

# LMS2 - Load Management System

#### **Technical Presentation**



By Lachlan Grogan, May 2011





#### **Features Overview**

- A solution for AS1418.19 (indicating and limiting) compliance
- Full colour high-resolution LCD display
- **Digital Rating Chart**, with novel band shade and prediction features
- Fully Automatic attachment recognition system
- Supports all attachments
- Options for on-board weighing/totalising and ticket printing
- Integrated forward / reverse camera



## Display Module – Main Features

- Digital rating chart display
- Lifting load (weight) display
- Current Rated Capacity of machine and attachment combination
- Image of current attachment
- Current attachment details
- Height / Angle / Radius display
- Chassis tilt sensor





## Display Module – Digital Rating Chart

• The digital rating chart **augments** the paper rating charts, while adding innovative features such as load position, height and radius indicators as well as a novel **band shading feature** allowing the operator to immediately identify their no-go zones.





## Display Module – Load Position Indicator

• The load position indicator shows the **true position of the load**. The load position indicator gives the operator a **quick and easy** method of identifying the load position within the rating chart. The load position indicator will change from green, through orange to red as the percentage of rated capacity changes.





#### **Display Module – Band Shade Feature**

 An important feature of the digital rating chart technology is the **band shade** feature. Bands in the rating chart shade, depending on the current rated capacity of the machine and attachment combination. The band shade feature gives the operator **unprecedented situational awareness** of the current lifting load compared against the current rating chart.



In the current situation, moving the load into the orange band will cause the machines rated capacity to exceed 80%.



### Band Shade Feature (Continued)

- Other LMS systems prevent further movement of the Telehandler <u>once</u> the rated capacity has exceeded 100%.
- The LMS2 allows the operator to visualise when they are approaching a limit and <u>prevent</u> that limit being exceeded in the first place. This feature provides the highest level of situational awareness for the operator.



In the current situation, moving the load into the red band will cause the machines rated capacity to exceed 100%. The LMS will prevent the operator from aggravating the current situation. The use of the override key will be required.



## Lifting Load Display

• The LMS2 shows the **current lifting load** and the **current rated capacity** of the machine and attachment combination.

Lifting Load (t)

Rated Capacity (%)

33.4

 Additional icons are also shown, such as a caution symbol (for > 80%RC), a stop symbol (for > 100%RC) and a blue dot, indicating the limiter has been disabled.

Lifting Load (t)	Lifting Load (t)	Lifting Load (t)
Rated Capacity (%)	Rated Capacity (%) <b>105.1</b>	Rated Capacity(%)



#### Limiter Inhibit Mode

 When a bucket attachment is being used, the LMS's rated capacity limiter is inhibited between 0°-10° and < 1m working radius in line with the provisions of AS1418.19. This permits breakout force to be applied to a bucket, without the operator being required to override the LMS2.





## **Tilt Indicator**

 The LMS2 features a tilt indicator for both lateral (roll) and longitudinal (pitch) measurements. The tilt indicator provides a visual warning to the operator when the roll limits of the machine have been exceeded. Additionally the tilt indicator has a 'snap to centre' feature, allowing for quick and precise frame levelling.





#### Attachment System

- The LMS2 supports a **fully automatic attachment recognition system**. When the attachment is connected to the carriage, the LMS2 **automatically recognises** the attachment and loads the correct rating charts and performance parameters.
- Each attachment is fitted with a radio transmitter that reports the type of attachment, and in some cases important information such as the attachments configuration, angle, etc.





#### Supported Attachments

• The LMS2 supports many popular attachments, as well as a broad range of third party attachments.





#### **Reverse Camera**

• The LMS 2is supplied **standard** with a reverse camera. The camera provides greater **situational awareness** when the Telehandler is being used in close proximity to other objects or people.







• The LMS2 is supplied **standard** with a light tower. The light tower shows the status of the rated capacity of the machine. The light tower is high brightness and easily visible in normal sunlight.





## **Bypass Timer**

• The LMS2 is supplied **standard** with a bypass timer that meets the requirements of AS1418.19. The bypass timer permits up to 60 seconds of override to permit use of the machine once 100% of rated capacity has been exceed. The bypass timer is shown on the LMS2 display.



A key icon is shown on the LMS2 display when the bypass key is in use



Once the bypass timer has expired, the icon is replaced and the hydraulics are locked out. The user must return the key to work mode to continue.



• The LMS2 is fitted with a LMS button. The single push button serves as the only user adjustment for the LMS2. The LMS button allows the user to confirm a new attachment, or to manually select attachments (where fitted)





### Support for ROTO machines

• The LMS2 supports ROTO (Rotating) Telehandlers. The LMS2 determines the current slew/stabiliser position, and correctly loads the appropriate rating charts.







#### Support for Active Suspension machines

The LMS2 supports boom suspension system (BSS) models. In addition an active tilt compensation system is implemented to allow the LMS to read correctly with both boom suspension on, and an attachment such as a bucket fully crowded back.







## Dual Lift Cylinder Support

• The LMS2 supports dual lift cylinder configurations (such as Merlo P60.10). The dual lift cylinder support greatly improves accuracy of the LMS2 during heavy lifting operations, or lifting operations where the machine is not level.





## Optional Weight Totalising + Ticket Printer

 The LMS2 can be optionally enabled to support weight totalising, with the addition of a joystick button. Further more a ticket printer can be supplied to print a receipt including the number and size of all weight readings, and a total (including variance calculation).



When the weight totalising system is enabled in software, the LMS2 display layout changes slightly.

Additional information is provided including the total accumulated weight (Total) and current lifting load + accumulated weight (Current)



## Weight Totalising – Continued

• To clear the current totalised weight, hold the joystick button down for 3 seconds.





• Lift a load in the bucket, and press the joystick button once. This will add the weight in the bucket to the current totalised weight.







## Weight Totalising – Ticket Printing

• If an optional ticket printer is fitted, press the print button once all weight readings have been completed. The printer will print a receipt containing all the data from the previous lift cycles.





## ID Login System - Option

 An optional ID login system is available. The operator must swipe their ID card across the screen to unlock the LMS2. If the LMS2 remains locked, the Telehandler will only have a 0.5m lift height. This prevents unlicensed operators using the machine.







LMS2 display with ID Login



## EN15000 - Option

- The LMS2 has support to meet the inertia limiting requirements set out in EN15000. As the LMS2 supports fully automatic attachment recognition, the LMS2 can command a reduction in boom acceleration during certain operating conditions.
- EN15000 compliance is supplied by means of a software update and an digitally controlled hydraulic valve.



Additional LMS2 software provides indication of the throttling of the boom acceleration during certain conditions.



## EN15000 – Valve Upgrade

• An additional valve can be provided to implement the EN15000 requirements. The valve connects to the LMS2's network.





The digitally controlled hydraulic valve, installs inline.