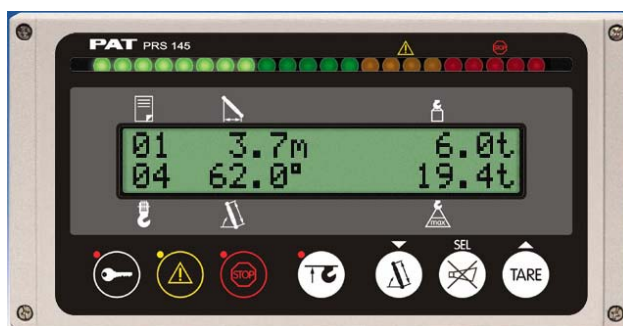




HIRSHMANN

PAT

PRS145



CALIBRATION MANUAL

P/N 031-300-190-161 REV A 07/28/2002

NOTICE

The information in this document is subject to change without notice.

PAT makes no warranty of any kind with regard to this material, including, but not limited to the implied warranties of merchantability and fitness for a particular purpose.

PAT shall not be liable for errors contained herein or for incidental or consequential damages in connection with the furnishing, performance or use of this manual.

This document contains proprietary information which is protected by copyright. All rights are reserved. No part of this document may be photocopied, reproduced, or translated to another language without prior consent of PAT.

MANUAL REVISIONS

REV	DATE	NAME	DESCRIPTION
A	07/25/02	SB	ECN-205

TABLE OF CONTENTS

1	GENERAL INFORMATION	1
2	MATERIAL LIST	1
3	WARNINGS.....	1
4	CALIBRATION PROCEDURE.....	2
4.1	I. C. INSTALLATION	2
4.2	PANEL START UP	3
4.3	ANGLE AND LENGTH PRE-CALIBRATION.....	3
4.4	ENTERING CALIBRATION MENU	4
4.5	ANGLE CALIBRATION	4
4.6	LENGTH CALIBRATION	5
4.7	PRESSURE CHANNEL CALIBRATION	6
4.8	RATIO CALIBRATION	7
4.9	RADIUS OFFSET CALIBRATION.....	7
4.10	LOAD CALIBRATION	8
4.11	DEFLECTION CALIBRATION.....	20
4.12	LOAD MOMENT SHUT OFF	21
4.13	MEASURE.....	21
4.14	LATTICE BOOM CALIBRATION	25
4.15	ANGLE PRE-CALIBRATION SETUP	25
4.16	SET ANGLE	25
5	MENU FLOW CHART.....	28
6	CALIBRATION SUMMARY TABLE	29

1 GENERAL INFORMATION

The Load Moment Indicator System PRS145 must be calibrated after completing system installation, crane modification, or anytime there is an indication of inaccuracy. The calibration will match the sensors installed on the crane.

Prior to starting the calibration, it is advised to first read over this procedure in its entirety. The purpose of this manual is to provide calibration information required before operating the system. Refer to the Operator's Manual for system description and console controls.

REFERENCE INFORMATION:

Load Moment Indicator System PRS145 Operator's Manual. 031-300-190-160

2 MATERIAL LIST

- software EPROMs and calibration information package
 - EPROM puller
 - Inclinator or Digital Level
 - 200' tape measure ft/meters
 - digital multimeter a set of leads
 - test weights; (Test loads are determined by the Crane Load Charts included with the calibration information).
- NOTE: To comply with the SAE J376 standards the test load must be to a known accuracy of $\pm 1\%$.

3 WARNINGS

Always refer to operational instructions and load charts that are provided by the crane manufacturer for specific crane operation and load limits.

The Load Moment Indicator System PRS145 is not and shall not be a substitute for good operator judgment, experience, or use of acceptable safe operating procedures.

The operator is responsible for operating the crane within the manufacturer's specified parameters.

The crane operator shall ensure that all warnings and instructions provided by the manufacturer are fully understood, observed, and remain with the crane.

Prior to operating the crane, the operator must carefully read and understand the information in the Operator's Manual so that he knows the operation and limitations of the Load Moment Indicator System PRS145.



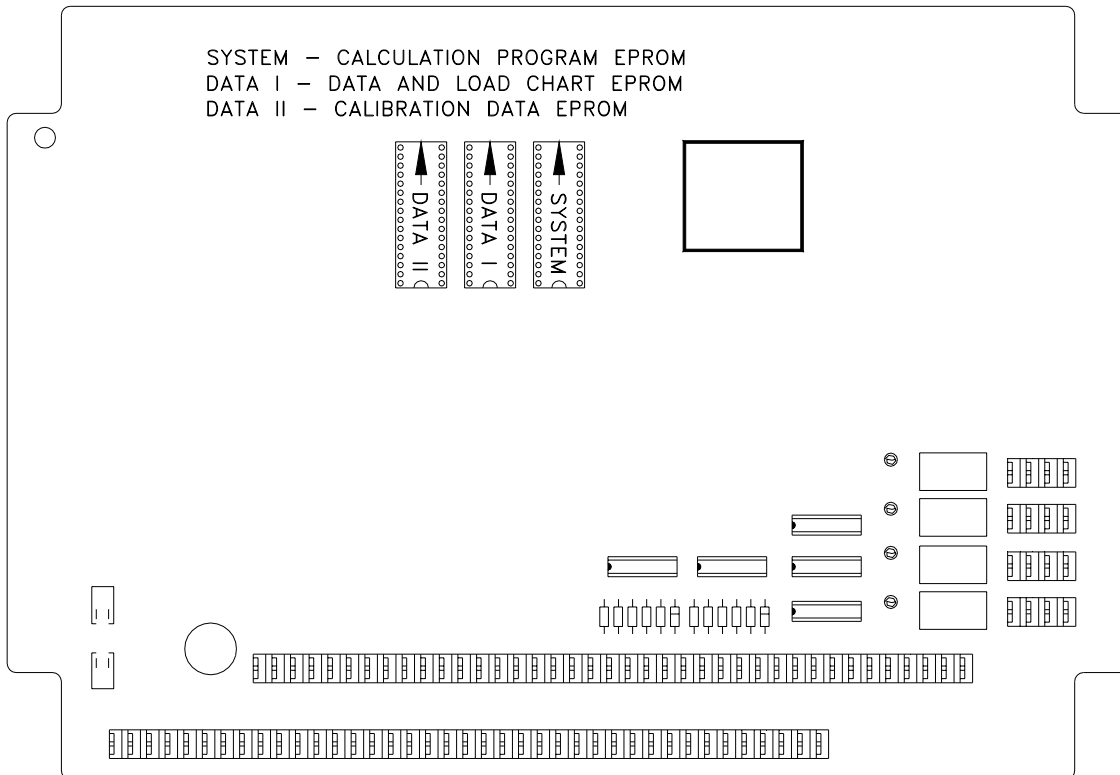
BEFORE OPERATION OF THE CRANE, THE SYSTEM MUST BE CALIBRATED. ALL STEPS MUST BE FOLLOWED AND COMPLETED. TO PREVENT MATERIAL DAMAGE AND SERIOUS, OR EVEN FATAL, ACCIDENTS, THE CORRECT ADJUSTMENT OF THE SYSTEM HAS TO BE ENSURED BEFORE STARTING THE CRANE OPERATION.

4 CALIBRATION PROCEDURE



4.1 I.C. Installation

- 4.1.1 Check and verify that the Load Chart in the enclosed booklet matches the Load Chart in the crane. If the Load Charts do not match, please contact PAT America Inc.
- 4.1.2 Install the EPROMs that are received with the booklet by plugging them into the proper socket and in the proper direction, as shown below.




WARNING: If the EPROMs are put into the sockets improperly they will be destroyed and new EPROMs will have to be purchased.




4.2 Panel start up








- 4.2.1 Turn on power to the system. The panel will display **E: 1140, E:1141 or E:1142** (if these error messages do not appear continue to Section 4.3). Push  or , then the display will change to:

ACCESS CODE 0000000

- 4.2.2 To enter the **ACCESS CODE** push  button to cursor to each digit and the  or  buttons to change number to get the proper menu digit. The **ACCESS CODE** is **001001**.

- 4.2.3 Push  button and panel will display:

CKSUM EP CKSUM EEP CKSUM PRG RESET
--

- 4.2.4 To checksum new EPROMs:  button at EACH of these menu titles, doing a **RESET** last. To select a menu title, use the  or  buttons until menu title blinks then push  button. After check summing EPROMs, **RESET** the system and panel will enter the Program Menu.
- 4.2.5 Use the  or  buttons to select the configuration the crane is configured. Push  button to get to Operating Screen.



4.2.6 For Lattice Boom Calibration Go To Sec. 4.14

4.3 Angle and length pre-calibration setup

- 4.3.1 With boom fully retracted and at lowest possible angle, set minimum angle and length voltages to approximately 1.000VDC.

- 4.3.2 **Angle** voltages are checked in the cable reel with ground lead of voltmeter put on terminal # 1 and the positive lead on terminal # 5 on the terminal strip. Loosen set screws on angle bracket. Turn angle bracket (allowing pendulum to swing freely as the boom goes up) until the pendulum and rubber bumper are barely touching. Retighten set screws. Adjust voltage by loosening the three screws by the angle potentiometer and turning potentiometer until approximately 1.000 VDC is reached.
- 4.3.3 **Length** voltages are checked with ground lead of voltmeter put on terminals # 1 and the positive lead on terminal # 2 on the terminal strip. Adjust voltage by turning wiper arm (located behind white nylon gear and on the shaft of the length potentiometer) to approximately 1.000 VDC.

4.4 Entering Calibration Menu

- 4.4.1 From the Operating Screen (shown below **Diagram # 1**) enter the Calibration menu by pushing and holding the  button then push the  button.

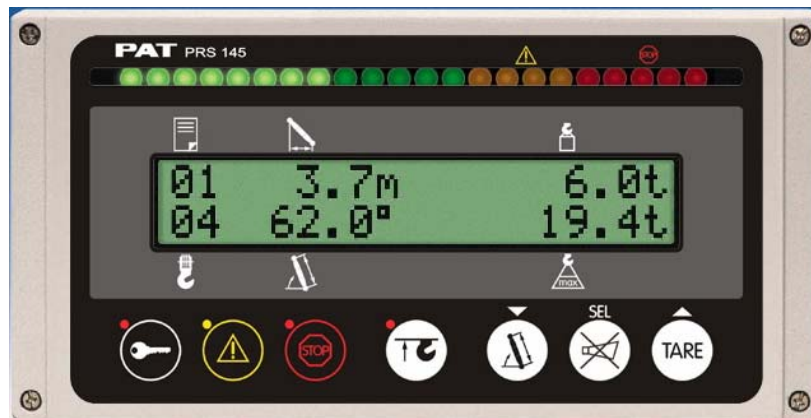







































Diagram # 1








4.5 Angle Calibration:

- 4.5.1 With Boom at Zero Degrees.
- 4.5.2 Go to the **Calibration Menu**. (Refer to Section 4.4)
- 4.5.3 Push the  or  button until **NORM** menu title blinks, then push the  button.
- 4.5.4 Push the  or  button until **ANGLE** menu title blinks, then push the  button.
- 4.5.5 Verify boom is at 0 degrees with an inclinometer or digital level.

- 4.5.6 Push the  or  button until **MINIMUM** menu title blinks, then push the  button.
- 4.5.7 Push the  button until all digits have been verified with the proper value of **000.0** at 0 degrees.
- 4.5.8 Hoist the boom all the way up and check angle, using an inclinometer or digital level.
- 4.5.9 Push the  or  button until **MAXIMUM** menu title blinks, then push the  button.
- 4.5.10 Push the  button to change the first digit of the angle displayed to match the digital level reading. Select the next digit by pushing the  or  button until the proper number for that digit is reached. Continue this process until all digits have been corrected. For Example, if the angle given by digital level was 76.5 degrees, then the display should read 076.5 before the  button is pushed for the last time.
- 4.5.11 Push the  or  button until **ADJUST** menu title blinks, then push the  button.
- 4.5.12 Push the  or  button (since **EXIT** menu title is at the end of each menu push  button) until **EXIT** menu title blinks, then push the  button until you return to the Operating Screen. (diagram # 1)
- 4.5.13 Boom down to 60 degrees, using crane angle indicator or digital level to verify proper angle indication.
















4.6 Length Calibration:

- 4.6.1 With Fully Retracted Boom
- 4.6.2 Go to the Calibration Menu. (Refer to Section 4.4)
- 4.6.3 Push the  or  button until **NORM** menu title blinks, then push the  button.
- 4.6.4 Push the  or  button until **LENGTH** menu title blinks, then push the  button.
- 4.6.5 Verify boom is at fully retracted.
- 4.6.6 Push the  or  button until **MINIMUM** menu title blinks, then push the  button.
- 4.6.7 Push the  button until all digits have been verified with the proper value, which will be minimum boom length of the load chart.
- 4.6.8 Fully extend the boom.
- 4.6.9 Push the  or  button until **MAXIMUM** menu title blinks, then push the  button.

- 4.6.10 Push the  button until all digits have been verified with the proper value, which will be maximum boom length of the load chart
- 4.6.11 Push the  or  button until **ADJUST** menu title blinks, then push the  button.
- 4.6.12 Push the  or  button until **EXIT** menu title blinks, then push the  button until you return to the Operating Screen. (diagram # 1)
- 4.6.13 Fully retract the boom. Check the cable reel when retracting to verify that the reel is spooling properly. If the reel is not spooling properly, adjust the first roller guide until spooling is correct.

4.7 Pressure Channel Set Up:

Piston Side Pressure Transducer













- 4.7.1 Tools required will be a potentiometer with leads. Digital Volt/Ohm meter
- 4.7.2 Go to the Calibration Menu. (Refer to Section 4.4)
- 4.7.3 Push the  or  button until **NORM** menu title blinks, then push the  button.
- 4.7.4 Push the  or  button until **PRESSURE PSI** menu title blinks, then push the  button.
- 4.7.5 Attach one lead from potentiometer to term X1.51 in the central unit. Connect the other lead to term. X1.11-19, 12 volts.
- 4.7.6 Attach the Volt/Ohm black lead to term X1 41-50 ground and the Positive lead to term X1.51.
- 4.7.7 Adjust the potentiometer to get an output of 2.5 Volts DC.
- 4.7.8 Select **MINIMUM** on the screen and press  button.
- 4.7.9 Enter 000.0 bars into the console.
- 4.7.10 Press the  button to exit.
- 4.7.11 Select the **MAXIMUM** menu and Press the  button.
- 4.7.12 Adjust the potentiometer to read 7.5 Volts DC. Enter the bar value stamped on the pressure transducer. Example for a 250 bar pressure transducer enter 250.0
- 4.7.13 Using the  or  button until the **ADJUST** menu appears and press  button.
- Once the Adjust program is done press the  or  to select **EXIT** and then push the  button.

Rod Side Transducer










- 4.7.14 Move the leads for both the potentiometer and Digital Volt/Ohm meter to term. X1.52

- 4.7.15 Use the  or  to select the **PRESSURE ROD** menu and press the  button.
- 4.7.16 Repeat steps 4.7.7 through 4.7.13

4.8 Ratio Calibration:

- 4.8.1 Go to the **Calibration Menu**. (Refer to Section 4.4)
- 4.8.2 Push the  or  button until **SETUP** menu title blinks, then push the  button.
- 4.8.3 Push the  or  button until **RATIO** menu title blinks, then push the  button.
- 4.8.4 While boom is stopped and load is steady, record ACT. LOAD indication.
- 4.8.5 Boom down slow and use the  or  buttons to adjust ACT. LOAD to the ACT. LOAD indication referred to above in 4.8.4.
- 4.8.6 After the ratio is set, push the  button to exit.
- 4.8.7 Push the  or  button until **EXIT** menu title blinks, then push the  button. Until you return to the Operating Screen. (diagram # 1)

4.9 Radius Offset Calibration:

- 4.9.1 Select program for the cranes configuration. (example: On Outriggers Main Boom)
- 4.9.2 Go to the **Calibration Menu**. (Refer to Section 4.4)
- 4.9.3 Push the  or  button until **RADIUS OFFSET** menu title blinks, then push the  button.
- 4.9.4 Measure actual radius. Then change RADIUS indicated to actual radius using the  or  buttons.
- 4.9.5 After RADIUS is set, push the  button to exit.
- 4.9.6 Push the  or  button until **EXIT** menu title blinks, then push the  button. Until you return to the Operating Screen. (diagram # 1)

4.10 Load Calibration:

- 4.10.1 Remove all extension, jibs, etc. from the side of the boom when calibrating Main Boom only configurations.
- 4.10.2 Select program for the cranes configuration. (example: On Outriggers Main Boom)
- 4.10.3 Verify **OWN WEIGHT** pressure profile for minimum boom length is correct. **OWN WEIGHT is an empty boom.**

4.10.4 Boom to 60 degrees

4.10.5 Get **OWN WEIGHT** value by adding block weights + deducts. If load indication is correct go to step 4.10.14.

4.10.6 Go to the **Calibration Menu**. (Refer to Section 4.4)

4.10.7 Push the  or  button until **SETUP** menu title blinks, then push the  button.

4.10.8 Push the  or  button until **CORRECTION** menu title blinks, then push the  button.

CORRECTION MENU OPERATION:

The correction menu consists of menu items **P1** through **P4**. The system comes with pressure profiles obtained from other cranes of the same make and model. The profiles are usually very close through crane models.




P1 – P4 Allows you to adjust the pressure profiles to allow any differences in the cranes hydraulic system.




P4: Adjusts the pressure profile from 0 to 90 degrees. This is a linear adjustment that shifts the complete curve up or down the same amount throughout the 0 to 90 range.

P1 Adjusts the curve from 45 to 90 degrees with the most adjustment in the middle of the range ie. 60 degrees.




P2 Adjusts the 30 to 60 degree range, again with the most adjustment in the middle of the curve.





































P3 Adjusts the 0 to 45 degree range, again with the most adjustment in the middle of the curve.




























4.10.9 Select current boom **LENGTH** by pushing the  or  and push the  button.








































4.10.10 Push the  or  button until **OWN-WEIGHT** menu title blinks, then push the  button.








































4.10.11 Push the  or  button until **P4** menu title blinks, then push the  button.


































4.10.12 Push the  or  button to change % until **ACT. LOAD = OWN WEIGHT** (Block Weights + Deducts), then push the  button.





































- 4.10.13 Push the  or  button until **EXIT** menu title blinks, then push the  button. Until you return to the Operating Screen. (diagram # 1)
- 4.10.14 Boom to 70 degrees.
- 4.10.15 Get **OWN WEIGHT** value by adding block weights + deducts. If load indication is correct go to step 4.10.23.
- 4.10.16 Go to the **Calibration Menu**. (Refer to Section 4.4)
- 4.10.17 Push the  or  button until **SETUP** menu title blinks, then push the  button.
- 4.10.18 Push the  or  button until **CORRECTION** menu title blinks, then push the  button.
- 4.10.19 Select current boom **LENGTH** by pushing the  or  and push the  button.
- 4.10.20 Push the  or  button until **OWN-WEIGHT** menu title blinks, then push the  button.
- 4.10.21 Push the  or  button until **P1** menu title blinks, then push the  button.
- 4.10.22 Push the  or  button to change % until **ACT. LOAD = OWN WEIGHT** (Block Weights + Deducts), then push the  button.
- 4.10.23 Boom to 45 degrees.
- 4.10.24 Get **OWN WEIGHT** value by adding block weights + deducts. If load indication is correct go to step 4.10.33.
- 4.10.25 Go to the **Calibration Menu**. (Refer to Section 4.4)
- 4.10.26 Push the  or  button until **SETUP** menu title blinks, then push the  button.
- 4.10.27 Push the  or  button until **CORRECTION** menu title blinks, then push the  button.
- 4.10.28 Select current boom **LENGTH** by pushing the  or  and push the  button.
- 4.10.29 Push the  or  button until **OWN-WEIGHT** menu title blinks, then push the  button.
- 4.10.30 Push the  or  button until **P2** menu title blinks, then push the  button.





































- 4.10.31 Push the  or  button to change % until **ACT. LOAD = OWN WEIGHT** (Block Weights + Deducts), then push the  button.
- 4.10.32 Push the  or  button until **EXIT** menu title blinks, then push the  button. Until you return to the Operating Screen. (diagram # 1)
- 4.10.33 Boom to 22 degrees.
- 4.10.34 Get **OWN WEIGHT** value by adding block weights + deducts. If load indication is correct go to step 4.10.42.
- 4.10.35 Go to the **Calibration Menu**. (Refer to Section 4.4)
- 4.10.36 Push the  or  button until **SETUP** menu title blinks, then push the  button.
- 4.10.37 Push the  or  button until **CORRECTION** menu title blinks, then push the  button.
- 4.10.38 Select current boom **LENGTH** by pushing the  or  and push the  button.
- 4.10.39 Push the  or  button until **OWN-WEIGHT** menu title blinks, then push the  button.
- 4.10.40 Push the  or  button until **P3** menu title blinks, then push the  button.
- 4.10.41 Push the  or  button to change % until **ACT. LOAD = OWN WEIGHT** (Block Weights + Deducts), then push the  button.
- 4.10.42 Boom to various intermediate angles to verify load indication is indicating **OWN WEIGHT** correct. If indication is correct go to Section 4.9.52. If there are variances in the indication this may be do to the cranes hydraulics. If the **OWN WEIGHT** profile is not good go to Section 4.13 – 4.17 to have MEARSURE generate the pressure profiles.
- 4.10.43 Verify **LOAD** pressure profile for minimum boom length is correct by booming to 15 degrees.
- 4.10.44 Boom to 70 degrees.
- 4.10.45 Get **LOAD** value by adding known weight (a weight to allow you to get to longest radius or lowest angle of the load chart) + block weights + deducts. If load indication is correct go to step 4.10.63.
- 4.10.46 Go to the **Calibration Menu**. (Refer to Section 4.4)
- 4.10.47 Push the  or  button until **SETUP** menu title blinks, then push the  button.































- 4.10.48 Push the  or  button until **CORRECTION** menu title blinks, then push the  button.
- 4.10.49 Select current boom **LENGTH** by pushing the  or  and push the  button.
- 4.10.50 Push the  or  button until **LOAD** menu title blinks, then push the  button.
- 4.10.51 Push the  or  button until **P4** menu title blinks, then push the  button.
- 4.10.52 Push the  or  button to change % until **ACT. LOAD = LOAD** (Known Weight + Block Weights + Deducts), then push the  button.
- 4.10.53 Push the  or  button until **EXIT** menu title blinks, then push the  button. Until you return to the Operating Screen. (diagram # 1)
- 4.10.54 Boom to 22 degrees.
- 4.10.55 Get **LOAD** value by adding known weight + block weights + deducts. If load indication is correct go to step 4.10.63.
- 4.10.56 Go to the **Calibration Menu**. (Refer to Section 4.4)
- 4.10.57 Push the  or  button until **SETUP** menu title blinks, then push the  button.
- 4.10.58 Push the  or  button until **CORRECTION** menu title blinks, then push the  button.
- 4.10.59 Select current boom **LENGTH** by pushing the  or  and push the  button.
- 4.10.60 Push the  or  button until **LOAD** menu title blinks, then push the  button.
- 4.10.61 Push the  or  button until **P3** menu title blinks, then push the  button.
- 4.10.62 Push the  or  button to change % until **ACT. LOAD = LOAD** (Known Weight + Block Weights + Deducts), then push the  button.
- 4.10.63 Boom to 45 degrees.
- 4.10.64 Get **LOAD** value by adding known weight + block weights + deducts. If load indication is correct go to step 4.10.73
- 4.10.65 Go to the **Calibration Menu**. (Refer to Section 4.4)
- 4.10.66 Push the  or  button until **SETUP** menu title blinks, then push the  button.








































- 4.10.67 Push the  or  button until **CORRECTION** menu title blinks, then push the  button.
- 4.10.68 Select current boom **LENGTH** by pushing the  or  and push the  button.
- 4.10.69 Push the  or  button until **LOAD** menu title blinks, then push the  button.
- 4.10.70 Push the  or  button until **P2** menu title blinks, then push the  button.
- 4.10.71 Push the  or  button to change % until **ACT. LOAD = LOAD** (Known Weight + Block Weights + Deducts), then push the  button.
- 4.10.72 Push the  or  button until **EXIT** menu title blinks, then push the  button. Until you return to the Operating Screen. (diagram # 1)
- 4.10.73 Boom to 60 degrees.
- 4.10.74 Get **LOAD** value by adding known weight + block weights + deducts. If load indication is correct go to step 4.10.91.
- 4.10.75 Go to the **Calibration Menu**. (Refer to Section 4.4)
- 4.10.76 Push the  or  button until **SETUP** menu title blinks, then push the  button.
- 4.10.77 Push the  or  button until **CORRECTION** menu title blinks, then push the  button.
- 4.10.78 Select current boom **LENGTH** by pushing the  or  and push the  button.
- 4.10.79 Push the  or  button until **LOAD** menu title blinks, then push the  button.
- 4.10.80 Push the  or  button until **P1** menu title blinks, then push the  button.
- 4.10.81 Push the  or  button to change % until **ACT. LOAD = LOAD** (Known Weight + Block Weights + Deducts), then push the  button.
- 4.10.82 Boom to 70 degrees.
- 4.10.83 Get **LOAD** value by adding block weights + deducts. If load indication is correct go to step 4.9.100.
- 4.10.84 Go to the **Calibration Menu**. (Refer to Section 4.4)
- 4.10.85 Push the  or  button until **SETUP** menu title blinks, then push the  button.


































- 4.10.86 Push the  or  button until **CORRECTION** menu title blinks, then push the  button.
- 4.10.87 Select current boom **LENGTH** by pushing the  or  and push the  button.
- 4.10.88 Push the  or  button until **LOAD** menu title blinks, then push the  button.
- 4.10.89 Push the  or  button until **P1** menu title blinks, then push the  button.
- 4.10.90 Push the  or  button to change% until **ACT. LOAD = LOAD** (Known Weight + Block Weights + Deducts), then push the  button.
- 4.10.91 After Load Indication has been calibrated for this length it is recommended that a load moment shutoff be tested. Refer to Section 4.11 Page 20.
- 4.10.92 EXTEND BOOM to the next boom length to be calibrated. (In most cases the next boom length is fully extended, but with cranes with non-synchronized and longer length booms there are middle pressure profiles. To determine this go to steps 4.9.92 – 4.9.95 and use up or down to get all pressure profile lengths).
- 4.10.93 Verify **OWN WEIGHT** pressure profile for indicated boom length is correct.
- 4.10.94 Boom to lowest possible angle on load chart for this configuration.
- 4.10.95 Get **OWN WEIGHT** value by adding block weights + deducts. If load indication is correct go to step 4.10.104.
- 4.10.96 Go to the **Calibration Menu**. (Refer to Section 4.4)
- 4.10.97 Push the  or  button until **SETUP** menu title blinks, then push the  button.
- 4.10.98 Push the  or  button until **CORRECTION** menu title blinks, then push the  button.
- 4.10.99 Select current boom **LENGTH** by pushing the  or  and push the  button.
- 4.10.100 Push the  or  button until **OWN-WEIGHT** menu title blinks, then push the  button.
- 4.10.101 Push the  or  button until **P4** menu title blinks, then push the  button.
- 4.10.102 Push the  or  button to change % until **ACT. LOAD = OWN WEIGHT** (Block Weights + Deducts), then push the  button.

- 4.10.103 Push the  or  button until **EXIT** menu title blinks, then push the  button. Until you return to the Operating Screen. (diagram # 1).
- 4.10.104 Boom to 30 degrees.
- 4.10.105 Get **OWN WEIGHT** value by adding block weights + deducts. If load indication is correct go to step 4.10.113.
- 4.10.106 Go to the **Calibration Menu**. (Refer to Section 4.4)
- 4.10.107 Push the  or  button until **SETUP** menu title blinks, then push the  button.
- 4.10.108 Push the  or  button until **CORRECTION** menu title blinks, then push the  button.
- 4.10.109 Select current boom **LENGTH** by pushing the  or  and push the  button.
- 4.10.110 Push the  or  button until **OWN-WEIGHT** menu title blinks, then push the  button.
- 4.10.111 Push the  or  button until **P3** menu title blinks, then push the  button.
- 4.10.112 Push the  or  button to change % until **ACT. LOAD = OWN WEIGHT** (Block Weights + Deducts), then push the  button.
- 4.10.113 Boom to 45 degrees.
- 4.10.114 Get **OWN WEIGHT** value by adding block weights + deducts. If load indication is correct go to step 4.10.124.
- 4.10.115 Go to the **Calibration Menu**. (Refer to Section 4.4)
- 4.10.116 Push the  or  button until **SETUP** menu title blinks, then push the  button.
- 4.10.117 Push the  or  button until **CORRECTION** menu title blinks, then push the  button.
- 4.10.118 Select current boom **LENGTH** by pushing the  or  and push the  button.
- 4.10.119 Push the  or  button until **OWN-WEIGHT** menu title blinks, then push the  button.
- 4.10.120 Push the  or  button until **P2** menu title blinks, then push the  button.




- 4.10.121 Push the  or  button to change % until **ACT. LOAD = OWN WEIGHT** (Block Weights + Deducts), then push the  button.
- 4.10.122 Push the  or  button until **EXIT** menu title blinks, then push the  button. Until you return to the Operating Screen. (diagram # 1)
- 4.10.123 Boom to 60 degrees.
- 4.10.124 Get **OWN WEIGHT** value by adding block weights + deducts. If load indication is correct go to step 4.10.132.
- 4.10.125 Go to the **Calibration Menu**. (Refer to Section 4.4)
- 4.10.126 Push the  or  button until **SETUP** menu title blinks, then push the  button.
- 4.10.127 Push the  or  button until **CORRECTION** menu title blinks, then push the  button.
- 4.10.128 Select current boom **LENGTH** by pushing the  or  and push the  button.
- 4.10.129 Push the  or  button until **OWN-WEIGHT** menu title blinks, then push the  button.
- 4.10.130 Push the  or  button until **P1** menu title blinks, then push the  button.
- 4.10.131 Push the  or  button to change % until **ACT. LOAD = OWN WEIGHT** (Block Weights + Deducts), then push the  button.
- 4.10.132 Boom to 70 degrees.
- 4.10.133 Get **OWN WEIGHT** value by adding block weights + deducts. If load indication is correct go to step 4.10.141.
- 4.10.134 Go to the **Calibration Menu**. (Refer to Section 4.4)
- 4.10.135 Push the  or  button until **SETUP** menu title blinks, then push the  button.
- 4.10.136 Push the  or  button until **CORRECTION** menu title blinks, then push the  button.
- 4.10.137 Select current boom **LENGTH** by pushing the  or  and push the  button.
- 4.10.138 Push the  or  button until **OWN-WEIGHT** menu title blinks, then push the  button.


















- 4.10.139 Push the  or  button until **P1** menu title blinks, then push the  button.
- 4.10.140 Push the  or  button to change % until **ACT. LOAD = OWN WEIGHT** (Block Weights + Deducts), then push the  button.
- 4.10.141 Boom to various intermediate angles to verify load indication is indicating **OWN WEIGHT** correct. If indication is correct go to Section 4.10.142 If there are variances in the indication this may be do to the cranes hydraulics. If the **OWN WEIGHT** profile is not good go to Section 4.13 - to have MEARSURE generate the pressure profiles.
- 4.10.142 Verify **LOAD** pressure profile for maximum boom length is correct.
- 4.10.143 Get **LOAD** value by adding known weight (a weight to allow you to get to longest radius or lowest angle of the load chart) + block weights + deducts. If load indication is correct go to step 4.8.62.
- Boom to lowest possible angle on load chart for this configuration. **WARNING:** Do not exceed Load Chart Capacity for **LOAD**. The operator is responsible for operating the crane within the manufacturer's specified parameters.
- 4.10.144 Go to the **Calibration Menu**. (Refer to Section 4.4)
- 4.10.145 Push the  or  button until **SETUP** menu title blinks, then push the  button.
- 4.10.146 Push the  or  button until **CORRECTION** menu title blinks, then push the  button.
- 4.10.147 Select current boom **LENGTH** by pushing the  or  and push the  button.
- 4.10.148 Push the  or  button until **LOAD** menu title blinks, then push the  button.
- 4.10.149 Push the  or  button until **P4** menu title blinks, then push the  button.
- 4.10.150 Push the  or  button to change % until **ACT. LOAD = LOAD** (Known Weight + Block Weights + Deducts), then push the  button.
- 4.10.151 Push the  or  button until **EXIT** menu title blinks, then push the  button. Until you return to the Operating Screen. (diagram # 1)
- 4.10.152 Boom to 30 degrees.
- 4.10.153 Get **LOAD** value by adding known weight + block weights + deducts. If load indication is correct go to step 4.10.161.
- 4.10.154 Go to the **Calibration Menu**. (Refer to Section 4.4)
- 4.10.155 Push the  or  button until **SETUP** menu title blinks, then push the  button.

- 4.10.156 Push the  or  button until **CORRECTION** menu title blinks, then push the  button.
- 4.10.157 Select current boom **LENGTH** by pushing the  or  and push the  button.
- 4.10.158 Push the  or  button until **LOAD** menu title blinks, then push the  button.
- 4.10.159 Push the  or  button until **P3** menu title blinks, then push the  button.
- 4.10.160 Push the  or  button to change % until **ACT. LOAD = LOAD** (Known Weight + Block Weights + Deducts), then push the  button.
- 4.10.161 Boom to 45 degrees.
- 4.10.162 Get **LOAD** value by adding known weight + block weights + deducts. If load indication is correct go to step 4.10.171.
- 4.10.163 Go to the **Calibration Menu**. (Refer to Section 4.4)
- 4.10.164 Push the  or  button until **SETUP** menu title blinks, then push the  button.
- 4.10.165 Push the  or  button until **CORRECTION** menu title blinks, then push the  button.
- 4.10.166 Select current boom **LENGTH** by pushing the  or  and push the  button.
- 4.10.167 Push the  or  button until **LOAD** menu title blinks, then push the  button.
- 4.10.168 Push the  or  button until **P2** menu title blinks, then push the  button.
- 4.10.169 Push the  or  button to change % until **ACT. LOAD = LOAD** (Known Weight + Block Weights + Deducts), then push the  button.
- 4.10.170 Push the  or  button until **EXIT** menu title blinks, then push the  button. Until you return to the Operating Screen. (diagram # 1)
- 4.10.171 Boom to 60 degrees.
- 4.10.172 Get **LOAD** value by adding known weight + block weights + deducts. If load indication is correct go to step 4.10.180.
- 4.10.173 Go to the **Calibration Menu**. (Refer to Section 4.4)
- 4.10.174 Push the  or  button until **SETUP** menu title blinks, then push the  button.

- 4.10.175 Push the  or  button until **CORRECTION** menu title blinks, then push the  button.
- 4.10.176 Select current boom **LENGTH** by pushing the  or  and push the  button.
- 4.10.177 Push the  or  button until **LOAD** menu title blinks, then push the  button.
- 4.10.178 Push the  or  button until **P1** menu title blinks, then push the  button.
- 4.10.179 Push the  or  button to change % until **ACT. LOAD = LOAD** (Known Weight + Block Weights + Deducts), then push the  button.
- 4.10.180 Boom to 70 degrees.
- 4.10.181 Get **LOAD** value by adding block weights + deducts. If load indication is correct go to step 4.8.21.
- 4.10.182 Go to the **Calibration Menu**. (Refer to Section 4.4)
- 4.10.183 Push the  or  button until **SETUP** menu title blinks, then push the  button.
- 4.10.184 Push the  or  button until **CORRECTION** menu title blinks, then push the  button.
- 4.10.185 Select current boom **LENGTH** by pushing the  or  and push the  button.
- 4.10.186 Push the  or  button until **LOAD** menu title blinks, then push the  button.
- 4.10.187 Push the  or  button until **P1** menu title blinks, then push the  button.
- 4.10.188 Push the  or  button to change% until **ACT. LOAD = LOAD** (Known Weight + Block Weights + Deducts), then push the  button.

4.11 Deflection (radius long boom) Calibration:

- 4.11.1 With boom fully extended at 60 degrees with no load on the hook.
- 4.11.2 Go to the **Calibration Menu**.
- 4.11.3 Push the  or  button until **SETUP** menu title blinks, then push the  button.

- 4.11.4 Push the  or  button until **DEFLECTION** menu title blinks, then push the  button.
- 4.11.5 Push the  or  button until **OWN-WEIGHT** menu title blinks, then push the  button.
- 4.11.6 Measure actual radius with hook block only. Then change RADIUS indicated to actual radius, using the  or  buttons.
- 4.11.7 After RADIUS is set, push the  button to exit.
- 4.11.8 Push the  or  button until **LOAD** menu title blinks, then push the  button.
- 4.11.9 Pick **LOAD** measure actual radius with hook block + test weight. Then change indicated **RADIUS** to actual **RADIUS** using the  or  buttons.
- 4.11.10 After **RADIUS** is set, push the  button to exit.
- 4.11.11 Push the  button to EXIT then the  button to the Operating Screen and enter the working display.
- 4.11.12 After Radius and Load Indication has been calibrated for this length it is recommended that a load moment shutoff be tested. Refer to next section.

4.12 Load Moment Shut Off

- 4.12.1 To perform a load moment shut off for this configuration and length you are at.
- 4.12.2 You need Known weight + hook blocks + deducts = Test Weight.
- 4.12.3 After getting test load determine where the load should shut off is at either by radius or angle from the information on the load chart.
- 4.12.4 Start with the load at a higher angle than shut off and verify load indication is correct.
- 4.12.5 Slowly boom to the point of shut off. (If load indication is not correct as you are booming down return to section 4.9 and readjust the Ratio).
- 4.12.6 If system warning and shut off has functioned before calculated shut off point record the information from shut off on **LOAD MOMENT FIELD TEST SHEET** for this configuration provided with technical information booklet. This configuration is complete.
- 4.12.7 Go to the next configuration and start with section 4.9 – 4.11. Repeat this process until all configurations have been calibrated.

4.13 MEASURE to generate Pressure Profiles




4.13.1 Fully retract and put the boom at 0 degrees.

4.13.2 Go to the **Calibration Menu**.

4.13.3 Push the  or  button until **MEASURE** menu title blinks, then push the  button.



4.13.4 Push the  or  button until **AUTOMATIC** menu title blinks, then push the  button.




4.13.5 Push the  or  until **CLEAR** menu title blinks, then push the  button.


4.13.6 Select current boom **LENGTH** by pushing the  or  button and push the  button.

4.13.7 Push the  or  button until **EXIT** menu title blinks, then push the  button.

4.13.8 Push the  or  button until **MEASURE** menu title blinks, then push the  button.

4.13.9 Push the  or  button until **OWN-WEIGHT** menu title blinks, then push the  button.




4.13.10 Select current boom **LENGTH** by pushing the  or  button and push the  button.




4.13.11 Push the  button until all digits have been verified to the proper value of the hook block + deducts weight.


4.13.12 Boom UP steady and slow, to highest boom angle before topping out the cylinder.





































Before you stop booming up, push the  button. If this procedure is not done properly the CALCULATION of the pressure profile will not work.






















4.13.13 Boom DOWN as close to 0 degrees as possible and select a known weight (load) for the known boom length (radius) that is within the load chart for the lowest boom angle. The larger the angle range with a weight over 1 ton the better the pressure profile.

4.13.14 Push the  or  button until **LOAD** menu title blinks, then push the  button.

4.13.15 Select current boom **LENGTH** by pushing the  or  and push the  button.

4.13.16 Push the  button until all digits have been verified to the proper value, which will be the hook block + deducts + known weight.

- 4.13.17 Boom up steady and slow to 75 degrees or maximum angle on the load chart. Before completion of booming up, push the  button.
- 4.13.18 Push the  or  button until **EXIT** menu title blinks, then push the  button.
- 4.13.19 Push the  or  button until **CALCULATION** menu title blinks, then push the  button.
- 4.13.20 Select current boom **LENGTH** by pushing the  or  button and push the  button.
- 4.13.21 Push the  button to **EXIT** then the  button to the Operating Screen and enter the working display.
- 4.13.22 Verify pressure profiles are correct by checking the load indication at angle 0, 15, 30, 45, 60 and 70° with maximum boom length. If load indications are within 200 lbs., skip to **Step 4.9**. If indications are NOT correct, continue with the following procedure, which uses the MEASURE selection in the Calibration menu. Use the boom lengths specified in the Calibration Booklet to generate good profiles.
- 4.13.23 Fully extend and put the boom at lowest angle of the load chart for that boom length.
- 4.13.24 Go to the **Calibration Menu**.
- 4.13.25 Push the  or  button until **MEASURE** menu title blinks, then push the  button.
- 4.13.26 Push the  or  button until **AUTOMATIC** menu title blinks, then push the  button.
- 4.13.27 Push the  or  button until **CLEAR** menu title blinks, then push the  button.
- 4.13.28 Select boom **LENGTH** by pushing the  or  button and push the  button.
- 4.13.29 Push the  or  button until **EXIT** menu title blinks, then push the  button.
- 4.13.30 Push the  or  button until **MEASURE** menu title blinks, then push the  button.
- 4.13.31 Push the  or  button until **OWN-WEIGHT** menu title blinks, then push the  button.
- 4.13.32 Select current boom **LENGTH** by pushing the  or  button and push the  button.

- 4.13.33 Push the  button until all digits have been verified to the proper value, which will be the hook block + deducts weight.
- 4.13.34 Boom up steady and slow, to 75 degrees or maximum angle on the load chart.
Before completion of booming up, push the  button.
- 4.13.35 Put the boom at lowest angle of the load chart for that boom length and pick up hook block + deducts + known weight less than the maximum capacity of the load chart.
- 4.13.36 Push the  or  button until **LOAD** menu title blinks, then push the  button.
- 4.13.37 Select current boom **LENGTH** by pushing the  or  button and push the  button.
- 4.13.38 Push the  button until all digits have been verified to the proper value, which will be the hook block + deducts + known weight.
- 4.13.39 Boom up steady and slow, to 75 degrees or maximum angle on the load chart.
Before completion of booming up, push the  button.
- 4.13.40 Push the  or  button until **EXIT** menu title blinks, then push the  button.
- 4.13.41 Push the  or  button until **CALCULATION** menu title blinks, then push the  button.
- 4.13.42 Select current boom length by pushing the  or  button and push the  button.
- 4.13.43 Push the  button to **EXIT** then the  button to the operating screen and enter the working display.
- 4.13.44 If all load indication are correct go to steps 4.10 and 4.11 to complete the calibration for this configuration. If load indication is not correct go to steps 4.9, 4.10 and 4.11 to complete the calibration for this configuration.



























4.14 Lattice Boom Calibration


































4.15 Angle pre-calibration setup



- 4.15.1 With boom at lowest possible angle, set minimum angle voltage to approximately 1.000VDC. Boom to 0 degrees. Check angle with a digital level.
- 4.15.2 **Angle** voltages are checked in the Junction Box with ground lead of voltmeter put on terminals X1.41 through 50 and the positive lead on terminal X1.56 in the Junction Box. Loosen set screw on angle bracket. Turn angle bracket until the pendulum and rubber

bumper are barely touching. Adjust voltage by loosening the three screws by the angle potentiometer and turning potentiometer until approximately 1.000VDC is reached.

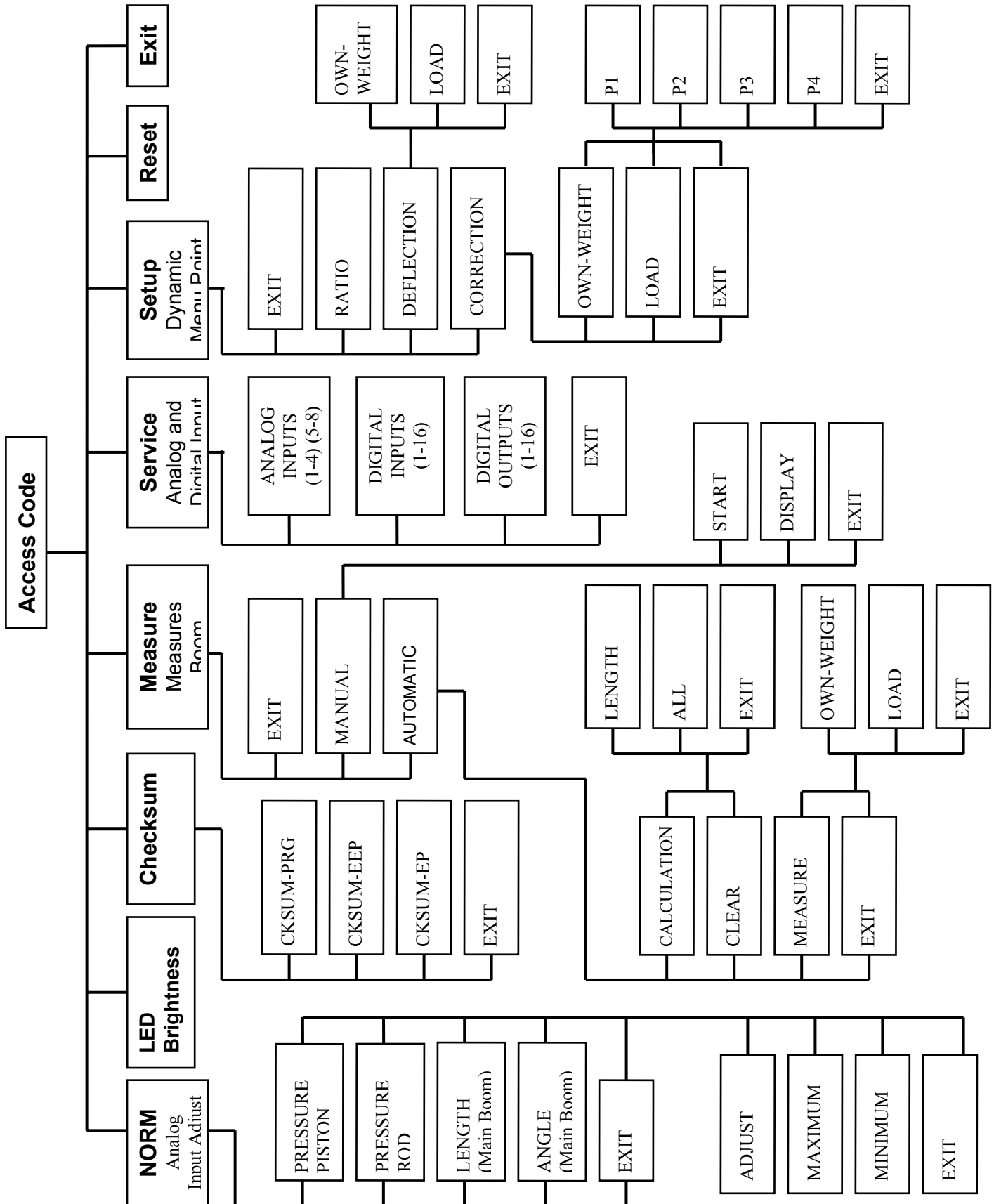
4.16 Set Angle:

- 4.16.1 Push the  or  button until **NORM** menu title blinks, then push the .
- 4.16.2 Push the  or  button until **ANGLE** menu title blinks, then push the .
- 4.16.3 Verify boom is at 0 degrees with a digital level.
- 4.16.4 Push the  or  button until **MINIMUM** menu title blinks, then push the  button.
- 4.16.5 Push the  button until all digits have been verified with the proper value of **000.0** at 0 degrees.
- 4.16.6 Hoist the boom all the way up and check angle, using a digital level.
- 4.16.7 Push the  or  button until **MAXIMUM** menu title blinks, then push the  button.
- 4.16.8 Push the  button to change the first digit of the angle displayed to match the digital level reading. Select the next digit by pushing the  or  button until the proper number for that digit is reached. Continue this process until all digits have been corrected. For Example, if the angle given by digital level was 76.5 degrees,
then the display should read 076.5 before the  button is pushed for the last time.
- 4.16.9 Push the  or  button until **ADJUST** menu title blinks, then push the .
- 4.16.10 Push the  or  button until **EXIT** menu title blinks, then push the .
- 4.16.11 Push the  or  button to **EXIT** then the  button to the Operating Screen and enter the working display. Verify angle values with digital level.
- 4.16.12 **LOAD INDICATION**
- 4.16.13 While in the working display select the current crane configuration, and the correct number of Parts Of Line.

- 4.16.14 Push the  or  button until **NORM** menu title blinks, then push the  button.
- 4.16.15 Push the  or  button until **DMS 0** menu title blinks, then push the  button. DMS 0 refers to the load cell for the main block and DMS 1 will refer the auxiliary block load cell.
- 4.16.16 Push the  or  button until the **Min.** title blinks, then push  button.
- 4.16.17 Enter the weight of the hook block and any rigging divided by the parts of line. For example: The main block is rigged with 4 Parts of Line. The main block weighs 1500 lbs and the slings weigh 500 lbs. The total weight would be 2000 lbs. Divided by 4 Parts of line equals 500.
- 4.16.18 Push the  button until all digits have been verified to the proper value of the hook block and rigging. Push the  or  to change the number values.
- 4.16.19 Push the  or  button until the **Max.** title blinks, then push the  button.
- 4.16.20 Enter the weight of the hook block, rigging and test load divided by the parts of line. For example: The main block is rigged with 4 Parts of Line. The main block weighs 1500 lbs, the slings weigh 500 lbs and the test load weighs 10,000 lbs. The total weight would be 12000 lbs. Divided by 4 Parts of line equals 3,000 lbs.
- 4.16.21 Push the  button until all digits have been verified to the proper value of the hook block, rigging, and load. Push the  or  to change the number values.
- 4.16.22 Push the  or  button until **ADJUST** menu title blinks, then push the  button.
- 4.16.23 Push the  or  button until **EXIT** menu title blinks, then push the  button.
- 4.16.24 Push the  or  button to **EXIT** then the  button to the Operating Screen and enter the working display. Verify load indication. If necessary repeat steps 4.20.13 through 4.20.22. **Note: YOU MUST ADJUST BOTH MIN AND MAX**
- 4.16.25 Check radius indication if necessary proceed to the next step.
- 4.16.26 **Set Radius Offset:**
- 4.16.27 Push the  or  button until **RADIUS OFFSET** menu title blinks, then push the  button.
- 4.16.28 Measure actual radius. Then change RADIUS indicated to actual radius using the  or  buttons.
- 4.16.29 After RADIUS is set, push the  button to exit.

- 4.16.30 Push the  button to EXIT, then the  button to the Operating Screen and enter the working display.
- 4.16.31 Check load and radius indications and check load moment shut off.

5 MENU FLOW CHART



6 CALIBRATION SUMMARY TABLE

This table is a summary of the calibration procedure and is not recommended for the first time user. Use this procedure as reference after reading, completing the calibration procedure and becoming familiar with console operation.

STEP	DESCRIPTION	REFERENCE
1.	Check that load chart booklet matches load chart in crane	Page 2
WARNING: If the EPROMs are put into the sockets improperly they will be destroyed and new ones will have to be purchased.		
2.	Install System, Data I, and Data II EPROMS	
3.	Enter Access Code: The ACCESS CODE is 001001 .	Page 3
4.	CHECKSUM NEW EPROMs: CKSUM EP → CKSUM EEP → CKSUM PRG → RESET	Page 3
5.	Position Boom At 0° → mechanically adjust angle sensor to 1.0 VDC at terminal #1 and terminal # 5 (angle signal) in the cable reel.	Page 3-4
6.	Fully Retract Boom → mechanically adjust length sensor to 1.0 VDC at terminal #1 and terminal #2 (length signal) in the cable reel.	Page 4
7.	Set Angle (refer to flow chart) → select: <ul style="list-style-type: none"> • NORM, ANGLE, MINIMUM (match display with actual angle) • Boom to max angle • MAXIMUM (match display with actual angle) • ADJUST • EXIT 	Page 4-5
8.	Set Length (refer to flow chart) → select: NORM, LENGTH, MINIMUM (match display with actual length), boom to max length, MAXIMUM (match display with actual length), ADJUST, EXIT and fully retract boom.	Page 5-6
9.	Set Ratio → From the operating screen (refer to flow chart) → <ul style="list-style-type: none"> • Select: SETUP, • RATIO, while boom is stopped and load is steady, • Record the ACT. LOAD from the display, • Boom down slow • Adjust the displayed ACT. LOAD to match the ACT. LOAD recorded, and exit. 	Pages 7
Warning: Operator is responsible for operating the crane within manufacturer's specified parameters.		
10.	Select a known loads that is within the load chart for the specified boom length or radius. For pressure profiles, the load should be greater than 1 ton and allow the boom to have the greatest range of angle movement. For testing, the load should be at least 75% of the rated load as read from the load chart.	Page 8
11.	Check hook block and/or test load at: 0°, 15°, 30°, 45°, 60°, 75° are within 200lbs. Note: Check the test load in crane configurations permitted by the load chart.	Pages 9-20
12.	If necessary, create pressure profiles using the boom lengths specified with calibration information. Use the same boom length throughout the following procedure and then repeating the procedure for each specified boom length. Refer to flow chart and select: <ul style="list-style-type: none"> • MEASURE, AUTOMATIC, CLEAR • Select boom length • EXIT • MEASURE, OWN-WEIGHT • Select boom length • Adjust the displayed load to match boom weight (hook block + deducts weight) • Boom up steady and slow • Before you get to the maximum angle and as the boom is moving up • Push the PROGRAM button to create a pressure profile 	Pages 21-22

	<ul style="list-style-type: none"> • Pick the known load • LOAD • Select boom length • Adjust the displayed load to match load (hook block + deducts + known weight) • Boom up steady and slow • Before you get to the maximum angle and as the boom is moving up • Push the PROGRAM button to create a pressure profile • EXIT • CALCULATION • Select boom length • EXIT • Return to the operating screen. 	
13.	<p>Correction of minimum boom length load. Refer to flow chart and select:</p> <ul style="list-style-type: none"> • SETUP, CORRECTION • Select boom length • OWN WEIGHT, P1 - P4, ACT. LOAD indicates actual load = hook block + deducts • EXIT • LOAD, P1 - P4, ACT. LOAD indicates actual load = hook block + deducts + test weight. • EXIT. 	Pages 8-9
14.	<p>Set radius offset → refer to flow chart and select: RADIUS OFFSET, measure actual radius and record, change radius to actual radius, and EXIT.</p>	Pages 7-8
15.	Check load and radius indications and check load moment shut off minimum boom.	Page 21
16.	<p>Correction of middle (if required) and maximum boom length load. Refer to flow chart and select:</p> <ul style="list-style-type: none"> • SETUP, CORRECTION • Select boom length • OWN WEIGHT, P1 - P4, ACT. LOAD indicates actual load = hook block + deducts • EXIT • LOAD, P1 – P4, ACT. LOAD indicates actual load = hook block + deducts + test weight • EXIT 	Page 14
17.	<p>Set deflection → Refer to flow chart and select: DEFLECTION, OWN WEIGHT, measure actual radius with hook block only and record, change radius to actual radius, LOAD, , measure actual radius with load and record, change radius to actual radius, and EXIT</p>	Page 20-21
18.	Check load and radius indications and check load moment shut off. If load, angle, or length measurements are incorrect, repeat calibration procedure.	Page 21