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**E-46 ELECTRONIC  
LOAD WEIGH SYSTEM**

*For The  
Sikorsky S-58 Series Helicopters*

**Owner's Manual**

*Owner's Manual Number 120-035-00*

*Revision 6*

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## RECORD OF REVISIONS

<i>Revision</i>	<i>Date</i>	<i>Page(s)</i>	<i>Reason for Revision</i>
2	9/17/02	Title, 4-3	Factory address change.
3	10/09/07	TOC, Section 1, 2-5, 3-8 to 3-12, 4-1 & 4-2	Added explanation of warnings, cautions and notes to Section 1. Updated warnings, cautions and notes throughout. Updated “daily inspection” to “daily check.”
4	01/28/08	1-4, 2-2, 2- 4 to 2-6 & 4-2	Updated manual to allow for installation of wire harness P/N 270-044-01.
5	3/2/10	Section 2 & Section 4	Updated manual to reflect new load weigh harness configuration. Changed overhaul frequency criteria.
6	08/25/10	Sections 1 thru 4	Removed references to S-55 model, updated appearance of C-39 indicator in figures in Section 3, updated safety symbols throughout document.

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# CONTENTS

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

Introduction, **1-1**  
Explanation of Signal Words and Symbols, **1-2**  
System Part Number, **1-2**  
Indicator Features, **1-2**  
Indicator Specifications, **1-2**  
Indicator Pin Out, **1-3**  
Load Cell Specifications, **1-3**  
Bill of Materials, **1-4**  
Inspection, **1-4**

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

Introduction, **2-1**  
System Installation Overview, **2-1**  
Internal Harness Installation, **2-2**  
Indicator Installation, **2-2**  
Indicator Internal Back Light, **2-3**  
Indicator Hook-Open Warning, **2-3**  
Remote Analog Meter, **2-3**  
Load Cell Installation, **2-4**  
Electrical Connections, **2-4**  
Installation Check-Out, **2-6**  
Weight and Balance, **2-6**  
Paper Work, **2-6**

## ***Section 3* Operation Instructions**

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

***Section 3 (cont.)***   **Operation Instructions**

- Calibration by Lifting a Known Weight, **3-9**
  - To run calibration by a known weight routine, **3-10**
- Setting the Scale on a Remote Analog Meter, **3-11**
  - To look at or change the scale, **3-11**
- Select KG or LB Units, **3-12**
  - To look at or change the units, **3-12**
- Indicator Version, **3-13**

***Section 4***   **Inspection, Maintenance, Overhaul & Trouble Shooting**

- Inspection, Maintenance & Overhaul Procedures, **4-1**
- Trouble Shooting, **4-3**
- Instructions for Returning a System to the Factory, **4-4**

***Section 5***   **Certification**

- STC, **5-1**
- Flight Manual Supplement, **5-4**
- STA, **5-6**

***Figures***

- 2-1   System Installation Overview, **2-1**
- 2-2   Wiring Arrangement, **2-5**
- 3-1   Front Panel, **3-1**
- 3-2   After Diagnostic Routine, **3-2**
- 3-3   LB Legend Displayed, **3-2**
- 3-4   Zeroing the Display, **3-3**
- 3-5   Changing Dampening Level, **3-7**
- 3-6   Changing the CAL Code, **3-8**
- 3-7   Running CAL Routine, **3-10**
- 3-8   Entering Load in CAL Routine, **3-10**
- 3-9   Changing the Scale, **3-11**
- 3-10   Changing the Units, **3-12**
- 3-11   Looking at Indicator Version, **3-13**

## ***Tables***

1-1	Indicator Specifications, <b>1-2</b>
1-2	Indicator Pin Out, <b>1-2</b>
1-3	Load Cell Specifications, <b>1-3</b>
3-1	Indicator Error Codes, <b>3-4</b>
3-2	Indicator Setup Routines, <b>3-6</b>
4-1	Inspection, Maintenance & Overhaul, <b>4-1</b>
4-2	Trouble Shooting, <b>4-3</b>

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# Section 1

## General Information

### Introduction

The Onboard 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. The system is designed specifically for each helicopter and is intended to be a permanent installation.

### Explanation of Signal Words and Symbols

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



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



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



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



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



Used to address practices not related to personal injury.

## System Part Number

<b>Part Number</b>	<b>Description</b>
200-080-00	E-46 Load Weigh System

## 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 source is used in place of the internal back light.
- Hook-Open Warning Display
- Analog Meter Output Signal

## Indicator Specifications

**Table 1-1 Indicator Specifications**

<b>SPECIFICATIONS</b>	<b>210-095-00 INDICATOR</b>
Size	Fits standard 2¼" clock hole
Weight	7 oz
Operating Voltage	16 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%

## Indicator Pin Out

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

**Table 1-2 Indicator Pin Out**

<b>Pin Letter</b>	<b>Function</b>
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 28 VDC
P	Aircraft Ground
R	Not Used

## Load Cell Specifications

**Table 1-3 Load Cell Specifications**

<b>SPECIFICATIONS</b>	<b>LOAD CELL</b>
Weight	7.0 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

## Bill Of Materials

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

Part Number	Description	Mfg.	Mfg. P/N	Qty
120-035-00	Owner's Manual	Onboard	Same	1
210-095-00	C-39 Indicator Assembly	Onboard	Same	1
210-093-00	E-46 Load Cell Assembly	Onboard	Same	1
290-214-00	Hook Links	Onboard	Same	4
510-142-00	Bolt	Any	AN 7-27	4
510-111-00	Bolt	Any	AN 3-25	2
510-146-00	Nut	Any	AN 310-7	4
510-195-00	Washer	Any	AN 960-716	4
510-113-00	Cotter Pin	Any	MS 24665-287	4
510-112-00	Nut	Any	AN 310-3	2
510-042-00	Washer	Any	AN 960-10	2
510-125-00	Cotter Pin	Any	AN 380-2-1	2
290-216-00	Load Cell Bumper	Onboard	Same	2
270-044-01	Harness Assembly	Onboard	Same	1
400-048-00	Power Switch	C&K	7101-SYZQE	1
215-010-00	Placard	Onboard	Same	2
215-012-00	Placard	Onboard	Same	1
512-001-00	Ty-Wrap	All-States	RT-350-NA	10
510-028-00	AN Screw	Any	AN515-4R10	4
510-029-00	AN Nut	Any	AN365-440A	4

## 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

## Installation Instructions

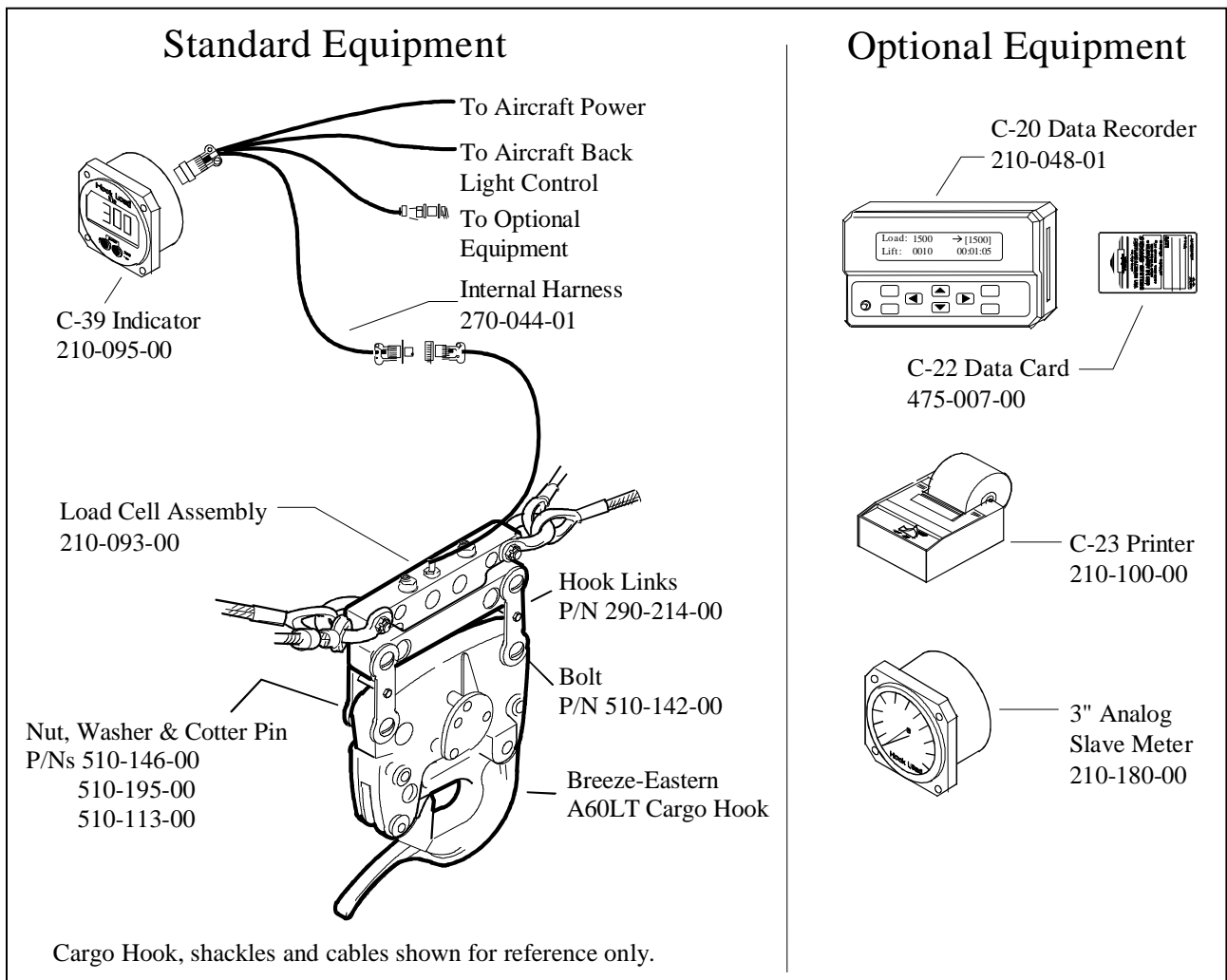
### Introduction

This section describes how to install the components of the Electronic Load Weigh System.

### System Installation Overview

The following diagram is an overview of the system installation.

Figure 2-1 System Installation Overview



## 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 optional items are not included under this STC.



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

The load cell cable can be routed with the cargo hook electrical cable to where the cable terminates at the hook electrical bulkhead connector. Install the load cell cable bulkhead fitting in a convenient location in the same area as the cargo hook electrical fitting.

**Secure the cables clear of flight control rods.**

## Indicator Installation

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 *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 user supplied 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 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 2-2 to connect the Analog Slave Meter to the Internal Harness "DATA" line. If a data connector is present on the data line use cable, P/N 270-059-00, to connect to Analog Slave Meter.

## Load Cell Installation

The E-46 Load Weigh System is compatible with Sikorsky S-58 series helicopters equipped with the Breeze Eastern (Eastern Rotorcraft) A60LT cargo hook.

Remove the supporting cables and shackles from the cargo hook. Attach the load cell to the hook using the fasteners provided. Tighten the hook attaching fasteners only hand tight and secure with the cotter pins provided.

Secure the load cell cable to the left front hook cable, with ty-wraps, in a manner that will provide the maximum protection. Insure that the cable will not be strained during all possible hook movement.

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

## Electrical Connections

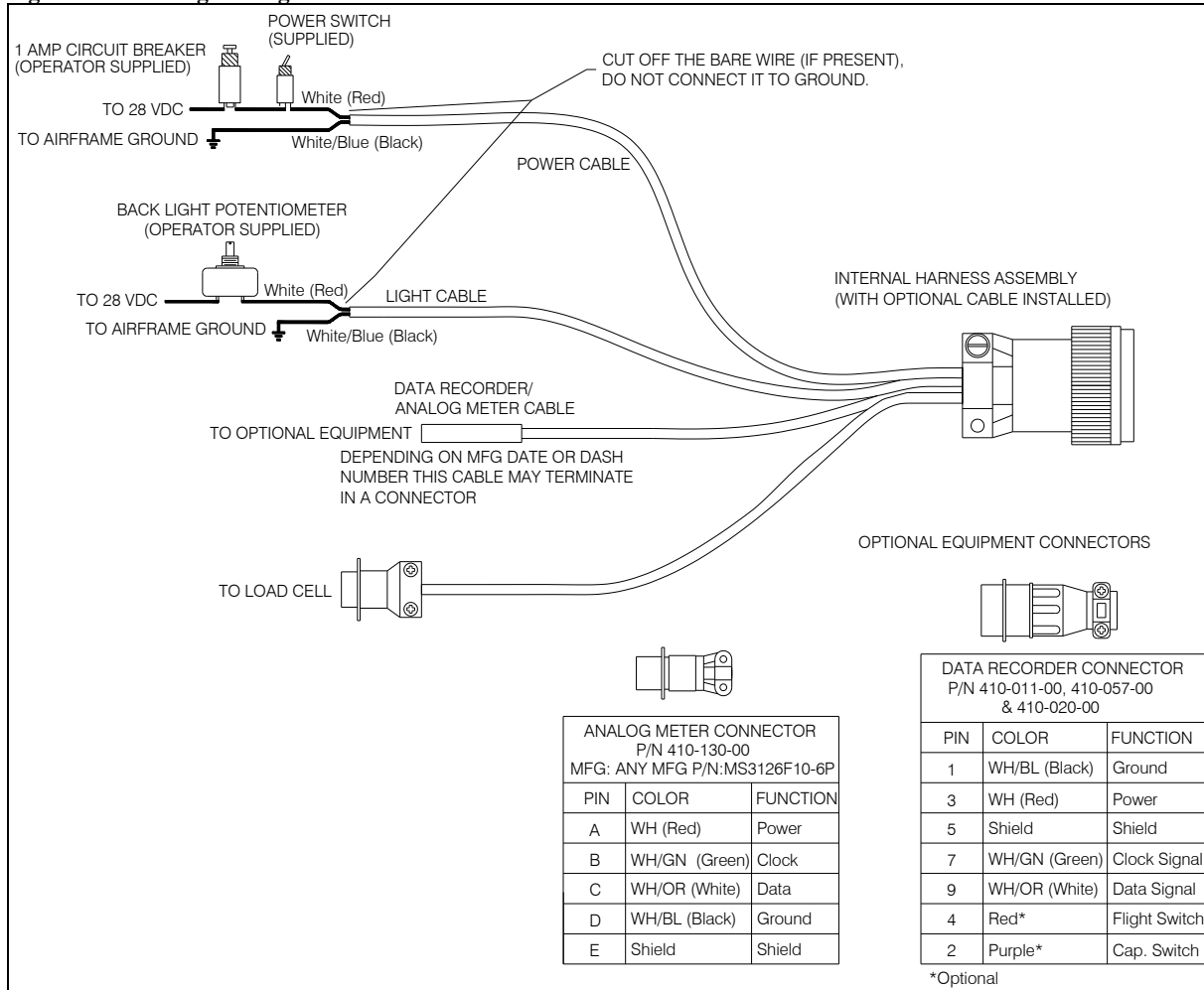
Install the supplied power switch, part number 400-048-00. The "POWER" cable on the Internal Harness is supplied extra long, cut off the excess cable and use as needed to connect the switch and circuit breaker. Connect the "POWER" white (or red wire if earlier harness configuration P/N 270-044-00 is installed) wire 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 as illustrated in Figure 2-2. Connect the circuit breaker to the 24 VDC bus. Connect the white/blue wire (or black wire if 270-044-00 is installed) to the ground bus. The bare wire should be cut off as it is not needed at this end of the cable. Use a minimum of 22 gauge wire to make all connections. Secure the connections and protect from corrosion.



# Electrical Connections

The following figure shows the wiring arrangement. Wire colors for harness P/N 270-044-00 are shown in parentheses.

**Figure 2-2 Wiring Arrangement**



Connect the Internal Harness to the Indicator connector. 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.*

## Installation Check-Out

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



*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.*

**Ensure that the cargo hook is free to move to its full extremes.**

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

## Weight and Balance

ITEM	WEIGHT
Indicator	0.43 lbs (0.20 kgs)
Load Cell	7 lbs (3.18 kgs)
<b>Total</b>	<b>7.43 lbs (3.38 kgs)</b>

## Paper Work

Insert the Flight Supplement into the aircraft flight manual. In the US fill in FAA form 337 for the initial installation. This procedure may vary in different countries. Make the appropriate aircraft log book entry.

# Section 3

## Operation Instructions

### Introduction

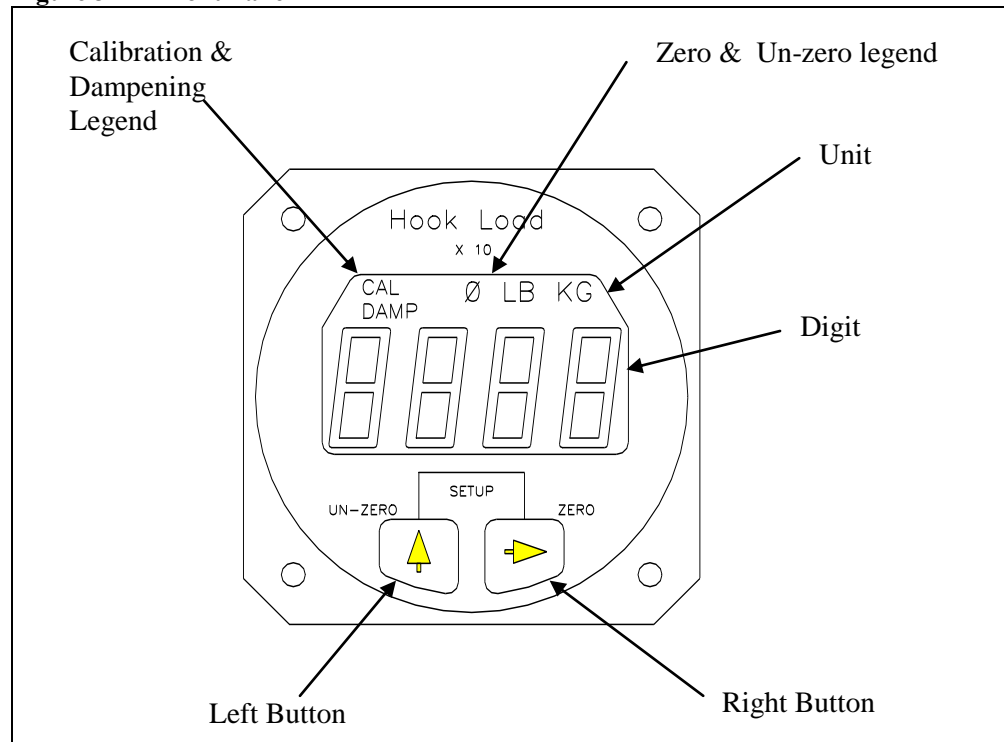
The Load Weigh system is shipped from the factory calibrated and set up to display the load in pounds. This section need only be used for reference. The following section explains the Indicator modes and describes how to change the units, scale, calibration code and other options.

### 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 3-1 Front Panel

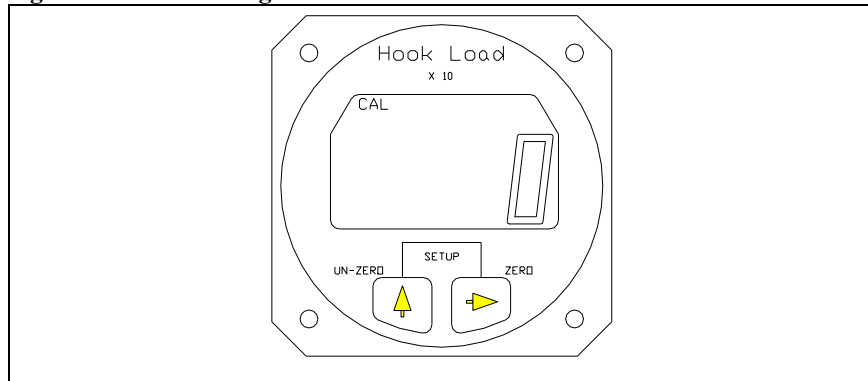


## The Run Mode

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.

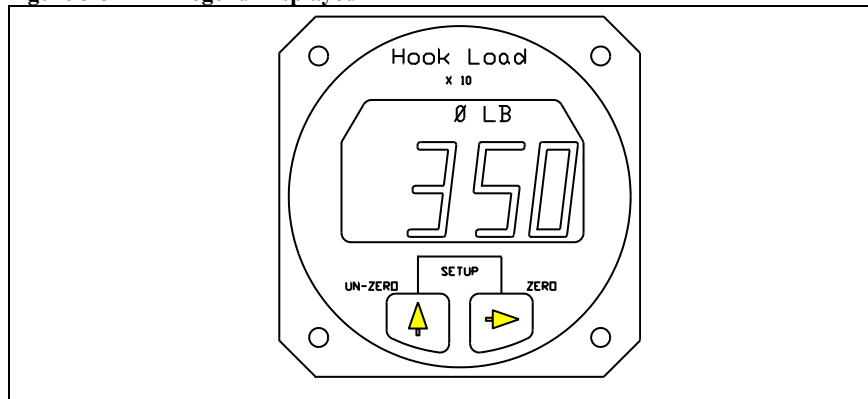
After the Indicator has been correctly installed, power it up by activating the Load Weigh Circuit Breaker. The Indicator will go through a self diagnostic routine. During this routine the display will display all of the digits and legends. If a problem is found during the routine an Error Code will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

**Figure 3-2 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 3-3 LB Legend Displayed**

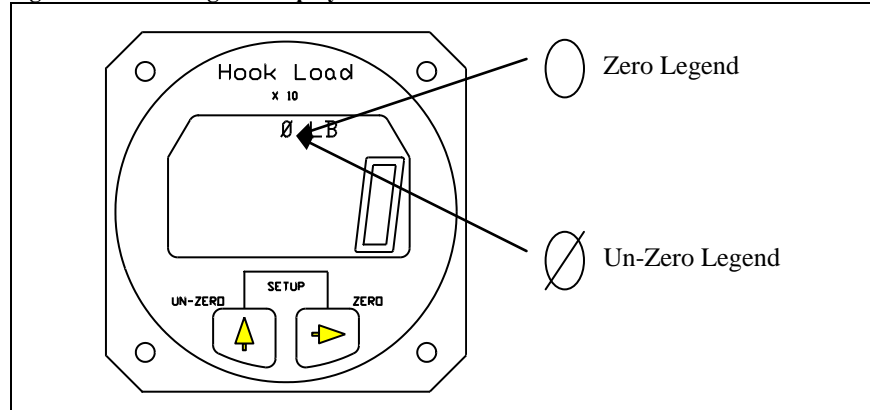


The illustration is a typical hook load reading. The display is 3,500 pounds, note the last digit is not displayed.

## 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 3-4 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 3-1 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.

**Table 3-2 Indicator Setup Routines**

<b>MENU</b>	<b>FUNCTION</b>	<b>DISPLAY</b>
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.



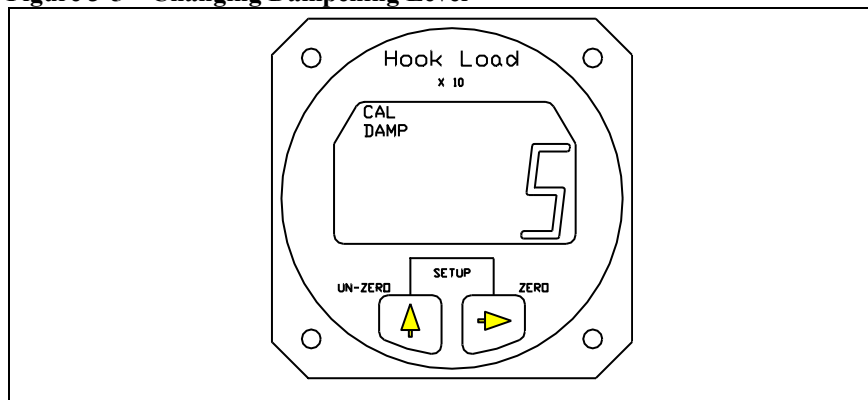
## Indicator Dampening

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 3-5 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

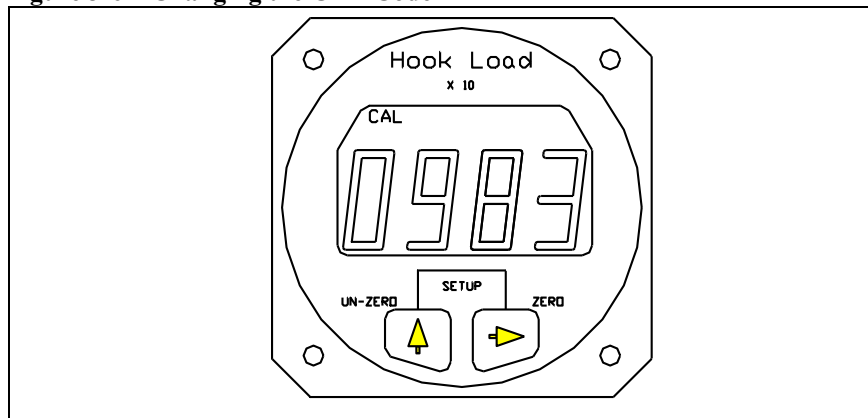
The Calibration Code, or CAL code, is a mandatory input. The Indicator will not accurately display the load without the correct calibration code. The calibration code scales the signal from the load cell.

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 3-6 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.



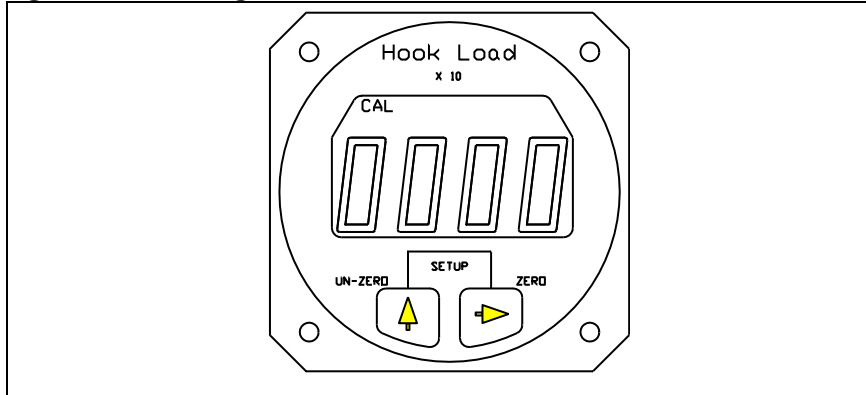
*Be sure to include the weight of everything between the cargo hook and the load, i.e. the cable, net, dirt, etc.*

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

### 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:

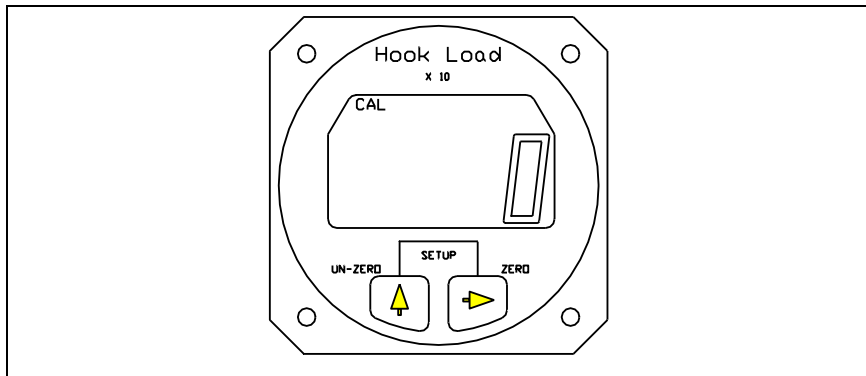
**Figure 3-7 Running CAL Routine**



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 3-8 Entering Load in CAL Routine**



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

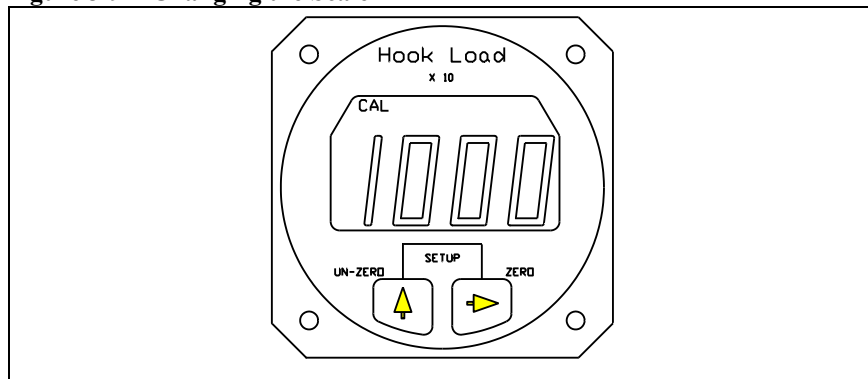
The Scale routine is used when a user supplied analog meter is connected to the Indicator. It is used to match or calibrate the analog meter to the Indicator. The Indicator outputs a 0 to 5 VDC analog signal which is proportional to the load cell load. The Scale number tells the Indicator at what point 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 Systems Analog Slave Meters P/N 210-106-00 or 210-180-00. The Scale number only affects instruments connected to the analog out signal. See Page 2-3.

## 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 3-9 Changing the Scale**



### To look at or change the Scale, contined

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.

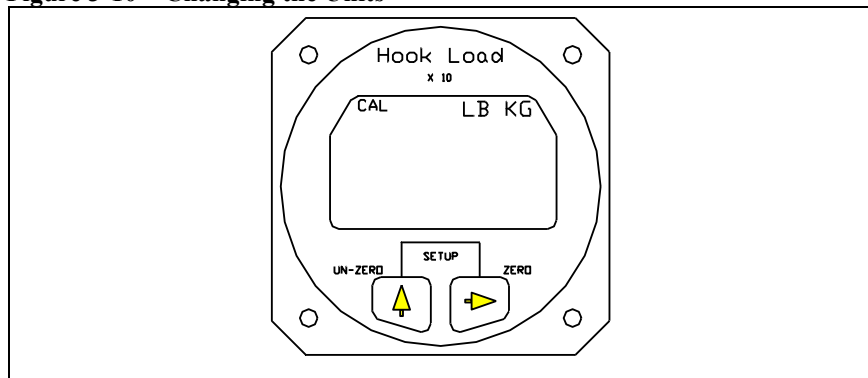
### Select KG or LB Units

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 3-10 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.

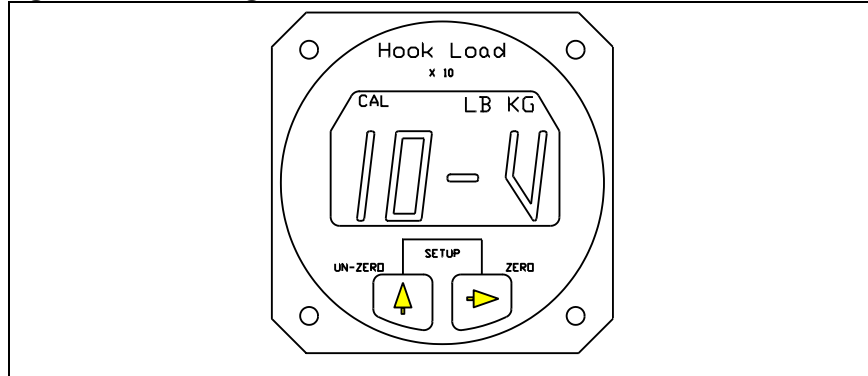


*The selected units are displayed when in the Run Mode.*

## 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 3-11 Looking at Indicator Version**



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## Section 4

# Inspection, Maintenance, Overhaul & Trouble Shooting

### Inspection, Maintenance & Overhaul Procedures

Inspection, maintenance and overhaul of the Electronic Load Weigh System shall be in accordance with the table below.

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



*(\*) 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.*

Table 4-1 Inspection, Maintenance & Overhaul

Seq.	Part Number Nomenclature	Daily Check	Inspection - 100 hours or annually whichever comes first.	Overhaul
1	210-093-00 Load Cell Assembly	Inspect in area of bolt holes for evidence of cracks. Inspect attaching hardware for security and excessive wear. Inspect strain relief for damage.  If worn excessively or cracked, replace part.	Same as Daily Check. Lubricate using a general purpose grease (MIL-G-23827 or equivalent). Check for evidence of corrosion. Remove corrosion and treat with zinc chromate primer.  <b>NOTE #1</b> <b>If assembly is used daily, inspect to overhaul criteria where indicated.</b>	Inspect load cell body using magnetic particle inspection per ASTM-E1444 and MIL-STD-1907 grade A. Inspect for hole elongation and excessive wear. Replace bushings if wear exceeds 0.442 diameter. Remove corrosion and treat with zinc chromate primer.

**Table 4-1 Inspection, Maintenance & Overhaul (continued)**

<b>Seq.</b>	<b>Part Number Nomenclature</b>	<b>Daily Check</b>	<b>Inspection - 100 hours or annually whichever comes first.</b>	<b>Overhaul</b>
2	210-095-00 Load Indicator	Ensure that the Indicator has been correctly calibrated and the correct Calibration Code has been entered into the Indicator.	Same as Daily Check. Inspect the Indicator for damage and security  Inspect the Indicator for corrosion. If corrosion is found, polish out shallow pits and treat with zinc chromate.	Calibrate the system by lifting a known weight.
3	270-044-01 Internal Harness Assembly	N/A	Check for security of attachment, damaged wires and connectors. Keep the wires clean and ensure that they are not chafing. Replace them if the insulation or shield is damaged.	Same as Daily Check.
4	290-214-00 Hook Links	Inspect for evidence of cracks. Inspect attaching hardware for security and excessive wear.  If worn excessively or cracked, replace part.	Check for condition and security of attachment, excessive wear, distortion and cracks. Check for evidence of corrosion. Remove corrosion and treat with zinc chromate primer.  See Note #1	Inspect links using magnetic particle inspection per ASTM-E1444 and MIL-STD-1907 grade A. Inspect for hole elongation and excessive wear. Replace if holes exceed 0.442 Dia. Remove corrosion and treat with zinc chromate primer.
5	All fasteners	Inspect for cracks, excessive wear and security or attachment. If worn excessively or cracked, replace part.	Same as Daily Check.	Replace

## Trouble Shooting

Table 4-2 Trouble Shooting

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

# Section 5

## Certification

STC

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

Number SH5780NM

This certificate, issued to Onboard Systems

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. SH5780NM for list of approved rotorcraft  
Model: \* models and applicable airworthiness regulations

Description of Type Design Change: Fabrication of Onboard Systems Model E-46 cargo hook load weigh system in accordance with FAA Approved Onboard Systems Master Drawing List No. 155-023-00, dated July 10, 1992, or later FAA approved revision; and, Installation of this system in accordance with FAA approved Onboard Systems Owners Manual No. 120-035-00, dated September 10, 1992, or later FAA approved revisions. Inspect load cells in accordance with Section 5 of Onboard Systems Owners Manual No. 120-035-00, dated September 10, 1992, or later FAA approved revision.

Limitations and Conditions: Approval of this change in type design applies to only those Sikorsky model rotorcraft listed on AML No. SH5780NM, dated October 13, 1992, or later FAA approved revision, which were previously equipped with an FAA approved installation of Sikorsky cargo hook sling assembly, P/N S1650-62195, and Cargo Hook P/N SP-7109-31. 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.

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: September 9, 1992

Date issued:

Date of issuance: October 13, 1992

Date amended:



By direction of the Administrator  
*[Signature]*  
(Signature)

Manager, Special Certification Branch  
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)

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

*Number* SH5780NM

LIMITATION AND CONDITIONS: (continued)

Rotorcraft modified in accordance with this STC must be operated in accordance with an FAA approved copy of Rotorcraft Flight Manual Supplement dated October 13, 1992, or later FAA approved revision. A copy of the Certificate, Continuation Sheet No. SH5780NM, AML No. SH5780NM and FAA approved Rotorcraft Flight Manual Supplement must be maintained as part of the permanent records of the modified helicopter.

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*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

# Eligibility List

FAA APPROVED MODEL LIST (AML) NO. SH5780NM


FOR

ONBORAD SYSTEMS

Issue Date: October 13, 1992

ITEM	AIRCRAFT MAKE	AIRCRAFT MODEL	ORIGINAL TYPE CERTIFICATE NUMBER	CERTIFICATION BASIS FOR ALTERATION	FAA APPROVED INSTALLATION		RFM SUPPLEMENT NO. AND DATE	AML AMENDMENT DATE
					NUMBER	REVISION NO. AND DATE		
1	Sikorsky	S-58A S-58B S-58C S-58D S-58E S-58F S-58G S-58H S-58J S-58BT S-58DT S-58ET S-58FT S-58HT S-58JT	IH11	CAR 6, dated January 15, 1951, and amendment 6-1 through 6-6 (also see TC Data Sheet IH11)	Onboard # 120-035-00	September 10, 1992	October 13, 1992	NC

FAA Approved:



Manager, Special Certification Branch  
Seattle Aircraft Certification Office

Date: October 13, 1992

# Flight Manual Supplement

Onboard Systems  
11212 NW St. Helens Road  
Portland, OR 97231  
STC No. SH5780NM

FAA APPROVED

## ROTORCRAFT FLIGHT MANUAL SUPPLEMENT

FOR

SIKORSKY MODEL S-58A, S-58B, S-58C, S-58D S-58E, S-58F,  
S-58G, S-58H, S-58J, S-58BT, S-58DT, S-58ET, S-58FT, S-58HT, S-58JT

R/N \_\_\_\_\_ S/N \_\_\_\_\_

This supplement must be attached to the appropriate FAA approved Sikorsky Rotorcraft Flight Manual when an Onboard Systems Model E-46 Cargo Hook load weigh system is installed in accordance with Supplemental Type Certificate (STC) NO. SH5780NM. The information contained herein supplements or supersedes the basic manual only in those areas listed herein. For limitations, procedures, and performance information not contained in this supplement, consult the basic Rotorcraft Flight Manual.

### I. LIMITATIONS

This suspension system is approved for cargo loads up to 5000 pounds, not to exceed those published in the basic Rotorcraft Flight Manual for the specified helicopter.

If a LOAD WEIGH system is installed, the following placards apply:


- Mount adjacent to the Onboard Systems INDICATOR in full view of the pilot and copilot:

TURN THE LOAD WEIGH SYSTEM OFF WHEN NAVIGATION EQUIPMENT IN USE  
NO AIRCRAFT OPERATION SHOULD BE PREDICATED ON THE READING OF THE  
ONBOARD WEIGH SYSTEM

- Mount adjacent to both the power switch and the circuit breaker in full view of the pilot and copilot:

ELECTRONIC WEIGHING SYSTEM

FAA Approved: \_\_\_\_\_

  
Manager, Special Certification Branch  
Seattle Aircraft Certification Office

Date: October 13, 1992

Page 1 of 2



Onboard Systems  
11212 NW St. Helens Road  
Portland, OR 97231  
STC No. SH5780NM

## II. PROCEDURES - PRE-FLIGHT

Swing the Onboard cargo hook suspension system and hook assembly to the full extremes to verify that it does not self trip. Consult the latest revision of the owners manual for Daily and 300 hour inspection procedures.

Verify proper function of both the mechanical and electrical release systems.

Adjust the instrument "zero knob" to set the display to zero.

## III. PERFORMANCE

The LOAD WEIGH system is designed and installed as a means of MONITORING the load suspended from the cargo hook. Functional and performance characteristics have not been determined on the basis of the load cell indication or display. Therefore, this instrument shall NOT be used as a primary indication of performance and flight operation must NOT be predicated on its use.

Date: October 13, 1992

Page 2 of 2

STA

DEPARTMENT OF TRANSPORT

# Supplemental Type Approval

Number: SH94-20

This approval is issued to:

Issue No.: 1

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

Approval Date: June 21, 1994

Issue Date: June 21, 1994

Responsible Region

Pacific

Aircraft/Engine Type or Model:

See FAA Approved Model List No. SH5780NM

Canadian Type Approval or Equivalent:

FAA 1H11

Description of Type Design Change:

Installation of Onboard Systems Model E-46  
Load Weighing System Per FAA STC SH5780NM.

Installation/Operating Data,  
Required Equipment  
and Limitations:

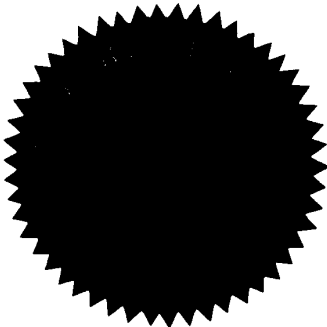
Fabrication is in accordance with FAA Approved  
Onboard Systems Master Drawing List No. 155-023-  
00 dated July 10, 1992\*.

Installation is in accordance with FAA Approved  
Onboard Systems Owners Manual No. 120-035-00  
dated September 10, 1992\*.

Inspect load cells in accordance with Section 5  
of Onboard Systems Owners Manual No. 120-035-00  
dated September 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.

L.B. Samoil  
Regional Airworthiness Engineer  
For Minister of Transport

26-0357 (10-88)

Canada

DEPARTMENT OF TRANSPORT

# Supplemental Type Approval

(Continuation Sheet)

Number: SH94-20

Issue No.: 1

Approval Date: June 21, 1994

Issue Date: June 21, 1994

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

Required Equipment:

1. Aircraft must have been previously equipped with an FAA Approved installation of Sikorsky Cargo Hook Sling Assembly P/N S1650-62195 and Cargo Hook P/N SP-7109-31.
2. FAA Approved copy of Onboard Systems Rotorcraft Flight Manual Supplement dated October 13, 1992, or later FAA Approved revision.

Limitation:

Approval of this change in type design applies to only those Sikorsky model rotorcraft listed on FAA Approved Model List No. SH5780NM dated October 13, 1992, or later FAA approved revision.