

- 1 DRIVE TRAIN MODEL RR640

- 2 HYDROSTATIC TRANSMISSION "REXROTH" SYSTEM

- 3 HYDRAULIC SYSTEM

- 4 HYDRAULIC CYLINDERS

- 5 INTERNAL OPERATIONS TO THE TELESCOPIC BOOM

- 6 ELECTRICAL ENGINEERING INSTRUCTIONS

- 7 ENGINE REMOVAL

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Merlo S.p.A. Industria Metalmeccanica

12026 S. Defendente di Cervasca (CN) - ITALY Tel: (0171) 814111 - Fax: (0171) 814100

Domino Mining Equipment Pty Ltd

A.C.N. 002 706 581 P.O. Box 69, WYONG, N.S.W. (Aust.) 2259 Phone: (043) 53 1033 - Fax: (043) 51 2119

P 35.9 EVA SERVICE MANUAL

**APPENDIX A D-Series
DEFENCE AIR CONDITIONER**

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Merlo S.p.A. Industria Metallmeccanica

12020 S. Defendente & Cervasco (CN) - ITALY Tel. (0171) 614111 - Fax (0171) 614100

Domino Mining Equipment Pty Ltd

A.C.N. 062 706 881 P.O. Box 89, WYONG, N.S.W. (Aust.) 2259 Phone (043) 53 1033 - Fax: (043) 51 2119

P 35.9 EVA SERVICE MANUAL



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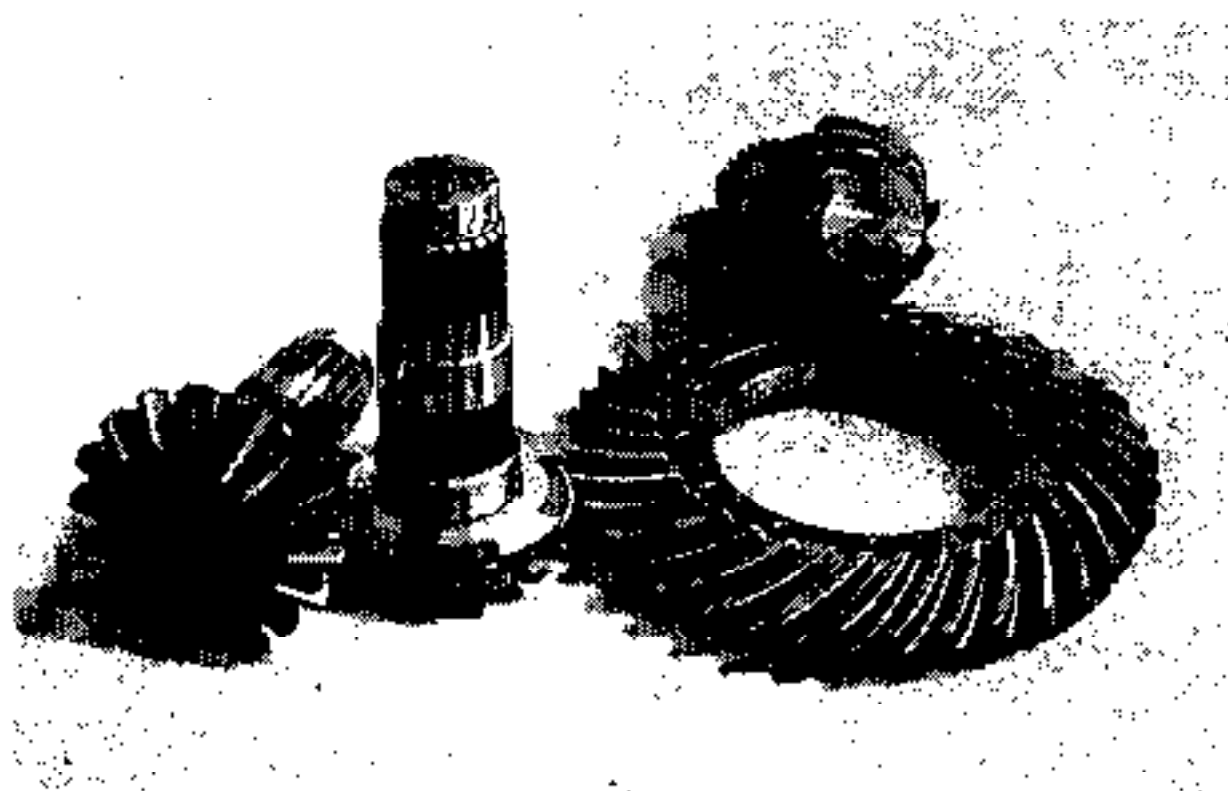
Domino Mining Equipment Pty Ltd

A C N 002 706 881 P O Box 69, WYONG, N.S.W. (Aust) 2259 Phone (043) 53 1033 - Fax (043) 51 2119

SERVICE MANUAL

P 35.9 EVA

DRIVE TRAIN MODEL RR640



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This manual provides the information necessary for correct and safe execution of maintenance works not included in the INSTRUCTION HANDBOOK FOR OPERATING AND MAINTENANCE; it is addressed to qualified fitters, who have the required knowledge of mechanical, hydraulic and electrical systems for the machine being serviced.

All work carried out should comply with all relevant environmental and occupational health and safety requirements.

IMPORTANT!

When replacing plastic bushes, always smear pivot pins with grease "XG 274" to avoid oxidation

This symbol is used to identify the dimensions of the spanner required for the operations described in this handbook. The spanner type will be mentioned only if it is not standard



GENERAL NOTE

Always ensure any work carried out on the vehicle is carried out on level ground. If this is not possible the ground should be as level as possible and the vehicle should be chocked to prevent any possibility of the vehicle rolling



SAFETY AND GENERAL INSTRUCTIONS

CAUTION!!!

Service of the machine shall only be carried out by skilled and competent personnel. For repair of parts that are not part of the normal scheduling, refer MERLO AUSTRALIA technical service.

WARNING!!!

Always wear suitable protective clothing and safety equipment when using lubricants. Extra care should be taken to avoid burns when working with hot fluids or elements.

WARNING!!!

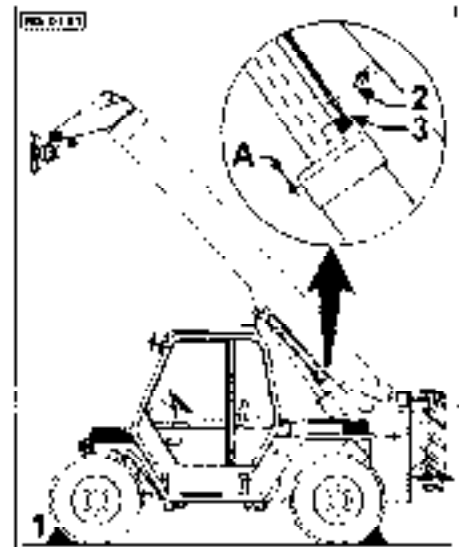
Always dispose of oils, filters or other mediums in an environmentally friendly manner. Use official organisations for the disposal of such fluids.

Before carrying out any kind of servicing, position the machine on flat, level ground and

- retract and lower the boom
- release loads or attachments on the vehicle
- put chock (1) at the front and back of the wheels to avoid accidental movement.
- apply the hand brake, place the transmission lever in neutral position and stop the engine.

Should it be necessary to carry out servicing operations with the boom lifted, use the safety lock following these instructions

- lift the boom
- apply the hand brake, place the transmission lever in neutral position and stop the engine
- working from the left rear mudguard, rotate lever (2) and rest the safety lock (3) on the lifting jack rod
- re-start the engine and slowly lower the boom till the lock is at about 10 mm from the jack head (dimension A)
- before lowering the boom, replace the safety lock in the the original position.

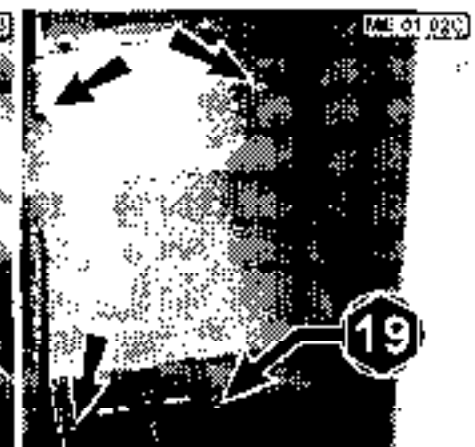
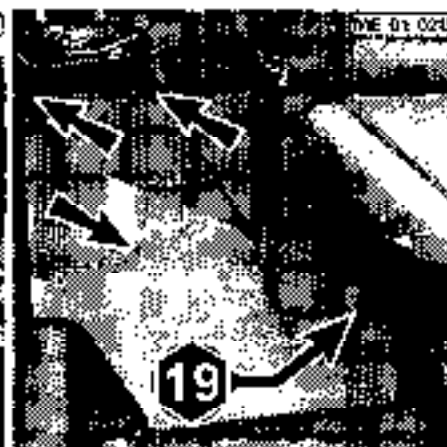


When working under the vehicle it is preferable to use a pit or height adjustable work platform. The vehicle weight is stated on identification plate

REMOVAL OF ACCESS PANELS

Remove the shown panels to work on the following parts

- 1) Front differential / Front universal joint / Braking system / Connecting rods (see picture ME 01.02A)
- 2) Universal joints / Gear box (see picture ME 01.02B)
- 3) Rear universal joint (see picture ME 01.02C)



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CONVERSION FACTORS

TORQUE

1Kgm	=	9,806	N·m
"	=	7,233	lb·ft
"	=	86,79	lb·in

PRESSURE

1bar	=	100	KPa
"	=	14,5	psi (lb/in²)
"	=	0,1	N/mm²

FORCE

1Kg	=	9,806	N
"	=	2,204	lb



2 - NECESSARY TOOLS AND REPAIR TIMES



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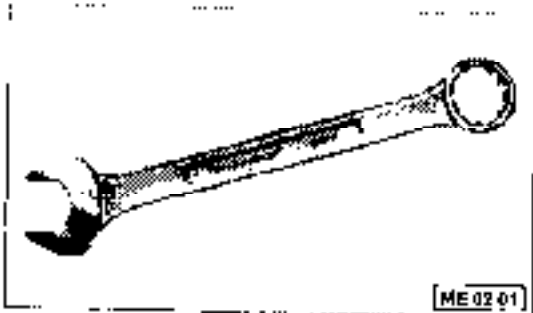


2 - NECESSARY TOOLS AND REPAIR TIMES

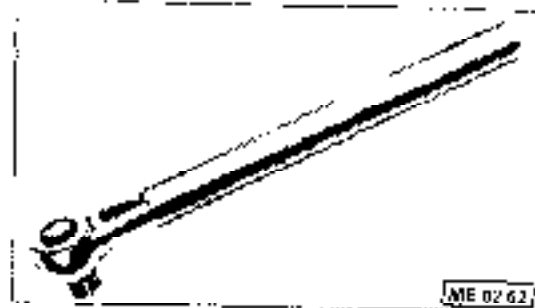


STANDARD TOOLS

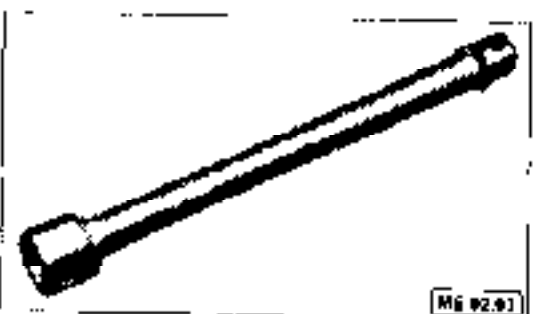
Spanner: 6, 8, 13, 14, 17, 18, 22, 24, 27, 30
41, 45, 50



Ratchet



Extension bar

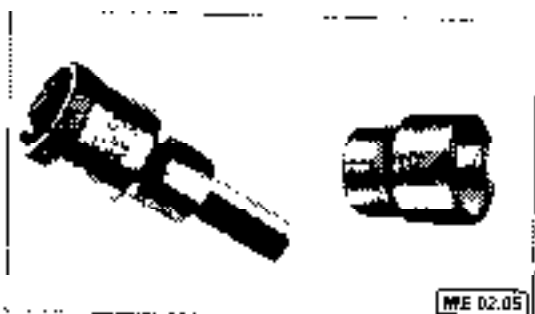


Sliding T-bar

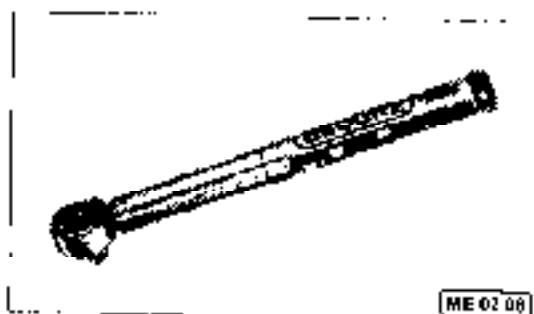


Sockets

- external hexagon 6, 12, 14
inner hexagon 19, 22, 24, 30, 32



Torque wrench



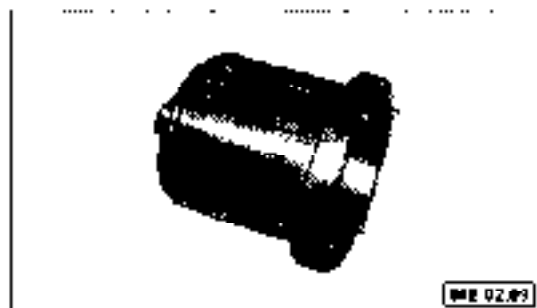
Allen key: 10, 4



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SPECIAL TOOLS

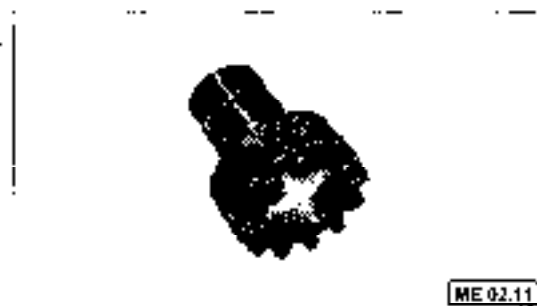
Tool - ring nut (Part.No.022723)



Tool - flange nut (Part.No 025100)



Tool - ring nut (Part.No 022722)



Tool - Ivan gap puller (Part.No 601914)



Tool - hub spanner (Part No 026474)

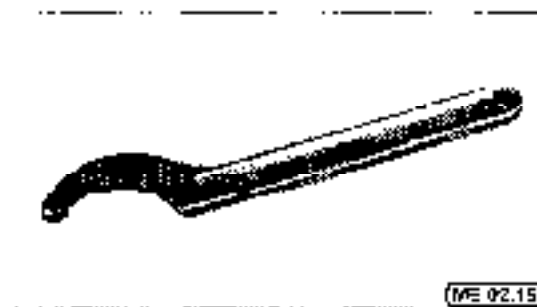


Tool - oil seal replacer (Part.No 026172)



"C" spanners:

- part no 601070
- part no 601071
- part no 025105



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2 - NECESSARY TOOLS AND REPAIR TIMES



REPAIR TIME

- Fast propshafts removal and reassembly	about 1 hour and 50 minutes
- Replacement of the gearbox piston	about 25 minutes .
- Replacement of the gearbox oil seal	about 1 hour and 45 minutes
- Gearbox removal from the chassis	about 1 hour and 5 minutes
- Overhaul of the gearbox inner parts	about 40 minutes .
- Gearbox reassembly on the chassis	about 1 hour and 40 minutes
- Oil seal replacement of the wheel reduction gear	about 30 minutes
- Reduction gear removal from the axle	about 30 minutes .
- Reduction gear reassembly on the axle	about 30 minutes .
- Parking brake pads replacement	about 30 minutes
- Parking brake disc replacement	about 1 hour
- Brake pads replacement on the rear axle	about 30 minutes.
- Brake pads replacement on the front axle	about 15 minutes
- Brake discs replacement on the rear axle	about 2 hours and 30 minutes.
- Brake discs replacement on the front axle	about 1 hour and 45 minutes
- Steering rear tie rods replacement	about 30 minutes
- Steering front tie rods replacement	about 30 minutes.
- Differential gear removal from the rear axle	about 1 hour and 20 minutes.
- Differential gear reassembly on the front axle	about 1 hour and 30 minutes
- Dismantling of the inner parts of the differential gear	about 45 minutes
- Reassembly of the inner parts of the differential gear	about 45 minutes
- Differential gear removal from the rear axle	about 1 hour
- Differential gear reassembly on the front axle	about 1 hour
- Front axle dismantling	about 1 hour .
- Front axle reassembly	about 1 hour and 15 minutes
- Rear axle dismantling	about 50 minutes.
- Rear axle reassembly	about 1 hour.



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3 - REMOVING THE HIGH SPEED PROPSHAFT BETWEEN GEARBOX AND DIFFERENTIAL

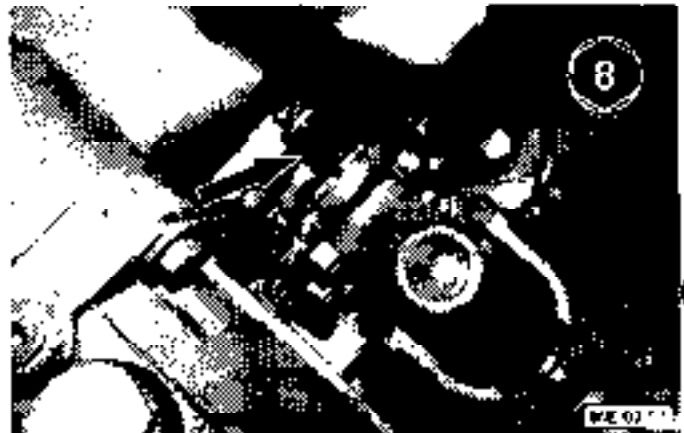


CAUTION!!!

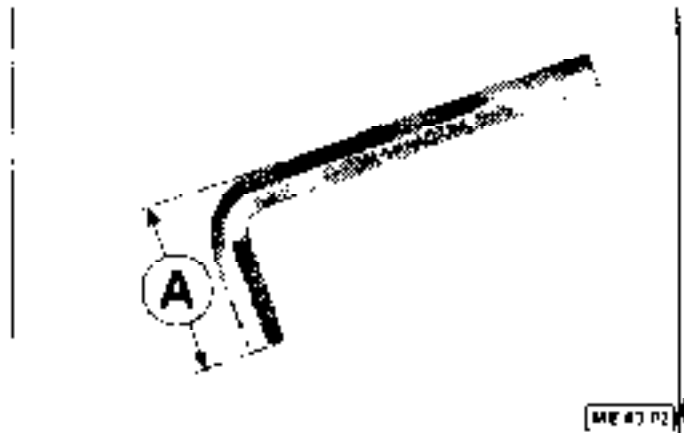
Refer to "GENERAL NOTE" Chapter "INTRODUCTION".

FRONT PROPSHAFT REMOVAL

- 1) Remove the r.p.m. pick up sensor (see picture ME 03.01)



NOTE In order to unscrew the propshaft screws use an allen key shortened to 30 mm as shown at "A" in the drawing ME 03.02.



- 2) Unscrew and remove the 5 bolts (B) that hold the propshaft to the gear box flange (see picture ME 03.03A), extract the propshaft from its seal together with the toothed plate (see picture ME 03.03B).





3 - REMOVING THE HIGH SPEED PROPSHAFT BETWEEN GEARBOX AND DIFFERENTIAL



- 3) Unscrew and remove the six bolts (C) which fix the propshaft to the front axle (see picture ME 03.04A), extract the propshaft from its seat together with the spacer (D) see picture ME 03.04B. Before separating the two parts (male and female) and fully extracting the propshaft from the machine, mark the two components so as to ensure they are replaced in the correct location.



REAR PROPSHAFT REMOVAL

- 4) Start the engine and release hand brake. Hold the brake caliper chamber (E) fully loosen the adjusting screw (F) see picture ME 03.05. Switch off the engine.



- 5) Unscrew and remove the six fixing bolts (G) on the rear axle (see picture ME 03.06A), unscrew and remove the six fixing bolts (H) on the flange of the gearbox (see picture ME 03.06B).





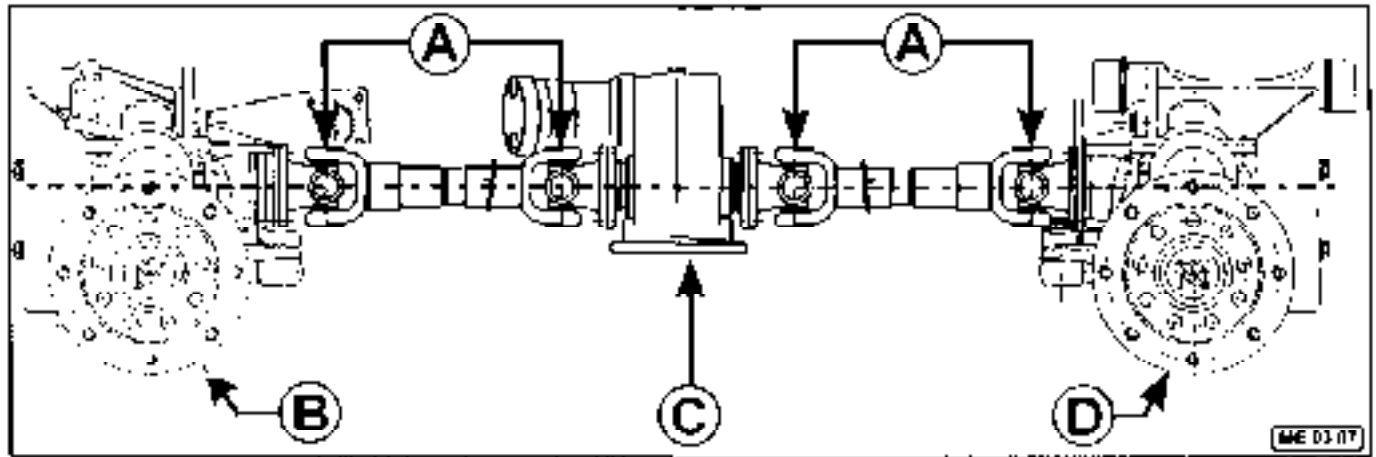
3 - REMOVING THE HIGH SPEED PROPSHAFT BETWEEN GEARBOX AND DIFFERENTIAL



- Before separating the two parts (male and female) and removing the propshaft from the machine, mark the two components so as to ensure they are replaced in the correct location.

REASSEMBLY OF PROPSHAFTS

- To avoid damaging the transmission make sure the propshaft splines are reassembled to the marks previously made and the universal joint are in the correct position (see picture ME 03.07).
Flange bolts: 8.8 type - Tighten torque: 83,3Nm



A - Correct positioning

B - Front axle

C - Gear box

D - Rear axle

- During the reassembly of the front propshaft on the axle, position the spacer as in the photo ME 03.08, that is with the chamfer (A) towards the flange, replace and tighten the six fixing bolts.



- Insert the loathed plate between the propshaft and the flange on the gear box. Then replace and tighten the six fixing bolts.
- Reassemble the rear propshaft replacing and tightening the six fixing bolts on the gear box; insert the hand brake disc in its original seat with the chamfer towards the propshaft, then retit and tighten the six fixing bolts on the rear axle side.
- Start the engine and release hand brake. Holding the brake chamber still, tighten the adjusting screw (see point 4 of the paragraph "REAR PROPSHAFT REMOVING OPERATIONS"), check the system working.



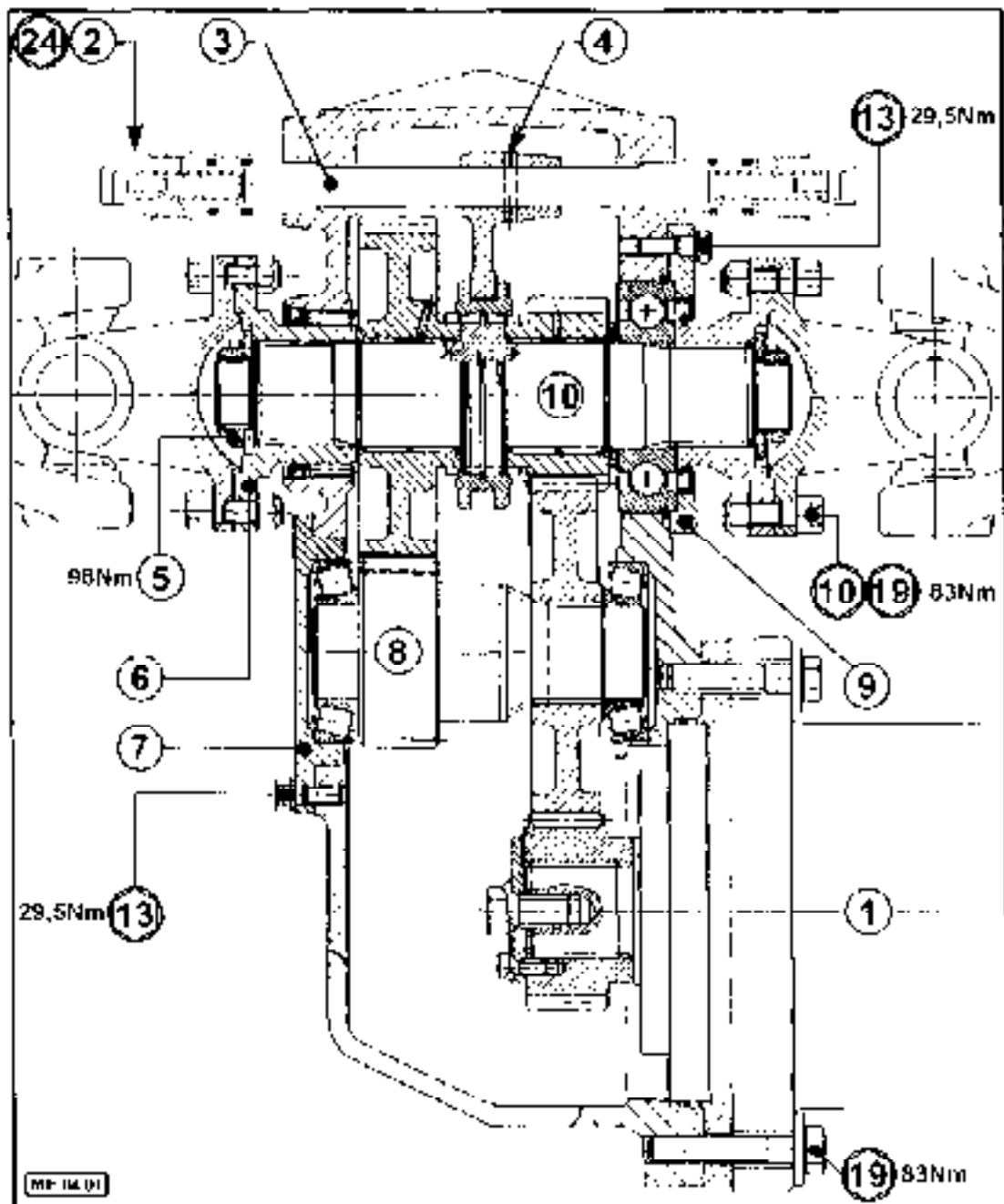
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4 - 2 SPEED GEARBOX



- 1) HYDROSTATIC ENGINE
- 2) CONTROL PISTON
- 3) CONTROL GEAR SHAFT
- 4) CONTROL GEAR FORK
- 5) SELF LOCKING RING NUT
- 6) FLANGE PROPSHAFT ATTACHMENT
- 7) LOCKING FLANGE
- 8) DOUBLE GEAR
- 9) LOCKING FLANGE
- 10) GEARBOX SHAFT

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**CONTROL PISTONS - REPLACEMENT**

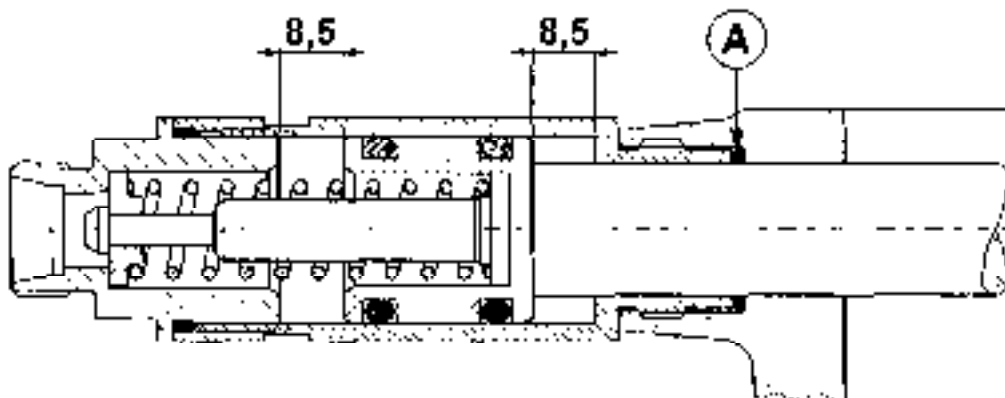
- 1) Drain the oil by removing the drain plug
- 2) Remove the piston's connecting pipes of the gearbox (A), see picture ME 04.02A and ME 04.02B.



- 3) Unscrew and extract the pistons, then replace them, see picture ME 04.03.



- 4) The disassembly of the small pistons of the gearbox control is normally carried out: to substitute the "O" ring (A) or to verify the correct mechanical movements (stroke $8,5 + 8,5$ mm) see picture ME 04.29. If the small piston is damaged or leaks from the inner seals, it is advisable to replace the whole assembly, do not tighten it in a clamp as you run the risk of deforming it.

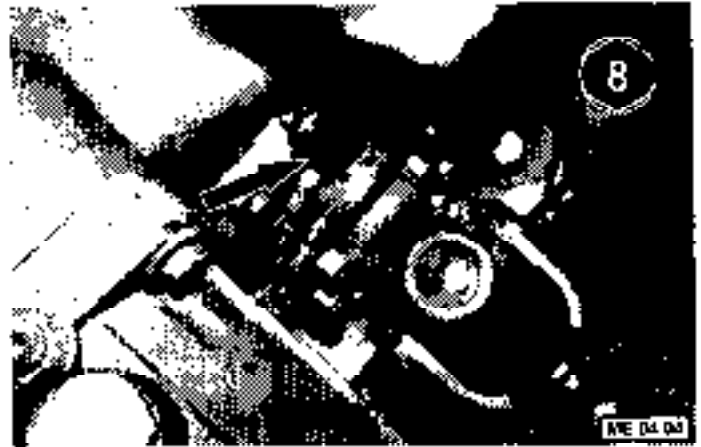


- 5) Refill the gearbox with oil as described in section "GEARBOX INSTALLATION" of this chapter

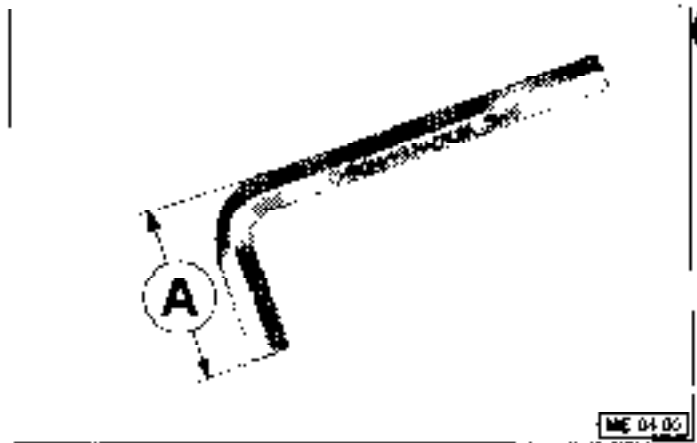


FRONT OIL SEAL REPLACEMENT

- 1) Drain the oil, by removing the drain plug
- 2) Remove the r.p.m. pick up sensor.



NOTE in order to unscrew the propshaft's screws use an allen key shortened to 30 mm as shown at "A" in the drawing ME 04.05.

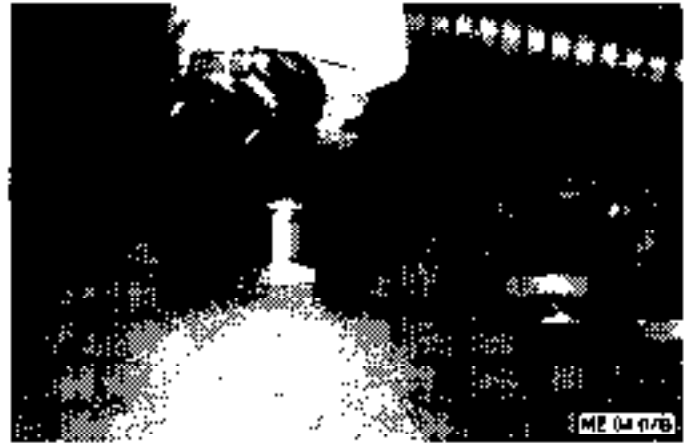
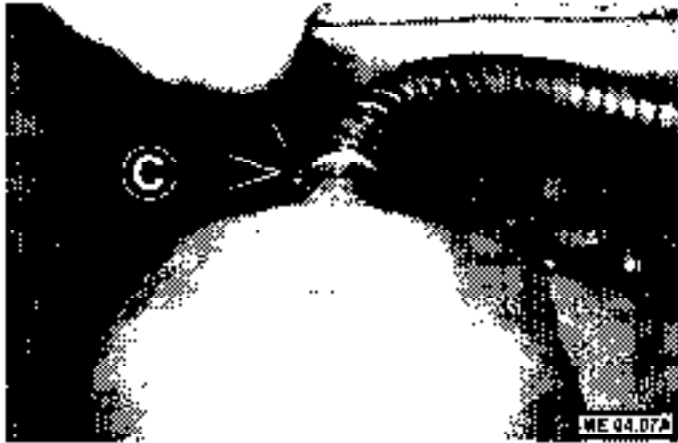


- 3) Unscrew and remove the six bolts (B) which fix the front propshaft to the gearbox flange (see picture ME 04.06A) extract the propshaft from its seat together with the toothed plate (see picture ME 04.06B)





- 4) Using a screwdriver, unscrew the hose clamp (C) of the breather and remove (see picture ME 04 07A and ME 04 07B)



- 5) By using the "C" spanner (special tool - 025105), unscrew the selflocking ring nut (D), see picture ME 04 08A and ME 04 08B



- 6) Extract the washer (E) and the O Ring (F), see picture ME 04 09



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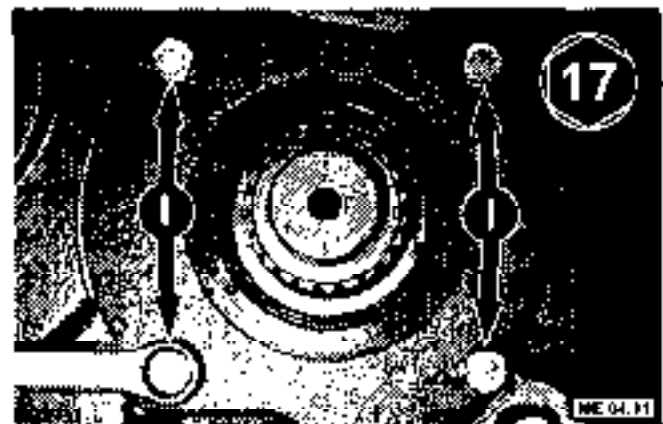


- 7) Remove the flange (G) and the protection cap (H) see picture ME 04.10.



- 8) Unscrew the four fixing screws (I) of the flange; remove the flange and replace the oil seal (see picture ME 04.11); reassembly torque 40Nm.

- 9) Reassembly is the reversal of the above procedures



REAR OIL SEAL REPLACEMENT

- 1) To replace the oil seal on the rear side of the gear box, disassemble and fully extract the rear propshaft as follows
- Carry out the procedure as per points 4 and 5 of the section "REAR PROPSHAFT REMOVAL OPERATIONS" of chapter 3.
 - Carry out the procedures as per points 4 to 7 of the section "FRONT OIL SEAL REPLACEMENT" of this chapter.
- 2) Using a screwdriver, pull the oil seal out and replace it



- 3) Ensure oil seal is sealed completely; re-fill with gearbox oil (see section "GEARBOX INSTALLATION" of this chapter).

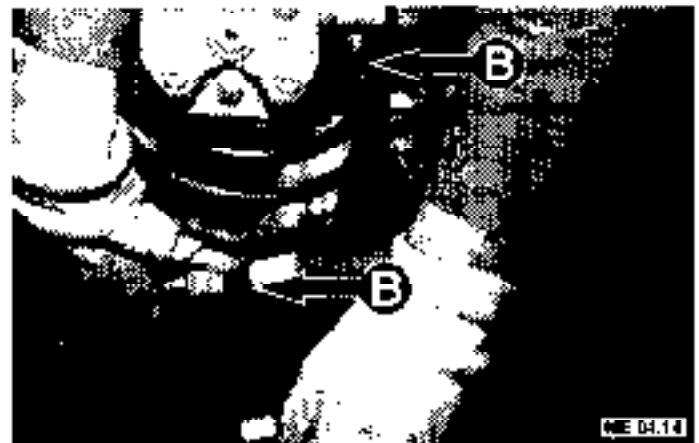


GEARBOX REMOVAL

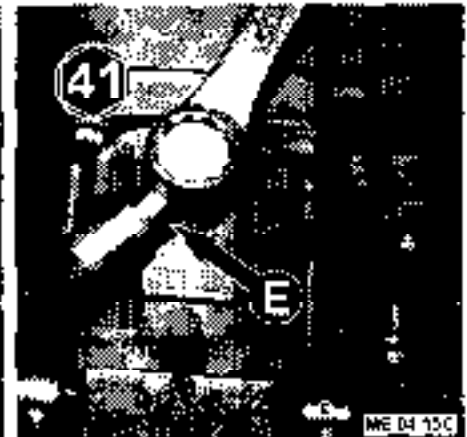
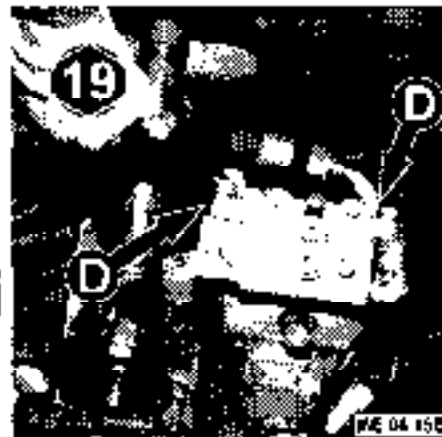
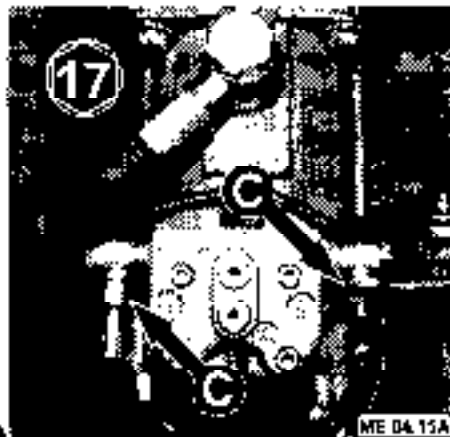
- 1) Disconnect the gearbox propshafts as described in the paragraphs "FRONT OIL SEAL REPLACEMENT" and "REAR OIL SEAL REPLACEMENT".
- 2) Remove the connecting pipes from the pistons of the gearbox unscrewing the fixing bolts (A), see picture ME 04.13A and ME 04.13B



- 3) Before disconnecting the connecting pipes from the hydrostatic motor, mark them with adhesive tape (B) ensure correct alignment during the reassembly (see picture ME 04.14).



- 4) Remove the two pilot connecting pipes (C), and two high pressure connecting pipes (D) and the upper connecting pipe of the case drain (E), see picture ME 04.15A, ME 04.15B and ME 04.15C.



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4 - 2 SPEED GEARBOX



- 5) Disconnect the connecting pipe (F) of the hydrostatic pump (see pictures ME 04 16A and ME 04.16B)



- 6) Remove the four bolts (G) securing the gearbox to the chassis by unscrewing the nuts (H) placed under the machine (see pictures ME 04 17A and ME 04 17B); this is a two person operation.

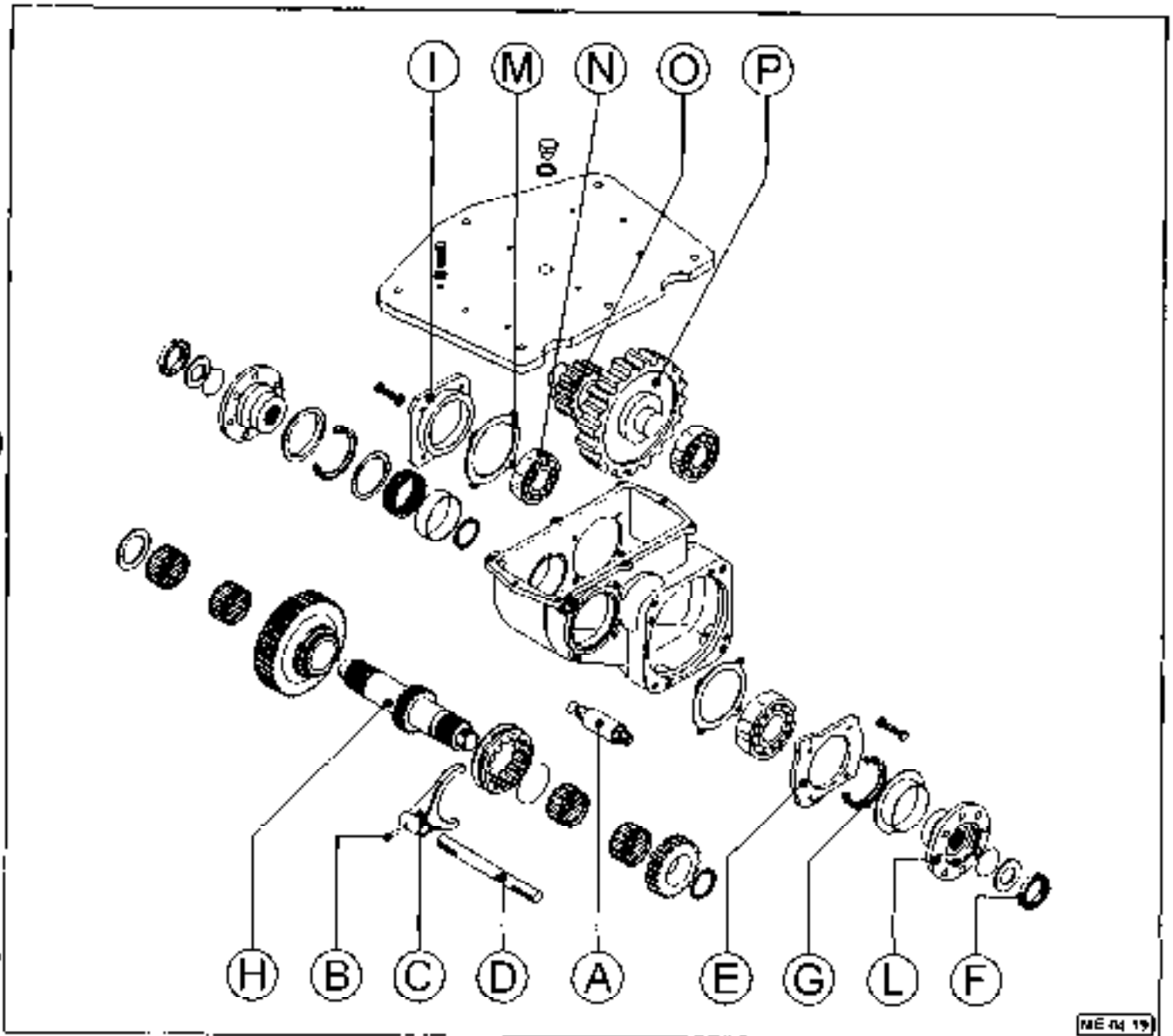


- 7) Using suitable lifting equipment (I), lift the gearbox/hydrostatic motor on to a workbench



4 - 2 SPEED GEARBOX

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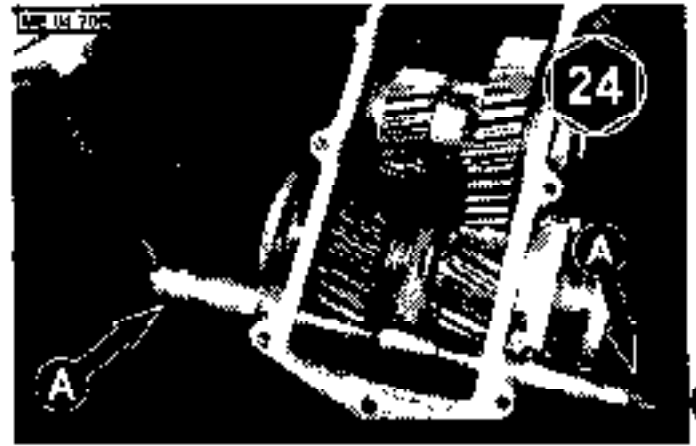
- A) GEARBOX CONTROL PISTON
- B) SPIRAL PIN
- C) SELECTOR FORK
- D) SHAFT
- E) FLANGE
- F) RING NUT
- G) OIL-SEAL

- H) SHAFT
- I) FLANGE
- L) FLANGE
- M) SEAL
- N) BEARING
- O) SHAFT
- P) GEAR

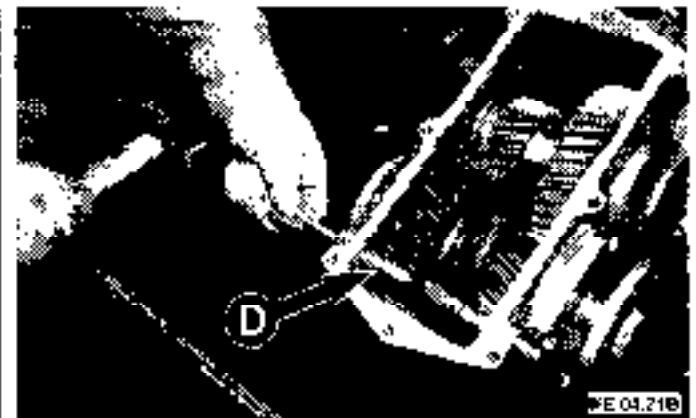


OVERHAULING THE GEARBOX

- 1) Remove the gearbox from the hydrostatic motor by removing the four securing bolts; remove the cover from the gearbox by removing the eight bolts shown in the photograph ME 04.20A. Remove the control pistons (A)



- 2) Using a suitable pin punch and hammer, remove the spiral pin from the selector fork (B); remove selector fork from collar (C); remove the selector shaft (D), see picture ME 04.21A and ME 04.21B



- 3) Carry out point 5 to point 7 described in the section "FRONT OIL SEAL REPLACEMENT". repeat this operation on the other side of the gearbox

- 4) Remove the flange (E) which contains the oil seal (G) unscrewing the four fixing screws (F), see picture ME 04.22A and ME 04.22B





5) By using a rubber hammer, extract the shaft (H) and replace the worn parts.



6) Remove the flange of the ZVM gear (I) unscrewing the four screws (L), replace the seal (M) and the bearing (N), see pictures ME 04.24A and ME 04.24B.



7) Using a copper punch and a hammer remove the shaft (O) from the gear (P), then remove it from the casing together with the gear and the bearing (see pictures ME 04.25A and ME 04.25B)



8) To reassemble the gearbox, carry out points 1 to 7 in reverse order. Before reassembling the cover apply some sealed paste like "LOCTITE 518" on the casing, reassemble the hydrostatic motor on the gearbox, applying "LOCTITE 242" to fixing bolts

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GEARBOX INSTALLATION

- 1) With suitable lifting equipment position the gearbox/hydrostatic motor assembly into the machine
- 2) Connect the cable drain hose between the hydrostatic pump and motor
- 3) Refit the gearbox/hydrostatic motor assembly to the chassis (see point 5 of the paragraph "GEAR BOX REMOVAL")
- 4) Carry out points 2 to 4 of the paragraph "GEARBOX REMOVAL" in reverse, do not assemble the upper drainage hose (see point 4 Ref. "E").
- 5) Reassemble the propshafts on gearbox sides
- 6) Carry out the oil topping up of the hydrostatic motor from the hole for the attachment of the upper connecting pipe of the case drain (see picture ME 04 26), by using the specific oil type "MOBILFLUID 424"



- 7) Reassemble the upper connecting pipe of the case drain.

- 8) Remove the rubber support (A) where the breather pipe of the gear box engages (see picture ME 04 27) top up oil using the specific oil type "OEP 220".



- 9) Reassemble the rubber hose for the breather connecting pipe and tighten the clamp (see point n° 4 of the paragraph "FRONT OIL SEAL REPLACEMENT").
- 10) Refit the r.p.m. pick up (see point 4)
- 11) Carry out the system filling following the instructions in the section "REFILLING OF THE SYSTEM AFTER A SERVICE OR DISASSEMBLY" of the chapter "DISASSEMBLY OF THE MAIN COMPONENTS OF THE HYDROSTATIC TRANSMISSION" of the manual "P 35 9 EVA HYDROSTATIC TRANSMISSION REXROTH SYSTEM"



5 - HUB REDUCTION GEAR & SAFE LOAD INDICATOR



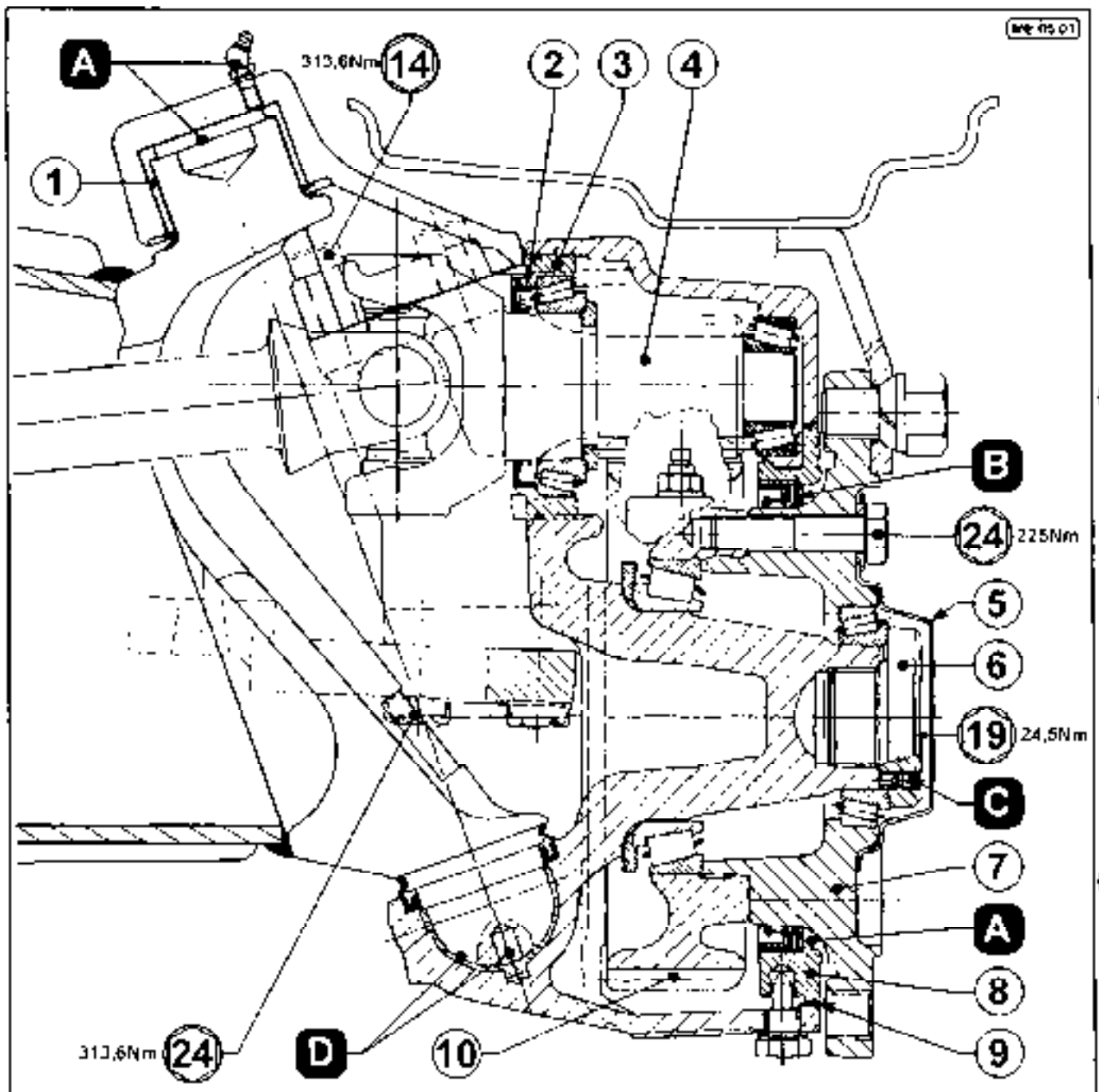
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5 - HUB REDUCTION GEAR & SAFE LOAD INDICATOR



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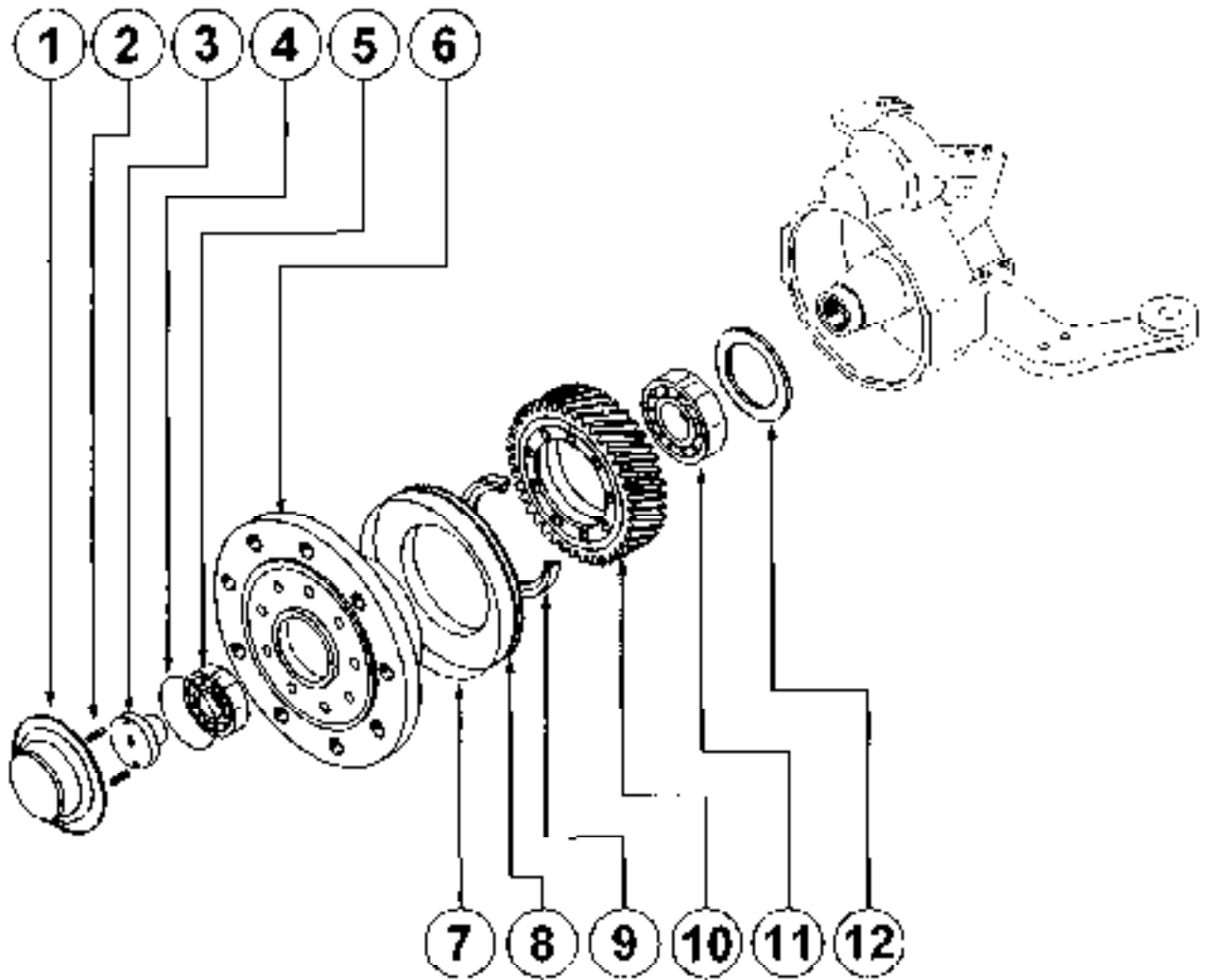
- | | |
|---|-----------------------|
| 1) Upper king pin bushing | 5) Hub adjustment pin |
| 2) Oil seal (special tool ref. 026472) | 7) Hub |
| 3) Pinion adjustment nut (special tool ref. 026474) | 8) Flange |
| 4) Pinion | 9) O Ring |
| 5) Cap | 10) Crown wheel |

A = when assembling fill with grease type "XG274"

B = before mounting the oil seal, apply some mastic for gaskets type "LOCTITE 518" on the external ring.

C = when assembling put thread-locking type "LOCTITE 270"

D = when assembling fill with grease type "XG274" + oil type "OEP 220" (~4 cl)



ME 05.02

- 1) CAP
- 2) DOWELS
- 3) HUB ADJUSTMENT PIN
- 4) O-RING
- 5) BEARING
- 6) BLOCK

- 7) O-RING
- 8) FLANGE
- 9) OIL SEAL
- 10) RING GEAR
- 11) BEARING
- 12) WASHER

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OIL SEAL REPLACEMENT

- 1) Jack up machine in a safe manner (see chapter 7 page 16 of the "INSTRUCTION HANDBOOK FOR OPERATING AND MAINTENANCE")
- 2) Remove the wheel (see picture ME 05 03)



- 3) Drain the oil by removing the drain plug placed in the lower part of the reduction gear (see picture ME 05 04)



- 4) Remove the three bolts and fixing washers of the hub cap (see picture ME 05 05).



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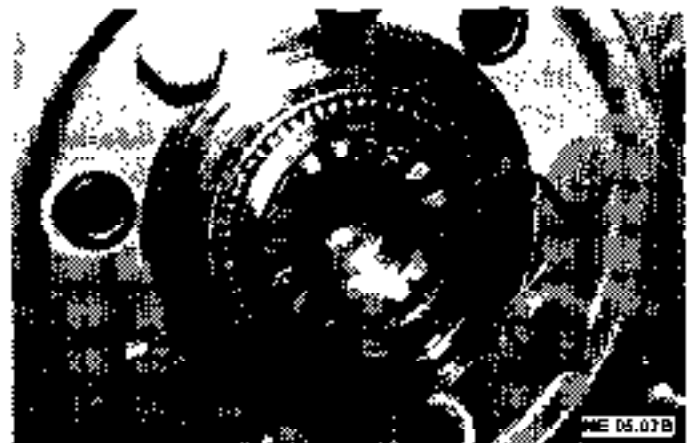
5 - HUB REDUCTION GEAR & SAFE LOAD INDICATOR



- 5) Unscrew the four grub screws that lock the hub adjuster (heat at 150° if necessary) see pictures ME 05.06A, ME05.06B and ME 05.06C
- WARNING** - There are two grub screws in each hole (A)
- the first is flat bottom(B)
 - the second is tipped (C).



- 6) Remove the hexagonal bolt that attaches the protection cap (see picture WE 05.07A and ME 05.07B).



- 7) Remove the remaining six fixing balls of the block (see picture ME 05.08)





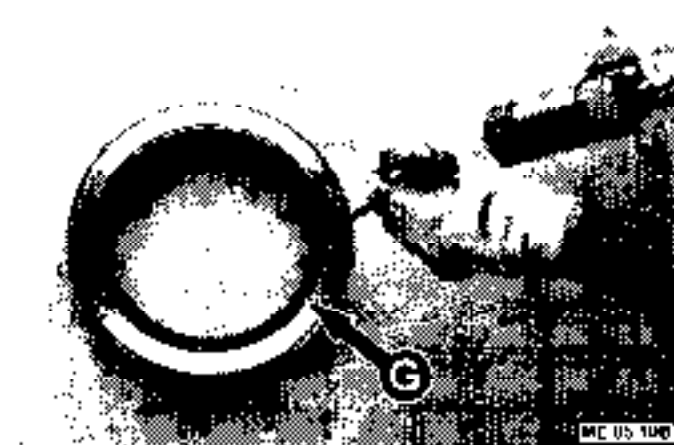
5 - HUB REDUCTION GEAR & SAFE LOAD INDICATOR



- 8) By using two levers, extract the block (D), see picture ME 05 09A: insert a screwdriver in oil drain hole, lever and extract the flange (E), see pictures MF 05 09B and MF 05 09C.



- 9) Replace the O Ring (F), see picture ME 05 10A: and the oil seal (G), see picture ME 05.10B



- 10) Use two of the block fixing bolts as a grip to extract the ring gear from the lower side of the casing of the reduction gear (see picture MF 05 11).



- 11) Using a puller (Part No 501914), remove the bearing and washer (see pictures ME 05 12A and ME 05 12B).



- 12) Assembly is the reverse of the points 10 & 11, paying special attention to the following.

- Put a smear of oil on the contact surfaces of the casing and the flange.
- Insert the flange in the upper part of the casing (see picture ME 05.13A).
- Press the flange slightly against the upper part of the casing using a screw M 10 x 1,5 to fit in the hole of the locking grub screw which coincides with the hole of oil draining (see picture ME 05.13B).
- Ease the flange into position by mean of a rubber hammer on the lower and lateral side (see picture ME 05.13C).



- 13) Re-fit the oil drain plug and tighten

- 14) Rent the bearing adjuster using torque wrench (H) torque six bolts (I) without washer to 225.4Nm. Using rubber hammer lightly tap to seat bearings, loosen bearing adjuster and bolts to a torque of 24,5 Nm, ensure the locking grub screw holes align with the grooves in the casing.





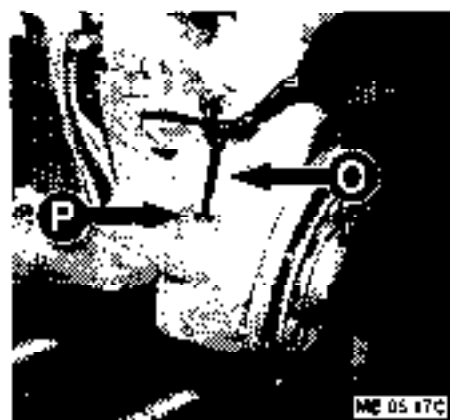
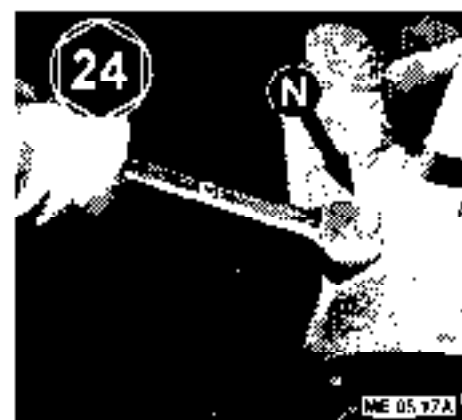
- 15) Replace the four tipped grub screws previously removed (see point 5 of this paragraph), inserting first the two tipped grubs (L) and then the two flat bottom (after having applied on them thread-locking type "LOCTITE 270") see pictures ME 05.15A and ME 05.15B.



- 16) Replace the O-Ring on hub cap (M) and reassemble onto the block with the three bolts and washer (see figure ME 05.16)



- 17) Refill with oil type "OPF 220" as follows.
- Remove the breather plug and washer (N), see picture ME 05.17A.
 - Pour in 1,3 litres of oil (see picture ME 05.17B).
 - Check the oil level with dip stick (O) see picture ME 05.17C. The distance from the oil level mark on the outside casing and the filler/plug hole (P) must not be over 93mm (see picture ME 05.17C)



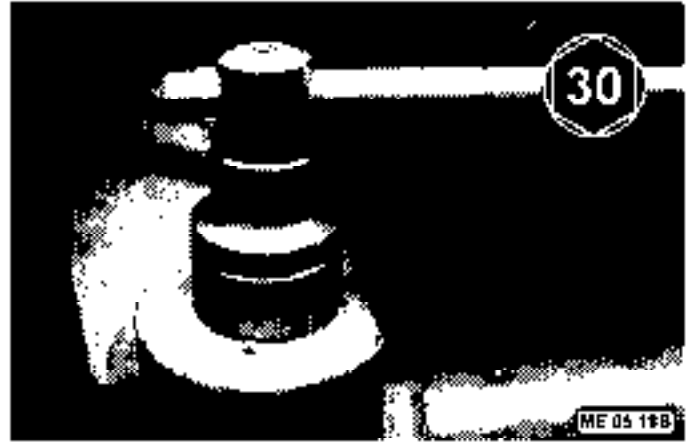
- 18) Refit the wheel.

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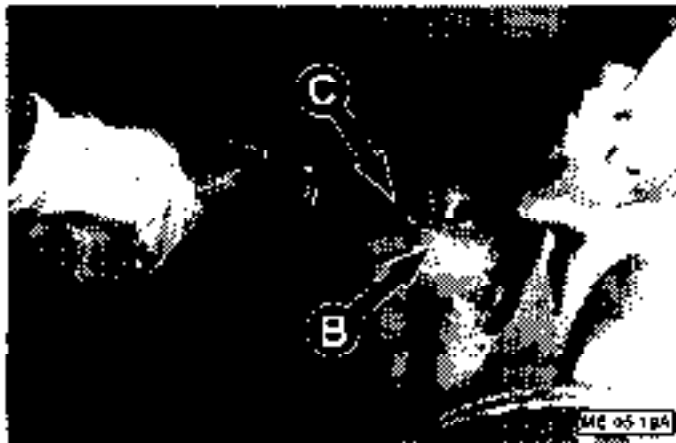


REMOVAL OF THE REDUCTION GEAR FROM THE AXLE

- 1) Carry out points 1, 2 and 3 of the section "OIL SEAL REPLACEMENT"
- 2) Remove the split pin (A) from the pivot on the pivot of the steering arm, then unscrew the nut (see picture ME 05.18A and ME 05.18B).



- 3) Turn steering to full lock to obtain more operating space, tap with a rubber hammer the steering arm (B) in the indicated point (C), remove pivot from steering arm (see picture ME 05.19).



- 4) Support the reduction gear with a sling and suitable lifting support, then unscrew the four fixing bolts attaching the reduction gear to the steering joint (see picture ME 05.20)





5 - HUB REDUCTION GEAR & SAFE LOAD INDICATOR

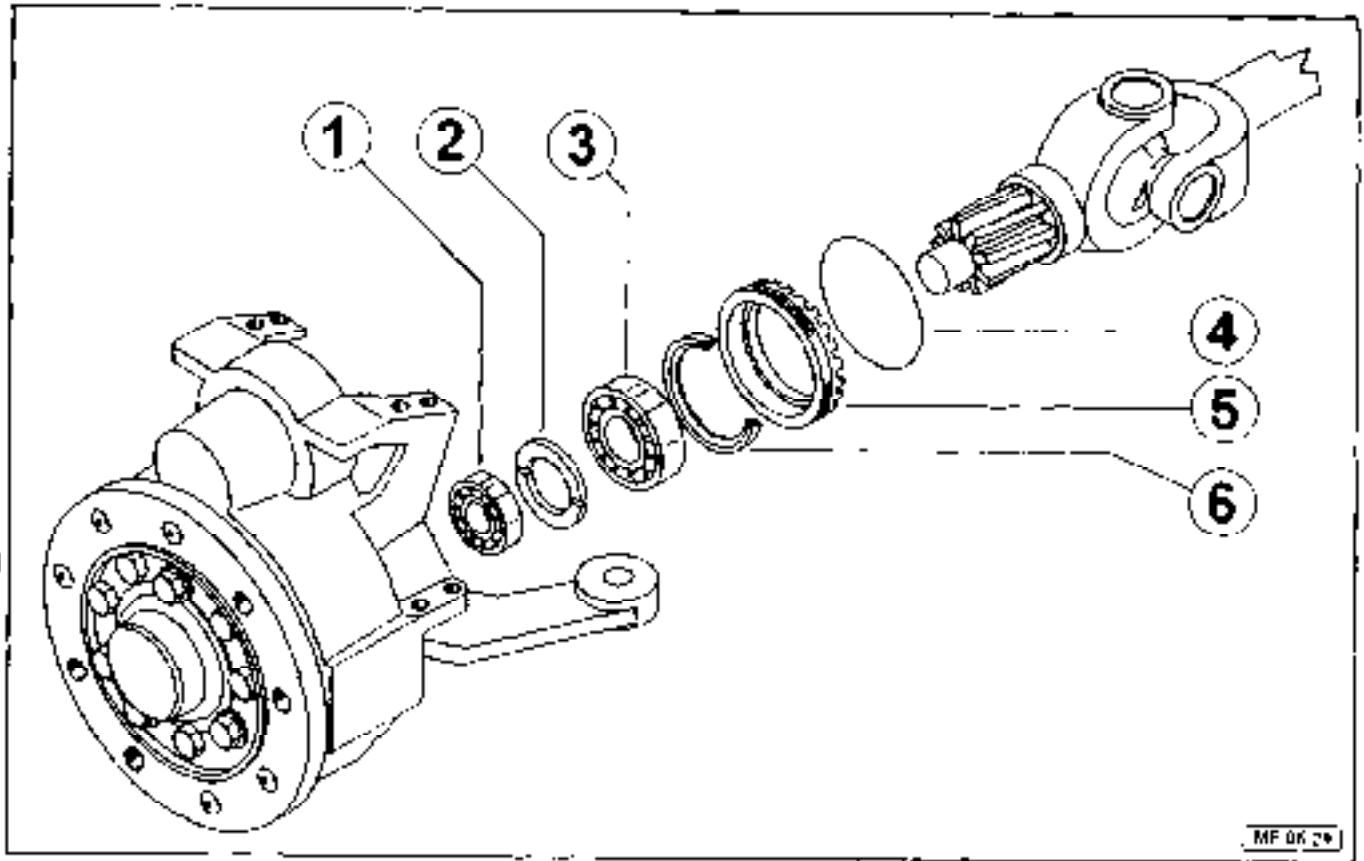


- 5) Remove the reduction gear from its seat together with the propshaft.



- 6) By using a screwdriver, lift and extract the joint (D), see picture ME 05.22A, replace the bushing (E), see picture ME 05.22B; and grease it with grease type "XG 274", then reassemble the joint





- | | |
|------------------------|-------------|
| 1) BEARING | 4) O RING |
| 2) RETAINING HALF RING | 5) RING NUT |
| 3) BEARING | 6) OIL SEAL |

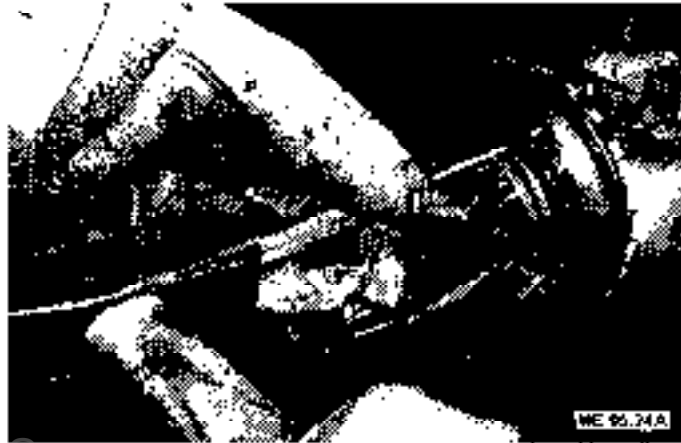
PROPSHAFT REMOVAL FROM THE REDUCTION GEAR

- 1) Carry out points 1 to 5 of the section "REMOVAL OF THE REDUCTION GEAR FROM THE AXLE".
- 2) Using special tool - hub spanner (Part No.026474) unscrew the register ring nut: then extract the propshaft with the pinion from the casing (see picture ME 05 23B)



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- 3) Tap the bearing with a hammer and a drift towards the spider (see picture ME 05 24A), so as to separate retaining half rings (see picture ME 05 24B).



- 4) With a plastic hammer, extract the register ring nut, remove and replace the O Ring (see picture ME 05 25A and ME 05 25B).



- 5) Remove and replace oil seal from adjusting ring nut.

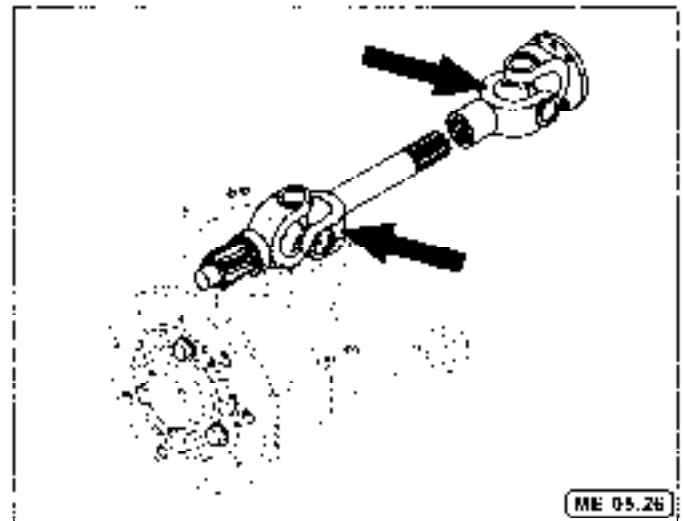
PROPSHAFT REASSEMBLY ON THE REDUCTION GEAR

- 1) To prevent damaging the oil seal, a special sleeve (Part No. 026472) is available to fit over the pinion, see chapter "NECESSARY TOOLS AND REPAIR TIMES" section "SPECIAL TOOLS"
- 2) Reassembly is the reversal of the removal procedure taking note of the following points 2 and 3 of the section "PROPSHAFT REMOVAL FROM THE REDUCTION GEAR"

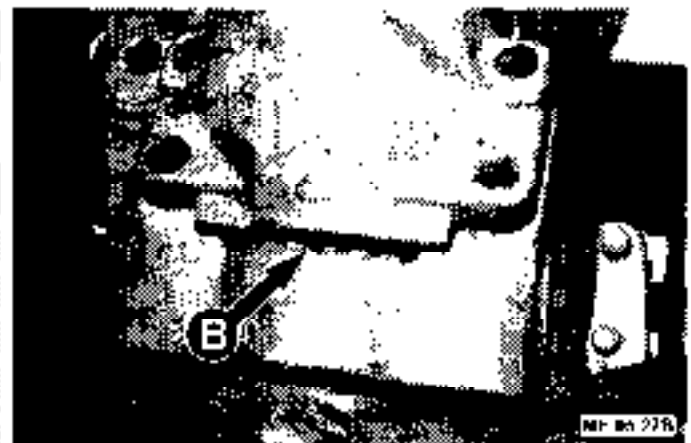


REDUCTION GEAR REASSEMBLY ON THE AXLE

- 1) Insert the propshaft into the spline ensuring the correct position of universal joint is maintained (see drawing ME 05.26)



- 2) The locking tooth (A), see picture ME 05.27A, must locate between the two lugs (B) of the retaining ring, see picture ME 05.27B.



- 3) Refit the reduction hub to the axle (see point 4 of the section "REMOVAL OF THE REDUCTION GEAR FROM THE AXLE"), replace the longer bolts in the two inside holes and the two shorter bolts in the outside holes 314Nm
- 4) Remove the sling from around the casing. Refit the bolt in the steering arm (see point 2 of the paragraph "REMOVAL OF THE REDUCTION GEAR FROM THE AXLE") tighten lock nut and fit new split pin
- 5) Refill hub with oil (see point 17 of the section "OIL SEAL REPLACEMENT")
- 6) Refit wheels

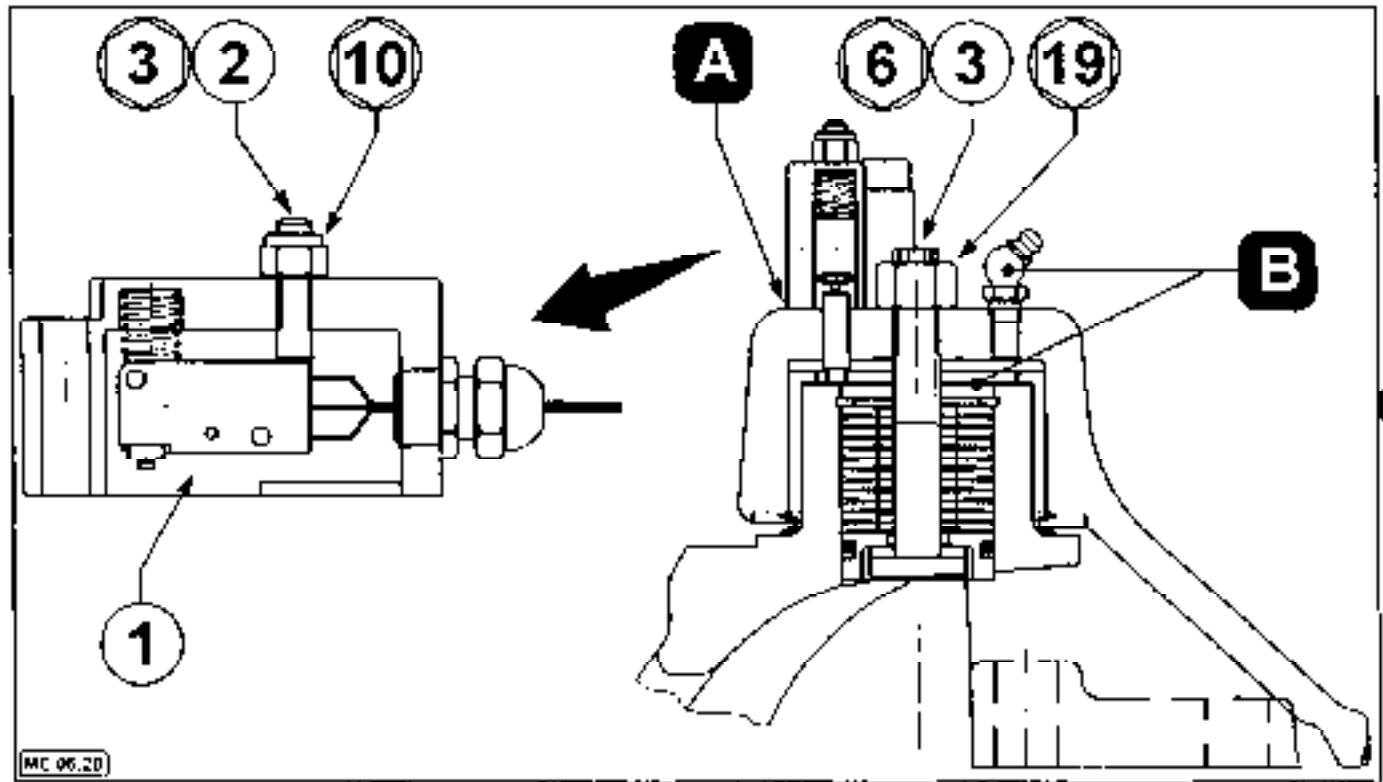
! Ensure washers are fitted to wheel retaining bolts during refit. otherwise serious damage to hubs can occur.

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SAFE LOAD INDICATOR

- A = sealing the microswitch box with silicone
- B = when assembling fill with grease type "XG 274"



- 1) Microswitch preassembly
- 2) Microswitch setting grub screw
- 3) Overload setting stud

MICROSWITCH ADJUSTMENT

- 1) Lift the rear axle from the ground using the lifting lugs.
- 2) Loosen the lock nut and screw in grub screw (2) until it is flush to the nut
- 3) Loosen the grub screw (2) until the alarm sounds, then screw out an additional 1/4 turn
- 4) Tighten lock nut

SAFE LOAD INDICATOR ADJUSTMENT

Choose on the load diagram a load value in the area of max. reach and boom horizontal. Then load the machine with such a value and extend the boom to the reach shown in the diagram:

- 1) Warning alarm sounds, system is O.k.
- 2) If warning alarm does not sound: loosen lock nut, then screw out the overload setting grub screw (3) until the alarm sounds. Tighten lock nut.
- 3) If warning alarm starts at a distance less than indicated on the load chart: loosen lock nut, then screw in the overload setting stud (3) at least 3 full turns; retract the boom, then repeat the test and follow item (2) above.
- 4) Extend and retract the boom several times to check that warning alarm sounds at the correct reach (1)

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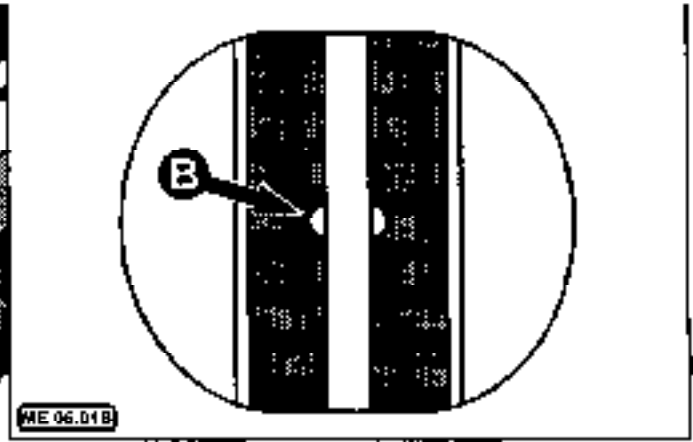
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CALIPER DISMANTLING	4
CALIPER ASSEMBLY	4
HAND BRAKE DISC REPLACEMENT	6

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BRAKE PAD REPLACEMENT

Check brake pad wear through the opening (A) in the caliper (see picture ME 06 01A). Pads must be replaced when slot (B) on pads has worn away (see picture ME 06 01B).



- 1) Start the engine and release hand brake. Hold the brake caliper chamber (C); completely loosen the adjusting screw (D), see picture ME 05 02, switch off the engine.



- 2) Remove the fixing screws (E), see picture ME 06 03A; extract the caliper support ring (F) and its O Ring, see picture ME 06 03B.



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6 - PARKING BRAKE



- 3) Lift the locking spring (G) over the lock pin with a screw driver (see picture ME 06.04A); withdraw the spring/locking pin (H) assembly (see picture ME 06.04B)



- 4) Remove caliper, taking care not to damage hydraulic hoses (I), see picture ME 06.05; install new pad and the thrust ring



- 5) Fit back the caliper and the spring/locking pin assembly
- 6) Insert the caliper support ring and its O Ring; then screw fixing screws in half way.
- 7) Start the engine and release hand brake, screw in the adjusting screw. Depress the brake pedal a few times, stop the engine
- 8) Tighten the fixing screws 24.5 Nm.



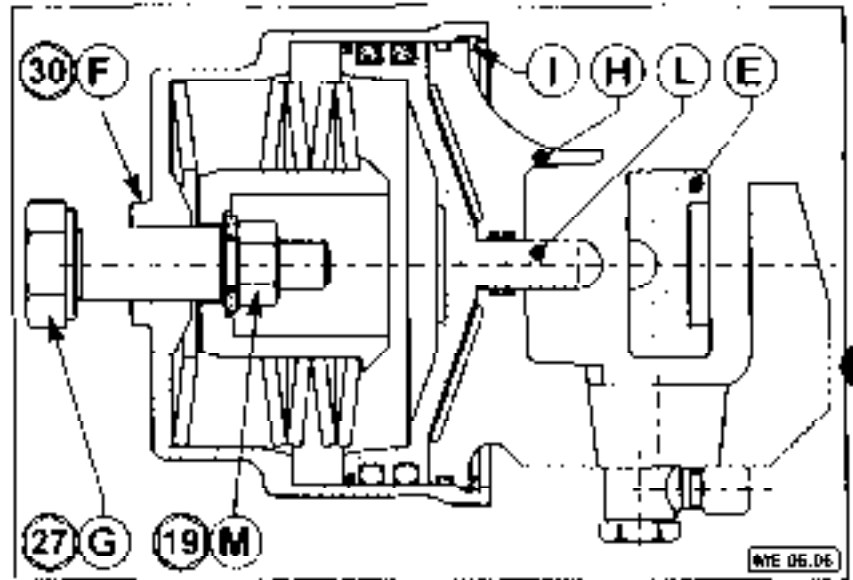
CALIPER DISMANTLING



WARNING !!!

The washers inside the caliper give a preload of about 1500 Kg.

- Start the engine and, release hand brake.
- Hold the brake caliper chamber (F) and completely loosen the adjusting screw (G).
- Stop the engine and disconnect oil supply hose.
- Remove the caliper (as described for brake pads replacement from point 2 to point 5). Remove the thrust ring (E).
- Using a vice, press the caliper inside assembly (H) to remove the strap ring (I).
- Extract the inside of the caliper and the piston (L).
- For dismantling the spring pack light completely the setting screw, then release the fixing nut (M), paying attention that this is assembled by "LOCTITE 243".



CALIPER ASSEMBLY

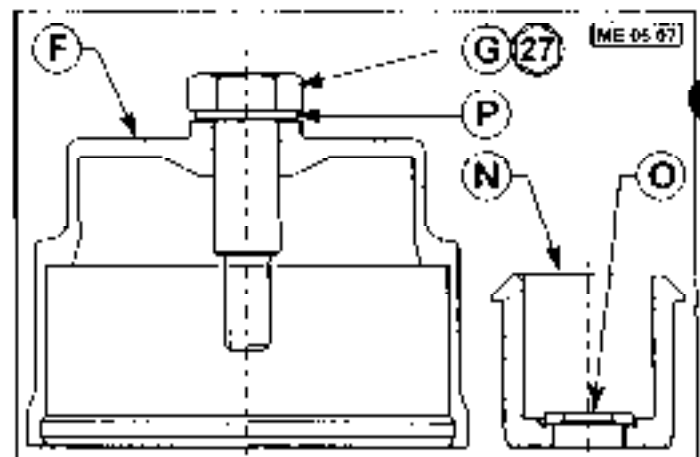


WARNING !!!

The washers inside the caliper give a preload of about 1500 Kg.

Greasing all the surfaces with grease type "XG 274" with a brush

- Grease the bottom of the chamber (F) and the piston (N), insert the ring (O) in the piston with the flaring facing the bottom.
- Degrease carefully the thread M12 of the setting screw (G), insert the bonded washer (P) and completely tighten the screw in the chamber



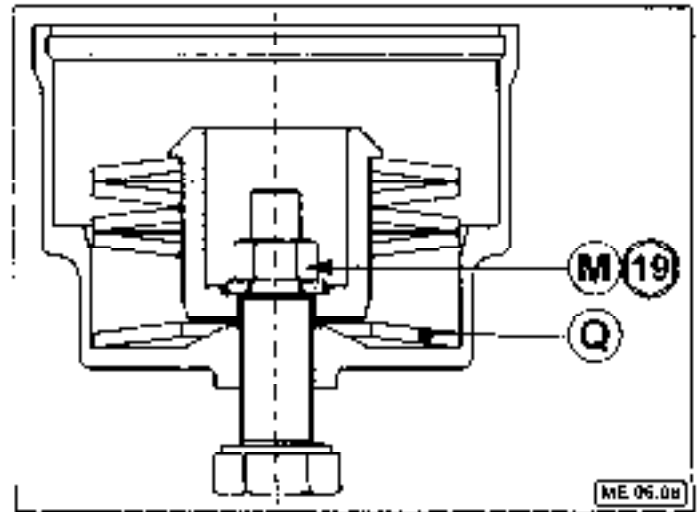
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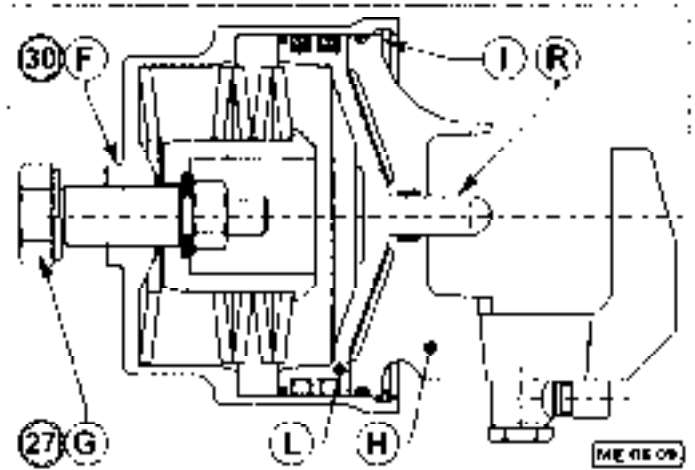
6 - PARKING BRAKE



- Assemble the first washer (Q) as shown: then assemble the other 12 washers greasing each surface
- Insert the piston inside the springs, applying on the fixing nut (M) thread-locking type "LOCTITE 243", then tight it without holding the setting screw. This way you press totally the springs re-easing at the same time the setting screw.



- Grease the inside of the chamber and the piston thrust pin (R)
- Fit the springs and insert the piston (L) and the caliper (H) in the chamber.
- Using a vice, press the caliper assembly (H) into the brake caliper chamber (F) fit snap ring (I) in the groove
- Put the caliper on the machine operating as described in the brake pad dismantling chapter (from point 6 to point 9)
- Connect the oil supply hose, start the engine and, operating the brake valve lever, release hand brake
- Hold the brake caliper chamber (F) and completely tighten the adjusting screw (G).
- Check that the system is working correctly.



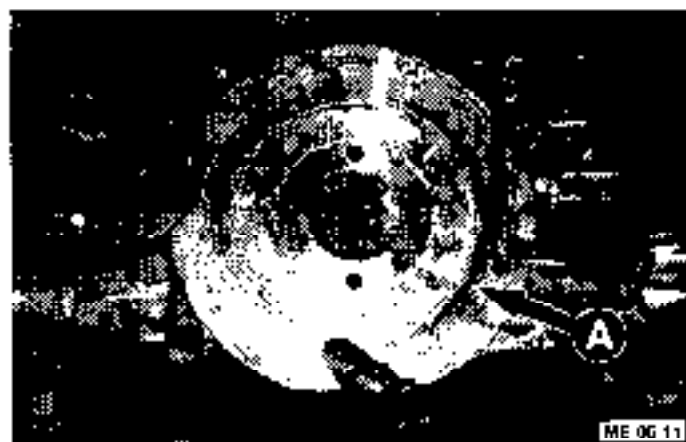


HAND BRAKE DISC REPLACEMENT

- 1) Remove the caliper (as described for brake pads replacement from point 1 to point 4).
- 2) Remove the propshaft by unscrewing the 6 fixing screw on the rear axle (see picture ME 06 10), extract and replace the disc.



- 3) Reassemble the new disc in its original seat with its face (A) towards the propshaft (see picture ME 06 11).



- 4) Reassemble the propshaft reassemble the caliper of the hand brake carrying out from points 5 to 8, previously described in the section "BRAKE PAD REPLACEMENT" of this chapter.



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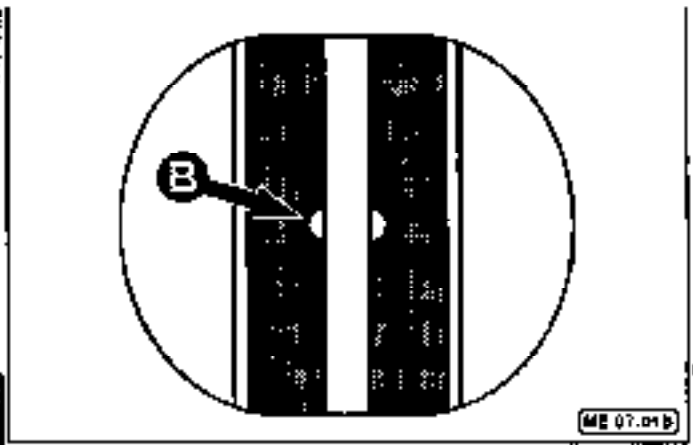
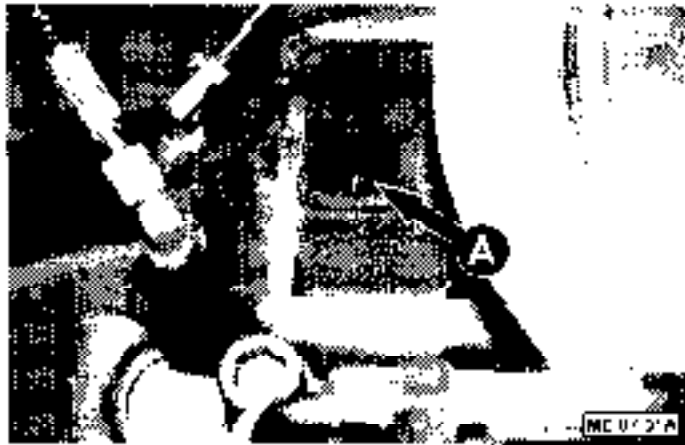
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BRAKE PAD REPLACEMENT

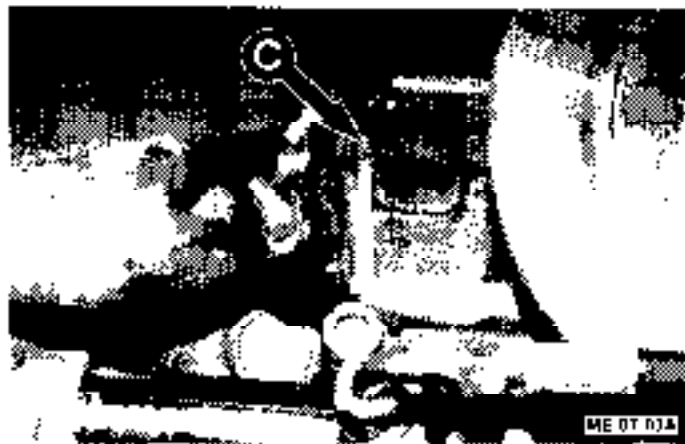
Check brake pads wear through the opening in the caliper (A), see picture ME 07.01A. Pads must be replaced when slot (B) is worn out, see picture ME 07.01B.



- 1) Remove the connecting pipe for the brake oil and blank it off (see picture ME 07.02A); remove the copper pipe that connects the two calipers together (see picture ME 07.02B).



- 2) With a screw driver lift the locking spring (C) over the lock pin (see picture ME 07.03A); extract the bolts, which fix the calipers, from the grooves (see picture ME 07.03B).



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- 3) Remove caliper; push the brake control piston in (see picture ME 07.04A); remove the pads from their seats; install the new pads (see picture ME 07.04B); reassemble

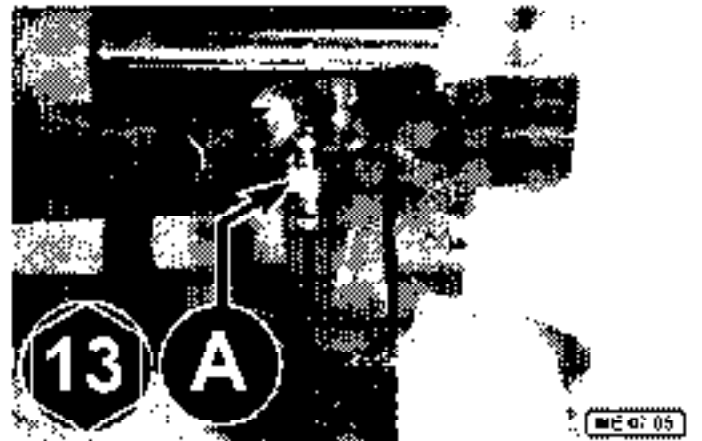


- 4) Before replacing the left caliper pads of the rear brake, it will be necessary to remove the caliper of the parking brake as described in points 1 to 4 of the section "BRAKE PAD REPLACEMENT" of the chapter "PARKING BRAKE".

HOW TO BLEED THE BRAKE SYSTEM

It is necessary to bleed the braking system everytime the hydraulic parts of the caliper are disassembled

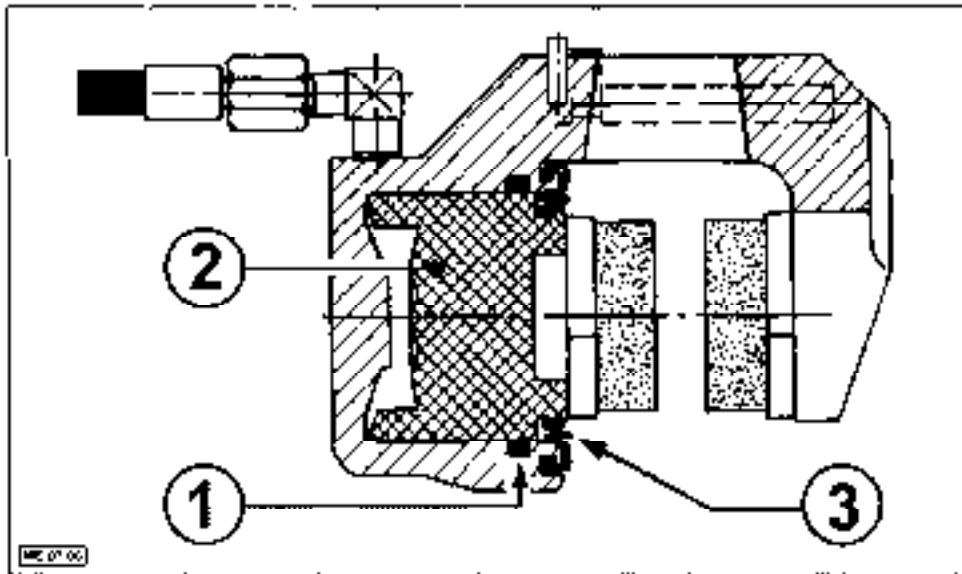
- Apply the brake pedal intermittently
- Depress the brake pedal
- Loosen the bleeder screw (A).
- Close the bleeder screw (A)
- Repeat from the first point until the liquid is free from air bubbles (see picture MF 07.05)



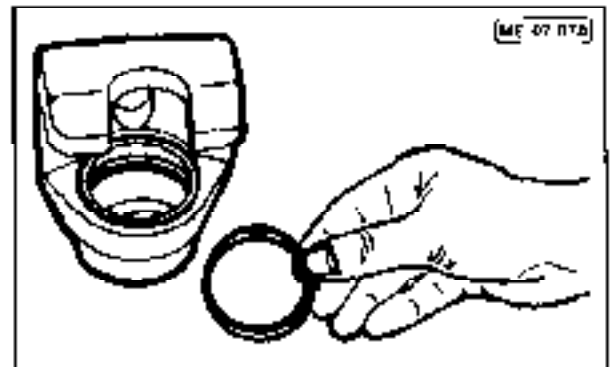
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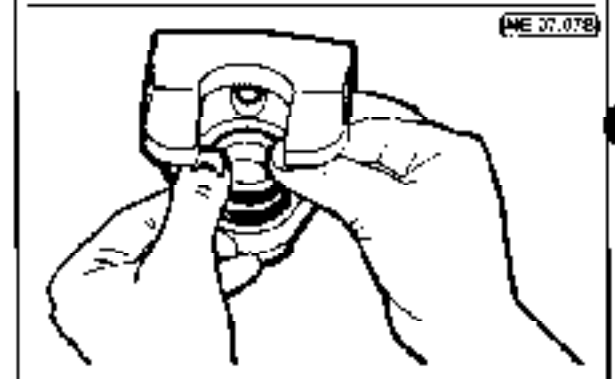
CALIPER ASSEMBLY



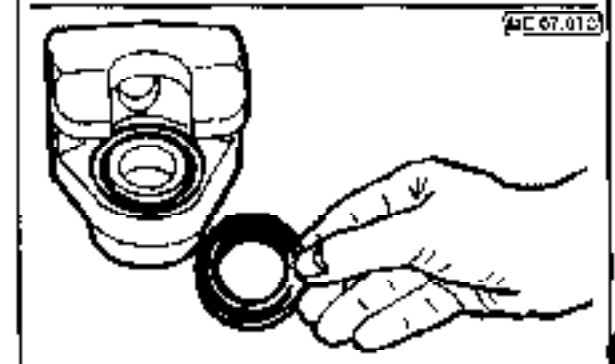
- Lubricate inner seal (1) with brake fluid and push into groove (see pictures ME 07.06 and ME 07.07A)



- Push piston (2) into position (see pictures ME 07.06 and ME 07.07B)



- Assemble the dust cover (3), see pictures ME 07.06 and ME 07.07C lubricating the seal with "PBR RUBBER GREASE".

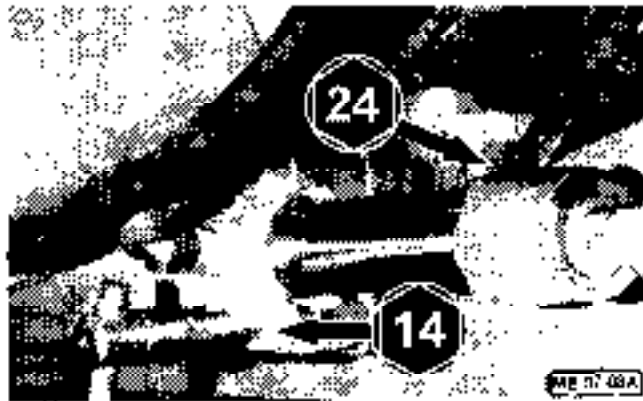


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BRAKE DISC REPLACEMENT

- 1) Remove the parking brake caliper (see points 1 to 5 of the section "BRAKE PAD REPLACEMENT" of the chapter "HAND BRAKE DISC REPLACEMENT").
Remove the parking brake disc (see points 2 and 3 of the section "BRAKE PAD REPLACEMENT" of the chapter "PARKING BRAKE").
Remove the two service brakes calipers (see points 1 to 3 of the section "BRAKE PADS REPLACEMENT" of this chapter)
- 2) Remove the steering cylinder, unscrewing the four fixing bolts (A) on the axle (see pictures ME 07.08A and ME 07.08B)



- 3) Passing through the hole placed on the lower part of the axle, unscrew the drain plug (B) and drain the oil from the differential gear (see picture ME 07.09).



- 4) Remove the cover from differential gear unscrewing the eight fixing bolts on the differential gear itself (see picture ME 07.10A) and the two on the axle (see picture ME 07.10B).



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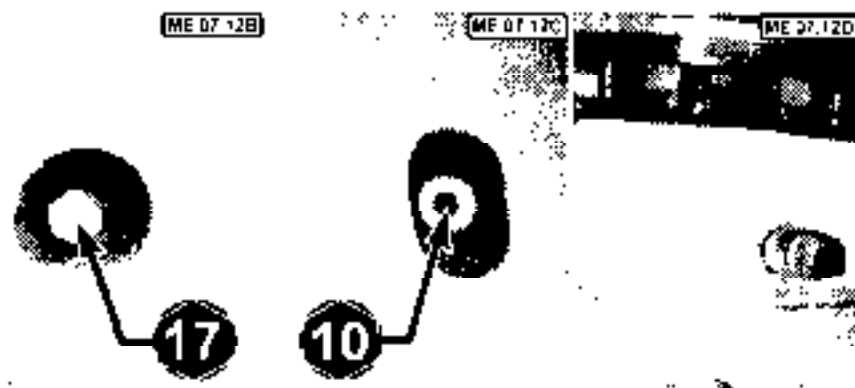
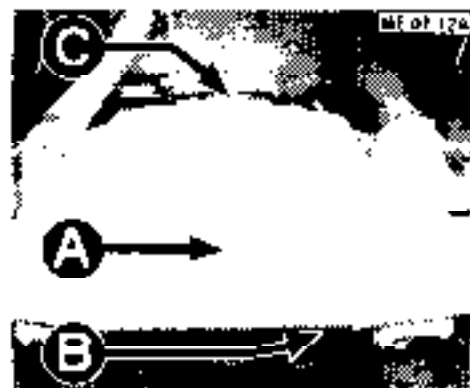


- 5) Unscrew the six bolts that fix the plate to the propshaft; then replace the plate (see pictures ME 07.11A and ME 07.11B).



- 6) Reassembly is a reversal of dismantling points 1 to 7.
- 7) On reassembly of the differential gear cover, replace the O ring on the back side of the differential cover, smear paste type "LOCTITE 542" on the two longer fixing holes (for the bolts tension see picture ME 09.01 of chapter 9 / page 9-2).
- 8) Refill differential gear:

Capacity = 5.3 lts.



See picture ME 07.12A, where

- A Filling and level plug
- B Draining plug
- C Bleeding plug

To replace oil

- Ensure drain plug (B) is secured in drain hole (see picture ME 07.12C)
- Refill oil from filling cap (A) until oil gets out (see picture ME 07.12B)
- Replace fill plug.
Trapped air will escape through bleed plug (C) see picture ME 07.12D

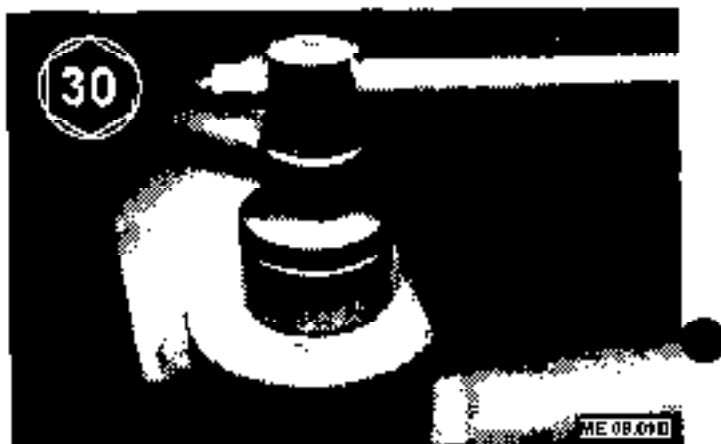


B - STEERING TIE RODS REPLACEMENT

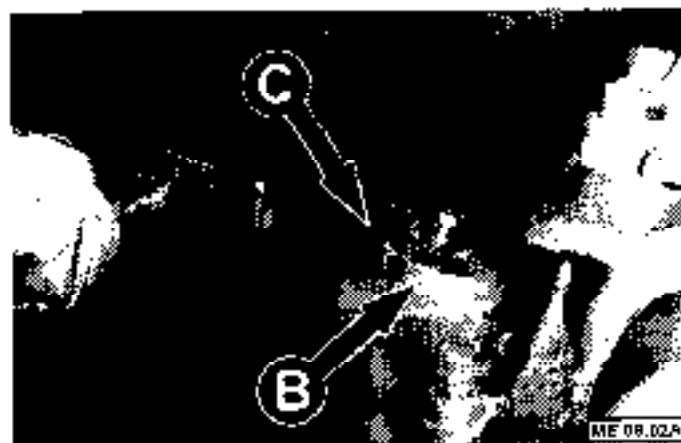


REAR TIE RODS REPLACEMENT

- 1) Remove the split pin (A) on the bolt of the steering tie rod (see picture ME 08 01A), then unscrew the nut (see picture ME 08 01B)



- 2) Turn steering to full lock to obtain more operating space, tap with a rubber hammer steering arm (B) at point (C), see picture ME 08 02A; remove pivot from steering arm (see picture ME 08 02B).



- 3) From the side of the tie rod being replaced dismantle the connecting pipe on the steering cylinder (see picture ME 08.03A), plug the connecting pipe and the filling on the cylinder (see picture ME 08.03B).





8 - STEERING TIE RODS REPLACEMENT



- 4) Start the engine and operate the steering since it is necessary to pressurize the circuit. In order to unscrew the tie rod and replace it (see pictures ME 08.04A and ME 08.04B)



- 5) Reassembly as follows:
- Remove the blanking plugs and re-connect the connecting pipe.
 - Start the engine and operate the steering to retract the piston.
 - Apply "LOCTITE 243" to tie rod end
 - Screw the tie rod to cylinder rod
 - Tighten using two spanners
 - Operate the steering to extend the cylinder rod.
 - Re-fit the tie rod ends into the steering arms
 - Re-fit nuts, tighten and secure with new split pin.

FRONT TIE RODS REPLACEMENT

When replacing the front tie rods carry out the instructions described in "REAR TIE RODS" omitting passages described in point 3



8 - STEERING TIE RODS REPLACEMENT



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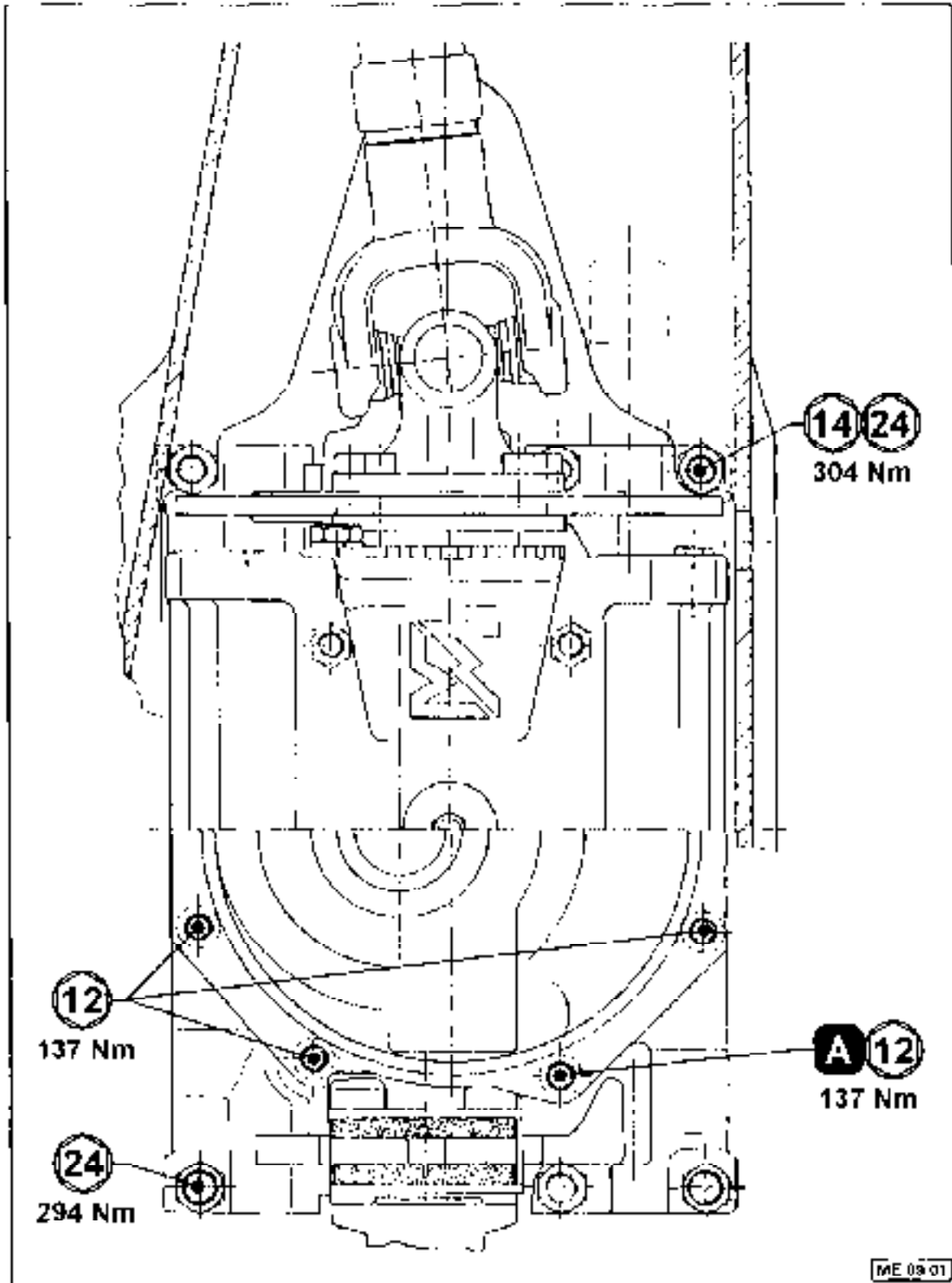
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A) When assembling put seating paste type "LOCTITE 572"



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DIFFERENTIAL GEAR DISMANTLING

- 1) Remove the parking brake caliper following the operations described from point 1 to point 3 of the section "BRAKE PAD REPLACEMENT" of the chapter "PARKING BRAKE".
- 2) Remove the parking brake disc following the operations described from point 2 and point 3 of the section "HAND BRAKE DISC REPLACEMENT" of the chapter "PARKING BRAKE".
- 3) Remove the service brake caliper (see points 1 to 3 of the section "BRAKE PAD REPLACEMENT" of the chapter "SERVICE BRAKES").
- 4) Remove the service brakes discs (see points 3 to 7 of the section "BRAKE DISC REPLACEMENT" of the chapter "SERVICE BRAKES").

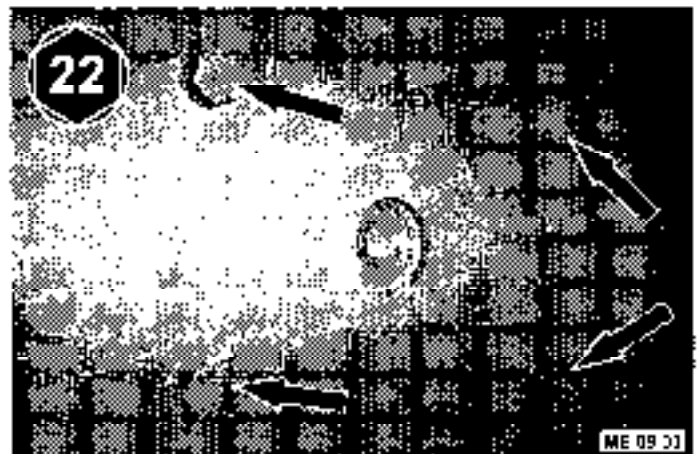
5) To simplify the removal of the differential, follow these instructions:

- Lift the machine at the rear with suitable lifting equipment. For further information consult the chapter "OPERATING INSTRUCTIONS" of the "INSTRUCTION HANDBOOK FOR OPERATING AND MAINTENANCE".
- Unscrew and remove the four fixing bolts at the front support of the oscillating axle to the chassis (see picture ME 09 02).
- Loosen the four bolts of the rear support.
- Lift the machine until the wheels just come off the ground in such a way that the oscillating bridge tilts forward. For further information on lifting procedure, we advise you to consult the chapter "OPERATING INSTRUCTIONS" of the "INSTRUCTION HANDBOOK FOR OPERATING AND MAINTENANCE".
- Extract the support.



"INSTRUCTIONS HANDBOOK FOR OPERATING AND MAINTENANCE"

6) Unscrew the 4 fixing screws of the differential gear to the axle (see picture ME 09 03).

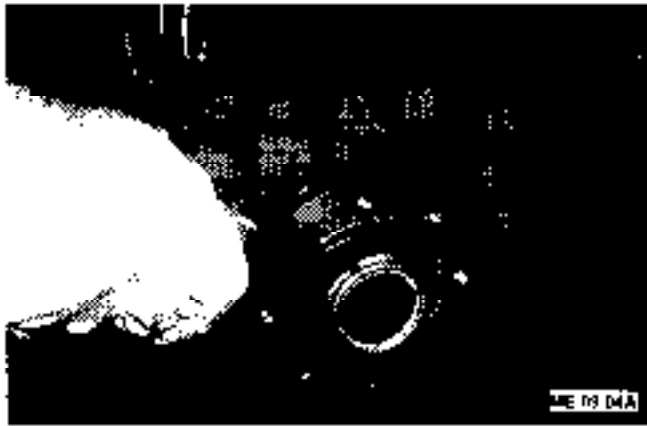


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OVERHAUL OF THE DIFFERENTIAL INTERNAL PARTS

- 1) By using the "C" spanner (Part No. 601071) unscrew the self locking ring nut (see picture ME 09.04A), then extract the flange (A) and the O Ring (B) see picture ME 09.04B.



- 2) Repeat point 1 on the other side of the differential gear.
- 3) Remove the bolt (C) from the block plate of the ring nut adjuster (D), see picture ME 09.05A, then by means of the special tool - hub spanner (Part No. 026474) unscrew and remove the ring nut (see figure ME 09.05B). Repeat this operation on the other side of the differential gear and replace if necessary, the oil seal and the O Ring on both ring nuts.



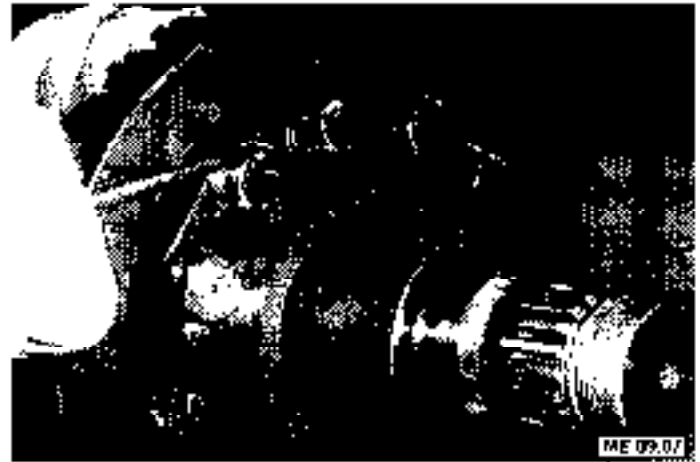
- 4) Extract the Differential gear, tilting it as visualized in the picture ME 09.06A. replace if necessary, the two bearings and the ring nuts.



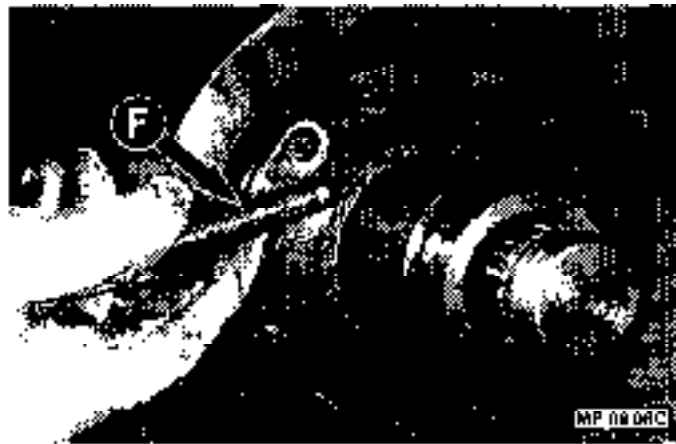
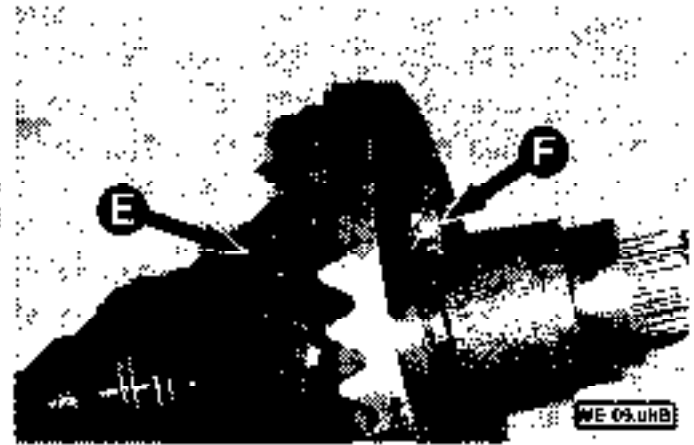
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- 5) Using a screw driver, lift the locking strips from the twelve fixing bolts of the ring gear on the short casing (see picture ME 09.07)



- 6) Unscrew the twelve fixing bolts of the ring gear on the short casing (see picture ME 09.08A); remember, during the reassembly the two longer bolts (F) must be screwed corresponding with the location of the side pinion rotation shaft mounting (E), see picture ME 09.08B and ME 09.08C



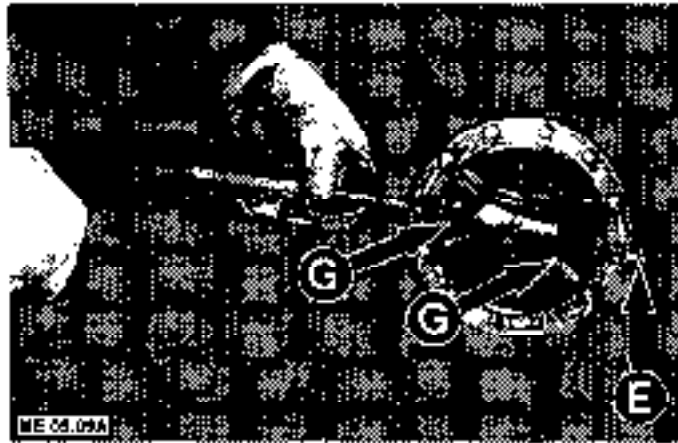
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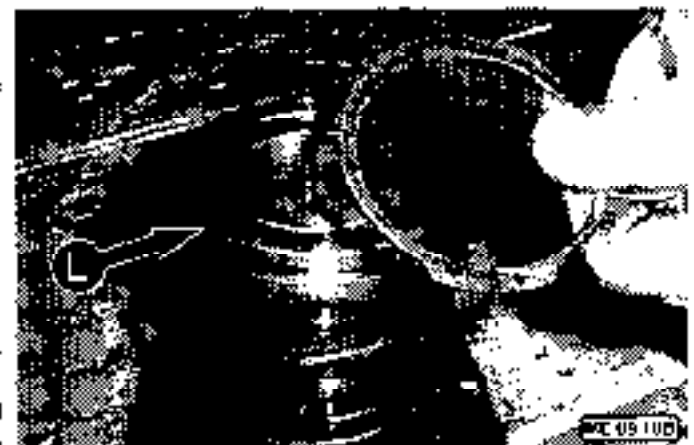
9 - DIFFERENTIALS



- 7) Extract, from the long casing, the bolt (E) and the two planetary gears (G) along with washer (see picture ME 09 09A); then extract the crown-wheel and the bushing (see picture ME 09 09B)



- 8) Remove the Circlip (H); the locking sliding ring out (L) and the compression spring (I), see pictures ME 09 10A and ME 09 10B

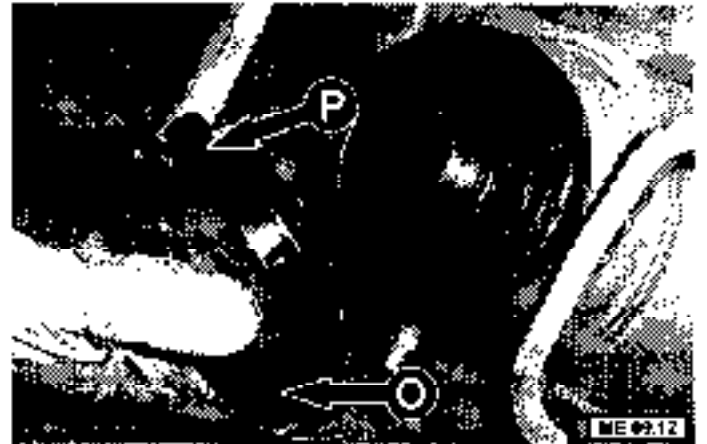


- 9) On the differential gear pinion, remove the collar pin, after this operation, by mean of a special wrench tool-hub (Part No 022722), see picture ME 09 11A, remove the ring nut (N) from the pin on with the O. Ring (M), see picture ME 09 11B





- 10) Extract the flange (Q) with the protection cap from the shaft (P), see picture ME 09.12.



- 11) Using a plastic hammer, tap the pinion from the casing (see picture ME 09.13A and ME 09.13B).



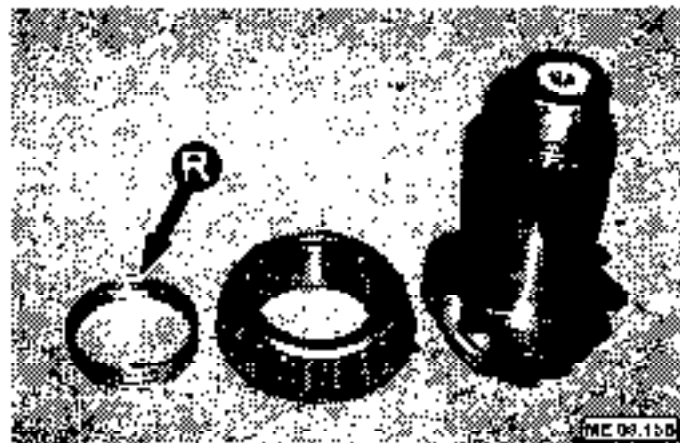
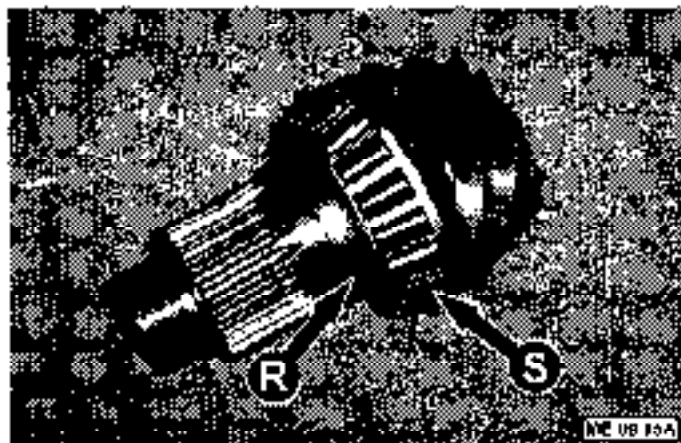
- 12) Using a screw driver extract the oil seal (Q), see picture ME 09.14A; then extract the bearing and replace it together with the O-ring (see picture MF 09.14B)



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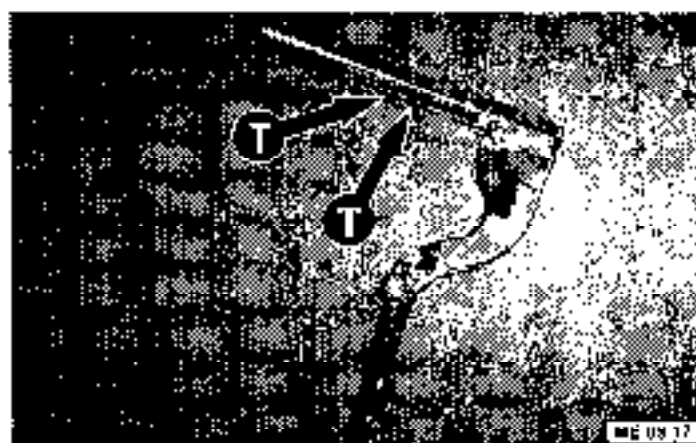
- 13) On the pinion, replace the deformable spacer (R) and the bearing (S), see pictures ME 09 15A and ME 09 15B.



- 14) On the cover, remove the fixing nut from the fork which controls the differential gear locking (see picture ME 09.16A) using a plastic hammer, extract the fork control lever of the locking of the differential gear and the fork itself (see picture ME 09.16B).



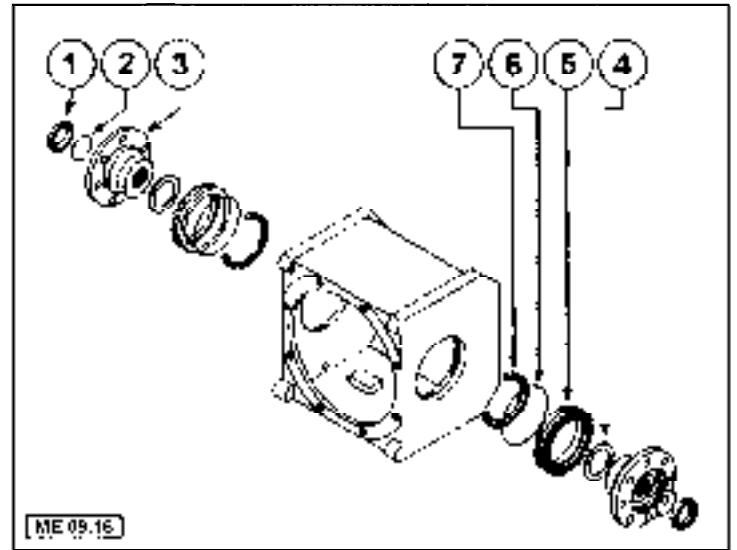
- 15) Replace the two O.Rings (T) placed on the lever (see picture ME 09 17)



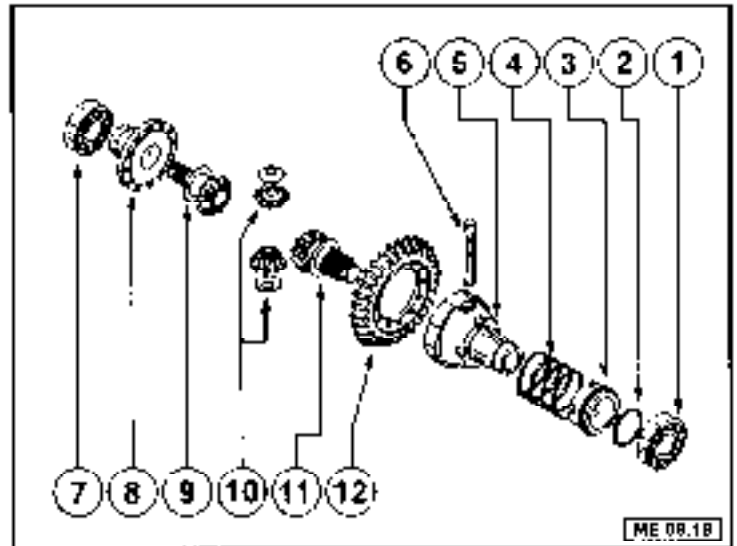
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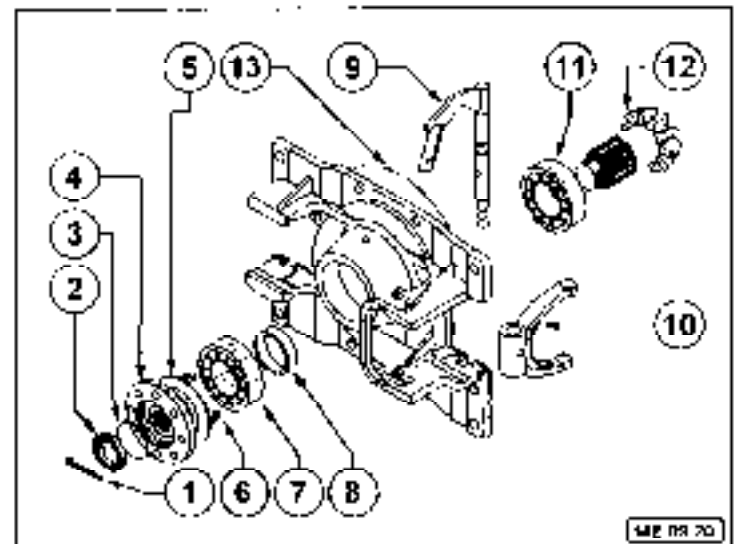
- 1) Self locking ring nut
- 2) O Ring
- 3) Differential gear output flange
- 4) Supporting bearing
- 5) Adjusting ring nut
- 6) O Ring
- 7) Oil seal



- 1) Bearing
- 2) Circlip
- 3) Locking coupling
- 4) Spring
- 5) Inner long casing
- 6) Planetary gears rotation shaft
- 7) Bearing
- 8) Inner narrow casing
- 9) Crown-wheel and shaft
- 10) Planetary gear and washer
- 11) Crown-wheel and shaft
- 12) Ring gear



- 1) Split pin
- 2) Pinion ring nut
- 3) O Ring
- 4) Flange
- 5) Shaft protection cap
- 6) Oil seal
- 7) Bearing
- 8) Spacer
- 9) Differential gear lock fork control lever
- 10) Differential gear fork
- 11) Bearing
- 12) Pinion
- 13) O Ring



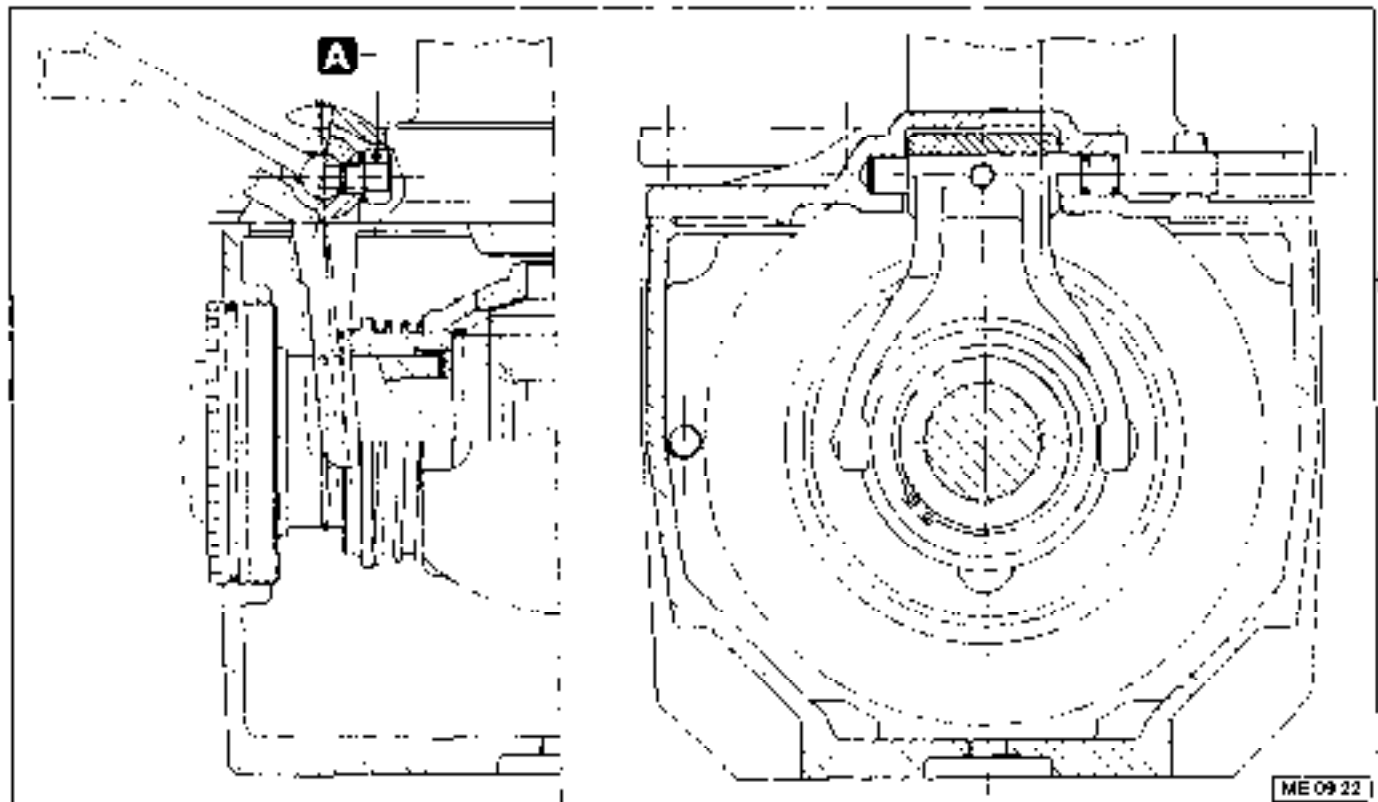


REASSEMBLY OF THE DIFFERENTIAL INTERNAL PARTS

- 1) Reassemble in the reverse of dismantling following points 1 to 15 described in the section "OVERHAUL OF THE DIFFERENTIAL INTERNAL PARTS". for the bolts torque setting, see picture ME 09 23 (page 9-11) of this chapter.
- 2) On reassembly of the locking fork on the differential gear, ensure the threaded hole is facing the inner part of the cover, apply to the fixing bolt some nut-lock "LOCTITE 242" and tighten. To avoid faulty operation of the fork, make sure that the bolt head flange is parallel with differential cover as shown in photo ME 09 21B, not as shown in photo ME 09.21A.

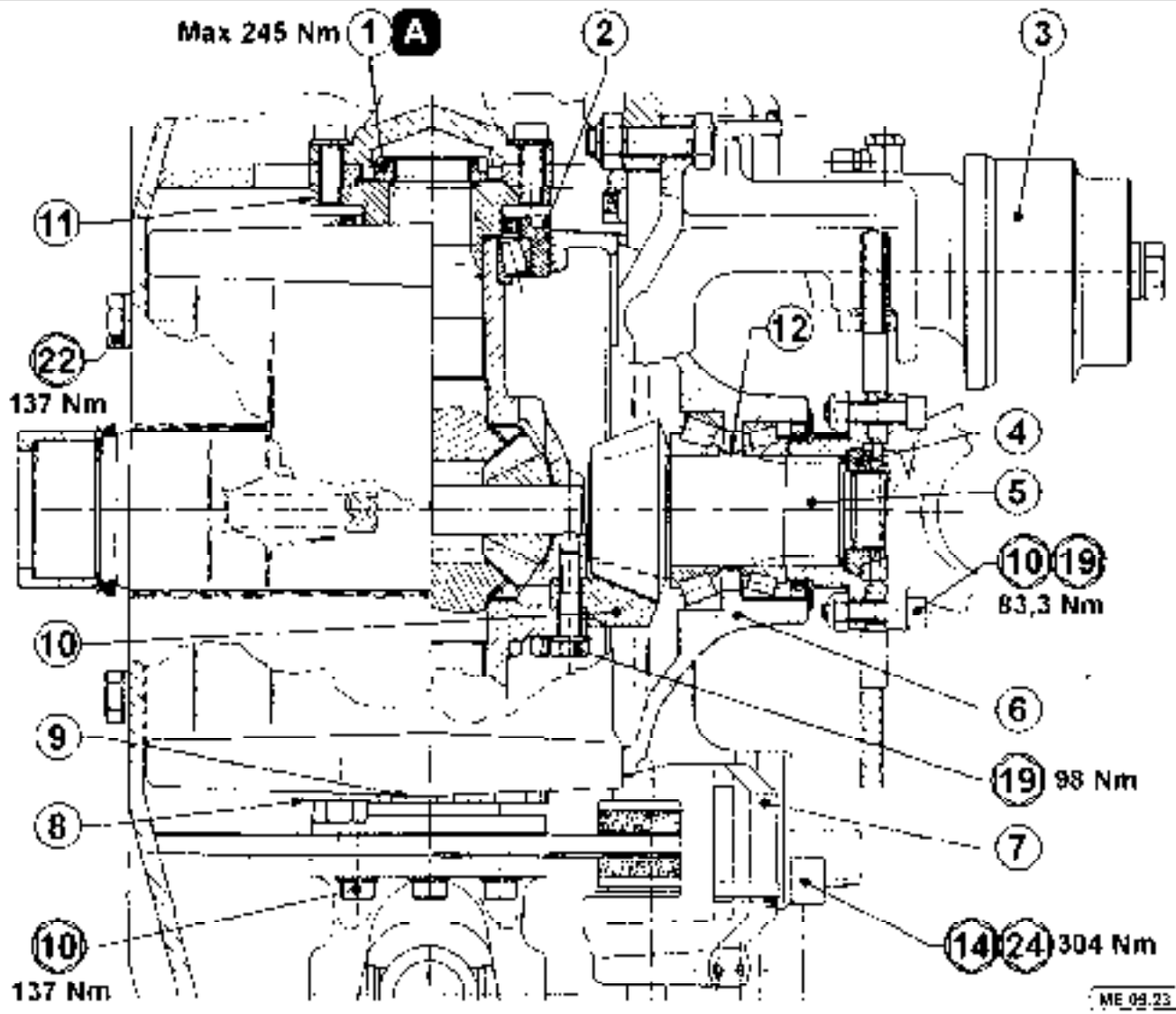


A = when assembling use nut-lock "LOCTITE 242"



- 3) Reassemble the cover replacing the external O Ring

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- A) When assembling use "LOCTITE 242".
- 1) Nut (special tool ref. 025100)
- 2) Differential output adjustment nut (special tool ref. 022723)
- 3) Parking brake calliper rear differential
- 4) Differential input adjustment nut (special tool ref. 022777)
- 5) Diff input pinion
- 6) Diff input flange
- 7) Service brake calliper
- 8) Stop plate
- 9) Diff output adjustment nut (special tool ref. 022723)
- 10) Crown
- 11) Prop shaft flange
- 12) Spacer

**DIFFERENTIAL ADJUSTMENT****PINION GEAR SLACK ADJUSTMENT**

The deformable spacer (12), see drawing MC 09.23, is designed to allow optimal backlash. It is crushed during assembly by means of a purpose built machine. Therefore, in case of bearing replacement, we suggest you to order the whole kit including both bearings and the pre-deformed spacer (12).

Adjustment (see ME 09.23 and ME 09.24A):

- Tighten nut (4) with a torque of 118Nm
- Loosen the ring nut by 1 turn
- Tighten nut with a torque of 39Nm, aligning a notch with a split pin hole
- Lock nut with split pin

If only one bearing is replaced (operation not recommended), the spacer (12) must be removed; then proceed with the adjustment as described before.

PINION GEAR AND RING BEVEL GEAR SLACK ADJUSTMENT (see MF 09.24B and ME 09.23)

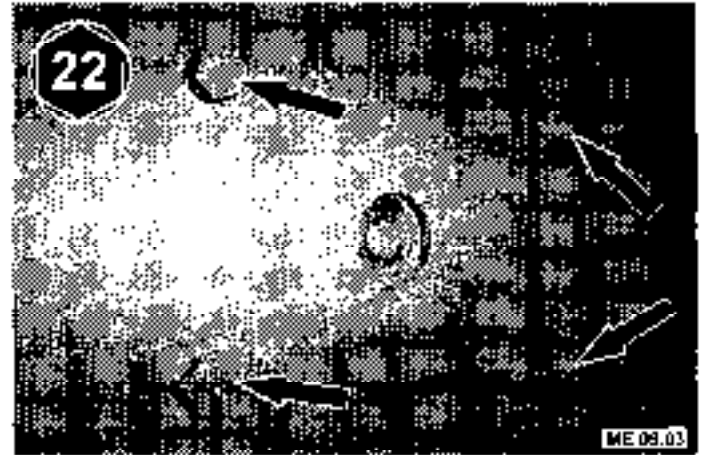
- Tighten the ring nut (9) until crown (10) has no free play with the pinion (5). Verify that the ring nut (2) is screwed in but not forced.
- Loosen the ring nut (9) by 8 notches aligning a notch with stop plate (8).
- Tighten to 44Nm the opposite ring nut (2).
- Verify in different positions of the ring bevel gear that the clearance between pinion gear and ring bevel gear keeps within fixed limits. The exact clearance is equivalent to a movement between 0,12 - 0,16 mm measured on the \varnothing 120 mm diameter of the input flange with ring bevel gear blocked (the crown can be locked introducing a screwdriver from the oil filling hole). If there is too much clearance, screw in 1 notch the ring nut (9) and unscrew 1 notch the ring nut (2). If there isn't enough clearance, proceed the other way.
- Loosen the ring nut (2) by 1 turn. With new bearings, tighten the ring nut (2) (at 44Nm) aligning a notch with stop plate (8). With running bearings, tighten the ring nut (2) with no slack aligning a notch with stop plate (8).
- Block the two ring nuts with stop plate (8) and its screw





DIFFERENTIAL REASSEMBLY IN THE AXLE

- 1) Insert the differential gear in the inner part of the axle.
- 2) Carry out reverse operations described in point 5 of the section "DIFFERENTIAL GEAR DISMANTLING" of this chapter
- 3) Replace the cover on the axle; screw in without over tightening the bolts that fix the cover to the axle.
- 4) Screw in the four fixing screws of the differential gear to the axle (see picture: ME 09 03)



- 5) Remove the cover from the differential gear then follows these points:
 - Reassemble the service brake discs (see section "BRAKE DISC REPLACEMENT" of the chapter "SERVICE BRAKES").
 - Reassemble the service brake pads (see section "BRAKE PAD REPLACEMENT" of the chapter "SERVICE BRAKES").
- 6) Reassemble the differential gear cover tightening the fixing bolts then carry out in the following order:
 - Reassemble the parking brake disc (see section "HAND BRAKE DISC REPLACEMENT" of the chapter "PARKING BRAKE").
 - Reassemble the parking brake caliper (see section "BRAKE PAD REPLACEMENT" of the chapter "PARKING BRAKE").
- 7) Top up oil in differential gear (see the relevant section on the "INSTRUCTION HANDBOOK FOR OPERATING AND MAINTENANCE")
- 8) Carry out the service brake bleeding (see section "HOW TO BLEED THE BRAKE SYSTEM" of the chapter "SERVICE BRAKES") and test for correct working of the braking system



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FRONT AXLE REMOVAL .. 2

REAR AXLE REMOVAL .. 4

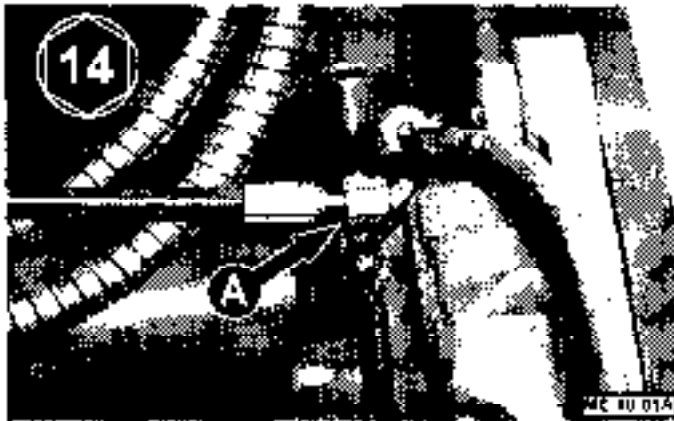
AXLE REASSEMBLY .. 6

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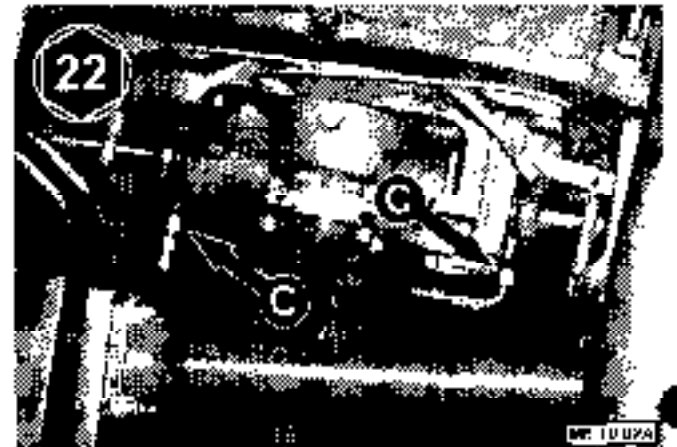


FRONT AXLE REMOVAL

- 1) Lift the boom observing all relevant safety rules described in the section "SAFETY AND GENERAL INSTRUCTIONS"
- 2) Disconnect the brake oil pipe (A) and blank off (see picture ME 10.01A) disconnect the locking differential gear control pipe (B), see picture ME 10.01B



- 3) Disconnect the two steering cylinder connecting pipes (C) and blank off (see picture ME 10.02A).



- 4) On the rear axle insert parking (block of wood) between the axle and the chassis, this will prevent the chassis oscillation when the front axle is removed (see picture ME 10.03A and ME 10.03B)

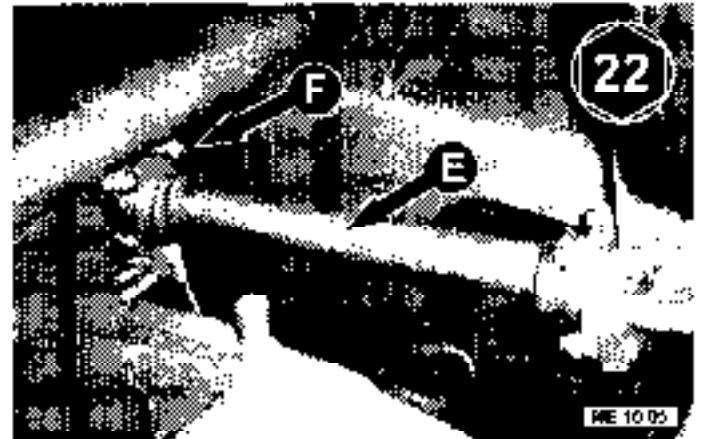




- 5) Using suitable lifting equipment, lift the machine at the front until the wheel just come off the ground. For further information about lifting procedure, we advise you to consult the chapter "OPERATING INSTRUCTIONS" of the "INSTRUCTION HANDBOOK FOR OPERATING AND MAINTENANCE"
- 6) Support the axle by a suitable means to prevent it turning when disconnected from the machine.
- 7) Remove the eight fixing bolts (four per cylinder) of the two frame levelling cylinders (D), see pictures ME 10 04A and ME 10 04B.



- 8) Remove the traverse tie rod (E) unscrewing the four bolts (F) fixing it to the axle (see picture ME 10.05).



- 9) On the front side of the axle, unscrew the fixing nuts (G) from the four tie rods (see picture ME 10.06).



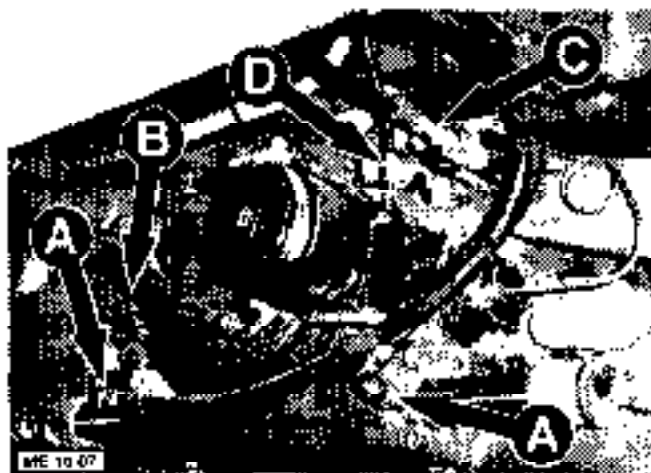
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- 10) Lift the machine until you can remove the axle from its seat. Mark the two propshaft parts (male and female) at a point at the junction, to ensure it is reassembled in the correct phase.
- 11) Remove the axle extracting the propshaft.

REAR AXLE REMOVAL

- 1) Lift the boom observing all relevant safety rules described in the section "SAFETY AND GENERAL INSTRUCTIONS" of the chapter "INTRODUCTION".
- 2) Remove the steering cylinder connecting pipes (A), the brake oil pipe (B), the differential gear locking pipe (C) and the control of the parking brake caliper pipe (D), see section "FRONT AXLE REMOVAL" (see picture ME 10.07).



- 3) Remove the overload system microswitch, unscrewing the two grub screws (E) and the nut (F), see picture ME 10.08.



- 4) With suitable lifting equipment, anchor and lift the machine until the wheels just come off from the ground in such a way that the oscillating bridge lifts forward (For further information on lifting procedure, we advise you to consult the chapter "OPERATING INSTRUCTIONS" of the "INSTRUCTIONS HANDBOOK FOR OPERATING AND MAINTENANCE").
- 5) Support the axle by a suitable means to prevent it turning when disconnected from the machine.
- 6) Unscrew and remove the four fixing bolts of the front support of the oscillating axle to the chassis and the four fixing bolts of the rear support (see picture ME 10.10).
- 7) Lift the machine until the axle comes out.

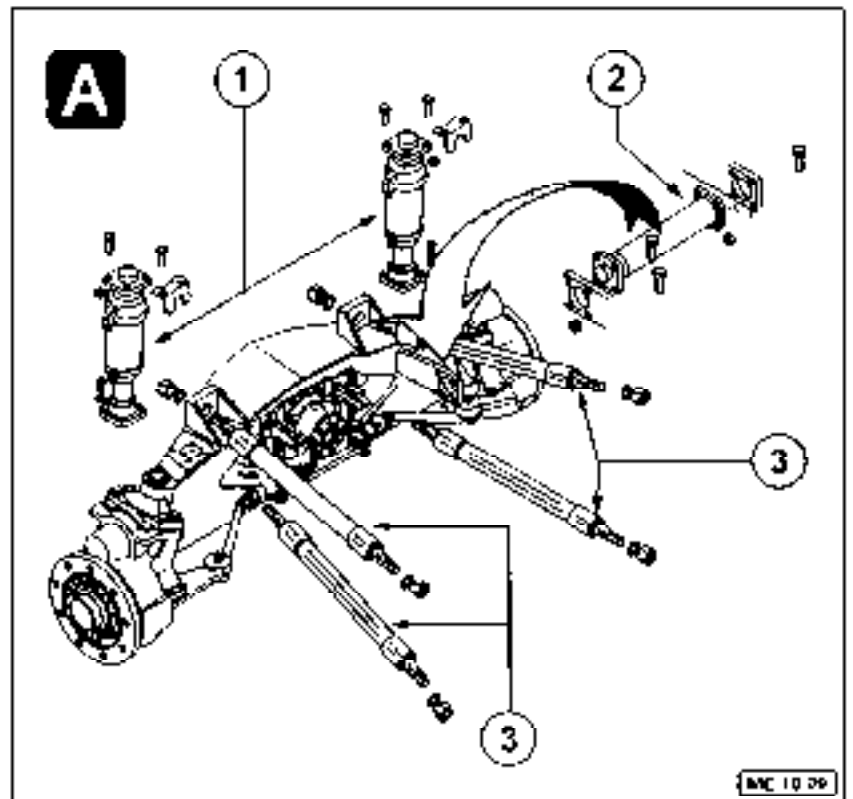


10 - FRONT AND REAR AXLES REMOVAL



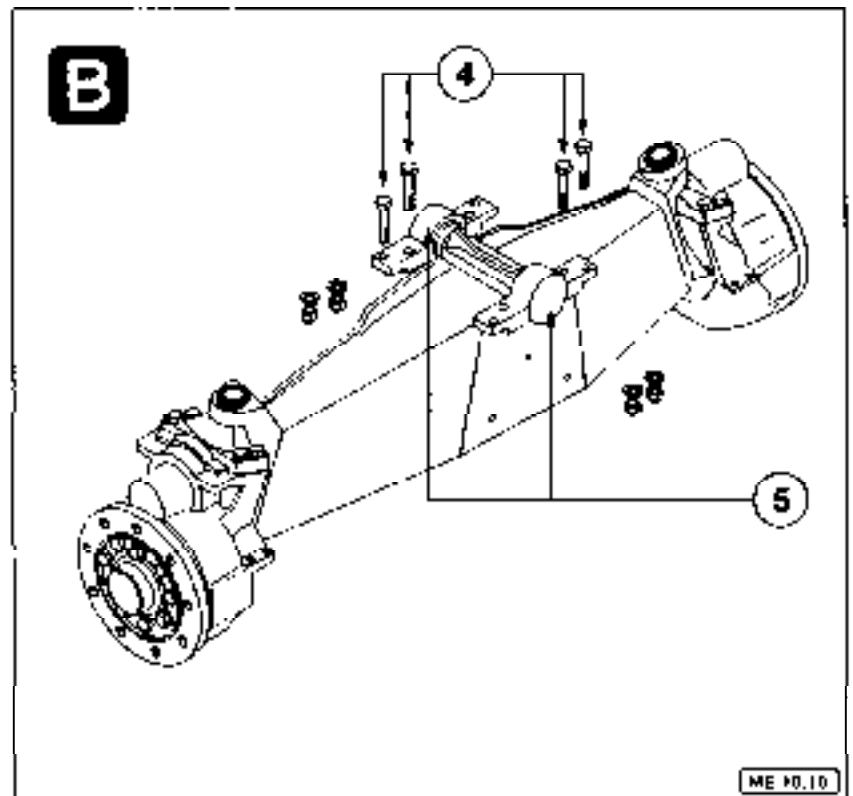
A) FRONT AXLE

- 1) Frame levelling cylinder
- 2) Transversal tie rod
- 3) Tie rod assembly



B) REAR AXLE

- 4) Fixing bolts
- 5) Oscillating axle supports



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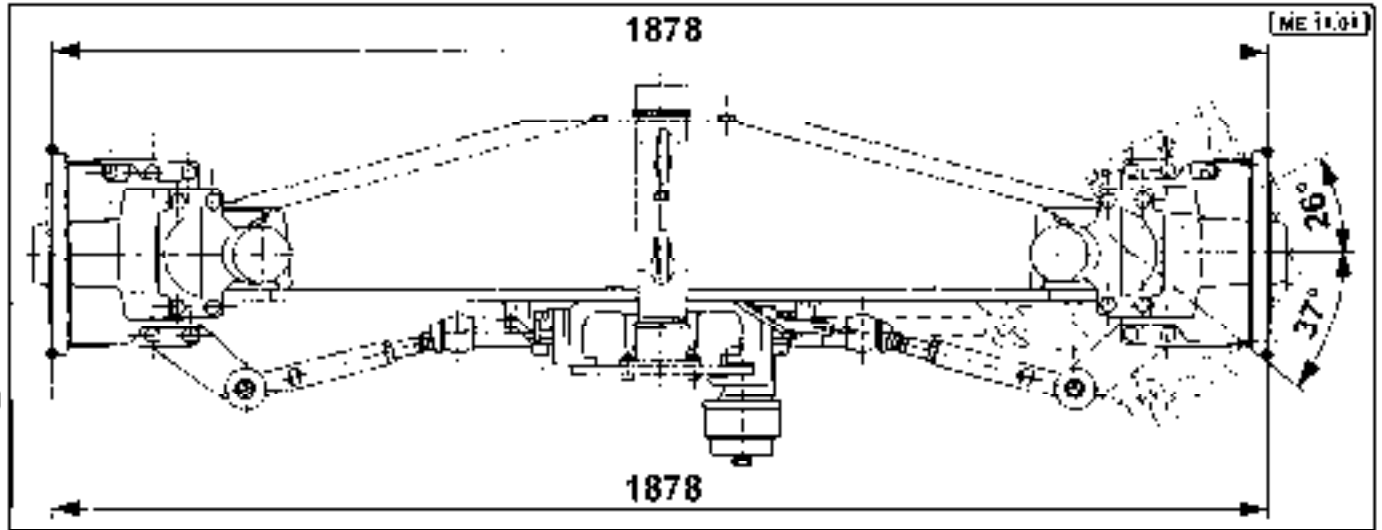
AXLE REASSEMBLY

- 1) Reinstall the axles in the reverse order as set out in the sections "FRONT AXLE REMOVAL" and "REAR AXLE REMOVAL", ensure that propshaft is reassembled in the correct orientation, in order to avoid irreparable damage to the transmission, ensure that the forks are reassembled according to the marks previously made. For further information see the chapter "HIGH SPEED PROPSHAFT DISASSEMBLY BETWEEN GEAR BOX AND DIFFERENTIAL GEARS"
- 2) Carry out the brake bleeding (see the chapter "SERVICE BRAKES").

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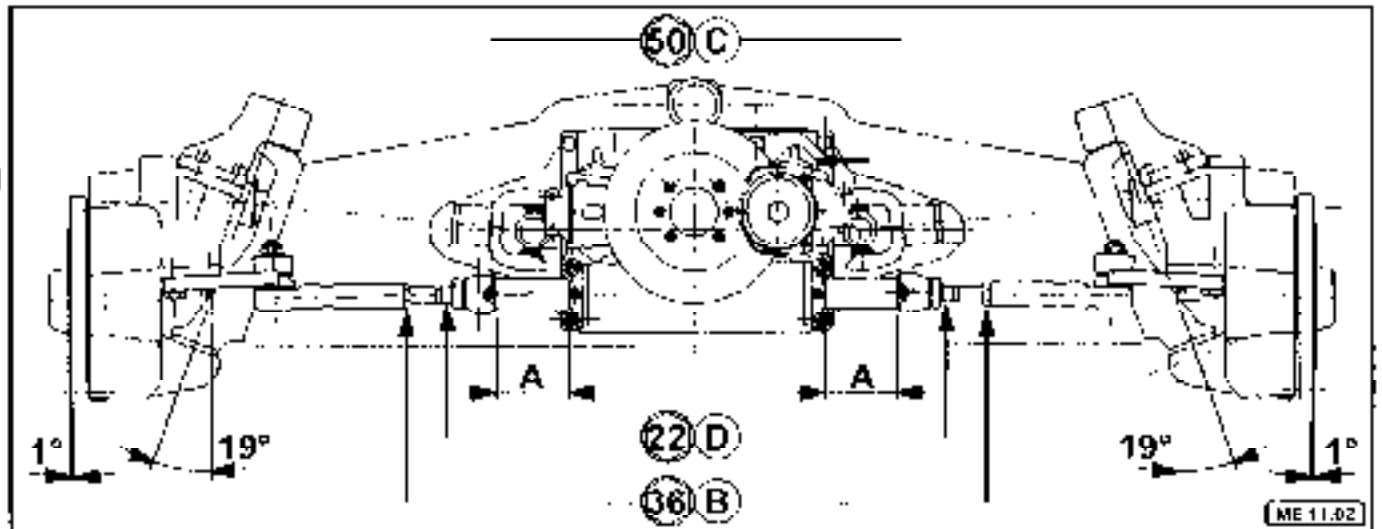
11 - HUB ALIGNMENT

If abnormal tyre wear occurs check hub alignment. The two measurements shown must be equal.



To check hub alignment (see picture ME 11 02):

- steering cylinder must be centralised "A" must be equal on both side
- operate the tie rod to correct hub alignment
- release the lock nut (B)
- hold cylinder rod in position (C)
- adjust turning the bar of the tie rod (D).
- if necessary operate both steering bar length
- tighten the locknuts (B).



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11 - HUB ALIGNMENT



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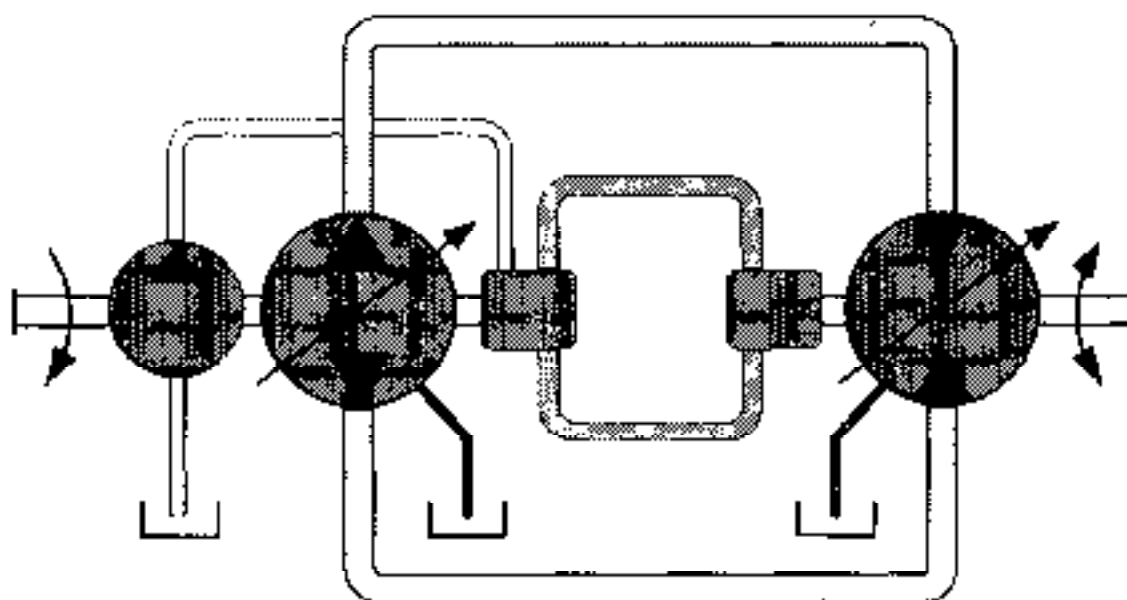
Domino Mining Equipment Pty Ltd

A.C.N. 002 705 881 P.O. Box 69, WYONG, N.S.W. (Aust.) 2259 Phone (043) 53 1033 - Fax (043) 51 2119

SERVICE MANUAL

P 35.9 EVA

HYDROSTATIC TRANSMISSION "REXROTH" SYSTEM



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HYDROSTATIC TRANSMISSION CIRCUIT "REXROTH" WITH VARIABLE DISPLACEMENT MOTOR..... 2

NECESSARY TOOLS AND TEST INSTRUMENTS / REPAIR TIMES..... 3

HYDROSTATIC TRANSMISSION CIRCUIT..... 4

SPEED SELECTION AND DIFFERENTIAL-LOCK CIRCUIT..... 5

PARKING BRAKE AND SERVO/BRAKE CIRCUIT..... 6

DISASSEMBLY OF THE MAIN COMPONENTS OF THE HYDROSTATIC TRANSMISSION..... 7

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This manual provides the information necessary for correct and safe execution of maintenance works not included in the **INSTRUCTION HANDBOOK**; It is addressed to qualified fitters, who have the required knowledge of mechanical, hydraulic and electric systems for the machine being serviced. All work carried out should comply with all relevant environmental and occupational health and safety requirements.

This symbol is used to identify the dimensions of the spanner to be used for some operations described in this handbook. The spanner type will be mentioned only if it draws away from the standard



GENERAL NOTE

Always ensure any work carried out on the vehicle is carried out on level ground. If this is not possible the ground should be as level as possible and the vehicle should be chocked to prevent any possibility of the vehicle rolling.

HYDROSTATIC OIL

MOBILFLUID 424

For different brands of oil, ensure that they have characteristics equal to the above product. Should you wish to change the product brand, the system must be flushed clean of the original fill product.

In case of use of oils of different characteristics, any warranty claim will be automatically refused.

Check oil level daily

Replace oil and cartridge (86) at the intervals shown in the **INSTRUCTION HANDBOOK**



SAFETY AND GENERAL INSTRUCTIONS



CAUTION!!

Serviceing of the machine shall only be carried out by skilled and competent personnel. For repair of parts that are not part of the normal scheduling, refer MERLO AUSTRALIA technical service.



WARNING!!!

Always wear suitable protective clothing and safety equipment when using lubricants. Extra care should be taken to avoid burns when working with hot fluids or elements.



WARNING!!!

Always dispose of oils, filters or other mediums in an environmentally friendly manner. Use official organisations for the disposal of such fluids.

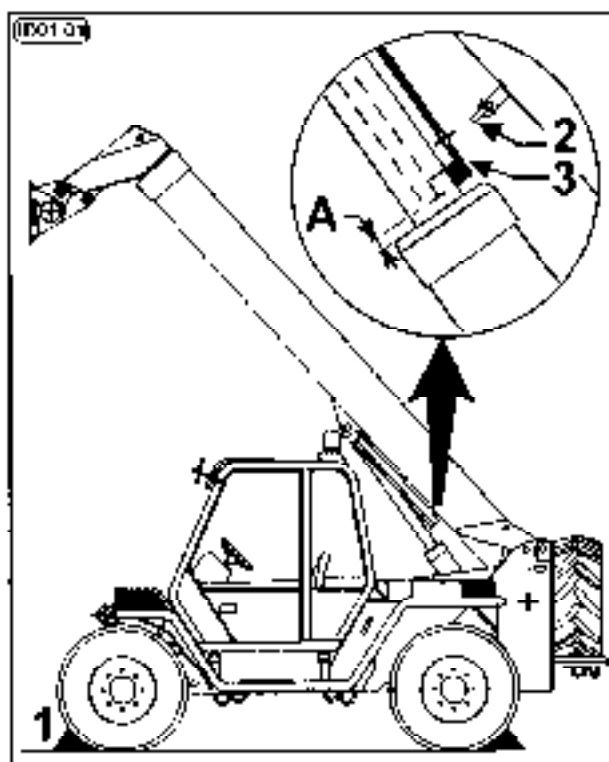
Before carrying out any kind of servicing, position the machine on flat, level ground and:

- retract and lower the boom
- release loads or attachments on the vehicle
- put chock (1) at the front and back of the wheels to avoid accidental movement
- apply the hand brake, place the transmission lever in neutral position and stop the engine.

Should it be necessary to carry out servicing operations with the boom lifted, use the safety lock following these instructions:

- lift the boom
- apply the hand brake, place the transmission lever in neutral position and stop the engine
- working from the left rear mudguard, rotate lever (2) and rest the safety lock (3) on the lifting cylinder rod
- re-start the engine and slowly lower the boom till the lock is at about 10 mm from the cylinder head (dimension A)
- before lowering the boom replace the safety lock in the original position

To work under vehicle it is preferable to use a pit or height adjustable work platform. The vehicle weight is stated on identification plate





CONVERSION FACTORS

ND01.02

1 Kgm	=	9,806 N·m
"	=	7,233 lb·ft
"	=	86,79 lb·in

1 bar	=	100 KPa
"	=	14,5 psi (lb/in²)
"	=	0,1 N/mm²

1 Kg	=	9,806 N
"	=	2,204 lb



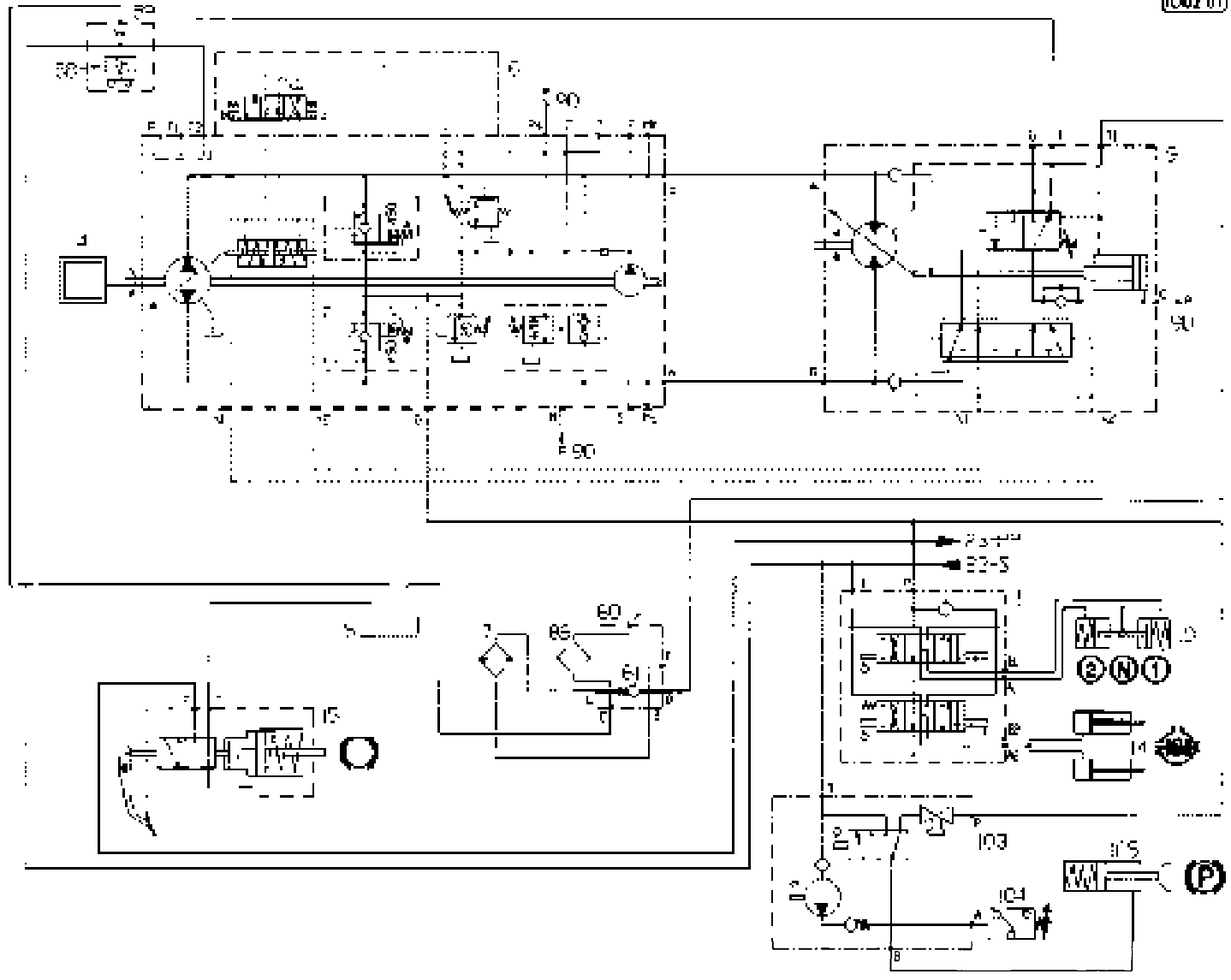
2 - HYDROSTATIC TRANSMISSION CIRCUIT "REXROTH" WITH VARIABLE DISPLACEMENT MOTOR



P 35.9 EVA (SAV 542201)

1002 01

- 4 Diesel engine
- 5 Tank for hydrostatic oil
- 6 Hydrostatic pump, variable delivery type
- 7 Heat exchanger
- 9 Hydrostatic motor variable displacement
- 10 Speed selection cylinders
- 11 Speed selection and differential-lock control valve
- 14 Cylinders for differential-lock
- 15 Servo / brake
- 60 Filter carrier block
- 61 One way valve (by-pass)
- 86 Cartridge filter
- 88 Thermal contact
- 89 Block for thermal contact
- 90 Pressure tube
- 103 Parking brake control valve
- 104 Pressure switch
- 105 Parking brake caliper



23 - PP (S) = Connection ports to item 23 - PP
 (S) no hydraulic circuit

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2 - HYDROSTATIC TRANSMISSION CIRCUIT "REXROTH" WITH VARIABLE DISPLACEMENT MOTOR



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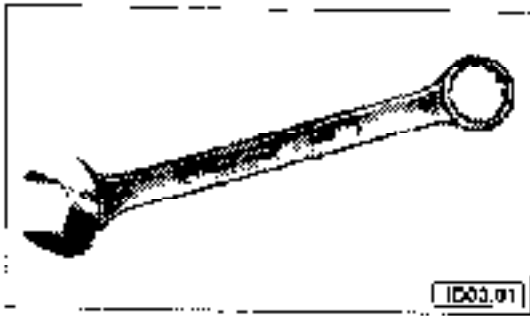
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SPECIAL TOOLS	3
TEST INSTRUMENTS.....	3
REPAIR TIMES.....	4

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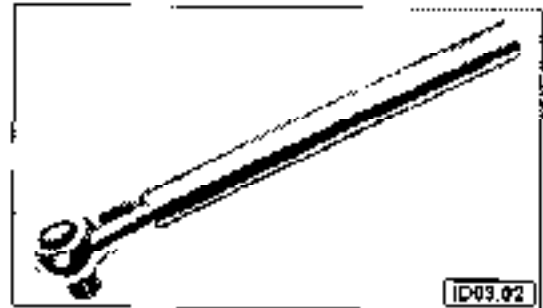


STANDARD TOOLS

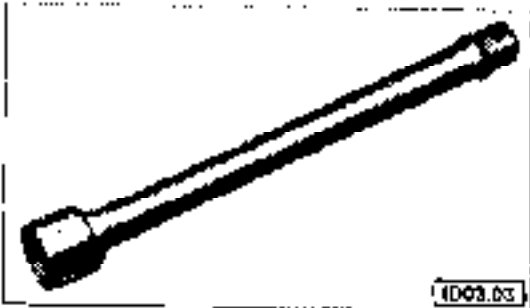
Spanner: 10, 13, 14, 17, 19, 22, 24, 27, 30, 32, 36, 41, 50



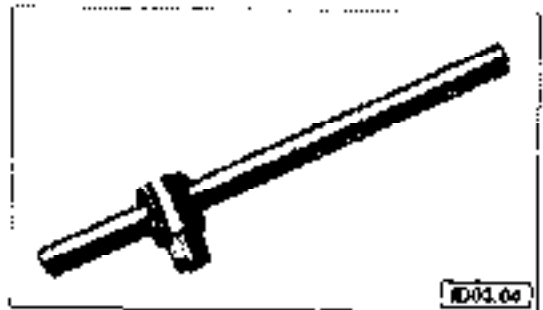
Ratchet



Extension. L = 50, 100, 200

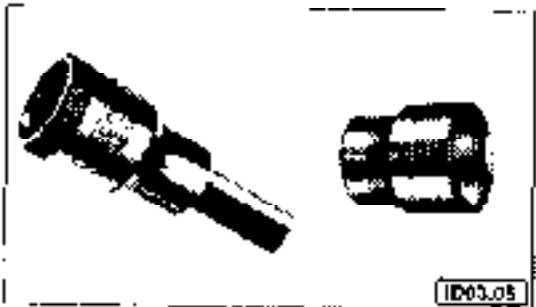


Sliding T-Bar



Sockets.

- external hexagon 8
- inner hexagon 13, 17, 19, 24, 27



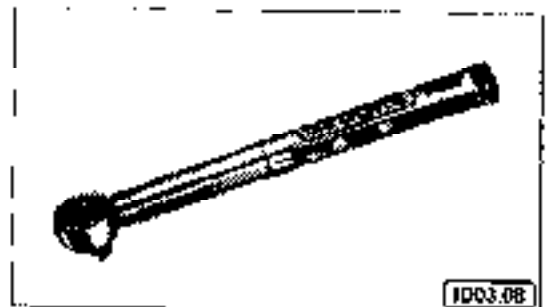
Swivel socket bar L = 400 - inner hexagon 7



Allen Key: 2.5, 3, 5, 6,



Torque wrench



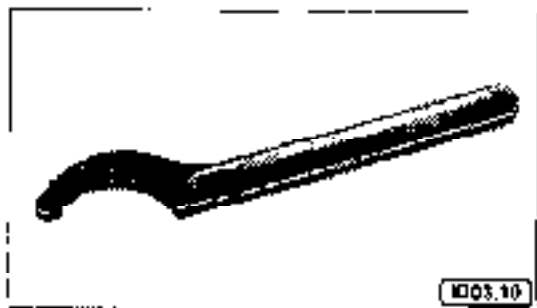
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Pipe wrench L = 500



SPECIAL TOOLS

'C' spanner (Part No 601070)



Filter spanner (Part No 031748)



TEST INSTRUMENTS

It is advisable to use the following pressure gauges (glycerine immersed) and instruments:

- 2 pressure gauges, scale end 600 bar
- 1 pressure gauge, scale end 40 bar.
- 1 thermometer, scale end 100° C.
- 1 R.P.M. counter, scale end 5000 RPM
- 1 millimeter, current I = 1,5 A (scale end) / voltage V = 30 V (scale end).

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REPAIR TIMES

- Hydrostatic pump disassembly about 1 hour and 30 minutes.
- Hydrostatic pump assembly about 1 hour and 45 minutes.
- Hydrostatic pump and connection flange on the engine disassembly about 2 hours and 30 minutes.
- Hydrostatic pump and connection flange on the engine assembly about 2 hours and 50 minutes.
- Refilling of the system after a service or disassembly about 15 minutes
- Servobrake disassembly about 1 hour.
- Overhaul of the servobrake inner parts about 25 minutes.
- Servobrake reassembly about 1 hour and 10 minutes.

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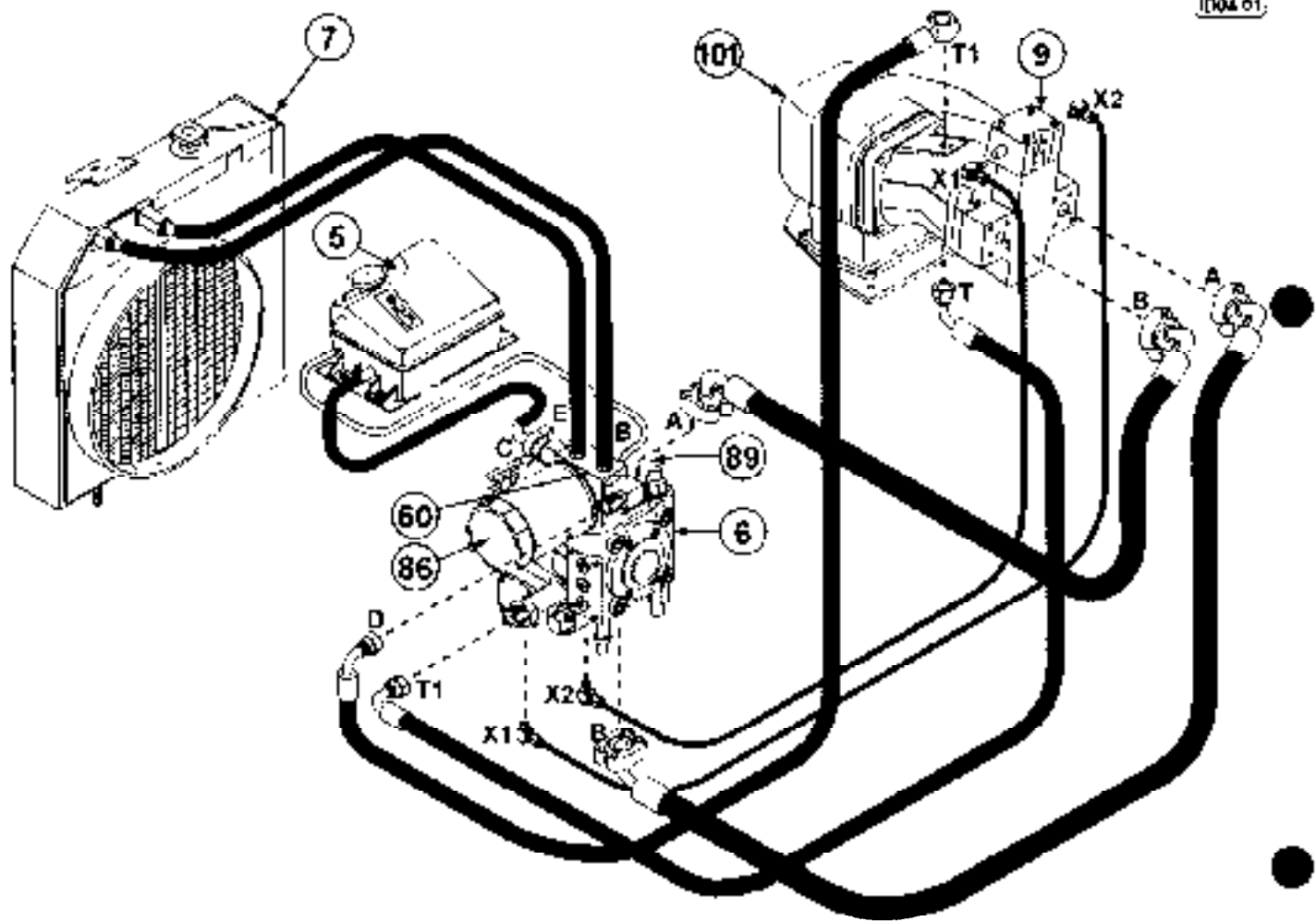
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4 · HYDROSTATIC TRANSMISSION CIRCUIT



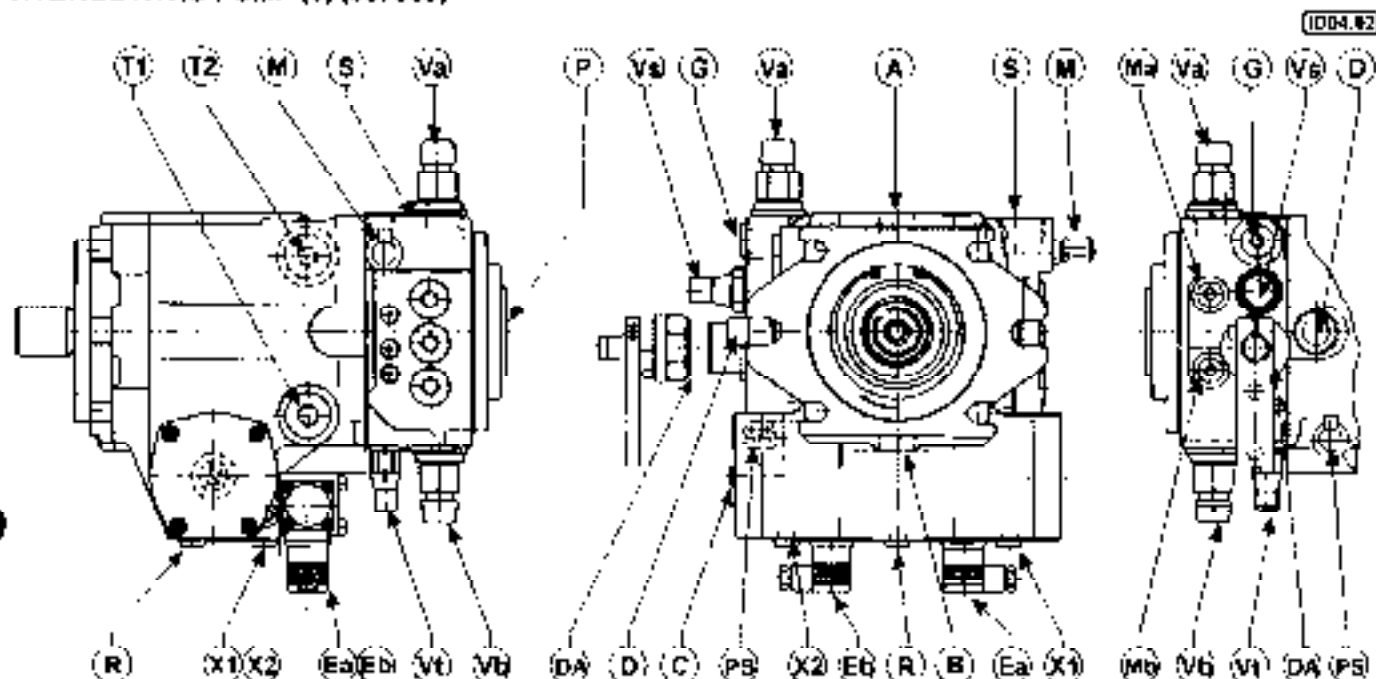
HYDROSTATIC TRANSMISSION CIRCUIT WITH VARIABLE DISPLACEMENT MOTOR



- 5 Hydrostatic oil tank
- 6 Hydrostatic pump
- 7 Heat exchanger
- 9 Hydrostatic motor, variable displacement
- 60 Block, filter holder
- 86 Filter
- 89 Block for thermal contact
- 101 2-speed gearbox

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HYDROSTATIC PUMP (6) (037066)



Characteristics of pump:
variable delivery type (max. 71 cubic centimeters), clockwise rotation, with auxiliary overfeeding pump (cylinder 19 cubic centimeters).

IMPORTANT !!!

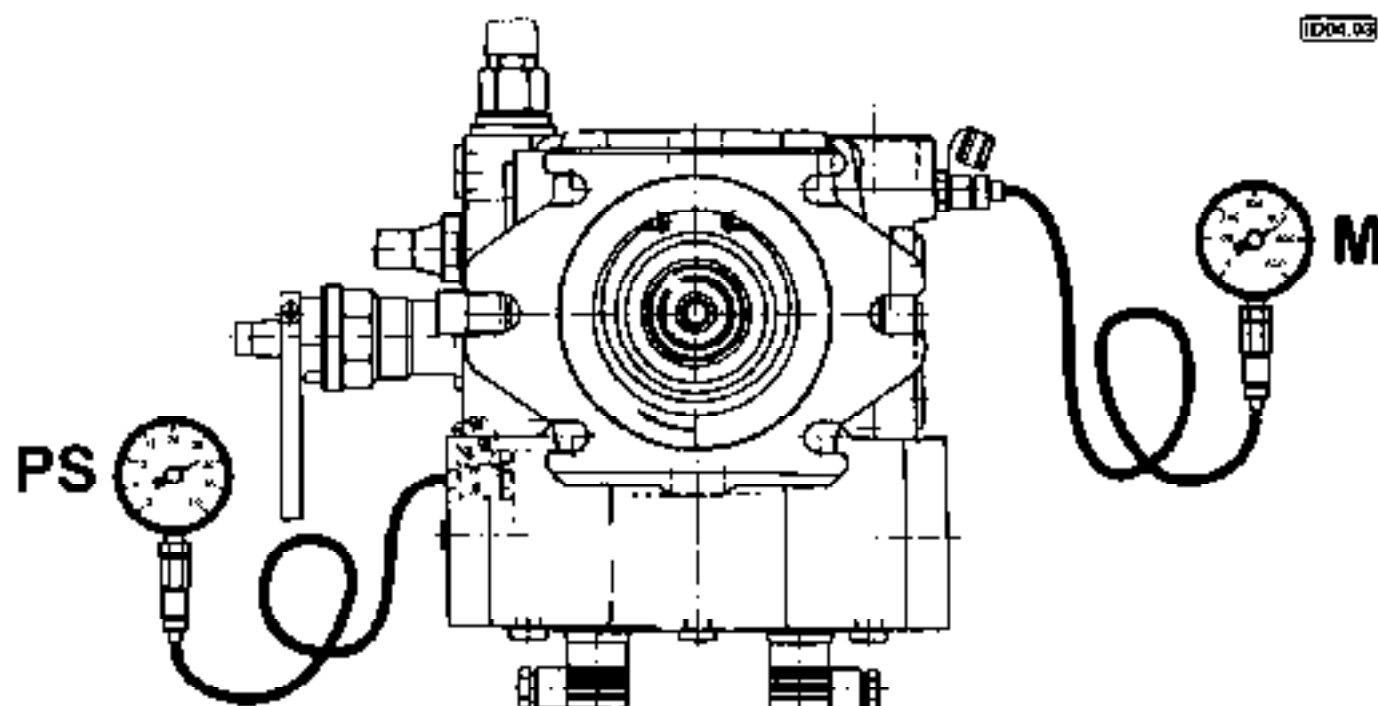
Do not tamper with zero-settings, either mechanical (C) or hydraulic (D)

- A, B = main ports (connected to B and A of the hydrostatic motor)
- C = mechanical zero-setting
- D = hydraulic zero-setting
- DA = regulating valve
- Ea, Eb = magnets
- G = delivery to P gear box control valve (11), to P servo/brake (15) to P parking brake control valve (103) and to PP main directional control valve (23)
- M = main pressure, check point on port A and B - overfeeding flow pressure check point (with pressure hose)
- Ma = main pressure, check point on port A (closed)
- Mb = main pressure, check point on port B (closed)
- P = auxiliary overfeeding pump
- PS = pilot pressure check point (with pressure hose)
- R = circuit filling plug
- S = overfeeding pump, suction
- T1 = drain to T hydrostatic motor (9)
- T2 = block for thermalcontact (88)
- Va, Vb = max. pressure relief piloted valves
- Vc = max. pressure valve on overfeeding pump
- Vt = pressure cutting valve
- X1 = pilot to X2 hydrostatic motor (9)
- X2 = pilot to X1 hydrostatic motor (9)

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PRESSURE MEASUREMENT ON HYDROSTATIC PUMP



ID04 03

- Pressure check points M12 x 1,5 / M16 x 2 to connect pressure gauge M
- Pressure check point M14 x 1,5 / M16 x 2 to connect pressure gauge PS
- High pressure plastic hoses (P max. 640 bar) with threaded fittings M16 x 2

STANDARD VALUES AND MEASUREMENT CONDITIONS
(with oil at temperature of approx. 65° C)

ID04 04

Measure on	Pressure gauge scale end (bar)	Stalling machine (1)	At 900 RPM (3)	At 1600 RPM (3)	At 2550 RPM (3)
M (main pressure)	600	Yes	60	420	420
M (overfueeing pressure)	40	No! (2)	value not indicative		26
PS (pilot pressure)	40	Yes	7	14	20

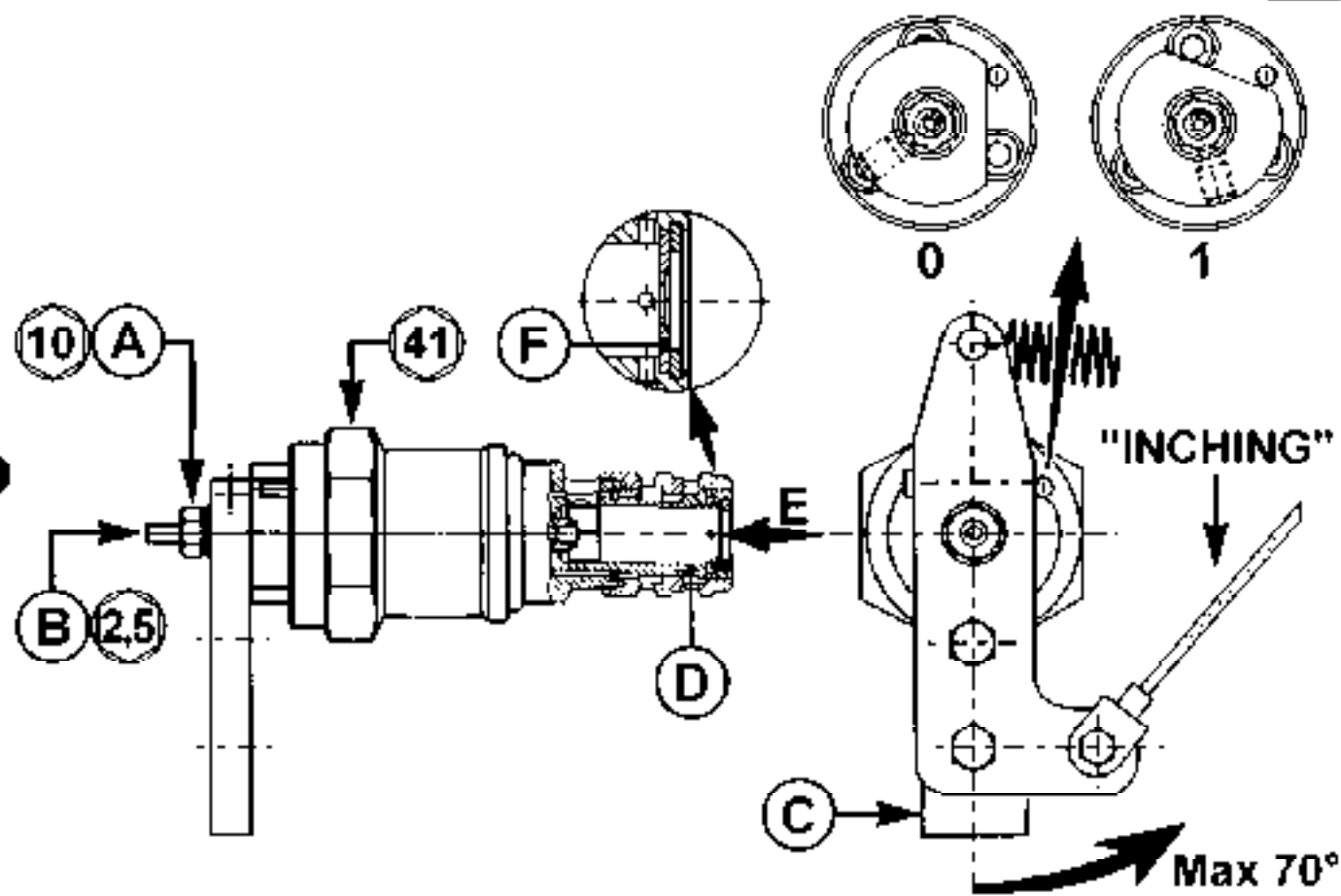
NOTE

- (1) Stalling machine = brake applied with selector in forward or reverse and second speed
With selector in forward, check on :
main pressure (M) on port A and pilot pressure (PS) branch X1
With selector in reverse, check on :
main pressure (M) on port B and pilot pressure (PS) branch X2.
- (2) Shift the gear box and the forward/reverse selector to neutral position.
- (3) The RPM of the diesel engine has to be adjusted using the suitable lever on the accelerator pedal and the engine speed indicator on the instrument board.



REGULATING VALVE (DA)

1004.03



DA REGULATING SYSTEM:

In the range between 900 and 1800 RPM the valve regulates the pilot pressure and consequently the pump delivery in relation with the engine revolution.

"INCHING" CONTROL

The pump delivery can be brought to zero by acting on the Inching pedal, even with engine at full RPM

"ON THE MOVE" RPM SETTING

Operating the Inching pedal, check that:

- with the pedal fully down, the regulating lever (C) is at its stroke end (1)
- with the pedal in rest position, the regulating lever (C) turns easily back to "zero" position (0).

The RPM at the beginning of the movement must be 900 RPM. Under these conditions the operating pressure measured on tap M (with stalling machine) must be 60 bar

If necessary loosen lock nut (A) and operate the screw (B) to restore the correct value: slowly screw counterclockwise if it is necessary to increase the pressure (M), clockwise if it is necessary to reduce it. When you have finished the adjustment tighten the lock nut

VALVE MAINTENANCE

Check that the slider D slides smoothly in its seat and press the surface E. Clean valve with diesel fuel and blow compressed air to remove dirt. Before assembling the valve again, make sure that it is dry.

The regulating valves, supplied as spare parts, do not include the diaphragm (F). Before substituting a valve, it is necessary to take the diaphragm from the old valve and assemble it on the new valve.



PRESSURE RELIEF VALVES, PILOTED TYPE (Va - Vb)

WORKING

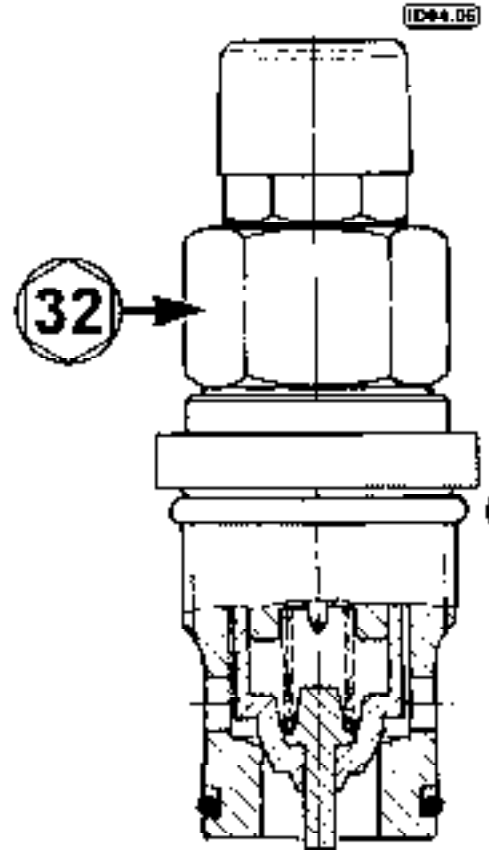
The pump is filled with two pressure relief valves (set at 450 bar) which protect the hydrostatic transmission from overloads. They also act as overfeeding valves.

IMPORTANT !!

The pressure relief valves must work only for short periods of time. Check temperature in the oil tank !

VALVE MAINTENANCE

Wash the valve with diesel fuel and blow compressed air to remove dirt. Before assembling the valve again, make sure that it is dry.



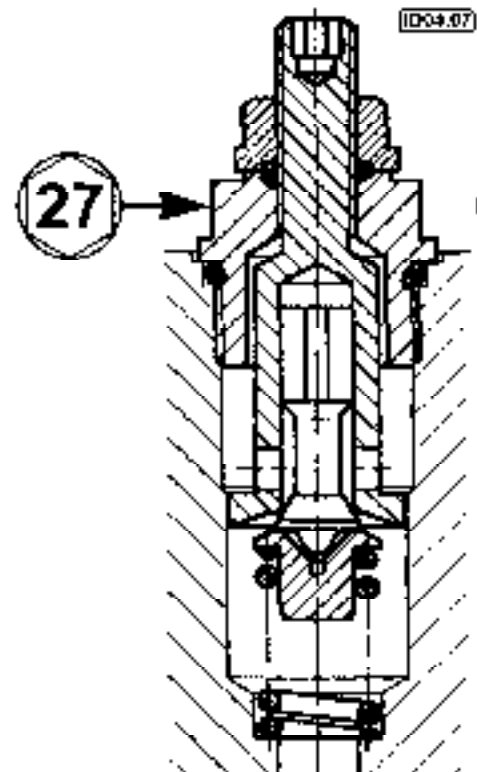
PRESSURE RELIEF VALVE ON OVERFEEDING PUMP (Vs)

WORKING

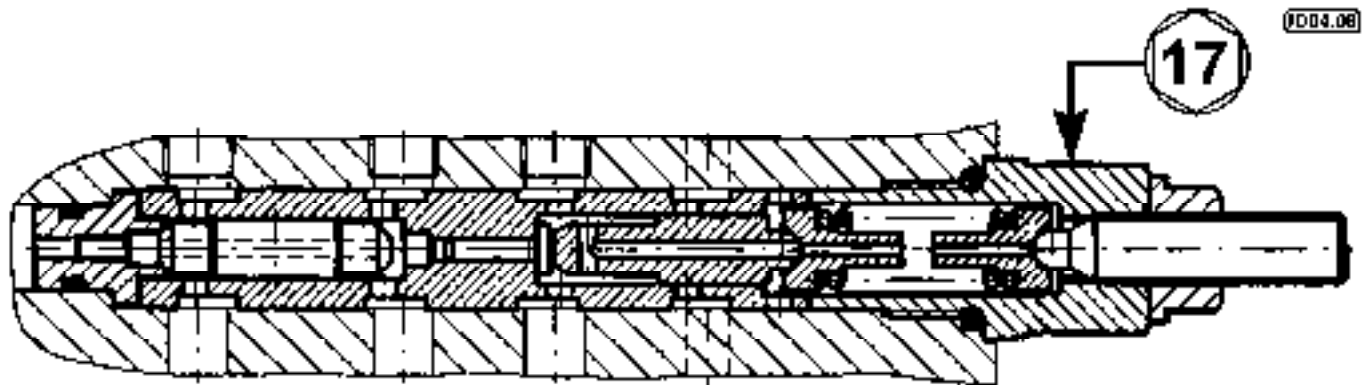
The function of the valve (set at 28 bar) is to limit the working pressure of the supercharging pump.

VALVE MAINTENANCE

Wash the valve with diesel fuel and blow compressed air to remove dirt. Before assembling the valve again, make sure that it is dry.



PRESSURE CUTTING VALVE (VI)



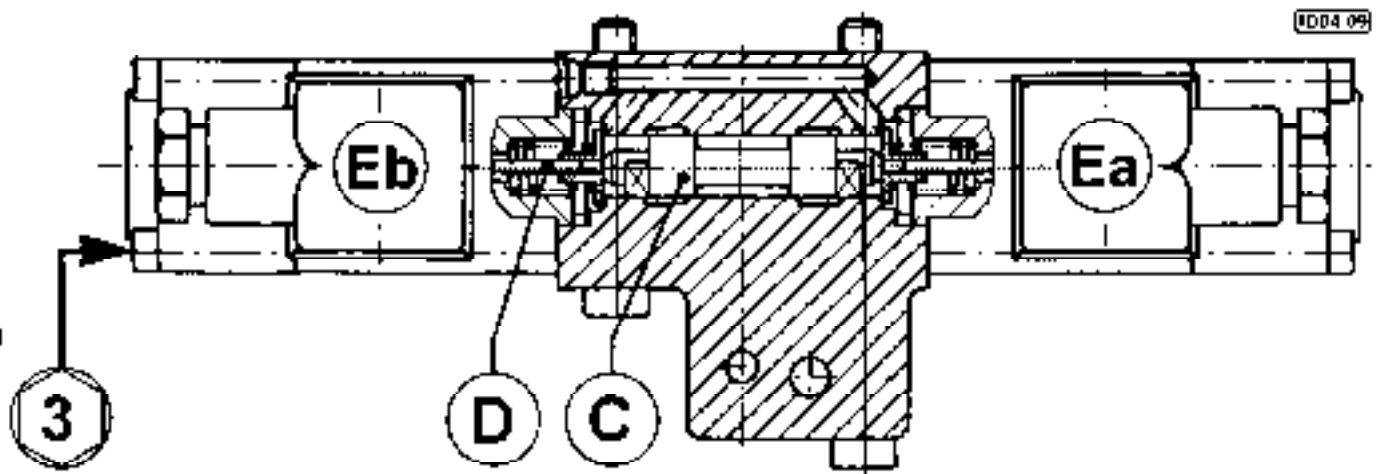
WORKING

This valve (set at 420 bar) prevents the max. pressure valves from interfering during the acceleration phases (pressure increase). In case of overloads (overcoming of the set pressure valve), the pump self-annuls its displacement. The quick pressure variations present during this phase are limited by the max pressure valves.

VALVE MAINTENANCE

Wash the valve with diesel fuel and blow compressed air to remove dirt. Before assembling the valve again, make sure that it is dry.

MAGNETS (Ea - Eb)



Magnets operate the forward / reverse direction of the machine:

- magnet Eb = forward
- magnet Ea = reverse

HOW TO CHECK MAGNETS

Remove the upper cap

Remove the magnet and test it at 24 Volt D.C.

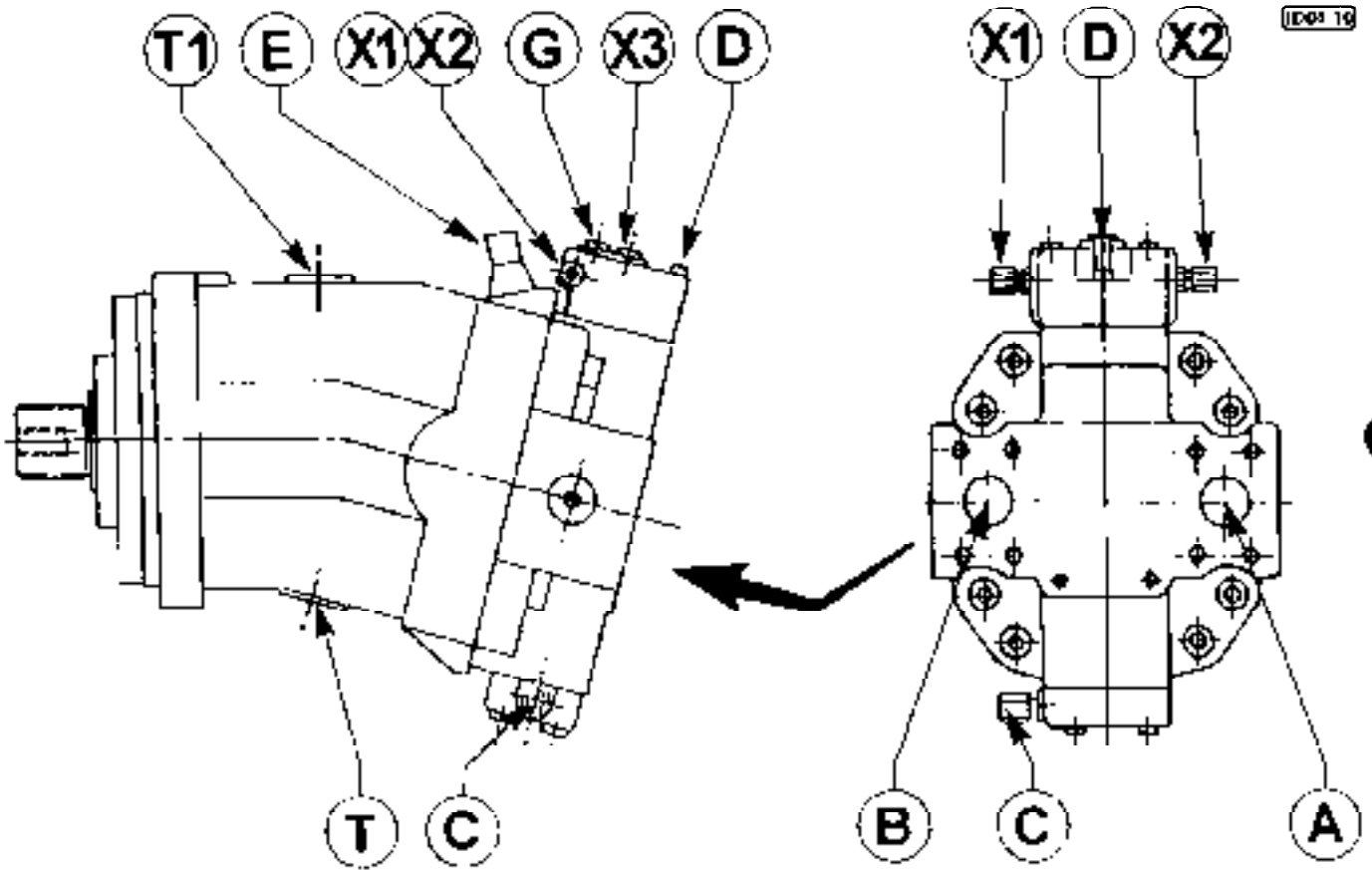
Check that slider (D) activates when energised and returns to original position when de-energised

Verify that piston (C) slides correctly.

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VARIABLE HYDROSTATIC MOTOR (9) (037222)

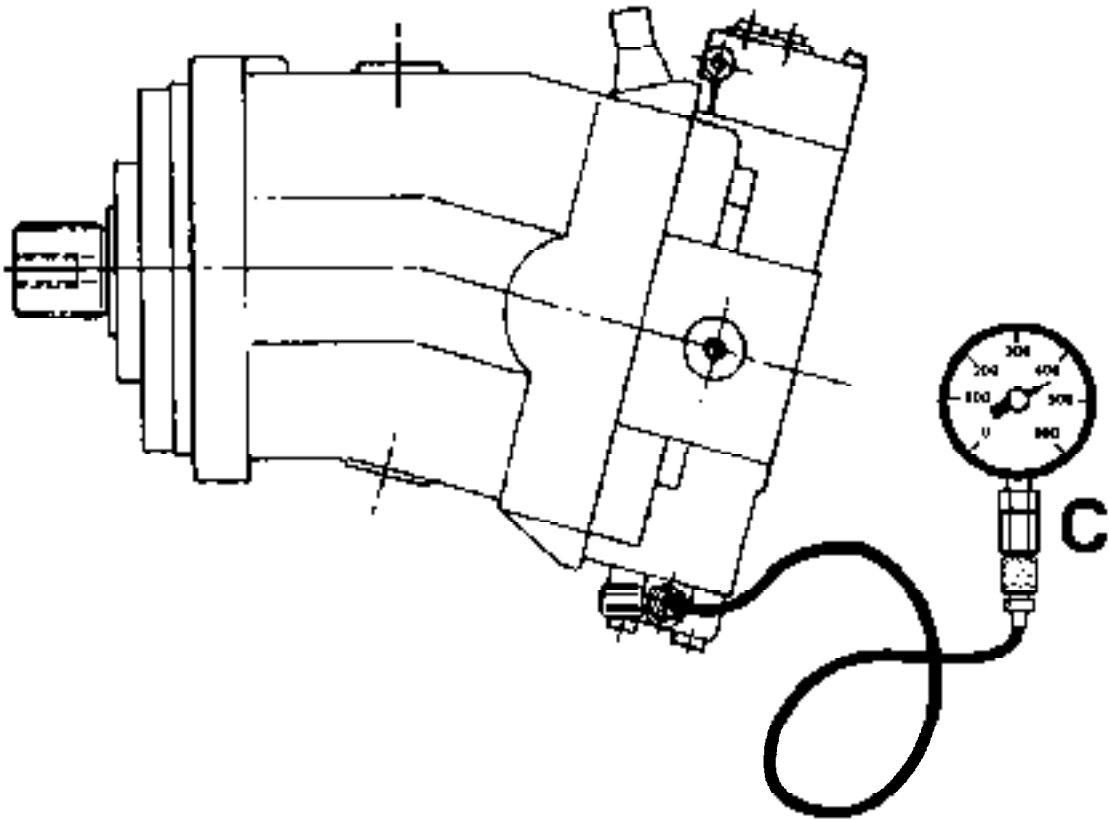


- A,B = main ports (connected with B and A hydrostatic pump)
- C = pressure check point in relation to displacement (with pressure tube)
- D = motor displacement change setting screw
- E = motor displacement setting screw
- G = main pressure check point (closed - equal to M pump)
- T = drain from T1 hydrostatic pump (6)
- T1 = drain to D block, filter hooker (6D)
- X1 = piloting from X2 hydrostatic pump (6)
- X2 = piloting from X1 hydrostatic pump (6)
- X3 = pilot pressure check point (closed - equal to PS pump)

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SETTINGS CHECK ON VARIABLE HYDROSTATIC MOTOR

1004 10



- Pressure check plug M 12 x 1,5 / M 16 x 2 and high resistance plastic hose (P max = 640 bar) with threaded fitting M 16 x 2
- Pressure gauge, scale end 600 bar

The pressure gauge (C) shows motor pressure in relation to the displacement

- min. displacement: 43 cm³ (less torque, more RPM)
- max. displacement: 107 cm³ (more torque, less RPM)

Check pressure with oil at temperature of approx. 65°C

Lift the vehicle from ground, insert second gear and, acting on the accelerator, run the engine at maximum r.p.m.:

A) MOTOR DISPLACEMENT CHANGE SETTING

Gradually depress the brake pedal, pressure increases to reach, at the change of displacement, the pre-set value for variable motor (160 bar with naturally aspirated engine).

Further depress the brake pedal the pressure goes down to zero

B) MOTOR MINIMUM DISPLACEMENT SETTING

Check that the rotation speed of the Cardan joints set on the gear box is 3600 RPM.

If necessary, act on adjusting screws ref. D - E (see picture 1004 10) to restore correct values.

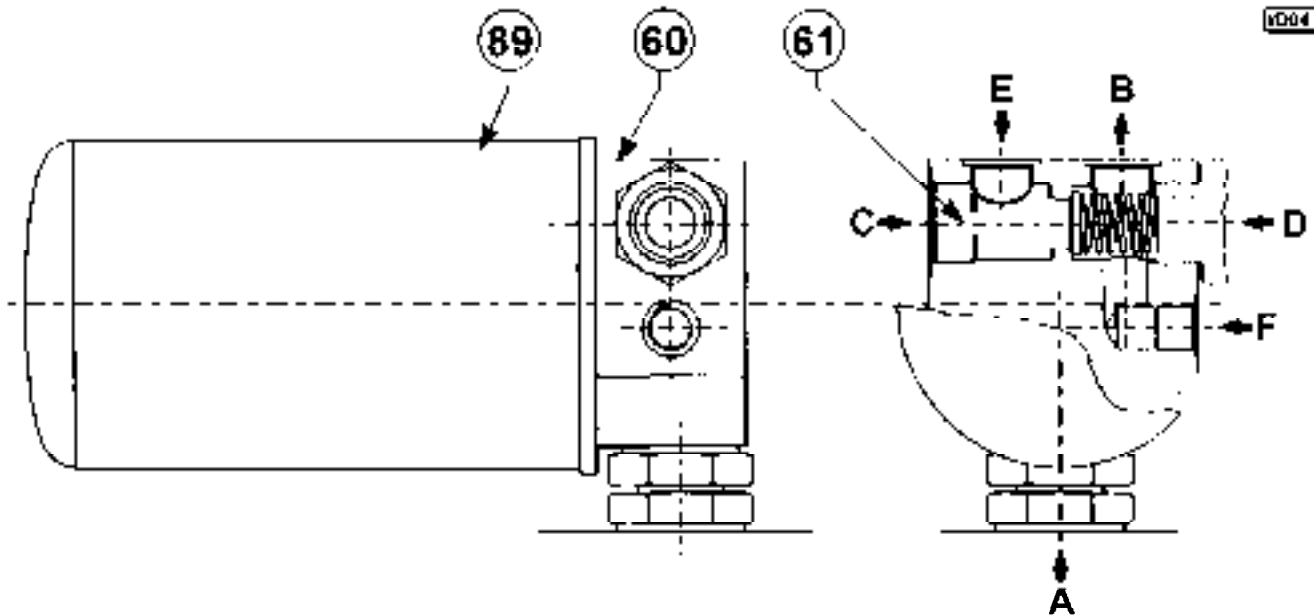


4 - HYDROSTATIC TRANSMISSION CIRCUIT



FILTER ASSEMBLY ON HYDROSTATIC PUMP

vD04.12

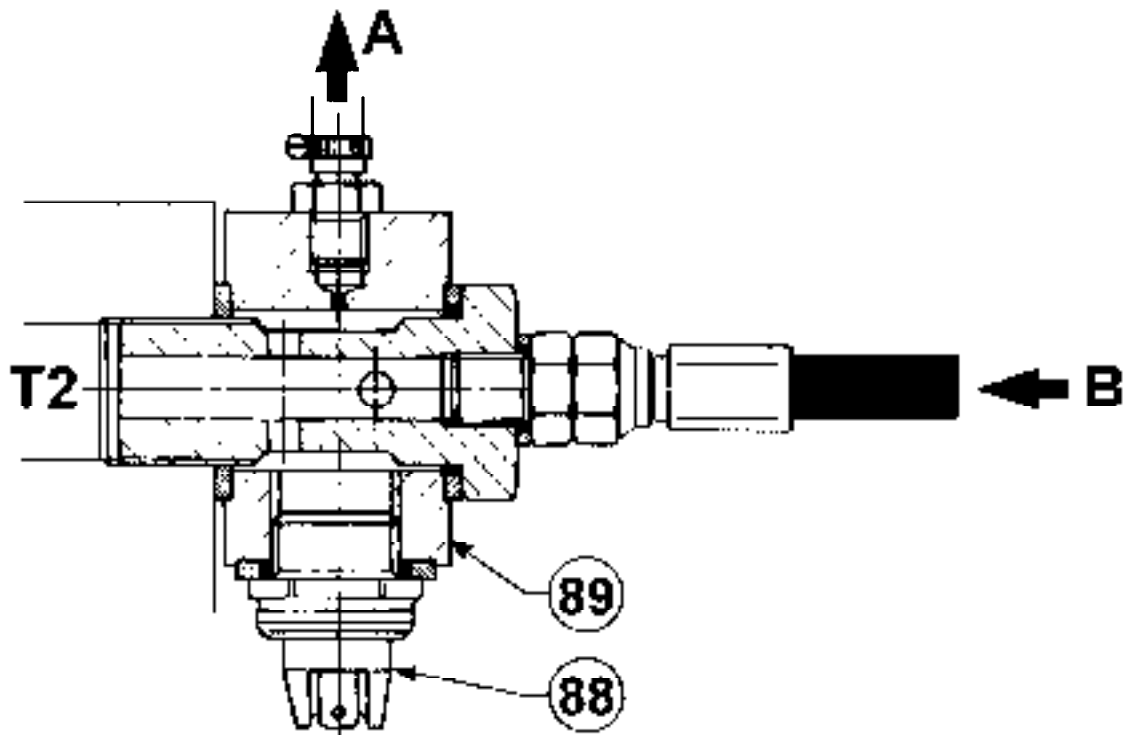


- 80 Block, filter holder (033117)
 - 81 By-pass valve (025145)
 - 86 Filter 10 microns (026611)
-
- A suction from S hydrostatic pump (6)
 - B return to heat exchanger (7)
 - C suction from oil tank (5)
 - D drain from T1 hydrostatic motor (9)
 - E delivery to heat exchanger (7)
 - F closed (see picture ID04.01)

When starting the line cold the by-pass valve (61 - Set A 1.75 bar) opens to prevent the oil from the pump flowing through the heat exchanger (7) (see picture ID04.01). This prevents excess pressure from damaging the pump.

THERMALCONTACT ASSEMBLY ON HYDROSTATIC PUMP

(1004,13)



88) thermalcontact (014466)

89) block for thermalcontact (025452)

A = breather on hydrostatic oil tank (5)

B = return from T gear box control valve (11), from T parking brake control valve (103) and from S main directional control valve (23)

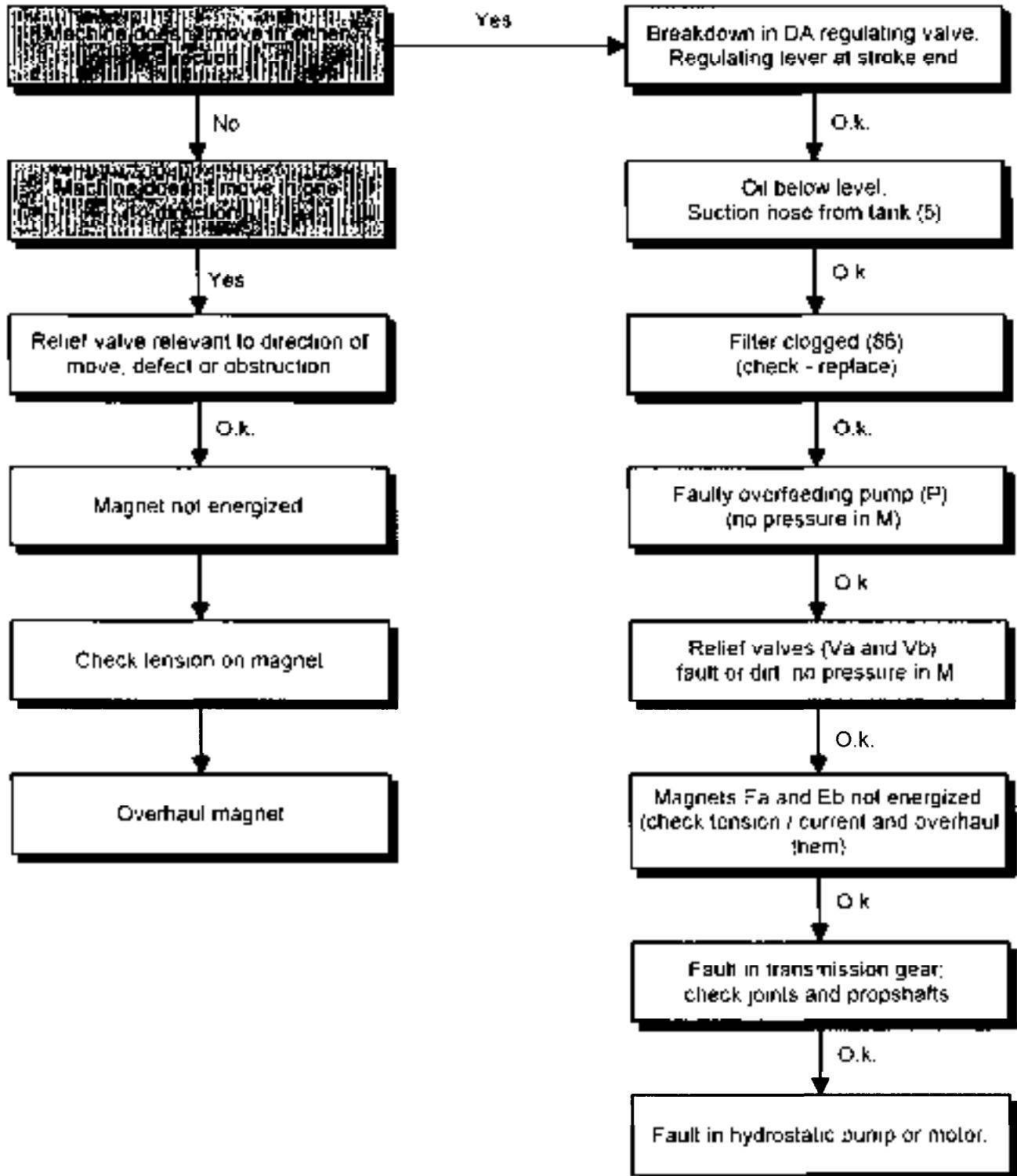
When oil temperature overcomes (+92° C) the thermalcontact (88) sends an electric signal to the horn to alert the operator.

Check possible causes.



HYDROSTATIC DRIVE, TROUBLE SHOOTING

IDM.14



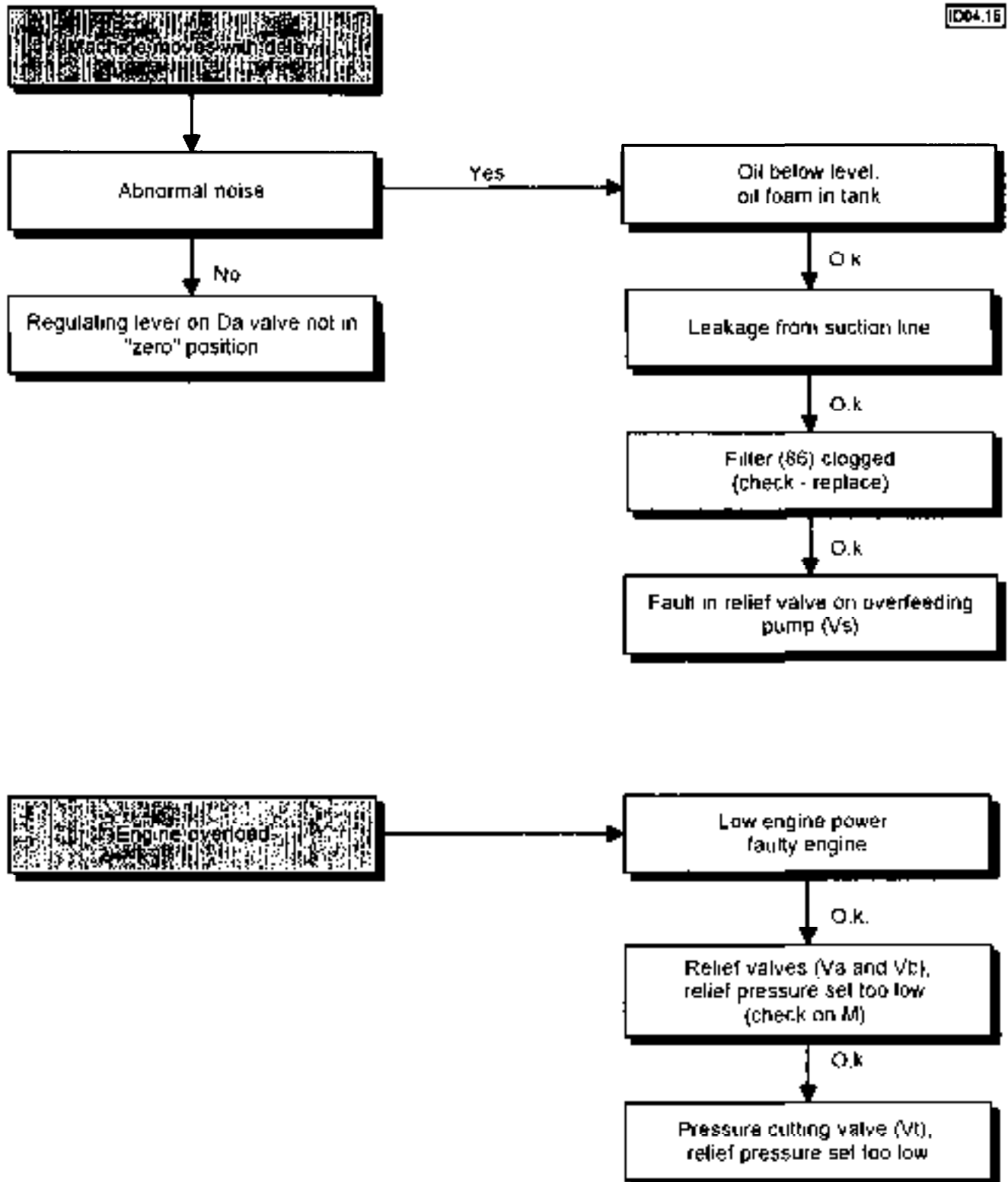
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4 - HYDROSTATIC TRANSMISSION CIRCUIT



ID04.1E



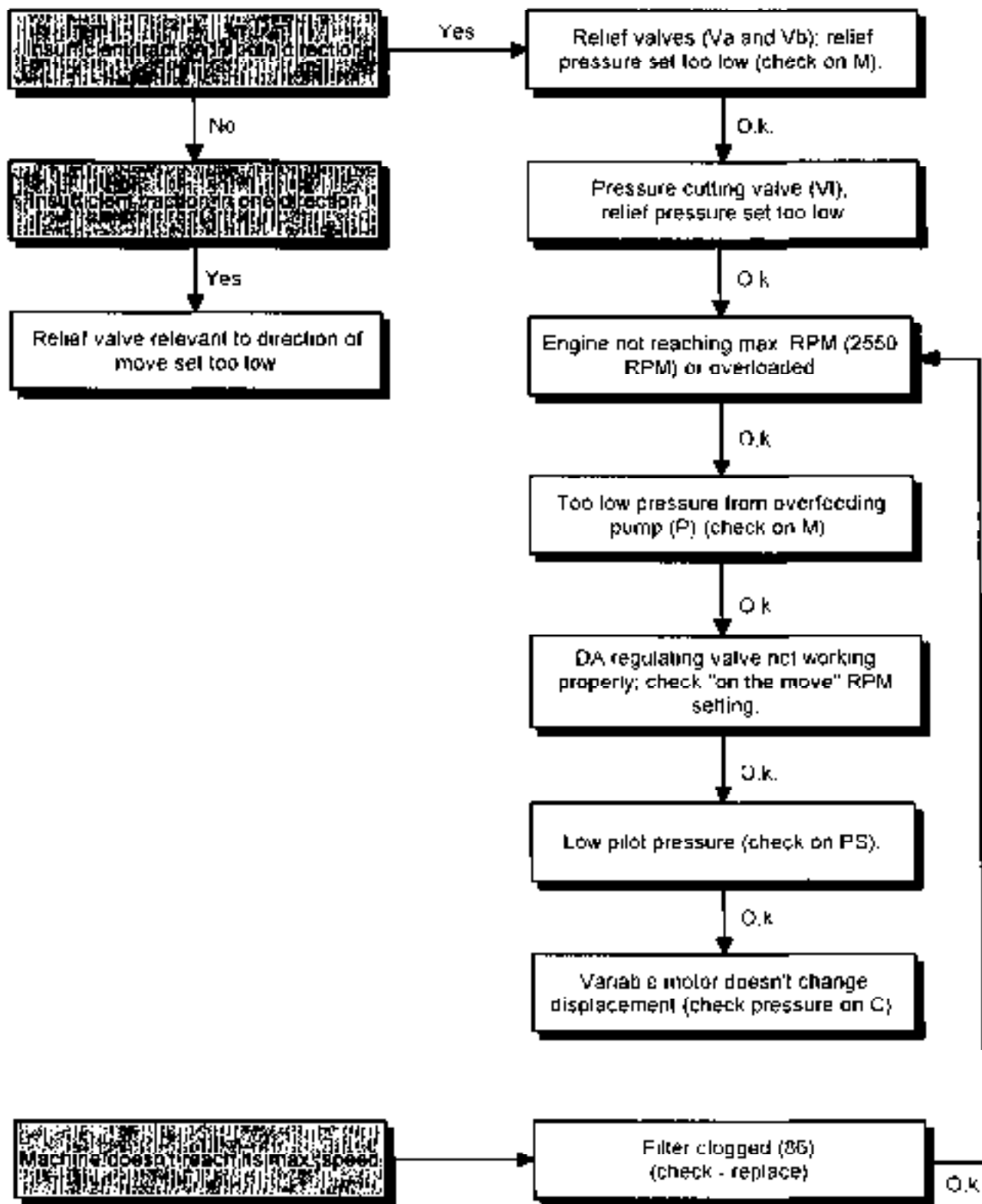
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4 - HYDROSTATIC TRANSMISSION CIRCUIT



1004.16



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ID004.17

Machine jerks when speed reducing

Magnets temporarily de-energized (Ea and Eb)

O.k

Fault in hydrostatic pump (6);
check pilot pressure (PS)

O.k.

Piloting pipes (X1-X2) inverted (check
the connection between the pump and
the variable hydrostatic motor)

Machine accelerates slowly

Low engine power

O.k

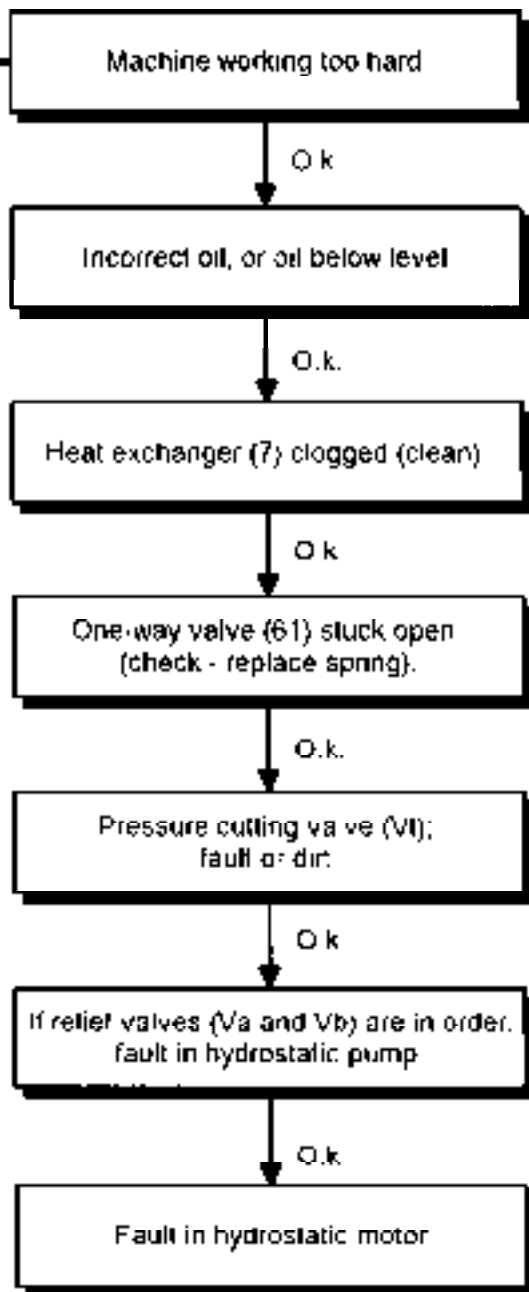
Variable motor doesn't change
displacement (check pressure on C).

O.k.

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ID04,18



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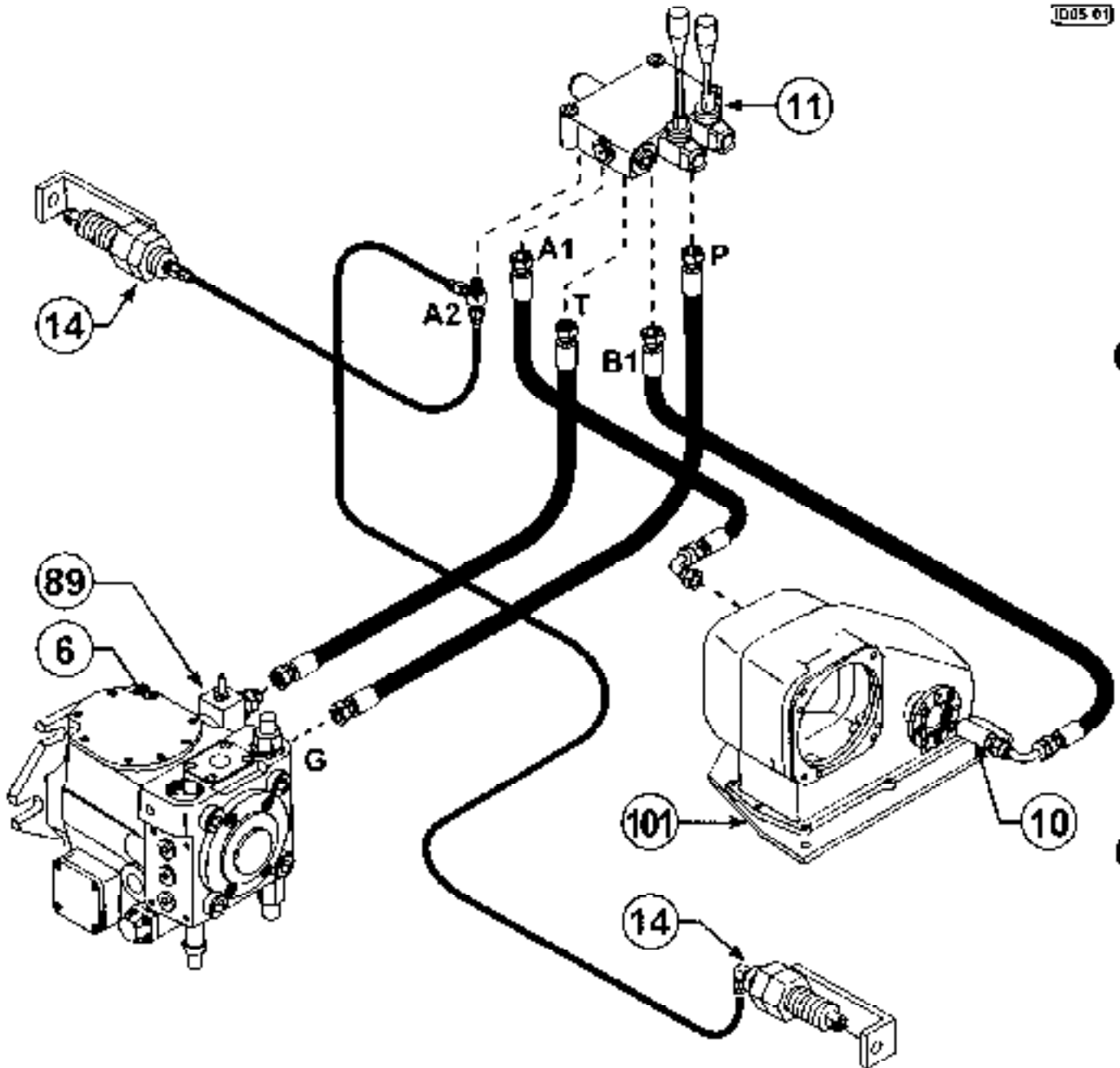
DIFFERENTIAL-LOCK, TROUBLE SHOOTING 5

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SPEED SELECTION AND DIFFERENTIAL-LOCK CIRCUIT

1005 01



- 6 Hydrostatic pump
- 10 Speed selection cylinders
- 11 Speed selection and differential-lock control valve
- 14 Cylinders for differential-lock
- 89 Block for thermalcontact
- 101 2-speed gearbox

Oil delivery to the circuit is given by the hydrostatic pump (P max = 28 bar)

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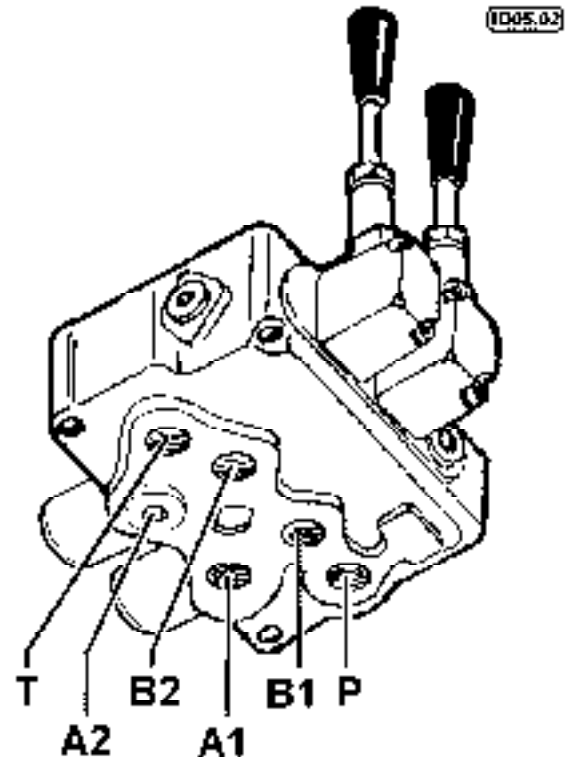


SPEED SELECTION AND DIFFERENTIAL-LOCK CONTROL VALVE (11) (022012)

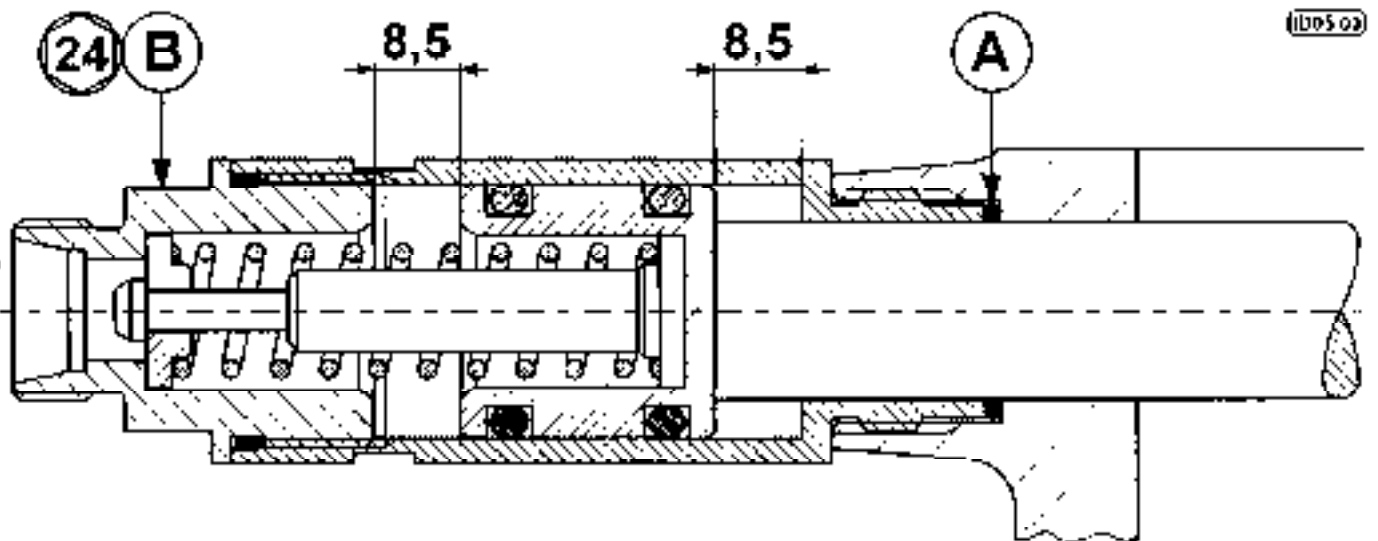
- P = from G hydrostatic pump (6)
- T = to block for thermalcontact (89)
- A1 = to speed selection cylinder (10) (high speed range)
- B1 = to speed selection cylinder (10) (slow speed range)
- A2 = to differential-lock cylinders (14)
- B2 = closed

Characteristics.

- one-way valve on suction: YES
- relief valve: NO (valve Vs on overfeeding pump)



SPEED SELECTION CYLINDERS (10) (036196)



Disassembly of the small cylinders of the gear box control is normally carried out to replace the O' Ring (A) or to verify the correct mechanical movement (stroke 8,5 + 8,5 mm). In any case it is necessary to drain the oil of the gear box and to disconnect the connecting pipes from the unions (B); therefore, acting on the unions, disassemble the small cylinders

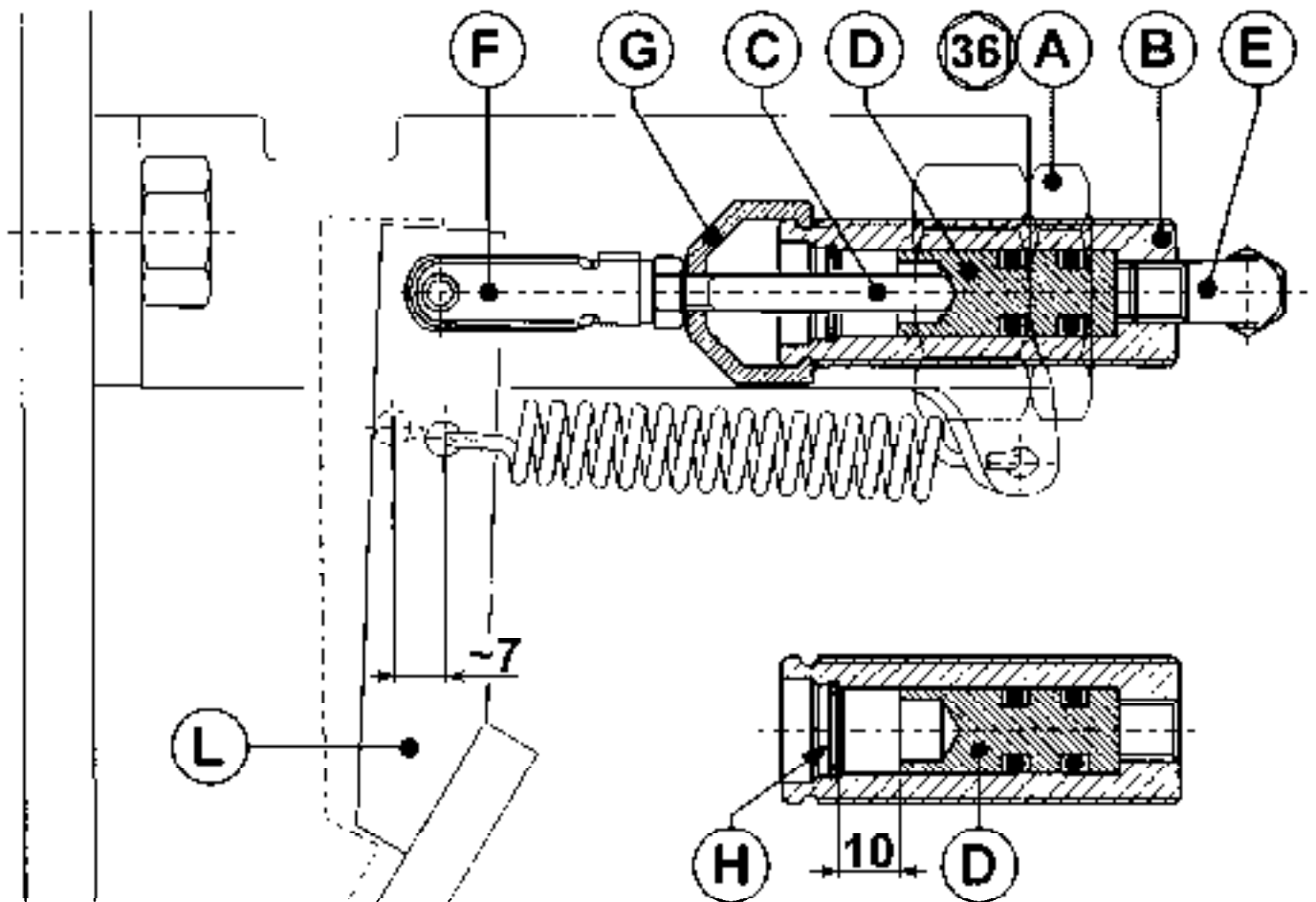
If the cylinder leaks from the inner seals it is advisable to replace the complete assembly, care should be taken not to damage it when dis-assembling.

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CYLINDERS FOR DIFFERENTIAL-LOCK (14) (037066-038154)

(1005 14)



The mis-alignment of the differential-block depends on the correct adjustment of the cylinder.

To check depress the distributor lever the lever (L) should move approximately 7 mm (measured at the spring hole). If this is not so follow these instructions:

- disconnect the pipe and loosen the locknut (A)
- screw in chamber (B) by hand until rod (C) is tight on the internal element (D), turn back half of one turn
- tighten the lock nut (A) and reassemble the pipe

If necessary, disassemble the cylinder as follows:

- disconnect the pipe; if the union (E) is at 90° it is necessary to dismantle it (re-assemble with Loctite 572)
- remove clevis (F), extract rod (C) and remove bellows (G)
- loosen lock nut (A), unscrew chamber (B) fully out
- to extract the internal element (D) remove the Circlip (H).

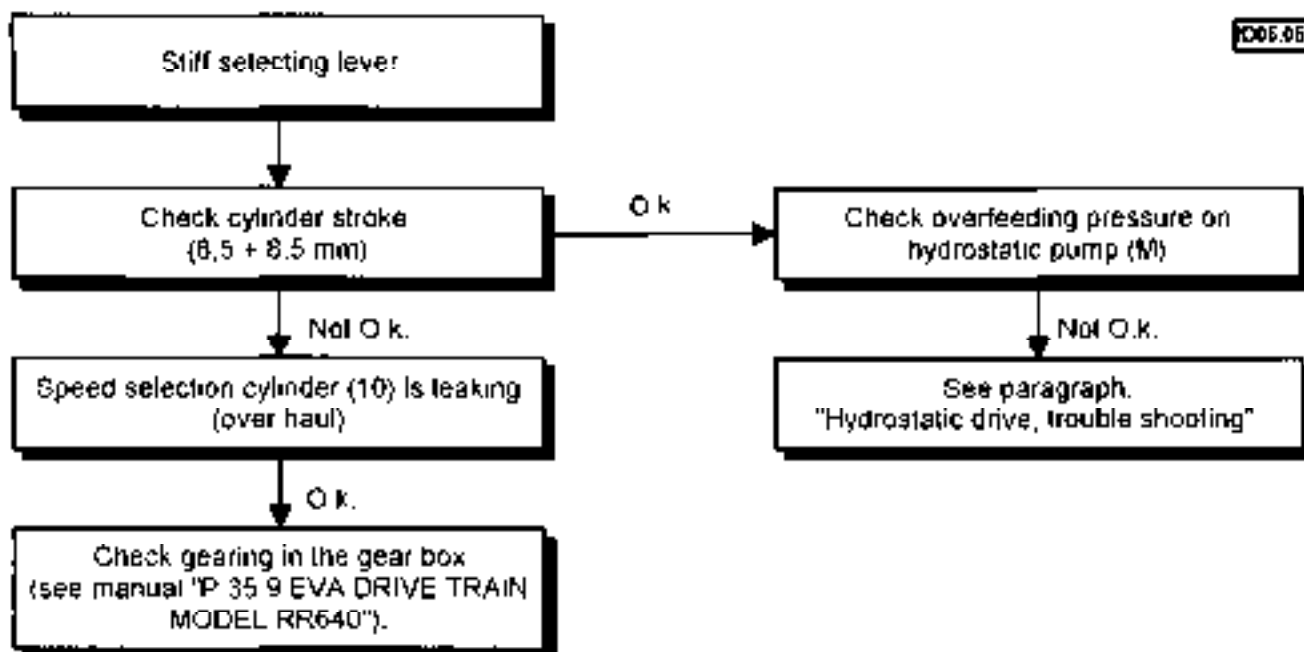


5 - SPEED SELECTION AND DIFFERENTIAL-LOCK CIRCUIT



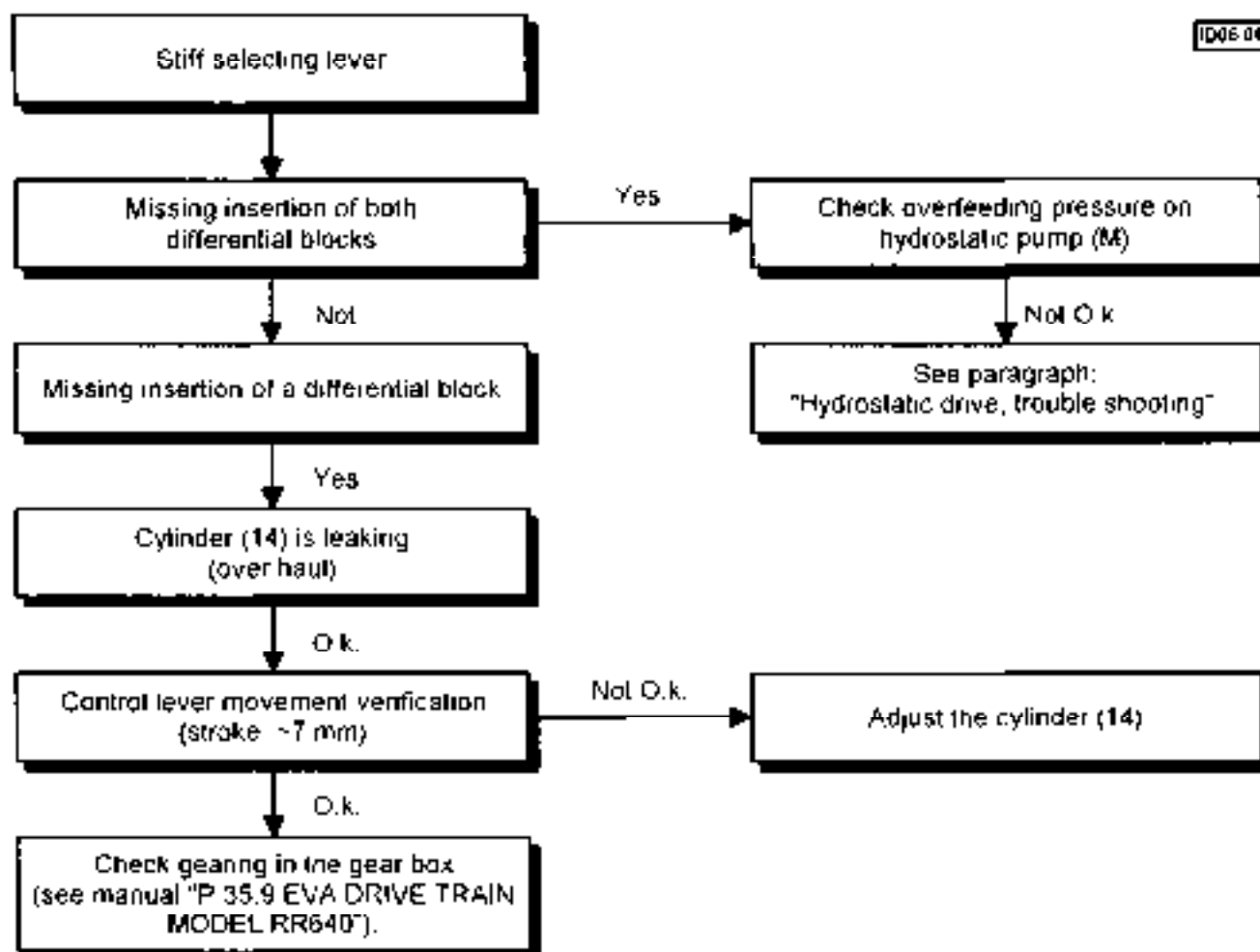
SPEED SELECTION, TROUBLE SHOOTING

1005.05



DIFFERENTIAL-LOCK, TROUBLE SHOOTING

1005.04



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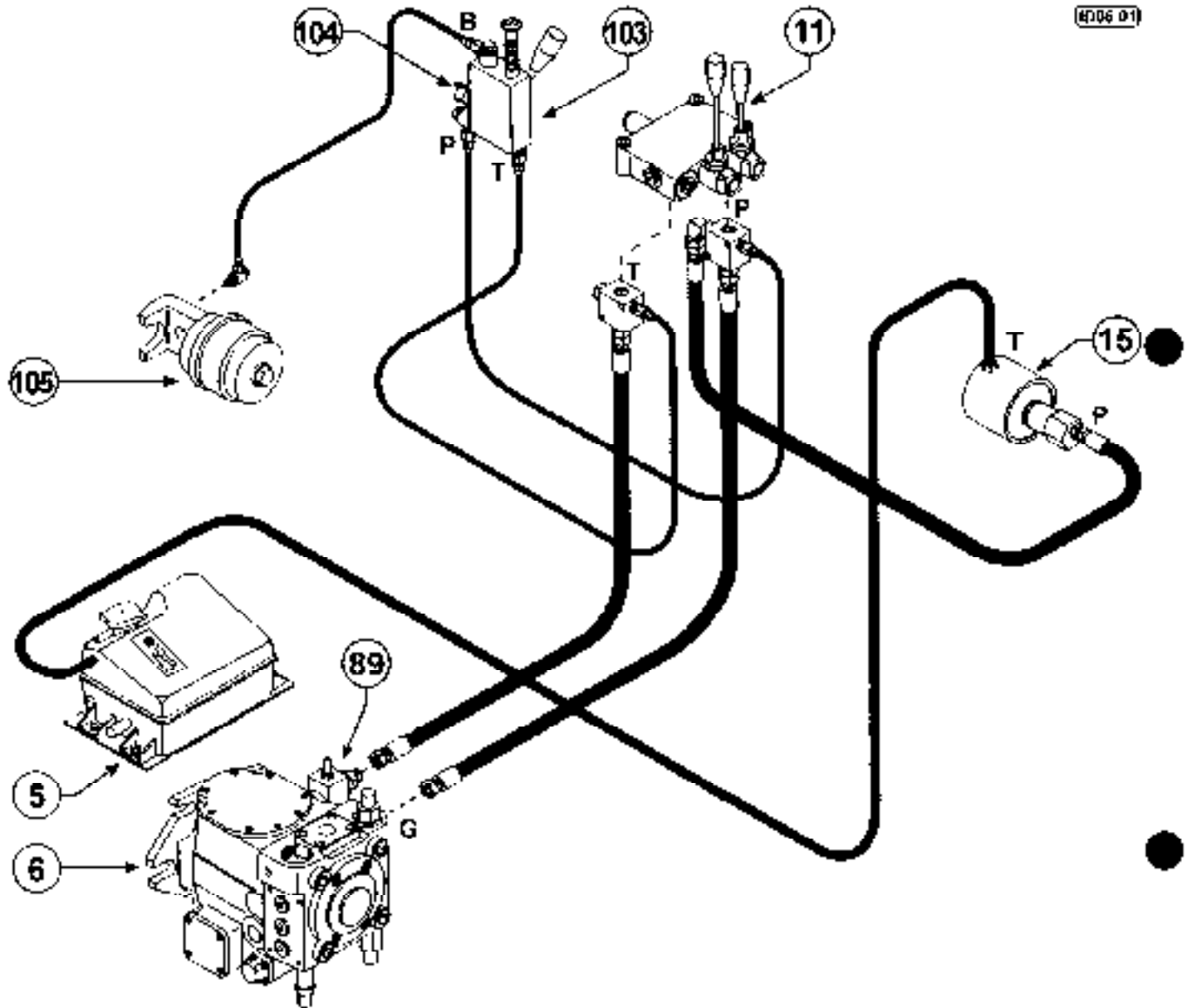
SERVO/BRAKE CIRCUIT, TROUBLE SHOOTING.. 5

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PARKING BRAKE AND SERVO/BRAKE CIRCUIT

4006 01



- 5 Hydrostatic oil tank
- 6 Hydrostatic pump
- 11 Speed selection and differential-lock control valve
- 15 Servo / brake
- 89 Block for thermalcontact
- 103 Parking brake control valve
- 104 Pressure switch
- 105 Parking brake caliper

Oil delivery to the circuit is given by the hydrostatic pump (P max = 28 bar).

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PARKING BRAKE CONTROL VALVE (103) (035573)

- P = from G hydrostatic pump (6)
- T = to block for thermostat (89)
- B = to parking brake caliper (105)
- 104 = Pressure switch (036093)

The function of the valve is to control the opening and the closing of the parking brake caliper (for information about the caliper, consult the manual "DRIVE TRAIN MODEL RR640")

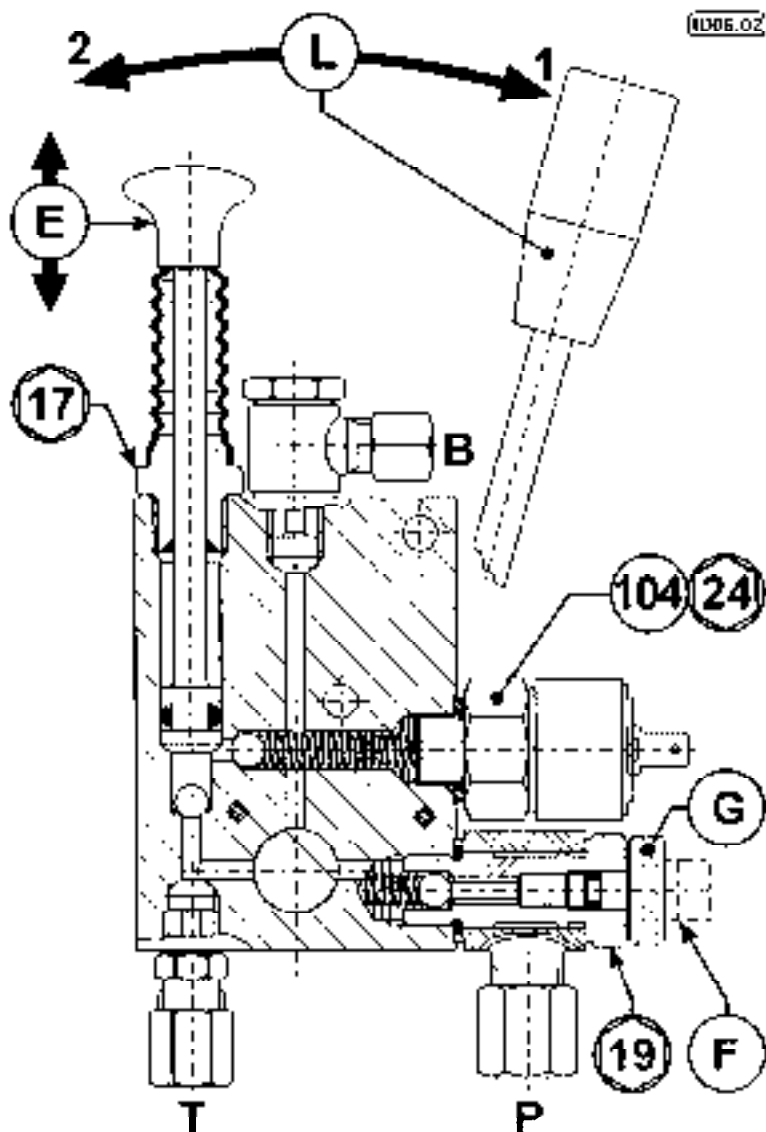
- with engine running, move the lever (L) to pos. 1 to open the passage of oil between P and B to open the brake caliper; bringing the lever (L) to pos. 2 the oil flows down from hole T and the brake caliper closes
- by stopping the engine, the parking brake remains engaged independently from the control lever position.

The pressure switch (104) is normally closed and it is calibrated at 18 bar. When you disconnected the parking brake, the pressure switch opens the electrical circuit switching the signal light off on the dashboard.

The emergency pump (E) must be used only to release the parking brake before towing the vehicle.

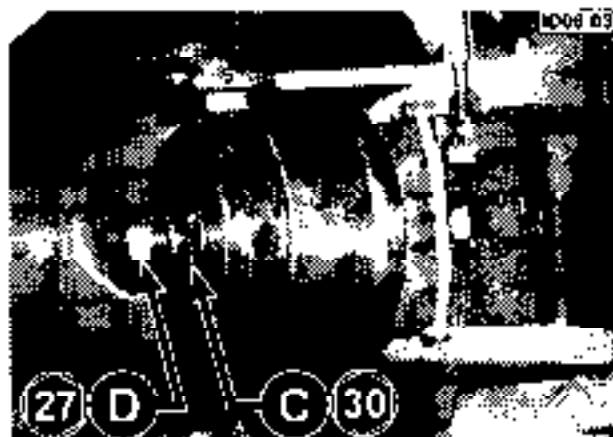
- move the lever (L) to position 1
- loosen the valve ring nut (G) to the stop position (F). Depress the emergency pump (E) sufficient times to open the brake caliper

Before restarting the vehicle tighten the ring nut (G) and check that the system is operating correctly.



EMERGENCY PUMP FAILS TO RELEASE PARKING BRAKE

- If the emergency pump does not release parking brake:
- hold the brake caliper chamber (C)
 - completely loosen the adjusting screw (D)
- Before restarting the vehicle tighten the adjusting screw and check the system is working correctly



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6 - PARKING BRAKE AND SERVO/BRAKE CIRCUIT



SERVO/BRAKE (15) (037101)

(D06.04)

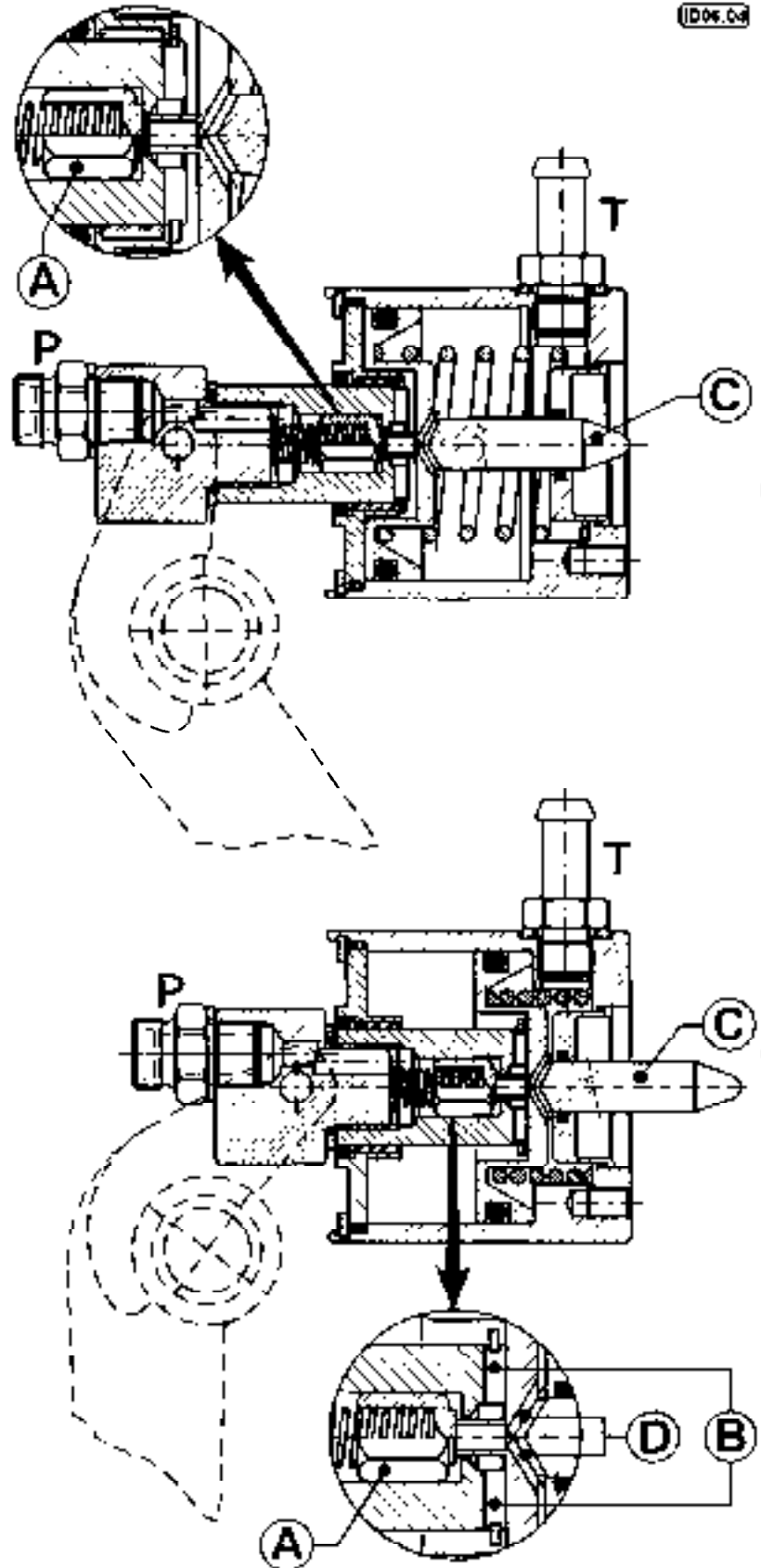
- P = from G hydrostatic pump
 T = return to hydrostatic oil tank (5)

With the brake pedal in it's rest position the cursor (A) prevents the passage of oil and any servo brake action, by depressing the pedal, the cursor (A) is pushed back, diverting the oil through the spline (B) forcing the pump piston forward (C).

Releasing the pedal allows the piston to return to the rest position returning the oil to tank through holes (D).

In case of damage to the system, the braking is performed by the mechanical movement of the piston (C).

NOTE FOR REMOVAL OF SERVO BRAKE UNIT REFER SECTION 7 "SERVO BRAKE DISASSEMBLY"

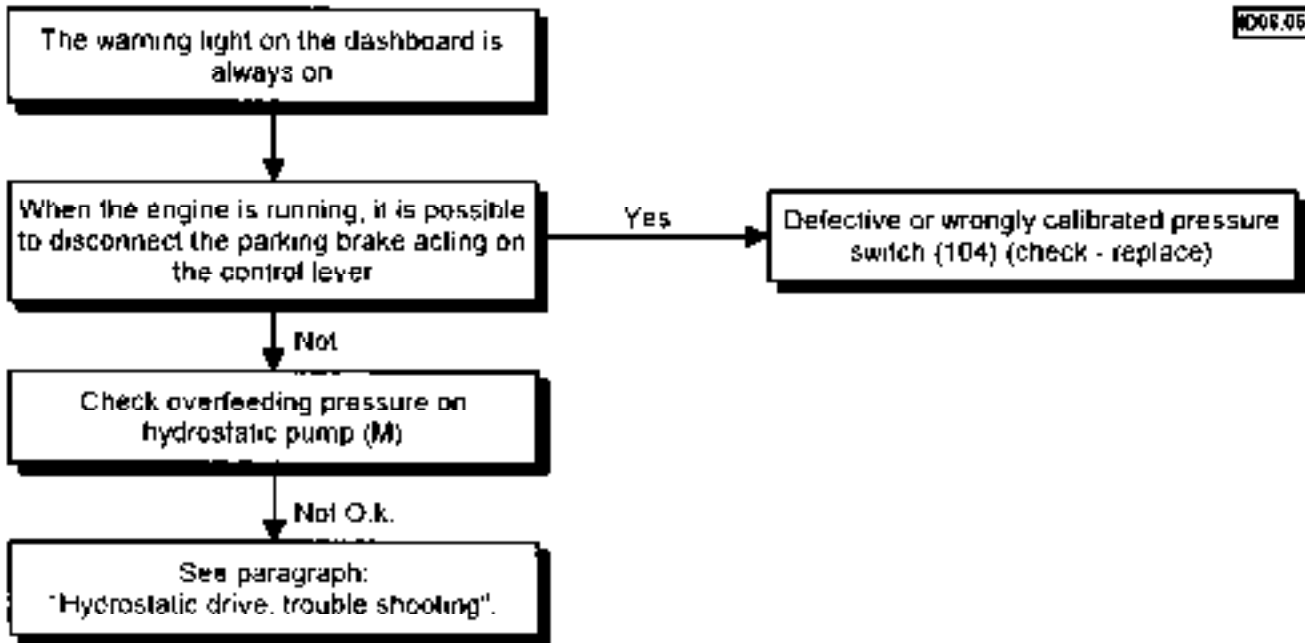


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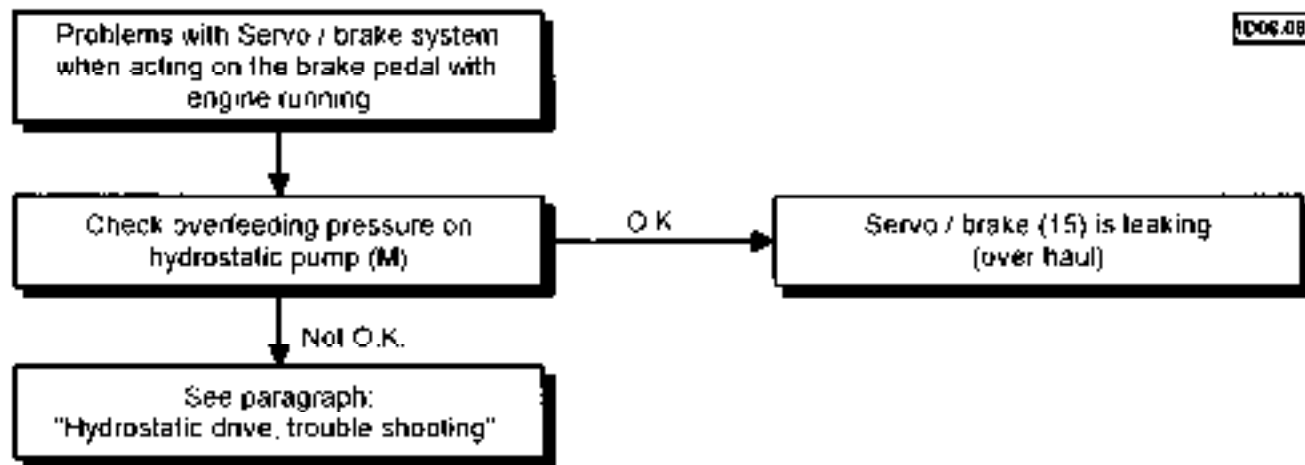
PARKING BRAKE CIRCUIT, TROUBLE SHOOTING

ND08.05



SERVO/BRAKE CIRCUIT, TROUBLE SHOOTING

ND08.08



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7 - DISASSEMBLY OF THE MAIN COMPONENTS OF THE HYDROSTATIC TRANSMISSION



HYDROSTATIC PUMP DISASSEMBLY

To disassemble the pump together with the connecting flange on the engine, it is necessary to fully lift the boom and put the safety lock into position

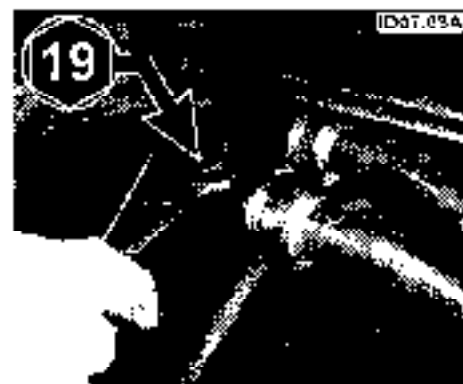
- 1) Remove the cover beside the pump by removing the four fixing screws.



- 2) Remove the cover under the engine by removing the seven fixing screws



- 3) Drain the oil from the system in a container:
 - remove the following plugs & caps: radiator breather (see picture ID07.03A), oil tank filling (see picture ID07.03B) and hydrostatic pump drain (see picture ID07.03C).

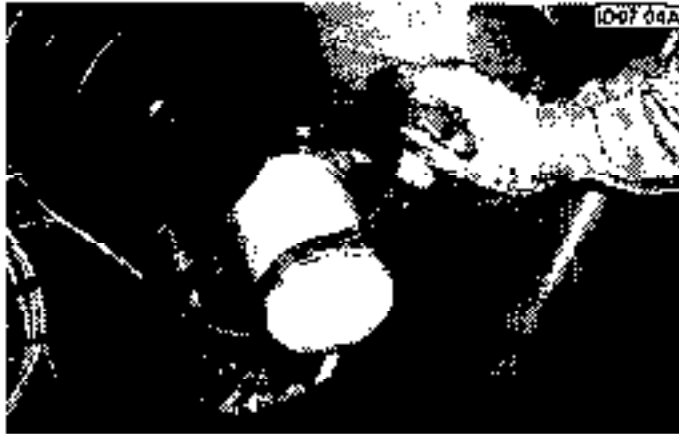




7 - DISASSEMBLY OF THE MAIN COMPONENTS OF THE HYDROSTATIC TRANSMISSION



- remove the filter using two filter spanners Part.No.031748 (see picture ID07.04A)
- remove the two fixing screws of the oil tank support (see picture ID07.04B), then tilt it in such a way so as to drain the remaining oil.



- 4) Disconnect the lead pipe from the filler manifold (see picture ID07.05A) and the breather from the temperature sensor manifold (see picture ID07.05B).



- 5) Disconnect the connector of the oil level indicator (see picture ID07.06A) and the drain pipe of the servobrake from the tank (see picture ID07.06B).
Remove the oil tank.



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7 - DISASSEMBLY OF THE MAIN COMPONENTS OF THE HYDROSTATIC TRANSMISSION



- 6) Disconnect from the filter manifold the two pipes (See pictures ID07.07A & ID07.07B) connecting it to the radiator



- 7) Disconnect the two connecting pipes from the filter manifold (see picture ID07.08A) and from the pump (see picture ID07.08B).



- 8) Remove the fixing screws to disconnect the two high pressure pipes of the pump (See picture ID07.09A & ID07.09B). To avoid losing the O' Rings remove them from under the connection flanges of the connecting pipes.





7 - DISASSEMBLY OF THE MAIN COMPONENTS OF THE HYDROSTATIC TRANSMISSION



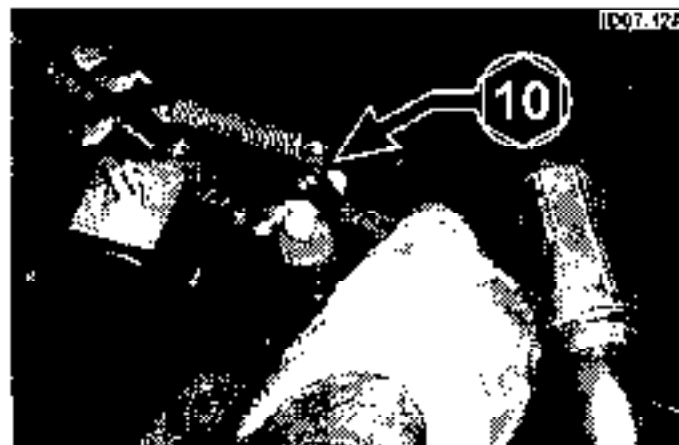
- 9) Loosen the locknut under the filter manifold (see picture ID07.10A)
Unscrew the filter manifold and remove it from the pump (see picture ID07.10B); if necessary disassemble the joint ref. A (see picture ID07.10A) to allow the removal of the filter manifold



- 10) Disconnect from the pump the lead pipe (see picture ID07.11A) and the discharge pipe (see picture ID07.11B) of the speed selection control valve



- 11) Remove from the inching regulation lever the spring fixing screw (see picture ID07.12A) and the pin of the small fork linking the operating cable (see picture ID07.12B)



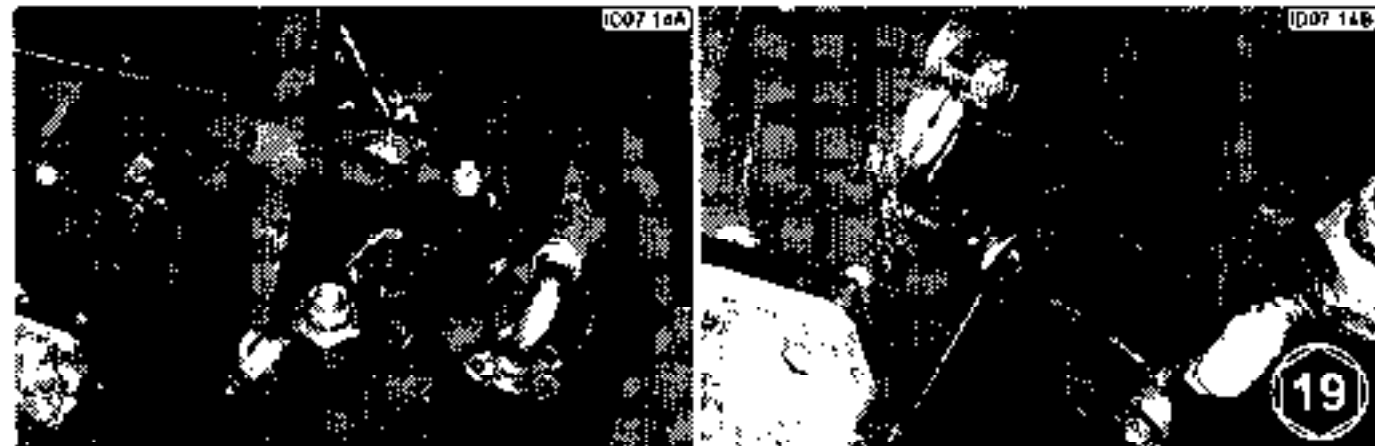
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- 12) Remove the caps of the two fwd/rev solenoid valves (see picture ID07 13A) and the two pilot system pipes (see pictures ID07 13B - ID07 13C).



- 13) Sling the pump and support it by means of a suitable attachment (see picture ID07 14A), then fully loosen the four fixing nuts (see picture ID07 14B). Move the pump back until it can be removed from its location.



HYDROSTATIC PUMP ASSEMBLY

- 1) If necessary, use the fittings from the old pump and assemble them on the new one.
- 2) Re-assembly is the reverse of the points described in the section HYDROSTATIC PUMP DISASSEMBLY, bearing in mind the following:
 - POINT 13: tighten the four fixing nuts of the pump to 98 Nm
 - POINT 9: the orientation of the filter manifold is related to the position of the connecting pipes and to allow the removal of the filter, it is therefore suggested that it is locked in the correct position after re-assembling the previous components
 - POINT 8: replace O' Rings that were removed for safe keeping
- 3) Carry out the system filling following the instructions in the paragraph REFILLING OF THE SYSTEM AFTER A SERVICE OR DISASSEMBLY



7 - DISASSEMBLY OF THE MAIN COMPONENTS OF THE HYDROSTATIC TRANSMISSION



HYDROSTATIC PUMP AND CONNECTION FLANGE ON THE ENGINE DISASSEMBLY

The flange disassembly is necessary if you have to replace the slotted coupling between the pump and the engine flywheel.

- 1) Carry out the operations described in the section HYDROSTATIC PUMP DISASSEMBLY from point 1 to 12
- 2) Remove the pertinent fixing clamp (see picture ID07.15A) and the air intake pipe (see picture ID07.15B).



- 3) Disconnect the wire of the air filter sensor (see picture ID07.16A) and loosen the fixing clamps of the coupling air intake pipe (see pictures ID07.16B - ID07.16C)



- 4) Remove the two fixing screws of the air filter support (see picture ID07.17A), then remove the filter with the inlet pipe (see picture ID07.17B).

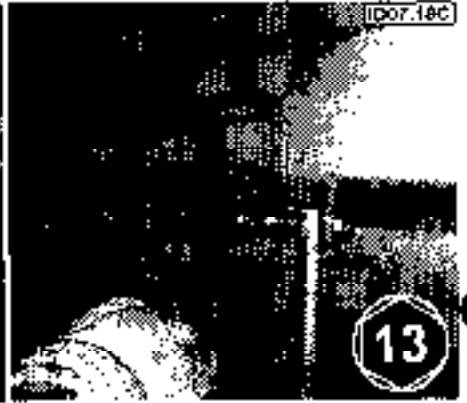




7 - DISASSEMBLY OF THE MAIN COMPONENTS OF THE HYDROSTATIC TRANSMISSION



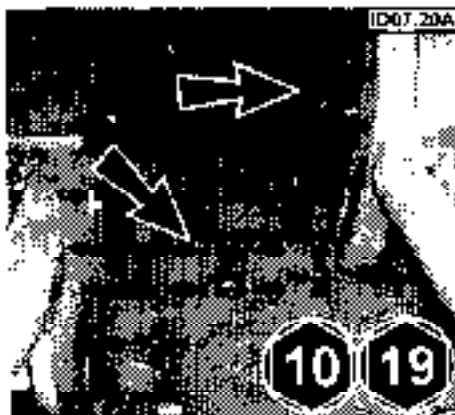
- 5) Before disassembly, the rear section of the engine needs to be supported. It is suggested a jib gantry crane be used for the purpose:
- remove the bonnet hinge, fixing nuts (see pictures 1D07.18A - 1D07.18B) and the fixing screws from the gas strut (see picture 1D07.18C); free the hinges and remove the bonnet (this should be a two man operation).



- attach sling and support engine by a suitable lifting device (eg gantry crane).
CAUTION: Engine weights approximately 600kg.



- 6) Remove the two protection covers (see picture 1D07.20A). Remove the fixing screw from the engine support to the chassis (see picture 1D07.20B) prevent the rotation of the rubber block by locking it with a wrench from the opposite side of the chassis (see picture 1D07.20C); this is a two person operation.

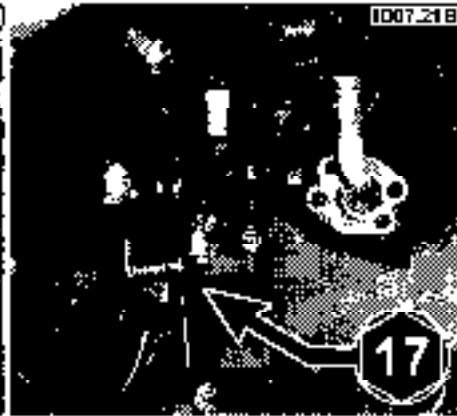
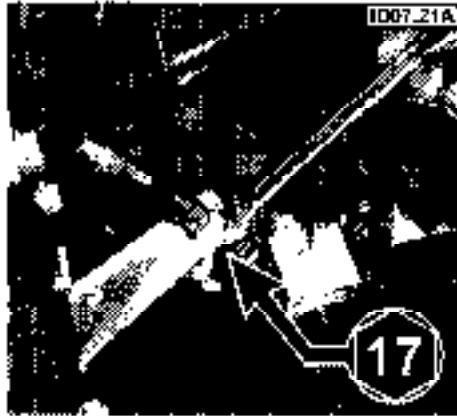




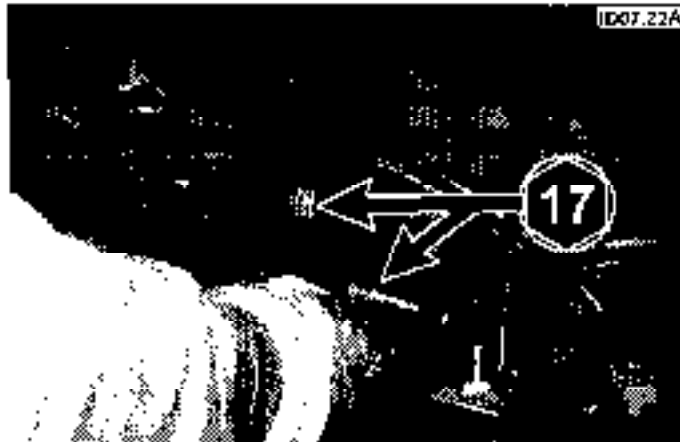
7 - DISASSEMBLY OF THE MAIN COMPONENTS OF THE HYDROSTATIC TRANSMISSION



- 7) Disassemble the inching cable screwing the nut from under the fixing bracket (see picture ID07.21A). Disassemble the bracket removing the two screws (see pictures ID07.21B - ID07.21C).



- 8) Remove the engine support by removing the two remaining fixing screws (see picture ID07.22A) and, by using the "C" spanner Part.No.601070, remove the auto locking ring nut (see picture ID07.22B).



- 9) Swing the pump/flange assembly and support in a suitable manner, remove the four fixing screws. Slide the pump/flange assembly back and remove it.





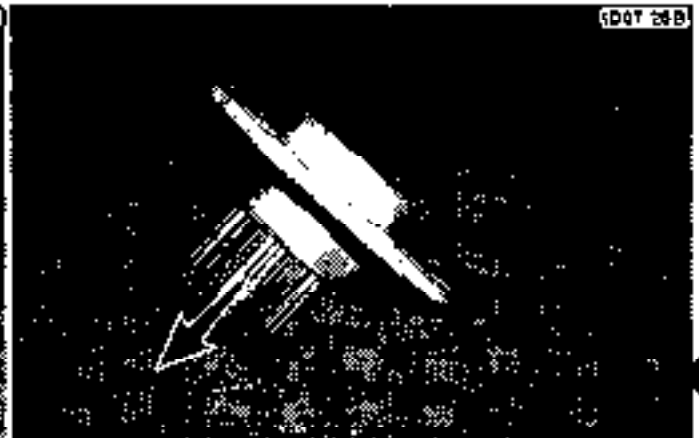
7 - DISASSEMBLY OF THE MAIN COMPONENTS OF THE HYDROSTATIC TRANSMISSION



- 10) Dismantle the flange and coupling from the engine flywheel. To centre the flywheel during the removal:
- remove two diametrically opposing screws, screw in two stud bolts (1/2" UNF x 120 mm long) (see picture ID07.24A)
 - remove the four remaining screws and slide off the flange (see picture ID07.24B).



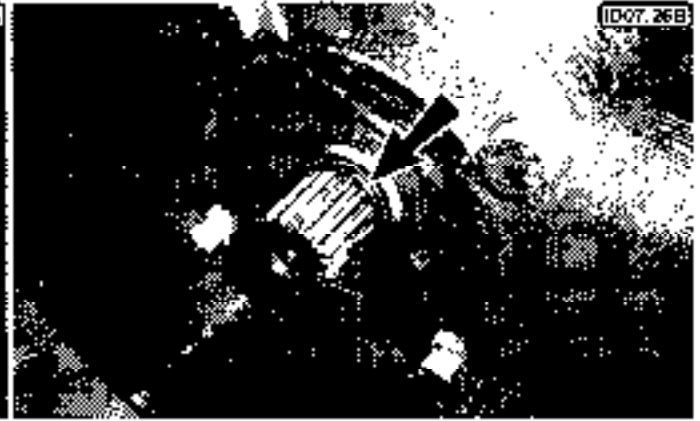
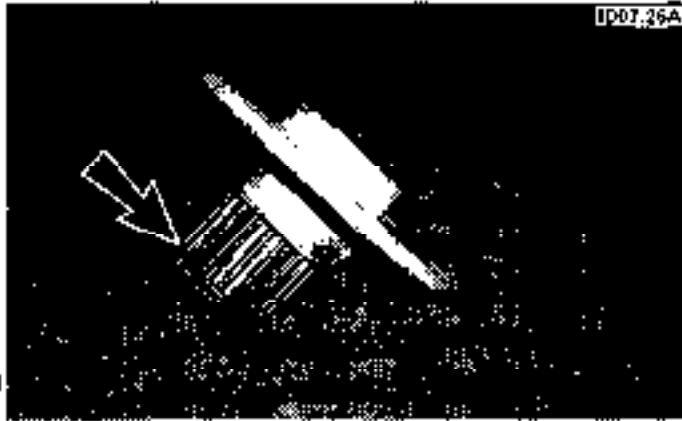
- 11) Remove the Circlip (see picture ID07.25A) and extract the coupling from the opposite side (see picture ID07.25B)





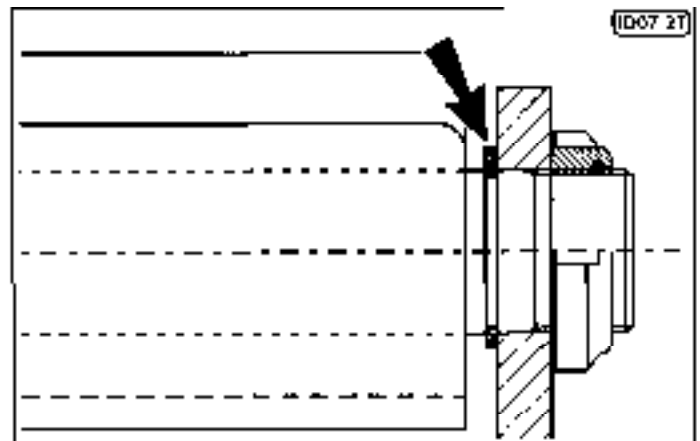
HYDROSTATIC PUMP AND CONNECTION FLANGE ON THE ENGINE ASSEMBLY

- 1) Replace the coupling and all O' Rings that are assembled either on it (see picture ID07.26A) or on the broached shaft of the pump (see picture ID07.26B).



- 2) Reassembly is the reverse of the operations described in the paragraph HYDROSTATIC PUMP AND CONNECTION FLANGE ON THE ENGINE DISASSEMBLY, bearing in mind the following.

- POINT 10: apply "LOCTITE 222" on the six fixing screws of the flange then tighten them at 78.5 Nm.
- POINT 8: lighten the autolocking ring nut until the engine support contacts the Circlip that is assembled on the fixing bolt (see picture ID07.27)
- POINT 1: carry out the described operations, also referring to points 2 and 3 of the section HYDROSTATIC PUMP ASSEMBLY.





7 - DISASSEMBLY OF THE MAIN COMPONENTS OF THE HYDROSTATIC TRANSMISSION



VARIABLE HYDROSTATIC MOTOR DISASSEMBLY AND ASSEMBLY

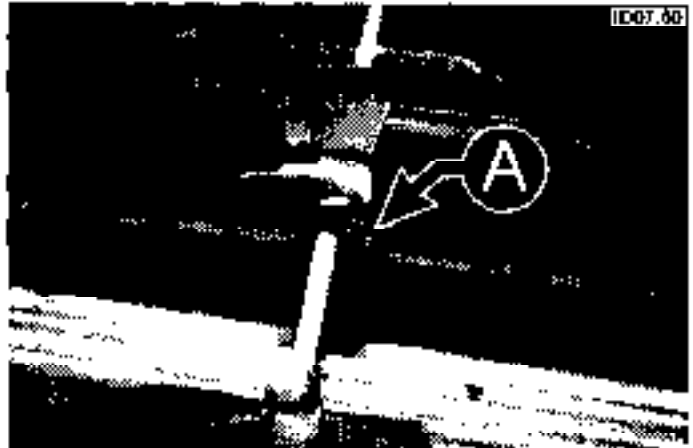
We do not recommend the removal of the hydrostatic motor only, please; follow the instructions referring to the disassembly and reassembly of the gearbox/hydrostatic motor assembly contained in "Service Manual for DRIVE TRAIN MODEL RR640".

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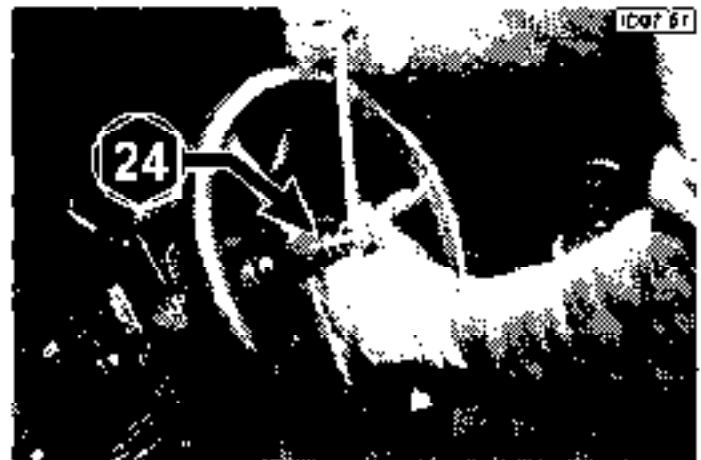


SERVOBRAKE DISASSEMBLY

- 1) To give enough room to carry out this operation it is recommended to lift the windscreen approximately 90 degrees like so:
 - Lift back the roof protection grid
 - Unhook the wing nut (A) to disconnect the windscreen opening mechanism.
 - Lift up the windscreen and securely support it to prevent it falling.



- 2) Remove the protection cap from the center of the steering-wheel: remove the locking nut and then extract the steering-wheel.



- 3) Remove the two fixing screws that hold together the two parts of the control levers ass'y (see picture ID07.52A) allowing you to take the right part off, release the screws that hold the two sub ass'y together (see picture ID07.52B), leaving one screw partially attached to simplify the reassembly





7 - DISASSEMBLY OF THE MAIN COMPONENTS OF THE HYDROSTATIC TRANSMISSION



- 4) To allow the extraction of the cables of the two divided parts of the lever assembly, remove the rubber bellows and the flange by unscrewing the four fixing screws (see picture ID07.53).



- 5) Unscrew the fixing nut of the dashboard (see picture ID07.54A) and the locking screw of the height setting lever of the steering-wheel (see picture ID07.54B); then remove the lever together with the spring



- 6) Lift carefully the dashboard extracting it from the steering column, rotate it counter clockwise and lean it on the front left splash-board and on the seal of the windscreen (see picture ID07.55A and picture ID07.55B)





7 - DISASSEMBLY OF THE MAIN COMPONENTS OF THE HYDROSTATIC TRANSMISSION



- 7) Unscrew the two fixing screws of the dashboard holding clamp (see pictures ID07.56A and ID07.56C) then remove it.



- 8) Unscrew the four fixing screws of the brake pump, then extract it and move it towards the right



- 9) Unscrew the fastener on the drain pipe (see picture ID07.58A), then unscrew the fixing nut of the feeding pipe (see picture ID07.58B); drain in a container the oil in both pipes, then orientate them upwards as shown in the picture ID07.58C.





7 - DISASSEMBLY OF THE MAIN COMPONENTS OF THE HYDROSTATIC TRANSMISSION



- 10) Remove the Circlip and extract the fixing bolt of the servobrake to the brake pedal



- 11) Remove the piloting pipe of the power steering.



- 12) Separate the power steering from the steering column unscrewing the four fixing screws (see picture ID07.61A & ID07.61B)





7 - DISASSEMBLY OF THE MAIN COMPONENTS OF THE HYDROSTATIC TRANSMISSION



- 13) Push the power steering inwards to enable you to extract it from the steering column (see picture ID07.62A); then tilt it and let it come out from the left of the pedals (see fig. ID07.62B).



- 14) By using a hammer handle, hit slightly on the servobrake pushing it backwards (in the direction of the arrow) Remove the two fixing elastic pins (B) of the servobrake (see picture ID07.63)



- 15) Tilt the servobrake upwards and extract it from its location (see pictures ID07.64A and ID07.64B)

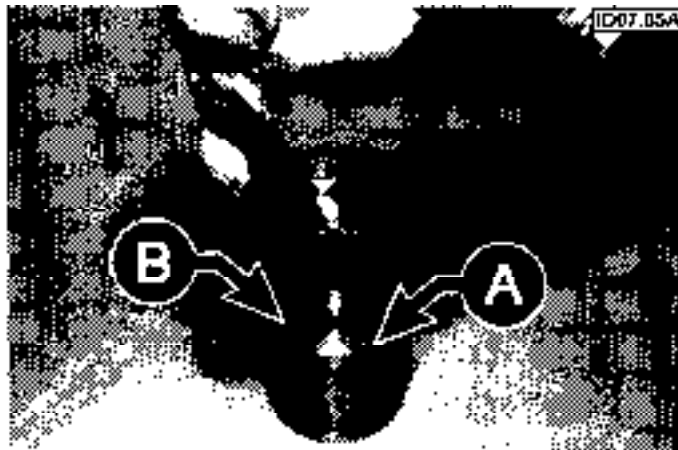




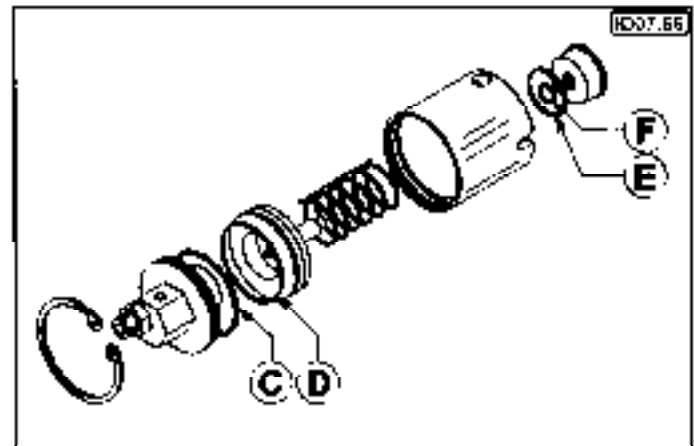
SERVOBRAKE INNER PARTS OVERHAUL

- 1) Depress the cap (B) to enable the Circlip (A) to be removed, see picture ID07.65A, at this point the inner spring should push the cap and the other servobrake parts.

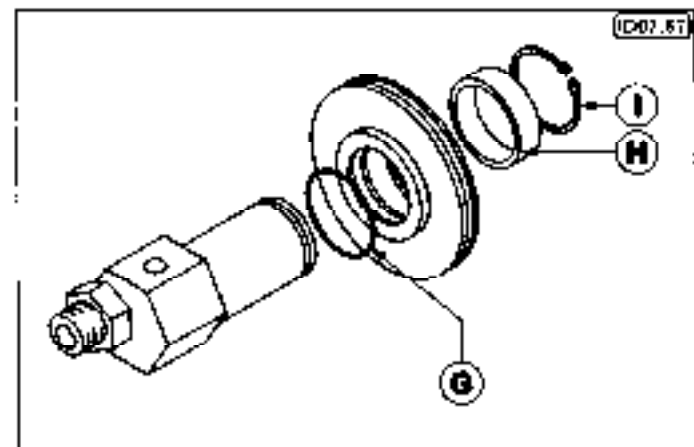
N B if this does not happen, try as follows keeping the cap pressed hit the servobrake with a plastic hammer (see picture ID07.65B) until the components come free



- 2) Replace the O Rings (shown in the picture ID07.66):
 - (C) on the cap,
 - (D) on the piston,
 - stroke end (E) and (F) on the bushing of the piston



- 3) Remove the Circlip (I) to replace the O Ring (G) and the seal (H) placed in the inner part of the cap (see picture ID07.67)

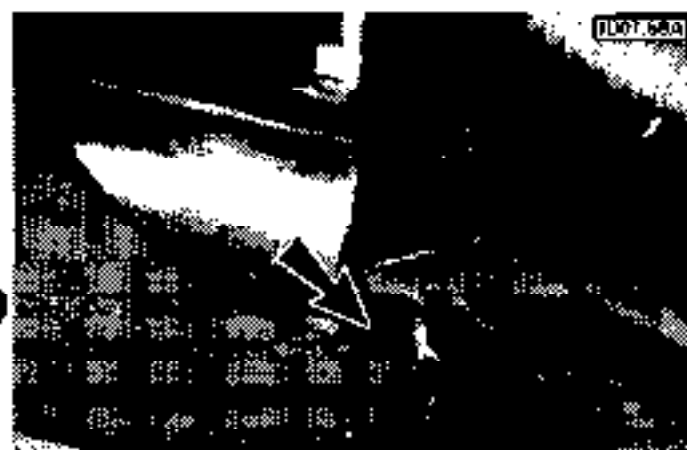




SERVOBRAKE REASSEMBLY

NOTE. all references "(see point)", written in the following instructions, refer to the points of the section "SERVOBRAKE DISASSEMBLY".

- 1) Reinsert the two elastic pins (see picture ID07.68A) and put the servobrake in place then reassemble the filling pipe, checking that it passes under the ones of the power steering (see picture ID07.68B)

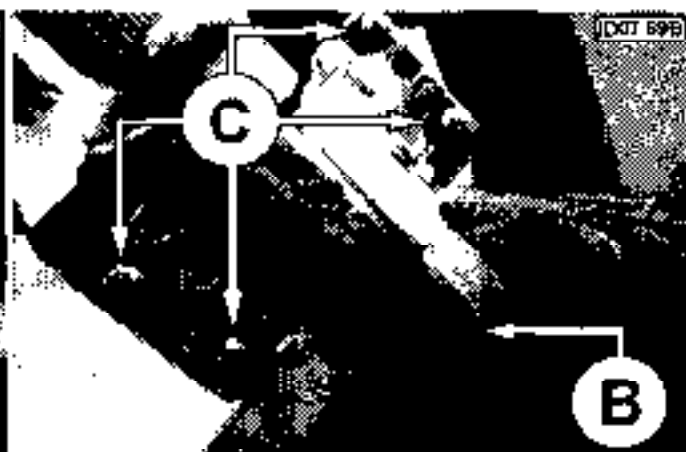


- 2) Reassemble the brake pump on the servobrake (see point 8) in such a way that, by screwing the four fixing screws, the servobrake is brought in its original position and locked on the two elastic pins
- 3) Replace the fixing bolt of the servobrake on the brake pedal and the circlip (see point 10) then reconnect the drain pipe and tighten the clamp (see point 9)
- 4) Reassemble the power steering on the steering column (see point 12), if the holes placed on the power steering do not match, rotate the power steering to enable you to insert the fixing screws
- 5) Reconnect the pilot pipe on the power steering (see point 11).
- 6) Reassemble the holding clamp on the dashboard (see point 7)
- 7) Reinsert the dashboard on the steering column (see point 5), pushing the fixing bolt of the windscreen through the suitable hole. Make sure, during the reassembly, that you do not pinch the cables and you do not disconnect accidentally the connectors placed under the dashboard; position the cables placed in the right part of the dashboard in such a way they pass under the fixing bolt of the regulating lever of the steering wheel.
- 8) Push the dashboard downwards until it is correctly positioned on all holding positions replace the fixing nut and reinsert the regulating lever of the steering wheel (see point 5) checking that it functions correctly
- 9) Reinsert the rubber bellows and the fixing flange (see point 4) then insert the four screws locking both.

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- 10) Reassemble the left control lever ass'y on the steering column, placing the pin (see ref. A picture ID07.69A) of the inner part of the half right section in the hole placed on the steering column (see ref. B picture ID07.69B). Insert the fixing screws (see ref. C picture ID07.69B) connecting the two half sections.



- 11) Reassemble the right part of the control levers ass'y (see point 3). The upper rim of the rubber bellows must remain closed inside the control levers ass'y.
- 12) Reassemble the steering wheel on the steering column; screw the fixing nut and replace the cap placed in the centre of the steering wheel (see point 2).
- 13) Reassemble the windscreen opening mechanism (see point 1) and check its functioning, then lower the protection grid placed on the roof of the cab.
- 14) Check the hydrostatic oil level in the tank and, if necessary, top up.



7 - DISASSEMBLY OF THE MAIN COMPONENTS OF THE HYDROSTATIC TRANSMISSION



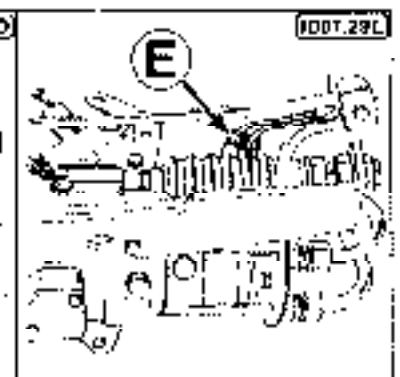
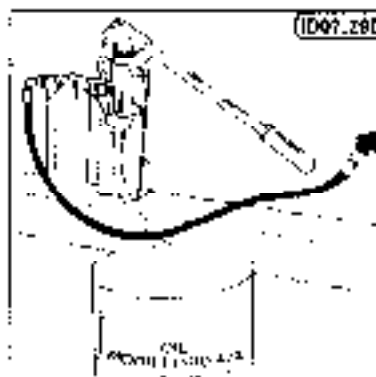
REFILLING OF THE SYSTEM AFTER A SERVICE OR DISASSEMBLY

- ensure hoses are connected correctly
- unscrew caps ref. A & B (see pictures ID07.28A & ID07.28B)
- refill system with specified 10 micron filtered oil. It is advisable to perform this task using a hand pump as per drawing (see picture ID07.29D)

WARNING: max pressure = 2,5 bar

- oil is pumped through hole ref. C (see picture ID07.28C) on the hydrostatic pump until the tank is filled, tighten tap ref. B (see picture ID07.28B) on radiator as soon as oil starts to get out
- tighten cap ref. A (see picture ID07.28A)
- disconnect plug ref. E (see picture ID07.29E) from injection pump
- turn ignition key to crank engine for max ten (10) seconds
- wait two (2) minutes to clear air
- repeat operation twice more
- reconnect electrical plug ref. E (see picture ID07.29E) start the engine and run at idle for approximately five (5) minutes with machine stationary

**IMPORTANT: check oil level in tank frequently, top up if necessary.
Total capacity = 12 litres.**



EMERGENCY REFILLING OF THE CIRCUIT

In case of emergency (i.e. field change of major hydrostatic component) the following procedure can be applied:

- fill the hydrostatic plastic header tank completely
- disconnect electric plug from engine injection pump
- turn ignition key to crank engine for max ten (10) seconds
- wait two (2) minutes to clear air
- refill the hydrostatic header tank
- repeat the above operations until the level in the hydrostatic tank remains at the full mark on tank
- connect electrical plug, start the engine and let it run at idle for approx. five (5) minutes with machine stationary.



WARNING!!!

Following this procedure the hydrostatic system has not been replenished with filtered oil.



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Merlo S.p.A. Industria Metallmeccanica

12020 S. Defendente di Cervasca (CN) - ITALY Tel (0171) 614111 - Fax (0171) 614100

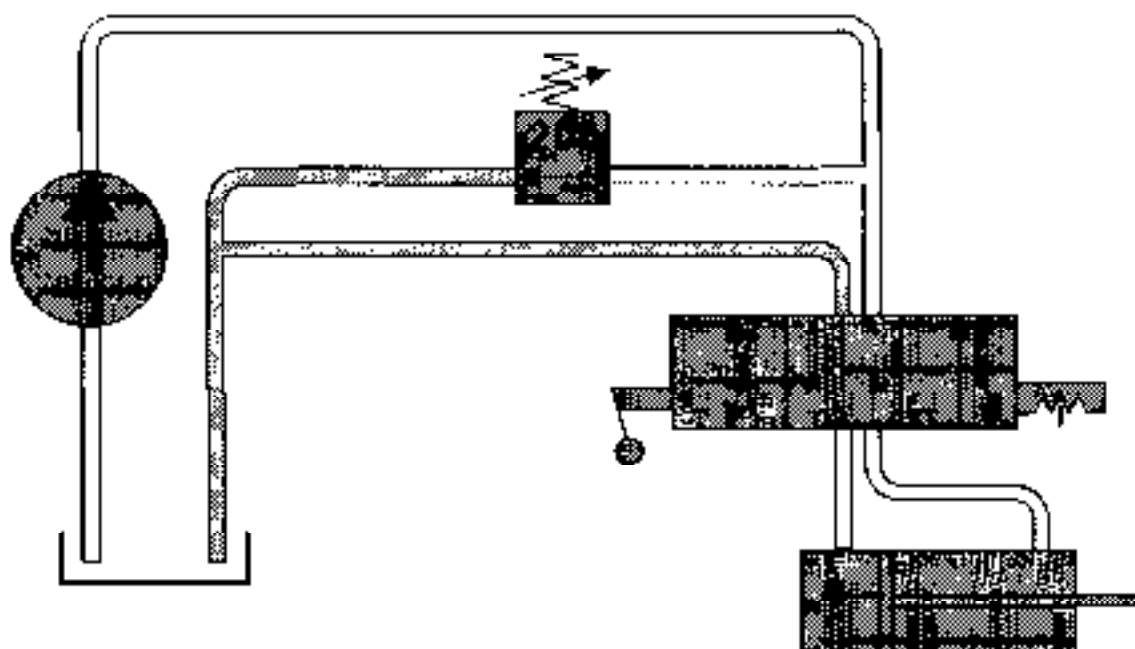
Domino Mining Equipment Pty Ltd

A.C.N 002 705 881 P.O. Box 69, WYONG, N S W (Aust) 2259 Phone (043) 53 1033 - Fax (043) 51 2119

SERVICE MANUAL

HYDRAULIC SYSTEM

P 35.9 EVA



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HYDRAULIC SYSTEM DIAGRAM 2

**NECESSARY TOOLS, ATTACHMENTS AND TEST INSTRUMENTS / REPAIR
TIMES 3**

**STEERING SYSTEM AND MAIN DIRECTIONAL CONTROL VALVE SUPPLY
SYSTEM..... 4**

BOOM LIFTING SYSTEM..... 5

BOOM EXTENSION SYSTEM 6

FORK TILTING / COMPENSATION SYSTEM 7

FRAME LEVELLING SYSTEM 8

FLOW DEVIATOR SYSTEM..... 9



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CYLINDER MAINTENANCE	2
SAFETY AND GENERAL INSTRUCTIONS	3
REMOVAL OF ACCESS PANELS.....	4
UNLOAD / LOADING OF THE SPARE WHEEL	4
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This manual provides the information necessary for correct and safe execution of maintenance works not included in the INSTRUCTION HANDBOOK; it is addressed to qualified fitters, who have the required knowledge of mechanical, hydraulic and electric systems for the machine being serviced. All work carried out should comply with all relevant environmental and occupational health and safety requirements.

This symbol is used to identify the dimensions of the spanner to be used for some operations described in this handbook. The spanner type will be mentioned only if it is not a standard size.



GENERAL NOTE:

Always ensure any work carried out on the vehicle is carried out on level ground. If this is not possible the ground should be as level as possible and the vehicle should be chocked to prevent any possibility of the vehicle rolling.

HYDRAULIC OIL

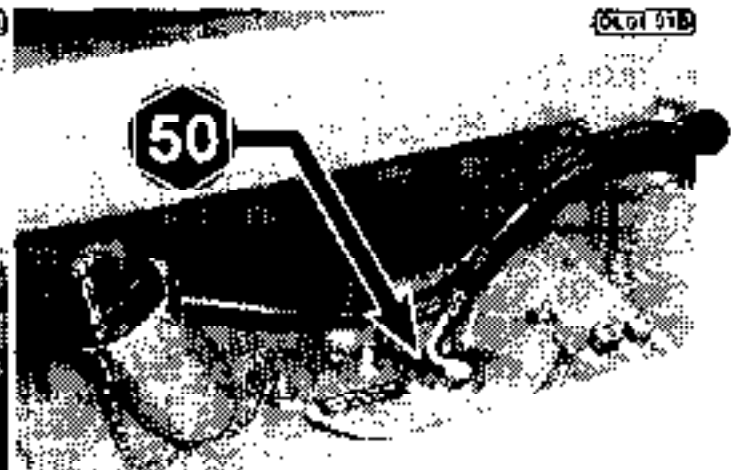
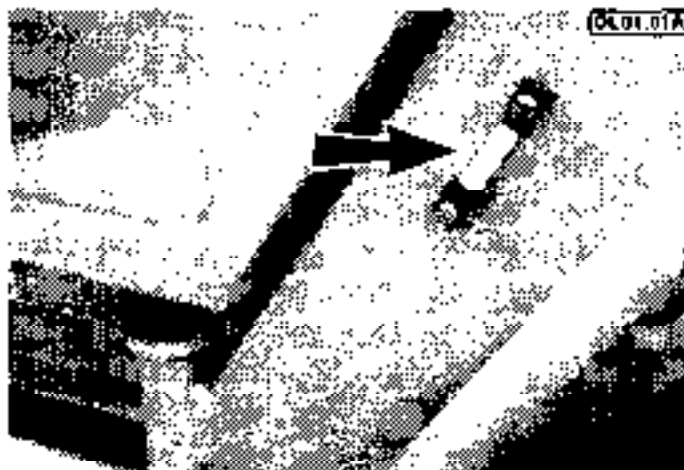
MOBILFLUID 424

For different brands of oil ensure that they have characteristics equal to the above product. Should you wish to change the product brand, the system must be flushed clean of the original fill product. If oils of different characteristics are used, any claim will be automatically refused.

Replace oil and return line filter at the intervals shown in the INSTRUCTION HANDBOOK.

Check oil level daily

- lower and retract the boom completely
- check level through the cap situated on the side of the tank (see picture OL01.01A); oil must be at max. level (peep hole completely covered)
- if necessary remove filler cap (see picture OL01.01B) and add oil.



CYLINDER MAINTENANCE

For cylinder reassembly and the overhaul described in the following pages, refer to the manuals "INTERNAL OPERATIONS TO THE TELESCOPIC BOOM P 35 9 EVA" and "HYDRAULIC CYLINDERS P 35 9 EVA"

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SAFETY AND GENERAL INSTRUCTIONS

! CAUTION!!!

Servicing of the machine shall only be carried out by skilled and competent personnel. For repair of parts that are not part of the normal scheduling, refer MERLO AUSTRALIA technical service.

! WARNING!!!

Always wear suitable protective clothing and safety equipment when using lubricants. Extra care should be taken to avoid burns when working with hot fluids or elements.

! WARNING!!!

Always dispose of oils, filters or other mediums in an environmentally friendly manner. Use official organisations for the disposal of such fluids.

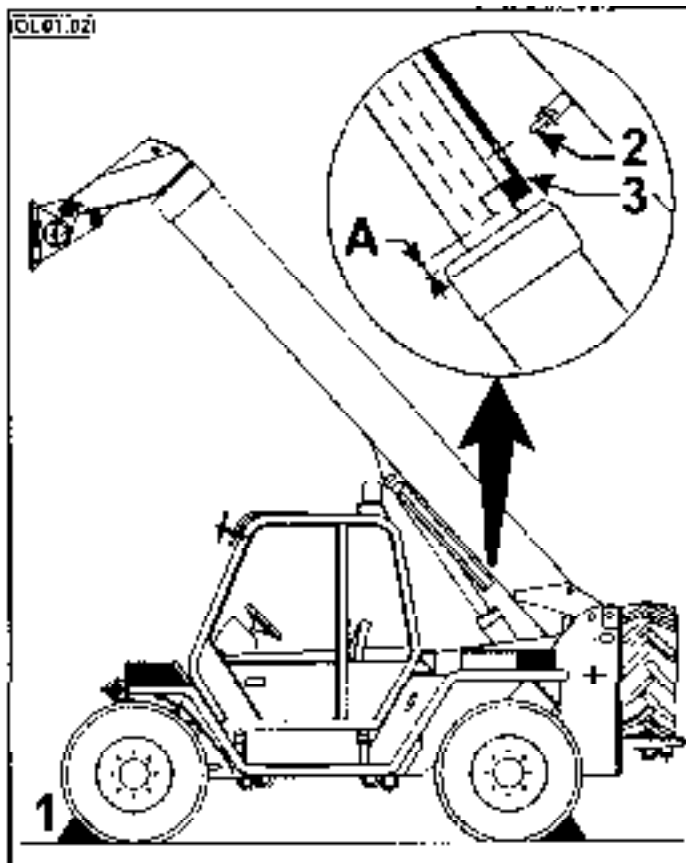
Before carrying out any kind of servicing, position the machine on flat, level ground and

- retract and lower the boom
- release loads or attachments on the vehicle
- put check (1) at the front and back of the wheels to avoid accidental movement
- apply the hand brake, place the transmission lever in neutral position and stop the engine

Should it be necessary to carry out servicing operations with the boom lifted, use the safety lock following these instructions.

- lift the boom
- apply the hand brake, place the transmission lever in neutral position and stop the engine
- working from the left rear mudguard, rotate lever (2) and rest the safety lock (3) on the lifting cylinder rod
- re-start the engine and slowly lower the boom till the lock is at about 10 mm from the cylinder head (dimension A)
- before lowering the boom, replace the safety lock in the original position

To work under vehicle it is preferable to use a pit or height adjustable work platform. The vehicle weight is stated on identification plate



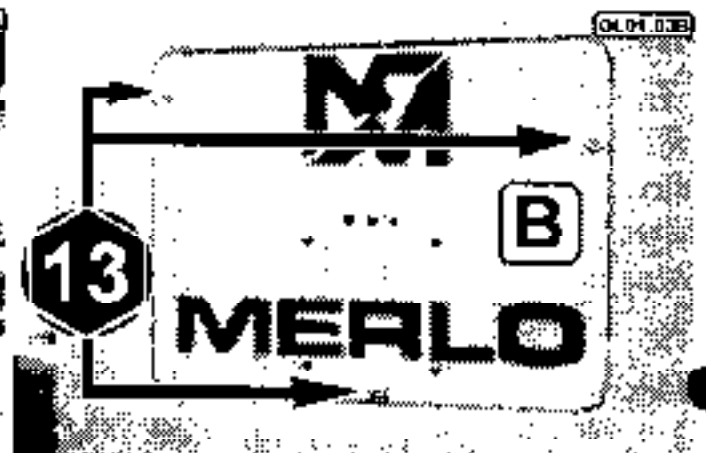
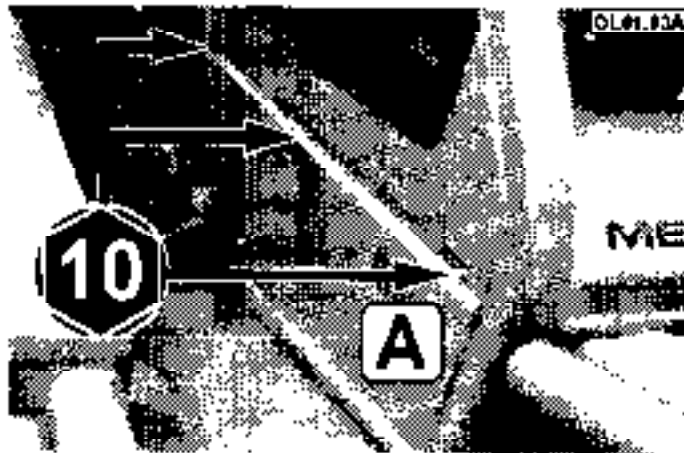
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REMOVAL OF ACCESS PANELS

Remove the following panels to work on:

- A) Main directional control valve - Steering directional control valve - Steering priority valve
- B) Stop valve on boom extension cylinder - Stop valve on boom lifting cylinder



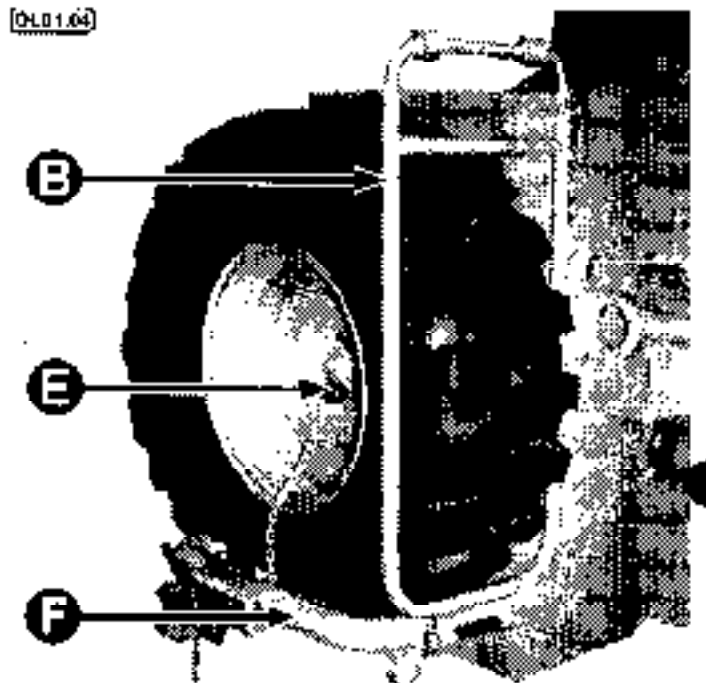
UNLOAD / LOADING OF THE SPARE WHEEL

Removal:

- 1) Remove spare wheel clamping system rotating lever (E).
- 2) From the cab side of the vehicle carefully rotate the wheel towards you and control the decent down to the ground.

Replacement:

- 1) Release pin (A) and lower the loading device (B) to ground level.
- 2) Extend loading device handle (D).
- 3) Ensure spare wheel clamping system rotating lever (E) is withdrawn.
- 4) Position the spare wheel in the main section of the loading device.
- 5) Slowly lift handle (D) and guide the wheel into the vehicle wheel receptacle.
- 6) Reassemble the spare wheel clamping system (E).
- 7) Retract loading device extension handle (D) and secure loading device into position with securing pin (A).



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CONVERSION FACTORS

01.01.05

1 Kgm	=	9,806 N·m
"	=	7,233 lb·ft
"	=	86,79 lb·in

1 bar	=	100 KPa
"	=	14,5 psi (lb/in²)
"	=	0,1 N/mm²

1 Kg	=	9,806 N
"	=	2,204 lb



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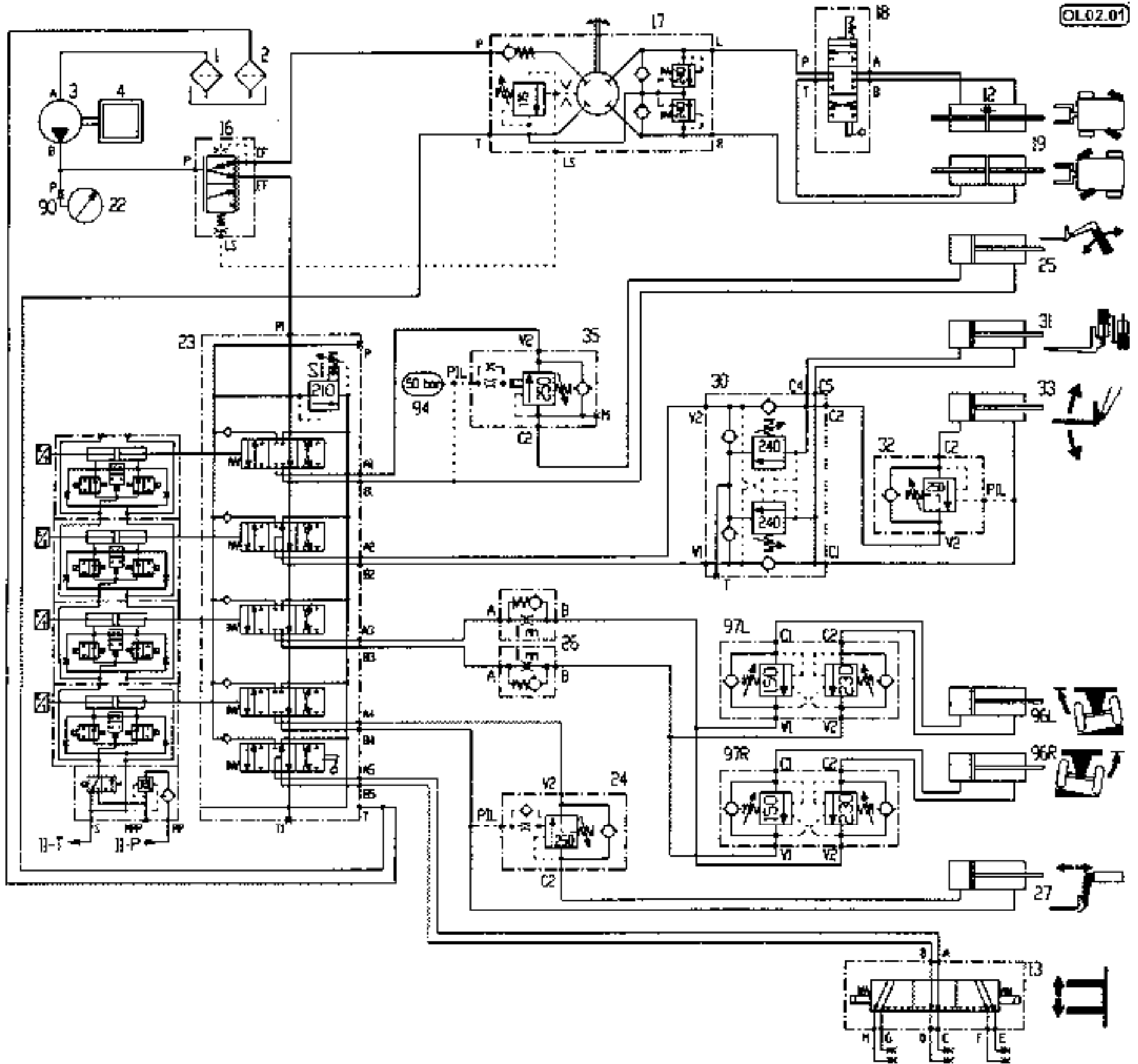


2 - HYDRAULIC SYSTEM DIAGRAM



P 35.9 EVA (SAV 542201)

OL02.01



- | | | | |
|----|------------------------------------|-------|---------------------------|
| 1 | Suction line filter | 25 | Lifting cylinder |
| 2 | Return line filter | 26 | Choke valves |
| 3 | Pump | 27 | Extension cylinder |
| 4 | Diesel engine | 30 | Fork / compensation valve |
| 12 | Volume recovery valve | 31 | Compensation cylinder |
| 13 | Flow deviator | 32 | Piloted check valve |
| 16 | Steering priority valve | 33 | Fork cylinder |
| 17 | Power steering | 35 | Lowering control valve |
| 18 | Steering directional control valve | 90 | Pressure coupling |
| 19 | Steering cylinders | 94 | Accumulator |
| 22 | Pressure gauge | 96L-R | Frame levelling cylinders |
| 23 | Main directional control valve | 97L-R | Balanced lock valves |
| 24 | Retracting control valve | S1 | relief valve |

11 - P (T) = Reference to part 11 connection P (T) hydrostatic transmission circuit.



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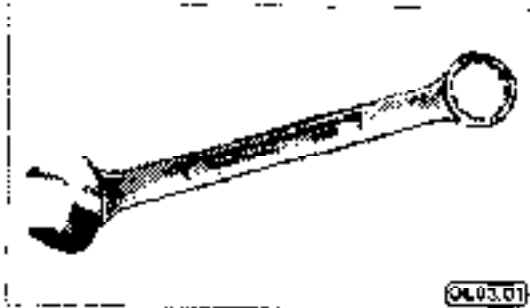


3 - NECESSARY TOOLS, ATTACHMENTS AND TEST INSTRUMENTS / REPAIR TIMES

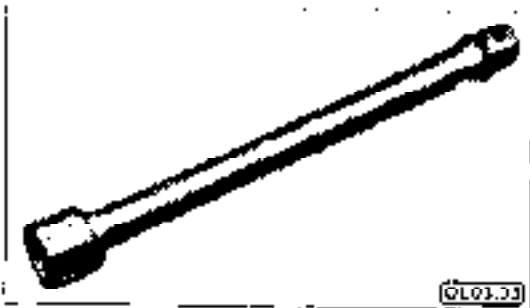


STANDARD TOOLS

Spanner: 6, 8, 10, 13, 17, 18, 19, 22, 24, 26, 27, 36, 50



Extension: L = 100, 200

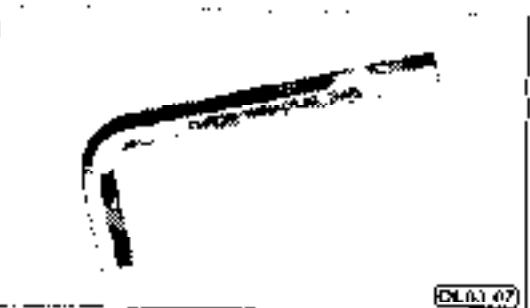


Sockets

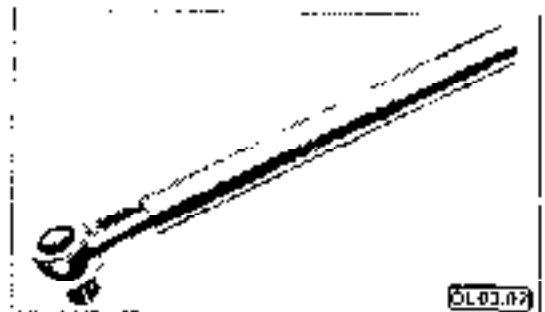
- external hexagon 6, 8
- inner hexagon 13, 15, 17, 18, 19, 24



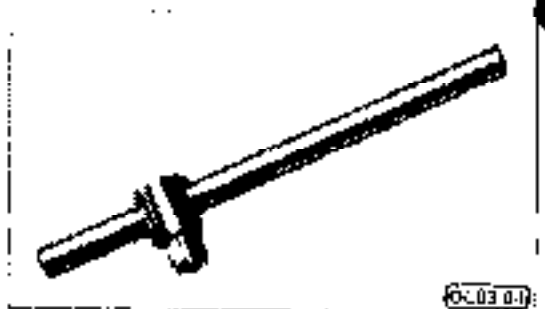
Allen Key: 5, 6, 8



Ratchet



Sliding T-Bar



Swivel socket bar L = 500



Double ended socket 15, 27, 28



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3 - NECESSARY TOOLS, ATTACHMENTS AND TEST INSTRUMENTS / REPAIR TIMES



Torque wrench

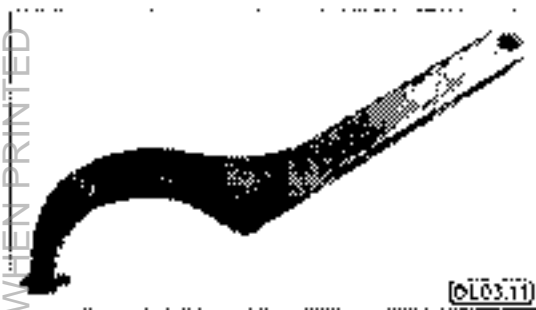


Circlop pliers



SPECIAL TOOLS

"C" spanner (Part.No 615049)



SPECIAL ATTACHMENTS

Accumulator pressure gauge kit (Part No. 035913)



Hydraulic manifold kit (Part No. 040435)



Pressure nipple (Part.No 040435)



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TEST INSTRUMENTS

It is advisable to use the following pressure gauges (glycerine immersed) and instruments

- 1 pressure gauge, scale end 610 bar
- 1 thermometer, scale end 100° C
- 1 multimeter, current I = 1.5 A (scale end) / voltage V = 30 V (scale end)

REPAIR TIMES

- | | |
|---|------------------------------|
| - Pump replacement | about 35 minutes |
| - Power take-off group overhaul | about 1 hour and 30 minutes |
| - Priority valve disassembly / cleaning and reassembly | about 25 minutes |
| - Power steering replacement | about 1 hour and 20 minutes |
| - Servocontrol overhaul | |
| a) Repairs that can be carried out on the machine | about 40 minutes |
| b) Repairs that require the removal of the main directional control valve | about 2 hours and 40 minutes |
| - Lifting cylinder valve replacement | about 25 minutes |
| - Accumulator replacement | about 15 minutes |
| - Accumulator overhaul | about 30 minutes |
| - Extension cylinder valve replacement | about 20 minutes |
| - Fork / compensation valve replacement | about 15 minutes |
| - Fork cylinder valve replacement | about 35 minutes |
| - Frame levelling cylinder valve replacement | about 15 minutes |
| - Flow deviator magnet replacement | about 20 minutes |



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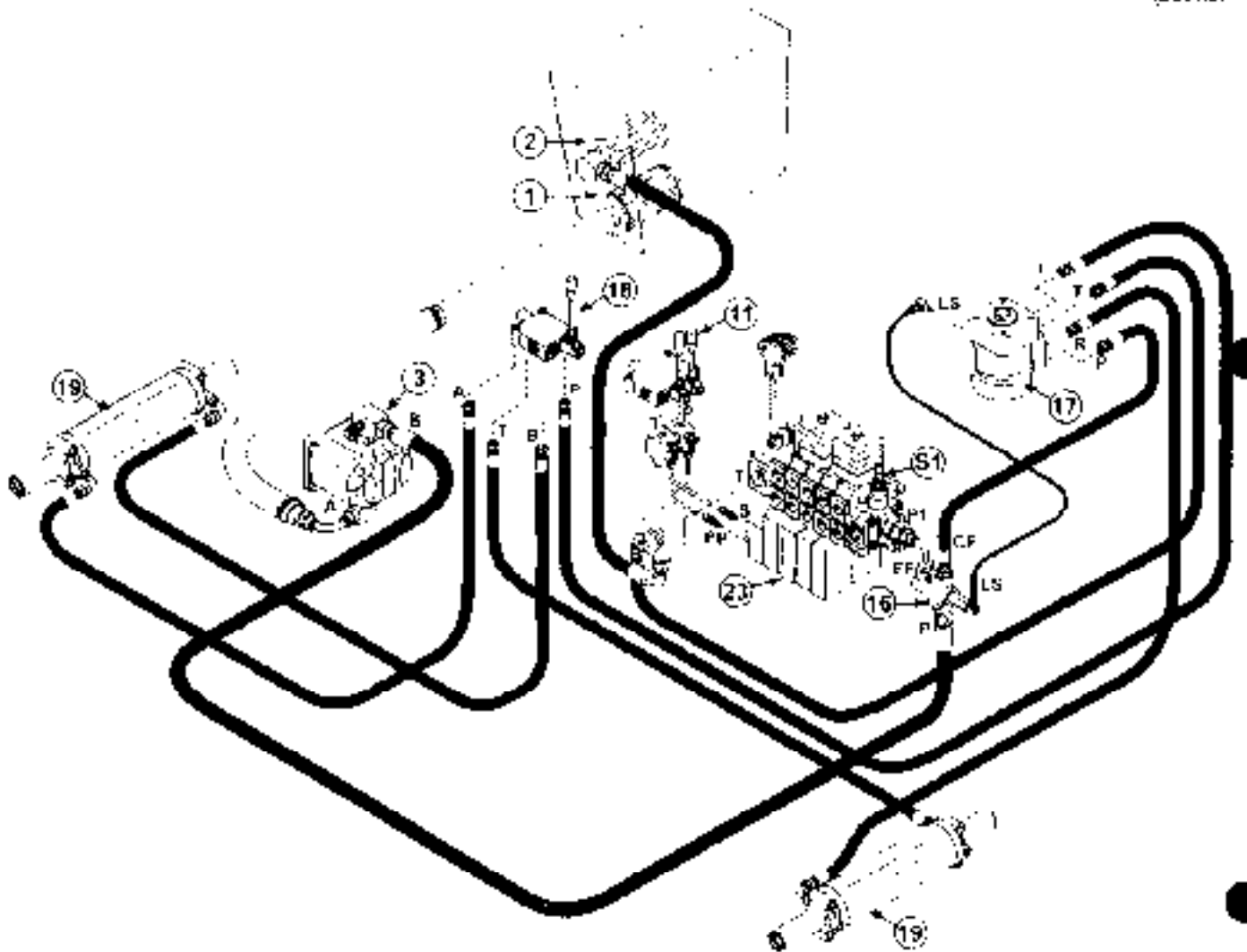


4 - STEERING SYSTEM AND MAIN DIRECTIONAL CONTROL VALVE SUPPLY SYSTEM



STEERING SYSTEM AND MAIN DIRECTIONAL CONTROL VALVE SUPPLY SYSTEM

(DL04.01)



- 1 Suction line filter
- 2 Return line filter
- 3 Pump
- 11 Speed selection and differential-lock control valve
- 16 Steering priority valve
- 17 Power steering
- 18 Steering directional control valve
- 19 Steering cylinders
- 23 Main directional control valve
- S1 Relief valve

The feeding of the servocontrol of the main directional control valve (23) comes from the hydrostatic pump by means of the gearbox control valve (11).

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4 - STEERING SYSTEM AND MAIN DIRECTIONAL CONTROL VALVE SUPPLY SYSTEM

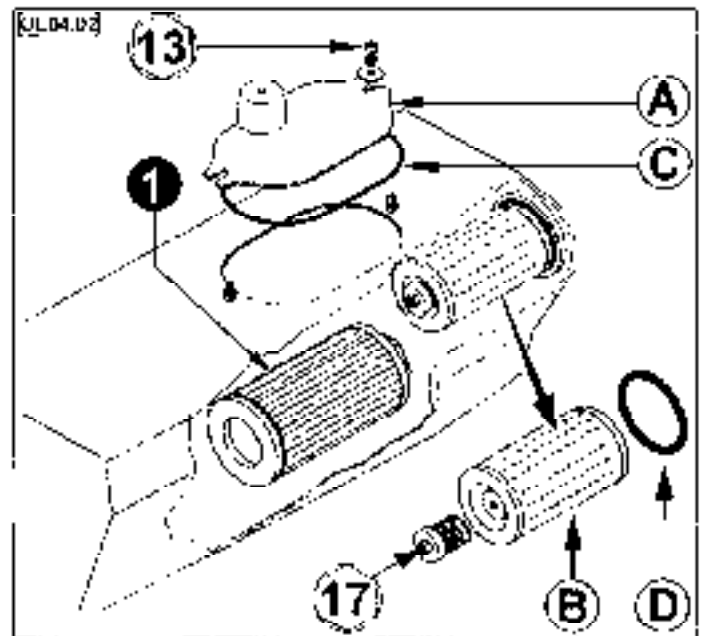


RETURN LINE FILTER (2) (032320)

To replace the element :

- Remove the cover (A), the filter (B) and the seals (C and D)
- Replace element
- Reinstall all above items taking care not to damage the seals

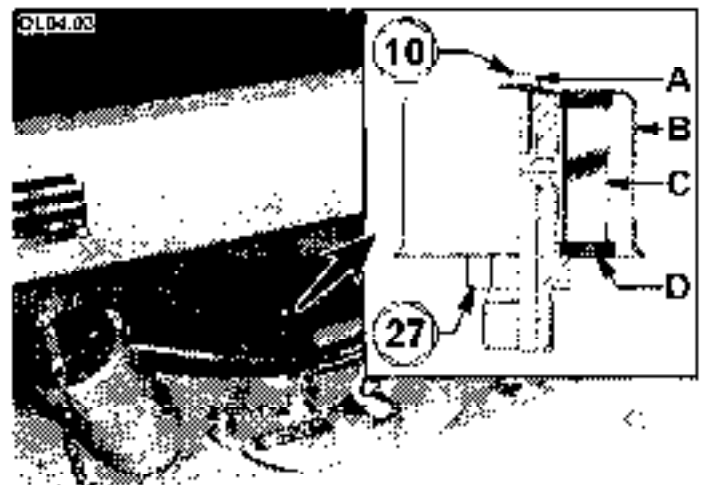
The suction line filter (1) needs no maintenance



HYDRAULIC DUMP BLEED FILTER (2A) (010507)

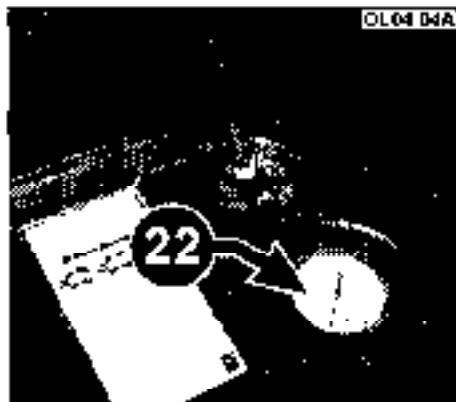
To inspect/clear the element:

- release screw (A)
- remove cap (B)
- check the cartridge (C) status: should it be dirty, it can be washed with no sudsing detergent and flushed with isopropyl alcohol
- re install (A) (B) (C)
- ensure lower plate (D) is in the correct position when re-installing



PRESSURE GAUGE (22) (025503)

By way of a pressure gauge ref 22 (see picture OL04 04A) measure the system pressure, by connecting the flexible cable (see picture OL04 04B) to the pressure intake ref 90 placed on the pump (see picture OL04 04C). The pressure gauge full scale is 600 bar.



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4 - STEERING SYSTEM AND MAIN DIRECTIONAL CONTROL VALVE SUPPLY SYSTEM

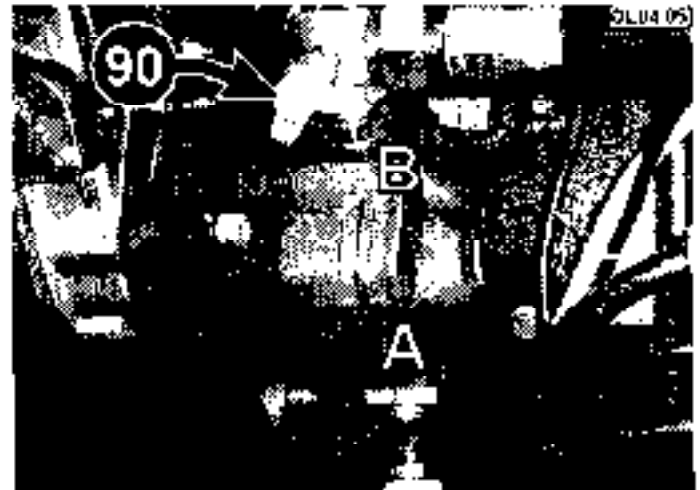


PUMP (3) (034559)

Characteristics of pump

fixed delivery 34 cm³/rev working pressure 210 bar,
clockwise rotation

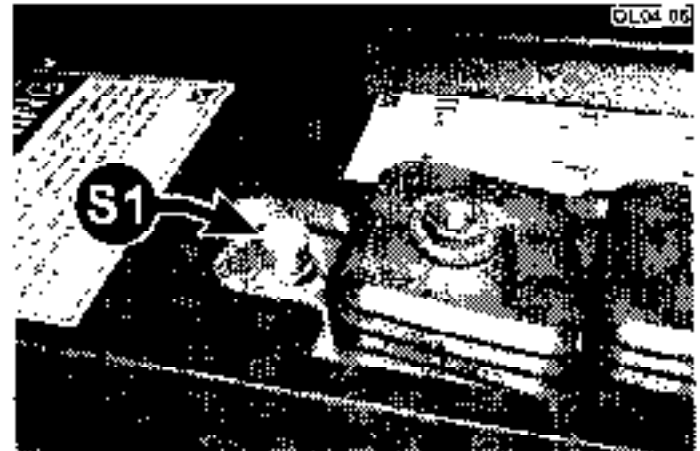
- A = suction from tank
- B = delivery to P priority valve (16)
- 90 = pressure coupling



REPLACING OF PUMP AND POWER TAKE-OFF GROUP

1) IMPORTANT !!!

Check that the lead seal placed on the relief valve (51) of the main directional control valve is intact; in case the lead seal has been tampered, before replacing the pump it will be necessary to fully loosen the valve register screw (see paragraph ADJUSTMENT CHECK OF THE RELIEF VALVE)



- 2) To avoid oil leaks when the pump suction line is disconnected, place the suction intake above the oil tank level. You can obtain a sufficient height by operating the frame levelling device to raise the engine to the maximum height from the ground. (before making carrying out this operation extend the boom and lift the carriage upwards to reduce the oil quantity in the tank).
Disconnect the suction connecting pipe and point it upwards (see pictures OL04 07A - OL04 07B)





4 - STEERING SYSTEM AND MAIN DIRECTIONAL CONTROL VALVE SUPPLY SYSTEM



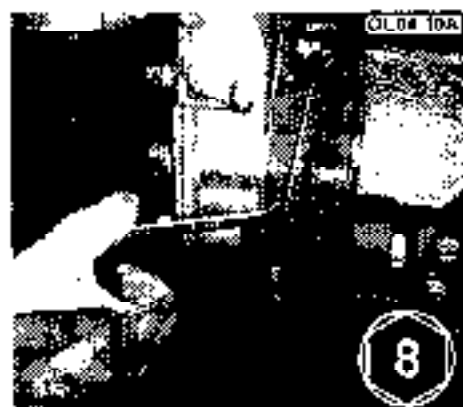
- 3) Disconnect the pressure line hose (see picture OL04.08A), then remove the four fixing screws of the pump (see picture OL04.08B).



- 4) Remove the pump support by taking out the two bolts (see picture OL04.09A), extract the pump from its place (see picture OL04.09B).



- 5) Disassemble the bearing lubrication pipe (see picture OL04.10A), remove the 6 fixing screws from the power take-off (see pictures OL04.10B - OL04.10C).



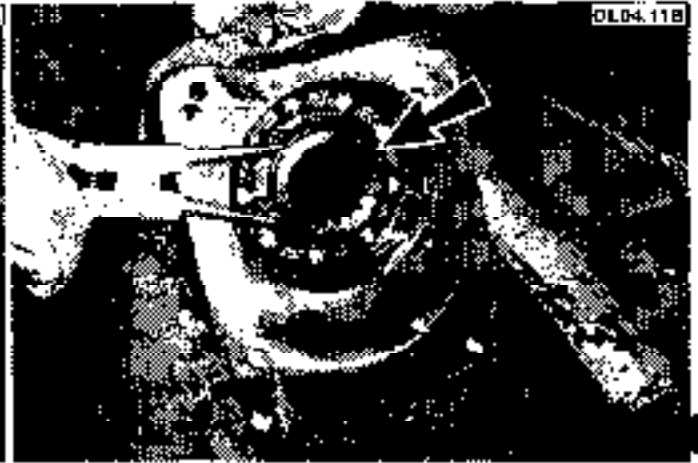
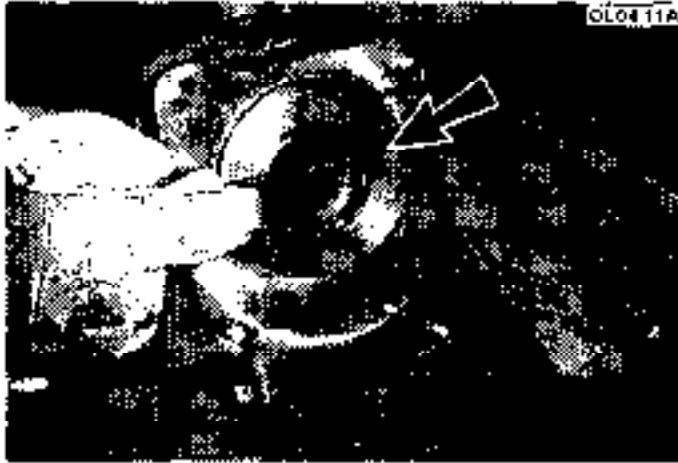
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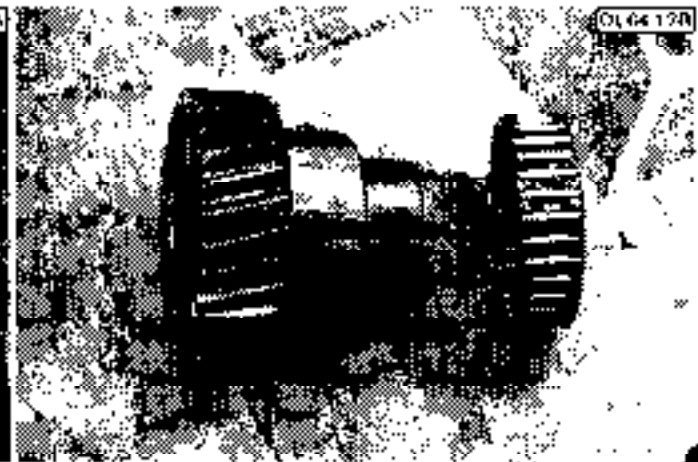
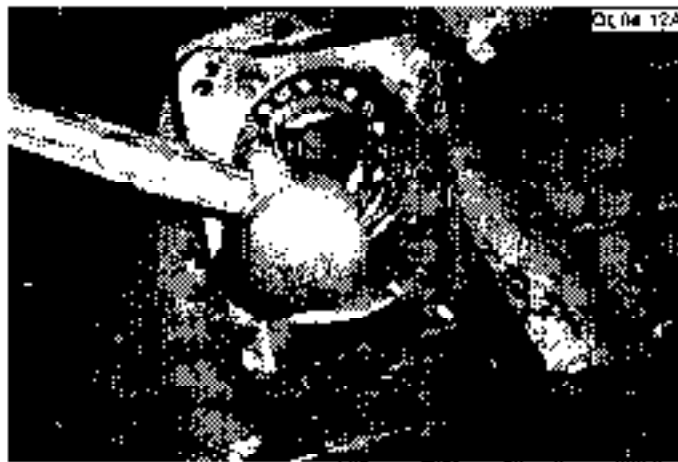
4 - STEERING SYSTEM AND MAIN DIRECTIONAL CONTROL VALVE SUPPLY SYSTEM



- 6) Remove the power take-off and secure it in a vice. Remove the centering flange (see picture OL04.11A) then removing the fixing circlip from the pinion (see picture OL04.11B).



- 7) Tap out the pinion and gearing from the opposite side of the power take-off with a soft hammer (see pictures OL04.12A - OL04.12B).



- 8) Remove the circlip from the ball bearing (see picture OL04.13A) Turn over the power take off and tap out the bearing from the opposite side (see picture OL04.13B).

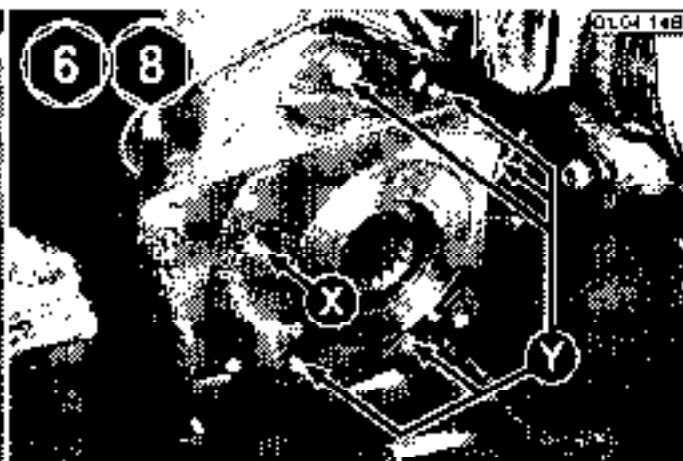




4 - STEERING SYSTEM AND MAIN DIRECTIONAL CONTROL VALVE SUPPLY SYSTEM



- 9) Replace the two bearings and the three 'O' rings assembled on the power take-off, if necessary use the fittings and the joint from the old pump and assemble them on the new one
 Reassemble in the reverse order all the operations described at the previous points, bearing in mind the following:
- POINT 6: replace the circlip and ensure that the pinion turns freely. if necessary, hit the pinion with a soft hammer to move it slightly forwards to obtain sufficient play (see picture OL04 14A)
 - POINT 5: apply "LOCTITE 572" on the six fixing screws of the power take-off: tighten the screw ref. X to 43 Nm and the five screws ref. Y to 21,5 Nm (see picture OL04 14B)



- 10) Check oil level (see paragraph HYDRAULIC OIL in the section INTRODUCTION), then test the system and ensure there are no leaks.

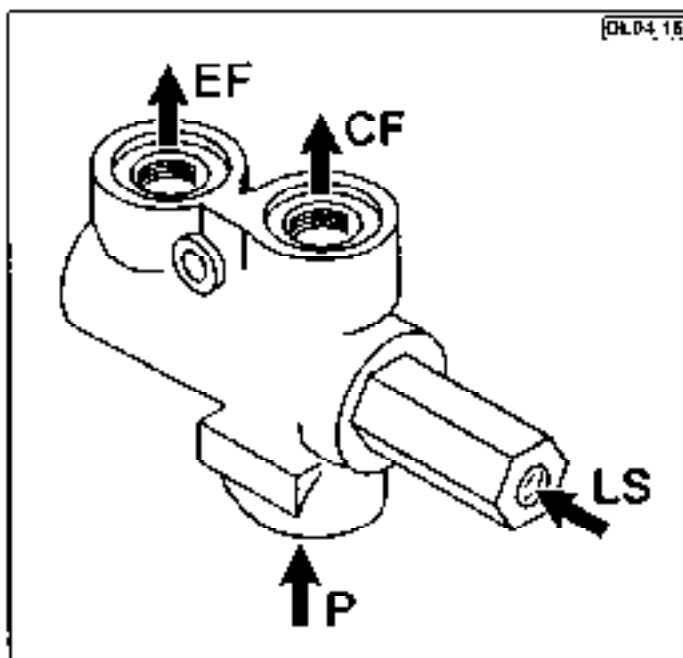
STEERING PRIORITY VALVE (16) (025470)

- CF = to P power steering (17)
- EF = to P1 main directional control valve (23)
- LS = from LS power steering (17)
- P = delivery from the pump (3)

The priority valve works in "load-sensing" method linked with the power steering (17)

The valve allows priority to the power steering in any condition, given only the oil quantity demanded by the power steering, the remainder of the oil is available for other operations.

Max. pressure achieved in the power steering system is 175 bar



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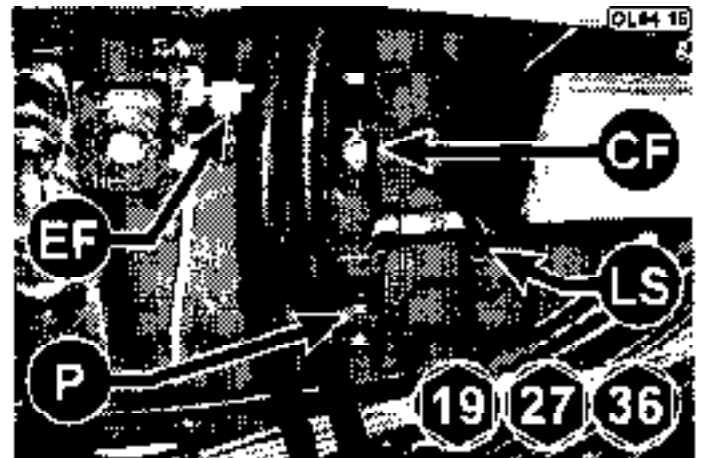
4 - STEERING SYSTEM AND MAIN DIRECTIONAL CONTROL VALVE SUPPLY SYSTEM



CLEANING OF THE PRIORITY VALVE

Should it become necessary to service the priority valve proceed as follows.

- 1) Disconnect from the priority valve the pressure line hose from the pump (P), the pilot hose (LS) and pressure line hose to the power steering (CF). Then disassemble the valve by unscrewing the pressure line fitting on the main directional control valve (EF).



- 2) Hold the valve in a vice and disassemble the fitting for the pilot hose (see picture OL04.17A), remove and clean the fitting (see picture OL04.17B).



- 3) Disassemble the cap (see picture OL04.18A), extract the cursor, check the valve on the indicated end clean as required (see picture OL04.18B).



- 4) Reassembly is the reverse of the the operations described in the previous points. Check oil level (see paragraph HYDRAULIC OIL in the section INTRODUCTION), then test the system and verify there are no leaks.



POWER STEERING (17) (018195)

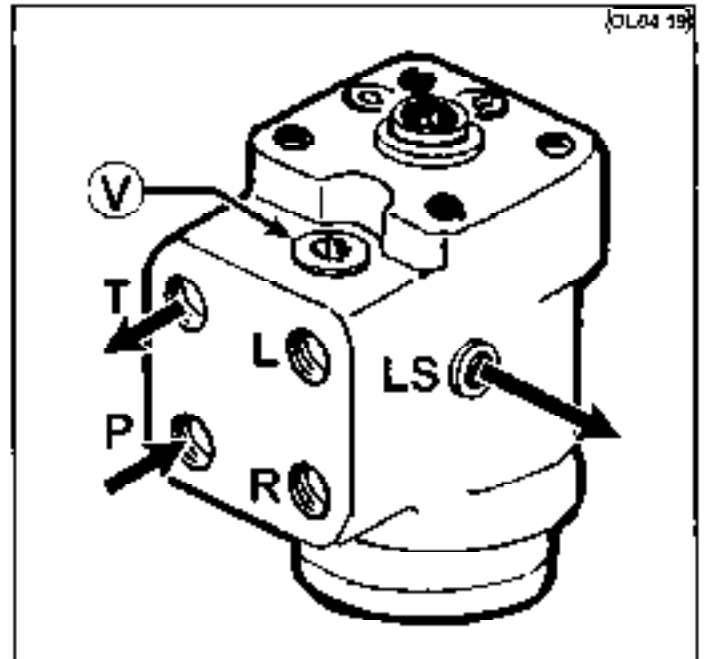
- L = to P steering directional control valve (18)
- LS = to L.S steering priority valve (16)
- P = from CP steering priority valve (16)
- R = to front steering cylinder (19)
- T = to T main directional control valve (23)
- V = max pressure valve

Power steering works in "load sensing" method linked with the priority valve (16).

Power steering is complete with max pressure valve (V) rated at 175 bar shock-resistant valves, non return valve and anti-cavitation valve.

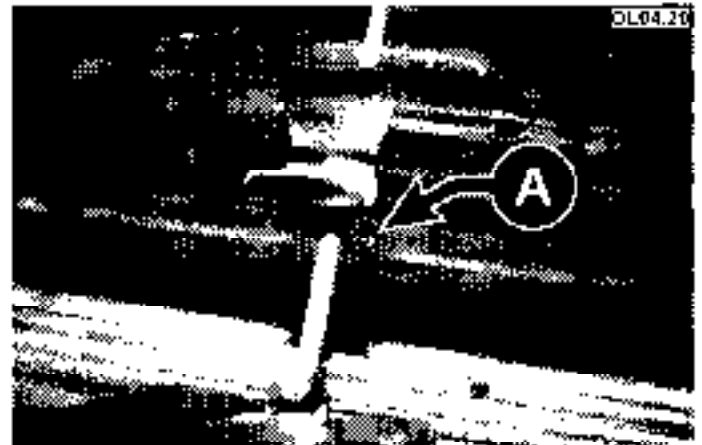
The rated pressure control could be done connecting the gauge (22) on pump (3) with engine at medium rate and steering wheel full stroke.

In case of failure of the feed pump, the power steering acts automatically as a hand pump assuring emergency steering.

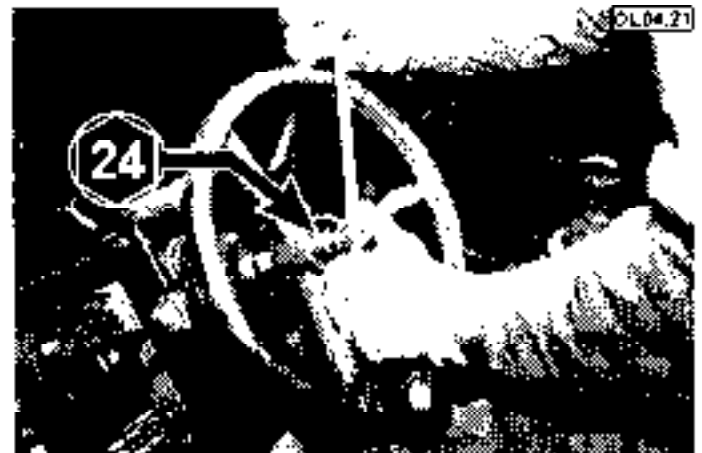


REPLACING OF POWER STEERING

- 1) To allow sufficient room to carry out this operation it is recommended to lift the windscreen approximately 90 degrees like so:
 - lift back the roof protection grid
 - unhook the wing nut (A) to disconnect the windscreen opening mechanism,
 - lift up the windscreen and securely support it to prevent it falling.



- 2) Remove the protection cap from the center of the steering-wheel remove the locking nut and then extract the steering-wheel.

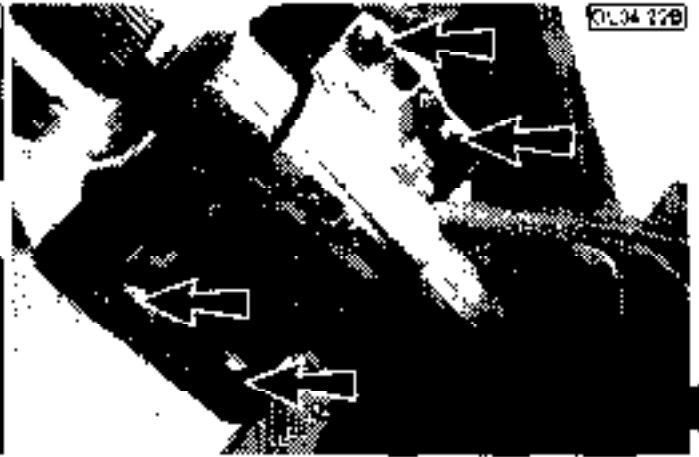
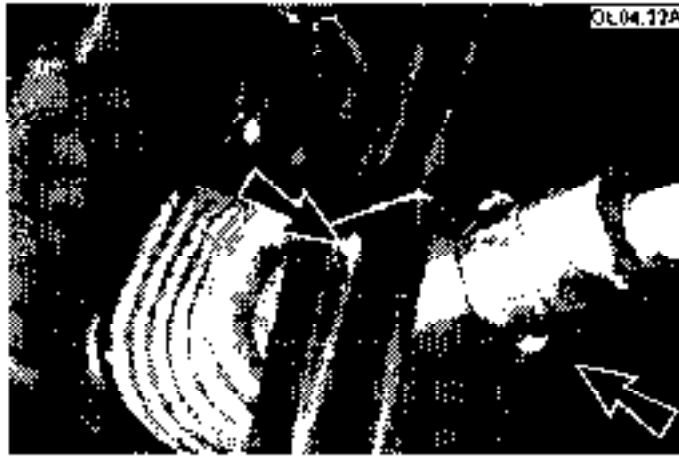




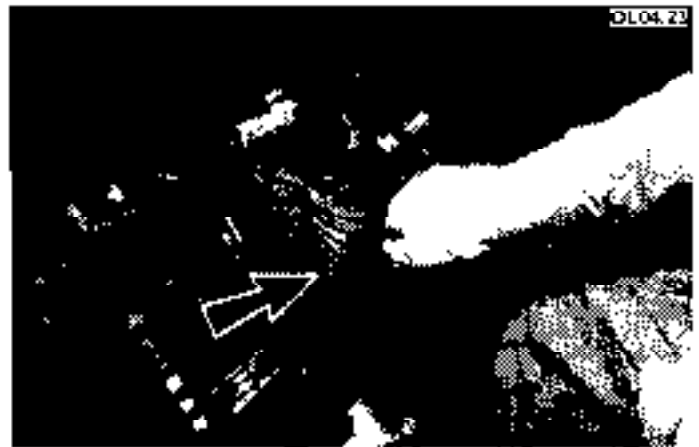
4 - STEERING SYSTEM AND MAIN DIRECTIONAL CONTROL VALVE SUPPLY SYSTEM



- 3) Remove the two fixing screws that hold together the two parts of the control lever assy (see picture OL04.22A) allowing you to take the right part off, release the screws that hold the two sub assy together (see picture OL04.22B) leaving one screw partially attached for ease of reassembly



- 4) To allow the extraction of the cables of the two divided parts of the lever assy remove the rubber bellows and the flange unscrewing the four fixing screws



- 5) Unscrew the fixing nut of the dashboard (see picture OL04.24A) and the locking screw of the height setting lever of the steering-wheel (see picture OL04.24B), then remove the lever together with the spring





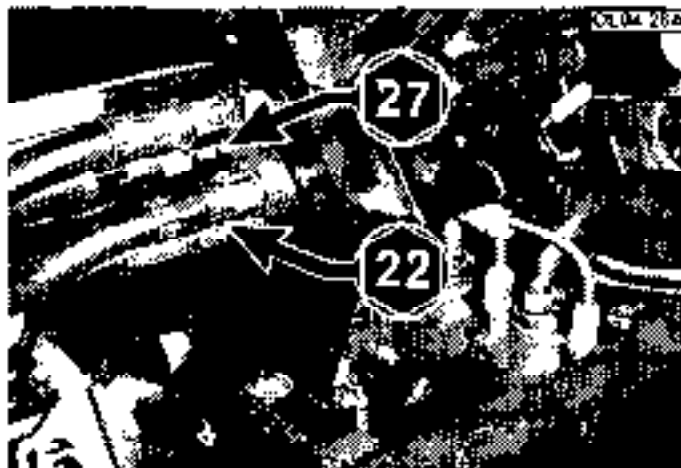
4 - STEERING SYSTEM AND MAIN DIRECTIONAL CONTROL VALVE SUPPLY SYSTEM



- 6) Lift out the dashboard extracting it from the steering column, rotate it counter-clockwise and lean it on the front left splash-board and on the seal of the windscreen (see picture OL04.25A and picture OL04.25B).



- 7) Disconnect the hoses mounted on the power steering (see picture OL04.26A and picture OL04.26B).



- 8) Separate the power steering from the steering column unscrewing the four fixing screws (see picture OL04.27A), push the power steering inwards so as to extract it from the steering column, tilt it and remove it from the left of the pedals (see fig. OL04.27B)

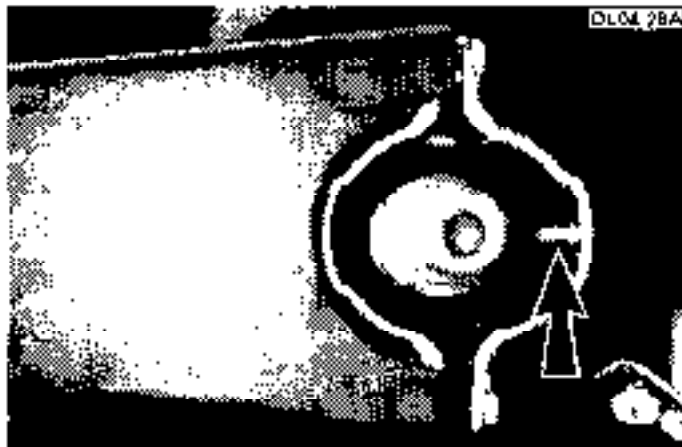




4 - STEERING SYSTEM AND MAIN DIRECTIONAL CONTROL VALVE SUPPLY SYSTEM



- 9) If necessary, recover the fittings used on the old power steering and assemble them on the new one. Re-assemble in the reverse order the operations described in the previous points, bearing in mind the following:
- POINT 6: reinsert the dashboard on the steering column, pushing the fixing bolt of the windscreen through the suitable hole. Make sure, during the reassembly, that you do not pinch the cables and you do not accidentally disconnect the connectors placed under the dashboard, position the cables in the right part of the dashboard so as they pass under the fixing bolt of the regulating lever of the steering wheel. Then push the dashboard downwards until it is correctly positioned on all holding positions.
 - POINT 4: reassemble the four fixing screws locking both the rubber bellows and the flange.
 - POINT 3: reassemble the left control lever ass'y on the steering column, placing the pin (see picture OL04.28A) of the inner part of the right half section in the hole placed on the steering column (see picture OL04.28B).
- Reassemble the right part of the control levers ass'y. The upper rim of the rubber bellows must remain closed inside the control levers ass'y.



- 10) Check oil level (see paragraph HYDRAULIC OIL in the section INTRODUCTION), then test the system and verify there are no leaks.



4 - STEERING SYSTEM AND MAIN DIRECTIONAL CONTROL VALVE SUPPLY SYSTEM



STEERING DIRECTIONAL CONTROL VALVE (18) (026062)

A-B = to rear steering cylinder (19)
 P = from L power steering (17)
 T = to front steering cylinder (19)
 M = steer mode switch

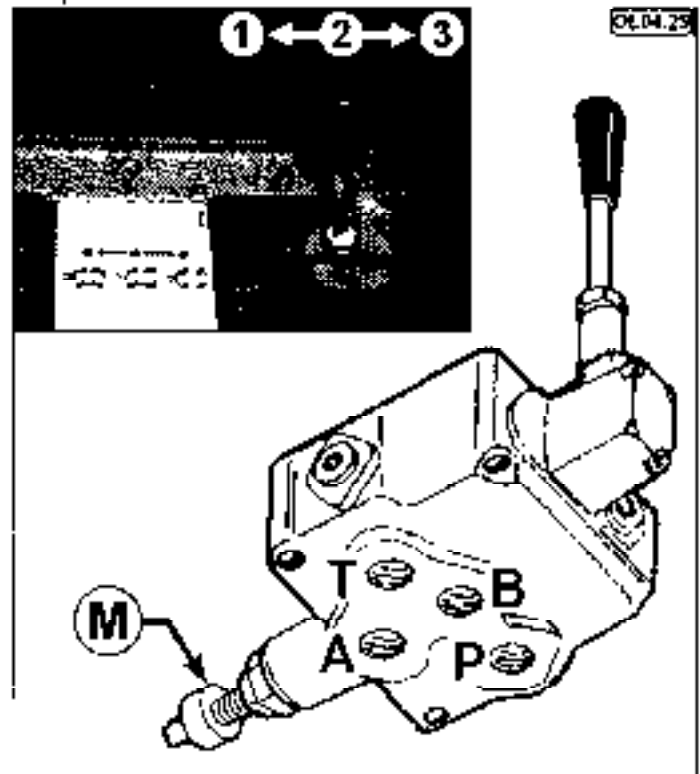
1 = four wheel steer
 2 = front wheel steer
 3 = crab steer

When the control lever is switched to pos. 3, the switch (M) closes the electric circuit and the crab steer light on the dashboard will illuminate.

WHEELS REALIGNMENT

To correct the misalignment between the front and the rear wheels, select four wheel steer or crab steer, steer full lock left then full lock right. This will re-align the front and rear wheels.

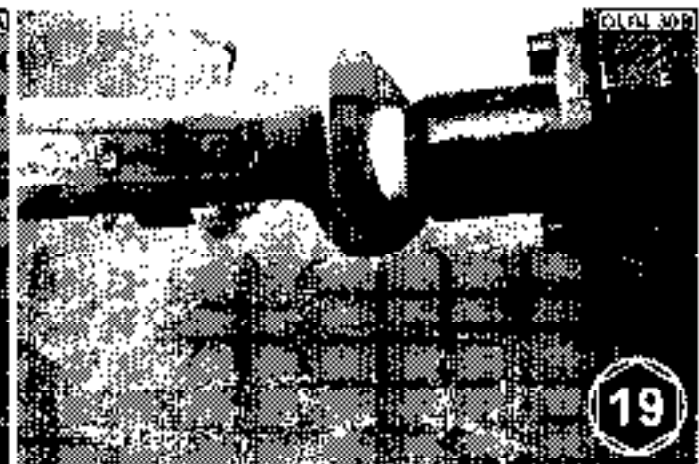
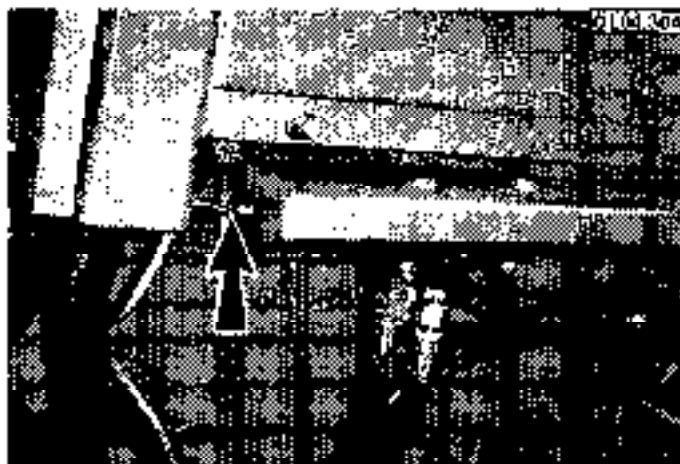
This is achieved by means of the volume recovering valve (12) placed in the rear steering cylinder (19).



SWITCH ADJUSTMENT ON THE STEERING CONTROL VALVE

Should the crab steer indicator light not illuminate when in crab steer mode, or if it illuminates when in another steering mode, follow the procedure below:

- 1) Disconnect the electric cable (see picture 01.04.30A), loosen the lock nut (see picture 01.04.30B) and unscrew the switch from the steering control valve.



- 2) Move the lever to four wheel steer, screw the switch to the end of its stroke on the steering control valve; tighten the lock nut and reconnect the electric cable.



TESTING FOR INTERNAL LEAKAGES FROM THE STEERING CYLINDER

If it is suspect that there is a leakage in the steer cylinders procede as follows

FRONT STEERING CYLINDER:

- 1) select front wheel steer mode, turn steering wheel until wheels are parallel with the side of the machine
- 2) prevent the rod re-entering on one of the two sides of the steering cylinder, by positioning a spacer (L = 400 mm approx) between the cylinder chamber and the fixing point of the steering tie rod (see picture OL04 60A)
- 3) disconnect and plug the pipe placed on the opposite side of the cylinder (see picture OL04 60B)
- 4) switch on the engine, then steer the wheels in the same direction on which you have mounted the spacer: if the cylinder leaks, the oil will come from the joint from which the pipe has been disconnected



REAR STEERING CYLINDER:

- 1) select four wheel steer mode then turn steering wheel until rear wheels are parallel with the side of the machine
- 2) carry out the same operations described for the front cylinder from point 2 to point 4

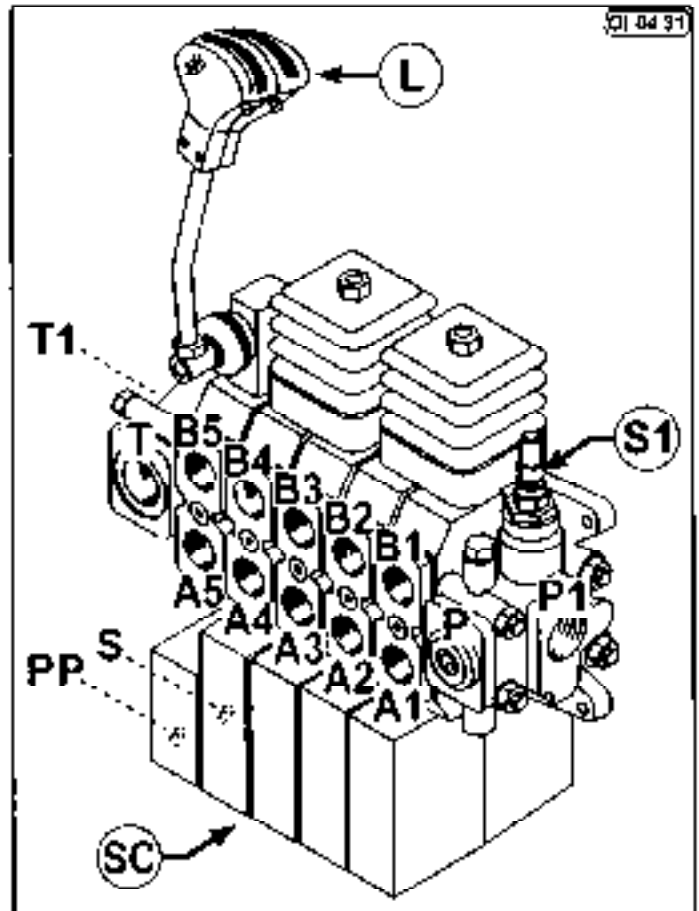


4 - STEERING SYSTEM AND MAIN DIRECTIONAL CONTROL VALVE SUPPLY SYSTEM



MAIN DIRECTIONAL CONTROL VALVE (23) (037061)

- A1 = to V2 lifting valve (35)
- B1 = to lifting cylinder (25) head and to P1 lifting valve (35)
- A2 = to V2 fork/compensation valve (30)
- B2 = to V1 fork/compensation valve (30)
- A3 = to V1 frame levelling valve (97L) ; to V2 frame levelling valve (97R)
- B3 = to V2 frame levelling valve (97L) ; to V1 frame levelling valve (97R)
- A4 = to V2 extension valve (24)
- B4 = to extension cylinder (24) head and to P1 extension valve (24)
- A5 = to A flow deviator (13)
- B5 = to B flow deviator (13)
- L = electromechanical 3X1 joy-stick
- P = plugged
- PP = from P speed selector and differential-lock control valve (11)
- P1 = from EF priority valve (16)
- S = to T speed selection and differential-lock control valve (11)
- SC = servocontrol
- S1 = relief valve
- T = to T power steering (17) / drain to tank
- T1 = plugged



The valve S1 controls max pressure of the main directional control valve system and consequently, of lifting and extension, forks/compensation, frame levelling, flow deviator systems.

The electromechanical joy-stick 3X1 (L) controls the movements concerning the flow deviator system (13) mounted on the valve.

The movements related to the remaining outlets of the main directional control valve (from A1/B1 to A4/B4) are operated by the electronic, proportional joy-stick 4X1 (L1) assembled on the arm rest. The joy-stick is connected to the electronic card placed under the seal, which is connected to the servocontrol (SC) assembled under the main directional control valve (23).

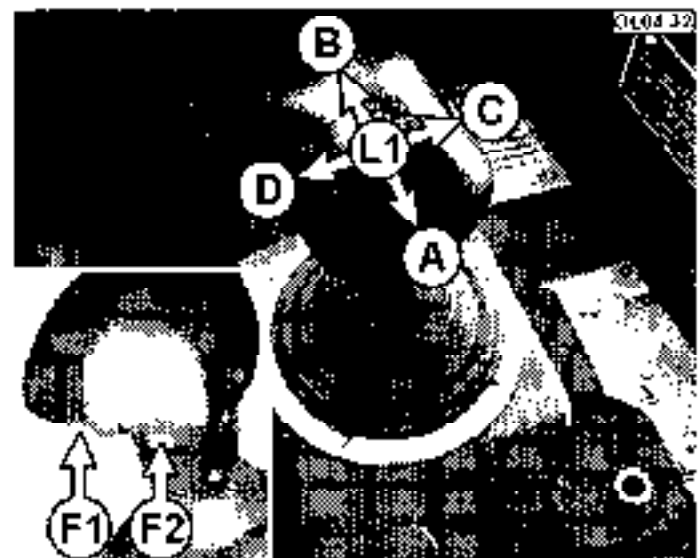
In order to have the desired movement, push one of the selection push buttons (F1-F2) and operate the joystick (L1) as follows:

Push button ref. F1 pressed

- pos. A raise boom
- pos. B lower boom
- pos. C forks inclination downwards
- pos. D forks inclination upwards

Push button ref. F2 pressed

- pos. A extend boom
- pos. B retract boom
- pos. C clockwise frame levelling
- pos. D counterclockwise frame levelling





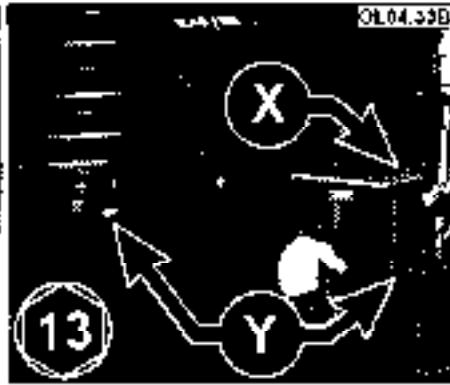
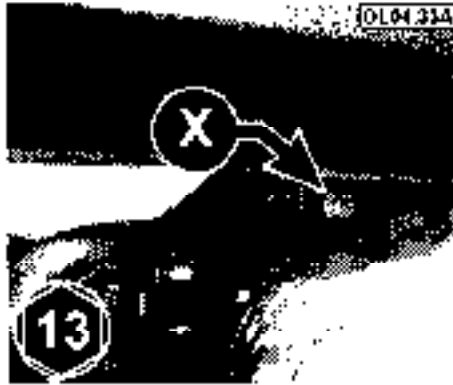
4 - STEERING SYSTEM AND MAIN DIRECTIONAL CONTROL VALVE SUPPLY SYSTEM



SERVOCONTROL - REPAIRS THAT CAN BE CARRIED OUT ON THE MACHINE

1) HOW TO REACH THE SERVOCONTROL:

- Loosen the two screws ref. X and remove the two screws ref. Y (see pictures OL04.33A - OL04.33B), extract the fixing panel of the electric box (see picture OL04.33C)

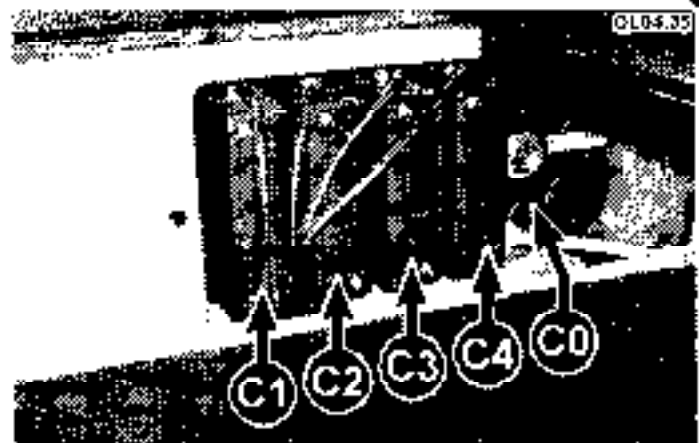


- Lift the rubber carpet (see picture OL04.34A), remove the panel of the servocontrol (see picture OL04.34B)



2) SERVOCONTROL DESCRIPTION:

- The servocontrol is composed of an entrance section (C0) on which the solenoid interception valve and the pressure reducing valve are assembled; it is comprised also of four intermediate sections (from C1 to C4) on which the proportional solenoid valves and the electronic cards are assembled. The machine movements related to these last four sections are the following:
 - C1 = raise / lower boom
 - C2 = forks filling
 - C3 = frame levelling
 - C4 = extend / retract boom



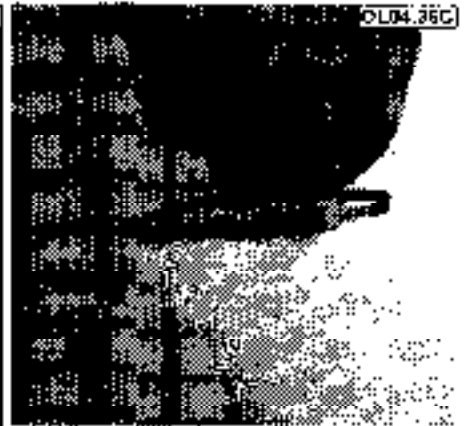
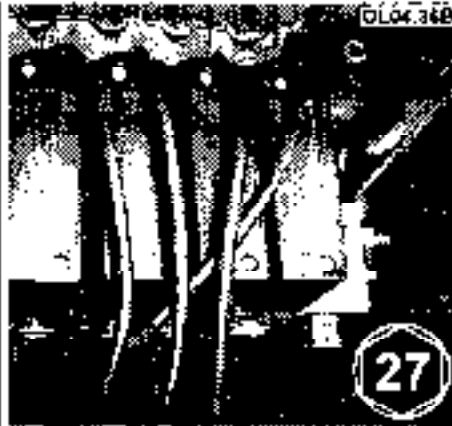
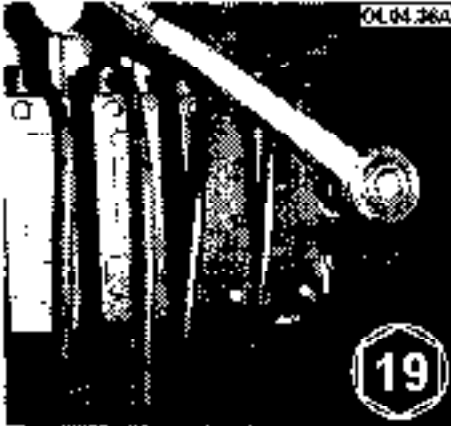


4 - STEERING SYSTEM AND MAIN DIRECTIONAL CONTROL VALVE SUPPLY SYSTEM



3) INTERCEPTION SOLENOID VALVE:

- Disassemble the magnet (see picture OL04.36A) remove the valve (see picture OL04.36B) and, by using a screwdriver, check the running of the cursor (see picture OL04.36C) Wash the valve with diesel fuel and blow compressed air to remove dirt, before assembling the valve again, make sure that it is dry



4) PRESSURE REDUCER VALVE:

- Disassemble the valve (see picture OL04.37A) and, by using a screwdriver, check the running of the cursor (see picture OL04.37B) Wash the valve with diesel fuel and blow compressed air to remove dirt before assembling the valve again, make sure that it is dry



5) REPAIRS ON THE INTERMEDIATE SECTIONS:

- Remove the cap of the intermediate section relevant to the operations of the machine on which you have to service (see point 2 - SERVOCONTROL DESCRIPTION).

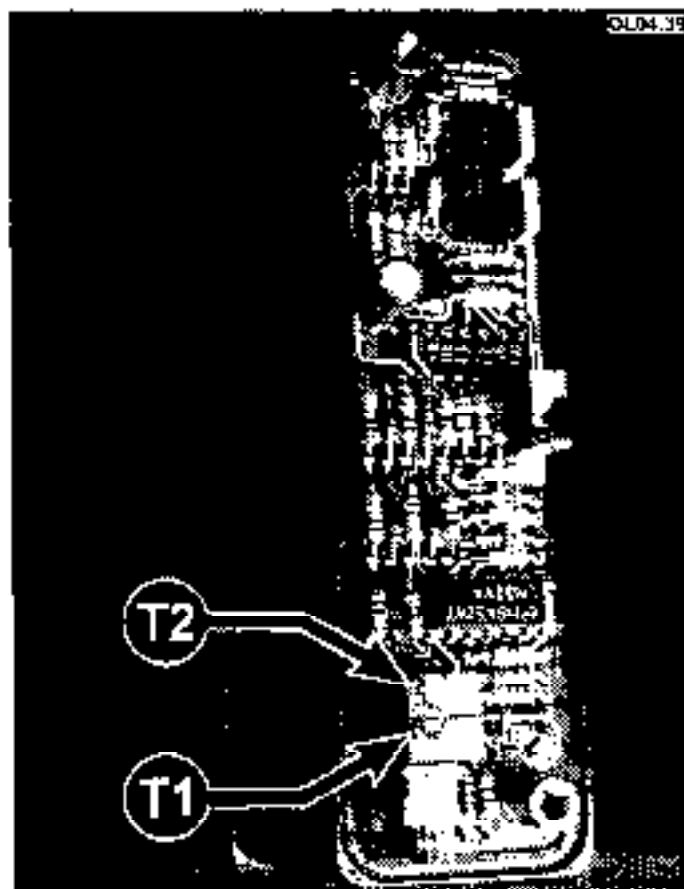




5.1) TRIMMER ADJUSTMENT.

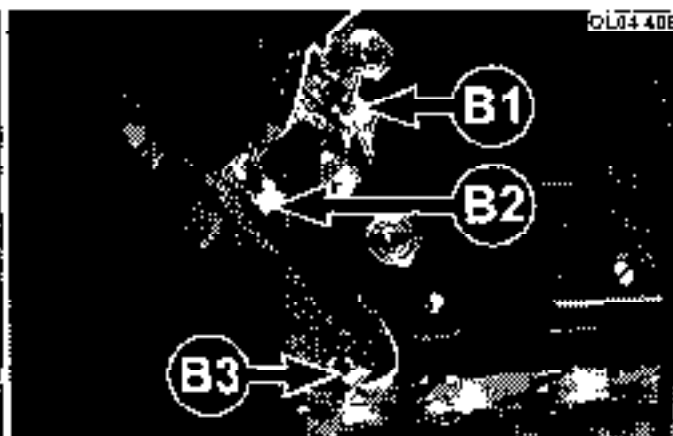
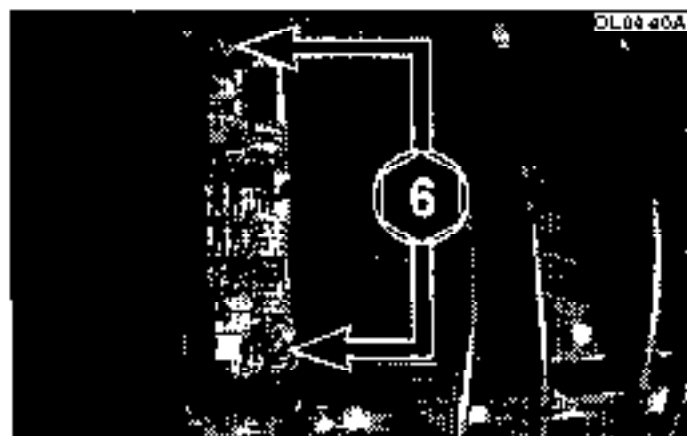
Before operating the trimmers check the potentiometers centering which are assembled in the electronic joystick (see the handbook ELECTRICAL ENGINEERING INSTRUCTIONS P35 9 EVA. page 1-7). Screw a lever in the pertinent mechanical joystick of the main directional control valve in such a way you can easier verify the movements:

- TRIMMER "T1": adjust it only when you push the red button on the electronic joystick, the lever of the main directional control valve move itself.
- TRIMMER "T2" adjust it only when the complete stroke of the electronic joystick does not correspond an equal stroke of the lever of the main directional control valve.
- All settings must be done on the trimmer one by one:
 - "T1" TRIMMER: push the red button of the electronic joystick, screw the regulator screw until there is no movement of the lever on the main directional control valve.
 - "T2" TRIMMER: push the red button and position the electrical joystick at end of its stroke screw the regulator screw until the complete stroke of the lever of the main directional control valve is obtained, then add about 1/2 turn (if the lever was already at the end of its stroke it is necessary to unscrew it prior to this operation). Repeat the same operations positioning the joystick to end of its stroke from the opposite side, if you cannot bring the lever to the end of its stroke on one of the two sides adjust the regulator on TRIMMER 1.



5.2) ELECTRONIC CARD AND SOLENOID PROPORTIONAL VALVES REPLACEMENT

- Disassemble the two fixing studs (see picture OL04.40A) extract the electronic card and disconnect the three connectors (cf B1-B2-B3 (see picture OL04.40B). Refer to the cables colour to reconnect the connectors correctly:
 - B1 = green / blue / violet / grey
 - B2 = red / brown / black / white
 - B3 = yellow / orange / red / brown



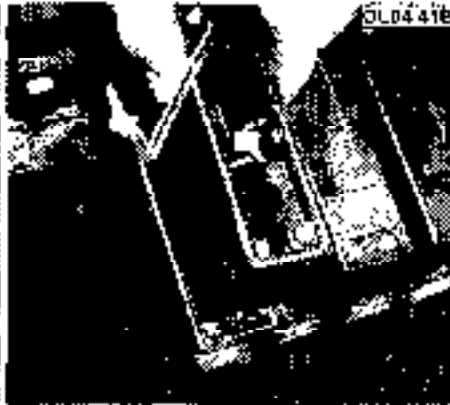
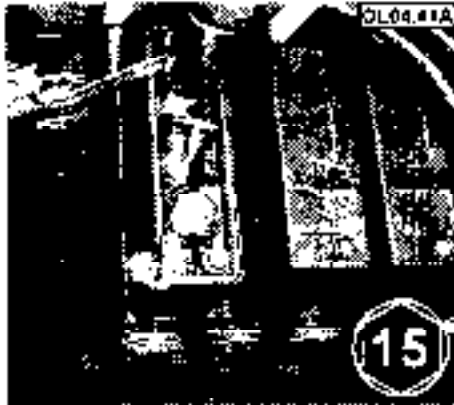
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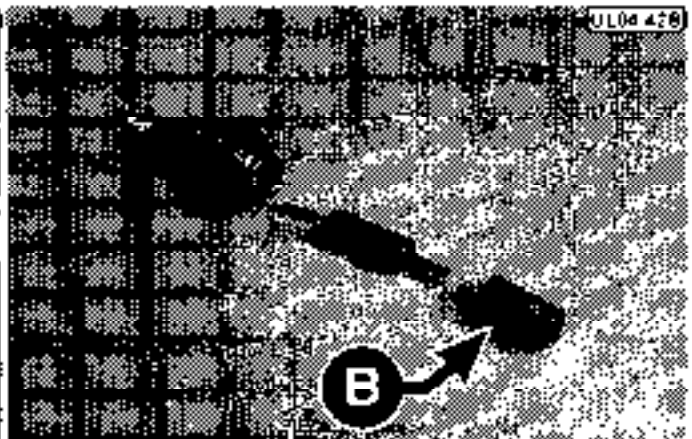
4 - STEERING SYSTEM AND MAIN DIRECTIONAL CONTROL VALVE SUPPLY SYSTEM



- Disassemble the two fixing nuts (see picture OL04 41A), then remove the cap (see picture OL04 41B) and extract the two magnets (see picture OL04 41C). Mark the magnets in order to re-assemble in the correct position.



- Remove the two valves (see picture OL04 42A), then unscrew the terminal part **B** (see picture OL04 42B) and extract the cursor and the spring. Wash the valves with diesel fuel and blow compressed air to remove dirt, before assembling the valves again, make sure that they are dry.



Re assemble in the reverse order the operations described in the previous points.



SERVOCONTROL - REPAIRS THAT REQUIRE THE REMOVAL OF THE MAIN DIRECTIONAL CONTROL VALVE

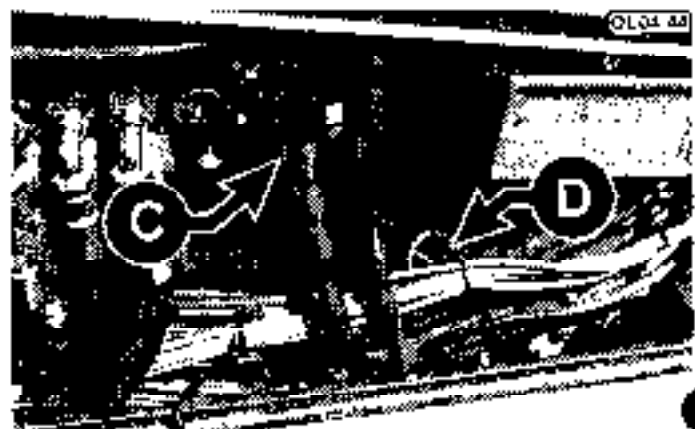
1. HOW TO DISASSEMBLE THE MAIN DIRECTIONAL CONTROL VALVE

- In order to avoid the oil leaks when removing the pipes from the main directional control valve we advise you, before beginning with the disassembly operations, to fully extend the boom and to tilt the carriage upwards in order to reduce the oil quantity in the tank.

- Disassemble the closing panel of the servocontrol (see point 1 of the paragraph "SERVOCONTROL - REPAIRS THAT CAN BE CARRIED OUT ON THE MACHINE"). Disconnect the cap (A) of the interception solenoid valve and the connectors (B) of the cables of the four intermediate sections



- The cable (C) is connected to the microswitch for checking boom position (assembled on the main directional control valve). The other end of the cable is not connected, as, on this machine type, the microswitch does not have any function. Extract the cable from its slot (D) by removing the pertinent fixing clamp



- Electromechanic 3X1 joy-stick disassembly: disconnect the connector (see picture OL04 45A) and loosen the fixing nut (see picture OL04 45B), unscrew the joy-stick (in cab) from the main directional control valve and extract it together with the pertinent cable.

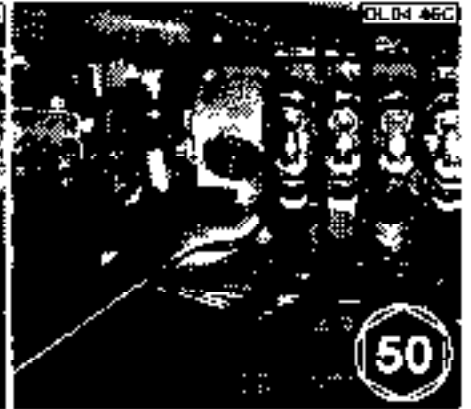
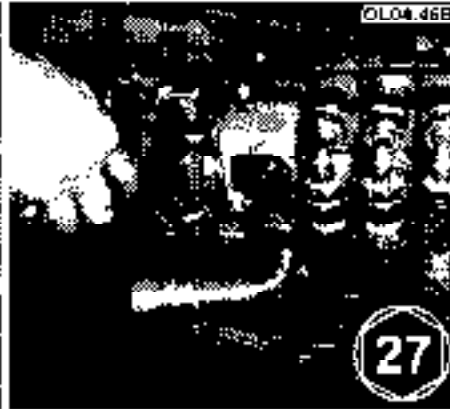




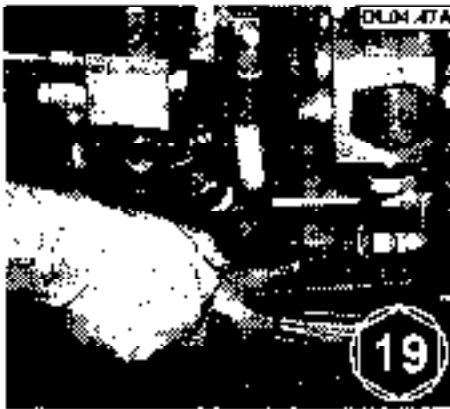
4 - STEERING SYSTEM AND MAIN DIRECTIONAL CONTROL VALVE SUPPLY SYSTEM



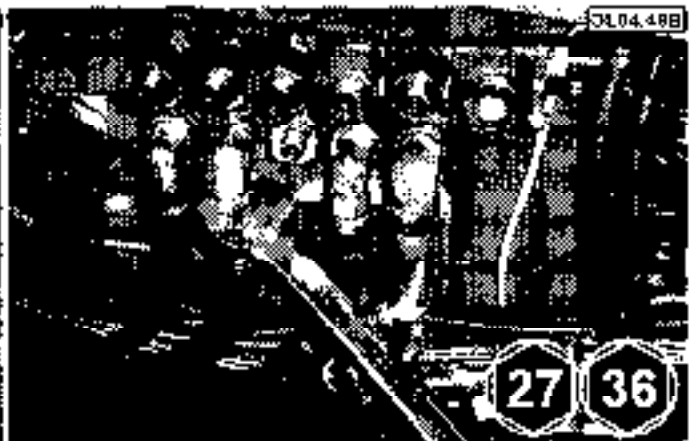
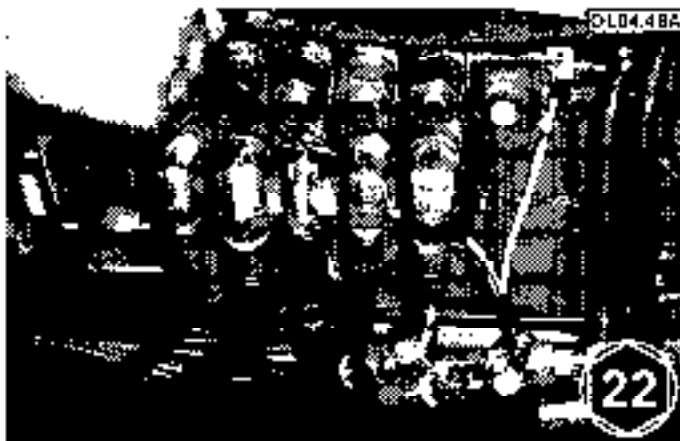
- Disconnect the pressure line fitting from the priority valve (see picture OL04.46A) and the return line pipes from the power steering (see picture OL04.46B) and to the tank (see picture OL04.46C).



- Disconnect the pressure line and the return line pipes of the servocontrol (see picture OL04.47A) disassemble the upper pipes of the main directional control valve (see picture OL04.47C) mark them in order not to confuse them during the reassembly (see picture OL04.47B).



- Disconnect the lower pipes of the main directional control valve (see pictures OL04.48A - OL04.48B)



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4 - STEERING SYSTEM AND MAIN DIRECTIONAL CONTROL VALVE SUPPLY SYSTEM

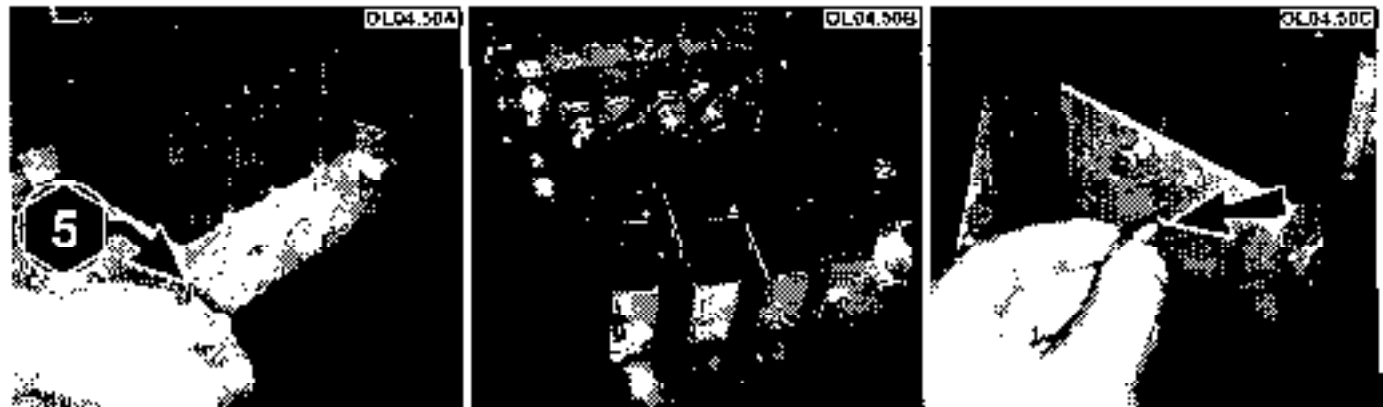


- By using two wrenches (see picture OL04 49A), disassemble the three fixing screws (see picture OL04 49B) and remove the main control valve from the machine.

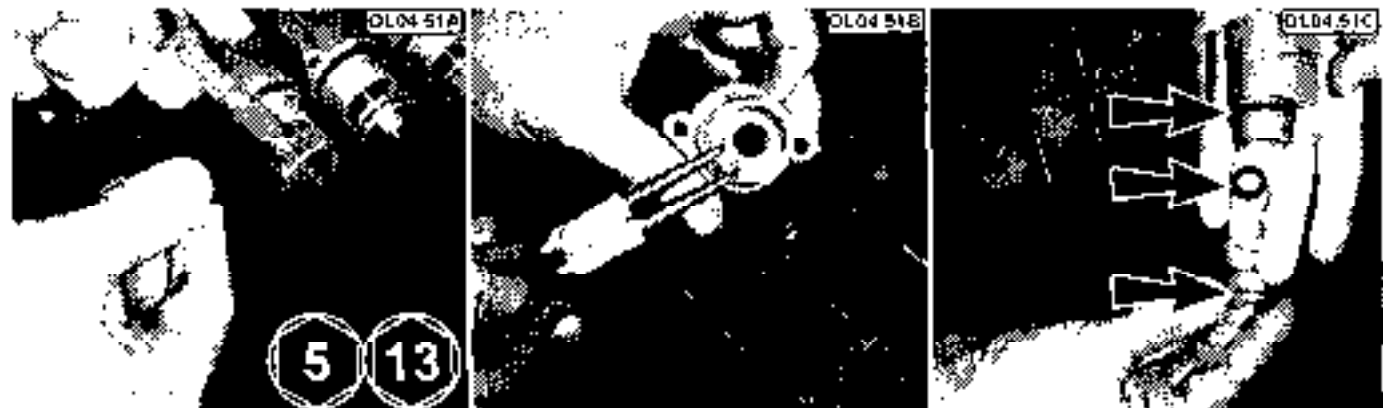


2) GASKETS AND POTENTIOMETERS REPLACEMENT

- Remove the servocontrol from the main control valve by removing the eight fixing screws (see picture OL04.50A) separate the servocontrol sections (see picture OL04 50B) then extract the cylinders and replace the pertinent 'O' Ring (see picture OL04 50C)



- By using the two wrenches, remove the fixing nut from the piston of the control valve system (see picture OL04 51A) extract the cartridge, then disassemble the circlip (see picture OL04 51B) and replace the gasket and the two 'O' Ring (see picture OL04 51C)
When reassembling apply "LOCTITE 242" on the fixing nut of the piston

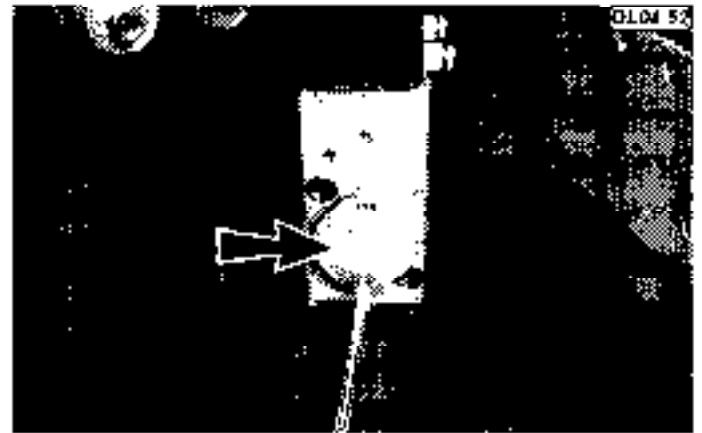




4 - STEERING SYSTEM AND MAIN DIRECTIONAL CONTROL VALVE SUPPLY SYSTEM

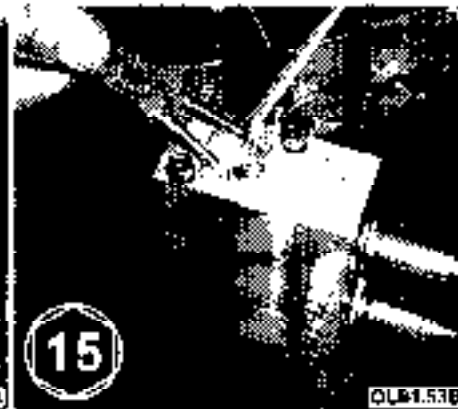


- Remove the cap of the potentiometer slot (see picture OL04.52)



- Disassemble the electronic card and the magnets of the two proportional solenoid valves (see points 5 and 5.2 of the paragraph "SERVOCONTROL - REPAIRS THAT CAN BE CARRIED OUT ON THE MACHINE")

Extract the cable and the pertinent connector (see picture OL04.53A), unscrew the fixing nut of the potentiometer (see picture OL04.53B), extract the potentiometer from the opposite side (see picture OL04.53C) and replace.



3) MAIN DIRECTIONAL CONTROL VALVE REASSEMBLY:

- Re-assemble in the reverse order the operations described in the previous points
- Check oil level (see paragraph HYDRAULIC OIL in the section INTRODUCTION), then test the system and verify there are no leaks



ADJUSTMENT CHECK OF THE RELIEF VALVE

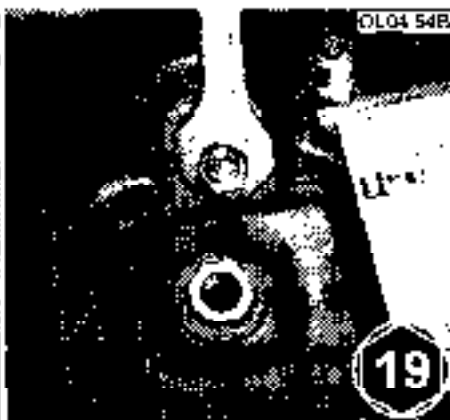
The valve S1 controls max. pressure to the main directional control valve system and consequently, of lifting and extension, forks/compensation frame levelling and flow deviator systems

The check of the setting pressure is to be carried out with the system oil at a temperature of about 65° C:

- connect the pressure gauge (see the paragraph "PRESSURE GAUGE, page 4-3) to the pressure plug placed on the feed pump
- fully retract the machine boom
- set the engine at full throttle, then activate the boom retraction lever and check that the pressure indicated on the pressure gauge is 210 bar

In case of emergency (see the following GENERAL RULES) it is possible to adjust the valve following these instructions:

- remove the original lead seal (see picture OL04 54A) disassemble the cap (see picture OL04 54A) and loosen the lock nut (see picture OL04 54B)
- repeat the operations carried out for checking the adjustment and operate the register screw (see picture OL04 54C) to restore the correct value: slowly screw the screw clockwise to increase the pressure, counterclockwise to reduce it (bear in mind that for every complete turn the pressure changes about 40 bar)
- when you have finished the adjustment, tighten the lock nut and reassemble the cap



GENERAL RULES

- It is necessary to confirm the pressure setting after replacement of the pump, of the system control valve and the valve itself
- If the reading on the pressure gauge is less than 200 bar the reason is not always an incorrect valve setting before adjusting the valve, check other possible causes of system malfunctions (clogged filters - worn pumps - clogged priority valve)
- **If the original seals have been tampered with, the MERLO warranty for the hydraulic system and the relative mechanical parts will be void.**

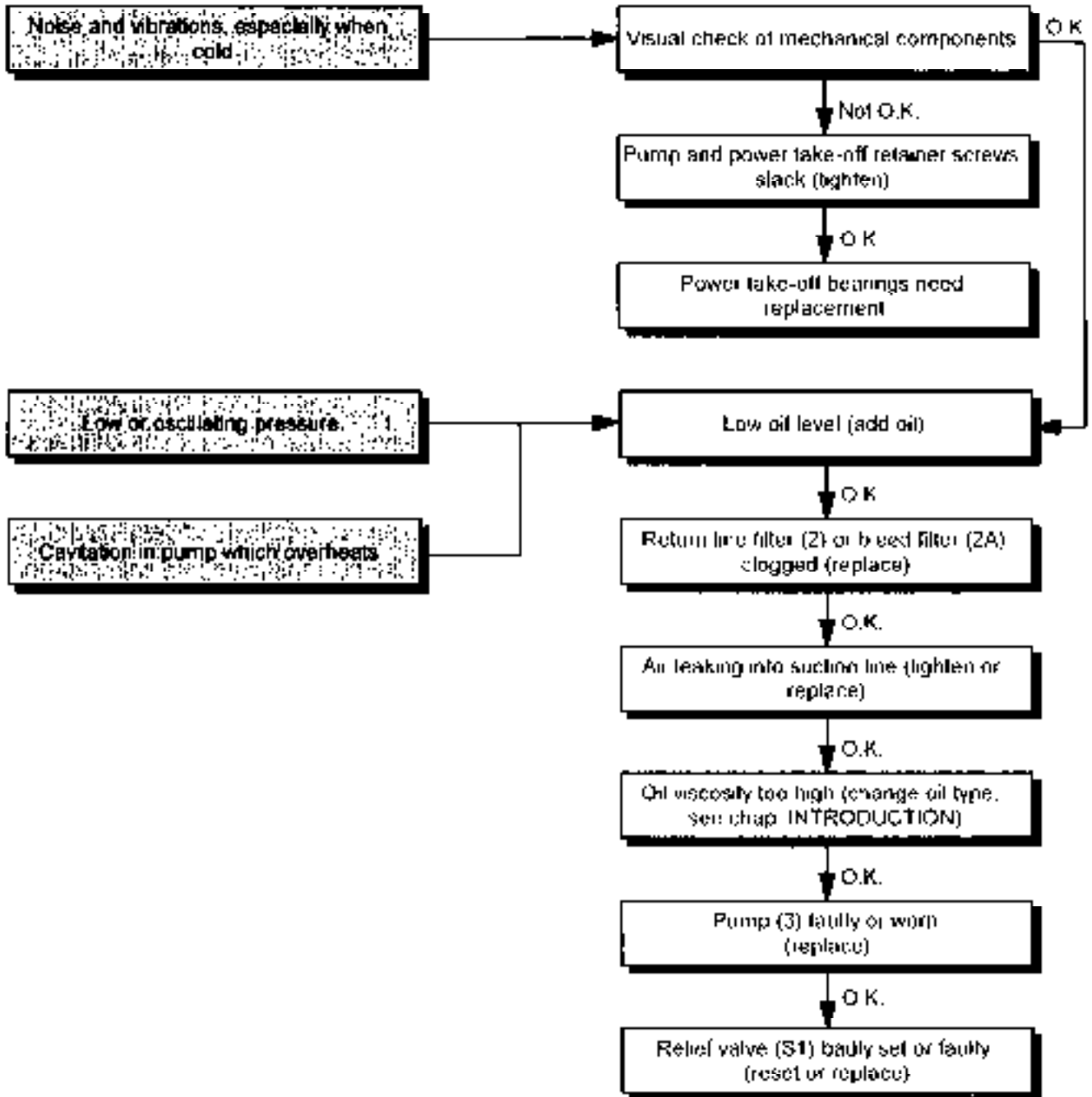


4 - STEERING SYSTEM AND MAIN DIRECTIONAL CONTROL VALVE SUPPLY SYSTEM



MALFUNCTIONS IN SUPPLY SYSTEM

QL04.55



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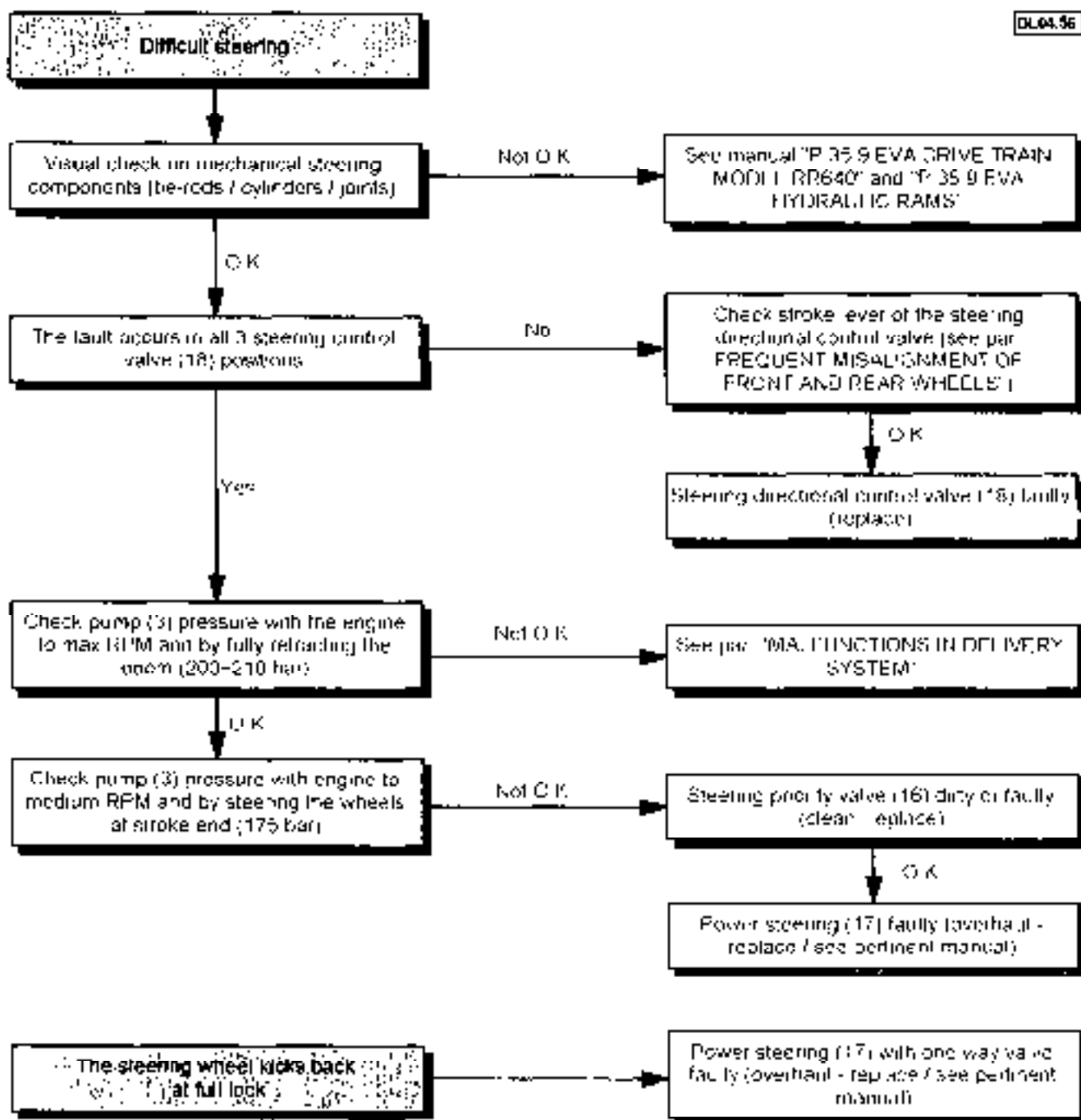


4 - STEERING SYSTEM AND MAIN DIRECTIONAL CONTROL VALVE SUPPLY SYSTEM



MALFUNCTIONS IN STEERING SYSTEM

DL04.56



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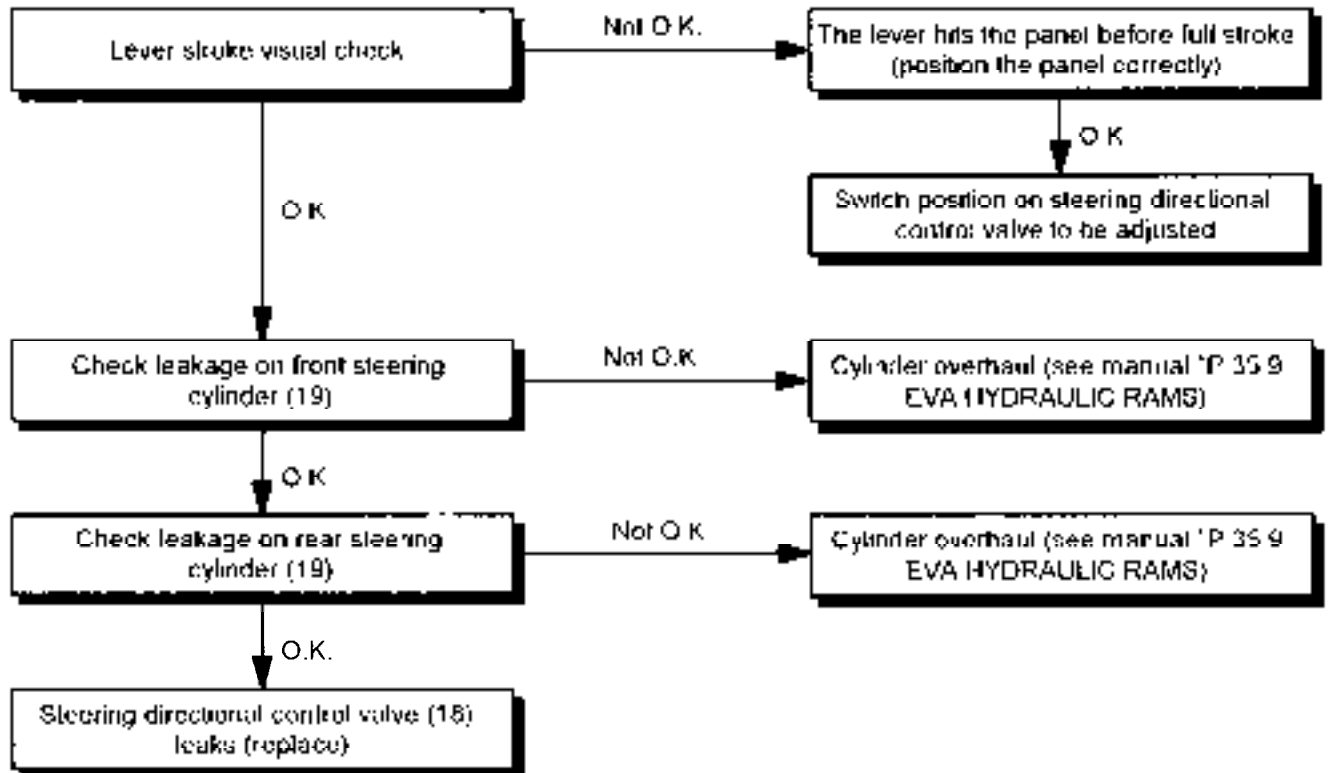


4 - STEERING SYSTEM AND MAIN DIRECTIONAL CONTROL VALVE SUPPLY SYSTEM



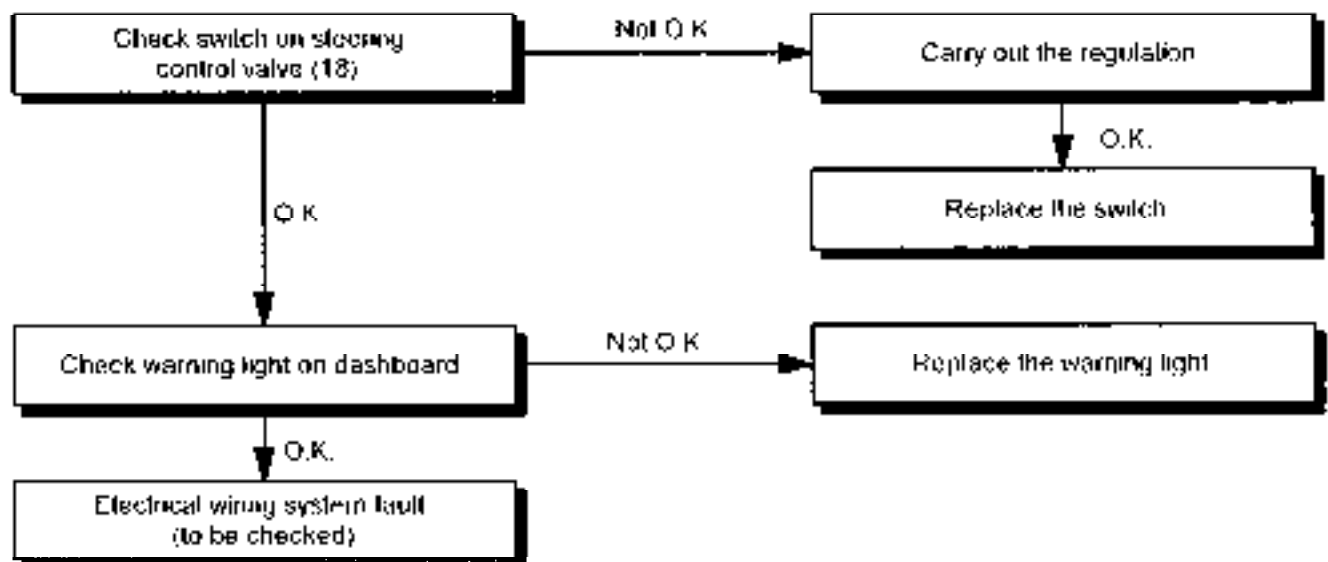
FREQUENT MISALIGNMENT OF FRONT AND REAR WHEELS

OL04.67



STEERING MODE WARNING LIGHT FAILURE

OL04.58

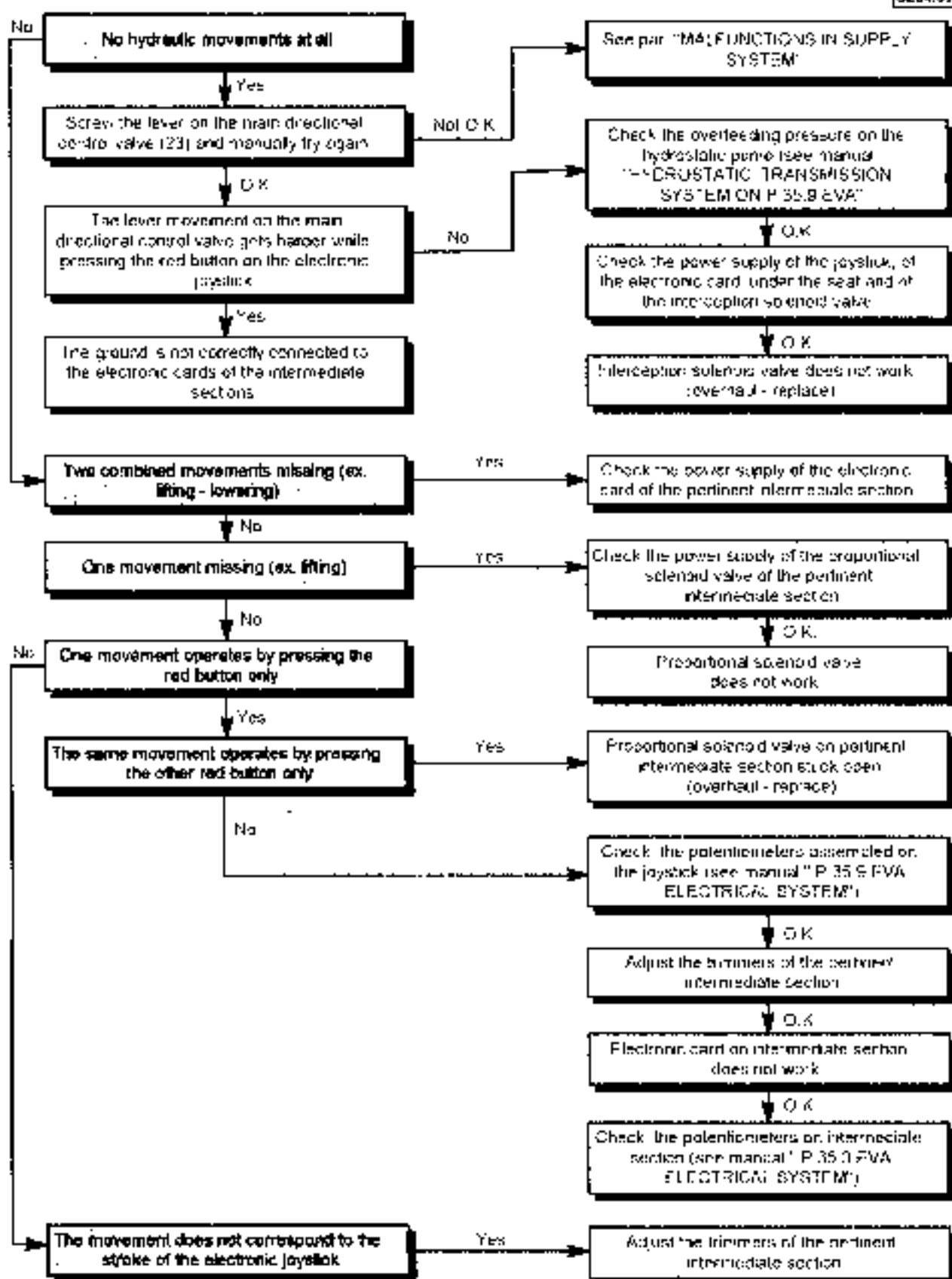


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4 - STEERING SYSTEM AND MAIN DIRECTIONAL CONTROL VALVE SUPPLY SYSTEM

CL04.59

MALFUNCTIONS ON THE SERVOCONTROLS



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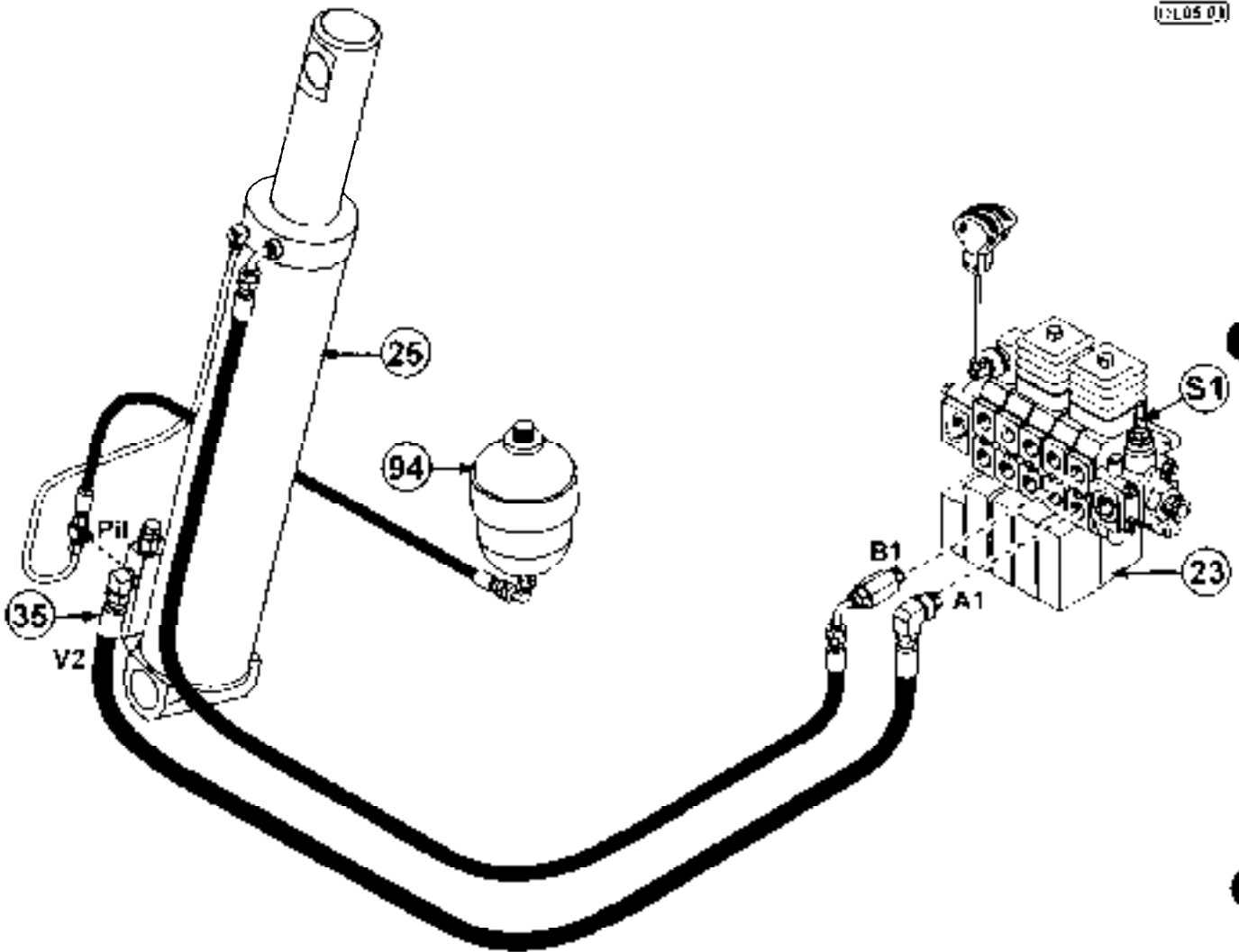
MALFUNCTIONS IN BOOM LIFTING SYSTEM 8

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BOOM LIFTING SYSTEM

(U:LO5 01)



- 23 Main directional control valve
- 25 Lifting cylinder
- 35 Lowering control valve
- 94 Accumulator
- S1 Relief valve

The system pressure is controlled by relief valve (S1).

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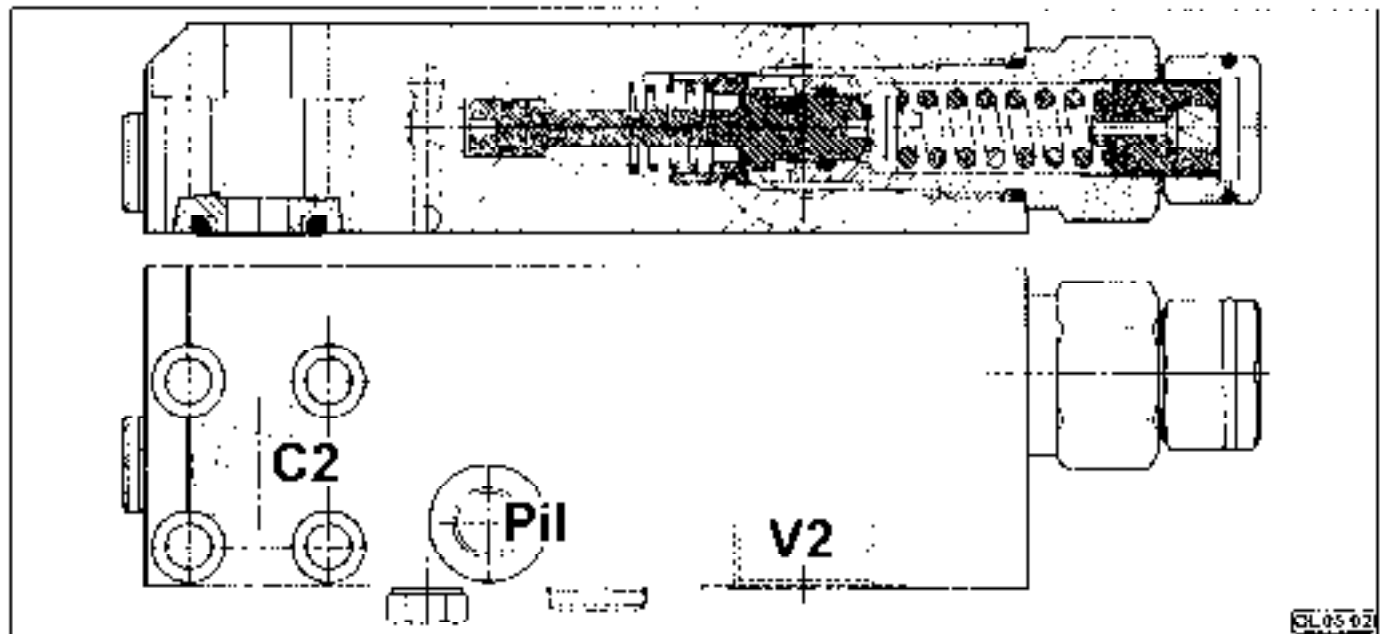
**LOWERING CONTROL VALVE (35) (032128)**

The valve's function is to prevent the accidental descent of the telescoping boom (for example in case of a hose burst of the cylinder base or of the leakage of the main directional control valve)

C2 = from valve to cylinder base

V2 = from A1 main directional control valve (23)

Pil = from B1 main directional control valve (23) and from accumulator (94)

**INTERNAL LEAKAGES FROM THE CYLINDER OR CONTROL VALVE**

Should the downward slip rate of a fully raised boom with the max rated load exceed the rate of 10 mm per hour (with the engine not running) check the correct functions of the lowering control valve and the lifting cylinder

To identify the point where a leakage occurs carry out the following operations.

- fully retract the boom, lift it to the max. angle. Support the boom (Page 5-4, point 1B) but allow some slack in the sling.
- stop the engine, disconnect the line from the header of the cylinder (see picture OL05.03A)
- insert the spare lever in the mechanical joystick of the main control valve, operate lever to lower the boom (see picture OL05.03B). While the cylinder retracts (to the extent of slack in the sling), check the joint on the header
 - if oil comes out, the leakage is from the cylinder
 - if oil does not come out, the control valve is leaking



OL05.03A

27

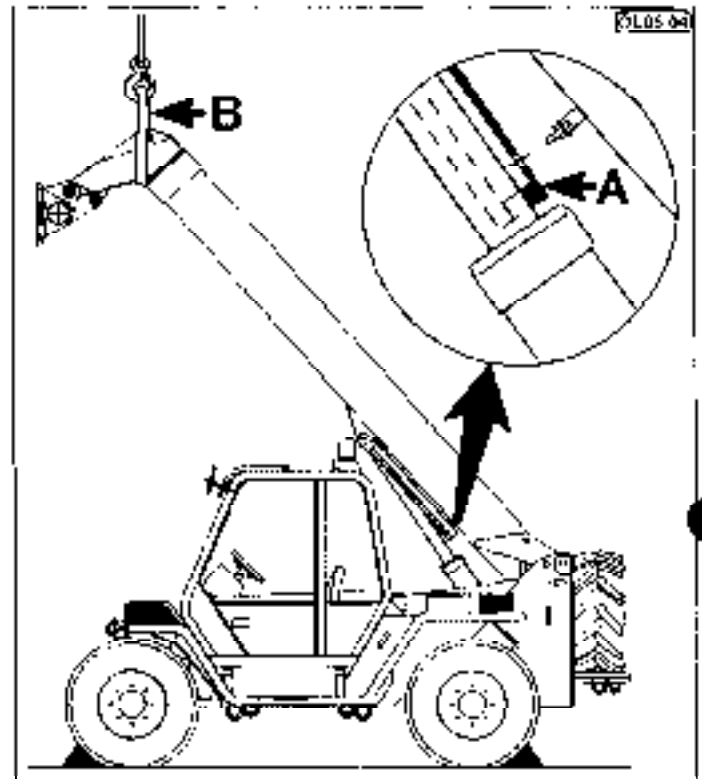


OL05.03B



REPLACING OF LOWERING CONTROL VALVE

- 1) **IMPORTANT!!!**
For maintenance to be carried out with boom lifted apply the safety lock (A) (see the instructions in the chapter INTRODUCTION). Before working on the valve, check that the boom is adequately supported by external means to prevent it from dropping: use a strap (B) and a lifting device with a min. lift capacity of 1500 kg.
- 2) Remove the spare wheel and the rear access panel placed on the rear side of the machine (see the instructions in the chapter INTRODUCTION).



- 3) Disconnect from the valve, the pipe and the two hoses (see pictures OL05.05A - OL05.05B), remove the valve from the cylinder by removing the fixing screws (see picture OL05.05C): for this operation we recommend that you to use a T wrench and universal joint so as to work perpendicular to the valve.



- 4) If necessary, recover the fillings used on the old valve and assemble them on the new one. Reassemble in the reverse of the operations described in the previous points.
- 5) Check oil level (see paragraph HYDRAULIC OIL in the section INTRODUCTION), then test the system and verify there are no leaks.



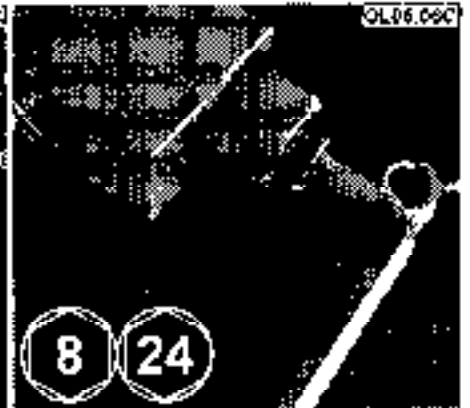
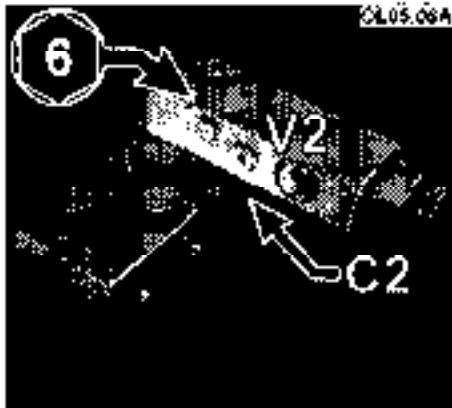
SETTING OF CONTROL VALVE

The setting check should be carried out on a bench with a hydraulic power unit (capacity of 5 l/min) and pressure gauge full scale 600 bar minimum. Since it is of a flanged valve we recommend that you use the suitable Kit part number 040435:

- assemble the valve on the manifold (see picture OL05.06A), screw the pressure plug in the corresponding hole (see picture OL05.06B) and connect it to the pressure gauge
- connect the delivery line to C2 and the drain line to V2 (see picture OL05.06A)
- supply oil to C2 and check that the pressure gauge reaches the setting value (250 bar)

If necessary, set the valve following this procedure:

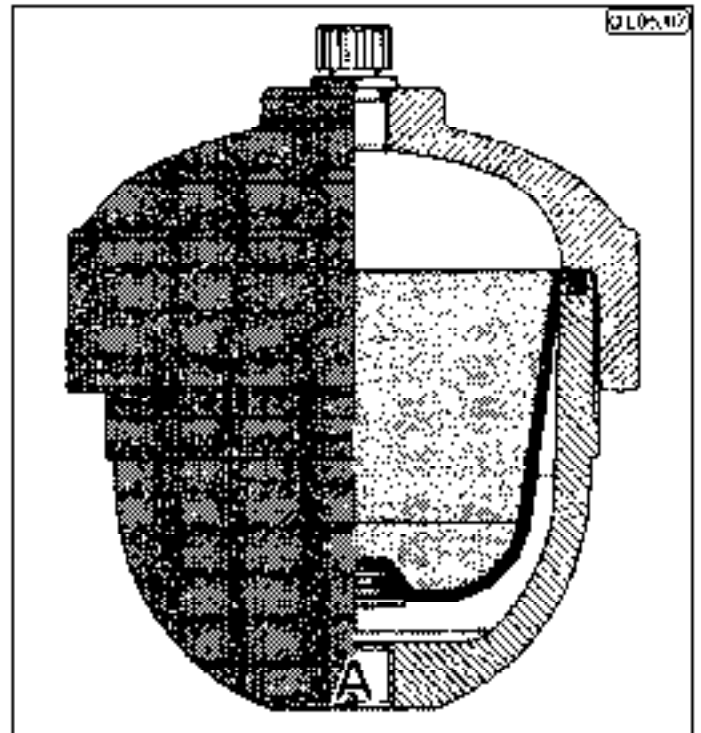
- cancel the valve setting by unscrewing the cap nut and completely backing off the stud bolt (see picture OL05.06C)
- supply oil to C2 and tighten the stud bolt until the pressure reading on the pressure gauge reaches 250 bar
- tighten the cap nut



ACCUMULATOR (94) (034167)

A = to Pil lowering control valve (35)

The accumulator's function is to maintain a minimum pressure in the pilot system of the locking valve, to avoid jerky operation during boom lowering. This is due to closing of the valve itself.



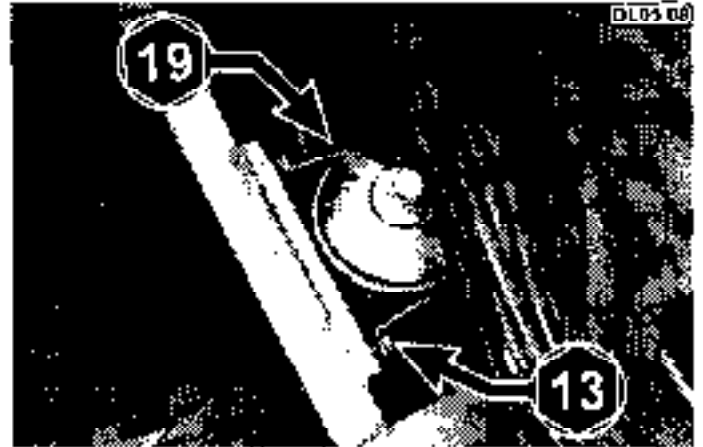
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CHECK AND RECHARGE OF THE ACCUMULATOR

To check the pressure of nitrogen contained in the accumulator and to recharge it can be carried out by using the suitable Kit part number 035913.

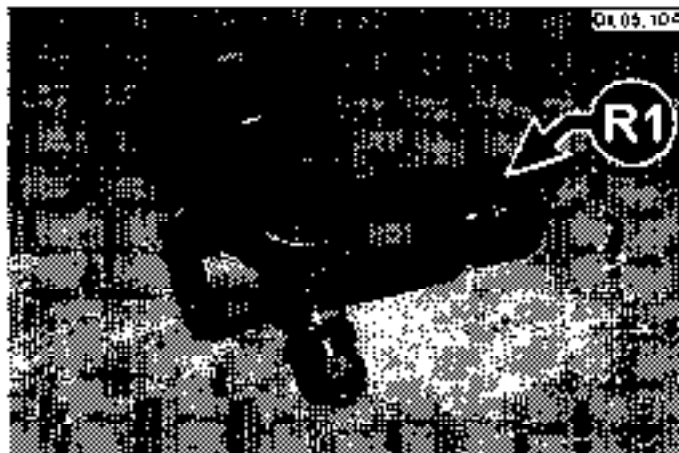
- 1) Remove the accumulator from the machine by disassembling the fixing bracket and by disconnecting the hose



- 2) Tighten the accumulator in a vice, be careful not to deform it, remove the cap from the nitrogen charging valve

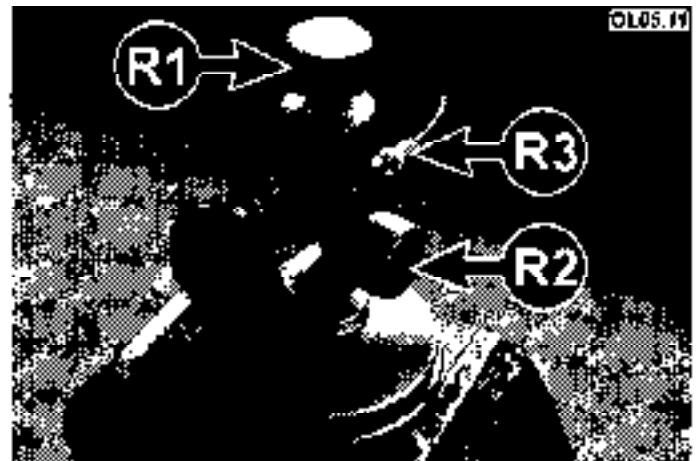


- 3) Unscrew fully the valve knob ref. R1 (see picture OL05 10A), then fully screw the equipment on the nitrogen loading valve of the accumulator (see picture OL05 10B). Close fully the drain valve ref. R2 (see picture OL05.10C), fully screw the valve knob and verify that the pressure indicated from the pressure gauge reaches the value (50 bar). In order to reduce the pressure (or to empty the accumulator) to disassemble the inner parts) slowly open the drain valve (R2), closing it again when you have reached the value required.





- 4) To recharge the accumulator follow these instructions:
- assemble a pressure reducer on the exit of the dry nitrogen bottle in order to avoid over pressurising the system
 - fully unscrew the valve knob (R1) and fully close the drain one (R2)
 - connect the bottle to the quick coupling (R3), then fully screw the valve knob.
 - slowly recharge until you reach a pressure of 53 bar, then close the bottle and disconnect the pipe from the quick coupling
 - wait for a couple of minutes until the nitrogen temperature stabilizes then bleed the exceeding gas by slowly opening the drain valve and closing it again when you have reached the setting value (50 bar).



- 5) Before disassembling the equipment from the accumulator it is necessary to bleed the remaining pressure fully unscrewing first the valve knob (R1) and then the bleeding knob (R2)
- 6) Reassemble and tighten the cap on the nitrogen charging valve (see point 2); replace the accumulator on the machine reconnected the hose (see point 1)
- 7) Check oil level (see paragraph HYDRAULIC OIL in the section INTRODUCTION), then test the system and verify there are no leaks

ACCUMULATOR OVERHAUL

- 1) Remove the accumulator from the machine and ensure the pressure has been released (see points 1,2,3 and 5 of the paragraph "CHECK AND RECHARGE OF THE ACCUMULATOR")
- 2) Disassemble the accumulator cap (see picture OL05.12A) by using the "C" spanner part number 615049 clean all components, replace the membrane (see picture OL05.12B) and the 'O' ring. (see picture OL05.12C) and reassemble the cap.

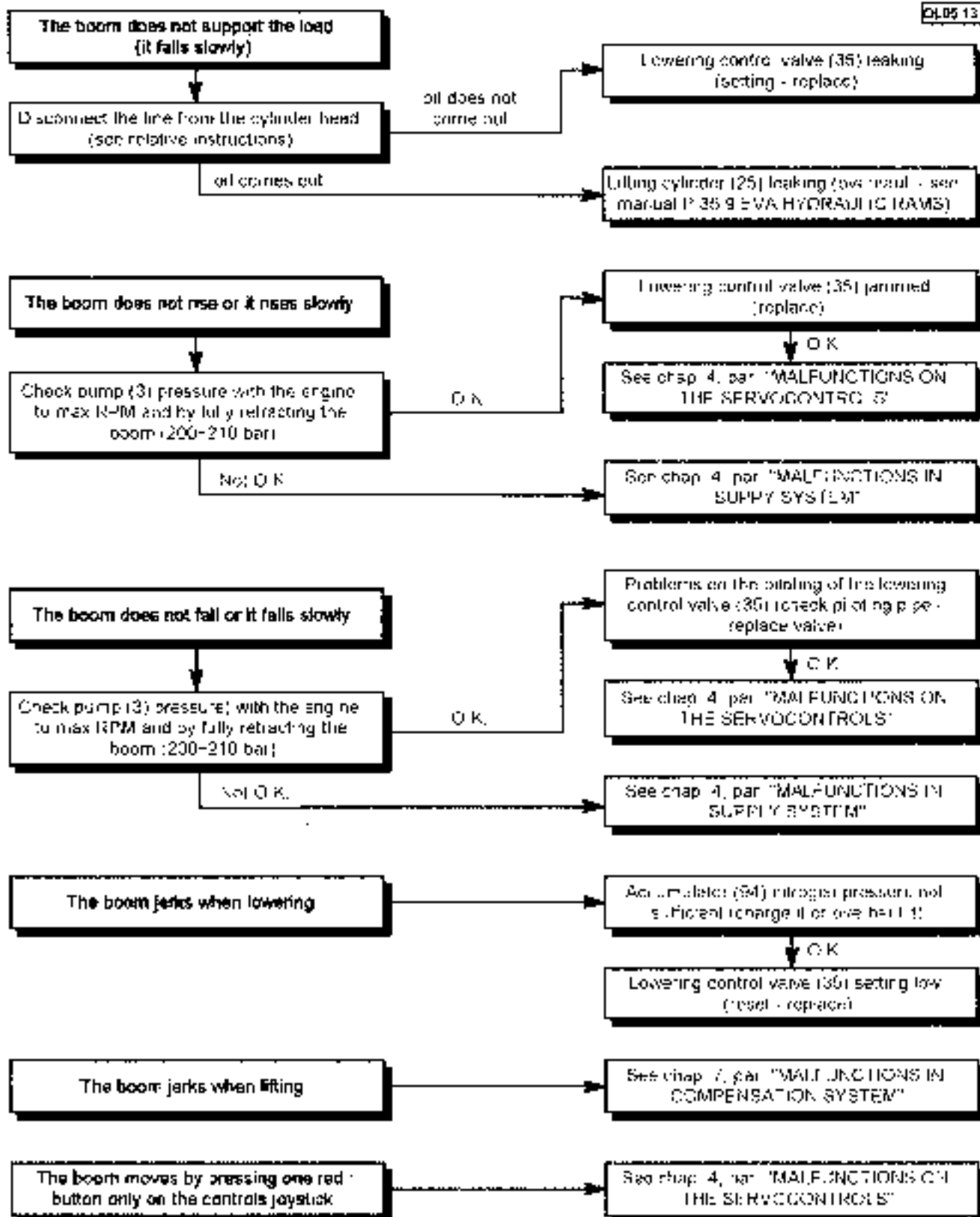


- 3) Carry out the accumulator recharge and reassemble it on the machine (see points from 4 to 7 of the paragraph "CHECK AND RECHARGE OF THE ACCUMULATOR")



MALFUNCTIONS IN BOOM LIFTING SYSTEM

OL05 13



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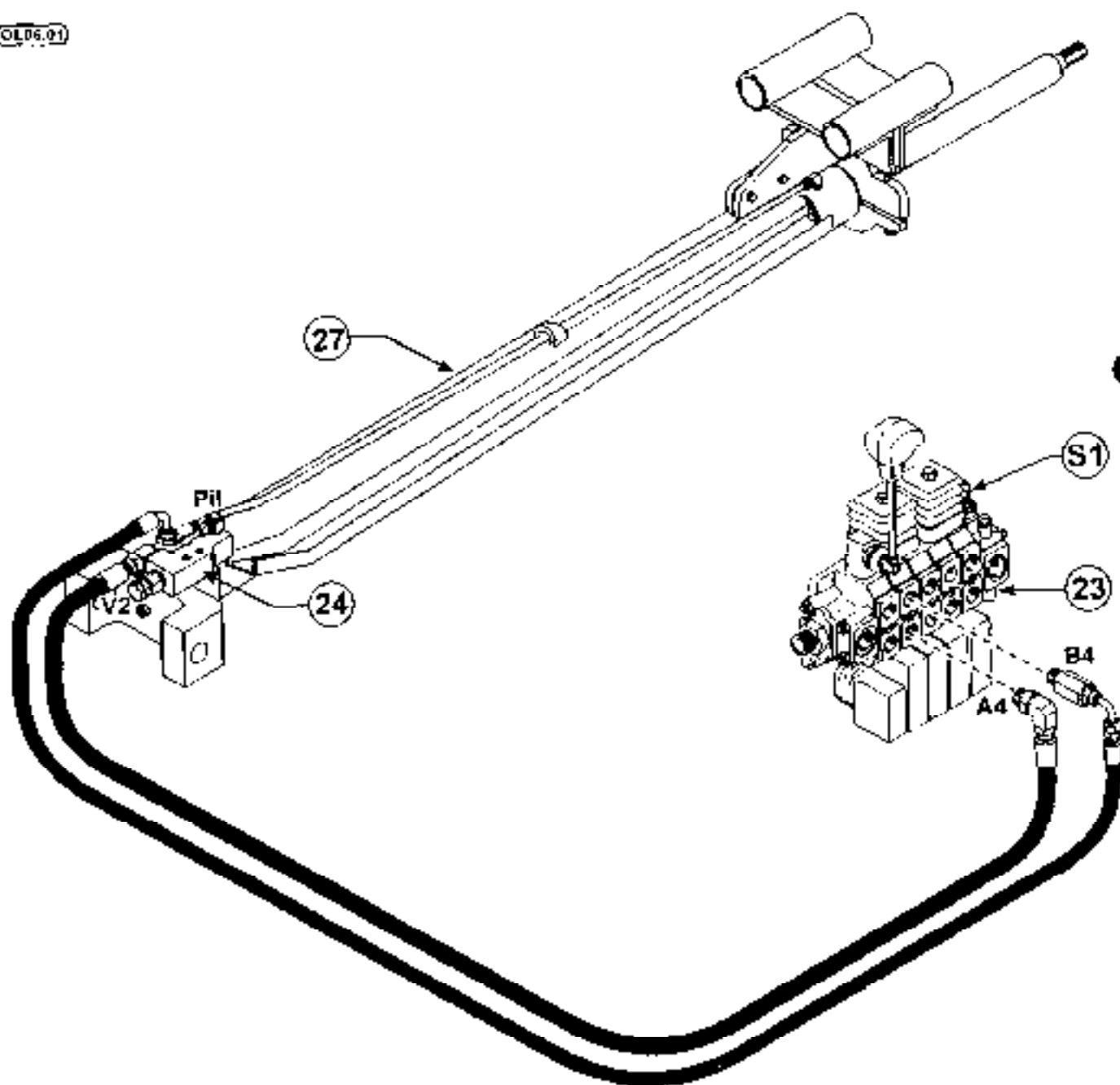
BOOM EXTENSION SYSTEM	2
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BOOM EXTENSION SYSTEM

OLD6.01



- 23 Main directional control valve
- 24 Retracting control valve
- 27 Extension cylinder
- S1 Relief valve

The system pressure is controlled by relief valve (S1)

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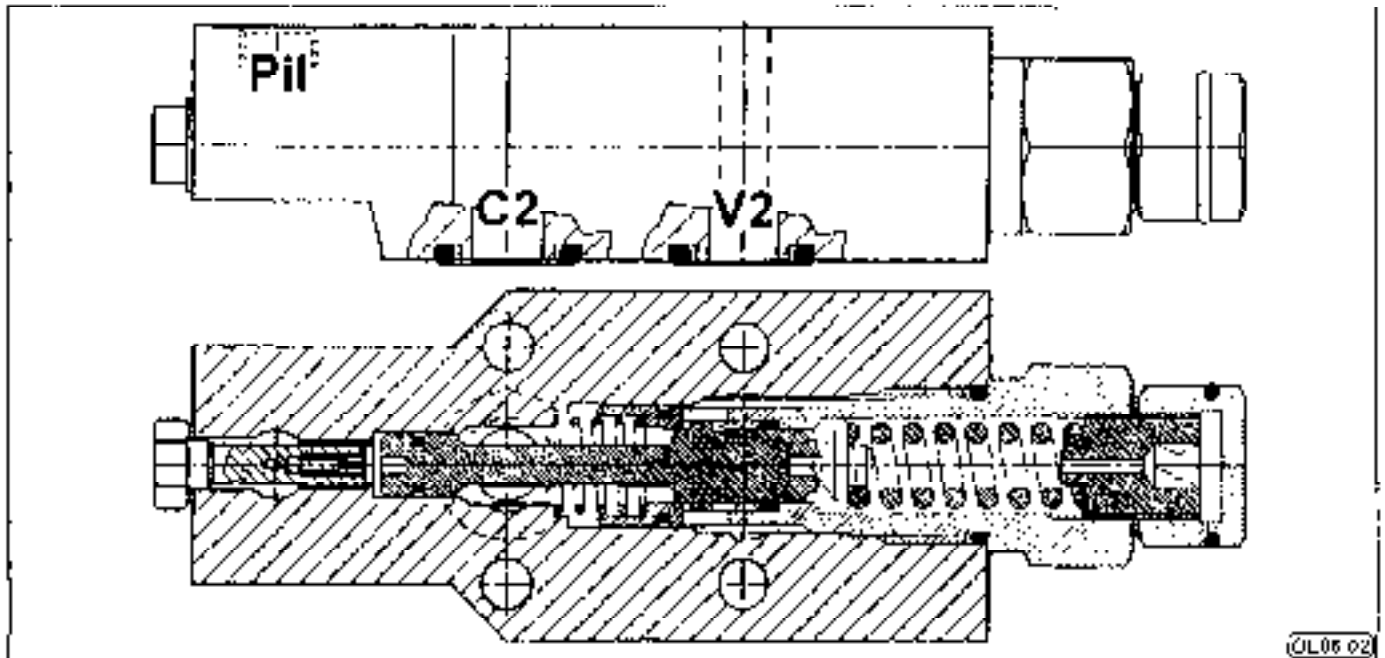
RETRACTING CONTROL VALVE (24) (029128)

The valve's function is to prevent the accidental retracting of the machine boom (for example in case of a burst hose on the base of the cylinder or of leakage at the main directional control valve)

C2 = from valve to cylinder base

V2 = from A4 main directional control valve (23)

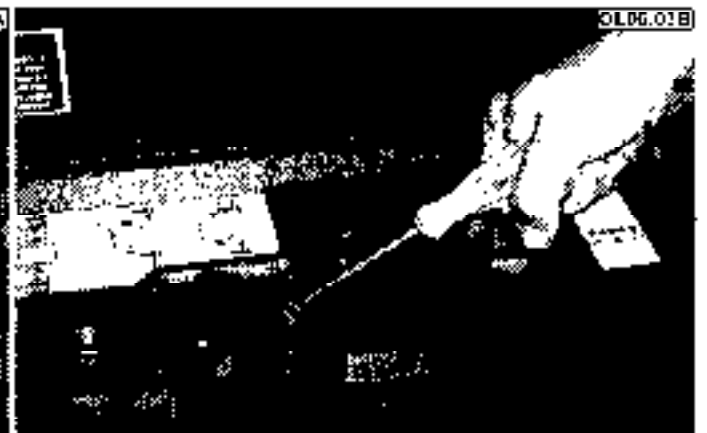
Pil = from A4 main directional control valve (23)



INTERNAL LEAKAGES FROM THE CYLINDER OR CONTROL VALVE

To identify the point where a leakage occurs it is necessary to follow these instructions:

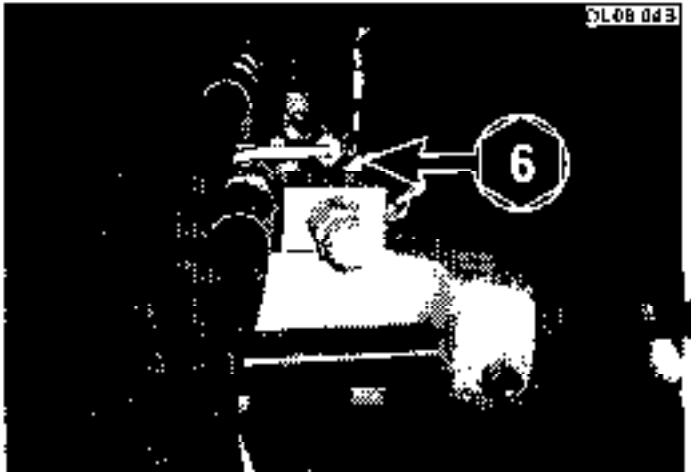
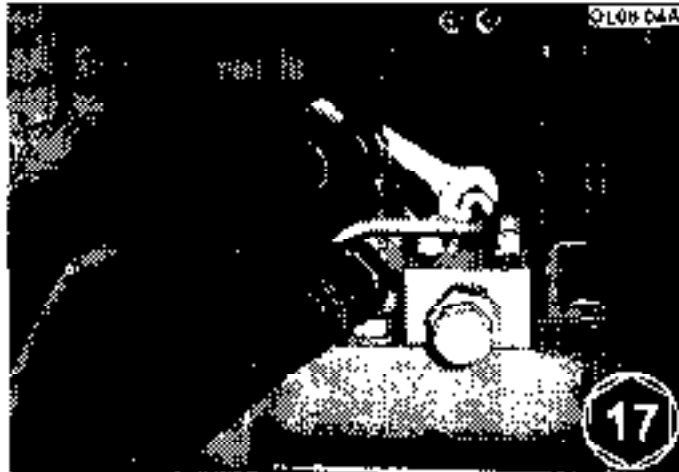
- remove the spare wheel and the rear access panel placed on the rear of the machine (see instructions in the chapter INTRODUCTION)
- extract the boom by about one metre, then lift it to the max angle. Support the boom (Page 5-4 point 1) but allow some slack in the sling
- stop the engine, disconnect the pressure line pipe to the header of the cylinder (see picture OL06.03A)
- insert the spare lever in the mechanic joystick of the main control valve (see picture OL06.03B), retract the boom (to the extent of slack in the sling). While the boom retracts check the joint on the cylinder:
 - if oil comes out, the leakage is from the cylinder
 - if nil does not come out, the control valve is leaking





REPLACING OF RETRACTING CONTROL VALVE

- 1) Retract and lower the boom. Then remove the spare wheel and the rear access panel placed on the rear of the machine (see the instructions in the chapter INTRODUCTION)
- 2) Disconnect the pilot pipe (see picture OL06.04A), disassemble the valve of the cylinder by removing the relevant fixing screws (see picture OL06.04B)



- 3) If necessary recover the fittings used on the old valve and assemble them on the new one. Reassemble in the reverse the operations described in the previous points
- 4) Check oil level (see paragraph HYDRAULIC OIL in the section INTRODUCTION) then test the system and verify there are no leaks

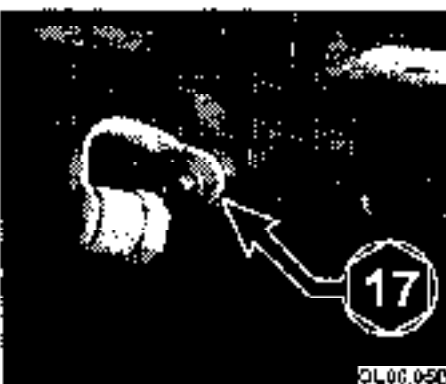
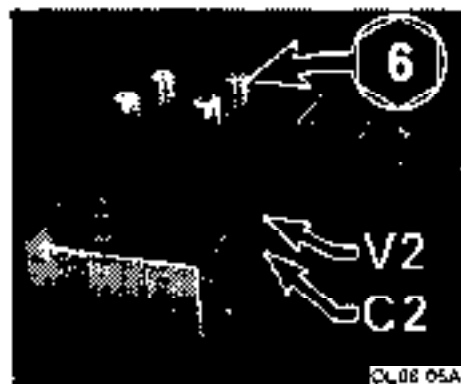
SETTING OF CONTROL VALVE

The setting check should be carried out on a bench with a hydraulic power unit (capacity of 5 l/min) and pressure gauge full scale 600 bar minimum. Since it is of a flanged valve we recommend that you use the suitable Kit part number 040435:

- assemble the valve on the manifold (see picture OL06.05A); screw the pressure plug in the correspondent hole (see picture OL06.05B) and connect it to the pressure gauge
- connect the delivery line to C2 and the drain line to V2 (see picture OL06.05A)
- supply oil to C2 and check that the pressure gauge reaches the setting value (250 bar)

If necessary, set the valve following this procedure:

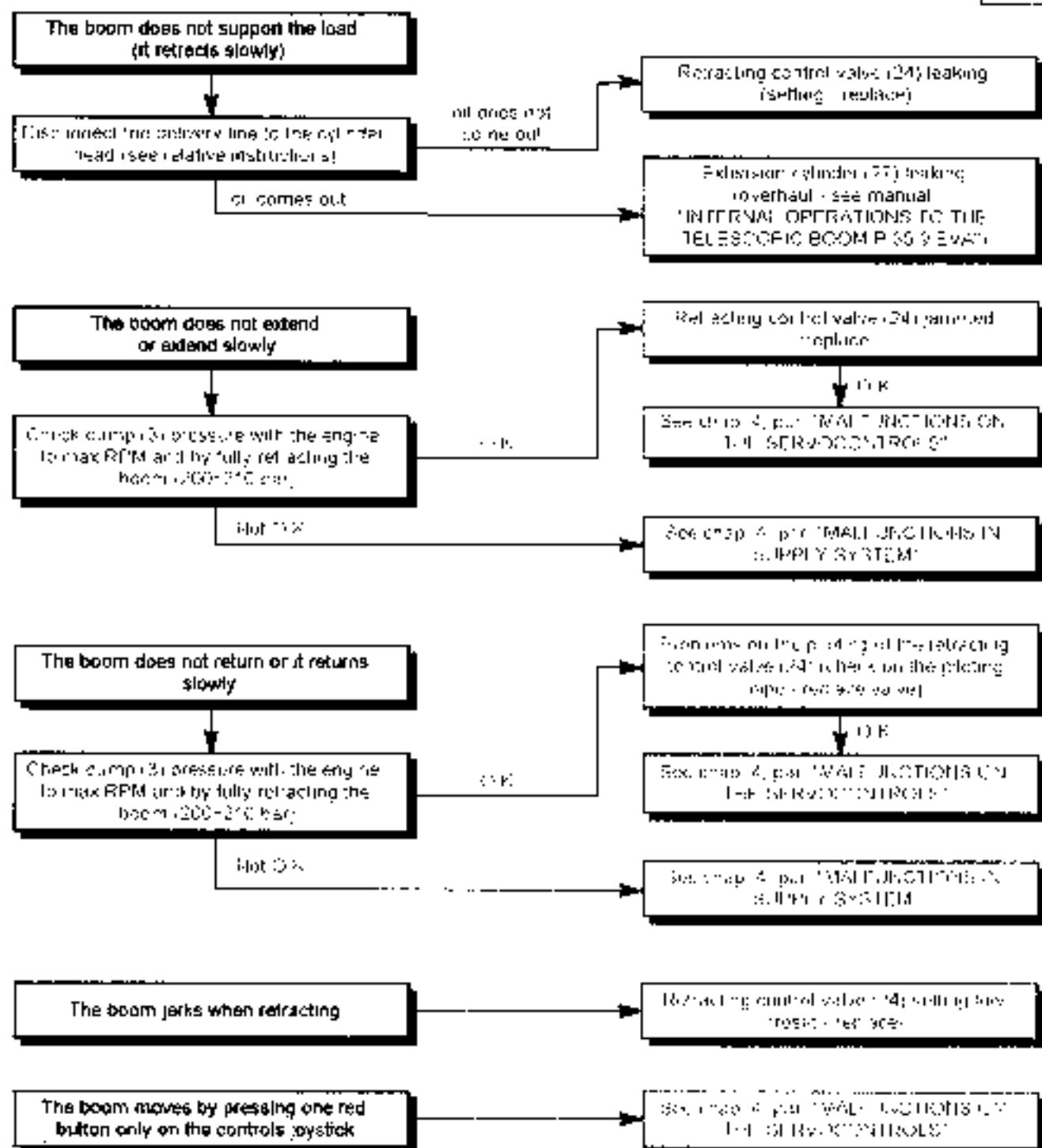
- cancel the valve setting by unscrewing the cap nut and completely backing off the stud bolt (see picture OL06.05C)
- supply oil to C2 and tighten the stud bolt until the pressure reading on the pressure gauge reaches 250 bar
- tighten the cap nut





MALFUNCTIONS IN BOOM EXTENSION SYSTEM

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6 - BOOM EXTENSION SYSTEM



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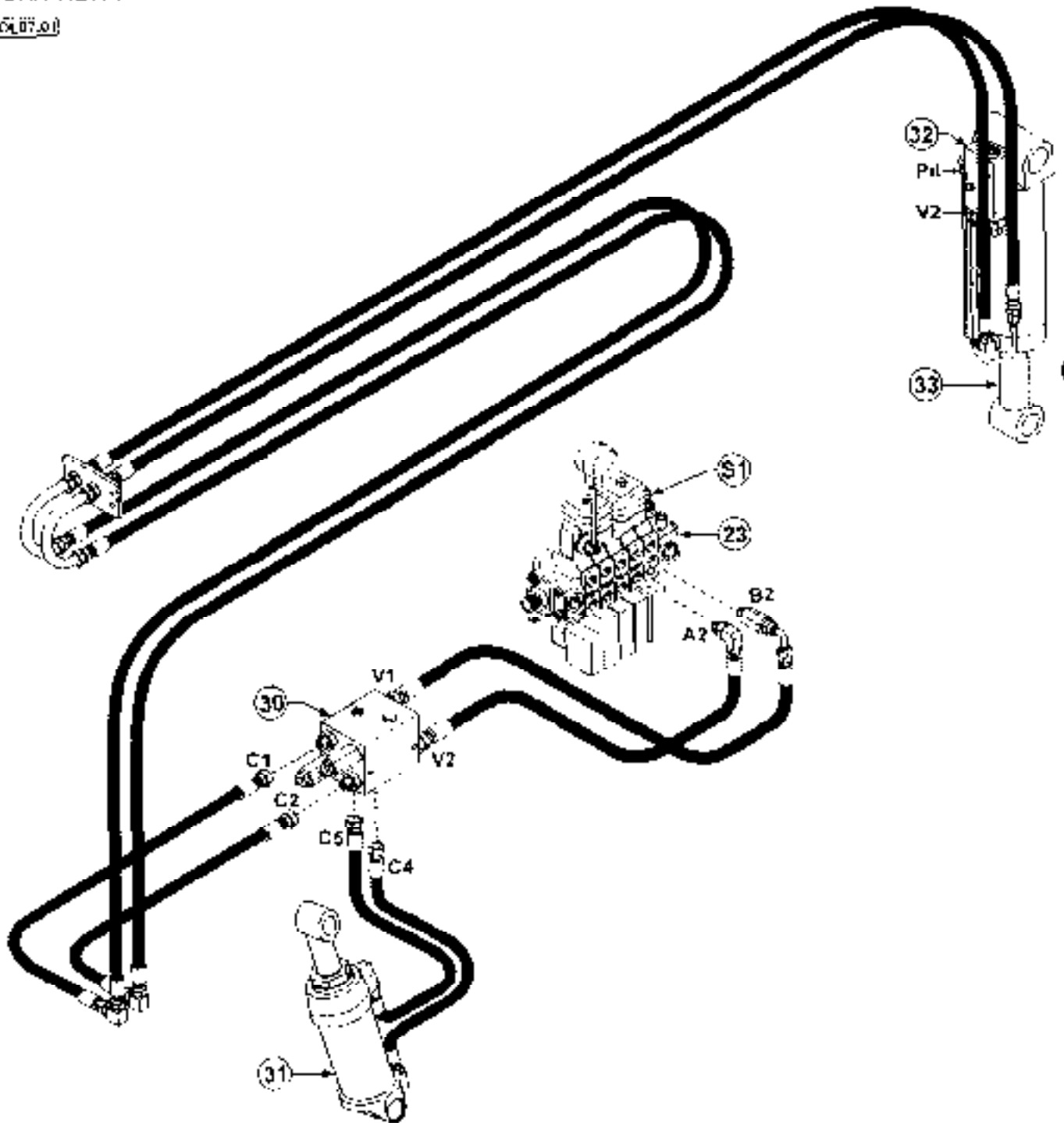


7 - FORK TILTING / COMPENSATION SYSTEM



FORK TILTING / COMPENSATION SYSTEM

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- 23 Main directional control valve
- 30 Fork / compensation valve
- 31 Compensation cylinder
- 32 Piloted check valve
- 33 Fork cylinder
- S1 Relief valve

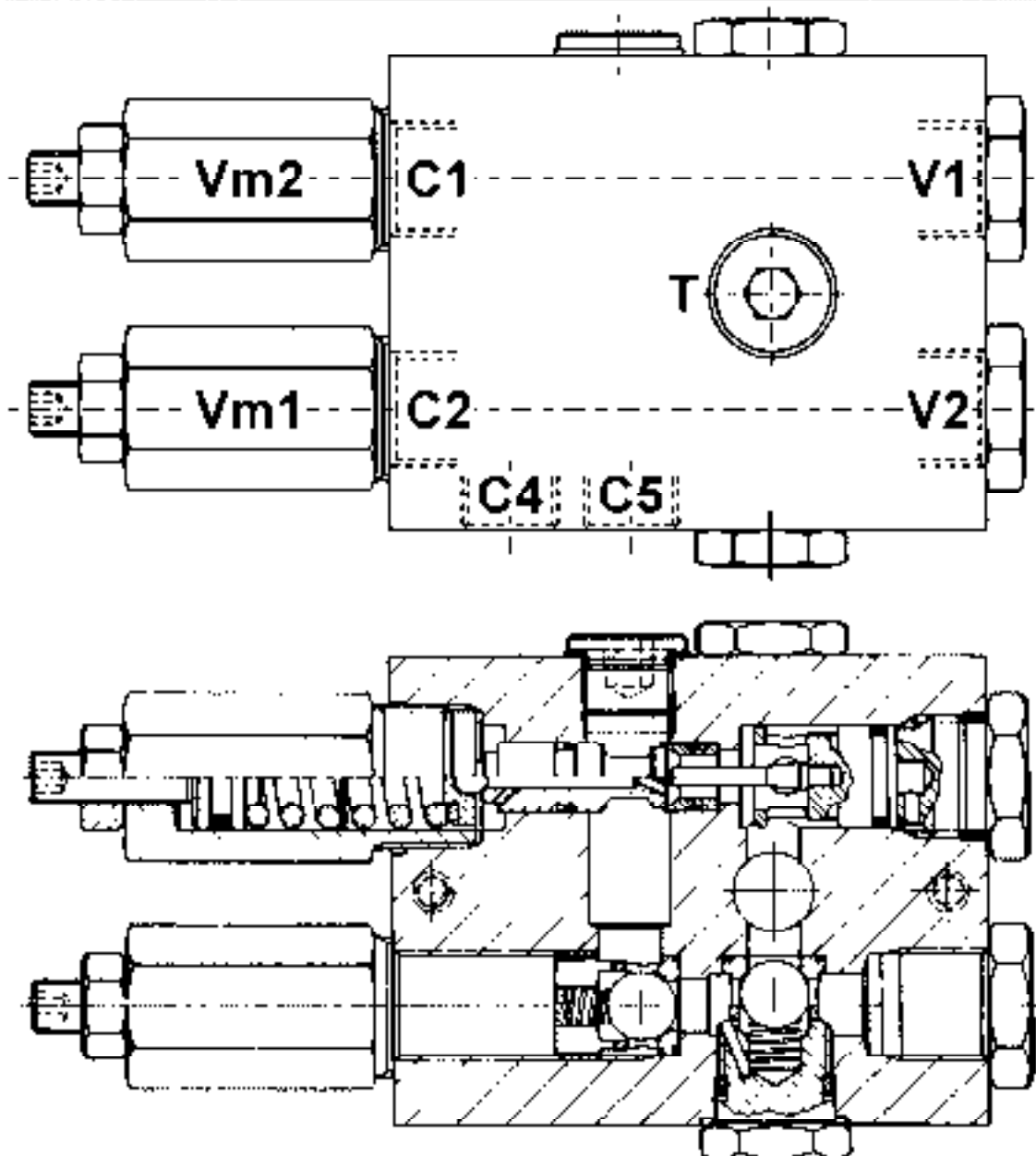
The system pressure is controlled by relief valve (S1)

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**FORK / COMPENSATION VALVE (30) (036548)**

This valve's function is to dump any overpressure in the system when forks reach the stroke end, moreover the valve provides the circulation of the oil between the two cylinders so as to ensure smooth transition of oil flow between the two cylinders.

- V1 = from B2 main directional control valve (23)
- V2 = from A2 main directional control valve (23)
- C1 = to fork lift cylinder (33) head and to P1' piloted check valve (32)
- C2 = to V2 piloted check valve (32)
- C4 = to compensation cylinder (31) base
- C5 = to compensation cylinder (31) head
- T = plugged
- Vm1= relief valve (on V1-C1)
- Vm2= relief valve (on V2-C2)



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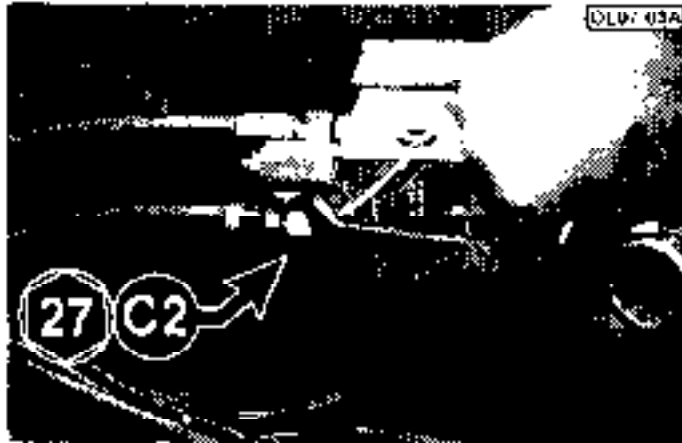


SETTING OF FORK / COMPENSATION VALVE

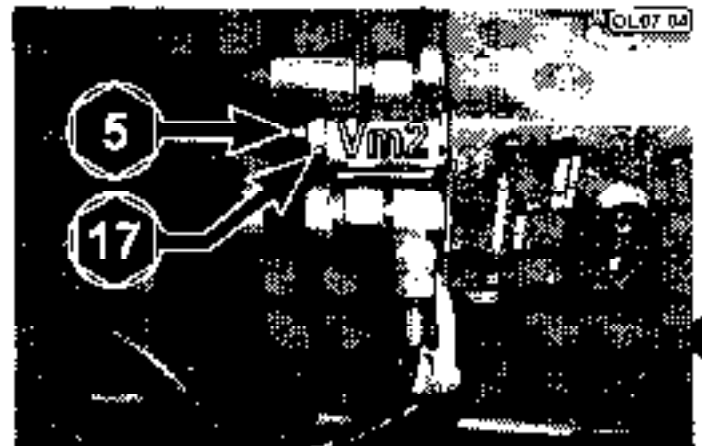
On this type of valve the checking and regulating of the setting pressure can be carried out directly on the machine; since it is a dynamic setting, the pressure is 30 bar higher than the nominal value (240 bar) established at the bench with the hydraulic gearcase and with the capacity of 5 l/min (static calibration)

Vm2 VALVE

- lower the boom completely, then replace the junction assembled on the connection C2 of the valve (see picture OL07.03A) with the suitable junction (part number 040436). Connect the pressure plug (see picture OL07.03B) to a pressure gauge with full scale 600 bar



- fully extend the cylinder by operating the carriage upwards; lower the boom slowly and verify that the pressure gauge reads the recommended pressure (270 bar)
- if necessary, loosen the lock nut and act on the adjustment screw (see picture OL07.04) in order to set the correct pressure: turn the screw slowly clockwise to increase the pressure counterclockwise to reduce it (bear in mind that at every complete turn the pressure changes of about 100 bar) when you have finished tighten the lock nut



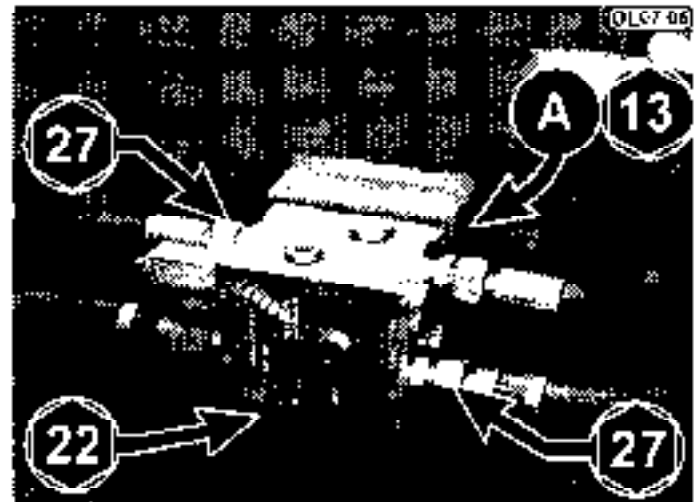
Vm1 VALVE

- carry out the same operations as described for the other valve, bearing in mind the following
 - the complete assembly of junction and pressure intake has to be mounted on the connection C1
- to check the setting pressure it is necessary to lower the boom to the ground, then slowly lift the boom after having fully retracting the fork tilting cylinder (carriage turned downwards).



REPLACING OF FORK / COMPENSATION VALVE

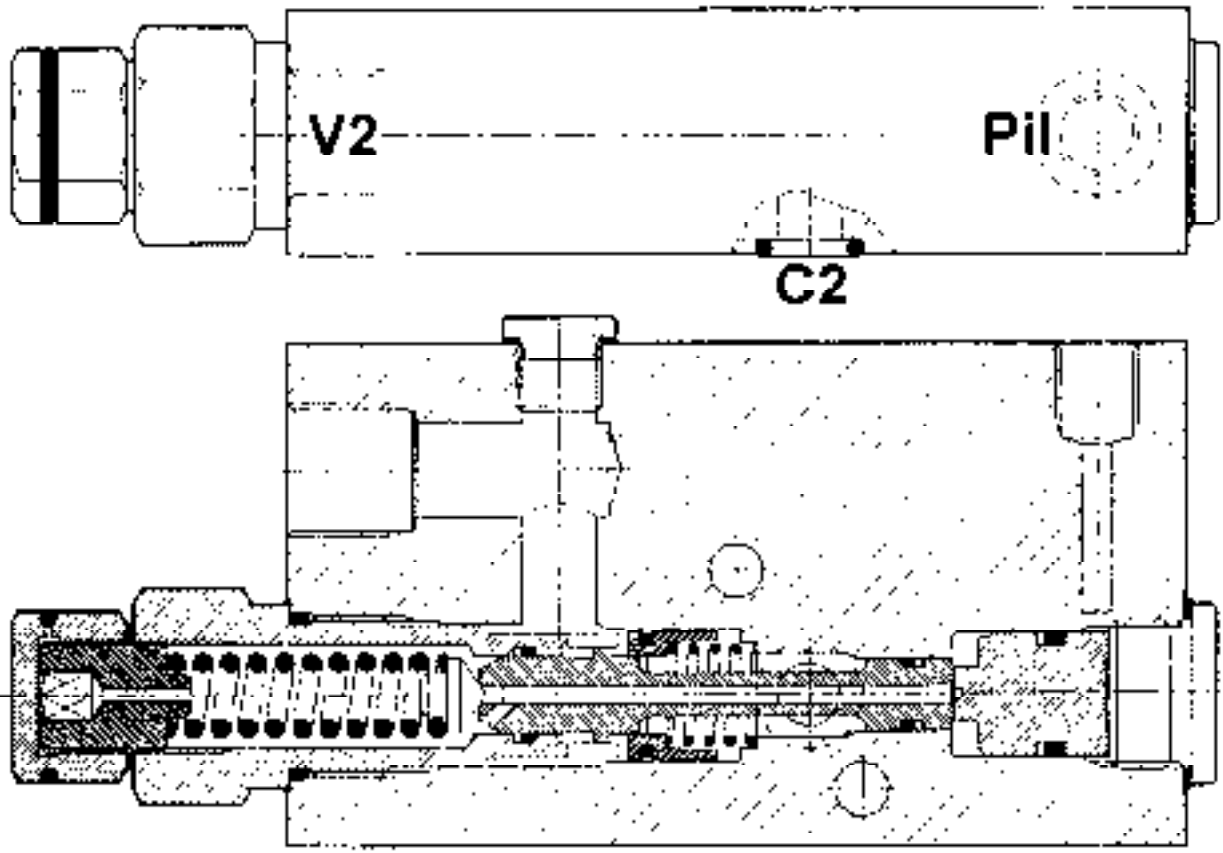
- 1) Disconnect the six hoses, disassemble the machine valve by removing the two fixing screws (A)
- 2) If necessary, recover the fittings used on the old valve and assemble them on the new one. Re-assemble in the reverse the operations described in the previous point
- 3) Check oil level (see paragraph HYDRAULIC OIL in the section INTRODUCTION), then test the system and verify there are no leaks



PILOTED CHECK VALVE (32) (031860)

This valve ensures that the fork cylinder will be locked if the hose to the base breaks.

- C2 = from valve to cylinder base
- V2 = from C2 fork / compensation valve (30)
- Pil = from C1 fork / compensation valve (30)



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**INTERNAL LEAKAGES FROM THE CYLINDER OR PILOTED CHECK VALVE**

To identify the point where a leakage occurs it is necessary to carry out the following operations.

- load on the forks about 1300 Kg then fully retract the boom and lower it until you position the load at about 20 cm from the ground
- stop the engine, then disconnect the pressure line pipe from the base of the cylinder (see picture OL07.07). While the carriage turns downwards check the junction on the cylinder:
 - if oil comes out, the piloted check valve is leaking
 - if oil does not come out, the leakage is from the cylinder

**LEAKAGES FROM THE UNIDIRECTIONAL PILOTED VALVE**

A slight lubricating oil leakage from the vent-hole (A) placed on the valve cap can be considered normal until the machine has worked for few hours. If the leakage continues after the first 100 operating hours, it is necessary to replace the valve.

**REPLACING OF PILOTED CHECK VALVE**

- 1) Release the cylinder from the boom and lean it on the carriage, carrying out the operations described from point 1 to point 8 in the chapter FORK CYLINDER REMOVAL AND OVERHAUL of the handbook HYDRAULIC CYLINDERS P 35.9 EVA
- 2) Disconnect the piloting pipe (see picture OL07.09A), then disassemble the valve from the cylinder by removing the fixing screws (see picture OL07.09B).



- 3) If necessary, recover the fittings used on the old valve and assemble them on the new one. Re-assemble in the reverse all the operations described in the previous points.
- 4) Check oil level (see paragraph HYDRAULIC OIL in the section INTRODUCTION), then test the system and verify there are no leaks.



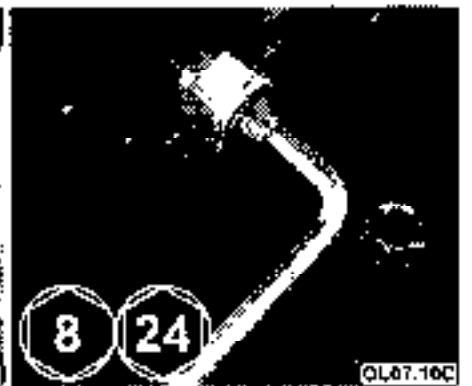
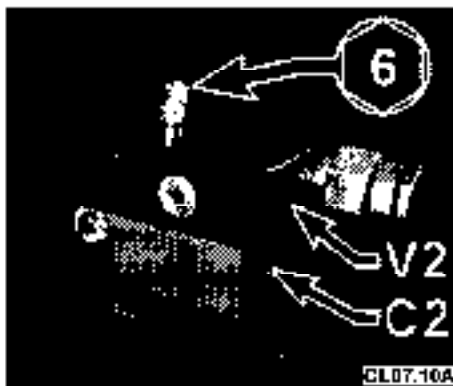
SETTING OF PILOTED CHECK VALVE

The setting check should be carried out on a bench with a hydraulic power unit (capacity of 5 l/min) and pressure gauge full scale 600 bar minimum. Since it is of a flanged valve we recommend that you use the suitable Kit part number 040435.

- assemble the valve on the manifold (see picture OL07.10A), screw the pressure plug in the correspondent hole (see picture OL07.10B) and connect it to the pressure gauge.
- connect the delivery line to C2 and the drain line to V2 (see picture OL07.10A)
- supply oil to C2 and check that the pressure gauge reaches the setting value (250 bar)

If necessary, set the valve following this procedure.

- cancel the valve setting by unscrewing the cap nut and completely backing off the stud bolt (see picture OL07.10C)
- supply oil to C2 and tighten the stud bolt until the pressure reading on the pressure gauge reaches 250 bar
- tighten the cap nut





MALFUNCTIONS IN COMPENSATION SYSTEM

OL07 11

The forks drop slowly under a static load

Disconnect the line from the fork cylinder base (forks under static load, see relative instructions)

oil comes out

Piloted check valve (32) leaking (replace)

oil does not come out

Fork cylinder (33) leaking (overhaul / see manual " P 35 9 EVA HYDRAULIC RAMS")

The carriage does not keep parallel during operations

When the boom is raised

Yes

Relief valve (Vm1) on fork/compensation valve (30) set too low (reset)

When the boom is lowered

Yes

Relief valve (Vm2) on fork/compensation valve (30) set too low (reset)

No

Fork / compensation valve (30) faulty (replace)

Compensation cylinders (31) in fork cylinder (33) leaking (overhaul / see manual " P 35 9 EVA HYDRAULIC RAMS")

The boom jerks when lifting

Relief valve (Vm1) on fork/compensation valve (30) set too low (reset)

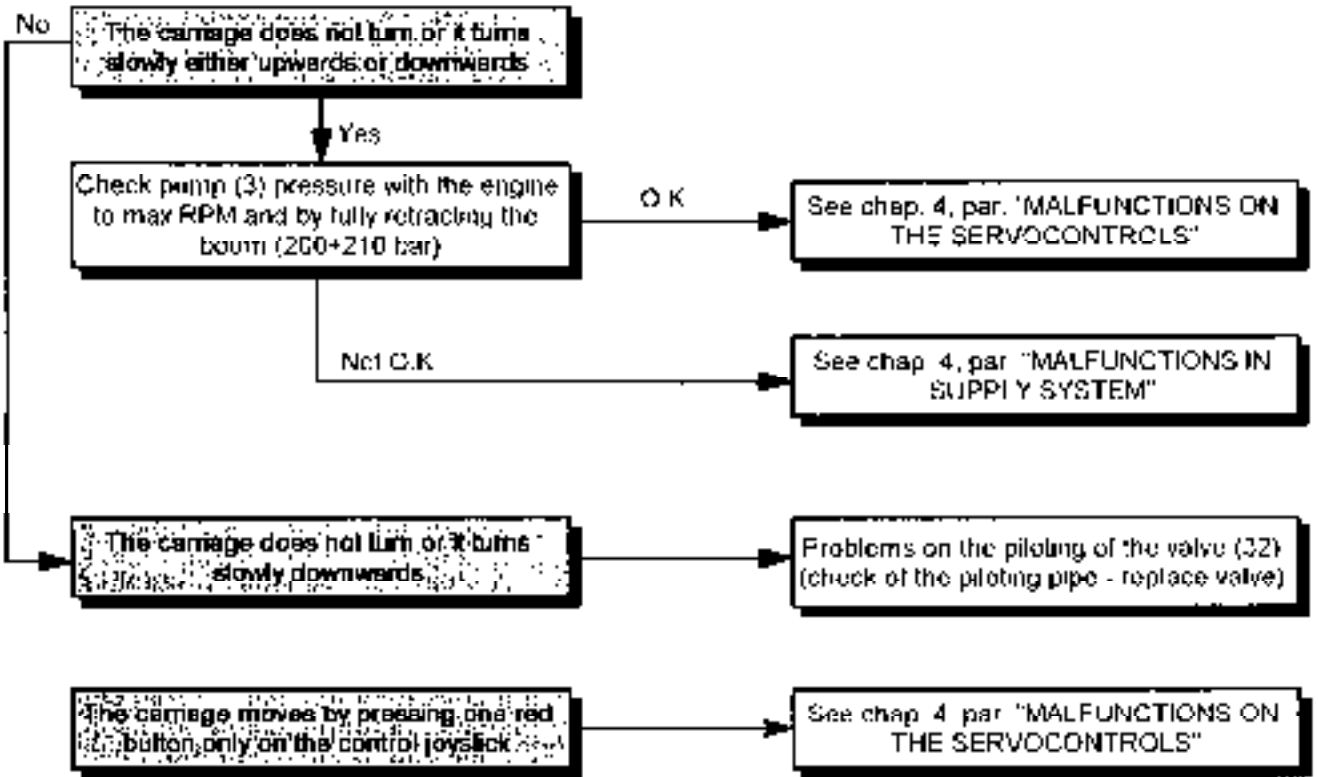
Fork / compensation valve (30) faulty (replace)

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MALFUNCTIONS IN FORK TILTING SYSTEM

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7 - FORK TILTING / COMPENSATION SYSTEM



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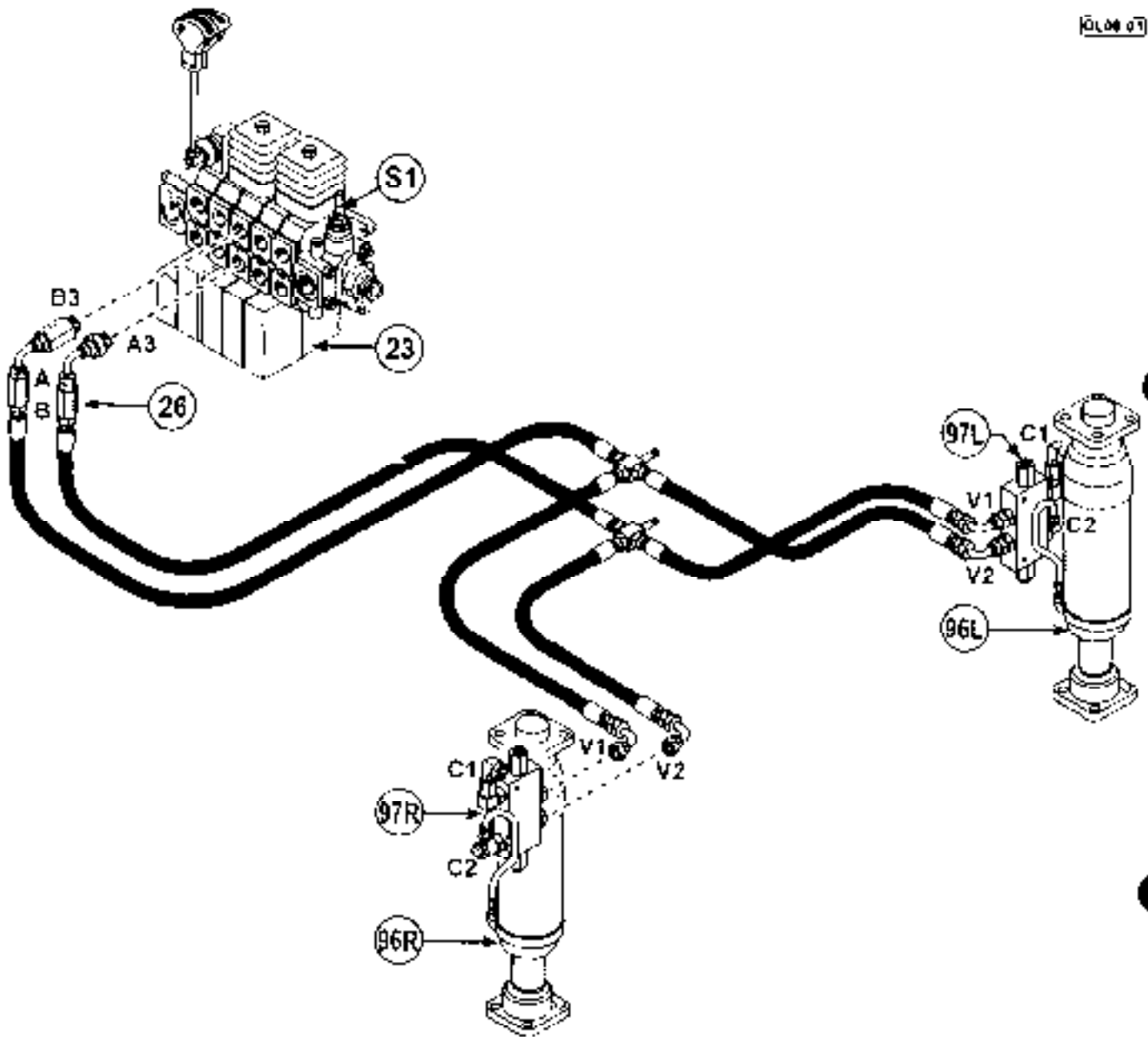
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FRAME LEVELLING SYSTEM

10L00 07



- 23 Main directional control valve
- 26 Choke valve
- 96L-R Frame levelling cylinders
- 97L-R Balanced lock valves
- S1 Relief valve

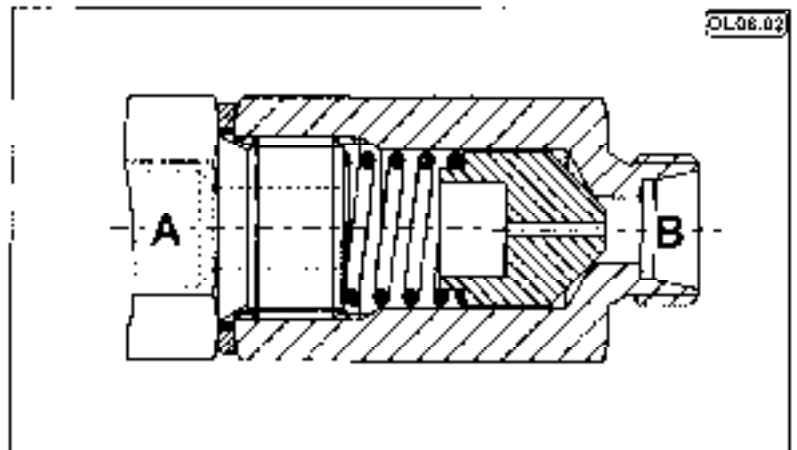
The system pressure is controlled by relief valve (S1)

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**CHOKE VALVES (26)**

The valve's function is to reduce the oil capacity and consequently, the speed of the movements of the frame levelling device

- A = from main directional control valve (23)
- B = to balanced lock valves (97L-R)

**BALANCED LOCK VALVES (97L-R) (030339)**

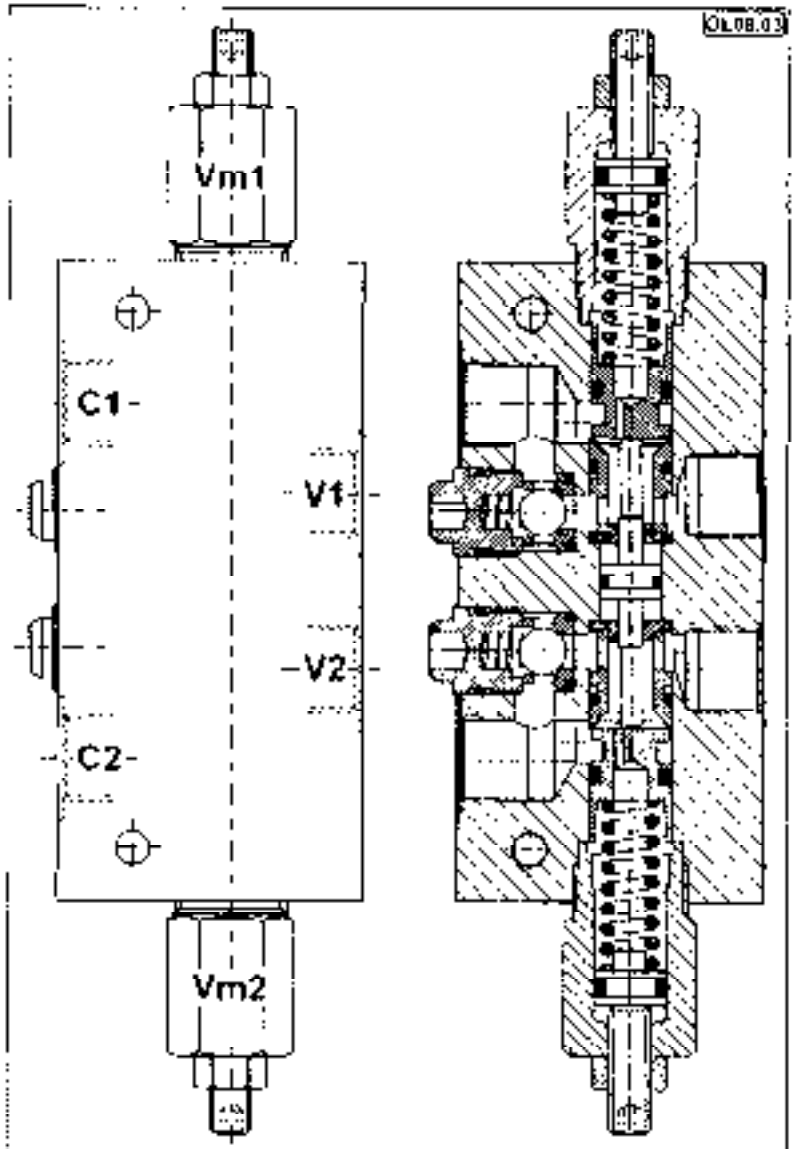
The valve's function is to prevent the accidental inclination of the machine chassis (for example in case of breakage of one or of both feed hoses of the cylinders or of the leakage of the main directional control valve)

VALVE 97L

- C1 = from valve to cylinder base (96L)
- C2 = from valve to cylinder head (96L)
- V1 = from A3 main directional control valve (23)
- V2 = from B3 main directional control valve (23)
- Vm1 = relief valve (on V1-C1)
- Vm2 = relief valve (on V2-C2)

VALVE 97R

- C1 = from valve to cylinder base (96R)
- C2 = from valve to cylinder head (96R)
- V1 = from B3 main directional control valve (23)
- V2 = from A3 main directional control valve (23)
- Vm1 = relief valve (on V1-C1)
- Vm2 = relief valve (on V2-C2)





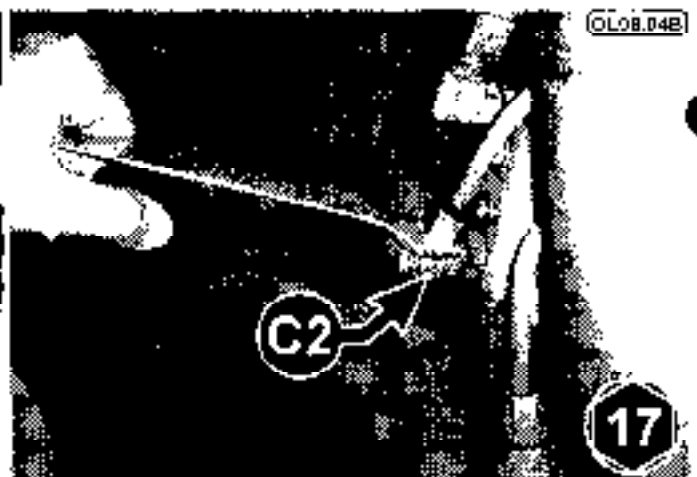
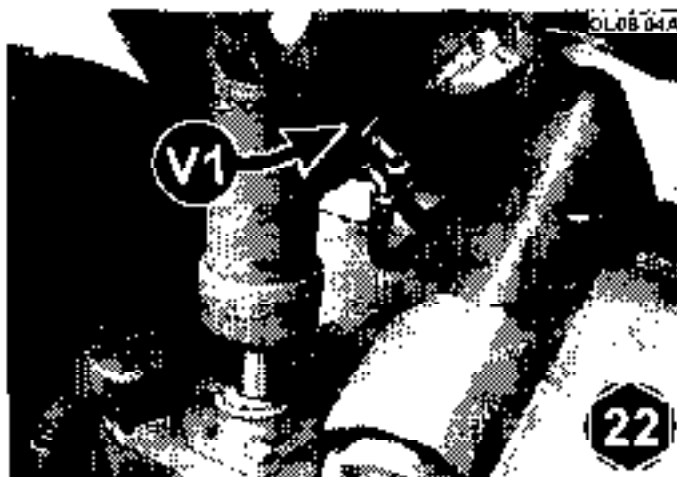
INTERNAL LEAKAGES FROM THE CYLINDERS OR BALANCED LOCK VALVES

CHECKING LEAKAGES FROM THE VALVES:

- place a 3000 Kg load on the forks, fully retract the boom and lower it until the load is approx. 10 cm from the ground
- extend the cylinder rod approx. 5 cm (on the cylinder you are checking).
- stop the engine, then disconnect the hose from the connection V1 of the valve (see picture OL08.04A); the valve leaks if, while the rod retracts, the oil comes out from the V1 connection.

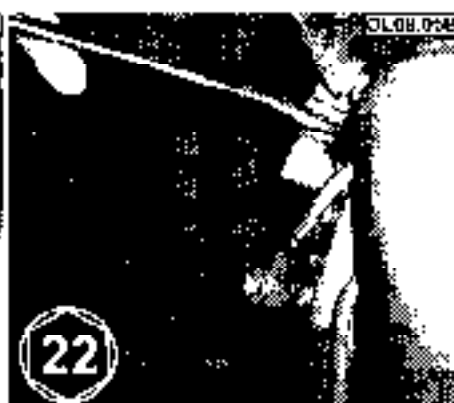
CHECKING LEAKAGES FROM THE CYLINDERS:

- fully retract the boom, lower it until you position the forks at about 20 cm from the ground
- fully extend the cylinder rod (on the cylinder you are checking)
- stop the engine, then disconnect the hose from the connection C2 of the valve (see picture OL08.04B); the cylinder leaks only if, when the rod retracts, the oil comes out of the pipe.



REPLACING OF BALANCED LOCK VALVES

- 1) Fully retract the rod of both cylinders
- 2) Disconnect from the valve the two feed hoses (see picture OL08.05A); unscrew the junction from the base of the cylinder (see picture OL08.05B), then disconnect the hose and remove the valve (see picture OL08.05C)



- 3) If necessary, recover the fittings used on the old valve and assemble them on the new one. Reassemble in the reverse the operations described in the previous points.
- 4) Check oil level (see paragraph HYDRAULIC OIL in the section INTRODUCTION); then test the system and verify there are no leaks



SETTING OF BALANCED LOCK VALVES

The safety valve Vm1 and Vm2 are set at two different pressure values, this ensures that one cylinder rod retracts fully before the other extends

The setting check is made on the work-bench with a hydraulic power unit (capacity of 5 l/min) and pressure gauge full scale 600 bar

VALVE Vm1 (150 bar)

- connect the delivery line to C1 and to the pressure gauge, connect the drain line to V1
- supply oil to C1 and verify on the pressure gauge that the pressure reaches the setting value

VALVE Vm2 (230 bar)

- carry out on line C2 - V2 the same operations as described for the other valve

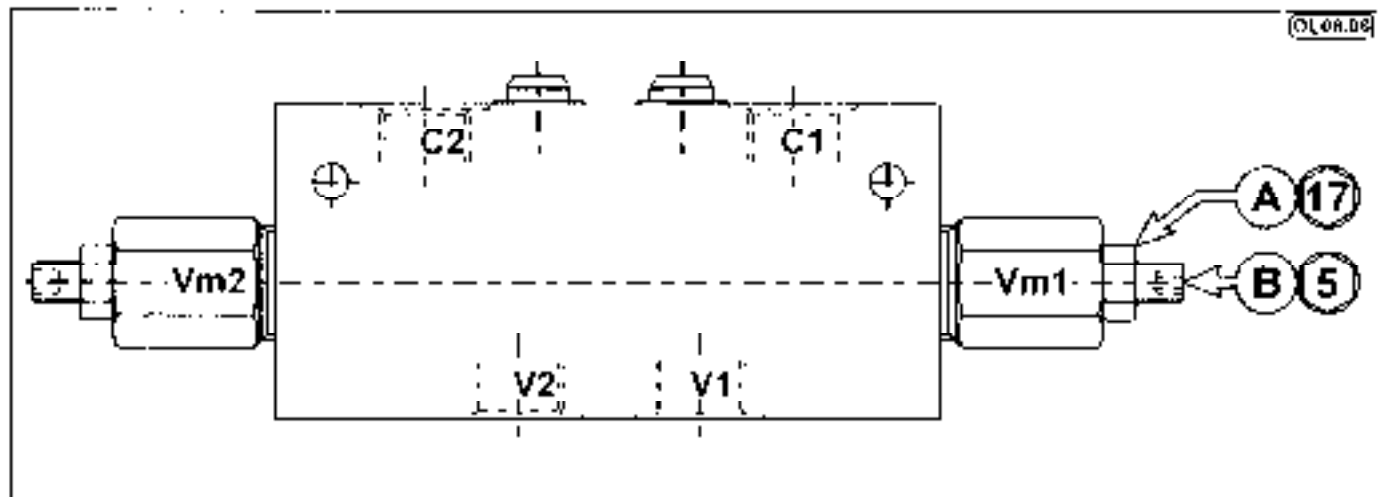
If necessary, set the valves following these instructions

VALVE Vm1 (150 bar)

- cancel the valve setting by unscrewing the nut (A) and completely backing off the stud bolt (B)
- supply oil to C1 and tighten the stud bolt until the pressure reading on the pressure gauge reaches the setting value
- tighten the nut

VALVE Vm2 (230 bar)

- carry out on line C2 - V2 the same operations as described for the other valve

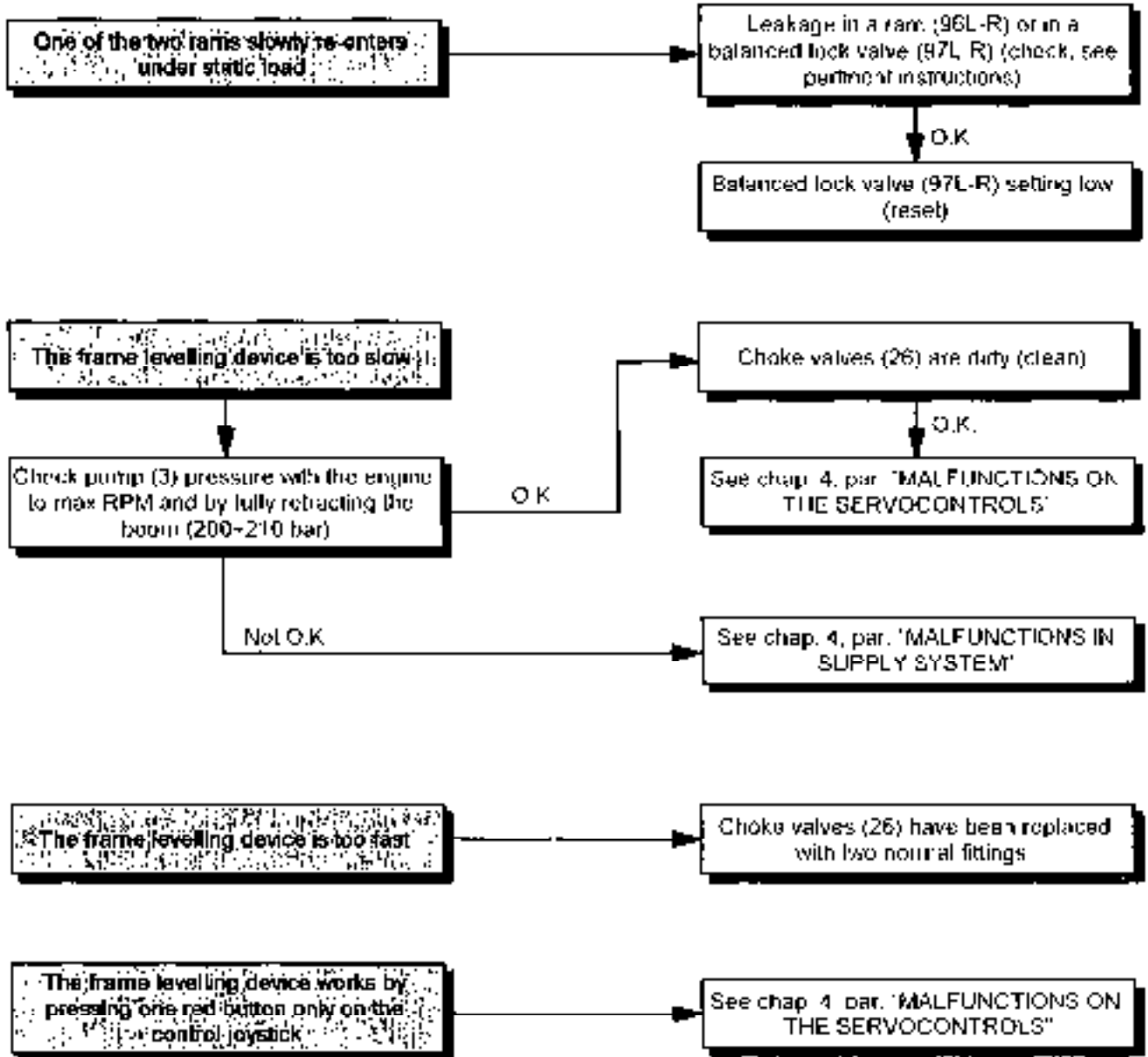


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MALFUNCTIONS IN FRAME LEVELLING SYSTEM

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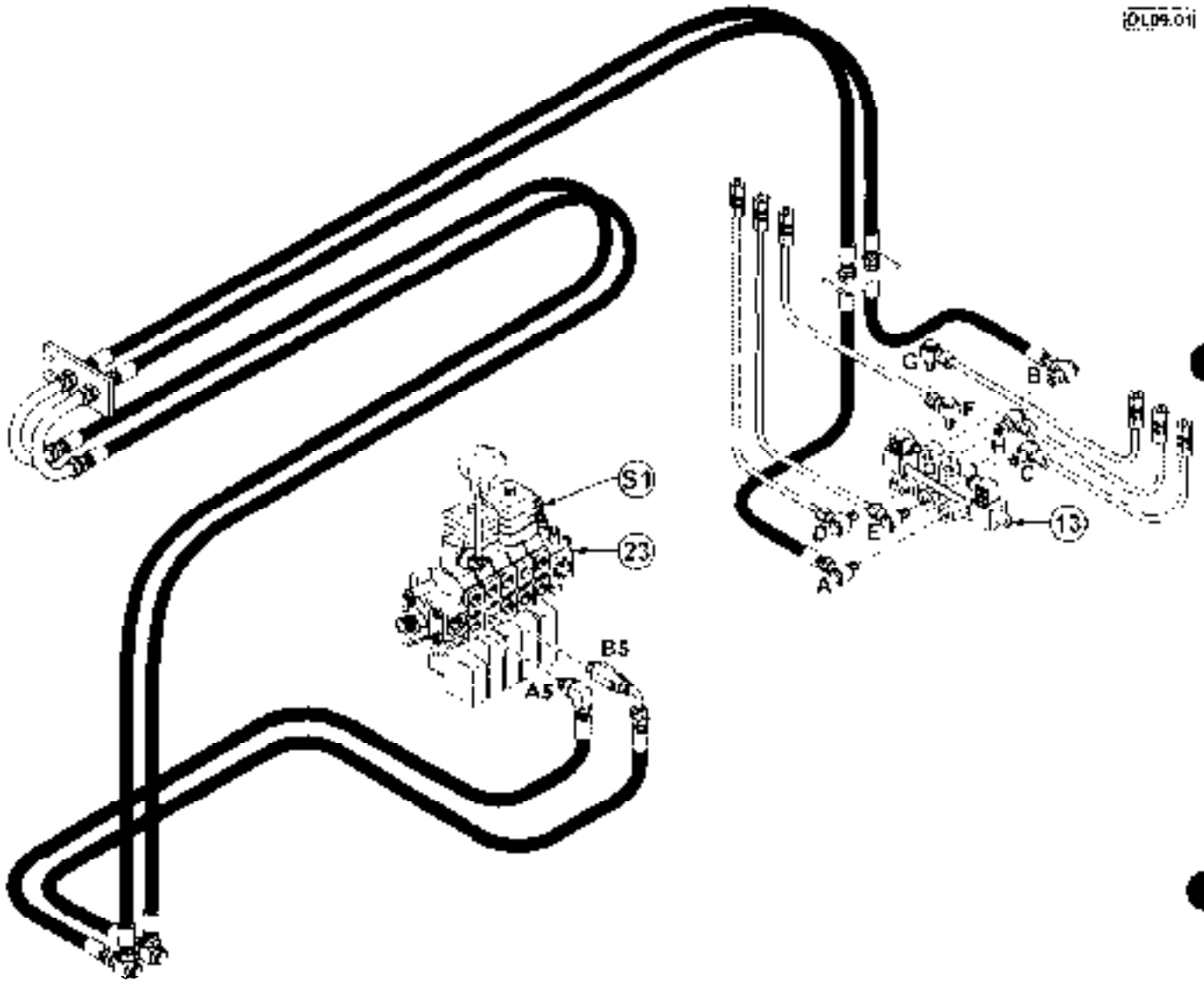
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MALFUNCTIONS IN FLOW DEVIATOR SYSTEM	5

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FLOW DEVIATOR SYSTEM

(0LD9.01)



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- 13 Flow deviator
- 23 Main directional control valve
- 51 Relief valve

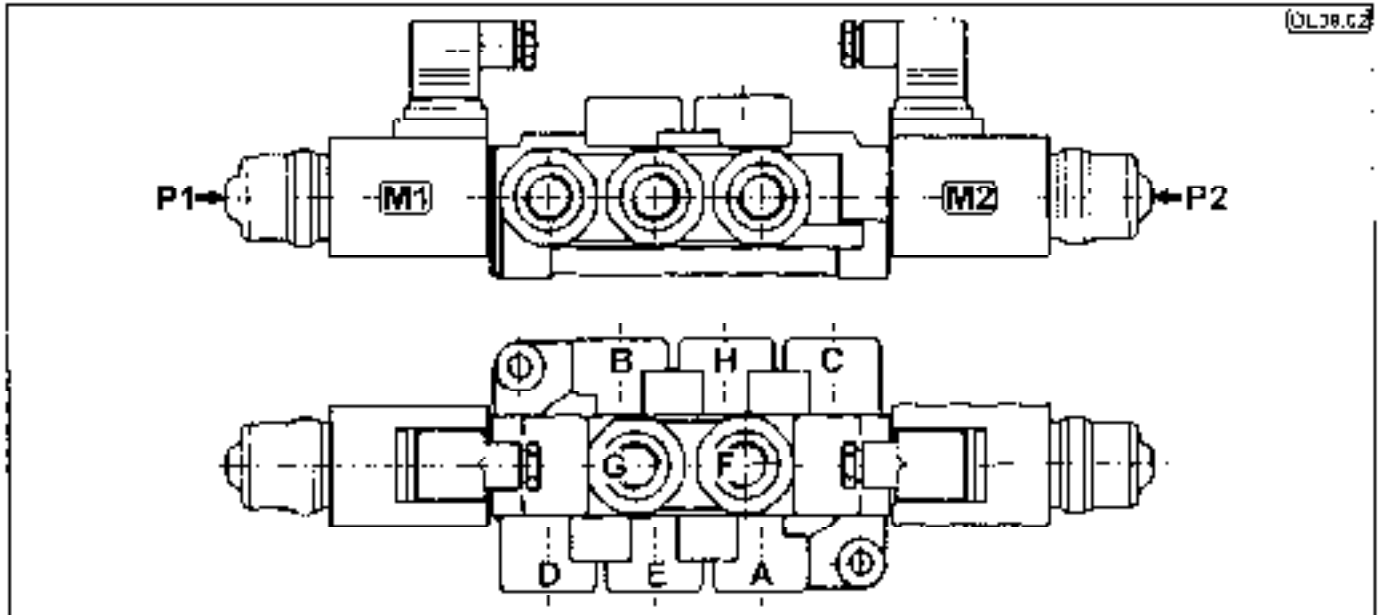
The system pressure is controlled by relief valve (51).



FLOW DEVIATOR (13) (037081)

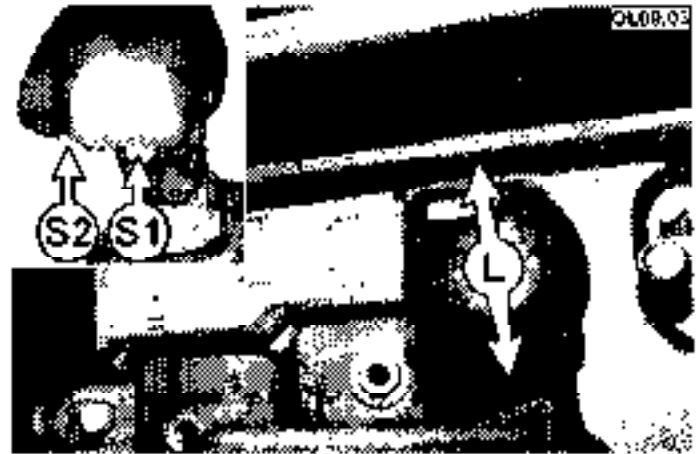
- A = from A5 main directional control valve (23)
- B = from B5 main directional control valve (23)
- M1-M2 = magnets
- P1-P2 = manual acting

The connections C, D, E, F, G and H are pertinent to the cylinders acting for the side shift on carriage (not included in the supply of MERLO SPA).



The flow deviator works by mean of an electromechanical joystick (L) assembled on the main directional control valve. By moving the lever towards the left or right the oil is diverted from the connections A5-B5 of the main control valve to the connections A-B of the deviator.

- by operating the joystick only (ie do not press button S1 - S2) you open the oil passage between the A-B and C-D.
- by pushing the button S1 you energize the magnet M1 opening the oil passage between the connections A-B and G-H.
- by pushing the button S2 you energize the magnet M2, opening the oil passage between the connections A-B and E-F.



HOW TO CHECK MAGNETS (this checking must be carried out by two people):

MAGNET M1:

- push with a finger the manual button ref. P1 (see picture 0L09 02)
- turn the start key in such a way you can feed the dashboard, then push the button S1 of the joystick (see picture 0L09 03). If the magnet works, the inner cursor of the deviator pushes the finger back at P1.

MAGNET M2:

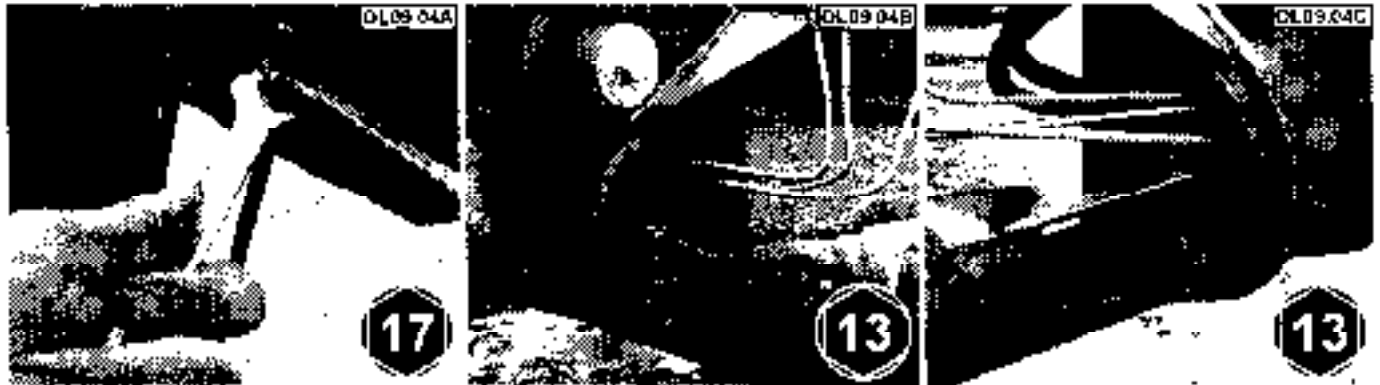
- carry out the same operations described for the other magnet acting on P2 and on the button S2.

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REPLACING A MAGNET OF THE FLOW DEVIATOR

- 1) Disconnect the six feed hoses from the side shift on carriage (see picture OL09.04A), then remove the two fixing screws of the deviator (see pictures OL09.04B - OL09.04C)



- 2) Extract the deviator from the left side of the carriage (see picture OL09.05A); disassemble the connector (see picture OL09.05B), then unscrew the fixing ring nut (see picture OL09.05C) and replace the magnet.

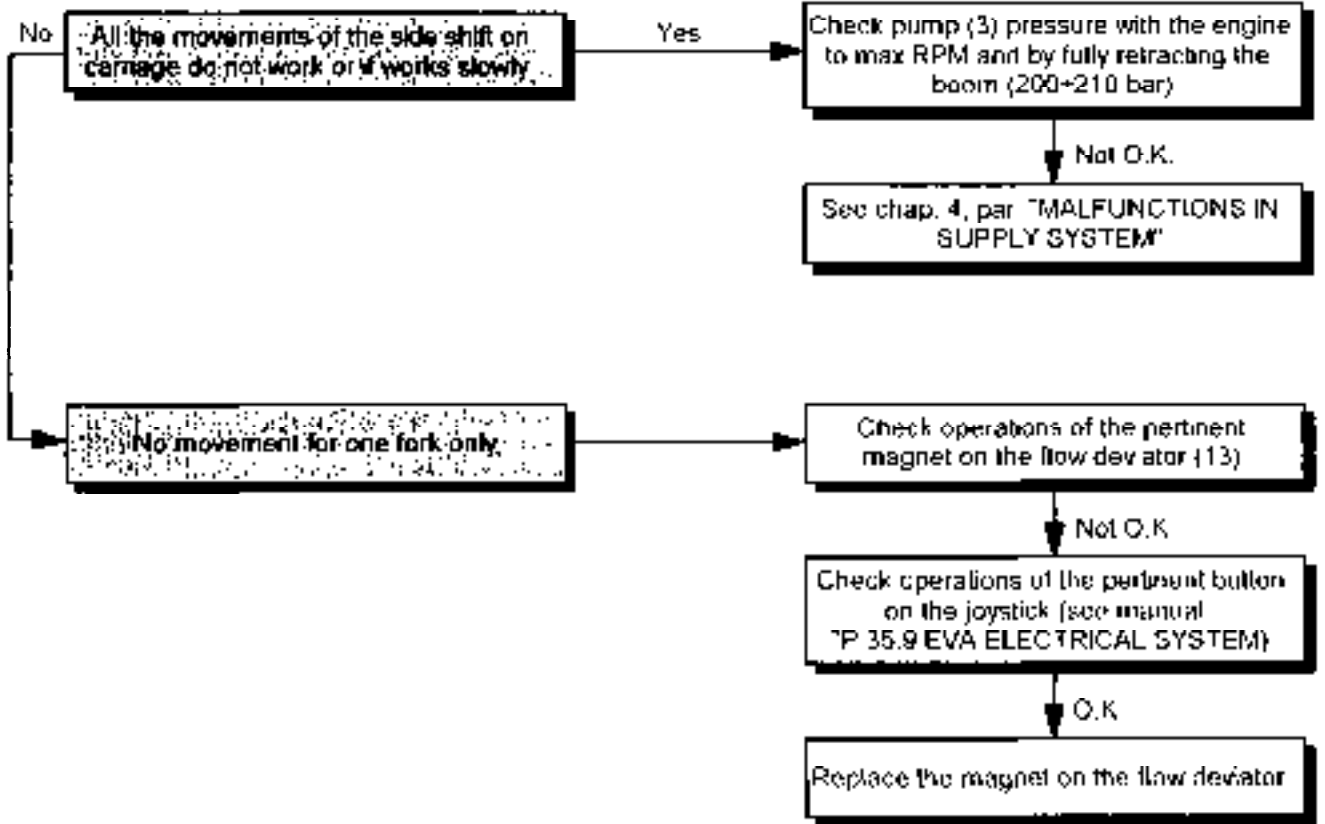


- 3) Reassemble in reverse order all the operations described in the previous points
- 4) Check oil level (see paragraph HYDRAULIC OIL in the section INTRODUCTION); then test the system and verify there are no leaks



MALFUNCTIONS IN FLOW DEVIATOR SYSTEM

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9 - FLOW DEVIATOR SYSTEM



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Merlo S.p.A. Industria Metalmeccanica

12020 S. Defendente di Cervasca (CN) - ITALY Tel (0171) 614111 - Fax (0171) 614100

Domino Mining Equipment Pty Ltd

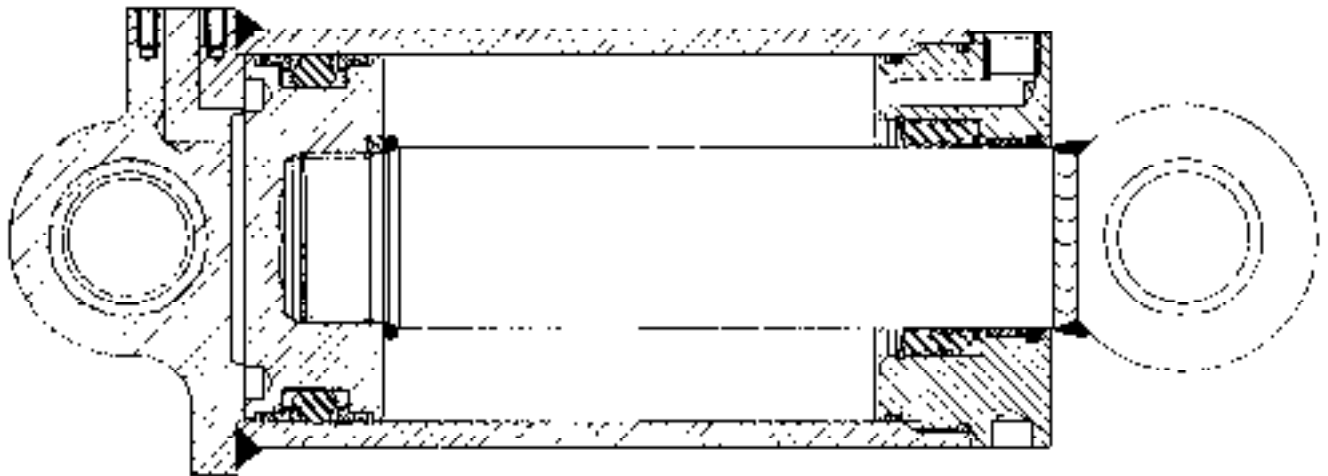
A.C.N. 002 708 881 P.O. Box 69, WYONG, N.S.W (Aust) 2259 Phone (043) 53 1033 - Fax (043) 51 2119

SERVICE MANUAL

HYDRAULIC CYLINDERS

P 35.9 EVA

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This manual provides the information necessary for correct and safe execution of maintenance works not included in the INSTRUCTION HANDBOOK FOR OPERATING AND MAINTENANCE; it is addressed to qualified fitters, who have the required knowledge of mechanical, hydraulic and electrical systems for the machine being serviced.

All work carried out should comply with all relevant environmental and occupational health and safety requirements.

IMPORTANT!

When replacing plastic bushes, always smear pivot pins with grease "KG 274" to avoid oxidation

This symbol is used to identify the dimensions of the spanner required for the operations described in this handbook. The spanner type will be mentioned only if it is non standard.



GENERAL NOTE

Always ensure any work carried out on the vehicle is carried out on level ground. If this is not possible the ground should be as level as possible and the vehicle should be chocked to prevent any possibility of the vehicle rolling.

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SAFETY AND GENERAL INSTRUCTIONS



CAUTION!!!

Servicing of the machine shall only be carried out by skilled and competent personnel. For repair of parts that are not part of the normal scheduling, refer MERLO AUSTRALIA technical service.



WARNING!!!

Always wear suitable protective clothing and safety equipment when using lubricants. Extra care should be taken to avoid burns when working with hot fluids or elements.



WARNING!!!

Always dispose of oils, filters or other mediums in an environmentally friendly manner. Use official organisations for the disposal of such fluids.

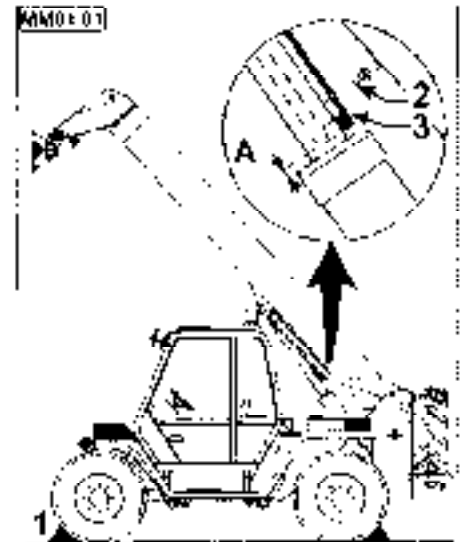
Before carrying out any kind of servicing, position the machine on flat, level ground and

- retract and lower the boom
- release loads or attachments on the vehicle
- put chock (1) at the front and back of the wheels to avoid accidental movement
- apply the hand brake, place the transmission lever in neutral position and stop the engine.

Should it be necessary to carry out servicing operations with the boom lifted, use the safety lock following these instructions

- lift the boom
- apply the hand brake, place the transmission lever in neutral position and stop the engine
- working from the left rear mudguard, rotate lever (2) and rest the safety lock (3) on the lifting jack rod
- re-start the engine and slowly lower the boom till the lock is at about 10 mm from the jack head (dimension A)
- before lowering the boom, replace the safety lock in the original position

When working under the vehicle it is preferable to use a pit or height adjustable work platform. The vehicle weight is stated on identification plate





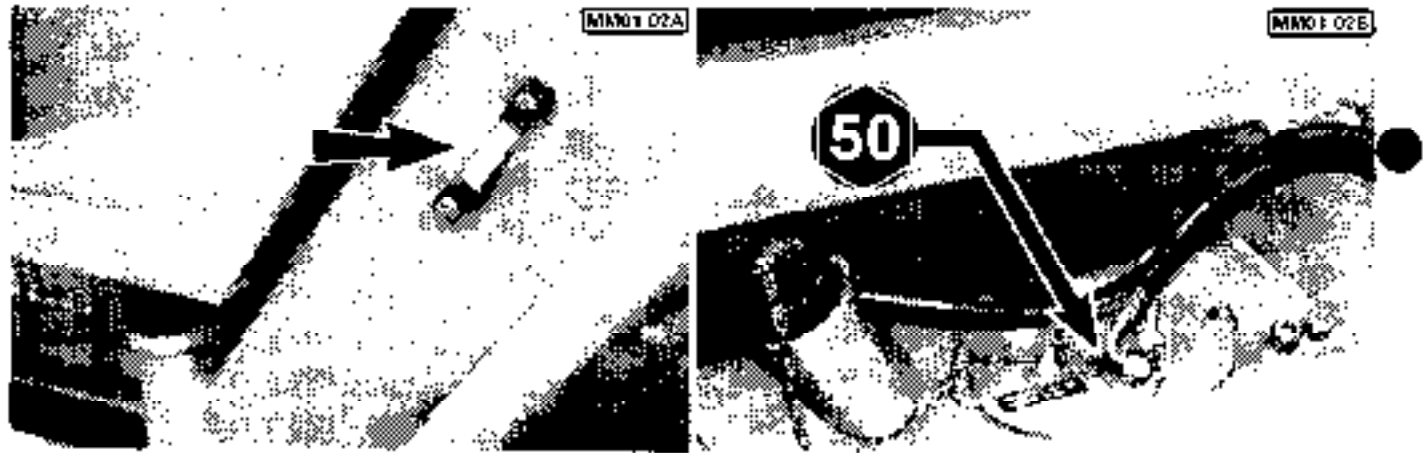
CHECK OF THE HYDRAULIC OIL LEVEL

MOBILFLUID 424

For different brands of oil, ensure that they have characteristics equal to the above product. Should you wish to change the product brand, the system must be flushed clean of the original fill product. In case of use of oils of different characteristics, any warranty claim will be automatically refused.

Check oil level

- lower and retract completely the boom.
- check level through the cap situated on the side of the tank (see picture MM 01 02A) oil must be at max level (peep hole completely covered)
- if necessary remove filler cap (see picture MM 01 02B) and add oil



BOOM EXTENSION CYLINDER

You can find the instructions referring to the removal and the overhaul of the extension CYLINDER in the handbook "INTERNAL OPERATIONS TO THE TELESCOPIC BOOM P35.9 EVA".

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CONVERSION FACTORS

TORQUE		
1 Kgm	=	9,806 N·m
"	=	7,233 lb·ft
"	=	86,79 lb·in

PRESSURE		
1 bar	=	100 KPa
"	=	14,5 psi (lb/in²)
"	=	0,1 N/mm²

FORCE		
1 Kg	=	9,806 N
"	=	2,204 lb



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SPECIAL TOOLS 3

REPAIR TIMES 4

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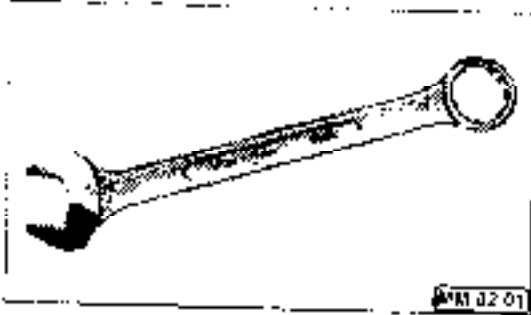


2 - NECESSARY TOOLS AND REPAIR TIMES



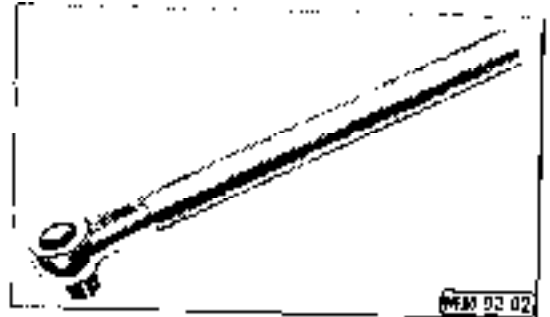
STANDARD TOOLS

Combination spanner: 13, 17, 19, 20, 27, 27, 38, 41, 50



MM 02 01

Reversible ratchets



MM 02 02

Sockets:

- external hexagon 6, 14
- inner hexagon 17, 22



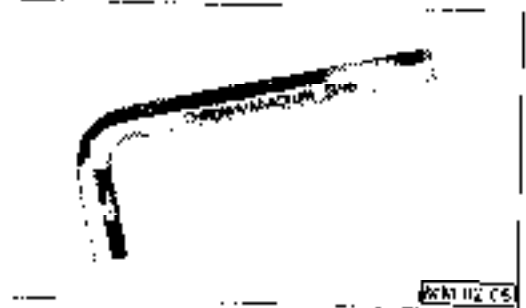
MM 02 03

Sliding T-bar



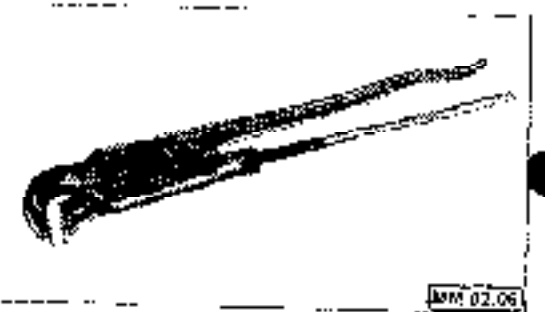
MM 02 04

Allen head wrenches: 3, 6, 20



MM 02 05

Pipe wrenches: 2", 3"



MM 02 06

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2 - NECESSARY TOOLS AND REPAIR TIMES



SPECIAL TOOLS

"C" SPANNERS FOR CYLINDER HEADS		Part No.
Lifting Cylinder		025103
Fork Cylinder		025102



MM 02 07

TOOLS FOR INNER ELEMENTS		Part No.
Compensation Cylinder		022725
Fork Cylinder		025101
Frame Levelling Cylinder		022724



MM 02 08

	Part No.
Compensation Cylinder Pin Puller	040545



MM 02 09

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REPAIR TIMES

- Steering cylinder replacement	about 60 minutes.
- Steering cylinder overhaul	about 40 minutes
- Lifting cylinder replacement	about 100 minutes.
- Lifting cylinder overhaul	about 35 minutes
- Compensation cylinder replacement	about 40 minutes
- Compensation cylinder overhaul	about 40 minutes.
- Fork cylinder replacement	about 30 minutes.
- Fork cylinder overhaul	about 45 minutes.
- Frame levelling cylinder replacement	about 50 minutes.
- Frame levelling cylinder overhaul	about 30 minutes



X/INDEX

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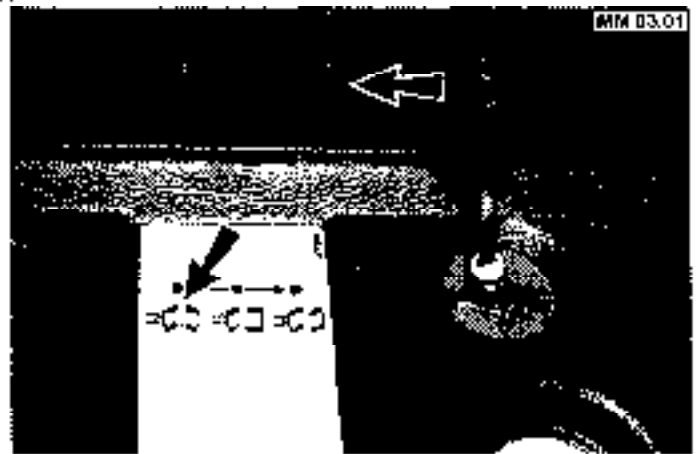
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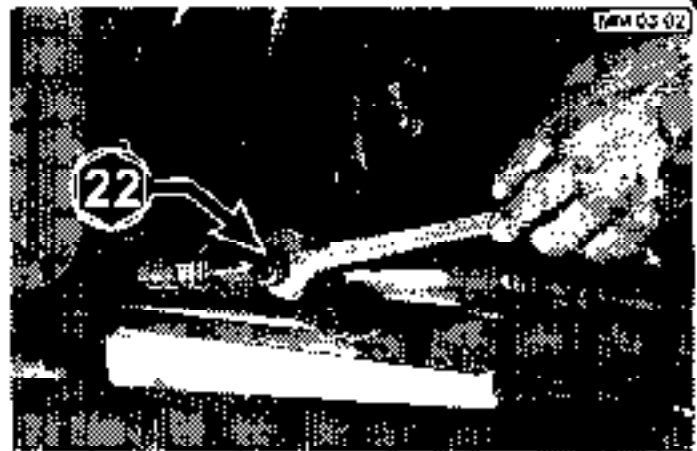


HOW TO REMOVE THE FRONT STEERING CYLINDER

- 1) Start the engine; select the four wheel steer mode (see picture MM 03 01), straighten the four wheels of the machine. switch off the engine.

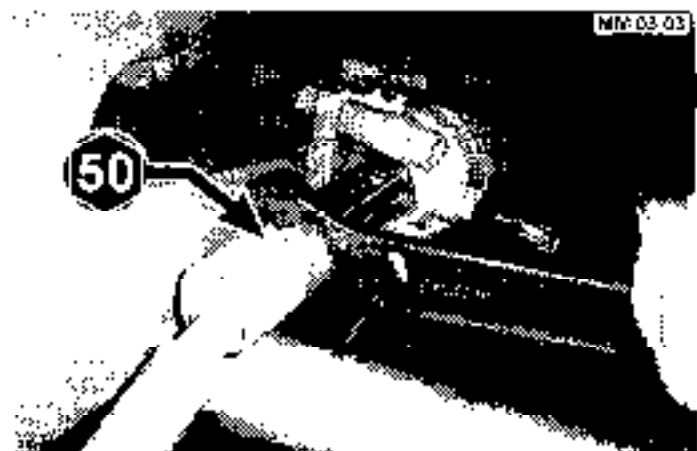


- 2) Disconnect the front right pipe (see picture MM 03 02); plug the connecting pipe and the fitting on the cylinder.



- 3) This operation must be carried out by two people. Start the engine and steer (four wheel steer) towards left so as to pressurize the cylinder. Temporarily unlock the steering tie rods from the stem, switch off the engine.

NOTE: if it is difficult to remove, heat at a temperature of 150° the end of the tie rod being careful not to damage the rubber bellow placed on the tie rod.

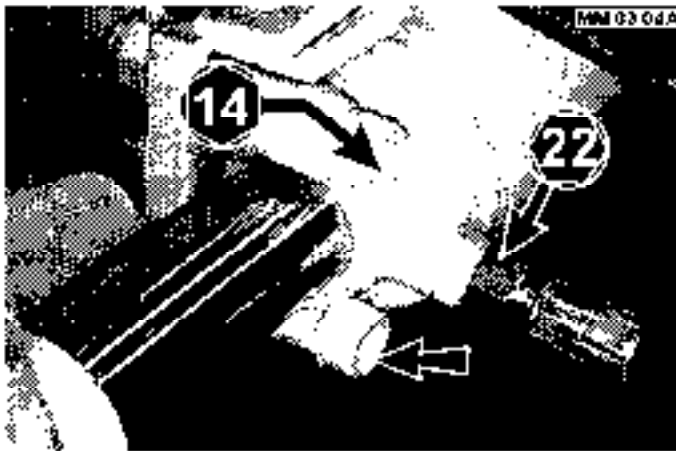


- 4) Fully unscrew the tie rods.

NOTE to simplify this operation lift the machine until the wheels clear the ground.



- 5) Disassemble the left pipe (see picture MM 03.04A), then, unscrewing the four fixing bolts, remove the cylinder from the axle (see picture MM03.04B)



HOW TO REMOVE THE REAR STEERING CYLINDER

- 1) For the removal of the rear cylinder carry out points 1 and 2 of the paragraph "FRONT CYLINDER DISASSEMBLY"
Disconnect the tie rods as described in point 3; carry out points 4 and 5 to remove the cylinder.

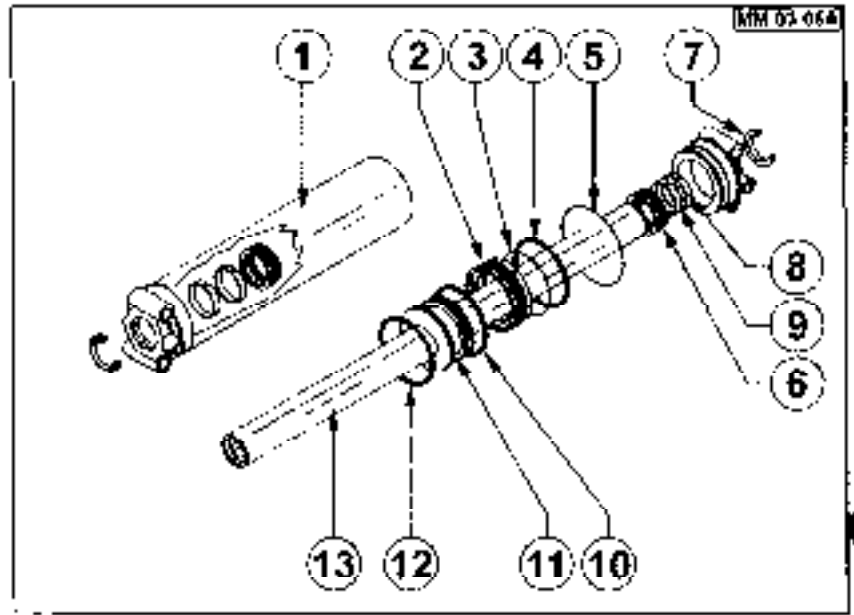
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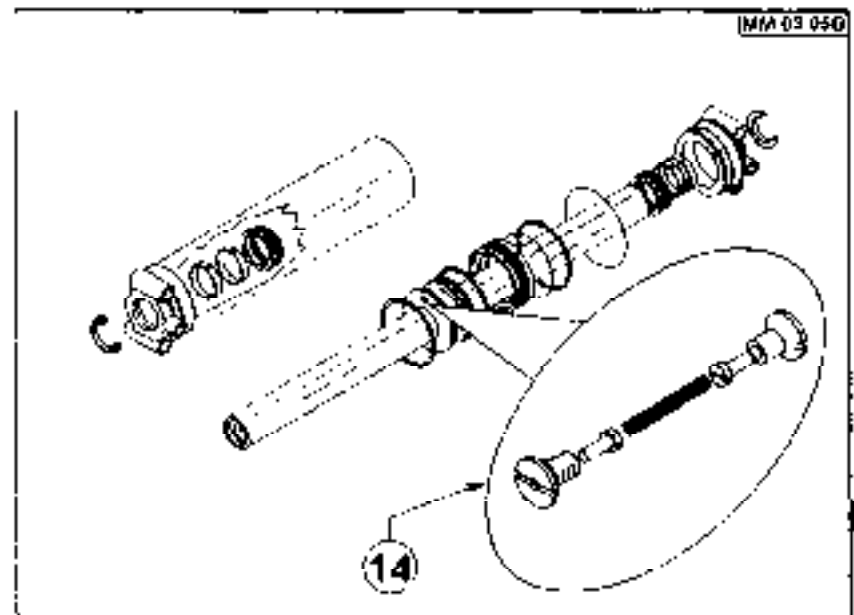
3 - STEERING RAM REMOVAL AND OVERHAUL



**FRONT
STEERING CYLINDER**



**REAR
STEERING CYLINDER**



- 1) CYLINDER CHAMBER
- 2) SEAL
- 3) O RING
- 4) RING
- 5) O RING
- 6) SEAL
- 7) SEAL

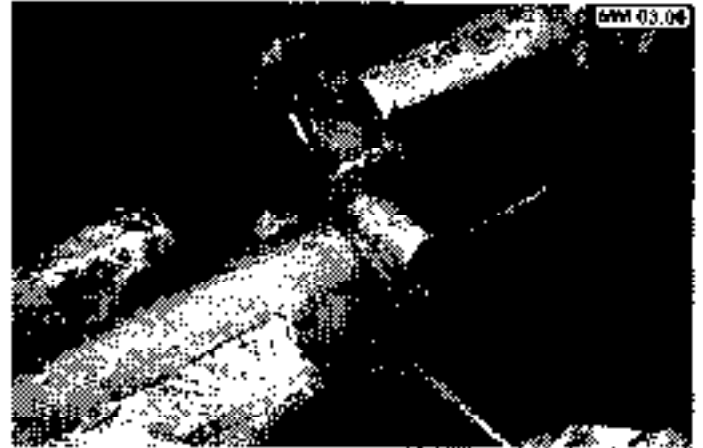
- 8) SEAL
- 9) SEAL
- 10) RING
- 11) INTERNAL ELEMENT
- 12) RING
- 13) ROD
- 14) VALVE

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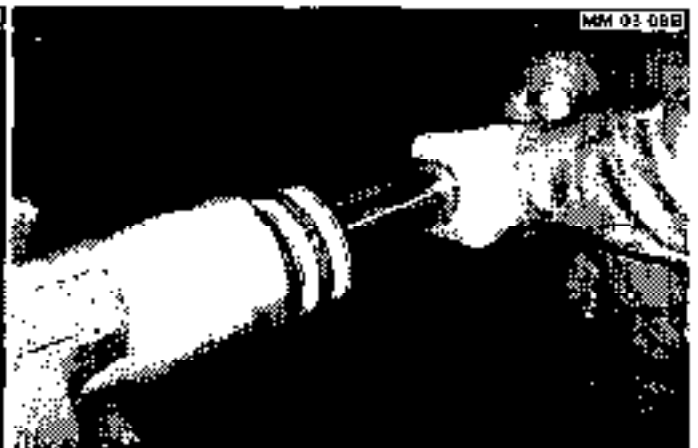
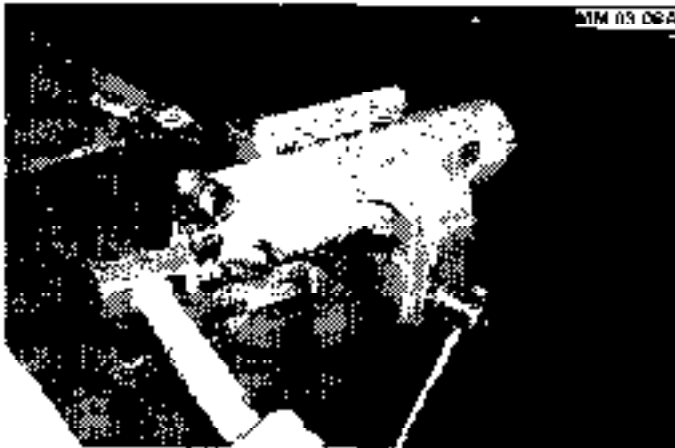


STEERING CYLINDER INNER PARTS OVERHAUL

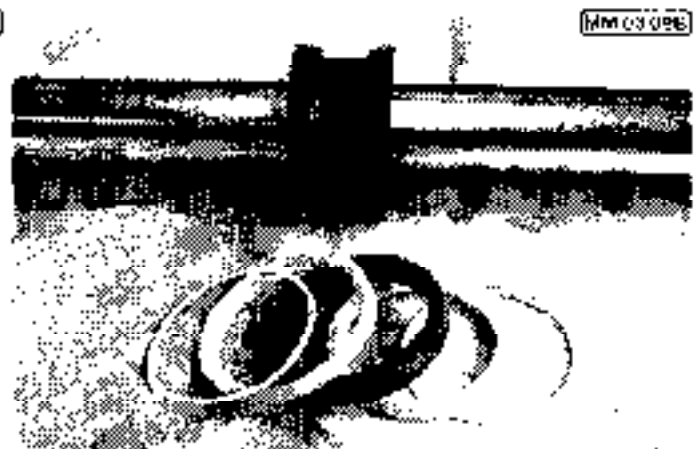
- 1) Lock the cylinder in a vice; using a lever inserted in one of the axle fixing bolt holes and a bronze hammer, unscrew the head (see picture MM 03.06).



- 2) Using a bronze hammer hit one end of the stem, and pulling it from the opposite side, ease it out from the chamber (see picture MM 03.08A and MM 03.08B).



- 3) By means of a screwdriver remove the gaskets placed on the inner element (see picture MM 03.09A and MM 03.09B).

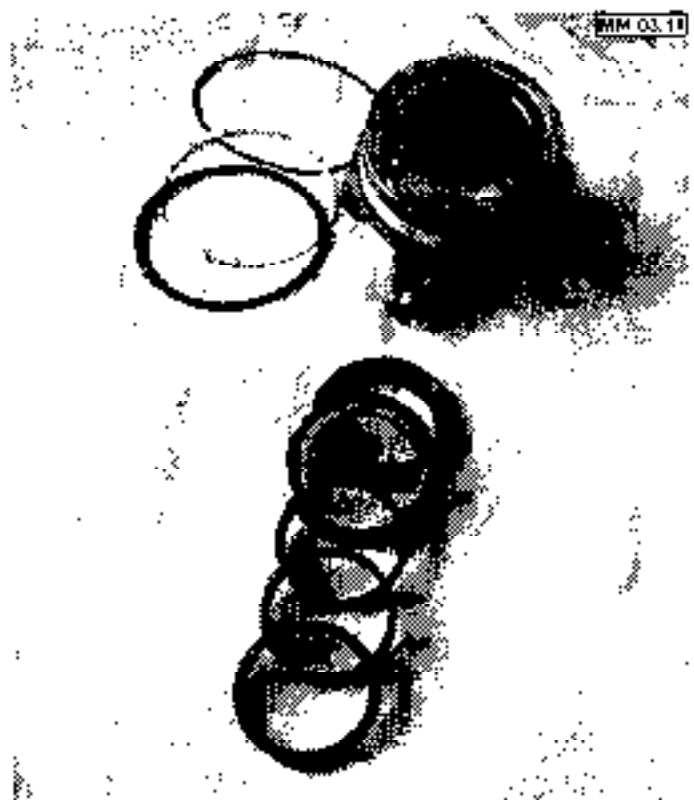




3 - STEERING RAM REMOVAL AND OVERHAUL



- 4) Remove the O Rings on the head and the gaskets in the inner part (see picture MM 03 10A, MM 03 10B, MM 03 10C, MM 03.11); repeat the operation on the other header welded on the cylinder chamber (see picture MM 03 12)



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3 - STEERING RAM REMOVAL AND OVERHAUL

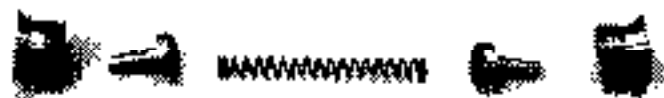


NOTE: the following instructions are valid only for the rear cylinder overhaul.

- 5) Lock the stem in a vice; heat to about 150° in the indicated area where the volume recovering valve is placed (see picture MM 03.13)



- 6) Using a screwdriver unscrew the cap, remove the spring and the cursor; repeat the operation on the other side of the inner element unscrewing the relevant cap (see picture MM 03.14A and MM 03.14B).





STEERING CYLINDER INNER PARTS REASSEMBLY

Once all the O Rings and the gaskets are replaced, reassemble in the reverse order of disassembly as described in the paragraph "STEERING CYLINDER INNER PARTS OVERHAUL" bearing in mind the following:

- 1) On the rear cylinder, reassemble the volume recovering valve (see points 5 and 6); before re-screwing the two caps, apply "LOCTITE 271" to threads
- 2) Apply grease to the gaskets of the inner element. To assist with the insertion of the stem in the chamber (see picture MM 03.15B) it is recommended that the special conical tool (X - part No. 042212) be used (see picture MM 03.15A).



- 3) Once the header is screwed in the chamber (see point 1), you will notice that the holes of the cylinder to axle fixing bolt will not be perfectly aligned with those of the other header. This is not a problem as during the cylinder reassembly on the axle the bolt clamping will align the two headers in the correct position.

STEERING CYLINDER REASSEMBLY ON THE AXLE

Reassembly is the reverse order of the operations described in the paragraph "HOW TO REMOVE THE FRONT STEERING CYLINDER", bearing in mind the following:

- 1) Before screwing the tie rod on the cylinder stem, apply "LOCTITE 271" on the thread of the tie rod (see point 4).
- 2) Check oil level (see section "CHECK OF THE HYDRAULIC OIL LEVEL" in the chapter "INTRODUCTION").



4 - LIFTING RAM REMOVAL AND OVERHAUL



HOW TO REMOVE THE LIFTING CYLINDER

- 1) Start the engine, raise the boom to maximum lift and switch off the engine
- 2) Support the boom by means of a second lifting unit (or any suitable lifting support) as shown in picture MM 04.01

MM 04.01



- 3) Secure the lifting cylinder with a sling and anchor it to the telescopic boom (see picture MM 04.02A and MM 04.02B), so as to avoid it falling when the upper fixing pivot is removed



- 4) Turn the flashing indicator upside down, unscrewing the fixing screw (see picture MM 04.03)





4 - LIFTING RAM REMOVAL AND OVERHAUL



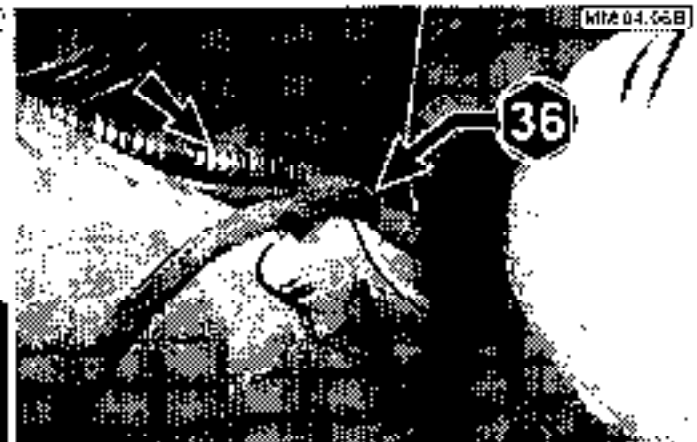
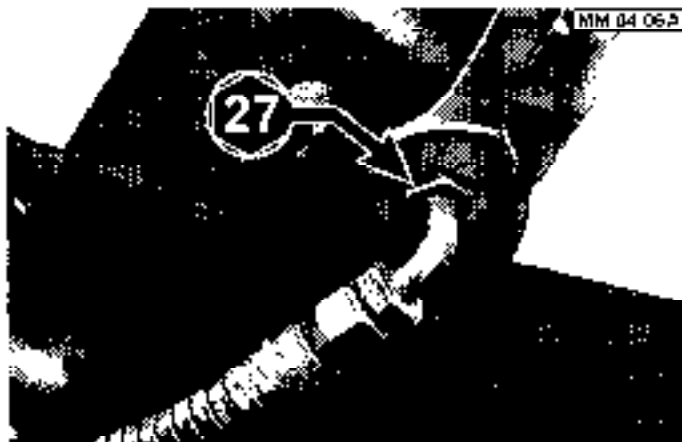
- 5) Remove the fixing plate of the upper pivot (see picture MM 04 04)



- 6) Remove the upper pivot.



- 7) Remove the pipe on the header (see picture MM 04 06A) and on the valve placed on the cylinder bottom (see picture MM 04.06B)





4 - LIFTING RAM REMOVAL AND OVERHAUL

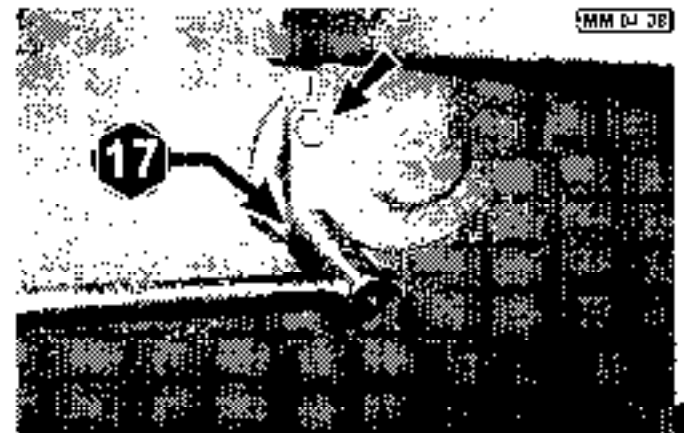


- 8) This operation must be carried out by two persons

Remove the sling securing the cylinder (see point 2 of this paragraph) and let it pass through the hole of the upper pivot placed on the stem, then lean the cylinder on the machine chassis (see picture MM 04 07).



- 9) Remove the two fixing screws of the locking plate of the lower pivot (see picture MM 04 08)



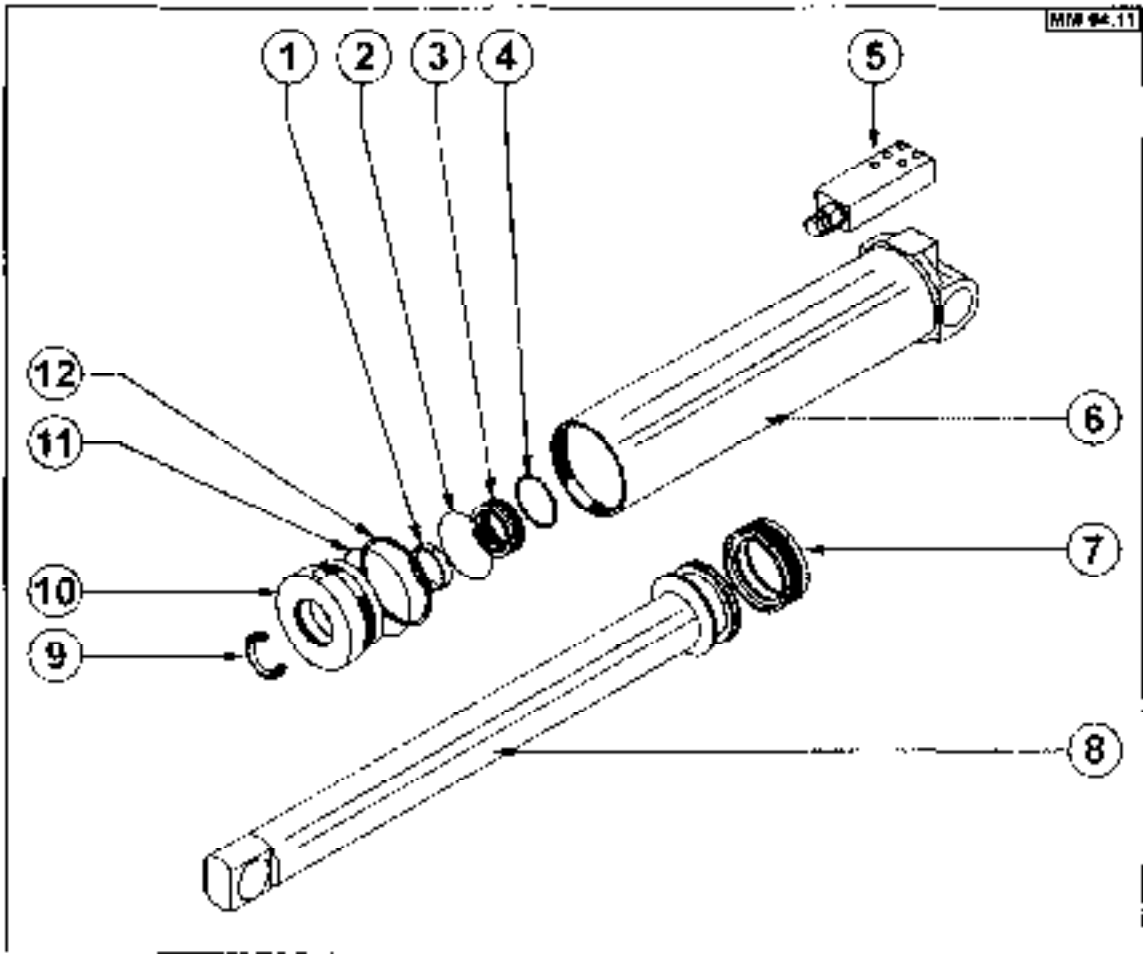
- 10) Knock the lower pivot out with a hammer and bar (see picture MM 04 09).



- 11) Using suitable means, lift and extract the cylinder from the machine



4 - LIFTING RAM REMOVAL AND OVERHAUL



- 1) SEAL
- 2) O RING
- 3) SEAL
- 4) BONDED SEAL
- 5) VALVE
- 6) CYLINDER CHAMBER

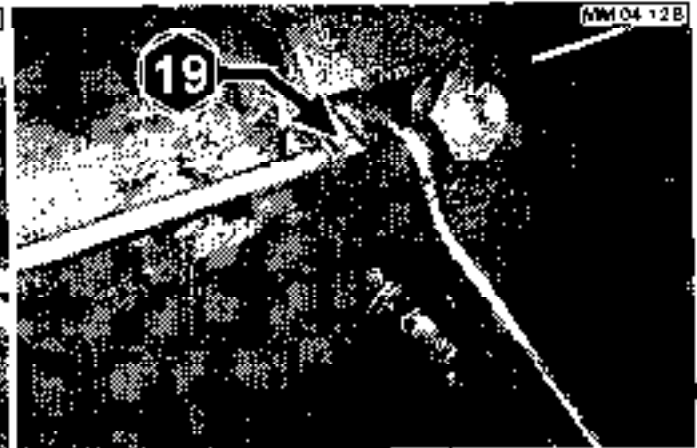
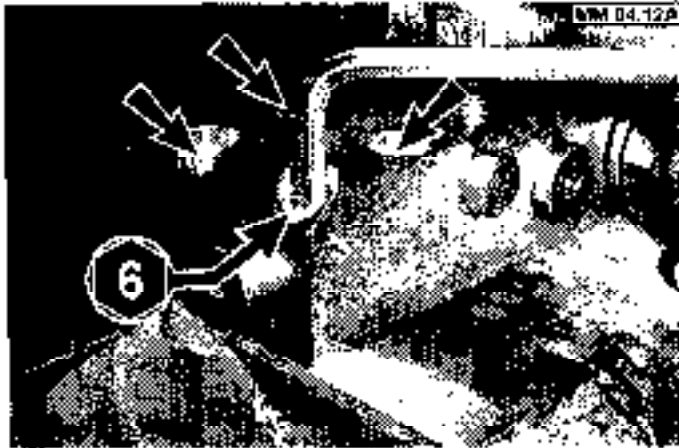
- 7) SEAL
- 8) ROD
- 9) SEAL
- 10) HEADER DISTRIBUTOR
- 11) O RING
- 12) RING

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OVERHAUL LIFTING CYLINDER INNER PARTS

- 1) Disassemble the locking valve from the cylinder room (see picture MM 04.12A) and the pilot pipe (see picture MM 04.12B)



- 2) Secure the cylinder in two vices by using the special tool (Part No 025103) unscrew the header, collect the oil in a container (see picture MM 04.10).



- 3) Grasp the stem and pull it fully from the chamber (see picture MM 04.13)

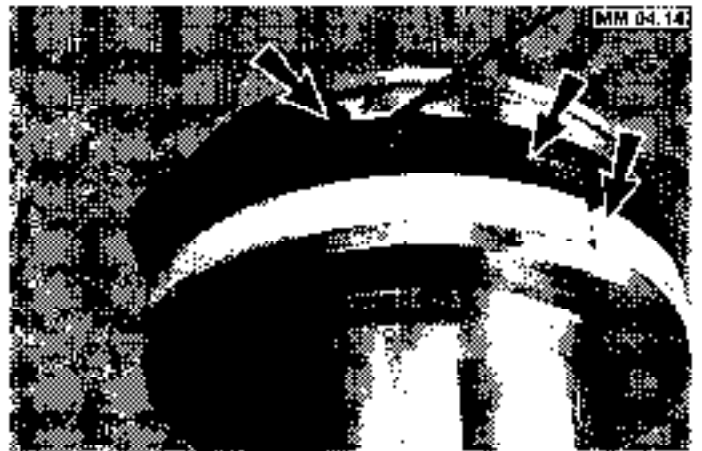




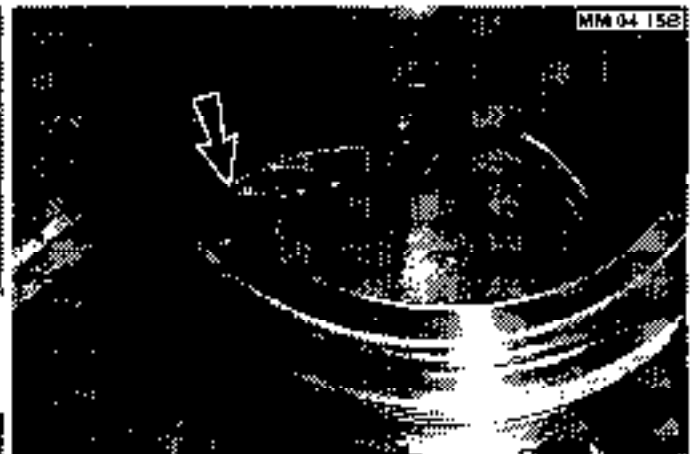
4 - LIFTING RAM REMOVAL AND OVERHAUL



- 4) By means of a screwdriver extract the gaskets placed on the inner element (see picture MM 04 14)



- 5) Remove the O Rings on the header and the inner gaskets (see picture MM 04 15A, MM 04 15B, MM 04 15C, MM 04 15D)





LIFTING CYLINDER INTERNAL PART REASSEMBLY

Once all the O.Rings and the gaskets are replaced reassemble all parts in the reverse order of the operations described in the paragraph "LIFTING CYLINDER INNER PARTS OVERHAUL" bearing in mind the following:

- Apply a little grease on the gaskets of the inner element in order to simplify the insertion in the chamber (see point 3)

LIFTING CYLINDER REASSEMBLY

- 1) Reassembly in the reverse order of the operations described in the paragraph "OVERHAUL LIFTING CYLINDER INNER PARTS".
- 2) Check oil level (see section "CHECK OF THE HYDRAULIC OIL LEVEL" in the chapter INTRODUCTION)



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COMPENSATION CYLINDER REASSEMBLY 7

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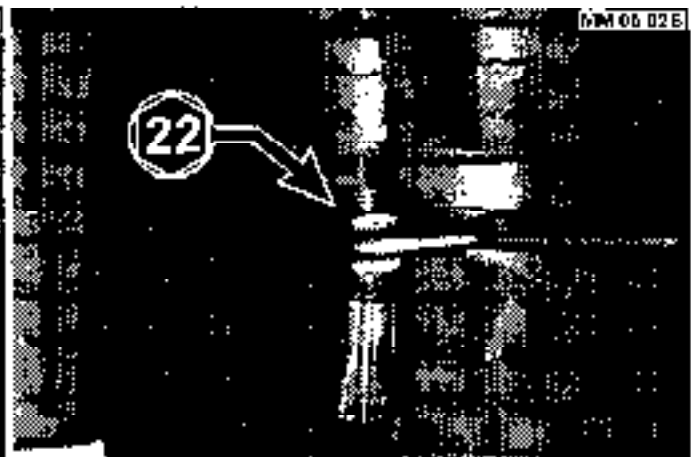
HOW TO REMOVE COMPENSATION CYLINDER

MM 05 01

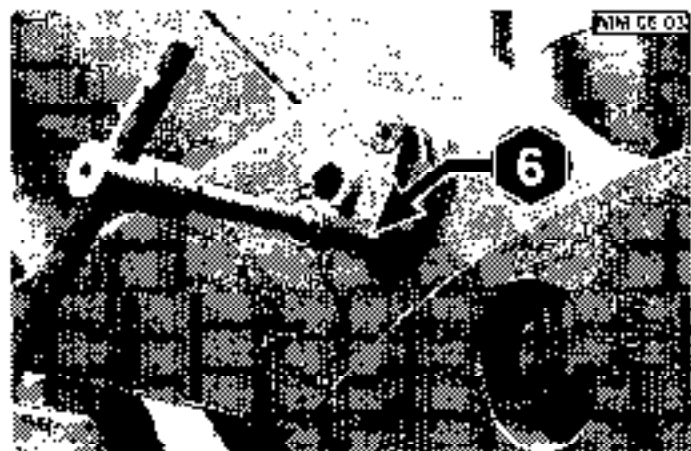
- 1) Lift the boom and support it by means of a second unit, in such a way you can unload the weight on the lower pivot of the cylinder (see picture MM 05 01)



- 2) Disconnect the pipe on the cylinder bottom (see picture MM 05 02A) and the one in the header (see picture MM 05 02B).



- 3) Remove the fixing plate of the upper pivot (see picture MM 05 03)





5 - COMPENSATION RAM REMOVAL AND OVERHAUL



- 4) By mean of the special tool (part number 040545), remove the upper pivot (see picture MM 05.04A and MM 05.04B)



- 5) Remove the two fixing screws from the locking plate of the lower pivot (see picture MM 05.05)



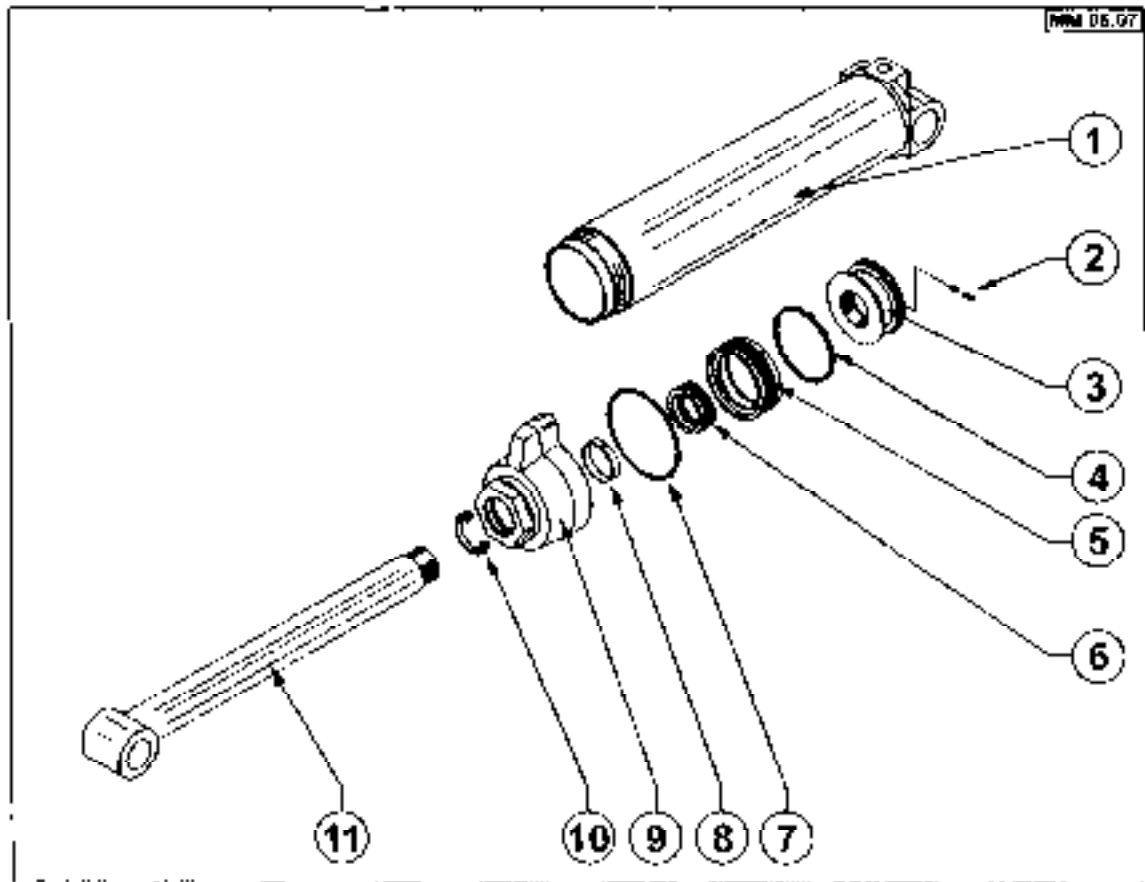
- 6) Push the lower pivot out (see picture MM 05.06).



- 7) Extract the cylinder from the machine



5 - COMPENSATION RAM REMOVAL AND OVERHAUL



- 1) CYLINDER CHAMBER
- 2) SCREWS
- 3) INTERNAL ELEMENT
- 4) O RING
- 5) SEAL
- 6) SEAL

- 7) O RING
- 8) SEAL
- 9) HEADER DISTRIBUTOR
- 10) SEAL
- 11) ROD

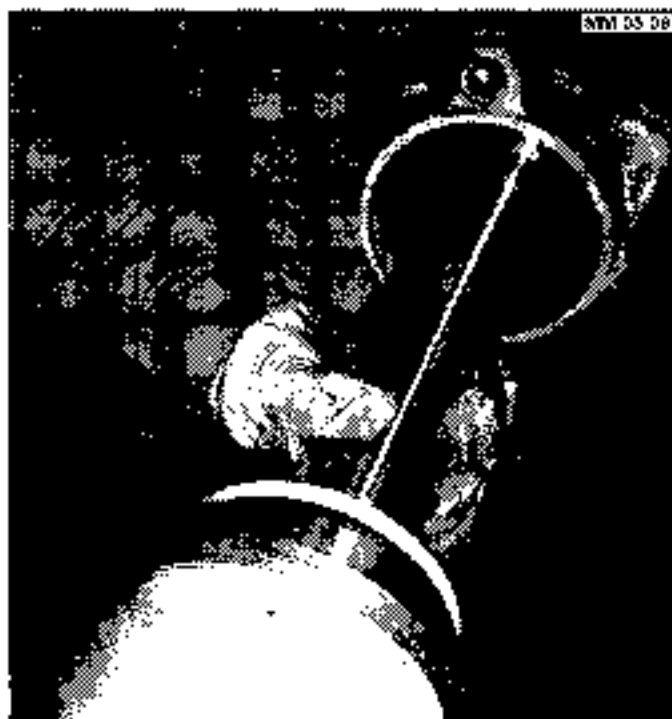
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OVERHAUL OF THE COMPENSATION CYLINDER INNER PARTS

- 1) Secure the cylinder in a vice; by using a 3" pipe wrench unscrew the header; collect the oil in a container (see picture MM 05 08).



- 2) Grasp the stem and pull it out fully from the chamber (see picture MM 05 09)



- 3) By mean of a screwdriver extract the gaskets placed on the inner element (see picture MM 05.10).



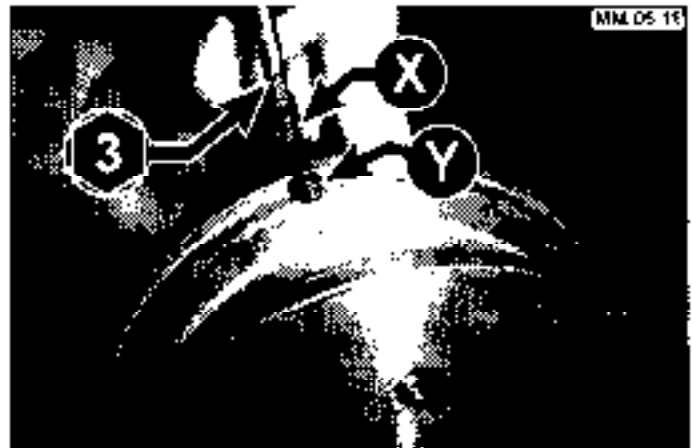
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5 - COMPENSATION RAM REMOVAL AND OVERHAUL



- 4) Unscrew the flat grub screw (X) and the pointed one (Y), placed on the inner element (see picture MM 05.11); if necessary heat to a temperature of 150° near the hole where the two dowels are placed



- 5) By means of the special wrench (part number 022725) unscrew the inner element from the stem (see picture MM 05.12).



- 6) Extract the header from the stem; extract and replace the O Ring and the inner gaskets (see picture MM 05.13A, MM 05.13B, MM05.13C, MM 05.13D).





COMPENSATION CYLINDER INTERNAL PARTS REASSEMBLY

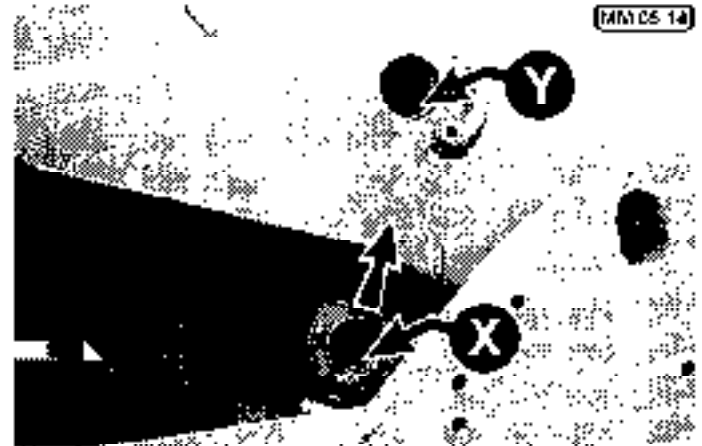
Replace the O-Rings and gaskets. Reassemble in the reverse order of the operations described in the paragraph "OVERHAUL OF THE COMPENSATION CYLINDER INNER PARTS", bearing in mind the following:

- After having reassembled the inner element on the stem, screw first the pointed grub screw (Y) and then the flat grub screw (X) (see picture MM 05 11 (point 4)); then apply some "LOCTITE 270" on the threading of the flat grub screw (X)
- Apply grease on the gaskets of the inner element to simplify the insertion in the chamber (see point 2)

COMPENSATION CYLINDER REASSEMBLY

Reassemble in the reverse order of the operations described in the paragraph "HOW TO REMOVE THE COMPENSATION CYLINDER", bearing in mind the following:

- Operate the control lever for the fork tilt (see paragraph "ELECTROPROPORTIONAL 5 x 1 JOY-STICK" of the chapter "CONTROLS AND INSTRUMENTS" of the "INSTRUCTION HANDBOOK FOR OPERATING AND MAINTENANCE") pull out the stem of the cylinder until holes "X" and "Y" are aligned (see picture MM 05 14) to allow the upper bolt to be inserted (see point 4).



- Check oil level (see section "CHECK OF THE HYDRAULIC OIL LEVEL" in the chapter INTRODUCTION)



5 - COMPENSATION RAM REMOVAL AND OVERHAUL



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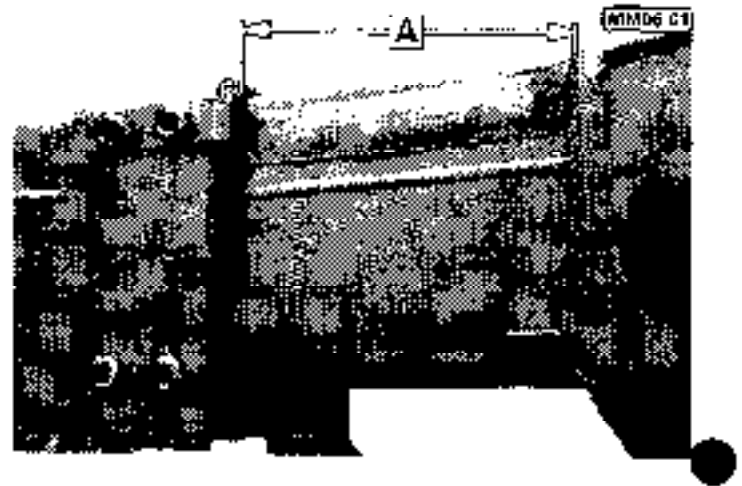


6 - FORK CYLINDER REMOVAL AND OVERHAUL



HOW TO REMOVE THE FORK CYLINDER

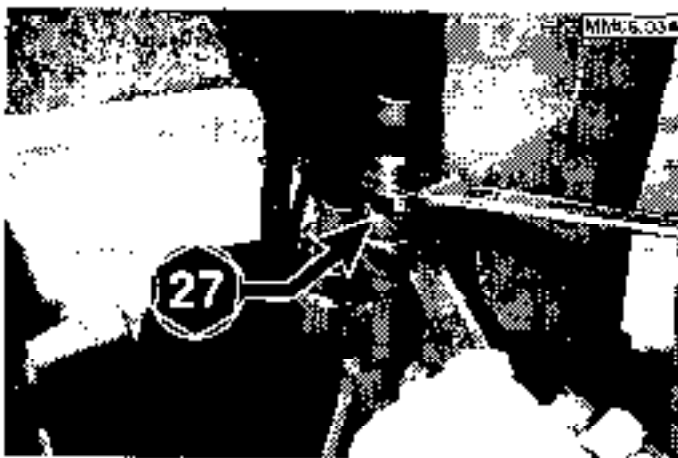
- 1) Extend the boom till dimension A = 60 cm (see picture MM 06 01)



- 2) Tilt the carriage downwards of about 45° (see picture MM 06 02)



- 3) Disassemble the 2 pipes placed on the cylinder, drain the remaining oil in a tank (see picture MM 06 03A and MM 06 03B)





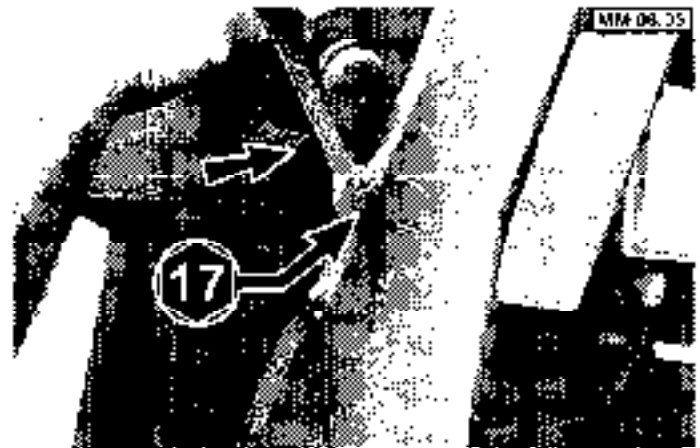
6 - FORK CYLINDER REMOVAL AND OVERHAUL



- 4) Remove the upper fixing screw of the connection rod (see picture MM 06.04A). Loosen the lower screw (see picture MM 06.04B).



- 5) Remove the fixing plate of the upper pivot (see picture MM 06.05).



- 6) Tap out the upper pivot with a hammer and bar (see picture MM 06.06A and MM 06.06B).





6 - FORK CYLINDER REMOVAL AND OVERHAUL



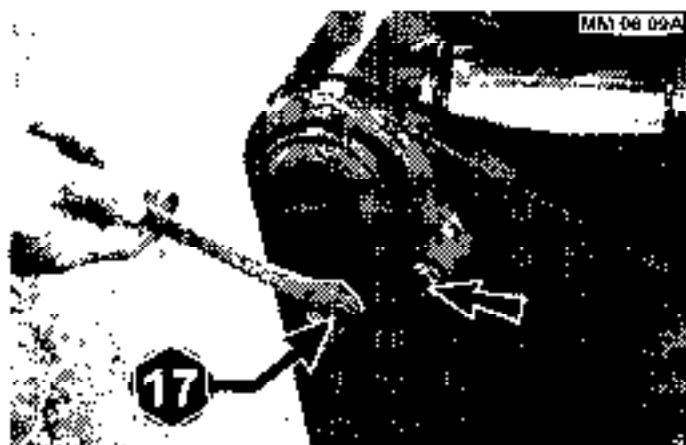
- 7) Turn the connection downwards and lean it towards the carriage (see picture MM 06 07)



- 8) By using a lever lift the carriage upwards (see picture MM 05.08), so as the cylinder can be released; during this operation support the cylinder with the other hand



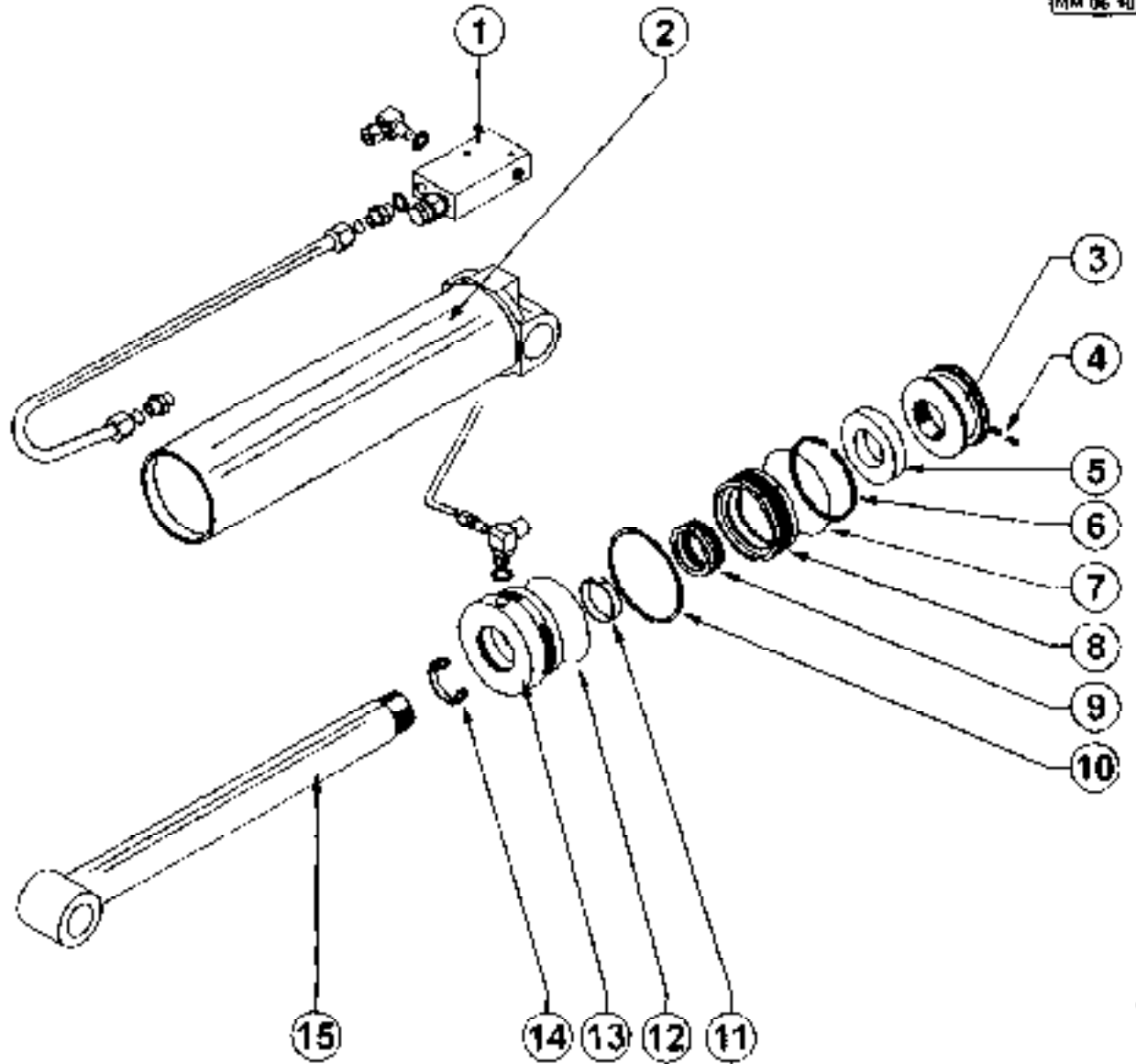
- 9) Remove the two fixing screws on the locking plate of the lower bolt (see picture MM 05.09A), rotate the carriage so as to uncover the inner part of the bolt; with a bar and a hammer hit the inner part of the lower bolt, removing it fully (see picture MM 06 09B)



- 10) Strong and lift the cylinder removing it from the machine



MM 06 40



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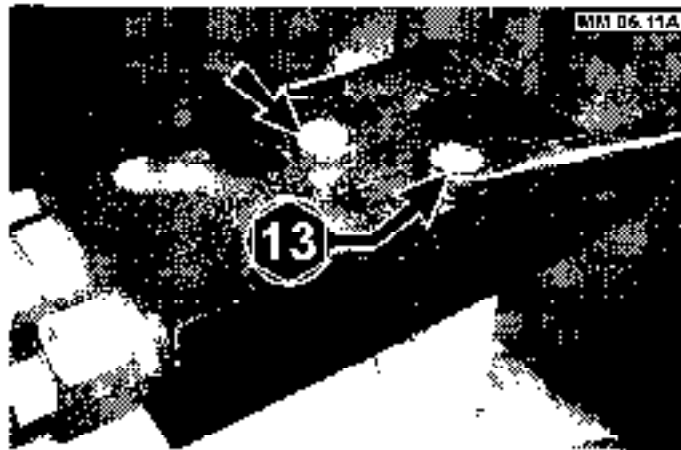
- 1) VALVE
- 2) CYLINDER CHAMBER
- 3) INTERNAL ELEMENT
- 4) SCREWS
- 5) BRUSHING
- 6) CIRCLIP
- 7) O-RING
- 8) SEAL

- 9) SEAL
- 10) RING
- 11) SEAL
- 12) O-RING
- 13) HEADER DISTRIBUTOR
- 14) SEAL
- 15) ROD

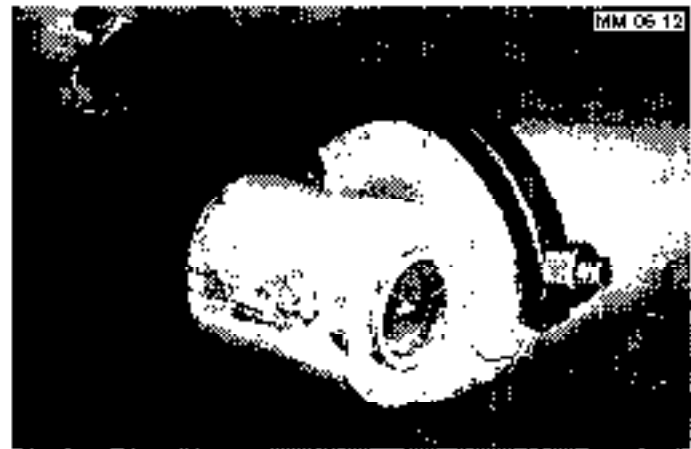


OVERHAUL OF THE INNER PARTS OF THE FORK CYLINDER

- 1) Secure the cylinder in a vice, remove the valve of the cylinder bottom (see picture MM 06 11A), remove the pipe from the fitting on the header (see picture MM 06 11B); and unscrew the fitting (see picture MM 06 11C).



- 2) By using the special wrench (part number 025102) unscrew the header; collect the oil in a container (see picture MM 06 12).



- 3) Grasp the stem and pull it fully from the chamber; by mean of a screwdriver extract the gaskets from the inner element (see picture MM 06 13).





6 - FORK CYLINDER REMOVAL AND OVERHAUL



- 4) Unscrew the flat grub screw (X) and the pointed one (Y), placed on the inner element (see picture MM 06 14B); if necessary heat to a temperature of 150° near the hole where the two dowels are placed (see picture MM 06 14A).



- 5) By mean of the special wrench (part number 025101) unscrew the inner element from the stem (see picture MM 06 15)



- 6) Extract the header from the stem, extract and replace the O Rings and the gaskets (see picture MM 06 16A, MM 06 16B, MM 06 16C, MM 06 16D).





FORK CYLINDER INTERNAL PARTS REASSEMBLY

Replace the 'O' Ring and seals. Reassemble in the reverse order of the operations described in the paragraph "OVERHAUL OF THE INNER PARTS OF THE FORK CYLINDER", bearing in mind the following:

- After having reassembled the inner element on the stem, screw first the pointed grub screw (Y) and then the flat grub screw (X), see picture MM 06.14B (point 4), apply some "LOCTITE 270" on the thread of the flat grub screw (X)
- Apply a little grease on the seats of the inner element to simplify the insertion in the chamber (see point 3)

FORK CYLINDER REASSEMBLY

- 1) Reassembly is the reverse order of the operations described in the paragraph "HOW TO REMOVE THE FORK CYLINDER".
- 2) Check oil level (see section "CHECK OF THE HYDRAULIC OIL LEVEL" in the chapter INTRODUCTION)



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FRAME LEVELLING CYLINDER INNER PARTS REASSEMBLY	7

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HOW TO REMOVE THE FRAME LEVELLING CYLINDER

- 1) Remove the front splash-board from the side of the cylinder you wish to dismantle, by:
 - Unscrewing the fixing bolt of the driving mixer (see picture MM 07.01A)
 - Unscrewing the four fixing screws of the splash-board indicated in the photos (see picture MM 07.01B and MM 07.01C).



- 2) Pressing the push-button "K" of the joy-stick (see picture MM 07.02C) operate the lever (see picture MM 07.02B) to extract the front right frame levelling cylinder until the quote "H" = about 50 mm (see picture MM 07.02A)



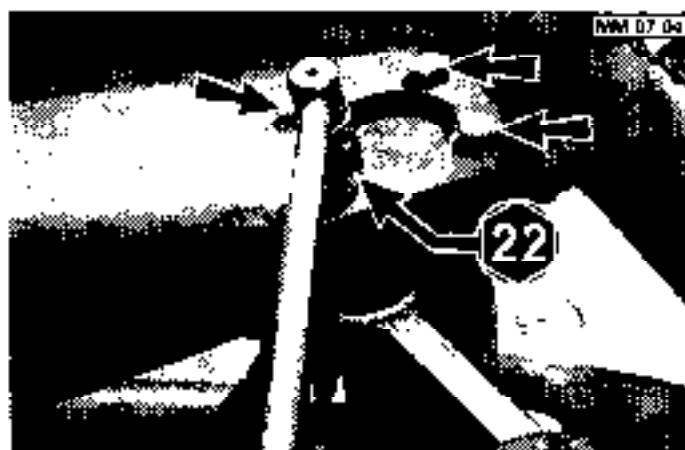
NOTE if you want to extract the front left frame levelling cylinder, act as described in point 2 of this paragraph moving the lever of the joy-stick towards right (see picture MM 07.03)



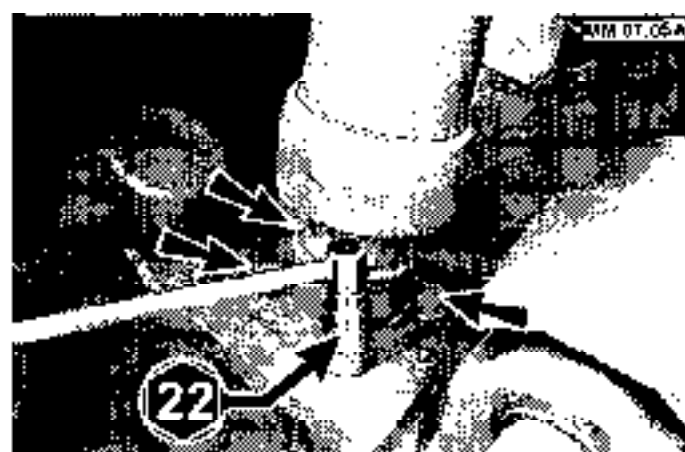


- 3) To simplify the removal of the levelling cylinder , follow these instructions
- By using hook positioned at front of the machine Hoist with suitable lifting equipment until the wheels just clear the ground For further information on lifting procedure, we advise you to consult the chapter "OPERATIVE INSTRUCTIONS" of the "INSTRUCTION HANDBOOK FOR OPERATING AND MAINTENANCE"
 - Lift the boom approximately 1.5 m.

- 4) Remove the four fixing screws of the cylinder bottom where the cylinder is attached to the chassis (see picture MM 07.04).



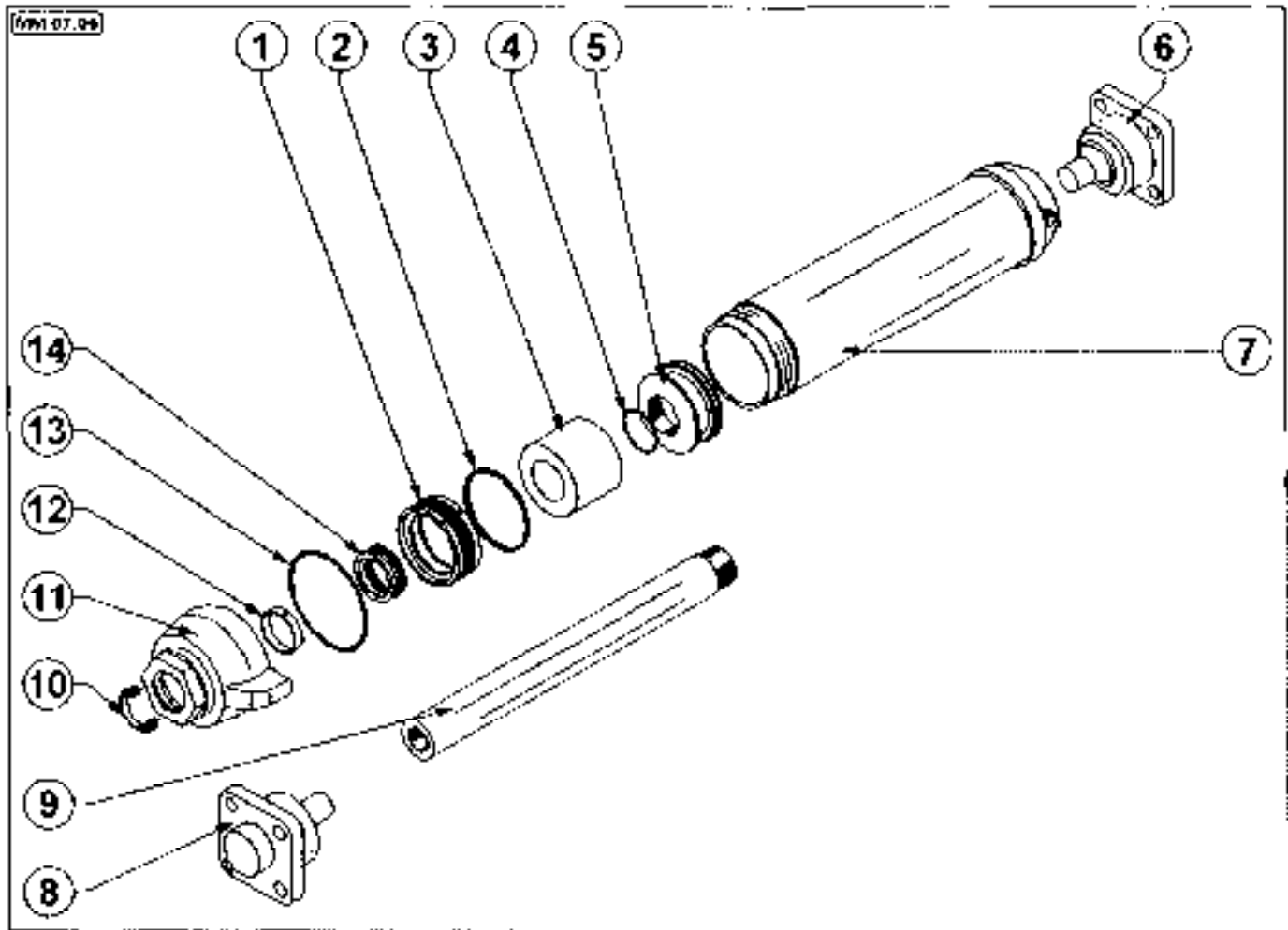
- 5) Operate joy-stick (see point 2. picture MM 07.02B and picture MM 07.02C), until cylinder is fully retracted. When fully retracted stop to avoid extracting the front left cylinder. Unscrew the four fixing bolts of the cylinder to the axle (see picture MM 07.05A). Disconnect the two pipes (see picture MM 07.05B)



- 6) Remove the cylinder.



7 - FRAME LEVELLING RAM REMOVAL AND OVERHAUL



- 1) SEAL
- 2) CIRCLIP
- 3) BUSHING
- 4) O.RING
- 5) INTERNAL ELEMENT
- 6) JOINT
- 7) CYLINDER CHAMBER

- 8) JOINT
- 9) ROD
- 10) SEAL
- 11) HEADER
- 12) SEAL
- 13) O RING
- 14) SEAL

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FRAME LEVELLING CYLINDER INNER PARTS OVERHAUL

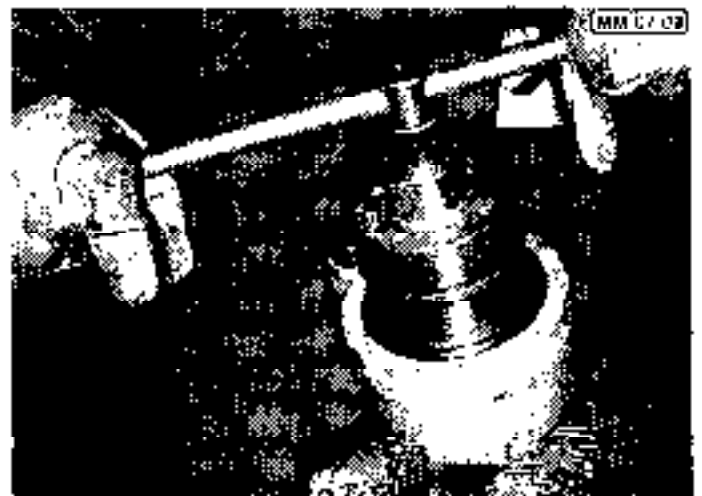
- 1) Secure the cylinder in a vice, by using a 2" pipewrench unscrew the header (see picture MM 07.7A), collect the oil in a container; grasp the stem and pull it fully from the chamber (see picture MM 07.7B)



- 2) By means of a screwdriver remove the gaskets placed on the inner element (see picture MM 07.8).



- 3) By means of the special wrench (part number 022724) unscrew the inner element from the stem (see picture MM 07.09).





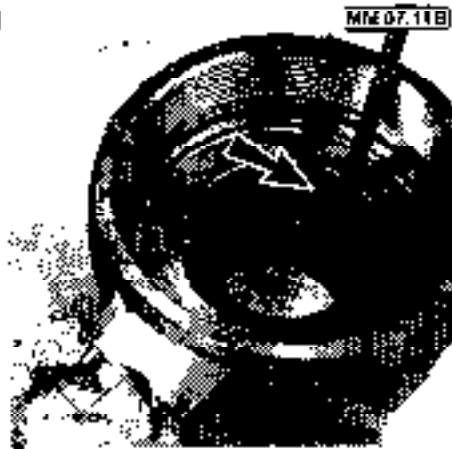
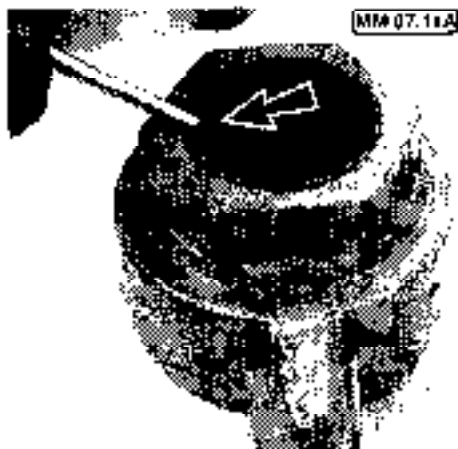
7 - FRAME LEVELLING RAM REMOVAL AND OVERHAUL



- 4) Replace the O Ring inside the inner element (see picture MM 07.10)



- 5) Extract the header from the stem and replace the inner gaskets (see pictures MM 07.11A, MM 07.11B, MM 07.11C).



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FRAME LEVELLING CYLINDER INNER PARTS REASSEMBLY

When all the 'O' rings and the gaskets are replaced reassemble in the reverse order all the operations described in the paragraph "OVERHAUL OF THE INNER PARTS OF THE FRAME LEVELLING CYLINDER" bearing in mind the following:

- Pein the thread in a couple of places by means of a drift to prevent it from working loose (see picture MM 07.12): screw it on the stem.



FRAME LEVELLING CYLINDER INNER PARTS REASSEMBLY

- 1) Re-assembly is the reverse order of the operations described in the paragraph "HOW TO REMOVE THE FRAME LEVELLING CYLINDER".
- 2) Check oil level (see section "CHECK OF THE HYDRAULIC OIL LEVEL" in the chapter INTRODUCTION)



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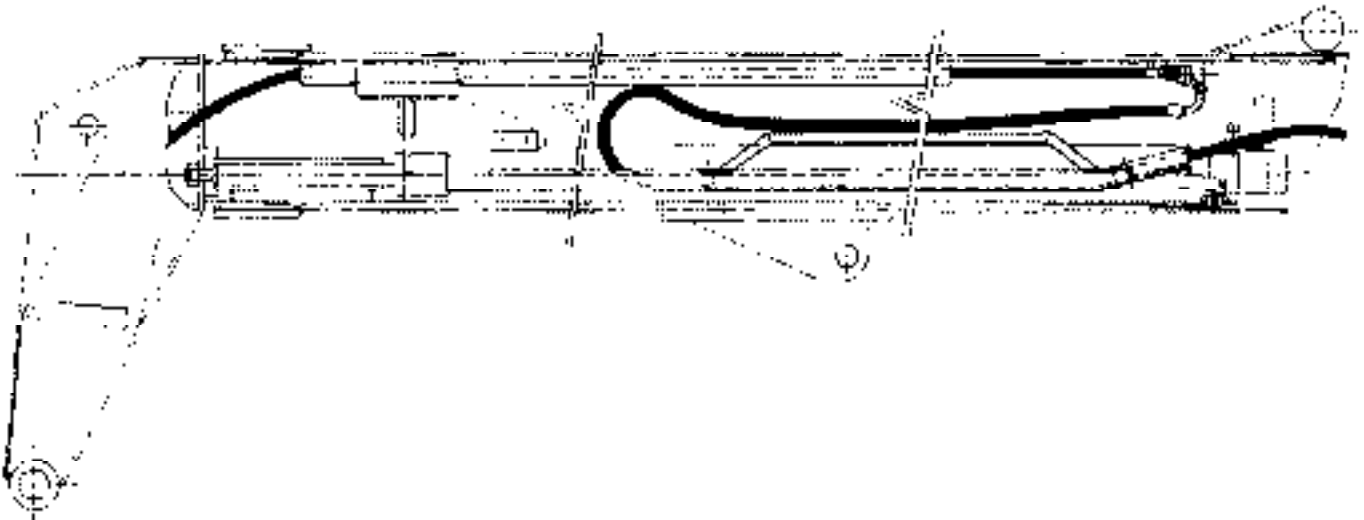
12020 S. Defendente di Cuvrasca (CN) - ITALY Tel. (0171) 614111 - Fax (0171) 614100

Domino Mining Equipment Pty Ltd

A.C.N. 002 706 881 P.O. Box 69, WYONG, N.S.W. (Aust.) 2259 Phone. (043) 53 1033 - Fax. (043) 51

SERVICE MANUAL

INTERNAL OPERATIONS TO THE TELESCOPIC BOOM P35.9 EVA



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SAFETY AND GENERAL INSTRUCTIONS. 3

CHECK OF THE HYDRAULIC OIL LEVEL 4

CONVERSION FACTORS 5

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This manual provides the information necessary for correct and safe execution of maintenance works not included in the INSTRUCTION HANDBOOK FOR OPERATING AND MAINTENANCE; it is addressed to qualified fitters, who have the required knowledge of mechanical, hydraulic and electrical systems for the machine being serviced.

All work carried out should comply with all relevant environmental and occupational health and safety requirements.

IMPORTANT!

When replacing plastic bushes, always smear pivot pins with grease "XG 274" to avoid oxidation.

This symbol is used to identify the dimensions of the spanner required for the operations described in this handbook. The spanner type will be mentioned only if it is non standard.



GENERAL NOTE

Always ensure any work carried out on the vehicle is carried out on level ground. If this is not possible the ground should be as level as possible and the vehicle should be chocked to prevent any possibility of the vehicle rolling.



SAFETY AND GENERAL INSTRUCTIONS

CAUTION!!!

Servicing of the machine shall only be carried out by skilled and competent personnel. For repair of parts that are not part of the normal scheduling, refer MERLO AUSTRALIA technical service.

WARNING!!!

Always wear suitable protective clothing and safety equipment when using lubricants. Extra care should be taken to avoid burns when working with hot fluids or elements.

WARNING!!!

Always dispose of oils, filters or other mediums in an environmentally friendly manner. Use official organisations for the disposal of such fluids.

Before carrying out any kind of servicing, position the machine on flat, level ground and:

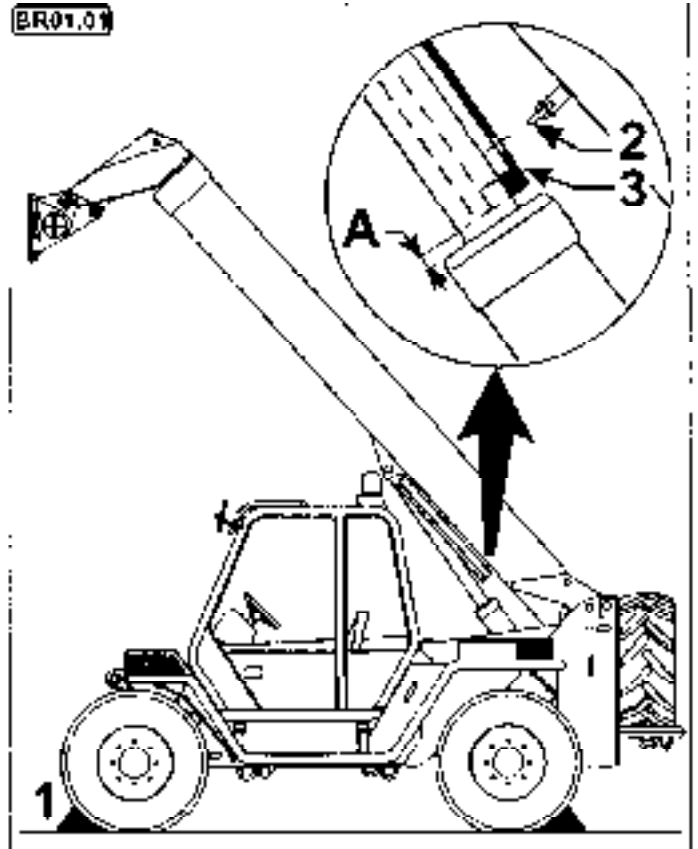
- retract and lower the boom
- release loads or attachments on the vehicle.
- put chock (1) at the front and back of the wheels to avoid accidental movement.
- apply the hand brake place the transmission lever in neutral position and stop the engine.

Should it be necessary to carry out servicing operations with the boom lifted use the safety lock following these instructions:

- lift the boom
- apply the hand brake, place the transmission lever in neutral position and stop the engine
- working from the left rear mudguard rotate lever (2) and rest the safety lock (3) on the lifting jack rod
- re-start the engine and slowly lower the boom till the lock is at about 10 mm from the jack head (dimension A)
- before lowering the boom, replace the safety lock in the original position.

When working under the vehicle it is preferable to use a pit or height adjustable work platform. The vehicle weight is stated on identification plate

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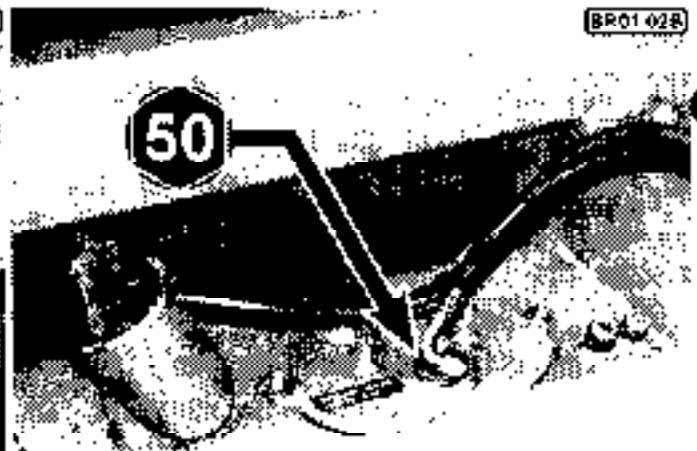
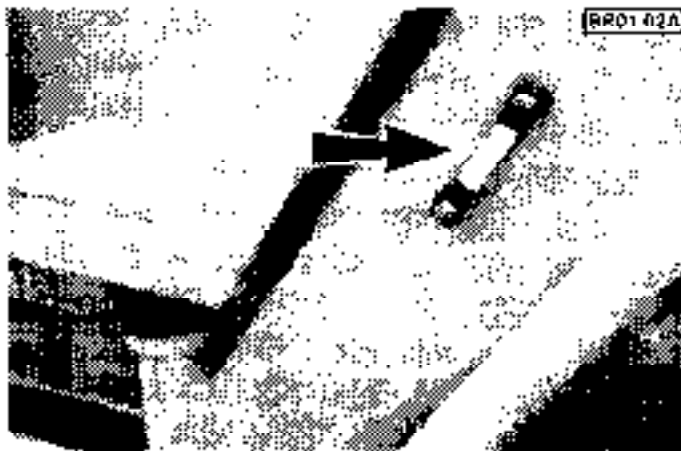
CHECK OF THE HYDRAULIC OIL LEVEL

MOBILFLUID 424

If using a different brand of oil, ensure that they have characteristics equal to the above product. Should you wish to change the product brand, the system must be flushed clean of the original fill product. If oils of different characteristics are used, any warranty claim will be automatically refused.

Check oil level.

- lower and retract the boom (completely)
- check level through the cap situated on the side of the tank (see picture BR 01 02A) oil must be at max level (popp hole completely covered)
- if necessary remove filler cap (see picture BR 01 02B) and add oil



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CONVERSION FACTORS

TORQUE

1Kgm	=	9,806	N·m
"	=	7,233	lb·ft
"	=	86,79	lb·in

PRESSURE

1bar	=	100	KPa
"	=	14,5	psi (lb/in²)
"	=	0,1	N/mm²

FORCE

1Kg	=	9,806	N
"	=	2,204	lb



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2 - NECESSARY TOOLS AND REPAIR TIMES



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STANDARD TOOLS.....	2
SPECIAL TOOLS	3
REPAIR TIME	3

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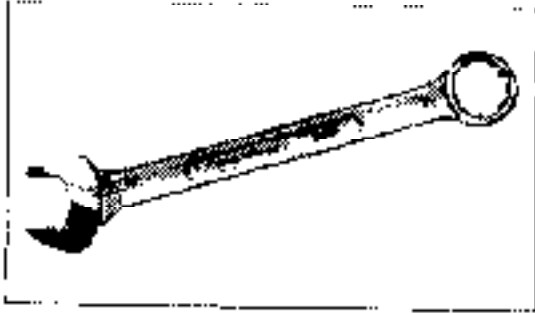


2 - NECESSARY TOOLS AND REPAIR TIMES

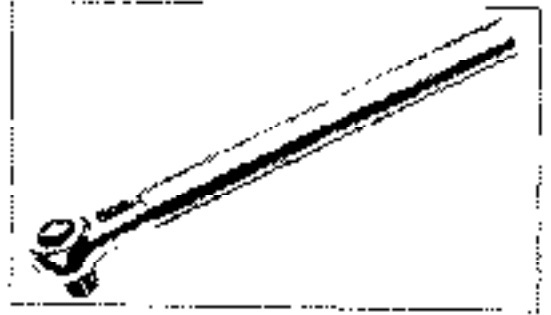


STANDARD TOOLS

Spanner: 10, 12, 13, 17, 19, 26, 27
30, 32, 36



Ratchet

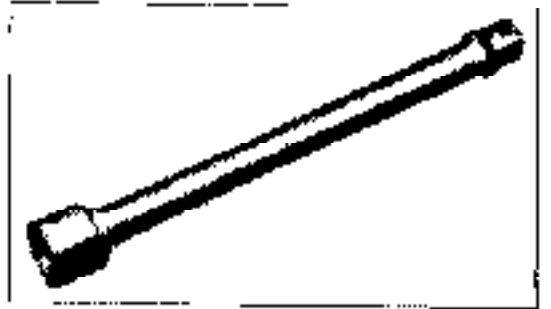


Sockets:

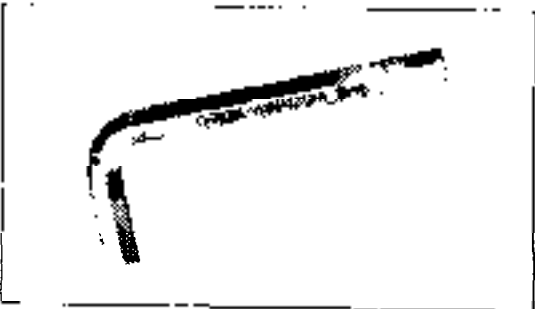
- external hexagon 6
- inner hexagon 13, 19, 24



Extension: L=200



Allen Keys: 3, 4, 5, 8, 12

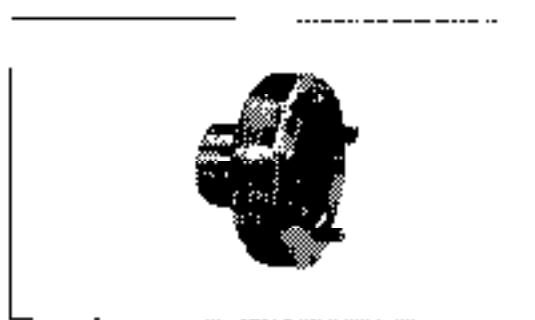


SPECIAL TOOLS

Tool - "C" spanner (Part No. 025105)



Tool - internal element (Part No. 022721)



REPAIR TIME

- Hoses disassembly	about 50 minutes
- Hoses reassembly	about 60 minutes
- Cylinder disassembly	about 55 minutes
- Cylinder reassembly	about 80 minutes
- Cylinder overhaul	about 75 minutes
- Pads replacement	about 60 minutes

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2 - NECESSARY TOOLS AND REPAIR TIMES



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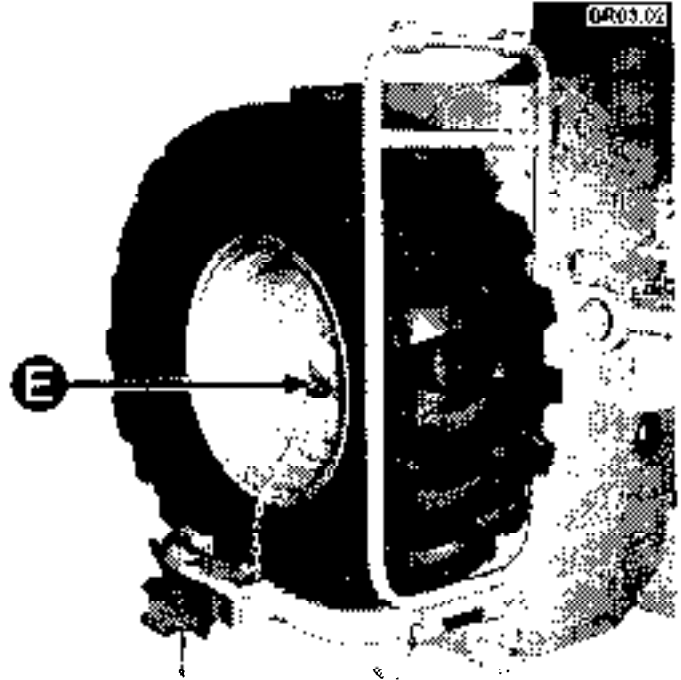
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LOWER HYDRAULIC HOSES - DISASSEMBLY AND REPLACEMENT	8
REASSEMBLY OF HYDRAULIC HOSES	10

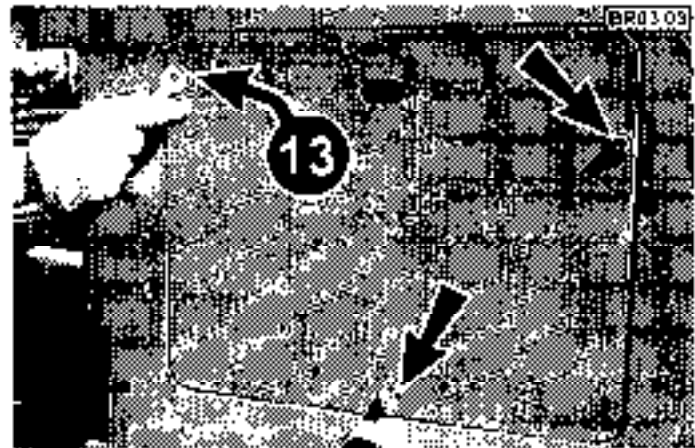
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UPPER HYDRAULIC HOSES - DISASSEMBLY AND REPLACEMENT

- 1) Unloading the spare wheel:
 - Remove spare wheel clamping system rotating lever (E) see picture BR 03.02.
 - From the cab side of the vehicle carefully rotate the wheel towards you and control the decent down to the ground.



- 2) Remove the rear panel of the machine.





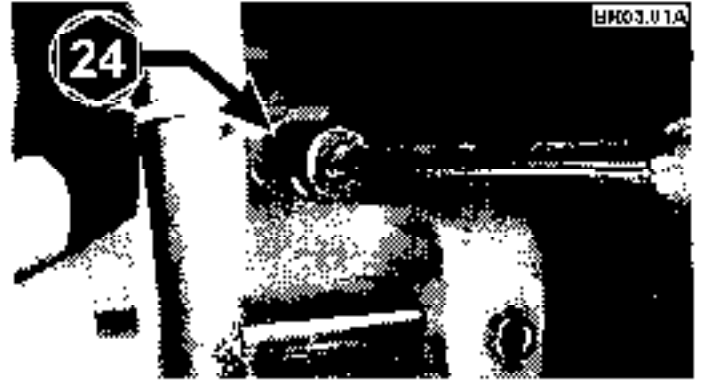
3 - REPLACEMENT OF INTERNAL HYDRAULIC HOSES OF THE BOOM



- 3) Fully retract the boom.

NOTE: should the boom retract without any problem, then go to point 4 of this section. Should the boom not to retract due to a break down of the Hydraulic system, carry out this operation with engine turned off.

- A) Unscrew the cap placed on the cylinder relief valve (see picture BR03.01A)

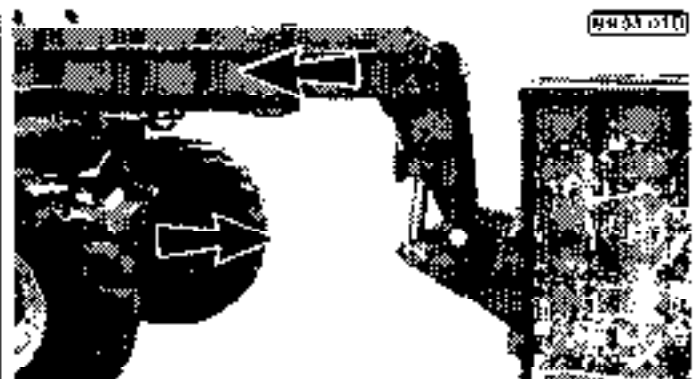


- B) Unscrew completely (see picture BR03.01B)



- C) Place the boom with a solid obstacle in front of it (see picture BR03.01D)

- D) Insert a screwdriver or screw the spare lever in the mechanic joystick of the main control valve, then pull the lever in order to drain the oil (see picture BR03.01C); while push to retract the boom fully (see picture BR03.01D)



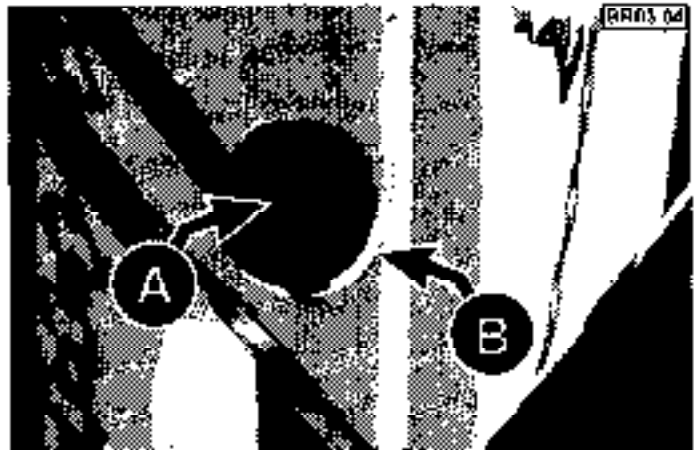
⚠ In order to restore the original calibration of the control valve it is necessary to remove it and carry out the calibration procedure as described in the section "SETTING OF CONTROL VALVE" of the chapter "BOOM EXTENSION SYSTEM" of the service manual "HYDRAULIC SYSTEM".



3 - REPLACEMENT OF INTERNAL HYDRAULIC HOSES OF THE BOOM



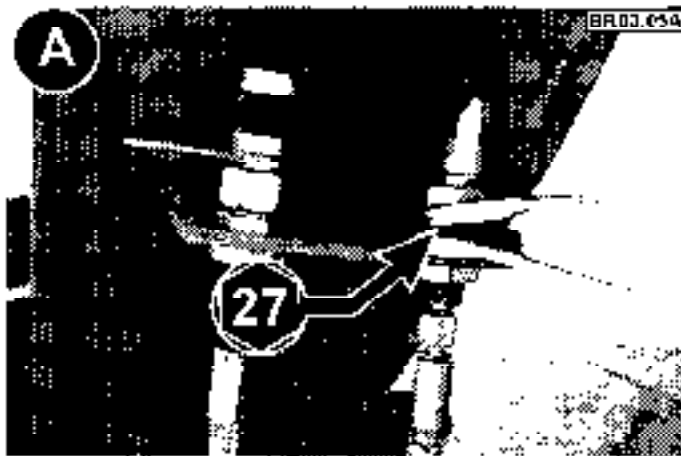
- 4) Lift or lower the boom so that the cylinder anchor pin (A) is aligned with the holes of the chassis (B) (see picture BR03.04)



- 5) Disconnect the 4 lines of the boom head, (A, B, C & D) (see pictures BR03.05A and B, and BR03.06A and B) drain the remaining oil in a tank, plug the 4 hoses.

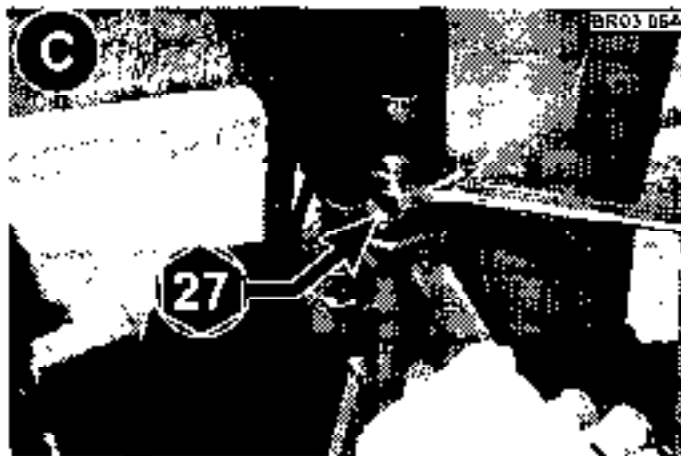
A) RETURN FROM EXTRA ATTACHMENT

B) DELIVERY TO EXTRA ATTACHMENT



C) TILT CYLINDER BOTTOM

D) TILT CYLINDER TOP

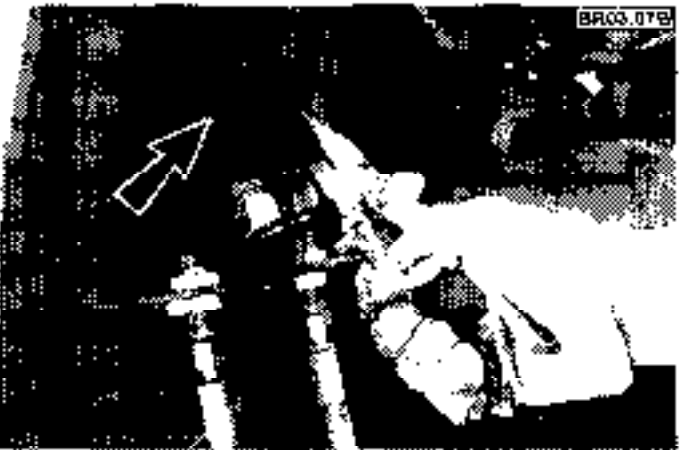
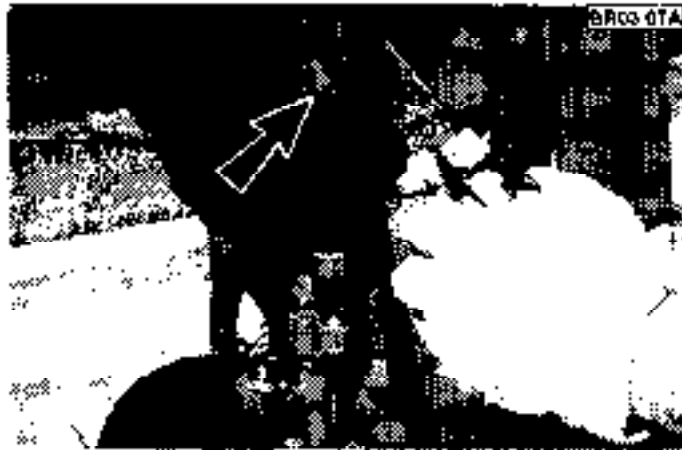




3 - REPLACEMENT OF INTERNAL HYDRAULIC HOSES OF THE BOOM



- 6) Remove the rubber protection from the pipes (see picture BR 03.07A and BR 03.07B).



- 7) Disconnect the electric cable from the box placed on the left front side of the second boom, carrying out the following instructions:

- Unscrew the four fixing screws of the cap (see picture BR 03.08A)



- Disconnect from the terminal board the wires indicated (marking where they were connected), see picture BR 03.08B



- Unscrew the cable gland indicated (X) and extract the cable (see picture BR 03.08B)

- Attach the wires to a small steel cable approximately 5m, long (see picture BR 03.08C).

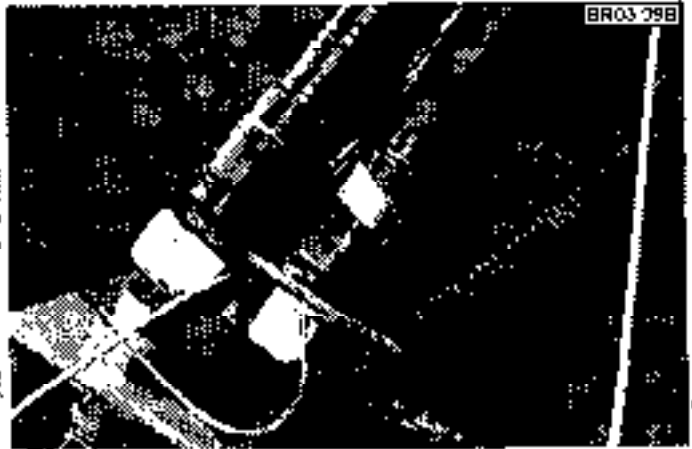




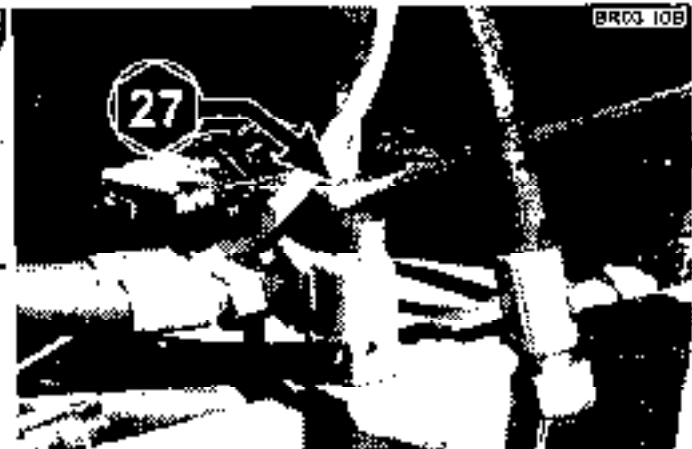
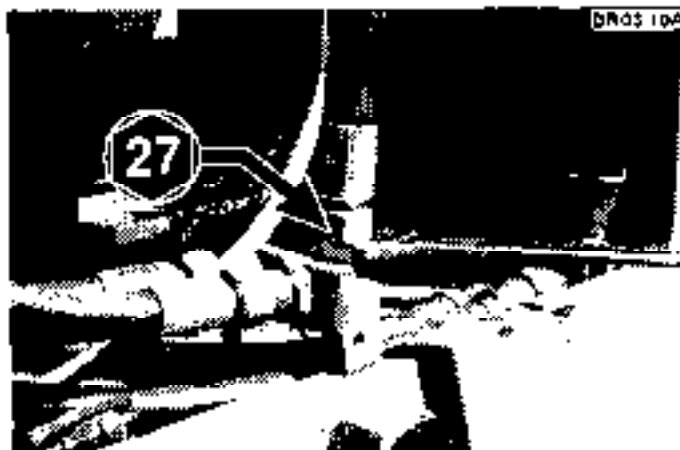
3 - REPLACEMENT OF INTERNAL HYDRAULIC HOSES OF THE BOOM



- 8) Attach cable 5 m long to the extremity of every hose (see picture BR 03.09A & BR 03.09B) and hook it to the carriage: protect fittings with adhesive tape



- 9) Disconnect the four hoses at the back, drain the remaining oil in a tank (see picture BR 03.10 A, B, C, D).

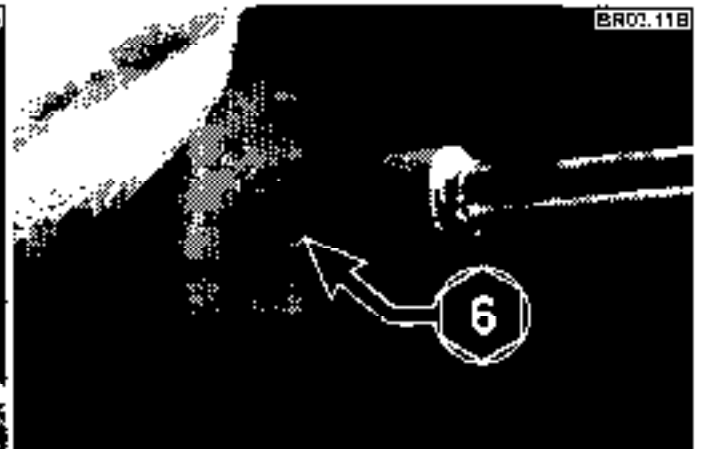
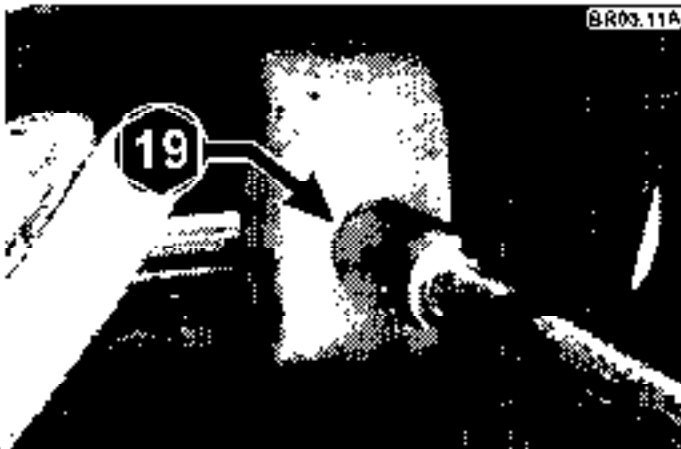




3 - REPLACEMENT OF INTERNAL HYDRAULIC HOSES OF THE BOOM



10) Remove the grub screw and nut from the pin. (see picture BR 03.11A e BR 03.11B).

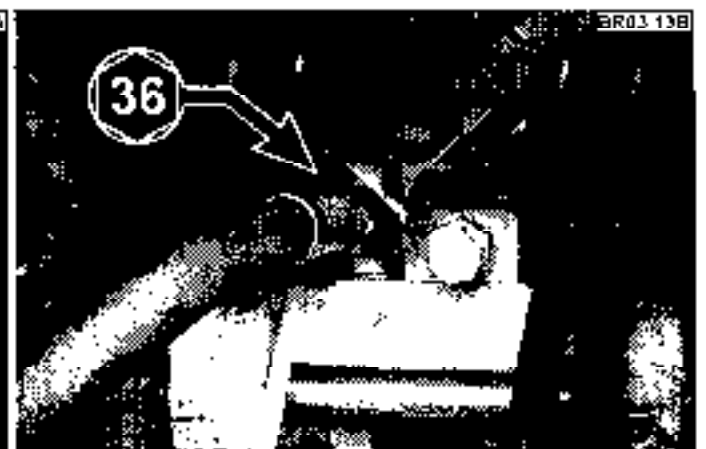


11) This operation requires two persons (see picture BR 03.12):

- Hammer on the left side to remove the anchor pin.
- Use the cylinder bottom as a fulcrum, to facilitate the bolt removal

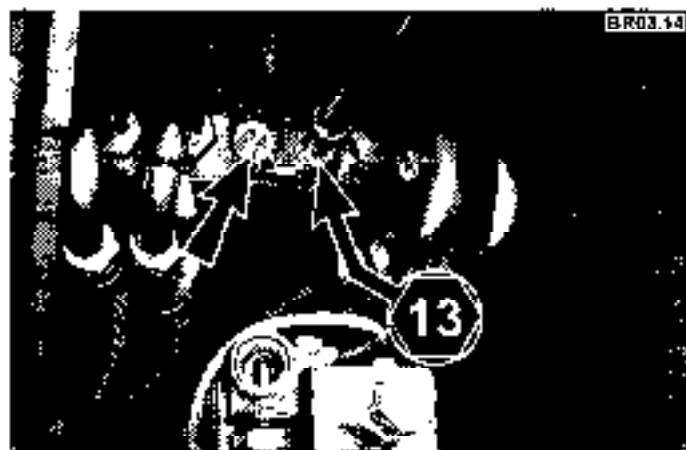


12) Disconnect the two hoses from the back of the cylinders and protect parts with plastic caps (see picture BR 03.13A and BR 03.13B)

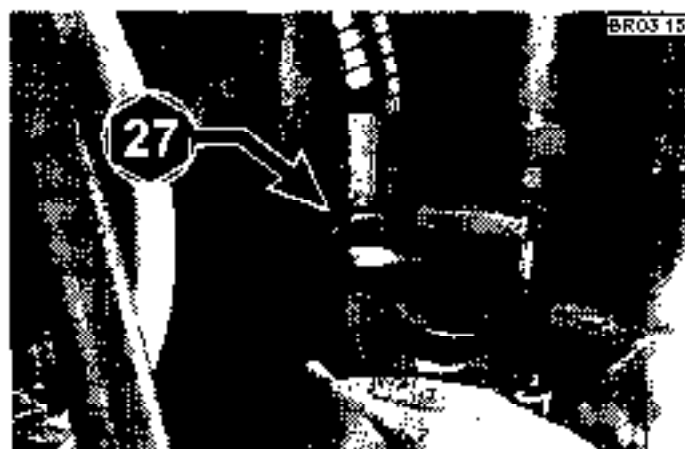


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- 13) Remove the two nuts from hose bracket (see picture BR 03 14)

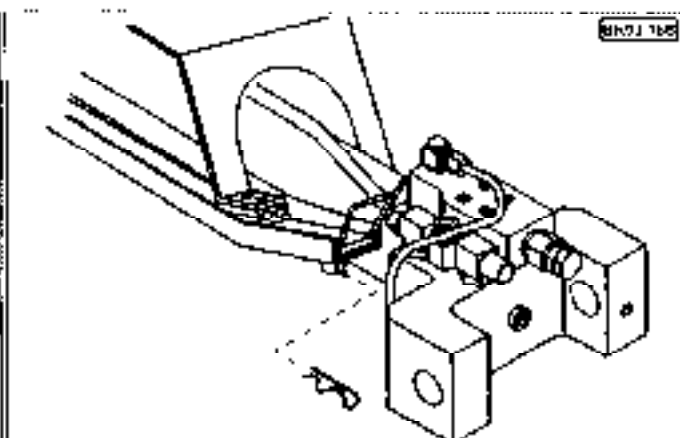


- 14) Disconnect the four lower hoses from the "U" fittings (see picture BR 03 15); extract the 4 upper pipes and the electric cable from the boom and extract them from the steel cables, leaving the cables in the boom, replace the four hoses.



LOWER HYDRAULIC HOSES - DISASSEMBLY AND REPLACEMENT

- 1) By using a hook as per photo BR 03.16A, disassemble the two small fixing forks (one per part) of the guide support of the pipes (see picture BR 03 16B).

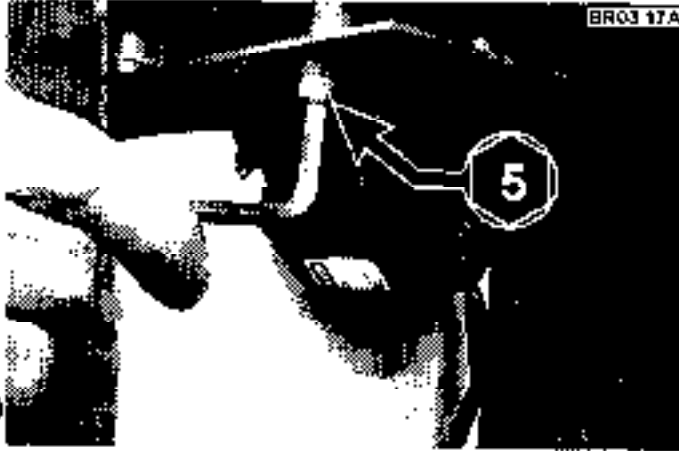




3 - REPLACEMENT OF INTERNAL HYDRAULIC HOSES OF THE BOOM



- 2) Disassemble the buzzer from the electric box placed in the rear part of the machine (see picture BR 03 17A and BR 03 17B)



- 3) Remove the cap of the electric box, split the two parts of the connector and disconnect the electric wires (marking their original position), see picture BR 03 18A, unscrewing the bolt extract the electric cable (see picture BR 03 18B)



- 4) Grasp the guide support of the interior pipes, lift it and extract it from the boom together with the pipes (see picture BR03.19).



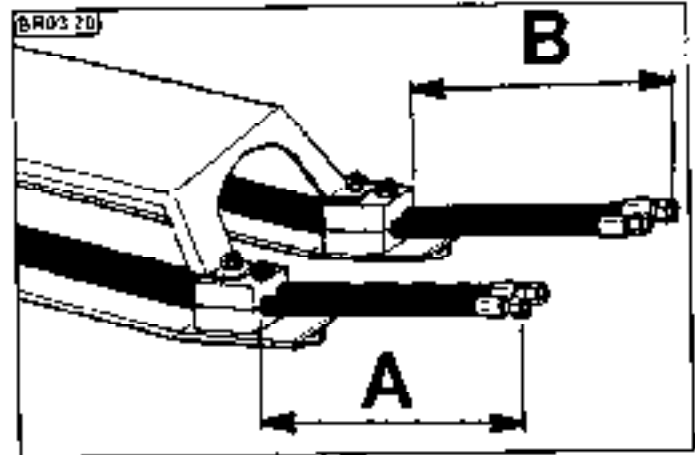


3 - REPLACEMENT OF INTERNAL HYDRAULIC HOSES OF THE BOOM

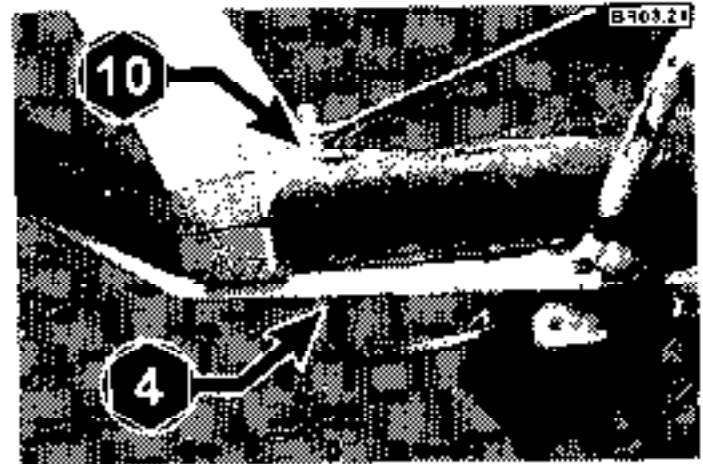


5) Take the following measurements to carry out the following re-assembly operations (see picture BR03 20).

- A=790mm
- B=830mm



6) Disconnect and replace the lower hoses from the guide bracket (see picture BR03 21).



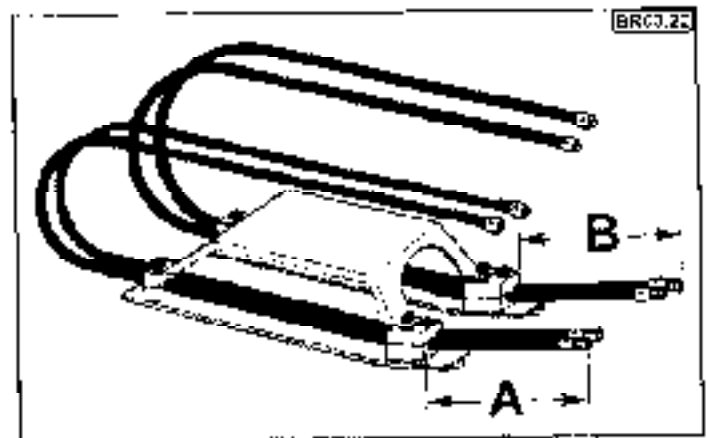
REASSEMBLY OF HYDRAULIC HOSES

Re-assembly is the reverse of the operations listed in the section "UPPER HYDRAULIC HOSES - DISASSEMBLY AND REPLACEMENT" and "LOWER HYDRAULIC HOSES DISASSEMBLY AND REPLACEMENT", bearing in mind the following:

1) Reconnect the new lower hoses on the guide bracket. Taking care that hoses remain well stretched and parallel (see picture BR03 22)

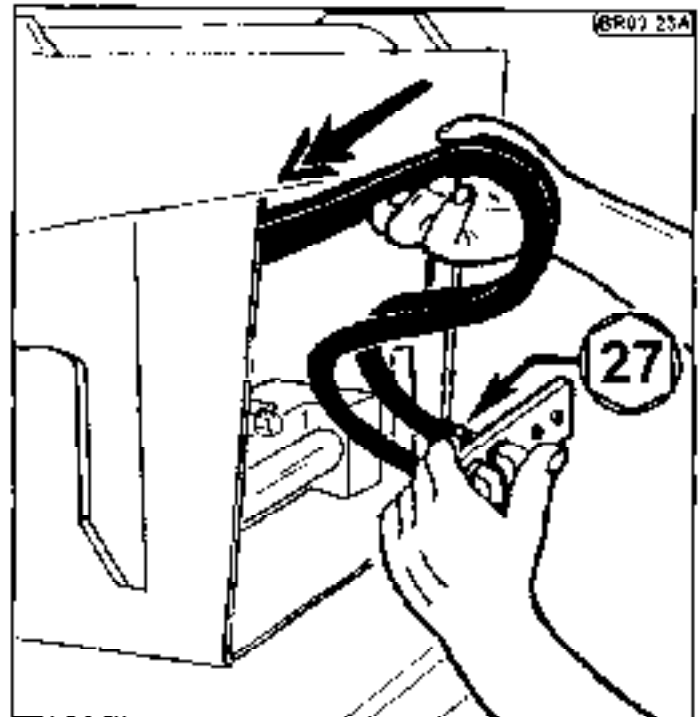


The measurements (A & B) must correspond to the ones taken during the disassembly operations (see point 5 of the section "LOWER HYDRAULIC HOSES DISASSEMBLY AND REPLACEMENT" of this chapter).



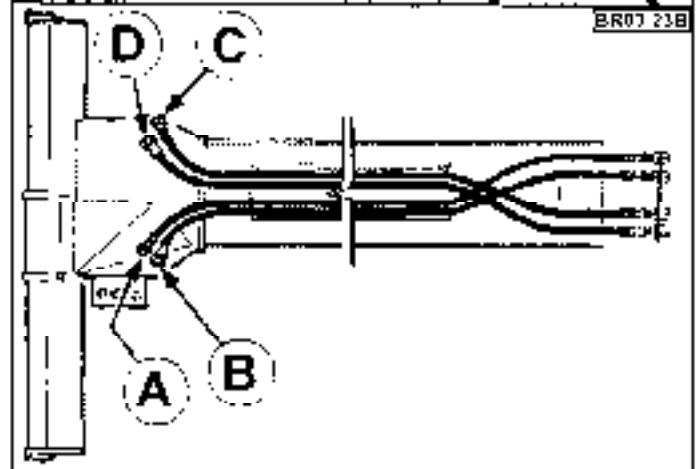
3 - REPLACEMENT OF INTERNAL HYDRAULIC HOSES OF THE BOOM

- Put the lower hoses guide bracket inside the boom and fasten it to the cylinder, by reassembling the suitable forks (see point 5 of the section "LOWER HYDRAULIC HOSES - DISASSEMBLY AND REPLACEMENT").
- Connect the new upper hoses on the respective connecting plates. Connect the fittings at the end to the steel wires laid during the dismounting operation (see point 14 of the section "UPPER HYDRAULIC HOSES - DISASSEMBLY AND REPLACEMENT"). Take the lines through the guide channel of the inner boom and pull the wire from the front.



! Hoses are to be crossed before the guide channel

- A) delivery to extra attachment
- B) return from extra attachment
- C) tilt cylinder bottom
- D) tilt cylinder top



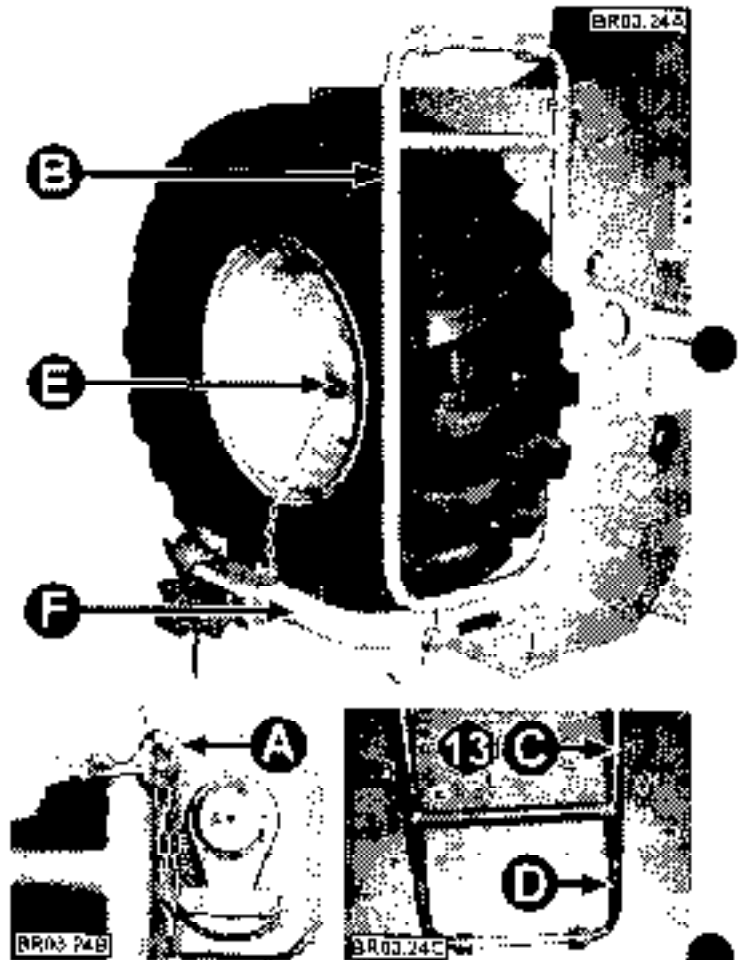


3 - REPLACEMENT OF INTERNAL HYDRAULIC HOSES OF THE BOOM



- 4) Check that hoses run correctly on the pulleys.
- 5) Reassemble rear panel of the machine (see point 2) of the section "UPPER HYDRAULIC HOSES - DISASSEMBLY AND REPLACEMENT"
- 6) Reassemble the spare wheel carrying out the following points (see pictures BR 03.24A, B and C).

- release pin (A) and lower the loading device (B) to ground level.
- Extend loading device handle (D)
- Ensure spare wheel clamping system rotating lever (E) is withdrawn
- Position the spare wheel in the main section of the loading device (B).
- Slowly lift handle (B) and guide the wheel into the vehicle wheel receptacle (F)
- Reassemble the spare wheel clamping system (E).



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HOW TO REMOVE THE BOOM TELESCOPING CYLINDER 2

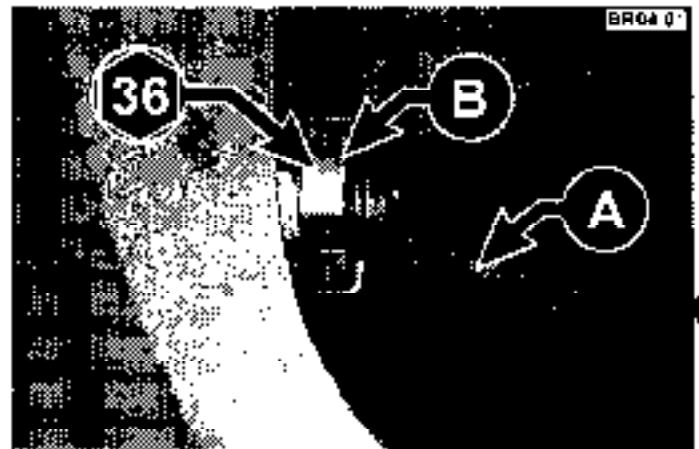
HOW TO REINSTALL THE BOOM TELESCOPING CYLINDER..... 3

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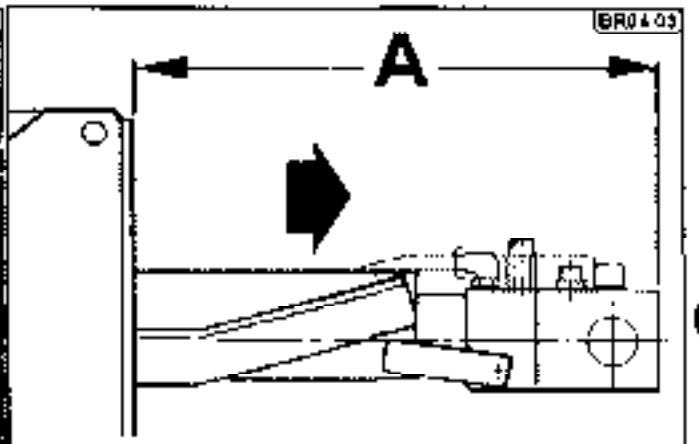


HOW TO REMOVE THE BOOM TELESCOPING CYLINDER

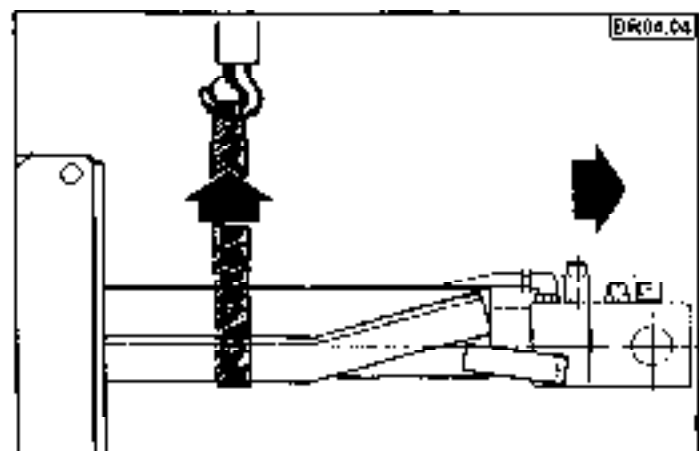
- 1) Operate as described in Chapter 3 "REPLACEMENT OF INTERNAL HYDRAULIC HOSES OF THE BOOM", from point 1 to point 14 of the section "UPPER HYDRAULIC HOSES - DISASSEMBLY AND REPLACEMENT", and from point 1 to point 4 of the section "LOWER HYDRAULIC HOSES DISASSEMBLY AND REPLACEMENT"
- 2) Remove the split pin (A) and the nut (B), see picture BR 04 01.



- 3) Seize the cylinder and extract it by hand until the dimension A = 1500 mm (see picture BR 04.02 and BR 04 03).



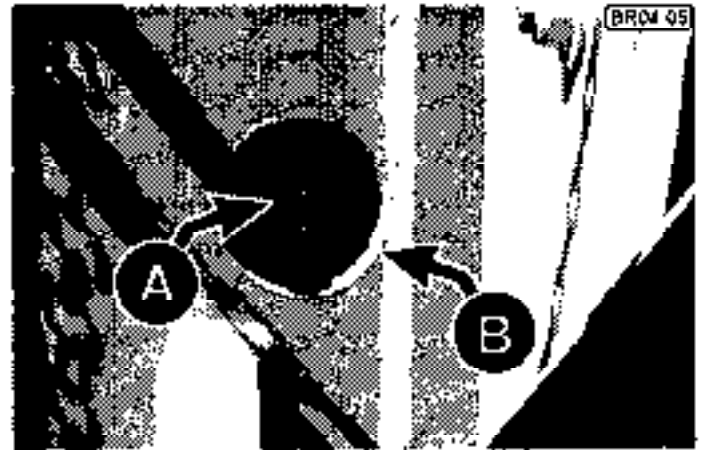
- 4) Then hook it up to a suitable lifting device and remove it fully from the boom (see drawing BR 04 04).





HOW TO REINSTALL THE BOOM TELESCOPING CYLINDER

- 1) Use a lifting device to replace the cylinder inside the boom till the position described at point 3 of the section "HOW TO REMOVE THE BOOM TELESCOPING CYLINDER" is achieved.
- 2) Push the cylinder fully in so that the bush is aligned with holes in the chassis (see picture BR04 05)



- 3) Replace nut to required position and insert split pin (see point 2 of the section "HOW TO REMOVE THE BOOM TELESCOPING CYLINDER").
- 4) Continue with the reassembly of the hoses in the reverse order of removal described in the sections "UPPER HYDRAULIC HOSES - DISASSEMBLY AND REPLACEMENT" and "LOWER HYDRAULIC HOSES - DISASSEMBLY AND REPLACEMENT", bearing in mind the description in the section "REASSEMBLY OF HYDRAULIC HOSES" from point 1 to point 4.
- 5) Lower the boom and check the telescoping system.
- 6) Reassemble rear panel of the machine (see point 2 of the section "UPPER HYDRAULIC HOSES - DISASSEMBLY AND REPLACEMENT")
- 7) Reassemble the spare wheel (see point 6 of the section "REASSEMBLY OF HYDRAULIC HOSES")



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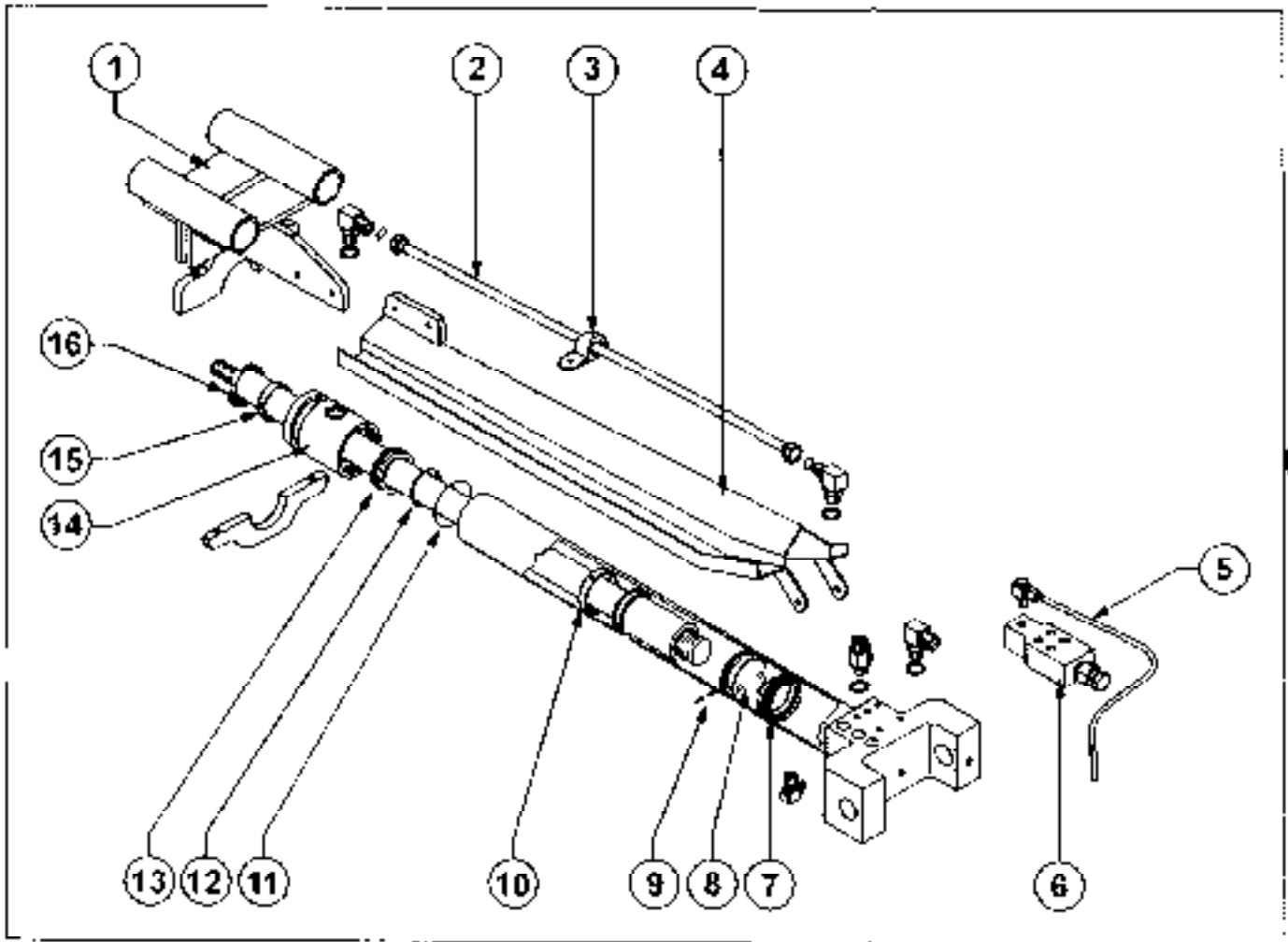
CYLINDER INNER PARTS DISASSEMBLY 3

CYLINDER INNER PARTS REASSEMBLY 7

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5 - CYLINDER OVERHAUL



- | | |
|-----------------------|------------------------|
| 1) BRACKET | 9) SCREWS |
| 2) PIPE | 10) SFAL |
| 3) CLAMP | 11) O-RING |
| 4) PLATE | 12) CIRCLIP |
| 5) PIPE | 13) HEADER SEAL |
| 6) VALVE | 14) HEADER DISTRIBUTOR |
| 7) INNER ELEMENT SEAL | 15) SFAL |
| 8) INNER ELEMENT | 16) SEAL |

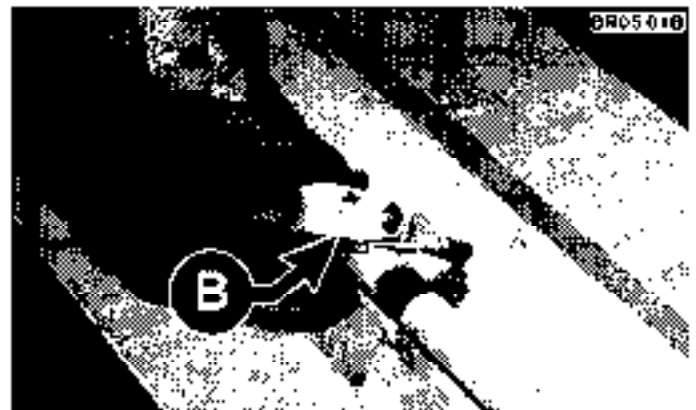
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CYLINDER INNER PARTS DISASSEMBLY

1) Remove the pipe (A) as follows (see pictures BR05.01A, BR05.01B, BR05.01C, BR05.01D):

- Unscrew the nut and remove the clamp (B)



- On the cylinder bottom disconnect the pipe from the fitting and replace the O Ring during reassembly



- On the header disconnect the pipe from the fitting and replace the O Ring during reassembly



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2) Remove the cable protection: before carrying out this operation; it is advisable to grip the cylinder in two places to avoid it rotating once the cable protection has been removed.

- Remove the fixing screws on the guide (see picture BR 05 02A).



- Remove the two fixing screws on the cylinder bottom (see pictures BR 05 02A and BR 05 02C)

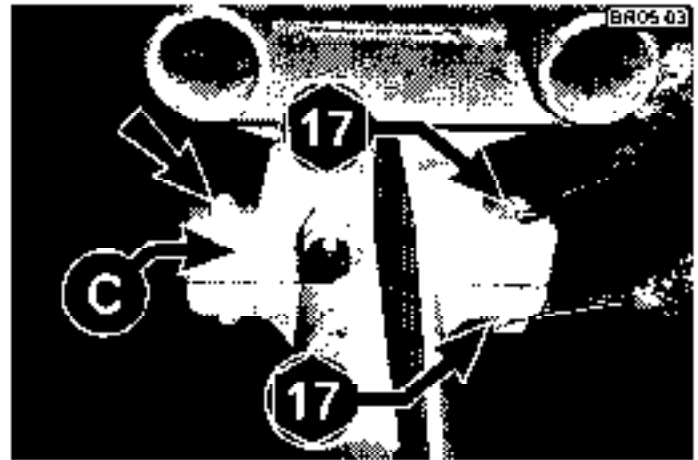


- Extract the cable protection lifting it and pulling it from the side of the cylinder bottom (see picture BR 05 02D).

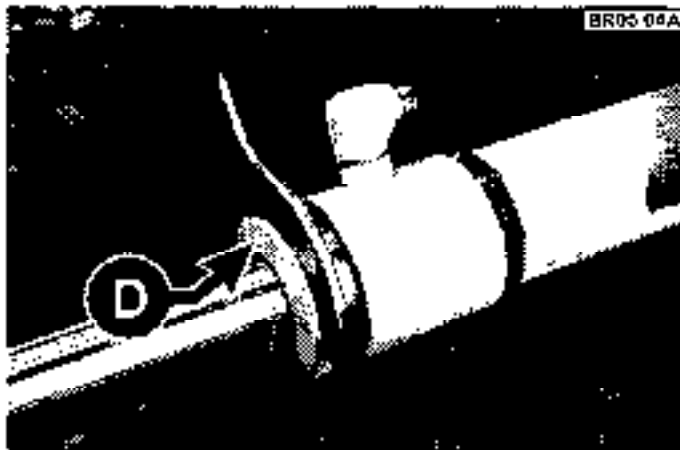




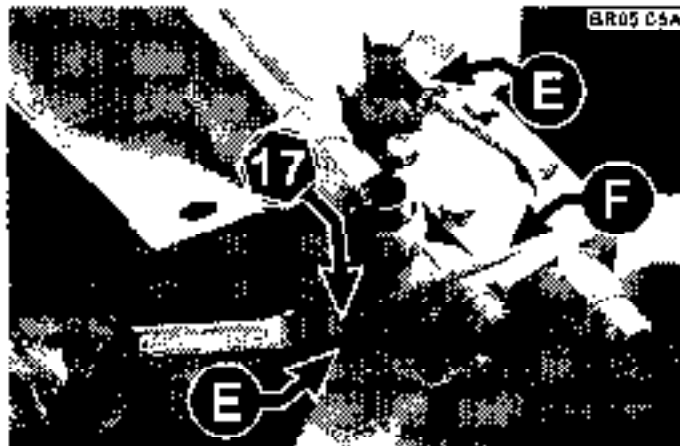
- 3) Unscrew the two fixing nuts and remove the guide (C) see picture BR 05.03.



- 4) By using the special tool (Part No. 025105) unscrew the header (D), see picture BR 05.04A, replace the gasket to its inner surface (see picture BR 05.04B).



- 5) Unscrew the two bolts (E) and remove the pilot pipe (F) see picture BR 05.05A; remove the valve from the cylinder bottom (see picture BR 05.05B) in order to eliminate the air pocket from the chamber; this will enable you to extract the stem.

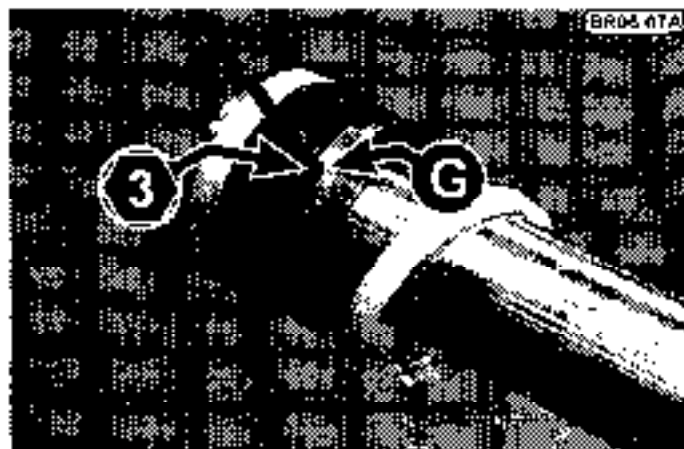




- 6) Grasp the stem and pull it hard to withdraw it from the chamber (see picture BR 05 06A and BR 05 06B)



- 7) Unscrew the two fixing screws (G) placed on the inner element (see picture BR 05 07A), by means of the special wrench (Part Nn 022721) unscrew the inner element from the stem (see picture BR 05 07B)



- 8) Extract and replace the gaskets placed on the inner element (see picture BR 05.08);



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CYLINDER INNER PARTS REASSEMBLY

- 1) Reassembly is the reversal of points 1 to 8 of the sections "CYLINDER INNER PARTS DISASSEMBLY" bearing in mind the following:
 - On assembly of the inner element on the stem (tightening torque = 697 Nm), add 'Loctite 270' on the upper screw (see point 7).
 - Test the cylinder connecting it to a hydraulic gearcase, carry out about 10n extension and retracting cycles, checking there are no leaks.
If you cannot use a hydraulic gearcase, use the machine hydraulic system moving the cylinder to the rear of the machine, so as it is possible to connect it to the relevant hoses.



5 - CYLINDER OVERHAUL



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REPLACEMENT OF FRONT SLIDING PADS 2

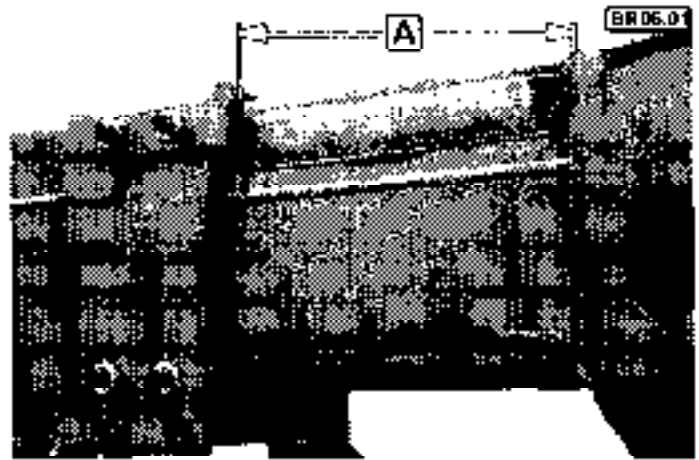
REPLACEMENT OF REAR SLIDING PADS 5

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REPLACEMENT OF FRONT SLIDING PADS

- 1) Extend the boom till dimension A = 60 cm



- 2) Remove the lock plates by loosening the lock nuts (see picture BR 06.02A) and the upper screws (see picture BR 06.02B).

BR06.02A

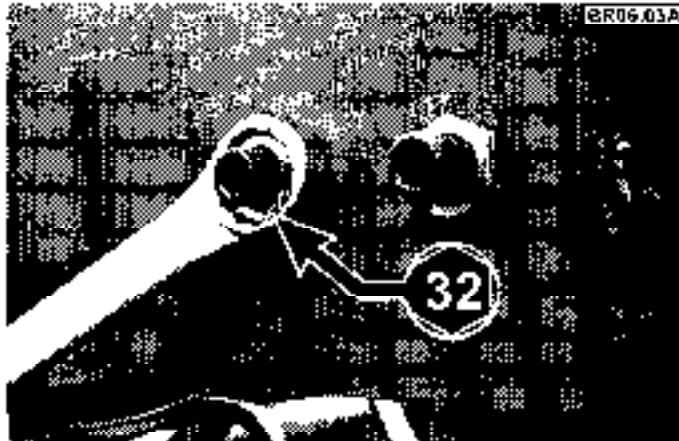
BR06.02B



- 3) Loosen lower lateral screws (see picture BR 06.03B)

BR06.03A

BR06.03B

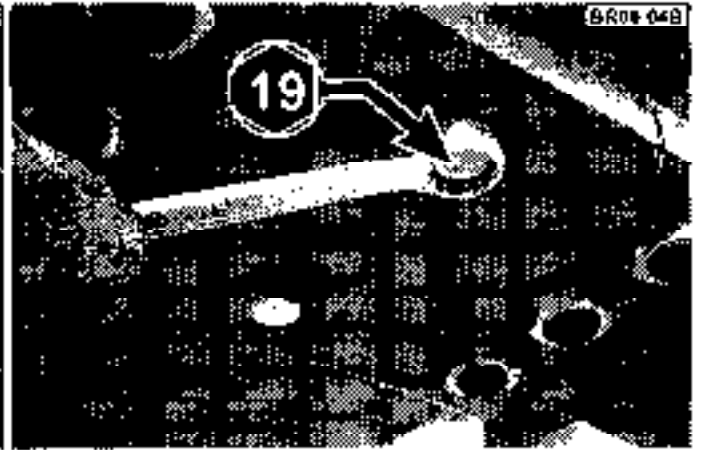




6 - HOW TO REPLACE FRONT AND REAR SLIDING PADS



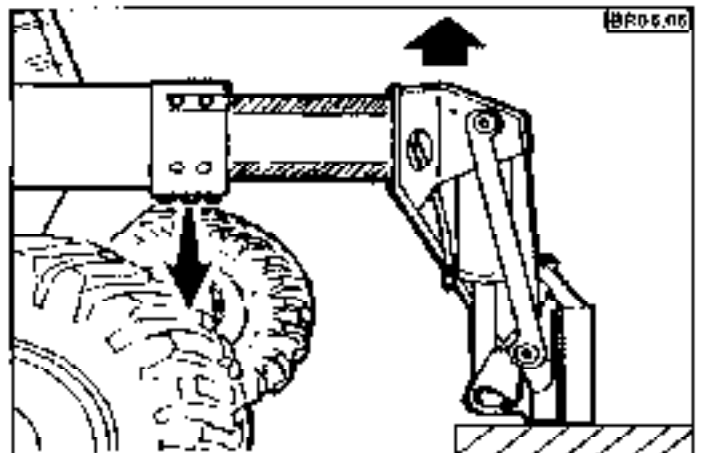
- 4) Loosen lower screws (see picture BR 06 04A) disconnect and remove locking screws on the pad holding plate (see picture BR 06 04B)



- 5) Remove upper pads (see picture BR 06 05)



- 6) Either lift the boom by a suitable lifting device or lay the carriage down on a stationary obstacle; then lower the boom (see drawing BR 06 06)



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6 - HOW TO REPLACE FRONT AND REAR SLIDING PADS



- 7) Remove lower pad holding plate (see picture BR 06.07).



- 8) Replace lower pads.
- 9) Reposition the pad holding plate (see point 7)
- 10) Reposition the locking screws on the pad holding plate and screw them on about two turns (see point 4)
- 11) Lift the boom to give clearance (see point 6).
- 12) Replace upper pads (see point 5).
- 13) Reposition pad locking plates and tighten screws fully, on both sides; thus centering the boom (see point 2). Loosen dowels by 1/2 turn which gives the required clearance. Tighten Lock nuts
- 14) Repeat process as shown at point 6.

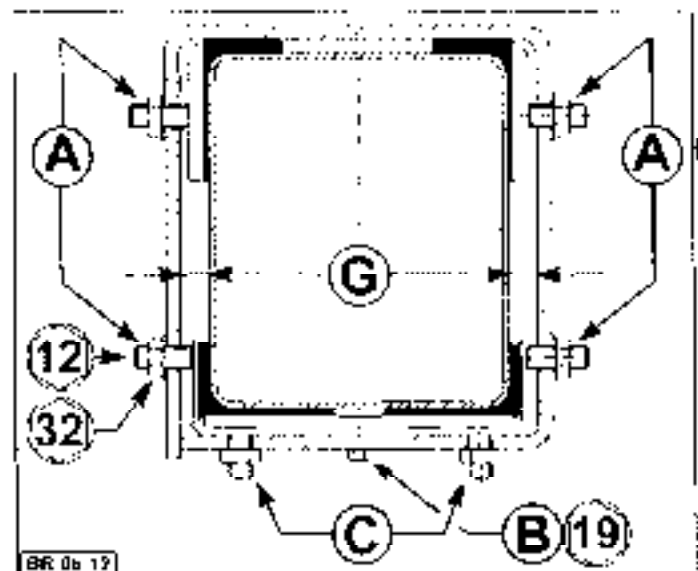
- 15) Adjust the boom sliding pads to the following instructions

To adjust horizontal clearance:

- loosen lock nuts at (A)
- center the boom by tightening the screws (A) until you get the same gap (G) on both sides.
- loosen screws by 1/2 turn which gives the required clearance and tighten lock nuts.

To adjust vertical clearance:

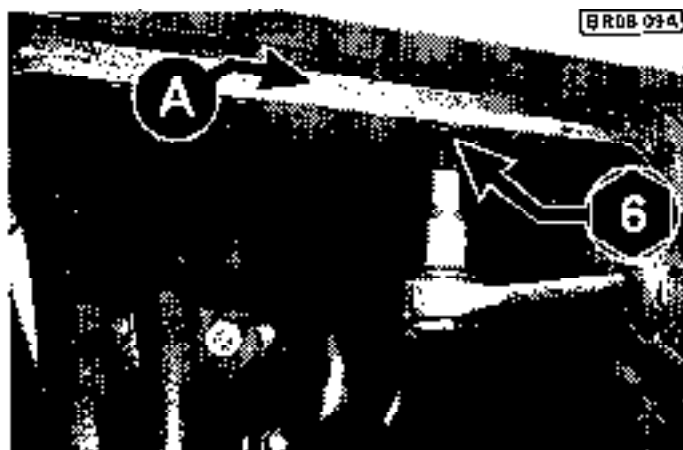
- loosen 2 bolts at (B)
- loosen lower lock nuts at (C)
- tighten screws at (C) fully then loosen them by 1 turn which gives the required clearance
- tighten lower lock nuts and 2 screws



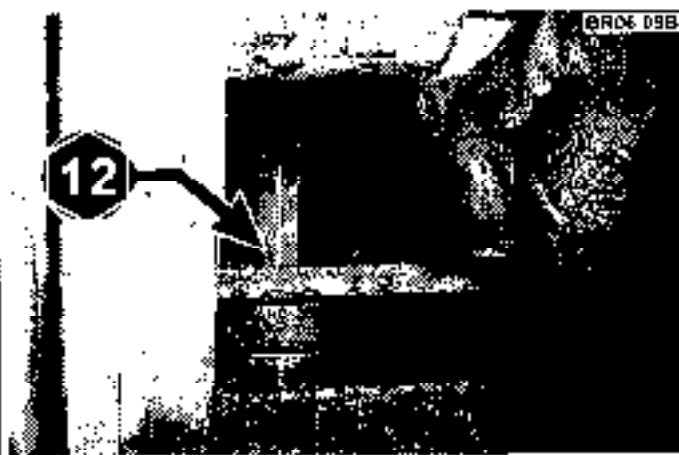
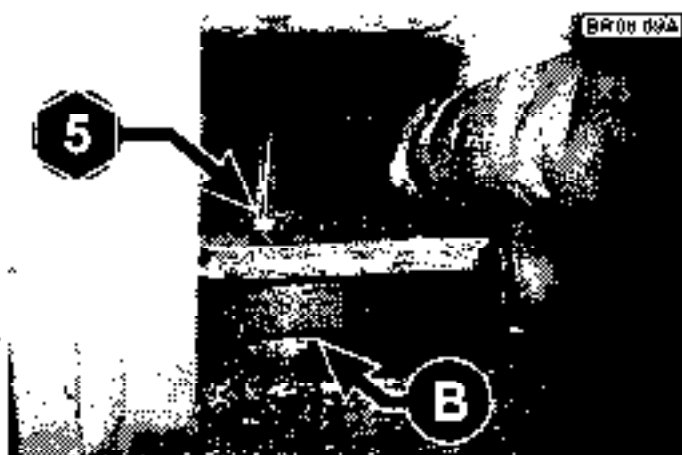


REPLACEMENT OF REAR SLIDING PADS

- 1) Retract the boom completely.
- 2) Unload the spare wheel: remove the rear panel of the machine (see points 1 and 2 of the section "UPPER HYDRAULIC HOSES - DISASSEMBLY AND REPLACEMENT" of the Chapter "REPLACEMENT OF INTERNAL HYDRAULIC HOSES OF THE BOOM")
- 3) Remove the pad locking plate (A) (see picture BR 06.08)



- 4) Loosen the grub screws (see picture BR 06.09A), remove the adjusting buffers (B), see picture BR 06.09B



- 5) Extend the boom with care to free the pads. Replace pads (see picture BR 06.10)

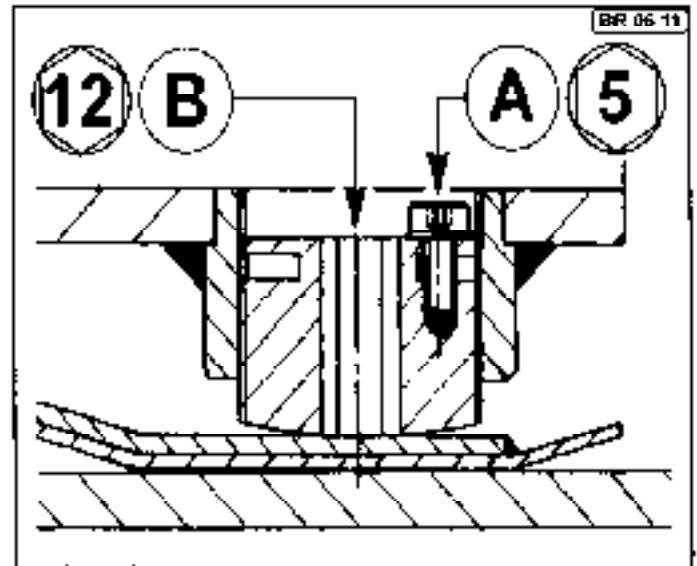




6 - HOW TO REPLACE FRONT AND REAR SLIDING PADS



- 6) Retract the boom fully in to bring pads back into correct position
- 7) Re-position pad holding plate and tighten relevant screws (see point 3 of this section).
- 8) Re-position the adjusting buffers (B) and screw them in until the second section of boom comes into contact with upper pads: tighten grub screws (A). (see picture BR 06.11).



- 9) Reassemble back panel of the machine, reload the spare wheel.



Merlo S.p.A. Industria Metalmeccanica

12020 S. Defendente di Cerverca (CN) - ITALY Tel. (0171) 614111 - Fax (0171) 614100

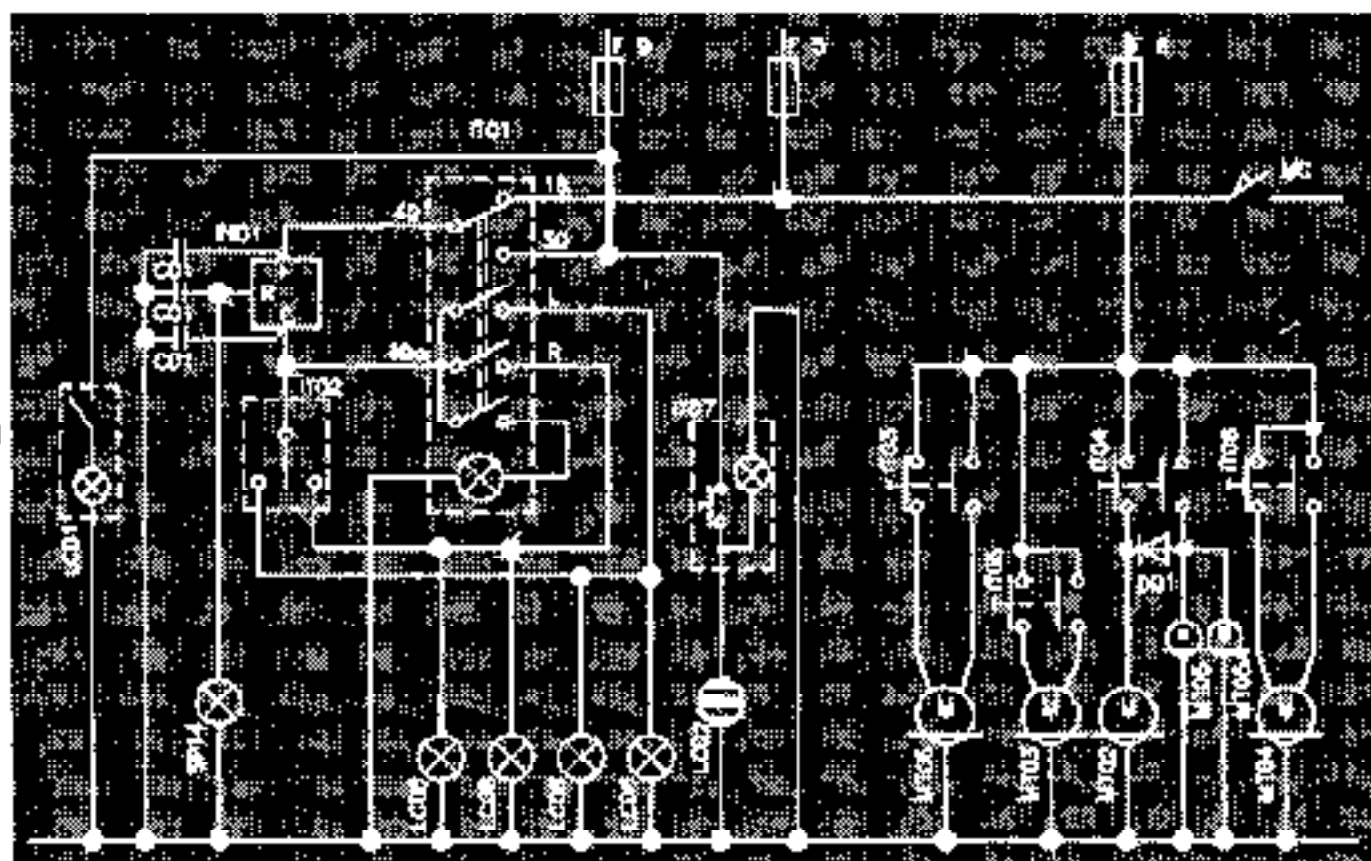
Domino Mining Equipment Pty Ltd

A.C.N. 002 708 881 P.O. Box 89, WYONG, N.S.W. (Aust.) 2259 Phone: (043) 53 1033 - Fax (043) 51 2119

SERVICE MANUAL

ELECTRICAL ENGINEERING INSTRUCTIONS P 35.9 EVA

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MERLO DRAWIGS

MIRETTI DRAWIGS

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This manual provides the information necessary for correct and safe execution of maintenance works not included in the INSTRUCTION HANDBOOK FOR OPERATING AND MAINTENANCE; it is addressed to qualified fitters, who have the required knowledge of mechanical, hydraulic and electrical systems for the machine being serviced.

All work carried out should comply with all relevant environmental and occupational health and safety requirements.

CAUTION!!!

The symbol shown to the right hand side will be used everytime a standard Merlo procedure will be substituted by a specific Miretti instruction valid for flameproofed units only. Please refer to the Miretti annex, attached at the end of this chapter, in order to follow the correct procedure.



GENERAL NOTE:

Always ensure any work carried out on the vehicle is carried out on level ground. If this is not possible the ground should be as level as possible and the vehicle should be chocked to prevent any possibility of the vehicle rolling.

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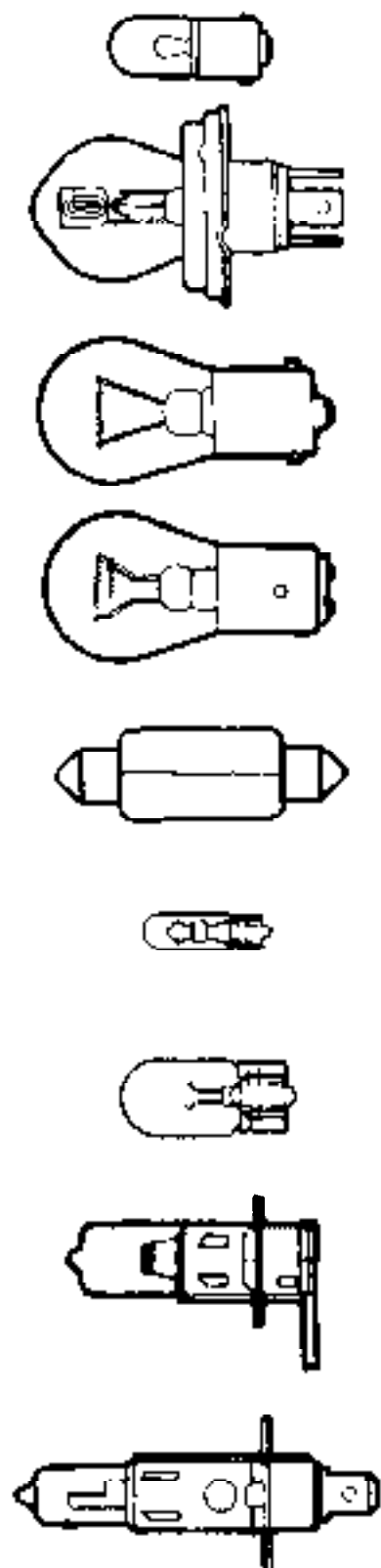
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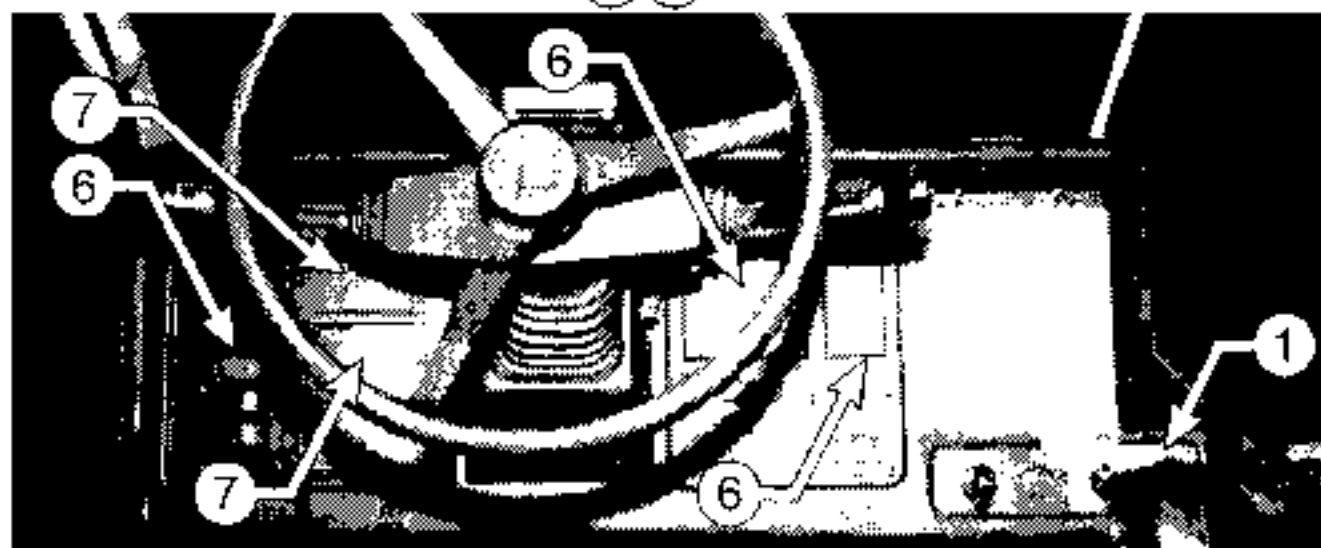
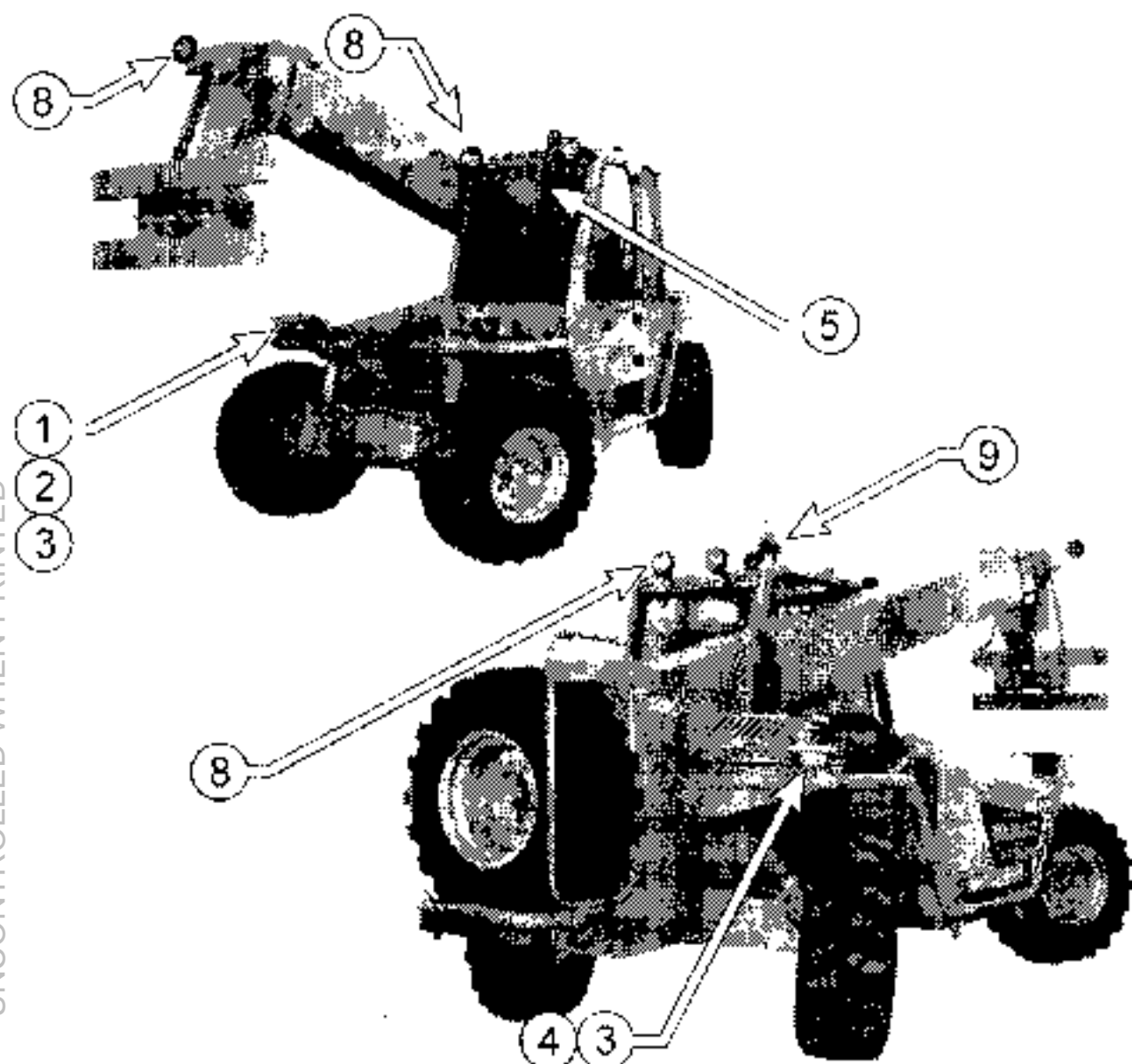
2 - GLOBES DATA SUMMARY



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Type	Q.ty	Globes
1	3	BA 95 24V 3W
2	2	P45 T 24V 50/55W
3	4	BA 15 S 24V 21W
4	2	BAY 15 D 24V 5/21W
5	1	SV 8,5-8 11X39 24V 5W
6	13	T5 24V 1,2W
7	10	T10 24V 3W
8	5	H3 PK22S 24V 70W
9	1	H1 24V 70W



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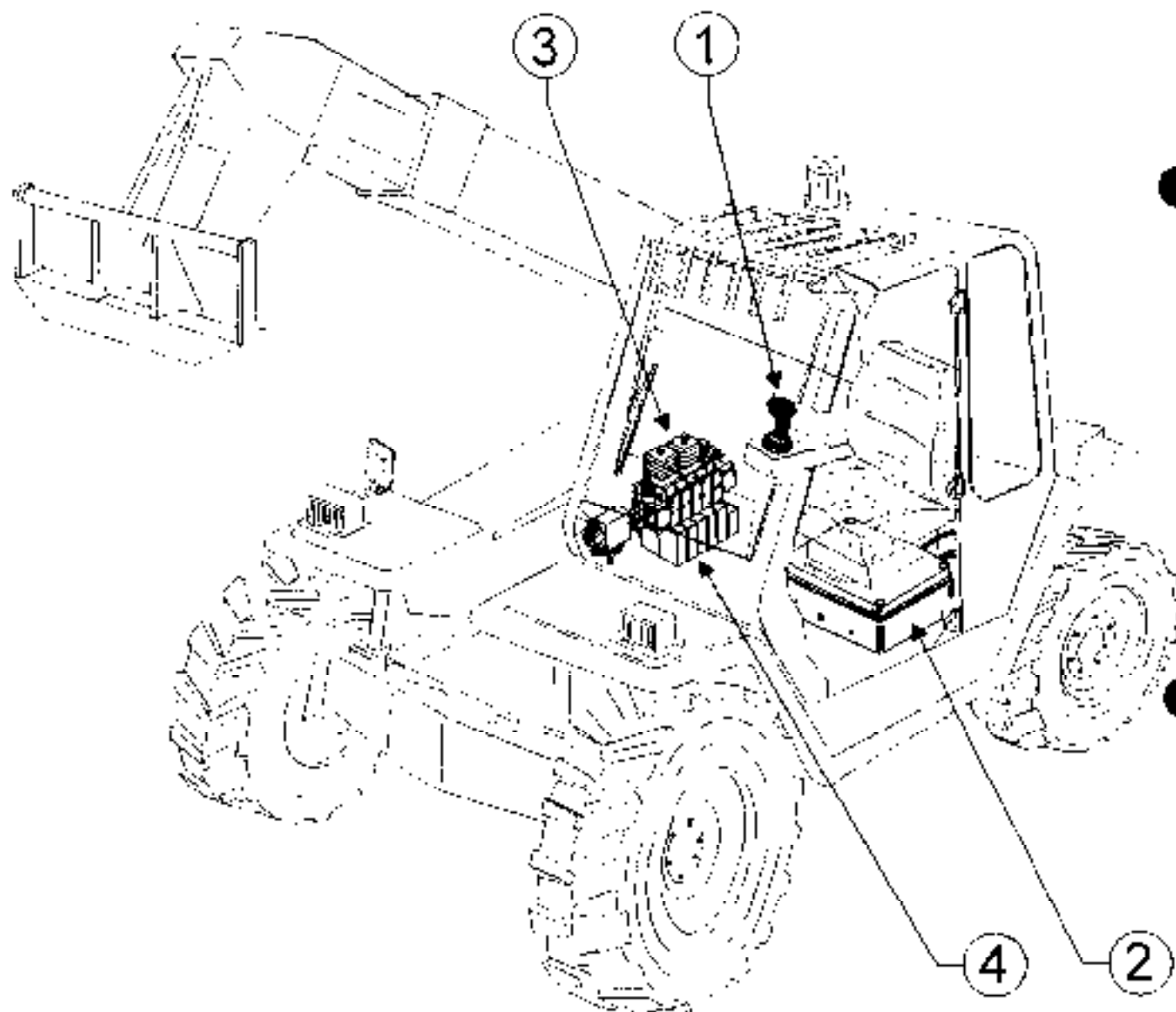
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SYSTEM DESCRIPTION

The joystick control system is composed by the following parts.

- 1) Electronic joystick lever
- 2) Main electronic control board S3
- 3) Main directional control valve pre arranged for joystick operations
- 4) Servocontrols and entrance section valves



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Electronic joystick

The joystick, assembled on the armrest, is made of one lever moving across two axis and two enabling buttons. Moving it across the two axis along with the pressing of one or both buttons produces the movement of the correspondent hydraulic section

Main electronic control board

The main electronic board is placed underneath the driver's seat into a plastic box. Such electronic board receives the signals from the joystick as well as from some main safety devices, (safe load indicator, emergency selector) and it controls the servocontrols as well as the solenoid interception valve.

Main directional control valve pre arranged for joystick operations

The main directional control valve is equipped with four servocontrols (solenoid valves) for the following hydraulic movements:

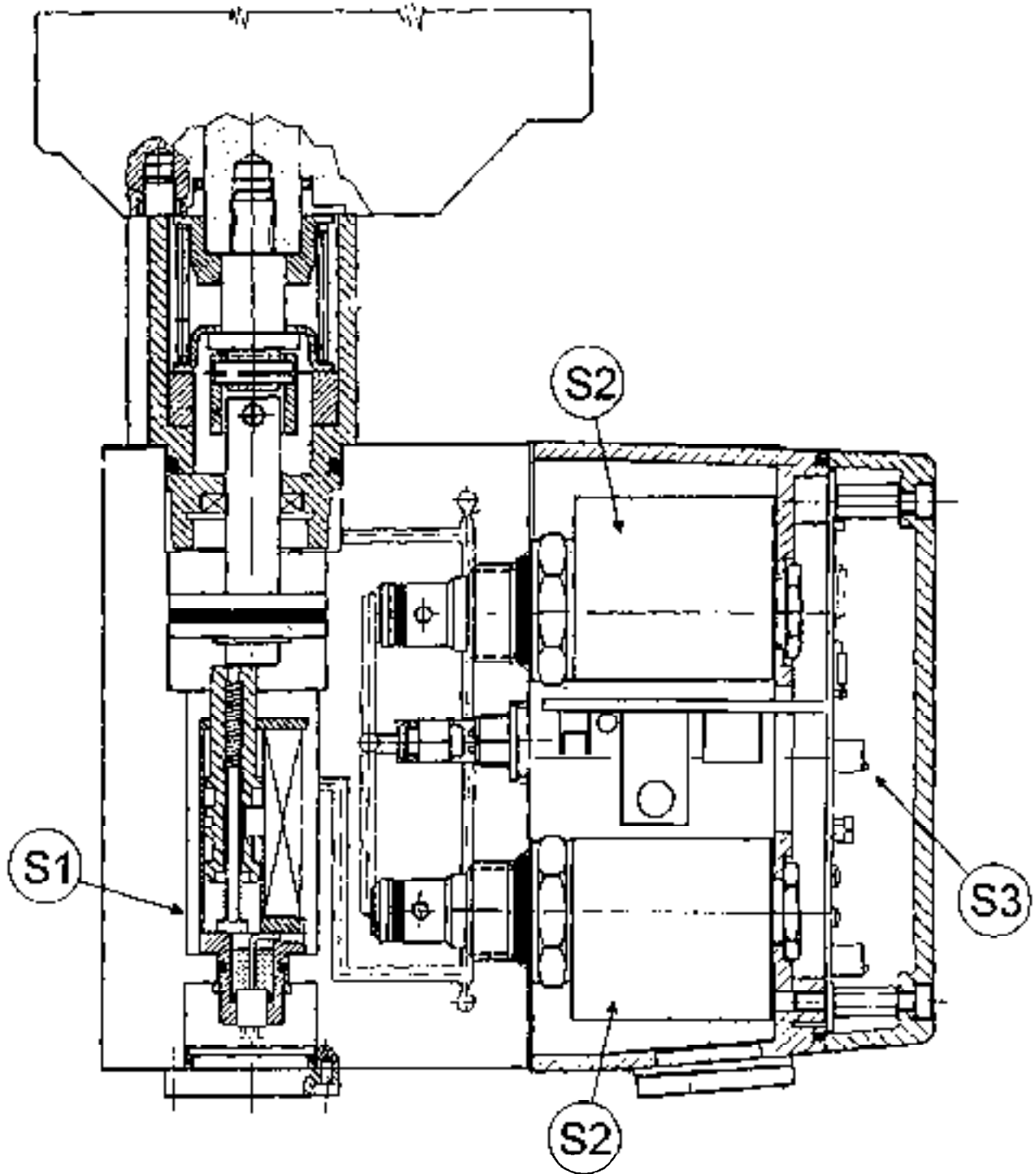
- Boom lifting / lowering
- Boom extension / retracting
- Fork tilting fwd/bwd
- Frame levelling R/L

Servocontrols and entrance section valves

Each servocontrol is made of two proportional solenoid valves S2, controlled by a small electronic board S3 which is driven by the main electronic control board. A feedback signal from an included linear trimmer informs the system about the actual position of the valve cursor S1.



SERVOCONTROLS ON MAIN DIRECTIONAL CONTROL VALVE



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In order not to accidentally swap the two solenoids pay attention to the wires colour (upper solenoid wires are BLUE / GREEN)



CHECKING PROCEDURE FOR JOYSTICK FUNCTIONS

Two checkings are possible at joystick level:

- Buttons check.
- Trimmers check

Buttons check:

- Remove the 4 fixing screws and extract the joystick from its seat.
- Disconnect the 3 wires (red, blue, orange) from the terminal.
- By using a multimeter tester on the resistance (Ohm) position check:
 - open circuit between white and blue, close circuit when pressing the "A" button
 - open circuit between white and red, close circuit when pressing the "B" button

Trimmers check:

- By using a multimeter tester on the voltage (VCC) position check
- Verify the 8 Volt voltage between red and black
- Make sure the joystick lever is in its center position, then check 4 Volt (+/- 0.1 Volt) presence between black and green, as well as between green and red
- By moving the lever from its center position to both full strokes the voltage should vary +/- 2 Volt. (from 4 Volt to 6Volt or 2 Volt)
- Should the above test fail then act as it follows:
 - Disconnect the trimmers wires from the terminal
 - Loosen the screws (item 21 in dwg 3-21868)
 - Set tester on resistance (Ohm) position
 - Set the joystick lever to the center position, then adjust trimmer position by so that the resistance between black and green equals the one between red and green.



ELECTRONIC MAIN BOARD OPERATIONAL CHECK (dwg. 3-22799)

The main electronic board identified on dwg 3-22799 has a group of LED designed to check the correct operations during the following situations:

- Green led DL7 and red led DL8 lit when the starter key is in position "R"
- Red led DL4 lit when pressing the "A" button of the joystick (input signal)
- Red led DL5 lit when pressing the "B" button of the joystick (input signal)
- Red led DL3 lit when pressing either "A" or "B" button of the joystick (output signal)
Such led switches off 1.5 seconds after the button is released
- Green led DL1 lit when pressing the lever is moved across the A-B axis
(or the lever is not correctly adjusted on its central position)
- Red led DL2 lit when pressing the lever is moved across the C-D axis
(or the lever is not correctly adjusted on its central position)

NOTE do not modify the trimmer settings on the main electronic board

The main electronic board features two terminals for input / output wiring

- The "A" terminal receives power supply, safety signals from the machine and joystick commands.
- The "B" terminal sends commands to the servocontrols

Terminal A	Function
1	24 volt power supply
2	24 volt power supply
3	Ground
4	Ground
5	Ground
6	Not used
7	Not used
8	Signal from safe load indicator (microswitch MC03 on rear axle)
9	Signal from SLO6 when set to the emergency position (to the right)
10	Signal from SLO6 when set to the normal operation's position (to the left)
11	Not used
12	Negative from joystick "A" button when pressed
13	Negative from joystick "B" button when pressed
14	Not used
15	Signal + 8 Volt to joystick trimmers
16	Signal + 4 Volt from joystick in center position (+/- 2 Volt at full stroke) C-D axis
17	Signal + 4 Volt from joystick in center position (+/- 2 Volt at full stroke) A-B axis
18	Negative to joystick trimmers

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3 - TROUBLE SHOOTING

Terminal	B	Function
19		Signal + 6 Volt from servocontrols
20		Not used
21		Not used
22		Not used
23		Not used
24		Not used
25		Not used
26		24 ± 5.6 Volt to servocontrol boom lift / lower
27		24 ± 5.6 Volt to servocontrol fork tilting fwd / bwd
28		24 ± 5.6 Volt to servocontrol boom extend / retract
29		24 ± 5.6 Volt to servocontrol chassis tilting R / L
30		Not used
31		Not used
32		Signal + 24 Volt to servocontrol main solenoid valve
33		Signal + 24 Volt to servocontrol boom lift / lower and boom extend / retract
34		Signal + 24 Volt to servocontrol chassis tilting R / L
35		Not used
36		Signal + 24 Volt to servocontrol fork tilting fwd / bwd

Set the starter key to 'R' position, then check the following voltages:

- 1) Stability condition met and joystick in center position:
 - 24 Volt between terminals 3 & 1, 3 & 8, 3 & 10
 - 8 Volt between terminals 3 & 15
 - 4 Volt between terminals 3 & 16, 3 & 17
- 2) Stability condition not met and joystick in center position:
 - 24 Volt between terminals 3 & 1, 3 & 10
 - 8 Volt between terminals 3 & 15
 - 4 Volt between terminals 3 & 16, 3 & 17
- 3) Stability condition not met, emergency selector SL06 set to right position, joystick in center position:
 - 24 Volt between terminals 3 & 1, 3 & 8
 - 8 Volt between terminals 3 & 15
 - 4 Volt between terminals 3 & 16, 3 & 17
- 4) Stability condition met, joystick "A" or "B" button pressed but lever in center position:
 - 24 Volt between terminals 3 & 1, 3 & 8, 3 & 10
 - 8 Volt between terminals 3 & 15
 - 4 Volt between terminals 3 & 16, 3 & 17
 - Terminals 12, 13 are grounded (thus check 24 Volt between 12 & 1, 13 & 1)
 - 24 Volt between terminals 3 & 33, 3 & 34, 3 & 36, 3 & 32 (power supply to servocontrols)
 - 8 Volt between terminals 3 & 19 (from servocontrols)
 - 4 Volt between terminals 3 & 26, 3 & 27, 3 & 28, 3 & 29 (signal to servocontrols)
- 5) Stability condition met, joystick "A" or "B" button pressed and lever moved off center:
 - 24 Volt between terminals 3 & 1, 3 & 8, 3 & 10
 - 8 Volt between terminals 3 & 15
 - 4 Volt between terminals 3 & 16, 3 & 17
 - Terminals 12, 13 are grounded (thus check 24 Volt between 12 & 1, 13 & 1)
 - 24 Volt between terminals 3 & 33, 3 & 34, 3 & 36, 3 & 32 (power supply to servocontrols)
 - 8 Volt between terminals 3 & 19 (from servocontrols)
 - 4 Volt (+/- 1.6 Volt depending on lever movement) between terminals 3 & 26, 3 & 27, 3 & 28, 3 & 29 (signal to servocontrols)



SERVOCONTROLS OPERATIONAL CHECK

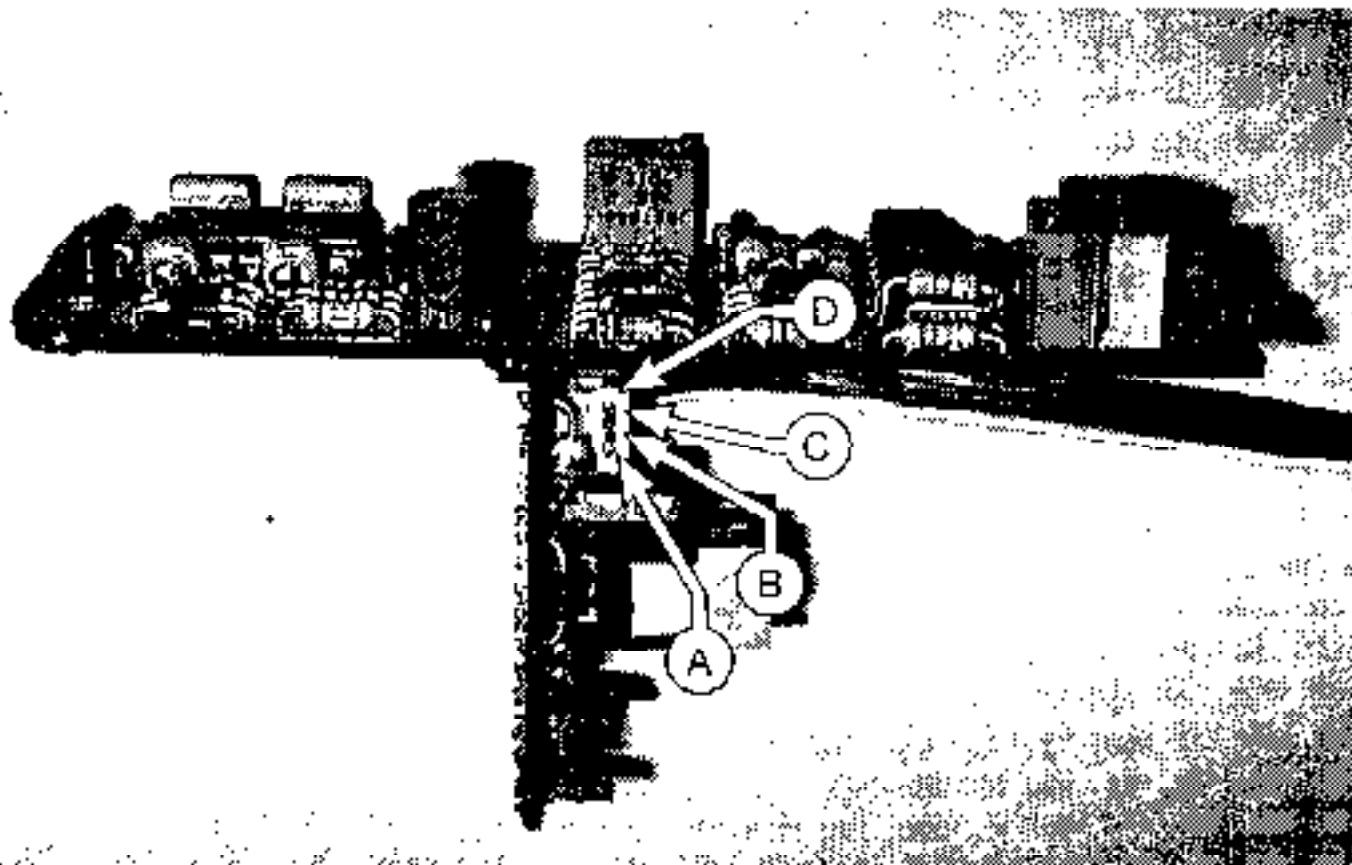
Each servocontrol is composed by:

- one electronic board
- one feedback trimmer
- two solenoids (not to be swapped in case of valve disassembly)
- two proportional valves

Electronic board power supply check

- 1) Remove the plastic cover protecting the electronic board belonging to the valve to be checked
- 2) Set the starter key to "R" position
- 3) Press the joystick button enabling the valve to be checked
- 4) Verify that all voltages across terminal A and B are according to the following table

A	WHITE	+ 24 Volt
B	BLACK	+ 8 Volt
D	RED	+ 4 Volt
C	BROWN	Ground



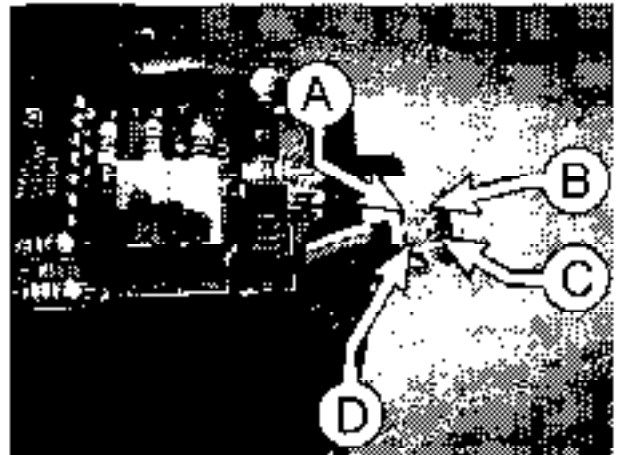
To calibrate the electronics, please refer to relevant paragraph.

Potentiometer (S1 trimmer) check.

The feedback potentiometer allows the system to provide an action proportional to the given command, and it makes possible the electronic calibration.

To verify the correct functions of this potentiometer act as it follows:

- 1) Remove the plastic cover protecting the electronic board belonging to the valve to be checked.
- 2) Disconnect the 4 wire terminal at the board bottom level
- 3) Verify that resistances across terminal A and B are according to the following table, first with the joystick in center position, then by moving the lever

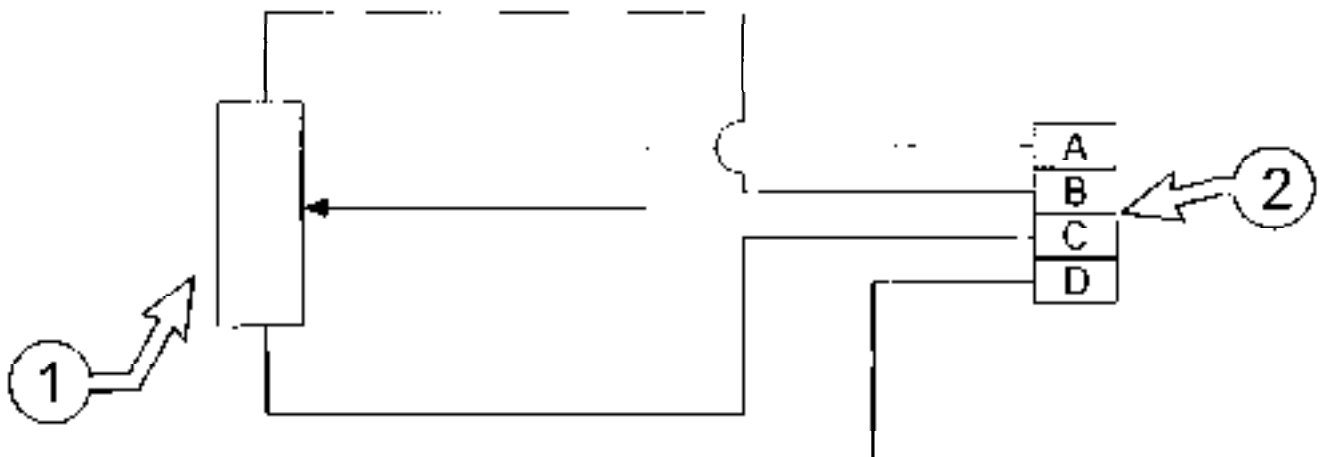


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RESISTENCE VALUES		
Between Terminals	Lever in center position	Lever at stroke end
A and C	About 10 Kohm *	About 10 Kohm
B and A	About 5 Kohm **	From 0 to about 10 Kohm
B and C	About 5 Kohm **	From 0 to about 10 Kohm

* Note: resistance absolute value could differ from the below feagures as well as from potentiometer and potentiometer. It is important that such value does not vary drift during the joystick action.

** Should the values differ by more than 10% from each other then change potentiometer.



- A Yellow
- B Orange
- C Red
- D Brown (not used)

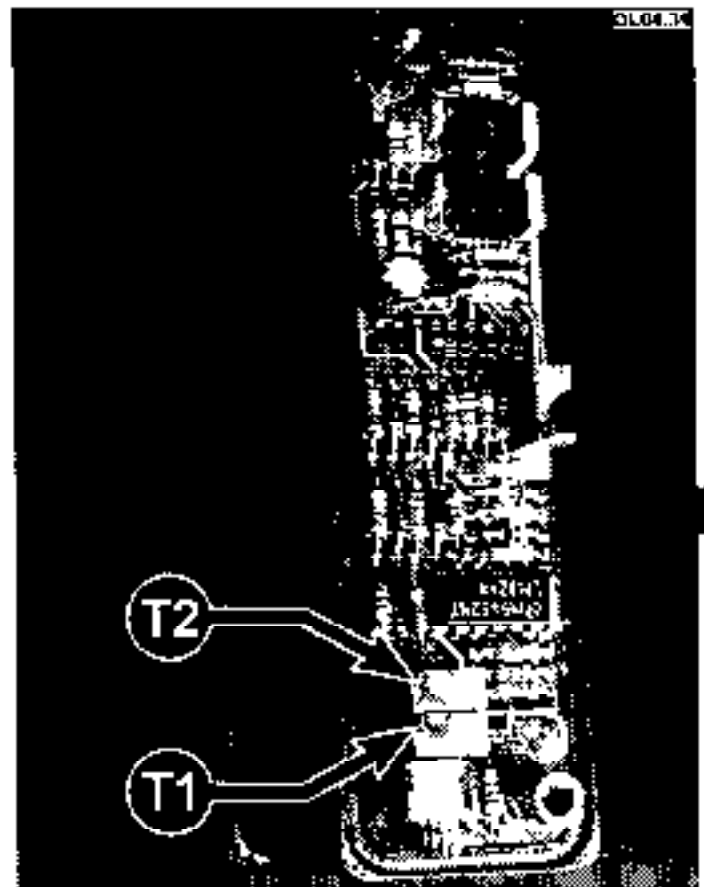


TRIMMER ADJUSTMENT:

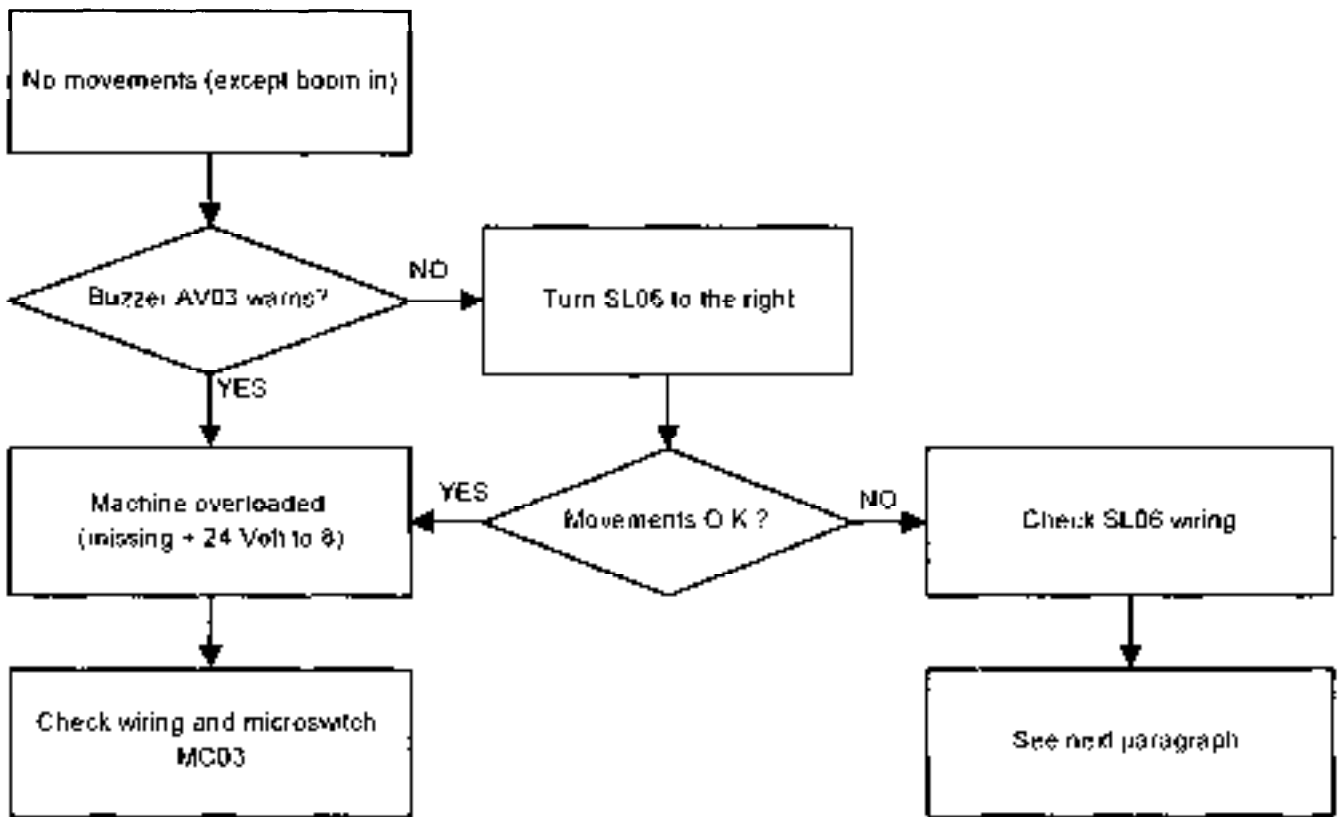
Before operating the trimmers check the potentiometers centering which are assembled in the electronic joystick (see the handbook P35 9 EVA ELECTRIC SYSTEM). Screw a lever in the pertinent mechanical joystick of the main directional control valve in such a way you can easier verify the movements:

- TRIMMER "T1" adjust it only when you push the red button on the electronic joystick, the lever of the main directional control move itself
- TRIMMER "T2" adjust it only when the complete stroke of the electronic joystick does not correspond an equal stroke of the lever of the main directional control valve.

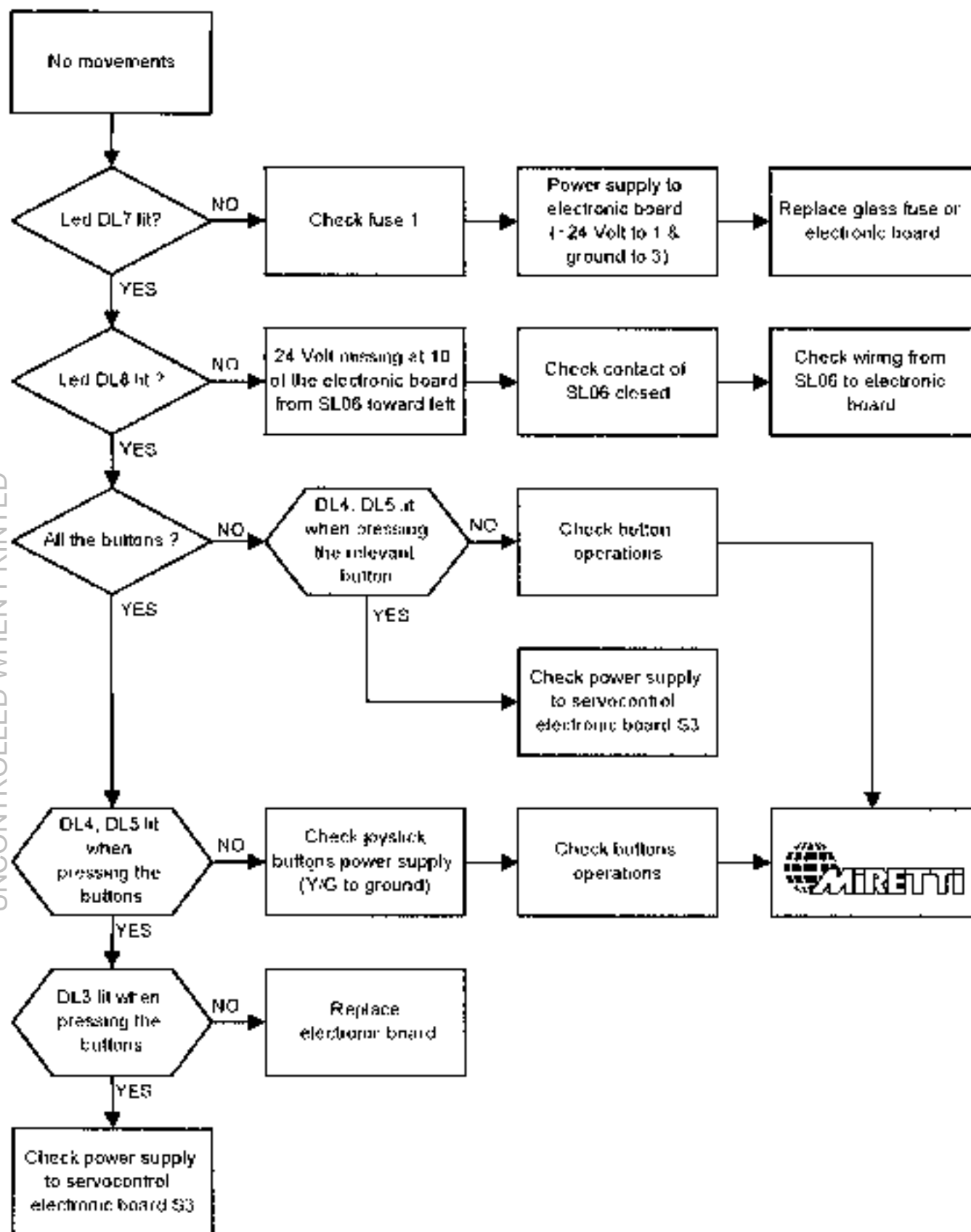
- All settings must be done on the trimmer one by one
 - "T1" TRIMMER: push the red button of the electric joystick, screw the regulator screw until there is no movement of the lever on the main directional control valve.
 - "T2" TRIMMER: push the red button and position the electrical joystick at end of its stroke; screw the regulator screw until the complete stroke of the lever of the main directional control valve is obtained, then add about 1/2 turn (if the lever was already at the end of its stroke it is necessary to unscrew it prior to this operation) Repeat the same operations positioning the joystick to end of its stroke from the opposite side. if you cannot bring the lever to the end of its stroke on one of the two sides adjust the regulator on TRIMMER 1.

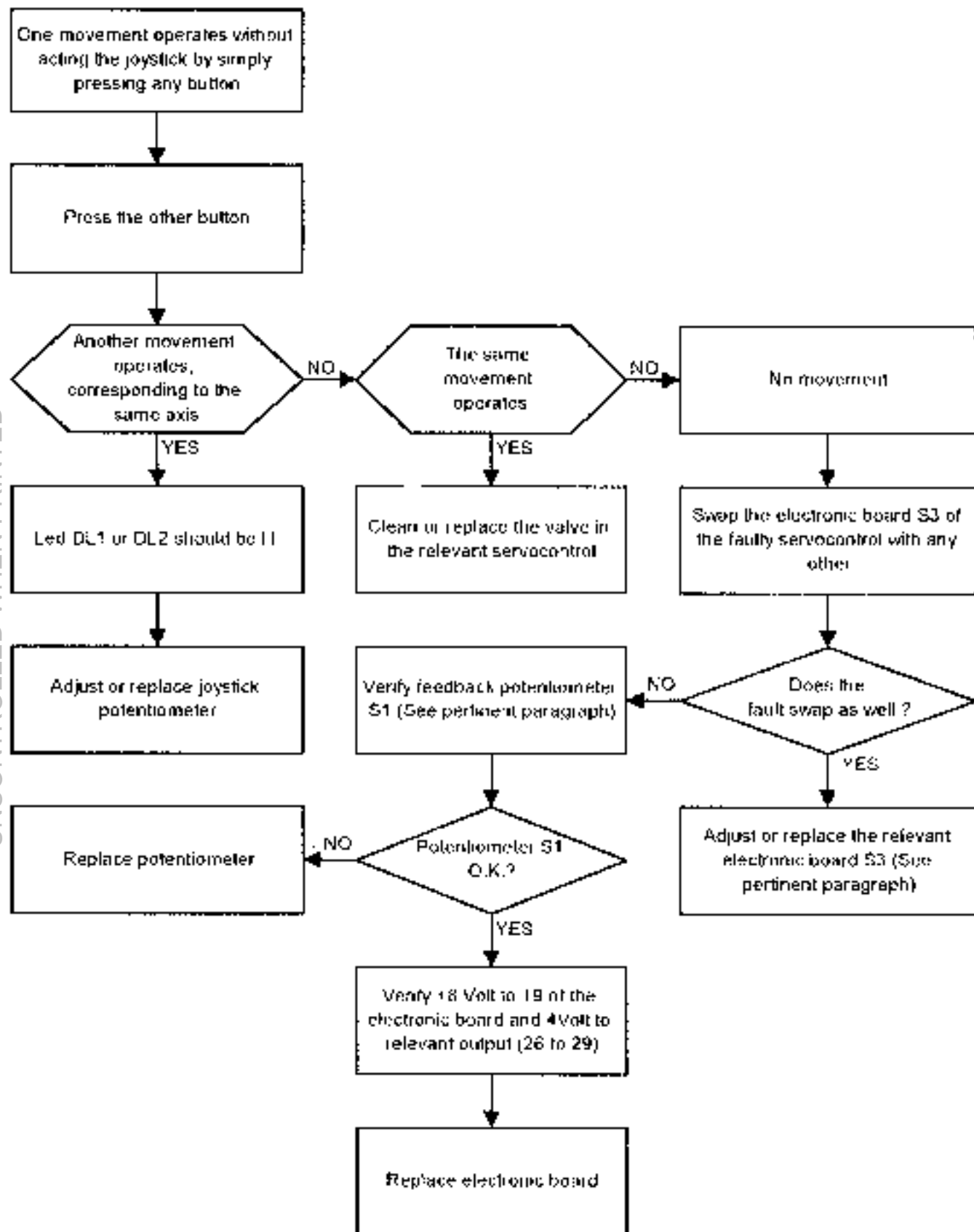


3 - TROUBLE SHOOTING

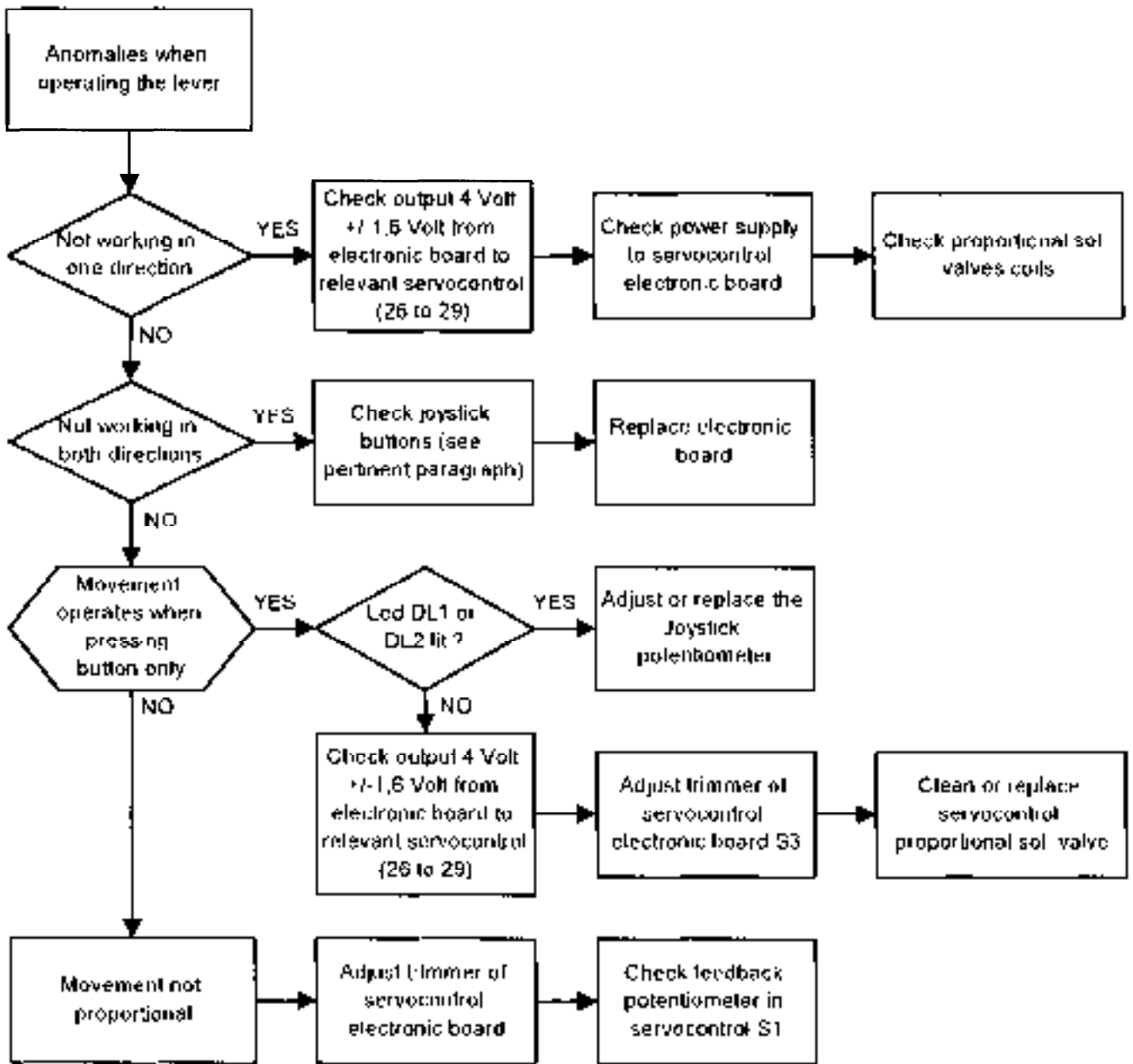


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3 - TROUBLE SHOOTING



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**Annex to the
Merlo workshop manual**

**ELECTRICAL ENGINEERING
INSTRUCTIONS P35.9 EVA**

**valid for
flameproof version**



MIRETTI

S. r. l. Via Marconi, 29/31 - 20051 Limbiate (MI) - ITALIA

MIRETTI TROUBLE SHOOTING

Annex for Flameproof Machines

Joystick Buttons Check 1

Troubleshooting..... 2

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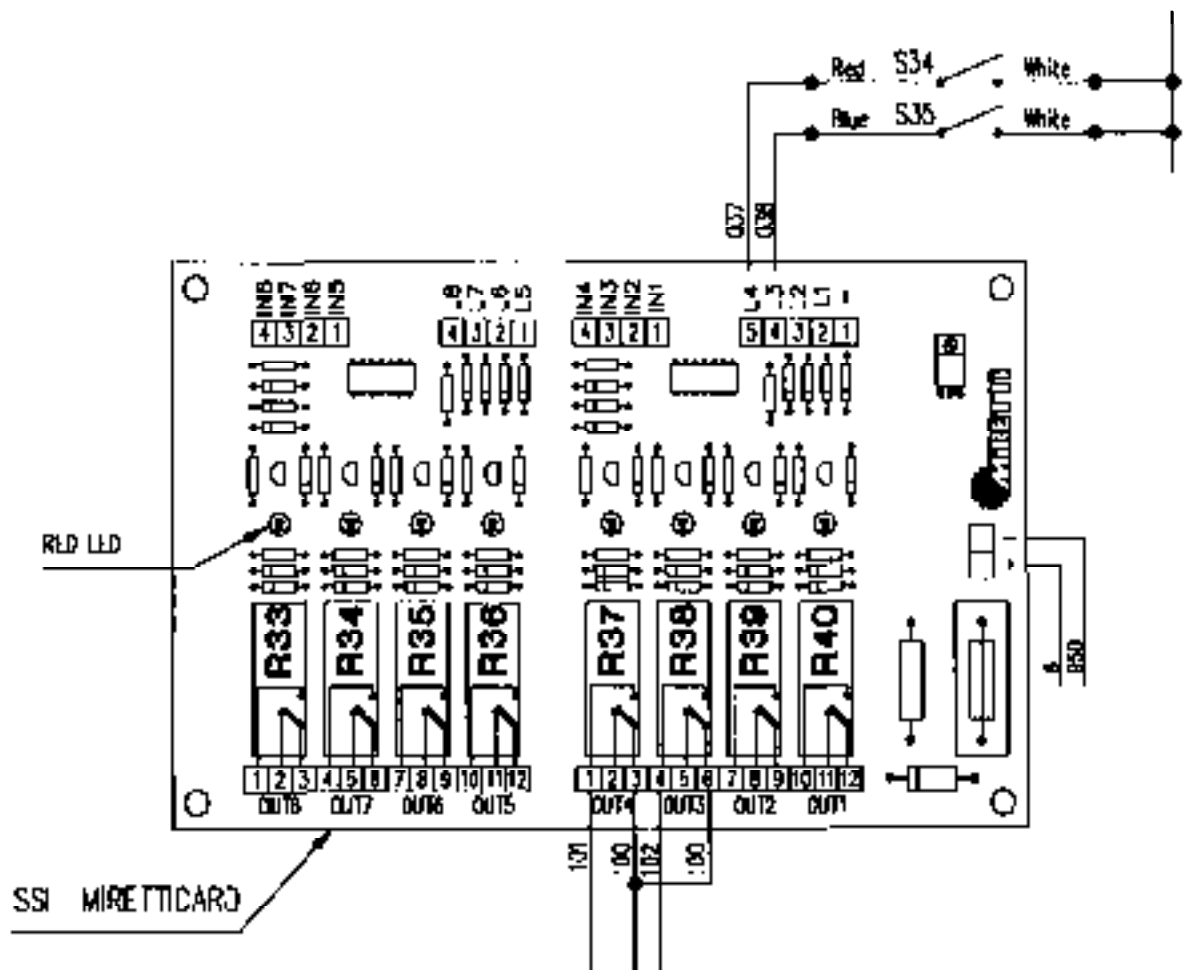
TROUBLE SHOOTING

JOYSTICK BUTTONS CHECK (Flameproof version)

(Reference: MIRETTI wiring diagram n° 4357 001000 sheet 4)

S34 = BUTTON B OF JOYSTICK

S35 = BUTTON A OF JOYSTICK



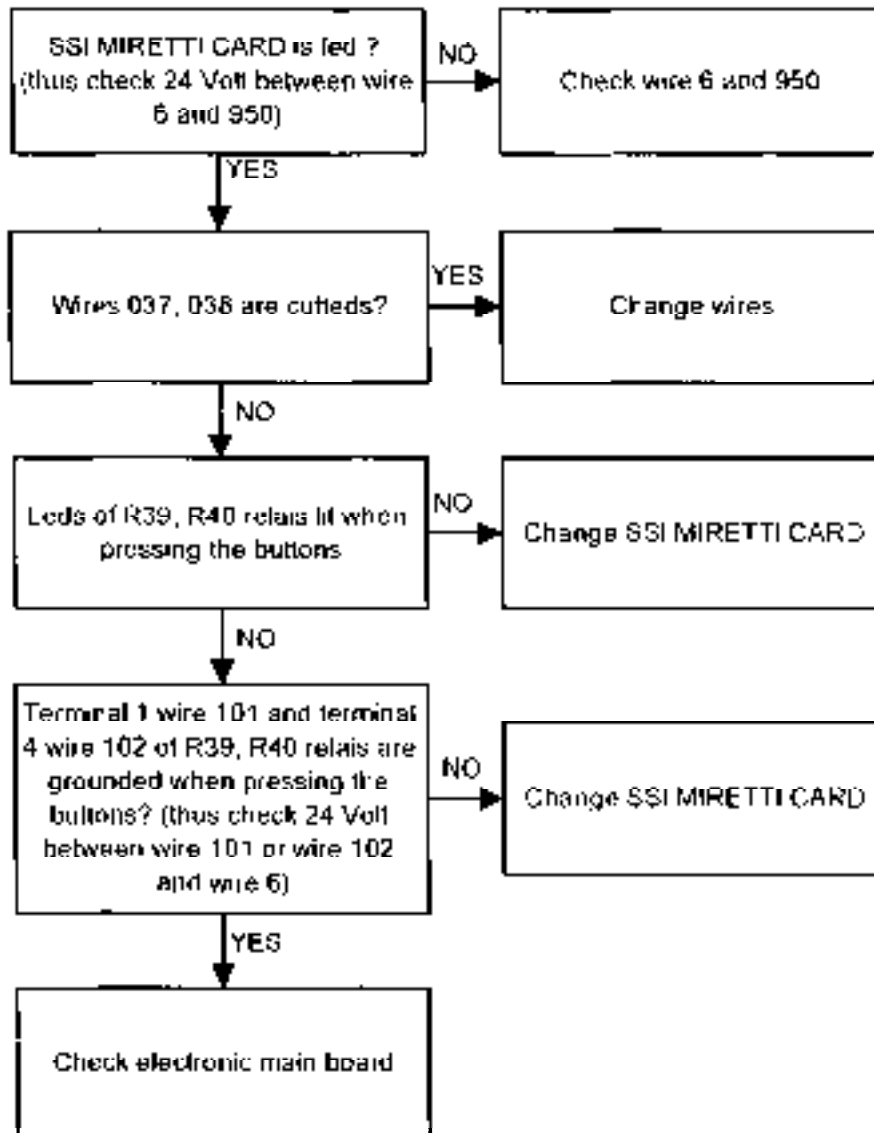
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TROUBLE SHOOTING



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ELECTRICAL SCHEMATIC	DWG	3-21969/C
POWER SUPPLY CABLE	"	3-21998
REMOTE START TERMINAL	"	4-15051
DASHBOARD ELECTRIC PREASSEMBLY	"	3-21978/B
ENGINE CABLE	"	3-21979
SERVICES IN CAB	"	3-20812/A
BOOM CABLE	"	3-21887
OVERLOADING MICROSWITCH CABLE	"	3-21768
CABLE FOR WORKING LIGHT ON CAB	"	3-22262/A
MONOLEVER JOY-STICK PREASSEMBLY	"	3-21868
JOY-STICK LEVER PREASSEMBLY	"	3-21872
ELECTRIC BOX PREASSEMBLY	"	3-21999/A
ELECTRONIC CARD	"	3-22799
AIR COMPRESSOR MOTOR POWER SUPPLY	"	3-21988
WORK LIGHTS CABLE	"	3-22036
LEFT FRONT LIGHT	"	3-22009
RIGHT FRONT LIGHT	"	3-22010
RIGHT REAR TAIL LIGHT	"	3-22008
LEFT REAR TAIL LIGHT	"	3-22000
MAIN CAB IT	"	3-21980

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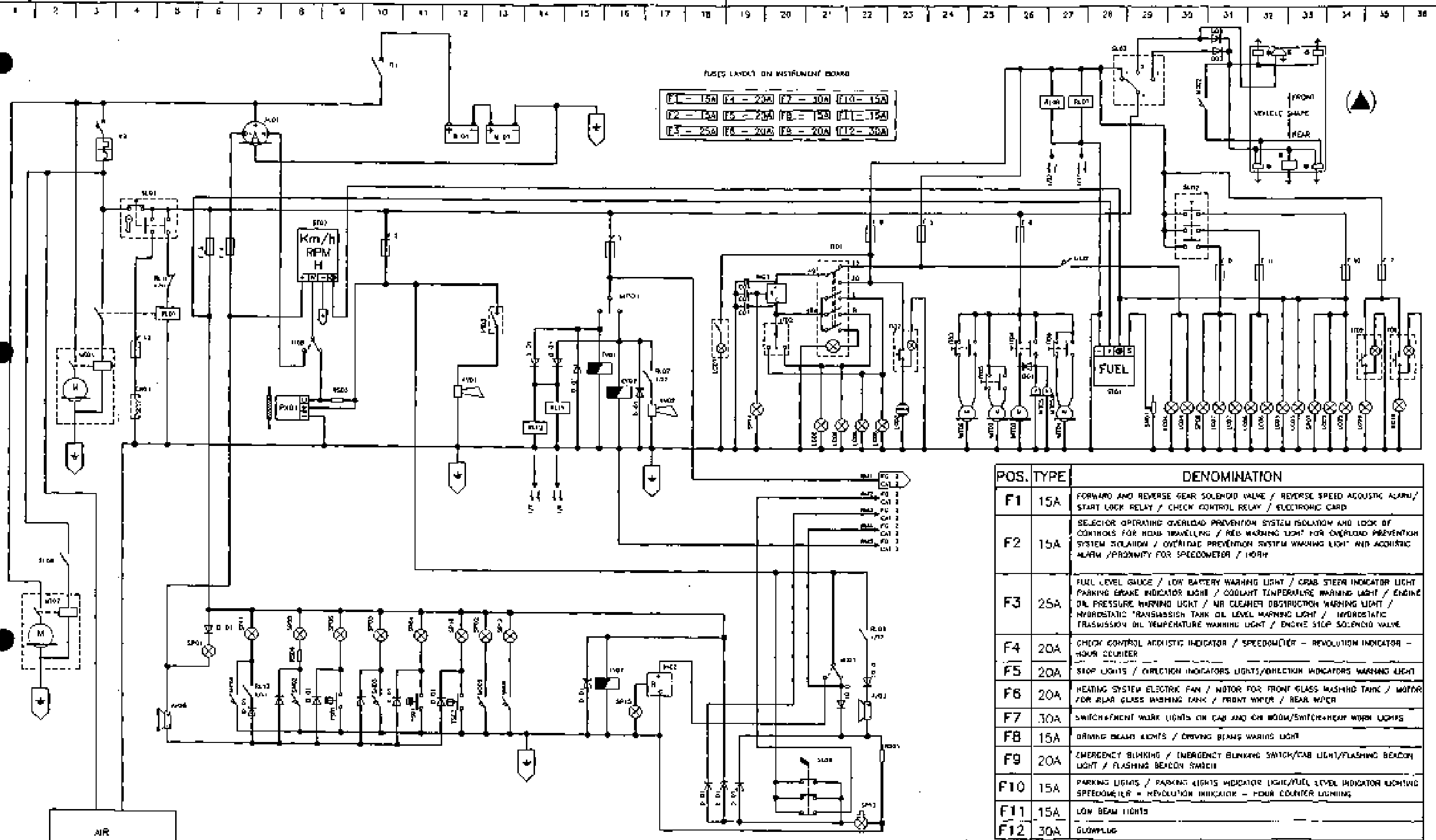
ELECTRICAL SCHEMATIC LEGEND (REF. TO DWG 3-21969/C)



AL01	Alternator	fg.1 cat.7	IT04	Wiperswitch	fg.1 cat.26	RL07	Acoustic alarms inhibiting relay	fg.1 cat.27
AV01	Horn	fg.1 cat.12	IT05	Wiperswitch (optional)	fg.1 cat.25	RL08	Overload prevention system & reverse gear	fg.1 cat.27
AV02	Reverse speed acoustic alarm	fg.1 cat.17	IT06	Wiperswitch	fg.1 cat.27	RL11	Starting block relay	fg.1 cat.14-15
AV03	Safe load acoustic indicator	fg.1 cat.22	IT07	Flashing beacon switch	fg.1 cat.23	RL12	Check-control relay	fg.1 cat.14
AV05	Check control acoustic indicator	fg.1 cat.5	IT08	Check control switch to select RPM or Km/h	fg.1 cat.8	RS01	Resistance 2 Kohm	fg.1 cat.22
B 01	Battery 12V	fg.1 cat.12-13	IT09	Work lighting switch	fg.1 cat.35	RS03	Resistance 2200 ohm	fg.1 cat.9
C 01	Condenser type 0,68,10-20%	fg.1 cat.19	LC01	Cab light	fg.1 cat.18-19	RS04	Resistance 10 ohm	fg.1 cat.8
CN01	Glowplug	fg.1 cat.4	LC02	Flashing beacon light	fg.1 cat.23	SL01	Key selector for starting	fg.1 cat.4-5
D 01	Diodes 1N4007		LC03	Load on boom indication light	fg.1 cat.16	SL02	Lights selector	fg.1 cat.30
D 02	Diodes 1N5002		LC04	Stop lights	fg.1 cat.29-30	SL06	Reset Emergency selector	fg.1 cat.21
EV01	Forward speed solenoid valve	fg.1 cat.15	LC05	Parking lights	fg.1 cat.33-34	SL07	Selector normal lights-war lights	fg.1 cat.28-29
EV02	Reverse speed solenoid valve	fg.1 cat.16	LC06	Low beam lights	fg.1 cat.32	SL08	Selector to apply cable winder (optional)	fg.1 cat.2
EV07	Engine stop solenoid valve	fg.1 cat.16	LC07	Driving beams lights	fg.1 cat.31	SN01	Fuel level sensor	fg.1 cat.29
EV09	Servo-controls oil solenoid valve	fg.2 cat.22	LC08	Direction lights	fg.1 cat.21-22	SN02	Hy oil level sensor	fg.1 cat.9
F 1	Fuse 15 A	fg.1 cat.16	LC09	Front work light on cab	fg.1 cat.34-35	SN03	Air filter obstruction sensor	fg.1 cat.10
F 2	Fuse 15 A	fg.1 cat.10	LC10	Rear work light on cab	fg.1 cat.35-36	SP01	Alternator warning light	fg.1 cat.6
F 3	Fuse 25 A	fg.1 cat.6	MC01	Stop lights microswitch	fg.1 cat.27	SP02	Steering warning light	fg.1 cat.13
F 4	Fuse 20 A	fg.1 cat.6	MC02	Stop lights microswitch (ware mode)	fg.1 cat.30-31	SP03	Air filter obstruction warning light	fg.1 cat.10
F 5	Fuse 20 A	fg.1 cat.23	MC03	Safe load indicator microswitch on wheel	fg.1 cat.21	SP04	Oil pressure warning light	fg.1 cat.11
F 6	Fuse 20 A	fg.1 cat.26	MC05	Steering microswitch	fg.1 cat.13	SP05	Hy oil level warning light	fg.1 cat.8
F 7	Fuse 30A	fg.1 cat.35	MC06	Parking brake microswitch	fg.1 cat.7	SP06	Water max. temperature warning light	fg.1 cat.9
F 8	Fuse 15 A	fg.1 cat.31	MP01	Running direction lever (on steering wheel)	fg.1 cat.16	SP07	Lights on warning light	fg.1 cat.33
F 9	Fuse 20 A	fg.1 cat.22	MT01	Starter	fg.1 cat.2	SP08	Driving beams warning light	fg.1 cat.30
F 10	Fuse 15 A	fg.1 cat.34	MT02	Motor for wiper	fg.1 cat.26	SP11	Parking brake warning light	fg.1 cat.7
F 11	Fuse 15 A	fg.1 cat.32	MT03	Motor for roof wiper (optional)	fg.1 cat.25	SP13	Red warning light for emergency on	fg.1 cat.22
F 12	Fuse 30 A	fg.1 cat.4	MT04	Motor for rear wiper	fg.1 cat.27	SP14	Direction indicators warning light	fg.1 cat.19
IN01	Intermittence 45 W	fg.1 cat.20	MT05	Motor for wiper tank	fg.1 cat.26	SP15	Safe load indicator warning light	fg.1 cat.16
IN02	Safe load indicator intermittence	fg.1 cat.17	MT05A	Motor for rear wiper tank	fg.1 cat.26	SP16	Overheating warning light	fg.1 cat.12
IT 1	Electrical master switch	fg.1 cat.10	MT06	Heater motor	fg.1 cat.24-25	ST01	Fuel level gauge	fg.1 cat.28
IT 2	Circuit breaker	fg.1 cat.3	PS01	Engine oil pressure switch	fg.1 cat.11	ST02	Speedometer-Revol. indicator-Hour counter	fg.1 cat.8
IT01	4 Arrows switch	fg.1 cat.21	PT03	Electric horn push button	fg.1 cat.13	TS01	Water thermostat	fg.1 cat.9
IT02	Directions lights switch (on steering wheel)	fg.1 cat.20	PX01	Proximity for speedometer	fg.1 cat.8	TS02	Hy transmission oil thermostat	fg.1 cat.12
IT03	Electrofan switch	fg.1 cat.25	RL01	Starting relay	fg.1 cat.5			

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FUSES LAYOUT ON INSTRUMENT BOARD

F1 - 15A	F4 - 20A	F7 - 30A	F10 - 15A
F2 - 15A	F5 - 20A	F8 - 20A	F11 - 15A
F3 - 25A	F6 - 20A	F9 - 20A	F12 - 30A

POS.	TYPE	DENOMINATION
F1	15A	FORWARD AND REVERSE GEAR SOLENOID VALVE / REVERSE SPEED ACOUSTIC ALARM / START LOCK RELAY / CHECK CONTROL RELAY / ELECTRONIC CARD
F2	15A	SELECTOR OPERATING OVERLOAD PREVENTION SYSTEM ISOLATION AND LOCK OF CONTROLS FOR ROAD TRAVELLING / RIB WASHING LIGHT FOR OVERLOAD PREVENTION SYSTEM ISOLATION / OVERLOAD PREVENTION SYSTEM WARNING LIGHT AND ACOUSTIC ALARM / PROXIMITY FOR SPEEDOMETER / HOUR
F3	25A	FUEL LEVEL GAUGE / LOW BATTERY WARNING LIGHT / CRAB STEER INDICATOR LIGHT / PARKING BRAKE INDICATOR LIGHT / COOLANT TEMPERATURE WARNING LIGHT / ENGINE OIL PRESSURE WARNING LIGHT / NR CLEANER OBSTRUCTION WARNING LIGHT / HYDROSTATIC TRANSMISSION TANK OIL LEVEL WARNING LIGHT / HYDROSTATIC TRANSMISSION OIL TEMPERATURE WARNING LIGHT / ENGINE STOP SOLENOID VALVE
F4	20A	CHECK CONTROL ACOUSTIC INDICATOR / SPEEDOMETER - REVOLUTION INDICATOR - HOUR COUNTER
F5	20A	STOP LIGHTS / DIRECTION INDICATORS LIGHTS/DIRECTION INDICATORS WARNING LIGHT
F6	20A	HEATING SYSTEM ELECTRIC FAN / MOTOR FOR FRONT GLASS WASHING TANK / MOTOR FOR REAR GLASS WASHING TANK / FRONT WIPER / REAR WIPER
F7	30A	SWITCH/AGENT WORK LIGHTS ON CAB AND ON BOOM/SWITCH/HEAT WORK LIGHTS
F8	15A	DRIVING BEAM LIGHTS / DRIVING BEAMS WARNING LIGHT
F9	20A	EMERGENCY BLINKING / EMERGENCY BLINKING SWITCH/CAB LIGHT/FLASHING BEACON LIGHT / FLASHING BEACON SWITCH
F10	15A	PARKING LIGHTS / PARKING LIGHTS INDICATOR LIGHT/FUEL LEVEL INDICATOR LIGHTING SPEEDOMETER - REVOLUTION INDICATOR - HOUR COUNTER LIGHTING
F11	15A	LOW BEAM LIGHTS
F12	30A	GLOWPLUG

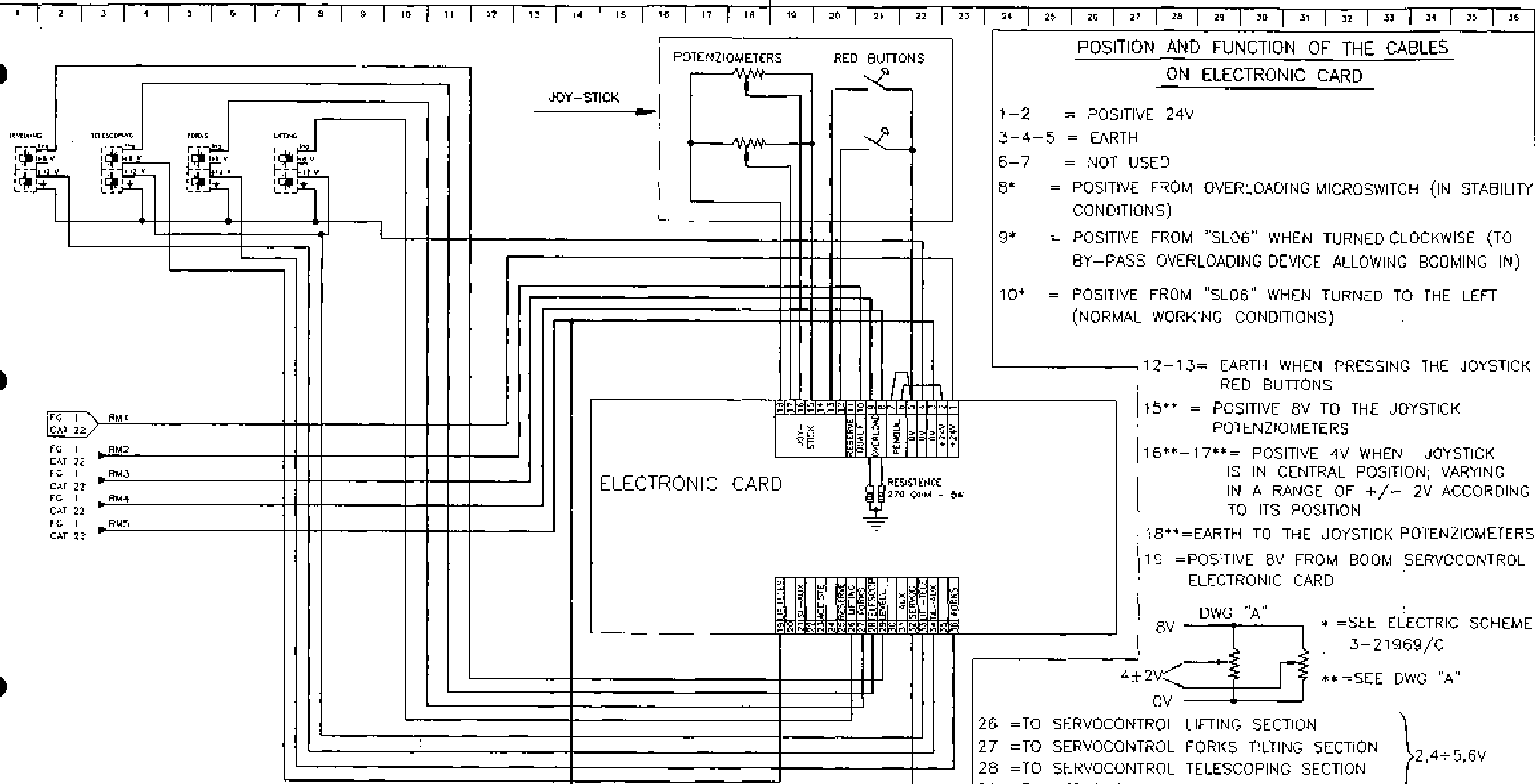
▲ WAR LIGHTS LAYOUT ON VEHICLE

SUBJECT: **PANORAMIC 35.9 EVA ELECTRIC SCHEME**

DRAWING NUMBER: **3-21969/C** DRAFTSMAN: **PEANO** CHECK: REGISTRATION: SCALE: DATE: **14.12.95**

PART NUMBER: **EPBAD** PAGE: **1/2** HEIGHT: NO:

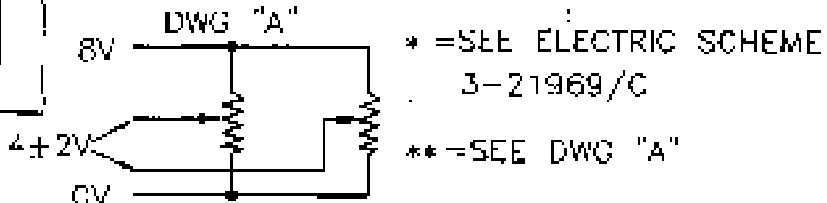
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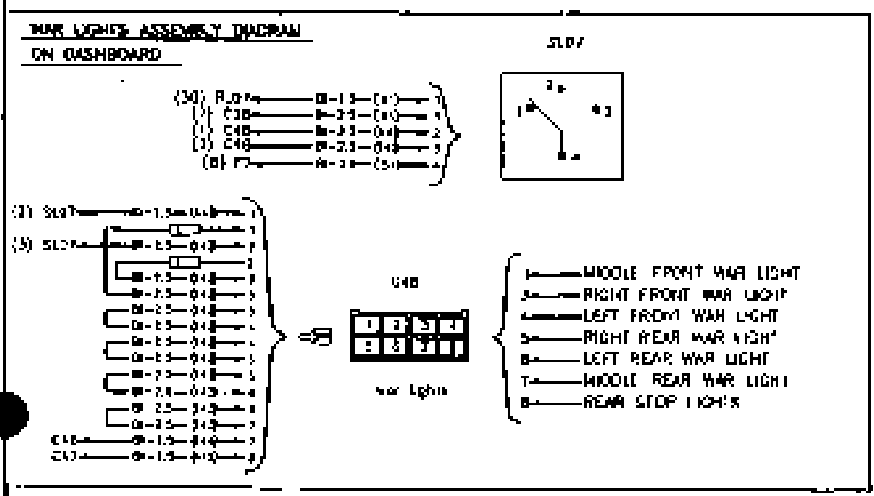
POSITION AND FUNCTION OF THE CABLES ON ELECTRONIC CARD

1-2 = POSITIVE 24V
 3-4-5 = EARTH
 6-7 = NOT USED
 8* = POSITIVE FROM OVERLOADING MICROSWITCH (IN STABILITY CONDITIONS)
 9* = POSITIVE FROM "SLO6" WHEN TURNED CLOCKWISE (TO BY-PASS OVERLOADING DEVICE ALLOWING BOOMING IN)
 10* = POSITIVE FROM "SLO6" WHEN TURNED TO THE LEFT (NORMAL WORKING CONDITIONS)

12-13 = EARTH WHEN PRESSING THE JOYSTICK RED BUTTONS
 15** = POSITIVE 8V TO THE JOYSTICK POTENZIOMETERS
 16**-17** = POSITIVE 4V WHEN JOYSTICK IS IN CENTRAL POSITION; VARYING IN A RANGE OF +/- 2V ACCORDING TO ITS POSITION
 18** = EARTH TO THE JOYSTICK POTENZIOMETERS
 19 = POSITIVE 8V FROM BOOM SERVOCONTROL ELECTRONIC CARD



- 26 = TO SERVOCONTROL LIFTING SECTION
 - 27 = TO SERVOCONTROL FORKS TILTING SECTION
 - 28 = TO SERVOCONTROL TELESCOPING SECTION
 - 29 = TO SERVOCONTROL FRAME LEVELLING SECTION
 - 32 = TO SERVOCONTROL MAIN SOLENOID VALVE 24V
 - 33 = TO SERVOCONTROL LIFTING/TELESCOPING SECTION
 - 34 = TO SERVOCONTROL FRAME LEVELLING SECTION
 - 36 = TO SERVOCONTROL FORKS TILTING SECTION
- } 2,4+5,6V
 } 24V



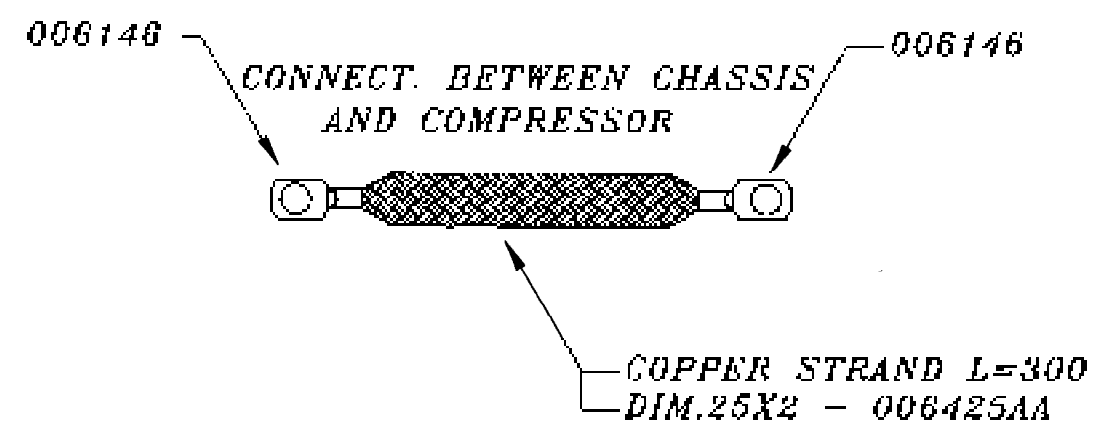
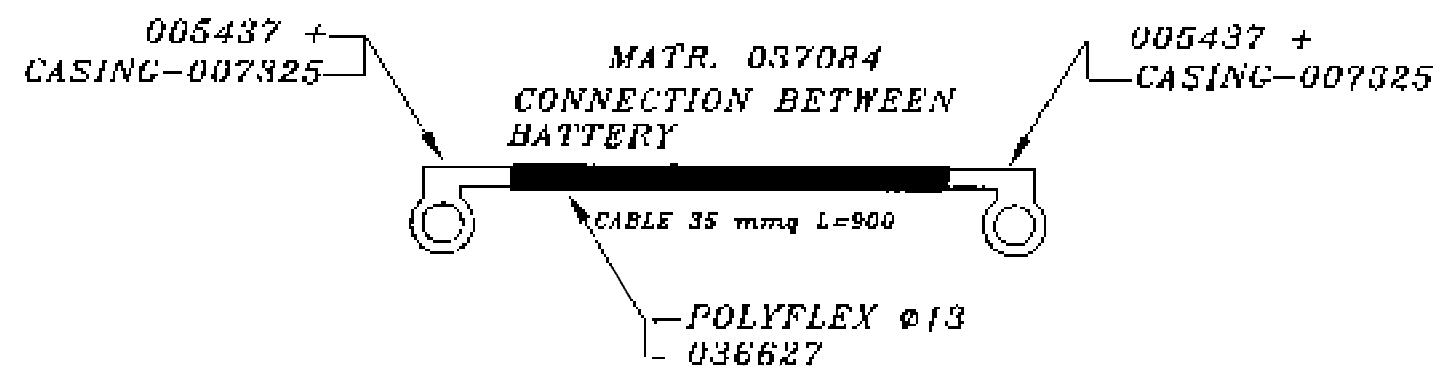
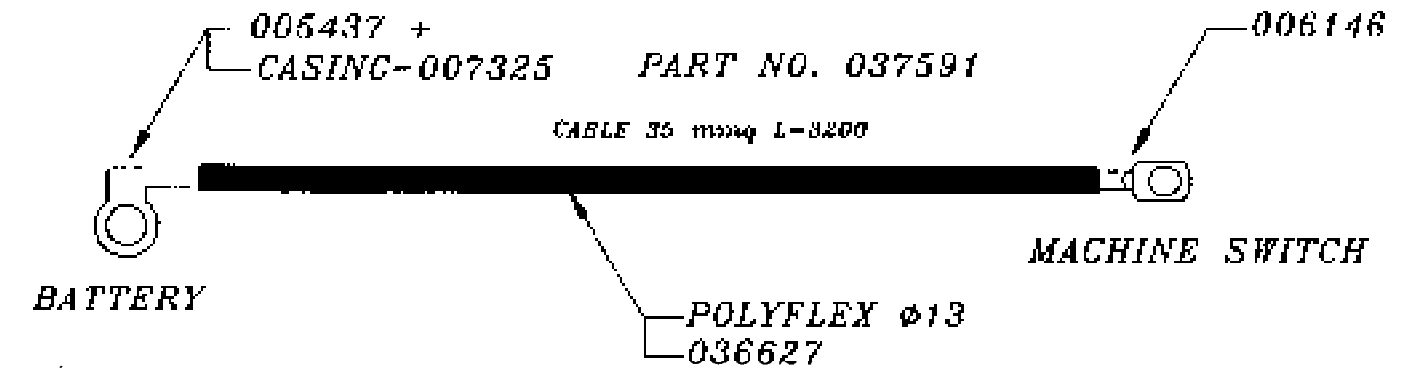
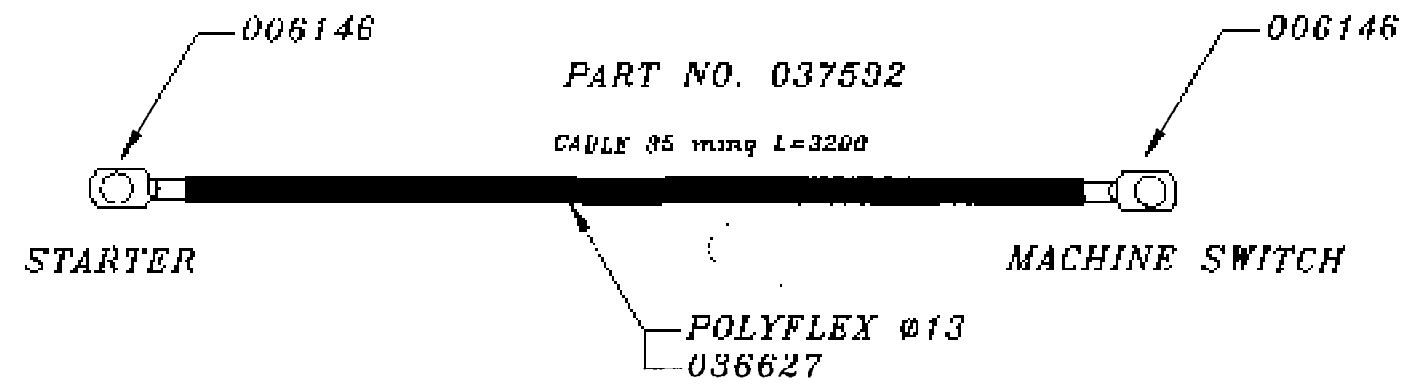
SUBJECT: **PANORAMIC 35.9 EVA ELECTRIC SCHEME**

DRAWING NUMBER: **3-21969/C** DRAFTSMAN: **PEANO** CHECK: REGISTRATION: SCALE: DATE: **14.12.95**

PART NUMBER: **EPBAD** WEIGHT KG:

PAGE 2/2

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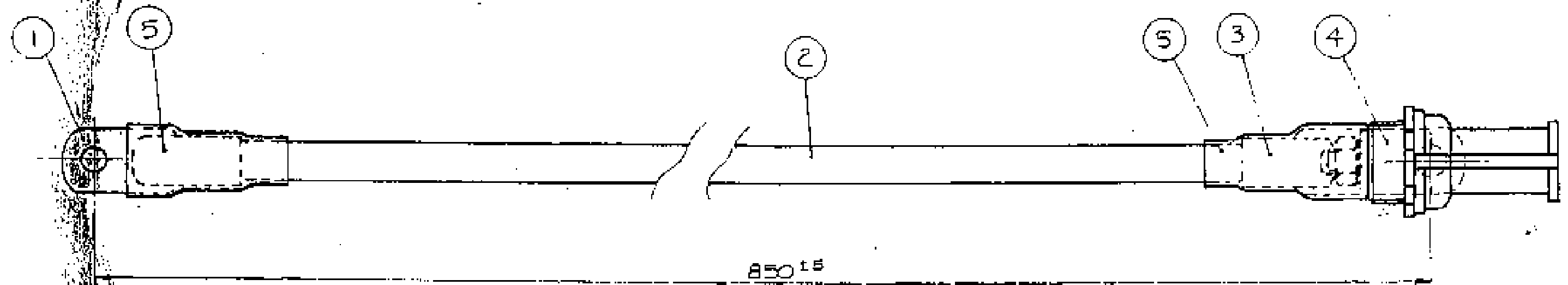
SUBJECT: **POWER SUPPLY CABLE 24V-PANO 35.9 EVA**

DRAWING NUMBER	DRAFTMAN	CHECK	REGISTRATION	SCALE	DATE
3-21998	PEANO				28.12.95
PART NUMBER				WEIGHT KG	

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CODE	ITEM	PART NUMBER	DESCRIPTION	QTY	REMARKS
	1		TERMINAL LUG 5/16"	1	UTILUX H203
	2		RED SHEATHED CABLE	830	2B & S
	3		TERMINAL LUG 3/8"	1	UTILUX H204
	4		BATTERY JUMPER TERMINAL	1	BRITAX M46210-02
	5		RED HEAT SHRINK	AR	



830 ± 15
LUG HOLES BEFORE 90° BEND

NOTES

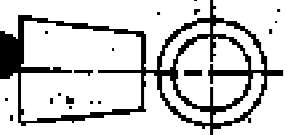
1. BEND LUG ITEM 3 90° ALLOWING ENOUGH CLEARANCE FOR NUT ON ITEM 4.
2. APPLY RED HEAT SHRINK TO ITEMS 1 & 3 ENSURING MAXIMUM INSULATION OF CONDUCTIVE SURFACES OF TERMINAL LUGS

ISSUED
16 SEP 1996
DESTROY PRINTS
OF PREVIOUS ISSUE

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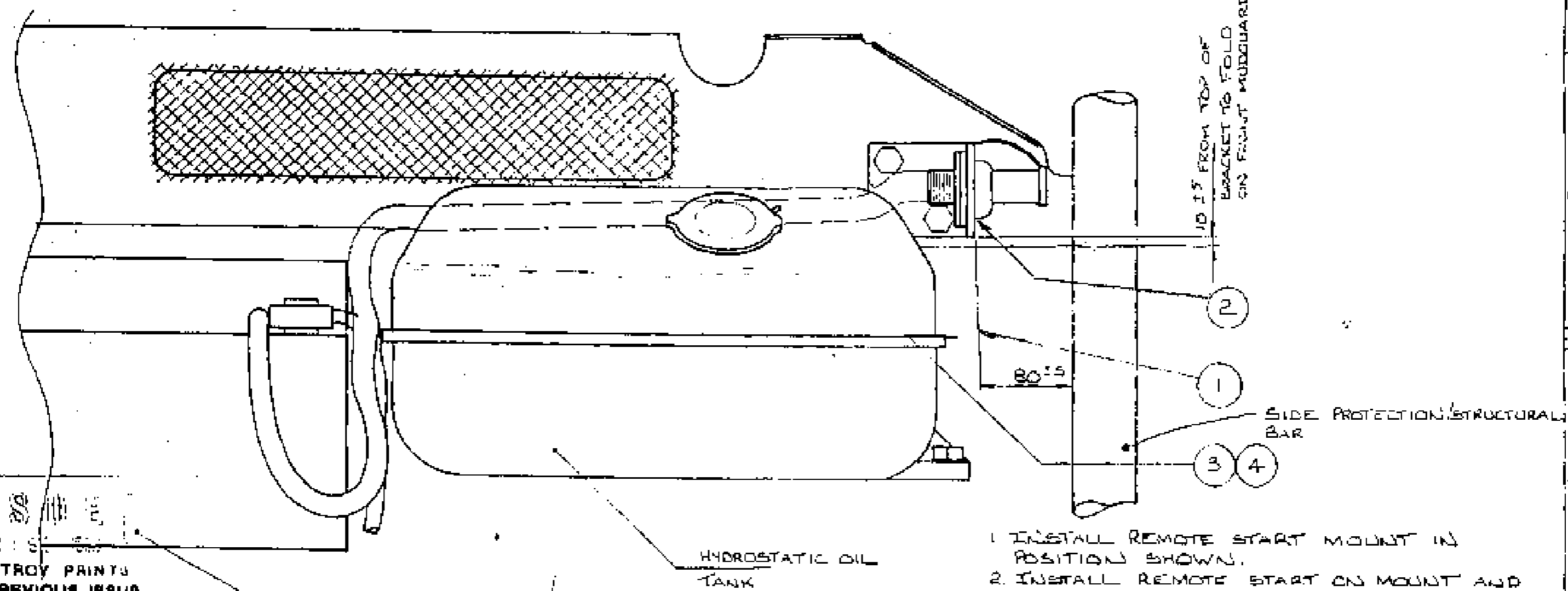
PURPOSES		DO NOT SCALE DRAWING			Domino Mining Equipment Pty Ltd		SCALE
NOT TO BE USED FOR MANUFACTURE		ISSUE No	1 2		TITLE		N.T.S
		DRAWN	LEWIS 20-1-96		REMOTE START		DRAWING NO
		TRACED			TERMINAL, ARMY MERLO		15051-4
DATE	REV	REVISION	APPROVED	PTL	20/1/96		SHEET OF

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CODE	ITEM	PART NUMBER	DESCRIPTION	QTY	REMARKS
S	1	15031-7	REMOTE START MOUNT	1	
S	2	15051-4	REMOTE START CABLE	1	
C	3		M6 X 10 X 20 BOLT	2	
C	4		M6 NYLON NUT	2	



1. INSTALL REMOTE START MOUNT IN POSITION SHOWN.
2. INSTALL REMOTE START ON MOUNT AND TIGHTEN KEEPER RING AGAINST RUBBER CAP RING.
3. LOOP CABLE BEHIND HYDROSTATIC OIL TANK THEN BRING CABLE AROUND BETWEEN TANK & BATTERIES.
4. INSTALL CABLE LUG ON BATTERY CLOSEST TO ENGINE ON LH SIDE OF POSITIVE TERMINAL.

DESTROY PRINTS OF PREVIOUS ISSUES

UNCONTROLLED DOCUMENT

VIEW LOOKING TOWARDS FRONT OF MACHINE

NO	DATE	REF	REVISION
			BRACKET MOVED UP

DO NOT SCALE DRAWING

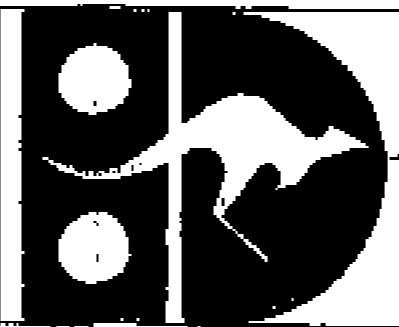
ISSUE No X 2

DRAWN L. BURNS 5-2-96

TRACED

VERIFIED

APPROVED W. R. [Signature] 5-2-96



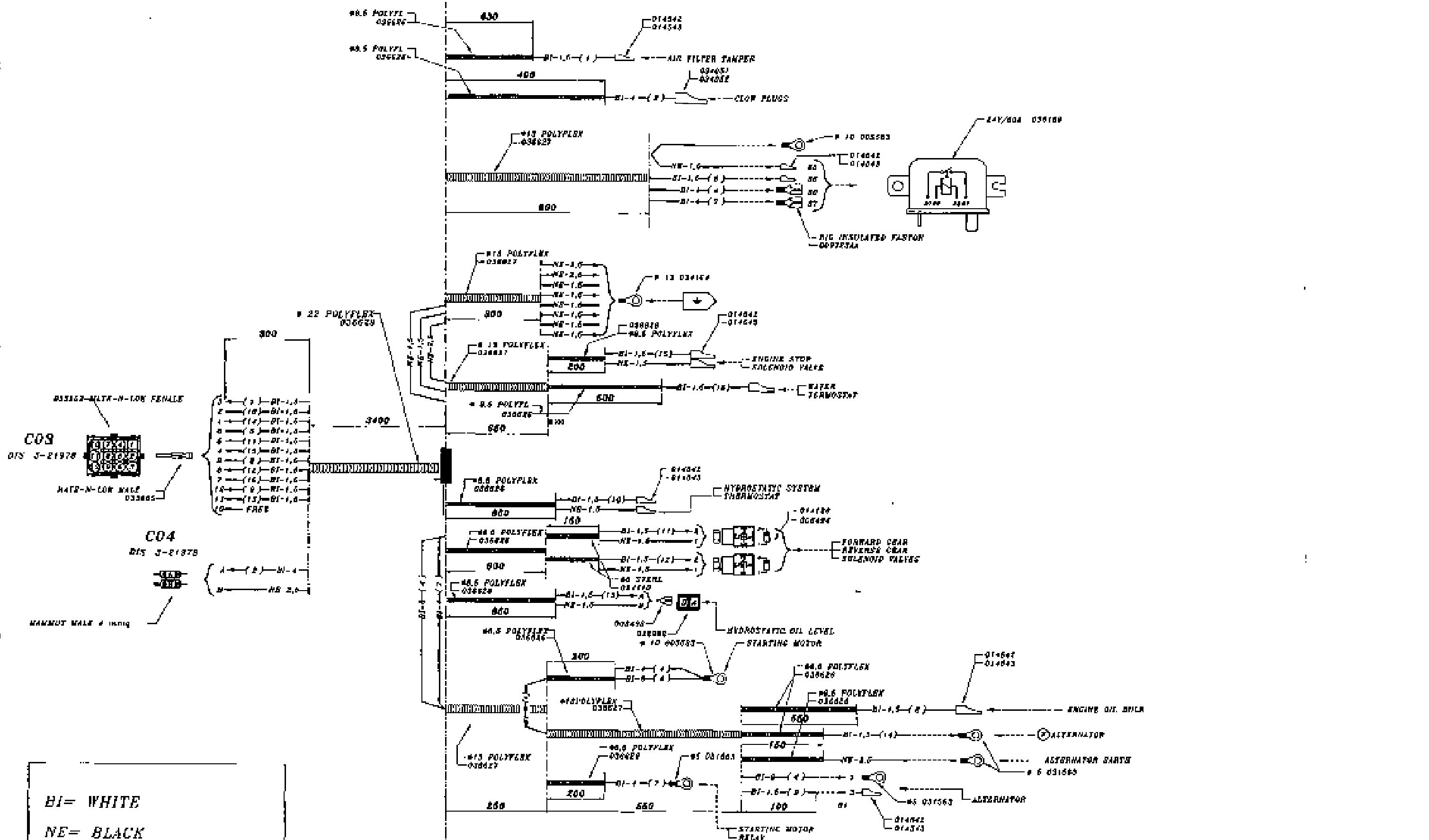
Domino Mining
Equipment Pty Ltd

N.T.S.

TITLE
REMOTE START LOC'N
ARMY MERLO

DRAWING NO
ARMY-MERLO-14


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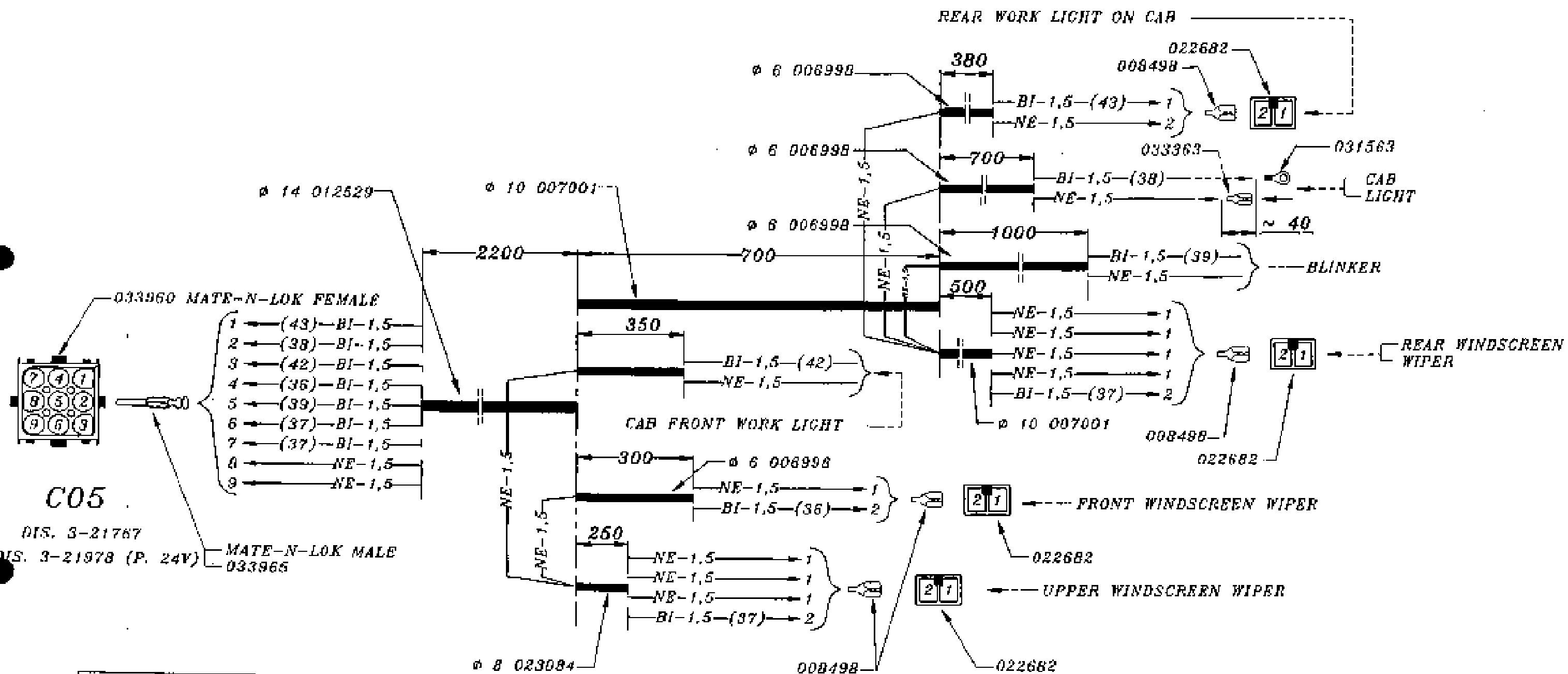
BI= WHITE
 NE= BLACK
 DIS.= DRAWING (SEE.....)

SUBJECT: ENGINE CABLE PAN. 35.9 EVA (24V)

DRAWING NUMBER	DRAFTMAN	CHECK	REGISTRATION	SCALE	DATE
3-21979	PEANO				19.12.95
PART NUMBER					WEIGHT KG
037068					


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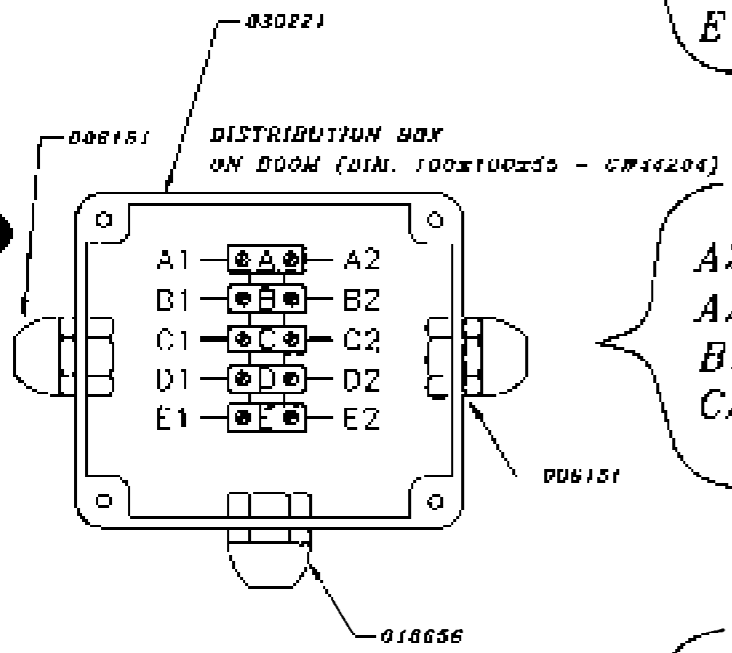
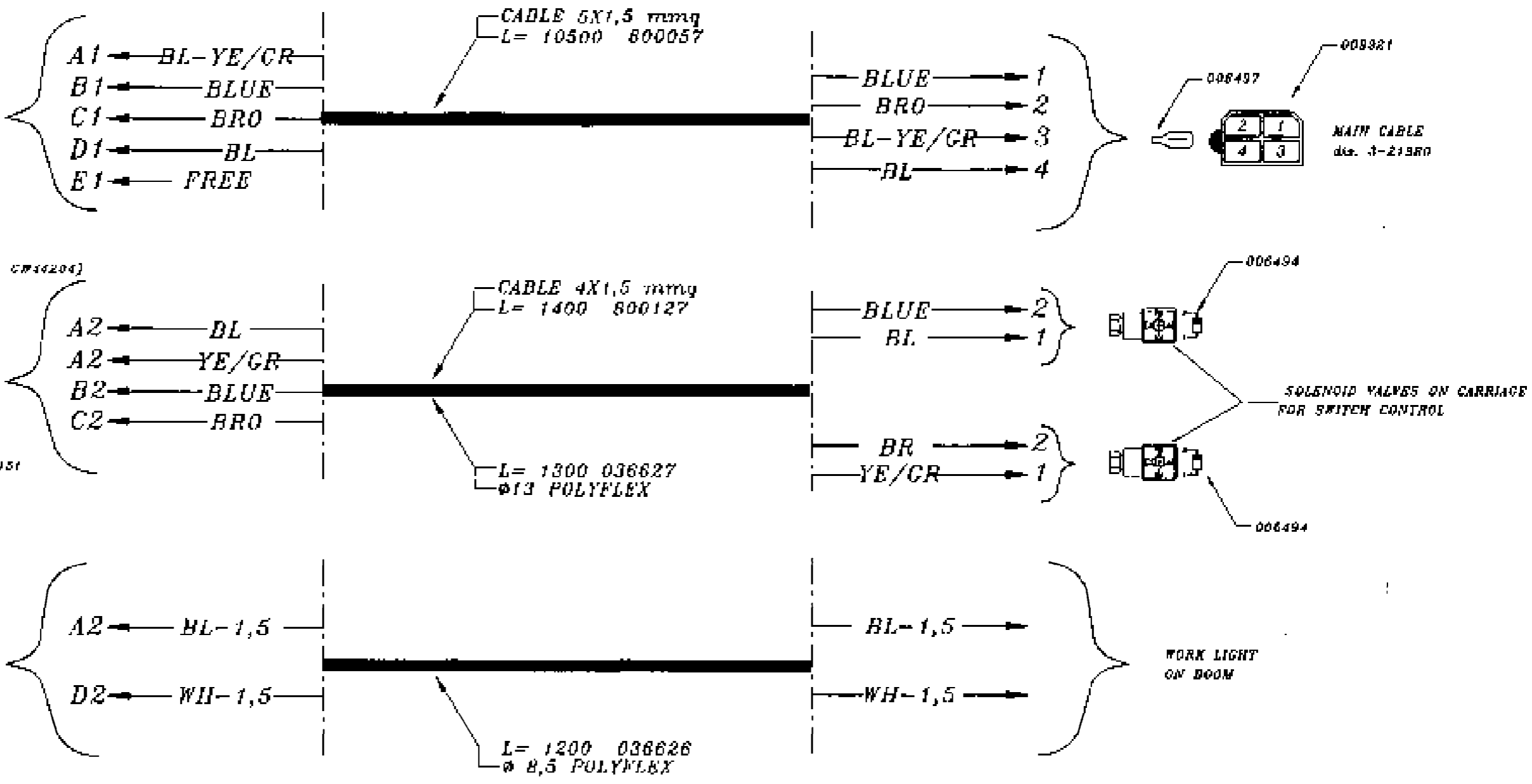


BI= WHITE
 NE= BLACK
 DIS.= DRAWING (SEE.....)

SUBJECT: PAN. 35.9 EVA SERVICES IN CAB CABLE

DRAWING NUMBER	DRAWN BY	CHECK BY	REGISTRATION	SCALE	DATE
3_20812/A	CAMPANA				30.01.95
PART NUMBER	WEIGHT KG.	MOTELCO S.p.A. CONSO ITALY			
035587					

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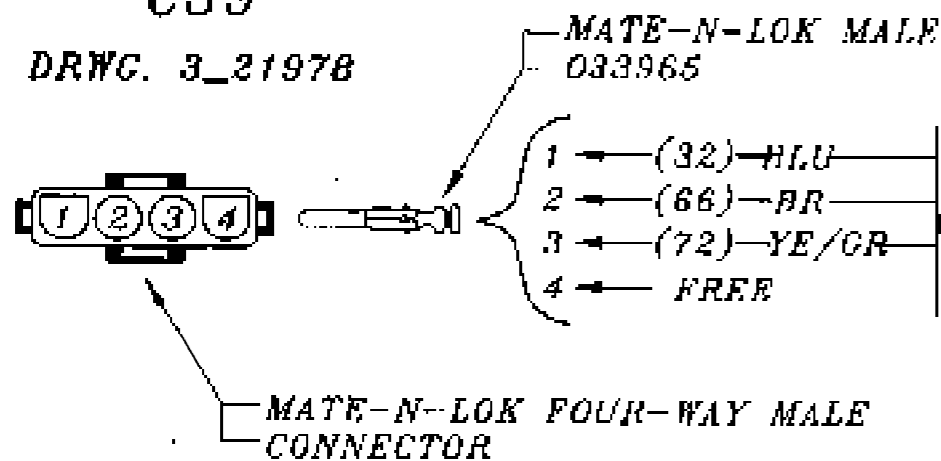
DIS. = DRAWING (SEE.....)

SUBJECT: PAN. 35.9 (24V) BOOM CABLES				
DRAWING NUMBER	DRAFTMAN	CHECK	REGISTRATION	SCALE
3-21987/A	PEANO			
PART NUMBER			WEIGHT KG.	DATE
037086				22.12.95

MERRIO S.p.A. CUNEO ITALY

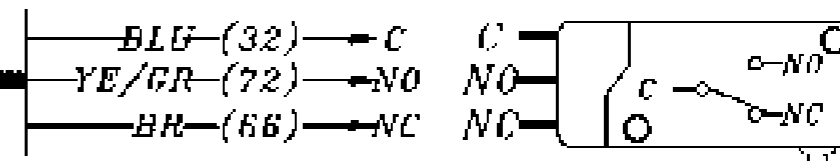
UNCONTROLLED WHEN PRINTED

C39
DRWG. 3_21978

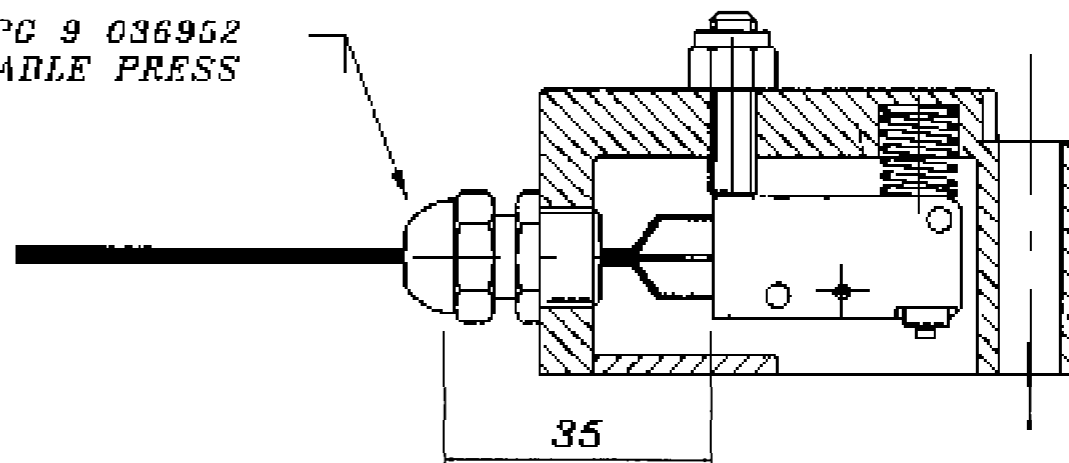


CABLE 3X1mmq
L= 5800 800019

034931 3A 250V
MATSUSHITA ABV 121061



PG 9 036952
PVC CABLE PRESS

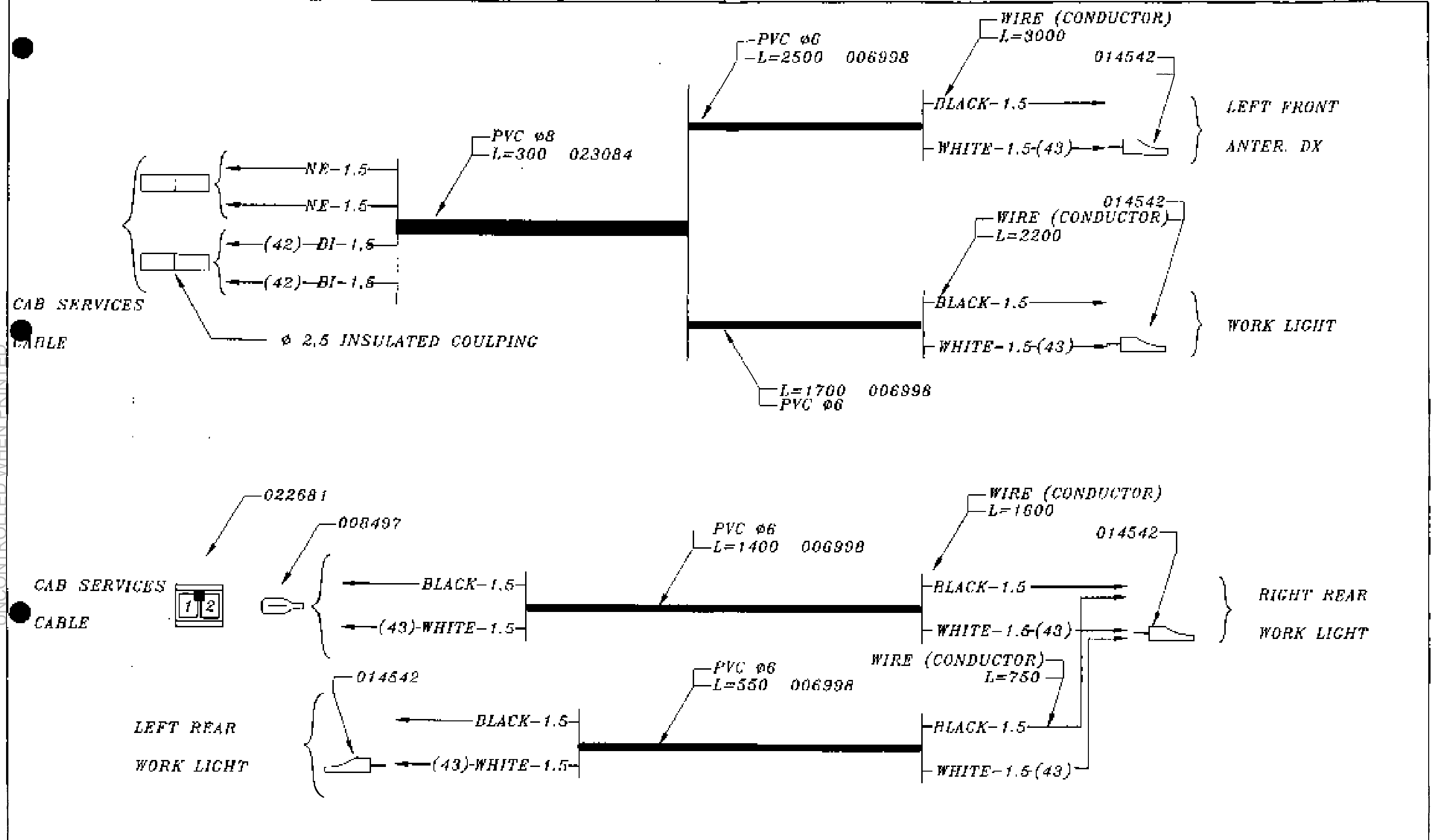


SUBJECT: OVERLOADING MICRO-SWITCH MAIN CABLE P.35.9(24V)EVA

DRAWING NUMBER	DRAFTER	CHECK	REGISTRATION	SCALE	DATE
3-21768	PEANO				27.10.95
PART NUMBER				WEIGHT KG.	
036951					

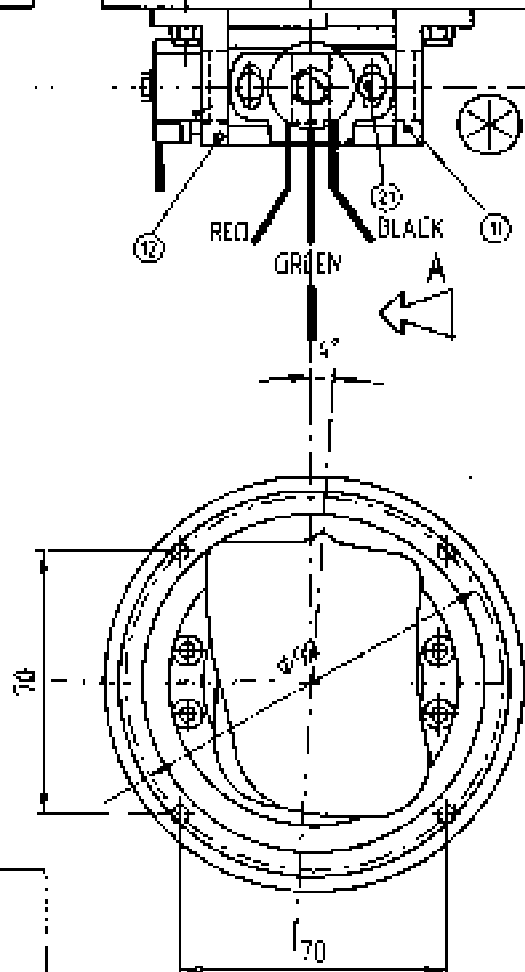
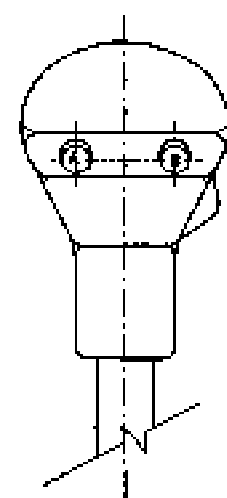
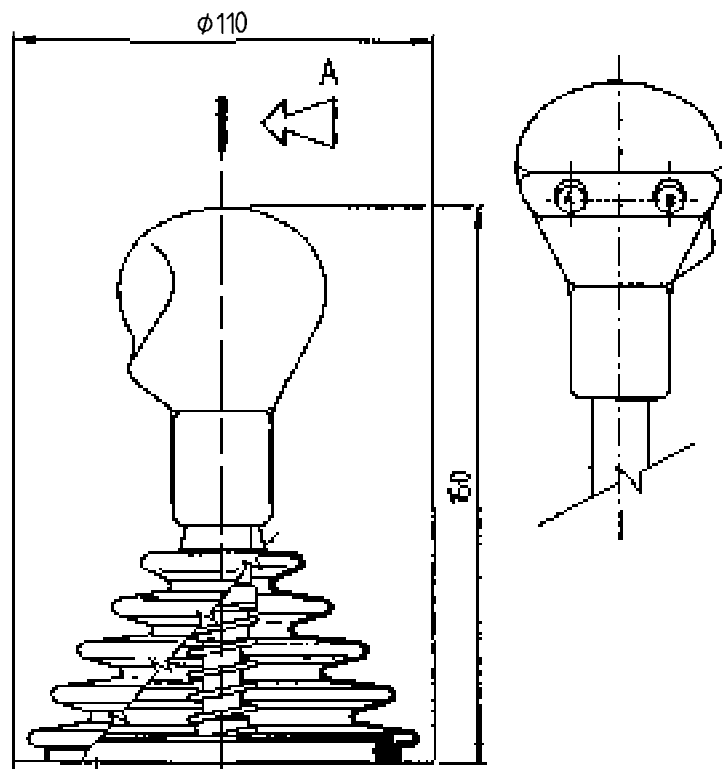
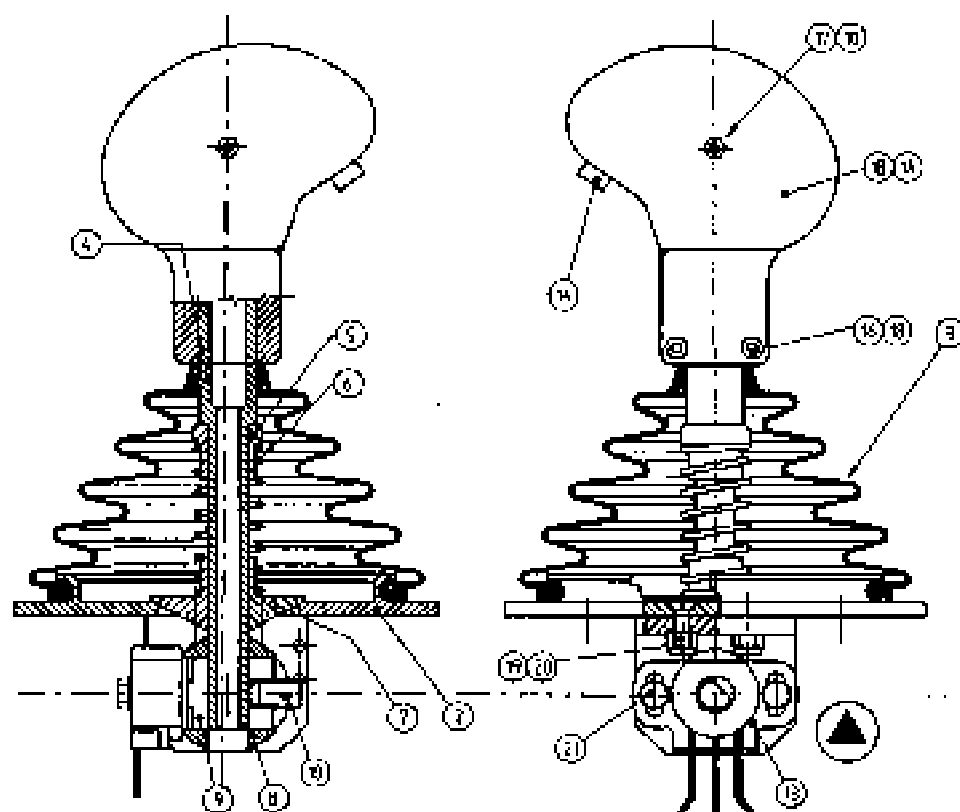


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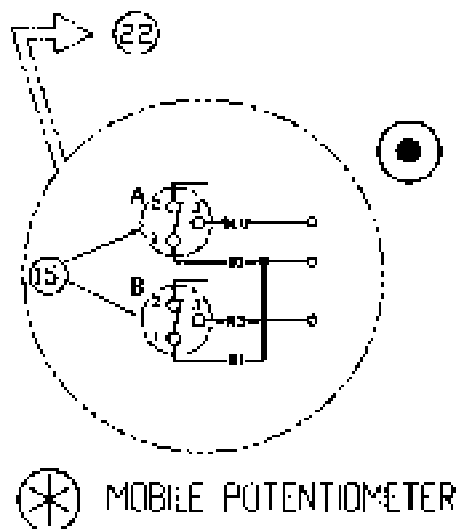
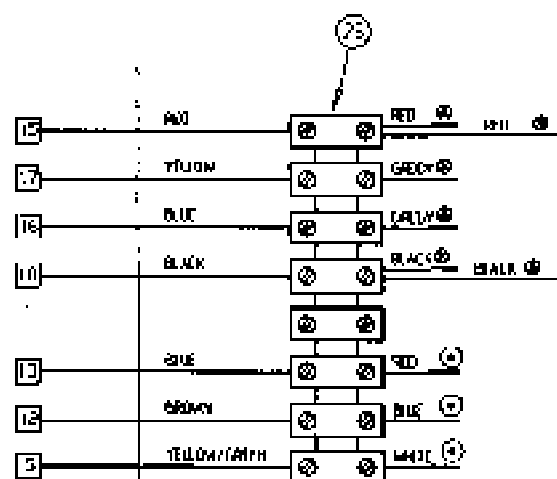
SUBJECT: CABLES FOR WORK LIGHT ON CAB P.35.9 EVA (24V)					
DRAWING NUMBER	DESIGNER	CHECK	REGISTRATION	SCALE	DATE
3-22262/A	PEANO				18.03.96
PART NUMBER				WENCH. KG.	
037774					

SEZ. A-A



POTENTIOMETER SETTING

- 1) REMOVE 4 BELTS AND EXTRACT THE JOYSTICK FROM THE HOUSING
- 2) DISCONNECT FROM THE CLAMP THE 3 WIRES (RED, GREEN, BLACK) OF THE POTENTIOMETER TO BE ADJUSTED
- 3) BY MEANS OF A MULTIMETER SET ON CONTINITY (OHM), VERIFY THAT BETWEEN RED AND GREEN YOU HAVE THE SAME RESISTANCE THAT YOU HAVE BETWEEN BLACK AND GREEN (WITH THE JOYSTICK IN NEUTRAL POSITION)
- 4) IN CASE OF ADJUSTMENT, RELEASE TWO RETAINING SCREWS AND SWING SLOWLY THE POTENTIOMETER IN ORDER TO GET THE A.M. SETTING



POS.	DESCRIPTION	MATERIAL	Q.TA'	UNDESIGNO	WTR	Q.T.	NOTE
24	GROWER WASHER # 4	COMM.	2	-	850764	-	-
23	8 WAY MAMMUT TERMINAL BOARD	COMM.	1	-	006147AA	-	-
22	SCREENED 4X0,22 ELECTRIC CABLE	COMM.	0,4m	-	800061	-	-
21	SCREW TCE M4X20	COMM.	4	-	850420	-	-
20	NUT ATEL M4 BA=4,8	COMM.	4	-	851118	-	-
19	SCREW TSEI M4X14	COMM.	4	-	851119	-	-
18	NUT NOR. M3	COMM.	3	-	850822	-	-
17	SCREW TCE M3X45	COMM.	1	-	851116	-	-
16	SCREW TCE M3X25	COMM.	2	-	851117	-	-
15	MICROSWITCH 3A 250V	COMM.	2	-	034931	-	-
14	PUSH BUTTON FOR JOY-STICK	PLASTIC	2	4-20556	034929	-	-
13	POTENZIOMETER 5Kohm	COMM.	2	-	035112	-	-
12	PAWL SUPPORT TAB	ERTALYTE	1	4-20612	035013	-	-
11	POTENZIOMETER FASTENING TAB	ERTALYTE	1	4-20613	035015	-	-
10	M4X14 POINTED DOWEL	COMM.	1	-	850356	-	-
9	LEVER FASTENING PAWL	INOX	1	20611_4A	035012	-	-
8	POTENZIOMETER'S FASTENING PAWL	ERTALYTE	1	20610_3A	035019	-	-
7	LEVER CENTERING BUSHING	BRONZE	1	4-20614A	035014	-	-
6	COMPRESSION SPRING	C72	1	4-20617	034978	-	-
5	SPRING STRIKING BUSHING	ERTALYTE	1	4-20615A	035016	-	-
4	JOY-STICK LEVER	CAO	1	20616_4A	035017	-	-
3	RUBBER CASING	RUBER	1	4-20650	035027	-	-
2	POTENZ. SUPP. TABS FAST. WASH.	CHARGED NYLON	1	3-20609A	035018	-	-
1B	RIGHT HALF KNOB	PLASTICA	1	-	034983	-	-
1A	LEFT HALF KNOB	PLASTICA	1	-	034930	-	-

ELECTRONIC CARD
OS 3-21999

▲ FIXED POTENTIOMETER * MOBILE POTENTIOMETER

PUSH BUTTON CHECK

- 1) REMOVE 4 BELTS AND EXTRACT THE JOYSTICK FROM THE HOUSING
- 2) DISCONNECT FROM THE CLAMP THE WIRES (RED,BLUE,WHITE)
- 3) BY MEANS OF A MULTIMETER SET ON CONTINUITY (OHM) VERIFY THAT
 - A) WHEN PRESSING "A" BUTTON THE CIRCUIT WHITE/BLUE CLOSES
 - B) WHEN PRESSING "B" BUTTON THE CIRCUIT WHITE/RED CLOSES

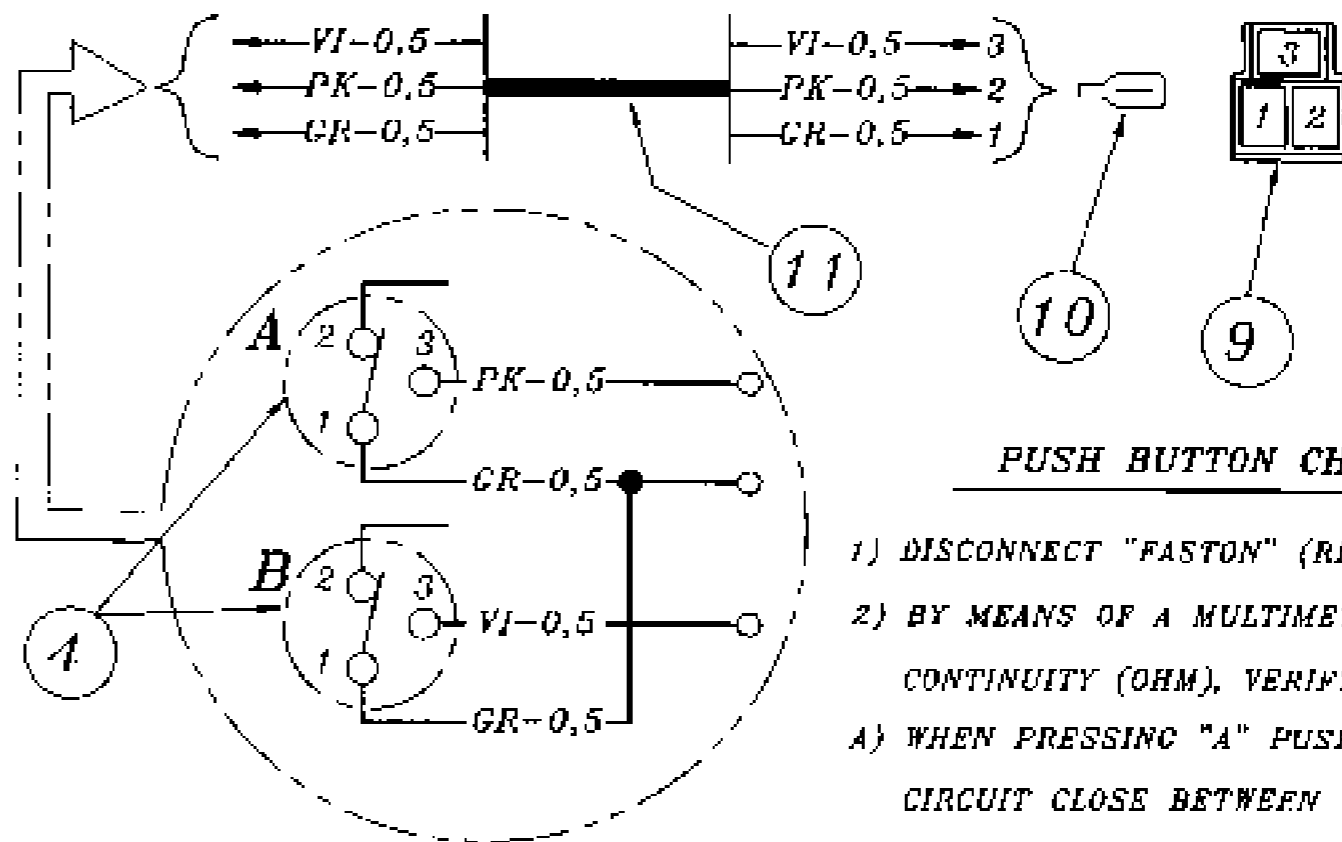
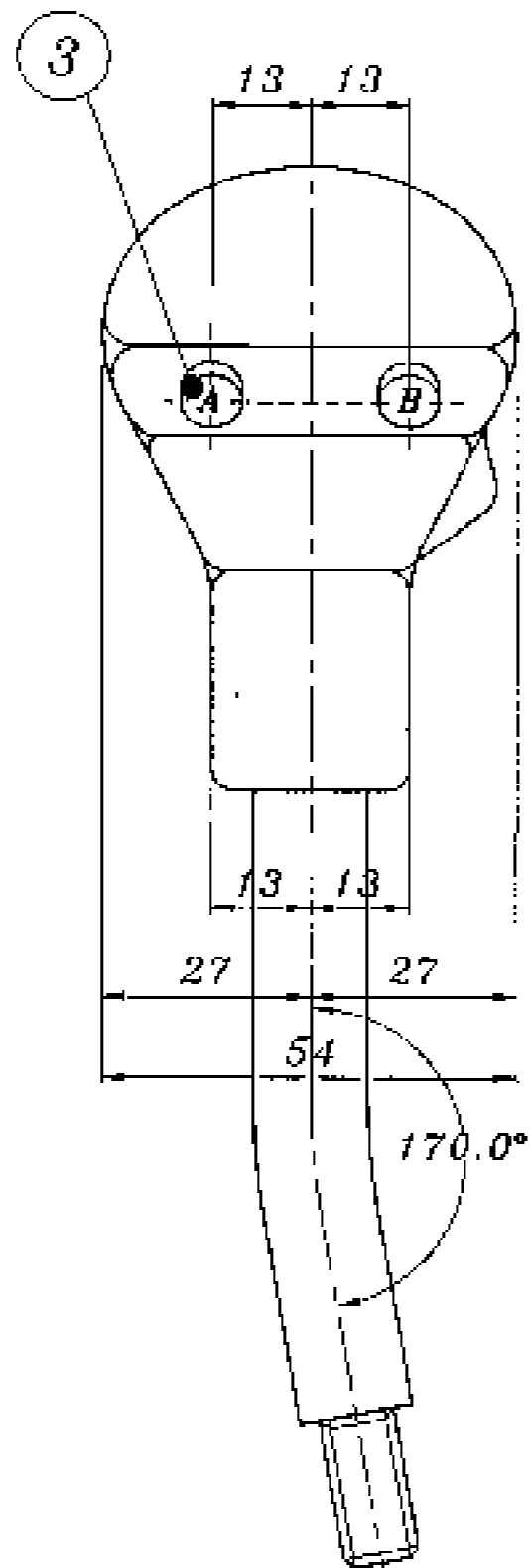
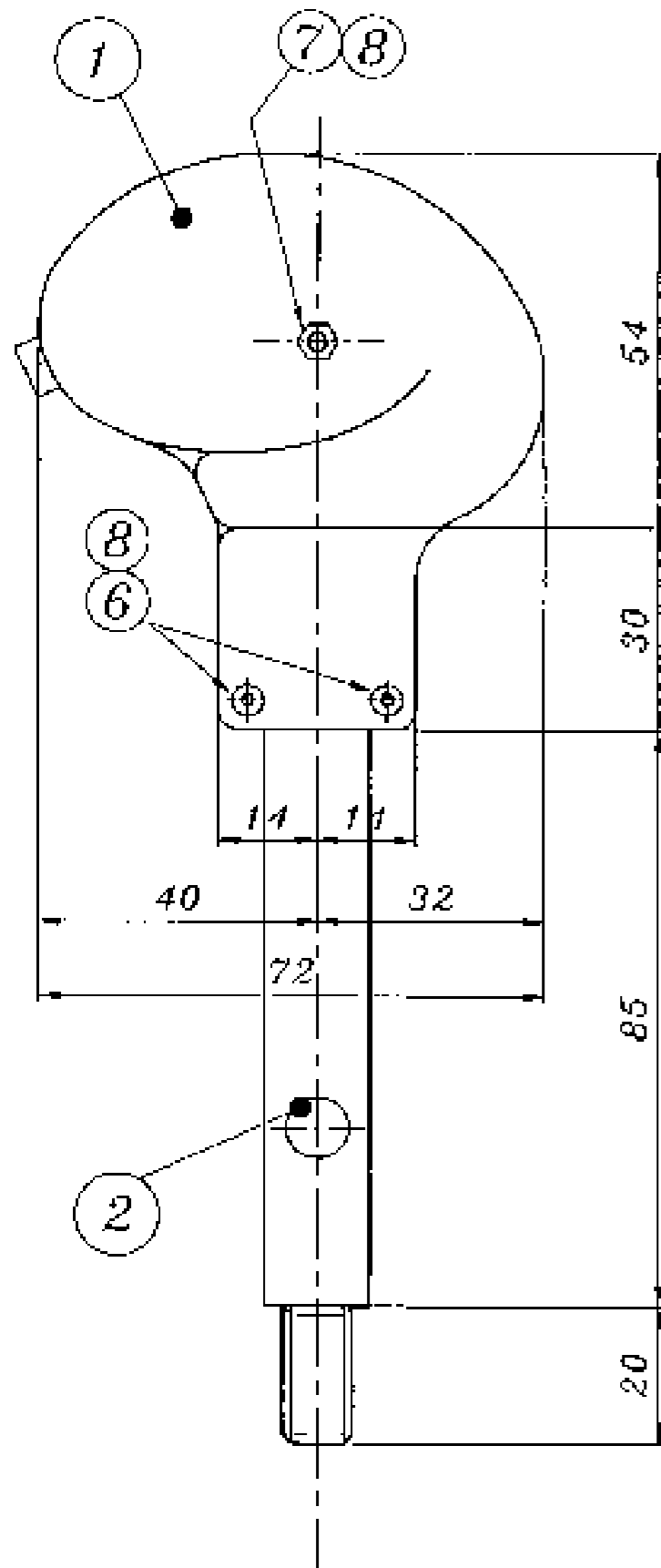
SUBJECT: **PANO.35.9-EVA-MONOLEVER-JOY-STICK-PRE-ASSEMBLY**

DRAWING NUMBER	DRAFTMAN	CHECK	REGISTRATION	SCALE	DATE
3-21868	PEANO			1:2	08.01.96
PART NUMBER	HEIGHT NO.				
037115					

MEPLG SpA CLONED ITALY

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PUSH BUTTON CHECK

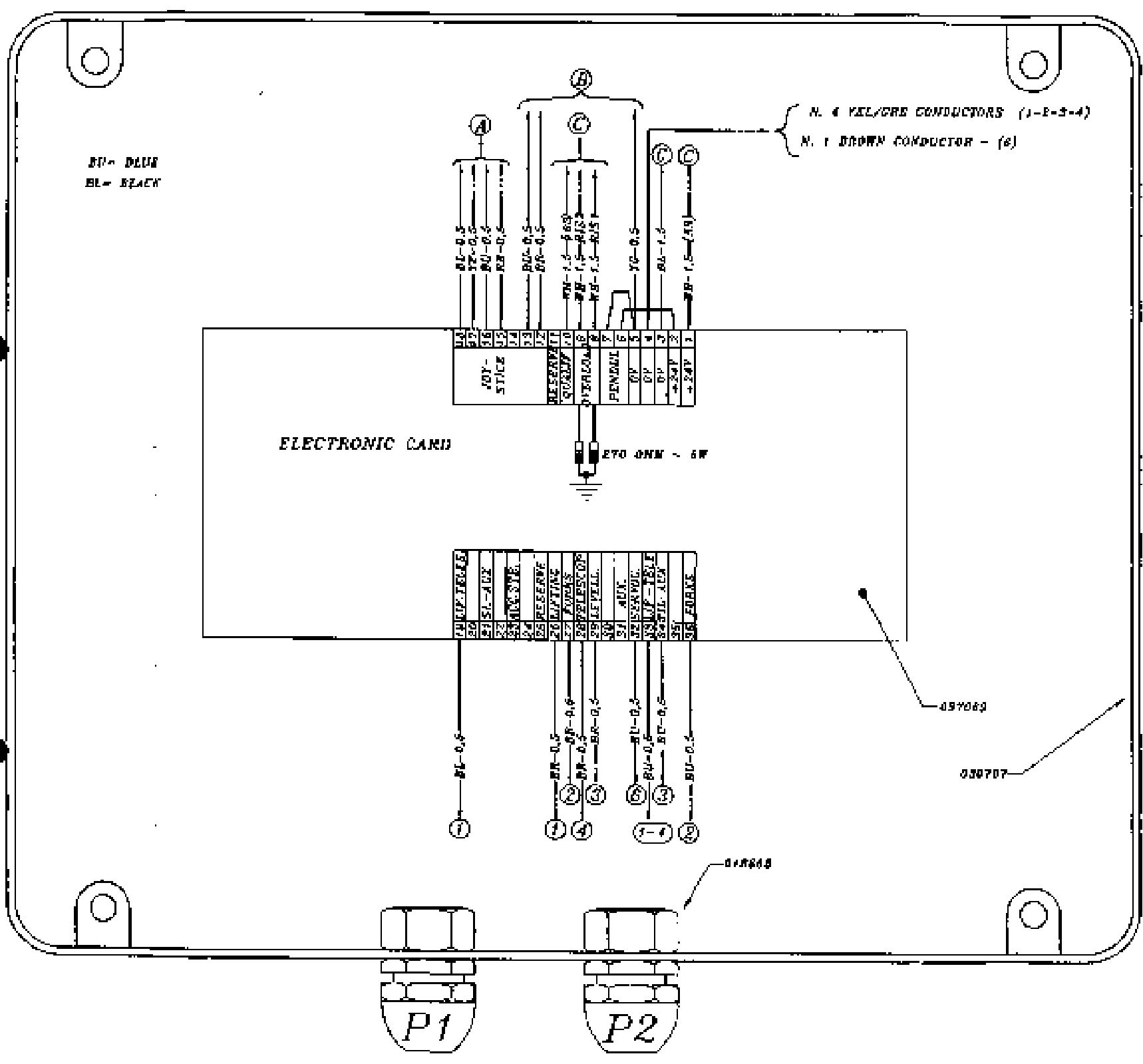
- 1) DISCONNECT "FASTON" (REF. 9)
- 2) BY MEANS OF A MULTIMETER SET ON CONTINUITY (OHM), VERIFY THAT:
 - A) WHEN PRESSING "A" PUSH BUTTON THE CIRCUIT CLOSE BETWEEN 1-2
 - B) WHEN PRESSING "B" PUSH BUTTON THE CIRCUIT CLOSE BETWEEN 1-3

POS.	DESCRIZIONE	MATERIALE	Q.TA'	N.DISEGNO	MATR.	CL.	NOTE
14	PINK 0,5 ELECTRIC WIRE	COMM.	L=0,4 ml	-	800060	-	-
13	GREY 0,5 ELECTRIC WIRE	COMM.	L=0,5 ml	-	800055	-	-
12	VIOLET 0,5 ELECTRIC WIRE	COMM.	L=0,4ml	-	800054	-	-
11	SHEATH Ø6	COMM.	L=0,2 mt	-	006998AA	-	-
10	MALE FASTON	COMM.	3	-	008497AA	-	-
9	MALE FASTON 3-WAY FEN. TERM. BOARD	COMM.	1	-	008392AA	-	-
8	STANDARD NUT M3	COMM.	3	-	850622	-	-
7	SCREW TCE M3X45	COMM.	1	-	851116	-	-
6	SCREW TCE M3X25	COMM.	2	-	851117	-	-
5	SPACER ON JOY-STICK KNOB	PLASTIC	1	4-20552	034927	-	-
4	MICROSWITCH 3A 250V	COMM.	2	-	034931	-	-
3	PUSH-BUTTON FOR JOY-STICK	PLASTIC	2	4-20556	034929	-	-
2	JOY-STICK SUPPORT PIPE	FE37	1	4-21871	037113	-	-
1B	RIGHT HALF-KNOB	PLASTIC	1	-	034983	-	-
1A	LEFT HALF-KNOB	PLASTIC	1	-	034930	-	-

SUBJECT: **JOY-STYCK LEVER PRE-ASSEMBLY P.35.9 EVA**

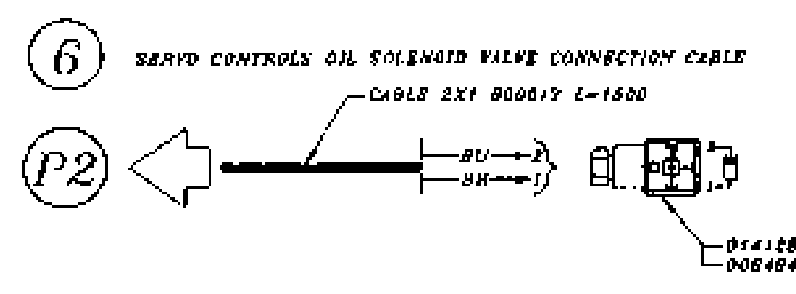
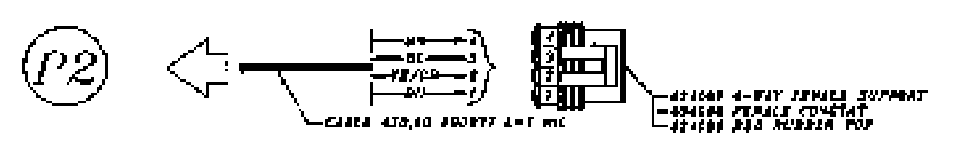
DRAWING NUMBER	DRAFTMAN	CHECK	REGISTRATION	SCALE	DATE
3-21872	PAUTASSI			1:1	15.11.95
PART NUMBER	WEIGHT KG				
037114					

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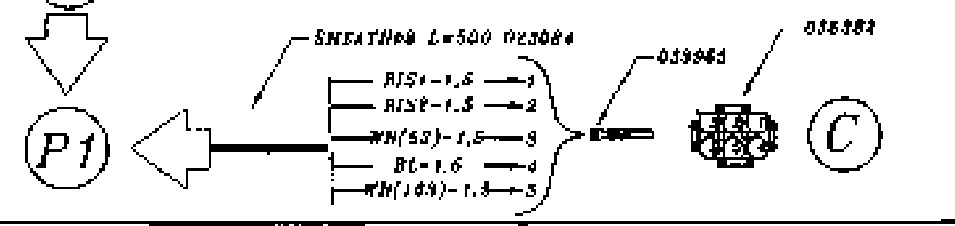


- ① BOOM LIFTING DISTRIBUTOR SOLENOID VALVES CONNECTION CABLE
- ② FORKS DISTRIBUTOR SOLENOID VALVES CONNECTION CABLE
- ③ TILTING DISTRIBUTOR SOLENOID VALVES CONNECTION CABLE
- ④ EXTENSION DISTRIBUTOR SOLENOID VALVES CONNECTION CABLE

N.B. - CABLES 1-2-3-4 HAVE SECTION 4X0,5-L-1400 PART N. 800077



- ⑥ SERVO CONTROLS OIL SOLENOID VALVE CONNECTION CABLE
- ⑦ JOY-STICK CONNECTION CABLE DIS. 3-21888 L=3000 IN POLYFLEX SHEATH #10
- ⑧ JOY-STICK CONNECTION 4X0,5 CABLE DIS. 3-21888 L=3000 IN POLYFLEX SHEATH#10
- ⑨ CONNECTION CABLE WITH MAIN CABLE DIS.3-21888



SUBJECT: **BOX PRE-ASSEMB. FOR P.35.9 EVA JOY-STICK**

DRAWING NUMBER	DRAWN BY	CHECK	REGISTRATION	SCALE	DATE
3-21999/A	PEANO				29.12.95
PART NUMBER	WEIGHT KG				
037388					

MARELLI
 S.p.A.
 DIVISIONE
 ITALIA

ELECTRONIC CARD TEST FACILITIES

- DL1= GREEN L.E.D IS LIT WHEN THE JOYSTICK IS NOT IN THE NEUTRAL POSITION (LONGITUDINAL AXIS)

- DL2= RED L.E.D IS LIT WHEN THE JOYSTICK IS NOT IN THE NEUTRAL POSITION (TRANSVERSE AXIS)

- DL3= RED L.E.D IS LIT WHEN ONE OF THE JOYSTICK PUSH BUTTONS IS OPERATED (24 VOLTS TO MULTIDROM) (IT SWITCHES OFF WITH A DELAY 1,5 SECONDS AFTER RELEASING THE PUSH BUTTON)

- DL4= RED L.E.D IS LIT WHEN THE JOYSTICK BUTTON "A" IS OPERATED

- DL5= RED L.E.D IS LIT WHEN THE JOYSTICK BUTTON "B" IS OPERATED

- DL6= RED L.E.D IS LIT WHEN THE JOYSTICK BUTTON "C" IS OPERATED (NOT USED)

- DL7= GREEN L.E.D IS LIT WHEN THE ELECTRONIC CARD IS FED

- DL8= RED L.E.D IS LIT WHEN STARTER KEY IS IN "R" POSITION (JOYSTICK ENABLE)

- R3= OFFSET ADJUSTMENT ON JOYSTICK ANALOGUE INPUT (TERMINAL N°17)

- R30= ADJUSTMENT ON THE POWER GAIN ON THE JOYSTICK ANALOGUE INPUT (TERMINAL N°17)

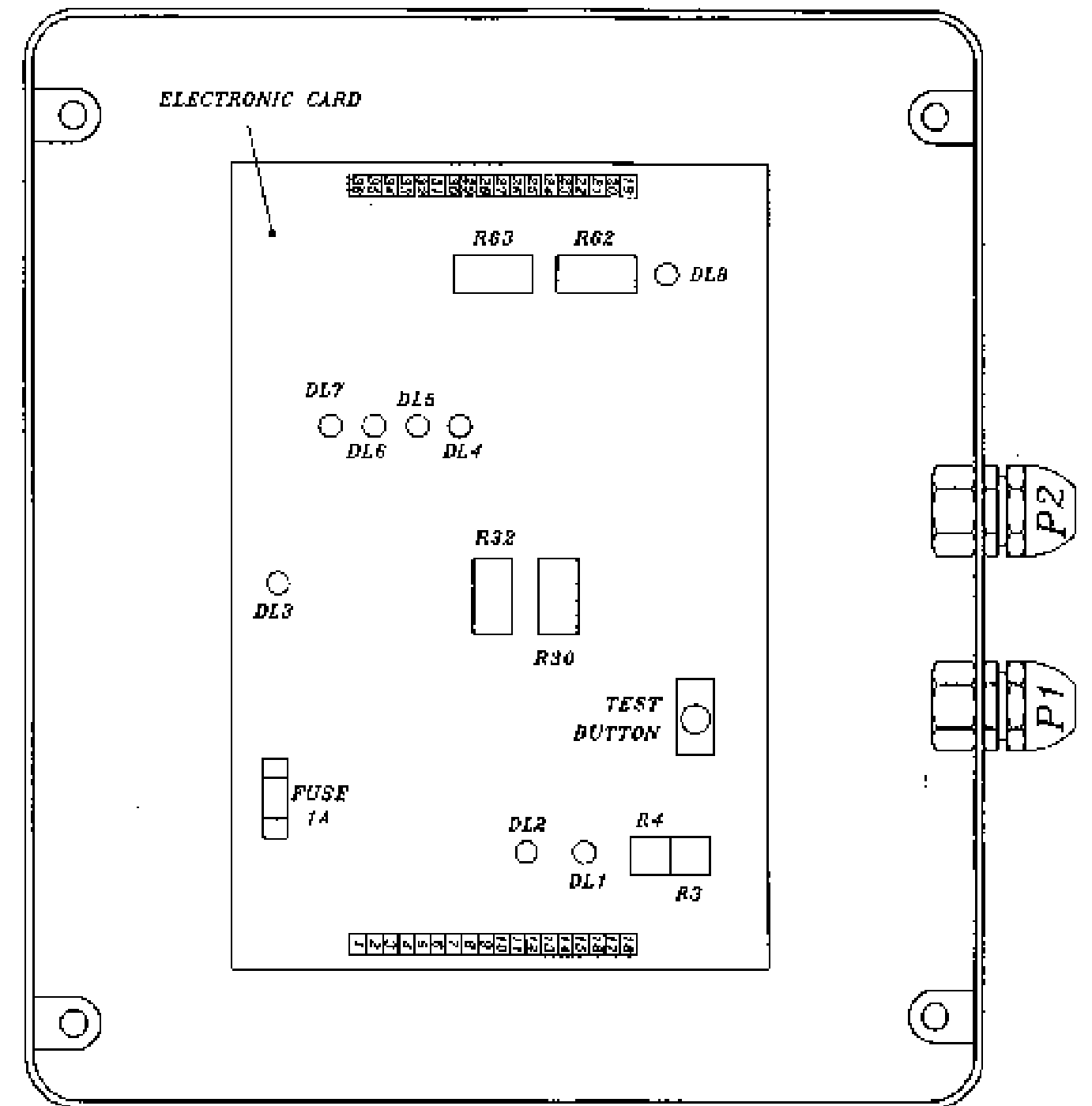
- R4= OFFSET ADJUSTMENT ON JOYSTICK ANALOGUE INPUT (TERMINAL N°16)

- R32= ADJUSTMENT ON THE POWER GAIN ON THE JOYSTICK ANALOGUE INPUT (TERMINAL N°16)

- R62= PROPORTIONAL OUTPUT ADJUSTMENT (TERMINAL N°26)

- R63= PROPORTIONAL OUTPUT ADJUSTMENT (TERMINAL N°28)

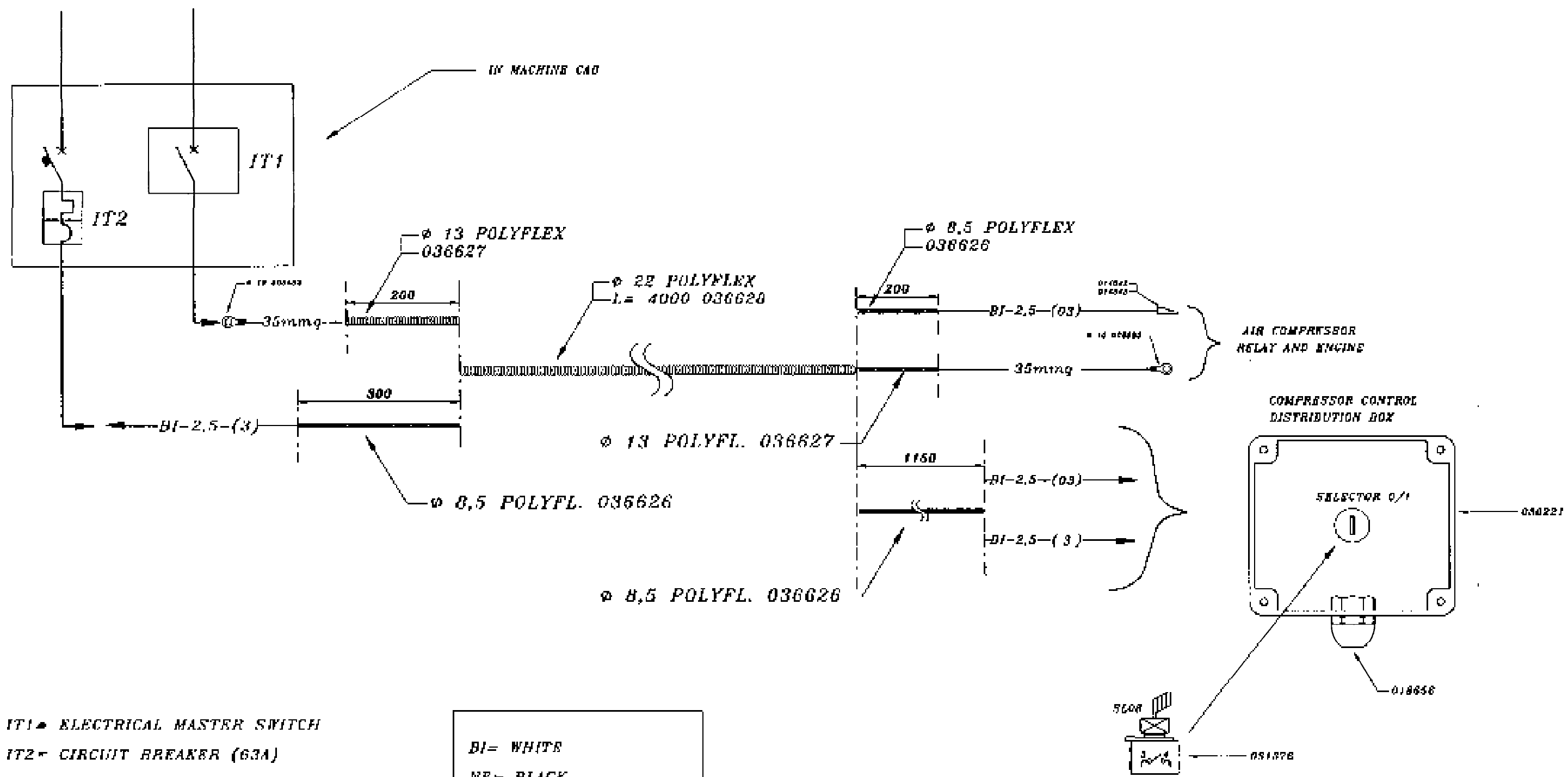
N.B. = THE ADJUSTMENT TRIMMERS INSIDE THE CARD R3-R4-R30-R32-R62-R63 HAVE BY NO MEANS TO BE TOUCHED NOT TO CHANGE THE PRE-SET ADJUSTMENT ON CARD



SUBJECT: ELECTRONIC CARD FOR P.35.9 EVA JOY-STICK					
DRAWING NUMBER	DRAFTSMAN	CHECK	REGISTRATION	SCALE	DATE
3-22799	PEANO				19.06.96
PART NUMBER				WEIGHT (G.)	
-					

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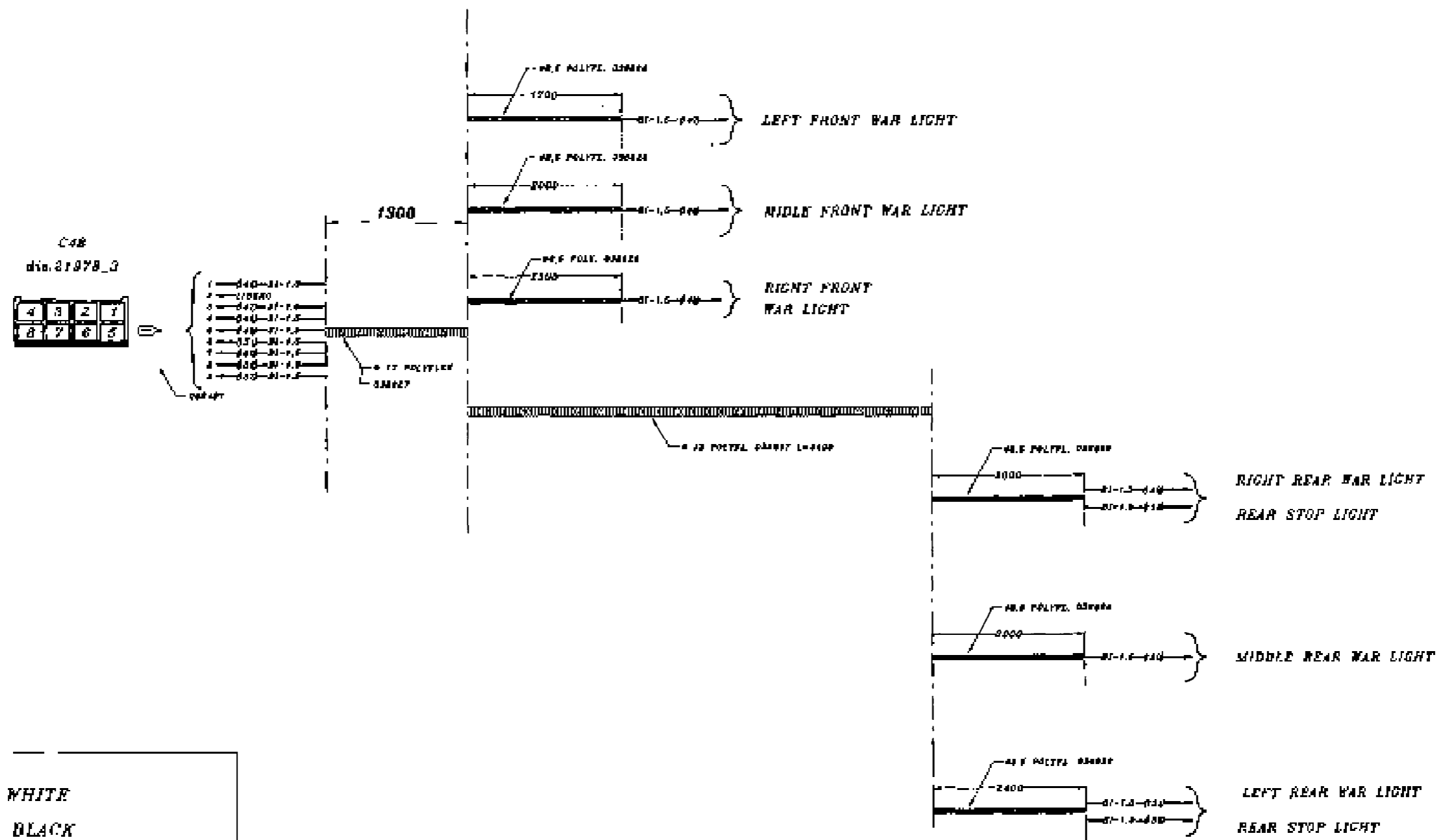
IT1 - ELECTRICAL MASTER SWITCH
 IT2 - CIRCUIT BREAKER (63A)

BI = WHITE
 NE = BLACK
 DIS. = DRAWING (SEE....)

SUBJECT: PAN.35.9 AIR COMPR. ENG. POW. SUPPLY CABLE

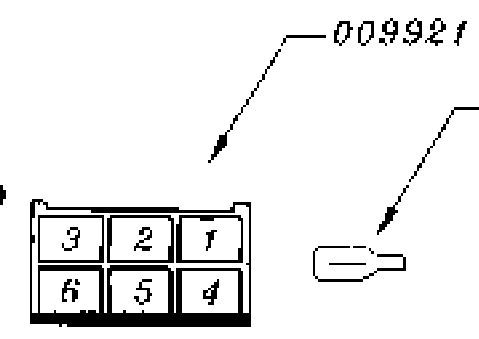
DRAWING NUMBER	DRAWN BY	CHECK	REGISTRATION	SCALE	DATE
3-21988	PEANO				22.12.95
PART NUMBER				WEIGHT KG.	 MARELLI S.p.A. COSENZA ITALY
037085					

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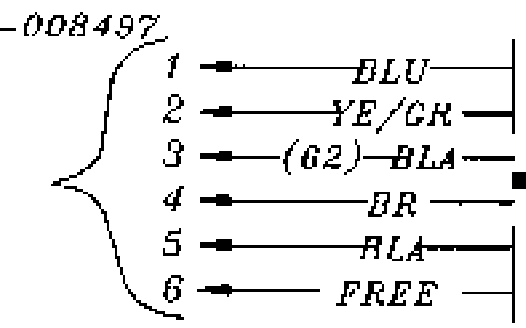


SUBJECT: PANO. 35.9 EVA (24V) WAR LIGHTS CABLE					
DRAWING NUMBER	DRAWN	CHECK	REVISION	SCALE	DATE
3-22036	PEANO				15.01.96
PART NUMBER			WEIGHT KG		 M.S. S.p.A. CONTO ITALY
037422					

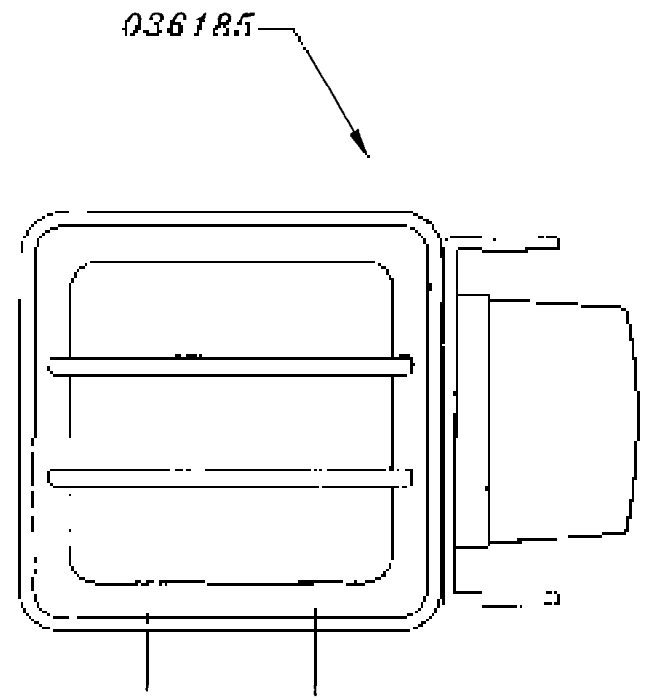
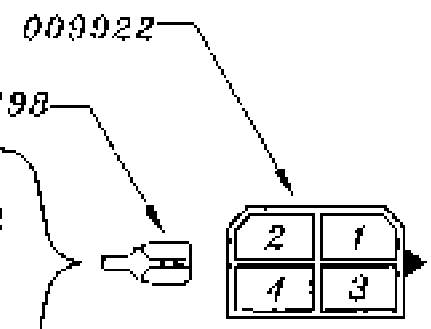
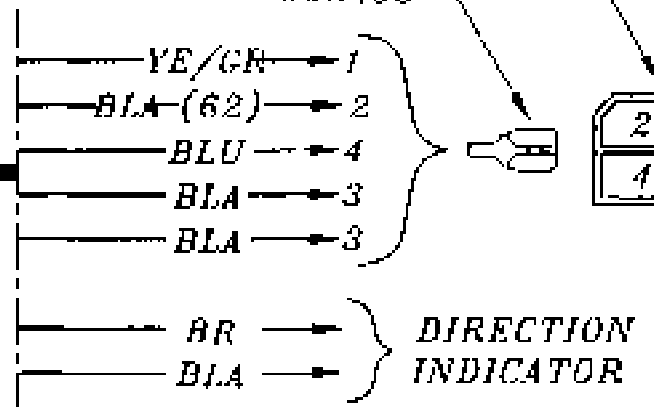
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C07
DRWG. 21978




CABLE 5X1,5 mmq
800057 L-2500

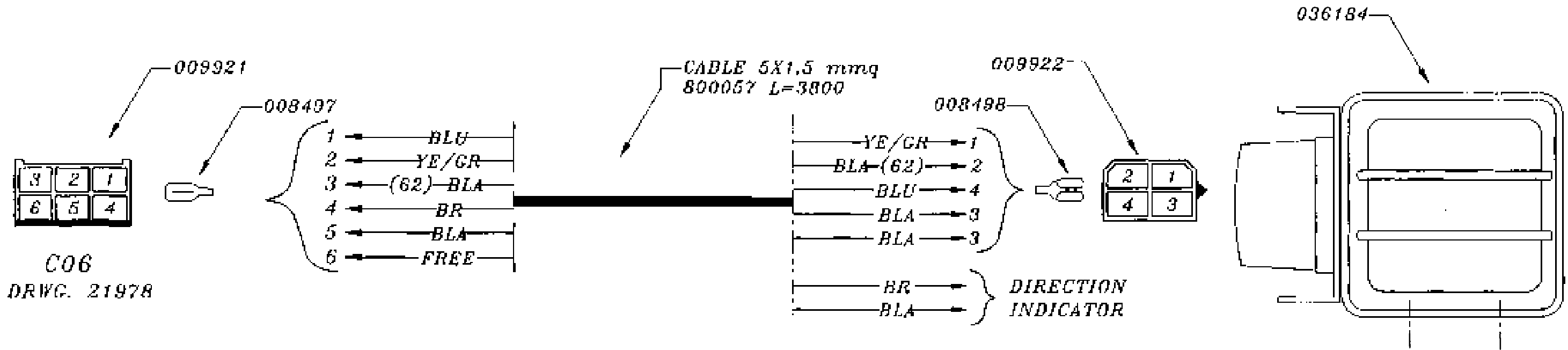


BLU	DRIVING LIGHTS
YE/GR	LOWER BEAMS
BLA(G2)	UPPER BEAMS
BR	DIRECTION INDICATOR
BLA	EARTH

SUBJECT: **LEFT FRONT LIGHT P. 35.9 (24V)**
 DRAWING NUMBER: **3-22009** PART NUMBER: **PEANO** CHECK: REGISTRATION: SCALE: DATE: **09.01.96**
 PART NUMBER: **036185** WEIGHT KG:



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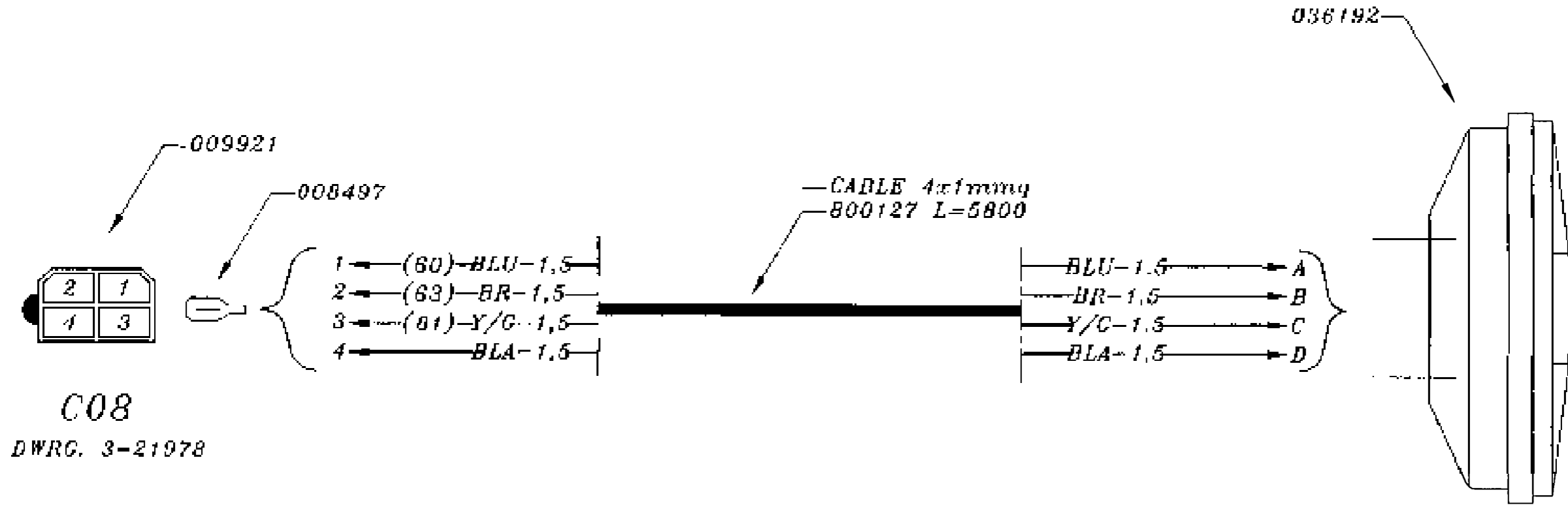
C06
DRWG. 21978

BLU	DRIVING LIGHTS
YE/GR	LOWER BEAMS
BLA(62)	UPPER BEAMS
BR	DIRECTION INDICATOR
BLA	EARTH

SUBJECT: **RIGHT FRONT LIGHT P.35.9 (24V)**

DRAWING NUMBER	DRAFTMAN	CHECK	REGISTRATION	SCALE	DATE
3-22010	PEANO				09.01.96
PART NUMBER	WEIGHT KG			MARELLA S.p.A. CONARO ITALY	
036184					

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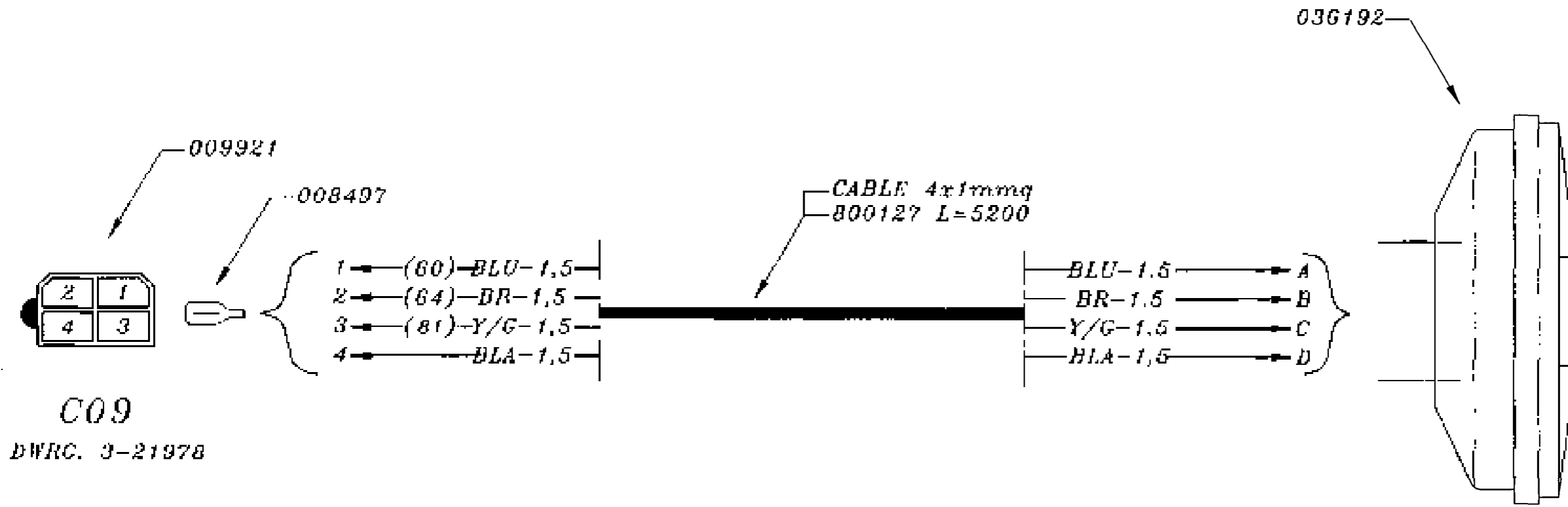


C08
DWG. 3-21978

BLU	DRIVING LIGHT
BR	RIGHT DIREC. INDIC.
Y/G	STOP
BLA	EARTH

SUBJECT: RIGHT REAR TAIL LIGHT P.35.9 (24V)					
DRAWING NUMBER	DRAWN	CHECK	REGISTRATION	SCALE	DATE
3-22008	PEANO				09.01.96
PART NUMBER				WEIGHT KG	
036186					

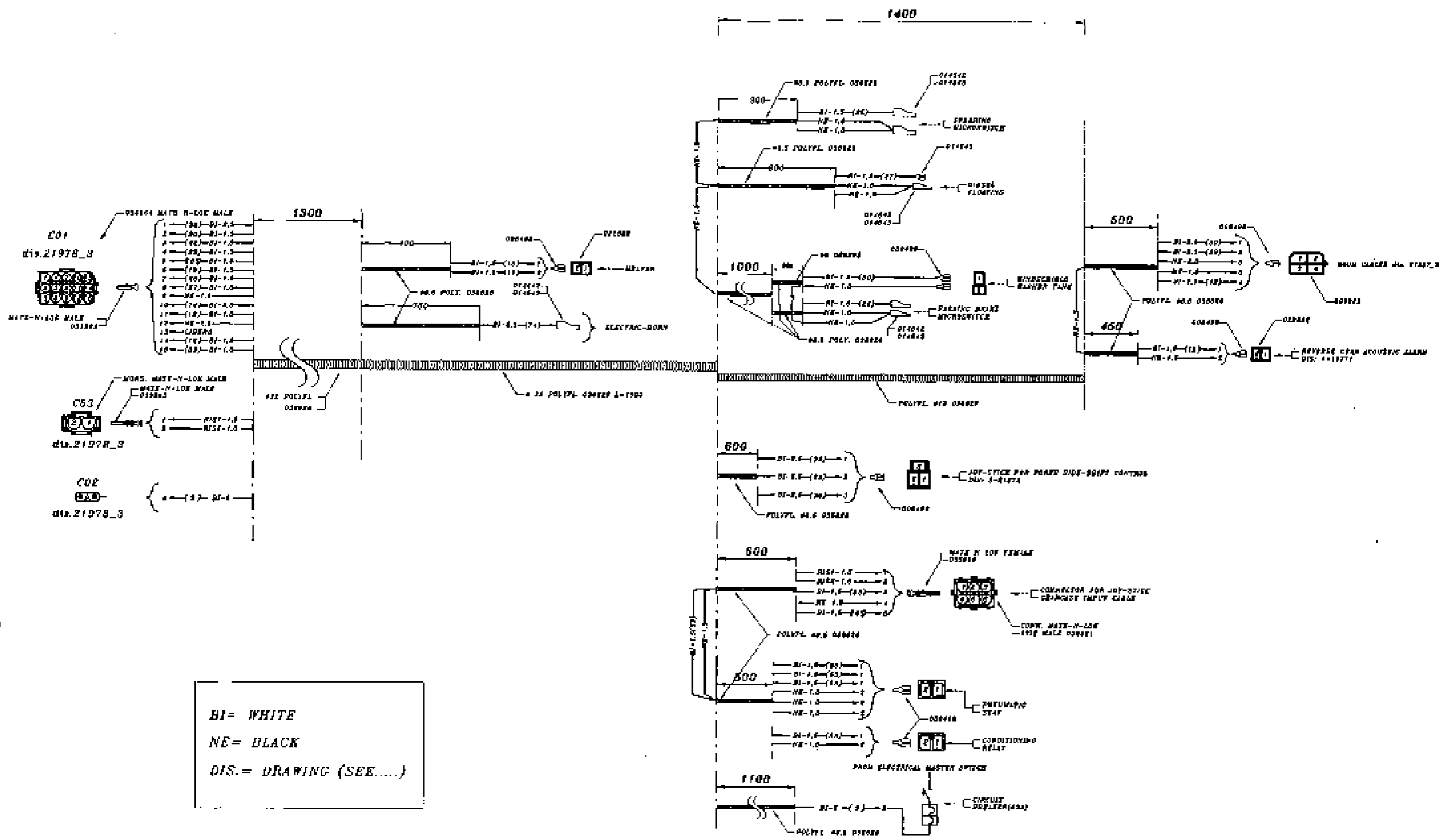
UNCONTROLLED WHEN PRINTED



BLU	DRIVING LIGHTS
BR	LEFT DIREC. INDIC.
Y/G	STOP
BLA	EARTH

SUBJECT: LEFT REAR TAIL LIGHT P. 35.9 (24V)					
DRAWING NUMBER	DRAFTER	CHECK	REGISTRATION	SCALE	DATE
3-22000	PEANO				09.01.96
PART NUMBER			WEIGHT KG.		
036187					


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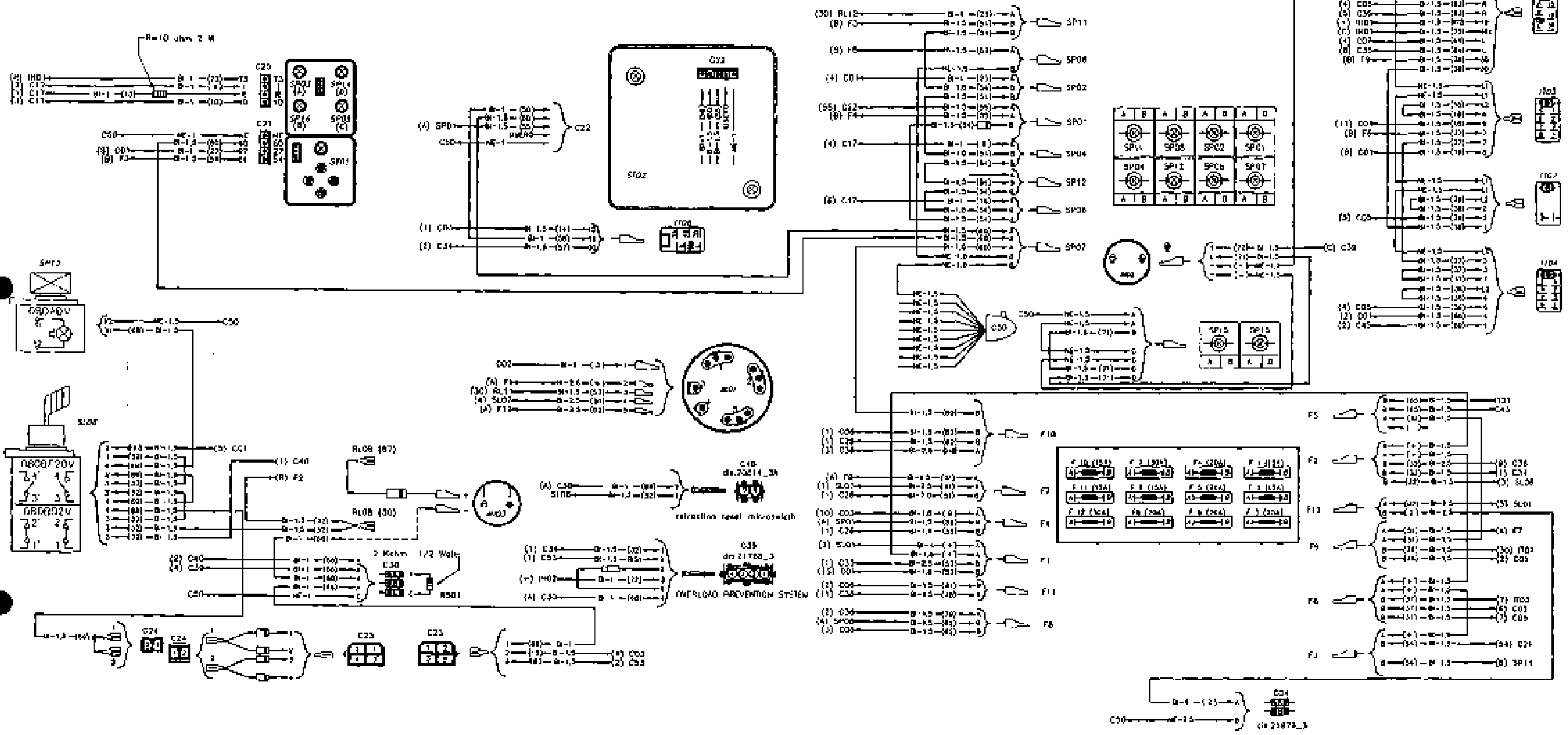
BI= WHITE
 NE= BLACK
 DIS.= DRAWING (SEE.....)

SUBJECT: PAN. 35.9 EVA (24V) MAIN CABLE

DRAWING NUMBER	DRAFTER	CHECK	REGISTRATION	SCALE	DATE
3-21980	PEANO				19.12.95
PART NUMBER					WEIGHT KG
037374					


 MARS
 S.p.A.
 COMPTON
 ITALY

N.B. THE CONNECTORS ARE SEEN FROM THE CONDUCTORS INPUT SIDE

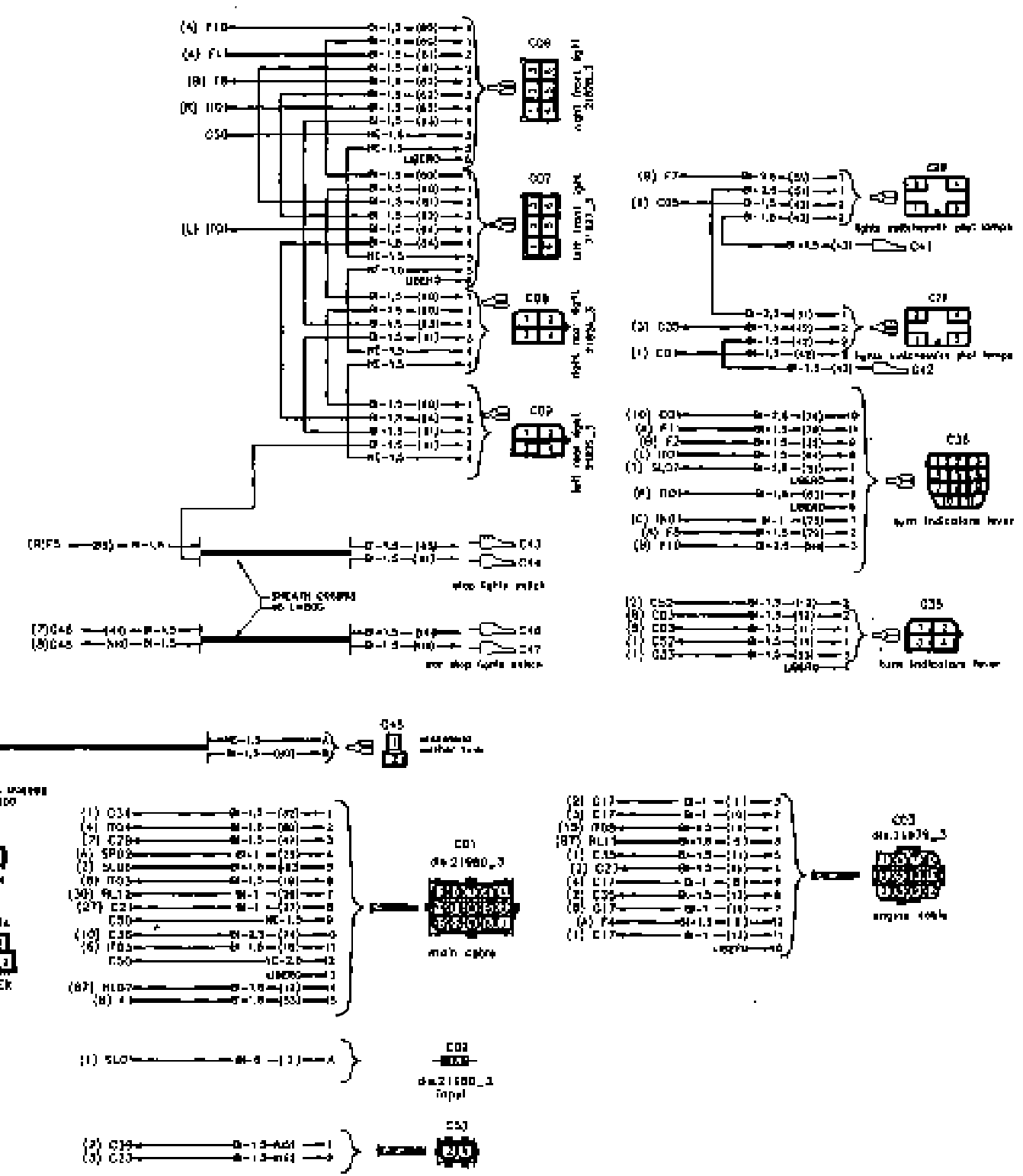
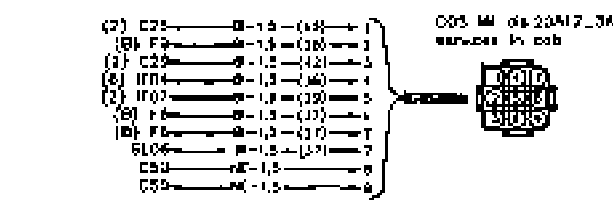
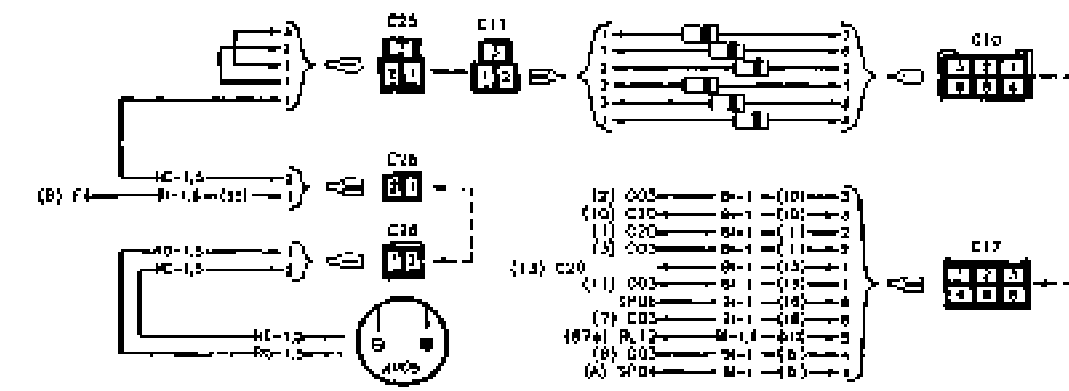
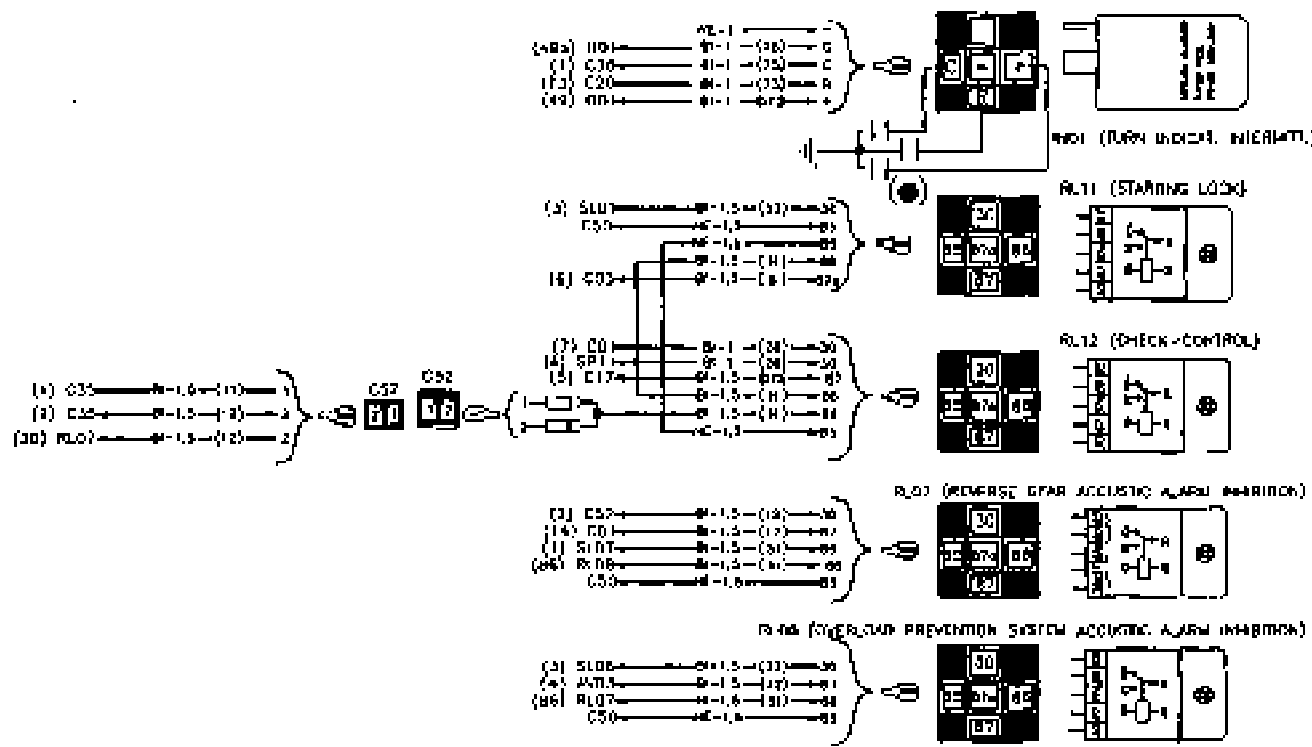


BI= WHITE
 NE= BLACK
 DIS. = DRAWING (SEC..)

SUBJECT: **DASHBOARD ELECTRIC PRE ASSEMBLY P.35.9 EVA (24V)**

DRAWING NUMBER	DRAFTSMAN	CHECK	REGISTRATION	SCALE	DATE
3-21978/B	PEANO				18.12.95
PART NUMBER	PAGE 1/2				VERLO S.p.A. GINECO ITALY
037083					

N.B. THE CONNECTORS ARE SEEN FROM THE CONDUCTORS INPUT SIDE



BI= WHITE
NE= BLACK
DIS.= DRAWING (SEE...)

TO ELIMINATE RADIO INTERFERENCES CONNECT N 3 0,0010-20K CONDENSERS

SUBJECT: DASHBOARD ELECTRIC PRE ASSEMBLY P.35.9 EVA (24V)

DRAWING NUMBER	DRAFTSMAN	CHECK	REGISTRATION	SCALE	DATE
3-21978/B	PEANO				18.12.95
PART NUMBER	PAGE 2/2		WEIGHT KG.	MIPRO S.p.A. CUNEO ITALY	
037083					

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S. r. l. Via Marconi, 29/31 - 20051 Limbiate (MI) - ITALIA

MIRETTI DRAWINGS

Drawing No 4357.90.000

Drawing Diagram..... 1-5

Componets Table..... 6-11

Warlights Connection..... 12

Drawing No 4357.91.000

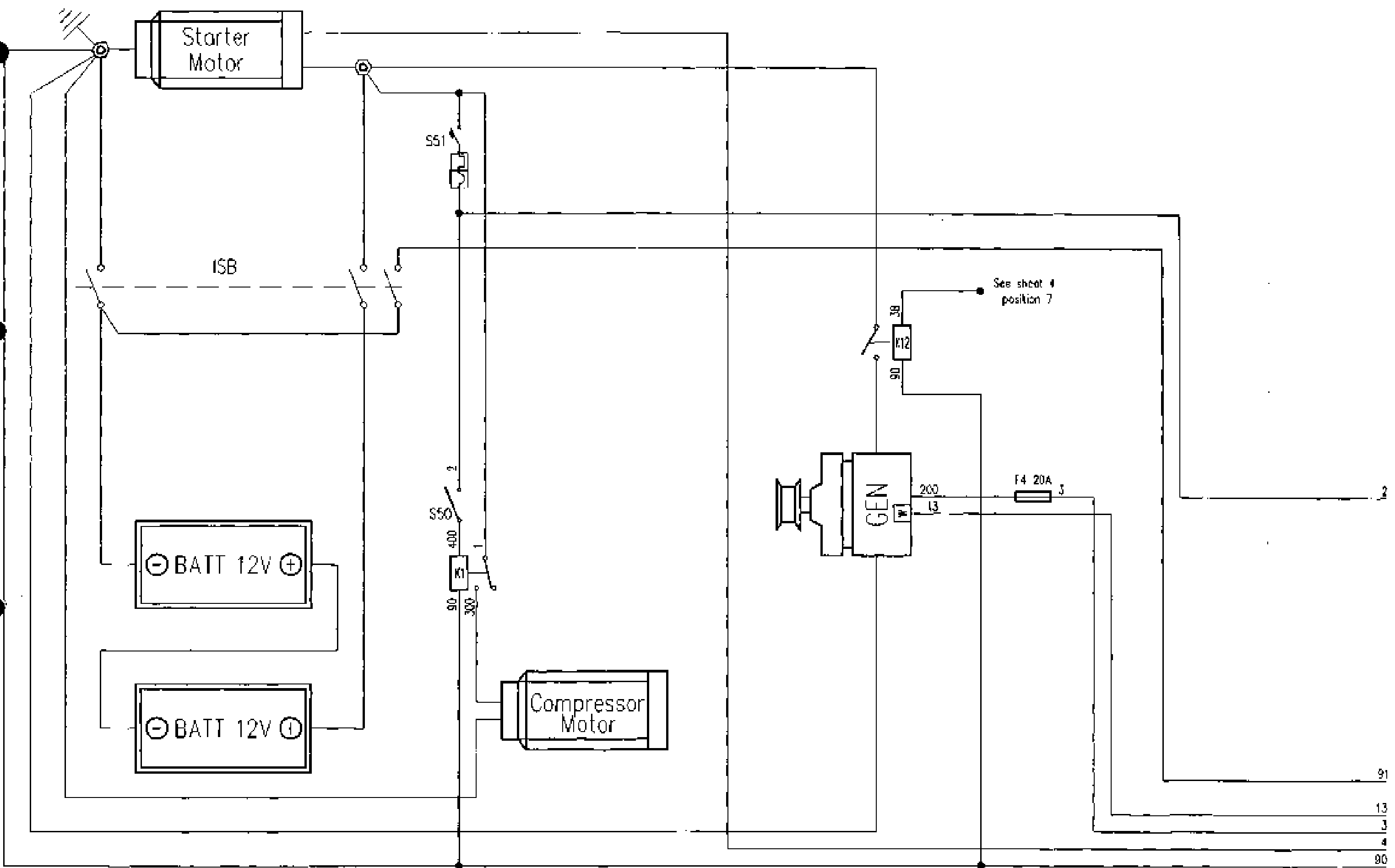
Engine Box 1

Drawing No 4357.93.000

Cables Wiring..... 1-2

Cables Lenght 3

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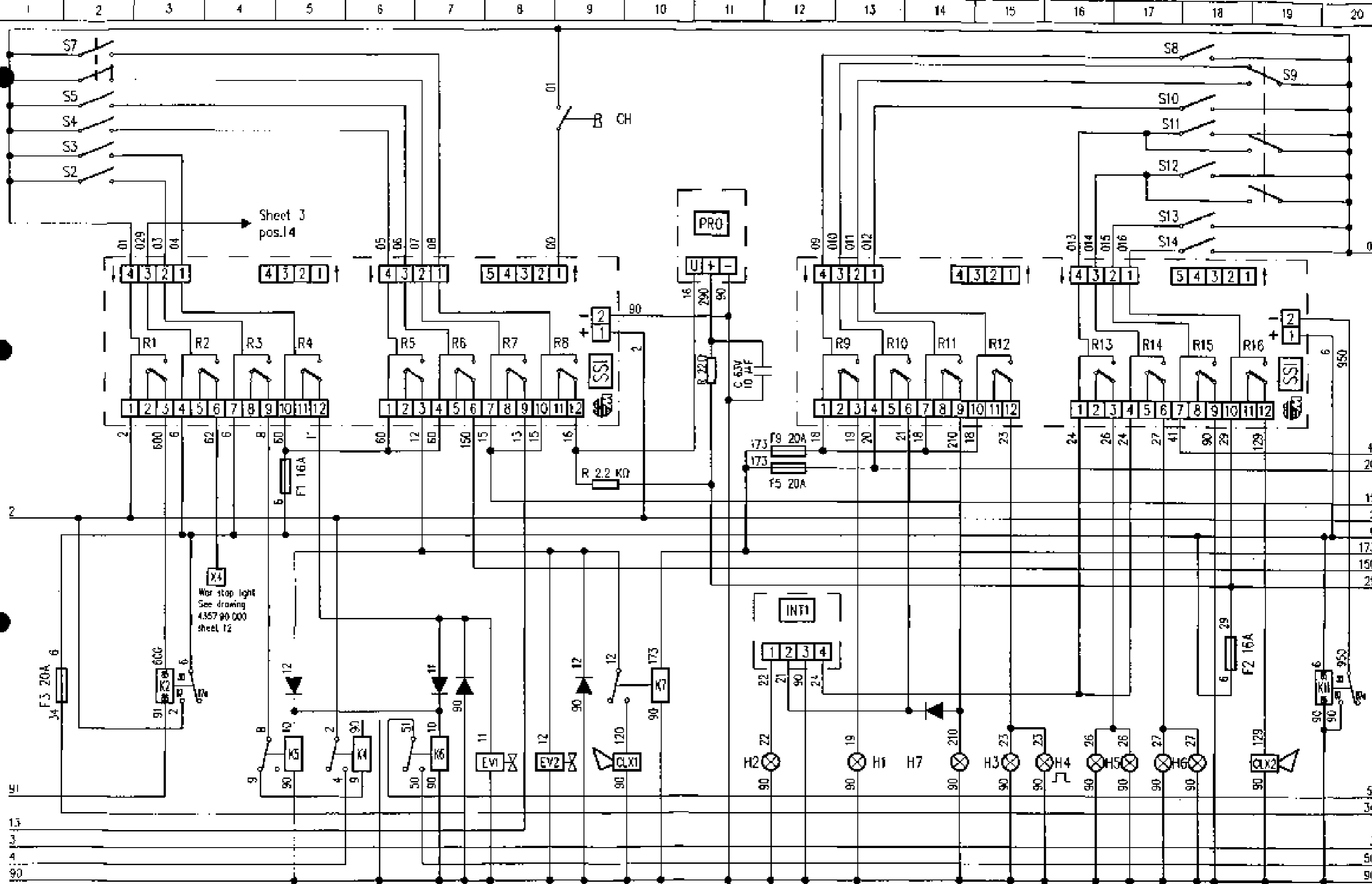


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Denominazione/Description:	Schema elettrico/Wiring diagram	Disegnato/Drawn:	Verificato/Checked:	Rev. 1	Rev. 2	Rev. 3	Rev. 4	Rev. 5
Costruttore/Modello/Manufacturer/Model:	MERLO P35.9 EVA	Data/Date:	10.06.96	22.05.97				
Impiego/Duty:	A0-T IP44	Firma/Drawn:	D.Pavan	D.Pavan				

MR. DIS. DRAW. N.	4357.90.000	Foglio Sheet	1	Segue Follow	2
FILE:	435790A1				

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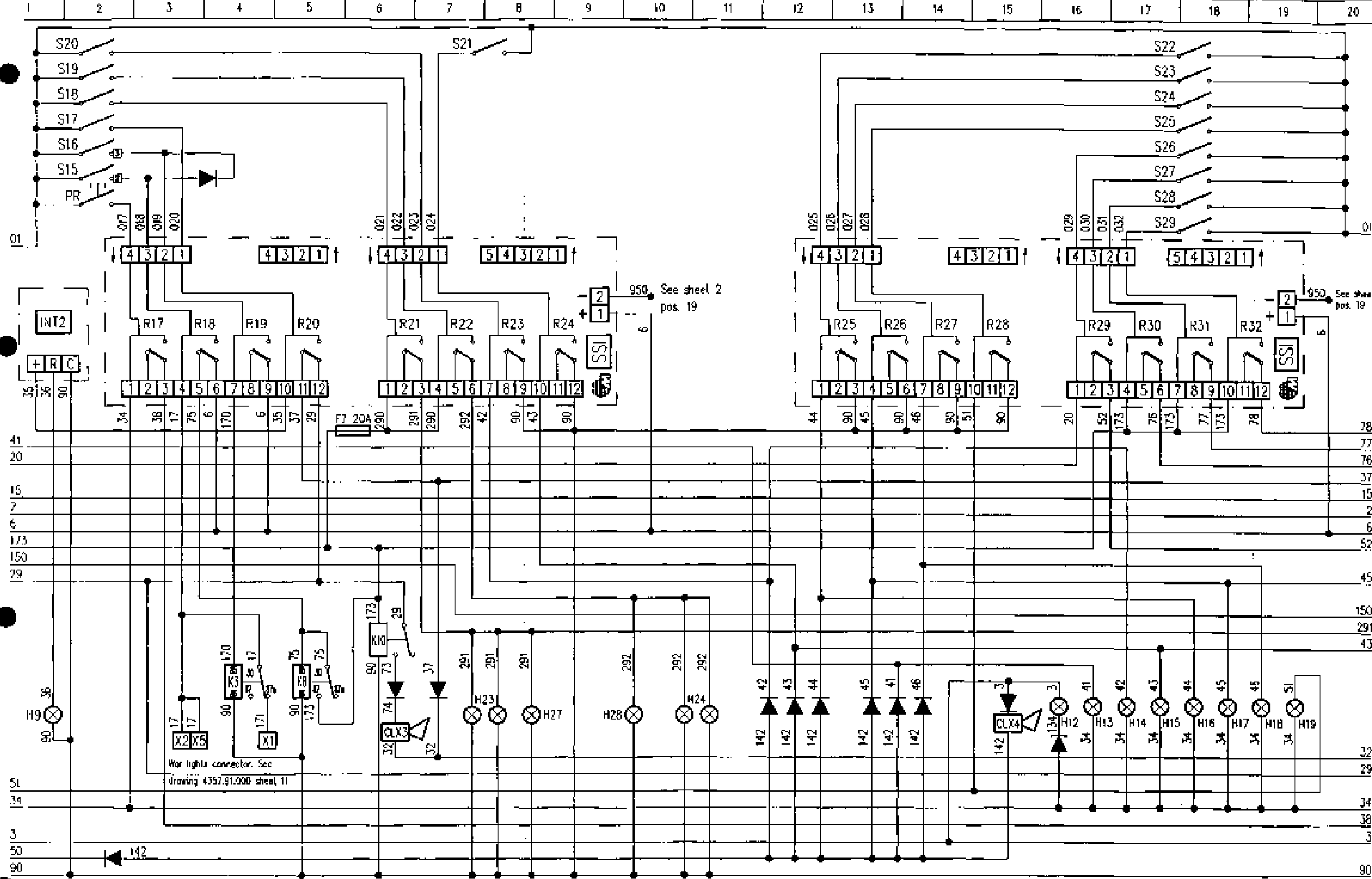
Denominazione/Description: Schema elettrico/Wiring diagram
 Costruttore/Modello/Manufacturer/Model: MERLO P35-9 EVA
 Impiego/Duty: AD-1 IP44

Disegnato/Drawn	Verificato/Checked	Rev. 1	Rev. 2	Rev. 3	Rev. 4	Rev. 5
Date	10.06.96	22.05.97				
Firma/Drawn	D.Pavan	D.Pavan				

MR. DTS. DRWG. N. 4357.90.000
 FILE: 435790B1

Foglio/Sheet 2
 Segue/Follows 3

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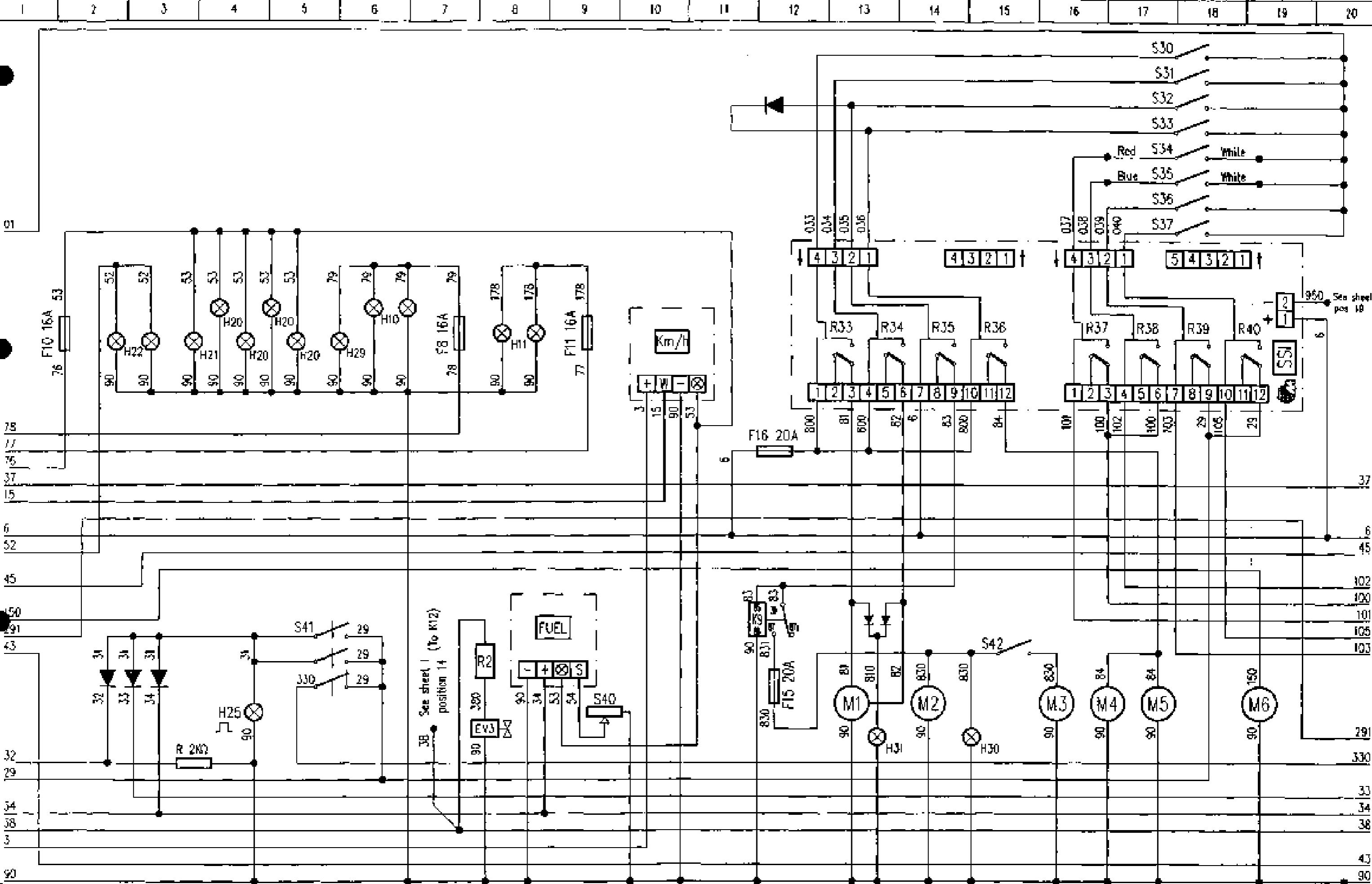
Denominazione: **Schema elettrico/Wiring diagram**
 Descrizione: **MERLO P35.9 EVA**
 Costruttore/Modello: **MERLO P35.9 EVA**
 Impiego/Duty: **AD-T IP44**

Disegnato/Drawn	Verificato/Checked	Rev. 1	Rev. 2	Rev. 3	Rev. 4	Rev. 5
Data/Date	10.06.96	10.06.96				
Firma/Drawn	D.Pavan	D.Pavan				

WIRETTI S.p.A. DIR. DIS. 4357.90.000
4357.90.000
 FILE: 435790ci

Foglio Sheet **3**
 Segue Follow **4**

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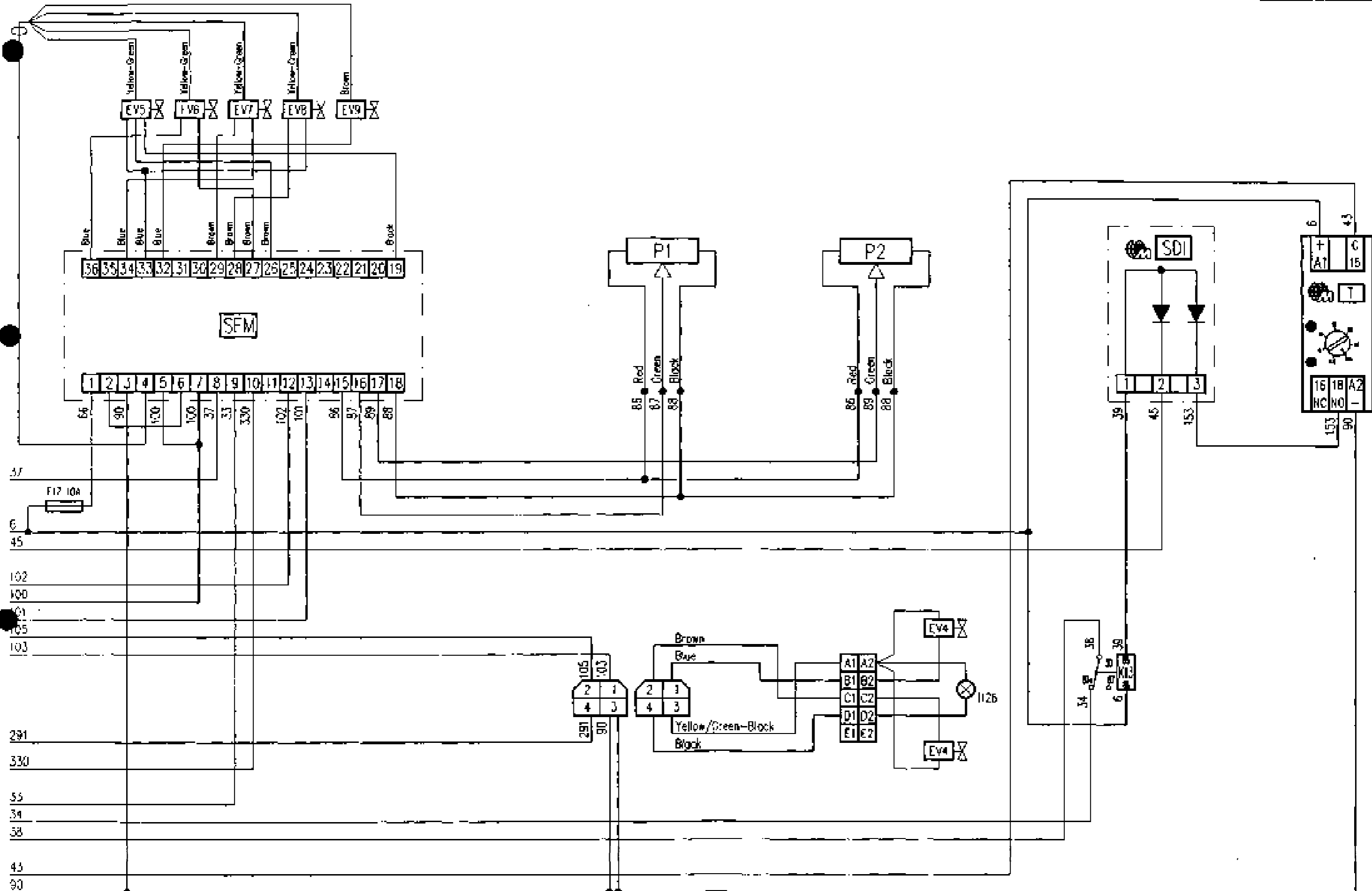
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Determinazione: Schema elettrico/Wiring diagram
Descrizione: Schema elettrico/Wiring diagram
Costruttore/Modello: MERLO P35.9 EVA
Manufacture/Model: MERLO P35.9 EVA
Impiego: AD-E IP44
Duty: AD-E IP44

Disegnato: D.Pavan	Visto: D.Pavan	Rev. 1: 22.05.97	Rev. 2:	Rev. 3:	Rev. 4:	Rev. 5:
Data: 10-06-96	Firma: D.Pavan	Disegnato: D.Pavan				

MR. DES. DRAWING N. 4357.90.000
FILE: 43579001

Foglio Sheet 4
Segue Follow 5



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Denominazione: **Schema dell'aria/Ming diagram**
 Descrizione:
 Costruttore/Modello: **MLRLD P35.9 EVA**
 Manufacture/Model:
 Impiego: **AG-T IP44**
 Duty:

Disegnato Draw	Visa Checked	Rev. 1	Rev. 2	Rev. 3	Rev. 4	Rev. 5
Date Date		10.06.96				
Firma Drawn		O. Pavan				

FILE: 435790E1
 4357.90.000

Foglio Sheet: **5**
 Segue Follow: **6**

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S23	SENSORE LIVELLO ACQUA / WATER LEVEL SENSOR		ORIGINAL
S22	SENSORE FILTRO ARIA INTASATO / CLOGGED AIR FILTER SENSOR		ORIGINAL
S21	SONDA PRESSIONE OLIO / OIL PRESSURE SENSOR		ORIGINAL
S20	SENSORE TEMPERATURA OLIO / OIL TEMPERATURE SENSOR		ORIGINAL
S19	INTERRUTTORE FARI DI LAVORO POSTERIORE / REAR WORK LIGHT SWITCH		ORIGINAL
S18	INTERRUTTORE FARI DI LAVORO ANTERIORE / FRONT WORK LIGHT SWITCH		ORIGINAL
S17	MICRO ANTIRIBALTAMENTO / SAFE LOAD MICROSWITCH		ORIGINAL
S16	SELETORE LUCI DA GUERRA (POS.3) / WAR LIGHTS (POS.3) SELECTOR		ORIGINAL
S15	SELETORE LUCI DA GUERRA (POS.1,2) / WAR LIGHTS (POS.1,2) SELECTOR		ORIGINAL
S14	INTERRUTTORE AVVISATORE ACUSTICO / HORN SWITCH		ORIGINAL
S13	MICRO STERZO / STEERING MICROSWITCH		ORIGINAL
S12	SELETORE FRECCIA SINISTRA / LEFT ARROW SELECTOR		ORIGINAL
S11	SELETORE FRECCIA DESTRA / RIGHT ARROW SELECTOR		ORIGINAL
S10	INTERRUTTORE LAMPEGGIANTE / FLASHING BEACON SWITCH		ORIGINAL
S9	INTERRUTTORE 4 FRECCIE / 4 ARROWS SWITCH		ORIGINAL
S8	INTERRUTTORE FARO CABINA / CAB LIGHT SWITCH		ORIGINAL
S7	SELETORE GIRI-Km/h (Km/h) / RPM-Km/h SELECTOR (Km/h)		ORIGINAL
S6	SELETORE GIRI-Km/h (GIRI) / RPM-Km/h SELECTOR (RPM)		ORIGINAL
S5	INTERRUTTORE SEDILE / SEAT SWITCH		ORIGINAL
S4	MICRO MARCA INDIETRO / REVERSE DIRECTION MICROSWITCH		ORIGINAL
S3	MICRO MARCIA AVANTI / FORWARD DIRECTION MICROSWITCH		ORIGINAL
S2	AVVIAMENTO / STARTER		ORIGINAL
CH	CHIAVI / KEY SELECTOR FOR STARTING		ORIGINAL




SIGLA MARK	DESCRIZIONE COMPONENTE COMPONENT DESCRIPTION	DATI TECNICI TECHN. DATA	CODICE CODE
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NR. LIS. DRWS. PL. **4357.90.000**
FILE: 435790F1


Denominazione: Description:	Tabella componenti/Components table	Disegnato Draw	Visto Checked	Rev. 1	Rev. 2	Rev. 3	Rev. 4	Rev. 5	Foglio Sheet	Segue Follow
Costruttore/Modello: Manufacture/Model:	MERLO P35.9 EVA	Data Date	12.11.96	22.05.97					6	7
Impiego: Duty:	40-T IP44	Firma Drawn	D.Pavan	D.Pavan						

H3	SPIA LAMPEGGIANTE / FLASHING BEACON WARNING LIGHT		 S133004122
H2	SPIA LUCI DI DIREZIONE / ARROWS WARNING LIGHT		ORIGINAL
H1	FARO CABINA / CAB LIGHT		ORIGINAL
PR	PULSANTE RIPRISTINO / RESET BUTTON		 P037012112
S51	SEZIONATORE / CIRCUIT BREAKER		ORIGINAL
S50	INTERRUTTORE COMPRESSORE / COMPRESSOR SWITCH		ORIGINAL
S42	INTERRUTTORE TERGICRISTALLO POSTERIORE / REAR WIPER SWITCH		 I033006122
S41	SELETORE RESETTA EMERGENZA / RESET EMERGENCY SELECTOR		ORIGINAL
S40	SENSORE LIVELLO CARBURANTE / FUEL LEVEL SWITCH		ORIGINAL
S37	MICRO JOYSTICK 2 PULSANTE 2 / BUTTON 2 JOYSTICK 2 SWITCH		ORIGINAL
S36	MICRO JOYSTICK 2 PULSANTE 1 / BUTTON 1 JOYSTICK 2 SWITCH		ORIGINAL
S35	MICRO JOYSTICK 1 PULSANTE 2 / BUTTON 2 JOYSTICK 1 SWITCH		ORIGINAL
S34	MICRO JOYSTICK 1 PULSANTE 1 / BUTTON 1 JOYSTICK 1 SWITCH		ORIGINAL
S33	INTERRUTTORE SPRUZZA LIQUIDO VETRI / WINDSCREEN SPRAYER SWITCH		ORIGINAL
S32	INTERRUTTORE TERGICRISTALLO / WIPER SWITCH		ORIGINAL
S31	INTERRUTTORE TERMOVENTILATORE (2) / THERMAL VENTILATOR SWITCH(2)		ORIGINAL
S30	INTERRUTTORE TERMOVENTILATORE (1) / ELECTROFAN SWITCH (1)		ORIGINAL
S29	INTERRUTTORE LUCI ABBAGLIANTI / HIGH BEAM SWITCH		ORIGINAL
S28	INTERRUTTORE LUCI ANAABBAGLIANTI / LOW BEAM SWITCH		ORIGINAL
S27	INTERRUTTORE LUCI POSIZIONE / TAIL LIGHT SWITCH		ORIGINAL
S26	MICRO STOP / STOP MICROSWITCH		ORIGINAL
S25	MICRO FRENO A MANO / HAND BRAKE MICROSWITCH		ORIGINAL
S24	SENSORE LIVELLO OLIO / OIL LEVEL SENSOR		ORIGINAL

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SIGLA MARK	DESCRIZIONE COMPONENTE COMPONENT DESCRIPTION	DATA TECNICA TECHNICAL DATA	CODICE CODE
 <p>20051 LAMBRATE (MI)-Via Marconi, 31</p>		<p>Questo disegno è proprietà della MIRETTI. Ogni riproduzione e concessione a terzi ne è pertanto interdetta a termini di legge. This drawing is property of MIRETTI. Any reproduction or assignment to third parties is forbidden as per law enacted.</p>	
<p>Denominazione: Description:</p> <p>Tabella componenti/Components table</p>		<p>NR. DIS. DRAWING N.</p> <p>4357.90.000</p>	
<p>Disegnato Draw</p> <p>12.11.96</p>		<p>FILE: 43579001</p>	
<p>Construttore/Modello: Manufacture/Model:</p> <p>MERLO P35.9 EVA</p>		<p>Viso Checked</p> <p>Rev 1 Rev 2 Rev 3 Rev 4 Rev 5</p> <p>22.05.97</p>	
<p>Impiego: Duty:</p> <p>EEx d IIB</p>		<p>Firma Drawn</p> <p>D.Pavan</p>	
		<p>Foglio Sheet</p> <p>7</p>	
		<p>Segue Follow</p> <p>8</p>	

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H26	FARO DI LAVORO BRACCIO / JIB WORK LIGHT		ORIGINAL
H25	SPIA ALLARME EMERGENZA / EMERGENCY ALARM WARNING LIGHT		ORIGINAL
H24	FARO DI LAVORO POSTERIORE / REAR WORK LIGHT		ORIGINAL
H23	FARO DI LAVORO ANTERIORE / FRONT WORK LIGHT		ORIGINAL
H22	LUCI STOP / STOP LIGHTS		ORIGINAL
H21	SPIA LUCI POSIZIONE / TAIL WARNING LIGHT		ORIGINAL
H20	LUCI POSIZIONE / TAIL LIGHT		ORIGINAL
H19	SPIA FRENO A MANO / HAND BRAKE LIGHT		ORIGINAL
H18	SPIA LIVELLO OLIO / OIL LEVEL LIGHT		ORIGINAL
H17	SPIA TEMPERATURA ACQUA / WATER TEMPERATURE LIGHT		ORIGINAL
H16	SPIA FILTRO ARIA INTASATO / CLOGGED AIR FILTER LIGHT		ORIGINAL
H15	SPIA PRESSIONE OLIO / OIL PRESSURE LIGHT		ORIGINAL
H14	SPIA TEMPERATURA OLIO / OIL TEMPERATUR WARNING LIGHT		ORIGINAL
H13	SPIA STERZO / STEERING LIGHT		ORIGINAL
H12	SPIA ALTERNATORE / ALTERNATOR LIGHT		ORIGINAL
H11	LUCI ANABBAGLIANTI / LOW BEAM		ORIGINAL
H10	LUCI ABBAGLIANTI / HIGH BEAM		ORIGINAL
H9	SPIA ANTIRIBALTAMENTO / SAFE LOAD WARNING LIGHT		ORIGINAL
H8	SPIA EMERGENZA / EMERGENCY WARNING LIGHT		ORIGINAL
H7	SPIA 4 FRECCHE / 4 WARNING LIGHT ARROWS		 S130040122
H6	FRECCIA SINISTRA / LEFT ARROW		ORIGINAL
H5	FRECCIA DESTRA / RIGHT ARROW		ORIGINAL
H4	LAMPEGGIANTE / FLASHING BEACON		ORIGINAL

SPGLA MARK	DESCRIZIONE COMPONENTE COMPONENT DESCRIPTION	DATI TECNICI TECHN. DATA	CODICE CODE
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





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MR. DES. DRWG. N. **4357.90.000**


FILE. 435790H1

Designazione: Description:	Tabella componenti/Components table	Disegnato Draw	Visto Checked	Rev. 1	Rev. 2	Rev. 3	Rev. 4	Rev. 5	Foglio Sheet	Segue Follow
Costruttore/Modello: Manufacture/Model:	MERLO P35.9 EVA	Data Date	12.11.95	22.05.97					8	9
Imp. ego. Duty:	AJ-T IP44	Firma Drawn	D.Pavan	C.Pavan						












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K4	RELE' AVVIAMENTO / STARTER RELAY	24V 50A	 T009021122
K3	RELE' LUCI GUERRA / WAR LIGHT RELAY	24V 20A	 T009008122
K2	RELE' CHIAVE / KEY RELAY	24V 50A	 T009021122
K1	RELE' COMPRESSORE / COMPRESSOR RELAY	24V 20A	 T009008122
C	CANDELETTA / GLOW PLUG	12V	 4357.26.600
F17	FUSIBILI / FUSES	10A	 F047077122
F16	FUSIBILI / FUSES	20A	 F047079122
F15	FUSIBILI / FUSES	20A	 F047079122
F11	FUSIBILI / FUSES	16A	 F047078122
F10	FUSIBILI / FUSES	16A	 F047078122
F9	FUSIBILI / FUSES	20A	 F047079122
F8	FUSIBILI / FUSES	16A	 F047078122
F7	FUSIBILI / FUSES	20A	 F047079122
F5	FUSIBILI / FUSES	20A	 F047079122
F4	FUSIBILI / FUSES	20A	 F047077122
F3	FUSIBILI / FUSES	20A	 F047079122
F2	FUSIBILI / FUSES	16A	 F047078122
F1	FUSIBILI / FUSES	16A	 F047078122
H31	SPIA TERMOVENTILATORE / ELECTROFAN WARNING LIGHT		 S130039122
H30	SPIA TERGICRISTALLO / WIPER LIGHT		 S130039122
H29	SPIA LUCI ABBAGLIANTI / HIGH BEAM WARNING LIGHT		ORIGINAL
H28	SPIA FARO DI LAVORO POSTERIORE / REAR WORK WARNING LIGHT		 S130039122
H27	SPIA FARO DI LAVORO ANTERIORE+BRACCIO / FRONT+JOB WORK WARNING LIGHTS		 S130039122















SIGLA MARK	DESCRIZIONE COMPONENTE COMPONENT DESCRIPTION	DATI TECNICI TECHN. DATA	CODICE CODE
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 20051 LMBATE (MO) Via Marconi, 31	Questo disegno e' proprieta' della MIRETTI. Ogni riproduzione e concessione a terzi ne e' pertanto interdetta a termini di legge. This drawing is property of MIRETTI. Any reproduction or assignment to third parties is forbidden as per law enacted.	MR.05 DRWG. N.	4357.90.000
			FILE: 4357901


Designazione: Description:	Tabella componenti/Componentis table	Disegnato Drawn	Visto Checked	Rev. 1	Rev. 2	Rev. 3	Rev. 4	Rev. 5	Foglio Sheet	Segue Follow
Costruttore/Modello Manufacture/Model	MERLO P35.9 EVA	Data Date	12/11/96	22/05/97					9	10
Impiego: Duty	AD-T IP44	Firma Drawn	D.Pavan	D.Pavan						

ISB	INTERRUTTORE STACCA BATTERIA / CUTOFF BATTERY SWITCH		 437019122
BATT	BATTERIA / BATTERY	24V	 4357.20.001
CLX4	AVVISATORE ACUSTICO DI CONTROLLO / CHECK CONTROL HORN		ORIGINAL
CLX3	AVVISATORE ACUSTICO ANTIRIBALTAMENTO / SAFE LOAD HORN		ORIGINAL
CLX2	AVVISATORE ACUSTICO / HORN		 4357.84.000
CLX1	AVVISATORE ACUSTICO DI RETROMARCIA / REVERSE HORN	12V	ORIGINAL
EV9	ELETTROVALVOLA DISTRIBUTORE / DISTRIBUTOR SOLENOID VALVE		ORIGINAL
EV8	ELETTROVALVOLA ESTENSIONE / EXTENDED SOLENOID VALVE		ORIGINAL
EV7	ELETTROVALVOLA BRANDEGGIO / TILTING SOLENOID VALVE		ORIGINAL
EV6	ELETTROVALVOLA FORCHE / FORKS SOLENOID VALVE		ORIGINAL
EV5	ELETTROVALVOLA SOLLEVAMENTO / LIFT SPEED SOLENOID VALVE		ORIGINAL
EV4	ELETTROVALVOLA ATTREZZATURA / EQUIPMENT SOLENOID VALVE		ORIGINAL
EV3	ELETTROVALVOLA GASOLIO / FUEL SOLENOID VALVE		ORIGINAL
EV2	ELETTROVALVOLA MARCIA INDIETRO / REVERSE DIRECTION SOLENOID VALVE		ORIGINAL
EV1	ELETTROVALVOLA MARCIA AVANTI / FORWARD DIRECTION SOLENOID VALVE		ORIGINAL
K13	RELE' SCHEDE DIODI / DIODES CARD RELAY	24V 20A	 T009008122
K11	RELE SCHEDE SICUREZZA INTRINSECA / INTRINSICALLY SAFE CARD RELAY	24V 20A	 T009008122
K10	RELE' ANTIRIBALTAMENTO / SAFE LOAD RELAY	24V 20A	 T009008122
K9	INTERRUTTORE TERGICRISTALLO / WIPER SWITCH	24V 20A	 T009008122
K8	RELE' SELETORE LUCI-LUC. GUERRA / LIGHT-LIGHT WAR SELECTOR RELAY	24V 20A	 T009008122
K7	RELE' INIBITORE AVVISATORE ACUSTICO RETROMARCIA / HORN INHIBITOR RELAY	24V 20A	 T009008122
K6	RELE' CONTROLLO / CHECK CONTROL RELAY	24V 20A	 T009008122
K5	RELE' BLOCCO AVVIAMENTO / STARTER BLOCK RELAY	24V 20A	 T009008122
SIGLA MARK	DESCRIZIONE COMPONENTE COMPONENT DESCRIPTION	DATI TECNICI TECHNI. DATA	CODICE CODE

 20051 LINBIATE (MI) - Via Marconi, 31	Questo disegno e' proprietà della MIRETTI. Ogni riproduzione e concessione a terzi ne e' pertanto interdette a termini di legge. This drawing is property of MIRETTI. Any reproduction or assignment to third parties is forbidden as per law enacted.		N. R. Dis. DRAWING	<div style="border: 1px solid black; padding: 5px; font-size: 24px; text-align: center;">4357.90.000</div>					FILE: 4357/9CL1
	Descrizione: Tabella componenti/Components table	Disegnato Drawn		Visto Checked	Rev. 1 Rev. 2 Rev. 3 Rev. 4 Rev. 5	Foglio Sheet	Segue Follow		
Costruttore/Modello Manufacture/Model:	MERLO P35.9 EVA	Data Date:	17/11/96	22/05/97				10	11
Impiegato/ Duty	AQ-T 1944	Firma Drawn	D. Pavan	D. Pavan					

K12	RELE' ALTERNATORE / ALTERNATOR RELAY	24V 60A	ORIGINAL
PT,P2	POTENZOMETRO AUSILIARI / AUXILIARY POTENTIOMETER		ORIGINAL
SDI	SCHEDA DIODI / DIODES CARD		 4357.85.000
SEM	SCHEDA ELETTRONICA MERLO / MERLO ELECTRONIQUE CARD		ORIGINAL
SSI	SCHEDA SICUREZZA INTRINSECA / INTRINSICALLY SAFE CARD	24V	 5020004122
Ti	TEMPORIZZATORE / SEAT TIMER	24V	 T065004122
M6	MOTORE COMPRESSORE SEDILE / SEAT COMPRESSOR MOTOR	24V	 4357.09.200
M5	MOTORE SPRUZZA LIQUIDO POSTERIORE / REAR SPRAYER MOTOR	24V	 4357.09.400
M4	MOTORE SPRUZZA LIQUIDO ANTERIORE / FRONT SPRAYER MOTOR	24V	 4357.09.300
M3	MOTORE TERGICRISTALLO POSTERIORE / REAR WIPER MOTOR	24V	 4357.09.500
M2	MOTORE TERGICRISTALLO ANTERIORE / FRONT WIPER MOTOR	24V	 4357.09.100
M1	TERMOVENTILATORE / ELECTROFAN	24V	 4357.26.500
FUEL	INDICATORE LIVELLO GASOLIO / FUEL LEVEL INDICATOR		ORIGINAL
Km/h	CONTA Km-CONTA GIRI / RPM-Km/h METER		ORIGINAL
X2	MORSETTO PER LUCE GUERRA (POS.3) / WAR LIGHT TERMINAL (POS.3)		
X1	MORSETTO PER LUCE GUERRA (POS.2) / WAR LIGHT TERMINAL (POS.2)		
INT2	INTERMITTENZA LUCE EMERGENZA / SAFE LOAD LIGHT INTERMITTENCE		ORIGINAL
INT1	INTERMITTENZA / INTERMITTENCE		ORIGINAL
PRO	SENSORE DI VELOCITA' / PROXIMITY		ORIGINAL
GEN	ALTERNATORE / ALTERNATOR	24V	 4357.30.000
MC	MOTORE COMPRESSORE / COMPRESSOR MOTOR	24V	 4357.09.000
MA	MOTORE AVVIAMENTO / STARTER MOTOR	24V	 4357.05.000

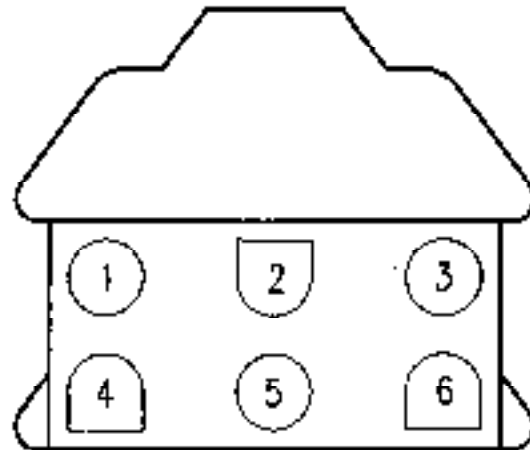
SIGLA MARK	DESCRIZIONE COMPONENTE COMPONENT DESCRIPTION	DATI TECNICI TECHN. DATA	CODICE CODE
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Designazione: Description:	Tabella componenti/Components table	Disegnato Draw	Visto Checked	Rev. 1 Rev. 2 Rev. 3 Rev. 4 Rev. 5	Foglia Sheet	Segue Follow
Costruttore/Modello: Manufacture/Model:	MERLO P35.9 EVA	Data Date:	12.11.96	22.05.97	11	12
Impiego: Duty:	AD-T IP44	Firma Drawn:	D.Pavan	D.Pavan		

IMPLEMENTAZIONE IMPIANTO GDF

WARLIGHTS CONNECTOR



- 1 Headlight gdf 171 Braun
- 2 Light gdf front 17 Blue
- 3  Yellow Green
- 4 Stop gdf 62 Braun
- 5 Light gdf rear 17 Blue
- 6  Yellow Green

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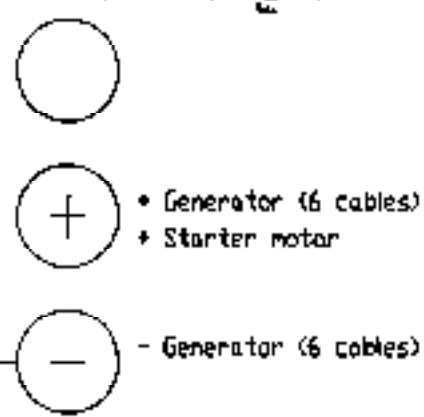
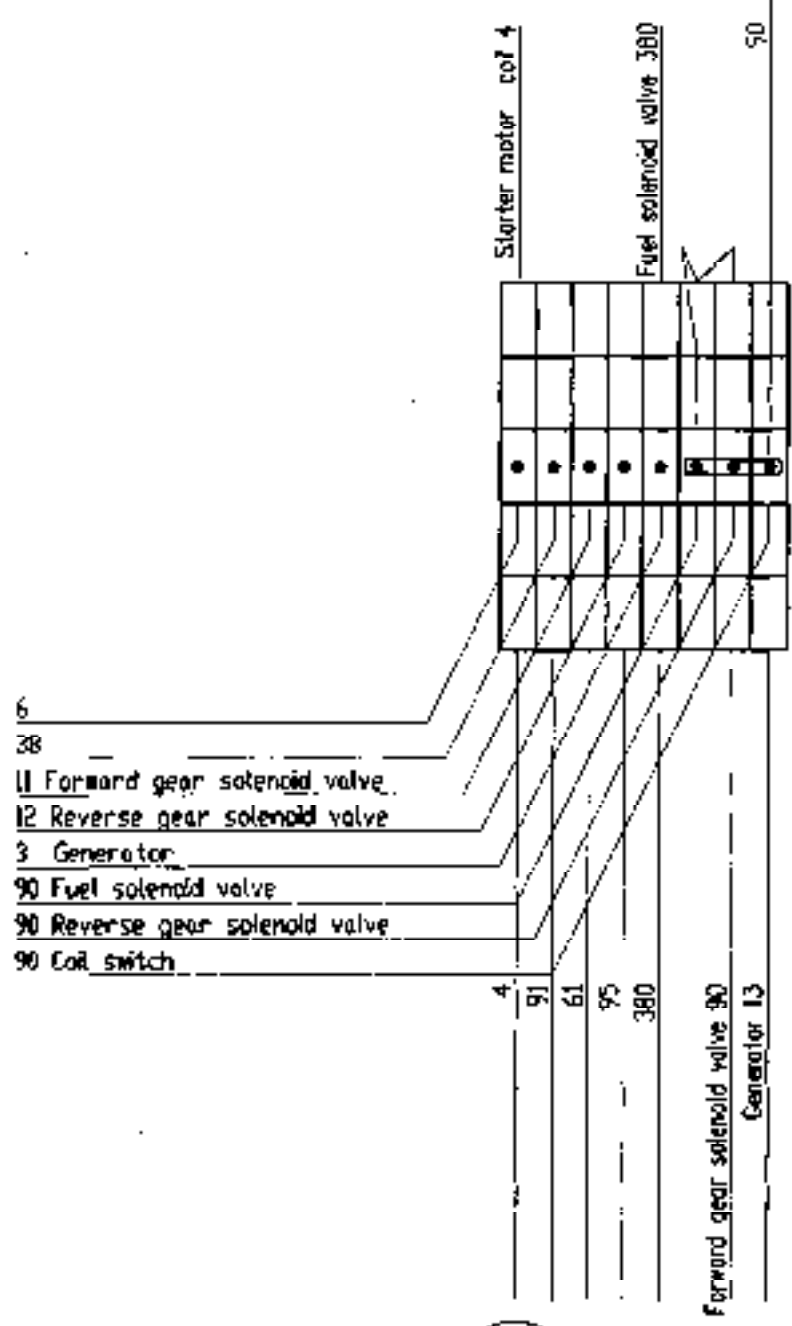


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NR. DIS. DRING. IN. **4357.90.000**
 FILE 435790N1

Designazione: Description: Warlights connection		Disegnato Draw	Visto Checked	Rev. 1	Rev. 2	Rev. 3	Rev. 4	Rev. 5	Foglio Sheet	Segue Follow
Costruttore/Modello: Manufacture/Model: MERLO P35.9 EVA		Data Date: 10/05/96							12	/
Impiego: Duty: AD-T IP44		Firma Draw: D. Pavan								

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MR. DIS. DRING. N. 4357.9.000

FILE: 435791E0

Denominazione Description:	ENGINE BOX	Disegnato Drawn	Visto Checked	Rev. 1	Rev. 2	Rev. 3	Rev. 4	Rev. 5	Foglio Sheet	Segue Follow
Strutture/Modello: Manufacture/Model:	MERLO P35.9 EVA	Data Date	10.06.96						1	/
Impiego: Duty:	AD-T IP44	Firma Drawn	D.Pavan							

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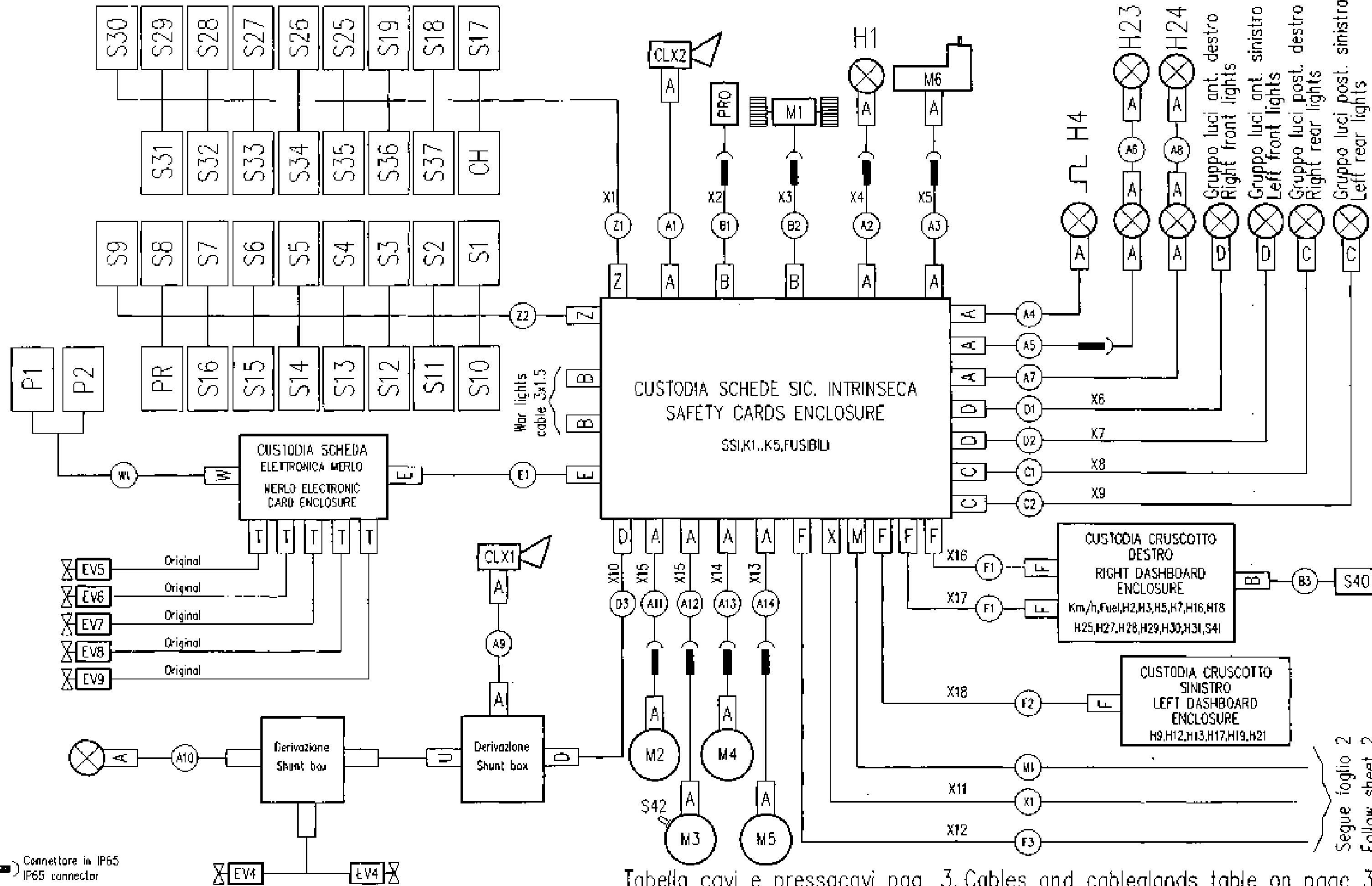


Tabella cavi e pressacavi pag. 3. Cables and cableglnds table on page 3.

Segue foglio 2
Follow sheet 2

Connettore in IP65
IP65 connector



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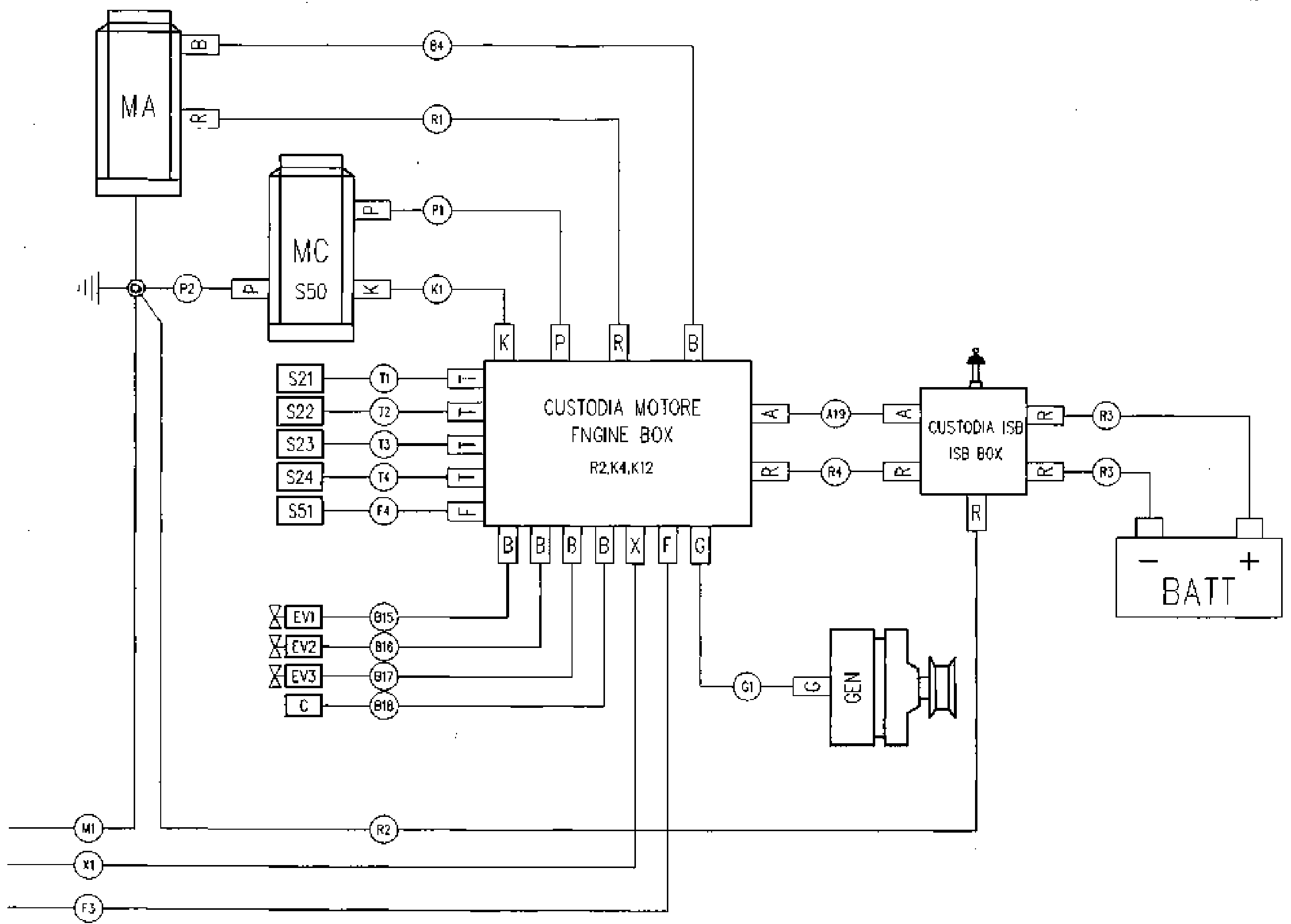
Denominazione: GIRO CAVI/CABLES WIRING
 Descrizione: MERLO P35.9 EVA
 Costruttore/Modello: MERLO P35.9 EVA
 Impiego/Duty: AD-1 IP44

Disegnato Draw	Visto Checked	Rev. 1	Rev. 2	Rev. 3	Rev. 4	Rev. 5
10.06.96	22.05.97					
Firma Drawn	D. Pavan					

FILE: 435793A1
 4357.93.000

Foglio Sheet 1
 Segue Follow 2

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Da foglio 1
From sheet 1



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Denominazione: GIRO CAM/CABLES WINDING
Description:
Costruttore/Modello: MERLO P35.9 EVA
Manufacture/Model:
Impiego: AD-T LP44
Duty:

Disegnato Draw	Verificato Checked	Rev. 1	Rev. 2	Rev. 3	Rev. 4	Rev. 5
Data Date	10.06.96	22.05.97				
Firma Drawn	D.Pavan	D.Pavan				

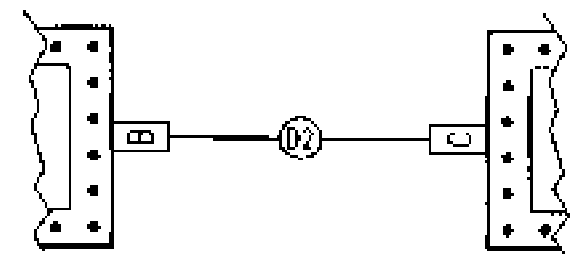
NR. DIS. DRWS. N. 4357.93.000
FILE: 43579361

Foglio Sheet 2
Segue Follow 3

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Sigla Mark	CONDUTTORE/CABLE			PRESSACAVO/CABLEGLAND		LUNGHEZZA CAVO (mt)/CABLE LENGTH (mt)																		
	TIPO TYPE	SEZIONE SECTION	CODICE CODE	PASSO THREAD	CODICE CODE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
A	CONC.	2x1.5	C105002122	1/2"	P001036122	2.5	4	4	6.5	3	1.2	5.5	0.8	1	2	3	6.5	4.5	6.5			2	2	3.5
B	CONC.	3x1.5	C105003122	1/2"	P001036122	2	3.5	3	3.5															
C	CONC.	4x1.5	C105004122	1/2"	P001037122	7	6																	
D	CONC.	6x1.5	C105006122	1/2"	P001037122	5.5	1.5	6																
E	CONC.	8x1.5	C105008122	3/4"	P001038122	5.5																		
F	CONC.	12x1.5	C105012122	1/2"	P001074122	3	3.5	5	5															
G	CONC.	14x1.5	C105014122	3/4"	P001038122	2.5																		
J	CONC.	4x2.5	C105030122	1/2"	P001037122																			
K	CONC.	1x2.5	C101002122	1/4"	P001040122	7																		
L	CONC.	1x4	C101003122	1/4"	P001040122																			
M	CONC.	1x10	C101010122	1/2"	P001036122	5																		
N	CONC.	1x16	C101015122	1/2"	P001036122																			
O	CONC.	1x25	C101020122	1/2"	P001036122																			
P	CONC.	1x35	C101025122	1/2"	P001037122	7	7																	
R	CONC.	1x50	C101030122	1/2"	P001037122	3.5	4	2	3.5															
I	NORM.	2x0.75	C106005122	1/4"	P001040122	1.5	1	1	1	2														
U	NORM.	3x0.75	C106006122	1/4"	P001040122																			
V	NORM.	4x0.75	C106007122	1/4"	P001040122																			
W	NORM.	8x0.75	C106011122	3/8"	P001041122	3																		
X	NORM.	12x0.75	C106016122	1/2"	P001036122	5																		
Y	NORM.	18x0.75	C106022122	1/2"	P001037122																			
Z	NORM.	21x0.75	C106030122	1/2"	P001037122	4.5	4.5																	

Esempio di utilizzo/Example of use



Sigla	CONDUTTORE/CABLE			PRESSACAVO/CABLEGLAND		LUNGHEZZA CAVO (mt)	
	TIPO	SEZIONE	CODICE	PASSO	TIPO	1	2
A	CONC.	2x1.5	C105002122	1/2"	P001036122		
B	CONC.	3x1.5	C105003122	1/2"	P001036122		
C	CONC.	4x1.5	C105004122	1/2"	P001037122		
D	CONC.	6x1.5	C105006122	1/2"	P001037122		3

Il pressacavo B a sinistra e quello C a destra, le cui tipologie si deducono dalla tabella dei pressacavi, sono collegati dal cavo D2, dove D sta per il pressacavo da 1/2" tipo P001037122, mentre il 2, incrociato con la D sulla tabella, dà la lunghezza del cavo utilizzato, in questo caso pari a 3 metri. The cable gland B on the left and C on the right, with types are deduced on the cable glands table, are connected by cable D2, where D indicates 1/2" cable gland type P001037122, while 2, crossed with D on the table, gives the length of cable used, in this case equal to 3 metre.



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Denominazione: Lunghezza cavo/Cables length
 Descrizione:
 Costruttore/Modello: MERLO P35.9 EVA
 Impiego: AD-T IP44
 Data Date: 10.06.96
 Firma Drawn: D.Pavan

Disegnato Draw	Viso Checked	Rev. 1	Rev. 2	Rev. 3	Rev. 4	Rev. 5
D.Pavan		22.05.97				

4357.93.000
 FILE: 43579301

Foglio Sheet 3
 Segue Follow /



Merlo S.p.A. Industria Metalmeccanica

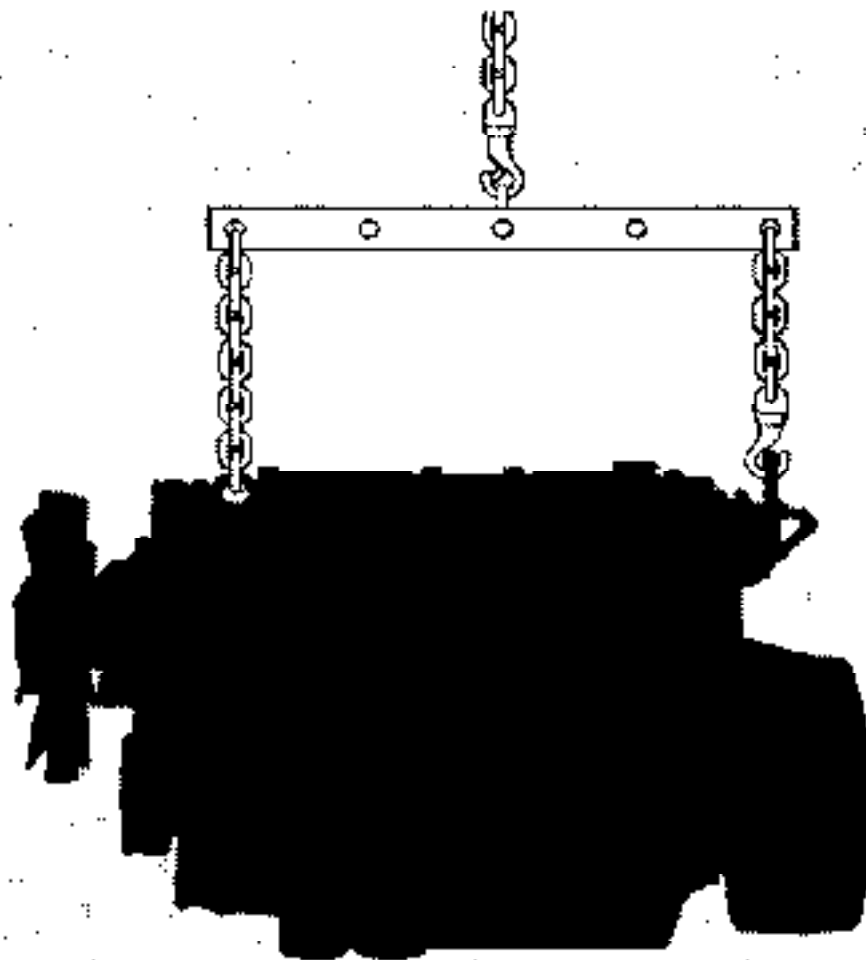
12020 S. Defendente di Cervasca (CN) - ITALY Tel (0171) 614111 - Fax (0171) 614100

Domino Mining Equipment Pty Ltd

A C N. 002 706 881 P.O. Box 89, WYONG, N.S.W. (Aust.) 2259 Phone: (043) 53 1033 - Fax: (043) 51 2119

SERVICE MANUAL

ENGINE REMOVAL FROM P35.9 EVA



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INTRODUCTION.....1

NECESSARY TOOLS AND REPAIR TIMES.....2

ENGINE REMOVAL FROM THE MACHINE.....3

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INDEX

SAFETY AND GENERAL INSTRUCTIONS 3

CONVERSION FACTORS 4

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This manual provides the information necessary for correct and safe execution of maintenance works not included in the INSTRUCTION HANDBOOK FOR OPERATING AND MAINTENANCE; it is addressed to qualified fitters, who have the required knowledge of mechanical, hydraulic and electrical systems for the machine being serviced.

All work carried out should comply with all relevant environmental and occupational health and safety requirements.

This symbol is used to identify the dimensions of the spanner required for the operations described in this handbook. The spanner type will be mentioned only if it is non standard.



CAUTION!!!

The symbol shown to the right hand side will be used everytime a standard Merlo procedure for engine removal will be substituted by a specific Miretti instruction valid for flameproofed units only. Please refer to the Miretti annex, attached at the end of this chapter, in order to follow the correct procedure.



GENERAL NOTE.

Always ensure any work carried out on the vehicle is carried out on level ground. If this is not possible the ground should be as level as possible and the vehicle should be chocked to prevent any possibility of the vehicle rolling.

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**SAFETY AND GENERAL INSTRUCTIONS****CAUTION!!!**

Serviceing of the machine shall only be carried out by skilled and competent personnel. For repair of parts that are not part of the normal scheduling, refer MERLO AUSTRALIA technical service.

**WARNING!!!**

Always wear suitable protective clothing and safety equipment when using lubricants. Extra care should be taken to avoid burns when working with hot fluids or elements.

**WARNING!!!**

Always dispose of oils, filters or other mediums in an environmentally friendly manner. Use official organisations for the disposal of such fluids.

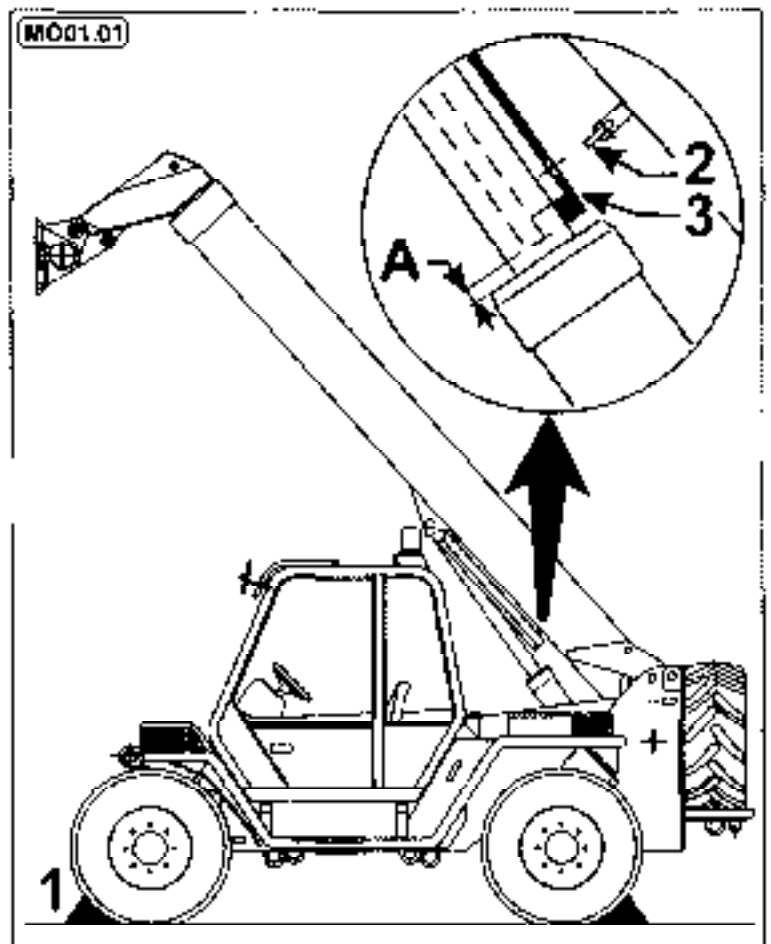
Before carrying out any kind of servicing, position the machine on flat, level ground and:

- retract and lower the boom
- release loads or attachments on the vehicle
- put chock (1) at the front and back of the wheels to avoid accidental movement
- apply the hand brake, place the transmission lever in neutral position and stop the engine.

Should it be necessary to carry out servicing operations with the boom lifted, use the safety lock following these instructions:

- lift the boom
- apply the hand brake, place the transmission lever in neutral position and stop the engine
- working from the left rear mudguard, rotate lever (2) and rest the safety lock (3) on the lifting jack rod
- re-start the engine and slowly lower the boom till the lock is at about 10 mm from the jack head (dimension A)
- before lowering the boom, replace the safety lock in the the original position.

When working under the vehicle it is preferable to use a pit or height adjustable work platform. The vehicle weight is stated on identification plate.





CONVERSION FACTORS

TORQUE

1Kgm	=	9,806	N·m
"	=	7,233	lb·ft
"	=	86,79	lb·in

PRESSURE

1bar	=	100	KPa
"	=	14,5	psi (lb/in²)
"	=	0,1	N/mm²

FORCE

1Kg	=	9,806	N
"	=	2,204	lb



INDEX

STANDARD TOOLS 2

SPECIAL TOOLS 3

REPAIR TIMES 3

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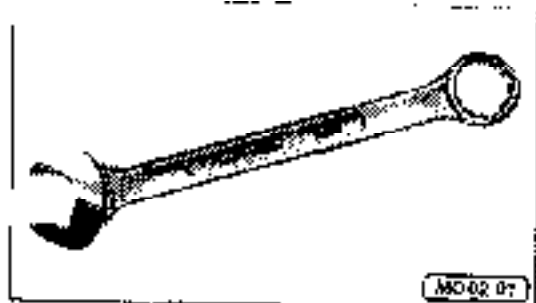


2 - NECESSARY TOOLS AND REPAIR TIMES

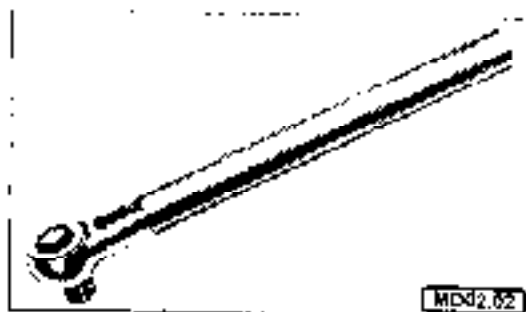


STANDARD TOOLS

Spanner: 6, 7, 8, 10, 13, 15, 17, 19, 22, 36, 41, 50

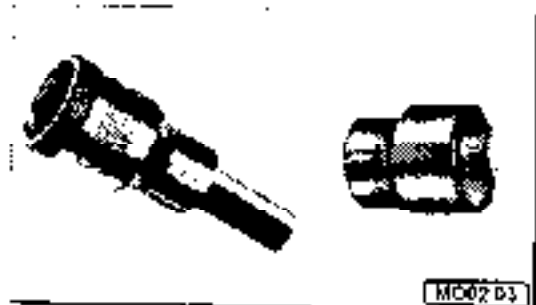


Ratchet



Sockets

- external hexagon 6
- inner hexagon 7, 13, 17, 19, 24



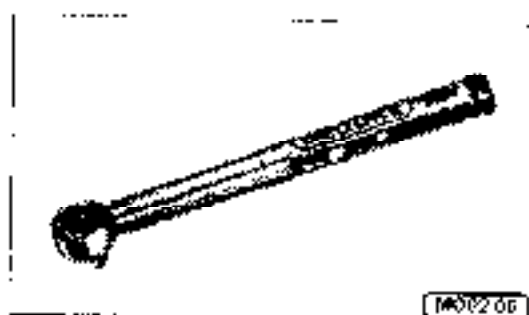
Extension: L = 50, 100, 200



Pipe wrench L = 580



Torque wrench



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2 - NECESSARY TOOLS AND REPAIR TIMES



SPECIAL TOOLS

Two filter spanners (Part No.031748)



REPAIR TIMES

- Engine removal from the machine

about 2 hour and 30 minutes.

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2 - NECESSARY TOOLS AND REPAIR TIMES



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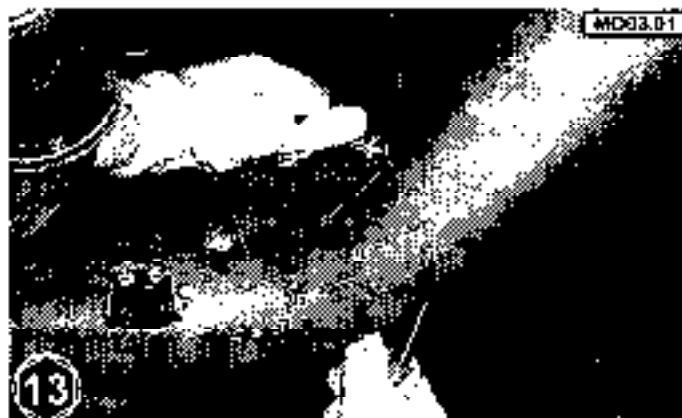
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CAUTION!!!

Refer to "GENERAL NOTE" Chapter "INTRODUCTION".

- 1) Lift and extend the boom, to reduce the oil level in the hydraulic tank.
- 2) Remove the cover beside the pump by removing the four fixing screws. See picture MO03.01



- 3) Remove the cover under the engine by removing the seven fixing screws. See pic.MO03.02A,B & C



- 4) Remove the two protection covers. See picture MO03.03



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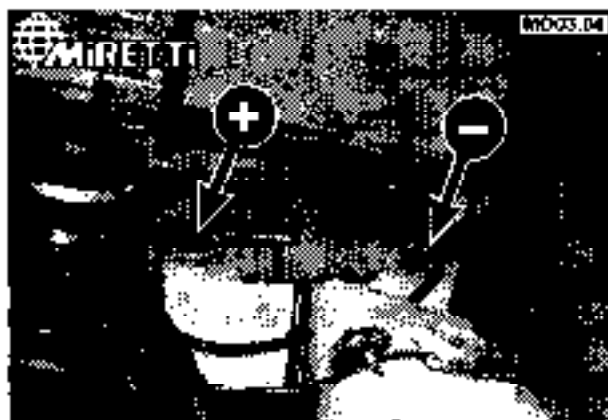
3 - ENGINE REMOVAL FROM THE MACHINE



- 5) Disconnect the battery terminals, first the negative (-), then the positive (+). See picture MO03.04

⚠ WARNING !!

Before carrying out any work on the batteries, read carefully the instructions in the "INSTRUCTION HANDBOOK FOR OPERATING AND MAINTENANCE, in the chapter "MAINTENANCE" paragraph "ELECTRICAL SYSTEM" and the chapter "EVERY 50 HOURS OR WEEKLY", paragraph "BATTERIES".



- 6) Remove the hose fixing clamp (see picture MO03.05A) and the air intake pipe (see picture MO03.05B).



- 7) Remove the bonnet hinge, fixing nuts (see pictures MO03.06A - MO03.06B) and the fixing screws from the gas strut (see picture MO03.06C); free the hinges and remove the bonnet (this should be a two man operation)



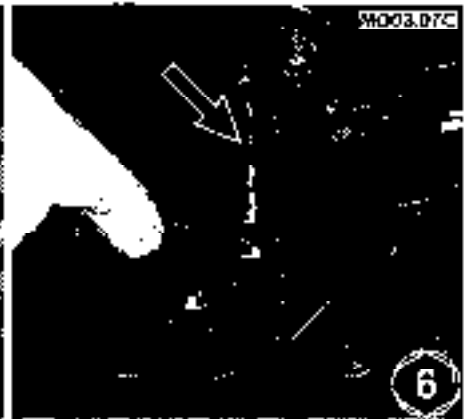
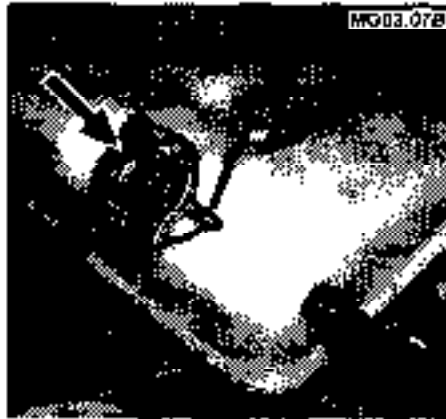
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3 - ENGINE REMOVAL FROM THE MACHINE



- 8) Drain the oil from the system in a container:
- remove the following plugs & caps: radiator breather (see picture MO03.07A), oil tank filler (see picture MO03.07B) and hydrostatic pump drain (see picture MO03.07C).



- remove the filter using two filter spanners Part.No.031748 (see picture MO03.08A).
- remove the two fixing screws of the oil tank support (see picture MO03.08B), then tilt it in such a way so as to drain the remaining oil.



- 9) Disconnect the feed pipe from the filter manifold (see picture MO03.09A) and the breather from the temperature sensor manifold (see picture MO03.09B)

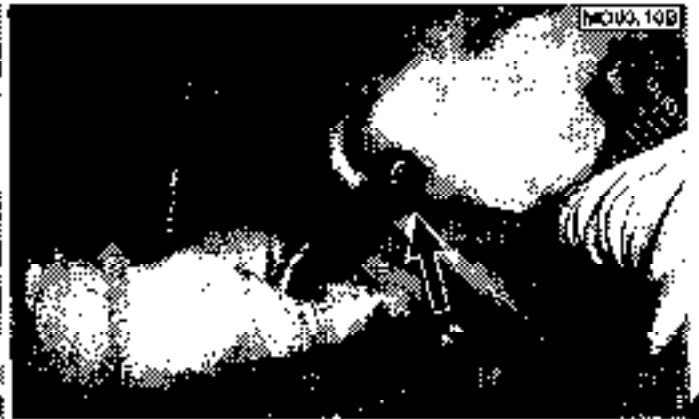




3 - ENGINE REMOVAL FROM THE MACHINE



- 10) Disconnect the electrical connector from the oil level indicator (see picture MO03.10A) and the servobrake drain pipe from the tank (see picture MO03.10B).
Remove the oil tank.



- 11) Disconnect from the filter manifold the two pipes that connect it to the radiator (See pictures MO03.11A and MO03.11B)



- 12) Disconnect the two connecting pipes from the filter manifold (see picture MO03.12A) and from the pump (see picture MO03.12B)





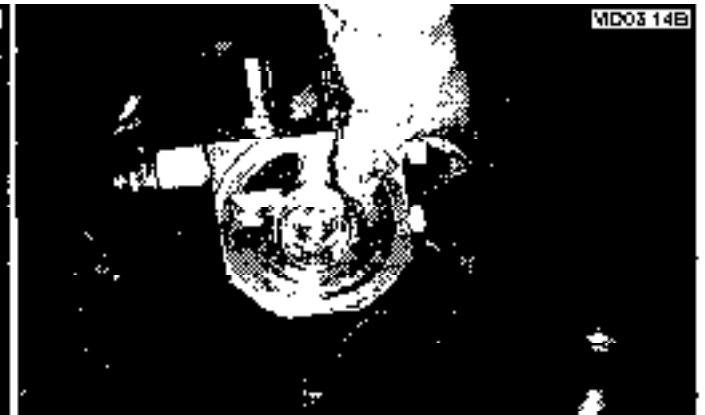
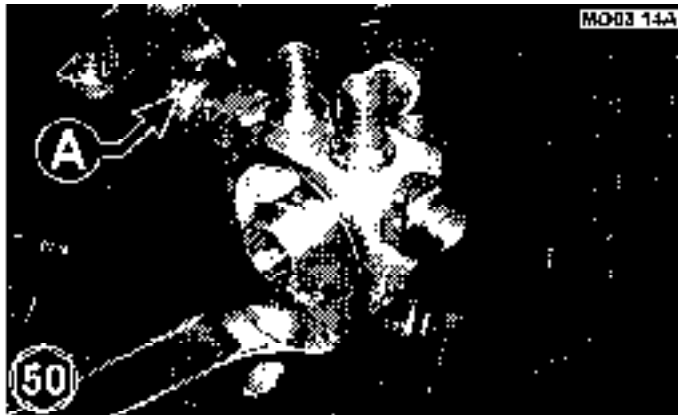
3 - ENGINE REMOVAL FROM THE MACHINE



- 13) Remove the fixing screws: disconnect the two high pressure pipes from the pump (See pictures MO03.13A and MO03.13B). To avoid losing the O' Rings remove them from under the flanges of the connecting pipes



- 14) Loosen the locknut under the filter manifold (see picture MO03.14A). Unscrew the filter manifold and remove it from the pump (see picture MO03.14B); if necessary disassemble the joint ref. A (see picture MO03.14A) to allow the removal of the filter manifold.



- 15) Disconnect from the pump the feed pipe (see picture MO03.15A) and the discharge pipe (see picture MO03.15B) of the speed selection control valve





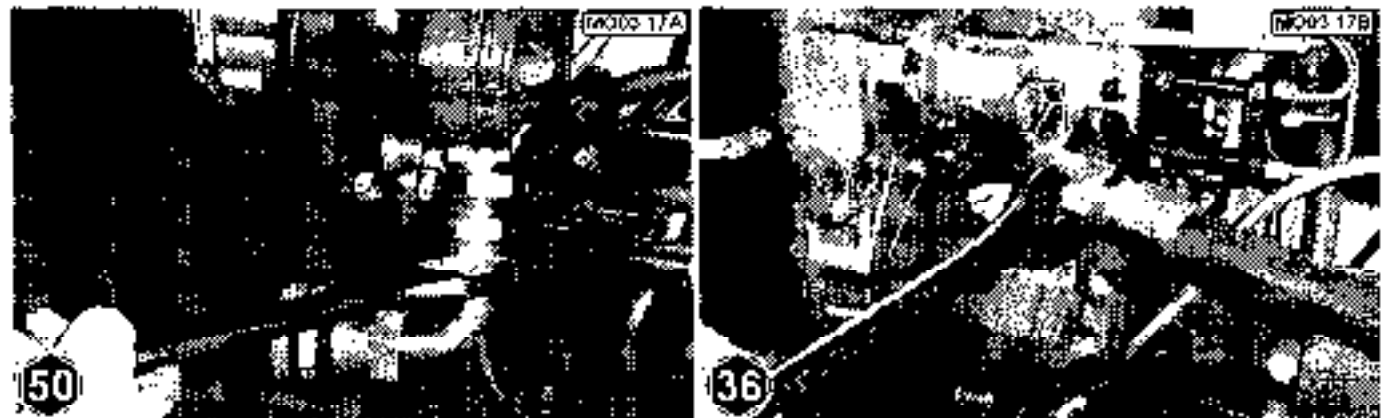
3 - ENGINE REMOVAL FROM THE MACHINE



- 16) Remove the caps of the two fwd/rev solenoid valves (see picture MO03.16A) and the two pilot system pipes (see pictures MO03.16B - MO03.16C).



- 17) To avoid oil leaks when the pump suction line is disconnected, place the suction intake above the oil tank level. Disconnect the suction pipe (see picture MO03.17A) prevent oil discharge by screwing on to the connecting-pipe fixing ring nut a 1"-1/4 cap, then disconnect the pressure line hose (see picture MO03.17B).



- 18) Disconnect the diesel feed pipe from the prefilter bowl (see pictures MO03.18A and MO03.18B)





- 19) Remove the prefilter bowl (see pictures MO03.19A and MO03.19B), in order to avoid accidental breakage during engine removal



- 20) Remove the hydrostatic pump pipes fixing clamps (see picture MO03.20A), disconnect the pipes from the radiator (see picture MO03.20B), then remove them.



- 21) Disconnect the heating system pipes (see pictures MO03.21A and MO03.21B)





3 - ENGINE REMOVAL FROM THE MACHINE



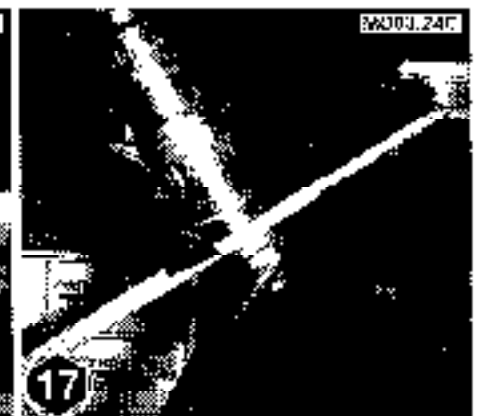
- 22) Disconnect the hydrostatic oil temperature sensor cable (see picture MO03.22A), remove the spring fixing screw from the inching regulator lever (see picture MO03.22B) and the pin from the small fork linking the operating cable (see picture MO03.22C).



- 23) Unscrew the radiator hose fixing clamps (see pictures MO03.23A, MO03.23B and MO03.23C), then remove the hoses.



- 24) Remove the two lower nuts fixing the radiator to the chassis (see picture MO03.24A) and the two fixing nuts from the upper bracket (see pictures MO03.24B and MO03.24C). Tilt the radiator, as much as possible, towards the rear mudguard.

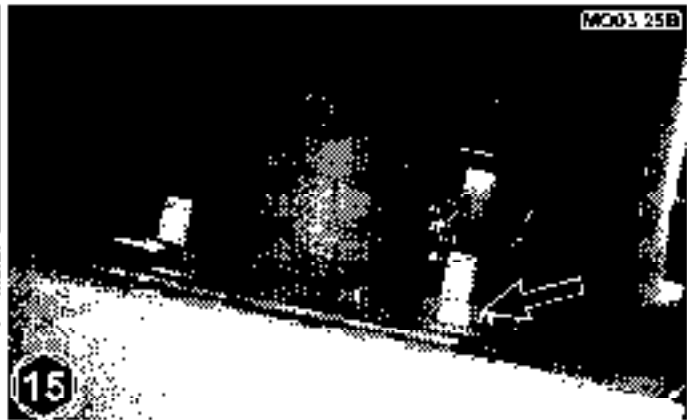




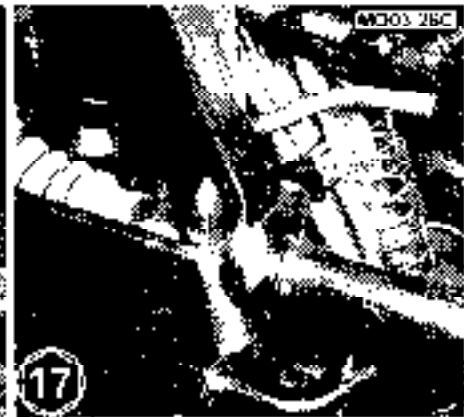
3 - ENGINE REMOVAL FROM THE MACHINE



25) Disconnect the exhaust pipe (see pictures MO03.25A and MO03.25B)



26) Disconnect the accelerator pedal cable (see pictures MO03.26A, MO03.26B and MO03.26C).



27) Remove the engine support fixing screws attached to the chassis (see pictures MO03.27A and MO03.27B), prevent the rotation of the rubber blocks by locking it with a wrench from the opposite side of the chassis (see picture MO03.27C): this is a two person operation.





3 - ENGINE REMOVAL FROM THE MACHINE



- 28) Disconnect the wire from the air filter sensor (see picture MO03.28)



- 29) Disconnect the water thermostat (see picture MO03.29).



- 30) Disconnect the diesel soleno-d valve from the injection pump (see picture MO03.30)

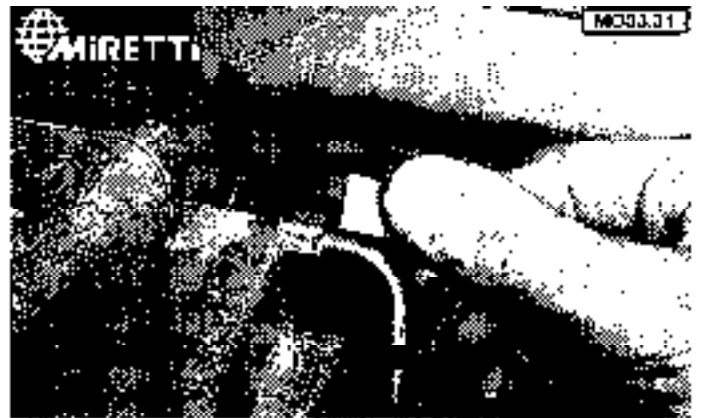




3 - ENGINE REMOVAL FROM THE MACHINE



- 31) Disconnect the glow plug (see picture MO03 31)



- 32) Disconnect the engine grounding strap (see picture MO03 32)



- 33) Disconnect the alternator by removing the plug (see picture MO03.33A), then the two pins (see picture MO03 33B)





3 - ENGINE REMOVAL FROM THE MACHINE



- 34) Remove the engine oil pressure switch connection (see picture MO03.34).

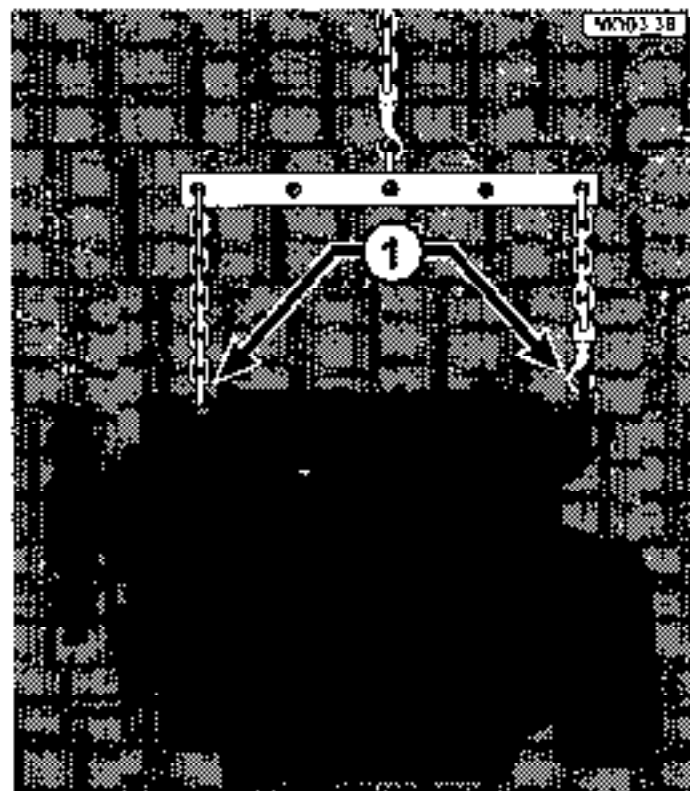


- 35) Disconnect the starter motor (see pictures MO03.35A, MO03.35B and MO03.35C)



- 36) By using the two lifting points (see picture MO03.36, rel. 1), hook and lift the engine using suitable equipment.

! *Keep in mind that the engine weight is around 600 Kg (1320 lbs).*





ENGINE REASSEMBLY INTO THE MACHINE

Reassembling the engine into the machine is the reversal of all the operations from points 38 – 1, bearing in mind the following:

- When inserting the engine into the machine, ensure the blades of the radiator fan are not damaged.
- Check the hydrostatic oil level in the tank and, if necessary, fill, following the instructions in Chapter 7 (paragraph REFILLING OF THE SYSTEM AFTER A SERVICE OR DISASSEMBLY) of the P 35 9 EVA HYDROSTATIC TRANSMISSION "REXROTH" SYSTEM service manual.



3 - ENGINE REMOVAL FROM THE MACHINE



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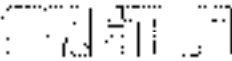


S.r.l. Via Marconi, 29/31 - 20051 Limbiate (Mi) - Italia

**Annex to the
Merlo workshop manual**

ENGINE REMOVAL FROM P35.9 EVA

**valid for
flameproof version**



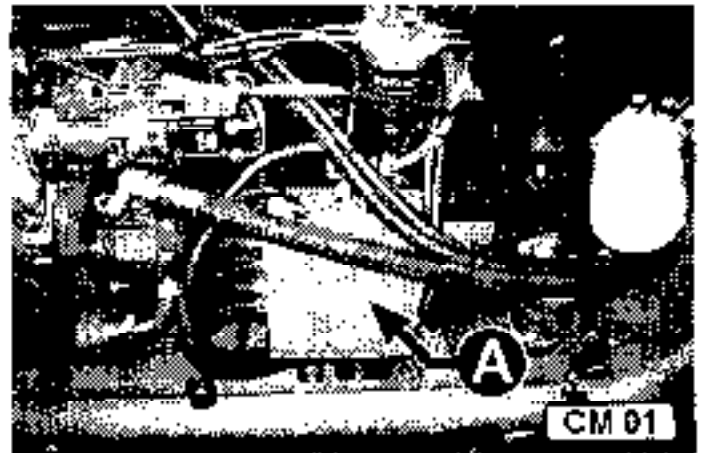
• **POINT Nr. 5 - See picture (MO 03.04), page 3-2**

On flameproofed units the engine bonnet opening will automatically disconnect the battery by acting on the cut-out battery switch.

To restore the safety switch, it is necessary to use the specific restoring key.

- **POINT Nr.10 - Hydrostatic oil level sensor cable (see pic. MO03.10A, page 3-4)**
- **POINT Nr.22 - Hydrostatic oil temperature sensor cable (see pic. MO03.22A, page 3-8)**
- **POINT Nr.28 - Intake air filter sensor cable (see pic. MO03.28, page 3-10)**
- **POINT Nr.29 - Engine coolant temperature sensor cable (see pic. MO03.29, page 3-10)**
- **POINT Nr.34 - Engine oil pressure sensor cable (see pic. MO03.34, page 3-12)**

Disconnect the above mentioned sensors, by following the standard Merlo instructions, bearing in mind that, in the P35 9 EVA flameproofed version, wirings disconnected from the sensors have to be kept connected to the Miretti box (A) installed at engine level, see picture CM 01

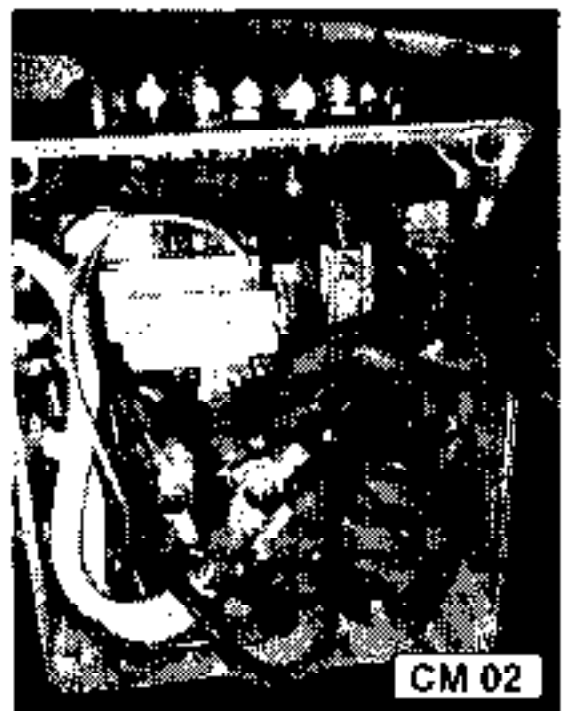


Open engine box (picture CM 02) by unscrewing the 4 cover fixing screws then referring to the Miretti electrical dwg 4357 91 000, sheet '1', disconnect from the terminals connector:

- cable Nr 11.12.90, linking the solenoid valve acting as fwd/bwd transmission control
- cable Nr 380. 90, linking the solenoid valve acting as diesel cut-off control
- power supply cable
- alternator charging signal cable
- engine starter motor cable

All disconnected cables have to be retracted from the box through the relevant gland.

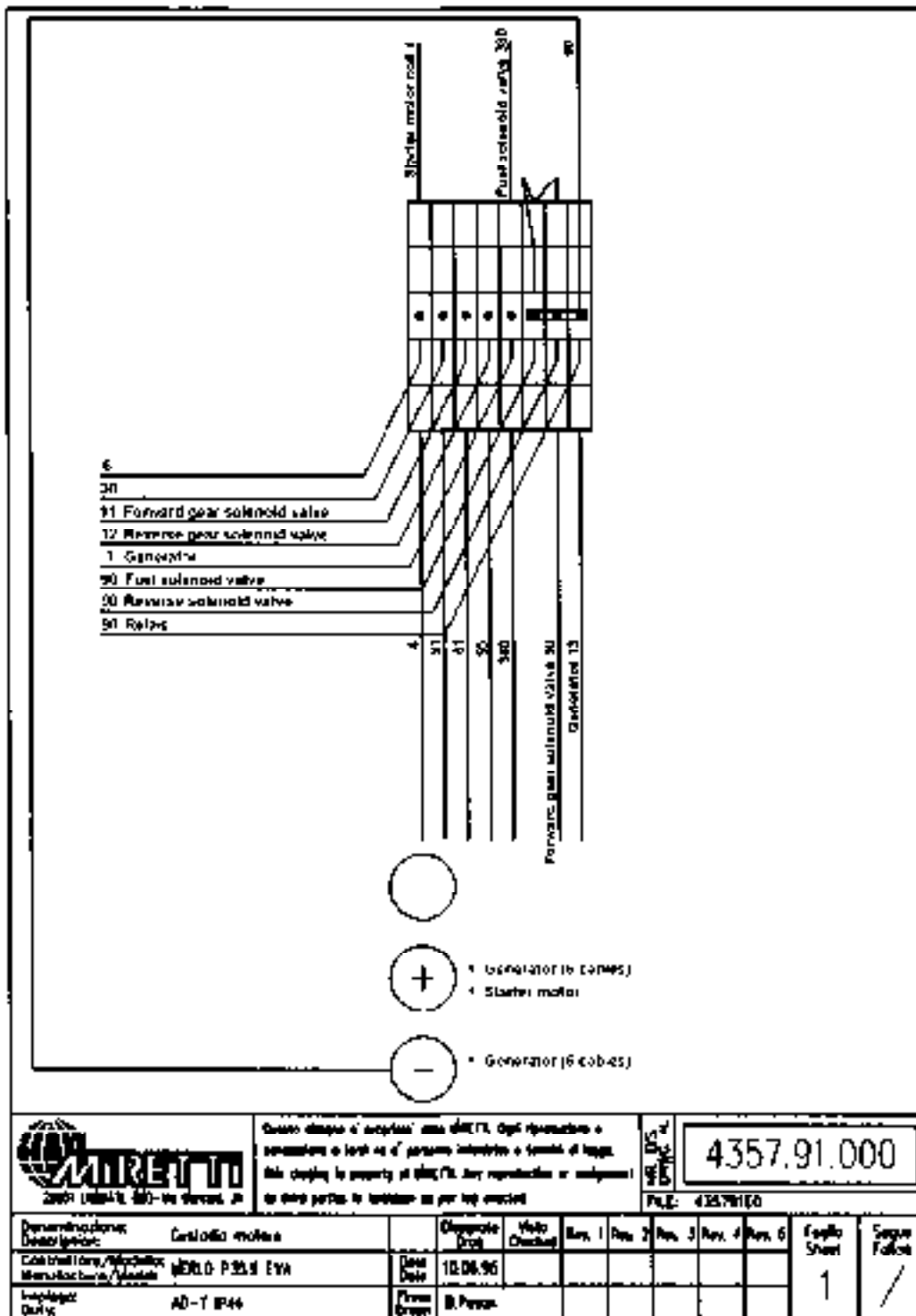
Remove the complete box from engine by unscrewing the four fixing screws





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Designazione: Descrizione:	Caratteristiche tecniche	Approvato Data	Verificato Data	Rev. 1	Rev. 2	Rev. 3	Rev. 4	Rev. 5	Rev. 6	Foglio Sheet	Segue Folios
Colore: Verde / Yellow Materiale: Acciaio / Steel	MERLO P.30.8 E.V.A.	10.06.95								1	/
Impianto: Disegno:	AD-T 8F44	10.06.95	B. Pavesi								

• POINT Nr. 31 - See picture (MO 03.31), page 3-11

Not to be done since the flameproofed units do not feature any air intake pre-heating system.

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**APPENDIX A D-Series
DEFENCE AIR CONDITIONER**

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D-Series

Defence Air Conditioner

*Operator's Compartment Air Conditioning
for Merlo P35.9 Panoramic Telescopic Fork Lift*

MAINTENANCE REPAIR MANUAL



Revised SBQ 66-2721

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TECHNICAL SUPPORT INQUIRIES



Telephone:

International 61 2 9330 7100
Australia (02) 9330 7100

Facsimile:

International 61 2 9330 7199
Australia (02) 9330 7199

Address:

4 Bachell Ave Lidcombe NSW 2141

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Application

Overview

This manual is a guide to the operation, maintenance and spare parts for the two types of fork lift applications of on/off-highway air conditioning systems manufactured by Air International Transit.

The Defence Series air conditioner has been designed to suit the Merlo P35.9 telescopic fork lift range. The systems provide for air conditioning of the operator's compartment.

The air conditioner is a split system configuration utilising a remote off-engine driven compressor. The unit is robustly constructed, relatively light weight and is designed to be installed on mobile equipment which is not subject to excessive vibration.

In applications requiring the fork lift to be operated in areas containing explosives, buildings or underground sites, the air conditioner has been purposely built to meet all safety conditions as outlined within "Leaflet No.8, Safety Conditions For Mobile Mechanical Handling Equipment And Vehicles For Use In Military Explosives Storage Areas, 1991, Category C - Buildings containing, or likely to contain, explosives which are not exposed and do not give rise to flammable vapours or explosives dust."

In conjunction with concerns of environmental damage, the air conditioner has been designed to operate on R134a refrigerant in lieu of traditional ozone depleting substances.

Model Number Designation

As the air conditioner system is applied to two types of applications, the remainder of this manual shall, where applicable, make particular reference to either 'Standard Application' or 'Flameproof Application' to ensure the two systems are clearly distinguished.

Standard Application:

Model Number : EC1214 - Wall Mounted Split Evaporator
 : DCF4BX1 - Floor/Deck Mounted Split Condenser

Flameproof Application:

Model Number : DCF4BX2 - Wall Mounted Split Evaporator
 : DCF4BX2 - Floor/Deck Mounted Split Condenser

The a/c systems includes the following primary components:

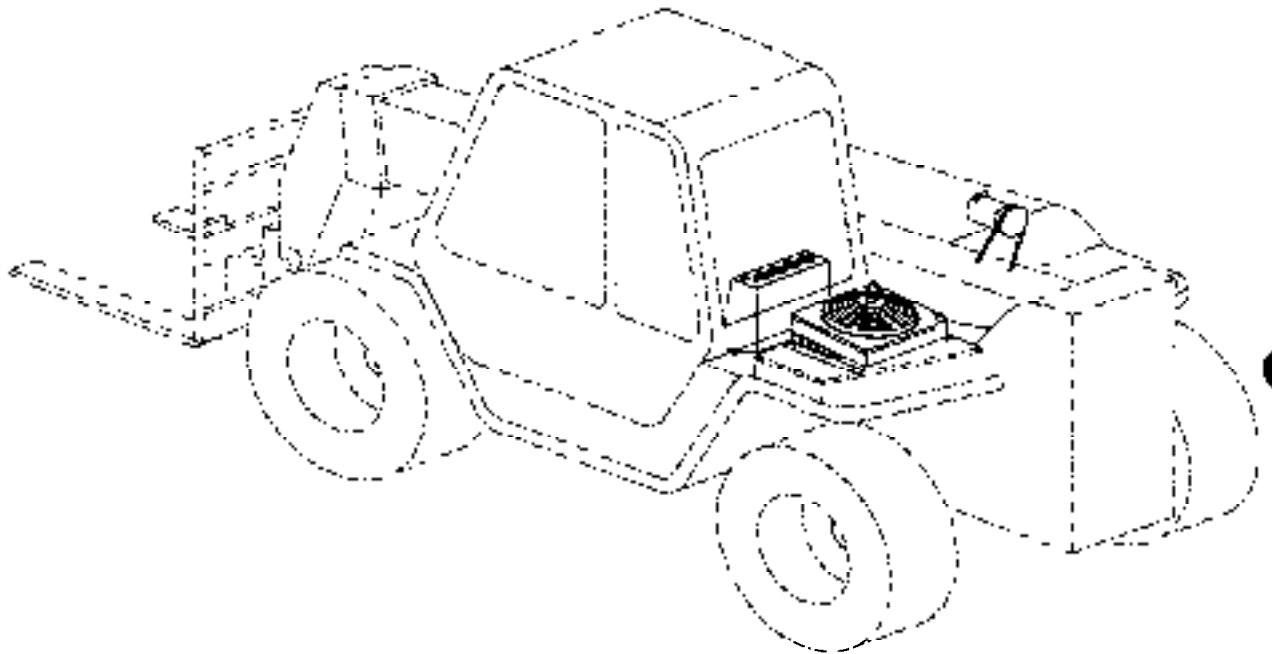
- ⇒ A wall mounted evaporator pack providing a/c (cooling only);
- ⇒ A deck mounted condenser pack;
- ⇒ An off-engine mounted compressor;
- ⇒ Installation fittings;
- ⇒ Wiring looms.

The a/c system has the following key features:

- ⇒ light-weight construction;
- ⇒ standard operating voltage of 24V DC;
- ⇒ use of environmental friendly R134a refrigerant;
- ⇒ return air filter
- ⇒ fan speed control

System Configuration

The typical configuration of the installed defence air system is shown in the following diagram:



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Specifications

Standard Application

EC1214 & DCF4BX1

Cooling Capacity	4 kW (nominal)						
Airflow	3 Speed Fan Operation						
Refrigerant	R134a – 1.5 kg charge weight (approx.)						
Compressor	Rotary 5 piston design – 128 cc. engine driven.						
Compressor Clutch	Ø 132mm OD electro-magnetic, 2A section pulley.						
Compressor Belt	AX section, heavy duty, raw edged cog construction.						
Casing	Primarily constructed of zinc annealed mild steel ensuring resistance to corrosion and physical damage due to its robust design.						
Corrosion Protection	The evaporator casing is fully powder coated (internal and external surfaces), the condenser is chemically pre-treated and finished with a Low Gloss Olive Drab Enamel. Wetted surfaces are coated with a combination sound deadening and rust preventative compound.						
Heat Exchange Coils	Heavy gauge copper tube and aluminium fin construction, sized to maintain reasonable pressures at a wide range of ambient conditions and loads.						
Evaporator Blower Motor	Medium duty, medium life, double shaft, double inlet rotor.						
Condenser Fan Motor	Slimline styled, medium duty, axial blade, steel ball bearings, permanent magnet type.						
Expansion Valve	Inherently equalised block valve.						
Drier Receiver	High capacity, vertical type, combination filter, drier and receiver, with integral sight glass.						
Lubricant	Ester Type Oil - Emkarate RL68S 135 ±15cc.						
Operating Voltage	24V DC						
Current Draw	<table> <tr> <td>Evaporator Fan:</td> <td>5.0 A</td> </tr> <tr> <td>Condenser Fan:</td> <td>6.0 A</td> </tr> <tr> <td>Compressor Clutch:</td> <td>2.0 A</td> </tr> </table>	Evaporator Fan:	5.0 A	Condenser Fan:	6.0 A	Compressor Clutch:	2.0 A
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Condenser Fan:	6.0 A						
Compressor Clutch:	2.0 A						
Weight	<table> <tr> <td>Evaporator Unit:</td> <td>10 kg</td> </tr> <tr> <td>Condenser Unit:</td> <td>10 kg</td> </tr> <tr> <td>Compressor & Clutch:</td> <td>7 kg</td> </tr> </table>	Evaporator Unit:	10 kg	Condenser Unit:	10 kg	Compressor & Clutch:	7 kg
Evaporator Unit:	10 kg						
Condenser Unit:	10 kg						
Compressor & Clutch:	7 kg						

EC1214 & DCF4BX1

Safety Features

Combination high/low pressure cut-out safety switch

HP Cut-in = 21.0 kg/cm²G (2060 kPa)

HP Cut-out = 27.0 kg/cm²G (2650 kPa)

LP Cut-in = 2.1 kg/cm²G (206 kPa)

LP Cut-out = 2.0 kg/cm²G (196 kPa)

Electrical de-ice thermostat

Cold Cut-in = +1°C

Cold Cut-in = -3°C

Electrical protection fuses; refer electrical schematics within manual

Flameproof Application

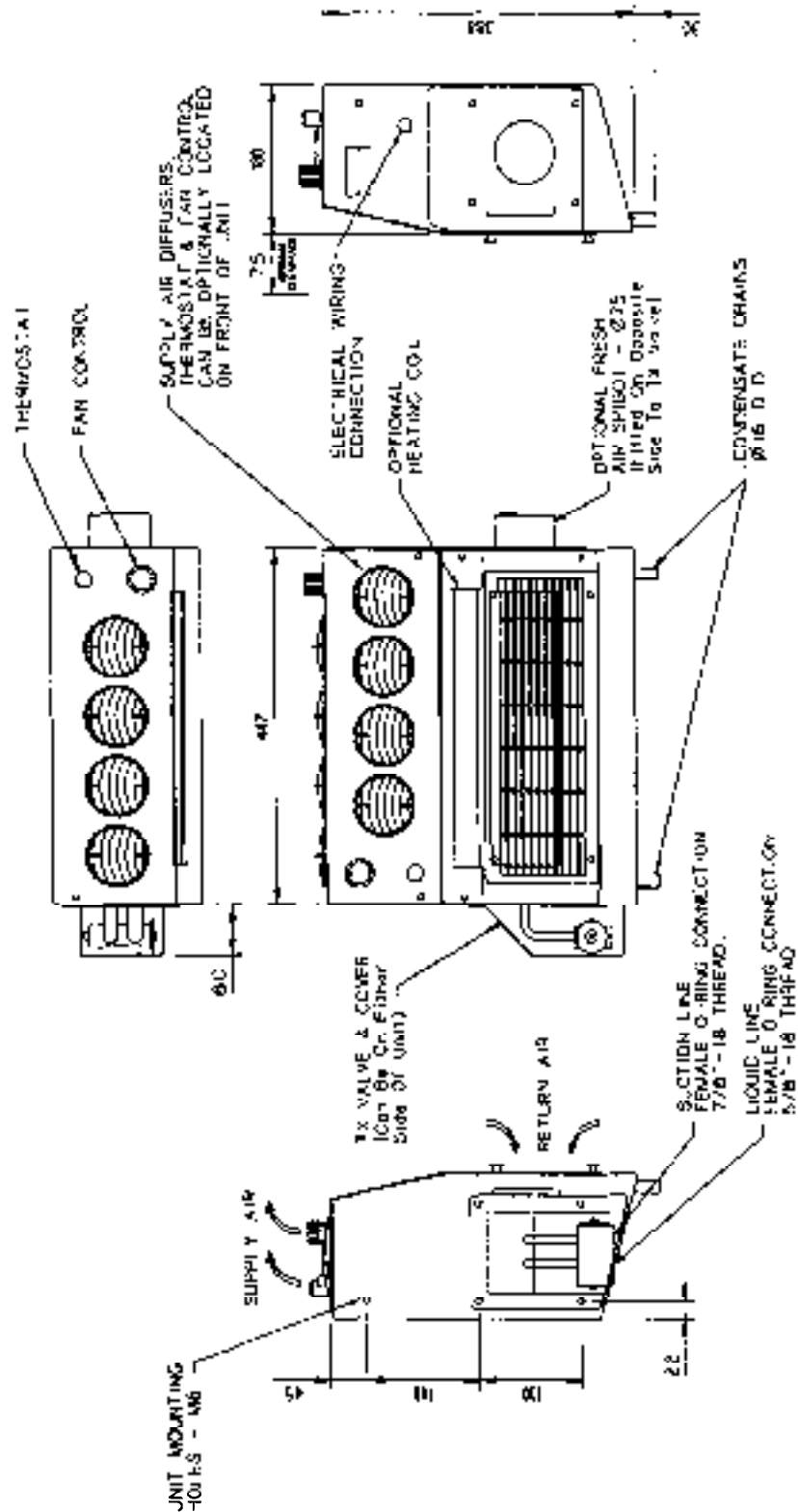
DFW4BX2 & DCF4BX2

Cooling Capacity	4 kW (nominal)												
Airflow	Linear Speed Fan Operation												
Refrigerant	R134a – 1.5 kg charge weight (approx.)												
Compressor	Rotary 5 piston design – 138 cc, engine driven.												
Compressor Clutch	Ø 132mm OD electro-magnetic, 2A section pulley.												
Compressor Belt	AX section, heavy duty, raw edged cog construction.												
Casing	Primarily constructed of zinc annealed mild steel ensuring resistance to corrosion and physical damage due to its robust design.												
Corrosion Protection	The evaporator casing is fully powder coated (internal and external surfaces), the condenser is chemically pre-treated and finished with a 'Low Gloss Olive Drab Enamel'. Wetted surfaces are coated with a combination sound deadening and rust preventative compound.												
Heat Exchange Coils	Heavy gauge copper tube and aluminium fin construction, sized to maintain reasonable pressures at a wide range of ambient conditions and loads.												
Evaporator Blower Motor	Heavy duty, long life, double shaft, steel ball bearings, double inlet rotor.												
Condenser Fan Motor	Slimline styled, medium duty, axial blade, steel ball bearings, permanent magnet type.												
Expansion Valve	Inherently equalised block valve.												
Dryer Receiver	High capacity, vertical type, combination filter, drier and receiver, with integral sight glass.												
Lubricant	Ester Type Oil - Emkarate RL685 135 ±15cc.												
Operating Voltage	24V DC												
Current Draw	<table border="0"> <tr> <td>Evaporator Fan:</td> <td>5.0 A</td> </tr> <tr> <td>Condenser Fan:</td> <td>6.0 A</td> </tr> <tr> <td>Compressor Clutch:</td> <td>2.0 A</td> </tr> </table>	Evaporator Fan:	5.0 A	Condenser Fan:	6.0 A	Compressor Clutch:	2.0 A						
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LP Cut-out	= 2.0 kg/cm ² G (196 kPa)												
Cold Cut-in	= +1°C												
Cold Cut-in	= -3°C												

System Parameters

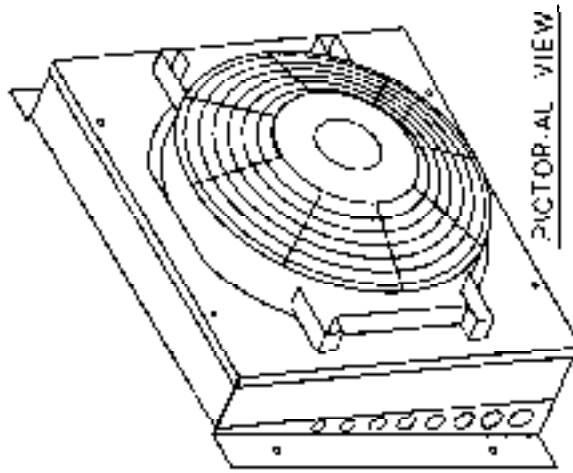
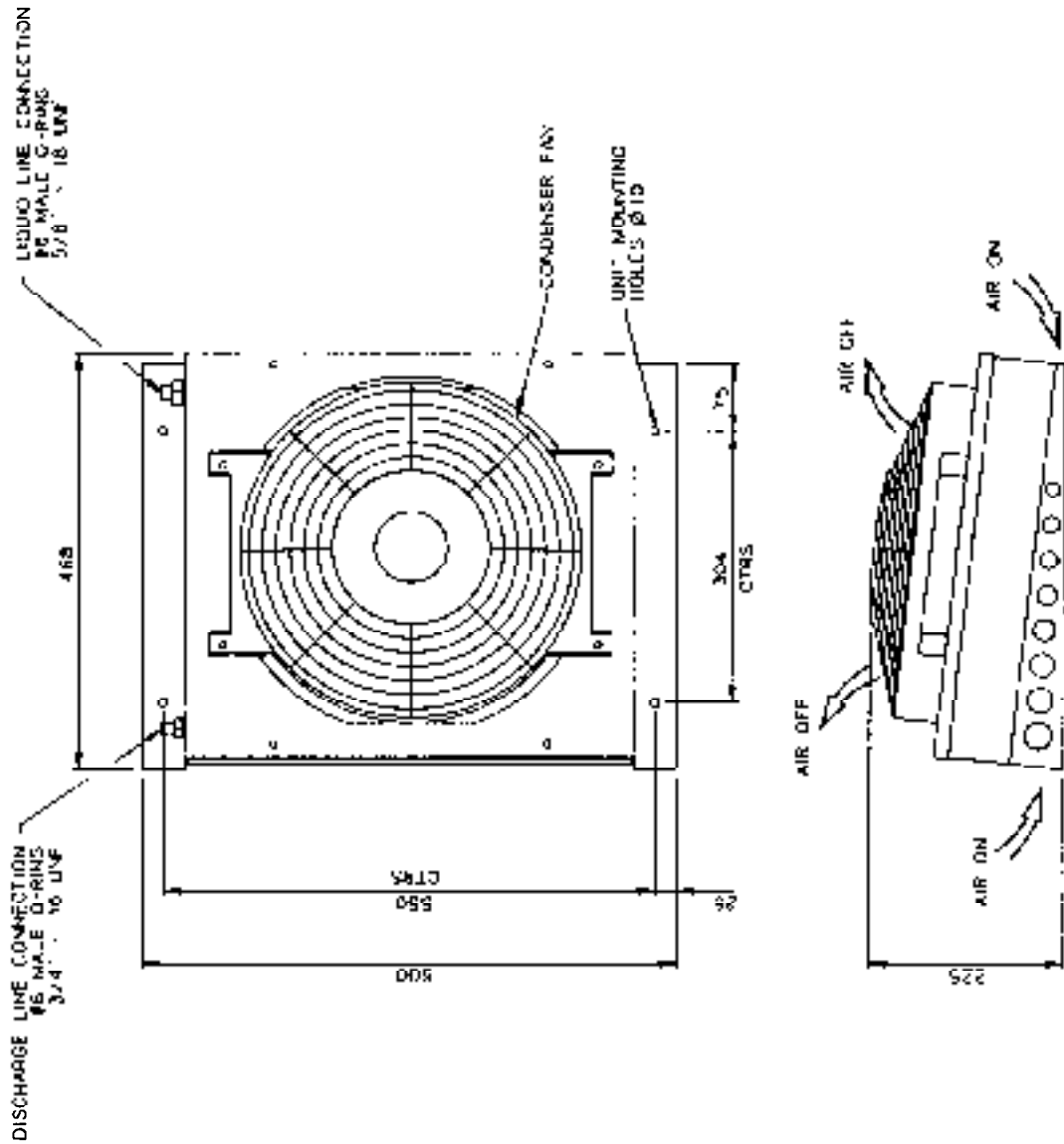
Evaporator Pack - Standard - EC1214

Drawing No. T2501001 - Issue : A



Condenser Pack - Standard - DCF4BX1

Drawing No. T2721001 - Issue : A

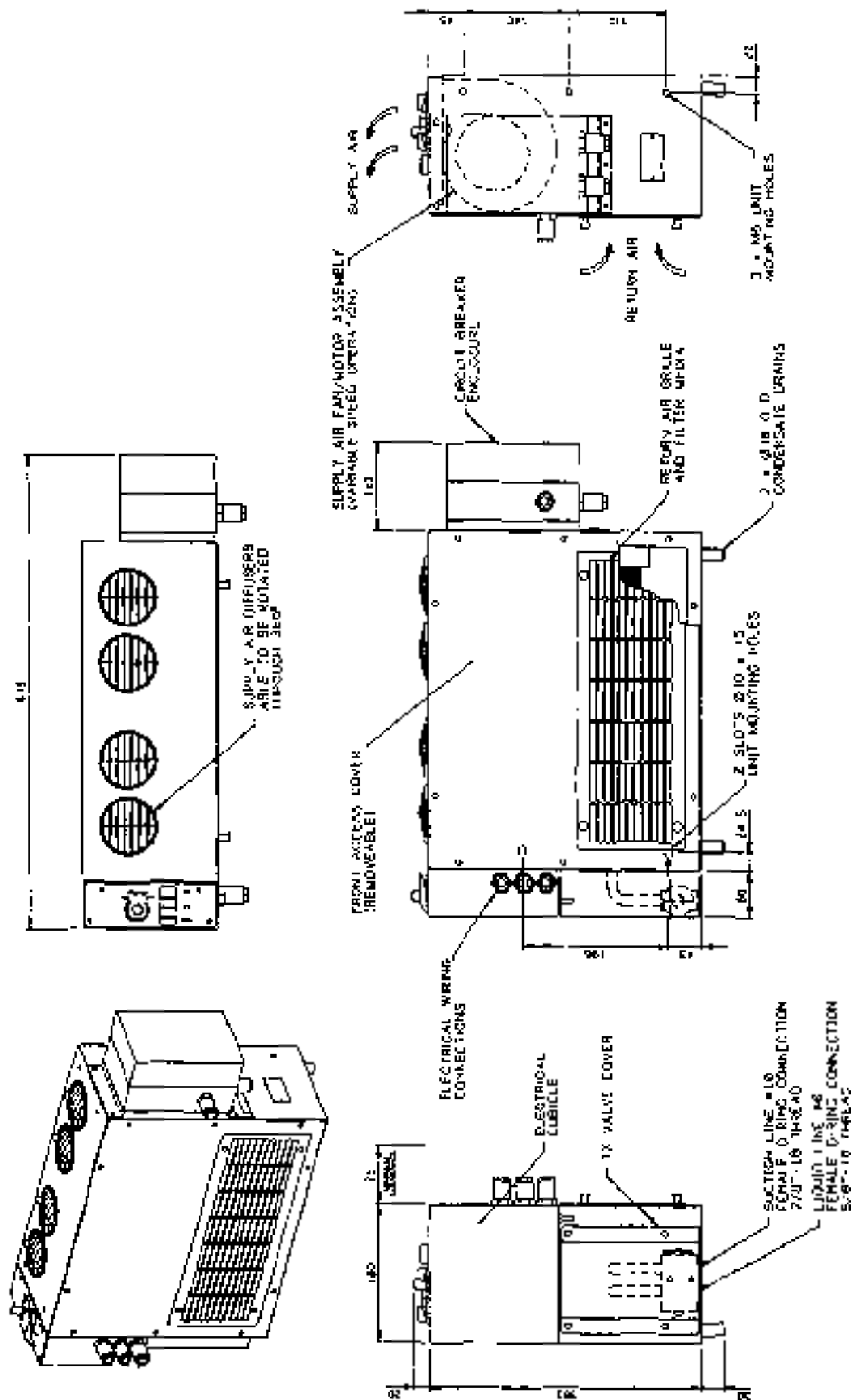


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Evaporator Pack - Flameproof - DFW48X2

Drawing No. T2721002 - Issue : B

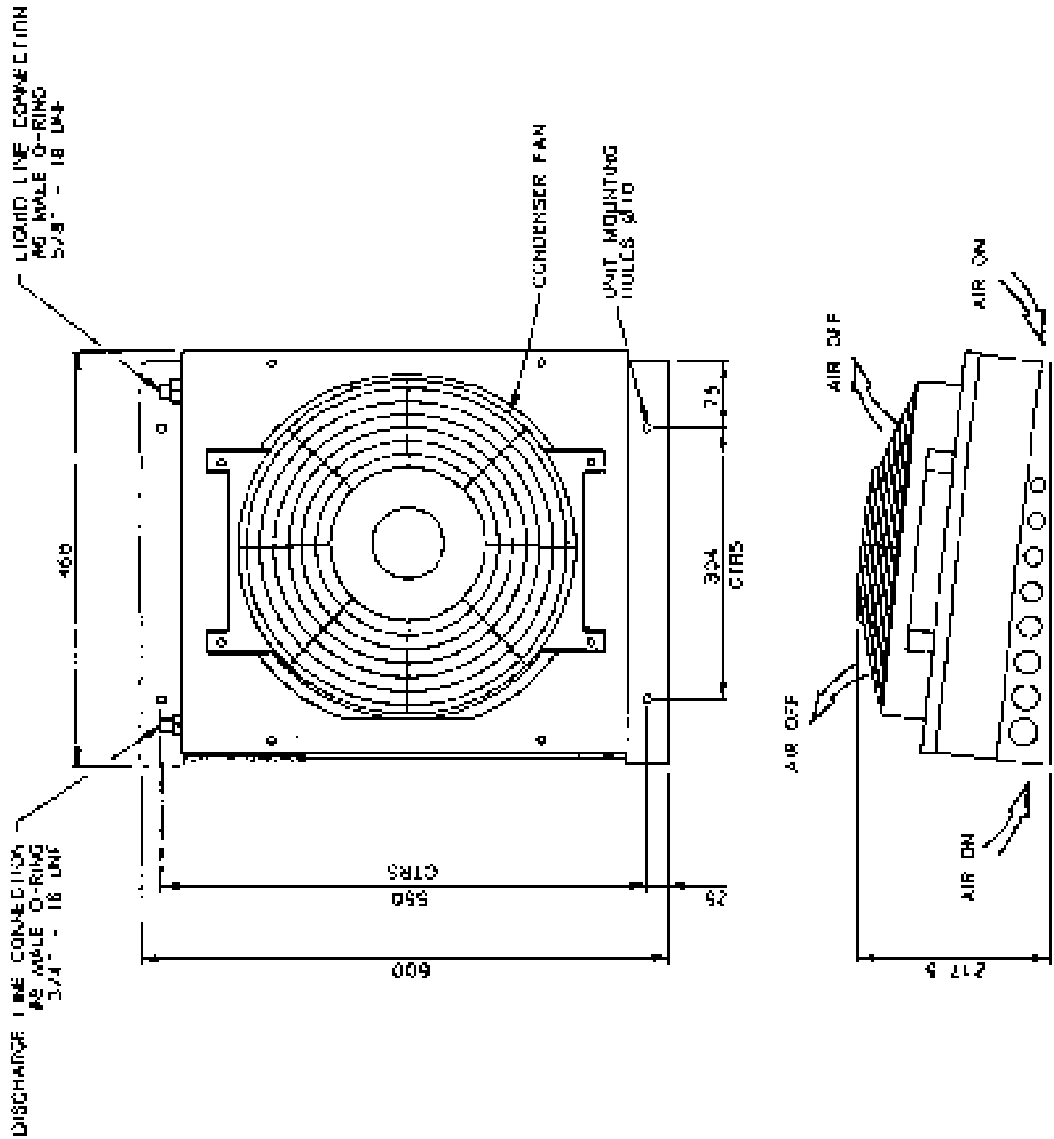
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Condenser Pack - Flameproof - DCF4BX2

Drawing No. T2721004 - Issue : 00

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Air Flow

The a/c system provides a cooling function to deliver conditioned air to the driver determined by the control settings integrated into the evaporator pack.

The wall mounted evaporator pack has a basic air recirculation circuit provided by two forward curved fans in parallel. These draw air through the return air filter and evaporator coil to deliver the conditioned air via four directional outlet vents into the cab.

For standard application a/c systems, average cab temperature is controlled by a thermostat, the capillary of which, senses the temperature of the coil. For flameproof application a/c systems, average cab temperature is controlled by a linear fan speed control, thus adjusting the volume of air being conditioned prior to re-delivery to the cab.

When operational the evaporator pack produces the following air flow:

1. *Return air* from the operator's cab is drawn by the supply fan through the *return air filter* into the evaporator pack
2. The air is *conditioned* as it passes through the evaporator coil inside the pack.

The evaporator coil cools and dehumidifies the air.

3. The conditioned *supply air* is discharged from the evaporator pack through the outlets, direction of discharge can be controlled via four 360° rotational vents.

The condenser air is provided by one axial (propeller) flow fan. Air is drawn through the bottom of the condenser coil and discharged through the top of the condenser.

The operator also has control over air direction within the cab by means of adjustable grilles fitted to the supply air duct. It is a matter of personal preference whether air is directed to the body or not.

Refrigeration System

The refrigeration system has been designed to provide easy service access to components. Reliable components have been used for high performance and elimination of nuisance down-times.

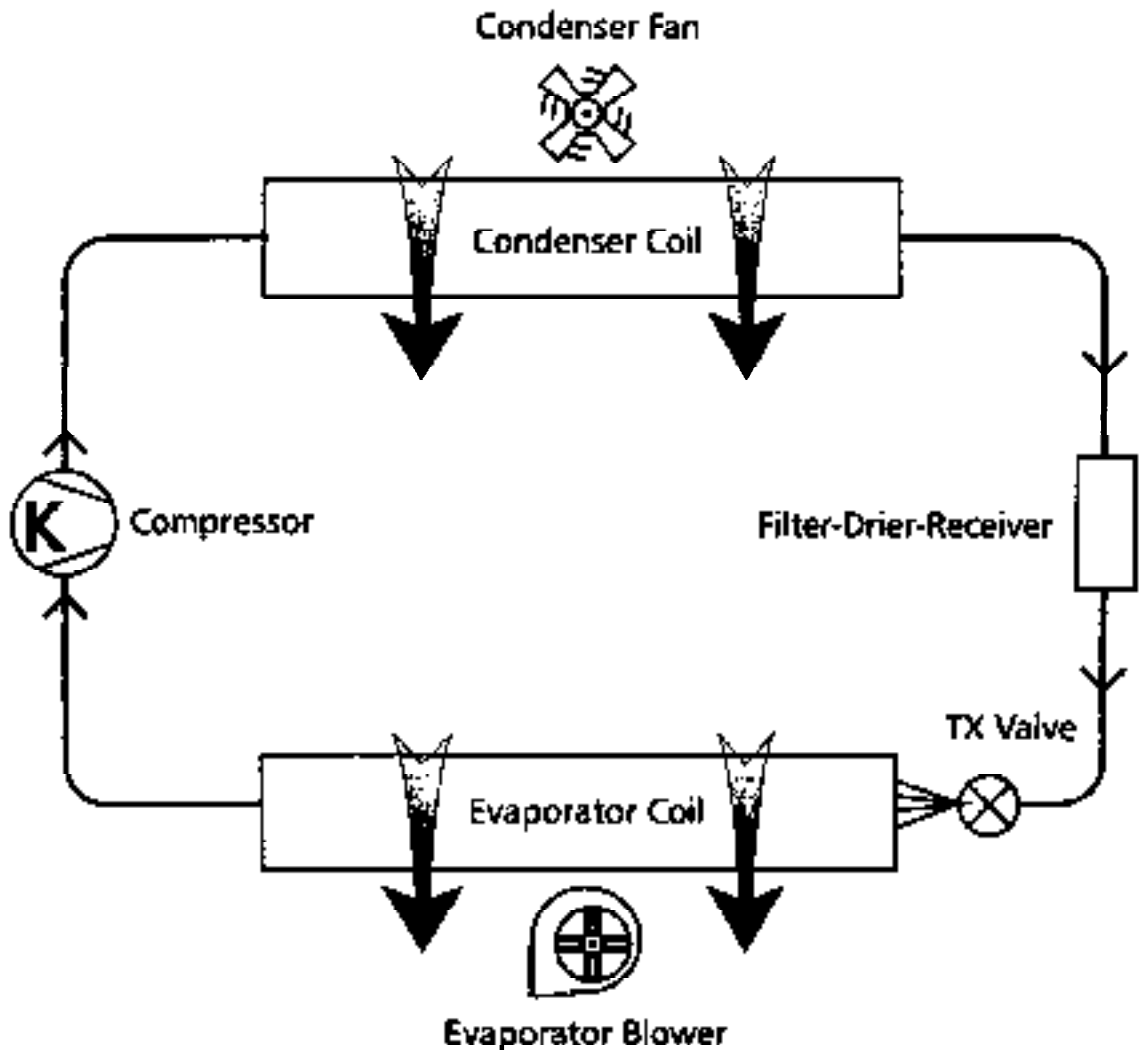
For safety, automatic-reset pressure cut-out safety devices are included in the high side of the refrigeration circuit. In the event of excessively low or high system pressures during operation, these safety devices will stop compressor operation, eliminating potential for equipment damage or injury.

The compressor delivers high pressure R134a vapour directly to the condenser which transfers the heat to the air being passed over the coil. This loss of temperature combined with high pressure results in the refrigerant vapour condensing.

Liquid from the condenser passes through a combination receiver/drier/sight glass, then to an inherently equalised thermal expansion (TX) valve which meters refrigerant to the evaporator coil. As expansion takes place within the coil, heat is absorbed, thereby cooling and dehumidifying the air as it passes over the coil.

The expanded refrigerant returns to the compressor where the cycle continues.

Refrigeration Schematic



Cooling Operation

The a/c system generates cool air by means of a refrigeration system operating on a closed refrigeration vapour compression cycle. The system utilises chemical refrigerant R134a, and is driven by a compressor running off the main engine.

As air passes through the evaporator coil, heat and humidity transfer from the air to the coil, and the air is cooled and dehumidified.

Electrical System

Standard Application

Battery power is circled through an in-line fuse via an ignition relay to the main switch which provides for OFF-LOW-MEDIUM-HIGH fan control. Three speed operation of the recirculating (supply) air fan is provided by means of a dropping resistor within the supply air fan motor. The compressor clutch is in series with the HP/LP safety pressure controls and de-ice thermostat.

A high pressure control operates through a relay to supply full voltage to the condenser fan motors.

Flameproof Application

Battery power is circled through a main circuit breaker to supply power to the line side of the control circuit breakers. Power is then supplied via an ignition relay to the main switch which provides for OFF-FANS-A/C control. Fan speed operation of the recirculating (supply) air fan is provided by means of a linear pulse width modulator device. The compressor clutch is in series with the HP/LP safety pressure controls and de-ice thermostat.

When A/C mode is selected, full operating voltage is supplied to the condenser fan motor via a relay in series with the A/C mode circuit.

The electrical circuit and materials utilised has been purposely built and selected to meet all safety conditions as outlined within "Leaflet No.8, Safety Conditions For Mobile Mechanical Handling Equipment And Vehicles For Use In Military Explosives Storage Areas, 1991, Category C - Buildings containing, or likely to contain, explosives which are not exposed and do not give rise to flammable vapours or explosives dust."

Piping and Hoses

Where the refrigeration circuit connects to vibration isolated devices such as the compressor, flexible hoses approved for R134a are used.

Refrigerant R134a

Properties

R134a is an 'environment-friendly' refrigerant, with the following key properties:

- ⇒ Hydrofluorocarbon refrigerant.
- ⇒ Non-ozone depleting.
- ⇒ Colourless in gas and liquid states.
- ⇒ Faint ether-like odour.
- ⇒ Non flammable.
- ⇒ Non toxic when in its natural state.

Handling

Always wear eye and hand protection when working on the a/c system or compressor.

Skin Contact:	Liquid splashes may cause freeze burns. No information is known on irritancy or sensitisation. There is no known hazard due to absorption of R134a through the skin.
Eye Contact:	Liquid splashes may cause freeze burns.
Inhalation:	Inhalation may cause drowsiness, headaches, giddiness and unconsciousness. Very high concentrations of R134a vapour can result in an irregular heart-beat and prove suddenly fatal. Even higher concentrations may cause asphyxiation due to the reduced oxygen content of the atmosphere.



Do not inhale R134a gas!

R134a is heavier than air and will settle in the lowest places, replacing the air. DO NOT enter small confined spaces where R134a vapour may have collected, as dizziness or suffocation may result.



Do not expose R134a to heat or fire!

R134a will decompose upon contact with high temperature sources to produce an irritating and highly toxic hydrogen fluoride gas.

IN CASE OF INJURY DUE TO R134A EXPOSURE, SEEK MEDICAL AID IMMEDIATELY.

Recovery

- ⇒ Never release refrigerant into the atmosphere.
- ⇒ When removing refrigerant from the a/c system always use a suitable refrigerant recovery/recycling unit.
- ⇒ Do not mix R134a with any other refrigerant when recovering the refrigerant.

Compressor Oil

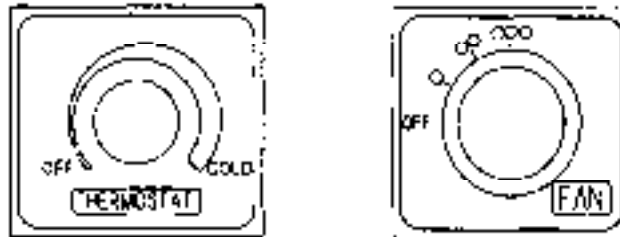
The oils used in R134a systems absorb atmospheric moisture very quickly.

- ⇒ Do not open the compressor to the atmosphere for any longer than the minimum required time. Cap all compressor fittings immediately after opening. Only remove caps immediately before making connections.
- ⇒ Do not leave oil containers open to the atmosphere. Always tightly seal oil containers immediately after each use.
- ⇒ After performing repairs on the refrigeration system always evacuate the system before recharging, to ensure removal of any moisture that may have been absorbed.

Operation

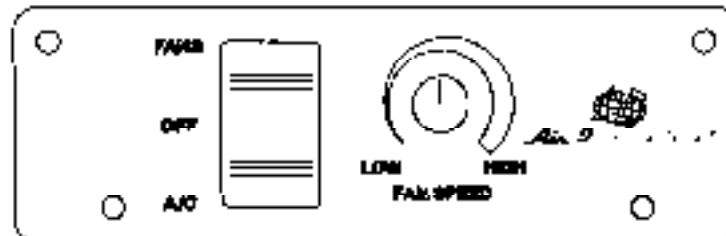
Controlling the A/C System

Standard Application



Thermostat Controller	Selects either 'FANS ONLY' or 'COOL' mode as desired. Control is achieved by varying the position of the thermostat knob from full anti-clockwise 'OFF' to full clockwise 'COOL'. In operating the thermostat, only small movements should be made and time allowed for the system to settle down before further adjustment.
Fan Speed Switch	Selects the fan speed operating mode between OFF, LOW, MEDIUM and HIGH.

Flameproof Application



Mode Switch	Selects operating modes of 'OFF', 'FANS ONLY' or 'COOL' as desired.
Fan Speed Controller	Selects the fan speed operating speed linearly between LOW and HIGH. Control is achieved by varying the position of the control knob from full anti-clockwise 'LOW' to full clockwise 'HIGH'. In operating the controller, movements should be made and time allowed for the system to adjust to its new position.

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Maintenance Program

To ensure consistent high performance from your air conditioning equipment, the following maintenance and service program must be followed.

To achieve maximum service life, Air International Transit recommends that the system is always serviced by authorised service agents.

Warranty Note

Should a fault develop during the warranty period (as defined in the Warranty Agreement), the unit must be taken to an authorised service centre for servicing. Any servicing of the unit by unauthorised personnel may render the warranty invalid.

Air International Transit will not accept any costs for repairs to the unit that are required as a result of unauthorised interference, under any circumstances.

Preventative Maintenance

Air International Transit recommend that the air conditioning system should be run for a minimum of five minutes each week regardless of the season and the compressor oil level should be checked whenever the refrigeration system is opened due to breakdown. This is a means of ensuring that the compressor seals are well lubricated so as to prolong service life.

2500 km Or 3 Months - Minor Service:

Return Air Filter

- Remove return air filter and replace/clean. The filter media may be washed out in water and replaced when within a reasonable physical condition. More or less frequent service may be required depending upon conditions.

Fans

- Inspect condenser and evaporator fans; visually and by hand check that rotors are not loose on motor shaft and that they are running true. Visually and with tools check bolts and screws for tightness.

Compressor Clutch

- Check clutch for accumulation of dust; remove hub and clean if necessary.

Compressor Belt

- Check compressor belts for wear, tightness and alignment. Replace and adjust as necessary.

10000 km Or 12 Months - Major Service:

Return Air Filter

- Remove return air filter and replace/clean. The filter media may be washed out in water and replaced when within a reasonable physical condition. More or less frequent service may be required depending upon conditions.

Fans

- Inspect condenser and evaporator fans; visually and by hand check that rotors are not loose on motor shaft and that they are running true. Visually and with tools check bolts and screws for tightness.
- Check for bearing wear and noise.

Compressor Oil Charge

- Inspect oil condition for indication of system contamination such as bearing wear.
- Check compressor oil charge (135cc) and adjust as necessary with approved polyolester oil only.
- Check for leaks around fittings and shaft seal.

Compressor Clutch

- Check that rotation is true and no bearing failure, wear or noise is apparent.
- Check clutch for accumulation of dust; remove hub and clean if necessary.

Compressor Belt

- Check compressor belts for wear, tightness and alignment. Replace and adjust as necessary.

Seals

- Check adhesion of insulation and lid seals of enclosures. Repair/replace as necessary.

Refrigeration Hoses and Electrical Looms

- Check all hoses and wiring for abrasion and wear. Repair/replace as necessary.

System Charge

- Connect gauges and check system charge whilst air conditioner is in operation based on typical operation pressures and liquid subcooling for R134a.
- Note that liquid line sight glass may sometimes have a milky appearance. This does not indicate system undercharge.

Heat Exchange Coils

- Hose condenser coil with either clean air/water being careful not to use excess pressure which can damage coil finning. (More frequent service may be required in dusty applications).
- Check cleanliness of evaporator coil. If required, clean with soapy water. Rinse well with tap water. Straighten bent finning.

Filter Receiver Drier

- Replace receiver drier. (Indicative only, always replace drier when the system has been opened).

Condensate Drains

- Check for blockage of condensate drains. Clean as necessary.

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Service Procedures

Sight Glass Check




The sight glass should be checked regularly to ensure minimal system moisture content and correct refrigerant gas charge.



Check The Sight Glass Regularly!

The sight glass colour may change slowly or rapidly depending on various operating conditions.

Excessive moisture causes the filter drier to become blocked and the refrigerant to chemically transform into corrosive acids. This acid build up can cause damage to the entire system.

<i>Sight Glass Appearance</i>	<i>Refrigerant Condition</i>
No liquid. 	No refrigerant charge.
Clear liquid or some bubbles appear only during cooling modes. 	Good refrigerant charge.
Bubbles in stream. 	Refrigerant charge is low.

Filter-Drier-Receiver Replacement

1. Reclaim the refrigerant charge from the system.
2. Loosen flare nuts on drier and remove FDR.
3. Apply a small amount of clean oil to replacement drier and pipes fittings.
4. Fit the replacement FDR and tighten flare nuts to drier. Ensure that arrow on the drier points in the correct direction of flow (towards evaporator).
5. Check for leaks.

Evaporator & Condenser Coil Cleaning

Clean the evaporator coil with water or compressed air. When cleaning the coils with water, home dish-washing detergent may be used if necessary. After using detergent always wash the coils again with clean water.

Compressor Oil Level Check/Replacement

1. Operate the system for at least 10 minutes with the vehicle engine running at idle speed.
2. Reclaim the refrigerant charge from the system.
3. Remove the compressor assembly.
4. Close off discharge and suction lines from atmosphere.
5. Remove the oil filler plug on top of the compressor.
6. Drain the oil into a clean measuring container. It may be necessary to rotate the compressor shaft to let all the oil drain.
7. If oil inspection indicates metal particles or other foreign material in the system, it will be necessary to clean and flush system and replace necessary refrigeration component(s).
8. Add replacement oil via the oil filler plug on top of compressor. Refit compressor assembly.
9. Connect discharge and suction lines.
10. Purge air and evacuate the system.
11. Leak test the connections.
12. Check a/c operation. Measure correct amount of refrigerant into system. Refer section titled 'Refrigerant Charging'.

Adjusting Compressor Drive Belt Alignment

The compressor drive belt must be correctly aligned with the engine drive pulley. Incorrect alignment will cause excessive belt wear, and loss of traction. A simple method of checking pulley alignment is by holding a straight round rod in the clutch pulley groove and ensuring that the rod falls squarely in the matching drive pulley groove.

Adjusting Compressor Drive Belt Tension

The compressor drive belt must be correctly tensioned, to ensure long life and best operation. If the belt tension is too light the belt life will be shortened, as will the life of the clutch bearing. On the other hand, too little tension will cause the belt to slip and wear rapidly.

Set the belt tension using a device suitable on heavy duty automotive drives. The following are recommended values per belt:

New Belt Tension = 59 kg (130 lbs)

Retention Amount = 48 kg (106 lbs) for new belt after 3–5 minutes run-in or used/in-service belt.

Reclaiming Refrigerant

Do not release R134a refrigerant into the atmosphere. While R134a is non-ozone depleting it can contribute to global warming. For this reason, correct evacuation and containment of R134a refrigerant is essential.

Remove the refrigerant from the a/c system and store it a commercial refrigerant recovery unit. Refer to the manufacturers instructions for the operation of the recovery unit.

Note: To minimise the chance of moisture entering the system when it is opened allow the system to warm to the ambient temperature before recovery. This will minimise the chance of condensation forming on any components.

Pressure Testing

Pressure testing is performed on the refrigeration system after the refrigerant has been removed..

It is important to pressure test after any maintenance procedures or leak repairs.

1. Fit a pressure gauge set manifold to the system.
2. Pressurise the system to 100 psi with dry nitrogen gas.
3. When the system has been pressurised, use soapy water to check all flared joints, sight glass, valves, system connections and ports for possible leaks. Mark and check HP gauge for any drop in pressure.

System Evacuation

1. Following system pressure testing, remove the nitrogen gas bottle from the manifold gauge.
2. Slowly release the pressure.
3. Immediately connect and start the vacuum pump.
4. Leave the vacuum pump on system evacuation @ 988 m bar (29.18 in Hg) vacuum for a minimum of four hours, or longer if possible.

The system should be able to hold the vacuum when the manifold gauge is closed and the pump is switched off. An immediate increase in the pressure will indicate a substantial leak on the system.

Refrigerant Charging

Initial Refrigerant Charge - Liquid



Do Not Charge Liquid Refrigerant Through the Compressor!

DO NOT charge the system with liquid through the compressor suction ports. This could seriously damage the compressor.

The initial liquid charge into the system should be as large as possible.

For the initial charge, refrigerant liquid is charged through the high side of the system while the system is off.

1. Make sure that the engine is not running and the dash panel mode switch is set to OFF.
2. Connect a manifold gauge set with centre hose connect to the liquid port of the R134a gas bottle.
3. The low and high pressure gauge hoses should be connected to the suction and discharge service access ports respectively.
4. Place the R134a bottle upside down to provide the liquid charge via the high side of the system.
5. Open the manifold gauge line valve and using a scale, record the amount of liquid added for future reference.
6. Close the manifold gauge line valve.

Final Refrigerant Charge - Gas

For the final charge, refrigerant gas is charged through the low side of the system while the system is running.

1. Start the main engine. Compressor speed of 1500 rpm is desirable.
2. Operate the a/c system by setting the dash panel switch to A/C. Set thermostat to maximum coldness (fully rotated anti-clockwise). Set fan speed to either MEDIUM or HIGH.
3. Fully charge the system via the low side of the system, while noting system pressure readings. Slowly add refrigerant gas until the sight glass approaches a clear state.
4. Allow the system to stabilise and check the sight glass for bubbles.
5. Ensure that the discharge and suction pressures are in line with typical R134a operating pressure for respective ambient conditions.

Note: Check the feel and condition of the suction hose at the compressor. The suction hose should be cold and sweaty, but not icing.

Safety Device Checks



Be Ready to Shut Down the System!

Take care while checking the pressure switch operation. You must be ready to shut down the system immediately if the pressure switches do not operate correctly. Personal injury and damage to the a/c equipment could result from a large build up of pressure.

High Pressure Switch

The engine speed may have to be increased during the HP test to increase the system pressure.

1. Electrically disconnect the condenser fan, else partially cover the condenser coil face. This will cause the discharge pressure to increase. Correct HP switch operation will cause the clutch to disengage when the discharge pressure rises to 2650 kPa.
2. Re-connect condenser fan, else remove cover from the condenser coil face.
3. Correct HP switch operation will cause the clutch to re-engage when the discharge pressure falls back to 2060 kPa.

De-Ice Operation

A temperature sensor is located in the fins of the evaporator coil. The coil temperature is monitored by the thermostat to detect a low temperature and thus prevent potential icing of the coil.

To check the de-ice operation:

1. Run the a/c system.
2. Disconnect the evaporator blower by disconnecting from the circuit. This will cause the evaporator coil temperature to drop quickly and activate the safety cut-out.
3. For 'Standard Application' a/c systems, rotate thermostat control fully clockwise. For 'Flameproof Application' a/c systems, the thermostat control is factory set to a full clockwise position.
4. Normal operation will cause the clutch to cut out at -3°C and cut in at $+1^{\circ}\text{C}$.

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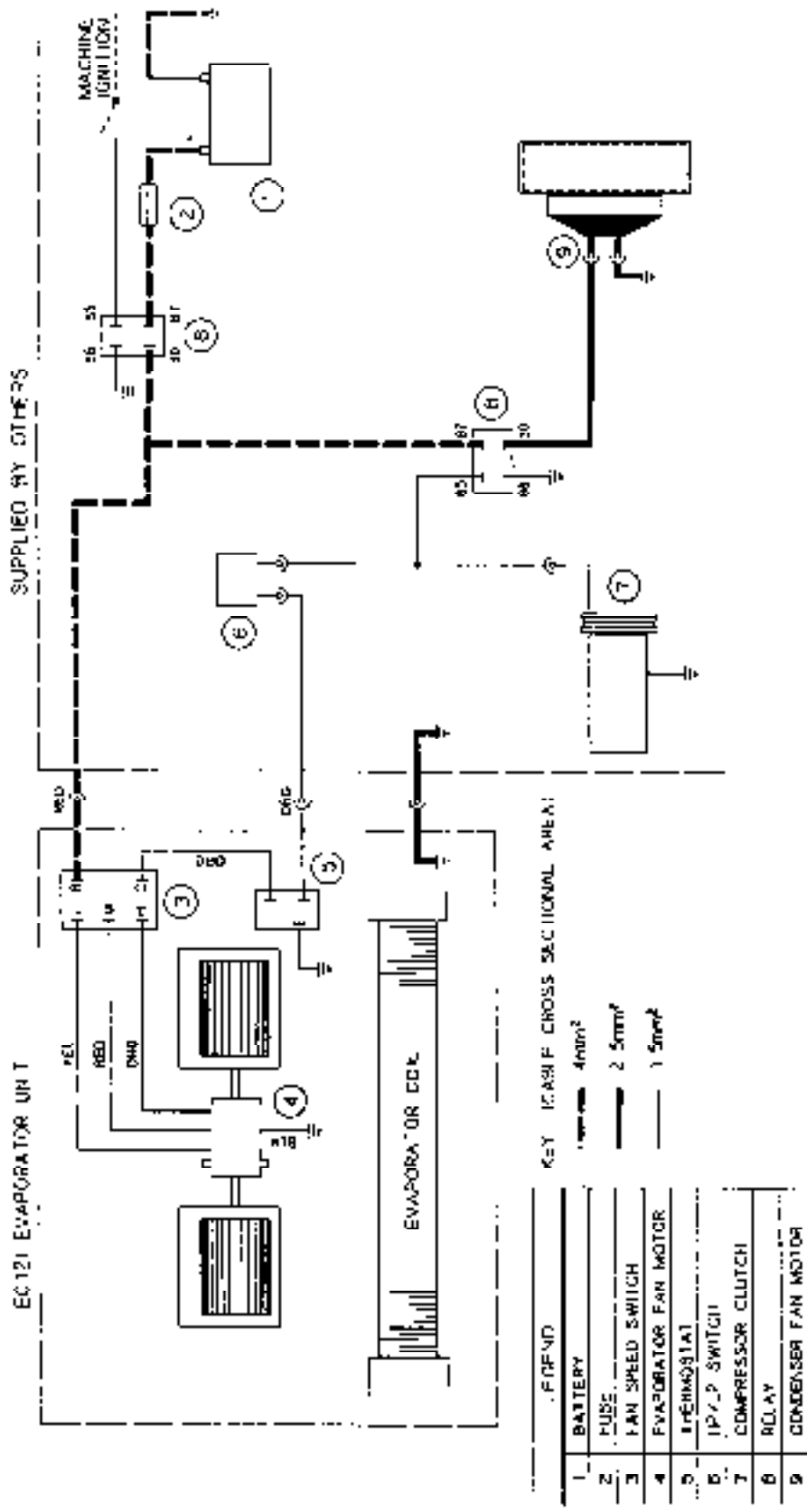
Electrical Schematics

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Standard Application - EC1214 & DCF4BX1

Drawing No. AE272103 - Issue : A

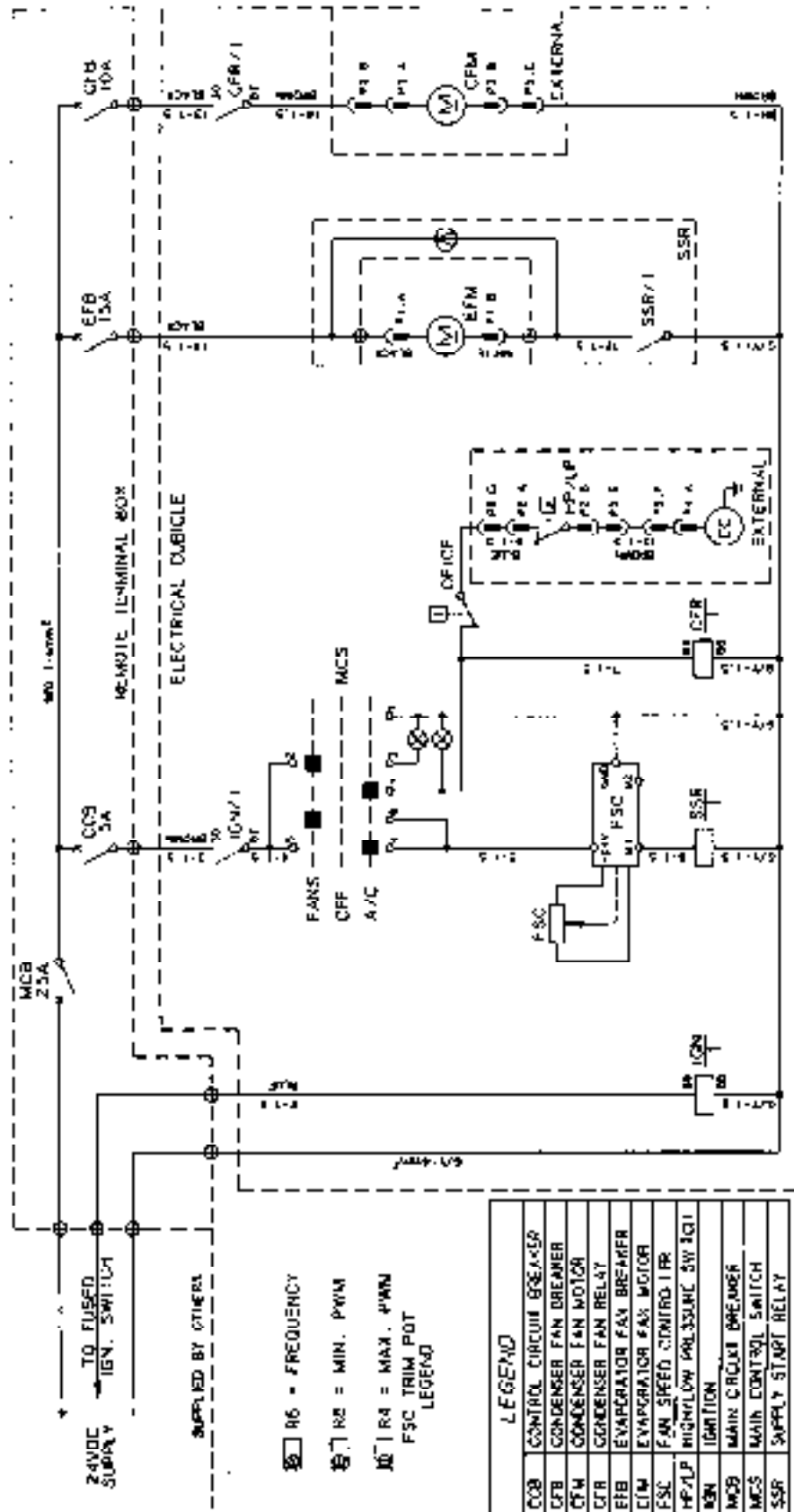
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Flameproof Application - DFW4BX2 & DCF4BX2

Drawing No. AE272104 - Issue : C

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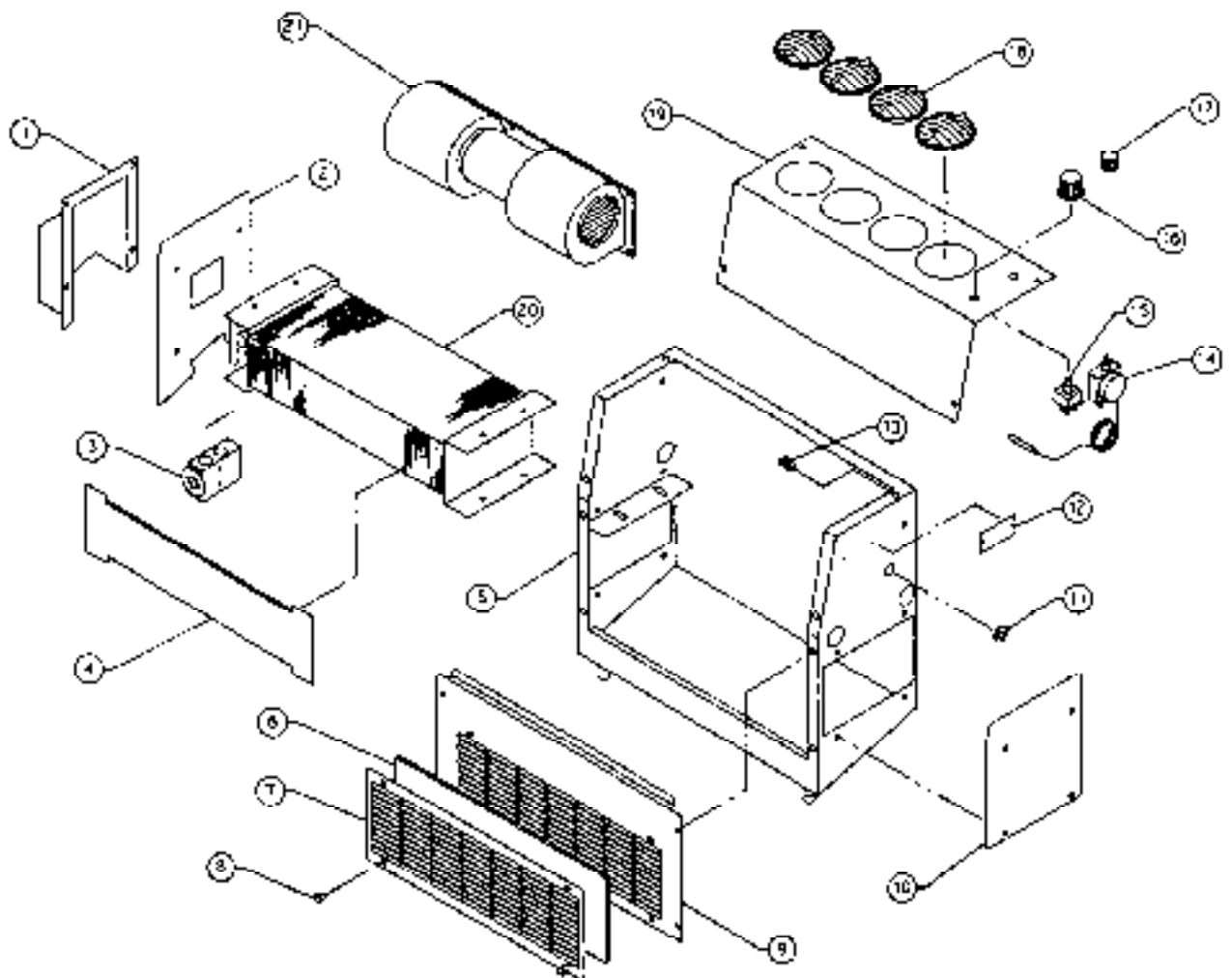
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Spare Parts

Evaporator Pack - Standard - EC1214

Ref	Description	Part No.	Ref	Description	Part No.
1	TX Valve Cover	S2501052	12	Data Plate	973012
2	TX Valve Blank Plate	S2501029	13	Screw Retainer Clip	913702
3	TX Valve	521946	14	De-ice Thermostat	UE016
4	Condensate Deflector	S2501122	15	Fan Switch - 3 Speed	UE335
5	Main Case Panel	AS250125	16	Fan Switch Knob	UC451
6	Return Air Filter Media	UC151	17	Thermostat Control Knob	UC022
7	Return Air Filter Grille	S2501021	18	Directional Diffuser	821708
8	Retaining Plunger	851610	19	Supply Air Panel	AS250126
9	Unit Cover Panel	S2501033	20	Evaporator Coil	120480
10	Side Blanking Plate	S2501031	21	Supply Air Blower - 3 Speed	400034
11	Round Edged Grommet	971002			

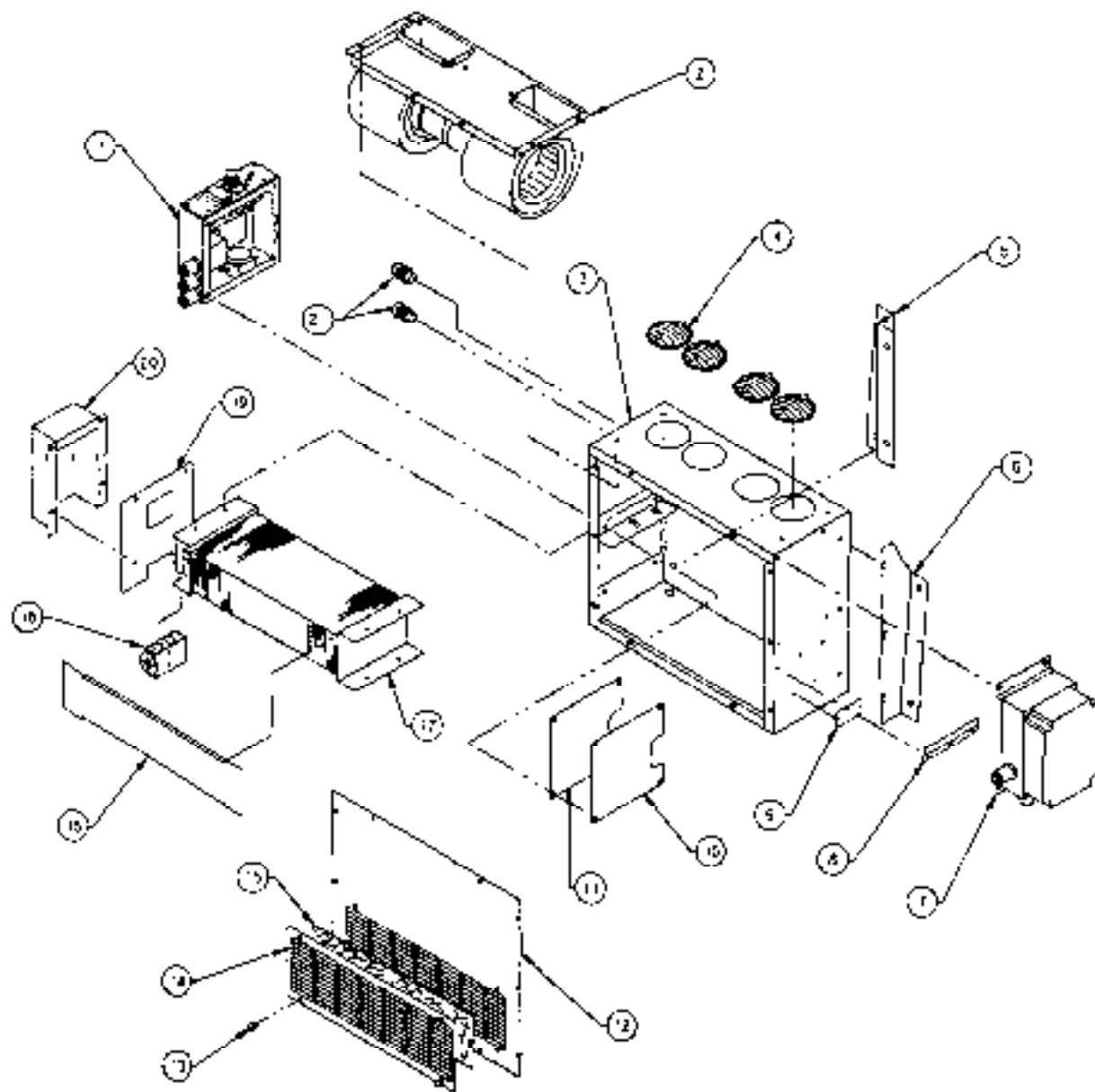
Drawing No. AS272124 - Issue : 00



Evaporator Pack - Flameproof - DFW4BX2

Ref	Description	Part No.	Ref	Description	Part No.
1	Controller Box Assy	AS272157	12	Unit Cover Panel	52721052
2	Supply Air Blower Assy	AS272136	13	Retaining Plunger	851610
3	Main Case Panel	AS272145	14	Return Air Filter Grille	52721053
4	Directional Diffuser	821708	15	Return Air Filter Media	52721069
5	Unit Mounting Bracket - LH	AS272151	16	Condensate Deflector	52721065
6	Unit Mounting Bracket - RH	52721067	17	Evaporator Coil	120480
7	Circuit Breaker Box Assy	AS272158	18	TX Valve	521946
8	Circuit Breaker Box Guide	52721082	19	TX Valve Blank Plate	52721059
9	Data Plate	973012	20	TX Valve Cover	52721058
10	Control Box Cover Plate	52721061	21	Control Box Cable Gland	967600
11	Control Box Cover Gasket	52721062			

Drawing No. AS272156 - Issue : 00

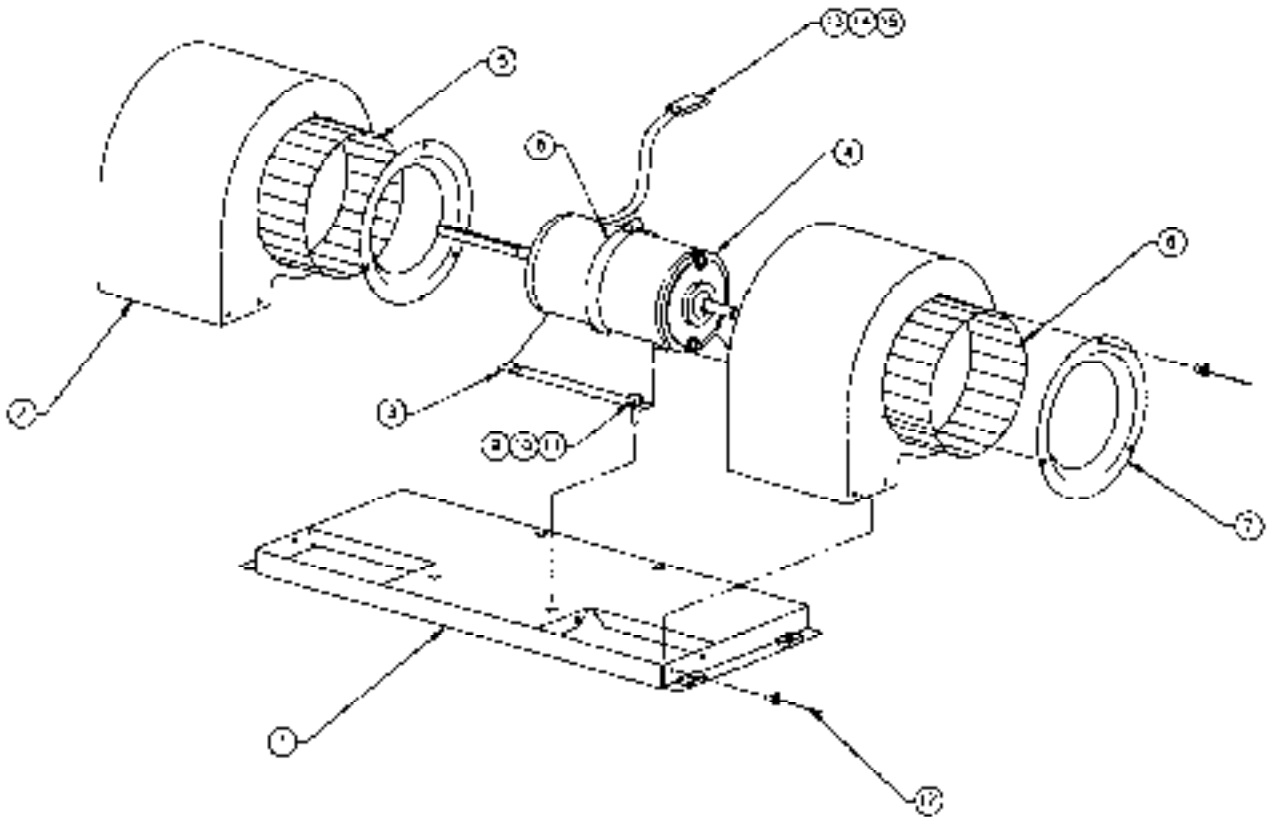


Evaporator Blower - Flameproof

Ref	Description	Part No.
1	Blower Base Panel	AS272147
2	Blower Housing	AS272148
3	Motor Mount Cradle	52721055
4	Motor 24VDC	320024
5	Blower Wheel - CW	410217
6	Blower Wheel - ACW	410218
7	Inlet Ring	410901
8	Hose Clamp - No. 4	553626

Ref	Description	Part No.
9	M6 x 16mm Setscrew	911495
10	M6 Spring Washer	912570
11	M6 Flat Washer	912520
12	Pop Rivet	916016
13	2 Way W/P Hsg Male	636061
14	W/P Terminal 14-16 AWG Male	636069
15	W/P Green Terminal Seal	636067
16		

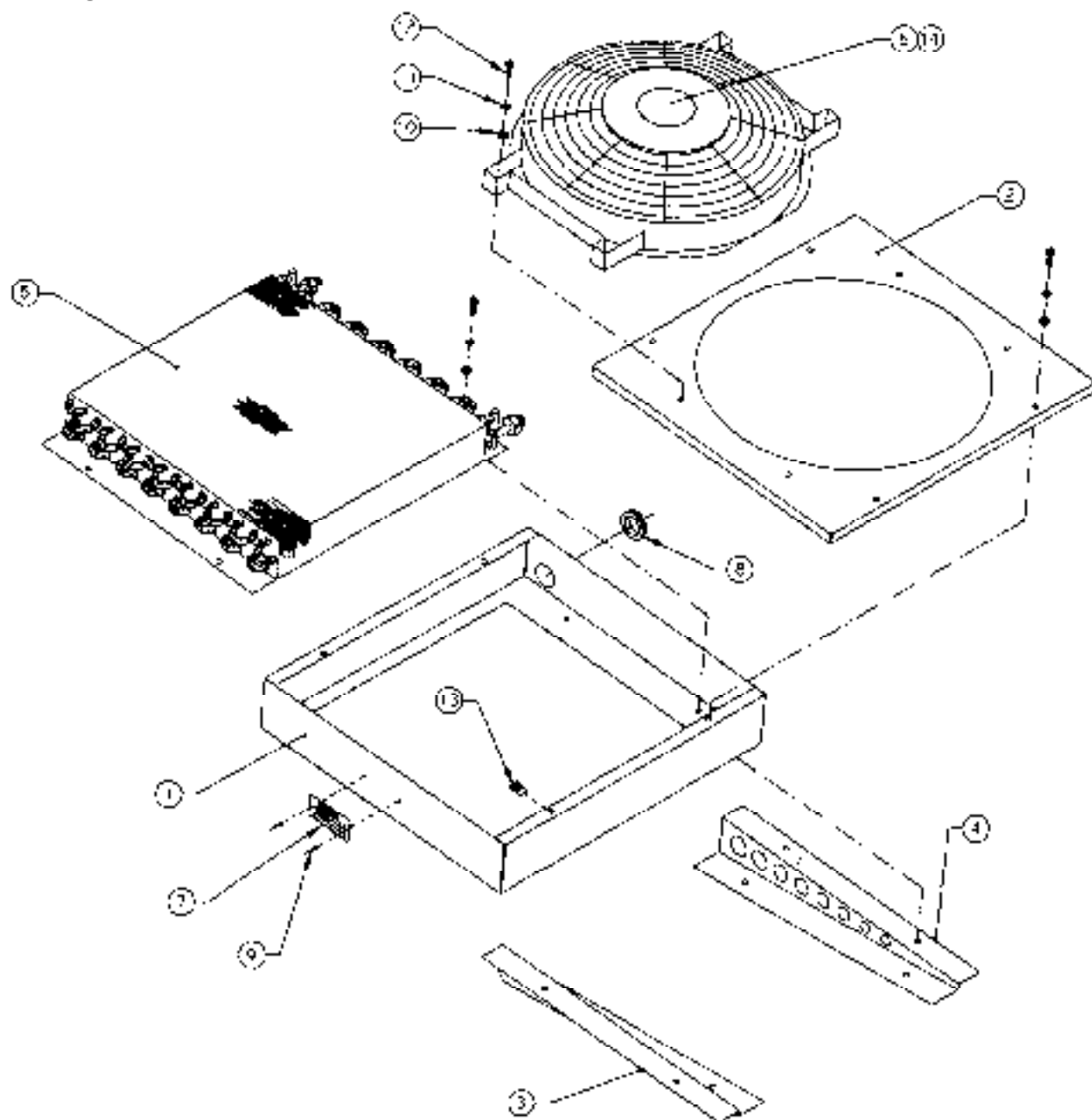
Drawing No. AS272136 - Issue : 00



Condenser Pack - Standard - DCF4BX1

Ref	Description	Part No.	Ref	Description	Part No.
1	Main Case Panel	52501137	8	Round Edged Grommet	971039
2	Condenser Lid	AS272125	9	Pop Rivet 1/8" x 3/8"	916015
3	Mounting Support - LH	AS250171	10	M6 Flat Washer	912520
4	Mounting Support - RH	AS250172	11	M6 Spring Washer	912570
5	Condenser Coil	110312	12	M6 x 20 Hex Head Setscrew	911510
6	Condenser Fan - Axial	420063	13	Screw Retainer Clip	913702
7	Data Plate	973012	14	Label - 24V DC	854729

Drawing No. AS272120 - Issue . A

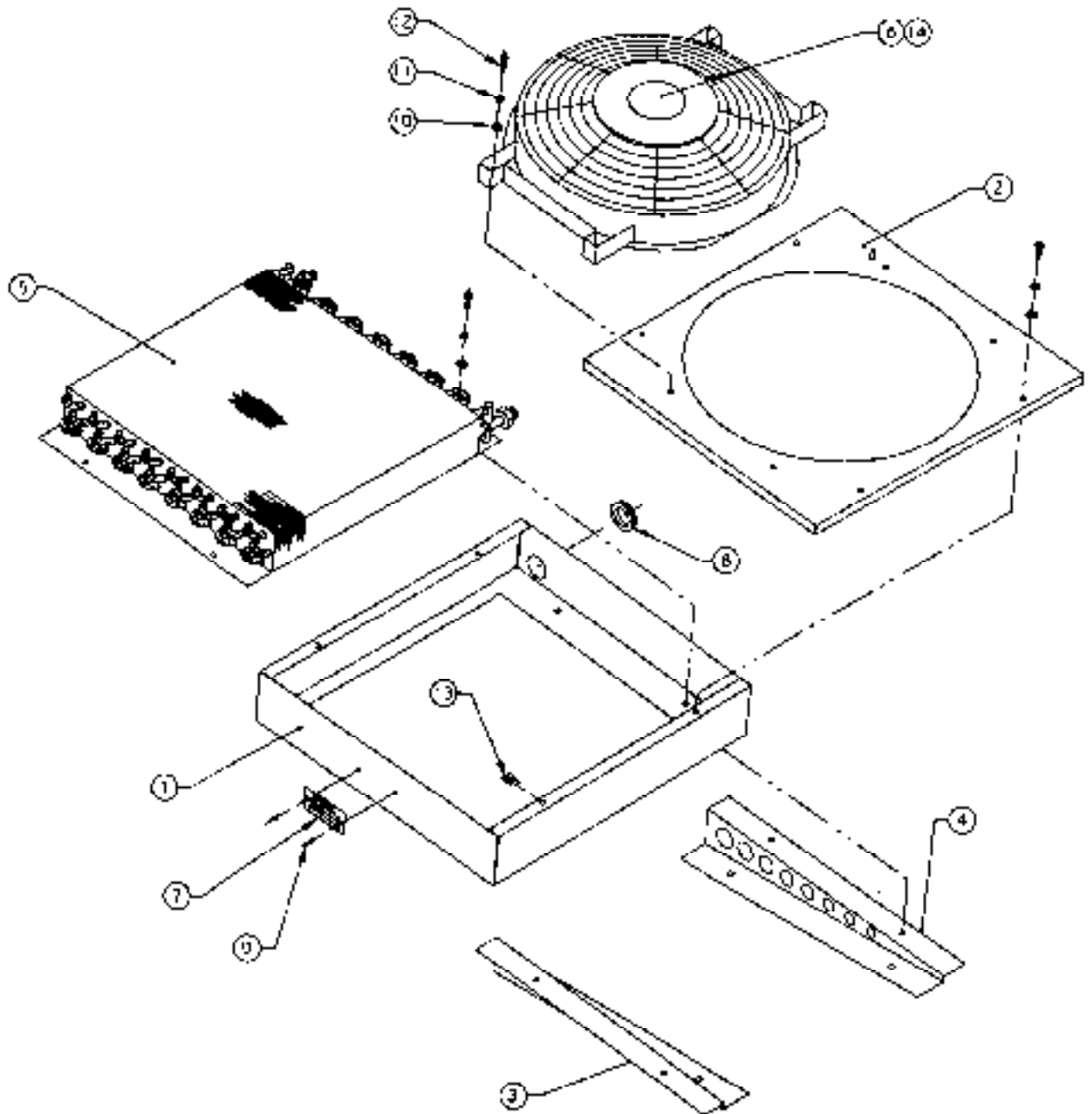


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Condenser Pack - Flameproof - DCF4BX2

Ref	Description	Part No.	Ref	Description	Part No.
1	Main Case Panel	S2501137	8	Round Edged Grommet	971039
2	Condenser Lid	AS272150	9	Pop Rivet 1/8" x 3/8"	916015
3	Mounting Support - LH	AS250171	10	M6 Flat Washer	912520
4	Mounting Support - RH	AS250172	11	M6 Spring Washer	912570
5	Condenser Coil	110312	12	M6 x 20 Hex Head Setscrew	911510
6	Condenser Fan - Axial	420061	13	Screw Retainer Clip	913702
7	Data Plate	973012	14	Label - 24V DC	854729

Drawing No. AS272133 - Issue : 00

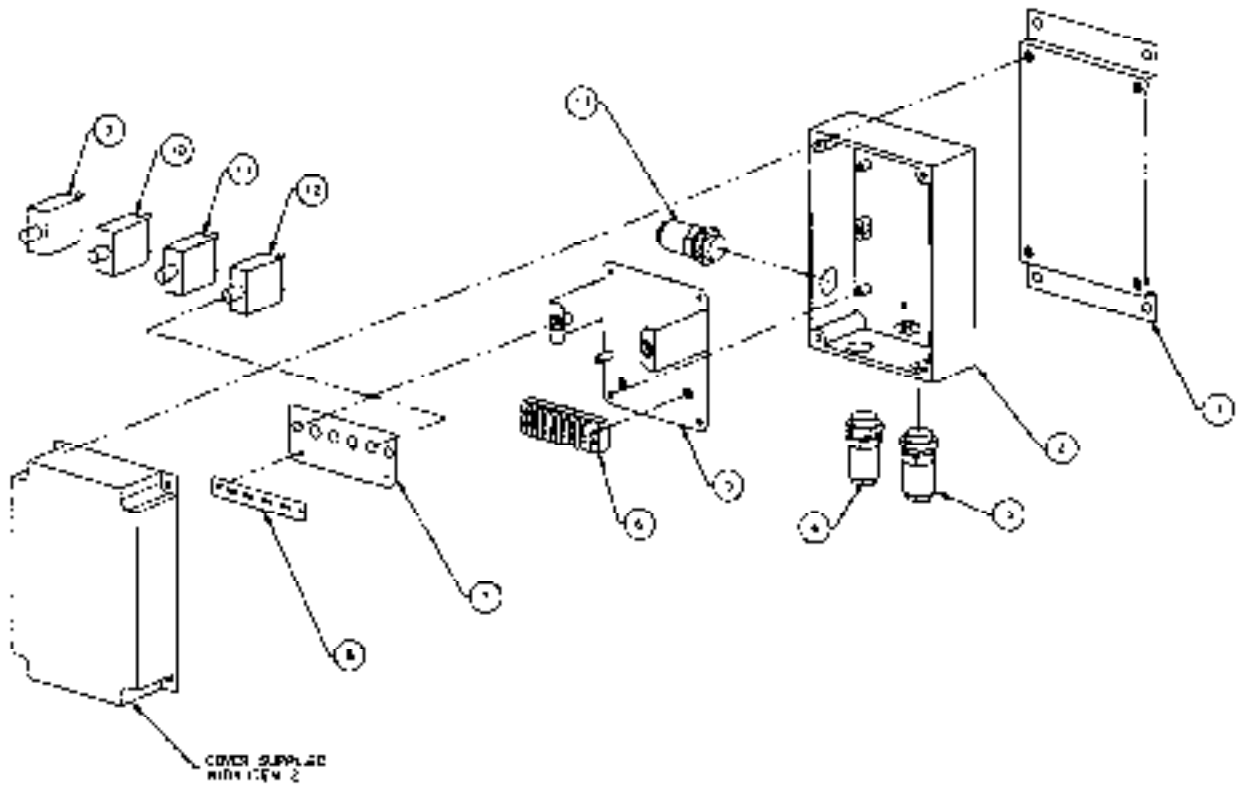


Circuit Breaker Box - Flameproof

Ref	Description	Part No.
1	Circuit Breaker Box Mount	A5272155
2	Terminal Box	S2721080
3	Cable Gland - UFP1C	967621
4	Cable Gland - EFP2A	967619
5	Component Base Panel	A5272154
6	Terminal Connector	635510
7	Circuit Breaker Mount Panel	S2721079

Ref	Description	Part No.
8	Circuit Breaker Label	854358
9	Circuit Breaker - 25A	641065
10	Circuit Breaker - 5A	641C111
11	Circuit Breaker - 15A	641C111
12	Circuit Breaker - 10A	641C107
13	Cable Gland - UFP1A	967622
14		

Drawing No. A5272153 - Issue : 00

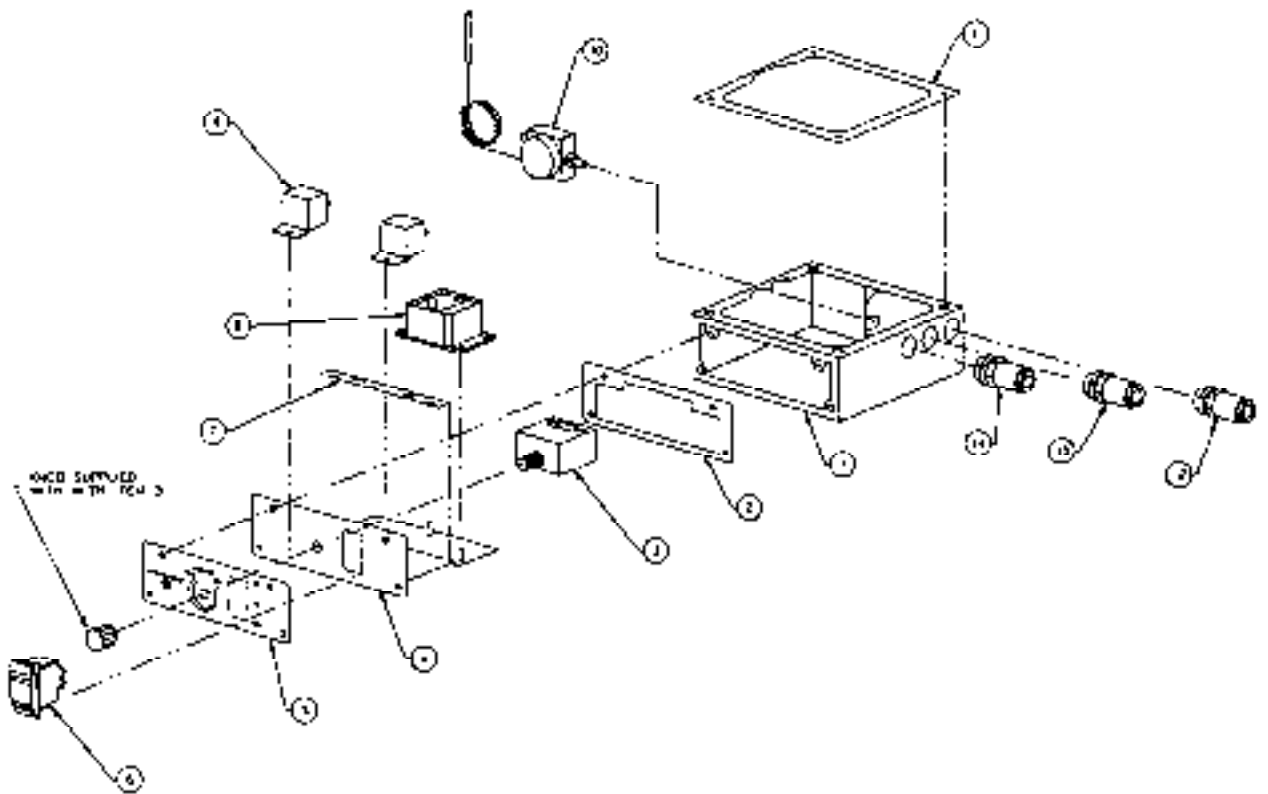


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Controller Box - Flameproof


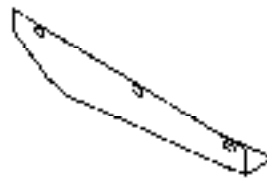

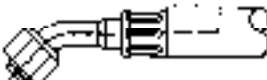
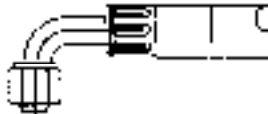
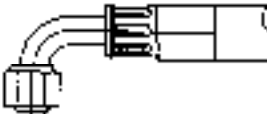
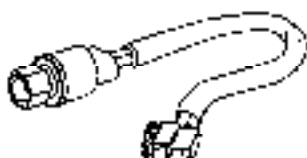





Ref	Description	Part No.	Ref	Description	Part No.
1	Electrical Cubicle	AS272146	8	Relay - Solid State	ERR060
2	Switch Cover Gasket	52721076	9	Relay 24V - 20A	661483
3	Fan Speed Controller	662024	10	De-ice Thermostat	1JE016
4	Component Mount Panel	AS272152	11	Electrical Cubicle Gasket	52721077
5	Switch Label	854357	12	Cable Gland - UFP1B	967620
6	Mode Switch - Rocker	662968	13	Cable Gland - UFP1C	967621
7	Circuit Breaker Label	854359	14	Cable Gland - UFP2A	967619

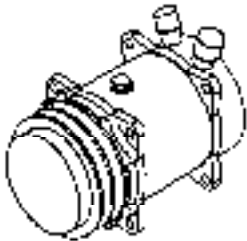
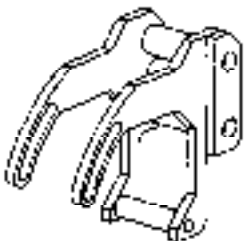
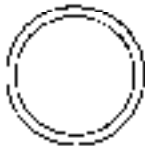






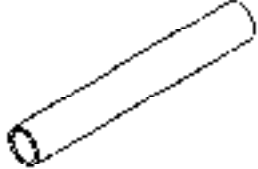
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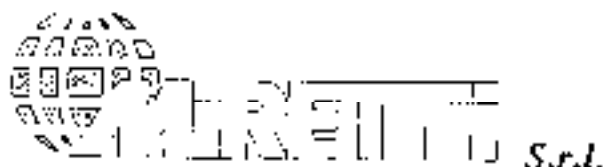
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Installation Components - General

Description Std Evap Mount - LH 	Part Number S2721022	Description Std Evap Mount - RH 	Part Number S2721029
Description Hose - Discharge 	Part Number AS272129	Description Hose - Suction 	Part Number AS272128
Description Hose - Condenser To FDR 	Part Number AS272130	Description Hose - FDR To TX Valve 	Part Number AS272131
Description HP/LP Switch - Standard A/C HP/LP Switch - Flameproof A/C 	Part Number UE064 AS272141	Description Circuit Breaker - 40A 	Part Number UE700
Description Filter-Drier-Receiver c/w S'glass 	Part Number 531422	Description 24VDC Relay - 20A 	Part Number 661483
Description PTO Pulley 	Part Number 872260	Description Drive Belt - AX36 	Part Number 842036

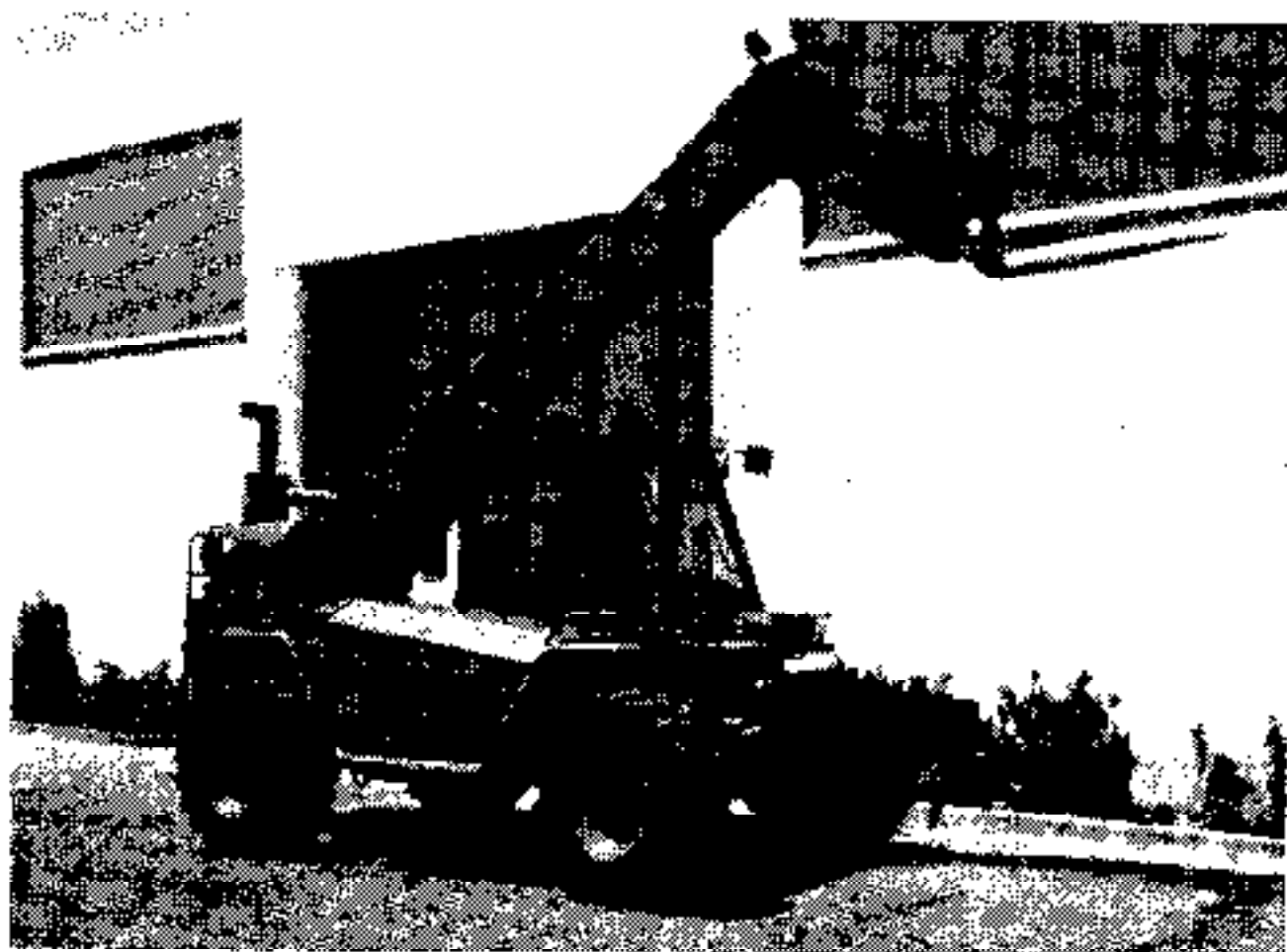
Description Compressor - Standard A/C Compressor - Flameproof A/C	Part Number 270022 AS272143	Description Compressor Mounting Bracket	Part Number AS272122
			
Description O-ring - R134a - #6 O-ring - R134a - #8 O-ring - R134a - #10	Part Number 552402 552403 552404	Description Hose Clamp ~ 16-27mm Hose Clamp ~ 75-89mm Hose P-Clamp - 19mm I.D. Hose P-Clamp - 54mm I.D. Hose P-Clamp - 24mm I.D.	Part Number 553611 553626 553560 553575 553565
			
Description Tee Piece - 13mm Barbed	Part Number 746232	Description Anti-Vibration Mount	Part Number 845150
			
Description Condenser Foot Guard	Part Number AS272126	Description P-Clamp Spacer Tube	Part Number S2721030
			
Description Drain Nozzle	Part Number UC504	Description Hose - Clear PVC - Ø12.5mm	Part Number S31411
			

Description FOR Mounting Bracket	Part Number 52721023	Description Condenser Mounting Washer	Part Number 52721025
			
Description	Part Number	Description	Part Number
2 Way W/P Hsg Female	636059	W/P Cavity Plug	636066
2 Way W/P Hsg Male	636061	W/P Green Terminal Seal	636067
6 Way W/P Hsg Female	636064	W/P Terminal 14-16 AWG Female	636068
6 Way W/P Hsg Male	636065	W/P Terminal 14-16 AWG Male	636069



Head Office and Workshop
20031 Lombrate (MI) Italia - Via Marconi, 29/31
Tel. 02 - 9908111 - Fax 02 - 99052488

USE AND MAINTENANCE MANUAL



MERLO P35.9 EVA

FLAMEPROOF CONVERSION OF DIESEL TRUCKS



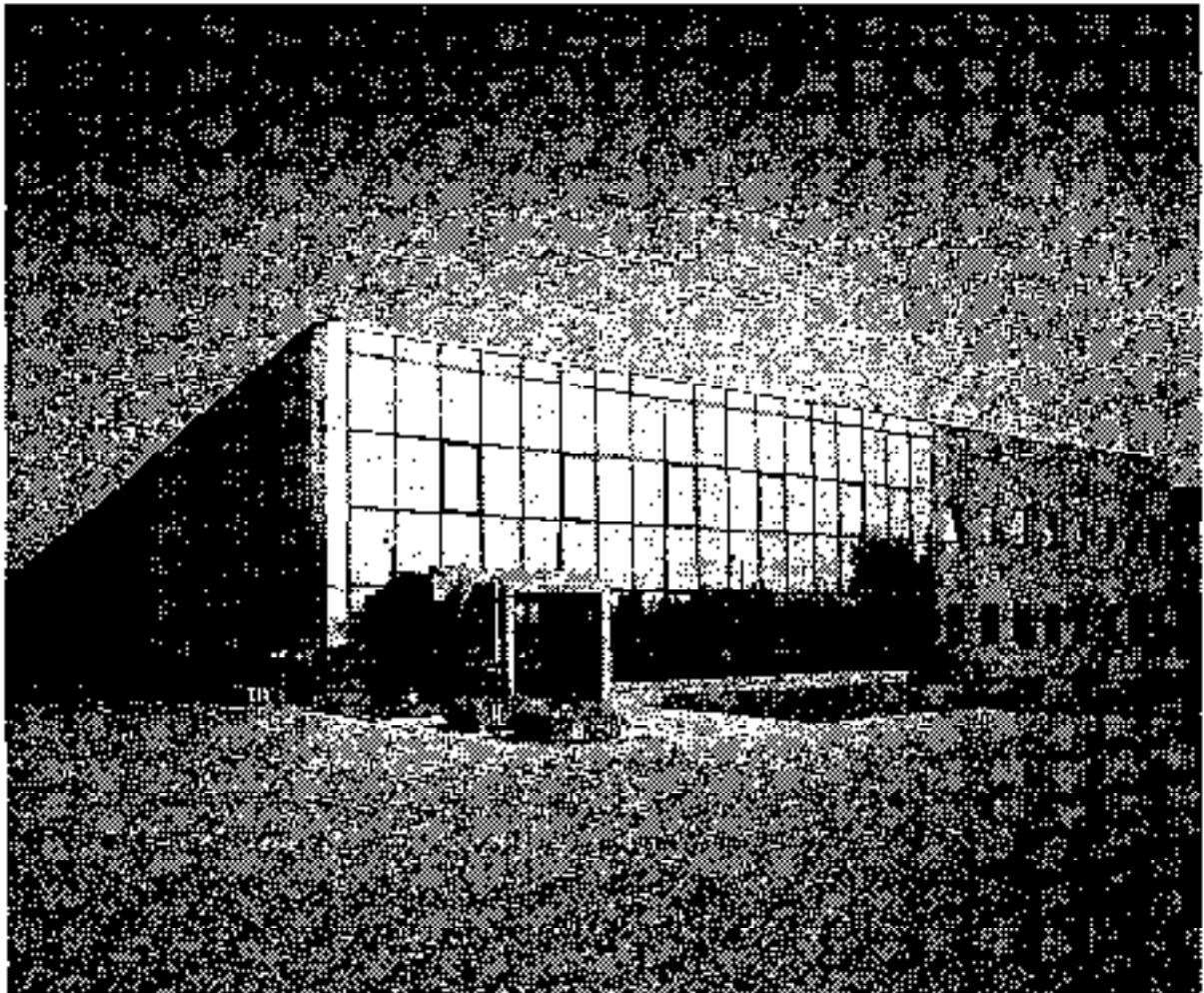
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MIRETTI'S GENERAL WARRANTY TERMS

1. This warranty applies to material and construction damage for 12 months as from the date of delivery
2. Any material/construction faults confirmed by MIRETTI will be replaced and despatched under warranty, ex our works, Limbiate (Milan) Italy
3. The warranty does not apply if modifications have been carried out to the truck or if accidental damage has occurred. Use and maintenance instructions must be observed correctly at all times.
4. Normal service wear to components are also excluded from warranty terms.
5. This warranty will be valid only if original spare parts are fitted.

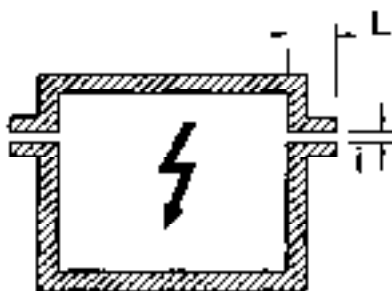


TYPES OF PROTECTION

For use in IP44 flameproof zones where there is an explosion risk, the machine has been protected in accordance with CENELEC EN 50014 - EN 50018 - EN 50019 - EN 50020 - EN 50028 Standards.

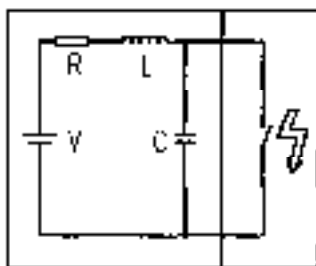
The types of protection used are:-

"IP44" FLAMEPROOF ENCLOSURE (EN 50014 - EN 50018)



These house all the high power components i.e. motors, transformers, lights, electronic controls and all the components that cause arcs and sparks
Its function is to avoid the entry of inflammable and explosive dusts.

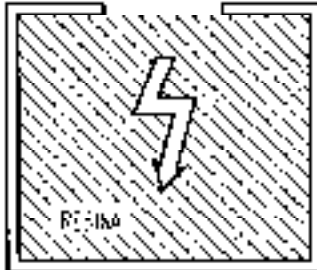
EEx "i" INTRINSICALLY SAFE PROTECTION (EN 50020)



This system limits the energy stored in the electric circuits. The circuit protected this way during normal service, or in particularly faulty conditions, will not generate sparking or thermal effects that would otherwise ignite an explosion of a dangerous substance. This type of protection means the trucks original electric components (limit switches, potentiometers, push buttons, resistive magnetic sensors) may be protected.



EEx "m" ENCAPSULED COMPONENTS (EN 50028)



This is a type of protection based on a resin sealing of the electric parts that could cause dangerous mixtures igniting either by sparking or heating. It is normally used to protect solenoid valves and electronic circuits.

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CLASSIFICATION OF THE DANGER ZONES

The hazardous zones are divided into four classes.

The protection of the truck must be suitable for the danger zone where the truck is due to operate.

Class "C0" - An area where there is an explosion hazard due to the presence or development of explosive dusts.

Class "C1" - An area in which the flammable substances present in a higher quantity than the values shown in the C.E.I. 64-2 norms, are capable, when at the vapour or gas stage, to form explosive mixtures with air.

Class "C2" - An area in which an explosion or fire risk exists due to the presence of flammable dusts.

Class "C3" - An area in which liquid or combustible substances when mixed with air become flammable. These are the same substances as those given for Class "C1", but are present in minor quantities either in production zones or in storage areas.

- **ATTENTION:**

The areas where it is possible to use a Flame Protected truck are shown in the Statement attached to this manual.



GENERAL USE AND MAINTENANCE INSTRUCTIONS

- Before carrying out any operations, read the manual supplied by the truck's Manufacturer very carefully.
- The information given in this manual represents an addition to the original manual and only refers to the Flameproof Protection.
- The conductors used for the Flameproof Protection conform with C.E.I. 20-22 Standards
- If this needs to be replaced, conductors with the same specifications must be used. This replacement also means that the cableglands rubber rings and aluminium rings must be replaced too.
- If the intrinsically safe cards show any faults they must not be repaired, but replaced with new ones.
- If any of the enclosures or motors needs to be opened for any reason, particular care must be taken during closure to make sure that the gaskets are undamaged and all fixing screws are in place as these are an important part of the Flameproof Protection. In particular gaskets and sealings of headlights and seal fittings.
- When in service, avoid any overloading, towing steep slopes. This is to prevent any overheating of the conductors which might cause an internal short-circuit.
- If the truck cuts out due to one of the safety devices intervening, it should be removed from the hazard area by means of another Flame Protected truck.
- Any eventual control and opening of the enclosures must be carried out in special spaces away from the hazardous area. The battery recharge too, following maintenance instructions.
- Periodically check, as advised by the Manufacturer, the maintenance and cleaning of the motors.
- The persons dealing with the maintenance must be fully qualified and authorised.
- If there are any faults in the seal fittings, stop the truck, take off the circuit breaker on the left hand side of the seat in the cab.
- Change the water in the conditioner as per instructions on page..
- Before the truck is used in a building containing explosives, make sure the conditioner has a max. water level.



-
- If the truck isn't used for a day, take off the battery cut-out switch, on the right front mudguard.

The truck has a earthing/bonding system. If an earthing cable is cut, it must be replaced with the same cable, putting a conductive paste between the metal side and terminal



TRUCK'S START UP

Taking into account that all flameproof equipment, fitted to the truck have been submitted to accurate testing and control during the various stages of production, it is advisable, before putting the truck into service, to carry out the following controls:

"IP44" Enclosures

Check that these have not been opened or damaged in any way during transport.

Fixing screws

Check that the flameproof enclosures have coupling screws correctly tightened.

Cableglands

Check that all the ring nuts are correctly tightened.

Electric conductors

Verify that these have not been squashed or ruined in any way

Battery

Check that acid has not leaked out.

Verify the battery charging and, if necessary, recharge, closely following the instructions given in this manual.

Complete the controls following those given by the truck's Manufacturer and shown in the original "Use and Maintenance" manual



PUTTING INTO SERVICE

To use the truck operate in the following way:

- a) Turn the key in red button of the battery cut-out switch on right front mudguard.
- b) Pull the red button to shut off the battery cut-out switch.
- c) Turn the key switch.
- d) Wait until the alarm indicator turns off, approx. 4-5 seconds.

The truck is now ready for use, following all instructions given in the manual supplied by the Manufacturer.

SAFETY SYSTEMS

In the IP flameproof protection there are the following safety systems:

• Water thermic control

When the water temperature red indicator lights up, there's a water overheating of the cooling system and the truck stop.

• Motor oil pressure control

When the oil pressure red indicator lights up, there's an oil pressure drop and the truck stop.

If, during operation the safety devices intervene, the truck must be removed immediately from the hazardous zone.

This operation can be carried out by either pressing the reset button found on the truck or, if the truck is unable to be used, by means of another flameprotected truck.



MAINTENANCE

Maintenance of the flameproof components fitted to the truck, carried out periodically and following the instructions, guarantees the efficiency of the safety devices.

Personnel

The engineers who will carry out any checks or interventions of flameproof devices must be qualified and authorised.

Spare Parts

The replacement of the flameproof components must be carried out exclusively using original spares

The purchase order for spares must be filled out indicating the part number of the component required which is shown in the technical documentation attached to the manual

Special Norms

a) The intrinsically safe cards must not be repaired, they must be replaced with new ones.

b) Modifications to the flameproof system must always be authorised by MIRETTI S.r.l.

If the IP flameproof fittings are opened a thin layer of silicone grease should be applied where there was before closing them.



COMPULSORY PERIODICAL INSPECTIONS

For a perfect efficiency of the various safety and flameproof systems fitted onto the truck the following indications should be correctly followed at the time given:

Monthly jobs

- a) State of wear of the connecting conductors of the various enclosures (sight check)
- b) State of wear of the trucks sparkproof protection, where provided (sight check)

Three monthly jobs

- a) Tightening of all the cablelands ring nuts and casings
- b) Tightening of all the fixing screws and closure of the flameproof constructions

If, during these controls, faults are found on the electric flameproof constructions the truck must be immediately prevented from being used in the hazardous area.



INSTRUCTIONS FOR INCREASED SAFETY BATTERY CHARGING

Battery charging must be carried out away from the hazardous zone in special ventilated spaces, and all instructions must be thoroughly observed.

1. Turn off the power supply by means of the cut-out battery on the right front mudguard.
2. Loosen the screws and open the lid. Take off all battery breathing plugs.
3. Loosen the cut-out battery enclosure lid fixing screws and remove the lid the plugs fixing clips and disconnect the plugs from the truck.
4. Fit the charging plugs into the cut-out battery connectors, side battery
5. Carry out charging following the instructions supplied by the cells manufacturer.
6. Once the operation has been completed, disconnect the charging plugs.
7. Carry out the eventual topping up of electrolyte taking particular care in not letting the water flow outside the cell's mouth.
8. Screw battery breathing plugs. Close battery and its cut-out enclosure lid fixing the screw.

For a normal maintenance follow the instructions shown in the battery cell manufacturer's manual.

If special interventions are necessary you should contact our Head Office or the manufacturer of the cells.

ATTENTION:

Lack in observing the above mentioned instructions will make charging extremely dangerous, and any warranty claim will be lost.



CUT-OUT BATTERY SWITCH WORKING

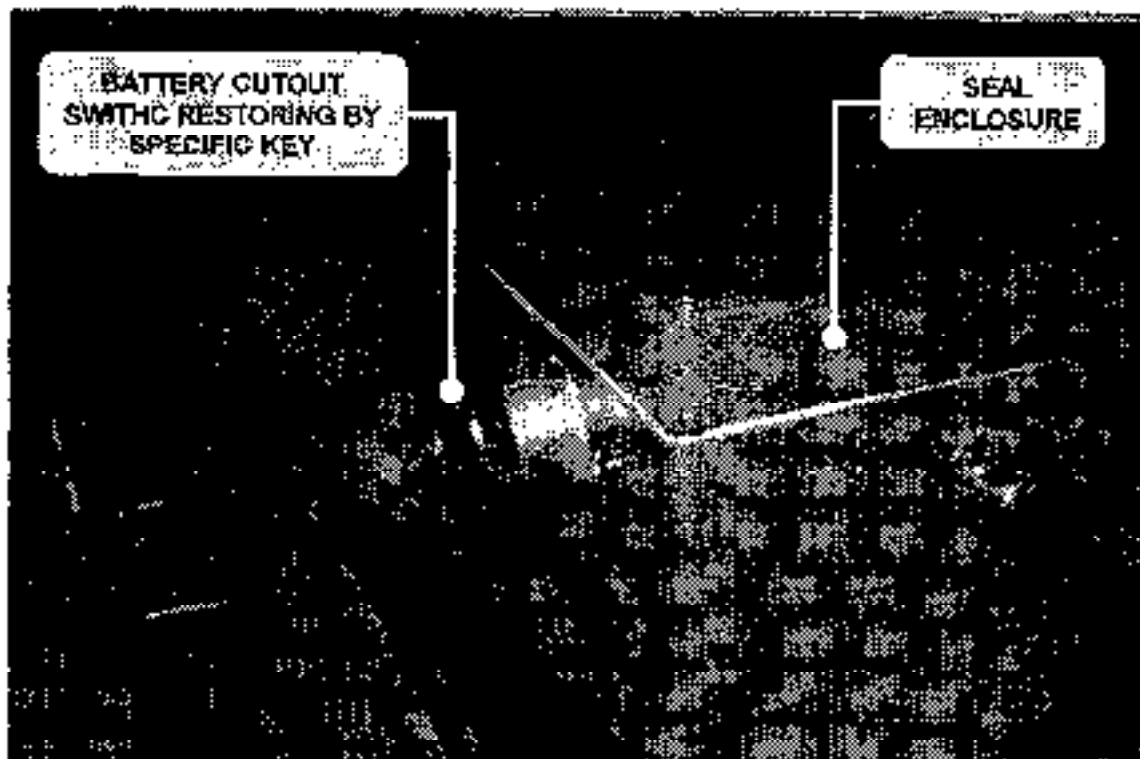
The truck has a bipolar switch on the right front mudguard, near the bonnet, to disconnect the battery from the truck.

Opening the bonnet will cause the switch to automatically disconnect.

The restoring could be made only by the specific key, kept by one of the technical supervisors.

ATTENTION :

After restoring, remove the key from the switch, to avoid any damage being made to it.





EXHAUST SYSTEM AND FUMES COOLING

The Flame Protection of diesel engines also contemplates the cooling of the exhaust fumes. At the engine head, where the exhaust fumes manifold was originally connected, a heat exchanger (11) and four entries (3 and 7) have been fitted. The exhaust fumes, both at the entries and in the exchanger pass into an inner piping, whose outer surface is cooled by liquids coming from the engine's cooling circuit.

There is a tap on the lower part of the exchanger that is used to empty the same

A piece of piping with a hexagon nut comes out of the exchanger onto which the flame protected flexible hose (25) must be attached. The hose must be screwed to one end of the rigid pipe (21) connected to the Flameproof water purifier (25). Care must be taken when tightening the two nuts and please make sure that the flexible hose does not come into contact with the truck's metal parts, so as to avoid any possible vibrations that might cause a breakage. It is through this piping that the exhaust fumes reach the Flameproof water purifier, and, by means of an inner circulating system, are mixed with the water. The water has the aim of cooling the fumes, purifying them and extinguishing any possible sparks that may be caused by incandescent scaling residues



FLAMEPROOF WATER CONDITIONER : USE AND MAINTENANCE

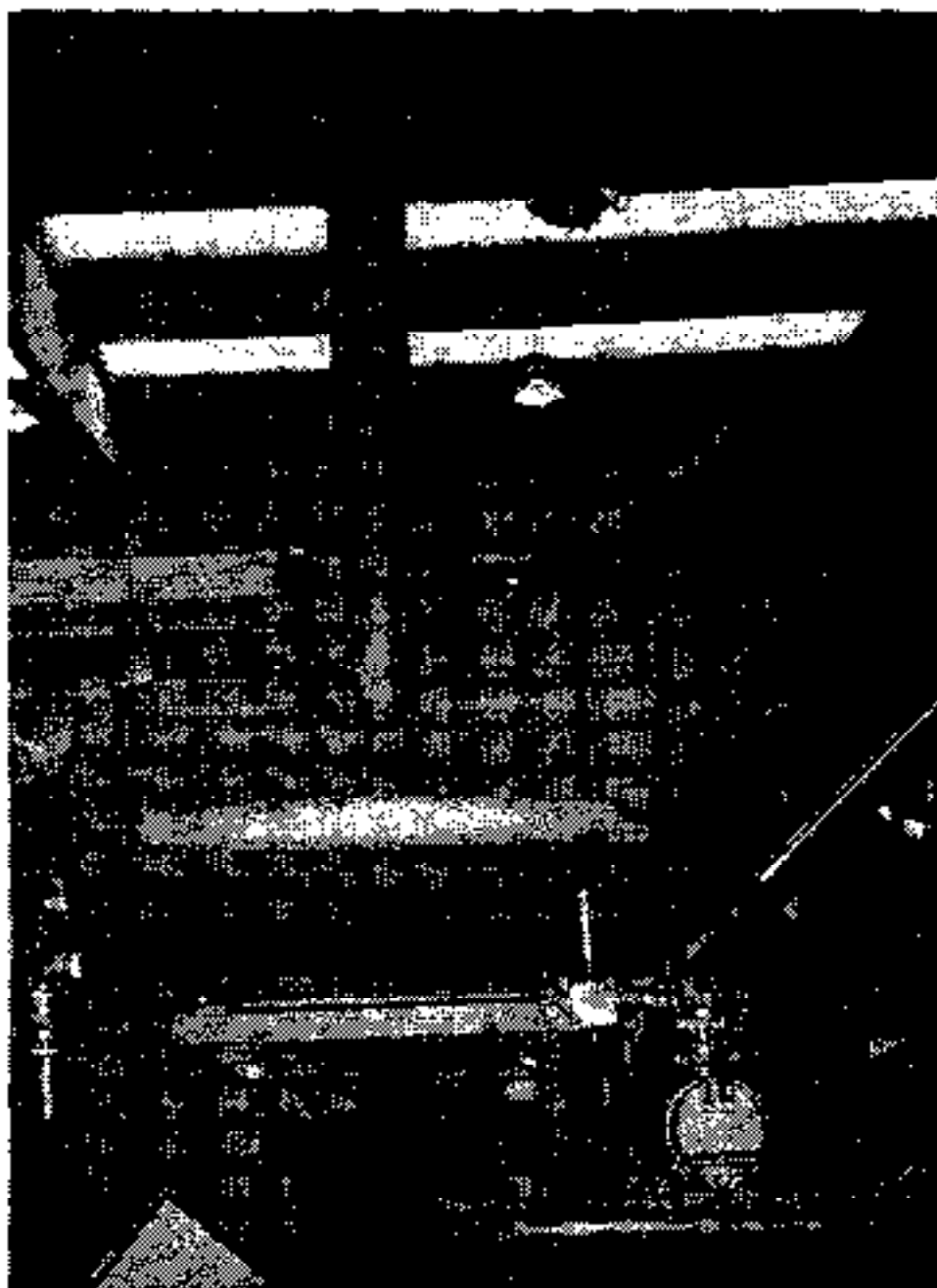
The Flameproof water purifier (2) is one of the main safety devices. Its maintenance requires a strict observance of the following rules

1. Replace the water every 8 working hours in normal use. If used in particularly hot climates, or in a prolonged functioning at a high speed, the water should be replaced every 4 hours. It must be remembered that use of the purifier without water excludes the Flame Protection (because any eventual sparks may come into contact with gases present in the environment and could ignite fires or explosions), and the fumes cooling. So, therefore, before the truck is used in a building containing explosives, make sure that the purifier has a maximum water level. Check the water level every 2 hours.
2. Carry out the Flameproof water purifier's filling through tap (3) only. Do not use the fumes exhaust pipe (1) under any circumstances as exceeding the max. level (the same as the filling hole) will cause water to enter inside the engine head with consequent serious damages, that will not be recognised by either Miretti's or the truck manufacturer's warranty.
3. The water replacement should be carried out as follows :
 - Take the truck away from the hazardous area before proceeding with draining off the water
 - Open valve (5) and wait, with the engine running, until the purifier is completely empty
 - Close valve (5)
 - Open tap (3)
 - Fill up the water purifier through hole (4) using a rubber hose with a diameter less than the hole itself so that any excess water will flow
 - Stop filling up when water starts to flow out of the hole
 - Make sure that the water has reached the right level and then close tap (3).

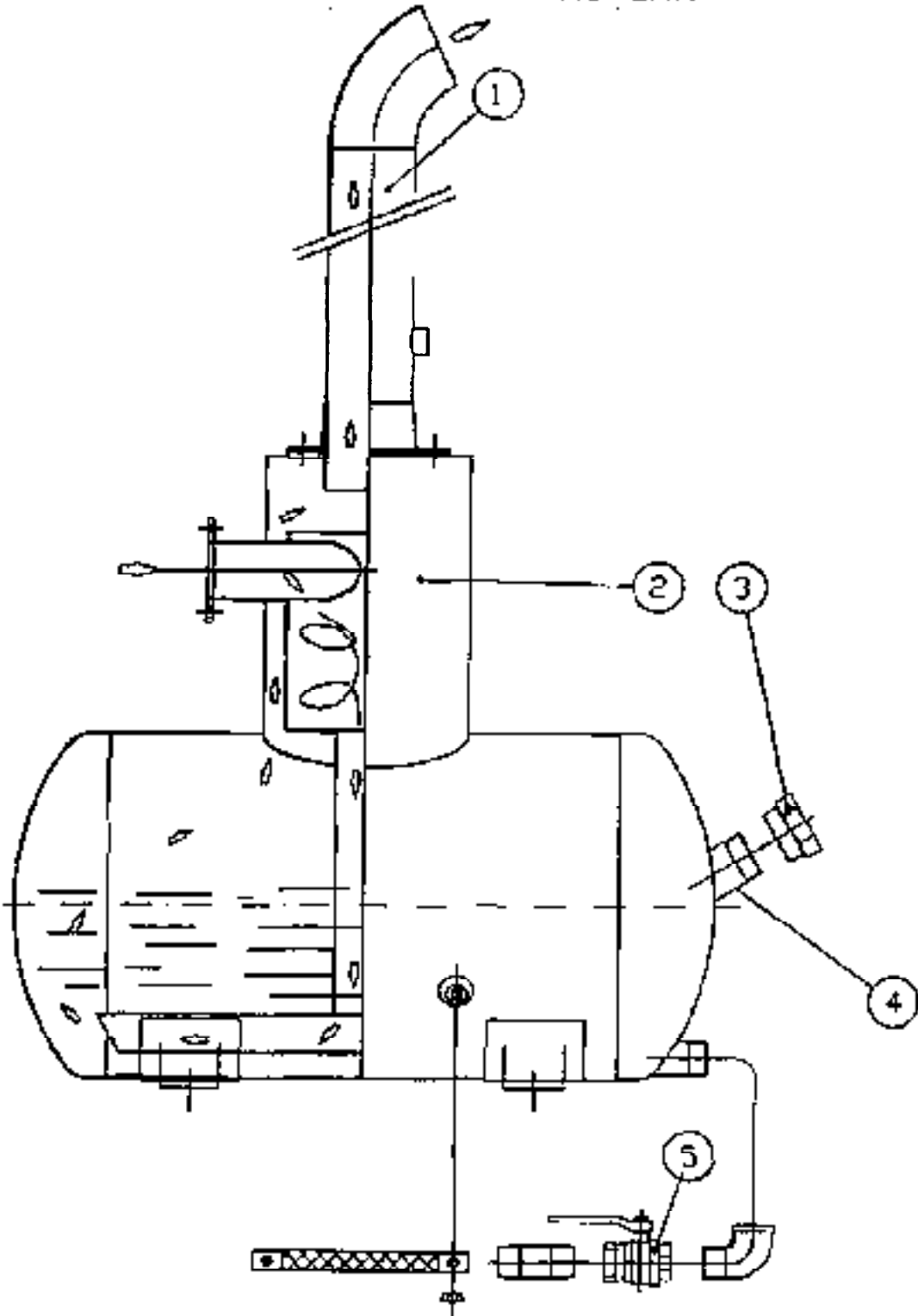
A constant use of MIRETTI' s AD/86 additive avoids any scaling being formed and guarantees a longer life of the purifier as well as improving its efficiency

4. The Flameproof water purifier should be cleaned as follows :
 - Clean it every 150 working hours
 - Follow exactly the same procedure as per that given in the previous paragraph but using a double dose of Miretti's AD/86 additive
 - Let the truck work for approx. 3 hours, then change the water and add only one bottle of additive.

5. If there are any deformations or breakages in the Flameproof water purifier, it should be replaced because any likely repairs not carried out by the Manufacturer will compromise the purifier's efficiency and will not guarantee the Flameproof protection.



GAS EXIT



UNCONTROLLED WHEN PRINTED

WATER PURIFIER

DRAWING 01



EARTH LEAKAGE CHECKS

A truck shall be measured to ensure that it has sufficient earthing. The truck is moved on to a metallic conductive test plate where the resistance between all metal parts of the truck and the metallic conductive test plate is measured. The measuring point on either metallic part of the truck and tyres, used for earthing, need to be thoroughly cleaned from rust, grease, paint and other obstructing substances. The insulation plates below the steel plate shall have a resistance of more than 10×10^{12} Ohm and shall extend at least 50 mm over the edges of the steel plate.

A testing voltage of 500V DC has to be used. All measurements shall be taken under a relative humidity below 60%.

The determined conductive resistance shall not exceed