FIATAGRI

FIAT 86 Series Tractors

3–cylinder engine models: 50V 55V 55F 60V 60F 62F
4–cylinder engine models: 70V 72F 72LP 82F 82LP

WORKSHOP MANUAL

SECTIONS

AFTER SALES SERVICE

06910107

Reprinted

(follows)

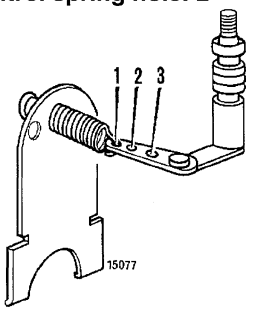
GENERAL SPECIFICATIONS	3–cylinder	4–cylinder
Timing	overhead type valves driven by the timing camshaft, located in the engine cranckase, through the push rod and rocker arm mechanism; the camshaft is driven by the engine cranckshaft through helical–tooth gears.	
Intake:		
– commencement: before T.D.C.	12°	
– end: after B.D.C.	31°	
Exhaust:		
– commencement: before B.D.C.	50°	
– end: after T.D.C.	16°	
Valve clearance for timing check	0,45 mm (.018 in)	
Normal operating valve clearance, measured on cold engine:		
– intake	0,30 ± 0,05 mm (.012 ± .002 in)	
– exhaust	0,30 ± 0,05 mm (.012 ± .002 in)	
For further timing data	See page 10–73	
Fuel system		
Air cleaning	through a dual–cartridge dry air cleaner, with clogged filter warning light, centrifugal pre–cleaner and automatic dust ejector	
Fuel transfer pump	double–diaphragm	
Fuel filtering	through wire filter in fuel transfer pump and a replaceable, cartridge–type filter in pump output	
Min. fuel output with drive shaft rotating at 1600 rpm	100 l/h (22 UK or 26 US gal)	
Cam drive	actuated by the engine timing mechanism	
BOSCH or C.A.V. fuel injection pump	distributor type	
All–speed, built–in speed governor:		
BOSCH and C.A.V.	mechanical flyweights	
Automatic, built–in advance variator:		
BOSCH and C.A.V.	hydraulic	
For further fuel system data	See prospect below	
For information concerning fixed advance (pump setting on engine for commencement of delivery, before T.D.C.) – Pressure setting – Firing order and others completing BOSCH and C.A.V. pump data, refer to the pages indicated hereafter in relation to the type of engine:		
– 50V model – type 8035.06.220 (BOSCH pump)	See data on p. 10–9	–
– 50V model – type 8035.06.321 (C.A.V. pump)	See data on p.10–11	–
– 55V and 55F models – type 8035.06.222 (BOSCH pump)	See data on p.10–13	–
– 55V and 55F models – type 8035.06.323 (C.A.V. pump)	See data on p.10–15	–
– 60V, 60F and 62F models – type 8035.05.208 (BOSCH pump)	See data on p.10–17	–
– 60V, 60F and 62F models – type 8035.05.309 (C.A.V. pump)	See data on p.10–19	–
– 70V, 72F and 72LP models – type 8045.06.208 (BOSCH pump)	–	See data on p.10–21
– 70V, 72F and 72LP models – type 8045.06.309 (C.A.V. pump)	–	See data on p.10–23
– 82F and 82LP models – type 8045.05.208 (BOSCH pump)	–	See data on p.10–25
– 82F and 82LP models – type 8045.05.309 (C.A.V. pump)	–	See data on p.10–27

FUEL SYSTEM MAIN DATA

BOSCH INJECTION SYSTEM	VE 3/11 F 1250 L 163–1–4794587–4800682
Engine	8035.06.222
Tractor	55V and 55F
Power output	55 HP
Cylinders	3
Stroke	115 mm (4.53 in)
Bore	100 mm (3.94 in)
Displacement	2710 cm^3 (165.31 in^3)
Max. power torque	2500 rpm
Injector types :	
– W ALTECNA	4802391
– BOSCH	4792442
– C.A.V.	–
– OMAP	4800032
Nozzle holder types :	
– W ALTECNA	KBEL 83S 1W200–4802392
– BOSCH	KBEL 83S 35–4791124
– C.A.V.	–
– OMAP	OKLL 83S 3392–4796644
Spray nozzle types :	
– W ALTECNA	DDL124S 500W–4802393
– BOSCH	DLLA 124S 1001–4792443
– C.A.V.	–
– OMAP	OOL124S 3990–4792447
Spray orifice diameter	0.31 mm (.012 in)
Number of spray holes	4
Pressure setting	230 ÷ 238 bar (235 ÷ 243 Kg/cm^2 – 3407 ÷ 3523 psi)
Delivery pipes	4797506
Pipe size	6 x 1.5 x 475 mm (.24 x .06 x 19 in)
Assembly data	
Sense of pump rotation (drive end)	counterclockwise
Firing order	1–2–3
Pumping element pre–lifting from B.D.C.	0.2 ± 0.02 mm (.008 ±.0008 in)
Pump setting on engine: commencement of delivery before T.D.C. at cylinder 1 in the compression phase **(*)**	$6^o \pm 1$
Pump delivery connection to cylinder 1	designated by the letter **A**.
Calibration test conditions	
Test bench complying with ISO 4008/1./2 standard	–
Injectors complying with ISO 7440 A 11 standard	1688901020 **(°)**
Test fluid ISO 4113	at the temperature of $40^o + 2^o$ ($104^o \pm 4^o$F)
Test glasses emptying time	30'
Note (*) Pumping element pre–lifting from B.D.C. for timing on engine (with 291754 and 291755 tools)	1 mm (.039 in)
Note (°) With button	1680103096

(continued)

FUEL SYSTEM MAIN DATA

C.A.V. INJECTION SYSTEM	DPS 8250 A 791 A – 98459271
Engine	8045.06.309
Tractor	70V, 72F and 72LP
Power output	70 (HP)
Cylinders	4
Stroke	115 mm (4.53 in)
Bore	100 mm (3.94 in)
Displacement	3613 cm^3 (220.39 in^3)
Max. power speed	2500 rpm
Injector type :	
– BOSCH	4824164
– C.A.V.	4817265
Nozzle holder type :	
– BOSCH	KBEL 83S 35–4791124
– C.A.V.	4816070
Nozzle type :	
– BOSCH	DLLA 134S 1113–4824165
– C.A.V.	BDLL 134S 6860–4817266
Spray orifice diameter	0.31 mm (.012 in)
Number of spray holes	4
Pressure setting	260 ÷ 268 bar (265 ÷ 273 kg/cm^2 – 3842 ÷ 3958 psi)
Delivery pipes	4797522
Pipe size	6 x 2 x 530 (.24 x .06 x 21.2 in)
Assembly data Sense of pump rotation (drive end): counterclockwise Firing order : 1–3–4–2 Distance between governor bracket and metering pin: 40.45 ÷ 41.05 mm (1.618 ÷ 1.642 in) Pump timing on engine: commencement of delivery before T.D.C. at cylinder 1 in compression phase $+0^o$ -1^o Flange centering guide diameter : 50mm Pump delivery connection corresponding to cylinder 1: designated by letter **U**	**Control spring hole: 2** 
Calibration test conditions	
Test bench complying with ISO 4008/1../2 standard	–
Injectors complying with ISO 7440 A 11 standard	–
Test fluid ISO 4113	at $40^o \pm 2^o$ C ($104^o \pm 4^o$ F)
Test glass emptying time	30'
Fuel transfer pressure: bar (kg/cm^2 – psi)	0.1 (1.45 psi)
Injector pressure setting	172 ÷ 175 bar (175 ÷ 178 kg/cm^2 – 3842 ÷ 3958 psi)
Pipes complying with ISO 4093/2 standards	6 x 2 x 845 mm (.24 x .08 x 33.8 in)
Projecting height of maximum delivery setscrew above its locknut surface	9 mm (.35 in)
Back off completely the transfer pressure set screw and then screw it in	3.5 revs
Position the release valve set screw just below its locknut surface	–
Back off completely the maximum, minimum and shut–off exclusion screws	–
The advance device, spring end, fits a 3 mm (.012 in) shim	no others required

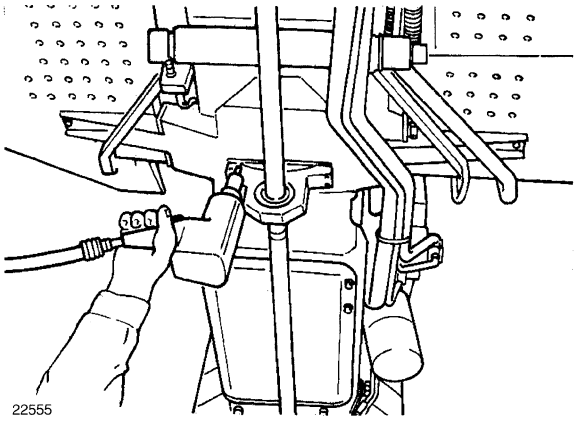
(continued)

ENGINE TROUBLESHOOTING GUIDE

(follows)

Problem	Possible cause	Correction
	8. Damaged fuel transfer pump.	Replace fuel transfer pump.
	9. Incorrect valve clearance.	Adjust valve clearance.
	10. Low engine compression.	Check compression level and recondition engine if necessary.
	11. Clogged air cleaner.	Clean it and replace filtering element if necessary.
	12. Misadjusted throttle rod length.	Adjust rod length.
	13. Misadjusted high speed set screw on injection pump.	Adjust high idle speed set screw.
Engine knocks	**1.** Partially plugged or damaged injectors.	Clean, recondition and adjust injector pressure setting.
	2. Impurities in fuel lines.	Clean fuel lines and replace heavily dented ones; clean injection pump if necessary.
	3. Incorrect injection pump/engine timing.	Adjust injection pump/engine timing.
	4. Crankshaft knocking due to excessive clearance at one or more main or connecting rod bearings or end play.	Re–grind crankshaft journals, fit oversize bush and thrust bearings.
	5. Unbalanced crankshaft.	Check crankshaft alignment and balancing, replace it if necessary.
	6. Loose flywheel screws.	Replace loose screws and tighten all screws to specification torque + angle.
	7. Misaligned connecting rods.	Straighten connecting rods, check parallelism on center lines and replace them if necessary.
	8. Piston knocking due to excessive wear.	Re–bore cylinder liners and fit oversize pistons.
	9. Noisy piston pins due to excessive play in hubs and in connecting rod bushing. Loose bushings inside connecting rod housing bore.	Replace piston pin fitting a new, oversized one, re–bore seats in piston and connecting rod bushings. Replace bushings with new parts.
	10. Noisy engine timing.	Inspect for broken springs, excessive valve stem and guide clearance; adjust valve clearance.

(continued)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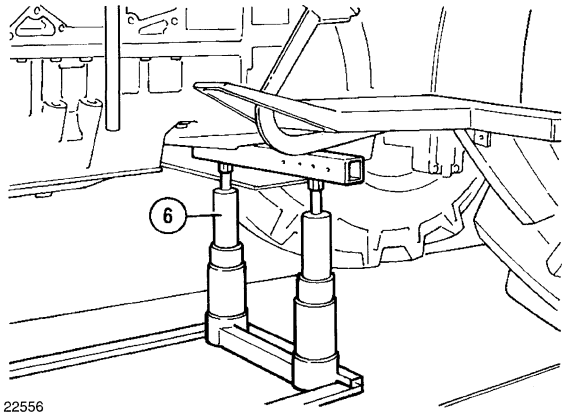
46. Undo the two holding screws and then remove the propeller shaft supporting bracket from live front axle.

47. Recover the propeller shaft and support.

Note 1. – Operations numbered from 27 through 31 only apply to tractors equipped with trailer brake remote control valve.

Note 2. – Operations numbered from 43 through 47 apply to 4WD tractors only.



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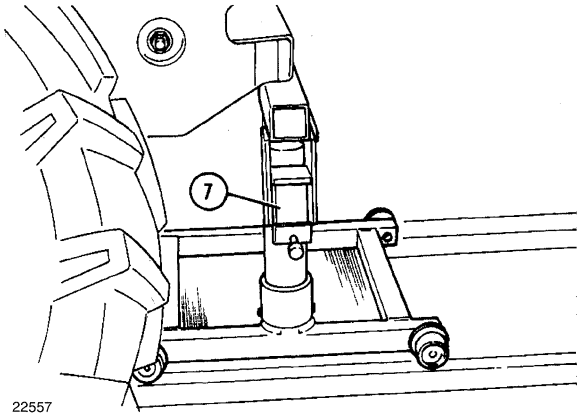
48. Place the **292320** (6) tractor disassembly stand in position by placing the **(292646)** fixed stands underneath the transmission housing near the flange for engine attachment, as shown in the figure.



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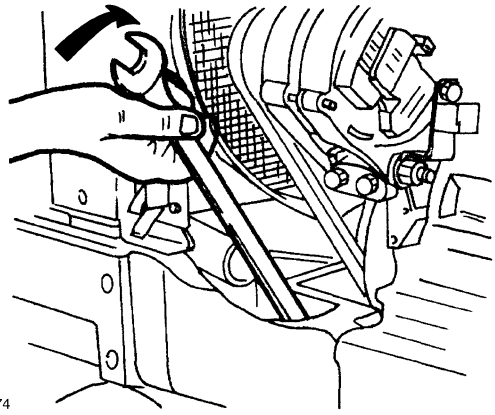
49. Hook up the **292645** mobile stand (7) underneath the front ballast weights, in order to prevent any possibility of front tipping movement of the live front axle during engine removal, operation 51.

50. Sling up the engine to hoist using specified steel lift eyes and the **290740/1** chains and just stretch the latter under load.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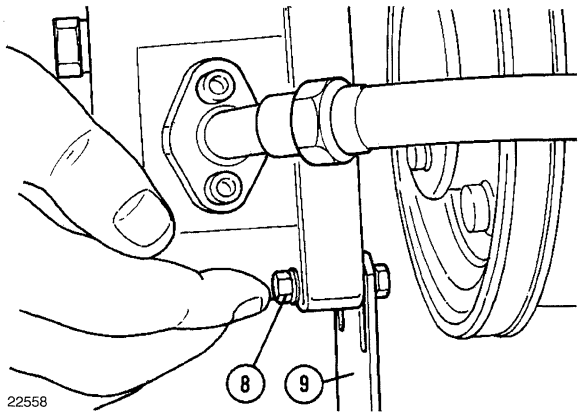
51. Remove the four screws attaching the engine to the front or live axle (two on each side).



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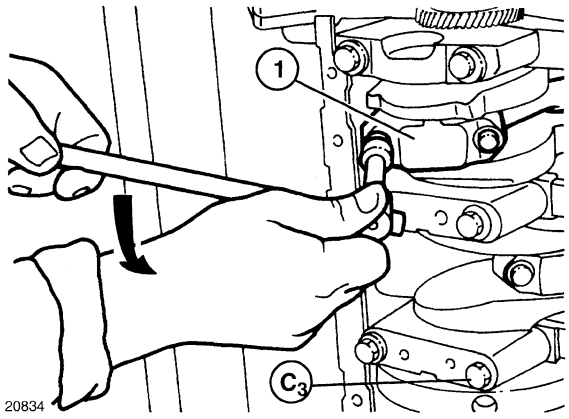
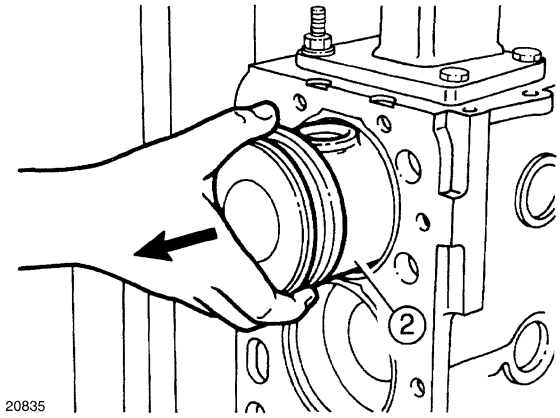
52. Slacken screws (8) securing the hydraulic steering restrainer plate and move upowards the slotted plate (9).

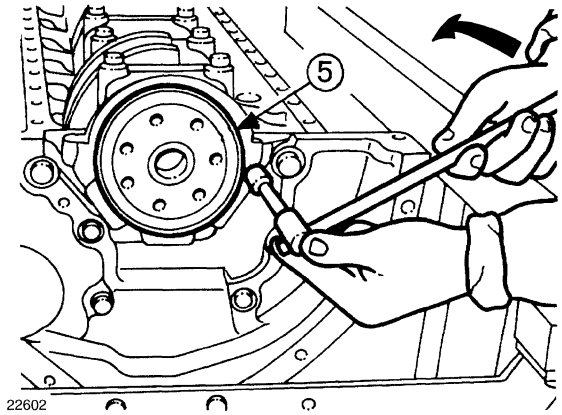
60. Remove the crankcase–timing gear case gasket.



61. Turn engine 90°, undo holding screws (**C_3**) and remove connecting rod bearing caps and shells.

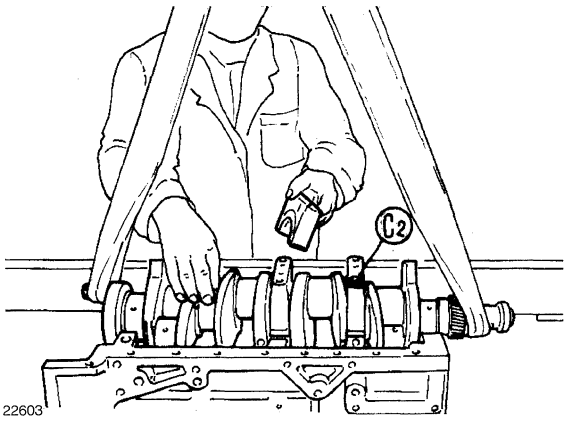


62. Slide out pistons (2) together with piston rings , pins and connecting rods.



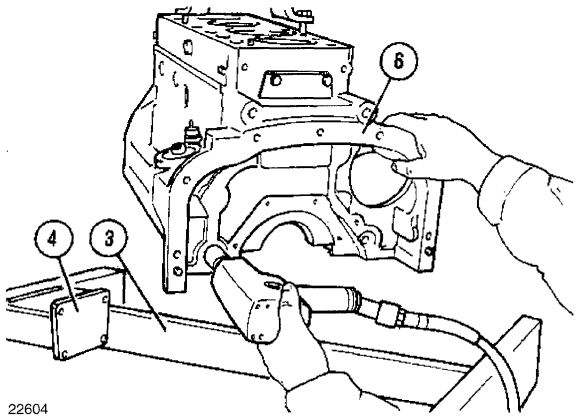
63. Return engine to horizontal position by turning it about 90° on the rotary stand, undo the holding screws (**C_4**) and then remove the flywheel using a hoist and the **290740/1** sling hook.

64. Undo holding screws (**C_{19}**) then remove the rear cover (5) together with seal.



65. Undo holding screws (**C_2**) then remove the main bearings and shells and recover the thrust washers un the main bearing before the last one shown in the figure.

66. Remove the engine crankshaft, using a suitable hoist and a nylon rope, and ,also, the bearings, thrust washers and valve tappets.



67. Turn the engine crankcase 180° on the **290090** rotary stand (3), attach the chain with eyelets to the crankcase as shown in the figure, pull the chain until slightly pre–loaded by means of the hoist and **290740/1** sling hook and finally undo the engine–rotary stand (3) and bracket (4) holding screws (**293860** set).

68. Lift up the engine crankcase, off the rotary stand.

69. Undo holding screws then remove the crankcase rear bracket (6) and gasket.

Note: operations 70 thru 78 which follow and concerning the disassembly of the balancer unit apply to the 4–cylinder engines only.

ENGINE CRANKCASE MAIN DATA	mm (in)	
	100 mm bore	104 mm bore
Crankcase	cast–iron block with dry and replaceable cylinder liners and crankshaft, camshaft and tappet housing bores	
Cylinder liner I.D.	100.000 ÷ 100.024 (1) (3.9370 ÷ 3.9379)	104.000 ÷ 104.024 (1) (4.0560 ÷ 4.0569)
Cylinder liner O.D.	103.020 ÷ 103.050 (4.0178 ÷ 4.0189)	107.020 ÷ 107.050 (4.1738 ÷ 4.1749)
Cylinder liner housing bore in crankcase, dia.	102.850 ÷ 102.900 (4.0112 ÷ 4.0131)	106.850 ÷ 106.900 (4.6720 ÷ 4.1691)
Interference fit of liners and housing bores	0,120 ÷ 0,200 (.0047÷ .0078)	
Oversized liner I.D.	0,4 ÷ 0,8 0.120 ÷ 0.200	
Oversized liner O.D.	0.2 (.008)	
Maximum permissible liner ovality or taper due to wear (2)	0.12 (.005)	
Main bearing housing bore dia.	84.200 ÷ 84.230 (3.2838 ÷ 3.2850)	
Camshaft bushing housing bore dia.:		
– front	54.780 ÷ 54.805 (2.1364 ÷ 2.1374)	
– intermediate	54.280 ÷ 54.305 (2.1169 ÷ 2.1179)	
– rear	53.780 ÷ 53.805 (2.0974÷ 2.0984)	
Tappet housing bore dia.	15.000 ÷ 15.018 (.5850 ÷ .5857)	
Spare tappet oversizes	0,1 – 0,2 – 0,3 (.004 – .008 – .012)	

(1) After press–fitting and reaming.
(2) Measure piston ring working area, in parallel and perpendicularly with respect to engine axis.

CHECKS – DIMENSIONS – REPAIRS (crankcase and cylinder head)

Before starting make sure to thoroughly clean all loose parts to be assembled.

Note – Cylinder liners inside diameter should never be measured when parts are loose because subject to deformations: always measure it once liners are press–fitted in place.

Check cylinder liner wear as follows:

– measure the I.D. on the (X, page 64) area delimitated by the piston ring stroke;

– measure both upper and lower sections of this area at the (a) axis, parallel to the engine crankshaft, and at the (b) axis, perpendicular to it;

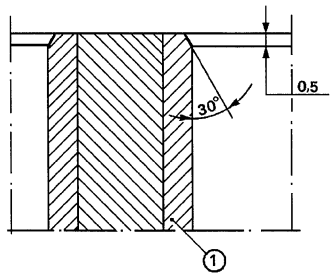
– compare readings to determine liner ovalization or taper.

Instead, to check the piston running clearance, measure the I.D. of each liner in the (Z) area, solely along the (b) axis, perpendicular to the engine crankshaft.

In case ovalization or taper exceed 0.12 mm (.005 in), or should the piston running clearance exceed 0.3 mm (.012 mm), proceed to re–bore and grind (or replace) the liners up to one of the oversizes specified in the table.

In this case, mate oversized liners and pistons of the same class (see page 10–69).

Note – In case of re–boring, all liners of the same engine must be processed the same way.



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After re–boring, mill the 0.5 mm (.02 mm) – 30° chamfer on liner (1).

VALVE TIMING GEAR MAIN DATA	mm (in)	
	100 mm bore	104 mm bore
Timing gear tooth backlash	0.160 (.0062)	
Idler gear bushings I.D. (press fitted and reamed)	37.050 ÷ 37.075 (1.4586 ÷ 1.4596)	
Idler gear jack shaft diameter	36.975 ÷ 37.000 (1.4557 ÷ 1.4567)	
Jack shaft journal clearance in bushing	0.050 ÷ 0.100 (.002 ÷ .004)	
Max. running clearance (wear limit)	0.15 (.006)	
Bushing interference fit in idler gear	0.063 ÷ 0.140 (.0025 ÷ .0055)	
Camshaft bushing O.D.:		
– front	54.875 ÷ 54.930 (2.1604 ÷ 2.1626)	
– intermediate	54.375 ÷ 54.430 (2.1407 ÷ 2.1429)	
– rear	53.875 ÷ 53.930 (2.1210 ÷ 2.1232)	
Bushing interference fit in housing	0.070 ÷ 0.150 (.0028 ÷ .0059)	
Camshaft bushing I.D. (press fitted and reamed):		
– front	51.080 ÷ 51.130 (2.011 ÷ 2.013)	
– intermediate	50.580 ÷ 50.630 (1.9913 ÷ 1.9933)	
– rear	50.080 ÷ 50.130 (1.9716 ÷ 1.9736)	
Camshaft journal diameter:		
– front	50.970 ÷ 51.000 (2.0067 ÷ 2.0079)	
– intermediate	50.470 ÷ 50.500 (1.9870 ÷ 1.9882)	
– rear	49.970 ÷ 50.000 (1.9673 ÷ 1.9685)	
Camshaft journal clearance in bushing	0.080 ÷ 0.160 (.0031 ÷ .0063)	
Max. running clearance (wear limit)	0.20 (.008)	
Camshaft end float (between thrust plate and seat)	0.070 ÷ 0.220 (.0028 ÷ .0087)	
For additional valve gear timing data	see page 10–3	

VALVE TAPPET MAIN DATA	mm (in)	
	100 mm bore	104 mm bore
Tappet seat diameter in crankcase	15,000 ÷ 15,018 (.5905 ÷ .5912)	
Standard tappet O.D.	14,950 ÷ 14,970 (.5885 ÷ .5894)	
Tappet clearance in crankcase seats	0,030 ÷ 0,068 (.0012 ÷ .0027)	
Max. clearance (wear limit)	0.15 (.006)	
Spare tappet oversizes	0.1 – 0.2 – 0.3 (.004 – .008 – .012)	

(continued)

FLYWEIGHT–TYPE DYNAMIC BALANCER (*)	(*) installed on 4–cylinder engines only mm (in)
Interference fit of bushings (32) in gear (19)	0.063 ÷ 0.140 (.0025 ÷ .0055)
Idler gear jack shaft (2) clearance in bushings (32)	0.050 ÷ 0.100 (.0020 ÷ .0040)
Interference fit of bushings in bearing seat (16)	0.063 ÷ 0.140 (.0025 ÷ .005)
Running clearance of gear (18) shaft and bushings	0.050 ÷ 0.100 (.0020 ÷ .0040)
Tooth backlash on splined sections of sleeve (13), connecting drive box gear (18) and flyweight drive gear (11)	0.038 ÷ 0.106 (.0015 ÷ .0042)
Interference fit of front bushing (33) and bore in balancer housing (10)	0.063 ÷ 0.140 (.0025 ÷ .0055)
Running fit of flyweight drive shaft (11) and front bushing (33)	0.050 ÷ 0.100 (.0020 ÷ .0040)
Interference fit, drive gear rear bushing (11) and seat (28)	0.037 ÷ 0.101 (.0014 ÷ .0040)
Gioco fra albero comando (11) e relativa boccola posteriore	0.013 ÷ 0.061 (.0005 ÷ .0024)
Interference fit of bushings in flyweight (27) housing	0.040 ÷ 0.100 (.0016 ÷ .0040)
Clearance of flyweight jack shaft (26) in bushings	0.020 ÷ 0.073 (.0008 ÷.0029)
Interference fit of idler gear (34) bushing in flyweight housing (10) bore	0.037 ÷ 0.101 (.0014 ÷ .0040)
Running fit of idler gear (34) shaft and bushing	0.013 ÷ 0.061 (.0005 ÷ .0024)
Meshed gear tooth backlash	0.080 (.0031)

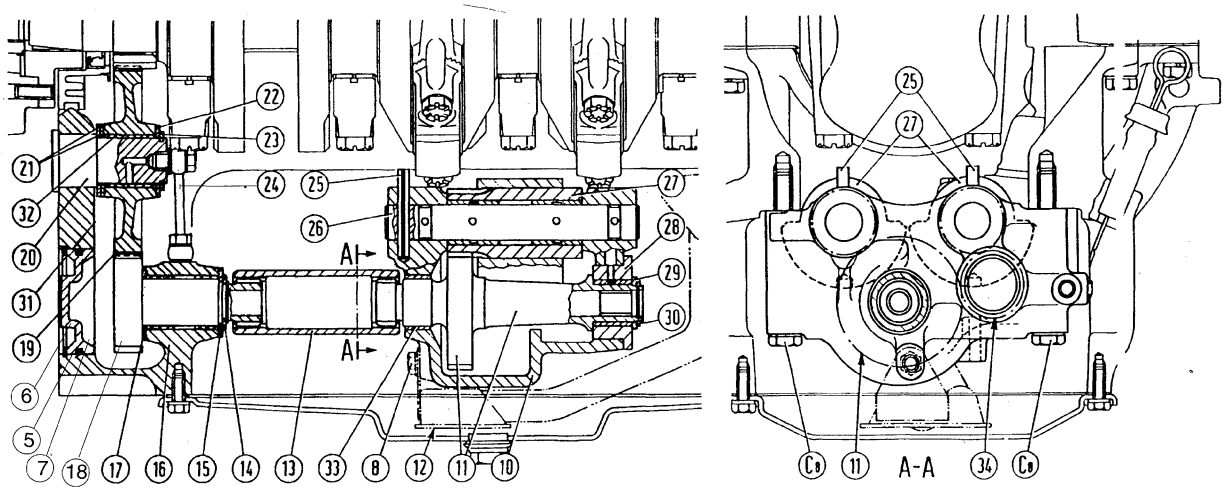
CHECKS, DIMENSIONS AND REPAIRS (FLYWEIGHT–TYPE DYNAMICBALANCER

Before starting make sure to thoroughly clean all loose parts to be assembled.

Check parts wear and replace defective ones.

In case of replacement, force fit the flyweight bushings inside their housing bores after pre–heating them in oil at 140° to 160°C (284 to 320°F) temperature.

Ream the new bushing I.D. after fitting, using expansible–blade reamers, conforming to tolerances and specifications given in the table of data.



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Sectional view of the flyweight–type dynamic balancer

C_8. Flyweight housing holding screws on engine sump – 5. O–ring seal – 6. Circlip – 7. Cover – 8. Gauze filter holding screws on flyweight housing (10) – 10. Flyweight housing – 11. Flyweight drive gear – 12. Wire gauze filter – 13. Connecting sleeve – 14. Circlip – 15. Thrust washer – 16. Gear (18) housing – 17. Thrust washer – 18. Gear with flyweight drive – 19. idler gear – 20. Idler gear (19) axle – 21 and 22. Thrust washers – 23. Circlip – 24. Bushing lubrication tubelet – 25. Axle (26) retaining split pin – 26. Flyweight rotation axle – 27. Flyweights – 28. Flyweight drive gear (11) support – Thrust washer – 30. Circlip – 32 and 33. Bushings – 34. Flyweight drive idler gear.

BOSCH INJECTION PUMP
Removal–Installation, timing check and air bleeding (Operation 10 246 14)

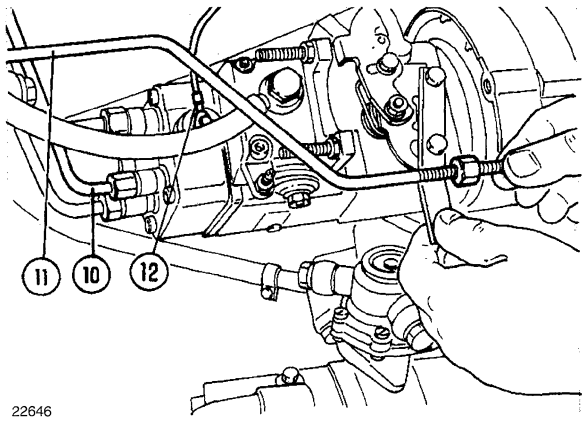
⚠ CAUTION ⚠

Handle all parts carefully. Do not put hands and fingers between parts.
Wear accident prevention clothing and accessories such as goggles, gloves and safety shoes.

⚠ CAUTION ⚠

Use suitable tools to align holes. DO NOT USE FINGERS OR HANDS.

For removal, proceed in the following sequence.



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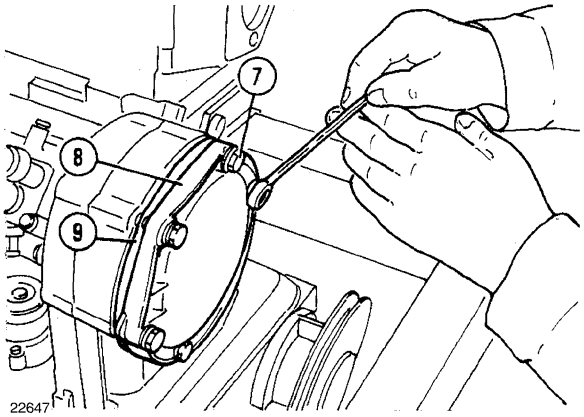
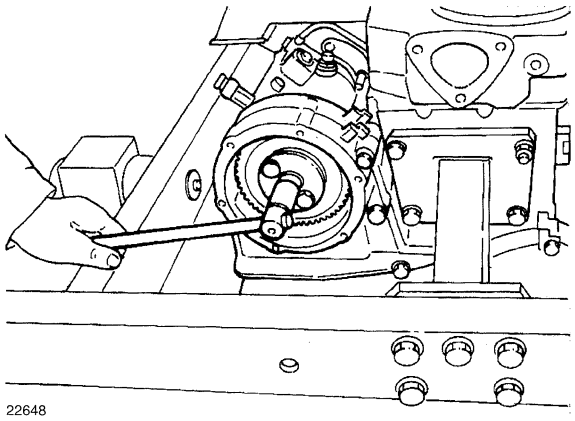
1. Lift up the hood, disconnect the battery positive (+) cable and insulate it, remove the hand throttle control rod (11).
2. Disconnect the engine shut–off solenoid cable (12).
3. Turn off the fuel tap and remove the injection pump feed line.
4. Unscrew connections and remove the fuel high pressure pipes (10) from the pump and injectors.
5. Remove the filter–injection pump connecting line.

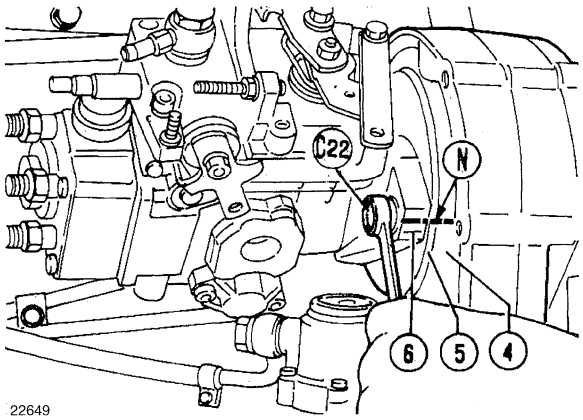


22647

6. Undo holding screws (7), remove front cover (8) and gasket (9). We suggest making a reference paint mark on meshed teeth of gears (5 and 6, page 10–94) to have a visual gear timing control when refitting the pump.


22648

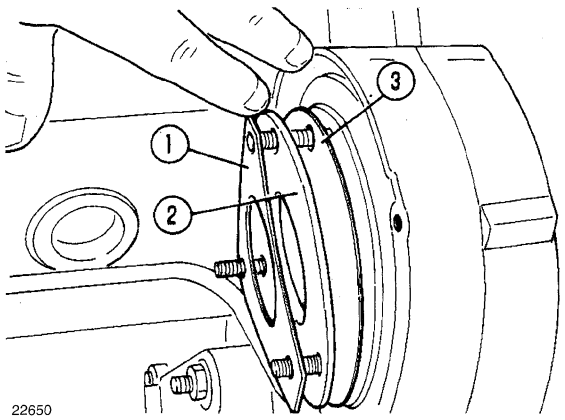
7. Pull out the pump drive gear by turning the central nut counterclockwise.



22649

8. Before removing the pump, make sure that the timing marks (N) stamped on protection (4), pump (6) and spacer (5) are clearly visible.

9. Undo holding screws (C_{22}) and retrieve the injection pump.



22650

10. Recover the gasket (1), spacer (2) and seal (3).

10"/10" LUK CLUTCH (50V, 55V, 55F TRACTORS)

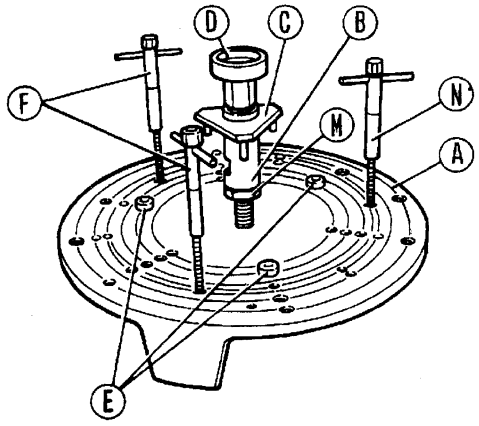
Type	dry, twin–disc clutch
Controls	mechanical: foot–control for main clutch, hand lever for P.T.O clutch
Release mechanism	single release dish spring
Driven plate lining	organic
Driven plate thickness:	
— main clutch mm (in)	10.1 ÷ 10.5 (.397 ÷ .413)
— P.T.O clutch mm (in)	8.5 ÷ 8.9 (.334 ÷ .350)
— wear limit	see page 18–13
Assembly clearance of main clutch throw–out collar mm (in)	0.050 ÷ 0.151 (.0019 ÷ .0059)
Assembly clearance of P.T.O clutch throw–out collar mm (in)	0.060 ÷ 0.180 (.0024 ÷ .0071)
Release lever alignment adjustment	see page 18–14
Main and P.T.O clutch control adjustment	see page 18–16

11"/11" LUK CLUTCH (60V, 60F, 62F, 70V, 72F, 72LP, 82F, 82LP TRACTORS)

Type	dry, twin–disc clutch
Controls	mechanical: foot–control for main clutch, hand lever for P.T.O. clutch
Release mechanism	single release dish spring
Driven plate facing:	
— main clutch:	
● standard on all models	organic material
● optional on 62F, 72F, 82F tractors	cerametallic facing
— P.T.O. clutch (all tractor models)	organic material
Driven plate thickness:	
— main clutch:	
● organic material (standard) mm (in)	9.7 ÷ 10.3 (.382 ÷ .406)
● on 62F, 72F, 82F tractors with cerametallic facing (optional) mm (in)	9.6 ÷ 10.4 (.378 ÷ .409)
— P.T.O. clutch mm (in)	7.3 ÷ 7.9 (.287 ÷ .311)
— wear limit	see pages 18–18 and 18–19
Assembly clearance of main clutch throw–out collar mm (in)	0.050 ÷ 0.151 (.0019 ÷ .0059)
Assembly clearance of P.T.O. clutch throw–out collar mm (in)	0.060 ÷ 0.180 (.0024 ÷ .0071)
Release lever alignment adjustment	see page 18–20
Main and P.T.O. clutch control adjustment	see pages 18–22 and 18–23

10"/10" LUK or VALEO CLUTCH OVERHAULING AND ADJUSTMENT (Operation 18 110 30 or 18 110 31).

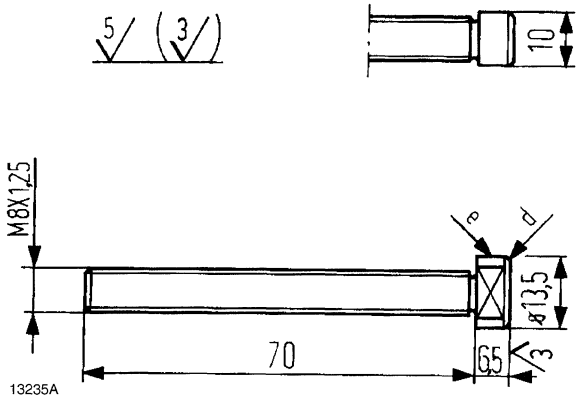
Clutch disassembly, re–assembly and adjustment are carried on using the **293650** clutch universal service kit or the **291291/2** clutch service kit.



22686

291291/2 clutch kit components necessary to adjust the 10"/10" VALEO or LUK clutches.

A. **292598** plate – B. **292450** central spacer – C. **293731** gauge – D. Spacer–gauge mounting **292344** nut – E. **50003** side spacers (self–made in the workshop) –. F. **291292/1** rod – M. M16x1.5 nut – N. **293737** spacers (for VALEO clutch only).

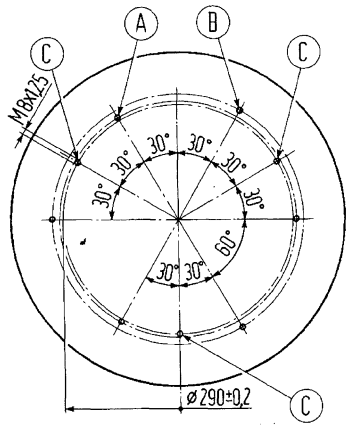


13235A

Working drawing of the self–made 50003 spacers for the 291291/2 clutch service kit (10"/10" LUK and VALEO clutches). Metric dimensions.

d = 1 mm (.04 in) chamfer – e = etch tool number (**50003**) – Use R80 steel for making the spacer.

For the **291291/2** clutch service kit only, make the three **50003** side spacers according to the working drawing and material specifications of the above figure.



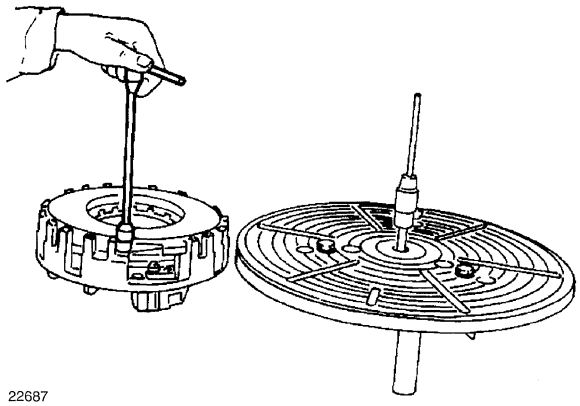
16278

Modification to be made on 292598 plate of 291291/2 service kit

A, b. Existing holes on the 295 mm dia. and 314 mm dia. – C. Holes to be drilled on the 290 mm dia.

In addition, modify the **292598** plate of the **291291/2** clutch service kit by drilling the three M8x1.25 holes on the 290 mm dia. circumference (follow indications given in the figure above).

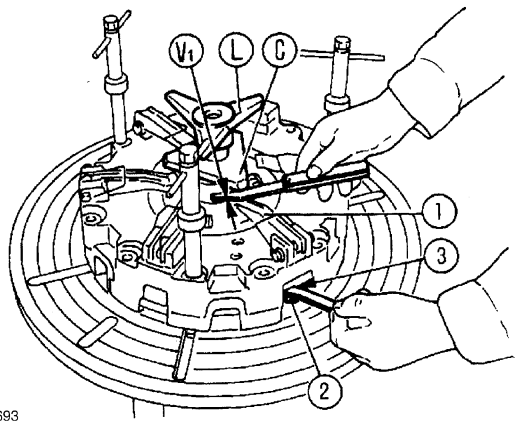
Note – Applying to the VALEO clutch only.


22687

1. Before installing the VALEO clutch on the **291291/2** service kit or on the **293650** universal kit we suggest removing from the clutch housing the three P.T.O. clutch pressure ring drag keys holding screws.

To install the LUK or VALEO clutches on the 291291/2 service kit, proceed as follows:

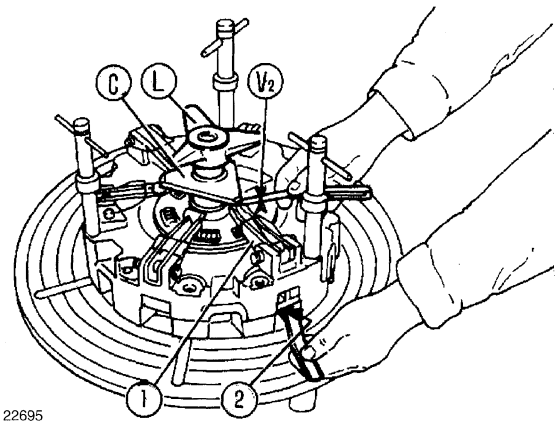
— place the central spacer (B) on plate (A) and position it, with respect to the gauge (G) supporting plane, 126 mm (5 in) higher than the plate (A) supporting surface, then lock it in place with nut (M);



22693

Checking and adjusting on the workbench the complanarity of the main clutch (LUK or O.M.G.) release levers using the 293650 universal kit.

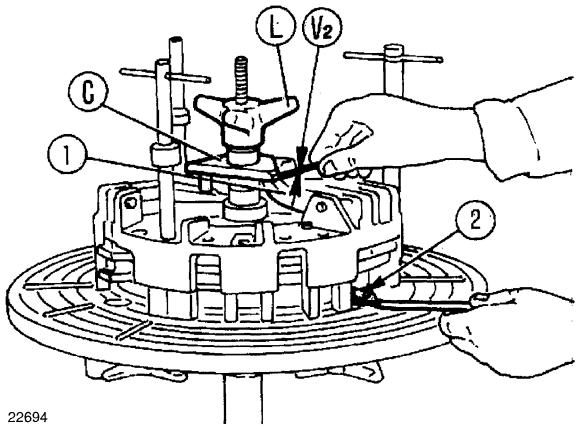
— Screw on or back off the main clutch release lever (1) set screws (2) until obtaining the clearance (V_1 = 0.1 mm – .004 in) between the ends of the gauge (C) pins and the main clutch release levers, then torque tighten their locknuts (3) at 4.9 da Nm (kgm).



22695

Checking and adjusting on the workbench the complanarity of the LUK or O.M.G. clutch release levers using the 293650 universal kit.

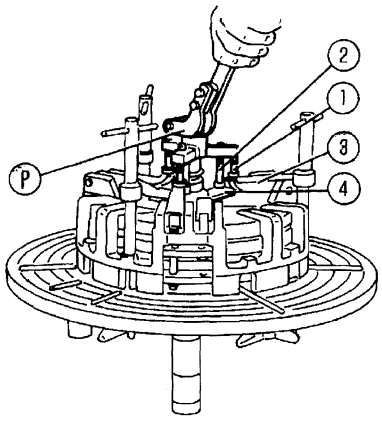
— After adjusting the clutch release levers, remove the **293739** wing screw (L) of the **293650** universal kit or nut (D, page 18–17) of the **291291/2** kit and the gauge (C).



22694

Checking and adjusting on the workbench the complanarity of the VALEO P.T.O. clutch release levers using the 293650 universal kit.

— Screw on or back off the P.T.O. clutch release lever (1) tie–rod set nuts (2) until obtaining the clearance (V_2 = 0.1 mm – .004 in) between the end of each release lever and the mating plane of gauge (C).



22696

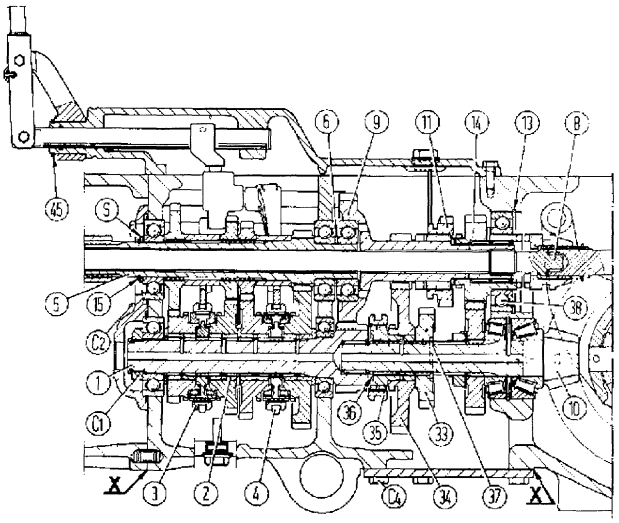
Checking the clutch release lever operation

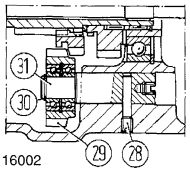
— Fit the **292176** compressor tool (P) on the kit base plate, adjust the length of screws (1) until aligned on the same plane (complanarity) and rest on the P.T.O. clutch release levers (3), then actuate the compressor tool (P) through its control lever, as shown in the figure to verify the P.T.O. clutch disengagement.

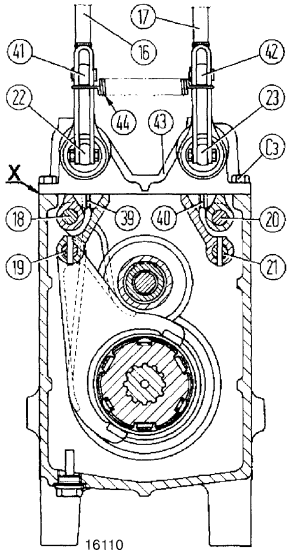
— Make then the screws (2) rest on the main clutch release levers (4) and verify that it will disengage.

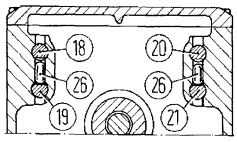
TORQUE WRENCH DATA – Model 50V – 55V – 70V – 55F – 60F tractors

DESCRIPTION	Thread size	Torque	
		Nm	kgm/ft–lb
Transmission and splitter			
Locknut, driven gear shaft (C_1)	M 32 x 1.5	294	30/217
Cap screws, transmission shaft bearing housings (C_2)	M 8 x 1.25	28	2.9/21
Cap screws, transmission case upper cover (C_3)	M 8 x 1.25	25	2,6/19
Cap screws, transmission case bottom cover (C_4)	M 10 x 1.25	59	6/43
Creeper speed – Reverser units			
Setscrews, creeper driven shaft lockplate or reverser driven shaft and intermediate gear axle (C_1, page 21–11 and 21–15)	M 12 x 1.25	67	6.8/49





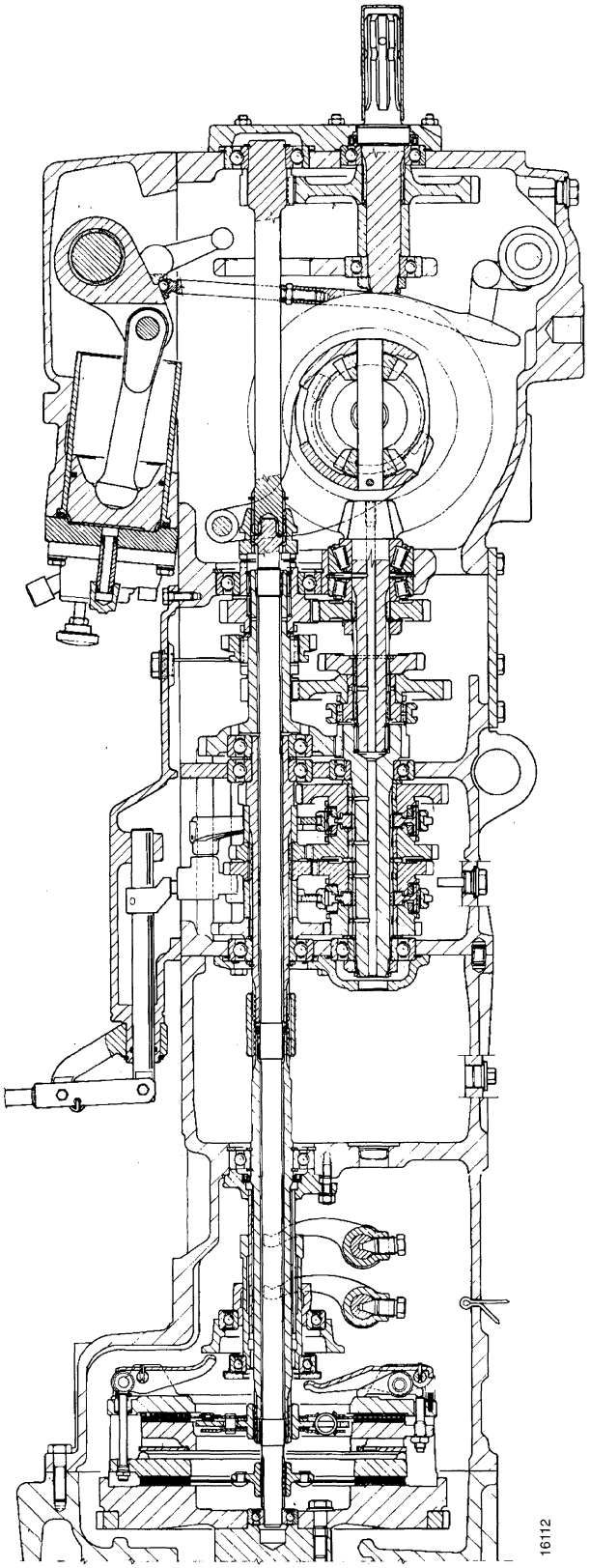




Longitudinal and cross–sections of the 12F + 4R transmission and splitter units – Model 50V – 55V – 60V – 70V – 55F – 60F tractors

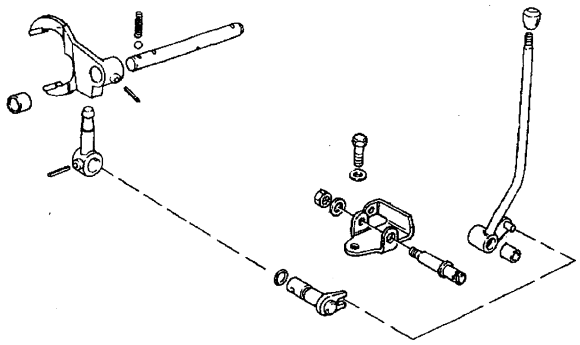
C_1. Driven gear shaft locknut – C_2. Bearing housing holding screws – C_3. Upper cover screws – C_4. Bottom cover screws – S. Drive shaft bearing adjustment shims – 1. Transmission driven shaft – 2. Transmission driven gear bearing bushings – 3. 3rd and 4th speed gear shift collar – 4. 1st and 2nd speed gear shift collar – 5.Transmission drive shaft – 6. Thrust washer – 8. Power take–off shaft – 9. Constant–mesh and creeper speed drive shaft – 10. Bevel pinion shaft – 11. Speed engagement gear through reverse gears – 13, 15, 30, 36 and 45. Circlips – 14. Medium range drive gear – 16. Transmission control lever – 17. Splitter control lever – 18. 1st and 2nd speed shift rail – 19. 3rd and 4th speed shift rail – 20. Low and high range shift rail 21. Medium range and reverse gear shift rail – 22. Transmission horizontal control rod – 23. Splitter horizontal control rod – 26. Range and gear shift detents – 28. Screw – 29. Reverse intermediate gear – 31. Reverser gear axle pin – 33. Reverse gear – 34. Low speed range driven gear – 35. Low speed range and transmission straight drive shift collar – 37. Half–rings – 38. Bearing – 39. Transmission control rod – 40. Splitter control rod 41. Transmission control lever articulation mount – 42. Splitter control lever articulation mount – 43. Transmission case cover – 44. Spring.

Note – At assembly, apply sealing compound on mating surfaces **X** following the instructions reported on page 1, section 00.



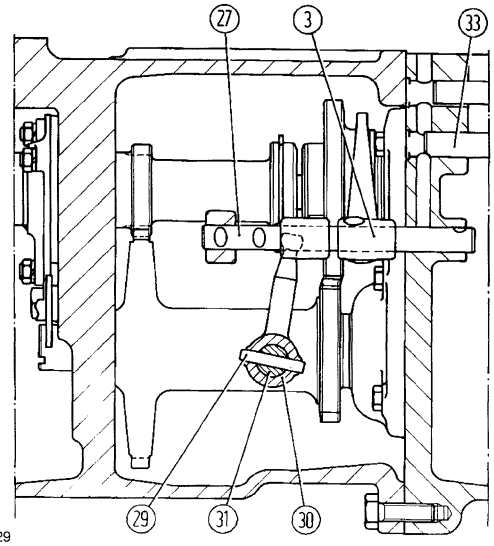
Longitudinal section of the 12 + 4 transmission – Model 50V – 55V – 60V – 55F – 60F and 70V tractors

REVERSER GEARS, SHAFTS AND BEARINGS
Model 50V – 55V – 60V – 70V – 55F – 60F tractors
Disassembly–Assembly (operations 2116217, 2116231 and 2116237) with clutch housing removed from the tractor



22728

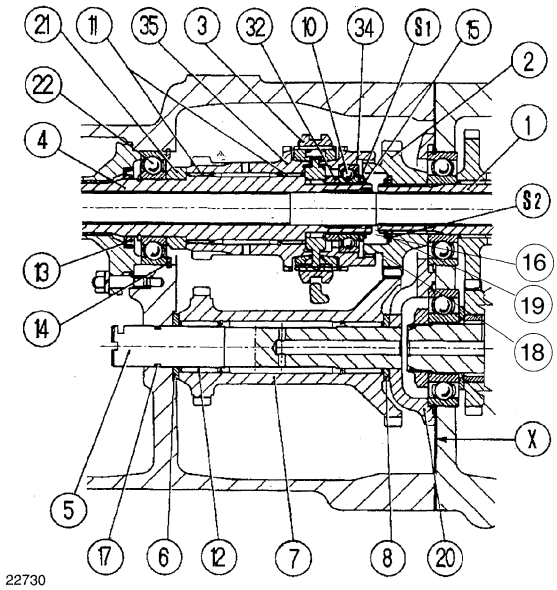
Exploded view of the reverser controls



22729

1. Remove shift rail set screw (27) and retrieve detent spring and ball.

2. Withdraw split pin (29), remove shift fork control lever (30) and partially withdraw in the outwards direction the shaft (31); if necessary, disassemble the reverser control device as shown in the exploded view illustrated above.



22730

3. Remove circlip (15), shim (S_1), collar (34) with ball bearing (10) and thrust ring (32).

4. Remove the synchromesh assembly (3), the reverser intermediate gear (7) with its needle bearing (12) and the front thrust ring (6).

5. Remove the reverser drive gear (35) complete with its needle bearing (11).

6. If necessary, remove circlip (14) and withdraw the clutch–reverser shaft (4) complete with bearing (22), thrust ring (21) and circlip (13), as an assembly.

Note – The previously described operations apply to the overhauling operations of the synchromesh reverser gears only.

Model 62F – 72F – 82F tractors, 30 km/h version

MAXIMUM NOMINAL SPEEDS IN KM/H (MPH) – 20 + 12 Var.113 (Creeper Speeds) TRANSMISSION						
RANGE / GEAR		TYRE SIZE				
FORWARD		14.5 – 20	380/70 – 24	420/70 – 24	13.6 – 28 380/70 – 28	14.9 – 28 (**)
Low C.S.	1st	*0.2 (.1)	*0.3 (.2)	*0.3 (.2)	*0.3 (.2)	*0.3 (.2)
	2nd	*0.4 (.2)	*0.4 (.2)	*0.5 (.3)	*0.5 (.3)	*0.5 (.3)
	3rd	*0.5 (.3)	*0.5 (.3)	*0.6 (.4)	*0.6 (.4)	*0.6 (.4)
	4th	*0.8 (.5)	*0.8 (.5)	*0.9 (.6)	*0.9 (.6)	*1.0 (.65)
Medium C.S.	1st	*0.6 (.4)	*0.7 (.45)	*0.7 (.45)	*0.7 (.4)	*0.7 (.4)
	2nd	*0.9 (.6)	*1.0 (.65)	*1.1 (.7)	*1.1 (.7)	*1.2 (.75)
	3rd	*1.1 (.7)	*1.2 (.75)	*1.3 (.8)	*1.4 (.9)	*1.4 (.9)
	4th	*1.8 (1.1)	*2.0 (1.2)	*2.1 (1.3)	*2.2 (1.4)	*2.3 (1.45)
Low	1st	1.4 (.9)	1.6 (1)	1.6 (1)	1.7 (1.1)	1.8 (1.15)
	2nd	2.2 (1.4)	2.4 (1.5)	2.5 (1.6)	2.6 (1.6)	2.7 (1.7)
	3rd	2.6 (1.6)	2.9 (1.8)	3.1 (1.9)	3.2 (2)	3.4 (2.1)
	4th	4.2 (2.6)	4.7 (2.9)	4.9 (3)	5.1 (3.2)	5.3 (3.3)
Medium	1st	3.3 (2)	3.6 (2.2)	3.8 (2.4)	4.0 (2.5)	4.2 (2.6)
	2nd	5.0 (3.1)	5.6 (3.5)	5.9 (3.7)	6.1 (3.8)	6.4 (4)
	3rd	6.2 (3.9)	6.9 (4.3)	7.2 (4.5)	7.5 (4.7)	7.9 (4.9)
	4th	9.8 (6.1)	10.9 (6.8)	11.5 97.1)	11.9 (7.4)	12.5 (7.8)
High	1st	7.7 (4.8)	8.6 (5.3)	9.0 (5.5)	9.4 (5.8)	9.8 (6.1)
	2nd	11.9 (7.4)	13.2 (8.2)	13.9 (8.6)	14.4 (8.9)	15.1 (9.4)
	3rd	14.5 (9)	16.2 (10.1)	17.0 (10.6)	17.6 (10.9)	18.5 (11.5)
	4th	23.1 (14.3)	25.8 (16)	27.1 (16.8)	28.0 (17.4)	29.4 (18.3)
REVERSE						
Low	1st	1.3 (.8)	1.5 (.9)	1.6 (1)	1.6 (1)	1.7 (1.1)
	2nd	2.0 (1.2)	2.3 (1.4)	2.4 (1.5)	2.5 (1.6)	2.6 (1.65)
	3rd	2.5 (1.6)	2.8 (1.7)	2.9 (1.8)	3.0 (1.9)	3.2 (2)
	4th	4.0 (2.5)	4.4 (2.7)	4.7 (2.9)	4.9 (3)	5.1 (3.2)
Medium	1st	3.1 (1.9)	3.5 (2.2)	3.6 (2.25)	3.8 (2.4)	4.0 (2.5)
	2nd	4.8 (3)	5.3 (3.3)	5.6 (3.5)	5.8 (3.6)	6.1 (3.8)
	3rd	5.9 (3.7)	6.5 (4)	6.9 (4.3)	7.1 (4.4)	7.5 (4.7)
	4th	9.3 (5.8)	10.4 (6.5)	11.0 (6.8)	11.3 (7)	11.9 (7.4)
High	1st	7.3 (4.5)	8.1 (5)	8.6 (5.3)	8.9 (5.5)	9.3 (5.8)
	2nd	11.3 (7)	12.6 (7.8)	13.2 (8.2)	13.7 (8.5)	14.3 (8.9)
	3rd	13.8 (8.6)	15.4 (9.6)	16.2 (10)	16.7 (10.4)	17.6 (10.9)
	4th	22.0 (13.6)	24.5 (15.2)	25.8 (16)	26.7 (16.6)	28.0 (17.4)

Model 62F – 72F – 82F tractors, 40 km version with high–speed bevel drive unit (DT version only)

MAXIMUM NOMINAL SPEEDS IN KM/H (MPH) – 20 + 12 Var. 720.113 + 720.320 or 324 (* Creeper speeds) TRANSMISSION						
RANGE / GEAR		TYRE SIZE				
FORWARD		14.9 – 28 (**)	13.6 – 28 380/70 – 28	380/70 – 24	14.5 – 20	420/70 – 24
Low C.S.	1st	*0.4(.2)	*0.4 (.2)	*0.3 (.2)	*0.3 (.2)	*0.4 (.2)
	2nd	*0.6 (.4)	*0.6 (.4)	*0.5 (.3)	*0.5 (.3)	*0.6 (.4)
	3rd	*0.7 (.45)	*0.7 (.45)	*0.6 (.4)	*0.6 (.4)	*0.7 (0.45)
	4th	*1.2 (.75)	*1.1 (.7)	*1.0 (.6)	*0.9 (.6)	*1.1 (.7)
Medium C.S.	1st	*0.9 (.6)	*0.9 (.6)	*0.8 (.5)	*0.7 (.45)	*0.8 (.5)
	2nd	*1.4 (.9)	*1.4 (.9)	*1.2 (.7)	*1.1 (.7)	*1.3 (.8)
	3rd	*1.7 (1)	*1.7 (1)	*1.5 (.9)	*1.4 (.9)	*1.6 (1)
	4th	*2.8 (1.7)	*2.6 (1.6)	*2.4 (1.5)	*2.2 (1.4)	*2.6 (1.6)
Low1st		2.2 (1.4)	2.1 (1.3)	1.9 (1.2)	1.7 (1)	2.0 (1.2)
	2nd	3.4 (2.1)	3.2 (2)	2.9 91.8)	2.6 (1.6)	3.1 (1.9)
	3rd	4.1 (2.5)	3.9 (2.4)	3.6 92.2)	3.2 (2)	3.8 (2.4)
	4th	6.5 (4)	6.2 (3.9)	5.7 (3.5)	5.1 (3.2)	6.0 (3.7)
Medium,	1st	5.1 (3.2)	4.8 (3)	4.4 (2.7)	4.0 (2.5)	4.7 (2.9)
	2nd	7.8 (4.8)	7.5 (4.7)	6.9 (4.3)	6.2 (3.9)	7.2 (4.5)
	3rd	9.6 (6)	9.1 (5.7)	8.4 (5.2)	7.5 (4.7)	8.9 (5.5)
	4th	15.3 (9.5)	14.6 (9.1)	13.4 (8.3)	12.0 (7.5)	14.1 (8.8)
High	1st	12.0 (7.5)	11.4 (7.1)	10.5 (6.5)	9.4 (5.8)	11.0 (6.8)
	2nd	18.5 (11.5)	17.6 (10.9)	16.2 (10.1)	14.5 (9)	17.0 (10.6)
	3rd	22.6 (14)	21.5 (13.4)	19.8 (11.9)	17.8 (11.1)	20.8 (12.9)
	4th	36.0 (22.4)	34.3 (21.3)	31.5 (19.6)	28.3 (17.6)	33.2 (20.6)
REVERSE						
Low	1st	2.1 (1.3)	2.0 (1.2)	1.8 (1.1)	1.6 (1)	1.9 (1.2)
	2nd	3.2 (2)	3.0 (1.9)	2.8 (1.7)	2.5 (1.6)	2.9 (1.8)
	3rd	3.9 (2.4)	3.7 (2.3)	3.4 (2.1)	3.1 (1.9)	3.6 (2.2)
	4th	6.2 (3.9)	5.9 (3.7)	5.4 (3.4)	4.9 (3)	5.7 (3.5)
Medium	1st	4.8 (3)	4.6 (2.9)	4.2 (2.6)	3.8 (2.4)	4.5 (2.8)
	2nd	7.4 (4.6)	7.1 (4.4)	6.5 (4)	5.9 (3.7)	6.9 (4.3)
	3rd	9.1 (5.7)	8.7 (5.4)	8.0 (5)	7.2 (4.5)	8.4 (5.2)
	4th	14.5 (9)	13.8 (8.6)	12.7 (7.9)	11.4 (7.1)	13.4 (8.3)
High	1st	11.4 (7.1)	10.8 (6.7)	9.9 (6.1)	8.9 (5.5)	10.5 (6.5)
	2nd	17.4 (10.8)	16.7 (10.4)	15.3 (9.5)	13.8 (8.6)	16.2 (10.1)
	3rd	21.5 (13.4)	20.5 (12.7)	18.8 (11.7)	16.9 (10.5)	19.8 (12.3)
	4th	34.2 (21.2)	32.6 (20.2)	29.9 (18.6)	26.9 (16.7)	31.5 (19.6)

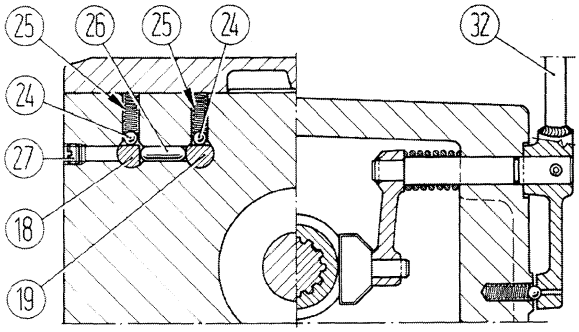
(**) Do not apply to model 62F.

TRANSMISSION–REAR DRIVE CASE
Model 62F – 72F – 82F – 72LP – 82LP tractors
Removal–Installation (Operation 2111810)

Proceed as illustrated on page 21–18.

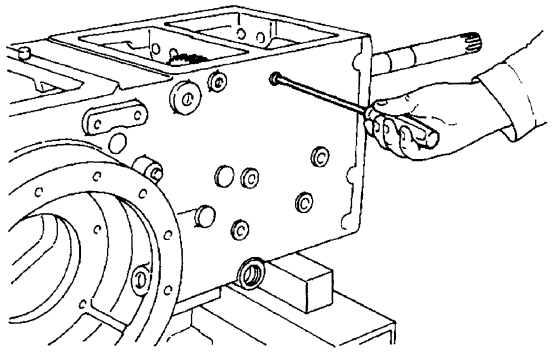
Prior to implementation of any further operation, carry on the preliminary disassemblies, following instructions of page 21–19, necessary for the subsequent installation of the transmission case on the revolving stand.

INSIDE COMPONENTS – Model 62F – 72F – 82F – 72LP – 82LP tractors Disaaembly–Assembly of transmission case removed from tractor (Operations 2114840 – 2114842 – 2114844 – 2114848 – 2114860 – 2114862 – 2114868).



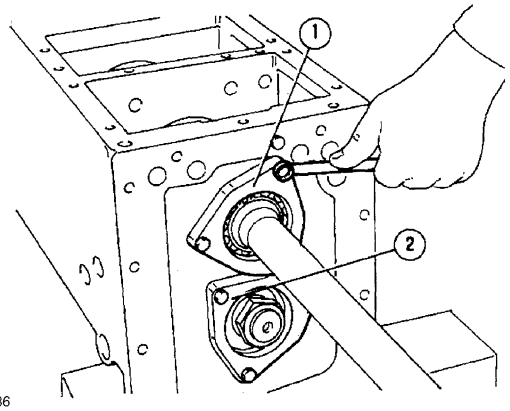
13025

1. Remove the transmission and splitter shift rails (18,19 and 20,21, respectively, see page 21–35) and retrieve their respective detent springs (25) and balls (24).



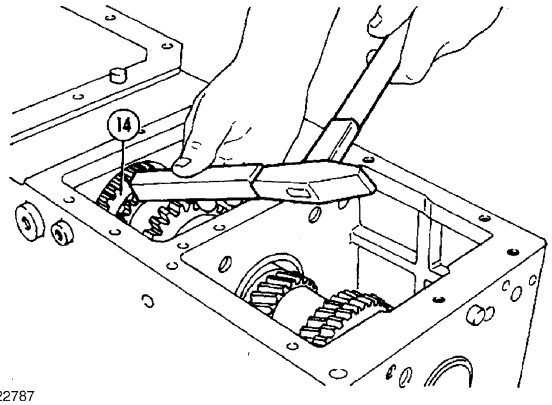
22785

2. Undo the two screws (27) on both sides of the transmission case and then remove the speed range selection detent pawls (26).



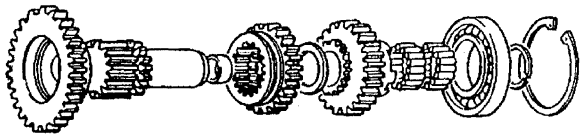
22786

3. Remove the transmission front bearing housings (1 and 2), shift into any two gears.



22787

4. Undo the splitter drive shaft (9) rear bearing (38) retaining circlip (13, page 21–35) and then remove the medium speed range drive shaft (14) together with ball bearing (38) and needle bearing, proceeding as shown in the accompanying figure.



22720

Exploded view of the constant–mesh and creeper speed drive shaft

5. Withdraw the constant–mesh and creeper speed drive shaft (9) complete with the medium range speed and reverse gear (11).

CAUTION

Use suitable tools to align holes. DO NOT USE FINGERS OR HANDS.

12. ASSEMBLY

Assemble parts in their housing in accordance with the following instructions and information:

a. make sure that the housing is duly clean, inside compartments in particular;

b. proceed by reversing the previous disassembly sequence of operations starting from no. 11 back to no. 1;

c. consult the preceding figures and exploded views to make sure that parts are correctly positioned;

d. after assembly of component parts on the clutch–reverser shaft (4, page 21–56) check for an **end play G = 0 ÷ 0.1 mm (0 ÷ .04 in)** between the retaining circlip (15) and thrust ring (31); if not, replace shim **(S)** with another of a suitable thickness.

The following shim thicknesses are available: 13.00 – 13.20 – 13.40 – 13.60 mm with a ± 0.05 mm tolerance (.512 – .520 – .528 – .535 ± .002 in).

e. prior to the installation of housings, bearing housings and covers, thoroughly clean and degrease mating surfaces and apply a round strip of sealing compound, about 2 mm (.08 in) thick, following the scheme indicated in the respective sections of the Manual.

f. tighten fastenings to the torque data of page 21–35.

TORQUE WRENCH DTA

DESCRIPTION	Thread size	Torque	
		Nm	kgm/lb
Steering knuckle capscrew (C_5, pages 25–6,8,10), excluding model 50VDT – 55VDT – 60VDT tractors	M 12 x 1.25	113	11.5/83
Wheel hub bearing lock ring (C_6)			
— models 50VDT – 55VDT – 60VDT	M 85 x 2	392	40/289
— models 55FDT – 60FDT – 70VDT – 62FDT – 72FDT – 82FDT 72LPDT – 82LPDT	M 45 x 1.5	See page 25–18, operations 11÷14	
Final drive housing capscrew (C_7, pages 25–4,6,8,10): All models	M 10 x 1.25	64	6.5/47
Wheel rim/disc bolt nut: All models	M 14 x 1.5	216	22/159
Live front axle Axle pivot support capscrew (C_9, pages 25–7 and 9), models 50VDT – 55VDT – 60VDT excluded	M 18 x 1.5	392	40/289
Differential bearing cap capscrew (C_{10}, pages 25–5,7,9):			
— Models 55FDT – 60FDT – 70VDT – 62FDT 72FDT – 82FDT – 72LPDT – 82LPDT	M 12 x 1.25	113	11.5/83
— Models 50VDT – 55VDT – 60VDT (see page 25–16)	—	—	—

SERVICE TOOLS

Attention – Operations included in this section of the Manual must be performed using the **ESSENTIAL** tools further evidenced by the identification code **X**.
Besides, to work safely and achieve the best technical results, with additional savings of time and fatigue, these mandatory tools should be used jointly with the recommended special tools listed below and furtherintegrated with the self–made ones for the construction of which you will find the necessary working drawings and material specifications directly in this Manual.

List of the special tools necessary to carry on the service operations concerning this section of the Manual.

293460 Stand, overhaul, front axle (all models).

293743 Support, fron differential housing overhaul (all models).

293785 Wrench, front bevel pinion lock ring, w/ **293782/1** (models 55F – 60F – 70V – 62F – 72F – 82F – 72LP – 82LP).

293782/1 Wrench, front bevel pinion, w/**293785** (models 55F – 60F – 70V – 62F – 72F – 82F – 72LP – 82LP).

293510 Gauge, live front axle wheel bearings, in alternative to **293752** and **293438/2** special tools.

293951 Torque wrench, bevel pinion check (models 50VDT – 55VDT – 60VDT).

293752 Adjuster, front bevel pinion bearing (models 50VDT – 55VDT – 60VDT).

293438/2 Adjuster, front bevel pinion bearing (models 55FDT – 60FDT – 62FDT – 72FDT – 82FDT – 72LPDT – 82LPDT).

293400/1 Gauge, front bevel pinion (all models).

293544 Wrench, front differential bearing lock ring (all models).

293837 Wrench, live front axle bearing lock ring (models 55FDT – 60FDT – 70VDT – 62FDT – 72FDT – 82FDT – 72LPDT – 82LPDT).

293655 Wrench, live front axle bearing lock ring (models 50VDT – 55VDT – 60VDT).

291525 Centralizers (M10x1.25), front final drive cover (all modelas).

293812 Centralizrs (M16x1.25), front wheel disassembly/assembly (all models).

X 293857/1 Remover, live front axle pivot (all models).

X 292161 Remover, live front pivot bearing outer race (all models).

X 292220/4 Adapter, front axle bearing rotating torque tester (all models).

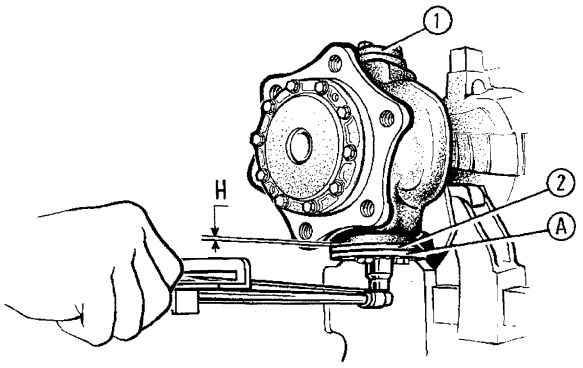
7. Re–assemble loose parts by reversing the previous disassembly sequence of operations and referring to the section illustrated on page 25–12 for the correct fitting of parts.

8. Prior to reassembly of the steering knuckle carrier, insert articulated axle shaft (5) in case and lubricate the inside of the bushing with **TUTELA MULTI F** oil.

9. At installation, fill wheel hub inside compartments with **TUTELA G9** grease and, finally, fit the side cover and tighten capscrews (C_7) to the torque specified on page 25–3.

Adjust wheel hub bearing pre–load as further indicated.

10. Check bearing outer races in axle case and associated seals for wear and pack with **TUTELA G9** grease.



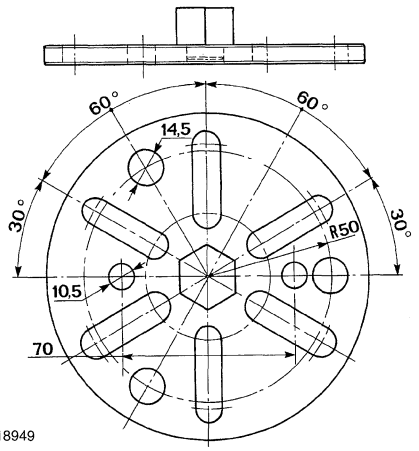
9513

11. Install top cover cover (1) without shims.

12. Torque capscrews (C_4, page 25–12) at the value specified on page 25–2.

13. Install bottom cover (2) without shims using three capscrews previously lubricated with engine oil.

14. Tighten, progressively and in alternative sequence, the three bottom cover capscrews, apply a torque wrench to the **292220/4** (A) tool and tighten until the carrier swings at 18÷22 Nm (1.8÷2.2 kgm – 13÷16 ft–lb), without taking starting torque into account.



18949

Modifications to be made on the 292220 tool for checking the roll torque of the front axle knuckle king pin (tool number becomes 292220/4)

15. Using a feeler gauge, measure gap (H) between bottom cover and carrier alongside the capscrews.

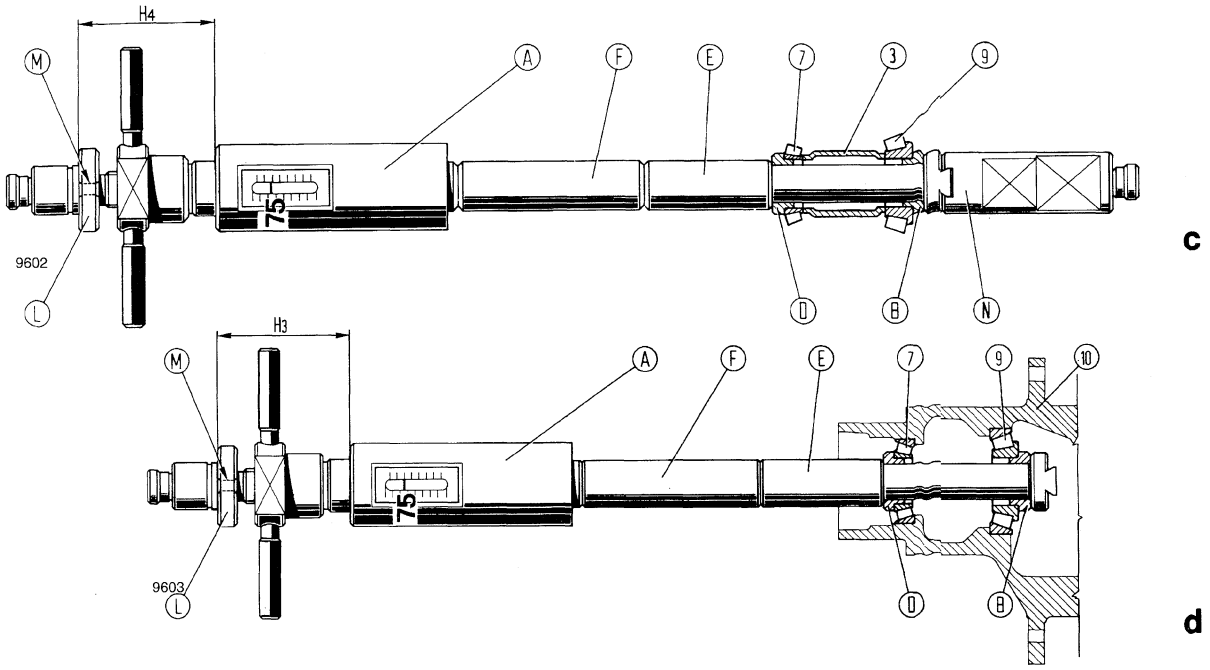
16. Thickness of shims (S_3, page 25–12) under bottom cover will be given by the arithmetical average of readings.

17. Partially slacken bottom cover capscrews (C_4), insert shims (S_3) and tighten capscrews to the torque on page 25–2.

18. Swing carrier several times to settle the bearings and, using a torque wrench and the **292220/4** (A) tool, check that the torque required to swing the carrier is 18÷22 Nm (1.8÷2.2 kgm – 13÷16 ft–lb).

19. If a higher torque is required, increase shim thickness, and, conversely, reduce it if the torque is less.

20. Install lubricators on top and bottom covers and grease.



Determining bevel pinion bearing shim thickness (S_1, page 25–22) using the 293510 universal gauge.

BEVEL DRIVE ADJUSTMENTS
Model 55FDT – 60FDT – 70VDT – 62FDT – 72FDT – 82FDT – 72LPDT – 82LPDT tractors.

Bevel pinion bearing adjustment and shim thickness (S_1, page 25–22) determination using the 293510 universal gauge.

Proceed as further indicated.

16. Install bushings **293632** (B) and **293633** (D) and spacers **293619** (E) and **293620** (F) on the **293510** universal gauge (A).

17. In addition, install part **293617** (N) to secure gauge in vice and insert bearing cones (7 and 9) and spacer (3) as shown in Fig. **c**.

18. Turn gauge handwheel to bring pointer gradually to 75 kg (165 lb).

19. Install register **293694** (L) on universal gauge (A) positioning holes (M) with flats on handwheel hub.

20. Measure dimension (H_4) using a depth gauge.

21. Disassemble unit, lubricate bearings with engine oil and reassemble gauge with bushings (B and D) and spacers (E and F) in differential carrier as shown in Fig. **d**.

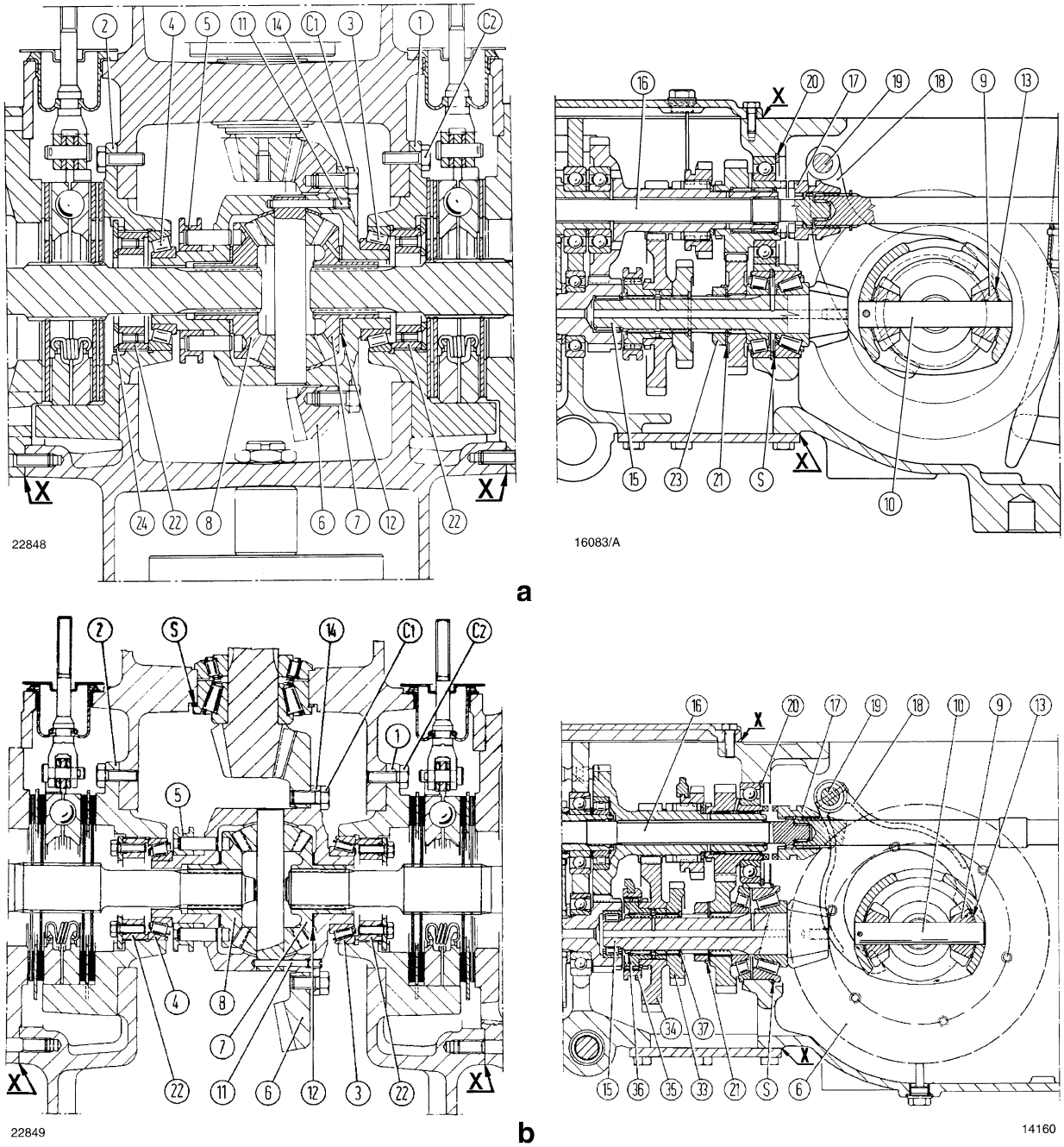
22. Gradually bring pointer back to 75 kg (165 lb) on graduated scale , rotating tool at the same time to settle the bearings> Measure dimension (H_3) as described above.

Shim thickness (S_1, page 25–22) is given by:

$$S_1 = H_4 - H_3 + 0.10 \text{ mm}$$

If necessary, round off (S_1) to the nearest 0.05 mm (.002 in) up.

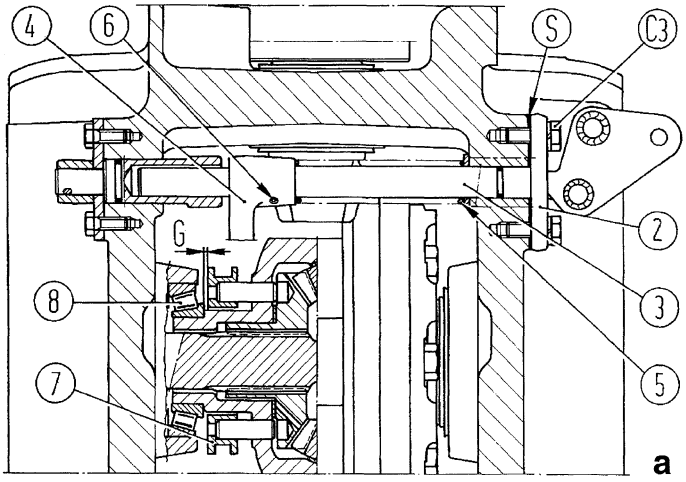
Note – At end of adjustment, do not remove tool from differential carrier, as it will be used for subsequent bevel pinion position adjustment.

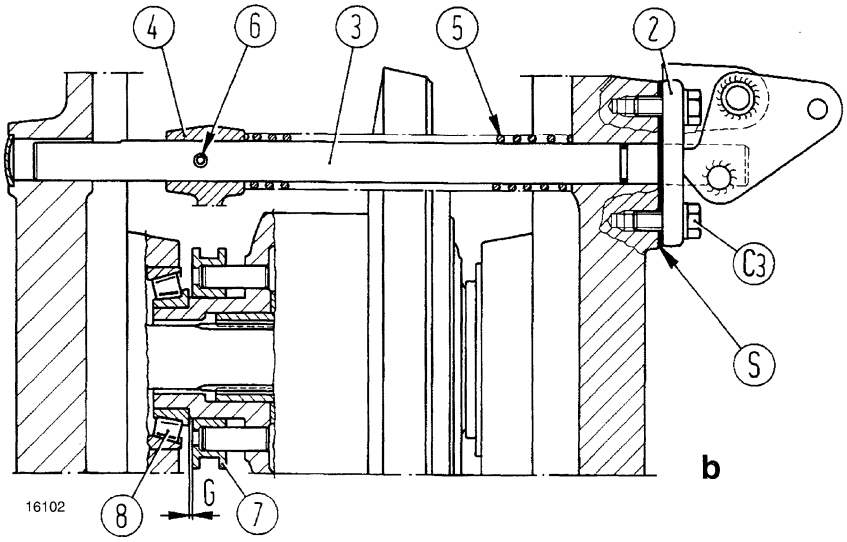


Longitudinal and cross–sectional views through bevel drive and differential

a. Model 50V – 55V – 55F – 60V – 60F – 70V – 72LP – 82LP tractors – b. Model 62F – 72F 82F tractors – C_1. Bevel ring gear screws – C_2. Bevel drive–differential carrier screws – S. Bevel pinion cone point adjustment shims – 1 and 2. Differential carriers – 3and 4. Taper roller bearings – 5. Differential lock sleeve – 6. Bevel ring gear – 7 and 8. Differential side gears – 9. Differential pinion – 10. Journal – 11. Pinion journal set screw – 12 and 13. Thrust rings – 14. Differential housing – 15. Bevel pinion shaft – 16. Power take–off shaft – 17. Power take–off engagement collar – 18. Shift fork – 19. Fork bar 20. Circlip – 21. Lock washer – 22. Bevel ring gear–differential bearing adjustment ring nut – 23. Bevel pinion bearing adjustment nut – 24. Lock washers – 33. Reverse gear – 34. Low speed range driven gear – 35. Transmission straight drive and low speed range shift collar – 36. Circlip – 37. Half–rings.

Note – Prior to assembly, thoroughly clean and degrease mating surfaces **X** and apply one of the sealing compounds listed on page 1, section 00.





Differential lock installation and adjustment

a. Models 50V – 55V – 60V – 70V – 55F – 60F – b. Models 62F – 72F – 82F – 72LP – 82LP – C_3. Differential lock control lever mount capscrew – G = 2 mm (.08 in). Clearance between collar (7) and bearing (8) – S. Collar (7) positioning shims – 2. Control lever mount – 3. Fork (4) shifter rod – 4. Fork – 5. Spring – 6. Spring pin – 7. Differential lock collar – 8. Ring gear bearing.

Assembly and adjustment

30. Assemble the differential lock control using the **292576** tool (on models 50V – 55V – 60V – 70V – 55F – 60F) and **293452** (on models 62F – 72F – 82F – 72LP – 82LP) to compress reaction spring (5) and fit spring pin (6) securing fork (4) onto control rod.

31. Using a feeler gauge, check that between collar (7) and ring gear–differential RH side bearing (8) there exists a 2 mm (.08 in) clearance (G).

32. In case, adjust above clearance by varying shim thickness (S) between mounting support (2) and rear drive housing.

⚠ CAUTION ⚠

Use suitable tools to align holes. DO NOT USE FINGERS OR HANDS.

7. Re–assemle the PTO box in accordance with the following instructions and information:

   a. proceed by reversing the previous disassembly sequence of operations, starting from no. 6 back to no. 1;

   b. inspect seal (8, page 31–3) and bearings, replace them if necessary;

   c. tighten fastenings to the torque data of page 31–2;

   d. consult sectional view of page 31–3, Fig. a, for correct positioning of parts;

   e. proceed considering the operations further indicated.

8. Thoroughly clean and degrease mating surfaces and apply a round strip of sealing compound about 2 mm (.08 in) thick following the lay–out shown in the scheme of page 31–6. Suitable types of sealing compounds are listed on page 1, section 00.

9. Install rear cover on power take–off case.

Disassembly–Assembly of 540/750–rpm or 540/1000–rpm PTO, models 50V 55V 60V 70V 55F 60F.
(Operations 31 112 45 – 31 112 46 – 31 112 48 – 31 114 45 – 31 114 46 – 31 114 48).

⚠ CAUTION ⚠

Handle all parts carefully. Do not put hands and fingers between parts.
Wear accident prevention clothing and accessories such as goggles, gloves and special shoes.

Proceed as further indicated.

1. Drain rear drive case oil.

2. Remove drawbar, supporting bracket and drawhook, if any, and the hydraulic lift.

3. Remove circlip (17, page 31–3, Fig. b) and cover (20).

4. Remove circlip (7) and circlip (9) from drive shaft, at the PTO engagement collar;

5. Engage ground–speed PTO to prevent the engagement collar from falling down while removing drive shaft (9).

6. Remove drive shaft (9).

7. Unscrew nut (C_1) and remove driven shaft (3), also retrieving driven gears (10 and 11), fixed gear (12), engagement collar (13), the two bearing bushes (14) and thrust washers from inside the PTO case.

8. Finally, remove cover (19).

Note – To replace seal (8, page 31–3), it is necessary to disassemble the power take–ff as previously described. To replace seal (18), instead, just remove circlip (17) and rear bearing quill (20).

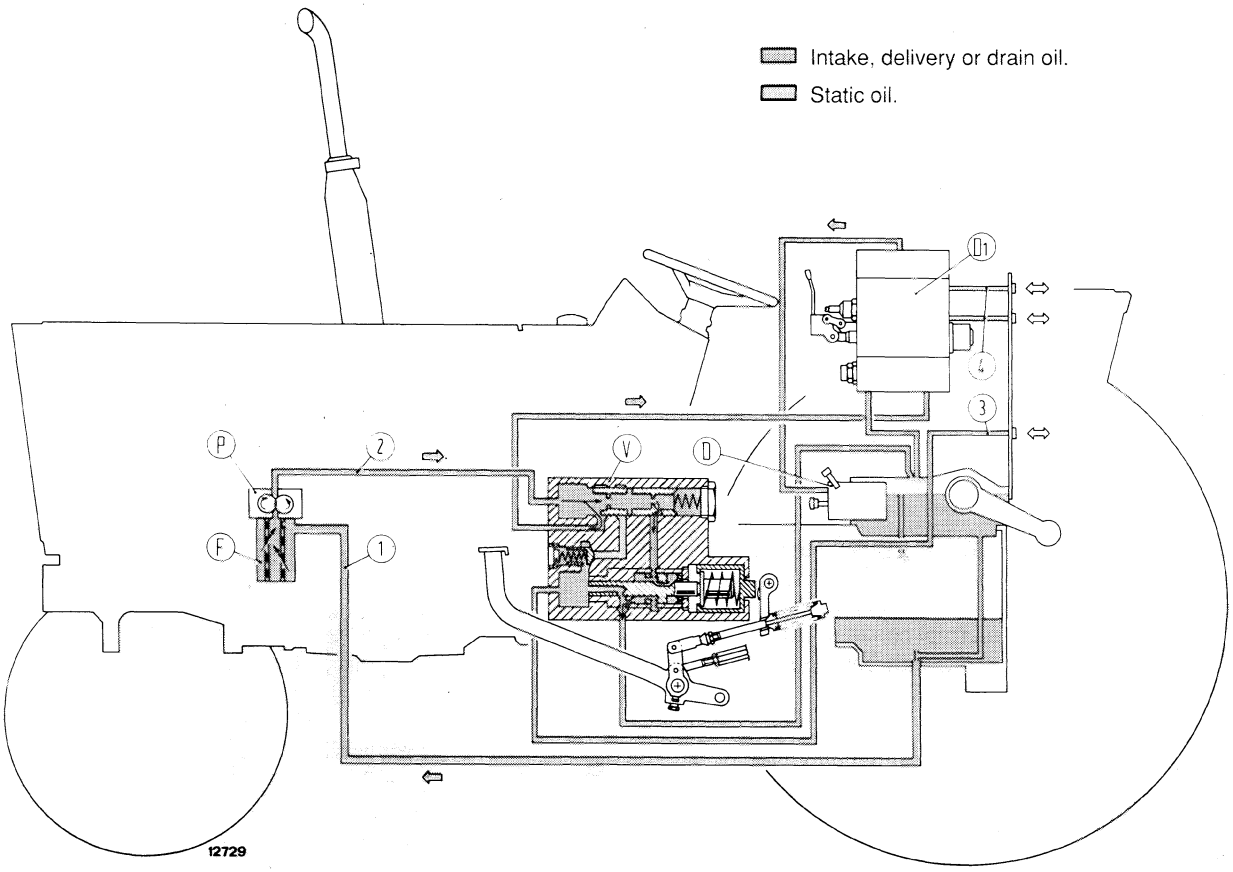
⚠ CAUTION ⚠

Use suitable tools to align holes. DO NOT USE FINGERS OR HANDS.

TRAILER BRAKE REMOTE CONTROL VALVE

The trailer brake remote control valve, available as an optional, is attached to the transmission housing by means of a mounting bracket.

Is automatically controlled through the tractor R.H. side brake pedal and allows the operator to brake the trailer using the same circuit of the tractor hydraulic lift system.



Trailer brake remote control valve oil flow diagram

D. Hydraulic lift control valve – D_1. Remote control valve – F. Filter – P. Oil feed pump (used jointly with hydraulic lift) – V. Trailer brake remote control valve – 1. Oil suction line from rear axle drive case reservoir – 2. Oil delivery line to trailer brake remote control valve – 3. Oil delivery line to trailer brake – 4. Oil delivery line to operated equipment.

IMPLEMENT CARRIER

	50V – 55V – 60V	70V – 55F – 60F – 62F 72F – 82F – 72LP – 82LP
Type	3–point hitch	
Category	1st	1st and 2nd
Draft control	through lower links by flexible bar	

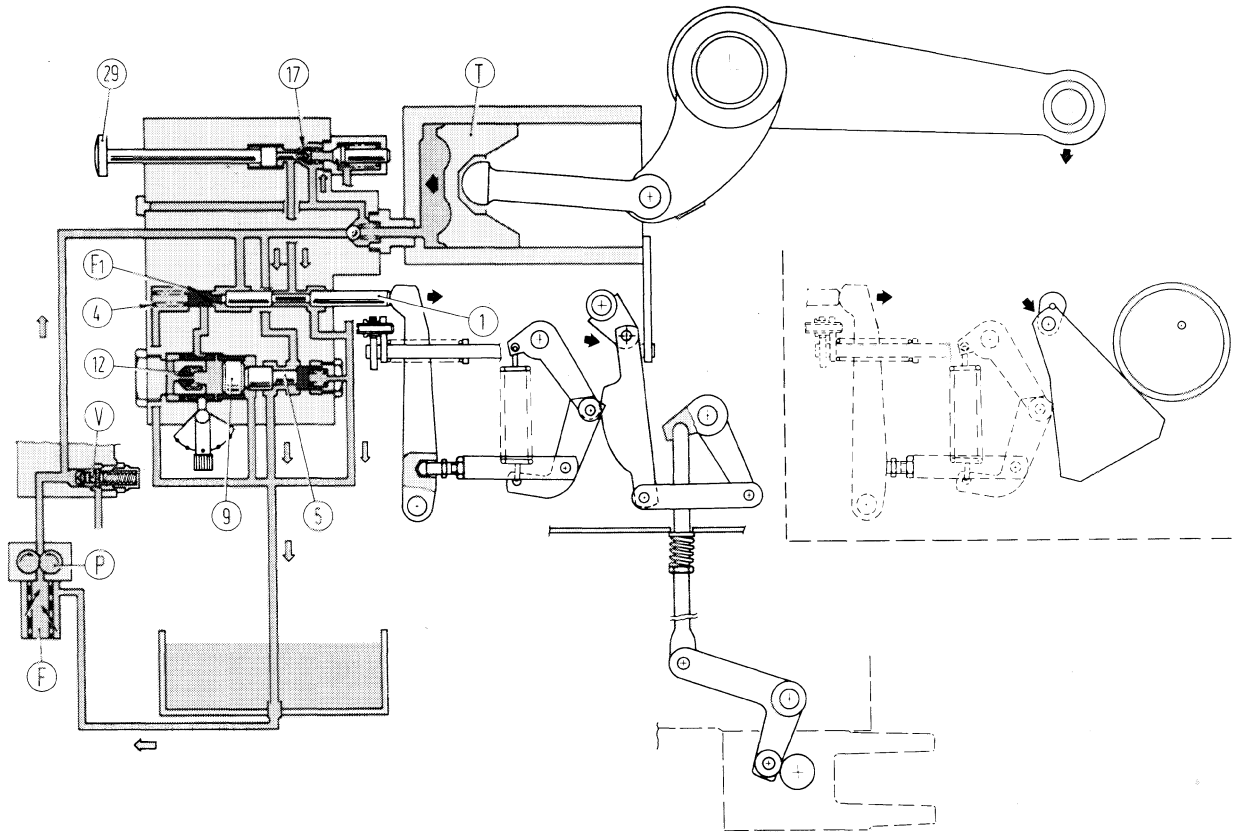
	50V	55V	55F	60V	60F	70V	62F	72F	82F
Maximum load lifting capacity over the full raise stroke with lower links horizontal and top link connected to upper bracket hole:									
– at lower link ball ends ..... kg (lb)	2375 (5237)						3045 (6714)		3880 (3555)
– w/center of gravity at 610 mm (24 in) from ball ends ..... kg (lb)	1960 (4322)						2225 (4906)	2690 (5931)	
– w/center of gravity at 1010 mm (39.75 in) from ball ends ..... kg (lb)	1880 (4145)	–	–	–	–	–	–	–	–
– w/center of gravity at 1050 mm (41.35 in) from ball ends ..... kg (lb)	–	1880 (4145)		–	–	–	–	–	–
– w/center of gravity at 1090 mm (42.91 in) from ball ends ..... kg (lb)	–	–	–	1880 (4145)		–	1755 (3870)	–	–
– w/center of gravity at 1170 mm (46 in) from ball ends ..... kg (lb)	–	–	–	–	–	1880 (4145)	–	2030 (4476)	–
– w/center of gravity at 1250 mm (49.2 in) from ball ends ..... kg (lb)	–	–	–	–	–	–	–	–	2030 (4476)

	72LP	82LP
Maximum load lifting capacity over the full raise stroke, with lower links horizontal, lift rods connected to rear mounting holes and top link connected to upper bracket hole:		
– at lower link ball ends ..... kg (lb)	3635 (8015)	
– w/center of gravity at 610 mm (24 in) from ball ends ..... kg (lb)	2800 (6174)	
– w/center of gravity at 1170 mm (46 in) from ball ends ..... kg (lb)	2200 (4851)	–
– w/center of gravity at 1250 mm (49.2 in) from ball ends ..... kg (lb)	–	2200 (4851)

	50V	55V	60V	55F	60F	70V	62F	72F	82F
Maximum lower link ball end travel:									
– w/fully extended lift rods ..... mm (in)	570 (22.441)			540 (21.260)			655 (25.787)		
– w/fully retracted lift rods ..... mm (in)	–						585 (23.031)		

	72LP	82LP
Maximum lower link ball end travel:		
– w/lift rods fully extended and connected to front holes ..... mm (in)	770 (30.315)	
– w/lift rods fully extended and connected to rear holes ..... mm (in)	660 (25.984)	

Flex bar diameter (all models) ..... mm (in)	24.867 ÷ 24.900 (.9790 ÷ .9803)
Flex bar end play (models 50V – 55V – 60V 70V – 55F – 60F) ..... mm (in)	1.5 ÷ 5.4 (.059 ÷ .213)
Flex bar end play (models 62F – 72F – 82F 72LP – 82LP) ..... mm (in)	1.2 ÷ 4.1 (.047 ÷ .161)



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F. Filter – F_1. Orifice on control valve spool (1) – P. Oil pump – T. Implement lift arm operating piston – V. Pressure relief valve (fitted on hydraulic lift case or on remote control valves, if installed) – 1. Control valve spool – 4. Control valve spool return spring – 5. Pilot valve spool – 6. Pilot valve spool spring – 9. Pilot valve plunger – 12. Sensitivity regulation valve – 15. Cylinder safety valve – 17. Arm drop speed rate regulation valve – 18. Ball – 22. Check valve – 29. Arm drop speed rate spool knob.

DESCRIPTION OF OPERATION (A. Arm lowering mode).

The spring (4) will displace the control valve spool (1) to the right thus allowing the oil, pushed by piston (T), to drain out of the cylinder through the arm drop rate regulation valve (17) and the port uncovered by the spool. The system oil, through port (F_1) of the control valve spool and the sensitivity regulation valve (12), acts upon the plunger (9) maintaining the pilot valve spool (5) in the position shown in the illustartion, thus allowing the oil flow coming from the pump to drain out through the clearance between spool (5) and associated control valve housing bore.

Note – The drop speed rate of the mounted implement, connected to the lift arms, is regulated by the position of knob (29). Thus, screwing the latter in, the drain clearance between valve (17) and control valve will be proportionally reduced and the implement drops more slowly, whilst tightening knob (29) will increase the drain clearance and consequently the implement lowers more quickly.

— turn rockshaft to bring internal arm against lift case;

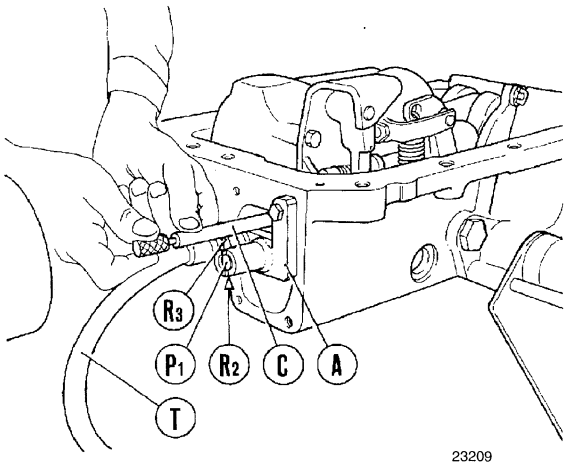
— connect the **293872** union (D, page 35–26) to the workshop compressed air system (T) and introduce air inside the cylinder chamber so to drive piston to end of raise stroke, then hold it in this position with compressed air;

— using the **293870** wrench (C) tighten screw (6) until the mobile rod tip (P_1) has regressed 1.3÷1.7 mm (.05÷.07 in) with respect to the internal reference plane (R_2) of the **293846** tool (A);

Note – This condition corresponds to a measured dimension (L_1) of 86.3÷86.7 mm (3.40÷3.41 in) between end of lever (7) and lift front reference plane.

— tighten jam nut (10).

B. Adjusting the upper height limit – Models 62F – 72F – 82F – 72LP – 82LP. Proceed as follows:

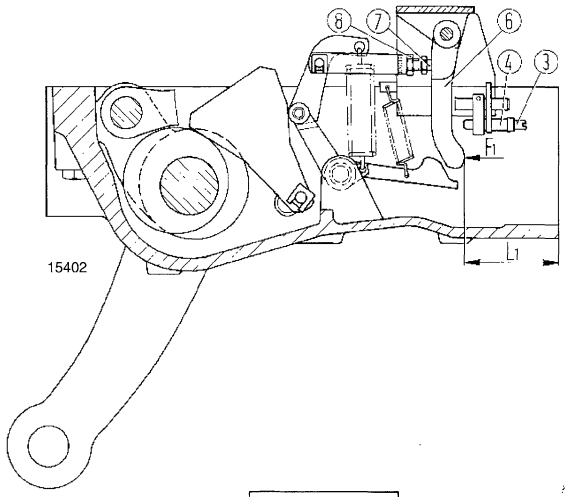


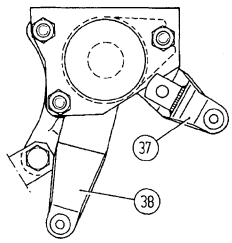
23209

A. **293846** tool – C. **293870** wrench – P_1. Mobile rod tip of **293846** tool – R_2. Internal reference plane of **293846** tool – R_3. Compressed air connection for **293846** tool – T. Compressed air line.

— install the **293846** tool (A) on lift case;

— move the draft control external lever (38) all the way back against the spacer and the position control external lever (37) all the way forward, against the spacer;





15401

Adjusting the upper height limit on models 62F – 72F – 82F – 72LP – 82LP

F_1 = 4÷4.5 mm da N (9÷10 lb). Force excersized by the **293846** tool upon lever (6) – L_1. Distance between end of lever (6) and the lift front reference plane – 3. Lift adjustment screw – 4. Upper height limit adjustment screw jam nut – 6. Control valve lever – 7. Control valve lever rod tip – 8. Jam nut – 37. External position control lever – 38. External draft control lever.

— turn rockshaft to bring internal arm against lift case;

— connect union (R_3) of tool (A) to the workshop compressed air system (T) and introduce air inside the cylinder barrel to drive piston to end of raise stroke, the hold it in this position with compressed air;

— using the **293870** wrench (C) tighten screw (3) to make the mobile rod tip (P_1) regress 1.3÷1.7 mm (.05÷.07 in) with respect to the internal reference plane (R_2) of the **293846** tool (A);

Note – This condition corresponds to a measured dimension (L_1) of 86.3÷86.7 mm (3.40÷3.41 in) between end of lever (6) and the lift front reference plane.

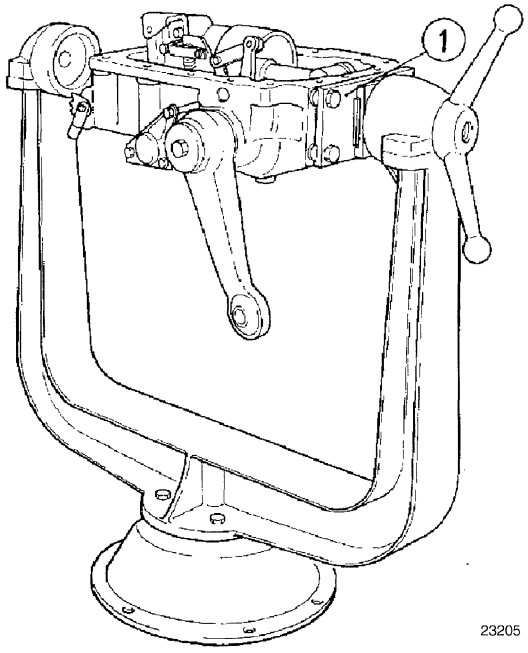
— tighten jam nut (4).

ARM ROCKSHAFT AND LIFTING CYLINDER – Disassembly–Assembly (Op. 35 110 42)

⚠ CAUTION ⚠

Handle all parts carefully.
Do not put hands and fingers between parts. Wear accident prevention clothing and accessories such as goggles, gloves and safety shoes.

Proceed as further indicated.



1. By means of bracket (1), fix the lifter on the rotary stand. The bracket is made according to the instruction given on pages 35–12.
   Proceed as follows:

A. Models 50V – 55V – 60V – 70V – 55F – 60F:

— remove the lift front cover (20, page 35–3) together with the distributor.

B. Models 62F – 72F – 82F – 72LP – 82LP

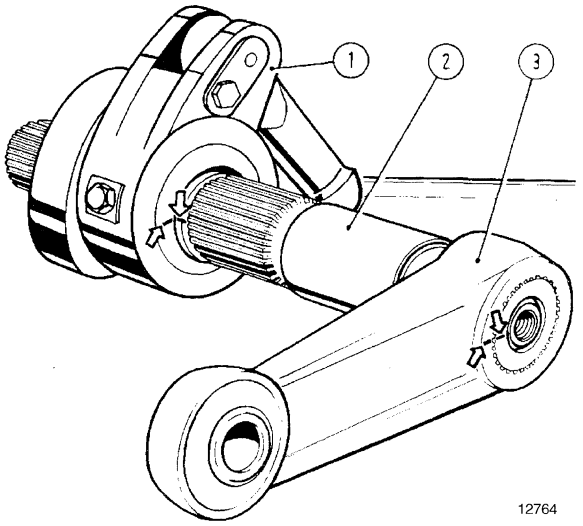
— remove the fixing screws and the whole distributor;

— remove the three screws fixing the cylinder liner to the lift and the two support fixing screws of the distributor control valve lever.

2. Remove the cylinder liner and the piston.

3. Remove the inner arm fixing screw (1, page. 35–3).

4. Remove screws (C_2, page 35–3) and arm end washer (4).



5. Make sure that the reference marks on both lifting arms and drive shaft are present. If no mark is present, it is to be written.

6. Remove the lifting arms.

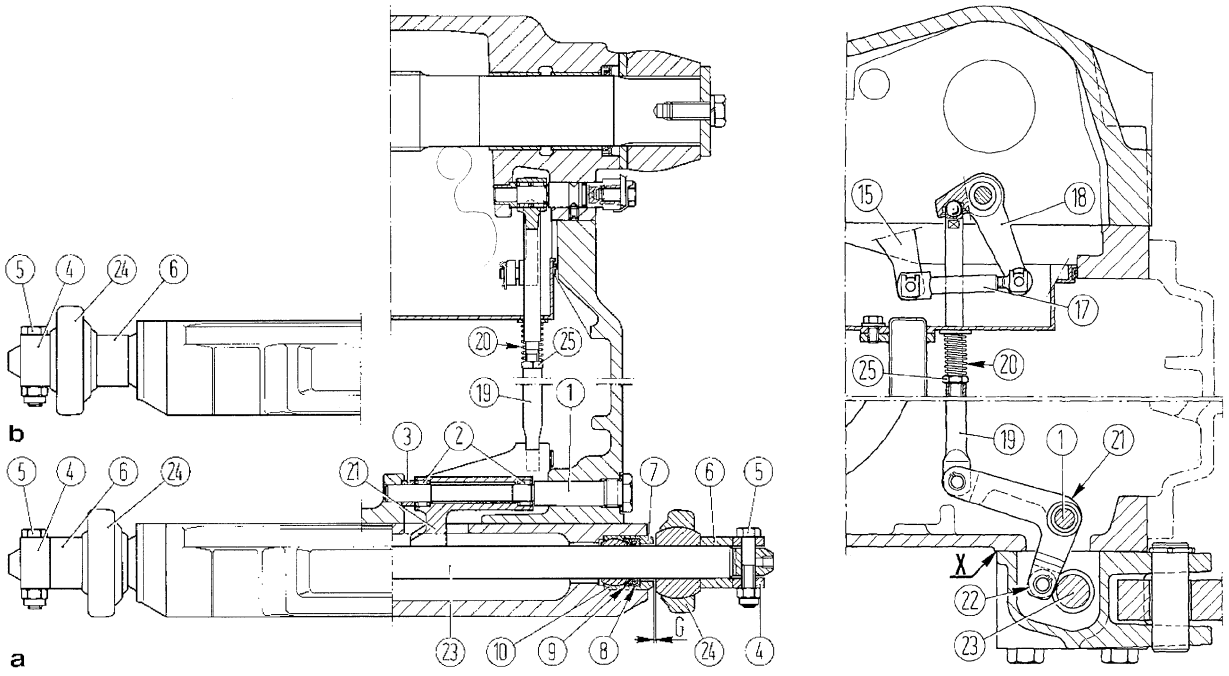
7. Beat on the right end of the lifting shaft to make the shaft slide out of the assembly.

8. Reassemble parts reversing sequence of removal operations from no. 7 back to no. 1 and take note of the following instructions:

   a. In case of replacement, fit the lifting arm rockshaft bushes from the outside to the inside of the lift body, making sure the values given on page 35–38 are respected. After fitting in the bushes, no further rectification is needed on them.

   b. In case of replacement extract right seal gasket (5) and left seal gasket (6, page 35–3).

   c. Couple the drive shaft (2, Fig. above) into the inside arm (1) and to the lifting arms (3), according to the reference marks on the parts (as shown in the figure above).



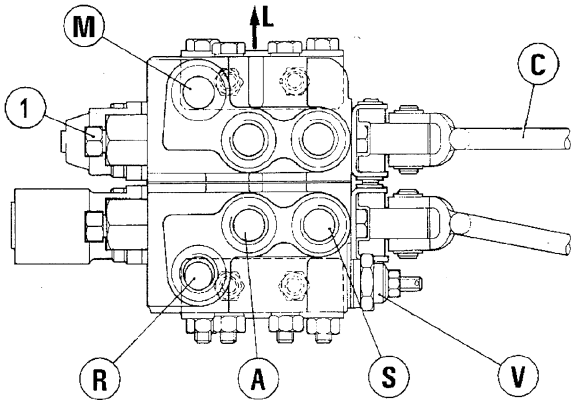
Sectional view of draft control lever. Models 62F – 72F – 82F – 72LP – 82LP.

a. Placing spacer (6) for heavy and normal work – b. Placing spacer (6) for light work– G = 1.2÷4.1 mm (.05 ÷ .016 in). Flex bar end play – 1. Draft control transmission lever pin – 2. Needle bearings – 3. Draft control transmission lever spacer – 4. Ball end shoulder bush – 5. Arm holding screw – 6. Ball end shoulder outer spacer – 7. Ball end shoulder inner spacer – 8. Gasket – 9. Shoulder ring – 10. Flexible rod holding bush – 15. Draft control lift inner lever – 17. Draft control linkage – 18. Draft control inner lever – 19. draft control rod – 20. Draft control rod spring –21. Draft control transmission lever – 22. Draft control transmission lever roller – 23. Flexible bar – 24. Implement linkage lower arms – 25. Counternut.

Note – When installing parts, thoroughly clean and remove grease from all mating surfaces **X** and apply one sealing compound chosen among those listed on page 1, section 00.

Operating steps of a SALAMI switchable remote control valve to operate a double–acting cylinder (descriptions a, b)

Note – To operate a double–acting cylinder, tighten screw (1) to close connection of line (S) with line (M) for delivery to lift control valve.



23244

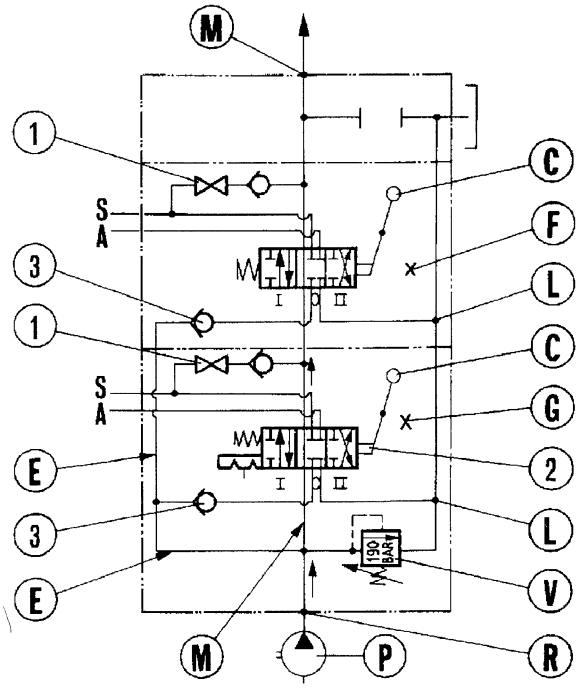
a. LIFTING – When lever (C) is pulled backwards, control valve rod (2) is also moved right to position (I) and closes duct (M) through which pressurized oil from pump (P) flows to lift control valve. Consequently, check valve (3) opens making pipe (E) to deliver oil into cylinder lower chamber through duct (S) and cylinder upper chamber discharge into outlet (L) through duct (A), catching oil delivered to hydraulic lift control valve. Keeping lever back, lifting is brought to cylinder end travel. After releasing, lever return spring brings the lever automatically to neutral position and the whole pump delivery is sent to lift control valve through delivery pipes (M).

Note – If control valve is double–acting with lock (G) in position I and II, lever (C) has to be unlocked manually when cylinder comes to its upper travel end.

b. LOWERING – To lower the implement, push control lever (C) forward. Control valve rod (2) moves to left position II, closes duct (M) and makes oil flow from cylinder lower chamber into outlet (L) through duct (S). Cylinder upper chamber is connected with delivery (E) through duct (A) and check valve (3).

Note – If control valve is double–acting with lock (G) in position I and II, lever (C) has to be unlocked manually when cylinder comes to its lower travel end.

To hydraulic lift control valve



23245

c. LIFTING – When lever (C) is taken backwards, the control valve rod (2) is also moved to right position I and closes duct (M) through which pressurized oil from pump (P) flows to lift control valve. Consequently, check valve (3) opens making pipe (E) to deliver oil into cylinder lower chamber through duct (S). Duct (H), which is used to operate double–acting cylinders, remains still in this step, as it is steadily connected to delivery from hydraulic lift (M) to control valve (L) by switching valve (1). Further, cylinder upper chamber is connected to outlet (L) through ducts (D), so that no lifting occurs.

Note – If control valve is double–acting with lock in position I and II, lever (C) has to be unlocked manually.

d. LOWERING – When control lever (C) is pushed forward, control valve rod (2) is moved to left position II and closes duct (M). Under the weight of the implement, cylinder oil flows to outlet (L) through duct (S) and all pump delivery is sent to cylinder upper chamber through check valve (3) and duct (A).

When the cylinder controlled by valve (G) is in its lower travel end, the whole pump delivery goes to control valve (F) or to lift control valve, through duct (E).

Operating steps of a SALAMI switchable remote control valve to operate a double–acting cylinder (descriptions c, d)

A. Connection pipe to cylinder upper chamber – C. Control lever – E. Delivery to control valves – F. Single/double action control valve – G. Single/double–action control valve with locking – L Outlet – M. Delivery to lift control valve – P. Pump – R. Intake from pump (P) – S. Connection pipe to cylinder lower chamber – V. Pressure relief valve – 1. Single to double action switch valve – 2. Control valve rod – 3. Check valve.

Note – To operate a double–acting cylinder, tighten screw (1) to close connection of line (S) with line (M) for delivery to lift control valve.

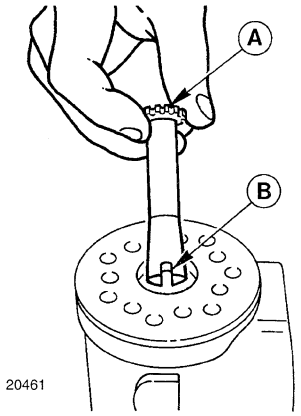
HYDROSTATIC STEERING TROUBLESHOOTING GUIDE

(follows)

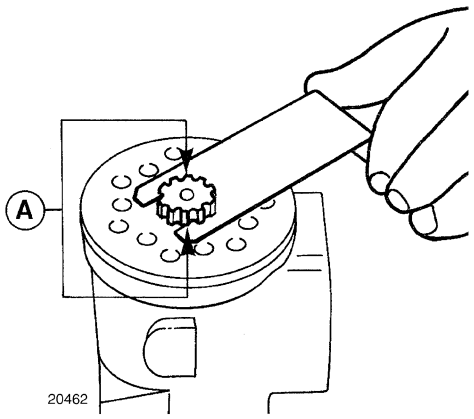
Problem	Possible cause	Correction
Jerking and chattering at steering wheel, steering out–of–control, tractor wheels steering in direction opposite to selection.	**1.** Wrong hydrostatic phasing.	Rectify phasing.
	2. Reversed position of oil lines to power cylinder.	Rectify connections.
Impossible to hold selected course, continuous corrections needed.	**1.** Insufficient oil level in hydraulic system reservoir.	Top up to correct level and bleed system by following directions on page 41–23.
	2. Worn cylinder piston gland.	Replace gland.
	3. Power cylinder safety valves (33, page 41–3) or back–flow valves stuck open owing to presence of impurities or because damaged.	Remove impurities and clean filter or replace control valve.
	4. Control valve mechanical wear.	Replace control valve.
Impossible to obtain and hold hydrostatics in neutral. Manual steering operates normally; ceasing this, steeringwheel tends to turn on its own, or remain stationary but steering action slowly continues along the direction originally selected ("motoring" effect), requiring continued corrections of the steering wheel asset.	**1.** Broken or weakened leaf springs (2, page 41–3) calling back sleeve (6) to neutral.	Replace leaf spring pack.
	2. Sleeve (6) and rotary valve (5) stuck in delievery position because of interposed foreign matter.	Remove foreign matter and clean filter.
	3. Sleeve (6) squeezing on rotary valve (5) owing to excessive fluid pressure.	Check relief valve (24, page 41–3) pressure setting.
Front wheel shimmy.	**1.** Air inside power cylinder.	Bleed system and remove causes of any entry of air.
	2. Worn steering linkage mechanical joints.	Replace worn parts.
	3. Power cylinder safety valves (33, page 41–3) or check valve (34) stuck open owing to presence of impurities or because damaged.	Remove impurities and clean filter or replace control valve.
Difficult steering in general or in one direction only.	**1.** Insufficient oil pressure.	Check oil pump and releif valve (24, page 41–3) pressure setting.
	2. Poor fluid tightness inside control valve.	Replace control valve.
	3. Misadjusted power cylinder safety valves (33, page 41–3) or presence of drillings or foreign particles preventing correct tightness of either valve.	Remove impurities and clean filter. If problem persists, replace control valve.

46. Lubricate the O–ring seal with hydraulic fluid and fit in place.

47. Fit abutment ring and align holes with the control valve housing ones.



48. Make a reference mark on the upper, toothed end (A) corrisponding to seat (B) to indicate exact assembly location of the valve–sleeve drive pin.

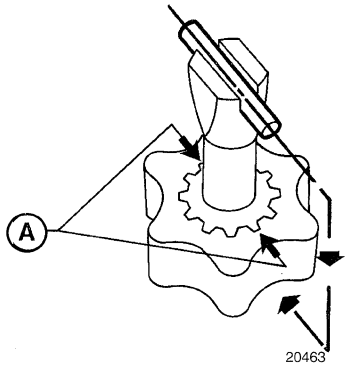


49. Fit the rotor drive shaft in control valve housing, introduce the **293390** retaining wrench between rotor shaft and abutment ring while turning the shaft to ease the assembly between seat (B) and drive pin installed on sleeve.

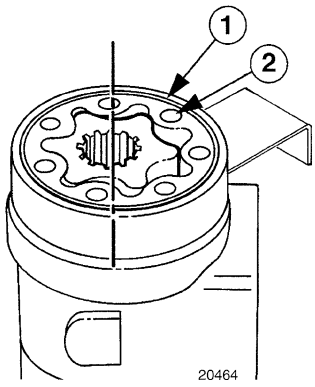
50. Assembly the rotor in accordance with the following instructions and information:

a) whenever disassembling hydrostatic steering, turn rotor upside down so to limit in time the wear of the splined coupling;

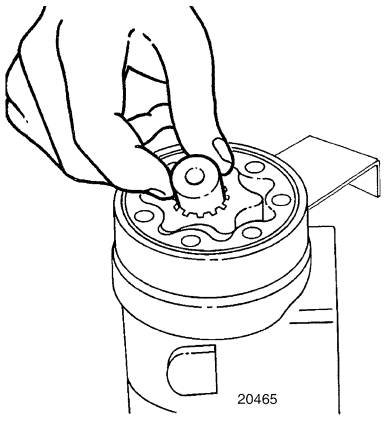
b) the figure which follows was made with the rotor shaft removed in order to put into evidence the correct phasing of rotor, rotor shaft and drive pin;



c) Fit rotor on shaft, considering that correct phasing is obtained by aligning, on the drive pin centerline plane, teeth (A), underlined in operation 48, with the centerline of a rotor vane.



51. Lubricate the two O–ring seals (1) with hydraulic fluid and fit them in their seats on the rotor stationary ring, then fit the latter lining up mounting holes (2) with the ones present on the abutment ring.



52. Install inside spacer.

53. Install cover with mounting holes aligned with those present on the rotor stationary ring.

FRONT AXLE

			50V – 55V – 60V	55F – 60F	70V
Type			inverted "U", telescoping and centrally pivoted		
Track widths, with tyres:	4.00–15	mm (in)	865 – 965 (34.1–38.0)		
	7.00–12	mm (in)	920 – 970 (36.2–38.2)		
	5.00–15	mm (in)	985 – 1050 (38.8–41.3)		
	5.50–16	mm (in)	—	1040 – 1140 (40.9–44.9)	—
	6.00–16	mm (in)	—	1040 – 1140 (40.9–44.9)	1040 – 1140 (40.9–44.9)
Steering knuckles					
Kingpin journal dia. (4, page 44–4)		mm (in)	29.967÷30.000 (1.1808÷1.1811)		
Force–fitted bushing (5) I.D.		mm (in)	30.100÷30.150 (1.1850÷1.1870)		
Kingpin (4) journal/bearing bushing (5) assembly clearance		mm (in)	0.100÷0.183 (0089÷.0072)		
Axle pivot mounting					
Pivot dia.		mm (in)	29.967÷30.000 (1.1808÷1.1811)		
Force–fitted bushing I.D.		mm (in)	30.100÷30.150 (1.1850÷1.1870)		
Pivot/bushing assembly clearance		mm (in)	0.100÷0.183 (0089÷.0072)		
Wheel camber (all models)			See page 44–7		
Toe–in (all models)		mm (in)	0 ÷ 5 (0 ÷ 2)		

FRONT AXLE

			62F – 72F – 82F	72LP – 82LP
Type			inverted "U", telescoping and centrally pivoted	
Track widths, with tyres:	6.50– 16	mm (in)	1180 – 1280 – 1380 – 1480 (46.5–50.4–54.3–58.3)	1410 – 1510 – 1610 – 1710 – 1810 – 1910 (55.5–59.4–63.4–67.3–71.3–75.2)
	7.00–12	mm (in)	1180 – 1280 – 1380 – 1480 (46.5–50.4–54.3–58.3)	—
	7.50–16	mm (in)	1215 – 1315 – 1415 – 1515 (47.8–51.8–55.7–59.6)	—
	7.50–15	mm (in)	1230 – 1330 – 1430 – 1530 (48.4–52.4–56.3–60.2)	—

(continues)

SERVICE TOOLS – CAB AIR CONDITIONING SYSTEM

Attention – Operations included in this section of the Manual must be performed using the **ESSENTIAL** tools further evidenced by the identification code (**X**). Besides, to work safely and achieve the best technical results, with additional savings of time and fatigue, these mandatory tools should be used in conjonction with the suggested special tools listed below.

Air conditioning system		List of the special tools necessary to perform servicing operations envisaged in this Section
with R12 gas	**with R134a gas**	
X 294005	**X** 294030	Charge and evacuation station
X 294041	**X** 294048	Recovery/recycling station
293824	–	Hoses, for 294005 and 294041
–	294044	Hoses, for 294030 and 294048
294045	–	Tool kit, for 294005
–	294043	Tool kit, for 294030
294042		Receiver–dryier filter, for 294041 and 294048
294036		Acoustic leak detector
293826		Heat resistant tape, for expansion valve
X293831		Comb, condenser and evaporator fin cleaning and straightening

REFRIGERANT RECOVERY–RECLAIMING AND EVACUATION–CHARGE STATIONS

⚠ ATTENTION ⚠

We strongly recommend not to use the recovery–reclaiming and evacuation–charge stations with types of refrigerant fluids other than the prescribed ones as their characterics are not compatible with the constituent chemical base.

Before connecting the station to the system or to the refrigerant container check that the fitting is the correct one.

Note – Connections for the R134a type fluid are made different from the R12 ones in order to avoid unvoluntary but dangerous contaminations. Do not tamper trying to adapt the R134a connections to the R12 ones and vice-versa: the operation of the air conditioning system and of the stations would be seriously and negatively affected.

When connecting station fluid lines to air conditioning system valves always connect the blue pipe (low pressure) to the valves located on the system inlet side (S–Suction) and the red pipe (high pressure) to the valve located on the system outlet side (D–Discharge).

RECOVERY–RECLAIMING STATION (294048 for R134a and 294041 for R12 fluid)

Description

Designed to carry on the recovery–reclaiming process of refrigerants employed in air conditioning systems.

The recovered refrigerant undergoes a first separation from the lube oil, used in the system, by a vaporizing process in a special container.

The reclaiming station provides for neutralizing acids, absorbing moisture and eliminating solid particles present in the refrigerant.

The reclaimed refrigerant is stocked inside a dispenser cylinder.

TECHNICAL FEATURES

Recovery compressor provided with oil level indicator, drain valve and connection.

Refrigerant reclaiming acid cleaner with a high moisture absorption capacity.

Refrigerant/oil still with electrical resistance, automatic device for returning the oil to the recovery compressor and automatic metering valve regulating the refrigerant flowing back to the station.

Graduated cylinder for recovered refrigerant , 2.2 kg (4.85 lb) capacity, with electrical resistance and safety valve.

2–way pressure gauge set, with refrigerant flow indicator and pressure gauges for cylinder and refrigerant checks.

Humidity indicator for checking the state of the reclaimed refrigerant.

Pressure–operated switch for automatic cut–in/cut–off of compressor.

Graduated container for recovered oil.

Switch (1–0–2) for cylinder recovery and heating operations.

Operation check light indicators.

Flexible hoses with safety taps:

293824 for **R12** fluid;
294044 for **R134a** fluid.

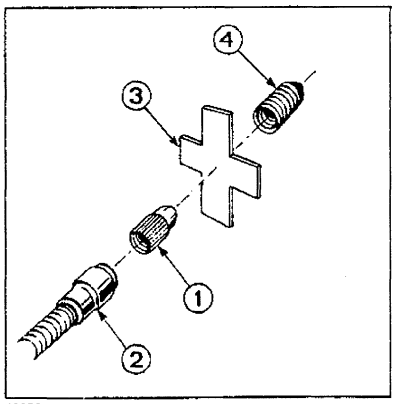
Recovering capacity:	200 g/1'.
Feeding:	220 V (50 Hz).

Replacing refrigerant reclaiming filter

Attention – Replace the filter (3) after every 12 months or in any case when the moisture gauge (12, page 50–15) becomes yellow and maintains colour in the recovery–reclaiming stage.

— Close the yellow tap located underneath the reclaiming still (4).
— Carry on the recovery process if the presence of refrigerant is noted inside the circuit.
— Remove the contaminated filter, replace connection seals and install a new filter.

Maintenance



Leak detector sonde

1. Sensor – 2. Flexible sonde – 3. Felt – 4. Protection.

Always make sure that the instrument is turned off before replacing the pick–up. To replace the latter, turn it counterclockwise, fit a new one with a new felt protection and turn them both clockwise on the tip of the sonde flex.

Do not turn the instrument on until the pick–up is securely fastened on the sonde tip.

At assembly, make sure that the hole connecting sonde and sensor is free from grease and dust.

AIR CONDITIONING SYSTEM

Leakage test using the 294036 leak detector and correction of leaks, if any (Operation 50 200 06)

With system charged and pressure gauges connected, proceed as further indicated.

1. Start the engine.
2. Set the thermostat, located inside the cab, for maximum cooling.
3. Set the electric fan for maximum speed.
4. Run engine at 1500 rpm.
5. Activate the electronic leak detector.
6. Check, using the sonde pick–up, every fluid line connection and any potential leakage source:

— any presence of refrigerant, and consequently of a lekage source, is evidenced by the instrument through increased frequency of sound signal emission.

Note – The refrigerant gas is heavier than air and consequently, in a leakage area, it will be easier to detect underneath the leak point rather than above.

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7. If leaks are found in correspondence of connecting lines, tighten connections to eliminate them.

Attention – In the event or replacement of any of the system components, always carry on the operations of refrigerant recovery, reclaiming and system charging described from page 50–15 through 50–20.

SUMMARY OF THE CAB AIR CONDITIONING SYSTEM POSSIBLE PROBLEMS AND THEIR CAUSES

In case of faults, three are the main conditions which may occur:

— conditioner fais to operate;

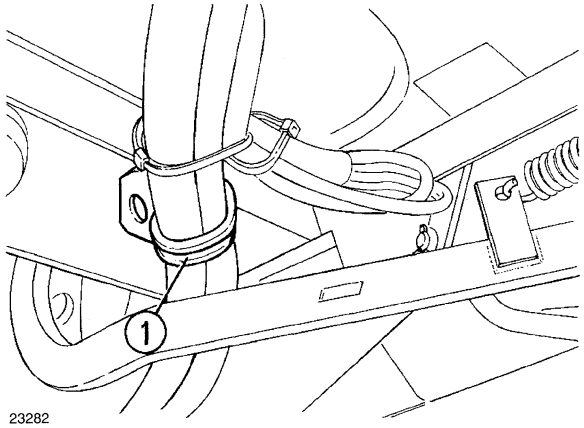
— poor cooling effect;

— random operation.

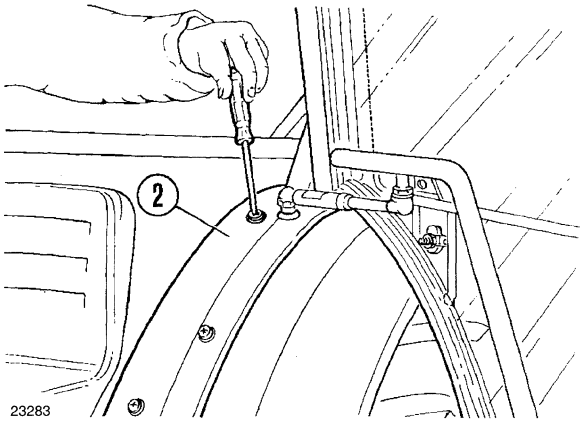
Once established that a poor cooling effect may well depend on external causes, indipendently from the air conditioning system operation, normally a preliminary mechanical check and visual inspection are sufficient to give a first indication on plant efficiency.

This information may then be completed by an electrical check of the plant.

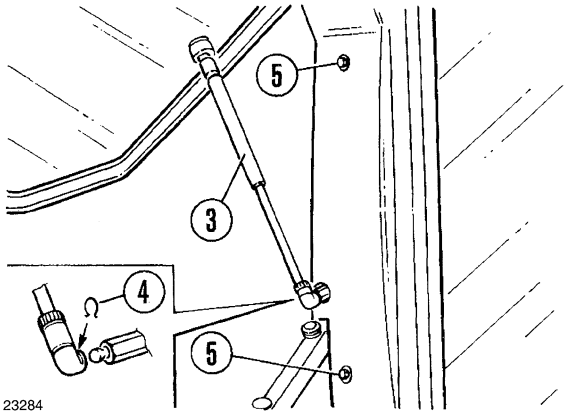
If, at this stage, the problem has not yet been located, it wil be necessary to further proceed by pressure testing the various components.



11. Remove the line holding bracket (1) located under the tractor left–hand side foot–board.

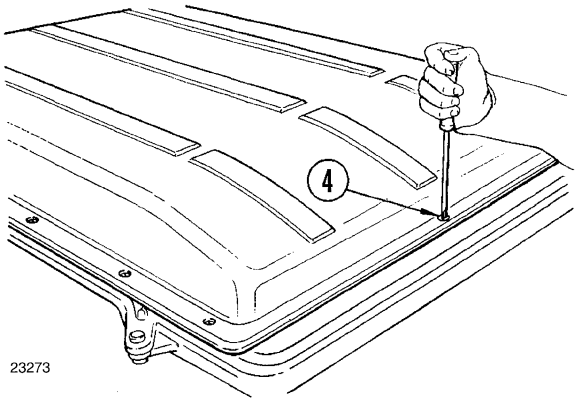


12. Remove the line guard (2) over the wheel and withdraw the hose accompanying it over its lay–out.

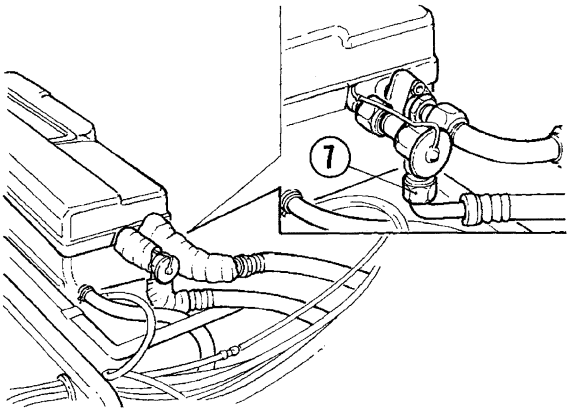


13. Disconnect the rear window glass spring opener (3), following removal of the ball joint retaining spring (4).

14. Undo holding screws (5) and remove side sealing gasket.



15. From outside of cab, undo perimeter holding screws (4) and remove the cab hatch being careful not to damage the rubber seal.



16. Remove the heat insulation from the fluid line, connection (7) and replace the fluid line.

17. Install the same in accordance with the following instructions and information:

a. reverse the previous removal sequence of operations starting from no. 10 back to no. 1;

b. consult previous illustrations for the correct placement of parts;

c. make sure to always operate under the best cleanliness conditions. Should hoses remain loose, make sure their open ends are properly sealed.

18. Carry on system evacuation, charge and functional check operations in accordance with the directions given on pages 50–18 through 50–20.

BATTERY CHARGING SYSTEM (all models)

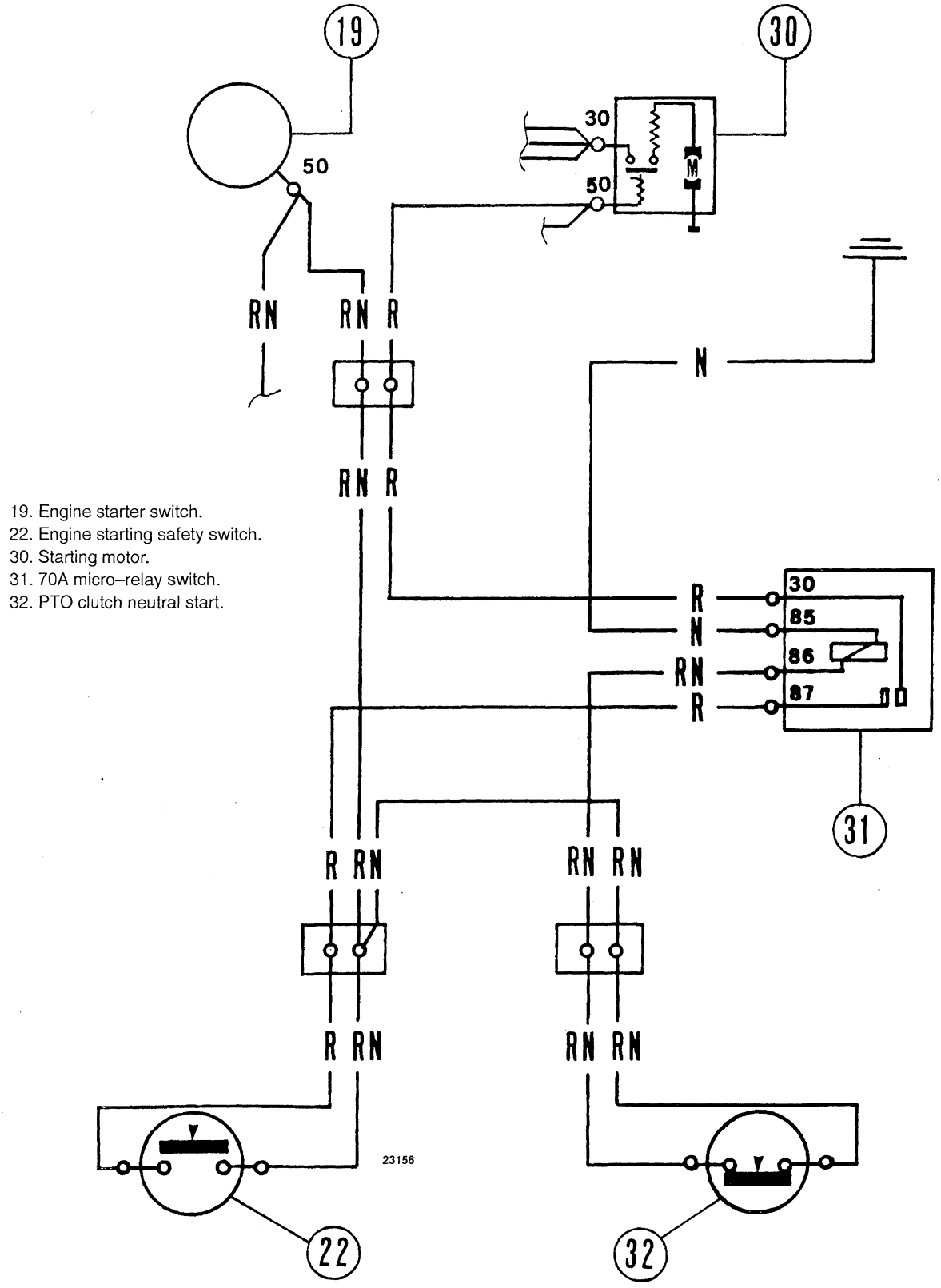
Alternator	5101645 (MARELLI) 4762563 (LUCAS) 4766127 (ISKRA)
Type (three–phase, self–rectifying)	
Nominal voltage V	14
Rotation (from pulley side)	clockwise
Charge starting speed at 12V (25 °C 277°F) ..... rpm	1050 ÷ 1150
Current output at 14V, at operating temperature (°):	
— MARELLI type at 7000 rpm ..... A	33
— LUCAS type at 6000 rpm ..... A	45
— ISKRA type at 5000 rpm ..... A	34
Rotor winding resistance:	
— type MARELLI ..... Ohm	3.4 ÷ 3.8
— type LUCAS ..... Ohm	3.04 ÷ 3.36
— type ISKRA ..... Ohm	3.4 ÷ 3.74
Speed of alternator installed on 3–cylinder engines (at engine maximum power speed) ..... rpm	5050
Speed of alternator installed on 4–cylinder engines (at engine maximum power speed) ..... rpm	4800
Speed ratio: engine/alternator (3 cylinders) ..... rpm	1: 2.02
Speed ratio: engine/alternator (4 cylinders) ..... rpm	1: 1.90
Voltage regulator	transistors, incorporated in alternator
Alternator speed, test and adjustment ..... rpm	4000
Test voltage:	
— MARELLI 5101645 model V	13.6 ÷ 14
— LUCAS 4762563 model V	14.2 ÷ 14.5
— ISKRA 4766127 models V	13.7 ÷ 14.5

(°) Measurable with fully shaped brushes.

LIGHTS – INDICATORS – ACCESSORIES

Two front, asymmetrical headlamps with low and high–beam head lights provided with double–filament, 45/40 W bulbs (white or yellow light).
Two front lamps including: — parking light (5 W bulb) with white lens; — turn signal light (21 W bulb) with orange lens.
Two tail lamps including: — parking light (5 W bulb) with red lens; — turn signal light (21 W bulb) with orange lens; — stop light (21 W bulb) with red lens; — license plate light.
Two rear red reflex lens.
One rear floodlight with built–in switch (35 W bulb, white light).
A set of optical indicators and warning lights, with 3 W bulb, for: — alternator charge (red light); — low engine oil pressure (red light); — air cleaner restriction (red light); — hand brake on (red light); — parking lights on (green light); — high–beam headlights on (blu light); — turn signal lights on (green light); — 1st trailer turn signal lights on (green light); — 2nd trailer turn signal lights on (green light).
A low–temperature cold–starting aid (Thermostart).

VARIANT TO THE ELECTRICAL WIRING DIAGRAM FOR USA MARKET
(models 50V – 55V – 60V – 70V – 55F – 60F, page 55–17)
Power take–off safety switch



19. Engine starter switch.
22. Engine starting safety switch.
30. Starting motor.
31. 70A micro–relay switch.
32. PTO clutch neutral start.