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Instructions for Continued Airworthiness

Talon LC Hydraulic Cargo Hook
Sling Suspension System
For the
Airbus Helicopters AS350 Series

System Part Numbers 200-282-01, 200-282-02

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Record of Revisions

Revision	*Date*	*Page(s)*	*Reason for Revision*
0	06/20/08	All	First Issue
1	03/18/10	05-00-00 Page 9	Changed overhaul frequency criteria.
2	12/16/11	i-viii 00-00-00 Page 2 05-00-00 Page 1, 9 12-00-00 Page 3-8 25-00-00 Page 16-17, 21	Changed Cup Seal P/N 556-038-00 to Quad Ring P/N 556-097-00 on Slave Cylinder Assembly. Updated precaution sections to current standards throughout manual.
3	02/04/13	05-00-00 pages 3, 5, 6, 9 25-00-00 page 6, 7, 9, 14	Added load cell P/N 210-203-03, updated definition of external load operations, updated electrical schematic, corrected P/N error on page 9 of section 25.
4	09/13/17	Section 4, Section 5, Section 12 pages 1 and 5, Section 25 pages 2 and 3	Updated Inspection section including removing daily check, expanding 100 hour inspection and updating NDT list. Added MIL-PRF-87257 hydraulic fluid. Added references to CMM 122-015-00 for storage and to troubleshooting table.
5	03/06/18	Section 5 page 6, 7	Removed magnetic particle inspection requirement for load cell assembly, inserted instructions to return load cell to factory for inspection/calibration. Updated inspection table. Revised attach bolt diameter limit to .495” to standardize with cargo hook CMMs.

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Section 0
Introduction

0.4 Scope

The following information is necessary to carry out the service, maintenance, and inspection of the Cargo Hook Sling Suspension System P/N 200-282-01 and 200-282-02.

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 200-282-01 and 200-282-02 Cargo Hook Sling Suspension System.

0.6 Arrangement

This manual contains instructions for the service, maintenance, inspection and operation of the Cargo Hook Sling Suspension System P/N 200-282-01 and 200-282-02 on Airbus Helicopters AS350 series helicopters. The manual is arranged in the general order that maintenance personnel would use to install, maintain and operate the Cargo Hook Sling Suspension System 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 Sling Suspension System P/N 200-282-01 and 200-282-02 (with Cargo Hook P/N 528-028-00) for the Airbus Helicopters AS350 series helicopters. Refer to the appropriate Airbus Helicopters maintenance documentation for instructions regarding parts of the aircraft that interface with these systems.

0.9 Abbreviations

FAA Federal Aviation Administration
FAR Federal Aviation Regulation
ICA Instructions for Continued Airworthiness

0.12 Precautions

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 Int'l web site at www.onboardsystems.com. Current revisions of all manuals are available from the factory.

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.

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Section 5
Inspection and Overhaul Schedule

5.1 Cargo Hook Sling 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 and suspension per the following.

NOTICE

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

1. Activate the electrical system and press the Cargo Release button to ensure the cargo hook electrical release system is operating correctly. The cargo hook must release. Reset the hook by hand after release.

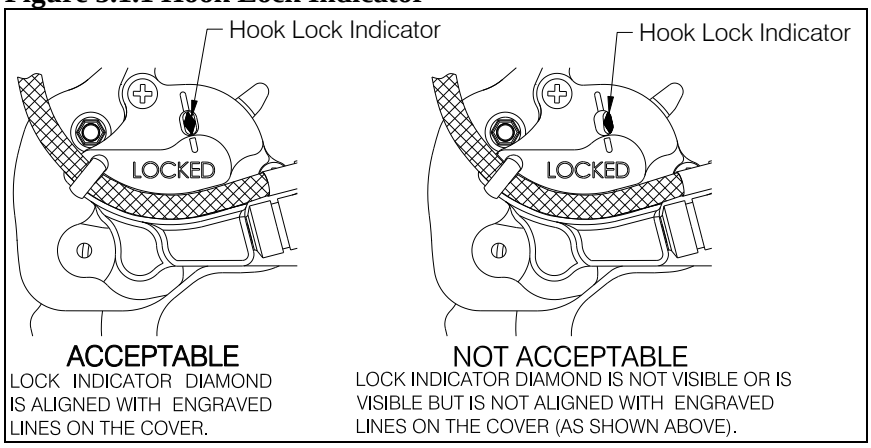
CAUTION

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 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 cover (see Figure 5.1.1).

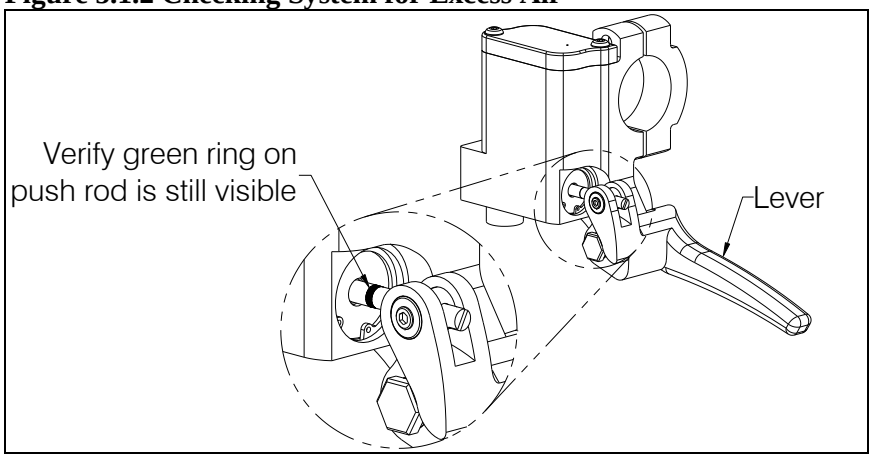
5.1 Cargo Hook Sling Suspension System Inspection continued

Figure 5.1.1 Hook Lock Indicator



3. Swing the cargo hook and the suspension system throughout their full ranges of motion to ensure the hydraulic hose and electrical harnesses have enough slack and are not kinked or pinched in any possible cargo hook or suspension location. The hose and harnesses must not be the stops that prevent the cargo hook or suspension from swinging freely in all directions.
4. Visually check for presence and security of fasteners and electrical connections.
5. 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 hook must not be used until the condition is repaired. See troubleshooting section to determine the course of action.
6. Check the fluid level in the master cylinder with the collective against the lower stop. 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).
7. Check the hydraulic release system for air by pulling the lever firmly until it bottoms out. Check the push rod position (see Figure 5.1.2). 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 instructions.

Figure 5.1.2 Checking System for Excess Air



5.1 Cargo Hook Sling Suspension System Inspection continued

8. Visually inspect the hydraulic hose and its connection to the cargo hook for damage and security.
9. Visually inspect the cargo hook bumper for damage.
10. Visually inspect for security of C-39 indicator mounting.

5.1 Cargo Hook Sling Suspension System Inspection continued

Every 5 years or 1000 hours of external load operations, whichever comes first, perform the following.

Remove the suspension assembly from the helicopter (see section 25.17), disassemble, and inspect the component parts per the following instructions.

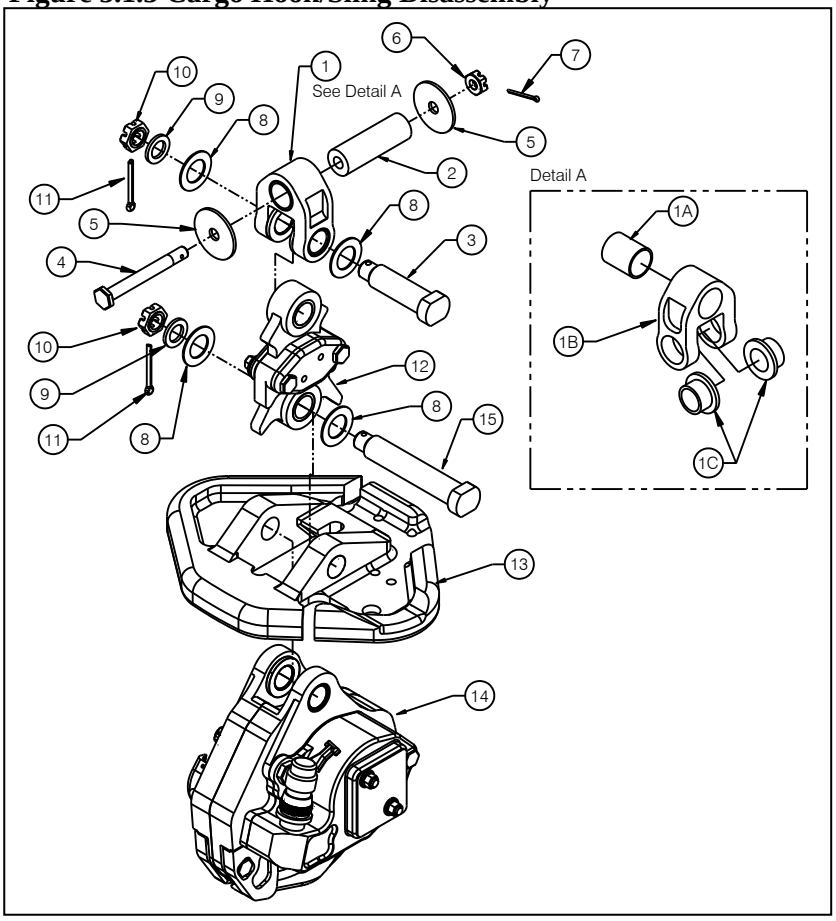
Remove the Gimbal Assembly (item 1) from the helicopter hard point (not shown below) by removing the cotter pin (item 7), nut (item 6) washers (item 5), and bolt (item 4) and sliding out the shaft (item 2).

Remove the Load Cell Assembly (item 12) from the Gimbal Assembly (item 1) by removing the cotter pin (item 11), nut (item 10), washer (item 9), and washer (item 8) from the Attach Bolt (item 3).

Separate the Cargo Hook (item 14) and Bumper (item 13) from the Load Cell Assembly by removing the cotter pin (item 11), nut (item 10), washer (item 9), and washer (item 8) from the Attach Bolt (item 15).

Cut ty-wraps that secure the electrical harness and hydraulic hose (not shown below) to the bumper and pull the bumper off the cargo hook.

Figure 5.1.3 Cargo Hook/Sling Disassembly



5.1 Cargo Hook Sling Suspension System Inspection continued

Table 5.1.1 Cargo Hook/Sling Assembly Parts

ITEM	PART NO.	DESCRIPTION	QTY
1	232-144-00	Sling Gimbal Assembly	1
1A	517-051-00	Bushing	1
1B	290-767-00	Gimbal	1
1C	290-294-00	Flange Bushing	2
2	290-766-00	Shaft	1
3	290-332-00	Attach Bolt	1
4	510-451-00	Bolt	1
5	510-336-00	Washer	2
6	510-259-00	Nut	1
7	510-081-00	Cotter Pin	1
8	510-183-00	Washer	4
9	510-174-00	Washer	2
10	510-170-00	Nut	2
11	510-178-00	Cotter Pin	2
12	210-203-03*	Load Cell Assembly	1
13	291-138-00	Bumper	1
14	528-028-00	Cargo Hook	1
15	290-775-00	Long Attach Bolt	1

*Optional P/N 210-203-01.

5.1 Cargo Hook Sling Suspension System Inspection continued

Return the Load Cell Assembly (P/N 210-203-01 or 210-203-03) 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 5.1.2. Inspect the parts in a clean, well-lit room.

Table 5.1.2 Suspension System Inspection Criteria

Component	Damage Permitted without Repair	Repair	Maximum Damage which Causes Replacement
Gimbal P/N 290-767-00 (item 1B, Figure 5.1.3)	Dents, gouges, and scratches less than .010" deep.	Blend at 20:1 ratio, length to depth, to provide smooth transitions.	Dents, gouges, and scratches greater than .030" deep. Cracks
Load Cell Assembly P/N 210-203-01 or 210-203-03 (item 12, Figure 5.1.3)	Dents, gouges, and scratches less than .010" deep in the structural link. Dents, gouges, and scratches less than .020" deep in the covers.	Blend at 20:1 ratio, length to depth, to provide smooth transitions.	Dents, gouges, and scratches greater than .030" deep in the structural link. Dents, gouges, and scratches greater than .030" deep in the structural link.
Bushing P/N 517-051-00 (item 1A, Figure 5.1.3)	This bushing has a Teflon type film overlaid on a layer of sintered copper on one side. Teflon film still covers more than 50% of the bushing wear area.	None.	If copper is visible over more than 50% of the bushing wear area, remove and replace the bushing.
Bushing P/N 290-294-00 (item 1C, Figure 5.1.3)	Wear on inside diameter, diameter less than .520".	None.	Wear on inside diameter, diameter greater than .520".

5.1 Cargo Hook Sling Suspension System Inspection continued

Table 5.1.2 Suspension System Inspection Criteria continued

Component	Damage Permitted without Repair	Repair	Maximum Damage which Causes Replacement
Attach Bolt P/N 290-332-00 (item 3, Figure 5.1.3)	Wear on outside diameter, diameter at or greater than .495”.	None.	Wear on outside diameter, diameter less than .495”. Cracks.
Attach Bolt (long) P/N 290-775-00 (item 15, Figure 5.1.3)	Wear on outside diameter, diameter at or greater than .495”.	None.	Wear on outside diameter, diameter less than .495”. Cracks.
Bumper P/N 291-138-00 (item 12, Figure 5.1.3)	Dents, gouges, and scratches less than .060” deep.	None	Dents, gouges, and scratches greater than .060”.
Threaded fasteners	N/A	It is recommended to replace all threaded fasteners at overhaul.	Wear, corrosion or deterioration.

5.1 Cargo Hook Sling Suspension System Inspection continued

Suspension Re-assembly after Inspection

Re-assemble the suspension per the following (refer to Figures 5.2.1).

1. Insert Attach Bolt (item 15) through washer (item 8), Bumper (item 13), cargo hook (item 14), Load Cell (item 12), washer (item 8), washer (item 9), nut (item 10), and cotter pin (item 11). Tighten the nut to finger tight, rotate to next castellation and insert and secure cotter pin.
2. Attach the Load Cell to the Gimbal Assembly (item 1) with Attach Bolt (item 3), washers (items 8 and 9), and nut (item 10). Tighten the nut to finger tight, rotate to next castellation and insert and secure cotter pin.
3. Install the suspension system onto the aircraft per section 25.17.

5.2 Cargo Hook Overhaul Schedule

Overhaul the cargo hook in accordance with the guidelines below. Contact Onboard Systems for the latest revision of overhaul instructions for the cargo hook and guidance to locate authorized overhaul facilities.

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.*

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Section 11
Placards and Markings
11.1 Placards

The 200-282-01 and 200-282-02 Cargo Hook Sling Suspension System 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 215-167-00 MAX. HOOK LOAD 1660 LBS. 750 KGS.	Located on the belly of the aircraft near the cargo hook suspension in clear view of the ground support personnel.
 (text is engraved on manual release lever shown)	Located on the release lever of the hydraulic release master cylinder assembly. Master cylinder assembly is located on the collective.

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Section 12
Servicing

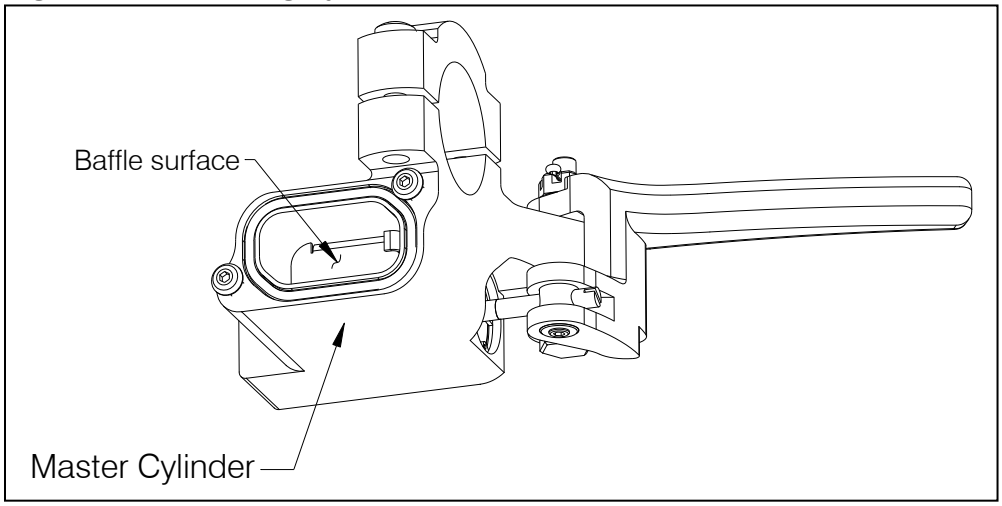
12.1 Maintenance of the Hydraulic Release System

The system is filled with hydraulic 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 must be visible over the baffle surface (see Figure 12.1).
3. Remove lid and add MIL-PRF-87257 (optional: MIL-PRF-5606) 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.

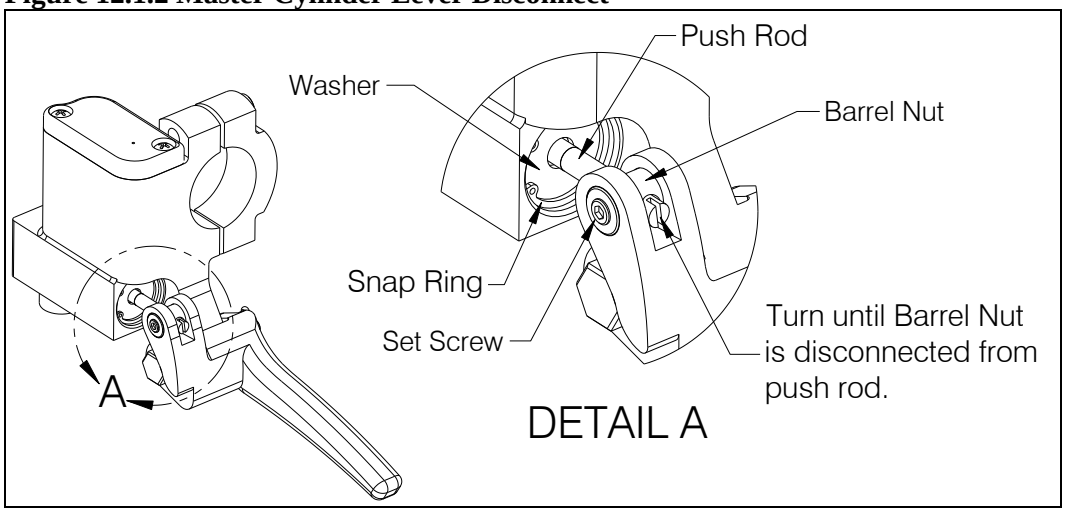
Disassembly:

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

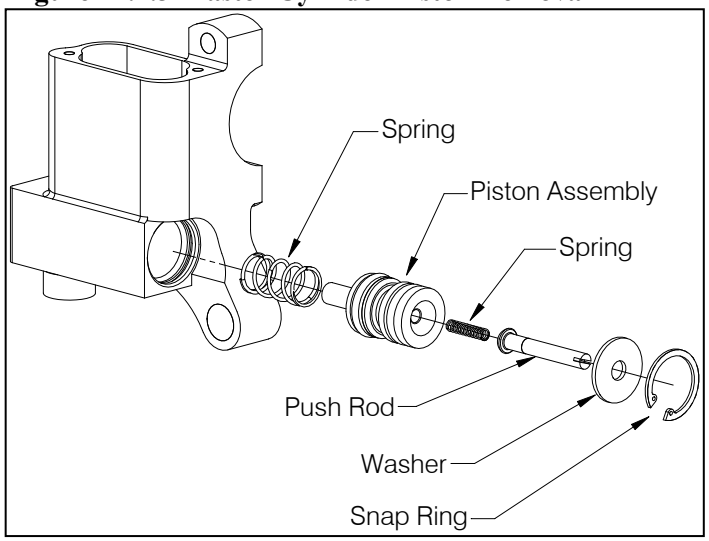
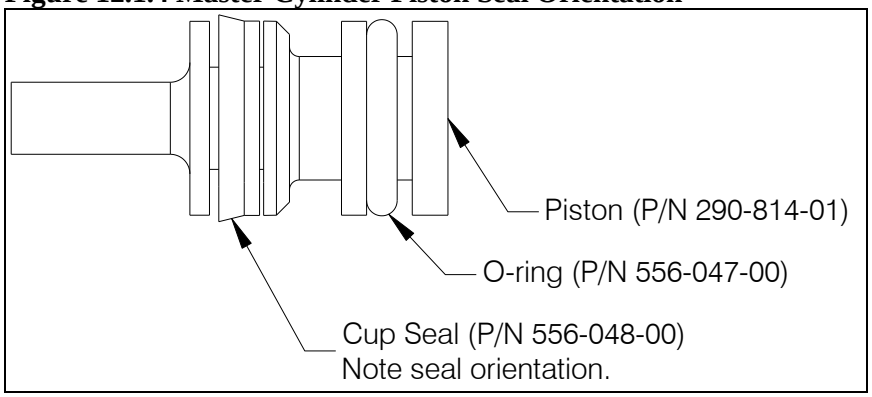


Figure 12.1.4 Master Cylinder Piston Seal Orientation



Slave Cylinder Repair

If the slave cylinder is leaking 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).

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.

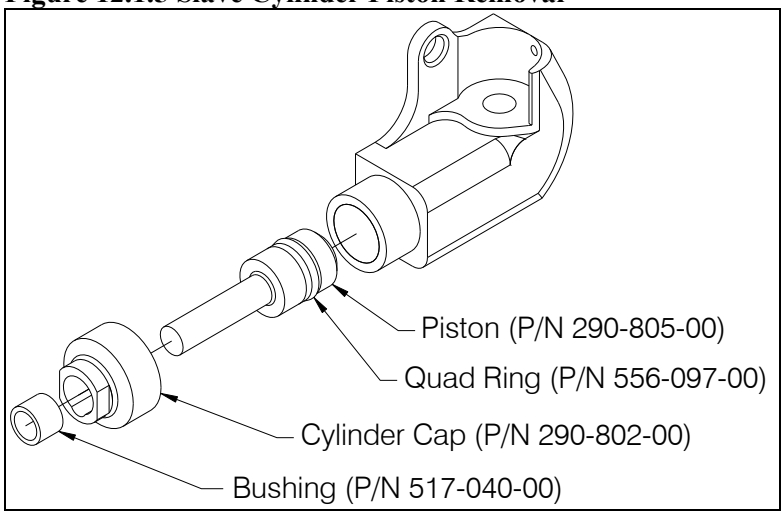
Re-assembly:

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 inch-pounds.

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 hook kits. Assemble the bleed kit by press fitting each component together.

NOTICE

MIL-PRF-5606 fluid is also compatible with the hydraulic system and was formerly included with new cargo hook kits. It is interchangeable and miscible with MIL-PRF-87257 fluid.

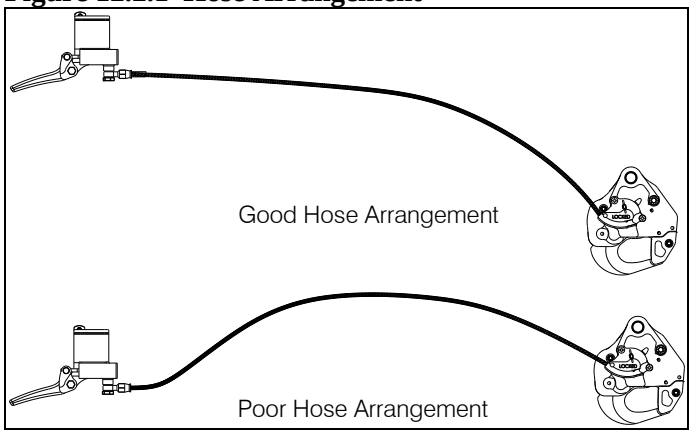
2. If the system is already installed on the aircraft, place an absorbent towel under the master cylinder. If the master cylinder is not installed on the aircraft, lightly clamp the master cylinder in a vise to hold it in a vertical position and position the slave cylinder so that its level is below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

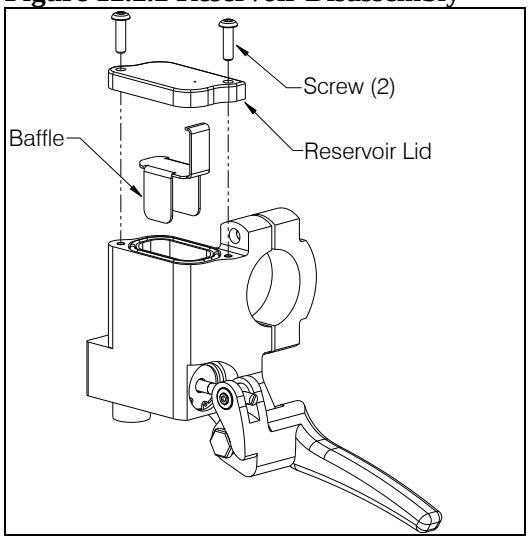
Figure 12.2.1 Hose Arrangement



12.2 Bleeding Hydraulic System, continued

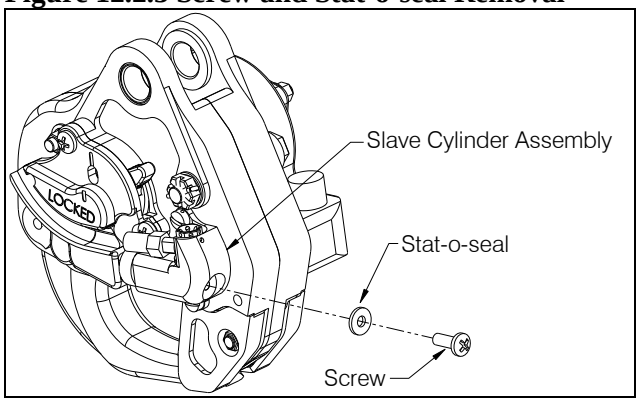
4. Remove screws, reservoir lid, and baffle from the master cylinder reservoir as shown in Figure 12.2.2.

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.

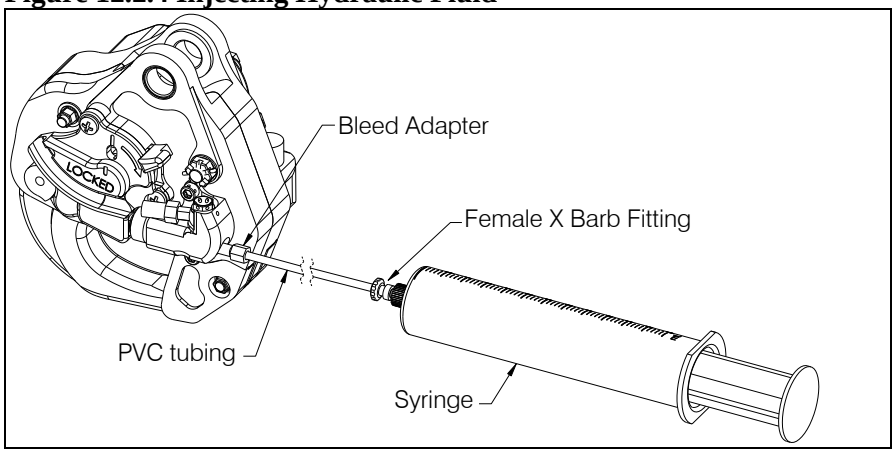
7. While observing the reservoir, **slowly** push on the syringe plunger to force fluid through the slave cylinder, hydraulic hose, and up to the master cylinder reservoir. There will be some resistance during filling—this is normal.

⚠ 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



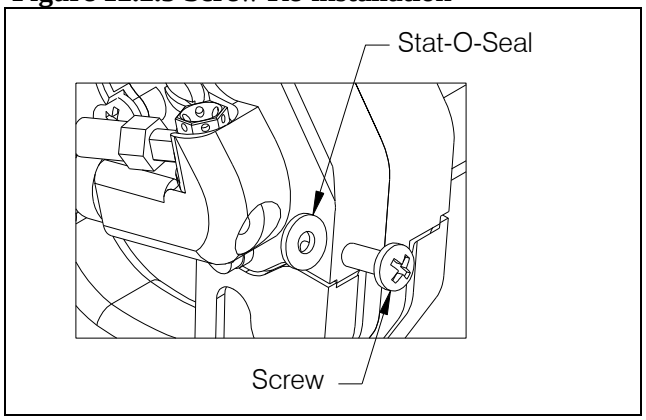
8. Continue to force fluid into the master cylinder reservoir until the reservoir is approximately half full.

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 510-493-00), see Figure 12.2.5.

Figure 12.2.5 Screw Re-installation



10. Allow the system to rest for several minutes. This will allow any air to rise through the system.

12.2 Bleeding Hydraulic System, continued

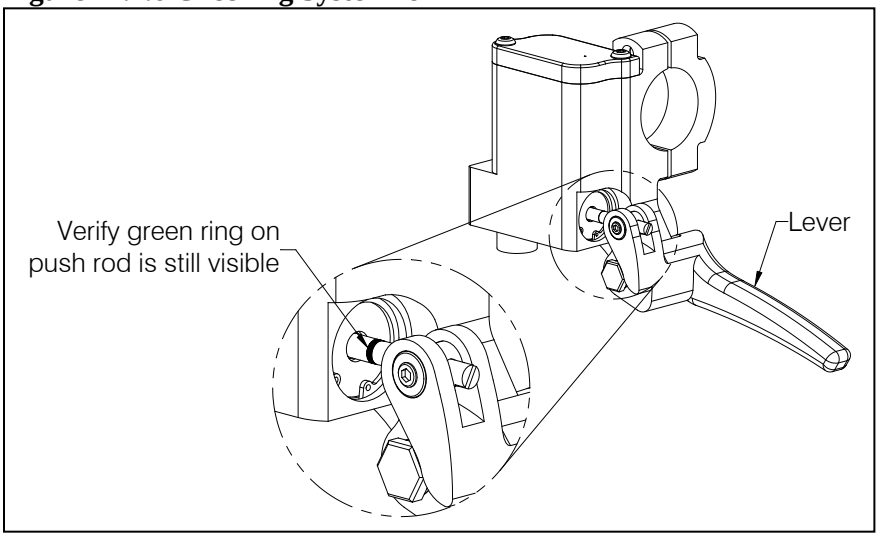
11. Very **slowly** pull the release lever on the master cylinder and watch for bubbles. If bubbles are observed rising within the reservoir, continue to cycle the lever until there are no more. Actuating the lever releases trapped air in the system.

⚠ 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 12.2.6). 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.

Figure 12.2.6 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.

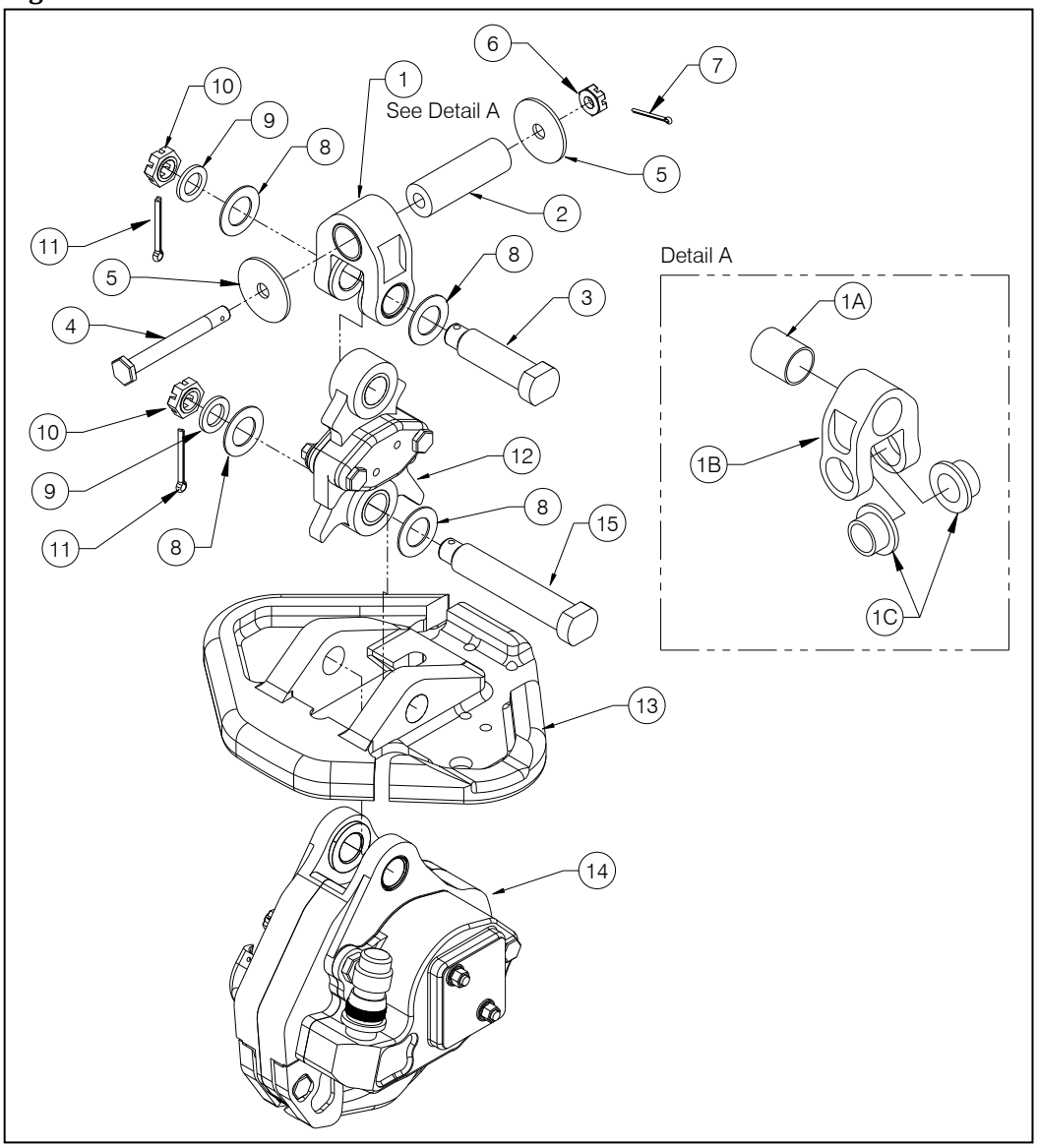
12.3 Lubrication Information

Lubrication of Cargo Hook Sling 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 Sling Suspension system approximately every 250 hours.

Lubricate the Cargo Hook Sling Suspension at points noted in Figure 12.3.1. Recommended lubricants are AeroShell 17, MIL-G-21164 or Mobilgrease 28, MIL-G-81322.

For re-assembly after lubrication, tighten castellated nuts to finger tight, then rotate to next castellation to install and secure cotter pins.

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. The cargo hook is polarity sensitive due to an arc suppressing diode internally mounted.

Table 25.1.1 Cargo Hook Connector

Pin	*Function*
A	Ground
B	Power

25.2 Description

The Cargo Hook Sling Suspension System consists of four primary subsystems, these are the Sling Suspension Assembly, Hydraulic Release System, Electrical Release System, and Load Weighing System.

The Sling Suspension supports the cargo hook and is attached to the center hard point on the forward fuel tank support. It consists of a gimbal, which is attached to the hard points and a load cell, which also serves as the connecting link between the gimbal and cargo hook.

The Electrical Release System provides a means to release a cargo hook load through the use of a switch in the cockpit.

The Hydraulic Release System provides an additional means to release a cargo hook load and consists of a release lever mounted on the collective, a hose routed from the release lever to the hook, and a piston at the hook that actuates the internal release mechanism when the lever is pulled.

The Load Weigh System consists of an indicator mounted within the cockpit, the load cell on the suspension, and associated wiring.

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
Removable Provisions*	6.0 lbs (2.7 kg)	124.4 in (3160 mm)
Fixed Provisions**	5.5 lbs (2.5 kg)	67 in (1700 mm)
Total	11.5 lbs (5.2 kg)	97.0 in (2464 mm)

***** The removable provisions include the sling 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.

Refer to the Component Maintenance Manual (CMM) 122-015-00 for Cargo Hook storage instructions.

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 Airbus Helicopters maintenance documentation for guidance on procedures relating to Airbus Helicopters 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 CMM 122-015-00.
Cargo hook does not operate electrically, manual hydraulic release operates normally.	Open electrical circuit, faulty wiring, circuit breaker, switch 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).
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. Bleed hydraulic system per this manual. Remove slave cylinder from hook and check for proper operation while actuating manual release lever. 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 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 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.
Cargo hook fails to open or re-lock properly.	Failure to open or re-lock properly.	Remove and replace cargo hook (see Sections 25.16 and 25.17) 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 2). Check solenoid resistance (see note 1), repair or replace defective parts.

25.15 Troubleshooting continued

Table 25.15.1 Troubleshooting continued

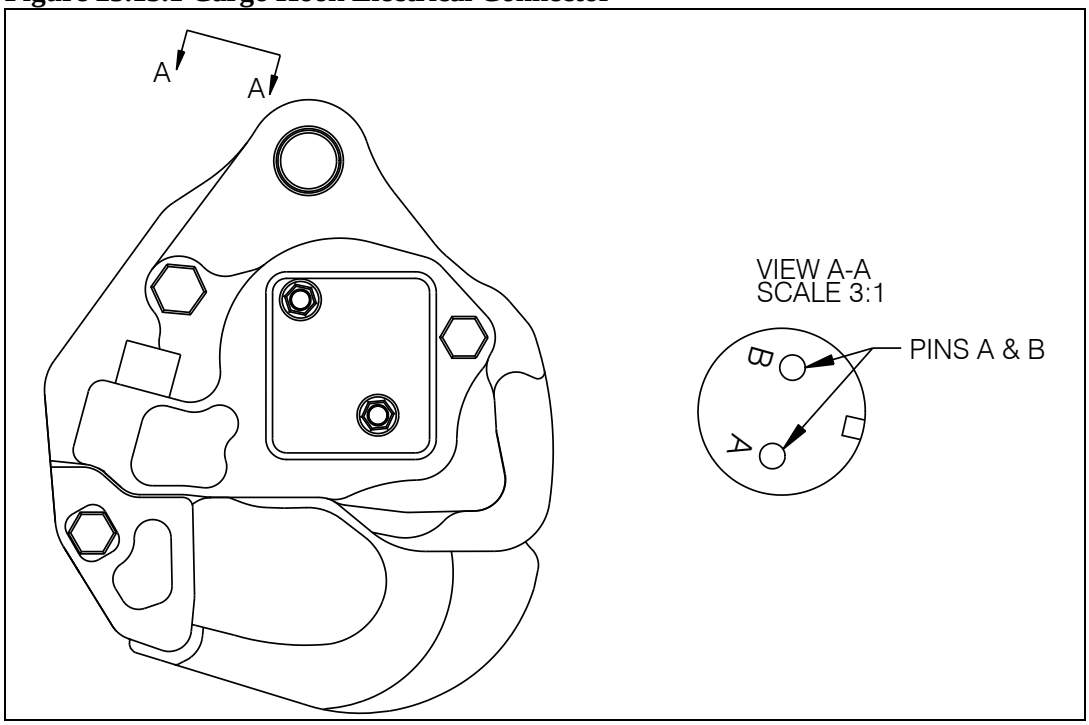
Load Weigh Indicator does not light up.	Faulty wiring or circuit breaker.	Check the circuit breaker and wiring (see Note 2). If this doesn't help, remove and replace indicator per sections 25.16 and 25.17.
The displayed load on the Load Weigh Indicator is incorrect.	Incorrect calibration code.	Ensure 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



25.15 Troubleshooting continued

Table 25.3 Notes continued:

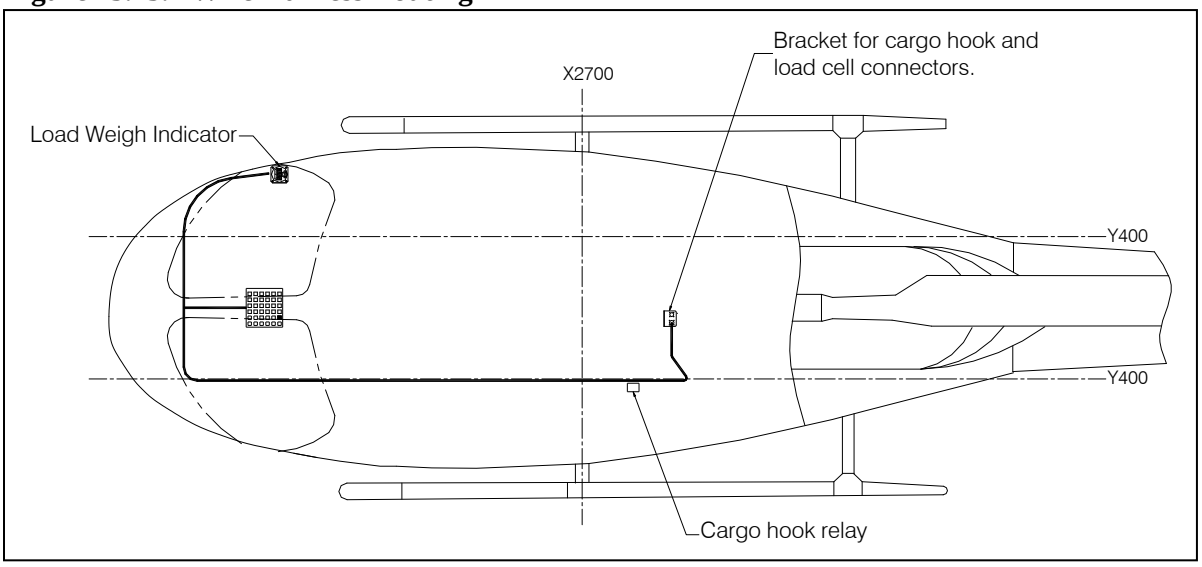
2. Checking Wire Harnesses.

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

- "EXT. PWR. BAT." push-button is released.
- External power connector is not supplied
- Further precaution: remove the circuit breaker(s) from the corresponding circuits (refer to Figure 25.15.3)

The wire harnesses are routed with and secured to existing wire bundles and are located approximately as shown below. Remove lower fairings to inspect wiring underneath the cabin floor. Inspect for general condition and chafing along length of wire runs. See Figure 25.15.3 for electrical schematic.

Figure 25.15.2 Wire Harness Routing



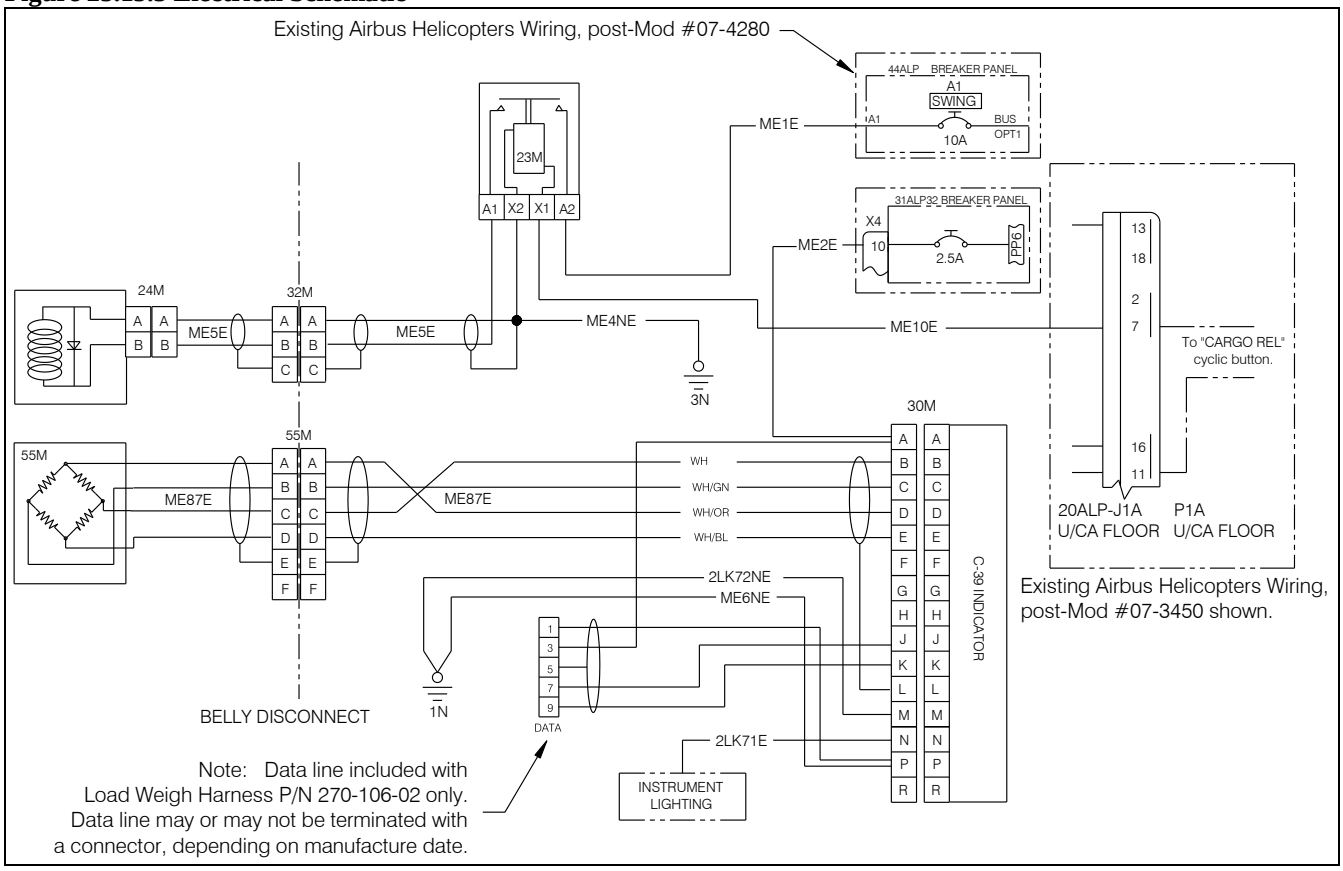
25.15 Troubleshooting continued

Table 25.3 Notes continued:

2. Checking Wire Harnesses continued

Refer to Section 25.80 of 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 25.15.3 Electrical Schematic

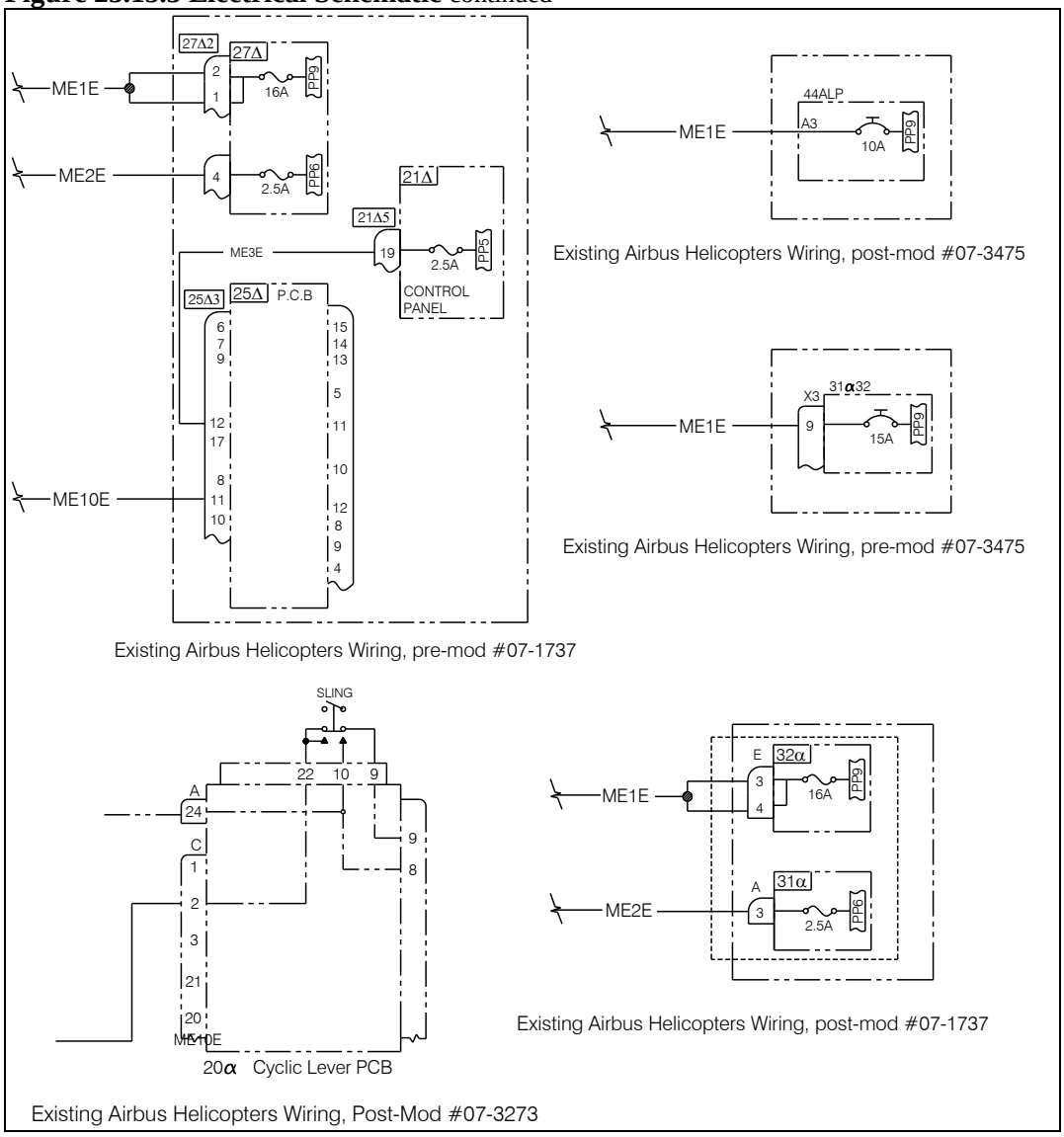


25.15 Troubleshooting continued

Table 25.3 Notes continued

2. Checking Wire Harnesses continued

Figure 25.15.3 Electrical Schematic continued



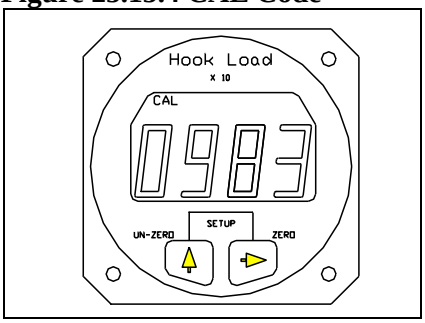
25.15 Troubleshooting continued

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 25.15.4 CAL Code

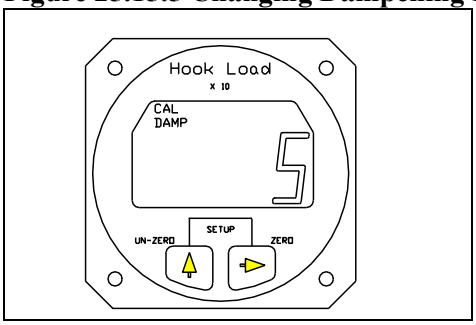


This code should match the code printed on the tag attached to the load cell cable. If this code does not match, contact Onboard Systems for further guidance.

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 25.15.5 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

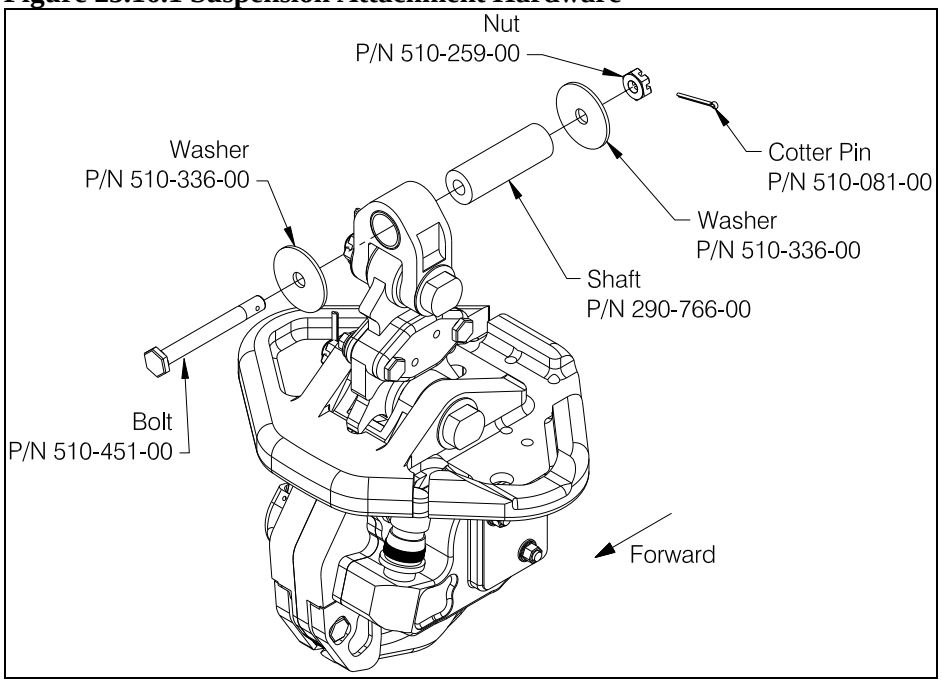
Cargo Hook Removal

1. Disconnect the hydraulic hose, electrical release connector, and ground strap at the bracket at the belly of the helicopter.
2. Remove the cotter pin (P/N 510-178-00) from the attach bolt (P/N 290-775-00) (refer to Figure 25.17.7).
3. Remove the castellated nut (P/N 510-170-00) from the attach bolt.
4. Remove the attach bolt and all washers.
5. Remove the cargo hook from suspension system.
6. Remove the slave cylinder assembly by removing two screws (refer to Figure 25.16.2) and associated ty-wraps.
7. Remove the electrical release harness, and ground strap from the Cargo Hook and associated ty-wraps at the bumper.
8. Remove the bumper (P/N 291-138-00) from the cargo hook.

Suspension System Removal

1. Disconnect the load cell harness connector, electrical release harness connector, ground strap, and hydraulic hose at their respective connections at the belly of the aircraft.
2. Remove the cotter pin (P/N 510-178-00) from the bolt (P/N 510-451-00).
3. Remove the castellated nut (P/N 510-259-00) from the bolt.
4. Remove the bolt and all washers.
5. Remove Shaft (P/N 290-766-00) and remove suspension from aircraft.

Figure 25.16.1 Suspension Attachment Hardware

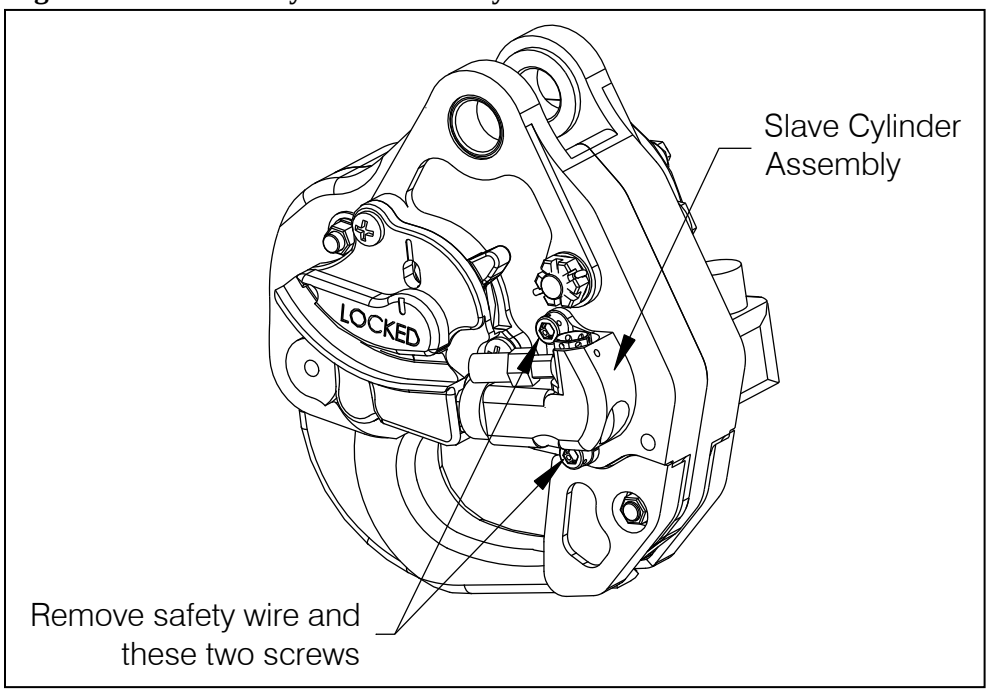


25.16 Component Removal continued

Slave Cylinder Assembly Removal

1. Disconnect the hose at the quick disconnect coupling at the belly of the helicopter.
2. Cut the safety wire and remove the two screws that hold the slave cylinder assembly to the cargo hook. Remove all ty-wraps that secure the hydraulic hose to the cargo hook and the bumper.

Figure 25.16.2 Slave Cylinder Assembly Removal

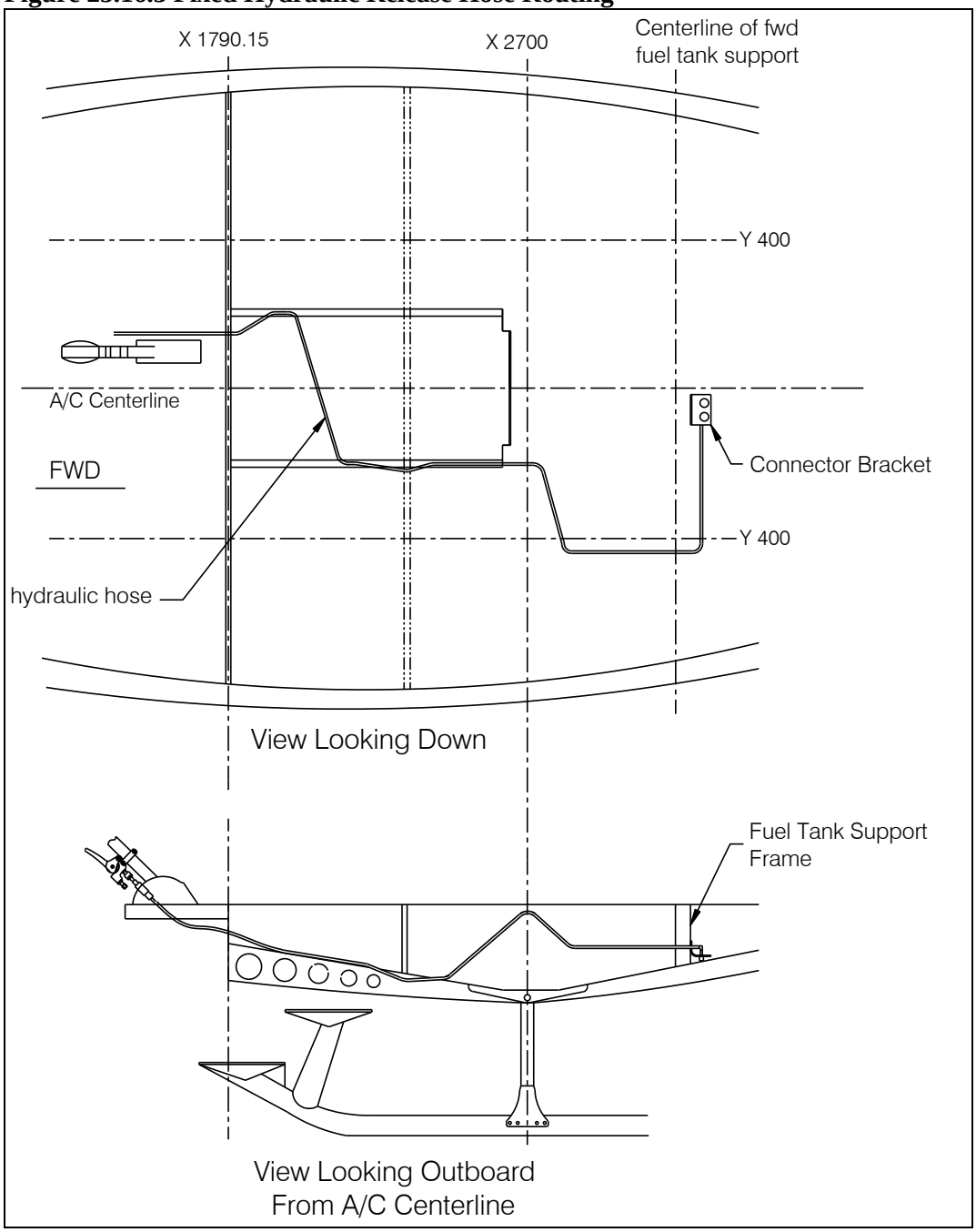


25.16 Component Removal continued

Fixed Hydraulic Release Hose Assembly Removal

The fixed hydraulic release hose is routed from the release lever mounted to the collective shaft, to underneath the cabin floor where it is routed with existing wire harnesses back to the connector bracket on the forward fuel tank support of the helicopter where it is mated with the removable section of the hydraulic release system.

Figure 25.16.3 Fixed Hydraulic Release Hose Routing

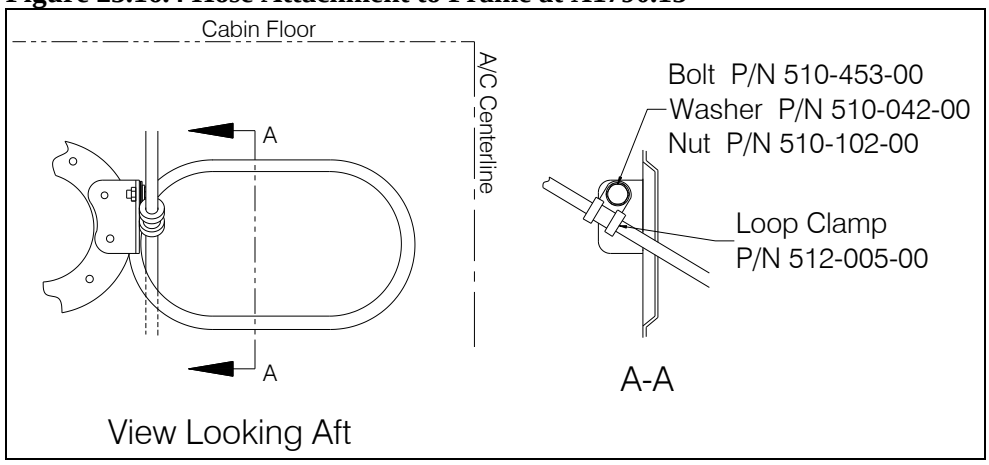


25.16 Component Removal continued

Fixed Hydraulic Release Hose Assembly Removal continued

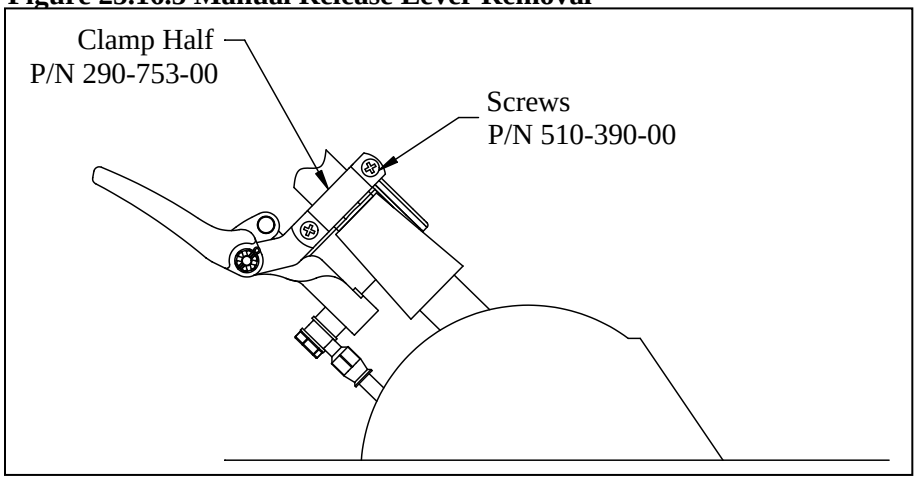
1. Remove the quick disconnect coupling from the connector bracket that is attached to the fuel tank support frame.
2. Moving farther forward, remove all ty-wraps on the hose and remove the loop clamp at the bracket at frame at STA 1790.15.

Figure 25.16.4 Hose Attachment to Frame at X1790.15



3. Feed the hose forward and then up through the slot in the floor.
4. Above the floor and on the collective remove the release lever by removing two screws (see below).

Figure 25.16.5 Manual Release Lever Removal



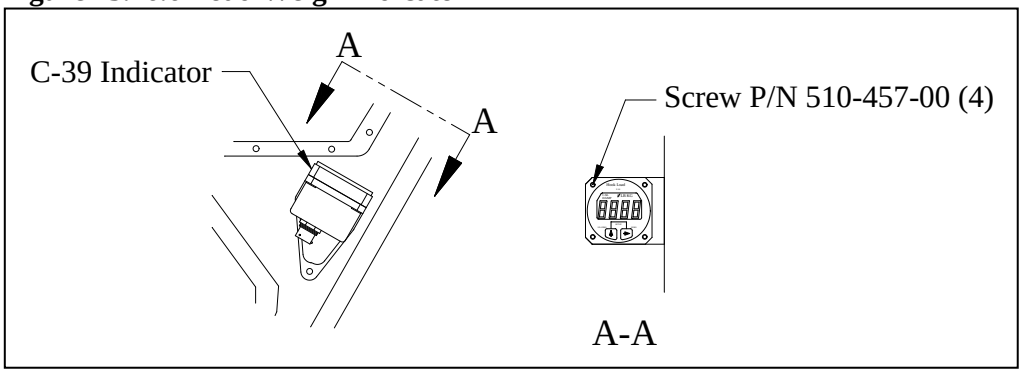
25.16 Component Removal continued

Load Weigh Indicator Removal

The load weigh indicator is located on the RH forward door pillar.

1. Disconnect electrical connector from the back of indicator.
2. Remove the four screws (P/N 510-457-00) that secure the indicator to the mounting bracket and remove the indicator.

Figure 25.16.6 Load Weigh Indicator

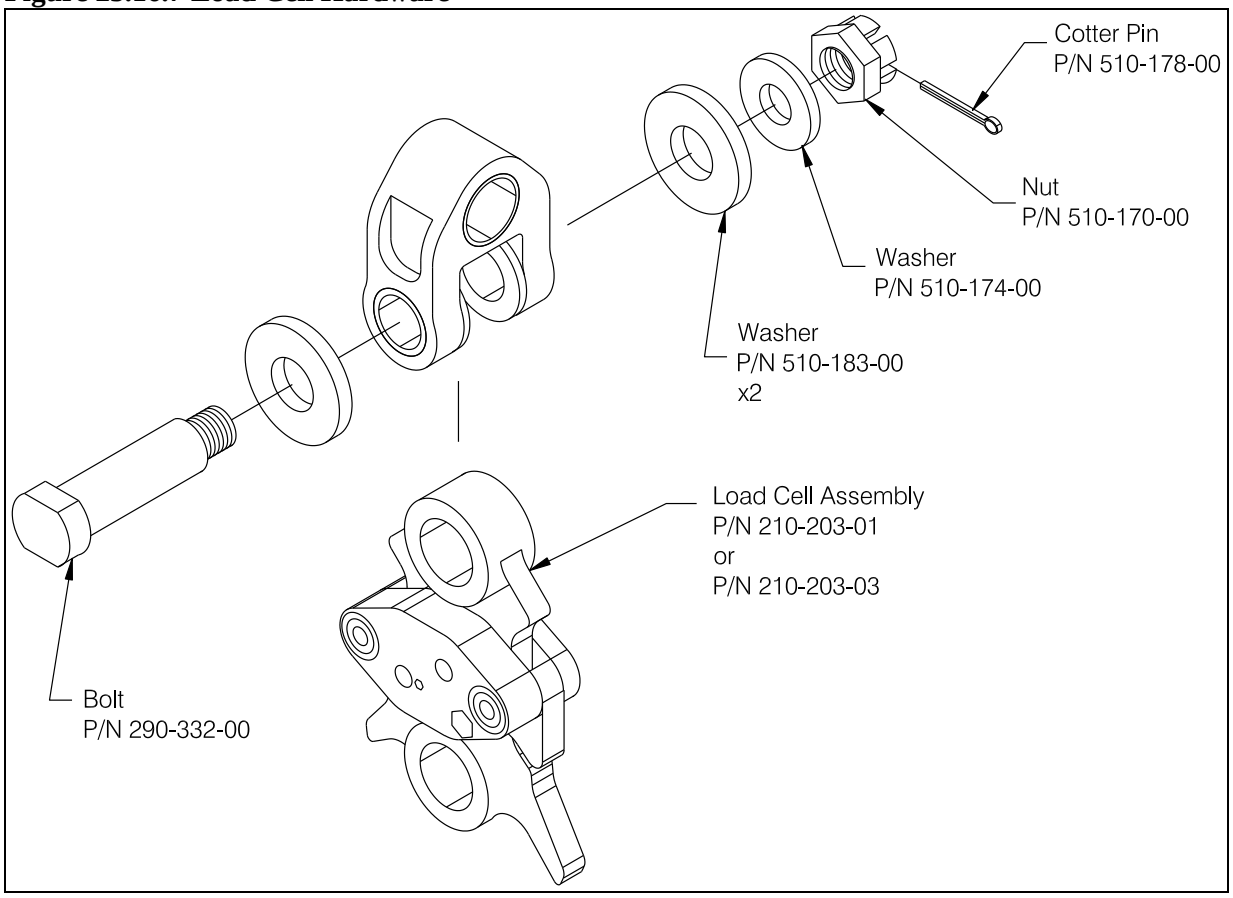


25.16 Component Removal continued

Load Cell Removal

1. Remove the Cargo Hook per the above instructions.
2. Disconnect the electrical connector at the belly of the helicopter.
3. Remove the Load Cell Assembly from the gimbal on the hard point (not shown) by removing the hardware as illustrated in Figure 25.16.7.

Figure 25.16.7 Load Cell Hardware

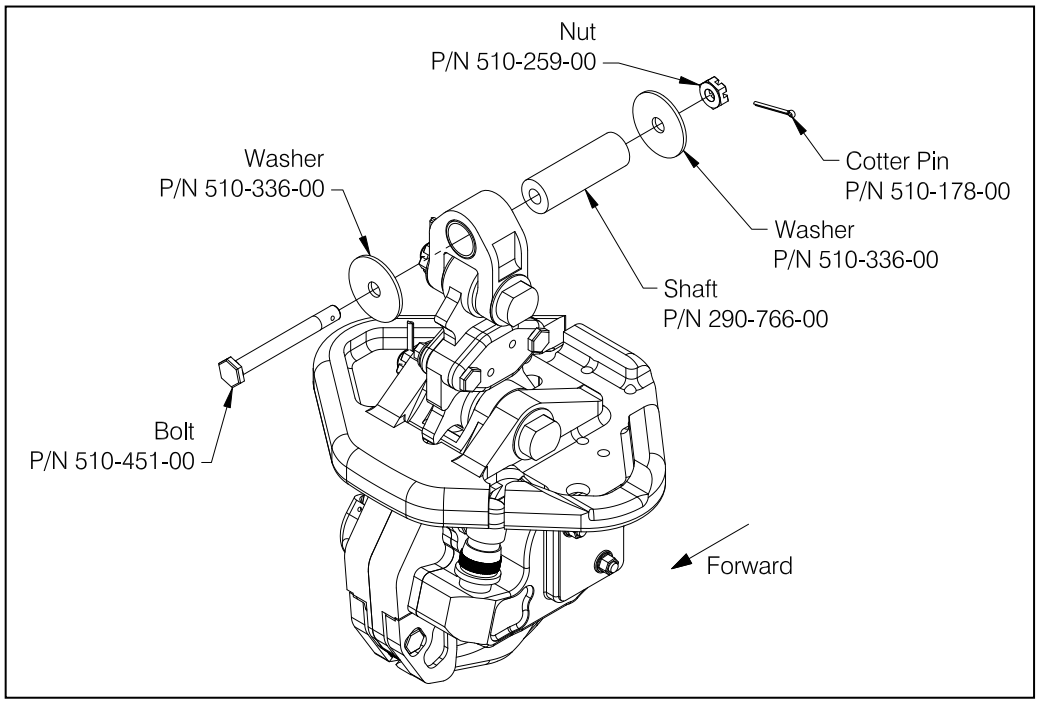


25.17 Component Re-installation

Suspension Re-installation

1. Inspect the Suspension for evidence of damage, corrosion, freedom of rotation at all pivot points, and security of fasteners. If damage is evident, do not use the items until they are repaired.
2. Attach the suspension to the center hard point at the forward fuel tank support with hardware as shown in Figure 25.17.1. The cargo hook load beam must point forward.
3. Connect the load cell harness connector to the bulkhead connector at the belly of the aircraft.
4. Connect the electrical release harness connector to the bulkhead connector at the belly of the aircraft.
5. Connect the ground strap attached to the cargo hook to the ground strap attached to the aircraft.
6. Connect the hydraulic release hose to the quick disconnect coupling at the belly of the aircraft.

Figure 25.17.1 Suspension Attachment

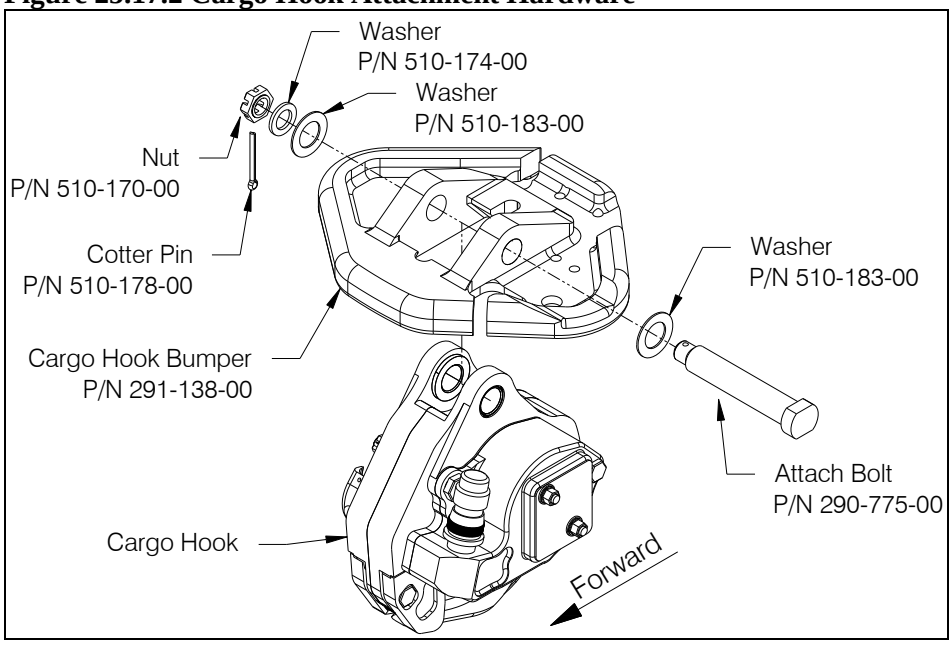


25.17 Component Re-installation continued

Cargo Hook Re-installation

1. Inspect the Cargo Hook for evidence of damage, corrosion and security of lock wire and fasteners. If damage is evident, do not use the items until they are repaired.
2. Re-install slave cylinder assembly (P/N 232-168-00) onto cargo hook per this section.
3. Re-install the ground strap (P/N 270-126-02) onto cargo hook with screw (P/N 510-391-00).
4. Re-install electrical release harness (P/N 270-150-00) onto cargo hook.
5. Attach the Cargo Hook (P/N 528-028-00) to the load cell on the suspension system by placing the Hook Bumper (P/N 291-138-00) over the Cargo Hook and installing the Attach Bolt (P/N 290-775-00) through the load cell (not shown below) with washer (P/N 510-183-00). Refer to Figure 25.17.2.
6. Install washer (P/N 510-183-00), washer (P/N 510-174-00) and nut (510-170-00) over bolt end.
7. Tighten nut finger tight, then rotate to next castellation to install and secure cotter pin (P/N 510-178-00).
8. Route electrical harnesses, ground strap, and hydraulic hose through channel in bumper and secure with ty-wraps. 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 (P/N 232-168-00) to the cargo hook first, per the following instructions:

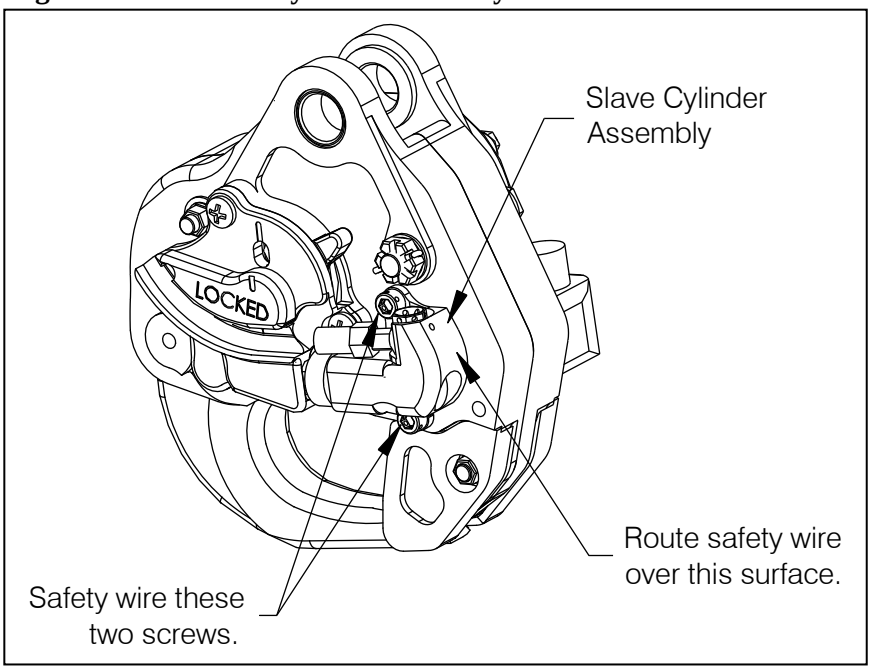
1. Ensure that the piston is in the retracted position. If the piston needs to be retracted connect the quick disconnect coupling and push the piston in.

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 side of the cargo hook as shown below and install the mounting screws (P/N 510-531-00). See Figure 25.17.3.
3. Install safety wire between these screws around the backside of the slave cylinder.
4. Route the hydraulic hose along the manual release cover and up through the hook bumper, along with the electrical cables and ground strap, as shown in Figure 25.17.4. Secure components to bumper with ty-wraps as shown.
5. Connect the quick disconnect coupling at the belly of the helicopter.

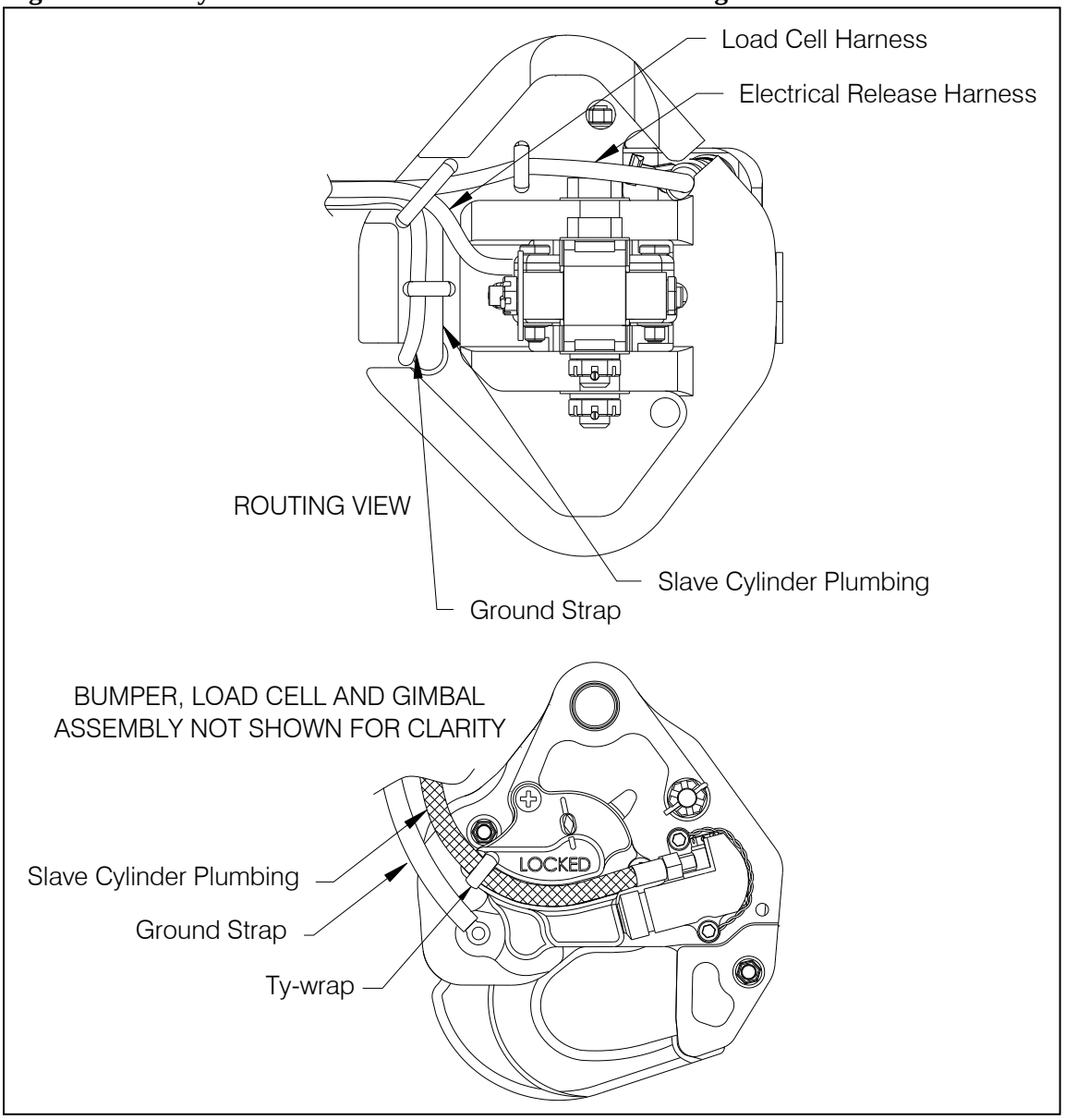
Figure 25.17.3 Slave Cylinder Assembly Installation



25.17 Component Re-installation continued

Slave Cylinder Assembly Re-installation continued

Figure 25.17.4 Hydraulic Hose and Electrical Harness Routing

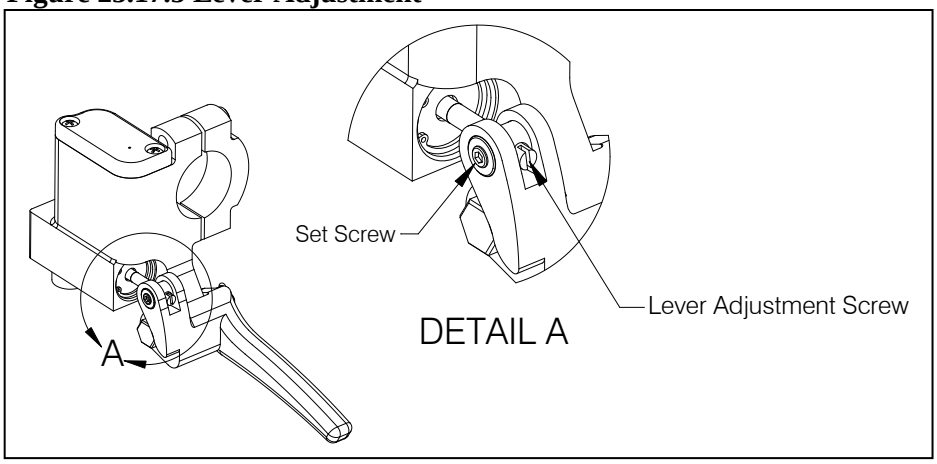


25.17 Component Re-installation continued

Fixed Hydraulic Release Hose Re-installation

1. Install the master cylinder and release lever onto the collective with the two screws (P/N 510-390-00).
2. Feed the end of the hydraulic hose through the slot in the floor. The grommet may have to be temporarily removed to allow the fitting to pass through.
3. Install the loop clamp around the hose at the bracket at frame at 1790.15 with hardware as shown in Figure 25.16.4.
4. Route the hose as shown in Figure 25.16.3 and install the quick disconnect coupling to the connector bracket attached to the fuel tank support.
5. 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 100 hour/annual inspection procedures.
6. 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 25.17.5 Lever Adjustment



25.17 Component Re-installation continued

Load Weigh Indicator Re-installation

1. Place the Load Weigh Indicator into the mounting bracket on the right hand door pillar and secure with four screws (P/N 510-457-00).
2. Connect the electrical connector on the wiring harness to the connector on the back of the indicator.

Load Cell Re-installation

1. Attach the load cell assembly to the gimbal fitting on the suspension frame with hardware as illustrated in Figure 25.16.7.
2. Route and secure the electrical harness through the bumper as shown in Figure 25.17.4. Secure with ty-wraps. Ensure harness does not pull or get pinched at full range of motion of hook and swing.
3. Connect the electrical connector on the load cell harness to the connector on the belly of the helicopter.

25.18 General Procedural Instructions-Testing

After re-installation of any parts, 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 5.1.1). 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 and the suspension to ensure that the hydraulic release hose, the electrical harnesses, and ground strap have enough slack to allow full swing of each component without straining or damaging the cables. The harnesses and hose must not be the stops that prevent the Cargo Hook or the suspension from swinging freely in all directions.
4. Visually check for presence and security of fasteners and electrical connections. Swing the Cargo Hook and the suspension in fore and aft and side to side directions to check for freedom of rotation at all joints.