Owner's Manual

TALON 6,000-lb Remote Cargo Hook

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Applicable Equipment Part Numbers
528-019-00
528-019-01
528-019-05
528-019-07

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for the latest revision of this manual.

RECORD OF REVISIONS

Revision	Date	Page(s)	Reason for Revision
14	05/05/11	4-10	Added washer P/N 510-042-00 and screw P/N 510-156-00 to overhaul kits.
15	01/04/12	4-10 thru 4-12	Changed Load Beam Assembly P/N 232-111-01 to 232-111-02. Changed Load Beam from 290-589-01 to 290-589-02. Updated Cargo Hook Parts table notes to use subscript notation for ease of use.
16	09/24/15	All	Updated format. Updated assembly and disassembly sections with photographs. Updated overhaul inspection criteria.
17	04/18/16	13, 35	Added check of keeper operation to section 6.2. Changed section 6.2 title from "Daily Check" to "Prior to External Load Operation". Added decal P/N 215-263-00 to parts list for P/N 528-019-00.
18	01/19/18	17	Removed NDT requirement for Cam (6.1).
19	01/13/20	5, 6, 11-13, 19, 33, 36-41	Added new keeperless configuration, P/N 528-019-07 and retrofit kit P/N 212-058-00. Replaced NDT inspection of Load Beam (8.1), Solenoid Side Plate (11), and Toggle (7.1) with magnified visual inspection; moved inspection step to Table 11.1.
20	04/02/21	13, 18, 38, 40, 41	P.18 #9 changed (17) to (42). In Table 5.1 add 290-589-03. In Table 15.1 changed 290-589-02 to 290-589-03, 232-111-02 to 232-111-03, changed qty of 510-100-00 from 5 to 2, added (item 42) 510-219-00 qty 3. Updated balloon #17 to #42 on p38.
21	01/03/23	20, 22, 23, 40	Add cleaning and inspection instructions for cam surfaces. Add cam assembly to overhaul kits.

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CONTENTS

1.0 Introduction 4
1.1 Scope 4
1.2 Capability 4
1.3 Safety labels 4
2.0 Referenced Documents 5
3.0 System Overview 5
3.1 Description 5
3.2 Specifications 6
3.3 Obsolete Configurations 6
3.4 Electrical Schematic 7
4.0 Installation 8
4.1 Functional Check 8
4.2 Cargo Hook Installation 8
4.3 Post Installation Check-Out 11
5.0 Operation Instructions 12
5.1 Cargo Hook Rigging 13
6.0 Maintenance 15
6.1 Storage 15
6.2 Prior to External Load Operations 15
6.3 Monthly Preventive Maintenance 15
6.4 Annual Inspection 15
6.5 Overhaul 16
6.6 Repair 16
7.0 Repair Instructions 16
8.0 Overhaul Schedule 16
9.0 Overhaul Instructions 17
10.0 Disassembly Instructions 18
11.0 Inspection Instructions 19
12.0 Re-assembly Instructions 24
13.0 Acceptance Test Procedure 34
13.1 Minimum Load Release Test 34
13.2 Proof Load Test 34
13.3 Electrical Release Test 35
13.4 Manual Load Release Test 35
14.0 Trouble Shooting 36
15.0 Illustrated Parts List 37
16.0 Instructions for Returning Equipment to the Factory 43

1.0 Introduction

1.1 Scope

This owner's manual contains instructions for installation, operation, and maintenance of the 6,000-lb Remote Cargo Hook (P/N 528-019-00, 528-019-01, and 528-019-05 and 528-019-07).

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.

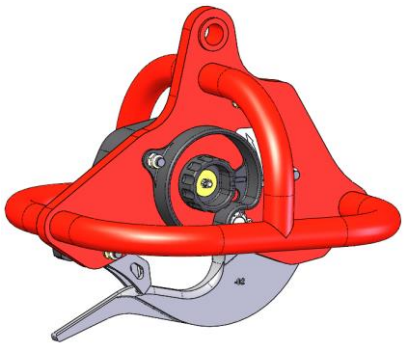
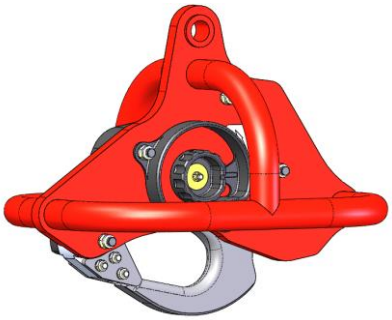
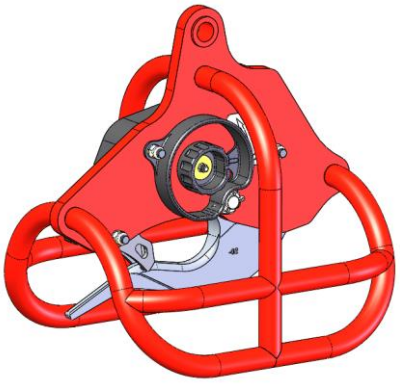
2.0 Referenced Documents

None

3.0 System Overview

3.1 Description

The 528-019-XX Remote Cargo Hooks are suitable for long line application with loads up to 6,000 lbs (2,722 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 528-019-01** 	**P/N 528-019-07** 
Full-Cage	**P/N 528-019-05** 	

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.

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 212-058-00) using simple hand tools, refer to section 15.0 for parts and installation instructions.

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 528-019-01	P/N 528-019-05	P/N 528-019-07
Rated Load	6,000 lb. (2,722 kg.)		
Release Capacity	15,000 lb. (6,803 kg.)		
Ultimate Strength	24,000 lb. (10,886 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	37.5 lbs (16.8 kg)	38.0 lbs (17.2 kg)	36.5 lbs (16.6 kg)

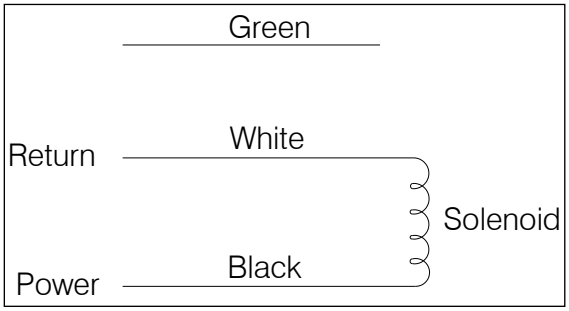
3.3 Obsolete Configurations

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

Obsolete P/N	Superseding P/N
528-019-00	528-019-01

3.4 Electrical Schematic

Figure 3.1 Electrical Schematic



Newer cargo hooks (shipped after July 2010) include an attached connector. The ground pin on the connector is not used. The cargo hook is not polarity sensitive.

Table 3.2 Connector Pin Out

Wire Color	Screw Color	Function
Not Used	Green	Not Used
White	Silver	DC Ground
Black	Brass	DC 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 DC solenoid and an external manual release knob provide the means for unlatching the load beam.

The load beam is normally returned to its closed position after release of the load by a spring in the internal mechanism (the keeperless configuration must be manually closed). 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. In the keepered configuration a spring in the internal mechanism then drives the load beam back to its closed and latched position (with the keeperless configuration the load beam must be manually closed).

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.

4.0 Installation

4.1 Functional Check

Ensure that the Cargo Hook has been subjected to a satisfactory Acceptance Test Procedure as detailed in the maintenance section.

If the unit has passed the Acceptance Test within two 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 unit has been stored in high temperature or damp conditions, the Acceptance Test Procedure 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.

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.

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. When using an anchor shackle install safety wire per Figure 4.3.

Part Number	Description	Owner's Manual
200-435-00	Electric Swivel	120-225-00
200-373-00	Electric Swivel	120-205-00
530-022-00	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.

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.

Figure 4.1 Electric Swivel Attachment

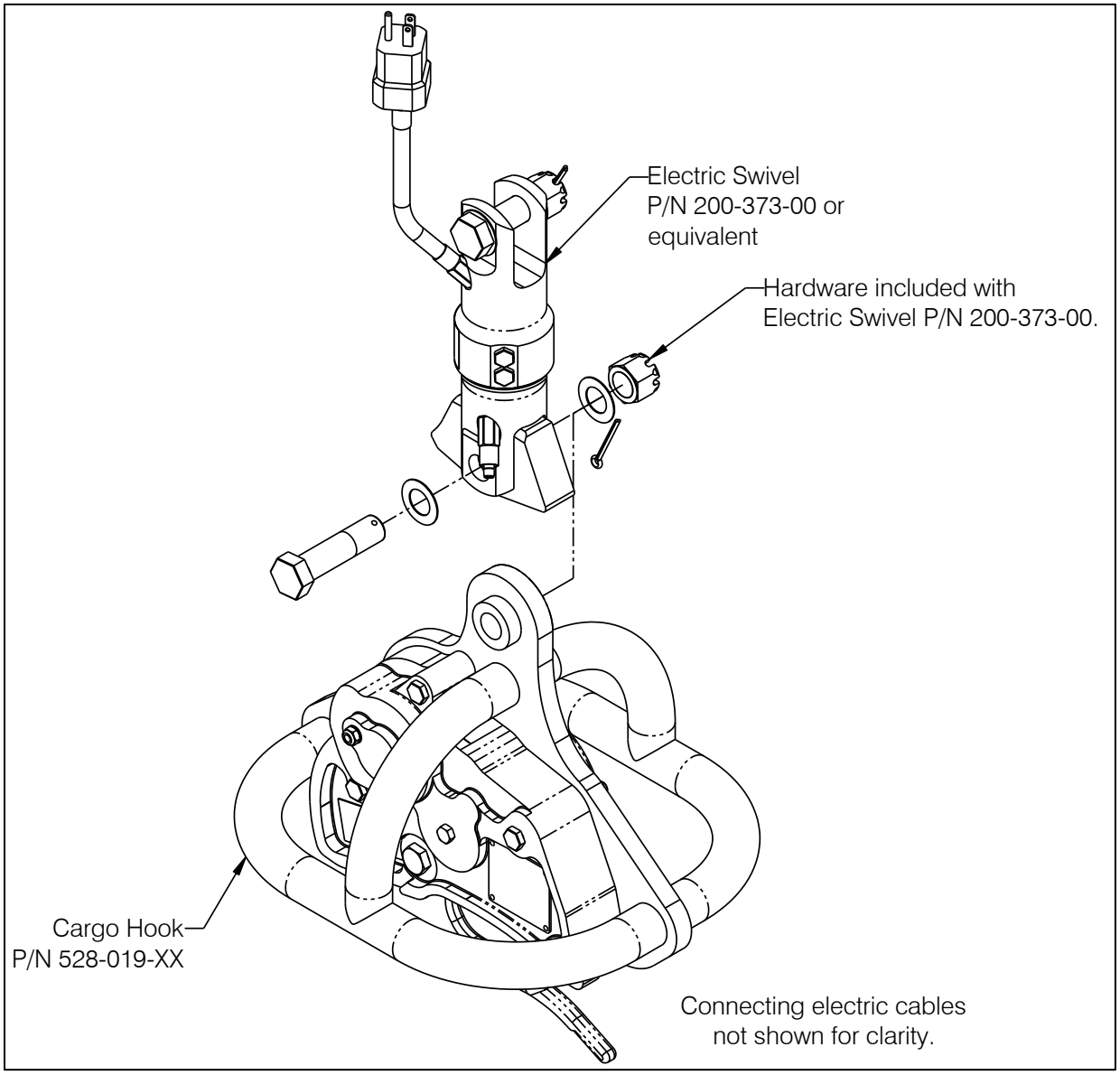


Figure 4.2 Anchor Shackle Attachment

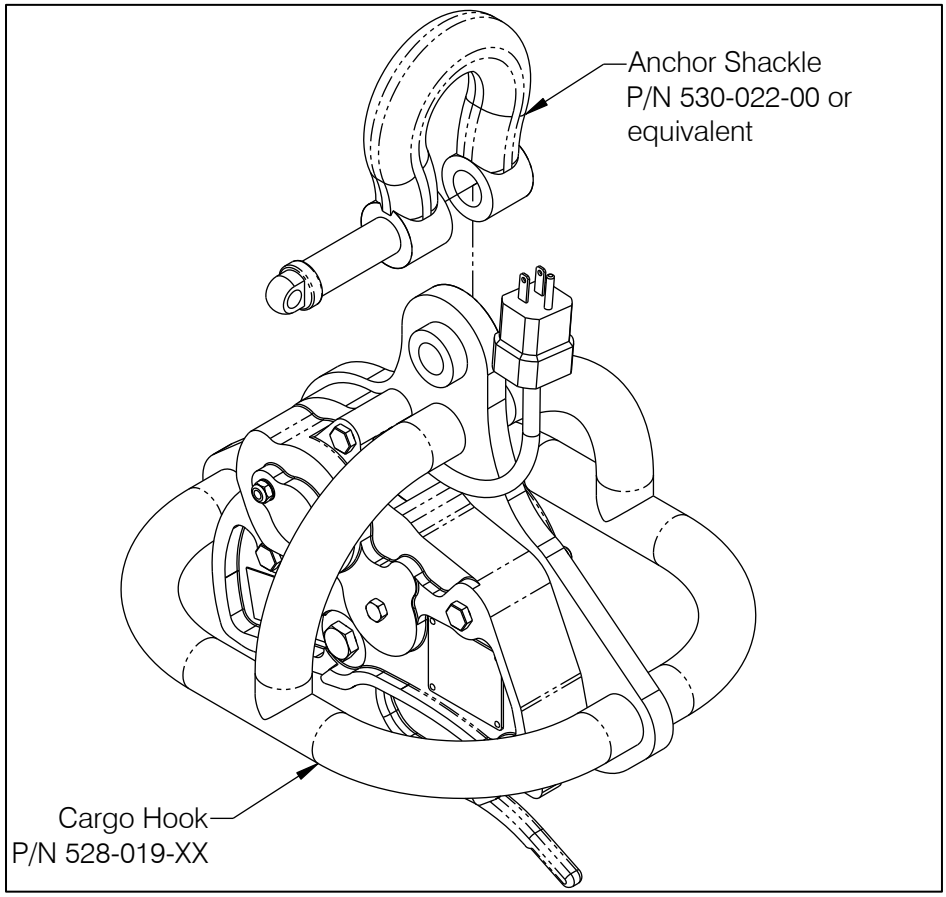
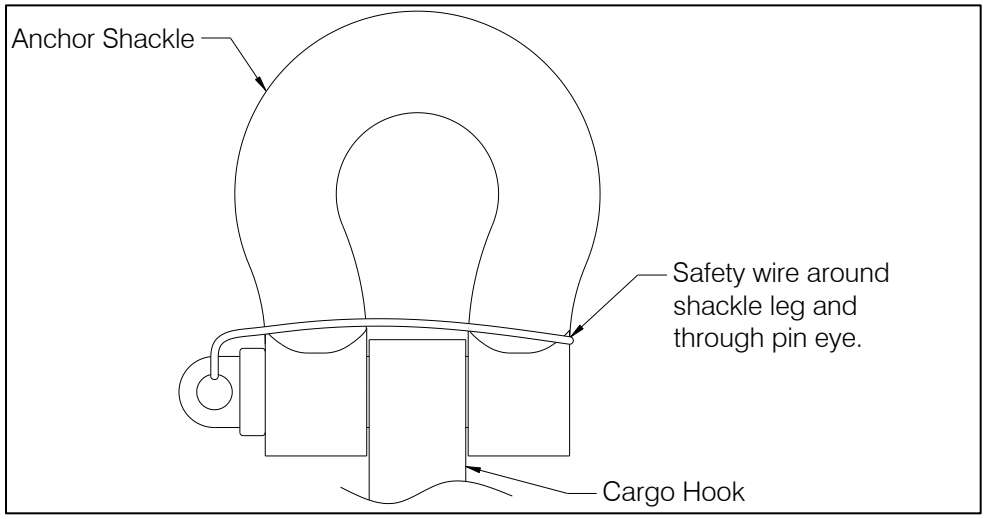


Figure 4.3 Anchor Shackle Safety Wire



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 2-5 pounds (or no load if the 528-019-07 keeperless cargo hook is installed) to the cargo hook load beam and energize the cargo hook electrical release circuit. The Cargo Hook should release.

3. Ensure the cargo hook automatically re-latches (keepered configuration) or latches when the load beam is pushed up and closed (keeperless configuration).

4. Apply 2-5 pounds (or no load if the 528-019-07 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.

5. Ensure the cargo hook automatically re-latches (keepered configuration) or latches when the load beam is pushed up and closed (keeperless configuration).

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.

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 (the keeperless cargo hook must re-latch when manually closed). If the hook does not re-latch do not use the unit until the difficulty is resolved.

Accumulated dust, dirt and grime will cause unreliable re-latch of the cargo hook. Remove immediately from service for disassembly and cleaning if re-latch performance is sluggish.

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. 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.

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.

The keepered configuration of 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 not greater than 4.5 inches (11.4 cm).

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
290-589-03	4.5 in. (11.4 cm)	215-263-00
290-589-02		
290-589-01		
292-053-00	N/A for Keeperless	N/A for Keeperless

WARNING

To prevent loss of load, the inside diameter of the primary load ring should not exceed 4.5 inches (11.4cm).

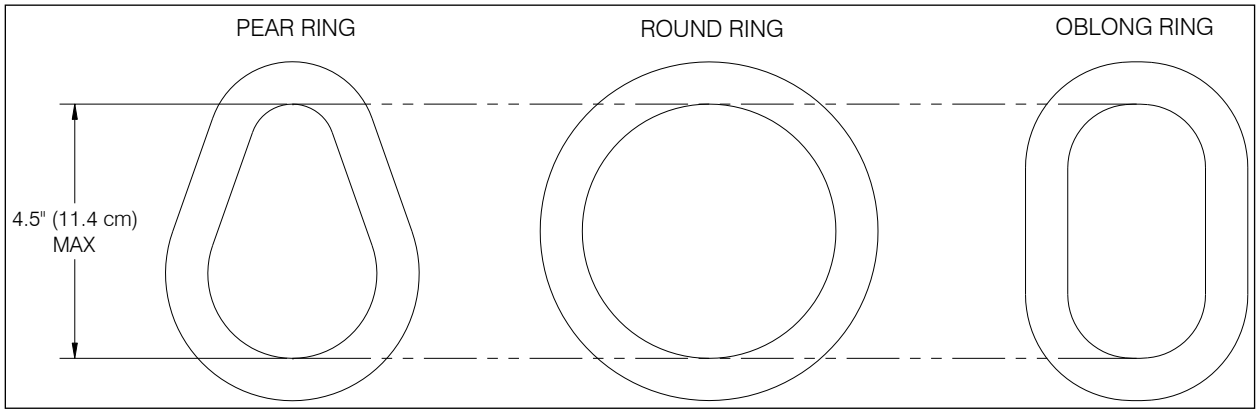
WARNING

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

NOTICE

The keeperless style cargo hook, P/N 528-019-07, does not have a maximum load ring size restriction.

Figure 5.1 Load Ring Examples



6.0 Maintenance

6.1 Storage

The cargo hook may be stored in its original factory sealed bag and box for up to 2 years from its date of manufacture or last factory overhaul. If stored in its original factory sealed bag and 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 in 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, 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. Open and close the keeper (not applicable to P/N 528-019-07) 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, apply a corrosion preventative compound such as ACF-50 to all exterior surfaces.

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.

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.

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.

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
528-019-00	212-019-00
528-019-01 528-019-05 528-019-07	212-031-00

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. Reassemble.
7. Acceptance test.
8. Inspect for return to service.

10.0 Disassembly Instructions

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

1. Remove the Nut (18) and Washer (24) from inside the Manual Release Knob (10). Remove the Manual Release Knob (10), Spacer (23) and Wave Washer (34).
2. Remove the Nut (25) and Washer (21) from the Load Beam Bumper Bolt (27).
3. Remove the Nut (25) and Washer (21) from the Keeper Pivot Bolt (27).
4. Remove the Nut (25) and Washer (21) from the Toggle Pivot Bolt (30).
5. Remove Nut (25) and Washer (21) from Frame Bolt (19).
6. Remove the Cotter Pin (16), Nut (15) and Washer (20) from the Load Beam Pivot Bolt (32).
7. Remove Brush Guard (13) and lift the Cage Weldment (4) off of the Side Plate (11).
8. Lay the Side Plate on the bench and remove the Load Beam Bumper (33) and Load Beam Bumper Bolt (27).
9. For the cargo hook configurations with Keeper: remove the Keeper (9), Keeper Spring (35), and Bolt (27). Be careful of the spring tension on the Keeper Spring.

   For the Keeperless configuration (P/N 528-019-07) remove the bolt (27) and the Armor Plate assembly (42, 22, 39, 40, and 41). The Armor Plate assembly can be disassembled by removing the three nuts (22) and washers (42) from the bolts (41).
10. Remove the Load Beam Bolt (32). Remove the Load Beam Assembly (8) and two Washers (20) by rotating it down slightly to clear the toggle and lifting it out of the housing.
11. Remove the Cam Roller Pin (37) and the Frame Bolt (19) that the toggle pivots on. Pull the Cam (6) up approximately .25 inches and allow the cam to rotate clockwise. The Toggle (7) may now be removed.
12. Remove the Cam (6), Spring (36) and Spring Guide (14) by lifting the cam out of its pocket and unwinding the spring tension by rotating the cam clockwise. Be careful of the spring preload tension.
13. Remove all remaining bolts from the Side Plate (11).
14. Remove the solenoid ring Screws (28), Washers (29) Ring (12), Nuts (22) and Washers (17).
15. Remove the Solenoid Assembly (5) out of the Side Plate.

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-lighted 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 8.3), Solenoid Side Plate (11), Toggle† (7.1)	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 8.3), Solenoid Cam (5.2) Keeper (9)	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 (11)	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 (10), Brush Guard (13), Armor Plate Adapter* (40) *cargo hook P/N 528-019-07 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.	Bushing (6.3, 6.4, 7.2, 7.5, 8.2)	Wear – more than 50% copper showing.	None. Replace.	N/A	Yes
6.	Bearing (7.6)	Roughness, binding, looseness, or corrosion.	None. Replace.	N/A	Yes
7.	Bumper (33)	Denting, cuts or abrasions – 0.060 in. (1.27 mm) deep	None. Replace.	N/A	Yes

Seq	Component	Inspection Criteria & Limit	Repair Action	Finish	Recommended replacement at overhaul.
8.	Keeper (9) Armor Plates* (45) *cargo hook P/N 528-019-07 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 and ensure load rings will not hang up on load beam during release. Replace if visibly cracked.	Passivate per AMS-QQ-P-35 or ASTM A967	No
9.	Cam Assembly (6)	Visible wear or dents on bearing surface.	None. Replace.	N/A	Yes
10.	Cam Assembly (6)	Roughness, binding or looseness of the Interlock Roller (5.2).	Replace Interlock Pin (6.5), Roller (6.2) and Bearings (6.3). Stake ends of pin.	N/A	Yes
11.	Toggle Assembly (7)	Roughness, binding or looseness of the Load Beam Roller (7.4).	Replace Pin (7.3), Roller (7.4), and Bearing (7.5). Stake ends of pin.	N/A	No
12.	Load Beam (8.1 or 8.3)	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 (4)	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 (14)	Wear, gouges, and nicks – 0.060 in. (1.27 mm) deep.	None. Replace	N/A	No
15.	Serial Number Plate (1)	Damaged or illegible.	None. Replace.	N/A	No

Seq	Component	Inspection Criteria & Limit	Repair Action	Finish	Recommended replacement at overhaul.
16.	Open Decal (2) Rigging Warning Decal (3)	Damage or illegible.	None. Replace.	N/A	Yes
17.	Springs (35, 36)	Cracks or deformation.	None. Replace.	N/A	Yes
18.	Solenoid (5.1)	Shorted or open electrical circuit. Resistance 1.9 ± .3 ohms.	None. Replace.	N/A	No
19.	Electrical connector (5.5)	Loose, missing, or damaged prongs, cracked case.	None. Replace.	N/A	No
20.	Electrical cord (5.7), electrical wires (5.6)	Deterioration, exposed conductors.	None. Replace.	N/A	No
21.	All remaining nuts, bolts, roll pins, cotter pins, washers, helicoils	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

Figure 11.2 Cam Assembly (6) 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

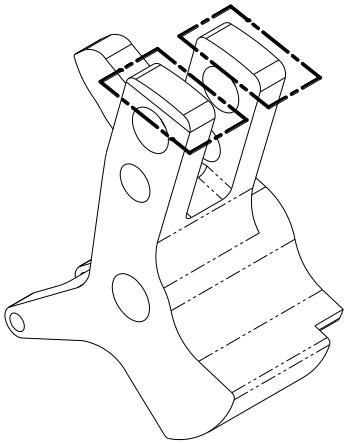
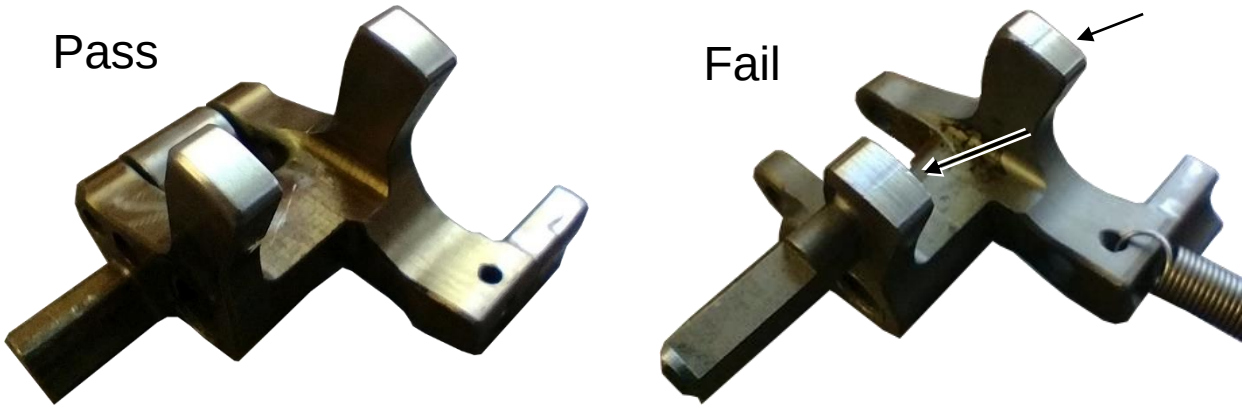
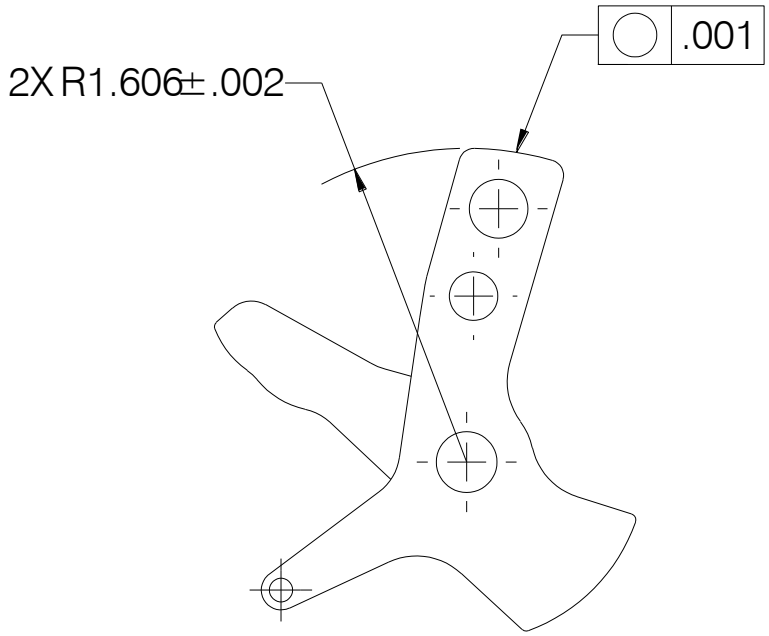


Figure 11.2.2



Continued on next page.

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.

12.0 Re-assembly Instructions

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

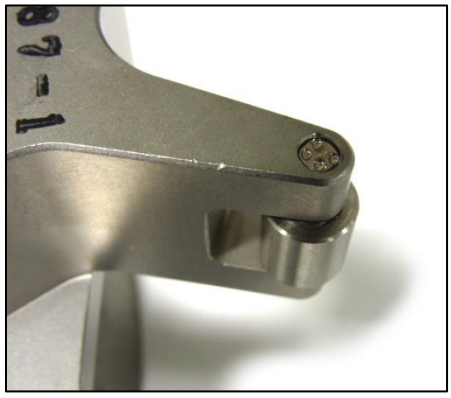
1. Replace all parts found to be damaged with serviceable parts.
2. Affix Load Ring Warning Decal (3) onto Solenoid Side Plate (11) and burnish in place.

3. Press Bearing (8.2) into the Load Beam (8.1 or 8.3) using wet zinc chromate primer.

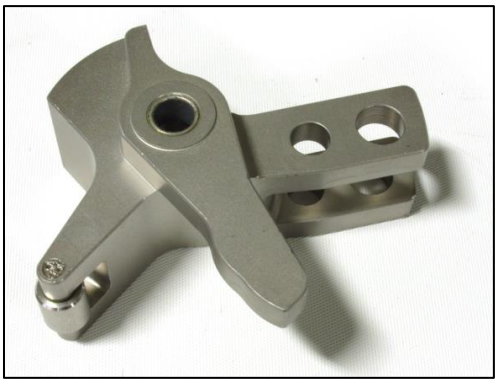
4. If Toggle Assembly (7) was disassembled, press in Load Beam Roller Bearing (7.5) into Load Beam Roller (7.4) using wet zinc chromate primer. Capture the Load Beam Roller in the Toggle (7.1) with Load Beam Roller Pin (7.3). Press Cam Roller Bearing (7.6) into the Toggle. Stake both sides of the Toggle to retain the bearing and the pin.

5. Press in two Bearings (7.2) into the Toggle using wet zinc chromate primer, one from each side.

6. If the Cam Assembly (6) was disassembled, press in two Bushings (6.3) into Roller (6.2) using wet zinc chromate primer, one from each end. Capture the Roller in the Cam (6.1) with the Interlock Pin (6.5). Stake pin three times on both ends as shown.

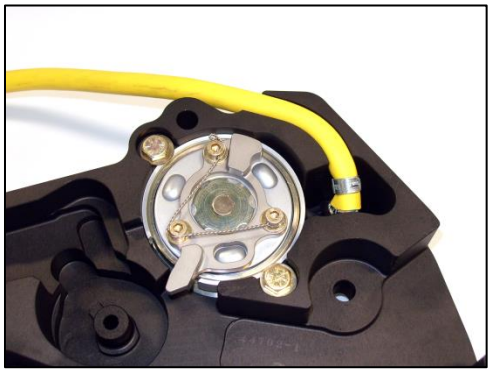


7. Press two Bushings (6.4) into the Cam using wet zinc chromate primer, one from each side.

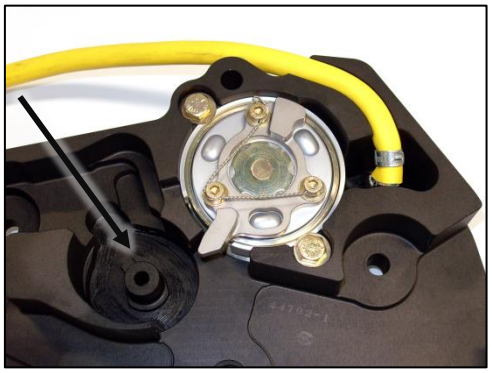


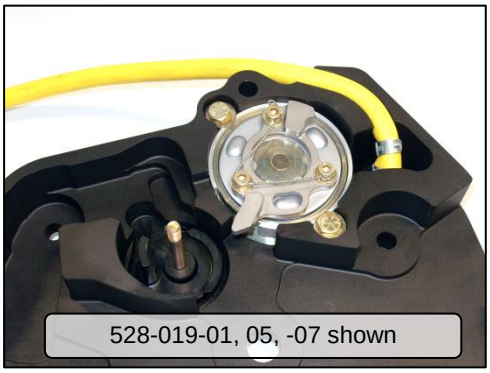
8. If the solenoid assembly was disassembled, install the Solenoid Cam (5.2) onto the solenoid (5.1) with the three Washers (5.3) and Screws (5.4), using Loctite 262 Threadlocker. Note orientation of Solenoid Cam in relation to the wires. Safety-wire the screws together as shown.

9. Install the Solenoid Assembly (5) into the Solenoid Side Plate (11) with the Solenoid Ring Screws (28), Washers (29), Wedge Ring (12), two Nuts (22) and two Washers (17).



10. Lightly grease the bottom of the side plate pocket with Mil-G-23827 or equivalent general purpose grease. Install the Cam Pivot Bolt (26) into the Solenoid Side Plate (11). For 528-019-01, 528-019-05, and 528-019-07 only - Install Spring Guide (14) over the Cam Pivot Bolt.



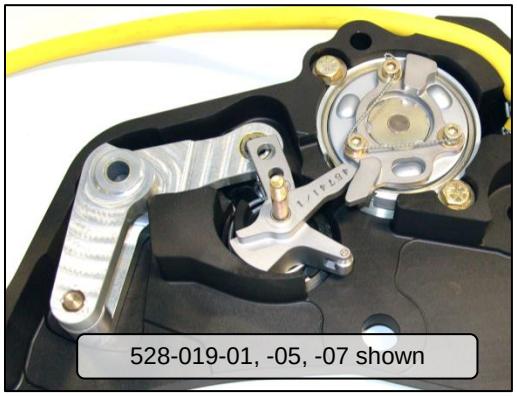


11. For the 528-019-00 cargo hook - Install the Cam Spring (36) partially into the Solenoid Side Plate. Slide the Cam (6) over the Bolt (26) and hook the Cam Spring onto the cam. Pre-load the Cam Spring by rotating the Cam counterclockwise 360º with the free end of the Cam Spring started into its pocket. Slide the Cam Spring and Cam into the pocket while maintaining the Cam Spring pre-load. It will be necessary to guide the free end of the Cam Spring into the lower part of its pocket.

12. For the 528-019-01, 528-019-05, and 528-019-07 cargo hooks - Hook the loop on the Cam Spring (36) onto the Cam (6) and place these over the Bolt (26) and Spring Guide (14). Pre-load the spring by rotating the Cam counterclockwise 360 degrees with the free end of the spring started into its pocket. Slide the Cam 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.

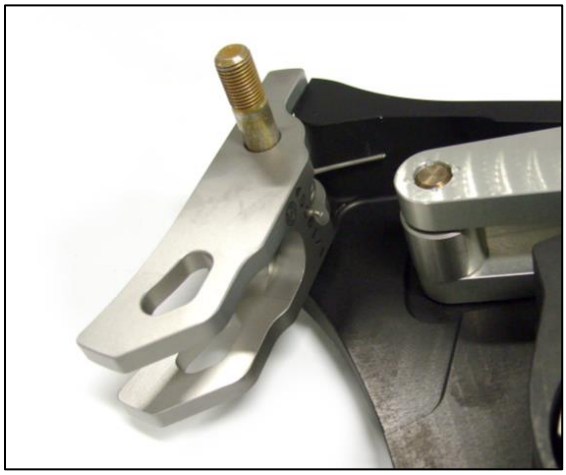
13. Grease the needle bearing (7.6) in the Toggle (7) with Mil-G-23827 or equivalent general purpose grease prior to assembly.

14. Install the Toggle by lifting the Cam about 1/4 inch from the bottom of its pocket and wiggling the Toggle into place. Ensure Cam Spring has not been removed from its place.

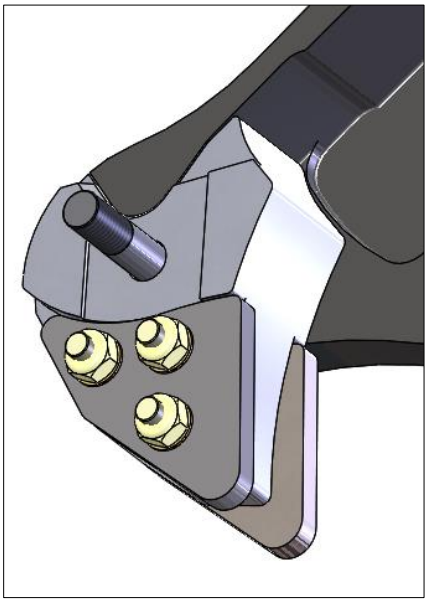


15. Install the Bolt (19) that the Toggle pivots on and the Cam Roller Pin (37).

16. For keepered configurations (all P/Ns except 528-019-07) install the Keeper Pivot Bolt (27), Keeper (9) and Keeper Spring (35). Note Keeper orientation. If new spring is installed trim as shown.



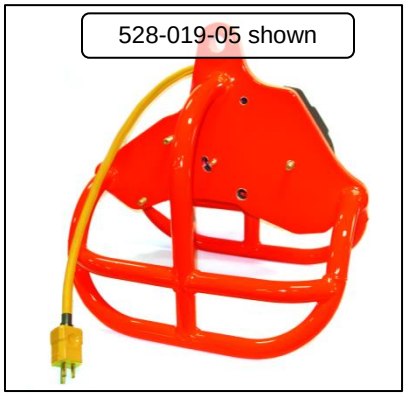
17. For P/N 528-019-07 keeperless configuration: if disassembled, re-assemble the Armor Plates (39) Armor Plate Adapter (40) with three bolts (41), washers (42), and nuts (22). Tighten nuts to 50-75 in-lbs. Install this assembly over the bolt (27).



18. Install the Load Beam Bumper (33), and the Load Beam Bumper Bolt (27).

19. Route the electrical cable through the Cage Weldment (4) as shown.

20. Place the Cage Weldment onto the Solenoid Side Plate (11) and over the protruding bolt ends. Be careful that the Cam does not come out of position. Install and lightly torque Keeper Nut (25) and Washer (21) and Toggle Nut (25) and Washer (21) 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.



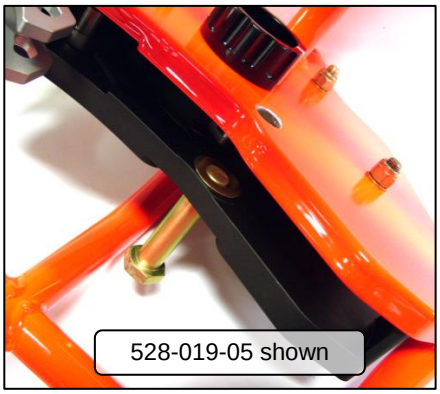
21. Install Washer (21), and Nut (25) over the Load beam Bumper Bolt (27) and torque the nut.

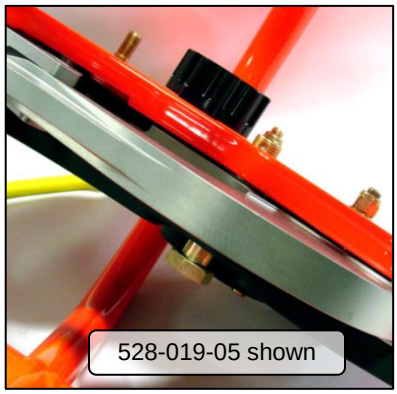
22. Grease Cage Weldment and Manual Release Knob (10) as shown with Mil-G-23827 or equivalent general purpose grease as shown.

23. Install Wave Washer (34) and Spacer (23), Manual Release Knob (10), Washer (24) and Nut (18) over the Cam Pivot Bolt (26). 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 (18).

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

25. While holding the Manual Release Knob in the open position, insert the Load Beam (8) into position and install the Load Beam Pivot Bolt (32). Place Washers (20) on both sides of the load beam.



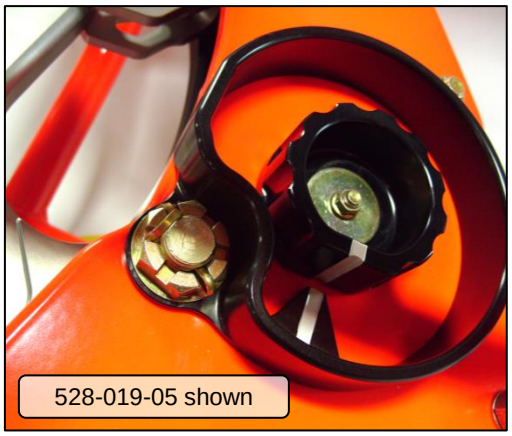


26. Install Frame Bolt (30).

27. For 528-019-01, 528-019-05, and 528-019-07 – Install Brush Guard (14) over the bolts.

28. Install Washer (24), and Nut (31).

29. Secure the Nut (17) and Washer (22) on the Load Beam Pivot Bolt and tighten nut to finger tight then rotate to next castellation to insert Cotter Pin (19). Install Cotter Pin.



30. Torque the 3/8" nuts to 180-200 inch-pounds (20.3 – 22.6 N-m) and the ¼" nuts to 50-75 inch-pounds (5.6 – 8.4 N-m). Torque the nuts evenly in several stages to avoid distorting the housing.

31. Affix Open Decal (2) and burnish in place.

32. Check again for free operation and automatic re-latch of the load beam.

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

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 15,000 pounds (6804 kg). Use a steel chain or a steel ring 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 2 to 5 pound (0.9 to 2.3 kg) load on the load beam. 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 (the keeperless configuration requires that the load beam be manually pushed up and closed).

Connect an adjustable 22 - 28 VDC power supply with a momentary release switch wired into the electrical release circuit. Place a 2 to 5 pound load on the load beam. With 22 VDC supplied, press the release switch. The load beam should unlatch and fall open, releasing the load.

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

13.2 Proof Load Test

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 15,000 pounds (6804 kg). 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 6,000 pounds (2721 kg) 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.

13.4 Manual Load Release Test

Gradually load the Cargo Hook to 6,000 pounds (2721 kg). Hold the load for 2 minutes. Perform a manual release by rotating the manual release knob counter-clockwise. The manual release knob should rotate smoothly. The required release torque shall not exceed 16 inch-pounds (1.8 N-m). This torque is measured on the knob since the item (18) nut 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 (0.34 N-m).

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 18 in-lbs. with no load on hook.	Defective manual release system.	Check manual release knob. Disassemble, and inspect internal mechanism for binding, jamming, and worn or broken parts. Repair as necessary.

15.0 Illustrated Parts List

Figure 15.1 Cargo Hook Parts

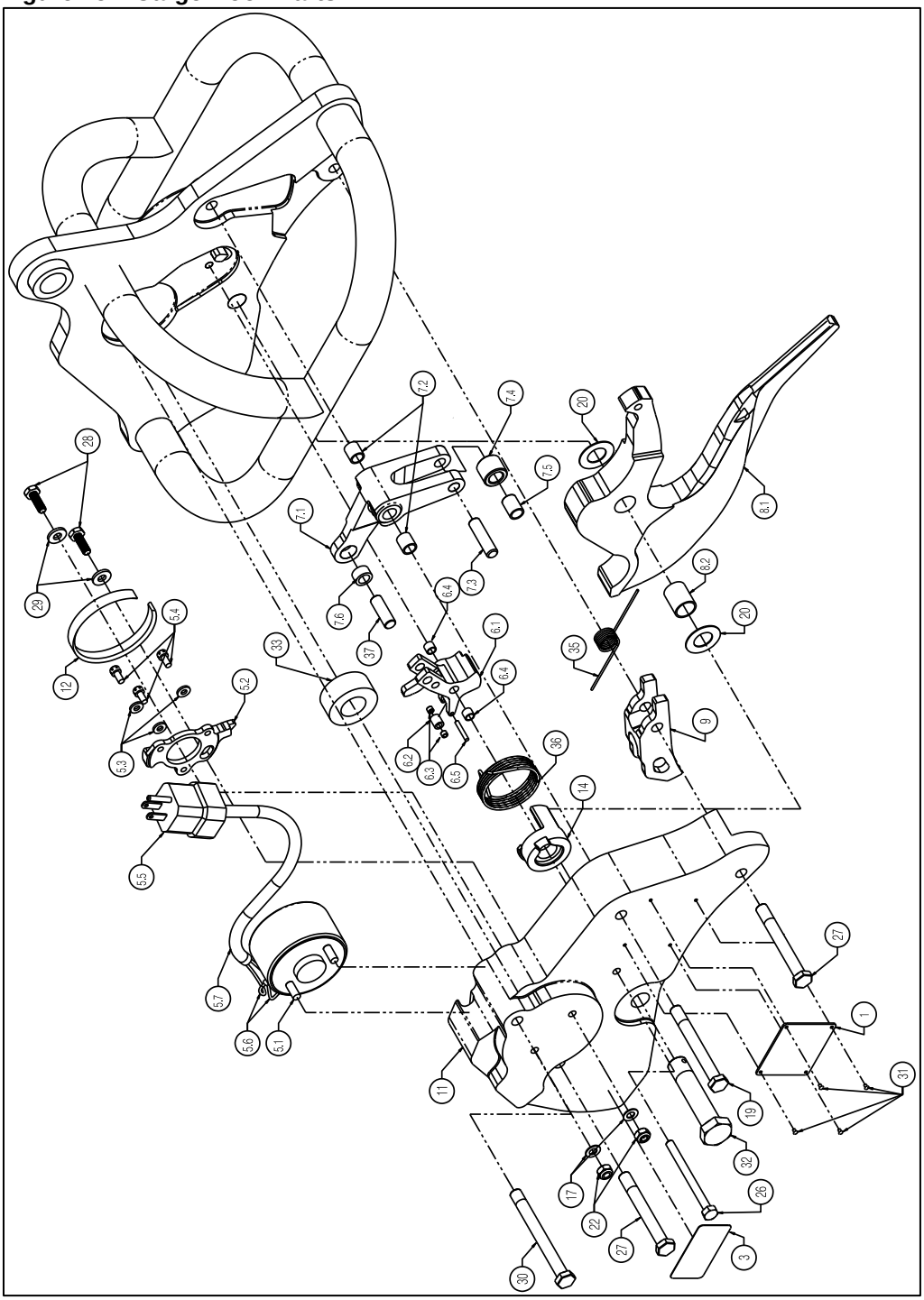
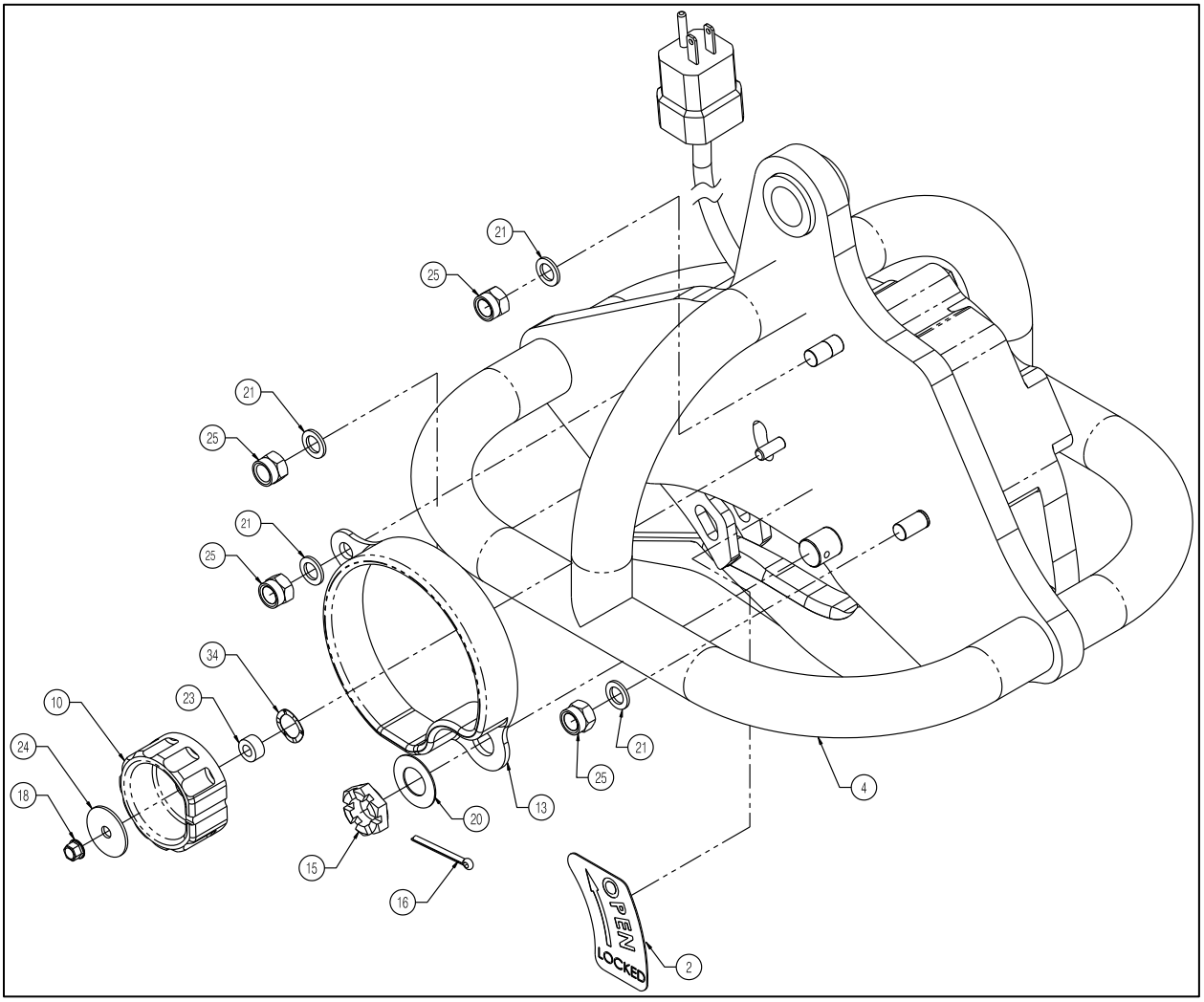
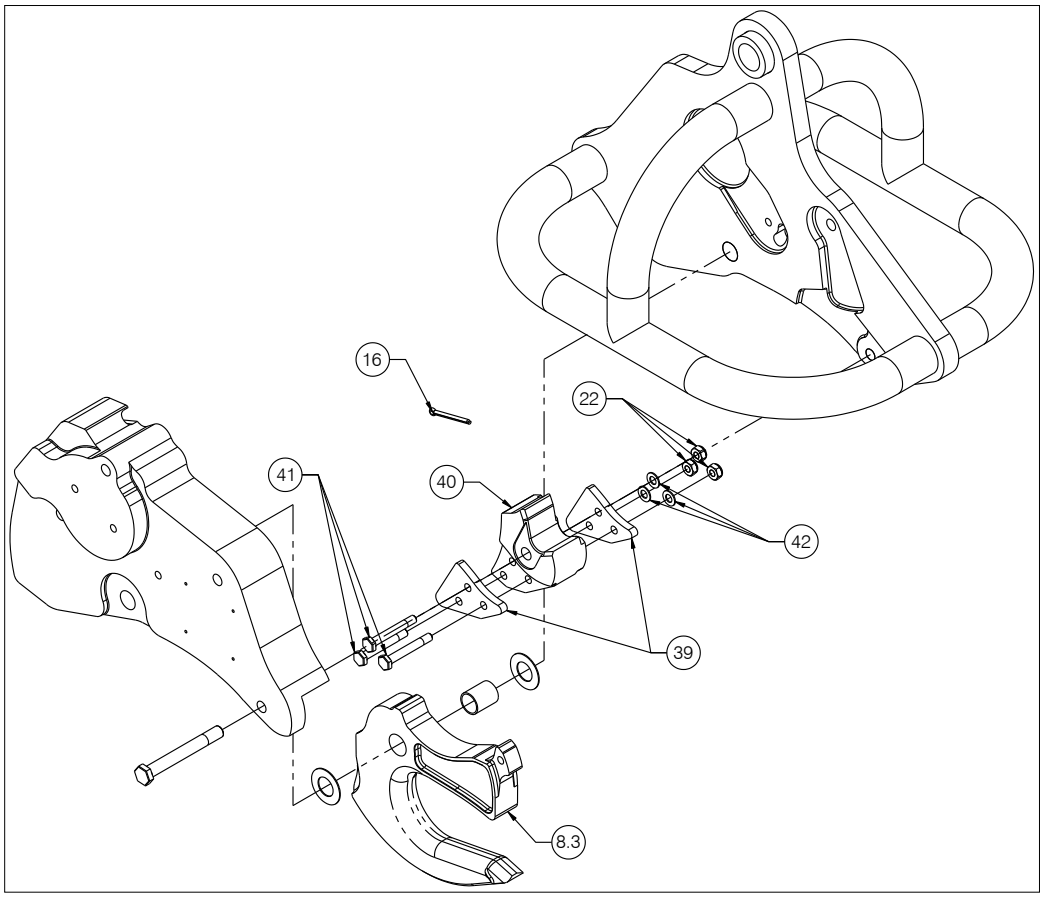


Figure 15.1 Cargo Hook Parts (continued)



* 528-019-01 configuration shown. Parts that are specific to cargo hook P/N 528-019-07* are numbered in the figure following. The numbered parts in Figure 15.2 replace items 8.1, 9, and 35 shown in Figure 15.1. For parts shown but not numbered refer to Figure 15.1.

Figure 15.2 Cargo Hook Parts Specific to 528-019-07



*A conversion kit (P/N 212-058-00) to convert a keepered half-cage cargo hook to a keeperless configuration includes the Armor Plate Assembly (42, 22, 39, 40, 41), Load Beam Assembly (8.2, 8.3), and a cotter pin (16). To install the conversion kit:

1. Remove the keeper pivot bolt (27), washer (21) and nut (25) and remove keeper.
2. Remove cotter pin (16) and remove washer (20), nut (15) and load beam pivot bolt (32) and remove load beam.
3. Position Armor Plate Assembly and new Load Beam Assembly with washers (20) 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 counter-clockwise direction. The load beam should unlatch and fall open. Manually push the load beam up and ensure it re-latches.

Table 15.1 Cargo Hook Parts

Item	*Part No.*	*Description*	*Included Quantity*					
			528-019-00	*528-019-01*	*528-019-05*	*528-019-07*	*212-019-00 Overhaul Kit for -00*	*212-031-00 Overhaul Kit for – 01,-05,-07*
1	215-144-00	Serial Number Plate	1	-	-	-	-	-
1[3]	215-144-01	Serial Number Plate	-	1	1	1	-	-
2	215-145-00	Open Decal	1	-	-	-	-	-
2	215-145-01	Open Decal	-	1	1	1	1	1
3	215-263-00	Load Ring Warning Decal	1	1	1	1	1	1
4	232-107-00	Half Cage Weldment	1	1	-	-	-	-
4	235-210-01	Full Cage Weldment	-	-	1	1	-	-
5[1]	232-108-00	Solenoid Assembly	1	1	1	1	-	-
5.1	455-004-00	Solenoid	1	1	1	1	-	-
5.2	290-587-00	Solenoid Cam	1	1	1	1	-	-
5.3	510-042-00	Washer	3	3	3	3	3	3
5.4	510-156-00	Screw	3	3	3	3	3	3
5.5	410-300-00	Plug	1	1	1	1	-	-
5.6	420-063-00	Cable	1	1	1	1	-	-
5.7	450-008-00	Heat Shrink	1	1	1	1	-	-
6[1]	232-109-00	Cam Assembly	1	1	1	1	1	1
6.1	290-592-00	Cam	1	1	1	1	-	-
6.2	290-603-00	Roller	1	1	1	1	-	-
6.3	517-031-00	Bushing	2	2	2	2	-	-
6.4	517-021-00	DU Bushing	2	2	2	2	-	-
6.5	290-450-00	Interlock Pin	1	1	1	1	-	-
7[1]	232-110-00	Toggle Assembly	1	1	1	1	-	-
7.1	290-588-01	Toggle	1	1	1	1	-	-
7.2	517-016-00	Bearing	2	2	2	2	2	2
7.3	290-520-00	Pin	1	1	1	1	-	-
7.4	290-379-00	Load Beam Roller	1	1	1	1	-	-

Item	*Part No.*	*Description*	*Included Quantity*					
			528-019-00	*528-019-01*	*528-019-05*	*528-019-07*	*212-019-00 Overhaul Kit for -00*	*212-031-00 Overhaul Kit for – 01,-05,-07*
7.5	517-015-00	Bearing	1	1	1	1	1	1
7.6	517-038-00	Bearing	1	1	1	1	1	1
8[1]	232-111-03	Load Beam Assembly	1	1	1	-	-	-
8[1]	232-828-00	Load Beam Assembly	-	-	-	1	-	-
8.1	290-589-03	Load Beam	1	1	1	-	-	-
8.2	517-044-00	Bearing	1	1	1	1	1	1
8.3	292-053-00	Load Beam	-	-	-	1	-	-
9	290-590-00	Keeper	1	1	1	1	-	-
10	290-591-00	Long Line Knob	1	-	-	-	-	-
10	290-591-01	Long Line Knob	-	1	1	1	-	-
11	290-594-01	Side Plate, Solenoid	1	-	-	-	-	-
11	290-594-02	Side Plate, Solenoid	-	1	1	1	-	-
12[2]	290-727-00	Wedge Ring	1	1	1	1	-	-
13	291-561-00	Brush Guard	-	1	1	1	-	-
14[3]	291-563-00	Spring Guide	-	1	1	1	-	-
15	510-096-00	Nut	1	1	1	1	1	1
16	510-098-00	Cotter Pin	1	1	1	1	1	1
17	510-100-00	Washer	2	2	2	2	2	2
18	510-114-00	Nut	1	1	1	1	1	1
19	510-351-00	Bolt	1	-	-	-	1	-
19	510-128-00	Bolt	-	1	1	1	-	1
20	510-172-00	Washer	3	3	3	3	3	3
21	510-221-00	Washer	4	4	4	4	4	4
22	510-246-00	Nut	2	2	2	5	2	5
23	510-327-00	Spacer	1	1	1	1	1	1
24	510-336-00	Washer	1	1	1	1	1	1
25	510-348-00	Nut	4	4	4	4	4	4

Item	*Part No.*	*Description*	*Included Quantity*					
			528-019-00	*528-019-01*	*528-019-05*	*528-019-07*	*212-019-00 Overhaul Kit for -00*	*212-031-00 Overhaul Kit for – 01,-05,-07*
26	510-350-00	Bolt	1	1	1	1	1	1
27	510-351-00	Bolt	2	2	2	2	2	2
28[2]	510-435-00	Screw	2	2	2	2	2	2
29[2]	510-436-00	Washer	2	2	2	2	2	2
30	510-437-00	Bolt	1	1	1	1	1	1
31	510-262-00	Drive Screw	4	-	-	-	-	-
31	510-940-00	Drive Screw	-	4	4	4	-	-
32	510-304-00	Bolt	1	-	-	-	1	-
32	510-950-00	Bolt	-	1	1	1	-	1
33	514-012-00	Bumper	1	1	1	1	1	1
34	514-024-00	Wave Spring Washer	1	1	1	1	1	1
35	514-026-00	Spring	1	1	1	1	1	1
36	514-027-00	Spring	1	-	-	-	1	-
36	514-027-01	Spring	-	1	1	1	-	1
37	517-027-00	Cam Roller Pin	1	1	1	1	1	1
38	215-260-00	Overhaul Label	-	-	-	-	1	1
39	292-040-00	Armor Plate	-	-	-	2	-	-
40	292-054-00	Armor Plate Adapter	-	-	-	1	-	-
41	510-322-00	Bolt	-	-	-	3	-	3
42	510-219-00	Washer	-	-	-	3	-	3

[1] Items not illustrated as assemblies

[2] Hook S/Ns 1-78 Solenoid Clamp (P/N 290-676-00) and Socket Screw (P/N 510-395-00) were present instead of Items 12, 28 and 29.

[3] The spring guide must be used with Side Plate P/N 290-594-02 and Spring P/N 514-027-01 (528-019-01, 528-019-05, and 528-019-07 configurations).

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