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C-39 Indicator

For

Helicopter Load Weigh Systems

Owner's Manual

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RECORD OF REVISIONS

Revision	*Date*	*Page(s)*	*Reason for Revision*
2	9/17/02	Title, 4-2	Factory address change.
3	10/24/07	TOC, Section 1, 3-7 to 3-9 & 3-12	Added explanation of warnings, cautions and notes to Section 1. Updated warnings, cautions and notes throughout.
4	11/04/10	All	Updated format of safety labels (was "warnings, cautions and notes"). Updated applicable part numbers, updated appearance of indicator to reflect current configuration.
5	05/05/12	1-1	Updated table 1-1.
6	07/09/15	All	Removed installation instructions section and inspection, maintenance, and troubleshooting section. This information is contained within Owner's Manual and/or ICA supplied with kits.

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Section 1
General Information

Introduction

The C-39 Indicator is a cockpit mounted Indicator whose purpose is to display the weight of the load carried on the cargo hook. The Indicator is part of a three component load weigh system, the Load Cell and the Internal Harness are the other components. The Indicator is usually supplied as part of a complete load weigh kit.

This manual is applicable to C-39 indicator P/N 210-095-00 which is the base version (features 28V incandescent lights and 5V analog output) and to the following part numbers which have the variations from the base version as noted.

Table 1-1 C-39 Indicator Versions

Part No.	Variation	Equivalent Part No.
210-095-00	Standard Configuration, 28 VDC lights	None
210-095-02	5V incandescent lights	210-177-00
210-095-03	7V analog output	210-175-00
210-095-04	28V NVG lights, 7V analog output	210-186-00
210-095-05	5V NVG lights	None
210-099-00	DB9 Connector	None
210-102-00	Kaman Helicopter Version	Kaman K983185-003

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.

Specifications

Table 1-2 C-39 Indicator Specifications

Size	Fits standard 2¼" clock hole
Weight	.47 lbs (.21 kgs)
Operating Voltage	21 to 31 VDC
Current Consumption	< 25 mA
Accuracy Over Operating Temperature Range	0.1% ± 1 digit
Operating Temperature Range	+70°C to -45°C
Storage Temperature Range	+80°C to -50°C
Scaleable Analog Output	0 to 7VDC ± 0.5% (depending on version)

Indicator Pin Out

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

Table 1-3 C-39 Indicator Pin Out*

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

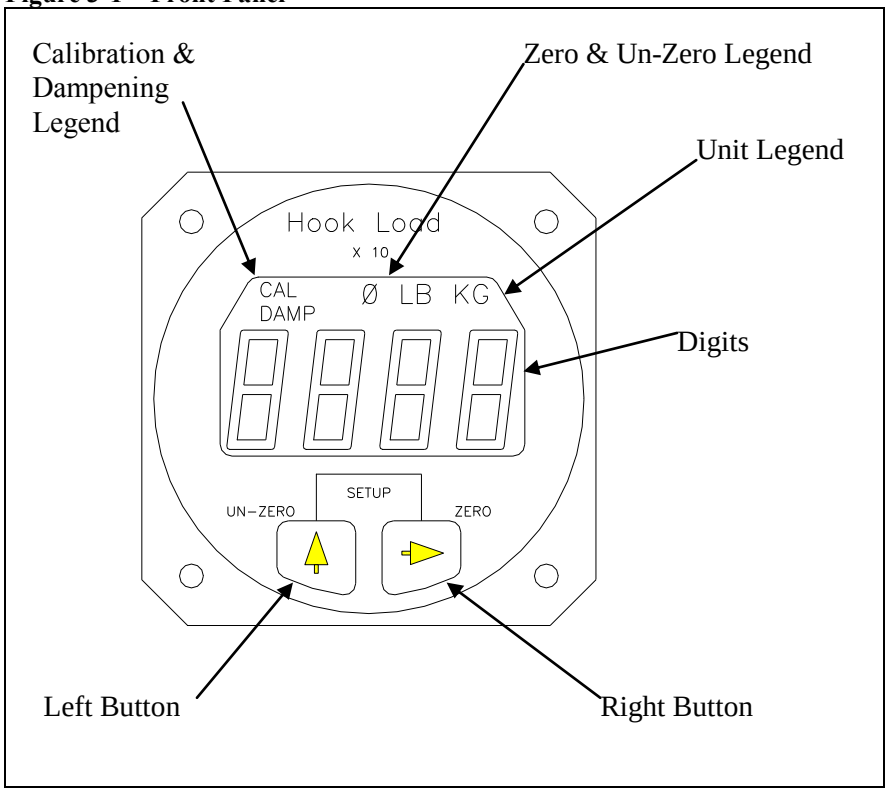
*Contact the factory for pin out of Indicator P/N 210-099-00 with DB-9 connector.

Section 2
Operation Instructions
About the 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, ect.
- 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

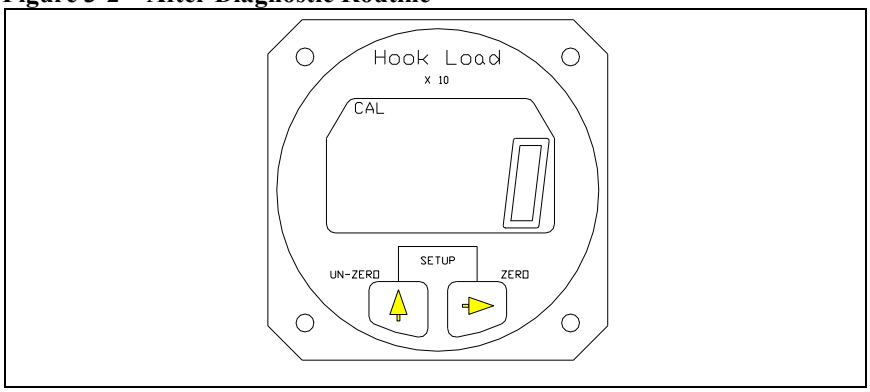


The Run Mode

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 Indictor always comes to life in the Run mode.

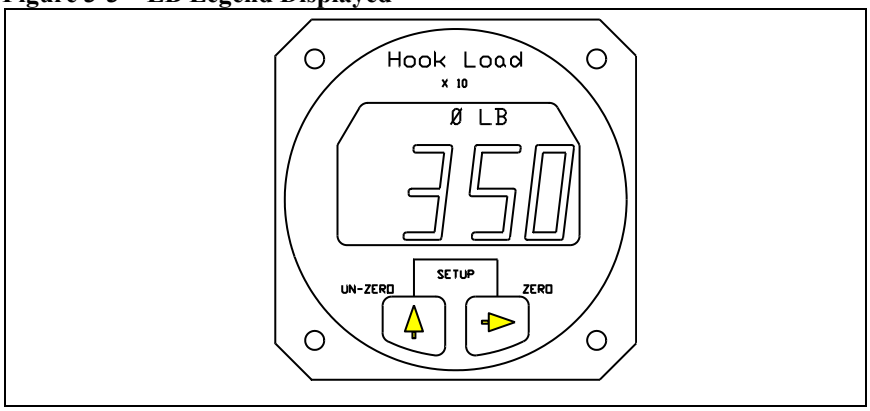
After the C-39 has been correctly installed, power it up by activating the Load Weigh Circuit Breaker. The Indicator will go through a self diagnostic routine. During this routine the display will display all of the digits and legends. If a problem is found during the routine an Error Code will be displayed. 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

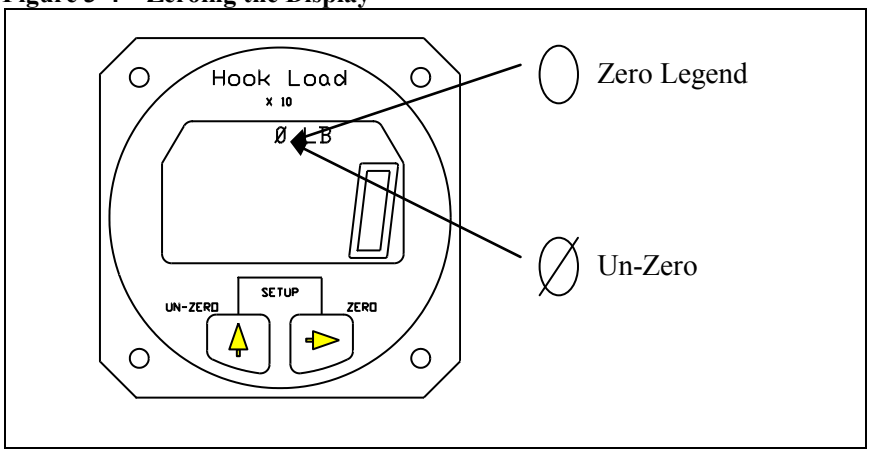


The illustration is a typical hook load reading. The display is 3,500 pounds, note the last digit is not displayed.

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 new number is less than zero, zero is displayed. 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 C-39 Indicator Error Codes

DISPLAY	CAUSE	POSSIBLE CORRECTIVE ACTION
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 C-39 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	Dampening Level, 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	Calibration Code, 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	Installation ZERO, 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	Load, 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	Scale, 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	Units, selects the Indicator units (pounds or kilograms).	Display is previously selected unit. To change the unit, use the Left button.
XX - V	Version, is the revision level of the Indicator hardware and software.	Version is for information only, it cannot be changed.

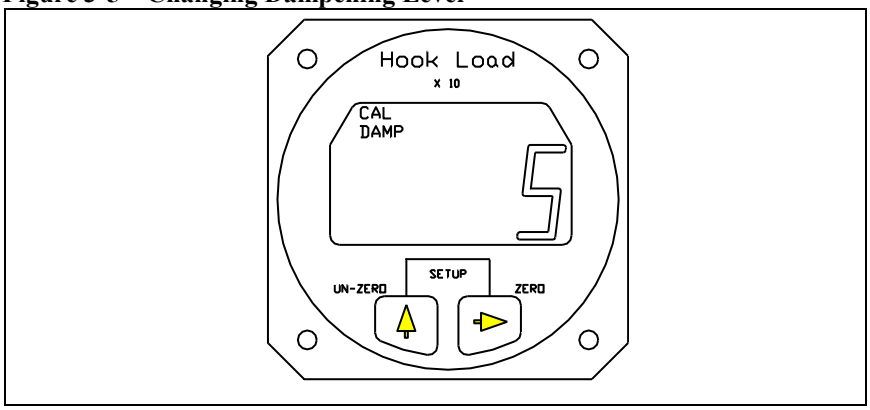
Indicator Dampening

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 then 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.

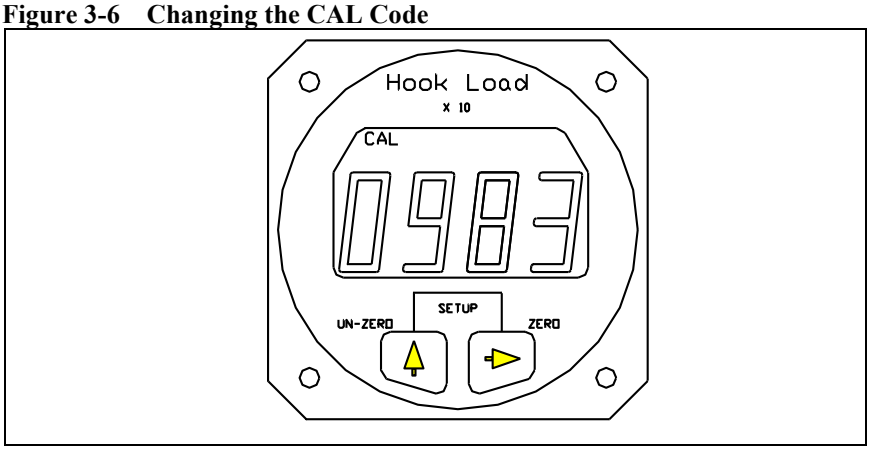
Indicator Calibration, continued

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. 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.

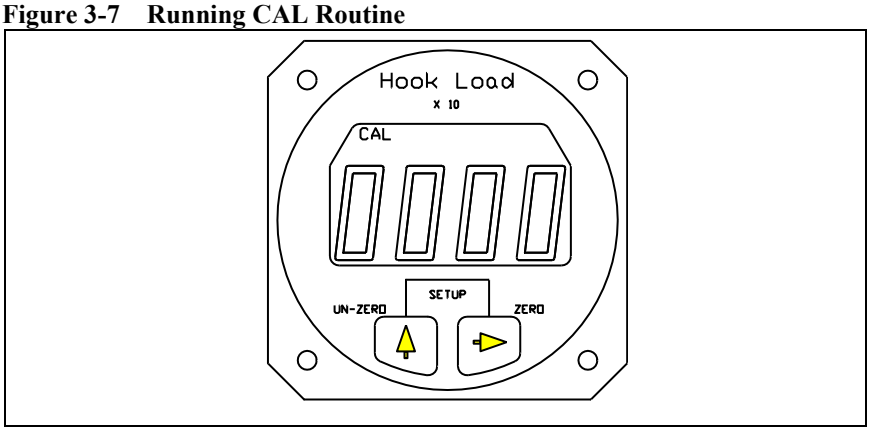
Be sure to include the weight of everything between the cargo hook and the load, i.e. the cable, net, dirt, etc.

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:

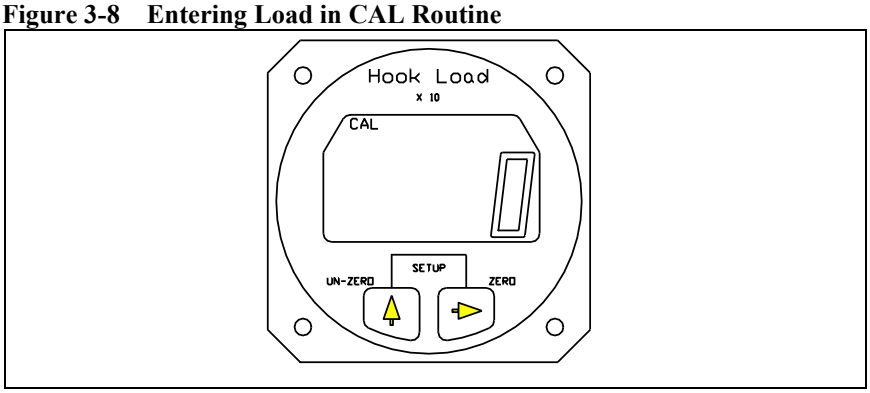
Figure 3-7 Running CAL Routine



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 know weight is entered "X 10"; a 1000 pound load is entered as 100. When the know 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.

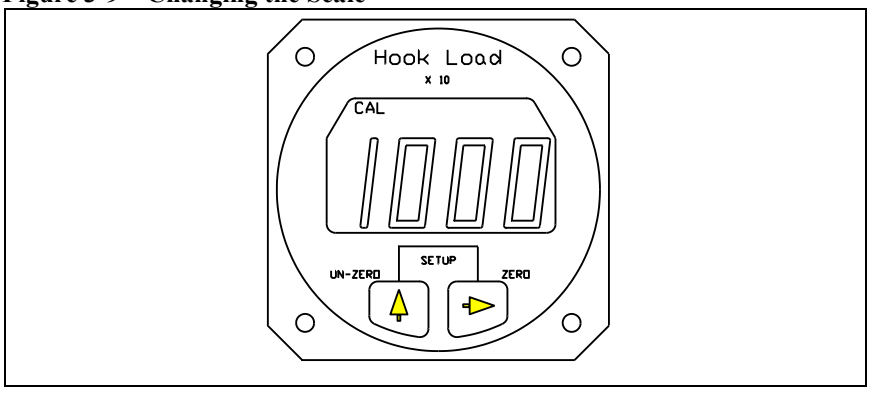
Setting the Scale on a Remote Analog Meter

The Scale routine is used when an optional analog meter is connected to the C-39. 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 (some Indicator P/Ns output 0 to 7 VDC, refer to Table 1-1). 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.

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



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.

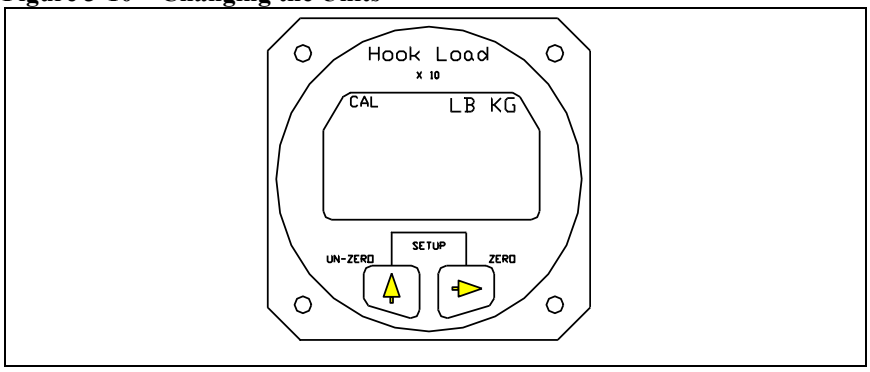
Select KG or LB Units

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.

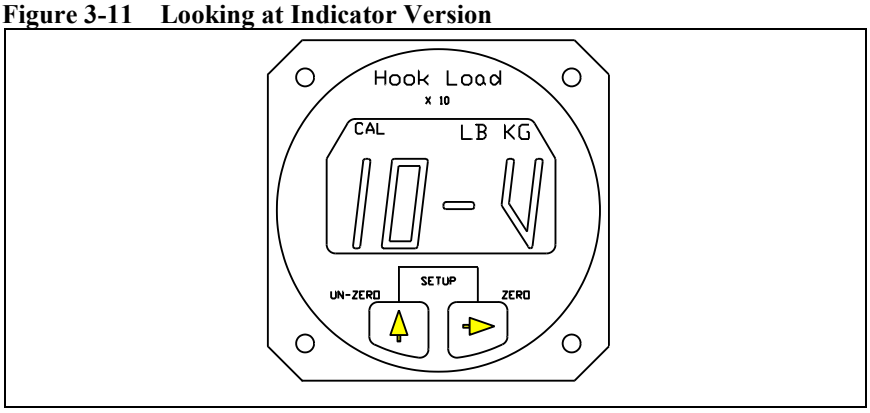
NOTICE

The selected units are displayed when in the Run Mode.

Indicator Version

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

Figure 3-11 Looking at Indicator Version



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