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

UH-1 CARGO HOOK SUSPENSION SYSTEM

For the Bell 204, 205, 210, 212, and 412 series, Agusta AB412 series, and Garlick UH-1H series helicopters

Owner's Manual

STC SH5707NM

Owner's Manual Number 120-031-01
Revision 35
February 23, 2017

ONBOARD™ SYSTEMS INTERNATIONAL

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

This page intentionally left blank.

RECORD OF REVISIONS

Revision	*Date*	*Page(s)*	*Reason for Revision*
25	02/06/09	8-7 & 8-9	Added the following parts to Overhaul Kit BOM: 650-064-00 (Qty 2), 650-065-00 (Qty 2), 650-063-00 (Qty 2), 510-215-00 (Qty 3) & 510-216-00 (Qty 4).
26	06/23/09	7-2 to 7-8	Added magnetic particle testing option for 232-011-00 load bolt. Added note allowing bearing to be left in place during NDT testing of housing.
27	3/2/10	TOC, Section 5 & 7-9	Updated manual to reflect new load weigh harness configuration. Changed overhaul frequency criteria.
28	11/02/10	Section 1, 2-1, 2-6, Section 3, 5-3, 5-4, 6-8, 6-9, 6-12, 7-9, 7-20, 7-16 & 8-6	Updated Overhaul Kit BOM to show four instances of screw P/N 510-131-00 replaced by superseding screw, P/N 510-317-00. Updated return information to include RMA procedures. Replaced warnings, cautions and notes section with safety labels sections. Updated safety label format to current format throughout document.
29	03/23/12	7-14	Added Overhaul label (P/N 215-260-00) to overhaul kit (P/N 212-022-00).
30	04/18/12	TOC & Section 8	Removed maintenance information for 528-002-00 hook, replaced with reference to 120-044-00.
31	11/02/12	1-3 & 7-13	Replaced 215-048-00 with 215-290-00.
32	03/18/13	1-3, Section 7	Removed suspension maintenance information and replaced with reference to manual 122-028-00.
33	03/21/13	1-3	Replaced indicator in kit 200-151-01 with 210-095-02.
34	06/12/13	1-3	Replaced bolt P/N 510-162-00 with P/N 510-314-00.
35	02/23/17	1-3, Sections 4 thru 8	Listed Load Cell Assembly P/N 210-088-02 as optional under kit P/N 200-089-03. Removed C-39 indicator operation instructions and replaced with reference to 120-039-00.

Register Your Products for Automatic Notifications

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

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

This page intentionally left blank.

CONTENTS

Section 1 ***Suspension System General Information***
Introduction, 1-1
Safety Labels, 1-2
System Part Numbers, 1-2
Bill of Materials, 1-3
Inspection, 1-4

Section 2 ***Suspension System Installation Instructions***
Suspension System Installation, 2-1
Suspension System Detail, 2-2
Suspension System Manual Release Arrangement, 2-3
Suspension System Manual Release Adjustment, 2-4
Suspension System Electrical Release Installation, 2-5
Ground Wire Installation, 2-5
Multi-Channel Slip-Ring Electrical Installation, 2-5
Suspension System Installation Check-Out, 2-6
Component Weights, 2-7
Paper Work, 2-7

Section 3 ***Suspension System Operation Instructions***
Suspension System Operating Procedures, 3-1
Bumper Lubrication, 3-1
Cargo Hook Rigging, 3-2
Un-Commanded Release Due to Too Large of a Load Ring, 3-3
Load Hang-Up Due to Too Small or Multiple Load Rings, 3-4
Un-Commanded Release Due to Nylon Type Straps, 3-5
Un-Commanded Release Due to Cable or Rope Type Straps, 3-6

Section 4 ***Load Weigh General Information***
Introduction, 4-1
Indicator Features, 4-1
Indicator Specifications, 4-2
Indicator Pin Out, 4-3
Load Cell Specifications, 4-3

Section 5 ***Load Weigh Installation Instructions***
Introduction, 5-1
Installation Overview, 5-1
Indicator Internal Back Light, 5-2
Indicator Hook-Open Warning, 5-2
Remote Analog Meter, 5-2
Load Weigh Internal Harness Installation, 5-3
Load Weigh Electrical Connections, 5-4
Load Weigh Installation Check-Out, 5-4

Section 6 ***System Maintenance***
Instructions For Returning a System to the Factory, 6-2

Section 7 ***Cargo Hook Maintenance***

Section 8 ***Certification***
STC, 9-1
Approved Model List, 9-3
STA, 9-4

Figures

2-1 Suspension System Detail, 2-2
2-2 Suspension System Manual Release Arrangement, 2-3
3-1 Examples of Correct & Incorrect Cargo Hook Rigging, 3-2
3-2 Un-Commanded Release, Too Large of a Load Ring, 3-3
3-3 Load Hang-Up, Too Small or Multiple Load Rings, 3-4
3-4 Un-Commanded Release, Nylon Type Straps, 3-5
3-5 Un-Commanded Release, Cable or Rope Type Straps, 3-6
5-1 Installation Overview, 5-1
5-2 Wiring Arrangement, 5-3

Tables

1-1 System Part Numbers, 1-1
1-2 Bill of Materials, 1-3
2-1 Component Weights, 2-7
4-1 Indicator Specifications, 4-2
4-2 Indicator Pin Out, 4-3
4-3 Load Cell Specifications, 4-3

Section 1
Suspension System General Information

Introduction

The Suspension Systems are replacements for the Bell 204-072-915-103 Suspension System. The Suspension System is approved for loads up to 5,000 pounds (2,267 kgs). See the basic rotorcraft flight manual for the capacity of a specific helicopter. The system attaches to the existing Bell hard point and utilizes the Bell provisions kit. Before installation ensure that the appropriate Bell provisions kit is correctly installed and operational. The cargo hook Suspension System hangs at approximately the center of gravity attached to a lateral beam. It extends through an opening in the bottom of the lower fuselage skin. The cargo hook unit is a horizontal loading type with provisions for both an electrical and a manual controlled release.

The Suspension System is equipped with an innovative Bumper Ring assembly. The bumper ring is molded from a resilient polymer to eliminate the fracturing problem common with the original equipment bumper.

The Suspension System is also equipped with a Multi-Channel Slip-Ring assembly that can be used to supply electrical power and control signals to accessory equipment suspended from the rotating cargo hook.

The Load Weigh System is a compliment to the helicopter lifting system. Its purpose is to display the weight of the load carried on the cargo hook. The Load Weigh System consists of three components, the cockpit mounted Indicator, the Internal Harness and the Load Cell.

Safety Labels

The following definitions apply to safety labels used in this manual.

Indicates a hazardous situation which, if not avoided, will result in death or serious injury.

Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

Draws the reader's attention to important or unusual information not directly related to safety.

Used to address practices not related to personal injury.

System Part Numbers

Table 1-1 System Part Numbers

Part No.	Description
200-088-03	System w/o Load Weigh
200-089-03	System w/ Load Weigh
200-088-04	System w/o Load Weigh
200-089-04	System w/ Load Weigh
200-089-05	System w/ Load Weigh
200-089-06	System w/ Load Weigh
200-151-01**	Load Weigh System

** The 200-151-01 Load Weigh System is an upgrade kit for operators with 200-088-03 and 200-088-04 kits. Installation of this kit onto a helicopter equipped with a part number 200-088-03 or 200-088-04 suspension system converts the system part number to a 200-089-05 or 200-089-06 respectively.

Bill of Materials

The following items are included with each system, if shortages are found contact the distributor from whom the system was purchased.

Table 1-2 Bill of Materials

Number	Description	200-088-03 Qty	200-089-03 Qty	200-088-04 Qty	200-089-04 Qty	200-089-05 Qty	200-089-06 Qty	200-151-01 Qty
120-031-01	Owner's Manual	1	1	1	1	1	1	1
120-039-00	Owner's Manual, C-39 Indicator	-	1	-	1	1	1	1
122-028-00	Component Maintenance Manual	1	1	1	1	1	1	1
121-027-00	RFMS	1	1	1	1	1	1	1
232-130-00*	UH-1 Sub-Assembly	1	1	1	1	1	1	-
232-010-00*	Clevis Assembly	1	1	1	1	1	1	-
232-011-00*	Load Bolt Assembly	2	2	2	2	2	2	-
232-009-01*	Load Link Assembly	1	-	1	-	-	-	-
210-088-01*	Load Cell Assembly	-	1	-	1	-	-	-
210-088-02*	Load Cell Assembly	-	opt	-	-	1	1	1
510-097-00*	Washer	2	2	2	2	2	2	-
510-096-00*	Nut	2	2	2	2	2	2	-
510-098-00*	Cotter Pin	2	2	2	2	2	2	-
528-001-00	Cargo Hook, Green W/Silver Load Beam	-	-	1	1	-	1	-
528-002-00	Cargo Hook, Gray W/ Silver Load Beam	1	1	-	-	1	-	-
528-004-00	Cargo Hook, Gray W/ Black Load Beam	opt	opt	opt	opt	opt	opt	-
220-025-03	Bumper Ring	1	1	1	1	1	1	-
290-210-01	Small Spacer	2	2	2	2	2	2	-
510-314-00	Bolt	1	1	1	1	1	1	-
510-104-00	Nut	1	1	1	1	1	1	-
290-209-01	Large Spacer	2	2	2	2	2	2	-
510-161-00	Bolt	1	1	1	1	1	1	-
510-129-00	Nut	1	1	1	1	1	1	-
268-002-00	Cable Assembly	1	1	1	1	1	1	-
210-180-24	Analog Meter	opt	opt	opt	opt	opt	opt	-
215-290-00	Data Tag	1	1	1	1	1	1	-
210-095-00**	C-39 Indicator, 28V	-	1	-	1	1	1	opt
210-095-02**	C-39 Indicator, 5V	-	opt	-	opt	opt	opt	1
270-044-01	Harness Assembly	-	1	-	1	1	1	1
400-048-00	Power Switch	-	1	-	1	1	1	1
215-010-00	Placard	-	2	-	2	2	2	2
215-012-00	Placard	-	1	-	1	1	1	1
512-001-00	Ty-Wrap	-	10	-	10	10	10	10
512-002-00	Ty-Wrap	10	10	10	10	10	10	-
510-028-00	Screw	-	4	-	4	4	4	4
510-029-00	Nut	-	4	-	4	4	4	4
270-059-00	Optional Equip. Harness	-	opt	-	opt	opt	opt	opt

* These items were previously included in P/N 210-120-00 (w/o load cell) and P/N 210-120-01 (with load cell).

** 210-095-00 and 210-095-02 Indicators are compatible with 200-089-03, 200-089-04, 200-089-05, 200-089-06 and 200-151-01. Verify Indicator voltage matches aircraft lighting system voltage.

Inspection

Inspect each component for evidence of mishandling and damage. If damage is evident, do not use it. File a claim with the carrier and notify the distributor from whom the system was purchased.

Section 2
Suspension System Installation Instructions

Suspension System Installation

The Suspension System interfaces with several Bell components. Before installation, have available and be familiar with the Bell Service Instructions 204-3 or 212-5, or later bulletins.

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, see the next section, *Suspension System Detail.*

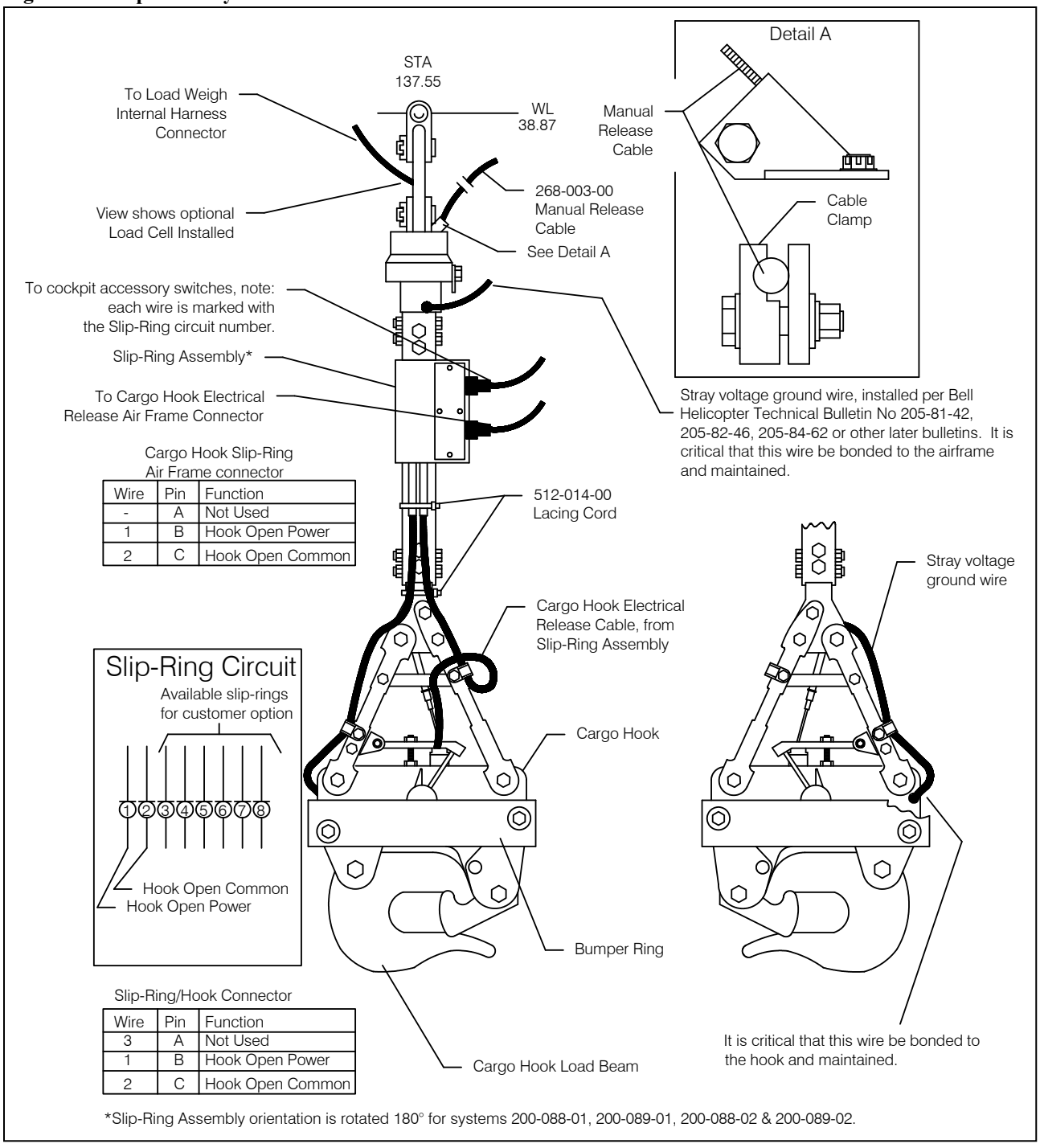
Install the bolt, washer and nut provided with the Bell provisions kit. These fasteners are not part of the Suspension System supplied items. See the appropriate Bell service instructions for the correct installation, torque values and maintenance.

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, P/N 268-003-00, 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 outer housing (conduit) of control cable assembly, 268-003-00, 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 inch from clamp, 204-070-996-1.

Suspension System Detail

Figure 2-1 Suspension System Detail



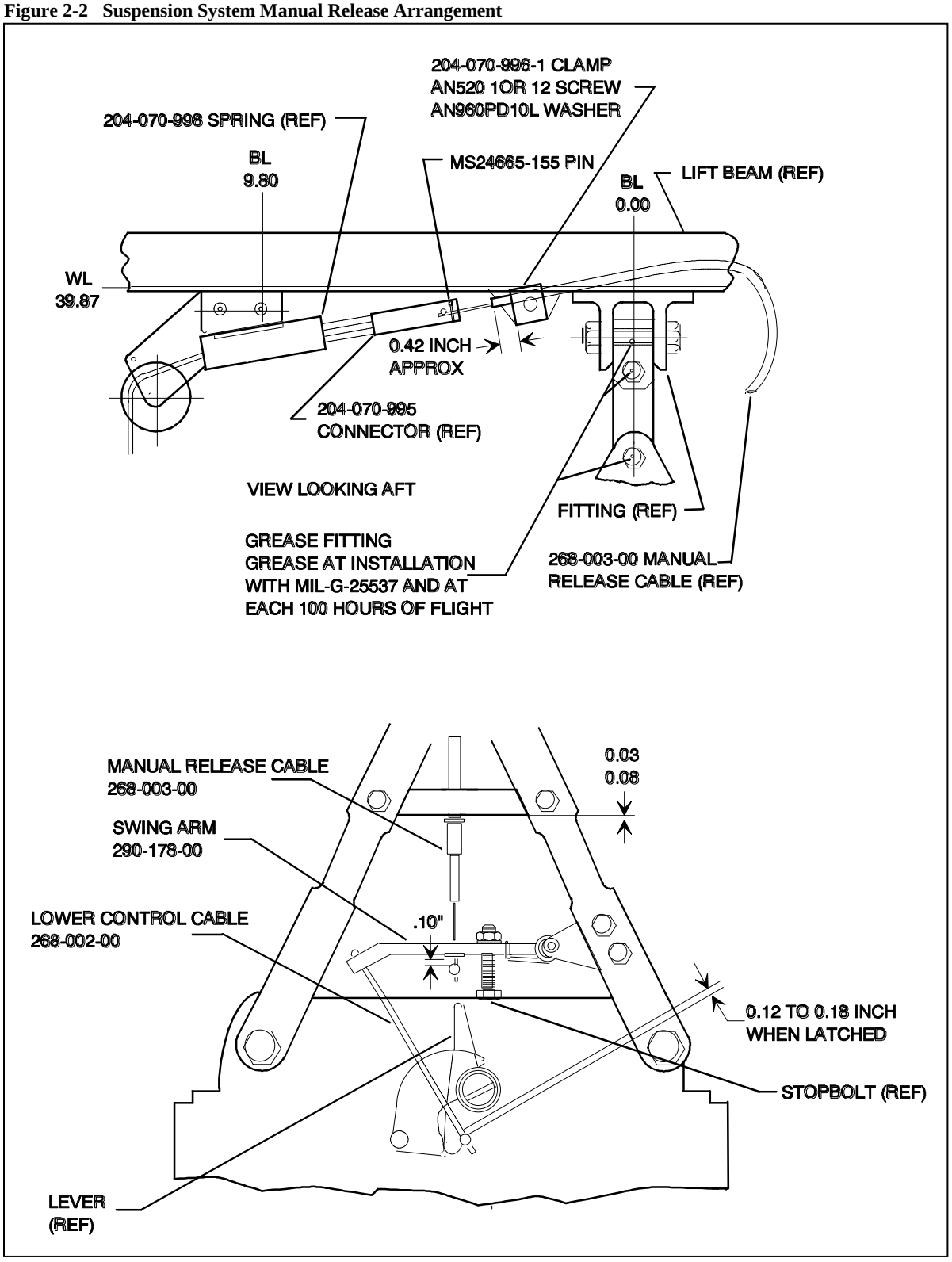
Wire	Pin	Function
-	A	Not Used
1	B	Hook Open Power
2	C	Hook Open Common

Wire	Pin	Function
3	A	Not Used
1	B	Hook Open Power
2	C	Hook Open Common

*Slip-Ring Assembly orientation is rotated 180° for systems 200-088-01, 200-089-01, 200-088-02 & 200-089-02.

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 assembly, P/N 268-003-00, 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. Alternatively the 0.10 clearance may be measured at the 204-070-995 connector with the cable ball terminal pulled against the swing arm.

The stop bolt of the swing arm, 290-178-00, 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 inch when the hook is rigged, the load beam is latched and the manual release lever is against its stop. It may be necessary to turn the lever slightly clockwise (against return spring pressure) to line up the red timing marks to achieve the 0.12 to 0.18 dimension. In no case should it be necessary to rotate the manual release lever to a position past the red timing marks to achieve the rigging dimensions. If adjustment is made to the stop bolt in order to obtain proper clearance, recheck adjustment of control cable and conduit.

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

- Ensure that the spring assembly, 204-070-998, **does not** bottom. See the previous section. If the spring assembly should bottom, return the cargo release 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, 204-072-928, is full up. Ensure lever is not stopped by the bottom end of the control cable outer housing. See the previous section, *Suspension System Manual Release Arrangement.*
- Ensure cargo hook load beam unlocks.
- Release the cargo release pedal, and ensure cables, 268-003-00 and 268-002-00, return to locking position. See the previous section.

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 it into place, see the *Suspension System Detail* section of this manual.

Check the manual release cable assembly and the electrical release cable to ensure enough slack is present to allow full swing of the suspension assembly without straining or damaging the cables.

Ground Wire Installation

Bell Helicopter troubleshooting information from the field has revealed the possibility of stray voltage existing on the contacts of the cargo release relay. To preclude the inadvertent actuation of the cargo hook due to the possible existence of this stray voltage, it is required that a ground path from the airframe to the Suspension System be provided.

The Suspension System ground wire is connected to the cargo hook manual release bracket, see the *Suspension System Detail* section. The free end of this wire must be connected to the airframe per Bell Helicopter technical bulletin no. 205-81-42, 205-82-46 and 205-84-62 or other later bulletins. It is essential that the ground path circuit be properly maintained by ensuring tight corrosion-free connections; see the section, *Suspension System Parts List*.

Multi-Channel Slip-Ring Electrical Installation

The Multi-Channel Slip-Ring assembly is a means of supplying electrical power and control signals to the cargo hook and to accessory equipment suspended from the rotating cargo hook suspension system. Two channels of the Slip-Ring assembly are dedicated to the operation of the cargo hook electrical release mechanism. One channel is used to the optional hook open warning light. Five other channels are available to operate suspended equipment such as fire-fighting buckets, agricultural and forest application equipment, logging equipment, construction equipment, and long-line hooks.

The Slip-Ring could be wired so that each piece of individual equipment could have its own switch in the cockpit, connecting through a separate Slip-Ring channel to a common accessory connector (designed by the installer to meet his specific needs) at the hook. Once the Slip-Ring and its control wires are installed, an equipment change would involve simply attaching the equipment to the cargo hook and plugging its control wires into the installer's common equipment connector.

The Onboard Multi-Channel Slip-Ring is offered as a means of passing electrical current across the rotating junction between the helicopter cargo hook suspension system and the suspended load. This assembly must be considered as an electrical part only, and not as a complete electrical system. Onboard has not evaluated any end-to-end use of this part other than the cargo hook electrical release mechanism defined herein and no other use is assumed or implied.

Accordingly, it is the responsibility of the installer and their Authorized Inspector (AI) to verify that each electrical system incorporating this Slip-Ring kit meets the applicable electrical requirements of the Federal Aviation Regulations. All electrical considerations such as electrical load determinations, voltage drops, electrical interference, electrical bus and circuit protections etc. are the responsibility of the end user and may require further FAA approval.

Onboard has accomplished satisfactory electrical load testing of the elements of this Slip-Ring assembly only, and has demonstrated maximum load ratings of 10 amps (continuous) and 30 amps (intermittent for 30 seconds) in the standard 28VDC electrical system. Electrical loading above these currents or time limits may harm the assembly performance.

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 cargo hook is free to move to its full extremes.**
2. Direct an assistant to observe the cargo hook and reset 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 release switch and hold for 2 or 3 seconds. The cargo hook should release.
4. Depress the foot operated mechanical release, the cargo hook should release.
5. Cycle the Slip-Ring accessories several times to ensure proper operation.

Component Weights

Table 2-1 Component Weights

System Part Number		Weight
200-088-01	Suspension System without Load Weigh	29 lbs (13.1 kgs)
200-089-01	Suspension System with Load Weigh	32 lbs (14.5 kgs)
200-088-02	Suspension System without Load Weigh	29 lbs (13.1 kgs)
200-089-02	Suspension System with Load Weigh	32 lbs (14.5 kgs)
200-088-03	Suspension System without Load Weigh	29 lbs (13.1 kgs)
200-089-03	Suspension System with Load Weigh	32 lbs (14.5 kgs)
200-088-04	Suspension System without Load Weigh	29 lbs (13.1 kgs)
200-089-04	Suspension System with Load Weigh	32 lbs (14.5 kgs)
200-089-05	Suspension System with Load Weigh	32 lbs (14.5 kgs)
200-089-06	Suspension System with Load Weigh	32 lbs (14.5 kgs)

Paper Work

Place the Rotorcraft Flight Manual Supplement 121-027-00 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.

This page intentionally left blank.

Section 3
Suspension System Operation Instructions

Suspension System Operating Procedures

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

Refer to Owner's Manual 120-039-00 for operation instructions for the C-39 load indicator.

Cargo is released by use of a button located on the pilot's 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.

Cycle all accessories attached to the cargo hook Slip-Ring to ensure proper operation.

Bumper Lubrication

Some combinations of load weight and airspeed may cause the bumper to bind against the airframe hell hole and the sling load to rotate independently of the suspension system. This situation can lead to inadvertent loss of load. The outside surface of the bumper ring should be lubricated frequently to prevent seizure from occurring.

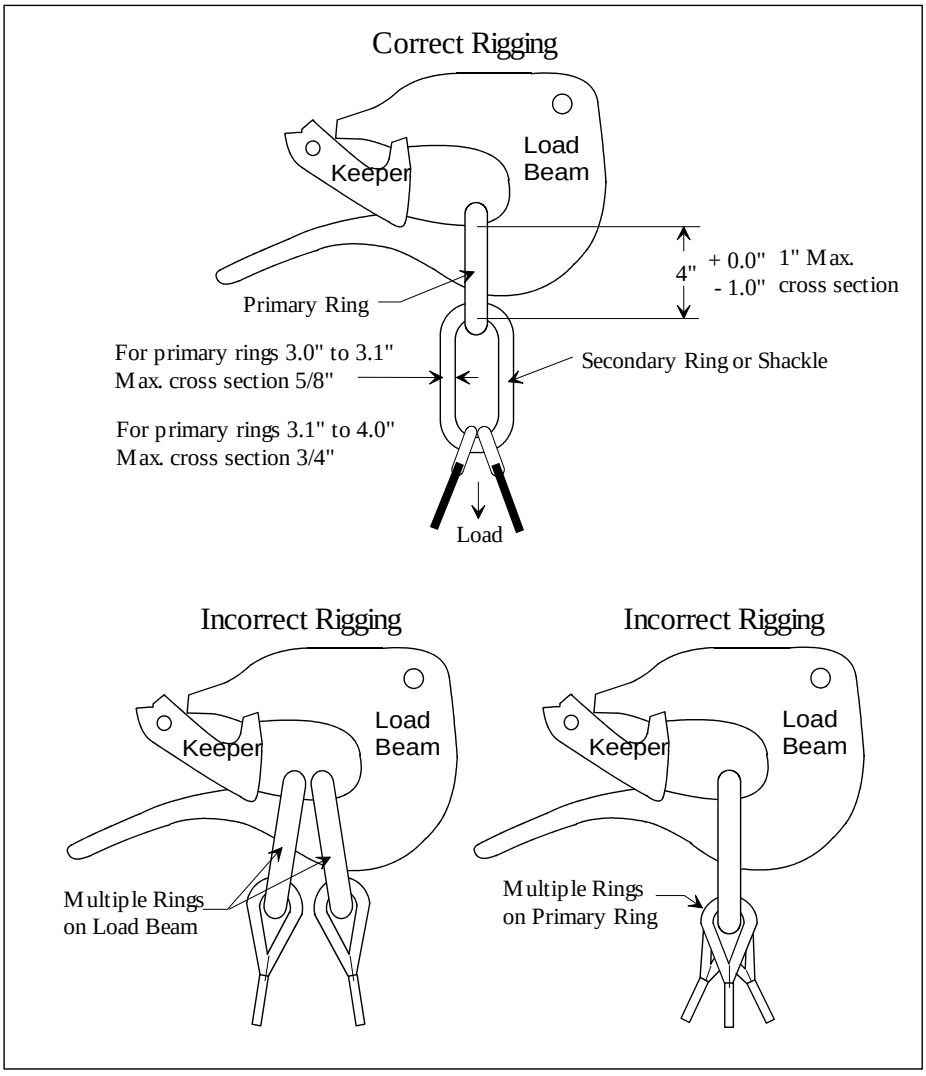
Cargo Hook Rigging

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 3-1 Examples of Correct and Incorrect Cargo Hook Rigging

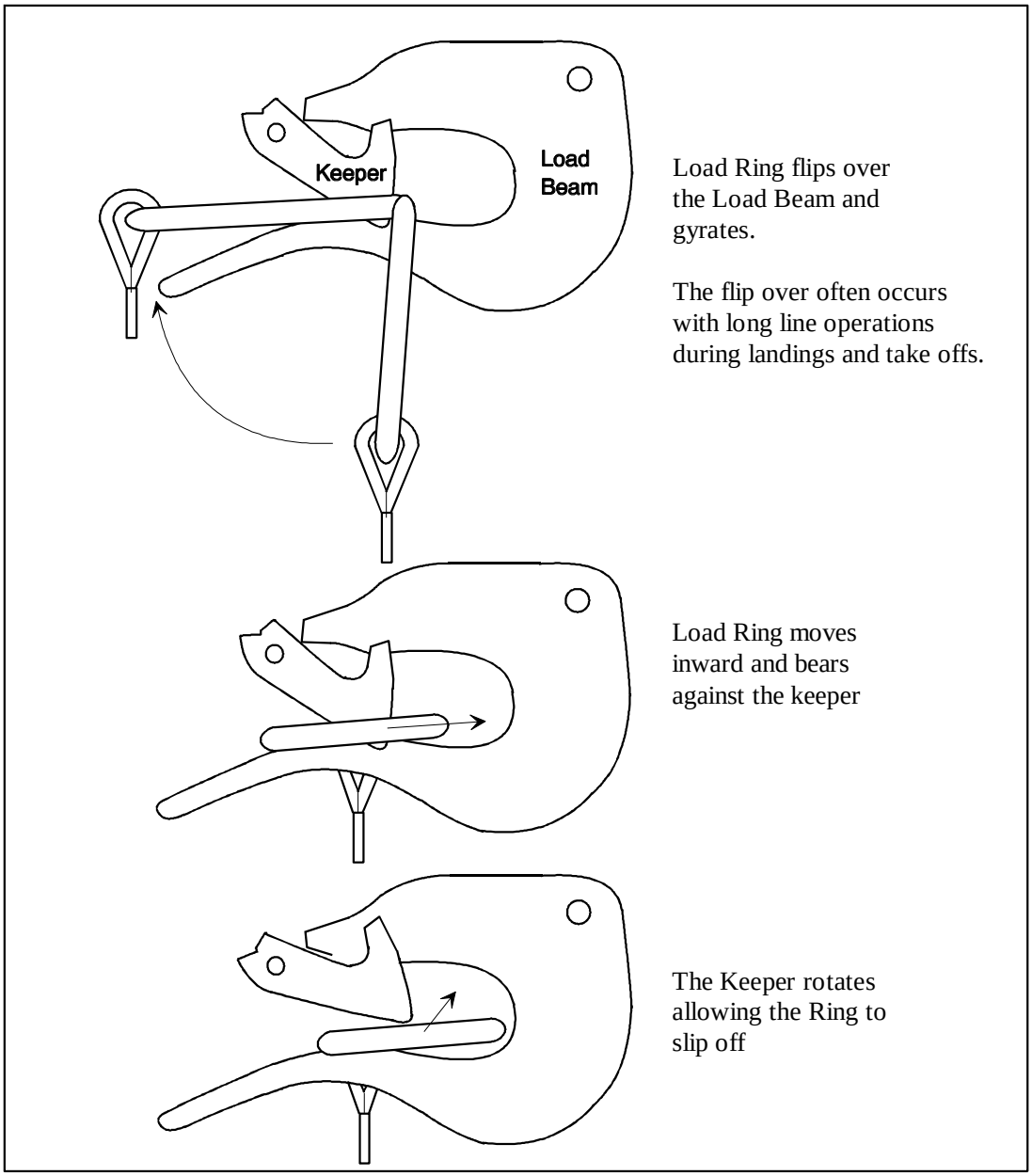


Un-Commanded Release Due to Too Large of a Load Ring

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

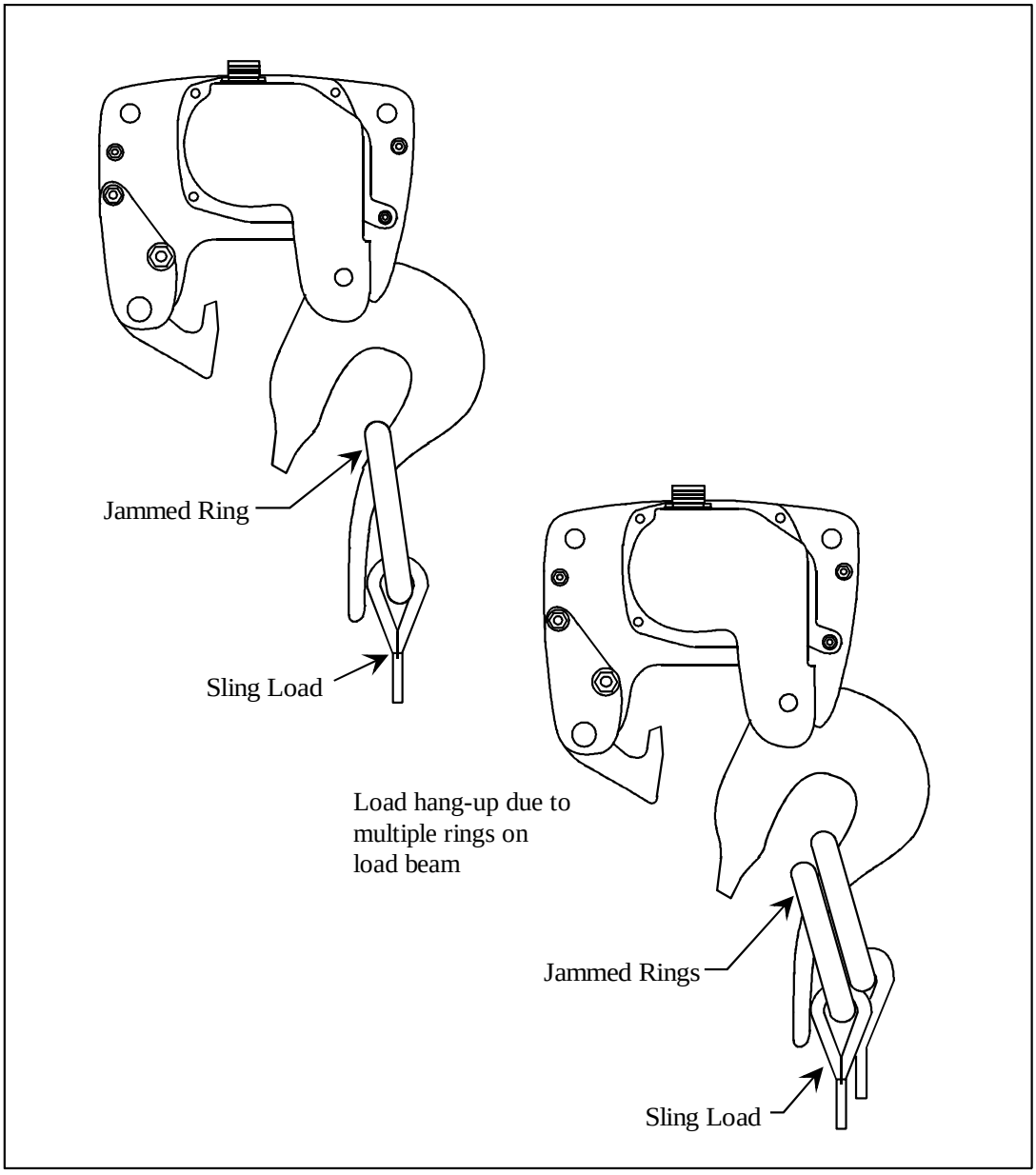


Load Hang-Up Due to Too Small of a Load Ring or Multiple Load Rings

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

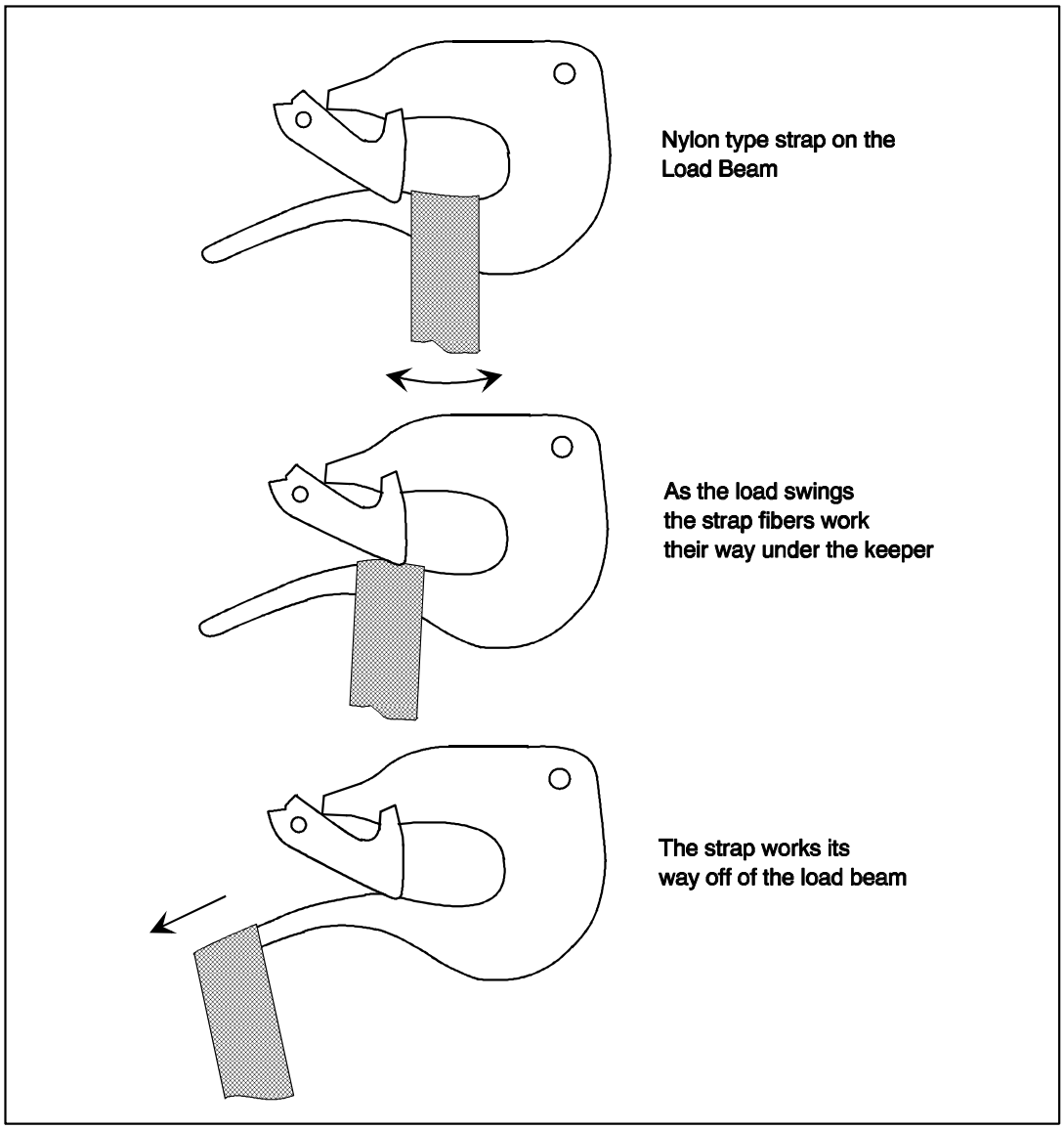


Un-Commanded Release Due to Nylon Type Straps

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

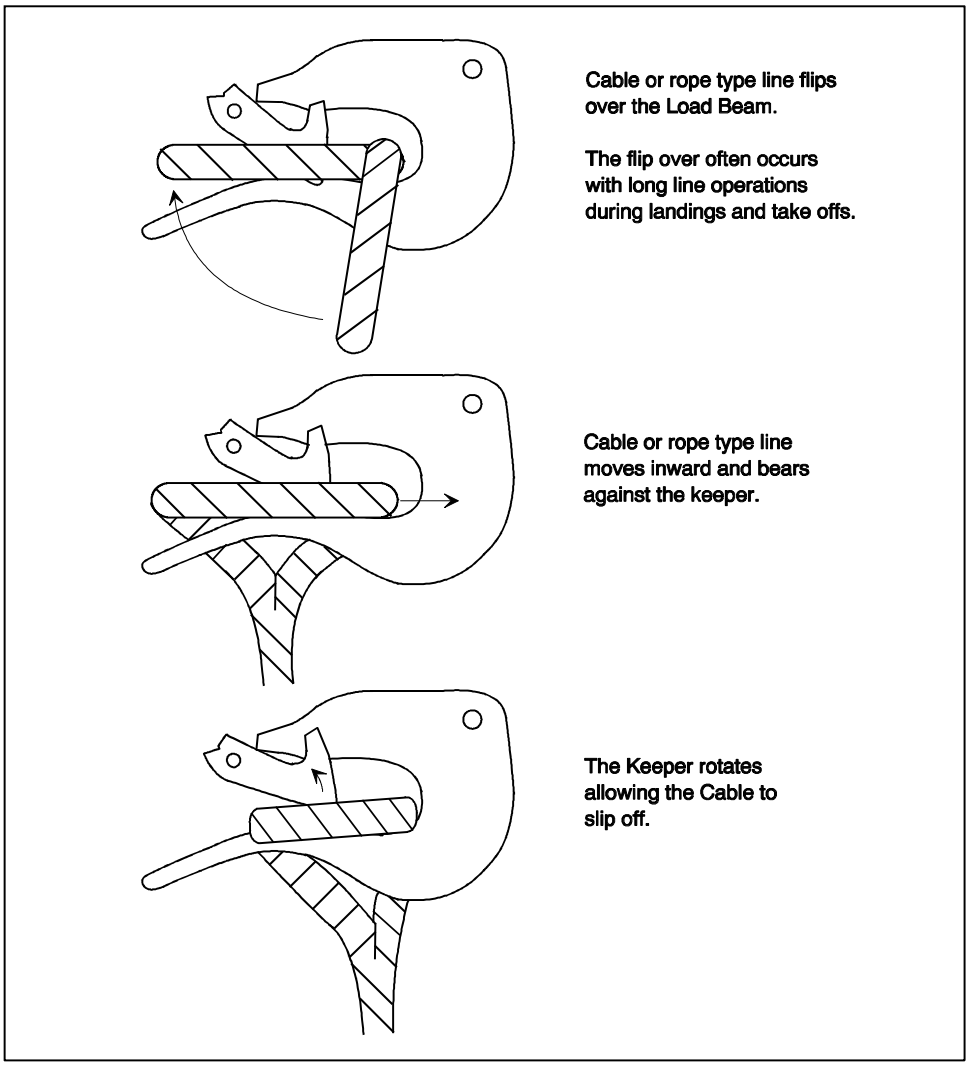


Un-Commanded Release Due to Cable or Rope Type Straps

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
Load Weigh General Information
Introduction

The Load Weigh System is an option to the Suspension System. The Load Weigh System consists of three components, the cockpit mounted Indicator, the Internal Harness and the Load Cell. When the Load Weigh option is specified, the Suspension Systems Load Link, P/N 232-009-01 or 232-009-00, is replaced by the Load Cell Assembly P/N 210-088-00, 210-088-01 or 210-088-02.

Refer to Owner's Manual 120-039-00 for operation instructions for the C-39 indicator including changing settings.

Indicator Features

The features of the C-39 Indicator include:

- Front panel programmable
- Data Recorder communications link
- Internal back lighting system
- Night Vision Compatible (NVG) When an external NVG light source is used in place of the internal back light
- Hook-Open Warning Display
- Analog Meter Output Signal

Indicator Specifications

Table 4-1 Indicator Specifications

Specifications	Indicator
Size	Fits standard 2¼" clock hole
Weight	7 oz
Operating Voltage	21 to 31 VDC
Current Consumption	< 25 mA
Accuracy Over Operating Temperature Range	0.1% ± 1 digit
Operating Temperature Range	+70°C to –45°C
Storage Temperature Range	+80°C to –50°C
Scaleable Analog Output	0 to 5VDC ± 0.5%

The C-39 Indicator complies with the Environmental and Vibration specifications of RTCA DO-160C. Contact the factory for specific details.

Indicator Pin Out

The connector located on the back of the Indicator has the following pin out.

Table 4-2 Indicator Pin Out

Pin Letter	Function
A	+ 28 VDC In
B	- Load Cell Signal
C	+ Load Cell Signal
D	+ Load Cell Excitation
E	Load Cell Common
F	Analog Out Common
G	+ Analog Out
H	Hook Open
J	Data Recorder Clock
K	Data Recorder Data
L	Shield
M	Back Light Common
N	Back Light Source
P	Aircraft Ground
R	Not Used

Load Cell Specifications

Table 4-3 Load Cell Specifications

Specifications	Load Cell
Weight	2 pounds
Accuracy Over Operating Temperature Range	0.5% ± 1 digit
Operating Temperature Range	+70°C to –45°C
Storage Temperature Range	+80°C to –50°C

This page intentionally left blank.

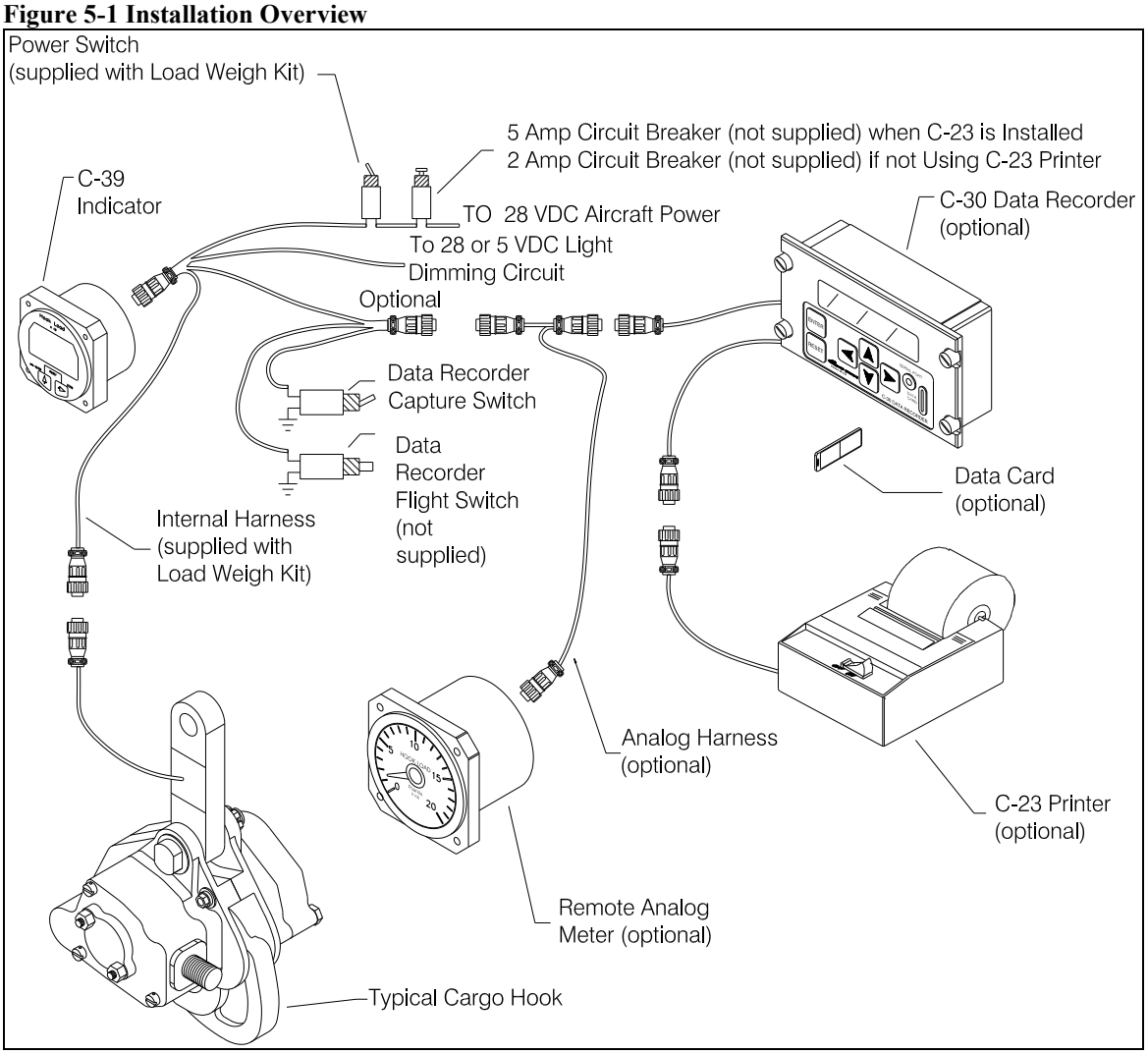
Section 5
Load Weigh Installation Instructions
Introduction

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 Indicator should be mounted in a position that is convenient, accessible and visible to the pilot. It can be mounted in a standard 2¼" instrument hole. Connect the Indicator to its Internal Harness, refer to *Load Weigh Internal Harness Installation*. See the section below for an overview of the installation.

Installation Overview

Figure 5-1 Installation Overview



Indicator Internal Back Light

The 210-095-00 Indicator is equipped with an Internal Back Lighting System that can be connected to the aircraft 28 VDC light dimming circuit. Use a 22 gauge, twisted pair, shielded cable to connect the aircraft dimming circuit to the Indicator. Disassemble the Indicator mating connector and carefully solder the positive wire, from the aircraft light dimming circuit, to pin N and the common wire to pin M. Connect the cable shield wire to airframe ground at the light dimmer end of the cable **ONLY**.

The 210-095-02 Indicator is equipped with an Internal Back Lighting System that can be connected to the aircraft 5 VDC light dimming circuit. Use a 22 gauge, twisted pair, shielded cable to connect the aircraft dimming circuit to the Internal Harness. Connect the cable shield wire to airframe ground at the light dimmer end of the cable **ONLY**.

Indicator Hook-Open Warning

The 210-095-00 and 210-095-02 Indicators are equipped with a Hook-Open Warning feature that can be connected to a cargo hook equipped with a hook open switch. Depending on the capabilities of the cargo hook switch the Indicator will flash "HOOK OPEN" when the cargo hook load beam is open. The cargo hook switch must be normally open when the cargo hook load beam is in the closed position. When the load beam is open, one side of the switch must be grounded and the other side of the switch is to be connected to the Indicator. Use a 22 gauge, shielded wire to connect the cargo hook switch to the Indicator. Disassemble the Indicator mating connector and carefully solder the wire, from the cargo hook switch, to pin H. Connect the cable shield wire to airframe ground as close to the cargo hook as possible, at the cargo hook end of the cable **ONLY**.

Remote Analog Meter

The 210-095-00 and 210-095-02 Indicators are equipped with an analog drive circuit that can be connected to a remote analog meter. Use a 22 gauge, twisted pair, shielded cable to connect the Remote Analog Meter to the Indicator. Disassemble the Indicator mating connector and carefully solder the positive wire, from the analog meter, to pin G and the common wire to pin F. Connect the cable shield wire to airframe ground as close to the Analog Meter as possible, at the Analog Meter end of the cable **ONLY**.

The 210-095-00 and 210-095-02 Indicators can be connected to Onboard Systems' Analog Slave Meter, P/N 210-180-00, through the "DATA" cable. This meter gives solid weight indications without needle bounce. The Analog Slave Meter may be mounted in any convenient location in a standard 3" instrument hole. Attach connector, P/N 410-130-00, to data line per pin out in Figure 5-2 to connect the Analog Slave Meter to the Internal Harness "DATA" cable. If a data connector is present on the data line use cable P/N 270-059-00 to connect to Analog Slave Meter.

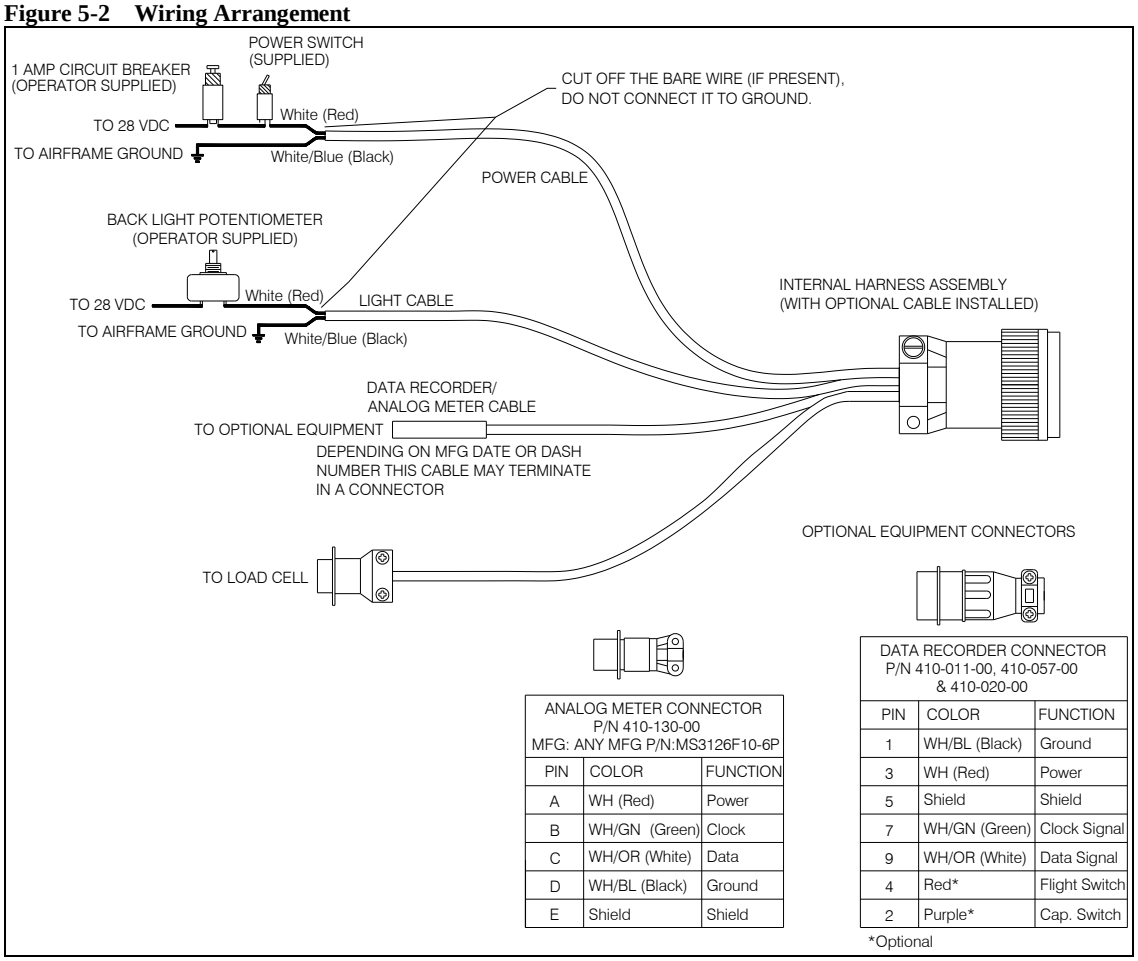
Load Weigh Internal Harness Installation

The Internal Harness is made up of four cables terminated to one connector. The connector is plugged into the back of the Indicator. One of the cables is marked "LOAD CELL" and is fitted with a bulkhead fitting. This cable is connected to the load cell. Another cable is marked "POWER" and is connected to the aircraft electrical power. Another cable is marked "LIGHT", refer to the *Indicator Internal Back Light* section for installation instructions. The last cable is marked "DATA" and can be connected to the optional Data Recorder or Analog Slave Meter. These items are not included under this STC.

NOTICE

This data cable may or may not be terminated with a connector depending on manufacture date.

Figure 5-2 Wiring Arrangement



ANALOG METER CONNECTOR
P/N 410-130-00
MFG: ANY MFG P/N:MS3126F10-6P

PIN	COLOR	FUNCTION
A	WH (Red)	Power
B	WH/GN (Green)	Clock
C	WH/OR (White)	Data
D	WH/BL (Black)	Ground
E	Shield	Shield

DATA RECORDER CONNECTOR
P/N 410-011-00, 410-057-00
& 410-020-00

PIN	COLOR	FUNCTION
1	WH/BL (Black)	Ground
3	WH (Red)	Power
5	Shield	Shield
7	WH/GN (Green)	Clock Signal
9	WH/OR (White)	Data Signal
4	Red*	Flight Switch
2	Purple*	Cap. Switch

*Optional

Load Weigh Electrical Connections

Connect the power cable to the Indicator and route the other end to a convenient location for the indicator power switch P/N 400-048-00. The cable is supplied extra long, cut off the excess cable and use as needed to connect the switch and circuit breaker. Connect the white wire (or red wire if earlier harness configuration P/N 270-044-00 is installed) in the power cable to one side of the power switch, connect another piece of suitable wire to the other side of the switch and then to an available 1 or 2 amp circuit breaker. Connect the white/blue wire (or black wire if 270-044-00 is installed) to the ground bus. The bare wire (present on P/N 270-044-00 harness only) should be cut off as it is not needed at this end of the cable. Install the placard 215-010-00 "ELECTRONIC WEIGHING SYSTEM" next to the power switch and circuit breaker. Install the placard 215-012-00 "TURN THE WEIGHING SYSTEM OFF WHEN NAVIGATION EQUIPMENT IN USE" "NO AIRCRAFT OPERATION SHOULD BE PREDICATED ON THE READING OF THE ONBOARD WEIGHING SYSTEM" next to the Indicator.

Load Weigh Installation Check-Out

After the system has been properly installed, activate the circuit breaker to turn the system on. Refer to *Load Weigh Operation Instructions*.

Perform an EMI ground test per AC 43.13-lb section 11-107. For equipment that can only be checked in flight an EMI flight test may be required.

NOTICE

The load cell is of a class of equipment not known to have a high potential for interference. This class of equipment does not require special EMI installation testing (i.e. FADEC) as required in paragraphs 7 and 8 of FAA policy memorandum ASW-2001-02.

Swing the hook assembly to the full extremes to verify that it does not self trip.

Ensure that all electrical cables are secured clear of flight control rods and hydraulic lines.

Section 6
System Inspection, Maintenance, Overhaul & Trouble Shooting

For inspection, maintenance, overhaul and trouble shooting of the cargo hook suspension system refer to Component Maintenance Manual 122-028-00.

Current revision levels of all manuals are posted on the Onboard Systems International web site at www.onboardsystems.com. Hard copies of current revision levels of all manuals are also available from the factory.

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.

NOTICE

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

Section 7
Cargo Hook Inspection, Maintenance & Overhaul Procedures

For inspection, maintenance, and overhaul procedures for cargo hook P/N 528-002-00 refer to Onboard Systems Cargo Hook Owner's Manual 120-044-00. Cargo hook P/N's 528-001-00, 528-003-00, or 528-004-00 must be maintained per their respective manufacturer instructions.

Current revision levels of all manuals are posted on Onboard Systems Int'l web site at www.onboardsystems.com. Hard copies of current revision levels of all manuals are also available from the factory.

This page intentionally left blank.

Section 8
Certification
STC

United States of America

Department of Transportation—Federal Aviation Administration

Supplemental Type Certificate

Number **SH5707NM**

This certificate, issued to **Onboard Systems International**
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. SH5707NM for list of approved rotorcraft
Model: models and applicable airworthiness regulations.

Description of the Type Design Change: Fabrication of Onboard Systems Model 200-088-01, -02, -03 or -04 (without load weight) or 200-089-01, -02, -03 or -04 (with load weight) cargo hook suspension system in accordance with FAA approved Onboard Systems Master Drawing List No. 155-020-01, Revision 22, dated October 14, 2005, or later FAA approved revision; and installation of this system in accordance with FAA approved Onboard Systems Owner's Manual No. 120-031-01, Revision 18, dated September 30, 2005, or later FAA approved revision. Inspect suspension system in accordance with Sections 7 and 8 of Onboard Systems Owner's Manual No. 120-031-01, Revision 18, dated September 30, 2005, or later FAA approved revision.

Limitations and Conditions: Approval of this change in type design applies to only those rotorcraft listed on AML SH5707NM, amended May 3, 2006, or later FAA approved revision, which were previously equipped with an FAA approved installation of Bell cargo hook suspension assembly, P/N 204-072-915-103, and the Cargo Hooks listed on the Onboard Drawing 200-088. This approval should not be extended to helicopters 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 helicopter.

(See Continuation Sheet 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: February 10, 1992
Date of issuance: April 30, 1992

Date reissued:
Date amended: 8/20/92; 5/12/94; 12/9/97; 4/5/99; 6/1/99; 5/3/06

FEDERAL AVIATION ADMINISTRATION

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)

STC continued

United States of America
Department of Transportation—Federal Aviation Administration

Supplemental Type Certificate
(Continuation Sheet)

Number **SH5707NM**

Onboard Systems
Reissued:
Amended: 8/20/92; 5/12/94; 12/9/97; 4/5/99; 6/1/99; 5/3/06

Limitations and Conditions (cont'd):

Rotorcraft modified in accordance with this STC must be operated in accordance with an FAA approved copy of the Rotorcraft Flight Manual Supplement (RFMS), Onboard Systems Document No. 121-027-00, dated April 20, 2006, or later FAA approved revision. A copy of this Certificate, Continuation Sheet No. SH5707NM, AML No. SH5707NM, and FAA approved Rotorcraft Flight Manual Supplement must be maintained as part of the permanent records of the modified helicopter.

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 -

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 8110-2-1 (10-69)

This certificate may be transferred in accordance with FAR 21.47.

PAGE 3 OF 3 PAGES

Approved Model List

FAA APPROVED MODEL LIST (AML) SH5707NM
FOR
ONBOARD SYSTEMS

ISSUE DATE: APRIL 30, 1992

ITEM	AIRPLANE MAKE	AIRPLANE MODEL	TYPE CERTIFICATE NUMBER	CERTIFICATION BASIS FOR ALTERATION	FAA SEALED DRAWING LIST		RFM SUPPLEMENT NO. AND DATE	AML AMENDED DATE
					NUMBER	REV		
1	BELL	204B, 205A, 205A-1	H1SW	CAR 7, dtd. 8/1/58 and Amendments 7-1 through 7-4, Category B	155-020-01	Rev. 10 4/28/99	120-031-01 revised 8/7/98	6/1/99
2	BELL	212, 412, 412EP	H4SW	FAR Part 29, dated 2/1/65 and Amdt. 29-1 and 29-2. See TCDS H4SW for additional information	155-020-01	Rev. 10 4/28/99	120-031-01 revised 8/7/98	6/1/99
3	GARLICK	UH-1H	H13WE	FAR 21.25 (a)(2)	155-020-01	Rev. 10 4/28/99	120-031-01 revised 8/7/98	6/1/99
4	Precision Helicopters, LLC	UH-1H	R00005SE	FAR 21.25 (a)(2)	155-020-01	Rev. 10 4/28/99	120-031-01 revised 8/7/98	6/10/04
5	Agusta	AB412 and AB412EP S/N 25801 and subs.	H79EU	FAR Part 29, dated 2/1/65. SEE TCDS H79EU for additional information.	155-020-01	Rev. 22 10/14/05	121-027-00 Dated 4/20/06	5/3/06

PAGE 1 OF 2

Approved Model List continued

FAA APPROVED MODEL LIST (AML) SH5707NM
FOR
ONBOARD SYSTEMS

ISSUE DATE: APRIL 30, 1992

6	Bell	210	H1SW	FAR Part 29, dated 8/12/65. SEE TCDS H1SW for additional information.	155-020-01	Rev. 22 10/14/05	121-027-00 Dated 4/20/06 5/3/06

FAA APPROVED: _____
Acting Manager, Seattle Aircraft Certification Office

DATE: 5/3/06

Amended: August 20, 1992; May 12, 1994; September 28, 1994;
April 20, 1995; December 9, 1997; April 5, 1999; June 1, 1999; June 10, 2004, May 3, 2006

PAGE 2 OF 2

STA

DEPARTMENT OF TRANSPORT

Supplemental Type Approval

Number: SH93-50

This approval is issued to:

Onboard Systems
11212 N.W. Saint Helens Road
Portland, Oregon
97231 U.S.A.

Issue No.: 1

Approval Date: August 4, 1993

Issue Date: August 4, 1993

Responsible Region Pacific

Aircraft/Engine Type or Model: See FAA Approved Model List No. SH5707NM

Canadian Type Approval or Equivalent: DOT H-86 and FAA H1SW

Description of Type Design Change: Fabrication & Installation Of Onboard Systems Model 200-088-01 or Model 200-089-01 Cargo Hook Suspension Systems Per FAA STC SH5707NM.

Installation/Operating Data, Required Equipment and Limitations:

Fabrication is in accordance with FAA Approved Onboard Systems Master Drawing List No. 155-020-01, dated July 10, 1992*.

Installation is in accordance with FAA Approved Onboard Systems Owners Manual No. 120-031-01, Revision 1, dated July 10, 1992*.

Inspect suspension system in accordance with Section 4 of Onboard Systems Owners Manual No. 120-031-01, Revision 1, dated July 10, 1992*.

Required Equipment and Limitations: See Continuation Sheet

(* or later FAA Approved Revision)

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.

H B Sansom

F.B. Sansom
Regional Director Airworthiness
For Minister of Transport

Canada

26-0357 (10-88)

DEPARTMENT OF TRANSPORT

Supplemental Type Approval

(Continuation Sheet)

Number: SH93-50

Issue No.: 1

Approval Date: August 4, 1993

Issue Date: August 4, 1993

NOTE: THIS ADDENDUM SHALL REMAIN PART OF THE SUPPLEMENTAL TYPE APPROVAL REFERRED THEREIN.

Required Equipment:

1. Aircraft must be equipped with an FAA Approved installation of Bell cargo hook suspension assembly P/N 204-072-915-103, and either Breeze-Eastern Cargo Hook P/N SP7109-12 or SP7109-62.

2. FAA Approved copy of Onboard Systems Rotorcraft Flight Manual Supplement dated August 20, 1992, or later FAA Approved revision.

Limitation:

Approval of this change in type design applies to only those Bell model rotorcraft listed on FAA Approved Model List No. SH5707NM dated August 20, 1992, or later FAA approved revision.

26-0375 (01-90)