

MicroGuard[®] 586 Retrofit Rated Capacity Indicator System

Calibration and Testing for:

Machine Model

Serial Number

Tester

Date



**MicroGuard® 586 Retrofit
Rated Capacity Indicator System**

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Introduction

Congratulations on purchasing the new MicroGuard® 586 Retrofit System.

This document describes the calibration process for the MicroGuard® 586 System in an onsite situation, assuming that there is no prior knowledge of the geometry of the crane.

This document is designed to assist the calibration personnel in keeping a record of measured dimensions and test results for review and comparison when subsequent modifications are made to the capacity chip. This data will provide an on-file record, which may serve future upgrades and changes to MicroGuard® designs.

Recording this important data during the calibration process will ensure a structured and easy to follow calibration that in turn leads to an accurate and safe calibration.

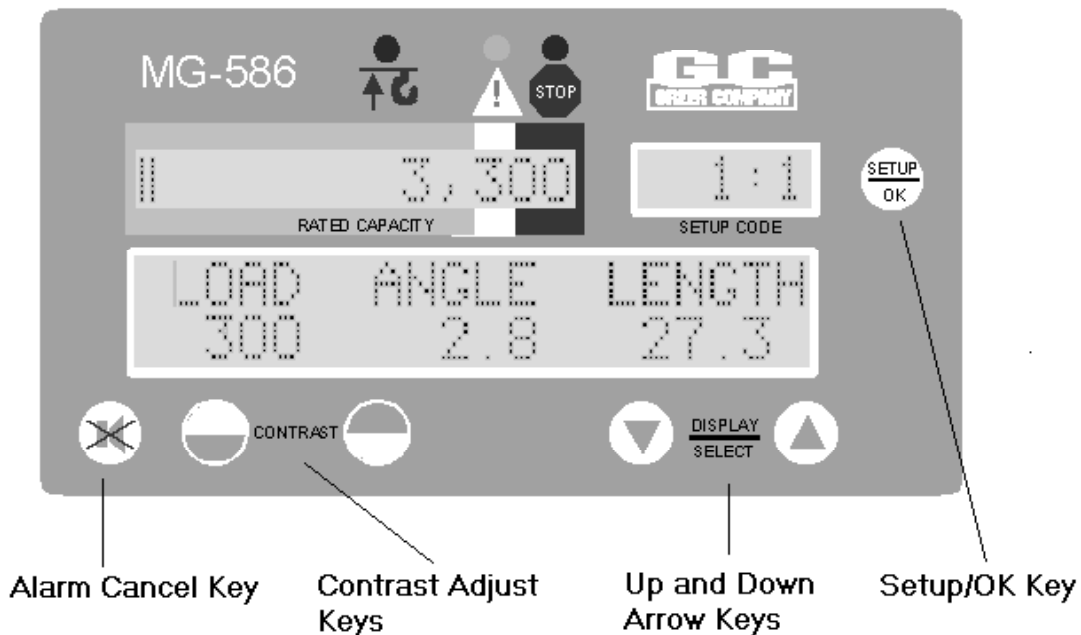
Notice

This document and resulting data about the crane are confidential. Copies of this document may not be distributed to third parties in any form without the prior written consent of the Greer Company and the crane manufacturer.

Tools Required

- Digital Volt/Ohmmeter
- Inclinometer – accurate to 0.1°
- Measuring tape
- Hand tools

MG586 Key Definitions



The above keys will be referred to many times in the following procedures. The “UP” and “DOWN” arrow keys are used to select from menus and to increase or decrease numeric values on the display. The “SETUP/OK” key is usually used to enter a finished number or enter a function via a menu. The “ALARM CANCEL” key is often used to exit a routine.

Preliminary Checks

Before starting calibration, it is important to check the machine geometry. Geometric values may have been previously entered into the capacity chip from the crane application data sheet filled out by the crane manufacturer’s engineering department. This data will appear in the relevant boxes, but should STILL be checked by the calibration personnel.

The following pages provide a list of required measurement checks. Measured values should be entered in the spaces provided.

Using an accurate tape, measure each dimension shown. It is, at best, a difficult exercise to measure these dimensions, but still a necessary check. It is recommended that two people carry out this task. Ensure that clear reference points are used when making measurements.

Boom Hoist Geometry

Dimension “L” is the distance parallel to the boom centerline between the center of the Boom pivot and the center of the upper Boom Hoist cylinder pivot.

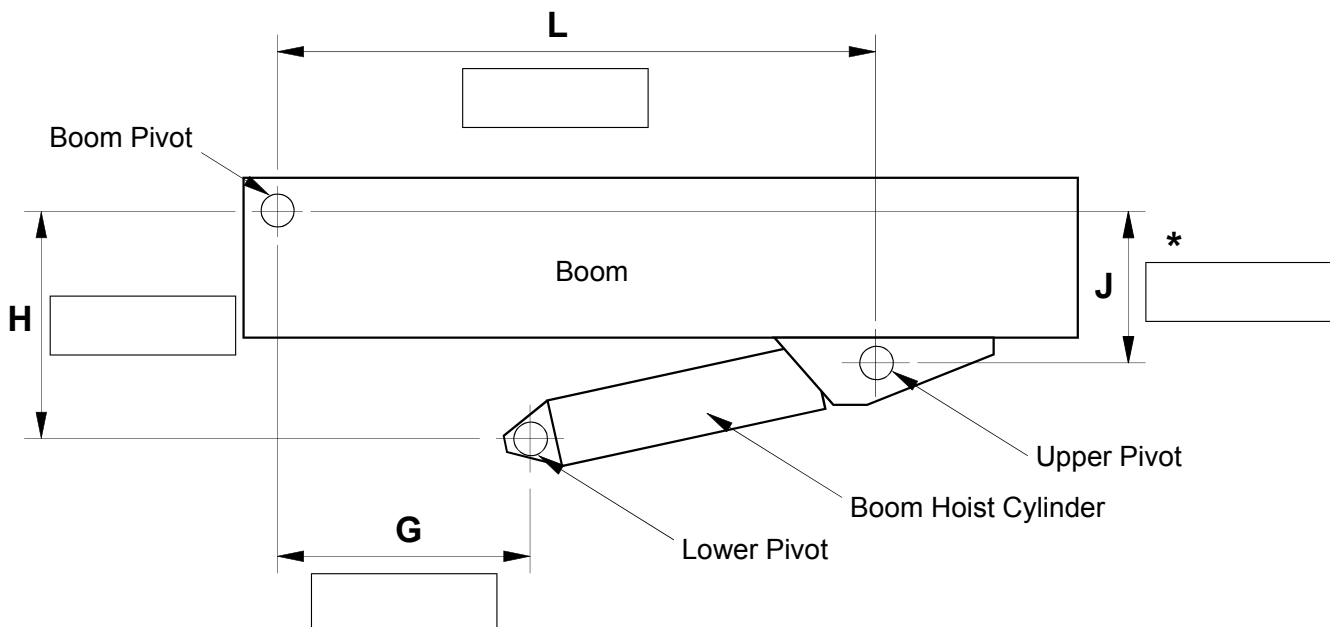
Dimension “J” is the distance at 90 ° to the boom centerline between the center of the Boom pivot and the center of the upper Boom Hoist cylinder pivot. **J is negative when the Boom pivot is above the upper Boom Hoist cylinder pivot and positive when it is below.**

Dimension “G” is the horizontal distance between the center of the Boom pivot and the center of the lower Boom Hoist cylinder pivot.

Dimension “H” is the vertical distance between the center of the Boom pivot and the center of the lower Boom Hoist pivot.

It is recommended that the boom is level when measuring dimensions “L” and “J.”
The carrier is assumed to be level for the purposes of measuring dimensions “G” and “H.”

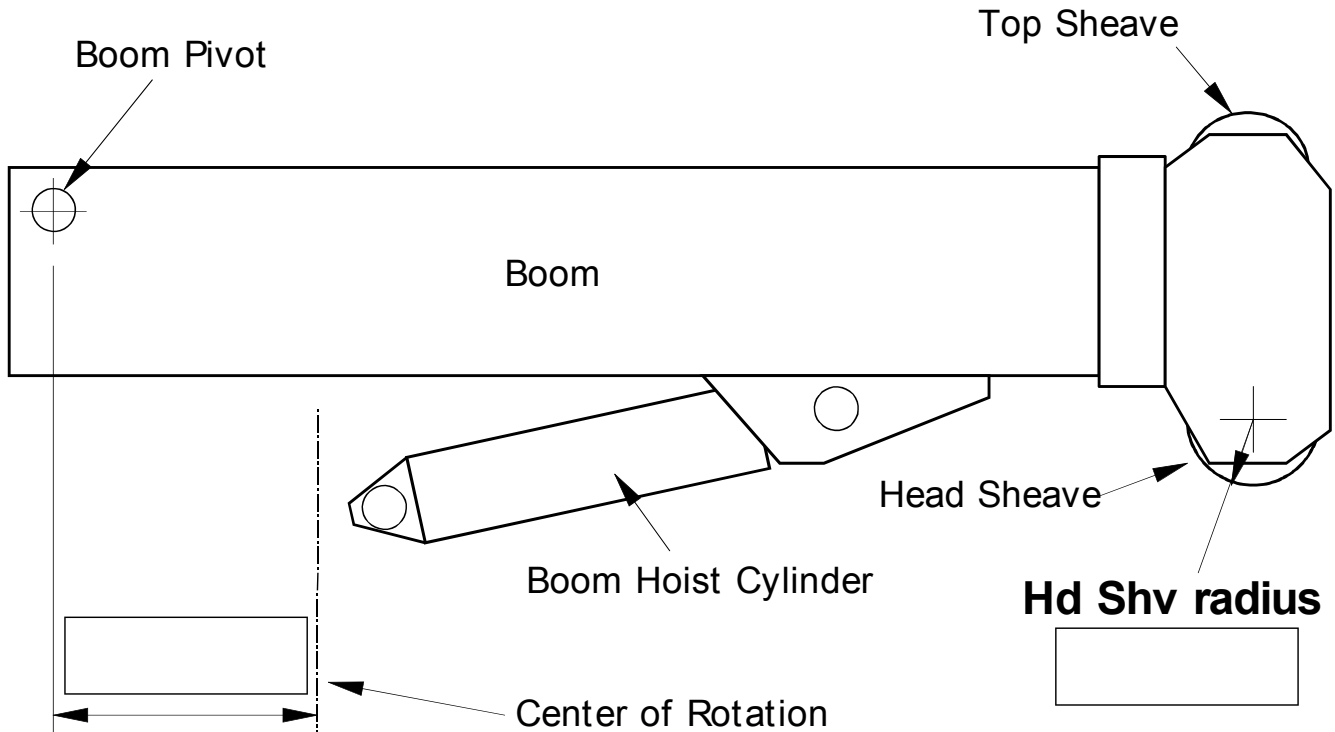
Enter the measured values into each of the gray boxes provided below.



* If the Boom pivot is above the Boom Hoist cylinder Upper pivot (as shown), dimension “J” is negative. **Clearly indicate “+” or “-”.** The above illustration shows dimension “J” as negative.

Miscellaneous Data

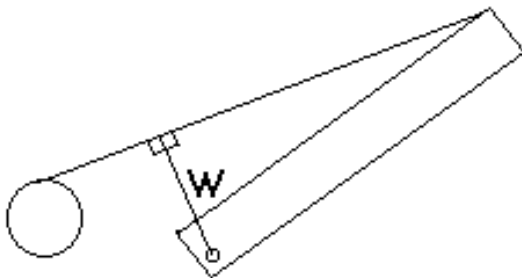
The following checks are for Main Boom Head Sheave Radius and Swing Offset. Swing Offset is negative when the boom pivot is behind the center of rotation. Measure the circumference of the boom hoist cylinder rod, which can be done by wrapping a tape around the rod and reading off the value. Enter the measured values in the gray boxes provided.



Swing Offset

Measure the W Dimensions on Non Boom-Mounted Hoist Reels.

Measure W at high and Low Angles



W low = **W high =**

Measure "W" at a low angle < 20 ° and at a high angle > 60 °. 'W' is the shortest distance from the boom pivot to the hoist rope.

Installation Checks

- Check wiring and EPROM installations.
- If swing switches are fitted, perform the digital input monitor routine via the MicroGuard® display to ensure that the switches operate correctly.
- Set the Extension Reel Clutch.

Calibration Routines and Menu Entry

The calibration routines, which are hidden from normal use, require the use of the entry code supplied with this manual.

To Enter the Calibration Mode: Hold down the ALARM CANCEL key and the UP ARROW key for about 6 seconds. A message requesting a PIN entry should appear. Use the UP and DOWN keys to enter the PIN, which is 112; calibration entry is complete. If incorrectly entered, the display will return to the normal working mode.

Once in the calibration mode, the options below are available. Use the UP or DOWN arrow key to display the desired option. Then, use the SETUP/OK key to enter the routine.

To exit the calibration menu at any time, press the ALARM CANCEL key; this action will return the system to the normal working screen. After the initial entry of the PIN, the calibration mode can be re-entered at any time by holding down the ALARM CANCEL and UP arrow keys. No code entry will be required as long as the power is not reset.

00	-	Information	-	Displays system information and error codes.
01	-	Reset Data	-	Crane data reset to initialize system before calibrating.
02	-	Dimensions	-	Allows entry of crane geometry.
03	-	Angle Sensor	-	Allows calibration of the angle sensor.
04	-	Extension Sensor	-	Allows calibration of the extension sensor.
05	-	Pressure	-	Allows calibration of boom hoist dimensions.
06	-	Radius/Moment	-	Allows calibration of radius and boom moment parameters.
07	-	Deflection	-	Allows entry of a boom bending correction.
08	-	Calibrate Fly	-	Allows calibration of fly/jib dimensions.
09	-	Stowed Jibs	-	Allows entry of stowed jib data.
10	-	Digital Input	-	Allows viewing of digital input status.
11	-	Angle Rate	-	Calibrates dynamic properties of the boom.
12	-	Data Viewer	-	Allows viewing of system variables.

00 Information

This routine allows viewing of the system error codes and the crane specific applications file used in the computer. Use the UP or DOWN arrow keys to move between information displays.

The following information is available:

1. System Error Codes (See Appendix for description).
2. Computer specific serial number (should match the number on the computer box).
3. The crane specific applications file used for system RESET.
4. Suggested diagnostics. These are recommendations on how to finish or improve a calibration. All calibration functions are not pertinent to all cranes; therefore, some diagnostic suggestions may not apply.
5. Exit the routine using the ALARM CANCEL key.

01 Reset Data

“Reset Data” from the calibration menu will display the status of the “Personality.” If the system has been reset and is functioning correctly, it should say, “Personality is good.”

In order for calibration to begin again, the crane RESET DATA **MUST** be implemented. This function will erase the Personality memory, which stores crane specific data and dimensions; it will also copy any known data from the on-board ROM applications file to the working personality memory for use by the system.

To reset crane data, simply enter the routine using the SETUP/OK key, then confirm the reset command by pressing the indicated keys.

02 Dimensions

The dimensions routine will show the current values of the following crane dimensions.

Use the UP or DOWN keys to modify the displayed values. Use the SETUP/OK key to move on and save. Use the ALARM CANCEL key to exit this routine.

Procedure:

1. Enter Swing Offset - Enter value from above worksheet.
2. Enter Ram L - Enter value from above worksheet.
3. Enter Ram J - Enter value from above worksheet.
4. Enter Ram G - Enter value from above worksheet.
5. Enter Ram H - Enter value from above worksheet.
6. The system will now ask, “**Is the winch mounted on the boom?**” Press the button under the Y/N caption to make a selection.
 - If “YES,” the system will require no more information regarding the crane winch.
 - If “NO,” the system will ask, “**Calibrate Hoist Rope Dimensions?**” Unless previously calibrated, press “YES” and work through the following calibration procedure. If previously calibrated, press “No” to continue.

Calibrating the Hoist Rope

- a. Follow the instructions provided on the screen, instructing the operator to move the boom to a high and low angle while fully telescoped in.
- b. Measure the shortest distance from the boom pivot to the hoist rope. This can be done by placing one end of the tape on the pivot and arcing the tape to find the shortest distance.
- c. The dimensions entered are “High Angle W” and “Low Angle W.” (See above worksheet on measuring W dimensions on non boom-mounted hoist reels.)

Continue with steps 7-13 below.

7. Head Shv. Rad - Enter value from above worksheet.
8. Enter RopeLim - Maximum line pull for a single part of line.
9. Enter Max POL - Maximum parts of line allowed on the main boom.
10. Enter Max Ext - Maximum boom extension allowed.
11. Load Scale - A load multiplier, usually set to 1.0.
12. Length Offset - Display offset added to length (gets over some OEM cheats).
13. Retracted Length - Retracted length of boom. (Measure it!)

03 Zero Angle Sensor

Mechanically zero the Boom Angle Sensor. Instructions for setting the potentiometer are contained in the Extension Reel installation manual. Double-check that the boom has been set level prior to setting. Set the angle sensor pot voltage to 1/10th of the drive voltage at the extension reel (0.5 V nominal).

Once the zero is mechanically set, a more accurate zero can be obtained electronically by positioning the boom as near to 0 ° (zero) as possible and pressing the DOWN arrow key to zero the display.

04 Zero Extension Sensor

Mechanically zero the Boom Extension Sensor. Instructions for setting the potentiometer are contained in the Extension Reel installation manual.

Double-check that the boom is fully retracted prior to setting.

Set the Extension Reel zero by measuring the drive voltage and adjusting the pot until the extension voltage is equal to 1/20th of the drive voltage (0.25 V nominal).

Once the zero is mechanically set, the zero can be set electronically more accurately by fully retracting the boom and pressing the DOWN arrow key to zero the display.

05 Pressure

This routine uses a calibration load to compute the diameter of the hoist cylinder, if the diameter is already known or is easily measured, simply skip the calibration option and enter the value directly at the end of this routine.

THIS DIMENSION IS CRITICAL AND SHOULD BE MEASURED TO WITHIN 1/10th INCH.

Procedure:

1. Examine the piston and rod-side pressures when first entering the routine; these should read positive numbers from around 20 to 3000 PSI with the boom not in its rest cradle. Press any key to continue.
2. Enter the rod circumference from the above worksheet.
3. Enter the calibration load that will be lifted, including all shackles and hook weights. The load should be as large a mass as is safe for the crane to pick with the boom as far retracted as possible and at a boom angle of around 60 °. If only small test loads are available, use a longer boom length.
4. Pick up the calibration load and hold it steady to settle any pressure fluctuations. Press "ok" to continue.
5. Measure and enter the radius of the load suspended.
6. Set down the calibration load, allow it to settle, and then confirm the weight. The routine will exit automatically upon completion.
7. Press the cancel key to Exit the Calibration Mode. Pick up the weight again. Check that the displayed load rises by the correct amount.
8. Reenter the Calibration Mode and adjust, as appropriate.

06 Radius/Moment

This routine calibrates the natural moment and radius of the boom, taking into account its deflection under its own weight.

Ensure that the boom configuration is set correctly, with the correct stowed attachment selected and without erected attachments. If calibrating with a stowed attachment, check that the relevant stowed data is entered into the system via the **10-Stowed Jibs** routine BEFORE calibrating the main boom.

Up to seven points may be stored; these points must include fully retracted and fully extended booms. Intermediate points should be chosen where individual sections of the boom start to telescope and/or where other sections stop telescoping, as the boom is extended.

For booms exhibiting an appreciable amount of flexibility or droop, it may be necessary to include an extra point to improve accuracy, especially if there is a long distance between obvious points of calibration. This is usually pertinent for long proportional booms, which may require only a fully retracted and fully extended calibration.

Some booms exhibit a sudden droop when nearing the fully telescoped position. This droop is often due to the design and fitting of wear pads inside the boom, which allow sections to hang on each other when nearing the fully telescoped limit. Though this has little affect on main boom radius accuracy, the radius of fly's/jib may be affected by this characteristic. It is essential here to add an extra calibration point at about 90% of the boom extension.

For each extension calibration, the system requires a stable measurement of the moment (via its own pressure sensors) and radius (via the calibration operator's measurements) at a high angle only. Try to pick angles of 60 ° – 70 ° for high angles. For low angles use 30 – 40 °.

Take care to accurately measure the radius at each calibration point. Using a single part-of-line will be helpful.

When entering the Tare load in the calibration routine, it is usually a good idea to add a little to the hook weight. Adding 100 pounds (or 50 Kilos) will help guarantee a slightly positive load reading in all operating configurations.

Procedure:

1. Determine whether this will be a new calibration or an existing calibration with new or added points. Be aware that a new calibration will destroy all radius moment data previously calibrated.
2. Enter the tare-load, which is the weight of extras added to the boom, i.e. the hook block, rope and shackles.
3. Follow the instructions on the screen. For each length/calibration point:
 - i) Telescope to the desired length.
 - ii) Boom to a high or low angle.
 - iii) Measure and enter the radius. Allow the boom bounce to settle, and then move on.
 - iv) Boom to the other required angle; measure and enter the radius.

The routine can be exited at any time by pressing the "cancel" key.

Always check the computer to ensure that the angle is identified as a 'high' or 'low' angle. If the display has indicated a different setting, use the up "high" or down "low" arrow keys to correct this. To restart a calibration length, press "cancel" once.

Calibrated lengths are stored in Personality memory. To re-enter a single length, simply re-enter the radius/moment routine. Select "No" for a single length. Select "yes" for a brand new calibration. Then telescope to the required length and calibrate.

The boom parameters computed during a radius/moment calibration can be manually entered or adjusted using the "EDIT" function available with the SETUP/OK key when first entering the routine.

07 Deflection

This routine is used to quantify the amount that a boom or attachment bends when under load. The boom has its own bending factor called "F." Each jib combination can have its own independent "F" value. Before entering the routine, the display will show the angle of the boom head under no load and under the current load.

Procedure:

Make sure that the crane is configured to pick off the main boom, that all stowed attachments are set correctly, and that there are no erected and unused attachments.

1. Fully extend the boom at a high angle of greater than 60 ° and lift a suitable calibration load. The load should induce significant deflection in the boom.
2. Begin the calibration by pressing the SETUP/OK key.
3. Measure the loaded main boom radius and enter the value. It is a good idea to add 0.1ft or 0.1m to the radius when entering the radius in the calibration for boom deflection. This will help ensure a slightly positive radius in most operating conditions.
4. Check that the new displayed radius matches (or slightly exceeds) the actual measured radius.
5. Use the DOWN arrow key to edit the “F” number manually without entering a radius; this is useful to trim the BDC up or down a bit.

Use this procedure for each fly/jib combination. Simply select the combination for calibration, re-enter the routine, and repeat the procedure.

Completing the Main Boom

Ensure that the main boom calibrations on the previous pages have been completed and boom functions thoroughly tested before calibrating the attachments identified in sections 08-11. These actions are essential for the collection of good calibration data. Use the worksheet at the end of this book to record test results for lifts.

08 Calibrate Fly

Perform a calibration on each jib configuration. Upon entry to the routine, the “edit” option can be used, if desired, to manually enter pre-calibrated data. This option assists in making it possible to trim an existing calibration that is less than perfect.

For each fly/jib combination, the system must gather data about the jib moment (through the pressure sensors) and the jib radius contribution (through the engineer’s radius measurements). Data must be gathered at high and low angles and for a retracted and extended main boom for EACH configuration.

Procedure:

1. Make sure that the crane is configured to be picking off the jib to be calibrated.
2. Enter the routine; bypass the edit option by selecting “N” for no with the DOWN arrow key.
3. Enter the main hook weight, if there is an unused hook picking off the main boom; otherwise enter 0.0.
4. Enter the weight of the fly hook and any other shackles and rope weights suspended from the fly pick point.
5. Follow the instructions on the screen. Move to retracted boom high and low angles to extended boom, high and low angles. Let the boom bounce settle for several seconds. Then, measure and enter the radius. After the four points are finished, the system will store the calibrated values and exit.
6. Check the validity of the calibration with a ‘Test Load’ before moving to the next jib combination.

Completion

Upon completion of a jib calibration, record the test results in the worksheet at the end of this book.

09 Stowed Jibs

Use this routine to enter data for stowed attachments. This information should be entered before performing a main boom radius/moment calibration, if it is to be calibrated with a stowed attachment.

Gather the required stowed jib data as follows:

Stowed Deduction

Data should be written on the chart or cab plate.

Jib Weight

Weigh it! Use the weight gathered during the erected attachment calibration. Use the "Edit" function in 09 Calibrate Fly.

Stowed G

Balance the jib on the hook to find the center point. Compute the distance from the boom pivot to this center point when jib is stowed. As an approximation, use the halfway point along the jib.

Stowed T

Measure from the boom pivot to the centerline of the jib when stowed, which should be a few inches. The number will be negative if the jib centerline is above the boom pivot (most likely).

Procedure:

1. Enter the routine. Using the UP and DOWN arrow keys, select the stowed attachment to be calibrated.
2. Use the UP and DOWN arrow keys to display the stowed parameters to be changed: either "Stowed Deduct" and "Fly Weight" or "Stowed G" and "Stowed T."
3. Select the parameter with the SETUP/OK key and enter the new values, using the UP and DOWN arrow keys.
4. Press the ALARM CANCEL key to exit the routine.
5. Re-enter the routine to calibrate an additional attachment.

10. Digital Input

Use this routine to examine the status of digital inputs and outputs.

11. Angle Rate

Often loads will change drastically when booming down. This routine compensates for this type of change. Two compensation speeds are allowed: "Slow" rate compensation and "Fast" rate compensation. The "Actual" rate of boom movement is also displayed in this routine.

Procedure:

1. Enter the routine; use the UP and DOWN arrow keys to select the desired compensation rate.
2. Select the rate using the SETUP/OK key. Enter a new compensation rate. Move the boom down to see the effect. If the effect is too small, increase the compensation. It is usual to leave the slow rate compensation as zero, or a very small number, and to adjust the fast rate compensation to counter the booming down effect.
3. Exit the routine using the ALARM CANCEL key.

"Compensation ONLY" switches in when booming down. The word "BUMP" appearing on the screen indicates that the machine was handled in a rough manner and an additional bump filter was switched in to try and remove the pressure spikes.

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