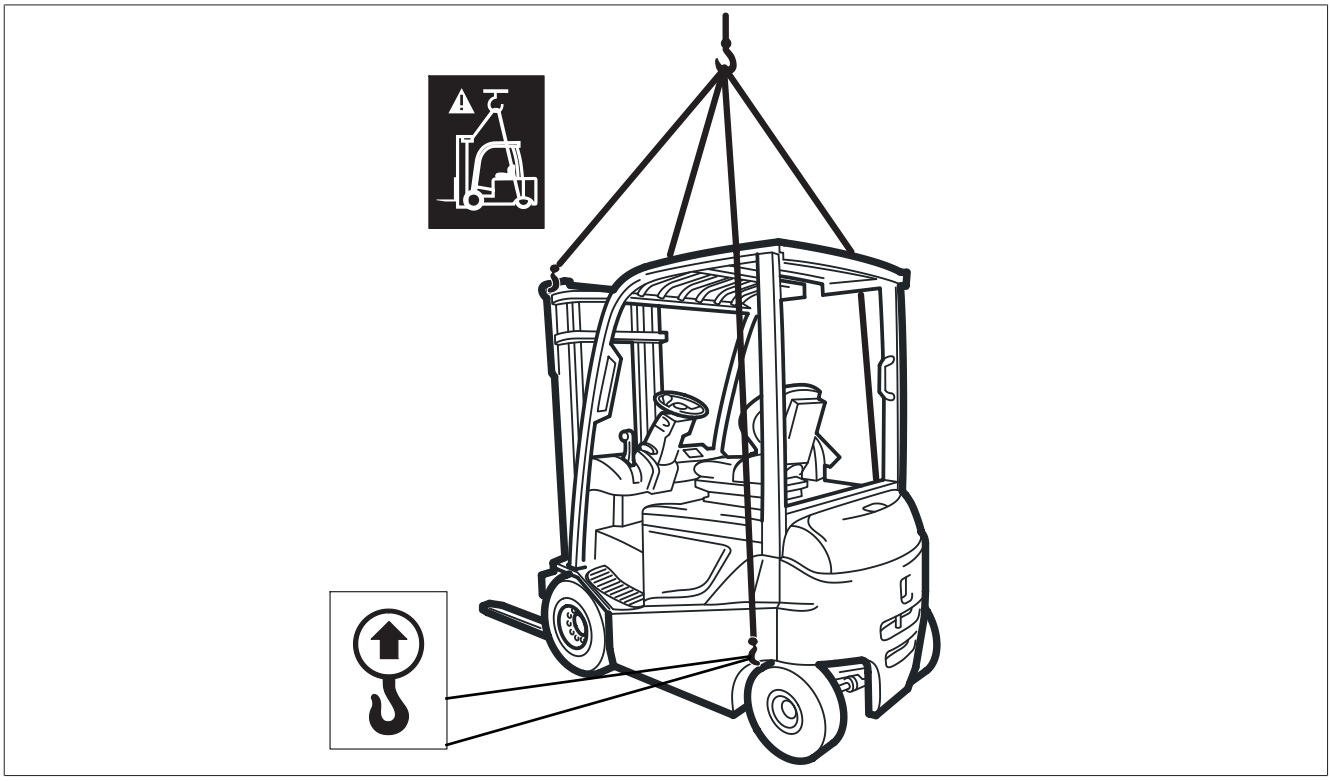
TOYOTA

REPAIR MANUAL

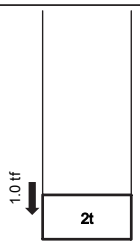
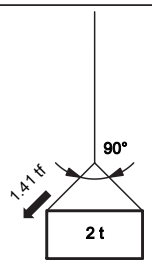
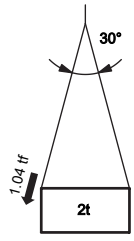
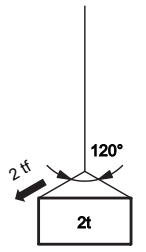
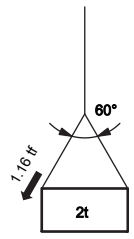
8FBMT40, 45, 50

Pub. No. CE370-1



CAUTION! To jack up the vehicle, use belts or ropes of suitable strength.

LIST OF SUSPENSION ROPE ANGLES

Suspension angle	Tension	Compression	Suspension method	Suspension angle	Tension	Compression	Suspension method
0°	1.00 times	0 times		90°	1.41 times	1.00 times	
30°	1.04 times	0.27 times		120°	2.00 times	1.73 times	
60°	1.16 times	0.58 times					

SAFETY LOAD FOR EACH SUSPENSION ROPE ANGLE

Unit: N

SAS Periodic maintenance

MAINTENANCE CYCLE **(Based on total hours operation or months elapsed during the life cycle of the truck, whichever is sooner)**	**every 6 weeks** **every 250 hours**	**every 6 months** **every 1000 hours**	**every 12 months** **every 2000 hours**
S.A.S.			
Operation		I	←
Integrity and tightness of sensors and wiring harnesses		I	←
Integrity, deformation and oil leaks on working components		I	←
Performance of the oscillation lock cylinder and/or accumulator		I	←
Condition of load sensor		I	←

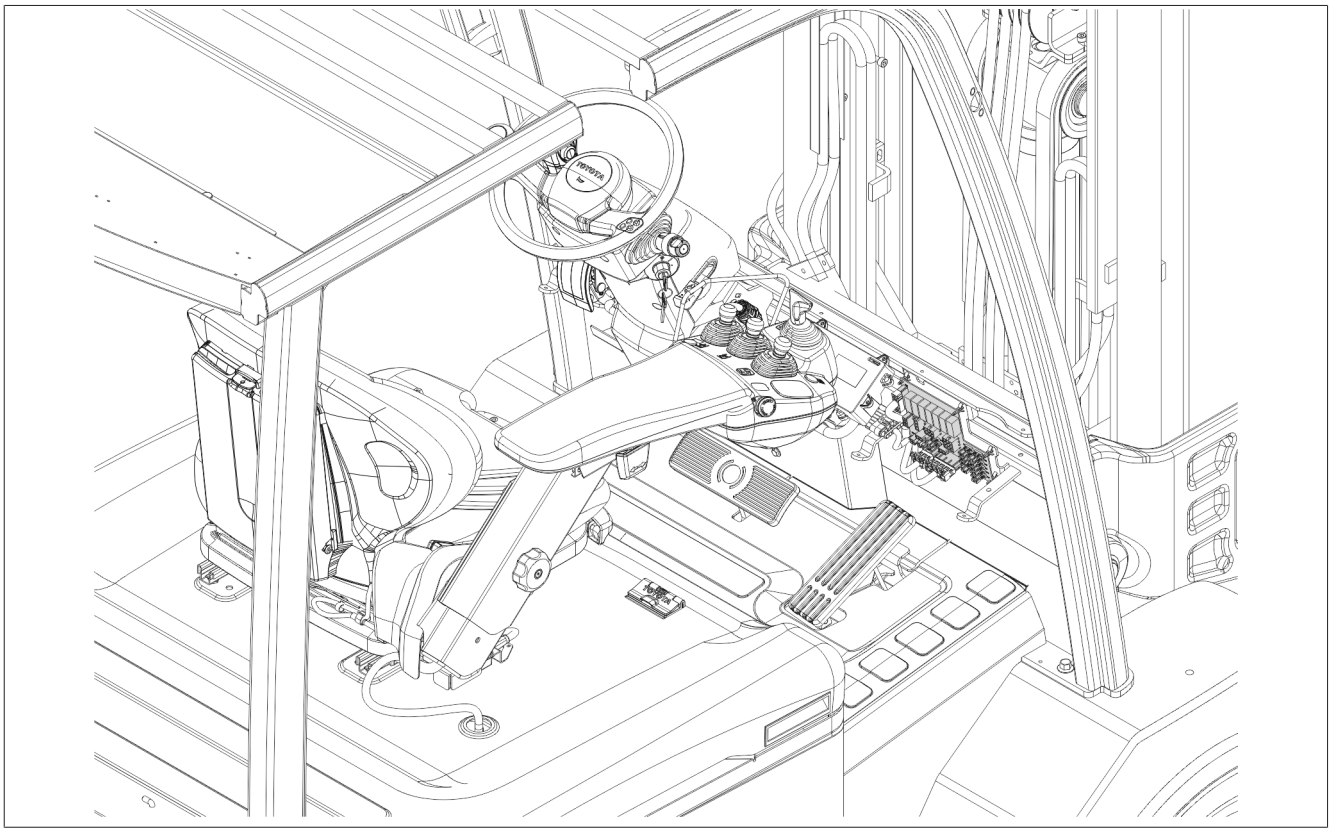
BATTERY INDICATOR TROUBLESHOOTING

DEFECT	CAUSE	REMEDY
Battery indicator does not reset after partial battery charge.	The BDI RESET rule is not respected. Standard BDI RESET = 30% (3 led)	▪ Make sure you have discharged the battery indicator at the value set by BDI RESET before charging the battery. ▪ Lower the BDI RESET value.
		▪ Battery charge duration too short for the value set in BDI RESET. ▪ Lower the BDI RESET value.
Battery indicator does not shown 100% after complete battery charge.	The BDI RESET rule is not respected. Standard BDI RESET = 30% (3 led)	▪ Make sure you have discharged the battery indicator at the value set by BDI RESET before charging the battery. ▪ Lower the BDI RESET value.
	Battery indicator does not correctly read the battery voltage.	▪ Perform the acquisitions for ADJ BATTERY and ADJ CAPACITOR.
	After charging the battery does not exceed the voltage set in RESET VOLT. Standard RESET VOLT= -0.7% (83.84V) Standard BDI MAX = -1.1% (83,60V)	▪ Check the battery conditions (old or damaged battery). Electrolyte density after charging 1.29 Kg/dm³. ▪ Lower the RESET VOLT value. ▪ Check that the RESET VOLT value is > BDI MAX
Battery indicator does not shown 100% after changing the battery.	The BDI RESET rule is not respected. Standard BDI RESET = 30% (3 led)	▪ Make sure you have discharged the battery indicator at the value set by BDI RESET before charging the battery. ▪ Lower the BDI RESET value.
	Battery indicator does not correctly read the battery voltage.	▪ Perform the acquisitions for ADJ BATTERY and ADJ CAPACITOR.
	After charging the battery does not exceed the voltage set in RESET VOLT. Standard RESET VOLT= -0.7% (83.84V)	▪ Check the battery conditions (old or damaged battery, or unused for too much time has passed between end of charging and use). Electrolyte density after charging 1.29 Kg/dm³. ▪ Lower the RESET VOLT value using the battery with a lower final charge voltage.
When the battery indicator shows 0% the electrolyte density is greater than 1.14 Kg/dm³	Battery indicator does not correctly read the battery voltage	▪ Perform the acquisitions for ADJ BATTERY and ADJ CAPACITOR.
	BDI MIN value too high. Standard BDI MIN = 0.0% (78.0V)	▪ Lower the BDI MIN value.
When the battery indicator shows 0% the electrolyte density is less than 1.14 Kg/dm³	Battery indicator does not correctly read the battery voltage.	▪ Perform the acquisitions for ADJ BATTERY and ADJ CAPACITOR.
	BDI MIN value too low Standard BDI MIN = 0.0% (78.0V)	▪ Increase the BDI MIN value.

CONTROL SYSTEM

24-12 V FUSE CARD

DISASSEMBLY-ASSEMBLY



Dismantling procedure

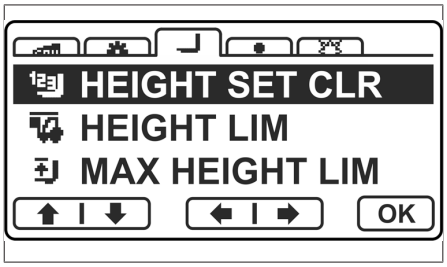
1) Open the battery cover.
2) Disconnect the battery connector.
3) Remove the dashboard.
4) Disconnect the electrical wiring.
5) Remove the 24-12 V fuse card.

Assembly procedure

The assembly procedure is the reverse of the disassembly procedure.

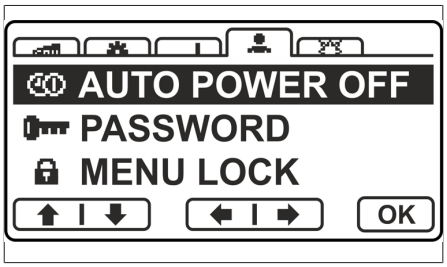
Menu	Name	Description	Requirement for execution
MAT 6. H-SELECTOR	ENABLE	Enabling of the height selector option	*1, *14
	MIN HEIGHT	Calibration of the fork height sensor, forks on the ground	*1, *14, *19
	MAX HEIGHT	Calibration of the fork height sensor, forks at maximum height	*1, *14, *19
MAT 7. ADJUST BATTERY	ADJ BATTERY	Calibration of the battery voltage reading for the battery indicator (referring to between pin 1 on connector J1 and GND)	*16
	ADJ CAPACITOR	Calibration of the battery voltage reading for the battery indicator (referring to between +Vbatt on the traction logic unit and GND)	*16
MAT 8. TIRE DATA	TIRE DATA	Calibration of speed indicator (speedometer)	*1, *14, *16
MAT 9. ELT BRAKE	ENABLE	Enabling of the negative brake	*14, *16
TUNING 2. M. HANDLING	ANGLE FW	Front tilt angle control	*1, *14,
	ANGLE BW	Rear tilt angle control	*1, *14,
ETC 1. METER START	METER START	Enabling of machine hour meters	*1, *14,
ETC 3. TO DEFAULT SET	PM DRV	Reset the lifting logic unit	*17
ETC 7. DELUXE MODE	DELUXE MODE	Enabling the Deluxe multifunctional display	*1, *14, *16, *17, *18
OPT 1. OPTIONSET	SWAYING PEDAL	Enabling of the swaying pedal system	*1, *14
	AUTO SPEED	Enabling of speed and acceleration reduction in line with the height and weight of the load	*1, *14
	CRV REDUCTION	Enabling of speed reduction in a curve	*1, *14
	SWING LOCK	Enabling SAS system of the rear axle	*1

Content required for execution:
*1: When the MCB is replaced
*2: When the accelerator potentiometer is removed/installed or replaced
*3: When the tilt angle potentiometer is removed/installed or replaced
*4: When the tilt angle potentiometer rod is replaced
*5: When the mast pressure sensor is removed/installed or replaced
*6: When the steering potentiometer or its cover is removed/installed or replaced
*7: When the equipment or fork is installed or replaced
*8: When the mast is removed/installed or replaced
*9: When the tilting cylinder is removed/installed or replaced
*10: When the lifting lever potentiometer is replaced
*11: When the tilting lever potentiometer is replaced
*12: When the optional system (1) lever potentiometer is replaced
*13: When the optional system (2) lever potentiometer is replaced
*14: When the multifunctional display is replaced
*15: When the wheel size or type is changed
*16: When the drive logic unit is replaced
*17: When the lifting logic unit is replaced
*18: When the armrest card is replaced
*19: When the fork height sensor is removed/installed or replaced



*1: With Deluxe multifunctional display

*2: With height selector



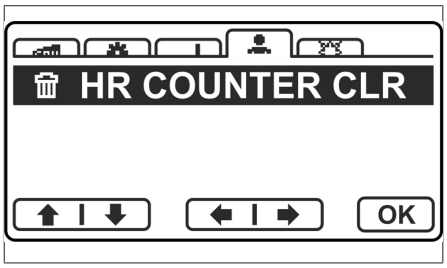
TRUCK MANAGEMENT

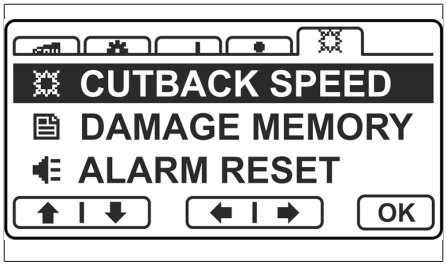
AUTO POWER OFF (setting of automatic switch-off)

PASSWORD (setting of second password)

MENU LOCK (switching of operator menu lock)

HR COUNTER CLR (reset of hour meter, partial)





SHOCK SENSOR (optional)

CUTBACK SPEED (reduction of shock speed)

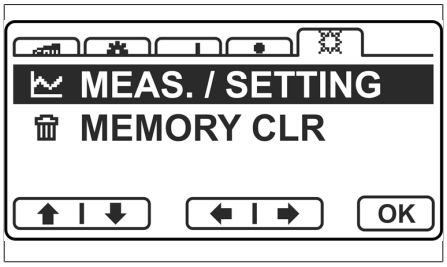
DAMAGE MEMORY (control of shock memorization) *

ALARM RESET (reset of shock alarm) *

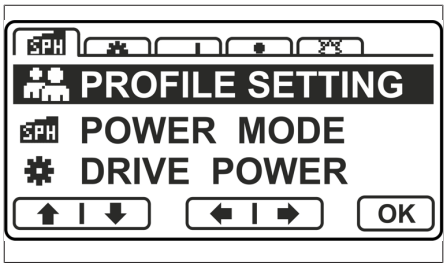
MEAS. / SETTING (monitoring and setting of shock detection level) *

MEMORY CLR (reset of shock memory) *

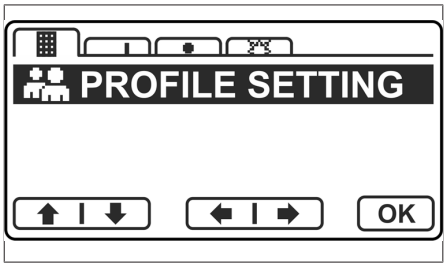
* Parameters not available with the TWIS

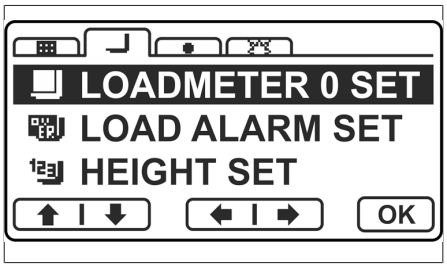


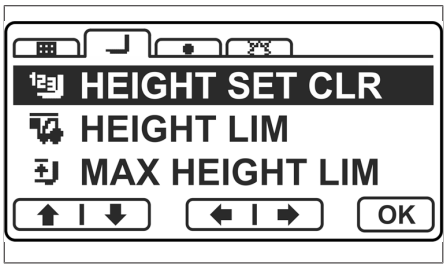
POWER CONTROL



This menu can be used to set the traction and lifting control functions.





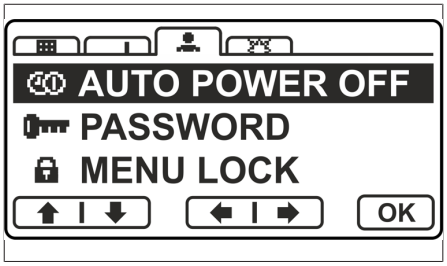


MATERIAL HANDLING (optional)

- LOAD METER 0 SET *1 (reset of load measuring device)
- LOAD ALARM SET *1 (setting of overload alarm)
- HEIGHT SET *2 (setting of automatic height control)
- HEIGHT SET CLR*2 (setting of automatic height control)
- HEIGHT LIM *2 (setting of height limiter)
- MAX HEIGHT LIM *2 (setting of maximum height limiter)

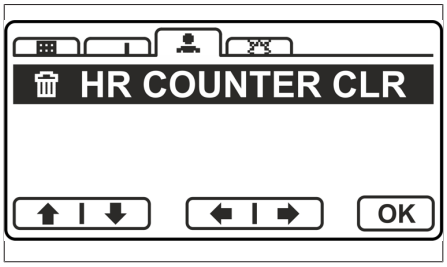
*1: With Deluxe multifunctional display

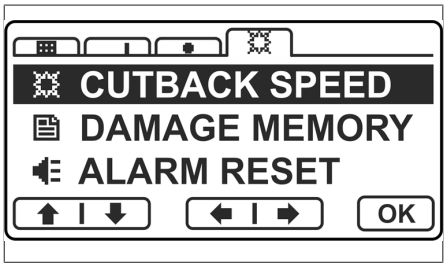
*2: With height selector



TRUCK MANAGEMENT

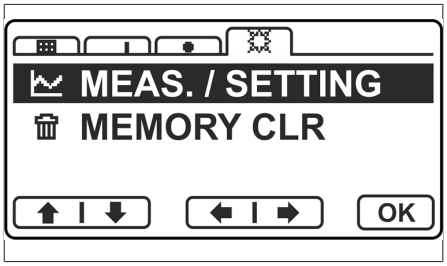
- AUTO POWER OFF (setting of automatic switch-off)
- PASSWORD (setting of second password)
- MENU LOCK (switching of operator menu lock)
- HR COUNTER CLR (reset of hour meter, partial)





SHOCK SENSOR (optional)

- CUTBACK SPEED (reduction of shock speed)
- DAMAGE MEMORY (control of shock memorization)
- ALARM RESET (reset of shock alarm)
- MEAS. / SETTING (monitoring and setting of shock detection level)
- MEMORY CLR (reset of shock memory)

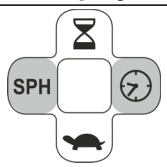
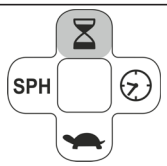
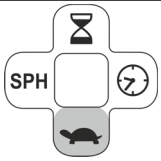
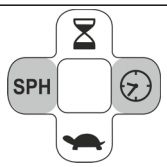
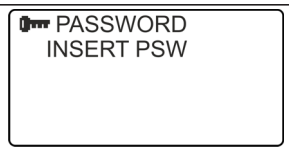
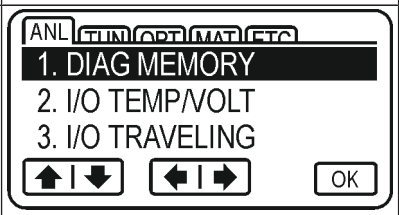


Mask menu password

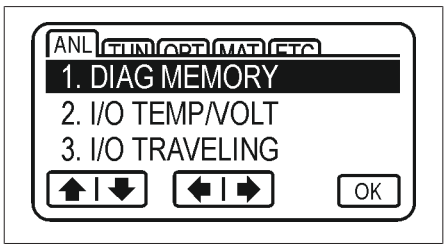
Password entry procedure

NOTICE! Always use your fingertips to operate the switches on the display. Sharp objects may damage the switch.

NOTICE! If an error occurs during the startup procedure, turn the key to OFF and start again from the beginning. If the MASK MENU does not appear after repeated attempts, the system may be faulty.

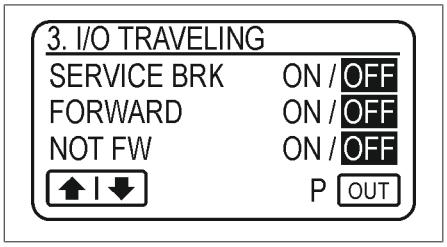
Step	Display	Operation	Vehicle response
1		Press and hold the (SPH) and ( ) buttons simultaneously for at least 2 seconds	When you press the buttons, a short beep will sound, followed by another 2 short beeps after 2 seconds.
2		Press the ( ) button within 10 seconds.	Short acoustic warning.
3		Press the ( ) button within 10 seconds.	Short acoustic warning.
4		Within 10 seconds, press and hold the (SPH) and ( ) buttons simultaneously for at least 2 seconds.	When you press the buttons, a short beep will sound, followed by another 2 short beeps after 2 seconds.
5		When the second hidden password has been set: The second password screen is displayed. Enter the second password. Or: If it has not been set beforehand, this screen will be skipped.	
6		The ANALYZER menu screen is displayed automatically.	

MASK MENU screen



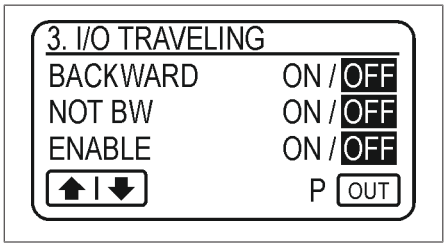
✓ **Operating procedure**

1) Enter the password on the general screen to display the MASK MENU.



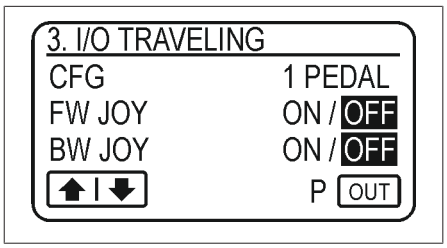
"I/O TRAVELING 3/12"
SERVICE BRK: Brake pedal microswitch
FORWARD: Forward motion N.O. microswitch
NOT FW: Forward motion N.C. microswitch

Button ( ): "I/O TRAVELING 4/12" screen



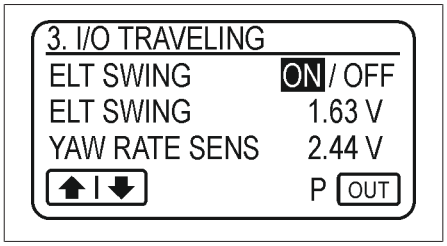
"I/O TRAVELING 4/12"
BACKWARD: Backward motion N.O. microswitch
NOT BW: Backward motion N.C. microswitch
ENABLE: Single pedal system microswitch

Button ( ): "I/O TRAVELING 5/12" screen



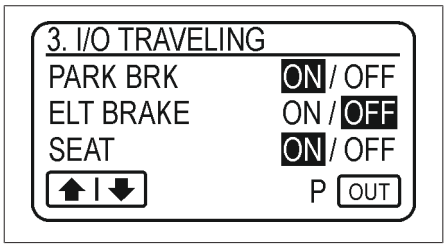
"I/O TRAVELING 5/12"
CFG: Accelerator pedal system configuration (single/double)
FW JOY: Forward motion armrest microswitch
BW JOY: Backward motion armrest microswitch

Button ( ): "I/O TRAVELING 6/12" screen



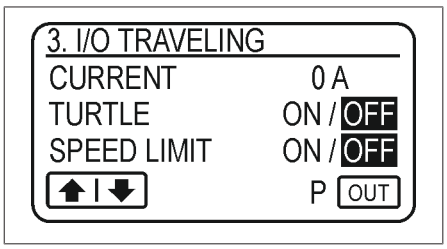
"I/O TRAVELING 6/12"
ELT SWING: Rear axle stability cylinder solenoid
ELT SWING: Current supplied to the rear axle stability cylinder solenoid
YAW RATE SENS: Yaw rate sensor signal

Button ( ): "I/O TRAVELING 7/12" screen



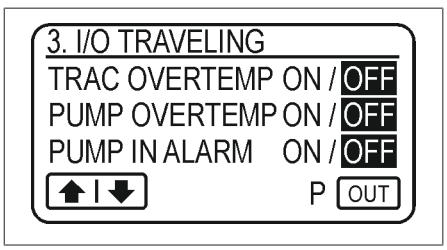
"I/O TRAVELING 7/12"
PARK BRK: Parking brake microswitch
ELT BRAKE: Negative brake
SEAT: Seat microswitch

Button ( ): "I/O TRAVELING 8/12" screen



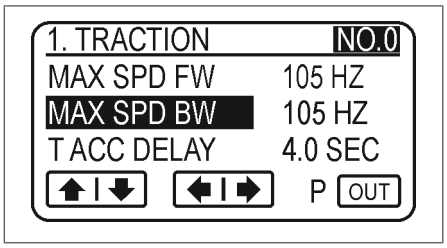
"I/O TRAVELING 8/12"
CURRENT: Current supplied to the drive motor
TURTLE: Turtle function speed reduction
SPEED LIMIT: SPEED LIMIT function speed reduction

Button ( ): "I/O TRAVELING 9/12" screen



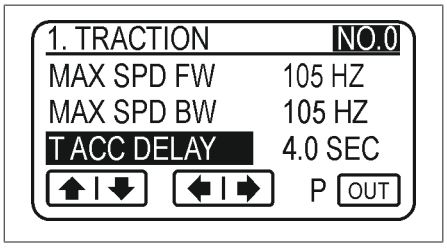
"I/O TRAVELING 9/12"
TRAC OVERTEMP: Speed reduction with drive motor overheating
PUMP OVERTEMP: Speed reduction with pump motor overheating
PUMP IN ALARM: Speed reduction with fault code

Button ( ): "I/O TRAVELING 10/12" screen



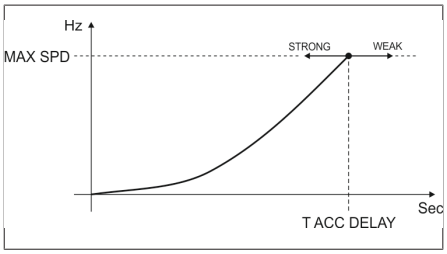
MAX SPD BW

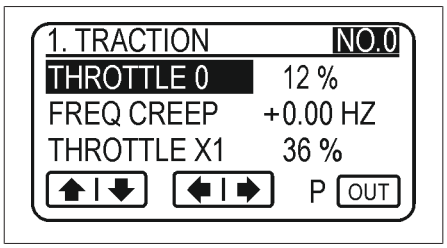
Determines the maximum reverse speed.
Minimum value: low speed - Maximum value: high speed
Formula for calculating km/h:
km/h = (Hz x 30) / (TIRE DATA value)



T ACC DELAY

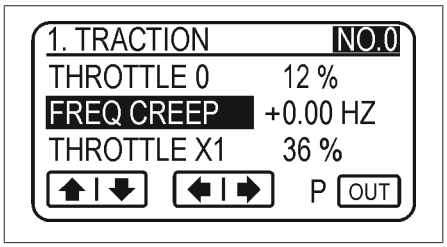
Determines forward/backward acceleration
Minimum value: hard acceleration - Maximum value: soft acceleration





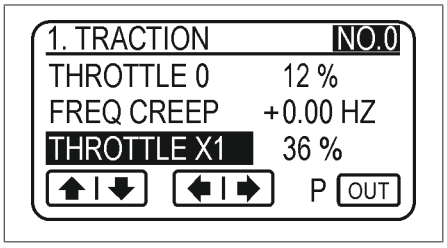
THROTTLE 0

Determines point 0 on the accelerator potentiometer



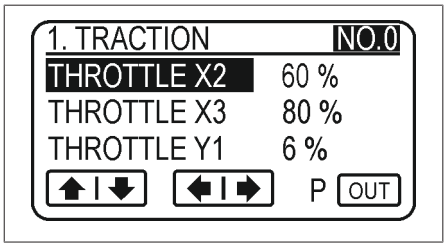
FREQ CREEP

Determines the minimum forward/backward speed



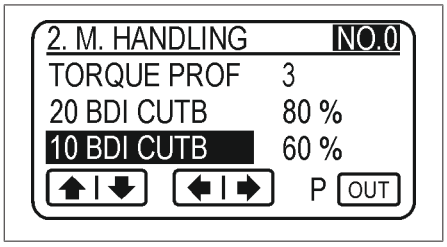
THROTTLE X1

Determines point 1 on the accelerator potentiometer



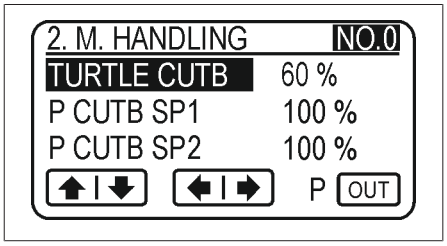
THROTTLE X2

Determines point 2 on the accelerator potentiometer



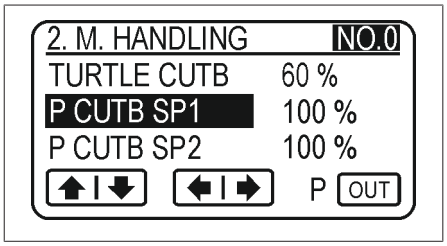
10 BDI CUTB

Sets the lifting speed reduction when the battery indicator shows 10% residual charge (1 LED lit)
Minimum value: maximum reduction - Maximum value: minimum reduction



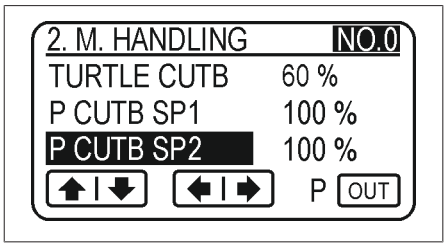
TURTLE CUTB

Sets the maximum lifting speed when the turtle function is enabled
Minimum value: low speed - Maximum value: high speed



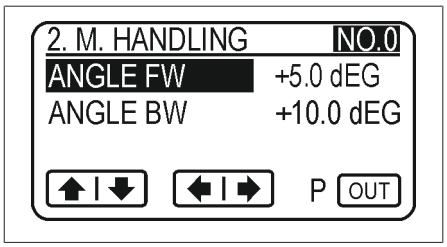
P CUTB SP1

Unused.



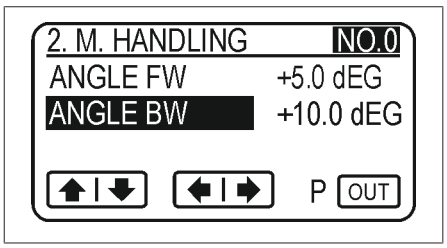
P CUTB SP2

Unused.



ANGLE FW

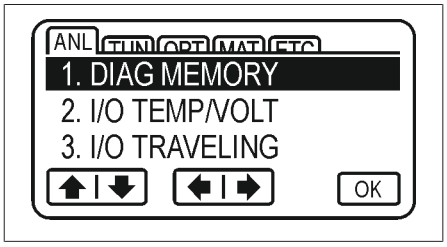
Selects the forward tilt degree according to the type of tilt cylinders installed



ANGLE BW

Selects the backward tilt degree according to the type of tilt cylinders installed

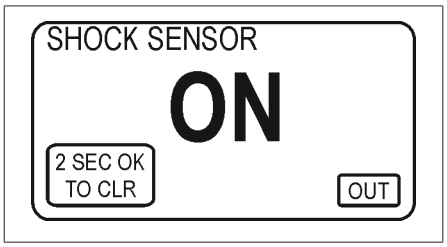
3. VALVE SAS

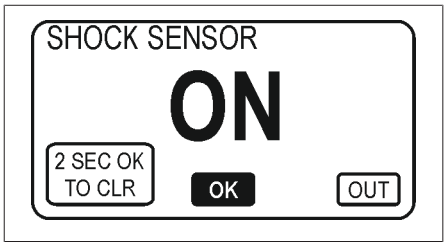


✓ **Operating procedure**

1) Display the ANALYZER MENU.

Menu	No.	Name	Description
OPT 7. ROT LAMP 2	1	LAMP	Enabling/disabling of rotating lamp 2
	2	WITH TURTLE	Enabling/disabling of automatic rotating lamp switch-on when the turtle function is enabled
	3	TRACTION	Enabling/disabling of automatic rotating lamp switch-on when movement is requested
	4	ANY PUMP	Enabling/disabling of automatic rotating lamp switch-on when material handling functions are requested
	5	SEAT	Enabling/disabling of automatic rotating lamp switch-on when the seat microswitch is closed
	6	JOY 1	Enabling/disabling of automatic rotating lamp switch-on when the 5th way function is enabled
	7	JOY 2	Unused.
	8	JOY 3	Unused.
	9	JOY 4	Unused.
	10	SPEED	Enabling/disabling of automatic rotating lamp switch-on when the speed set via SPEED VALUE is reached
	11	SPEED VALUE	Speed of SPEED parameter
	12	REVERSE	Enable/disable automatic switch-on of rotating lamp when reversing
	13	PB ENABLED	Enable/disable lamp button on display
OPT 8. FLASH LAMP	1	LAMP	Enabling/disabling of flash lamp
	2	WITH TURTLE	Enabling/disabling of automatic flash lamp switch-on when the turtle function is enabled
	3	TRACTION	Enabling/disabling of automatic flash lamp switch-on when movement is requested
	4	ANY PUMP	Enabling/disabling of automatic flash lamp switch-on when material handling functions are requested
	5	SEAT	Enabling/disabling of flash lamp switch-on when the seat microswitch is closed
	6	JOY 1	Enabling/disabling of automatic flash lamp switch-on when the 5th way function is enabled
	7	JOY 2	Unused.
	8	JOY 3	Unused.
	9	JOY 4	Unused.
	10	SPEED	Enabling/disabling of automatic flash lamp switch-on when the speed set via SPEED VALUE is reached
	11	SPEED VALUE	Speed of SPEED parameter
	12	REVERSE	Enable/disable automatic switch-on of flash lamp when reversing
	13	PB ENABLED	Enable/disable lamp button on display
OPT 9. DIPPED LIGHT	1	LIGHT	Enabling/disabling of dipped headlights
OPT 10. WORK LAMP	1	LAMP FW	Enabling/disabling of front working lights
	2	LAMP BW	Enabling/disabling of rear working lights
	3	MOTION	Enabling/disabling of automatic rear working light switch-on and front working light switch-off when backward motion is requested
	4	AUTO BW	Enabling/disabling of automatic rear working light switch-on when backward motion is requested

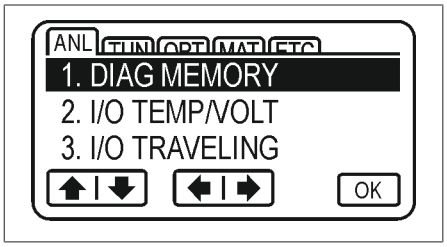




TWIS FLAG functions

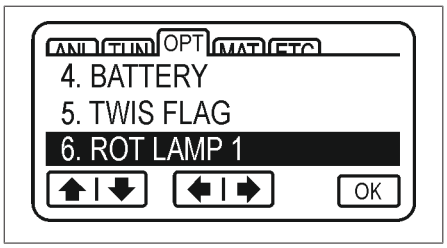
The TWIS FLAG menu is used when one or more of the three optional features is/are removed from the vehicle.
For example: if you want to remove the shock sensor, the sensor must be disconnected. Enter the TWIS FLAG menu and select SHOCK SENSOR.
Press and hold the (**I**) button for at least 2 seconds; the vehicle will be updated to the new configuration. In that case “OK” is displayed.
Press the (**O**) button: Return to the menu screen.
The same procedure applies for: DHU FLAG / KEY PAD FLAG / SMART ACCESS

6. ROT LAMP 1

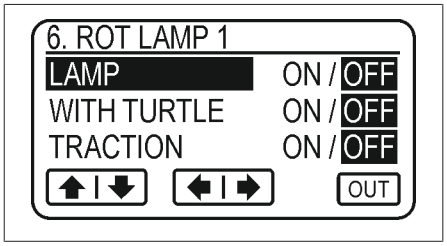


✓ **Operating procedure**

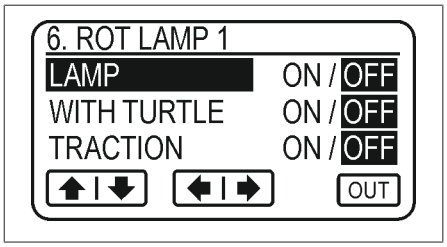
1) Display the ANALYZER MENU.



2) Press the ( ) button to select the OPTIONSET screen
3) Press the ( ) button to select the ROT LAMP 1 menu
4) Press the (**I**) button to enter the ROT LAMP 1 menu



Button ( ): Selects the next parameter
Button ( ): Selects the previous parameter
Button ( ): Increases the parameter value
Button (SPH): Decreases the parameter value
Button (**O**): Return to menu screen



LAMP

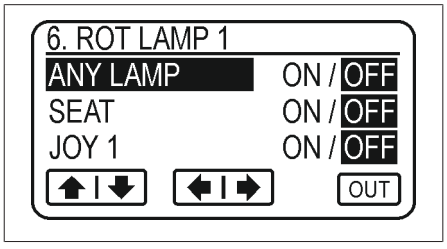
Enables/disables rotating lamp 1 (DA2)

WITH TURTLE

Enables/disables automatic lamp switch-on when the turtle function is enabled

TRACTION

Enables/disables automatic lamp switch-on when movement is requested



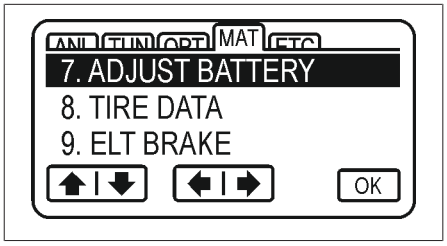
ANY LAMP

Enables/disables automatic lamp switch-on when material handling functions are requested

SEAT

Enables/disables automatic lamp switch-on when the seat microswitch is closed

JOY 1



Button ( ): Selects the next MASK MENU

Button (SPH): Selects the previous MASK MENU
Button **I**: "H-SELECTOR" screen

"7. ADJUST BATTERY"

Button ( ): Selects the next option

Button ( ): Selects the previous option

Button ( ): Selects the next MASK MENU

Button (SPH): Selects the previous MASK MENU
Button **I** "ADJUST BATTERY" screen

"8. TIRE DATA"

Button ( ): Selects the next option

Button ( ): Selects the previous option

Button ( ): Selects the next MASK MENU

Button (SPH): Selects the previous MASK MENU
Button **I**: "TIRE DATA" screen

"9. ELT BRAKE"

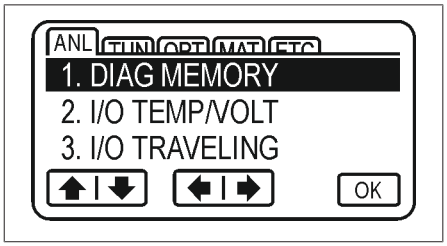
Button ( ): Selects the next option

Button ( ): Selects the previous option

Button ( ): Selects the next MASK MENU

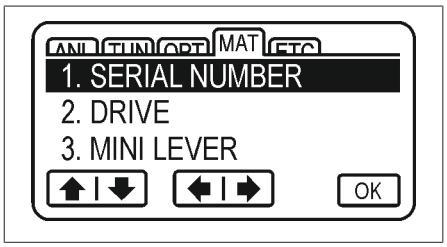
Button (SPH): Selects the previous MASK MENU
Button **I**: "ELT BRAKE" screen

1. SERIAL NUMBER

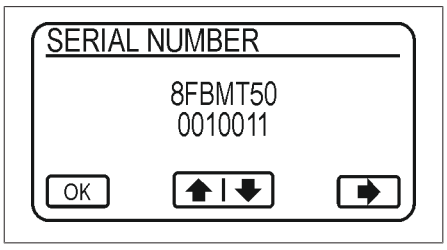


✓ **Operating procedure**

1) Display the ANALYZER MENU.



2) Press the ( ) button to select the MATCHING screen.
3) Press the (**I**) button to enter the SERIAL NUMBER menu.

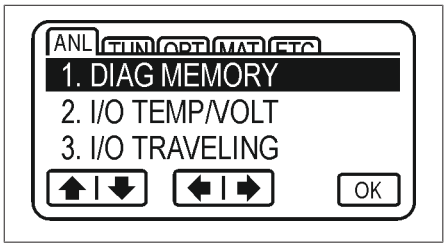


SERIAL NUMBER (acquisition of vehicle serial number)

Press the ( ) button to select the field

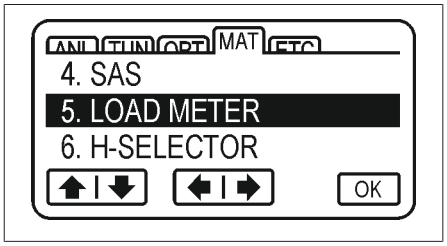
Press the ( ) or ( ) button to adjust the value of the selected field
Press the **I** button to continue to the next screen

5. LOAD METER



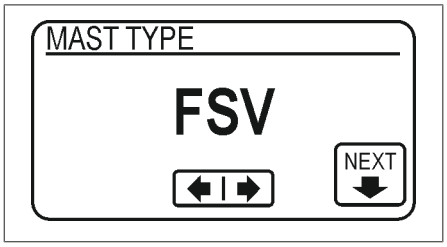
✓ **Operating procedure**

1) Display the ANALYZER MENU.



2) Press the ( ) button to select the MATCHING screen.
3) Press the ( ) button to select the LOAD METER menu
4) Press the (**I**) button to enter the LOAD METER menu.

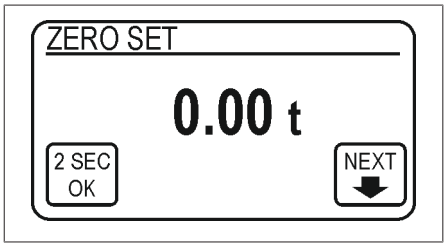
NOTICE! The LOAD SENSOR menu is only available with the de-luxe multifunctional display



MAST TYPE (select type of mast fitted to the vehicle)

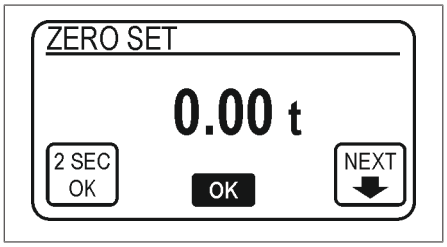
Press the ( ) or (SPH) button to select the mast type.

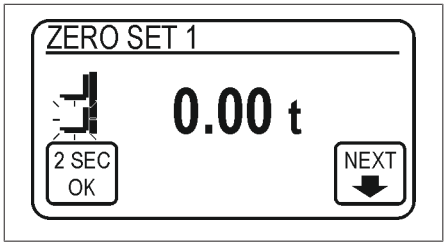
Press the ( ) button to continue to the next calibration



ZERO SET (calibration of load measuring device for V masts)
Procedure:
Position the mast vertically and lift the forks to 500 mm above the ground
Press and hold the **I**button for at least two seconds to reset the value to zero. In that case “OK” is displayed

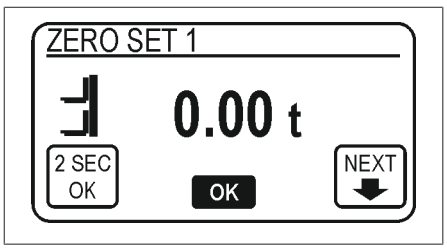
Press the ( ) button to continue to the next calibration

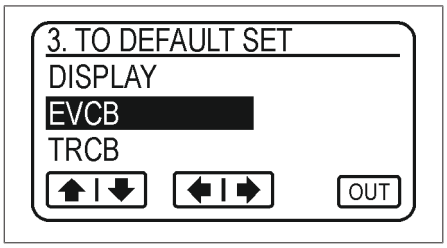


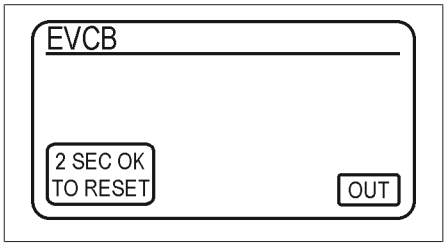


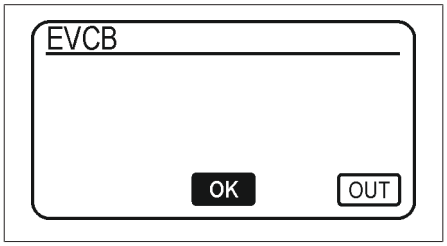
ZERO SET 1 (calibration of load measuring device for FV and FSV masts)
Procedure:
Position the mast vertically and lift the forks to 500 mm above the ground
Press and hold the**I** button for at least two seconds to reset the value to zero. In that case “OK” is displayed

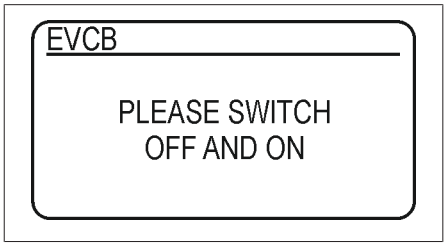
Press the ( ) button to continue to the next calibration











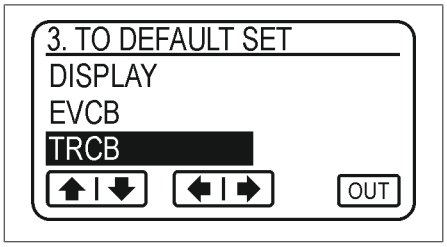
EVCB (Resetting of TRCB card parameters to their default values)

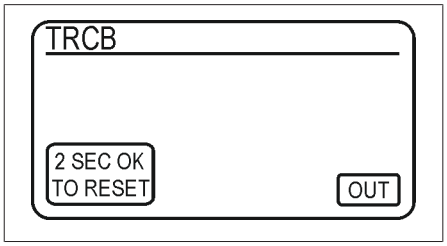
Press the **O** button to return to the OTHERS MENU screen

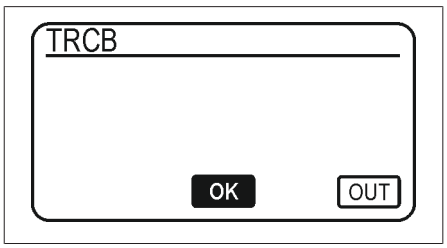
Press the ( ) or ( ) button to select the option within the menu

Press the ( ) button to start the reset procedure or the selected option

Procedure:
Press and hold the **I** button for at least two seconds to carry out the reset
If OK appears, the procedure was completed successfully
Press the **O** button to continue to the next screen
Turn the machine off and on again







TRCB (Resetting of EVCB card parameters to their default values)

Press the **O** button to return to the OTHERS MENU screen

Press the ( ) or ( ) button to select the option within the menu

Press the ( ) button to start the reset procedure or the selected option

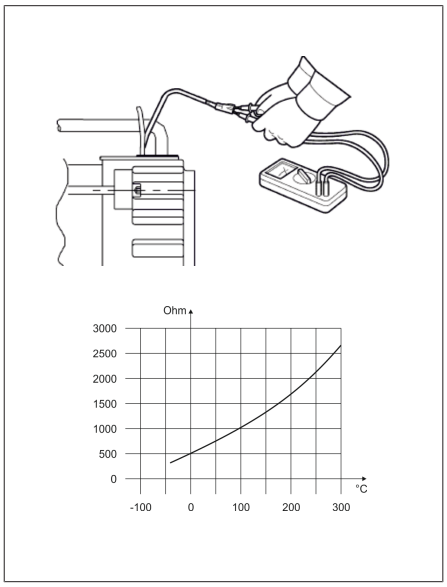
Procedure:
Press and hold the **I** button for at least two seconds to carry out the reset
If OK appears, the procedure was completed successfully
Press the **O** button to continue to the next screen
Turn the machine off and on again

3

TEMPERATURE SENSOR CHECK PROCEDURE

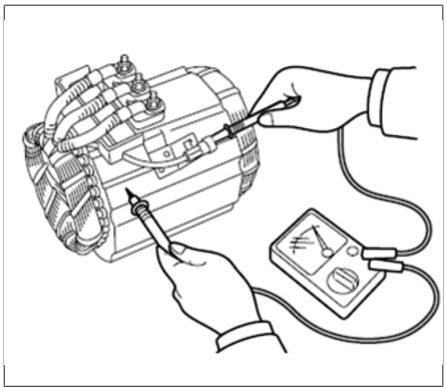
When trouble occurs, check the state of the temperature sensor, following the procedure described below:

Sensor integrity check



1. Disconnect the battery from the truck
2. Disconnect the sensor connector
3. Check the resistance value of the sensor
   temperature 25 °C = 600

Sensor insulation check



1. Disconnect the battery from the truck
2. Disconnect the sensor connector
3. Measure the resistance between the sensor and the motor body (unpainted surface)
   Standard: 10 MW or higher

CAN-BUS CHECK PROCEDURE

If fault codes associated with the Can-bus appear, follow the procedure described below:

Software version check

If there are any cards not communicating on the Can-bus line, the display will not be able to identify the version of the relative software.

Current	Card	Alarm	Description
554 [P 126]	LIFTING LOGIC UNIT	WRONG RAM MEM	Incorrect values detected in lift logic unit RAM
555 [P 127]	LIFTING LOGIC UNIT	LOGIC FAILURE #1	Problem with lift logic unit power circuit - low voltage condition detected
556 [P 127]	LIFTING LOGIC UNIT	NO CAN MSG	Problem with communication on Canbus line - lift logic unit not receiving messages from other cards
557 [P 128]	LIFTING LOGIC UNIT	PARAM RESTORE	Default parameters reloaded by lift logic unit at power up
558 [P 128]	LIFTING LOGIC UNIT	VDC LINK OVERV	Overvoltage detected
55A [P 129]	LIFTING LOGIC UNIT	CONTR. TYPE MISM	Mismatch detected in lift logic unit configuration
55B [P 129]	LIFTING LOGIC UNIT	INPUT MISMATCH	Detection of inconsistency between values read by MASTER and SLAVE of lift logic unit
55C [P 130]	LIFTING LOGIC UNIT	ANALOG INPUT	Problem with signal monitoring circuit of lift logic unit
55D [P 130]	LIFTING LOGIC UNIT	CONTROLLER MISM	Mismatch detected in lift logic unit configuration
560 [P 130]	LIFTING LOGIC UNIT	WRONG SETPOINT	Detection of inconsistency reading values of steering potentiometer R1
561 [P 131]	LIFTING LOGIC UNIT	OUTPUT MISMATCH	Detection of inconsistency between values read by MASTER and SLAVE of lift logic unit
562 [P 131]	LIFTING LOGIC UNIT	CTRAP THRESOLD	Problem with signals read by SLAVE lift logic unit
659 [P 132]	EVCB	PSV_ERR	Problem with mast pressure sensor R7
65A [P 132]	EVCB	LHS_ERR	Problem with signal at mast height switch K4
65B [P 133]	EVCB	TAS_ERR	Problem with tilt angle potentiometer R6
65D [P 134]	EVCB	WMV_ERR	Problem with tilt angle potentiometer R6 or pressure sensor R7
65E [P 135]	EVCB	LHP_ERR	Problem with fork height potentiometer R24
6A1 [P 136]	EVCB	DOUBLE_REQUEST	Selection of two commands attempted on the same way
6A2 [P 136]	EVCB	RELOAD_PARAM_ WARN	Default parameters reloaded by EVCB card at power up
6A3 [P 137]	EVCB	PAR_LOAD_ERROR	Problem with memory of EVCB card
6A4 [P 137]	EVCB	NOT_REP_ERROR	Problem with communication on Canbus line - EVCB card not receiving messages
6A7 [P 137]	EVCB	P_SHORT_ERR	Problem with circuit piloting solenoid valves
6A8 [P 138]	EVCB	EV1_1_OPEN	Descent valve coil disconnected - EVCB card detects no load at the coil
6A9 [P 138]	EVCB	EV2_1_OPEN	Lift valve coil disconnected - EVCB card detects no load at the coil
6AA [P 139]	EVCB	EV1_2_OPEN	Tilt valve coil disconnected - EVCB card detects no load at the coil
6AB [P 140]	EVCB	EV2_2_OPEN	Tilt valve coil disconnected - EVCB card detects no load at the coil

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CONTACTOR OPEN(traction logic - master section)

Circumstances of error detection
The traction logic unit (AU1) has detected a problem with contactor K7 - power is applied to the contactor, but the contacts do not close **Possible causes:** ▪ Fault at contactor K7 Check: ▪ The resistance value of the coil at contactor K7 (standard 256 ohm) ▪ Insulation of the coil from the body ▪ The condition of the plate and contacts of contactor K7 (oxidation or dirt) ▪ The tightening torque of nuts on the contacts of contactor K7 (15.3 Nm – 16.4 Nm) ▪ The crimping of wires to contacts and insertion of the contacts into connectors J62, J63, J1, J50 and P50 (possible false contact) ▪ Continuity of the wiring between connector J1 pin 16 and connector J62 ▪ Continuity of the wiring between connector J4 pin 87 and connector J63 ▪ The state of the wiring (pinched wire), crimping of the wires, and insertion of the pins into the connectors ▪ Truck insulation defective. Check: ▪ Truck insulation (see paragraph INSULATION CONTROL PROCEDURE) ▪ Fault affecting one or more components connected to the traction logic unit. Disconnect: ▪ Accelerator potentiometer (connector P32) ▪ Seat (connector P21) ▪ Drive motor rpm sensor (connector J15) ▪ Drive motor temperature sensor (connector J16) ▪ Negative brake solenoid (connector J53) ▪ 5th way solenoid (connector P18) If the alarm condition disappears on disconnecting one of the components listed above, proceed to check the state of the component ▪ Internal fault Replace: ▪ Traction logic unit (AU1)

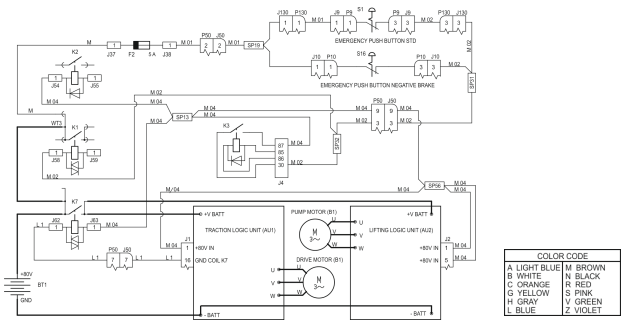
21A

CONTR.TYPE MISM. (traction logic - master section)

Circumstances of error detection
The traction logic unit (AU1) has detected a wrong configuration. **Possible causes:** ▪ False contact in wiring harness Check: ▪ that the battery voltage registers between pin 1 of connector J1 and negative BATT ▪ that the battery voltage registers between pin 1 of connector J2 and negative BATT ▪ that the battery voltage registers between pin 5 of connector J2 and negative BATT ▪ Problem with configuration of traction logic unit Action: ▪ Reset traction logic unit and lift logic unit (see heading 4. TO DEFAULT SET of chapter 03) and repeat the accelerator and steering potentiometer acquisitions ▪ Update software of traction logic unit ▪ Internal fault Replace: ▪ Traction logic unit (AU1)

21B

SENS MOT TEMP KO (traction logic unit - master section)

Circumstances of error detection
The traction logic unit (AU1) has detected a value generated by the drive motor temperature sensor that is out of range. **Possible causes:** ▪ Temperature sensor disconnected or wiring damaged Check: ▪ That connector J16 is correctly plugged in ▪ For continuity between pin 1 of connector J16 and pin 9 of connector J1 ▪ For continuity between pin 2 of connector J16 and pin 23 of connector J1 ▪ The state of the wiring (pinched wire), crimping of the wires, and insertion of the pins into the connectors    ▪ Truck insulation defective. Check: ▪ Truck insulation (see paragraph INSULATION CONTROL PROCEDURE) ▪ Temperature sensor or traction logic unit faulty Actions: ▪ Connect a resistance (500 ohm – 1000 ohm) to connector J16 If the fault code disappears, replace the temperature sensor of the drive motor If the fault code persists, replace the traction logic unit (AU1)

226

INIT VMN LOW (traction logic unit - master section)

Circumstances of error detection
The traction logic unit (AU1) has detected a problem with the power circuit - low voltage at drive motor. **Possible causes:** ▪ Truck insulation defective. Check: ▪ Truck insulation (see paragraph INSULATION CONTROL PROCEDURE) ▪ Drive motor open or leaking current Check: ▪ The insulation of the drive motor (see heading INSULATION CHECK PROCEDURE) ▪ The windings of the drive motor (see heading MOTOR WINDINGS CHECK PROCEDURE) ▪ Power cables. Check: ▪ The tightening torque of nuts on the traction logic unit (13 Nm – 15 Nm) ▪ The tightening torque of nuts on the drive motor (13 Nm – 15 Nm) ▪ The crimping of terminals ▪ That cable sheaths are not worn or damaged (possible current leakage to chassis) ▪ Fault at contactor K7 Check: ▪ The resistance value of the coil at contactor K7 (standard 256 ohm) ▪ Insulation of the coil from the body ▪ The condition of the plate and contacts of contactor K7 (oxidation or dirt) ▪ The tightening torque of nuts on the contacts of contactor K7 (15.3 Nm – 16.4 Nm) ▪ The crimping of wires to contacts and insertion of the contacts into connectors J62, J63, J1, J50 and P50 (possible false contact) ▪ Continuity of the wiring between connector J1 pin 16 and connector J62 ▪ Continuity of the wiring between connector J4 pin 87 and connector J63 ▪ Self-diagnostic Invert connector J1 (traction logic unit) with connector J2 (lift logic unit). Switch on the truck and reset the traction and lift logic unit (see heading 4. TO DEFAULT SET of chapter 03). ▪ If the fault code changes from 226 to 526, replace the traction logic unit (AU1) ▪ If the fault code remains 226, the cause of the fault is outside the traction logic unit

227

PARAM RESTORE (traction logic - master section)

Circumstances of error detection
The traction logic unit (AU1) loads the default parameters when the machine is switched on. **Possible causes:** ▪ Truck insulation defective. Check: ▪ Truck insulation (see paragraph INSULATION CONTROL PROCEDURE) ▪ Electrostatic discharges Check: ▪ That an antistatic ground strap is fitted to the machine, if equipped with non-marking tyres ▪ Problem with the memory of the traction logic unit Action: ▪ Reset traction logic unit (see heading 4. TO DEFAULT SET of chapter 03) ▪ Update software of traction logic unit

234

WRONG RAM MEM. (traction logic - master section)

Circumstances of error detection
The traction logic unit (AU1) has encountered a problem in the RAM. **Possible causes:** ▪ Truck insulation defective. Check: ▪ Truck insulation (see paragraph INSULATION CONTROL PROCEDURE) ▪ Electrostatic discharges Check: ▪ That an antistatic ground strap is fitted to the machine, if equipped with non-marking tyres ▪ Problem with the memory of the traction logic unit Action: ▪ Reset traction logic unit (see heading 4. TO DEFAULT SET of chapter 03) ▪ Update software of traction logic unit

235

STEER OUT RANGE (traction logic unit - master section)

Circumstances of error detection
Fault code not utilized. **Possible causes:** ▪ Problem with configuration of traction logic unit Action: ▪ Reset traction logic unit (see heading 4. TO DEFAULT SET of chapter 03) ▪ Update software of traction logic unit

236

HANDBRAKE (traction logic - master section)

Circumstances of error detection
The traction logic unit (AU1) has detected an incorrect start sequence.

246

OVERLOAD (traction logic - master section)

Circumstances of error detection
The traction logic unit (AU1) has detected an abnormal level of current **Possible causes:** ▪ Truck insulation defective. Check: ▪ Truck insulation (see paragraph INSULATION CONTROL PROCEDURE) ▪ Drive motor open or leaking current Check: ▪ The insulation of the drive motor (see heading INSULATION CHECK PROCEDURE) ▪ The windings of the drive motor (see heading MOTOR WINDINGS CHECK PROCEDURE) ▪ Internal fault Action: ▪ Reset traction logic unit (see heading 4. TO DEFAULT SET of chapter 03) ▪ Update software of traction logic unit Replace: ▪ Traction logic unit (AU1)

247

POWER MISMATCH (traction logic - master section)

Circumstances of error detection
The traction logic unit (AU1) has detected a problem with power values read by the system **Possible causes:** ▪ Truck insulation defective. Check: ▪ Truck insulation (see paragraph INSULATION CONTROL PROCEDURE) ▪ Electrostatic discharges Check: ▪ That an antistatic ground strap is fitted to the machine, if equipped with non-marking tyres ▪ Drive motor open or leaking current Check: ▪ The insulation of the drive motor (see heading INSULATION CHECK PROCEDURE) ▪ The windings of the drive motor (see heading MOTOR WINDINGS CHECK PROCEDURE) ▪ Front axle or drive motor stuck mechanically Actions: ▪ Raise the front wheels and check that they are free to turn, and that the mechanical differential gear is working correctly. ▪ Problem with the memory of the traction logic unit Action: ▪ Reset traction logic unit (see heading 4. TO DEFAULT SET of chapter 03) ▪ Update software of traction logic unit

496

RELOAD_PARAM_WARN (MCB card - TRCB section)

Circumstances of error detection
The MCB card (AE2) has detected a problem with the TRCB memory. **Possible causes:** ▪ Electrostatic discharges Check: ▪ That an antistatic ground strap is fitted to the machine, if equipped with non-marking tyres ▪ Problem in the memory of the TRCB card Action: ▪ Reset TRCB card (see heading 4. TO DEFAULT SET of chapter 03) ▪ Update the software of the TRCB card ▪ Internal fault Replace: ▪ The MCB card (AE2)

4B6

DASH_KO (MCB card - TRCB section)

Circumstances of error detection
The MCB card (AE2) is not receiving Can-bus messages from the Display (AE1). **Possible causes:** ▪ One or more cards not communicating on the Can-bus line Check: ▪ Which of the cards is not available on the Can-bus line, using the SW VERSION menu (see heading 1. SW VERSION of chapter 03) ▪ The Can-bus connections (see heading CAN-BUS CHECK PROCEDURE) ▪ Truck insulation defective. Check: ▪ Truck insulation (see paragraph INSULATION CONTROL PROCEDURE)

4C1

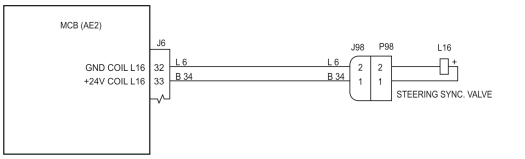
INCORRECT_START (MCB card - TRCB section)

Circumstances of error detection
The MCB card (AE2) has detected an incorrect start sequence.

4FA

STEER_LOAD_OPEN (MCB card - TRCB section)

Circumstances of error detection
The MCB card (AE2) has detected a problem with the coil of the synchronization valve of knob L16. **Possible causes:** ▪ Coil disconnected/broken, or wiring damaged Check: ▪ That connector P98 is correctly plugged in ▪ The resistance value of the coil at contactor L16 (standard 36 ohm) ▪ For continuity between pin 1 of connector J98 and pin 33 of connector J6 ▪ For continuity between pin 2 of connector J98 and pin 32 of connector J6 ▪ The state of the wiring (pinched wire), crimping of the wires, and insertion of the pins into the connectors



COLOR CODE	
A LIGHT BLUE	M BROWN
B WHITE	N BLACK
C ORANGE	R RED
G YELLOW	S PINK
H GRAY	V GREEN
L BLUE	Z VIOLET

▪ Internal fault Replace:
  ▪ The MCB card (AE2)

509

STBY I HIGH (lift logic unit - master section)

Circumstances of error detection
The lift logic unit (AU2) has detected an abnormal level of current at the pump motor when in stand-by status. **Possible causes:** ▪ Truck insulation defective. Check: ▪ Truck insulation (see paragraph INSULATION CONTROL PROCEDURE) ▪ Pump motor open or leaking current Check: ▪ The insulation of the pump motor (see heading INSULATION CHECK PROCEDURE) ▪ The windings of the pump motor (see heading MOTOR WINDINGS CHECK PROCEDURE) ▪ Power cables. Check: ▪ The tightening torque of nuts on the lift logic unit (13 Nm – 15 Nm) ▪ The tightening torque of nuts on the pump motor (13 Nm – 15 Nm) ▪ The crimping of terminals ▪ That cable sheaths are not worn or damaged (possible current leakage to chassis) ▪ Self-diagnostic Invert connector J1 (traction logic unit) with connector J2 (lift logic unit). Switch on the truck and reset the traction and lift logic unit (see heading 4. TO DEFAULT SET of chapter 03). ▪ If the fault code changes from 509 to 209, replace the lift logic unit (AU2) ▪ If the fault code remains 509, the cause of the fault is outside the lift logic unit

50A

INCORRECT START (lifting logic - master section)

Circumstances of error detection
The lift logic unit (AU2) has detected an incorrect start sequence.

50B

TORQUE PROFILE (lifting logic - master section)

Circumstances of error detection
The lift logic unit (AU2) has detected inconsistent torque values given by the profiles stored in its memory. **Possible causes:** ▪ Problem with range of parameters Action: ▪ Reset lift logic unit (see heading 4. TO DEFAULT SET of chapter 03) ▪ Reset EVCB and TRCB cards and armrest card, master and slave (see heading 4. TO DEFAULT SET of chapter 03) ▪ Update software of lift logic unit, of EVCB and TRCB cards and armrest card, master and slave, and repeat the reset of the lift logic unit. ▪ Internal fault Replace: ▪ Lift logic unit (AU2)

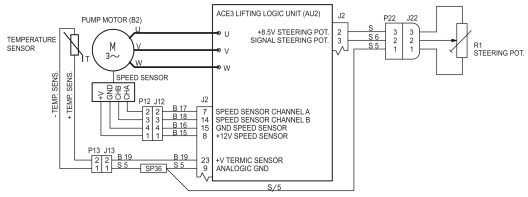
50C

FORW+BACK (lift logic unit - master section)

Circumstances of error detection
The lift logic unit (AU2) has detected an incorrect start sequence.

51D

STALL ROTOR (lifting logic - master section)

Circumstances of error detection
The lift logic unit (AU2) has detected a problem with signals from the motor rpm sensor, or the pump motor rotor is stuck **Possible causes:** ▪ Truck insulation defective. Check: ▪ Truck insulation (see paragraph INSULATION CONTROL PROCEDURE) ▪ Hydraulic pump or pump motor stuck mechanically Actions: ▪ Disconnect the hydraulic pump. Turn the rotor of the pump motor by hand to check that it spins freely, then proceed to operate any hydraulic service: if code 51D disappears, replace the hydraulic pump. ▪ Rpm sensor disconnected or wiring harness damaged. Check: ▪ That connector J12 is correctly plugged in ▪ That the pin contacts are correctly inserted into connectors J12 and J2 ▪ For continuity between pin 1 of connector J12 and pin 8 of connector J2 ▪ For continuity between pin 2 of connector J12 and pin 7 of connector J2 ▪ For continuity between pin 3 of connector J12 and pin 14 of connector J2 ▪ For continuity between pin 4 of connector J12 and pin 15 of connector J2 ▪ The state of the wiring (pinched wire), crimping of the wires, and insertion of the pins into the connectors    COLOR CODE A LIGHT BLUE / M BROWN B WHITE / N BLACK C ORANGE / R RED G YELLOW / S PINK H GRAY / V GREEN L BLUE / Z VIOLET ▪ Rpm sensor damaged Check: ▪ That the rpm sensor is clean, and correctly positioned and secured in its socket ▪ The power input to the rpm sensor (10.5 V – 11.5 V) between pin 1 and pin 4 of connector J12 ▪ The insulation of the rpm sensor relative to the body of the drive axle (must be > 1 Mohm) Actions: ▪ Switch on the truck and set the pump motor running at low speed. Using a multimeter set to V AC, measure the voltage between pin 1 and pin 2 of connector J12 (reading should be 5.5 – 6.5 V) Using a multimeter set to V AC, measure the voltage between pin 1 and pin 3 of connector J12 (reading should be 5.5 – 6.5 V) If the values measured are not with the above range, replace the rpm sensor ▪ Internal fault Replace: ▪ Lift logic unit (AU2)

4

531

VKEY OFF SHORTED (lift logic unit - master section)

Circumstances of error detection
The lift logic unit (AU2) has detected a problem with the power-up circuit. **Possible causes:** ▪ Low input voltage (at power up, the voltage on pin 1 connector J2 falls below the 30 V threshold). Check: ▪ For the correct battery voltage between pin 1 of connector J2 and negative BATT when the truck is powered up. ▪ The resistance value of the coil at contactor K7 (standard 256 ohm) ▪ The resistance value of the coil at contactor K1 (standard 1030 ohm) ▪ The resistance value of the coil at contactor K2 (standard 1030 ohm) ▪ The connections at emergency button S1 or S16 ▪ - Whether there are any electrical optionals connected to the power line of the logic units (leads M/04, M/02 and M/01) that may be causing a voltage drop at pin1 of connector J2. ▪ Battery damaged. Check: ▪ The state of the battery elements (one or more elements of the battery could be damaged) ▪ The state of the battery plug contacts (oxidation, defective crimping or damage) ▪ That the battery voltage does not drop below 30V with the drive motor in operation or when handling materials ▪ Drive motor leaking current Check: ▪ The insulation of the pump motor (see heading INSULATION CHECK PROCEDURE) ▪ The windings of the pump motor (see heading MOTOR WINDINGS CHECK PROCEDURE) ▪ Power cables leaking current Check: ▪ That cable sheaths are not worn or damaged (possible current leakage to chassis) ▪ Truck insulation defective. Check: ▪ Truck insulation (see paragraph INSULATION CONTROL PROCEDURE) ▪ Internal fault Replace: ▪ Lift logic unit (AU2)

532

TEACH VACC POT (lift logic unit - master section)

Circumstances of error detection
Fault code not present if the logic unit is configured as pump. **Possible causes:** ▪ Problem with configuration of lift logic unit Action: ▪ Reset lift logic unit (see heading 4. TO DEFAULT SET of chapter 03) ▪ Update the software and repeat the reset of the lift logic unit and the acquisitions of the DRIVE menu

546

OVERLOAD (lifting logic - master section)

Circumstances of error detection
The lift logic unit (AU2) has detected an abnormal level of current **Possible causes:** ▪ Truck insulation defective. Check: ▪ Truck insulation (see paragraph INSULATION CONTROL PROCEDURE) ▪ Pump motor open or leaking current Check: ▪ The insulation of the pump motor (see heading INSULATION CHECK PROCEDURE) ▪ The windings of the pump motor (see heading MOTOR WINDINGS CHECK PROCEDURE) ▪ Internal fault Action: ▪ Reset lift logic unit (see heading 4. TO DEFAULT SET of chapter 03) ▪ Update the software and repeat the reset of the lift logic unit Replace: ▪ Lift logic unit (AU2)

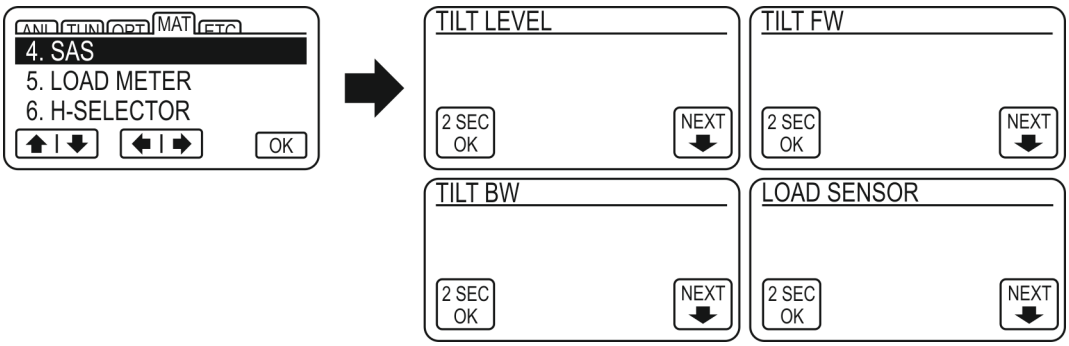
547

POWER MISMATCH (lifting logic - master section)

Circumstances of error detection
The lift logic unit (AU2) has detected a problem with power values read by the system. **Possible causes:** ▪ Truck insulation defective. Check: ▪ Truck insulation (see paragraph INSULATION CONTROL PROCEDURE) ▪ Electrostatic discharges Check: ▪ That an antistatic ground strap is fitted to the machine, if equipped with non-marking tyres ▪ Pump motor open or leaking current Check: ▪ The insulation of the pump motor (see heading INSULATION CHECK PROCEDURE) ▪ The windings of the pump motor (see heading MOTOR WINDINGS CHECK PROCEDURE) ▪ Problem with the memory of the lift logic unit Action: ▪ Reset lift logic unit, EVCB card and armrest card, master and slave (see heading 4. TO DEFAULT SET of chapter 03) ▪ Update software of lift logic unit, of EVCB card and armrest card, master and slave, and repeat the reset of the lift logic unit.

65D

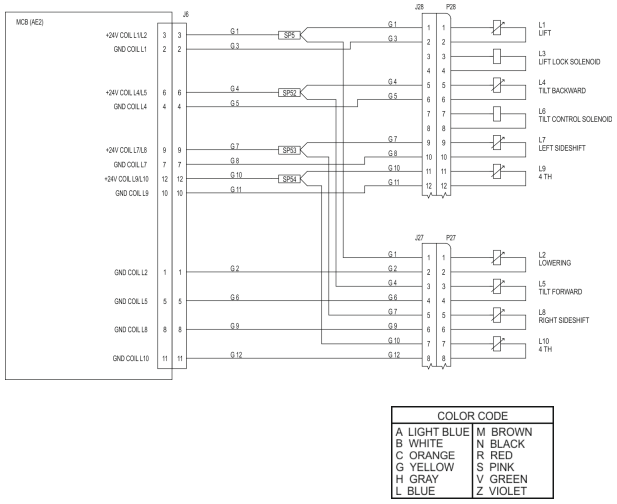
WMV_ERR (MCB card - TRCB section)

Circumstances of error detection
The MCB card (AE2) has detected values for tilt angle potentiometer R6 or mast pressure sensor R7 different from those stored in memory **Possible causes:** ▪ Memorized acquisition values different to values read Action: ▪ Acquisition of tilt angle potentiometer R6 or mast pressure sensor R7 (see heading 4. SAS of chapter 03)    ▪ Tilt angle potentiometer R6 not adjusted Action: ▪ Adjust the rod of the potentiometer (see heading TILT ANGLE POTENTIOMETER, chapter 02)

4

6AF

EV2_4_OPEN (MCB card - EVCB section)

Circumstances of error detection
The MCB card (AE2) has detected a problem with tilt valve L10 **Possible causes:** ▪ Valve disconnected/broken, or wiring damaged Check: ▪ That connector J27 is correctly plugged in ▪ For continuity between pin 8 of connector J27 and pin 11 of connector J6 ▪ For continuity between pin 7 of connector J27 and pin 12 of connector J6 ▪ The resistance value of the coil fitted to valve L10 (31 ohm) ▪ The state of the wiring (pinched wire), crimping of the wires, and insertion of the pins into the connectors    COLOR CODE A LIGHT BLUE M BROWN B WHITE N BLACK C ORANGE R RED G YELLOW S PINK H GRAY V GREEN L BLUE Z VIOLET ▪ Internal fault Replace: ▪ The MCB card (AE2)

6B0

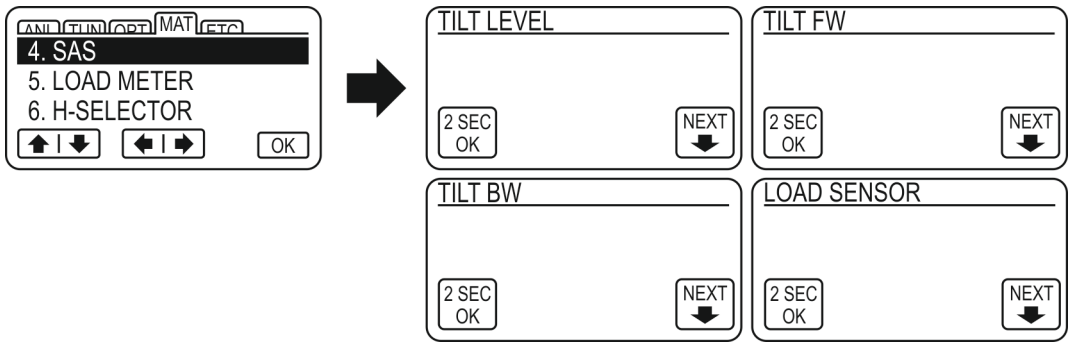
TRCB_MICRO_ERROR (scheda MCB - sezione EVCB)

Circumstances of error detection
The MCB card (AE2) has detected an internal problem **Possible causes:** ▪ Internal fault Replace: ▪ The MCB card (AE2)

6F3

NYM_ERR (scheda MCB - sezione EVCB)

Circumstances of error detection
The MCB card (AE2) has no acquisition values for tilt angle potentiometer R6 or mast pressure sensor R7 stored in memory. **Possible causes:** ▪ MCB card newly installed, or acquisitions have been reset (RESET TILT) Action: ▪ Acquisition of tilt angle potentiometer R6 or mast pressure sensor R7 (see heading 4. SAS of chapter 03)



6F4

INCORRECT_START (MCB card - EVCB section)

Circumstances of error detection
The MCB card (AE2) has detected an incorrect start procedure.

ARMREST CARD (section Master)

8E1

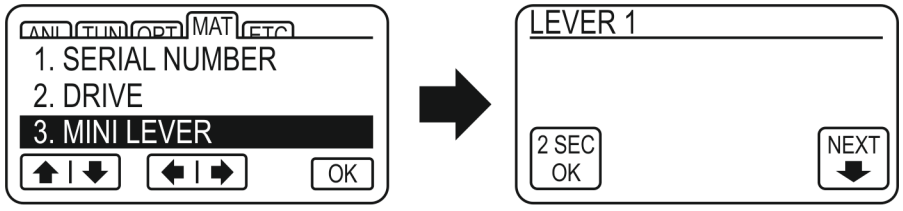
INCORRECT_START_MH - (armrest card - master section)

Circumstances of error detection
The armrest card (AE3) has detected an incorrect start procedure.

8E2

BAD_LIFT_POT (armrest card - master section)

Circumstances of error detection
The armrest card (AE3) has detected a problem with the lift potentiometer R8 / R9. **Possible causes:** ▪ Calibration values not correct Action: ▪ Run calibration of the lift potentiometer (see heading3. MINI LEVER of chapter 03)



▪ Potentiometer broken or armrest card faulty Action: ▪ Swap the lift potentiometer (connector P400) with the tilt potentiometer (connector P401) and repeat the calibration of both potentiometers. ▪ If the fault code changes from 8E2 to 8E3, replace the lift potentiometer. ▪ If fault code 8E2 persists, replace the armrest card (AE3).

CDA

SHOCK_LOCKOUT (display)

Circumstances of error detection
The shock sensor SH1 has detected a bump and the machine has reduced speed. The truck supervisor must restore normal operation.

CDC

CAP_DISCHARGE_ALARM (display)

Circumstances of error detection
The display (AE1) has detected that the truck was not shut down correctly. **Possible causes:** ▪ Truck switched off using the emergency button

CDD

LIGHT_ALARM (display)

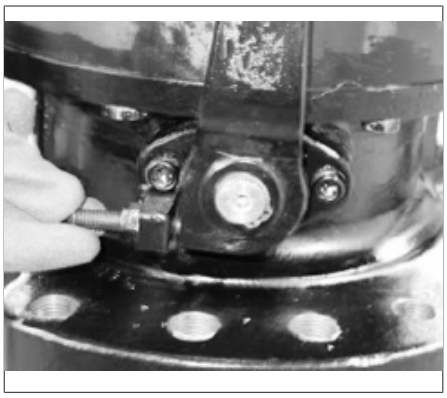
Circumstances of error detection
The display (AE1) has detected a problem with the outputs piloting optionals. **Possible causes:** ▪ Once or more optionals connected to the display short-circuiting or leaking current Disconnect: ▪ Optional systems (sidelights, headlights, hazard lights, beacons, screenwasher, heated rear window, heated seat) ▪ Defective relay/s on the 12-24V fuse card (AE5). Replace: ▪ 12-24V fuse card (AE5) ▪ Internal fault Replace: ▪ The display (AE1)

CDE

KEY_ERROR (display)

Circumstances of error detection
The display (AE1) has detected a problem with the key circuit. **Possible causes:** ▪ Relay K3 broken. Check: ▪ The status of relay K3 and connector J4 - possible short-circuit or false contact ▪ Internal fault Replace: ▪ The display (AE1)

[Point 3]



Disassembly:

Loosen the nut M10 and the screw M10x50.

Disassembly:

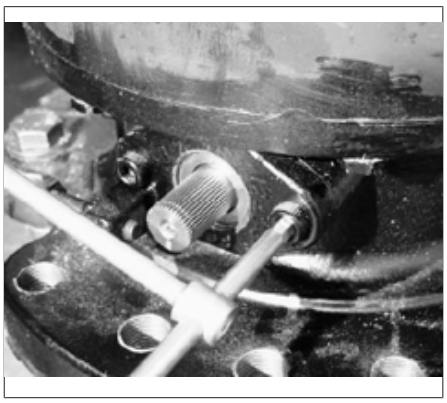
Use pliers to pull out the seeger ring from the seat in the grooved shaft of the lever.

[Point 4]

Disassembly:

Pull out the lever.

[Point 5]



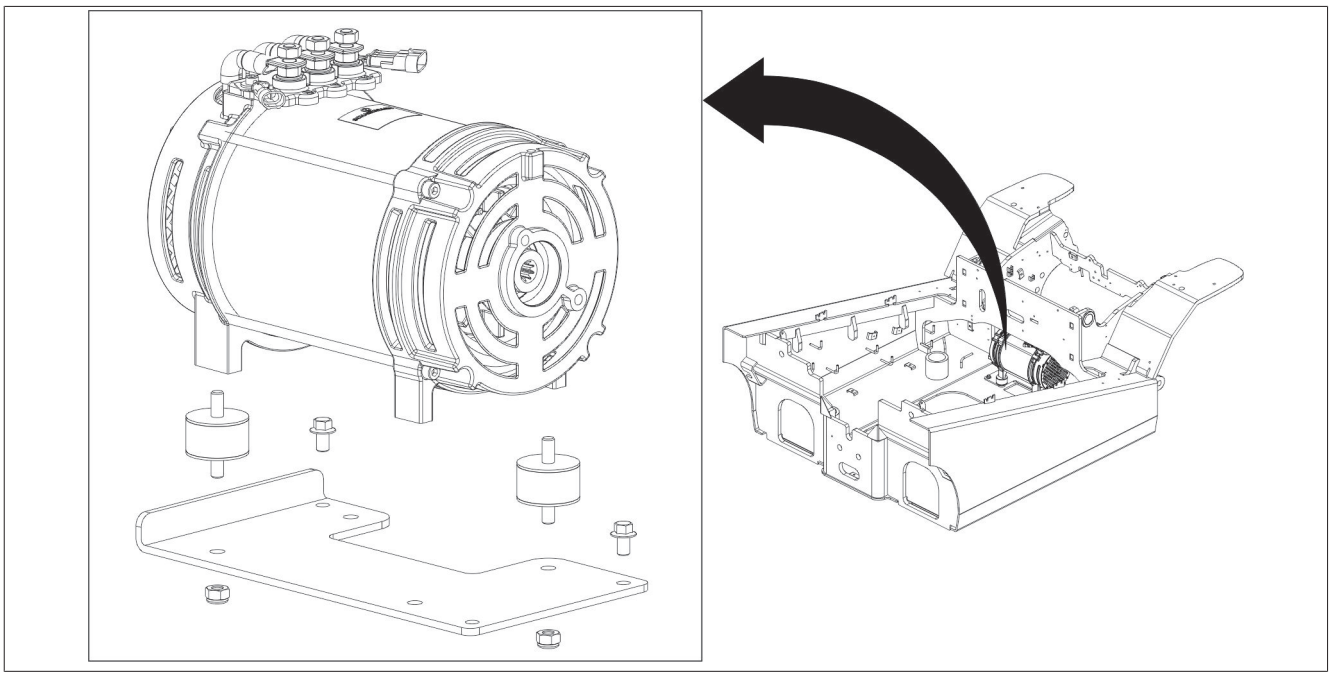
Disassembly:

Loosen the 2 screws M10x25 from the bushing.

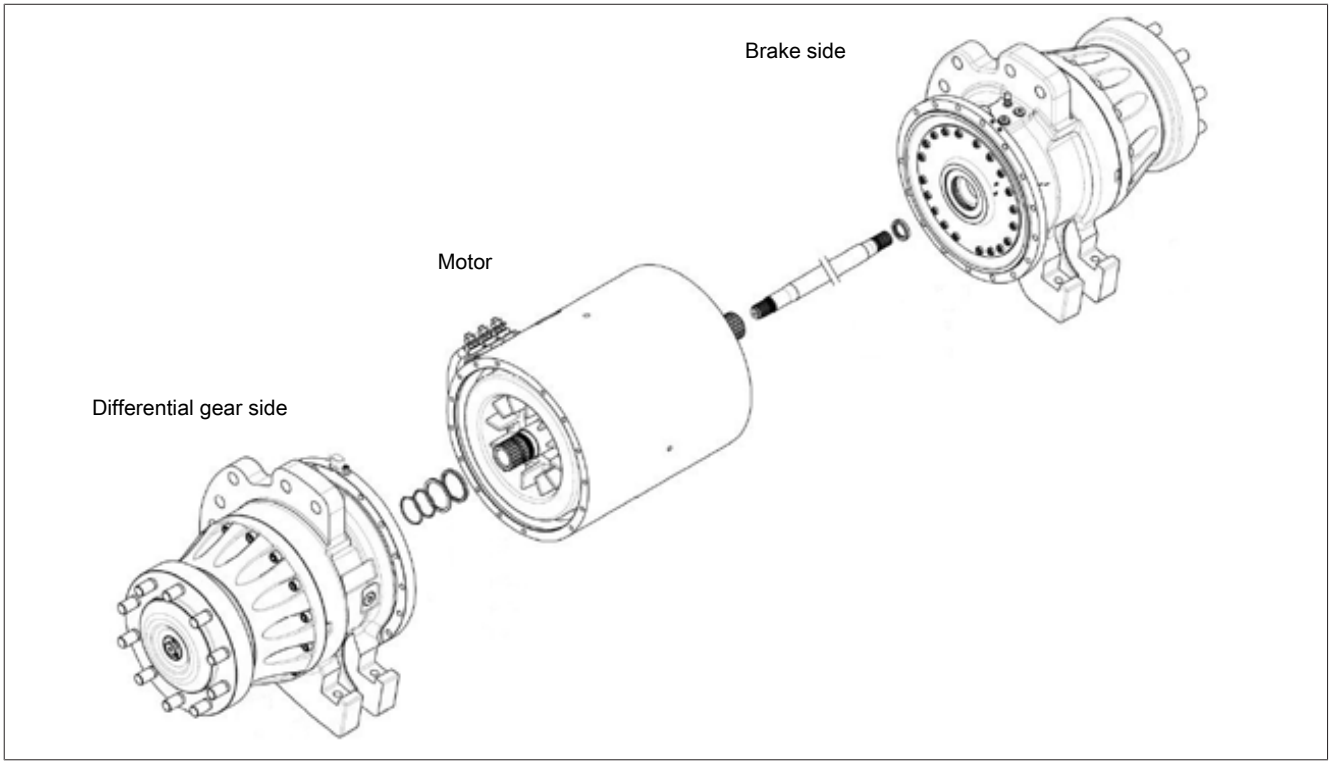
SPECIFICATIONS

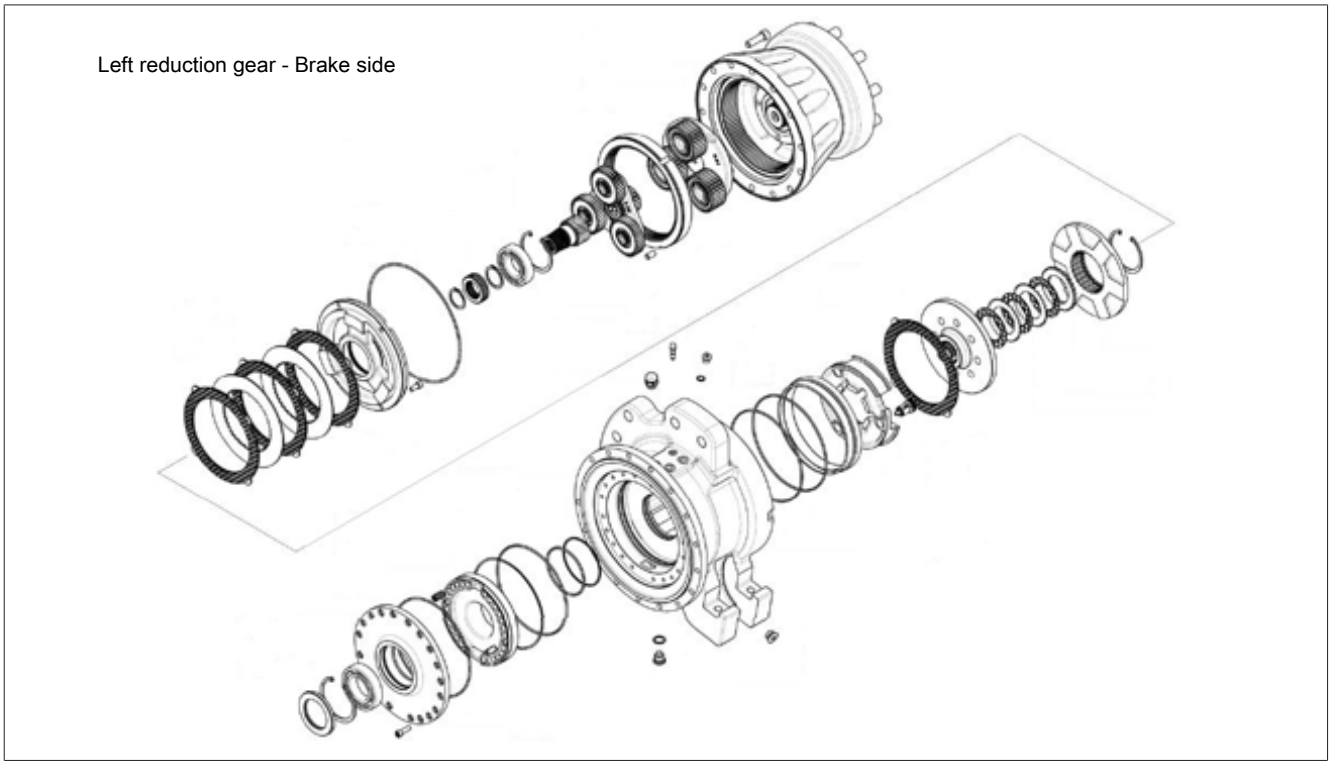
	Version IP20	Version IP43
VOLTAGE	53 Vac	53 Vac
POWER	25.5 kW	17.8 kW
CURRENT	381 A	258 A
FREQUENCY	79 Hz	86 Hz
SPEED	2280 rpm	2525 rpm
FACTOR POWER (cosφ)	0.852	0.85
EFFICIENCY (η)	85.7 %	89.2 %
DEGREE OF PROTECTION (IP CODE)	IP 20	IP 43
METHOD OF COOLING (IC CLASS)	IC 00	IC 00
INSULATION CLASS	F	F
SERVICE	S3-15%	S3-15%
TYPE OF CONNECTION	Δ	Δ
NUMBER OF POLES	4	4

COMPONENTS

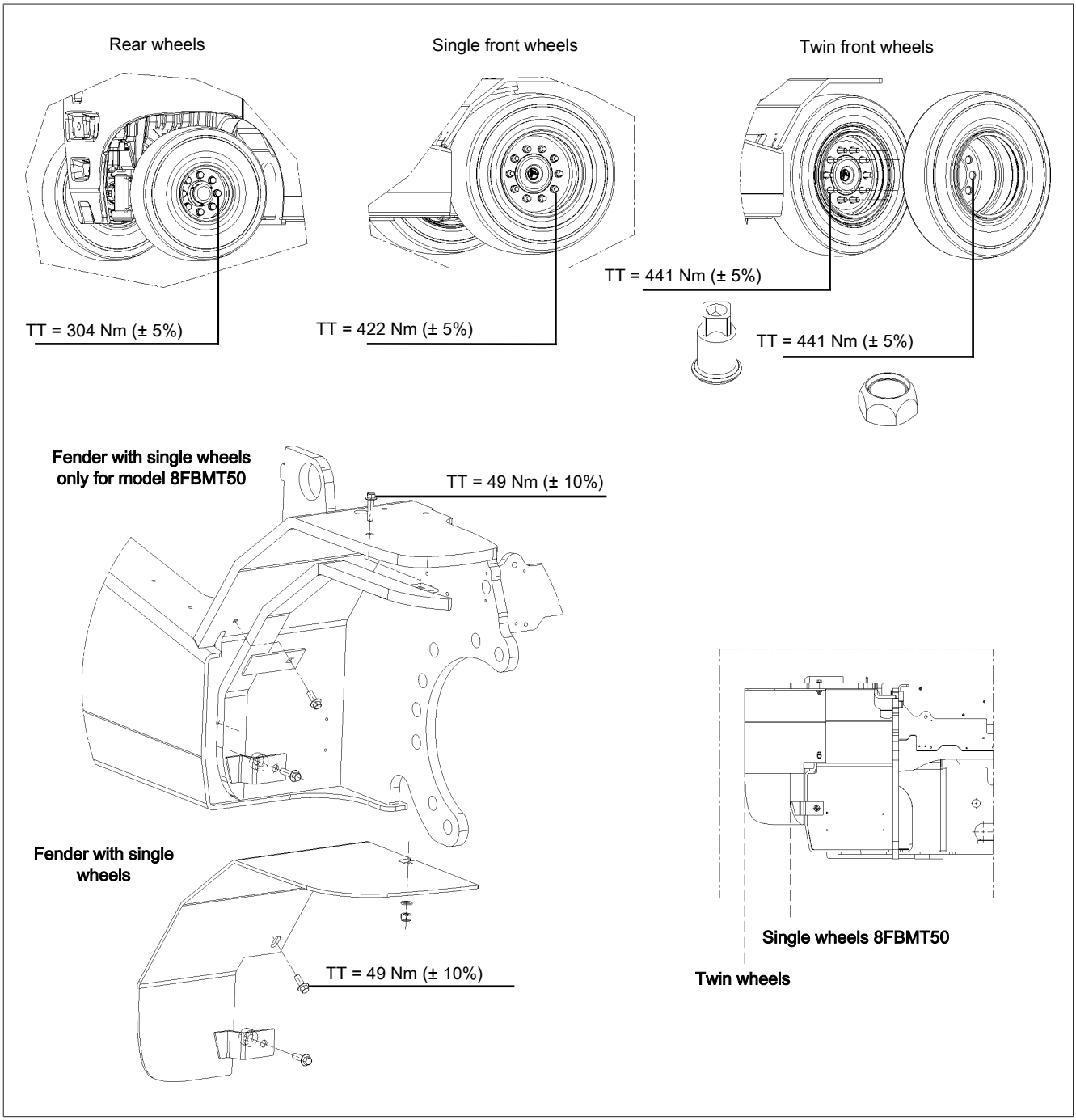


COMPONENTS - NEGATIVE BRAKE VERSION





WHEELS



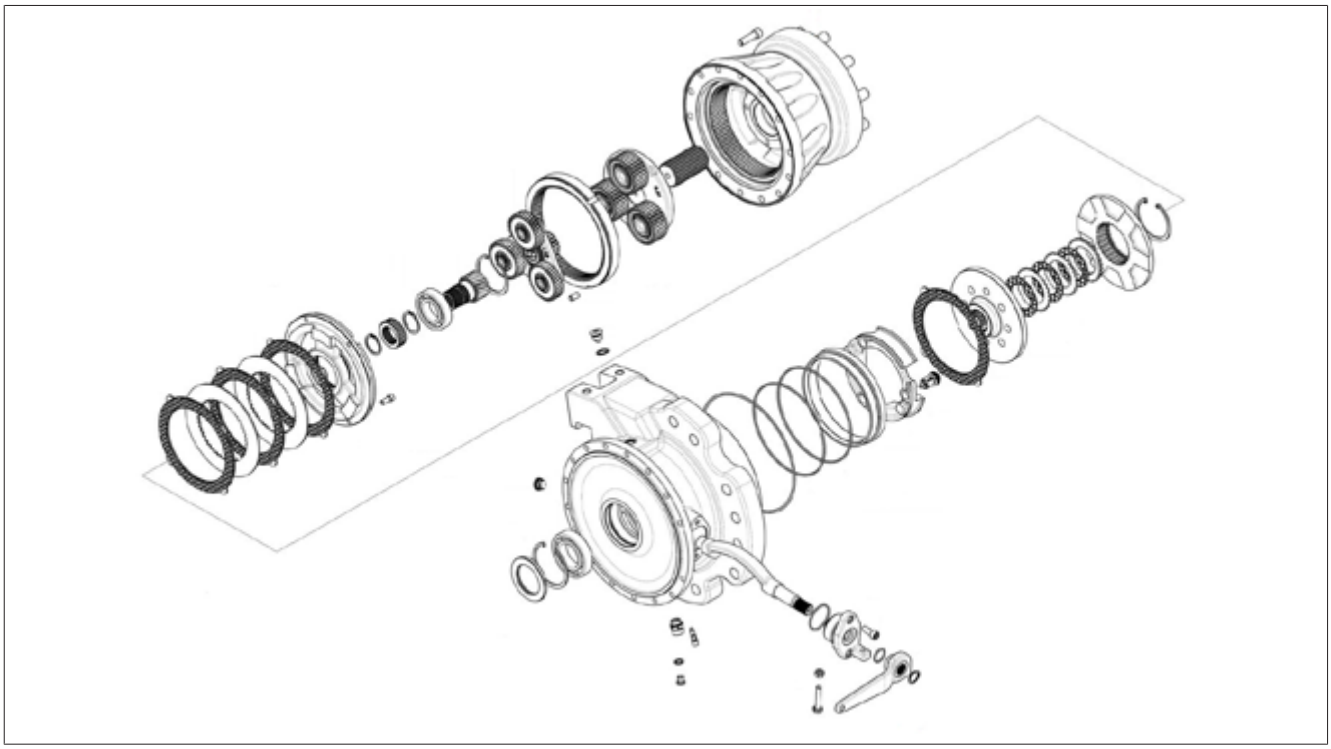
SPECIFICATIONS

Model	Rear tyre size	Front tyre size	Front tyre size, twin wheels version
8FBMT40	23x9-10 (225/75-10)	250-15 (250/70-15)	7.00-15
8FBMT45	23x9-10 (225/75-10)	250-15 (250/70-15)	7.00-15
8FBMT50	23x9-10 (225/75-10)	28X12.5-15	7.00-15

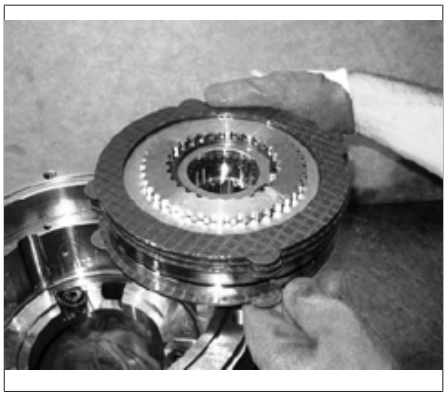
STEERING

COMPONENTS

BRAKE UNIT

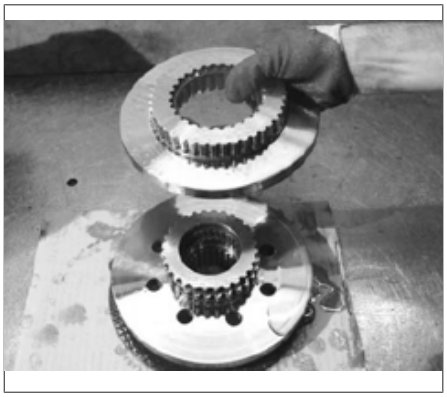


[Point 14]



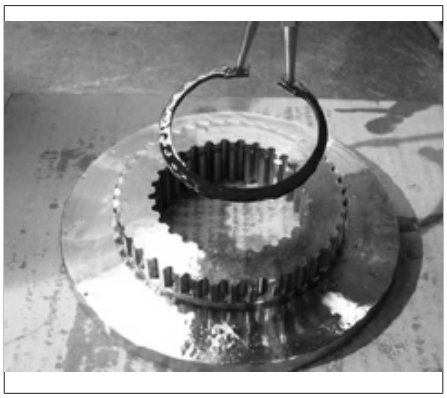
Disassembly:
Pull out the brake unit and the brake disks.

[Point 15]



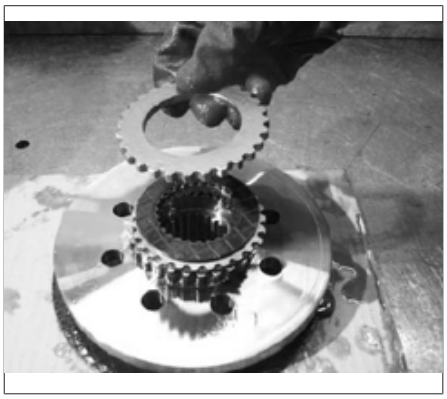
Disassembly:
Pull out the disk.

[Point 16]

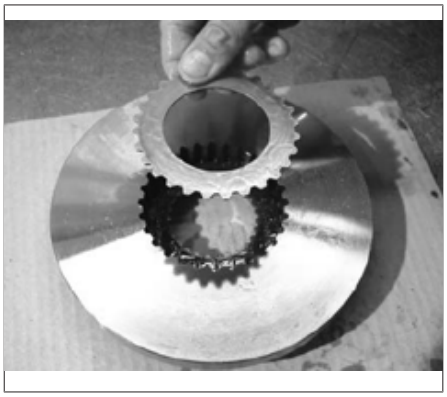


Disassembly:
Using pliers, pull out the seeger ring from its seat in the disk.

[Point 17]



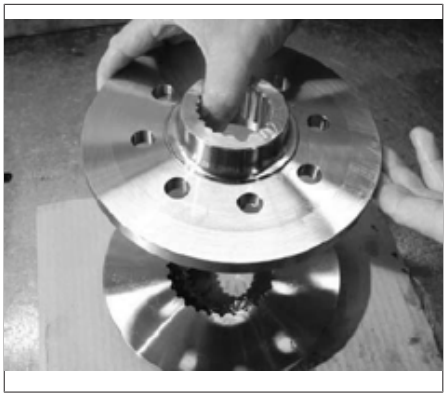
Disassembly:
Remove the spacer.



Assembly:

Next, fit a steel disk with external teeth. Repeat the operation until you have fitted 3 sintered bronze disks and 2 steel disks.

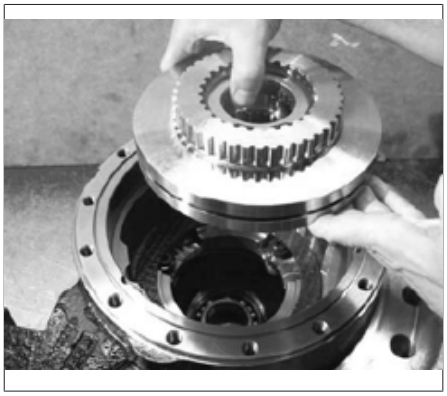
[Point 43]



Assembly:

Fit the brake shaft.

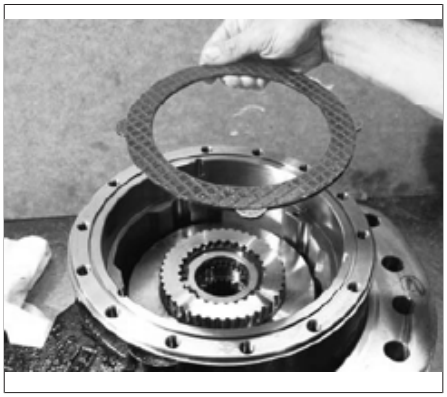
[Point 44]



Assembly:

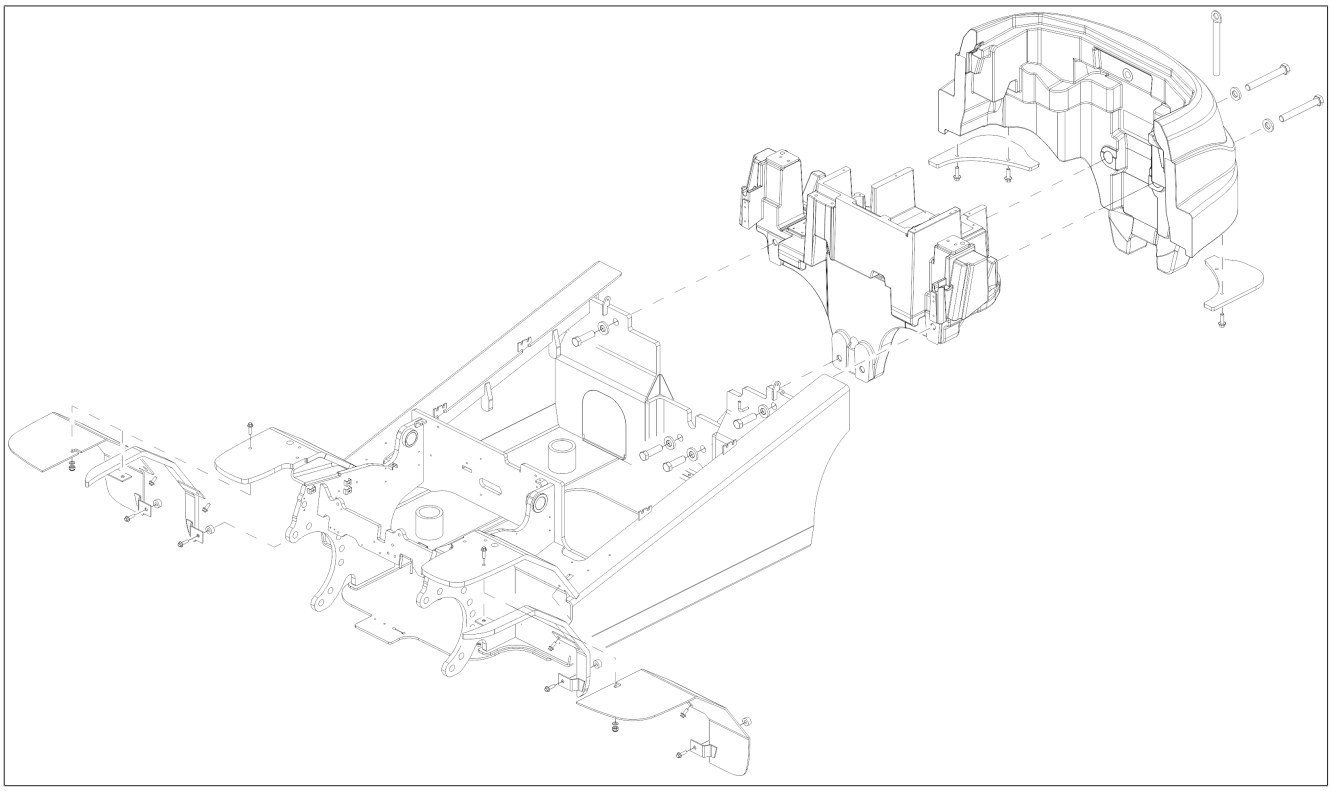
Fit the brake disk unit inside the brake body.

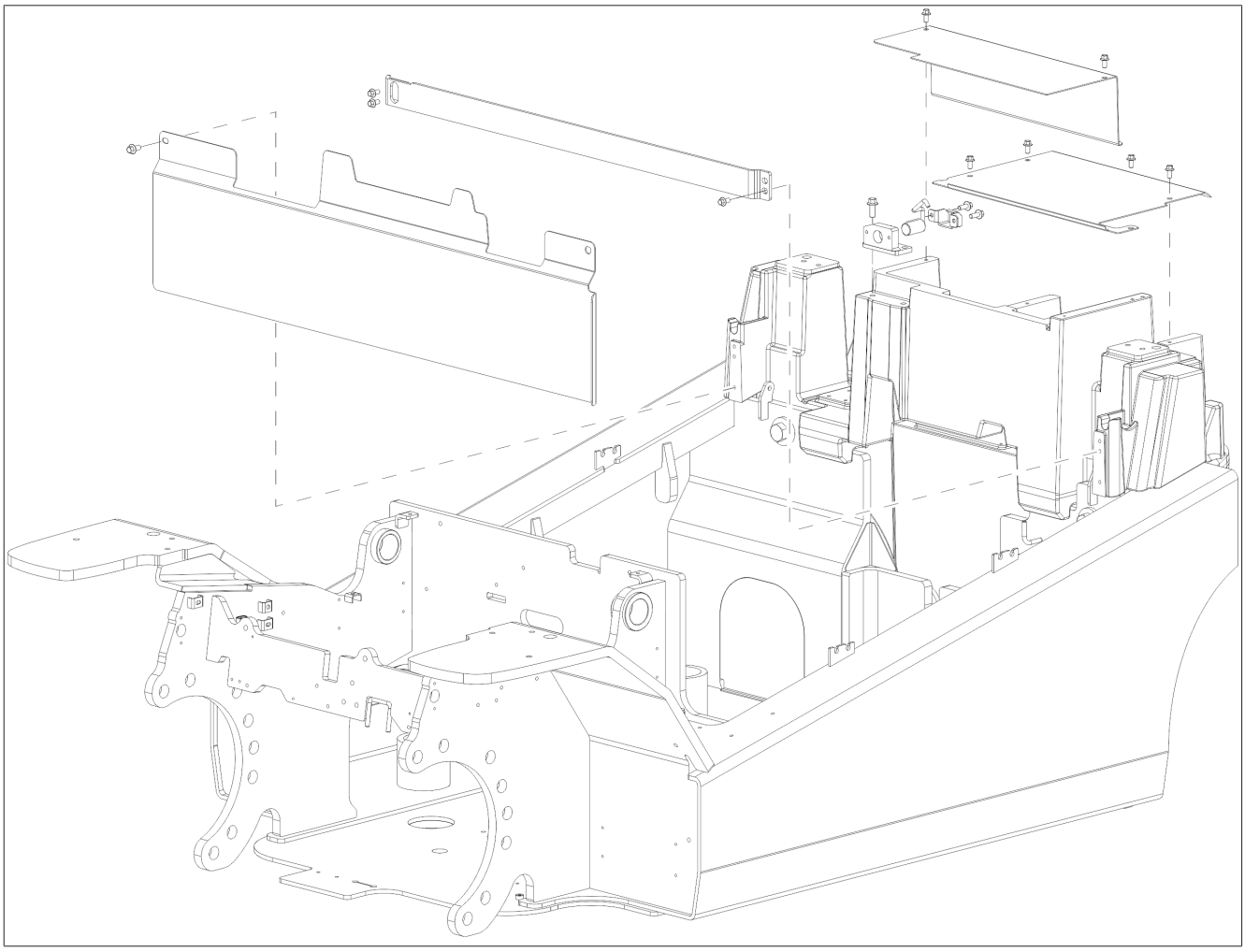
[Point 45]

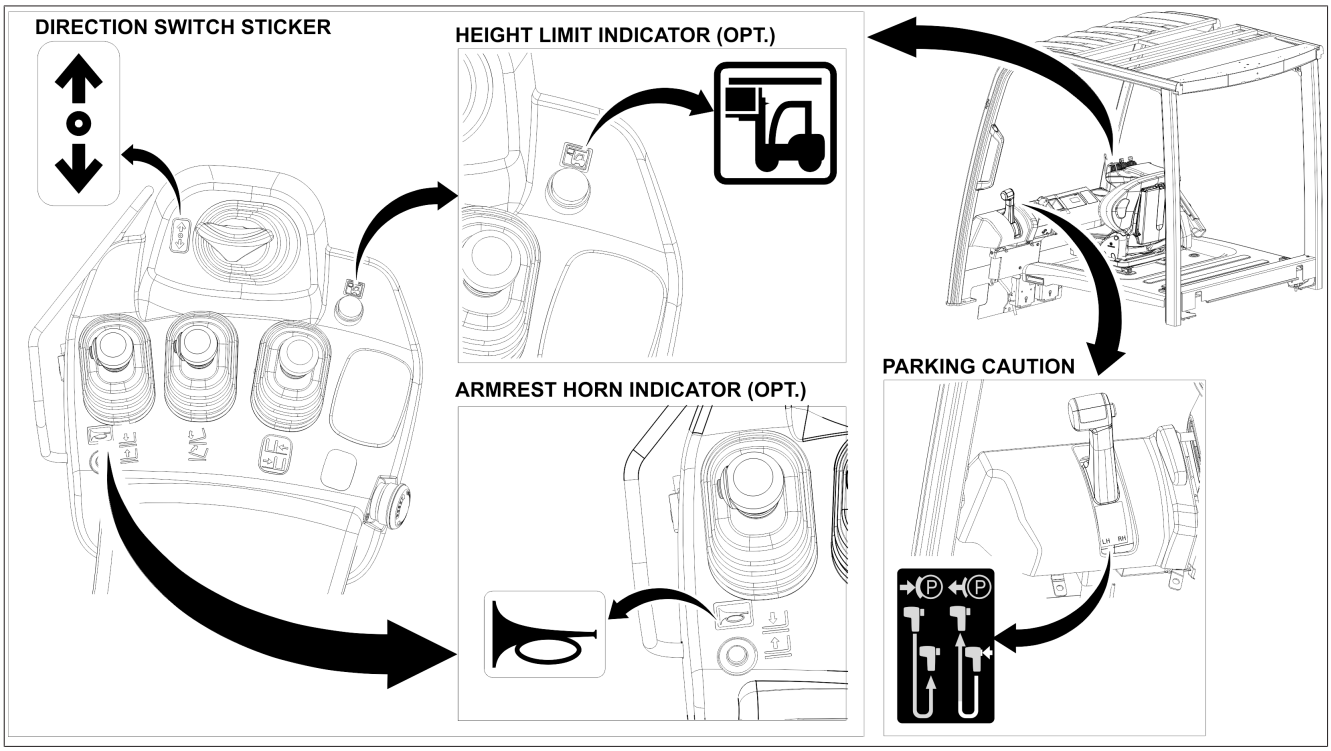


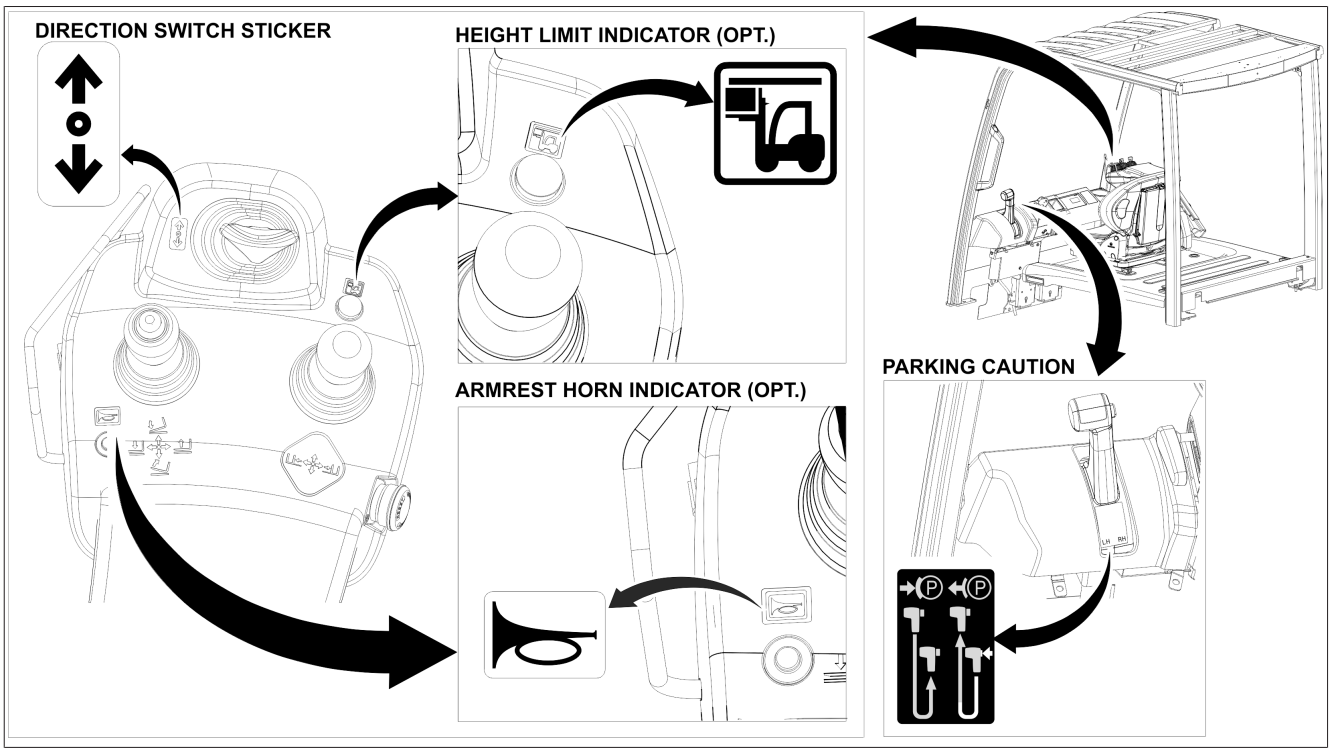
Assembly:

Fit the disk stack in the following order: first fit a sintered bronze disk with external teeth.



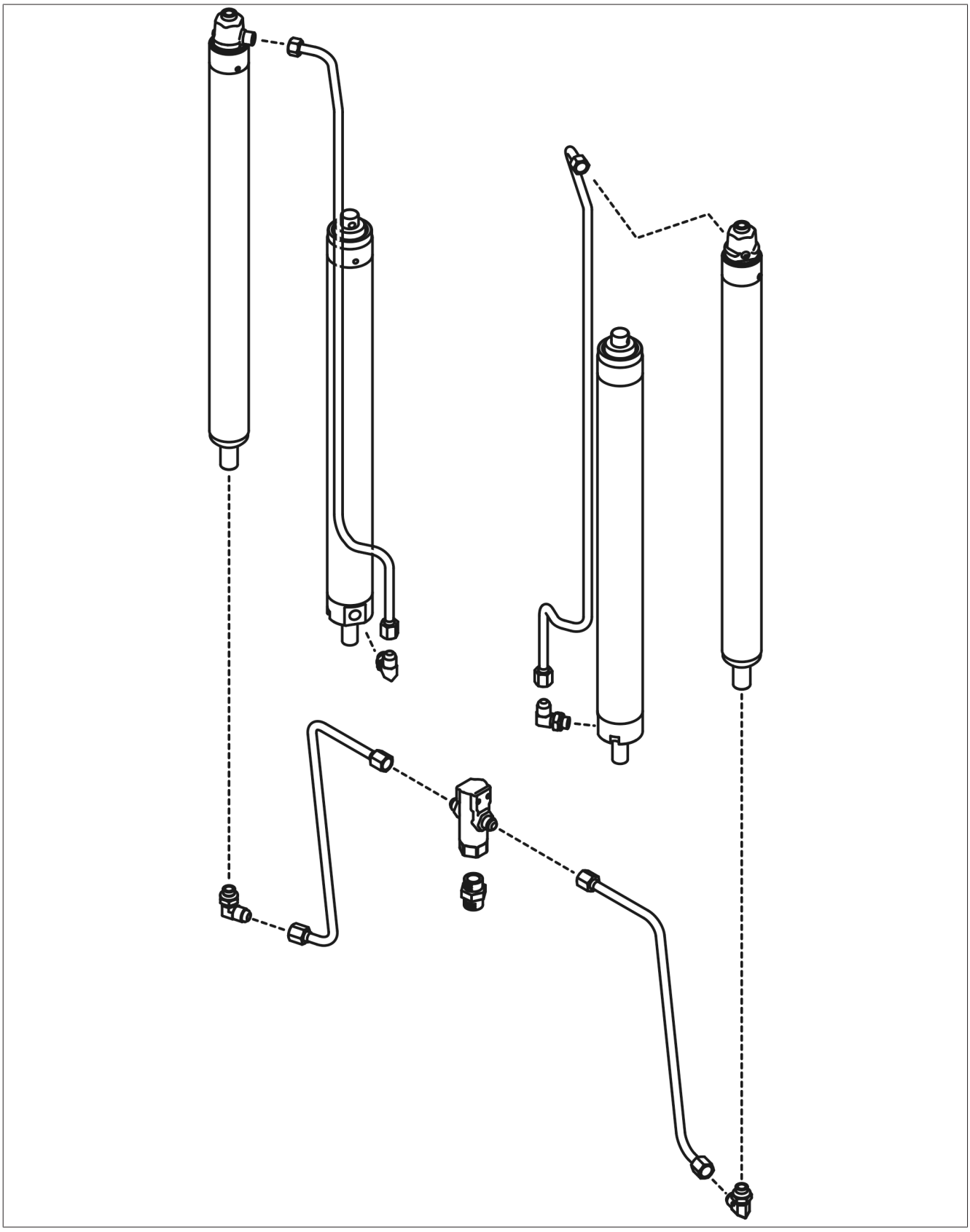


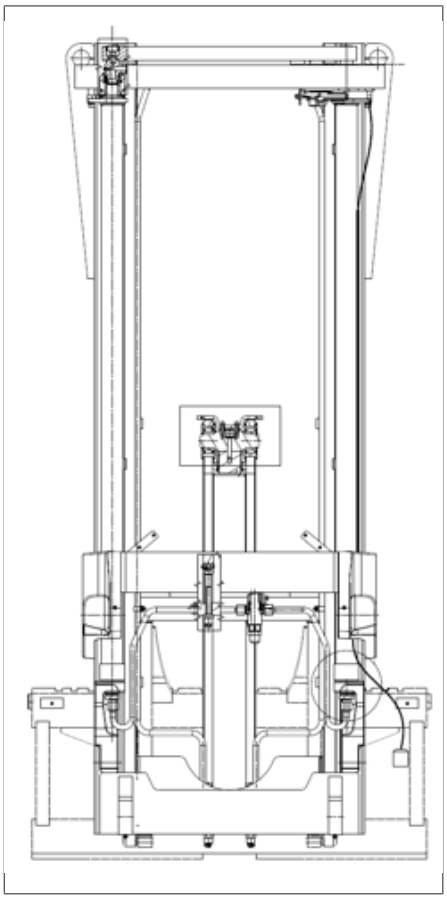

DIRECTION SWITCH STICKER
HEIGHT LIMIT INDICATOR (OPT.)
ARMREST HORN INDICATOR (OPT.)
PARKING CAUTION


DIRECTION SWITCH STICKER
HEIGHT LIMIT INDICATOR (OPT.)
ARMREST HORN INDICATOR (OPT.)
PARKING CAUTION

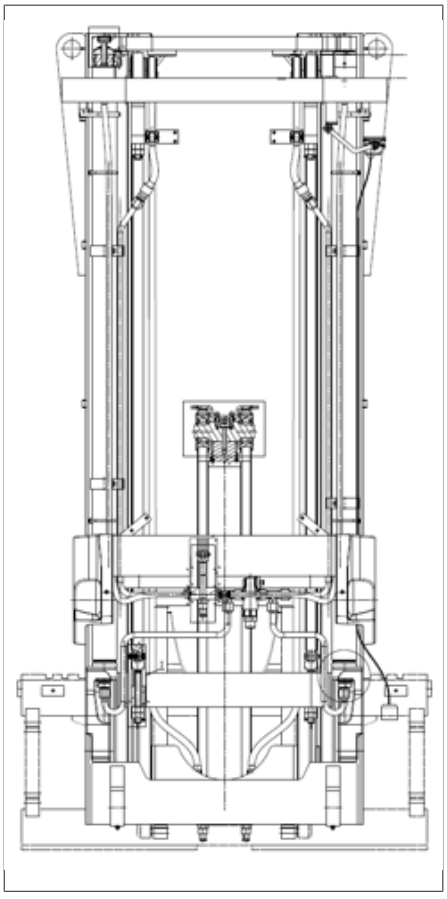
MATERIAL HANDLING SYSTEM

FW MAST



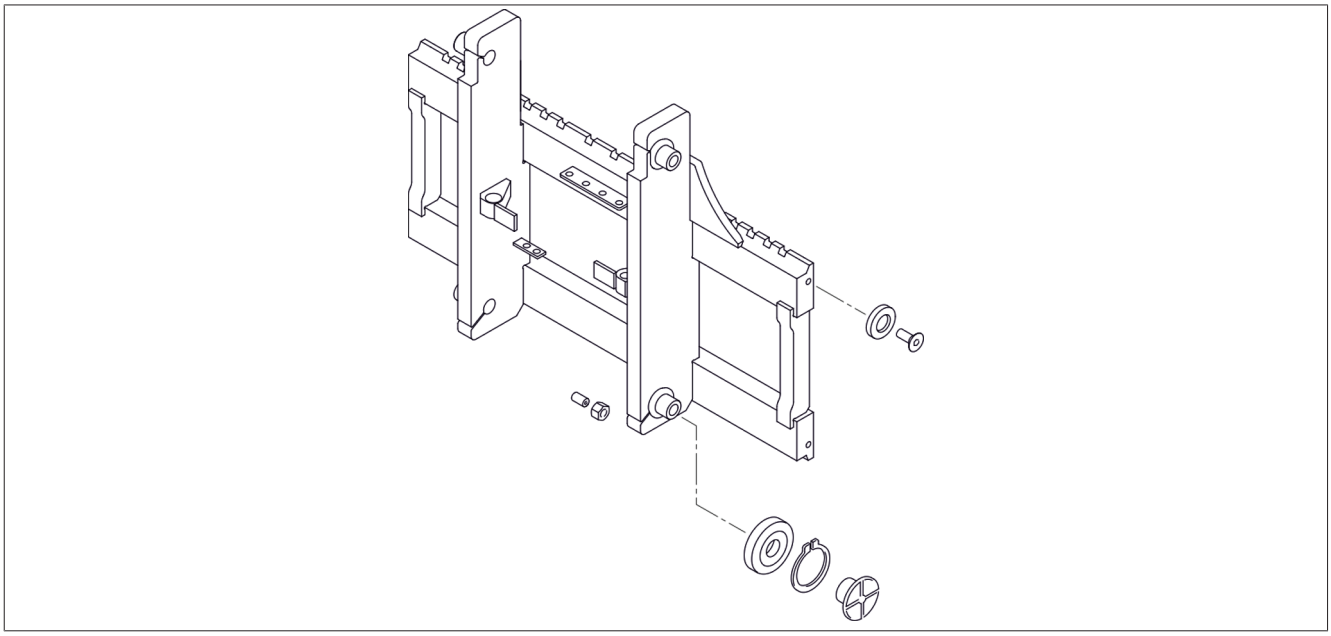


FV mast
Double mast: 2 rear cylinders and 1 front cylinder

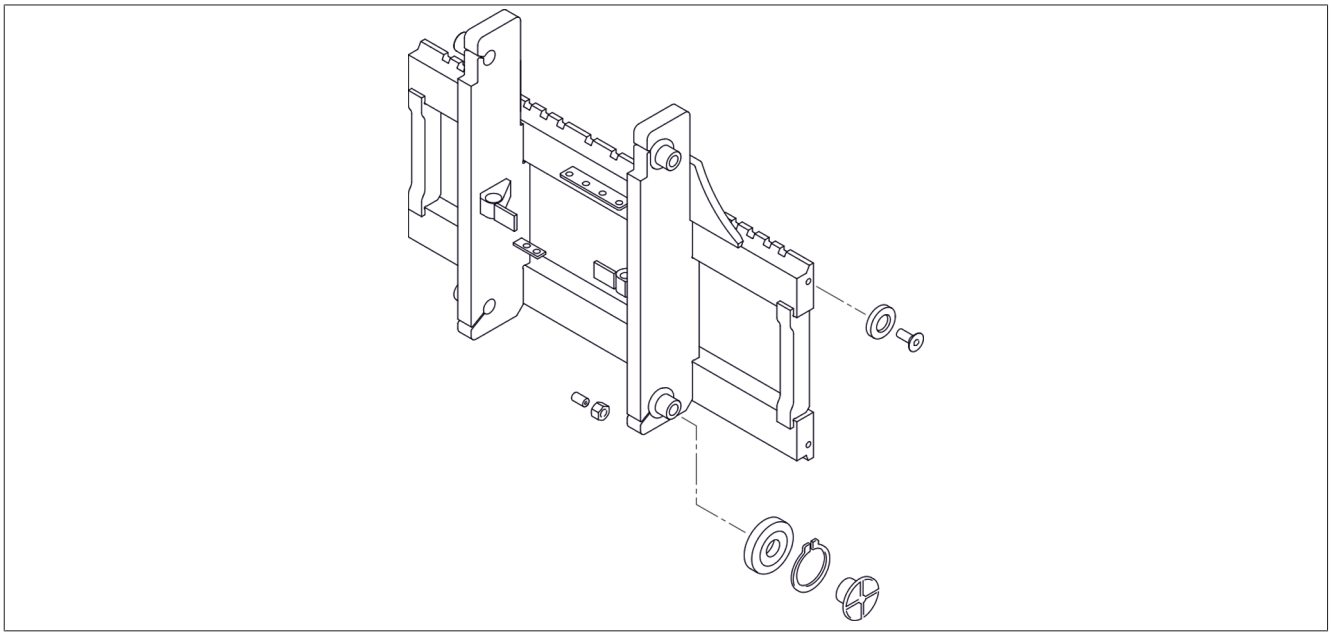


FSV mast
Triple mast: 2 rear cylinders and 1 front cylinder

LIFTING BRACKET GROUP (FV) (5.0 t)



LIFTING BRACKET GROUP (FSV) (4.0 - 4.5 t)



5) Disconnect the overflow hose and high pressure hoses. (Before disconnecting the hoses, fully lower the inner mast.) **[Point 2]**
6) Slightly lift the mast group. **[Point 3]**
7) Remove the tilting cylinder front pin from the mast side. **[Point 4]**
8) Remove the mast support screws.
9) Remove the mast group.
10) Check the condition of the bushing pin for the mast support grease nipple. **[Point 5]**

Reassembly Procedure

The assembly procedure is the reverse of the disassembly procedure.

NOTICE! Apply molybdenum bisulphite grease to the inside of the mast support bushing and the mast support cap. Apply MP grease to the tilting cylinder front pin.

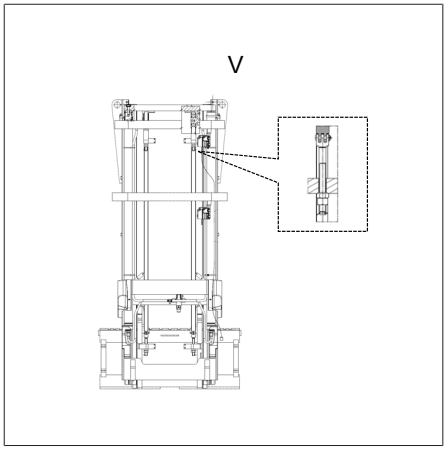
NOTICE! Shim the lift cylinder rod when the mast assembly, outer mast, inner mast or either lift cylinder is replaced.

NOTICE! After assembly, adjust the chain tension.

NOTICE! When replacing the mast, calibrate the SAS system. (See Chapter 16.)

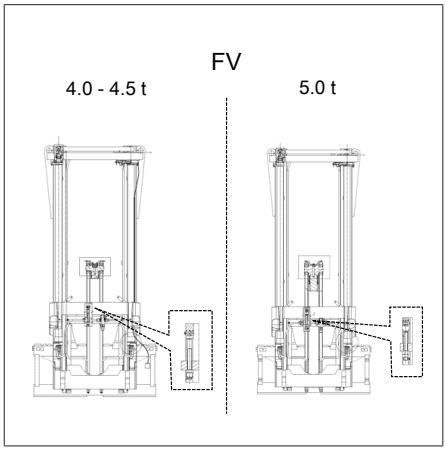
Point Operations

[Point 1]



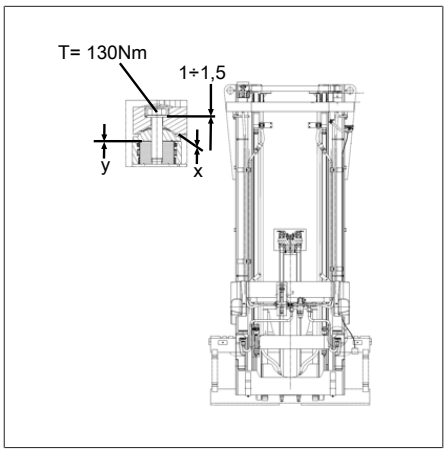
Disassembly:

After removing the hoses. Tightening torque of the chain adjustment nut: 180 Nm ± 5%



Point Operations

[Point 1]



Disassembly:

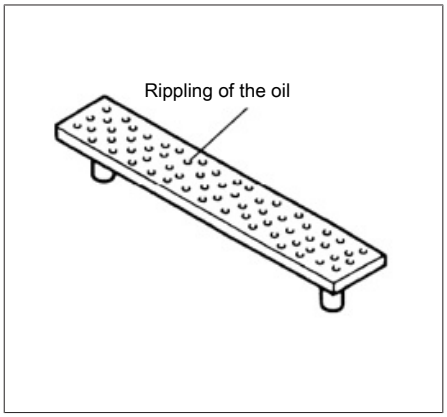
Adjustment must be done using shims on the end of the lifting cylinder rod to prevent uneven lifting of the right and left lifting cylinders. Keep a record of how the adjustment is done and how many shims are used.

Assembly:

Tighten the screw and leave some play, as shown in the figure.

Spacer shim (x): end stop during closing
Spacer shim (y): end stop at maximum height

[Point 2]

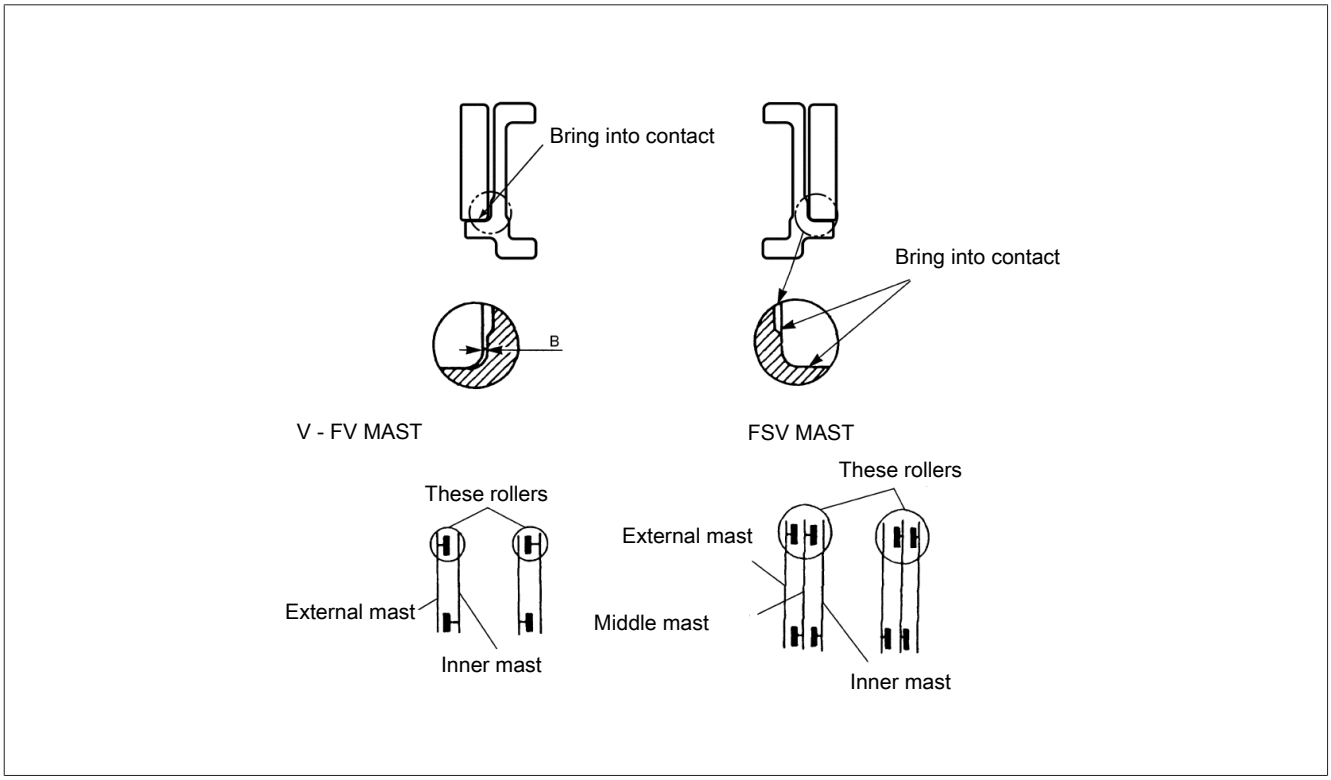


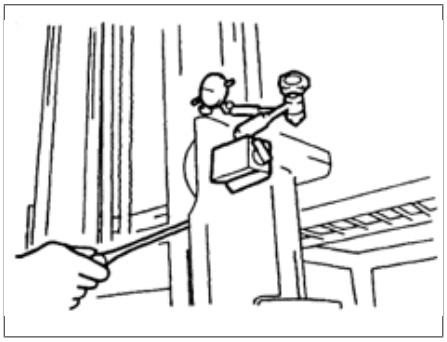
Inspection:

Measure the thickness of the mast tab.

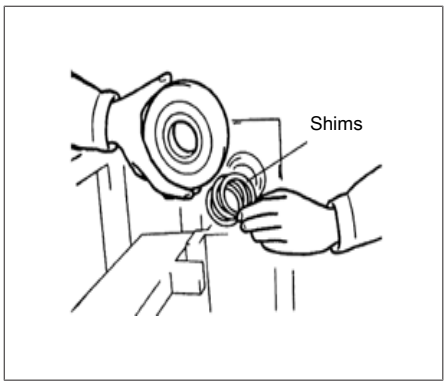
Limit of wear: Until the rippling of the oil is eliminated

Adjusting the play on the outer mast roller (V - FV - FSV) and central mast upper roller (FSV)





- Adjust the part overlapping the mast by approximately 500mm
- Move the inner mast to one side to bring the roller into contact with the outer mast, and on the opposite side measure the play between the side surface of the roller and the mast at their nearest point.
  Standard value: B=0 ~ 0.8 mm
  If it is not to standard, change the thickness of the inner mast roller adjusting ring (see paragraph on Mast roller).
  Thickness of adjusting ring: 0.5 - 1.0 mm



- Distribute the adjusting rings equally on the right and left rollers
- After adjustment, check that the inner mast slides smoothly on the outer mast

ADJUSTING THE ADJUSTING RINGS ON THE LIFT CYLINDER ROD (TO AVOID IRREGULAR LIFTING)

NOTICE! For double lift cylinders, check and adjust in order to prevent the irregular lifting on the right and left sides caused by loads beyond the permitted limits, etc.

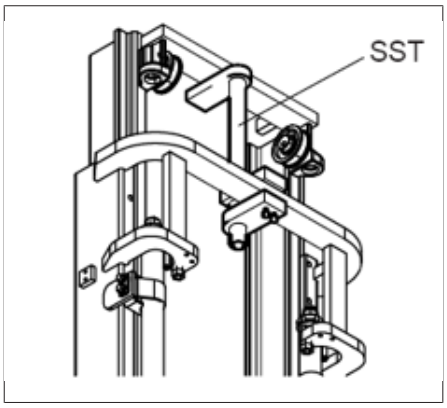
NOTICE! Check and adjust where required when replacing any of the following elements: Lift cylinder ASSY, lift cylinder rod SUB-ASSY, mast ASSY, outer mast SUB-ASSY and inner mast SUB-ASSY.

NOTICE! Having completed the adjustments, align the SAS system.

1. Inspection method.

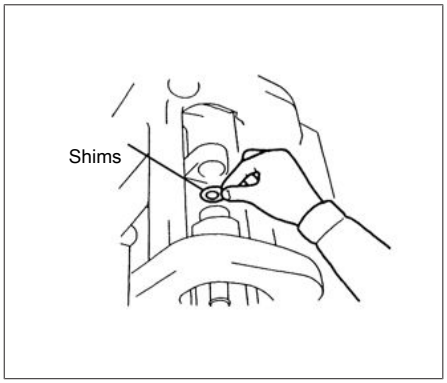
Slowly lift the inner mast and check that the right and left cylinder rod stop when the inner mast reaches maximum height.

- Normal conditions
  The right and left rods stop more or less simultaneously with almost no vibrations on the inner mast.
- Abnormal conditions
  The rods stop at a slightly different time and the upper part of the inner mast vibrates as they stop. To correct the defect, add adjustment rings to the cylinder which stops first.



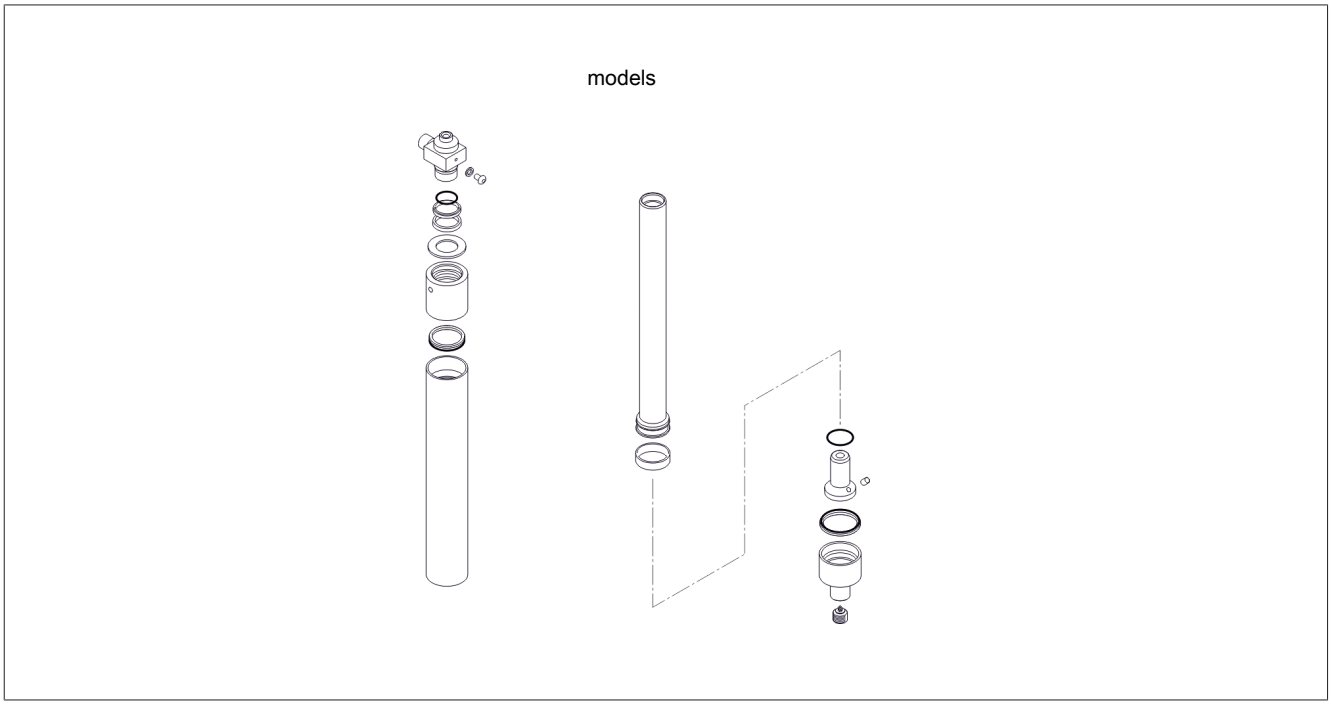
2. Adjustment method:

- Lift the inner mast, connect the SST to the outer mast and lower the inner mast until it comes into contact with the SST.
  SST 09610-22000-71
- Remove the end stop nut from the cylinder on the side on which the adjusting rings need adjustment.
- Slowly lower the lift cylinder rod and disconnect the end.

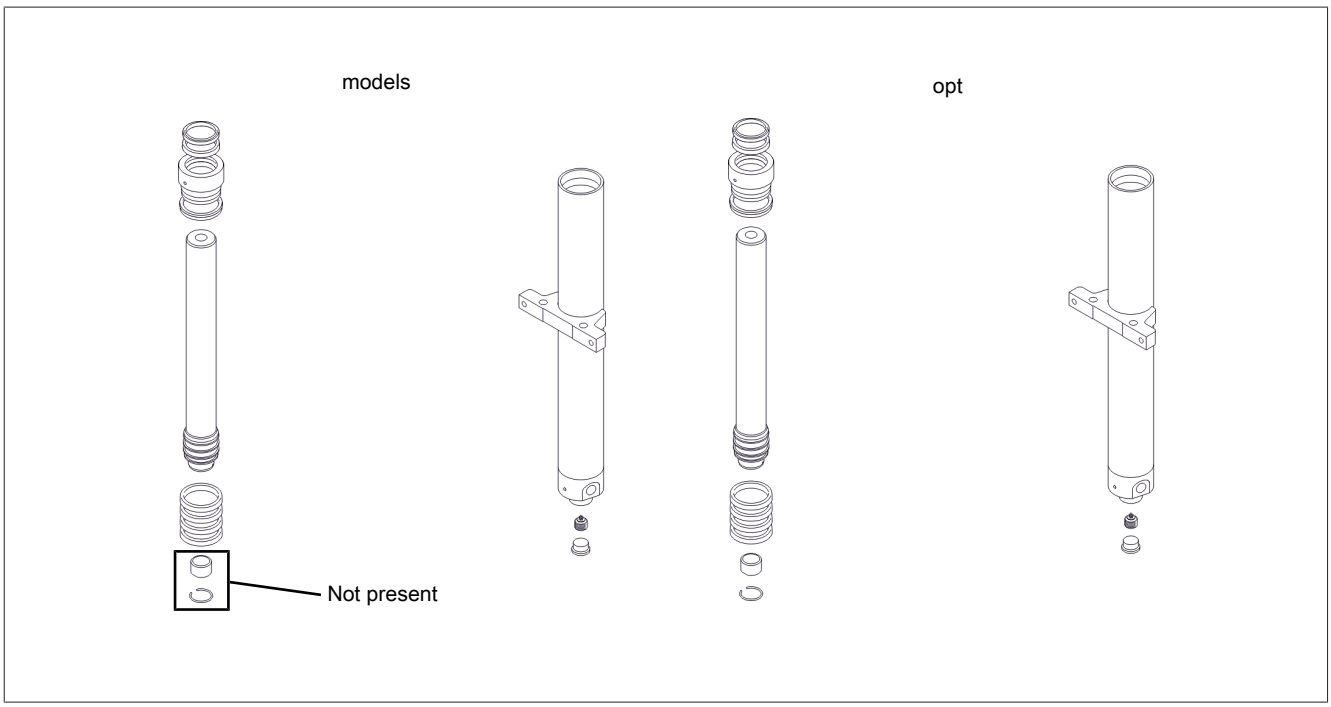


- Place the adjusting rings on the end of the cylinder rod and lift it slowly in the inner mast.
- Replace the end stop nut on the cylinder.
- Lift the inner mast again for a final check.
- Repeat the control and adjustments until the number of adjusting rings is defined.
  Thickness of adjusting ring: 0.5·1.0 mm

SIDE LIFTING CYLINDERS FV MAST (5.0 t)

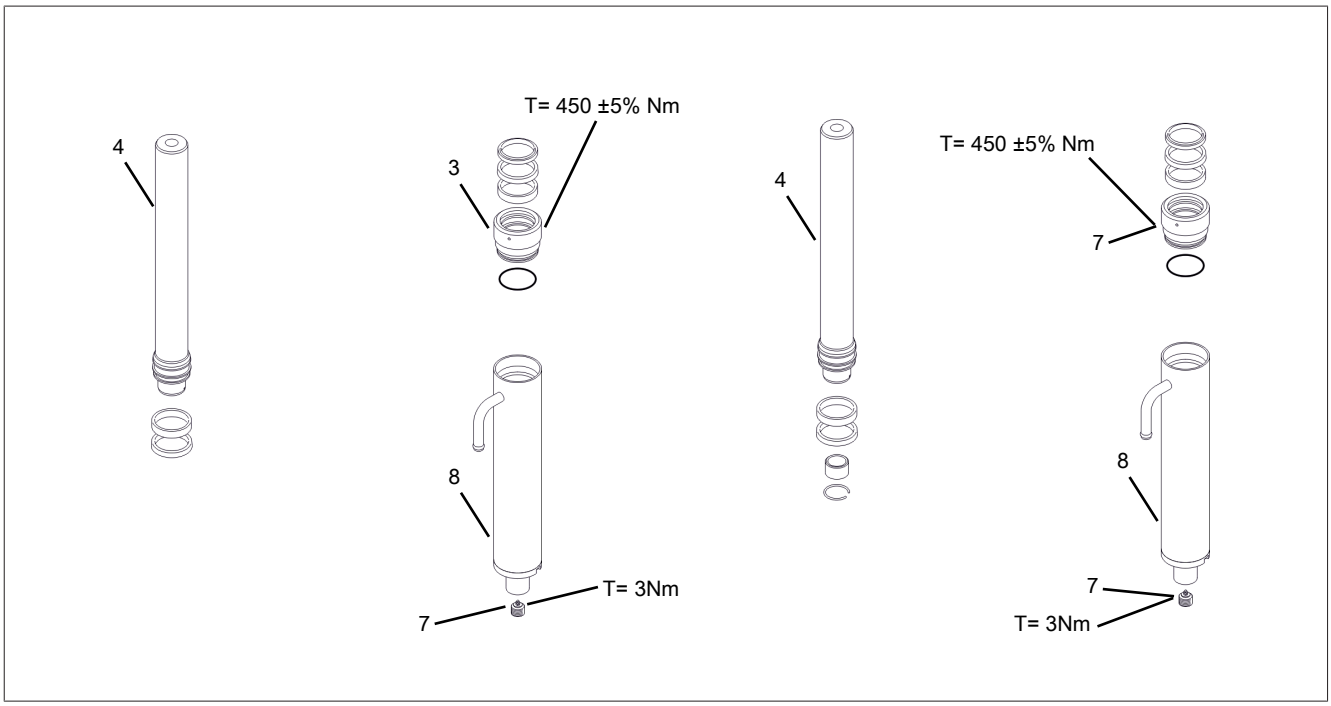


CENTRAL LIFTING CYLINDERS FV MAST (5.0 t)



CYLINDER (V - FSV) (FSW)

REMOVAL - INSPECTION - INSTALLATION



Disassembly Procedure

1) Lock the cylinder in the vice.
2) Position a container to collect the oil.
3) Remove the bushing from the cylinder (upper side). **[Point 1]**
4) Remove the piston rod. **[Point 2]**
5) Remove the seals from the piston rod. **[Point 3]**
6) Remove the descent braking device. **[Point 4]**
7) Remove the parachute valve (descent safety valve).
8) Remove the cylinder. **[Point 5]**

Reassembly Procedure

The assembly procedure is the reverse of the disassembly procedure.

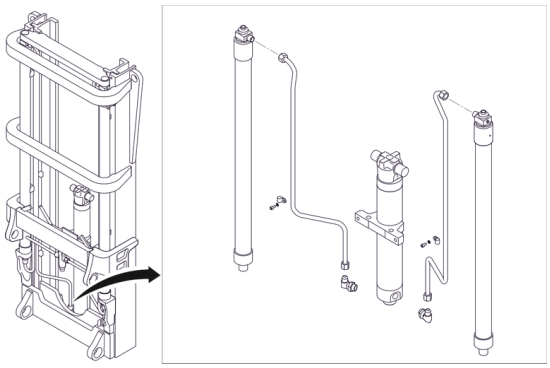
NOTICE! Apply hydraulic oil to packings, O-rings and dust seal lips;

NOTICE! Apply sealant (Loctite 222) to the threaded parts of the cylinder covers (upper sides).

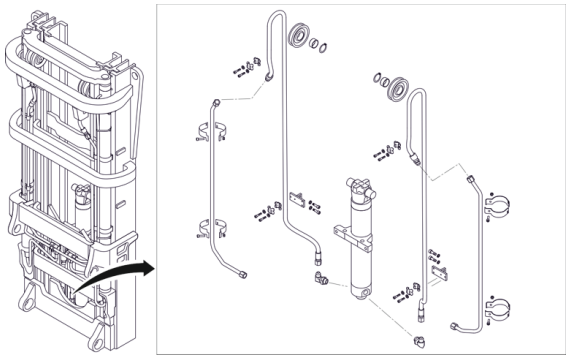
CENTRAL LIFTING CYLINDER ASSEMBLY

DISASSEMBLY•ASSEMBLY

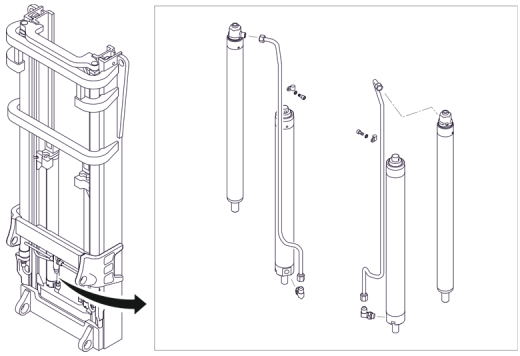
FV



FSV



FW



NOTICE! After installation, slowly tilt the mast forwards and backwards a few times without load to bleed the air from the hydraulic circuit and check that it is working correctly.

NOTICE! After installation, if the tilt sensor has been removed, calibrate the SAS system.

CAUTION! There must be no interference between the top hose and the bottom fitting.

Adjusting

To adjust the length of the internal lock on the screw between the rod and the gasket, adjust the tilting angle of the mast by rotating the rod.

The tolerance range of the tilting angle of the mast:

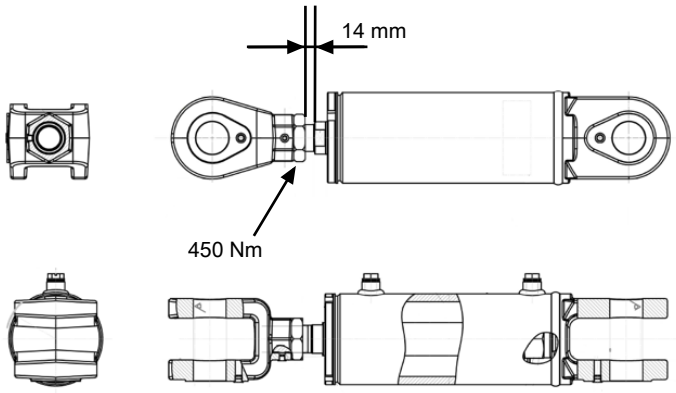
	4 wheels
Forwards	0° - 0.4°
Reverse	0.6° - 0°

The stroke difference between the tilting cylinders is not more than 1 mm.

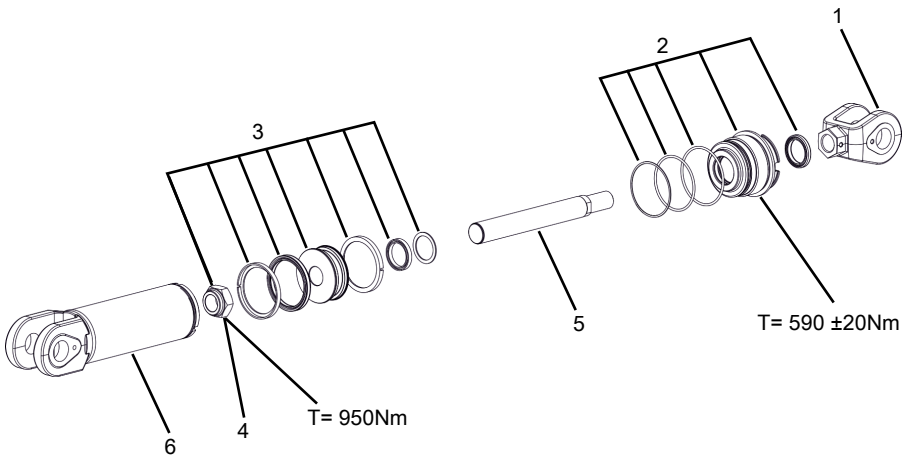
NOTICE! Adjust the forwards and backwards tilting angle of the mast (to prevent unwanted tilting) when the tilting cylinder and/or mast are replaced or disassembled;

NOTICE! After adjustment, calibrate the SAS system.

NOTICE! When adjusting the rod joint by loosening it, make sure that the remaining thread is max. 14 mm long.



DISASSEMBLY•INSPECTION•ASSEMBLY

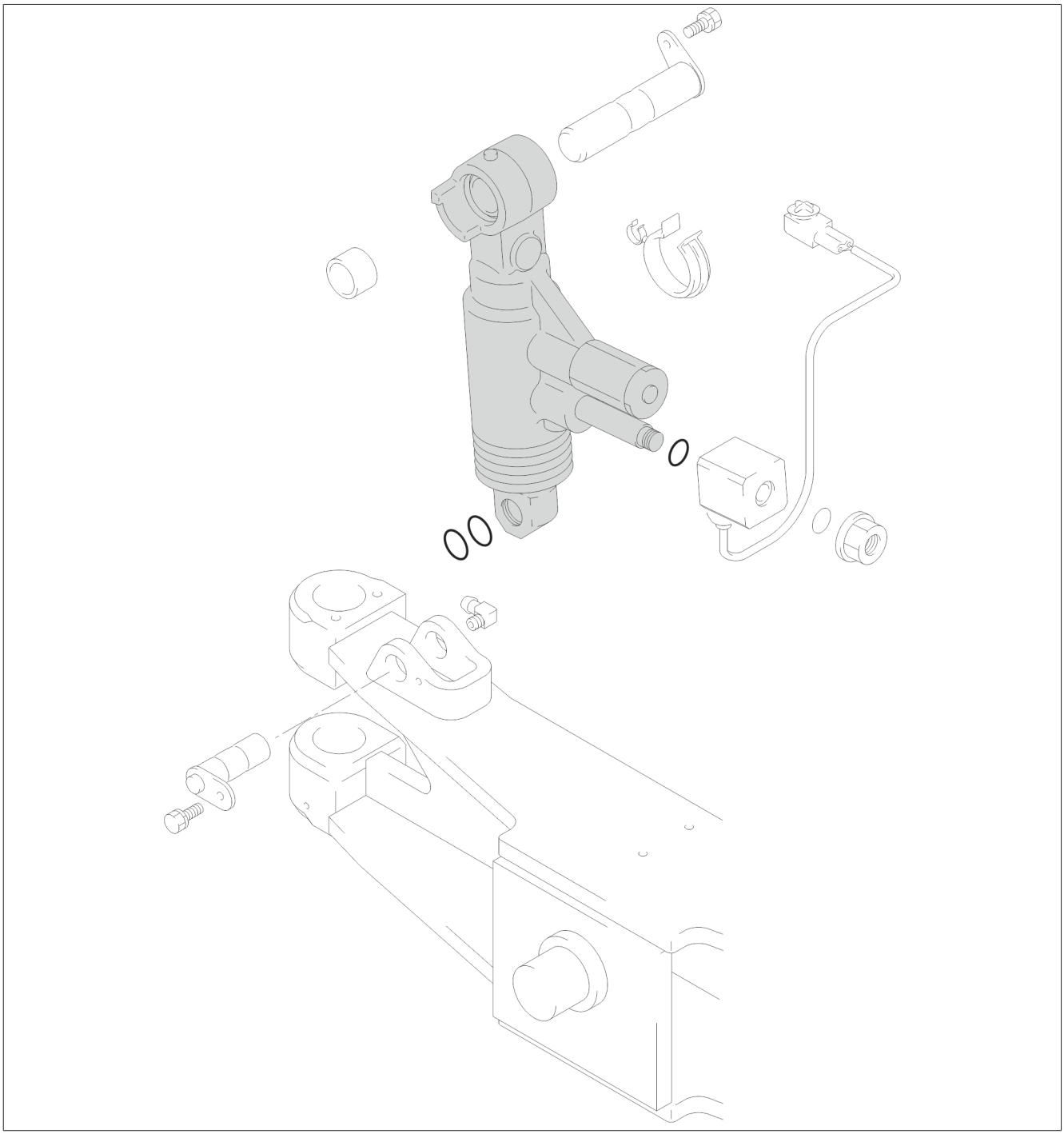


OIL CONTROL VALVE

SAS FUNCTION

OSCILLATION LOCK CYLINDER

DISASSEMBLY-ASSEMBLY



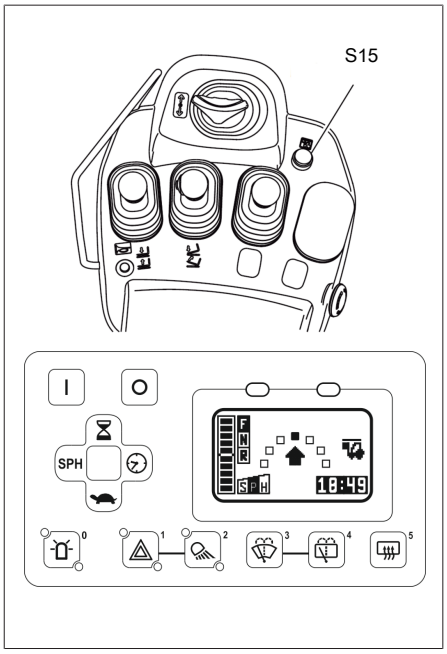
Dismantling procedure

1) Remove the counterweight.; hoist the vehicle until the rear wheels are lifted.
2) Disconnect the oscillation lock solenoid valve connector.
3) Remove the oscillation lock cylinder top pin. **[Point 1]**
4) Remove the oscillation lock cylinder bottom pin.
5) Remove the oscillation lock cylinder assembly.
6) Remove the oscillation lock cylinder crank.

Assembly procedure

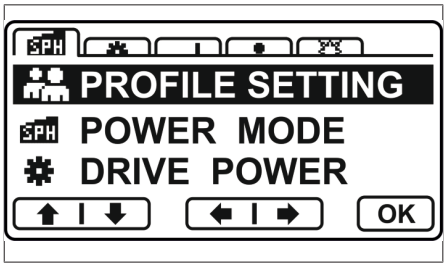
The assembly procedure is the reverse of the disassembly procedure.

HEIGHT LIMITER



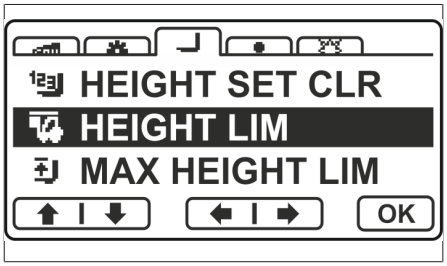
The administrator can set a height limit value which can be enabled/disabled by the operator via the height limiter button (S15). When the function is enabled, the forks cannot be raised over the set height.

NOTICE! The operator can set the height value for the height limit function if the parameter MENU LOCK = OFF

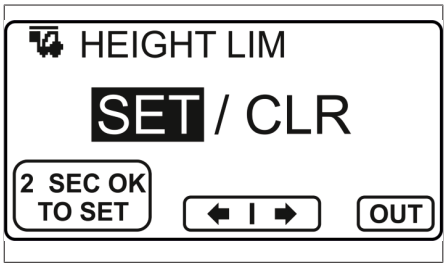


✓ Enabling procedure via menu ADMINISTRATOR, if the parameter MENU LOCK = OFF the operator will have the same parameters in the TRAVEL SETTING menu.

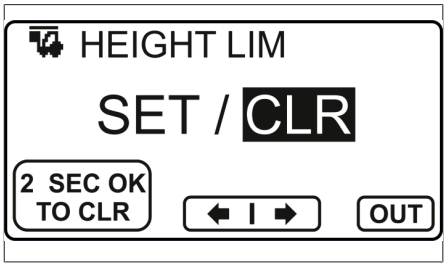
1) To enable the "height limiter" function, you will need to access the ADMINISTRATOR menu. Please refer to the procedure in chapter 03.



2) Select the MATERIAL HANDLING folder.
3) Enter the HEIGHT LIM option.



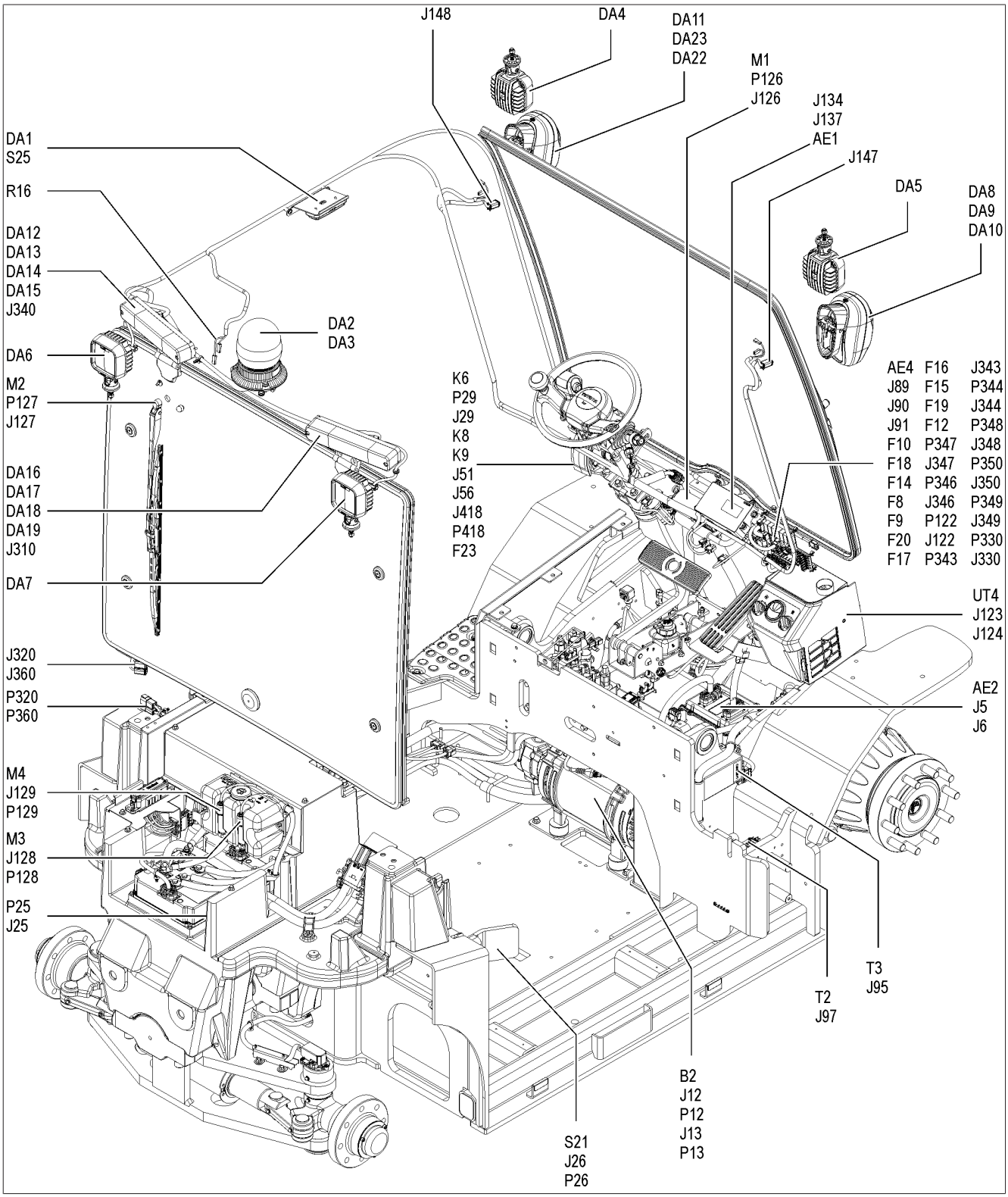
4) Select SET.
5) Set the mast in a vertical position and lift the forks until they reach the desired height.
6) Press and hold the (**I**) button for at least 2 seconds to save **the** height. In that case “OK” is displayed.
7) Press button (**O**) to return to the MATERIAL HANDLING folder.



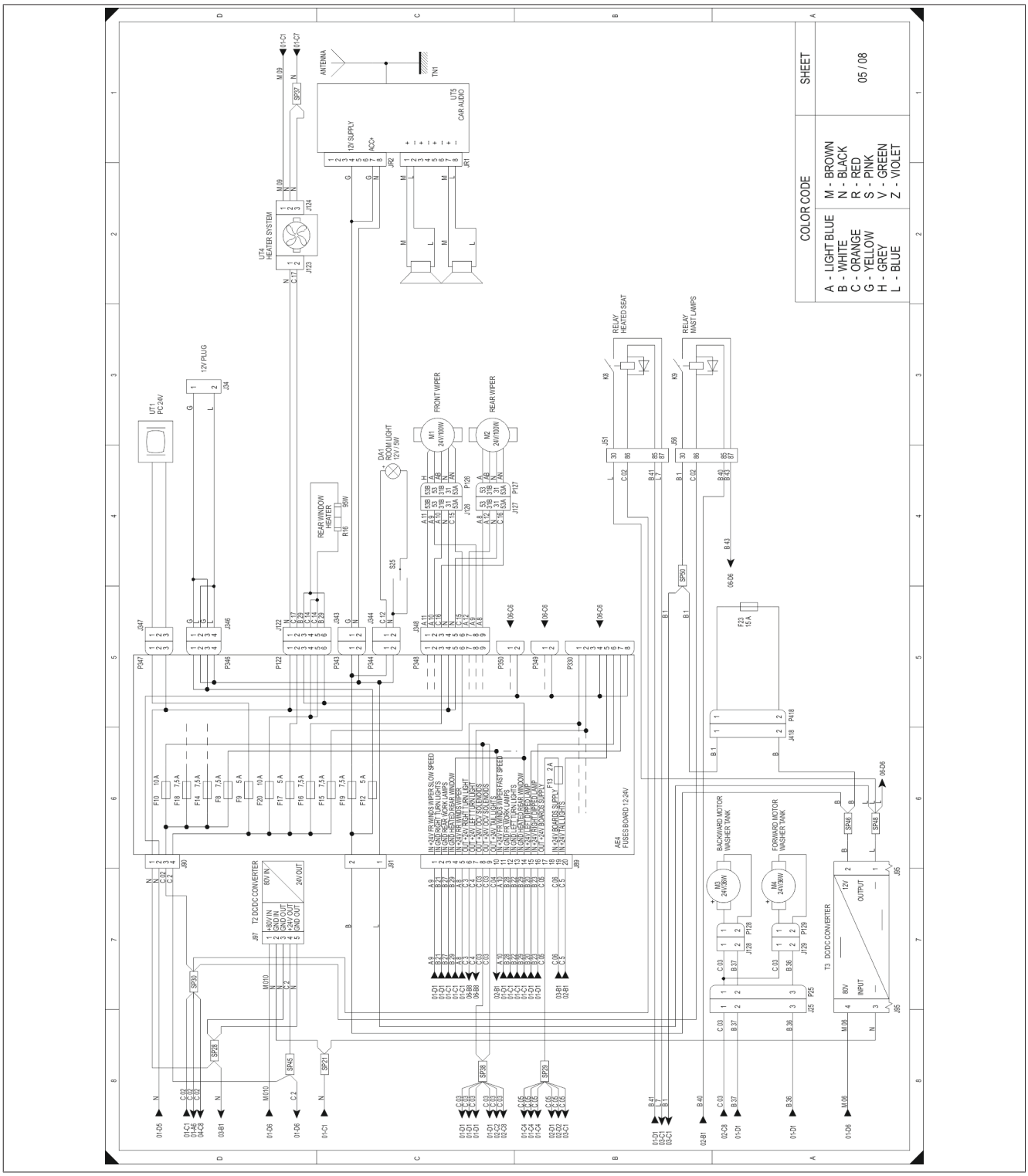
8) To disable the “height limiter” function, select the CLR value under the HEIGHT LIM option in the MATERIAL HANDLING folder.
9) Press and hold the (**I**) button for at least 2 seconds to disable the function. In that case “OK” is displayed. Press button (**O**) to return to the MATERIAL HANDLING folder.

APPENDIX

IMAGE 2


J148
DA4
DA11
DA23
DA22
M1
P126
J126
J134
J137
AE1
J147
DA5
DA8
DA9
DA10
DA1
S25
R16
DA12
DA13
DA14
DA15
J340
DA2
DA3
DA6
M2
P127
J127
K6
P29
J29
K8
K9
J51
J56
J418
P418
F23
AE4 F16 J343
J89 F15 P344
J90 F19 J344
J91 F12 P348
F10 P347 J348
F18 J347 P350
F14 P346 J350
F8 J346 P349
F9 P122 J349
F20 J122 P330
F17 P343 J330
DA16
DA17
DA18
DA19
J310
DA7
UT4
J123
J124
J320
J360
P320
P360
AE2
J5
J6
M4
J129
P129
M3
J128
P128
P25
J25
T3
J95
T2
J97
B2
J12
P12
J13
P13
S21
J26
P26

18


SHEET
05 / 08
COLOR CODE
A - LIGHT BLUE
B - WHITE
C - ORANGE
G - YELLOW
H - GREY
L - BLUE
M - BROWN
N - BLACK
R - RED
S - PINK
V - GREEN
Z - VIOLET
ANTENNA
12V SUPPLY
CAR AUDIO
HEATER SYSTEM
12V PLUG
PC 24V
ROOM LIGHT 12V / 5W
FRONT WIPER
REAR WIPER
REAR WINDOW HEATER
RELAY HEATED SEAT
RELAY MAST LAMPS
FUSES BOARD 12-24V
T2 DC/DC CONVERTER
T3 DC/DC CONVERTER
BACKWARD MOTOR WASHER TANK
FORWARD MOTOR WASHER TANK

18

J15				POS	01 - A7		DRIVE MOTOR SPEED SENSOR
PIN	COL	mm²	MARK	TW	DEST		
					CONN	PIN	FUNCTION
1	B	0.50	9		J1	8	+12V
2	B	0.50	11		J1	14	CHANNEL B
3	B	0.50	10		J1	7	CHANNEL A
4	B	0.50	12		J1	15	GND

J16				POS	01 - A7		DRIVE MOTOR TEMPERATURE SENSOR
PIN	COL	mm²	MARK	TW	DEST		
					CONN	PIN	FUNCTION
1	V	0.50	5		SP47		GND TEMPERATURE SENSOR
2	B	0.50	13		J1	23	+V TEMPERATURE SENSOR

J17				POS	02 - B3		BRAKE PEDAL SYSTEM K5
PIN	COL	mm²	MARK	TW	DEST		
					CONN	PIN	FUNCTION
1	N	0.50			SP27		GND
2	V	0.50	19		J5	8	BRAKE PEDAL SW
3							

J18				POS	04 - B6		5TH WAY CONNECTOR PLUG
PIN	COL	mm²	MARK	TW	DEST		
					CONN	PIN	FUNCTION
1							
2							

J23				POS	02 - B2		DRIVE SPEED REDUCTION
PIN	COL	mm²	MARK	TW	DEST		
					CONN	PIN	FUNCTION
1	B	0.50	38		J5	17	SPEED REDUCTION SW
2	N	0.50			SP25		GND

J25				POS	05 - A7		WINDSCREEN WASHER TANK
PIN	COL	mm²	MARK	TW	DEST		
					CONN	PIN	FUNCTION
1	C	0.50	3		SP39		+24V FR / RR WINDS. WASHER
2	B	0.50	37		J134	10	GND FR WINDS. WASHER
3	B	0.50	36		J134	11	GND RR WINDS. WASHER

J26				POS	02 - D1		BATTERY LOCK CONNECTOR PLUG
PIN	COL	mm²	MARK	TW	DEST		
					CONN	PIN	FUNCTION
1	N	0.50			J26	2	GND
2	N	0.50			J26	1	GND
3							

P86				POS	02 - A6		TILT ANGLE POTEN-TIOMETER R6
PIN	COL	mm²	MARK	TW	DEST		
					CONN	PIN	FUNCTION
1	V	0.50	1		SP42		+5V POT. R6
2	V	0.50	12		J5	24	SIGNAL POT. R6
3	V	0.50	13		SP43		GND POT. R6

P320				POS	06 - A7		FLASH / ROTATING LAMP
PIN	COL	mm²	MARK	TW	DEST		
					CONN	PIN	FUNCTION
1	C	1.00	02		SP4		+24V SUPPLY
2	B	0.50	24		J134	9	GND ROTARY LAMP 1
3	B	0.50	25		J134	34	GND ROTARY LAMP 2
4	B	0.50	26		J134	24	GND FLASH LAMP

P360				POS	06 - B8		REAR LIGHTS
PIN	COL	mm²	MARK	TW	DEST		
					CONN	PIN	FUNCTION
1	C	0.50	5		SP49		+24V TAIL LIGHTS
2	C	0.50	4		J89	7	+24V LH TURN LIGHT
3	A	0.50	6		J6	29	+24V STOP LIGHTS
4	A	0.50	7		J6	31	+24V REVERSE LIGHTS
5	C	0.50	3		J89	6	+24V RH TURN LIGHT
6	N	1.00			SP23		GND

P409				POS	02 - B2		MAST HEIGHT SENSOR R24
PIN	COL	mm²	MARK	TW	DEST		
					CONN	PIN	FUNCTION
1	V	0.50	13		SP43		GND POT. R24
2	V	0.50	17		J5	26	SIGNAL POT. R24
3	V	0.50	11		J6	30	+24V POT. R24

P410				POS	07 - B8		TWIS
PIN	COL	mm²	MARK	TW	DEST		
					CONN	PIN	FUNCTION
1							
2	M	1.00			P410	3	INPUT +80V
3	M	1.00			P410	2	OUTPUT +80V
4							
5							
6							

WT12				POS	01 - B7		GND
PIN	COL	mm²	MARK	TW	DEST		
					CONN	PIN	FUNCTION
1	N	6.00			SP22		GND

WT13				POS	01 - B7		GND HEATER
PIN	COL	mm²	MARK	TW	DEST		
					CONN	PIN	FUNCTION
1	N	6.00			SP37		GND

J63				POS	01 - C8		CONTACTOR COIL K7
PIN	COL	mm²	MARK	TW	DEST		
					CONN	PIN	FUNCTION
1	M	0.50	4		SP13		+80V COIL K7

J76				POS	01 - D7		INPUT F4
PIN	COL	mm²	MARK	TW	DEST		
					CONN	PIN	FUNCTION
1	C	0.50	01		SP12	0	+24V

J413				POS	01 - D7		INPUT F6
PIN	COL	mm²	MARK	TW	DEST		
					CONN	PIN	FUNCTION
1	M	1.50	08		WT4	1	+80V

J414				POS	01 - D7		OUTPUT F6
PIN	COL	mm²	MARK	TW	DEST		
					CONN	PIN	FUNCTION
1	M	1.50	10		P60	5	+80V

J415				POS	01 - D7		INPUT F5
PIN	COL	mm²	MARK	TW	DEST		
					CONN	PIN	FUNCTION
1	M	6.00	08		WT6	1	+80V

J416				POS	01 - D7		OUTPUT F5
PIN	COL	mm²	MARK	TW	DEST		
					CONN	PIN	FUNCTION
1	M	6.00	09		P60	6	+80V

J417				POS	01 - D7		OUTPUT F7
PIN	COL	mm²	MARK	TW	DEST		
					CONN	PIN	FUNCTION
1	M	1.50	06		P60	1	+80V

P50				POS	01 - C6		CONTACTOR GROUP
PIN	COL	mm²	MARK	TW	DEST		
					CONN	PIN	FUNCTION
1	C	1.00	01		SP12		+24V
2	M	1.50	01		J38	1	+80V
3	M	1.00	02		SP32		+80V
4	A	0.50	14		SP18		GND
5	N	0.50			J55	1	GND
6	C	0.50	07		J42	1	+24V
7	L	0.50	1		J62	1	GND
8							
9	M	1.00	04		SP13		+24V

J402				POS	03 - C5		AUTOLEVEL BUTTON S7
PIN	COL	mm²	MARK	TW	DEST		
					CONN	PIN	FUNCTION
1	R	0.35			SP39		+5V
2	L	0.35			SP40		GND
3	SZ	0.35			SP41		SIGNAL

J403				POS	03 - C5		ATT1 POTENTIOMETER R12 / R13
PIN	COL	mm²	MARK	TW	DEST		
					CONN	PIN	FUNCTION
1	R	0.35			SP39		+5V
2	RL	0.35			J139	12	PS1
3	HZ	0.35			J139	3	PS2
4	N	0.35			SP38		GND

J404				POS	03 - B5		POTENTIOMETER R14 / R15 ATT2
PIN	COL	mm²	MARK	TW	DEST		
					CONN	PIN	FUNCTION
1	R	0.35			SP39		+5V
2	A	0.35			J139	5	PS1
3	AB	0.35			J139	14	PS2
4	N	0.35			SP38		GND

J405				POS	03 - B5		ATT2 BUTTON S10
PIN	COL	mm²	MARK	TW	DEST		
					CONN	PIN	FUNCTION
1	R	0.35			SP39		+5V
2	L	0.35			SP40		GND
3	M	0.35			J139	17	SIGNAL

J406				POS	03 - D2		HORN BUTTON S13
PIN	COL	mm²	MARK	TW	DEST		
					CONN	PIN	FUNCTION
1	N	0.50			P131	8	INPUT GND
2	A	0.50	4		P131	9	OUTPUT SIGNAL

J407				POS	03 - D5		LOAD METER BUTTON S14
PIN	COL	mm²	MARK	TW	DEST		
					CONN	PIN	FUNCTION
1	R	0.35			SP39		+5V
2	L	0.35			SP40		GND
3	ZN	0.35			J139	18	SIGNAL

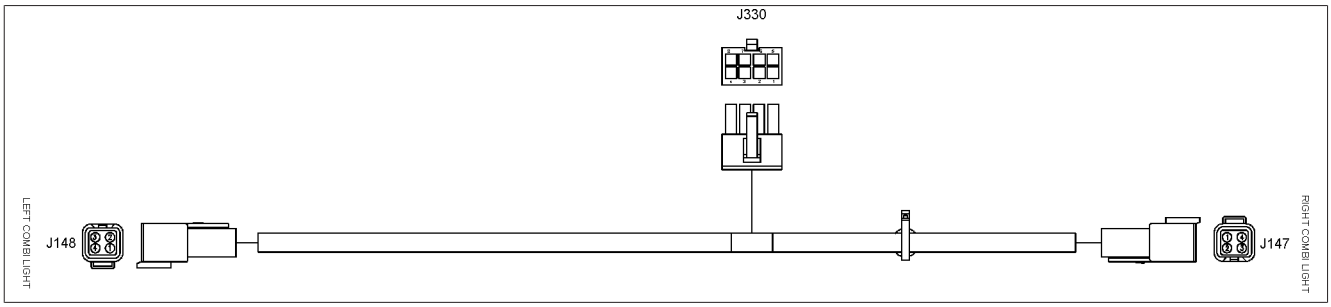
J408				POS	03 - C3		HEIGHT LIMITER BUTTON S15
PIN	COL	mm²	MARK	TW	DEST		
					CONN	PIN	FUNCTION
1	V	0.50			J139	11	OUTPUT SIGNAL
2	L	0.50			SP40	9	GND

J330				POS	06 - B6		12-24V FUSE CARD
PIN	COL	mm²	MARK	TW	DEST		
					CONN	PIN	FUNCTION
1	C	0.50	3		J147	3	+24V RH DIRECTION LIGHT
2	C	0.50	4		J148	3	+24V LH DIRECTION LIGHT
3							
4	N	1.00			J147	4	GND LH LIGHTS
5	C	0.50	5		SP55		+24V TAIL LIGHTS
6	B	0.50	23		J147	2	+24V RH HEAD LIGHT
7	B	0.50	20		J148	2	+24V LH HEAD LIGHT
8	N	1.00			J148	4	GND RH LIGHTS

J148				POS	06 - C3		FRONT LEFT LED LIGHTS
PIN	COL	mm²	MARK	TW	DEST		
					CONN	PIN	FUNCTION
1	C	0.50	5		SP55		+24V TAIL LIGHT
2	B	0.50	20		J330	7	+24V HEAD LIGHT
3	C	0.50	4		J330	2	+24V DIRECTION LIGHT
4	N	1.00			J330	8	GND

SP55				POS	06 - B4		+24V SIDE LIGHTS
PIN	COL	mm²	MARK	TW	DEST		
					CONN	PIN	FUNCTION
1	C	0.50	5		J330	5	+24V TAIL LIGHTS
2	C	0.50	5		J147	1	+24V TAIL LIGHTS
3	C	0.50	5		J148	1	+24V TAIL LIGHTS

FRONT LED LIGHTS WIRING



COLOR CODES

- **A** PALE BLUE
- **B** WHITE
- **C** ORANGE
- **G** YELLOW
- **H** GREY
- **L** DARK BLUE
- **M** BROWN
- **N** BLACK
- **R** RED
- **S** PINK
- **V** GREEN
- **Z** PURPLE