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Cargo Hook Kit, 14 Volt

For The

Robinson R44

Kit P/N 200-227-00

STC SR00578SE

Owner's Manual

Owner's Manual Number 120-077-00

Revision 16

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RECORD OF REVISIONS

<i>Revision</i>	<i>Date</i>	<i>Page(s)</i>	<i>Reason for Revision</i>
11	02/13/07	Section 1, 2-4, 2-6, 2-13, 2-17, 2-18, 3-8, 3-9, 3-12, Section 4, 5-1	Updated Warnings, Cautions and Notes to new format. Added Warning, Cautions, and Notes explanation in introduction. Changed P/N 210-182-00 to 210-095-01. Added maintenance information specific to rotational force applications.
12	02/15/07	1-3, 1-4, 2-16, 2-17	Revised to change cargo hook part number from 528-010-06 (28V cargo hook) to 528-010-06 (12V cargo hook).
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14	10/12/09	1-2, 5-1, 5-2	Changed cargo hook service manual number from 122-013-00 to 122-001-00.
15	03/17/11	1-1, 1-2, 2-4, 2-6, 2-12, 2-16, 2-17, 3-8, 3-9, 3-12, Section 4, 5-1 & 5-2	Added External Load Limit 800 Decal P/N 215-119-00 to Bill Of Materials. Replaced Warnings, Cautions and Notes section with Safety Labels section. Updated safety label format throughout document. Updated RMA information.
16	09/27/16	Sections 1 thru 4.	Removed references to kit P/N 200-228-00 and its accompanying load weigh system. Added note regarding decal P/N 215-114-00.

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Section 1

General Information

Introduction

The 200-227-00 Cargo Hook Kit is approved for the Robinson R44 helicopters with 14 volt electrical systems.

Safety Labels

The following definitions apply to the symbols used throughout this manual to draw the reader's attention to safety instructions as well as other important messages.



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.

Bill of Materials

The following items are included with the Cargo Hook Kit. If shortages are found contact the company from whom the system was purchased.

Table 1-1 Bill of Materials

Part No.	Description	Qty
120-077-00	Owner's Manual	1
122-001-00	Component Maintenance Manual	1
215-118-00	R22/44 Multiple Decal Sheet	1
215-119-00	External Load Limit 800 Decal	1
232-049-01	Gimbal Assembly	1
232-050-00	Link Assembly	1
232-063-00	Cyclic Switch Housing Assy	1
232-114-01	Grip Switch Housing Assy	1
268-014-01	Release Cable Assembly	1
270-089-00	Wire Assy – Circuit Breaker	1
270-090-00	Wire Bundle	1
290-440-00	Roller Pin	1
290-478-01	Switch Guard	1
290-492-01	Pillow Block	1
290-505-00	Drilled Cap Head Screw	2
400-053-00	Switch	1
400-054-00	Cap	1
400-059-00	Switch	1
410-162-00	Ring Terminal	2
440-006-00	Circuit Breaker	1
445-002-00	Relay	1
500-065-00	Grommet	1
500-066-00	Spacer	1
505-011-00	Grommet	1
510-100-00	Washer	1
510-115-00	Cotter Pin	1
510-209-00	Washer	1
510-273-00	Nut	1
510-277-00	Screw	2
510-278-00	Washer	2
510-279-00	Nut	2
510-286-00	Nut	1
510-297-00	Screw	1
510-301-00	Screw	2
510-528-00	Bolt	1
512-010-00	Clamp	2
512-018-00	Adel Clamp	2
528-010-06	3,500 Lb. 14V Cargo Hook	1

Inspection

Inspect the kit items for evidence of damage, corrosion and security of lock wire and fasteners. If damage is evident, do not use the items until they are repaired.

Specifications

Table 1-2 System Specifications

Design Load	800 lbs. (363 kg.)
Design Ultimate Strength	3,000 lbs. (1360 kg.)
Unit Weight P/N 200-227-00	4.8 lbs (2.2 kg.)

Specifications, continued

Table 1-3 P/N 528-010-06 Cargo Hook Specifications

Design load	3,500 lbs. (1,587 kg.)
Design ultimate strength	15,750 lbs. (7,143 kg.)
Electrical release capacity	8,750 lbs. (3,968 kg.)
Mechanical release capacity	8,750 lbs. (3,968 kg.)
Force required for mechanical release at 3,500 lb.	8 lb. Max (.400" travel)
Electrical requirements	10.5-18 VDC 6 amps
Minimum release load	7 pounds
Unit weight	3 pounds (1.35 kg.)
Mating electrical connector	PC06A8-2S SR

Theory of Operation

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

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

To release the load, the latch is disengaged from the load beam. With the latch disengaged, the weight of the load causes the load beam to swing to its open position, and the cargo sling slides off the load beam. A spring in the internal mechanism then drives the load beam back to its closed and latched position.

A load release can be initiated by three different methods. Normal release is achieved by pilot actuation of a push-button switch in the cockpit. When the push-button switch is pressed, it energizes the DC solenoid in the Cargo Hook, and the solenoid opens the latch in the internal mechanism. An optional secondary release button is also provided on the left seat outboard support that can also be used to electrically initiate load release. In an emergency, release can be achieved by operating a mechanical release lever. A manual release cable attached to the lever operates the internal mechanism of the Cargo Hook to unlatch the load beam. The load can also be released by the actuation of a lever located on the side of the Cargo Hook.

Section 2

Installation Instructions

These procedures 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.

The R44 maintenance and parts manuals should be available throughout the installation as various R44 components will be referred to by name and part number.

All equipment removed and replaced shall be done in accordance with the R44 maintenance manual. All installed hardware shall be torqued in accordance with standard torques of AC43.13 unless noted otherwise. Apply torque stripe where applicable.

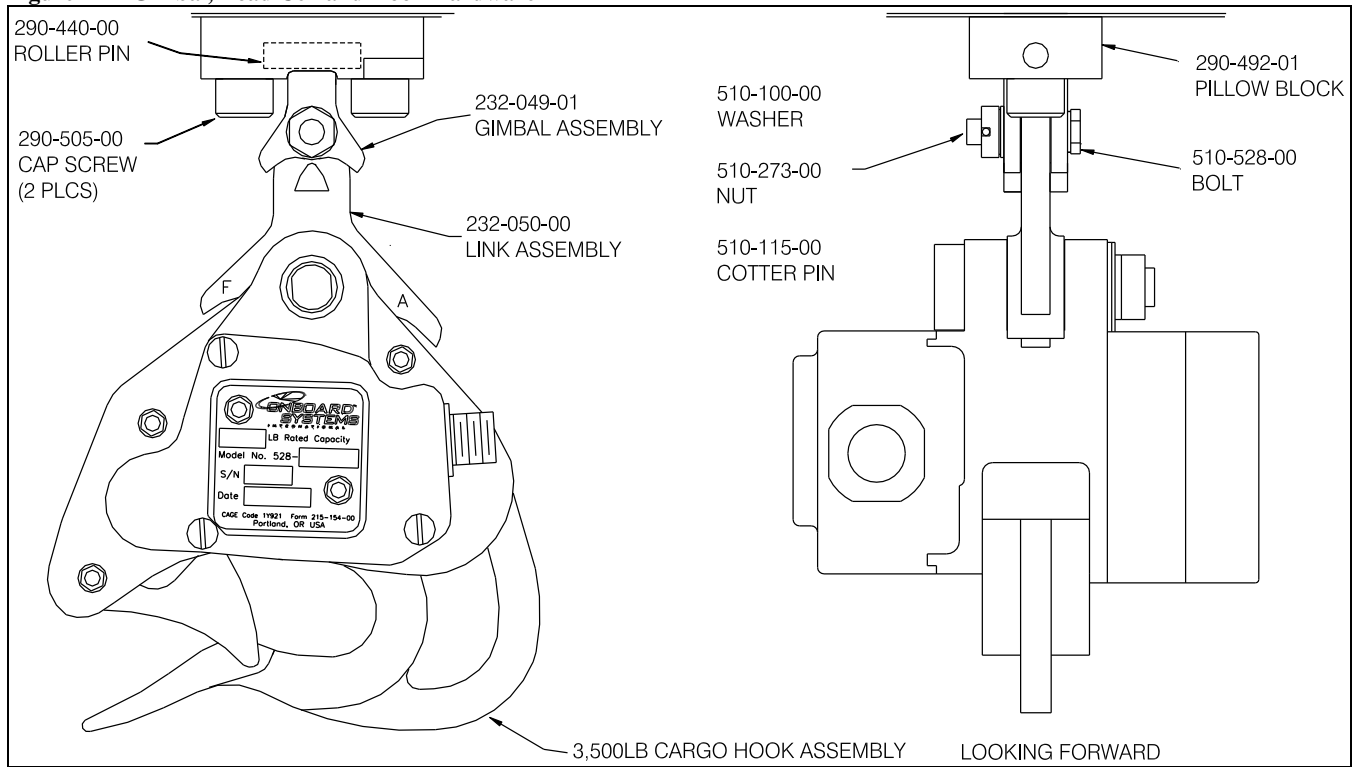
1. Disconnect the battery.

Pillow Block, Gimbal and Link Installation

1. Insert the 290-505-00 cap screws into the two holes in the Robinson hardpoint block and screw in to ensure thread integrity. Some re-work of access holes in skin may be required to allow bolt installation.
2. Remove the two cap screws.
3. Place the 290-492-01 Pillow Block against the lower skin and install one of the cap screws as shown in Figure 2-1.
4. Partially insert the 290-440-00 Roller Pin into the 290-492-01 Pillow Block. Hold the 232-049-01 Gimbal Assembly in position and slide the roller pin through the Gimbal Assembly and into the other side of the pillow block. Grease the roller pin with Aeroshell 7, MIL-G-23827 or equivalent before assembly.
5. Install the second 290-505-00 cap screw and torque to 26 ft-lbs (35 N-m).
6. Safety-wire the cap screws to the safety wire ears on the Pillow Block.
7. Grease the bushings with Aeroshell 7, MIL-G-23827, or equivalent before assembly. Install the 232-050-00 Link Assembly to the Gimbal Assembly using the hardware shown in Figure 2-1. Install the load cell or link so that the travel limiter identified with the F is facing forward and the travel limiter identified with the A is facing aft. Tighten nut finger tight and then tighten to next available slot for cotter pin. Install new cotter pin.

Pillow Block, Gimbal and Link Installation, continued

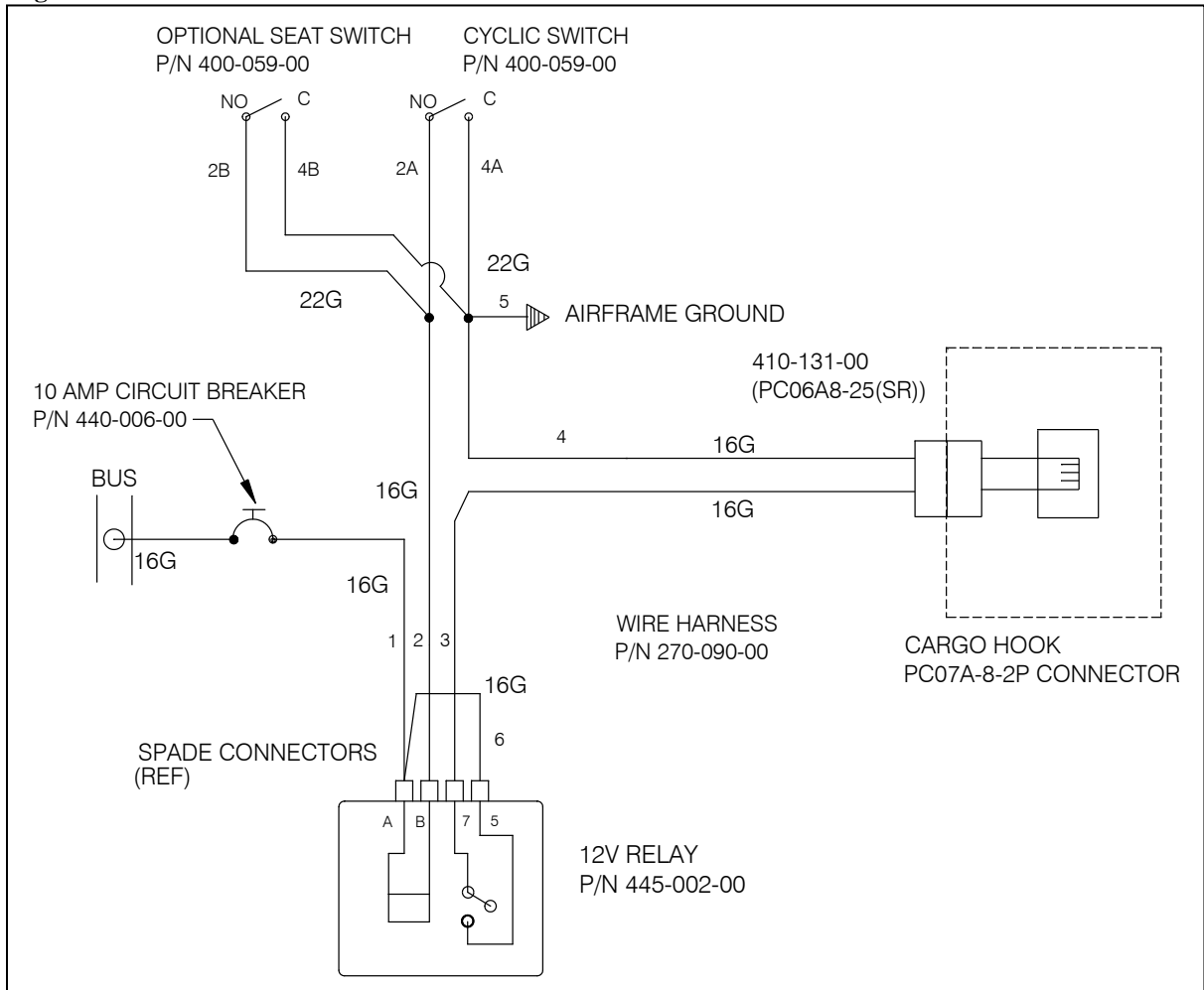
Figure 2-1 Gimbal, Load Cell and Hook Hardware



Electrical Schematic

The electrical release system is powered from the bus through a 10 amp circuit breaker to a relay in the center tunnel. Switches on the cyclic and copilots seat support control the relay and energize the DC solenoid in the Cargo Hook, opening the hook and releasing the cargo. A schematic for the electrical system is shown below in Figure 2-2.

Figure 2-2 Electrical Schematic



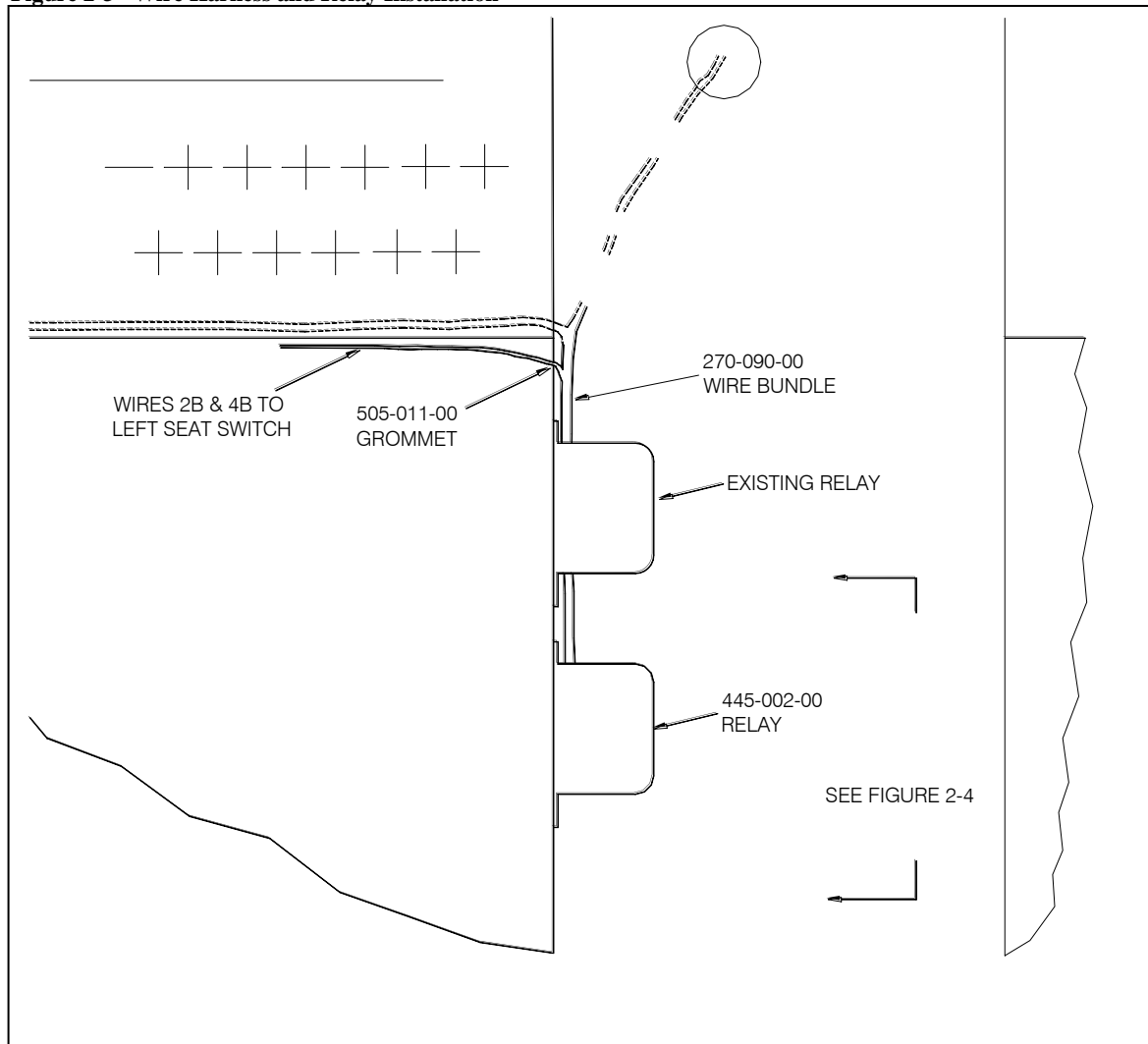
Wire Harness and Relay

1. Install the 445-002-00 relay on the keel panel near the existing relay installation using the correct hardware as shown in Figure 2-3 and 2-4.
2. Place the 270-090-00 main wire bundle into the tunnel on top of the existing wire bundle.

NOTICE

Due to possible minor configuration changes incorporated by Robinson Helicopters, install the relay per figures 2-7 and 2-8 or as near as possible. Ensure adequate clearance between the relay's associated wire bundle and the push/pull control rods.

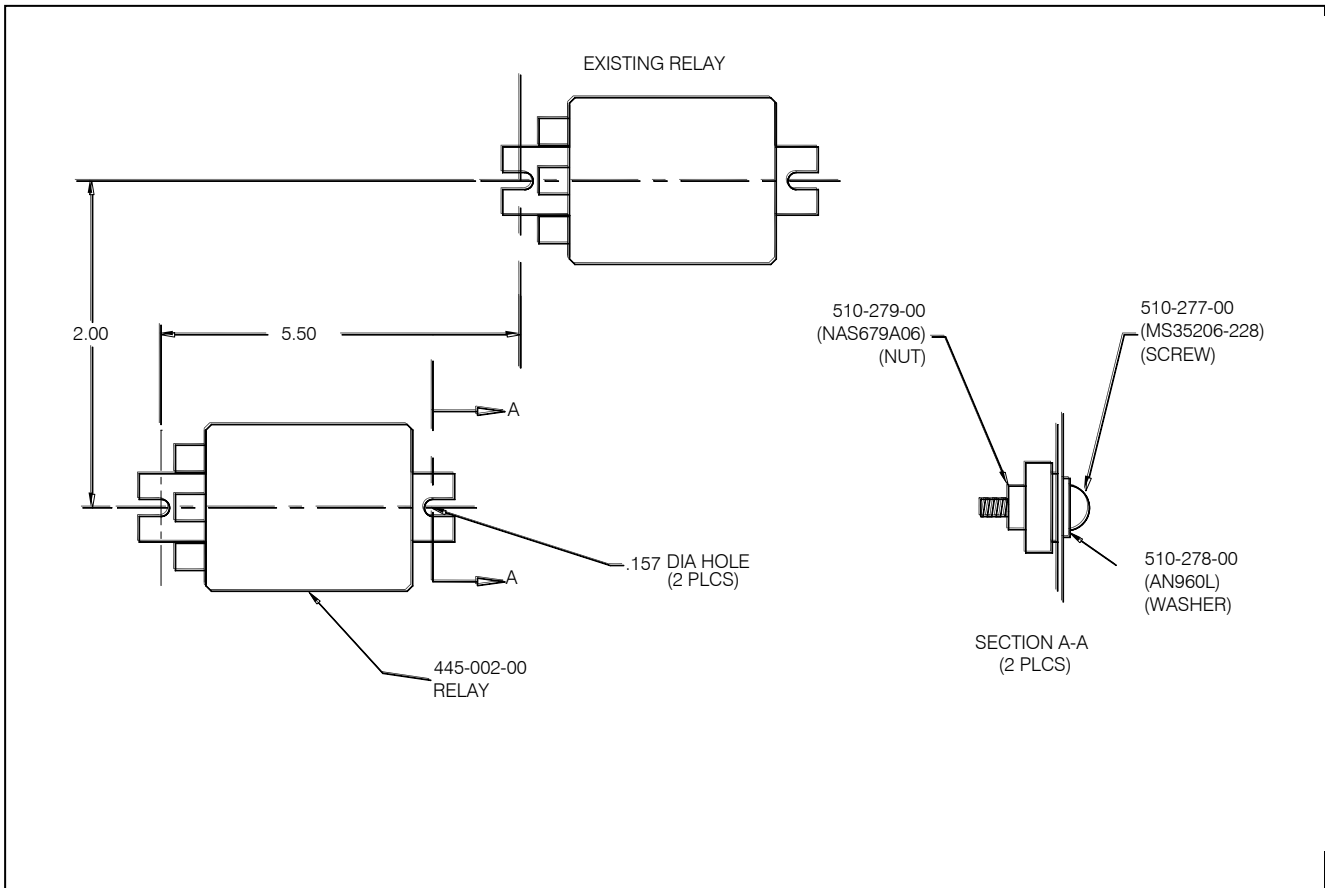
Figure 2-3 Wire Harness and Relay Installation



Wire Harness and Relay, continued

3. Connect wire numbers 1, 2 and 3 from the main bundle to the relay terminals A, B and 7 as shown in the Figure 2-2 electrical system schematic. Connect jumper wire 6 to relay terminal 5.
4. Connect the ground lead of wire number 5 to any convenient existing ground location in the tunnel.
5. Secure the wire bundle with wire ties as required.

Figure 2-4 Relay Installation



Wiring to Circuit Breaker Panel and Circuit Breaker Installation

1. Remove the circuit breaker cover panel and install the 440-006-00 10 amp circuit breaker in an available location.
2. Open the circuit breaker to disarm the cargo hook release circuit.
3. Use the 270-089-00 wire assembly and a 410-162-00 ring terminal as a jumper to power the input side of the circuit breaker in compliance with AC 43.13.
4. Feed the number 1 wire of the main wire bundle from the tunnel into the circuit breaker bay using the existing wire bundle access hole. Connect the wire to the output side of the 440-006-00 circuit breaker using the other 410-162-00 ring terminal provided. Secure the power wire to the existing wire bundles with tie wraps.

Release Switches



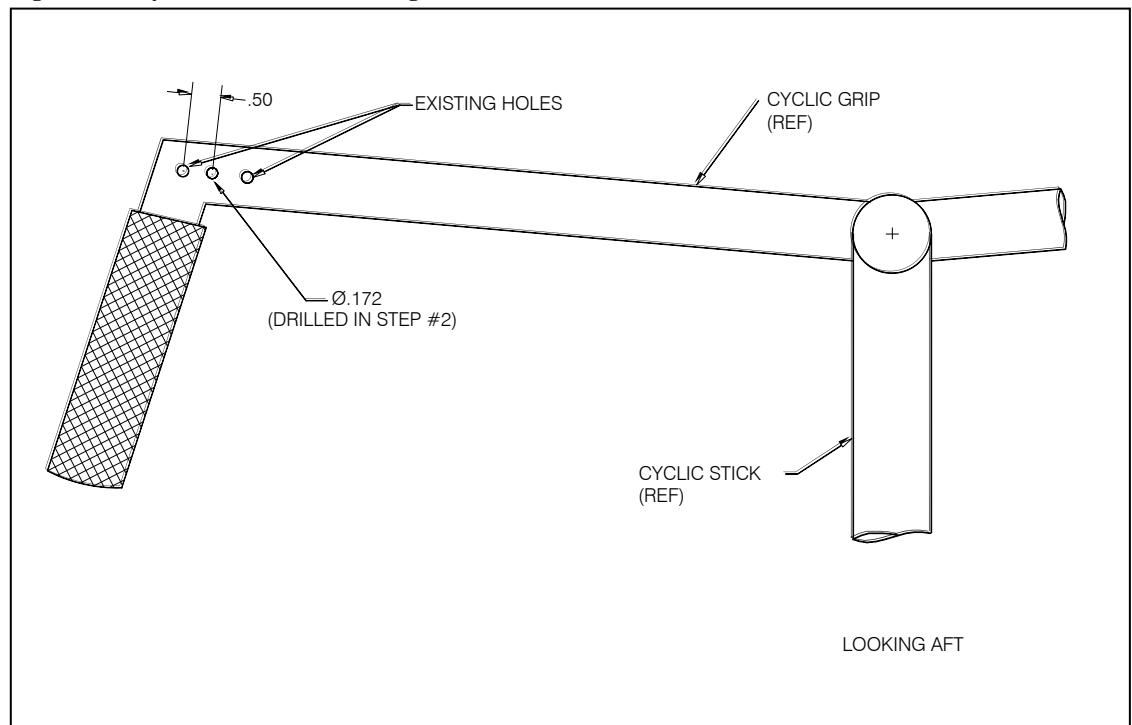
If Robinson Grip Assembly P/N C058 is installed, the Cyclic Release Switch Installation is not performed. Proceed to the Grip Assembly Switch Installation instructions.

Cyclic Release Switch Installation

1. Remove the cover to the cyclic switch housing and ensure its wires are clear of the areas to be drilled on the horizontal cyclic control handle.
2. Drill a .172 inch (4.4 mm) diameter hole on the forward side of the cyclic grip as shown in Figure 2-5.
3. Use a lead wire and route the number 2A and 4A wires up through the cyclic stick and out the existing wire routing hole. Place a length of heat shrink over the wires that will cover the exposed portion similar to the existing com wires.
4. Using a lead wire again, pull the number 2A and 4A wires up through the cyclic grip and out the .250 hole on the front of the cyclic grip.
5. Place a 1 inch (25.4 mm) length of heat shrink over each wire to the cyclic switch. Prepare each wire end and solder them to the normally open and closed switch terminals as shown in the Figure 2-2 wiring schematic. Using a heat gun, shrink the covering material to final size.

Release Switches, continued

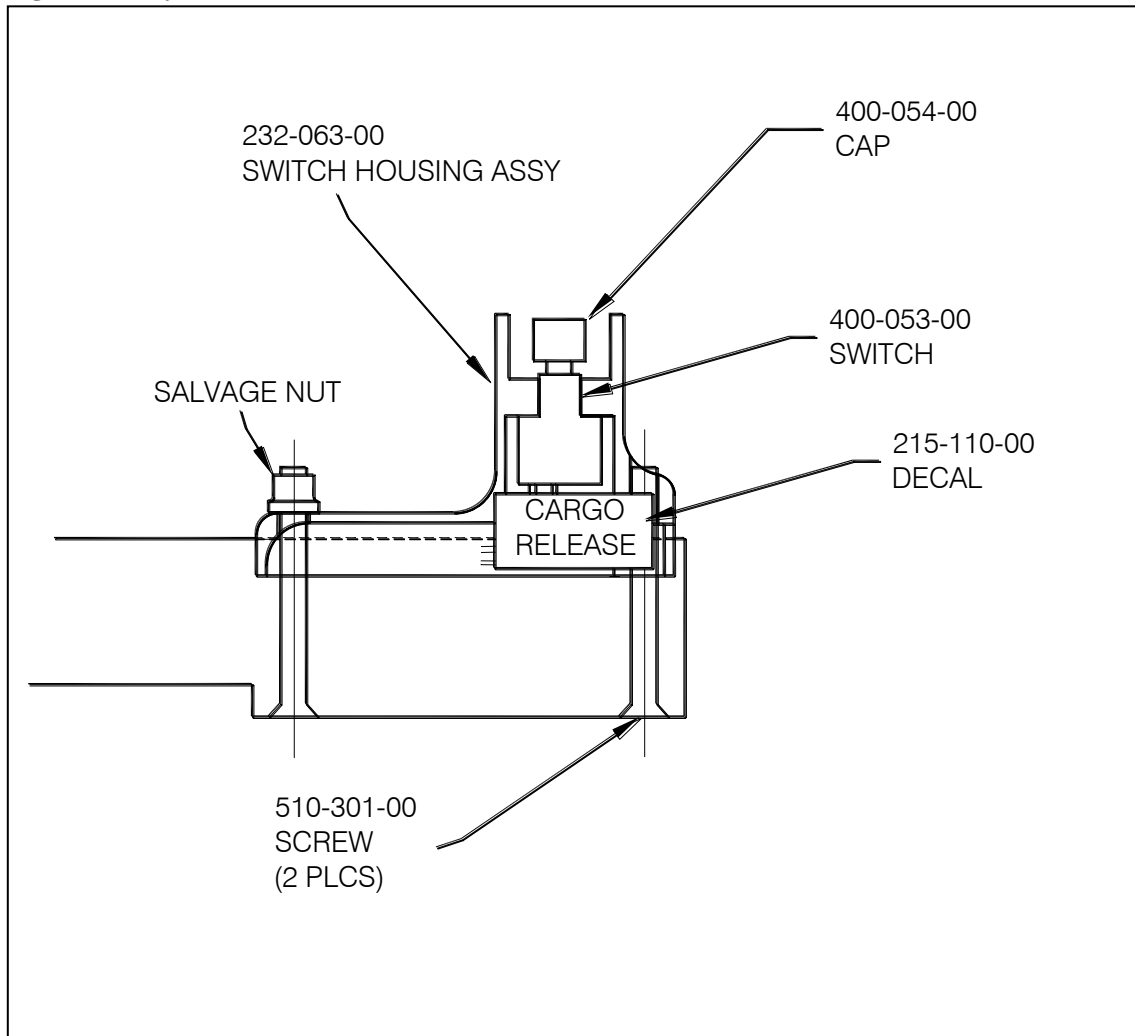
Figure 2-5 Cyclic Switch Wire Routing



6. Install the 400-053-00 switch in the 232-063-00 cyclic switch housing assembly using needle nose pliers to hold the switch. Install the completed switch housing assembly with the correct hardware as shown in Figure 2-6. Remove the existing switch housing screws and replace them with the longer 510-301-00 screws and salvage one of the removed nuts as shown in Figure 2-6.
7. Re-install the com switch housing and wires.
8. Check the cyclic for freedom of motion throughout its complete travel range and ensure the wires are not chafing on any components.

Release Switches, continued

Figure 2-6 Cyclic Release Switch Installation



Optional Left Seat Release Switch Installation

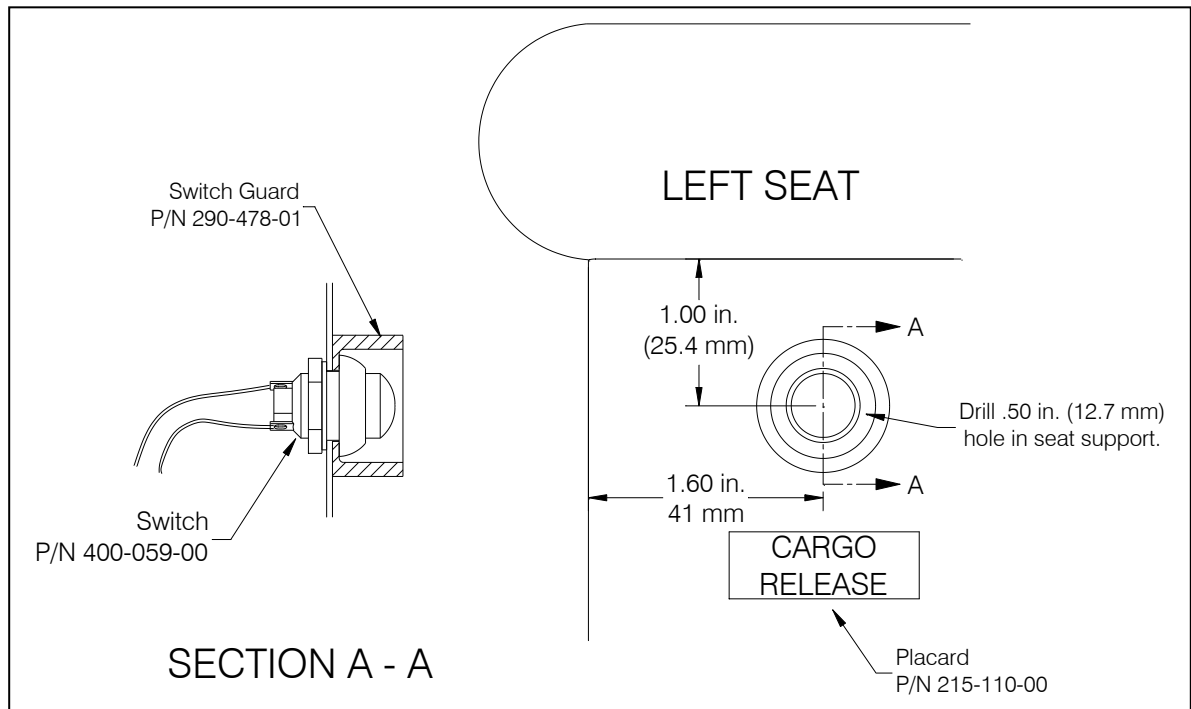
If the left seat release switch installation is not desired, cap and stow wires 2B and 4B per AC 43.13 and skip this section.

1. Drill a .250 inch hole in the left side of the tunnel wall above the main wire bundle in a convenient location or use an existing unused hole in the tunnel wall. Install Grommet (P/N 505-011-00).

Release Switches, continued

2. Drill a .50 inch hole in the outboard side of the left seat support as shown in Figure 2-7.
3. Route the number 2B and 4B wires through the grommets hole and through the left baggage area to the .50 inch hole on the outboard seat support. Secure the wires to the forward seat hinge fasteners with two clamps (P/N 512-018-00).
4. Slide the nut (provided with the switch P/N 400-059-00) over the wires from inside the seat support and feed the wires through the .50 inch hole and through the switch guard (P/N 290-478-01).
5. Place a .50 inch length of heat shrink over each wire to the switch. Solder the wires to the switch as shown in the Figure 2-2 wiring schematic. Use a heat gun and shrink the covering material to final size. Place the switch (P/N 400-059-00) into the switch guard and through the seat as shown in Figure 2-7 and secure with nut.

Figure 2-7 Optional Left Seat Release Switch Installation



Release Switches, continued

Grip Assembly Switch Installation

(for use with Robinson Grip Assembly C058)

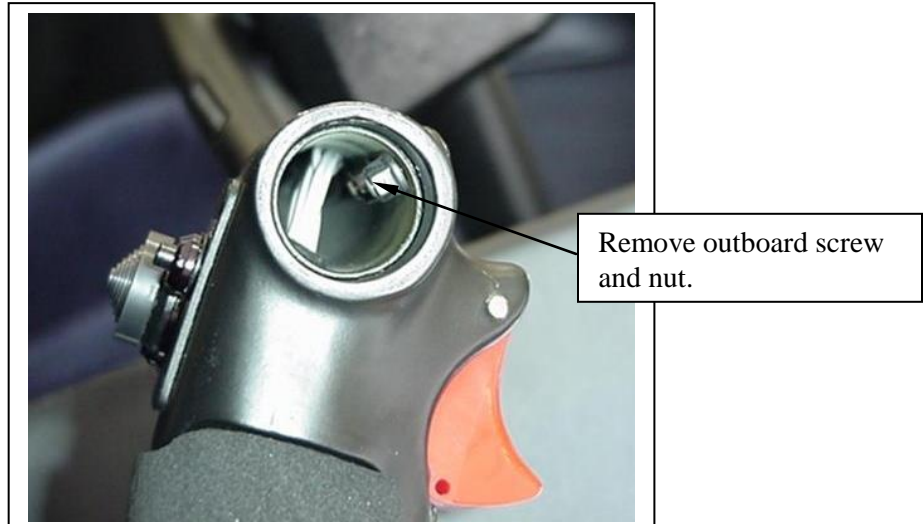
1. Remove Plug (Robinson P/N DP-875) and discard as shown in Figure 2-8.

Figure 2-8 Grip Assembly C058, Plug Removal



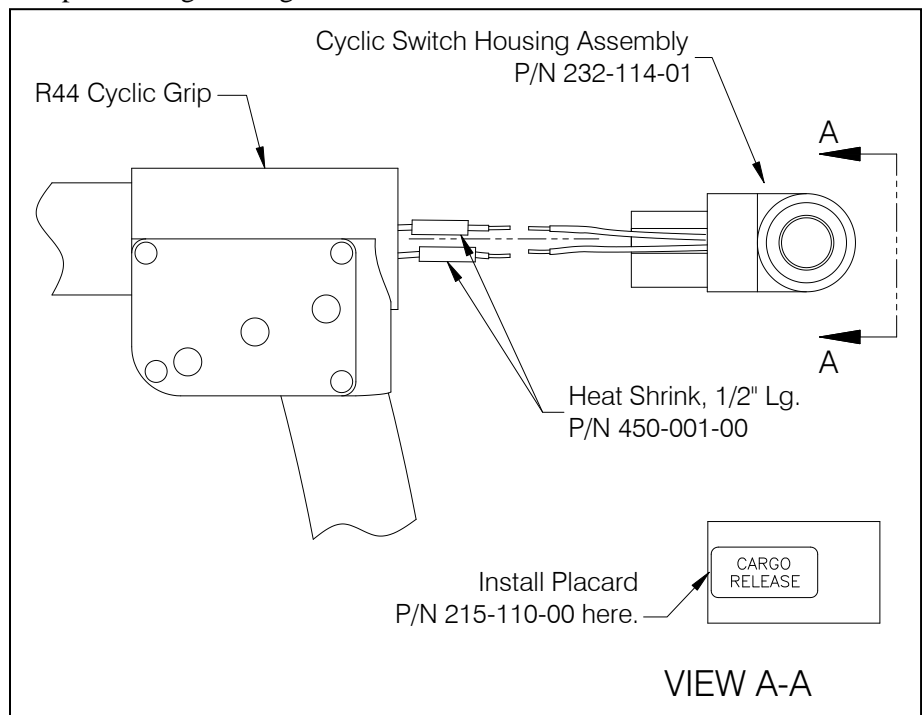
2. Remove outboard screw (MS27039C0806) and nut (MS21042L08) as shown in Figure 2-9.

Figure 2-9 Grip Assembly C058, Screw and Nut Removal



Release Switches, continued

3. Using a lead wire, pull the number 2A and 4A wires from wire harness P/N 270-090-00 up through the horizontal tube and out the end of the grip assembly.
4. Slide a piece of heat shrink (P/N 450-001-00) over the 2A and 4A wires (ref. Figure 2.3.3).
5. Prep and solder, using a lap splice, the 2A wire from up through the cyclic to one of the wires from the switch and the 4A wire from the cyclic to the other wire from the switch.
6. Slide the heat shrink over the respective solder joints and shrink in place using a heat gun.



7. Install the Switch Housing Assembly into the end of the grip assembly and secure with the Screw (P/N MS27039C0806) removed earlier. The Nut (P/N MS21042L08) removed earlier will not be re-used for this installation and can be discarded.
8. Check the cyclic for freedom of motion throughout its complete travel range and ensure the wires are not chafing on any components.

Mechanical Release Cable Installation

NOTICE

Due to possible minor configuration changes incorporated by Robinson Helicopters, install the mechanical release cable per Figure 2-11 or as near as possible. Ensure adequate clearance between the release cable and push/pull control rods and electrical components in the tunnel.

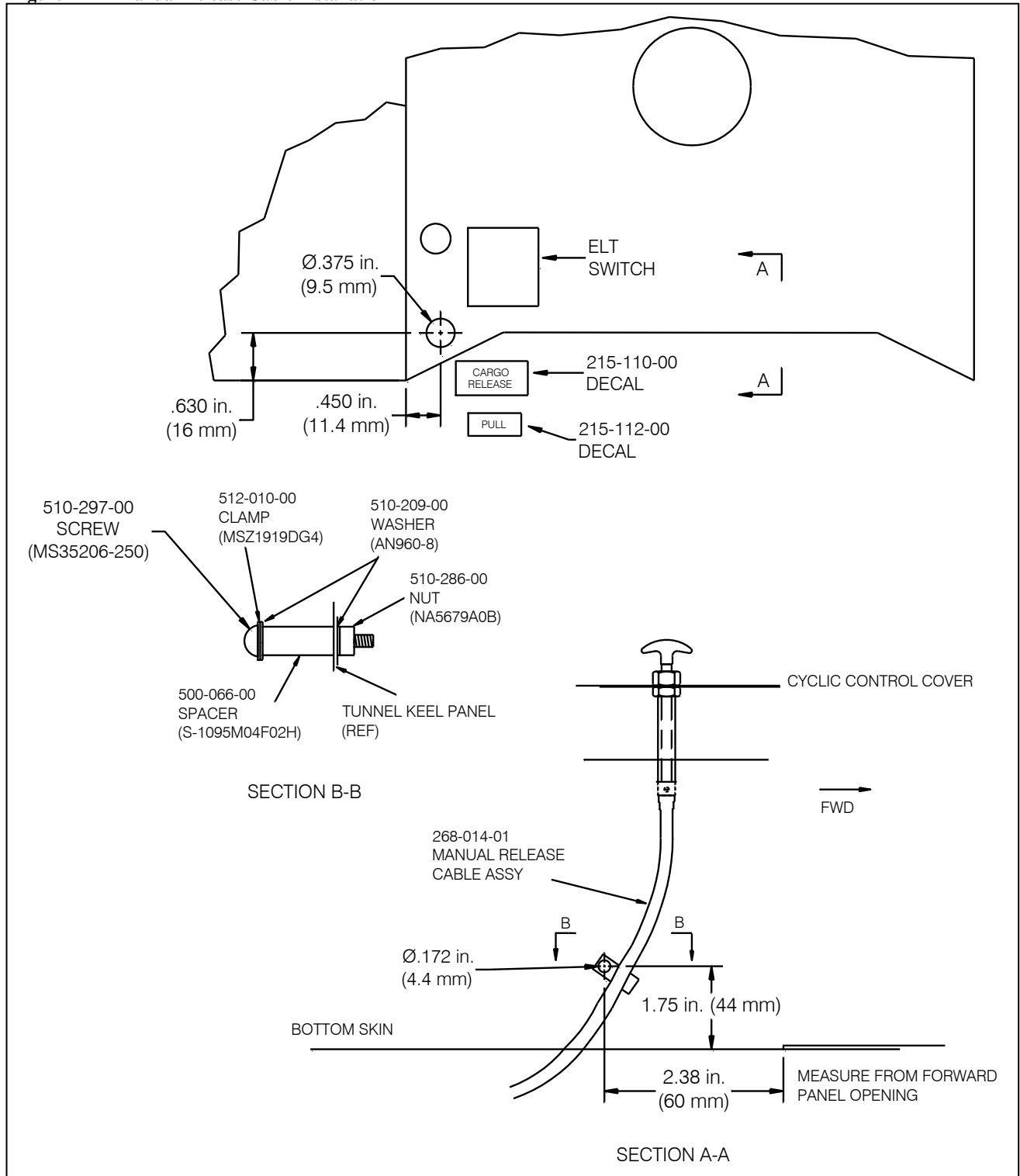
1. Drill a .375 inch (9.5 mm) diameter hole through the left aft corner of the cyclic control cover and box assembly as shown in Figure 2-11. Locate and drill the hole for the cable clamp in the tunnel keel panel as shown in Figure 2-11.
2. Place the 268-014-01 mechanical release cable assembly inside the tunnel and route the output end of the cable out the bottom of the helicopter. Install the cable clamp as shown in Figure 2-11. Insert the head end of the cable into the cover plate and install the face nut and tee handle as shown in Figure 2-11.
3. Make a cutout in the forward belly panel as shown in Figure 2-12 and install the 500-065-00 edge grommet.
4. Route the mechanical release cable as shown in Figure 2-12 and secure.

Electrical Release Wire Routing to the Hook

Route the #3 and #4 electrical release wires out the same hole in the forward panel as the mechanical release cable as shown in Figure 2-12. Secure the two release wires to the mechanical release cable with wire ties as necessary and route as shown in Figure 2-12.

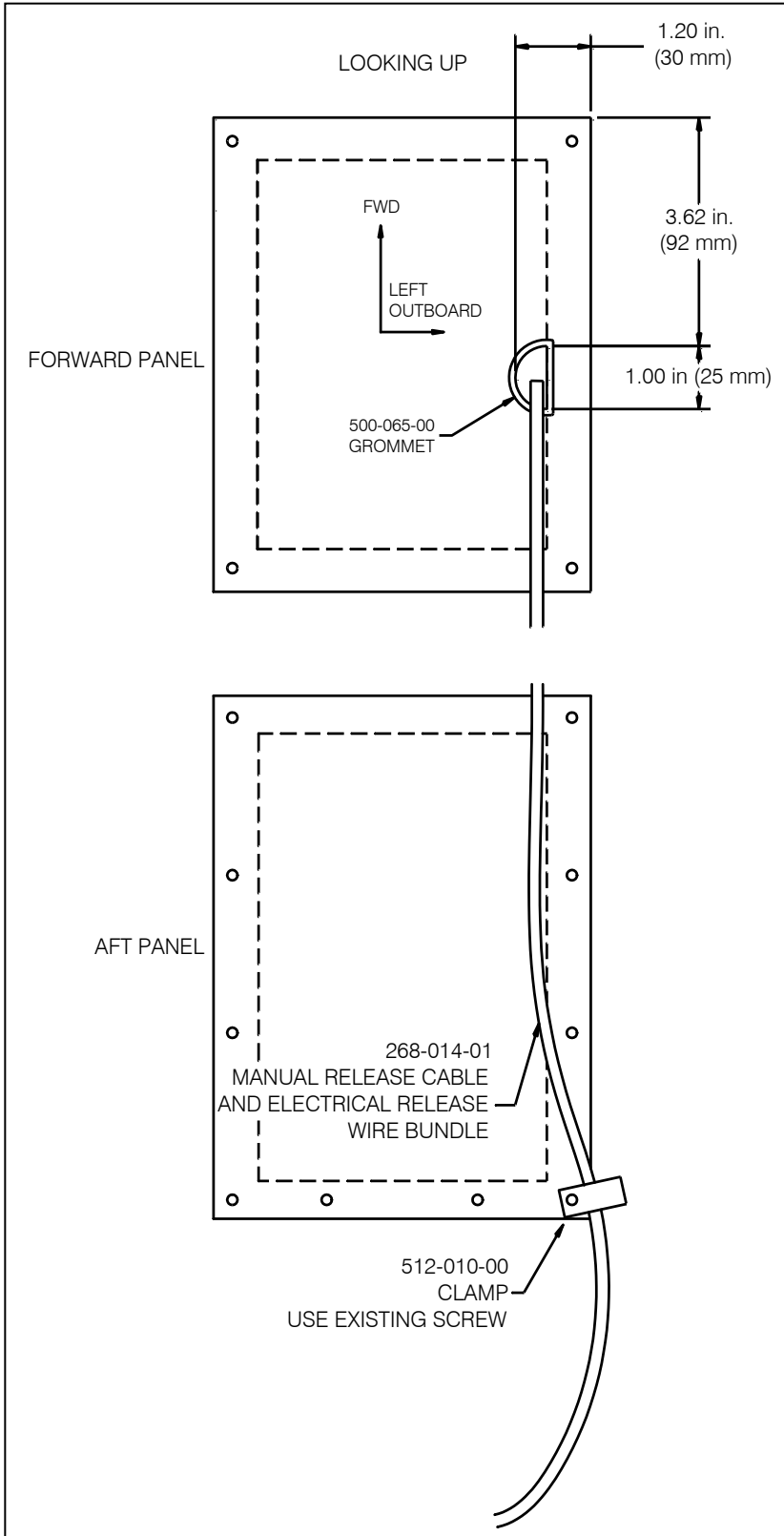
Electrical Release Wire Routing to the Hook, continued

Figure 2-11 Manual Release Cable Installation



Electrical Release Wire Routing to the Hook, continued

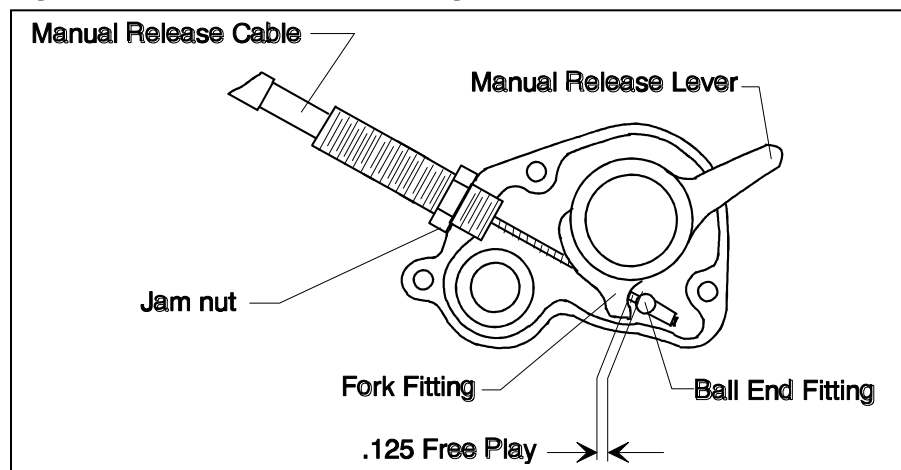
Figure 2-12 Manual Release Cable Routing



Mechanical Release Adjustment

1. Remove the manual release cover from the 528-010-06 Cargo Hook.
2. Screw the manual release cable into the hook by holding the cable and turning the hook assembly.
3. Place the cable ball end fitting into the hook manual release fork fitting as illustrated in Figure 2-13. Adjust the release cable to give .125" (3.2 mm) of free play with the manual release lever in the non-release position.
4. Replace the manual release cover. Tighten the jam nut against the hook and safety wire the jam nut to the nearest cover screw. Safety-wire the remaining cover screws.

Figure 2-13 Manual Release Cable Rig



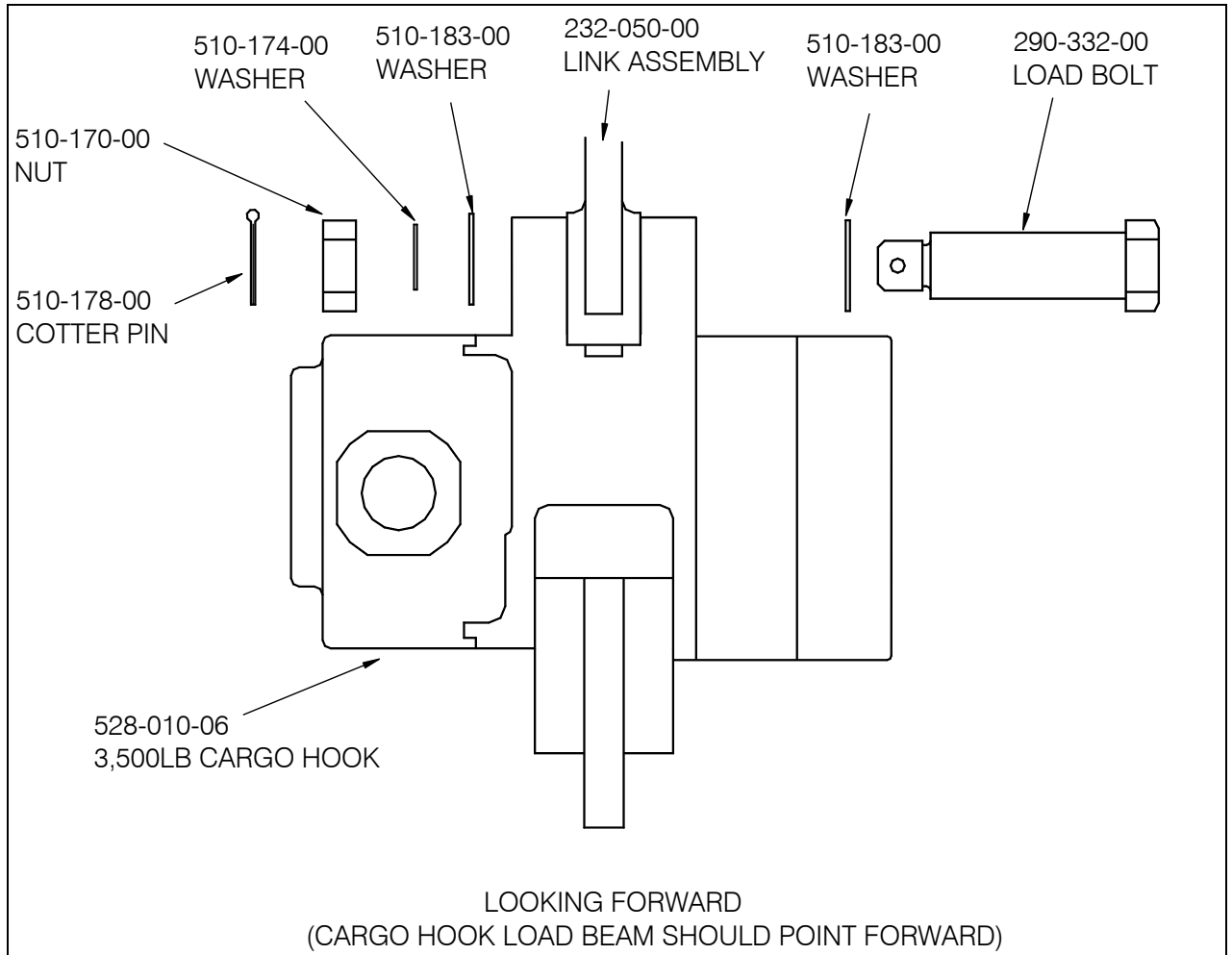
Cargo Hook Installation

Attach the 528-010-06 Cargo Hook as shown in Figure 2-14.

NOTICE

Tip of cargo hook load beam must point forward.

Figure 2-14 Cargo Hook Installation



Torque nut P/N 510-170-00 on bolt P/N 290-332-00 to finger tight then rotate nut to previous castellation if necessary to insert cotter pin. Install and secure cotter pin P/N 510-178-00.

Wiring Connector

Connect the cargo hook electrical release cable connector to the Cargo Hook. Listed below is the pin out for the cargo hook connector. Safety-wire the connector.

Table 2-1 Cargo Hook Connector

<i>Pin</i>	<i>Function</i>
A	Ground
B	Power

CAUTION

The Cargo Hook is equipped with a suppression diode that will be damaged if the Cargo Hook electrical connections are reversed. Do not attach the electrical connector until the polarity of the aircraft connector is determined to be compatible with the Cargo Hook connector listed in Table 2-1.

Decals and Placards

Install the following decals:

Table 2-2 Decals

DECAL NUMBER (DECAL DESCRIPTION)	LOCATION
215-110-00 (CARGO RELEASE)	Mounted adjacent to the cyclic release switch in clear view of the pilot. (See Figure 2-6)
215-110-00 (CARGO RELEASE)	Mounted adjacent to the left seat release switch in clear view of the pilot. (See Figure 2-7)
215-110-00 (CARGO RELEASE)	Mounted adjacent to the mechanical release in clear view of the pilot. (See Figure 2-11)
215-111-00 (PULL)	Mounted adjacent to the mechanical release in clear view of the pilot. (See Figure 2-11)
215-112-00 (CARGO)	Mounted adjacent to the cargo hook circuit breaker in clear view of the pilot
215-114-00* (WITH EXTERNAL LOADS, APPROVED FOR CLASS B ROTORCRAFT – LOAD OPERATIONS DAY-VFR ONLY)	Mounted on the instrument panel in clear view of the pilot.
215-115-00 (FAR PART 133.35(A) OPERATIONS)	Mounted on the instrument panel in clear view of the pilot.
215-119-00 (EXT. LOAD LIMIT = 800 LBS (363 KGS))	Mounted on the belly of the aircraft adjacent to the cargo hook attachment point in clear view of the ground support personnel.

*Not included with new decal sheets, rotorcraft load combination classes are now approved under operational rules (14 CFR part 133 for US operators).

Installation Check-Out

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

1. Swing the installed Cargo Hook to ensure that the manual release cable assembly and the electrical release cable have enough slack to allow full swing of the suspension assembly without straining or damaging the cables. The cables must not be the stops that prevent the Cargo Hook from swinging freely in all directions.
2. Apply 10-20 pounds (44.5 – 89 N) to the cargo hook load beam and pull the handle operated cargo hook mechanical release, the Cargo Hook must release.
3. Reconnect the battery and close the cargo hook release circuit breaker. Apply 10-20 pounds to the cargo hook load beam and depress the cargo hook electrical release button, the Cargo Hook must release using the cyclic and left seat electrical release switches.

Weight

The weight of the system is listed in Table 2-3.

Table 2-3 Component Weights

Item	Weight lbs (kgs)
P/N 200-227-00	4.8 (2.2)

Paper Work

Remove the Flight Manual Supplement from the back of this manual and place it into Rotorcraft Flight Manual. In the US, fill in FAA form 337 for the initial installation. This procedure may vary in different countries. Make the appropriate aircraft log book entry.

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Section 3

Operation Instructions



Specific maintenance restrictions apply to the Cargo Suspension System when used to transport fertilizer spreaders or loads with similar rotating tendency. See the maintenance section for specific time-between-overhaul requirements.

Operating Procedures

Prior to a flight involving external load operations perform the following:

1. Ensure that the Cargo Hook has been properly installed and that the manual and electrical release cables do not limit the movement of the hook.
2. Be completely familiar with this manual, particularly the Cargo Hook rigging section.
3. Be completely familiar with all Cargo Hook operating instructions.
4. Activate the electrical system and press the cargo hook release button to ensure the cargo hook electrical release is operating correctly. The Cargo Hook should relatch after release. If the hook does not relatch do not use the unit until the difficulty is resolved.



The release solenoid is intended to be energized only intermittently. Depressing the electrical release button continuously in excess of 20 seconds may cause the release solenoid to overheat, possibly causing permanent damage

5. Activate the manual release lever to test the cargo hook manual release mechanism. The mechanism should operate smoothly and the Cargo Hook must relatch after release. If the hook does not relatch do not use the unit until the difficulty is resolved.

Optional Flight Configuration

The aircraft can be operated with the Cargo Hook and gimbal assembly removed. This may be accomplished by removing the Cargo Hook from the 232-050-00 Link Assembly. Then remove the 232-049-01 Gimbal Assembly and 290-492-01 Pillow Block together by removing the two 290-505-00 Pillow Block mounting fasteners (See Figure 2-1). Secure the manual release cable and electrical wire bundle to any convenient location on the frame structure using tie wraps.

Cargo Hook Rigging

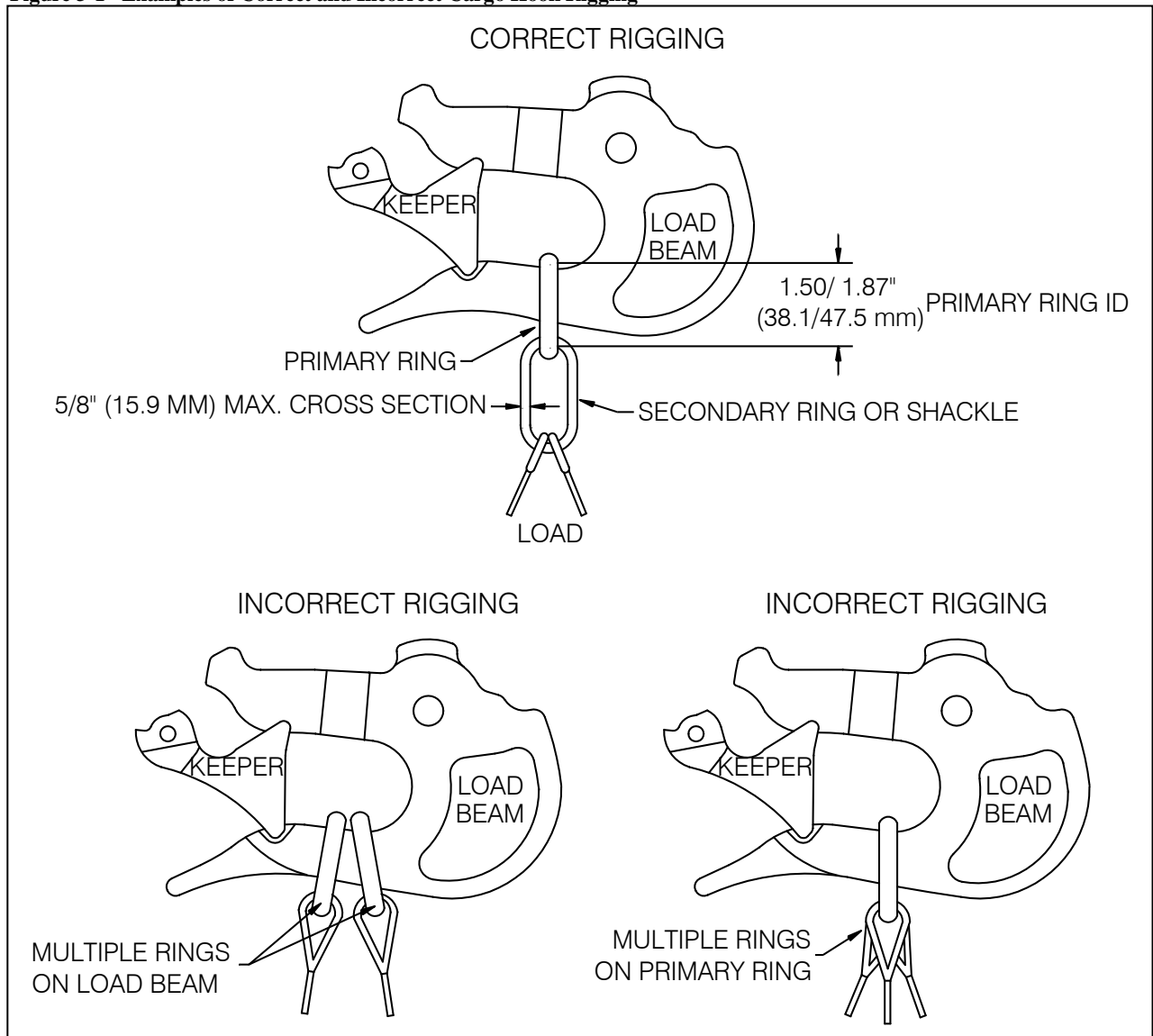
Extreme care must be exercised in rigging a load to the Cargo Hook. If the load ring is too big it may work its way around the end of the load beam and be supported for a time on the keeper and then fall free. If the load ring is too small it may jam itself against the load beam during an attempted release. The following illustrations show recommended configurations and potential difficulties that must be avoided.



The examples shown are not intended to represent all problem possibilities. It is the responsibility of the operator to assure the hook will function properly with the rigging.

Cargo Hook Rigging, continued

Figure 3-1 Examples of Correct and Incorrect Cargo Hook Rigging

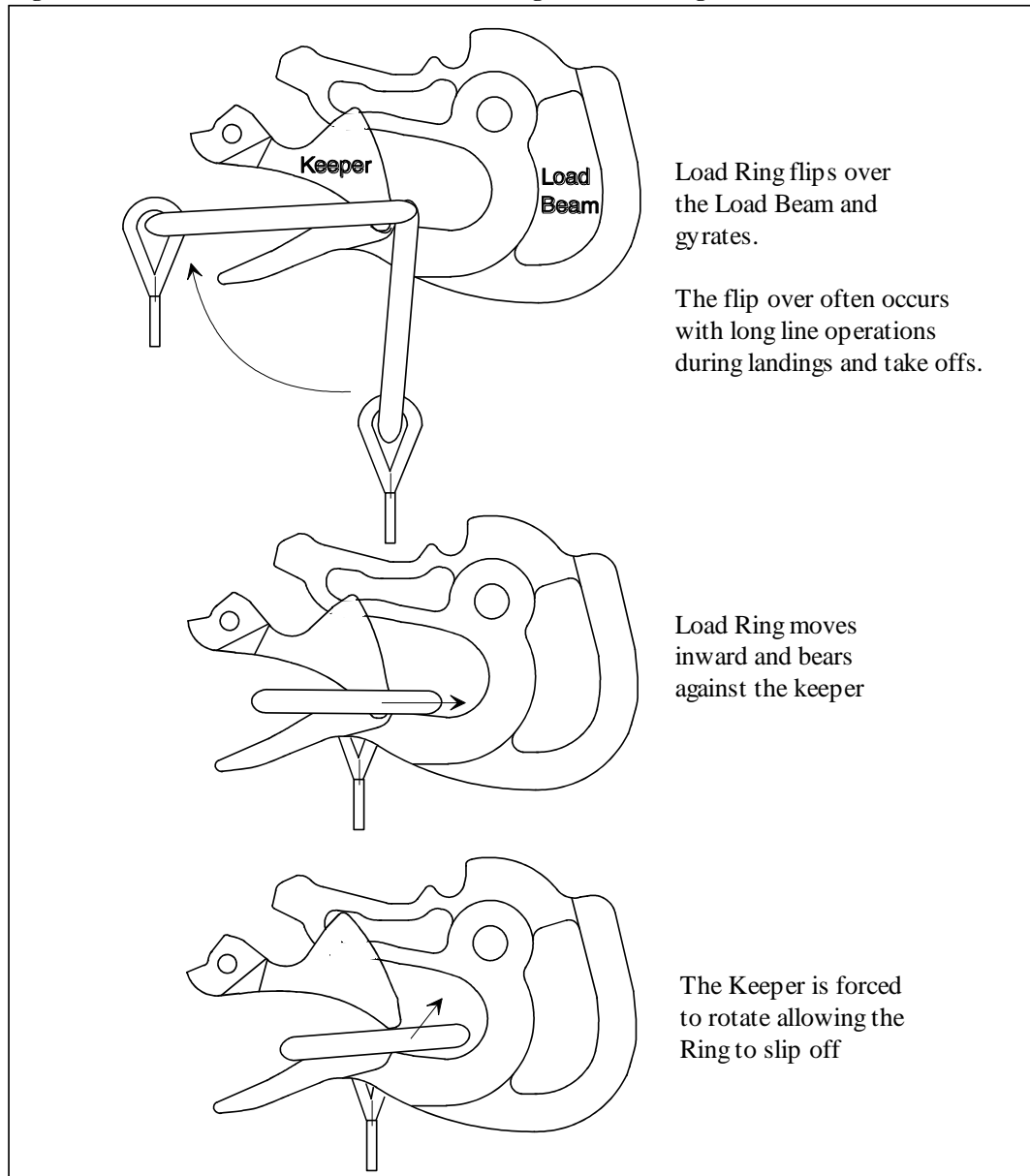


Un-Commanded Release Due to Too Large of a Load Ring



Load rings that are too large will cause an un-commanded release. The ring will flip over the end of the load beam and flip the keeper up and then fall free. Only correctly sized load rings must be used. See examples below.

Figure 3-2 Un-Commanded Release Due to Too Large of a Load Ring

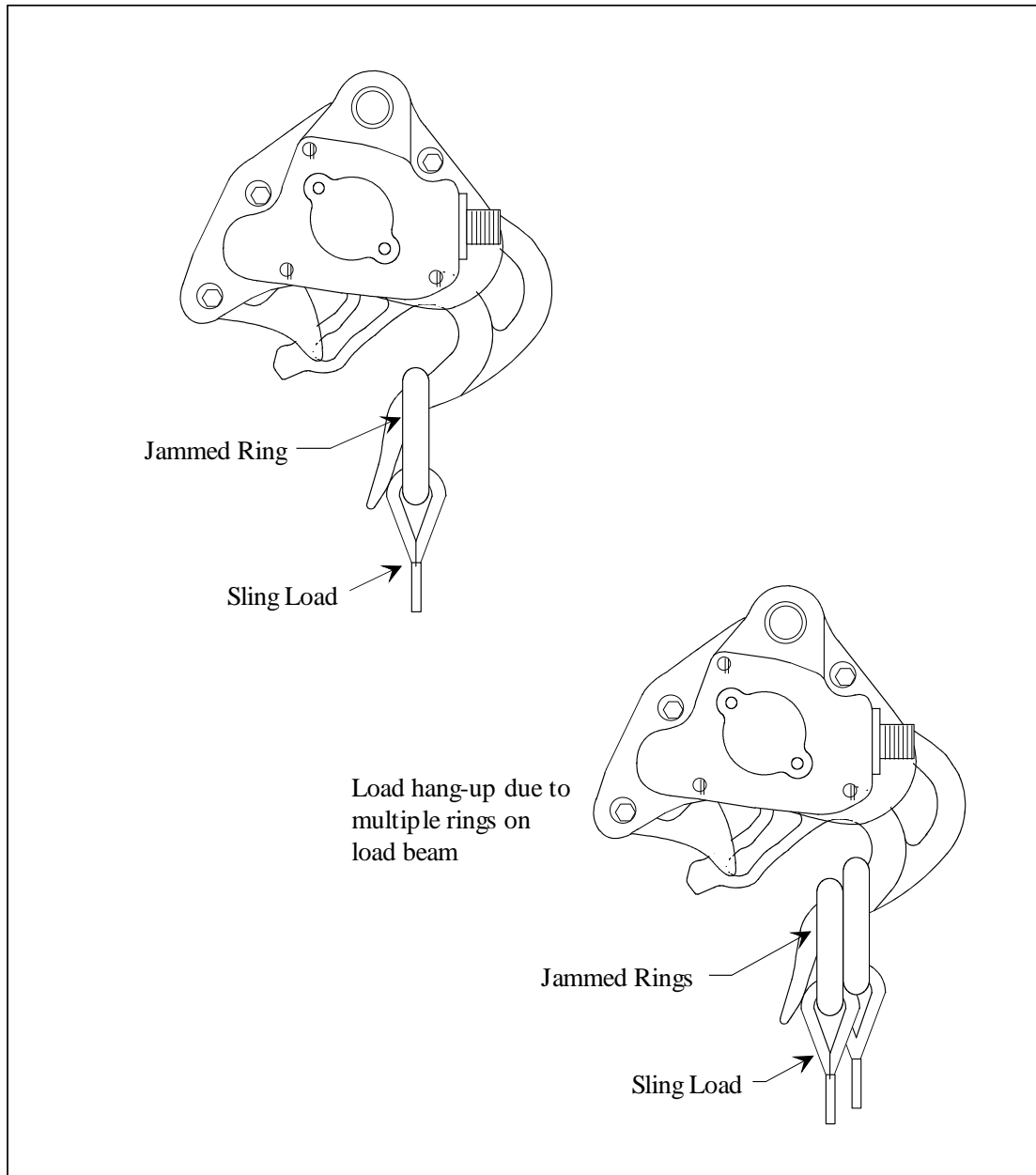


Load Hang-Up Due to Too Small of a Load Ring or Multiple Load Rings



Load rings that are too small or multiple load rings will hang on the load beam when the load is released. Only correctly sized load rings must be used. See examples below.

Figure 3-3 Load Hang-Up Due to Too Small of a Load Ring or Multiple Load Rings

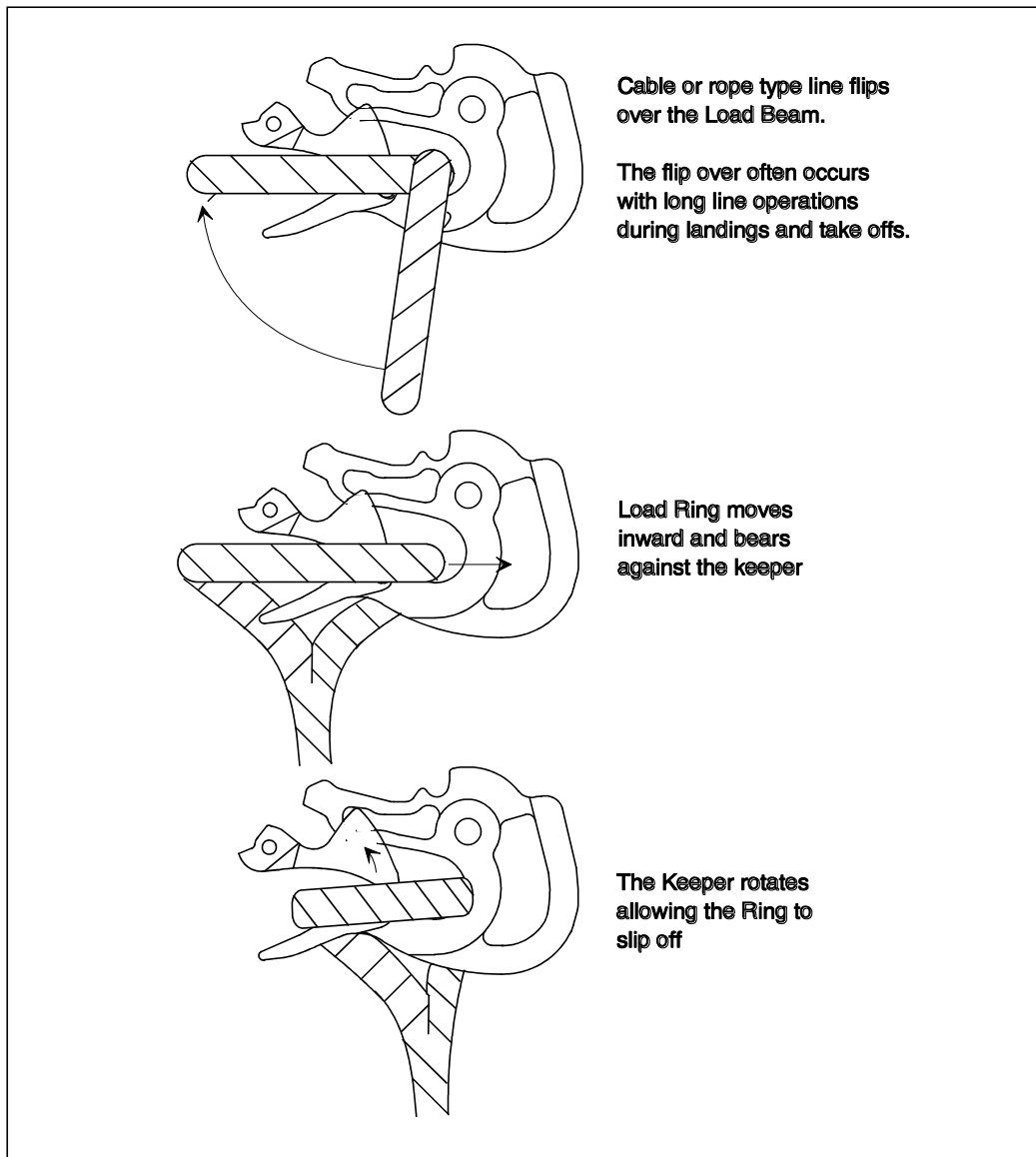


Un-Commanded Release Due to Nylon Type Straps



Nylon type straps (or similar material) must not be used directly on the cargo hook load beam as they have a tendency to creep under the keeper and fall free. If nylon straps must be used they should be first attached to a correctly sized primary ring. Only the primary ring should be in contact with the cargo hook load beam. See examples below.

Figure 3-4 Un-Commanded Release Due to Nylon Type Straps

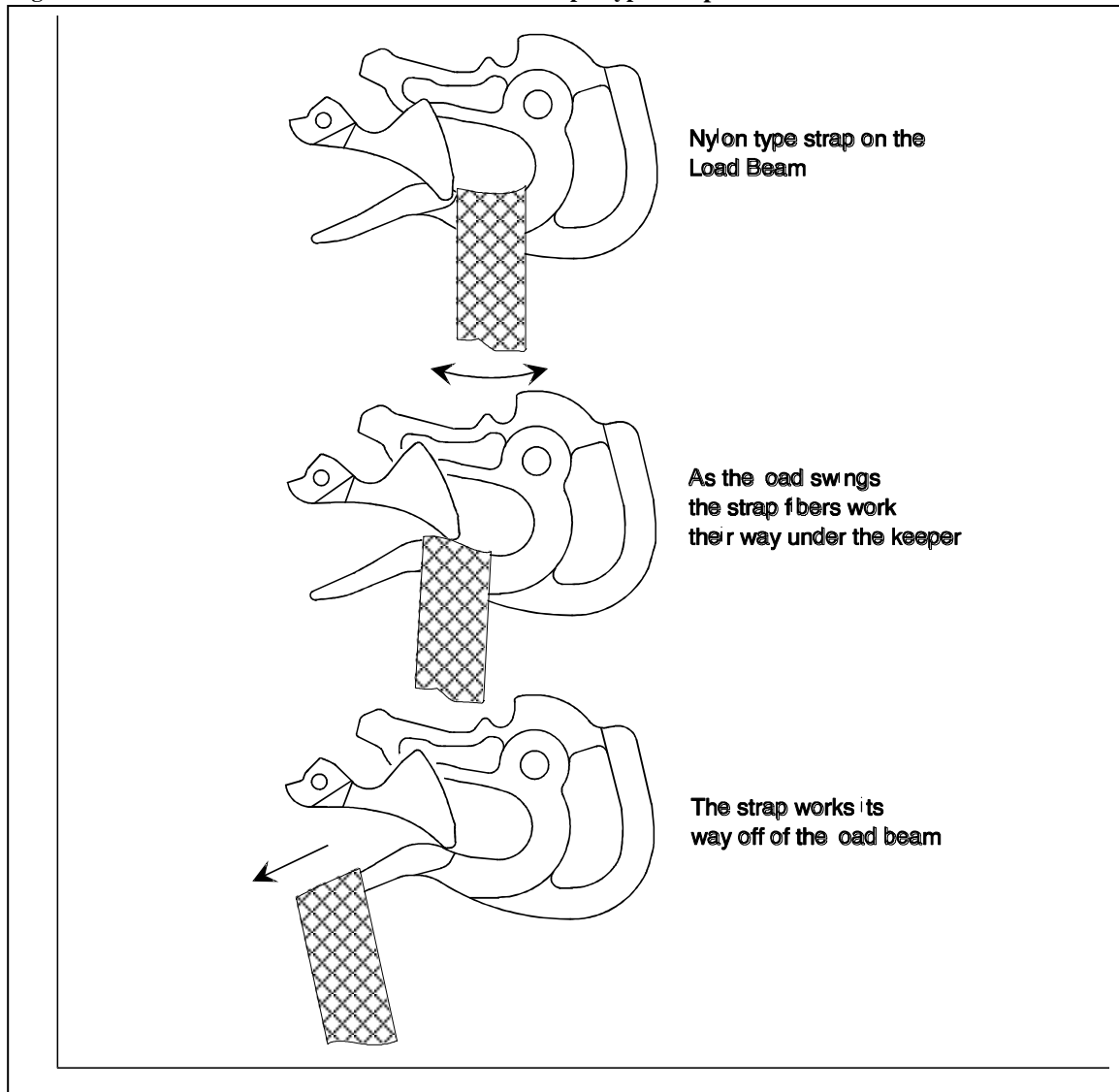


Un-Commanded Release Due to Cable or Rope Type Straps



Cable or rope type straps must not be used directly on the cargo hook load beam. Their braided eyes will work around the end of the load beam and fall free. If cable or rope is used they should be first attached to a correctly sized primary ring. Only the primary ring should be in contact with the cargo hook load beam. See examples below.

Figure 3-5 Un-Commanded Release Due to Cable or Rope Type Straps



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Section 4

Maintenance



Specific maintenance restrictions apply to the Cargo Suspension System when used to transport fertilizer spreaders or loads with similar rotating tendency. See this section for specific time-between-overhaul requirements.



Failure to perform a complete daily check of the system, especially when used to transport fertilizer spreaders, may result in sudden failure of the Cargo Suspension System.

Refer to Component Maintenance Manual 122-001-00 for detailed maintenance information for the Cargo Hook.

Inspection

The inspection of the Cargo Hook Kit 200-227-00 shall be in accordance with the table below.

Table 4-1 Inspection

Seq.	Part Number	Daily Check	At Overhaul Interval**
1	200-227-00 System	<ol style="list-style-type: none"> 1. Check all items for cracks, wear and corrosion. If worn excessively or cracked, replace parts. Remove corrosion and treat with zinc chromate primer. 2. Visually check all mounting fasteners to ensure that they are tight. 3. Visually check the electrical cables for damage and security. 4. Visually check the manual release cable for damage and security. 5. Move the Cargo Hook back and forth to ensure that it moves freely. 6. Cycle the electrical and manual release mechanisms to ensure proper Cargo Hook operation. 	<p>Tear-down and inspect the suspension components to the requirements outlined in the overhaul procedures of this manual.</p> <p>Overhaul at the same interval as the Cargo Hook. Refer to Component Maintenance Manual 122-001-00 for cargo hook overhaul interval.</p>
2	270-089-00 270-090-00 Wire Harness	<ol style="list-style-type: none"> 1. Check for security of attachment, damaged wires and connectors. Replace if damaged. 	<p>Most system problems will be the result of damaged wires. Keep the cables clean and ensure that they are not chafing. Replace them if the insulation or shield is damaged.</p>
3	All fasteners	<ol style="list-style-type: none"> 1. Inspect for cracks, excessive wear and security of attachment. If worn excessively or cracked, replace part. 	<p>Recommend replacement at cargo hook overhaul.</p>



*** The overhaul interval shall be no more than 100 hours of operations if the Cargo Suspension System has been used with fertilizer spreaders or loads with similar rotating tendency.*

Suspension System Overhaul

At cargo hook overhaul remove the suspension system from the helicopter, and disassemble per the following instructions and inspect. Refer to Figure 5-1 for part identification.

1. Remove cotter pin (item 5).
2. Remove Link Assembly (items 9, 10, and 11) from the Gimbal Assembly by removing hardware (items 3, 4, and 7).
3. Remove the Gimbal Assembly (items 6 and 8) from the Pillow Block (item 1) by removing Roller Pin (item 2).
4. Press out bushings (items 6, 9, and 10).

Figure 4-1 Suspension System Parts

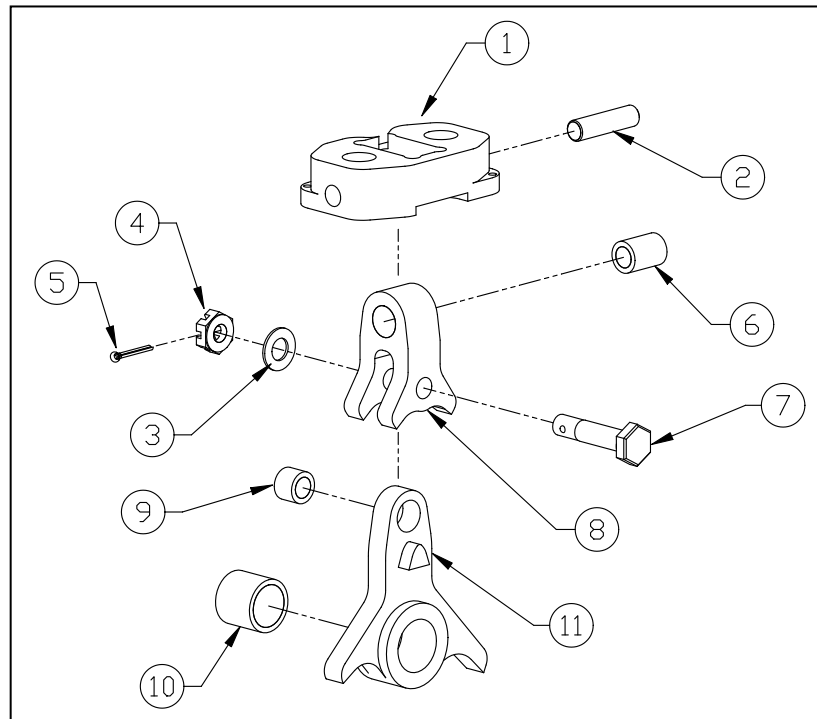


Table 4-2 Suspension System Parts

ITEM	PART NO.	DESCRIPTION	QTY
1	290-492-01	Pillow Block	1
2	290-440-00	Roller Pin	1
3	510-100-00	Washer, AN960-416L	1
4	510-273-00	Nut, BACN10JD104	1
5	510-115-00	Cotter Pin, MS24665-136	1
6	290-462-00	Bushing	1
7	510-528-00	Bolt, NAS6204-12D	1
8	290-455-01	Gimbal	1
9	290-463-00	Bushing	1
10	290-364-00	Bushing	1
11	290-460-00	Load Link	1

Suspension System Overhaul continued

Carefully inspect and repair the suspension system detail parts in accordance with the instructions in Table 4-3. Inspect the parts in a clean, well-lit room.

Perform magnetic particle inspection in accordance with ASTM-E1444 and MIL-STD-1907, Grade A on the parts listed below. No cracks are permitted in any of these parts.

1. Gimbal (item 8)
2. Load Link or Load Cell Link (item 11) depending on kit installed.
3. Pillow Block (item 1)
4. Roller Pin (item 2)

Table 4-3 Suspension System Inspection

Component	Damage	Remedy	Finish
Pillow Block P/N 290-492-01	Dents, nicks, cracks, gouges, corrosion or scratches	Repair dents, gouges, nicks, scratches and corrosion if less than .030" deep, blend out at a ratio of 20:1, length to depth, replace if otherwise damaged.	This part is 15-5PH, passivated. No touch up finish required.
Gimbal P/N 290-455-01	Dents, nicks, cracks, gouges, corrosion or scratches	Repair dents, gouges, nicks, scratches and corrosion if less than .030" deep, blend out at a ratio of 20:1, length to depth, replace if otherwise damaged.	This part is 15-5PH, passivated. No touch up finish required.
Gimbal bushing P/N 290-462-01	Wear on inside diameter.	Maximum permissible bushing ID is .260 inches. Remove and replace if it exceeds .260.	
Load Link P/N 290-460-00	Dents, nicks, cracks, gouges, corrosion or scratches	Repair dents, gouges, nicks, scratches and corrosion if less than .030" deep, blend out at a ratio of 20:1, length to depth, replace if otherwise damaged.	This part is 15-5PH, passivated. No touch up finish required.
Load Link bushing P/N 290-463-00	Wear on inside diameter.	Maximum permissible bushing ID is .260 inches. Remove and replace if it exceeds .260.	
Load Link bushing P/N 290-364-00.	Wear on inside diameter.	Maximum permissible bushing ID is .520 inches. Remove and replace if it exceeds .520.	
Threaded fasteners	Wear, corrosion or deterioration	It is recommended to replace all threaded fasteners.	

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

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Section 5

Certification

FAA STC

United States of America
 Department of Transportation—Federal Aviation Administration
Supplemental Type Certificate
Number SR00578SE

This certificate, issued to **Onboard Systems
 13915 NW 3rd Court
 Vancouver, WA 98685**

certifies that the change in the type design for the following product with the limitations and conditions therefor as specified hereon meets the airworthiness requirements of Part 27 of the Federal Aviation Regulations.


Original Product—Type Certificate Number: H11NM
Make: Robinson
Model: R44, R44 II

Description of the Type Design Change: Fabrication of Onboard Systems Cargo Hook Kits Model 200-227-00 (without load weigh), Model 200-228-00 (with load weigh), Model 200-313-00 (28V, without load weigh), Model 200-314-00 (28V, with load weigh) in accordance with FAA approved Onboard Systems Master Drawing List No. 155-043-00, revision 12, dated February 16, 2007, or later FAA approved revision. Installation of the Onboard Systems Cargo Hook Kits Model 200-227-00 or 200-228-00 in accordance with FAA approved Onboard Systems Owner's Manual No. 120-077-00, dated February 15, 2007, or later FAA approved revision. (continued on page 3)

Limitations and Conditions: Approval of this change in type design applies only to those Robinson rotorcraft models listed above which are equipped with Robinson hard point/tie down block P/N D134-1. This approval should not be extended to rotorcraft of these models on which other previously approved modifications are incorporated unless it is determined by the installer that the relationship between this change and any of those other previously approved modifications, including changes in type design, will introduce no adverse effect upon the airworthiness of that rotorcraft. Modified Robinson R44 rotorcraft must be operated in accordance with a copy of the FAA approved Onboard Rotorcraft Flight Manual Supplement (RFMS) No. 120-077-00, dated November 16, 2005, or later FAA approved revision. Modified Robinson R44 II rotorcraft must be operated in accordance with a copy of the FAA approved Onboard Rotorcraft Flight Manual Supplement (RFMS) No. 121-041-00, dated October 5, 2007, or later FAA approved revision. (continued on page 3)

This certificate and the supporting data which is the basis for approval shall remain in effect until surrendered, suspended, revoked, or a termination date is otherwise established by the Administrator of the Federal Aviation Administration.

Date of application: August 31, 1998 *Date reissued:*
Date of issuance: September 28, 1998 *Date amended:* 3/13/2002; 1/13/2003; 10/12/2007

 *By direction of the Administrator*

 Acting Manager, Seattle Aircraft
 Certification Office

 (Title)

Any alteration of this certificate is punishable by a fine of not exceeding \$1,000, or imprisonment not exceeding 3 years, or both.
FAA FORM 8110-2 (10-68) This certificate may be transferred in accordance with FAR 21.47.

FAA STC continued

United States of America
Department of Transportation—Federal Aviation Administration
Supplemental Type Certificate
(Continuation Sheet)

Number SR00578SE

Onboard Systems

Reissued:

Amended: 3/13/2002; 1/13/2003; 10/12/2007

Description of the Type Design Change: (continued) This modification must be inspected and maintained in accordance with Section 5 of Onboard Systems Owner's Manual No. 120-077-00, revision 10, dated January 15, 2007, or later FAA approved revision and Cargo Hook Service Manual No. 122-013-00, revision 2, dated November 16, 2006, or later FAA approved revision.

Installation of the Onboard Systems Cargo Hook Kits Model 200-313-00 or 200-314-00 in accordance with FAA approved Onboard Systems Owner's Manual No. 120-128-00, revision 0, dated January 22, 2007, or later FAA approved revision. This modification must be inspected and maintained in accordance with Section 5 of Onboard Systems Owner's Manual No. 120-128-00, revision 0, dated January 22, 2007, or later FAA approved revision and Cargo Hook Service Manual No. 122-001-00, revision 5 dated August 8, 2007, or later FAA approved revision.

Limitations and Conditions: (continued) A copy of this Certificate, Owner's Manual, Service Manual, and FAA approved RFMS must be maintained as part of the permanent records of the modified rotorcraft.

If the holder agrees to permit another person to use this certificate to alter the product, the holder shall give the other person written evidence of that permission.

-- END --

Canadian STC

Canadian Approval was granted on March 4, 1999 by familiarization of FAA STC SR00578SE. Refer to the following letter.



Transport
Canada

Aviation

Transports
Canada

Aviation

Aircraft Certification Branch
620 - 800 Burrard Street
Vancouver, BC V6Z 2J8

Your file Votre référence
98-190S -700, -818
Our file Notre référence

March 4, 1999

Onboard Systems
11212 NW Saint Helens Road
Portland, OR 97231
USA

Attention: Mr. Mark Lemmon

Subject: **Familiarization of STCs SR00578SE, SH4908NM and SH1635NM**

Dear Mr. Lemmon:

This is in response to your letters dated 1 October, 1998 making application for Canadian approval of the subject STCs. Hitherto Transport Canada policy has been a process of familiarizing FAA STCs and issuing corresponding Canadian documents. However following new policy now being implemented for certain categories of FAA STCs, some will be accepted entirely on the basis of the FAA document and entered on a national index.

This letter is your verification of the acceptance of the subject STCs by Transport Canada. Should you require additional information with regards to this matter or clarification please do not hesitate to contact Mr. Paul Swan at (613) 952-4439.

Yours truly,

H. W. Wong
Regional Engineer

for
Regional Manager
Aircraft Certification

c.c. Mr. Donald L. Riggan
Manager, Seattle ACO

Canada

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FAA APPROVED

ROTORCRAFT FLIGHT MANUAL SUPPLEMENT

Robinson R44 Series Helicopters

R/N _____

S/N _____

FAA Approved:



for Manager,
Seattle Aircraft Certification Office

Date: 9/28/98

Revised: 11/16/05



Rotorcraft Flight
Manual Supplement

Document Number

120-077-00

Cargo Hook

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INTRODUCTION

This supplement must be attached to the appropriate FAA approved Rotorcraft Flight Manual when an Onboard Systems 200-227-00 or 200-228-00 Cargo Hook Kit is installed in accordance with Supplemental Type Certificate (STC) NO. SR00578SE. The information contained herein supplements or supersedes the basic manual only in those areas listed herein. For limitations, procedures and performance information not contained in this supplement, consult the basic Rotorcraft Flight Manual.

I. LIMITATIONS

I.1 Airspeed Limits

Vne= 85 KIAS, or less with external load. Do not exceed Vne of basic helicopter. (Vne determined from maximum demonstrated airspeed with dense cargo.)

CAUTION

Maximum operational air speed with external loads is dependent upon the load configuration and sling length. It is the responsibility of the operator to establish the maximum operational speed for each specific configuration.

I.2 Type of Operation

The basic Flight Manual remains applicable. With a load attached to the cargo hook, operation shall be conducted in accordance with the respective national operational requirements. For U.S. operators FAR Part 133 is applicable. This cargo hook is approved for non-human cargo, class B and C rotorcraft load combinations only.

The helicopter may also be operated with the provisions portion of the kit installed only. This includes the hard point, stowed manual and electric release cables and all Cargo Hook related equipment in the cockpit.

I.2 Weight and CG

The maximum weight and CG of the combined helicopter and external load remains the same as the basic manual.



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Table I.2-1 Weight and CG data

DESCRIPTION	WEIGHT lbs (kgs)	FUSELAGE STATION in. (mm)	LATERAL STATION in. (mm)
Complete Cargo Hook Kit with Load Weigh	6.3 (2.9)	93.9 (2385)	-4.1 (104)
Complete Cargo Hook Kit without Load Weigh	4.8 (2.2)	93.9 (2385)	-4.1 (104)
Provisions Kit (no hook) with Load Weigh	3.3 (1.5)	93.9 (2385)	-4.1 (104)
Provisions Kit (no hook) without Load Weigh	1.8 (0.8)	93.9 (2385)	-4.1 (104)

Load Weigh Indicator location is variable: Indicator weight = .43 lbs (.20 kgs).

Center of gravity limits must be checked with and without the external load to verify that the rotorcraft is within the approved weight and center of gravity limits.

I.3 Cargo Hook Load

Maximum cargo hook loading is 800 lbs (363 kgs).

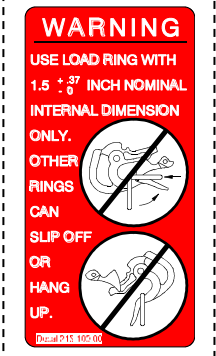


I.4 Placards

PLACARD	LOCATION
<div style="border: 1px solid black; padding: 5px; text-align: center;">CARGO RELEASE</div>	Mounted adjacent to the cyclic release switch in clear view of the pilot.
<div style="border: 1px solid black; padding: 5px; text-align: center;">CARGO RELEASE</div>	Mounted adjacent to the copilot's release switch in clear view of the pilot.
<div style="border: 1px solid black; padding: 5px; text-align: center;">CARGO RELEASE</div>	Mounted adjacent to the mechanical release in clear view of the pilot.
<div style="border: 1px solid black; padding: 5px; text-align: center;">PULL</div>	Mounted adjacent to the mechanical release in clear view of the pilot.
<div style="border: 1px solid black; padding: 5px; text-align: center;">CARGO</div>	Mounted adjacent to the Cargo Hook circuit breaker in clear view of the pilot
<div style="border: 1px solid black; border-radius: 10px; padding: 10px; text-align: center;">EXTERNAL LOAD LIMIT = 800 LBS (363 KGS)</div>	Mounted on the belly of the aircraft adjacent to the cargo hook attachment point in clear view of the ground support personnel.
<div style="border: 1px solid black; padding: 10px; text-align: center;">WITH EXTERNAL LOADS, APPROVED FOR CLASS B ROTORCRAFT – LOAD OPERATIONS DAY – VFR ONLY</div>	Mounted on the instrument panel in clear view of the pilot.

I.4

Placards, continued

<p>FOR FAR PART 133.35(A) OPERATIONS: NO PERSON MAY BE CARRIED UNLESS HE IS: (1) A FLIGHT CREW MEMBER OR TRAINEE; (2) PERFORMS AN ESSENTIAL FUNCTION IN CONNECTION WITH THE EXTERNAL LOAD OPERATION; OR (3) IS NECESSARY TO ACCOMPLISH THE WORK ACTIVITY DIRECTLY ASSOCIATED WITH THAT OPERATION.</p>	<p>Mounted on the instrument panel in clear view of the pilot.</p>
	<p>Mounted on bottom of Cargo Hook</p>
<p>TURN THE WEIGHING SYSTEM OFF WHEN NAVIGATION EQUIPMENT IN USE. NO AIRCRAFT OPERATION SHOULD BE PREDICATED ON THE READING OF THE ONBOARD WEIGHING SYSTEM.</p>	<p>When Onboard Systems 200-228-00 System is installed, mount adjacent to the Onboard Systems digital/analog indicator in full view of the pilot and copilot.</p>
<p>ELECTRONIC WEIGHING SYSTEM</p>	<p>When Onboard Systems 200-228-00 System is installed, mount adjacent to both the power switch and the circuit breaker in full view of the pilot and copilot.</p>

II. NORMAL PROCEDURES

II.1 STATIC DISCHARGE

Instruct the ground crew to ensure that the helicopter has been electrically grounded prior to attaching cargo to discharge static electricity. If possible, maintain ground contact until hook up is completed.

II.2 DAILY OR PREFLIGHT CHECK

Before each Cargo Hook use perform the following procedures. If the procedures are not successful do not use the equipment until the problem has been corrected.

II.2.1 EXTERIOR CHECK

- Inspect all mounting fasteners to ensure that they are tight.
- Visually inspect the electrical connector for loose or damaged pins and sockets.
- Operate the keeper manually and check that it snaps back to its normal position on the load beam.
- Inspect the case and covers for cracks and damage.
- Inspect the load beam for gouges and cracks.

II.2.2 INTERIOR CHECK

1. Cycle the manual release handle to ensure proper operation.
2. Cycle the electrical release system to ensure proper operation.

When an Onboard Systems 200-228-00 Cargo Hook Suspension System with Load Weigh is installed, perform the following additional procedures:

1. After installation of the Load Weigh System, swing the suspension assembly to the full extremes to verify that it does not reach the limit of the mechanical release cable range of motion and actuate the mechanical release mechanism.
2. Power on the Indicator and allow it to warm up for 5 minutes (with no load on the hook). Press both Indicator buttons at the same time to go to the Setup Mode. Scroll through the menu until the symbol "0 in" is displayed, then press the Right button. Remove any weight that is not to be zeroed out and press either button to complete the procedure.

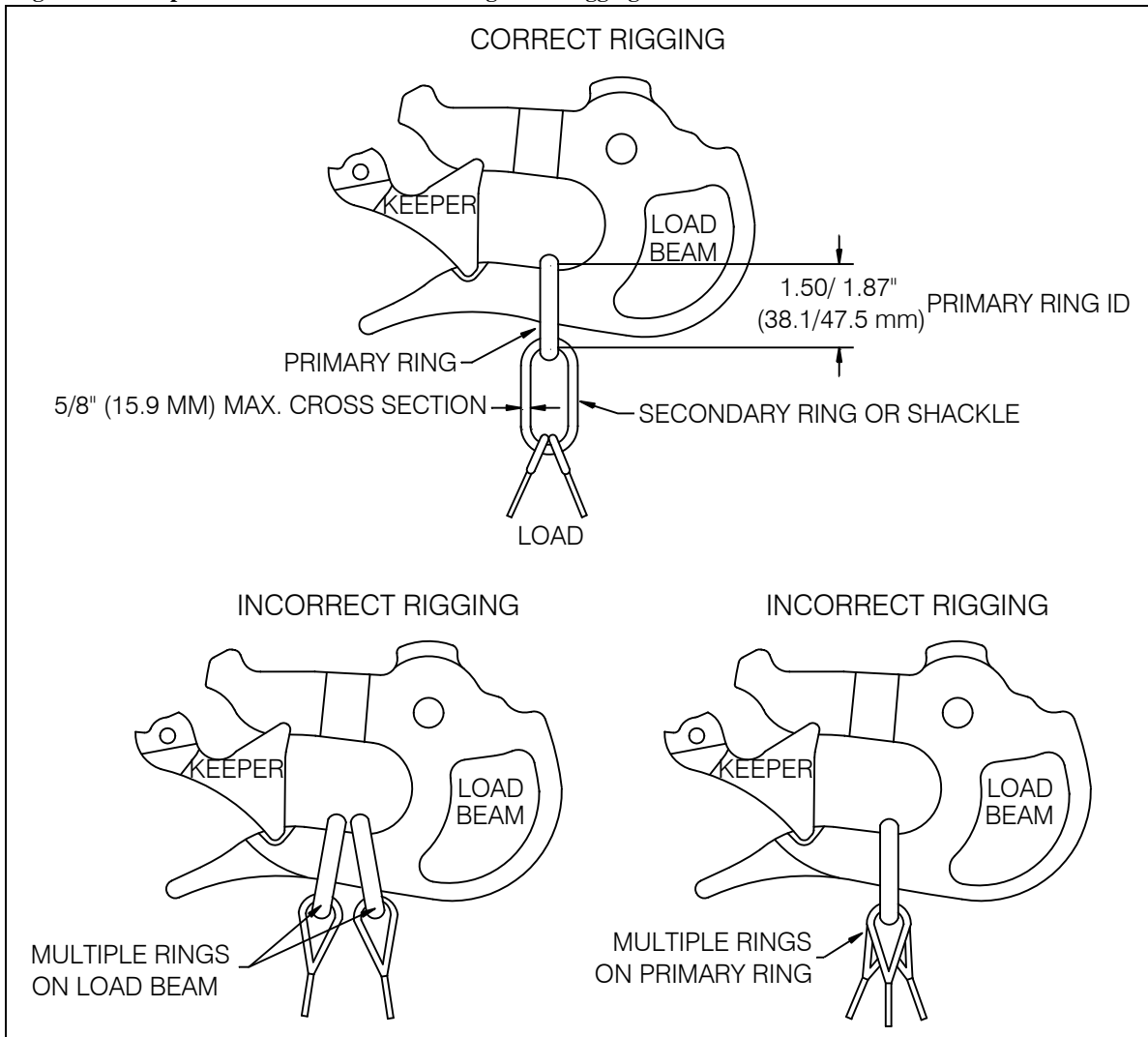


II.3 CARGO HOOK RIGGING

Extreme care must be exercised in rigging a load to the Cargo Hook. If the load ring is too big it may work its way around the end of the load beam and be supported for a time on the keeper and then fall free. If the load ring is too small it may jam itself against the load beam during an attempted release. The following illustrations show recommended configurations and potential difficulties that must be avoided.

WARNING: The examples shown are not intended to represent all problem possibilities. It is the responsibility of the operator to assure the hook will function properly with the rigging.

Figure 1 Examples of correct and incorrect cargo hook rigging

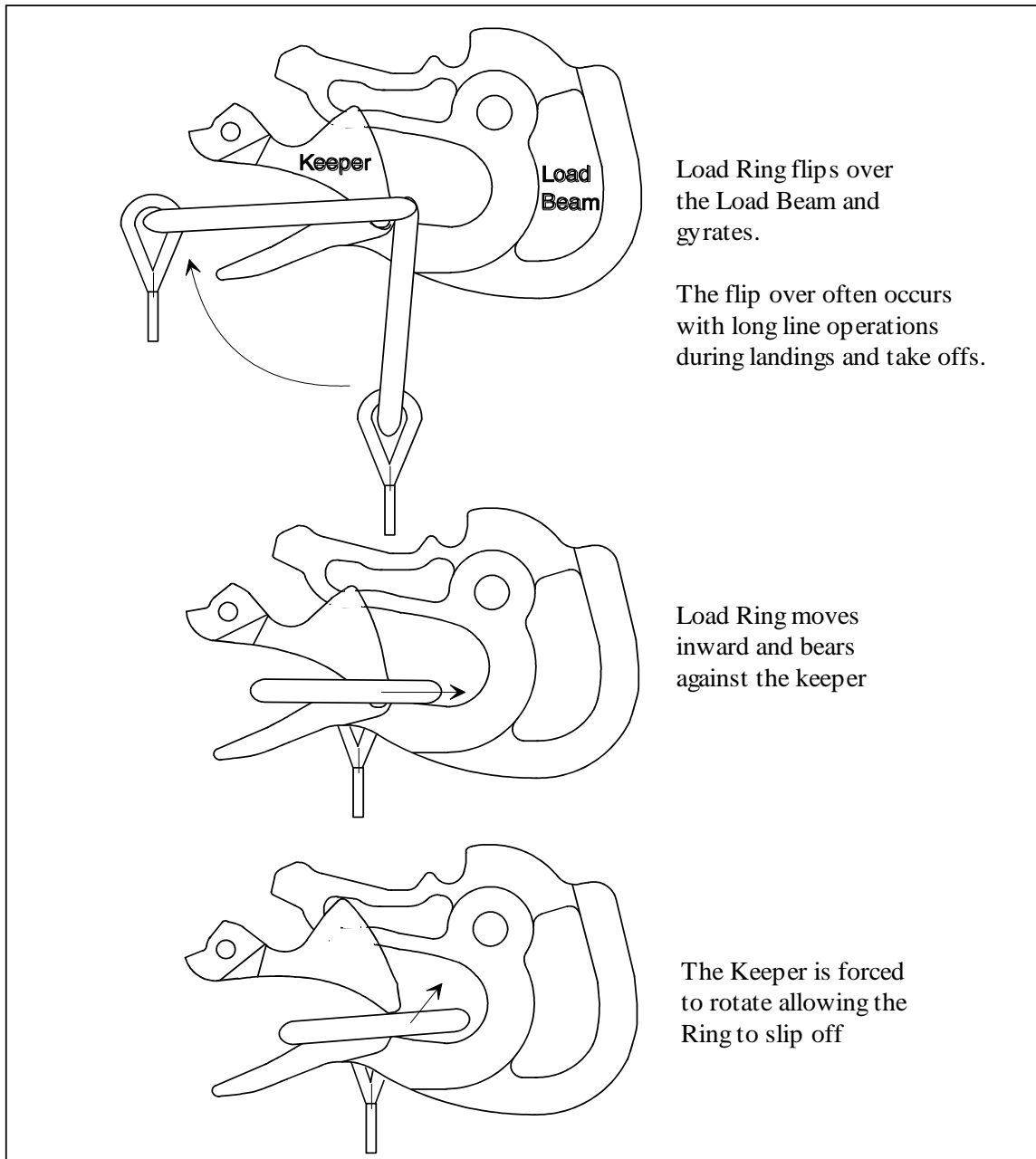


II.3 Cargo Hook Rigging, continued

Un-Commanded Release Due to Too Large of a Load Ring

WARNING: Load rings that are too large will cause an un-commanded release. The ring will flip over the end of the load beam and flip the keeper up and then fall free. Only correctly sized load rings must be used. See examples below.

Figure 2 Un-commanded release due to load rings that are too large

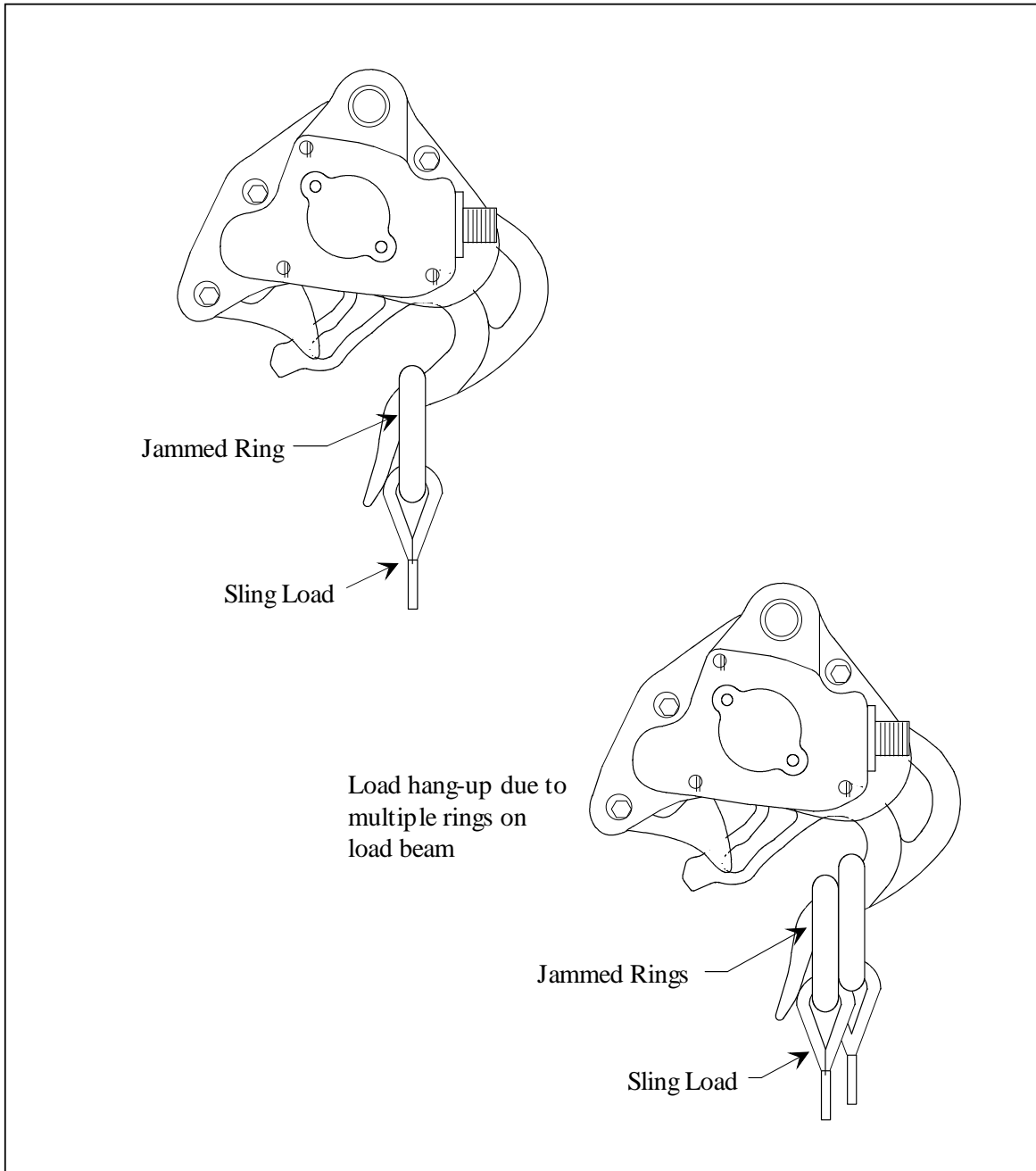


II.3 Cargo Hook Rigging, continued

Load Hang-Up Due to Too Small of a Load Ring or Multiple Load Rings

WARNING: Load rings that are too small or multiple load rings will hang on the load beam when the load is released. Only correctly sized load rings must be used. See examples below.

Figure 3 Load hang-up due to load rings that are too small or using multiple load rings

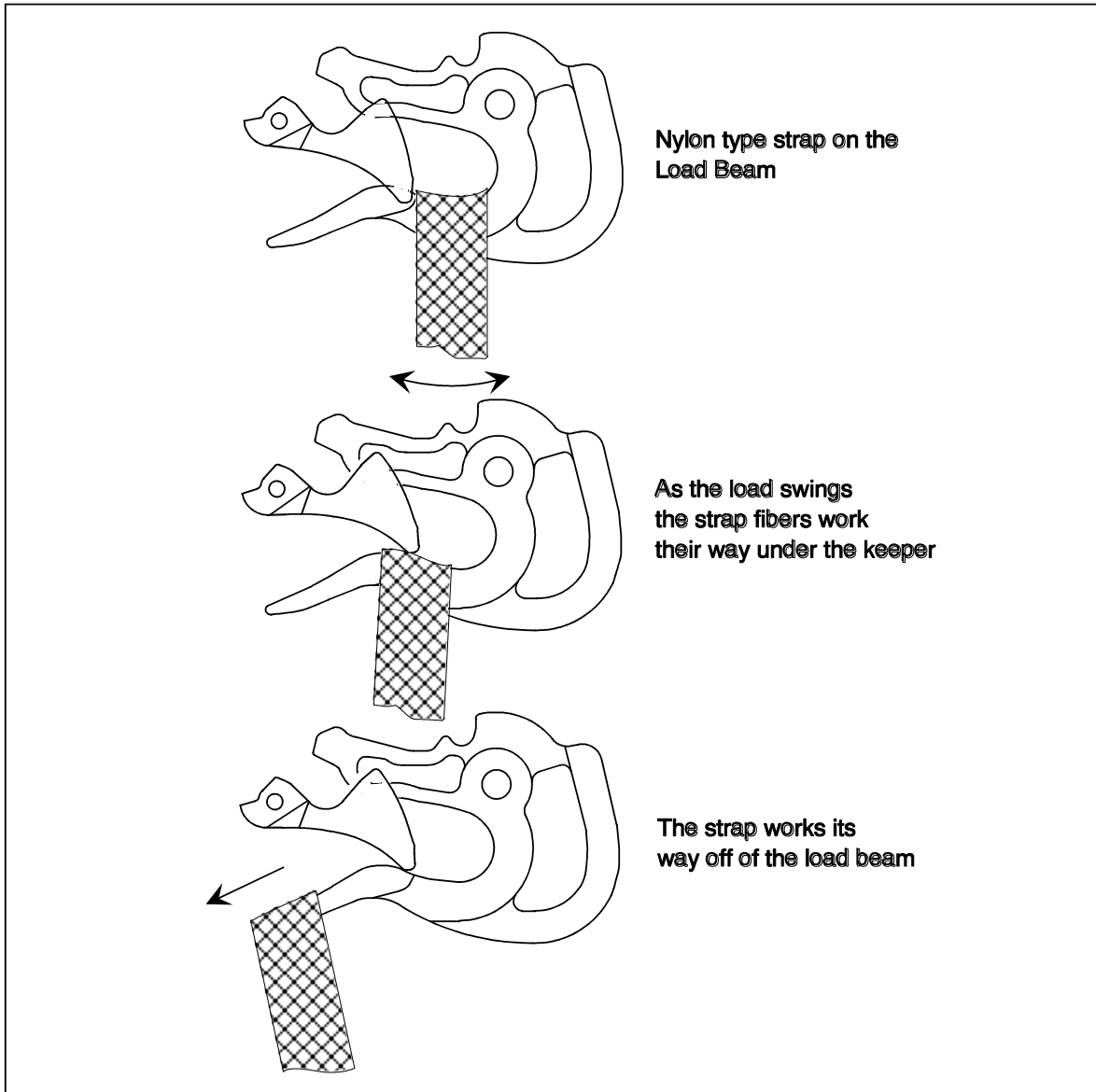


II.3 Cargo Hook Rigging, continued

Un-Commanded Release Due to Nylon Type Straps

WARNING: Nylon type straps (or similar material) must not be used directly on the cargo hook load beam as they have a tendency to creep under the keeper and fall free. If nylon straps must be used they should first be attached to a correctly sized primary ring. Only the primary ring should be in contact with the cargo hook load beam. See examples below.

Figure 4 Un-commanded release due to nylon type straps

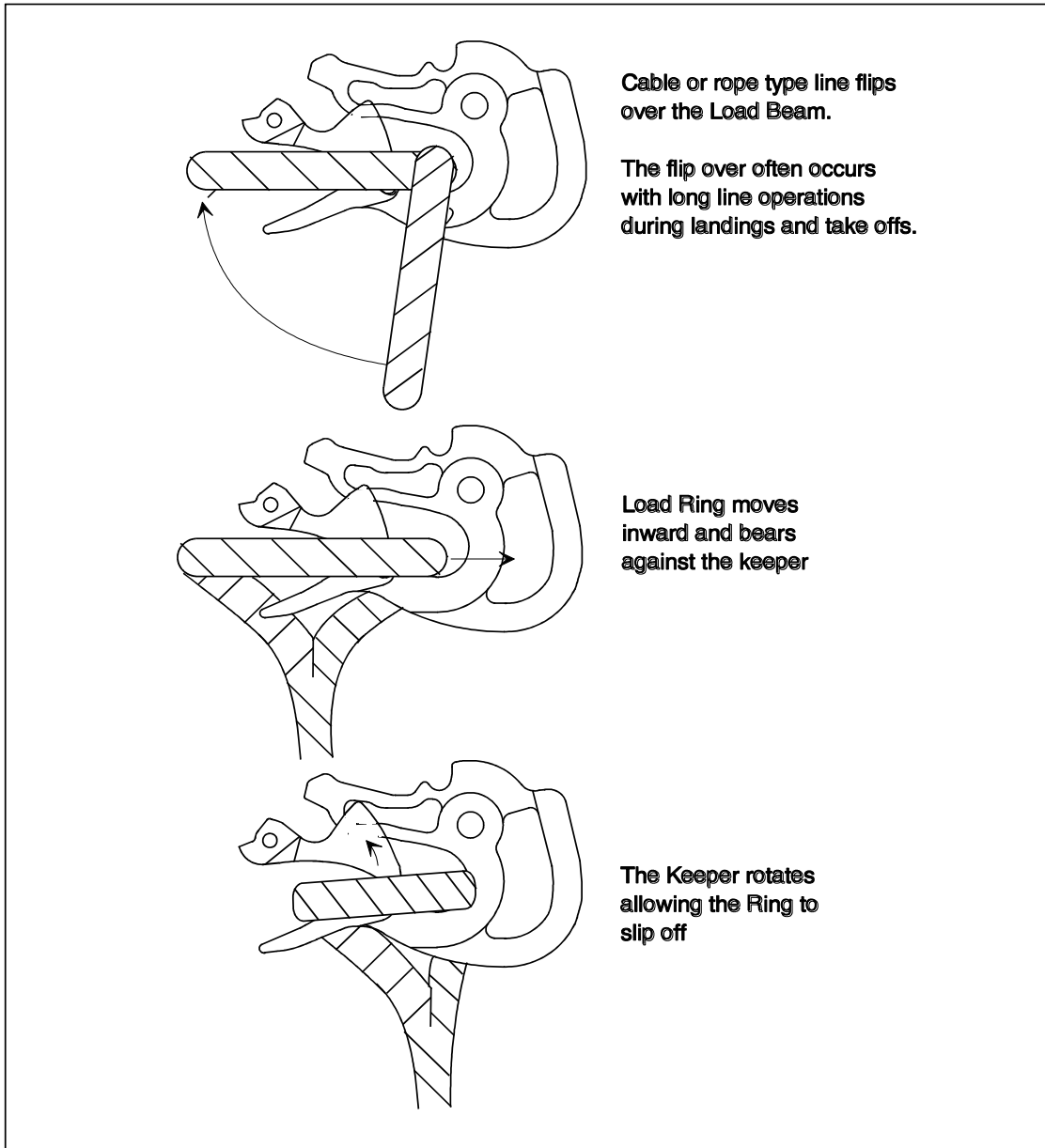


II.3 Cargo Hook Rigging, continued

Un-Commanded Release Due to Cable or Rope Type Straps

WARNING: Cable or rope type straps must not be used directly on the cargo hook load beam. Their braided eyes will work around the end of the load beam and fall free. If cable or rope is used they should first be attached to a correctly sized primary ring. Only the primary ring should be in contact with the cargo hook load beam. See examples below.

Figure 5 Un-commanded release due to cable or rope type straps



II.4 IN-FLIGHT OPERATION

Carriage of external loads up to the maximum weight limits of the rotorcraft does not change the flight characteristics. Normal control movements are used to fly the rotorcraft with an external load. When the load is released from a hover, in the air, the rotorcraft will rise and drift aft if control adjustments are not made. If desired this tendency is easily compensated for by normal control inputs.

NOTE:

Rapid control inputs result in oscillations of the load. Avoid rapid control inputs.

Hovering with external loads may be easier with the force trim system turned off. Turn the force trim system off while the forces are neutralized.

These characteristics were demonstrated with a dense load in a symmetric container with line lengths between 15 and 75 feet. Other load configurations, especially unsymmetrical shapes, loads with large surface areas, and/or different line lengths can develop unusual aerodynamic characteristics at moderate airspeeds. For any load configuration that differs from that previously carried, approach flight with care, following respective national operational requirements (FAR 133.33 for U.S. operators).



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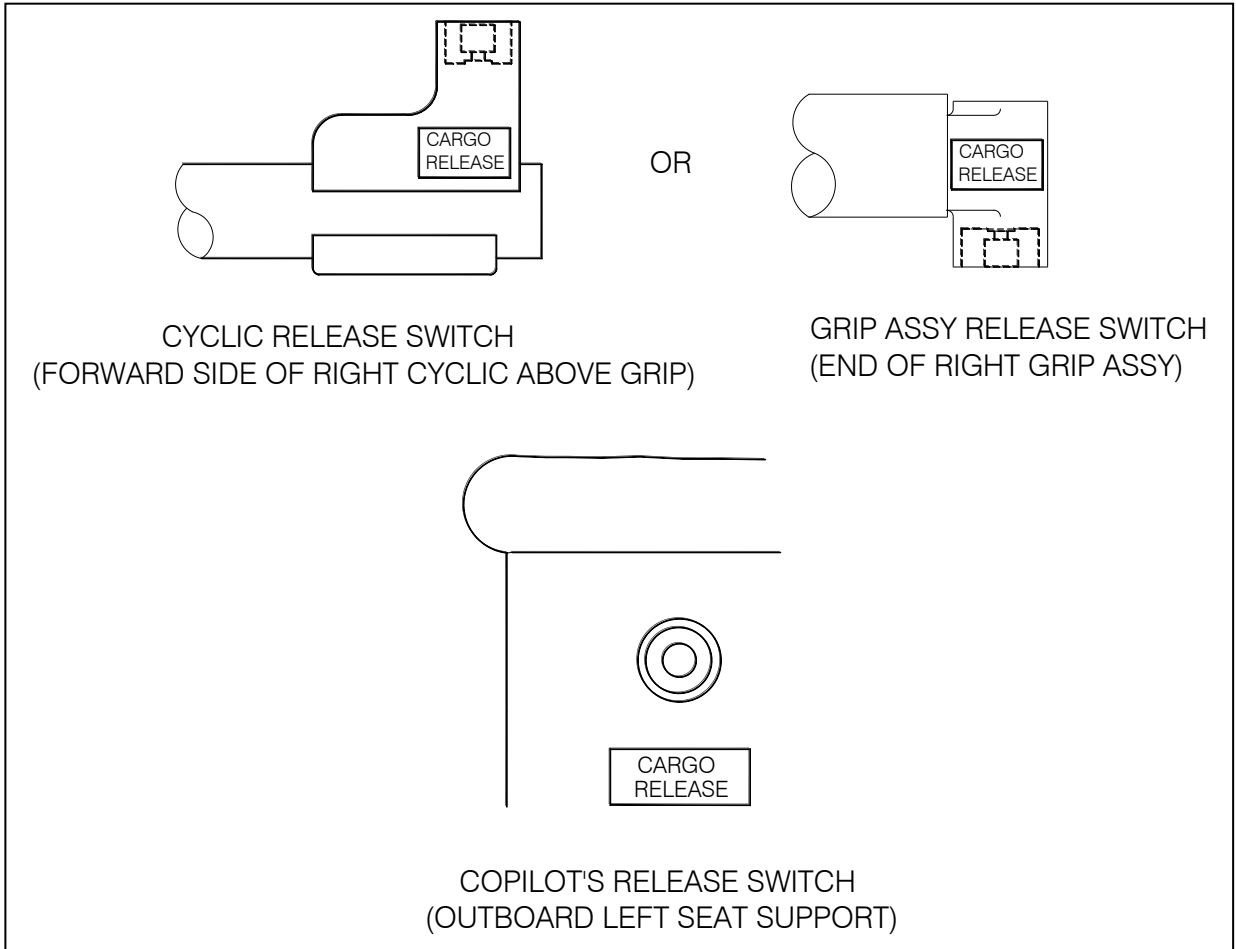
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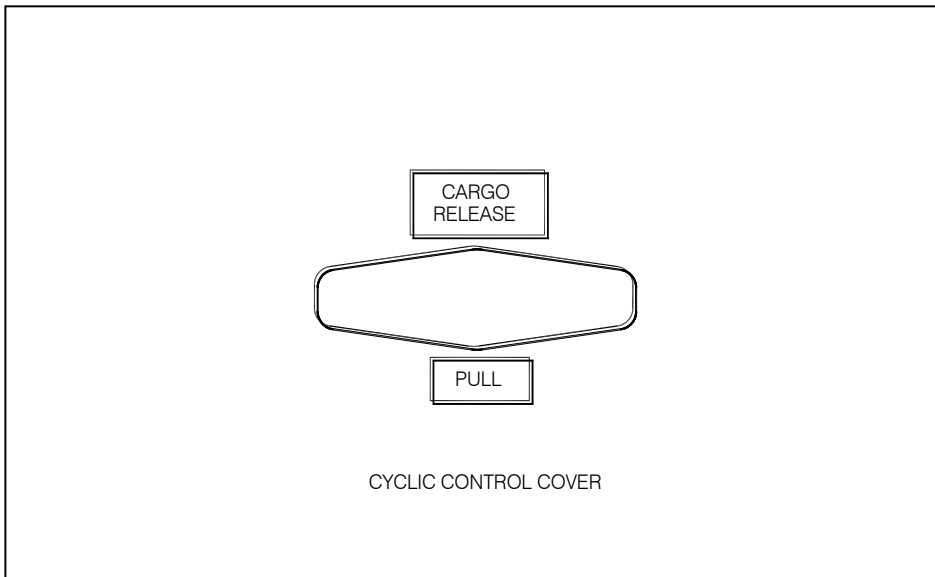
Actuate either electrical release switch to release the external load.

Figure 6 Electrical release switches



The mechanical release handle may be used to release the external load in normal circumstances.

Figure 7 Mechanical release handle



It is the responsibility of the operator to establish safe operational limits for each specific configuration.

III. EMERGENCY PROCEDURES

III.1 CARGO FAILS TO RELEASE ELECTRICALLY

In the event that the Cargo Hook will not release the external load electrically, proceed as follows:

1. Maintain tension on the sling.
2. Pull the mechanical release handle to release the external load.

IV. PERFORMANCE

The basic Flight Manual issued by Robinson Helicopter Company remains applicable. There is no change from basic flight performance with no load attached to the Cargo Hook. Performance will be reduced depending on the size, weight and shape of the external load.

When an Onboard Systems 200-228-00 Cargo Hook Suspension System with Load Weigh is installed the following applies:

The Load Weigh System is designed and installed as a means of MONITORING the load (weight) suspended from the Cargo Hook. Functional and performance characteristics have not been determined on the basis of Load Cell indication or display. Therefore, this instrument shall NOT be used as a primary indication of performance and flight operation must NOT be predicated on its use.



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