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6,000 Pound Cargo Hook

Part Number 528-002-00 and -01
for the
204, 205, 212 & 412 Series Helicopters

Owner's Manual

Owner's Manual Number 120-044-00
Revision 21
10/18/16

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RECORD OF REVISIONS

Revision	*Date*	*Page(s)*	*Reason for Revision*
8	10-30-00	4-7 to 4-10	Rolled dash number on items 33, 80, 82, and 84. Updated Exploded view drawing.
9	01/08/02	4-9	Added information about items 95-99
10	9/17/02	Title, 4-11	Factory address change.
11	12/10/03	4-5	Corrected conflicting statements regarding overhaul periods specified on pages 4-1 and 4-5. Changed statement on 4-5 to "every three years" to match overhaul period specified on page 4-1.
12	03/13/06	4-8	Corrected part number call-out on page 4-8.
13	04/03/06	4-7	Added solenoid assembly part number 650-021-01 for spare part usage.
14	10/01/07	TOC, i, Section 1, 2-4, 2-7, Section 3, 4-2 & 4-6	Added explanation of warnings, cautions and notes. Updated warnings, cautions and notes throughout. Changed "daily inspection" to "daily check" in section 4. Updated magnetic particle inspection and penetrant inspection specifications.
15	02/06/09	4-7 to 4-9	Added Overhaul Kit P/N 212-016-00 to Illustrated Parts List.
16	07/16/09	4-8	Corrected Mfg. P/N 650-050-01 to 650-050-00
17	3/2/10	4-1	Changed overhaul frequency criteria.
18	10/06/10	1-2, 4-9	Updated warning, caution and note symbols and descriptions throughout. Added P/N 215-260-00 to overhaul kit.
19	03/12/12	4-5	Removed word "Major" from first paragraph.
20	06/25/14	4-1, 4-9, 4-11	Corrected P/N 650-051-01 to P/N 650-051-00. Updated Return to Factory section. Updated "hours of external load operations" definition.
21	10/18/16	4-7, 4-9	Updated Illustrated Parts List including addition of alternatives to P/N 510-214-00, 510-108-00, 510-109-00.

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CONTENTS

CONTENTS, continued

Section 1
General Information

Introduction

The 528-002-00 (painted gray) or 528-002-01 (painted green) are approved for installation on the following Bell Helicopter Cargo Hook Suspension Systems.

204-072-915-1	204-072-915-17
204-072-915-3	204-072-915-25
204-072-915-5	204-072-915-101
204-072-915-7	204-072-915-103
204-072-915-9	
204-072-915-11	

The 528-002 series Cargo Hooks should not be used as a replacement for the Breeze-Eastern SP-7109-51 hook on the 204-072-915-15 suspension system.

The 528-002 series Cargo Hooks are suitable as a replacement for the following cargo hooks when used on one of the applicable Bell Helicopter Cargo Hook Suspension Systems listed above.

Bell Cargo Hook Part Number	**Equivalent Breeze-Eastern Cargo Hook Part Number**
204-072-924-1	SP7109-1, -11
204-072-924-7	SP7109-62

Explanation of Signal Words and Symbols

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, if shortages are found contact the company from whom the system was purchased.

Part Number	Description	Quantity
528-002-00 or -01	Cargo Hook	1
120-044-00	Owner's Manual	1

Inspection

Inspect the Cargo Hook for evidence of damage, corrosion and security of lock wire and fasteners. If damage is evident, do not use the unit until it has been repaired.

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. The load beam is latched through the internal mechanism. The DC solenoid and an external manual release cable 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 electrically or mechanically. Normal release is achieved by pilot actuation of the 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. 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.

A safety switch is included in the Cargo Hook. The switch, which is actuated by the internal mechanism, interrupts power to the DC solenoid when the internal mechanism is unlatched to prevent damage to the solenoid from overheating due to sustained current flow. Since the load beam is returned to its closed position automatically after release, the DC solenoid is again energized if the pilot's push-button is still closed; therefore, the solenoid will be energized and de-energized repeatedly as long as the push-button switch is held closed. A chattering action of the cargo hook mechanism will result. If the safety switch were not included in the solenoid circuit, the solenoid would be energized continuously, rather than intermittently, as long as the push-button switch was closed, and the resulting current could damage the solenoid.

Section 2
Installation Instructions

Suspension System Removal

The Suspension System interfaces with several helicopter components, such as the cargo hook manual and electrical release provisions. Before removing the Cargo Hook Suspension System have available and be familiar with the Bell Service Instructions 204-3, 212-5 or later bulletins.

See the Suspension System Detail Illustration located on the following page of this manual.

Remove the cargo hook manual release cable at the 204-070-995 Connector. Loosen the 204-070-996-1 Clamp to allow the cable to slide through it. The Connector and the Clamp are located at approximately WL 39.87 and between BL 9.80 and BL 0.00, near the upper end of the suspensions system.

Disconnect the suspension system electrical connector located between the suspension system and airframe.

Remove the Bell load bolt located at BL 0.00, WL 38.87 and Station 137.55, this will allow the suspension system to be removed through the bottom of the aircraft.

Cargo Hook Removal

To remove the Cargo Hook from the suspension system perform the following.

Disconnect the lower manual release cable from the swing arm by removing the cotter pin located in the out-board end of the swing arm.

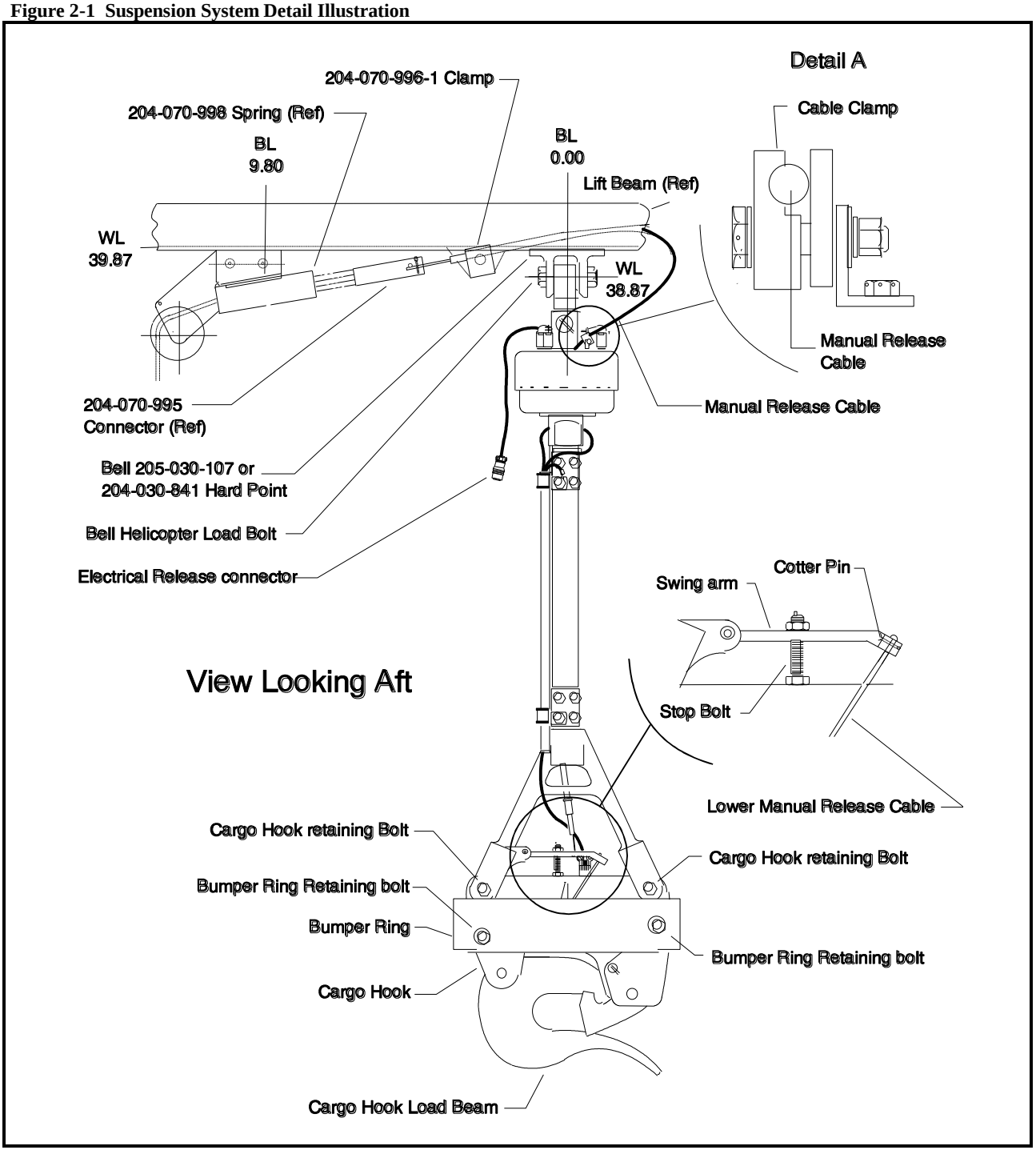
Remove the cargo hook electrical connector located on the Cargo Hook between the two cargo hook retaining bolts.

Remove the two cargo hook retaining bolts and separate the Cargo Hook from the suspension system.

Remove the two bumper ring retaining bolts and separate the bumper ring from the Cargo Hook.

Suspension System Detail Illustration

Figure 2-1 Suspension System Detail Illustration



Functional Check Before Installation

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

If the unit has passed the Acceptance Test Procedure within one year of being installed and has been stored in accordance with the approved instructions listed above, no further checks or tests are required. If the above time limit has expired or the unit has been stored in high temperature or damp conditions, the Acceptance Test Procedure must be repeated.

Cargo Hook Installation

Compare the Cargo Hook removed with the new Cargo Hook to ensure that they are physically the same and the part numbers match the list in section one of this manual. If significant differences are found do not attempt to use the new Cargo Hook, contact the factory for clarification.

Inspect the suspension system to ensure that all components are in serviceable condition before assembling the new Cargo Hook to the suspension system and returning the system to service.

Install the bumper ring to the 528-002-00 or -01 Cargo Hook, in the same manner as it was installed on the old hook, using the hardware that was removed. Inspect the hardware to ensure that it is serviceable.

Install the new Cargo Hook and bumper ring assembly to the suspension system, in the same manner as the old hook was installed, using the hardware that was removed. Inspect the hardware to ensure that it is serviceable. Orient the hook to the suspension system such that the cargo hook load beam points in the same direction as the swing arm. See the illustration located on the previous page.

Connect the lower manual release cable between the swing arm and the cargo hook manual release provisions, in the same manner as it was installed on the old hook. Inspect the cable to ensure that it is serviceable. Install the cotter pins, see the illustration located on the previous page.

Connect the cargo hook electrical connector located on the Cargo Hook between the two cargo hook retaining bolts. Safety wire the connector.

Suspension System Installation

Position the Suspension System with the manual release control cable on the left and the clevis aligned in the Bell hard point, 205-030-107 or 204-030-841, at waterline 38.87.

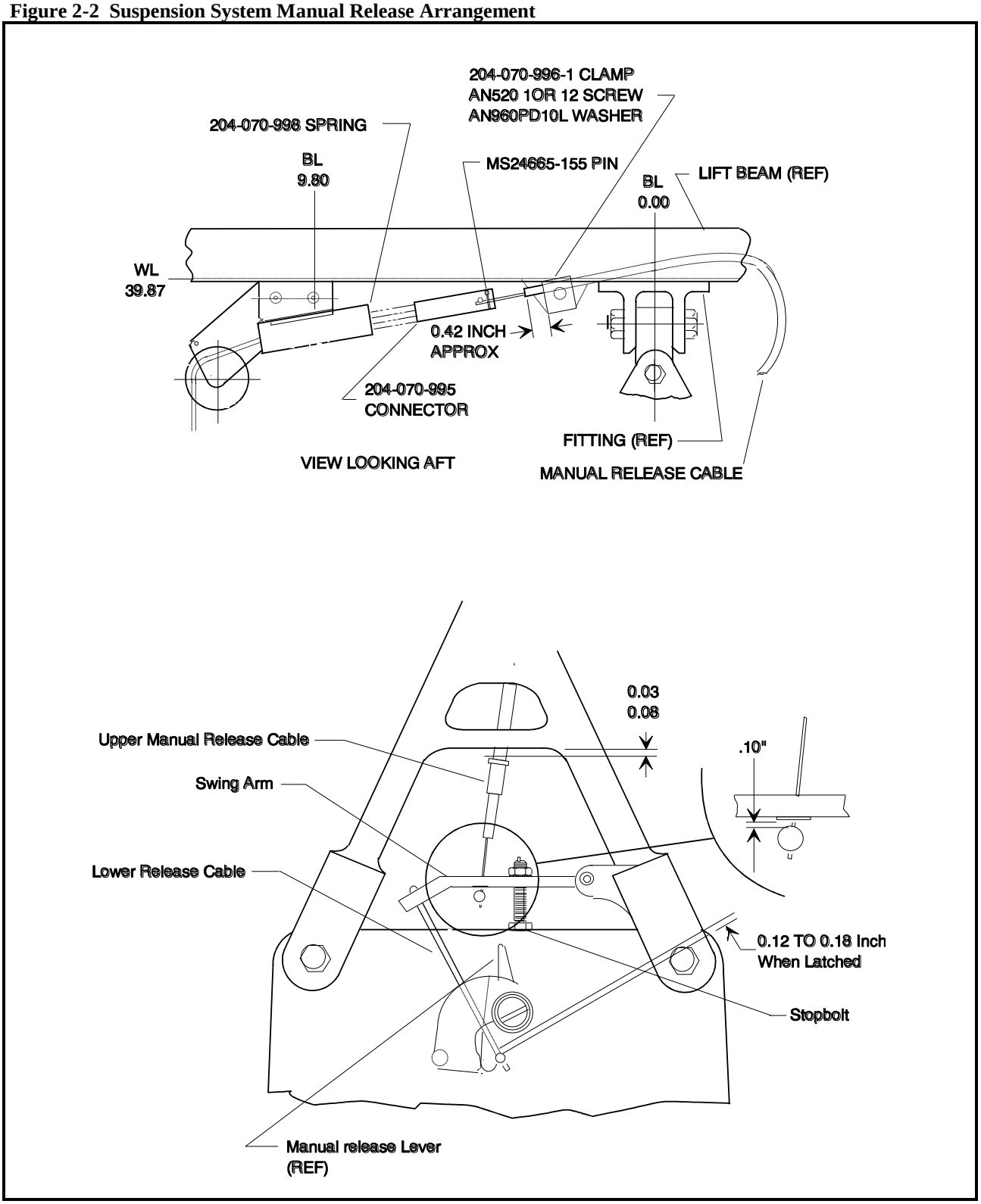
Install the bolt, washer and nut removed previously. See the appropriate Bell service instructions for the correct installation, torque values and maintenance.

The attaching bolt supplied by Bell is a high heat treat bolt. No substitution of this bolt is allowed. Refer to the Bell Service Instructions for the bolt inspection requirements.

Route the free end of the manual release cable aft and to the right (looking aft) of the hard point fitting. See the *Suspension System Manual Release Arrangement* section of this manual. Engage ball terminal into the cable connector 204-070-995 and secure with the cotter pin MS24665-155. Place the outer housing (conduit) of control cable assembly into clamp 204-070-996-1 and secure with screw AN520-1 or 12 and washer AN960PD10L into nut plate in existing structure. The conduit end should measure approximately 0.42 inches from clamp 204-070-996-1.

Suspension System Manual Release Arrangement

Figure 2-2 Suspension System Manual Release Arrangement



Suspension System Manual Release Adjustment

Adjust the conduit of the manual release cable to obtain 0.03 to 0.08 inch dimension shown in the previous section and secure clamp shown in detail A of the *Suspension System Detail* section. Adjust connector 204-070-995, shown in the previous section to obtain 0.10 inch over-travel in the control cable as shown in the previous section.

The stop bolt of the swing arm should be in contact with the top of the cargo hook case and the swing arm should be parallel to the plane of the main hook attachment bolts when the 0.10 inch measurement is taken.

Measure the clearance of the lower control cable ball terminal to the cargo hook lever as shown in the previous section. Measurement shall be 0.12 to 0.18 inches when hook is rigged and load beam is latched. If adjustment is made to the stop bolt in order to obtain proper clearance, recheck adjustment of control cable and conduit.

With the cargo hook release pedal against the FORWARD stop, check for the following conditions:

- Ensure that the spring assembly 204-070-998, does not bottom. If the spring assembly should bottom, return the cargo hook pedal to the aft stop and check control cable tension. Cable tension should be 20 to 24 pounds.
- Check the operation of the mechanical release with at least 20 pounds load on the cargo hook load beam.
- Ensure the swing arm is full up. Ensure lever is not stopped by the bottom end of the control cable outer housing.
- Ensure cargo hook load beam unlocks.
- Release the cargo hook pedal and ensure that both the upper and lower manual release cables return to the locking position.
- See the Bell Helicopter service instructions that cover the original cargo hook suspension system for additional instructions.

Suspension System Electrical Release Installation

Connect the electrical release cable to the connector located on the right underside of the lift beam and safety wire.

Suspension System Installation Check-Out

After installation of the Suspension System, perform the following functional checks. Follow the Bell Helicopter instructions for the specific helicopter.

1. 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.
2. Direct an assistant to observe the Cargo Hook and reset the cargo hook load beam to the closed position as required.
3. Close the cargo hook release circuit breaker and position the battery switch to the ON position. Depress the cargo hook switch. The Cargo Hook should release.
4. With no weight on the cargo hook load beam, depress and hold the cargo hook switch to the ON position while the suspension system is rotated 360 degrees. Verify that the Cargo Hook continues to cycle (machine gun) rapidly without interruption.

To prevent burning out the solenoid do not hold the switch for more than 5 seconds in any 30 second period.

5. Apply 10 - 20 pounds to the cargo hook load beam and depress the foot operated cargo hook mechanical release, the Cargo Hook should release.
6. See the Bell Helicopter service instructions that cover the original cargo hook suspension system for additional instructions.

Component Weights

The weight of the 528-002-00 or -01 Cargo Hook is 13 lbs (5.9 kgs). This is approximately the same weight as the Cargo Hook it replaced.

Paper Work

Remove the Flight Manual Supplement from the back of this manual and place it into the 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.

Section 3
Operation Instructions

Suspension System Operating Procedures

Before operating the Suspension System be completely familiar with the Bell Helicopter suspension system operating instructions for your helicopter.

Cargo is released by use of a button located on the pilot's cyclic control stick. Prior to a flight involving external load operations, activate the electrical system and press the release button to ensure the cargo hook electrical release is operating correctly.

Depress the manual release foot pedal to test the cargo hook manual release mechanism.

See the Bell Helicopter service instructions that cover the original cargo hook suspension system for additional instructions.

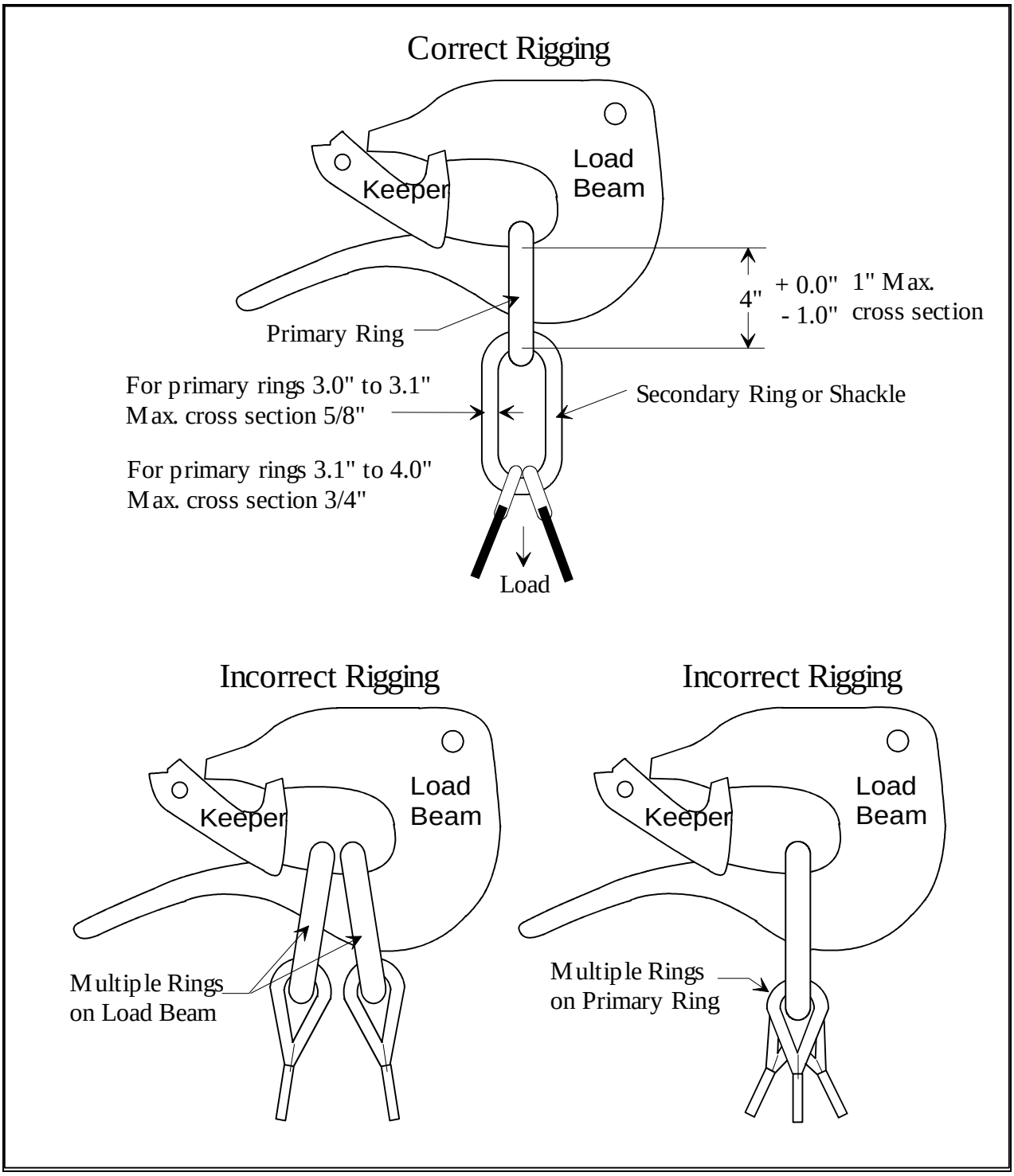
Cargo Hook Rigging

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

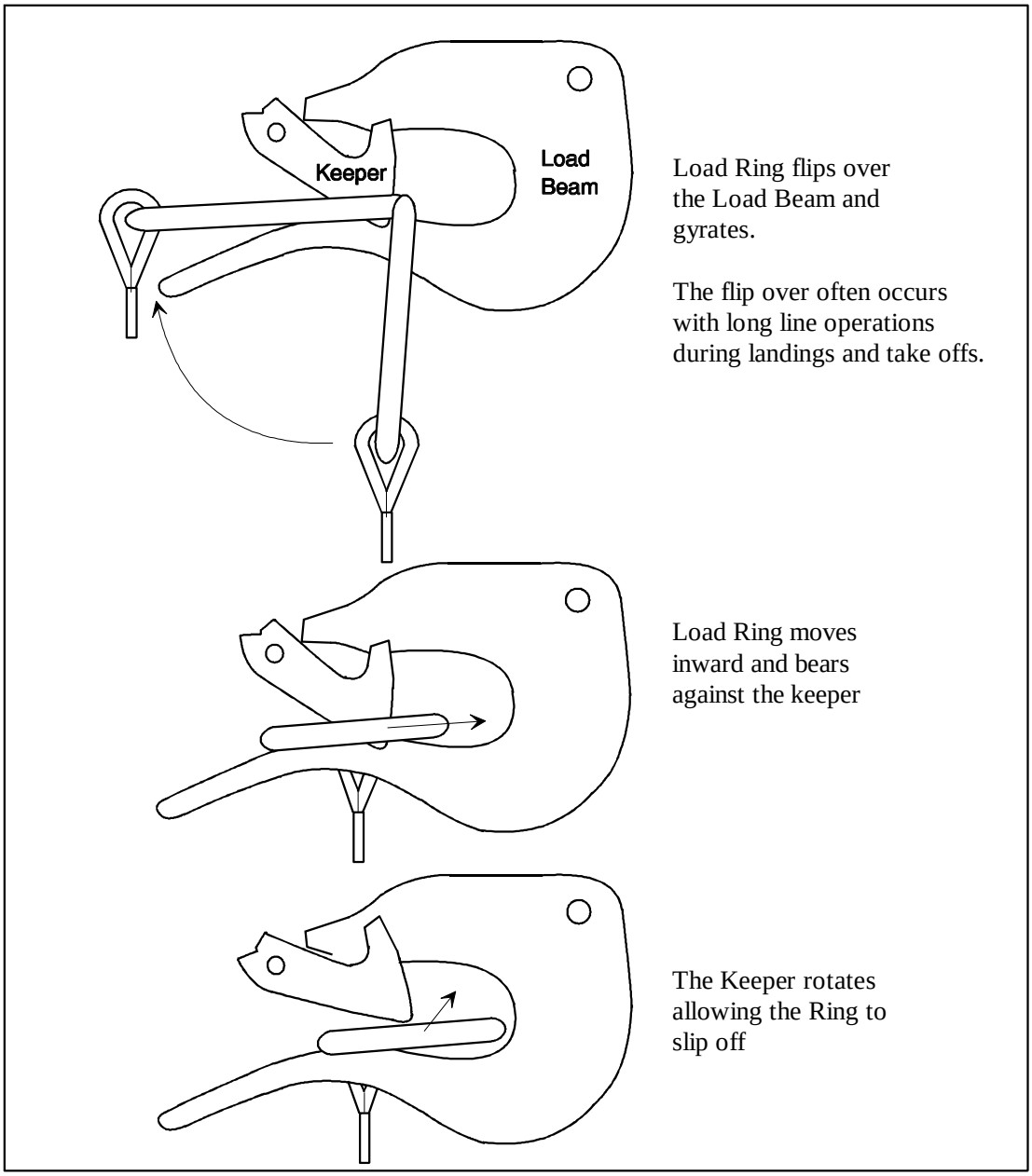


Un-Commanded Release Due to Too Large of a Load Ring

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.

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

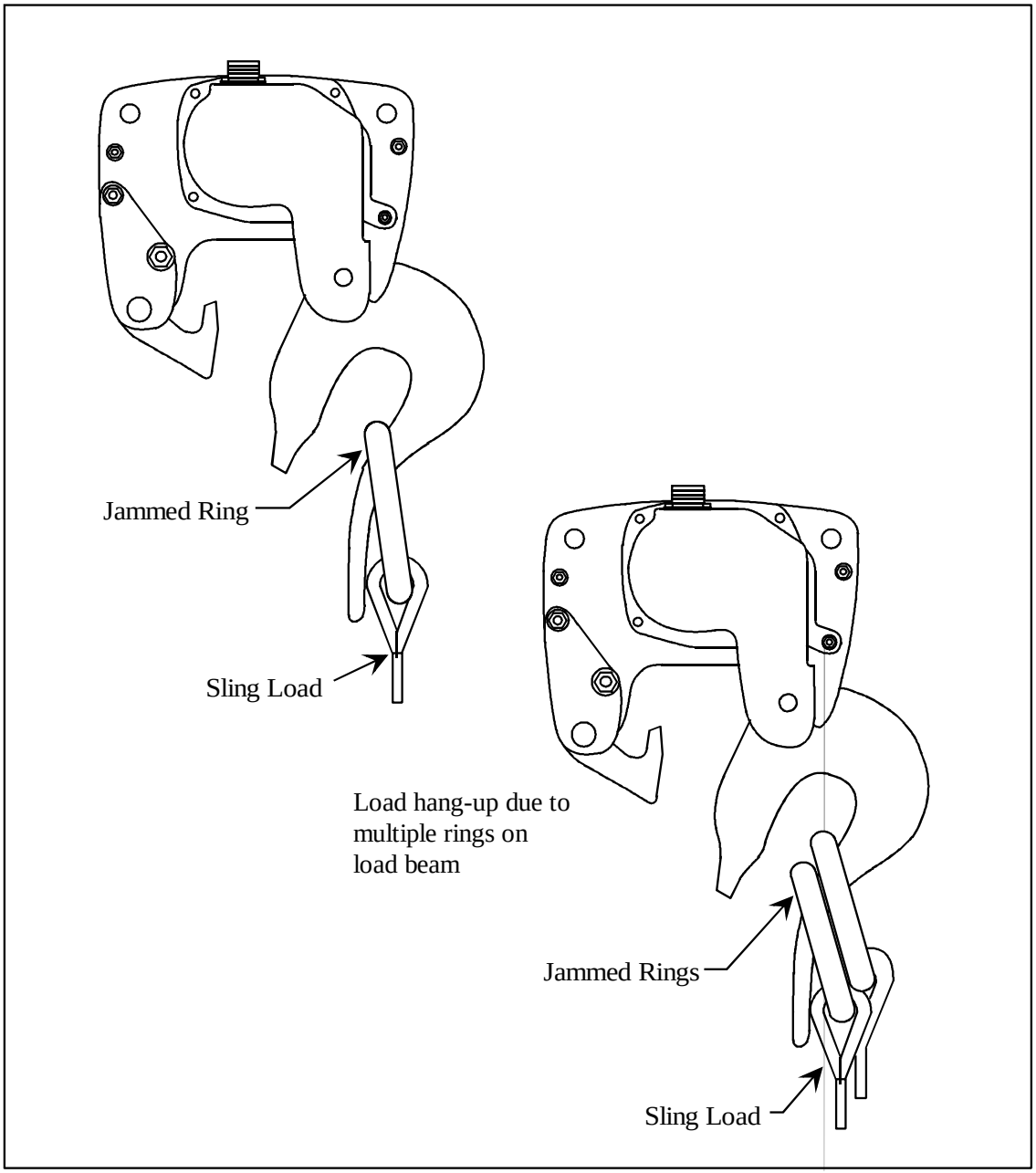


Load Hang-Up Due to Too Small of a Load Ring or Multiple Load Rings

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

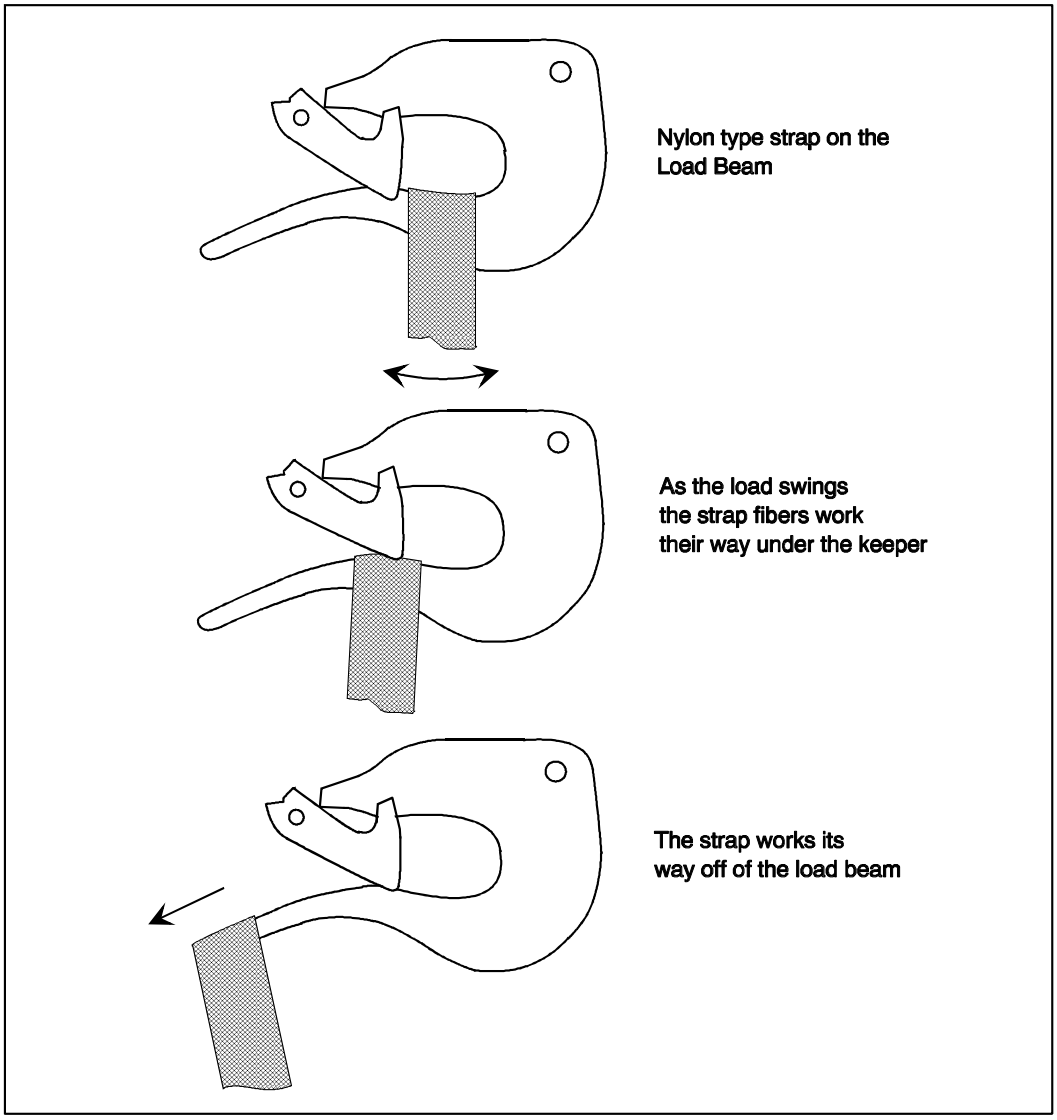


Un-Commanded Release Due to Nylon Type Straps

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 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

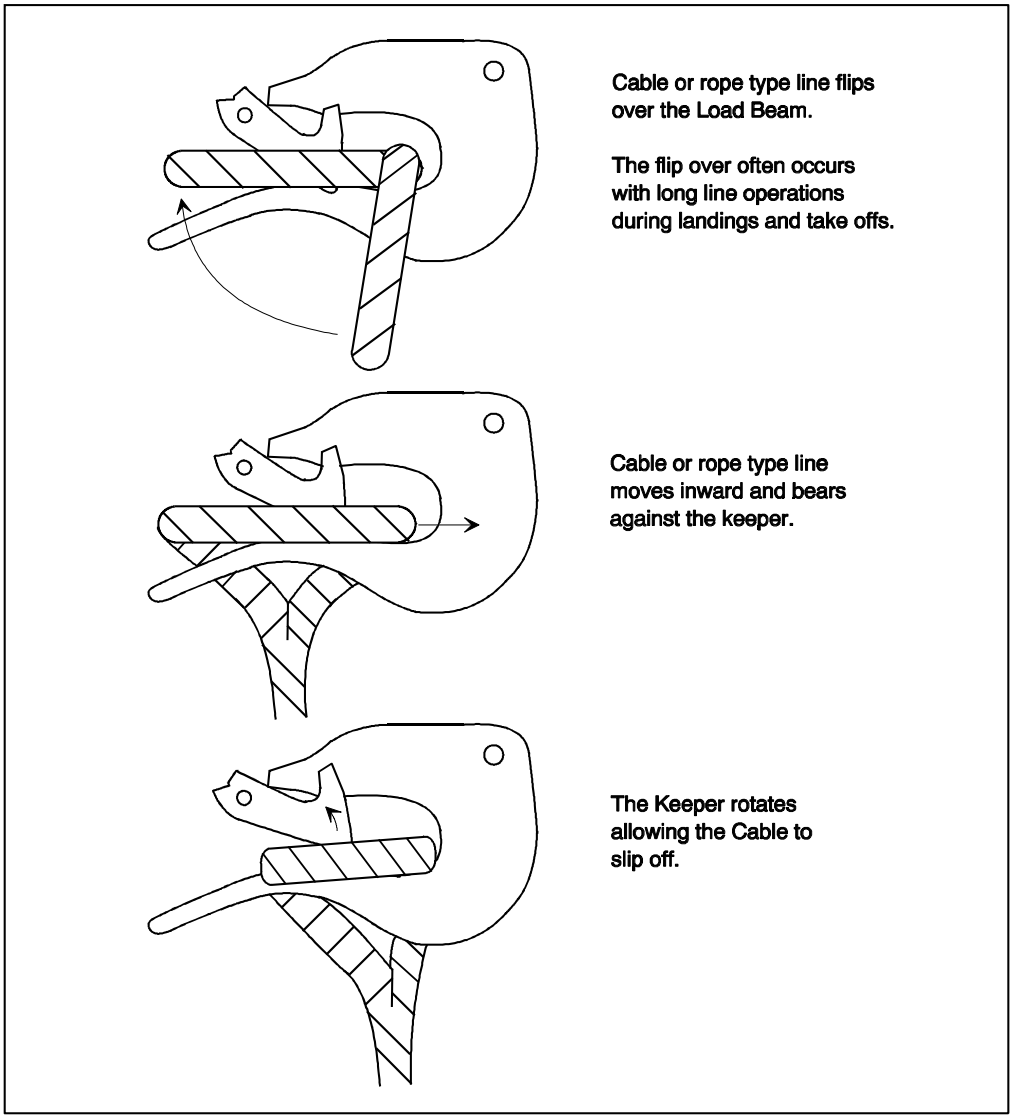


Un-Commanded Release Due to Cable or Rope Type Straps

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 cargo hook 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



Section 4
Maintenance

Storage Instructions

Clean the Cargo Hook thoroughly before packaging. Pack the unit in a heat-sealable package. If the unit is to be stored for long periods in a tropical climate it should be packed in a reliable manner to suit local conditions. Refer to relevant MIL specifications.

Package the unit in a suitable fiberboard box and cushion the unit to prevent shifting. Seal the fiberboard box with tape and mark the box with the contents and date of packaging.

Shelf Life

Provided the unit has been packed by the appropriate method, the unit can be stored indefinitely. The primary concern during storage is corrosion. When unit is returned to service, visually inspect for corrosion. If no corrosion is noted the unit may be installed and checked for proper function per page 2-7. If evidence of corrosion is present, follow overhaul instructions for disassembly, inspection of parts and acceptance testing.

Overhaul Periods

Time Between Overhaul (TBO): 1000 hours of external load operations or 5 years, whichever is less.

NOTICE

*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.*

Cargo Hook Inspection

The inspection of the Cargo Hook shall be in accordance with the tables below.

Table 4-1 Inspection

Seq.	Part Number Nomenclature	Daily Check	Inspection - 100 hours or annually whichever comes first.	Overhaul
1	528-002-00 or -01 Cargo Hook	1. Inspect all mounting fasteners to ensure that they are tight. 2. Inspect threaded parts for damage. 3. Visually inspect the electrical connector damage and security 4. Operate the keeper manually and check that it snaps back to its normal position on the load beam. 5. Inspect the cargo hook case and covers for cracks and damage. 6. Inspect the load beam for gouges and cracks. 7. Open the load beam and inspect the contact surfaces of the load beam and the latch for signs of roughness. 8. Cycle the electrical and manual release mechanisms to ensure proper operation.	Same as Daily Check	Disassemble per Section 5 of this manual. Inspect in accordance with this section and Table 4-2. Re-assemble per Section 5 of this manual.

Carefully inspect the detail parts in accordance with the instructions in Table 4-2. Inspect the parts in a clean, well lighted room.

Inspect bearings for corrosion, which will be evidenced by reddish discoloration in advanced stages of staining. Reject bearings that are corroded or that have pits on the roller path.

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

Keeper (57)

Load beam (56)

Trunnion (46)

Release arm assembly (41)

Lever, latch & shaft assembly (27)

Perform penetrant inspection per ASTM E1417 with acceptance criteria per MIL-STD-1907, Grade A on the parts listed below. No cracks are permitted in any of these parts.

Case (12)

Cover (24)

Cargo Hook Inspection, continued

Table 4-2 Detail Parts Inspection

Part	Visually Inspect for	Remedy
Threaded parts	Stripped, crossed, or otherwise damaged threads	Replace
Nameplate, electrical diagram plate	Mutilation or illegibility	Replace
Springs	Cracks and deformation	Replace
Switch actuators	Deformation	Replace
Bearings	Roughness, binding, looseness, or corrosion	Replace
Solenoid	Burning, check resistance with ohmmeter	Replace if burnt or if resistance is outside 1.70 to 2.08 ohm range
Switches	Cracked case; check electrical operation with ohmmeter	Replace
Bumper	Wear	Replace
Case and cover assembly	Dents, nicks, cracks, gouges, or scratches	Repair minor replace if otherwise damaged
Electrical wiring	Deterioration	Replace
Electrical connector	Loose, missing, or mutilated contact pins, cracked case, or worn insulator	Replace
Load beam	Gouges or burrs on wearing surfaces	Remove burrs, replace if gouged
Latch	Gouges or burrs on wearing surfaces	Remove burrs, replace if gouged

Cargo Hook Preventive Maintenance

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

Keep the end of the load beam where it engages the latch coated with a light coat of grease. Wipe off excess grease.

Trouble Shooting

Table 4-3 Trouble Shooting

DIFFICULTY	PROBABLE CAUSE	CORRECTIVE ACTION
Cargo Hook does not operate electrically, manual cable release operates normally.	Open electrical circuit, faulty wiring, circuit breaker, switch, solenoid or slip-ring contacts.	Disconnect cable from electrical connector on Cargo Hook. Check and lubricate pivot points. Check clearance between latch, lever and toggle links and replace if required.
Cargo Hook does not operate electrically or manually.	Defective internal mechanism.	Using multimeter, check for 1.70 to 2.08 ohms between pins B and C of electrical connector. If open indication is obtained, check safety switch continuity, and check solenoid for 1.70 to 2.08 ohms resistance, replace solenoid if required. Disassemble, and inspect internal mechanism for binding, jamming, and worn or broken parts. Repair.
Cargo Hook operates electrically, but not manually. Cargo Hook does not chatter when operated electrically. Load beam fails to relatch after load release.	Defective manual release system Shorted safety switch. Defective return spring, arm assembly or pin. Defective latch mechanism.	Check manual release cable and cable connection to Cargo Hook. Correct any defects. Check safety switch in Cargo Hook. Check the clearance between the release switch actuator and the internal lever. Check operation of release micro switch. Replace defective switch. If load beam does not swing back up, check return spring, pin, and arm assembly. Replace defective part. If load beam does swing back up but does not latch, check latch and lever assembly and related parts. Replace defective part.
Cargo Hook manual release pull-off exceeds 18lbs (at the hook).		Check pivot points for excessive friction and lubricate. Check clearance between latch, lever and toggle links and replace if required. Check contact surfaces between latch and load beam, burnish if required. Check operation of unit using manual release lever.
Circuit breaker opens when Cargo Hook is energized.	Short in the system, faulty wiring, circuit breaker, solenoid, switch, or slip-ring contacts.	Check for shorts to ground. Check solenoid, repair or replace defective parts.

Note # 1 Additional Bell Helicopter Suspension system trouble shooting procedures are available in the Service Instructions, such as 212-5.

Repair

It is recommended that only minor repairs be attempted by the operator. The Cargo Hook should be returned to the factory for overhaul or when the Cargo Hook is in need of repair.

Acceptance Test Procedures

After the Cargo Hook has been repaired or stored for an extended period of time it must be subjected to the Acceptance Test Procedure as follows:

- Examine the Cargo Hook externally for security of the lockwire, cotter pins and fasteners.
- Use an appropriate insulation resistance tester to test the resistance between each pin and the base of the connector. The readings should not be less than 2 mega-ohms. Using a multimeter, check continuity between pins C & B of the electrical connector.
- Suspend the hook from a test rig capable of loading the Cargo Hook to 18,000 pounds. Use a steel ring or chain to apply the load to the load beam.
- Ensure that the unit is correctly cocked by observing that the nose of the load beam is secure in the latch and that the red datum lines on the release indicator and the release cover coincide.
- Attach a 12 lb. (4.536 kg.) weight to the load beam.
- Operate the manual release lever. The load beam should open and the load fall clear. Release the manual release lever. Ensure that the load beam returns to the fully cocked position. The red datum lines on the release indicator and the release cover should coincide.
- Connect an adjustable 22 - 28 VDC supply with a momentary release switch wired into the positive wire, to the connector located on top of the solenoid housing. Connect the negative lead to pin C and the positive lead to pin B.

Acceptance Test Procedures, continued

Press the release switch. The load beam should release the load and relatch.

Damage to the release solenoid can occur if the release switch is operated for more than 5 seconds continuously in a 30 second period.

Perform a proof load test as follows:

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

Gradually load the Cargo Hook with the test rig to 18,000 pounds. Hold the load for 1 minute. The load beam should hold the load without unlatching. Reduce the load to zero.

Electrical load release test

Use a nylon sling or steel cable that is free to drop clear of the load beam and allow it to relatch.

Gradually load the Cargo Hook to 6,000 pounds and hold the load for 2 minutes.

With the power supply operating voltage set at 22VDC press the release button. The load beam should unlatch and the nylon sling or the steel cable should slide off the load beam. The load beam should automatically relatch after the release. Repeat the test one more time.

Manual load release test

With no load applied to the load beam, verify that the load beam can be unlatched manually using the release arm assembly.

Connect a manual release cable to the Cargo Hook and gradually load the Cargo Hook to 6,000 pounds. Hold the load for 2 minutes. Perform a manual release by pulling the manual release cable. The required release force shall be 18 pounds maximum. Repeat the test a second time.

Illustrated Parts Breakdown

This section lists the assemblies and parts of the Cargo Hook.

Table 4-4 Illustrated Parts Breakdown (Ref. Figure 4-1)

ITEM	PART NO.	DESCRIPTION	UNITS / SYSTEM	Overhaul Kit P/N 212-016-00
1*	528-002-	Cargo Hook	--	--
2*	650-001-01	. Case and cover assembly	1	-
3	510-212-00	Screw, AN23-23A	2	2
4	510-095-00	Washer, AN960-10	2	2
5	510-213-00	Nut, AN364-1032	2	2
6**	510-214-00	Bolt, AN27-36	1	1**
7**	510-108-00	Nut, AN320-7	1	1**
8**	510-109-00	Washer, AN960-716L	1	1**
9	510-067-00	Cotter Pin, AN380-3-4	1	1
10	Not used		-	-
{11*}	650-002-00	. . Case Assembly	1	-
{12}	650-003-00	. . . Case	1	-
13	650-004-00	. . . Support, spring	1	-
14	Not used		-	-
15	650-006-00	. . . Pin stop	1	-
16	650-007-00	. . . Post, microswitch	3	-
17	650-008-00	. . . Post, microswitch	2	-
18	650-009-00	. . . Pin, switch actuator	1	-
19	650-010-00	. . . Dowel pin	2	-
20	650-011-00	. . . Dowel pin	1	-
21	650-012-00	. . . Pin, shoulder	1	-
22	Not used		-	-
{23*}	650-013-00	. . Cover Assembly	1	-
{24}	650-014-00	. . . Cover	1	-
25	650-015-00	. . . Shaft support	1	--
26	Not used		-	-
27	650-017-00	. Lever, latch and shaft assembly	1	-
28	Not used		-	-
29	Not used		-	-
30	Not used		-	-
31	Not used		-	-
32	Not used		-	-
33*	650-018-01	. Cover assembly, solenoid	1	-
34	510-215-00	Screw, AN 500A8-7	3	3
35	290-270-00	. . Cover	1	-
36	410-132-00	. . Connector, MS 3102E-16S-5P	1	-
37	510-216-00	Screw, AN 500A4-7	4	4
38	Not used		-	-
39	Not used		-	-

* Item not illustrated.

** Bolt P/N 511-014-00 is an alternate to bolt P/N 510-214-00. Use bolt P/N 511-014-00 with nut P/N 510-146-00 (replaces P/N 510-108-00) and washer P/N 510-195-00 (replaces P/N 510-109-00).

{} Indicates items not sold as spares

Illustrated Parts Breakdown, continued

Table 4-4 Illustrated Parts Breakdown, continued

ITEM	PART NO.	DESCRIPTION	UNITS / SYSTEM	Overhaul Kit P/N 212-016-00
40***	650-021-00	. Solenoid assembly	1	-
41	650-022-00	. Manual release arm assembly	1	-
42	Not used		-	-
43	Not used		-	-
44	650-025-00	. . Screw BS A218/A	1	-
45	650-026-00	. . Washer BS SP11A	1	-
46	650-027-00	. Load beam return assy, arm, pin & trunnion	1	-
47	Not used		-	-
48	Not used		-	-
49	510-217-00	1/8" x 5/8" long, roll pin	1	1
50	Not used		-	-
51	Not used		-	-
52	290-269-00	. Plate assembly, pivot, LH	1	-
53	290-268-00	. Plate assembly, pivot,RH	1	-
54	650-034-00	. Spring, keeper, LH	1	1
55	650-035-00	. Spring, keeper, RH	1	1
56	650-036-00	. Beam, load	1	-
57	650-037-00	. Keeper, load beam	1	-
58	650-038-00	. Retainer, solenoid	1	-
59	650-039-00	. Plunger, trunnion	1	-
60	650-040-00	. Spring, trunnion	1	1
61	Not used		-	-
62	650-017-00	. Latch, Lever, Shaft & Arm Assembly	1	-
63	Not used		-	-
64	510-218-00	3/32" x 3/8" long, roll pin	1	-
65	650-043-00	Grooved bushing	1	-
66	650-058-00	. Solenoid link	1	-
67	650-059-00	. Solenoid linkage pin	1	-
68	650-060-00	. Solenoid linkage pin	2	-
69	650-044-00	. Indicator, release	1	-
70	650-045-00	. Cover, release	1	-
71	Not used		-	-
72	650-046-00	. Spacer, release cover	3	-
73	650-047-00	Screw	3	3
74	650-048-00	. Spring release arm	1	1
75	650-049-00	. Spring, load beam return	1	1
76	Not used		-	-
77	Not used		-	-
78	Not used		-	-
79	Not used		-	-

* Item not illustrated

{} Indicates items not sold as spares

*** For spare part usage P/N 650-021-00 has been superseded by P/N 650-021-01. When installing 650-021-01, item 85 bushings must be discarded. They are replaced by the bushings included with the –01 solenoid assembly.

Illustrated Parts Breakdown, continued

Table 4-4 Illustrated Parts Breakdown, continued

ITEM	PART NO.	DESCRIPTION	UNITS / SYSTEM	Overhaul Kit P/N 212-016-00
80	650-050-00	. Bumper, beam	1	1
81	Not used		-	-
82	650-051-00	. Bumper, latch	1	1
83	650-052-00	. Microswitch, safety ITB1-1	1	-
84	650-053-01	. Actuator, safety switch	1	-
85	650-054-00	. Bushing, solenoid	2	-
86	Not used		-	-
87	650-055-00	. Rubber stop	1	1
88	650-056-00	. Data plate, modification	1	-
89	510-262-00	. Rivet	4	4
90	215-075-00	. Serial Number Plate	1	1
91	215-074-00	. Wiring Diagram Decal	1	1
92	215-096-01	. Load Ring Limits Decal	1	1
93	510-309-00	. Rivet	4	4
94****	650-066-00	. Spring, Toggle	1	-
95	650-064-00	Screw	2	2
96	650-062-00	Actuator auxiliary switch	1	-
97	650-065-00	Spacer safety microswitch	2	2
98	650-063-00	Nut	2	2
99****	650-069-00	Spring, toggle	1	1
100*	215-260-00	Overhaul Label	-	1

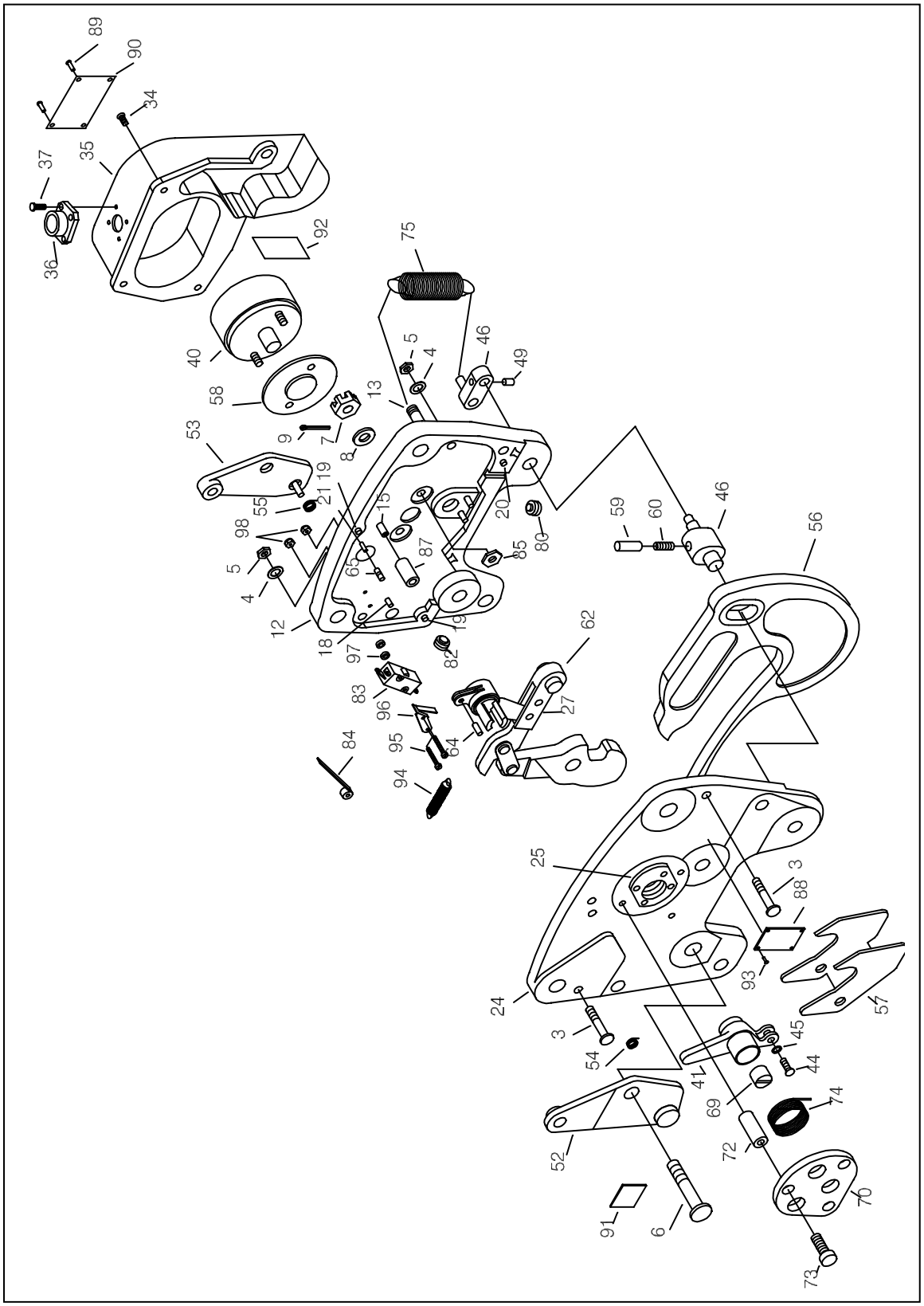
* Item not illustrated

{} Indicates items not sold as spares

****Cargo Hooks S/N CAL 1135 and on, Item 99 is used. Item 99 replaces Item 63 and Item 94. (See Service Bulletin 159-005-01 and 159-005-02)

Cargo Hook Exploded View

Figure 4-1 Cargo Hook Detail Parts



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
Assembly & Disassembly Procedures

Introduction

Table 5-1 is a Cargo Hook compatibility reference chart. This table is for reference only.

Table 5-1 Cargo Hook Compatibility (Ref.)

Onboard Systems P/N 528-002- Cargo Hook Compatibility	Bell Helicopter Suspension System 204-072-915 Dash Number	Bell Hook Part Number	Breeze Hook Part Number	Helicopters Used On	Cargo hook Differences
Yes	-1, -3, -5, -7, -9, -11	204-072-924-1	SP7109-11 or SP7109-1	204B, 205 GRC, UH-1D, 205FRG, 205A, UH-1N	
No	-13	204-072-924-3	SP7109-12		
No	-15	204-072-924-5	SP7109-51	UH-1N (N/M)	Military wiring
Yes	-17, -25, -101, -103	204-072-924-7	SP7109-62	204B, 205A-1, 212, 205A, UH-HRS, UN-1N, 205, 412, 412NB, UH-1H	New bolts, PMA plate

Disassembly Procedures

1. Cut and remove all lockwire.
2. Remove name plate if mutilated or illegible
3. Remove pivot plates (52 and 53) by removing bolt (6), nut (7), washer (8) and cotter pin (9).
4. Remove pivot springs (54 and 55) note the pivot springs are left and right, keep the pivot springs with the appropriate pivot. Remove the keeper (57).
5. Remove bolts (3), nuts (5), and washers (4).
6. Remove connector (36) from solenoid cover (35) by removing screws (37), disconnect lead wires from connector contact pins (36).
7. Remove solenoid cover (35) by removing screws (34).
8. Lift the cover (24) carefully from case (12)
9. Disconnect pink leadwires from terminals of switch (83). Remove wiring including both switches from the case.
10. Remove switch actuator (84).

Disassembly Procedures, continued

11. Remove lever, latch and shaft assembly (27) as an assembly. Check security of toggle pins and toggle links. If pins are loose the assembly must be replaced with a serviceable assembly.
12. Detach toggle spring (94) from shaft and arm assembly by removing roll pin (pin in 27 assembly).
13. Remove solenoid assembly from case (12) by removing nuts (85).
14. Remove return spring (75).
15. Remove load beam (56) from trunnion (46). Trunnion spring is under compression. Restrain trunnion spring while removing load beam to prevent possible injury should trunnion spring fly free.
16. Press out pin (49) from the trunnion (46) and remove arm assembly (46), from the case (12).
17. Remove plunger (59) and trunnion spring (60) from trunnion (46).
18. Remove bumpers (80 and 82) and stop (87) from case (12).
19. Remove release cover (70) from cover (24) by removing screws (73) and spacers (72).
20. Remove release arm spring (74) and indicator (69).
21. Remove release arm assembly (41) from cover (24). Remove screws (44) and washer (45) from arm (41). Press roll pin out of arm.

Assembly Procedures

1. Smooth contacting surfaces of the latch and the load beam with emery cloth as necessary.
2. Replace all cotter pins that have been removed at disassembly.
3. Replace all parts found to be damaged with serviceable parts.
4. Install trunnion (46) in case (12). Align arm assembly (46) over end of trunnion. Align pin holes in both parts and press in roll pin (49).
5. Install trunnion spring (60) and plunger (59) in trunnion (46). Compress spring and install load beam (56) over trunnion (46).
6. Install return spring (75) between arm assembly (46) and support (13).
7. If new solenoid is being installed cut one solenoid leadwire to length of 10 ±1/2 in. and install a new terminal on this leadwire. Cut other solenoid leadwire to length of 8 ± 1/2".
8. If new solenoid is being installed, rotate solenoid shaft counterclockwise to stop position. Align holes in sleeve within 0.003 in. on center-line between holes for pins and press sleeve onto solenoid shaft. Using holes in sleeve, drill 0.1560 to 0.1568 in. diameter hole through solenoid shaft. Hole shall be positioned 0.344 in. from face of solenoid. Press in pin centered in solenoid shaft within 0.005 in.
9. Apply RTV sealant to solenoid (40) to the solenoid mating surfaces. Insert studs of solenoid (40) through mounting holes in case (12). Install nuts (85) on solenoid mounting studs. Stake nut in place.
10. Install toggle spring (94) to shaft and arm using roll pin (64).
11. Install shaft and arm and link and lever assembly (27) in case (12).
12. Attach one end of toggle spring (94) to shaft (65) installed over pin (21).
13. Route solenoid pink wire with terminal end through wire hole in case (12). Attach the pink wire to switch (83) terminal #2. Attach the blue wire to switch terminal #1.
14. Install wiring harness. Seat switches (83) over the pins (16 and 17).
15. Install switch actuator (84).
16. Route all wires outside case through wiring hole and seal with RTV to form watertight seal.
17. Install linkage stop (87), latch bumper (82), and beam bumper (80) in case (12).
18. Coat all moving parts with grease, MIL-G-23827.
19. Coat mating surfaces of cover (24) and case (12) with RTV sealant, Install cover over parts assembled in case.

Assembly Procedures, continued

20. Install bolts (3), nuts (5), washers (4) to secure case (12) and cover (24).
21. Install pivot springs (54 and 55) and keeper (57) between pivot plates (52 and 53). Secure assembled parts using bolt (6), nut (7), washer (8), and cotter pin (9).
22. Install screw (44) and washer (45) in arm (41). Back off screw until screw end is flush with inner face of fork at end of arm (41). Stake center of screw.
23. Install release arm assembly (41) over shaft and arm assembly (27).
24. Install indicator (69) in release arm assembly (41).
25. Engage end of release arm spring (74) in hole in release cover (70). Apply Loctite to threads of screws (73). Install release cover using screws and spacers (72).
26. Pass end of electrical wires through connector hole in solenoid cover (35). Attach solenoid cover (35) to case (12) with screws (34). Secure screws (34) with lockwire.
27. Solder pink wire to pin B, solder blue wire to pin C of connector (36) remaining wires are not used secure and isolate.
28. Attach the connector (36) to the solenoid cover (35) with screws (37). Secure the screws with lockwire.
29. Replace the data plate if removed.
30. Paint as desired. Do not paint the keeper, load beam or any of the internal load bearing members.
31. Test assembled Cargo Hook using the Acceptance Test Procedures listed in Section 4.
32. Fill out and affix Overhaul Label (P/N 215-206-00).

Section 6
Certification

STC

United States of America
Department of Transportation—Federal Aviation Administration

Supplemental Type Certificate

Number **SR00277SE**

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 * of the * Regulations.*

Original Product—Type Certificate Number: *See attached Approved Model List (AML)
Make: No. SR00277SE for list of approved rotorcraft
Model: models and applicable airworthiness regulations

Description of the Type Design Change: Fabrication of Onboard Systems Model 528-002-00 or 528-002-01 cargo hook in accordance with FAA approved Onboard Systems Master Drawing List No. 155-028-00, dated November 10, 1995, or later FAA approved revision; and installation of these hooks in accordance with FAA approved Onboard Systems Owner's Manual No. 120-044-00, dated November 10, 1995, or later FAA approved revision. Inspect these cargo hooks in accordance with Section 4 of Onboard Systems Owner's Manual No. 120-044-00, dated November 10, 1995, or later FAA approved revision.

Limitations and Conditions: Approval of this change in type design applies to the Bell rotorcraft models listed on AML SR00277SE, dated January 18, 1996, or later FAA approved revision, which were previously equipped with an FAA approved installation of the following cargo hooks: Bell P/N 204-072-924-1 or -7, or Breeze Eastern P/N SP7109-1, -11 or -62. 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. No Rotorcraft Flight Manual change is required for this installation. A copy of this Certificate and AML SR00277SE 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 the permission.

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: November 17, 1995
Date of issuance: January 18, 1996

Date reissued:
Date amended: January 13, 2003

By direction of the Administrator

(Signature)

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.

This certificate may be transferred in accordance with FAR 21.47.

FAA FORM 8110-2(10-68)

ONBOARD SYSTEMS
FAA APPROVED MODEL LIST (AML) NO. SR00277SE
FOR
INSTALLATION OF CARGO HOOKS

Original Issue: January 18, 1996

Item	AIRCRAFT MAKE	AIRCRAFT MODEL	ORIGINAL TYPE CERT. NO.	CERT. BASIS FOR ALTERATION	FAA DRAWING LIST NO.	REVISION NO. AND DATE	RFM SUPPLEMENT NO. &DATE	AML AMENDMENT DATE
1	Bell	204B 205A 205A-1	H1SW	CAR 7, dtd. 8/1/58 & amendments 7-1 through 7-4, Category B	155-028-00	11/10/95	N/A	1/18/96
2	Bell	212 412 412EP	H4SW	FAR Part 29, dtd. 2/1/65 & Amendments 29-1 and 29-2. See TCDS H4SW for additional information	155-028-00	11/10/95	N/A	1/18/96

FAA Approved: _____
Manager, Special Certification Branch, ANM-190S
Seattle Aircraft Certification Office

STA

DEPARTMENT OF TRANSPORT

Supplemental Type Approval

Number: SH96-77

This approval is issued to:

Onboard Systems
11212 NW Saint Helens Rd.
Portland, Oregon
97231 USA

Issue No.: 1

Approval Date: 21 June, 1996

Issue Date: 24 June, 1996

Responsible Region Pacific

Aircraft/Engine Type or Model: Refer to attached FAA Approved Model List (AML) No. SR00277SE for list of approved rotorcraft models and applicable airworthiness regulations.

Canadian Type Approval or Equivalent:

Description of Type Design Change:
Installation of the Onboard Systems Model 528-002-00 or 528-002-01 cargo hook in accordance with FAA STC SR00277SE.

Installation/Operating Data, Required Equipment and Limitations:

Fabrication of Onboard Systems Model 528-002-00 or 528-002-01 cargo hook is to be carried out in accordance with FAA Approved Onboard Systems Master Drawing List No. 155-028-00, dated November 10, 1995, or later FAA approved revision. Installation of these hooks is to be done in accordance with FAA approved Onboard Systems Owners Manual No. 120-044-00, dated November 10, 1995, or later FAA approved revision.

Required Equipment:
Inspection of the cargo hooks is to be done in accordance with Section 4 of the Onboard Systems Owners Manual No. 120-044-00, dated November 10, 1995, or later FAA approved revision.

Approval of this change in type design applies to only those Bell rotorcraft models listed on AML No. SR00277SE, dated January 18, 1996, or later FAA approved revision, which were previously equipped with an FAA approved installation of the following cargo hooks, Bell P/N 204-072-924-1 or -7, or Breeze-Eastern Cargo Hook P/N SP7109-1, -11 or -62.

Conditions: This approval is only applicable to the type / model of aeronautical product specified therein. Prior to incorporating this modification, it shall be established that the interrelationship between this change and any other modification(s) incorporated will not adversely affect the airworthiness of the modified product.

L.B. Samoil

For Minister of Transport

Canada

26-0357 (10-88)

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MANUFACTURE SUPPLIED

ROTORCRAFT FLIGHT MANUAL SUPPLEMENT

Bell Helicopter Models
204B, 205A, 205A-1, 212, 412 & 412EP

R/N _____ **S/N** _____

FAA Approved: for Jeffrey A. Morfitt
Manager, Special Certification Branch
Seattle Aircraft Certification Office

Date: MAY 26 1999
Revised:

INTRODUCTION

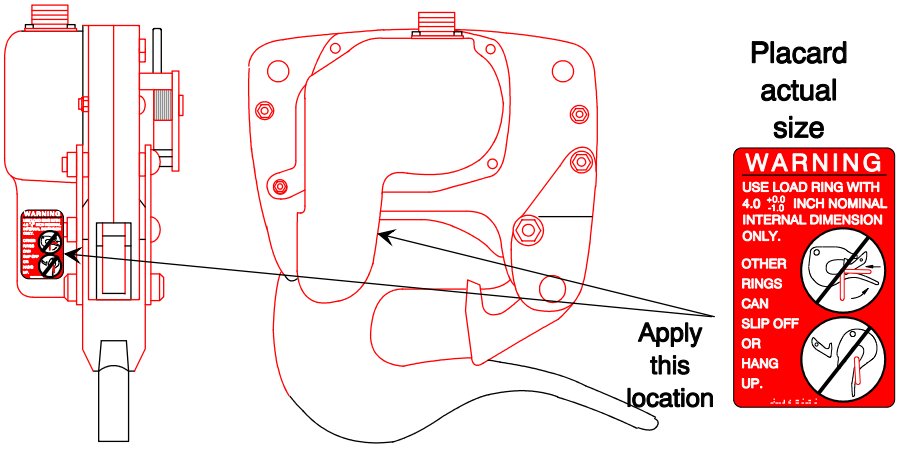
This supplement must be attached to the appropriate approved Bell Rotorcraft Flight Manual when an Onboard Systems 528-002-00 or 528-002-01 Cargo Hook is installed in accordance with Supplemental Type Certificate (STC) NO. SR00277SE. The information contained herein supplements or supersedes the basic 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

The basic Flight Manual remains applicable.

- Ensure that the following placard is mounted in the location shown in full view of the cargo hook operator.

WARNING. USE LOAD RING WITH 4.0 +0.0 -1.0 INCH NOMINAL INTERNAL DIMENSION ONLY. OTHER RINGS CAN SLIP OFF OR HANG UP.



II. PERFORMANCE

The basic Flight Manual remains applicable.

III. PROCEDURES

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.

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.
Cycle the manual release mechanisms to ensure proper operation.
Cycle the electrical release mechanisms to ensure proper operation.

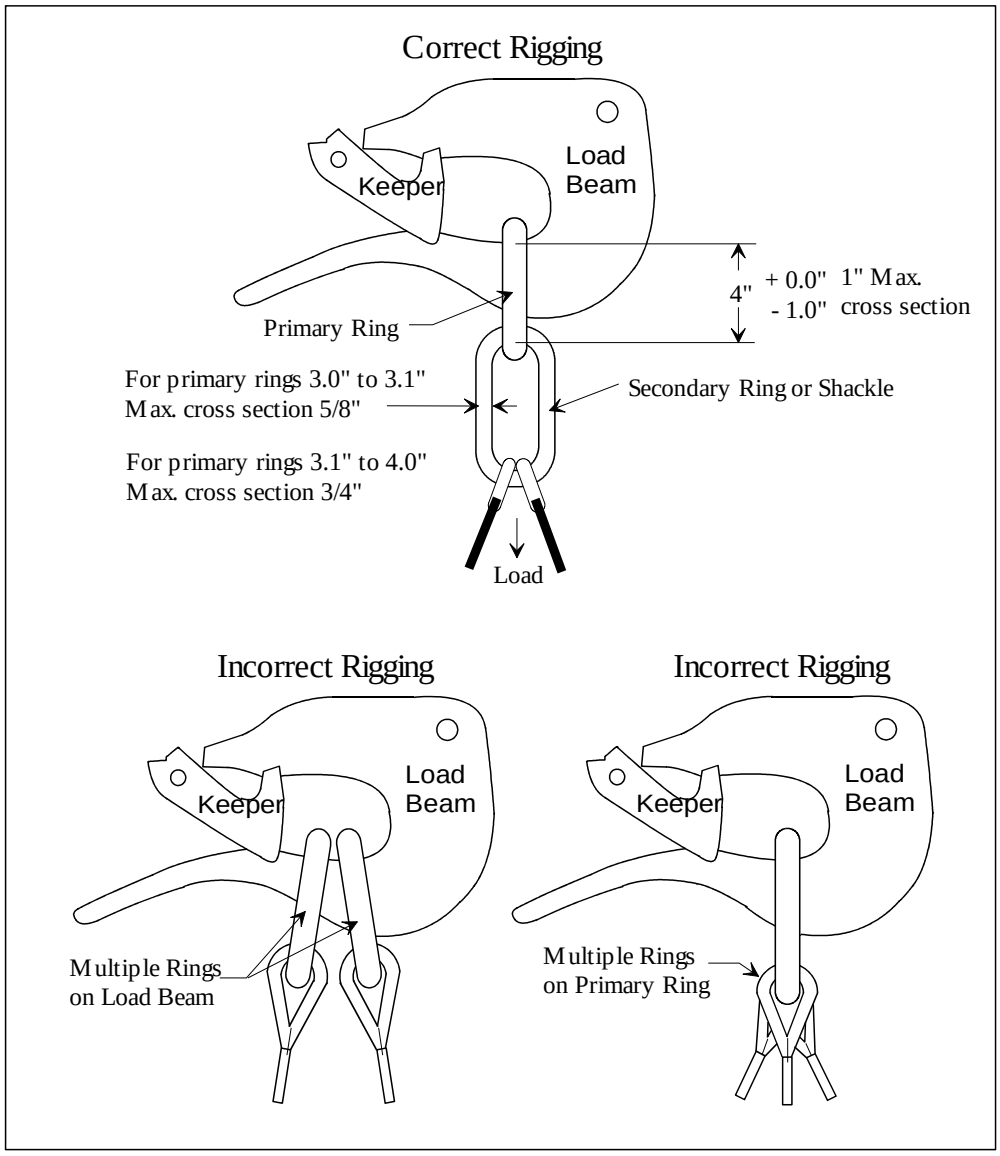
III. PROCEDURES, continued

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

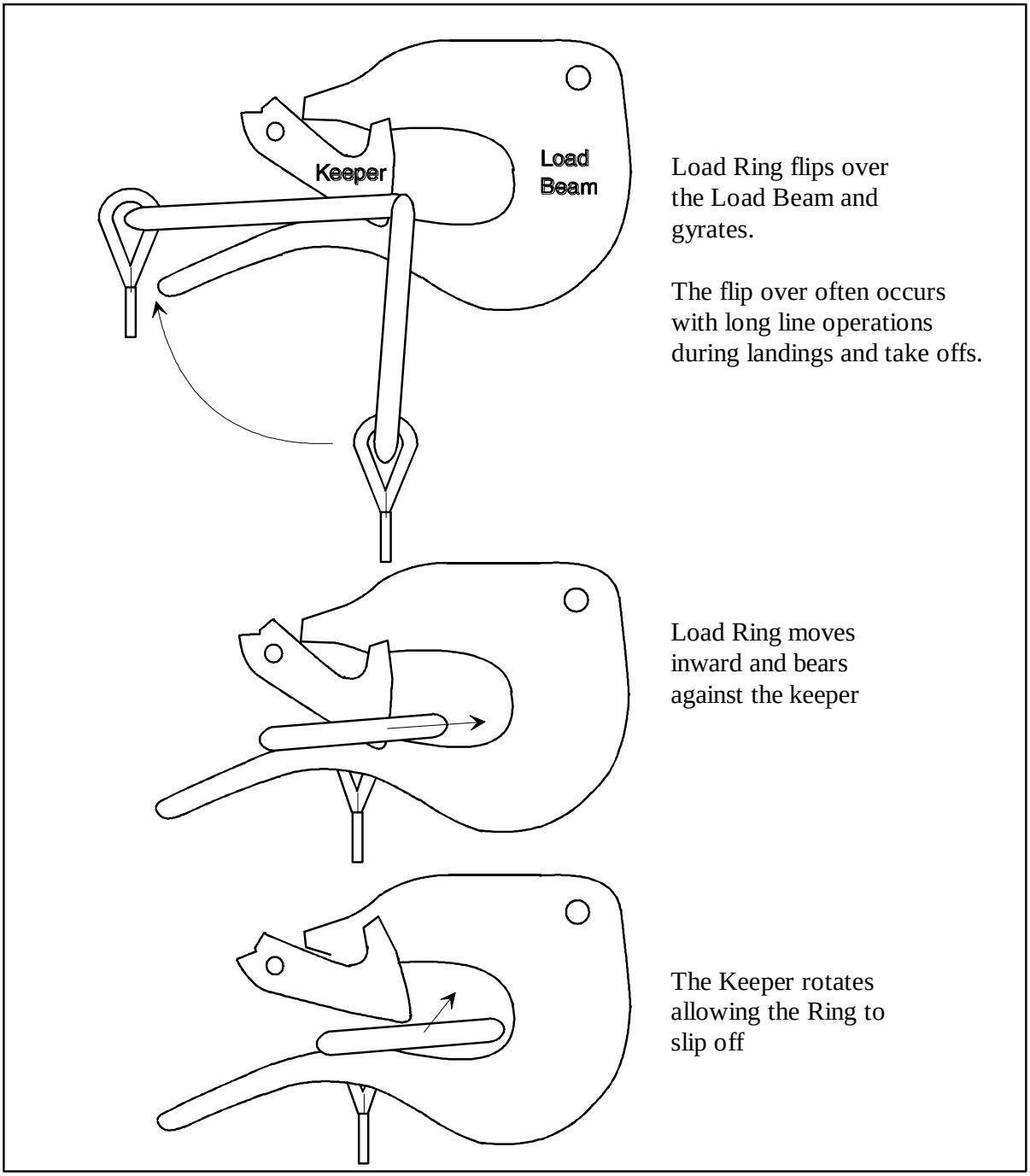


III. PROCEDURES, continued

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

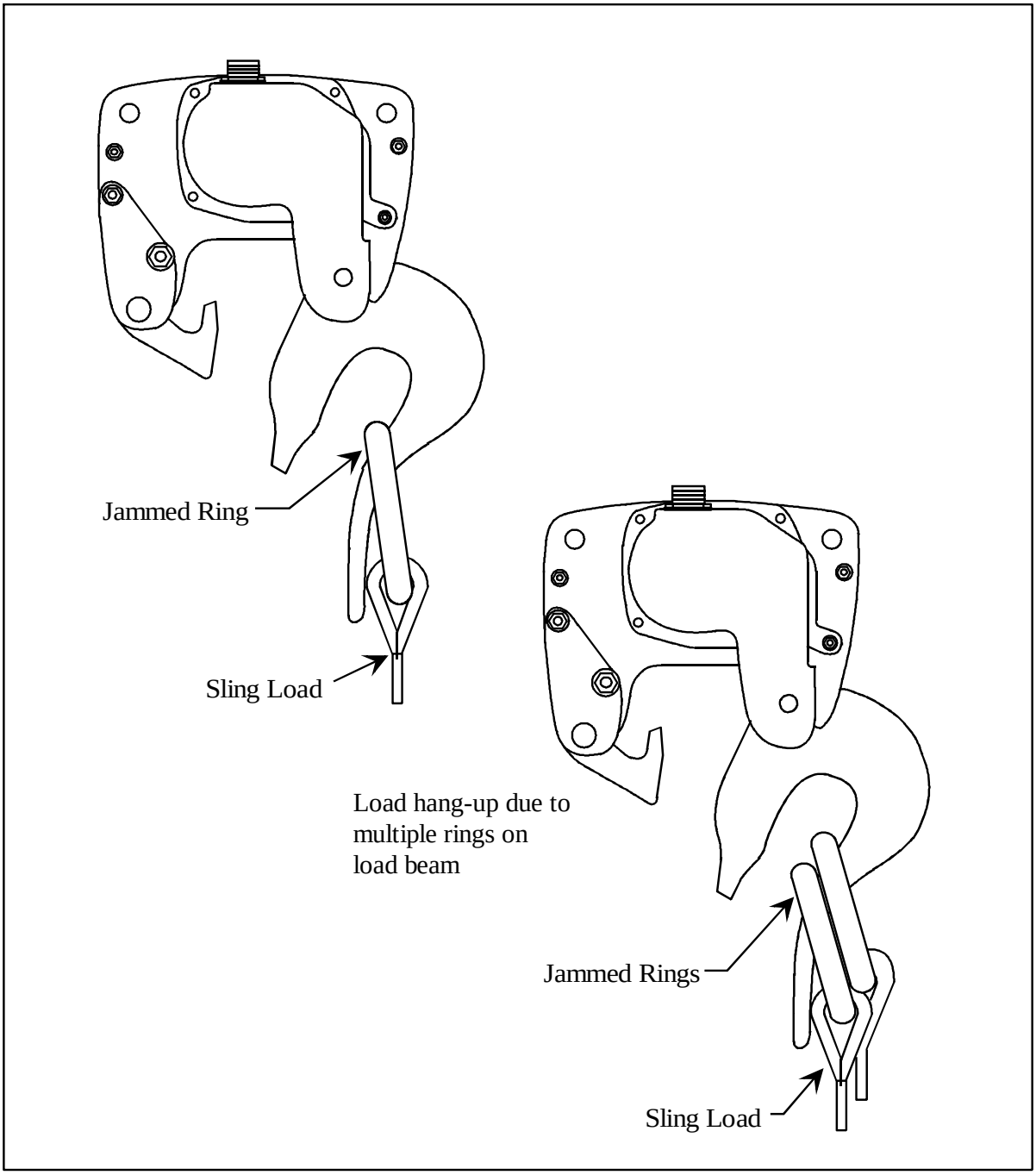


III. PROCEDURES, continued

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

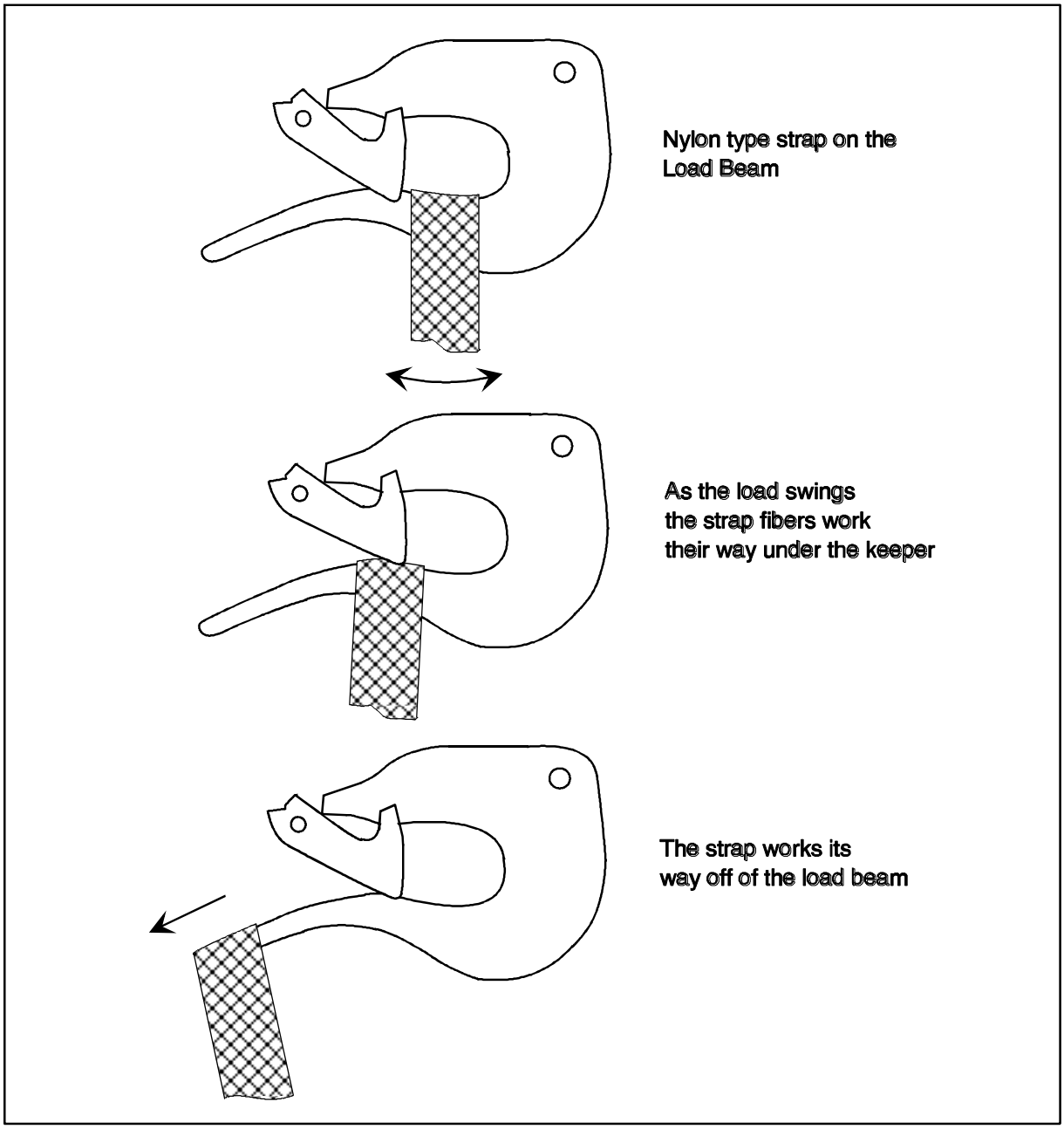


III. PROCEDURES, continued

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

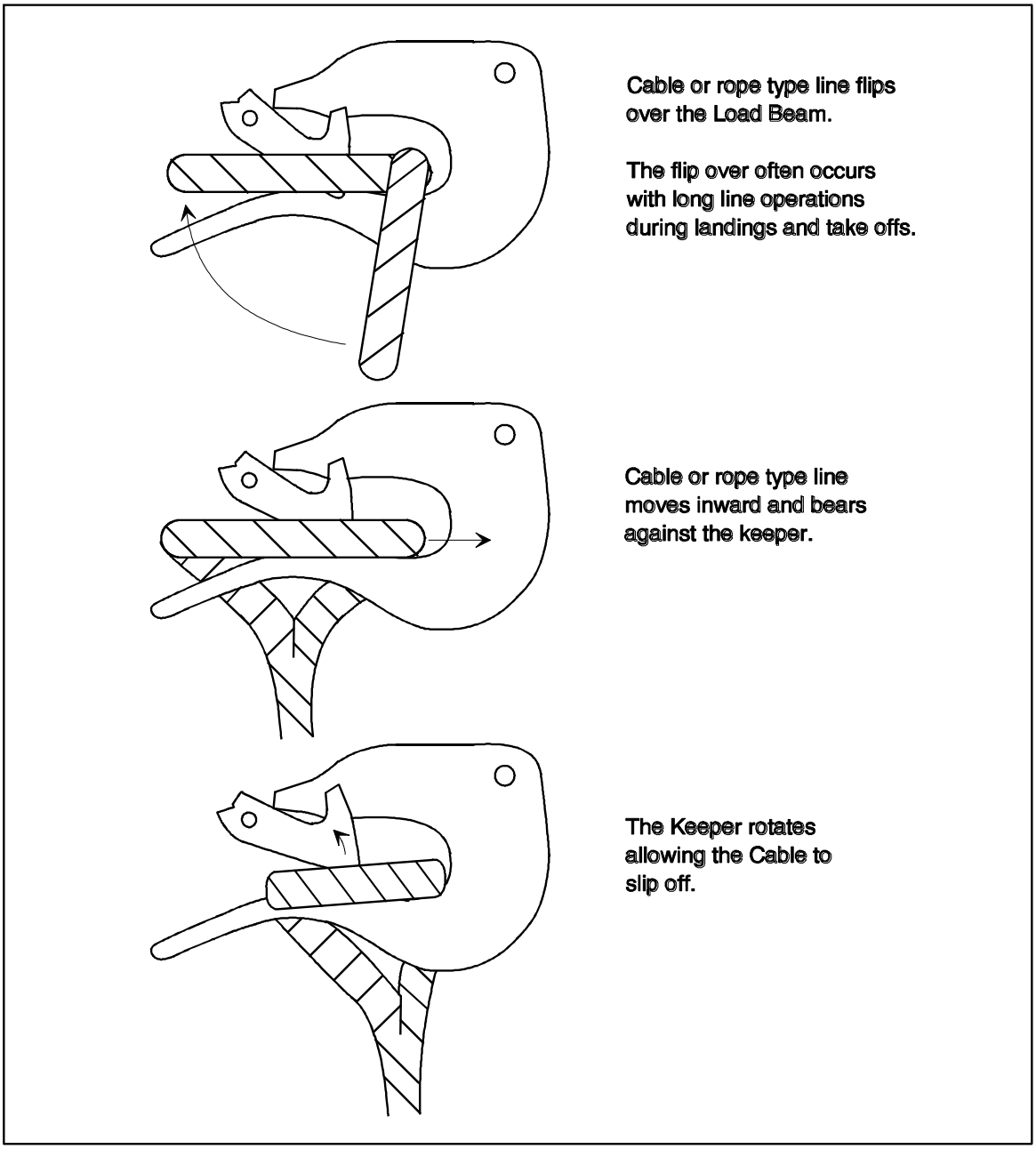


III. PROCEDURES, continued

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



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