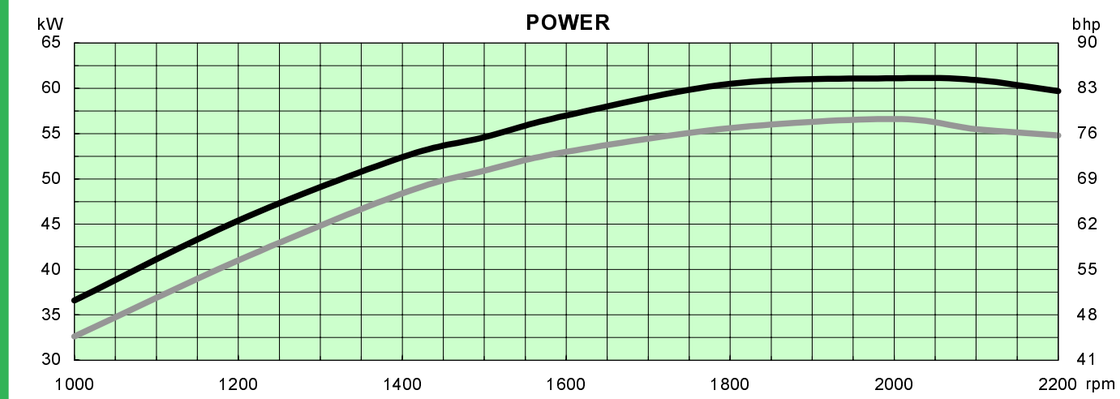
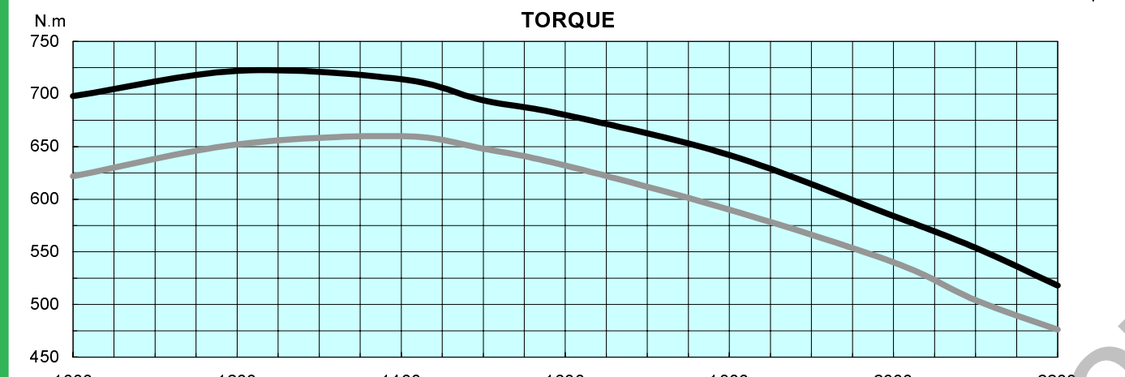
RENAULT Agriculture

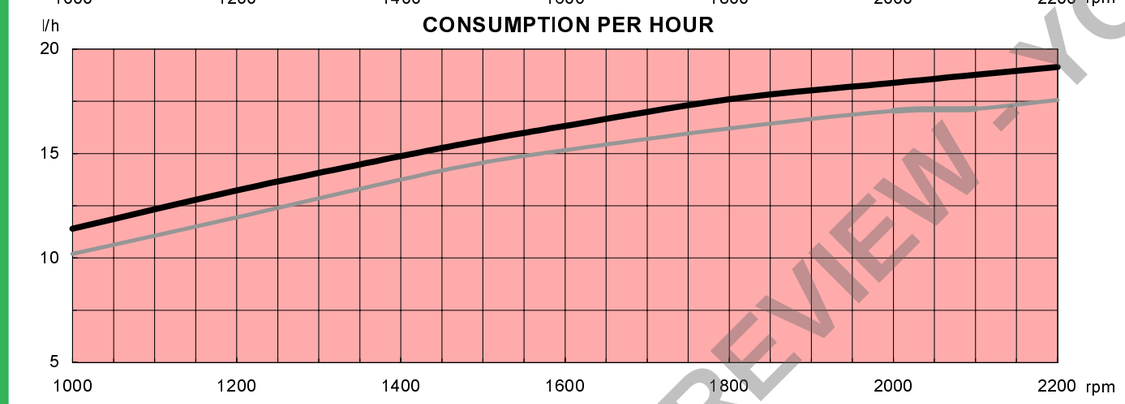
ENGINE TESTS ON THE POWER TAKE-OFF

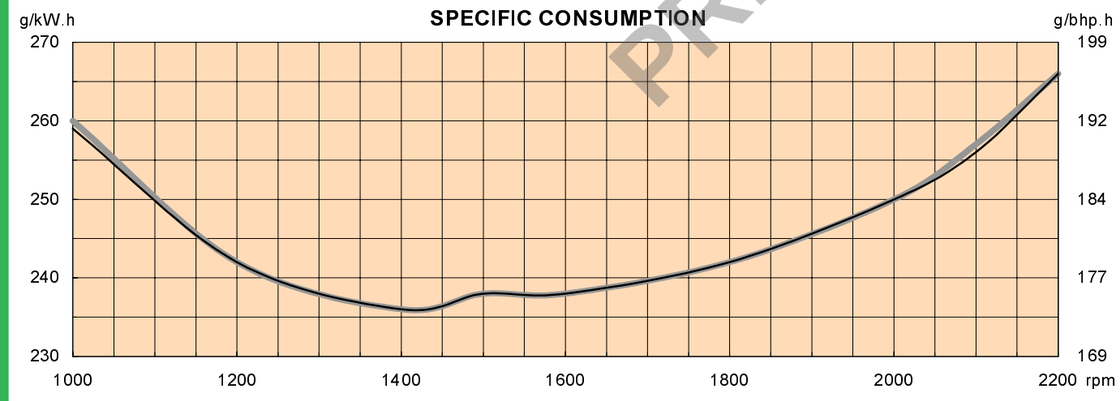
Position 1000 rpm

ARES 546 - S 5312









CURVE INTERPRETATION (intermediate)

Engine speed	rpm	**1200**	**2000**	③ **2200**
Power take-off speed	rpm	**600**	② **1000**	**1100**
POWER	kW	**43,5**	**59,0**	**57,3**
	bhp	59,1	80,2	77,9
TORQUE (Power take-off output)	N.m	① **692**	**564**	**498**
CONSUMPTION PER HOUR	l/h	**12,7**	**17,8**	**18,4**
SPECIFIC CONSUMPTION	g/kW.h	**242**	**250**	**266**
	g/bhp.h	178	184	196

① Maximum torque ② Power take-off standardized speed ③ Nominal engine speed

$$\text{Torque feedback} = \frac{\text{maximum torque} - \text{nominal speed torque}}{\text{nominal speed torque}} \times 100 = 39,0\ \%$$

ENGINE TESTS AT POWER TAKE-OFF

Engine	Gearbox	Rear axle	Power Take-off (total reduction)			
			Position 540	Position 540 ECO	Position 1000	Position 1000 ECO
4045TRT53	**GBA 20**	**GPA 22**	**3,66**	**2,84**	**2,00**	**1,55**

SPEEDS (rpm)		Idle		Nominal		Max no load	
		Engine	Power take-off	Engine	Power take-off	Engine	Power take-off
Power take-off position	**540**	**825 → 875**	**225 → 239**	**2200**	**601**	**2375 → 2405**	**649 → 657**
	540 ECO	**825 → 875**	**290 → 308**	**2200**	**775**	**2375 → 2405**	**836 → 847**
	1000	**825 → 875**	**413 → 438**	**2200**	**1100**	**2375 → 2405**	**1188 → 1203**
	1000 ECO	**825 → 875**	**532 → 565**	**2200**	**1419**	**2375 → 2405**	**1532 → 1552**

REFERENCE VALUES - Power Take-off position 1000 rpm

Tolerances represented in the curves

SPEED	Engine	rpm	1000	1200	1400	1600	1800	2000	2100	2200
	PTO	rpm	**500**	**600**	**700**	**800**	**900**	**1000**	**1050**	**1100**
POWER *	**Minimum**	kW	**32,6**	**41,0**	**48,4**	**53,0**	**55,6**	**56,6**	**55,5**	**54,8**
		bhp	44,3	55,7	65,8	72,1	75,6	77,0	75,5	74,5
TORQUE ** (power take-off output)	**Minimum**	N.m	**622**	**652**	**660**	**632**	**590**	**540**	**504**	**476**
CONSUMPTION PER HOUR	**Minimum**	l/h	**10,2**	**12,0**	**13,8**	**15,2**	**16,2**	**17,0**	**17,1**	**17,6**
	Maximum	l/h	**11,4**	**13,2**	**14,9**	**16,3**	**17,6**	**18,4**	**18,8**	**19,1**
SPECIFIC CONSUMPTION ***	**Maximum**	g/kW.h	**259**	**242**	**236**	**238**	**242**	**250**	**256**	**266**
		g/bhp.h	190	178	174	175	178	184	188	196

* Power (W) = torque (N.m) x speed (rad/s)

$$\text{Injection flow (mm3)} = \frac{\text{Hourly consumption (l/h)} \times 1\,000\,000}{\text{Number of engine cylinders} \times \text{engine speed(rpm)} \times 30}$$

$$\text{*** Specific consumption (g/kW.h or g/bhp.h)} = \frac{\text{Hourly consumption (l/h)} \times \text{diesel fuel density (0.840)}}{\text{Power (kW or bhp)}}$$

** Equivalent engine torque (N.m) = $\frac{\text{Torque at Power take-off outlet (N.m)}}{\text{Power take-off reduction}}$

1 bhp = 0.7355 kW
1 rpm = 0.1047 rad/s
1 kW = 1.3596 bhp
1 rad/s = 9.5510 rpm

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Checks - Adjustments

8 - Run the engine at full throttle then gradually apply a load until it reaches nominal speed.
Read the dynamic adjustment value and compare this with the value provided in the specifications at the beginning of this chapter.

Note: a negative value indicates that the signal from the clip-on probe is poor. Check the probe and the pipes are clean and that the installation is correct.

9 - Record the engine speed (rpm) and the adjustment angle.

IMPORTANT : stop the engine before attempting to set the adjustment. There is a risk of the injection pump seizing if the setting is performed whilst the engine is running.

10 - Stop the engine.
If the dynamic adjustment is retarded by more than 8 degrees in relation to the adjustment marks applied at the manufacturer's, prior to delivery, on the pump flange and on the front plate, this may indicate that the advance on the pump is not functioning correctly. Check the following points:
- replace the fuel filter,
- check the pressure between the supply pump and the injection pump,
- if none of the above checks provides conclusive results, remove the pump and have it repaired in an approved diesel engine repair workshop.

Setting the dynamic adjustment of the rotary injection pump (Fig. 13)

1 - Loosen the nuts **(1)** on the injection pump attachment flange and set the pump adjustment. To advance the pump adjustment, turn it clockwise **(2)** as viewed from the rear (engine flywheel end). To retard the adjustment, turn it anti-clockwise **(3)**. A 1.524 mm displacement of the injection pump flange is equivalent to 2 degrees of engine adjustment.

2 - Torque tighten the pump attachment collar-nuts to **2,7 daN.m**. Start the engine and check again the dynamic adjustment of the injection pump. Set the adjustment as required.

3 - After completing all the final settings and achieving satisfactory engine performance, grind away the original adjustment mark and scribe a new mark **(B)** on the pump flange, in line with mark **(A)** on the front plate.

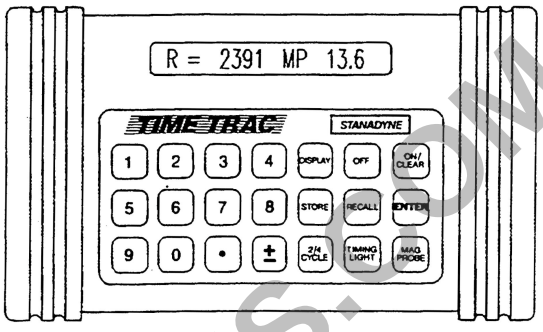


Fig. 12

A1-025

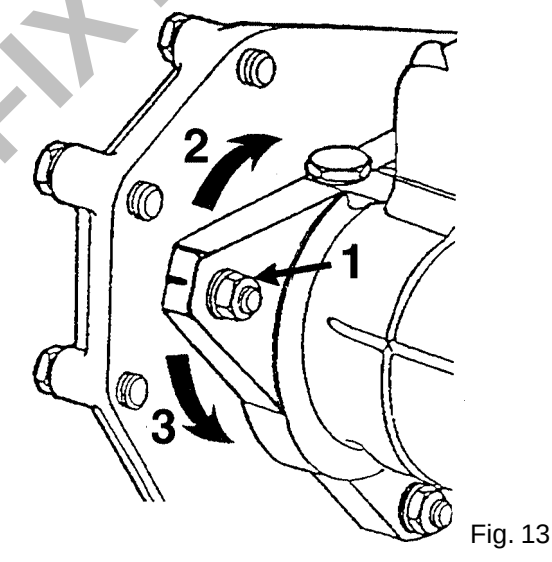


Fig. 13

A1-026

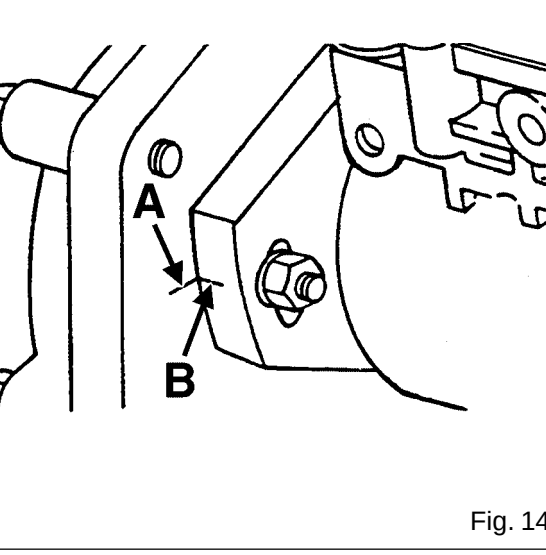


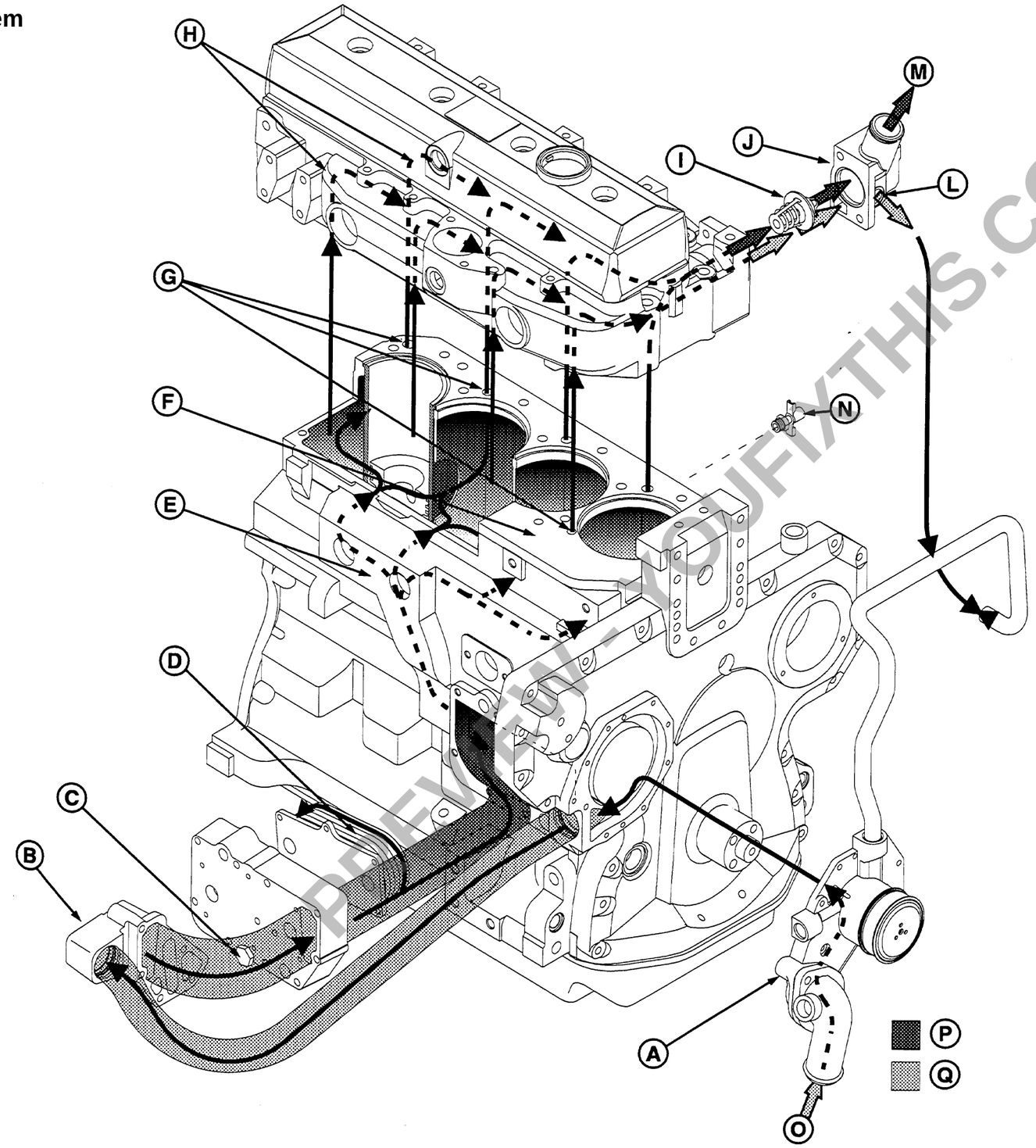
Fig. 14

A1-027

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Operating principles

Cooling system



Description

A - Water pump
B - Cooling fluid passage adapter
C - Oil cooler drain cap
D - Oil cooler plates
E - Cooling fluid passage
F - Cooling fluid envelope
G - Upper block part passages
H - Passages
I - Thermostat
J - Water manifold/thermostat casing
L - Bypass circuit
M - Towards the radiator upper tank
N - Cylinder block drain cap
O - Water pump suction end
P - High temperature cooling fluid
Q - Low temperature cooling fluid

A2-023

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Removal - installation

• Reassembling the water pump

1 - Clean and inspect carefully the assembly surface of the water pump in the distributor casing before installing it.
2 - Install the outside circlip **(C)** in the groove of the shaft **(B)** using appropriate circlip pliers.
3 - Fit the bearing **(A)** on the shaft against the circlip, using an appropriate mandrel supported on the bearing inside bush.

IMPORTANT: do not press the end of the bearing shaft. Push only the outside bush of the bearing when fitting the bearing and shaft asembly in the body.

4 - Fit the bearing and shaft assembly in the body by pushing until it reaches the bottom of the body bore using a mandrel **(D)**.
5 - Fit the large inside circlip in the front bore groove of the pump body.

Note: The water pumps are fitted with a single part water sealing gasket.

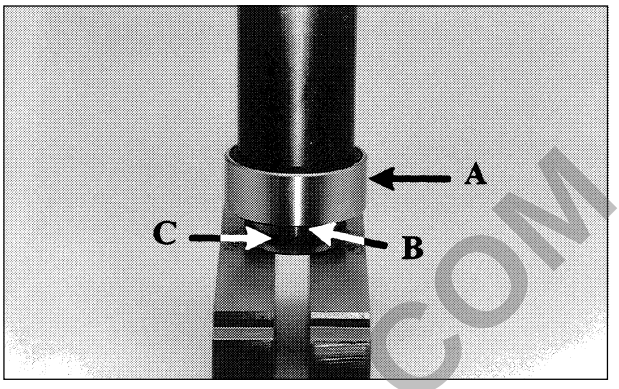
6 - Install the seal (dry) on the water pump shaft and in the body while pushing it in properly in the body using the tool provided with the seal kit.
7 - Support the front nose of the water pump shaft.

IMPORTANT: When installing the turbine, press only the brass bush (E), otherwise the turbine could crack.

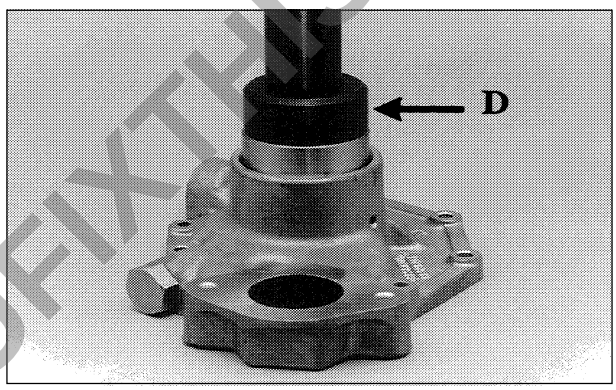
8 - Using an appropriate mandrel, install the turbine on the shaft according to the dimensions specified below.

Gap between the turbine and the end of the shaft: on the same level ± 0.13 mm than the end of the shaft.

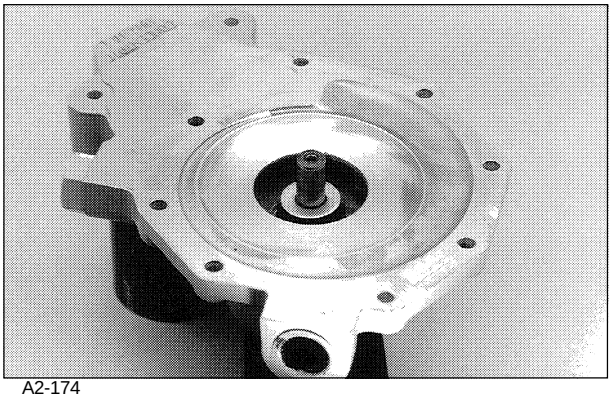
9 - Turn the turbine a full turn by hand, and check the clearance between the turbine and the body using a set of feeler gauges.
Minimum clearance between the body and the turbine: 0.27 mm.

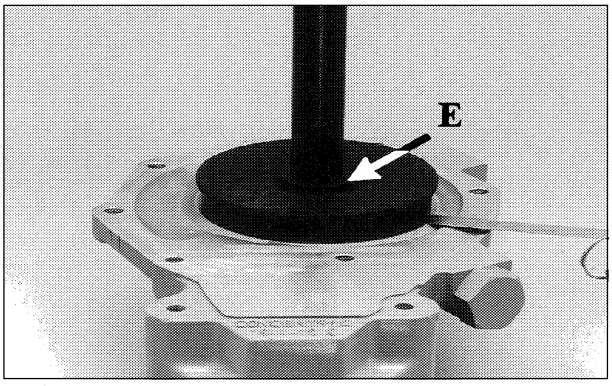


A2-172



A2-173


A2-174

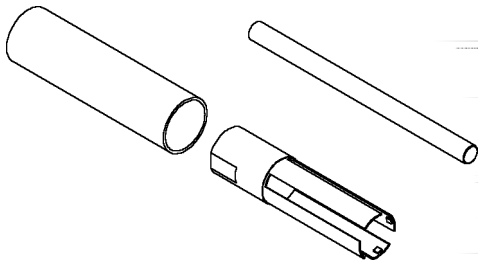
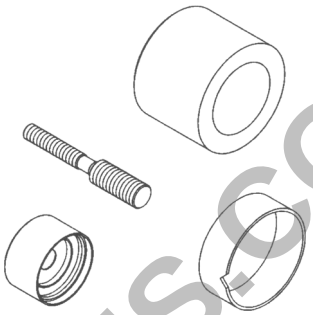


A2-175

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Engine tool DPS TIER II

60 05 005 573	5573	77 11 132 517	2517
			
Oil pressure valve extractor		**Tool for fitting the front bearing seal and the timing wheel on the crankshaft**	

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Twinshift housing

General presentation

The TWINSHIFT assembly is secured at the front of the input housing. It is an hydraulically-controlled speed shifting device providing two input ratios to the gearbox. This function is ensured by:
- a multidisc hydraulic clutch,
- a planetary gear train composed of a planet carrier with three double planet gears, an input sun gear and an output sun gear,
- a hydraulic braking system of the planet carrier.

The design of the TWINSHIFT enables changing gears while moving, without declutching, even at full load.

Kinematics

TWINSHIFT is composed of a double planetary gear train, by means of a wet clutch it is possible:
- either with pression, to attach the input shaft to the planet carrier.
- or without pression, using a spring (Bellevile washer), to attach the planet carrier to the casing, and to immobilise it.

a: Input shaft linked to the first sun gear.
b: Planet carrier.
c: Double planet gear.
d: Output shaft linked to the second sun gear.

Speed 1 (Fig. 8)
The pressure compresses the Belleville washers and as a clutch attaches the planet carrier to the input shaft and so to the first sun gear.
The planet gears can not turn around the sun gear as the planet carrier is also fixed in relation to the sun gear.
The assembly is then «fixed» in relation to the input shaft, everything turns at the same speed, including the output shaft, ratio of 1

Output speed = input speed.

Speed 2 (Fig. 7)
The springs (Belleville washers) keep the planet carrier fixed. The input movement of the first sun gear drives the planet gears which in turns drive the second sun gear and the output shaft.
As the two planetary gear trains have different dimensions, the output speed is different from the input speed. Here the difference is of 20 % more, ratio of 1.26.

Output speed = 1.26 x input speed.

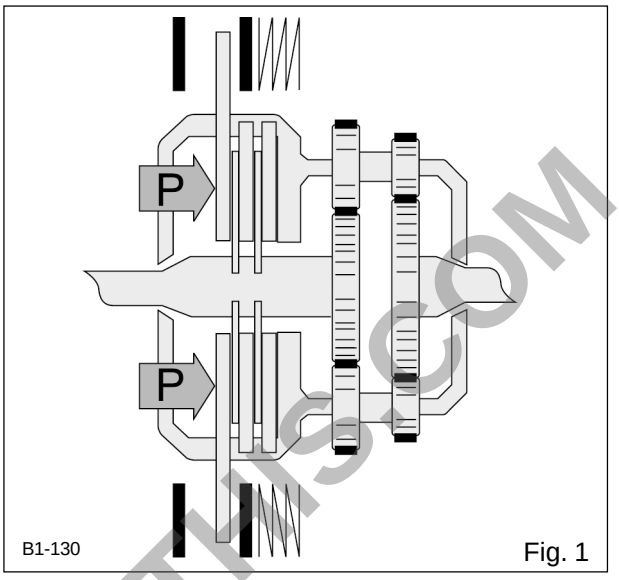


Fig. 1

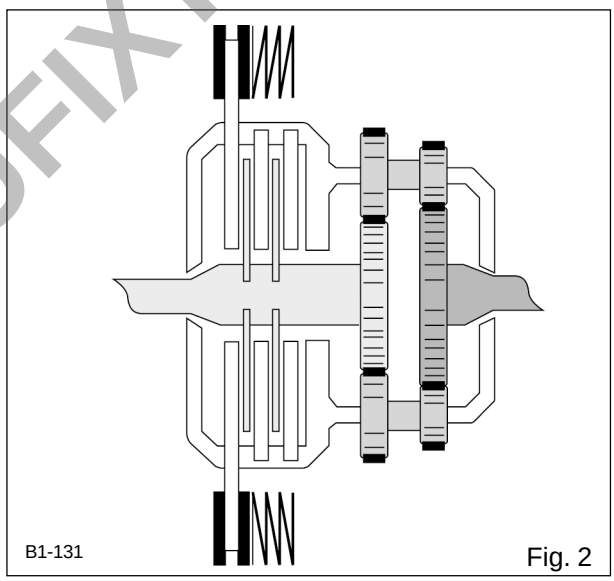


Fig. 2

Description

Input movement by the sun gear of the first planetary gear train.

Output movement by the sun gear of the second planetary gear train.

Immobilised parts, maintained fixed against the casing by means of a Belleville washer.

Intermediate movements of the planet gears.

P — Pressure action to attach the input shaft to the planet carrier.

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MEASUREMENT POINTS AND CHECKS

LUBRICATION CIRCUIT B2.27
LUBRICATION AND CONTROL CIRCUIT B2.28
LUBRICATION AND CONTROL CIRCUIT B2.29
OPEN CENTRE: ARES TRACTORS 500-600 ..... B2.33
CHECK SHEET B2.33
OPEN CENTRE: ARES TRACTOR 600 WITH BOOSTER BRAKE CONTROL B2.34
CHECK SHEET B2.34
CLOSED CENTRE: ARES TRACTOR 500 ..... B2.35
CHECK SHEET B2.35
CLOSED CENTRE: ARES TRACTOR 600 WITH BOOSTER BRAKE CONTROL B2.36
CHECK SHEET B2.36

TOOLS

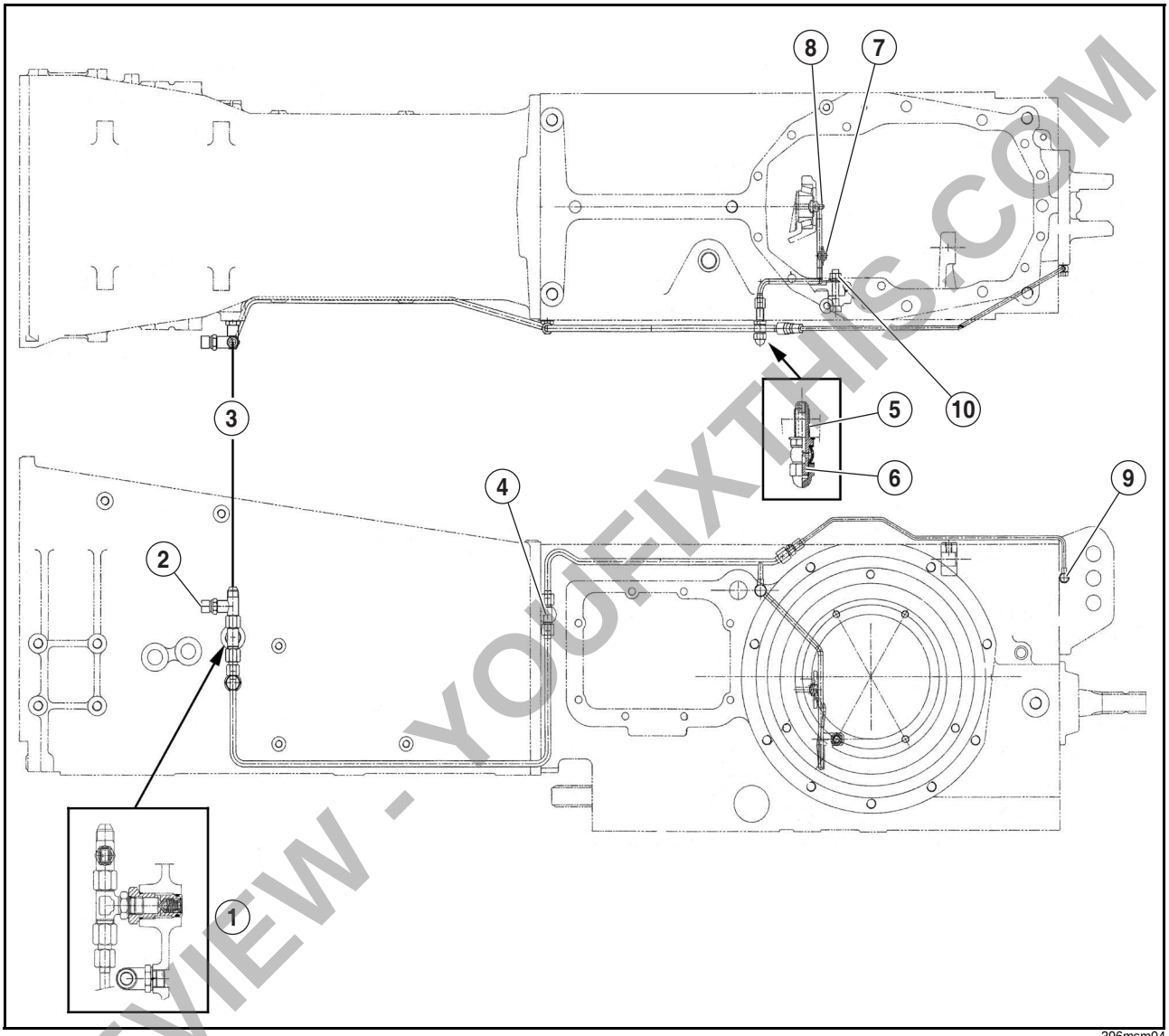
LOW PRESSURE HYDRAULIC CIRCUIT TOOLS B2.38

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Lubrication LS 100 l/min circuit

Gearbox and power take-off



396msm04

Description

1 1,5 bar valve and gearbox lubrication.
2 Cooler oil return.
3 17 bar distribution valve return.
4 Front part power take-off lubrication.
5 Hollow screw.
TIGHTENING: 4 ± 0,5 daN.m + Loctite Frenetanch (242).
6 Nut:
TIGHTENING: 2,5 ± 0,5 daN.m + Loctite Frenetanch (242).
7 Bolt.
APPLY: Loctite Frenetanch (242).
8 Driving pinion lubrication.
9 Rear part power take-off lubrication.
10 Bolt.
TIGHTENING: 110 ± 10 daN.m + Loctite Frenetanch (242).

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RR PTO clutch

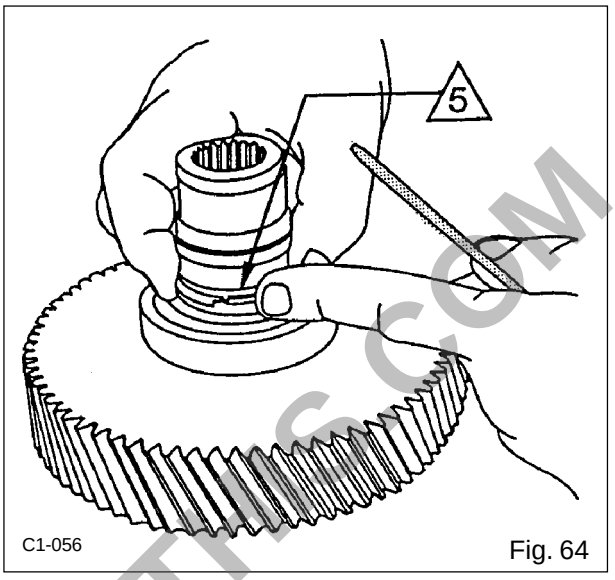
Installation

Note: The valve (8) is crimped on the clutch housing (9). Check the ball is not under constraint.

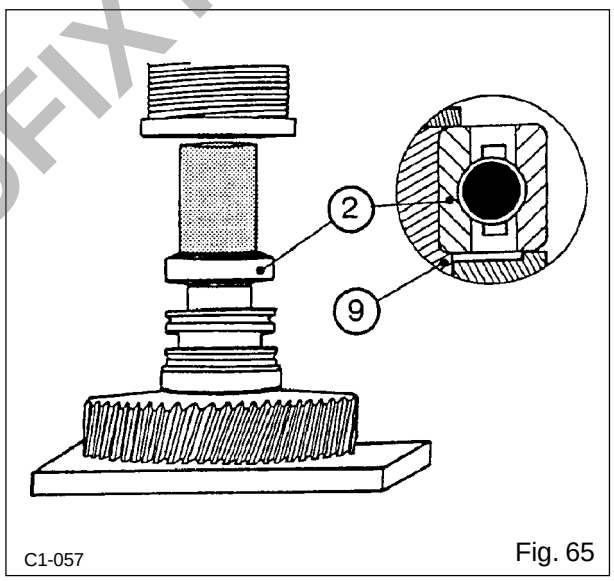
The sleeve (27) coated with Loctite 648 (Fig. 66) is fitted using a press. If removal is necessary, check while removing that the duct is not obstructed with Loctite.

Two pins (30) are fitted in the housing (9) 5 mm away from the face (Fig. 58).

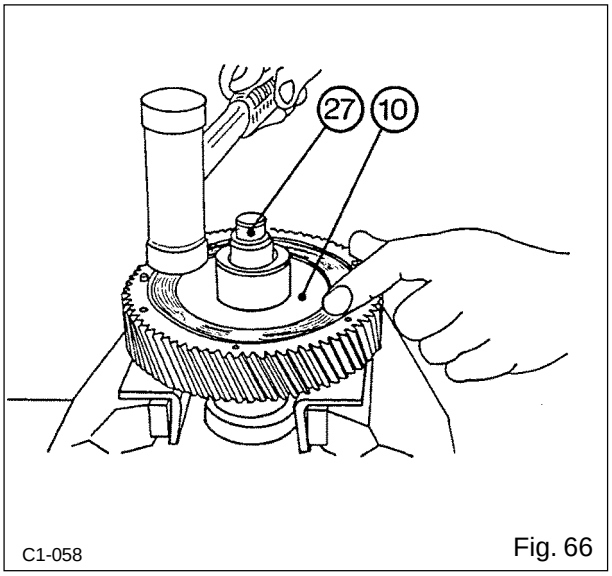
- Check and clean the parts.
- Using an appropriate installation and a press, fit the bearing **(7)** at the bottom of the shoulder.
- Place the sealing piston rings **/5** in their grooves and fasten their ends (Fig. 64), check they rotate freely.
- Slide the sleeve (4) on the rings and avoid damaging them.
  Note: Turn the large sleeve diameter towards the bearing (7).
- Using an appropriate installation and a press, fit the bearing **(2)**, until contact on the housing shoulder**(9)** (Fig. 65).
- Place the circlip **(1)**.
- Replace and lubricate the O-rings **(11)**, **(25) (26)**.
- Lubricate the sleeve **(27)**, the piston **(10)** and fit it in the housing using a plastic soft face hammer (Fig. 66).
- Using an appropriate installation and a press, fit the bearing **(22)** in the hub **(21)**, mount the arrestor ring **(20)**.
- Reinstall the lockwasher **(12)**, the support **(13)**, the spring **(18)**, the spring seat **(19)** and the drive hub **(21)**.
- Compress the spring **(18)** using the tool (Fig. 63), install the washer **(23)**, tighten the screw **(24)** coated with Loctite FRENBLOC to 2.4 - 2.8 daN.m.
- Place the spacers, the counterplates and the discs (according to type) on the hub **(21)**.
- Position the housing **(15)** in the two pins **(30)**. Install the screws **(16)** slightly coated with Loctite 542 and tighten to 1.5 - 1.8 daN.m.
- Manually check the discs and counterplates are not under constraint.
- Lubricate and install the O-rings **(3) - (6)**.
  Note: The seals have different diameters.



C1-056 Fig. 64



C1-057 Fig. 65

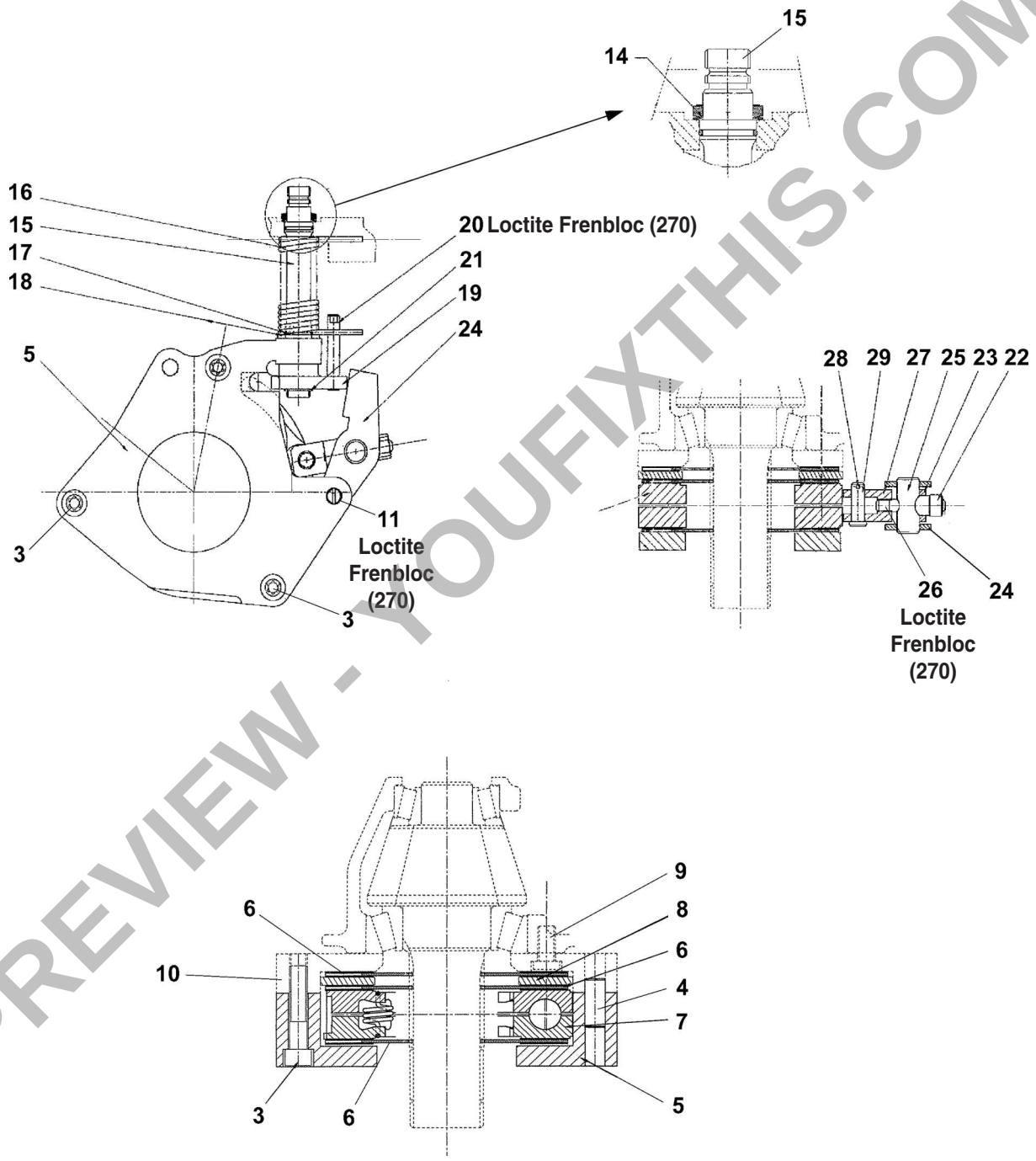


C1-058 Fig. 66

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Hand brake



362msm39

Fig. 47

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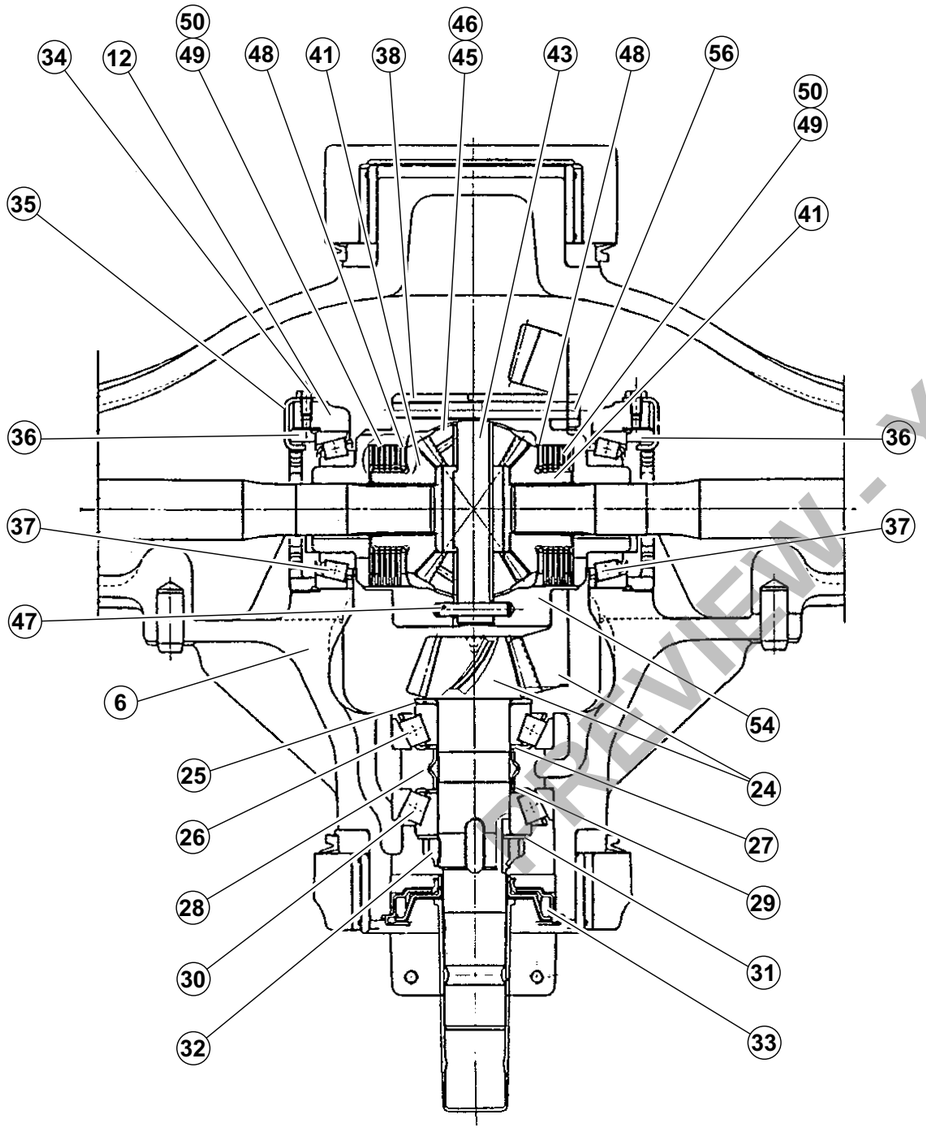
Removal/installation

Crown wheel and pinion - differential - Axle A 86-1

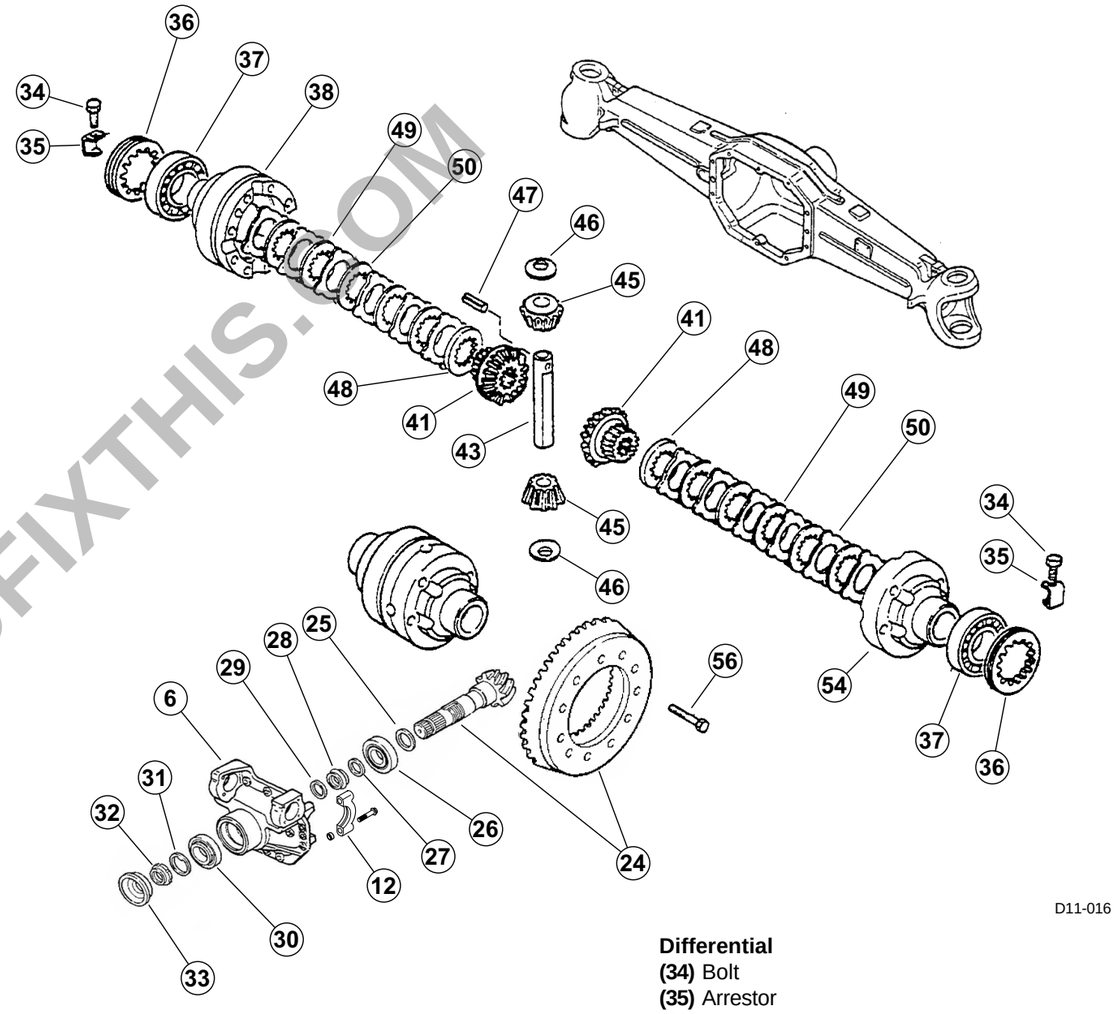
-Before removing the differential, apply a marking between the two casings.
-When installing the casing, replace the bolts **(56)** and lock them with FRENETANCH and torque tighten them to 7 daN.m.

Mark	Max dimension	Min dimension	Acceptable max wear
48	2,83	2,77	0.10 mm
49	1,53	1,47	-
50	1,63	1,57	0.15 mm

Clearance between satellite joint and pinion : 0.085 to 0.131



D11-016a



D11-016

Bevel gear
- **(6)** Cylinder support
- **(12)** Flange
- **(24)** Bevel gear
- **(25)** Adjustment shim(s)
- **(26)** Tapered bearing
- **(27)** Washer
- **(28)** Spacer
- **(29)** Washer
- **(30)** Tapered bearing
- **(31)** Washer
- **(32)** Nut
- **(33)** Lip seal

Differential
- **(34)** Bolt
- **(35)** Arrestor
- **(36)** Nut
- **(37)** Tapered bearing
- **(38)** Differential housing
- **(41)** Grooved planetary
- **(43)** Differential axis
- **(45)** Planet gears
- **(46)** Tapered washers
- **(47)** Pin
- **(48)** Disc thickness 2.83
- **(49)** Disc thickness 1.53
- **(50)** Back-plate thickness 1.63
- **(54)** Differential housing
- **(56)** Bolt

Fig. 8

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Hydraulic checks

Personal notes:

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Removal/installation of the components

3-position auxiliary distributor

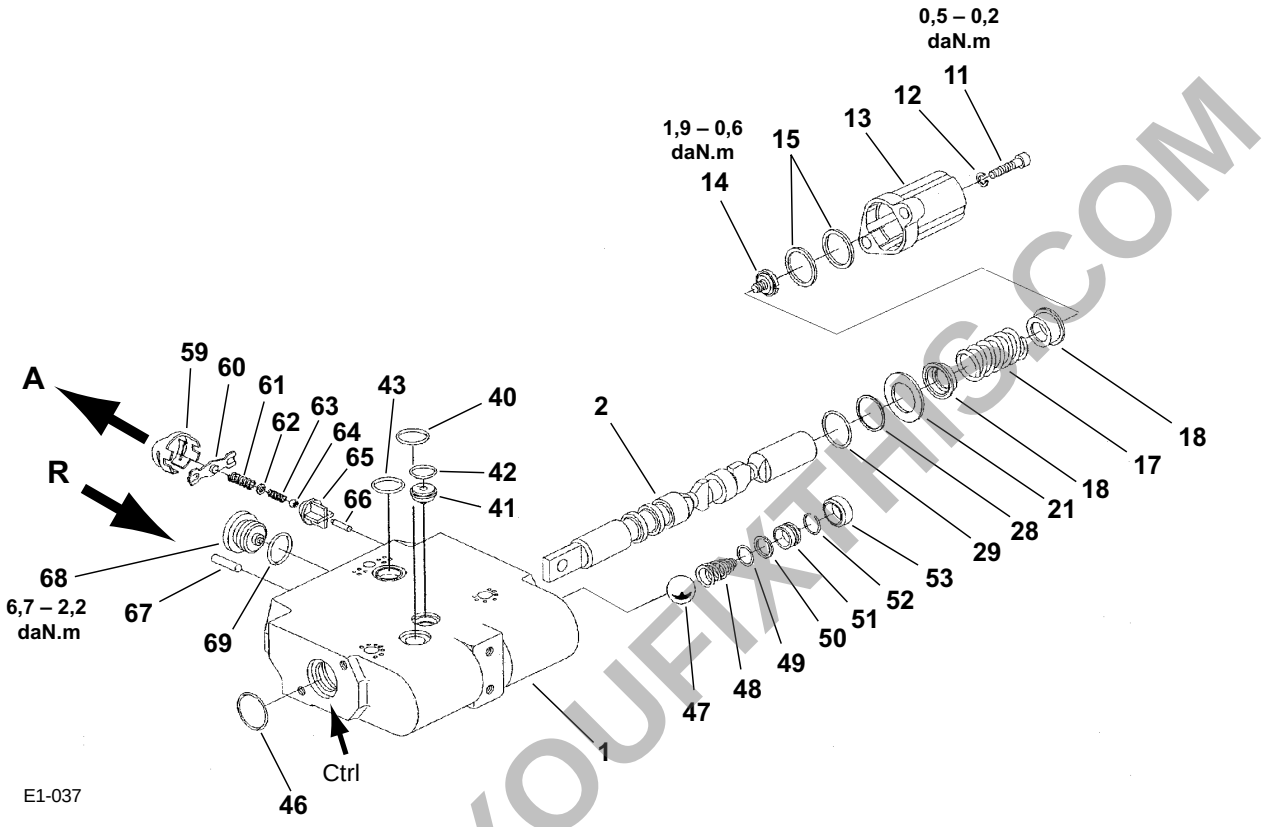


Fig. 36

Description

1 Distributor body
2 Distributor spool
11 Screw
12 Washer
13 Sheath
14 Plug
15 Shim
17 Spring
18 Spring cup
21 Washer
28 O-ring
29 O-ring
40 O-ring
41 Shuttle valve
42 O-ring
43 O-ring
46 O-ring
47 Ball
48 Spring
49 O-ring
50 Support washer
51 Ring
52 Spring clip
53 Plug
59 Castellated bush
60 Drive
61 Spring
62 Spacer
63 Spring
64 Ball
65 Rotating distibutor
66 Needle
67 Needle
68 Plug
69 O-ring

A Supply
R Return
Ctrl Control

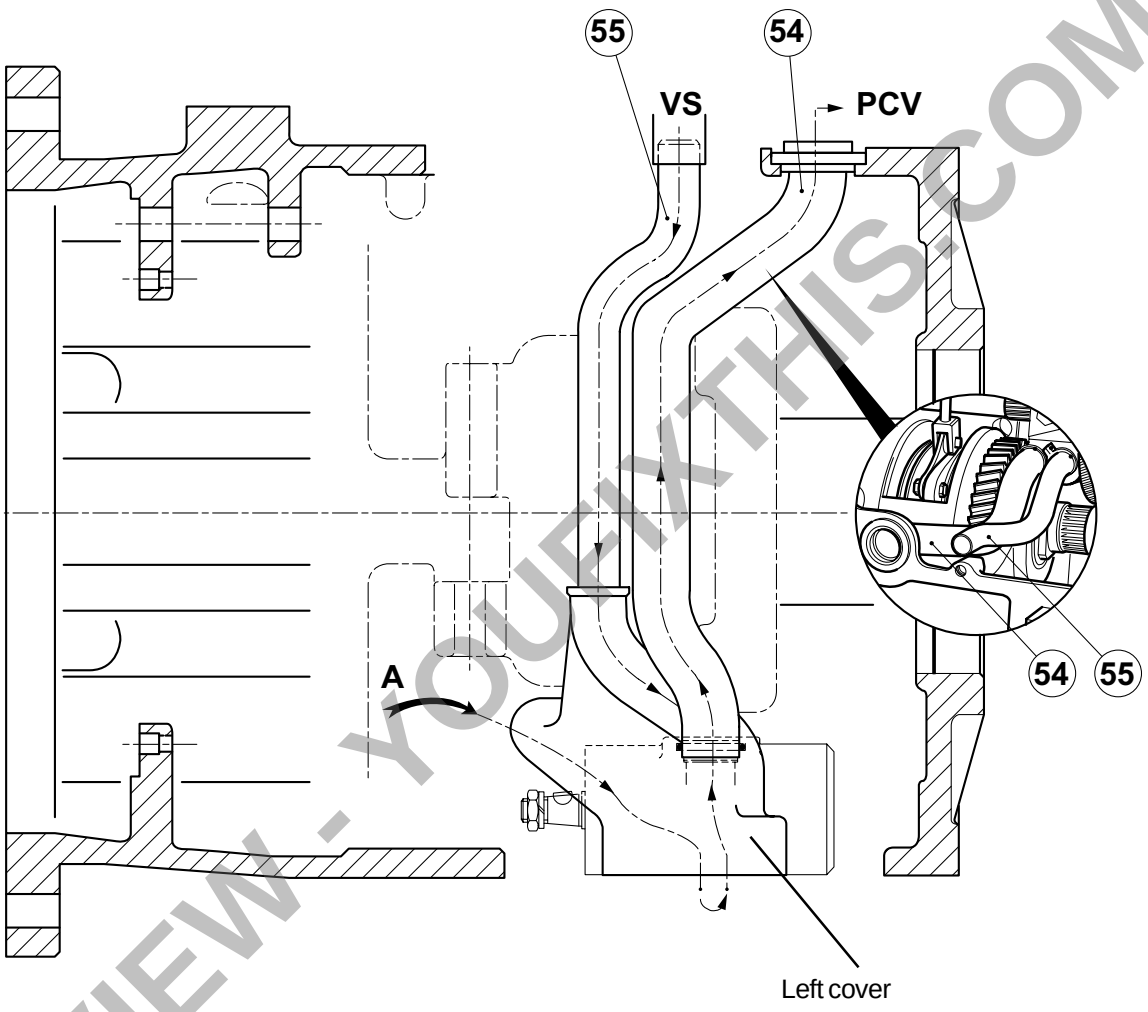
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Removal / installation of the components

Left cover

Cutaway view of the rear axle.



E2-006

Fig. 13

Description

(**54**) Booster tube
(**55**) Safety valve tube

(**A**) Suction
(**PCV**) Towards variable displacement pump
(**VS**) 5-bar safety valve

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ITEM LIST
WIRING AND GENERAL LISTS

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Notes

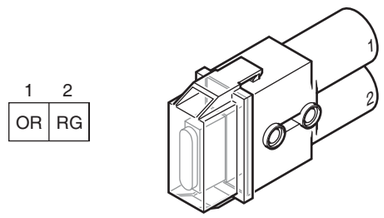
Notes

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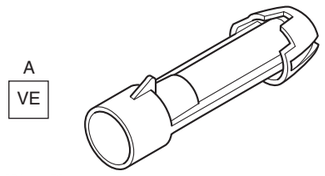
2 - Preheating control harness

Wire markers	2	J39	Ending	
1 OR	10	Preheating relay	226	30
2 RG	10	+ Battery	31	



604msm55

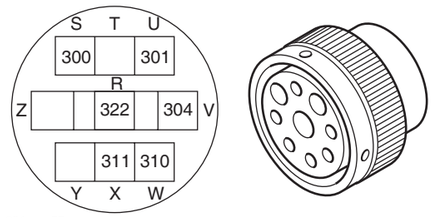
Wire markers	2	P16	Ending	
A VE	1	Preheating control	226	85



604msm56

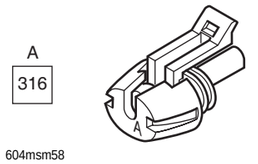
3 - Front harness (engine)

Wire markers	2	J01	Ending	
R 322	10	+ AVC general	E3D	
S 300	7	+ AVC general	E3D	
T ---	---	---		
U 301	7	+ AVC general	E3D	
V 304	2	Starter solenoid	32	
W 310	2	Dipped light	E3A	
X 311	2	Headlight	E3B	
Y ---	---	---		
Z ---	---	---		



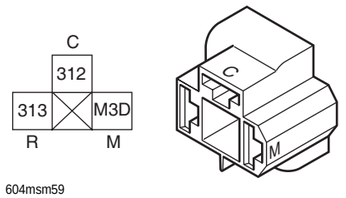
604msm57

Wire markers	2	J16	Ending	
A 316	1	Preheating control	P02	P
A 316	1	Preheating control	J218	K3



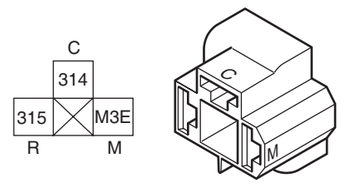
604msm58

Wire markers	2	J18	Ending	
C 312	1	LH dipped light	E3A	
M M3D	1	LH light earth	E3C	
R 313	1	LH headlight	E3B	



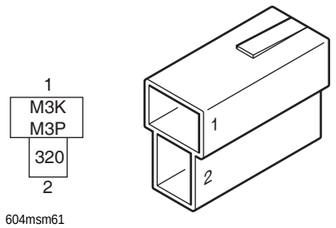
604msm59

Wire markers	2	J19	Ending	
C 314	1	RH dipped light	E3A	
M M3E	1	RH light earth	E3C	
R 315	1	RH headlight	E3B	



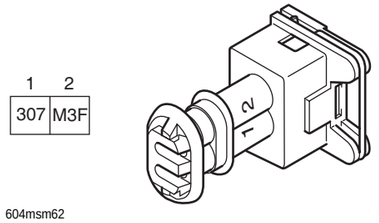
604msm60

Wire markers	2	J22	Ending	
1 M3K	1	FR windscr. washer pump earth	E0A	
1 M3P	1	RR windscr. washer pump earth	J200	1
2 320	1	Front windscreen washer pump	P02	H



604msm61

Wire markers	2	J31	Ending	
1 307	1	Engine water temperature	P02	K
2 M3F	1	Engine water temp. earth	P02	T



604msm62

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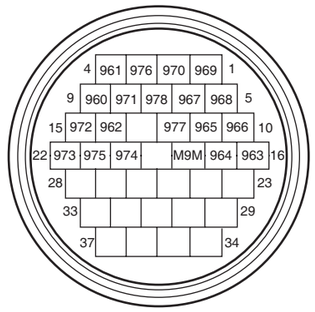
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9/1a - TCE 15/25/35 Harness

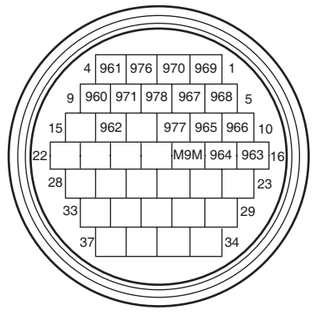
	Wire markers	2	P69	Ending	
1	969	0,6	+ VRef. rear position	J73	3
2	970	0,6	RR position signal	J73	2
3	976	0,6	V - rear position.	J79	1
4	961	0,75	V - down valve	J72	1
5	968	0,6	+ VRef. LH force	J75	3
6	967	0,6	Left draft signal	J75	2
7	978	0,6	V - rear LH force.	J74	1
8	971	0,75	V + lower valve	J72	2
9	960	0,75	V + lift valve	J76	1
10	966	0,6	+ VRef. RH force	J74	3
11	965	0,6	Right draft signal	J74	2
12	977	0,6	V - rear RH force.	J73	1
13	---	---	---		
14	962	0,75	V + lift valve	J76	2
15	972*	0,75	V + 1/2 lower valve	J77	1
16	963	0,6	+ APC radar (D + relayed)	J79	3
17	964	0,6	Radar signal	J79	2
18	M9M	0,6	Radar earth	J79	1
19	---	---	---		
20	974*	0,75	V + 1/2 lower valve	J77	2
21	975*	0,75	V + 1/2 rise valve	J78	2
22	973*	0,75	V - upwards valve 1/2	J78	1
23	---	---	---		
24	---	---	---		
25	---	---	---		
26	---	---	---		
27	---	---	---		
28	---	---	---		
29	---	---	---		
30	---	---	---		
31	---	---	---		
32	---	---	---		
33	---	---	---		
34	---	---	---		
35	---	---	---		
36	---	---	---		
37	---	---	---		

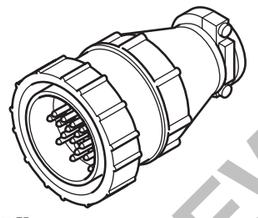
* TCE 35 only.

TCE 35 without DEH



TCE 15/25 without DEH





604msm7P

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Presentation

Access to the software version installed (TCE 15, TCE 25)

To obtain the information:
- Turn the ignition.
- Simultaneously press on the keys ↑ and ↓.
  The software is composed of two steps, e.g. 0/12.
  The two numbers continuously scroll.



G2-03

Lift application conditions

Upon tractor start-up, when the safety indicator is on, perform several actions in order to reset lifting:
- Place the switch in "Operating" position then immediately after in "Stop" position.
- Wait for two seconds for the central unit to unlock.

Error codes
System failures may appear in error code form. It is displayed on the screen with the "EN" indication followed by the code No.

Code	Definition	Flashing
0	Battery voltage	Quick
2	Left draft sensor	Slow
3	Right draft sensor	Slow
7	TCE position outlet towards Drivetronic	Slow
8	5-position selctor potentiometer	
9	Lift position sensor	Quick
10	Lift solenoid in SC or OC	Quick
11	Lower solenoid in SC or OC	Quick
12	Semi-mounted plough sensor	Slow
13	EVP rise of semi-mounted plough	Slow
14	EVP descent of semi-mounted plough	Slow
16	Diagnostic lamp in OC	
18	No data on CAN bus	Slow

SC short circuit - OC open circuit

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Functions

Front axle

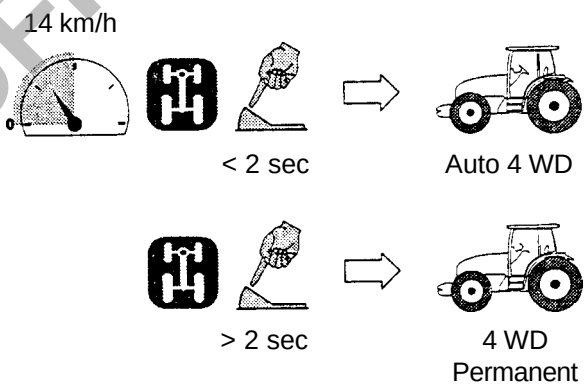
Control of the front axle
The control of the front axle is located on the RH console in cab (A Fig. 31), on a plate also containing the differential control and the displays of both devices.



G3-031 Fig. 31

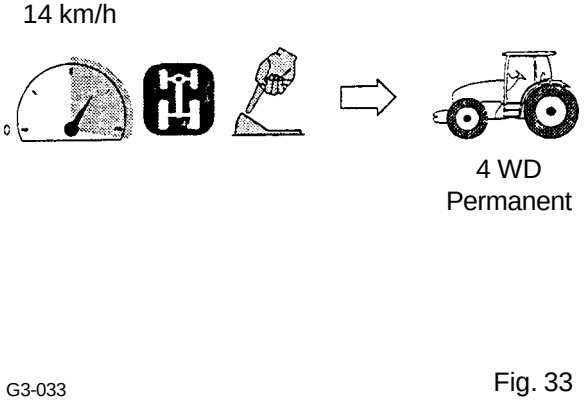
Engaging of the front axle
When actuating the switch in cab, the front axle is engaged. Several modes are possible (Fig. 32):

Below 14 km/h:
- a quick press of the control (< 2 sec), engaging with **electronic management,**
- a sustained press of the control (> 2 sec), permanent engaging, no management.



G3-032 Fig. 32

Above 14 km/h:
- a press of the control, permanent engaging, no management (Fig. 33).



G3-033 Fig. 33

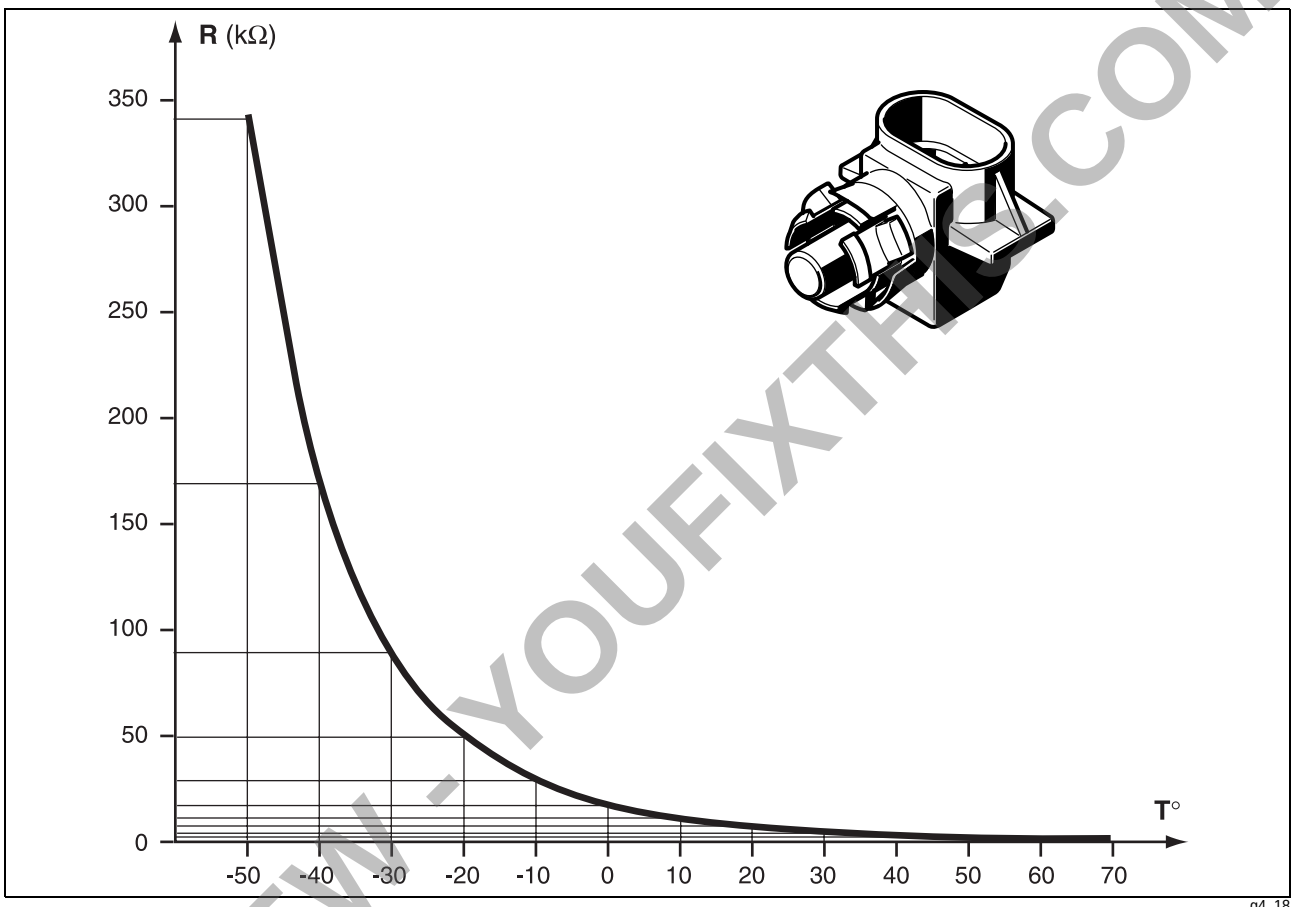
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Removal / installation - Electric checks

Outside air temperature sensor

It is composed of a material whose electrical resistance varies with the temperature.
Measuring capacity : – 40 to + 70 °C.
Resistance tolerance: ± 1 %.



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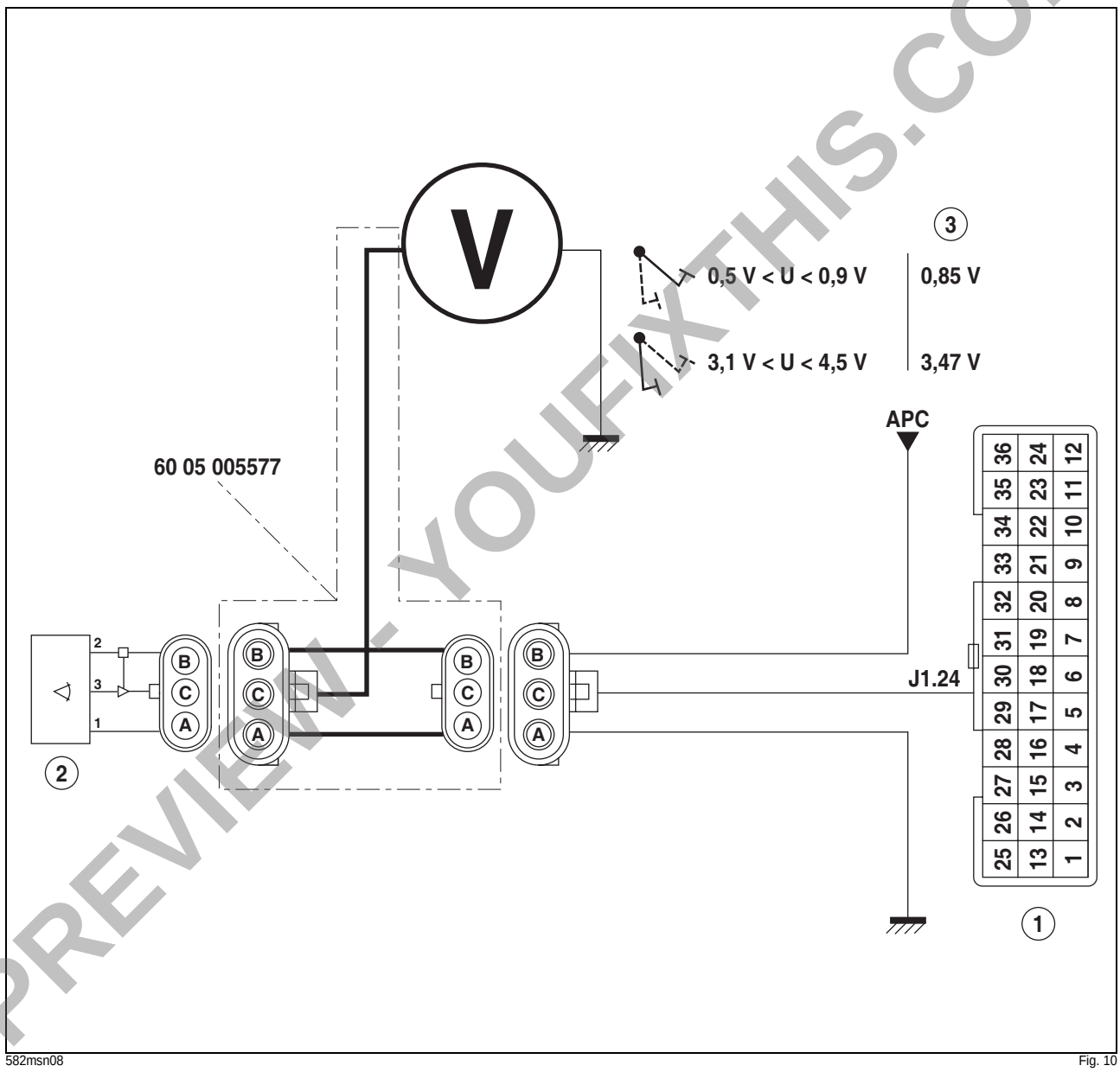
Adjusting the accelerator detector

Hall effect detector.

Adjustment

Output voltage measurement: Contact on.

Using the wiring n° 60 05 005 577 measure the voltage of the "cursor".



582msn08 Fig. 10

Description

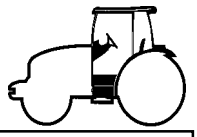
1 Engine control unit.
2 Accelerator detector.
3 Values measured on a tractor.

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FULL REMOVAL OF THE CAB

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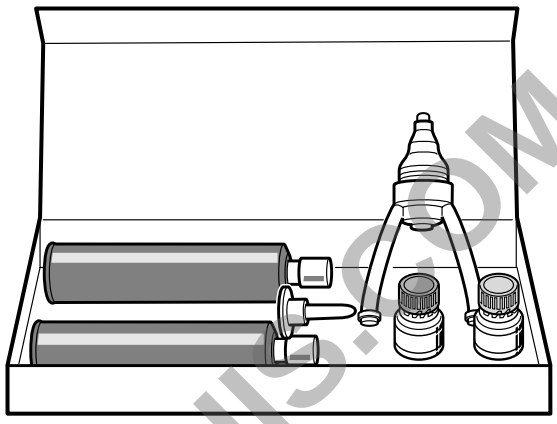
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Preparation of the bonding two-component product

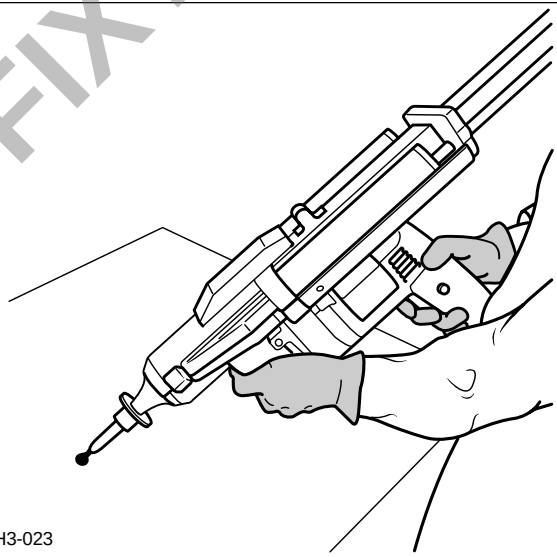
BEWARE of the validity date!

- If the temperature is low (below 15 °C), heat the cartridges to improve the fluidity (water bath or hot air blower).
- Release the (red) retaining steady of the agent cartridges.
- Connect the plug to the 200 V electric network.
- Press the trigger and position the pushers in rear position (see BETAGUN manual).
- Position the cartridges in the housings of the spray gun and close the spray gun casing.
- Cut the guide tape of the V-nozzle, screw the nozzle on the spray gun.



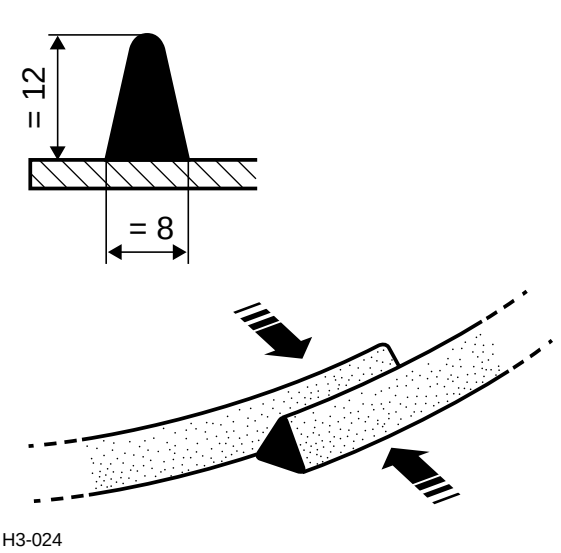
H3-022

- Press the trigger to move forwards the 2 products that are mixed in the nozzle.
- Lay down a volume, equivalent to a nut, of product on a piece of paper (drying indicator).
- Position the indicator in the cab.



H3-023

- Perform a displacement test around the windscreen so as to check that nothing hinders the operation, in order to make a continuous glue deposit.
- Apply the glue, at the center of the black edge, adjusting the displacement and extrusion speeds to obtain a triangular and regular deposit, according to the drawing.
- A triangular layer makes the position of the windscreen easier.
- Carry out the junction rejoining the layers as shown by the opposite figure.



H3-024

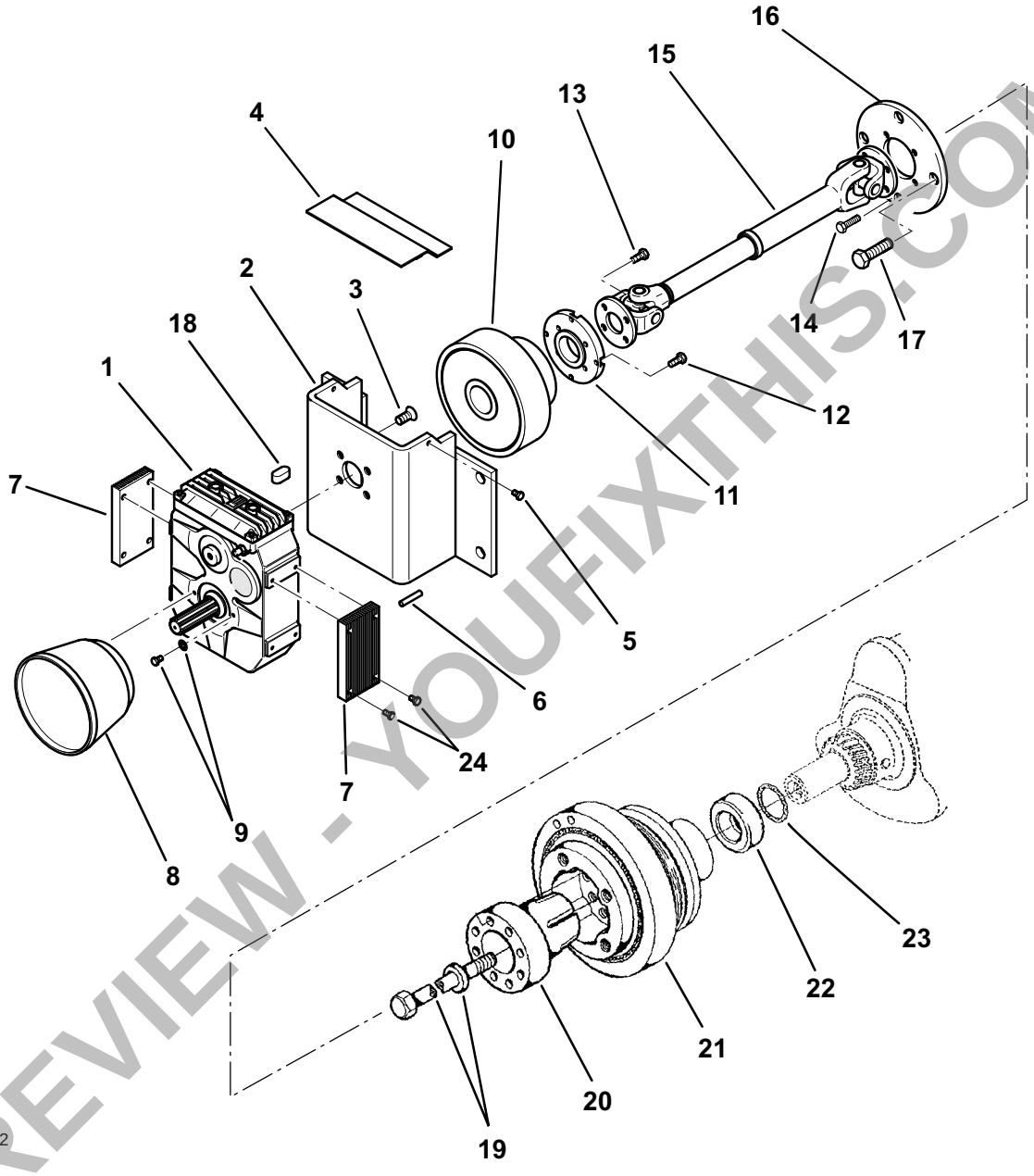
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Front PTO

Removal / installation

Note: No intervention is required inside the housing.



Description

(1) Drop box
(2) Support
(3) Bolt
(4) Guard
(5) Bolt
(6) Stud
(7) Grid
(8) Protector
(9) Bolt
(10) Hydraulic clutch
(11) Flange
(12) Bolt
(13) Bolt
(14) Bolt
(15) Universal joint shaft
(16) Flange
(17) Bolt
(18) Hollow key
(19) Bolts + washers
(20) Hub
(21) Coupling pulley
(22) Bush
(23) Seal

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