Owner's Manual

TALON 3,300-lb Remote Cargo Hook

Onboard Systems International, LLC
13915 NW 3rd Court
Vancouver, WA 98685 USA
Cage Code: 1Y921

Toll Free Phone: (800) 275-0883
Phone: (360) 546-3072
Fax: (360) 546-3073

Applicable Equipment Part Numbers
528-018-01
528-018-02
528-018-03
528-018-05
528-018-06
528-018-09

Please check our web site www.onboardsystems.com for the latest revision of this manual.

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RECORD OF REVISIONS

Revision	Date	Page(s)	Reason for Revision
27	01/19/18	17	Removed NDT requirement for Cam (5.1).
28	12/03/18	10, 13	Added instructions to apply a corrosion preventative compound such as ACF to interior of cargo hook when operating in a marine/corrosive environment and to check interior for corrosion at annual inspection.
29	07/01/19	1, 4-7, 11-14, 17-20, 28, 32, 33, 35-41	Addition of new keeperless configuration, P/N 528-018-09 and retrofit kit P/N 212-057-00.
30	01/16/20	19	Replaced NDT inspection of Load Beam (8.1 or 8.5), Solenoid Side Plate (12), and Toggle (6.1) with magnified visual inspection; moved inspection step to Table 11.1.
31	02/10/20	6, 39 - 42	Updated table in section 3.3. Added cargo hook P/N 528-018-01 to parts list, updated notes and added note 8 to parts list to clarify differences between Cargo Hook part numbers.
32	01/03/23	20, 22, 23, 41	Add cleaning and inspection instructions for cam surfaces. Add cam assembly to overhaul kits.
33	06/03/25	34, 35	Clarified torque instructions for frame nuts.
34	06/29/26	43	Changed drive screw P/N 510-262-00 to P/N 510-940-00.

RECORD OF SERVICE BULLETINS/LETTERS

SB No.	Date	Description
159-024-00	10/20/08	This service bulletin replaces keeper bolt, spring, washer and nut and changed the cargo hook P/N from 528-018-01 to 528-018-02.
159-029-00	06/30/10	Revision to load ring size limitations for the P/N 528-018-01 and 528-018-02 cargo hooks (S/N 255 and higher),
159-042-00	11/1/17	Service Bulletin authorizing load rating increase of 528-018-XX Cargo Hooks from 3,000 lbs to 3,300 lbs / 1500 kg and instructions to remove and replace serial plate.

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1.0 Introduction

1.1 Scope

This owner's manual contains instructions for installation, operation, and maintenance of the 3,300-lb Remote Cargo Hook (P/Ns 528-018-01, 528-018-02, 528-018-03, 528-018-05, 528-018-06 and 528-018-09).

1.2 Capability

The instructions contained in this document are provided for the benefit of experienced aircraft maintenance personnel and facilities that are capable of carrying out the procedures.

1.3 Safety labels

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



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



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



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



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



Used to address practices not related to personal injury.

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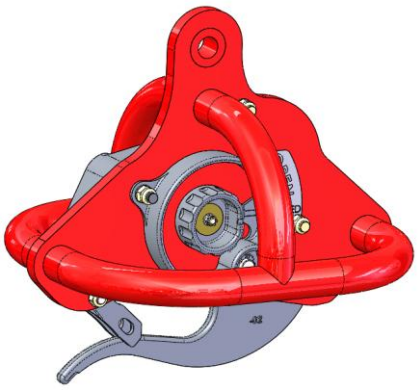
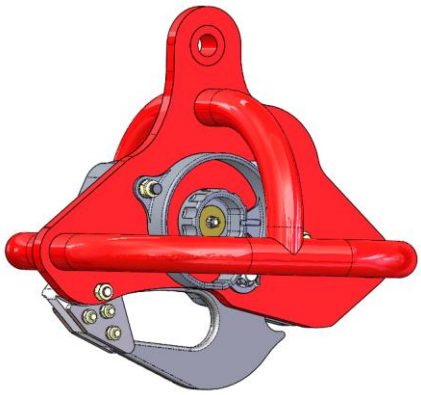
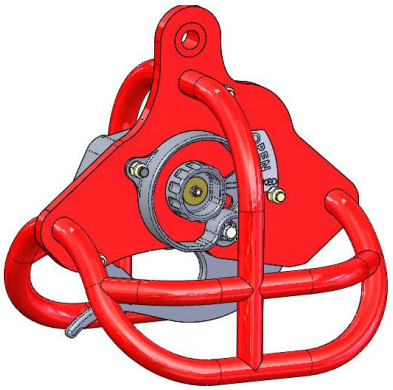
2.0 Referenced Documents

159-042-00 Service Bulletin – Load Rating Increase for Talon 3K Remote Hooks

3.0 System Overview

3.1 Description

The 528-018-XX Remote Cargo Hooks are intended for long line applications with loads up to 3,300 lbs (1500 kg) and are available in multiple configurations. The table below shows available options with either half or full protective cage and traditional keeper or keeperless style.

	Keeper	**Keeperless**
Half-Cage	**P/N 528-018-03** 	**P/N 528-018-09** 
Full-Cage	**P/N 528-018-06** 	

The half-cage option provides unobstructed access for most convenient loading of the cargo hook. The full cage option provides best cargo hook protection for missions in rugged and rocky terrain. Note: the keeperless configuration is factory-available in the half-cage configuration to accommodate the loading style of the keeperless design.

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The traditional keeper is quick and simple to load but also carries rigging size limitations. The keeperless design does not have rigging size limitations but is less rapid to load.

A keepered configuration can be readily converted to the keeperless configuration (and back) with an available conversion kit (P/N 212-057-00) using simple hand tools, referring to section 15 for parts and installation instructions. The retrofit kit cannot be used on P/N 528-018-01 until Service Bulletin 159-024-00 has been completed.

NOTICE

It is not recommended to convert a full-cage cargo hook to keeperless as the full-cage restricts the loading motion that is required to close the keeperless load beam.

3.2 Specifications

Table 3.1 Specifications

	P/N 528-018-03	P/N 528-018-06	P/N 528-018-09
Rated Load*	3,300 lbs (1,500 kg)*		
Release Capacity	8,250 lbs (3,750 kg)		
Ultimate Strength	12,375 lbs (5,625 kg)		
Power Requirements	21 – 28 VDC, 15 A		
Minimum Releasable Load	2 lbs (1 kg)	2 lbs (1 kg)	0 lbs (0 kg)
Unit Weight	27.5 lbs (12.5 kg)	28.0 lbs (12.7 kg)	27.5 lbs (12.5 kg)

* Previously, the 528-018-XX Cargo Hooks were rated at 3,000 lbs, but after re-qualification, they have been uprated to 3,300 lbs / 1500 kg. See Service Bulletin 159-042-00 for more information.

3.3 Obsolete Configurations

Obsolete part numbers and their replacements are shown below. It is recommended that obsolete configurations be updated to the superseded configuration at time of overhaul to take advantage of the design improvements offered.

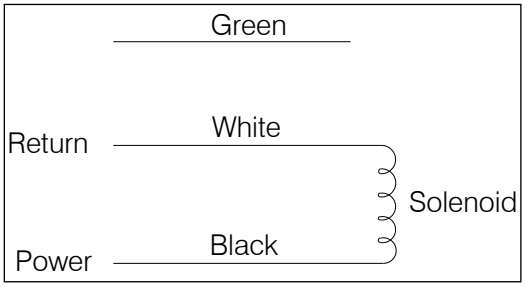
Part Number	Superseded Part Number
528-018-00	N/A*
528-018-01	528-018-03
528-018-02	528-018-03
528-018-05	528-018-06

*P/N 528-018-00 is not upgradeable to a newer configuration.

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3.4 Electrical Schematic

Figure 3.1 Electrical Schematic



Newer cargo hooks (shipped after July 2010) include an integral 3-prong connector. The ground pin on the connector is not used. The cargo hook is not polarity sensitive. The resistance across the solenoid should measure 1.6 – 2.2 ohms.

Table 3.2 Connector Pin Out

Wire Color	Screw Color	Function
Green	Green	Not Used
White	Silver	Return
Black	Brass	Power +

3.5 Theory of Operation

The primary elements of the Cargo Hook are the load beam, the internal mechanism, and a DC solenoid. The load beam supports the load and is latched through the internal mechanism. The solenoid and an external manual release knob provide the means for unlatching the load beam.

In the keepered configuration the load beam is normally returned to its closed position after release of the load by a spring in the internal mechanism. In the closed position, a latch engages the load beam and latches it in position. The load is attached to the load beam by passing the cargo load ring into the throat of the load beam past a spring-loaded keeper, which secures the load.

To release the load, the latch is disengaged from the load beam. With the latch disengaged, the weight of the load causes the load beam to swing to its open position, and the cargo sling slides off the load beam. A spring in the internal mechanism then drives the load beam back to its closed and latched position. In the keeperless configuration the load beam remains open, ready for the next load to be attached.

Load release can be initiated by two different methods. Normal release is achieved by pilot actuation of the DC solenoid. When the DC solenoid is energized, it opens the latch in the internal mechanism. The load can also be released by rotation of the manual release knob located on the side of the Cargo Hook.

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4.0 Installation

4.1 Functional Check Prior to Installation

If the Cargo Hook is not new, ensure that the Cargo Hook has been subjected to a satisfactory Acceptance Test Procedure as detailed in the maintenance section.

If the Cargo Hook has passed the Acceptance Test within 2 years since last use and has been stored in accordance with the instructions listed in Section 6.1, no further checks or tests are required. If the above time limit has expired or the Cargo Hook has been stored in high temperature or damp conditions, the Acceptance Test must be repeated.

4.2 Cargo Hook Installation

Inspect the mounting hardware to be used to ensure that all components are in serviceable condition before installing the new Cargo Hook.

⚠ WARNING

Spinning sling loads require use of an electric swivel. Twisting loads may wind up the long line and then suddenly reverse, spinning the cargo hook and causing an uncommanded release.

The Cargo Hook may be installed using either an electric swivel (See Figure 4.1) or an anchor shackle (See Figure 4.2). This compatible hardware is available from Onboard Systems under the following part numbers. See the referenced Owner's Manual for complete information, as applicable. When using an anchor shackle install safety wire per Figure 4.3.

Part Number	Description	Owner's Manual
200-434-00	Electric Swivel Kit	120-225-00
200-372-00	Electric Swivel Kit	120-205-00
530-021-00	Anchor Shackle	N/A

Connect the Cargo Hook electrical release cable wiring to the aircraft electrical release circuit wiring. The connection of the black and white wires in the electrical release cable to the aircraft wiring is not polarity dependent. The cargo hook will function properly as long as the electrical release power circuit is completed.

Newer Cargo Hooks (manufactured after July 2010) are fitted with an electrical connector (Onboard Systems P/N 410-300-00). This connector is compatible with a Leviton P/N 5259-VY (Onboard Systems P/N 410-299-00). See Table 3.2 for connector pin-out.

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Figure 4.1 Electric Swivel Attachment

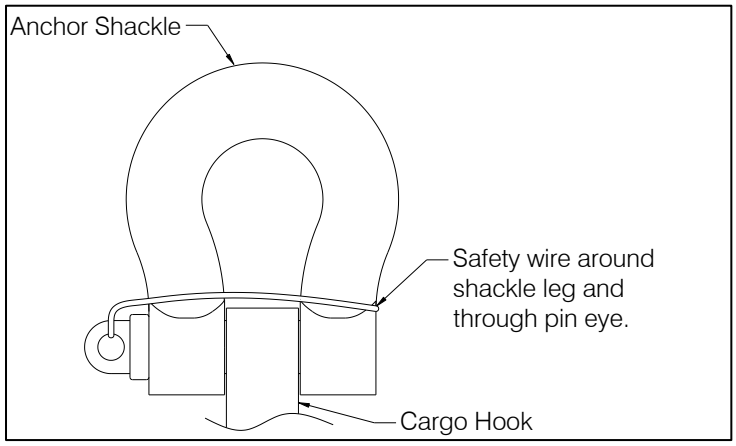


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Figure 4.2 Anchor Shackle Attachment



Figure 4.3 Anchor Shackle Safety Wire



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4.3 Post Installation Check-Out

After installation of the Cargo Hook, perform the following functional checks.

1. Ensure that the electrical release cord has enough slack to allow full swing of the Cargo Hook without straining or damaging the electrical release cord.

2. Apply 1-5 pounds (or no load if 528-018-09 keeperless cargo hook is installed) to the cargo hook load beam and energize the cargo hook electrical release circuit. The Cargo Hook should release. Ensure the cargo hook automatically re-latches (keepered configuration) or latches when pushed up and closed (keeperless configuration).

3. Apply 1-5 pounds (or no load if 528-018-09 keeperless cargo hook is installed) to the cargo hook load beam and turn the manual release knob in the counter-clockwise direction. The Cargo Hook should release. Ensure the cargo hook automatically re-latches (keepered configuration) or latches when pushed up and closed (keeperless configuration).

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5.0 Operation Instructions

Before operating the cargo hook, be completely familiar with the Rotorcraft Flight Manual Supplement for External Cargo Operation for your helicopter and perform the following functional checks.

Release the cargo hook electrically by energizing the cargo hook electrical release circuit. The mechanism should operate smoothly and the cargo hook must re-latch after release. If the hook does not re-latch do not use the unit until the difficulty is resolved.

WARNING

Accumulated dust, dirt, grime and/or corrosion can cause unreliable re-latch of the cargo hook. Remove immediately from service for disassembly, visual inspection, and cleaning if re-latch performance is sluggish. In a marine environment apply a corrosion preventative compound such as ACF-50 to interior components.

CAUTION

The solenoid in the hook is not rated for continuous duty. Continuous power to the solenoid for longer than 30 seconds may damage the solenoid.

For ground operations, the manual release knob can be rotated counter-clockwise to release the cargo hook load beam. Rotate the manual release knob, the mechanism should operate smoothly. A keepered cargo hook must re-latch after release while the keeperless cargo hook load beam should remain open.

5.1 Cargo Hook Rigging

Extreme care must be exercised in rigging a load to the Cargo Hook. Steel primary load rings are recommended to provide consistent release performance and resistance to fouling. When using steel load rings, verify that the load ring and the rigging attached to it will freely slide off the load beam when it is opened.

WARNING

It is the responsibility of the operator to ensure the cargo hook will function and release properly with each individual rigging configuration.

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The Cargo Hook can accommodate different styles of primary steel load rings (see Figure 5.1 for examples) as long as the largest inside dimension of the load ring is less than the Max. Load Ring Size listed in the table below (*the keeperless configuration 528-018-09 does not have a maximum load ring size limitation*).

A smaller load ring size is required for a Cargo Hook with load beam P/N 290-683-00. This load beam was originally included with cargo hook P/N 528-018-01 but could be retrofitted to other cargo hook P/Ns, refer to Figure 15.3 to verify load beam configuration.

Table 5.1 Maximum Load Ring Sizes

Load Beam P/N	Max. Load Ring Size (see Figure 5.1)	Load Ring Warning Decal P/N
290-683-00	2.00 in. (5.08 cm)*	215-359-00
290-683-01	3.25 in. (8.26 cm)**	215-203-00
290-683-02	3.25 in. (8.26 cm)**	215-203-00
292-038-00	N/A for Keeperless	N/A for Keeperless

*An Isolated Shackle Assembly (P/N 530-023-00) is available from Onboard Systems that meets this requirement.

**A pear-shaped ring (P/N 530-020-00) is available from Onboard Systems that meets this requirement.

WARNING

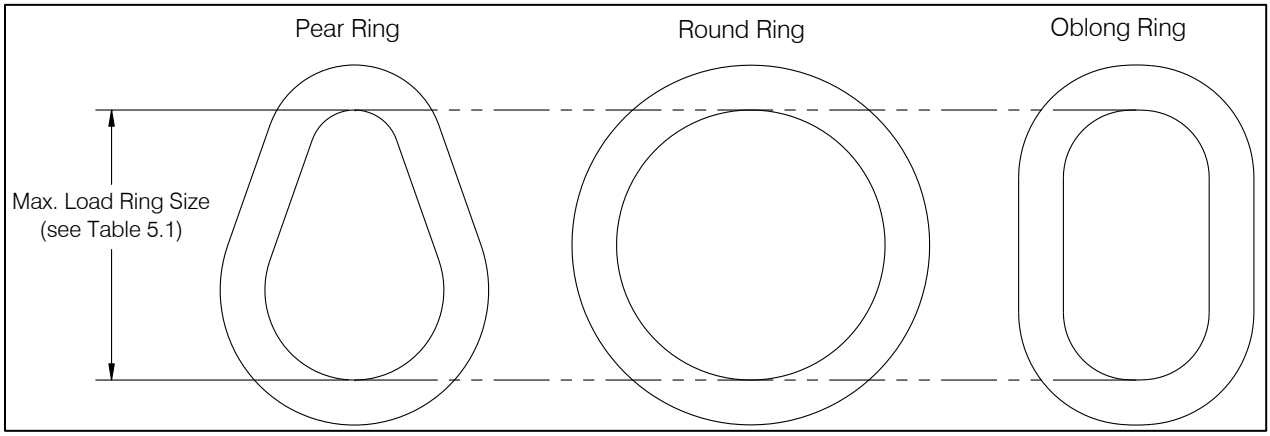
To prevent loss of load, the inside diameter of the primary load ring should not exceed the size listed.

NOTICE

The keeperless style cargo hook, P/N 528-018-09, does not have a maximum load ring size restriction.

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Figure 5.1 Load Ring Examples



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6.0 Maintenance

6.1 Storage

The Cargo Hook may be stored in its original factory box for up to 2 years from its date of manufacture or last factory overhaul. If stored in its original box for less than 2 years, it may be used without any additional activity. If the period of storage in its original packaging is greater than 2 years the cargo hook must be subjected to the acceptance test procedures (ATP) described herein before being used.

If the Cargo Hook is to be removed from service, store it indoors. If it is to be stored longer than 6 months perform the following. Prepare the cargo hook for storage by thoroughly cleaning and drying the exterior, liberally applying ACF-50 corrosion preventative compound inside and out, sealing it in a plastic bag with a desiccant, and labeling it with the date of storage. If stored in this condition for less than 2 years, it may be used without any additional activity. If the period of storage exceeds 2 years the cargo hook must be subjected to the acceptance test procedures (ATP) described herein before being used.

Time Between Overhaul criteria still apply regardless of storage conditions and time.

6.2 Prior to External Load Operations

1. Check all fasteners to ensure that they are in place and secure.
2. Check the electrical cord and connection for damage and security.
3. Check the load beam, case and covers for cracks and damage.
4. For cargo hook configurations with keeper: open and close the keeper to ensure smooth operation with no binding. Check that the keeper fully closes and overlaps the load beam.
5. Cycle the electrical and manual release mechanisms to ensure proper operation.
6. Verify hook locked indicator aligns consistently when cargo hook is cycled.

6.3 Monthly Preventive Maintenance

Remove accumulated soils from the exterior with a soft bristle brush and mild solvent/cleaner

In corrosive environments, such as areas close to salt water, apply a corrosion preventative compound such as ACF-50 to all exterior surfaces and open the load beam to spray into the interior of the cargo hook.

6.4 Annual Inspection

Annually or 100 hours of external load operations, whichever comes first, thoroughly clean the exterior with a soft bristle brush and mild solvent/cleaner and visually inspect for cracks, gouges, dents, nicks, corrosion, and missing or loose fasteners. Open the load beam and check the visible parts in the interior of the cargo hook for corrosion.

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6.5 Overhaul

Overhaul the cargo hook in accordance with the overhaul schedule and instructions contained here-in.

6.6 Repair

Repair the cargo hook in accordance with the repair instructions contained here-in.

7.0 Repair Instructions

It is recommended that only minor repairs be attempted by anyone other than the factory. The following procedures and information are provided for the benefit of experienced aircraft maintenance facilities and trained maintenance and inspection personnel capable of carrying out the procedures. They must not be attempted by those lacking the necessary expertise and suitable equipment to acceptance test the cargo hook after maintenance. See Section 16.0 instructions for returning equipment to the factory.

Reference numbers throughout this manual shown in parentheses ( ) refer to Table 15.1 and Figure 15.1 and Figure 15.3.

Follow these steps to repair the Cargo Hook, referring to the applicable sections in this manual.

1. Disassemble as required.
2. Inspect disassembled parts.
3. Obtain required replacement parts.
4. Re-assemble.
5. Acceptance test.
6. Inspect for return to service.

8.0 Overhaul Schedule

The Cargo Hook shall be overhauled every 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 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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9.0 Overhaul Instructions

It is recommended that only minor repairs be attempted by anyone other than the factory. The following procedures and information are provided for the benefit of experienced aircraft maintenance facilities and trained maintenance and inspection personnel capable of carrying out the procedures. They must not be attempted by those lacking the necessary expertise and suitable equipment to acceptance test the cargo hook after overhaul. See Section 16.0, Instructions for Returning Equipment to the Factory.

An overhaul kit is recommended to complete the Cargo Hook overhaul. The overhaul kit contains all recommended items to be replaced at time of overhaul. Table 15.1 lists detail parts contained in the overhaul kit.

Follow these steps to overhaul the Cargo Hook, referring to the applicable sections in this manual:

1. Obtain Overhaul Kit per the following table.

Cargo Hook P/N	Overhaul Kit P/N
528-018-02 528-018-05	212-018-00
528-018-03 528-018-06 528-018-09	212-030-00

2. Completely disassemble.
3. Discard all items that are to be replaced by an item in Overhaul Kit listed in Table 15.1 (bearings, roll pins, cotter pins, fasteners, nuts and washers).
4. Inspect disassembled parts.
5. Obtain required replacement parts.
6. Re-assemble.
7. Acceptance test.
8. Inspect for return to service.

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10.0 Disassembly Instructions

Reference numbers throughout this manual shown in parentheses ( ) refer to Table 15.1 and Figure 15.1 and Figure 15.2.

1. Remove the Nut (20) and Washer (28) from inside the Manual Release Knob (9).
2. Remove the Manual Release Knob (9), Spacer (27) and Wave Washer (39).
3. Remove the Nut (29) and Washer (24) from the Load Beam Bumper Bolt (32).
4. Remove the Nut (31) and Washer (25) from the Keeper Pivot Bolt (36).
5. Remove the Nut (29) and Washer (23) from the Toggle Pivot Bolt (21).
6. Remove Nut (29) and Washer (24) from Frame Bolt (32).
7. Remove the Cotter Pin (19), Nut (17) and Washer (22) from the Load Beam Pivot Bolt (35).
8. Lift the Cage Weldment (7) off of the Solenoid Side Plate (12).
9. Lay the Solenoid Side Plate on the bench and remove the Load Beam Bumper (41) and Load Beam Bumper Bolt (21).
10. For the cargo hooks configurations with Keeper: Remove the Keeper (10), Keeper Spring (38), Spacer (11), and Bolt (36). Be careful of the spring tension on the Keeper Spring.

    For the Keeperless configuration (P/N 528-018-09) remove the Bolt (36) and the Armor Plate assembly (18, 26, 44, 45, and 46). The Armor Plate assembly can be disassembled by removing the three nuts (26) and separating the parts.
11. Remove the Load Beam Bolt (35). Remove the Load Beam Assembly (8) by rotating it down slightly to clear the Toggle and lifting it out of the Side Plate.
12. Remove the Cam Roller Pin (42) and the Bolt (21) that the Toggle pivots on. Pull the Cam Assembly (5) up approximately 1/4 inch and allow the Cam to rotate clockwise. The Toggle Assembly (6) may now be removed.
13. Remove the Cam Assembly (5) and Spring (40) by lifting the Cam out of its pocket and unwinding the spring tension by rotating the cam clockwise. Be careful of the spring pre-load tension.
14. Remove all remaining bolts from the Solenoid Side Plate (12).
15. Remove the Solenoid Ring Screws (33), washers (34), Wedge Ring (13), Nuts (26) and Washers (18).
16. Remove the Solenoid Assembly (4) out of the Solenoid Side Plate.

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11.0 Inspection Instructions

Carefully inspect the detail parts in accordance with the instructions in Table 11.1. Parts should be completely free of surface contaminants, soils or grease before beginning inspections. Inspect the parts in a clean, well-lit room.

Table 11.1 Cargo Hook Overhaul Inspection

Seq	Component	Inspection Criteria & Limit	Repair Action	Finish	Recommended replacement at overhaul.
1.	Load Beam (8.1 or 8.5), Solenoid Side Plate (12), Toggle† (6.1)	Cracks. Inspect under illuminated magnification (2X or higher power)	None. Cracks of any size are cause for part replacement.	N/A	No
2.	Load Beam (8.1 or 8.5), Solenoid Cam (4.2) Keeper (10)	Corrosion – 0.010 in. (0.25 mm) deep.	Glass bead blast at less than 30 PSI (2.11 KGF/CM^2) to remove corrosion.	Passivate per AMS-QQ-P-35 or ASTM A967	No
3.	Side Plate (12)	Dents, nicks, gouges, scratches, and corrosion – 0.060 in. (1.52 mm) deep.	Glass bead blast at less than 30 PSI (2.11 KGF/CM^2) to remove corrosion. Blend at 10:1 ratio as required to provide smooth transitions.	Apply alodine (MIL-DTL-5541) and zinc chromate primer (MIL-PRF-23377 or similar) to affected surfaces – see Note 1	No
4.	Manual Rel. Knob (9), Brush Guard (14) Armor Plate Adapter* (44) *cargo hook P/N 528-018-09 only	Dents, nicks, cracks, gouges, scratches and corrosion – 0.050 in. (1.27 mm) deep.	Blend at 10:1 ratio as required to provide smooth transitions.	Apply alodine (MIL-DTL-5541) & zinc chromate primer (MIL-PRF-23377 or similar) to affected surfaces – see Note 1.	No
5.	DU bushing (5.3, 5.4, 6.2, 6.5, 8.4)	Wear – more than 50% copper showing.	None. Replace.	N/A	Yes
6.	Bearing (6.6)	Roughness, binding, looseness, or corrosion.	None. Replace.	N/A	Yes
7.	Bumper (41)	Denting, cuts or abrasions – 0.060 in. (1.27 mm) deep.	None. Replace.	N/A	Yes

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Seq	Component	Inspection Criteria & Limit	Repair Action	Finish	Recommended replacement at overhaul.
8.	Keeper (10) Armor Plates* (45) *cargo hook P/N 528-018-09 only	Gouges and nicks – 0.060 in. (1.52 mm) deep. No visible cracks.	Blend at 10:1 ratio as required to provide smooth transitions. Replace if visibly cracked.	Passivate per AMS-QQ-P-35 or ASTM A967	No
9.	Cam Assembly (5)	Visible wear or dents on bearing surface (Fig 11.2).	None. Replace.	N/A	Yes
10.	Cam Assembly (5)	Roughness, binding or looseness of the Interlock Roller (5.2).	Replace Interlock Pin (5.5), Roller (5.2) and Bearings (5.3). Stake ends of pin.	N/A	Yes
11.	Toggle Assembly (6)	Roughness, binding or looseness of the Load Beam Roller (6.4).	Replace Pin (6.3), Roller (6.4), and Bearing (6.5). Stake ends of pin.	N/A	No
12.	Load Beam (8.1 or 8.5)	Wear, gouges and nicks – 0.10 in. (2.54 mm) deep.	Blend at 10:1 ratio as required to provide smooth transitions and ensure load rings will not hang up on load beam during release.	Passivate per AMS-QQ-P-35 or ASTM A967	No
13.	Cage Weldment (7)	Tubes deformed such that access to knob and load beam are obstructed. Wear at upper attachment lug hole - .81 in. (20.6 mm)	None. Replace.	N/A	No
14.	Spring Guide (15)	Wear, gouges, and nicks – 0.060 in. (1.27 mm) deep.	None. Replace	N/A	No
15.	Serial Number Plate (2)	Damaged or illegible.	None. Replace.	N/A	No

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Seq	Component	Inspection Criteria & Limit	Repair Action	Finish	Recommended replacement at overhaul.
16.	Open Decal (1) Rigging Warning Decal (3)	Damage or illegible.	None. Replace.	N/A	Yes
17.	Springs (38, 40)	Cracks or deformation.	None. Replace.	N/A	Yes
18.	Solenoid (4.1)	Shorted or open electrical circuit. Resistance 1.9 ± .3 ohms.	None. Replace.	N/A	No
19.	Electrical connector (4.5)	Loose, missing, or damaged prongs, cracked case.	None. Replace.	N/A	No
20.	Electrical cord (4.6), electrical wires (4.7)	Deterioration, exposed conductors.	None. Replace.	N/A	No
21.	All remaining nuts, bolts, roll pins, cotter pins, washers, heli-coils	Wear, corrosion or deterioration.	None. Replace.	N/A	Yes

Note 1 – optional finish: black anodize per MIL-A-8625 Type II, Class 2 after NDT (if NDT is required). Prepare for anodize by using standard methods.

†The toggle may be subject to wear from the cam return spring. Up to .06 in. (1.52 mm) wear depth is acceptable without replacement

Figure 11.1 Toggle Wear Area



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Figure 11.2 Cam Assembly (5) Inspection Criteria

WARNING

Thoroughly inspect surfaces inside lines for signs of visible wear, dents, corrosion, gouges or nicks. Continued use of a damaged cam may cause inadvertent load release.

WARNING

Repair (including filing, deburring and buffing) is prohibited on all surfaces shown inside lines. Alterations of these surfaces may cause inadvertent load release.

Figure 11.2.1

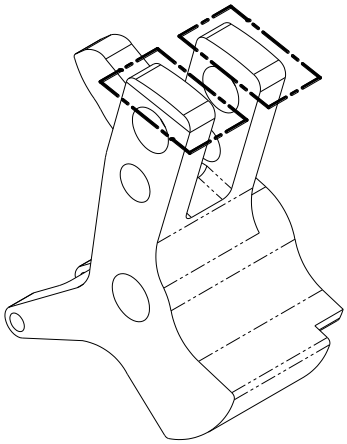


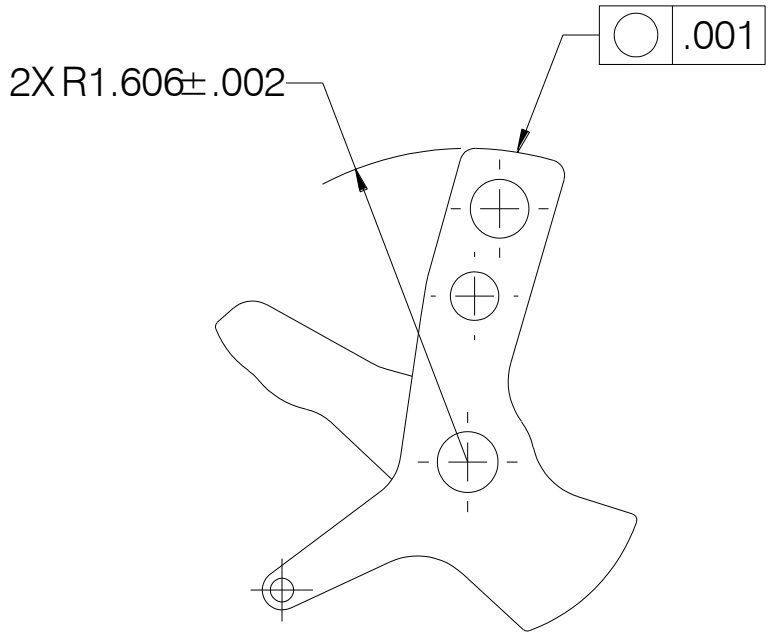
Figure 11.2.2



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Figure 11.2.3



Inspection Criteria and Limits

Inside lines, see figure 11.2.1, gently clean surface by hand using Scotch-Brite (MFG: 3M, MFG P/N: 7447). Visually inspect surface. No dents, corrosion, gouges, or nicks may remain after cleaning, see figure 11.2.2. If the cam passes visual inspection, dimensionally inspect per figure 11.2.3.

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12.0 Re-assembly Instructions

Reference numbers throughout this manual shown in parentheses ( ) refer to Table 15.1 and Figure 15.1 and Figure 15.3.

1. Replace all parts found to be damaged with serviceable parts.

2. Affix Load Ring Warning Decal (3) onto Side Plate (12) and burnish in place.



3. If Load Beam Assembly (8) was disassembled, press Spacer Bushing (8.2) into the Load Beam (8.1 or 8.5).



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4. Install DU bushings (8.4) into the Spacer Bushing (8.1), one from each side, using wet zinc chromate primer. Install Snap Ring (8.3)



5. If Toggle Assembly (6) was disassembled, press in Load Beam Roller Bearing (6.5) into Load Beam Roller (6.4) using wet zinc chromate primer. Capture the Load Beam Roller in the Toggle (6.1) with Load Beam Roller Pin (6.3). Press Cam Roller Bearing (6.6) into the Toggle. Stake both sides of the Toggle to retain the bearing and the pin.



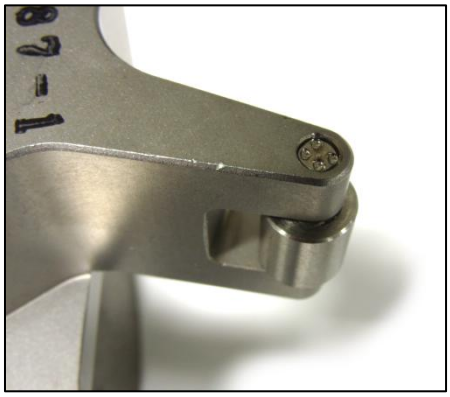


6. Press in two DU bushings (6.2) into the Toggle using wet zinc chromate primer, one from each side.

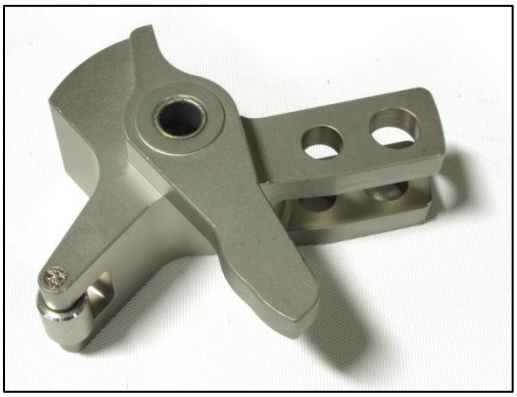


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7. If the Cam Assembly was disassembled, press in two Bushings (5.3) into Roller (5.2) using wet zinc chromate primer, one from each end. Capture the Roller in the Cam (5.1) with the Interlock Pin (5.5). Stake pin three times on both ends as shown.



8. Press two DU bushings (5.4) into the Cam using wet zinc chromate primer, one from each side.



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9. If the solenoid assembly was disassembled, install the Solenoid Cam (4.2) with the three Washers (4.3) and Screws (4.4), using Loctite Threadlocker. Note orientation of solenoid cam in relation to the wires. Safety-wire the screws together as shown.



10. Install the Solenoid Assembly (4) into the Side Plate (12) with the Solenoid Ring Screws (33), Washers (34), Wedge Ring (13), two Nuts (26) and two Washers (18).





11. Lightly grease the bottom of the pocket with MIL-PRF-23827 or equivalent general purpose grease. Install the Cam Pivot Bolt (30) into the Side Plate (12). For 528-018-03 and 528-018-06 only - install Spring Guide (15) over the Cam Pivot Bolt.





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12. For the 528-018-02 and 528-018-05 cargo hooks - Install the Cam Spring (40) partially into the Solenoid Side Plate. Slide the Cam (5) over the Bolt (30) and hook the spring onto the cam. Pre-load the spring by rotating the cam counterclockwise 360 degrees with the free end of the spring started into its pocket. Slide the spring and cam into the pocket while maintaining the spring pre-load. It will be necessary to guide the free end of the spring into the lower part of its pocket.

13. For the 528-018-03 and 528-018-06 cargo hooks - Hook the loop on the Cam Spring (40) onto the Cam (5) and place these over the Bolt (30) and Spring Guide (15). Pre-load the spring by rotating the cam counterclockwise 360 degrees with the free end of the spring started into its pocket. Slide the spring and cam into the pocket while maintaining the spring pre-load. It will be necessary to guide the coils of the spring, using a flat screwdriver, around the spring guide so they are stacked upon each other.


528-018-03 & 528-018-06 shown


528-018-03 & 528-018-06 shown


528-018-03 & 528-018-06 shown

14. Grease the needle bearing (6.6) in the Toggle (6) with MIL-PRF-23827 or equivalent general purpose grease prior to assembly.



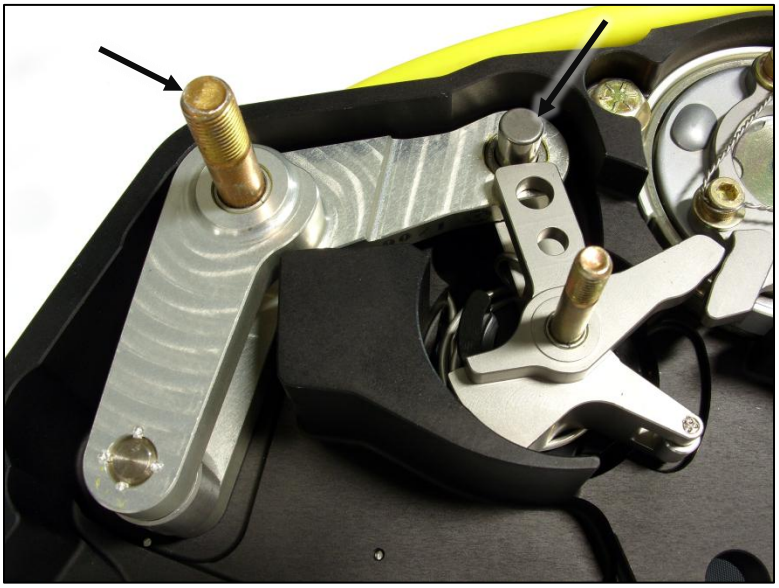
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15. Install the Toggle (6) by lifting the Cam (5) about a 1/4 inch (6.4 mm) from the bottom of its pocket and wiggling the Toggle into place. Ensure Cam Spring (40) has not moved from its place.



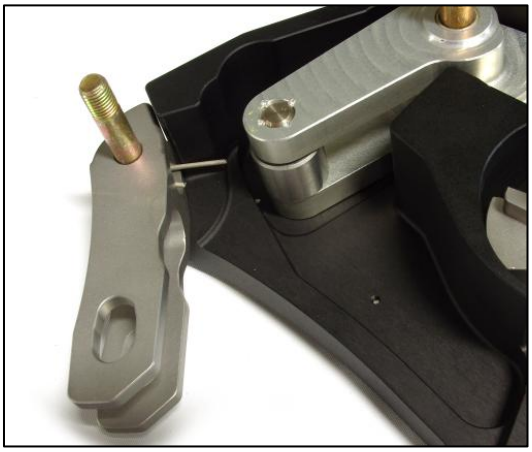


16. Install the Bolt (21) that the Toggle pivots on and the Cam Roller Pin (42).

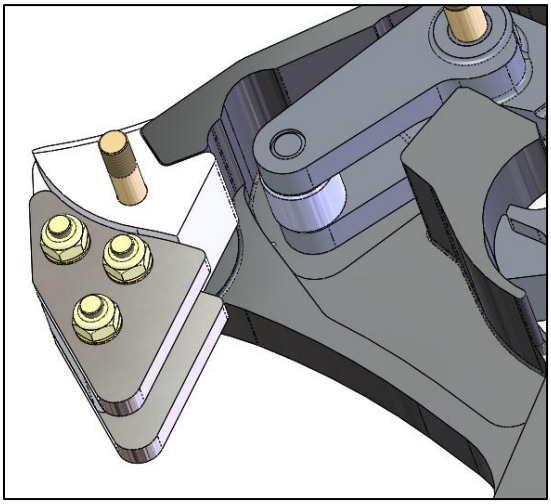


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17. For Keepered configurations (all P/Ns except 528-018-09): Install Bolt (36), Keeper (10) and Keeper Spring (38). Ensure Keeper is oriented as shown below. If new spring is installed, trim as shown.



18. For P/N 528-018-09 keeperless configuration: If disassembled, re-assemble the Armor Plates (45) Armor Plate Adapter (44) with three bolts (46), washers (18) and nuts (26). Tighten the nuts to 50-75 in-lbs. Install this assembly over the bolt (36).

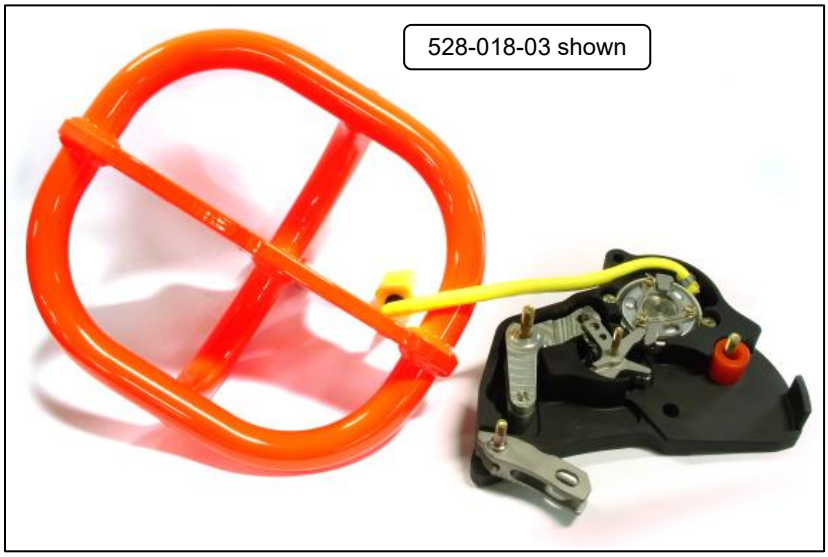


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19. Install the Load Beam Bumper (41) and the Load Beam Bumper Bolt (32).

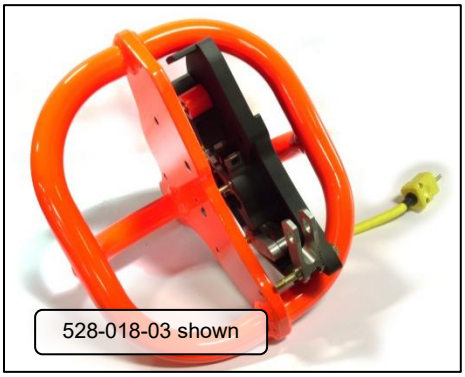


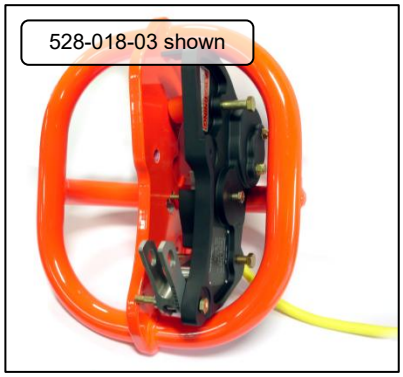
20. Route the electrical cable through the Cage Weldment (7) as shown.



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21. Place the Cage Weldment (7) onto the Side Plate (12) and over the protruding bolt ends. Be careful that the cam does not come out of position. Install and lightly torque Keeper Nut (31) and Washer (25) and Toggle Nut (29) and Washer (23) to hold assembly together. Before torqueing the nuts, the housing should rest flush against the main frame. If there are any gaps, something is out of position and torqueing the nuts might damage the part.







22. Install Washer (24) and Nut (29) over the load beam bumper Bolt (32) and torque the nut.

23. Grease Cage Weldment and Manual Release Knob (9) as shown with Mil-PRF-23827 or equivalent general purpose grease as shown.

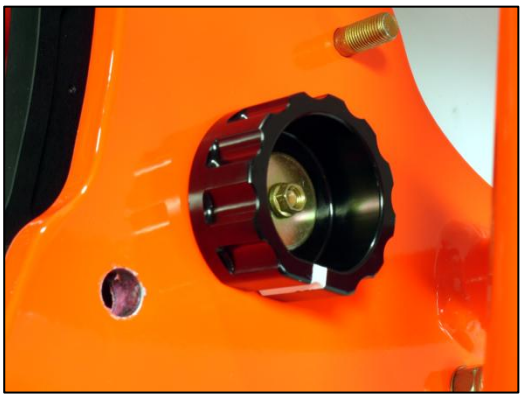




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24. Install Wave Washer (39), Spacer (27), Manual Release Knob (9), Washer (28) and Nut (20) over the Cam Pivot Bolt (30). Make sure that the wave washer is not trapped between the spacer and the frame, and the manual release knob striker is inserted into the slot in the side plate. Secure the Nut (20).





25. Rotate the Manual Release Knob counterclockwise to make sure the mechanism is free.

26. While holding the Manual Release Knob in the open position, insert the Load Beam Assembly (8) into position and install the Load Beam Pivot Bolt (35).





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27. Install Frame Bolt (32).
28. For 528-018-03 and 528-018-06 – Install Brush Guard Spacer (16) on to the Load Beam Pivot Bolt. Install Brush Guard (14) over the bolts over the Toggle Pivot Bolt and Load Beam Pivot Bolt.





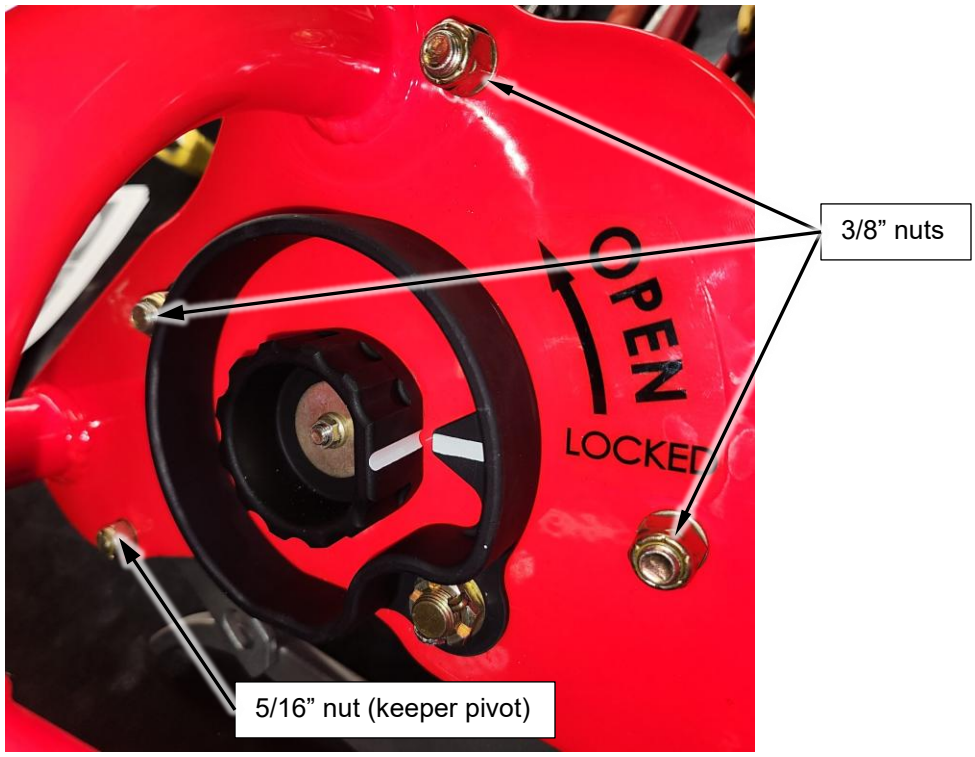
29. Install Washer (23) and Nut (29) over the Toggle Pivot Bolt.
30. Secure the Nut (17) and Washer (22) on the Load Beam Pivot Bolt and torque to fit Cotter Pin (19). Install Cotter Pin.



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31. Torque the frame nuts (180-200 in-lbs. for the 3/8" nuts and 50-75 in-lbs. for the 5/16" nut) evenly in several stages to avoid distorting the housing. Check for free operation and re-latch of the load beam.

    Note: Service Bulletin 159-024-00 (issued in 2008) changed the keeper pivot bolt from 1/4" to 5/16".



32. Affix Open Decal (1) and burnish in place.



33. Perform Acceptance Test Procedures as listed in Section 13.0 of this manual.

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13.0 Acceptance Test Procedure

After the hook has been overhauled, repaired or stored for an extended period of time (see section 6.1) it must be subjected to the Acceptance Test Procedure (ATP) as follows. Examine the Cargo Hook externally for security of the fasteners. Suspend the hook from a test rig capable of loading the Cargo Hook to 8,250 pounds. Use a steel cable or chain to apply the load to the load beam.

13.1 Minimum Load Release Test

Ensure that the cargo hook load beam is locked. Place a 1 to 5 pound load on the load beam (or no load if testing 528-018-09). Rotate the manual release knob in the counter-clockwise direction. The load beam should unlatch and fall open. After the load is released, ensure that the load beam re-latches. For keeperless configuration 528-018-09, manually push the load beam up and ensure it re-latches.

Connect an adjustable 22 - 28 VDC power supply with a momentary release switch wired into the electrical release circuit. Place a 1 to 5 pound load on the load beam (or no load if testing 528-018-09). With 22 VDC supplied, press the release switch. The load beam should unlatch and fall open, releasing the load.

CAUTION

Damage to the release solenoid can occur if the release switch is operated for more than 30 seconds continuously.

13.2 Proof Load Test

⚠ WARNING

Do not release the proof test load electrically or manually. Decrease the load gradually, using the test machine, after completion of the proof load test.

Gradually load the Cargo Hook on the test rig to 8,250 pounds. Hold the load for 1 minute. The load beam should hold the load without unlatching. Reduce the load to zero.

13.3 Electrical Release Test

Apply a load using a steel cable or chain with a steel load ring that is free to drop clear of the load beam. Gradually load the Cargo Hook to 3,300 pounds and hold the load for 2 minutes.

With the power supply operating voltage set at 22 VDC, press the release button. The load beam should unlatch and the loading device should slide off the load beam. Ensure the load beam re-latches after the load is released. Repeat the test a second time.

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13.4 Manual Load Release Test

Gradually load the Cargo Hook to 3,300 pounds. Hold the load for 2 minutes. Perform a manual release by rotating the manual release knob counterclockwise. The manual release knob should rotate smoothly. The required release torque shall not exceed 16 inch-pounds. This torque is measured on the knob since the nut (20) does not rotate with the knob.

With no load on the hook, use the torque wrench and manual release knob fixture to measure the locking torque as follows: Rotate the knob with the torque wrench to the open position. Allow the knob to slowly return to the closed position, applying resistance to the locking motion. Record the torque applied to the wrench as it nears the full locked position. This must be a minimum of 3 in-lbs.

Repeat the test a second time.

14.0 Trouble Shooting

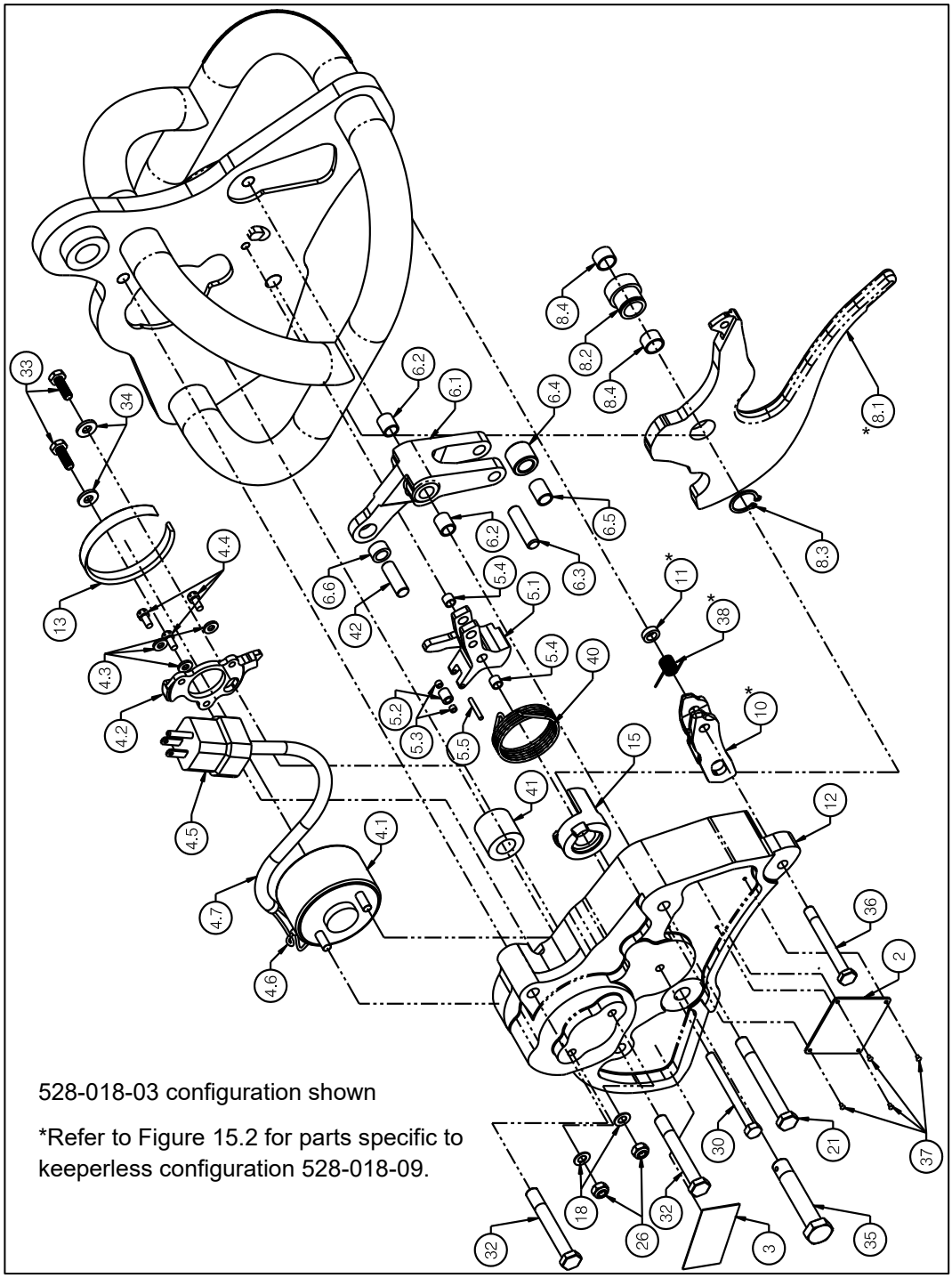
Table 14.1 Trouble Shooting

Symptom	Probable Cause	Remedy
Cargo hook does not operate electrically; manual release operates normally.	Open electrical circuit, faulty wiring, circuit breaker, switch or solenoid	Disconnect electrical release cable connection from aircraft wiring. Using multi-meter, check for 1.9 +/- .25 ohms between the two solenoid wires. If open indication is obtained, check the solenoid directly for 1.9 +/- .25 ohms resistance, replace solenoid if required.
Cargo hook does not operate electrically or manually.	Defective internal mechanism	Disassemble and inspect internal mechanism for binding, jamming, and worn or broken parts. Repair as necessary.
Cargo hook operates electrically, but not manually. Load beam fails to re-latch.	Defective manual release system Defective latch mechanism	Check manual release knob. Disassemble and inspect internal mechanism for binding, jamming, and worn or broken parts. Repair as necessary.
Load beam re-latch unreliable or re-latch is sluggish.	Accumulated dust, dirt and grime.	Remove immediately from service for disassembly and cleaning.
Cargo hook manual release knob torque exceeds 10 in-lbs.	Defective manual release system.	Check manual release knob. Disassemble and inspect internal mechanism for binding, jamming, and worn or broken parts. Repair as necessary.

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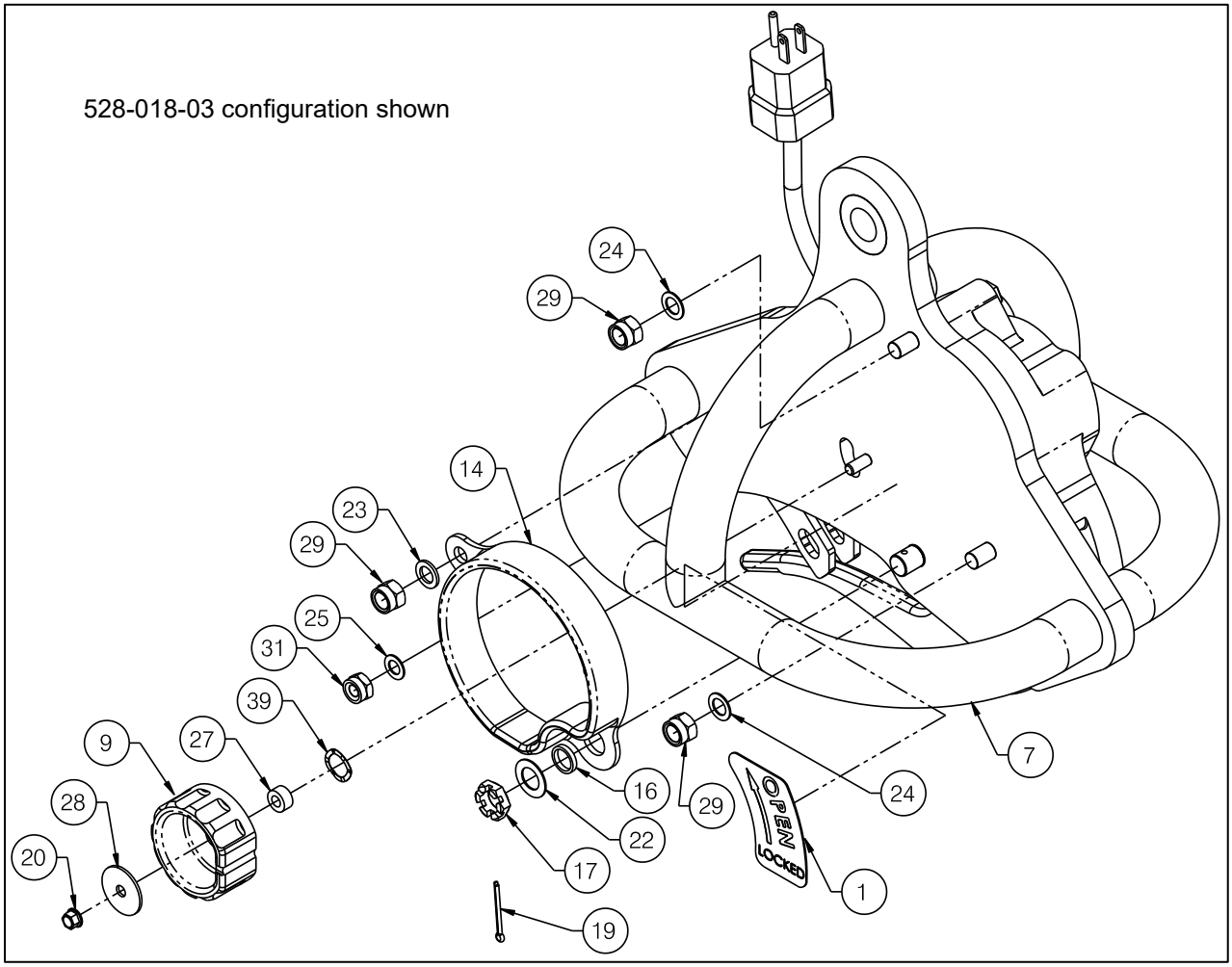
15.0 Illustrated Parts List

Figure 15.1 Cargo Hook Parts



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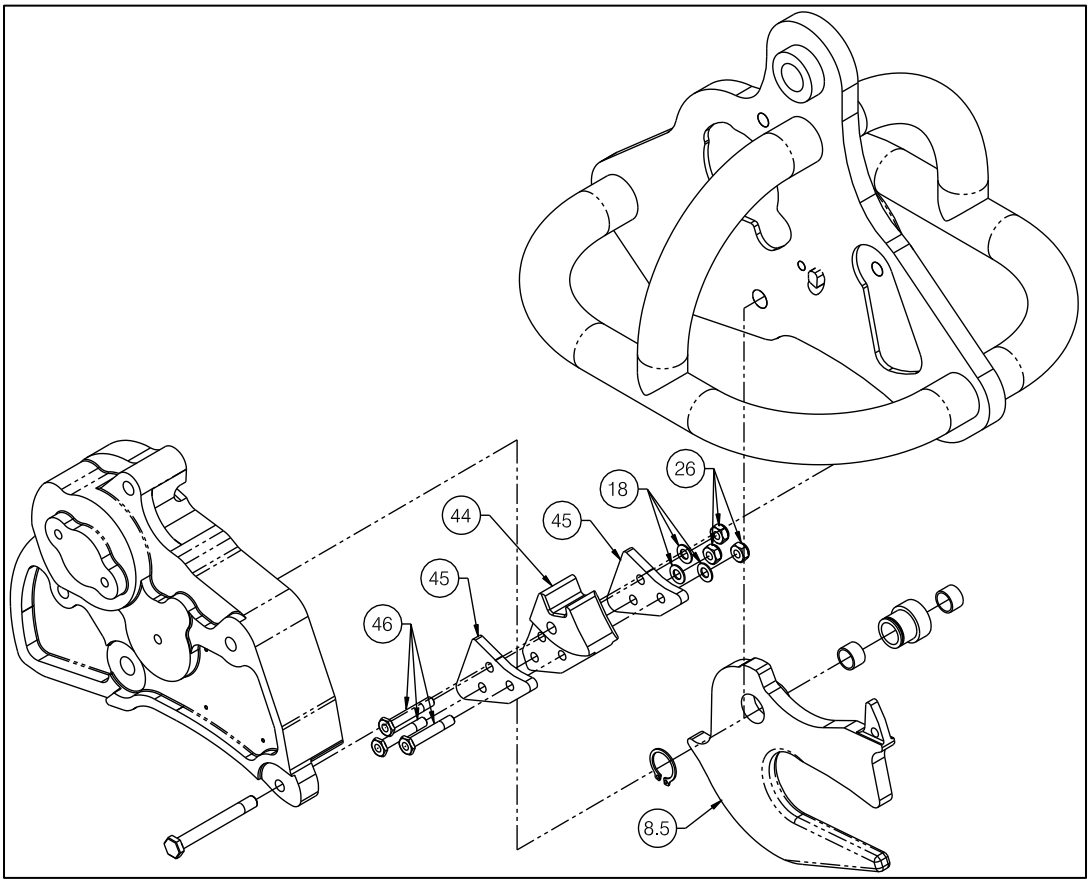
Figure 15.1 Cargo Hook Parts(continued)



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Parts that are specific to cargo hook P/N 528-018-09* are numbered in the figure below. These parts replace items 8.1, 10, 11, and 38 shown in Figure 15.1. For parts shown but not numbered refer to Figure 15.1.

Figure 15.2 Cargo Hook Parts Specific to 528-018-09



*A conversion kit (P/N 212-057-00) to convert a keepered half-cage cargo hook to 528-018-09 includes the Armor Plate Assembly (items 18, 26, 44, 45, 46) and Load Beam Assembly (8.2, 8.3, 8.4 and 8.5) and cotter pin (19). To install the conversion kit:

1. Remove the keeper pivot bolt (36), washer (25) and nut (31) and remove keeper.
2. Remove cotter pin (19) and remove washer (22), nut (17) and load beam pivot bolt (35) and remove load beam.
3. Position Armor Plate Assembly and new Load Beam Assembly within the assembly and re-install hardware. Tighten nut at keeper pivot bolt to 50-75 in-lbs. Tighten nut at load beam pivot bolt to finger tight and rotate to next castellation to fit cotter pin.
4. Perform a functional check (full ATP not required): With no load on the load beam rotate the manual release knob in the counterclockwise direction. The load beam should unlatch and fall open. Manually push the load beam up and ensure it re-latches.

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Table 15.1 Cargo Hook Parts

Item	*Part No.*	*Description*	*Quantity*							
			528-018-01	*528-018-02*	*528-018-03*[8]	*528-018-05*[9]	*528-018-06*[9]	*528-018-09*	*212-018-00 Overhaul Kit for -01, -02, -05*	*212-030-00 Overhaul Kit for -03 -06 & -09*
1	215-145-00	Open Decal	1	1	-	1	-	-	-	-
1	215-145-01	Open Decal	-	-	1	-	1	1	1	1
2	215-147-00	Serial Number Plate	1	1	-	1	-	-	-	-
2	215-147-01	Serial Number Plate	-	-	1	-	1	1	-	-
3	215-203-00[7]	Load Ring Warning	1	1	1	1	1	-	1	1
4[1]	232-108-01	Solenoid Assembly	1	1	1	1	1	1	-	-
4.1	455-004-00	Solenoid	1	1	1	1	1	1	-	-
4.2	290-587-00	Solenoid Cam	1	1	1	1	1	1	-	-
4.3	510-042-00	Washer	3	3	3	3	3	3	3	3
4.4	510-156-00	Screw	3	3	3	3	3	3	3	3
4.5	410-300-00	Plug	1	1	1	1	1	1	-	-
4.6	420-063-00	Cable	1	1	1	1	1	1	-	-
4.7	450-008-00	Heat Shrink	1	1	1	1	1	1	-	-
5[1]	232-109-00	Cam Assembly	1	1	1	1	1	1	1	1
5.1	290-592-00	Cam	1	1	1	1	1	1	-	-
5.2	290-603-00	Roller	1	1	1	1	1	1	-	-
5.3	517-031-00	DU Bushing	2	2	2	2	2	2	-	-
5.4	517-021-00	DU Bushing	2	2	2	2	2	2	-	-
5.5	290-450-00	Interlock Pin	1	1	1	1	1	1	-	-
6[1]	232-110-00	Toggle Assembly	1	1	1	1	1	1	-	-
6.1	290-588-01	Toggle	1	1	1	1	1	1	-	-
6.2	517-016-00	Bearing	2	2	2	2	2	2	2	2
6.3	290-520-00	Load Beam Roller Pin	1	1	1	1	1	1	-	-
6.4	290-379-00	Load Beam Roller	1	1	1	1	1	1	-	-
6.5	517-015-00	Load Beam Roller Bearing	1	1	1	1	1	1	-	-
6.6	517-038-00	Cam Roller Bearing	1	1	1	1	1	1	1	1
7[3]	232-127-00	Half Cage Weldment	1	-	-	-	-	-	-	-
7[3]	232-127-01	Half Cage Weldment	-	1	1	-	-	1	-	-
7	235-192-00	Full Cage Weldment	-	-	-	1	1	-	-	-
8[1]	232-128-01	Load Beam Assembly	1	1	1	1	1	-	-	-
8[1]	232-817-00	Load Beam Assembly	-	-	-	-	-	1	-	-

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Item	*Part No.*	*Description*	*Quantity*							
			528-018-01	*528-018-02*	*528-018-03*[8]	*528-018-05*[9]	*528-018-06*[9]	*528-018-09*	*212-018-00 Overhaul Kit for -01, -02, -05*	*212-030-00 Overhaul Kit for -03 -06 & -09*
8.1[6]	290-683-02	Load Beam	1	1	1	1	1	-	-	-
8.2	290-680-00	Spacer Bushing	1	1	1	1	1	1	-	-
8.3	515-003-00	Snap Ring	1	1	1	1	1	1	1	1
8.4	517-023-00	DU Bushing	2	2	2	2	2	2	2	2
8.5	292-038-00	Load Beam	-	-	-	-	-	1	-	-
9	290-591-00	Long Line Knob	1	1	-	1	-	-	-	-
9	290-591-01	Long Line Knob	-	-	1	-	1	1	-	-
10[3]	290-615-00	Keeper	1	-	-	-	-	-	-	-
10[3]	290-615-01	Keeper	-	1	1	1	1	1	-	-
11[3]	290-681-00	Keeper Spacer	1	-	-	-	-	-	-	-
11[3]	290-681-01	Keeper Spacer	-	1	1	1	1	-	-	-
12[3]	290-682-00	Side Plate, Solenoid	1	-	-	-	-	-	-	-
12[3]	290-682-01	Side Plate, Solenoid	-	1	-	1	-	-	-	-
12	290-682-03	Side Plate, Solenoid	-	-	1	-	1	1	-	-
13[1]	290-727-00	Wedge Ring	1	1	1	1	1	1	-	-
14	291-561-00	Brush Guard	-	-	1	-	1	1	-	-
15[5]	291-563-00	Spring Guide	-	-	1	-	1	1	-	-
16	291-586-00	Brush Guard Spacer	-	-	1	-	1	1	-	-
17	510-036-00	Nut	1	1	1	1	1	1	1	1
18	510-100-00	Washer	2	2	2	2	2	5	2	5
19	510-113-00	Cotter Pin	1	1	1	1	1	1	1	1
20	510-114-00	Nut	1	1	1	1	1	1	1	1
21	510-128-00	Bolt	-	-	1	-	1	1	-	1
21	510-351-00	Bolt	1	1	-	1	-	-	1	-
22	510-183-00	Washer	1	1	1	1	1	1	1	1
23	510-221-00	Washer	1	1	1	1	1	1	1	1
24	510-238-00	Washer	2	2	2	2	2	2	2	2
25	510-239-00	Washer	1	1	1	1	1	1	1	1
26	510-246-00	Nut	2	2	2	2	2	5	2	5
27	510-327-00	Spacer	1	1	1	1	1	1	1	1
28	510-336-00	Washer	1	1	1	1	1	1	1	1
29	510-348-00	Nut	3	3	3	3	3	3	3	3
30	510-350-00	Bolt	1	1	1	1	1	1	1	1

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Item	*Part No.*	*Description*	*Quantity*							
			528-018-01	*528-018-02*	*528-018-03*[8]	*528-018-05*[9]	*528-018-06*[9]	*528-018-09*	*212-018-00 Overhaul Kit for -01, -02, -05*	*212-030-00 Overhaul Kit for -03 -06 & -09*
31	510-370-00	Nut	1	1	1	1	1	1	1	1
32	510-396-00	Bolt	2	2	2	2	2	2	2	2
33[2]	510-435-00	Screw	2	2	2	2	2	2	2	2
34[2]	510-436-00	Washer	2	2	2	2	2	2	2	2
35	510-398-00	Bolt	1	1	-	1	-	-	1	-
35	510-544-00	Bolt	-	-	1	-	1	1	-	-
36[3]	510-366-00	Bolt	1	-	-	-	-	-	-	-
36[3]	510-714-00	Bolt	-	1	1	1	1	1	1	1
37	510-940-00	Drive Screw	4	4	4	4	4	4	-	-
38[3]	514-003-00	Spring	1	-	-	-	-	-	-	-
38[3]	514-014-00[4]	Spring	-	1	1	1	1	1	1	1
39	514-024-00	Wave Spring Washer	1	1	1	1	1	1	1	1
40	514-027-00	Spring	1	1	-	1	-	-	1	-
40	514-027-01	Spring	-	-	1	-	1	1	-	1
41	514-036-00	Bumper	1	1	1	1	1	1	1	1
42	517-027-00	Cam Roller Pin	1	1	1	1	1	1	1	1
43	215-260-00	Overhaul Label	-	-	-	-	-	-	1	1
44	292-039-00	Armor Plate Adapter	-	-	-	-	-	1	-	-
45	292-040-00	Armor Plate	-	-	-	-	-	2	-	-
46	510-230-00	Bolt	-	-	-	-	-	3	-	3

[1]Items not illustrated as assemblies.

[2]Hook S/Ns 1-86: Solenoid Clamp (P/N 290-676-00) and Socket Screw (P/N 510-395-00) were present instead of Items 13, 33 and 34.

[3]Per Service Bulletin 159-024-00, Cargo Hook P/N 528-018-01 was changed to P/N 528-018-02. This Service Bulletin changed the Half-Cage Weldment P/N to 232-127-01, Keeper P/N to 290-615-01, Spring P/N to 514-014-00, Keeper Spacer P/N to 290-681-01, Solenoid Side Plate P/N to 290-682-01, and the Keeper pivot bolt to 510-714-00. Overhaul Kit P/N 212-018-00 is intended for Cargo Hooks with this Service Bulletin incorporated (i.e. - for 528-018-01: overhaul it with P/N 212-018-00 after upgrading per Service Bulletin 159-024-00).

[4]Optionally use P/N 514-083-00.

[5]The spring guide must be used with Side Plate P/N 290-682-03 and Spring P/N 514-027-01 (P/N 528-018-03 and 528-018-06 configurations.)

[6]Load Beam P/N has changed from 290-683-00 to 290-683-01 to 290-683-02 (see Figure 15.3 for identification). Note: Early versions of cargo hook P/N 528-018-01 included Load Beam P/N 290-683-00.

Notes are continued on following page.

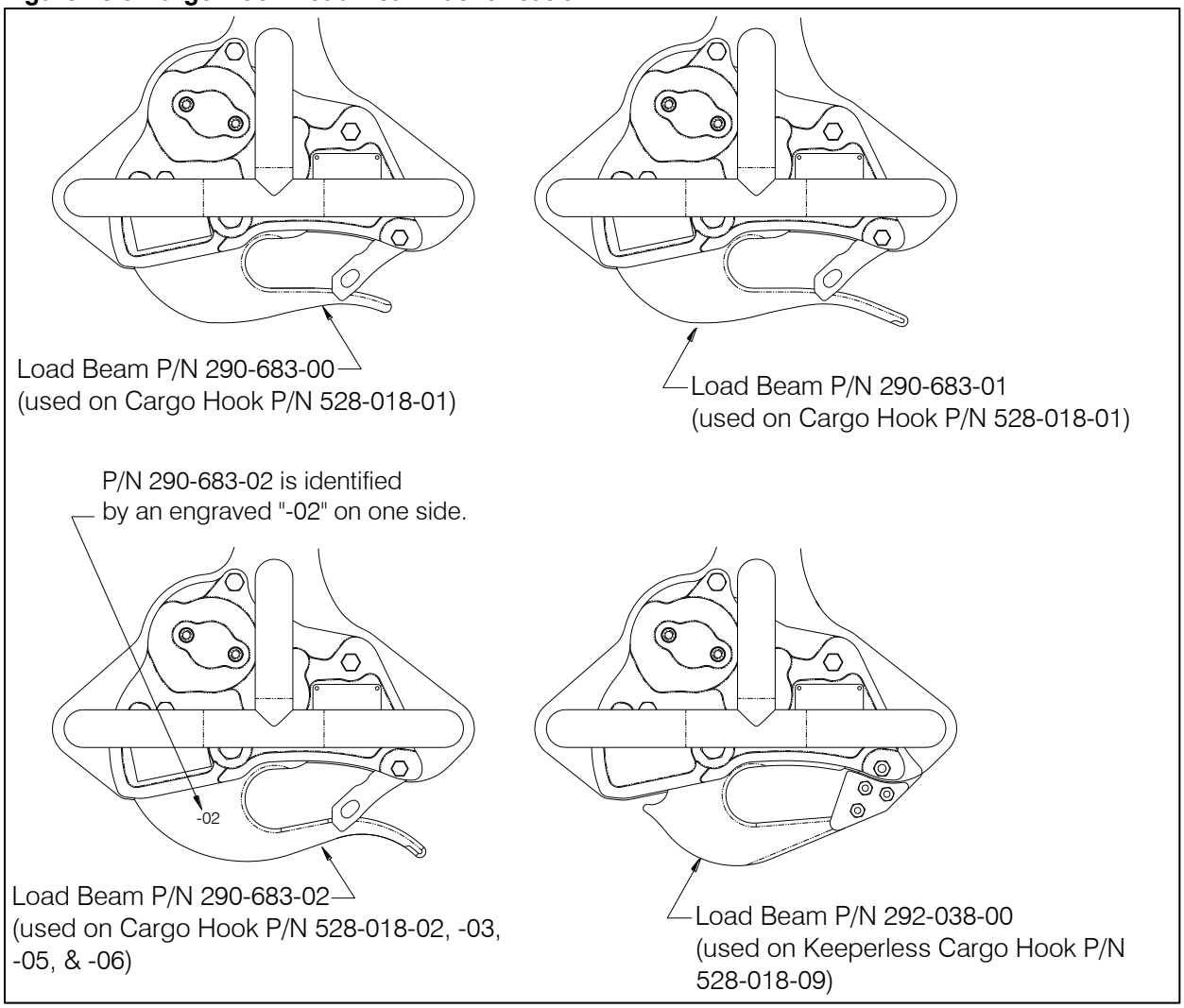
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[7]If Load Beam P/N 290-683-00 is installed use Load Ring Warning Decal P/N 215-359-00.

[8]Cargo Hook P/N 528-018-03 is the same as P/N 528-018-02 except it includes a redesigned lower profile Knob (P/N 290-591-01), a Brush Guard (P/N 291-561-00) around the Knob, and improved re-latching that incorporates a new Spring (P/N 514-027-01) and Spring Guide (P/N 291-563-00). The new Spring and Spring Guide requires Side Plate P/N 290-682-03. Refer to parts list for complete parts breakdown for each P/N cargo hook.

[9]Cargo Hook P/N 528-018-05 is the same as P/N 528-018-02 except it has the full-cage weldment (P/N 235-192-00) rather than the half-cage weldment (P/N 235-127-01). Cargo Hook P/N 528-018-06 is the same as P/N 528-018-03 except it has the full-cage weldment (P/N 235-192-00) rather than the half-cage weldment (P/N 235-127-01).

Figure 15.3 Cargo Hook Load Beam Identification



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16.0 Instructions for Returning Equipment to the Factory

If an Onboard Systems product must be returned to the factory for any reason (including returns, service, repairs, overhaul, etc.) obtain an RMA number before shipping your return.

NOTICE

An RMA number is required for all equipment returns.

To obtain an RMA, please use one of the listed methods.

- Contact Technical Support by phone or e-mail (Techhelp@OnboardSystems.com).
- Generate an RMA number at our website: http://www.onboardsystems.com/rma.php

After you have obtained the RMA number, please be sure to:

- Package the component carefully to ensure safe transit.
- Write the RMA number on the outside of the box or on the mailing label.
- Include the RMA number and reason for the return on your purchase or work order.
- Include your name, address, phone and fax number and email (as applicable).
- Return the components freight, cartage, insurance and customs prepaid to:

  Onboard Systems International
  13915 NW 3rd Court
  Vancouver, Washington 98685
  USA
  Phone: 360-546-3072

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