Component Maintenance Manual, Cargo Hook

Onboard Systems International, LLC
13915 NW 3rd Court
Vancouver, WA 98685 United States of America
Cage Code: 1Y921

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

Applicable Equipment Part Numbers

Obsolete P/Ns	Current P/Ns
	528-043-00
	528-043-10

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RECORD OF REVISIONS

Revision	Date	Page(s)	Reason for Revision
0	01/16/20	All	Initial Release

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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

180-255-00 Acceptance Test Procedure – Cargo Hook P/Ns 528-043-00, 528-043-10

3.0 Service Bulletins/Amendments

3.1 There are no applicable service bulletins/amendments.

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 **Monthly Preventative Maintenance**

1. Remove accumulated soils from the exterior with a soft bristle brush and mild solvent/cleaner
2. 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, 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.

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, perform the functional check per instructions in sections 11.6 through 11.8 of the Acceptance Test Procedure (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 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 for instructions for returning equipment to the factory.

5.2 Reference numbers throughout this manual shown in parentheses ( ) refer to Table 13.1 and Figure 13.1 through Figure 13.4.

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. Reassemble.
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.

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.

If a C-40 Load Weigh System is installed (cargo hook P/N 528-043-10 includes a pin load cell) the C-40 Indicator records and displays external load time accumulated on the Cargo Hook to facilitate timely inspection and overhaul of the cargo hook. Refer to the Owner's Manual for the C-40 Indicator for using this function.

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 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.

Cargo Hook P/N 528-043-10 integrates a pin load cell. This Cargo Hook requires return to the factory for inspection and calibration of the load cell as the load cell requires calibration within the specific cargo hook it's being used in. See Section 14 for instructions for returning equipment to the factory.

7.2 Overhaul kit P/N 212-051-00 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 212-051-00.
2. Completely disassemble.
3. Discard all items that are to be replaced by an item in Overhaul Kit P/N 212-051-00 listed in Table 13.1 (springs, 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.

8.0 Disassembly Instructions

For reference numbers shown in parentheses ( ) refer to Table 13.1 and Figure 13.1 through Figure 13.4.

8.1 Remove the self-locking nuts (19, 20, 25) and washers (28, 31) from the bolts (29, 30, 34, 35). Remove the Armor Plate (15). Leave the bolts in place for now.

8.2 Remove bolt (27) securing the Grounding Bracket (12) to the Trunnion (11) and remove the bolt (29) through the Grounding Bracket and Side Plate Assemblies (6, 7) to remove the Grounding Bracket.

8.3 Remove the cotter pins (23) from the two castellated nuts (21, 26) and remove these nuts and the washers (22, 24, and 32). Leave the bolts in place for now. For cargo hook P/N 528-043-10, remove the Pin Load Cell Assembly (1) and temporarily insert it or a ½" diameter bolt from the other side.

8.4 With the manual release lever side down and all of the bolts in place, carefully separate the Side Plate Assemblies to gain access to the internal mechanism. The internal mechanism can now be viewed and cycled to check for smooth operation.

8.5 Unhook the Cam Assembly (9) and Toggle Assembly (8) springs from their respective roll pins.

8.6 Rotate the Cam Assembly (9) as necessary and lift the Load Beam Assembly (5), Toggle Assembly and Cam Assembly off the Side Plate from their respective pivot points.

8.7 Remove the load beam bumper (36) and cam bumper (4). Note: The cam bumper is secured to the side plate with RTV silicone.

8.8 Remove the spiral retaining ring (37) from the forward end of the Trunnion and slide the connector and Trunnion Connector Plate (16) out to access the rear of the connector (18) to remove the wire contacts. The Trunnion can now be lifted off the side plate.

8.9 Separate the connector from the Trunnion Connector Plate by removing its nut.

8.10 Detach the spring from the Manual Release Lever Assembly (10) at the tab on the Side Plate (7.3).

8.11 Remove all bolts, the remaining Armor Plate (14) the Manual Release Lever Assembly, bushing (38), and washers (24, 32).

8.12 Separate the backup solenoid (7.6) from the Side Plate (7.3) by removing two nuts (7.15), two washers (7.14), three screws (7.19) and Wedge Ring (7.20). Separate the PCB Assembly (7.1) from the Side Plate by removing two nuts (7.13), washers (7.8), and screws (7.16). Remove the solenoid, PCB Assembly, shock absorbers (7.7) and interconnecting wiring from the side plate.

8.13 Remove the Solenoid Actuator (7.4) from the backup solenoid by cutting safety wire and removing the three screws (7.12) and washers (7.10).

8.14 Remove roll pins (7.9, 7.11).

8.15 On the other Side Plate Assembly (6), separate the primary solenoid (6.12) from the Side Plate (6.4) by removing two nuts (6.22), two washers (6.21), three screws (6.25) and Wedge Ring (6.26).

8.16 Remove the four nuts (6.20) and screws (6.18) securing the connector (6.8) to the side plate.

8.17 Remove the nut (6.20) and screw (6.13) securing the Surefire Module (6.1) to the side plate. Note: The Surefire Module is also secured to the side plate with RTV silicone.

8.18 Remove the two screws (6.19) securing the Switch Plate (6.2) with Switch (6.7) to the side plate.

8.19 Note the routing of the wiring for re-assembly purposes and cut lacing tape securing the wiring to the Side Plate and remove the entire electrical assembly.

8.20 Remove the Solenoid Actuator (6.5) from the primary solenoid by cutting safety wire and removing the three screws (6.17) and washers (6.14).

8.21 The Toggle Assembly (8) may be disassembled by removing the spiral retaining rings (8.8, 8.9) at the Cam Roller Pin (8.3) and Load Beam Roller Pin (8.2).

8.22 Disassemble the Cam Assembly by removing the cotter pin (9.4) from the Clevis Pin (9.5) and sliding the Clevis Pin out to separate the Interlock Roller (9.1) and Spring Extension (9.3) from the Cam (9.2).

8.23 All bushings and bearings may be removed from detail parts by conventional means.

8.24 Remove helicoils (6.15, 6.16, 7.21) from Side Plates and helicoil (11.3) from Trunnion

8.25 The Manual Release Lever Assembly (10) is not typically disassembled. If necessary, disassemble by pressing out the four roll pins (10.3, 10.4) and separating the Lever Safety (10.2), Lever (10.1), and Springs (10.5).

8.26 Remove the Serial Plate (2 or 3) from the Side Plate by removing four screws (33).

8.27 Do not typically disassemble the load beam (5.1) from the load beam shaft (5.2).

9.0 Inspection Instructions

9.1 Thoroughly clean all parts to be inspected using standard methods.

9.2 If the Cargo Hook is being overhauled, perform nondestructive inspection on the parts below 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 (6.4)** and **Side Plate, Manual Release (7.3)**, 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

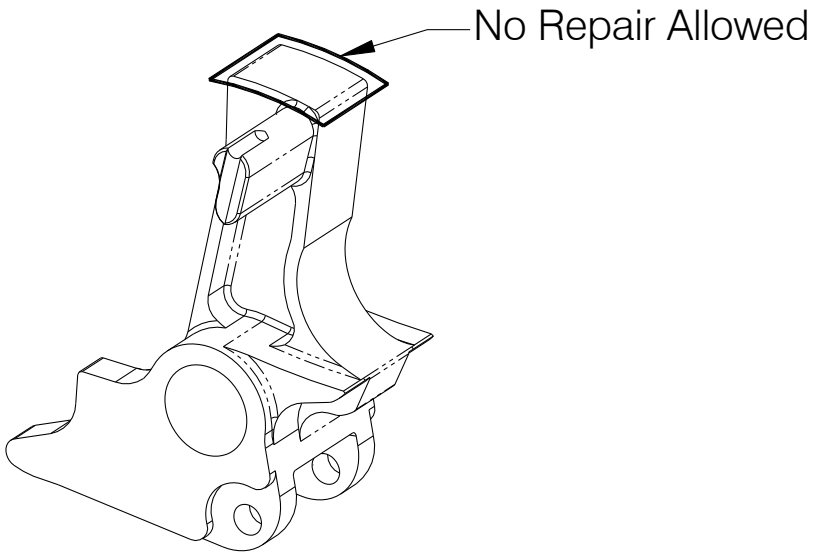
Seq	Component	Inspection Criteria & Limit	Repair Action	Finish	Recommended replacement at overhaul.
1.	Load Beam Assembly (5)	Surface cracks – inspect under illuminated magnification (minimum 2X / 4 diopter).	None. Cracks of any size are cause for part replacement.	N/A	No
		Corrosion – 0.010 in. (0.254 mm) deep	Glass bead blast at less than 30 PSI (207 kPa) to remove corrosion.	If plating is completely removed exposing base metal apply zinc chromate primer to affected surfaces or electroless nickel plate per SAE-AMS 2404 Class 1 (thickness to be .0015-.0018)	No
		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.		No
2.	Side Plate (6.4, 7.3)	Dents, nicks, 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
3.	Bushing (6.3, 7.2)	Wear on ID - .770 in. (19.56 mm)	None	N/A	Yes
4.	Solenoid Actuator (6.5, 7.4)	Dents, nicks, cracks, gouges, scratches and corrosion – 0.010 in. (0.25 mm) deep	Blend at 10:1 ratio as required to provide smooth transitions.	Passivate per AMS-QQ-P-35 or ASTM A967.	No
5.	Toggle Assembly (8)	Surface cracks – inspect under illuminated magnification (minimum 2X / 4 diopter).	None. Cracks of any size are cause for part replacement.	N/A	No
		Roughness, binding or looseness of the Load Beam Roller (8.1).	Replace Pin (8.2), Roller (8.1), and DU bushings (8.11).	N/A	No
		Roughness, binding or looseness of the Cam Roller Tire (8.4)	Replace Cam Roller Pin (8.3), Roller Bearing (8.12), and Cam Roller Tire (8.4).	N/A	No

Seq	Component	Inspection Criteria & Limit	Repair Action	Finish	Recommended replacement at overhaul.
6.	Cam Roller Pin (8.3)	Visible denting.	None	N/A	No
7.	Cam Roller Tire (8.4)	Visible denting on the ID or OD.	None	N/A	No
8.	Cam Assembly (9)	See Figure 9.1	Blend at 10:1 ratio as required to provide smooth transitions.	Passivate per AMS-QQ-P-35 or ASTM A967.	No
		Roughness, binding or looseness of the Interlock Roller (9.1)	Replace Clevis Pin (9.5), Interlock Roller (9.1), and DU Bushing (9.7)	N/A	No
9.	Bearing (9.8)	Roughness, binding, looseness, or corrosion	None	N/A	Yes
10.	Cam Bumper (4)	Denting, cuts or abrasions – 0.030 in. (0.76 mm) deep	None	N/A	No
11.	DU Bushing (8.10, 8.11, 9.7)	Wear – more than 50% copper showing	None	N/A	Yes
12.	Manual Release Lever Assembly (10)	Roughness or binding of the inner part with respect to the outer part of the lever.	None	N/A	No
13.	Trunnion (11.1)	Corrosion – 0.010 in. (0.254 mm) deep	Glass bead blast at less than 30 PSI (207 kPa) to remove corrosion.	Passivate per AMS-QQ-P-35 or ASTM A967.	No
		Gouges and nicks – 0.030 in. (0.76 mm) deep	Blend at 10:1 ratio as required to provide smooth transitions,	Passivate per AMS-QQ-P-35 or ASTM A967.	No
14.	Armor Plate (14, 15)	Corrosion – 0.020 in. (0.51 mm) deep	Glass bead blast at less than 30 PSI (207 kPa) to remove corrosion.	Passivate per AMS-QQ-P-35 or ASTM A967.	No
		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
15.	Cam Pivot Bolt (17)	Visible denting	None	N/A	No
16.	Bumper (36)	Denting, cuts or abrasions – 0.060 in. (1.27 mm) deep	None	N/A	Yes
17.	Serial Number Plate (2 or 3)	Damaged or illegible	None	N/A	No
18.	Solenoid (6.12, 7.6)	Shorted or open electrical circuit. Resistance 1.9 - 2.5 ohms.	None	N/A	No

Seq	Component	Inspection Criteria & Limit	Repair Action	Finish	Recommended replacement at overhaul.
19.	Surefire Module (6.1)	Bent or corroded terminals.	None	N/A	No
20.	Electrical connectors (6.8, 18)	Loose, missing, or mutilated contact pins, cracked case, or worn insulator	None	N/A	No
21.	Switch (6.7)	Open circuit with switch not pressed, closed when switch is pressed.	None	N/A	No
22.	Springs (8.7, 9.6, 10.5)	Cracks or deformation	None	N/A	Yes
23.	Electrical wiring	Deterioration	None	N/A	No
24.	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.

Figure 9.1, Cam (9.2) Inspection Criteria



Inspection Criteria and Limits:

Inside Lines: No wear, dents, corrosion, gouges or nicks allowed.
Outside Lines: Dents, nicks, cracks, gouges, scratches and corrosion – 0.010 in. (0.25 mm) deep

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 surface shown inside lines. Alterations of these surfaces may cause inadvertent load release.

10.0 Re-assembly Instructions

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

10.2 Using an arbor press, install bushing (6.3) into Side Plate (6.4) with Loctite primer P/N 7471 and Loctite adhesive P/N 680 or equivalent .

10.3 Install two 8-32 helicoils (6.16) and four 10-32 helicoils (6.15) into Side Plate. Break and remove helicoil tangs.

10.4 Mount the Solenoid (6.12) on the Side Plate (LH) with two nuts (6.22) and two washers (6.21). Torque the nuts to 20-25 in-lbs. Install the Wedge Ring (6.26) and secure it with three screws (6.25). Torque the screws to 12-15 in-lbs.

10.5 Apply Loctite 242 to the three screws (6.17) and secure the Solenoid Actuator (6.5) to the solenoid with the screws and washers (6.14). Torque the screws to 12-15 in-lbs. and secure them with safety wire.

NOTICE

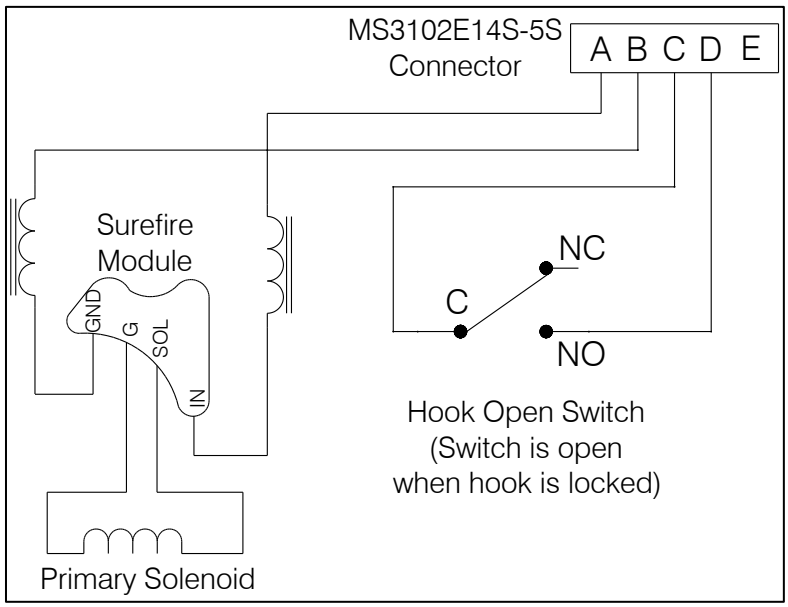
The clockwise rotational solenoid must be installed in the LH side plate. The counter-clockwise rotational solenoid must be installed in the RH side plate.

10.6 Install switch (6.7) onto Switch Plate (6.2) with two screws (6.19).

10.7 Position the Switch Plate (6.2) on the Side Plate and loosely attach with screws (6.23). The Switch Plate has slotted mounting holes, slide the Switch Plate to the end of the slots that locate it furthest from the Cam pivot hole and torque the screws to 20-25 in-lbs.

10.8 Install connector (6.8) with the four flat head screws (6.18) and self-locking nuts (6.20). Orient the key of the connector towards the solenoid.

10.9 If the solenoid, Surefire Module (6.1), switch or connector were disassembled solder the wires to terminations per the schematic below.



10.10 Apply RTV silicone to the mating surfaces of the Side Plate and position the Surefire Module in its mounting location with the wires routed under it and with the ferrite beads nested in the corner of the Side Plate under it. Secure the Surefire Module with flat head screw (6.13) and nut (6.20).

10.11 Apply RTV silicone around the wires under the Surefire Module.

10.12 Secure wires to side plate in three locations using lacing tape.

10.13 Secure the Cam Bumper (4) to the Side Plate (6) with RTV silicone.

10.14 On the other Side Plate: press bushing (7.2) into Side Plate (7.3) with Loctite primer P/N 7471 and Loctite adhesive P/N 680.

10.15 Install three 10-32 helicoils (7.21) into Side Plate. Break and remove helicoil tangs.

10.16 Mount the solenoid (7.6) to the Side Plate with two washers (7.14) and two nuts (7.15). Torque the nuts to 20-25 in-lbs. Install the Wedge Ring (7.20) and secure it with three screws (7.19). Torque the screws to 12-15 in-lbs.

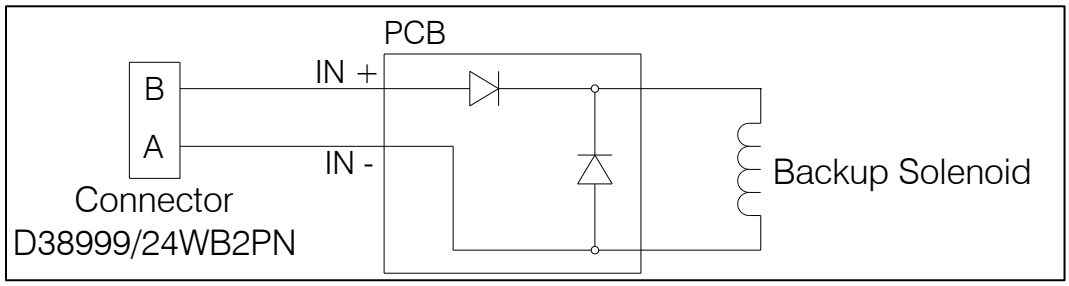
10.17 Apply Loctite 242 Threadlocker to the three screws (7.12) and secure the Solenoid Actuator (7.4) to the solenoid with the screws and washers (7.10). Secure the screws with safety wire.

10.18 Press roll pins (7.11 and 7.9) into Side Plate using an arbor press.

10.19 Adhere the PCB insulator (7.18) to the Side Plate.

10.20 Attach the PCB Assembly (7.1) to the Side Plate using screws (7.16), four shock absorbers (7.7) (two on each side of the PCB), washers (7.8) and nuts (7.13). Torque the nuts until the gap between the PCB and PCB insulator is .09/.11".

10.21 If the solenoid, PCB assembly, were disassembled connect the wires per the schematic below.



10.22 Assemble Toggle Assembly (8):

Press bushing (8.10) into toggle (8.5) pivot with wet zinc chromate primer (TTP1757B-1CY or equivalent) using an arbor press.

Press two bushings (8.11) into load beam roller (8.1) with wet zinc chromate primer using an arbor press. Capture the Load Beam Roller in Toggle using Pin (8.2) and secure pin with a Spiral Retaining Ring (8.9) on each end.

Press roller bearing (8.12) into Cam Roller Tire (8.4) using an arbor press. Grease the roller bearing with Mobilgrease 28. Capture Cam Roller Tire and washers (8.6) in toggle using pin (8.3). Secure pin with Spiral Retaining Rings (8.8) over each end.

Attach spring (8.7) to small hole in Toggle.

10.23 Assemble Cam Assembly (9):

Press two roller bearings (9.8) into Cam (9.2) pivot with wet zinc chromate primer using an arbor press. Use care to ensure primer doesn't touch the rollers

Press bushing (9.7) into Interlock Roller (9.1) with wet zinc chromate primer using an arbor press.

Attach two springs (9.6) to Spring Extension (9.3).

Capture Interlock Roller and Spring Extension in Cam with pin (9.5) and secure with cotter pin (9.4).

10.24 Feed wires from the PCB Assembly (7.1) through the end of the Trunnion and insert into the connector (18) and insert the connector through the end of the Trunnion Connector Plate (16) and secure it with its nut.

10.25 Apply a thin layer of corrosion preventative compound to the faying surfaces of Trunnion Connector Plate (and Trunnion) and insert it into the end of the Trunnion and secure it in place with the Spiral Retaining Ring (37).

10.26 Insert the two bolts (35) through the outer holes of the Side Plate Assembly (7) and set the Trunnion over them.

10.27 Position the Manual Release Lever Assembly (10) on the Side Plate with its spring on the inside of the Side Plate. Apply a thin layer of Mobilgrease 28 (MIL-PRF-81322) to the Spacer (38) and insert the Spacer into the Manual Release Lever pivot point and place washer (32) over it and insert the Cam Pivot Bolt (17) through.

10.28 Connect the spring of the Manual Release Lever Assembly through the hole in the tab feature of the Side Plate.

10.29 Position fin of the Load Beam Assembly (5) between the lower arms of the Cam Assembly (9) and set them into place at their respective pivot points on the Side Plate.

10.30 Insert the Attach Bolt (13) through a washer (24) and through the Side Plate. For Cargo Hook P/N 528-043-10 use a temporary ½" diameter bolt that will be replaced by the Pin Load Cell from the opposite side after the Side Plates are assembled.

10.31 Place Toggle Assembly (8) over the Attach Bolt and connect its spring to the roll pin in the Side Plate.

10.32 Extend and connect the Cam Assembly springs to the roll pin (7.11) in the Side Plate.

10.33 Insert bolt (30) through the Side Plate and place the Bumper (36) over it.

10.34 Cycle the mechanism manually by rotating the Cam Assembly counterclockwise while pulling open the load beam. Release the Cam and rotate the load beam back to its closed position and ensure the mechanism snaps closed.

10.35 Check for and remove FOD if present.

10.36 Rotate the Load Beam Assembly (5) into the open position. Align the holes of the Side Plate (6) with the bolts through the other Side Plate (7) and ease it into position so that it is flush with the Trunnion and the Side Plates are together with no gaps.

CAUTION

The Load Beam Assembly must be "open" when set in place on the Side Plate or the switch will be damaged.

10.37 For Cargo Hook P/N 528-043-10: insert the Pin Load Cell Assembly (1) through the Toggle pivot, pushing out the temporary bolt. Do not force the Pin Load Cell Assembly, the spring on the Toggle will pull the hole out of alignment. If necessary use a non-marring tool to align the Toggle to facilitate insertion.

10.38 Place the Grounding Bracket (12) over the two Side Plates and insert bolt (29) through and secure with nut (19) and tighten to 60 – 84 in-lbs. Secure the Grounding Bracket to the Trunnion with Bolt (27).

10.39 Coat the faying surfaces of the Armor Plates (14, 15) with a corrosion preventative compound and assemble them to the Side Plates with bolt (34), washer (31) and nut (20). Torque nut to 50-70 in-lbs.

10.40 Place washers (28) and self-locking nuts (25) over the outer bolts (35) and tighten to 25-35 ft-lbs.

10.41 Place washer (31) and self-locking nut (20) over the bolt (30) inserted through the Side Plates and Bumper and tighten to 50-70 in-lbs.

10.42 Place washers (22, 24) and nut (21) over the Attach Bolt (13) or Pin Load Cell (1) supporting the toggle. Tighten nut to finger tight and rotate to previous castellation to insert cotter pin (23).

10.43 Place washer (32) and nut (26) over the Cam Pivot Bolt (17) and tighten the nut to finger tight then rotate to previous castellation to insert cotter pin (23).

10.44 Install the Serial Plate (2) with four screws (33)

10.45 Perform Acceptance Test Procedures as listed in this manual.

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

11.0 Acceptance Test Procedure

11.1 When the Cargo Hook is overhauled it 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 cotter pins and fasteners.

11.3 Use an appropriate resistance tester to test the resistance between each pin and the base of the connectors (6.8, 18). The readings should not be less than 2 mega-ohms.

11.4 Secure the cargo hook in a test fixture which simulates the aircraft interface and suspend this from a test rig capable of loading the cargo hook to 22,500 lbs (10206 kg). Use a steel ring to apply the load to the load beam.

11.5 Connect a power supply with a momentary release switch wired into the positive wires, to the connectors, and an in-line current meter. At each cargo hook connector, connect the negative lead to pin A and the positive lead to pin B. Set the voltage to 27.5 ± 0.1 VDC.

11.6 With no load on the load beam, operate the manual release lever. Squeeze the gold inner part of the lever inward and then rotate the manual release lever assembly counterclockwise. The load beam should fall open and stay in the open position. Release the manual release lever and it should return to its starting position. Push the load beam up and closed. The load beam should latch closed. Repeat step.

11.7 Check continuity using a multi-meter between pins C and D of the primary release connector (Hook Open switch). With the Cargo Hook closed there should be no continuity, open the Cargo Hook and verify that there is continuity.

11.8 Check the primary and backup electrical release functions of the cargo hook.

For the primary electrical release, perform the following.

NOTICE

The cargo hook's primary electrical release system includes an electronic delay of approximately ½ second. It is necessary to press and hold the release switch.

Actuate the release switch very briefly without holding it down (less than ½ second). The load beam should remain closed and the mechanism should not audibly cycle.

Actuate and hold the release switch for a few seconds. The load beam should fall to the open position after approximately ½ second and then continue to audibly cycle repeatedly.

For the backup electrical release, perform the following.
With no load on the load beam, release the cargo hook with the backup electrical release (through the Trunnion mounted connector). The load beam should fall open and stay in the open position. Push the load beam up and closed. The load beam should automatically latch. Repeat step.

CAUTION

Damage to the release solenoid can occur if the release switch is held for more than 20 seconds.

11.9 Load a load ring onto the load beam (5.1) and push up load beam until it latches. Gradually load the cargo hook with the test rig to 22,500 lbs (10,206 kg). Hold the load for 1 minute. The load beam should hold the load without unlatching. Reduce the load to zero.

CAUTION

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

11.10 Load the cargo hook using a steel ring that is free to drop clear of the load beam. Gradually load the cargo hook to 9,000 pounds (4082 kg). Press and hold the electrical release button for the **primary** electrical release system for approximately 1 second. The load beam should unlatch and the steel ring should slide off the load beam. Push the load beam up and closed. The load beam should latch closed and the hook lock indicator should align with the line on the side plate. Verify that the current draw is between 7 and 11 amps. The primary electrical release system delivers this current in rapid pulses which may register as a lower current value on some ammeters due to averaging. Repeat the test at 6,000 pounds (2722 kg), and 3000 pounds (1361 kg).

CAUTION

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

11.11 Load the cargo hook using a steel ring that is free to drop clear of the load beam. Gradually load the cargo hook to 9,000 pounds (4082 kg). Press the electrical release button for the **backup** electrical release system. The load beam should unlatch and the steel ring should slide off the load beam. Push the load beam up and closed. The load beam should automatically latch and the hook lock indicator should align with the line on the side plate. Verify that the current draw is between 7 and 11 amps. Repeat the test at 6,000 pounds (2722 kg) and 3000 pounds (1361 kg).

11.12 Remove the Cargo Hook from the test stand.

11.13 End of Acceptance Test Procedure.

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

Acceptance Test Procedure	Applicable P/Ns
180-255-00	528-043-00, 528-043-10

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 with the primary or the backup electrical release system.	Damaged or defective diodes on the PCB assembly (7.1) or Surefire Module (6.1) or solenoid (6.12, 7.6).	<u>For the backup release system:</u> Disassemble the cargo hook and check the resistance across the solenoid leads at the PCB assembly terminals for 2 – 2.5 ohms. Check the diodes for proper operation. Replace diode or solenoid as necessary. <u>For the primary electrical release system:</u> Disassemble the cargo hook and check the resistance across the (+) and (-) solenoid terminals of the Surefire Module for 2 – 2.5 ohms. Replace Surefire Module or solenoid (as necessary).
	Damaged or loose wiring	Disassemble the Cargo Hook and inspect and repair wiring.
	Release switch not held down long enough (Primary electrical release system only).	Hold the release switch for a longer time. The cargo hook's primary electrical release system includes a Surefire Module (6.1) which incorporates an electronic delay of approximately ½ second after which time the hook solenoid will activate repeatedly. If the release switch is not held down long enough the hook solenoid will not activate.
	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 (9) for denting/ damage. Check toggle roller and pin for denting/ damage. Replace as necessary.

13.0 Illustrated Parts List

Figure 13.1 shows the cargo hook parts breakdown; refer to Figures 13.2 and 13.3 for the Side Plate Assemblies (6, 7) parts breakdowns and Figure 13.4 for configuration specific to Cargo Hook P/N 528-043-10.

Figure 13.1 Cargo Hook Parts (P/N 528-043-00 shown)

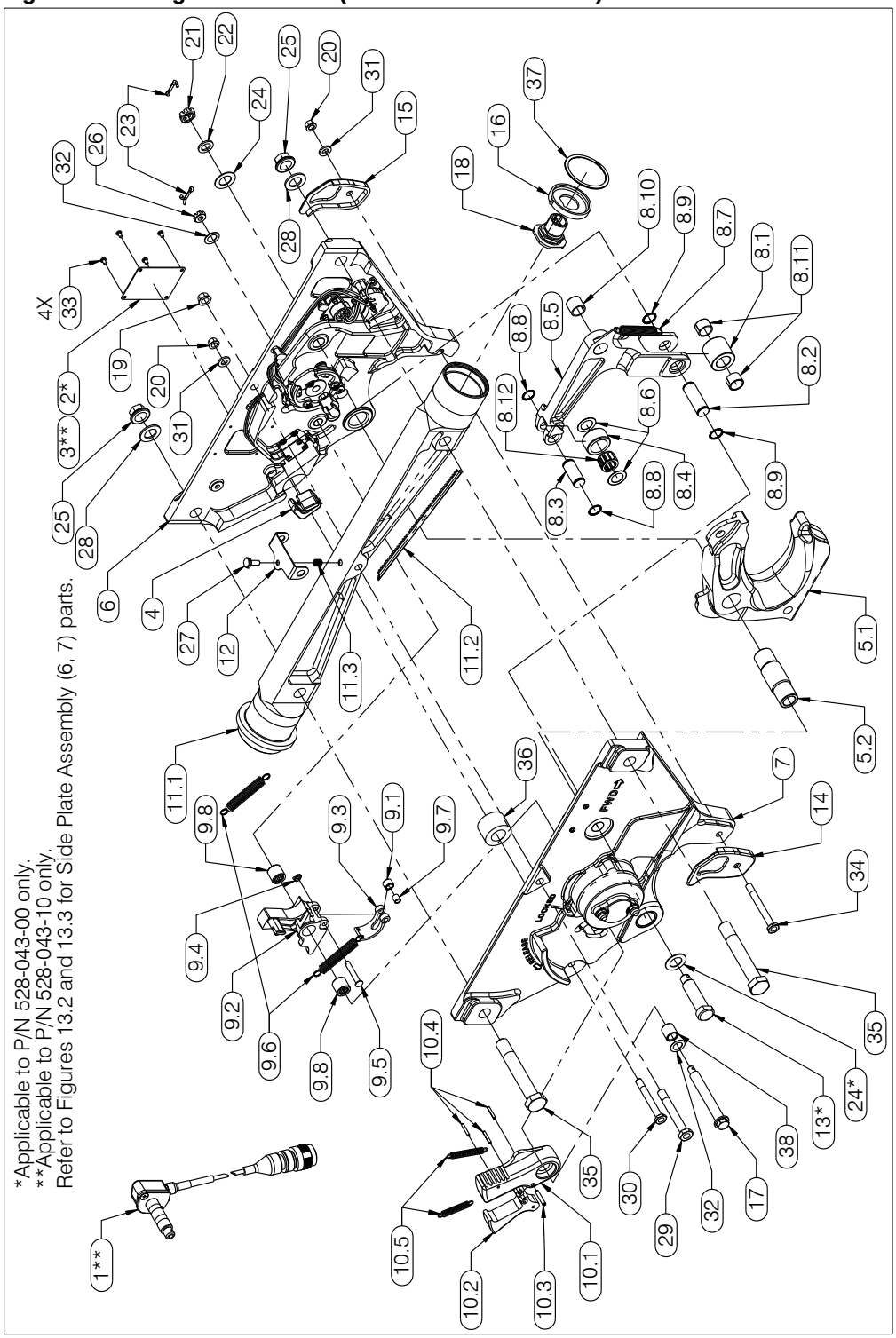


Figure 13.2 Side Plate Assembly (6) Parts

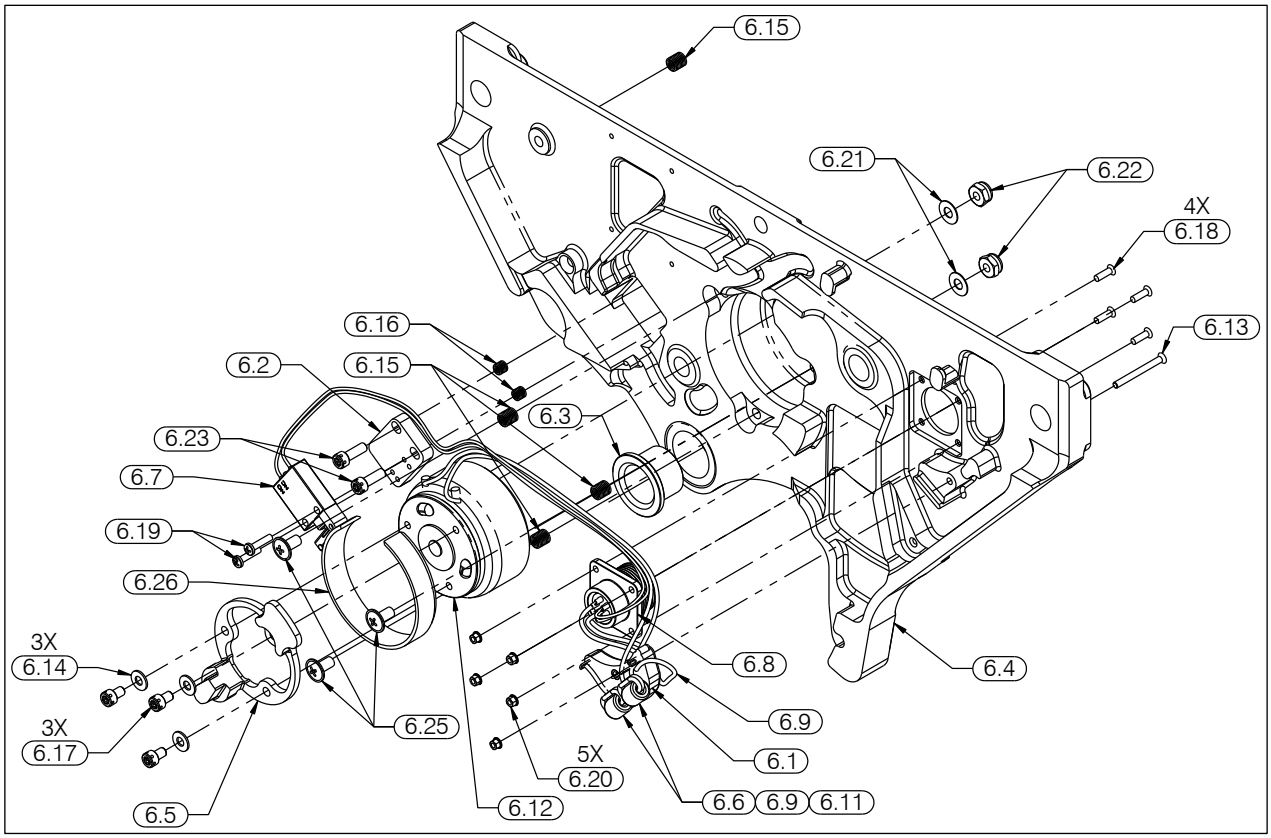


Figure 13.3 Side Plate Assembly (7) Parts

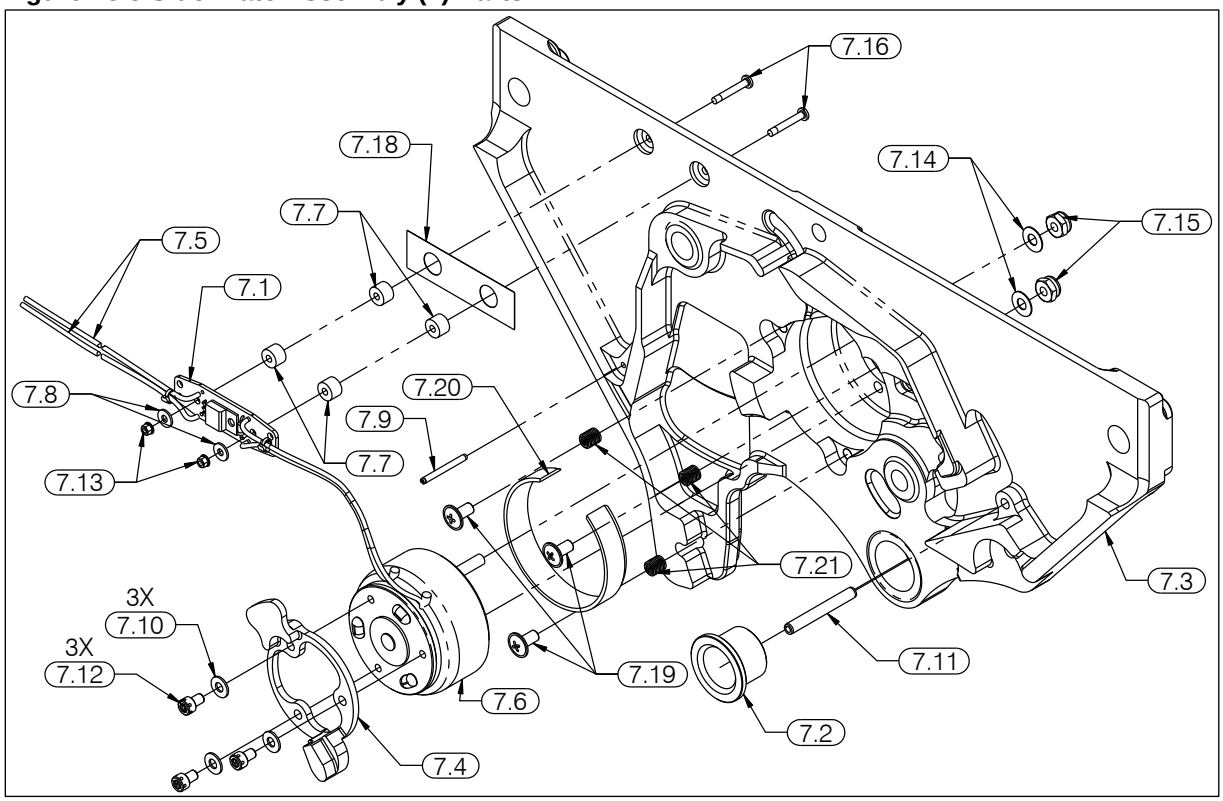


Figure 13.4 Pin Load Cell Assembly (1) Installation (Cargo Hook P/N 528-043-10)

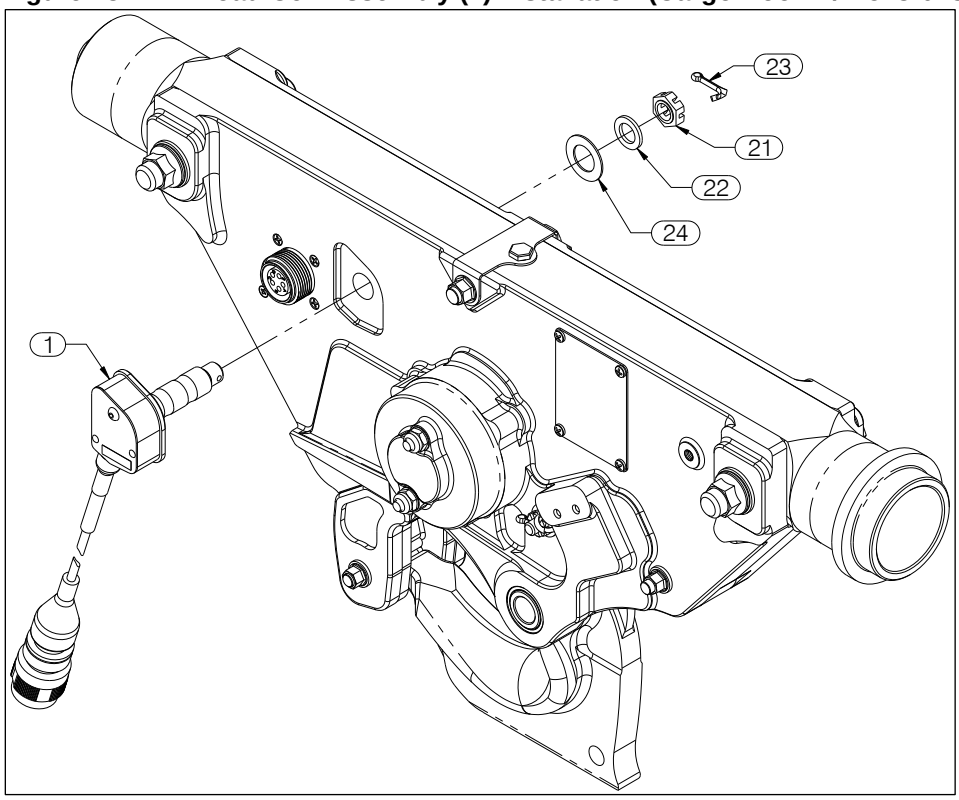


Table 13.1, Cargo Hook Parts

Item	Part No.	Description	Qty in 528-043-		Qty in Overhaul Kit 212-051-00
			00	10	
1	210-306-00	Pin Load Cell Assembly	-	1	-
2	215-363-00	Serial Plate	1	-	-
3	215-363-00	Serial Plate	-	1	-
4	220-048-00	Cam Bumper	1	1	1
5[1]	232-770-00	Load Beam Assembly	1	1	-
5.1	291-974-00	Load Beam	1	1	-
5.2	291-977-00	Load Beam Shaft	1	1	-
6	232-771-00	Side Plate Assembly – Port	1	1	1
6.1	232-772-00	Surefire Module	1	1	-
6.2	291-174-00	Switch Plate	1	1	-
6.3	291-747-00	Bushing	1	1	1
6.4	291-980-00	Side Plate – Port	1	1	-
6.5	291-983-00	Solenoid Actuator	1	1	-
6.6	320-028-00	Ferrite Cable Core	2	2	-
6.7	400-062-00	Switch	1	1	-
6.8	410-426-00	Connector – Receptacle	1	1	-
6.9	420-088-00	Wire, 18 Ga.	AR	AR	-
6.10[2]	450-008-00	Heat Shrink	AR	AR	-
6.11[2]	450-113-00	Heat Shrink	AR	AR	-
6.12	455-005-00	Solenoid	1	1	-
6.13	510-169-00	Screw	1	1	1
6.14	510-209-00	Washer	3	3	3
6.15	510-248-00	Helicoil	4	4	4
6.16	510-522-00	Helicoil	2	2	2
6.17	510-531-00	Screw	3	3	3
6.18	510-700-00	Screw	4	4	4
6.19	510-920-00	Screw	2	2	2
6.20	510-922-00	Nut	5	5	5
6.21	510-986-00	Washer	2	2	2
6.22	511-149-00	Nut	2	2	2
6.23	511-215-00	Screw	2	2	2
6.24	512-022-00	Lacing Tape	AR	AR	-
6.25	511-222-00	Screw	3	3	3
6.26	292-055-00	Wedge Ring	1	1	-
7	232-772-00	Side Plate Assembly – Stbd	1	1	-
7.1	230-108-00	Solenoid Diode PCB Assembly	1	1	-
7.2	291-747-00	Bushing	1	1	-
7.3	291-981-00	Side Plate - Stbd	1	1	-

Item	Part No.	Description	Qty in 528-043-		Qty in Overhaul Kit 212-051-00
			00	10	
7.4	291-983-00	Solenoid Actuator	1	1	-
7.5	420-082-00	Wire, 16 Ga	AR	AR	-
7.6	455-013-00	Solenoid	1	1	-
7.7	500-522-00	Shock Absorber	4	4	-
7.8	510-062-00	Washer	2	2	2
7.9	510-202-00	Roll Pin	1	1	1
7.10	510-209-00	Washer	3	3	3
7.11	510-414-00	Roll Pin	1	1	1
7.12	510-531-00	Screw	3	3	3
7.13	510-922-00	Nut	2	2	2
7.14	510-986-00	Washer	2	2	2
7.15	511-149-00	Nut	2	2	2
7.16	511-201-00	Screw	2	2	2
7.17[2]	512-022-00	Lacing Tape	AR	AR	-
7.18	520-137-00	PCB Insulator	1	1	-
7.19	511-222-00	Screw	3	3	3
7.20	292-055-00	Wedge Ring	1	1	-
7.21	510-248-00	Helicoil	3	3	3
8[1]	232-773-00	Toggle Assembly	1	1	-
8.1	291-715-00	Load Beam Roller	1	1	-
8.2	291-737-00	Pin, Load Beam Roller	1	1	-
8.3	291-742-00	Pin, Cam Roller	1	1	-
8.4	291-751-00	Cam Roller Tire	1	1	-
8.5	291-973-00	Toggle	1	1	-
8.6	510-667-00	Washer	2	2	2
8.7	514-071-00	Spring	1	1	1
8.8	515-016-00	Spiral Retaining Ring	2	2	2
8.9	515-017-00	Spiral Retaining Ring	2	2	2
8.10	517-022-00	DU Bushing	1	1	1
8.11	517-023-00	DU Bushing	2	2	2
8.12	517-124-00	Roller Bearing	1	1	1
9[1]	232-774-00	Cam Assembly	1	1	-
9.1	290-982-00	Interlock Roller	1	1	-
9.2	291-972-01	Cam	1	1	-
9.3	291-978-00	Spring Extension	1	1	1
9.4	510-417-00	Cotter Pin	1	1	1
9.5	510-683-00	Clevis Pin	1	1	1
9.6	514-005-00	Extension Spring	2	2	2
9.7	517-009-00	DU Bushing	1	1	1

Item	Part No.	Description	Qty in 528-043-		Qty in Overhaul Kit 212-051-00
			00	10	
9.8	517-013-00	Roller Bearing	2	2	2
10[1]	232-775-00	Manual Release Lever Assembly	1	1	
10.1	291-975-00	Manual Release Lever	1	1	-
10.2	291-976-00	Release Lever Safety	1	1	-
10.3	510-347-00	Roll Pin	1	1	1
10.4	511-169-00	Roll Pin	3	3	3
10.5	514-115-00	Spring	2	2	2
11[1]	232-781-00	Trunnion Assembly	1	1	-
11.1	291-979-00	Trunnion	1	1	-
11.2	500-513-00	Grommet Edging	AR	AR	-
11.3	510-248-00	Helicoil	1	1	1
12	235-281-00	Grounding Bracket	1	1	-
13	290-332-00	Attach Bolt	1	-	-
14	290-516-00	Armor Plate	1	1	-
15	290-517-00	Armor Plate	1	1	-
16	291-985-00	Trunnion Connector Plate	1	1	-
17	292-037-00	Cam Pivot Bolt	1	1	-
18	410-425-00	Connector - Panel Mount	1	1	-
19	510-104-00	Nut	1	1	1
20	510-114-00	Nut	2	2	2
21	510-170-00	Nut	1	1	1
22	510-174-00	Washer	1	1	1
23	510-178-00	Cotter Pin	2	2	2
24	510-183-00	Washer	2	1	1
25	510-232-00	Nut	2	2	2
26	510-259-00	Nut	1	1	1
27	510-342-00	Bolt	1	1	1
28	510-407-00	Washer	2	2	2
29	510-578-00	Bolt	1	1	1
30	510-689-00	Bolt	1	1	1
31	510-852-00	Washer	2	2	2
32	511-038-00	Washer	2	2	2
33	511-161-00	Screw	4	4	4
34	511-174-00	Bolt	1	1	1
35	511-202-00	Bolt	2	2	2
36	514-010-00	Bumper	1	1	1
37	515-022-00	Spiral Retaining Ring	1	1	1
38	517-133-00	Bushing – Plain	1	1	1
39	215-260-00	Overhaul Label	-	-	1

Table 13.1 Notes:

1 Item not illustrated as an assembly.

2 Item not illustrated.

AR = As Required

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