TEREXLIFT

TEREXLIFT

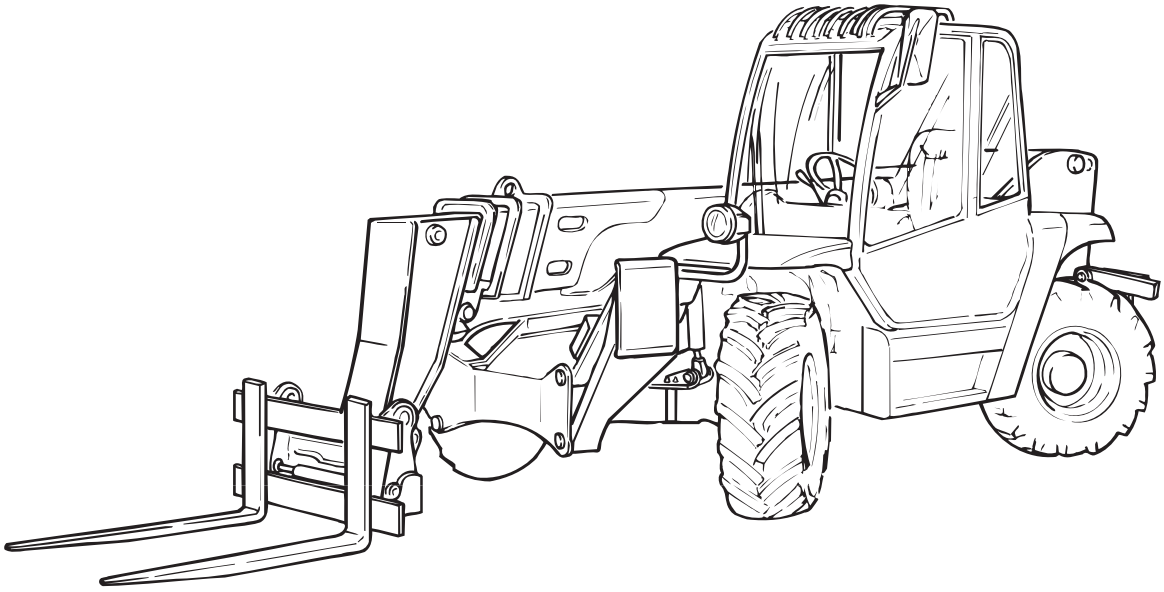
# WORKSHOP MANUAL

*Code 57.4400.5200 - 1st Edition 04/2003*

## *Handler with telescopic boom*

# TELELIFT 3713 *Elite*

# TELELIFT 3517 - TELELIFT 4010



**English**
Edition

*INDEX*

## A.04 UNITS OF MEASURE

### 1 FORCE

The unit of measure of force is the Newton (N)

For the conversion:

| | | |
|---|---|---|
| 1 N | = | 0.1019 kg |
| 1 kg | = | 9.81 N |

### 2 POWER

The unit of measure of power is the kilowatt (kW). Other units of measure used are:

| | |
|---|---|
| CV | Horsepower |
| HP | Horsepower |

For the conversion:

| | | | |
|---|---|---|---|
| 1 kW | = | 1.36 | CV |
| 1 kW | = | 1.34 | HP |
| 1 CV | = | 0.736 | kW |
| 1 CV | = | 0.986 | HP |
| 1 HP | = | 0.746 | kW |
| 1 HP | = | 1.014 | CV |

### 3 TORQUE

The unit of measure of power is the Newton metre (Nm).

For the conversion:

| | | | |
|---|---|---|---|
| 1 Nm | = | 0.1019 | kgm |
| 1 kgm | = | 9.81 | Nm |
| ***1 kgm*** | ***=*** | ***10*** | ***Nm*** |

***NOTE:***

For simplicity, the ***Nm*** unit is converted according to the ratio 10 Nm = 1 kgm

### 4 SPECIFIC CONSUMPTION

The specific consumption is expressed in g/kWh (grams per kilowatt-hour). Another unit of measure used is: g/HPh (grams per horsepower-hour)

For the conversion:

| | | | |
|---|---|---|---|
| 1 g/kWh | = | 0.736 | g/CVh |
| 1 g/CVh | = | 1.36 | g/kWh |

### 5 PRESSURE

The unit of measure of pressure is the kPa (kilopascal). Other units of measure used are:

| | |
|---|---|
| kg/cm$^2$ | kilogram per square centimetre |
| Atm | Technical atmosphere |
| psi | Pound per square inch |

For the conversion:

| | | | |
|---|---|---|---|
| 1 kg/cm$^2$ | = | 1 | Atm |
| 1 kg/cm$^2$ | = | 98.1 | kPa |
| 1 kg/cm$^2$ | = | 0.981 | bar |
| ***1 kg/cm$^2$*** | ***=*** | ***1*** | ***bar*** |
| 1 kg/cm$^2$ | = | 14.22 | psi |
| 1 bar | = | 100 | kPa |
| 1 bar | = | 1.02 | kg/cm$^2$ |
| 1 bar | = | 14.51 | psi |
| 1 psi | = | 6.9 | kPa |
| 1 psi | = | 0.069 | bar |
| 1 psi | = | 0.0703 | kg/cm$^2$ |
| 1 kPa | = | 0.145 | psi |
| 1 kPa | = | 0.0102 | kg/cm$^2$ |
| 1 kPa | = | 0.01 | bar |

***NOTE:***

For simplicity, the ***bar*** unit is converted according to the ratio 1 bar = 1 kg/cm$^2$

### 6 CONVERSION OF SOME METRIC UNITS OF MEASURE INTO IMPERIAL UNITS OF MEASURE

| | | | |
|---|---|---|---|
| 0,1 mm | = | 3.937 | mils |
| 1 mm | = | 0.039 | inch |
| 1 m | = | 3.281 | ft |
| 1 km | = | 0.621 | miles |
| 1 cm$^3$ | = | 0.061 | cu. in. |
| 1 g | = | 0.035 | oz. |
| 1 kg | = | 2.205 | lbs. |
| 1 t | = | 1.102 | short ton |
| 1 t | = | 0.9842 | long ton |
| 0°C | = | 32°F | |

Note: in case of differences of temperature 1°C = 1.8°F

## A.09 STANDARD TIGHTENING TORQUES FOR FITTING SEALS

### ■ 60° CONICAL SEALS

| Thread diameter | | TIGHTENING TORQUES (0+10%) |
|---|---|---|
| inc. | mm | 60° CONICAL SEALS Nm |
| G 1/8" | | 15 |
| G 1/4" | M 10 x 1 | 20 |
| 9/16"-18 | | 25 |
| 11/16"-16 | | 40 |
| 13/16"-16 | | 55 |
| 3/4"-16 | | 62 |
| 1"-14 | | 80 |
| 7/8"-14 | | 80 |
| 1.1/16"-12 | | 110 |
| 1.3/16"-12 | | 115 |
| 1.5/16"-12 | | 160 |
| 1.7/16"-12 | | 130 |
| 1.11/16"-12 | | 190 |
| 1.5/8"-12 | | 225 |
| 1.7/8"-12 | | 270 |
| 2"-12 | | 245 |
| 2.1/4"-12 | | 360 |

### ■ FRONT O-LOK (Parker) SEALS

| Thread diameter | | TIGHTENING TORQUES (0+10%) |
|---|---|---|
| inc. | mm | FRONT O-LOK (Parker) SEALS Nm |
| 9/16"-18 | | 25 |
| 11/16"-16 | | 40 |
| 13/16"-16 | | 55 |
| 1"-14 | | 80 |
| 1.3/16"-12 | | 115 |
| 1.7/16"-12 | | 130 |
| 1.11/16"-12 | | 190 |
| 2"-12 | | 245 |

### ■ 37° COUNTER-SUNK CONICAL SEALS (JIC)

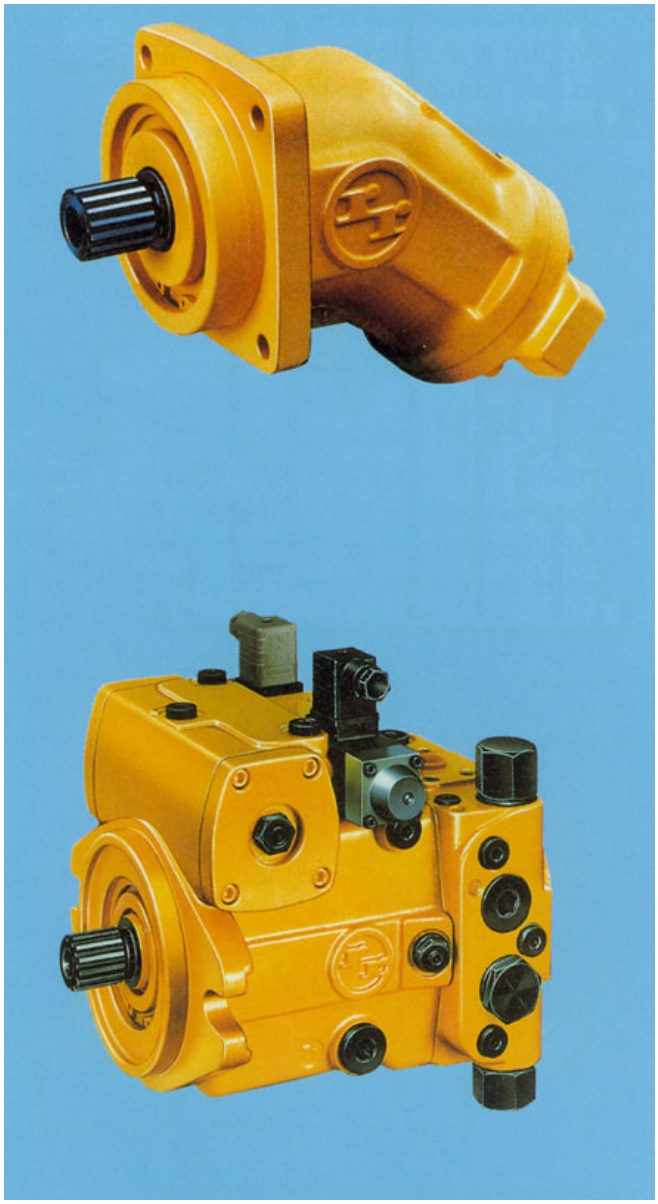
| Thread diameter | | TIGHTENING TORQUES (0+10%) |
|---|---|---|
| inc. | mm | 37° CONICAL SEALS (JIC) Nm |
| 7/16"-20 | M10x1 | 15 |
| 1/2"-20 | M12x1.5 | 20 |
| 9/16"-18 | M14x1.5 | 28 |
| | M16x1.5 | 62 |
| 3/4"-16 | M18x1.5 | 62 |
| 7/8"-14 | M22x1.5 | 80 |
| 1.1/16"-12 | M27x2 | 110 |
| 1.3/16"-12 | | 141 |
| 1.5/16"-12 | M33x2 | 160 |
| 1.5/8"-12 | M42x2 | 225 |
| 1.7/8"-12 | M48x2 | 270 |
| 2.1/4"-12 | M10x1 | 360 |

## A.16 CHECKS WITH LIQUID PENETRANTS

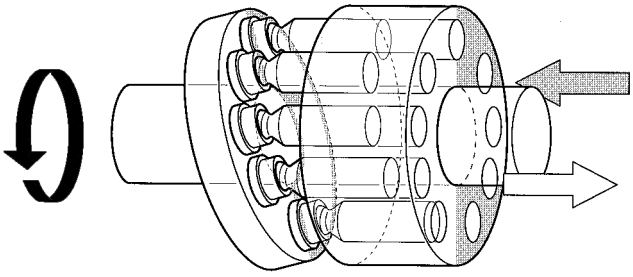
Procedure to check welds or material cracks:

1. Thoroughly clean the part to be checked making sure there are no fluids or anything else which can prevent a good penetration of the fluid; to this end, use sand paper, grinding wheel, dry rags or paper.
2. Use a red liquid and let it dry for about 5 ÷ 8 minutes
3. Thoroughly clean with a rag and some water or a sponge, then dry with a clean and dry rag
4. Spray a white liquid (detector) onto the part to be checked and let dry for about 5 ÷ 6 minutes. If after this treatment the red colour comes to surface decidedly there is a crack. Pay extreme attention as, in presence of a deep but close crack, the red colour could hardly come to surface.
5. Pay attention to the area thermally altered by welding since cracks usually appear in this area and not in the middle of the weld.
6. This check can detect any surface crack.

# Axial Piston Units



## 2.2.1 Swashplate Principle



The *swashplate* rotary group is a displacement unit whose displacement pistons are arranged axially to the drive shaft and are supported against a tilted plate (swashplate).

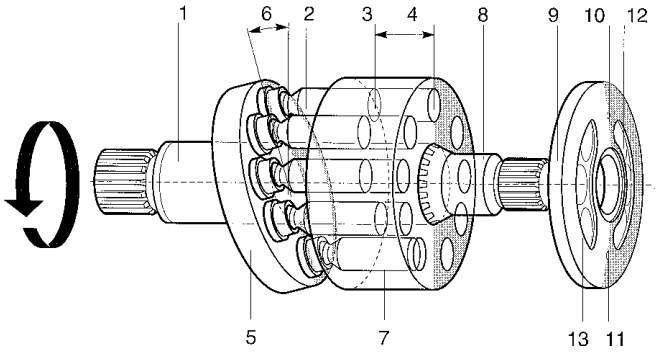
**Pump Function:**
Through the gearing, rotation of the drive shaft also causes the cylinder to rotate. The pistons execute a stroke within the cylinder bores dependent on the tilt angle of the *swashplate*. The hydraulic medium is fed to the low pressure (inlet) side of the pump and pumped out by the pistons on the high pressure (outlet) side into the system.

**Motor Function:**
In motor operation, the process is reversed and pressure oil is fed to the inlet side of the unit. The pistons perform a stroke, taking the cylinder with them. Via the gearing, this, in turn, causes the drive shaft to rotate. Oil exits on the low pressure (outlet) side and flows back into the system.

**Swashplate Angle:**
In the fixed displacement unit, the angle of the swashplate is fixed within the housing. In the variable unit, this angle is infinitely variable within specific limits. Changing the swashplate angle changes the piston stroke, thus varying the displacement.

## 2.2.2 Description of Function

**Example: Variable Displacement Pump**




1 = drive shaft
2 = piston
3 = piston area
4 = piston stroke
5 = swashplate
6 = angle of adjustment
7 = cylinder
8 = through drive
9 = port plate
10 = upper dead point OT
11 = lower dead point UT
12 = control slot,pressure side (for direction of rotation shown)
13 = control slot,suction side (for direction of rotation shown)

**Description**
The axial piston units of swashplate design, with fixed or variable displacement, can operate as hydraulic pumps or motors.
When used as a pump, the flow is proportional to the input speed and the swashplate angle. If the unit is used as a motor, the output speed is proportional to the flow through the unit. The input (pump) or output (motor) torque increases with the pressure drop between the high and low pressure sides.
In pump operation, mechanical energy is converted into hydrostatic power, while in motor operation, inversely, hydrostatic power is converted into mechanical energy.

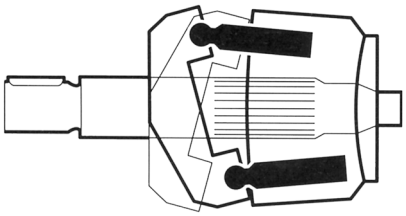
By adjusting the swashplate angle of a variable pump or motor it is possible to *vary* the displacement and thus the flow.

**Function**
**.....as a pump:**
Driven by the prime mover, (e.g. diesel or electric motor), the drive shaft rotates and, via the gearing, also causes the cylinder to rotate, taking with it the nine pistons. The pistons are held against the sliding surface of the swashplate by the slipper pads and carry out a stroke. The slipper pads are held against the sliding surface and guided by means of a return device. As the cylinder rotates, each piston moves through the lower or upper dead point and back to its starting position. A movement from one dead point to the other (where the direction of movement is reversed) constitutes one complete stroke during which a volume of hydraulic fluid, corresponding to the piston area and the stroke, is either *sucked in* or *pumped out* via the two control slots in the portplate.

During the *suction* stroke, the hydraulic fluid is sucked - in reality *compressed* - by atmospheric pressure in open circuits, and by the boost pressure in closed circuits, into the piston area as it increases in size. During the *pressure stroke*, fluid is pushed out through the piston bores on the opposite side into the hydraulic system.

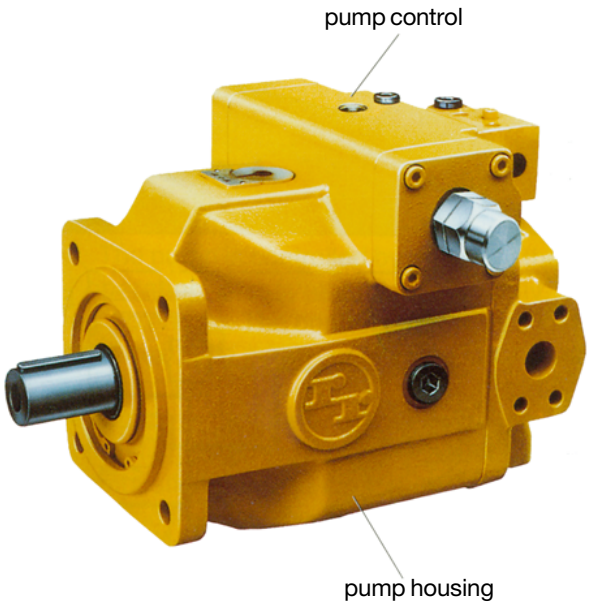
## 3.4 Variable Pump of Swashplate Design
**for universal industrial applications**

**O=open circuit**
**G=closed circuit**
H=semi-closed circuit



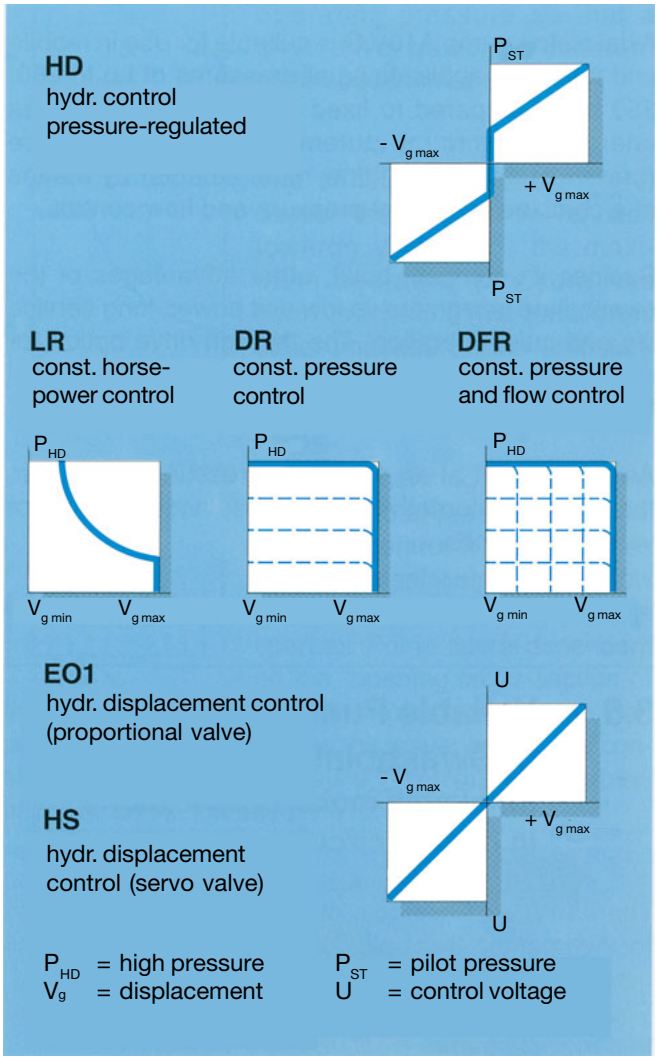
The A4VS.. variable pump is universally suitable for use in the various types of circuit (O-C-S). A wide range of controls and pump models are available. For industrial applications the A4VS..G pump e.g. (operating in closed circuit) can be extended by the addition of relevant adjusting devices and built-on valve block, auxiliary pumps at the through drive, tank and cooler to form a complete hydraulic drive unit. A semi-closed circuit **..H..** may also be extended by the use of anti-cavitation check valves. This will compensate e.g. for differences in volume when operating single rod cylinders.

**350/400 bar**



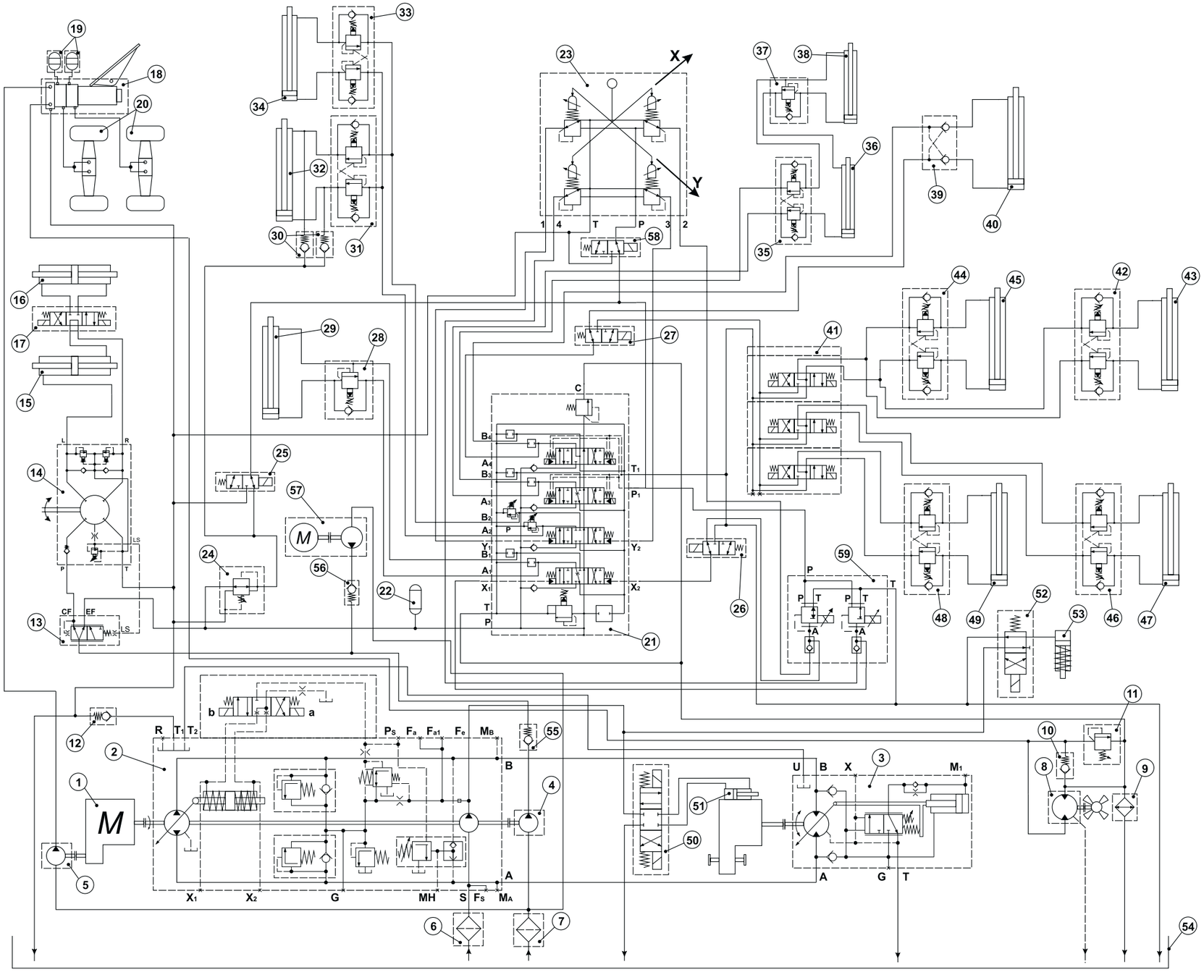

**A4VSO**

### 3.4.1 Pump Control Devices
**of modular design for a variety of control and regulating functions**




In addition to the recognised advantages of swashplate design the A4VSO pump, developed specially for use in industrial applications, also offers an extremely long bearing service life. Load-sensing control and mooring operation, as well as secondary control, can be achieved with this pump.
The system of closed loop secondary speed control, in combination with a pressure-controlled pump and a secondary-controlled motor, guarantees high control dynamics, accurate speed control, minimal power loss and energy recuperation.
Speed control DS1 regulates the variable unit to produce the necessary torque for the required speed. This torque (in the power supply with impressed pressure) is proportional to the displacement and thus also proportional to the swivel angle. The swivel ang le (adjusting distance) is recorded by means of an inductive positional transducer, and the speed is recorded by a tachogenerator.

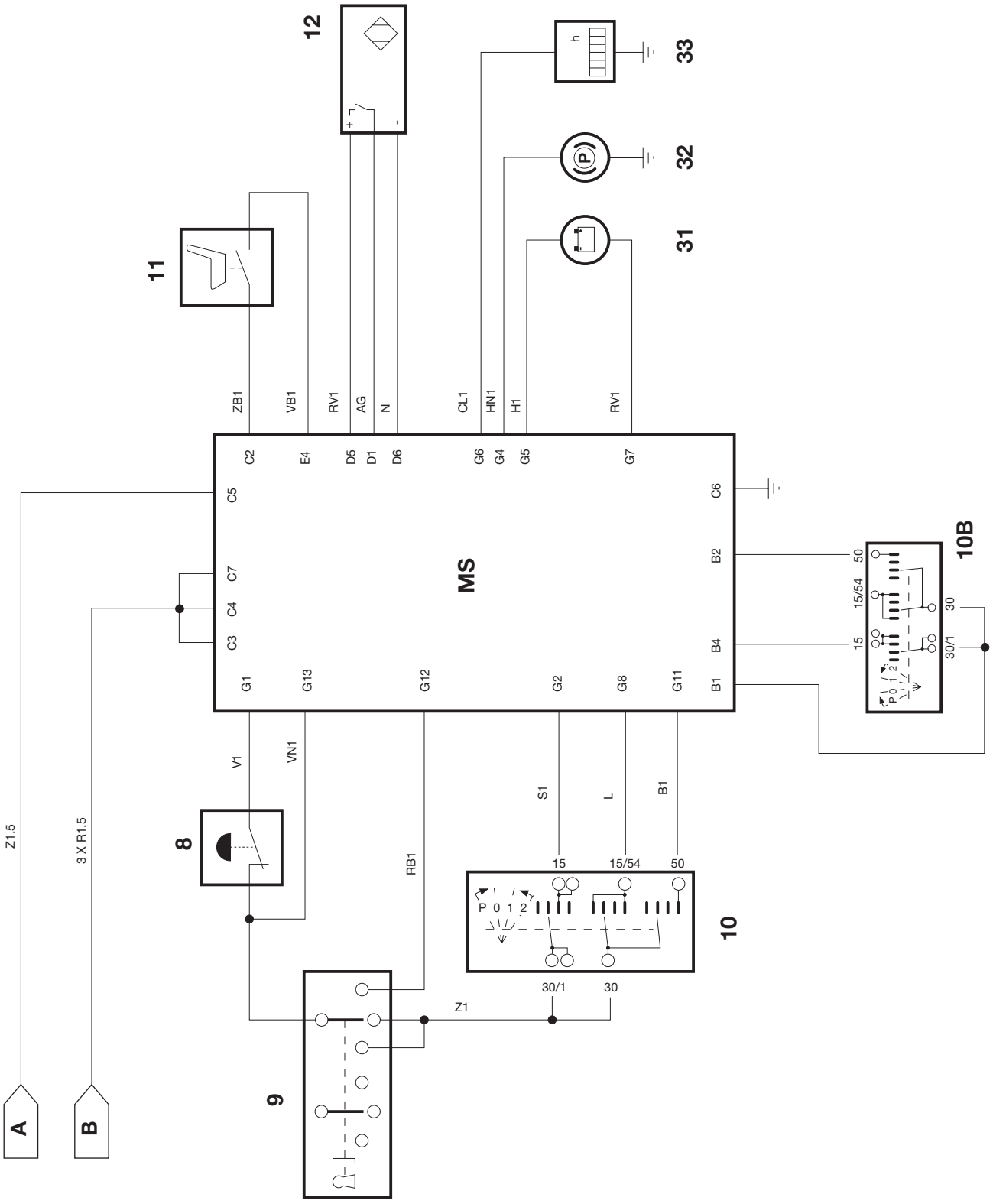
| *Operation:* Hydraulic scheme Telelift 3013 (**up to serial no. 8450**) | *Table:* **C.03.01.01** |
|---|---|



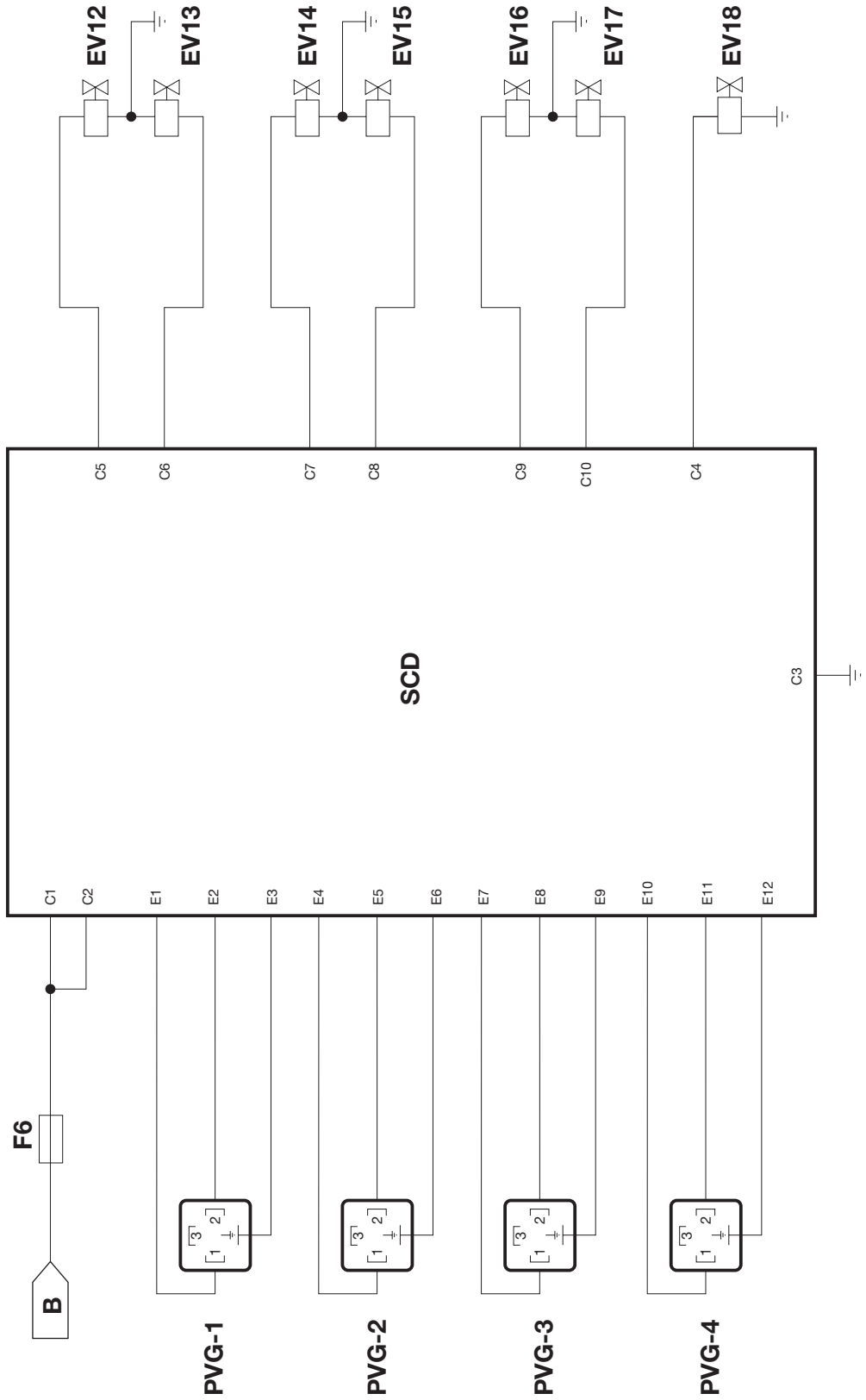

| Ref. | Description |
|---|---|
| 1 | Diesel engine |
| 2 | Hydraulic drive pump |
| 3 | Hydraulic driving motor |
| 4 | Main hydraulic pump |
| 5 | Auxiliary hydraulic pump |
| 6 | Intake filter |
| 7 | Intake filter |
| 8 | Thermal exchanger fan motor |
| 9 | Thermal exchanger |
| 10 | One-way valve |
| 11 | Pressure reducing valve |
| 12 | One-way valve |
| 13 | Load sensing priority valve |
| 14 | Hydraulic steering |
| 15 | Front axle steering cylinder |
| 16 | Rear axle steering cylinder |
| 17 | Steering selection solenoid valve |
| 18 | Servo-controlled brake pump |
| 19 | Accumulator |
| 20 | Axle |
| 21 | 4-section control valve |
| 22 | Accumulator |
| 23 | Hydraulic lever servo-control |
| 24 | Pressure reducing valve |
| 25 | Flow divider (deadman command) |
| 26 | Flow divider (ARB) |
| 27 | Flow divider (aux. functions) |
| 28 | Lifting cylinder block valve |
| 29 | Lifting cylinder |
| 30 | One-way valve |
| 31 | Sway cylinder block valve |
| 32 | Sway cylinder |
| 33 | Fork tilting cylinder block valve |
| 34 | Fork tilting cylinder |
| 35 | 2nd boom element ext. cyl. block valve |
| 36 | 2nd boom element extension cylinder |
| 37 | 3rd boom element ext. cyl. block valve |
| 38 | 3rd boom element extension cylinder |
| 39 | Attachment coupling cyl. block valve. |
| 40 | Attachment coupling cylinder |
| 41 | Stabilisation/sway solenoid valves panel |
| 42 | Right sway cylinder block valve |
| 43 | Right sway cylinder |
| 44 | Left sway cylinder block valve |
| 45 | Left sway cylinder |
| 46 | Right outrigger cylinder block valve |
| 47 | Right outrigger cylinder |
| 48 | Left outrigger cylinder block valve |
| 49 | Left outrigger cylinder |
| 50 | 1st/2nd speed selection solenoid valve |
| 51 | Mechanical gears hydraulic actuator |
| 52 | Differential locking solenoid valve |
| 53 | Differential locking hydraulic actuator |
| 54 | Hydraulic oil tank |
| 55 | One-way valve (*) |
| 56 | One-way valve (*) |
| 57 | Emergency electric pump (*) |
| 58 | Flow divider (joystick off) (*) |
| 59 | Proportional valve (*) |

(*) Only with man-platform

| Operation: Wiring diagram 2/25 - Telelift 3013 (**up to serial no. 7184**) | Table: **C.05.01.02** |
|---|---|



| *Operation:* Wiring diagram 12/25 - Telelift 3013 (**up to serial no. 7184**) | *Table:* **C.05.01.12** |
|---|---|

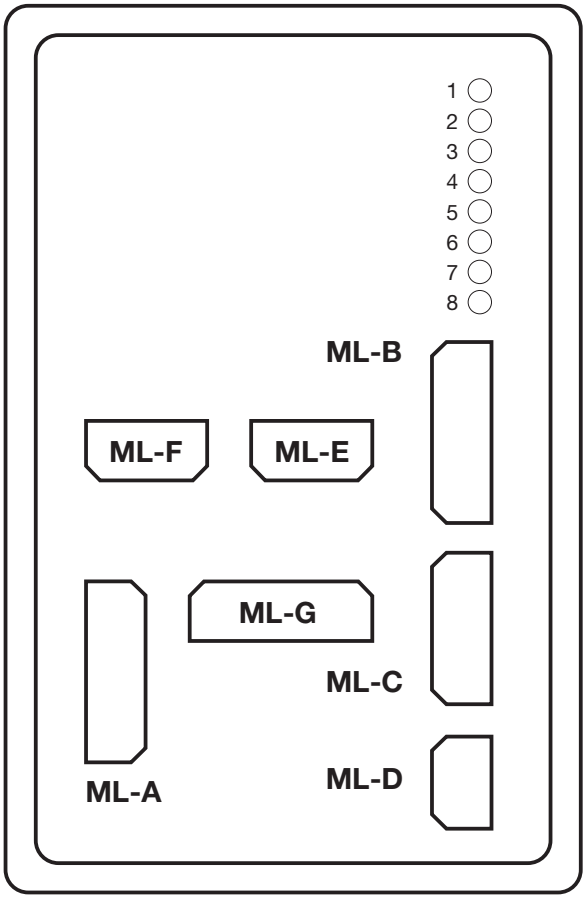


| *Operation:* Wiring diagram 22/25 - Telelift 3013 (**up to serial no. 7184**) | *Table:* **C.05.01.22** |
|---|---|

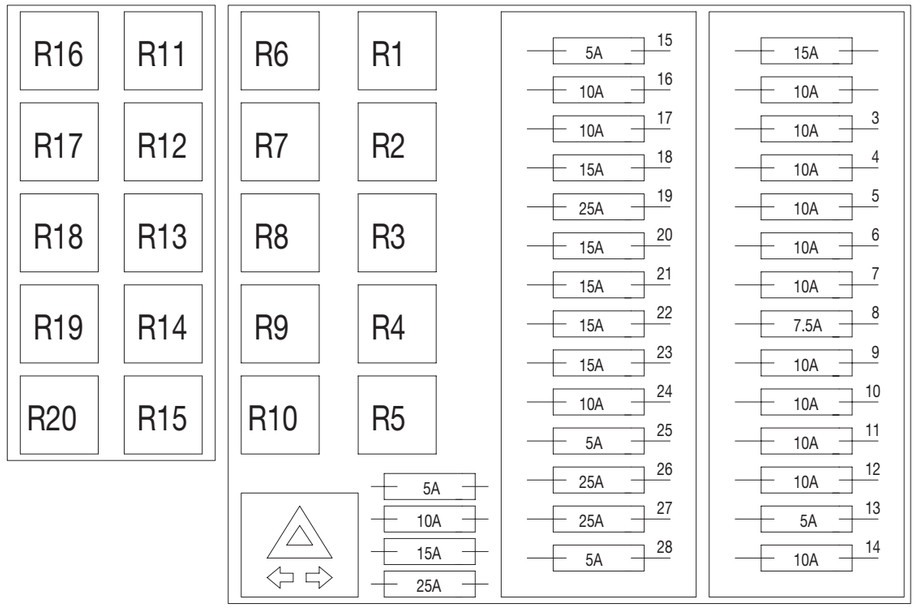
## LIGHTS MODULE

**Overload LED**

**1** Brake pressure switches
**2** Stop lights
**3** Position lights
**4** Low beam
**5** High beam
**6** Beacons
**7** Back-up lamp
**8** Back-up horn



| *Operation:* | *Table:* |
|---|---|
| Fuse wiring diagram - Telelift 3013 (**from serial no. 8451 to serial no. 9407**) - Telelift 3517 (**to serial no. 9362**) | **C.05.03.02** |



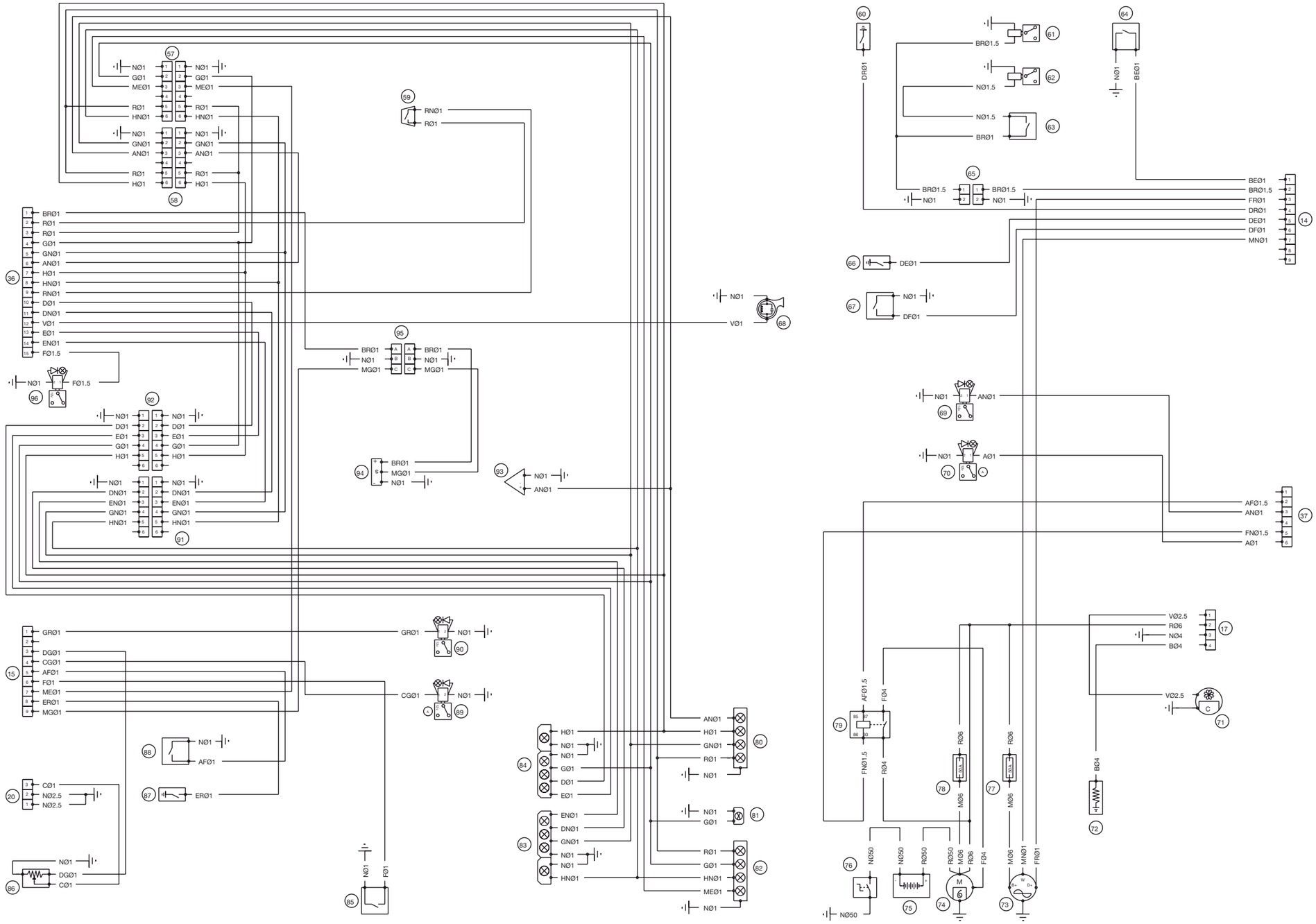

## FUSE-BOX UNIT

| Pos. | User |
|---|---|
| 1 | +30 turn signals emergency switch power supply, beacon switch |
| 2 | R10 relay power supply |
| 3 | R1 relay power supply |
| 4 | Blank |
| 5 | Right front/rear left position lights, license plate lights, R1 relay energizing coil, position lights indicator, water temperature indicator light, hydraulic oil temperature indicator light |
| 6 | Front left/rear right position lights, fuel gauge - hourmeter light, position lights switch light |
| 7 | Right low beam, fog lamp switch power supply |
| 8 | Left low beam |
| 9 | Right high beam, high beam indicator |
| 10 | Left high beam |
| 11 | Horn |
| 12 | Blank |
| 13 | R14 relay power supply |
| 14 | Blank |
| 15 | + 15 turn signals, emergency switch power supply |
| 16 | Power supply: windscreen wiper/washer motor - lights switch |
| 17 | R2, R10 relay power supply, right outrigger sensor, left stabillzer sensor, low boom sensor, parking brake sensor, wheel centring sensor, 17m boom sensor |
| 18 | Hydraulic stop power supply, cardan shaft motion sensor, 1st speed sensor, 2nd speed sensor, speed change button, S.C.T. control unit connector, fuel reserve, air filter clogging sensor, hydraulic oil temperature indicator, water temperature sensor, engine oil pressure indicator, brake failure indicator, gen-set indicator, fuel gauge hourmeter, water temperature hydraulic oil temperature indicator, optional attachment switch |
| 19 | Power supply: R12 - R16 relays, R12 relay pickup |
| 20 | Wiper motor power supply |
| 21 | Emergency pump switch power supply |
| 22 | Air conditioning compressor power supply |
| 23 | Power supply and lighting of the heating fan switch |
| 24 | Power supply - S.C.T. control unit connector R4 relay, R5 relay |
| 25 | R8 relay power supply |
| 26 | R9 relay power supply |
| 27 | Power supply: road safety switch, 35-pole plug for electronic control unit, platform-road-cabin switch |
| 28 | Beacon power supply |

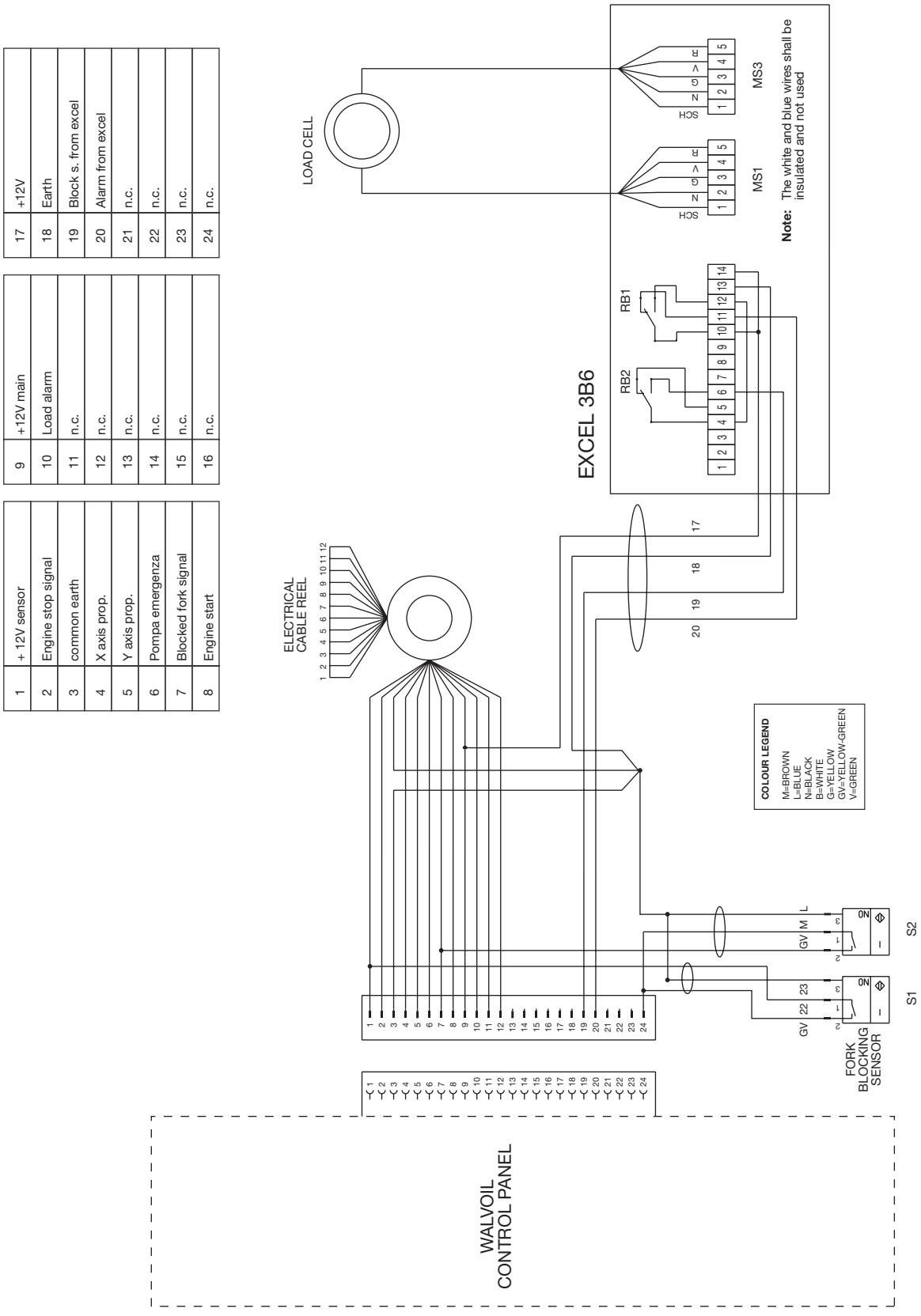
## RELAYS UNIT

| Pos. | User |
|---|---|
| R1 | Work light switch power supply |
| R2 | Parking brake indicator, R3 relay pickup enabling |
| R3 | Engine start with parking brake engaged |
| R4 | Fwd speed |
| R5 | Reverse speed |
| R6 | R7 relay power supply |
| R7 | Outriggers enabling command |
| R8 | R6 relay enabling command, crab/4-wheel steer selector |
| R9 | ARB system |
| R10 | ARB1 control unit |
| R11 | Platform power supply enabling command |
| R12 | Solenoid in accordance with T.Ü.V regulations |
| R13 | R14 relay enabling command |
| R14 | Engine shutdown from platform |
| R15 | Enabling command for engine shutdown from platform |
| R16 | R11 relay enabling command, ARB1 connector |
| R17 | Start-up relay pickup enabling command |
| R18 | 17m boom |
| R19 | Outriggers up/down movement with low boom sensor ON |
| R20 | Blank |

| *Operation:* Wiring diagram 2/3 - Telelift 4010 (**from serial no. 9163**) | *Table:* **C.05.06.02** |
|---|---|



| Operation: | Table: |
|---|---|
| Wiring diagram - Platform/boom connection - for **ROTARY** platforms **from serial no. 55116** | **C.06.05.02** |

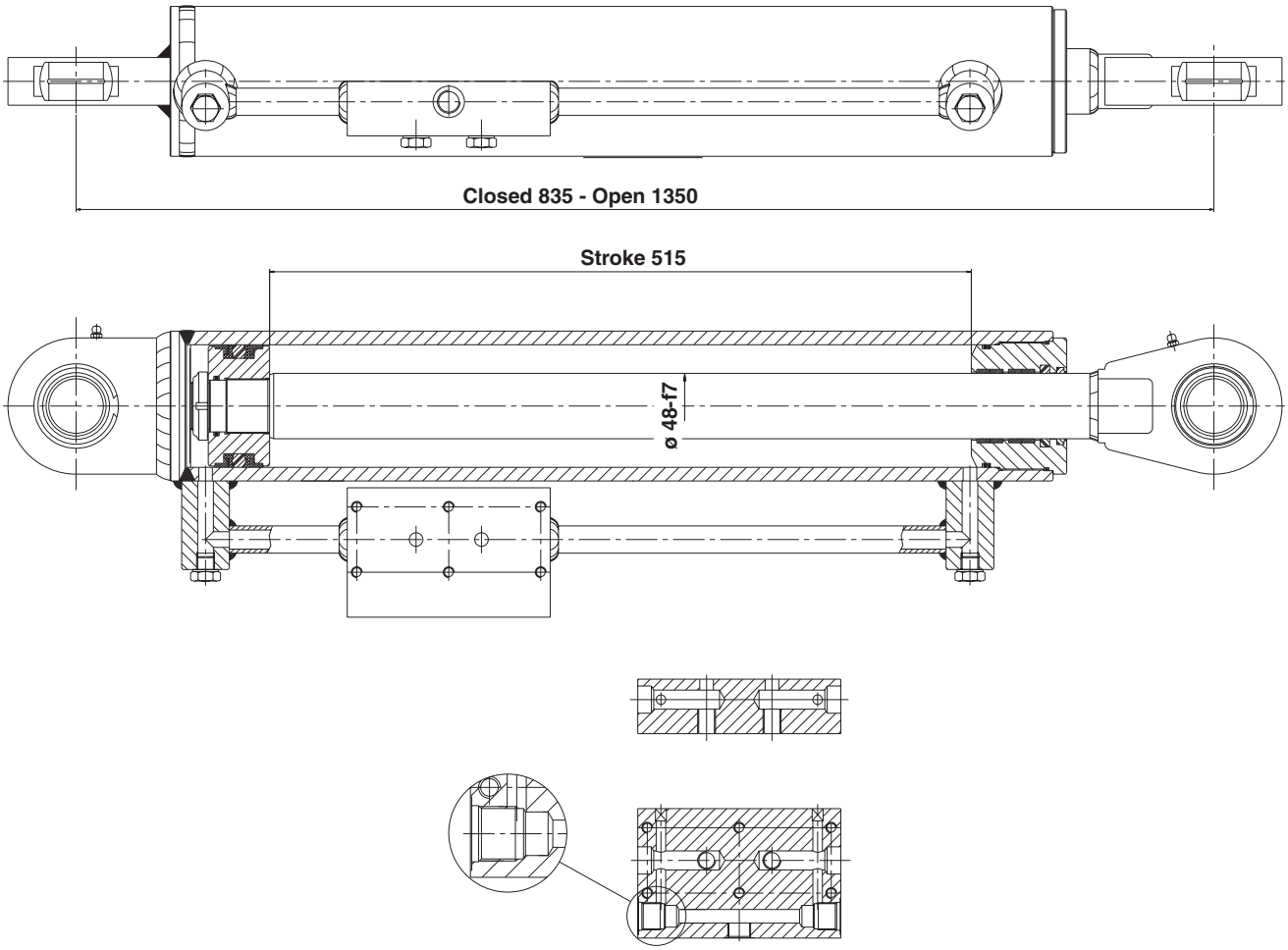



| | | |
|---|---|---|
| 1 | + 12V sensor | |
| 2 | Engine stop signal | |
| 3 | common earth | |
| 4 | X axis prop. | |
| 5 | Y axis prop. | |
| 6 | Pompa emergenza | |
| 7 | Blocked fork signal | |
| 8 | Engine start | |

| | | |
|---|---|---|
| 9 | +12V main | |
| 10 | Load alarm | |
| 11 | n.c. | |
| 12 | n.c. | |
| 13 | n.c. | |
| 14 | n.c. | |
| 15 | n.c. | |
| 16 | n.c. | |

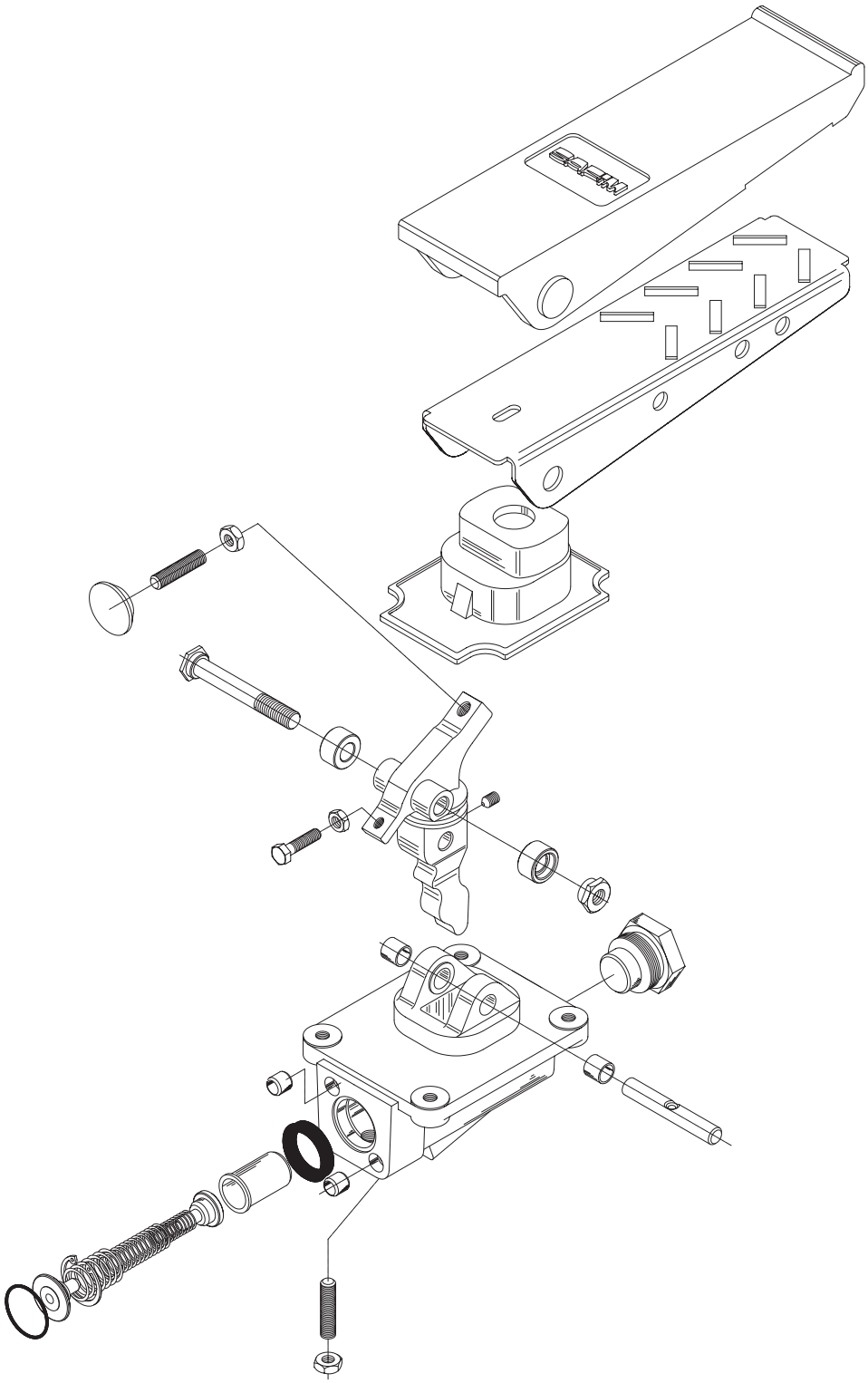
| | | |
|---|---|---|
| 17 | +12V | |
| 18 | Earth | |
| 19 | Block s. from excel | |
| 20 | Alarm from excel | |
| 21 | n.c. | |
| 22 | n.c. | |
| 23 | n.c. | |
| 24 | n.c. | |

| *Operation:* Balance cylinder - Telelift 3517 | *Table:* **C.07.03.02** |
|---|---|

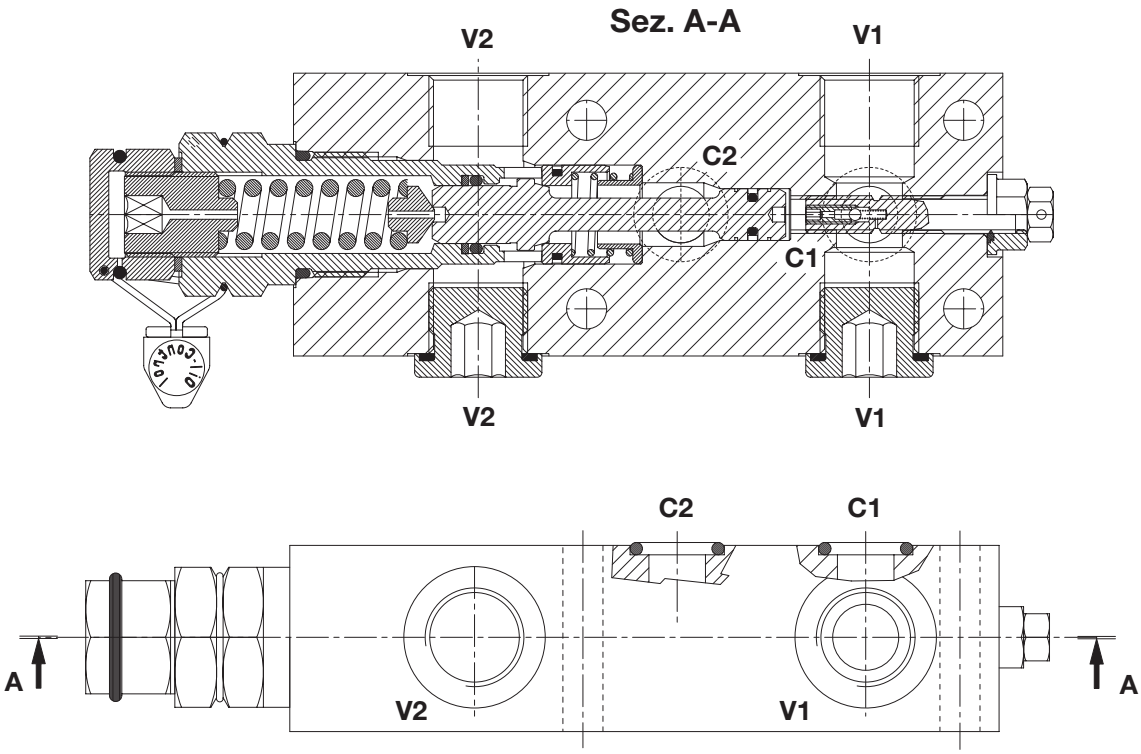


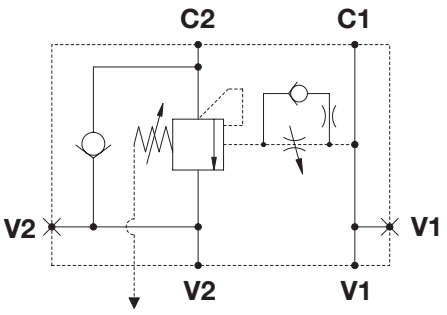

| DESCRIPTION | INDICATIVE CHARACTERISTICS |
|---|---|
| Working pressure | 250 bar |
| Working temperature | -15°C +70°C |
| Rod material | C45 |
| Rod tolerance | f7 |
| Rod roughness | Ra max 0.2 my |
| Chrome-plating thickness | 25 (+5/-5) my |
| Chrome-plating hardness | 900-1100 HV (Vichers 100 g) |
| Liner material | St 52.3 |
| Liner tolerance | H8 |
| Liner roughness | Ra max 0.2 my |

| *Operation:* Brake pump - pedal support | *Table:* **C.08.03.02** |
|---|---|



| Operation: | Boom raising cylinder block valve<br>Telelift 3713 Elite - Telelift 4010 | Table:<br>**C.11.01.01** |
|---|---|---|



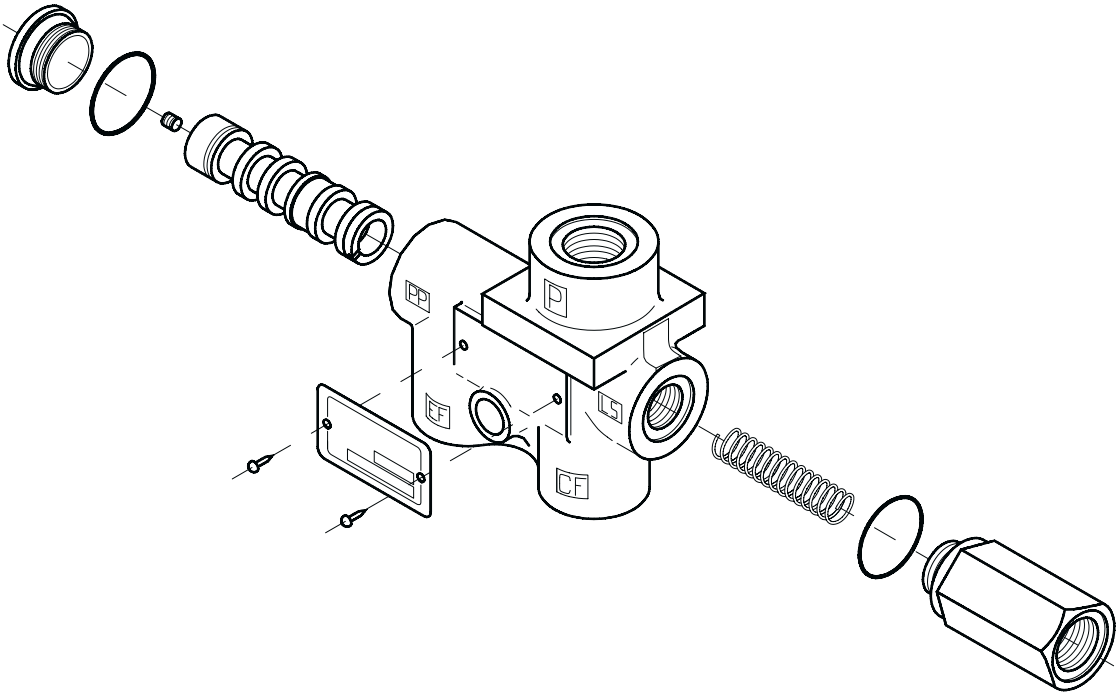




FITTINGS
V1-V2: G 1/2”
C1-C2: ø 12

**TECHINCAL DATA**

- Max working pressure .....350 bar
- Piloting ratio .....4:1
- Valve setting .....1.3 times higher than the load induced pressure
- Manifold.....steel
- Weight .....2,5 kg

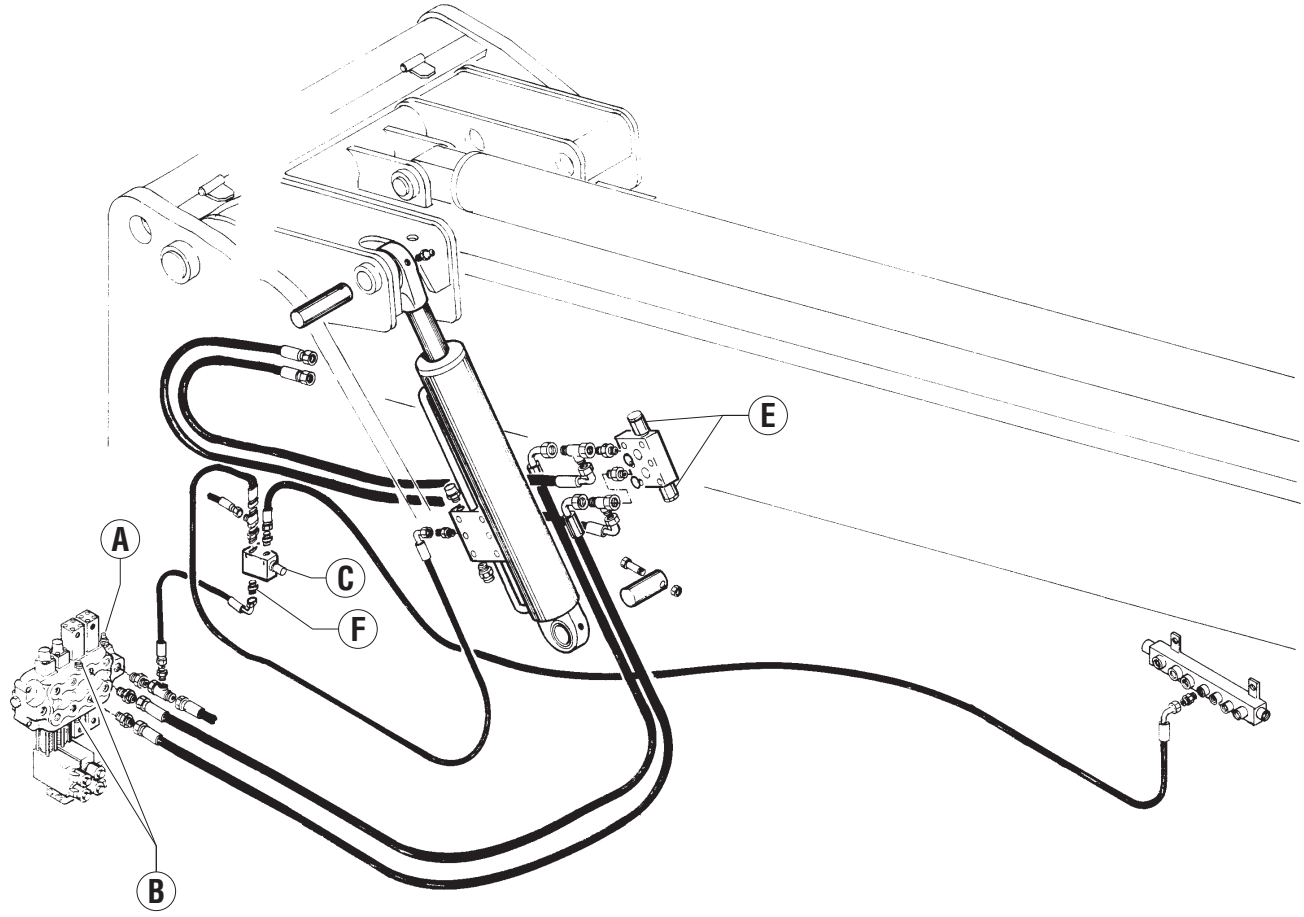
| Operation: | Table: |
|---|---|
| OLS 80 priority valve<br>Telelift 3713 Elite - Telelift 3517 - Telelift 4010 | C.11.07 |




| *Procedure:* Check and calibration of the circuit pressure<br>Telelift 3013 (**up to serial no. 8450**) | *Table:*<br>**D.02.01** |
|---|---|

## HYDRAULIC SYSTEM - FORK COMPENSATION

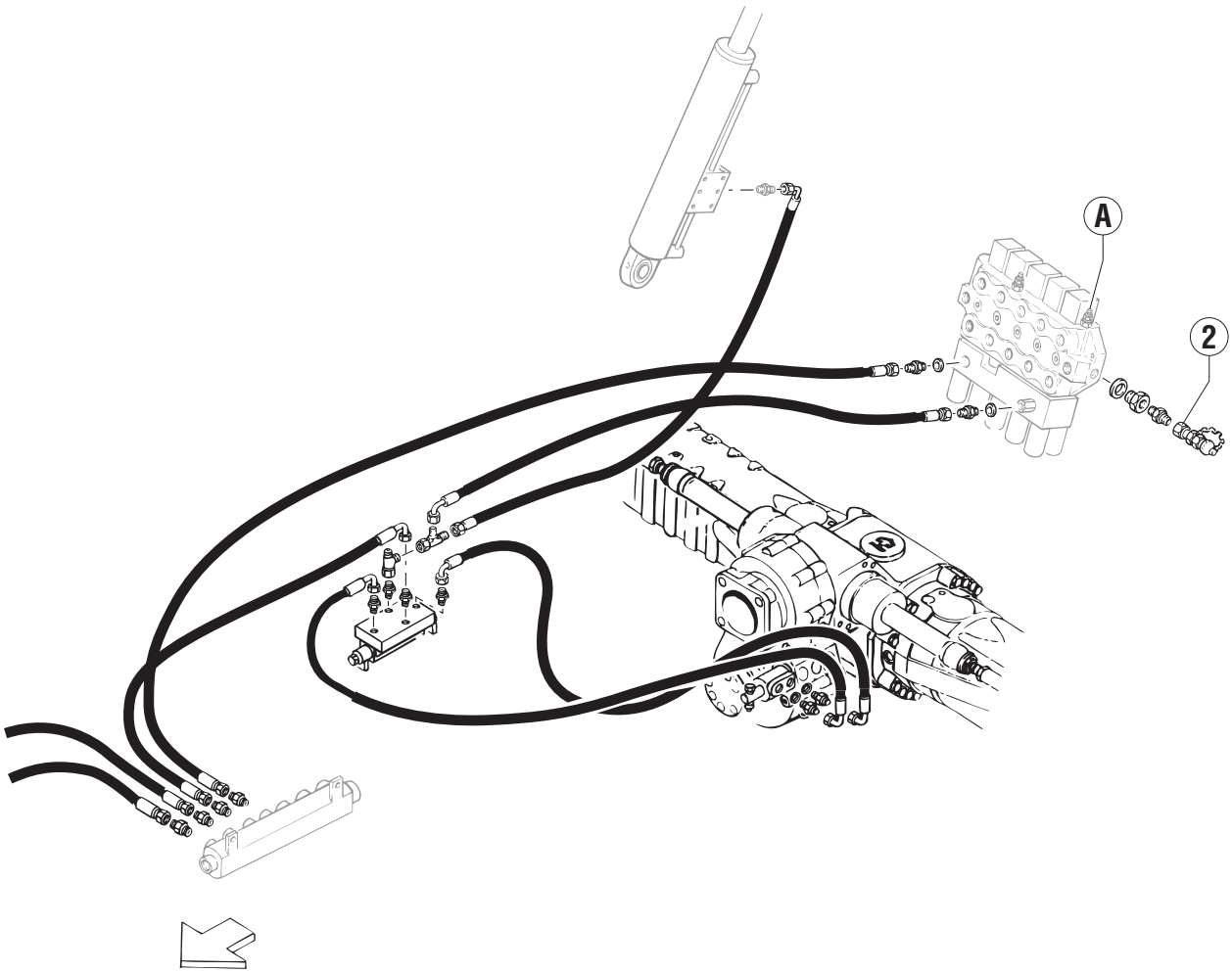
**Annex 1**



| *Procedure:* Check and calibration of the circuit pressure<br>Telelift 3013 (**from serial no. 8451**) - Telelift 3517 | *Table:*<br>**D.02.02** |
|---|---|

## HYDRAULIC SYSTEM - GEARBOX

**Annex 1**



tral-reverse selector to neutral position.



| Procedure: | Check and calibration of the circuit pressure<br>Telelift 4010 | Table:<br>**D.02.03** |
|---|---|---|

### 4.2 CALIBRATION OF THE PRESSURE CUT-OFF VALVE

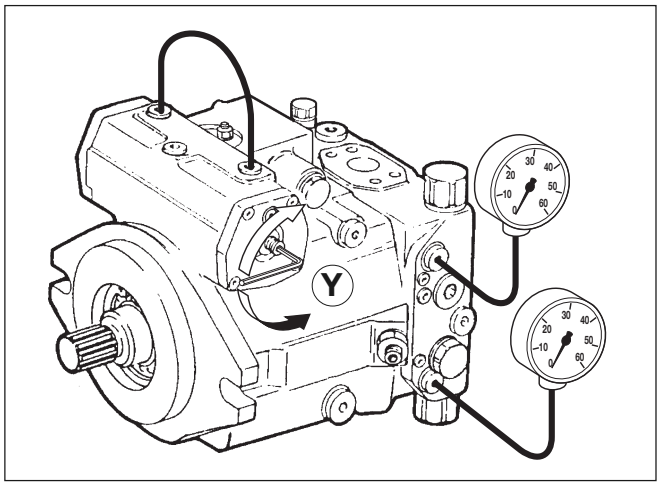
- With the engine running at maximum speed and the forward speed engaged, adjust the pressure cut-off valve **F** (see **annex 3**) to 430 bar.

  The two pressure control valves **H** must not be calibrated since they are of cartridge type and already set to 450 bar by Rexroth.

### 4.3 CALIBRATION OF THE MECHANICAL ZERO

The calibration of the mechanical zero **I** is required if the machine is set to neutral position with the forward-reverse speed lever.

- Set the forward-neutral-reverse selector to neutral position.
- With the engine running at idle speed, adjust the mechanical zero**Y** screw by rotating it until the high-pressure manometer reads the same value measured by the boost pressure manometer.




## 5. SETTING THE BRAKING SYSTEM PRESSURE

- Connect a 0-250 bar manometer to position **T** (see **annex 4**).
- Depress the foot brake some times until the manometer starts increasing. When it stops, the value shown is the calibration value of valve **R** (see **annex 4**) which must be 140 bar. If the displayed value is inferior, loosen valve **R**; if the value is greater, tighten the valve.

  **Note:** To check the pressure, it is necessary to depress the foot brake some times until the manometer restarts increasing; when it stops in stable position, it shows the calibration value.
  Pay special attention while disconnecting the hose from the accumulator. Oil can splash all around. First of all, release any residual pressure from the accumulators.

## 6. SETTING THE POWER STEERING

- Connect a 0-250 bar manometer to position **Z** (see **annex 5**).
- Select the front axle steering mode.
- Move the steering cylinder to stroke end and make sure the value of the power steering **S** is 140 bar.If the value is less, tighten valve **X**; if the value is greater, loosen the valve.

  **Note:** To gain access to valve **X**, remove the protection cap (see **annex 5**).

## 7. SETTING THE ARB 1 OVERLOAD WARNING SYSTEM

To adjust the ARB1 overload warning system, load a weight of 1000 kg on the forks.

With the machine resting on the wheels:

- Extend the boom to end of stroke while holding it horizontal:
- Switch on the overload warning system.

Proceed with a number aof tests with different weights and check that the machine stops at the values shown in the load chart in the cab and in the operator handbook.

## 8. SETTING THE SAFETY VALVE OF THE RADIATOR FAN MOTOR

- Valve **9** (see **annex 6**) has been factory-set to **160 bar** and cannot be tampered with and/or adjusted by third parties.

| *Procedure:* Calibration of the Excel card for aerial man-platforms - valid for Telelift 3013 (**from serial no. 9408**) - Telelift 3517 (**from serial no. 9363**) | *Table:* **D.03.01** |
|---|---|

## MAXIMUM LOAD SETTING

1 Load the platform with the maximum admissible load (consider 100 kg per person).

2 Power down by removing connector ref. **F**.

3 Reconnect the power connector and, using buttons ref. **C**, type in the following sequence:

**S1 S1 S0 S1 S2**

Type in the code within 10 seconds after reconnecting the power connector.

**IMPORTANT**

***Keep the code within reach before reconnecting the power connector.***

**IMPORTANT**

***When the maximum load has been set, ensure the procedure has been done correctly by checking that the second and fourth LED on the left come on. After removing the load, all LED's must go off.***

Now the platform calibration procedure has ended.

**ATTENTION**

***Before switching the controls back to the driving cab, disconnect the 24-pole ILME socket at the top of the boom.***

## SIGNALS ON DISPLAY WITH PC

Parameters:

15 **PercLevel1** load percent value corresponding to the first payload for load charts with 3 payloads.

16 **PercLevel2** load percent value corresponding to the second payload for load charts with 3 payloads.

17 **PercLevel3** load percent value corresponding to the third payload for load charts with 3 payloads or to the payload for one-payload load charts.

18 **Mode** this is 2 for rotating platforms and 1 for fixed platforms.

19 **Command** accepts values which are command codes.

20 **Cell_Adc1** this is the value of a calibration without load coming from the A/D converter of the displayed sensor.

21 **Cell_Known1** = 0.

22 **Cell_Adc2** this is the value of a calibration with maximum load coming from the A/D converter of the displayed sensor.

23 **Cell_Known2** =1000.

31 **CurPerc** ranges from 0 to 120; when 90 is displayed the system enters in pre-alarm.

32 **Cell_Actual** this is the value of the cell scale ranging from 0 to 1000.

33 **Cell_Adc** this is the value of the coming from the 12 bits A/D converter of the displayed sensor (therefore it ranges from 0 to 4096).

34 **SwVersion** = 300 for rotating platforms.

## LED BEHAVIOUR DURING WORK

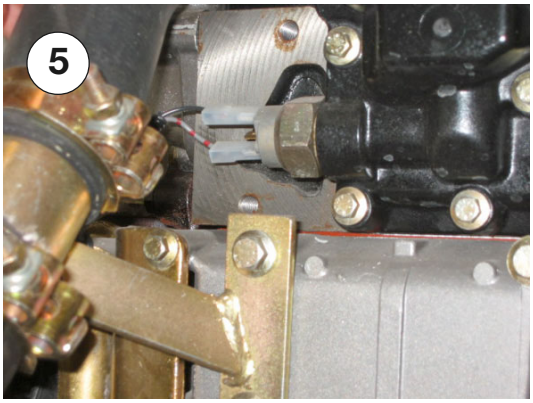
**ALL LED'S ON**: the loaded weight is within the accepted limits, **correct functioning**.

**2 LED'S ON**: the loaded weight is close the maximum admissible weight, **pre-alarm condition**.

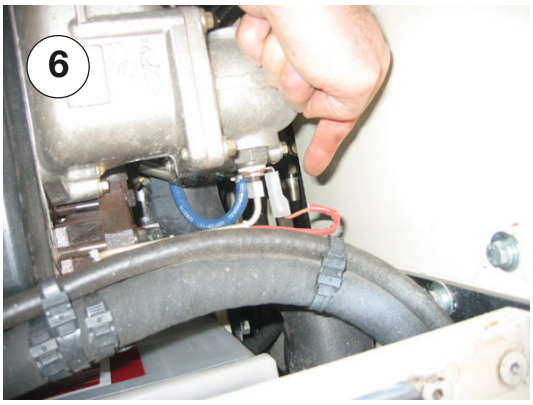
**ALL LED'S OFF**: machine in **alarm condition** and platform movements blocked.

| *Procedure:* Perkins engine bulbs - Description | *Table:* **D.06.01** |
|---|---|

**5** Water temperature measuring bulb (light indicator on dashboard).




**6** Glow plug pre-heating bulb.
Absorption during pre-heating: **~ 13 A**

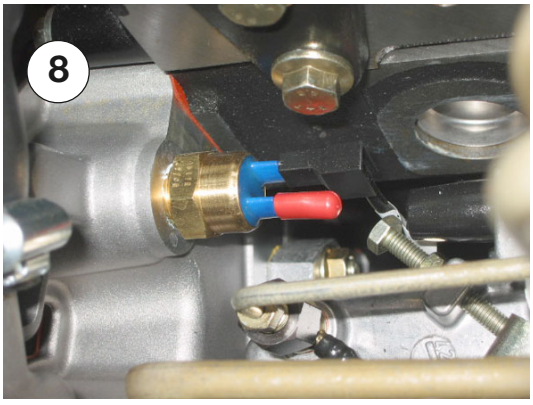



**7** Water temperature measuring bulb (pressure gauge power supply on dashboard).


**8** Cold advance adjustment bulb.

**IMPORTANT**

***Do not, at any time, operate on this bulb. Call in an expert technical engineer in case of troubles.***



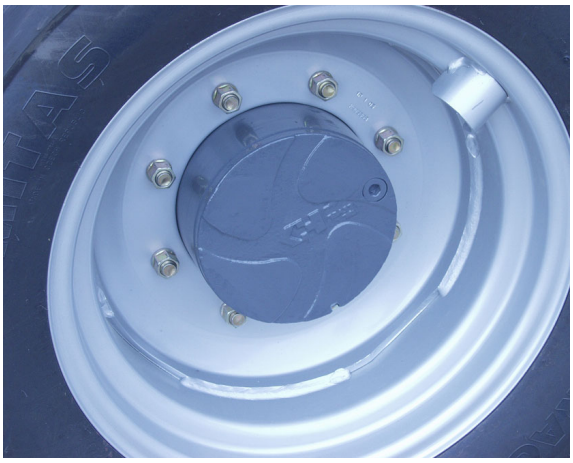
| Procedure: **Assembling a wheel** | Table: **T-001** |
|---|---|

**Procedure:**

**6** Line up the wheel with the axle and fit the 8 nuts.

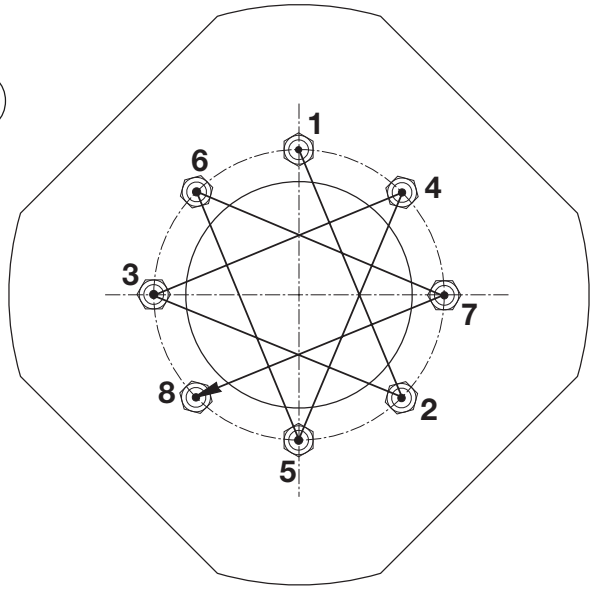
.

6



**7** Raise the outrigger or the hydraulic jack and tighten the nuts with the pneumatic screwing machine. Cross-tighten as shown.

7




**8** Lower the machine to the ground.

**9** ***Re-tighten all nuts to a torque 300 Nm.***

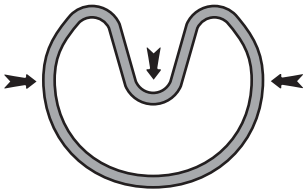
**DANGER**

***Check the tightening of wheels one hour after the job. They might get loose until they do not stay correct.***

| *Characteristics* | *Telelift 3713 Elite* | *Telelift 3517* | *Telelift 4010* |
|---|---|---|---|
| **Dimensions** (front and rear) | 400/70-20 | 400/70-20 | 400/70-20 |
| **Load index / P.R.** | 14 | 14 | 14 |
| **Rim** | 13 x 20 | 13 x 20 | 13 x 20 |
| **Wheel disc** | 8 holes DIN 70361 | 8 holes DIN 70361 | 8 holes DIN 70361 |
| **Pressure** bar/Psi | 4/58 | 4/58 | 4/58 |

| Procedure: How to refit the cylinder seals | Table: T-002 |
|---|---|

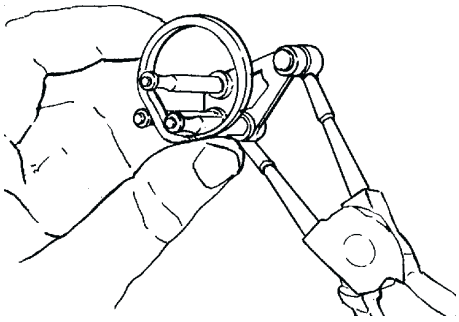
## ■ Refitting the seals into the internal housings

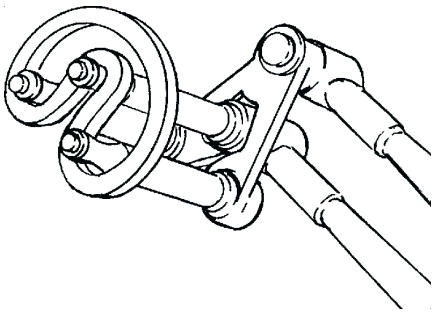


To refit a seal into its internal housing, bend it as shown to reduce its dimensions.
Once released, the seal will get back to its original shape.
To this end, use the special tool for seals (if available).

Before refitting a seal:

- Ensure all metal parts, the seal and the mounting tools are clean
- Oil the seal and the surfaces along which it has to slide with the same fluid of the system or an equivalent oil
- Make sure the seal enters the special notches and that there are no sharp edges
- Avoid a prolonged deformation of the seal during mounting.



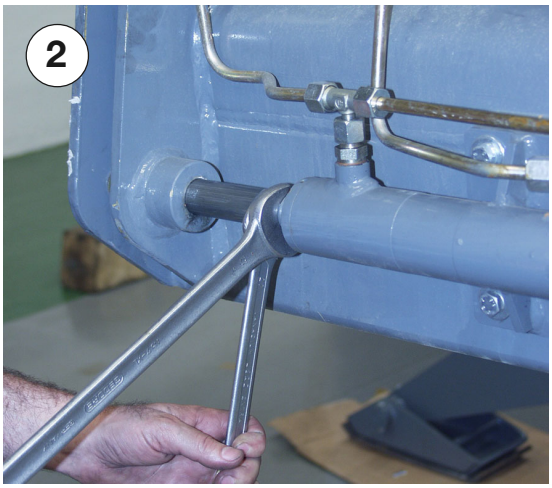


| Procedure: | Table: T-006 | | | |
|---|---|---|---|---|
| **Dismantling the cylinders**<br>**Attachment locking cylinder**<br>**(up to serial no. 9261)** | 3713 Elite ✔ | 3517 ✔ | 4010 ✔ | kg: 11.4 |
| | | | | Hours: 1 — Min.: - |
| Bridge crane, payload 500 kg (2000 lb)<br>Textile bridles or chains with hooks | Standard tools | | | 1 |

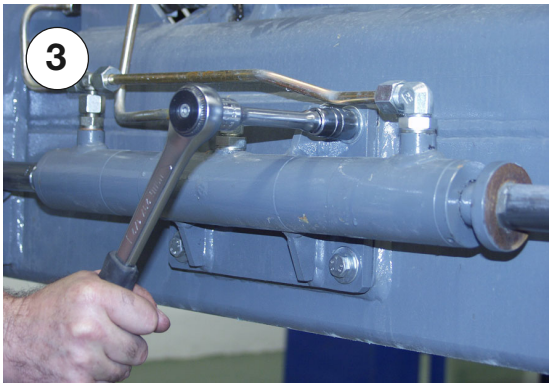
**Dismantling:**

**1** Release the attachment.

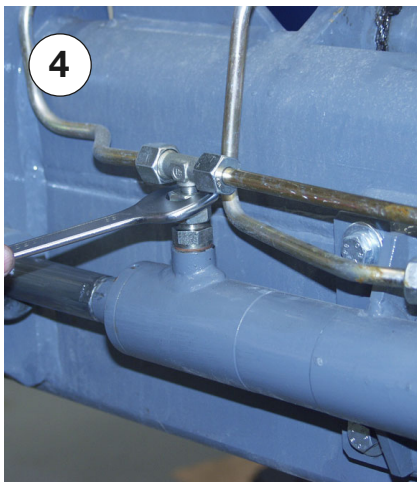
**2** Unscrew the cylinder coupling terminals using two 27mm wrenches.

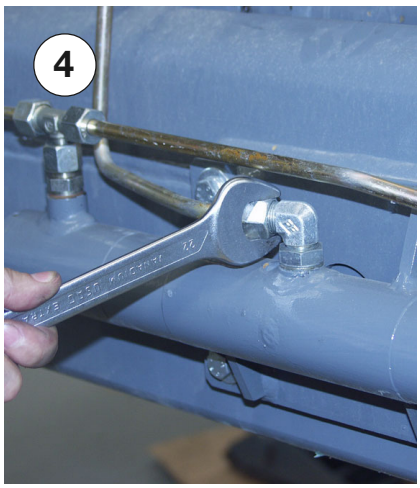


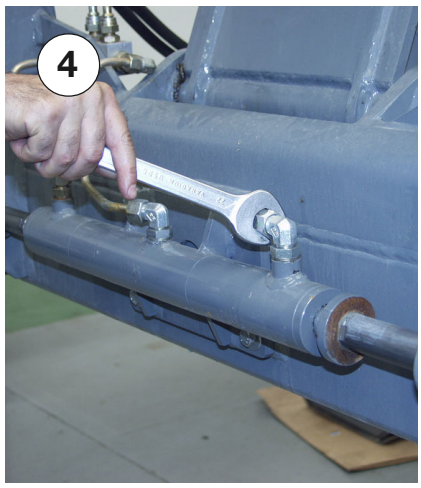

**3** Loosen the 4 screws fixing the cylinder to the attachment holding plate with two 17mm wrenches.




**4** Disconnect the iron pipes from the cylinder with a 22mm wrench.



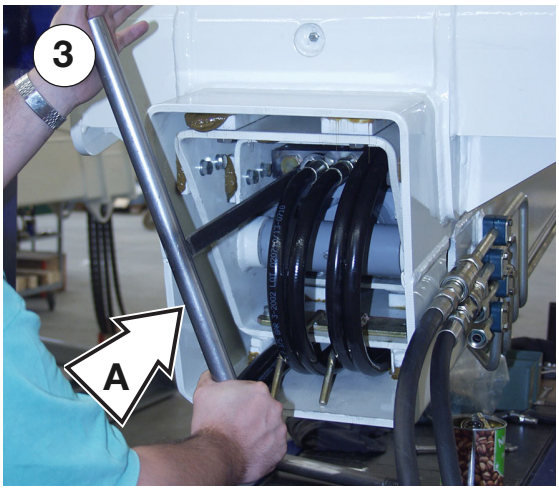
| Procedure: | Table: T-010 | | | | |
|---|---|---|---|---|---|
| **Dismantling the cylinders**<br>**3rd telescope extension cylinder** | 3713 Elite ✔ | 3517 ☐ | 4010 ☐ | kg | 146 |
| | | | | | Hours: 2 / Min.: 30 |
| Bridge crane, payload 500 kg (2000 lb)<br>Textile bridles or chains with hooks | Standard tools | | | | 1 |

**Dismantling:**

**1** Set the boom to horizontal position.

**2** Remove the attachment holding plate from the boom nose.

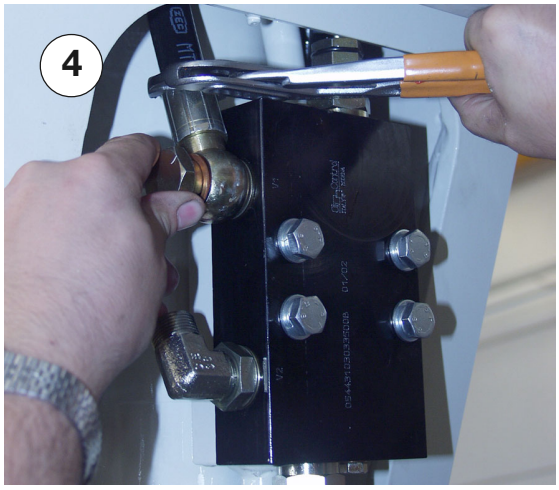
**3** Disconnect the hydraulic lines from the block valve of the third telescope extension cylinder using the special wrench **A** (see A-06 dwg.04).



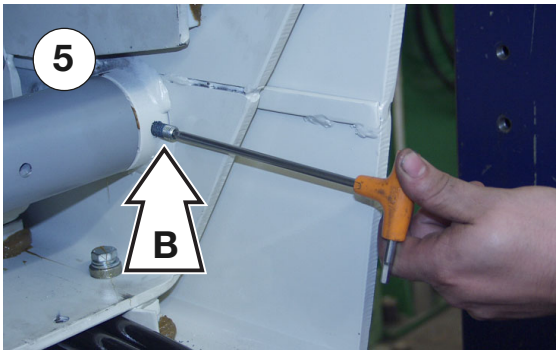

**PROTECT THE ENVIRONMENT**

***Used oils must be handled and disposed of according to local and national regulations. Address to legally authorised centres.***

**4** Disconnect and plug the hydraulic lines from both the block valve of the fork pitching cylinder and the hose-ring fitted to the boom nose. Tie a cord of suitable length around the lines for the subsequent reassembly, then extract the hydraulic hoses from the rear side of the boom.

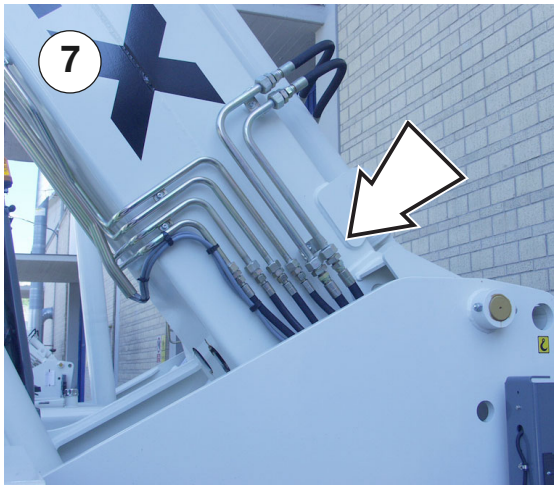



**5** Extract the grubscrew **B** locking pin **C** (see step 6).

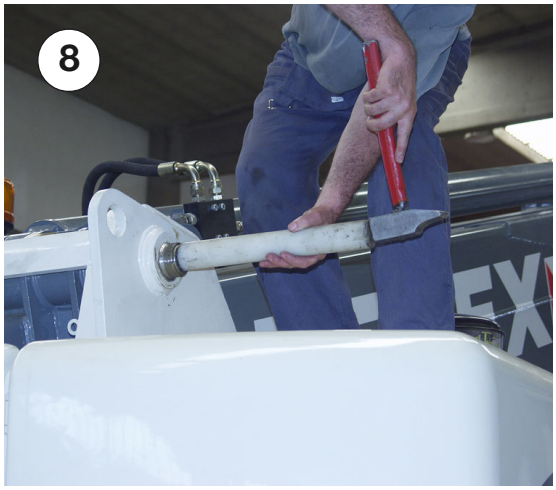


| *Procedure:* **Dismantling the boom** | *Table:* **T-012** |
|---|---|

**7** Eliminate any residual pressure from the hydraulic circuit before disconnecting the flexible hoses from the pipes with a 27mm wrenck and loosening the counter-nut with a 30mm wrench (or 27+30+41 mm for Telelift 3517)




**8** Knock out and extract the boom joint pin with a mallet of soft material (aluminium, copper, wood, etc.).

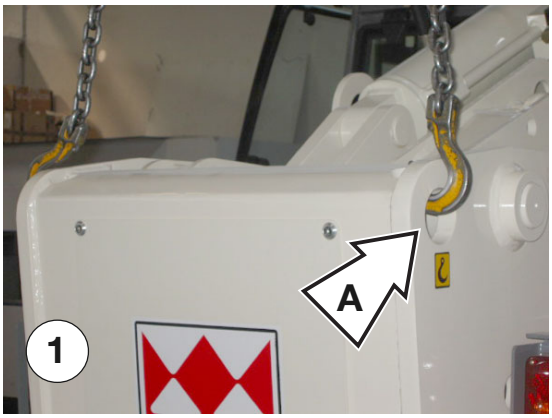



**9** Raise the boom so that it does not hinder other operations.

| Procedure: **Dismantling the rear axle** | Table: **T-016** | | | kg: 700 |
|---|---|---|---|---|
| | 3713 Elite ✔ | 3517 ✔ | 4010 ✔ | Hours: 3 — Min.: - |
| Bridge crane, payload 1000 kg<br>Textile bridles or chains with hooks | Standard tools | | | 1 |

**Dismantling:**

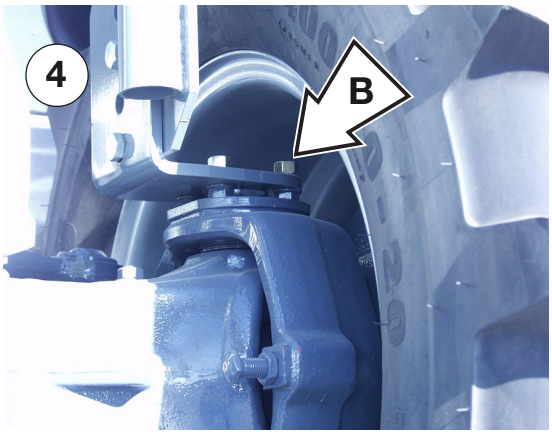
**1** Secure a two-leg chain of adequate capacity and connected to the bridge crane to the anchoring lugs **A** and slightly raise the rear part of machine.




**2** Place some adjustable stands under the chassis.

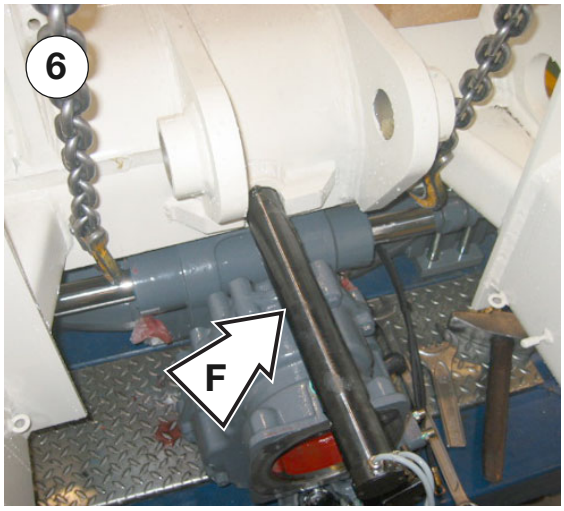
**3** Remove the rear wheels - see T-001.


**4** Loosen the bridge-shaped fixing screws **B** with a 19mm wrench and remove the mud-guard.



| Procedure: **Replacing the load cell** | Table: **T-018** |
|---|---|

**6** Knock out and extract the load cell **F** with a wooden block.




**IMPORTANT**

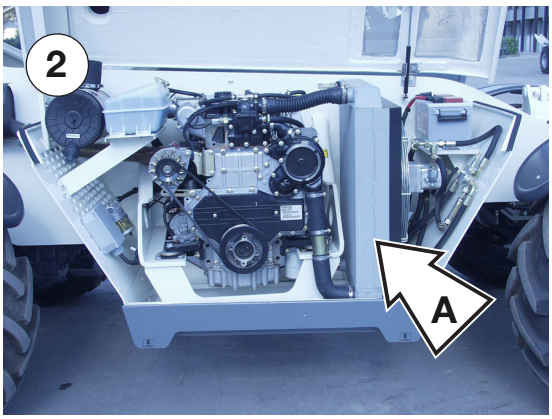
***When reassembling the load cell, place the electrical cables upwards and knock the cell lightly home with a rubber hammer to avoid damage.***

| Procedure: **Dismantling the water/oil cooler** | Table: **T-022** 3713 Elite ✔ 3517 ✔ 4010 ✔ | kg 50 |
|---|---|---|
| | | Hours 1 Min. 30 |
| Bridge crane, payload 500 kg<br>Textile bridles or chains with hooks | Standard tools | 1 |

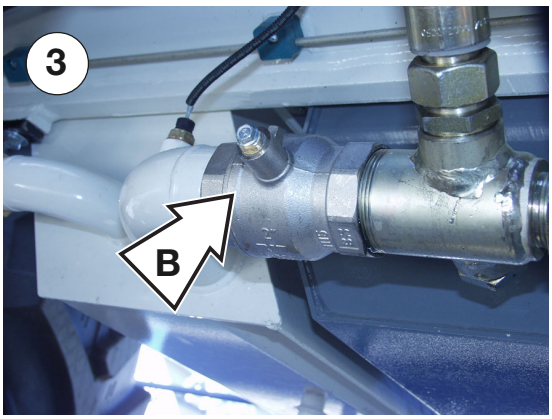
**Procedure:**

**1** Move to the right-hand side of the machine and remove the side cover with a 17mm wrench.


**2** Raise the top cover and access to cooler **A**.




**3** Close cock **A** placed at the outlet of the hydraulic oil tank, at the base of the machine.




**IMPORTANT**

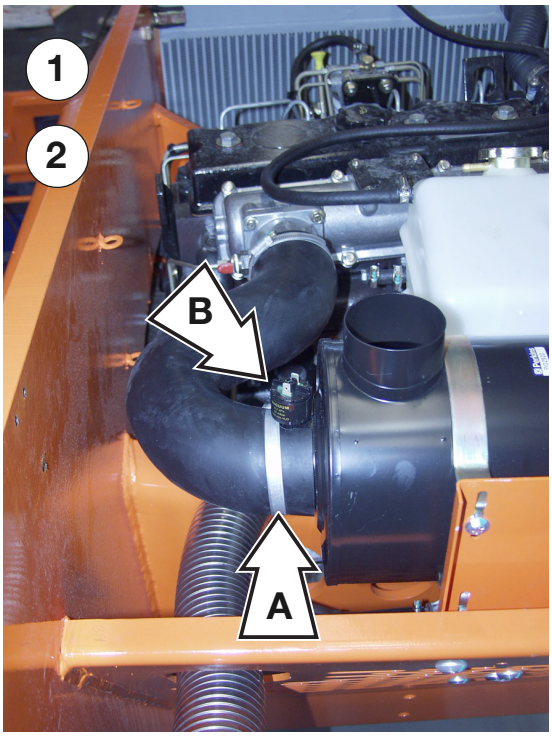
***This operation is not indispensable but it guarantees greater protection for the hydraulic system.***

| Procedure: **Dismantling the air filter** | Table: **T-025** 3713 Elite ✔ 3517 ✔ 4010 ✔ | kg 8 |
|---|---|---|
| | | Hours - Min. 30 |
| Standard tools | | 1 |

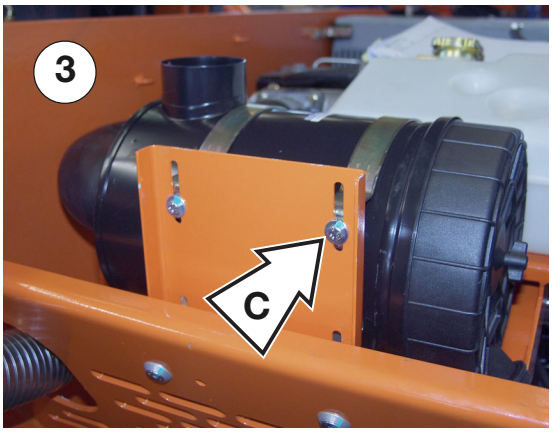
**Procedure:**

**1** With a flat screwdriver, loosen binder **A** fixing the rubber hose.

**2** Disconnect the connector of the clogging indicator **B**.



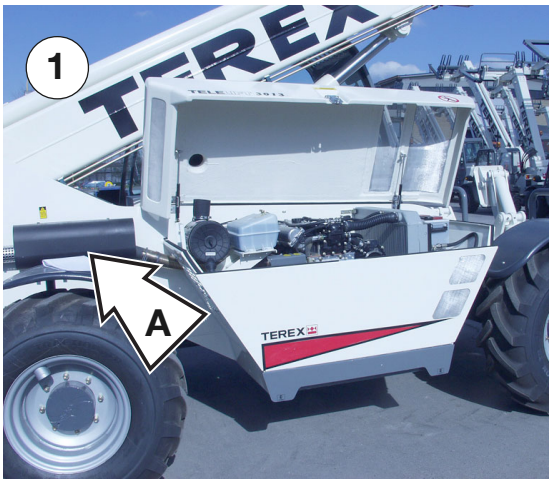

**3** With a 10mm wrench, remove the 4 screws **C** fixing the air filter. Remove the filter.



| Procedure: Dismantling the exhaust pipe | Table: T-028 | | | kg: 20 |
|---|---|---|---|---|
| | 3713 Elite ✔ | 3517 ✔ | 4010 ✔ | Hours: - / Min.: 30 |
| Standard tools | | | | 1 |

**Procedure:**

**1** Move to the rear right-hand side of the machine and access to the exhaust pipe **A**.




**2** Remove the U-bolt fixing the flexible hose to the exhaust pipe loosening the nuts with a 17mm wrench.

**3** From the internal side of the frame, loosen the 3 fixing screws of the exhaust pipe with a 17mm wrench.

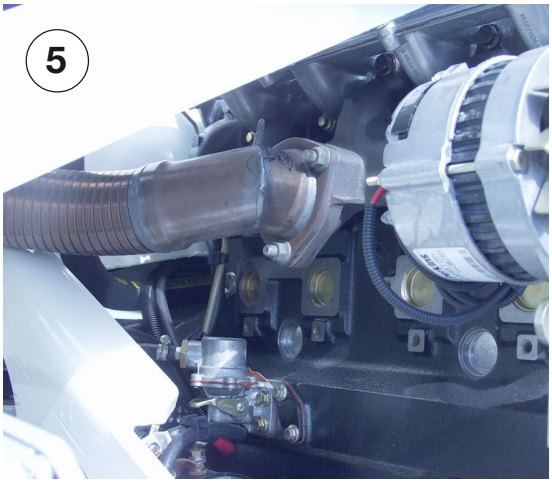
**CAUTION**

***Before dismantling the exhaust pipe, make sure it is cold. The pipe shall be supported by a second operator while re-tightening the fixing screws.***

**Changing the exhaust flexible hose:**

**4** Remove the exhaust pipe.

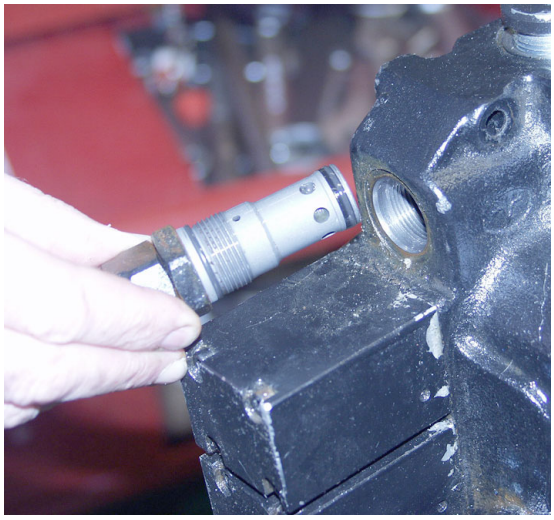
**5** Loosen the 3 nuts fixing the flexible hose to the exhaust manifold of the engine using a 15mm wrench.



| Procedure: | Dismantling the actuator on bench (slider and valves) | Table: T-030 |
|---|---|---|

7 Clean thoroughly, check the seals and, if necessary, replace, anoint with hydraulic oil and reassemble.

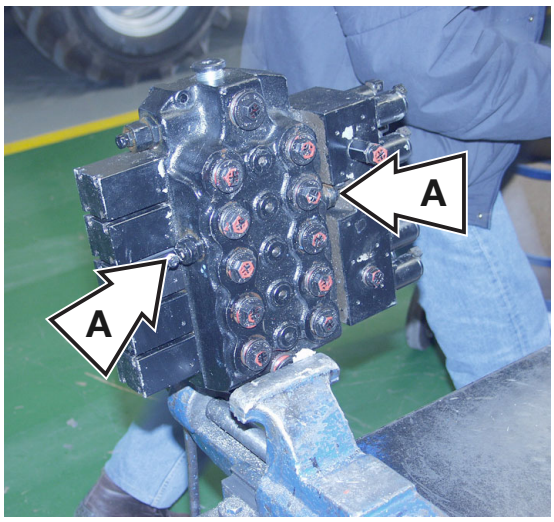
7



❑ **Dismantling the shock-proof valves**

8 The shock-proof valves **A** are calibrated and lead-sealed by the manufacturer prior to delivery. If they have to be re-calibrated, they shall be removed with a 22mm wrench and a 12mm wrench, re-calibrated and cleaned thoroughly. Check they have been re-sealed by the repair workshop after re-calibration.

8



| Procedure: **Overload warning system** | Table: **T-031** |
|---|---|

## A - 2 TECHNICAL SPECIFICATIONS

### *Electrical specifications*

- Supply voltage: 12 ÷ 15 Vdc
- Maximum current: 350 mA
- Fuse (external): 0.5 A F (fast-acting) 5x20mm
- Protected against power inversions

### *Environmental*

- Temperature: -20 ÷ 50 °C
- Humidity (non-condensing): 95%

### *Inputs/outputs*

- Stabiliser status input
  Input voltage: 10 ÷ 15 V
  Input current: 30 mA

- Alarm relay output
  Output voltage: 12 V
  Maximum load: 200 mA

### *Load cell specifications*

- Excitation voltage 5 V
- Sensitivity: 1 mV/V

| Procedure: **Sistema antiribaltamento** | Table: **T-031** |
|---|---|

***Calibration procedure:***

**1** - Retract the boom all the way, bringing it in a horizontal position.

**2** - Lower the boom with an abrupt movement of the control lever, in order to “bounce” the machine; return the boom to the horizontal position and wait for oscillations to dampen out.

**3** - Rotate trimmer **VR1** (see Fig.15) until LED2 turns off (rotating the trimmer clockwise turns off more LEDs, and viceversa); after LED2 turns off, rotate the trimmer clockwise two and half turns more.

**4** - Load the forks with the known weight.

**5** - Extend the boom to the distance previously found on the load chart. If LED5 turns on while the boom is being extended (and therefore the boom locks out), turn trimmer **VR2** clockwise approximately five turns.

**6** - Lower the boom with an abrupt movement of the control lever, in order to “bounce” the machine; return the boom to a horizontal position and wait for oscillations to dampen out.

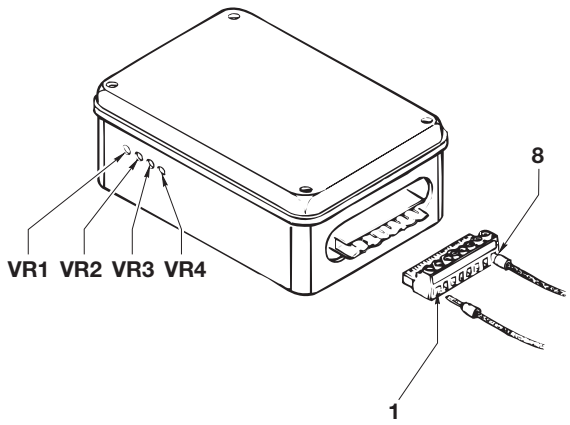
**7** - Rotate trimmer **VR2** counterclockwise until LED5 is lit; at this point, rotate **VR2** counterclockwise another half turn.

After completing the calibration procedure, make sure the alarm is activated at the required distance. Then replace the main module on its support.

**IMPORTANT**

If, during the calibration procedure, the LEDs light up in an unusual manner (for example, LEDs 2 and 3 off, LEDs 4 and 5 on) proceed as follows:

- turn trimmer **VR1** counter-clockwise approximately ten turns.
- turn trimmer **VR2** clockwise approximately ten turns.



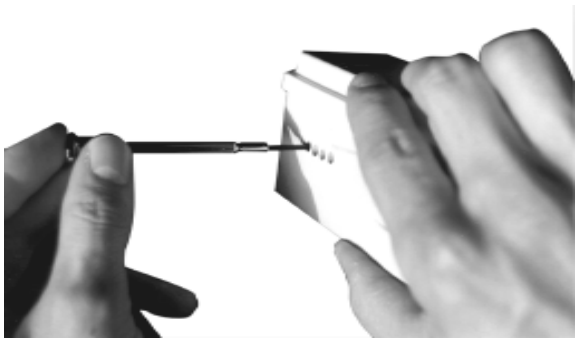



*Fig. 15*

| Procedure: Dismantling the accumulators | Table: T-035 | | | 7.2 (1.5 l) 4.1 (0.5 l) |
|---|---|---|---|---|
| | 3713 Elite ✔ | 3517 ✔ | 4010 ✔ | |
| | Standard tools | | | Hours: - Min.: 30 |
| | | | | 1 |

- ***Actuator accumulators (15 litres)***

1 on Telelift 3713 Elite

- ***Brake accumulators (0.5 litres)***

2 on Telelift 3713 Elite/3517
1 on Telelift 4010

**Procedure:**

## ■ Actuator accumulator

**DANGER**

***Before dismantling and disconnecting the accumulator from the hydraulic line operate the actuator levers forward and back until they can hardly move.***

**PROTECT THE ENVIRONMENT**

***Used oils must be handled and disposed of in accordance with local and national regulations. Address to legally authorised centres.***

**1** Place a container of suitable size under the feeding connector to prevent oil spillage.

**2** Hydraulically disconnect the accumulator with extreme caution:
- protect your hands with gloves
- protect your face with a screen
- protect your eyes with goggles

**3** Wrap up the accumulator with a rag, then slowly loosen the feeding connector **A** with a 19mm wrench.

| *Procedure:* **Checking the accumulator** | *Table:* **T-036** |
|---|---|

## CHECKS

Check that the accumulator has been disconnected from the circuit and that it discharges and returns to the liquid side.

- Loosen the plugs of the inflation valve (pos. **F**).
- Unscrew the regulator (pos. **E**).
- Open the vent (pos. **B**).
- Hand-tighten the tester on the inflation valve.
- Hand-lock the fitting and position the pressure gauge.
- Lock the vent key (pos. **B**).
- Screw down the regulator (pos. **E**) and start checking the needle. Screw down when the needle moves from position 0 (1/2 turn is enough; do not tighten).
- Read the inflation pressure on the pressure gauge.
- To reduce the pressure, open the vent key slowly until reaching the pressure you wish.
- To increase the inflation pressure:
  - remove the knurled plug (pos. D);
  - connect the fitting (pos. **C**) to one end of the 60° 1/4" BSP flexible hose;
  - connect the other end of the hose to the nitrogen source and set under pressure.

Compulsorily wait for the stabilisation of the thermal exchange caused by the movement of the pressures before any check or pre-charge. For safety reasons, cut out the nitrogen source during stabilisation.

## DISMANTLING

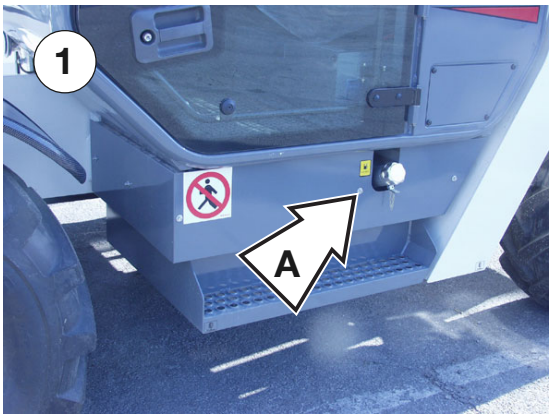
Repeat the check phase in reversed order. After removing the inflator tester, check the tightness of the inflation valve.

Re-tighten the plug/s of the inflation valve.

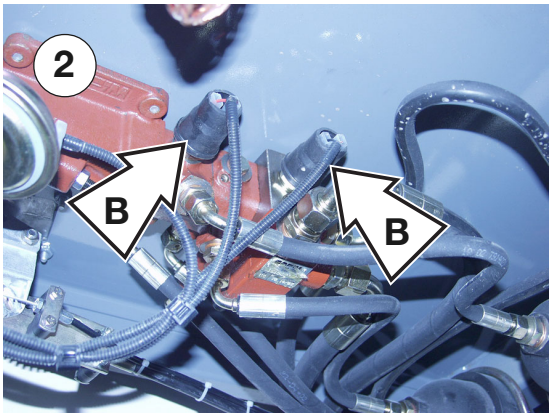
| Procedure: Dismantling the brake pump | Table: T-040 | | | kg | 5 |
|---|---|---|---|---|---|
| | 3713 Elite ✔ | 3517 ✔ | 4010 ✔ | Hours | Min. |
| | Standard tools | | | 1 | - |
| | | | | | 1 |

**Procedure:**

**1** Lift out the protection cover after loosening all screws **A** with a 4mm hexagonal wrench.




**2** Move to the bottom of the cab and access to the brake pump. Disconnect the two electrical connectors **B**.




**PROTECT THE ENVIRONMENT**

***Before disconnecting the hydraulic lines, place containers of suitable size underneath to prevent oil spillage.***

**IMPORTANT**

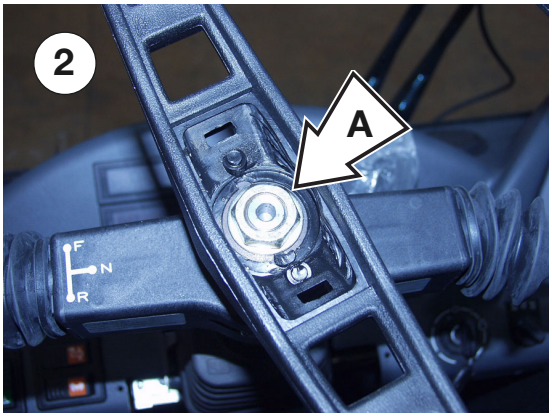
***Thoroughly clean the area around the hydraulic lines to be disconnected. Plug all disconnected parts with couplings, rags or adhesive tape to prevent that dust and impurities may enter the circuit and cause damage.***

| Procedure: **Dismantling the steering wheel** | Table: **T-044** | | | 1.8 | |
|---|---|---|---|---|---|
| | 3713 Elite ✔ | 3517 ✔ | 4010 ✔ | Hours | Min. |
| | Standard tools | | | - | 10 |
| | | | | 2 | |

**Procedure:**

**1** Access to the driving place and remove the protection cover at the top of the steering wheel.


**2** With a 27mm box spanner, remove the ring nut locking the steering wheel **A**.



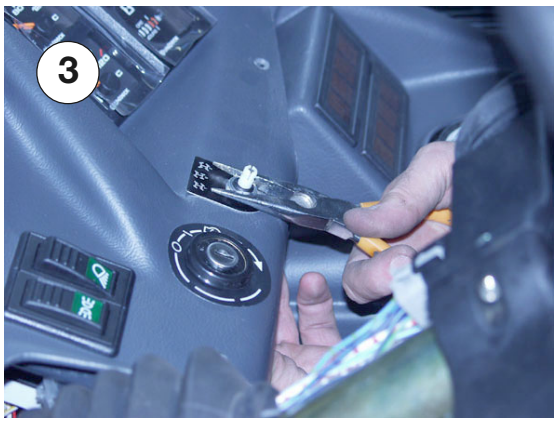

| Procedure: **Dismantling the steering selector** | Table: **T-049** | | | kg | - |
|---|---|---|---|---|---|
| | 3713 Elite ✔ | 3517 ✔ | 4010 ✔ | Hours | Min. |
| | Standard tools | | | - | 15 |
| | | | | 1 | |

**Procedure:**

**1** With a crosstip screwdriver pry off the dashboard cover.


**2** Lift out the plastic cap.


**3** Loosen the nut locking the selector to the dashboard with pliers. Push out the selector.



| Procedure: | Table: T-054 | | | |
|---|---|---|---|---|
| **Changing the warning lights' blocks on the dashboard** | 3713 Elite ✔ | 3517 ✔ | 4010 ✔ | |
| | Standard tools | | | kg: - |
| | | | | Hours: - Min.: 15 |
| | | | | 1 |

**Procedure:**

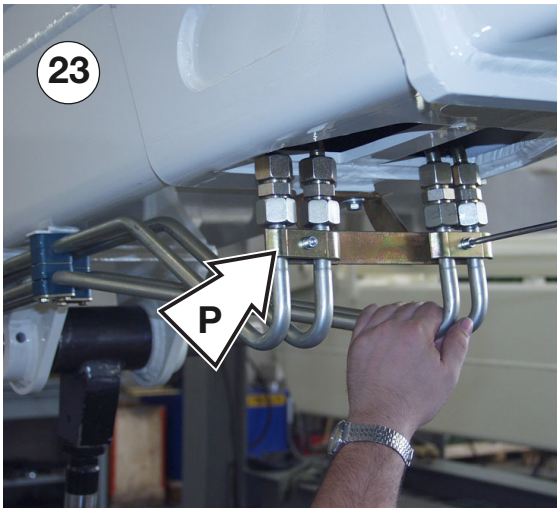
**1** Pry off the dashboard cover with a crosstip screwdriver.


**2** Push out the block to replace.

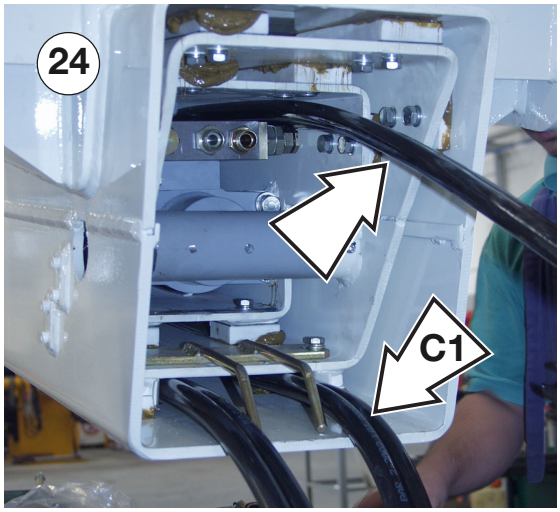

**3** Disconnect the electrical wires and replace the block with a new one.Fit the new block.

| Procedure: **Pre-assembling the boom assy** | Table: **T-056** |
|---|---|

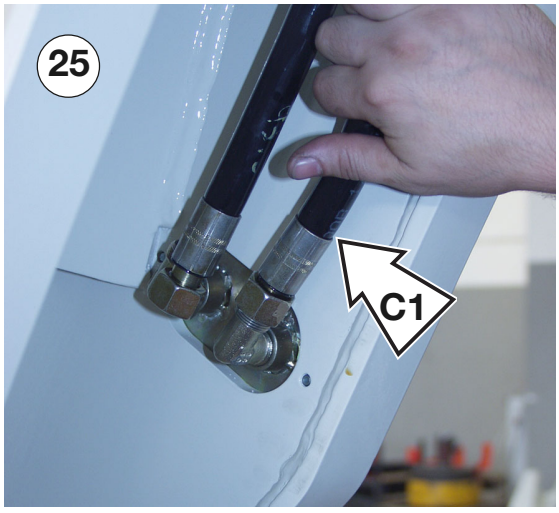
**23** With a 5mm hexagonal wrench, mount the iron plates **P** on to the pipes' holding bracket.




**24** Place the flexible hoses in the third boom tube. Place them correctly and check that they come out of the internal part of the nose.

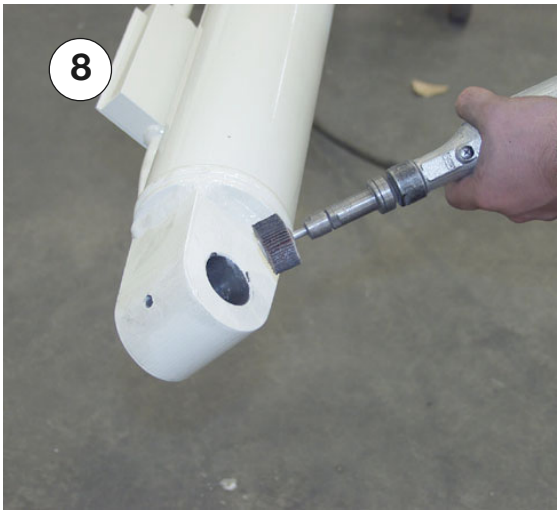



**25** With a 27mm wrench, tighten hoses **C1** to the guiding slit connecting the internal hose with the external coupling (machine side). Pressurise the line and tighten the hose clamps.



| Procedure: **Pre-assembling the boom assy** | Table: **T-056.1** |
|---|---|

**8** Thoroughly clean the holes of the boom extension cylinder with a grinding wheel.




**9** Try to drive the pin in the housing and check that it enters correctly.

**IMPORTANT**

***Before inserting the pins, smear them with grease.***


**10** Sling the extension cylinder and place it into the hole of the rear connection of the first boom tube.

| Procedure: **Assembling the boom** | Table: **T-056.2** | | | kg: 3588 |
|---|---|---|---|---|
| | 3713 Elite ☐ | 3517 ☑ | 4010 ☐ | Hours: 16 — Min.: - |
| Bridge crane, payload 5000 kg (20000 lb)<br>Textile bridles or chains with hooks | Standard tools | | | 1+1 |

**Procedure:**

The assembly order of the different boom parts is the following: 4th boom tube into 3rd boom tube; 4th+3rd boom tubes into 2nd boom tube; 4th+3rd+2nd boom tubes into 1st boom tube.

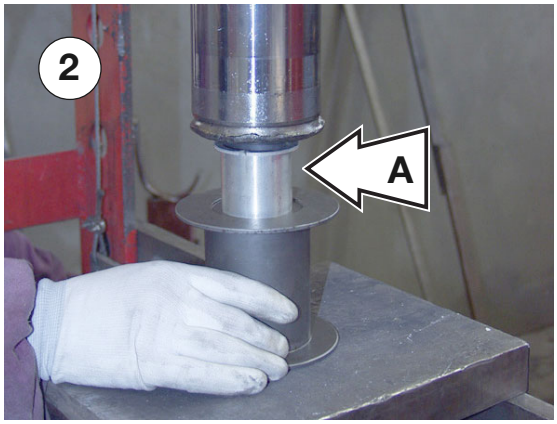
Prepare the four boom tubes and proceed as follows:

**1** Remove the paper protecting the mechanical slide part of the pads; clean with a grinding wheel until the surfaces are perfectly smooth.

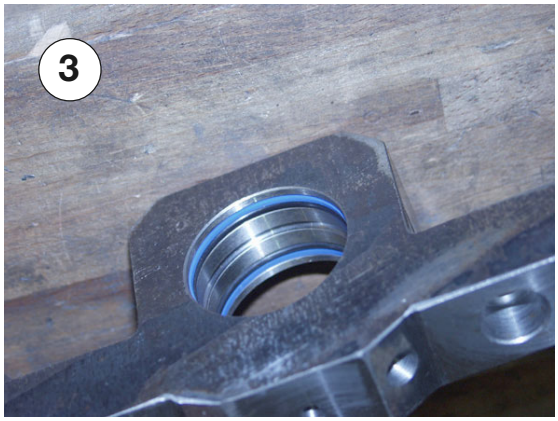

**2** Fit bushings **A** (EKF 4550) into the sheaves where the boom extension chains slide.

**IMPORTANT**

***Do this operation with a press.***




**3** Fit the O-rings into the outer grooves of the pad locking supports.



| Procedure: **Assembling the boom** | Table: **T-056.2** |
|---|---|

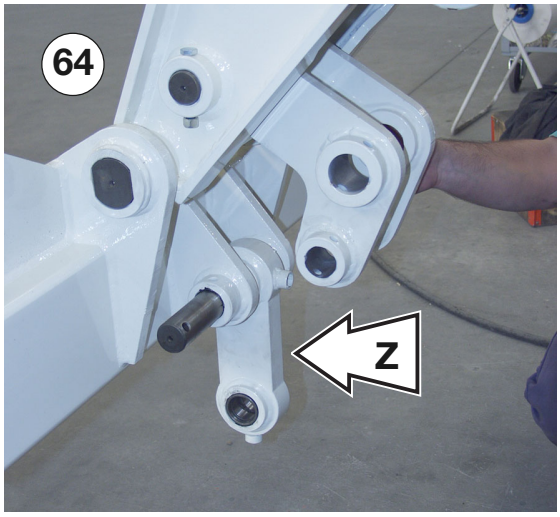
**33** Sling the boom extension cylinder and raise it with the bridge crane.


**34** Place the cylinder on the boom and fit the locking pin after smearing the relevant hole. Check that holes are aligned and fit the fixing screw.

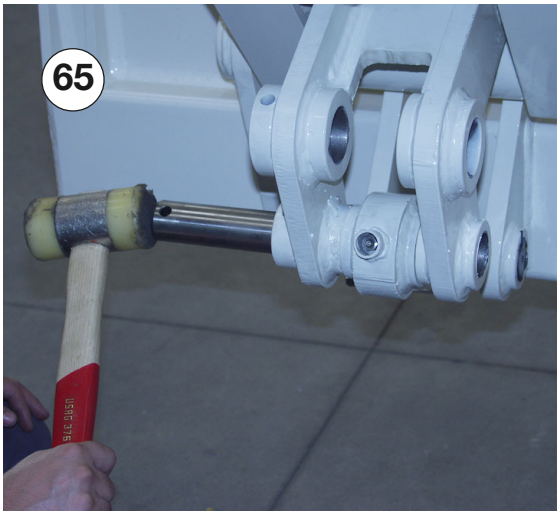

**35** Insert the fixing screw and tighten the nut with two 17mm wrenches.

| Procedure: **Assembling the boom** | Table: **T-056.2** |
|---|---|

**64** Mount the straight connecting rod **Z** as shown. Fit the locking pin and tighten the locknut on the screw with a 17mm wrench.



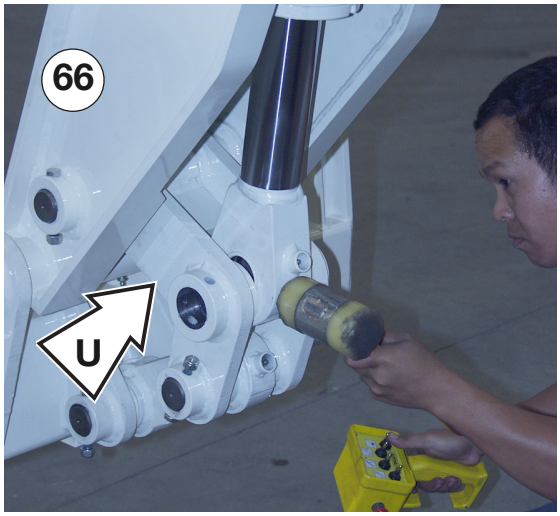

**65** Fit the pin of the connecting rod and knock it lightly home with a rubber hammer. Fit the screw and the nut and tighten all parts with a 17mm wrench.




**66** Connect the connecting rod **U** with the fork pitching cylinder fitting the special pin and locking all the parts with the screw and locknut using a 19mm wrench.

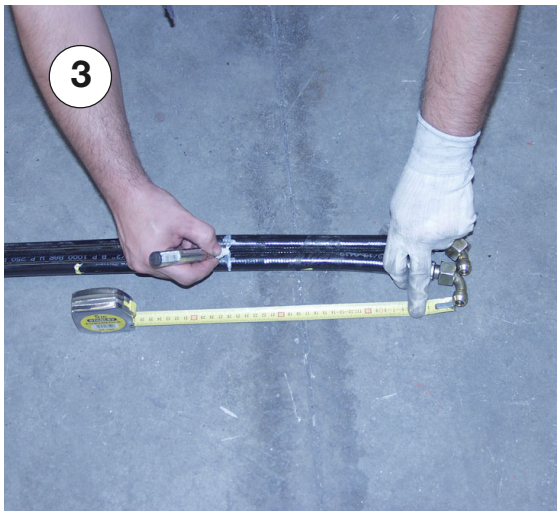
**IMPORTANT**

***Once all connections have been made, lubricate all pins injecting grease with a greasing gun into the greasing nipples and check they are in efficient working order.***



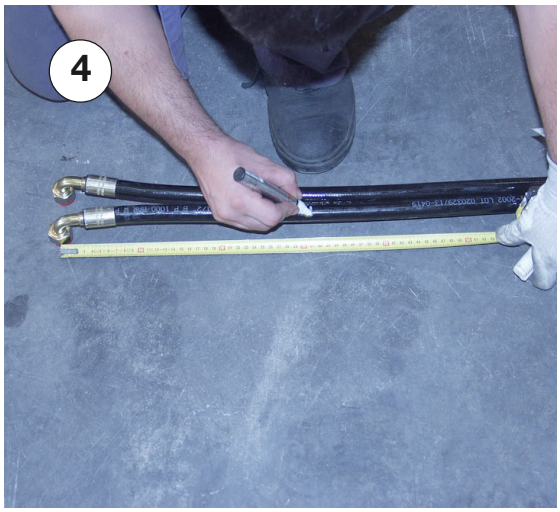
| *Procedure:* **Assembling the boom chain** | *Table:* **T-059** |
|---|---|

**3** Using the scheme on the previous page, find the measure corresponding to the distance between the flexible hose connection (4th boom tube side) and the plate (**1**) and mark such measure on the hoses.

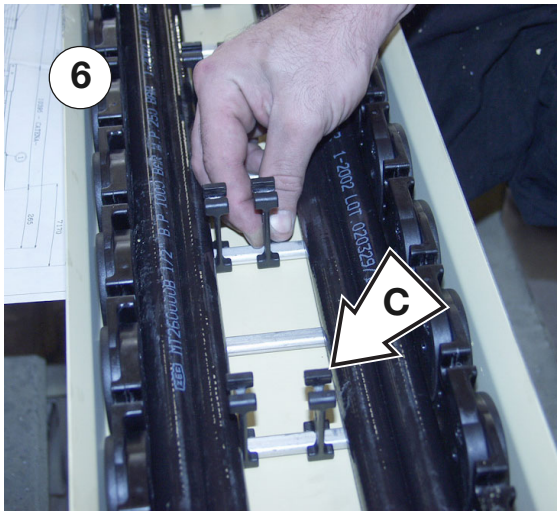



**4** Find and mark the distance between connection and sheathing (**6**) on the opposite side of the flexible hoses (1st boom tube side).

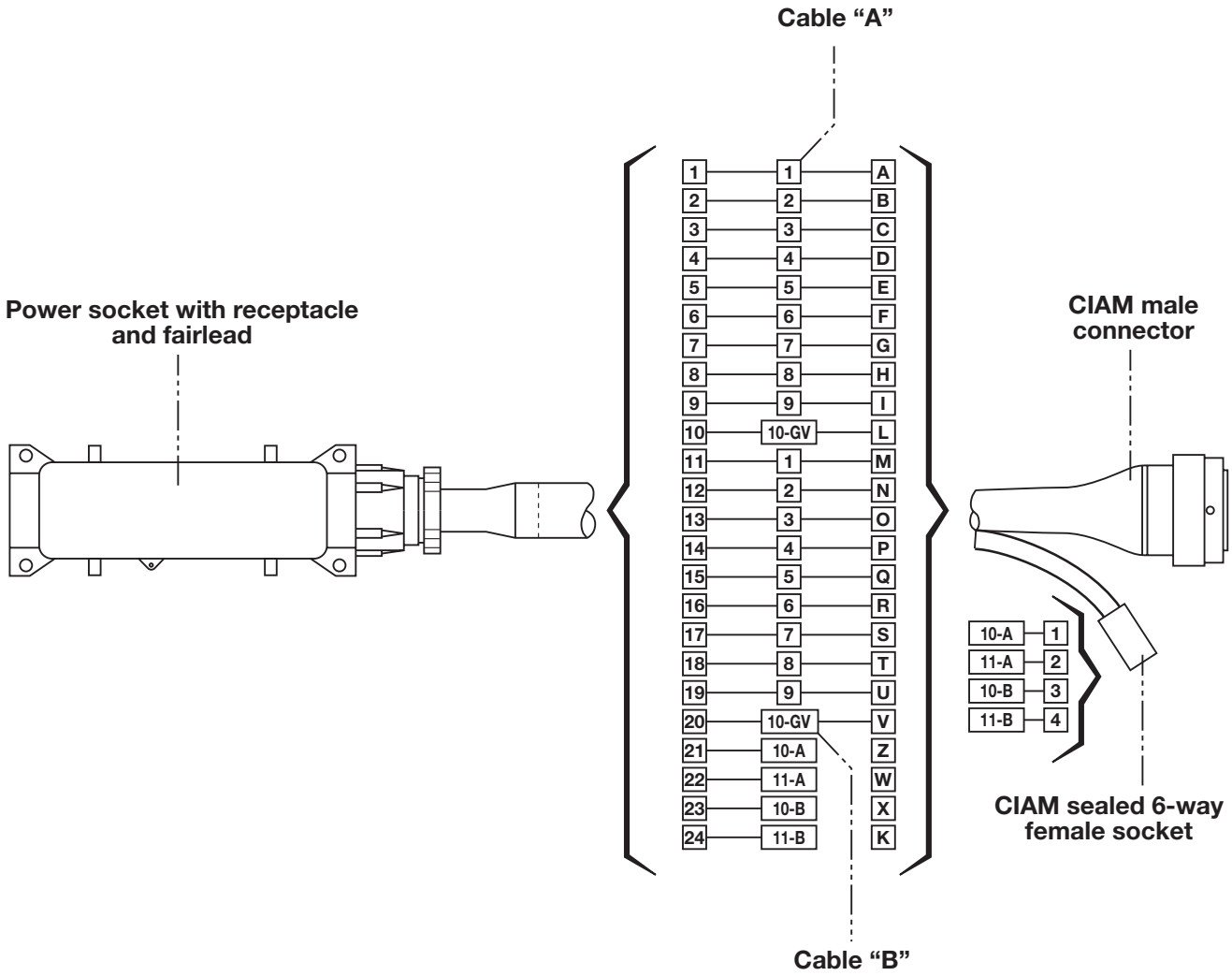
**5** Fit the assembled flexible hoses in the chain.




**6** Space the internal spacers **C** and place the power cables of the chain right in the middle.



| Procedure: | Assembling the boom chain | Table: |
|---|---|---|
| | | T-059 |




**Note:** Wire pos. 10 is yellow-green

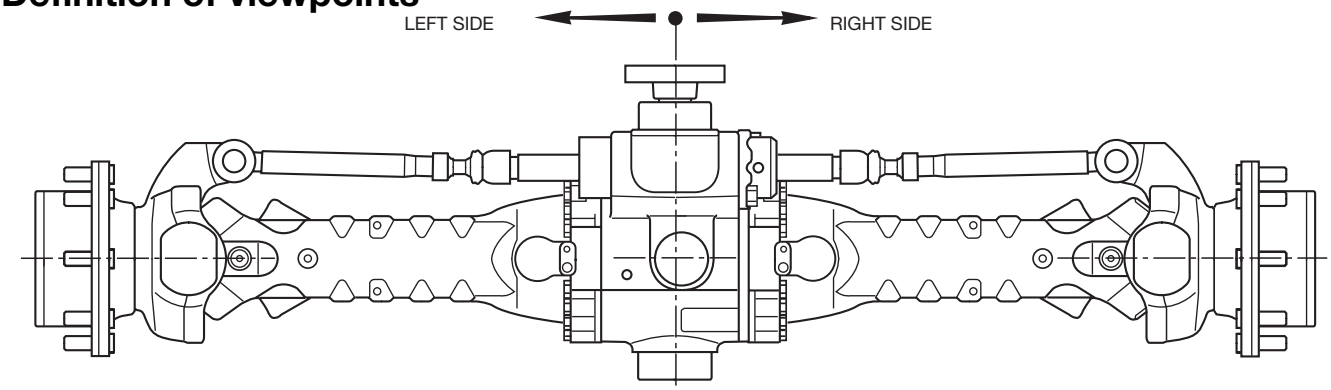
# Section F
# TROUBLESHOOTING

## SECTION INDEX

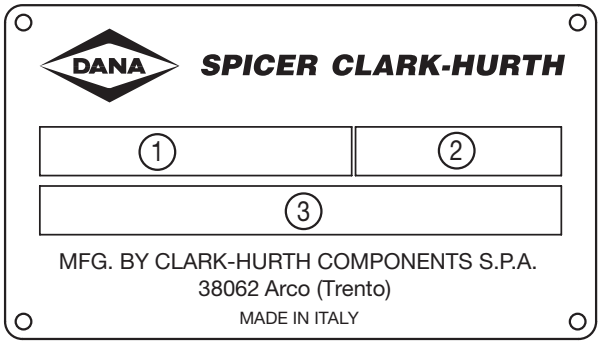
| Trouble | Cause | Solution |
|---|---|---|
| **The boom does not move (IDENTIFICATION A)** | • Fuse **F27** (Walvoil control unit power supply) blown<br>• Walvoil control unit, joystick, outriggers' movement and levelling pushbuttons defective<br>• Road/jobsite/platform selector damaged<br>• Cables interrupted | • Change the fuse<br>• Using the diagnostic program supplied by Terexlift, check and find the defective element and replace<br>• Check and replace the selector, if necessary<br>• Check the continuity of all cables; re-connect if necessary |
| **The boom cannot be raised or lowered** | • See **IDENTIFICATION A**<br>• Relays **R9 - R21** damaged<br>• Fuse **F26** blown<br>• Walvoil actuator solenoids **A1**-**B1** damaged<br>• Cables interrupted | • See **IDENTIFICATION A**<br>• Change the relays<br>• Change the fuse<br>• Check the efficiency and replace if necessary<br>• Check the continuity of all cables; re-connect if necessary |
| **The boom cannot be moved out or in** | • See **IDENTIFICATION A**<br>• Relays **R9 - R22** damaged<br>• Fuse **F26** blown<br>• Walvoil actuator solenoids **A3**-**B3** damaged<br>• Cables interrupted | • See **IDENTIFICATION A**<br>• Change the relays<br>• Change the fuse<br>• Check the efficiency and replace if necessary<br>• Check the continuity of all cables; re-connect if necessary |
| **The boom does not move the the forks** | • See **IDENTIFICATION A**<br>• Relay **R9** damaged<br>• Fuse **F26** blown<br>• Walvoil actuator solenoids **A2**-**B2** damaged<br>• Cables interrupted | • See **IDENTIFICATION A**<br>• Change the relay<br>• Change the fuse<br>• Check the efficiency and replace if necessary<br>• Check the continuity of all cables; re-connect if necessary |
| **The outriggers do not work** ***(only Telelift 3013-3517)*** | • See **IDENTIFICATION A**<br>• Relay **R9** damaged<br>• Fuse **F26** blown<br>• Walvoil actuator solenoids **A5**-**B5** damaged<br>• Cables interrupted | • See **IDENTIFICATION A**<br>• Change the relay<br>• Change the fuse<br>• Check the efficiency and replace if necessary<br>• Check the continuity of all cables; re-connect if necessary |

# MAINTENANCE AND LUBRICANT

## Definition of viewpoints

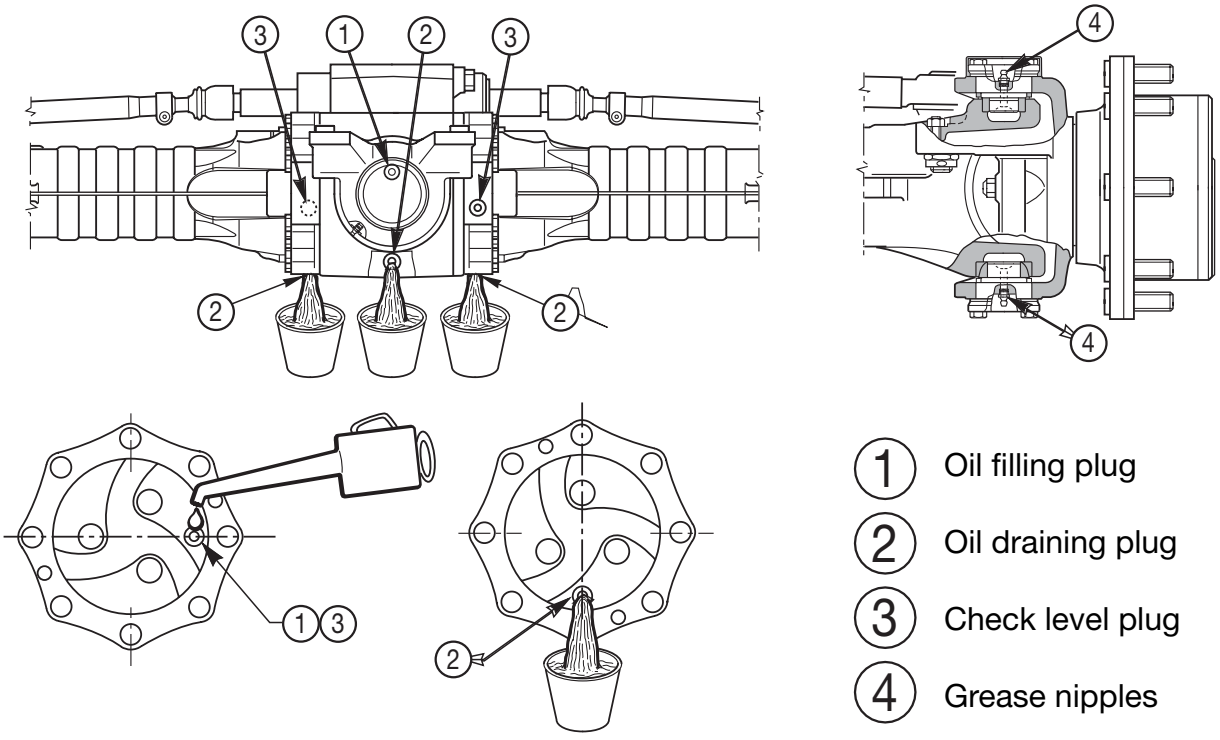



## Data plate

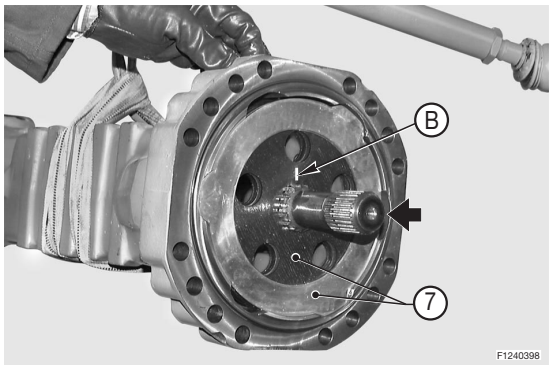



1. Type and model unit - modification index
2. Serial number
3. Lubrificant

## Maintenance points

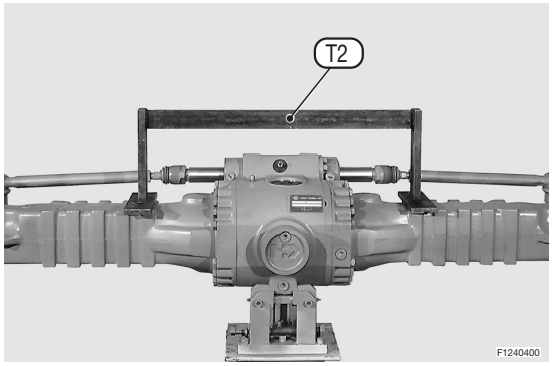



1. Oil filling plug
2. Oil draining plug
3. Check level plug
4. Grease nipples



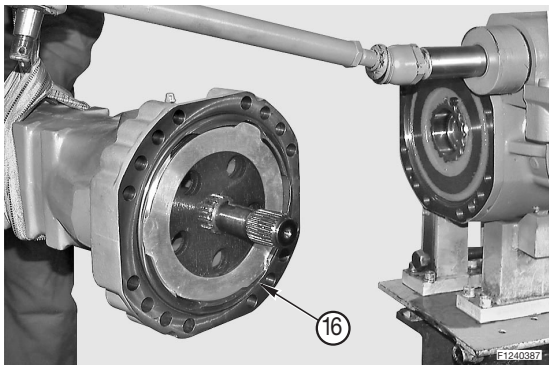

GB a

Slightly lubricate the braking disks (7) and fit them in the arm following the correct sequence; orient them so that the oil circulation holes and the marks “B” are perfectly lined up.
**NOTE.** When installing the steel discs, the slot corresponding to the oil level cap should always be kept free.




GB c

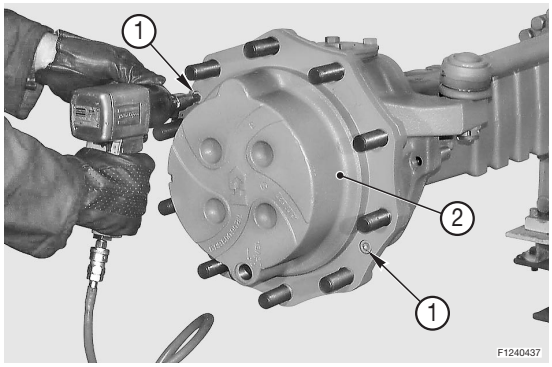
Check the flatness of the arms using tool T2 and finally lock the arms with the screws (4) and the washer (5) using the crosstightening method.
Torque wrench setting: 298 Nm




GB b

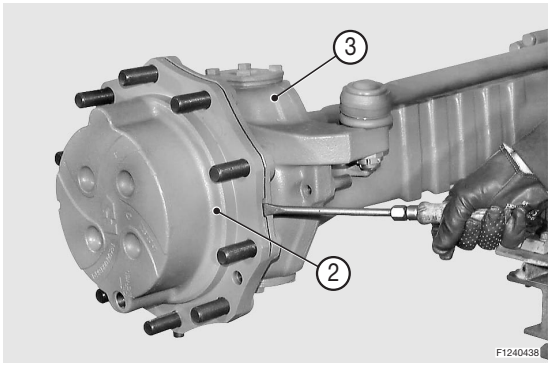
Check that the positioning of the sealing ring (16) on the arm is intact; install the complete arm. Lock it into position using two facing screws (4) and washers (5).

## PLANETARY REDUCTION - Disassemble



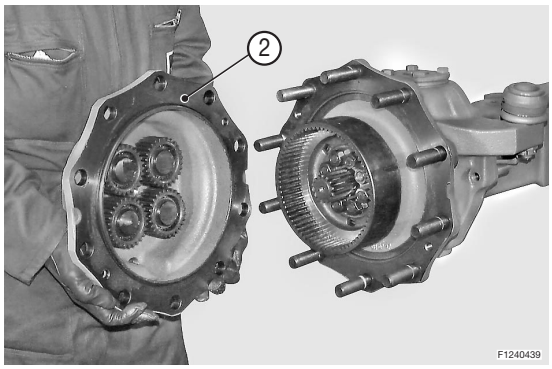

GB a

Disconnect the steering bars from the steering case (3).
For details, see "HOW TO REMOVE THE COMPLETE STEERING CASE".
Remove the securing screws (1) from the planetary carrier cover (2).



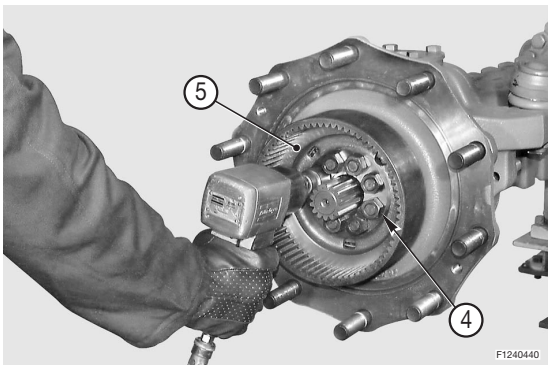

GB b

Disjoint the planetary carrier cover (2) from the steering case (3) by alternatively forcing a screwdriver into the appropriate slots.



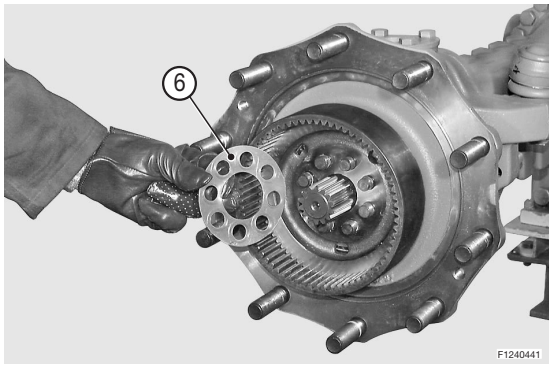

GB c

Remove the complete planetary carrier cover (2).



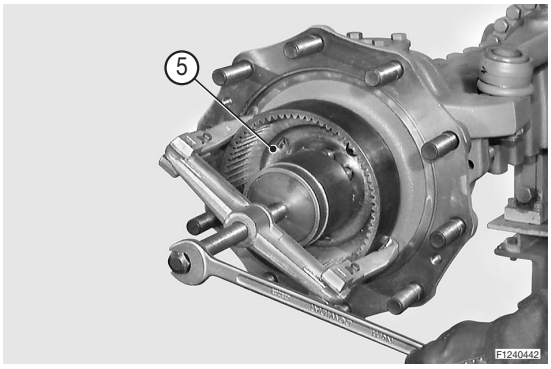

GB d

Unloose and remove the tightening nuts (4) from the crown flange (5).




GB e

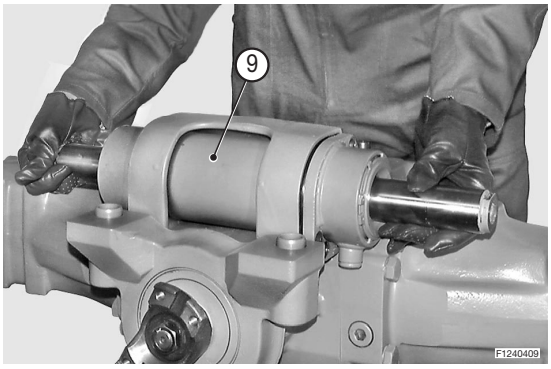
Remove the safety flange (6).




GB f

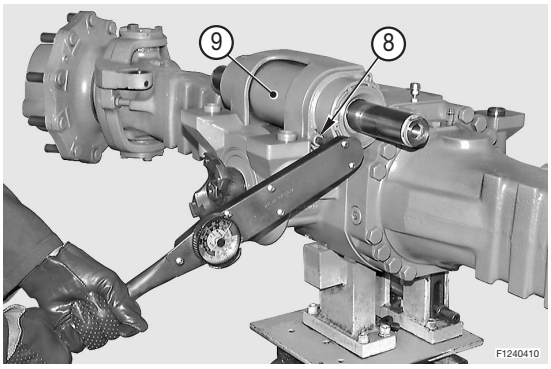
Using a puller, remove the complete crown flange (5) by acting onthe stud bolts.

## Installation



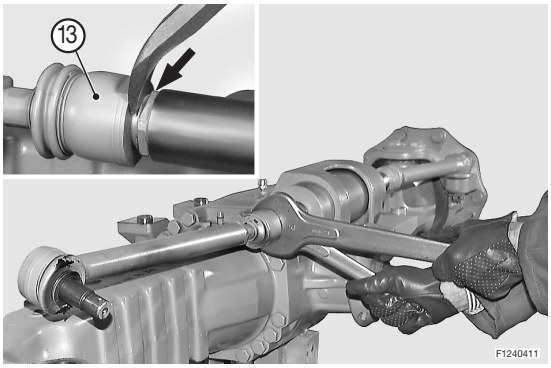

GB a

Check that the O-rings (15) of the axle unit are in good condition; lubricate the seats of the seals (15) and fit the steering cylinder (9) into its seat.
Lock the cylinder by cross- tightening the screws (8).
Torque wrench setting: 116÷128 Nm



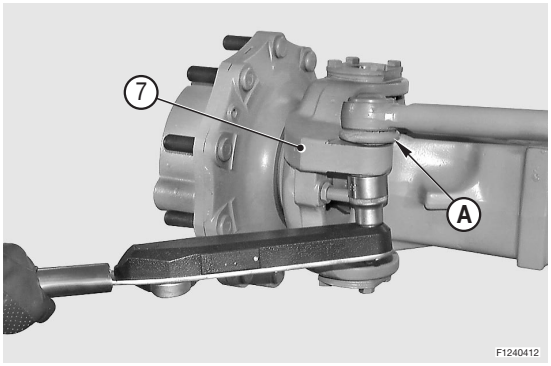

GB b

Apply Loctite 242 to the thread and connect the steering bars by screwing the terminals onto the piston stem.
Torque wrench setting: 240÷270 Nm
**NOTE.** Versions with coupling require that the rim of the articulation (13) is riveted onto the surfaces of the piston stem.



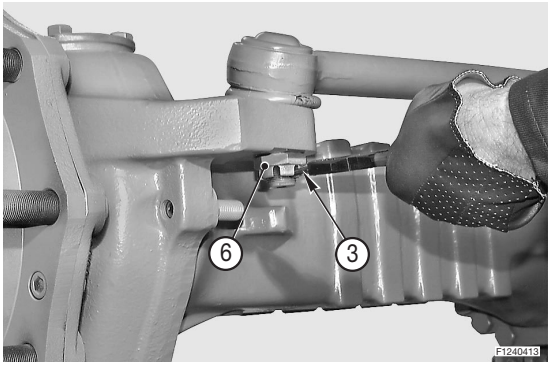

GB c

Insert the pins (4) in the steering case (7) and lock into position using a torque wrench setting of 260÷290 Nm.



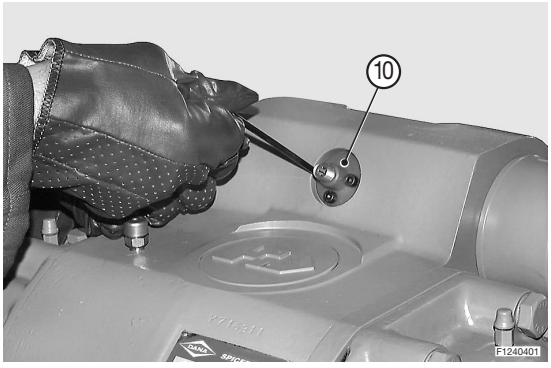

GB d

Find the position of the notching in relation to the hole of the cotter pins and tighten the nut (6) further.
**CAUTION!** Check that rubber guards (A) are intact.



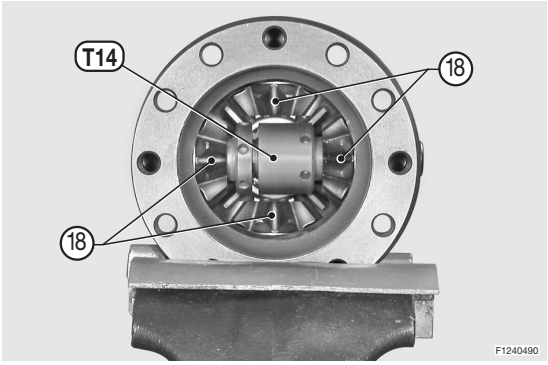

GB e

Insert the cotter pins (3) and bend the safety stems.
**CAUTION!** Use new cotter pins.



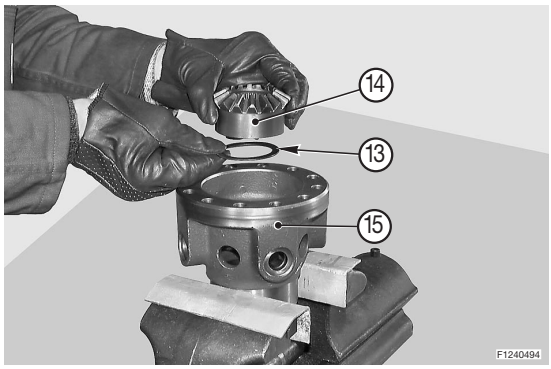

GB f

Install the proximity (1) for checking piston centring - if applicable - and tighten the screws (10).
Torque wrench setting: 5÷6 Nm



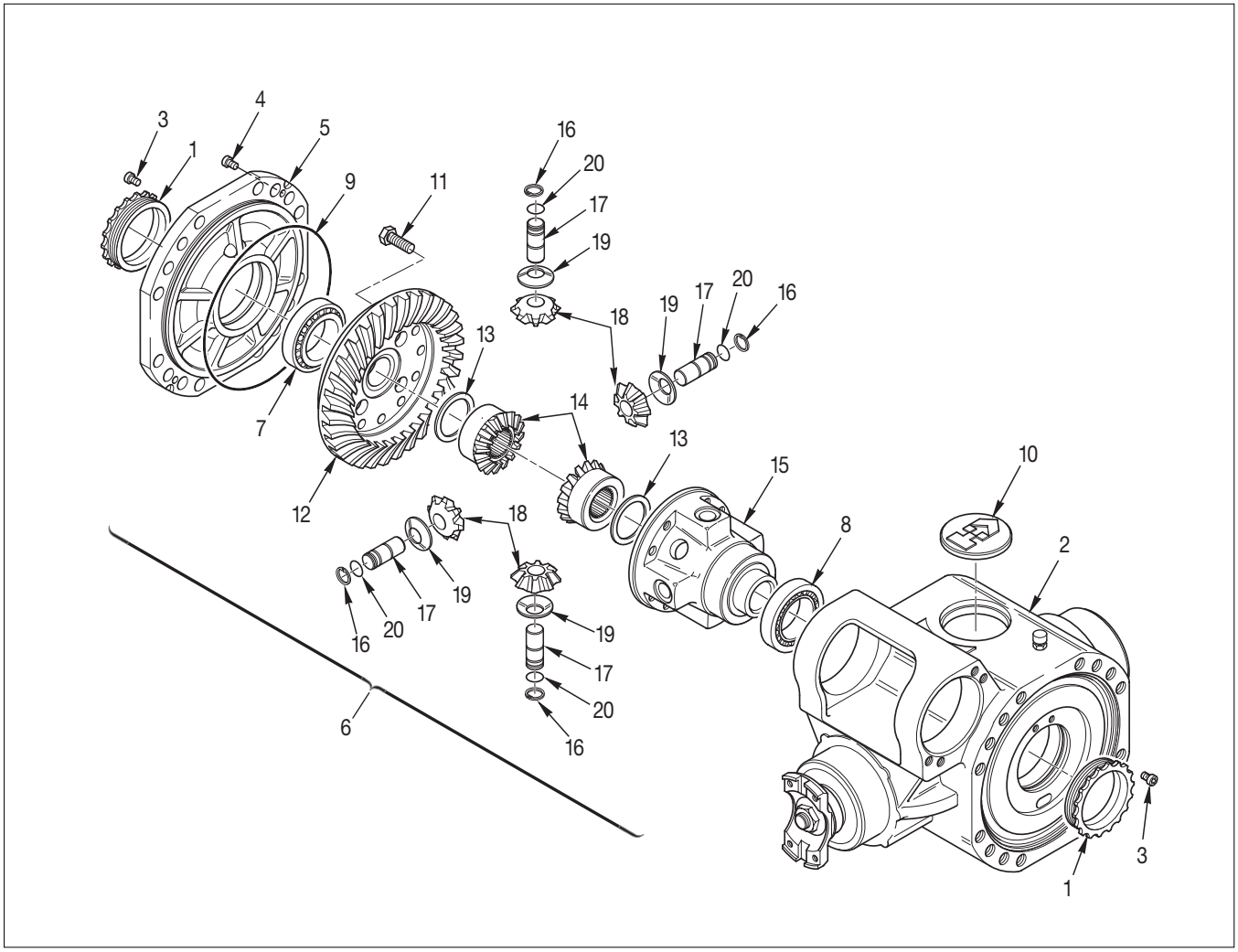

GB a

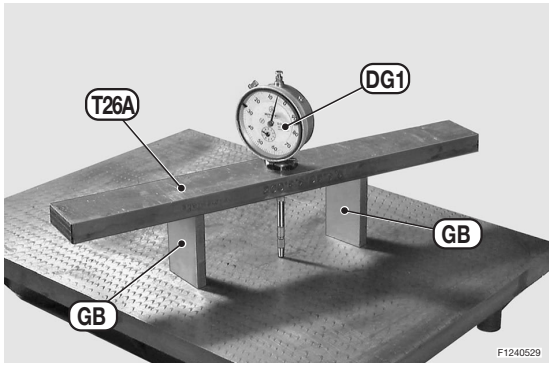
Leave the released planetary gear in position and again lock tool T14.
Repeat the operations for the extraction of the pin of the 2nd planet wheel (17).
Repeat the operations for all other pins.




GB b

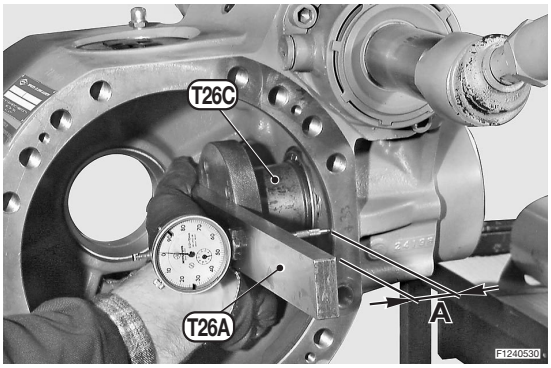
Remove tool T14 and remove the last two planet wheel gears (18), the 2nd differential unit gear (14) and the relative shim washer (13) from the differential carrier.





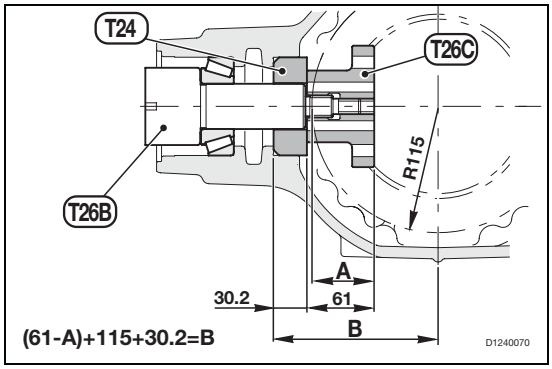

GB a

Fit a centesimal comparator “DG1” with long stem into bar T26A; when the bar rests on two size- blocks “GB” of 57 mm, reset the comparator.
Preset the comparator to approx. 2 mm and reset.



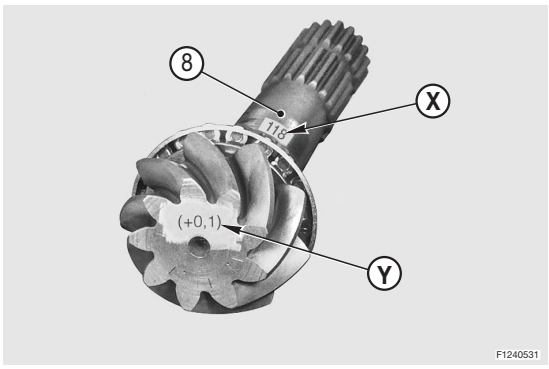

GB b

Lay bar T26A on gauged nut T26C and take the size “A” at about 57 mm corresponding to the maximum diameter of arms centring.



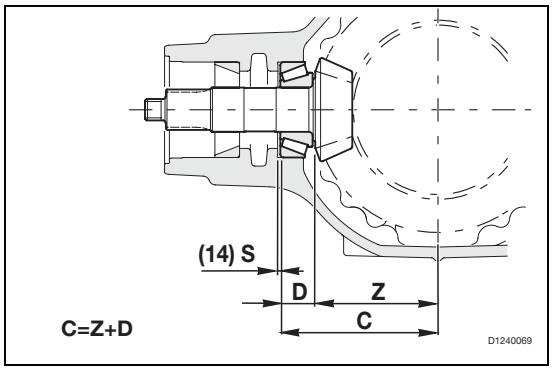

GB c

Calculate size “B” which will be the first useful value for calculating the size of the shims (14) that are to be inserted under the thrust block of the internal bearing (9).



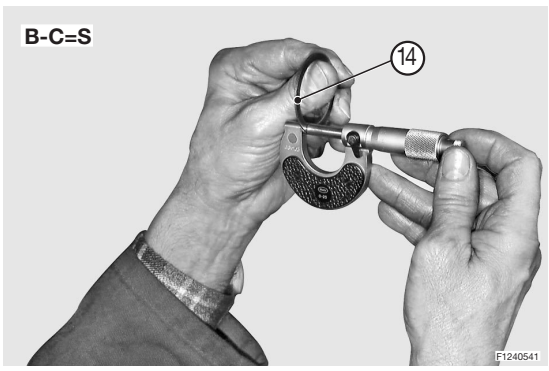

GB d

Check the nominal size (X) marked on the pinion and add or subtract the indicated variation (Y) so as to obtain size “Z”.
e.g.: Z= 118 + 0.1 = 118,1
Z= 118 ÷ 0,2 = 117,8




GB e

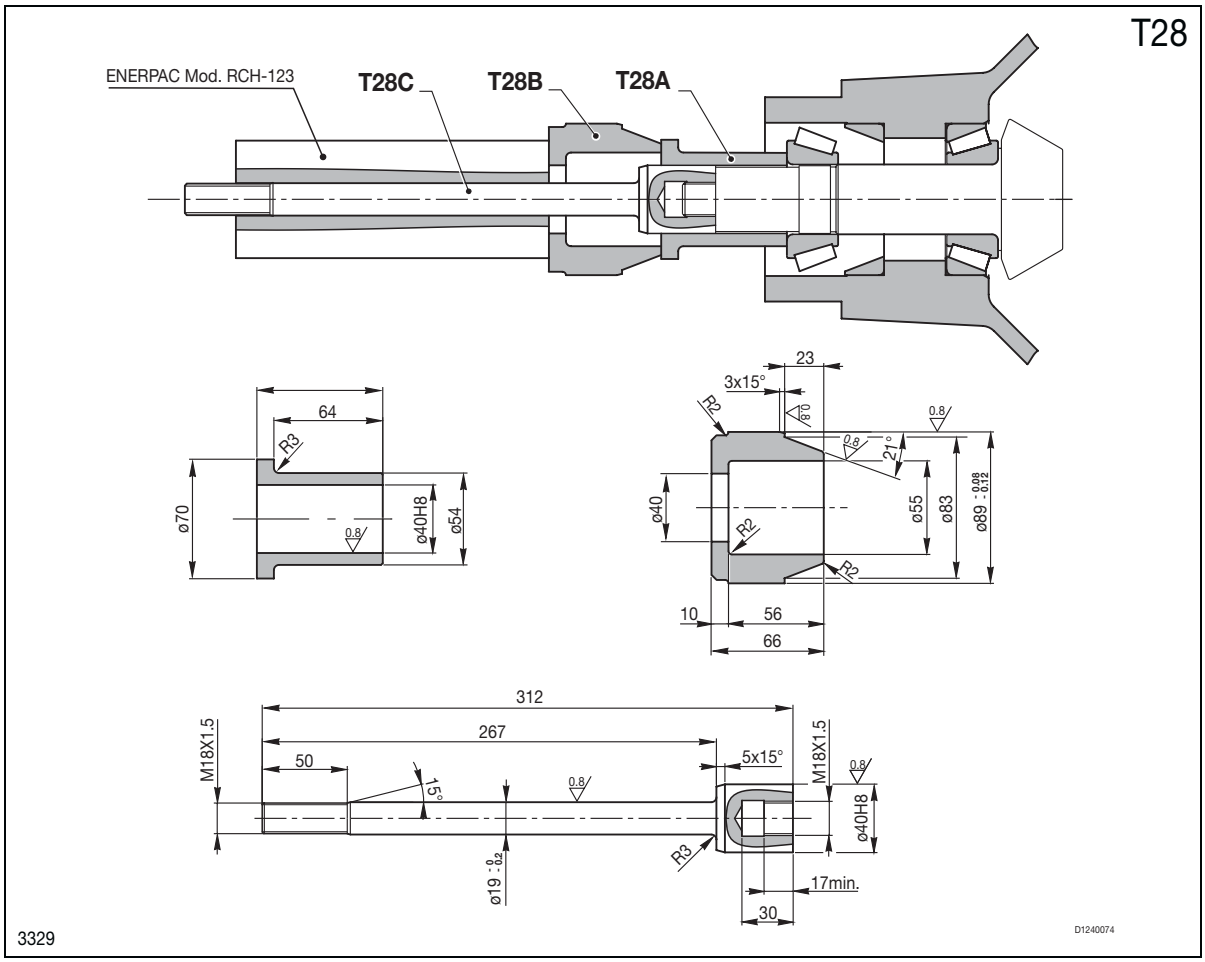
Calculate size “C” which represents the second value for calculating the size of the shims “S” that are to be placed under the thrust block of the internal bearing (9).




GB f

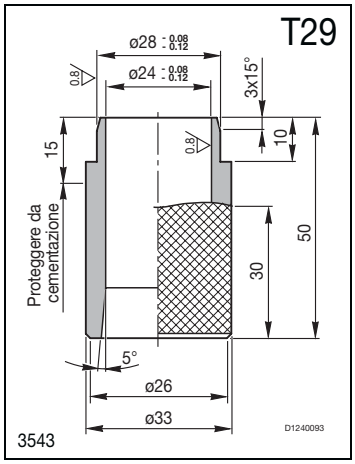
Calculate the difference between sizes “B” and “C” so as to obtain the size “S” of the shim (14) that will go under the thrust block of the internal bearing (9).

## T28



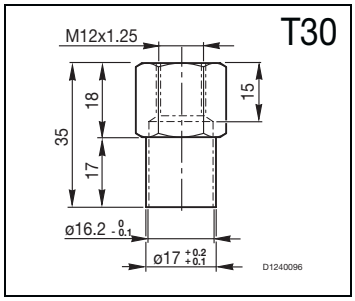

3329

## T29

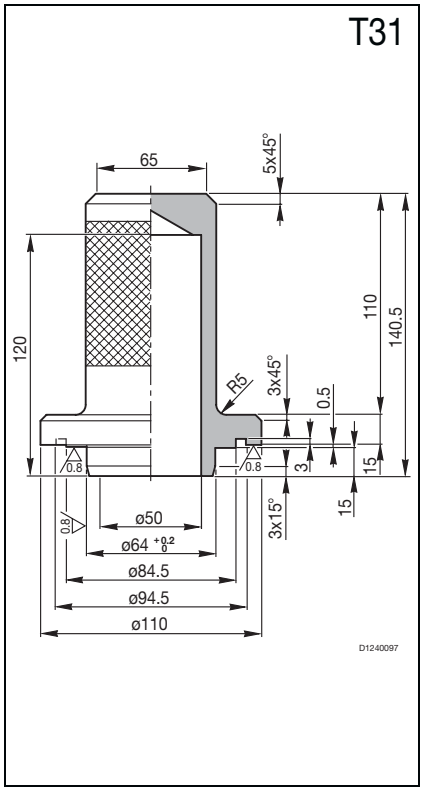



3543

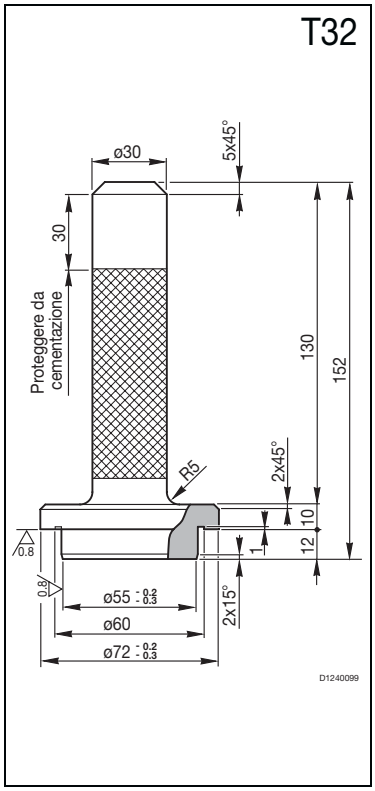
## T30

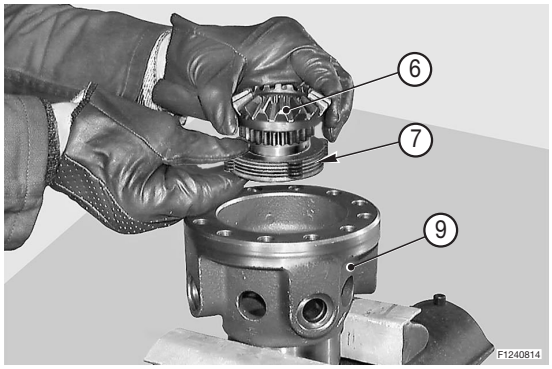



## T31



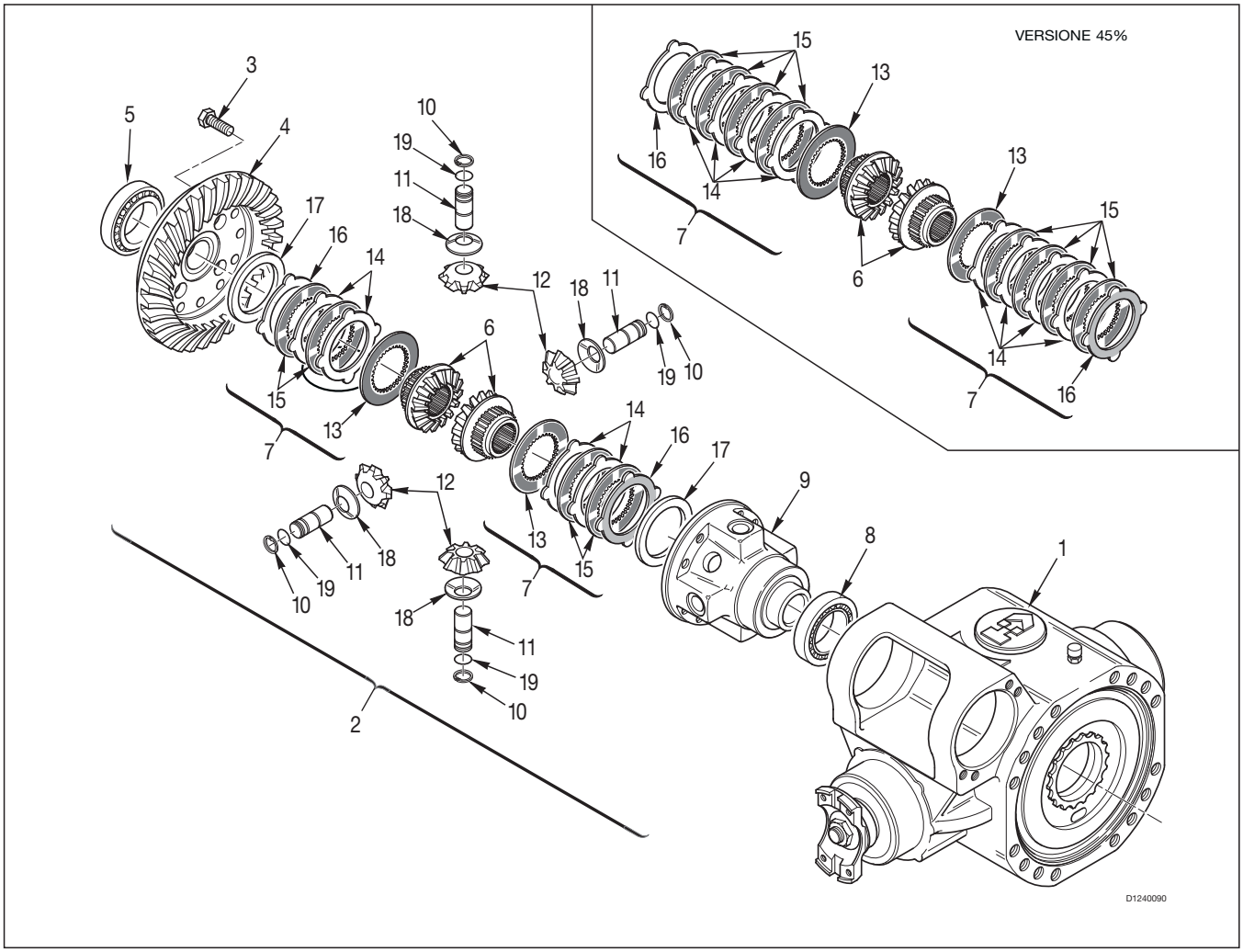

## T32

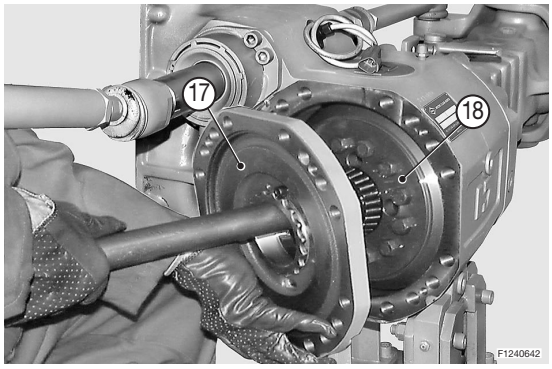





GB a

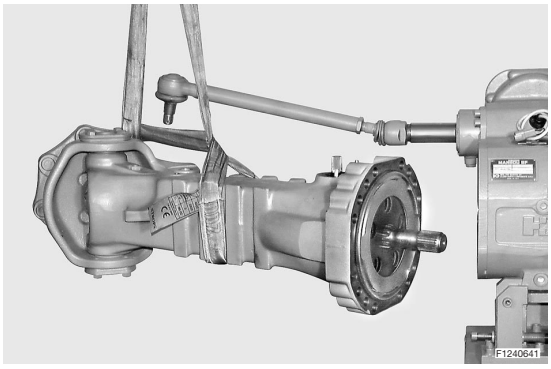
Remove tool T14 and extract from the differential unit (9) the two final planet gears (12), the 2nd planet gear (6) and the whole friction assembly concerned (7).





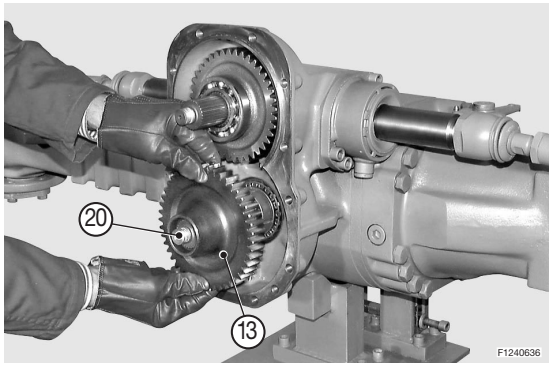

GB a

Re-install the differential unit (18) and the intermediate cover (17).
**CAUTION!** If the crown has been replaced, reinstate clearances.
For details, see “HOW TO ASSEMBLE AND ADJUST THE DIFFERENTIAL UNIT”.



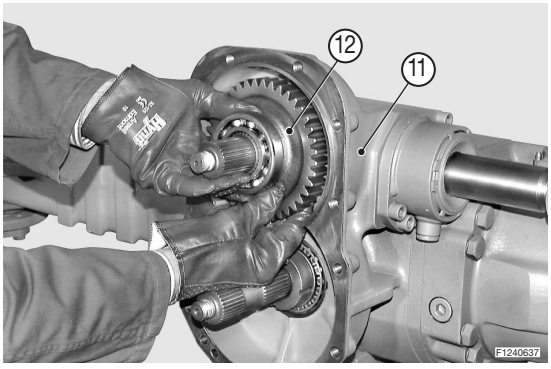

GB b

Re-install the complete arm checking flatness and blocking the arm by keeping to the appropriate procedures illustrated in section “HOW TO ASSEMBLE THE BRAKING UNITS”. Also connect the steering bar.



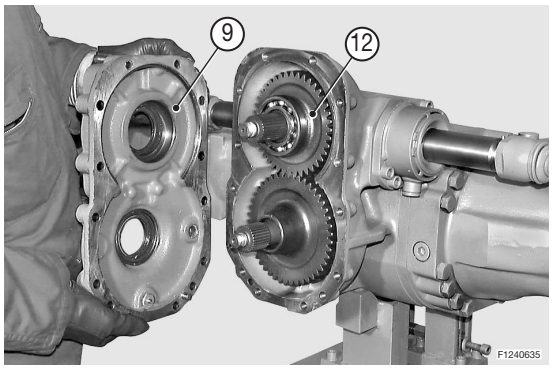

GB c

Fit the lower gear (13) into the pinion (20).



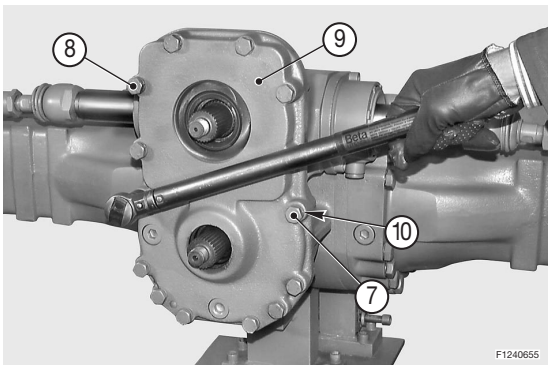

GB d

Insert the upper gear unit (12) into the body of the reduction gear (11)




GB e

Apply Loctite 510 to the locking surface of the body of the reduction gear (11).
Lubricate snap rings (6) and (15); fit cover (9) and set cover (if necessary) by lightly tapping with a plastic hammer.




GB f

Block cover (9) with screws (7) and (8) and relative washers (10). Tighten using the criss-cross method.
Torque wrench setting: 82÷91 Nm

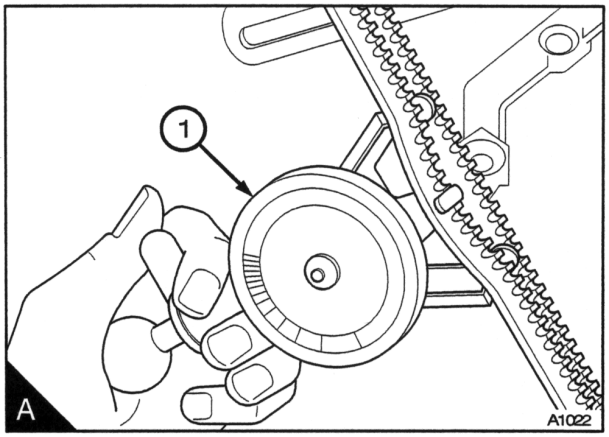
## How to check the drive belt(s)

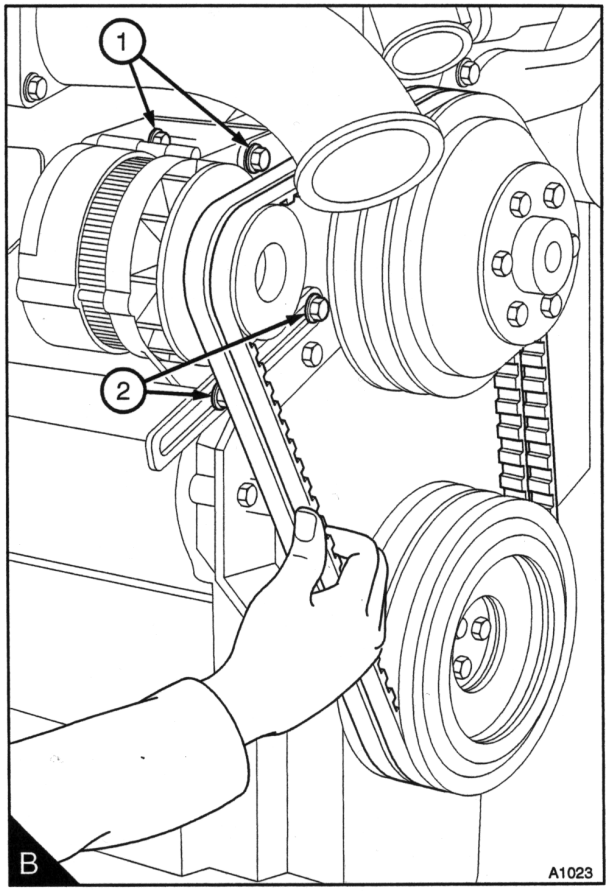
Renew a belt if it is worn or damaged. If twin belts are fitted, they must be renewed together.

To ensure maximum belt life, it is recommended that a belt tensioner gauge is used to check the belt tension. Fit the gauge (A1 ) at the centre of the longest free length and check the tension. If a “Burroughs” gauge is used, the correct tension is 355 N (80 lbf) 36 kgf. If the tension is 220 N (50 lbf) 22 kgf or below, adjust it to 355 N (80 lbf) 36 kgf as indicated below:

If a gauge is not available, press down the belt with the thumb at the centre of the longest free length and check the deflection (B). With moderate thumb pressure - 45N (10 lbf) 4,5 kgf - the correct deflection of the belt is 10mm(3/8in).

If twin belts are fitted, check/adjust the tension on the tighter belt.




### How to adjust the belt tension

**1** Loosen the pivot fasteners (B1) of the alternator and the adjustment link fasteners (B2).

**2** Change the position of the alternator to give the correct tension. Tighten the pivot fasteners of the alternator and the adjustment link fasteners.

**3** Check the belt tension again to ensure that it is still correct. If a new belt is fitted, the belt tension must be checked again after the first 20 hours of operation.

***Caution:*** *Use a spanner to prevent movement of the fuelled starting aid (A1) when the union nut (A2) is loosened or tightened.*

**3** Loosen the union nut (A2) at the fuelled starting aid and operate the priming lever of the fuel lift pump until fuel, free of air, comes from the connection. Tighten the union nut at the starting aid.

**Note:** For Delphi fuel injection pumps: Loosen the union nut at the outlet connection of the low pressure fuel leak off pipe which is on top of the governor housing of the fuel injection pump. Operate the priming lever of the fuel lift pump until fuel, free of air, comes from the connection. Tighten the union nut.

***Caution:*** *Do not tighten the union nuts of the high-pressure pipes more than the recommended torque tension. If there is a leakage from the union nut, ensure that the pipe is correctly aligned with the atomiser inlet. Do not tighten the atomiser union nut more, as this can cause a restriction at the end of the pipe. This can affect the fuel delivery.*

**4** Loosen the high-pressure connections at two of the atomisers (B1).

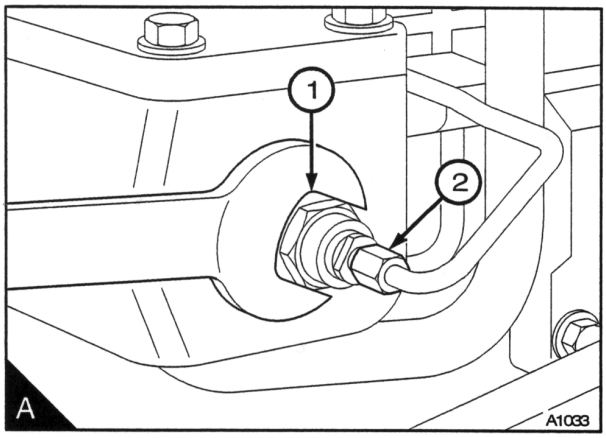
***Caution:*** *Damage to the fuel injection pump, battery and starter motor can occur if the starter motor is used excessively to eliminate air from the fuel system.*

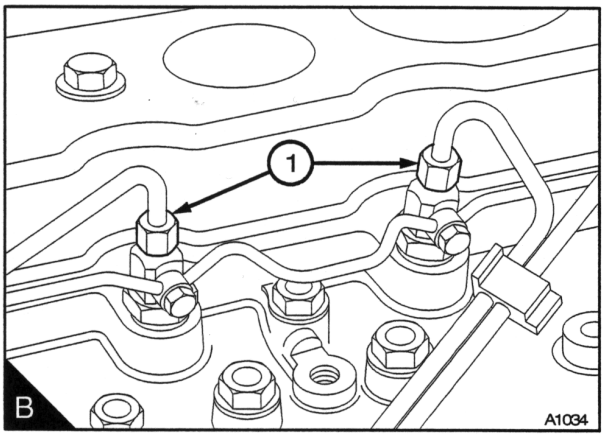
**5** Put the electrical system switch to the “On” position. Ensure that the manual stop control, if one is fitted, is in the “Rue” position. Operate the starter motor until fuel, free from air, comes from the pipe connections. Tighten the high-pressure pipe connections to 27 Nm (20 lbf ft) 2,8 kgf m. Return the switch to the “Off” position.

**6** The engine is now ready to star

***Caution:*** *Operate the engine at low idle speed for a minimum of two minutes immediately after air has been removed from the fuel system. This will ensure that the pump is free of air and prevent any damage to the pumps internal parts by metal to metal contact.*

If the engine runs correctly for a short time and then stops or runs roughly, check for air in the fuel system. If there is air in the fuel system, there is probably a leakage in the low pressure system.



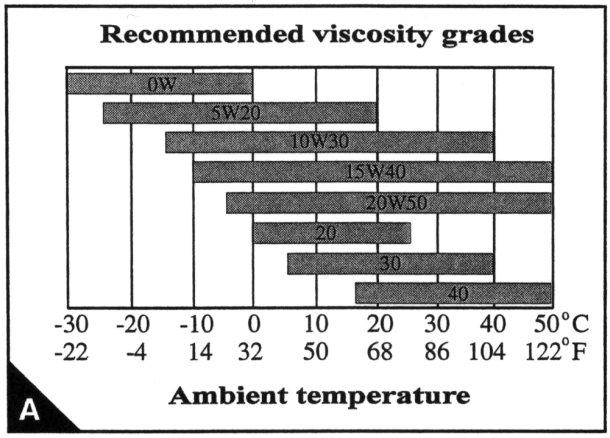
## Lubricating oil specification

If you need advice on adjustments to an engine setting or to the lubricating oil change periods which may be necessary because of the standard of available fuel, consult your nearest Perkins distributor or the Technical Service Department.

Use only a good quality lubricating oil to the relevant specification as shown in the table below.

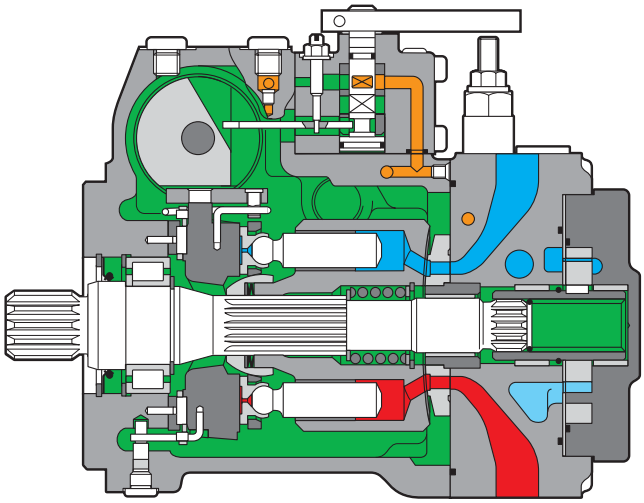
***Caution:*** *The type of lubricating oil to be used may be affected by the quality of the fuel which is available. For further details see "Fuel specification" on page 28 and the "Preventive maintenance schedules" on page 3.*

Always ensure that the correct viscosity grade of lubricating oil is used for the ambient temperature range in which the engine will run as shown in the chart (A) and the table below:

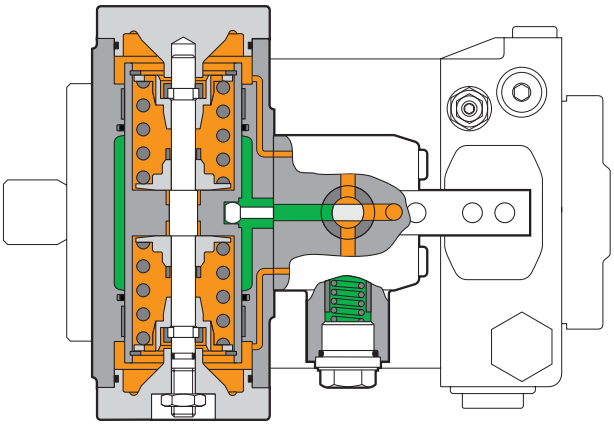



| Engine type | Specifications | |
|---|---|---|
| | API CF4 o ACEA E2 | API CG4 o ACEA E3 |
| Naturally aspirated | • | •(1) |
| Turbocharged | • | •(1) |

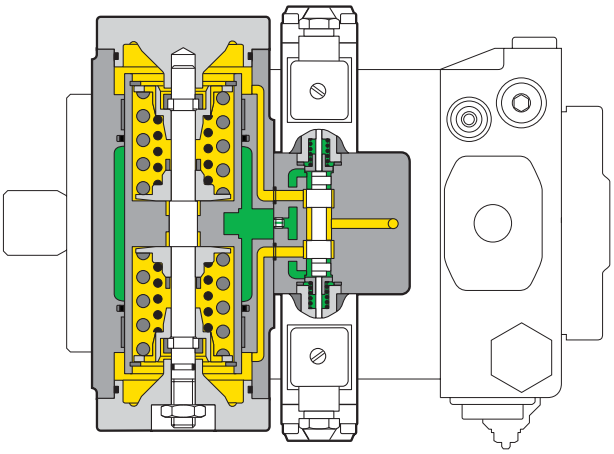
**(1)** Recommended for applications which have engines that operate at high load conditions. Refer to your equipment supplier's handbook for the application or the table on page 4 for guidance. If further advice is necessary, refer to your nearest Perkins distributor.



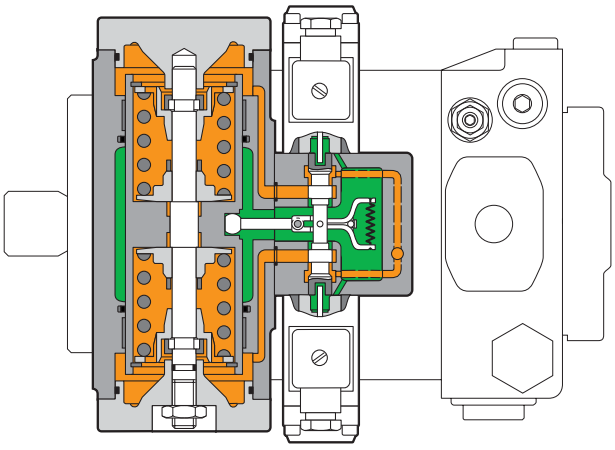
HWD



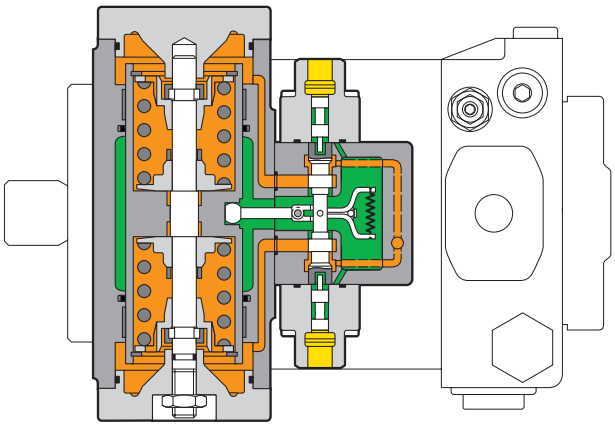
DAD

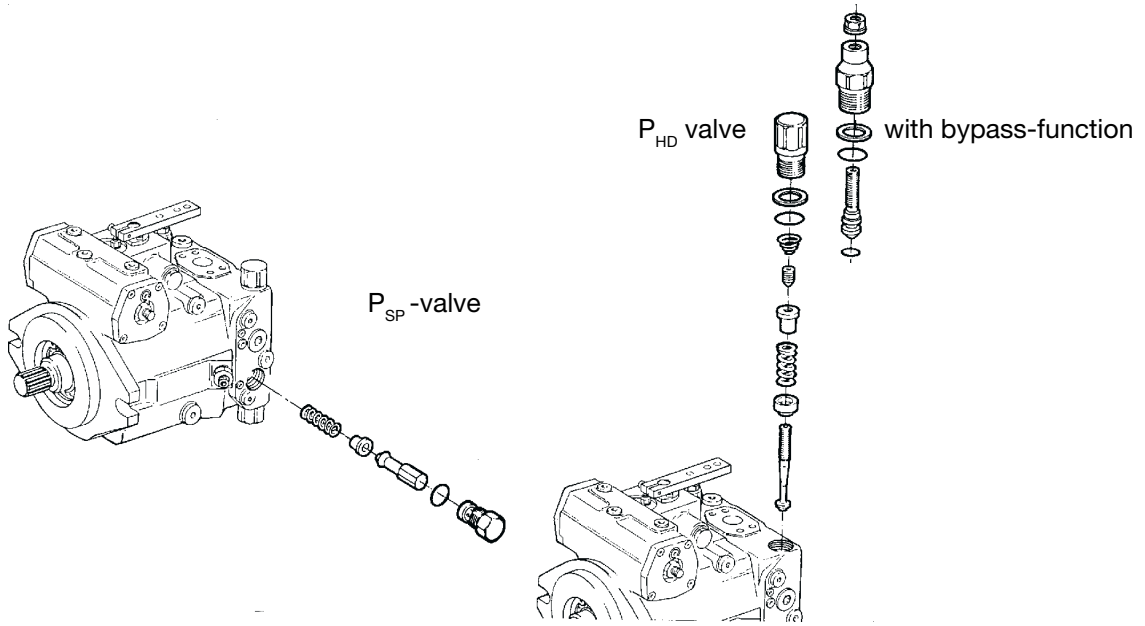


EPD

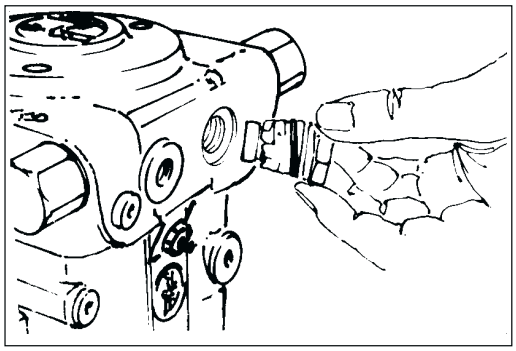


HDD

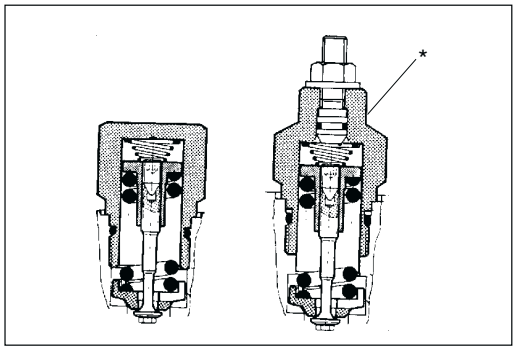




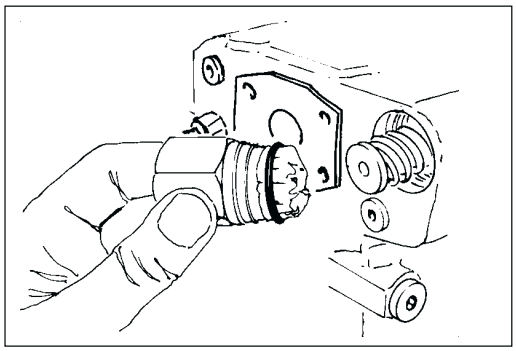

28



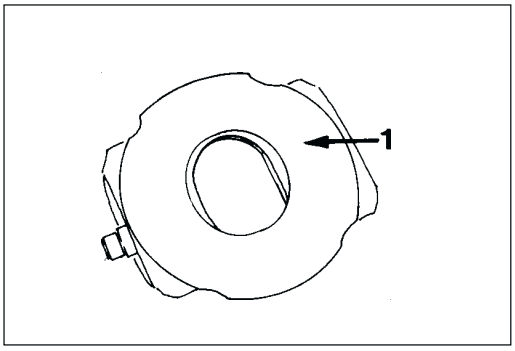
29 Cover threads before fitting new O-rings.
(Damage protection).




30 Remove valve poppet with spring.
* with bypass-function

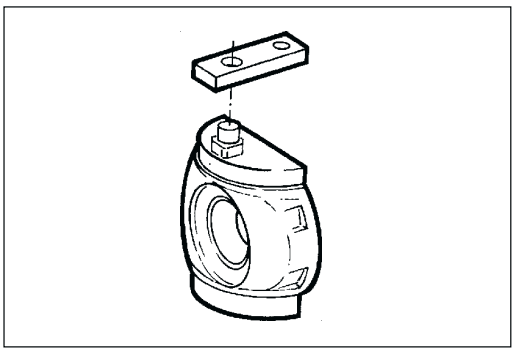


31 Cover threads before fitting new O-rings.
(Damage protection).



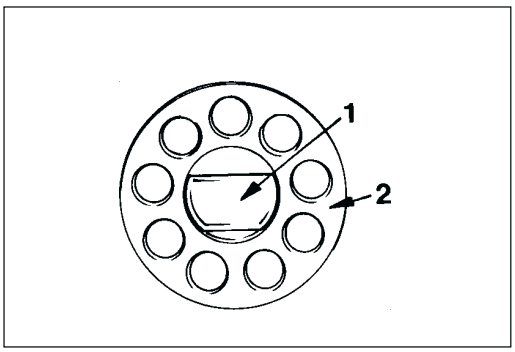

66

Check!
Sliding surface free of grooves.



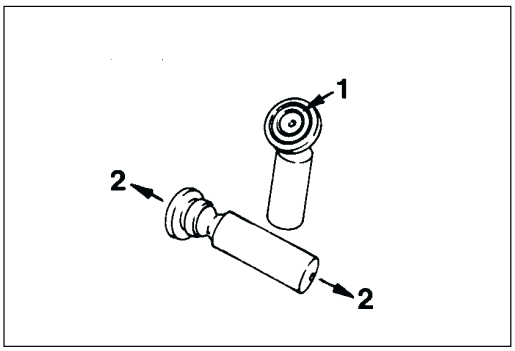
67

Check!
Make sure sliding ring/swivel pin are free of play.



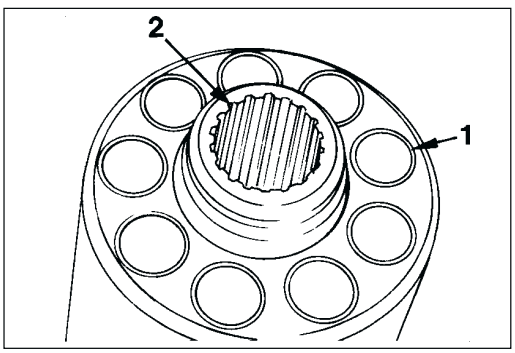

68

Check!
Check that return device is free of grooves (1) no wear in slipper pad area.



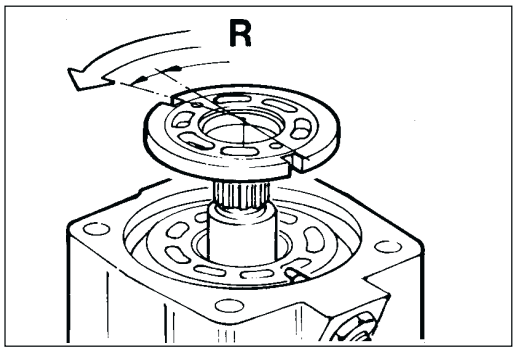

69

Check!
Check that there are no scratches or metal deposits on sliding surface (1), and there is no axial play (2), (otherwise: pistons must be replaced in sets).

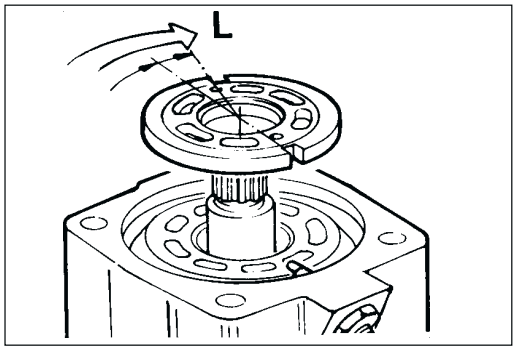



70

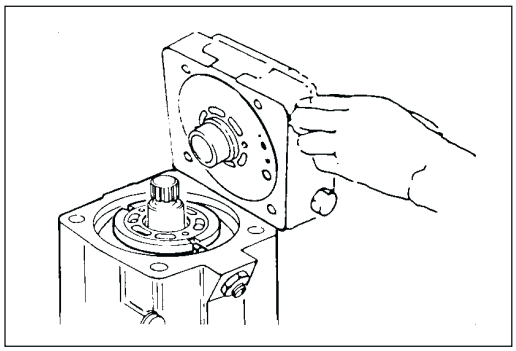
Check!
Cylinder bores (1), splines (2).



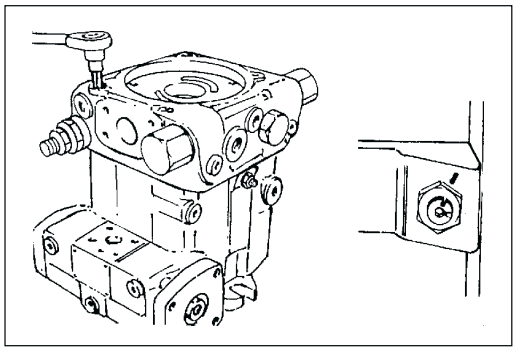

94 Insert the control plate - clockwise rotation.



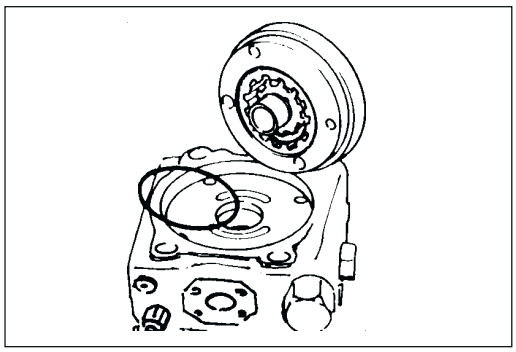

95 Insert the control plate - Counter- clockwise rotation.



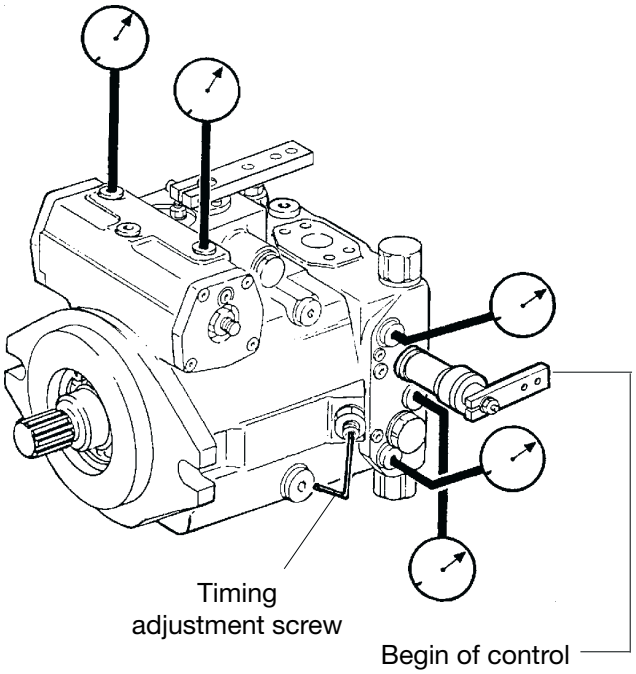
96 Place in correct position.
Note:
HW, HD, EP - Put control plate with greas to the port block.



97 Tighten screws (Cross-corner).
Turn the indexing screw to marking.



98 Assemble boost pump.




111

Attention!
Observe safety regulations!

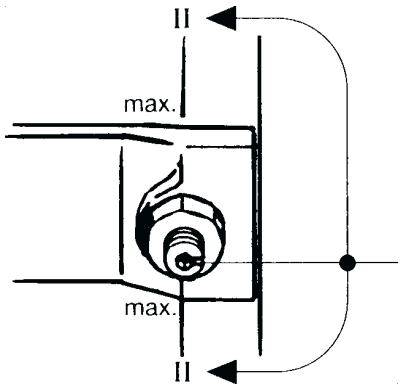
Check setting data.
Operating temperature should be kept largely constant during the check procedure.
Start prime mover, idle speed.

**Block position**
Drive direction switch - **"0"**.
Slowly increase motor speed up to the max. motor speed and thereby observe measuring instruments.

Boost pressure:
Idle speed of prime mover
Psp = approx. 15-20 bar
max. motor speed
Psp = . . . . . bar*

**Block position**
Drive direction switch - **forward**
(Road gear and fully applied brake)

Check setting data pump A4VIDA
**Begin of control:**
HD 40-50 bar
Motor speed . . . . . rpm* Psp . . . . . bar*
HD . . . . . bar*
Readjusting - control start screw

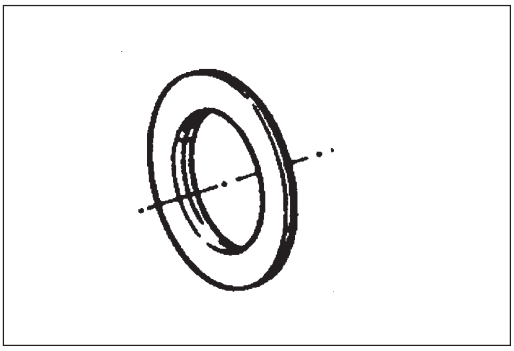



112

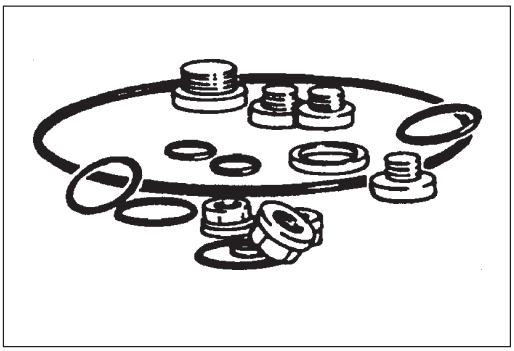
**End of control**
HD . . . . . bar
Motor speed . . . . . rpm* Psp . . . . . bar*
Readjusting timing adjustment screw

Note:
Eccentric adjusting - observe direction of rotation

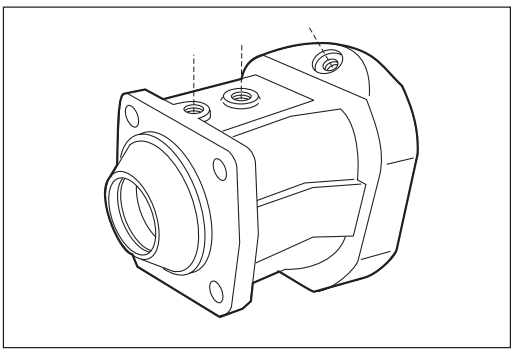
* Setting data according to order!



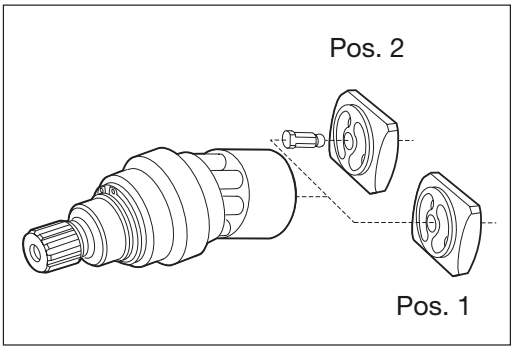
1 Seal kit for drive shaft.



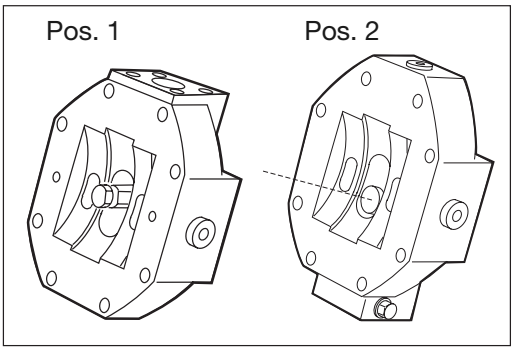
2 External seal kit.



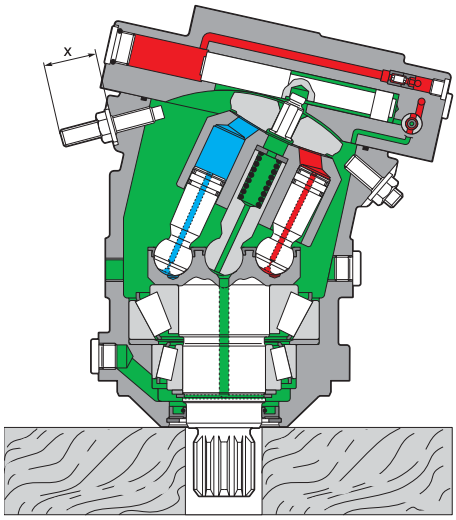
3 Housing.




4 Complete rotary group
Note:
Pos. 1 - For port plate with differential piston
Pos. 2 - For port plate with synchronizing piston

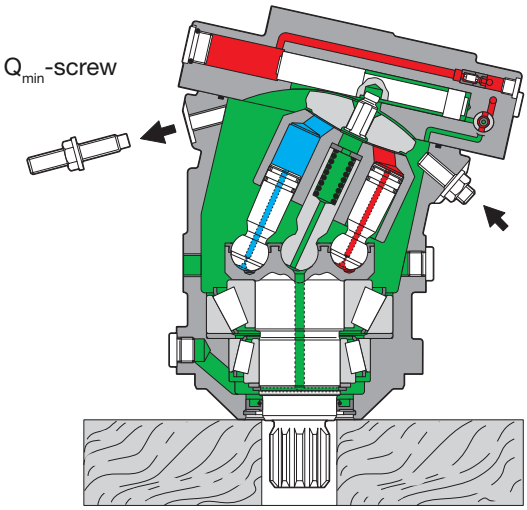



5 Port plate with control piston
Note:
Pos. 1 - For port plate with differential piston
Pos. 2 - For port plate with synchronizing piston

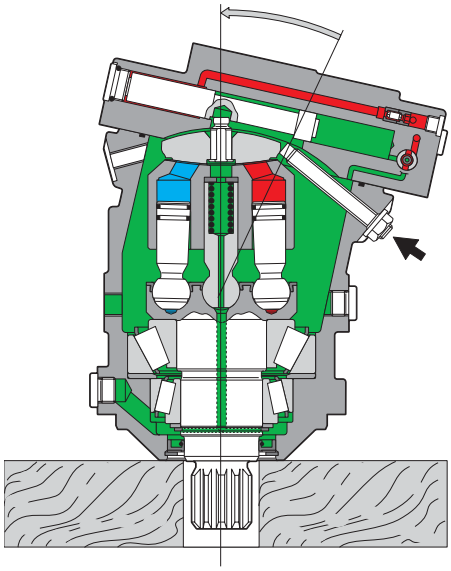



**Synchronizing piston:**
Note dimension x.

⚠
For disassembly of the port plate, swivel always rotary group to zero position.
Piston rings to hang out of the cylinder boring.

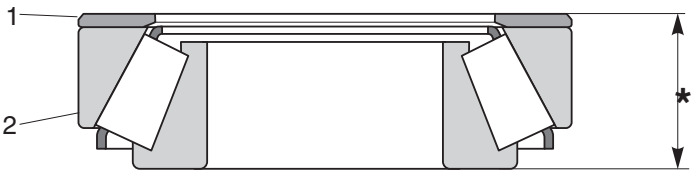



Remove $Q_{min}$-screw and plug.

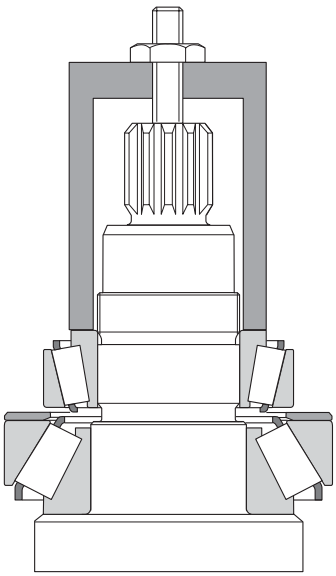


Swivel rotary group to zero position with screw $Q_{min}$.

**Rotary group: mechanical part**

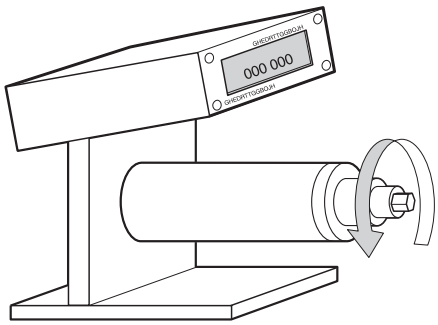


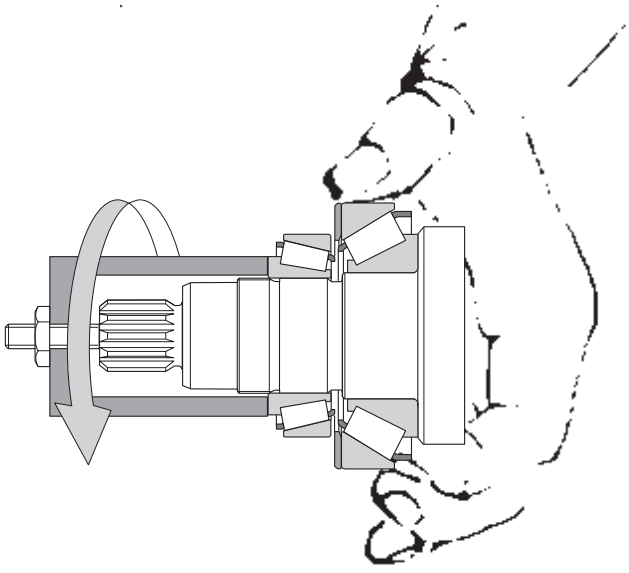

Adjustment dimension * and bearing torque see service information.



Press on bearing.
Do not exeed bearing torque during press-on.

Preload bearing with assembly sleeve and steady control of torque.



**Start**

- When starting all operating levers must be in “neutral position”.
- Only start the machine from the driver’s seat
- Check the indicating instruments after start to assure that all functions are in order.
- Do not leave the machine unobserved when the motor is running.
- When starting with battery connection cables connect plus with plus and minus with minus.
  Always connect mass cable (minus) at last and cut off at first.

**Attention**

- Exhaust gas is dangerous. Assure sufficient fresh air when starting in closed rooms!

**Hydraulic equipment**

1. Hydraulic equipment is standing under high pressure.

⚠ High pressure fluids (fuel, hydraulic oil) which escape under high pressure can penetrate the skin and cause heavy injuries.
Therefore immediately consult a doctor as otherwise heavy infections can be caused.

2. When searching leakages use appropriate auxiliary devices because of the danger of accidents.
3. Before working at the hydraulic equipment, lower pressure to zero and lower working arms of the machine.
4. When working at the hydraulic equipment, absolutely stop motor and secure machine against rolling away (parking brake, shim)!

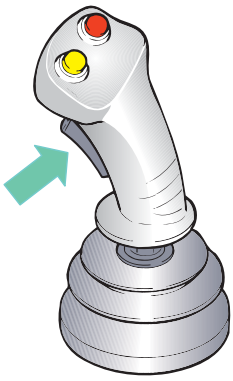
5. When connecting hydraulic cylinders and motor pay attention to correct connection of hydraulic flexible hoses.
6. In case of exchanging the ports, the tunctions are vice versa (f. ex. lift-up/lower) - danger of accidents!

7. Check hydraulic flexible hoses regularly and replace them in case of dammage or wear! The new hose pipes must comply with the technical requirements of the machine manufacturer!

⚠ Orderly disposal or recycling of oil, fuel and filters!

# Operation

***Important: whenever you wish to select a function different from the one in use (using the rocker switch or the control board) the joystick must be brought back to the central position.***



## Deadman

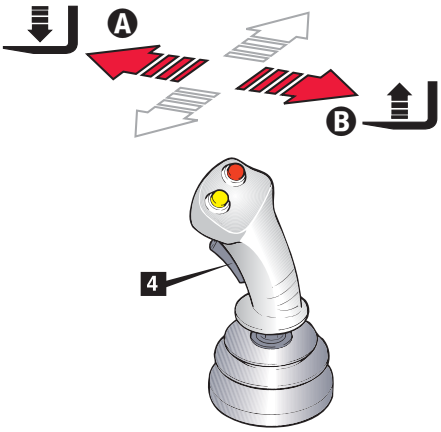
**Note:** Before any operation, press the “deadman” button.

## Standard Functions:

- **Boom lifting/lowering**

**4+A** Boom up

**4+B** Boom down

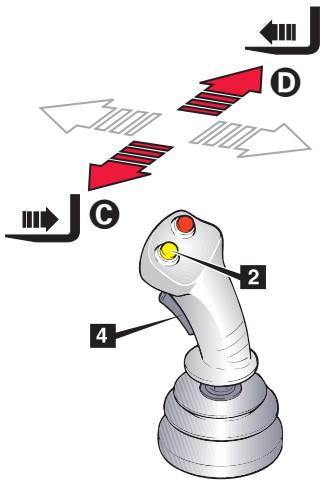



## Fork up/down

- **Boom extension/retraction**

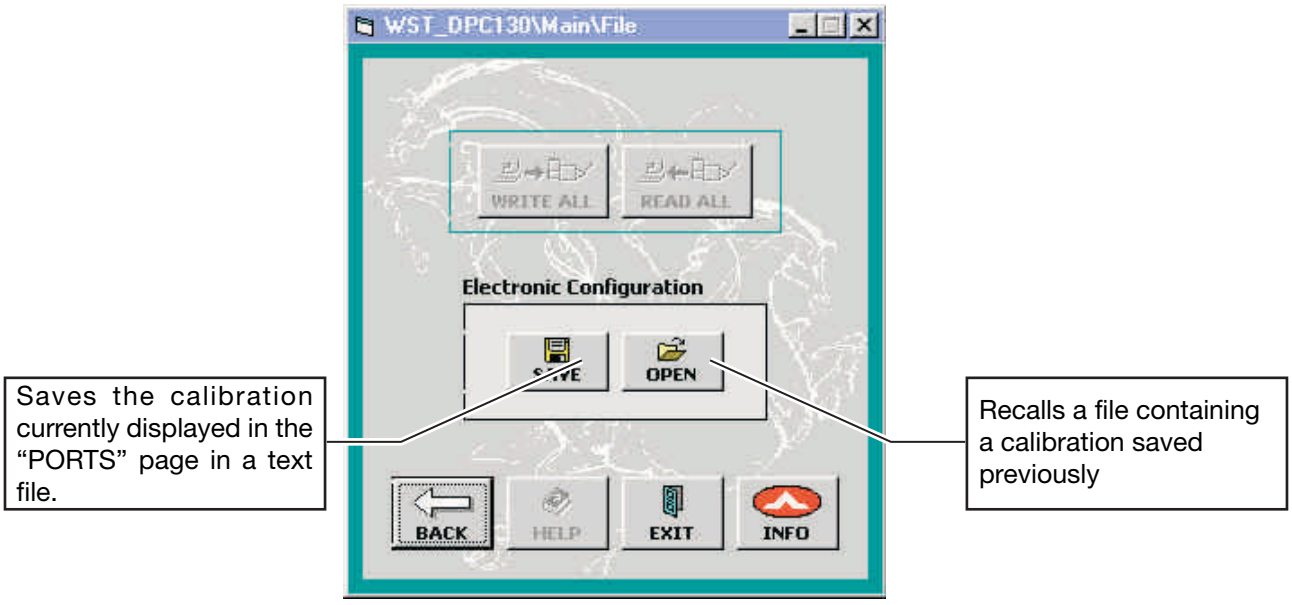
**4+2+C** Boom in

**4+2+D** Boom out



**FILE Page**

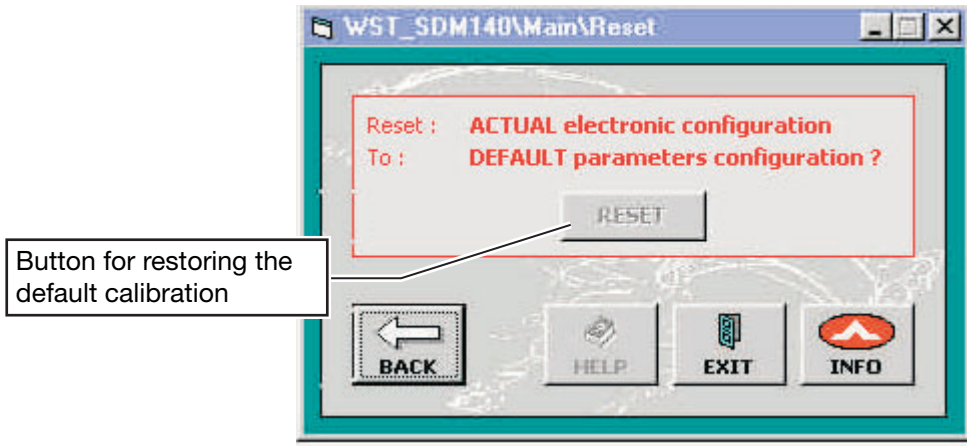
Used to file or recall customised settings.



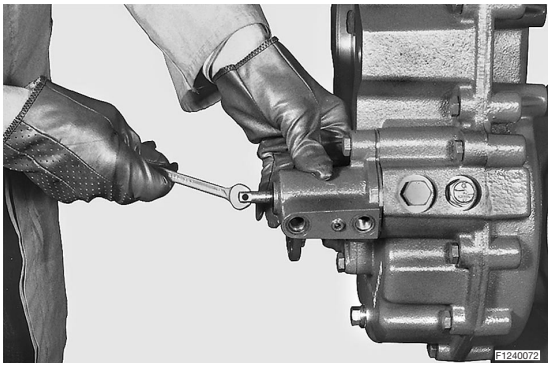

**Nota:** once the file containing the calibration of choice has been recalled, you can download it into the control unit directly from this page by pressing the "WRITE ALL" button.
If you wish to save the calibration of the control unit currently connected, it can be recalled directly from this page by pressing the "READ ALL" button and then saved using the "SAVE" button

**RESET Page**

Allows the default calibration to be restored at any moment.

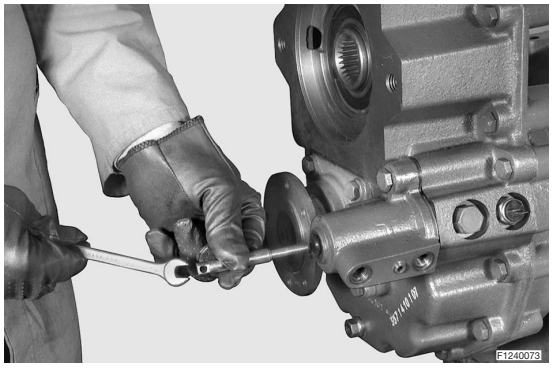


## REMOVAL OF HYDRAULIC GEAR CONTROL



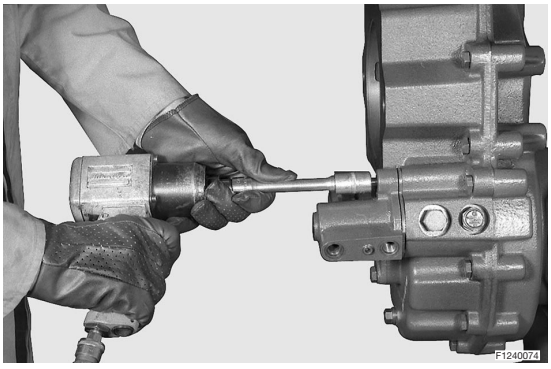

GB a

Remove the gear control rod.



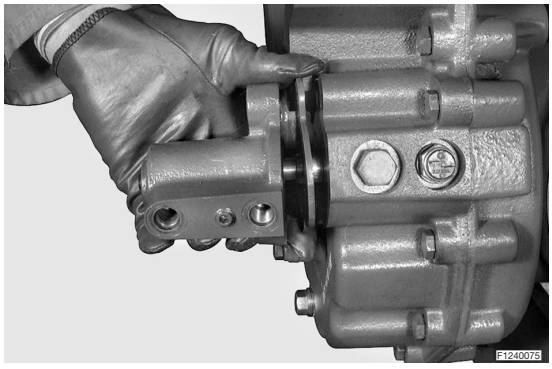

GB b

Pull out the control rod.



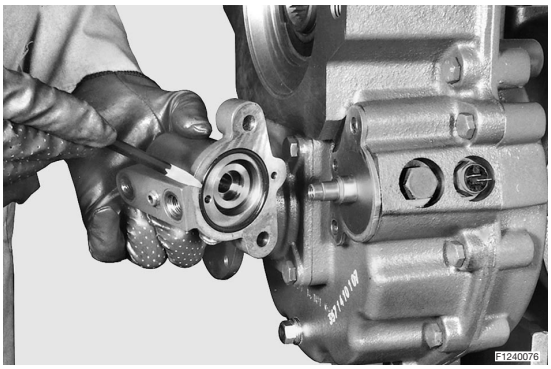

GB c

Remove screws on the gear control cylinder.



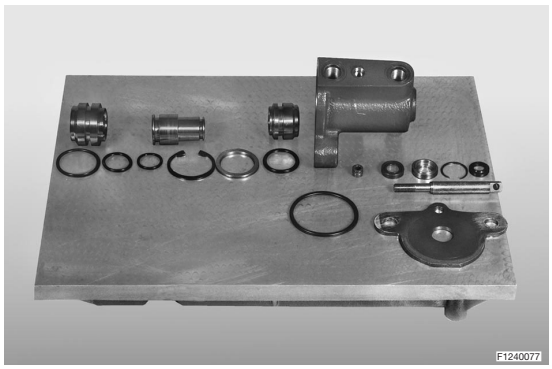

GB d

Remove the gear control cylinder.



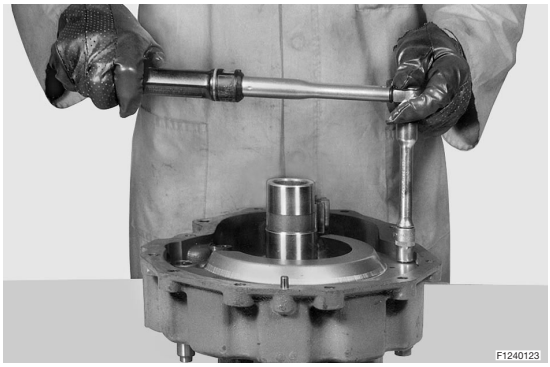

GB e

Pull out the gear control cylinder.
Pay attention to the position of the O-rings.
Remove the protection plate.



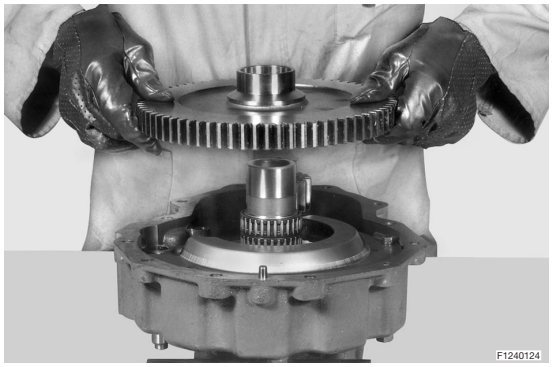

GB f

Re-assembly arrangement of gear control cylinder parts.



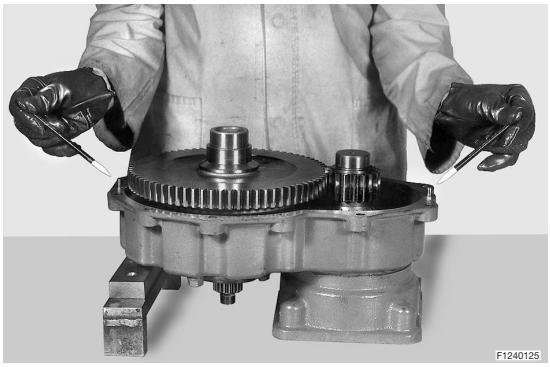

GB a

Tighten screws using a torque wrench setting of 25÷26 Nm.



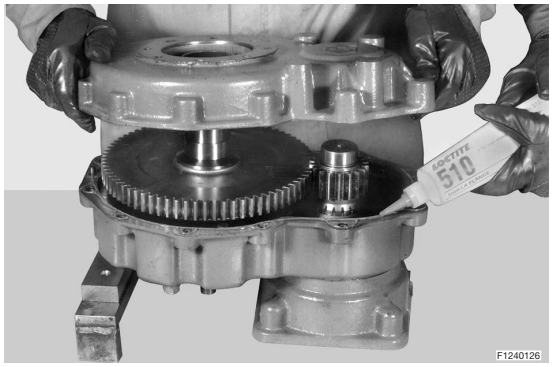

GB b

Re-assemble needle bearings, gear and distance piece.



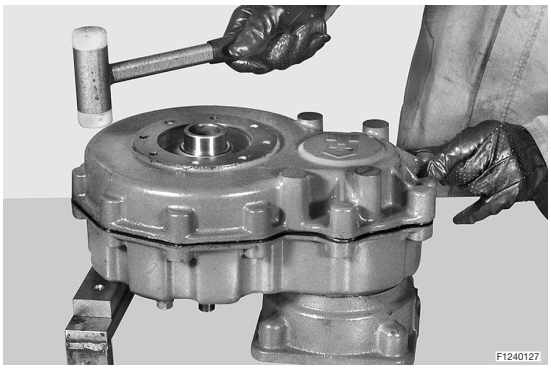

GB c

Check the insertion of pins.




GB d

Spread LOCTITE 510 on the surface and assemble the cover.




GB e

Fasten the cover.

## COMPONENTS LOCATION ON THE MACHINE


Infolift main unit

Load cell pin

Load cell amplifier