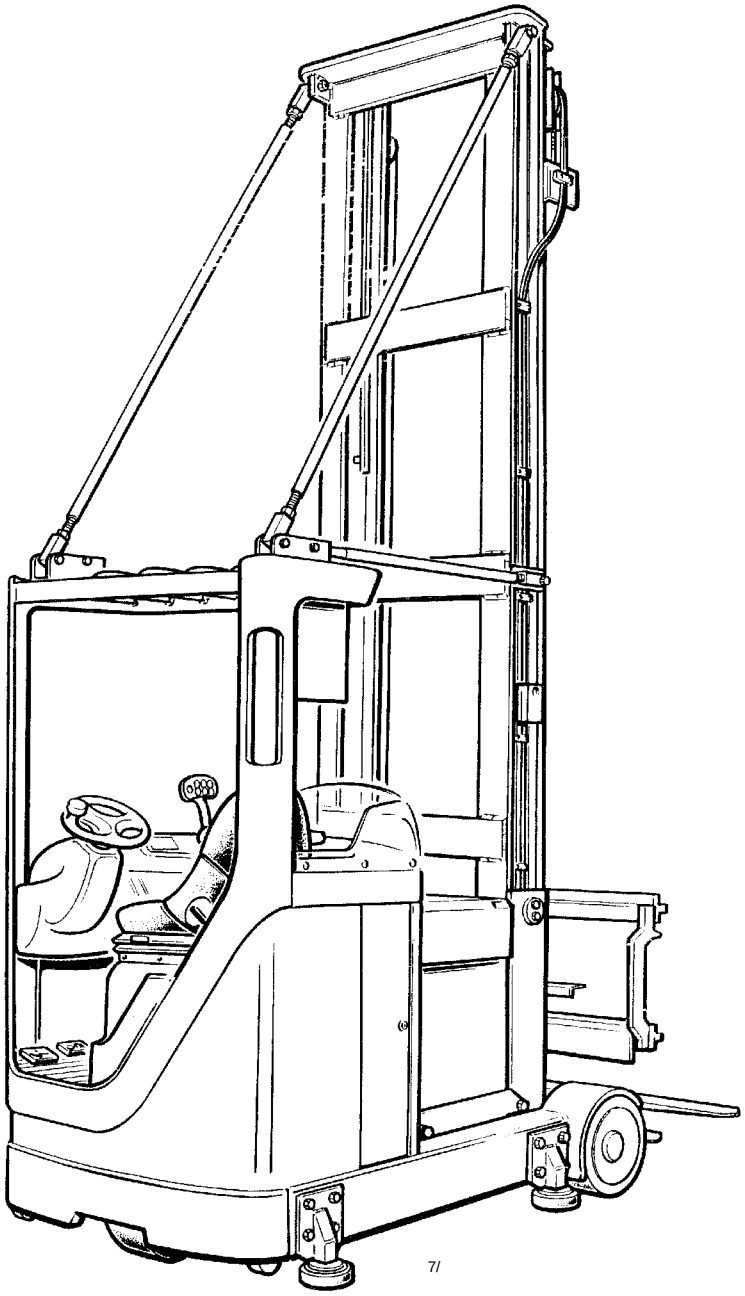
Workshop Manual GX10



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First issued: 02/99 Last update: 11/01		Workshop Manual	**GX10**	Id. No. 8 054 137

Continued

Dismantling the travel motor

Inspecting the individual components

After the motor has been dismantled, the individual components must be carefully cleaned and checked for wear or damage. Clean the components with a petroleum oil based cleaning solution and leave them to dry. Replace all old bearings with new bearings.

Check the brushes to ensure that they are worn evenly; replace brushes which are very worn (minimum carbon brush length: 17 mm) or damaged by pitting or overheating. Always replace the full set of carbon brushes. Ensure that the brushes can move freely in the holders and that the brush spring pressure is correct.

Armature inspection

Check the bearing journals of the armature shaft and keyway for wear. Inspect the windings and commutator connections and rails for signs of burning. Burn marks in the brush track or on the raised ends of the commutator rails indicate an interruption or short circuit in the armature windings.

Reworking commutators

The commutator can be reworked on a lathe with fine emery paper, to remove notches or pitting from the surface. If there is a great deal of pitting, large notches or heavy wear, the commutator must be re-turned (minimum diameter 100 mm). Only slight cuts of 0.13 mm and a final removal of 0.005 mm are permissible. The mica insulation should then be cut into by about the same degree as the width of the insulation (usually 1 mm). After cutting, smooth off the commutator with fine emery paper and clean it, to remove dust and fine particles of dirt.

Assembling the travel motor

The motor is assembled by following the instructions in reverse order. Check that all the screwed and clamped connections are secure. Bed in the new brushes as described in the section 'Bedding in the carbon brushes'.

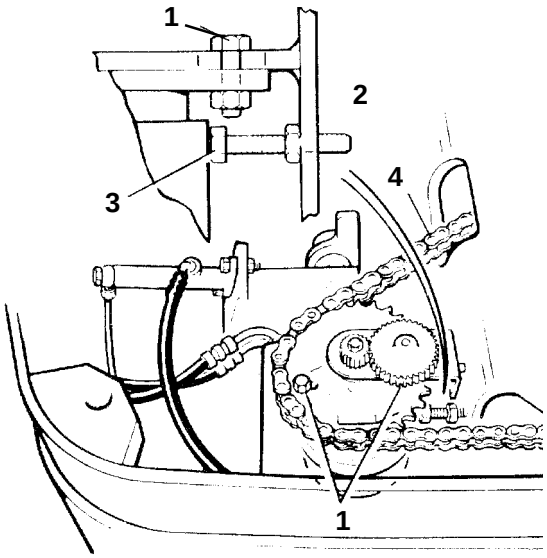
Contents

Sheet no.

LR80

Adjusting the steering chain

- Switch off the key-operated switch, pull out the battery plug and block the load bearing wheels securely.
- Remove the retaining screw from the base plate in the driver's footwell; raise and support the base plate.
- Release the two hexagon screws M12 x 50 '1' which fasten the steering motor to its mounting.
- Release lock nut '2'.
- Increase the tension on the steering chain by turning the screw '3' to the left.
- Do not tension the steering chain too much. There should still be a play of 8 - 12 mm at point (4).
- Once the adjustment is complete, tighten the lock nut '2' and retaining screw '1' on the steering motor.
- Replace the base plate and reconnect the cables for the accelerator pedal and foot switch. Check the steering function.



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LR80

Steering output stage W96 / 100 A

Service switch (1)

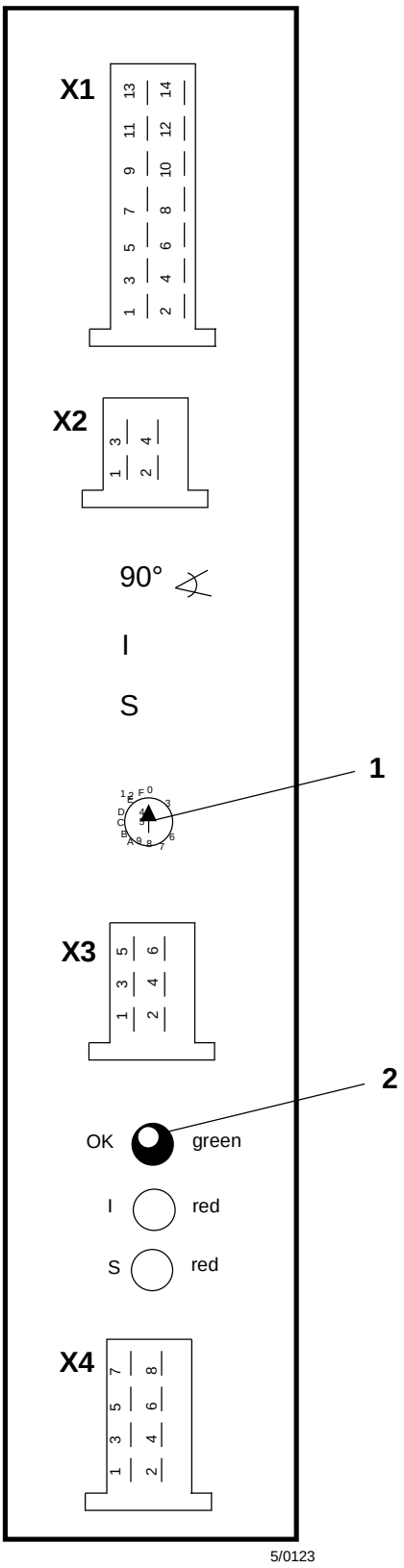
The service switch can be used to reduce the output of the steering output stage and consequently reduce the steering speed.

In this way, it is posible to prevent breakage of the steering chain due to incorrect adjustment.

The service switch can only be turned to a maximum setting F (not an endless switch).

	Switch position	Drive
Normal operation	3	max
Max. reduction at the output stage	C	30% of output stage

After adjustment work, the switch must be returned to the normal operation setting "3".



LR 80

Guide frequency generator

Specifications

Output voltage:	4.3 V / AC
Output current:	adjustable, 20 mA to 200 mA Display on 10 LEDs in steps of 20 mA
Loop length:	max. 800 m (100 mA, 1.5 mm^2)
Power supply:	110 V / 230 V (Adapt at change-over switch on the board)
Power consumption:	10 W f = 45 Hz - 66 Hz
Protection class:	in accordance with VDE 0411 Class I
Noise suppression:	in accordance with VDE 0875 Class n
Main fuse:	0.4 A semi time-lag
Internal fuse:	0.2 A semi time-lag
Frequency stability:	± 2 Hz

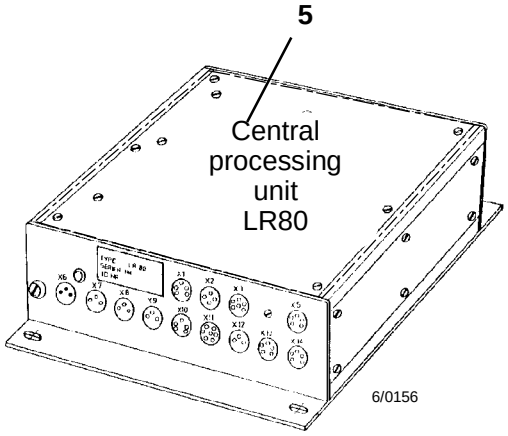
Remark: If other frequency generators are used, it is important to ensure that these do not have frequency fluctuations of more than ± 20 Hz. If they do, the digital filter integrated on the CPU card can no longer evaluate the signal.

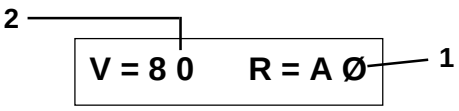
LR 80 adjustment

Balancing the digital filter

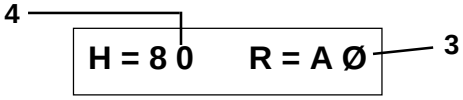
Remark: The vehicle does not have to be positioned over the wire for this purpose! The "NEW" CPU card (see sheet no. B24) is preset in the factory.

- Remove the cover (5) of the central processing unit so that the balancing potentiometers (see sheet no. B24) can be accessed.
- Set the frequency switch to position E (see sheet no. B24).
- Set the operating mode switch to position 4 and press the reset key (see sheet no. B21).
- A message is displayed on the operating unit e.g.





- Turn the steering wheel (setpoint potentiometer) until the value (1) AØ appears on the operating unit display.
- Use the potentiometer (item 5, sheet no. B24) to set the value (2) to 80.
- Set the operating mode switch to position 6.
- As message is displayed on the operating unit e.g.



- Turn the steering wheel (setpoint potentiometer) until the value (3) shown on the operating unit display is AØ.
- Use the potentiometer (item 6, sheet no. B24) to set the value (4) to 80.
- Return the operating mode switch and frequency switch to their normal positions (see sheet no. B24) and press the reset key.

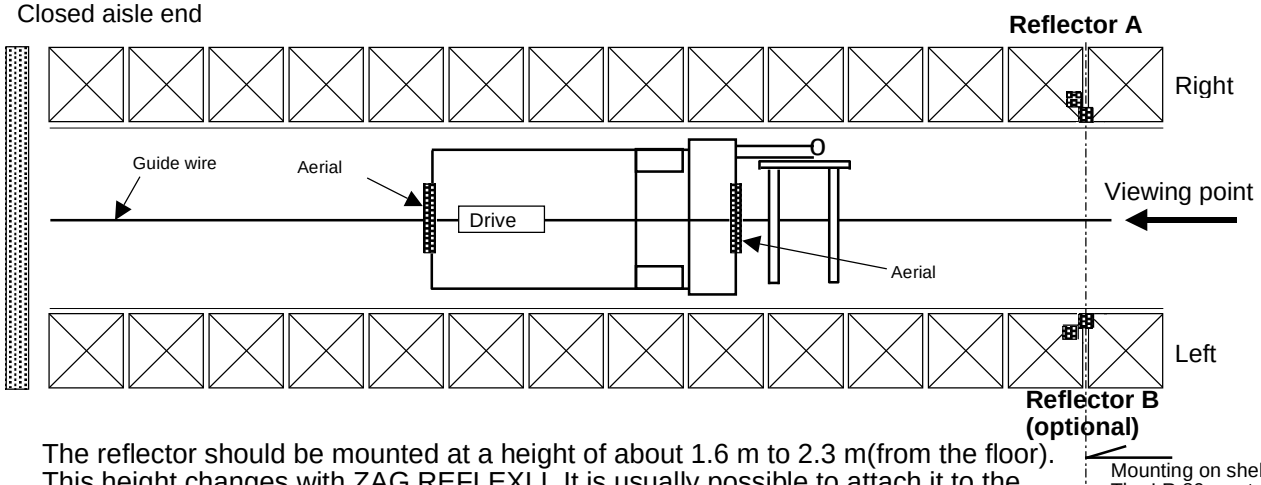
LR 80

Aisle detection

Mounting the reflectors

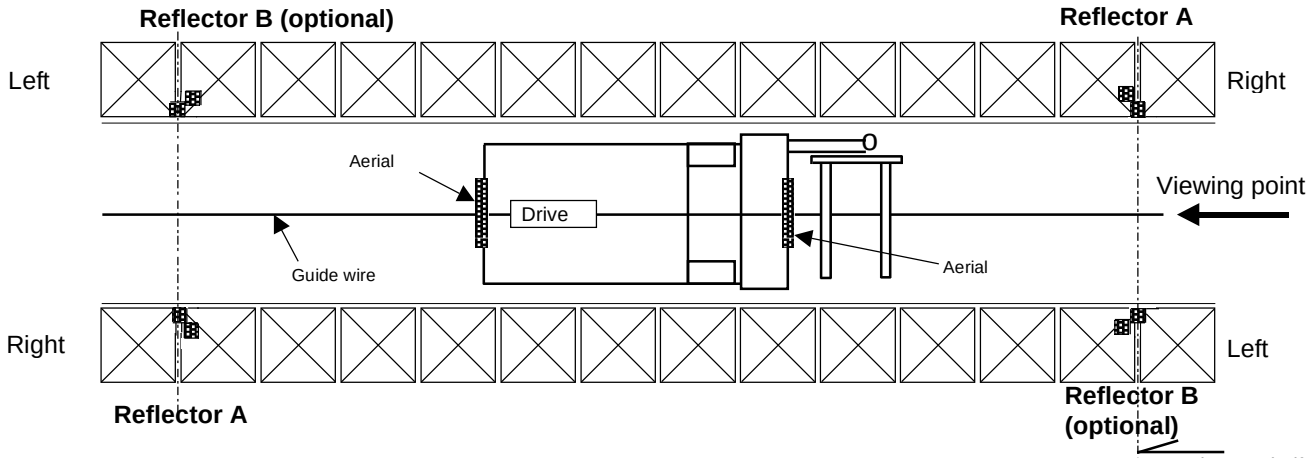
1 = 7B10 In aisle upper light barrier
2 = 7B11 Outside aisle lower light barrier
3 = 7B12 In aisle upper light barrier
4 = 7B13 Outside aisle lower light barrier

Aisle with one open end



The reflector should be mounted at a height of about 1.6 m to 2.3 m(from the floor).
This height changes with ZAG REFLEXLI. It is usually possible to attach it to the first shelf upright.
The A reflector should only ever be mounted on one side of the aisle, that is, on the right as seen from the viewing point.
If installation on the right is not possible, mount the B reflector on the left-hand side as seen from the viewing point.

Aisle with 2 open ends



The reflector should be mounted at a height of about 1.6 m to 2.3 m (from the floor).
This height changes with ZAG REFLEXLI. It is usually possible to attach it to the first shelf upright.

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LR 80 adjustment

Reading out and changing parameters and test selection

Storing parameters

The basic setting of all the parameters is stored in the EPROM. When the vehicle is switched on, these parameters are loaded from the EPROM into the RAM (working memory) (1), if there are not yet any parameters in the EEPROM or the EEPROM is missing.

The parameters can only be changed in the RAM (volatile memory). This memory only stores the data until the power supply is switched off. This means that the altered parameters are lost when the vehicle is swtiched off.

For this reason, the altered parameters must be transferred to and stored in the EEPROM (non-volatile memory) (2) before the vehicle is switched off. During this process, a marker is set so that the data is read in from the EEPROM the next time the vehicle is switched on. A check sum is also stored with the data which is recalculated and compared with the original as the data is read into the working memory.

The command for storing the parameters is:
(see also sheet no. B50)

P S Ø 1 E X E

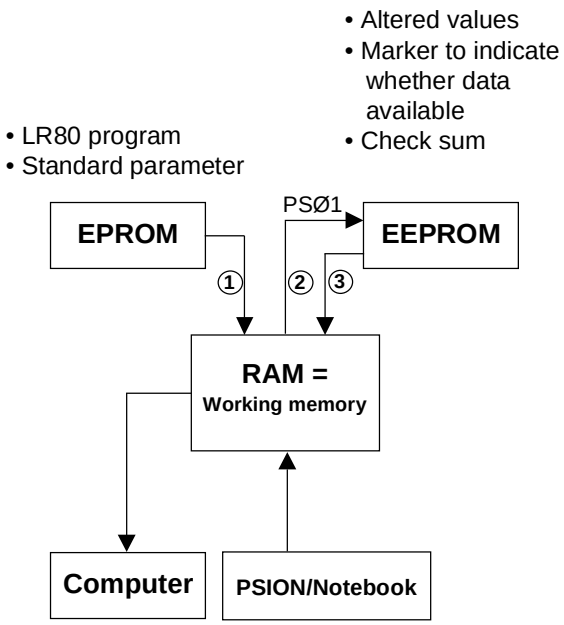
When this command has been given, the vehicle can be switched off.

When the vehicle is switched on the next time, the parameters are taken from the EEPROM (3).

Note: Before entering the programming command PS01, ensure that:

1. There is no travel direction selected
2. The LR80 is in manual operation, i.e. manual/automatic switch is not pressed; logged off with command BØØØ.
3. Vehicle is at a standstill.
4. The "enable steering" switching output is switched off.

Continued on sheet no. B61



LR 80

Error messages

- *** Frequency synthesiser not latched in***

  Test frequency synthesiser (Min-max test)
  In this test, a minimum and a maximum frequency are specified and after a time-defined transient time, a test made to ascertain whether the frequency is stable.

  Test minimum = 18000 Hz
  Test maximum = 48000Hz

  What to do if this error message appears:
  If this error occurs, it is only possible to replace the CPU in the central processing unit.

- *** Analogue-digital converter faulty ***

  Test analogue-digital converter
  - In this test, the A-D converter is started and a check carried out to ascertain whether convertion is possible (interrupt must have responded).

  What to do if this error message appears:
  If this error occurs, it is only possible to replace the CPU in the central processing unit.

- *** Emergency stop * coil (aerial) at front faulty ***
  *** Emergency stop * coil (aerial) at rear faulty ***
  Vehicle has lost the track (field loss)

  What to do if this error message appears:
  - Check the wire loop for transmission
  - Measure the current through the wire loop (>60 mA)
  - If everything is in order, make new adjustments to the vehicle

- *** Emergency stop lateral deviation at front too great ??**
  *** Emergency stop lateral deviation at rear too great??**
  Vehicle has lost the track (deviation from wire too great)

  What to do if this error message appears:
  - Check the wire loop for transmission
  - Measure the current through the wire loop (>60 mA)
  - If everything is in order, make new adjustments to the vehicle

Continued on sheet no. B 71

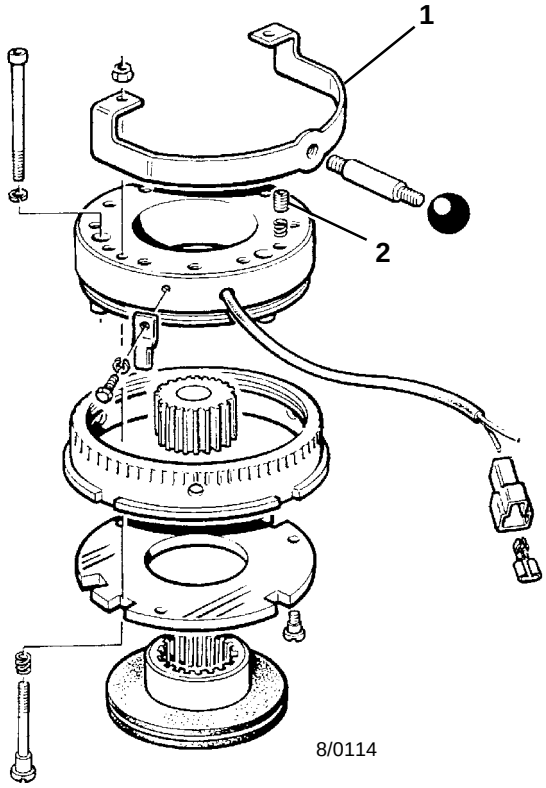
Electromagnetic brake 1K13

The single-stage leectromagnetic brake is mounted on the drive motor.

The brake is activated as follows:

1. Slight pressure on the brake pedal with pressure switch 1S7.
2. Pressing the "brake ON" key on the key pad, see sheet no. M 43.
3. Quitting the HISP position.
4. Outside aisle, above 0.5 m.
5. In aisle, above 0.5 m, when vehicle at a standstill.
6. LR80 emergency-off.
7. In event of faulty EASS system.
8. Seat not actuated.

If, for some reason, it is no longer possible to release the brake electrically, the brake can be released mechanically with the manual release (1).



Adjusting the braking force

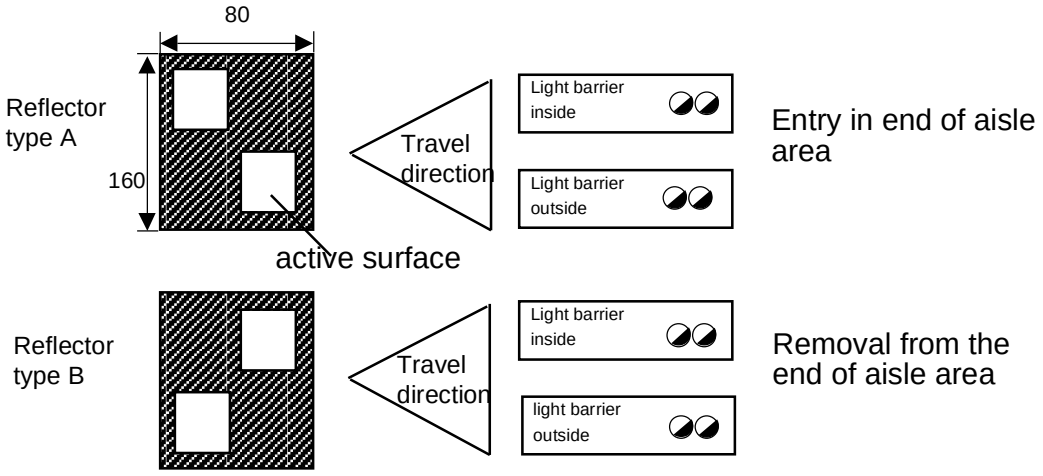
The braking force is adjusted at 4 adjusting screws (2). The adjustment is made in the factory and should on no account be altered!

Automatic braking at end of aisle (ZAG-Reflexli)

The end-of-aisle safety feature complies with the following requirements:

- Brake-free aisle entry with automatic speed recuction at the end of the aisle.
- Absolute stop at the end of the aisle
- Time stop at the end of the aisle
- Self-monitoring
- Emergency stop function

Function:
An end of aisle area is characterised by two type A and type B reflectors. There are two small reflecting mirrors mounted on the reflector panels A and B which are vertically and horizontally offset. Two light barriers are rquired to detect the end of aisle area. The upper light barrier generates the "inside area" signal, the lower light barrier generates the "outside area" signal. The status "inside" or "outside" is stored by the EASS module and is also retained after the vehicle has been switched off.



When the vehicle recognises an "inside end of aisle area" situation, it is decelerated immediately with the aid of the generator brake.
The vehicle now moves forward at reduced speed until the next reflector is reached. This is a C type reflector. The current travel speed and the travel direction are derived from the speed sensor of the left-hand motor.

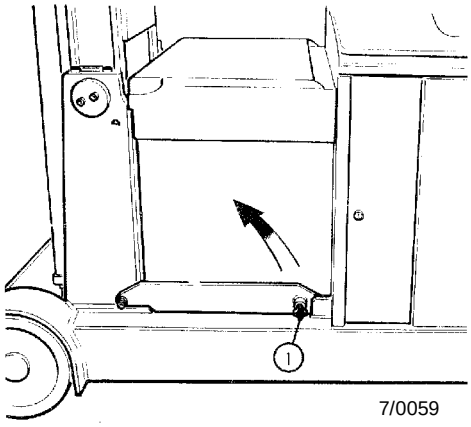
Replacing the battery

The normal process for replacing the battery is based on the roll-on roll-off principle.

The battery sits on 7 rollers in the vehicle. It is prevented from moving sideways by a fastening rod at each side. These fastenings are mounted on bearings in the lower section of the mast so that they rotate, and they engage at the bottom in a screw connection in a chassis plate. This means that the battery can be removed from either the right or left-hand side but is seated securely during normal operation

The method for battery replacement is as follows:

- Position the vehicle next to an empty stand.
- Apply the parking brake, raise the battery cover and pull out the battery plug.
- Open the fastening on the empty stand.
- Unscrew the fastening button (1) completely. The pin is spring-loaded at the end of the threaded section.
- Pull the button against the springs until the fastening can be lifted.
- Lift the fastening into the vertical position and keep the springs tensioned until the pin engages in the flange on the rotating mast section and the fastening remains fixed in its raised position.
- After the leg height has been checked, the battery can be pushed onto the stand.
- Close the fastening on the stand.
- Once the battery which has just been removed is secured in the stand, the two stands can be exchanged with a pallet lifter. Alternatively, the vehicle can be started up with an additonal cable and manoeuvred to the stand with the charged battery.
- Push the charged battery onto the vehicle and secure it.
- Close the battery cover and ensure that the fastenings and cover securing bolts are seated securely.



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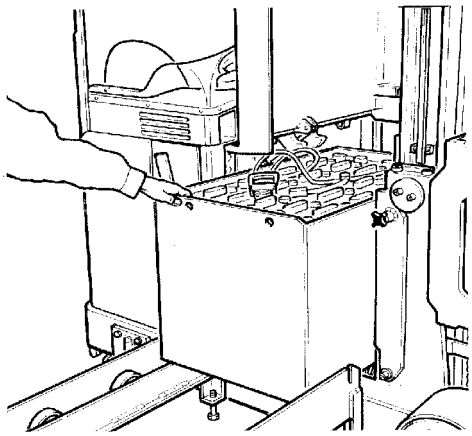
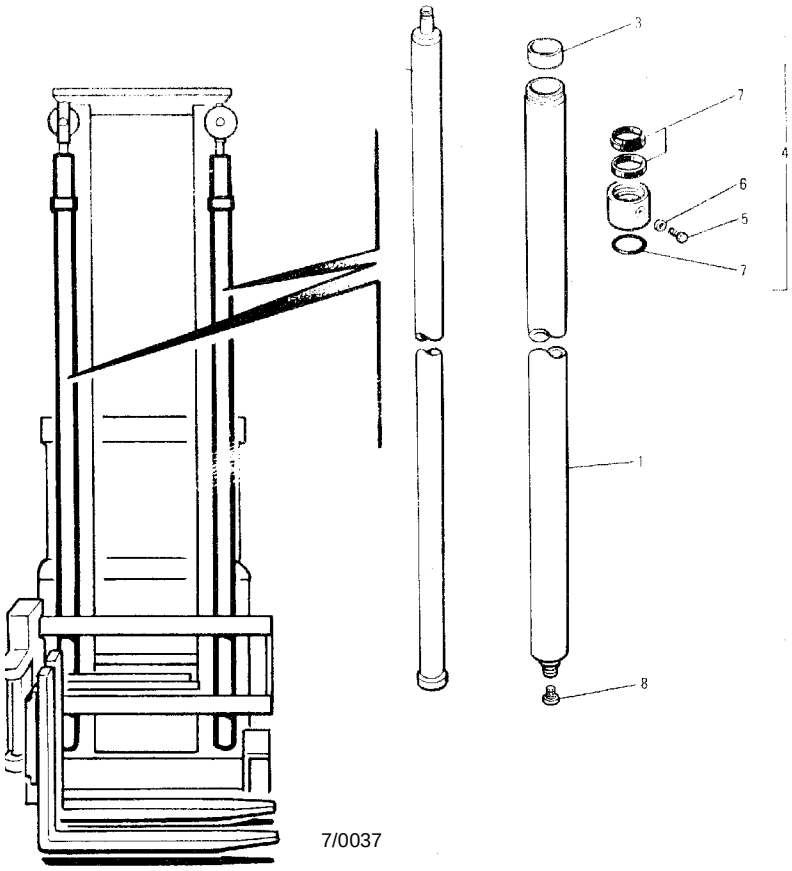

7/0060

Telescopic mast cylinder

1. **Cylinder**
2. **Shaft**
3. **Bearing**
4. **Cylinder head**
5. **Shim**
7. **Seals**
8. **Valve**



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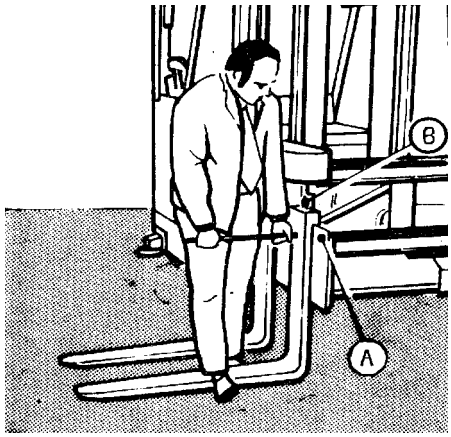
Removing the lifting forks

- Extend and swivel the swivel shift forks so that the forks point to the front and are in a central position.
- Lower the forks.
- Remove the two round-headed stop screws A from the ends of the fork holder.
- Raise detent B on the forks.
- Insert an approx. 600 mm long steel rod with a diameter of 16 mm in the hole at the top end of the fork rear and push the forks one by one along the rod from the end of the fork holder.



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Lifting forks - inspection

Remove rust and rubbings from the fork prongs and check the forks for wear. The fork prongs should be replaced when the fork prong thickness is only 90% of the original thickness.

Remark: The vertical part of the fork indicates the original thickness.

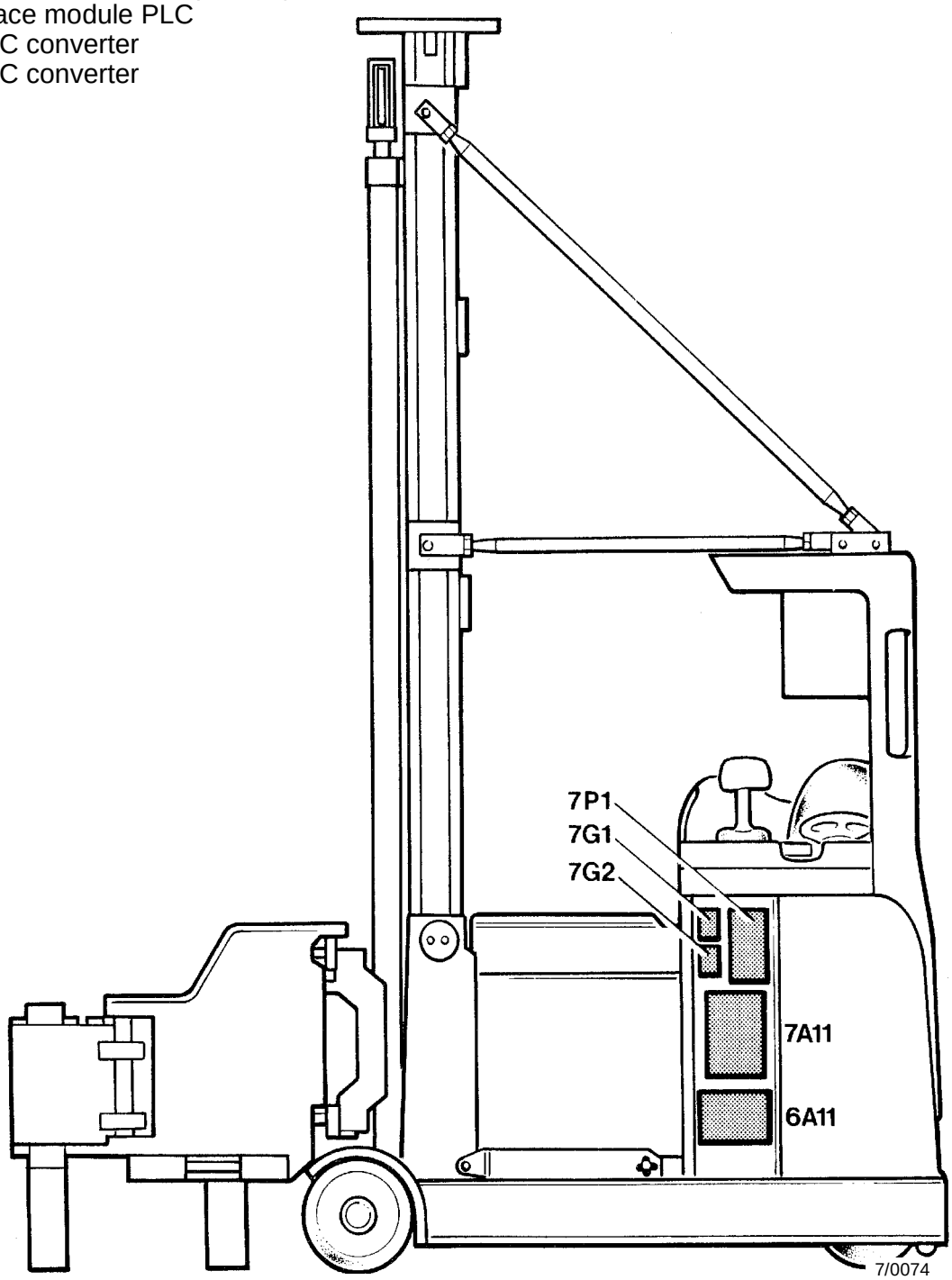
Check the upper and lower stays for wear or damage.

Check that the stop screws are correctly seated and are not damaged.

Check and lubricate the fork detent.

Module positions at left-hand side of chassis

6A11 Interface module for operating elements
7A11 Interface module PLC
7G1 DC-DC converter
7G2 DC-DC converter
7P1 PLC



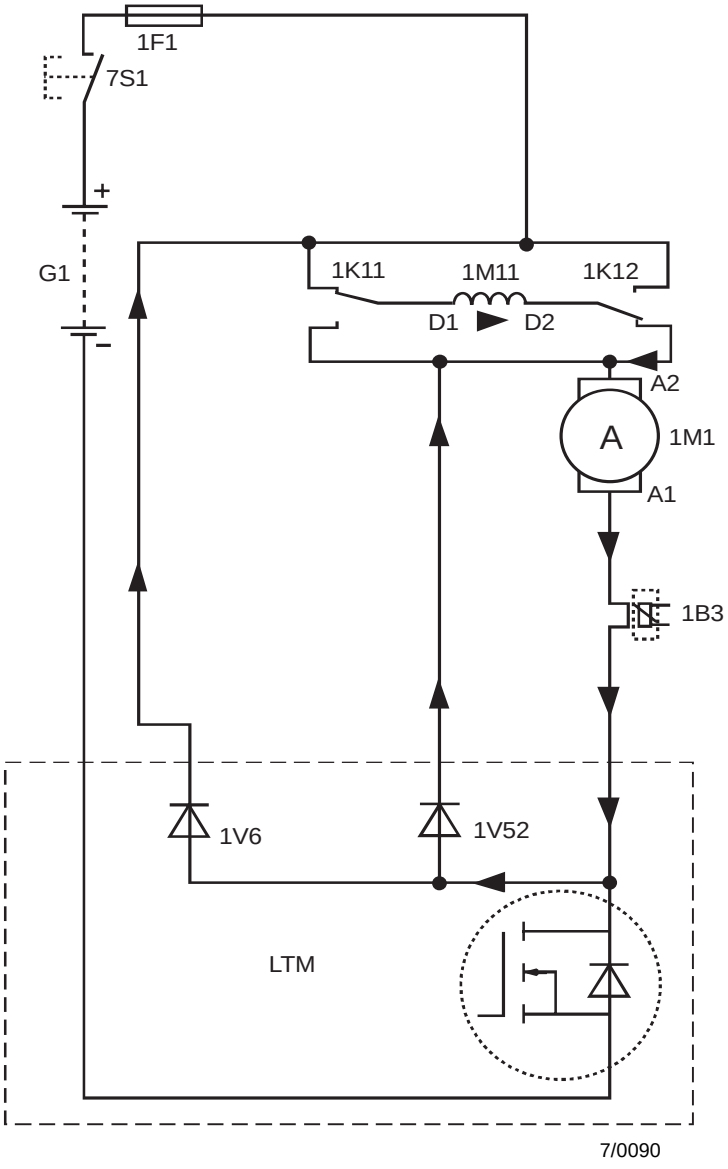
Travel connection

MOSFETs switched off, Current flow through recovery diode

Current flow through armature and field recovery diodes with MOSFETs switched off.

No adjustments can be made to the standard LTM travel control system. When the travel motor is blocked, the maximum armature current is 250 amps.

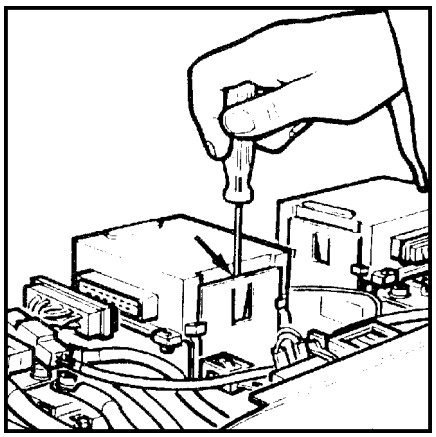
1B3	Current sensor
1F1	Fuse
1K11	Forwards contactor
1K12	Reverse contactor
1M1	Motor Y field
1M1	Motor Y anchor "A"
1V6	Diode
1V52	Diode
G1	Battery, 48 volts
LTM	Pulse travel connection
7S1	Emergency-off switch



Hydraulics module

Removal

- Apply the handbrake, block the load-bearing wheels and interrupt the vehicle power supply.
- Pull out the 25-pin connector.
- Use a small screwdriver to push the motherboard out on both sides.
- Lift out the module and release connectors 2V1, 2V2 and 2V3.
- Use a 4 mm hexagon socket screw key to unscrew the head screw in order to loosen the drain wire from the X8 terminals.



7/0125

Releasing the brake 2 and

Selection of the travel direction contactors

24 volts from 7G2 are applied to 7X10:3 and 7X10:4. On condition that the current circuit described below is closed, the parking brake is released and the travel direction contactors selected.

Current circuit of the seat relay is closed (seat occupied).

Relay current circuit of the parking brake is closed (brake released).

Switch current circuit of the footbrake 1S7 is closed (footbrake pedal not pressed).

PLC "RUN" relay current circuit closed.

EASS (END OF AISLE SLOWDOWN AND STOP) OK. The EASS module permits traction (bridged if not installed).

LR80. The LR80 system permits traction (bridged if not installed).

SLT LATCHING RELAY OK. (SIMULTANEOUS LIFT AND TRACTION)
If the swivel shift fork is below the switch for simultaneous lift and traction.

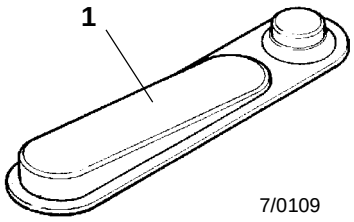
HISP OK. (Head in Safe Position) [fully rotated and retracted]

6A11 Interface module for operating elements
7A11 PLC interface module
7G1 DC/DC converter 24 V
7G2 DC/DC converter for 24 V
7P1 PLC
1S7 Footbrake switch

Direction selection

A basic differentiation is made between 3 different types of direction selection:

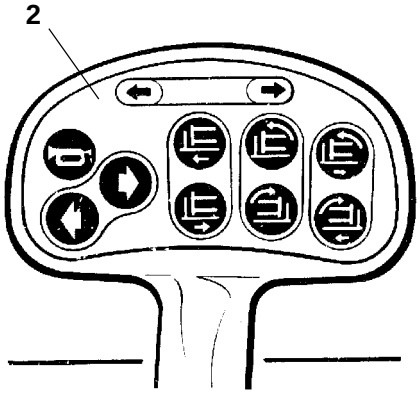
1. Two-pedal vehicle:
   --> with travel transducer voltage
2. Single pedal vehicle with multifunctional lever (MFL):
   --> with button in (MFL) (3)
3. Single pedal vehicle with valve lever:
   --> with travel direction switch (1)



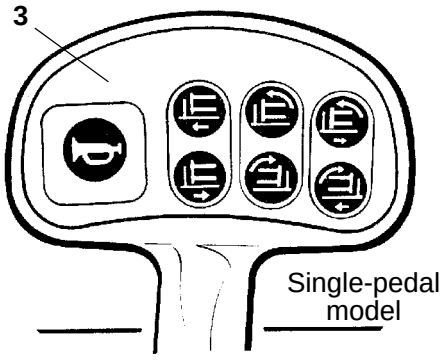
On the **two-pedal vehicle**, the direction selection is always derived from the travel transducer voltage:

Forwards = 7.5 - 3.7 V
Reverse = 7.5 - 11.3 V

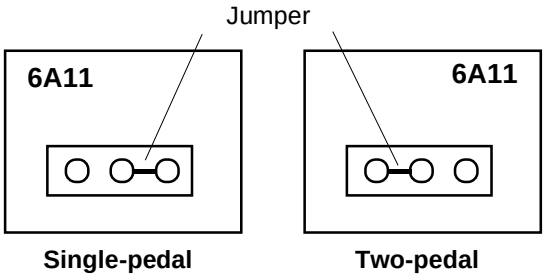
This is why the two-pedal vehicle does not have a travel direction switch (1) or the direction keypad in the MFL (2).



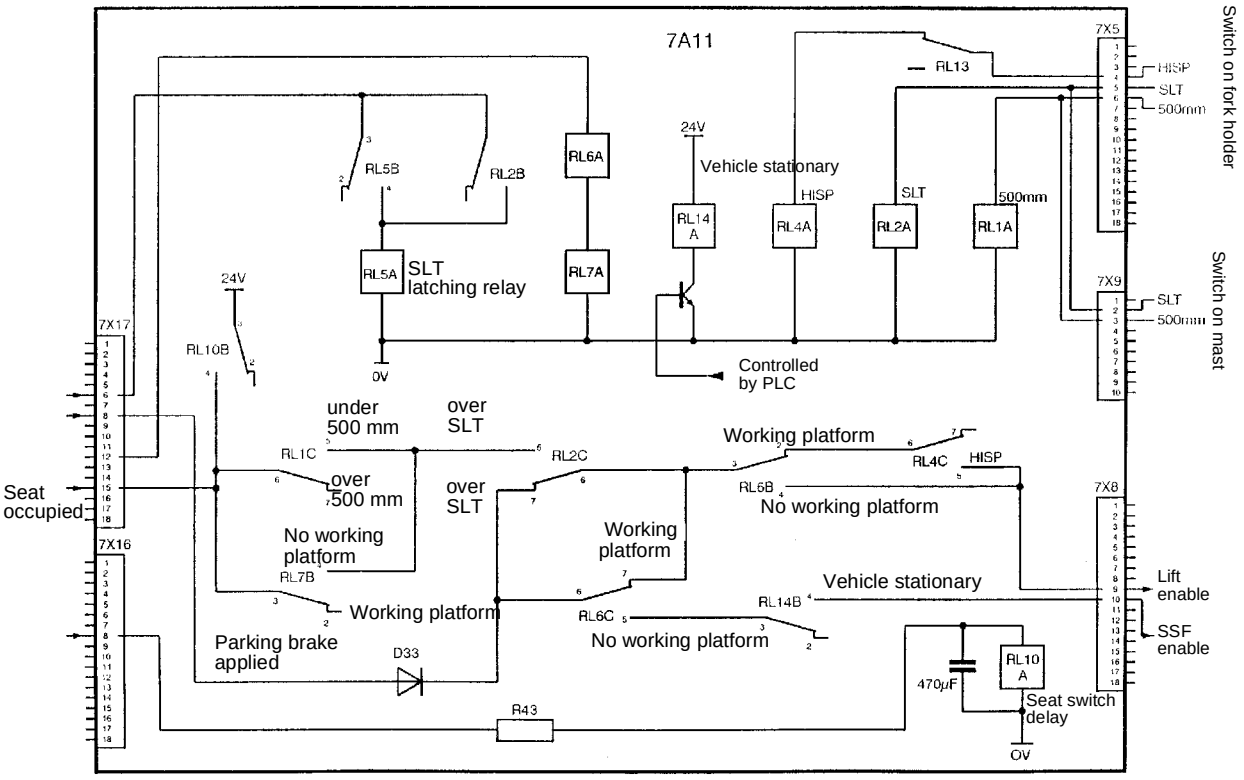
On the **single-pedal vehicle with MFL**, the travel direction is selected with keys (3) in the MFL and on single-pedal vehicles with valve levers with the travel direction switch (1).



Remark: On the 6A11 module are a jumper which must be positioned differently according to the vehicle type.



SLT (simultaneous lift and traction)



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7A11	PLC interface module
RL1	Relay 500 mm height
RL2	SLT relay (simultaneous lift and travel mode)
RL4	HISP relay
RL5	SLT latching relay
RL6	Working platform relay
RL7	Working platform relay
RL10	Delay relay for seat switch
RL13	Emergency operation relay
RL14	Vehicle at standstill relay

Lift enable

The black/white valve 2Y1 for lifting the main lift is integrated in the chassis valve block. Lift enable means that this valve is triggered.

24V voltage is supplied from the PLC output A7.7 channel 3 via the valve driver module 2A11.

The 0V voltage is switched off internally by switching RL1 to PIN 2x20:20. RL1 is switched on by applying a 24V voltage to 2x2018.

In order for RL1 to switch, the following relay contacts must be **closed**:

RL10B	Seat switch
RL1C	0.5 m or
RL7B	working platform (always excited when no working platform)
RL2C	SLT or parking brake applied
RL6B	Working platform (always excited, when no working platform)
RL4C	HISP relay

The black/white valve 2Y2 for lowering main lift is integrated in the chassis valve block. Lowering enable means that this valve is triggered. 24V voltage is supplied from the PLC output A7.6 channel 3 via the valve driver module 2A11.

The 0V voltage is switched off by 2X20:20.

Emergency shifting

For this function, the "ancillary movements" valve 2Y4, the proportional valve for lifting, shifting and rotating 2Y10 and either the black/white valve for shifting left 2Y9 or for shifting right 2Y8 must be triggered. The pump motor must be running.

When the emergency-shift key for shifting left is actuated, 24 V are sent from the converter 5G1 to 7X10:10 to RL12. Zero voltage transmission in the relay takes place via 7X10:8 and the brake contact of the emergency lowering switch to the DC/DC converter.

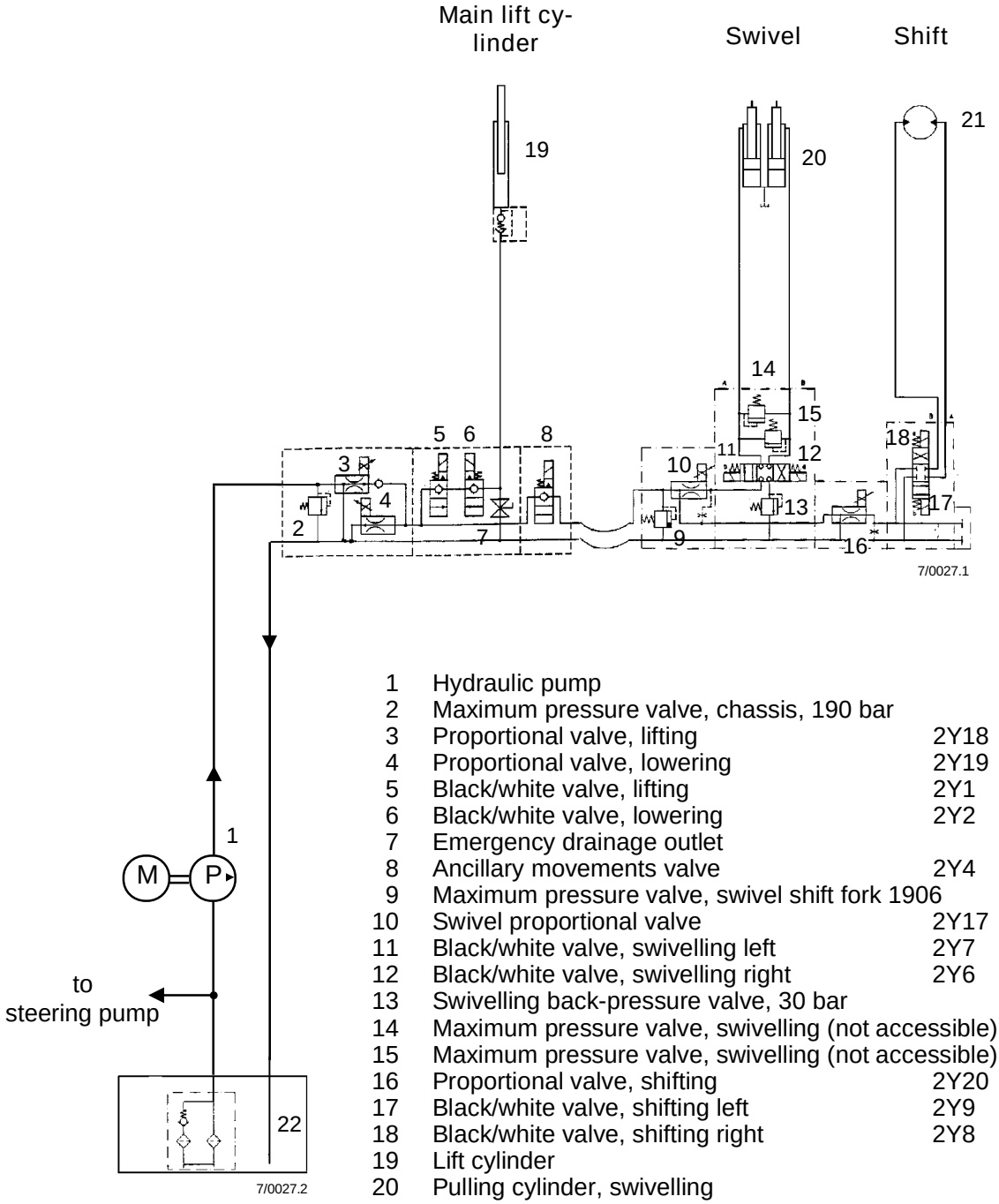
The contacts of RL12 close; this causes a change of polarity at 7X5:16 and 7X5:17.

As a result of the polarity change caused by actuation of RL12, current is supplied to the ancillary movements valve 2Y4 via diodes D49 and D50 and 24 V applied to 7X16:4 via diode D51.

When the emergency switch for shifting right is actuated, R13 is supplied with 24 V via 7X10:11 and the RL12 contacts are excited via D47.

The RL12 contacts cause a change of polarity in the auxiliary power supply, and in addition, the mast wire at 7X5:4, which is normally used to supply the HISP relay, functions as a shift-direction command lead.

Hydraulics circuit diagram



1	Hydraulic pump	
2	Maximum pressure valve, chassis, 190 bar	
3	Proportional valve, lifting	2Y18
4	Proportional valve, lowering	2Y19
5	Black/white valve, lifting	2Y1
6	Black/white valve, lowering	2Y2
7	Emergency drainage outlet	
8	Ancillary movements valve	2Y4
9	Maximum pressure valve, swivel shift fork 1906	
10	Swivel proportional valve	2Y17
11	Black/white valve, swivelling left	2Y7
12	Black/white valve, swivelling right	2Y6
13	Swivelling back-pressure valve, 30 bar	
14	Maximum pressure valve, swivelling (not accessible)	
15	Maximum pressure valve, swivelling (not accessible)	
16	Proportional valve, shifting	2Y20
17	Black/white valve, shifting left	2Y9
18	Black/white valve, shifting right	2Y8
19	Lift cylinder	
20	Pulling cylinder, swivelling	
21	Hydraulic motor, shifting	
22	Tank	

All proportional valves: 0 - 630 mA / 24 Ω
All black/white valves: 24 V / 46 Ω

Inspecting and repairing the hydraulic pump

Housing

Inspect the section of the housing in which the toothed wheels move in the housing. The housing may only continue to be used if these sections are clean and shining and the depth does not exceed 0.08 mm.
Replace the housing if the surface is scored or has a matt appearance or shows signs of wear which are due to contact with the tips of the toothed wheels.
Check the housing for any damage to the surface which may impair the performance or tightness. Take particular care when inspecting the connecting threads and the seal recesses of the housing o-ring.

Fastening flange and end cover

Check the inside surfaces for any unusual wear or for groove formation at the contact points between the housing o-rings and bushing seals, since these can cause leakage.
Check the shaft seal recesses for formation of grooves or damage, which can cause oil leaks around the shaft seal. If there is only slight damage in this area, new shaft seals can be fitted and sealed with Loctite hydraulic sealing mass.

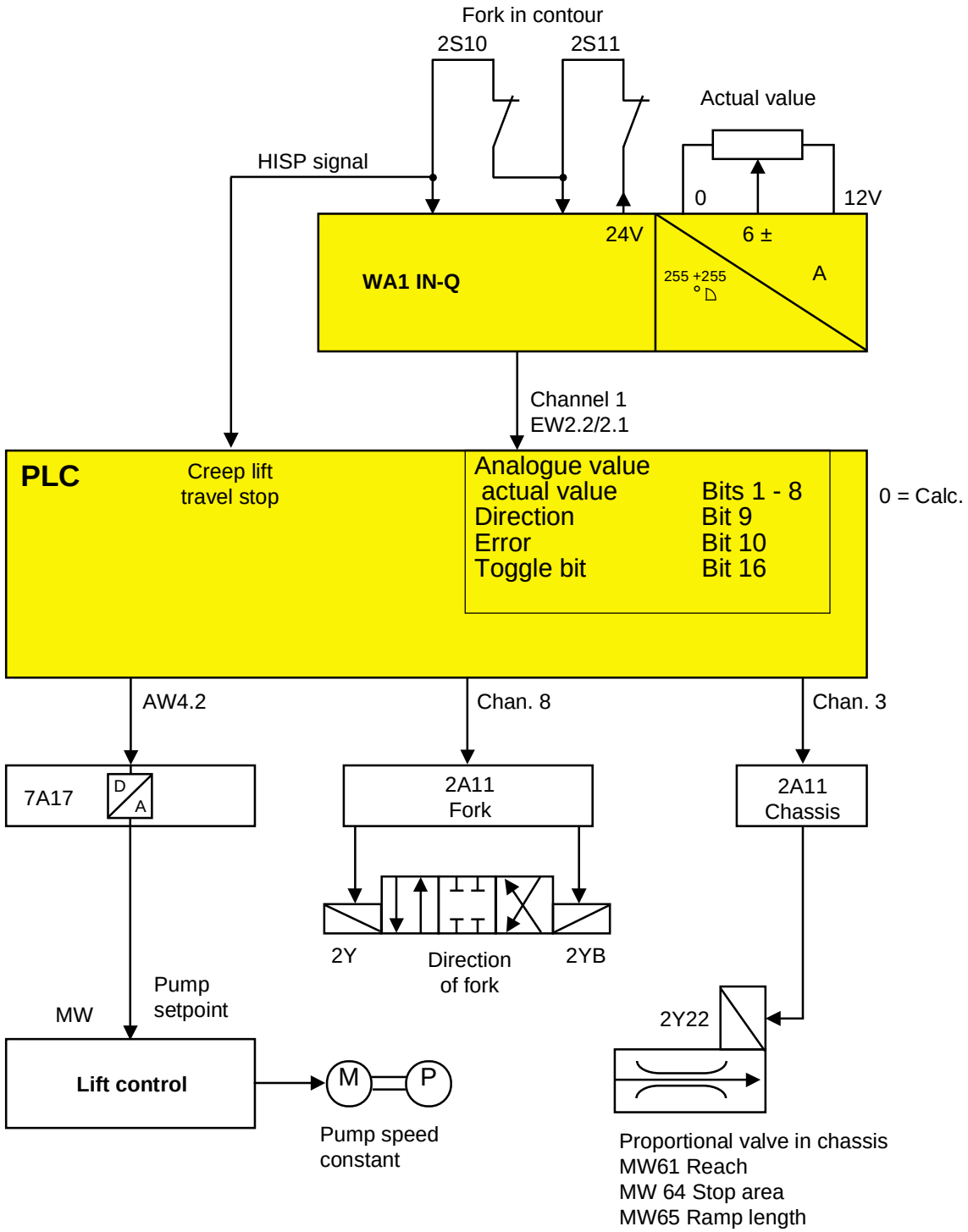
Bushings and compensating plate

The side surfaces which come into contact with the toothed wheels must be completely flat and must not show any signs of groove formation. The surfaces should normally be shiny; this is due to the pressure exerted on the surfaces of the toothed wheel sides, which is often more pronounced on the low-pressure side. Replacement is necessary if there are any signs of groove formation or if the surface looks matt or rough due to slight score marks. An overlapping mark in the shape of a semi-circle can often be observed in the contact area of the tips of the opposite toothed wheels. There must not be any clear stepping visible; it is important for the bushing sides and the compensating plate to lie completely flat against the surfaces of the toothed wheel sides. The sliding surfaces of the bushing bearing must not show any indication of groove formation or other damage. The outside of the bushing should not, in general, show any significant signs of wear.

Toothed wheels

Inspect the teeth carefully for signs of damage or corrosion.
The axle journal bearing surfaces should be entirely free from damage and groove formation. The surface must have a very shiny appearance and feel smooth to the touch.
Check the areas in which the shaft sealing lips run on the drive shaft; these should have the appearance of one or more shiny rings. If a recess can be felt clearly or groove formation is detected, the shaft must be replaced.
Inspect the spline in the axle journal extension of the drive shaft for any damage or splintered areas.

Block diagram



Parameter adjustment

Attention: Do not drive as far as the mechanical end stop - risk of damage!

Extension depth: MW61

Call up parameter EW2.1 in the "Digsy" PLC down-load program and carefully move forks to just in front of the mechanical end stop. Read the value in EW2.1 and enter as parameter value MW61. The length of the distance from the fork's centre position to the end stop is now defined for the PLC.
Typical value: depends on the support width.

Stop area MW64

MW64 defines the width of the stop window for the centre position. The fork must come to a standstill within this window. As soon as it enters this area, the proportional valve closes completely.
Typical value: 2

Ramp length MW65

MW65 defines the ramp length at the end stop and towards the centre.
When the fork enters this area, the proportional valve closes until the value is reached that is entered in parameter MW40 and slows down the reach speed.
Typical value: 3

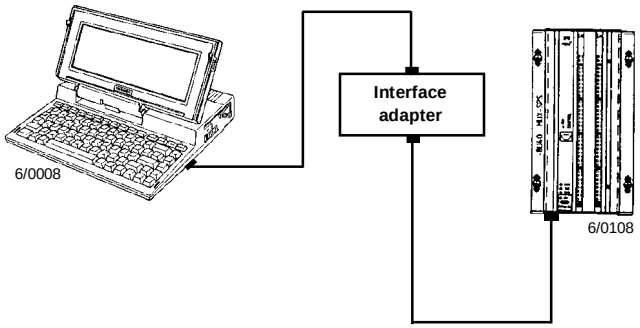
Maximum speed for reaching MW41

MW41 defines the speed at which reaching is carried out outside the ramps. This parameter influences the ramp length and also the stop area.
Typical value: 14

Changing parameters in the PLC with a notebook

For this work you will need a notebook, an interface adapter Id. no. W8 406 464 and a PLC MUX installation diskette, Id. no. W8 406 810.

- Connect the notebook to the PLC with the interface adapter.
- Switch on the vehicle.
- Switch on the notebook.



You will now see:

```
HIMEM testet den erweiterten Speicher...beendet.


SystemSoft Socket Services 2.1 Vadem Version 1.05 (2188-08)
Copyright 1993-1994 SystemSoft Corporation. All Rights Reserved

SystemSoft Card Services 2.1 Version 2.06 (2036-09)
Copyright 1993-1994 SystemSoft Corporation. All Rights Reserved.

SystemSoft Plug-N-Play Card Services Allocation Utility Version 3.01 (2137-13)
Copyright 1993-1994 SystemSoft Corporation. All Rights Reserved.

SystemSoft CardID Version 1.03 (2082-12)
Copyright 1993-1994 SystemSoft Corporation. All Rights Reserved.
SystemSoft CS APM Version 1.03
Copyright 1993-1994 SystemSoft Corp. All Rights Reserved
Maustreiber - Version 6.44       Standard-Version
Copyright (C) 1984, 1994  Logitech S.A. Alle Rechte vorbehalten.

Lese die Initialisierungsdatei MOUSEDRV.INI...
Suche eine Maus...
 PS/2-Maus gefunden.
Angeschlossen an EGA/VGA.
Maustreiber installiert.
C:\>
```

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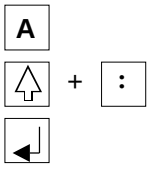
- Insert the PLC MUX installation diskette in drive A of the notebook

Enter:



Continued

Changing parameters in the PLC with a PC

You will now see:

```
EW1.1 BIS EW2.4 ->        0      0      0      0         0      0      0
EW3.1-4/AW4.1-4 ->        0      0      0      0         0      0      0
AW5.1 BIS AW6.4 ->        0     64      0      0         0      0      0
ZW1   BIS ZW8   ->        0      0      0      0         0      0      0
TW1   BIS TW8   ->        0      0      0      0         0      0      0
TW9   BIS TW16  ->        0      0      0      0         0      0      0
MW1   BIS MW8   ->       64      0      0      0         0      0      0
MW9   BIS MW16  ->    18432    127    122     55        40     50     67
MW17  BIS MW24  ->        0     26     26     34       114     45    100
MW25  BIS MW32  ->       55      0      0      0         0     50    107
MW33  BIS MW40  ->      100     60     60      0         0      0      0
MW41  BIS MW48  ->       97     11    105     79        59    100      8
MW49  BIS MW56  ->      100    114    114    114       114      1      1
MW57  BIS MW64  ->       82      0      0      0         0      0     50
MW65  BIS MW72  ->        0      3      0    115         0      0      0
MW73  BIS MW80  ->        0      0      0      0       114      0      0
MW81  BIS MW88  ->      415    159     27      0         0     10      0
MW89  BIS MW96  ->        0      0      0      0         0      0      0
MW97  BIS MW100 ->        0      0      0     99

        Neuen Wert eingeben : 122

  F1       F2       F3        F4      F9      F5       F6       F7      F8
Starten  Stoppen  ndern  1 Zyklus          Bit Oper WortOper  Hilfe   Menue
```

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Enter: **F1**

The new value of the parameter is now stored in the RAM memory of the PLC and can be tested. When the key-operated switch is switched off and then on again, the PLC takes on the old parameter value again.
If you wish the new value to be adopted, it must be programmed.

Programming procedure:

Enter: **F8**

You will now see:

```
INTER CONTROL  MUX-Master   Progr.-Gerät  Version 1.5 D   Serien-Nummer  330001

Datum/Index  |    Name    |          Projekt          |     Firma     | Teile-Nr.
31.07.96     | Mustermann | Konst-Display-Vorverarb.  | Musterfabrik  | GX 10 A00
61292A03     | 18:03 Uhr  |        Musterkunde        | Fördertechnik | 61292A03

        F1     Programmieren / Editor
        F2     Baustein - Menue
        F3     Ausdruck - Menue
        F4     SPS Online Funktionen - Menue

        F7     Kopf editieren und CPU konfigurieren
        F8     Projekt wählen, Formatieren, Kopieren - Menue.

  F1       F2        F3       F4      F9      F5      F6      F7      F8
Editor  Baustein  Ausdruck  Online    DOS                   K Edit  P-Menue
```

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Enter: **F1**

You will now see:

```
          Zeilen Nr. ?
   F1        F2       F3       F4       F9       F5     F6       F7     F8
AW-Zeile NaechNzw  Bild auf  Bild ab                                   Menue
```

Enter: **7** **0** **9** ↵

This is the program address taken from sheet no. V 29.

You will now see:

```
    ! HTSW.SLT   HTSW.500             ARM.ON    MFL.OP   IN.SEAT          !
709 !===]/[===+===]/[===+=========+---]  [---+---]  [---+---]  [---+--->>>   +
!  WB3.2 !   WB3.1 !          !    M67       M68       E6.3     lin 720 !
! HBR.REL ! IN.AISLE!          !                                          ! 710
+===]/[===+---]  [---+                                                    +
!  E6.4   !  E9.3                                                         !
!         !  SPEED             !                                          !
+         +---]  [---+---]=[---+                                          +
!            EW3.1       KO                                               !
!          OVERRIDE    LPS.ASEQ  PULLED   LIFT.ENAB JS.NEUTRL             ! 720
+    >>>--+===]/[===+===]/[===+---]  [---+---]  [---+===]/[===+--->>>     +
!            E6.1     E1.5       E7.5      M75       M13      lin 725 !
!          DEPRESURE RCH.LATCH ROT.LATCH                         LIFT  ! 725
!    >>>--+===]/[===+===]/[===+===]/[===+=========+=========+---( )---  +
!             T4       M33       M34                         !    M4    !
!                                                             !
V.LIFT  !      +
+---( )--- +      !
A7.7   !

        SPS nicht betriebsbereit.
  F1       F2        F3       F4       F9       F5       F6       F7       F8
```

Callouts: 1 (at M68), 2 (at the line after HTSW.500), 3 (at the enlarged detail):

```
 !  V.LIFT
!  +---( )--
- +
A7.7   !
```

The required network, the connection result of which is the found output A7.7 (item 3), is now displayed. Information in diagram form, about which conditions must be fulfilled in order to set the output, is also displayed.

A single dotted line (item 1) means:	This condition is not met, no current flow, interruption.
A double dotted line (item 2) means:	This condition is met, current flow.

The connection result (item 3) is not activated until a path has no interruptions (all lines to the target are dotted)..

---(S)--- = Set (switch on until reset)

---(R)--- = Reset (switch off)

---( )--- = Switch on until current path is interrupted

Inputs - table of symbols

Channel 5

E11.7 Shelf occupied check, right
E11.6 Shelf occupied check, left
E11.5 Load sensor
E11.4 Height switch Z make contact
E11.3 Height switch Z break contact
E11.2 Height switch Y make contact
E11.1 Height switch Y break contact

E10.8 Height switch X make contact
E10.7 Height switch X break contact
E10.6 SLT switch make contact - rail guidance: 4 m / LR80: 2.5 m height
E10.5 SLT switch break contact - rail guidance: 4 m / LR80: 2.5 m height
E10.4 Height switch W make contact
E10.3 Height switch W break contact
E10.2 ---
E10.1 ---

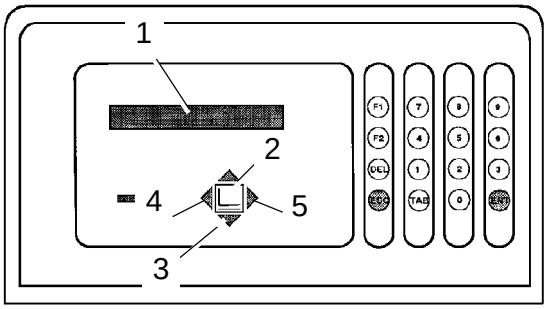
Outputs - table of symbols

Channel 6

AW4.4	Setpoint 2^E	Proportional valve swivelling
AW4.4	Setpoint 2^D	Proportional valve swivelling
AW4.4	Setpoint 2^C	Proportional valve swivelling
AW4.4	Setpoint 2^B	Proportional valve swivelling
AW4.4	Setpoint 2^A	Proportional valve swivelling
AW4.4	Setpoint 2^9	Proportional valve swivelling
AW4.4	Setpoint 2^8	Proportional valve swivelling
AW4.4	Setpoint 2^5	---
AW4.4	Setpoint 2^4	---
AW4.4	Setpoint 2^3	---
AW4.4	Setpoint 2^2	---
AW4.4	Setpoint 2^1	---
AW4.4	Setpoint 2^0	---
AW4.4		Switch over cameras on fork holder
AW4.4		Laser sensor on

Description of the menus and how to use them

"Normal mode" menu



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Normal mode is the operating mode in which the user can enter an in/out/reorganise cycle. The PG7 is always in normal mode after a reference run has been completed.

First, the operator is shown in plain text (1) that the vehicle must be put through a referencig process.

The mesage **Ref.Haupthub** (Main lift ref.) and the **Lift** (2) and **Lower** (3) symbols indicate that a reference run must be conducted for the main lift.

If the vehicle is fitted with the **Fork cycle** option, the reference run for the forks must then be carried out. The **Ref.Gabel (Fork ref.)** message and the **Shift left** (4) and **Shift right** (5) symbols are displayed to indicate this to the operator.

When the reference run has been completed, the display (1) reads **"von... nach..."** (from... to...) or **"Ebene..."** (level) (if the PG7 is configured for half cycles). When the vehicle is in this status, it is ready for normal operation. It is now possible to enter a level number.

For the "von... nach..." (from... to...) display, the level number at:

- "von" (from) is the collection level
- "nach" (to) is the depositiong level

For the "Ebene..." (level) display, the level number:

- is a collection level if there is no load on the forks
- is a depositing level if there is a load on the forks

The desired level can be entered on the keypad. Leading zeros are not required. Press the **ENT** key to end the input process.

"Monitor" menu
Continued

max.Geschw. Maximum speed of the axis (mm/s) for both movement directions. The **max.Geschw.** (max. speed) must be calculated in the most extreme situation (lifting main lift with full load).

Permissible values: 11 - 999
Typical value: 350

KV
(see W 25) Amplification of the position control loop (1)
Control setpoint = Control difference * KV
The value for **KV** must not be selected too high, otherwise the axis vibrates at the target.

Permissible values: 16 - 99
Typical value: 24

Offset pos. Minimum setpoint for control of the proportional valve in positive direction of movement.
(Lifting / shifting right) (mV).
Offset pos. is the setpoint for the proportional valve at which the axis begins to move.

Permissible values: 0 - 3000
Typical value: 2000

Offset neg. Minimum offset setpoint for control of the proportional valve in negative direction of movement
(Lowering / shifting left) (mV).
Offset neg. is the setpoint for the propotional valve at which the axis begins to move.

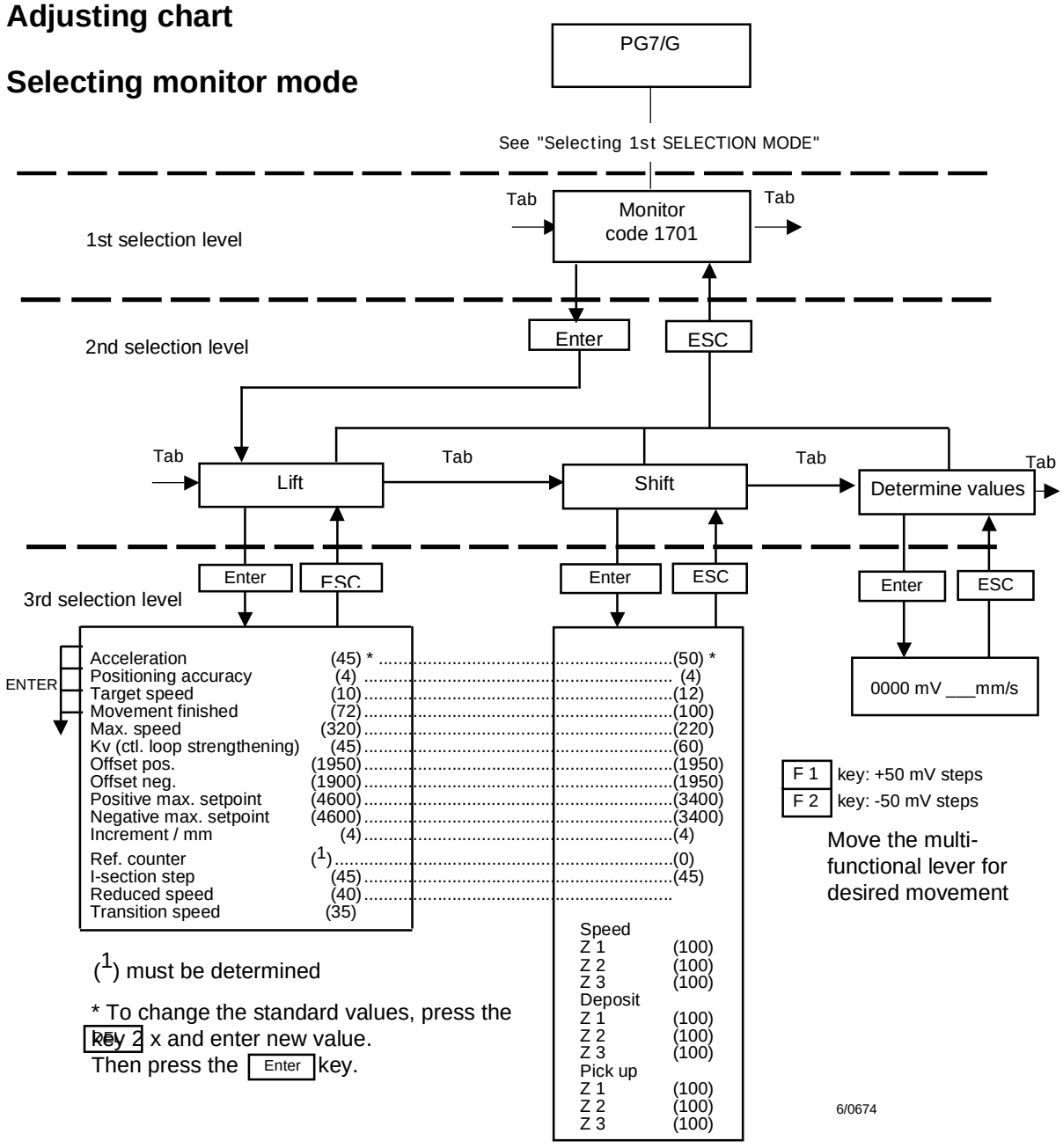
Permissible values: 0 - 3000
Typical value: 2000

Sollmax.pos. Maximum setpoint for control of the proportional valve in positive direction of movement (mV) for lifting / shifting right.
Sollmax.pos. is the setpoint for the proportional valve at which the axis has reached the maximum or desired speed including the speed reserve.

Permissible values: 0 - 9999
Typical value: 2000 - 5000

Adjusting chart

Selecting monitor mode



Remark:

The fork cycle must be tested with the fork at its maximum height and with its maximum load, since the mast torsion and vibration are greatest in this condition.

If the vibration is too great, the acceleration of the shift function (**Beschl**.) may be reduced or the fork extension speed reduced in certain zones (**Geschw.Z2, Geschw.Z3)**.

If the fork vibration cannot be eliminated in this way, the vibrations can also be settled with the **absetzen.Zx** and **anheben.Zx** (deposit and pick up) pause lines.

The speed for depositing the load in the fork cycle can be set with the **Geschw.red.** (reduce speed) parameter