Component Maintenance Manual

Cargo Hook

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Applicable Equipment Part Numbers

Obsolete P/Ns	Current P/Ns
528-010-00	528-010-04
528-010-01	528-010-05
528-010-03	528-010-06
	528-010-07
	528-010-08

Please check our web site www.onboardsystems.com

for the latest revision of this manual.

RECORD OF REVISIONS

Revision	Date	Page(s)	Reason for Revision
16	01/18/12	7, 10-12 & 21-23	Added references to overhaul kit in overhaul instructions. Added replacement recommended column to inspection criteria table. Updated Cargo Hook Parts table note format for ease of use.
17	03/12/12	17	Removed reference to “Major Repair” in para. 11.1.
18	04/19/12	13, 17 & 18	Updated figures to change position of approved metal stamp location. Updated ATP section to remove nylon slings from approved load release test equipment.
19	07/27/12	17, 18	Clarified applicability of Onboard Systems ATP documents. Clarified power supply requirements.
20	06/12/13	7	Clarified definition of external load operations.
21	09/09/13	5, 6, 8	Added requirement to maintain record of all cargo hook activity (pg 5). Added Storage and Inactivity section. Added Section 6.3.
22	03/25/14	12 & 15-26	Added Cam Bearing deburr warning and Figure 9.2.
23	01/19/18	10	Removed NDT requirement for Attach bolt (14), Keeper (7), Cam roller pin (9), Cam assembly (4), Cam actuator (4.3).
24	01/14/20	6, 10	Replaced NDT inspection of Toggle Assembly (5) and Load Beam Assembly (6) with magnified visual inspection; moved inspection step to Table 9.1. Changed item 1 of section 4.5 to require a functional check rather than full ATP.
25	04/12/23	5, 8, 11, 14, 15, 23	Added cleaning and inspection instructions for cam surfaces. Added cam assembly to overhaul kits. Changed monthly preventative maintenance to “based on visual condition”. Added grace period for annual/100 hour and 5 year/1000 hour overhaul intervals.

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1.0 Introduction

1.1 **Scope.** This component maintenance manual contains instructions for inspection, maintenance and overhaul.

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

180-144-00 Acceptance Test Procedure

180-149-00 Acceptance Test Procedure

180-167-00 Acceptance Test Procedure

3.0 Service Bulletins

3.1 This component is subject to the following service bulletins. Service bulletin documents may be obtained from the Onboard Systems website. Verify compliance with all service bulletins prior to maintenance.

Service Bulletin	Description	P/N Applicability	S/N Applicability
159-001-00	Drain Holes	528-010-00	028 and prior
159-007-00	Side Plate Attach Lugs	528-010-00	026-391
159-017-00*	Toggle Replacement	528-010-00	026-999
159-019-00**	Toggle Replacement	528-010-01	All
159-028-00	Conversion of 28 VDC cargo hooks to 14 VDC on R22 and R44 models.	528-010-00 528-010-04	All

* Per Service Bulletin 159-017-00, Cargo Hook P/N 528-010-00 was changed to 528-010-04. This change incorporated Toggle Assembly part number 232-028-01 and Thrust Plate part numbers 290-304-01 and 290-306-01. If in possession of cargo hook P/N 528-010-00 contact the factory for additional guidance.

** Per Service Bulletin 159-019-00, Cargo Hook P/N 528-010-01 was changed to 528-010-05. This change incorporated Toggle Assembly part number 232-028-01 and Thrust Plate part numbers 290-304-01 and 290-306-01. If in possession of cargo hook P/N 528-010-01 contact the factory for additional guidance.

4.0 Maintenance

4.1 Maintain a record of **ALL** cargo hook activities including aircraft installation and removal, inspections, repair and overhaul as well as inactivity and storage events.

Failure to follow all equipment maintenance instructions and component inspection criteria may result in serious injury, death or immediate loss of flight safety.

4.2 **Cleaning and Preventative Maintenance**

1. As needed per visual condition, remove accumulated soils from the exterior with a soft bristle brush and mild solvent/cleaner

2. As needed per visual condition, in salt water environments, apply a corrosion preventative compound such as ACF-50 to all exterior surfaces.

4.3 **Annual Inspection**

1. Annually or 100 hours of external load operations (see section 6.2 for definition), whichever comes first, remove the Cargo Hook from the aircraft. 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. See Table 9.1 for inspection criteria. A one-month or 10-hour grace period can be applied if needed. No additional extension is allowed beyond this grace period.

2. Lubricate the Cargo Hook Attach Bolt. Recommended lubricants are Mobilgrease 28 or AeroShell 7.

4.4 **Overhaul**

1. Overhaul the Cargo Hook in accordance with the overhaul schedule and instructions contained here-in.

4.5 Storage and Inactivity

1. 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 a functional check before being used. Perform the functional check per the instructions in section 11.8 through 11.10 of the acceptance test procedures (ATP) herein.

2. If the cargo hook has been installed on an aircraft and subsequently removed from service, store it in a reasonably protected indoor, dry, heated storage area for up to 6 months. If stored in this condition for less than 6 months, it may be used without any additional activity. If it is to be stored longer than 6 months perform the following activities. 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 placed in service without any additional activity. If the period of storage exceeds 2 years the cargo hook must be subjected to the ATP described herein before being placed in service.

3. If the cargo hook has been installed on the aircraft and subsequently removed from service but not stored in accordance with the instructions above, the cargo hook must be subject to the ATP described herein before being placed in service.

4.6 Repair

1. Repair the Cargo Hook in accordance with the repair instructions contained here-in.

5.0 Repair Instructions

5.1 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 14, instructions for returning equipment to the factory.

5.2 Reference numbers throughout this manual shown in parentheses ( ) refer to Table and Figure 13.1.

5.3 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.

6.0 Overhaul Schedule

6.1 The Cargo Hook shall be overhauled every 1000 hours of external load operations or 5 years, whichever comes first. A six-month or 100-hour grace period can be applied if needed. No extension to maintenance is allowed beyond this tolerance grace period.

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

6.3 The 5-year period is from the initial installation date when the cargo hook is new or newly overhauled, regardless of storage or inactivity periods. If initial installation date is unknown, then 5-year period is from date of manufacture as indicated on the cargo hook data plate or 5 years from date of last overhaul indicated on the overhaul sticker.

7.0 Overhaul Instructions

7.1 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 14, instructions for returning equipment to the factory.

7.2 Overhaul kit P/N 212-013-00 is recommended to complete the Cargo Hook overhaul. The overhaul kit contains all recommended items to be replaced at time of overhaul. Table 13.1 lists detail parts contained in the overhaul kit.

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

1. Obtain Overhaul kit P/N 212-013-00.
2. Completely disassemble.
3. Discard all items that are to be replaced by an item in Overhaul Kit P/N 212-013-00 listed in table 13.1 (springs, bearings, roll pins, cotter pins, fasteners except Attach Bolt (14), nuts and washers).
4. Inspect disassembled parts.
5. Obtain required replacement parts.
6. Reassemble.
7. Acceptance test.
8. Inspect for return to service.

8.0 Disassembly Instructions

8.1 Cut and remove all safety wire.

8.2 Remove solenoid assembly (2) by removing 3 screws (23).

8.3 Remove roll pin (26) and remove cam actuator (4.3) from cam (4.2).

8.4 Remove nuts (17), and washers (16) from frame bolts (10 and 22).

8.5 The frame can now be split by lifting the side plate (3.2) from the assembly. The internal mechanism can now be viewed and cycled to check for smooth operation. All of the internal parts may be removed at this time except the cam (4) and the load beam (6).

8.6 The solenoid (2.7) may be removed from the cover (2.3) by removing two nuts (2.9) and two washers (2.10). Note the orientation of connector (2.6), diode (2.4) and solenoid wires (2.7). Do not typically unsolder the wires at the connector (2.6) and diode (2.4). Note the orientation of solenoid cam (2.2) and remove three screws (2.11) and washers (2.8).

8.7 To remove the cam (4) from the side plate, manual release (3.3), first remove the 3 screws (24) and manual release cover (11) and spring (29). Then remove the roll pin (25) and remove the cam hub (4.1) and the cam spring (28). The Cam (4) can now be removed.

8.8 To remove the load beam (6), remove roll pin (26) and load beam crank (6.2) from the load beam shaft (6.3). The load beam assembly may now be removed.

8.9 Remove the attach bushings (3.1) by pressing them out of the side plates.

8.10 Bushings and bearings may be removed from detail parts by conventional means.

8.11 Do not typically disassemble the cam assembly (4) or toggle assembly (5).

8.12 Do not typically disassemble the load beam (6.1) from the load beam shaft (6.3).

9.0 Inspection Instructions

9.1 Thoroughly clean all parts to be inspected using standard methods. Parts should be completely free of surface contaminants, soils or grease before beginning inspections.

9.2 If the Cargo Hook is being overhauled, perform nondestructive inspection on the following parts to confirm absence of surface cracks which may have developed in service. Confirmed cracks of any size are cause for part replacement.

For the **Side Plate, Solenoid (3.2)** and **Side Plate, Manual Release (3.3)**, inspect using:

- Liquid penetrant inspection per ASTM E1417

Mark all indications and then interpret each under 10X magnification. Differentiate surface cracks from other non-relevant indications such as machine tool marks, scratches, dents or superficial corrosion.

9.3 Carefully inspect detail parts in accordance with the instructions in Table 9.1. Inspect the parts in a clean, well lighted room using standard dimensional measuring tools and visual methods. Repair parts found within inspection limits. Replace any part found beyond limits.

Table 9.1, Cargo Hook Inspection Criteria

Seq	Component	Inspection Criteria & Limit	Repair Action	Finish	Recommended replacement at Overhaul
1.	Load Beam Assembly (6), Toggle Assembly (5)	Surface cracks – inspect under illuminated magnification (minimum 2X / 4 diopter).	None. Cracks of any size are cause for part replacement.	N/A	No
2.	Attach Bolt (14) Keeper (7) Cam Actuator (4.3) Load Beam Assembly (6) Manual Release (8) Solenoid Cam (2.2)	Corrosion – 0.006 in. (0.127 mm) deep	Glass bead blast at less than 30 PSI (20.7N/CM^2) to remove corrosion.	Passivate per AMS-QQ-P-35 or ASTM A967	No
3.	Side Plate (3.2), (3.3)	See Figure 9.1	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

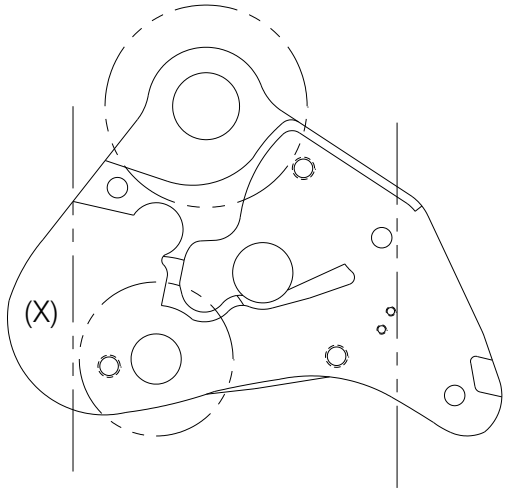
Seq	Component	Inspection Criteria & Limit	Repair Action	Finish	Recommended replacement at Overhaul
4.	Side Plate (3.2), (3.3)	Wear or deformation of top attach bushing hole ID – 0.6285 in (15.96 mm)	None	N/A	No
5.	Manual Release Cover (11) Solenoid Cover (2.3)	Dents, nicks, cracks, gouges, scratches and corrosion – 0.020 in. (0.50 mm) deep	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
6.	Attach bolt (14)	Wear on OD – 0.495 in. (12.57 mm)	None	N/A	No
7.	Bearing (3.10), (5.6)	Wear – more than 50% copper showing	None	N/A	Yes
8.	Bearing (3.9), (5.4)	Roughness, binding, looseness, or corrosion	None	N/A	Yes
9.	Attach Bushing (3.1)	Wear on ID – 0.520 in (13.208 mm)	None	N/A	Yes
10.	Bumper (12)	Denting, cuts or abrasions – 0.060 in. (1.27 mm) deep	None	N/A	Yes
11.	Keeper (7)	Gouges and nicks – 0.050 in. (1.27 mm) deep	Blend at 10:1 ratio as required to provide smooth transitions.	Passivate per AMS-QQ-P-35 or ASTM A967	No
12.	Keeper (7)	Bending or deformation between keeper ears, 0.436 in (11.07 mm) $\pm$ 0.200 in. (5.08 mm)	Straighten to 0.436 in (11.07 mm)	Passivate per AMS-QQ-P-35 or ASTM A967	No
13.	Cam Assembly (4)	See figure 9.2	None	N/A	Yes
14.	Cam Assembly (4)	Roughness, binding or looseness of the Interlock Roller (4.4)	Replace Interlock Pin (4.5) and Roller (4.4)	N/A	No
15.	Cam Hub (4.1)	Wear in spring groove – 0.030 in (0.762 mm) deep	None	N/A	No
16.	Toggle Assembly (5)	Roughness, binding or looseness of the Load Beam Roller (5.2)	None	N/A	No

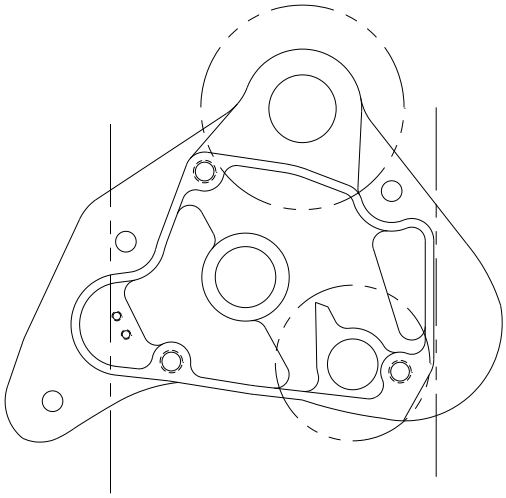
Seq	Component	Inspection Criteria & Limit	Repair Action	Finish	Recommended replacement at Overhaul
17.	Cam Roller Pin (9)	Visible denting, corrosion	None	N/A	No
18.	Load Beam (6.1)	Wear, gouges and nicks – 0.050 in. (1.27 mm) deep	Blend at 10:1 ratio as required to provide smooth transitions and ensure load rings will not hang up on load beam during release.	Passivate per AMS-QQ-P-35 or ASTM A967	No
19.	Serial Number Decal (2.1)	Damaged or illegible	None	N/A	Yes
20.	Load Beam Crank (6.2)	Wear in spring groove - 0.030 in (0.762 mm)	None	N/A	No
21.	Solenoid (2.7)	Shorted or open electrical circuit. For Cargo Hook 528-010-06, resistance 1.2 to 1.6 ohms. All other Cargo Hook P/Ns, resistance 3.0 to 4.0 ohms.	None	N/A	No
22.	Electrical connector (2.6)	Loose, missing, or mutilated contact pins, cracked case, or worn insulator	None	N/A	No
23.	Load ring warning decal (1)	Damaged or illegible	None	N/A	Yes
24.	Rigging Warning Decal (30)	Damaged or illegible	None	N/A	Yes
25.	Springs (27, 28 and 29)	Cracks or deformations	None	N/A	Yes
26.	Electrical Wiring	Deterioration	Replace	N/A	No
27.	All remaining nuts, bolts, roll pins, cotter pins, washers, heli-coils	Wear, corrosion or deterioration	None	N/A	Yes

Note 1 – For service at Onboard Systems, optional finish - black anodize per MIL-A-8625 Type II, Class 2 after nondestructive inspection. Prepare for anodize by using standard methods and process per 142-034-00.

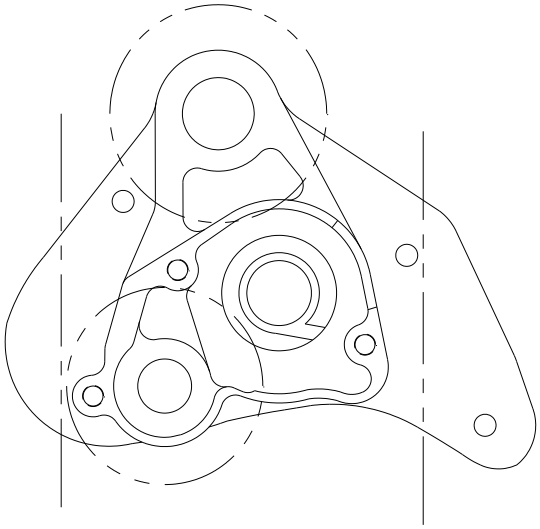
Figure 9.1, Side Plate, Additional Inspection Criteria

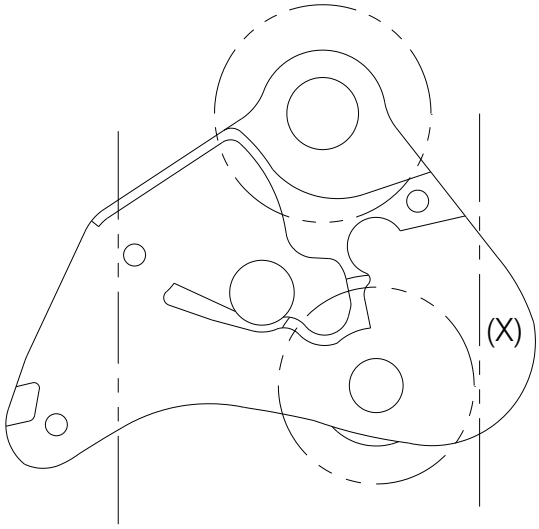
Side Plate, Solenoid (3.2)





Side Plate, Manual (3.3)





Inspection Criteria and Limits

Inside dashed circles – NO corrosion allowed.
Inside dashed circles – Dents, nicks, gouges, and scratches – 0.005 in (0.13 mm) deep.
Inside dashed lines – Dents, nicks, gouges, scratches, and corrosion – 0.010 in (0.25 mm) deep.
Outside dashed lines– Dents, nicks, gouges, scratches, and corrosion – 0.020 in (0.50 mm) deep.

(X) Approved metal stamp locations

Figure 9.2, Cam Assembly (4) 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 9.2.1

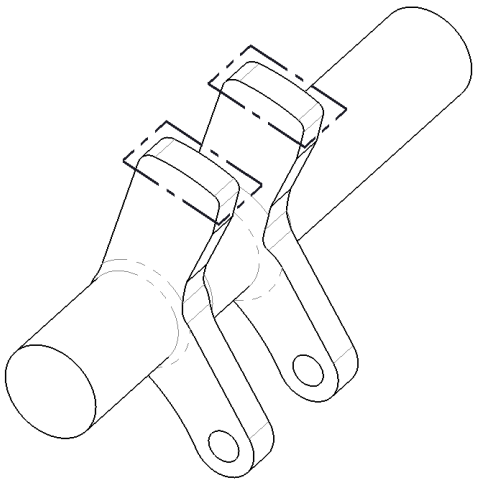
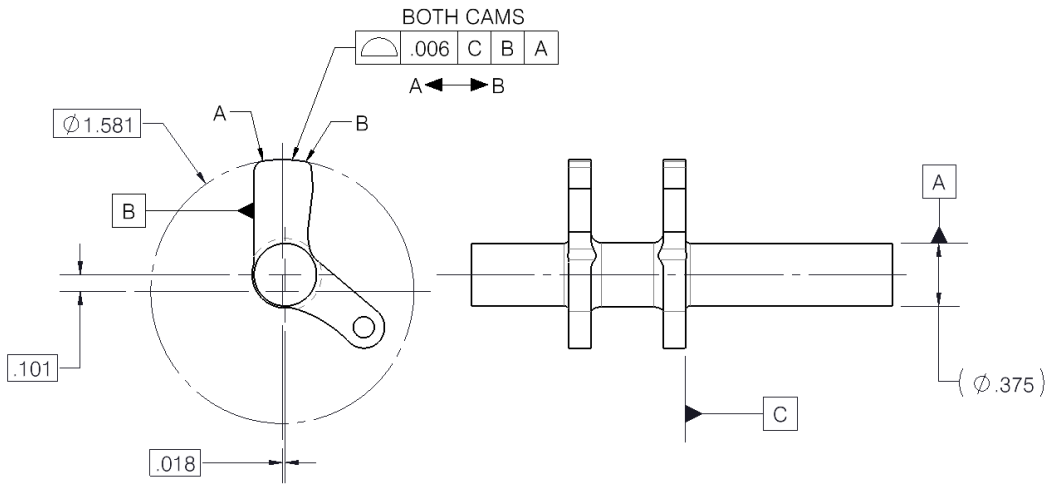


Figure 9.2.2

Continued on next page.

Figure 9.2.3



Inspection Criteria and Limits

Inside lines, see figure 9.2.1, 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 9.2.2.

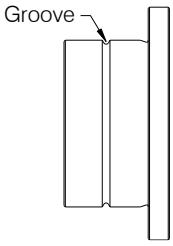
If the cam passes visual inspection, dimensionally inspect per figure 9.2.3.

10.0 Reassembly Instructions

10.1 Replace all parts found to be unserviceable or beyond limits.

10.2 Measure the top attach bushing hole of side plates (3.2) and (3.3) with a bore gage to determine if the standard attach bushing (3.1) is appropriate or if an oversize attach bushing P/N 290-294-01 is required. The oversize attach bushing P/N 290-294-01 may be distinguished from the standard attach bushing (3.1) by the presence of a groove on the OD.

10.3 Install correct attach bushing into side plates (3.2) and (3.3) as follows.

If top attach hole measures:	**Use attach bushing:**	**Installation**
Less than .6257 in (15.893 mm) .6264 - .6270 in (15.910 – 15.926 mm)	P/N 290-294-00 (3.1) P/N 290-294-01* * Oversized Attach Bushing P/N 290-294-01 is identified by a groove on its OD as shown. 	Install with wet zinc chromate primer using an arbor press. Ensure a continuous fillet seal of primer around bushing flange after installation.
.6257 - .6263 in (15.893 – 15.908 mm) .6271 - .6285 in (15.928 – 15.954 mm)	P/N 290-294-00 (3.1) P/N 290-294-01	Install with Loctite 680 adhesive using an arbor press. Ensure a continuous fillet seal of adhesive around bushing flange after installation.

10.4 Install all bearings (3.9) and bushings (3.10) with an arbor press into side plates (3.2) and (3.3).

10.5 Clean the inside of the side plates (3.2) and (3.3) with trichloroethylene. Apply a keeper thrust strip (3.7) and thrust washer (3.6) to each side plate. Apply right thrust strip (3.5) and left thrust strip (3.4) to appropriate side plates. Ensure that cutouts in thrust strips are centered over their respective holes.

10.6 Use MIL-PRF-23827 grease on the two camshaft bearings (3.9) and the toggle cam roller bearing (5.4)

10.7 If cam was disassembled, install interlock roller (4.4) and pin (4.5) stake body of cam around pin hole.

10.8 If cam spring (28) is new, place spring into cam hub (4.1) and cut the spring so that it is flush with the hub. Flip the spring over and cut the other end of the spring flush with the hub. Then remove the spring and cut one tail 1/8” shorter. The shorter tail mates with the hub.

10.9 Install cam assembly (4) in side plate (3.3). Install spring (28), manual release lever (8), cam hub (4.1) and roll pin (28) while pre-loading the cam spring approximately 270°. Tap roll pin with center punch so the pin is below flush.

10.10 Install load beam assembly (6) in side plate (3.3) and push on load beam crank (6.2) and roll pin (26). Tap roll pin with center punch so the pin is below flush.

10.11 Install return spring (29) between cam hub (4.1) and load beam crank (6.2).

10.12 Safety wire roll pins through load beam crank (6.2) and cam hub (4.1).

10.13 Check for and remove FOD, if present.

10.14 Temporarily install manual release cover (11) with three screws (24).

10.15 Push bolts (10 & 22) into place through side plate to hold internal components for assembly.

10.16 Install keeper (7) and spring (27) onto keeper bolt. Spring should have about 120° of pre-load. Trim new spring flush with the keeper. Bend the other end of the spring over the post of the side plate and cut flush.

10.17 Install bumper (12) into frame.

10.18 Install toggle assembly (5) and cam roller pin (9).

10.19 Check for and remove FOD if present.

10.20 Mate two side plates together assuring that mechanisms function freely.

10.21 Install two frame washers (16) and tighten nuts (17) on frame bolts (22). Tighten nut at keeper pivot to 20-25 inch-pounds and the other to 75 inch-pounds.

10.22 Install frame washer (16) and tighten nut (17) on toggle pivot bolt (10) to 30 inch-pounds.

10.23 Install cam actuator (4.3) and roll pin (26). Tap roll pin with center punch so the pin is below flush

10.24 Safety wire roll pin through cam actuator (4.3).

10.25 If solenoid, diode, and connector were disassembled, re-assemble opposite of disassembly procedure.

10.26 If data plate (2.1) is new, stamp applicable information.

10.27 Install data plate (2.1) and solenoid (2.7) into solenoid housing (2.3) using 2 washers (2.10) and nuts (2.9).

10.28 Install solenoid cam (2.2) on solenoid (2.7) using three washers (2.8) and screws (2.11).

10.29 Check for and remove FOD if present.

10.30 Apply RTV sealant to the side plate (3.2) faying surfaces where the solenoid will be installed.

10.31 Install solenoid assembly onto side plate with screws (23).

10.32 Safety wire screws on solenoid cover.

10.33 Install attach bolt (14), washers (21), washer (19), nut (18). Temporarily install and cotter pin (20).

10.34 If load ring warning decal (1) is new, install onto bottom of solenoid cover (2.3). If rigging warning decal (30) is new, install onto bottom of side plate (3.3) near manual release cover (11).

10.35 Perform the acceptance test procedure per this manual.

10.36 Fill out and affix Overhaul Label (P/N 215-260-00).

11.0 Acceptance Test Procedure

11.1 When Cargo Hook is overhauled or the side plates (3.2 and 3.3) are separated, the Cargo Hook must be subjected to the following acceptance test procedure (ATP) before being returned to service.

11.2 Examine the cargo hook externally for security of the lock wire, cotter pins and fasteners.

11.3 Use an appropriate insulation resistance tester to test the resistance between each pin and the base of the connector (2.6). The readings should not be less than 2 mega-ohms.

11.4 Using a multi-meter, check the resistance between pins A and B of the electrical connector. Resistance should be:

Applicable P/Ns		**Resistance**
528-010-04 528-010-07	528-010-05 528-010-08	3 – 4 ohms
528-010-06		1.2 – 1.6 ohms

11.5 For Cargo Hook P/N 528-010-05 and 528-010-08, test the continuity between pins C and D of connector (2.6). With the Load Beam (6) in the closed position, the continuity should be infinite. With the Load Beam (6) in the open position, the continuity should be zero.

11.6 Remove the Manual Release Cover (11) and screws (24) and install a manual release test cable. Re-install the Manual Release Cover and screws.

11.7 Suspend the hook from a test rig capable of loading the cargo hook to 8,750 pounds (3968 KG). Use a steel ring to apply the load to the load beam.

11.8 Connect a power supply (see below for required VDC output) with a momentary release switch wired into the positive wire, to the connector (2.6), and an in-line current meter. Connect the negative lead to pin A and the positive lead to pin B. Set the voltage as follows:

Applicable P/Ns		**Voltage**
528-010-04 528-010-07	528-010-05 528-010-08	20 VDC $\pm$ 0.1
528-010-06		10 VDC $\pm$ 0.2

11.9 Attach a 7 pound (3.18 KG) weight to the load beam. Operate the manual release lever. The load beam should unlatch and the load should slide off the load beam. Release the manual release lever. Ensure that the load beam returns to the fully locked position.

11.10 Attach a 7 pound (3.18 KG) weight to the load beam. Operate the electrical release. The load beam should unlatch and the load should slide off the load beam. Release the electrical release. Ensure that the load beam returns to the fully locked position.

CAUTION

Damage to the cargo hook release solenoid can occur if the release switch is operated for more than 20 seconds continuously.

11.11 Load a suitable load ring onto the load beam (6). Gradually proof load the cargo hook with the test rig to 8,750 pounds (3969 KG). Hold the load for 1 minute. The load beam should hold the load without unlatching. Reduce the load to zero.

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.

11.12 Load the cargo hook using a steel ring that is free to drop clear of the load beam and allow it to re-latch. Gradually load the cargo hook to 3,500 pounds (1587 KG). Using a spring scale or equivalent, pull the manual release cable. The load beam should unlatch and the steel ring should slide off the load beam. The load beam should automatically re-latch after the release. Verify the required release force is between 3.5 pounds (1.58 KG) and 8 pounds (3.62 KG). Repeat the test at 2,000 pounds (907 KG), 600 pounds (272 KG) and 7 pounds (3.18 KG).

Use of a nylon sling is not recommended for load release tests as recoil may cause damage to the cargo hook.

11.13 Load the cargo hook using a steel ring that is free to drop clear of the load beam and allow it to re-latch. Gradually load the cargo hook to 3,500 pounds (1587 KG). Press the electrical release button. The load beam should unlatch and the steel ring should slide off the load beam. The load beam should automatically re-latch after the release. Verify that the current draw is between 5 and 9 amps. Repeat the test at 2,000 pounds (907 KG), 600 pounds (272 KG) and 7 pounds (3.18 KG).

11.14 Remove the Cargo Hook from the test stand. Remove the manual release cable and replace the Manual Release Cover (11) and screws (24).

11.15 End of Acceptance Test Procedure.

11.16 For service at Onboard Systems, optionally use the following Onboard Systems factory acceptance test procedures:

Acceptance Test Procedure	**Applicable P/Ns**	
180-144-00	528-010-04	528-010-07
180-149-00	528-010-05	528-010-08
180-167-00	528-010-06	

12.0 Troubleshooting

12.1 The following section lists symptoms and probable causes to aid in equipment troubleshooting.

Symptom	Probable Cause	Remedy
Failure to operate electrically	Damaged or defective diode (2.4) or solenoid (2.7)	Check for proper resistance across connector pins A and B per section 11.4. If out of tolerance, remove the Solenoid Assembly (2) and disconnect the diode (2.4). Re-check for proper resistance. Replace diode (2.4) or solenoid (2.7) as necessary.
	Damaged or loose wiring	Check for proper continuity across connector pins A & B per table 9.1 seq. 20. Remove the Solenoid Assembly (2) and repair wiring.
During the Acceptance Test Procedure, the manual release cable force exceeds requirements	Friction in internal mechanism	Check operation of unit using the manual release lever. Disassemble and inspect internal mechanism. Check all bearing joints for free movement. Check cam assembly (4) for denting/ damage. Check toggle roller and pin for denting/ damage. Replace as necessary.

13.0 Illustrated Parts List

Figure 13.1, Cargo Hook Parts

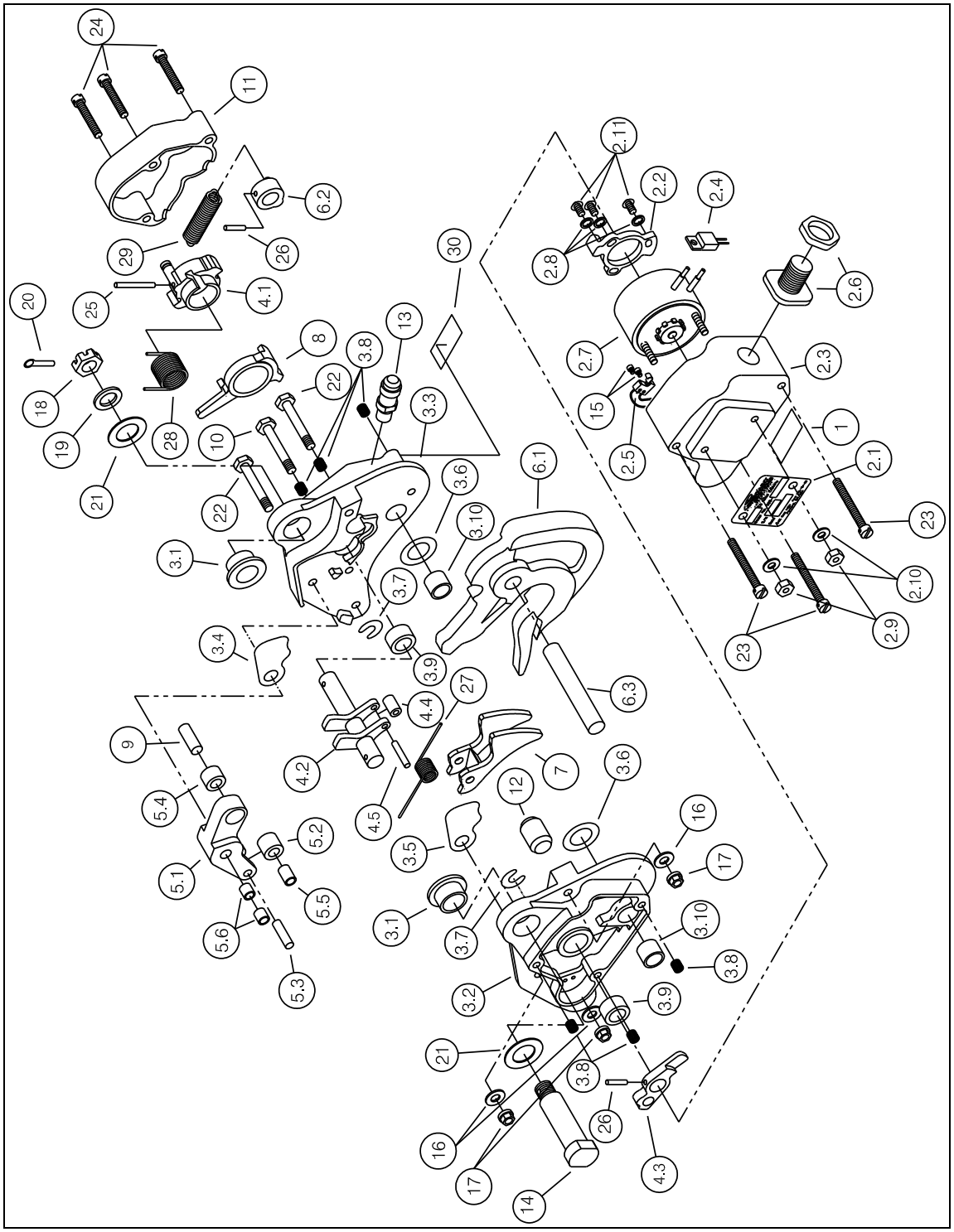


Table 13.1, Cargo Hook Parts

ITEM	PART NUMBER	DESCRIPTION	QTY in 528-010-XX					QTY in Overhaul Kit P/N 212-013-00
			04♠■	05♠	06♠	07	08	
1	215-100-00	Load Ring Warning Decal	1	1	1	1	1	1
2[1]	232-025-02	Solenoid Assembly	-	-	-	1	-	-
2[1]	232-025-03	Solenoid Assembly	-	1	-	-	1	-
2[1]	232-025-04	Solenoid Assembly	-	-	1	-	-	-
2[1]	232-025-05	Solenoid Assembly	1	-	-	-	-	-
2.1	215-077-00	Serial Tag	-	-	-	-	-	1
2.1[3]	215-246-00	Serial Tag	1	-	-	-	-	-
2.1[4]	215-249-00	Serial Tag	-	-	-	1	-	-
2.1[5]	215-248-00	Serial Tag	-	-	1	-	-	-
2.1	215-206-00	Serial Tag	-	1	-	-	1	-
2.2	290-298-00	Solenoid Cam	1	1	1	1	1	-
2.3	290-300-02	Solenoid Cover	1	1	1	1	1	-
2.4	340-027-00	Diode	-	1	-	1	1	-
2.4	340-035-00	Diode	1	-	1	-	-	-
2.5	400-047-00	Switch	-	1	-	-	1	-
2.6	410-139-00	Connector	1	-	1	1	-	-
2.6	410-159-00	Connector	-	1	-	-	1	-
-	556-045-00	O-Ring	-	-	-	-	-	1
2.7	455-003-00	Solenoid	1	1	-	1	1	-
2.7	455-007-00	Solenoid	-	-	1	-	-	-
2.8	510-158-00	Washer	3	3	3	3	3	3
2.9	510-206-00	Nut	2	2	2	2	2	2
2.10	510-209-00	Washer	2	2	2	2	2	2
2.11	510-211-00	Screw	3	3	3	3	3	3
3[1]	232-026-02	Frame Assembly	1	1	1	1	1	-
3.1[2]	290-294-00	Attach Bushing	2	2	2	2	2	2
3.2	290-302-01	Side Plate, Solenoid	1	1	1	1	1	-
3.3	290-303-01	Side Plate, Manual	1	1	1	1	1	-
3.4	290-304-01	Thrust Plate, Left	1	1	1	1	1	1
3.5	290-306-01	Thrust Plate, Right	1	1	1	1	1	1
3.6	290-329-00	Thrust Washer	2	2	2	2	2	2
3.7	290-330-00	Thrust Plate Keeper	2	2	2	2	2	2
3.8	510-210-00	Helicoil	6	6	6	6	6	6
3.9	517-007-00	Cam Shaft Bearing	2	2	2	2	2	2
3.10	517-010-00	Load Beam Pivot Bearing	2	2	2	2	2	2
4[1]	232-027-01	Cam Assembly	1	1	1	1	1	1
4.1	290-288-01	Cam Hub (Sold as assembly only)	1	1	1	1	1	-
4.2	290-296-00	Cam (Sold as assembly only)	1	1	1	1	1	-
4.3	290-297-00	Cam Actuator (Sold as assembly only)	1	1	1	1	1	-

ITEM	PART NUMBER	DESCRIPTION	QTY in 528-010-XX					QTY in Overhaul Kit P/N 212-013-00
			04♠■	05♠	06♠	07	08	
4.4	290-308-00	Interlock Roller (Available separately)	1	1	1	1	1	-
4.5	290-309-00	Interlock Pin (Available separately)	1	1	1	1	1	-
5[1]	232-028-01	Toggle Assembly	1	1	1	1	1	-
5.1	290-285-01	Toggle	1	1	1	1	1	-
5.2	290-289-00	Load Beam Roller	1	1	1	1	1	-
5.3	290-292-01	Load Beam Roller Pin	1	1	1	1	1	-
5.4	517-006-00	Cam Roller Bearing	1	1	1	1	1	1
5.5	517-008-00	Load Beam Roller Bearing	1	1	1	1	1	1
5.6	517-009-00	Toggle Pivot Bearing	2	2	2	2	2	2
6[1]	232-073-01	Load Beam Assembly	1	1	1	1	1	-
6.1	290-280-00	Load Beam (Sold as assembly only)	1	1	1	1	1	-
6.2	290-287-01	Load Beam Crank (Sold as assembly only)	1	1	1	1	1	-
6.3	290-293-00	Load Beam Shaft (Sold as assembly only)	1	1	1	1	1	-
7	290-284-00	Keeper	1	1	1	1	1	-
8	290-286-00	Manual Release	1	1	1	1	1	-
9	290-291-00	Cam Roller Pin	1	1	1	1	1	-
10	290-295-00	Toggle Pivot Bolt	1	1	1	1	1	1
11	290-299-01	Manual Release Cover	1	1	1	1	1	-
12	290-307-00	Bumper	1	1	1	1	1	-
13	290-331-00	Release Fitting	-	1	-	1	1	-
14	290-332-00	Attach Bolt	1	1	1	1	1	-
15	510-008-00	Screw	-	2	-	-	2	-
16	510-095-00	Washer	3	3	3	3	3	3
17	510-102-00	Nut	3	3	3	3	3	3
18	510-170-00	Nut	1	1	1	1	1	1
19	510-174-00	Washer	1	1	1	1	-	1
19	510-238-00	Washer	-	-	-	-	1	-
20	510-178-00	Cotter Pin	1	1	1	1	1	1
21	510-183-00	Washer	2	2	2	2	2	2
22	510-199-00	Bolt	2	2	2	2	2	2
23	510-200-00	Screw	3	3	3	3	3	3
24	510-201-00	Screw	3	3	3	3	3	3
25	510-202-00	Roll Pin	1	1	1	1	1	1
26	510-203-00	Roll Pin	2	2	2	2	2	2
27	514-003-00	Keeper Return Spring	1	1	1	1	1	1
28	514-004-00	Cam Spring	1	1	1	1	1	1
29	514-005-00	Load Beam Spring	1	1	1	1	1	1
30	215-240-00	Rigging Warning Decal	1	1	1	1	1	1
31	215-260-00	Overhaul Label	-	-	-	-	-	1

NOTICE

[1] Item not illustrated as an assembly.

[2] Optionally, P/N 290-294-01 may be used, see section 10.3.

[3] Replaces P/N 215-163-00 on P/N 528-010-04.

[4] Replaces P/N 215-163-00 on P/N 528-010-07.

[5] Replaces P/N 215-181-00 on P/N 528-010-06.

■ P/N 528-010-04 is a 28 VDC cargo hook and is not recommended for use on aircraft with 14 VDC electrical systems. This P/N can be converted to P/N 528-010-06 for use on 14 VDC aircraft by replacing the solenoid (2.7) and Serial Tag (2.1) per Service Bulletin 159-028-00.

♠ Per Service Bulletins 159-017-00 and 159-019-00, Cargo Hook part numbers have changed per the following table.

Original part number	Part number after Service Bulletin compliance
528-010-00	528-010-04
528-010-01	528-010-05
528-010-03	528-010-06

This change incorporated Toggle Assembly, P/N 232-028-01, and Thrust Plates, P/Ns 290-304-01 and 290-306-01. If in possession of cargo hook P/N 528-010-00, -01 or -03 contact the factory for additional guidance.

* Solenoid Assembly, P/N 232-025-02, was superseded by Solenoid Assembly, P/N 232-025-05, on Cargo Hook P/N 528-010-04. The change replaced diode, P/N 340-027-00, with diode, P/N 340-035-00. These part numbers are interchangeable.

14.0 Instructions for Returning Equipment to the Factory

14.1 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.

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