Service Manuals

Manuals Available For B841 (MP18)

Manual	Manual Title
272486700	Controller Electronic COMBI
272487200	Multifunction Digital Instrument (MDI)
272490600	Reducer
272495100	Service Repair Manual

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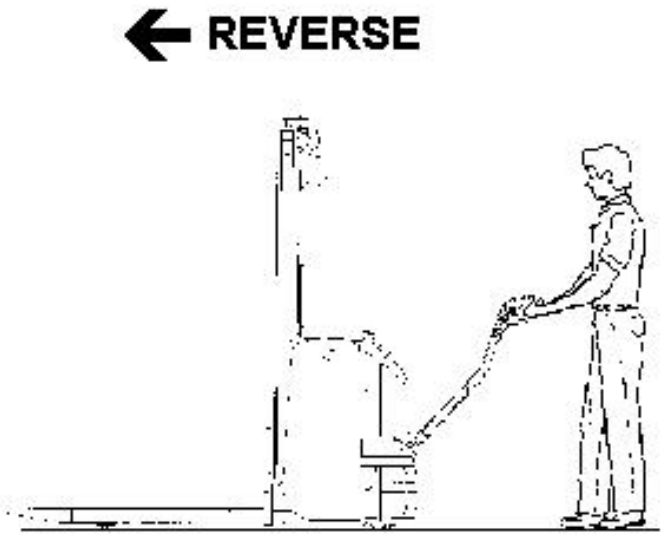


GENERAL WARNINGS AND PRECAUTIONS

- Do not interface the controller with other electronic controls, especially those that operate at low frequency.

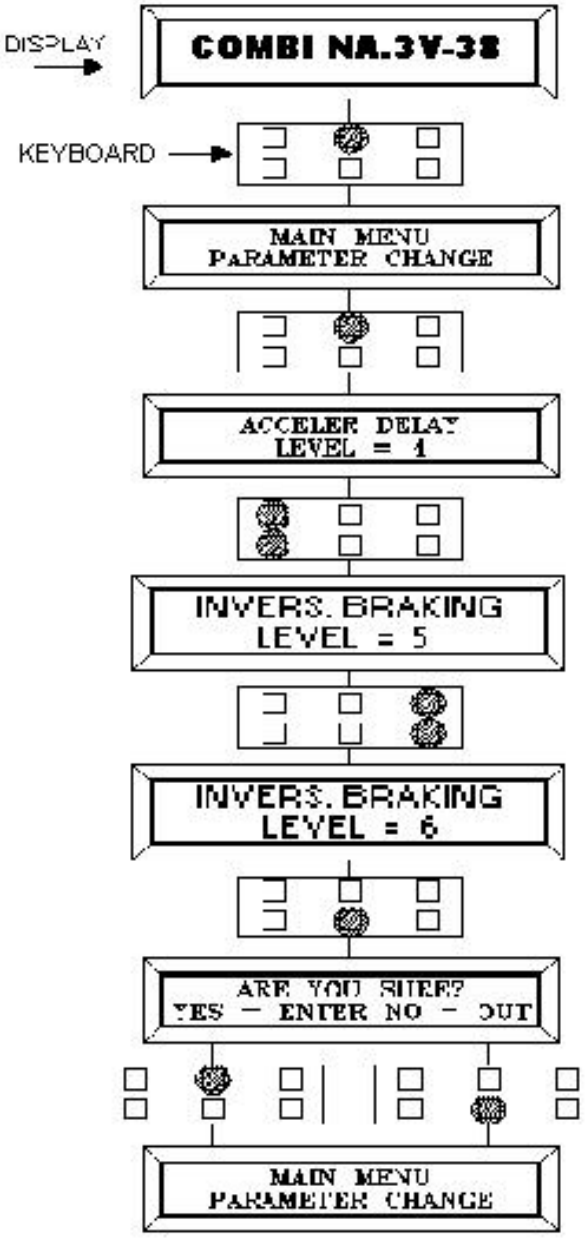
- Do not connect the controller to a battery with a different nominal voltage to that indicated on the module nameplate.
If the battery voltage is higher it may damage the MOS. If the battery voltage is lower, the module will not function.

- In the event of controller replacement, test the drive functions with the DRIVE WHEEL RAISED FROM THE GROUND, as connections errors can give rise to potentially dangerous situations.

3.8 PROGRAMMING CONSOLE

3.8.1 INTRODUCTION

The programming console is designed to facilitate the calibration and fault diagnosis of the controller.
Featuring microprocessor technology, the programming console is connected to the controller by a cable that carries serial transmission data and the power supply.
Messages are displayed in alphanumerical characters on an LCD with 2 rows of 16 characters.


DISPLAY
COMBI NA.3V-38
KEYBOARD
MAIN MENU
PARAMETER CHANGE
ACCELER DELAY
LEVEL = 1
INVERS. BRAKING
LEVEL = 5
INVERS. BRAKING
LEVEL = 6
ARE YOU SURE?
YES - ENTER NO - OUT
MAIN MENU
PARAMETER CHANGE

PROGRAM NO.	ALARM CODE	ALARM DESCRIPTION
1	AL 01	EVP NOT OK
2	AL 02	BRAKE DRIVER KO
3	AL 03	VFIELD NOT OK
4	AL 04	PUMP VACC NOT OK
5	AL 06	SERIAL ERROR #1
6	AL 08	WATCHDOG
7	AL 13	EEPROM KO
8	AL 32	VMN NOT OK
9	AL 37	CONTACTOR CLOSED
10	AL 49	I = 0 EVER
11	AL 53	STBY I HIGH
12	AL 57	HIGH FIELD CURRENT
13	AL 58	NO FIELD CURRENT
14	AL 60	CAPACITOR CHARGE
15	AL 66	BATTERY LOW
16	AL 67	THERMAL PROTECTION
17	AL 68	CHARGING BATTERY
18	AL 73*	POWER FAILURE #1
19	AL 74	DRIVER SHORTER
20	AL 75	CONTACTOR DRIVER
21	AL 78	VACC NOT OK
22	AL 79	INCORRECT START (TRAZIONE)
23	AL 98	INPUT ERROR #2
24	AL 99	INPUT ERROR #1
*	*	MDI ALARM CODE

1) EVP NOT OK
This alarm is not generated on model S1 S2 = 0 0
Proportional valve open in standby condition; in travel, the proportional valve is either too open or too closed with respect to the applied pwm.

2) BRAKE DRIVER KO
This alarm is generated when a fault is detected on the driver of the electromagnetic brake.
Possible causes:
a) driver short circuited
b) driver faulty, incapable of driving the electromagnetic brake.
b) feedback circuit of voltage on electromagnetic brake coil.
This alarm is not generated on models S1 S2.

3) VFIELD NOT OK
This test is carried out in standby with the main contactor in rest condition. In these conditions the voltage on both field connections must be approximately 1/2 Vbatt.
The alarm is generated when the voltage differs from this value.
Possible causes:
a) motor leakage to earth;
b) the motor field is not connected to the controller;
c) fault in the section of the power unit relating to the field.

4) PUMP VACC NOT OK
This alarm is signalled on power up or in standby condition if the value of the lifting potentiometer received by the serial tiller is greater than 1V. The problem is associated with the serial tiller.
Possible causes:

Wrench symbol:
Indicates either that programmed servicing is required or the presence of an alarm condition; in the later case the relative alarm code will also be displayed. The information provided by the MDI is extremely useful as it helps the service engineer to identify and thus rectify any faults.

Hourglass symbol:
Flashes to indicate that the hourmeter is in operation.

4.0 MDI CONNECTION DIAGRAM

14) CAPACITOR CHARGE
The test is performed during initial diagnostics. The alarm is signalled if the capacitors have not started charging 500 ms after KEY-ON. A probable cause is a fault in the power unit.

15) BATTERY LOW
Reduces drive current and inhibits lifting. Battery low alarm, signalled when residual charge level falls to 10% . If the alarm is signalled when the battery is charged, check the battery value indicated in the TESTER menu of the console; if the value is incorrect, perform a fine adjustment in the menu CONFIG MENU - ADJUSTMENT.

16) thermal protection
Temperature alarm > 80°; the maximum armature current is reduced down to 0 at 90°; the alarm is reset at T < 70°; current reduction starts at 75°C. If the temperature <-10°, the maximum current is reduced to 80%.

17) CHARGING BATTERY
Battery charger connected.

18) POWER FAILURE #1
Short circuit on ON / OFF valves, on the proportional valve or on the brake.

19) DRIVER SHORTED
This test is performed with the main contactor open. Check that the driver of the main contactor is not short-circuited.
Possible causes:
a) driver short-circuited;
b) fault in feedback circuit of contactor coil voltage;
c) wiring fault;
d) fault in the hardware protection circuit;
This alarm is normally masked by alarm (1).

20) CONTACTOR DRIVER
The test is performed with the main contactor closed and checks that the driver is not open.
Possible causes:
a) driver open;
b) fault in feedback circuit of contactor coil voltage.

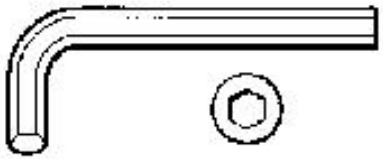
21) VACC NOT OK
This alarm indicates that the voltage on the drive accelerator received from the serial tiller exceeds 1V on power up in standby condition.
Possible causes: (to be investigated on the SERIAL TILLER)
a) a potentiometer wire is broken;
b) the potentiometer is not correctly wired;
c) the potentiometer is defective;
d) the serial tiller programming has not been performed correctly.

22) INCORRECT START (DRIVE)
Up / down, forks, shift, quick inversion present on power up; drive request signal present before operation of tiller. If the drive control is operated before the tiller, the INCORRECT START alarm will not be generated provided that the tiller is operated within 1 sec. of the drive request. The alarm is cancelled by deactivating the drive control.

23) INPUT ERROR #2
Failure to detect the quick inversion input on the controller.

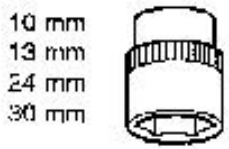
24) INPUT ERROR #1
Failure to detect the quick inversion input on the serial tiller.

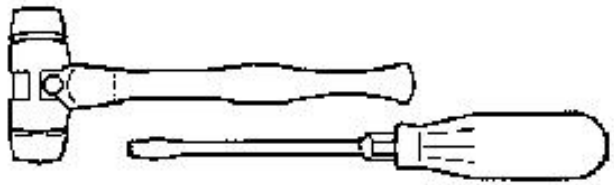
Wrench	10 mm 13 mm 30 mm	

Allen wrench	6mm 10mm	

Torque wrench
adjustable from 9.5 to 250 Nm

Hex socket



Plastic mallet	1000g	
Steel hammer	250g	

Sturdy screwdriver or lever

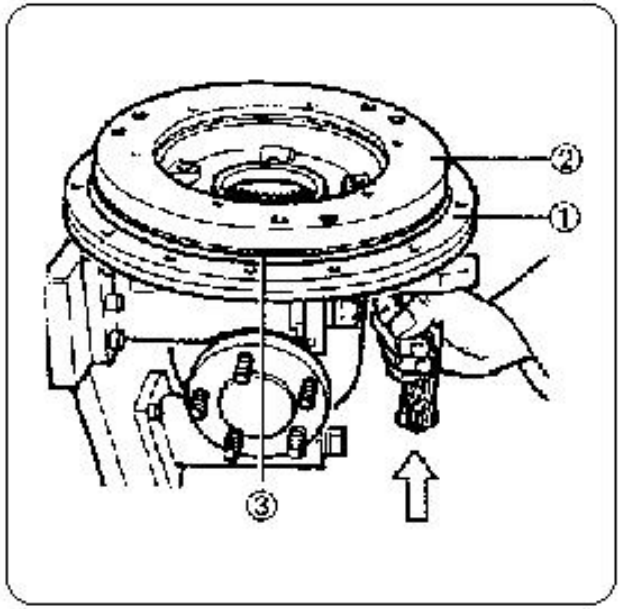


Figure 4

ATTENTION

The upper section of the reduction gear can only be replaced as a complete unit. The centring ring supplied with the SF/BF version can be reutilized.

IMPORTANT

REPLACE THE PIN, discharge filter and grease nipples if damaged. To check the upper part refer to the “Assembly” chapter.

4.3 REMOVING THE REDUCTION GEAR COVER

Unscrew the hex screws (pos. 1).
Lift the cover (pos. 2) by tapping it with the hammer (Figure 5).

6.1 MEASURING THE PINION SHAFT ASSEMBLY CLEARANCE

Insert measuring bush “0” in the bearing bore in the reduction gear case and measure length F.
The length E of the reduction gear case is obtained by the following formula:

E = L- F+d/2

L = Length of the measuring bush “D” (shown)
F = Distance from the diameter of the bearing bore to the end of the measuring bush “D”
d/2= Diameter of the bore (reduction gear model 400: 45.00 mm (1.7716 in.)

Thickness X of the shims (pos. 1) is obtained from the following formula:

X= E -B - T

E = Dimensions of the reduction gear case
B = Assembly clearance of the pinion shaft (shown)
T = Width of bearings (pos. 2)

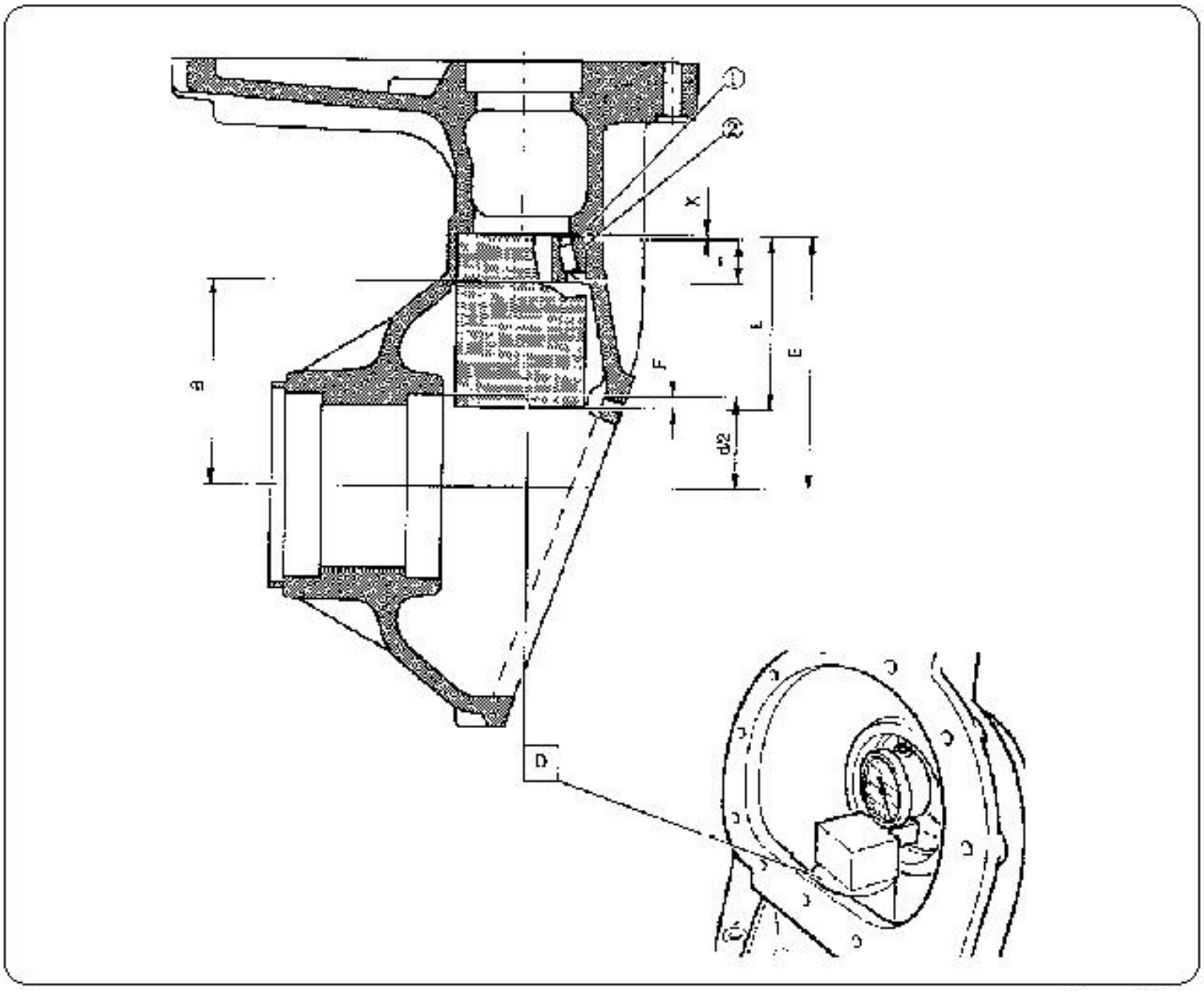


Figure 16

6.2 PRE-ASSEMBLY OF THE REDUCTION GEAR CASE

PINION SHAFT BEARING

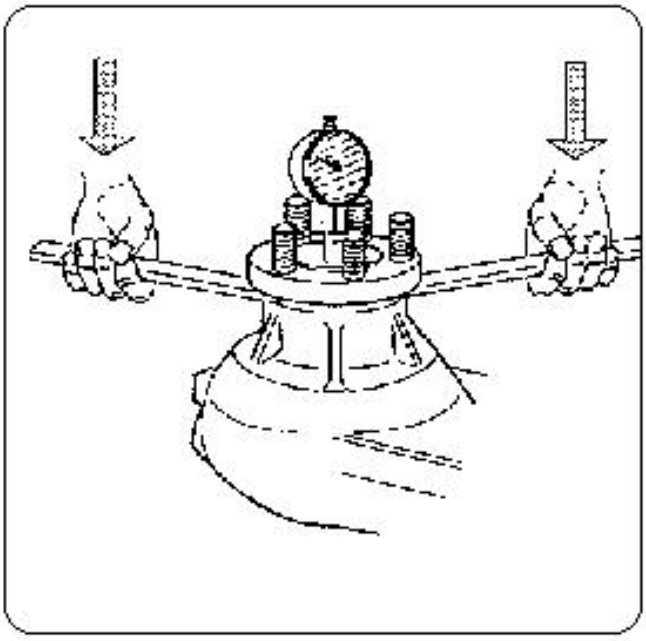


Figure 31

Lift the axle shaft upwards using two levers (screwdrivers or assembly bars). Read the bearing clearance on the dial gauge.

Remove the axle shaft and remove the outer race of the taper roller bearing from it bore using a 3-leg puller.

Form a pack with the shims (pos. 1) and fit them in the reduction gear case (Figure 32).

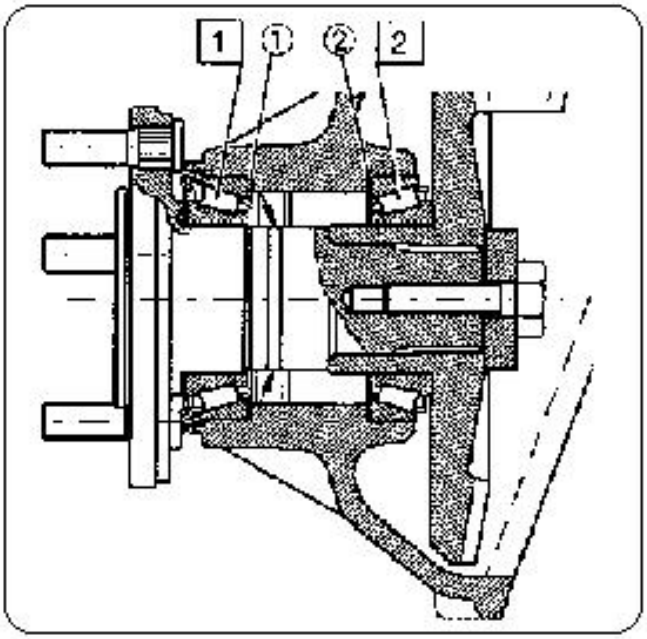


Figure 32

IMPORTANT
THE MINIMUM CLEARANCE BETWEEN BEARINGS MUST BE APPROX. 0.02 mm (0.0008 in.); IF NECESSARY, FIT ADDITIONAL SHIMS. DO NOT SET THE FINAL BEARING PRELOAD UNTIL THIS OPERATION HAS BEEN COMPLETED.

Required preload: 0.05 to 0.10 mm (0.002 to 0.004 in.)

Install the outer bearing race and the axle shaft. Repeat the measurement procedure.

IMPORTANT
AT THIS POINT IT IS NOT YET POSSIBLE TO CHECK THE PRELOAD ON THE ADJUSTED BEARING. DURING CHECKING

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1.0 SERVICING PRODUCTS

1.1 CLEANING PRODUCTS

Use detergents such as benzol or LOCTITE rapid cleaner n. 706

ATTENTION

When using aggressive detergents, avoid contact with eyes and skin. Do not ingest or inhale the vapours. Wear safety gloves and safety glasses. In the case of skin contact, rinse the affected area immediately in plenty of water. In case of ingestion, call a doctor immediately. Follow the appropriate accident prevention standards.

1.2 ASSEMBLY PRODUCTS

LOCTITE No. 242 for medium-high torque bolts
LOCTITE No. 542 for gasketing

Lubricant: **(SEE TABLE 01 AT THE BEGINNING OF THE MANUAL)**

Ink: for checking gear tooth backlash

Use reduction gear oil **(SEE TABLE 01 AT THE BEGINNING OF THE MANUAL)**

Viscosity:
Standard oil:
Ambient temperature: 0 - 40 °C (32-104 °F) SAE 80-90

Low oil temperature:
Ambient temperature; down to -26 °C (-15 °F) SAE 80W
Ambient temperature; down to -40 °C (-40 °F) SAE 75W

Always consult the manufacturer before using a synthetic oil. Always check the oil level again after using the truck for a brief period. When topping up the oil, use the same oil as that used originally to fill the unit.
Read the following sections of the manual carefully: “Installation, Operation, Maintenance”.

Quantity of oil required:
(SEE TABLE 01 AT THE BEGINNING OF THE MANUAL)

The indicated oil quantities apply to standard models. The oil level is correct when the oil is up to the lower edge of the filler hole.

2.0 COMPONENTS OF REDUCTION GEAR GR-96

6.1 INTRODUCTION

Thoroughly clean all components and remove all traces of LOCTITE.

ATTENTION

When using aggressive detergents, avoid contact with eyes and skin. Do not ingest or inhale the vapours. Wear safety gloves and safety glasses. In the case of skin contact, rinse the affected area immediately in plenty of water. In case of ingestion, call a doctor immediately. Follow the appropriate accident prevention standards.

Inspect all parts for wear and replace any that are damaged.

If any gears are damaged, the entire gear assembly must be replaced.

New gear assemblies require new taper roller bearings.

Even if only some of the taper roller bearings are damaged, all of them must be renewed (use only the inner and outer races supplied by the manufacturer).
After cleaning, lubricate the taper roller bearings with reduction gear oil prior to installing them.
Do not reutilize damaged spacers.

Smooth the sides of the seal using an oilstone or file.

The following new parts are required for assembly:

- Radial seal for the axle shaft
- Seal for the axle shaft
- Hex retaining nut for helical gear
- Shims to adjust bearing preload and clearances
- Seals for the oil filler and drain plugs

6.2 ASSEMBLY

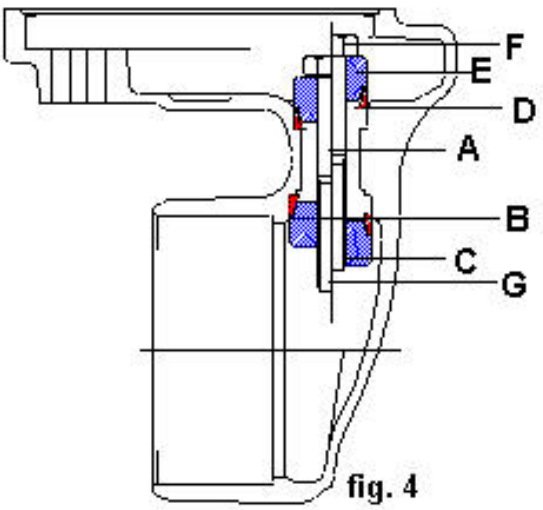


fig. 4

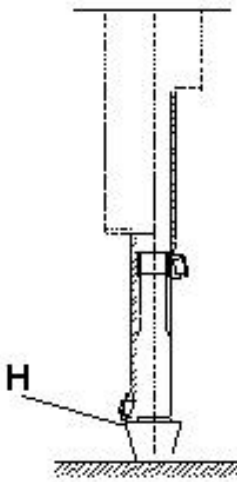


fig. 5

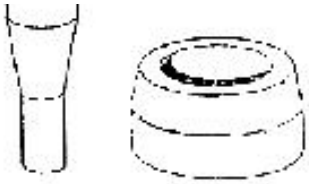
1) Tool for installation of the outer races of the taper roller bearings of the bevel pinion on the reduction gear case (4). 19 mm hex wrench N° 2

Assembly procedure

- Insert quadrant **E** on rod **A** with the conical side facing away from nut **F**. Install the outer ring of bearing **D** in the seat in the reduction gear case; insert the rod in the pinion seat from the top so that the conical side of quadrant **E** is inserted in the ring of bearing **D**.

CODE 272452900

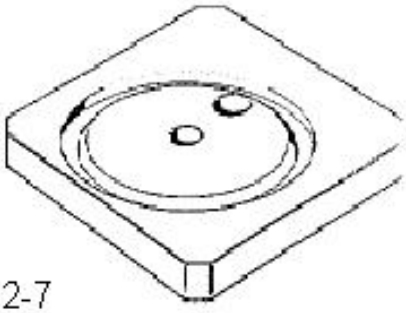
A 92-5



Support plate

CODE 272453600

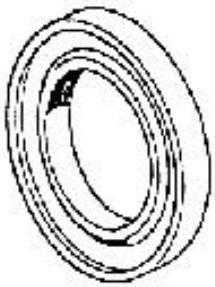
A 92-7



Tool to insert steering thrust bearing on flange

CODE 272453500

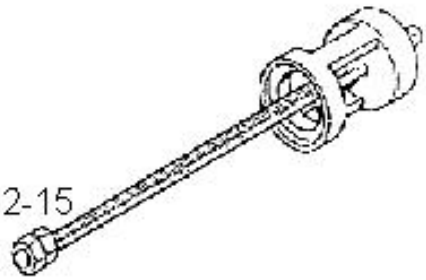
A 92-14



Tool for fitting/removing passive brake spring

CODE 272453300

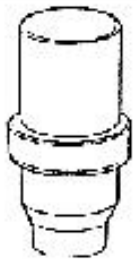
A 92-15



Tools to insert bearing internal races on crown wheel, on wheel hub, and bearing external races on hub carrier

CODE 272453900

A 92-10

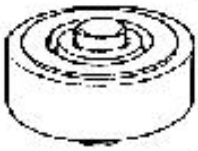


CODE 272453800

A 92-9

CODE 272453000

A 92-8



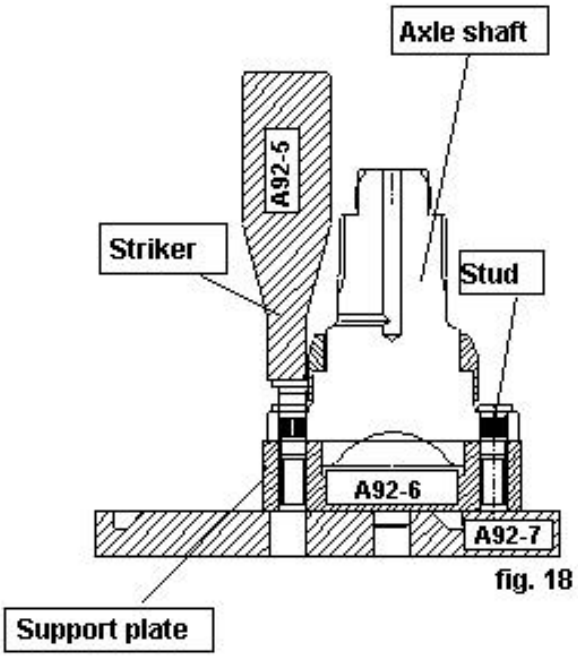


fig. 18

5.6 FITTING THE TAPER ROLLER BEARINGS ON THE BEVEL CROWN WHEEL FITTING THE TAPER ROLLER BEARINGS ON THE FLANGE

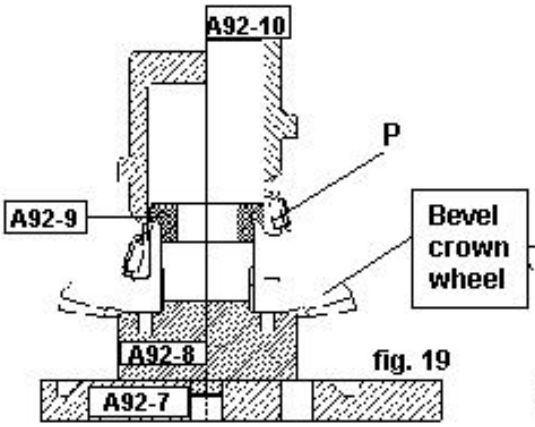


fig. 19

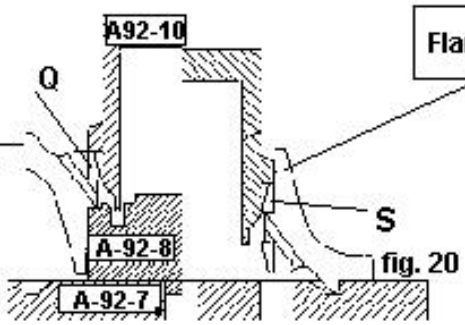


fig. 20

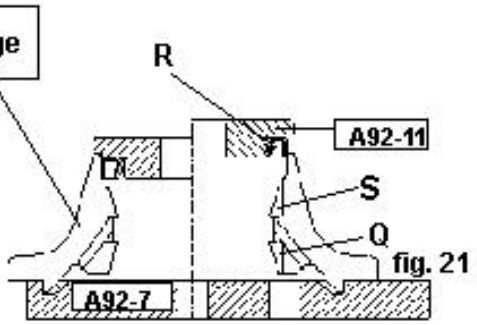


fig. 21

8) Hammer, Support plate A 92-7, Support plate A 92-8, Tool A 92-9 - Position the bevel crown wheel on support plate A 92-8. Position the bearing guide A 92-9 on the crown wheel. Place the bearing on the crown wheel (Ref. P), then use tool A 92-10 and the hammer to drive the bearing fully home. (fig. 19)

9) Hammer, Support plate A 92-7, Support plate A 92-8, Tool A 92-10 - Place the flange facing upwards on the support plate 92-8 (fig. 20) and fit the taper roller bearing external race (Ref. Q); now use tool A 92-10 and the hammer to drive the race fully home. (fig. 20)

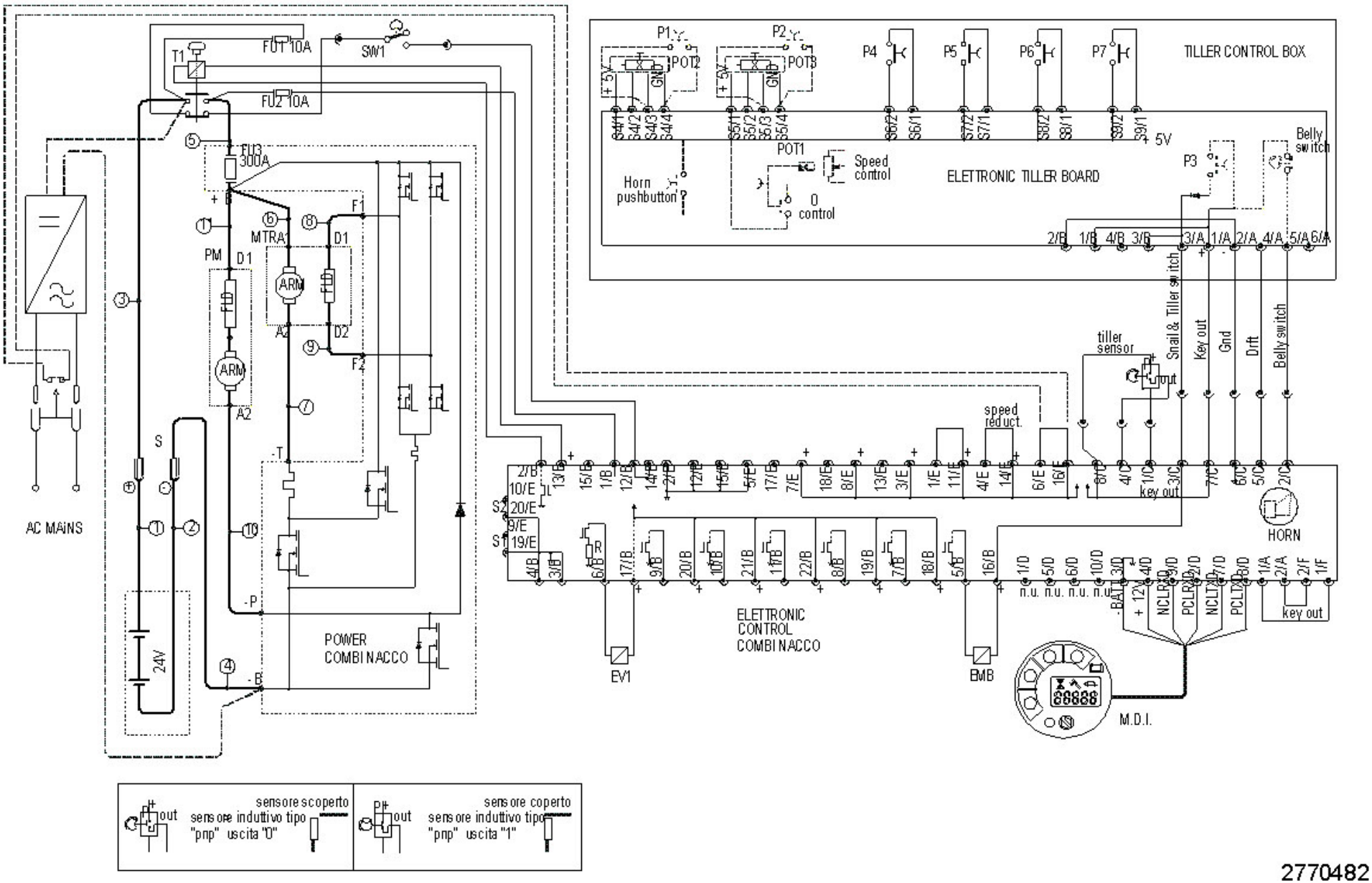
10) Support plate A 92-7, Tool A 92-10, Tool A 92-11 - Overturn the flange and place it on plate A 92-7, Fit the outer race of the taper roller bearing (Ref. S) and use tool A 92-10 to drive the bearing race fully home. Fit the oil seal in the crown wheel seat and use tool A 92-11 and the hammer to drive it fully home. (fig. 21)

Grease the oil seal in the area of contact with the axle shaft.

5.7 FITTING THE FLANGE AND BEVEL CROWN WHEEL TO THE AXLE SHAFT

1.0 FUNCTIONAL ELECTRICAL DIAGRAM MODEL MP18 - MP22 - MP30 - MP30HD

S	PM	MTR	FU1- FU3	SW1	T1	P1	P2	P3	P4	P5	P6	P7	POT1	POT2	POT3	EMB	EV1	
Battery plug	Pump motor	Traction Motor	Fuses	Key switch	Main contactor	Hydr. lift pushbutton	Hydr. lower pushbutton	Snail pushbutton	Initial lift pushbutton	Initial lower pushbutton	Side shift left pushbutton	Side shift right pushbutton	Forward/reverse Potentiometer	Lift load Potentiometer	Lower load Potentiometer	Elettromagnetic brake	Down proportional elettrovalve	



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2.0 ELECTRICAL WIRING HARNESS CONNECTION DIAGRAM MODEL MP18

MP18 - MP22/30			
SET OPTIONS	HOUR COUNTER	RUNNING	During operation
		KEY ON	Keyswitch turned to ON
	BATTERY CHECK	ON	Conditions to be left for stackers
	AUX FUNCTION 2	ABSENT	Controls EV1 as an ON - OFF valve
		PRESENT	Controls EV1 as a proportional valve
	SIFR FUNCTION	ABSENT	Not utilized
	QUICK INVERSION	BELLY	On pressing the belly switch, the truck moves forward for as long as the switch is held pressed
		TIMER	When the belly switch is released, the truck reverses for a certain time period
	AUX FUNCTION 1	ON	Allows transfer of MDI operating hours to controller after replacement
		OFF	Condition to be left during truck operation
	CHECK UP DONE	ON	Clears the MDI operating hours on the controller after the 300 hour service
		OFF	Condition to be left during truck operation
	CHECK UP ENEBLE	ON	After 300 operating hours the wrench symbol on the MDI starts to flash to indicate that servicing is required
		OFF	Deactivates the servicing programme
	INVERSION MODE	ON	Condition to be left during truck operation
	BRAKE IN RELEASE	ON	The electromagnetic brake is applied three seconds after release of the butterfly control (standard version)
		OFF	The electromagnetic brake is applied as soon as the butterfly control is released (version for use on ramps and gradients)
ADJUST	ADJUST BATTERY	25 V	Eliminates the VBATT measurement error
	ADJUSTMENT # 01	LEVEL=05	Controls the 100 % battery charge value
	ADJUSTMENT # 02	LEVEL=05	Controls the battery 20 % discharged value

3.1 TABLE OF PARAMETERS - COMBI PARAMETER CHANGER MODEL MP18 - MP22/30

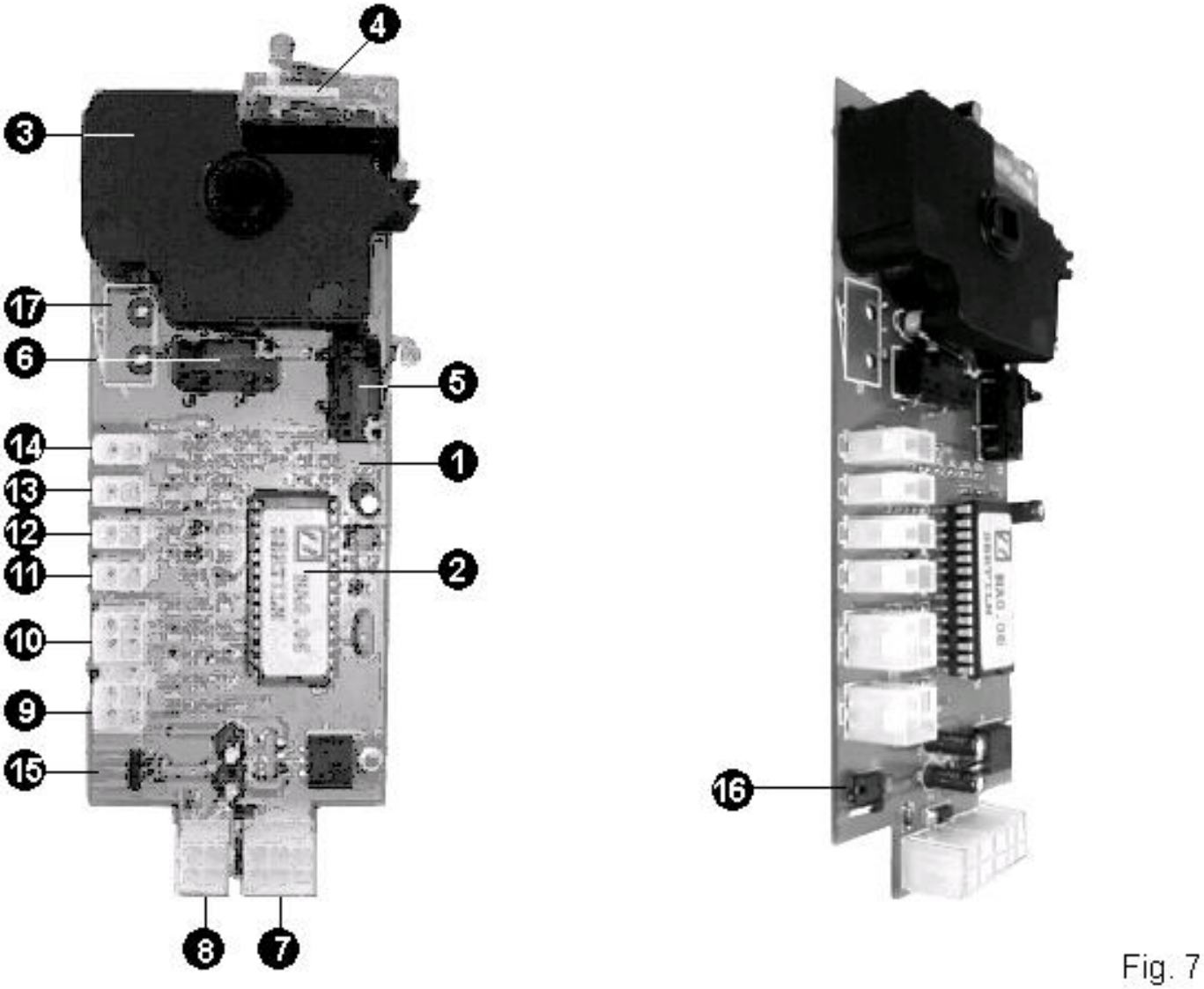
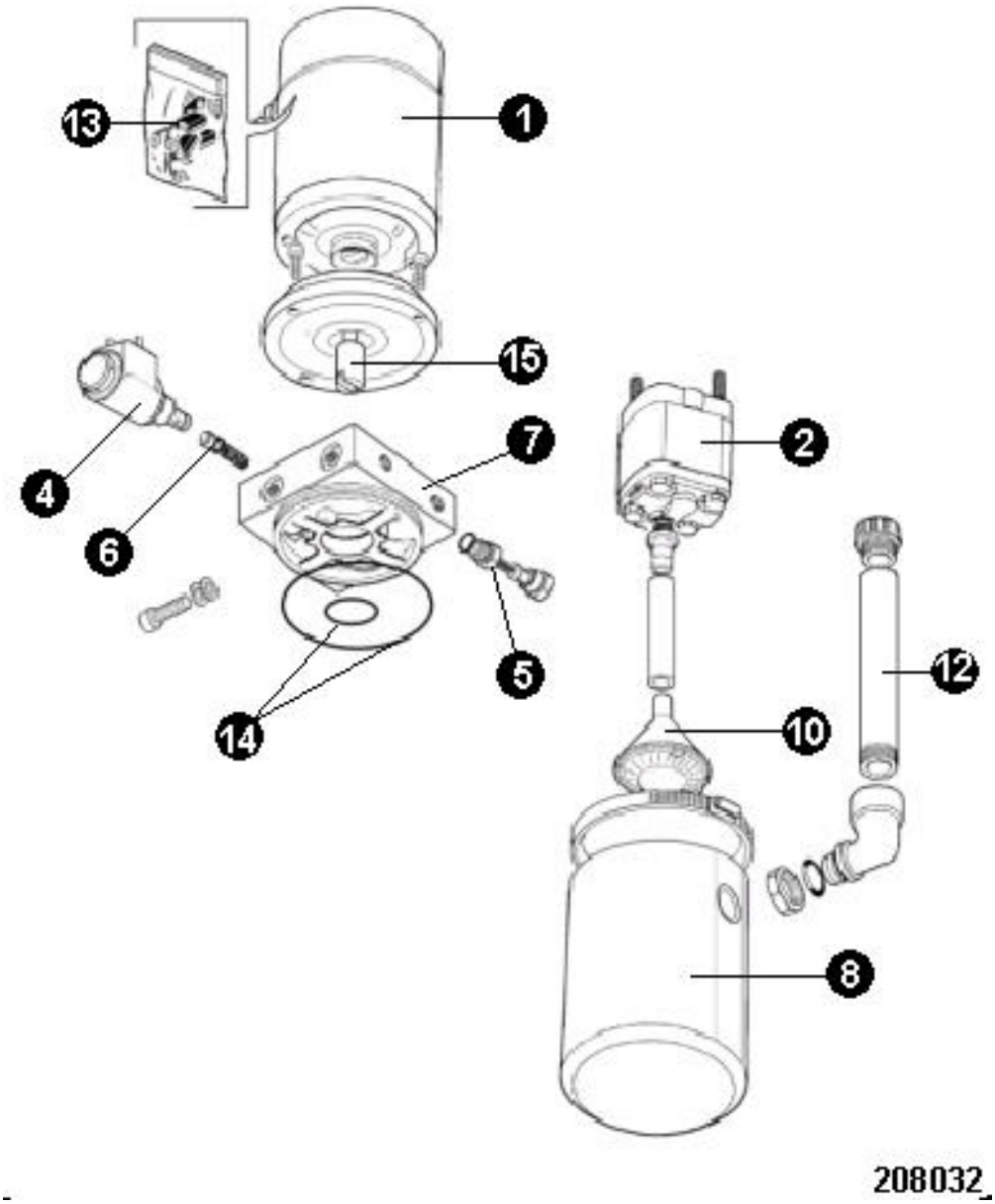


Fig. 7



Key:
Ref. Component reference in exploded view;
Component description Function of component;
Technical Data Component specifications;

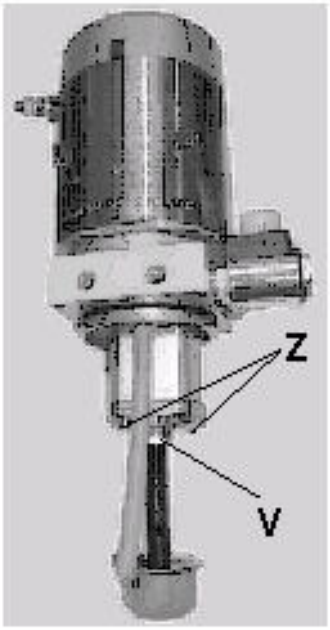


Fig. 15

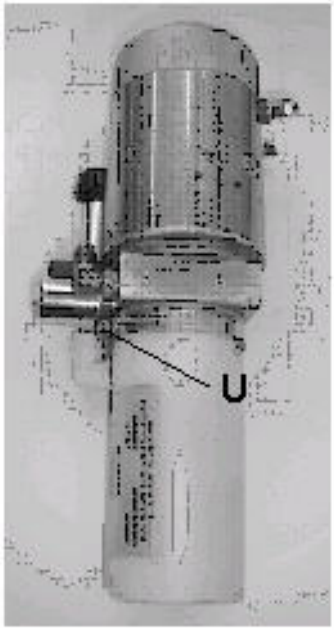


Fig. 14

Ref. Component reference;
Component Description Function of component;

Ref	Component Description
1	Ties to body rear connecting lever
2	Complete lifting tie-rod
3	Rear lever/ body pivot pin
4	Tie-rod adjuster pin
5	Threaded end element connecting front lever and tie-rod
6	Front lever clevis
7	Lock nut
8	Tie-rod pivot pin connecting front clevis
9	Pivot pin between clevis and fork
10	Clevis pin bushing
11	Bushing for tie-rod pin and front clevis
12	Flexible pin
13	Flexible pin
14	Grease nipple
15	Pivot pin attaching tie-rod to rear lever
16	Pivot pin attaching rear lever to reduction gear support forging
17	Flexible pin
18	Rear lever bushing
19	Rear lever bushing
20	Rear lever to forging pivot pin fixing screw
21	Flexible pin
22	Rear lever bushing

NOTE: All Yale Part Numbers are given in the parts catalogue.

2.0 REPLACING THE FRONT LEVER REPLACING THE REAR LEVER

ADJUSTING FORK HEIGHT MODEL MP18 - MP22/30

SPECIAL TOOLS REQUIRED

- 2 Wooden blocks 150x150x200

STANDARD TOOLS REQUIRED

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