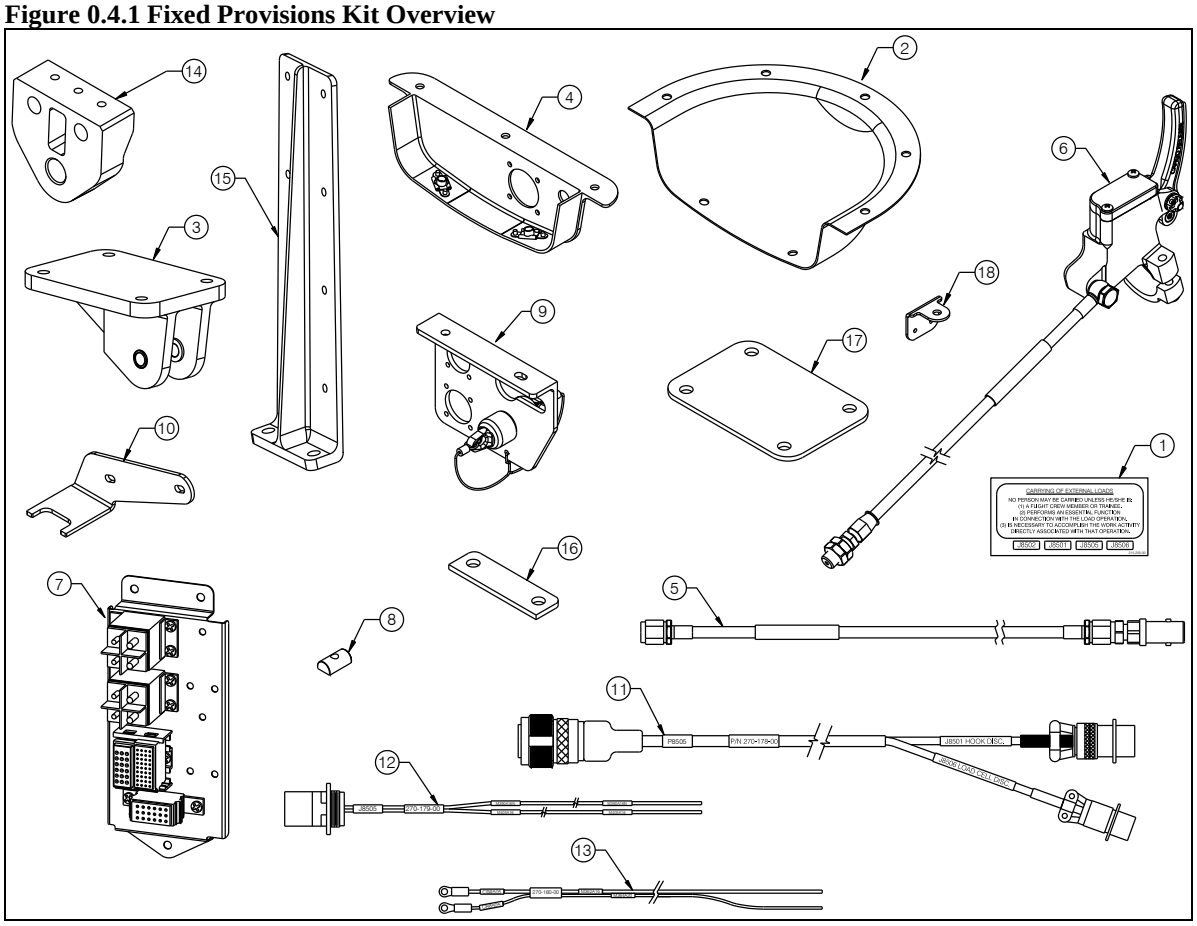
0.4 Scope

This ICA contains maintenance instructions for cargo hook kit P/N's 200-355-00, 200-356-00, 200-357-00, and 200-369-00 on the Agusta A109E, A119, AW119 MkII model helicopters. These kits, when installed, provide the means for the helicopter to carry external loads.

Kit P/N 200-356-00 must be installed with Kit P/N 200-355-00 (on the A109E) or with Kit P/N 200-369-00 (on the A119 and AW119 MkII models) and Kit P/N 200-357-00 is an optional load weigh kit which can be installed in addition to these kits.

Kit P/N 200-355-00 and 200-369-00 are fixed provisions kit. P/N 200-355-00 is for the A109E model and P/N 200-369-00 is for the A119 and AW119 MkII models. These kits include the internal electrical release wiring harnesses, fixed manual release system including the release lever for actuation, support brackets and hard points which support the cargo hook suspension, and miscellaneous brackets and hardware. The primary kit components are shown below.

Figure 0.4.1 Fixed Provisions Kit Overview



0.4 Scope continued

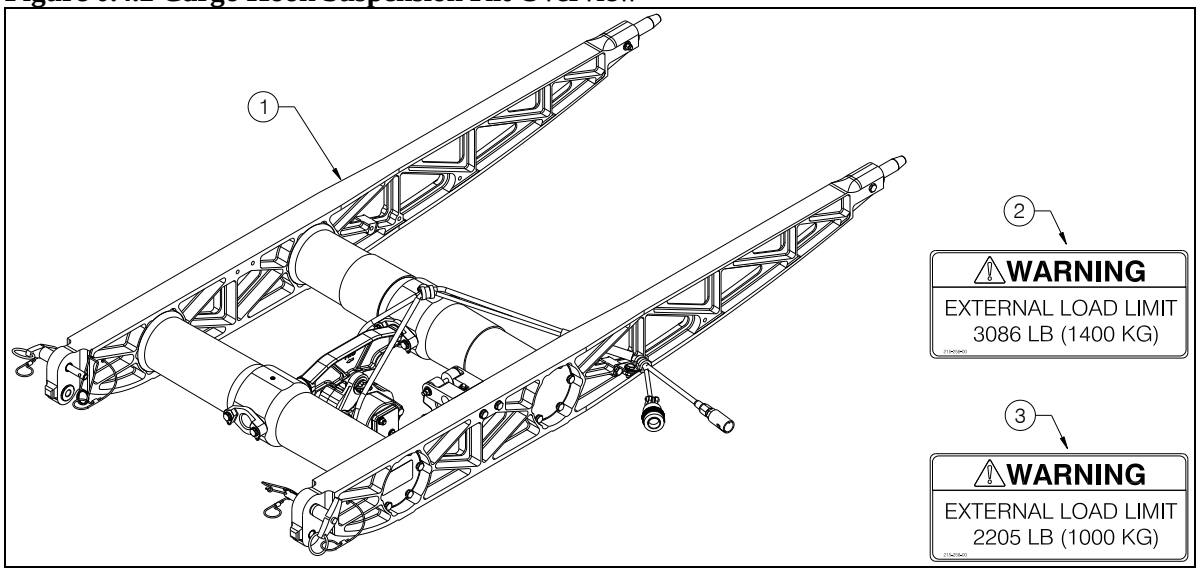
Table 0.4.1 Primary Fixed Provisions Kit Components

ITEM	PART NO.	DESCRIPTION	QTY
1	215-255-00	A109/A119 Information Decals	1
2	220-043-00	Fwd Connector Bracket Fairing	1
3	232-453-00	Fwd Hard Point Assembly	2
4	232-463-00	Fwd Connector Bracket Assembly	1
5	232-464-00	Intermediate Hose Assembly	1
6	232-465-00	Release Lever Assembly w/ Plumbing	1
7	232-466-00	Electrical Module Assembly	1
8	232-474-00	Barrel Nut Assembly	4
9	232-475-00	Aft Connector Bracket Assembly	1
10*	235-177-00	Landing Gear Lock	1
11	270-178-00	Intermediate Electrical Harness	1
12	270-179-00	Internal Electrical Harness	1
13	270-180-00	Electrical Harness	1
14	291-361-00	Aft Hard Point	2
15	291-363-00	Support Bracket	2
16	291-365-00	Peel Shim	1
17	291-367-00	Peel Shim	1
18	291-617-00	Angle Bracket	1

* Included with Kit P/N 200-355-00 only.

Kit P/N 200-356-00 is a cargo hook suspension kit and includes the cargo hook and its external electrical release and manual release components which mate with the associated fixed provision kit components, and a frame assembly which supports the cargo hook and spans the hard points on the belly of the helicopter. It requires that a helicopter be equipped with the Onboard Systems Fixed Provisions Kit P/N 200-355-00 or 200-369-00 (see above).

Figure 0.4.2 Cargo Hook Suspension Kit Overview



0.4 Scope continued

Table 0.4.2 Cargo Hook Suspension Kit Components

ITEM	PART NO.	DESCRIPTION	QTY
1	210-244-00	Cargo Hook/Frame Assembly	1
2	215-256-00	External Load Limit Decal	1
3	215-258-00	External Load Limit Decal	1

Kit P/N 200-357-00 is a load weigh kit which includes a pin load cell, internal electrical harness, and load weigh indicator. When this kit is installed, the pin load cell assembly replaces the cargo hook attach bolt within the cargo hook suspension assembly. The primary kit components are shown below.

Figure 0.4.3 Pin Load Weigh Kit Overview

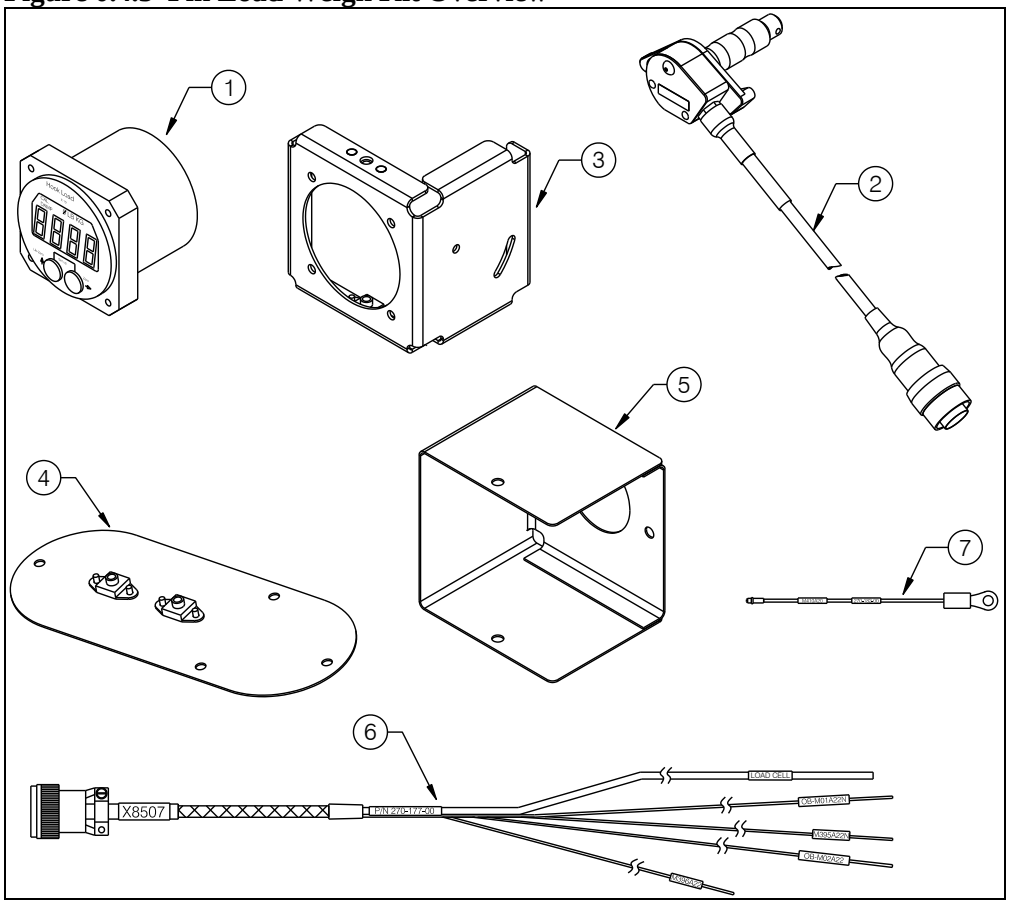


Table 0.4.3 Primary Pin Load Weigh Kit Components

ITEM	PART NO.	DESCRIPTION	QTY
1	210-095-02	C-39 Indicator Assembly	1
2	210-301-02*	Pin Load Cell Assembly	1
3	232-451-00	Bracket Assembly	1
4	232-452-00	Mounting Plate Assembly	1
5	235-198-00	Outer Cover	1
6	270-177-00	Load Weigh Internal Harness	1
7	270-182-00	Jumper Assembly	1

*Supersedes P/N 210-226-02, these P/Ns are interchangeable in this installation.

0.5 Purpose

The purpose of this Instructions for Continued Airworthiness (ICA) manual is to provide the information necessary to inspect, service, and maintain in an airworthy condition the P/N 200-355-00, 200-356-00, 200-357-00, and 200-369-00 Cargo Hook kits.

0.6 Arrangement

This manual contains instructions for the service, maintenance, inspection and operation of the P/N 200-355-00, 200-356-00, 200-357-00, and 200-369-00 Cargo Hook Kits. The manual is arranged in the general order that maintenance personnel would use to install, maintain and operate the Cargo Hook Kits 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

0.7 Applicability

These Instructions for Continued Airworthiness are applicable to Cargo Hook Kits P/N 200-355-00, 200-356-00, 200-357-00 and 200-369-00 for the Agusta A109E, A119, and AW119 MkII helicopters. Refer to the appropriate Agusta maintenance documentation for instructions regarding parts of the aircraft that interface with these cargo hook kits.

0.9 Abbreviations

FAA Federal Aviation Administration
CFR Code of Federal Regulations
ICA Instructions for Continued Airworthiness

0.12 Precautions

The following definitions apply to precaution flags 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 Int'l web site at www.onboardsystems.com.

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

Notices can be chosen to be received on an immediate, weekly, or monthly schedule via fax, email or both methods. There is no charge for this service. Please visit the Onboard Systems web site at www.onboardsystems.com/notify.php to get started.

THIS PAGE INTENTIONALLY LEFT BLANK

Section 4
Airworthiness Limitations

4.2 No 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.

THIS PAGE INTENTIONALLY LEFT BLANK

Section 5
Inspection and Overhaul Schedule

5.1 Cargo Hook Suspension System Inspection

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.

Annually or 100 hours of external load operations, whichever comes first, inspect the cargo hook kits per the following. Refer also to Component Maintenance Manual (CMM) 122-015-00 for the cargo hook for additional instructions.

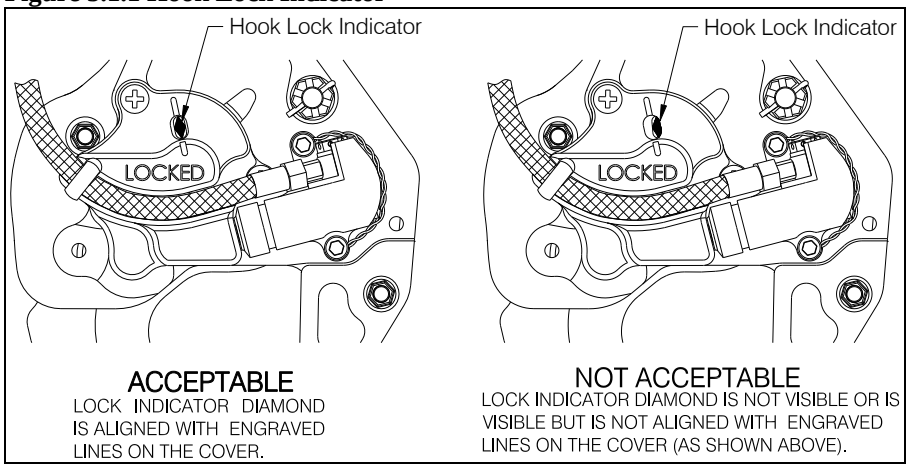
1. Activate the electrical system and press the Cargo Release button to ensure the cargo hook electrical release system is operating correctly. With no load on it the cargo hook must open. Reset the hook by hand after release.

CAUTION

Depressing the electrical release button continuously in excess of 20 seconds will cause the cargo hook release solenoid to overheat, possibly causing permanent damage.

2. Activate the hydraulic release system by pulling the release lever on the cyclic. The lever should operate smoothly and the cargo hook must open. Return the load beam to its closed and locked position by hand after release. Verify that the hook lock indicator on the side of the hook returns to the fully locked position. In the fully locked position the hook lock indicator must align with the lines on the cover (see Figure 5.1.1). If the hook does not release or re-latch, do not use the unit until the problem is resolved.

Figure 5.1.1 Hook Lock Indicator



5.1 Cargo Hook Suspension System Inspection continued

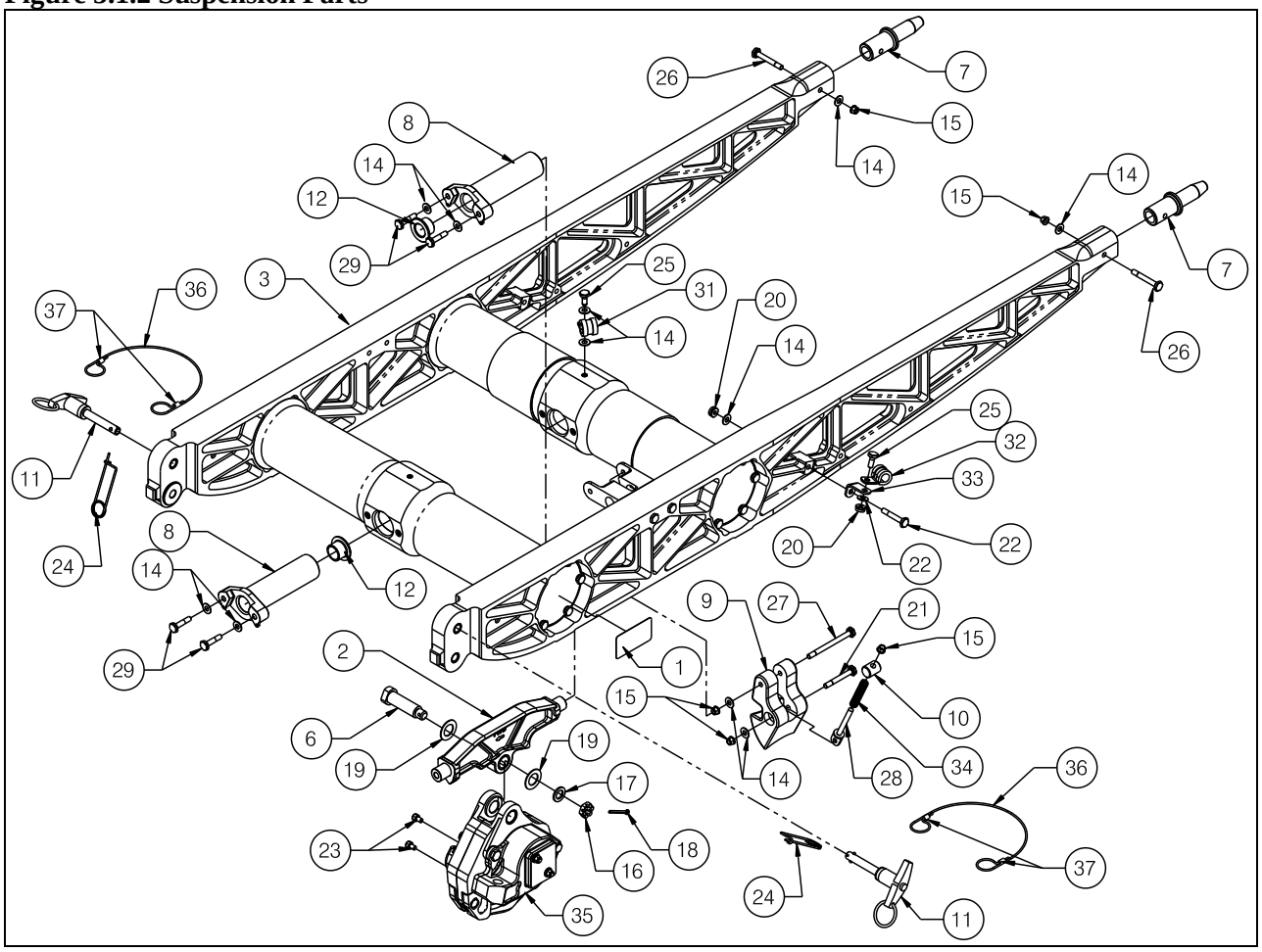
3. Move the cargo hook throughout its full range of motion and observe the hydraulic hose and electrical harnesses to ensure that they have enough slack. The hose or harnesses must not be the stops that prevent the cargo hook from moving freely in all directions.
4. Move all pivoting joints to ensure that they rotate freely throughout their range of motion.
5. Visually inspect for presence and security of fasteners.
6. Visually inspect the external electrical harnesses and their connectors at the forward and aft connector brackets for damage and security.
7. Visually inspect the external hydraulic hose and its connection to the cargo hook and the fittings at the forward and aft connector brackets on the belly of the helicopter for damage and security.
8. Visually inspect for cracks in suspension frame assembly and the forward and aft hard points.
9. Visually inspect for security of C-39 load weigh indicator mounting (if load weigh system is installed).
10. Visually check for oil leaks in the hydraulic release system. Some seeping or dampness is acceptable at the cargo hook, but if drips or areas cleaned by oil leaking are present the hook must not be used until the condition is repaired. See troubleshooting section to determine the course of action.
11. Check the fluid level in the master cylinder on the cyclic. The master cylinder features a transparent lid through which the fluid level can be checked. Hydraulic fluid must be visible over the baffle surface (reference Figure 12.1.1).
12. Check the hydraulic release system for air by pulling the lever firmly until it bottoms out. Check the push rod position (reference Figure 12.2.5). 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 12.2 for bleeding instructions.
13. Check function of cargo hook stowage bracket. Rotate cargo hook up to the left and into the bracket. Ensure cargo hook is retained by the bracket and can be released. In the stowed position visually inspect the hose and harness for chafing points.

5.1 Cargo Hook Suspension System Inspection continued

Every 1000 hours of external load operations or 5 years, whichever comes first, remove the suspension assembly and the hard points from the helicopter (see section 25.17), disassemble, and inspect the component parts per the following instructions.

- Remove the two loop clamps which secure the wiring harness and hydraulic hose to the suspension assembly.
- Cut safety wire and remove the two bolts at each Center Bar Tube (item 8).
- Slide the forward Center Bar Tube out of the forward Cross Tube of the Frame Assembly (item 3) and remove the Cargo Hook (item 35) and Trunnion Assembly (item 2).
- Slide the aft Center Bar Tube out of the aft Cross Tube.
- Separate the Cargo Hook from the Trunnion Assembly by removing the cotter pin (item 18), nut (item 16), and washers (items 17 and 19) from the Attach Bolt (item 6).
- Remove the Attach Bolt and remaining washers.
- The aft pins are installed with sealant in addition to the hardware shown and are not typically disassembled from the frame unless damage is observed.

Figure 5.1.2 Suspension Parts



5.1 Cargo Hook Suspension System Inspection continued

Table 5.1.1 Suspension Assembly Parts

ITEM	PART NO.	DESCRIPTION	QTY
1	215-150-00	Serial Number Decal	1
2	232-433-00	Trunnion Assembly	1
3	232-434-00	Frame Assembly	1
4	232-482-00*	Slave Cylinder Plumbing Assembly	1
5	270-181-00*	Electrical Release Harness Assembly	1
6	290-332-00**	Attach Bolt	1
7	291-500-00	Aft Pin	2
8	291-504-00	Center Bar Tube	2
9	291-555-00	Stowage Clip	1
10	291-556-00	Stowage Clip Rod	1
11	291-558-00	Quick Release Pin	2
12	291-612-00	Bushing	2
13	450-001-00*	Heat Shrink	AR
14	510-095-00	Washer	12
15	510-102-00	Nut	5
16	510-170-00	Nut	1
17	510-174-00	Washer	1
18	510-178-00	Cotter Pin	1
19	510-183-00	Washer	2
20	510-213-00	Nut	2
21	510-452-00	Bolt	1
22	510-455-00	Bolt	1
23	510-531-00	Screw	2
24	510-565-00	Safety Pin	2
25	510-712-00	Bolt	2
26	510-836-00	Bolt	2
27	510-934-00	Bolt	1
28	510-935-00	Eye Bolt	1
29	510-949-00	Bolt	4
30	512-011-00	Ty-wrap	1
31	512-026-00	Loop Clamp	1
32	512-027-00	Loop Clamp	1
33	512-028-00	Angle Bracket	1
34	514-100-00	Spring	1
35	528-028-00	Cargo Hook	1
36	531-010-00	Lanyard Cable	2
37	531-016-00	Crimp Sleeve	4
38	590-013-00*	Spiral Wrap	AR

* Not shown in figure.

** Replaced by pin load cell (P/N 210-226-02 or P/N 210-301-02) if load weigh system is installed.

5.1 Cargo Hook Suspension System Inspection continued

Figure 5.1.3 Trunnion Assembly Parts

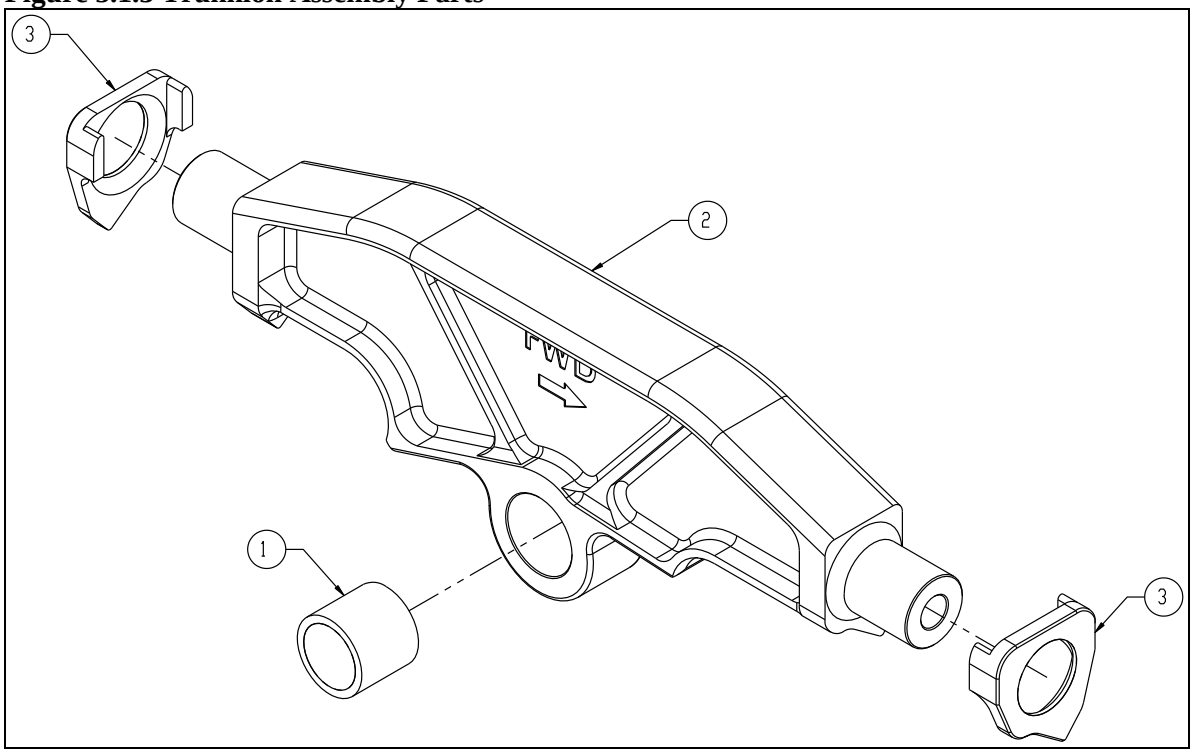


Table 5.1.2 Trunnion Assembly Parts

ITEM	PART NO.	DESCRIPTION	QTY
1	290-364-00	Bushing	1
2	291-501-00	Trunnion	1
3	291-575-00	Radius Filler	2

5.1 Cargo Hook Suspension System Inspection continued

Figure 5.1.4 Forward and Aft Hard Point Parts

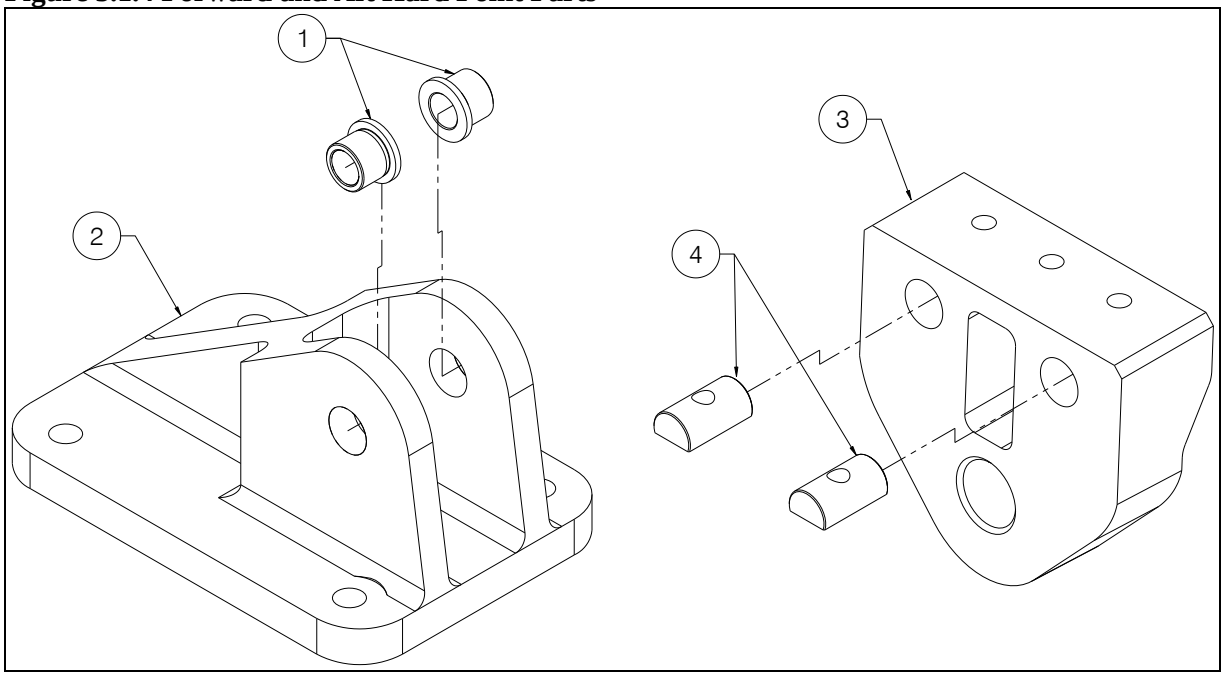


Table 5.1.3 Forward and Aft Hard Point Parts

ITEM	PART NO.	DESCRIPTION	QTY
1	290-788-00	Bushing	2
2	291-364-00	Forward Hard Point	1
3	291-361-00	Aft Hard Point	1
4	232-474-00	Barrel Nut Assembly	2

5.1 Cargo Hook Suspension System Inspection continued

- Return the Pin Load Cell Assembly (P/N 210-226-02 or 210-301-02) 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.
- In addition, carefully inspect, and if necessary repair, the detail parts in accordance with the instructions in Table 5.1.4. Inspect the parts in a clean, well-lit room. Perform a thorough visual inspection of the Frame Assembly including the aft pins (item 7) for cracks and damage. The large Cross Tubes of the Frame Assembly are assembled onto the longitudinal side frames using a structural adhesive in addition to the eight screws at each end thus these joints should not be disassembled. Remove the screws in order to remove the covers so that the insides of the Cross Tubes can be visually inspected for damage including corrosion.

Table 5.1.4 Suspension System Inspection Criteria

Component	Damage Permitted without Repair	Repair	Maximum Damage which Causes Replacement
Frame Assembly P/N 232-434-00 (item 3, Figure 5.1.2)	Dents, gouges, corrosion and scratches less than .010” deep except on the four raised pads on the bottom of the assembly’s side frames which have a tolerance of less than .070” deep.	Blend at 20:1 ratio, length to depth, to provide smooth transitions. Protect bare surface with Alodine (MIL-PRF-5541), zinc chromate primer (MIL-PRF-23377 or similar) and topcoat (MIL-PRF-85285 or similar).	Dents, gouges, corrosion and scratches greater than .030” deep except on the four raised pads on the bottom of the assembly’s side frames which have a tolerance of greater than .080” deep. Visual cracks.
Trunnion P/N 291-501-00 (item 2, Figure 5.1.3)	Dents, gouges, corrosion and scratches less than .010” deep.	Blend at 20:1 ratio, length to depth, to provide smooth transitions. Part is 15-5 stainless steel, no touch up paint required.	Dents, gouges, corrosion and scratches greater than .030” deep. Visual cracks.
Fwd Hard Point P/N 291-364-00 (item 2, Figure 5.1.4)	Dents, gouges, corrosion and scratches less than .010” deep.	Blend at 20:1 ratio, length to depth, to provide smooth transitions. Protect bare surface with Alodine (MIL-PRF-5541), zinc chromate primer (MIL-PRF-23377 or similar) and optionally topcoat (MIL-PRF-85285 or similar).	Dents, gouges, corrosion and scratches greater than .060” deep. Visual cracks.

Table 5.1.4 Suspension System Inspection Criteria continued

Component	Damage Permitted without Repair	Repair	Maximum Damage which Causes Replacement
Bushing P/N 290-788-00 (item 1, Figure 5.1.4)	Wear on inside diameter, diameter less than .340”.	None.	Wear on inside diameter, diameter greater than .340” inclusive.
Aft Hard Point P/N 291-361-00 (item 3, Figure 5.1.4)	Dents, gouges, corrosion and scratches less than .010” deep.	Blend at 20:1 ratio, length to depth, to provide smooth transitions. Protect bare surface with Alodine (MIL-PRF-5541), zinc chromate primer (MIL-PRF-23377 or similar) and optionally topcoat (MIL-PRF-85285 or similar).	Dents, gouges, corrosion and scratches greater than .060” deep. Visual cracks.
Attach Bolt P/N 290-332-00 (item 6, Figure 5.1.2) or Pin Load Cell P/N 210-226-02 or P/N 210-301-02	Wear on outside diameter, diameter greater than .495” inclusive.	None.	Wear on outside diameter, diameter less than .495”. Visual cracks
Center Bar Tube P/N 291-504-00 (item 8, Figure 5.1.2)	Dents, gouges, corrosion and scratches less than .010” deep.	Blend at 20:1 ratio, length to depth, to provide smooth transitions. Protect bare surface with Alodine (MIL-PRF-5541) and zinc chromate primer (MIL-PRF-23377 or similar).	Dents, gouges, corrosion and scratches greater than .040” deep. Visual cracks.

Table 5.1.4 Suspension System Inspection Criteria continued

Component	**Damage Permitted without Repair**	**Repair**	**Maximum Damage which Causes Replacement**
Aft Pin P/N 291-500-00 (item 7, Figure 5.1.2)	Dents, gouges, corrosion and scratches less than .010" deep.	Blend at 20:1 ratio, length to depth, to provide smooth transitions. Part is 15-5 stainless steel, no touch up required.	Dents, gouges, corrosion and scratches greater than .040" deep. Visual cracks.
Bushing P/N 291-612-00 (item 12, Figure 5.1.2)	These bushings are self-lubricating using a composite liner. Wear on the composite liner, but base metal is not exposed.	None.	If the composite liner is worn through to the base metal or binding of the Trunnion Assembly pivot when installed.
Quick Release Pin P/N 291-558-00 (item 11, Figure 5.1.2)	Wear or indentations on outside diameter, diameter greater than or equal to .300" inclusive.	None.	Wear or indentations on outside diameter, diameter less than .300". Visual cracks.

5.1 Cargo Hook Suspension System Inspection Schedule continued

Suspension Frame Re-assembly after Inspection

Re-assemble the suspension assembly per the following (refer to Figure 5.1.2).

1. Press in new bushings as necessary.
2. Insert the Center Bar Tube (item 8) with bushing (item 12) through aft Cross Tube of Frame Assembly (item 3) and secure with bolts (item 29) and washers (item 14). Torque the bolts to 20-25 in-lbs. Safety-wire the bolts to holes in the tabs on the Center Bar Tube.
3. Ensure Radius Fillers are installed over ends of Trunnion shafts (item 2) and insert the aft Trunnion shaft into the Center Bar Tube. Orient the Trunnion using the FWD indication on the side of it.
4. Align the forward Trunnion shaft with the hole in the forward Cross Tube of the Frame Assembly and insert the other Center Bar Tube with bushing through and capture the forward Trunnion shaft.
5. Secure the forward Center Bar Tube to the forward Cross Tube with bolts (item 29) and washers (item 14). Torque the bolts to 20-25 in-lbs. Safety-wire the two bolts together.
6. Assemble the Cargo Hook onto the Trunnion with Attach Bolt (item 6) and two washers (item 19), washer (item 17), nut (item 16) and cotter pin (item 18). Tighten nut to finger tight and rotate to next castellation to install cotter pin (item 18).

5.2 Cargo Hook Overhaul Schedule

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

*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.*

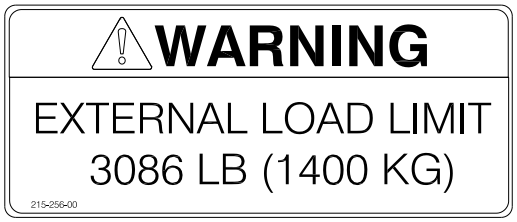
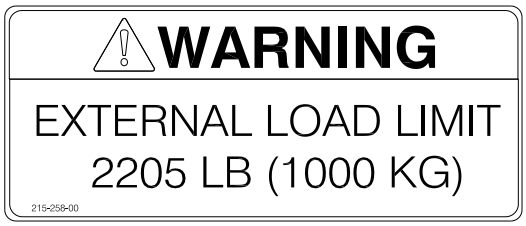
Overhaul the cargo hook per component maintenance manual 122-015-00. Contact Onboard Systems for guidance in locating authorized overhaul facilities.

THIS PAGE INTENTIONALLY LEFT BLANK

Section 11
Placards and Markings
11.1 Placards

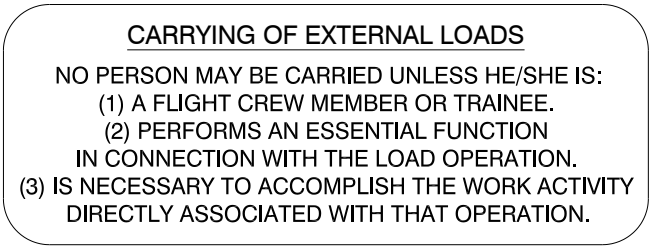
The Cargo Hook Kits include the following placards shown in Table 11.1.1.

Table 11.1.1 Cargo Hook Suspension System Placards

Placard part number and appearance	Location
P/N 215-256-00  or P/N 215-258-00  Depending on model on which the kit is installed. The A109E uses 215-258-00 and A119 and AW119 MkII use P/N 215-256-00.	Located on the belly of the aircraft near the cargo hook suspension or on the cargo hook suspension frame in clear view of the ground support personnel.
 (text is engraved on manual release lever P/N 290-906-00 shown)	Located on the release lever of the hydraulic release master cylinder assembly. Master cylinder assembly is located on the cyclic.

11.1 Placards continued

Table 11.1.1 Cargo Hook Suspension System Placards continued

Placard part number and appearance	Location
P/N 215-255-00 	In the cockpit in a location visible to the pilot.

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.

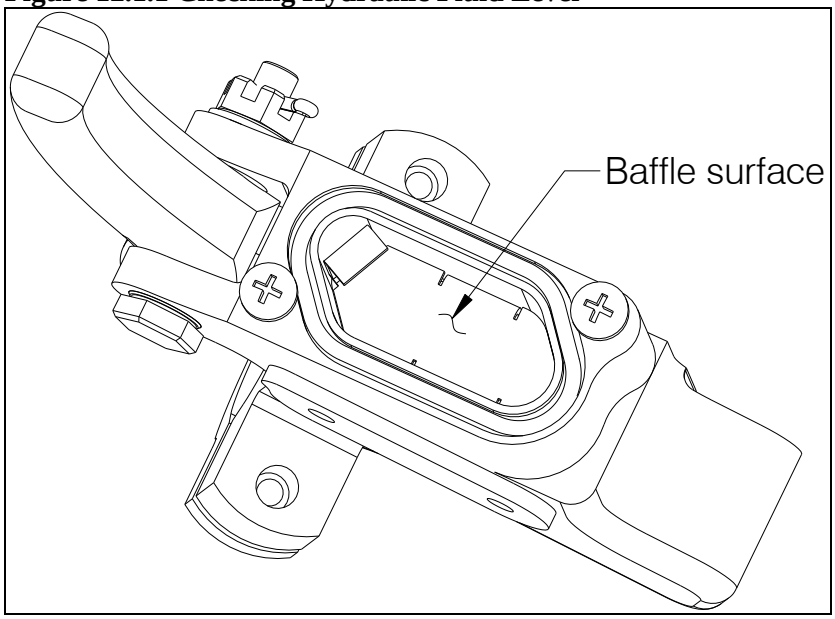
NOTICE

MIL-PRF-5606 and MIL-PRF-87257 fluids are both compatible with the hydraulic system. These fluids are interchangeable and miscible.

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 must be visible over the baffle surface (see Figure 12.1.1).
3. Remove lid and add hydraulic fluid as required until the baffle surface is partially or fully submerged.

Figure 12.1.1 Checking Hydraulic Fluid Level



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 Maintenance of the Hydraulic Release System continued

Master Cylinder Repair

If fluid is leaking around the piston, 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.

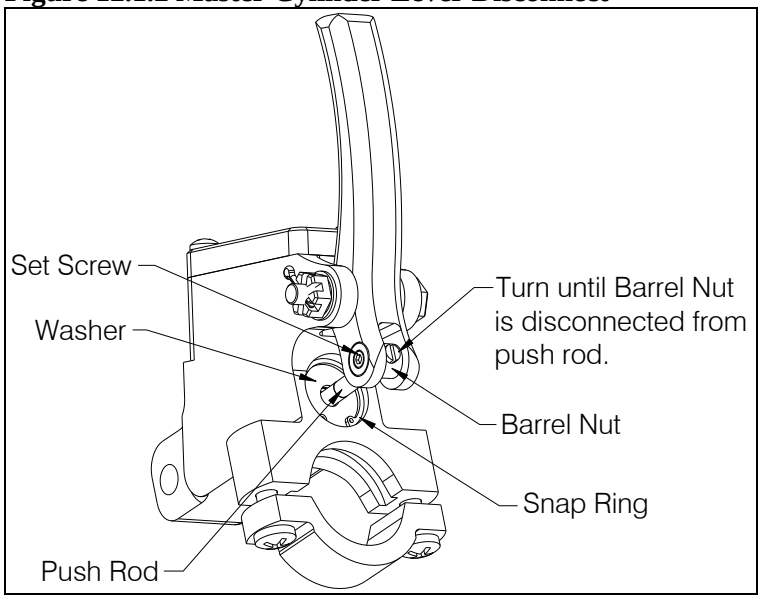
Disassembly:

1. Remove snap ring. Use caution when removing 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 on lever from the push rod. See Figure 12.1.2.
3. Remove the piston and spring. See Figure 12.1.3 for parts breakdown.
4. Inspect the master cylinder bore for scratches. If any scratches or gouges are visible in the bore, the master cylinder must be replaced.

Re-assembly:

1. If the bore condition is acceptable, replace the lip seal and O-ring on the piston assembly. Maintain orientation as shown in Figure 12.1.4. Stretch seals over piston into grooves.
2. To assemble the master cylinder, lubricate the piston seals and cylinder bore generously with hydraulic fluid.
3. Place the spring in the cylinder bore.
4. Pass the push rod through the washer.
5. Thread the push rod into the barrel nut until approximately 1/16" of thread is visible through the opposite side of the barrel nut.
6. Insert the small spring into the piston assembly and insert the piston assembly into the master cylinder bore using a firm rocking motion.
7. Use the lever to compress the spring and hold the piston in place.
8. Use snap ring pliers to install the snap ring.
9. Secure push rod threads by tightening set screw.

Figure 12.1.2 Master Cylinder Lever Disconnect



12.1 Maintenance of the Hydraulic Release System continued

Master Cylinder Repair continued

Figure 12.1.3 Master Cylinder Piston Removal

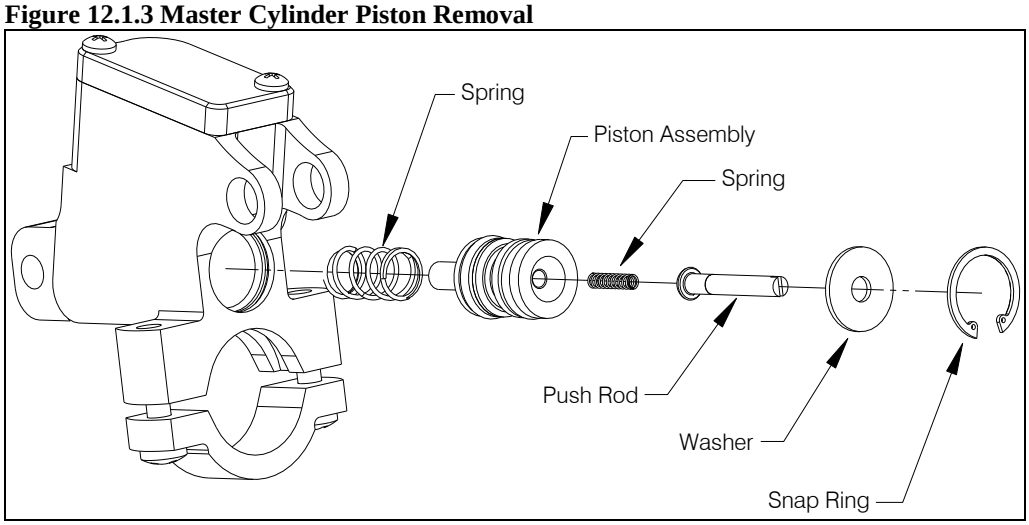
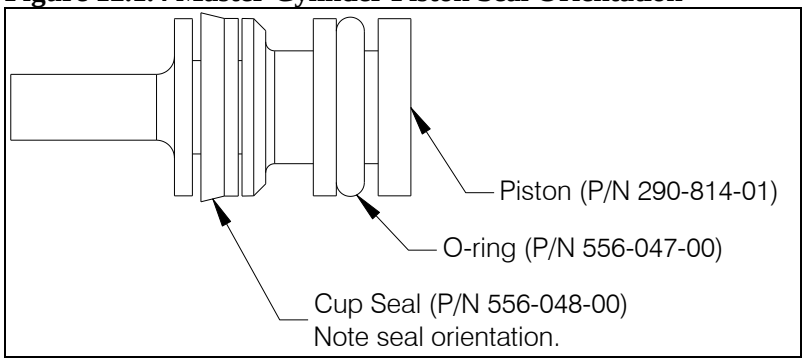


Figure 12.1.4 Master Cylinder Piston Seal Orientation



Slave Cylinder Repair

If the slave cylinder is leaking oil 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).

Disassembly:

1. Remove cap, piston, and seal (see Figure 12.1.5).
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.

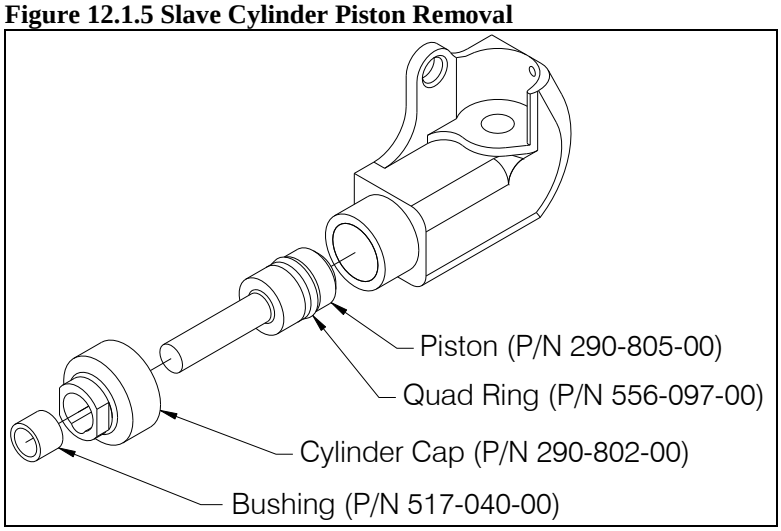
Re-assembly:

1. Press new bushing into cap.
2. Stretch new quad ring over piston into groove.
3. Clean and lubricate cylinder bore and piston seal with hydraulic fluid.
4. Insert piston into cylinder taking care not to damage edges of quad ring.
5. Screw on cap and torque to 50-60 in-lbs.

12.1 Maintenance of the Hydraulic Release System continued

Slave Cylinder Repair continued

Figure 12.1.5 Slave Cylinder Piston Removal



12.2 Bleeding 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.

Following is the procedure:

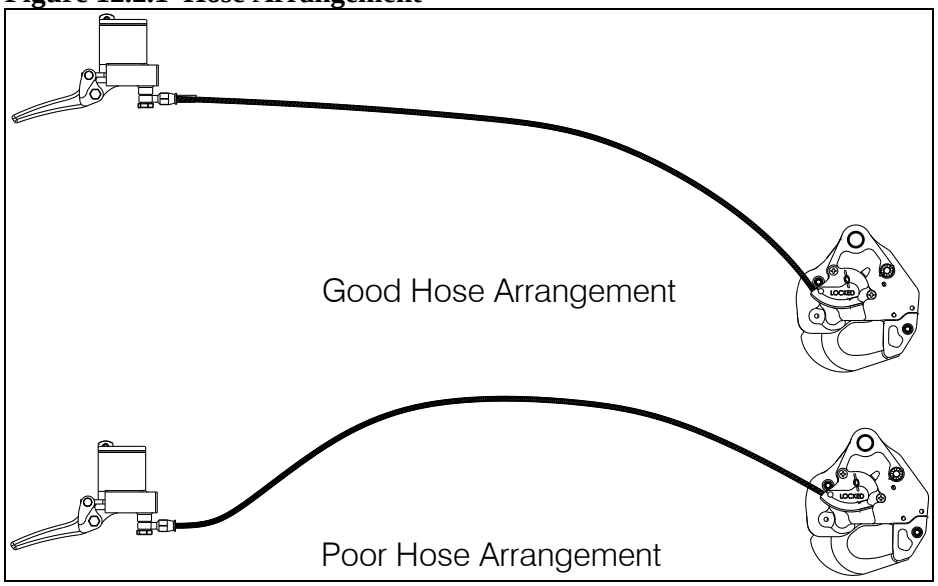
1. Obtain the hydraulic hook bleed kit, 212-014-02. This kit consists of 2 ounces of MIL-PRF-87257 fluid, a syringe, a female barb fitting, a length of PVC tubing, and a bleed adapter fitting. The bleed kit is included in new hydraulic hook kits. Assemble the bleed kit by pressing the fittings into the tubing and threading the female barb fitting into the syringe.
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 assembly to the slave cylinder assembly if not already done. If filling or bleeding on the bench, as much as possible, arrange the hoses uncoiled, straight and running uphill. See Figure 12.2.1.

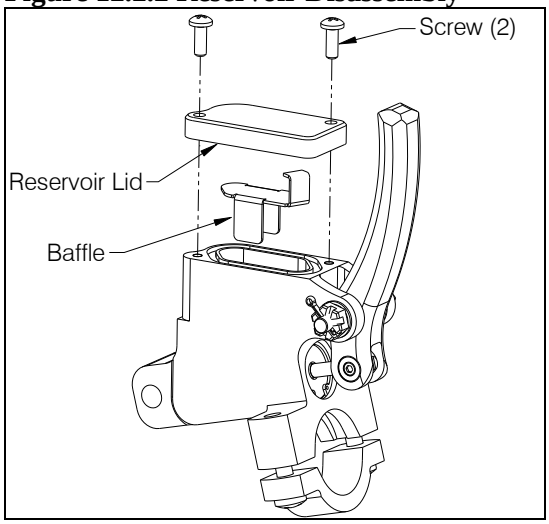
Figure 12.2.1 Hose Arrangement



12.2 Bleeding Hydraulic System continued

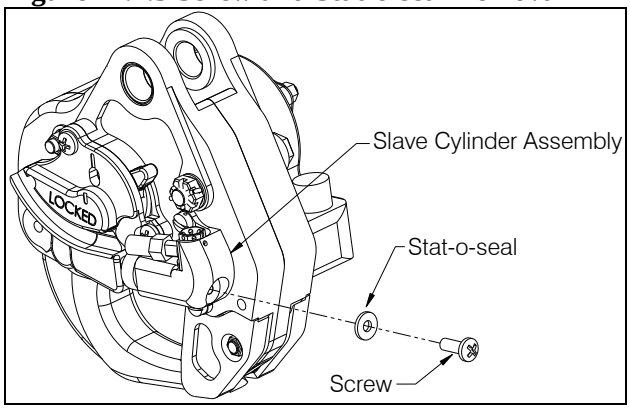
4. Remove screws, reservoir lid, and baffle from the master cylinder reservoir as shown in Figure 12.2.2.

Figure 12.2.2 Reservoir Disassembly



5. Remove the screw and stat-o-seal on the slave cylinder, see Figure 12.2.3.

Figure 12.2.3 Screw and Stat-o-seal Removal



6. Fill a syringe with approximately 35 cc of hydraulic fluid. Screw the end of the syringe into the screw hole on the slave cylinder to create a tight seal. See Figure 12.2.4.

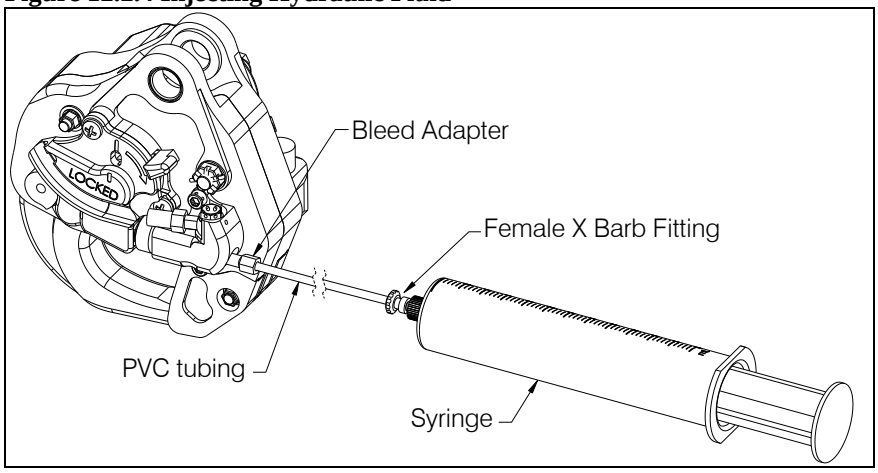
7. While observing the reservoir, **slowly** push on the syringe plunger to force fluid through the slave cylinder, hydraulic hose, and up to the master cylinder reservoir. There will be some resistance during filling—this is normal.

⚠ 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.

12.2 Bleeding Hydraulic System continued

Figure 12.2.4 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. Remove the syringe from the screw hole. Re-install the stat-o-seal (P/N 510-496-00) and screw (P/N 510-525-00), see Figure 12.2.3.

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 bubbles. If bubbles are observed rising within the reservoir, continue to cycle the lever until there are no more. Actuating the lever releases trapped air in the system.

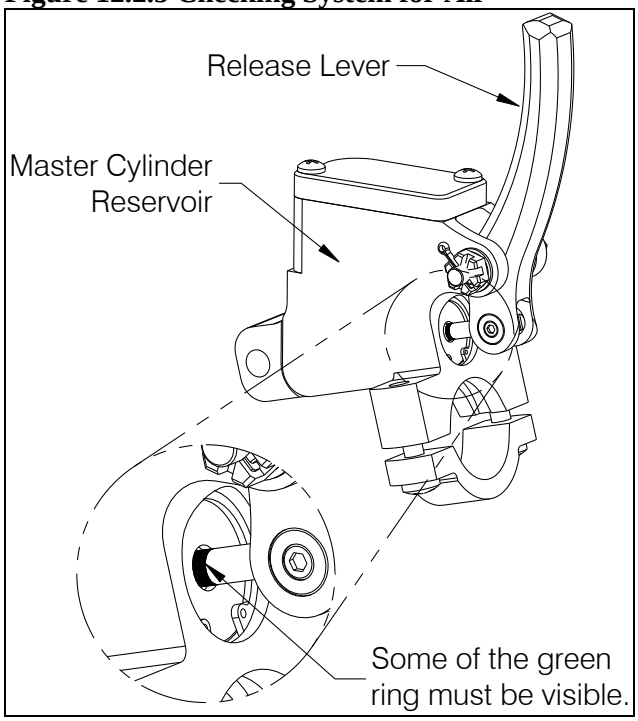
⚠ CAUTION

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 12.2.5). If the green area on the push rod is visible, proceed to step 13. If 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.

12.2 Bleeding Hydraulic System continued

Figure 12.2.5 Checking System for Air



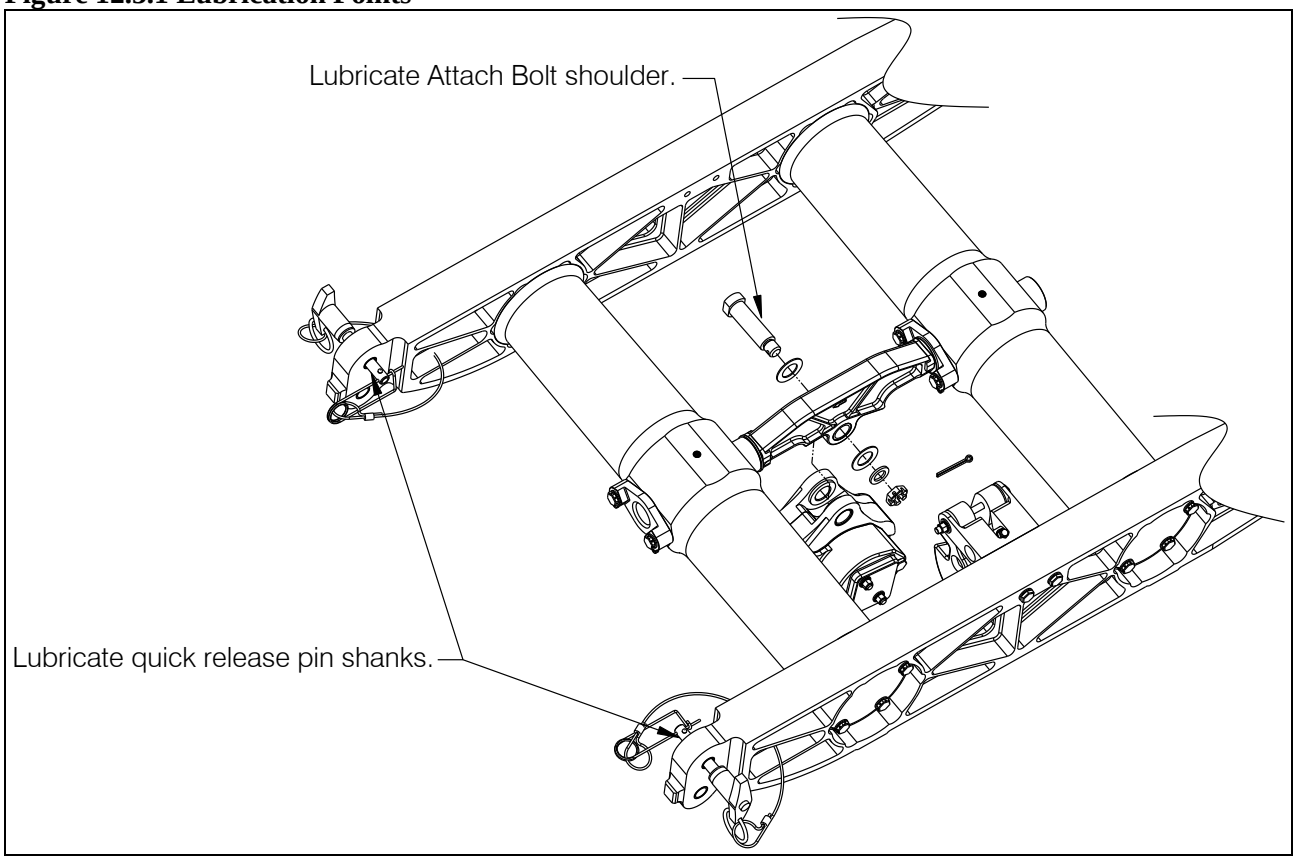
13. After the system is properly bled, verify that the reservoir is approximately half full of hydraulic fluid. Fluid should be visible above the baffle.
14. Re-install the baffle, and the reservoir lid.
15. Check the system for proper operation. Fully actuate the release lever. The hook must open and the lever must have a firm feel.
16. Disassemble and thoroughly clean the syringe with isopropyl alcohol. Allow it to dry. Not cleaning the syringe will render it unusable. Reassemble and store for next use.

12.3 Lubrication Information

Lubrication of Cargo Hook Suspension system is required every 500 hours of hook operation. To obtain maximum life under severe duty conditions such as logging or seismic work, it is recommended to lubricate the suspension system approximately every 250 hours.

Lubricate the Cargo Hook attach bolt (or Pin Load Cell shoulder if load weigh kit is installed) as noted in Figure 12.3.1. Recommended lubricants are AeroShell 17, MIL-PRF-21164 or Mobilgrease 28, MIL-PRF-81322. Re-assemble the attach hardware and tighten the nut to finger tight and then rotate nut to next castellation to install the cotter pin.

Figure 12.3.1 Lubrication Points



12.3 Lubrication Information, continued

Hook Corrosion Prevention

In marine or other corrosive environments the life of the hook can be increased by periodically treating with a corrosion preventative compound such as ACF-50. Spray exterior of hook with corrosion preventative compound and wipe off excess with a rag.

The amount and frequency of application will vary depending on climate. In dry dusty environments it is not recommended to treat for corrosion since the oily residue on the inside of the hook that cannot be wiped off could attract and retain dust and sand. In addition corrosion is not likely to be a problem in these conditions. For offshore or coastal operations, treatment should be done every two weeks.

Section 25
Equipment and Furnishings

25.1 Cargo Hook Connector

Listed below is the pin out for the cargo hook connector.

Table 25.1.1 Cargo Hook Connector

Pin	***Function***
A	Ground
B	Power

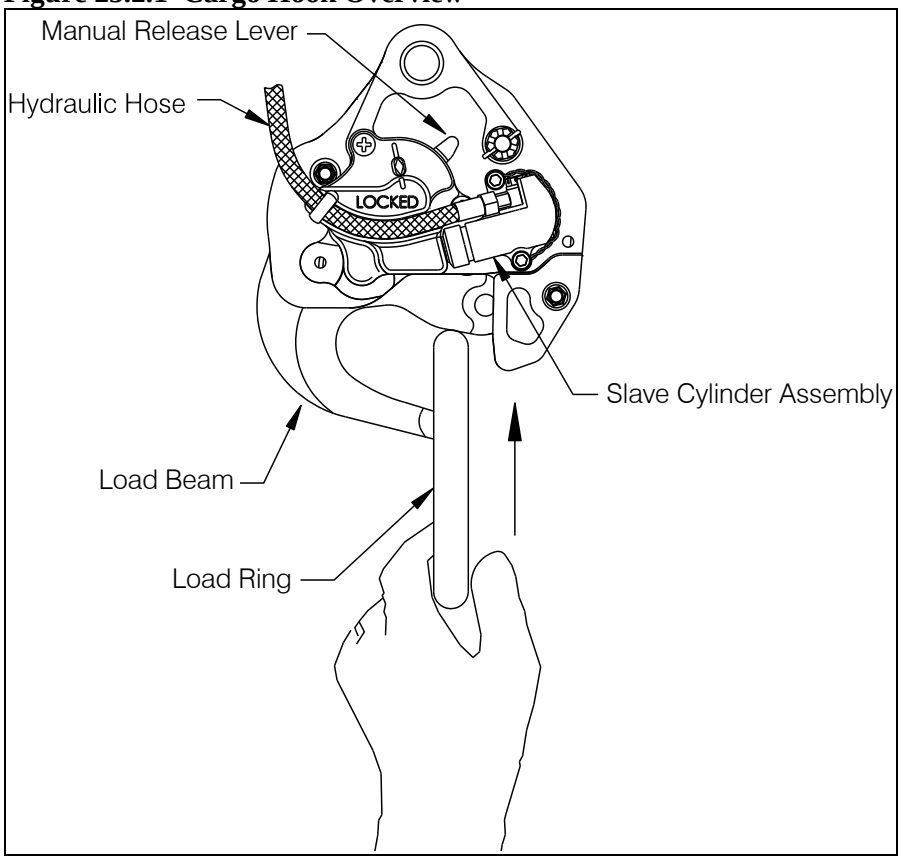
25.2 Description

The cargo hook kits enable a helicopter to transport and release external loads. The cargo hook is the device through which the load is attached and released. It is supported by a suspension frame assembly which spans the hard points on the belly of the helicopter. The suspension frame assembly has provisions which allow the cargo hook to pivot side to side and fore and aft in response to the direction of the load. An optional load weigh kit can be used to provide the pilot with the weight of the load on the cargo hook via a cockpit indicator.

A load is attached to the cargo hook by passing a load ring into the throat of the load beam and pushing the ring against the upper portion of the load beam throat (see Figure 25.2.1), which will initiate the hook to close. In the closed position, a latch engages the load beam and latches it in this position. A load release can be initiated by three different methods. Normal release is achieved by pilot actuation of a push-button switch in the cockpit. When the push-button switch is pressed, it energizes the solenoid in the cargo hook, and the solenoid opens the latch in the internal mechanism. In the event of an electrical failure, load release can be achieved by operating the manual release lever in the cockpit. The release lever moves hydraulic fluid through a hose which moves a piston with the slave cylinder assembly which in actuates the internal mechanism of the cargo hook to unlatch the load beam. A rigging window provides a means to verify the manual release cable setting with respect to the internal mechanism. Ground personnel can also release the load by actuating a manual release lever located on the side of the cargo hook (see Figure 25.2.1).

25.2 Description continued

Figure 25.2.1 Cargo Hook Overview



25.5 Component Weights

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

Table 25.5.1 Component Weights and CGs

Item	Weight	Station
Fixed Provisions Kit, A109 P/N 200-355-00	9.0 lbs (4.1 kgs)	125.9 in. (3200 mm)
Cargo Hook Suspension Kit P/N 200-356-00	20.5 lbs (9.3 kg)	129.9 in. (3300 mm)
Load Weigh Kit* P/N 200-357-00	2.1 lbs (.95 kgs)	125.9 in. (3200 mm)
Fixed Provisions Kit, A119 P/N 200-369-00	9.0 lbs (4.1 kgs)	125.9 in. (3200 mm)

***** The removable provisions include the suspension w/ hook, external hydraulic hose, and external electrical release harness. 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 hose, 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 Suspension Frame components thoroughly of excess dirt and grease with a rag before packaging. Pack the unit in a heat-sealable package. If the unit is to be stored for long periods in a tropical climate it should be packed in a reliable manner to suit local conditions. Refer to MIL-PRF-23199 and MIL-STD-2073-1 for additional guidance. Refer to the CMM 122-015-00 for specific cargo hook storage instructions.

Package the unit 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 Troubleshooting

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. Refer to the appropriate Agusta maintenance documentation for guidance on procedures relating to parts that interface with this suspension system.

Table 25.15.1 Troubleshooting

MALFUNCTION	PROBABLE CAUSE	CORRECTIVE ACTION
Cargo hook does not operate electrically or manually.	Defective internal mechanism.	Remove and replace cargo hook (see sections 25.16 and 25.17) or repair per Component Maintenance Manual (CMM) 122-015-00.
Cargo hook does not operate electrically, hydraulic release operates normally.	Open electrical circuit, faulty wiring, circuit breaker, relay or solenoid.	Disconnect cable from electrical connector on cargo hook. Using multi-meter, check for 3.0 to 4.0 ohms between pins A and B of electrical connector (see note 1 below). If open indication is obtained, remove and replace cargo hook (see sections 25.16 and 25.17) or repair per CMM 122-015-00.
Cargo hook operates electrically, but not manually.	Leaks in hydraulic hose system. Air in hydraulic hose system. Jammed slave cylinder.	Check for leaks in hydraulic hose system and correct defects if found. Check for excess air in system (see Figure 12.2.5). Bleed hydraulic system per this manual. Remove slave cylinder from hook and check for proper operation while actuating manual release lever in the cockpit. Repair as required.
Load beam fails to re-latch after being reset.	Defective latch mechanism.	Remove and replace cargo hook (see sections 25.16 and 25.17) or repair per CMM 122-015-00
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 release lever on the master cylinder. If operation feels free and force is less than 5 lbs remove and replace cargo hook (see Section 25.16 and 25.17) or repair per CMM 122-015-00.
Hydraulic fluid leaks at hose fittings.	Loose fittings	Tighten fittings. Check oil 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.
Cargo hook fails to re-latch properly.	Slave cylinder piston is jammed in the extended position preventing mechanism from returning	Remove slave cylinder from hook and check position and operation of piston. Check operation of cargo hook re-latch without slave cylinder installed. Remove and replace cargo hook (see Sections 25.16 and 25.17) or slave cylinder assembly as required.

Table 25.15.1 Troubleshooting continued

MALFUNCTION	PROBABLE CAUSE	CORRECTIVE ACTION
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 2). Check solenoid resistance (see note 1), repair or replace defective parts.
Load Weigh Indicator does not light up.	Faulty wiring or circuit breaker.	Check the circuit breaker and wiring (see Note 2). If this doesn't help, remove and replace indicator per sections 25.16 and 25.17.
The displayed load on the Load Weigh Indicator is incorrect.	Incorrect calibration code.	Ensure the correct calibration code has been entered (see Note 3).
Indicator displayed load is not stable.	Dampening level is too low.	Adjust the dampening level to a higher number (see Note 4).
Indicator displayed load takes too long to change the reading when the load is changed.	Dampening level is too high.	Adjust the dampening level to a lower number (see Note 4).
Indicator does not change with changing hook loads.	Defective load cell, indicator failure or damaged wire harness.	Check for damaged wire harness (see note 2), remove and replace wire harness assembly or load cell (see sections 25.16 and 25.17).

Notes:

1. **Checking resistance at pins A and B.**

   Check for 3.0 to 4.0 ohms between pins A and B of electrical connector located on the cargo hook (see below).

Figure 25.15.1 Cargo Hook Electrical Connector

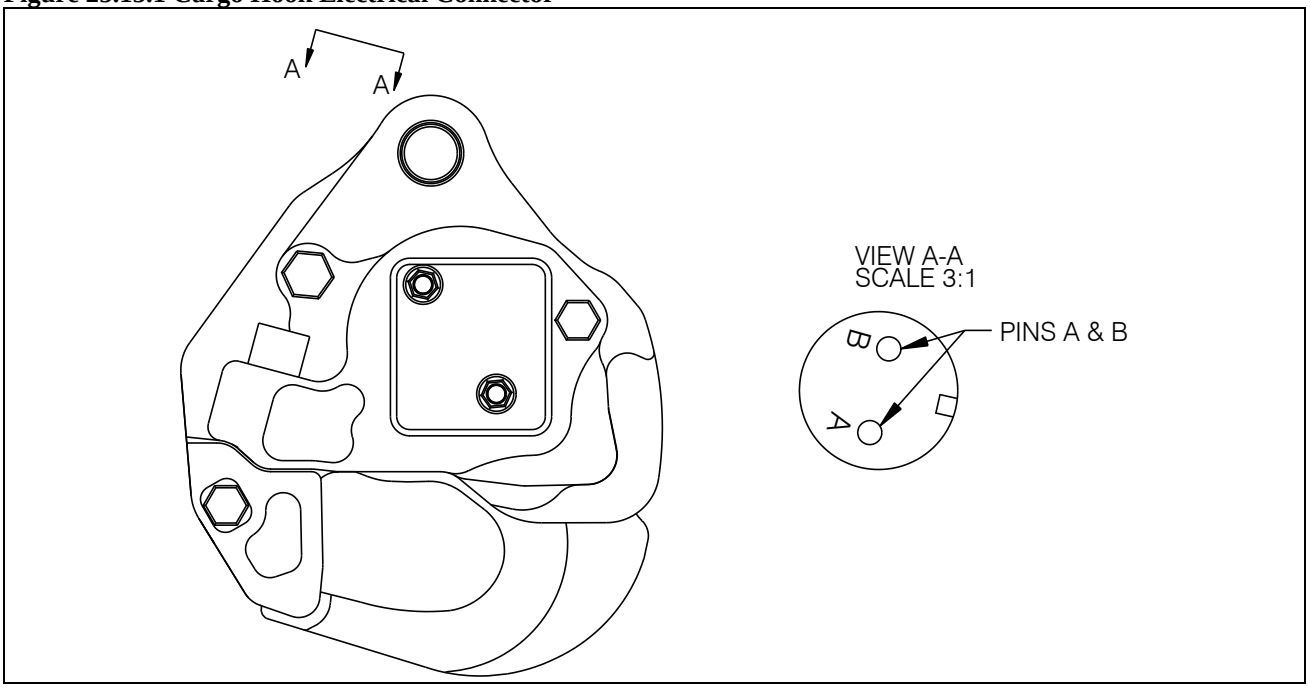


Table 25.3 Notes continued**:**

2. Checking Wire Harnesses.

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

- External power connector is not supplied
- Further precaution: remove the circuit breaker(s) from the corresponding circuits.

The wire harnesses are routed with and secured to existing wire bundles and are located approximately as shown below. Inspect for general condition and chafing along length of wire runs. See Figure 25.15.3 through Figure 25.15.5 for electrical schematics and refer to Agusta Wiring Diagrams for information on and locations of shipside wiring connections. The electrical release system wiring supplied with these kits interfaces with the cyclic connector(s), the remaining wiring up to and including the push button release switch on the cyclic is as provided by Agusta.

Figure 25.15.2 Wire Harness Routing Overview

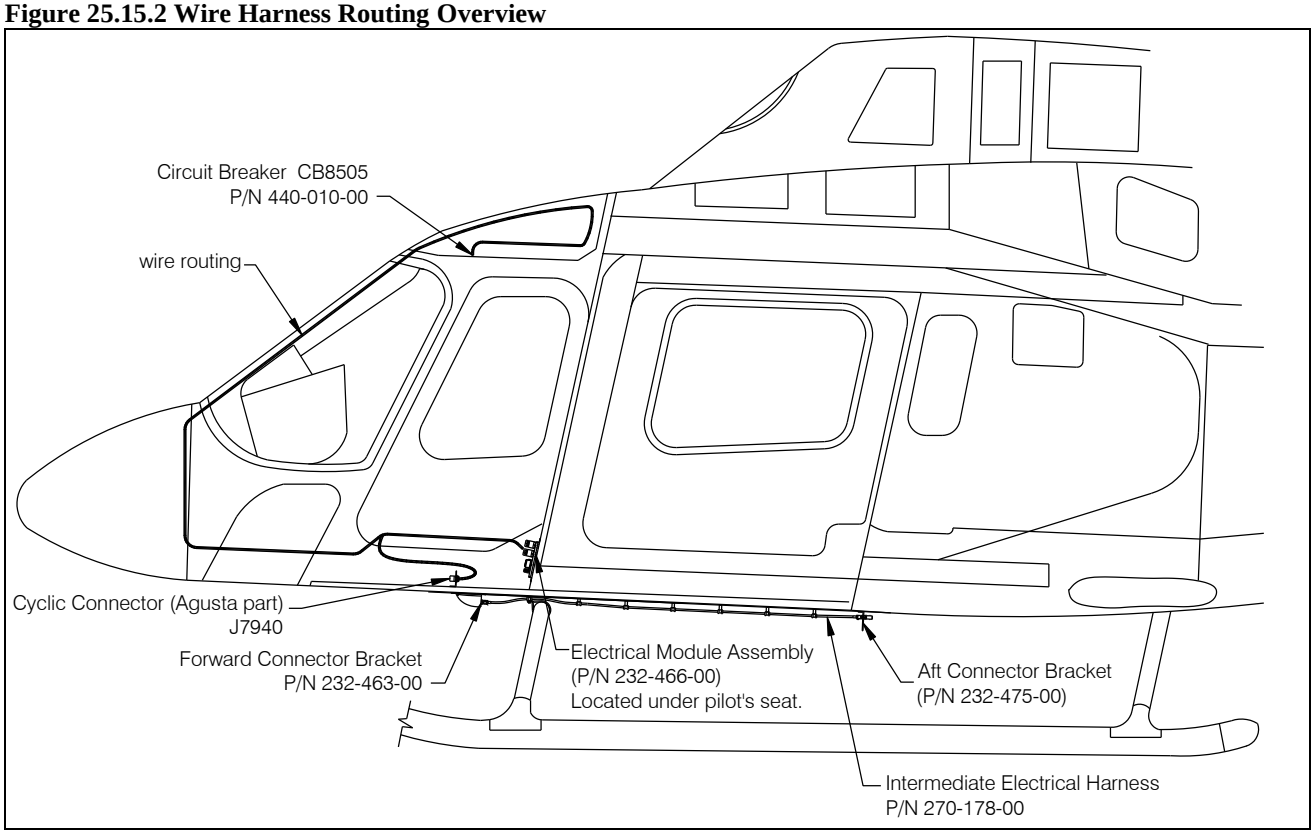


Table 25.3 Notes continued**:**

2. Checking Wire Harnesses continued

Figure 25.15.3 Internal Electrical Release Schematic – A109E and A119/AW119 MKII without IDS

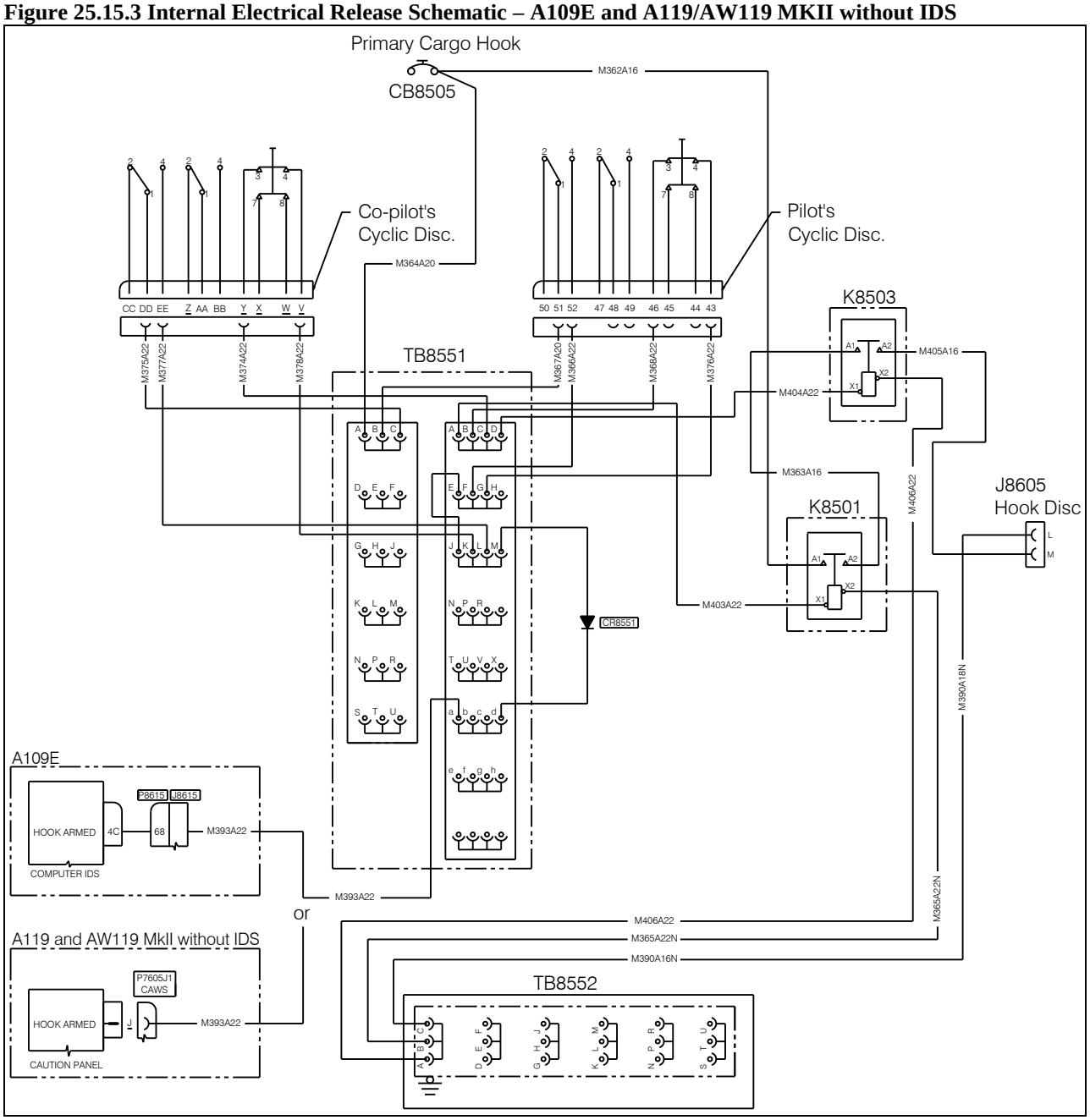


Table 25.3 Notes continued**:**

2. Checking Wire Harnesses continued

Figure 25.15.4 Internal Electrical Release Schematic – A119/AW119 MKII with IDS

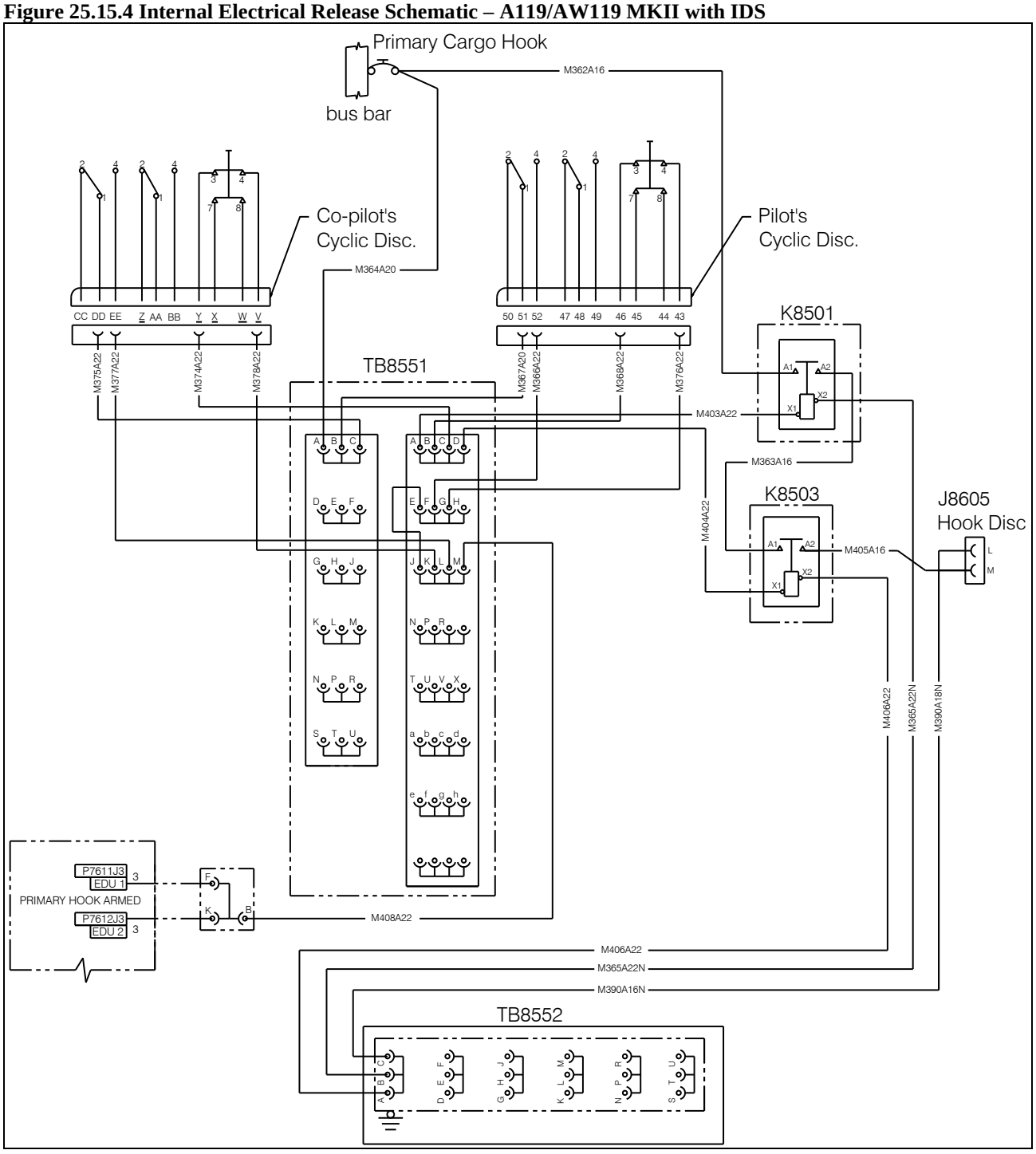


Table 25.3 Notes continued**:**

2. Checking Wire Harnesses continued

Figure 25.15.5 Load Weigh System Schematic (Applicable to Kit P/N 200-357-00)

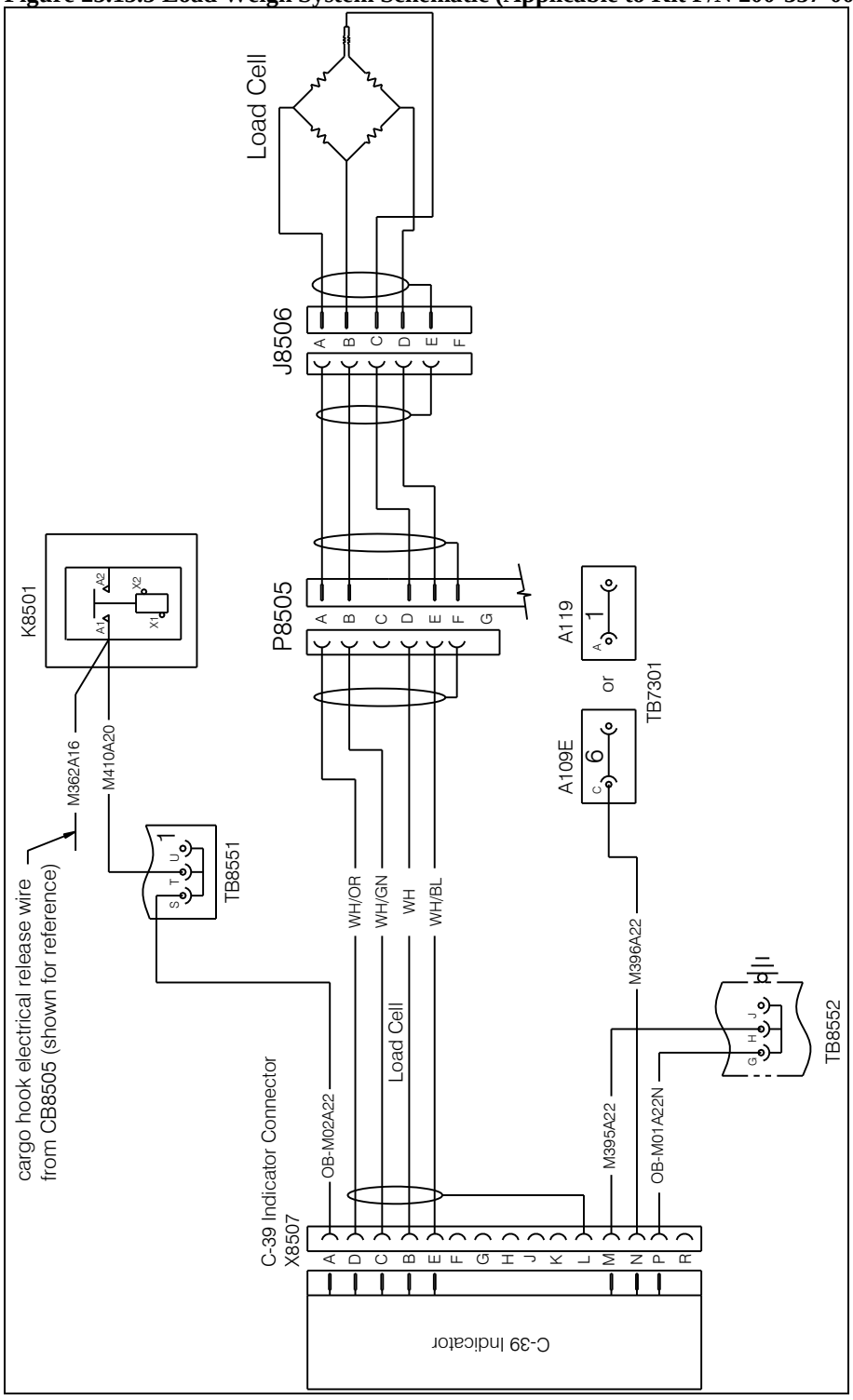
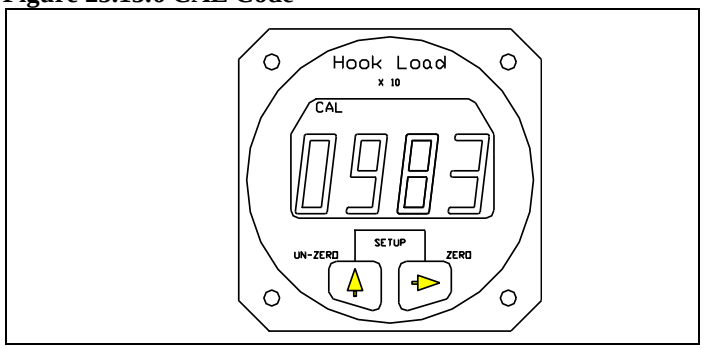


Table 25.3 Notes continued**:**

3. Checking Load Weigh Indicator calibration code:

With the Indicator powered up and in the Run Mode, press both buttons at the same time to go to Setup. Scroll through the menu until the word CODE is displayed, then press the Right button. The display should look like this:

Figure 25.15.6 CAL Code

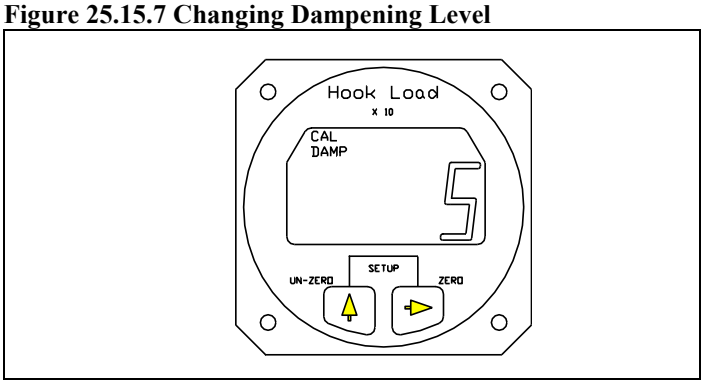


This code should match the code printed on the tag attached to the load cell cable. If this code does not match, contact Onboard Systems for further guidance.

4. Adjusting dampening level:

With the Indicator powered up and in the Run Mode, press both buttons at the same time to go to Setup. Scroll through the menu, using the Left button, until the word DAMP is displayed. To look at or change the Dampening Level press the Right button. The display should look like this:

Figure 25.15.7 Changing Dampening Level



The CAL and the DAMP legend is turned on and the previously set dampening level is displayed. To return to Run without changing the current dampening level press both the Right and Left buttons at the same time. To change the dampening number, use the Left button to scroll the blinking digit to the desired number. Ten dampening levels are available, from 0 through 9. At level 0 the display responds to the slightest change in weight. However, if the load bounced even slightly, the display digits would respond instantly, making the display look unstable. With a dampening level of 9, the display would be stable under the most turbulent conditions, however, it would take several seconds for the display to respond to a change in weight. The ideal dampening level will depend on the flying conditions. A mid range setting of 5 or 6 is usually adequate. After the selection has been made press both the Right and Left buttons at the same time to return to Run.

25.16 Component Removal

Cargo Hook Removal

1. Remove the slave cylinder assembly from the Cargo Hook by removing two screws and associated ty-wrap on the manual release cover.
2. Disconnect the electrical release connector from the Cargo Hook.
3. Remove the cotter pin (P/N 510-178-00) from the attach bolt (P/N 290-332-00) or Pin Load Cell if the load weigh kit is installed.
4. Remove the castellated nut (P/N 510-170-00) from the attach bolt.
5. Remove attach bolt and all washers.
6. Remove the Cargo Hook from the suspension system.

Suspension System Removal

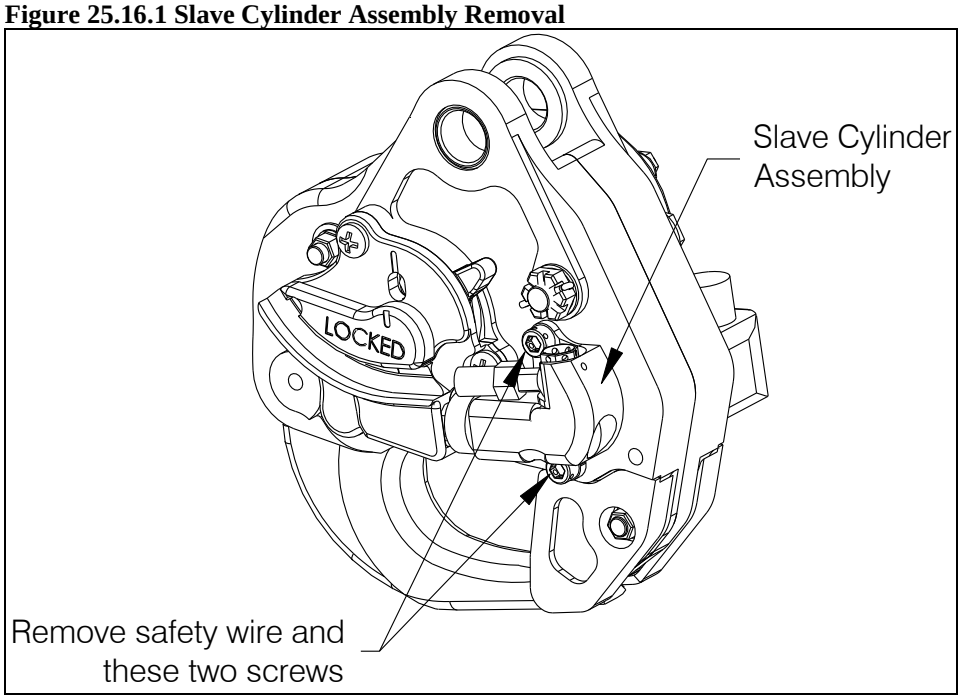
1. Disconnect the load cell harness connector (if load weigh system is installed), electrical release harness connector, and hydraulic hose at their respective connections at the bracket mounted to the belly of the aircraft.
2. Remove the Safety Pins (P/N 510-565-00) from the Quick Release Pins (P/N 291-558-00) at the two forward hard points and remove the Quick Release Pins.
3. Lower the forward end of the Suspension Frame Assembly and slide the aft pins forward and out of the aft hard points.

25.16 Component Removal continued

Slave Cylinder Assembly Removal

1. Disconnect the hose at the quick disconnect coupling at the belly of the helicopter.
2. Remove the two screws that hold the slave cylinder assembly to the cargo hook.
3. Remove the ty-wrap that secures the hose to the cargo hook and remove the two loop clamps that secure it to the suspension frame.

Figure 25.16.1 Slave Cylinder Assembly Removal



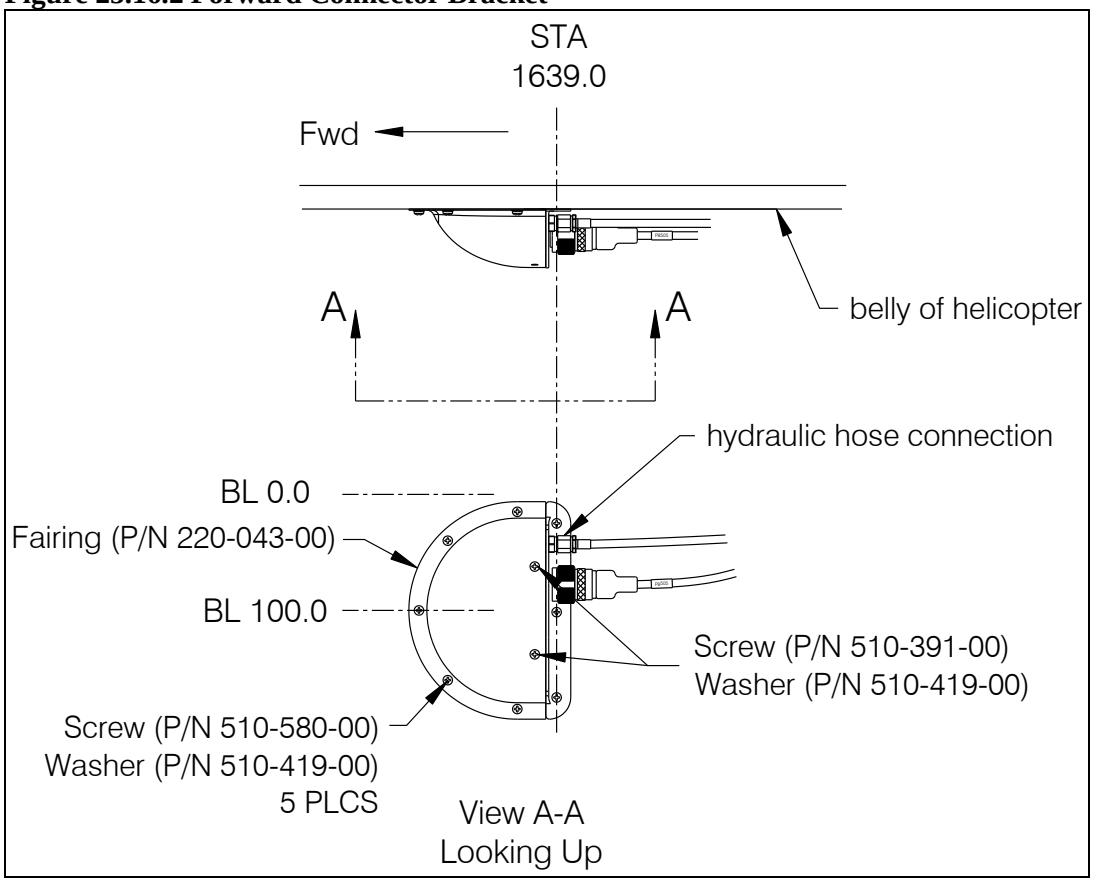
25.16 Component Removal continued

Fixed Hydraulic Release Hose Assembly Removal

The fixed hydraulic release hose is routed from the release lever mounted to the cyclic, to underneath the cabin floor where it is routed to the connector bracket on the belly of the helicopter where it is mated with the removable section of the hydraulic release system.

1. Remove the fairing (P/N 220-043-00) at the forward connector bracket on the exterior of the aircraft below the center console.

Figure 25.16.2 Forward Connector Bracket



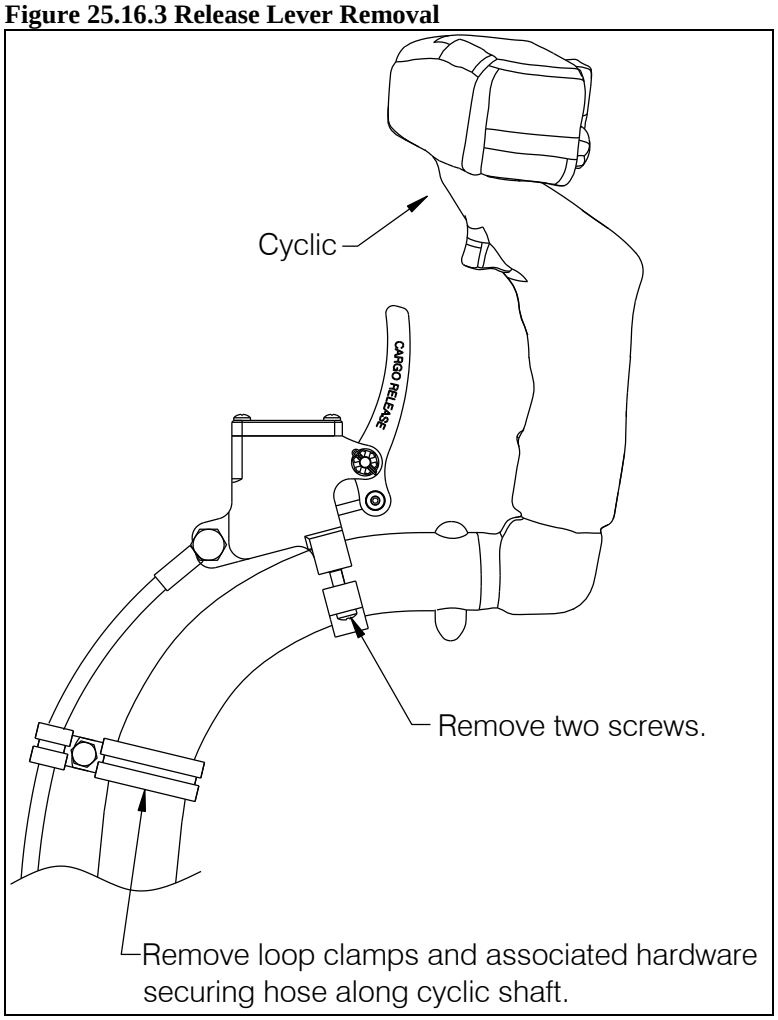
2. With a container to catch the fluid, disconnect the hydraulic hose connection at the forward bracket.
3. Remove the nut from the end of the hydraulic fitting at the forward connector bracket.
4. Feed the hydraulic hose up through the hole in the belly.
5. Feed the hose through the structure under the center console removing it from the two loop clamps along its length and then feed it through the boot at the base of the cyclic.

25.16 Component Removal continued

Fixed Hydraulic Release Hose Assembly Removal continued

6. Above the floor and on the cyclic shaft remove the cushioned loop clamps securing the hose by removing associated hardware.
7. Remove the release lever by removing two screws (see below).

Figure 25.16.3 Release Lever Removal



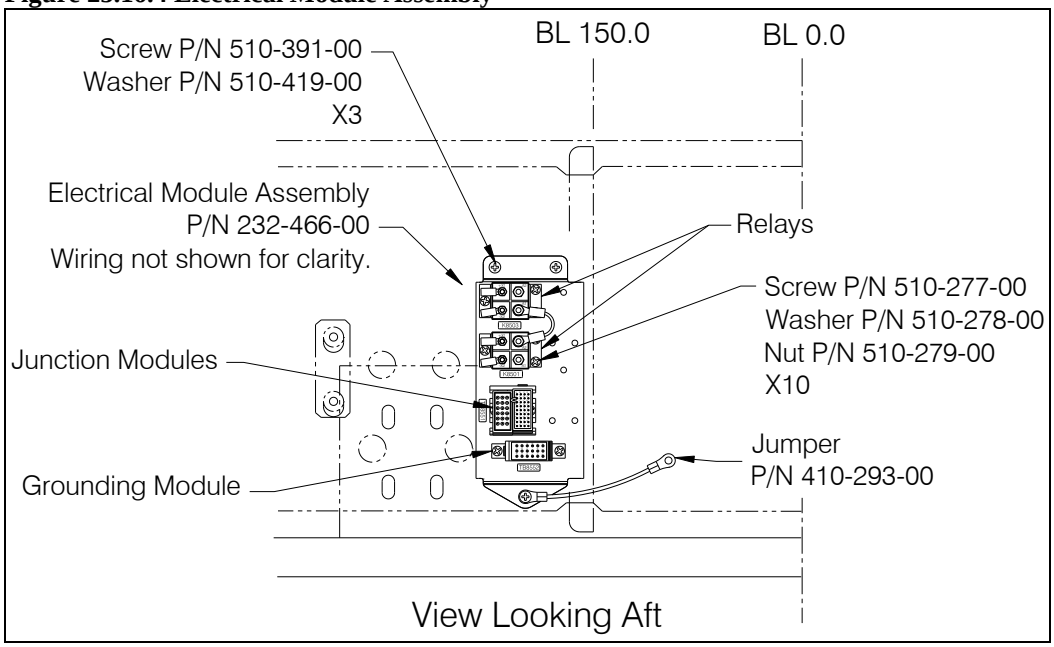
25.16 Component Removal continued

Electrical Module Assembly Removal

The Electrical Module Assembly includes the cargo hook electrical release system relays and junction modules including the grounding module. It is located in the bay underneath the pilot's seat. The entire assembly must be removed from its mounting location in order to access the nuts which secure the relays (K8501 and K8503) and grounding module (TB8552) to it.

1. Remove the assembly by removing the three screws and washers (see Figure 25.16.4).
2. Disconnect wiring from components as needed. A 20 gauge and 22 gauge extraction tool is needed to remove wires from the junction and grounding module.
3. The relays and grounding modules are removed by removing the screws, washers, and nuts (see Figure 25.16.4) which secure them to the assembly's mounting bracket.
4. The two junction modules TB8551 can be removed from their mounting rail by using a flat screwdriver inserted between the rail tong and the module and exerting a light pressure until it releases.

Figure 25.16.4 Electrical Module Assembly



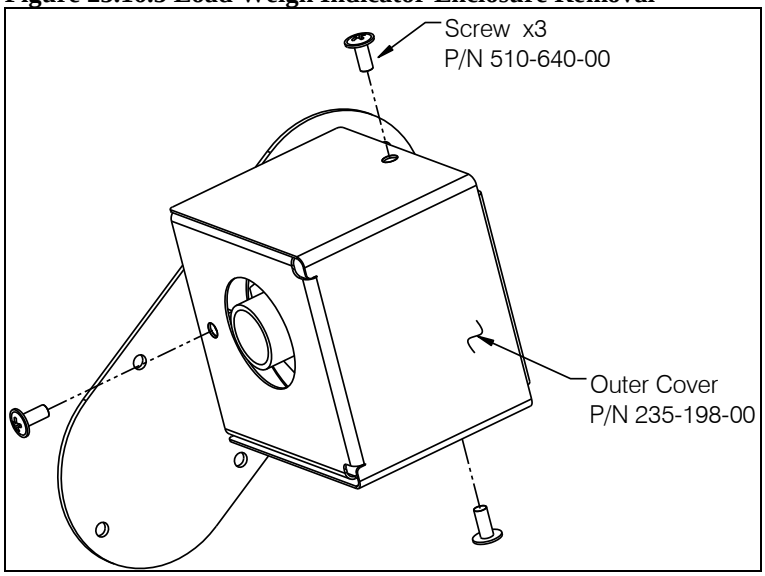
25.16 Component Removal continued

Load Weigh Indicator Removal

The load weigh indicator (P/N 210-095-02 or P/N 210-095-05, included with load weigh kit P/N 200-357-00) is located on the RH forward door pillar or within the instrument panel.

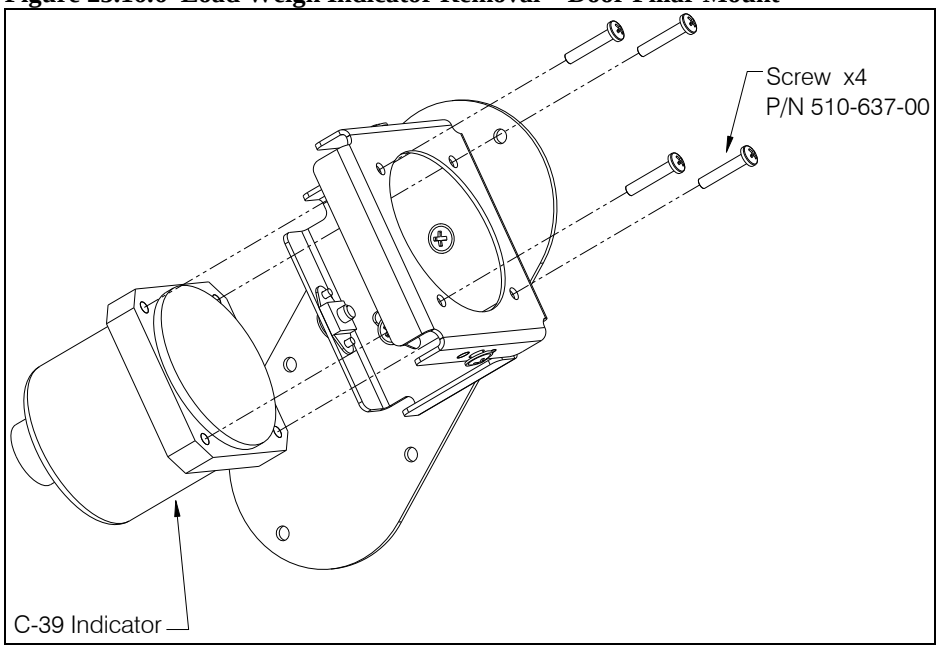
1. Disconnect electrical connector from the back of indicator.
2. If the indicator is mounted on the RH forward door pillar remove the outer cover by removing three screws (P/N 510-640-00) as shown below.

Figure 25.16.5 Load Weigh Indicator Enclosure Removal



3. Remove the four screws (P/N 510-637-00) that secure the indicator to the mounting bracket (shown) or instrument panel and remove the indicator.

Figure 25.16.6 Load Weigh Indicator Removal – Door Pillar Mount



25.16 Component Removal continued

Pin Load Cell Removal

The pin load cell (included with load weigh kit P/N 200-357-00) is installed at the cargo hook and also serves as the cargo hook pivot bolt.

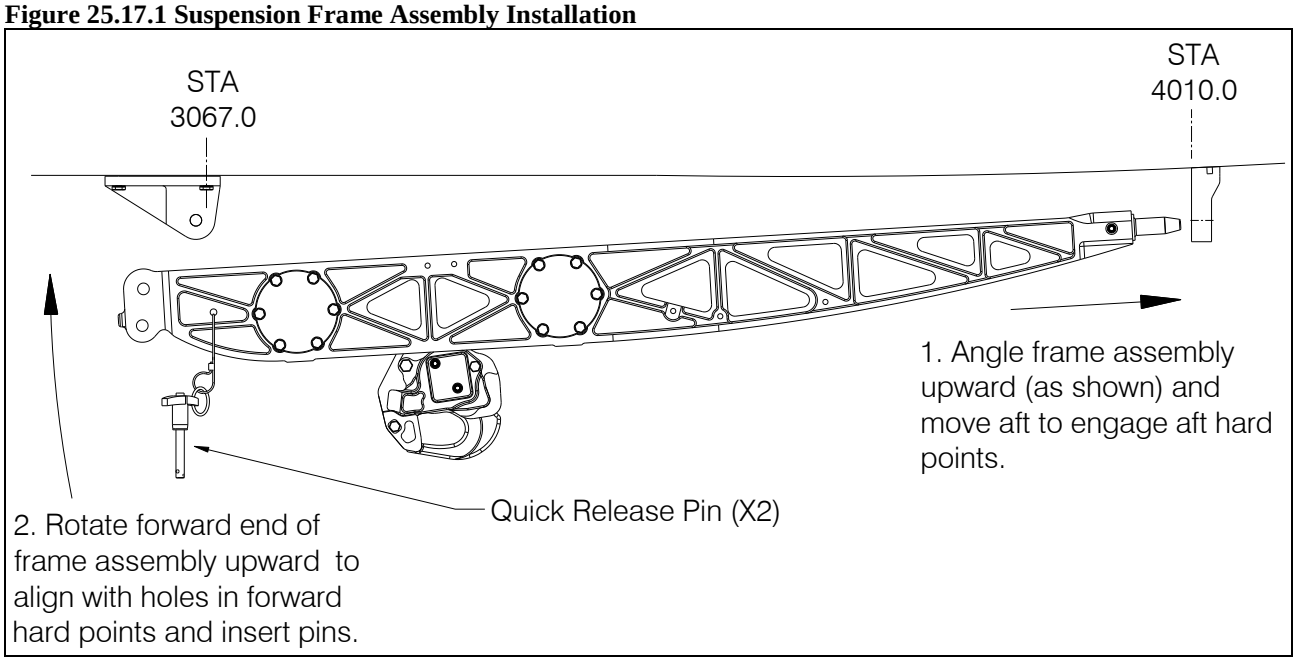
1. Disconnect the electrical connector at the bracket on the belly of the helicopter.
2. Remove the electrical harness from the two loop clamps on the suspension frame.
3. Remove the cotter pin (P/N 510-178-00), nut (P/N 510-170-00), washer (P/N 510-174-00), and washer (P/N 510-183-00) from the load cell and remove the load cell from the cargo hook.

25.17 Component Re-installation

Suspension Re-installation

1. Install the Suspension Frame Assembly as shown below. Secure quick release pins with attached safety pins.

Figure 25.17.1 Suspension Frame Assembly Installation



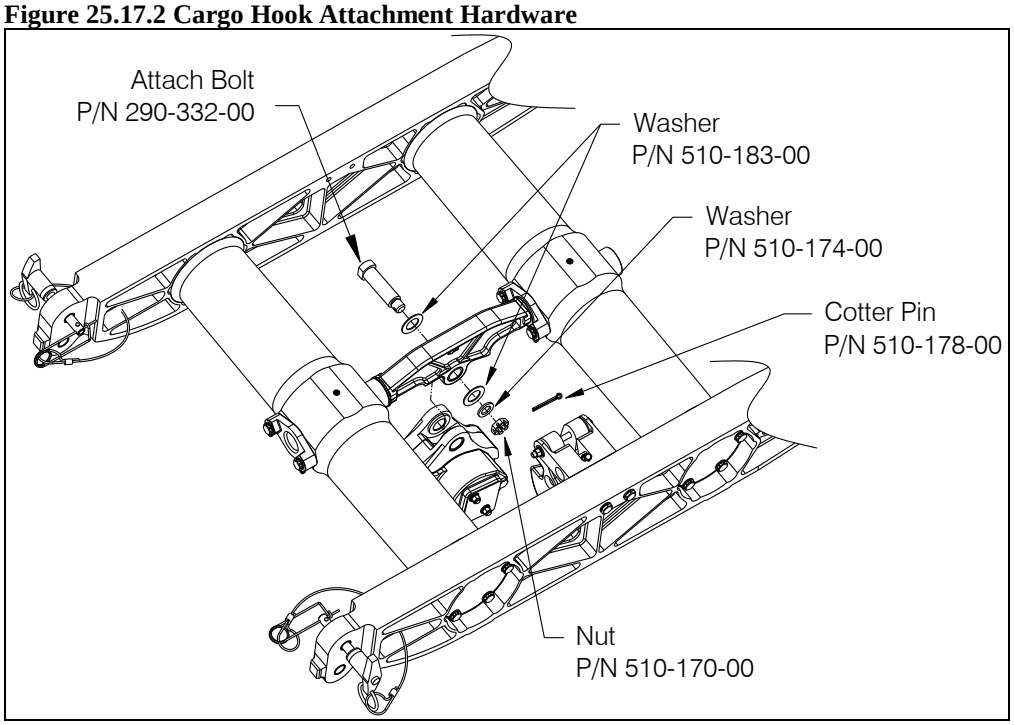
2. Connect the load cell harness connector (if installed) to the connector at the bracket on belly of the aircraft.
3. Connect the electrical release harness connector to the connector at the bracket on belly of the aircraft.
4. Connect the hydraulic release hose to the quick disconnect coupling at the bracket on the belly of the aircraft.

25.17 Component Re-installation continued

Cargo Hook Re-installation

1. Re-install slave cylinder assembly (P/N 232-482-00) onto cargo hook per this section.
2. Connect the electrical release harness (P/N 270-181-00) to the cargo hook connector.
3. Attach the Cargo Hook (P/N 528-028-00) to the suspension system by installing the Attach Bolt (P/N 290-332-00) or Pin Load Cell (not shown below) through the suspension attach point with washer (P/N 510-183-00). Refer to Figure 25.17.2.
4. Install washer (P/N 510-183-00), washer (P/N 510-174-00) and nut (510-170-00) over bolt end.
5. Tighten nut on attach bolt 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 (P/N 510-178-00).
6. Route electrical harnesses and hydraulic hose to the loop clamp at the aft cross tube and through the cutout in the suspension side frame where it is attached to another loop clamp and then forward to connect to the respective connectors on the bracket on the belly of helicopter. See Figure 25.17.4.

Figure 25.17.2 Cargo Hook Attachment Hardware



NOTICE

The Cargo Hook load beam must point forward.

25.17 Component Re-installation continued

Slave Cylinder Assembly Re-installation

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

NOTICE

Slave cylinder assembly should be bled at this point. If assembly has not been bled follow instructions in Section 12.2.

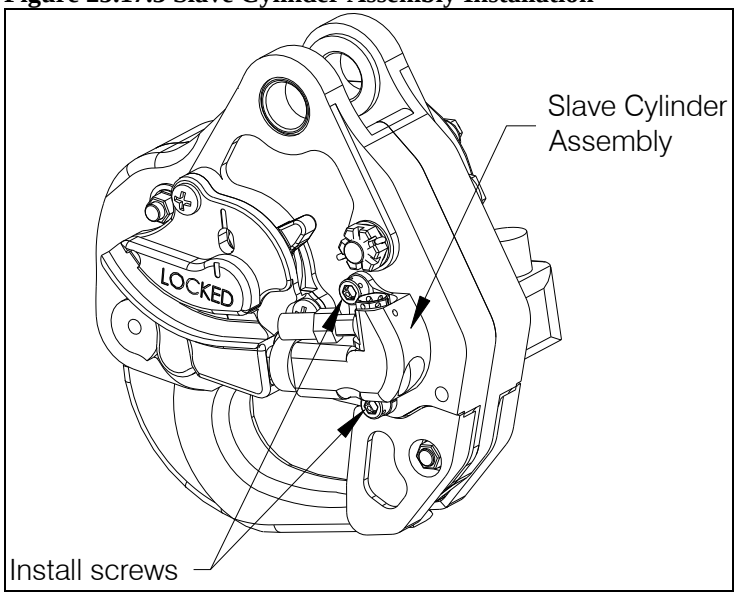
1. Ensure that the piston is in the retracted position. If the piston needs to be retracted connect the quick disconnect coupling at the opposite end of the slave cylinder plumbing and push the piston in.

NOTICE

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

2. Insert the nose of the slave cylinder assembly into the opening in the side of the cargo hook and secure it with two screws (P/N 510-531-00), see Figure 25.17.3. Torque screws to 12-15 in-lbs.
3. Install safety wire between the two screws.
4. Route the hydraulic hose along the manual release cover and secure with ty-wrap at provided hole in the cover.

Figure 25.17.3 Slave Cylinder Assembly Installation



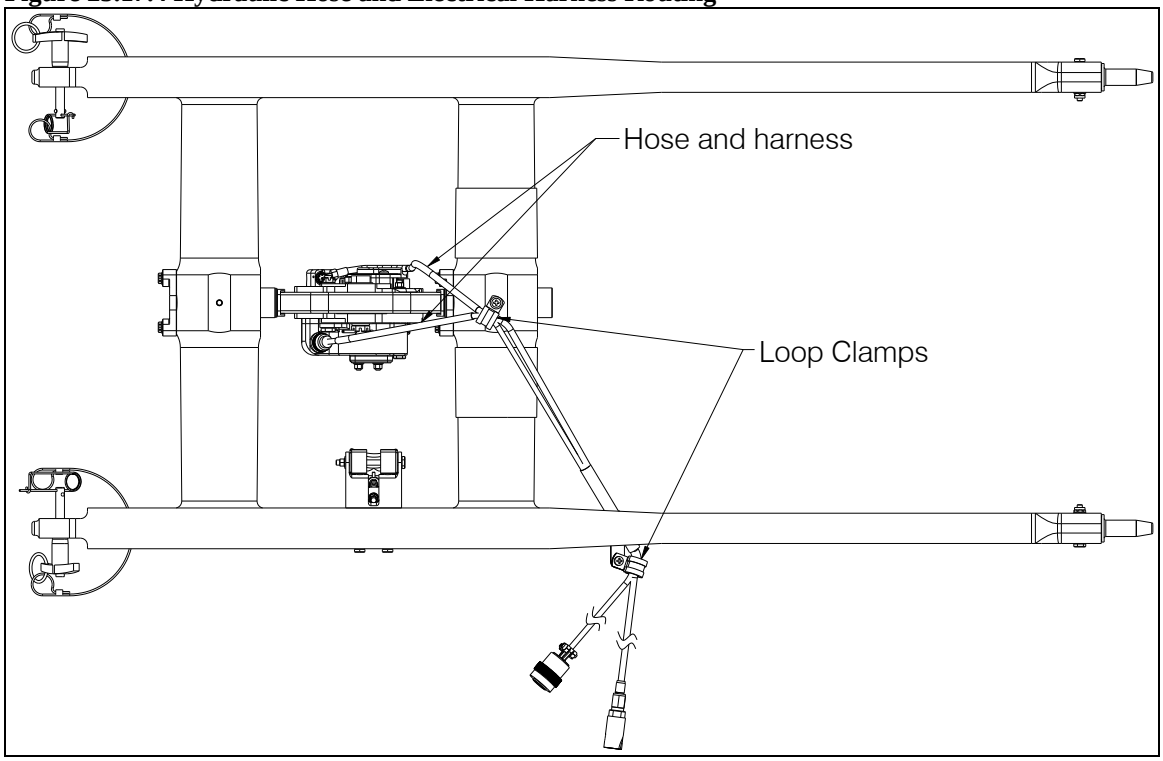
25.17 Component Re-installation continued

Slave Cylinder Assembly Re-installation continued

5. Route the hose with the electrical harness(es) through the loop clamps on the frame as shown in Figure 25.17.4 providing sufficient slack to allow the cargo hook to move throughout its range of motion without pulling the hose (or the electrical harness) tight. Protect the hose and harness from chafing on the frame assembly by wrapping with spiral wrap in this area.

6. Connect the quick disconnect coupling at the belly of the helicopter.

Figure 25.17.4 Hydraulic Hose and Electrical Harness Routing

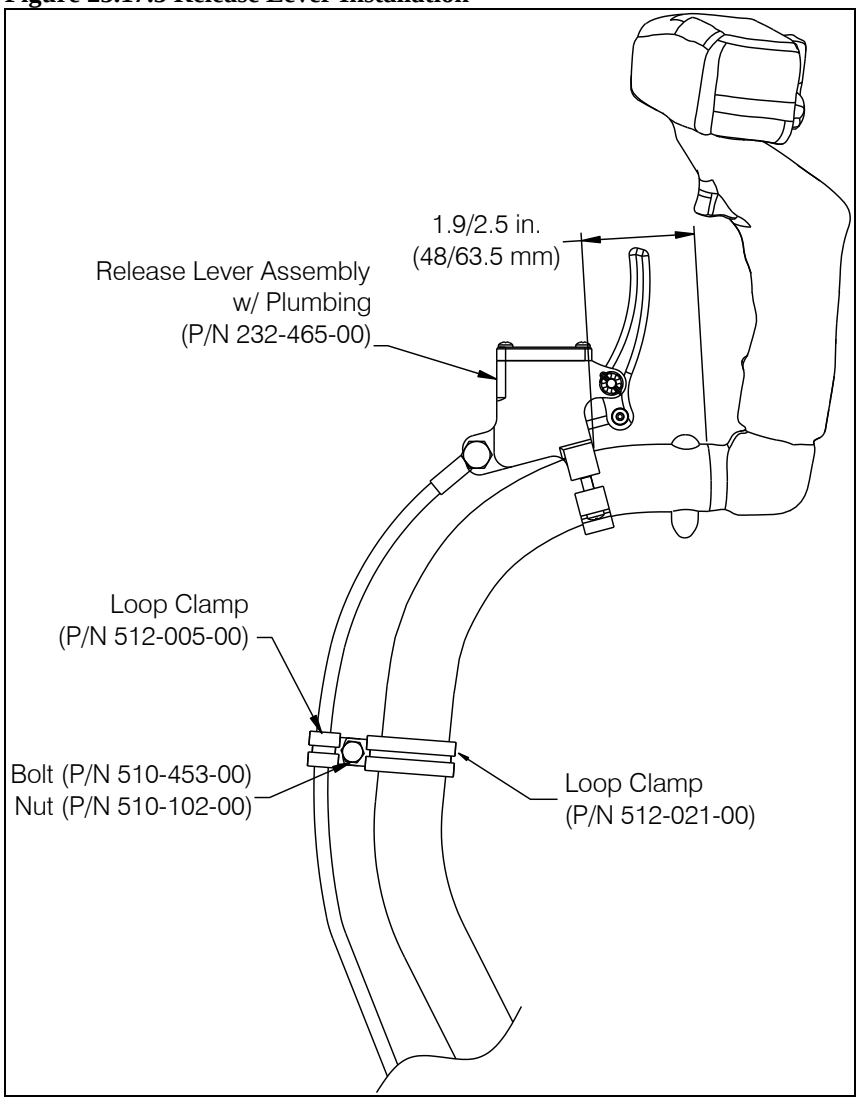


25.17 Component Re-installation continued

Fixed Hydraulic Release Hose Re-installation

1. Install the release lever assembly w/ plumbing onto the cyclic (at location shown below) with two screws (P/N 510-390-00).
2. Route the hose along the cyclic stick and secure at approximately half way down the cyclic shaft with loop clamps and hardware as shown below.

Figure 25.17.5 Release Lever Installation



3. Feed the end of the hydraulic hose through the boot at the base of the cyclic and route it through the hole in the frame underneath the boot.

25.17 Component Re-installation continued

Fixed Hydraulic Release Hose Re-installation

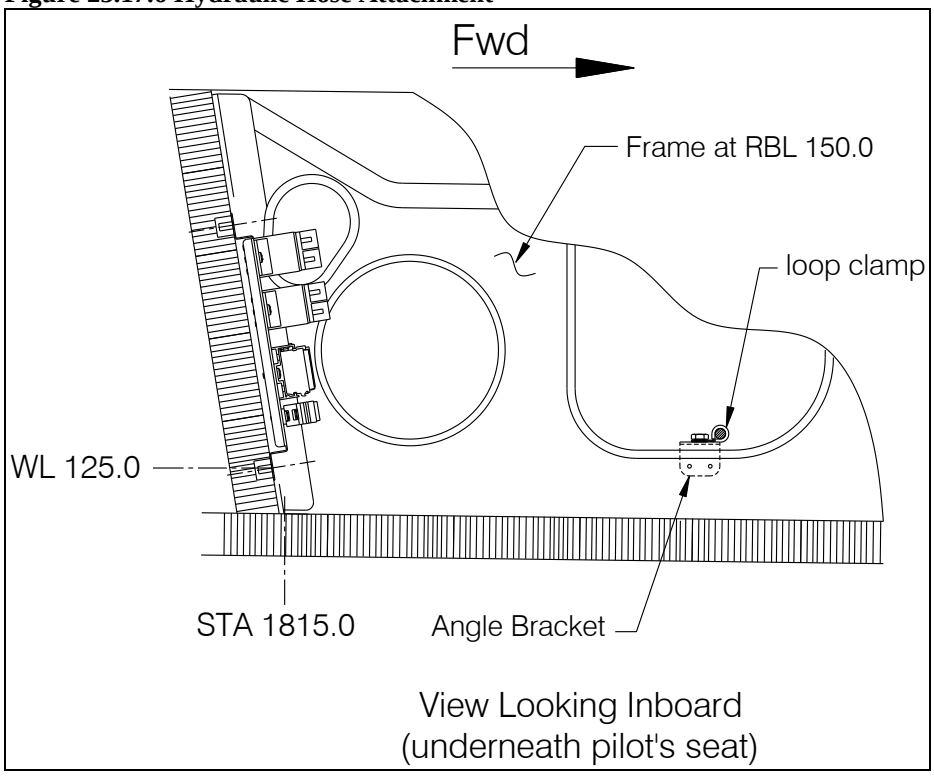
4. Immediately aft of the base of the cyclic, route the hose to the "L" Bracket installed at the pilot's cyclic connector mounting bracket. Attach it here with a loop clamp (P/N 512-005-00) and hardware.

CAUTION

Move cyclic throughout its range of motion to ensure that the hose is secured clear of flight control linkage. Ensure hose is secured clear of any potential chafing points. Wrap hose with spiral wrap to protect from rubbing on wiring.

5. At the airframe structure that separates the bay underneath the pilot's seat from the bay underneath the center console attach the hose to the mounting bracket with loop clamp (P/N 512-005-00) and hardware.

Figure 25.17.6 Hydraulic Hose Attachment



6. Route the hose through the hole through the belly and fasten to the forward connector bracket.

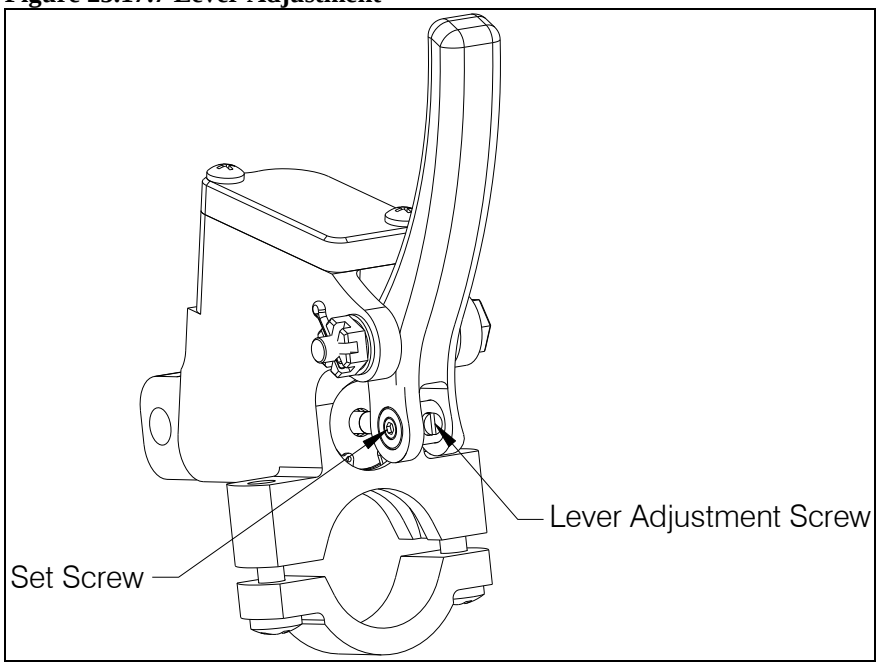
25.17 Component Re-installation continued

Fixed Hydraulic Release Hose Re-installation continued

7. After completing installation of the hydraulic system (both fixed and removable) bleed the system per section 12.2. If the hoses have not been disassembled, the system may not need to be bled. Check function per daily check section.

8. If necessary adjust position of lever (see below) on master cylinder to give full stroke of lever. Secure lever adjustment screw with set screw. Ensure there is no interference in any combination of control movements.

Figure 25.17.7 Lever Adjustment



25.17 Component Re-installation continued

Load Weigh Indicator Re-installation

The load weigh indicator can be installed within the instrument panel or on the right hand forward door pillar using mounting bracket provided with the load weigh kit.

1. Place the Load Weigh Indicator into the mounting bracket on the RH forward door pillar and secure with four screws (P/N 510-637-00).
2. Install the Outer Cover (P/N 235-198-00) over the indicator with three screws (P/N 510-640-00).
3. Connect the electrical connector on the wiring harness to the connector on the back of the indicator.

25.17 Component Re-installation continued

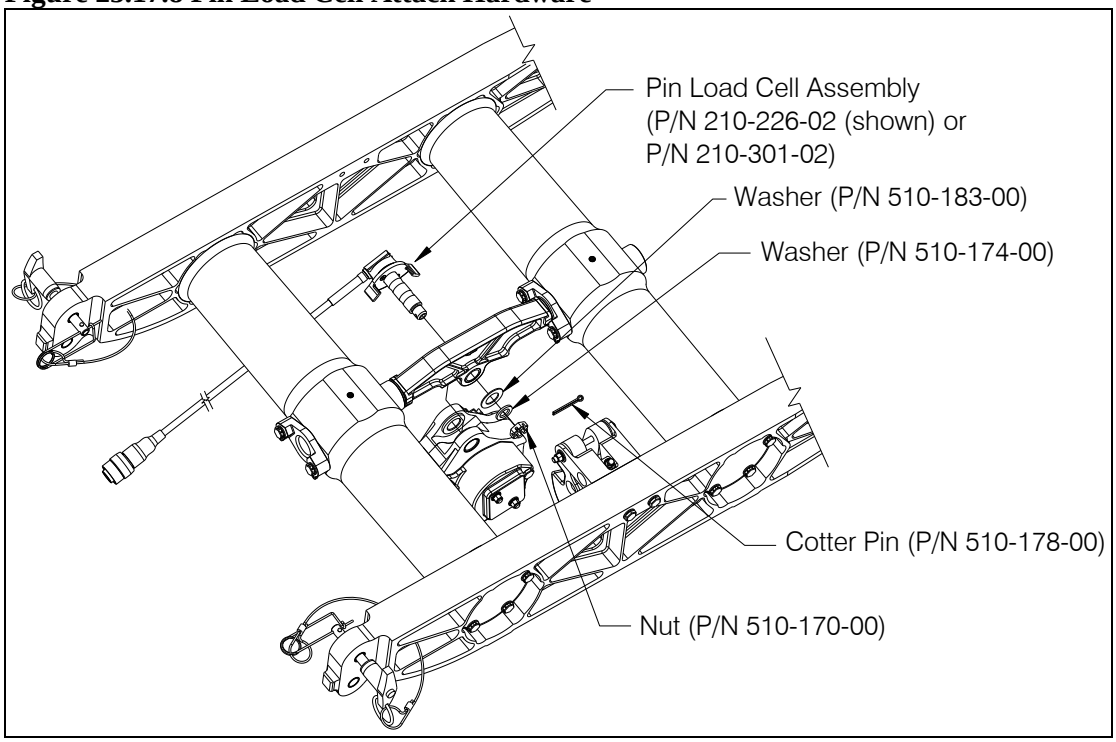
Pin Load Cell Re-installation

1. Attach the load cell assembly to the trunnion on the suspension frame with hardware as illustrated in Figure 25.17.8. Tighten nut on pin load cell 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 (P/N 510-178-00).

CAUTION

Do not tighten nut on pin load cell more than finger tight. Over-tightening will damage load cell.

Figure 25.17.8 Pin Load Cell Attach Hardware



2. Route the load cell harness with the slave cylinder hydraulic hose up to the first loop clamp on the frame and then route with hydraulic hose and electrical release harness.
3. Secure the load cell harness along with the hydraulic hose and electrical release harness at two locations (reference Figure 25.17.4) along the suspension frame with loop clamps.
4. Ensure load cell harness does not pull or get pinched at any point throughout the full range of motion of the cargo hook.

25.17 Component Re-installation continued

Electrical Module Assembly Re-installation

The electrical module assembly includes the cargo hook's electrical release system relays, junction modules, and grounding provisions and is installed underneath the pilot's seat.

Install it using three screws (P/N 510-391-00) and washers (P/N 510-419-00) locating the bonding jumper (P/N 410-293-00) under the lower screw and washer. Tighten screws to 20-25 in-lbs.

25.18 General Procedural Instructions-Testing

After re-installation of the cargo hook and/or release system components, perform the following:

1. Activate the electrical system and press the Cargo Hook release button to ensure the cargo hook electrical release is operating correctly. The Cargo Hook must release. Reset the hook by hand after the release. If the hook does not release or re-latch, do not use the unit until the difficulty is resolved.

   CAUTION

   The cargo hook solenoid is intended to be energized only intermittently. Depressing the electrical release button continuously in excess of 20 seconds will cause the release solenoid to overheat, possibly causing permanent damage.

2. Activate the hydraulic release system by pulling the release lever on the collective in the cockpit. The mechanism should operate smoothly and the cargo hook must release. Return the load beam to its closed and locked position by hand after release. Verify that the hook lock indicator on the side of the hook returns to the fully locked position. In the fully locked position the hook lock indicator should align with the lines on the manual release cover (see Figure 5.1). If the hook does not release or re-latch, do not use the unit until the problem is resolved.

3. Swing the installed Cargo Hook to ensure that the hydraulic release hose and the electrical harnesses have enough slack to prevent straining or damaging them. The hose and harnesses must not be the stops that prevent the Cargo Hook from swinging freely in all directions.