CAB WIRING DIAGRAM

Borletti Unit
A - Electric fan; B - Resistence; C - Inside light switch; D - Windscreen washer button; E - Thermostat; F - Thermostat light; G - Electric fan switch; H - Light switch; I - Two-speed windscreen wiper switch.

Wiring description
L - Digital clock; M - Front windscreen washer/wiper motor; N - Fusebox; O - Right ceiling lamp; P - Left front headlamp; Q - Right front headlamp; R - Headlamp switch; S - Left rear light; T - Right rear light; U - Rear light switch; V - Radio; Z - Radio antenna; AA - Right speaker; AB - Left speaker; AC - Revolving light; AD - Two-way block (revolving light); AE - Four-way block (power plug); AF - Six-way block (earth); AG - Rear windscreen wiper motor; AH - Rear windscreen washer motor; AI - Rear windscreen washer/wiper motor; AL - Two-way block for rear windscreen washer motor.

Fusebox
1 - Right ceiling lamp; 2 - Electric fan switch and front windscreen wiper motor; 3 -Front windscreen wiper switch; 4 - Inside lights; 5 - Headlamps; 6 - Rear lights; 7 - Radio; 8 - Rear windscreen wiper motor and rear windscreen washer motor.

Wire colours
A - Light blue; B - White; C - Orange; G - Yellow; H - Grey; I - Dark blue; M - Brown; N - Black; R - Red; S - Pink; V - Green; Z - Purple

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HYDRAULIC CIRCUIT

FEATURES

Hydraulic circuit ..... Independent circuit with its own hydraulic pump
- Type of circuit ..... Open centre

Hydraulic pump
- Manufacturer ..... Turolla
- Type ..... Geared
- Model with intermediate unit on housing ..... TF 211S (Cat.1-2 tractors)
- Model flanged on the housing ..... S2069 for 3 cylinders
  S2061 for 4 cylinders
  BOSCH geared pumps can be used in place of these two models.
- Capacity at 1000 pump revs/min ..... 11 lt/min.
- Fitting ..... On the flanged support of the timing system housing (first models)
  Flanged directly onto the timing system housing
- Rotation direction ..... Clockwise for 3 cylinders
  Anticlockwise for 4 cylinders
- Capacity with engine at max engine speed ..... 35.6 lt/min (3 cylinders)
  37.4 lt/min (4 cylinders)
  pumps with intermediate unit
  38.6 lt/min (3 cylinders)
  42.3 lt/min (4 cylinders)
  pumps flanged on housing

Intake oil filter ..... Wire net, removable for cleaning

System relief valve
- Setting ..... 170 bar
- Location ..... Auxiliary spool valves speed plate

Parts served
- Fitting ..... In series
- Auxiliary spool valves ..... Max 3 - see Auxiliary spool valves
- Lift valve ..... See Hydraulic lift
- External pressure port selector ..... Optional - see Hydraulic lift

Description of the circuit

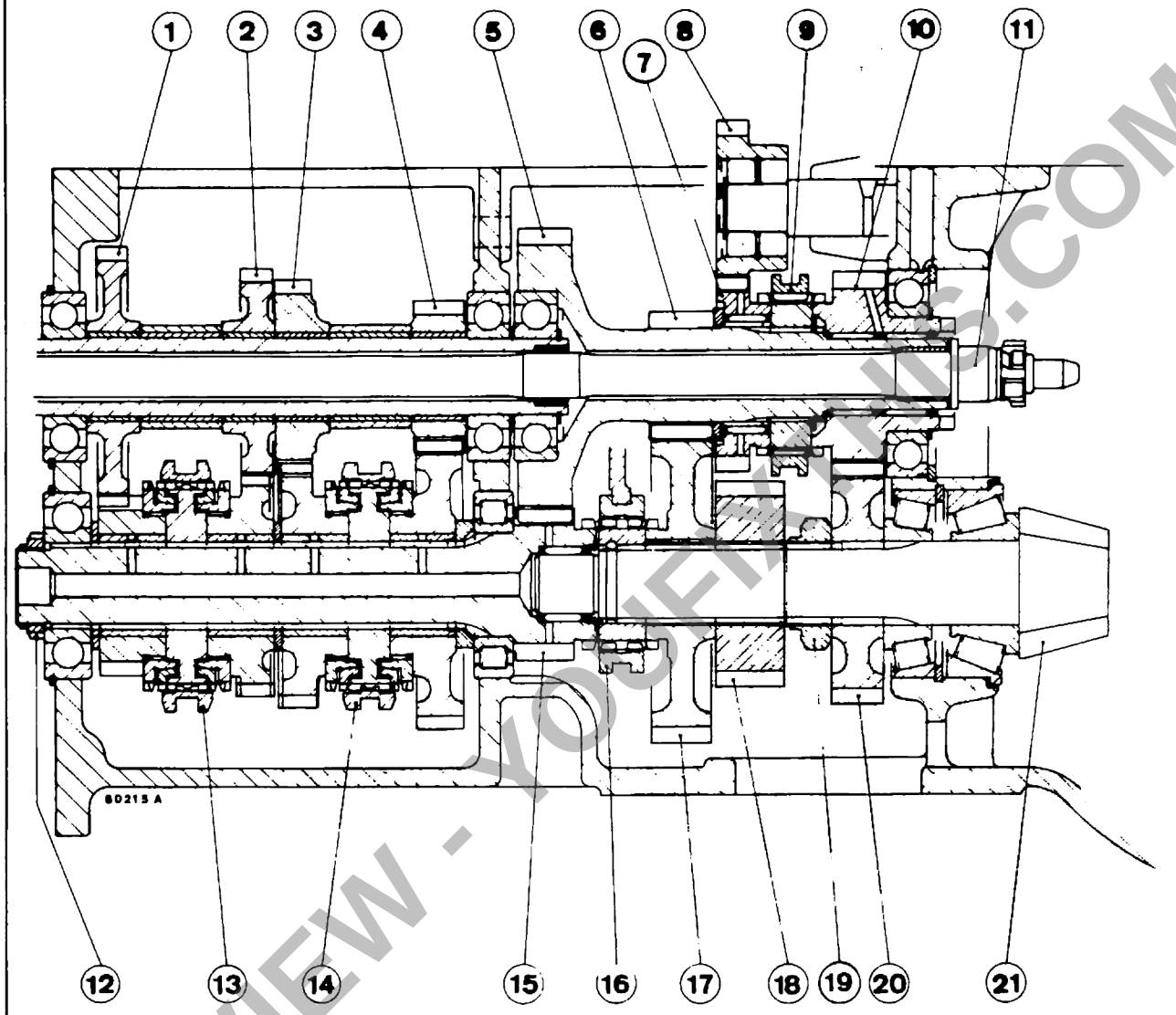
A tractor hydraulic system is made up of an open centre hydraulic circuit fed by a geared pump.
Oil delivered from the pump serves the following parts fitted in series: open centre auxiliary spool valves (max 3), the lift valve and the external pressure port selector (fitted on request).

The hydraulic circuit is protected by a pressure relief valve set at 170 bar and fitted on the auxiliary spool valve feed plate.
The lift valve has an independent safety valve set at 170 bar.

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GEARBOX AND REDUCER IN CROSS SECTION

1 - 4th gear
2 - 3rd gear
3 - 2nd gear
4 - 1st gear
5 - Reducer driven gear
6 - Slow range driving gear
7 - Reverse gear
8 - Reverse intermediate gear
9 - Engagement sleeve
10 - Normal range driving gear with front engagement of the P.t.o. proportional to the advance
11 - P.t.o. transmission shaft
12 - Driven shaft lock nut
13 - Syncromesh sleeve
14 - Syncromesh sleeve
15 - Lower shaft with reducer driving gear
16 - Engagement sleeve
17 - Slow speed driven gear
18 - Reverse driven gear
19 - Pinion conical bearing pre-loading lock nut
20 - Normal range driven gear
21 - Bevel gear pair pinion

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19 - RECOMMENDED TIGHTENING TORQUE IN Nm

20 - ELECTRIC CIRCUIT

All 12 V engines - negative earth

	3 Cylinders	4 Cylinders
Cold hot head	100 -	136 129
Connecting rod (phosphatezed nuts)	81	129
Bed caps	156	244
Flywheel	108	108
Engine rear plate	61	-
Crankshaft pulley	250	390
Crankshaft gear	28	60
Intermediate gear	68	40
Injector lock nuts	16	16
Piston cooling jet locking connections	27	27
Balancing weights	-	49

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TIMING 3 CYLINDER ENGINES

A - FITTING THE TIMING GEARS

1 - Position the crankshaft with cylinder no.1 at T.D.C.

2 - Fit and fasten the cam shaft gearing, making sure that the reference marks "D" on the the gear and on the hub are aligned. Position the timing adjustment mark at the centre of the intermediate gear hub.

3 - Fasten the the DPA pump on the timing system casing.
Fasten the driving pinion on the the pump hub, aligning the the hub and the pinion dowel.
Position the timing adjustment mark close to the centre of the idle gear hub.

4 - Position the crankshaft with cylinder no.1 at T.D.C.

5 - Fit the idle gear aligning the reference marks on the crankshaft gearing, the cam shaft and the injection pump.

B - CHECKING THE CAM SHAFT TIMING

In order to check that the the cam shaft is perfectly timed with the drive shaft it is necessary to carry out the following operations:

1 - Remove the rocker cover.

2 - Rotate the shaft to bring piston no.1 to T.D.C. of compression (both valves closed).

3 - Loosen the adjustment screws of the exhaust valve rockers of piston no.1.

4 - Compress the rocker pin spring laterally and detach the rocker from the valve stem turning it upside down.

5 - Using the appropriate tool remove the cotters and the valve springs and place the mushroom valve on the piston crown.

6 - Tie a piece of wire around the groove in the valve stem to prevent its falling into the cylinder.

7 - Place a comparator feeler on cylinder no.1 exhaust valve stem.

8 - Find the precise T.D.C. of cylinder no.1 and set the comparator to zero.

9 - Adjust the play between the rockers and the intake valve adjustments screws to:
1.09 mm for AD3.152S
0.8 mm for T3.152.4

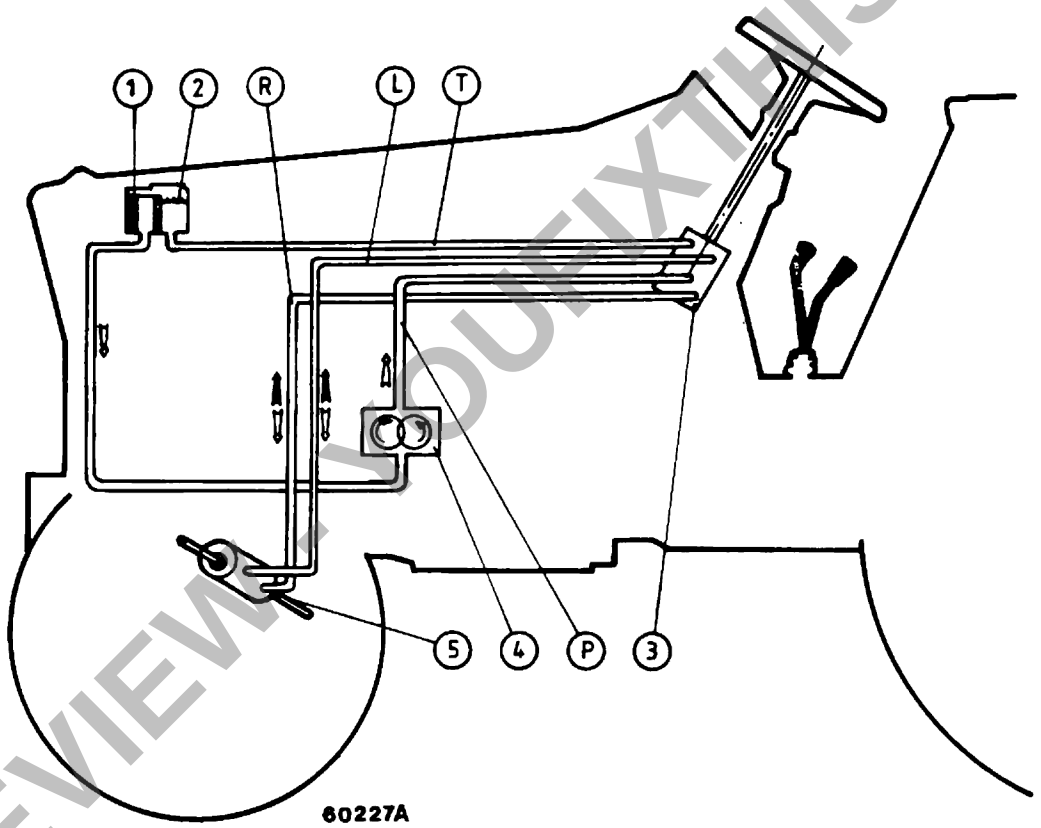
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POWER STEERING STANDARD HYDRAULIC SYSTEM

The steering system is completely hydrostatic, which means that there is no mechanical connection between the steering wheel and the wheels.
Schematically it is composed of: a hydraulic fluid reservoir (see features in section C), a steering valve, a gear pump and a steering jack.

The angular movement of the wheels is directly proportional to the steering wheel rotation.
If the engine stops, it is possible to maintain hydraulic control of the steering through steering wheel rotation.



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POWER STEERING STANDARD HYDRAULIC SYSTEM

1 - Wire net filter cartridge
2 - Fluid reservoir
3 - Danfoss valve
4 - Hydraulic pump
5 - Steering ram

P - Pump delivery
T - Discharge into reservoir
L - Left side ram feed line
R - Right side ram feed line

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FAULT-FINDING TABLE

Symptom	Cause	Remedy
Clutch does not disengage	Control lever or pedal wrong adjustament	Adjust lever or pedal idling
	Damaged thrust pressure plates	Replace the defected part
	Warped clutch disks or clutch disk plate breakage	Install new disks
	Dirt or foreign particles in the clutch	Disassembly the clutch and clean with care. Make sure that everything is clean
Clutch slips	Oil or grease on the disks	Replace disk or disks
	Radial spring or springs unsufficient pressure	Replace spring-springs
	Linkage hardening and subsequent non return of lever or pedal	Lubricate all linkage pins
	Pedal or lever wrong adjustament	Adjust correctly
	Excessives worn clutch disks	Replace disks

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GENERAL CHARACTERISTICS OF THE ENGINES

PERKINS ENGINE		AD3.152S	T3.152.4	A4.236 d.*	A4.236	A4.248	T4.236
TYPE OF TRACTORS		**5860-5870**	**6060-6070**	**6860-6870 6880**	**7860-7870 7880**	**8860-8870 8880**	**9880**
SPECIFICATIONS					LD 31199		
Engine		CE 31197	CN 31198	LD 31201/2	LD 31200	LF 31203/4	LF 31153
Type		Diesel-Direct injection	Diesel-Direct injection	Diesel-Direct injection	Diesel-Direct injection	Diesel-Direct injection	Diesel-Direct injection
Number of cylinders		3	3	4	4	4	4
Stroke bore	mm.	91,44 x 127	91,44 x 127	98,42 x 127	98,42 x 127	100,96 x 127	98,42 x 127
Capacity	cm³.	2502	2502	3865	3865	4065	3865
Compression ratio		16,5 : 1	15,5 : 1	16 : 1	16 : 1	16 : 1	15.5 : 1
Cilinder liners		dry replac.	dry replac.	dry replac.	dry replac.	dry replac.	dry replac.
Max.	rpm	2250	2250	2200	2200	2200	2200
Max. power - CUNA**	cv.	53	60	67	74	83	95
- DIN 70020**	cv.	47	58	62	71	80	93
Max. idle	rpm	2470	2470	2420	2420	2420	2420
Max. torque	Kgm.	17,5	20,60	24,8	27,1	28,8	33,9
Max. torque	rpm	1350	1500	1400	1400	1400	1400
Min. torque	rpm	750	750	750	750	750	750
TIMING							
Valves		head	head	head	head	head	head
TIMING DATA							
- Intake:							
opens before t.d.c.		13°	28°	4°	4°	4°	4°
closes before b.d.c.		43°	58°	36°	36°	36°	36°
- Exhaust:							
opens before t.d.c.		46°	52°	4°	4°	4°	4°
closes before b.d.c.		10°	16°	36°	36°	36°	36°

* d = Non-calibrated ** The declared power values can vary according to the homologation in force in various countries: DIN 70020 - BSAU 141a 1971 - CUNA DIN 70020

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16 - FUEL INJECTION PUMP

All engines: DPA type rotative CAV pump with mechanical regulator.

Operating adjustment codes: see engine technical characteristics table.

17 - FUEL INJECTORS

CAV type

All engines: injectors must be changed only as a complete set.

Engine type:	Operating pressure (bar)	Injector pressure when new (bar)	Identification code
AD3.152'S' AT3.152 A4.236	175 210 175	190 210 170	EE HX FY
A4.248 AT4.236	175 230	170 230	FW HL

18 - FUEL INJECTION PUMP

Adjustment of the injection pump static phase.

Engine	Injection advance angle	Reference letter on the plate	Equivalent piston drop	Cylinder outlet N°. 1
AD3.152S AT3.152 A4.236	16° Before TDC 17° Before TDC 23° Before TDC	E E C	3.15 mm. 3.55 mm. 6.35 mm.	W W W
A4.236 A4.248 AT4.236	23° Before TDC 24° Before TDC 16° Before TDC	C C C	6.35 mm. 6.98 mm. 3.15 mm.	W W W

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HYDRAULIC CHECKS AND TESTS

When major servicing is carried out, or when the power steering is seen to be less than fully efficient in operation, check fluid pressure in the circuit and check the pressure relief valve threshold before proceeding with disassembling and replacement of parts.

VALVES INCORPORATED IN THE ORBITROL UNIT

(See Fig. G15)

The OSPC Orbitrol unit differs from its predecessors in that the pressure relief valve (10), the two shock valves (9) and the two anti-cavitation valves (8) have been incorporated into the unit itself. These last two do not require calibrating.
The shock valves and pressure relief valves are located at the top of the unit where the steering column is attached.
The steering column flange is cut away at one side in order to expose the relief valve.
Access is gained to the relief valve by removing the protection below the dash board, while it is necessary to remove the Orbitrol unit from the tractor in order to service the shock valves.

Relief valve

Check the relief valve pressure setting (10) as follows:

1 - Start up the engine and work the steering a number of times until the fluid temperature in the system reaches 50° C.

2 - Switch off the engine and connect a pressure gauge (not less than 210 bar full scale) to the steering ram delivery line.

3 - Start up the engine, bring it to medium revs and turn the steering wheel to full lock so that pressure builds up in the line to which the gauge has been connected.
At this point the pressure limit valve should be activated and the pressure gauge indicate a calibrated pressure of 120 bar (2WD) or 150 bar (4WD).

If the pressure reading is different, remove the plug and adjust the setting screw, tightening it to increase the pressure or slackening it to lower the pressure.
In order to check the shock valve pressure (9), proceed as follows:

Note: before carrying out the following operations, clean the outside of the unit carefully.
If the unit is to be overhauled, before fitting, wash all the parts carefully and lubricate them with new oil.

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ASSEMBLY SPECIFICATIONS

1 - VALVE PLAY (COLD)

Engine	Intake (mm)	Exhaust (mm)
AD3.152S	0.30	0.30
T3.152	0.32	0.32
A4.236	0.30	0.30
A4.248	0.30	0.30
T4.236	0.30	0.30

2 - HEAD GASKETS

- 3 cylinders:
  Layered steel with steel gas seal edge around the cylinder bore. Fit dry and re-tighten after 25 and 50 working hours.

- 4 cylinders:
  A4.236 and A4.248: Coopercor Dowprint type seal.
  Dry fitting and hot re-tightening after 25 and 50 working hours.

- AT4.236: Coopercor seal with red sealing edge around the rocker arm rod holes and some water galleries. The gasket is silver coloured. Fit dry and re-tighten after 25 and 50 working hours.

3 - VALVE GUIDES

- Suitable for all motors. Projection of the valve guides above the spring bed face as follows:

Valves	3 Cylinders	4 Cylinders
Intake (mm)	9.19-9.55	15.87
Exhaust (mm)	14.73-15.09	15.87

4 - VALVES

	3 Cylinders	4 Cylinders
Angle of valve inclination	35°	45° (T4.236 Intake 30°)
Valve seat angle	36°	46° (T4.236 Exhaust 31°)

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MAINTENANCE NOTES

Even if this unit is relatively easy to disassemble and refit, it is necessary to keep the following points in mind for this second operation:

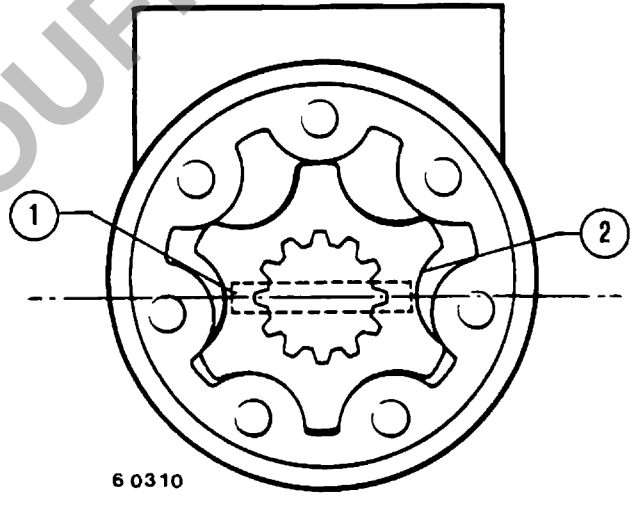
1 - Make sure that all the parts are paired together as in the preceeding illustration.

2 - Always replace the shaft sealing ring (O-ring and dust excluder) using tool MS 62A to avoid damage and ensure a correct fitting of the pump.

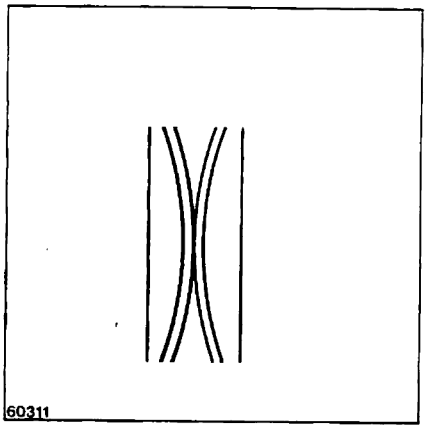
3 - Make sure that the six leaf centering springs are fitted correctly (see illustration).
Use tool MS 63 for easier fitting.

4 - Make sure that the splined rotor is correctly timed with the splined drive shaft.
For a correct timing, the pin which is positioned in the drive shaft slot, must be in line with two rotor chambers (see drawing).

5 - Fit the lower cover locking screws with new sealing washers and tighten them to a torque of 2.8 Kgm.



Timing of the rotor with splined drive shaft
1 - Pin
2 - Rotor chamber



Leaf spring fitting scheme

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SAFETY REGULATIONS

WATCH OUT FOR THIS SIGN



You will find it wherever there is a serious risk of injury or to health. It is intended to draw attention to measures to be taken to ensure working in safety.

WARNING: As long as possible accident causes are identified and the necessary precautions taken to protect the personnel working on the tractor and the people close to it, most accidents can be avoided.

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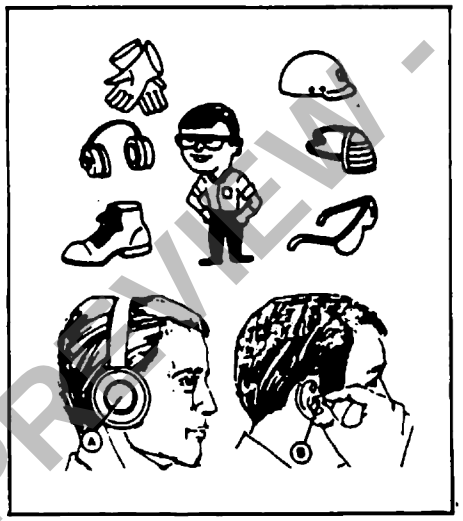
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PERSONAL SAFETY

Never attempt to clean, service or lubricate the tractor with the **engine running**.

Never wear rings, wristwatches, loose or unfastened clothing when working on the tractor as they can be caught in moving parts.

Make use of all available personal protection to prevent harm.
- Wear wrap-around goggles when welding, grinding and chiselling or when cleaning parts with compressed air.
- Use appropriate protection when applying paint or using solvents and when work is being carried out in areas with exhaust fumes .
- Noise becomes a health hazard above certain thresholds: use ear plugs or protective ear muffs.
- Protect your feet by wearing footwear with reinforced toe-caps and non-slip soles



Make sure you are able to handle bulky items before trying, otherwise ask for help or use a hoist.

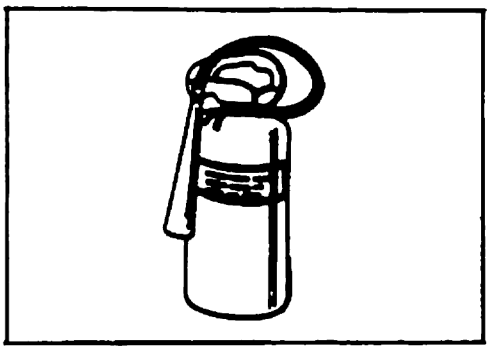
Keep your head, hands and body well away from fans, belts and rotating parts in general.

GENERAL OPERATING REGULATIONS

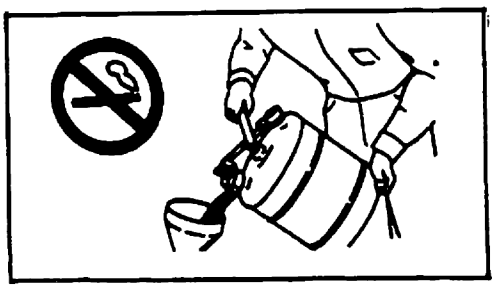
A well organized and tidy workshop makes for a better working environment. The working area should always be kept clean and **dry**, free of puddles and patches of oil.

Oil or grease impregnated rags are a fire hazard, keep them closed inside metals containers.

Irreversible damage may be avoided by observing safety standards closely;
- Cigarettes and matches must be properly extinguished.
- Collect refuse in appropriate containers.
- Equip the workshop with fire extinguishers and notices giving instructions regarding various types of fires.
- Never leave solvents or fuel in open containers.
- In dangerous situations, do your best to remain calm.

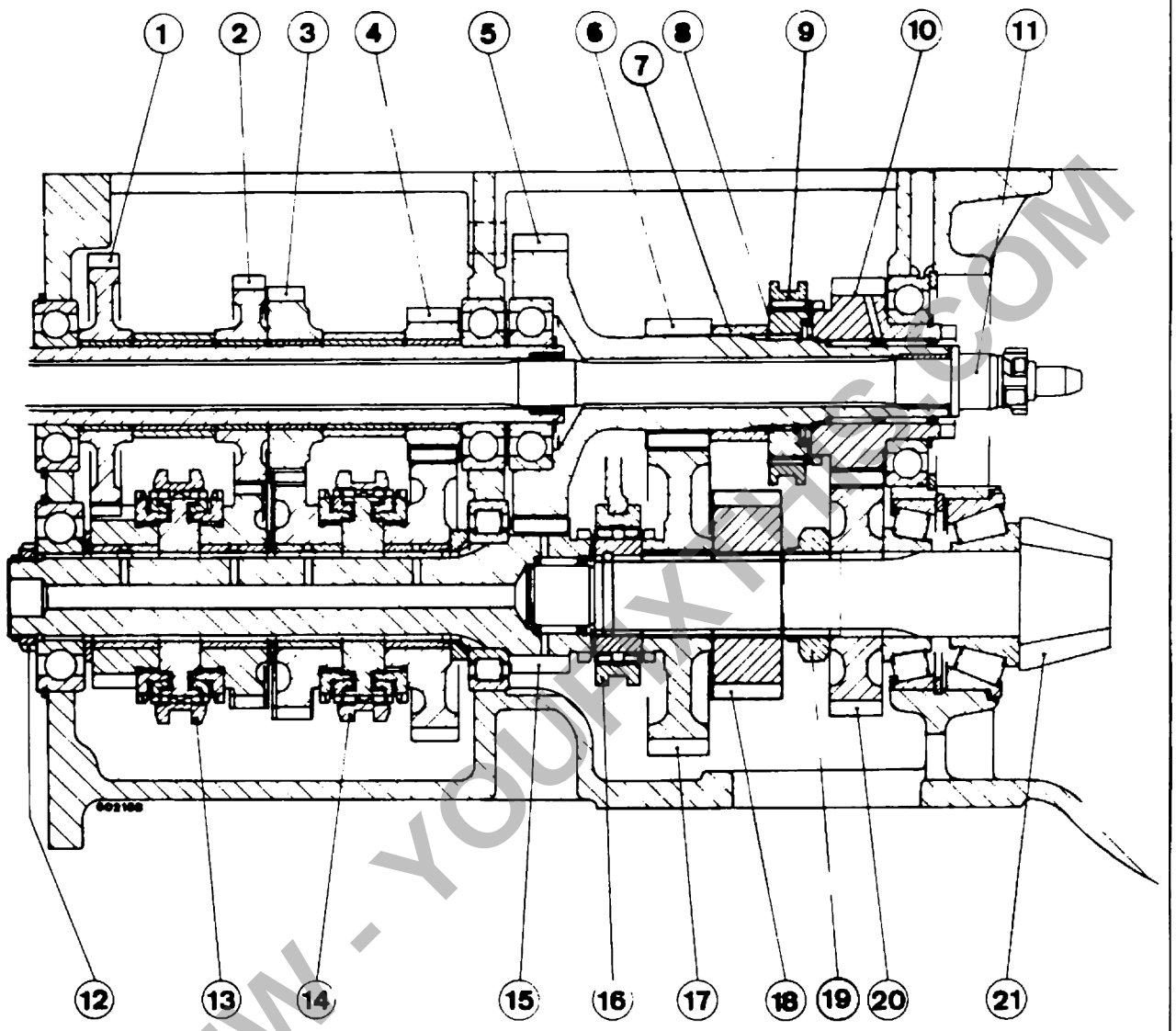


Diesel fuel, battery fluid and ether are all highly flammable; never handle them while smoking or carrying a naked flame.



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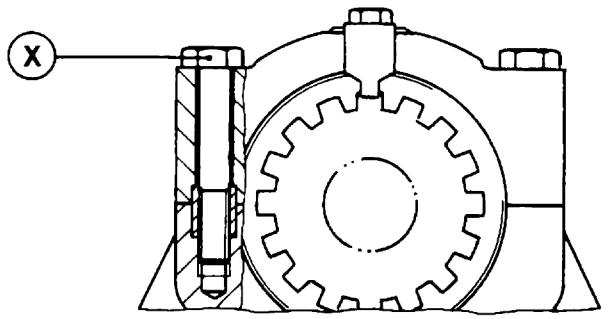


GEARBOX AND REDUCER FITTED TOGETHER WITH REVERSE SHUTTLE IN CROSS SECTION

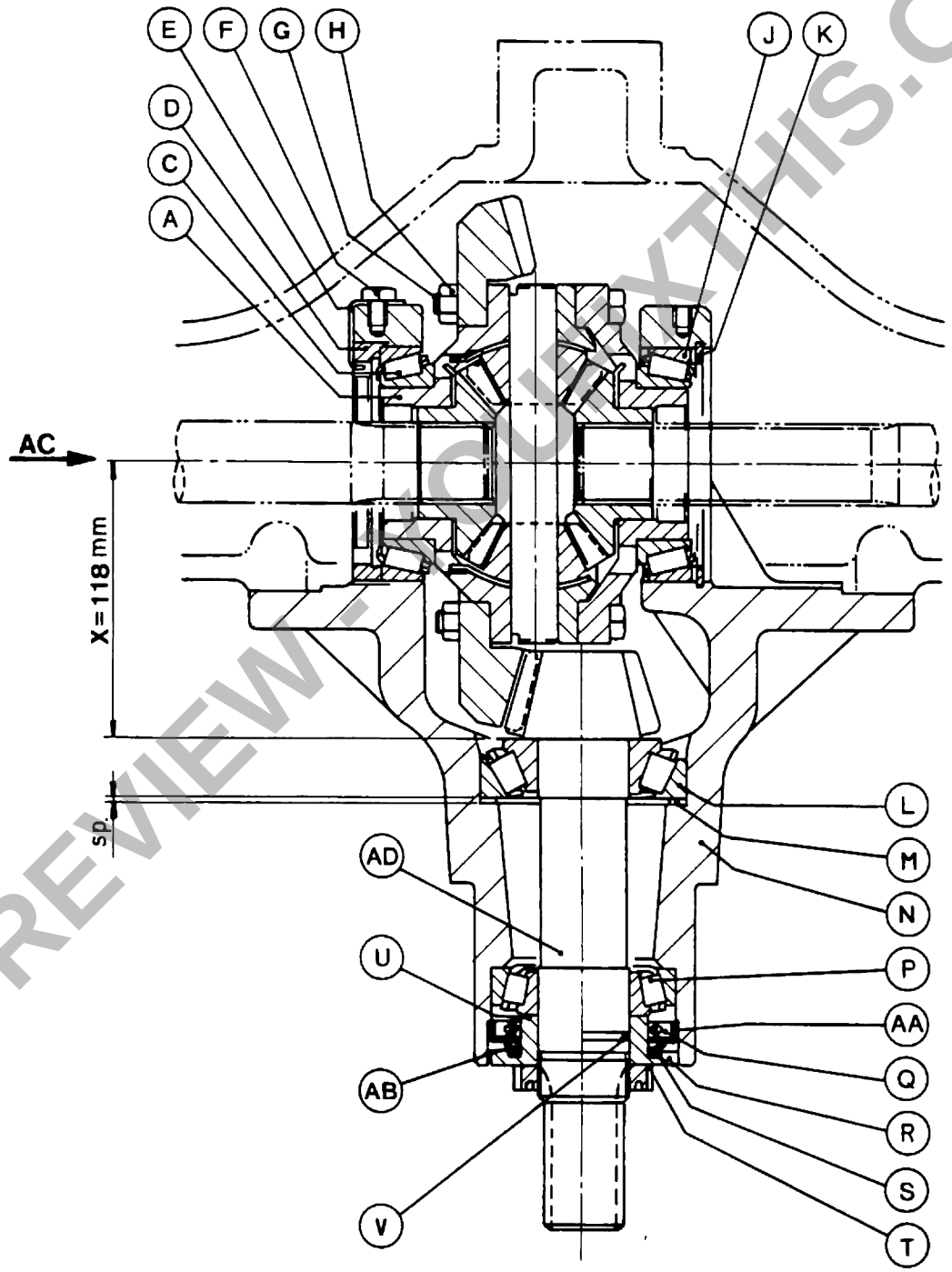
1 - 4th gear
2 - 3rd gear
3 - 2nd gear
4 - 1st gear
5 - Reducer driven gear
6 - Slow range driving gear
7 - Spacer
8 - Engagement sleeve hub
9 - Engagement sleeve
10 - Normal range driving gear with front engagement of the P.t.o. proportional to the advance
11 - P.t.o. transmission shaft
12 - Driven shaft lock nut
13 - Syncromesh sleeve
14 - Syncromesh sleeve
15 - Lower shaft with reducer driving gear
16 - Engagement sleeve
17 - Slow speed driven gear
18 - Reverse driven gear
19 - Pinion conical bearing pre-loading lock nut
20 - Normal range driven gear
21 - Bevel gear pair pinion

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View from AC



STANDARD DIFFERENTIAL WITH 4 PLANETARY GEARS

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OPERATING THE HYDRAULIC LIFT

Hydraulic lifts fitted on tractors may be used in the four following ways:

1 - Position control
2 - Float control
3 - Draft control
4 - Combined position/draft control: "intermix"

The controls provided permit the selection of the type of function in relation to to the implement, the type of work to be carried out and the soil texture.

1 - POSITION CONTROL

Position control allows the implement to be carried and held at any position between the lowest and highest, in the soil or above it, depending on the position selected by setting the appropriate hand lever.

The upward shift of the lift arms is prportional to to the movement of the control hand lever.

Position control is suitable for implements which, during work, do not impose too much tractive and adhesive effort on the tractor but which must penetrate to given depths (or heights) with respect to the surface of the terrain.
Position control is selected by moving the selector lever or knob fully back in the quadrant.

2 - FLOAT CONTROL

Float control allows the unrestrained oscillation of the lift arms throughout their displacement arc.
Float control is used for all implements which only need to rest on the soil surface and follow its contour or for implements which are provided with their own rest wheels or skids.
Float control is selected by moving the selector lever fully back and then moving the hand control lever-fully forward in the quadrant.

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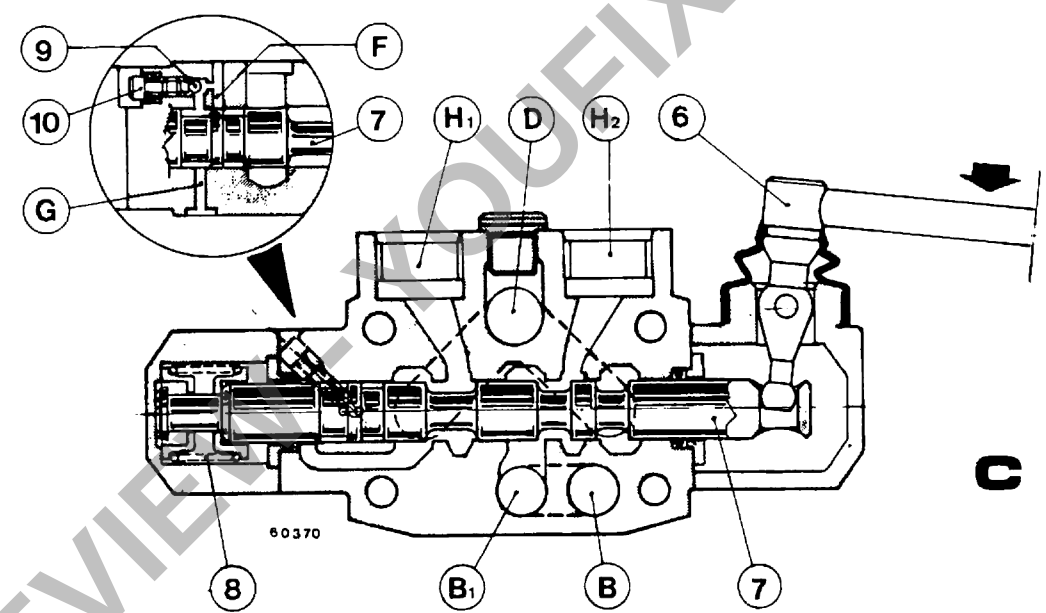
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C - Lowering phase

By pushing the control lever downwards (6), the spool valve rod (7) connects the line (H1) to the discharge line (D), thus allowing the external cylinder to empty.
The spool valve rod (7) movement interrupts the communication between the line (F) and the discharge line (G) but, as the spool valve is set for the single acting operation, the screw (10) is unscrewed and the ball (9) is free in its seat and reconnects discharge line (G) to line (F), thus allowing the cylinder to move (see phase "A", description of plate operation) which allows the oil from the pump to be discharged through the lifter main valve.

Even if the rods allows the communication between line (B1) and line (H2), there is no delivery under pressure as the cylinder is in the position which allows communication with the discharge.

Note: When the valve is set for double acting operation, the screw (10) is tighten and the ball (9) cuts off the communication between line (F) and discharge line (G). The base plate interrupts delivery from the pump to the lifter through the automatic intervention of the cylinder and conveys the oil to the lifter feed line (B) to allow the delivery to the other side of the double acting cylinder.



C - Auxiliary spool valve set for single acting operation - Lowering phase

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