PLEASE CHECK WEB SITE AT WWW.ONBOARDSYSTEMS.COM FOR THE LATEST REVISION OF THIS MANUAL

Component Maintenance Manual

For the

12K Hook Assembly and Load Cell

On the

EH101 Series

System Part Numbers

200-210-00
200-210-01
200-210-02

Owner's Manual Number 120-066-00
Revision 3
December 21, 2005

ONBOARD™ SYSTEMS INTERNATIONAL

13915 NW 3rd Court Vancouver, Washington 98685 USA
Phone: 360-546-3072 Fax: 360-546-3073 Toll Free: 800-275-0883
www.OnboardSystems.com

This page intentionally left blank.

Record of Revisions

Revision	*Date*	*Page(s)*	*Reason for Revision*
1	9/17/02	Title, 5-11	Changed factory address
2	11/07/05	All	Converted to Onboard Systems format. Previously Drallim Industries – Onboard Systems Document number CAP 14/98, April 21, 2004.
3	12/21/05	All	Minor formatting changes throughout. Added micro switch testing procedure to section 2-1.

Register Your Products for Automatic Notifications

Onboard Systems offers a free notification service via fax or email for product alerts and documentation updates. By registering your Onboard Systems products at our website, we will be able to contact you if a service bulletin is issued, or if the documentation is updated.

You can choose to receive notices on an immediate, weekly, or monthly schedule via fax, email or both methods. There is no charge for this service. Please visit our website at www.onboardsystems.com/notify.php to get started.

This page intentionally left blank.

CONTENTS

This page intentionally left blank.

Section 1
General Information

Introduction

The 12,000 lb. External Load Management System consists of two components: Cargo Hook and Load Cell.

The Cargo Hook is the means used to attach an external load to the aircraft. It features an electrical and a mechanical means of releasing the load.

The Load Cell is installed between the cargo hook and the helicopter hard point. It functions as part of the Cargo Hook gimbal and outputs a signal proportional to the load on the Cargo Hook.

Physical Description

1. The cargo hook is normally installed vertically, located by a single attach pin. The unit is pinned to a link and swinging structure that allows gimbaling action. This allows the cargo hook to align itself with the direction of applied load. The unit must be mounted in this manner as it is not designed to accommodate side loading. The aircraft structure does not allow the hook to rotate relative to the helicopter.
2. A load beam, in the shape of a hook, pivots about an axis on the lower edge of the unit's case. The aperture into the throat of this beam is sufficiently sized to accommodate a 2 1/4 inch diameter round steel bar formed into a ring or lifting strop. When fitted to an aircraft, the opened end of the load beam must point either forward or at right angles to the fore and aft centre line of the aircraft. The unit provides a semi automatic cargo hook of 12,000 lb. load capacity, which is capable of being loaded without the ground operator having to close or cock the unit. The loading is done by the action of the operator passing the load attachment eye, or sling, on to the load beam and past a keeper, into the throat of the beam hook. When the load has been released and the eye of the sling has left the load beam, the unit will automatically return to a 'ready for loading' or cocked position
3. The unit is assembled in two halves. The two halves are held together by three 3/8 inch bolts and nuts and two 5/16 inch bolts and nuts. Two 3/8 inch bolts also serve as pivots for the keeper and toggle. One 3/8 inch bolt retains the beam bumper.
4. The two halves are the manual release side plate and the solenoid side plate. A solenoid housing is attached to the solenoid side plate. This forms a watertight compartment that houses the solenoid, a switch for a hook lock indicator light and all electrical wiring. The solenoid housing is fitted with two electrical connectors. The 6 pin connector provides a convenient break point for the load cell. The load cell wires pass through the solenoid housing to the 12 pin connector. The 12 pin connector is the interface to the helicopter's electrical system. The solenoid side plate houses all the electrical components.

5. The hook is equipped with two polyurethane bumpers that contact the support structure on the aircraft in the event of abnormal movement of the hook such as a re-coil from releasing a load.
6. The hook has an internal polyurethane bumper that acts as a cushion between hook frame and the load beam. This absorbs some of the recoil energy imparted to the load beam when releasing large loads.

Operation

1. The unit releases the load by rotating a cam. The cam supports the toggle which in turn supports one end of the load beam. The cam is held in the locked position by two springs. When the cam is moved to the release position the profile of the cam allows the toggle to rotate about its pivot and release the end of the load beam. The load beam then rotates about its pivot and the load slides off the beam.
2. There are three ways to rotate the cam and release the load. Electrically by solenoid, manually through a manual release cable and with a release lever.
3. Electrical release is accomplished by energising a rotary solenoid. The solenoid has fastened to it a solenoid cam. The solenoid cam has a protruding dog that strikes the cam crank which in turn rotates the cam.
4. The manual release cable housing is anchored to the manual release cover. The cable pulls on the manual release lever which in turn rotates the cam. To rotate the cam sufficient force must be applied to overcome the two springs acting on the cam and a third spring that acts on the manual release lever. The third spring provides sufficient force to retract the manual release cable. The manual release lever may be manually activated by directly pushing the lever. The manual release lever acts on the cam through lugs on the cam hub which allows the cam to rotate in the direction of release independently of the lever. This allows the solenoid to release the load independently of the manual mechanism.
5. The cam is equipped with an interlock roller that acts on the load beam. This holds the cam in the release position while the load beam is open. When the load beam is returned to the closed position the cam is released and the mechanism locks. This allows the hook to relatch automatically.

Indicator Lights

1. The unit is fitted with two switches that control cockpit indicator lights that indicate the operational status of the hook.
2. The hook open light switch closes a circuit when the hook is locked. The switch is actuated by a cam surface on the cam crank which is in turn connected to the cam. Because of the interlock feature between the load beam and the cam, the circuit is closed only when the hook is locked.

3. The load on hook indicator light switch closes when a load of approximately 150 lb is applied to the load beam. The switch is actuated by a cam surface on the toggle. The toggle is spring loaded by two springs so that with no load the cam roller is held off the cam surface. In this condition the switch is actuated. When a load is applied to the load beam, the load beam roller is forced down a cam surface on the end of the load beam. This moves the entire toggle assembly which continues to move until the switch is de-actuated and the cam roller comes into contact with the cam. When the load on the load beam is reduced to approximately 50 lb, the springs acting on the toggle will lift the cam roller away from the cam surface, thereby actuating the switch.

Cargo Hook Versions

Table 1-1 Cargo Hook/Load Cell Variants

Hook + Load Cell			Hook			Load Cell	
WHL P/N	Onboard Systems P/N	=	WHL P/N	Onboard Systems P/N	+	WHL P/N	Onboard Systems P/N
EA2500V158-001	200-210-00		EA2500V158-003	528-012-00		EA2500V158-004	210-170-00
EA2500V158-002	200-210-01		EA2500V158-007	528-012-01		EA2500V158-004	210-170-00
EA2500V158-008	200-210-02		EA2500V158-009	528-012-02		EA2500V158-004	210-170-00

Table 1-2 Cargo Hook Variations - Description

Hook P/N	Description/Variation
EA2500V158-003 (Onboard Systems P/N 528-012-00)	Manual release cable angle 34°.
EA2500V158-007 (Onboard Systems P/N 528-012-01)	Same as EA2500V158-003, except with different angle of manual release cable (69°).
EA2500V158-009 (Onboard Systems P/N 528-012-02)	Same as EA2500V158-003, with sight hole in manual release cover and modified manual release lever, which will accept a larger diameter manual release cable.

Table 1-3 Cargo Hook Variations – Part Changes

Cargo Hook	Notes	Part	P/N
EA2500V158-003		Manual release cover	290-351-00
		Manual release arm	290-413-00
		Cam hub	290-412-00
EA2500V158-007	EA 2500V158-003 parts replaced by:	Manual release cover	290-351-02
		Manual release arm	290-413-02
		Cam hub	290-412-01
	Redundant parts	Screw	510-276-00
		Washer	510-095-00
	In place of	Shaft cover	290-418-00
		Screw (qty 3)	510-251-00
	Replaced with	Retractor bracket	290-547-00
		Screw (qty 3)	510-317-00
EA2500V158-009	EA2500V158-003 parts replaced by	Manual release cover	290-351-01
		Manual release arm	290-413-01
		Cam hub	290-412-01
	Redundant parts	Screw	510-276-00
		Washer	510-095-00

Specifications

Table 1-4 P/N 528-012-XX Cargo Hook Specifications

Overall dimensions	6.125 in (155.5 mm) x 14.66 in. (325.5 mm) x 13.06 in (331.7 mm)
Hook weight	21 lbs. (9.52 kg)
Rated load	12,000 lbs. (5,443 kg.)
Force required for mechanical release at 12,000 lb.	22 lbs. (9.9 kg) max.
Electrical requirements	22-32 VDC
Current required for release at 12,000 lbs.	16 A
Minimum release load	15 lbs. (6.8 kg)
Mating electrical connector	MIL-C-38999

Table 1-5 P/N 210-170-00 Load Cell Specifications

Load cell weight	3.25 lbs. (1.47 kg)
Total error over linearity range	± 1% of full scale
Linearity range	1,000 to 12,000 lb. (454 to 5,448 kg)
Operating temperature range	+158 to -40° F (+70 to -40 ° C)
Storage temperature range	+194 to -67° F (+90 to -55 ° C)

Bill of Materials

The following items are included with the 200-210-00, 200-210-01, and 200-210-02 systems. If shortages are found contact the company from whom the system was purchased.

Table 1-6 Onboard Systems Bill of Materials

P/N	DESCRIPTION	200-210-00	200-210-01	200-210-02
210-170-00	12K Load Cell Assembly	1	1	1
528-012-00	12K Hook Assembly	1	-	-
528-012-01	12K Hook Assembly	-	1	-
528-012-02	12K Hook Assembly	-	-	1

Section 2
Maintenance

Preventative Maintenance

Remove caked-on dirt from the Cargo Hook and Load Cell with a brush and clean exposed surfaces with a mild solvent. Thoroughly dry all surfaces.

In highly corrosive environments such as salt water, monthly application of a corrosion preventative compound such as ACF-50 is required. Spray exterior of hook with corrosion preventative compound and wipe off excess.

Testing Procedures

The procedure detailed below shall be performed on completion of the service instructions or used as required in order to verify suspected faults.

General Requirements

1. A suitable electrical test box connected to a 28 VDC power supply. (See Figure 2-1).
2. A stand or sling to suspend and load the unit together with a loose weight of 15 lb. (6.8 kg) and 150 lb. (68 kg).

Mechanical

1. Test the manual release as follows.
    (a). Suspend a weight of 15 lb. (6.8 kg) from the load beam.
    (b). Operate the manual release, the unit should function and the weight should fall clear.
    (c). Release the manual release mechanism and ensure that the load beam returns to its latched position and that the manual release returns to its locked datum position line.

Electrical

1. Test the electrical release function as follows (refer to Figure 2-2 for electrical schematic of the cargo hook).
    (a). Suspend a weight of 15 lb. (6.8 kg) from the load beam.
    (b). Connect the test box to a 28 VDC power supply.
    (c). Set power switch “on”.
    (d). Press test box button. The weight should fall clear.
    (e). Release the button and check that the load beam is in its latched position.

Testing Procedures continued

Indicator Lights

1. The two indicator lamps on the test box (see figure 2-1) are provided to test the internal cargo hook switches for proper operation. Test the switches as follows:

    (a). Suspend a weight of 15 lb. (6.8 kg) from the load beam.

    (b). Press test box button. The weight should fall clear and the *Hook Locked* indicator lamp should turn off momentarily.

    (c). When the load beam relatches, verify that the *Hook Locked* indicator lamp is illuminated.

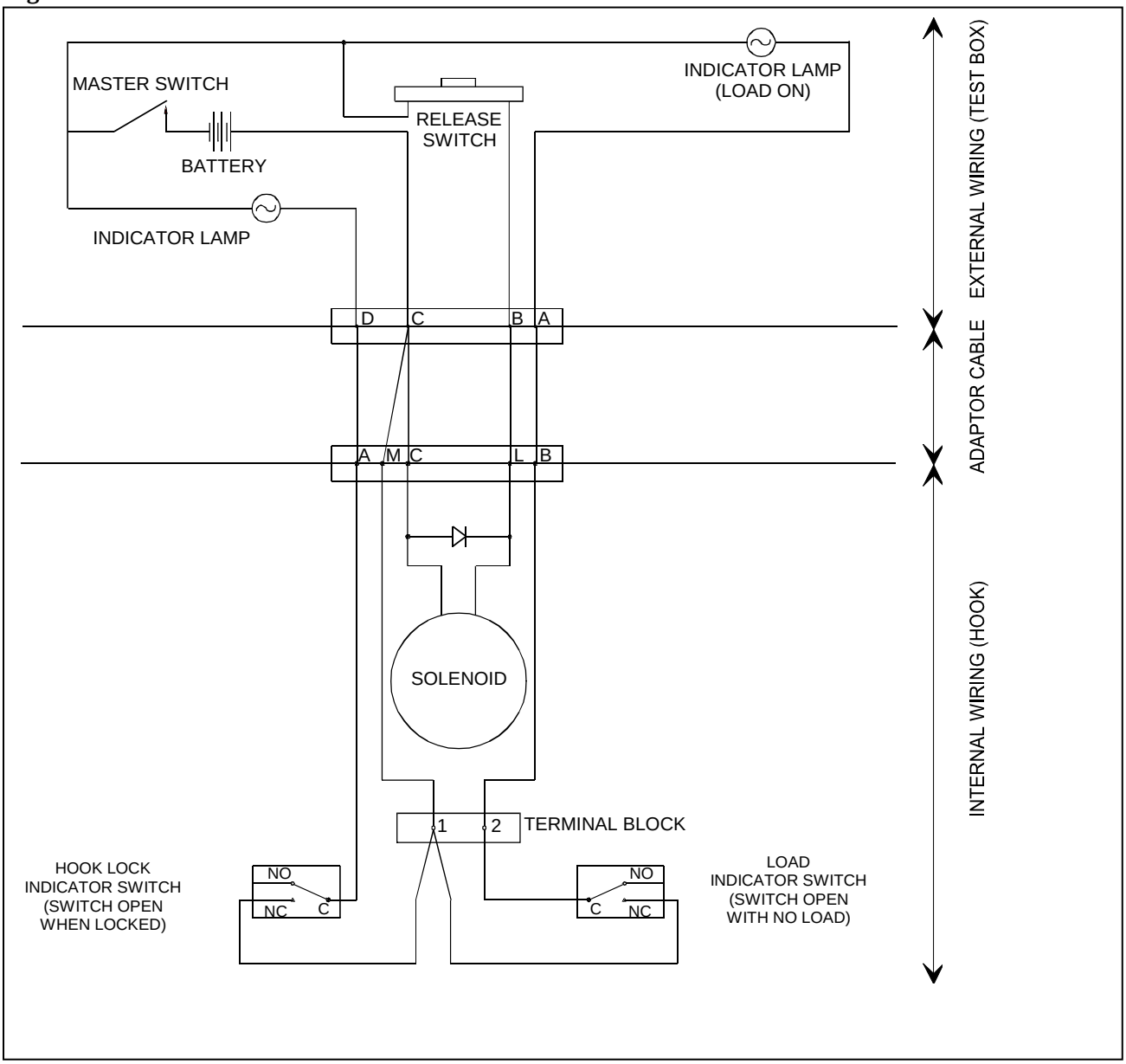
    (d). Suspend a weight of 150 lb. (6.8 kg) from the load beam.

    (d). Verify that the *Load on Hook* indicator lamp is illuminated.

    (d). Remove the load. Verify that the *Load on Hook* indicator lamp is not illuminated.

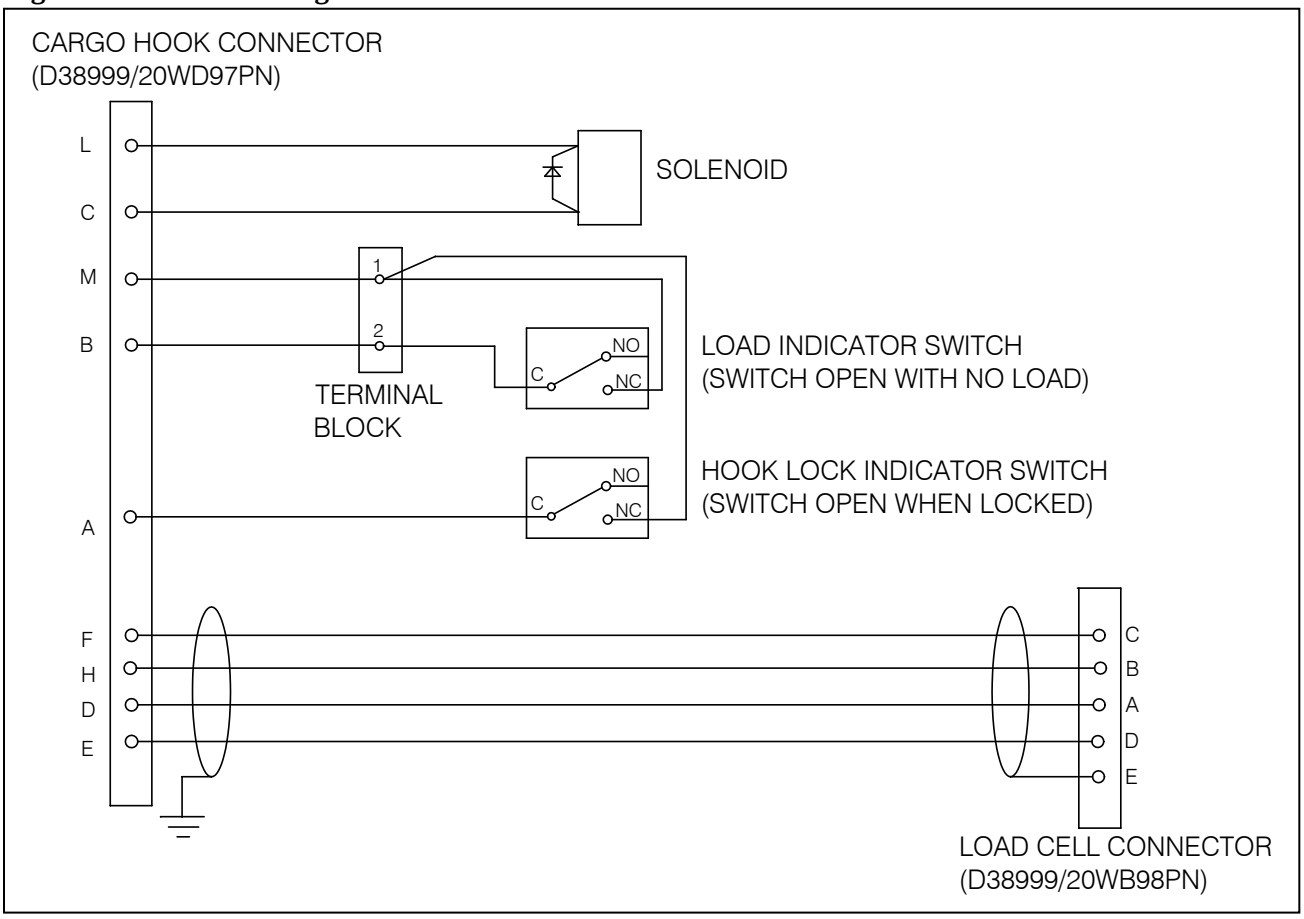
Testing Procedures continued

Figure 2-1 – Test Box Schematic



Testing Procedures continued

Figure 2-2 – Hook Wiring Schematic



Cargo Hook Disassembly Procedure

As a guide, the equipment should be removed from service, disassembled, cleaned and inspected every 1000 operating hours. This figure should be subject to review as operational experience is gained. The information that follows refers to the items in Figure 2-3.

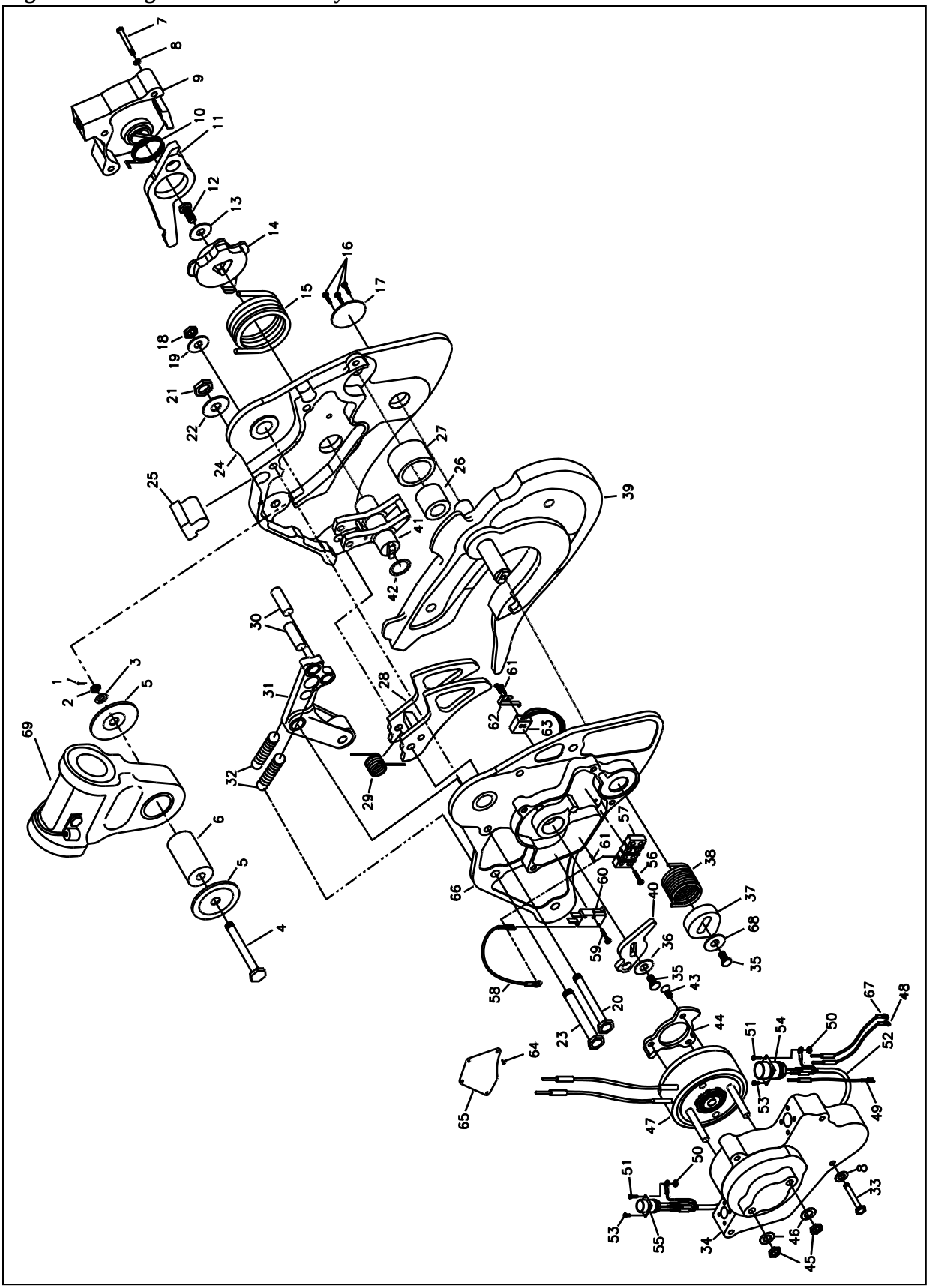
1. General preparation
   a. Generally remove any aircraft attachment components if fitted.
   b. Remove safety wire from screws as required.
2. Separate hook from load cell per the following:
   a. Disconnect load cell electrical cable from connector on hook.
   b. Remove solenoid cover screw (item 33) to disconnect ground strap.
   c. Remove items 1-6 and load cell (item 69).
3. Separate side plates (items 24 and 66) per the following:
   a. Remove manual release cable as applicable.
   b. Remove items 7-15 in numerical order.
   c. Remove nuts and washers (items 18, 19, 21, and 22) and bolts (item 20). Leave remaining bolts in place.
   d. Lay hook on bench with the manual release side up.
   e. Gently pry two side plates apart. The manual release side plate (item 24) should lift off, exposing the mechanism. The mechanism may be manually cycled and observed for proper operation.
4. Remove bumpers (items 25, 26, and 27).
5. Remove keeper (item 28) per the following:
   a. Remove bolt (item 23).
   b. Remove keeper and spring (items 28 and 29).
6. Remove Toggle Assembly (item 31) per the following:
   a. Remove cam rollers (item 30).
   b. Remove bolt (item 23).
   c. Remove load on hook springs (item 32).
   d. Manually rotate cam and load beam to the open position.
   e. Remove toggle assembly (item 31) being careful to avoid damage to switch actuator (item 62).

Cargo Hook Disassembly Procedure continued

7. Remove Solenoid Cover (item 34) per the following:
   a. Remove screws and washers (items 8 and 33).
   b. Lift cover off side plate being careful not to damage wiring.
   c. Disconnect wiring from terminal block (item 57) and switch (item 61). Make a note of the correct connections to assist during re-assembly.
   d. Remove cover with wiring.
8. Remove Load Beam Assembly (item 39) per the following:
   a. Remove screw (item 35), washer (item 68), Load Beam Crank (item 37), Load Beam Spring (item 38).
   b. Remove load beam.
9. Remove Cam (item 41) per the following:
   a. Remove O-Ring (item 42).
   b. Disconnect spring from pin in side plate.
   c. Remove cam.
10. Remove Solenoid from Solenoid Cover (only if faulty)
   a. Remove nuts and washers (item 45) and (item 46).

Cargo Hook Disassembly Procedure continued

Figure 2-3 Cargo Hook Disassembly



Cargo Hook Inspection

General

The information that follows refers to the items in Figure 2-3.

Manual Release

1. Examine items 7 through 15 for corrosion. Check to see that the manual release lever (item 11) pivots smoothly on cover (item 9).

Side Plates (items 24 and 66)

1. Examine for corrosion. Visually inspect for cracks, deformation and damage.
2. Inspect bushings for excessive wear. If more than 20% of the bushing area is worn into the copper-coloured material, replace the bushing.
3. Inspect needle bearings for lubrication and smoothness. If the bearings feel rough when the cam is installed or are dry or contaminated, replace the bearings.
4. Inspect the main attach bushings for wear. If wear exceeds the wear limit, replace bushings.

Bumpers (items 25, 26, and 27)

1. Visually inspect all bumpers for cracks and deformation. If a bumper is cracked or deformed, replace.

Keeper (item 28)

1. Examine for corrosion. Visually inspect for cracks, deformation and damage.
2. Check for wear in pivot holes. If hole diameter exceeds .390 inches (9.9 mm) in any direction, replace Keeper Assembly (28).
3. Check for wear on bolt (item 23). If worn area of bolt exceeds .010 inches (.254 mm), measured on diameter, replace bolt.
4. If keeper is deformed or bent more than .030 inches (.76 mm), replace.

Cargo Hook Inspection continued

Toggle Assembly (item 31)

1. Examine for corrosion. Visually inspect for cracks, deformation and damage.
2. Inspect bushings for excessive wear. If more than 20% of the bushing area is worn into the copper-coloured material, replace the bushing.
3. Inspect the load beam roller for smooth operation. If load beam roller does not roll smoothly, replace toggle assembly.
4. Inspect needle bearings for lubrication and smoothness. If the bearings feel rough when the cam rollers are installed or are dry or contaminated, replace the bearings.
5. Inspect the cam rollers (item 30) for denting. If any dents or irregularities on the OD of the roller are observed, replace roller and needle bearing in toggle assembly.
6. Inspect the posts used to attach the springs for wear. If worn to more than .035 inches (.89 mm) out of round, replace the toggle assembly.

Solenoid Cover (item 34)

1. Examine for corrosion. Visually inspect for cracks, deformation and damage.
2. Inspect for any sign of leaking of water around connectors and solenoid. If leakage is detected renew sealant as required.
3. Examine wiring for damage. Replace wires as required.
4. Examine area of solenoid cam (item 44) that contacts cam crank (item 40). File as required to remove upset metal and burrs. If wear exceeds .020 inches (.51mm), replace solenoid cam.
5. Check screws (item 44) for tightness. If screws are found to be loose, remove and apply Loctite 270 and re-torque screws.

Load Beam (item 39)

1. Examine for corrosion. Visually inspect for cracks, deformation and damage. Some wear and gouging in the area that contacts the load is normal. If the wear or depth of gouge exceeds .060 inches (1.52 mm), replace the load beam. Polish out rough areas or sharp corners with 00 grit emery cloth to provide smooth transitions and finish.
2. Examine end of load beam at load beam roller contact point for wear and deformation. If any evidence of denting or deformation is observed, replace the load beam. A polished appearance on the load roller path is normal.
3. Examine load beam shaft for wear from rubbing against the spring (item 38). If wear exceeds .030 inches (.76 mm), replace load beam assembly.
4. Examine Load Beam Crank (item 37) and Load Beam Spring (item 38) for excessive wear. Visually inspect for cracks, deformation and damage. Replace as required. If any wear is noted on the spring, replace it.

Cargo Hook Inspection continued

Cam (item 45)

1. Examine for corrosion. Visually inspect for cracks, deformation and damage.
2. Inspect the cam surface and the bearing surfaces. If there is any evidence of denting from the cam rollers or the roller bearings, replace the cam.
3. Inspect the interlock roller for smooth operation. If it does not roll smoothly on its shaft, replace the cam assembly. If denting on the roller surface exceeds .010 inches (.25 mm) deep, replace the cam assembly.

Load on Hook Switch (item 63)

1. Visually inspect for damage to the wires and switch body. If there is any damage, replace the switch (item 63).
2. Visually inspect the switch actuator (item 62). If there is any damage, replace the actuator.
3. Manually operate the switch and check for positive action. If any sluggishness or non-positive action is noted, replace the switch.

Hook Open Switch (item 60)

1. Visually inspect for any damage to the actuator or switch body. If any damage is observed, replace the switch. Manually operate the switch and check for positive action. If any sluggishness or non-positive action is noted, replace the switch.

Load Cell Assembly (item 68)

1. Examine load cell body for corrosion. Visually inspect for cracks, deformation and damage.
2. Examine covers for corrosion. Visually inspect for cracks, deformation and damage.
3. Examine wiring for damage. Replace wires as required.
4. Inspect the attach bushings for wear. If wear exceeds the wear limit, replace bushings.

Cargo Hook Assembly Procedure

General

1. Items identified in the following information refer to Figure 2-3.

Torque Values

1. The following table lists the torque values for the various fasteners as well as Loctite and safety wire requirements.

Table 2-1 Torque Values

Description	Item	Torque (lb-in)	Loctite	safety wire	A/F dim
case bolt at keeper only	23	see note	none	no	9/16”
case nut at keeper only	21	see note	none	no	9/16
case bolt case	23	160-190	none	no	9/16
case nut case	21	160-190	none	no	9/16
case bolt case	20	100-140	none	no	1/2”
case nut case	18	100-140	none	no	1/2”
solenoid cover screws	33	12-15	none	yes	3/8”
manual release cover screws	7	12-15	none	yes	3/8”
cam hub screw	12	40-50	241	yes	7/16”
cam crank bolt	35	20-25	241	yes	3/8”
load cell attachment bolt	4	12-15	none	cotter pin	7/16”
load cell attachment nut	2	12-15	none	cotter pin	7/16”
solenoid cam screw	43	20-25	270	no	-
misc. screws	-	shop practice	241	no	-

Fit Hook Open Switch (If necessary)

1. Attach hook open switch (item 60) to side plate (item 66) with screw (item 59).

Assemble solenoid into Solenoid Cover.

1. Assemble solenoid (item 47) into solenoid cover (item 34) and secure with washers (item 46) and nuts (item 45).
2. Apply sealant (GE RTV 133) around the solenoid mounting studs where they protrude through outside of solenoid cover (item 34). Take care not to apply excess sealant which may foul the return spring on the back of the solenoid. If connector (item 54) had to be replaced, this should be assembled at this stage using screws (item 51) and (item 53) sealing the flange with sealant (GE RTV 133) where it mates with the solenoid cover.

Cargo Hook Assembly Procedure continued

Fit Load on Hook Switch (if necessary)

1. Attach load on hook switch (item 63) to side plate (item 66) with screws (item 61).
2. Feed load on hook switch wires through side plate and seal with sealant (GE RTV 133) where they pass through the side plate. Allow the squeeze-out to cure (approximately two hours) and then trim any excess.
3. Connect wires to terminal strip (item 57).

Install Cam

1. Pack needle bearing located in boss in side plate (item 66) with Aeroshell 7 grease.
2. Coat O-ring (item 42) with Aeroshell 7 grease and fit onto cam (item 41).
3. Apply light coat of Aeroshell 7 grease around cam area of side plate (item 66) and fit cam (item 41), with triangle side up, through needle bearing in side plate.
4. Coat end of bolt (item 35) with Loctite 241. Fit cam actuator (item 40) and washer (item 36) over bolt (item 35) and screw into cam. Tighten to a torque of 20-25 lb-in and lock with safety wire.

Install Load Beam

1. Locate shaft of load beam (39) into boss in side plate (66).
2. Coat load beam shaft with Aeroshell 7 grease where it contacts load beam return spring (item 38). Do not lubricate the shaft at the bushings.
3. Apply Loctite 242 to bolt (item 35) threads. Fit washer (item 68), load beam crank (item 37) and load beam spring (item 38) over bolt (item 35) and screw into load beam shaft (item 39), ensuring load beam crank correctly locates in side plate. Tighten to a torque of 20-25 lb-in and lock with safety wire.

Install Solenoid Cover

1. Place solenoid cover (item 34) close to side plate (item 66) and connect wiring to terminal strip (item 57) and hook open switch (item 60).
2. Apply sealant (GE RTV 133) on the mating surfaces between solenoid cover (item 34) and side plate (item 66) taking care to leave the drain hole adjacent to the load beam return spring clear.
3. Place solenoid cover onto side plate taking care not to damage wiring. Secure with three screws (item 33), washers (item 8), tighten to a torque of 12-15 lb-in and lock with safety wire.

Install Toggle Assembly

1. Pack both needle bearings in toggle assembly (item 31) with Aeroshell 7 grease.
2. Rotate cam and load beam to the open position.

Cargo Hook Assembly Procedure continued

3. Place toggle assembly in the correct position against side plate (item 66), taking care not to damage load on hook switch (item 63) and connect springs (item 32) to side plate roll pin and toggle assembly.
4. Adjust position of toggle assembly and push frame bolt (item 23) through hole in side plate and toggle assembly.
5. Fit cam roller pins (item 30).

Install Keeper

1. Fit bolt (item 23) through hole in side plate (item 66).
2. Fit keeper (item 28) and keeper return spring (item 29) over bolt.

Fit Bumpers

1. Fit bumper (item 25), inner load beam (item 26) and outer load beam bumper (item 27) to manual release side plate (item 24).

Assemble Side Plates

1. Pack needle bearing located in side plate (item 24) with Aeroshell 7 grease.
2. Carefully fit side plate over cam assembly, protruding bolts and onto the other side plate assembly (66). Place washers (item 19) over bolts (item 20) and secure with nuts (item 18). Ensure keeper spring (item 29) is located correctly with arm pushed between side plates.
3. Fit washers (item 22) over bolts (item 23) and secure with nuts (item 21).
4. Tighten nuts (item 18) onto frame bolts (item 20) to a torque of 100-140 lb-in.
5. For the bolt that is used as the pivot bolt for the keeper, tighten the nut until it just makes contact with the case, then turn nut 1/4 to 1/2 turn more. **CAUTION**: Excessive tightening of this nut could distort the case and cause the keeper to bind.
6. Tighten remaining nuts (item 21) onto bolts (item 23) to a torque of 160-190 lb-in.

Install Manual Release components.

1. Fit cam spring (item 15) and cam hub (item 14) over protruding part of cam assembly (item 41). Apply Loctite 242 to screw (item 12) threads and secure cam hub with washer (item 13) and screw. Tighten to a torque of 40-50 lb-in, and lock with safety wire. Fit manual release lever (item 11), cable return spring (item 10) and manual release cover (item 9) over cam hub and secure in place with washers (8) and screws (7).
2. Tighten manual release cover screws (7) to a torque of 12-15 lb-in and lock with safety wire.

Cargo Hook Assembly Procedure continued

Fit Hook to Load Cell

1. Lightly lubricate bushings of load cell assembly with Aeroshell 7 grease.
2. Align load cell assembly in position between wings of assembled cargo hook.
3. Lightly lubricate attach pin (item 6) with Aeroshell 7 grease and slide through hook and load cell assembly.
4. Place attach pin washer (item 5) over load cell attach bolt (item 4) and push bolt through attach pin (item 6).
5. Place attach pin washer over protruding end of load cell attach bolt and secure with washer (item 3) and nut (item 2).
6. Install cotter pin (item 1) onto end of load cell attach bolt.
7. Connect ground strap to solenoid cover (item 34) with remaining screw (item 33). Tighten to a torque of 12-15 lb-in and lock with safety wire.
8. Connect load cell electrical cable to connector (item 55) on hook assembly.

Storage and Handling

1. There are no special storage requirements for the equipment to maintain the shelf life of 5 years from the date of supply.
2. There are no special handling requirements for either bench or aircraft installation.

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.

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

This page intentionally left blank

Section 3
Illustrated Parts List

Purpose

(1) This Illustrated Parts List (IPL) is intended for use in identifying and requisitioning replaceable parts.

How to use the IPL

(1) The figure number refers to Figure 3-1 in this section.

(2) The item number corresponds to the item number shown for the part on the illustration.

Numerical Parts List

(1) The numerical index contains all part numbers in the detailed parts list arranged in alphanumeric order.

Table 3-1 Illustrated Parts List

PART NO.	DESCRIPTION	FIG INDEX NO.	UNITS PER ASSY 528-012-00	UNITS PER ASSY 528-012-01	UNITS PER ASSY 528-012-02
215-104-00	S/N Plate	65	1	1	1
232-035-00	Solenoid Assembly	47	1	1	1
232-036-00	Side Plate Assembly – Solenoid	66	1	1	1
232-037-00	Side Plate Assembly – Manual	24	1	1	1
232-038-00	Toggle Assembly	31	1	1	1
232-039-00	Load Beam Assembly	39	1	1	1
232-040-00	Cam Assembly	41	1	1	1
232-041-00	Keeper Assembly	28	1	1	1
270-080-00	Wire Assembly, Plug Pin	48	1	1	1
270-080-01	Wire Assembly, Plug Pin	67	1	1	1
270-081-00	Switch Assembly – Load on Hook	63	1	1	1
270-082-00	Wire Assembly – Hook Lock	49	1	1	1
270-083-00	Wire Assembly – Common	58	1	1	1
270-084-00	Wire Harness, P to P	52	1	1	1
290-351-00	Manual Release Cover	9	1	-	-
290-351-02	Manual Release Cover	9	-	1	-
290-351-01	Manual Release Cover	9	-	-	1
290-352-00	Solenoid Cover	34	1	1	1
290-380-00	Cam Roller Pin	30	2	2	2

Illustrated Parts List continued

Table 3-1 Illustrated Parts List continued

PART NO.	DESCRIPTION	FIG INDEX NO.	UNITS PER ASSY 528-012-00	UNITS PER ASSY 528-012-01	UNITS PER ASSY 528-012-02
290-385-00	Cam Actuator	40	1	1	1
290-386-00	Solenoid Cam	44	1	1	1
290-394-00	Load Beam Crank	37	1	1	1
290-406-00	Attach Pin	6	1	1	1
290-407-00	Bumper	25	2	2	2
290-408-00	Attach Pin Washer	5	2	2	2
290-412-00	Cam Hub	14	1	-	-
290-412-01	Cam Hub	14	-	1	1
290-413-00	Manual Release	11	1	-	-
290-413-02	Manual Release	11	-	1	-
290-413-01	Manual Release	11	-	-	1
290-418-00	Shaft Cover	17	1	-	1
290-547-00	Retraction Bracket	17	-	1	-
400-050-00	Switch Actuator	62	1	1	1
400-052-00	Switch – Hook Open	60	1	1	1
410-146-00	Terminal Strip	57	1	1	1
410-147-00	Connector, Main	54	1	1	1
410-148-00	Connector, Load Cell	55	1	1	1
510-008-00	Screw	61	3	3	3
510-029-00	Nut	50	2	2	2
510-042-00	Washer	36	1	1	1
510-085-00	Washer	68	1	1	1
510-095-00	Washer	8	7	6	7
510-100-00	Washer	3	1	1	1
510-100-00	Washer	46	2	2	2
510-104-00	Nut	18	2	2	2
510-115-00	Cotter Pin	1	1	1	1
510-129-00	Nut	21	3	3	3
510-132-00	Screw	53	6	6	6
510-157-00	Screw	56	2	2	2
510-189-00	Screw	59	2	2	2
510-237-00	Screw	43	3	3	3

Illustrated Parts List continued

Table 3-1 Illustrated Parts List continued

PART NO.	DESCRIPTION	FIG INDEX NO.	UNITS PER ASSY 528-012-00	UNITS PER ASSY 528-012-01	UNITS PER ASSY 528-012-02
510-238-00	Washer	22	3	3	3
510-239-00	Washer	19	2	2	2
510-240-00	Screw	23	3	3	3
510-241-00	Screw	20	2	2	2
510-246-00	Nut	45	2	2	2
510-251-00	Screw	16	3	-	3
510-317-00	Screw	16	-	3	-
510-254-00	Screw	33	4	4	4
510-256-00	Screw	4	1	1	1
510-257-00	Screw	35	2	2	2
510-258-00	Screw	12	1	1	1
510-259-00	Nut	2	1	1	1
510-312-00	Washer	13	1	1	1
510-262-00	Rivet	64	4	4	4
510-265-00	Screw	51	2	2	2
510-276-00	Screw	7	3	2	3
514-005-00	Spring, Load on Hook	32	2	2	2
514-006-00	Spring, Cam	15	1	1	1
514-007-00	Spring, Keeper Return	29	1	1	1
514-009-00	Spring, Load Beam	38	1	1	1
514-011-00	Load Beam Bumper, Inner	26	1	1	1
514-012-00	Load Beam Bumper, Outer	27	1	1	1
514-018-00	Spring, Cable Return	10	1	1	1
556-028-00	O-Ring, Cam Shaft	42	1	1	1

Illustrated Parts List continued

Figure 3-1 Cargo Hook Parts