Sect. 2-Tractor identification & technical specifications

2-1 Tractor identification

The tractor is identified by a serial number stamped on the rear part of the transmission housing and on the bonnet. Each engine has a serial number of its own, stamped on the engine block.

To ensure a quick and efficient service when ordering spare parts or asking for technical specifications or other information, always state the chassis and engine serial numbers.

Engine serial number .....

Chassis serial number .....

Type of tractor .....

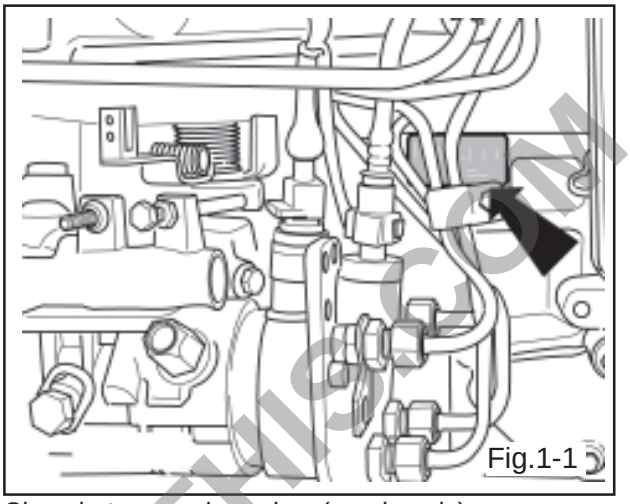
Owner / Operator .....

Dealer's or Agent's address .....

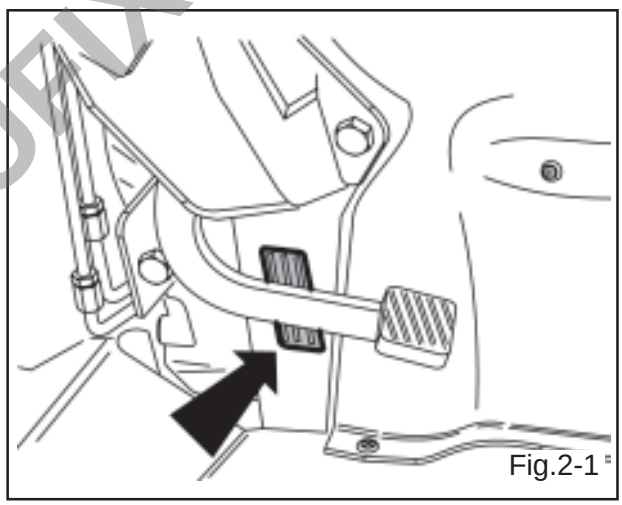
.....

Delivery date .....

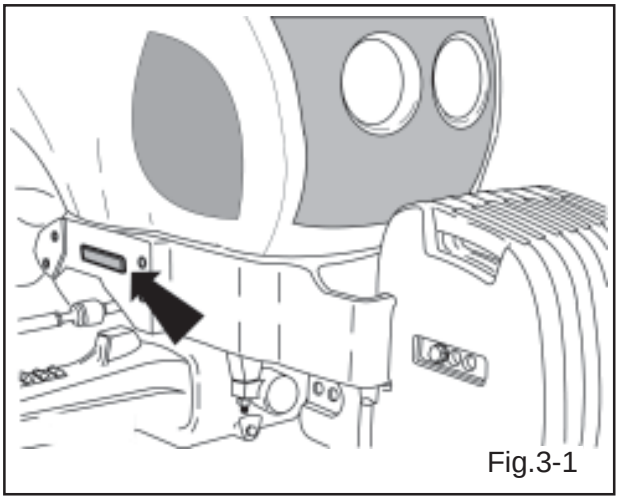
Warranty expiry date .....



Chassis type and number (on chassis).



Chassis type and number - Data plate on platform.



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Driving torques

2-2 Recommended driving torques

Cylinder head
Torque all the screws to **110 Nm** in compliance with the numeric order of Fig.2/3-2.
With the aid of the tool (1) shown in Fig. 4-2 or making a mark on the screws and on the cylinder head, tighten the screws further in compliance with the numeric order and the rotation degrees shown in Fig.5-2.
Screws **marked with the letter (L) must be turned a further 270° and the remaining ones by 225°.**

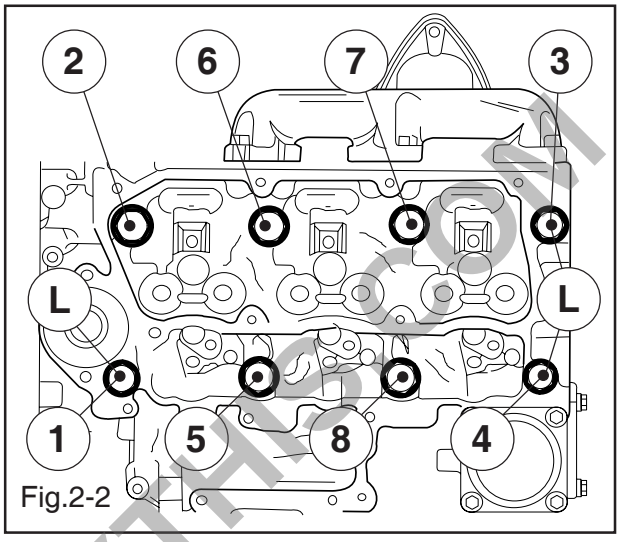


Fig.2-2

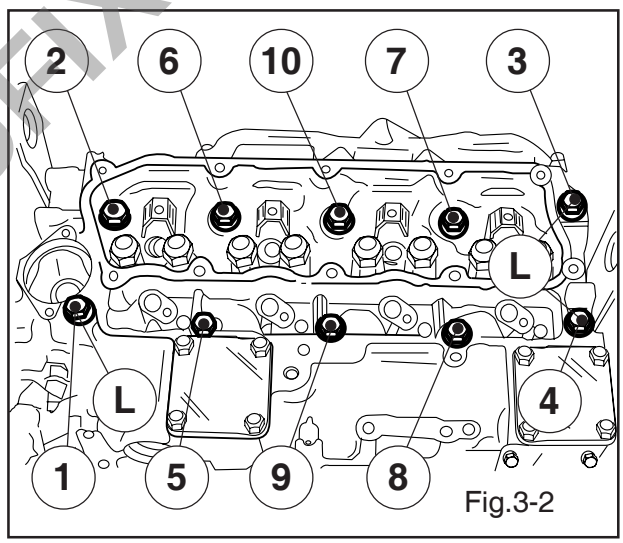


Fig.3-2

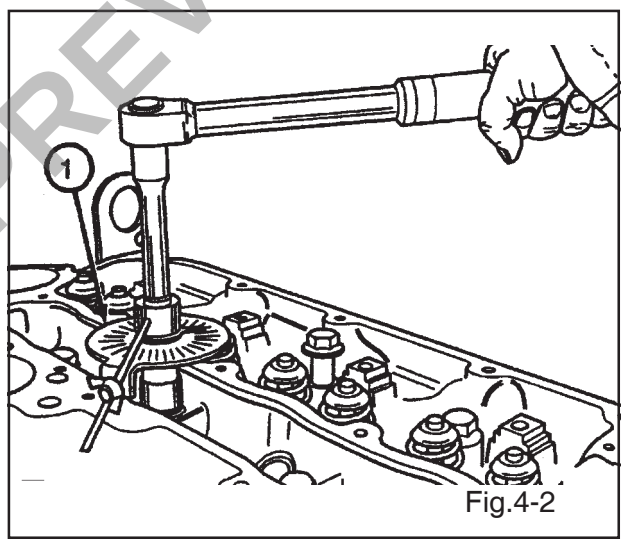


Fig.4-2

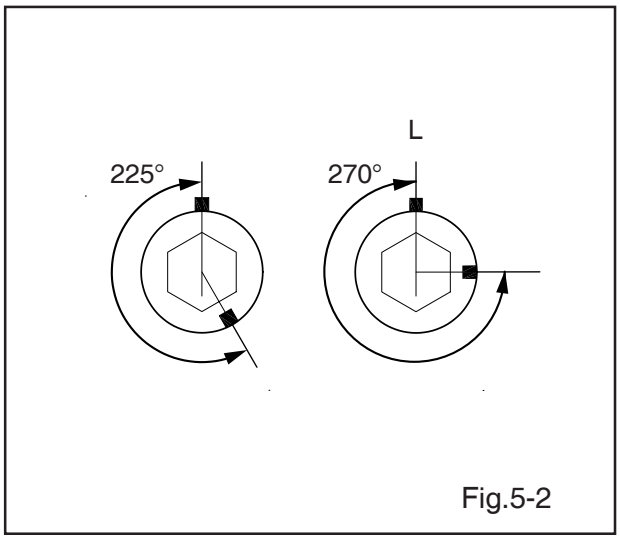


Fig.5-2

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Sect.1 - General description

1-1 Drawing of assembly and components

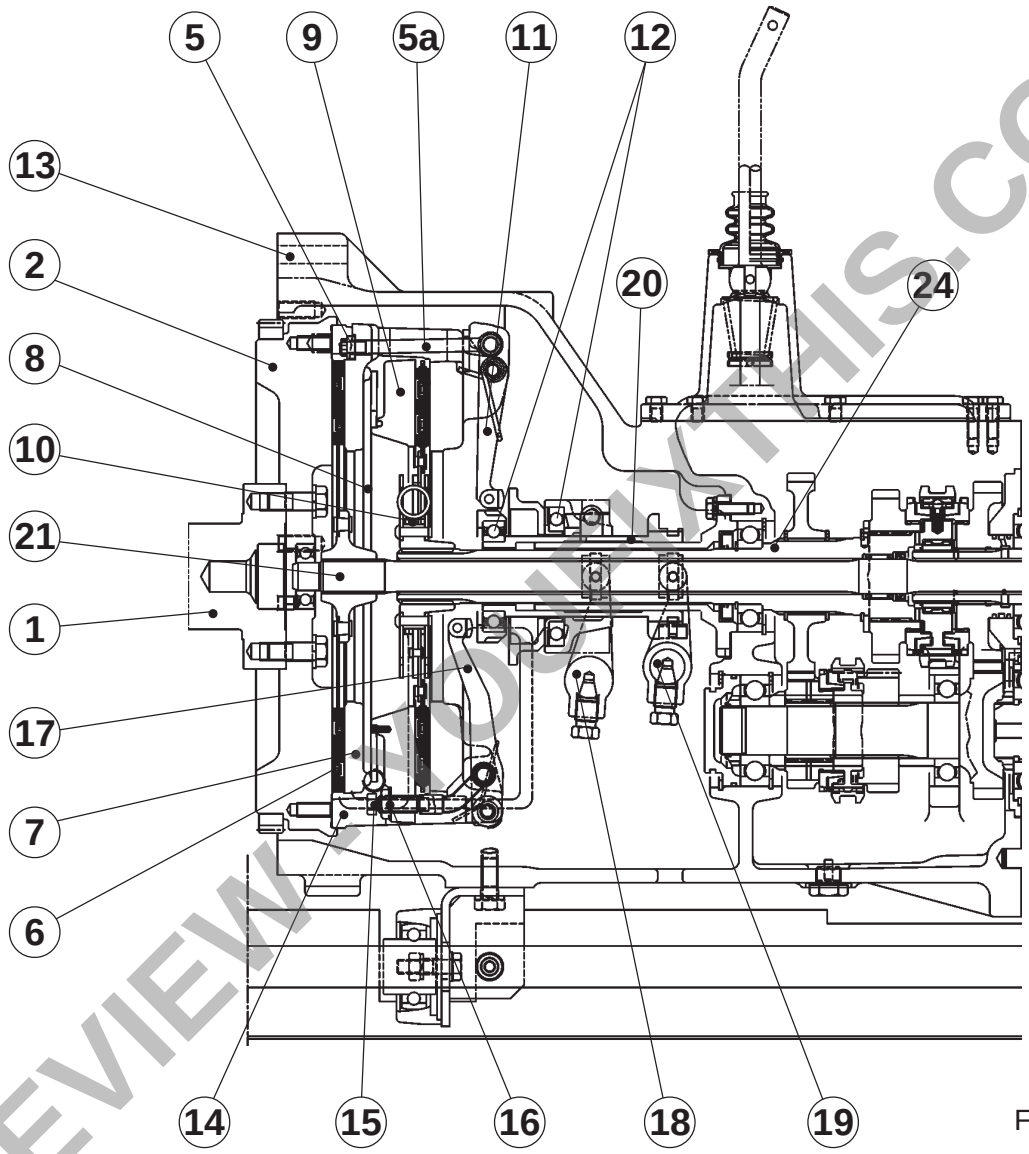


Fig.1-3

1- Drive shaft
2- Flywheel
5- PTO clutch adjuster screw
6- P.T.O. clutch plate
7- P.T.O. clutch pressure plate
8- Belleville washer
9- Main clutch pressure plate
10- Main clutch disc
11- P.T.O. clutch disengaging lever
12- Thrust bearings
13- Engine/gearbox assembly housing
14- Clutch unit
15- Main clutch lever adjuster screw
16- Adjuster screw lock nut
17- Main clutch disengaging lever
18- PTO clutch thrust control fork
19- Main clutch thrust control fork
20- Clutch disengaging collar
21- P.T.O. shaft
24- Gearbox input shaft
25- PTO lever rod

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General description

POWERSHUTTLE ASSEMBLY

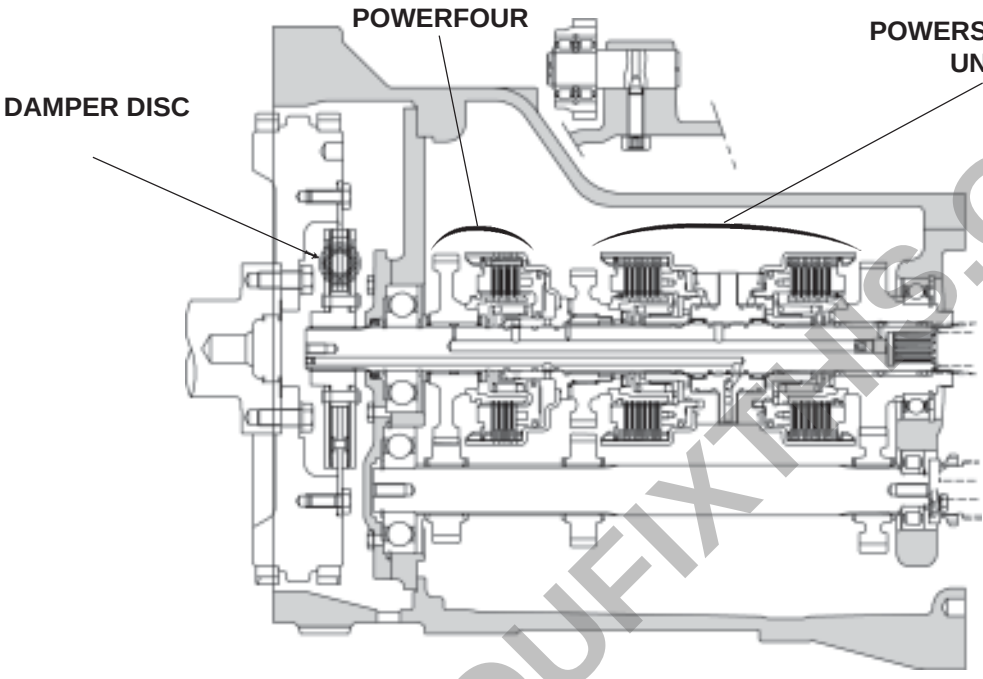


Fig.2-4

REAR TRANSMISSION (VERSION WITH MECHANICAL P.T.O.)

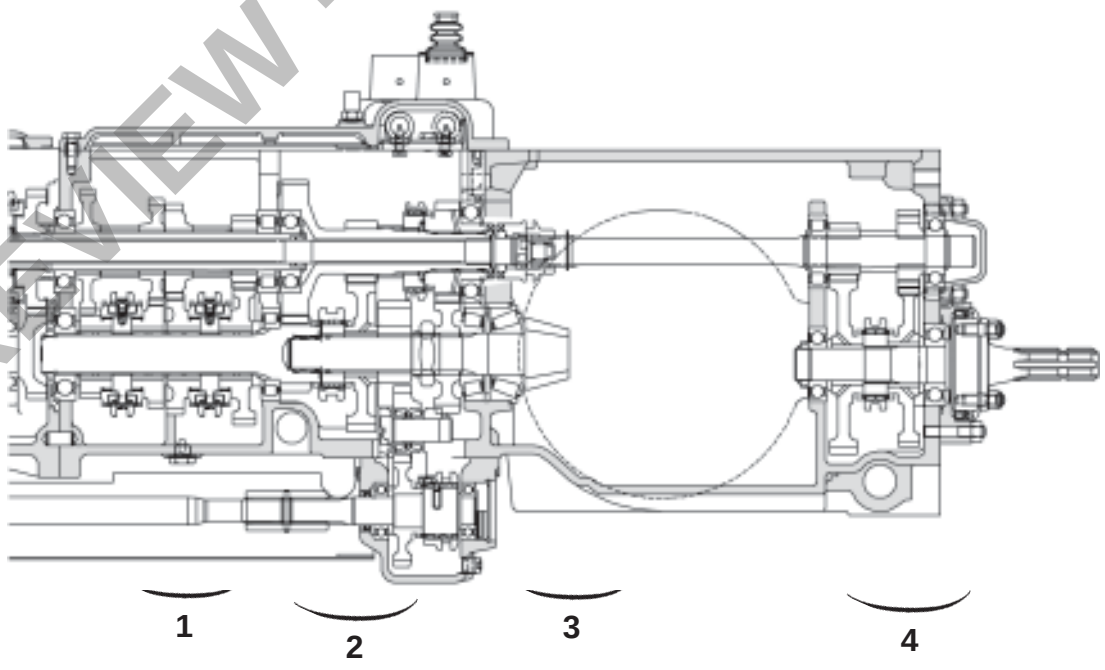


Fig.3-4

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Sect. 1 - General description

1-1 Drawing of assembly

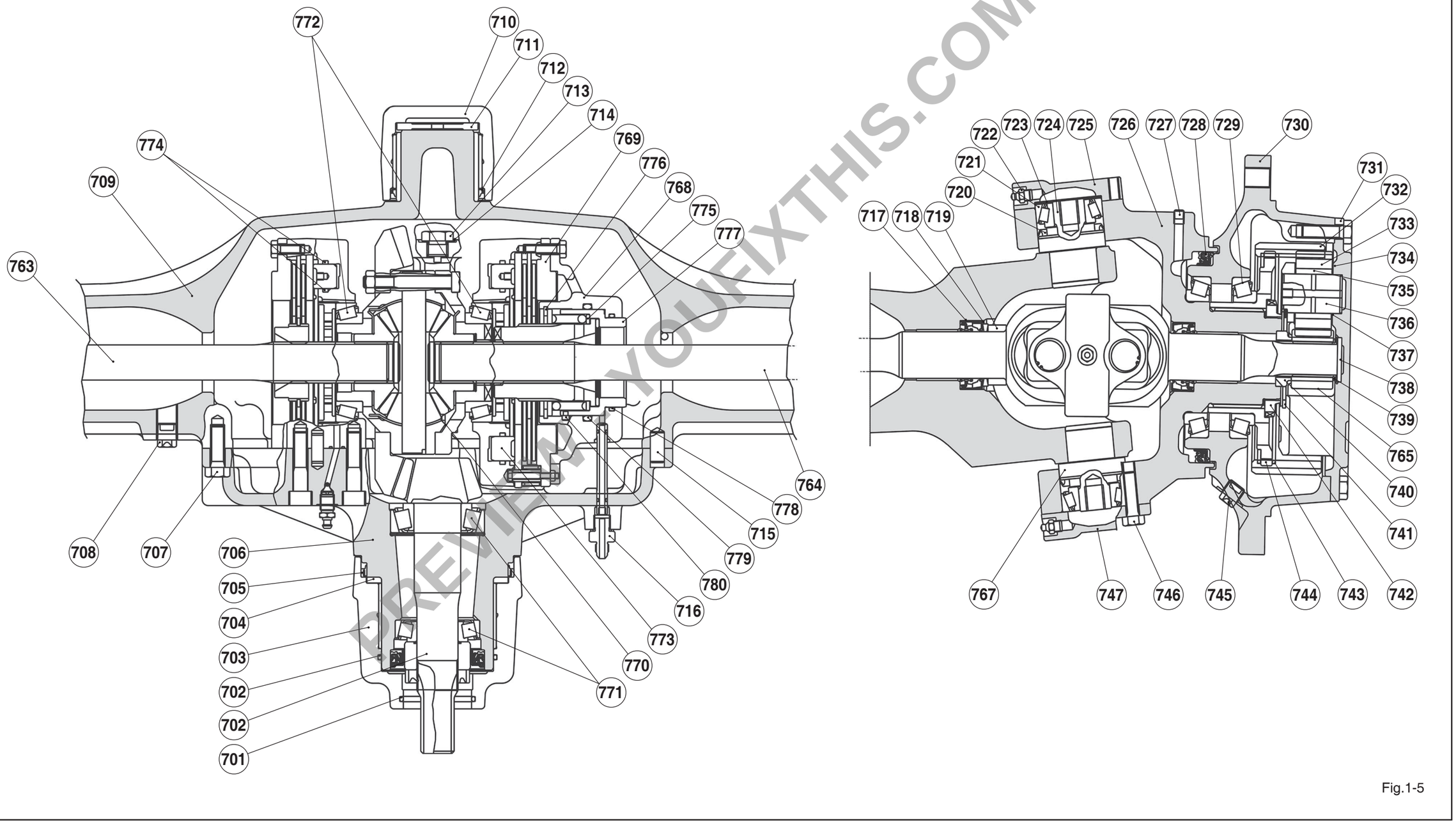


Fig.1-5

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Sect.1 - General description.

1-1 Drawing of assembly and components

POWER FARM 95-105

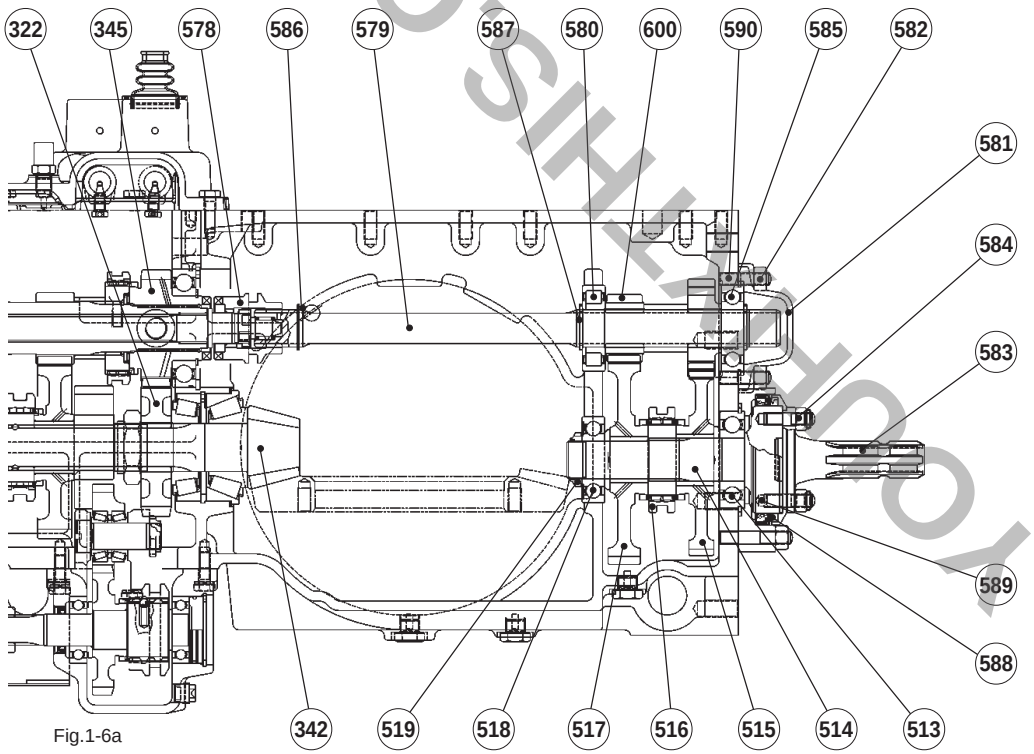


Fig.1-6a

POWER FARM 60-75-85

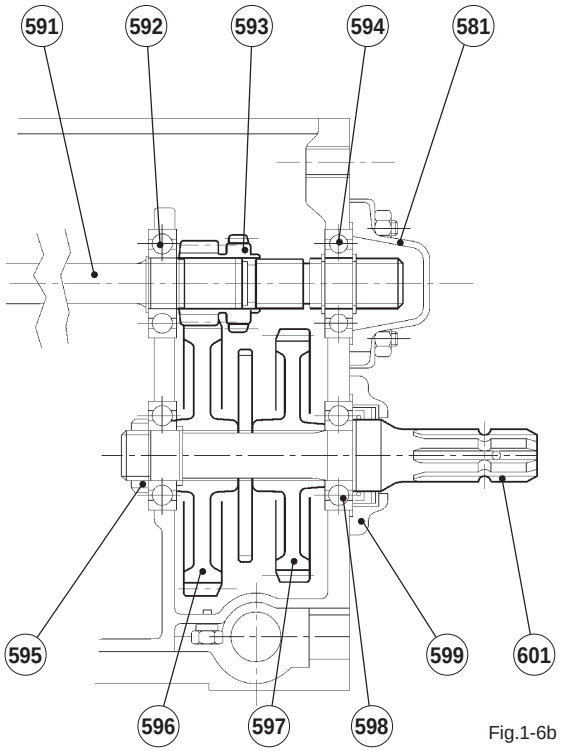


Fig.1-6b

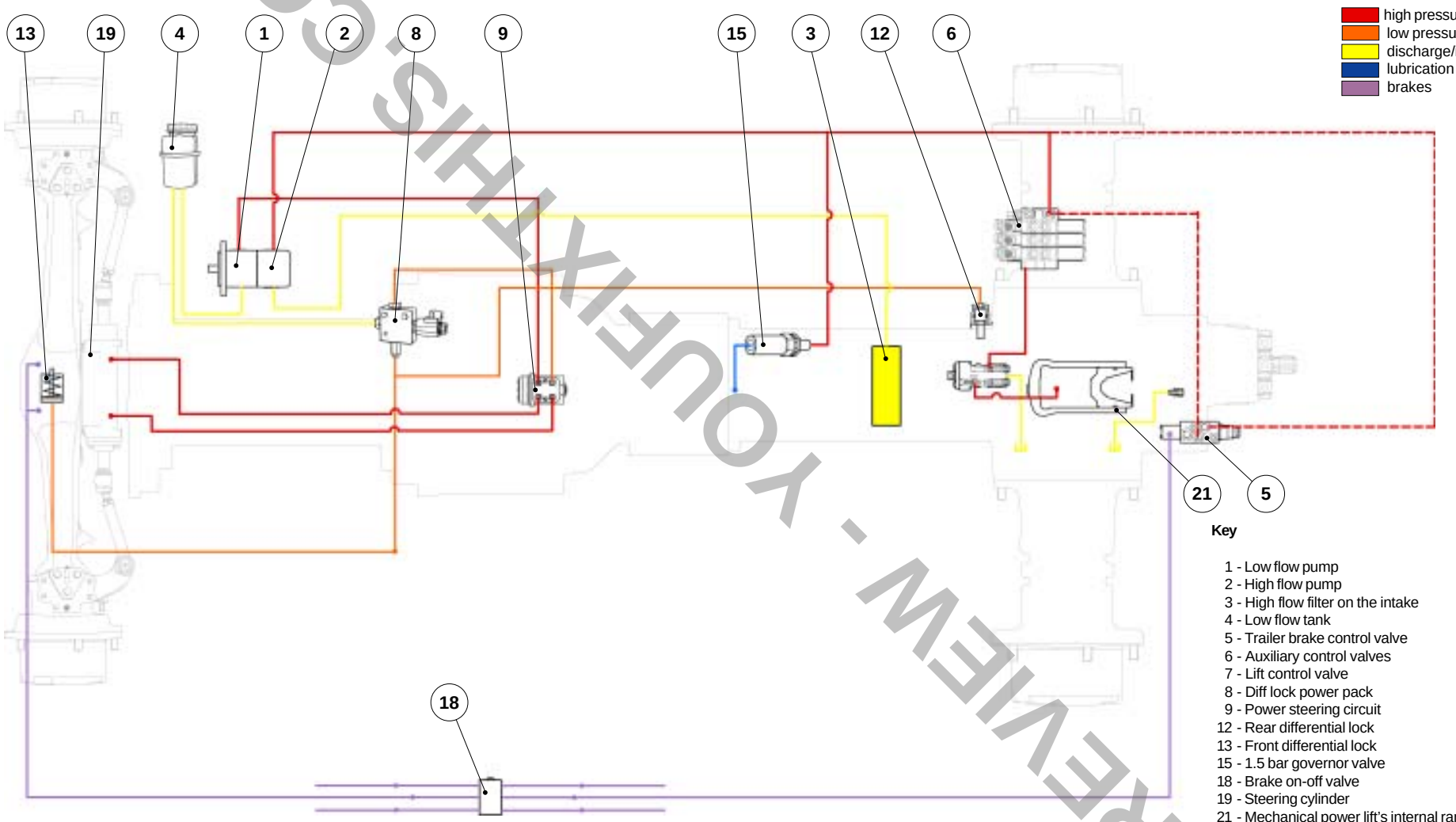
322 - Standard range driven gear
342 - Bevel pinion
345 - Standard range driving gear
513 - Ball bearing
514 - Lower shaft
515 - 1000 RPM driven gear
516 - 540 or 1000 RPM PTO selection sleeve
517 - 540 RPM driven gear
518 - Ball bearing
519 - Ring nut
578 - PTO selection sleeve
579 - PTO rear shaft
580 - Roller bearing
581 - Cover
582 - Cover fixing screw
583 - Interchangeable end
584 - Interchangeable end fixing screw
585 - Ball bearing
586 - Spring ring
587 - Spring ring
588 - Retention ring
589 - O-ring
590 - 1000/540 E PTO gear
591 - Upper PTO shaft
592 - Ball bearing
593 - Sliding double gear
594 - Ball bearing
595 - Ring nut
596 - 540 RPM gear
597 - 540 E/1000 RPM gear
598 - Ball bearing
599 - Cover
600 - 540 PTO gear
601 - PTO lower shaft

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General hydraulic system (Speedfour version)

GENERAL HYDRAULIC SYSTEM



Key

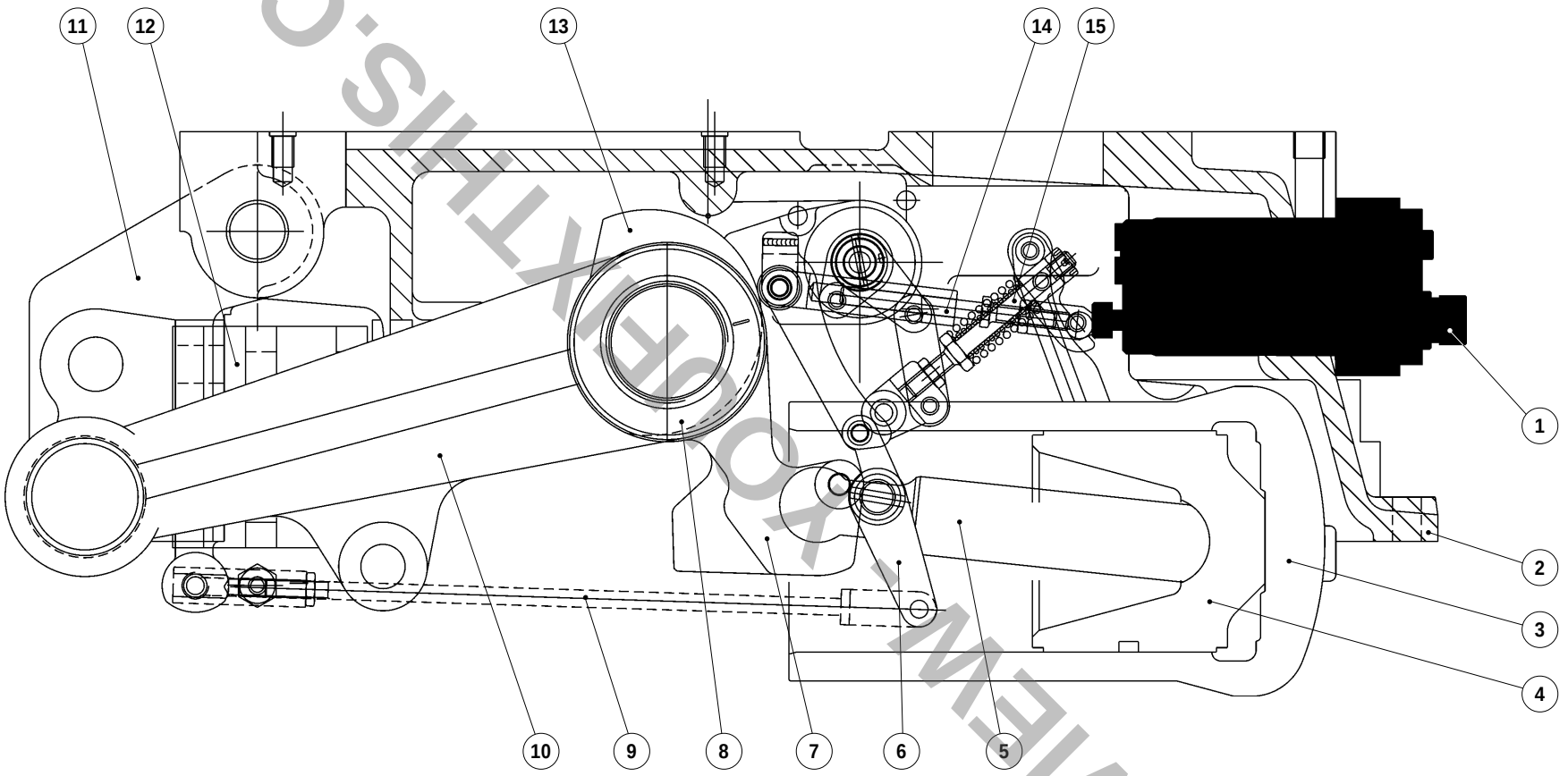
1 - Low flow pump
2 - High flow pump
3 - High flow filter on the intake
4 - Low flow tank
5 - Trailer brake control valve
6 - Auxiliary control valves
7 - Lift control valve
8 - Diff lock power pack
9 - Power steering circuit
12 - Rear differential lock
13 - Front differential lock
15 - 1.5 bar governor valve
18 - Brake on-off valve
19 - Steering cylinder
21 - Mechanical power lift's internal ram

Fig.1-7

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Sect.1 - General description.

1-1 Drawing of assembly and main components of Powerfarm Std



1 - Control valve
2 - Power lift casing
3 - Cylinder
4 - Piston
5 - Link
6 - Draft control lever
7 - Link carrier shaft lever
8 - Link carrier shaft
9 - Outer draft control lever
10 - Power lift link
11 - Swinging support
12 - Spring
13 - Position control cam
14 - End of travel extensible rod
15 - Spring rod

Fig.1-8

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Sect.1
Precautions and Safety Recommendations

Certain precautions and safety recommendations are described in this section. It is important for operators to comply with these instructions in order to prevent accidents. Moreover, always bear in mind the safety measures described in the Operation and Maintenance Manual and in chapter 1 of the training manual.
Carefully comply with the Warnings indicated by means of this symbol:

WARNING : Always consult the instructions in the operation and maintenance manual when working on the battery.

WARNING : Take all the necessary precautions when batteries containing sulphuric acid are installed. If the acid splashes on to the skin or into the eyes, immediately rinse the affected parts under clean running water.

WARNING : When the acid is mixed with water, SLOWLY POUR THE ACID INTO THE WATER, NEVER EVER POUR WATER INTO THE ACID.

WARNING : Explosive gas escapes when batteries are recharged. Work in places where there is good air circulation and keep well away from flames or sparks.

WARNING : Always switch off the charging apparatus before disconnecting the cables.

WARNING : Keep batteries well out of children's reach.

WARNING : Do not smoke when checking or handling batteries.

WARNING : Disconnect the negative terminal first. Connect the positive terminal first when installing the battery again. Always take great care to check the polarity of the terminals.

WARNING : Always disconnect the ground cable (-) of the battery before working on the electrical system.

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Sect.1 - Introduction

1-1 Introduction to calibration

PURPOSE OF CALIBRATION
Calibration allows the tractor to operate in an excellent way in all conditions, guaranteeing:

- smooth, immediate and progressive start-ups:
- acceleration proportional to the load;
- smooth, immediate and progressive direction changes.

WHEN TO CALIBRATE
Calibration is carried out accurately in the production plant and need not be done again, unless one or all the proportional solenoid valves (_YV1, _YV2, _YV5 Fig.2-10) of the electronic control unit C (Fig.3-10) are replaced.

HOW TO CALIBRATE
Use the buttons (_SB3/_SB2 Fig.1-10) on the gear-shift lever to operate the processor in the electronic control unit (C Fig.3-10), which finds and synchronizes the times required for the hydraulic clutch assemblies to engage (Main and Secondary and Powerfarm engaging/disengaging clutch Fig.4-10) and optimizes the settings to allow the tractor to operate correctly.

WHICH CALIBRATIONS
C3: Clutch pedal calibration.
C4: Secondary clutch limit setting.
C5: Main clutch limit setting.
C6: Powerfour clutch limit setting.

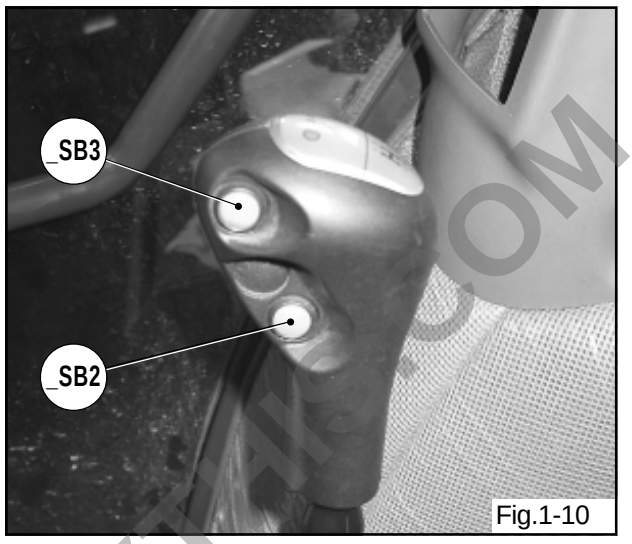


Fig.1-10

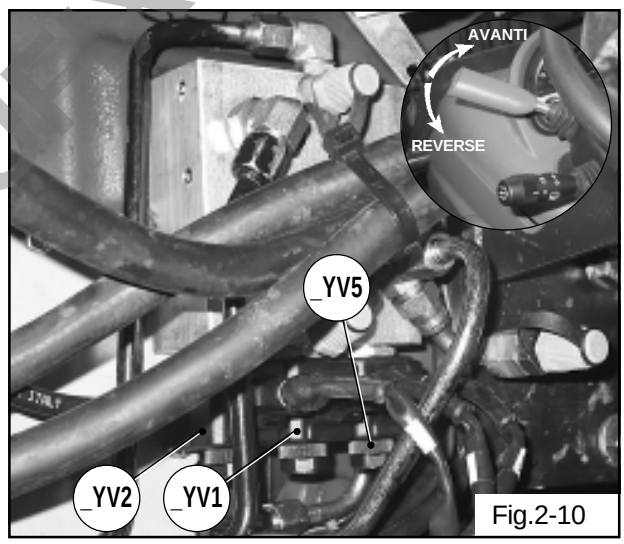


Fig.2-10

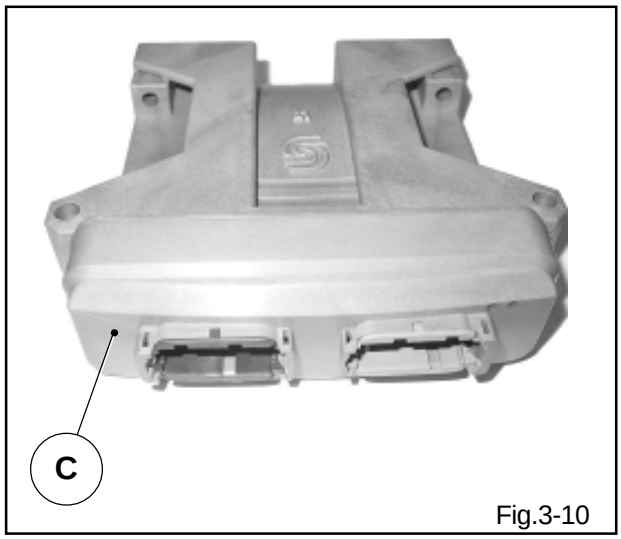


Fig.3-10

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Alarm codes

2-2 Alarm code autodiagnosis

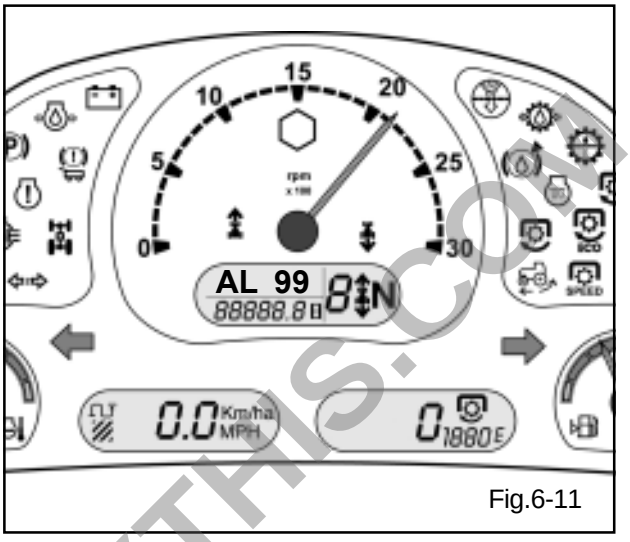


Fig.6-11

Alarm code (99)

FINAL COMPONENT CONCERNED
Electronic control unit

CAUSE
Short-circuit/open circuit in the control unit.

TERMINALS INVOLVED
PIN 8 of terminal board C14.

REMEDY
Replace the electronic control unit (C).

The clutch assemblies that engage the “Powershuttle” unit must be calibrated if the electronic control unit is replaced.
The control unit (_C) is installed in the dashboard cover, just under the instrument (Fig.8-11). It can be accessed by removing the dashboard’s protective covering and the instrument.
It is connected to the dashboard line by the 12-pin connectors (C14 and C15 Fig.8-11).

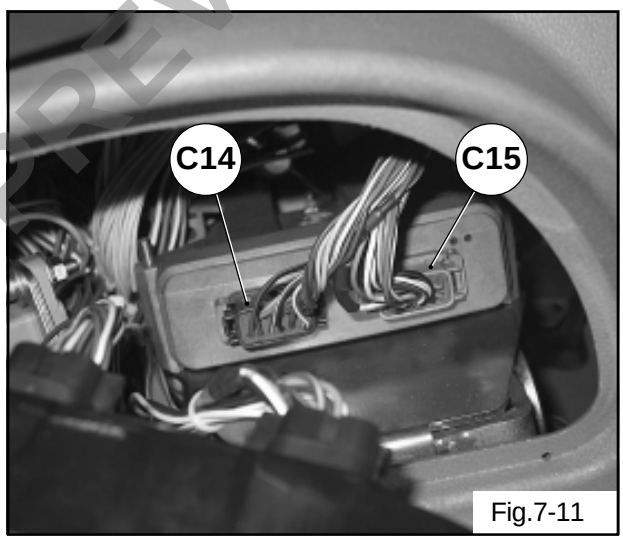


Fig.7-11

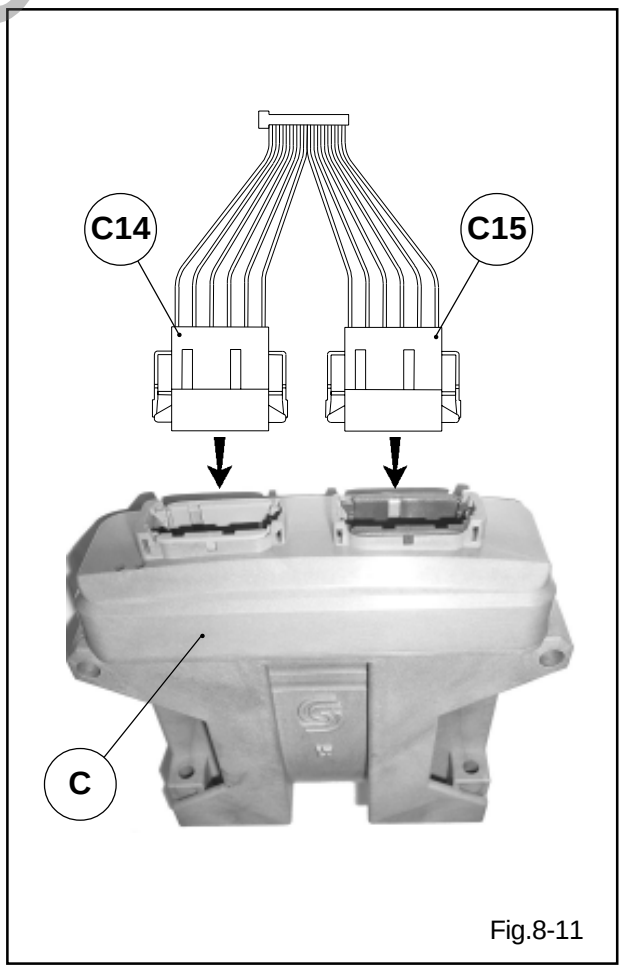


Fig.8-11

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General description

EXPERIMENT

The experiment begins by placing water in a freezer to form ice, i.e. so that it solidifies.
Now transfer the block of ice to the vessel, place the thermometer bulb in contact with the ice and place everything over the flame (Fig.6-12 a-b).
At the beginning of the experiment, the thermometer will indicate the temperature of ice as taken from the freezer, e.g.: -10°C.
As time goes by, you will note that the heat will cause the temperature of the ice to progressively rise to -9°C, -8°C, etc., until it reaches 0°C.
Drops of liquid water will now begin to form on the surface of the ice (Fig.6-12 c): the ice has begun to melt and this process will continue (Fig.6-10 d) until the solid phase disappears and the water is all in the liquid state (Fig.6-12 e).
If you watch the thermometer, you will note that the temperature indicated will remain at 0°C all through the ice melting phase.
If you continue to administer heat, maintaining the thermometer bulb immersed in the water, you will note that the temperature progressively increases (Fig.6-12 f) until the following phenomena occur at the same time (Fig.6-12 g):

- the thermometer indicates 100°C
- turbulent movement occurs in the water, with separation of a great quantity of steam.

Boiling or water evaporation has begun.
This phenomenon will continue for as long as a trace of water remains.

During this period of time (from the beginning of evaporation to the end) and if the thermometer bulb is kept in continuous contact with the boiling liquid, the temperature indicated will have remained at 100°C.

If the steam that has developed is collected in a suitable vessel (Fig.6-12 h) and heat continues to be administered, the liquid will completely disappear (Fig.6-12 i), after which the temperature of the steam will progressively increase above 100°C (Fig.6-12 l).

Graph in Fig.5-12 represents the successive phases of the experiment.

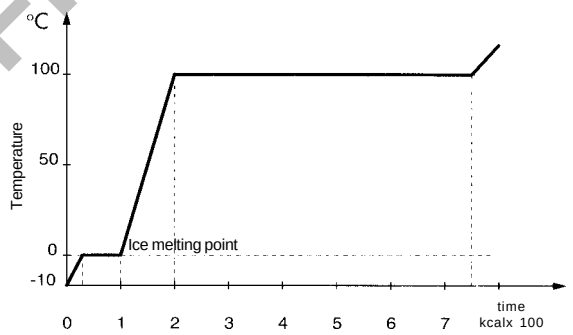


Fig.5-12

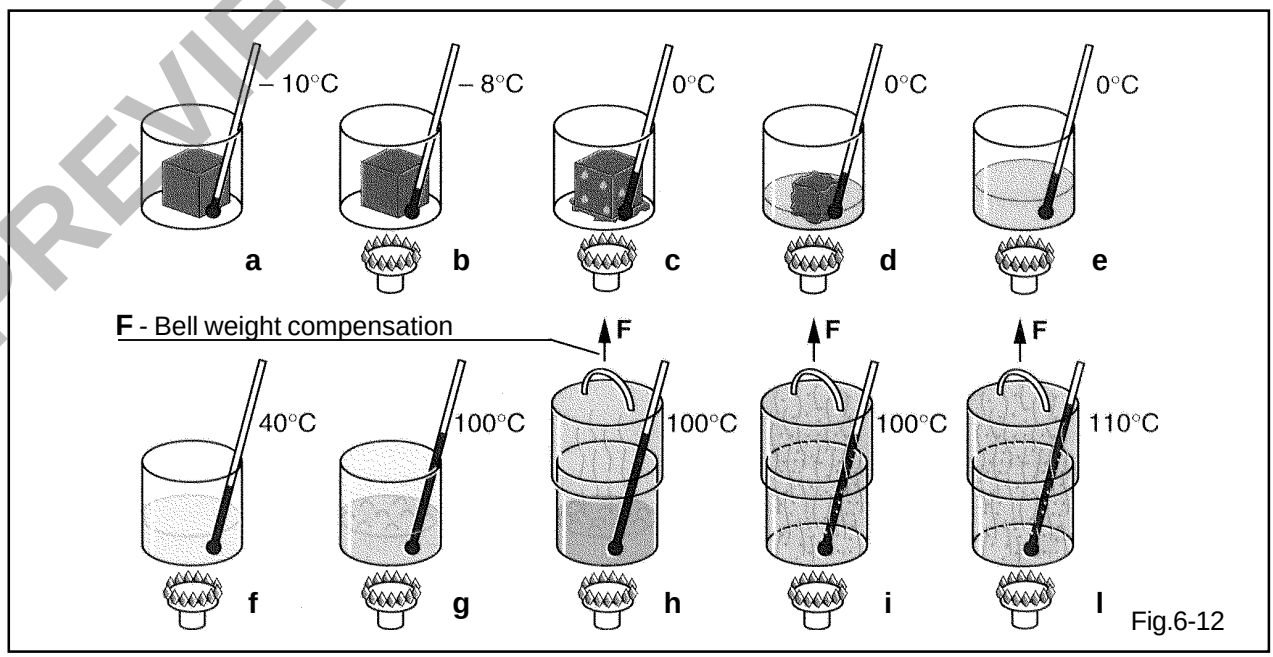
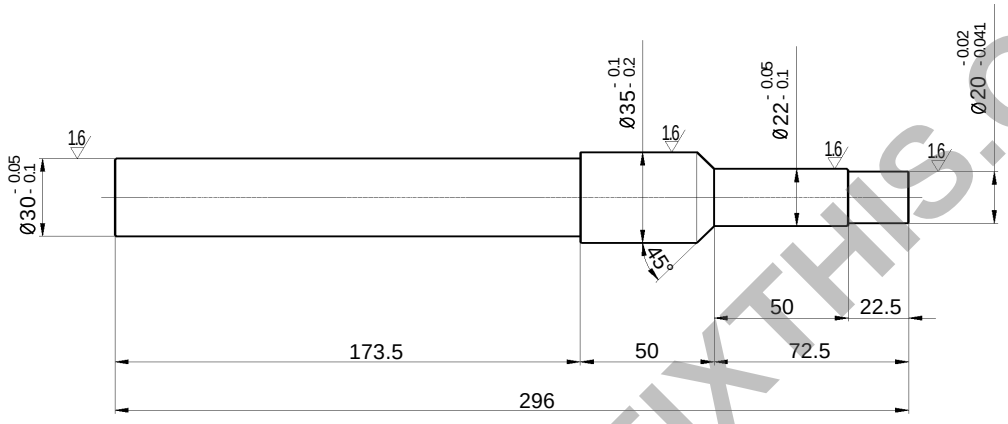


Fig.6-12

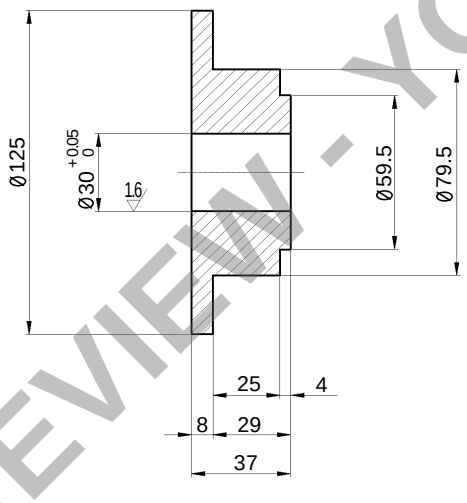
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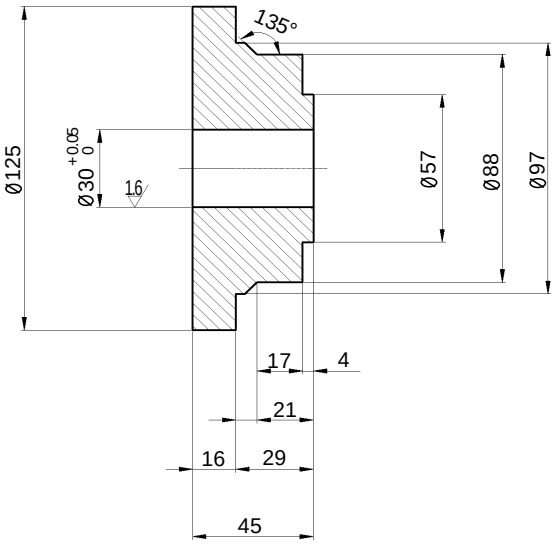
01 FRI REX



12″



11″



01 FRI REX	Clutch plate centering pin and lever height check
Quantity: **1**	Material : Anticorodal aluminium UNI 3571
Notes:	

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CHAP. 1

CONTENTS

Sect. 1 How to consult the manual. 1-3
1-1 Introduction 1-4
1-2 Structure of the manual 1-4

Sect. 2 Tractor identification and technical specifications. 1-5
2-1 Tractor identification 1-6
2-2 Weights and dimensions 1-7
2-3 Engine specifications 1-10
2-4 Clutch specifications 1-11
2-5 Transmission specifications 1-11
2-6 Power take-off specifications 1-21
2-7 2 WD axle 1-24
2-8 4WD front axle specifications 1-25
2-9 Hydraulic circuit specifications 1-26
2-10 High Clearance tractor specifications 1-30

Sect. 3 Working in safety. 1-35
3-1 Essential rules for accident prevention 1-36
3-2 Safety decals 1-40
3-3 Replacement of tractor parts 1-43
3-4 Safe use of the tractor 1-43

Sect. 4 Pre-delivery inspection and maintenance. 1-48
4-1 General information 1-49
4-2 Pre-delivery inspections 1-49
4-3 Periodical maintenance table 1-50

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Sect. 3 - Engine timing

3-1 Introduction

To ensure that 1100 Series engines have an accurate timing system, they are timed by means of pins (A)(Fig.6-2).
This ensures that piston N° 1 is at top dead center (TDC) in the compression stroke.
To achieve the correct fuel injection able to meet the requirements of the anti-pollution standards in force, the more recent injection pumps operate with a static advance near to TDC.
It is very important for the fuel injection to be accurately timed in compliance with the current standards governing emissions. Comply with the instructions described in Procedure 3-2 to reach TDC on the compression stroke of cylinder N° 1.

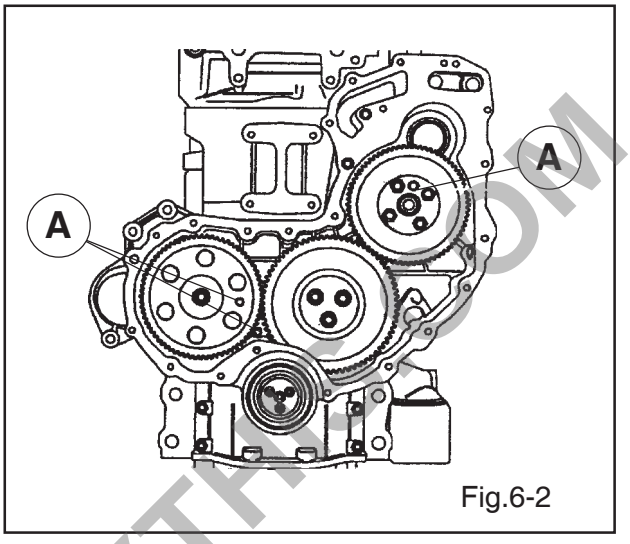


Fig.6-2

Warning: the injection pump has a locking screw (**1**)(Fig.7/9-2) which blocks the shaft.
It is important to slacken off the lock bolt and for the pump shaft to freely turn.
The pump drive shaft must nut be turned without the spacer (**2**) (Fig.7/9-2) mounted under the lock bolt. The drive shaft would be damaged if it were to be turned with the lock bolt toghtened on it.

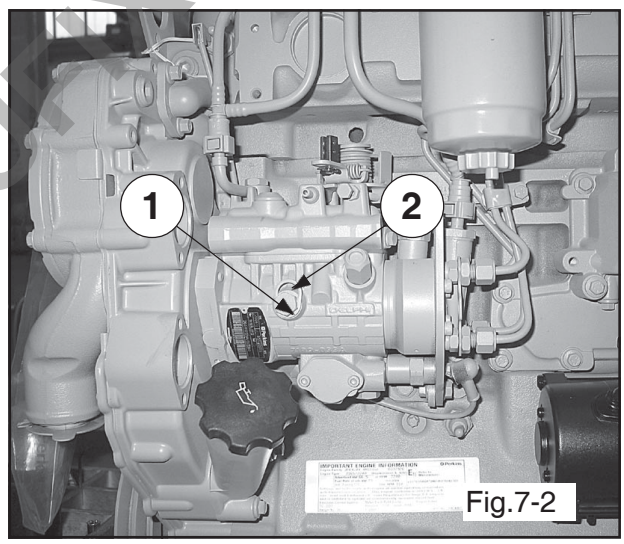


Fig.7-2

More recent injection pumps are equipped with a hub (**3**) (Fig.8-2) **permanently mounted** on the control shaft.
The manufacturer mounts the hub on the pump to ensure very accurate timing. Engines with this configuration are equipped with a driving gear fixed to the hub and not to the pump shaft. A plug (**4**) (17 Fig.8-2) is used to accurately time these pumps when serviced.

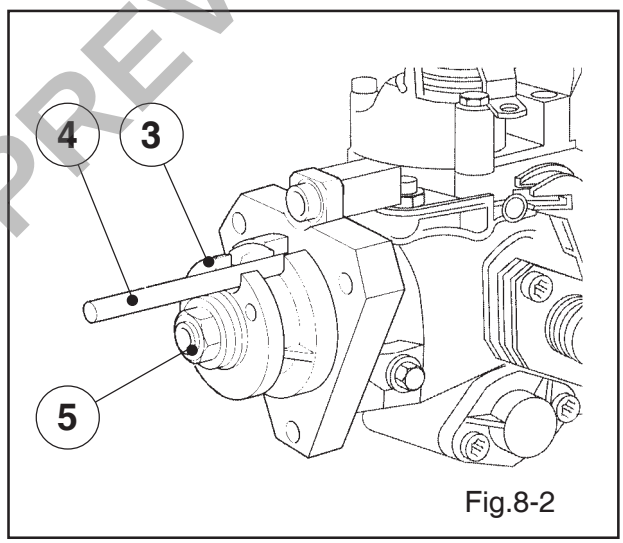


Fig.8-2

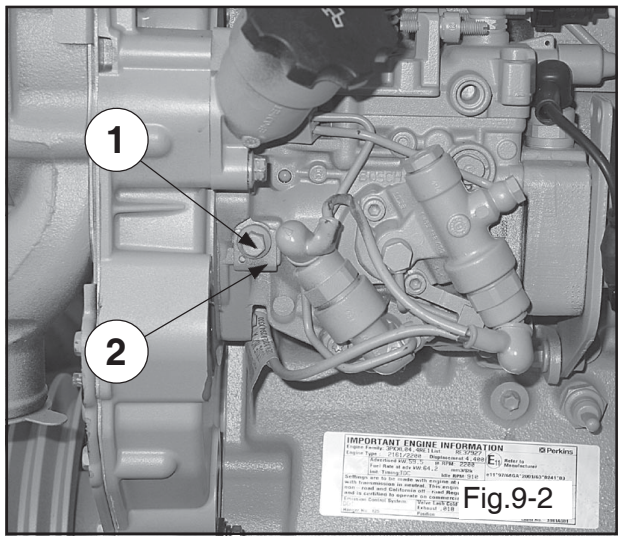


Fig.9-2

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Gearbox

TRANSMISSION SHAFT REMOVAL

- remove the ring nut (133) with the aid of tool **31 DIF LG**;

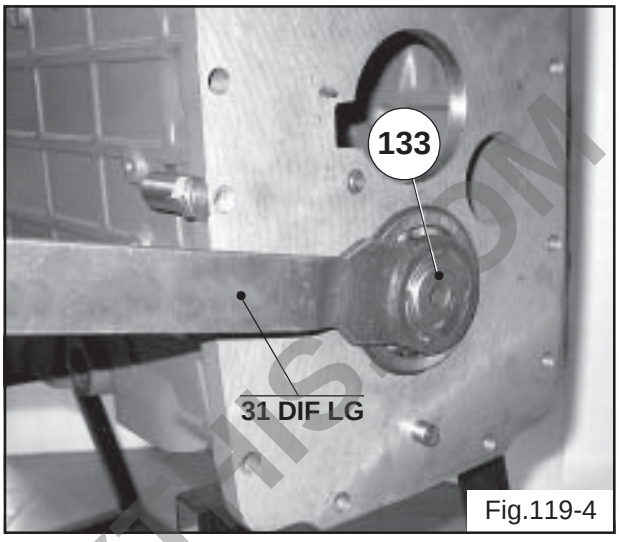


Fig.119-4

- remove the shaft (123) from the rear side.

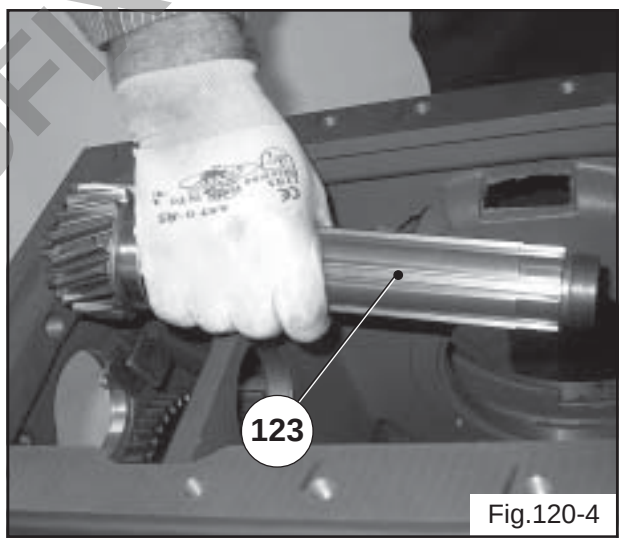


Fig.120-4

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Guide lines for disassembly, re-assembly and adjustment

3 - HOW TO OBTAIN THE PLAY BETWEEN THE PINION RING GEAR TEETH AND THE PRE-LOAD FOR THE DIFFERENTIAL BEARINGS

Turn the ring nut (H) with the aid of tool **03 DT MYT** in order to obtain the required play between the pinion-ring gear teeth (**0.20-0.30 mm**) measured in 4 points at 90° to each other.

Use the ring nut (I) to take up the float between the cones and cups of the bearings (L).
Turn the ring nut again until a total rotation movement of **32 to 35 Nm** measured on the bevel pinion is obtained, inclusive of the resistance from the retention ring.
Make 1+1 opposed caulks to lock the ring nuts.

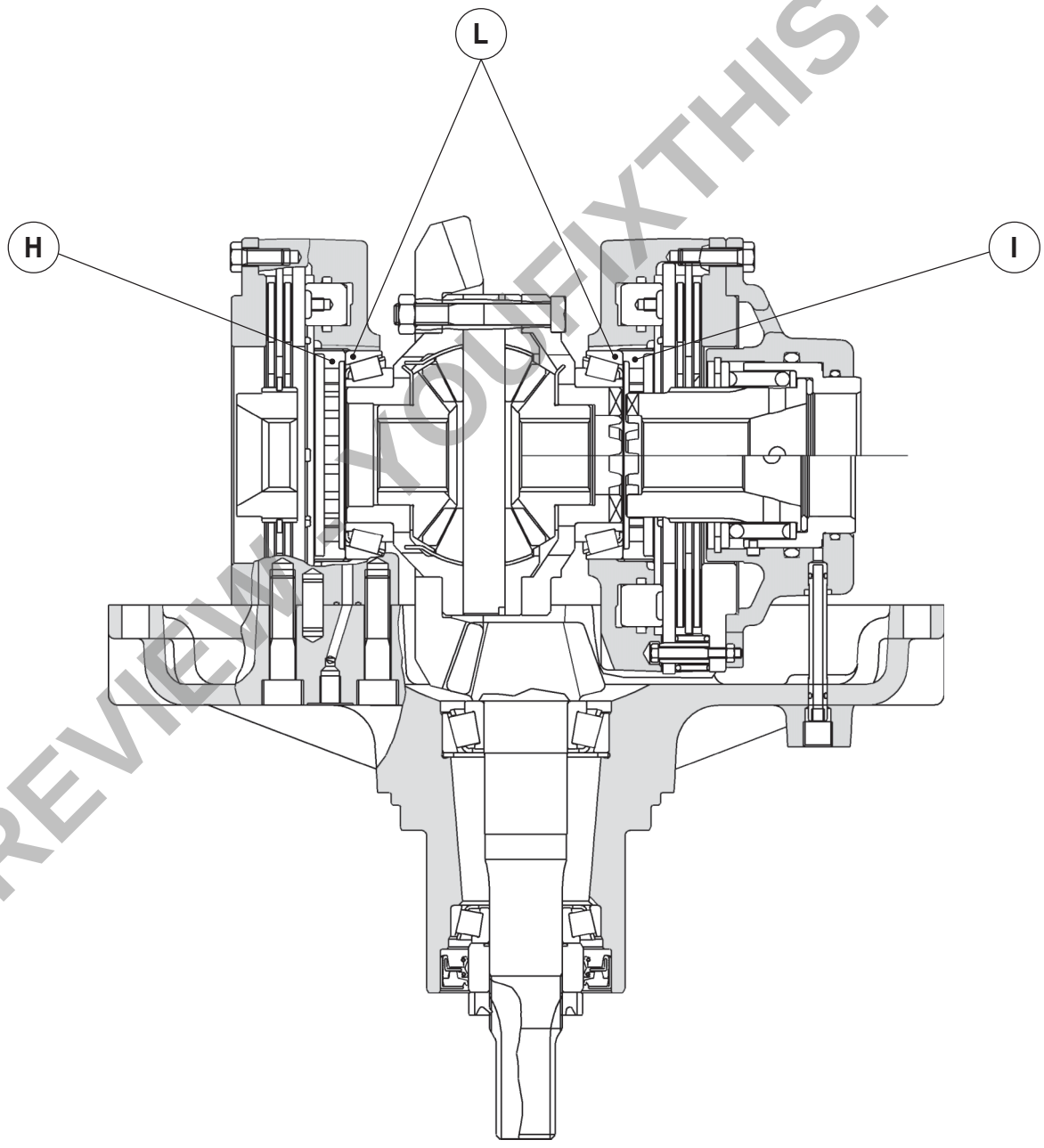


Fig.31-5

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Hydraulic braking system

The parking or emergency brake operates mechanically on the expansion units rods and is controlled by a hand lever (L Fig.19-7).
Powerfarm tractors in the Powershuttle version are also provided with a further mechanical block system, that assures the braking action even with the tractor at full load on slopes. This system, called “Park Lock”, is mechanically engaged by means of a lever (P Fig.19-7) placed on the left-hand side, just behind the parking brake lever. In the absence of a mechanical connection between the engine and rear wheels, this system provides a more reliable braking action for the tractor.

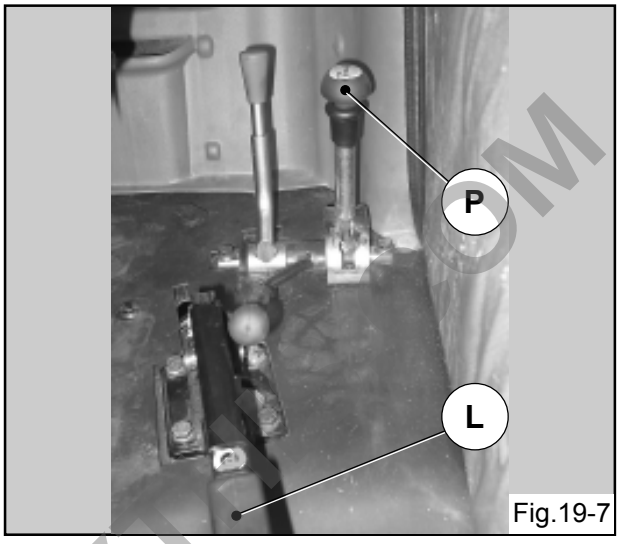


Fig.19-7

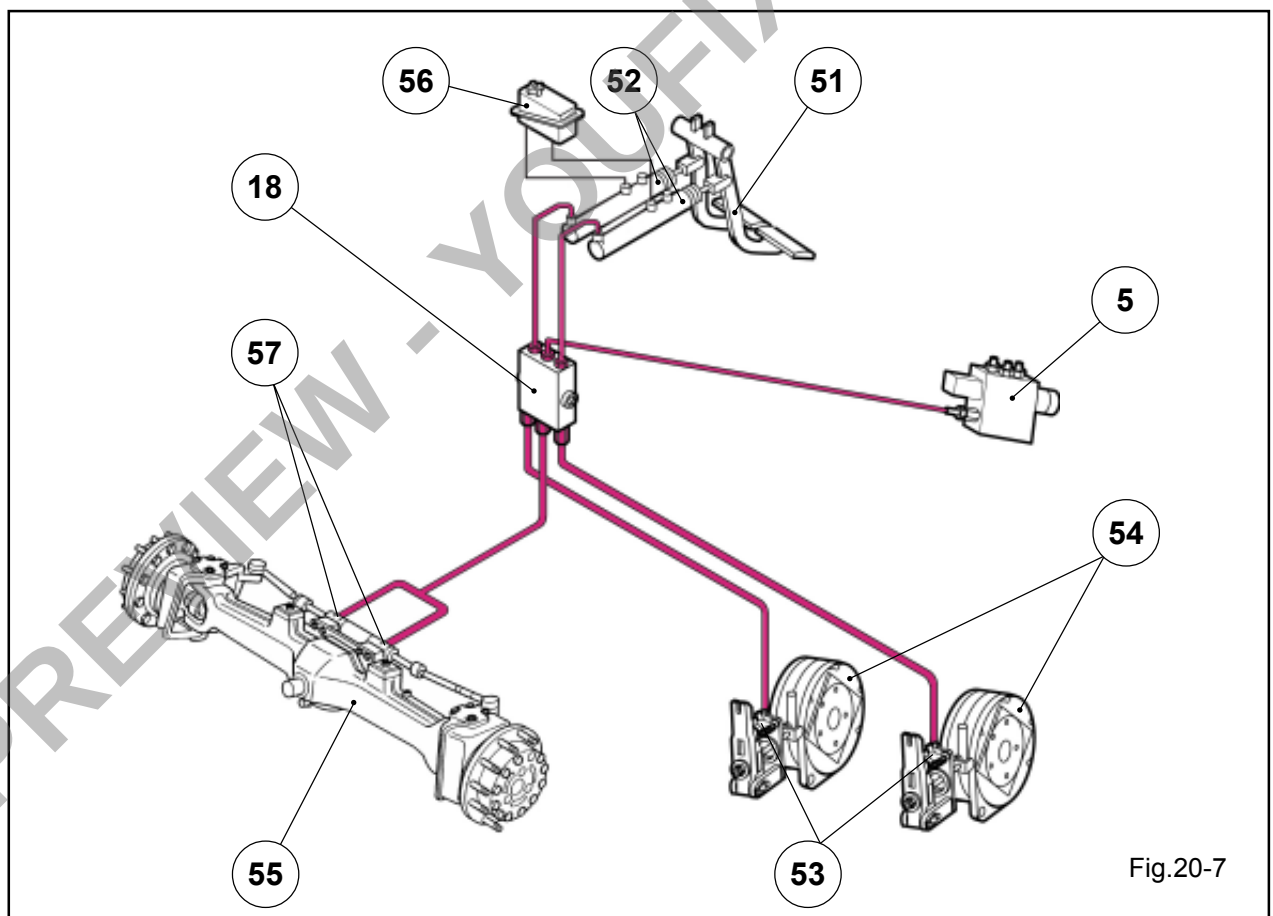


Fig.20-7

5 - Hydraulic trailer brake valve
18 - Brake circuit on-off valve
51 - Pedal brakes
52 - Brake pumps
53 - Cylinders
54 - Rear brake assembly
55 - 4WD front axle
56 - Oil fluid reservoir
57 - Front axle brake supply line

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Notes

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Inspections, adjustments and troubleshooting

f - Move the lever (A) upwards on the sector to about **10 mm** from its end of travel position.
Unscrew the screw (23) about two turns then, with the aid of a lever, keep the swinging support pulled backwards, touching the screw itself.
Start the engine and tighten the screw (23) until the links begin to lift.
Now stop the screwing action and tighten the nut (24).
The purpose of this adjustment is to make certain that the links lift when the maximum negative draft is reached.

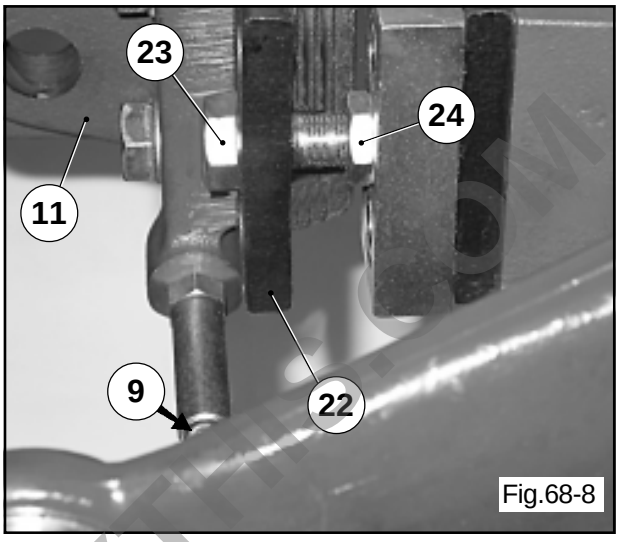


Fig.68-8

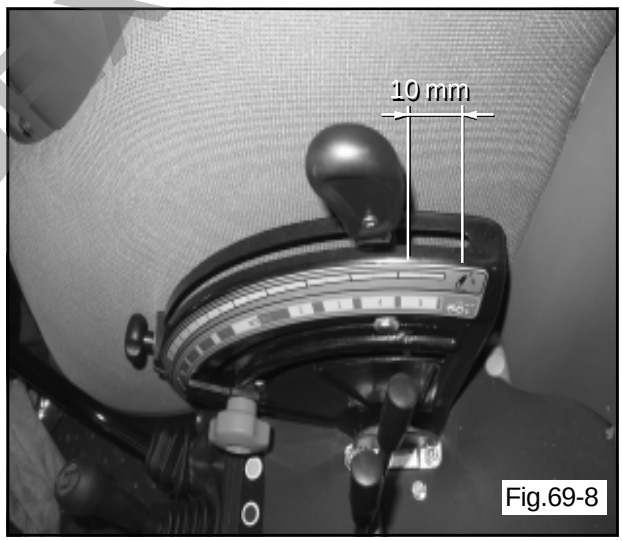


Fig.69-8

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Dashboard line

CONNECTOR (C33) FOR INSTRUMENT CONNECTION

Terminal	Colour of wire	To connector or component	Terminal
1	GR	XS1	10
2	(not used)		
3	C	XS2	25
4	(not used)		
5	(not used)		
6	(not used)		
7	R	_F36	B
8	(not used)		
9	HB	_HA2	1
10	HL	XS1	8
11	(not used)		
12	(not used)		
13	L	_F5	B
14	SG	XS2	14
15	(not used)		
16	HL	XS2	2
17	N	C7	19
18	(not used)		
19	B	C8	11
20	(not used)		
21	VB	XS1	3
22	S	XS2	15
23	(not used)		
24	(not used)		
25	(not used)		
26	(not used)		

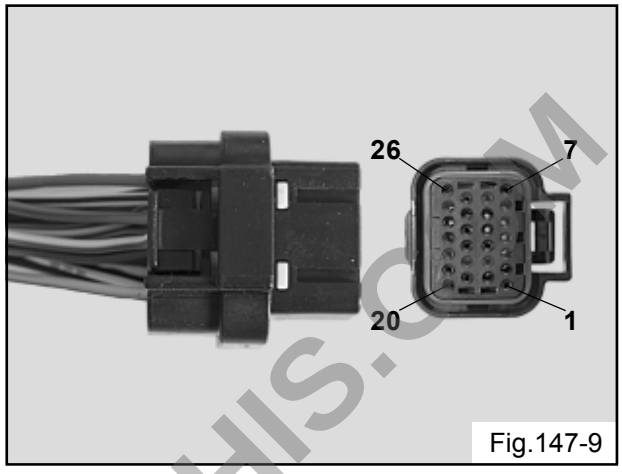


Fig.147-9

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Roof line

B.2-7.3 Connector locations

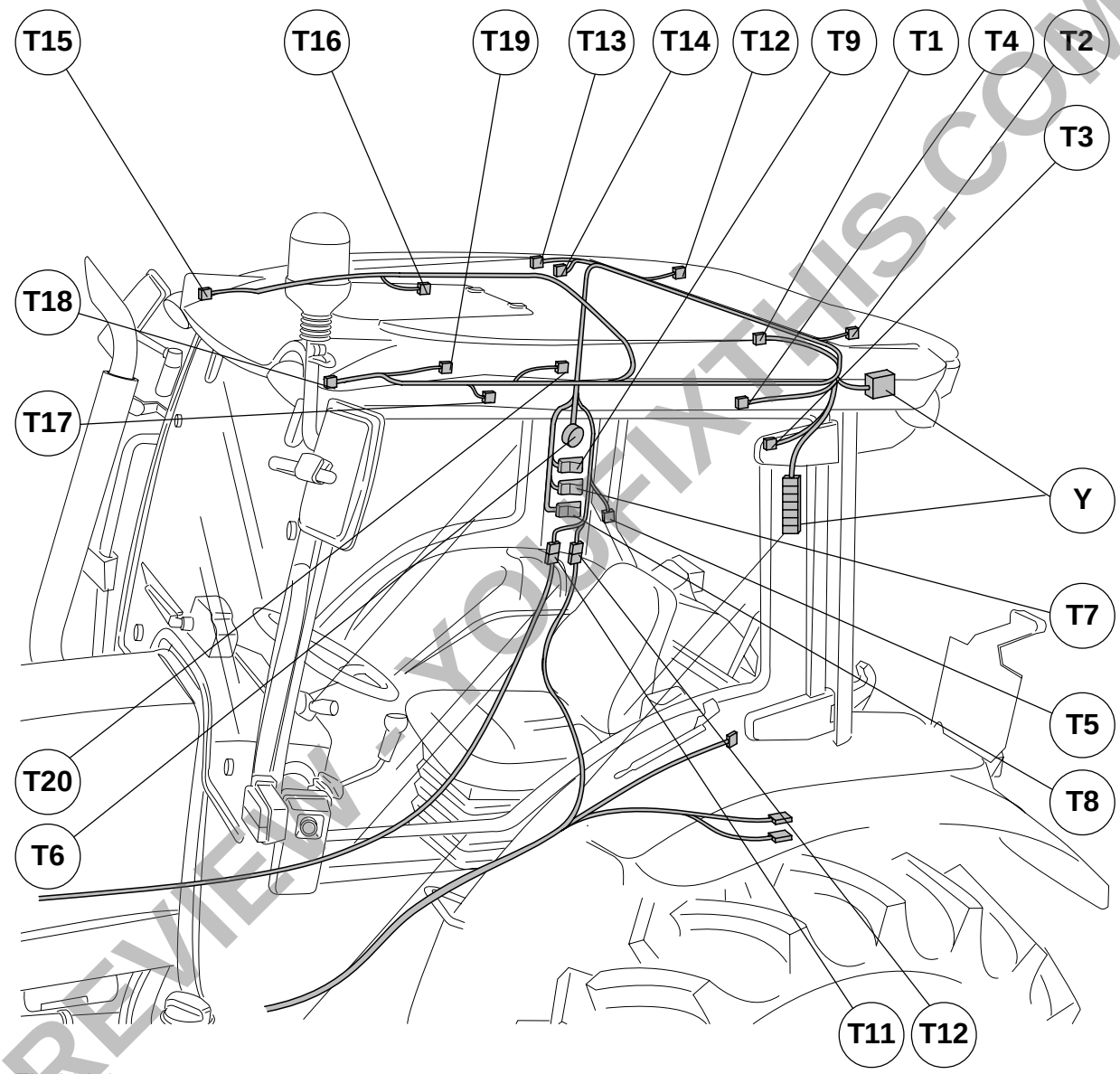


Fig.336-9

T1- 6-way connector for the A/C system
T2- Terminals for left-hand rear field light connection
T3- Grounding eyelet
T4- Connector for rear window wiper motor
T5- Connector for air conditioning switch
T6- Terminals for connecting the fan speed selector switch
T7- Connector for front and rear window wiper switch
T8- Connector for rear field light switch
T9- Connector for front field light switch
T10- Connector for the dashboard line
T11- Connector for power supply and services
T12- Terminals for right-hand rear field light connection
T13- Connector for radio
T14- Connector for radio
T15- Terminal for right-hand front field light
T16- Terminals for the rh loud-speaker
T17- Terminals for the lh loud-speaker
T18- Terminals for left-hand front field light connection
T19- Connector for front window wiper motor
T20- Terminals for courtesy light

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D - Powerfarm Powershuttle cab version

D.2-1 Location of connecting points

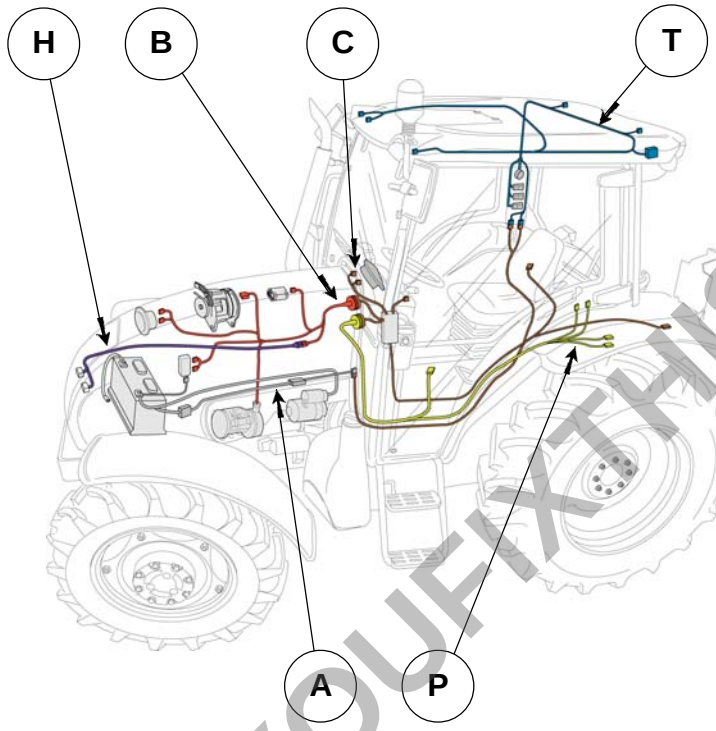
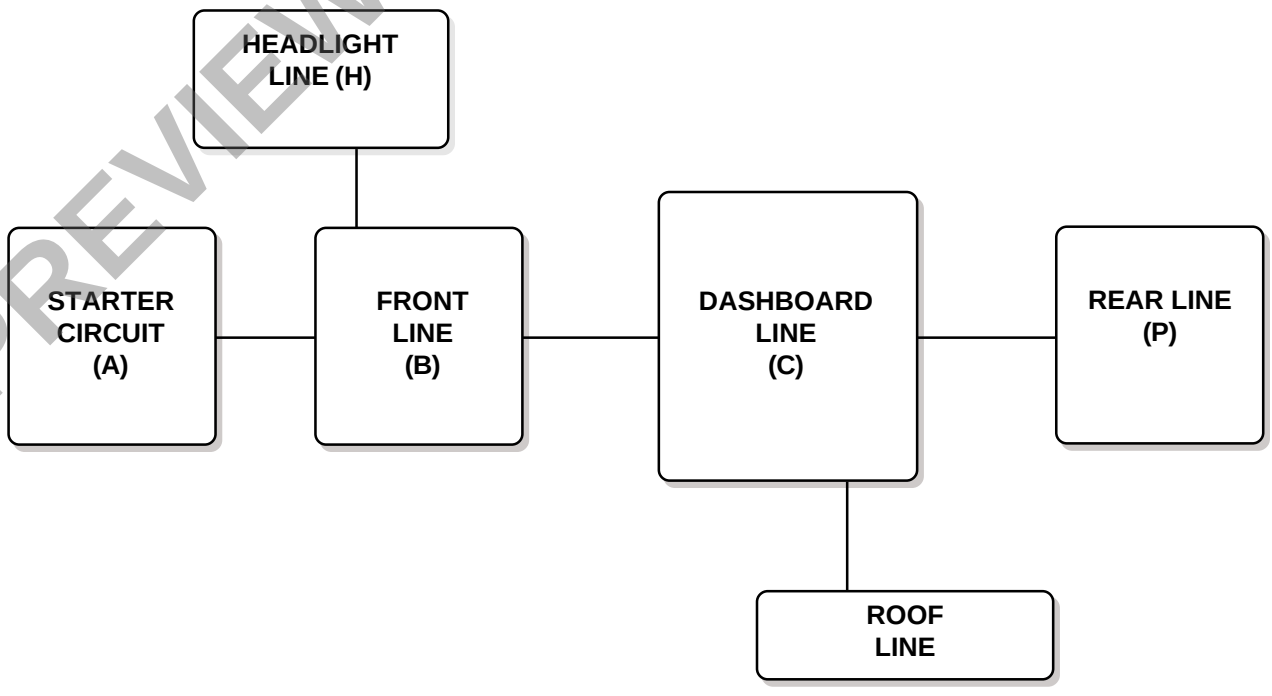


Fig.531-9



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5C - Switches and buttons

4-4.1 General description

The purpose of the switches and buttons installed in **Powerfarm** tractors is to activate or deactivate a given service. The signals transmitted can be of two types: permanent and temporary.
Permanent signal means a signal that indicates a determined situation in a fade-free way.
Temporary signal is a control pulse sent to the monitoring plant in order to modify an already existing situation.
For example, the parking brake activated indicator switch transmits a permanent signal which is maintained constant by means of the engaging lever of the actual brake itself.
The diff lock engaging button transmits a temporary signal, thus modifying an already existing situation.

Certain types of switches and buttons installed in **Powerfarm** tractors are graphically depicted alongside.

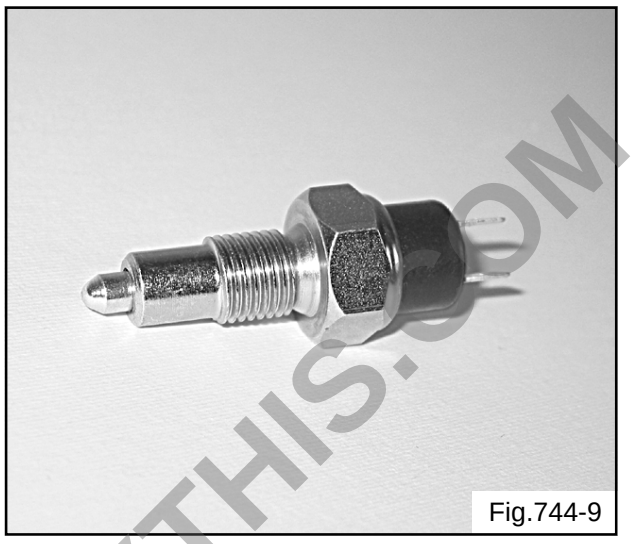

Fig.744-9


Fig.745-9

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Alarm codes

Alarm code (95)

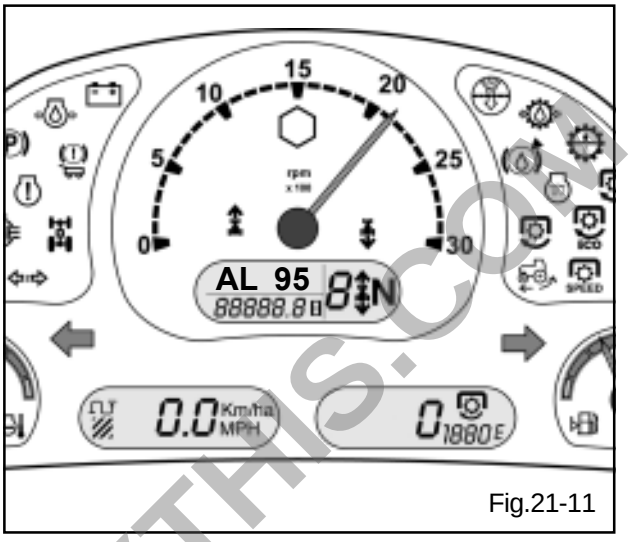


Fig.21-11

FINAL COMPONENT CONCERNED
Engine RPM rate sensor.

CAUSE
Short-circuit/open circuit.

TERMINALS INVOLVED
PIN 12 of terminal board C14.

REMEDY
- Replace the sensor.
- Eliminate the short-circuit/open circuit from the line.

The sensor (_SR2) on the right-hand side of the engine-gearbox assembly, detects the engine rate and transmits a signal to the electronic power unit, that calculates the RPM number to display on an analogue indicator on the instrument, where a pointer turns around a graduated scale.
The sensor (_SR2) is connected to the rear wiring by means of connector (P19)(Fig.22-11).
Alarm code (94)

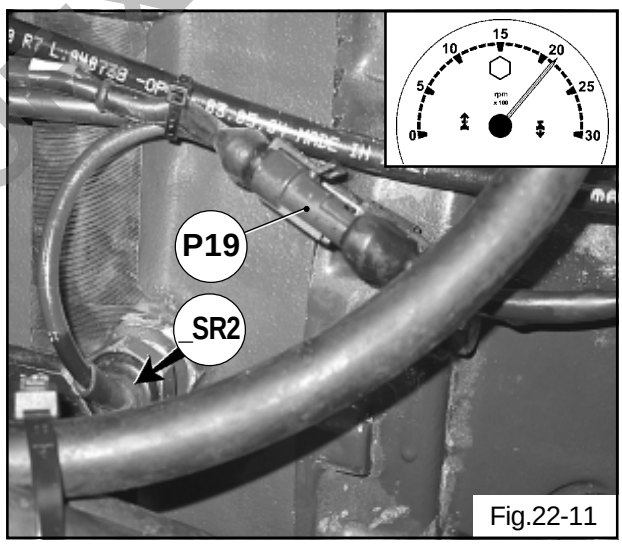


Fig.22-11

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