

1.2 CRANKSHAFT

1.2.1 ADJUSTING ALTERNATOR V-BELT TENSION

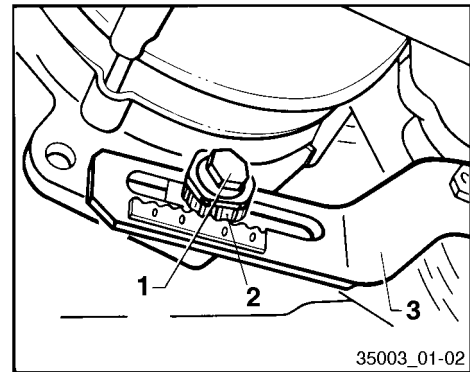
- Loosen all security bolts (1) for tensioner (3) and alternator by at least one turn.



ATTENTION

The alternator must be easily moveable by hand.

- Tension V-belt by tensioning nut (2) with a torque wrench.
Specification:
New V-belt: 8 Nm
Used V-belt: 4 Nm



and tighten tensioning nut securing bolt to 30 Nm.

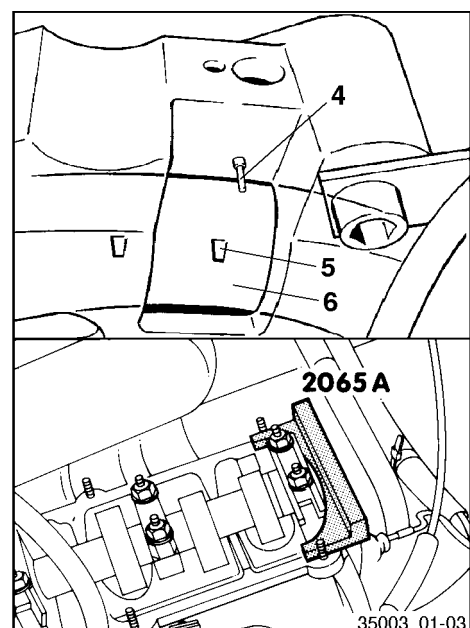
- Tighten all tensioner and alternator securing bolts.

NOTE: Adjustment is ideally carried out with the torque wrench V.A.G. 1410 in connection with the socket spanner V.A.G. 1410/2.

1.2.2 REMOVING TOOTHED BELT

REMOVAL

- Remove upper belt guard and cylinder head cover.
- Turn crankshaft to TDC on No. 1 cylinder.
The TDC mark (5) on the flywheel (6) must be in line with the boss (4) on the bell housing.
- Fix camshaft in position with setting bar (2065 A).
- Align setting bar as follows:
Turn camshaft until one end of bar touches the cylinder head. Measure the gap at the other end of the setting bar with the feeler. Take half of gap measurement and insert feeler of this thickness between setting bar and cylinder head. Now turn the camshaft so that the setting bar touches the feeler. Insert second feeler of the same thickness between the other end of the setting bar and the cylinder head.



- Remove securing bolts (2) from bracket (3 bolts).
- Remove securing bolt (1) from rear support bracket.

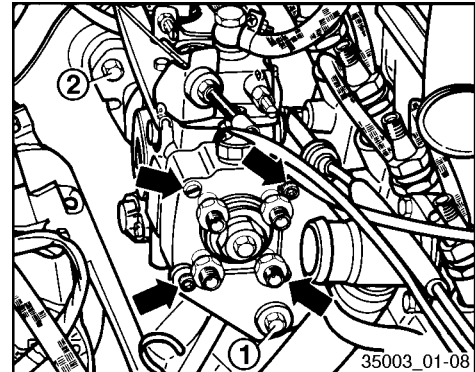
NOTE: Loosen the lower and right-hand securing bolt from the front.



ATTENTION

Under no circumstances should the securing bolts (see arrows) holding the fuel injection pump head be loosened.

Loosening the securing bolts would allow the head to move and would cause the breakage of the distributor plunger.



INSTALLATION

- Install the fuel injection pump and align centrally in the elongated flange holes.

Tightening torques:

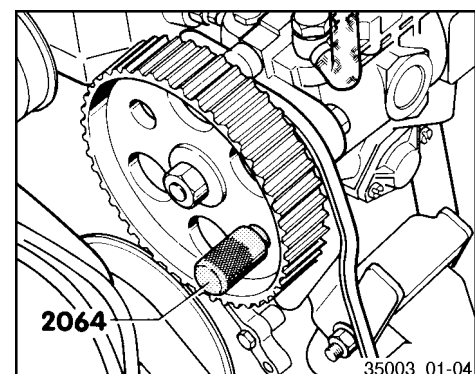
Pump mounting bolts:	25 Nm
Fuel pipes:	25 Nm
Injection pump sprocket:	45 Nm



ATTENTION

Do not interchange the feed and return pipe banjo bolts. The inside diameter of the bolt for the return pipe is smaller and the hexagon head is marked "OUT".

- Install injection pump sprocket and fix position with positioning pin (2064).
- Loosen bolt of camshaft sprocket by half a turn. Free camshaft sprocket from the taper by tapping with a hammer (using a drift through the hole in the rear toothed belt guard).
- Check that TDC mark on the flywheel is aligned with the reference mark
- Install toothed belt and remove the positioning pin from the fuel injection pump sprocket.



Service Training

2.3 TECHNICAL DATA OF THE TRAVEL DRIVE SYSTEM

VARIABLE DISPLACEMENT PUMP

Type	HPV 55 -02
Number of pistons	7
Piston diameter	19 mm
Max. working pressure	420 bar
Boost/pilot pressure	17.5 bar
Swash angle	19.7°
RPM in vehicle	2300 rpm
Q Maximum of feed pump	16 - 17 l/min
Control	hydraulic
Actuation	Linde Hydraulic Control LHC
Pump drive	directly via flexible coupling

DRIVE AXLE

Type	AH 20 -01
Two fixed displacement pumps	HMF 35 -02
Number of pistons	7
Piston diameter	17 mm
Constant swash angle	20.8 °

REDUCTION GEARBOXES (PLANETARY GEAR)

Planetary reduction	single speed
Total ratio	7.615 : 1

2 OIL PRESSURE - MULTI-DISC BRAKES

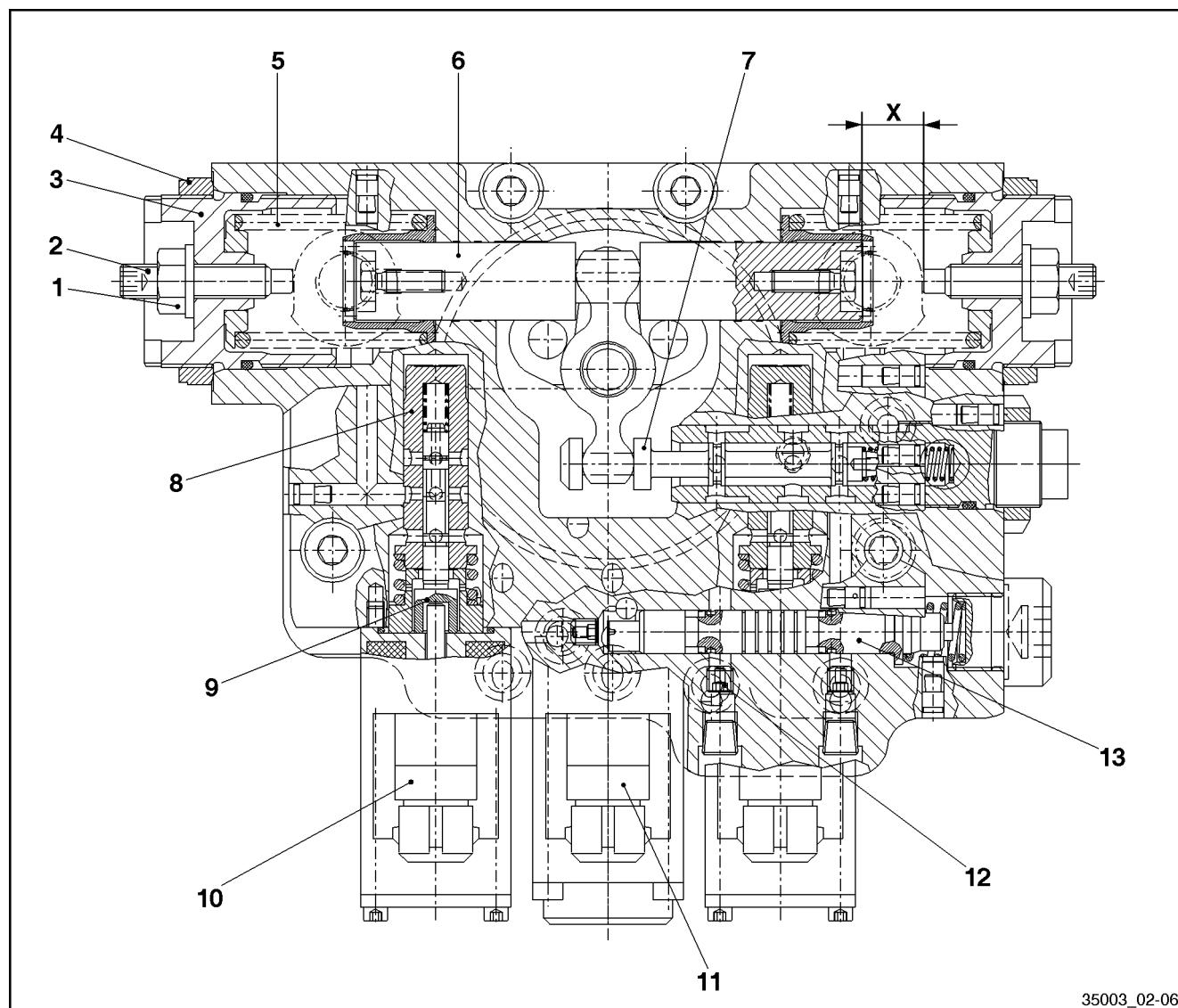
- on extended motor shaft
- fully encapsulated - running in oil bath
- only required as parking and emergency brake

TANDEM GEAR PUMP

1 working hydraulics pump	14 cm ³
1 pump for steering, supply and control	11 cm ³

Service Training

2.7.1 HYDRAULIC ADJUSTMENT WITH ELECTRONIC CONTROL



35003_02-06

- | | |
|-----------------------------------|----------------------------------|
| 1 Locknut | 9 Proportional valve |
| 2 Swashplate angle setscrew | 10 Solenoid |
| 3 Setting bush - start of control | 11 Release valve |
| 4 Locknut | 12 Servo circuit nozzles |
| 5 Control spring | 13 Way valve |
| 6 Spool | |
| 7 Control pilot | X Travel of servo piston 15.1 mm |
| 8 Way valve | |

Service Training

2.10.1.1 WORKING WITH THE LINDE TEST MODULE

Conditions

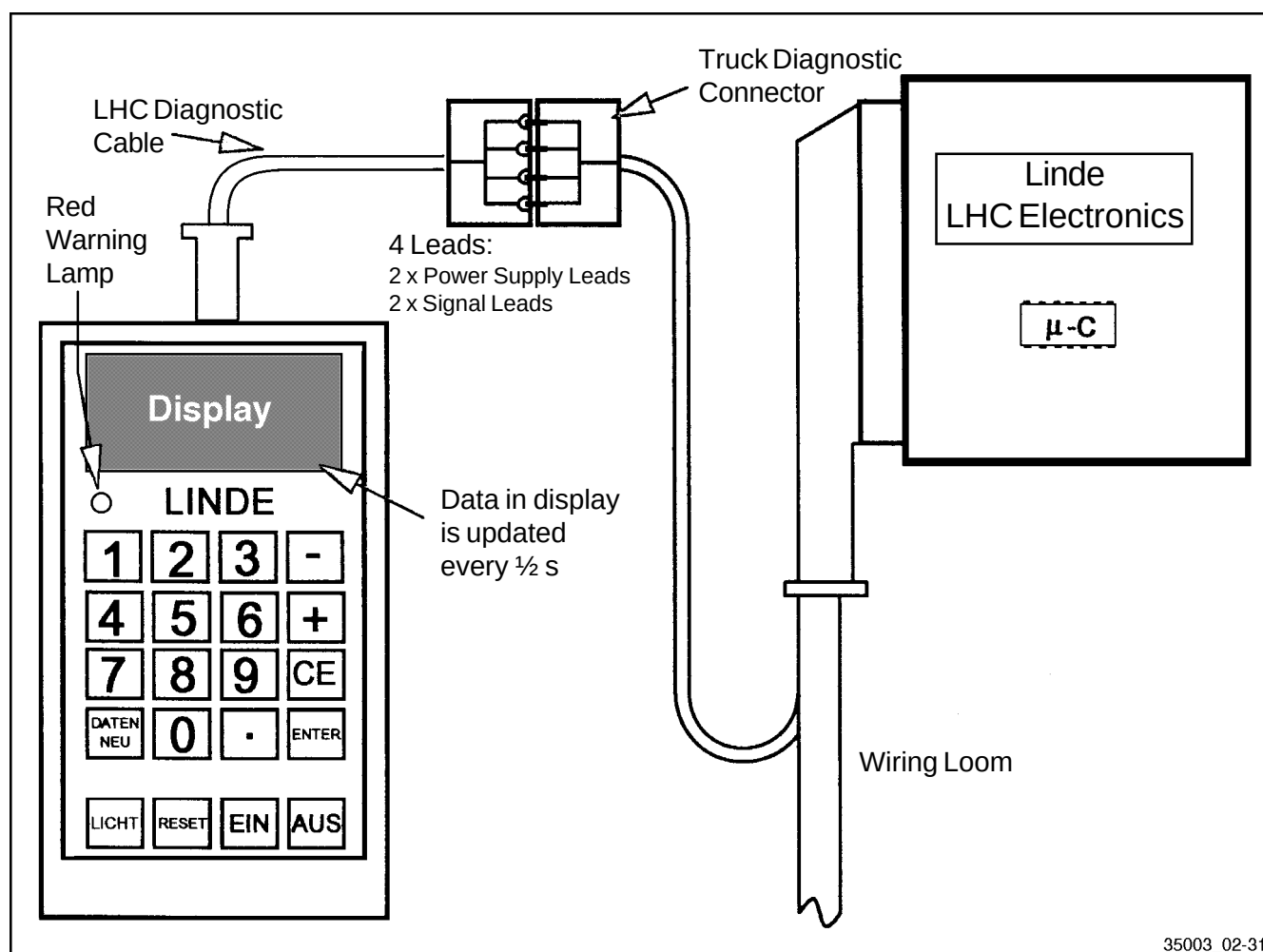
- Traction wheels of truck off the ground
- Accelerator pedals in neutral position
- Brake pedal held in braking position
- Ignition switched off

Before using the Test Module, check if it is operational by pressing the EIN (ON) button. The following information will be displayed:

```

* Linde Test Modul *
* V2.27-P 10/96 St *
* Terminal ready   *
* No data received *
  
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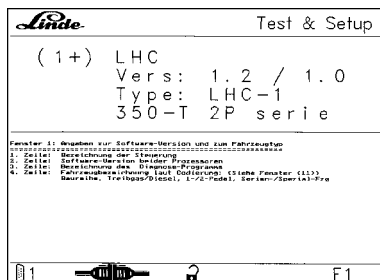
Software version and version date
of the module
Module is operational
No data received



2.10.1.3.3 MENU WINDOWS IN DETAIL - LHC SOFTWARE VERSION 1.1 - 1.3

WINDOW 1 INFORMATION ON SOFTWARE VERSION AND TRUCK TYPE ALL SOFTWARE VERSIONS

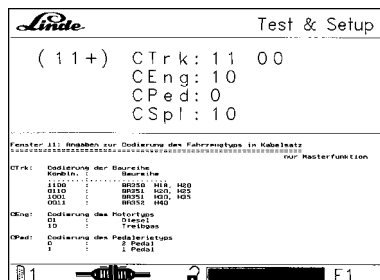
This window displays general information on the truck as detected by the Test Module.



1st line: Controller designation
2nd line: Software version of both processors
3rd line: Designation of diagnostic program
4th line: Truck model code:
(see window (11)) series, LPG/Diesel,
1/2 pedal(s), series/special truck

NOTE: If the information displayed in the window does not correspond to the truck version, there is a fault in the wiring or the electronic controller.

WINDOW 11 (MASTER VERSION) INFORMATION ON TRUCK TYPE CODE IN THE CABLE LOOM



CTrk Truck series code
1100 BR 350 H18, H20
0110 BR 351 H20, H25
1001 BR 351 H30, H35
0011 BR 352 H40

CEng Engine type code
01 Diesel
10 LPG

CPed: Pedal type code
0 2 pedals
1 1 pedal

WINDOW 5 OUTPUT SIGNALS

Window 5 displays the output signals. The indicated components are numbered and correspond to the designation in the wiring diagram.

Safety relay in electronic controller

Release valve

Fuel shutoff valve

Fault lamps

Stop light

Flashing light during reversing

Reversing light

REPRESENTATION OF SWITCHING STATES

- 0 means not driven
- 1 means driven

1K1 Safety relay in electronic controller

1K1:1 appears after the ignition is turned on.

1Y4 Release valve

Depress the accelerator pedal with the engine running and the brake released. Output 1Y4:1 will be displayed.

1Y5 Fuel shutoff valve

During the starting procedure the output changes from 1Y5:0 to 1Y5:1.

1H20 Fault lamps

- With the ignition on, lamps on: 1H20:1
- With the engine running, lamps off: 1H20:0
- With malfunction, lamps flashing: alternately 1H20:0/1

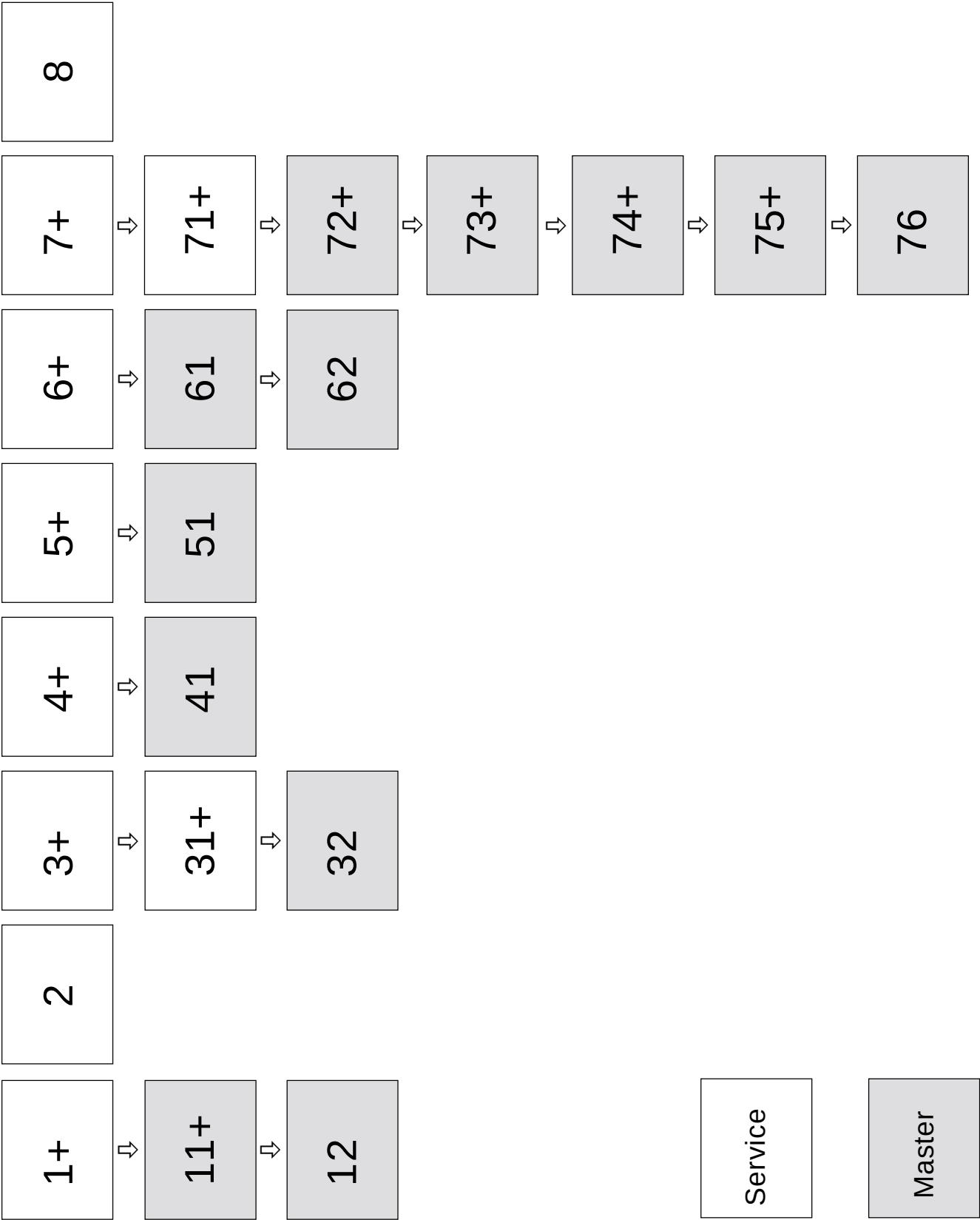
5K10 Stop light

- 5K10:0 Stop light off
- 5K10:1 Stop light on

- 31 The voltage values of potentiometers 1B2.1 and 1B2.2 do not match, and neither is 0 V.
The values supplied by both potentiometers are not within the admissible tolerance range.
Possible cause: potentiometer
- 32 The voltage value of potentiometer 1B2.1 is either too low or too high.
The voltage value supplied by potentiometer 1B2.1 is not within the admissible range. It is either below 0.8 V or over 9.2 V. Check this value in window 6. For a setting of the maximum values see the description in window 6. If an adjustment can not be carried out successfully, the potentiometer could be defective.
Truck responses: W – B – L
- 33 The voltage value of potentiometer 1B2.2 is either too low or too high.
The voltage value supplied by potentiometer 1B2.2 is not within the admissible range.
Possible cause: potentiometer
Truck responses: W – B – L
- 34 Both potentiometers 1B2.1 and 1B2.2 at 0 Volt
The voltage of approx. 10 Volt specified by the LHC box can not be processed further.
Possible causes: potentiometer not connected, potentiometer defective, cable loom
Truck responses: W – B – L
- 35 Travel direction signal encoding is not OK
The controller can not sense if it is a single-pedal or two-pedal vehicle.
Possible causes: encoding plug (near key switch); travel direction switch not connected or faulty, cable loom (negative signals to LHC box not present, check)
--> Window 4)
Truck responses: W – B – L
- 36 Signal from travel direction switch
A signal expected from the travel direction switch can not be detected.
Possible causes: travel direction switch, cable loom (check negative signals coming from travel direction switch to LHC box) --> window 4
Truck responses: W – B – L
- 37 Brake switch 1 (1S5) breaker and maker have the same signal.
The brake switch does not change its outputs from 0 to 1 and from 1 to 0. --> window 4
Possible causes: brake switch defective, open connection (check negative signals coming from brake switch to LHC module)
Truck responses: W – B
- 38 Switching sequence of brake switch 1 (1S5) and brake switch 2 (S14) is not OK.
The controller first expects (operation of brake pedal) brake switch 1 (1S5), before brake switch 2 (S14) becomes active. --> window 4
Possible causes: both brake switch connectors interchanged; brake switch 1 (1S5) not connected, brake switch 1 defective; cable loom from brake switch 1 to LHC module
Truck responses: W – B

VERSION 1.6

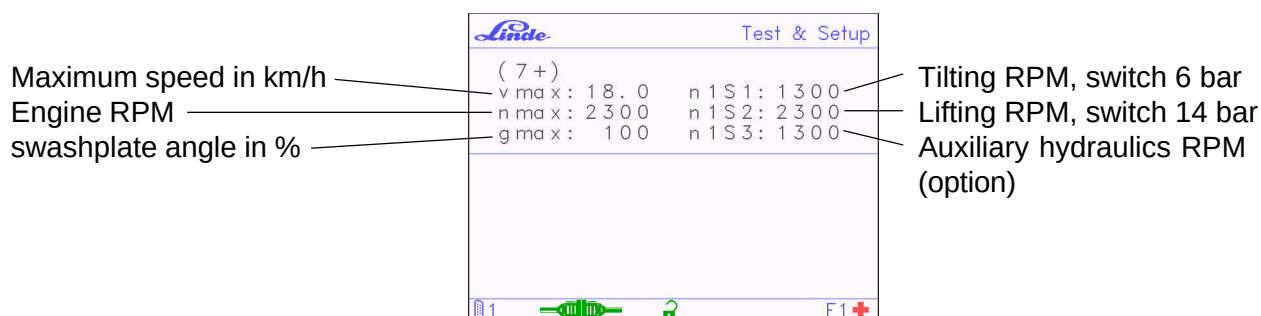
2.10.1.3.6 OVERVIEW OF MENU WINDOWS - LHC SOFTWARE VERSION 1.6



- 39 Seat switch breaker and maker have the same signal
The seat switch is activated --> window 72 and both output signals of the seat switch show the same value 00 or 11. --> window 4
Possible causes: seat switch is switched active but not connected; seat switch defective; open connection (seat switch - LHC module); cable loom
Truck responses: W – B – L
- 41 vs is under 8 Volt although vr is over 11 Volt
Supply voltage vs for the traction potentiometer is under 8 Volt, although supply voltage vr for the LHC module is over 11 Volt. --> window 6
Possible cause: voltage regulator in LHC module
Truck responses: W – B – L
- 43 Controller without power
The LHC module is without supply voltage vr . --> window 6
Possible causes: fuse 1F18 defective; cable loom at LHC module not connected to positive and negative terminals.
Truck responses: W – B – L
- 44 Safety relay in the controller can no longer be switched off
Safety relay K1 in the LHC module (switched off briefly when the ignition key is turned) is sticking.
Possible cause: K1 relay in the LHC module is oxidized, sticking
Truck responses: W – B – L
- 45 Release valve can no longer be activated
Release valve 1Y4 can not be activated. --> window 5
Possible causes: open connection in cable loom to the release valve, release valve solenoid defective
Truck responses: W – B
- 46 Release valve can no longer be deactivated
Release valve 1Y4 was activated, but can no longer be deactivated.
--> window 5
Possible causes: LHC module defective; cable loom for release valve is permanently "+"
Truck responses: W – B
- 47 Current of release valve is too low
Release valve 1Y4 can not be activated --> window 5
Possible causes: inherent resistance of solenoid of valve 1Y4 is too large or solenoid not connected; cable loom
Truck responses: W – B
- 51 Current of solenoid for IC engine is too high
The vehicle detects too high a current value for solenoid iY1 to speed controller, over 1.8 A --> window 6
Possible causes: short in solenoid iY1 or in cable loom to solenoid iY1
Truck responses: W – E – L – F – S

WINDOW 7 SETTING TRUCK SPEED AND SPECIFIED RPM

This window displays the parameters specified by the controller. These parameters can be modified up to certain limits.



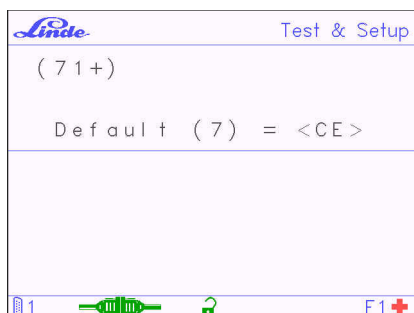
HOW TO CHANGE THE PARAMETERS

- Press the ENTER button.
- The cursor will appear and jump to the first parameter.
- The value can be changed within limits using the "+" and "-" buttons.
- The modification is stored instantly and is in effect.
- Go to the next parameter by pressing ENTER again.
- The entry of parameters can be ended by selecting a different window number.

NOTE: V_{max} can only be modified by changing n_{max} (engine RPM) or g_{max} (pump swashplate angle). The speed is changed in steps of 50 RPM.
A change of n_{max} is only effective if the brake pedal is released and the accelerator pedal fully depressed.
The speed of $n1S1$ and $n1S2$ can be changed in steps of 100 RPM.

WINDOW 71 RESETTING PARAMETERS TO STANDARD FACTORY SETTINGS

Pressing 71 (7 and 1) quickly displays window 71 (sub-window of 7).



In window 71 the parameters shown in window 7 can be reset to their factory default settings.

The parameters are reset to their factory default settings by pressing the CE key.

2.10.2.2 TEST AIDS

The screw couplings, adapters, test lines and pressure gauges required for the measurements are contained in the test case.

2.10.2.2.1 EXPLANATIONS TO TROUBLESHOOTING

The functional tests and any ensuing troubleshooting is performed separately for each main group. The following components and functions are affected:

Hydraulic steering system	Section 2.10.2.3
Hydraulic braking system	Section 2.10.2.4
Hydrostatic travel drive	Section 2.10.2.5

Before commencing with the activities described below, first check the oil level and top up the oil, if required.

If a pressure gauge or a plug must be installed for a test procedure, first depressurise the tank by unscrewing the breather valve.

The installation points for pressure gauges or plugs are shown in the line hook-up diagram.

In some test steps the Drive axle AH 20 -01 must be disconnected. In this case proceed as follows:

Unscrew the union nuts on the HP hoses connected to the AH20 -01 drive axle, plug the openings and reconnect the hoses.

LIST OF ABBREVIATIONS USED

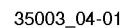
LP gauge	= low pressure gauge
HP gauge	= high pressure gauge
LP	= low pressure
HP	= high pressure
F pedal	= forward accelerator pedal
R pedal	= reverse accelerator pedal

If not specified otherwise, all pressure measurements must be performed with the brake pedal released.

Service Training

4 STEERING SYSTEM

4.1 SCHEMATIC DIAGRAM OF THE STEERING SYSTEM



- 1 Gear pump
- 2 Pressure relief valve 120 bar
- 3 Steering valve 45 cm³
- 4 Make-up valve
- 5 Hose safety valves 190 bar

- A Working hydraulics
B Feed

9H4	Switch light (1.2 W)	115
9H16	Switch light (1.2 W)	7
9H17	Switch light (1.2 W)	10
K2	Starter relay	205 - 208
5K1	Flasher unit	36 - 38
5K10	Relay for optional equipment	49 - 51, 54 - 56, 59 - 61
7K3	Regeneration inhibit relay	160 - 163
7K4	Start inhibit relay	186 - 190
7K5	Warning stage 1 relay	179 - 184
7K6	Time relay	168 - 170
7K7	Auxiliary starter relay	199 - 202
7K8	Reset relay	173 - 177
9K5	Wiper relay, front	78 - 83
9K6	Wiper relay, rear	100 - 105
7M4	Fan	162
7M5	Metering pump	168
9M1	Wiper motor, front	78 - 82
9M2	Wiper motor, rear	100 - 104
9M6	Heater fan	212
7R2	Glow plug	178
4S15	Revolving light switch	44 - 46
5S11	Light switch	18 - 23
5S12	Hazard light switch	31 - 38
5S13	Flasher switch	34, 35
7S1	Vacuum switch	134
7S16	Ignition switch	162
7S17	Emergency stop switch	171 - 175
9S1	Working light switch, front	2 - 7
9S2	Working light switch, rear	9 - 13
9S3	Switch for front windscreen wiper	88 - 94
9S4	Switch for rear windscreen wiper	110 - 116
9S10	Seat switch	65
9S11	Engine speed increase option switch	69
7V1	Recovery diode	166
7V2	Decoupling diode	184
7V3	Decoupling diode	184
X3	Connector 1 pin	162
X3.1	Connector 1 pin	167
5X1	Connector 8 pins	18 - 38
5X2	Connector 6 pins	23 - 38
5X3	Connector 3 pins	28
7X1	Connector 2 pins	126
7X2	Connector 2 pins (LPG)	127
7X2	Connector 4 pins (Diesel)	162 - 164

Service Training

9.1.2.2 REMOVING, INSTALLING, TENSIONING THE TOOTHED BELT

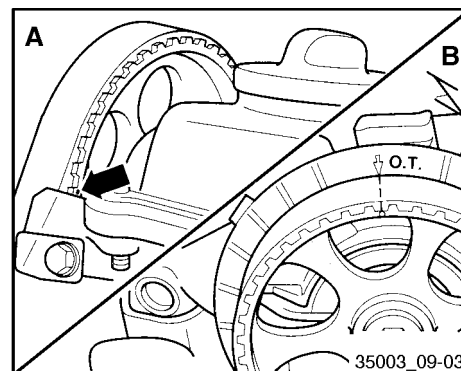
REMOVAL

- Remove the V-belt, pulley and upper and lower toothed belt guards.
- Mark the running direction of the toothed belt.
- Loosen the idler pulley and remove the toothed belt.

INSTALLATION

NOTE: When rotating the camshaft, the crankshaft must not be at TDC. Risk of damage to valves/piston head.

- Install the toothed belt on the crankshaft sprocket and the intermediate shaft sprocket (observe direction or rotation).
- Lock the V-belt pulley with a screw (observe fixing).
- Bring the mark on the ignition timing gear into line with the mark on the rocker cover -A- or toothed belt guard -B- (arrow).



- Bring the mark on the pulley in line with the mark on the intermediate shaft sprocket (TDC of cylinder no. 1).
- Install the toothed belt on the camshaft sprocket.

