Maintenance Manual

WP2300S Series

MS-WP2300S 05/03 • Printed in Germany
Order Number: 812529-006

LUBRICATION AND ADJUSTMENT

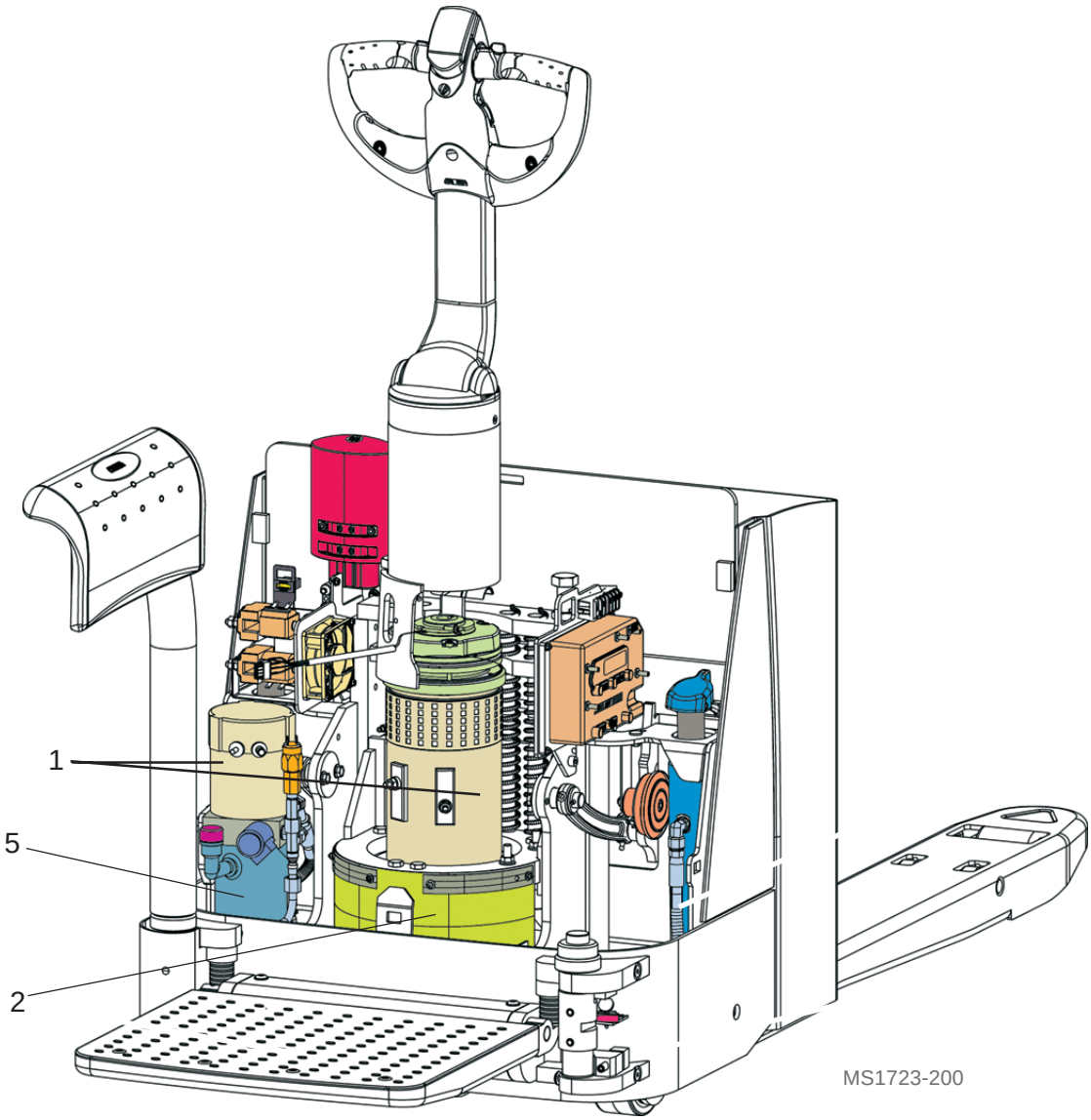
Printed in Germany

Grease (multi purpose)	Aralube HLP2 LM-Grease Regulus A2 Beacon EP2 EP2 Mobiluxe EP2 Retinax LX LGWMI	Aral Castrol Century Esso Maxol Mobil Shell SKF	053002-001	B
Low temperature grease	Aralube SKL2 Unirex Lotemp EP	Aral Mobil	053002-005	BB
Hydraulic oil	Vitam GF 32 Hyspin AWS-32 Nuto H32 DTE 24 Tellus 32 Hydran LZ 32 B110	Aral Castrol Esso Mobil Shell Finol Fuchs Minralölwerke GmbH	053001-003	D
Low temperature hydraulic oil	Deutz Oel HVI 32	Klockner	053001-009	DD
Transmission oil	Hyp 85W90 GX - D 85W90 Mobilube HD85/90 Spirax MB90	Aral Esso Mobil Shell	053002-004	A
Low temperature transmission oil	Mobil SHC 624	Mobil	053002-009	AA

L01_lubricants_wp-GB

Anti-corrosive agent	Tectyl	Anti-corrosive agent for cold store trucks.	805236-004
Transparent coating	2K Klarlack	Acid resistant transparent coating for traction controllers for cold store applications.	805236-003

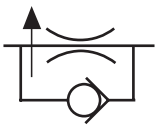
L01_adjuvants_WPS-GB


1
5
2
MS1723-200

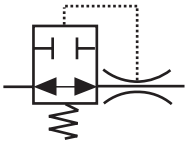
Throttle, fixed

Throttle, adjustable

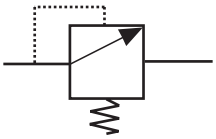
Pressure-compensated flow control, fixed



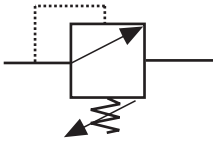
Pressure-compensated flow control with reverse flow bypass; fixed.



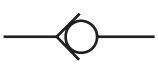
Velocity fuse



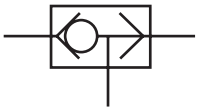
Relief valve, fixed setting



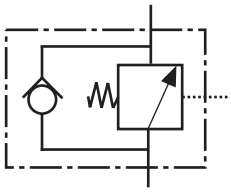
Relief valve, adjustable



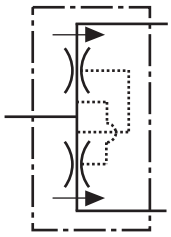
Check valve



Shuttle valve



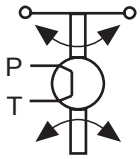
Single counterbalance valve assembly in manifold



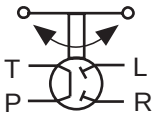
Flow divider/combiner

Bypass flow control with controlled flow, pressure-regulated

Shut-off valve, manual



Torque generator



Hydraulic steer unit

M3561

DRIVE UNIT

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Electrics - General

Wire Colour Codes

The wires used in the truck are colour-coded and numbered according to their function. The first digit or the first two digits indicate the wire colour while the last two digits are counter numbers.

BLK	Black	0 **	Digital signal
BRN	Brown	1 **	Analog signal
RED	Red	2 **	Positive not connected
ORG	Orange	3 **	+12 V DC converter
YEL	Yellow	4 **	Third DC converter
GRN	Green	5 **	Negative not connected
BLU	Blue	6 **	Insulated negative
VIO	Violet	7 **	+5 V DC converter
GREY	Grey	8 **	Fourth DC converter
WHT	White	9 **	Various
RED/WHT	Red/White	29 **	Positive connected
GRN/WHT	Green/White	59 **	Negative connected

** Numbers 01 to 99

E01-gb

SEM1 Traction Controller

DANGER

Jack up the truck before carrying out any repair work or troubleshooting the electrical system.

General

M1531

The programmable SEM1 impulse controller provides effective control over the driving behaviour of the truck.

The truck is powered by a separate excited motor (SEM). This version has two variables for governing the motor output: field and armature current.

Precautionary Measures

- Do not attach the controller to a battery with a different rated voltage to that of the controller (24 - 36 VDC).
  A higher battery voltage may destroy the MOSFETs, while a lower power supply will result in system failure.
- Only operate the controller with special traction batteries. Do not connect to a rectifier or mains components.
- When commissioning jack up the truck to prevent it from starting suddenly if there is a wiring error.
- When the key switch has been turned off the filter capacitors in the controller remain charged for a few minutes. If work is performed on the controller during this time it must be disconnected from the battery (disconnect battery). Finally, to discharge the capacitors short-circuit the positive and negative terminals of the power part together over a resistance (10 - 100 Ohm, min. 5 W) for a few seconds.

Operational Features

Speed Control

Infinately variable handset programmable speed control in both directions.

Reduced Speed Ranges

There are several interdependent travel ranges with reduced speed available: slow travel (via a rotary switch contained in the tiller handle HSS), slow travel when the platform is not folded out (via the GCSR, GCSL and PLS switches) in walkie mode and an automatically reduced travel speed for loads in excess of 1,000 kg.

Downhill Speed Control

When travelling downhill the controller monitors the motor anchor speed via the drive signal from the traction potentiometer. When the set speed is exceeded, electrical braking with energy retention is introduced.

Regenerative Braking

Three forms of regenerative braking are available:

- Release braking (travel switch or multitask handle return to neutral)
- Inversion braking (travel switch set in opposite direction)
- Braking by reducing speed on a slope: the controller constantly regulates the engine speed according to the set value prescribed by the travel switch. Braking is automatically activated when the set value is exceeded.

Anti - Roll Down Function

This function prevents the truck from accidentally rolling down a slope. When the key switch is on the controller monitors the engine speed. If it detects a turning movement without a travel command, braking is automatically activated.

If the truck automatically starts to move on a slope, it therefore brakes after a short period. When the truck stops braking is released causing the truck to move again, followed by further braking. If the brake is not applied the truck will therefore move down the slope very slowly.

Parameter Setting, Folded Platform

The settings in this table apply only to traction controllers with part nos. 813196-xxx and software version SW#006B.

Menu item	Setting range	Recom-mended setting	Description
ACCELER DELAY	1.15 - 3.00 sec	2	Acceleration delay. The time taken for the traction controller to increase the output supply to the traction motors from 0 to 100% (when transmitter (butterfly switch) suddenly set to limit).
DECELER DELAY	9 - 0	0	Time taken to reach the new set value when the set value on the transmitter is changed. Corresponds to the braking intensity when the transmitter is returned.
RELEASE BRAKING	0 - 9	3	Release braking. Activated when the accelerator pedal is released or when it returns to neutral. Time taken for the motor current to fall to zero.
INVERSE BRAKING	0 - 9	6	Inversion braking. Activated when transmitter (butterfly switch) is set to the opposite direction. Time taken for the motor current to fall to zero.
CUTBACK SPEED	30 - 100 % ACC	2	Maximum current (= speed) for the low speed range selected by the fast / slow speed switch (HSS) (in % of max. current ACC for fast speed (= normal)) in walkie mode. Again, the entire mechanical control range of the transmitter is available. Enables more sensitive travelling at reduced speed.
MAX SPEED FRW W	100 - 75 % FCN	6	Max. forward speedin walkie mode: this value determines the maximum traction motor current during forward travel. When the armature voltage has been fully absorbed by the controller, the speed is increased by weakening the field current. If the value is set to 0 the field current will not fall below the nominal value (FCN = field current nominal) when the armature voltage is fully absorbed.
MAX SPEED BCK W	100 - 75 % FCN	6	Max. reverse speedin walkie mode: this value determines the maximum traction motor current during reverse travel. When the armature voltage has been fully absorbed by the controller, the speed is increased by weakening the field current. If the value is set to 0 the field current will not fall below the nominal value (FCN = field current nominal) when the armature voltage is fully absorbed.
CUTBACK SPEED 1	30 - 100 % ACC	8	Maximum current (= speed) for the low speed range selected by the fast / slow speed switch (HSS) (in % of max. current ACC for fast speed (= normal)) in rider mode. Again, the entire mechanical control range of the transmitter is available. Enables more sensitive travelling at reduced speed.

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Electric Motors

General Maintenance Instructions

The following instructions apply to all motors. Details relating to specific models and designs are provided in the sub-sections (traction motor, pump motor etc.).

Preparation

- Disconnect the battery (= EMERGENCY DISCONNECT).
- Secure the truck from rolling away.

Important Maintenance Instructions

- Remove all carbon brushes and check for wear. If one or more carbon brushes need to be replaced, replace all brushes. In addition to the carbon brushes the pressure springs must also be replaced to ensure the correct pressure.

  The length of the shortest brush determines whether the brush set needs to be replaced.

  Even if the minimum length has not been reached the brushes should be replaced as the remaining useful life could be much shorter than the time until the next inspection:

  If a brush is too short the spring will lie on the brush support. The brush sparks during operation and burns the collector with corresponding damage.

- Blast the motor with dry compressed air only.
- Check the armature for uneveness, burning, grooves and cracking of the multi-plate edges. Turn the armature if necessary. A non-oily, evenly distributed layer on the brush surfaces is normal.
- **If oil or grease is found in the motor collector compartment** (usually a paste consisting of oil, oil vapour, dust and carbon particles), **immediately remove the cause** and clean the motor thoroughly:

  Oil or grease burns in the brush sparks and leaves behind a highly abrasive oil ash which can very quickly destroy the collector and the brushes.

- The brushes must be able to move freely in the brush support (without spring tension) without tilting. Never modify brushes if one or more brushes cannot move freely.
  In this case replace all brushes as they will probably have been thermally overloaded. Thermal overloading (temperatures >160 ºC) causes the brushes to swell up.
  Brushes which jam in the brush support produce intense sparking and destroy the collector.
- The brush edges must not be cracked. Brushes with cracking along the long edge of the surface will have been damaged by a worn collector.
  If information is provided in the manual, restore the collector to the specified limits. Otherwise, replace the armature in full.
- Loose brush connections are a clear sign of motor overload. In this case inspect the collector for burning and repair or replace as necessary.
- When fitting the brush take care to place the spring gently on the brush. If the contact is too hard the brush will be damaged.
- Make sure that all brushes contact the armature at the same pressure.
- New brushes must be run in with a medium load in the first hours. Never fully charge the motor straight away.

STEERING

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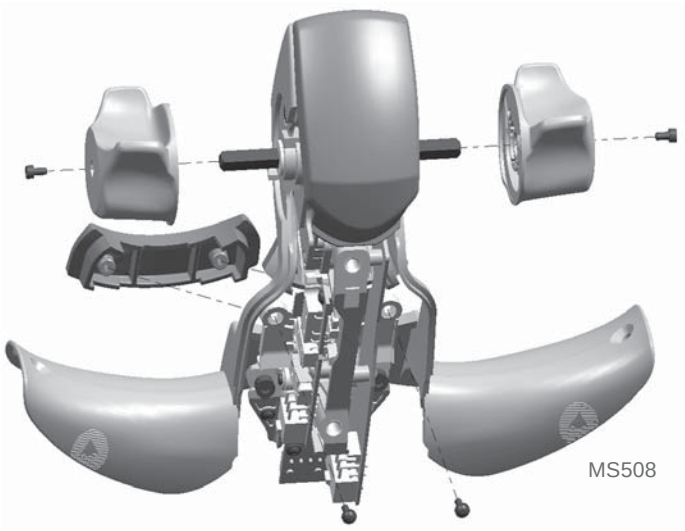
Safety Reverse Switch

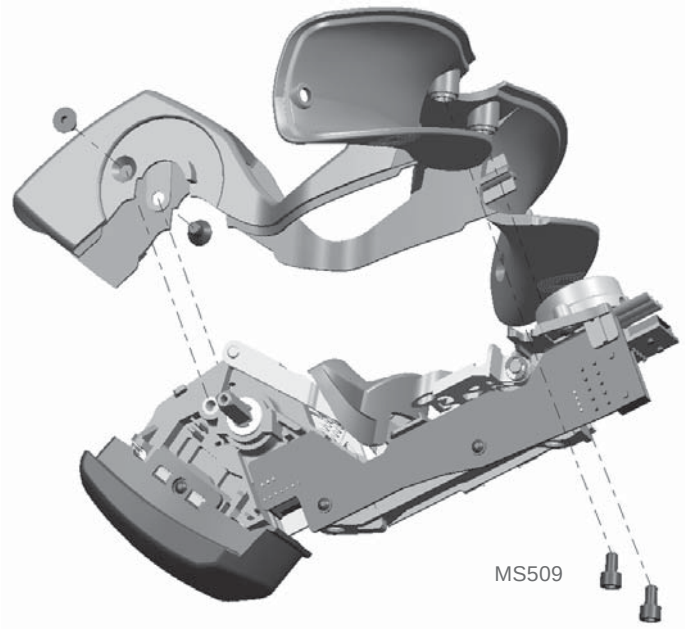
Removal

- Remove the switch unit (see *SWITCH UNIT* section in this chapter).

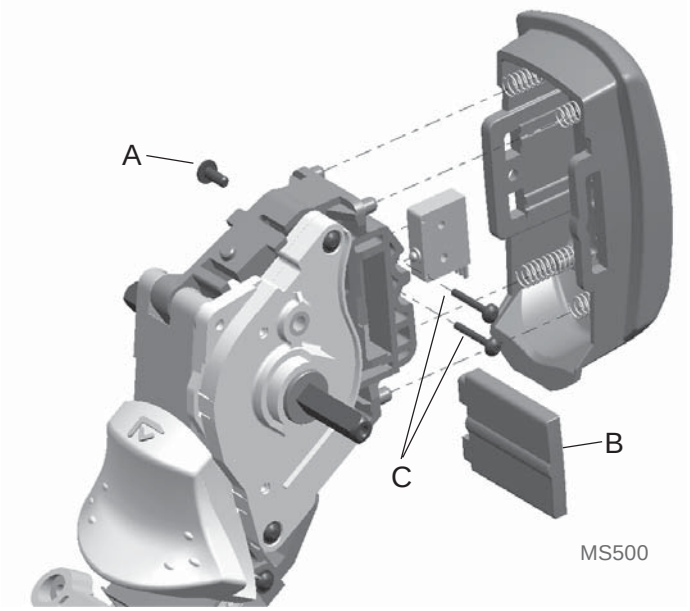


- Remove the two M3 Torx® screws (see Fig. MS508) from the butterfly switches and pull the butterfly switches off. Take care not to lose the plastic slide bearings (washers).

- Remove the two M3 Torx® screws which secure the orange lower switch cap. Remove the switch cap.



- Remove the four M5 Torx® screws shown in Fig. MS509. Remove the switch unit cover.



- Remove the M3 Torx® screw (item A, Fig. MS500) and pull out the switch jumper (item B).

- Remove the two M2 Torx® screws (item C). Remove the microswitch connector from the main board.

Installation

Installation of the safety reverse switch is the reverse of removal.

- **Before connecting the microswitch to the main board, lubricate the microswitch connector with grease (part no. 053002-005). Do not use any other grease.**

- Re-install the switch unit (see *SWITCH UNIT* section in this chapter) and carry out a functional test.

Note: **The butterfly switches cannot be fitted incorrectly. They will only fit properly in a single position.**

CYLINDERS

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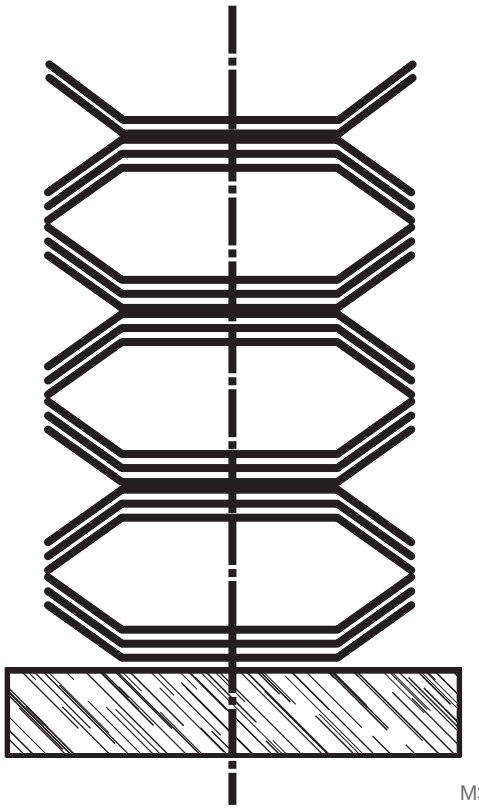
Platform Suspension

Plate Spring Layers

To achieve optimal lifespan and spring quality of the platform, layer the plate springs with 6 sets of 3 springs and one set of 2 springs.



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