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**Owner's Manual  
for the  
3.5KK Cargo Hook Kit  
on the  
BO-105 Series Helicopter**

**System Part Numbers  
200-290-00  
200-291-00**

*Owner's Manual Number 120-110-00  
Revision 9  
February 3, 2012*



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## RECORD OF REVISIONS

<i>Revision</i>	<i>Date</i>	<i>Page(s)</i>	<i>Reason for Revision</i>
0	04/04/03	All	First Issue
1	10/10/03	1-1, 1-2, 2-1, 2-4, and 5-2	528-023-01 cargo hook configuration change Reference Service Bulletin 159-011-00
2	02/17/06	3-2, 3-3 and T of C	Added cargo hook loading section
3	09/05/06	3-1, Section 5	Updated cargo hook suspension system maintenance information.
4	09/07/06	1-1, 2-5, 2-6, 4-1	Updated manual to add information for installation of wire harness P/N 270-048-04.
5	09/07/07	TOC, Section 1, 2-3, 2-4, 2-6, 2-7, 2-8, 3-1, 3-3, 3-4, 4-8, and 4-9	Added Warnings, Cautions and Notes explanation to section 1. Updated warnings, cautions and notes format throughout.
6	01/12/09	1-2, 2-2, 2-3	Changed load cell part no. from 210-028-00 to 210- 028-01 (load cells are the identical except -01 has longer electrical harness). Updated Figure 2-3 and clarified corresponding rigging instructions.
7	10/28/09	2-3	Added caution note and revised Figure 2-3.
8	3/2/10	2-3, 2-5 to 2-8 & 5-1	Updated manual to reflect new load weigh harness configuration. Changed overhaul frequency criteria. Corrected Figure 2-3.
9	02/03/12	1-1, 2-3 to 2-5, 2- 7, 3-1, 3-3, 3-4, 4- 8, 4-9, 4-12, Section 5	Replaced Warnings, Cautions and Notes section with Safety Labels section. Updated Safety labels throughout document. Updated RMA information. Replaced Load Cell P/N 210-028-01 with 210-028- 02 in kit P/N 200-291-00 and added P/N 210-028- 02 to the maintenance section (section 5).

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# ***CONTENTS***

## ***Section 1* General Information**

Introduction, 1-1  
Safety Labels, 1-1  
Bill of Materials, 1-2  
Specifications, 1-2

## ***Section 2* Installation Instructions**

Cargo Hook Removal, 2-1  
Cargo Hook Kit Installation, 2-1  
Load Weigh System Internal Harness Installation, 2-5  
C-39 Cockpit Indicator Installation, 2-5  
Indicator Internal Back Light, 2-6  
Indicator Hook-Open Warning, 2-6  
Remote Analog Meter, 2-6  
Electrical Connections, 2-7  
Installation Check-Out, 2-8  
Component Weights, 2-8  
Paper Work, 2-8

## ***Section 3* Cargo Hook Suspension System Operation Instructions**

Operating Procedures, 3-1  
Cargo Hook Loading, 3-2  
Cargo Hook Rigging, 3-3

## ***Section 4* Load Weigh Operation Instructions**

Indicator Front Panel, 4-1  
The Run Mode, 4-2  
    To Zero or Tare the Display, 4-3  
    To Un-Zero the Display, 4-3  
    Error Codes, 4-4  
The Setup Mode, 4-5  
    Indicator Dampening, 4-7  
        To look at, or change the dampening level, 4-7  
    Indicator Calibration, 4-8  
        To look at or change the calibration code, 4-8  
    Installation Zero, 4-9  
        To run the installation zero routine, 4-9  
    Calibration by Lifting a Known Weight, 4-9  
        To run calibration by known weight routine, 4-10

## **CONTENTS, continued**

Setting the Scale on a Remote Analog Meter, 4-11

To look at or change the scale, 4-11

Select KG or LB Units, 4-12

To look at or change the units, 4-12

Indicator Version, 4-13

### ***Section 5* Maintenance**

Inspection, 5-1

Link Assembly Overhaul, 5-3

Trouble Shooting, 5-4

Instructions for Returning a System to the Factory, 5-5

### ***Section 6* Certification**

FAA STC, 6-1

Canadian STC, 6-2

# Section 1

## General Information

### Introduction

The P/N 200-290-00 & P/N 200-291-00 Cargo Hook Suspension Systems are approved for installation on the BO-105 series helicopters. These systems replace the cargo hook, an adapter link assembly, the lower manual release cable and an electrical release wire harness on the MBB supplied cable type suspension system and cargo hook kit. The P/N 200-291-00 system is the same as the 200-290-00 except it features a load cell, cockpit indicator, and associated wiring.

### 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.

## Bill of Materials

The following items are included with the Cargo Hook Kit, if shortages are found contact the company from whom the system was purchased. Provisions provided by the MBB 105-E0018 kit for the upper manual release cable, the internal helicopter wiring and the cable suspension system are required to complete the installation.

Part No.	Description	200-290-00 Quantity	200-291-00 Quantity
528-023-01	3.5K Keeperless Hook	1	1
232-096-00	Load Link Assembly	1	-
270-113-00	Electrical Release Cable	1	1
268-026-00	Manual Release Cable Assembly	1	1
120-110-00	Owners Manual	1	1
121-018-00	RFMS	1	1
122-005-00	3.5KK Hook Service Manual	1	1
270-048-04	Load Weigh Wire Harness	-	1
210-095-00	C-39 Indicator	-	1
210-028-02	E-73 Load Link Assembly	-	1
215-010-00	Placard	-	2
215-012-00	Placard	-	1
215-169-00	Indicator Light Placard	1	1
400-048-00	Power Switch	-	1
512-001-00	Ty-wrap	-	10

\* 210-028-02 supersedes P/N 210-028-01. It features a stainless steel body for improved corrosion resistance and includes bushings and travel limiters at the cargo hook. These part numbers are interchangeable.

## Specifications

**Table 1-1 System Specifications**

Design load	2,205 lb. (1000 kg.)
Design ultimate strength	9,922 lb. (4500 kg.)
Unit weight P/N 200-290-00	4.8 lbs (2.2 kg)
Unit weight P/N 200-291-00	6.3 lbs (2.9 kg)

**Table 1-2 P/N 528-023-01 Cargo Hook Specifications**

Design load	3,500 lbs. (1,580 kg.)
Design ultimate strength	15,750 lbs. (7,140 kg.)
Electrical release capacity	8,750 lbs. (3,970 kg.)
Mechanical release capacity	8,750 lbs. (3,970 kg.)
Force required for mechanical release at 3,500 lb.	8 lb. Max. (.600" travel)
Electrical requirements	22-32 VDC 6.9 – 10 amps
Minimum release load	0 pounds
Unit weight	3.0 pounds (1.35 kg.)
Mating electrical connector	PC06A8-2S SR

## ***Section 2***

# **Installation Instructions**

These procedures are provided for the benefit of experienced aircraft maintenance facilities capable of carrying out the procedures. They must not be attempted by those lacking the necessary expertise.

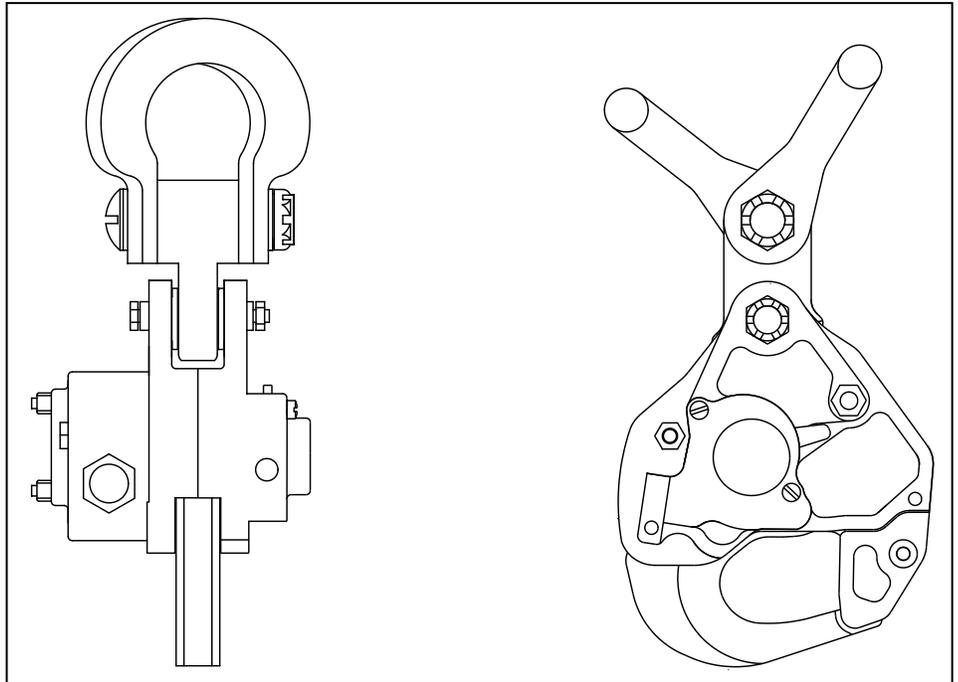
### **Cargo Hook Suspension Components Removal**

If the helicopter currently has the MBB kit installed, remove the cargo hook, the external wire harness, and the mechanical release cable at the connection near the landing gear support tube.

### **Cargo Hook Kit Installation**

Attach the 528-023-01 cargo hook and 232-096-00 link assembly to the shackles using the hardware provided in the MBB kit, see figure 2-1 below. Install the cargo hook so the tip of the hook points aft, which is opposite of the MBB kit.

**Figure 2-1 Cargo Hook Installation**



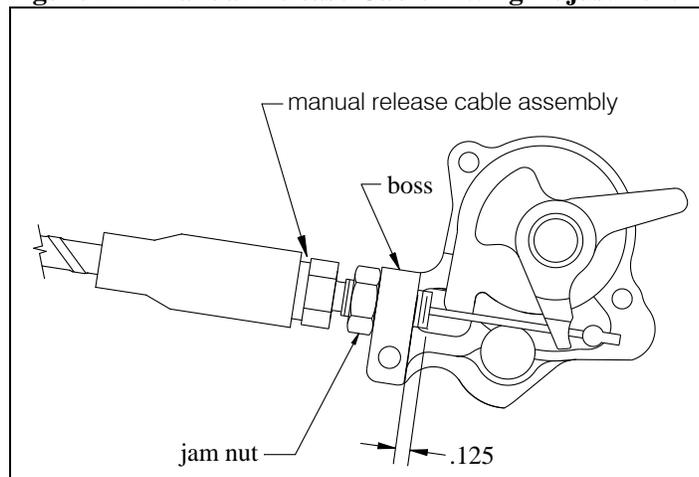
## Cargo Hook Kit Installation continued

Connect the manual release cable (P/N 268-026-00) to the cargo hook first, per the following instructions:

Remove the manual release cover from the cargo hook. Thread the fitting at the end of the manual release cable into the manual release boss on the hook side plate until the threads protrude approximately .125" inch beyond the boss (as shown in Figure 2-2) and temporarily secure with jam nut

Leave the manual release cover off of the cargo hook until the other end of the release cable is connected, in order to verify proper setting.

**Figure 2-2 Manual Release Cable Fitting Adjustment**



Route the cable up the right forward suspension cable to the cargo hook. Connect the 268-026-00 manual release cable to the connection near the landing gear support tube.

### **Verify proper setting at the hook:**

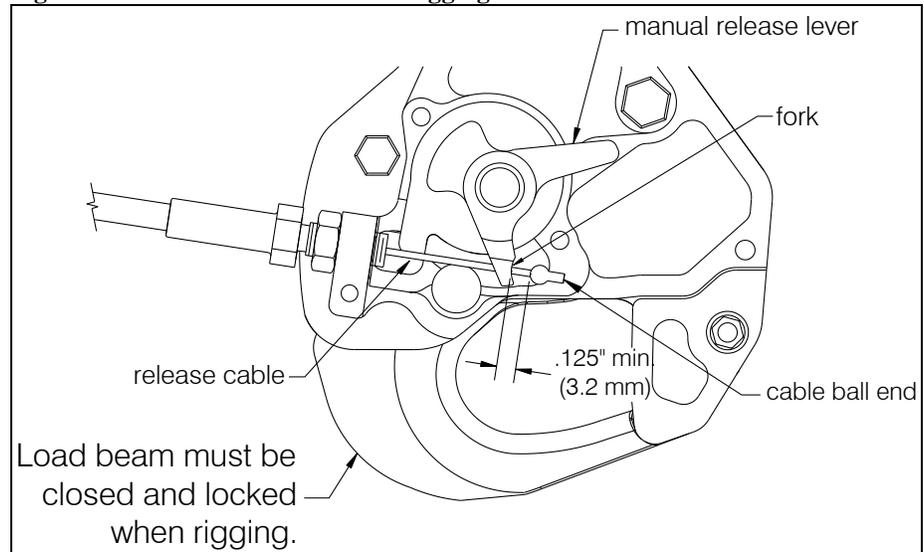
Place the cable ball end fitting into the hook manual release lever fork as illustrated in Figure 2-3. Rotate the manual release lever in the clockwise direction until the boss on its underside contacts the cam stop and hold in this position. Measure the cable ball end free play with the manual release handle in the cockpit in the non-release position. Adjust the manual release cable system for a minimum of .125 inches (3.2 mm) of free play at the fork as shown in Figure 2-3. The maximum amount of free play is limited by the manual release cover, i.e. – the ball end must fit inside the manual release cover when it is installed.

## Cargo Hook Kit Installation continued



*Manual release cable rigging must be done with the cargo hook in the closed and locked position.*

**Figure 2-3 Manual Release Cable Rigging**



If the gap does not measure at least .125", make adjustments at the hook only. This is done by disconnecting the cable at the interface with the fixed manual release cable, loosening the jam nut at the hook, and rotating the cable in the required direction.

Connect the 270-113-00 Electrical Release Wire Harness to the Cargo Hook connector. Listed below is the pin out for the cargo hook connector.

**Table 2-1 Cargo Hook Connector**

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



*The cargo hook is equipped with a suppression diode that will be damaged if the cargo hook electrical connection is reversed.*

## Cargo Hook Kit Installation continued

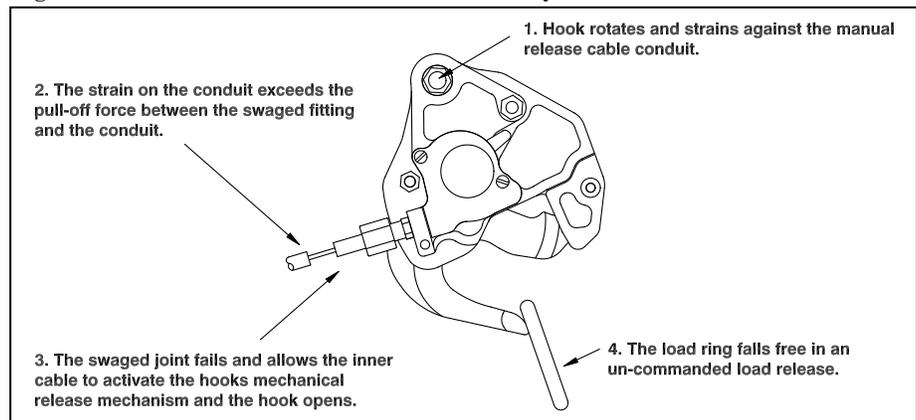
Route the electrical release cable up the left front suspension cable and attach to the side of body electrical connector.

Secure the electrical release wire harness and manual release cable to the suspension cables using existing clamps.



*Un-commanded cargo hook release will happen if the manual and electrical release cables are improperly restrained. The cables must not be the stops that prevent the Cargo Hook from swinging freely in all directions. If the Cargo Hook loads cause the hook to strain against the manual release cable the swaged end of the cable may separate allowing the inner cable to activate the cargo hook manual release mechanism. The result is an un-commanded release. Ensure that no combination of cyclic stick or Cargo Hook position is restrained by the manual or electrical release cables.*

**Figure 2-4 Un-commanded Release From Incorrectly Secured Cable**



Install the “INOP” placard (P/N 215-169-00) over the hook advisory light in the cockpit (the 528-023-01 cargo hook does not have a hook lock indicator switch).

## Load Weigh System Internal Harness Installation

The Internal Harness is made up of four cables terminated to one large 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. Hardware is provided to attach the bulkhead fitting to the Quick Disconnect Bracket, P/N 235-035-00. Attach the Quick Disconnect Bracket to the bracket that holds the manual and electrical release fittings on the skin of the aircraft at the cargo hook area.

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 optional items are not included under this STC.



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

Route cables along the existing harnesses while observing the following precautions:

- Pick up existing wire runs by opening existing cable clamps. Nylon ties alone may not be used for primary support.
- The distance between supports should not exceed 21 inches.
- Bend radius of wire or harness must not be less than 10 times the wire or harness diameter.
- Inspect and verify that the wire harness may not be manually deflected into a structure with a bend radius of less than .13 (i.e – sharp corners which could cause chafing).

Secure the cables clear of flight control rods.

## C-39 Cockpit Indicator Installation

The Indicator, P/N 210-095-00, 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 *Internal Harness Installation*.

## Indicator Internal Back Light

The 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 Internal Harness. Connect the cable shield wire to airframe ground at the light dimmer end of the cable ONLY.

## Indicator Hook-Open Warning

The Indicator is 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 Indicator is 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 Indicator 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 2-5 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.

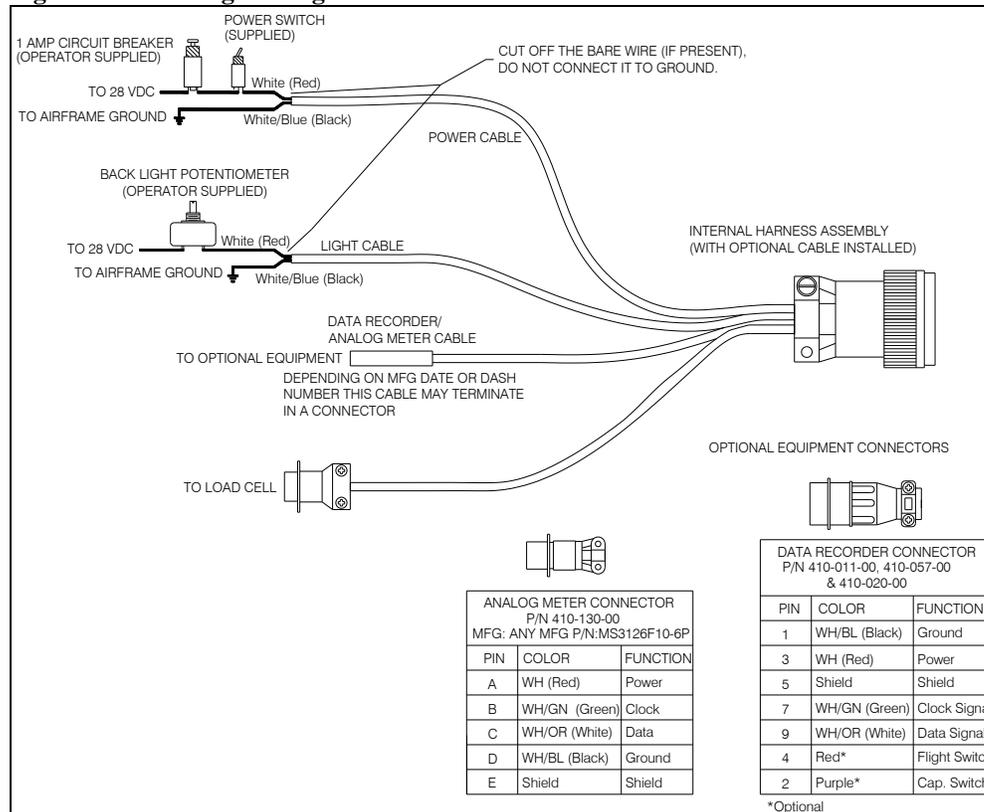
## Electrical Connections

Connect the Internal Harness to the Indicator and route the other end to a convenient location for the Indicator power switch part number 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 (red if wire harness P/N 270-048-00 is installed) wire 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 (black if wire harness P/N 270-048-00 is installed) wire to the ground bus. The bare wire (present on P/N 270-048-00 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.

# NOTICE

*If the C-23 Printer is being utilized with the C-30 Data Recorder, a 5 amp circuit breaker should be used.*

**Figure 2-5 Wiring Arrangement**



## Installation Check-Out

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

1. Swing the installed Cargo Hook to ensure that the manual release cable assembly and the electrical release cable have enough slack to allow full swing of the suspension assembly without straining or damaging the cables. The cables must not be the stops that prevent the Cargo Hook from swinging freely in all directions.
2. Apply 10-20 pounds to the cargo hook load beam and pull the handle operated cargo hook mechanical release, the Cargo Hook should release.
3. Close the cargo hook release circuit breaker and position the battery switch to the ON position. Apply 10-20 pounds to the cargo hook load beam and depress the cargo hook electrical release button, the Cargo Hook should release.

## Component Weights

The weight of the Cargo Hook Kit components are listed below.

**Table 2-2 Component Weights**

Item	Weight
Suspension System W/ hook, W/O Load Cell	4.8 lbs (2.2 kg)
Suspension System W/ hook, W/ Load Cell	6.3 lbs (2.9 kg)
Indicator	7 oz (0.2 kg)

## Paper Work

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. Insert the Rotorcraft Flight Manual Supplement (document no. 121-018-00) into the aircraft Flight Manual.

## Section 3

# Cargo Hook Operation Instructions

### Operating Procedures

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

1. Ensure that the Cargo Hook Kit has been properly installed and that the manual and electrical release cables do not limit the movement of the hook.
2. Be completely familiar with this manual, particularly the section covering the Cargo Hook rigging.
3. Be completely familiar with all BO-105 Helicopter Cargo Hook operating instructions.
4. Activate the electrical system and press the Cargo Hook release button to ensure the cargo hook electrical release is operating correctly. The mechanism should operate smoothly and the Cargo Hook should release. Reset the load beam.

**CAUTION**

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

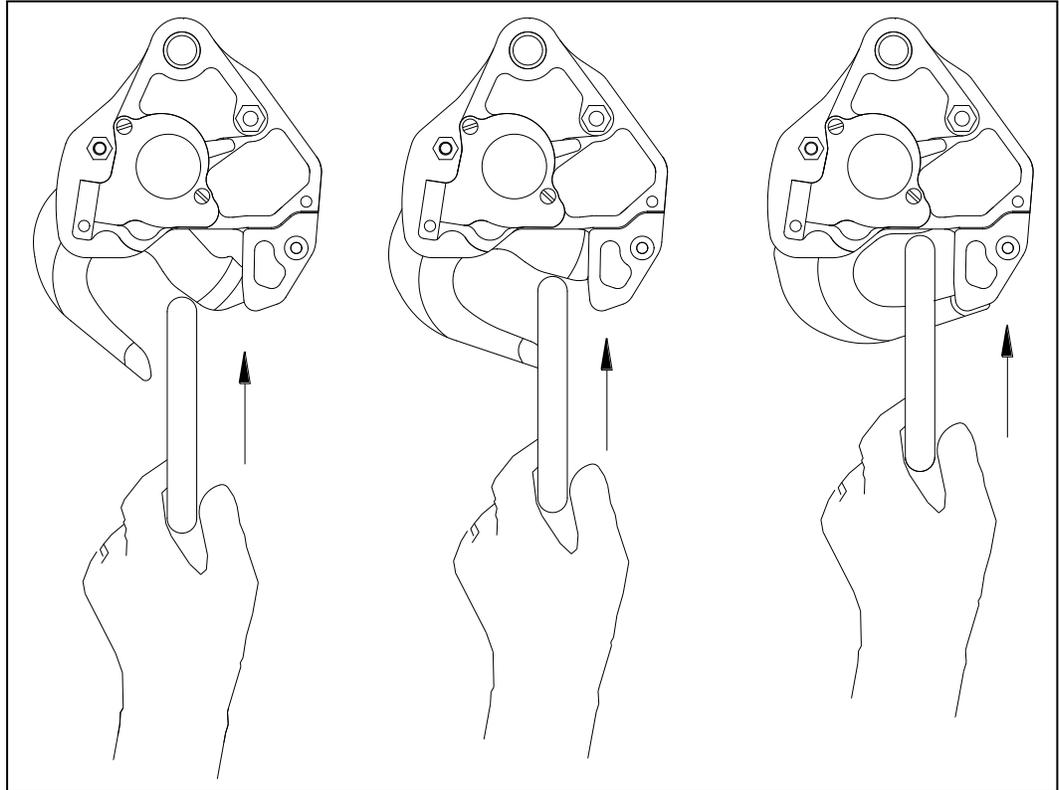
5. Activate the manual release handle. The mechanism should operate smoothly and the Cargo Hook should release. Reset the load beam.

See the Cargo Hook Service Manual 122-005-00 and the aircraft's service instructions that cover the original Cargo Hook installation for additional instructions.

## Cargo Hook Loading

The cargo hook can easily be loaded with one hand. A load is attached to the hook by pushing the ring upward against the upper portion of the load beam throat, as illustrated in Figure 3-1, until an internal latch engages the load beam and latches it in the closed position.

**Figure 3-1 Cargo Hook Loading**



## Cargo Hook Rigging

Extreme care must be exercised when rigging a load to the Cargo Hook. Steel load rings are recommended to provide consistent release performance and resistance to fouling. The following illustration shows the recommended rigging, but is not intended to represent all rigging possibilities.



*Some combinations of small primary rings and large secondary rings could cause fouling during release.*

It is the responsibility of the operator to assure the cargo hook will function properly with each rigging.

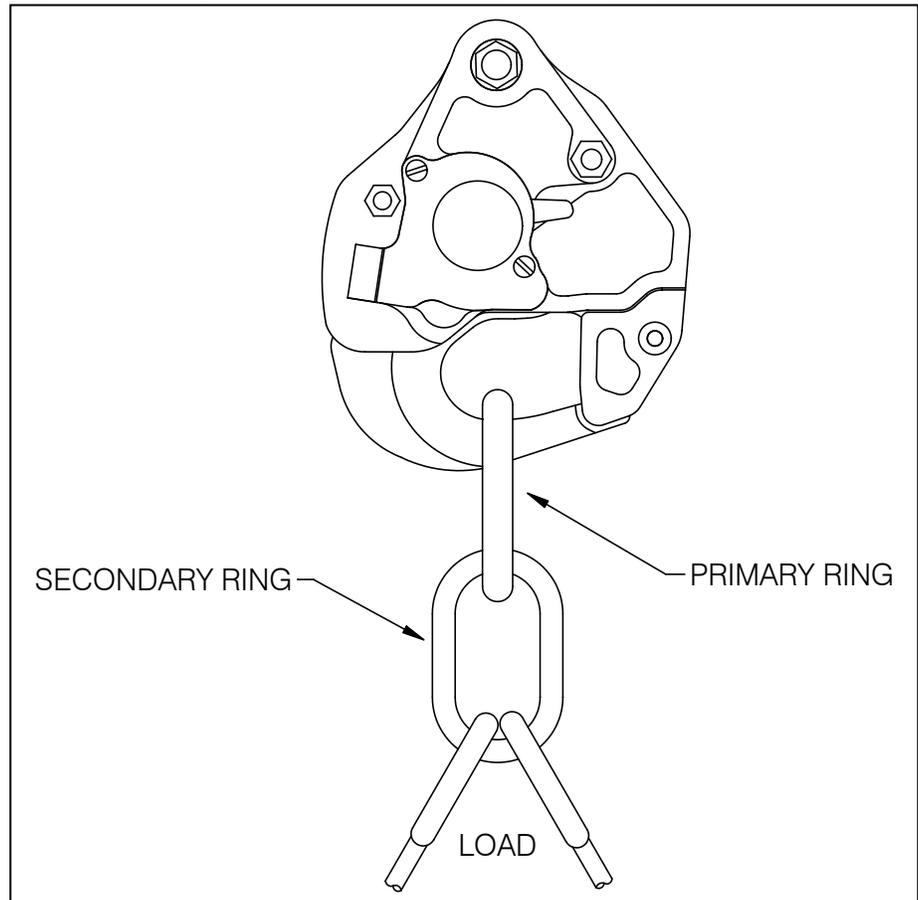
## Cargo Hook Rigging, continued

### Nylon Type Straps and Rope



*Nylon type straps (or similar material) or rope must not be used directly on the cargo hook load beam. If nylon straps or rope must be used they should be first attached to a steel primary ring. Verify that the ring will freely slide off the load beam when it is opened. Only the primary ring should be in contact with the cargo hook load beam.*

**Figure 3-2 Example of Recommended Cargo Hook Rigging**



## Section 4

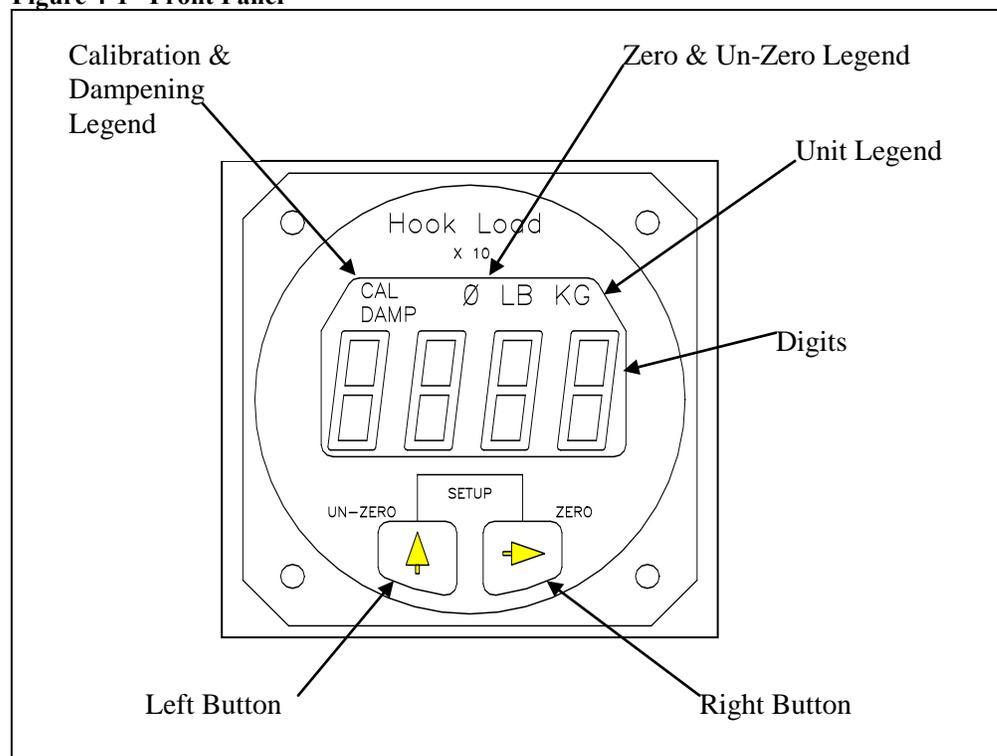
# Load Weigh System Operation Instructions

## Indicator Front Panel

The C-39 Indicator front panel includes the following features.

- The four 7 segment LCD digits show the weight on the Cargo Hook and displays various Setup information.
- The Legends clarify the digital display. i.e. when the LB Legend is turned on, the display will be pounds, etc.
- The Right button is used to Zero the display in the Run Mode and select the digit to be changed in the Setup Mode.
- The Left button is used to Un-Zero the display in the Run Mode and scroll the selected digit in the Setup Mode.

**Figure 4-1 Front Panel**

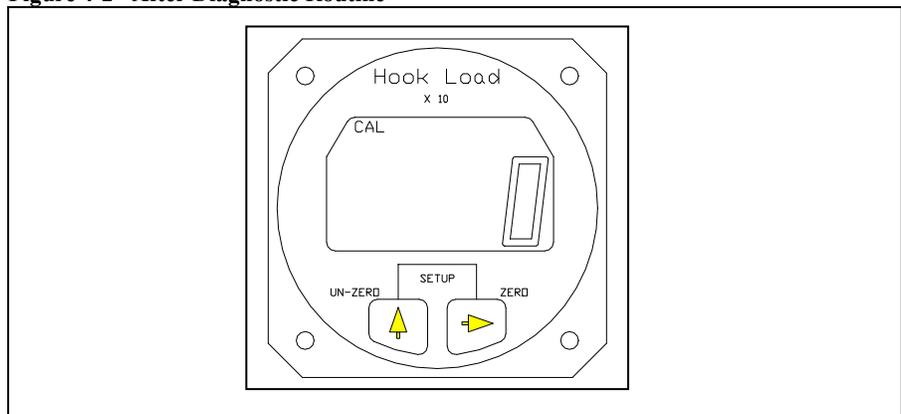


## The Run Mode

The C-39 Indicator has two operating modes, Run and Setup. The Run Mode is used to display the cargo hook weight and the Setup Mode is used to setup or configure the Indicator to the helicopter and to the Load Cell. When powered up, the Indicator always comes to life in the Run Mode.

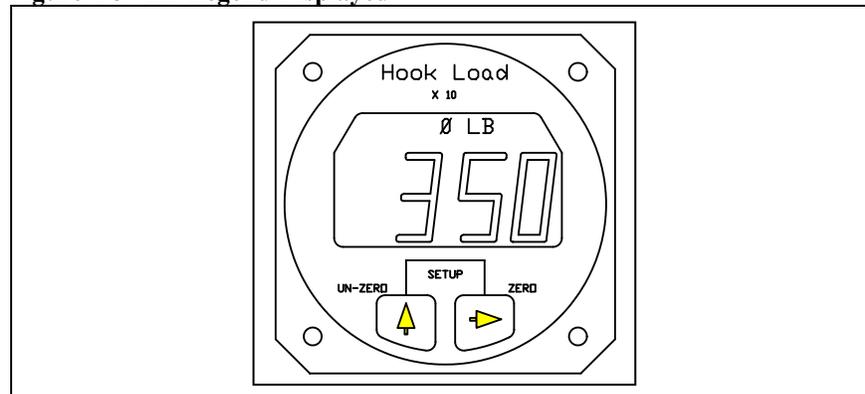
After the Indicator has been correctly installed, power it up by activating the Load Weigh Circuit Breaker. The Indicator will go through a self diagnostic routine. During this routine the display will display all of the digits and legends. If a problem is found during the routine an Error Code will be displayed. For an explanation of Error Codes see the section *Error Codes*. After the diagnostic routine the display should look like this:

**Figure 4-2 After Diagnostic Routine**



The illustration is of the Indicator in the Run Mode with no load on the hook. Note the LB legend displayed.

**Figure 4-3 LB Legend Displayed**

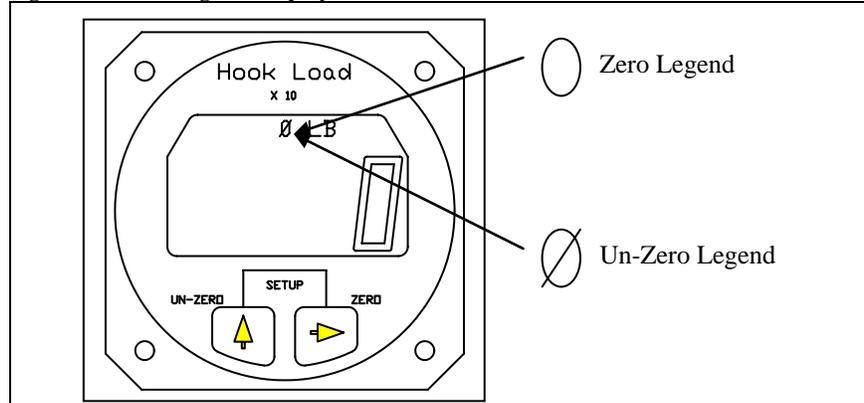


The illustration is a typical hook load reading. The display is 3,500 pounds, note the last digit is not displayed.

## To Zero or Tare the Display

The zero feature is used to zero or tare the weight on the Cargo Hook that is not wanted, such as the weight of a cargo net or long line. The Right button is used to zero the Indicator reading. When the Right button is pressed the display is zeroed. The zero legend is turned on and the zeroed number is stored in memory. If the Right button is pressed again, before the Un-zero button is pressed, the display blinks in response to the button closure. Zero is only available in the Run Mode.

Figure 4-4 Zeroing the Display



## To Un-Zero the Display

The Left button is used to add the zeroed value back into the current Indicator reading or Un-zero the display. When the Left button is pressed, the number previously zeroed is added to the current display and the Un-zero legend is turned on. If the Left button is again pressed before the zero button is pressed, the display blinks in response to the button closure. Un-Zero is only available in the Run Mode.

## Error Codes

Error Codes are the result of difficulties discovered during the Indicator diagnostic tests. Diagnostic tests occur at power up and during the execution of certain routines. Listed below is a matrix of the Error Code displays, their meaning and possible corrective action. Pressing either button will usually bypass the error code, however, the displayed information may be suspect.

**Table 4-1 Indicator Error Codes**

<b>DISPLAY</b>	<b>CAUSE</b>	<b>POSSIBLE CORRECTIVE ACTION</b>
Err 1	A/D or D/A circuit failure	Potential short in the optional analog meter cable. Clear short and power cycle the Indicator by turning the power to the Indicator off for a few moments. If Error Code continues, return the Indicator to the factory.
Err 2	NV Ram failure	Power cycle the Indicator; if Error Code continues, return the Indicator to the factory.
Err 3	NV Ram write failure	Re-enter data, if Error Code continues, return the Indicator to the factory.
Err 4	NV Ram busy failure	Power cycle the Indicator, if Error Code continues return the Indicator to the factory.

## The Setup Mode

The C-39 Indicator can be used with a wide range of helicopters and load cells. The Setup Mode on the Indicator matches the Indicator to the Load Cell and to the helicopter. This is done by entering data into the Indicator. Entered data includes the load cell Calibration Code, the units that the Indicator should read-out (pounds or kilograms), and several other items.

The Indicator has a group of Setup routines, arranged in menu form, that are used to configure the Indicator. Shown on the next page is a matrix of the Setup routines and a brief discussion of their function and how they are programmed. A complete discussion of each setup item is presented later in this section.

To enter the Setup Mode press both the Right and Left buttons at the same time while the Indicator is powered up and in the Run Mode. To exit the Setup Mode and return to the Run Mode, press both the buttons at the same time. If you are in a Setup routine and have started to change an entry, but you change your mind before completing the procedure, power cycle the Indicator to exit the Setup Mode and then go to the Run Mode without changing the item. The Indicator is power cycled by turning the Indicator power off for a few moments.

## The Setup Mode, continued

Table 4-2 Indicator Setup Routines

MENU	FUNCTION	DISPLAY
Press the Left button to scroll through the menu	Press the Right button to view or change the menu item.	To return to the Run Mode press both the Right and Left buttons at the same time.
DAMP	<u>Dampening Level</u> , sets the pilots preference for display dampening.	Blinking display is previously entered Dampening Level. Select the desired dampening level by pressing the Left button.
CODE	<u>Calibration Code</u> , matches the Indicator to the Load Cell.	Display is previously entered CAL Code. The Code is changed by selecting the digit to be changed with the Right button. The selected digit will blink. Change the blinking digit by pressing the Left button.
0 in	<u>Installation ZERO</u> , matches the Indicator to the installed Load Cell and to the helicopter. After this procedure the display will be zero when no load is on the Cargo Hook.	Display is a combination of load on the Load Cell, and normal load cell zero offset. Remove all weight from the installed Load Cell except the Cargo Hook, and press any button to complete the procedure and return to the Run Mode.
LOAD	<u>Load</u> , is used to calibrate the system by lifting a known load.	No previous display is shown. Enter the known load using the Right button to select the digit to be changed and Left button to enter the number. Known load is entered "X 10" i.e.; 5000 kilograms is entered as 500. After the known load is entered, press both buttons at the same time and lift the known load. When the load is stabilized press either button. A new Calibration Code will be calculated and the known load will be displayed. This completes the procedure.
Scale	<u>Scale</u> , matches the analog output of the Indicator to an optional remote analog meter.	Display is previously entered number. To change the number use the Right button to select a digit, use the Left button to scroll the digit to the desired number. Entry is times 10.
LB KG	<u>Units</u> , selects the Indicator units (pounds or kilograms).	Display is previously selected unit. To change the unit, use the Left button.
XX - V	<u>Version</u> , is the revision level of the Indicator hardware and software.	Version is for information only, it cannot be changed.

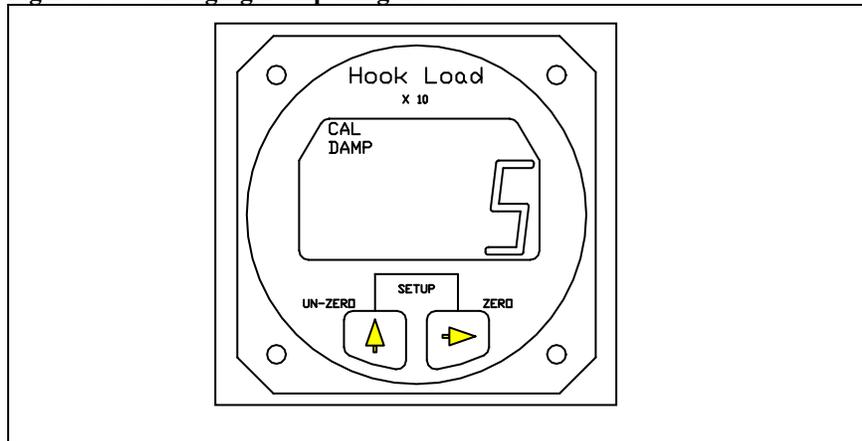
## Indicator Dampening

The Damp or dampening routine allows the pilot to adjust the Indicator dampening level to his preference. The dampening routine is a program that stabilizes the Indicator reading. It offers a trade-off between Indicator responsiveness and stability. Ten dampening levels are available, from 0 through 9. At level 0 the display responds to the slightest change in weight. However, if the load bounced even slightly, the display digits would respond instantly, making the display look unstable. With a dampening level of 9, the display would be stable under the most turbulent conditions, however, it would take several seconds for the display to respond to a change in weight. The ideal dampening level will depend on the flying conditions. A mid range setting of 5 or 6 is usually adequate.

### To Look at or Change the Dampening Level

With the Indicator powered up and in the Run Mode, press both buttons at the same time to go to Setup. Scroll through the menu, using the Left button, until the word DAMP is displayed. To look at or change the Dampening Level press the Right button. The display should look like this:

**Figure 4-5 Changing Dampening Level**



The CAL and the DAMP legend is turned on and the previously set dampening level is displayed. To return to Run without changing the current dampening level press both the Right and Left buttons at the same time. To change the dampening number, use the Left button to scroll the blinking digit to the desired number. After the selection has been made press both the Right and Left buttons at the same time to return to Run.

## Indicator Calibration

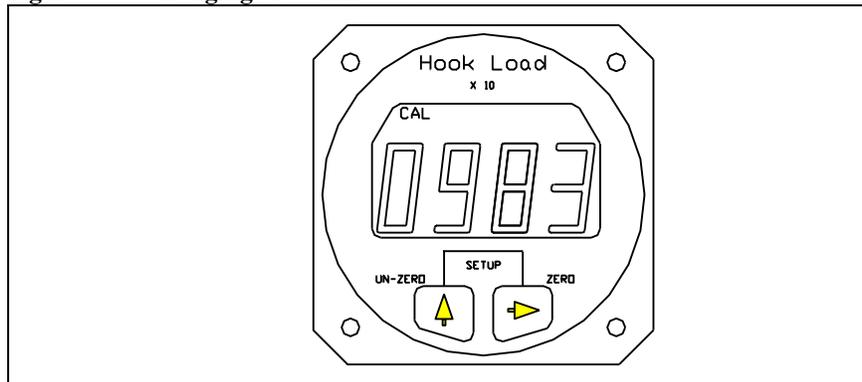
The Calibration Code, or CAL code, is a mandatory input. The Indicator will not accurately display the load without the correct Calibration Code. The Calibration Code scales the signal from the Load Cell.

If the C-39 Indicator was supplied as part of a Load Weigh System, the Calibration Code will have been entered into the Indicator by the factory, however, it should be confirmed. If the Indicator is to be mated to a different Load Cell, it must be calibrated before use. Calibration can be done by entering a known Calibration Code or by lifting a known load and having the Indicator calibrate itself. Both options are discussed below.

### To Look at or Change the Calibration Code

With the Indicator powered up and in the Run Mode, press both buttons at the same time to go to Setup. Scroll through the menu until the word CODE is displayed, then press the Right button. The display should look like this:

**Figure 4-6 Changing the CAL Code**



The CAL legend is turned on and the previously entered or computed Calibration Code is displayed. To return to Run without changing the CAL Code, press both the Right and Left buttons at the same time. To change the Calibration Code, use the Right button to select the digit to be changed, then use the Left button to scroll the blinking digit to the desired number. When the Calibration Code has been entered, press both the Right and Left button at the same time to return to Run.

## NOTICE

*Depending on the type of Load Cell, the Calibration code could be a 3 or 4 digit number. If the Calibration Code is a 3 digit number a leading zero (0) must be used. For example if a Load Cell had a CAL Code of 395 it would be entered as 0395.*

## To Look at or Change the Calibration Code, continued

If the load cell Calibration Code is not known or as a cross check, the Indicator can generate the Calibration Code. This is done by entering the weight of a known load into the Indicator LOAD routine and then lifting the load. See the section Calibration by Lifting a Known Load.

## Installation Zero

Installation zero is a routine that matches the Indicator to the ***INSTALLED*** Load Cell. It adjusts the Indicator reading to compensate for the weight of the Cargo Hook on the Load Cell and whatever zero offset is built into the Load Cell. The Installation Zero procedure is not mandatory. If done the Indicator will read zero when the Un-Zero button is pressed and there is no weight on the Cargo Hook. If the Installation Zero is not done, the Indicator will show the weight of the Cargo Hook plus the value of the Load Cell zero offset.

## To Run the Installation Zero Routine

With the Indicator powered up and in the Run Mode, press both buttons at the same time to go to Setup. Scroll through the menu until the symbol "0 in" is displayed, then press the Right button. The CAL legend will be turned on and the current weight on the Cargo Hook will be displayed and blinking. Remove any weight that is not to be zeroed out and press either button to complete the procedure and return to the Run Mode.

## Calibration by Lifting a Known Weight

Calibration by lifting a known weight is a Setup routine that calculates the Calibration Code for the Load Cell attached to the Indicator. It is useful if the load cell Calibration Code is not known or as a cross check to the accuracy of a known Calibration Code. The procedure is done by entering the known weight into the Indicator and then lifting the weight. This procedure can be done in the shop or on the helicopter. The accuracy of the procedure is directly related to the weight of the known load. If for example the procedure was done with a 1,000 pound load that was assumed to weigh only 900 pounds, all subsequent lifts would be displayed 10% light.



*Be sure to include the weight of everything between the Cargo Hook and the load, i.e. the cable, net, dirt, etc.*

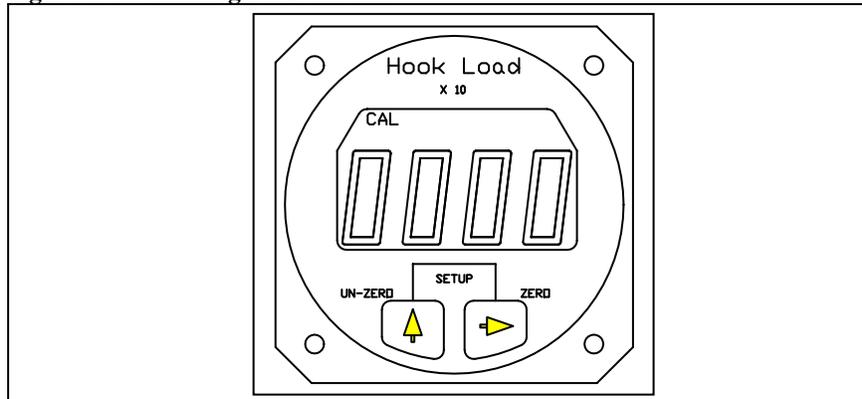
The closer the known load approaches the lifting capacity of the helicopter, the more accurate the calculated Calibration Code will be.

## Calibration by Lifting a Known Weight, continued

### To Run the Calibration by Lifting a Known Weight Routine

With the Indicator powered up and in the Run Mode, press both buttons at the same time to go to Setup. Scroll through the menu until the word LOAD is displayed, then press the Right button. The display should look like this:

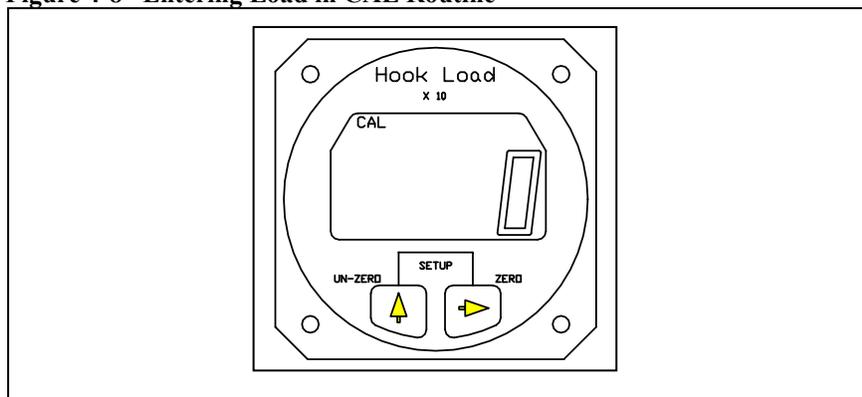
**Figure 4-7 Running CAL Routine**



The CAL legend is turned on and the first digit is blinking. The previous load is not displayed. At this point if you wish to return to the Run Mode without changing the Calibration Code, power cycle the Indicator. At this point it is not possible to return to the Run Mode without changing the Calibration Code by using the buttons on the Indicator front panel.

To proceed with the procedure, use the Right button to select the digit to be changed, then use the Left button to scroll the blinking digit to the desired number. Note that the known weight is entered "X 10"; a 1000 pound load is entered as 100. When the known load has been entered, press both the Right and Left button at the same time. The display will look like this:

**Figure 4-8 Entering Load in CAL Routine**



## Calibration by Lifting a Known Weight, continued

The CAL legend and the digits will be blinking. Again, at this point if you wish to return to the Run Mode without changing the Calibration Code, power cycle the Indicator. It is not possible to return to the Run Mode by using the buttons on the Indicator front panel without changing the Calibration Code. If you wish to proceed, lift the known load and when it is stabilized, press either button to complete the procedure. The Indicator will display the load. This ends the procedure. The Indicator is now calibrated to the Load Cell. It is a good practice to go to the Code routine and record the new Calibration code for later reference.

## Setting the Scale for a remote analog meter

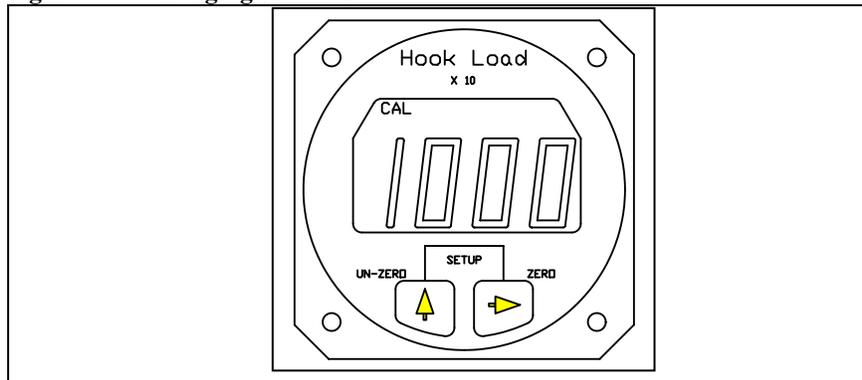
The Scale routine is used when a user supplied analog meter is connected to the Indicator. It is used to match or calibrate the analog meter to the Indicator. The Indicator outputs a 0 to 5 VDC analog signal which is proportional to the Load Cell load. The Scale number tells the Indicator at what point in pounds or kilograms it should reach the 5 VDC output. If for example a 5 volt analog meter is used and its full scale reading is 10,000 pounds, the number entered into the Indicator Scale routine would be 1000 (the number is entered X 10). This number tells the Indicator that it should output the proportional 0 to 5 VDC signal between zero pounds and 10,000 pounds.

The Scale number does not affect Onboard Slave Meters, P/N 210-106-00 or 210-180-00. This number only affects user supplied instruments connected to the analog out signal.

## To Look at or Change the Scale

With the Indicator powered up and in the Run Mode, press both buttons at the same time to go to Setup. Scroll through the menu until the word SCALE is displayed, then press the Right button. The display should look like this:

**Figure 4-9 Changing the Scale**



## To Look at or Change the Scale, continued

The CAL legend is turned on and the previously set Scale number is displayed. To return to Run without changing the Scale, press both the Right and Left button at the same time. To change the Scale number, use the Right button to select a digit to be changed, then use the Left button to scroll the blinking digit to the desired number. When the complete Scale number has been entered, press both the Right and Left button at the same time to return to Run.

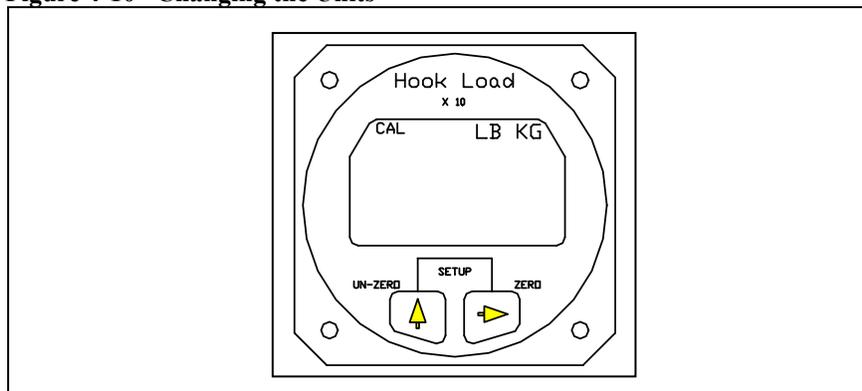
## Select KG or LB Units

The units routine sets the display to read in pounds (LB) or kilograms (KG).

## To look at or change the Units

With the Indicator powered up and in the Run Mode, press both buttons at the same time to go to Setup. Scroll through the menu until the word LB or KG is displayed, then press the Right button. The display should look like this:

**Figure 4-10 Changing the Units**



The CAL legend is turned on and the previously set unit is displayed. To return to Run without changing the units, press both the Right and Left button at the same time. To change the units press the Left button. When the selection has been made, press both the Right and Left button at the same time to return to Run.

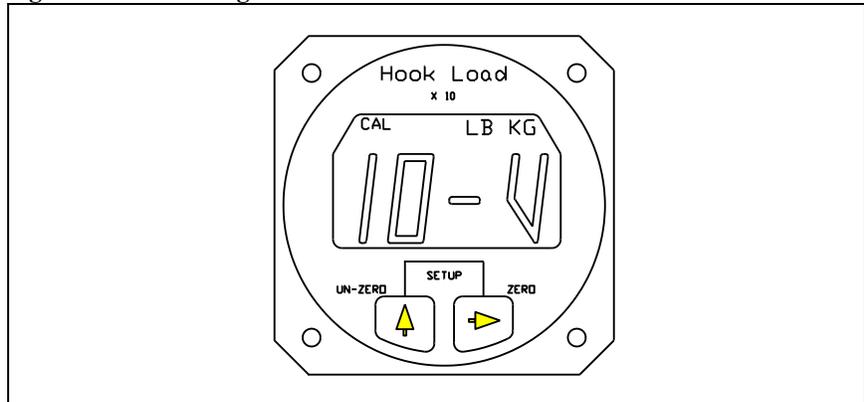
**NOTICE**

*The selected units are displayed when in the Run Mode.*

## Indicator Version

The Version routine displays the Indicator's hardware and software revision levels. Version is set at the factory and cannot be changed.

**Figure 4-11 Looking at Indicator Version**



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# Section 5

## Maintenance

Refer to Service Manual 122-005-00 for detailed maintenance information for the Cargo Hook.

### Inspection

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

The overhaul interval for the kit components (other than the cargo hook) shall be at the same overhaul interval as the cargo hook. See Service Manual 122-005-00.

**Table 5-1 Inspection**

Seq.	Part Number	Daily Check	Inspection – Annually or 100 hours of external load operations*, whichever comes first.	At overhaul interval.
1	200-290-00 200-291-00 System	<ol style="list-style-type: none"> <li>1. Inspect all items for cracks, wear and corrosion. If worn excessively or cracked, replace parts. Remove corrosion and treat with zinc chromate primer.</li> <li>2. Inspect all mounting fasteners to ensure that they are tight.</li> <li>3. Visually inspect the electrical cables for damage and security.</li> <li>4. Visually inspect the manual release cable for damage and security.</li> <li>5. Cycle the electrical and manual release mechanisms to ensure proper cargo hook operation.</li> </ol>	Same as Daily Check	Tear-down and inspect the detail components (see Figure 5-1) to the requirements outlined in this Manual. Overhaul at the same interval as the Cargo Hook. Refer to Service Manual 122-005-00 for overhaul instructions for the cargo hook.



*(\*) Hours of external load operations is defined as the time in which a helicopter is engaged in external load operations. This includes time between loads on the hook.*

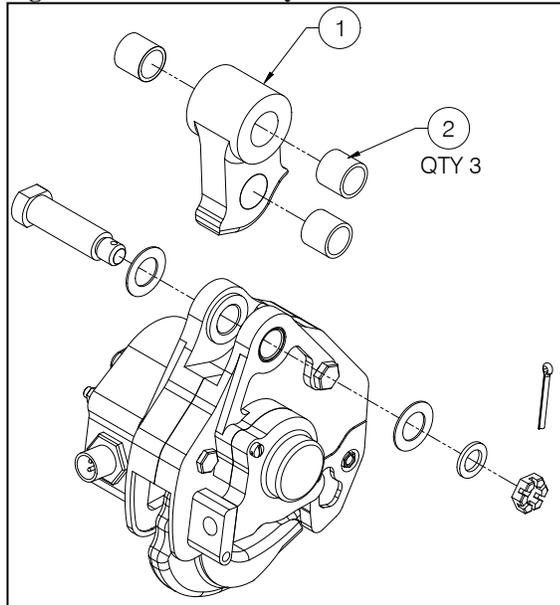
## Inspection *continued*

**Table 5-1 Inspection** *continued*

<b>Seq.</b>	<b>Part Number</b>	<b>Daily Check</b>	<b>Inspection – Annually or 100 hours of external load operations, whichever comes first.</b>	<b>At overhaul interval.</b>
3	210-095-00 Load Indicator	Ensure that the Indicator has been correctly calibrated and the correct Calibration Code has been entered into the Indicator.	Inspect the Indicator for damage and security. If damage is found return the Indicator to the factory.	Calibrate the system by lifting a known weight.
4	270-048-00 270-048-04 Internal Harness Assembly	None	None	Check for security of attachment, damaged wires and connectors. Replace if damaged. Most system problems will be the result of damaged wires. Keep the cables clean and ensure that they are not chafing.
5	All fasteners	Inspect for cracks, excessive wear and security or attachment. If worn excessively or cracked, replace part.	Same as Daily Check	Recommended to replace at overhaul.

# Link Assembly Overhaul

**Figure 5-1 Link Assembly Parts**



**Table 5-2 Link Assembly Parts**

ITEM	PART NO.	DESCRIPTION	QTY
1	290-607-00*	Load Link	1
2	290-364-00	Bushing	3

**\* With a 200-291-00 kit (with Load Weigh), 290-031-00 or 291-550-00 (part of load cell assembly 210-028-01 and 210-028-02 respectively) Load Cell Link is installed rather than 290-607-00. Load Cell P/N 210-028-01 does not include bushings.**

Carefully inspect and if necessary repair the detail parts in accordance with the instructions in Table 5-3. Inspect the parts in a clean, well-lit room.

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

1. Load Link or Load Cell Link (item 1) depending on kit installed. Since it is necessary to remove the covers it is recommended that the Load Cell Assembly be returned to the factory for magnetic particle inspection of the Load Cell Link. If the inspection is to be performed by the customer, contact the factory for additional guidance.

# Link Assembly Overhaul

**Table 5-3 Inspection**

Component	Damage	Remedy	Finish
Load Link P/N 290-607-00 Load Cell Link P/N 291-550-00	Dents, nicks, cracks, gouges, corrosion or scratches.	Repair dents, gouges, nicks, scratches and corrosion if less than .030" deep, blend out at a ratio of 20:1, length to depth, replace if otherwise damaged.	This part is 15-5PH, passivated. No touch up finish required.
Load Cell P/N 290-031-00	Dents, nicks, cracks, gouges, corrosion or scratches.	Repair dents, gouges, nicks, scratches and corrosion if less than .030" deep, blend out at a ratio of 20:1, length to depth, replace if otherwise damaged.	Touch up with zinc chromate primer.
Bushing P/N 290-364-00 (also included with Load Cell Assembly P/N 210-028-02).	Wear on inside diameter.	Maximum permissible bushing ID is .520 inches. Remove and replace if it exceeds .520.	

# Trouble Shooting

**Table 5-4 Trouble Shooting**

DIFFICULTY	PROBABLE CAUSE	CORRECTIVE ACTION
Load Weigh Indicator does not light up.	Faulty wiring, circuit breaker or switch.	Check the power switch, circuit breaker and wiring. If this doesn't help, return the unit to the factory.
Where Am I? (Lost when programming the Indicator)		Turn the Indicator power off for a few moments. When it comes to life it will be in the Run mode.
Indicator displayed load is incorrect.	Incorrect Calibration Code.	Insure the correct Calibration Code has been entered.
Indicator displayed load is not stable.	Dampening level is too small.	Adjust the dampening level to a larger number.
Indicator displayed load takes too long to change the reading when the load is changed.	Dampening level is too large.	Adjust the dampening level to a smaller number.
Do not recognize the Indicator displayed numbers.	NV Ram failure, A/D or D/A circuit failure.	Refer to <i>Error Codes</i> in Table 3-1.
Indicator does not change with changing hook loads.	Defective load cell, indicator failure or damaged internal harness.	Check for damaged internal harness, replace load cell.

## 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](mailto: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 6 STC

United States of America

Department of Transportation—Federal Aviation Administration

## Supplemental Type Certificate

Number SR00808SE

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

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

Original Product—Type Certificate Number: H3EU  
Make: Messerschmitt-Bolkow-Blohm  
Model: BO 105S

Description of the Type Design Change: Fabrication of Onboard Systems Model 200-253-00 (without load weigh) and Model 200-254-00 (with load weigh) Big Mouth Hook Kit and Model 200-290-00 (without load weigh) and Model 200-291-00 (with load weigh) 3.5KK Cargo Hook Kit in accordance with FAA approved Onboard Systems Master Drawing List No. 155-056-00, Revision 4, dated May 14, 2003, or later FAA approved revision; and installation of these replacement cargo hooks in accordance with FAA approved Onboard Systems Owner's Manuals No. 120-088-00, Revision 4, dated January 23, 2003, for the Big Mouth Hook Kit and No. 120-110-00, Revision 0, dated April 4, 2003, for the 3.5KK Cargo Hook Kit, or later FAA approved revisions. This modification must be inspected in accordance with Section 5 of the Onboard Systems Owner's Manual No. 120-088-00, Revision 4, dated January 23, 2003, for the Big Mouth Hook Kit and Section 5 of the Onboard Systems Owner's Manual No. 120-110-00, Revision 0, dated April 4, 2003, and FAA approved Onboard Systems Cargo Hook Service Manual No. 122-005-00, dated October 10, 2002, for the 3.5KK Cargo Hook Kit, or later FAA approved revisions.

Limitations and Conditions: Approval of this change in type design applies to only Messerschmitt-Bolkow-Blohm model rotorcraft listed above, which are modified with a FAA approved installation of a Breeze Eastern P/N 14027-6 hook per STC SH286NE. This approval should not be extended to rotorcraft of these models on which other previously approved modifications are incorporated unless it is determined by the installer that the relationship between this change and any of those other previously approved modifications, including changes in type design, will introduce no adverse effect upon the airworthiness of that rotorcraft. Modified rotorcraft must be operated in accordance with an FAA approved copy of Onboard Systems Rotorcraft Flight Manual Supplement (RFMS) No. 120-088-00, dated June 5, 2000, for the Big Mouth Kit and Onboard Systems Rotorcraft Flight Manual Supplement (RFMS) No. 121-018-00, Revision 0, dated September 11, 2003, for the 3.5KK Cargo Hook Kit, or later FAA approved revisions. A copy of this Certificate, Owner's Manual, Service Manual and the FAA approved RFMS must be maintained as a part of the permanent records of the modified rotorcraft.

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

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: March 31, 2000  
Date of issuance: June 5, 2000

Date reissued: January 13, 2003  
Date amended: May 1, 2001; September 11, 2003



By direction of the Administrator

*[Handwritten Signature]*  
(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.

FAA FORM 8110-2(10-68)

This certificate may be transferred in accordance with FAR 21.47.

# Canadian Approval



Transport  
Canada  
Aviation

Transports  
Canada  
Aviation

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

Your file    Votre référence

Our file    Notre référence  
5009-02

August 4, 2000

Onboard Systems  
11212 NW St. Helens Road  
Portland, OR 97231

Attention: Mr. Donn Snyder

Subject: Type Design Examination of FAA STC SR 00808SE

Dear Sir/Madam :

This is in response to your letters dated June 12, 2000 requesting Transport Canada (TC) approval of subject STC.

In accordance with our revised policy associated with the familiarization of FAA STCs, some STCs applicable to certain categories of aircraft may be accepted solely on the basis of their FAA certification and do not require the issuance of a corresponding certificate by TC. The referenced STC falls within that criteria. Notwithstanding, the subject STC will be entered in the national index of STCs that have been familiarized or accepted by TC for installation on Canadian registered aeronautical products.

This letter confirms formal acceptance of the referenced STCs by Transport Canada.

Yours truly,

J. H. Nehera  
Regional Manager Aircraft Certification

c.c. Mr. Ali Bahrami  
Manager, Seattle ACO  
1601 Lind Avenue S. W. 3960 Paramount Boulevard  
Renton, Washington 98055-4056

Canada

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