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Instructions for Continued Airworthiness

Talon LC Hydraulic Cargo Hook Kits for the Airbus Helicopters Deutschland BO-105S and BO-105LS Helicopters

System Part Numbers
200-302-00, 200-302-10, 200-303-00, 200-303-10
200-387-00, 200-387-10, 200-388-00, 200-388-10

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Record of Revisions

Rev.	*Date*	*Page(s)*	*Reason for Revision*
2	03/18/10	05-00-00 Page 5 05-00-00 Page 6 25-00-00 Page 2 25-00-00 Page 7	Updated manual figure to reflect new load weigh harness configuration. Changed overhaul frequency criteria.
3	09/24/10	00-00-00 page 1 and 2, 05-00-00 page 1, page 4 thru 6. 12-00-00 pages 5, 7, 8. 25-00-00 pages 13 thru 15, 17, 19, 20	Updated load cell part numbers and maintenance information. Updated precaution flags format throughout document. Updated bleed kit part no. and instructions.
4	08/17/11	Section 5, Section 25 pages 2, 3, 6, 7, 13, 15	Added kit part numbers 200-387-00 and 200-388-00 and associated link assembly and load cell assembly part numbers.
5	04/18/16	Section 5 pages 1 thru 7 Section 12 pages 2 thru 4 Section 25 pages 7, 15, 16	Added references to CMM 122-015-00 for annual inspection and storage instructions. Updated definition of "hours of external load operations". Clarified 5 year/1000 hour inspection requirement of kit components. Updated configuration of slave cylinder assembly and cargo hook bumper. Corrected electrical schematic for cargo hook.
6	06/08/16	Section 0 Section 5 pages 1 - 5 Section 11 Section 25 pages 2 – 7, 13, 15, 20	Added kit P/Ns 200-302-10, 200-303-10, 200-387-10, and 200-388-10 which include Cargo Hook with Surefire. Added maintenance information associated with these kits.
7	08/17/17	Section 12 pages 1-3, 5	Added MIL-PRF-87257 hydraulic fluid as a compatible fluid.
8	03/05/18	Section 5 Page 4	Removed magnetic particle inspection requirement for load cell assembly, inserted instructions to return load cell to factory for inspection/calibration.

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Section 0
Introduction

0.4 Scope

The following information is necessary to carry out the service, maintenance, and inspection of Cargo Hook Kit P/N's 200-302-00, 200-302-10, 200-303-00, 200-303-10, 200-387-00, 200-387-10, 200-388-00, and 200-388-10.

CAUTION

The Cargo Hook Kits consist of the cargo hook, link or load cell (depending on kit installed), hydraulic release system, external electrical release harness, load weigh system and miscellaneous supporting hardware (see Figure 25.1). They interface with the fixed provisions, including internal electrical wiring, and the cable type suspension system as supplied by Airbus Helicopters, therefore this ICA must be used in conjunction with applicable Airbus Helicopters documentation in the maintenance of the complete cargo hook suspension system.

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 Cargo Hook Kit P/N's 200-302-00, 200-302-10, 200-303-00, 200-303-10, 200-387-00, 200-387-10, 200-388-00 and 200-388-10.

0.6 Arrangement

This manual contains instructions for the service, maintenance, inspection and operation of the Cargo Hook Kit P/N's 200-302-00, 200-302-10, 200-303-00, 200-303-10, 200-387-00, 200-387-10, 200-388-00, and 200-388-10 on Airbus Helicopters Deutschland BO-105S and BO-105LS A-3 model helicopters. The manual is arranged in the general order that maintenance personnel would use to install, maintain and operate these kits.
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 Kit P/N's 200-302-00, 200-302-10, 200-303-00, 200-303-10, 200-387-00, 200-387-10, 200-388-00, and 200-388-10 for the Airbus Helicopters BO-105S and BO-105LS A-3 model helicopters. Refer to the appropriate Airbus Helicopters maintenance documentation for instructions regarding parts of the helicopter that interface with these kits.

0.9 Abbreviations

FAA Federal Aviation Administration
FAR Federal Aviation Regulation
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. 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 Kit 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 (see section 5.2 for definition), whichever comes first, inspect the cargo hook and other kit components per the following. Refer also to CMM 122-015-00 for additional procedures.

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

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

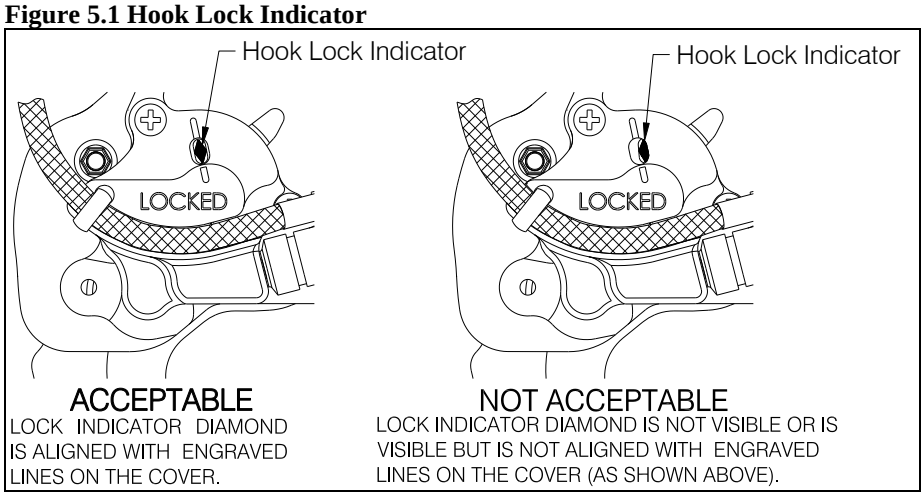
The following instructions are applicable to cargo hook P/N 528-028-02 which is equipped with Surefire electrical release. With no load on the cargo hook perform the following.

- *Very* briefly press the Cargo Release switch, the cargo hook should not actuate and the load beam should remain closed.
- Press and hold the Cargo Release switch for a few seconds, the load beam should fall to the open position and the cargo hook solenoid should continue to cycle repeatedly.
- Push up on the load beam and verify that it latches and the hook lock indicator is aligned with the engraved line on the manual release cover (see Figure 5.1).

5.1 Cargo Hook Kit Inspection continued

2. Activate the hydraulic release system by pulling the release lever located on the collective in the cockpit. The mechanism should operate smoothly and the cargo hook must release. After release, return the load beam to its closed and locked position by hand. 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.

Figure 5.1 Hook Lock Indicator



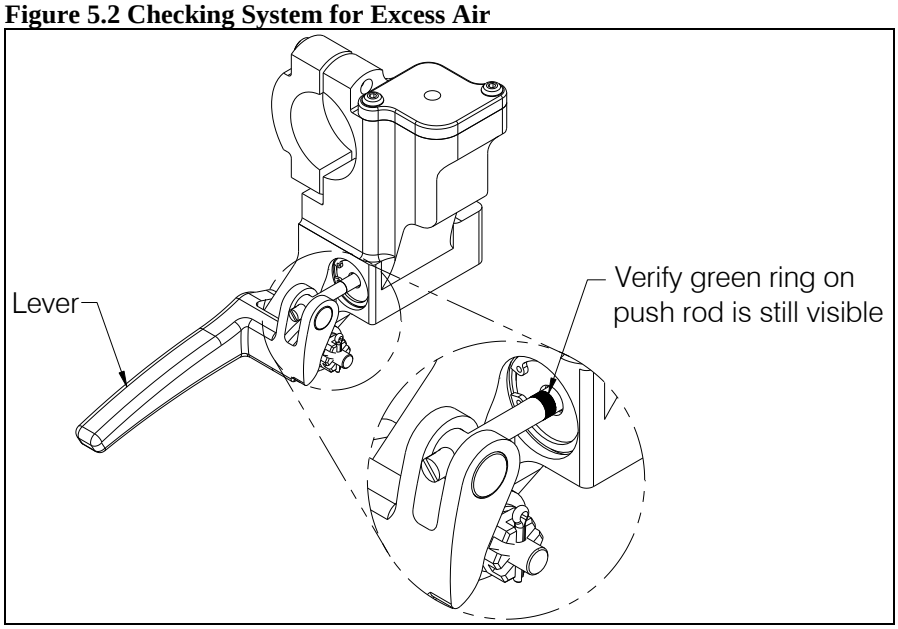
3. Check the fluid level in the master cylinder with the collective against the lower stop. The Master Cylinder features a transparent lid through which the fluid level can be checked. Hydraulic fluid must be visible over the baffle surface (reference Figure 12.1).

4. Visually inspect 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.

5.1 Cargo Hook Kit Inspection continued

5. Check the hydraulic release system for air by actuating the lever firmly until it bottoms out. Check the push rod position (see Figure 5.2). 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 bleeding instructions.

Figure 5.2 Checking System for Excess Air



6. Visually inspect for corrosion on the exterior of cargo hook and link assembly components (refer to Table 5.3 for limits for link assembly components). Corrosion on the cargo hook side plates is cause for immediate overhaul. Additionally, any exfoliation corrosion in the upper attach lug area of the cargo hook is cause for immediate replacement of the side plate.
7. Visually inspect for presence and security of fasteners and electrical connections.
8. Visually inspect the external electrical wire harnesses and their connectors for damage and security.
9. Visually inspect the hydraulic hose for damage and security.
10. Visually inspect the electrical harness strain relief at the load cell (if installed) for damage.
11. Verify calibration of the load cell (if installed) by lifting a load of known weight.

5.1 Cargo Hook Kit Inspection continued

Every 5 years or 1000 hours of external load operations, whichever comes first, remove the Cargo Hook and Link Assembly (or Load Cell) from the helicopter and disassemble per the following instructions and inspect. Refer to Figure 5.3 or Figure 5.4 (depending on kit P/N) for part identification. Refer to section 5.2 for cargo hook overhaul.

1. Remove the cargo hook and bumper from the Link Assembly or Load Cell Assembly (refer to 25.16 for removal instructions).
2. Remove Link Assembly (or Load Cell Assembly) from the helicopter's suspension cable shackles by removing cotter pin, nut, washer, and bolt.
3. If present, return the Load Cell Assembly (P/N 210-028-01, 210-028-02, 210-262-00) 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.
4. Carefully inspect and if necessary repair the detail parts in accordance with the instructions in Table 5.3. Inspect the parts in a clean, well-lit room.

5.1 Cargo Hook Kit Inspection continued

Figure 5.3 Link Assembly Parts (Kit P/N 200-302-00, 200-302-10)

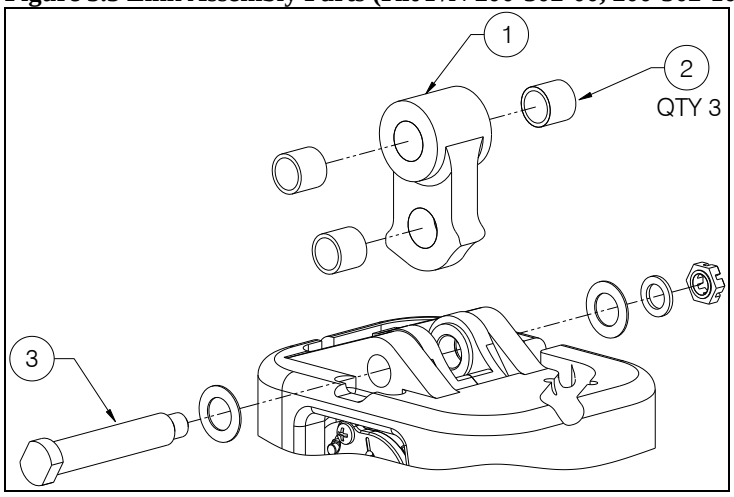


Table 5.1 Link Assembly Parts (kit P/Ns 200-302-00, 200-302-10)

ITEM	PART NO.	DESCRIPTION	QTY
1	290-607-00*	Load Link	1
2	290-364-00	Bushing	3
3	290-775-00	Attach Bolt	1

* With a P/N 200-303-00 and 200-303-10 kit (with Load Weigh), P/N 290-031-00 (part of load cell assembly P/N 210-028-01) or P/N 291-550-00 (part of load cell assembly P/N 210-028-02) is installed rather than 290-607-00. Load cell P/N 210-028-01 does not include bushings.

Figure 5.4 Link Assembly Parts (Kit P/N 200-387-00, 200-387-10)

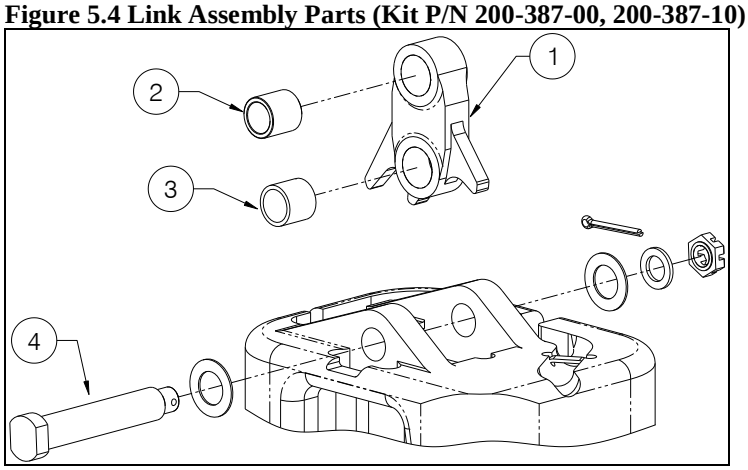


Table 5.2 Link Assembly Parts (Kit P/Ns 200-387-00, 200-387-10)

ITEM	PART NO.	DESCRIPTION	QTY
1	291-604-00*	Load Link	1
2	291-605-00	Bushing	1
3	290-364-00	Bushing	1
4	290-775-00	Attach Bolt	1

* With P/N 200-388-00 and 200-388-10 kit (with Load Weigh), P/N 291-603-00 (part of load cell assembly P/N 210-262-00) is installed in place of P/N 291-604-00.

5.1 Cargo Hook Kit Inspection continued

Table 5.3 Inspection

Component	Damage	Remedy	Finish
Load Link P/N 290-607-00 P/N 291-604-00	Dents, nicks, cracks, gouges, corrosion or scratches.	Repair dents, gouges, nicks, scratches and corrosion if less than .030" deep, blend out at a ratio of 20:1, length to depth, replace if otherwise damaged.	This part is 15-5PH, passivated. No touch up finish required.
Load Cell Link P/N 290-031-00 (part of Load Cell Assembly P/N 210-028-01).	Dents, nicks, cracks, gouges, corrosion or scratches.	Repair dents, gouges, nicks, scratches and corrosion if less than .030" deep, blend out at a ratio of 20:1, length to depth, replace if otherwise damaged.	Touch up bare spots with zinc chromate primer or other corrosion preventative compound.
Load Cell Link P/N 291-550-00 (part of Load Cell Assembly P/N 210-028-02).	Dents, nicks, cracks, gouges, corrosion or scratches.	Repair dents, gouges, nicks, scratches and corrosion if less than .030" deep, blend out at a ratio of 20:1, length to depth, replace if otherwise damaged.	This part is 15-5PH, passivated. No touch up finish required.
Load Cell Link P/N 291-603-00 (part of Load Cell Assembly P/N 210-262-00).	Dents, nicks, cracks, gouges, corrosion or scratches.	Repair dents, gouges, nicks, scratches and corrosion if less than .030" deep, blend out at a ratio of 20:1, length to depth, replace if otherwise damaged.	This part is 15-5PH, passivated. No touch up finish required.
Attach Bolt P/N 290-775-00	Wear on outside diameter.	.495 inch (12.57 mm) minimum diameter. Remove and replace if smaller.	
Bushing P/N 290-364-00	Wear on inside diameter.	Maximum permissible bushing ID is .520 (13.2 mm) inches. Remove and replace if it exceeds .520 (13.2 mm). Press new bushing in with zinc chromate primer (TTP1757B-1CY or equivalent).	
Bushing P/N 291-605-00	Wear on inside diameter.	Maximum permissible bushing ID is .496 inches (12.6 mm). Remove and replace if it exceeds .496 inches (12.6 mm). Press new bushing in with zinc chromate primer (TTP1757B-1CY or equivalent).	

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.*

Contact Onboard Systems for the latest revision of overhaul instructions for the cargo hook and guidance to locate authorized overhaul facilities.

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Section 11
Placards and Markings

11.1 Placards

The cargo hook kits utilize the helicopter's existing cable type suspension system, including the placards except as shown below. Consult Airbus Helicopters documentation for additional placards relating to the cargo hook suspension system.

Table 11.1 Cargo Hook Kit Placards

Placard part number and appearance	Location
P/N 215-169-00 INOP	Installed over the hook advisory light in the cockpit (the P/N 528-028-00 or P/N 528-028-02 cargo hook does not have a hook status indicator switch).
P/N 215-010-00 ELECTRONIC WEIGHING SYSTEM	When an Onboard Systems 200-303-00, 200-303-10, 200-388-00 or 200-388-10 cargo hook kit is installed, mounted adjacent to both the power switch and the circuit breaker in full view of the pilot and co-pilot.
P/N 215-012-00 TURN THE WEIGHING SYSTEM OFF WHEN NAVIGATION EQUIPMENT IN USE. NO AIRCRAFT OPERATION SHOULD BE PREDICATED ON THE READING OF THE ONBOARD WEIGHING SYSTEM.	When an Onboard Systems 200-303-00, 200-303-10, 200-388-00 or 200-388-10 cargo hook kit is installed, mounted adjacent to the Onboard Systems digital/analog indicator in full view of the pilot and co-pilot.
P/N 215-336-00 	Mounted on the bottom of solenoid housing of cargo hook P/N 528-028-02 (included with kit P/Ns ending in -10 only).
P/N 215-343-00 	Located adjacent to the cargo hook release switch on the cyclic (included with kit P/Ns ending in -10 only).

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Section 12
Servicing

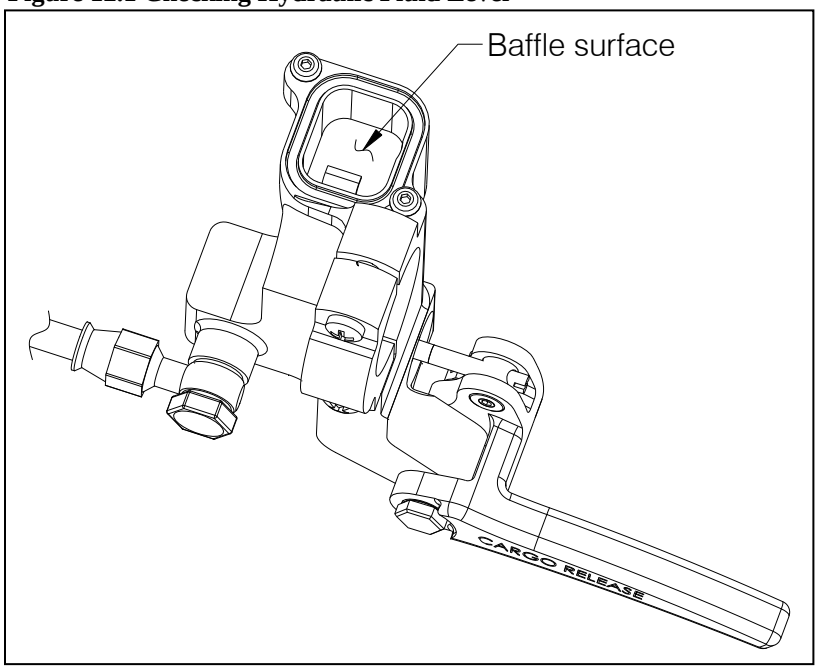
12.1 Maintenance of the Hydraulic Release System

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 submerged (fill so that there is approximately 1/16" of fluid above the baffle surface).

Figure 12.1 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.

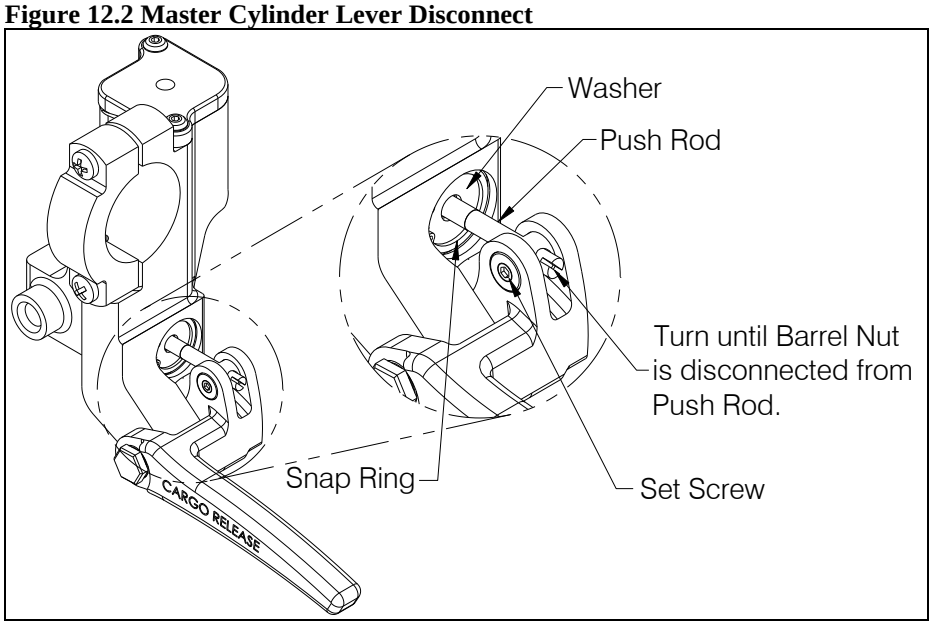
Disassembly

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 12.2.
3. Remove the piston and spring. See Figure 12.3 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 12.4. Stretch seals over piston into grooves.
2. To assemble the master cylinder, lubricate the piston seals and cylinder bore generously with hydraulic fluid (MIL-PRF-82757 or MIL-PRF-5606).
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 12.2 Master Cylinder Lever Disconnect



12.1 Maintenance of the Hydraulic Release System, continued

Master Cylinder Repair continued

Figure 12.3 Master Cylinder Piston Removal

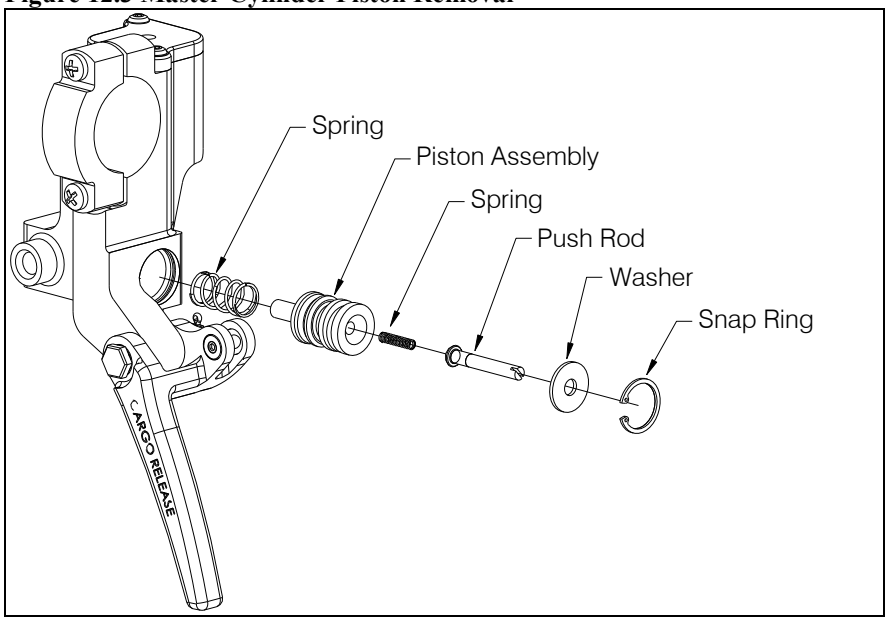
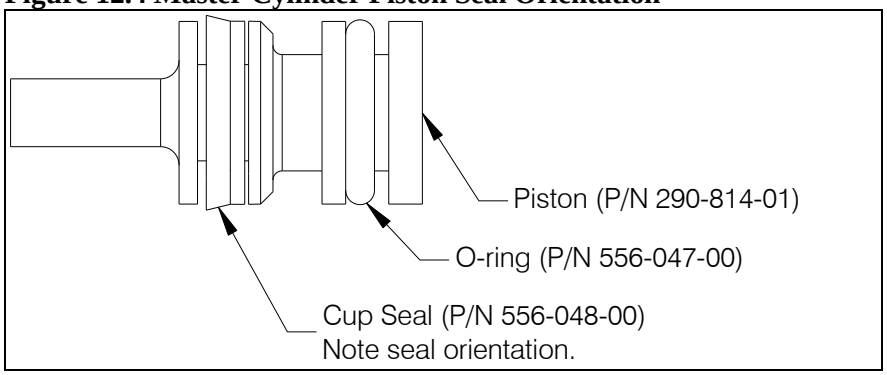


Figure 12.4 Master Cylinder Piston Seal Orientation



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 used a cup seal instead of a quad ring).

Disassembly:

1. Remove cap, piston, and seal (see Figure 12.5).
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.

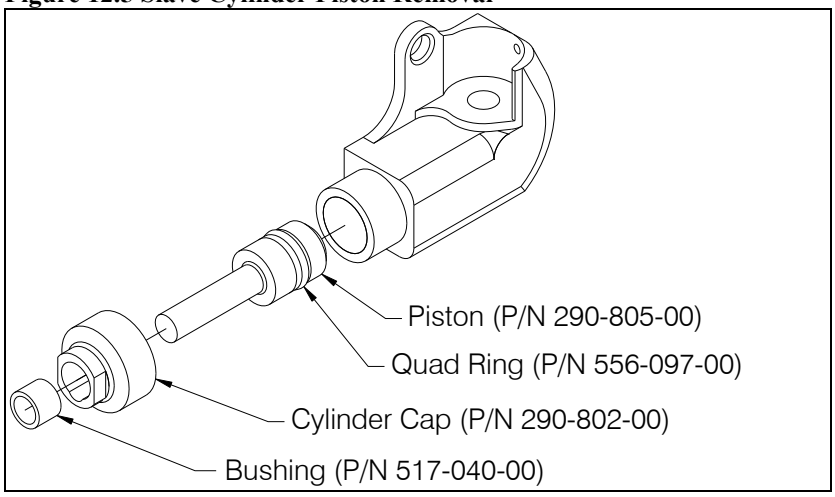
Re-assembly:

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 12.5 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.

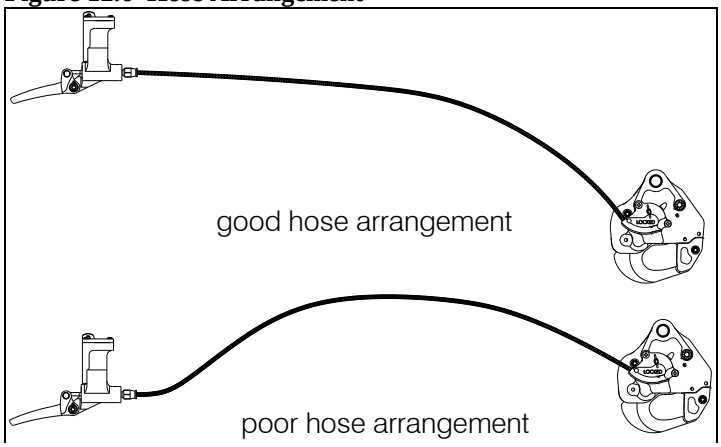
2. If the system is already installed on the aircraft, place an absorbent towel under the master cylinder. If the master cylinder is not installed on the aircraft, lightly clamp the master cylinder in a vise to hold it in a vertical position and position the slave cylinder so that its level is below 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 12.6.

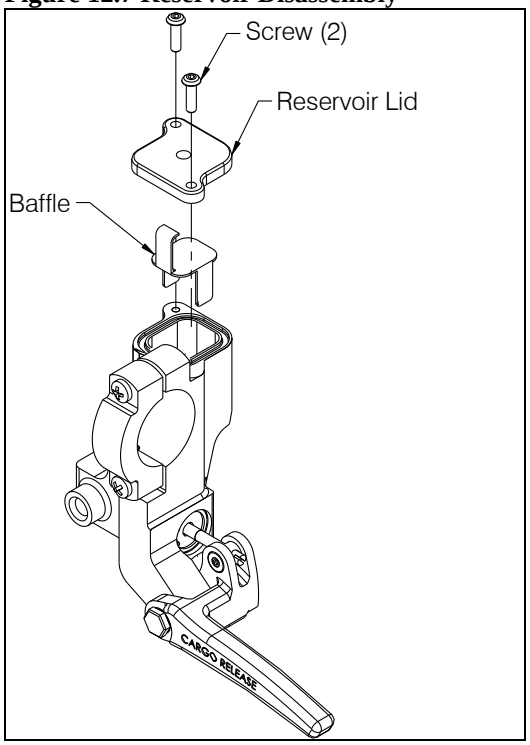
Figure 12.6 Hose Arrangement



12.2 Bleeding Hydraulic System, continued

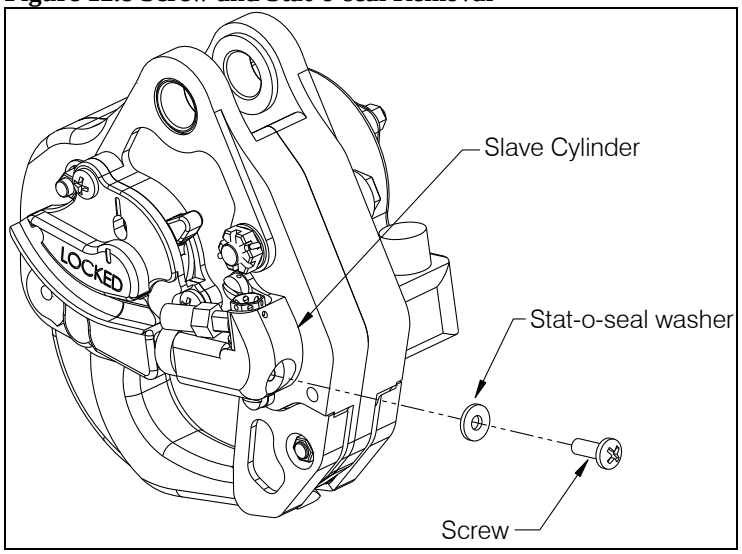
4. Remove screws, reservoir lid, and baffle from the master cylinder reservoir as shown in Figure 12.7.

Figure 12.7 Reservoir Disassembly



5. Remove the screw and stat-o-seal on the slave cylinder, see Figure 12.8.

Figure 12.8 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 12.9.

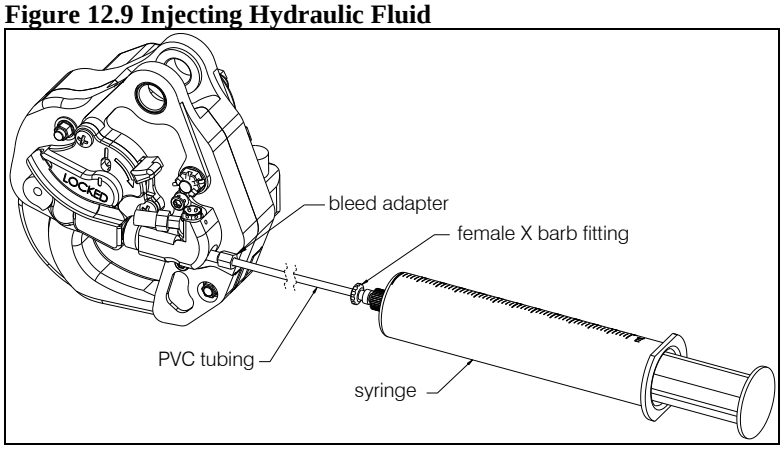
12.2 Bleeding Hydraulic System, continued

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

CAUTION

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

Figure 12.9 Injecting Hydraulic Fluid



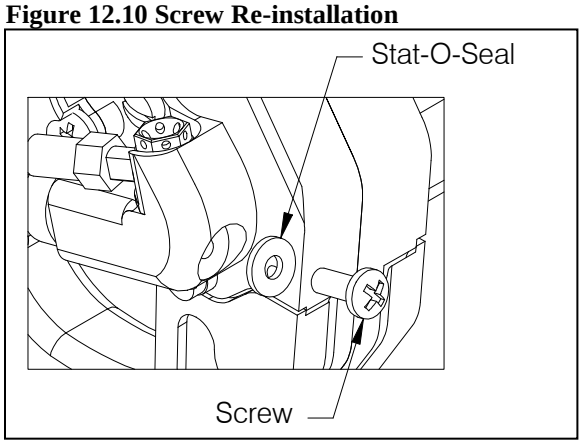
8. Continue to force fluid into the master cylinder reservoir until the reservoir is approximately half full.

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 12.10.

Figure 12.10 Screw Re-installation



12.2 Bleeding Hydraulic System, continued

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

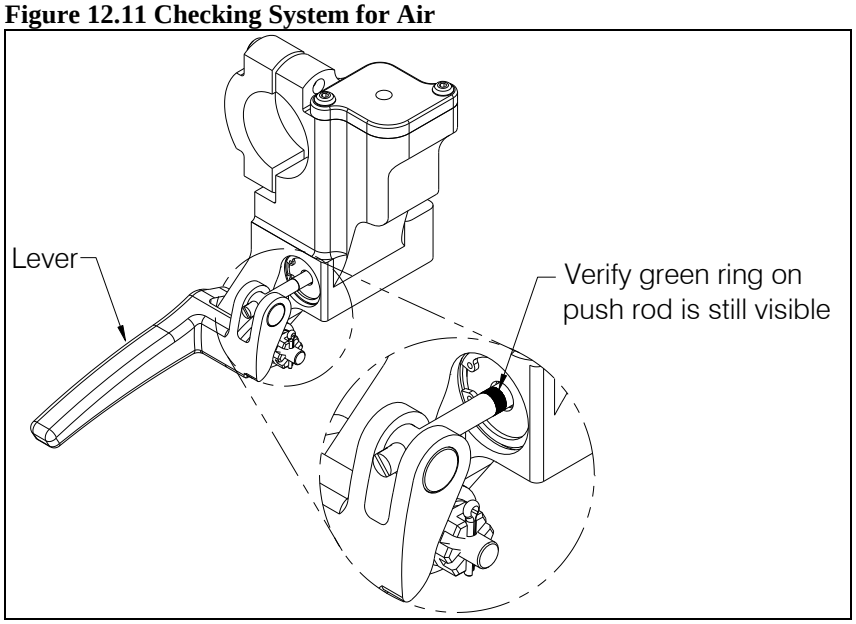
11. Very **slowly** pull the release lever on the master cylinder and watch for bubbles. If bubbles are observed rising within the reservoir, continue to slowly cycle the lever until there are no more. Actuating the lever releases air trapped within the master cylinder.

⚠ CAUTION

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

12. Check the system for air by actuating the lever firmly until it bottoms out. Check the push rod position (see Figure 12.11). 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 12.11 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.

Section 25
Equipment and Furnishings

25.1 Cargo Hook Connector

Listed below is the pin out for the cargo hook connector. The hook is polarity sensitive due to an arc suppressing diode internally mounted.

Table 25.1 Cargo Hook Connector

Pin	*Function*
A	Ground
B	Power

25.2 Description

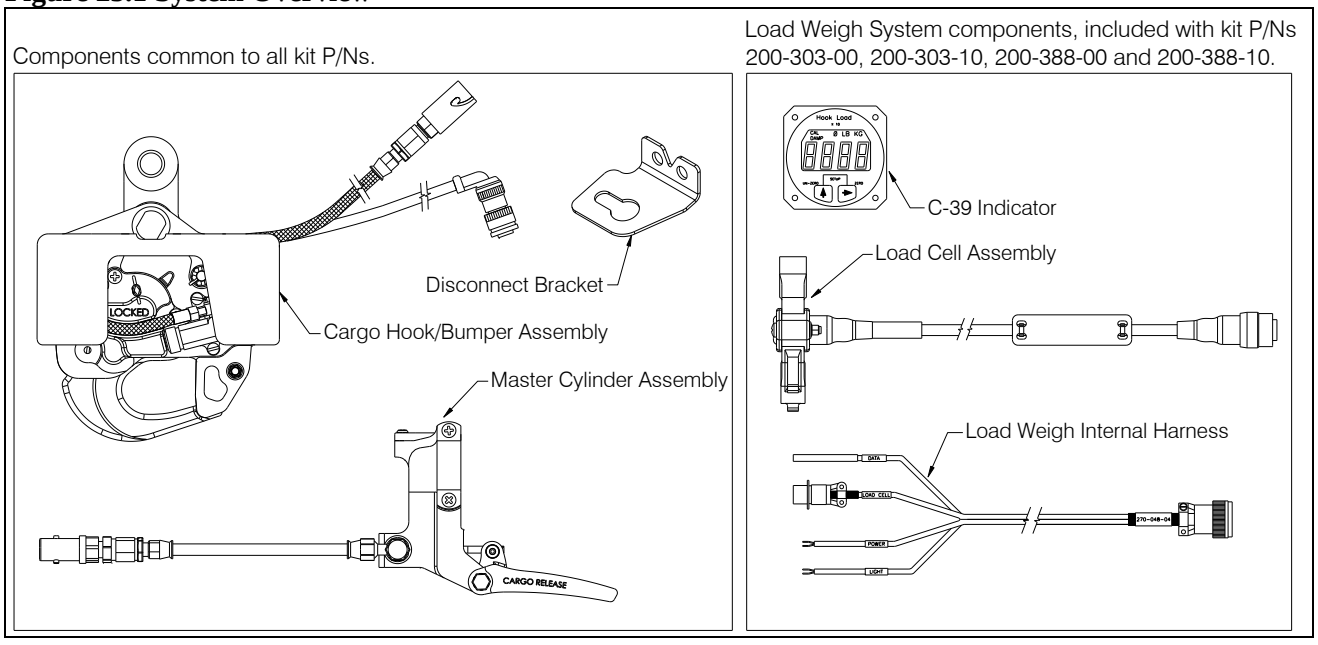
The P/N 200-302-00, 200-302-10, 200-387-00 and 200-387-10 kits include the cargo hook assembly which includes an adapter link and bumper, a wire harness, and a hydraulic release system. The cargo hook attaches to the helicopter via the adapter link that adapts it to the existing cable type suspension system of the helicopter.

The hydraulic release system provides a backup means of releasing a cargo hook load. It consists of a release lever mounted to the collective, a hose assembly routed from the release lever to the cargo hook, and a piston at the hook that actuates the internal release mechanism of the cargo hook when the lever is pulled.

The 200-303-00, 200-303-10, 200-388-00, and 200-388-10 kits are the same as the 200-302-00, 200-302-10, 200-387-00 and 200-387-10 kits respectively, except the adapter link is replaced with a load cell for a load weigh system. The load weigh system also includes the load weigh indicator and the interconnecting electrical wiring harness between it and the load cell.

Kit P/Ns ending in -10 include a Cargo Hook with Surefire release as part of the electrical release system. Surefire release is a safety enhancement to protect against inadvertent load release due to accidental contact with the release switch or mistaken actuation of the release switch when another is intended.

Figure 25.1 System Overview



25.5 Component Weights

The weights of the systems are listed in Table 25.2.

Table 25.2 Component Weights

Item	Weight
200-302-00, -10	6.2 lbs (2.8 kgs)
200-303-00, -10	8.3 lbs (3.8 kgs)
200-387-00, -10	5.9 lbs (2.7 kgs)
200-388-00, -10	8.3 lbs (3.8 kgs)

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, either drain the reservoir or apply a piece of tape over the breather hole on the reservoir lid. If draining the reservoir, 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 Component Maintenance Manual (CMM) 122-015-00 for storage instructions for the cargo hook.

25.15 Troubleshooting

Table 25.3 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 25.3 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 P/N 528-028-00 does not operate electrically, hydraulic release operates normally.	Open electrical circuit, faulty wiring, fuse/circuit breaker, switch or solenoid.	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. Check the aircraft circuit for opens and shorts by using a multi-meter on the hook connector. When the release switch is pressed 28V aircraft voltage should be seen on the connector pins.
Cargo hook P/N 528-028-02 (includes Surefire time delay circuit) does not operate electrically, hydraulic release operates normally.	Release switch not held down long enough. Open electrical circuit, faulty wiring, circuit breaker, switch or solenoid.	Hold the release switch for a longer time. The time delay circuit incorporates an electronic delay of approximately ½ second after which time the hook solenoid will activate repeatedly. If the release switch is not held down long enough the cargo hook's solenoid will not activate. Check the aircraft circuit for opens and shorts by using a multi-meter on the hook connector. When the release switch is pressed 28V aircraft voltage should be present on the connector pins. Check the aircraft connector polarity. The time delay circuit is polarity sensitive and protected against reverse polarity. +28V should be on pin B and ground on pin A. Check the power pins on the hook itself. A multi-meter set to the kilo-ohms range should read between 2-8Kohms. Some auto-ranging meters will not read properly so be sure to try a manual kilo-ohms range. If the meter reads open or short there is a problem with the solenoid module itself and the hook should be replaced or repaired per CMM 122-015-00.
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.

25.15 Troubleshooting continued

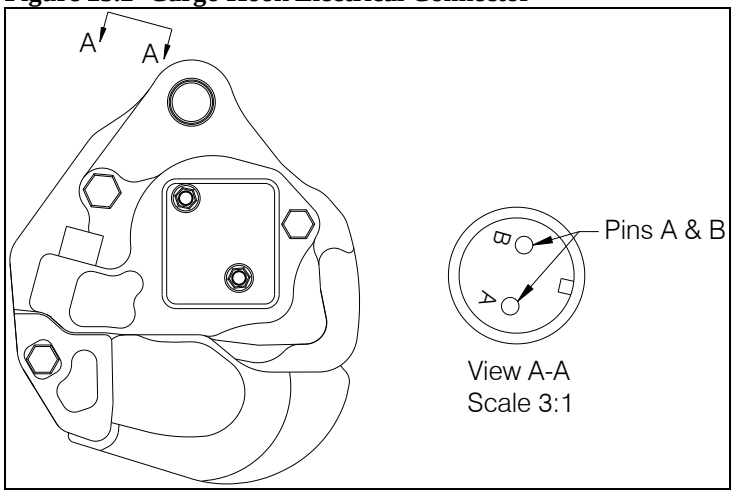
Table 25.3 Troubleshooting continued

MALFUNCTION	PROBABLE CAUSE	CORRECTIVE ACTION
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. Replace seals (refer to Section 12.1 for servicing of hydraulic system).
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 (refer to Airbus maintenance documentation) 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 (see below). See troubleshooting table above for checking resistance of cargo hook P/N 528-028-02.

Figure 25.2 Cargo Hook Electrical Connector



25.15 Troubleshooting continued

Table 25.3 Notes continued:

2. Checking Wire Harnesses.

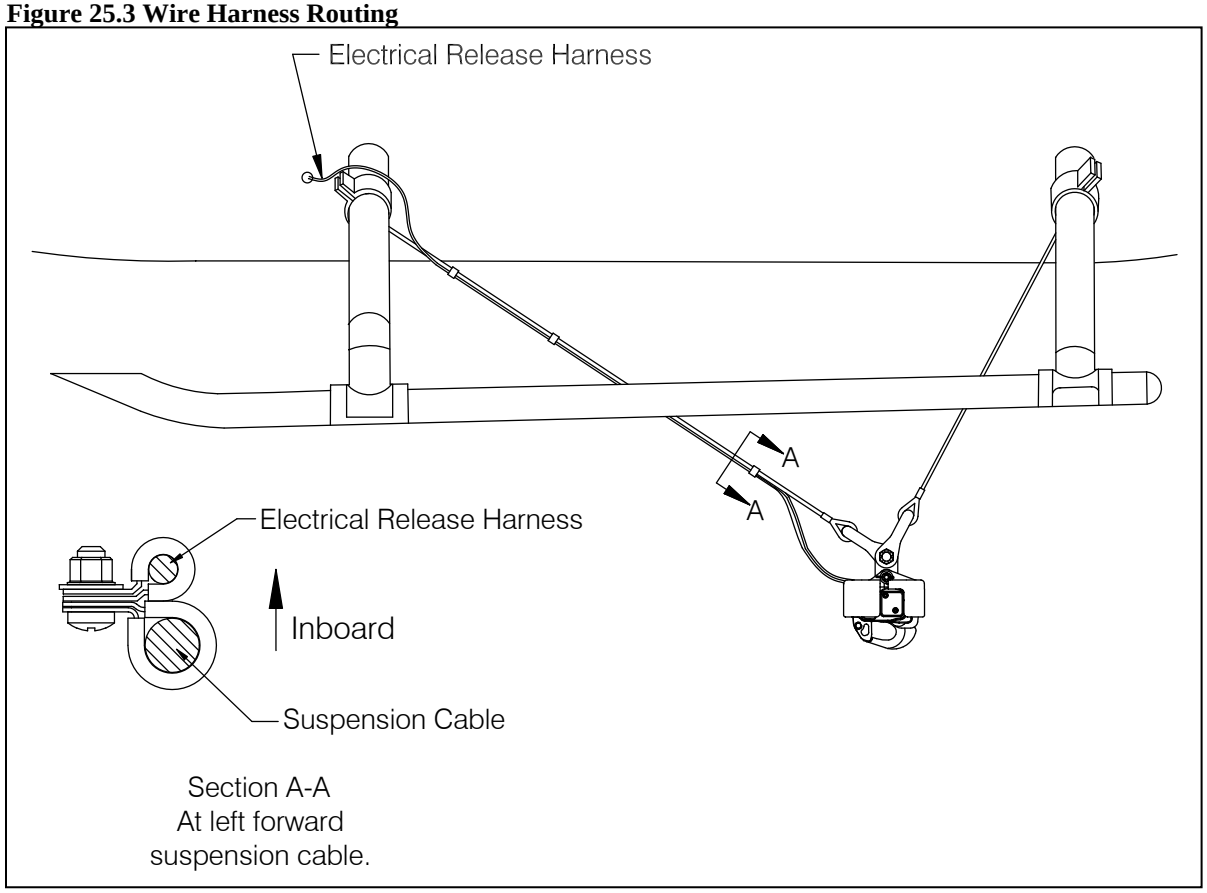
As appropriate, before working on a circuit, e.g. - inspection, removal-installation of components, check that the aircraft system is not energized.

The electrical release harness is routed up the left forward suspension cable (see Figure 25.3). It is mated with the helicopter's fixed electrical release connector at a point forward of the front landing gear tube (refer to Airbus Helicopters maintenance documentation for fixed electrical release wiring information).

If load weigh system is installed, the external load cell harness is routed with the electrical release harness to a connector located next to the fixed electrical release connector. The internal load weigh harness is routed from this connector to the load indicator in the cockpit. The load indicator location is optional within the cockpit.

Inspect for general condition and chafing along length of wire runs. See Figure 25.4 for electrical schematic.

Figure 25.3 Wire Harness Routing



25.15 Troubleshooting continued

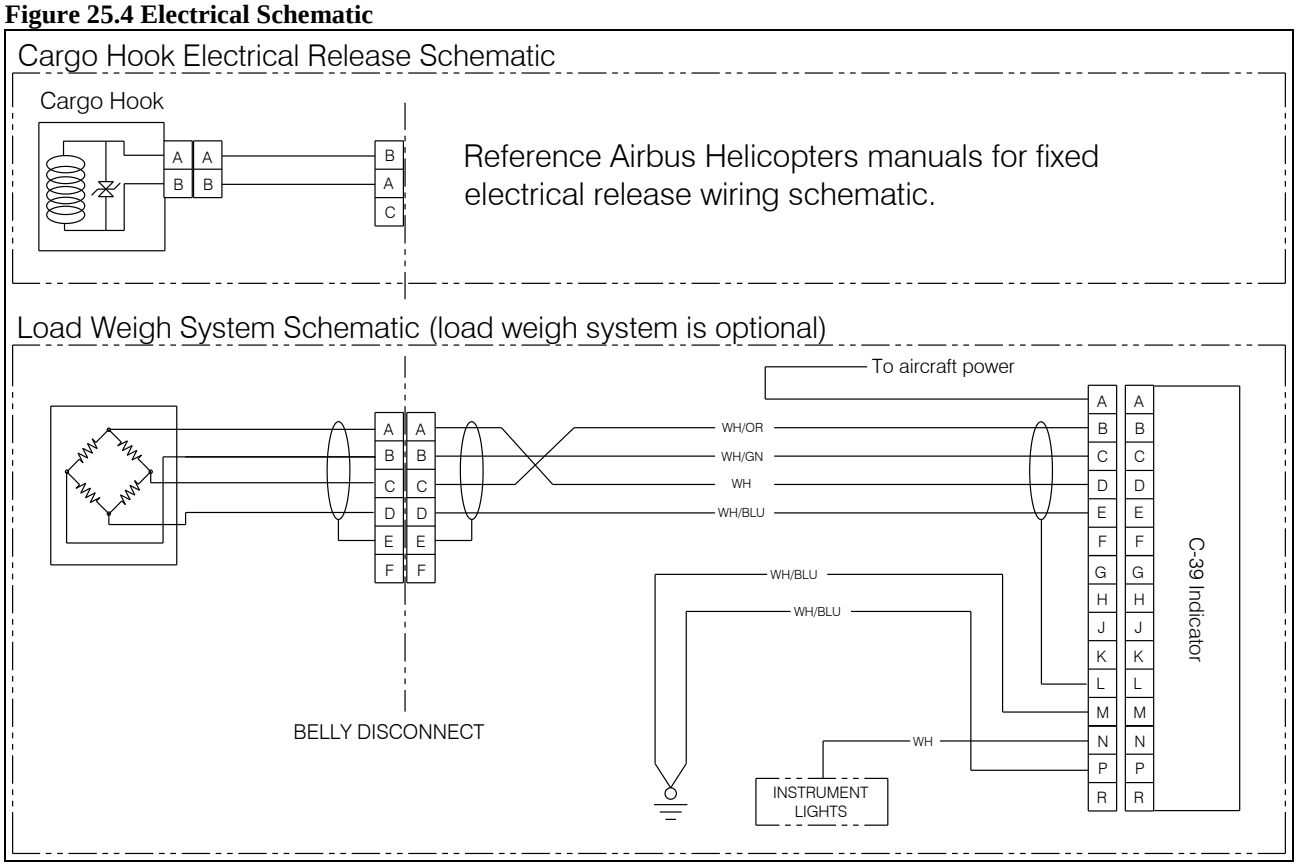
Table 25.3 Notes continued:

2. Checking Wire Harnesses continued

NOTICE

The type certificated cargo hook included a hook status switch (for hook open or hook loaded) for illumination of a light in the cockpit. Cargo hook P/N 528-028-00 does not include a switch thus pin C is not used in this installation.

Figure 25.4 Electrical Schematic



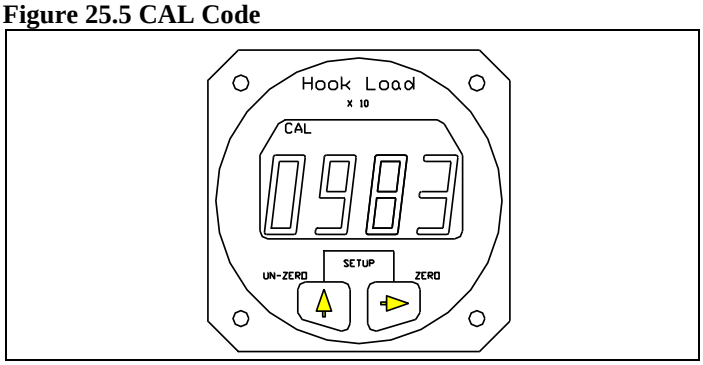
25.15 Troubleshooting continued

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 25.5 CAL Code

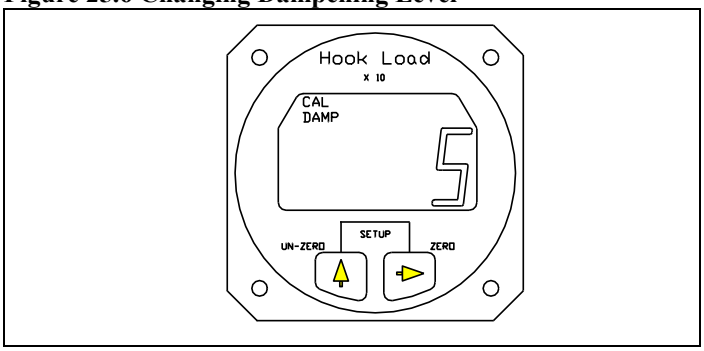


This code should match the code printed on the tag attached to the load cell cable. If this code does not match, contact Onboard Systems for further guidance.

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 25.6 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. Cut ty-wraps that secure hydraulic hose and electrical release harness to the cargo hook bumper.
2. Remove the cotter pin (P/N 510-178-00) from the attach bolt (P/N 290-775-00) (refer to Figure 25.17.2).
3. Remove the castellated nut (P/N 510-170-00) from the attach bolt.
4. Remove the attach bolt and washers.
5. Remove the bumper from the cargo hook.
6. Remove the slave cylinder assembly from the cargo hook by removing two screws (refer to Figure 25.16.1) and the associated ty-wrap.
7. Remove the electrical release harness from the Cargo Hook at the mating connector on the cargo hook.
8. Remove the cargo hook from suspension system.

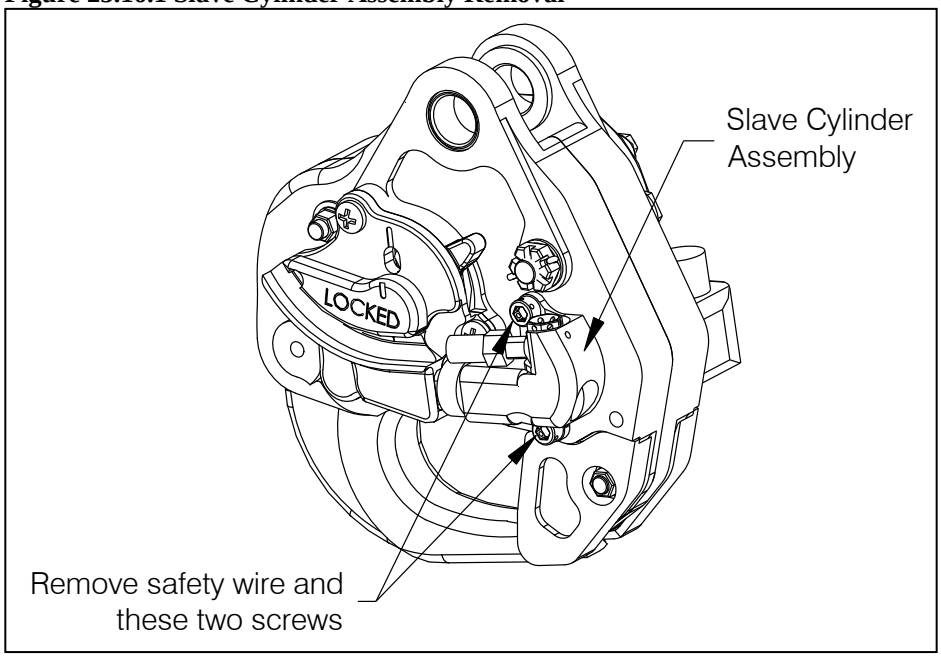
25.16 Component Removal continued

Slave Cylinder Assembly Removal

To remove the slave cylinder assembly the bumper must be removed from the cargo hook in order to access the slave cylinder assembly screws.

1. Cut the ty-wraps that secure the hydraulic hose and electrical release harness to the top of the bumper.
2. Remove the cotter pin (P/N 510-178-00) from the attach bolt (P/N 290-775-00).
3. Remove the castellated nut (P/N 510-170-00) from the attach bolt.
4. Remove the attach bolt and all washers.
5. Lift the bumper off of the cargo hook.
6. Remove the slave cylinder assembly from the cargo hook by removing the safety wire and the two screws (refer to Figure 25.16.1).
7. Remove the ty-rap that secures the hydraulic hose at the end of the groove in the cargo hook cover.
8. Remove the hose from the right forward suspension cable by removing the four loop clamps.
9. Disconnect the hose at the quick disconnect coupling at the belly of the helicopter.

Figure 25.16.1 Slave Cylinder Assembly Removal

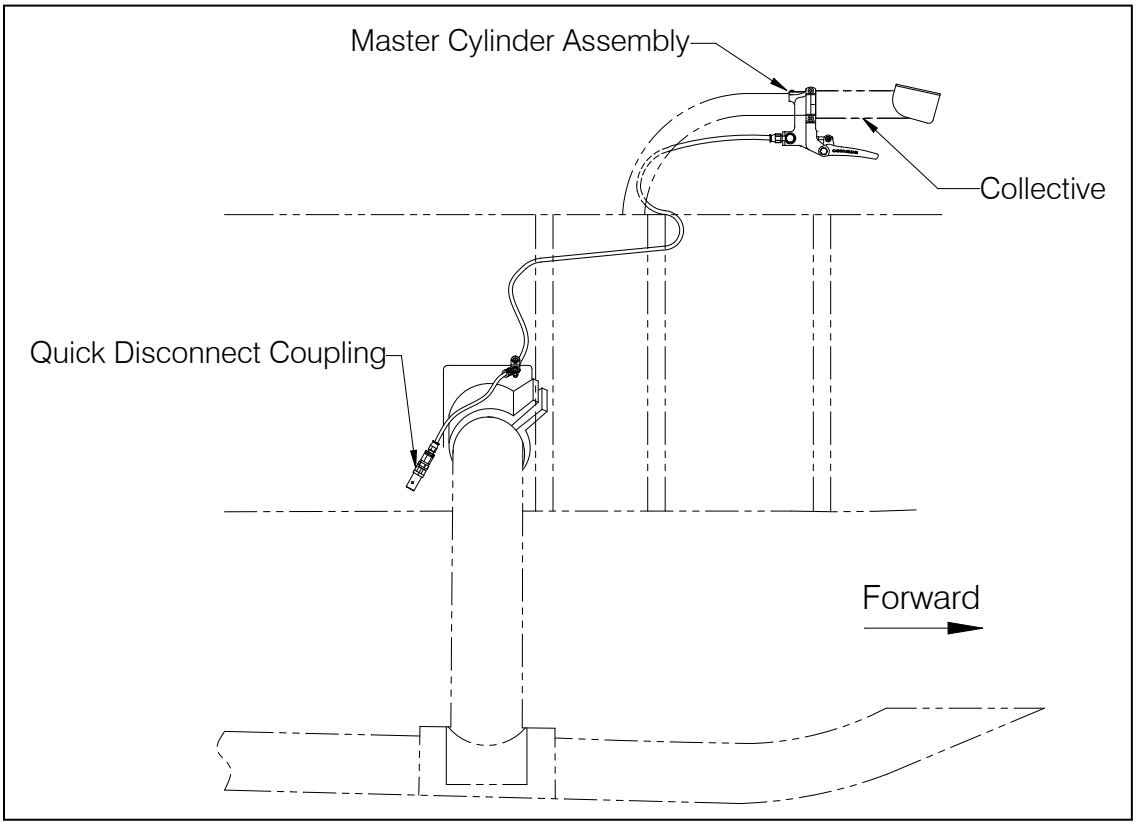


25.16 Component Removal continued

Master Cylinder Assembly and Hose Removal

The fixed hydraulic release hose is routed from the master cylinder mounted to the collective to a bracket at the right forward cargo hook suspension cable attach point where it is mated with the external section of hose of the hydraulic release system.

Figure 25.16.2 Fixed Hydraulic Release Hose Routing

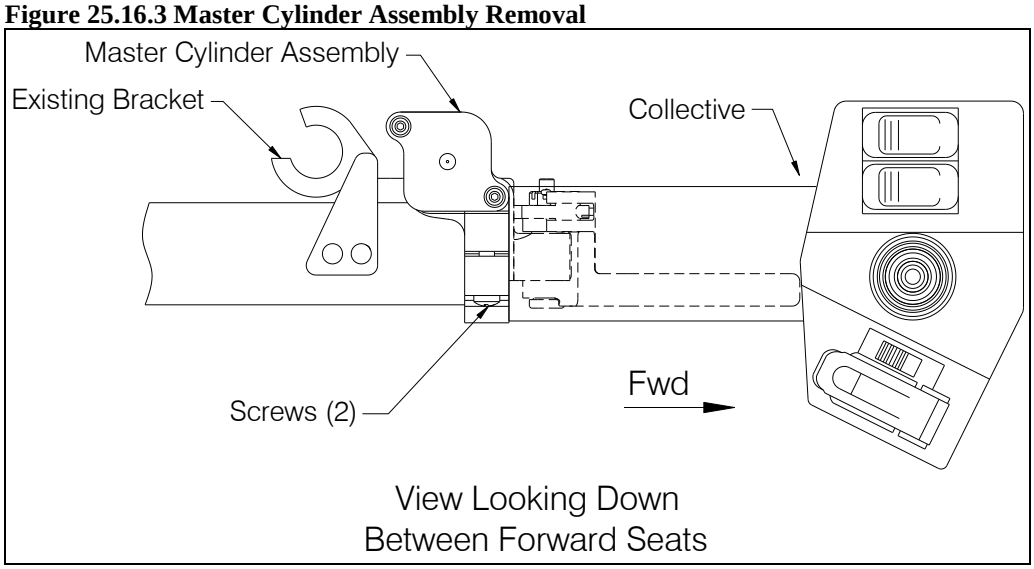


25.16 Component Removal continued

Master Cylinder Assembly and Hose Removal continued

1. Disconnect the quick disconnect coupling at the bracket at the right forward suspension cable attach point and remove it from the bracket.
2. Remove the hose from the loop clamps along its path up to the collective.
3. Remove the bellows around the base of the collective and feed the hose up through the hole in the floor forward of the collective base.
4. Above the floor and on the collective stick remove the Master Cylinder by removing two screws (see below).

Figure 25.16.3 Master Cylinder Assembly Removal



25.16 Component Removal continued

Load Weigh Indicator Removal

The load weigh indicator location is optional within the cockpit.

1. Remove the four screws that secure the indicator in its position and remove the indicator.
2. Disconnect electrical connector from the back of indicator.

The load weigh indicator is included with kit P/Ns 200-303-00, 200-303-10, 200-388-00, and 200-388-10 only.

Load Cell Removal

1. Remove the Cargo Hook per the above instructions.
2. Disconnect the load cell electrical connector at the belly of the helicopter.
3. Remove the Load Cell Assembly from the shackles on the suspension by removing the cotter pin, nut, washer, and bolt. The Onboard Systems cargo hook kit utilizes the existing suspension system hardware. Refer to Airbus Helicopters maintenance documentation for part numbers.

The load cell is included with kit P/Ns 200-303-00, 200-303-10, 200-388-00 and 200-388-10 only.

25.17 Component Re-installation

Slave Cylinder Assembly Re-installation

Install the slave cylinder assembly (P/N 232-205-00) onto the cargo hook per the following instructions:

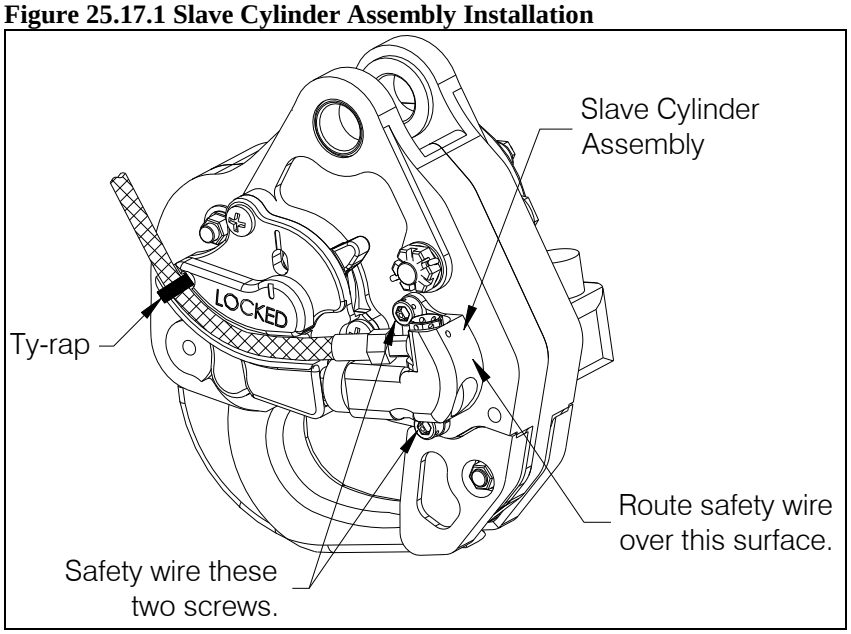
1. Ensure that the piston is in the retracted position. If the piston needs to be retracted connect the quick disconnect coupling and push the piston in.

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 and install the mounting screws (P/N 510-531-00).
3. Install safety wire between these screws around the backside of the slave cylinder. See Figure 25.17.1.
4. Route the hydraulic hose along the manual release cover and secure with ty-wrap at end of groove. Route through the hook bumper per the following section.

Figure 25.17.1 Slave Cylinder Assembly Installation



25.17 Component Re-installation continued

Cargo Hook Re-installation

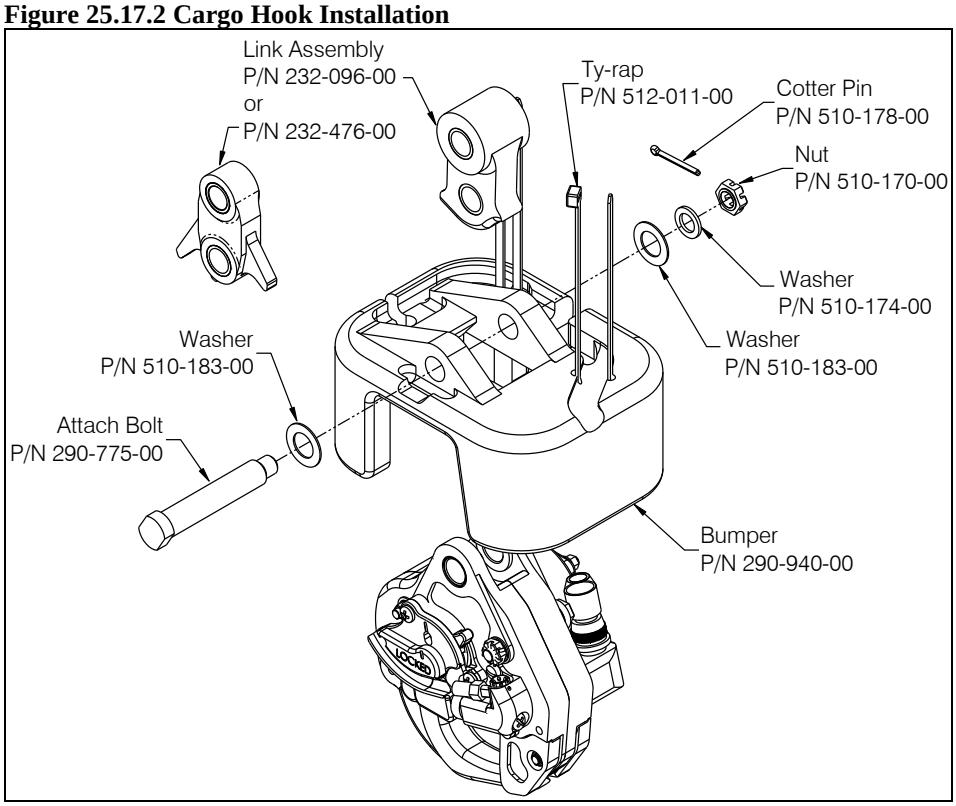
The following instructions are for installing the cargo hook onto the Link Assembly on the helicopter cable suspension (not shown in figure below).

NOTICE

The Cargo Hook load beam must point forward when installed.

1. Connect the electrical release harness to the cargo hook connector.
2. Insert ty-raps at the two (or three) pairs of small holes in the bumper (earlier versions of the bumper had two pairs of holes). Insert ty-raps through one hole from the top side of bumper and then back up through the adjacent hole.
3. Lower the bumper (with ty-raps) onto the cargo hook guiding the hydraulic hose and electrical release harness (not shown in figure below) into the slots in the bumper (ref Figure 25.17.2).
4. Insert attach bolt through bumper, cargo hook, and Link Assembly (or Load Cell Assembly if load weigh system is installed) and secure with hardware shown. Tighten nut (P/N 510-170-00) finger tight until fully seated and rotate to previous castellation if necessary to install cotter pin.
5. Route harness and hose through bumper as shown in Figure 25.17.3 and secure with the ty-raps. If load cell is installed route the load cell harness as shown in Figure 25.17.4.

Figure 25.17.2 Cargo Hook Installation



25.17 Component Re-installation continued

Cargo Hook Re-installation continued

Figure 25.17.3 Hose and Harness Routing at Bumper

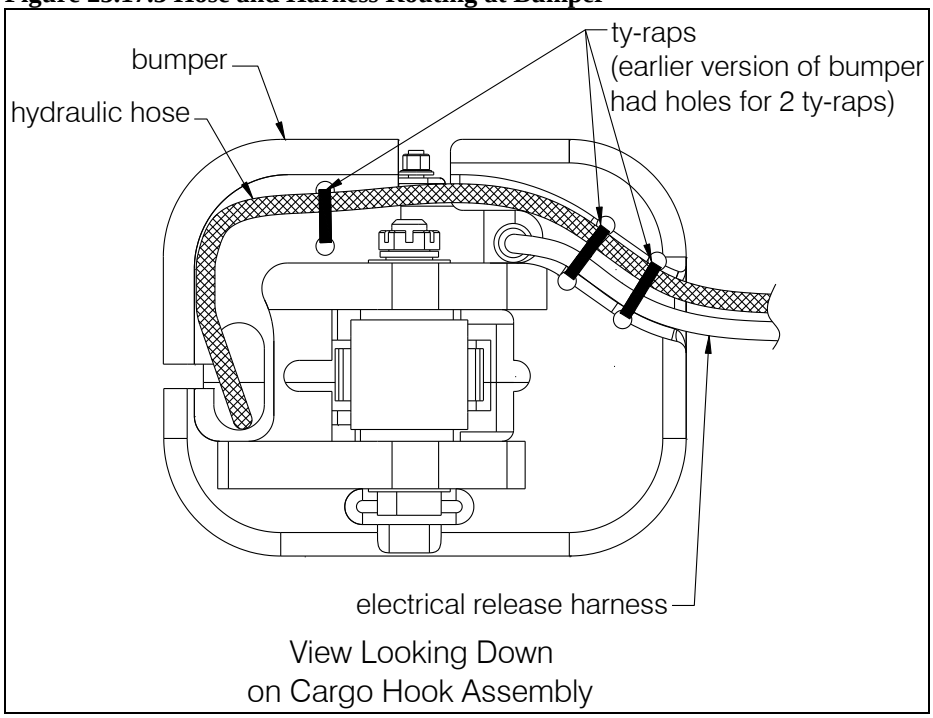
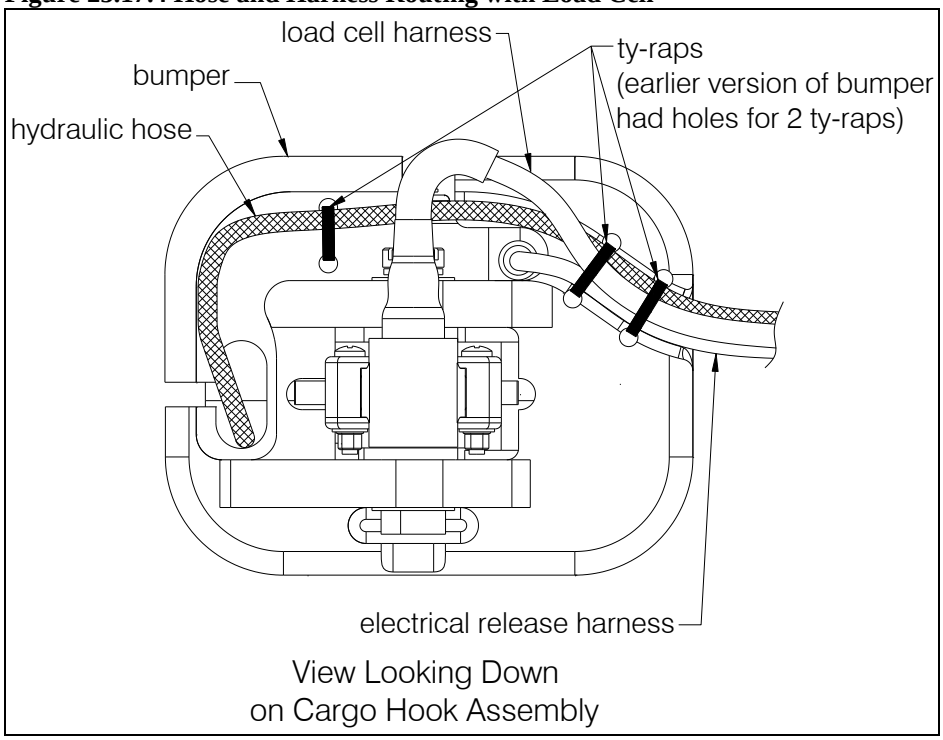


Figure 25.17.4 Hose and Harness Routing with Load Cell



25.17 Component Re-installation continued

Cargo Hook Re-installation continued

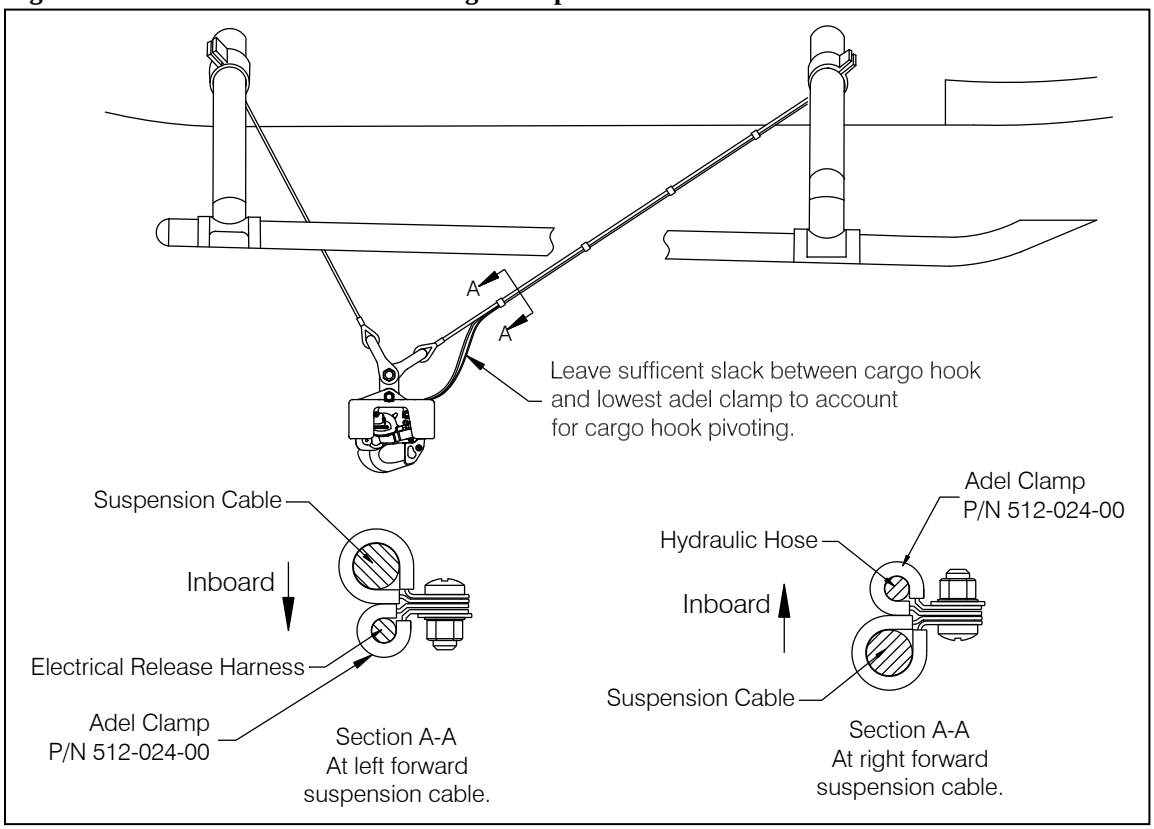
6. Route the hydraulic hose up the right forward suspension cable and secure it in four places, uniformly spaced, to the suspension cable using the P/N 512-024-00 adel clamps attached to the suspension cable adel clamps as shown in the figure below.

7. Route the electrical release harness up the left forward suspension cable and secure it in four places, uniformly spaced, to the suspension cable using the P/N 512-024-00 adel clamps attached to the suspension cable adel clamps as shown in the figure below.

⚠ CAUTION

Allow sufficient slack in the hose and electrical release harness between the last tie off point at the cargo hook bumper and the lowest adel clamp to account for pivoting and movement of the cargo hook.

Figure 25.17.5 Hose and Harness Routing at Suspension Cables

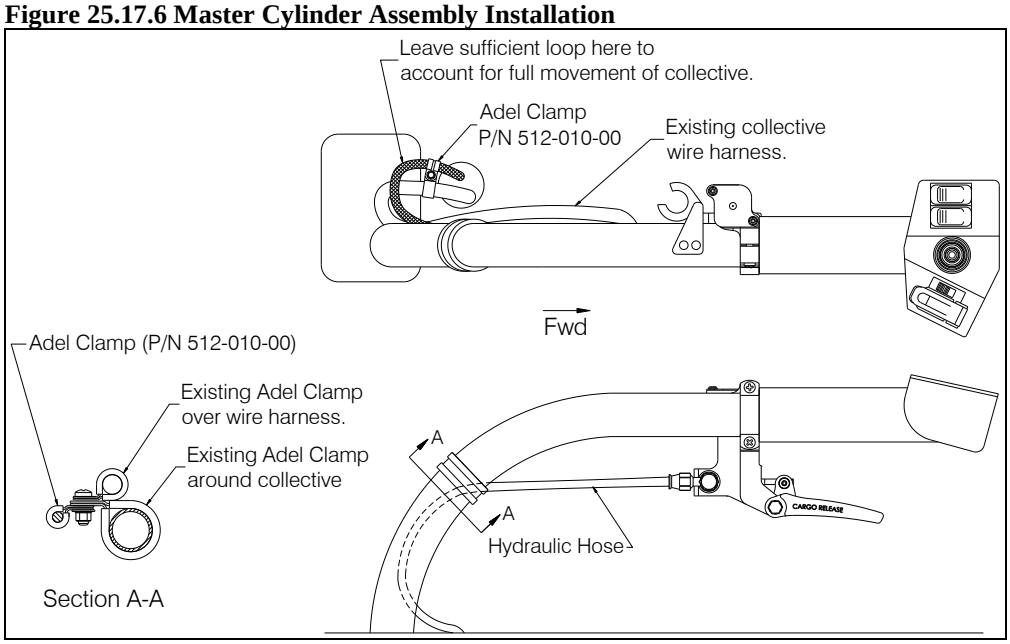


25.17 Component Re-installation continued

Fixed Hydraulic Release Hose Re-installation

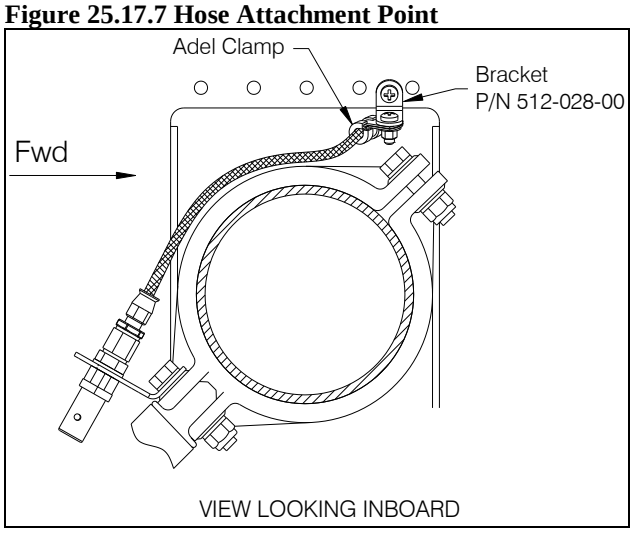
1. Install the master cylinder assembly (P/N 232-208-01) onto the collective stick with the two screws (P/N 510-390-00).
2. Route the hose through the hole in the floor through which the collective electrical wire harness is routed. Add sufficient loop to account for full movement of collective and secure with two adel clamps using the same attach points that the adel clamps for the collective wire harness uses.

Figure 25.17.6 Master Cylinder Assembly Installation



3. Underneath the cabin floor and aft of the collective re-install the adel clamp around the hose and secure the adel clamp to the bracket at the frame.
4. Route the hose outboard to the right forward suspension cable support and install the quick disconnect coupling to the disconnect bracket.
5. Re-install the adel clamp around the hose and secure the adel clamp to the bracket at the outside skin, just above the landing gear tube (see below).

Figure 25.17.7 Hose Attachment Point



25.17 Component Re-installation continued

Fixed Hydraulic Release Hose Re-installation continued

6. 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 section 5.1.

Load Weigh Indicator Re-installation

1. Place the Load Weigh Indicator into its mounting location and secure with four screws.
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 suspension cable shackles with the cotter pin, nut, washer, and bolt.

NOTICE

The Onboard Systems cargo hook kit utilizes the existing suspension system hardware. Refer to Airbus Helicopters maintenance documentation for part numbers.

2. Install the Cargo Hook and Bumper and route the load cell electrical harness through the bumper (refer to Figure 25.17.4).
3. Route the electrical harness up the left forward suspension cable, securing it to the four adel clamps on the suspension cable.
4. Connect the load cell electrical harness connector to the connector on the skin of the helicopter just forward of the left forward suspension cable attachment point.

25.18 General Procedural Instructions-Testing

After re-installation of the cargo hook or other major component, perform the following:

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

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

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

   - *Very* briefly press the Cargo Release switch, the cargo hook should not actuate and the load beam should remain closed.
   - Press and hold the Cargo Release switch for a few seconds, the load beam should fall to the open position and the cargo hook solenoid should continue to cycle repeatedly.
   - Push up on the load beam and verify that it latches and the hook lock indicator is aligned with the engraved line on the manual release cover (see Figure 5.1).

2. Activate the release handle located on the master cylinder assembly on the collective to test the cargo hook manual release mechanism. The Cargo Hook must release. Reset the hook by hand after release. If the hook does not release or relatch do not use the unit until the difficulty is resolved.

3. Swing the installed Cargo Hook and the suspension to ensure that the hydraulic release hose and the electrical harnesses have enough slack to allow full swing of each component without straining or damaging them. The hose and harnesses must not be the stops that prevent the Cargo Hook or the suspension from swinging freely in all directions.