

Real Time Height, Fixed Height and Slew Monitor

Operators Guide



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1 Introduction

The Prolec Real Time Height and Slew System is designed for the positional sensing of the equipment height and slew of 360° monoboomb and triple articulation excavators :

The system audibly warns the operator of approach to the set limits and offers optional motion inhibit when the set limit is reached.

The system consists of 4 main components :

- 1 Computer Unit
- 2 Controller Unit
- 3 Angle Sensor – AS7 as standard (AS10 direct drive optional)
- 4 Slew Sensor – option only available for 360° excavator

The angle sensors are used by the computer to calculate the real time height of the equipment. The height limit is set in the cab using the display unit. On reaching the height limit the display unit alarm will sound continuously and an appropriate relay which may be used to control a solenoid valve is activated inside the computer unit – see table below :

Excavator Type	Motion Control
Monoboomb	Slew, individual Boom and Dipper motion cuts
Triple Articulation	Slew, Boom and Intermediate section (treated as one component) and Dipper motion cuts
Backhoe loader	Bucket Arms, individual Boom and Dipper motion cuts

The slew sensor is selected depending upon machine type. Slew left and slew right limits are set using the control unit. When either limit is reached the control unit alarm will sound. There are two relays allocated for motion cut in this application each separately activated depending on the direction of slew travel. As the slew limit is approached the alarm will pulse until the slew limit is reached when the alarm will then sound continuously.

For all applications all set limits are stored in non volatile memory of the computer during power down, protecting the set data against any power supply disturbances. On power up the system will automatically use the last set limits unless new limits are set.

This guide describes the system components, operation and maintenance of the Real Time Height and Slew system.

IMPORTANT NOTE FOR RAILWAY USE

This system does not meet the requirements of RIS-1530 PLT ISSUE 3. If the system is to be used on a rail site, it is the responsibility of the user to assess whether additional means of protection are required.

THESE UNITS ARE NOT SUITABLE FOR USE IN EXPLOSIVE ATMOSPHERES.

Prolec supports a network of fully trained service engineers. Warranty claims, service work, technical information and spare parts are available by contacting :

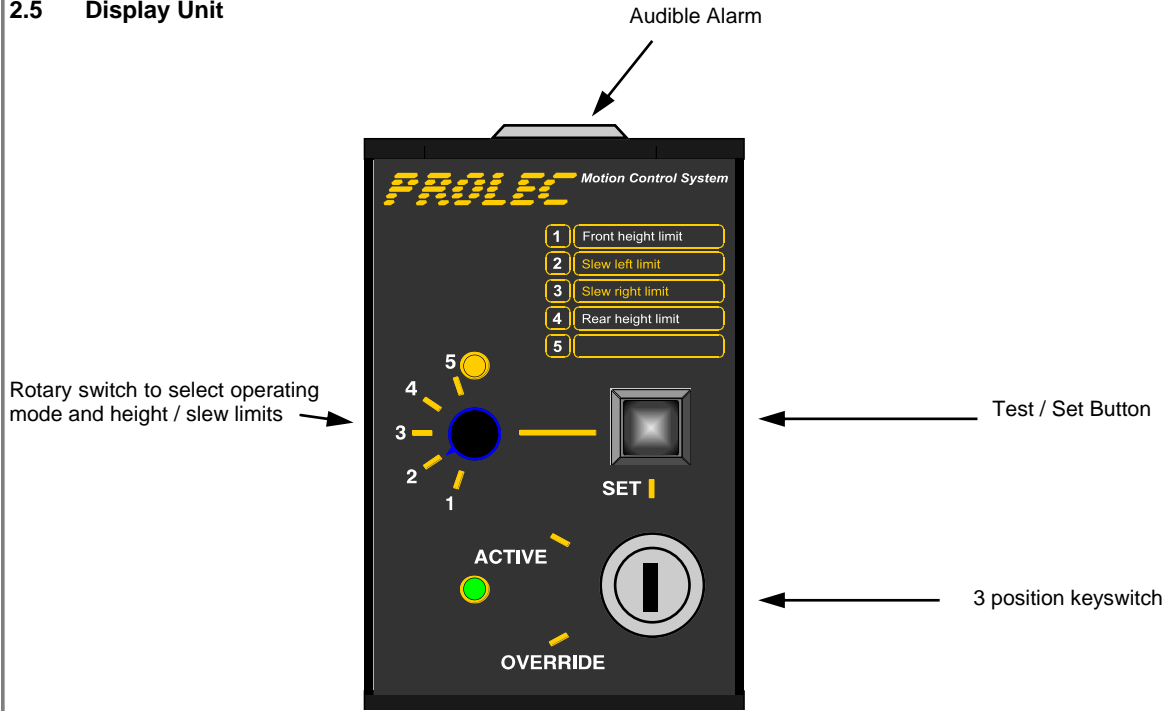
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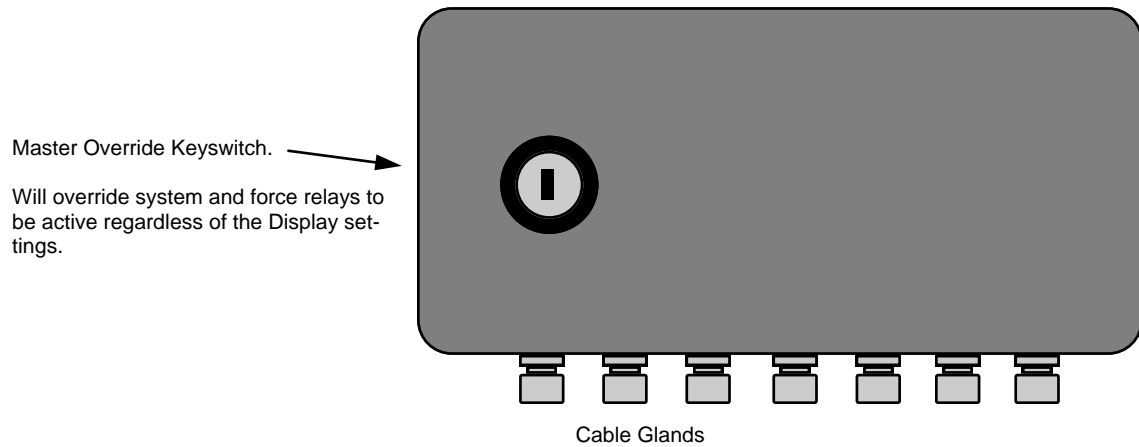
service@prolec.co.uk



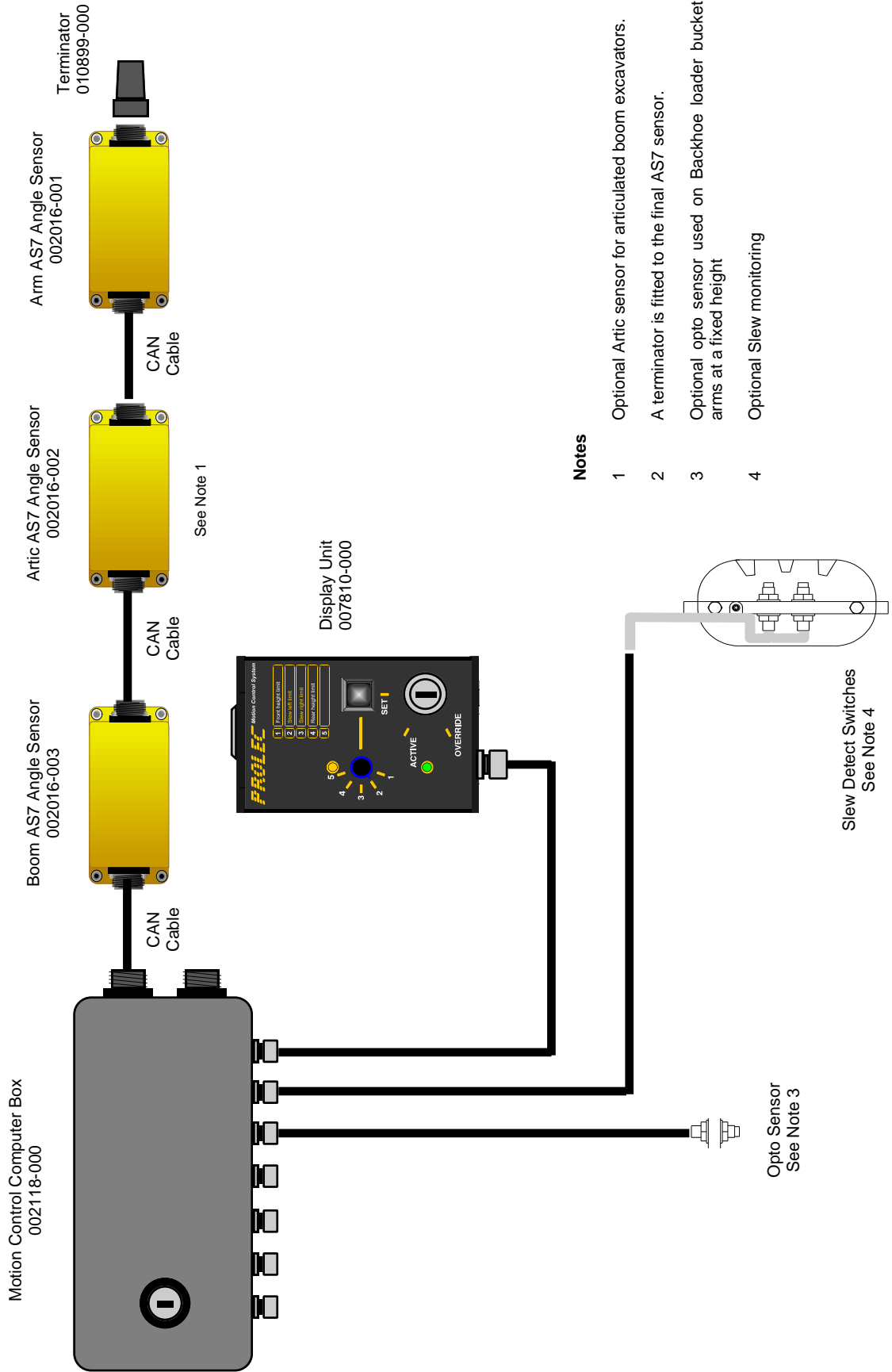
2.5 Display Unit



2.6 Computer Box

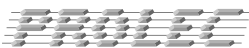


2.7 Triple Artic Height and Slew System Block Diagram



Notes

- 1 Optional Artic sensor for articulated boom excavators.
- 2 A terminator is fitted to the final AS7 sensor.
- 3 Optional opto sensor used on Backhoe loader bucket arms at a fixed height
- 4 Optional Slew monitoring



3 Operation - 360° Excavator

BEFORE OPERATION ALWAYS CHECK THE VALIDITY OF THE ALARM HEIGHT AND SLEW LIMITS AND THE RELAY / SOLENOID ACTIVATION BEFORE PROCEEDING

3.1 Power Up

The Motion Control System will be activated whenever the machine ignition is switched on.

3.2 Keyswitch Override

With the keyswitch in the OVERRIDE position the Motion Control System will be inactive and will have no effect on the operation of the machine. Removal of the key in this mode will render the unit permanently inactive.

3.3 Keyswitch Active

With the keyswitch in the ACTIVE position the Motion Control System will register an alarm condition when the pre-set maximum height or slew limit is approached / reached. Removal of the key in this mode will provide permanent protection through height restriction whenever the machine ignition is switched on.

3.4 Test Procedure

The operation of the Motion Control System can be verified at any time the keyswitch is in the ACTIVE position, by pressing the SET / TEST button. Pressing SET / TEST will cause the internal alarm to sound, and any optional equipment connected to the system to activate (e.g. solenoid operated lock out valve).

3.5 Setting the Height Limit

- a) Turn the keyswitch to the SET position.
- b) Turn the rotary switch to position 1.
- c) Move the machine equipment to the required maximum height.

Note : Any previously set limits will be overridden.

- d) Press and hold the SET / TEST button until the AMBER SET LED illuminates.
- e) Move the rotary switch to position 2. This will set the system to monitor height only.
- f) Return the keyswitch to the ACTIVE position.
- g) Verify the operation by lowering and raising the equipment through the new alarm position. The alarm will start to pulse on and off as the limit is approached. When the limit is reached the alarm will sound continuously and the appropriate motion cut relay will be activated.
- h) Re adjust height limit if necessary.

3.6 Setting the Slew Limit

- a) Turn the keyswitch to the SET position.
- b) Turn the rotary switch to position 2.
- c) Slew the cab left to the desired limit. Press the SET button until the AMBER SET LED illuminates.
- d) Turn the rotary switch to position 3.
- e) Slew the cab right to the desired limit. Press the SET button until the AMBER SET LED illuminates.
- f) Move the rotary switch to position 1 or 3 (depends on the required operating mode – see section 3.7).
- g) Return the keyswitch to the ACTIVE position.
- h) Verify the operation by slewing the machine left and right to the alarm limits. The alarm will start to pulse on and off as the limit is approached. When the limit is reached the alarm will sound continuously and the appropriate motion cut relay will be activated.
- i) Re adjust the slew limit position if necessary.

3.7 Selecting Operating Mode

The modes of operation can be changed by moving the rotary switch to the required position and moving the keyswitch from SET to ACTIVE.

Rotary Switch position	Operating Mode
1	Height and Slew
2	Height only
3	Slew only



4 Operation - Backhoe Loader

BEFORE OPERATION ALWAYS CHECK THE VALIDITY OF THE ALARM HEIGHT LIMITS AND THE RELAY / SOLENOID ACTIVATION BEFORE PROCEEDING

4.1 Power Up

The Motion Control System will be activated whenever the machine ignition is switched on.

4.2 Keyswitch Override

With the keyswitch in the OVERRIDE position the Motion Control System will be inactive and will have no effect on the operation of the machine. Removal of the key in this mode will render the unit permanently inactive.

4.3 Keyswitch Active

With the keyswitch in the ACTIVE position the Motion Control System will register an alarm condition when the pre-set maximum height or slew limit is approached / reached. Removal of the key in this mode will provide permanent protection through height restriction whenever the machine ignition is switched on.

4.4 Test Procedure

The operation of the Motion Control System can be verified at any time the keyswitch is in the ACTIVE position, by pressing the SET / TEST button. Pressing SET / TEST will cause the internal alarm to sound, and any optional equipment connected to the system to activate (e.g. solenoid operated lock out valve).

4.5 Setting the Height Limit on backhoe

- a) Turn the keyswitch to the SET position.
- b) Turn the rotary switch to position 1.
- c) Move the machine equipment to the required maximum height.

Note : Any previously set limits will be overridden.

- d) Press and hold the SET / TEST button until the AMBER SET LED illuminates.
- e) Move the rotary switch to position 1. This will set the system to monitor height only.
- f) Return the keyswitch to the ACTIVE position.
- g) Verify the operation by lowering and raising the equipment through the new alarm position. The alarm will start to pulse on and off as the limit is approached. When the limit is reached the alarm will sound continuously and the appropriate motion cut relay will be activated.
- h) Re adjust height limit if necessary.

4.6 Fixed Height Limit on Loader Arms

The fixed height limit is activate whenever the keyswitch is in the active position.

4.7 Selecting Operating Mode

The modes of operation can be changed by moving the rotary switch to the required position and moving the keyswitch from SET to ACTIVE.

Rotary Switch position	Operating Mode
1	Height with Fixed height limit

Fixed height limit on Bucket arms cannot be altered or deactivated.



5 Failure Modes

On power up the system performs self test routines and is able to detect various modes of failure. If a failure is detected the alarm will sound in a particular pattern, depending upon the failure type.

Alarm Output (- = long pulse, . = short pulse)

<u>Failure</u>	<u>Alarm Output</u>	<u>Action</u>
Slew system fault	▣	A single proximity switch failure has been detected. The proximity switch or cable may be damaged.
Angle sensor Not detected	▣ . . .	1 System may be a slew only system. Check operating mode is correct - see 3.7 or 4.7 2 Angle sensor or cable may be damaged. 3 Contact Prolec for service.
Undefined mode	▣ . .	System is operating in an undefined mode. Check operating mode is correct – see 3.7 or 4.7
System Fault	▣ .	System has failed. Contact Prolec for service.



6 Manual Issue Changes

<u>Manual Issue</u>	<u>Date</u>	<u>Comments</u>
A	December 03	Draft version
1.0	June 2004	1st Issue release
1.1	December 09	Additional backhoe opto feature added
1.2	March 11	Altered IMPORTANT NOTE FOR RAILWAY USE comment

