# Electrical components in circuit diagram

FIATALLIS

| FX600 | Circuit diagram No. | T 1287263 - 001<br>B 1287262 - 010 |
|---|---|---|

| Part | Quantity | Description and function | Curr. Path | Location | Part no. |
|---|---|---|---|---|---|
| A10 | 1,000 | LOAD LIMIT GOVERNOR | 3 - 0/58 - | CONTROL PANEL | |
| A10X4 | 1,000 | DIAGNOSTIC UNIT CONNECTOR | 7 - 3/18 - | CONTROL PANEL | 73172588 |
| A10X4 | 1,000 | FLANGE | 7 - 3/18 - | CONTROL PANEL | 73172589 |
| A100 | 1,000 | CENTRAL ELECTRONIC UNIT | 3 - 1/16 - | CONTROL PANEL | 73172003 |
| A158 | 1,000 | ELECTRONIC SPEED CONTROL | 4 - 1/21 - | ENGINE | |
| A68 | 1,000 | RESISTANCE MODULE | 3 - 2/86 - | SEAT CONSOLE,RH | 73175260 |
| B10 | 1,000 | PRESSURE SENSOR - TRAVEL | 11 - 0/84 - | SUPERSTRUCTURE | |
| B10.1 | 1,000 | SPEED SENSOR | 3 - 9/89 - | ENGINE | |
| E3.2 | 1,000 | WORKING LIGHT, TANK MODULE LEFT | 9 - 3/87 - | FUEL TANK | 73172509 |
| E3.2 | 1,000 | BULB | 9 - 3/87 - | FUEL TANK | 73172510 |
| E3.3 | 1,000 | WORKING LIGHT, COUNTERWEIGHT LEFT | 9 - 4/87 - | COUNTERWEIGHT | 73172509 |
| E3.3 | 1,000 | BULB | 9 - 4/87 - | COUNTERWEIGHT | 73172510 |
| E3.4 | 1,000 | WORKING LIGHT CAB L.H.(UP-AND DOWN) | 9 - 1/87 - | CAB ROOF | 73172509 |
| E3.4 | 1,000 | BULB | 9 - 1/87 - | CAB ROOF | 73172510 |
| E4.2 | 1,000 | WORKING LIGHT, TANK MODULE RIGHT | 9 - 2/87 - | FUEL TANK | 73172509 |
| E4.2 | 1,000 | BULB | 9 - 2/87 - | FUEL TANK | 73172510 |
| E4.3 | 1,000 | WORKING LIGHT, COUNTERWEIGHT RIGHT | 9 - 5/87 - | COUNTERWEIGHT | 73172509 |
| E4.3 | 1,000 | BULB | 9 - 5/87 - | COUNTERWEIGHT | 73172510 |
| E4.4 | 1,000 | WORKING LIGHT CAB R.H.(UP-AND-DOWN) | 9 - 1/87 - | CAB ROOF | 73172509 |
| E4.4 | 1,000 | BULB | 9 - 1/87 - | CAB ROOF | 73172510 |
| E9 | 1,000 | INTERIOR LIGHT | 7 - 3/74 - | CAB | 73172604 |
| E9 | 2,000 | BULB | 7 - 3/74 - | CAB | 73172605 |
| F | 1,000 | FUSE | 4 - 1/37 - | ENGINE | 73175137 |
| F | 1,000 | FUSE INSERT | 4 - 2/37 - | ENGINE | 73175137 |
| F | 1,000 | FUSE INSERT | 5 - 6/30 - | ENGINE | 73175137 |
| F1 | 1,000 | FUSE | 7 - 3/16 - | CONTROL PANEL | 73172606 |
| F1.8 | 1,000 | MAIN FUSE | 2 - 0/36 - | CONTROL PANEL | 73175153 |
| F1.8 | 1,000 | FUSE HOLDER | 2 - 0/36 - | CONTROL PANEL | 73175154 |
| F1.8 | 1,000 | LID | 2 - 0/36 - | CONTROL PANEL | 73175155 |
| F1.8 | 1,000 | BRACKET PLATE | 2 - 0/36 - | CONTROL PANEL | 73172001 |
| F10 | 1,000 | FUSE | 12 - 5/17 - | CONTROL PANEL | 73172606 |
| F11 | 1,000 | FUSE | 7 - 1/16 - | CONTROL PANEL | 73172606 |
| F12 | 1,000 | FUSE | 7 - 2/16 - | CONTROL PANEL | 73172606 |

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## Control panel operating instructions

2732897

The keyboard is a membrane-type keyboard with symbols printed on the membrane describing the function of the key below.

The keys are depressed to activate or de-activate the corresponding functions. The keys are short-stroke tactile touch types telling the operator by a click that the key has been successfully de-pressed.

Light-emitting diodes (LEDs) are located above the keys under transparent sections of the key-board membrane to indicate the control state of the key. Depressing the key repeatedly permits to select all possible control states sequentially (see example opposite).

**⚠ CAUTION**

**The keyboard membrane may be damaged by pointed objects.**

**Use your fingers only to depress the keys.**

**Never use ball-point pens, pencils, nails or similar pointed objects.**

After shutting off the machine (ignition OFF), the last switching state of the keys "Fan" (15), "Hydraulic Hammer" (19), "AUTO-IDLE" (22), "Swing mode" (26), "Gearshift" (27) and "Overload warning system" (29) remain stored and are being displayed when the machine is started next time.
All other activated functions are reset to zero.

The following rule applies to the rocker switches on supplementary control panel (D, Fig. 2):

A function is activated when the switch face bearing the function symbol / the description is depressed.

**Example (Fig. 3):**

Key (15), fan

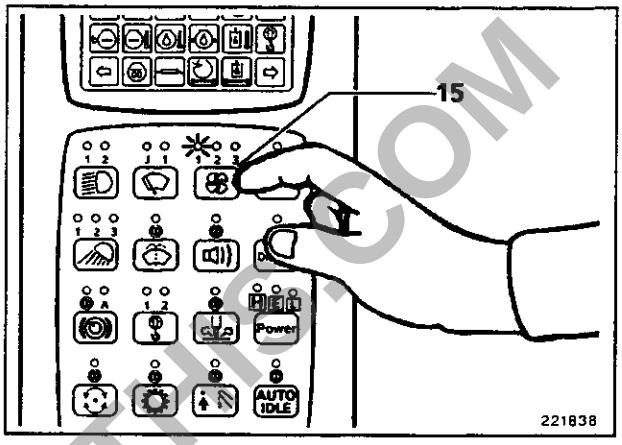



*Fig. 3*

Possible control states:

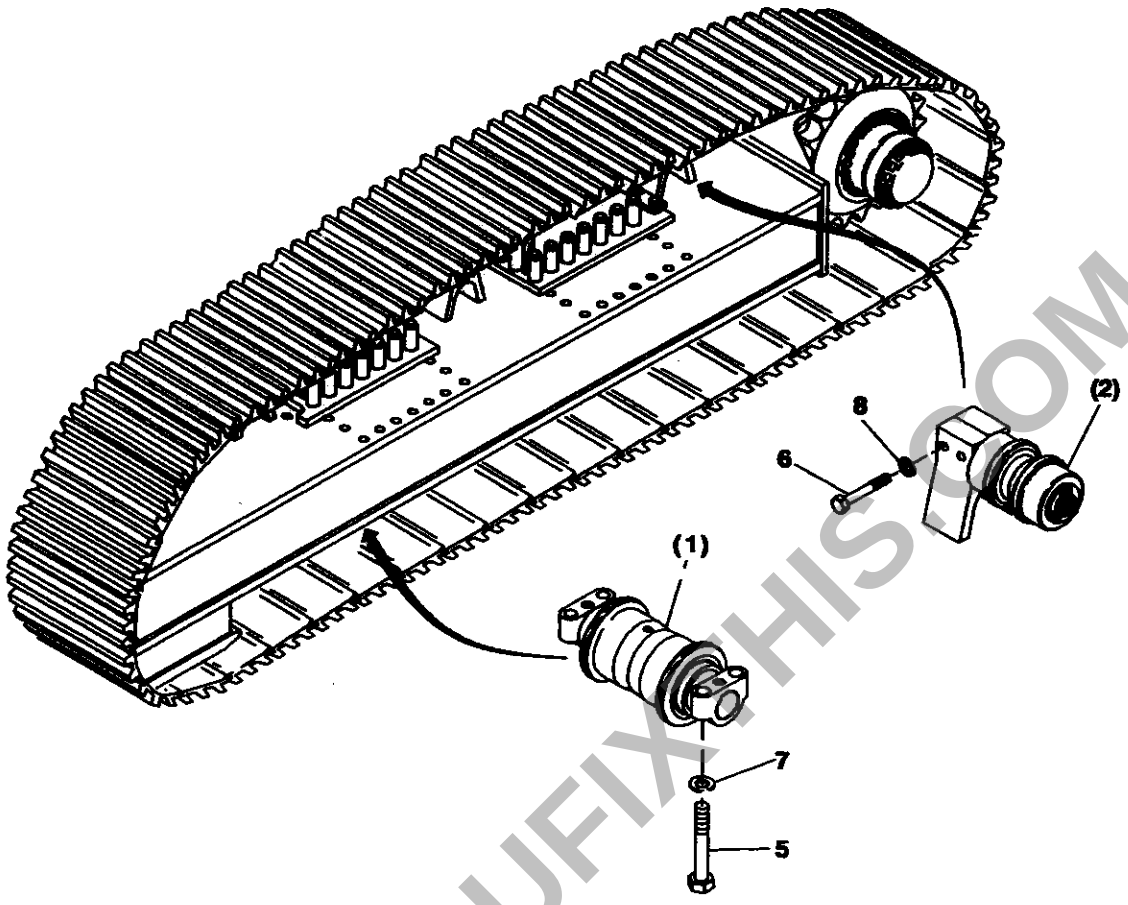
- none of the LEDs lit
  = fan **OFF**.
- key (15) depressed once:
  = fan in range **1**, LED above **1** on.
- key (15) depressed twice:
  = fan in range **2**, LED above **2** on.
- key (15) depressed three times:
  = fan in range **3**, LED above **3** on.
- Depress key (15) four times:
  = fan in stage **2** , LED above **2** lit up.
- Depress key (15) five times:
  = fan in stage **1** , LED above **1** lit up.
- If the key is depressed again:
  = fan **OFF**, LED extinguished.

It is not possible to pass directly into the **OFF** position from a selected range. This means that if the operator wants to switch off the fan running in range **1** he has to depress the key five times.

The other keys are operated the same way. □

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2 496 890.010

## CRAWLER CHASSIS INSTALL.MATERIAL

06.010

FX600 / 106101 - .....

T 2496890 - 000
B 2496890 - 010

| Item | Quan. | ME | Part No. | Description |
|---|---|---|---|---|
| 001 | 8 | 00 | | **06.150 2443691**<br>IDLER ROLLER |
| 002 | 3 | 00 | | **06.180 2496891**<br>SUPPORT ROLLER |
| 005 | 32 | 00 | **73170019** | HEXAGON BOLT |
| 006 | 6 | 00 | **73170020** | HEXAGON BOLT |
| 007 | 32 | 00 | **73170022** | DISK/WASHER |
| 008 | 6 | 00 | **73170010** | DISK/WASHER |

ME: 00 = Stück/piece 13 = m 26 = $m^2$ 39 = $m^3$ 43 = kg 50 = l (litre)



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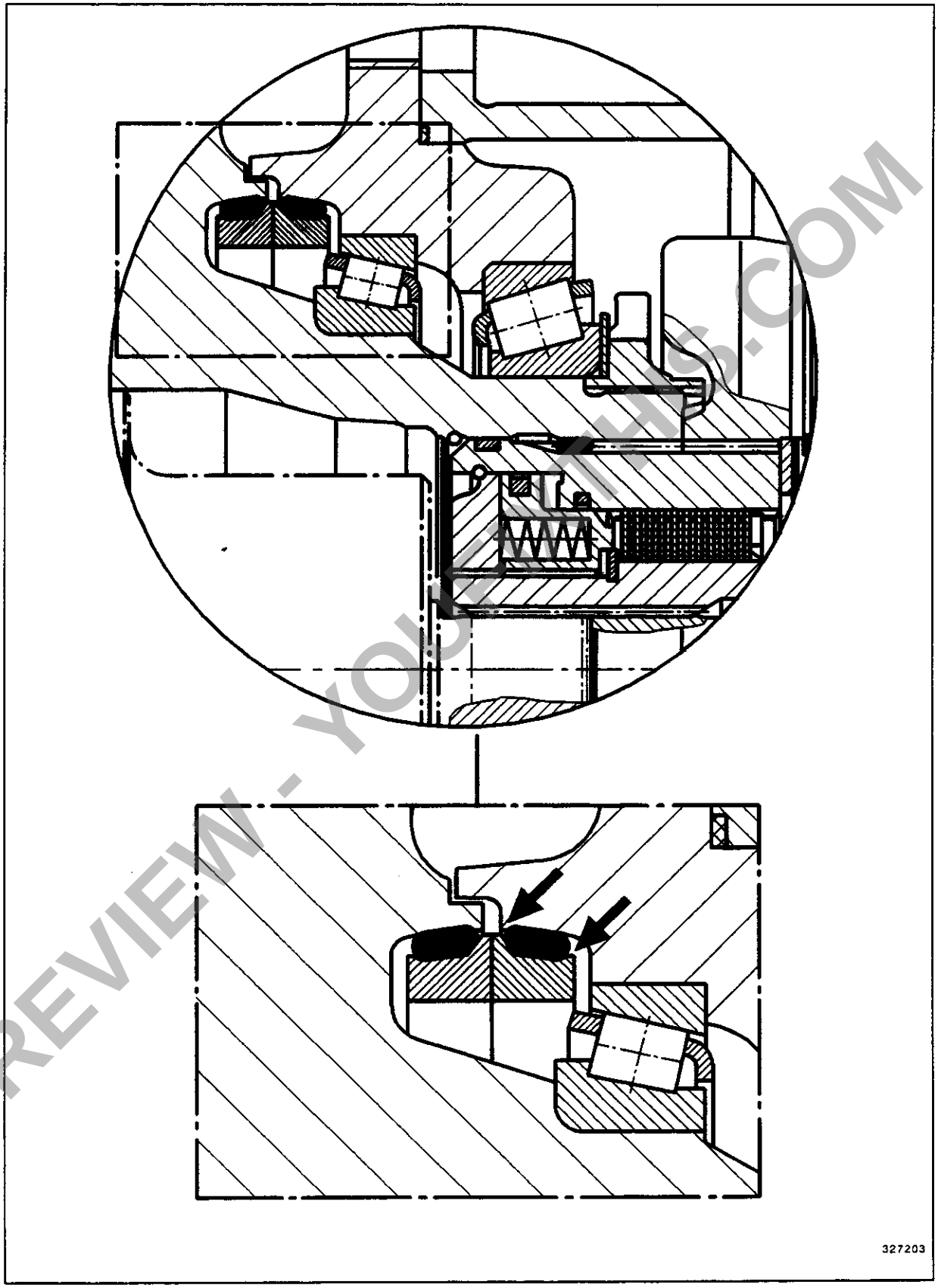



Fig. 28

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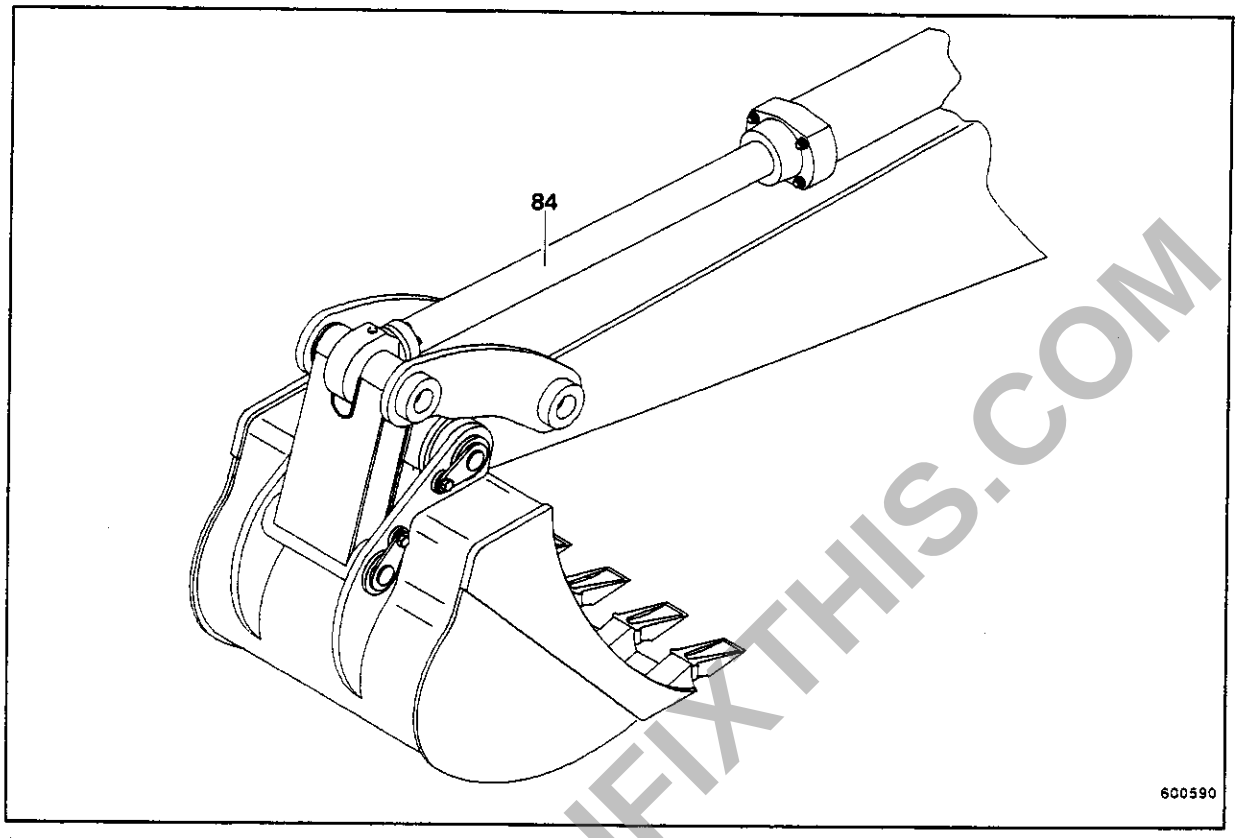



*Fig. 22*

## Bucket cylinder (84, Fig. 22)

The dual-action hydraulic cylinder is installed between stick and linking element/toggle lever.

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### Control loop

This is where the power-limiting function sets in.

The speed of a diesel engine is reduced immediately when the engine is loaded. In extreme cases, this condition may even lead to the engine being throttled down to n = 0 and stalling.

A power-limiting controller makes use of this effect for the indirect measurement of engine power.

Because of the high precision requirements, the speed of the drive engine is determined electronically by sensing the teeth of the gearing of the starter motor in the flywheel housing.

The actual speed measured (A) is compared by a micro-controller (8, Fig. 1) to the pre-determined nominal speed (B) of the engine.

On reaching a preset value of speed loss (see chapter "Types of engines"), the main hydraulic pumps (2) are tilted back electronically by means of proportional valve (6) until the pump reaches a stable point of operation.

This point is defined by an equilibrium between the power supplied by the engine and the power consumed by the hydraulic system.

The main reference variable of the electronic power-limiting control PCS III is the speed of the diesel engine.

## Types of engines (FX 140 - FX 600)

| Type of excavator | Engine CUMMINS | Net flywheel power HP (kW) Controlled rpm | Fuel system | Controller regulation | Max. coolant temperature (°C) |
|---|---|---|---|---|---|
| FX 140 | 4 BT | 100 (75) / 2200 | Bosch A/RSV | 8% | 100 |
| FX 200 | 6 BT | 135 (101) / 2200 | Bosch A/RSV | 8% | 100 |
| FX 240 | 6 BTA | 165 (123) / 2200 | Bosch A/RSV | 8% | 100 |
| FX 270 | 6 BTA | 184 (138) / 2200 | Bosch A/RSV | 8% | 100 |
| FX 350 | 6 CTA | 230 (172) / 2000 | Bosch A/RSV | 8% | 100 |
| FX 480 | M 11 | 315 (235) / 1800 | PT Centry/STC | 6% | 100 |
| FX 600 | N 14 | 400 (298) / 1800 | PT Centry/STC | 6% | 100 |
| FX 200 W | 6 BT | 135 (101) / 2200 | Bosch A/RSV | 8% | 100 |
| FX 220 W | 6 BTA | 165 (123) / 2200 | Bosch A/RSV | 8% | 100 |

1 kW = 1.341 HP

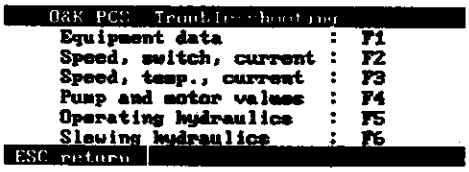
The powers set out in the table are continuous net effective outputs in acc. with SAEJ1995/ISO 3046 / 1 IFN blocked.

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## Working Hydraulics

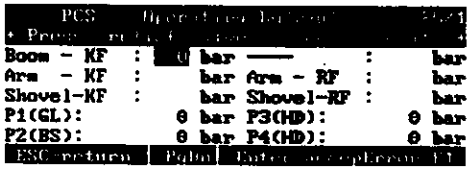
### PCS troubleshooting submenu







### PCS working hydraulics F5/1




The procedure described in the opposite column must be repeated for all parts of the equipment and for the piston and rod sides (RF, KF) of the working cylinders. After collection of the measuring values, the procedure ends automatically and the following message is displayed: **Measurement terminated**

to F5/2 

from F5/2

Selection of data and mesasured value pages of the PCS

Keys 

select the corresponding data page of the menu showing the actually valid settings and meaured values..

Mit 

returns from all data screens back to the troubleshooting submenu..

**Function:** Checking and setting the pressure-limiting valves (secondary circuit of working hydraulics)

The pressure to be checked is automatically highlighted by means of a black field.

**Preparatory work:** connection of pressure sensors

**Measurements:** automatic start with boom cylinder piston side

Boom cyl. piston side: lift boom against the limit stop 


Boom cyl. rod side: lower boom Ausleger against the limit stop 


– *The name of pressure-limiting valves belonging to another function can be entered and edited here.*

**stick piston-side:** lift stick to limit stop, then 


**stick rod-side:** lower stick to limit stop, then 


**bucket piston-side:** Dip bucket backwards to limit stop, then 


**bucket rod-side:** Dip bucket forwards to limit stop, then 


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## ⚠ CAUTION

**The engine must be at running temperature before being subjected to full load.**

### Select correct shoes

**Never use a wide shoe and marsh type shoe for rough ground (which involve rocks, sand and gravel, pebbles etc.), as they are designed for soft and weak ground. Using theses shoes on rough ground will cause bending and loosening of the shoes, and may damage other undercarriage components (links and rollers).**

### Driving over longer distances

**Before driving the machine over longer distances:**

- **bring the machine to basic position and**
- **set superstructure holding brake to AUTOMATIC.**

**The machine is now operated in its basic position.**

**When travelling over longer distances, the machine should always be driven forwards. Travelling over longer distances by reversing leads to increased wear of track bushings and sprocket wheel.**

### Driving uphill and downhill

**When driving uphill or downhill the track drives must always be at the rear, seen in driving direction.**

**Always use max. engine speed when driving uphill.**

**When driving downhill the travel brake valves prevent the machine from reaching an excessive speed.**

□

## Seat belt

2411979

The driver's seat is fitted with a lap-type seat belt (Fig. 1).

### Seat belt - safety instructions

## ⚠ WARNING

**Always belt up before driving.**

**Never run belt over rigid or fragile objects such as bunches of keys or spectacles. This may result in injury.**

**The belt must always be flat and firm against the body and must not be jammed.**

**The buckle opening must not be locked, e. g. with paper, as the buckle can then not engage.**

**Damaged seat belts and those stretched in an accident must be replaced.**

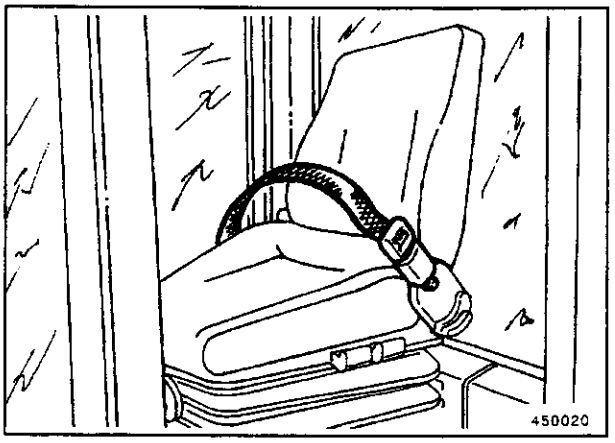


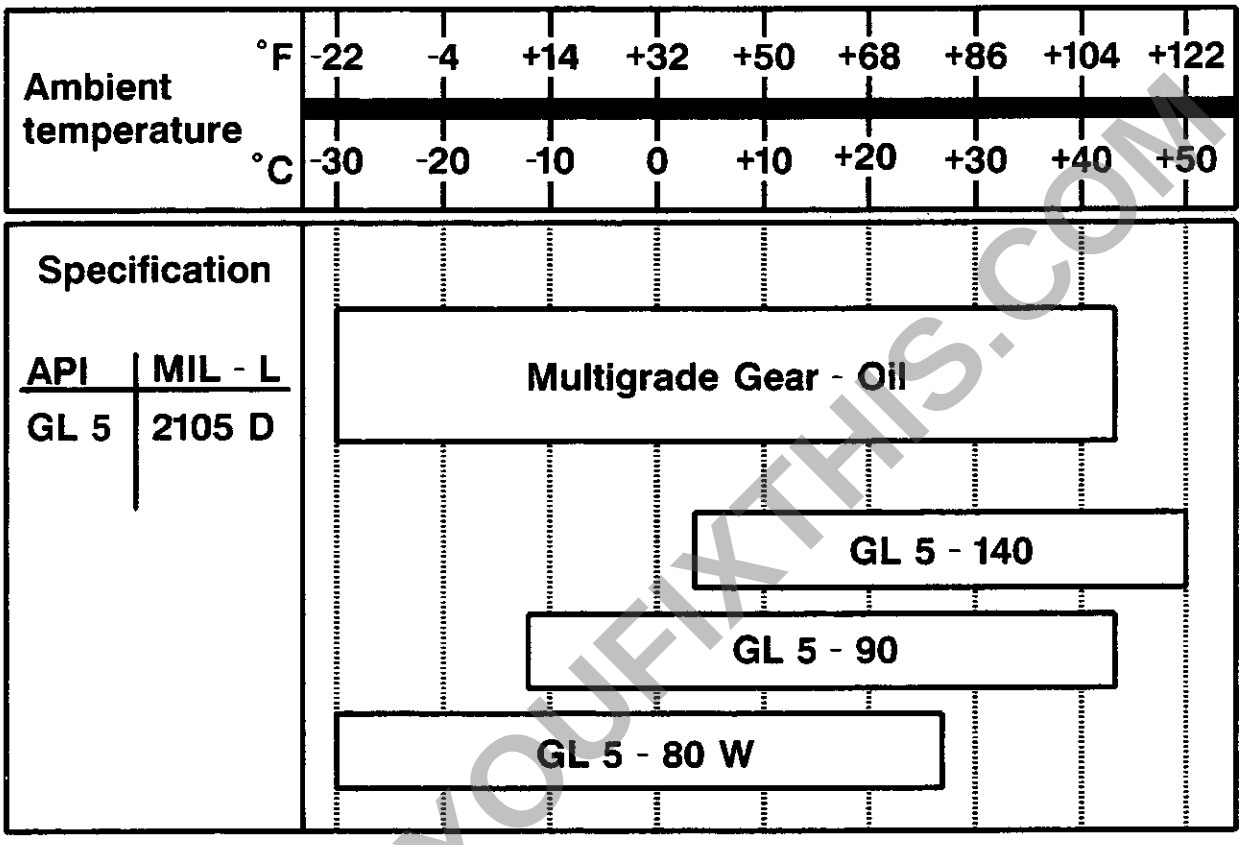

*Fig. 1* □

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# III. Oils for gearboxes

2732722




8003701

**API:** American Petroleum Institute

**MIL:** US armed forces fuel specifications for engine and machine manufacturers □

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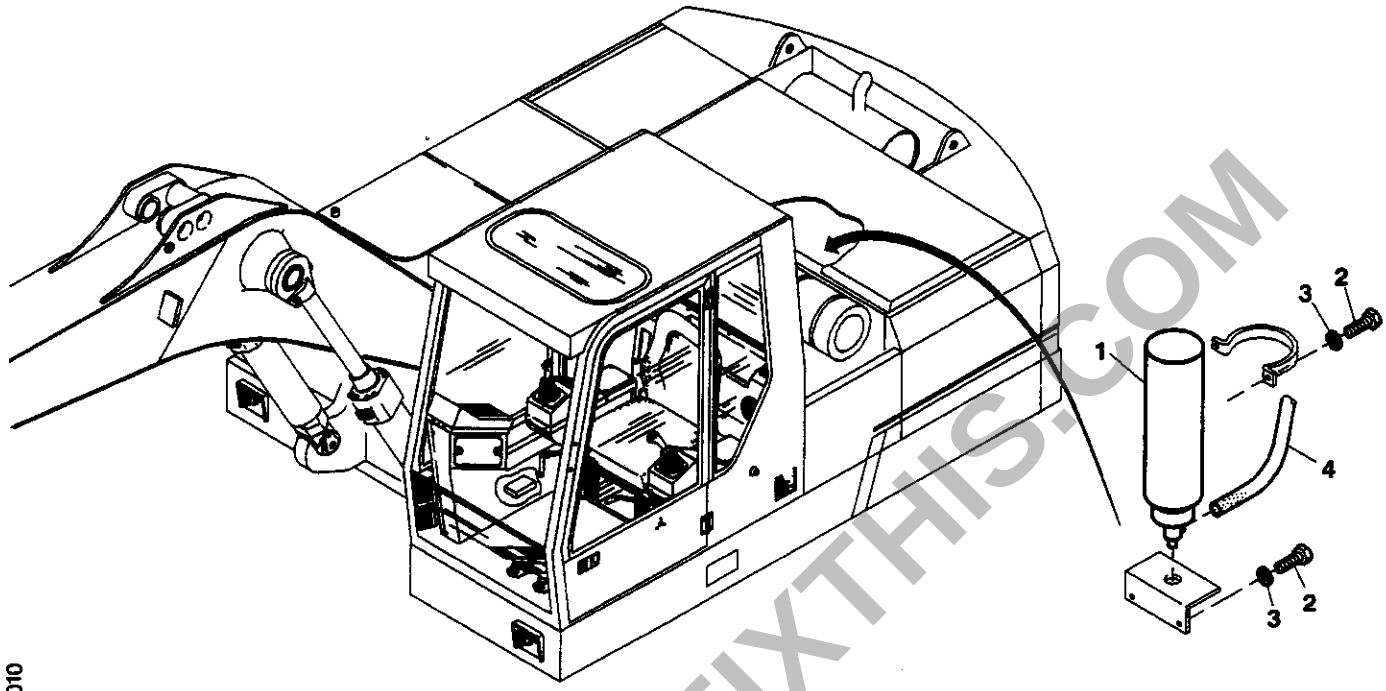
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## COLD-START SYSTEM

13.400

FX600 / 106101 - .....

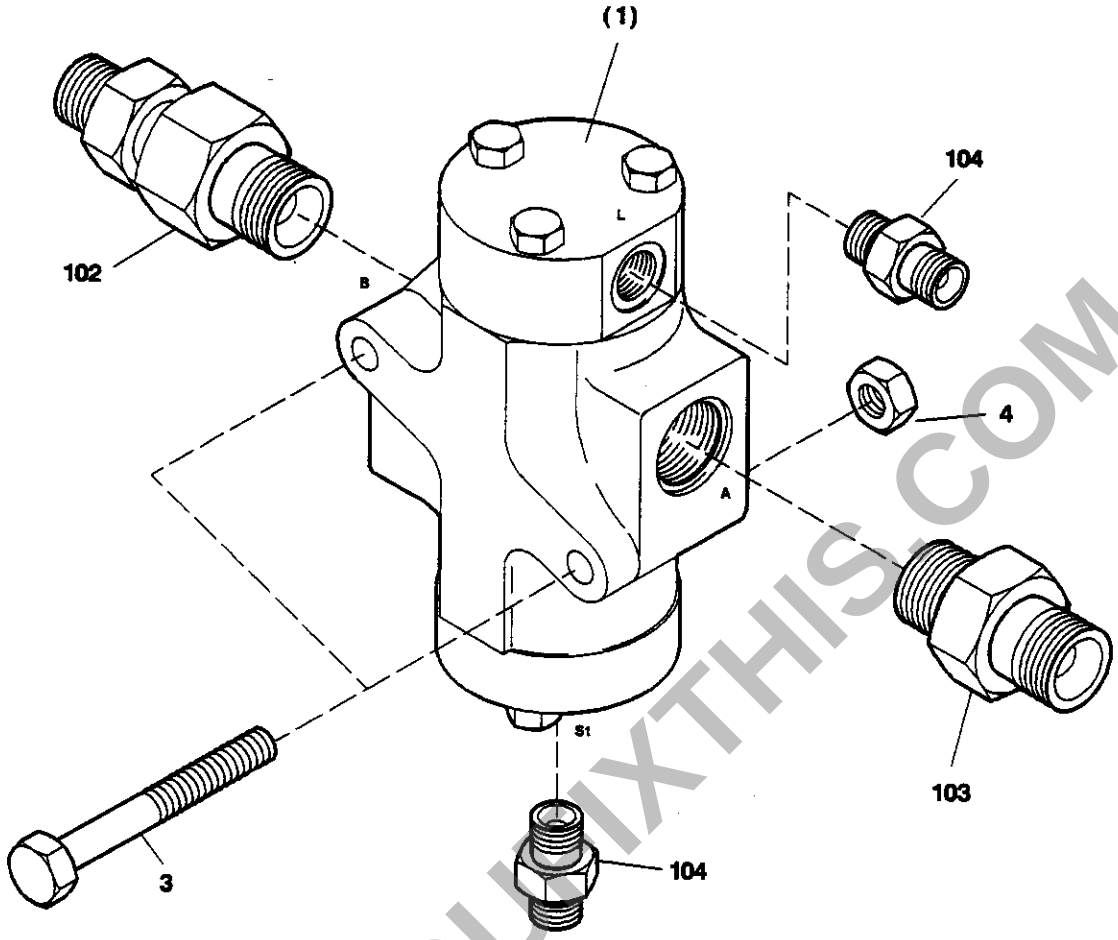
T 2782790 - 000
B 2782790 - 010

| Item | Quan. | ME | Part No. | Description |
|---|---|---|---|---|
| 001 | 1 | 00 | **73170793** | BOTTLE |
| 002 | 4 | 00 | **73170696** | HEXAGON BOLT |
| 003 | 4 | 00 | **73170185** | DISK/WASHER |
| 004 | 1,50 | 13 | **73175759** | PIPE |

ME: 00 = Stück/piece 13 = m 26 = $m^2$ 39 = $m^3$ 43 = kg 50 = l (litre)

1998-09-10

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2 283 060.010

## CONTROL VALVE INSTALL.MATERIAL

23.180

FIATALLIS

FX600 / 106101 - .....

T 2283060 - 002
B 2283060 - 010

| Item | Quan. | ME | Part No. | Description |
|---|---|---|---|---|
| 001 | 1 | 00 | | **23.182 1707400**<br>CONTROL VALVE |
| 003 | 2 | 00 | **73170412** | HEXAGON BOLT |
| 004 | 2 | 00 | **73170215** | HEXAGON NUT |
| 102 | 1 | 00 | **73170413** | VALVE |
| 103 | 1 | 00 | **73170414** | SOCKET |
| 104 | 2 | 00 | **73170296** | SOCKET |

ME: 00 = Stück/piece 13 = m 26 = $m^2$ 39 = $m^3$ 43 = kg 50 = l (litre)

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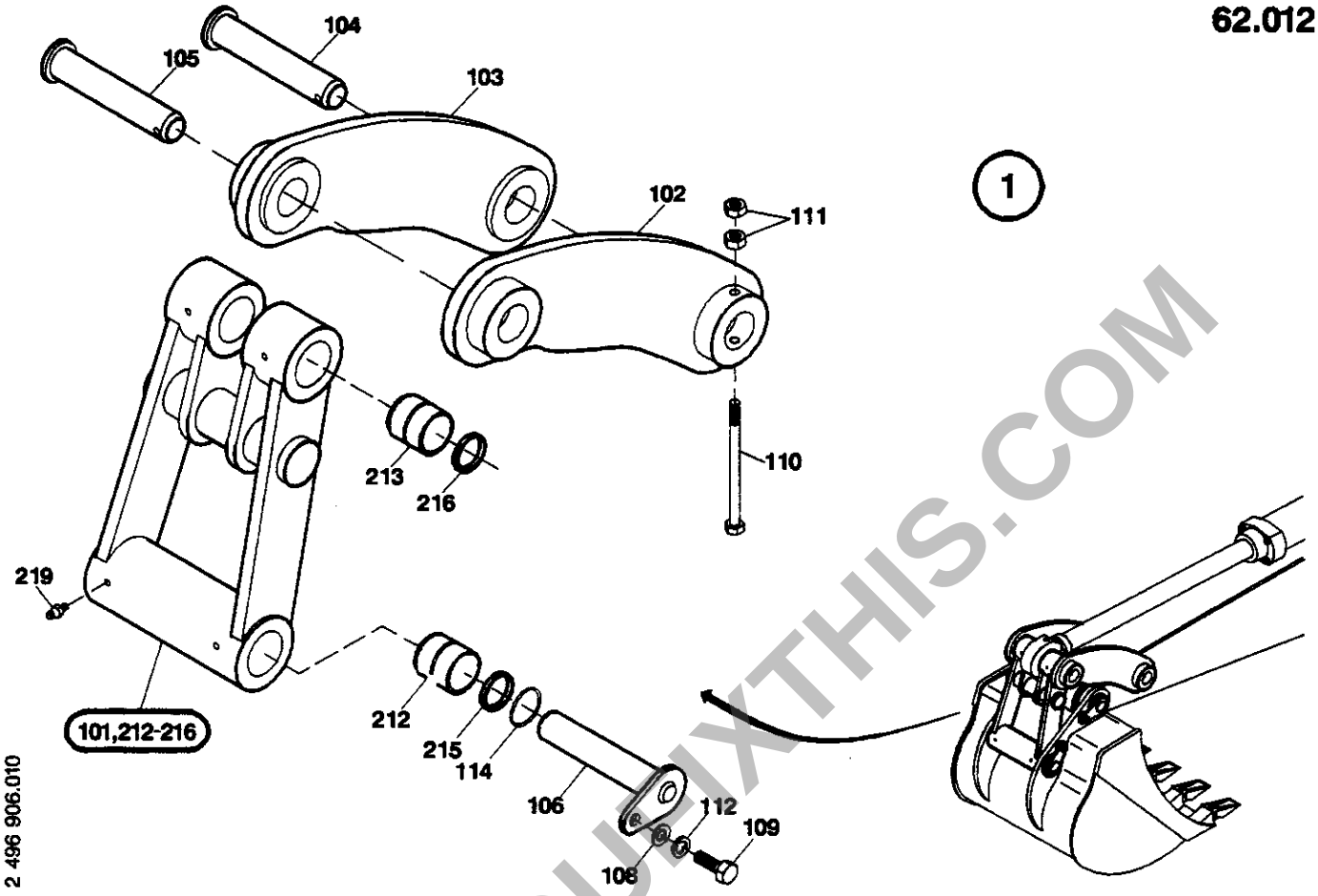
# Electrical components in circuit diagram

| FX600 | Circuit diagram No. | T 1287263 - 001<br>B 1287262 - 010 |
|---|---|---|

| Part | Quantity | Description and function | Curr. Path | Location | Part no. |
|---|---|---|---|---|---|
| Y39.1 | 1,000 | SOLENOID VALVE - HAMMER | 10 - 3/94 | SUPERSTRUCTURE | |
| Y63 | 1,000 | POWER BOOSTER | 10 - 4/94 | VALVE BLOCK | |
| Y37.1 | 1,000 | SOLENOID VALVE - GRAB ROTATOR | 12 - 5/85 | SUPERSTRUCTURE | |
| Y37.2 | 1,000 | SOLENOID VALVE - GRAB ROTATOR | 12 - 8/85 | SUPERSTRUCTURE | |
| Y39 | 1,000 | SOLENOID VALVE - SWITCHINGONE TASK CYLINDER / HAMMER | 10 - 1/94 | VALVE BLOCK | |
| Y39.1 | 1,000 | SOLENOID VALVE - HAMMER | 10 - 3/94 | VALVE BLOCK | |
| Y63 | 1,000 | POWER BOOSTER | 10 - 4/94 | VALVE BLOCK | |

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62.012

## TOGGLE & LINKAGE

FX600 / 106101 - .....

T 2496906 - 000
B 2496906 - 010

| Item | Quan. | ME | Part No. | Description |
|---|---|---|---|---|
| 001 | 1 | 00 | **73175239** | TOGGLE/LINKAGE |
| 101 | 1 | 00 | **73175240** | TOGGLE ARM |
| 102 | 1 | 00 | **73175241** | LINKAGE |
| 103 | 1 | 00 | **73175242** | LINKAGE |
| 104 | 1 | 00 | **73171403** | PIN |
| 105 | 1 | 00 | **73171404** | PIN |
| 106 | 1 | 00 | **73175243** | PIN |
| 108 | 1 | 00 | **73170979** | DISK/WASHER |
| 109 | 1 | 00 | **73171345** | HEXAGON BOLT |
| 110 | 2 | 00 | **73171406** | HEXAGON BOLT |
| 111 | 4 | 00 | **73171407** | HEXAGON NUT |
| 112 | 1 | 00 | **73170981** | LOCK WASHER |
| 114 | 2 | 00 | **73171408** | ROUND SEALING RING |
| 212 | 2 | 00 | **73172063** | BUSHING |
| 213 | 2 | 00 | **73171409** | BUSHING |
| 216 | 6 | 00 | **73171410** | SCRAPER |
| 219 | 4 | 00 | **73170138** | GREASE NIPPLE |

ME: 00 = Stück/piece 13 = m 26 = $m^2$ 39 = $m^3$ 43 = kg 50 = l (litre)



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New parts needed:

To replace a chain segment the following parts are needed:

- 1 chain segment (Fig. 8)
- 2 master pins
- 2 end washers
- 4 sealing washers

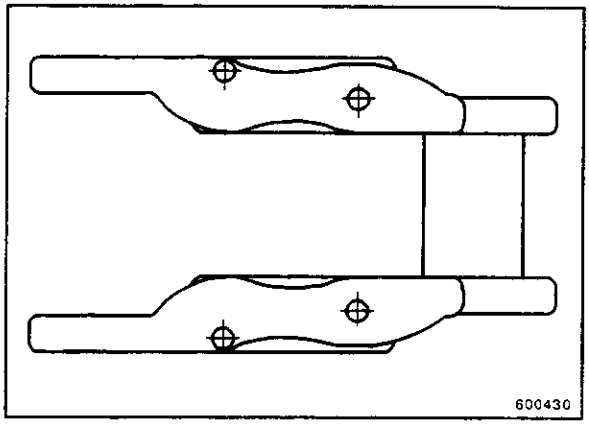



*Fig. 8*

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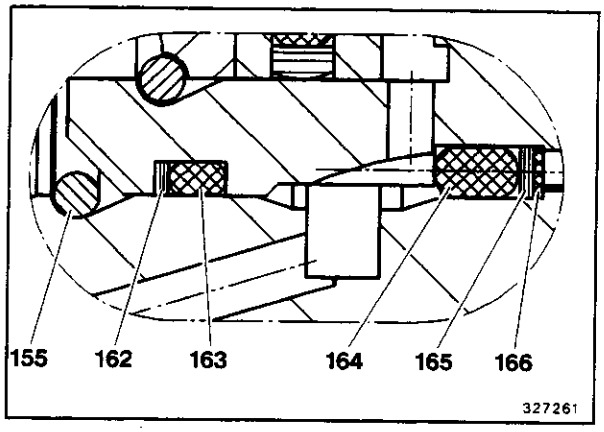



**Fig. 50**
Replace the seals on the brake.
Keep the positions of the seals as shown. Before and behind the brake oil duct, the O-rings (163 + 164) are located, followed by the back-up rings (162 + 165).
For F 25, F 30 traveling gearbox, **one** steel ring (166) must be added as shown.
Offset the joints of the backing ring (165) and the steel ring (166) by 180°.
Oil the seals well.

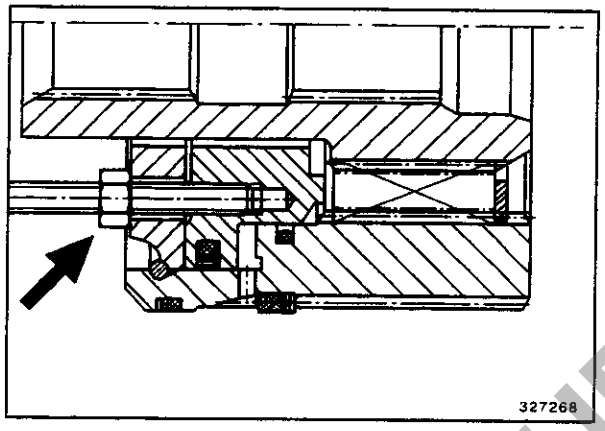



**Fig. 51**
Lift the disk brake removed.
For this purpose, slowly and uniformly tighten two M6 hexagon nuts on the long screws inserted for dismantling until the piston sits on the cylinder cover.

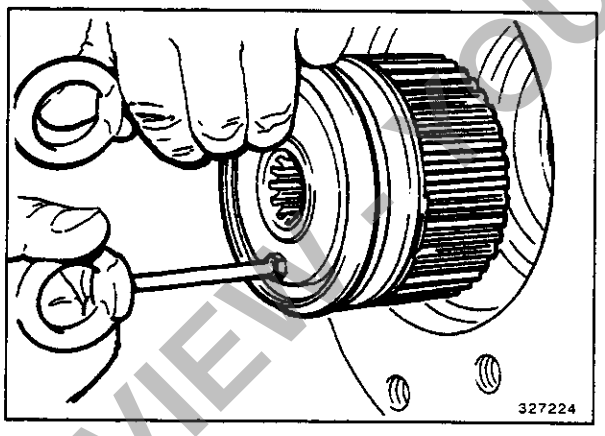



**Fig. 52**
Carefully insert the brake with the aid of the long screws without damaging the seals.

Do not remove the screws (assembling aid).
Leave the brake lifted for fitting planetary stage I.

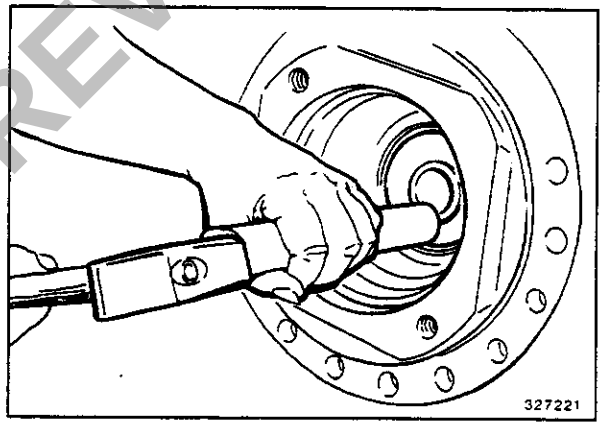



**Fig. 53**
Fully drive in the brake by light bumps, using an aluminium or copper punch.

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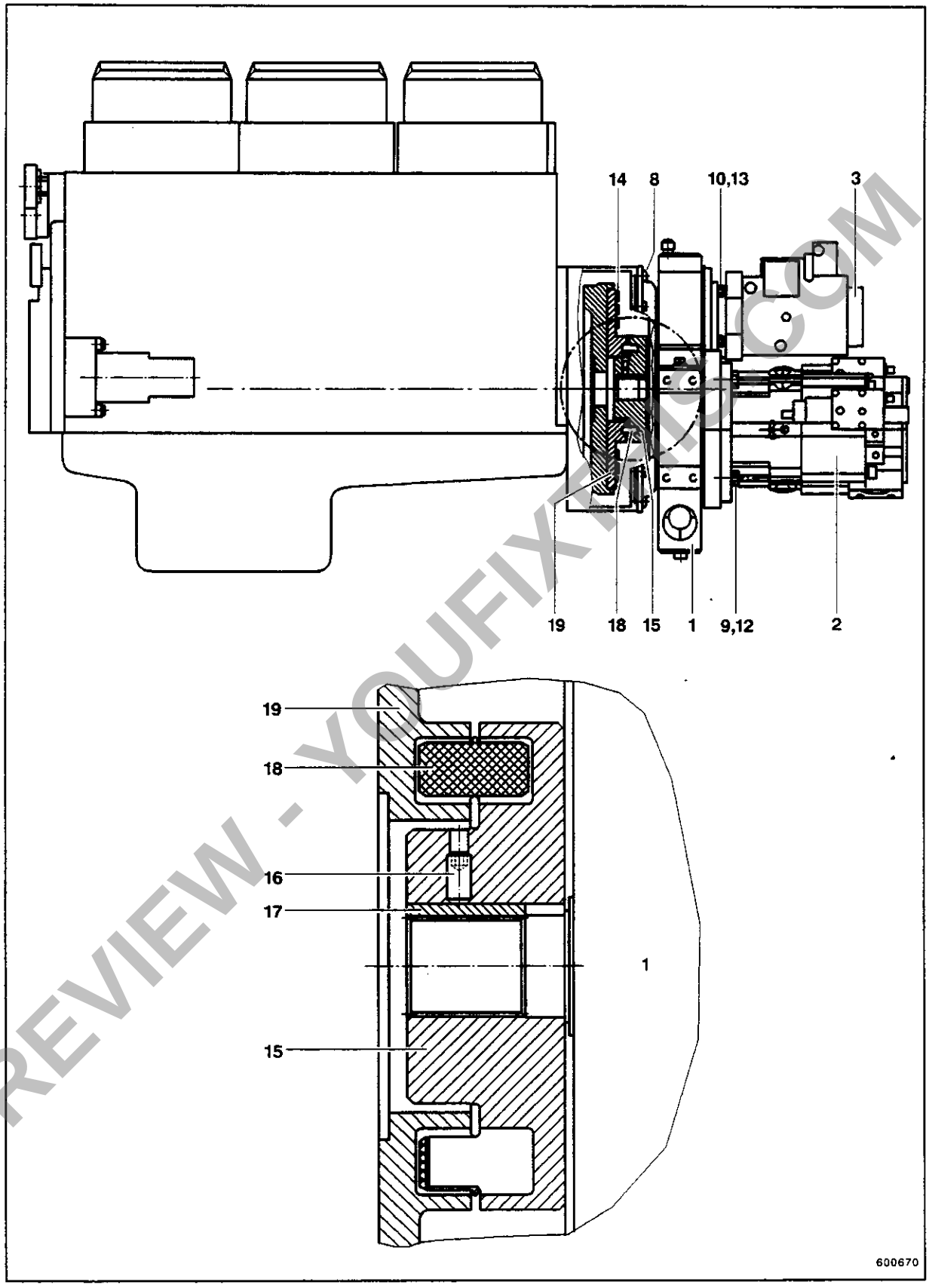



*Fig. 3*

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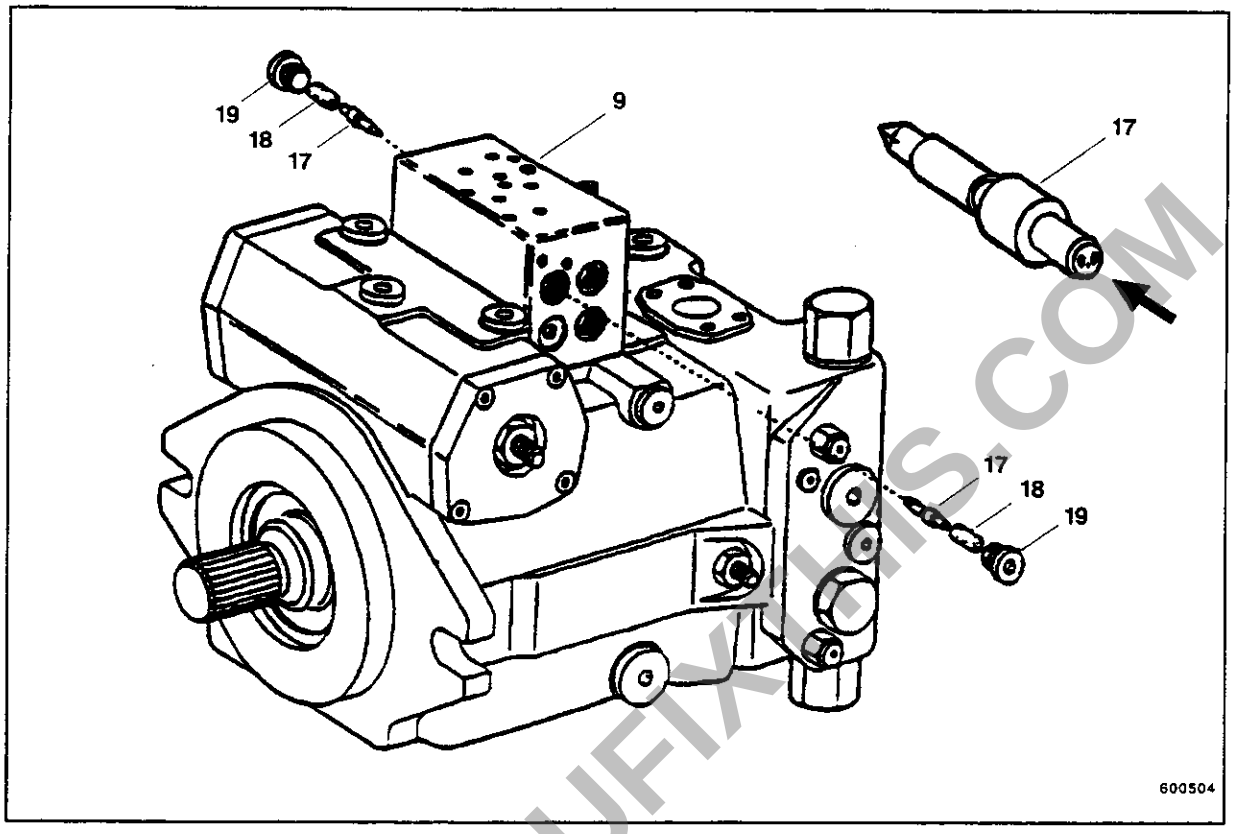



*Fig. 1*

## Changing the braking moment

The hydraulic braking moment is fixed in three stages by throttle pistons (17) in the control unit (9).

**Standard braking:**

Throttle piston 100, P/N 73176984,
1.00 mm slot depth.

**Maximum braking:**

Throttle piston 135, P/N 73176985,
1.35 mm slot depth.

**Minimum braking:**

Throttle piston 80, P/N 73176986,
0.80 mm slot depth.

The slot depth is engraved into the throttle piston.

Throttle piston 100 is installed.

**Changing the throttle piston (on customer's request):**

- Apply vacuum pump.
- Remove screw plug (19).
- Remove spring (18) and throttle piston (17) (pointed pliers).
- Insert new throttle piston, then spring and screw plug. □

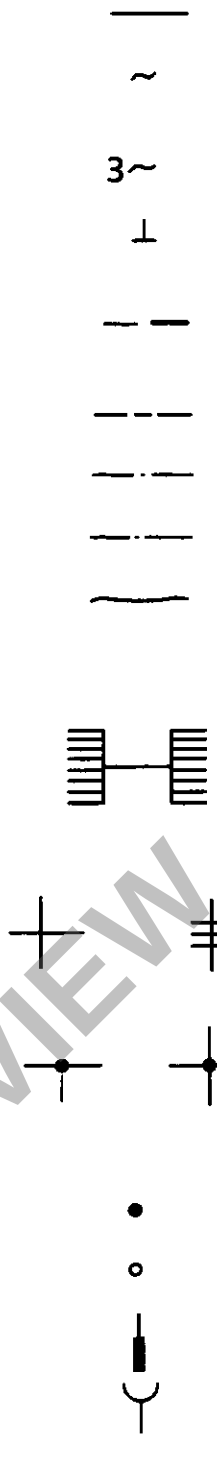
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## Symbols used in electrical engineering

Extract from DIN 40 900.



Direct current

Alternating current

3-phase alternating current

Ground, general

Lines, variable line thickness for emphasized elements

Grounding N, formerly Mp

Protective earth PE, formerly SL

Assembly

Loose cable end

Grouping of lines for simplified representation in circuit diagrams.
Lines in arbitrary order, lines must be identified

Line crossings without connection

Crossings and branches with connection

Connection, firm (soldered)

Connection, detachable, general (terminal or plug)

Male plug

Female plug

328082

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## Pressure switch - travelling (S10.2) (FX 200 W / FX 220 W only)

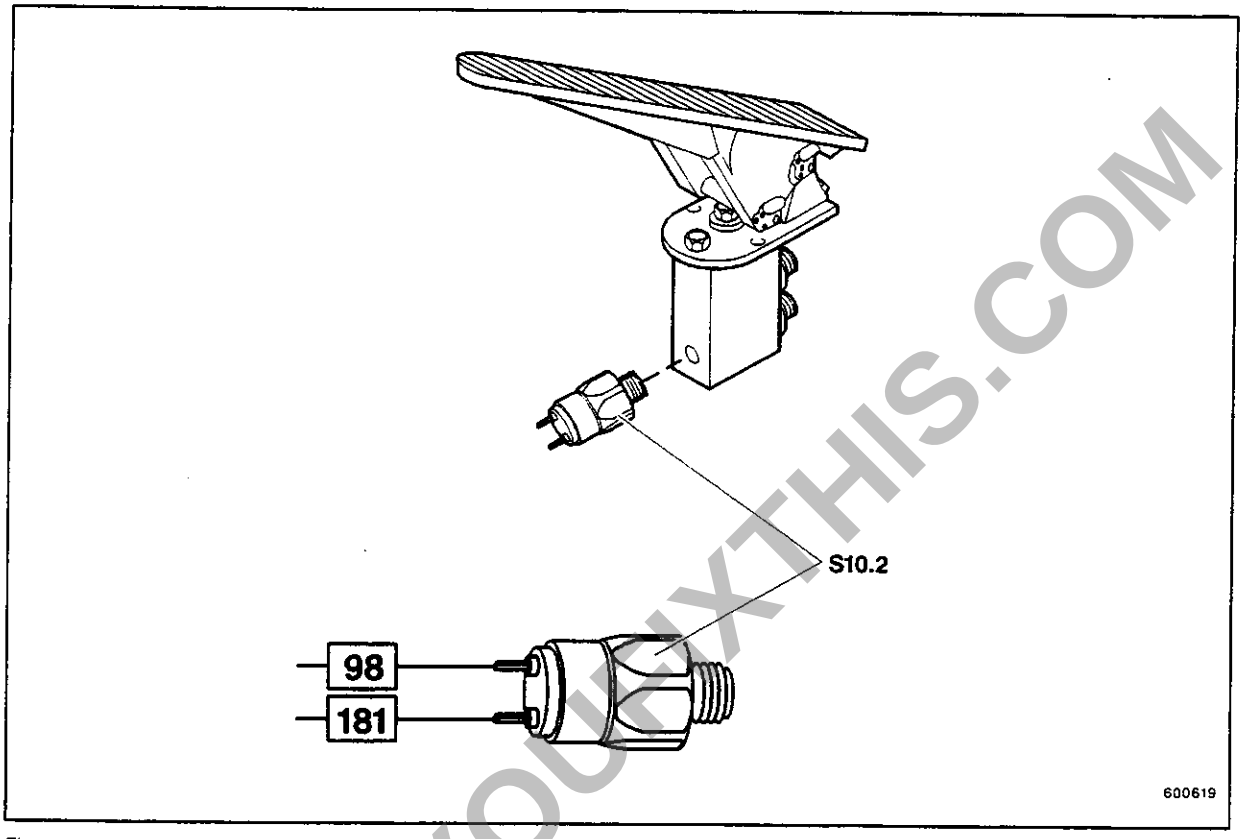



*Fig. 14*

Cable (Fig. 14)

98 - to central electrical system X102.1 and to on-board computer A10X.14
181 - to grounding terminal of central electrical system

Technical data
Thread: M 10 x 1 tapered
Break contact: opening pressure = 3.5 bars
2 tabs AMP 6,3 x 0,8 mm

Remark:
In the FX 200 W / FX 220 W (mobile excavator) a second pressure switch (S10.2) sets the travelling pump to maximum power X3 = 5 bars (one pump: 100%). Together with S10.1, S10.2 has the higher priority.

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## Corrosion protection for pins and bearings (bushings and hubs) 2732241

**⚠ CAUTION**

**Use Voler A.C. anti-corrosive agent only.**

**Other agents are not approved by FIATALLIS.**

All pins and bearings (bushings and hubs) of the working equipment or in equipment components must be treated with **Voler A.C.** anti-corrosive agent before fitting.

**Voler A.C.:**

- permits easy fitting and dismantling
- protects against rust, oxidation and similar wear
- prevents seizing and fretting corrosion in non-moving parts of bearings.

This is achieved by aluminium and copper particles forming a protective layer on the metal. This layer removes surface irregularities and does not sweat, seize or harden.

**Part nos. for Voler A.C.**

P/N 73171461 - 0,5 l spray can (CFC-free)

P/N 73171462 - 0,5 kg tin

P/N 73171463 - 4,5 kg bucket

Available from the FIATALLIS Spare-Parts Service

**Application of Voler A.C.**

- Clean off grease, oil, dirt and corrosion protection agents from pins and bearings using white spirit or diesel fuel.

  Rust patches must be thoroughly removed, if any.

  All parts must present a dry, bright metal surface.

- Apply a thin layer of Voler A.C. on pins and all bearings using a brush or a spray can. Pin shafts and bearings must be completely covered by the protective layer.

  If the protective layer of a pin already treated with Voler A.C. is damaged, these areas must be touched up before fitting the part.

- Fitting and securing of pins

  If the pin is too heavy to be fitted manually, apply Voler A.C. at first only on abt. a quarter of the pin's length

  Then position pin by means of a lifting gear ready for fitting.

  Apply Voler A.C. on the remaining length of pin shaft, fit pin and secure. □

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# Swivel couplings

## Swivel couplings

Application: in hydraulics for pipes with 25, 30 and 38 mm outside diameter

## Swivel coupling with straight male thread acc. to DIN (Fig. 1)

Components:
1 - Coupling body
2 - Union nut
3 - Cutting and wedging ring
4 - Union nut
5 - O-ring
6 - Straight male thread acc. to DIN
7 - Component to be sealed
8 - Retaining ring body/nut

Leakages can be remedied as follows:
In area A; sealed with cutting and wedging ring as described under "Sealing pipe couplings".

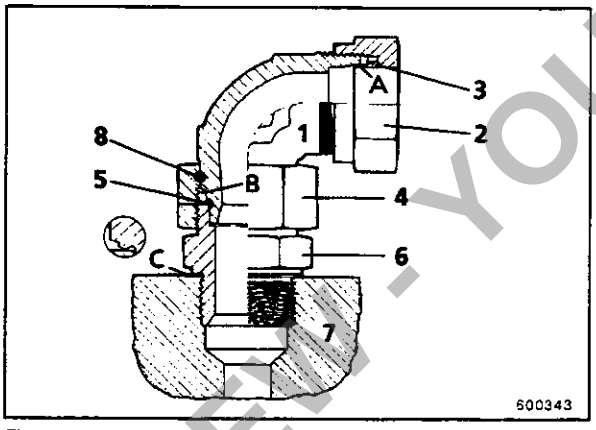



*Fig. 1*

In area B; sealed with O-ring
tighten up by hand - otherwise change O-ring.

in area C; sealed with sealing edge
tighten male nipple. Should this not help, check sealing surface of main component for pitting, grooving or scoring - rework with a spot facer if necessary. Male nipple to be changed if sealing edge is damaged.

## Swivel coupling with long male adaptor (Fig. 2)

The swivel coupling positioned on the adaptor (6, Fig. 2) is made up of the same components as stated under "Swivel coupling with straight male thread acc. to DIN".

Any leakages are to be remedied in the same manner as given under "Swivel coupling with straight male thread acc. to DIN". The coupling is sealed in area "C" with a steel sealing ring (9).

If sealing ring or male adaptor are damaged, they are to be replaced.

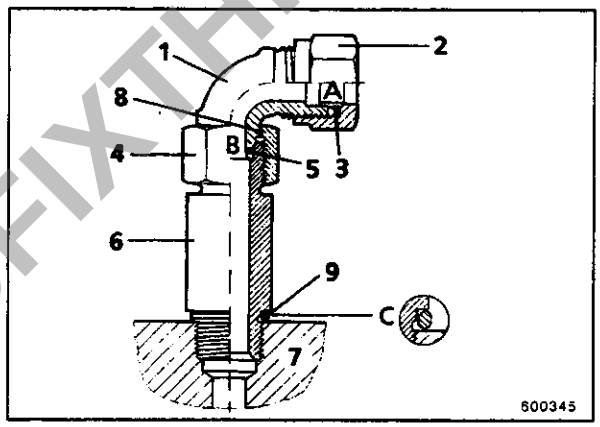



*Fig. 2*

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### 3.7.3.2 Recessed chord plate

The following example shows how to fit a new recessed piece of chord plate by welding it into a box-type section with 2 web plates (fig. 81).

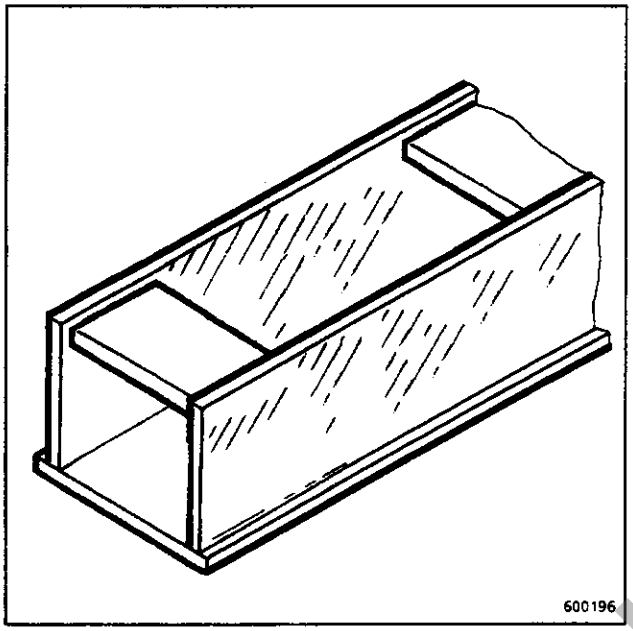



*Fig. 81*

**Working sequence:**

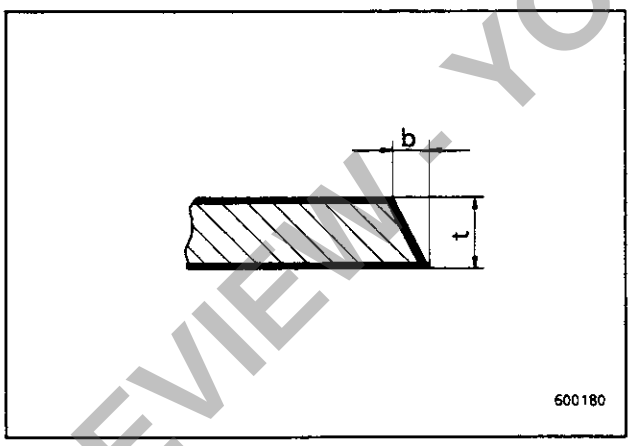



*Fig. 82*

1. Chamfer welding bevel at 15°. Width (b, fig. 82) can be taken in fig. 70, page 42.

2. Work out longitudinal seams between web plate (2, fig. 83) and chord plate (1) over a distance of approximately 100 mm beyond the cutting edge of the chord plate.

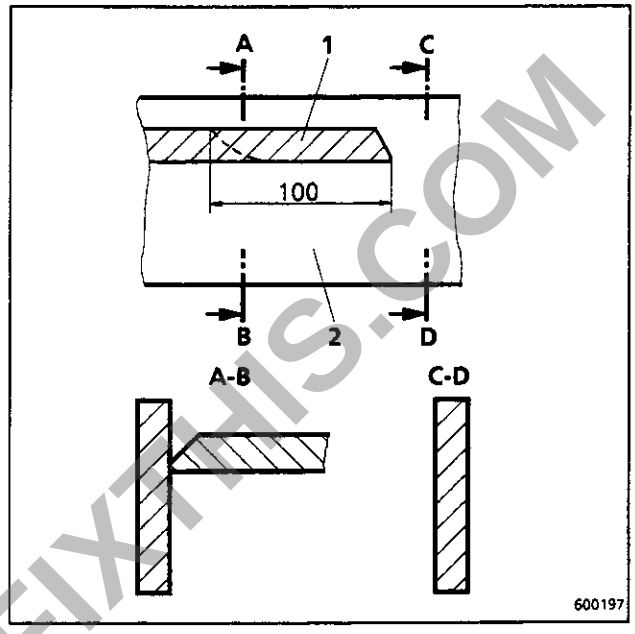



*Fig. 83*

3. Attach backing strips (3, figs. 84 + 85) to the two remaining ends of the chord plate (1).

   For the backing strip (3) use flat steel 25 x 4 mm. Fit in backing strip (3) properly and without any gaps between the two web plates (2).

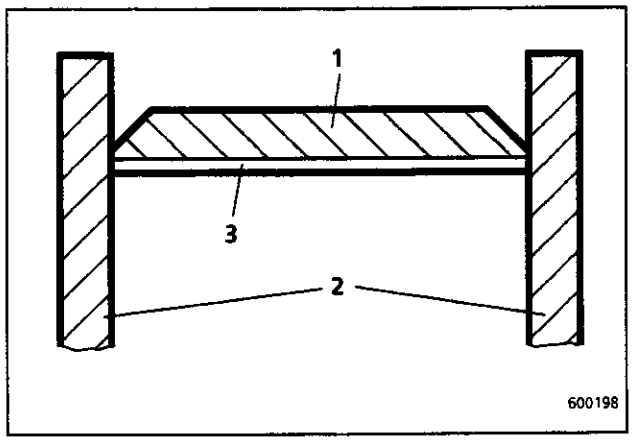



*Fig. 84*

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