Fiat Trattori

FIAT

580-580 DT
680-680 DT

(570 - 670)

WORKSHOP MANUAL

QUICK REFERENCE INDEX

D I R E Z I O N E C O M M E R C I A L E

FOREWORD

- *The manual is divided into separately numbered sections.*
- **Two-digit** *sections contain*
  — *Tractor specification (00).*
  — *Tractor sub-assembly specification and data (10 Engine, 20 Power Train, etc.).*
- **Three-digit** *sections deal with the overhaul of the sub-assemblies whose data are listed in the two-digit sections.*
  The first two digits are the same as those of the associated data sections (e.g. 20 - Power Train 201 - Clutch 202 Transmission, splitter etc.).
- *A contents list is provided to facilitate retrieval of desired information.*
- *Each sheet carries the print number of the manual and the date of issue in the bottom right-hand corner of the front page.*
- *Revised sheets will carry the same print number followed by a number (e.g. first revision 603.54.202/1, second revision 603.54.202/2, etc) and next issue date.*

  Revised sheets will be accompanied by the updated contents sheet.
- *Wear limits recommended for some parts are not binding, being given for guidance only.*

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Print No. ***603.54.202*** *- IX - 1979*

GENERAL: Contents

SHIMS

When adjusting, measure each shim with a micrometer gauge and add the values obtained. Do not rely on overall shim thickness or the nominal value indicated for each shim.

ROTARY SHAFT SEALS

To fit rotary shaft seals proceed as follows:

— Prior to fitting, soak the seals for at least half an hour in the fluid to be retained.
— Carefully clean the shaft and ensure that the contact surface is free from damage.
— Turn the end of the sealing lip towards the fluid. If of the thrower lip type, turn the grooves so that during shaft rotation the fluid tends to be thrown back.
— Smear the sealing lip with a very thin coat of lubricant (oil is better than grease) and pack the space between sealing lip and dust shield with grease. (applicable to double-lip seals).
— Fit the seals into their housing using a flat-ended tool or ram. Under no circumstances fit with a mallet or hammer.
— Avoid entry of the seal into the recess in a tilted position. Exert a firm and uniform pressure squarely on it and ensure that the seal is pressed fully home.
— To prevent sealing lip damage during fitting, use some sort of protection before sliding over the shaft.

O-RINGS

Lubricate each ring prior to fitting and, on reassembly, slide over the part but do not twist, otherwise leakage will result.

SEALING COMPOUNDS

On the mating surfaces indicated with X apply one of the following sealing compounds: RTV SILMATE, RHODORSIL CARF 1 or LOCTITE PLASTIC GASKET.
Before applying the sealing compound, prepare the surfaces as follows:

— Using a wire brush, remove any deposits.
— Thoroughly degrease using one of the following detergents: Solvent, kerosene or hot water/soda solution.

BEARINGS

To fit bearings:

— Before installing on shafts, heat to 80°C to 90°C.
— Cool before pressing them into their seats.

ROLL PINS

When fitting straight roll pins ensure that they face in direction of work to stress the pin.
Coil roll pins can be installed in any position.

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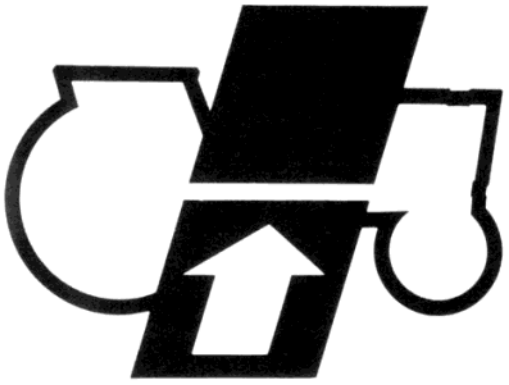
SPARE PARTS

Use exclusively **FIAT spare parts,** having the trade mark below.



ricambi originali

FiatTrattori

These are the only parts that guarantee the quality, durability and safety of the original parts, being parts fitted in production.
Only FIAT spare parts can offer this guarantee.
When ordering spare parts please state:
— Tractor model (marketing code) and frame number.
— Engine type and number.
— Part number (given on "Microfiches" or Spare Parts Catalogue").

SERVICE TOOLS

The service tools indicated in this manual are:
— Designed specifically for tractors of the FIAT range.
— Essential for reliable repair work.
— Manufactured and tested in such a way as to offer efficient and durable working instruments.
The mechanic is also reminded that being equipped means:
— Operating in optimum working conditions.
— Obtaining the best results.
— Saving time and energy.
— Working in more safety.

NOTICE

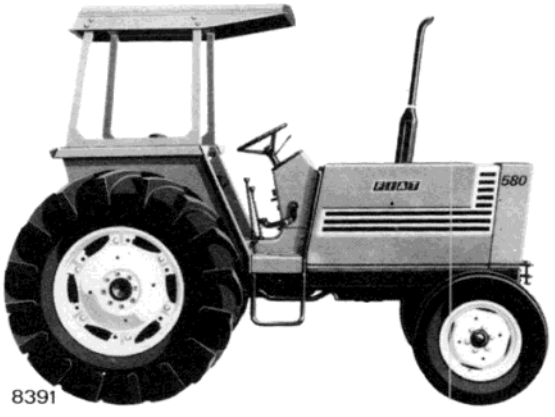
Wear limits recommended for some parts are not binding, being given for guidance only.
"Front", "rear", "right" and "left" references are with operator facing normal direction of travel of tractor.

DIREZIONE COMMERCIALE

IDENTIFICATION DATA

Marketing Code — Rear wheel drive (RWD) — Four wheel drive		580 580 DT	680 680 DT
Engineering code:			
— 8-speed, rear wheel drive		661.100.000	662.100.000
— 12-speed, rear wheel drive		661.100.000 Var. 720.286.080	662.100.000 Var. 720.286.090(1)
— 16-speed, rear wheel drive		661.100.000 Var. 720.111.170	662.100.000 Var. 720.111.170(1)
— 8-speed, rear wheel drive with reverser		661.100.000 Var. 700.109.030	662.100.000 Var. 700.109.010
— 8-speed, four wheel drive		661.127.000	662.127.000
— 12-speed, four wheel drive		661.127.000 Var. 720.286.080	662.127.000 Var. 720.286.090(2)
— 16-speed, four wheel drive		661.127.000 Var. 720.111.170	662.127.000 Var. 720.111.170(2)
— 8-speed, four wheel drive with reverser		661.127.000 Var. 700.109.030	662.127.000 Var. 700.109.010
Engine type (all versions)		— FIAT 8035.04.370(°)/377(*) (C.A.V. pump)	FIAT 8045.02.270(°)/277(*) (BOSCH pump) FIAT 8045.02.370(°)/377(*) (C.A.V. pump)
WEIGHTS (8-speed version)			
Operating weight (including lift, implement attachment, swinging drawbar and ROP frame)	mod. 580 kg mod. 580 DT » mod. 680 » mod. 680 DT »	2335 (5149 lb) 2651 (5766 lb) — —	— — 2500 (5513 lb) 2800 (6174 lb)

(°) Engine with FERODO clutch. (*) Engine with LUK or O.M.G. clutch. (1) 68OH (see page 00 9). (2) 680H DT (see page 00 9).



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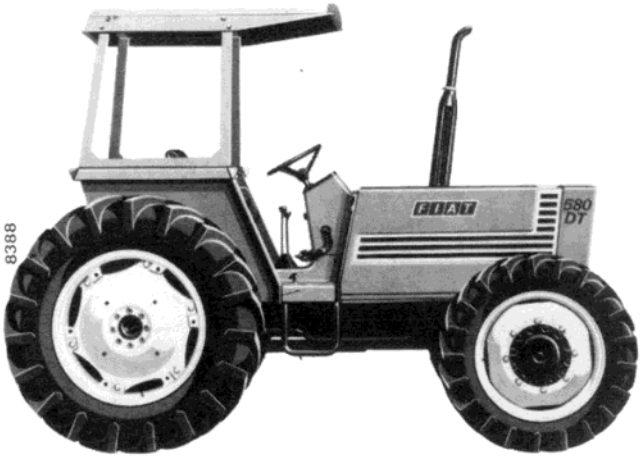
SPECIFICATION

ENGINE

	580-580 DT	680-680 DT
Type	4-stroke diesel, naturally aspirated	
Injection	Direct	
Number of cylinders	3	4
Sleeves	Dry	
Bore and Stroke	103x110 mm (4.05x4.33) in	100x110 mm (3.93x4.33) in
Displacement	2750 cm³	3456 cm³
Compression ratio	17 to 1	
Max. horsepower, DGM/DIN, metric	42.7 kW (58 HP)	50 kW (68 HP)
Max. output speed	2700 rpm	2500 rpm
Max. torque speed	1600 rpm	1400 rpm
Main bearings	4	5
Balancer	Flyweight, engine sump	
Sump	Iron	
Valve Gear	OH valves, push rod operated	
Inlet — Opens: BTDC	3°	
Inlet — Closes: ABDC	23°	
Exhaust — Opens: BBDC	48° 30'	
Exhaust — Closes: ATDC	6°	
Valve clearance		
— For timing check	0.45 mm (0.018 in)	
— Normal		
- Intake	0.25 mm (0.010 in)	
- Exhaust	0.35 mm (0.014 in)	



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DIREZIONE COMMERCIALE

ENGINE

		580-580 DT	680-680 DT
Fuel System			
Air cleaner		Oil bath or dry, automatic drain centrifugal precleaner	
Fuel filters (between pumps)		Two, in line, cartridge type, water separator integral with first filter	
Feed pump		Double diaphragm	
— Operation		Cam	
Injection pump		Distributor	
— Type	BOSCH or C.A.V.	—	EP/VA 4/110H 1250 CL 771381
		DPA-3233 F700 771338	DPA-3342 F470 771414
— Integral all speed governor	BOSCH	—	Hydraulic
	C.A.V.	Centrifugal	Centrifugal
— Integral advance device		Hydraulic	
— Pump timing, BTDC	BOSCH	—	9° ± 1°
	C.A.V.	13° ± 1°	15° ± 1°
Injectors		3-orifice	
— Type		See page 19, Section 10	
— Release pressure	bar	221 to 230 (225 to 235 kg/cm², 3200 to 3342 psi)	
Firing order		1-2-3	1-3-4-2
Lubrication System		Forced feed, gear pump	
Pump drive		Camshaft	
Oil filters		Strainer on pump inlet and full flow cartridge on outlet	
Relief valve		In pump body	
— Oil pressure at governed speed	bar	2.9 to 3.9 (3 to 4 kg/cm², 42.6 to 56.9 psi)	
Cooling System		Water, centrifugal pump	
Radiator		3 deep core vertical tube	3 or 4 deep core vertical tube
Expansion tank		Semi-transparent plastic	
Fan, water pump pulley mounted		Suction, steel	
Temperature control		Wax thermostat	
Tractor Meter		On instrument panel	
Drive		Oil pump gear	
Hourmeter activation speed		1800 rpm	1800 rpm
Meter drive ratio		1 to 2	1 to 2

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SPECIFICATION

POWER TRAIN

Clutch

Type	Luk, Ferodo, or O.M.G., 11 in.
Construction	Twin, dry single plate
Control	
— Transmission	Pedal
— PTO	Manual
Plate material	
— models 580 and 580 DT	
Transmission	Organic
PTO	Organic
— models 680-680 DT	
Transmission	Cerametallic compound (*)
PTO	Organic

(*) Optional for mod. 580

Transmission

Type	Constant mesh
Gear	Spur
Splitter	Planetary
— Single	8 forward, 2 reverse speeds
— Double	12 forward, 3 reverse speeds
Crawler	In-line, 12-speed splitter mounted 16 forward, 4 reverse speeds
Reverser version	Mechanical, 8 forward, 8 reverse speeds
Control levers	Separate
Bevel drive	Helical
Differential	Two pinion
Differential lock	Pedal controlled
Final Drives	Planetary, three planet
— 12/16 speed transmission	Heavy Duty (mods. 680 H and 680 H DT)

BRAKES

Service

Type	Disc, oil-bath, axle shaft mounted
Operation	Hydraulic
Circuits	Split
Control	Latched pedals

Parking/Emergency

Type	Disc, independent
Position	Bevel pinion shaft mounted
Control	Manual lever

STEERING

Steering unit	
— 560-680	Recirculating ball and fully hydraulic (optional)
— 580 DT - 680 DT	Fully hydraulic
Linkage joints	Sealed for life
Turning radius (without brakes)	
— 580	3.8 m (12 ft 5 in)
— 580 DT, with front axle in	5.7 m (18 ft 8 in)
— 680	4 m (13 ft 1 in)
— 680 DT, with front axle in	5.75 m (18 ft 10½ in)

FRONT AXLE (580-680)

Type	Inverted U, telescoping, center pivotting
Track widths	6

LIVE FRONT AXLE (580 DT - 680 DT)

Type	Full floating, center pivotting, unjointed drive shaft and articulations on tractor centerline.
Differential	Two pinion
Final Drives	Planetary
Track widths	5

REAR WHEELS

Track widths	7

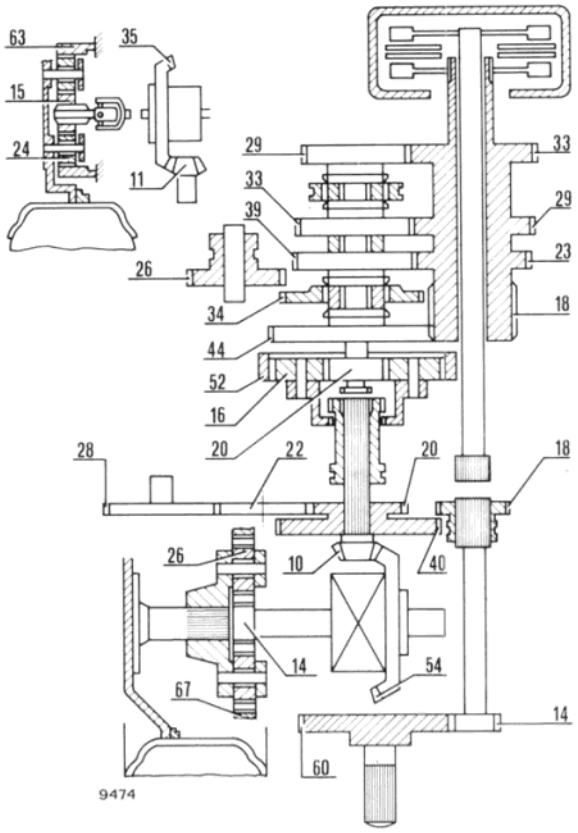
POWER TAKE-OFF

Type	Fully independent
Speed	540 rpm, 1-3/8 in six spline or 1-3/4 in six spline extension 1000 rpm, 1-3/8 in 21-spline extension
Control	Manual lever
Standard speed selection	Automatic
Engine speed with PTO at standard speeds	
— 580 - 540 rpm	2314 rpm
— 580-680 - 540 rpm	2230 rpm
- 1000 rpm	2410 rpm
Rotation	Clockwise (seen from rear)

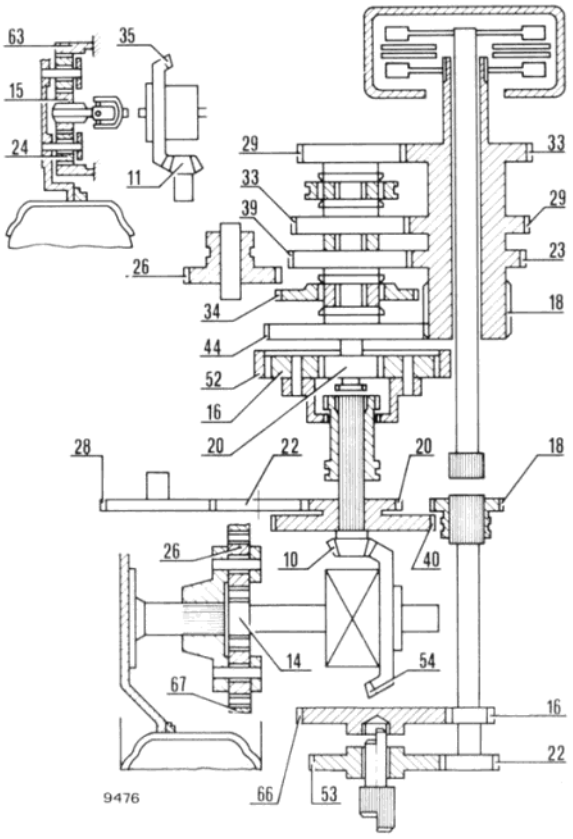
(continued page 8)

POWER TRAIN SCHEMATICS

580-580 DT (8-speed version)



680-680 DT (8 speed version)



Tractor speeds at maximum engine speed, full load (8-speed transmission)																		
GEARS		Mods. 580 and 580 DT rear tyres										Mods. 680 and 680 DT rear tyres							
		14.9/13-30		16.9/14-30		12.4/11-36		13.6/12-36		16.9/14-28 (*)		16.9/14-30		13.6/12-36		18.4/15-30		13.6/12-38	
		kph	mph	kph	mph	kph	mph	kph	mph	kph	mph	kph	mph	kph	mph	kph	mph	kph	mph
Low	1st	2.4	1.5	2.5	1.5	2.5	1.5	2.6	1.6	2.5	1.5	2.4	1.5	2.5	1.5	2.5	1.5	2.5	1.5
	2nd	3.5	2.2	3.7	2.3	3.7	2.3	3.8	2.4	3.6	2.2	3.4	2.1	3.5	2.2	3.6	2.2	3.7	2.3
	3rd	5.2	3.2	5.5	3.4	5.5	3.4	5.7	3.5	5.3	3.3	5.1	3.2	5.3	3.3	5.3	3.3	5.5	3.4
	4th	6.8	4.2	7.1	4.4	7.1	4.4	7.4	4.6	6.9	4.3	6.6	4.1	6.9	4.3	6.9	4.3	7.1	4.4
	Reverse	3.1	1.9	3.3	2.0	3.3	2.0	3.4	2.1	3.2	1.9	3.1	1.9	3.2	1.9	3.2	1.9	3.3	2.0
High	1st	8.8	5.5	9.2	5.7	9.2	5.7	9.6	5.9	8.9	5.5	8.5	5.3	8.9	5.5	8.9	5.5	9.2	5.7
	2nd	12.6	7.8	13.3	8.3	13.3	8.3	13.8	8.6	12.9	8.0	12.3	7.6	12.8	7.9	12.9	8.0	13.2	8.2
	3rd	18.9	11.7	19.7	12.2	19.7	12.2	20.6	12.8	19.1	11.9	18.3	11.4	19.1	11.9	19.2	11.9	19.7	12.2
	4th	24.5	15.2	25.7	15.9	25.7	15.9	26.6	16.5	24.8	15.4	23.7	14.7	24.7	15.3	24.9	15.5	25.6	15.9
	Reverse	11.3	7.0	11.9	7.4	11.9	7.4	12.4	7.7	11.5	7.1	11.0	6.8	11.5	7.1	11.6	7.2	11.9	7.4

(*) Model 580 only

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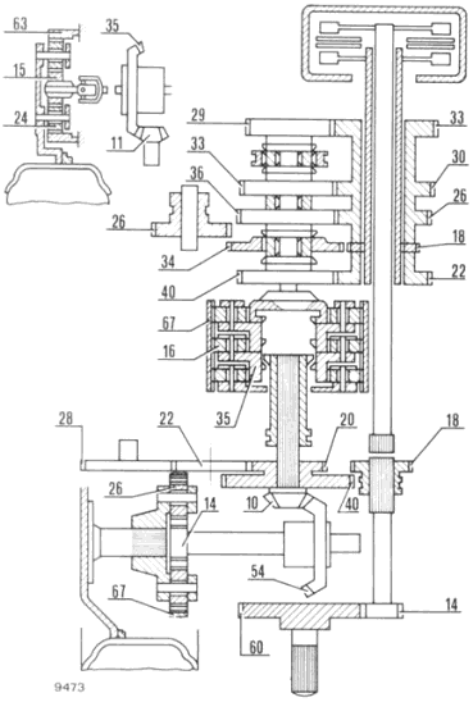
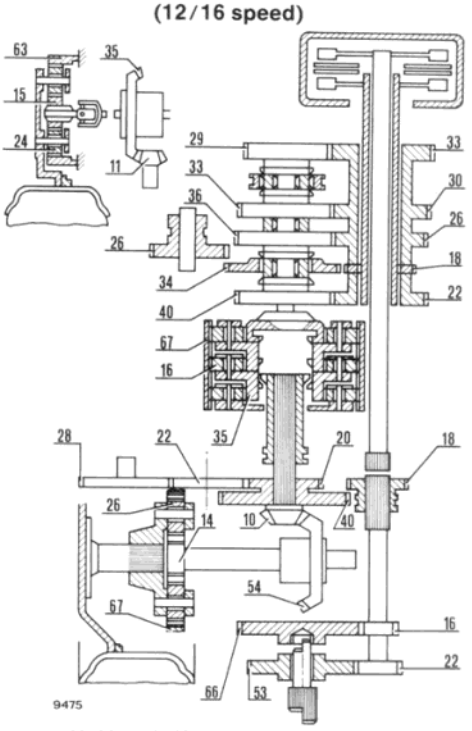
POWER TRAIN SCHEMATICS

580-580 DT
(12/16 speed)



680-680 DT
(12/16 speed)



Tractor speeds, maximum engine speed, 12 and 16 speed transmission

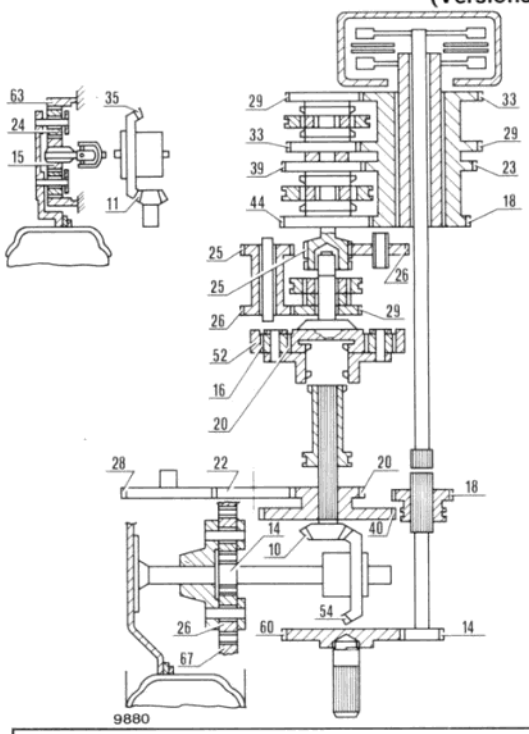
GEARS		Mods. 580 and 580 DT rear tyres										Mods. 680 and 680 DT rear tyres							
		14.9/13-30		16.9/14-30		12.4/11-36		13.6/12-36		16.9/14-28 (*)		16.9/14-30		13.6/12-36		18.4/15-30		13.6/12-38 16.9/14-4	
		kph	mph	kph	mph	kph	mph	kph	mph	kph	mph	kph	mph	kph	mph	kph	mph	kph	mph
Crawler (●)	1st	0.5	0.3	0.5	0.3	0.5	0.3	0.5	0.3	0.5	0.3	0.4	0.2	0.5	0.3	0.5	0.3	0.5	0.3
	2nd	0.6	0.4	0.6	0.4	0.6	0.4	0.6	0.4	0.6	0.4	0.6	0.4	0.6	0.4	0.6	0.4	0.6	0.4
	3rd	0.8	0.5	0.8	0.5	0.8	0.5	0.8	0.5	0.8	0.5	0.8	0.5	0.8	0.5	0.8	0.5	0.8	0.5
	4th	1.0	0.6	1.0	0.6	1.0	0.6	1.1	0.7	1.0	0.6	0.9	0.6	1.0	0.6	1.0	0.6	1.0	0.6
	Reverse	0.4	0.2	0.4	0.2	0.4	0.2	0.5	0.3	0.5	0.3	0.4	0.2	0.5	0.3	0.5	0.3	0.5	0.3
Low	1st	1.4	0.9	1.4	0.9	1.4	0.9	1.5	0.9	1.4	0.9	1.3	0.8	1.4	0.9	1.4	0.9	1.5	0.9
	2nd	1.8	1.1	1.9	1.2	1.9	1.2	2.0	1.2	1.9	1.2	1.8	1.1	1.8	1.1	1.8	1.1	1.9	1.2
	3rd	2.3	1.4	2.4	1.5	2.4	1.5	2.5	1.6	2.3	1.4	2.2	1.4	2.3	1.4	2.3	1.4	2.4	1.5
	4th	2.8	1.7	3.0	1.9	3.0	1.9	3.1	1.9	2.9	1.8	2.8	1.7	2.9	1.8	2.9	1.8	3.0	1.9
	Reverse	1.3	0.8	1.4	0.9	1.4	0.9	1.4	0.9	1.4	0.9	1.3	0.8	1.3	0.8	1.4	0.9	1.4	0.9
Normal	1st	4.0	2.5	4.2	2.6	4.2	2.6	4.4	2.7	4.1	2.5	3.9	2.4	4.1	2.5	4.1	2.5	4.2	2.6
	2nd	5.3	3.3	5.6	3.5	5.6	3.5	5.8	3.6	5.4	3.4	5.1	3.2	5.4	3.4	5.4	3.4	5.6	3.5
	3rd	6.7	4.2	7.0	4.3	7.0	4.3	7.3	4.5	6.8	4.2	6.5	4.0	6.8	4.2	6.8	4.2	7.0	4.3
	4th	8.4	5.2	8.8	5.5	8.8	5.5	9.1	5.7	8.5	5.3	8.1	5.0	8.5	5.3	8.5	5.3	8.8	5.5
	Reverse	3.9	2.4	4.1	2.5	4.1	2.5	4.2	2.6	4.0	2.5	3.8	2.4	3.9	2.4	4.0	2.5	4.1	2.5
High	1st	11.8	7.3	12.4	7.7	12.4	7.7	12.9	8.0	12.0	7.5	11.4	7.1	11.9	7.4	12.0	7.5	12.4	7.7
	2nd	15.5	9.6	16.3	10.1	16.3	10.1	16.9	10.5	15.8	9.8	15.0	9.3	15.7	9.7	15.8	9.8	16.2	10.1
	3rd	19.5	12.1	20.5	12.7	20.5	12.7	21.3	13.2	19.8	12.3	19.8	12.3	19.7	12.2	19.9	12.4	20.4	12.7
	4th	24.4	15.2	25.7	15.9	25.7	15.9	26.6	16.5	24.8	15.4	24.7	15.3	24.7	15.3	24.9	15.5	25.5	15.8
	Reverse	11.0	6.8	12.0	7.5	12.0	7.5	12.4	7.7	11.5	7.1	11.0	6.8	11.5	7.1	11.6	7.2	11.9	7.4

(●) 16 speed only (*) Mod. 580 only

DIREZIONE COMMERCIALE

POWER TRAIN SCHEMATICS

580-580 DT (Versions with reverser) 680-680 DT



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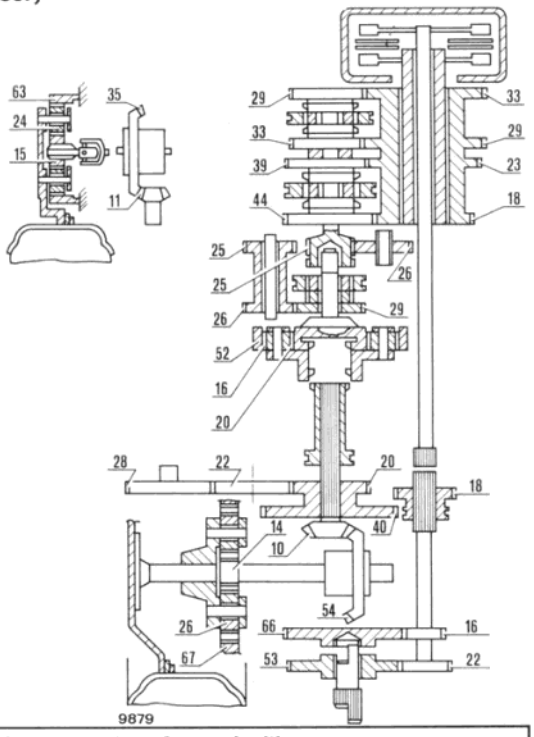

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Tractor speeds, maximum engine speed, 8-speed transmission, 8-speed with reverser

GEARS		Mods. 580 and 580 DT, rear tyres								Mods. 680 and 680 DT, rear tyres							
		14.9/13-30		16.9/14-30		12.4/11-36		13.6/12-36		16.9/14-30		13.6/12-36		18.4/15-30		13.6/12-38 16.9/14-34*	
		kph	mph	kph	mph	kph	mph	kph	mph	kph	mph	kph	mph	kph	mph	kph	mph
Low	1st	2.4	1.5	2.5	1.5	2.6	1.6	2.7	1.7	2.4	1.5	2.5	1.5	2.5	1.5	2.5	1.5
	2nd	3.5	2.2	3.7	2.3	3.7	2.3	3.8	2.4	3.4	2.1	3.6	2.2	3.6	2.2	3.7	2.3
	3rd	5.3	3.3	5.5	3.4	5.5	3.4	5.7	3.5	5.1	3.2	5.3	3.3	5.3	3.3	5.5	3.4
	4th	6.8	4.2	7.1	4.4	7.2	4.4	7.4	4.6	6.6	4.1	6.9	4.3	6.9	4.3	7.1	4.4
High	1st	8.8	5.5	9.2	5.7	9.3	5.8	9.6	5.9	8.5	5.3	8.9	5.5	8.9	5.5	9.2	5.7
	2nd	12.7	7.9	13.3	8.3	13.3	8.3	13.8	8.6	12.3	7.6	12.8	7.9	12.9	8.0	13.2	8.2
	3rd	18.9	11.7	19.7	12.2	19.9	12.4	20.6	12.8	18.3	11.4	19.1	11.9	19.2	11.9	19.8	12.3
	4th	24.5	15.2	25.6	15.9	25.8	16.0	26.7	16.6	23.7	14.7	24.7	15.3	24.9	15.4	25.6	15.9
Low	1st reverse	2.2	1.4	2.3	1.4	2.3	1.4	2.4	1.5	2.1	1.3	2.2	1.4	2.2	1.4	2.3	1.4
	2nd reverse	3.2	1.9	3.3	2.1	3.3	2.1	3.4	2.1	3.1	1.9	3.2	1.9	3.2	1.9	3.3	2.1
	3rd reverse	4.7	2.9	4.9	3.0	4.9	3.0	5.1	3.2	4.5	2.8	4.7	2.9	4.8	3.0	4.9	3.0
	4 th reverse	6.1	3.8	6.4	3.9	6.4	3.9	6.6	4.1	5.9	3.7	6.1	3.8	6.2	3.8	6.4	3.9
High	1st reverse	7.9	4.9	8.2	5.1	8.3	5.2	8.6	5.3	7.6	4.7	8.0	4.9	8.0	4.9	8.2	5.1
	2nd reverse	11.4	7.1	11.9	7.4	12.0	7.5	12.4	7.7	11.0	6.8	11.5	7.1	11.6	7.2	11.9	7.4
	3rd reverse	16.9	10.5	17.7	11.0	17.8	11.1	18.5	11.5	16.4	10.2	17.1	10.6	17.2	10.7	17.7	11.0
	4th reverse	21.9	13.6	22.9	14.2	23.1	14.4	23.9	14.9	21.2	13.2	22.2	13.8	22.3	13.9	22.9	14.2

(*) Heavy duty transmission only.

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Ground speed PTO

Control	same as transmission PTO
Rotation	same as transmission PTO
Shaft drive ratio	
— 580 (540 rpm)	16.2 revs per rear wheel turn
— 580-680	
with PTO at 540 rpm	16.8 revs per rear wheel turn
with PTO at 1000 rpm	28.8 revs per rear wheel turn

LIFT

Type	Hydraulic, draught and position control
Response	Manually adjustable
Draught control	
— 580	Top link or Lower links through sensing bar (optional)
— 680	Lower links through sensing bar
Pump	Gear, engine driven
Hydraulic fluid	Rear axle oil
Design lift capacity	See Section 50, page 4
Max. lift stroke	See Section 50, page 4
Max. lift capacity	See Section 50, page 4
Linkage	Three-point, with three automatic hooks (optional), for 580 applicable only to lift derived from model 680
Attachment	
— 580	Categories one and two
— 680	Category two only
Lower links	Conventional or telescoping (for 580 only applicable to lift derived from model 680).

Remote Control Valves

Number	up to three
Type	Single or double acting, for trailer power braking

TOWING ATTACHMENTS

Rear

Drawbar	Swinging, over sector Swinging free
Crossmember	Drilled
Tow hook	Adjustable for height
Hook	Standard for trailer with swinging drawbar
Rockinger hook	Pivotting, with safety type automatic hitch and lock-up device

Front

Pull hook	Rigid, not usable with front ballast

BALLASTING

Front axle

Support	130 kg (287 lb)
Cast iron plates	
— Six, 40 kg (88 lb) each	370 kg (816 lb) total
— Ten, 40 kg (88 lb) each	530 kg (1168 lb) total

Rear axle

Cast iron rings	
— Four, 55 kg (121 lb) each	220 kg (485 lb) total
— Six, 55 kg (121 lb) each	330 kg (727 lb) total

Cast iron wheel discs

— model 680, 120 kg (264 1/2 lb) each for a total of 240 kg (529 lb), only for 34", 36", and 38" wheel discs

TYRE SIZES

	580	580 DT	680	680 DT
Front	6.00-16 6.00-19 7.50-16	12.4/11-24 (*) 9.5/ 9-24 (°) 11.2/10-24 (●)	6.50-20 7.50-16 7.50-18	12.4/11-24 (x) 11.2/10-28 (+) 11.2/10-24 (★)
Rear	12.4/11-36 13.6/12-36 14.9/13-30 16.9/14-28 16.9/14-30	12.4/11-36 (●) 13.6/12-36 (*) 14.9/13-30 (°) 16.9/14-30 (●)	13.6/12-36 16.9/14-34 18.4/15-30 16.9/14-30 13.6/12-38	13.6/12-36 (x) 16.9/14-34 (+) 18.4/15-30 (x) 16.9/14-30 (★) 13.6/12-38 (+)

(*) (°) (●) (x) (+) (★) Tyre matching references

DIREZIONE COMMERCIALE

BODY

Floor	On four rubber cushion mountings. Compact, rigid, vibration free, integral, complete with footboards, mudguards, dash and provision for safety frame or cab installation
Fuel Tank	Behind seat, boxed between mudguards
Dashboard	13-function instrument panel plus control board
Bonnet	Full enclosing, in four parts
L.H. side section	Access to air cleaner, oil filter and dipstick, brake fluid and battery
R.H. side section	Access to fuel filters, fuel pump, injection pump and steering fluid

Cab

Visibility	All-round
Accessibility	On either side
Rear window	Adjustable
Protection	Insulated, with provisions for roof-mounted heating and ventilating or air conditioning system

Driver's Seat

Type	Anthropomorphic
Suspension	Hydraulic damper
Adjustment	
— Reach (Std. and De-Luxe)	11 positions
— Height	

ELECTRICAL SYSTEM (12 Volt)

Generating and Starting

Alternator	
— Type	
- Bosch	G1→14V - 33A27 or
- Marelli	AA108 - 14V-33A-1
— Rated output	33A
— Voltage regulator	Electronic, integral
Starter	
— 580	
Marelli	2.5 kW (3.4 HP) MT 71A
Bosch	1.8 kW (2.5 HP) JF→12V
Lucas	2.5 kW (3.4 HP) M45G
— 680	
Marelli	3.5 kW (4.8 HP) MT 68 AB
Bosch	2.94 kW (4 HP) JD→12V

Battery	
— Location	Ahead of radiator
— Capacity	
— 580	88/92 Ah or 110/120 Ah
— 680	110/120 Ah or 132/140 Ah

Lighting

Headlamps	Twin, high and asymmetric low beams, 45/40 W
Front lights	
— Parking	5 W
— Turn signal	21 W
Tail lights	
— Parking	5 W
— Turn signal	21 W
— Stop	21 W
— Number plate	L.H. rear light

Instruments and Accessories

Instrument panel	13-function (see Section 60, page 15)
Control board	See Section 60, page 15
Flood light	35 W
Rear power point	DIN, 7-pole
Dash power point	Single-pole
Horn	Control board mounted
Cold starting	Thermostarter or start-pilot
Lighter	Dash-mounted
Fuses	See Section 60, page 15
Hazard warning	Tractor and trailers
CAV fuel pump automatic start-retard device	See Section 60, page 16

MODELS 680H - 680H DT
HEAVY DUTY

These models differ from standard models in having reinforced final drives, capable of supporting greater stress.
These final drives make it possible to have 8 rear track widths of 1400 to 2100 mm (55 to 86 1/2 in) rather than seven. The wheels may also be equipped with size 16.9/14-34 tyres.
The left lift arm of the hydraulic lift is suitable for mounting a remote control lift cylinder.

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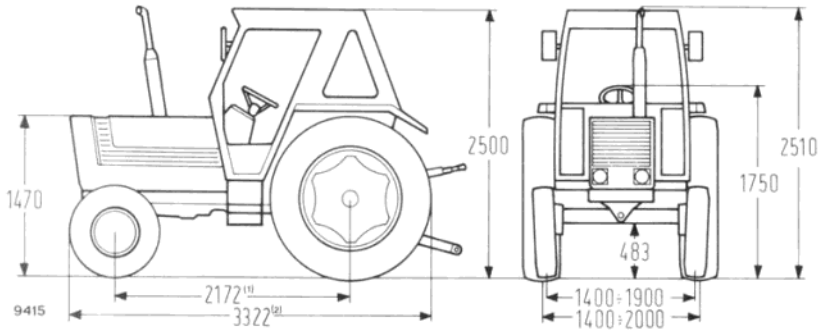
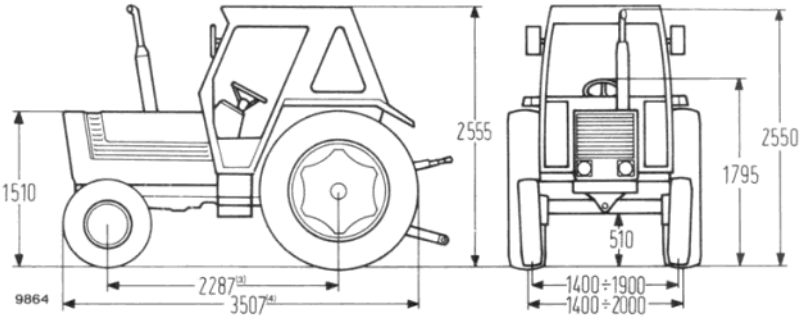
SPECIFICATION

MAIN DIMENSIONS (in mm)



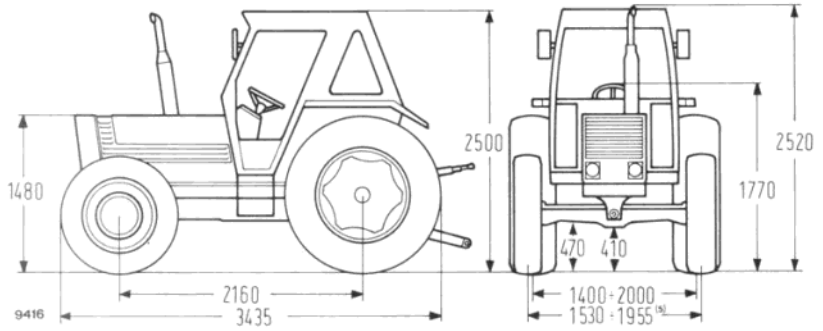
Mod. 580
(6.00-19 front and
12.4/11-36 rear tyres)

(1) A.M. wheelbase = 2150
(2) A.M. lenght = 3300

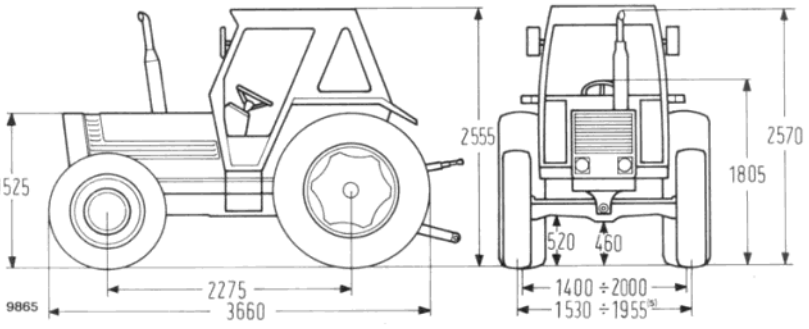


Mod. 680
(7.50-18 front and
13.6/12-38 rear tyres)

(3) A.M. wheelbase = 2265
(4) A.M. length = 3485



Mod. 680 DT
(11.2/10-24 front and
12.4/11-36 rear tyres)



Mod. 580 DT
(11.2/10-28 front and
13.6/12-38 rear tyres)

(5) A.M. tracks = 1600 to 1925

DIREZIONE COMMERCIALE

CAPACITIES

DESCRIPTION	FIAT Recommended Lubricants	CAPACITY						International Designation
		Modd. 580-580 DT			Modd. 680-680 DT			
		litres	pints	kg	litres	pints	kg	
Engine oil (with filter and lines)	**oliofiat AMBRA 20 W/40** above 0°C	7.6	13¼	6.8	11.7	20½	10.5	Multigrade detergent mineral oil, MIL-L-2104B EP characteristics
Sump and filter oil		7.4	13¼	6.6	11.2	19¾	10.1	
Sump oil		6.7	11¾	6	10.6	18½	9.5	
Air cleaner (1)	**oliofiat AMBRA 10 W/30** below 0°C	0.80	1½	0.72	0.8	1½	0.72	
Power steering fluid		1.7	3½	1.5	1.7	3½	1.5	
Transmission oil	**oliofiat AMBRA 20 W/40**	10	17½	9	10	17½	9	
Steering oil		0.39	½	0.35	0.39	½	0.35	
Live front axle oil								
— Axle casing		4.7	8½	4.2	4.7	8½	4.2	
— Final drives (each)		1.5	2½	1.35	1.5	2½	1.35	
Brake fluid	**oliofiat AGERTER 10 W**	0.7	1¼	0.65	0.7	1¼	0.65	Single grade oil, MIL-L-2104C, API CD Serie 3
Rear axle (bevel drive, final drives, brakes) and lift oil	**oliofiat AF 87**	44.4	78½	40(2)	44.4	78½	40(2)	Mineral gear oil with stick-slip inhibiting properties
Front hub grease	**grassofiat MR 3**	—	—		—		—	Lithium based grease NLGI No. 3
Clutch withdrawal support	**grassofiat G 9**	—	—		—		—	Lithium-calcium based grease, NLGI No. 2
Lubricator grease		—	—		—		—	

Coolant (3) water and FIAT **PARAFLU 11**	580 680	10 litres 17½ pints 13 litres 23 Pints
Fuel (diesel oil)	580-680	80 litres 17.6 GALL.

(1) Change cleaner oil when sediment is 10 mm or ½ in deep (2) 580 DT and 680 DT oil capacity is 45.5 litres or 41 kg (10 Gall.)
(3) Including expansion tank

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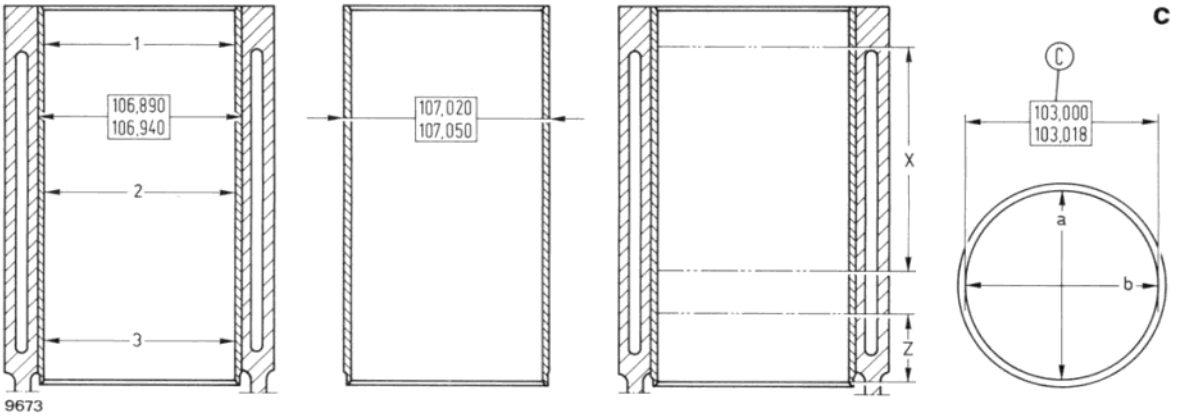
ENGINE BLOCK

	580-580 DT	680-680 DT
Engine Block		
Cylinder bore diameter in engine block	106.890 to 106.940 mm (4.208 to 4.210 in)	102.890 to 102.950 mm (4.051 to 4.053 in)
Sleeve O.D.	107.020 to 107.050 mm (4.213 to 4.215 in)	103.020 to 103.050 mm (4.056 to 4.057 in)
Sleeve interference fit in block	0.08 to 0.160 mm (0.003 to 0.006 in)	0.07 to 0.160 mm (0.0027 to 0.006 in)
Sleeve diameter oversize	0.2 mm (0.008 in)	0.2 mm (0.008 in)



Sleeve and Block Inspection Data

a/b. Sleeve bore measurements at right angles - c. Model 580 - d. Model 680 - C. Sleeve fitted bore diameter - Z. Sleeve wear inspection length for assessment of piston fit on plane b at right angles to crankshaft - X. Sleeve wear inspection length (swept area) for assessment of ovality and taper on planes a and b - 1/2/3. New or re-bored sleeve bore measuring depth on planes a and b

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ENGINE: Specification and Data

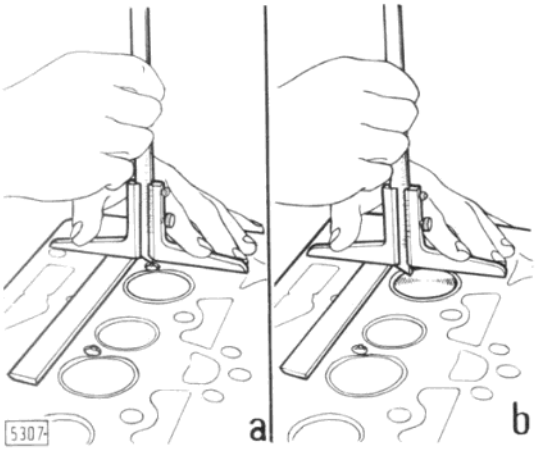
ENGINE BLOCK

(continued)

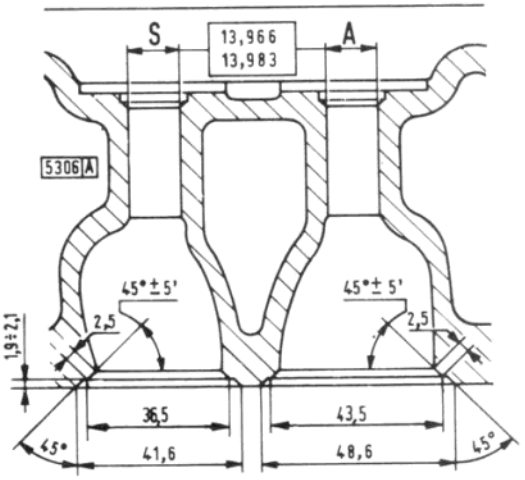
	mm		in	
	580-580 DT	680-680 DT	580-580 DT	680-680 DT
Sleeve bore diameter	103.000 to 103.018	100.000 to 100.018	4.055 to 4.046	3.937 to 3.938
Maximum ovality and taper due to wear	0.12		0.005	
Sleeve bore oversize	0.2-0.4-0.6-0.8		0.008 - 0.016 - 0.024 - 0.031	
Housing bore diameter				
— Camshaft bushings				
- Front	54.780 to 54.805		2.1567 to 2.1577	
- Intermediate	54.280 to 54.305		2.1370 to 2.1379	
- Rear	53.780 to 53.805		2.1173 to 2.1183	
Tappet housing bore diameter	15.000 to 15.018		0.590 to 0.591	
Tappet oversize	0.1 - 0.2 - 0.3		0.004 - 0.008 - 0.012	
Main bearing housing bore diameter	80.587 to 80.607		3.1727 to 3.1734	

CYLINDER HEAD

Valve guide housing bore diameter in head	13.966 to 13.983	0.5498 to 0.5505
Valve guide oversize	0.2	0.0079
Valve seat dimensions	see figure below	
Valve stand-in	0.7 to 1.1	0.027 to 0.043
— Maximum stand-in allowed	1.4	0.055
Injector stand-out	1 to 1.5	0.039 to 0.059
— Maximum stand-out allowed	1.8	0.071
Cylinder head height	92	3.622
Maximum head skimming depth	0.5	0.020



Checking Fuel Injector Stand-out and valve Stand-in.
a. Stand-out: 1 to 1.5 mm (Maximum stand-out: 1.8 mm) - b. Valve stand-in 0.7 to 1.1. mm (maximum stand-in: 1.4 mm)

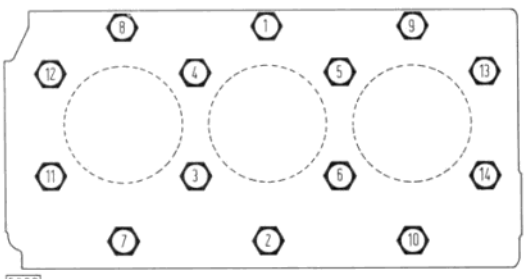


Valve Seat and Guide Housing Dimensions
A. Inlet - S. Exhaust

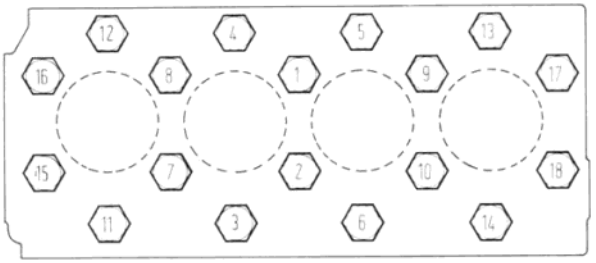
DIREZIONE COMMERCIALE

CYLINDER HEAD

Cylinder Head Tightening Diagram



a



b

a. Mod. 580 - b. Mod. 680

When refitting the cylinder head thoroughly clean the mating surfaces and reposition the head gasket noting the following points:

— place the gasket (provided with adhesive face) on the block with the mark "ALTO" facing towards the cylinder head. Offer up the cylinder head and tighten the capscrews in the order shown.
The correct torque should be reached in three stages as shown in the table alongside;

Stage	Nm	Kgm	ft lb
1st	49	5	36
2nd	98	10	72
3rd	147	15	87

CRANK GEAR

Crankshaft - Bearings	mm		in	
	580-580 DT	680-680 DT	580-580 DT	680-680 DT
Main journal diameter	76.187 to 76.200 (1)		2.9994 to 2.9999	
Main journal undersize	0.254 - 0.508 - 0.762 - 1.016		0.0099 - 0.0199 - 0.0299 - 0.0399	
Main bearing wall thickness	2.162 to 2.172		0.0851 to 0.0855	
Main bearing undersize	0.254 - 0.508 - 0.762 - 1.016		0.0099 - 0.0199 - 0.0299 - 0.0399	
Main journal clearance in bearings	0.042 to 0.096		0.0016 to 0.0038	
— Maximum wear clearance	0.180		0.0071	
Crankpin diameter	58.730 to 58.743 (1)		2.3122 to 2.3127	
Crankpin undersize	0.254 - 0.508 - 0.762 - 1.016		0.0099 - 0.0199 - 0.0299 - 0.0399	
Big end bearing wall thickness	1.805 to 1.815		0.0710 to 0.0715	
Big end bearing undersize	0.254 - 0.508 - 0.762 - 1.016		0.0099 - 0.0199 - 0.0299 - 0.0399	
Crankpin clearance in big end bearing	0.035 to 0.080		0.0014 to 0.0031	
— Maximum wear clearance	0.180		0.0071	

(1) 0.1 mm undersize crankpin and main journal crankshafts may be fitted in production coupled to corresponding undersize bearings.

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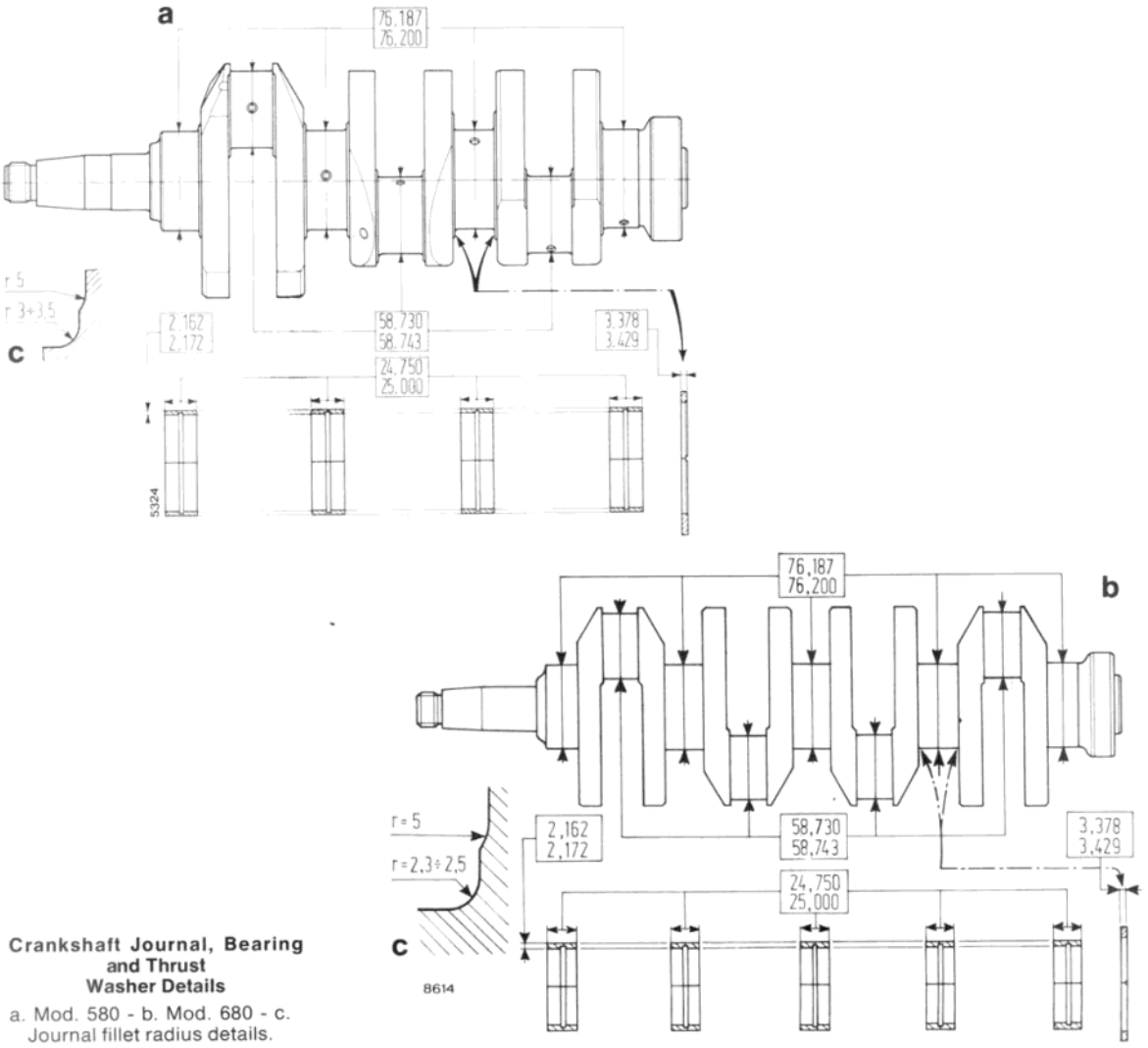
CRANK GEAR

(continued)

	580-580 DT	680-680 DT
Crankshaft thrust washer thickness	3.378 to 3.429 mm (0.1329 to 0.1349 in)	
Thrust washer oversize	0.127 mm (0.0049 in)	
Width of main bearing housing over thrust washers	31.766 to 31.918 mm (1.2506 to 1.2566 in)	
Length of corresponding main journal	32.000 to 32.100 mm (1.2598 to 1.2638 in)	
Crankshaft end float	0.082 to 0.334 mm (0.0032 to 0.0131 in)	
— Maximum wear end float	0.40 mm (0.016 in)	



Crankshaft Journal, Bearing and Thrust Washer Details

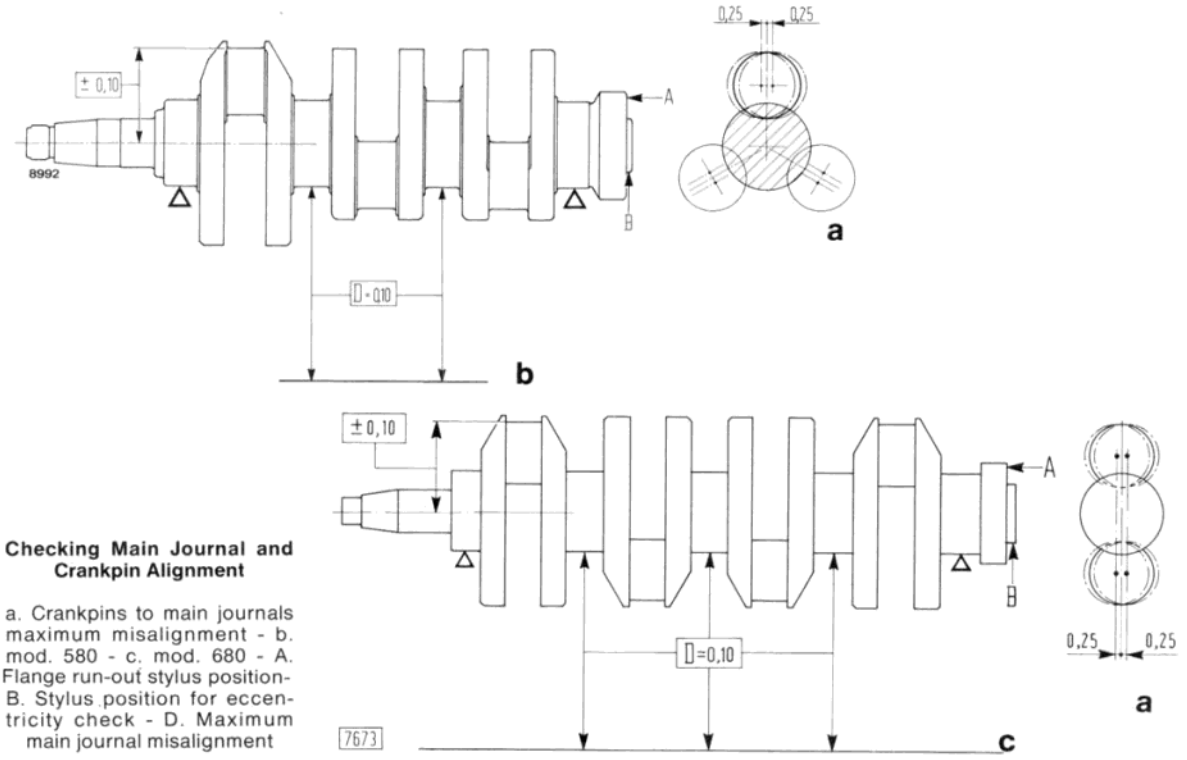
a. Mod. 580 - b. Mod. 680 - c. Journal fillet radius details.

DIREZIONE COMMERCIALE

Crank Gear

(continued)

	580-580 DT	680-680 DT
Maximum main journal and crankpin ovality or taper after grinding	0.01 mm (0.0004 in)	
Maximum main journal and crankpin ovality or taper due to wear	0.05 mm (0.0019 in)	
Maximum main journal misalignment with crankshaft resting on end journals	0.10 mm (0.0039 in)	
Maximum misalignment of crankpins (mod. 580) or of every pair of crankpins (mod. 680) relative to main journals (in either direction)	0.25 mm (0.0098 in)	
Maximum tolerance on distance from outer crankpin edge	±0.10 mm (±0.0039 in)	
Maximum crankshaft flange run-out with stylus in A, (see figure) over 108 mm (4.25 in) diameter, T.I.R.	0.02 mm (0.0008 in)	
Maximum flywheel seat eccentricity relative to main journals (see B, figure), T.I.R.	0.04 mm (0.0016 in)	



Checking Main Journal and Crankpin Alignment

a. Crankpins to main journals maximum misalignment - b. mod. 580 - c. mod. 680 - A. Flange run-out stylus position- B. Stylus position for eccentricity check - D. Maximum main journal misalignment

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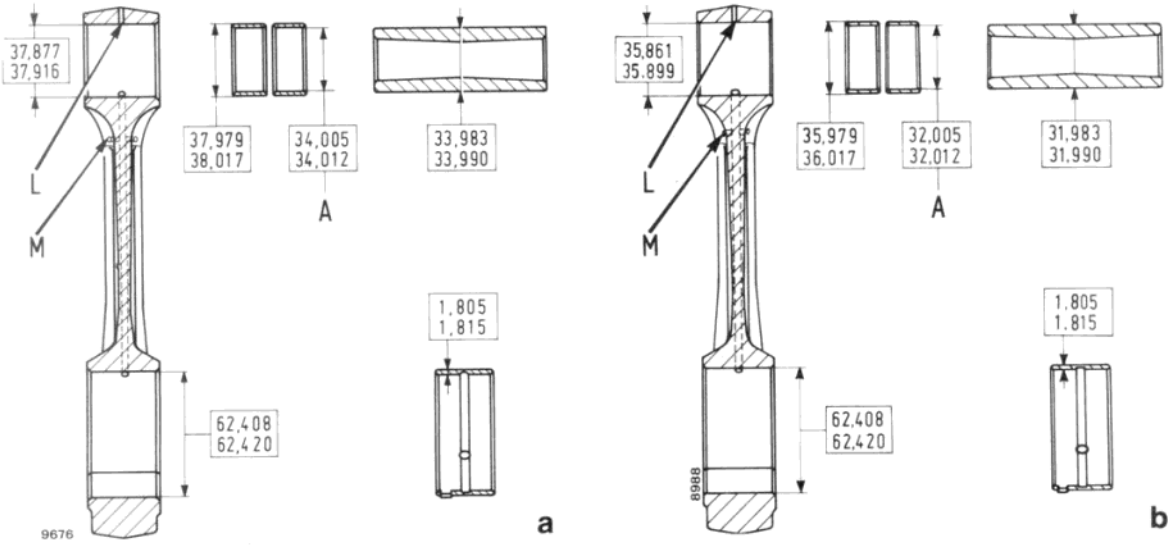
CRANK GEAR (continued)

	580-580 DT	680-680 DT
Connecting Rods		
Small end bore diameter	37.877 to 37.916 mm (1.4912 to 1.4927 in)	35.861 to 35.899 mm (1.4118 to 1.4133 in)
Small end bushing ID	37.979 to 38.017 mm (1.4952 to 1.4967 in)	35.979 to 36.017 mm (1.4165 to 1.4179 in)
Bushing interference fit in small end	0.063 to 0.140 mm (0.0025 to 0.0055 in)	0.080 to 0.156 mm (0.0031 to 0.0061 in)
Small end bushing fitted ID	34.005 to 34.012 mm (1.3388 to 1.3390 in)	32.005 to 32.012 mm (1.2600 to 1.2603 in)
Big end bore diameter	62.408 to 62.420 mm (2.4570 to 2.4575 in)	
Maximum connecting rod axis misalignment at 125 mm (5 in)	±0,07 mm (±0.003 in)	
Maximum connecting rod weight difference over a complete set of the same engine	25 grammes (0.88 OZ)	
Pistons		
Piston diameter 50 mm (2 in) from base of skirt, at right angles to pin	102.813 to 102.825 mm (4.0477 to 4.0482 in)	99.828 to 99.840 mm (3.9302 to 3.9307 in)
Piston clearance in sleeve	0.175 to 0.205 mm (0.0069 to 0.0081 in)	0.160 to 0.190 in (0.0063 to 0.0075 in)
— Maximum wear clearance	0.30 mm (0.012 in)	
Piston oversize range	0.2-0.4-0.6-0.8 mm (0.008-0.016-0.024-0.032 in)	
Piston protrusion above block at T.D.C.	0.462 to 0.787 mm (0.0182 to 0.0309 in)	

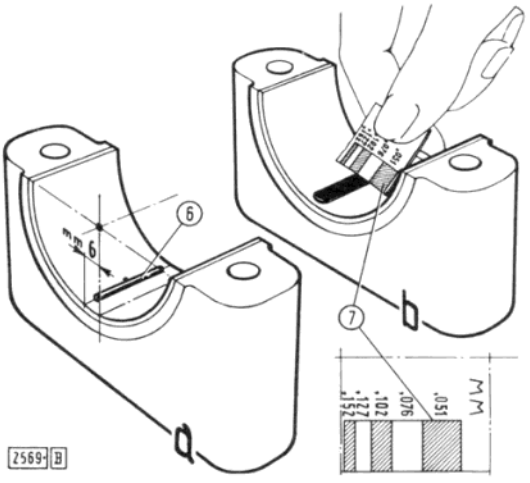


Connecting Rod, Bearing, Bushing and Pin Details

a. Mod. 580 - b. Mod. 680 - A. Fitted dimension after reaming - L/M. Lubricant ways

CRANK GEAR (continued)

	580-580 DT	680-680 DT
Piston pin diameter	33.983 to 33.990 mm (1.3379 to 1.3382 in)	31.983 to 31.990 mm (1.2592 to 1.2594 in)
Piston pin housing bore in piston	33.993 to 34.000 mm (1.3383 to 1.3386 in)	31.993 to 32.000 mm (1.2596 to 1.2598 in)
Piston pin clearance in piston	0.003 to 0.017 mm (0.0001 to 0.0007 in)	0.003 to 0.017 mm (0.0001 to 0.0007 in)
Piston pin oversize	0.2-0.5 mm (0.008-0.019 in)	
Piston pin clearance in small end bushing	0.015 to 0.029 mm (0.0006 to 0.0011 in)	
— Maximum wear clearance	0.06 mm (0.0024 in)	
Maximum weight difference over a complete set of pistons	20 grams (2/3 oz.)	
Piston ring clearance in groove		
— Top	0.090 to 0.122 mm (0.0035 to 0.0048 in)	
— 2nd	0.050 to 0.082 mm (0.0019 to 0.0032 in)	
— 3rd	0.040 to 0.072 mm (0.0016 to 0.0028 in)	
Maximum wear clearance		
— Top	0.50 mm (0.008 in)	
— 2nd and 3rd	0.20 mm (0.019 in)	
Piston ring gap		
— Top	0.35 to 0.55 mm (0.0138 to 0.0216 in)	0.35 to 0.55 mm (0.0138 to 0.0216 in)
— 2nd	0.30 to 0.50 mm (0.0118 to 0.0197 in)	0.30 to 0.45 mm (0.0118 to 0.0177 in)
— 3rd	0.30 to 0.45 to (0.0118 to 0.177 in)	0.25 to 0.40 mm (0.0098 to 0.0157 in)
Maximum wear gap	1.20 mm (0.047 in)	

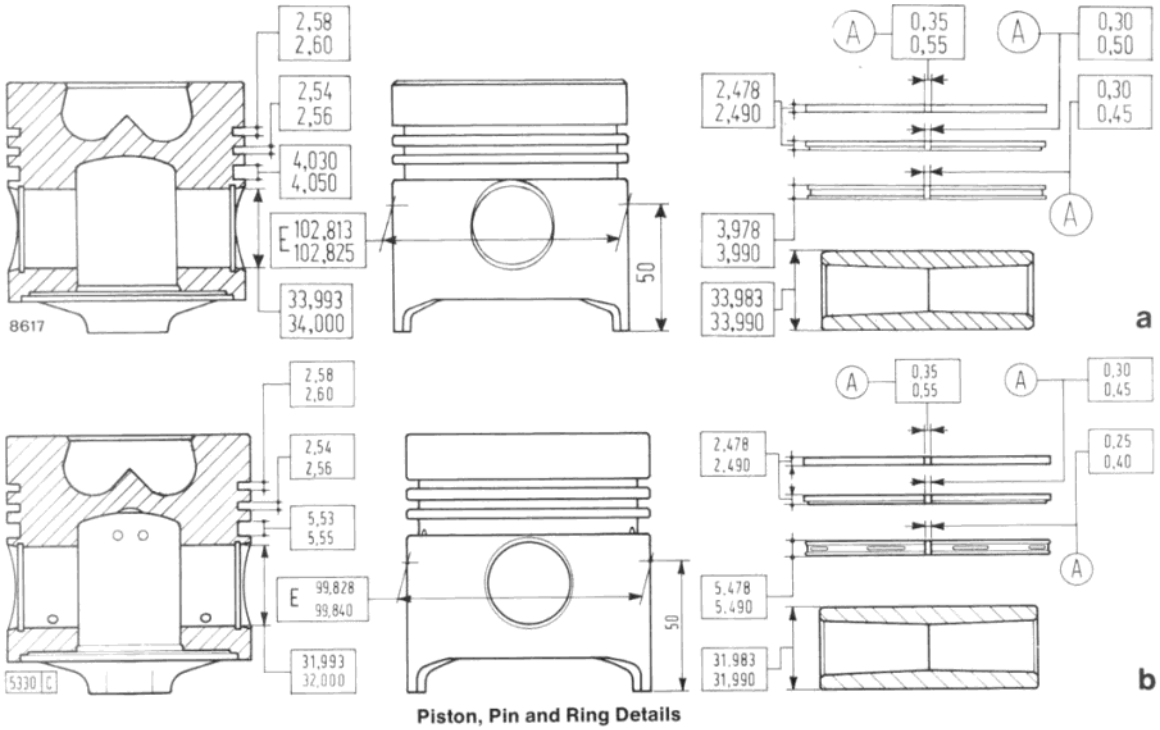


Checking Crankshaft Journal Running Clearance
a. Calibrated wire in position on bearing cap - b. Comparing width of compressed calibrated wire with reference scale - 6. Calibrated wire - 7. Graduated scale printed on wire container

CRANK GEAR (continued)

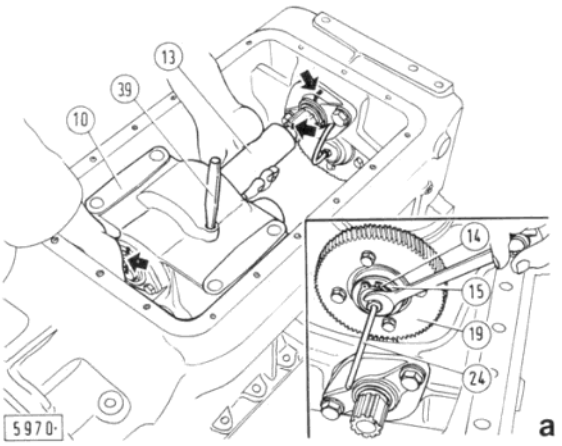
	mm	in
Dynamic Balancer (680)		
Idler gear jack shaft clearance in gear bushing (see 19, page 9) (1)	0.050 to 0.100	0.002 to 0.004
Flyweight gear shaft clearance in front bushing (see 11) (1)	0.050 to 0.100	0.002 to 0.004
Drive pinion clearance in bushings (see 18) (1)	0.050 to 0.100	0.002 to 0.004
Connecting sleeve spline backlash (see 13)	0.038 to 0.106	0.0015 to 0.0042
Flyweight gear shaft clearance in rear bushing (see 11) (2)	0.013 to 0.061	0.0005 to 0.0024
Pivot clearance in flyweight bushings (see 26 and 27)	0.020 to 0.073	0.0008 to 0.0029
Flyweight bushing interference fit in housing	0.040 to 0.100	0.0016 to 0.0040
Idler gear jack shaft clearance in bushing (see 34) (2)	0.013 to 0.061	0.0005 to 0.0024
Gear backlash	0.080	0.0031
Flyweight balancer timing	See page 9	

(1) Bushing interference fit in housing, 0.063 to 0.140 mm (0.0025 to 0.0055 in)
(2) Bushing interference fit in housing, 0.037 to 0.101 mm (0.0014 to 0.0040 in)



Piston, Pin and Ring Details

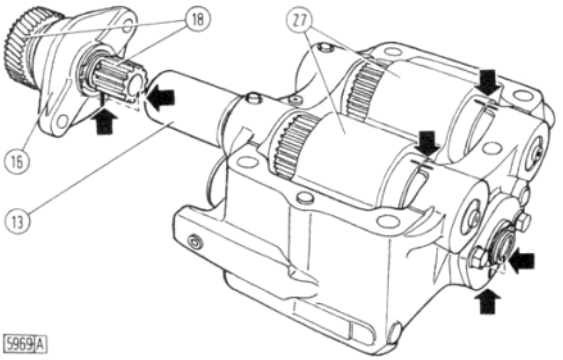
a. Mod. 580 - b. Mod. 680 - A. Piston ring fitted gap - E. Piston diameter as measured 50 mm (2 in) and 30 mm (1¼ in) from base of skirt



Refitting Dynamic Balancer

(Timing reference marks arrowed)

a. Refitting oil tube (24) - 14. Snap ring - 15. Thrust washer - 19. Intermediate gear - 39. Locking pin



Dynamic Balancer Timing Marks with cylinder n. 1 at T.D.C. (680 Tractor)

13. Sleeve - 16. Flange - 18. Drive pinion and gear - 27. Flyweights

BALANCER TIMING (680 TRACTOR)

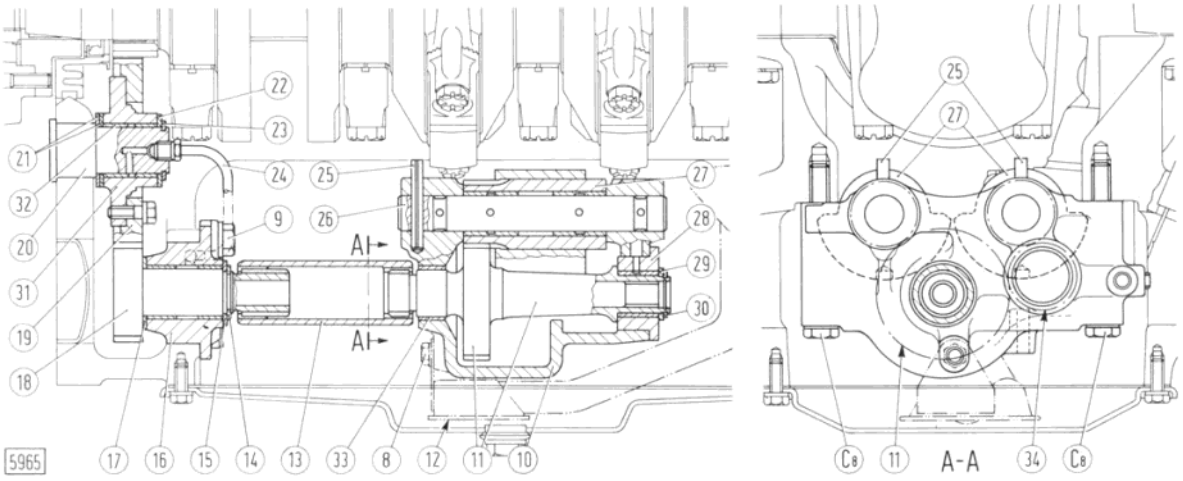
To time the balancer proceed as follows:

— Split pin holes in weight carriers (26) should be aligned with those in the case;

— Idler gear (34) should be positioned with the longer end facing towards the case wall.

— Secure drive gear (18) to the sump, with the reference marks aligned as shown.

— Lock the weights in position with pin (39) and check reference mark alignment.



Section through Dynamic Balancer (680 Tractor)

C_8. Flyweight case retaining screws - 8. Oil scoop retaining screws - 9. Flange retaining screws - 10. Case - 11. Flyweight drive gear - 12. Oil scoop - 13. Sleeve - 14. Snap ring - 15. Thrust washer - 16. Drive gear flange - 17. Thrust washer - 18. Drive pinion - 19. Intermediate gear - 20. Intermediate gear carrier - 21. Thrust washer - 22. Thrust washer - 23. Snap ring - 24. Oil tube - 25. Roll pin - 26. Flyweight carrier - 27. Flyweights - 28. Flyweight drive gear flange - 29. Thrust washer - 30. Snap ring - 31. Intermediate gear flange - 32. Bushing - 33. Bushing - 34. Idler gear

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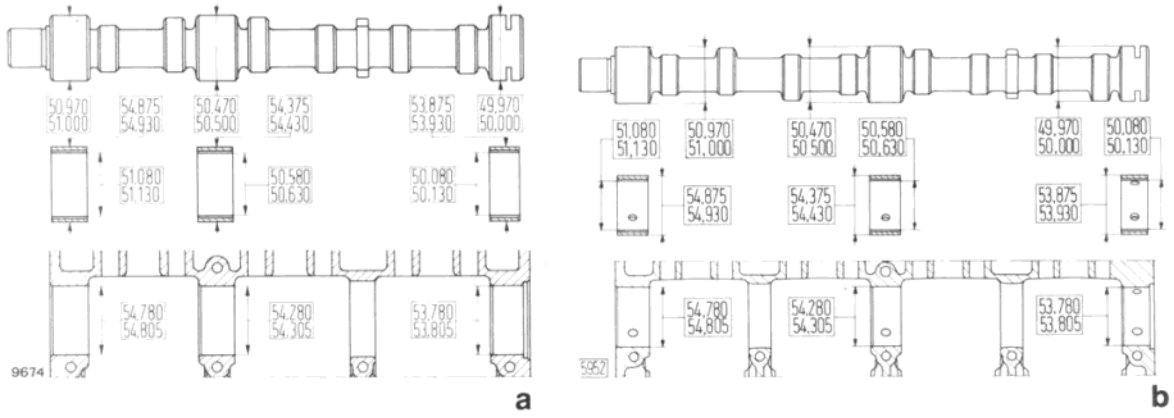
VALVE GEAR

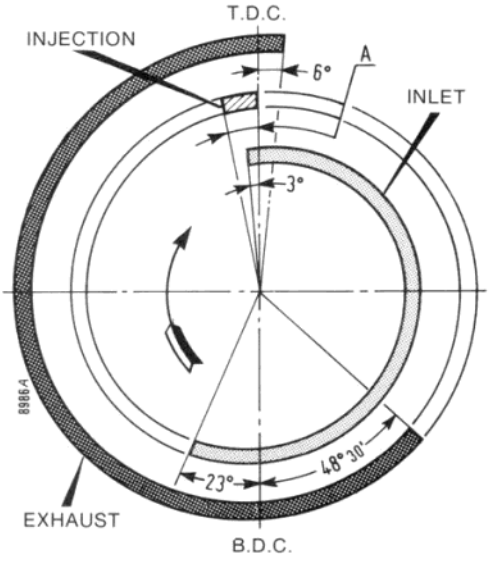
	580-580 DT	680-680 DT
Camshaft		
Camshaft bushing O.D.:		
— Front	54.875 to 54.930 mm (2.1604 to 2.1626 in)	
— Intermediate	54.375 to 54.430 mm (2.1407 to 2.1429 in)	
— Rear	53.875 to 53.930 mm (2.1210 to 2.1232 in)	
Bushing interference fit in housing	0.070 to 0.150 mm (0.0028 to 0.0059 in)	
Camshaft bushing fitted I.D. after reaming		
— Front	51.080 to 51.130 mm (2.011 to 2.013 in)	
— Intermediate	50.580 to 50.630 mm (1.9913 to 1.9933 in)	
— Rear	50.080 to 50.130 mm (1.9716 to 1.9736 in)	
Camshaft journal diameter		
— Front	50.970 to 51.000 mm (2.0067 to 2.0079 in)	
— Intermediate	50.470 to 50.500 mm (1.9870 to 1.9882 in)	
— Rear	49.970 to 50.000 mm (1.9673 to 1.9685 in)	
Camshaft journal clearance in bushing	0.080 to 0.160 mm (0.0031 to 0.0063 in)	
Maximum wear clearance	0.20 mm (0.0079 in)	
Camshaft end float (thrust plate to associated seat in camshaft)	0.070 to 0.220 mm (0.0028 to 0.0087 in)	
Tappets		
Tappet O.D.	14.950 to 14.970 mm (0.5886 to 0.5894 in)	
Tappet clearance in housing on engine block	0.030 to 0.068 mm (0.0012 to 0.0027 in)	
Maximum wear clearance	0.15 mm (0.0059 in)	
Tappet oversize	0.1-0.2-0.3 mm (0.004-0.008-0.012 in)	



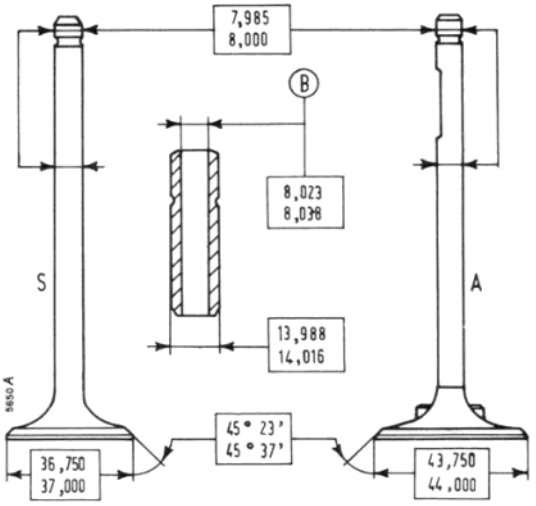
Dimensions (mm) of camshaft journals and housings on engine block.
Note: bushing fitted I.D. - a. Mod. 580 - b. Mod. 680.

VALVE GEAR (continued)

	580-580 DT	680-680 DT
Rockers		
Rocker bushing O.D.	21.006 to 21.031 mm (0.8270 to 0.8280 in)	
Rocker bore diameter	20.939 to 20.972 mm (0.8244 to 0.7902 in)	
Bushing interference fit in rocker	0.034 to 0.092 mm (0.0013 to 0.0036 in)	
Rocker bracket bore diameter	18.016 to 18.034 mm (0.7093 to 0.7100 in)	
Rocker shaft diameter	17.982 to 18.000 mm (0.7079 to 0.7087 in)	
Rocker shaft clearance in bracket	0.016 to 0.052 mm (0.0006 to 0.0020 in)	
— Maximum wear clearance	0.15 mm (0.006 in)	
Rocker spacer spring length		
— Free	59.5 mm (2.3425 in)	
— Under 46 to 52 N (4.7 to 5.3 kg, 10.4 to 11.7 lb)	44 mm (1.7323 in)	
Valves, Guides and Springs		
Valve dimensions	see figure below	



Timing diagram
A. Fixed advance depending on type of injection pump and tractor model (see page 23)



Valve and Guide Details
Note: Minimum land below head chamfer is 0.5 mm or 0.020 in - A. Inlet - B. Fitted diameter - S. Exhaust

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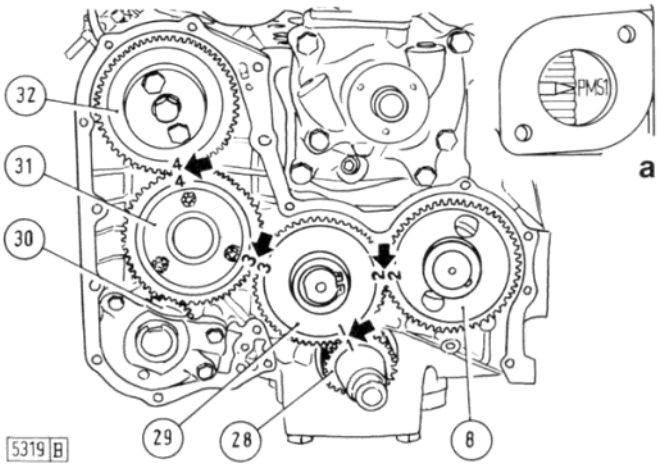
VALVE GEAR (continued)

	580-580 DT	680-680 DT
Valve face angle	45° ± 5'	
Valve clearance — Timing check	0.45 mm (0.0177 in)	
Valve clearance — Normal (cold or warm) — Inlet	0.25 mm (0.0010 in)	
Valve clearance — Normal (cold or warm) — Exhaust	0.35 mm (0.0138 in)	
Cam lift — Inlet	5.250 mm (0.2067 in)	
Cam lift — Exhaust	5.777 mm (0.2274 in)	
Valve lift — Inlet	9.3 mm (0.3661 in)	
Valve lift — Exhaust	10.2 mm (0.4016 in)	
Valve guide O.D.	13.988 to 14.016 mm (0.5507 to 0.5518 in)	
Valve guide oversize	0.2 mm (0.0079 in)	
Valve guide interference fit in housing on cylinder head	0.005 to 0.050 mm (0.0002 to 0.0020 in)	
Valve guide fitted I.D. after reaming	8.023 to 8.038 mm (0.3159 to 0.3165 in)	
Valve stem clearance in guide	0.023 to 0.053 mm (0.0009 to 0.0021 in)	
— Maximum wear clearance	0.13 mm (0.0051 in)	
Maximum valve stem eccentricity over one revolution with stylus on sealing face	0.04 mm (0.0016 in)	
Inlet and exhaust valve spring length		
— Free	66.5 mm (2.618 in)	
— Valve closed, under -295 to 332 N (30.1 to 33.9 kg, 66.4 to 74.7 lb)	41 mm (1.614 in)	
— Valve open, under 472 to 511 N (48.1 to 52.1 Kg, 106 to 115 lb)	30.8 mm (1.213 in)	
Valve timing gears		
Timing gear backlash	0.08 mm (0.0031 in)	
Idler gear jack shaft diameter	31.975 to 32.000 (1.2589 to 1.2598 in)	
Idler gear bushing fitted I.D. After reaming	32.050 to 32.075 (1.2618 to 1.2628 in)	
Jack shaft journal clearance in bushing	0.050 to 0.100 mm (0.0019 to 0.0039 in)	
— Maximum wear clearance	0.15 mm (0.0059 in)	
Bushing interference fit in idler gear	0.063 to 0.140 mm (0.0025 to 0.0055 in)	

VALVE GEAR (continued)

	580-580 DT	680-680 DT
Lift and power steering pump drive gear shaft diameter	36.975 to 37.000 mm (1.4557 to 1.4567 in)	
Bushing fitted I.D.	37.050 to 37.075 mm (1.4586 to 1.4596 in)	
Shaft clearance in bushing	0.050 to 0.100 mm (0.0019 to 0.0039 in)	
Bushing interference fit in housing	0.063 to 0.140 in (0.0025 to 0.0055 in)	
Pump drive gear thrust washer thickness	1.45 to 1.50 mm (0.0571 to 0.0591 in)	



Valve Timing

Note: Arrows point to timing marks to line up with piston No. 1 at T.D.C. on compression stroke (insert a.)

a. Flywheel timing mark and pointer - PMS 1 = Piston No. 1 at T.D.C. - 8. Camshaft gear - 28 Crankshaft gear - 29. Idler gear - 30. Lift pump gear - 31. Fuel pump drive gear - 32. Injection pump drive gear

TO ADJUST VALVE CLEARANCE

Check the valve clearance using a suitable feeler gauge and wrench **290886.** For the correct clearance see the table on page 12.
Model 580, proceed as follows:

— Turn the crankshaft until the valves on cylinder No. 1 balance. This will be indicated when the pointer is aligned with flywheel timing mark "P.M.S. 1" (= piston No. 1 at T.D.C.)
— Turn the crankshaft for one complete revolution, thus bringing the P.M.S. 1 mark to its former position. Check that valve clearance is that shown in the table on page 12.
— Follow the same procedure for the remaining valve pairs. For pistons 2 and 3, the P.M.S. mark is no longer valid: when the valves balance, make a reference mark on the flywheel or pulley.

Mod. 680:
— check valve clearance with the valves of the opposite cylinder in a condition of balance (i.e. inlet just open) Cylinder matching is 1-4 and 2-3

VALVE TIMING GEAR TRAIN

For valve timing, proceed as directed hereunder.
— Turn the crankshaft to bring piston No. 1 to T.D.C. position on compression stroke.
— Fit the drive gears and align as indicated.

Both Models

For valve timing check adjust valve clearance to 0.45 mm (0.018 in), (See table, page 2, section 00).

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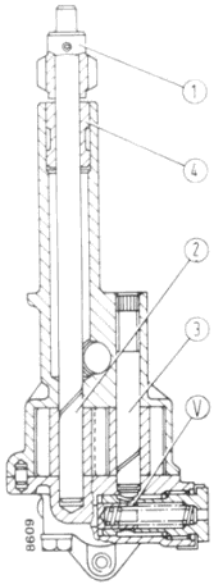
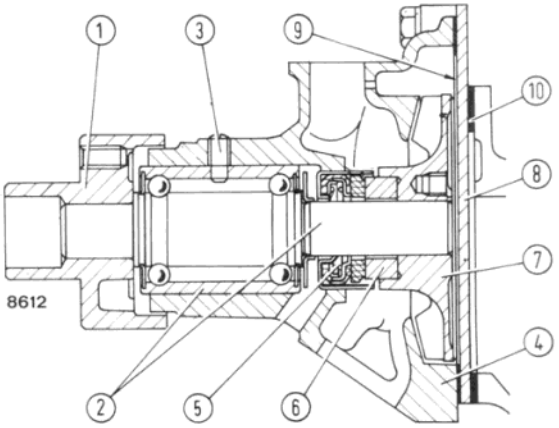
ENGINE: Specification and Data

LUBRICATION SYSTEM

	580-580 DT	680-680 DT
Oil Pump	Gear, camshaft driven	
Oil pump drive ratio	2:1	
Oil pressure, warm, at governed speed	2.9 to 3.9 bar (3 to4 kg/cm², 42.6 to 56.9 psi)	
Relief valve crack-off setting	3.5 bar (3.6 kg/cm², 51.2 psi)	
Shaft clearange in bushing	0.016 to 0.055 mm (0.0006 to 0.0022 in)	
Shaft clearance in driven gear	0.033 to 0.066 mm (0.0013 to 0.0026 in)	
Gear backlash	0.100 mm (0.0039 in)	
Gear clearance in pump body	0.060 to 0.170 mm (0.0024 to 0.0067 in)	
Drive and driven gear width	40.961 to 41.000 mm (1.6126 to 1.6142 in)	
Gear housing depth in pump body	41.025 to 41.087 mm (1.6152 to 1.6176 in)	
Drive and driven gear end float	0.025 to 0.126 mm (0.0009 to 0.0049 in)	
Pressure relief valve spring length: — Free	45 mm (1.77 in)	
— Closed, under 88 to 94 N (9 to 9.6 kg, 19.8 to 21 lb.)	30.5 mm (1.20 in)	
Oil filters	Gauze on suction and main cartridge	



Section through Oil Pump
V. Relief valve - 1. Outer drive gear - 2. Drive gear shaft - 3. Driven gear shaft - 4. Bushing.



Section through Water Pump
1. Drive hub - 2. Drive shaft assembly - 3. Retaining screw - 4. Pump body - 5. Water seal - 6. Bushing - 7. Impeller - 8. Cover - 9. Gasket - 10 Gasket.

COOLING SYSTEM

	580-580 DT	680-680 DT
Water Pump	Centrifugal, vane	
Water pump drive ratio	1.066 to 1	
Shaft interference fit in impeller	0.027 to 0.060 mm (0.0011 to 0.0024 in)	
Shaft interference fit in fan hub	0.015 to 0.061 mm (0.0006 to 0.0024 in)	
Face sealing bushing interference fit in impeller	0.012 to 0.058 mm (0.0005 to 0.0023 in)	
Thermostat		
Type	BEHR-THOMSON or SAVARA or FLEXIDER	
Opening temperature	79 ± 2°C	
Fully open at — FLEXIDER or SAVARA type	94°C	
Fully open at — BEHR-THOMSON type	95°C	
Valve travel when fully open	7.5 mm (0.295 in)	
Radiator	Vertical tube and steel fins, 3 or 4 deep (*)	
Expansion tank	See-through plastic	
Fan	Suction, steel, 4-bladed	
Water Temperature Gauge	Three coloured sectors	
Temperature range		
— White sector	30° to 65°C	
— Green sector	65° to 105°C	
— Red sector	105° to 115°C	

(*) Four deep for model 680

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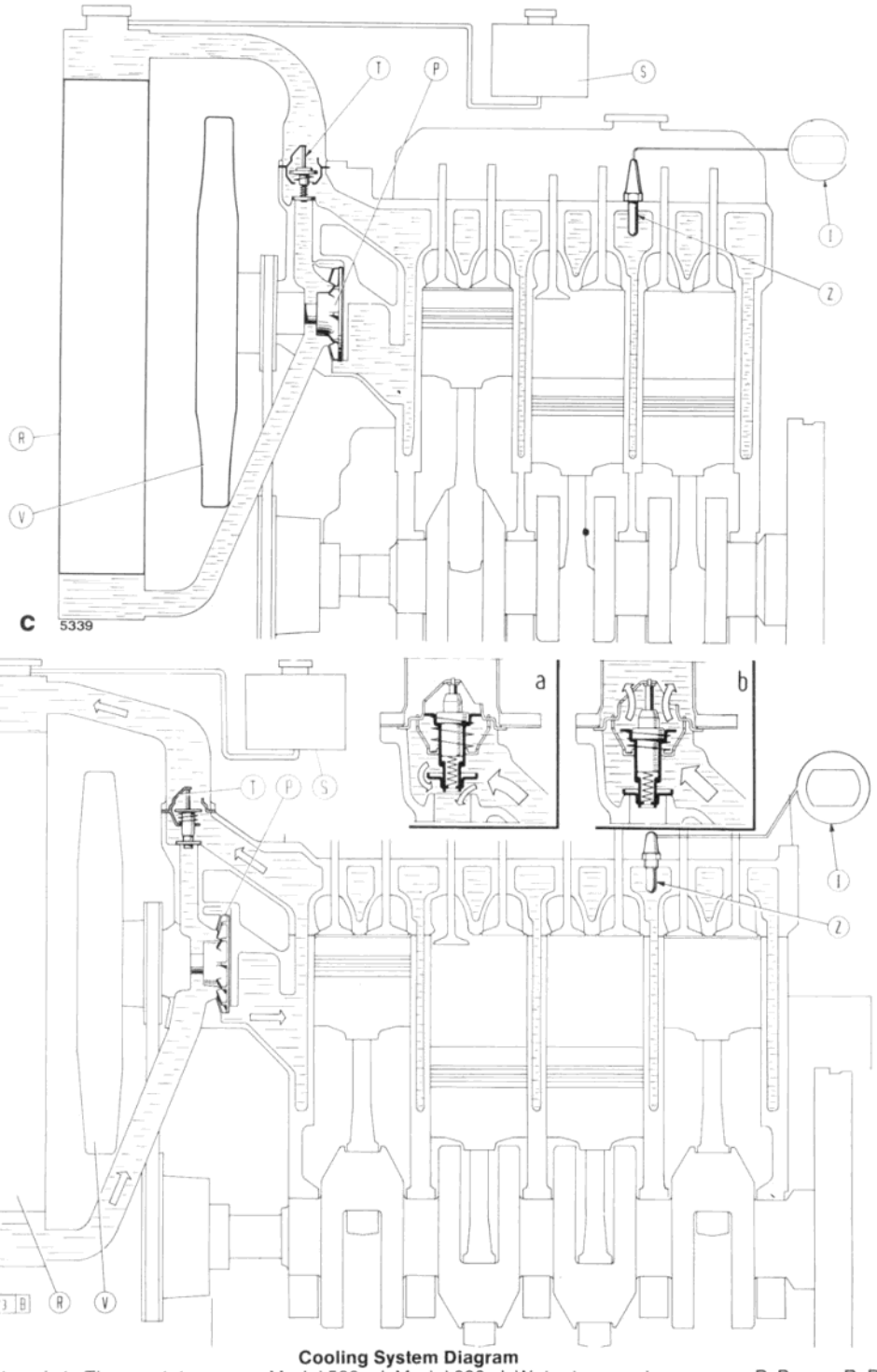
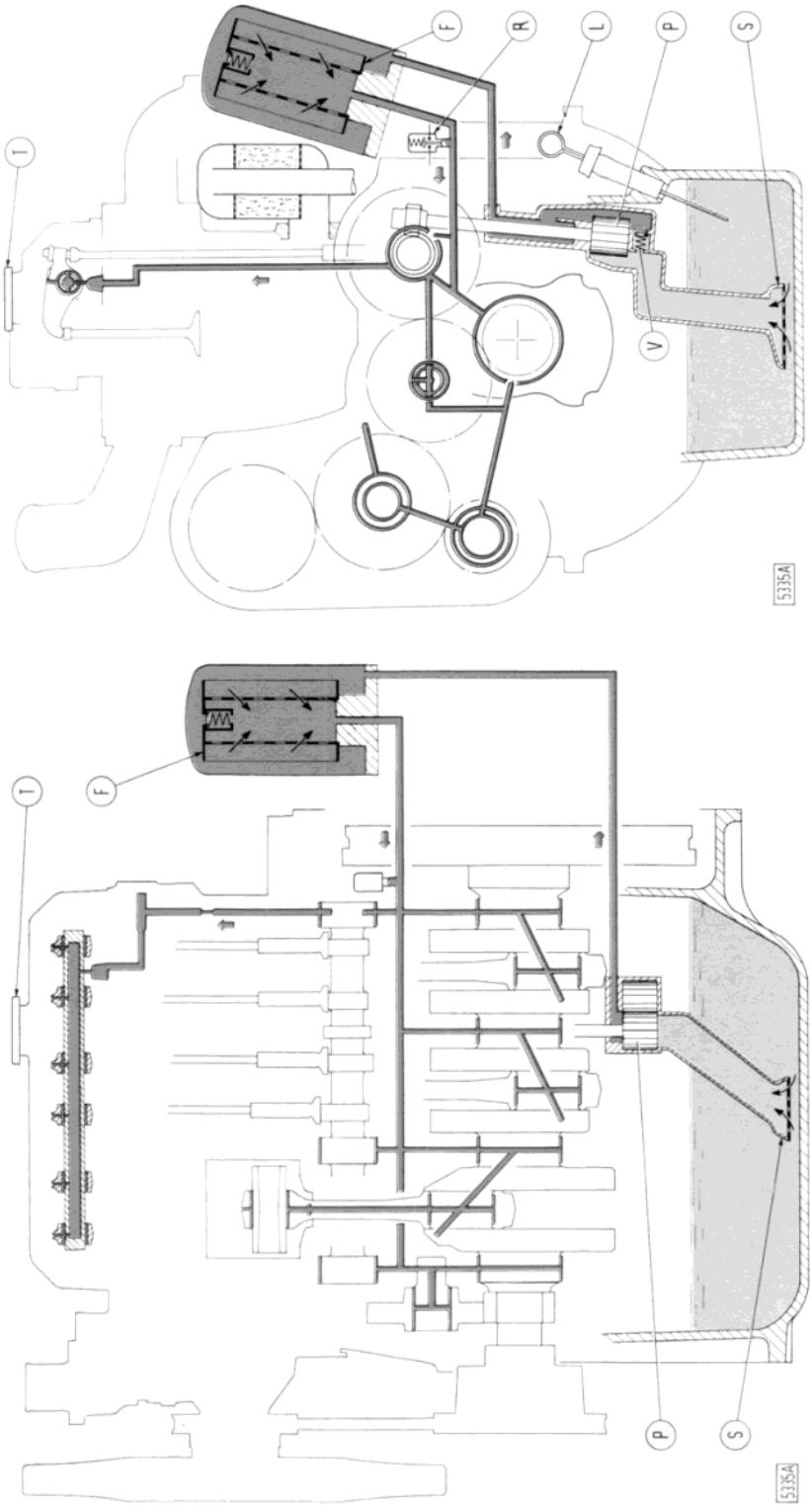


Cooling System Diagram

a. Termostat closed - b. Thermostat open - c. Model 580 - d. Model 680 - I. Water temperature gauge - P. Pump - R. Radiator S. Expansion tank - T. Thermostat - V. Fan - Z. Transmitter.

DIREZIONE COMMERCIALE



Lubrification System Diagram (580 Tractor)
F. Replaceable cartridge filter - L. Dipstick - P. Gear pump - R. Oil pressure warning transmitter - S. Gauze filter - T. Oil filler plug - V. Relief valve.

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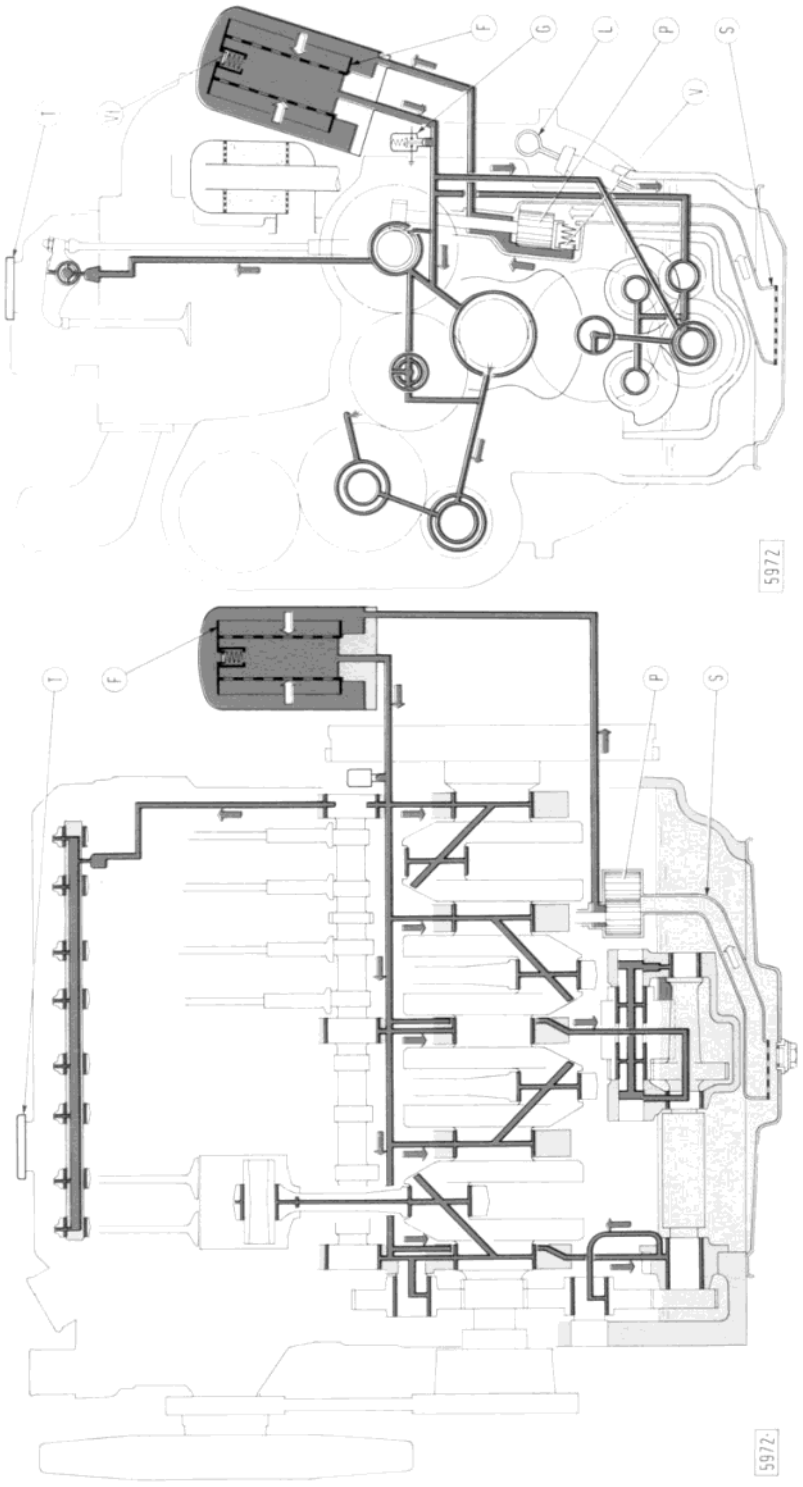
ENGINE:
Lubrication System



Lubrication System Diagram (680 Tractor)

F. Filter - G. Oil pressure warning transmitter - L. Dipstick - P. Pump - S. Suction filter - T. Oil filler plug - V. Relief valve - Vf. By-pass valve (cuts in when inlet pressure is 0.9 to 1.1 kg / cm^2 or 12 to 15 psi higher than outlet pressure)

FUEL SYSTEM

	580-580 DT	680-680 DT
Lift Pump	Double diaphragm	
Operation	Engine driven	
Minimum fuel flow at 1.600 rpm shaft	100 litre/hour (22 Gall/hour)	
Drive shaft eccentricity	3 mm (0.118 in)	
Lift Pump Drive		
Shaft journal diameter	31.975 to 32.00 mm (1.2588 to 1.2598 in)	
Bushing fitted I.D. after reaming	32.050 to 32.075 mm (1.2618 to 1.2628 in)	
Shaft clearance in bushing	0.050 to 0.100 (0.0020 to 0.0040 in)	
Bushing interference fit in housing	0.063 to 0.140 (0.0025 to 0.0055 in)	
Inner washer thickness	1.45 to 1.50 mm (0.0570 to 0.0590 in)	
Outer washer thickness	2.93 to 3.00 mm (0.1153 to 0.1181 in)	
Injection Pump	Distributor, integral governer	
Type		
— BOSCH	—	EP/VA 4/110H1250 CL-771381
— CAV	DPA3233 F700-771338	DPA3342 F470-771414
Direction of rotation	Anticlockwise	
Firing order	1-2-3	1-3-4-2
Fuel Injectors		
Type		
— FIAT		EPPZ10F1-770577
- Nozzle holder		KB70S1F10-767107
- Spray nozzle		DLL140S64F-770578
— BOSCH		EPPZ50F3-771064
- Nozzle holder		KBL70S177/4-771065
- Spray nozzle		DLLA141S662-771066
— CAV		EPPZ60F3-770897
- Nozzle holder		BKBL69S5376-770899
- Spray nozzle		BDLL140S6655-770902
— OMAP		EPPZ70F3-770957
- Nozzle holder		OKLL70S2974-770958
- Spray nozzle		OLL140S64F-770959
Number of spray orifices	3	
Spray orifice diameter	0.35 mm (0.0137 in)	
Release pressure	221 to 230 bar (225 to 235 kg/cm^2 3200 to 3342 psi)	
Delivery pipes		
— Type	PRR11F15Z-768356	PRR25F17Z-768068
— Pipe size	2x6x427 mm	1.5x6x480 mm

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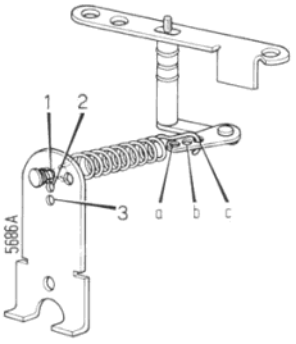
MODEL 580 - CALIBRATION DATA - CAV INJECTION PUMP TYPE DPA 3233F700 - 771338

ASSEMBLY DATA

Pump rotation (drive end)	Anti-clockwise
Firing order	1-2-3
Governor control stud to metering valve lever pin	54 mm (2.13 in)
Roller spacing	50.2 mm (1.98 in)
Pump timing	13° ± 1° B.T.D.C.
External timing mark degree position with respect to shaft key (on tool **290757**)	271° ± 30'
Delivery connection of cylinder No. 1	Marked with letter W.



Governor Spring Attachment Position on Control Arm 1 and c

TEST PLAN

Procedure A
BOSCH test machine with WSF 2044/4X injector springs and EFEP 182 spray nozzles

RABOTTI test machine with FIAT 656829 injector springs and EFEP 182 spray nozzles

Release pressure 171.6 bar (175 kg/cm², 2483 psi)

Pipes 2x6x865 mm

Procedure B
Test machine incorporating injector bodies and nozzles as fitted to the engine

Release pressure 221 to 230 bar (225 to 235 kg/cm², 3200 to 3 343 psi)

Pipes 2x6x700 mm

Calibration fluid FIAT CFB at 20° to25°C

Fuel pressure 0.2 bar (0.2 kg/cm², 2.8 psi)

Test No.	Lever Position L_1 = Throttle L_2 = Shut-off	Speed rpm	Transfer pressure bar (kg/cm²)	Advance degrees	PROCEDURE A Injector delivery cm³/1000 shots	PROCEDURE A Back leakage cm³/100 shots	PROCEDURE B Injector delivery cm³/1000 shots
1-2	—	100	⩾1	—	—	—	—
3	—	800	—	4 to 5	—	—	—
4	—	1200	—	10.3 to 10.8	—	—	—
5	—	180 max	—	3.3 to 3.5	—	—	—
6 (1)	—	300	—	0	—	—	—
7 (2)	—	1200	—	10.3 to 10.8	—	—	—
8-9-10 (3)	L_1 = Full L_2 = Out	1350 +0 −20	5 to 6	—	55.5 to57.5 (*)	⩾ 14	54.5 to 56.5 (*)
11-12		800 ± 5	2.8 to 3.8	—	55 to 58 (*)	—	60.5 to 63.5 (*)
13 (1)		100	—	—	⩾ 42	—	—
14	L_1 = Full L_2 = In	200	—	—	4 max	—	—
15 (3)	L_1 = Idle L_2 = Out	200	—	—	5 max	—	—
16 (4)	L_1 = Full	1475	—	—	3 max	—	—
17 (5)	L_2 = Out	1350 +0 −20	—	—	55.5 to 57.5	—	—

(*) Max. spread 2 cm³/1000 shots
(1) Manual start-retard activated
(2) 3-cylinder engine only
(3) Back off throttle lever adjusting screws fully
(4) Governor cut-in. Adjust maximum speed screw
(5) Recheck fuelling

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MODEL 680 - CALIBRATION DATA - BOSCH INJECTION PUMP TYPE EP/VA 4/110 H 1250 CL - PART No. 771381

ASSEMBLY DATA

Direction of rotation (drive end)	Anti-clockwise
Firing order	1-3-4-2
Rotor stroke to spill cut-off	0.5 ± 0.02 mm (0.020 ± 0.0008 in)
Pump timing	9° ± 1° B.T.D.C.
Delivery connection to cylinder no.1	Marked with letter A

TEST PLAN

Procedure A

BOSCH test machine with WSF 2044/4X injector springs and EFEP 182 spray nozzles

RABOTTI test machine with FIAT 656829 injector springs and EFEP 182 spray nozzles —
Release pressure 147.1 bar (150 kg/cm², 2133 psi)
Pipes 2x6x845 mm

Procedure B

Test machine with injector bodies and nozzles as fitted to engine

Release pressure	221 to 230 bar (225 to 235 kg/cm², 3200 to 3343 psi)
Pipes	1.5x6x700 mm
Calibration fluid	FIAT CFB at 40° to 45° C (for lower test temperatures add 0.25 cm³/1000 shots to each degree)
Fuel pressure	0.2 bar (0.2 kg/cm², 2.8 psi)

Test No.	Lever position L_1 = Shuttle L_2 = Throttle	Speed rpm	Transfer pressure bar (kg/cm²)	Advance piston stroke (*) mm	PROCEDURE A		PROCEDURE B	
					Injector delivery cm³/1000 shots	Back leakage cm³/100 shots	Injector delivery cm³/1000 shots	Back leakage cm³/100 shots
1	L_1 = Shut-off L_2 = Full	700 ± 5	—	—	0	—	0	—
2	L_1-L_2 = Full	700 ± 5	—	—	63 to 66	—	51 to 54	—
3	L_1-L_2 = Full	1300	—	—	36 to 44	—	32 to 40	—
4	—	100	0.6 to 1.1	—	—	—	—	—
5		700 ± 5	4.2 to 4.7	—	—	—	—	—
6		1250	6.2 to 6.7	—	—	—	—	—
7	L_1-L_2 = Full	250	—	—	57 max	—	57 max	—
8	L_1-L_2 = Full	100	—	—	130 min	—	130 min	—
9	—	400 to 550	—	0 (start)	—	—	—	—
10		700 ± 5	—	2 to 3	—	—	—	—
11		1100 to 1150	—	6.5 (end)	—	—	—	—
12	L_1 = Full	1425 to 1475	—	—	0	—	0	—
13	L_2 = Full (1)	1300	—	—	36 to 44	—	32 to 40	—
14		1250^{+9}_{-20}	—	—	58 to 60 (°)	—	49.5 to 51.5 (°)	—
15	L_1 = Full (2)	1000	—	—	—	30 to 55	—	30 to 55
16	L_2 = Full	700 ± 5	—	—	63 to 66	—	51 to 54	—
17		500 ± 5	—	—	59 to 62	60 to 90	51 to 54	60 to 90
18	L_1 = Full	400 to 500	—	—	0	—	0	—
19	L_2 = Idle (3)	350	—	—	12 to 22	—	10 to 18	—

(*) Using tool **292817**
(°) Max. spread 2.5 cm³/1000 shots
(1) Adjust max. speed screw
(2) Adjust max. fuel screw
(3) Adjust idling speed screw

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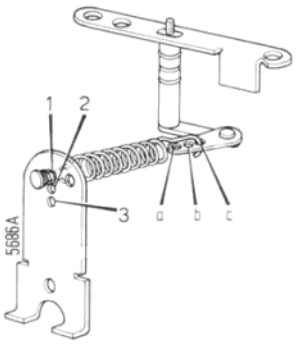
MODEL 680 - CALIBRATION DATA - CAV INJECTION PUMP TYPE DPA 3342 F470 - 771414

ASSEMBLY DATA

Pump rotation (drive end)	Anti-clockwise
Firing order	1-3-4-2
Governor control stud to metering valve lever pin	53 to 54 mm (2.08 to 2.13 in)
Roller spacing	49.83 mm (1.9618 in)
Pump timing	15° ± 1° B.T.D.C.
External timing mark degree position with respect to shaft key (on tool **290757**)	253°
Delivery connection of cylinder No. 1	Marked with letter X



Governor Spring Attachment Position on Control Arm 1 and c

TEST PLAN

Procedure A

BOSCH test machine with WSF 2044/4X injector springs and EFEP 182 spray nozzles

RABOTTI test machine with FIAT 656829 injector springs and EFEP 182 spray nozzles

Release pressure 171.6 bar (175 kg/cm², 2483 psi)

Pipes 2x6x845 mm

Procedure B

Test machine incorporating injector bodies and nozzles as fitted to the engine

Release pressure 221 to 230 bar (225 to 235 kg/cm²) (3200 to 3342 psi)

Pipes 1.5x6x700 mm

Calibration fluid FIAT CFB at 20 + 5°C

Fuel pressure 0.2 bar (0.2 kg/cm², 2.8 psi)

Test No.	Lever Position L_1 = Throttle L_2 = Shut-off	Speed rpm	Transfer pressure bar (kg/cm²)	Advance degrees	PROCEDURE A Injector delivery cm³/1000 shots	PROCEDURE A Back leakage cm³/100 shots	PROCEDURE B Injector delivery cm³/1000 shots
1-2	—	100	1	—	—	—	—
3	—	700	—	3 to 4	—	—	—
4	—	1250	—	7 to 7.5	—	—	—
5	—	180	—	1.5 to 2	—	—	—
6 (1)	—	300	—	0	—	—	—
7 (2)	—	—	—	—	—	—	—
8-9 10 (3)	L_1 = Full L_2 = Out	1250 $^{+0}_{20}$	4.5 to 5.5	—	48.5 to 51 (°)	14 min	54.5 to 57 (°)
11-12		700 ± 5	3 to 4	—	52.5 to 55.5 (°)	—	54 to 57 (°)
13 (1)		100	—	—	40 min	—	—
14	L_1 = Full L_2 = In	200	—	—	4 max	—	—
15 (3)	L_1 = Idle L_2 = Out	200	—	—	5 max	—	—
16 (4)	L_1 = Full	1370	—	—	9 max	—	—
17 (5)	L_2 = Out	1250 $^{+0}_{20}$	—	—	48.5 to 51	—	—

(°) Max. spread 2 cm³/1000 shots
(1) Manual start-retard activated
(2) 3-cylinder engine only
(3) Back off throttle lever adjusting screws fully
(4) Governor cut-in. Adjust maximum speed screw
(5) Recheck fuelling

DIREZIONE COMMERCIALE

ON-BENCH PERFORMANCE DATA

Test Plan

Engine on bench with fan, air cleaner and exhaust silencer removed.

Barometric pressure 740 ± 5 mm Hg at 239 metres (785 ft) above sea level.

Ambient temperature, 20° ± 3°C.

Relative humidity, 70% ± 5%.

Fuel density, 830 ± 10 g/litre.

Pump timing, B.T.D.C.

— mod. 580	- CAV	13° ± 1°
— mod. 680	- BOSCH	9° ± 1°
	- CAV	15° ± 1°

580 - CAV Injection Pump

Throttle	Engine rpm	kW		Time to burn 250 cm³ (15 in³) of fuel (seconds)
		2-hour run-in	50-hour run-in	
Maximum, full load	2700	⩾39.4 (53.7 HP) (*)	⩾40.5 (55 HP)	⩾27.3
Maximum, full torque	1600	⩾28 (35.7 HP) (*)	⩾28.7 (39 HP)	⩾42.5
Maximum, no-load	⩽2850	—	—	—
Minimum, no-load	650 to 700	—	—	—

680 - BOSCH Injection Pump

Throttle	Engine rpm	kW		Time to burn 250 cm³ (15 in³) of fuel (seconds)
		2-hour run-in	50-hour run-in	
Maximum, full load	2500	⩾47.8 (65 HP) (*)	⩾48.5 (66 HP)	⩾60.4
Maximum, full torque	1400	⩾28.5 (38.7 HP) (*)	⩾29.4 (40 HP)	⩾97.6
Maximum, no-load	2850 max	—	—	—
Minimum, no-load	650 to 700	—	—	—

680 - CAV Injection Pump

Throttle	Engine rpm	kW		Time to burn 250 cm³ (15 in³) of fuel (seconds)
		2-hour run-in	50-hour run-in	
Maximum, full load	2500	⩾47.1 (64 HP) (*)	⩾48.5 (66 HP)	⩾59.8
Maximum, full torque	1400	⩾28.7 (39 HP) (*)	⩾29.4 (40 HP)	⩾98.5
Maximum, no-load	⩽2700	—	—	—
Minimum, no-load	650 to 700	—	—	—

(*) Anticipated

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TIGHTENING TORQUE FIGURES

DESCRIPTION	Thread Size	Coppia di serraggio		
		Nm	kgm	ft lb
Engine Block and Cylinder Head-Valve Gear-Crank Gear				
Cap screw, cylinder head (C_1, pages 25 and 26)	M12x1.25	147	15	108
Cap screw, rocker bracket (C_2, pages 25 and 26)	M 8x1.25	23	2.3	16.5
Nut, rocker bracket	M 8x1.25	23	2.3	16.5
Cap screw, timing cover and case (C_3, pages 25 and 26)	M 8x1.25	23	2.3	16.5
Cap screw, main bearing caps (C_4, pages 25 and 26)	M14x1.5	147	15	108
Cap screw, connecting rod caps (C_5, pages 25 and 26)	M12x1.25	108	11	79
Cap screw, flywheel (C_6, pages 25 and 26)	M12x1.25	118	12	87
Nut, crankshaft pulley hub (C_7, pages 25 and 26)	M30x1.5	294	30	217
Cap screw, balancer housing to sump, 680 (C_8, page 9)	M12x2.5	147	15	108
Cap screw, fan and alternator drive pulley (C_9, pages 25 and 26)	M10x1.25	49	5	36
FUEL SYSTEM				
Nut, injection pump shaft gear:				
— BOSCH	M12x1.75	64	6.5	47
— CAV	9/16" 18 UNF	81	8.3	60
Nuts, injection pump to support	M 8x1.25	23	2.3	16.5
Thermostarter spark-plug	1/2" GAS	66	6.7	48.5
Adapter, spark-plug to thermostarter reservoir	3/8"-24UNF-2B	13	1.3	9.4

CLUTCH - FERODO 11"/11"

	580-580 DT	680-680 DT
Type	Twin, single dry plate	
Control — Transmission — PTO	 Pedal Manual	
Release mechanism — Transmission — PTO	 Diaphragm spring Dished spring	
Plate material — Transmission	Organic compound	Cerametallic compound (*)
— PTO	Organic compound	
Plate thickness — Transmission	8.5 to 8.9 mm (0.335 to 0.350 in)	8.3 to 8.9 mm (0.327 to 0.350 in) (*)
— PTO — Wear limit	8.5 to 8.9 mm (0.335 to 0.350 in) see page 2, section 201	
Transmission clutch control sleeve working clearance PTO clutch control sleeve working clearance	0.050 to 0.151 mm (0.0020 to 0.0060 in) 0.072 to 0.205 mm (0.0028 to 0.0080 in)	
Release lever alignment	see page 3, section 201	
Clutch linkage adjustment	see page 7, section 201	

(*) Optional for model 580

CLUTCH - LUK 11"/11"

	580-580 DT	680-680 DT
Type	Twin, single dry plate	
Control — Transmission — PTO	 Pedal Manual	
Release mechanism	Dished spring	
Plate material — Transmission	organic compound	cerametallic compound (*)
— PTO	Organic compound	
Plate thickness — Transmission	8.4 to 9.0 mm (0.331 to 0.354 in)	8.3 to 8.9 mm (0.327 to 0.350 in) (*)
— PTO — Wear limit	8.3 to 8.9 mm (0.327 to 0.350 in) see page 4, section 201	

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CLUTCH - LUK 11"/11" (continued)

	580-580 DT	680-680 DT
Transmission clutch control sleeve working clearance	0.050 to 0.151 mm (0.0020 to 0.0060 in)	
PTO clutch control sleeve working clearance	0.072 to 0.205 mm (0.0028 to 0.0080 in)	
Release lever alignment	see page 5, section 201	
Clutch linkage adjustment	see page 7, section 201	

(*) Optional for Model 580

CLUTCH - O.M.G. 11"/11"

	580-580 DT	680-680 DT
Type	Twin, single dry plate	
Control — Transmission — PTO	Pedal Manual	
Release mechanism	Dished spring	
Plate material — Transmission	Organic compound	Cerametallic compound (*)
— PTO	Organic compound	
Plate Thickness — Transmission	8.5 to 9.1 mm (0.3346 to 0.3583 in)	8.7 to 9.3 mm (*) (0.3425 to 0.3661 in)
— PTO — Wear limit	8.7 to 9 mm (0.3425 to 0.3543 in) see page 4, section 201	
Transmission clutch control sleeve working clearance PTO clutch control sleeve working clearance	0.050 to 0.151 mm (0.0020 to 0.0059 in) 0.072 to 0.205 mm (0.0028 to 0.0081 in)	
Release lever alignment Clutch linkage adjustment	see page 5, section 201 see page 7, section 201	

(*) Optional for Model 580

CLUTCH - FERODO, LUK AND O.M.G.

Transmission Clutch Pedal Support	580-580 DT	680-680 DT
Pivot dia.	21.967 to 22.000 mm (0.8648 to 0.8661 in)	
Bushing fitted I.D. after reaming	22.000 to 22.030 mm (0.8661 to 0.8673 in)	
Pivot clearance in bushing	0 to 0.063 mm (0 to 0.0025 in)	

CLUTCH - FERODO, LUK AND O.M.G. (continued)

	580-580 DT	680-680 DT
Support bore dia.	25.939 to 25.972 mm (1.0212 to 1.0225 in)	
Bushing O.D.	25.979 to 26.000 mm (1.0228 to 1.0236 in)	
Bushing interference fit in housing	0.007 to 0.061 mm (0.0003 to 0.0024 in)	

TRANSMISSION AND SPLITTER

	580-580 DT	680-680 DT
Transmission	8 forward speed (3rd, 4th, 7th and 8th synchro-mesh, two reverse speeds	
Gears	Spur	
Splitter — Reduction ratio	Planetary, 3-planet, spur 20:(20 + 52) = 1:3.6	
Transmission and splitter controls	Separate manual levers	
Driven gear I.D.	50.050 to 50.089 mm (1.9705 to 1.9720 in)	
Bushing O.D.	49.925 to 49.950 mm (1.9655 to 1.9665 in)	
Bushing clearance in gear	0.100 to 0.164 mm (0.0039 to 0.0065 in)	
Driven shaft dia.	39.166 to 39.191 mm (1.5419 to 1.5429 in)	
Bushing I.D.	39.200 to 39.239 mm (1.5433 to 1.5448 in)	
Shaft clearance in bushing	0.009 to 0.073 mm (0.0003 to 0.0029 in)	
PTO clutch shaft dia.	24.964 to 24.985 mm (0.9828 to 0.9837 in)	
Bushing fitted I.D.	25.040 to 25.092 mm (°) (0.9858 to 0.9879 in) (°)	
Shaft clearance in bushing	0.055 to 0.128 mm (0.0021 to 0.0050 in)	
Bushing interference fit with drive shaft	0.037 to 0.091 mm (0.0014 to 0.0035 in)	
Driven gear and splitter support shim thickness	1.470 to 1.530 mm (0.0579 to 0.0602 in)	

(°) Not reamed

TRANSMISSION AND SPLITTER (continued)

	580-580 DT	680-680 DT
Selector quadrant return spring length		
— Free	51 mm (2.008 in)	
— Under 48 to 54 N (4.9 to 5.5 kg, 10.8 to 12.1 lb)	44 mm (1.732 in)	
Selector shaft detent ball spring length		
— Free	30 mm (1.181 in)	
— Under 50 to 56 N (5.13 to 5.67 kg, 11.3 to 12.5 lb)	25.5 mm (1.004 in)	
Splitter detent ball spring length		
— Free	35.5 mm (1.398 in)	
— Under 115 to 126 N (11.7 to 12.9 kg, 25.8 to 28.4 lb)	31.5 mm (1.240 in)	

CRAWLER GEAR

	580-580 DT	680-680 DT
Type	Planetary, 3-planet, spur, in-line with splitter	
Drive ratio	35:(35 + 67) = 1:2.9	
Control	Splitter lever	
Driven gear and splitter support shim thickness	1.470 to 1.530 mm (0.0579 to 0.0602 in)	

REVERSER

	580-580 DT	680-680 DT
Type	mechanical, spur	
Engagement	sliding sleeve	
Reduction ratio	$\frac{25x26x26}{26x25x29} = \frac{1}{1.115}$	
Control	Splitter lever	
Driven gear and splitter support shim thickness	1.470 to 1.530 mm (0.0579 to 0.0602 in)	

REAR BEVEL DRIVE AND DIFFERENTIAL

	580-580 DT	680-680 DT
Bevel drive ratio	10/54 = 1 to 5.4	
Bevel drive backlash	0.15 to 0.20 mm (0.006 to 0.008 in)	
Differential	2-pinion	
Differential lock	Pedal controlled	
Differential pinion bore dia.	24.040 to 24.061 mm (0.9465 to 0.9473 in)	25.040 to 25.061 mm (0.9858 to 0.9867 in)
Differential pinion journal dia.	23.939 to 23.960 mm (0.9423 to 0.9433 in)	24.939 to 24.960 mm (0.9818 to 0.9827 in)
Differential pinion running clearance on journal	0.080 to 0.122 mm	(0.0031 to 0.0048 in)
Side gear boss housing dia. in differential box	44.080 to 44.119 mm (1.7354 to 1.7369 in)	51.100 to 51.146 mm (2.0118 to 2.0136 in)
Side gear boss dia.	43.961 to 44.000 mm (1.7307 to 1.7323 in)	50.954 to 51.000 mm (2.0061 to 2.0079 in)
Side gear boss clearance in box	0.080 to 0.158 mm (0.0031 to 0.0062 in)	0.100 to 0.192 mm (0.0040 to 0.0075 in)
Bevel pinion adjustment	see page 2, section 204	
Bevel pinion shim thickness	4.0-4.1-4.2-4.3-4.4-4.5-4.6-4.7-4.8-4.9-5.0 mm (0.157-0.161-0.165-0.169-0.173-0.177 0.181-0.185-0.189-0.193-0.197 in)	
Bevel pinion bearing adjustment	see page 1, section 204	
Bevel pinion bearing shim thckness range	1-1.05-1.10-1.15-1.20-1.40-1.50-1.70-1.75 1.85-1.90-1.95-2-2.05-2.10-2.15 mm (0.039-0.041-0.043-0.045-0.047-0.055 0.059-0.067-0.069-0.073-0.075-0.077 0.079-0.081-0.083-0.085 in)	
Differential bearing and bevel drive backlash adjustment	see page 3, section 204	
Differential bearing and bevel drive backlash shim thickness	0.15-0.2-0.5 mm (0.006-0.008-0.020 in)	
Side gear thrust washer thickness	1.5-1.6 mm (0.059-0.063 in)	
Differential pinion thrust washer thickness	1.5 mm (0.59 in)	
Differential lock adjustment	see page 6, section 204	
Differential lock fork shim thickness	0.5 mm (0.020 in)	
Differential lock fork spring length		
— Free	212.5 mm (8.366 in)	
— Under 167.7 to 185.3 N (17.1 to 18.9 kg, 38 to 42 lb)	123.5 mm (4.862 in)	

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BRAKES

	580-580 DT	680-680 DT
Type — Service — Parking	Disc, oil-bath, axle shaft mounted Disc, oil-bath, bevel pinion shaft mounted	
Control — Service — Parking	Hydraulic, latched pedals Mechanical, manual lever	
Service brake disc material Parking brake disc material	Sintered Steel	
Parking brake lining material	Sintered or graphite conglomerate	
Disc thickness — Service Wear limit — Parking	10 mm (0.394 in) 9 mm (0.354 in) 3 mm (0.118 in)	
Parking brake lining thickness — Side linings — Intermediate lining	3.1 to 3.4 mm (0.122 to 0.134 in) 4.2 to 4.5 mm (0.165 to 0.177 in)	
Parking brake relay lever shim thickness	0.5-1-1.5-2 mm (0.020-0.040-0.060-0.080 in)	
Brake pedal support R.H. brake shaft journal dia. (4, page 2, Section 205) Bushing I.D. (4) Shaft clearance in bushing	16.973 to 17.000 mm (0.6682 to 0.6693 in) 17.100 to 17.150 mm (°) (0.6732 to 0.6752 in) (°) 0.100 to 0.177 mm (0.0040 to 0.0070 in)	
R.H. brake shaft journal dia. (5 and 7) Bushing I.D. (5and 7) Shaft clearance in bushings	20.967 to 21.000 mm (0.8255 to 0.8268 in) 21.100 to 21.150 mm (°) (0.8307 to 0.8327 in) (°) 0.100 to 0.183 mm (0.0040 to 0.0072 in)	
L.H. brake shaft journal dia. (6) Bushing I.D. (6) Shaft clearance in bushing	39.961 to 40.000 mm (1.5733 to 1.5748 in) 40.100 to 40.150 mm (°) (1.5787 to 1.5807 in) (°) 0.100 to 0.189 mm (0.0040 to 0.0074 in)	

(°) Not reamed

BRAKES (continued)

	580-580 DT	680-680 DT
Hydraulic System		
Pump	Independent master cylinders	
Rated pressure	~ 17.6 bar (18 kg/cm², 256 psi approx.)	
Master cylinder piston dia.	24.967 to 25.000 mm (0.9829 to 0.9842 in)	
Master cylinder bore dia.	25.020 to 25.041 mm (0.9850 to 0.9859 in)	
Piston clearance in bore	0.020 to 0.074 mm (0.0008 to 0.0029 in)	
Piston spring length		
— Free	190 mm (7.480 in)	
— Under 97 to 107 N (9.9 to 10.9 kg, 21.8 to 24 lb)	128 mm (5.04 in)	
— Under 143 to 159 N (14.6 to 16.2 kg, 32.2 to 35.7 lb)	98 mm (3.86 in)	
Pedal adjustment	see page 2 section 205	
System bleeding	see page 3, section 205	

FINAL DRIVES

	580-580 DT	680-680 DT
Type	Planetary, 3-planet, spur	
Reduction ratio	14:(14 + 67) = 5.785 to 1	
Planet thrust washer thickness	1 mm (0.040 in)	
Final drive carrier end float adjustment	see page 1, section 206	
Final drive carrier shim thickness	4.5-4.6-4.7-4.8-4.9-5-5.1-5.2-5.3-5.4-5.5-5.6-5.7-5.8 mm (0.1772-0.1811-0.1850-0.1890-0.1929-0.1968 0.2008-0.2047-0.2087-0.2126-0.2165 -0.2205-0.2244-0.2283 in)	

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POWER TAKE-OFF

	580-580 DT	680-680 DT
540 rpm PTO		
Type	Ground speed or Transmission	
Control	Manual	
Rotation (as viewed from rear)	Clockwise	
Engine speed with PTO at 540 rpm		
— standard version	2314 rpm	2230 rpm
— optional version	2230 rpm	—
PTO speed with engine at full load rpm		
— standard version	630 rpm	605 rpm
— optional version	655 rpm	—
Shaft rev/rear wheel rev, any tyres, full load engine rpm		
Ground speed PTO rpm		
— standard version	16.2	18.8
— optional version	16.8	—
Output shaft diameter	1 1/8 in (6 spline)	
540/1000 rpm PTO (optional)		
Type Control Rotation (as seen from rear)	As 540 rpm PTO	
Engine speed with PTO at 540 rpm	2230 rpm	
Engine speed with PTO at 1000 rpm	2410 rpm	
PTO speed at full load engine rpm		
— 540 rpm	655 rpm	605 rpm
— 1000 rpm	1120 rpm	1040 rpm
Ground speed PTO rmp Shaft rev/rear wheel rev, any tyres, full load engine rpm	28.8	
Output shaft dia.		
— 540 rpm	1 3/8 in (6-spline)	
— 1000 rpm	1 3/4 in (6-spline) 1 3/8 in (21-spline)	
Driven gear bushing O.D.	56.910 to 56.940 mm (2.2405 to 2.2417 in)	
Driven gear I.D.	57.060 to 57.106 mm (2.2464 to 2.2483 in)	
Gear clearance in bushings	0.120 to 0.196 mm (0.0047 to 0.0077 in)	
Driven shaft diameter	47.566 to 47.591 mm (1.8727 to 1.8737 in)	
Bushing I.D.	47.600 to 47.639 mm (1.8740 to 1.8755 in)	
Shaft clearance in bushings	0.009 to 0.073 mm (0.0003 to 0.0029 in)	

TIGHTENING TORQUE FIGURES

DESCRIPTION	Thread Size	Torque		
		Nm	kgm	ft lb
Platform removal Capscrew, front and rear cushion mountings	M16x1.5	220	22.5	163
Clutch-Section 201 Capscrew, Ferodo clutch to flywheel (C_1, page 1)	M10x1.25	59	6	43
Capscrew, LUK or O.M.G. clutch to flywheel	M 8x1.25	25	2.6	19
Capscrew, withdrawal fork (C_2, pages 2 and 4)	M16x1.5	157	16	116
Capscrew, clutch casing to axle casing	M14x1.5	147	15	108
Capscrew, clutch case to engine	M12x1.25	98	10	72
Capscrew, support, clutch pedal (hydraulic power steering)	M 8x1.25	20	2	14
Transmission, splitter and crawler - Section 202 Nut, driven gear shaft (C_1 page 1)	M24x1.5	245	25	181
Nut, transmission shaft bearing cap (C_3 page 1)	M 8x1.25	12	1.2	8.7
Capscrew, splitter sun gear (C_4 page 1)	M12x1.25	98	10	72
Capscrew, splitter support mounting flange (C_5 page 2)	M 8x1.25	29	3	22
Capscrew, splitter, ring gear back plate (C_6 page 2)	M10x1.25	61	6.2	45
Capscrew, transmission case cover (C_4 page 1)	M10x1.25	59	6	43
Nut, self-locking, shifter lever quadrant (C_8 page 1)	M 8x1.25	31	3.2	23
Capscrew, self-locking, splitter shifter rod support (C_7 page 2)	M10x1.25	61	6.2	45
Reverser-splitter - Section 203 Capscrew, splitter sun gear (C_1 page 1)	M10x1.25	94	9.6	69
Capscrew, reverser casing (C_3)	M10x1.25	59	6	43
Capscrew, self-locking, shifter rod support (C_4)	M10x1.25	61	6.2	45
Bevel drive and differential - Section 204 Nut, self-locking, ring gear (C_1, page 7)	M12x1.25	123	12.5	90
Nut, bevel pinion shaft (C_2)	M40x1	294	30	217
Capscrew, self-locking, support, ring gear and differential (C_3)	M10x1.25	61	6.2	45
Capscrew, fork, differential lock (C_4)	M12x1.25	62	6.3	45.5
Capscrew, cover, axle case (C_5)	M10x1.25	59	6	43
Capscrew, support, differential lock lever (C_6 page 6)	M12x1.25	98	10	72

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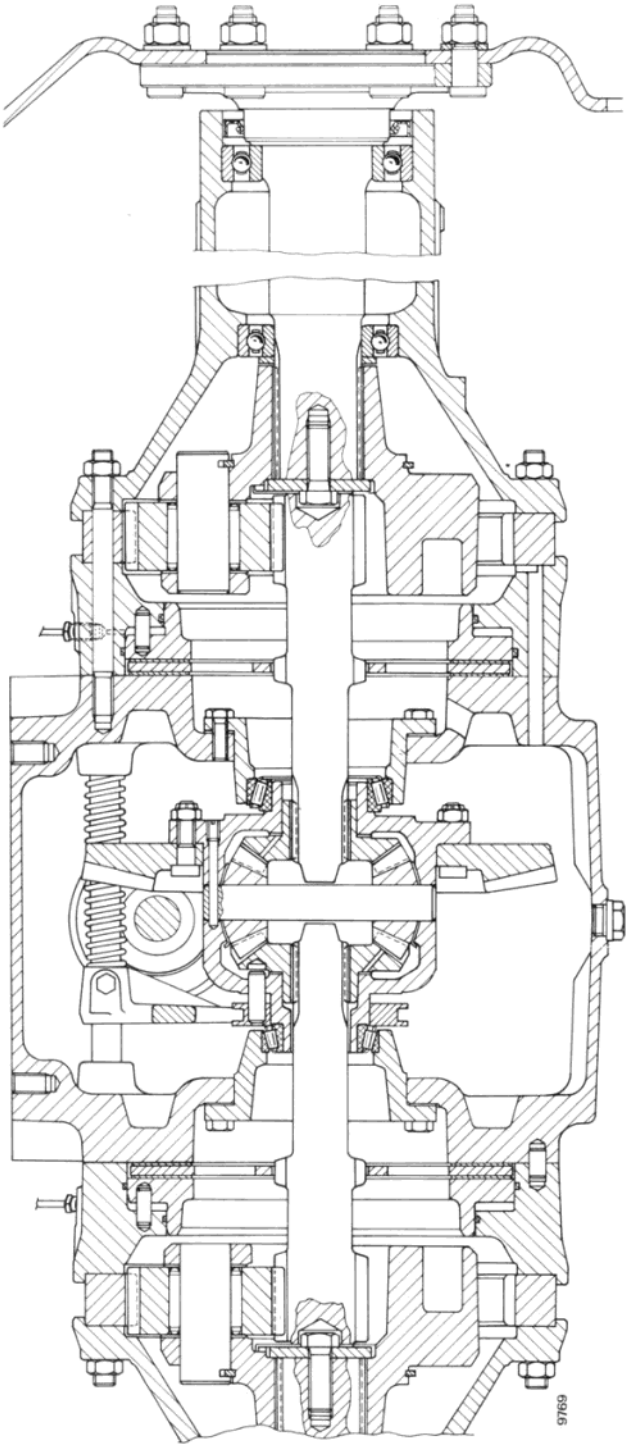
TIGHTENING TORQUE FIGURES

DESCRIPTION	Thread Size	Torque		
		Nm	kgm	ft lb
Brakes, Section 205				
Capscrew, support, parking brake (C_1, page 5)	M10x1.25	59	6	43
Capscrew, guide, parking brake	M14x1.5	69	7	51
Capscrew, master cylinder	M16x1.5	176	18	130
Nut, support, hand lever	M 8x1.25	16	1.7	12
Nut, parking brake turnbuckle (9, page 5)	M10x1.25	40	4	29
Final Drives, Section 206				
Nut, final drive housing (C_1 page 1)	M14x1.5	196	20	192
Capscrew, self-locking, wheel axle (C_2)	M16x1.5	260	26.5	144
Nut, wheel disc and rim (C_3)	M18x1.5	314	32	231
Nut, driving wheel ballast ring (C_4)	M14x1.5	98	10	72
Nut, cast driving wheel disc	M18x1.5	314	32	231
Power Take-off - Section 207				
Nut, driven gear shaft				
— mod. 580 (C_1, pag. 1) - 540 rpm	M22x1.5	157	16	115.7
— mod. 680 (C_1, pag. 2) { 540 rpm	M32x1.5	211	21.5	155.5
— mod. 680 (C_1, pag. 2) { 540/1000 rpm	M36x1.5	245	25	181
Nut, self-locking, splined end (C_2)	M12x1.25	161	16.5	119
Capscrew, support, bearing (C_3)	M12x1.25	98	10	72
Capscrew, support shifter rod (C_4)	M 8x1.25	25	2.6	19
Capscrew, sector, relay lever (C_5, page 1)	M 8x1.25	25	2.6	19
Capscrew, housing, P.T.O.	M14x1.5	147	15	108
Capscrew, guard, P.T.O.	M 8x1.25	25	2.6	19
Nut, P.T.O. shaft guard (option for Rockinger hook)	M 8x1.25	25	2.6	19



Cross Section through Power Train, 580 Tractor

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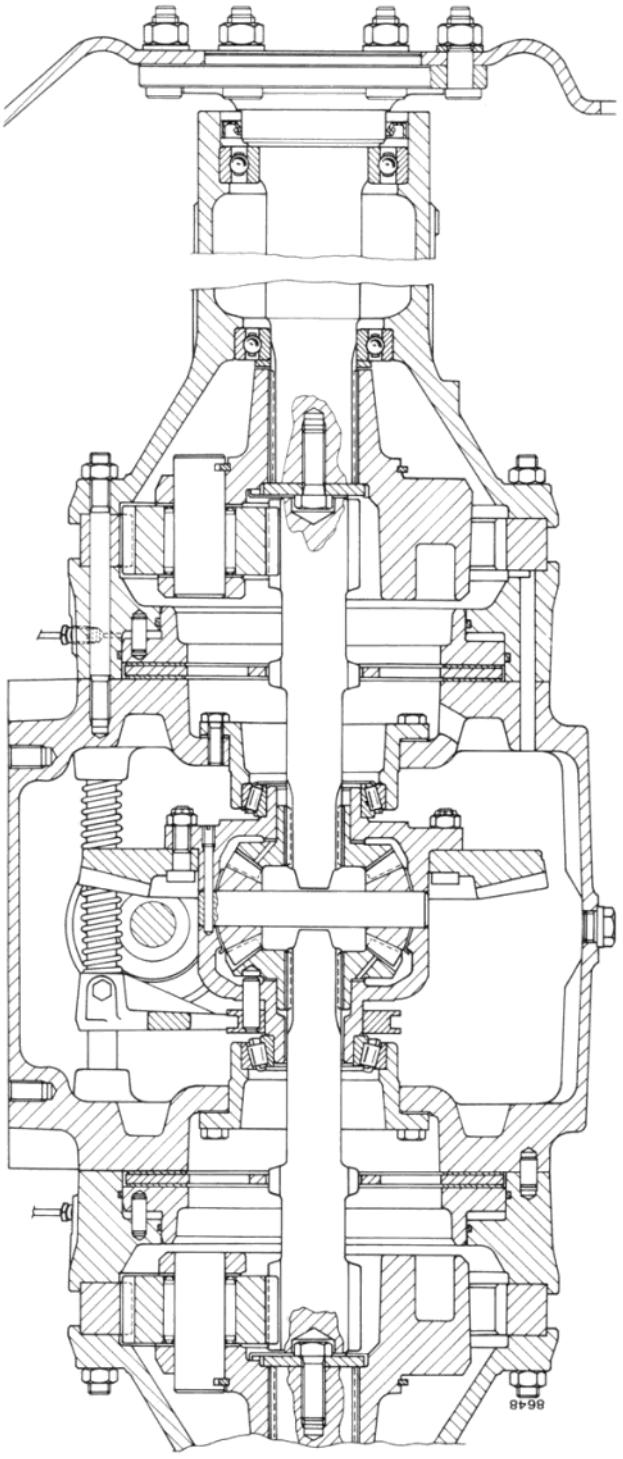


Cross Section through Power Train, 680 Tractor

TO OVERHAUL FERODO CLUTCH

To dismantle, reassemble and adjust the clutch use tool **291291/2** or universal tool **293650**.

To fit the clutch to tool **291291/2** proceed as follows:

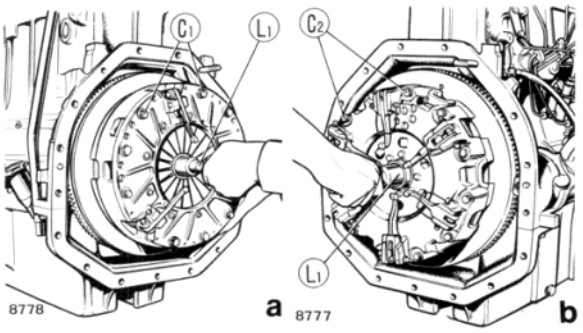
— Place spacer (B) on base plate (A) and three locators (E) over a 241 mm (9.5 in) circumference.

— Rest the clutch assembly without the P.T.O. driven plate on the base plate and secure by means of three fasteners (F) provided with guide bushes (G).

To fit clutch to universal tool **293650** proceed as follows:

— Position spacer (B) on base plate (A) with register contact surface 124.5 mm (4.901 in) above base plate and tighten at this height using locknut (D).

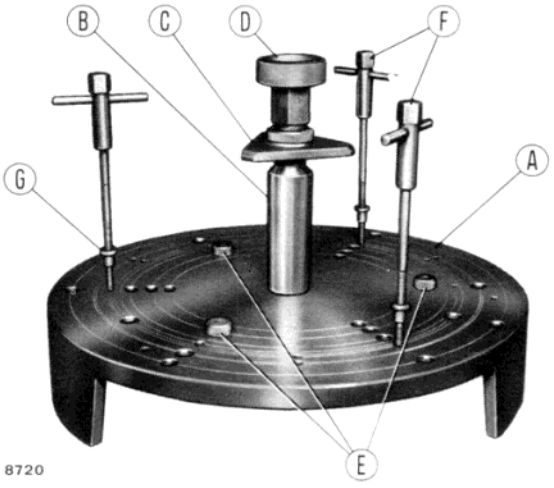
— Position adjustable locators (E) on a 240 mm (9.4 in) circumference with the top surface 9 mm (0.4 in) from base plate and tighten using handwheels (M).



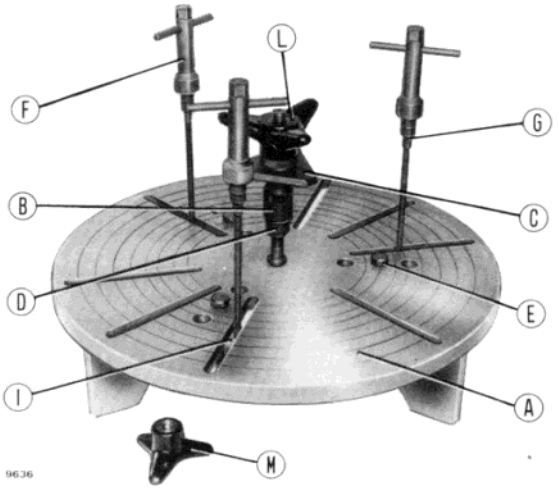
Removing the Clutch from the Flywheel
a. Ferodo 11"/11" clutch - b. LUK 11"/11" clutch or O.M.G. 11"/11" clutch - C_1/C_2. Clutch capscrews - L_1. Centraliser **291184**.

— Rest the clutch assembly without the P.T.O. driven plate on the base plate and secure by means of three fasteners (F) provided with guide bushes (G) and pads (I).

Slacken nuts (6a, page 2) and fully unscrew adjusting screws (6) using wrench **293763**



Component Parts of Ferodo Clutch Adjuster 291291/2
A. Base plate **292598** - B. Spacer **292342** - C. Register **292347** - D. Nut **292344** - E. Locators **293454** - F. Fasteners **291292/1** - G. Bushes **291293/1**.



Component Parts of FERODO Clutch Universal Adjuster 293650
A. Base plate **293332/1** - B. Spacer **293728** - C. Register **293732**- D. Locknut **293730** - E. Locators **293726** - F. Fasteners **293725** - G. Bushes **293734** - I. Pads **293755** - L. Handwheel **293739** - M. Handwheels **293740**

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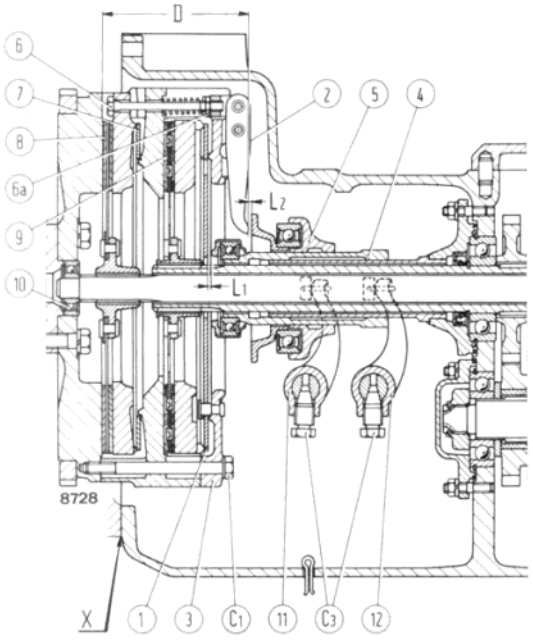


Longitudinal Section through 11"/11" FERODO Clutch

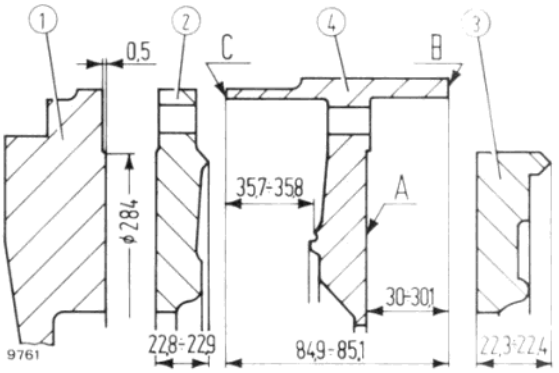
C_1. Clutch capscrews - C_3. Withdrawal lever capscrews - D = 124.5 mm (4.901 in), P.T.O. clutch release lever height above flywheel face - L_1 = 2 mm (0.0790 in), nominal transmission clutch spring end clearance - L_2 = 2.5 mm (0.098 in) nominal P.T.O. clutch release lever clearance - 1. Diaphragm spring - 2. P.T.O. clutch release levers - 3. Cover - 4/5. Control sleeves and release bearings - 6/6a. P.T.O. clutch release lever adjusting screw and nut - 7. Dished spring - 8. P.T.O. clutch plate - 9. Transmission clutch plate - 10. Flywheel bearing - 11/12. Withdrawal forks.

Note: On assembly, apply adhesive to surfaces X as directed in the general istructions on page 5, Section A.

Remove the cover screws (3) and gradually unscrew fasteners (F, page 1) to take the load off the springs for subsequent clutch dismantling.

Check the clutch plates for wear and renew if the rivets are found to be flush with the facing. Clutch plate replacement is also necessary if the organic conglomerate surfaces are found to be soaked with oil.

Check the pressure plate and clutch casing contact surfaces; if necessary, these surfaces may be dressed according to the dimensions given in the illustration and noting the following instructions:



Dimensional Data of Wearing Parts (in mm)

A/B/C See text - 1. Flywheel - 2. P.T.O. clutch pressure plate - 3. Transmission clutch pressure plate - 4. Clutch casing

1. P.T.O. clutch pressure plate (2) - Grind contact surface down to a maximum depth of 1 mm (0.04 in). Subsequently, also grind the clutch casing surface (C) removing an equivalent amount of material.

2. Transmission clutch pressure plate (3) - Proceed as described above and remove the same amount of material from clutch casing (B).

3. Clutch casing (4) - Grind contact surface (A) to a maximum depth of 0.5 mm (0.02 in).

If necessary, the flywheel face may be dressed noting that the 0.5 mm (0.02 in) deep peripheral step must be restored.

Note - On assembly, position the PTO clutch driven plate (8) with the protruding side of the hub facing towards the transmission.

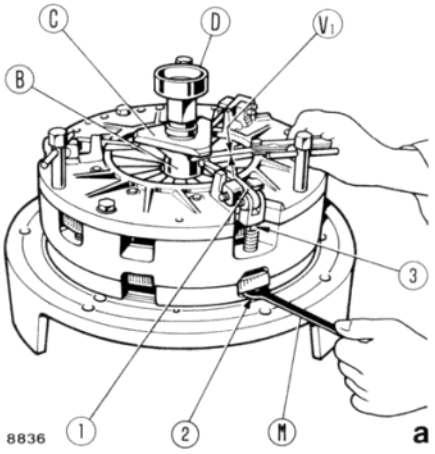
When renewing diaphragm spring (1) remember that the spring is supplied together with cover (3) to which it is rivetted.

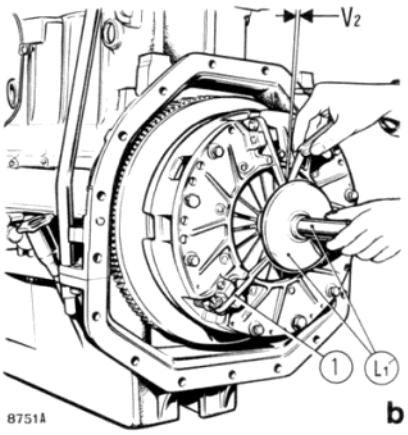
To reassemble the clutch use tool **291291/2**, or universal tool **293650** noting the following points:

— Reposition dished spring (7) over the P.T.O. clutch pressure plate with the convex side uppermost.
— Adjust the clutch as directed in the following section.

Checking P.T.O. clutch release lever height

a. On-bench adjustment using tool **291291/2**, or universal tool **293650** - b. On-flywheel adjustment - B. Spacer - C. Register - D. Nut **292344** (for tool **291291/2**) or handwheel **293739** (for universal tool **293650**) - L_1. Centralizer **291184** - M. Wrench **293763** - V_1 = 0.1 mm (0.004 in), release lever gap against register - V_2 = 3 mm (0.120 in) release lever gap against clutch with unit fitted to flywheel - 1. Release levers - 2/3. Adjusting screw and nut.





TO ADJUST FERODO CLUTCH

For a correct P.T.O. clutch adjustment, the release levers should be aligned at dimension (D, page 2) from the flywheel surface.

Clutch adjustment may be carried out both on the bench and with the clutch fitted to the flywheel.

1. On-bench clutch adjustment

Position the clutch over the base plate of tool **291291/2** or universal tool **293650** and clamp using parts previously mentioned for dismantling (page 1) Fit register (C) and secure with nut (D), for tool **291291/2** or with handwheel (L, page 1) for universal tool **293650.**

Use wrench (M) to screw in or back off PTO clutch release lever screws (2) to obtain a clearance (V_1) between the end of each release lever and register (C). Susequently, retighten nuts (3).

2. On-Flywheel Clutch Adjustment

Insert centraliser (L_1) **291184**, in place of the clutch shaft ensuring that the end is in contact with bearing (10, page 2), and push the associated register against it.

Adjust gap (V_2) as directed above for (V_1) gap adjustment.

Note: On-bench and on-flywheel clutch adjustment may result in quite considerable differences in terms of positioning, a fact which does not affect clutch efficiency, being due to varying P.T.O. clutch plate thickness, owing to machining tolerance build-up or wear, plus the magnification inherent in the high leverage ratio.

TO OVERHAUL LUK OR O.M.G. CLUTCH

To dismantle, reassemble and adjust the clutch use tool **291291/2** or universal tool **293650** (page 5).
To apply clutch to tool **291291/2** proceed as follows:

— Place spacer (B) on baseplate (A, page 5) and three locators (E) over a 241 mm (9.5 in) circumference.

— Rest P.T.O. clutch assembly without driven plate on baseplate and secure by means of three fasteners (F),

To apply clutch to universal tool **293650** proceed as follows:

— Place spacer (B) on baseplate (A, page 5) and position register at a height of 123 mm (4.8 in) and tighten at this height using locknut (D).

— Place adjustable locators (E) over 240 mm (9.4 in) circumference with top face at a height of 10.6 mm (0.417 in) and tighten through handwheels (M)

— Rest clutch assembly without P.T.O. driven plate on baseplate and secure by means of three fasteners (F) with pads (I) plus spacers (N).

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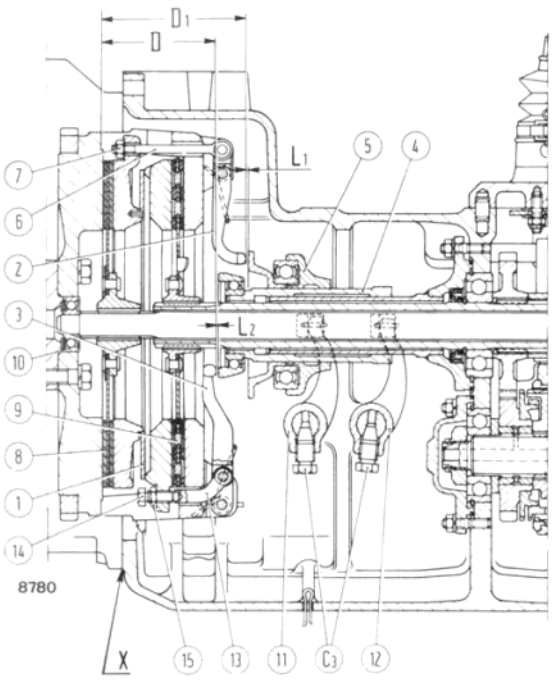


Section through LUK or O.M.G. 11"/11" Clutch

C_3. Withdrawal lever screws - D = 98 mm (3.858 in), release lever height above flywheel face - D_1 = 123 mm (4.842 in), release lever height above flywheel face - L_1 = 2.5 mm (0.984 in) - L_2 = 2 mm (0.079 in) release lever gap for P.T.O. clutch and transmission clutch - 1. Dished spring - 2. P.T.O. clutch release levers - 3. Transmission clutch release levers - 4/5. Control sleeves and bearings - 6/7. P.T.O. clutch adjusting screw and nut - 8. P.T.O. clutch plate - 9. Transmission clutch plate - 10. Flywheel bearing - 11/12. Withdrawal forks - 13/14/15. Transmission clutch lever, adjusting screw and nut.

Note: On assembly, apply sealing compound to surfaces X as directed in the general instructions on page 5, Section A.

Remove P.T.O. clutch release lever adjusting nuts (7) and gradually back off fasternes (F, page 5) to take the load off the dished spring and permit clutch disassembly as shown below.

Check clutch driven plates for wear and renew if rivets are near to or flush with top of facings. The plates are also to be renewed if the organic facings are found to be soaked with oil.

Check friction faces of pressure plates and clutch casing.

If necessary, dress noting that dimensions (A, B, C and D) of each part must not be reduced below the limits given in the illustrations. Renew as necessary.

Proceed as follows:

— Dress pressure plate surfaces.

— Replace damaged or worn plates.

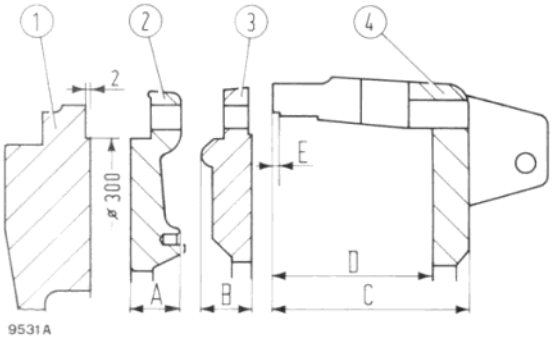
— Dress clutch casing face.

— Calculate dimension (D) according to the following formula:

$$D = A + B + S_1 + S_2 + P + L$$

where:

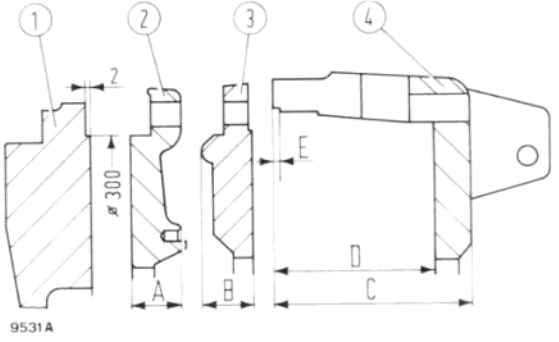
A and **B** = Measured dimension of two pressure plates after dressing.



Minimum Dimensions After Wearing Part Dressing. LUK 11"/11" Clutch

A ⩾22 mm (0.867 in); B⩾24 mm (0.945 in); C⩾87 mm (3.425 in); D = 70±0.15 mm (2.756±0.006 in); E⩾2.5 mm (0.098 in)

1. Flywheel - 2. P.T.O. clutch pressure plate - 3. Transmission (master) clutch pressure plate - 4. Housing



Minimum Dimensions After Wearing Part Dressing O.M.G. 11"/11" Clutch

A⩾22 mm (0.867 in); B⩾24 mm (0.945 in); C⩾87 mm (3.425 in); D = 70±0,15 mm (2.756±0.006 in); E⩾2.5 mm (0.098 in)

1. Flywheel - 2. P.T.O. clutch pressure plate - 3. Transmission (master) clutch pressure plate - 4. Housing.

DIREZIONE COMMERCIALE

S_1 and S_2 = Measured dimension of P.T.O. and master clutch plates.

P = 4.5 mm (0.18 in) for LUK clutch, or 4 mm (0.15 in) for O.M.G. clutch. Spring dimension to restore original load.

L = 2 mm (0.08 in) external undercut;

— Check that value (D) is greater than or equal to that shown in the figures. In restoring value (D), check that dimension (C) does not fall below the values given. If necessary, replace one or both of the pressure plates, bearing in mind the following notes:

Note: Clutch casing width should not fall below 17 mm (0.67 in); therefore, ensure that the following condition exists at all times:

C—D = 17 mm min.

Check that undercut (E) is higher than indicated in the illustration and restore as necessary.
If necessary, dress friction face on engine flywheel, and restore external undercut of 2 mm (0.08 in).

Note: On assembly, position the PTO clutch driven plate (8, page 4) with the protruding side of the hub facing towards the transmission.

Assemble clutch using tool kit **291291/2** or universal kit **293650,** noting the following points:

— Correctly position dished spring (1, page 4) on P.T.O. clutch pressure plate, ensuring that centralisers are in register with slots.

— Adjust clutch as directed below.

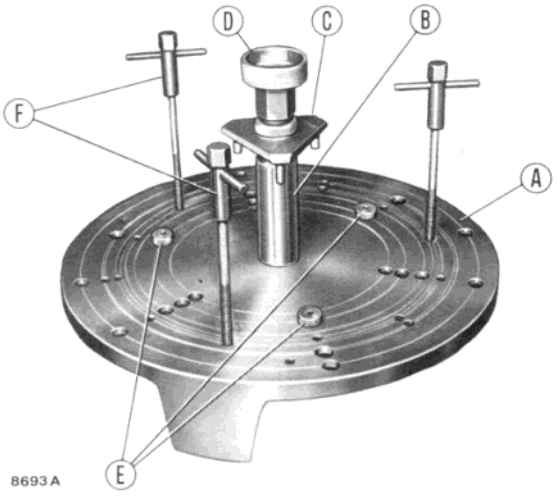
TO ADJUST LUK OR O.M.G. CLUTCH

For correct clutch adjustment the release levers must be correctly aligned at the dimensions given (D and D_1, page 4) relative to flywheel face.

Clutch adjustment may be carried out with the clutch on the bench or fitted to the flywheel.

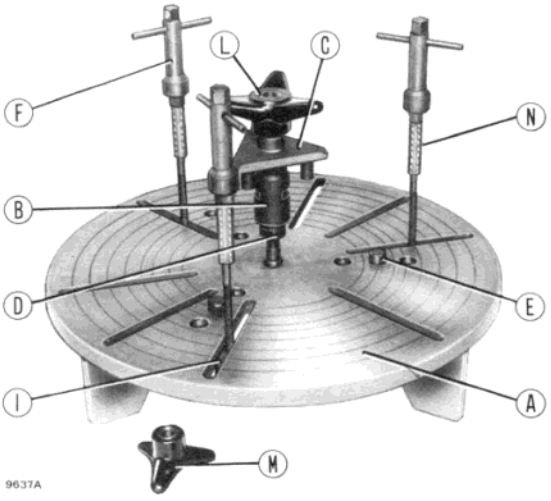
1. On-Bench Clutch Adjustment

Place the clutch over the base plate of tool **291291/2** or universal tool **293650** and tighten by means of the fasteners provided, and adhering to the instruction given for dismantling (page 3).



Component Parts of Tool 291291/2 for LUK or O.M.G. Clutch Adjustment

A. Baseplate **292528** - B. Spacer **292342** - C. Register **291299** - D. Nut **292344** - E. Locators **293454** - F. Fasteners **291292/1**



Component Parts of Universal Tool 293650 for LUK or O.M.G. Clutch Adjustment

A. Base plate **293332/1** - B. Spacer **293728** - C. Register **293731** - D. Locknut **293730** - E. Locators **293726** - F. Fasteners **293725** - I. Pads **293755** - L. Handwheel **293739** - M. Locator handwheels **293740** - N. Spacers **293737**.

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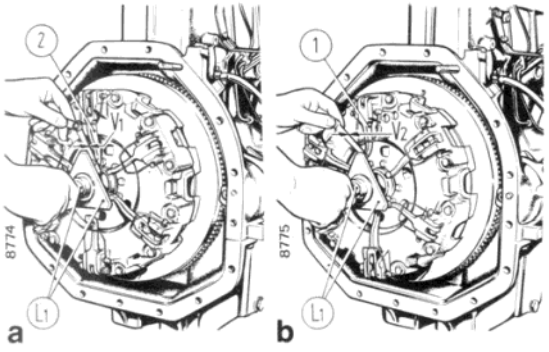


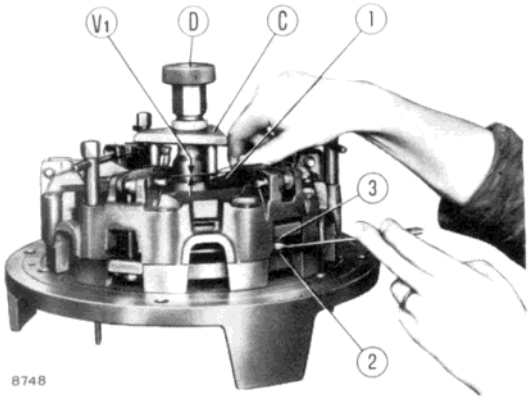
Checking Release Lever Height On-Flywheel

a. Transmission clutch - b. P.T.O. clutch - L_1. Centraliser **291184** with register - V_1 = 0.5 mm (0.02 in), release lever gap - V_2 = 0.5 mm (0.02 in), release lever gap - 1. P.T.O. clutch release lever - 2. Transmission clutch release lever.

Fit register (C) and tighten by means of nut (D) for tool **291291/2**, or with handwheel (L) for universal tool **293650** (page 5)

Screw in or back off the transmission clutch release lever screws (2) to obtain gap (V_1) between register (C) and release levers. Subsequently, retighten nuts (3).

Screw in or back off P.T.O. clutch nuts (2) to obtain a gap (V_2) between each release lever and register (C).



On-Bench Inspection and Adjustment of Transmission Clutch Release Lever Height Using Tool 291291/2 or Universal tool 293650

C. Register - D. Nut **292344** for tool **291291/2** or Handwheel **293739** for universal tool **293650** V_1 = 0.1 mm (0.004 in), release lever gap - 1. Release levers - 2/3. Adjusting screw and nut.

2. On-Flywheel Clutch Adjustment

Insert centraliser (L_1) **291184**, in place of the clutch shafts, ensuring that the end is in contact with bearing (10, page 4) and press against the associated register.

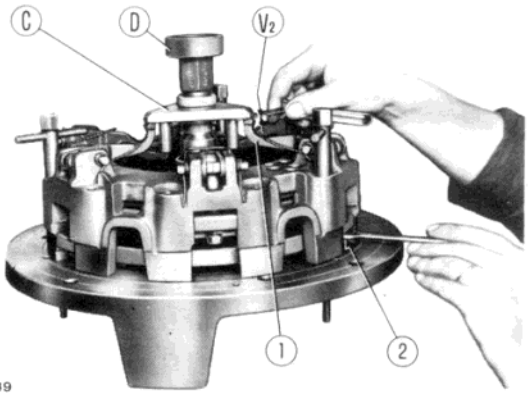
Adjust the gaps (V_1 and V_2) as indicated above.

Note: On-bench and on-flywheel clutch adjustment may result in quite considerable differences in terms of positioning, a fact which does not affect clutch efficiency, being due to varying P.T.O. clutch plate thickness owing to machining tolerance build-up or wear, plus the magnification inherent in the hig leverage ratio.

TO ADJUST CLUTCH LINKAGE

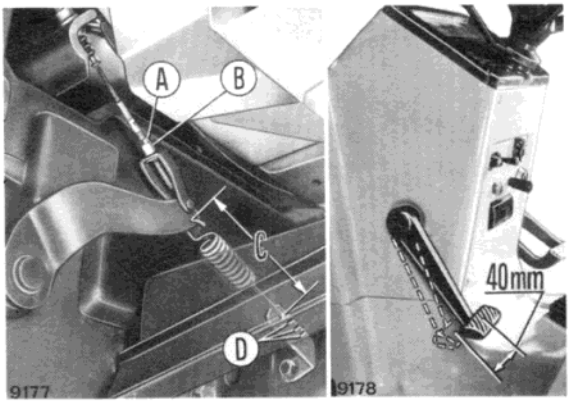
Transmission clutch linkage

Check the free travel of transmission clutch pedal; the correct travel is 40 mm (1½ in). When the free travel is reduced to 15 mm (½ in) adjust the linkage as follows:



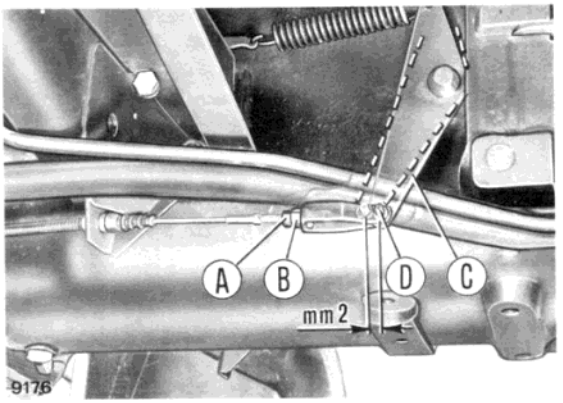
On-Bench Inspection and Adjustment of P.T.O. Clutch Release Lever Height Using Tool 291291/2 or Universal tool 293650

C. Register - D. Nut **292344** for tool **291291/2** or handwheel **293739** for universal tool **293650** V_2 = 0.1 mm (0.004 in), release lever gap - 1. Release levers - 2. Adjusting nut.



Adjusting Transmission Clutch Pedal Free Travel

A. Locknut - B. Adjusting nut - C. Return spring length - D. Alongated holes



Adjusting P.T.O. Clutch Control Lever

A. Locknut - B. Adjusting nut - C. Outer relay lever - D. Pin.

— Backoff locknut (A) and turn nut (B) counter-clockwise noting that each turn of the nut is equivalent to a 9 mm (0.354 in) pedal displacement.

— Retighten locknut (A).

— Ensure that the pedal free travel is 40 mm (1.6 in):

After each adjustment, check that return spring length (C) is 175 mm (6.9 in).

To adjust, make use of elongated holes (D).

P.T.O. Clutch Linkage

Bring lever (C) to the rest position (fully forward) Check that the free travel near pin (D) is 2 mm (0.08 in) When the free travel is reduced to 0.5 mm (0.02 in), adjust as follows:

— Back off locknut (A) and turn nut (B) clockwise through 1½ turns (1 turn = 1 mm (0.04 in) displacement at pin D).
— Retighten locknut (A);
— Ensure that the free travel of lever (C) is 2 mm (0.08 in).

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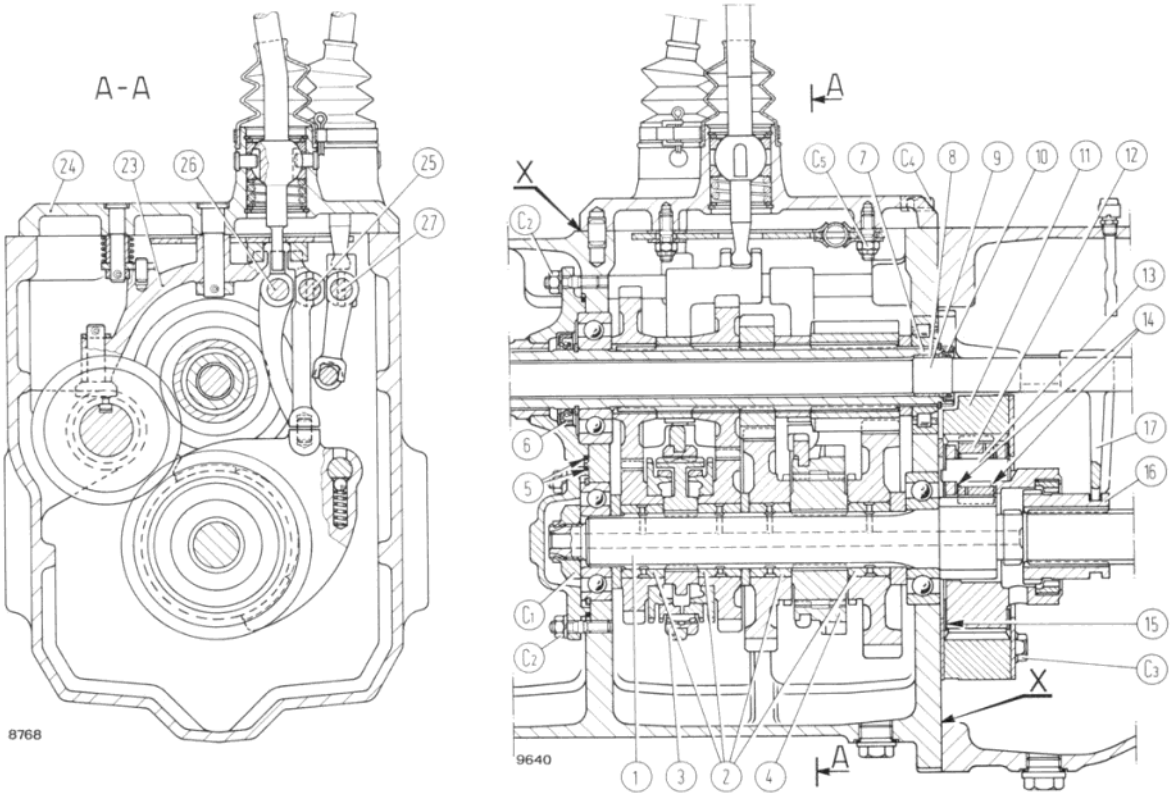

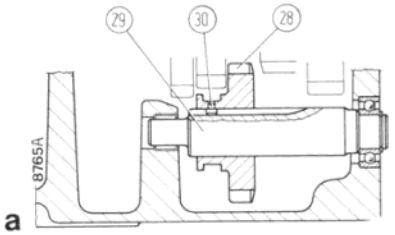

Sections through 8-speed transmission

a. Section through reverse idler shaft - C_1. Driven shaft nut - C_2. Transmission shaft bearing cap nut - C_3. Splitter sun gear cap screws - C_4. Transmission cover capscrews - C_5. Sector self-locking nuts - 1. Driven shaft - 2. Driven gear bushings (no internal splines) - 3. 3rd/4th sliding sleeve - 4. 1st/2nd sliding sleeve - 5. O-rings - 6. Seal - 7. Drive shaft - 8. PTO shaft bushing - 9. PTO shaft - 10. Seal - 11. Splitter sun gear - 12. Planet wheels - 13. Planet wheel journal - 14. Thrust washers - 15. Retaining ring - 16. Splitter control sleeve - 17. Splitter shifter fork - 23. Reverse shifter fork - 24. Transmission cover - 25. 1st/2nd shifter rod - 26. 3rd/4th shifter rod - 27. Splitter shifter rod - 28. Reverse idler gear - 29. Reverse shaft - 30. Reverse idler gear locating pin.

Note - On reassembly, apply adhesive to faces **X** as shown in the general instructions, page 5, section A.

Adhesive is also to be applied to replacement bearing cap fasteners on both drive and driven shafts.

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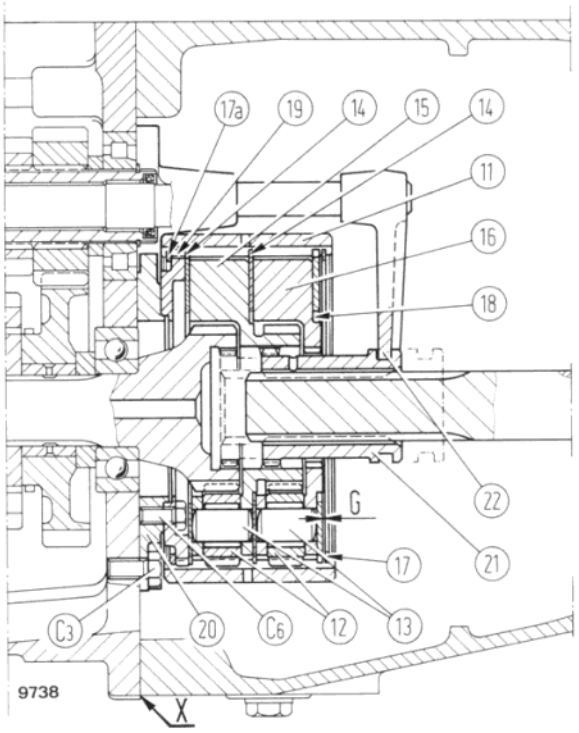
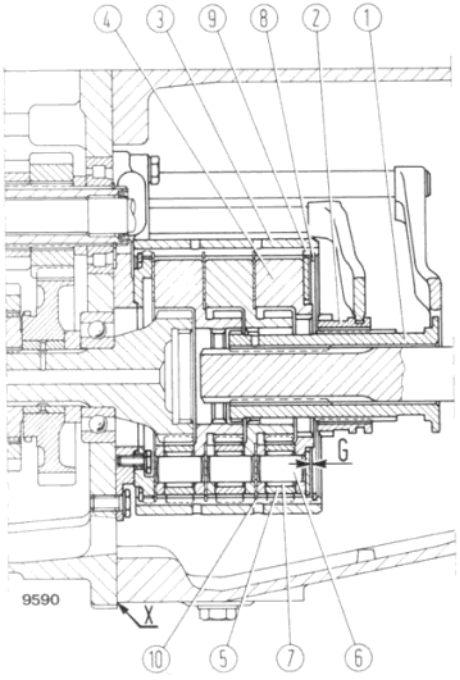
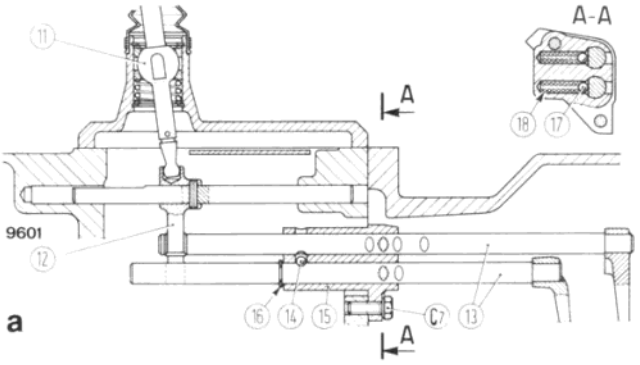
Longitudinal section through 12-speed transmission

C_3. Splitter support flange capscrews - C_6. Ring gear backplate capscrews - G. = 0.94 to 1.48 mm (4.037 to 0.0583 in), splitter gear end play - 11. Floating ring gear - 12. Planet wheels - 13. Planet wheel journals - 14. Thrust washers - 15. Normal range planet wheel carrier - 16. Low range planet wheel carrier - 17/17a. Retaining rings - 18. Low range carrier retainer plate - 19. Ring gear backplate - 20. Splitter mounting flange - 21. Splitter control sleeve - 22. Splitter shifter fork.





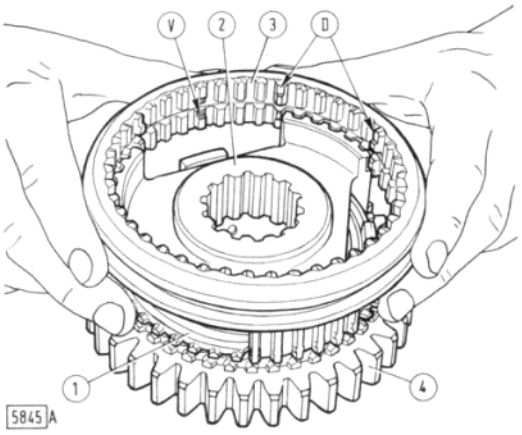


Section through crawler (16-speed)

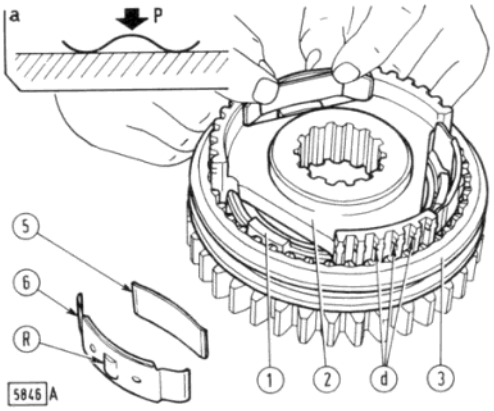
a. Section through actuating levers - C_7. Splitter shifter rod support self-locking screws - G = 0.91 to 1.56 mm (0.0036 to 0.0614 in), crawler gear end play - 1. Splitter sleeve - 2. Crawler control sleeve - 3. Floating ring gear - 4. Planet wheel carrier - 5. Planet wheels - 6. Planet wheel journals - 7. Needle rollers - 8. Retaining ring - 9. Planet wheel carrier retainer plate - 10. Thrust washer - 11. Crawler and splitter shifter lever - 12. Splitter and crawler inner shifter lever - 13. Shifter rods - 14. Detent ball - 15. Shifter rod support - 16. Retaining ring - 17/18 Detent balls and springs.

Note - On reassembly, apply adhesive to surfaces **X** as directed in the general instructions, page 5, Section A.

DIREZIONE COMMERCIALE



Installing Synchromesh Sliding Sleeve
D. Stepped teeth - V. Shifting plate recess - 1. Synchrocone - 2. Synchrohub - 3. Sliding sleeve - 4. Driven gear



Installing Shifting Plate and Spring
a. Checking shifting plate spring - d. Detent pips - P = 13.7 to 15.2 N (1.40 to 1.55 kg, 3 to 3½ lb), test load - R. Shifting plate relief - 1. Synchrocone - 2. Synchrohub - 3. Sliding sleeve - 5. Spring - 6. Shifting plate

ASSEMBLY

When assembling refer to the illustrations on pages 1 and 2 for correct positioning and note the points mentioned hereunder:

— To check the condition of synchromesh springs (5) place a spring over a flat surface, depress the spring in the centre all along the width applying a 13.7 to 15.2 N (1.4 to 1.55 kg, 3 to 3½ lb) load (P) and check that deflection is 1.5 mm (0.06 in).

— Ensure that shifting plates (6) are free from distortion and dents, especially on the central relief (R).

3rd/4th synchromesh:

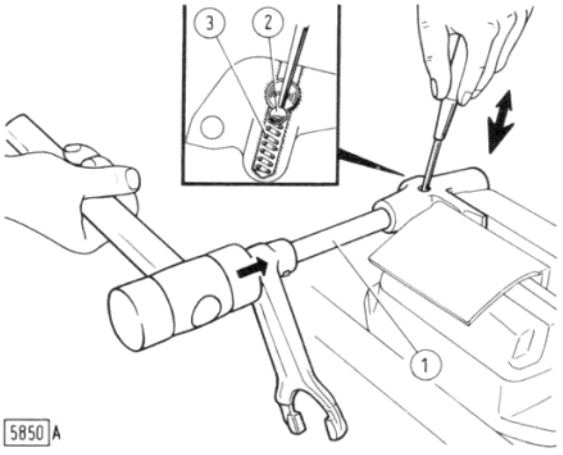
— Fit a synchrocone (1) and synchrohub (2) on 3rd driven gear (4) with attached baulk ring so that the three toothed sectors match the recesses in the baulk ring and the lead-in chamfer on the splines faces towards the gear.

— Install sliding sleeve (3) so that the three toothed synchrohub sectors (2) are included in the width spanning stepped teeth (D).

— Position springs (5), on shifting plate (6) as shown and refit in their recesses.

— Install the second synchrocone with the three front fins in register with those of the first synchrocone previously fitted and position the fourth driven gear.

— Test synchromesh effectiveness by operating the sliding sleeve by hand in either direction.



Positioning Splitter Shifter Rod
1. Splitter shifter rod - 2. and 3. Detent ball and spring

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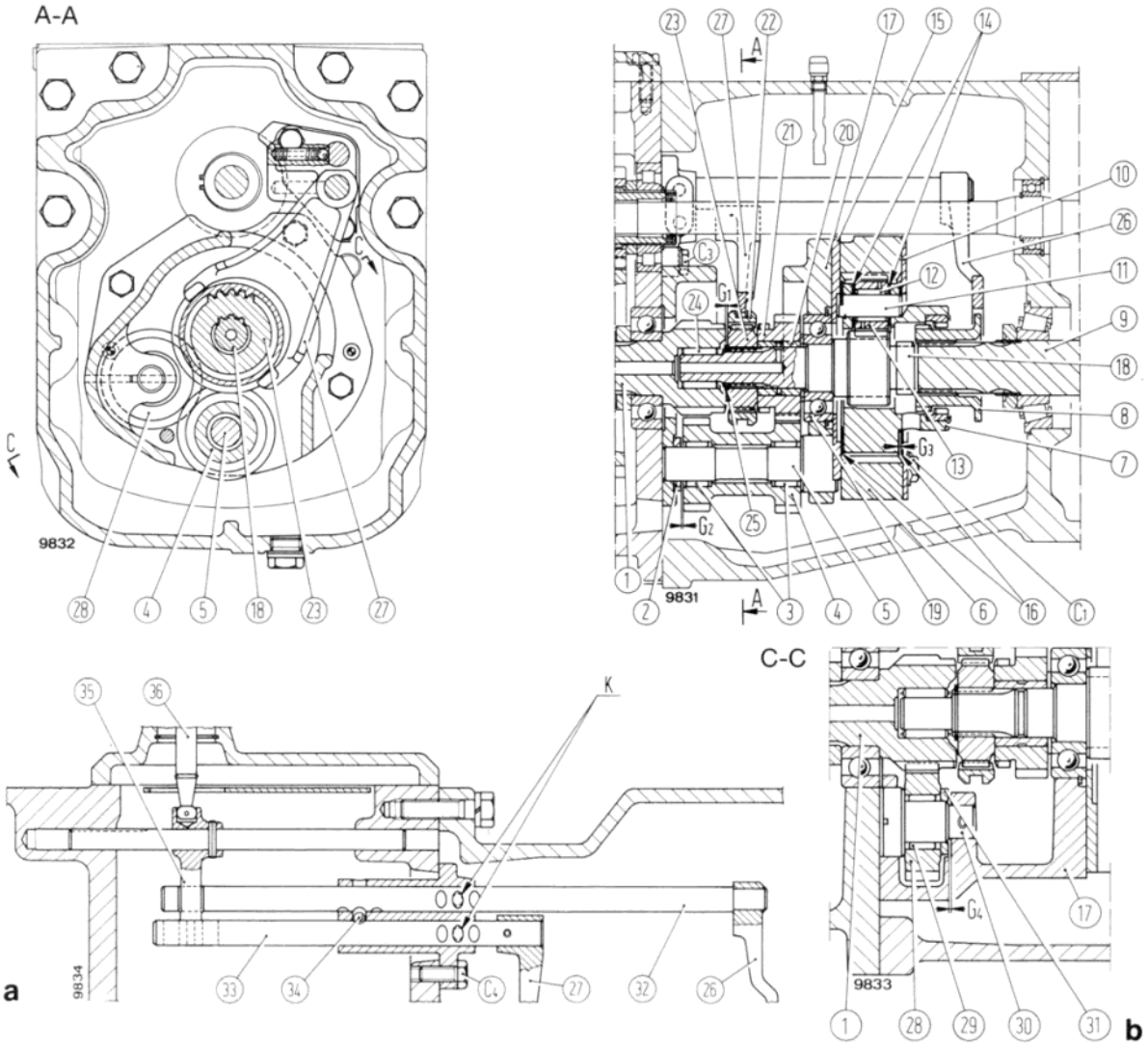

SECTIONS THROUGH MECHANICAL REVERSER

a. Section through control levers - b. Section through reverser idler shaft. - C_1. Splitter sun gear capscrew - C_3Reverser housing capscrew - C_4. Self-locking rod support screws - K. Detent balls - G_1. 0.44 to 1.75 mm (0.02 to 0.07 in) Hub to sliding sleeve end play - G_2. 0.20 to 0.50 mm (0.008 to 0.02 in) thrust washer (2) to double drive gear (4) end play - G_3. 0.44 to 0.76 mm (0.02 to 0.03 in) splitter end play - G_4. 0.20 to 0.60 mm (0.02 to 0.024 in) reverser idler gear end play - 1. Driven gear shaft - 2. Thrust washers - 3. Needle roller bearings - 4. Double drive gear - 5. Double gear journal - 6. Splitter sun gear - 7. Splitter planet wheel carrier - 8. Splitter sliding sleeve - 9. Bevel pinion shaft - 10. Toothed retaining plate - 11. Planet wheel journal - 12. Needle roller bearings - 13. Splitter planet wheel - 14. Thrust washers - 15. Splitter abutment plate. - 16. Thrust washers - 17. Reverser housing - 18. Reverser shaft with splitter pinion - 19. Ball bearings - 20. Driven gear bushing - 21. Driven gear - 22. Reverser sliding sleeve - 23. Reverser hub. - 24. Needle roller bearing - 25. Retaining ring - 26. Splitter shifter fork - 27. Reverser shifter fork - 28. Reverser idler gear - 29. Needle roller bearign - 30. Idler gear shaft - 31. Thrust washer - 32. Splitter shifter rod - 33. Reverser shifter rod - 34. Reverser and splitter rod detent ball - 35. Inner splitter and reverser shifter lever - 36. Splitter-reverser shifter lever

Note: On reassembly, first install rod (33) in neutral position, insert detent ball (34) and then install rod (32).

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TO ADJUST BEVEL DRIVE

1. Adjustment of bevel pinion bearings with tool 293339 and determination of shims (Sp, page 4).

Install bearing cones (1 and 2), spacer (D) **293750**, spacer (4), abutment ring (5) and parking brake hub (3) on tool (E) **293339**.

Fully tighten nut (M) on the tool and measure dimension (H_1) using a depth gauge.

Disassemble, lubricate the bearings with engine oil and reinstall tool in casing.

Fully retighten nut (M), simultaneously turning the tool to settle the bearings.

Measure dimension (H_2).

The thickness of shims (Sp, page 4) to be fitted will be:

$$Sp = H_2 - H_1 + 0.05$$

where,
0.05 mm (0.002 in) = compensation coefficient to offset the increase in bearing preload caused by bevel pinion shaft clamping.

If necessary, round up Sp to the nearest 0.05 mm (0.002 in).

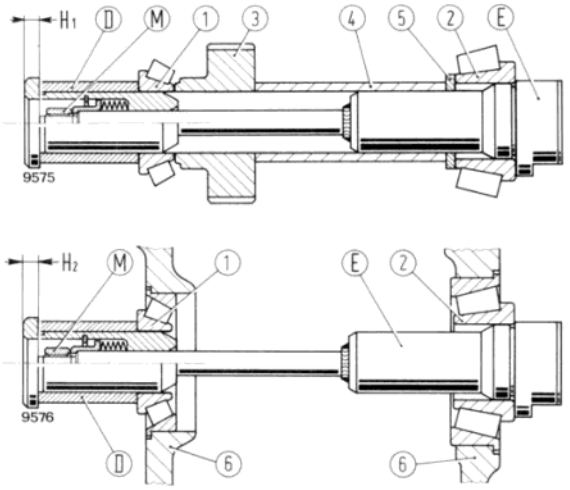
Note: Do not remove tool from the axle casing on completion of adjustment as the same tool will also be used for bevel pinion position adjustment.

2. Adjustment of bevel pinion bearings with universal tool 293510 (page 2) and determination of shims (Sp, page 4).
Install adaptors **293632** (P) and **293637** (Q), and spacers **293619** (B) and **293625** (C) on universal tool **293510** (A).

Also fit adapter **293617** (N) to clamp tool in vise and position pinion bearing cones (1 and 2), spacer (4), abutment ring (5) and parking brake (3) as shown in fig. **a**.

Turn tool handwheel until graduated scale pointer progressively moves to 175 kg.

Fit register **293624** (L) on universal tool (A), positioning holes (M) in line with the flats on handwheel. Using a suitable depth gauge, measure dimension (H_4).



Determining Bevel Pinion Bearing Shim Thickness (Sp)
E. Adjuster **293339** - D. Spacer **293750** - H_1/H_2. Dimensions read off depth gauge - M. Clamp nut - 1/2. Bearing cones - 3. Parking brake hub - 4. Spacer - 5. Abutment ring - 6. Axle case.

Dismantle, lubricate bearings with engine oil and refit the tool in the casing with attached adaptors (P. and Q) and spacers (B and C) as shown in figure **b**.

Progressively return graduated scale pointer to 175 kg, simultaneously turning the tool to settle the bearings, and measure dimension (H_3).

The thickness of shims (Sp) to be fitted will be:

$$Sp = H_4 - H_3 + 0.05$$

where,

0.05 mm (0.002 in) = compensation coefficient to offset the increase in bearing preload caused by bevel pinion shaft nut clamping.

If necessary, round off (Sp) to the nearest 0.05 mm up (0.002 in).

Note: Do not remove the tool on completion of adjustment as the tool will also be used for bevel pinion position adjustment.

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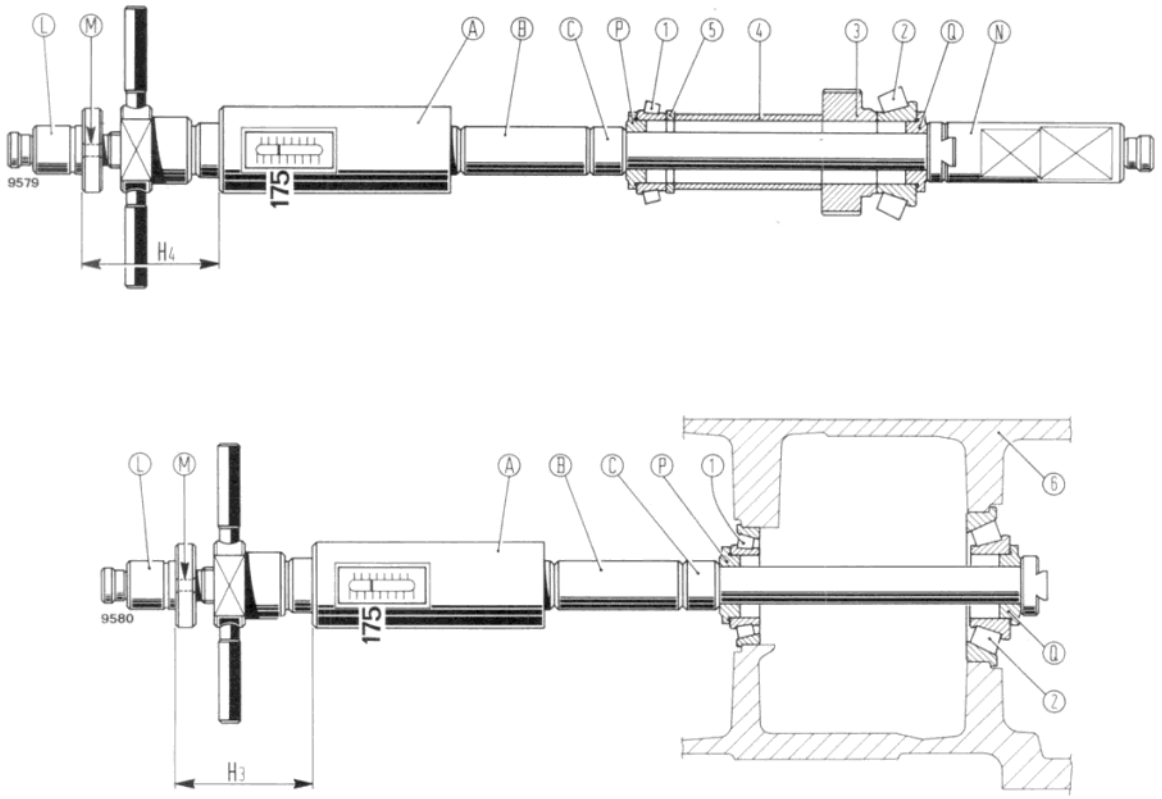
POWER TRAIN:
Bevel Drive and Differential



Determining Bevel Pinion Bearing Thickness (Sp) Using Universal Tool 293510

A. Universal tool **293510** - B. Spacer **293619** - C. Spacer **293625** - H_3/H_4. Depth gauge readings - L. Register **293624** - M. Register holes - N. Adaptor **293617** - P. Adaptor **293632** - Q. Adaptor **293737** - 1/2. Bearing cones - 3. Parking brake hub - 4. Spacer - 5. Abutment ring - 6. Axle casing.

3. Bevel Pinion Position and Shim (S, page 4)

Install tool (F, page 3) **293400/1** in the differential supports (1 and 2) with the bearing cups (9 and 10) in position. Screw in or back off the two cones (4) to bring spindle (5) of micrometer gauge (3) over bevel pinion bearing (7).

Note: Use spindle marked 150 to 175.

Act on cones (4) manually or using lock ring spanner **293446** and lightly tighten the tool onto cups (9 and 10) to eliminate all end play.
Clamp the micrometer gauge and spindle by means of screw (6).

Bring spindle (5) of the micrometer gauge in contact with bearing (7) and read the dimension (H_3).

Find correct nominal dimension (H_4) from ring gear centreline to back of pinion as follows:

$$H_4 = H_5 \pm C$$

where,

H_5 = nominal dimension from ring gear centreline to back of pinion, namely 165.5 mm.

C = correction factor stamped on ring gear expressed in mm and preceded by + or — if different from 0, to be added to, or substracted from, nominal dimension (H_5) according to sign.

Thickness of shim (S) will be:

$$S = H_3 - H_4$$

where,

H_3 = dimension read off the micrometer gauge

H_4 = nominal dimension from ring gear centreline to back of pinion

Example

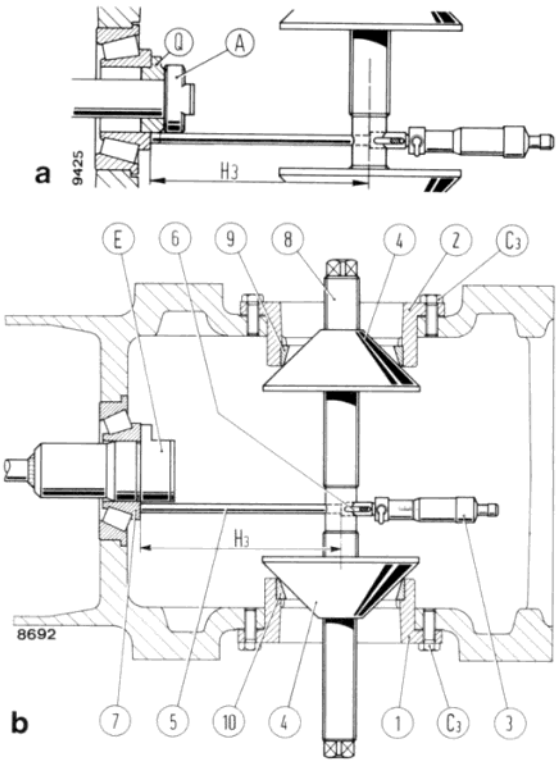
Dimension read off micrometer gauge H_3 = 170 mm.
Nominal dimension from ring gear centreline to back of pinion H_5 = 165.5 mm.
Correction dimension C = + 0.2 mm.
Correct nominal dimension H_4 = 165.5 + 0.2 = 165.7 mm.
Thickness of shim: S = 170 — 165.7 = 4.3 mm.
Correction dimension C = — 0.2 mm.
Correct nominal dimension H_4 = 165.5 — 0.2 = 165.3 mm.

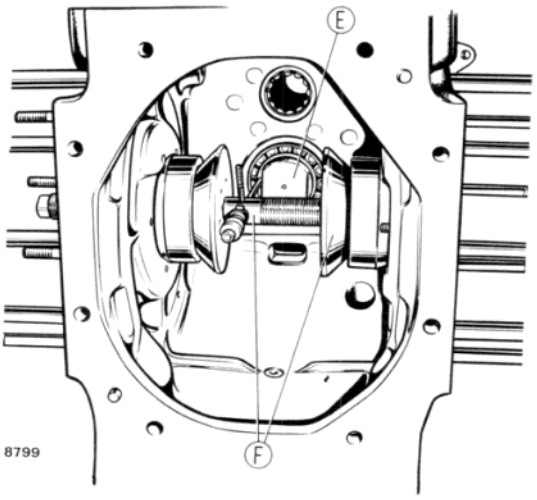
Thickness of shim:
S = 170 — 165.3 = 4.7 mm
Correction dimension C = 0 mm.
Correct nominal dimension H_4 = H_3 = 165.5 mm.

Thickness of shim:
S = 170 — 165.5 = 4.5 mm.

4. Ring gear bearings and bevel drive back lash

— Dismantle the bevel pinion and install the differential assembly with attached ring gear
— Fasten left hand support (1, page 5) with a thickness of shims (S_1) 0.5 to 1 mm thick tightening only three of the screws to 6.2 kgm or 61 Nm (44.84 ft lb).
— Measure flange width (D_1) of right hand support (2) and install the latter without shims using three screws (3) lubricated and equi-spaced.
— Progressively tighten screws (3) in a staggered fashion using torque wrench (P) **291269** up to 7 kgm or 7 Nm (5.06 ft lb), for 680 tractor, and 5 Nm or 0.5 kgm (3.6 ft lb), for 580 tractor simultaneously turning the ring gear to settle the bearings.
— Ensure that the torque needed to rotate the ring gear assembly is 0.15 to 0.20 kgm or 1.5 to 2 Nm (1.08 to 1.44 ft lb), as measured with spring balance and cord wrapped round the differential box flange, and that differential lock fork does not interfere with its seat. The specified rotating torque is equivalent to a spring balance pull of 20 to 24.5 N (2.0 to 2.5 kg, 4.4. to 5.5. lb) for 580





Positioning Bevel Pinion Gauge

a. Positioning universal gauge (A) - b. Measurement by means of gauge (E) - A. Universal tool **293510** - C_3. Differential support screws - E. Gauge **293339** - F. Universal tool **293400/1** - H_3. Gauge reading - Q. Adaptor **293637** - 1/2. Differential support screws - E. Micrometer gauge - 4. Centralising cones - 5. Micrometer spindle - 6. Micrometer screw - 7. Bevel pinion bearing cone - 8. Threaded shaft - 9/10. Bearing cups

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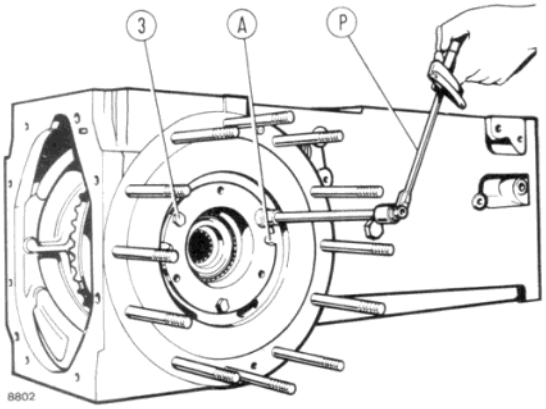
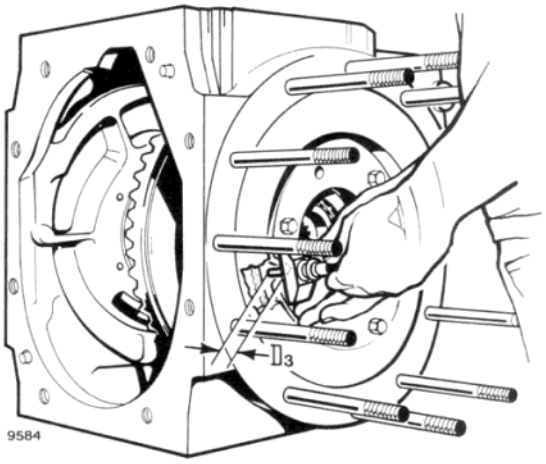


Tightening RH Support Capscrews (3) for Ring Gear Bearing Adjustment
A. Recesses in support - P. Torque wrench **291269**



Measuring Bearing Depth (D_3) from Differential Support

tractor and 12 to 15 N (1.25 to 1.5 kg, 2.8 to 3.3. lb) for 680 tractor

Note - For 580 tractor with reinforced differential, obtain the same values as 680 tractor

— Using a suitable depth gauge, measure depth (D_3) of recesses in support relative to contact face on casing and average two readings arithmetically.

Shim pack (S_2) to be fitted to right hand support will be:

$$S_2 = D_3 - D_1 + 0.05$$

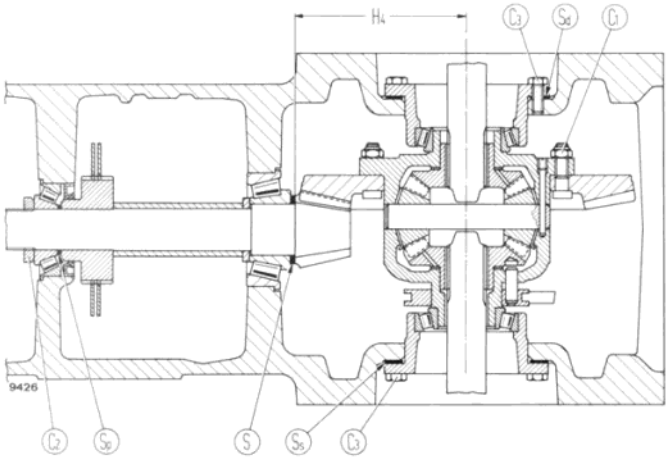
where,
0.05 mm = correction factor for reducing bearing preload caused by screws (3, page 9).
If necessary, round up (S_2) to the nearest 0.05 mm.

Final thickness of shims (S) to be adopted on differential supports will be:

$$S = S_1 + S_2$$

Install the pinion in the casing with the associated shims and tighten nut (C_2) to 294 Nm (30 kgm, 217 ft lb), simultaneously turning the bevel pinion shaft to settle the bearings.
The rotating torque necessary to turn the bevel pinion shaft should be 0.69 to 1.37 Nm (0.07 to 0.14 kgm 0.5 to 1 ft lb), which is equivalent to a dynamometer reading of 24.5 to 49 N (2.5 to 5 kg 5.5 to 11 lb), as obtained by wrapping a length of cord around the bevel pinion shaft spacer.

Note - If the rotating torque is considerably different from the prescribed value, increase or reduce the thickness of shims (Sp).



Horizontal Section through Bevel Drive

C_1. Ring gear nuts - C_2. Bevel pinion shaft nut - C_3. Differential support screws - H_4. Nominal dimension from ring gear centre line to back of pinion - S. Bevel pinion shim - Sp. Bevel pinion bearing shims - Sd/Ss. Differential bearing shims

Complete bevel drive assembly inserting shims (S_1 and S_2) and, using a suitable dial gauge, check backlash (G) in three equi-spaced points and average arithmetically.

Normal backlash should be 0.15 to 0.20 mm (0.006 to 0.008 in), 0.18 mm (0.006 in) being a desirable intermediate. To compensate for higher or lower backlash, note that the ratio of backlash to ring gear end displacement is 1 to 1.4

Therefore, axial displacement (Z) will be:

$$Z = (G - 0.18) \times 1.4$$

Final thickness of shims (**Sd** and **Ss**) to be adopted on differential supports will be:

$$Sd = S_2 - Z$$

$$Ss = S - Sd$$

S = Total shim thickness

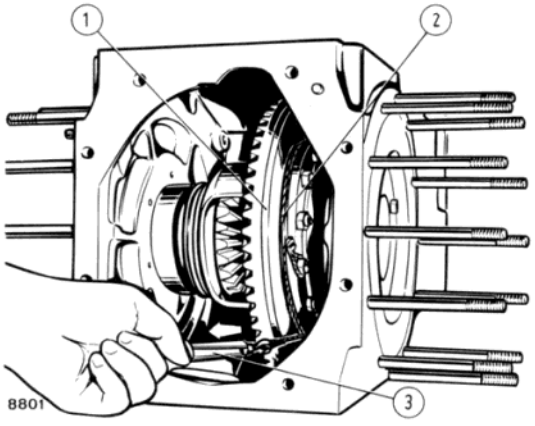
S_2 = Thickness of right hand support shims

Z = Ring gear end displacement as determined above

Example

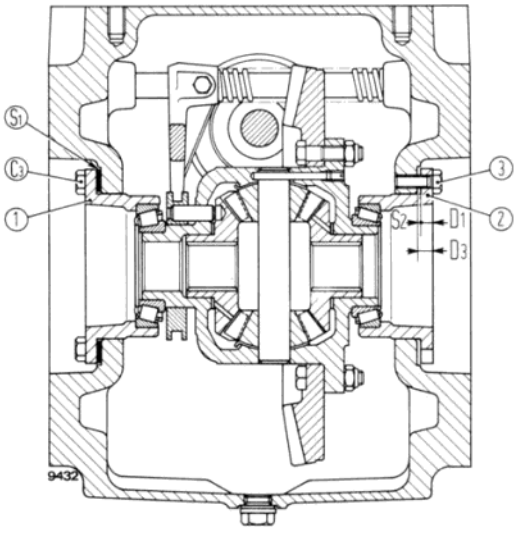
Thickness of left hand support shims (S_1) = 1 mm. Right hand support shim thickness (D_1): 11.99 mm, 12.02 mm and 11.99 mm.

$$D_1 = \text{Average value} = \frac{11.99 + 12.02 + 11.99}{3} = 12 \text{ mm}$$



Checking ring gear bearing rotating torque

1. Ring gear - 2. Cord - 3. Spring balance



Adjusting the Differential Bearings

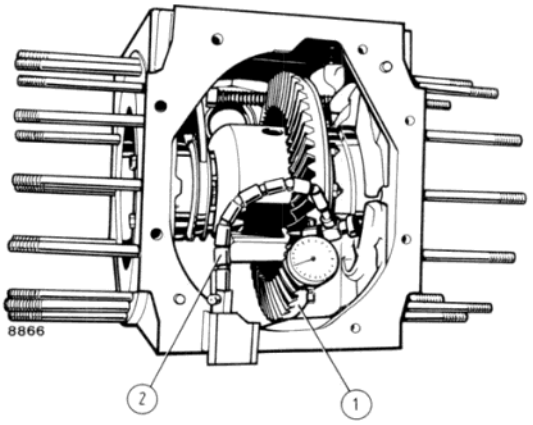
C_3. L.H. differential support screws - D_1. R.H. support thickness - D_3. Dimension measured with gauge - S_1 = 0.5 to 1 mm (0.020 to 0.040 in), shim pack for L.H. support - S_2. Shim pack thickness - 1. L.H. differential support - 2. R.H. differential support - 3. R.H. differential support screws

Distance (D_3) from right hand support to axle casing face: 13.70 mm and 13.90 mm.

$$D_3 = \text{Average value} = \frac{13.70 + 13.90}{2} = 13.80 \text{ mm.}$$

Thickness of shim for right hand support:

$S_2 = 13.380 - 12 + 0.05 = 1.85$ mm.



Checking Bevel Drive Backlash (Correct backlash = 0.15 to 0.2 mm or 0.006 to 0.008 in)

1. Ring gear - 2. Dial gauge

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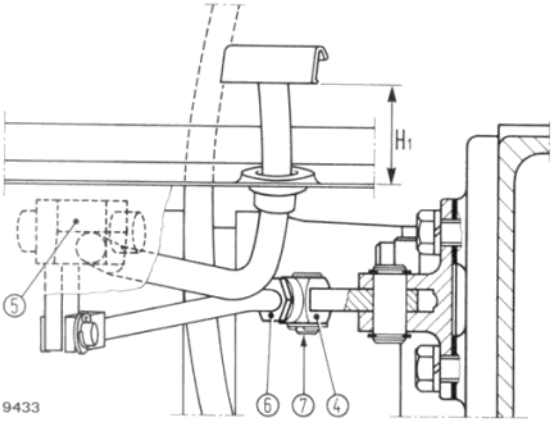


Adjusting Differential Lock Control

H_1 = 40 mm (1.57 in), height of pedal above platform - 4. Adjuster fork - 5. Pedal support - 6. Locknut - 7. Pivot

Total shim thickness: S = 1 + 1.85 = 2.85 mm.

Backlash G = 0.53 mm.

End displacement: Z = (0.53 — 0.18) x 1.4 = 0.5 mm.

Thickness of shims for right hand support:

Sd = 1.85 — 0.5 = 1.35 mm.

Thickness of shims for left hand support:

Ss = 2.85 — 1.35 = 1.50 mm.

TO ADJUST DIFFERENTIAL LOCK

Rebuild the differential lock using tool **293452** to compress return spring (5) and tighten the retaining screw on actuating fork (4).

Install the differential and ring gear assembly in the differential supports.

Check the clearance (G) between differential lock actuating collar (6) and differential bearing (7) using a feeler gauge (T).

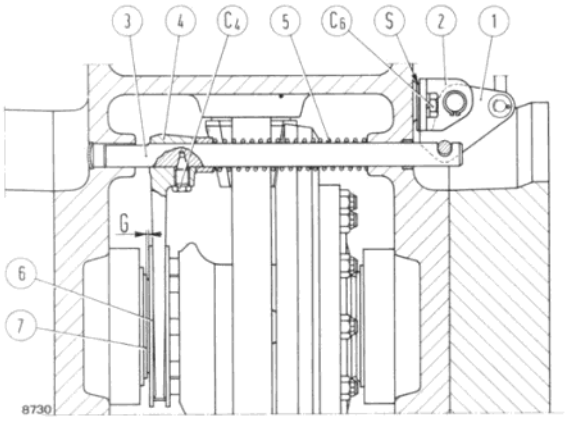
The correct gap is 4.5 mm (0.177 in) for 580 tractor, and 1 mm (0.040 in) for 680 tractor.

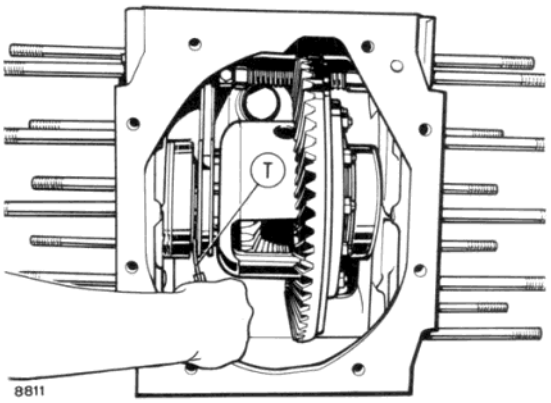
To adjust, alter the thickness of shims (S) between support (2) and the axle case.

To Adjust, Differential Lock Control

Distance (H_1) of control pedal above the platform should be approximately 40 mm (1.57 in) in order to secure efficient differential lock operation.

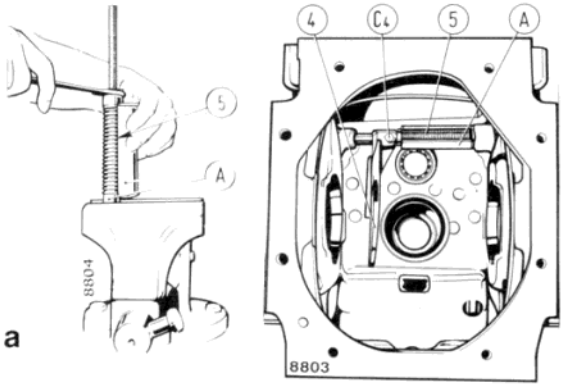
To adjust, withdraw pivot (7) and turn adjuster fork (4), subsequently retightening locknut (6).





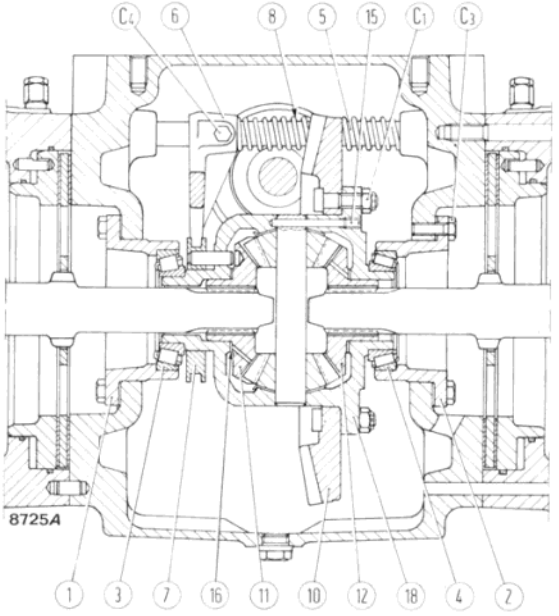
Adjusting Differential Lock Collar Position

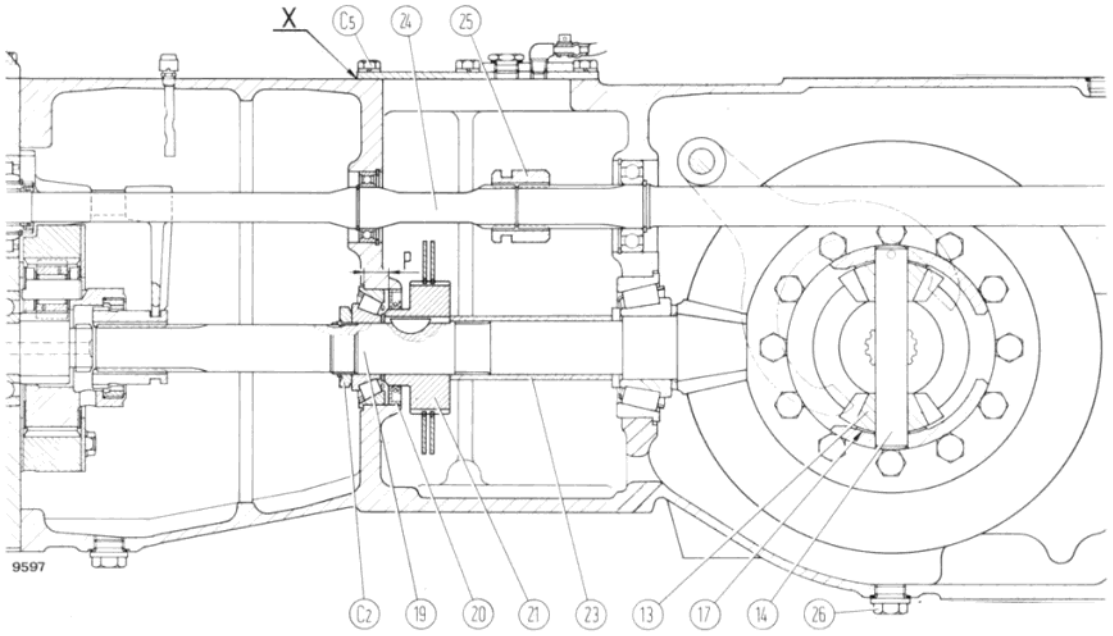
C_4. Fork screw - C_6. Support screws - G = 4.5 mm (0.177 in) for 580 tractor, or 1 mm (0.040 in) for 680 tractor - gap between collar and bearing - S = 0.5 mm or 0.020 in, differential lock collar shim - T. Feeler gauge - 1. Differential lock actuating lever - 2. Support - 3. Shaft - 4. Fork - 5. Spring - 6. Actuating collar - 7. Differential bearing



Installing Differential Lock

a. Positioning spring on tool **293452** (A) - A. Tool **293452** - C_4. Fork screw - 4. Fork - 5. Spring.





Sections through Bevel Drive and Differential

C_1. Ring gear nut - C_2. Bevel pinion shaft nut - C_3. Differential support screws - C_4. Differential lock screw - C_5. Cover screws - P = 19 mm or O.748 in: stand of seal (20) after installation - 1/2. Differential support - 3/4. Tapered roller bearings - 5. Differential lock shaft - 6. Fork - 7. Differential lock actuating sleeve - 8. Spring - 10. Ring gear - 11/12. Differential wheels (side gears) - 13. Differential pinion - 14. Differential pinion shaft - 15. Pinion shaft screw - 16/17. Thrust washers - 18. Differential case - 19. Bevel pinion shaft - 20. Seal - 21. Parking brake hub - 23. Spacer - 24. P.T.O. shaft - 25. P.T.O. control sleeve - 26. Oil drain plug.

Note: On assembly, apply adhesive to surfaces **X** as directed in the general instructions, page 5, Section A.

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TO ADJUST DIFFERENTIAL BACKLASH

Install side gears (11 and 12, page 7) in differential box without thrust washers (16).

Position differential pinions (13) with associated thrust washers (17) and shaft (14) and start screw (15) to prevent shaft fallout.

Move left hand side gear into full contact with the pinion and, using a depth gauge, check dimension (H_1) at two diametrically opposed points and average arithmetically.

Bring side gear in contact with differential box and measure dimension (H_2).

Repeat the above operations on right hand side gear.

End displacement of each side gear without thrust washer should be:

$$\mathbf{Gs} \text{ or } \mathbf{Gd} = H_1 - \mathbf{H_2}$$

where,

Gs = left hand side gear end displacement

Gd = right hand side gear end displacement

$\mathbf{H_1}$ and $\mathbf{H_2}$ = dimension measured on left hand or right hand side gear.

Normal differential backlash is 0.15 mm (0.006 in) for 580 tractor and 0.18 mm (0.007 in) for 680 tractor.

Average value of backlash to side gear end displacement is 1 : 1.7

Note that the ratio of backlash to side gear end displacement is 1 to 1.7.

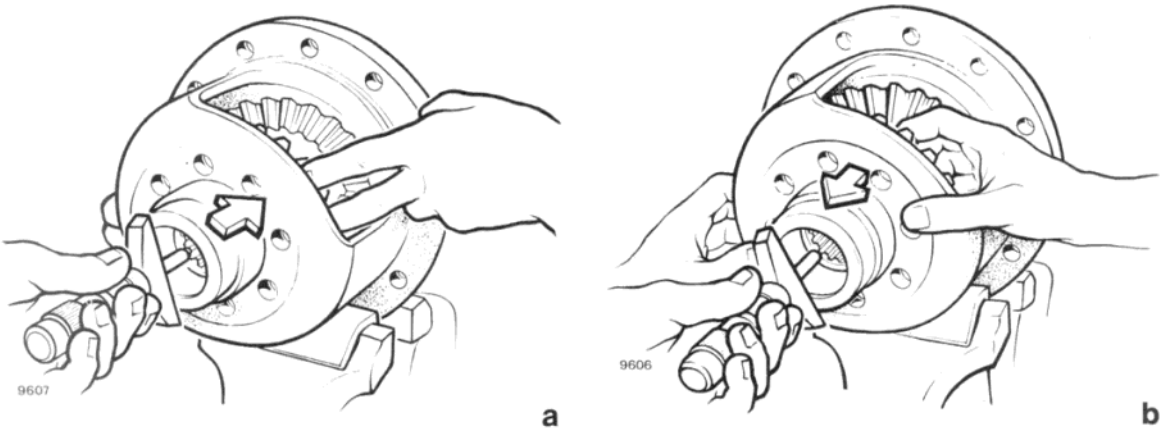
End displacement of side gear equivalent to normal backlash will be 0.15x1.7 = 0.25 for 580 tractor and 0.18x1.7 = 0.30 for 680 tractor.

Therefore, the thickness of shims to be inserted in differential box will be:

Ss = **Gs - 0.25** for left hand side gear, 580 tractor
Sd = **Gd - 0.25** for right hand side gear, 580 tractor
Ss = **Gs - 0.30** for left hand side gear, 680 tractor
Sd = **Gd - 0.30** for right hand side gear, 680 tractor

Use shims as near as possible to the value obtained, bearing in mind that available shim thicknesses are 1.5 and 1.6 mm (0.059 and 0.063 in)

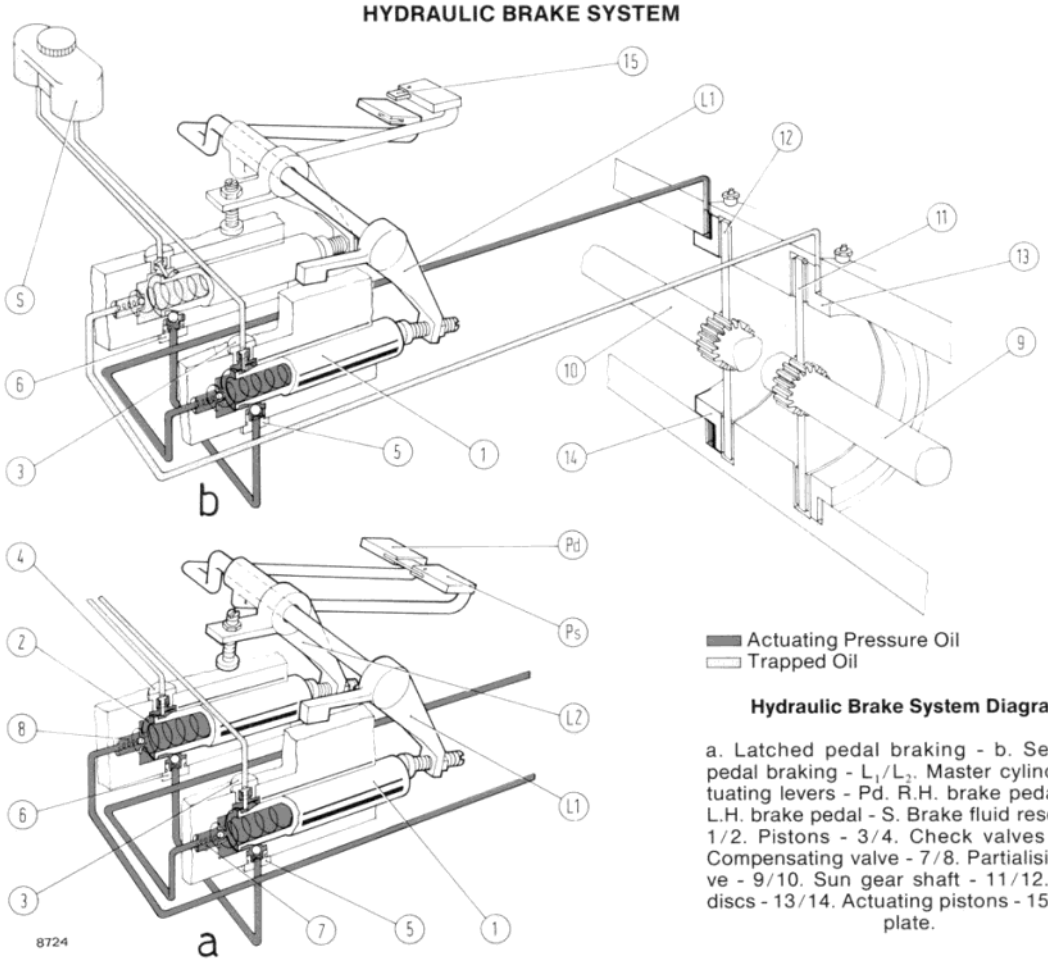
Note: For 580 tractor with reinforced differential, use the same values as for 680 tractor.



Assessing Thickness of Side Gear Shims (16, page 7)

a. Measuring dimension (H_1) - b. Measuring dimension (H_2).

HYDRAULIC BRAKE SYSTEM



Hydraulic Brake System Diagram

a. Latched pedal braking - b. Separate pedal braking - L_1/L_2. Master cylinder actuating levers - Pd. R.H. brake pedal - Ps. L.H. brake pedal - S. Brake fluid reservoir - 1/2. Pistons - 3/4. Check valves - 5/6. Compensating valve - 7/8. Partialising valve - 9/10. Sun gear shaft - 11/12. Brake discs - 13/14. Actuating pistons - 15. Latch plate.

Latched Pedal Braking

Upon brake application, actuating levers (L_1 and L_2) activate pistons (1 and 2).
Piston operation causes check valves (3 and 4) to cut off the fluid line from the reservoir (S) and simultaneously opens compensating valves (5 and 6) which keep the pressure uniform throughout the circuit. During their stroke, the pistons compress the fluid inside the master cylinder body which, through partialising valves (7 and 8), acts on brake actuating pistons.
On full braking, the circuit pressure is approximately, 17.6 bar (18 kg/cm^2, 256 psi).
When the brake pedals are released, oil pressure flows from the annular actuating cylinder chambers to the master cylinder body through the restrictions in the partialising valve cups.
The small restrictions cause the oil pressure to flow slowly, thereby resulting in a gradual return of the brake pedals.

The actuating pistons return to their rest position, the check valve plates are displaced, the line to the reservoir is opened and the compensating valves close.

Individual Pedal Braking.

Master cylinder piston (1) actuated by lever (L_1) moves the plate of check valve (3) to close the line from the reservoir, opens the associated compensating valve (5) and causes a pressure build-up in the relevant actuating cylinder. In these conditions, compensating valve (6), which remained closed, prevents oil pressure from reaching the other actuating cylinder.

Note: The twin section fluid reservoir supplies the two master cylinders separately to maintain brake effectiveness in the event of brake line failure.

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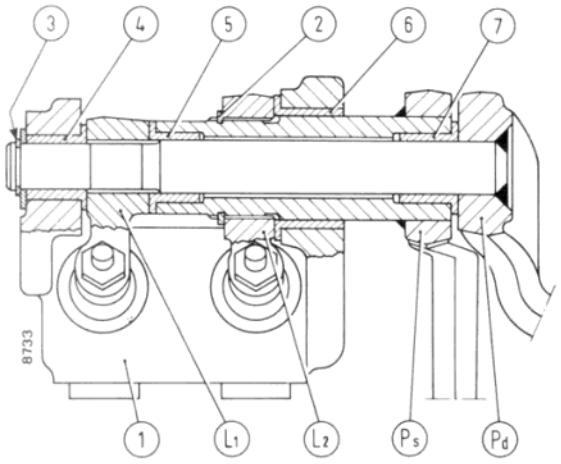
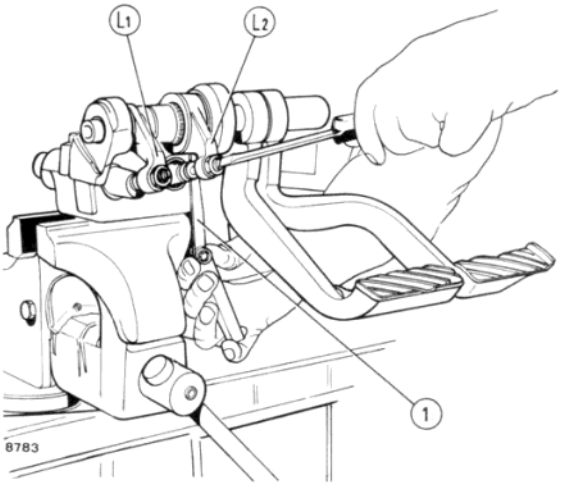


Section through Brake Pedal Assembly

L_1/L_2. Master cylinder actuating levers - Pd. R.H. brake pedal - Ps. L.H. brake pedal - 1. Master cylinder body - 2/3. Retaining rings - 4/5/6/7. Bushings.



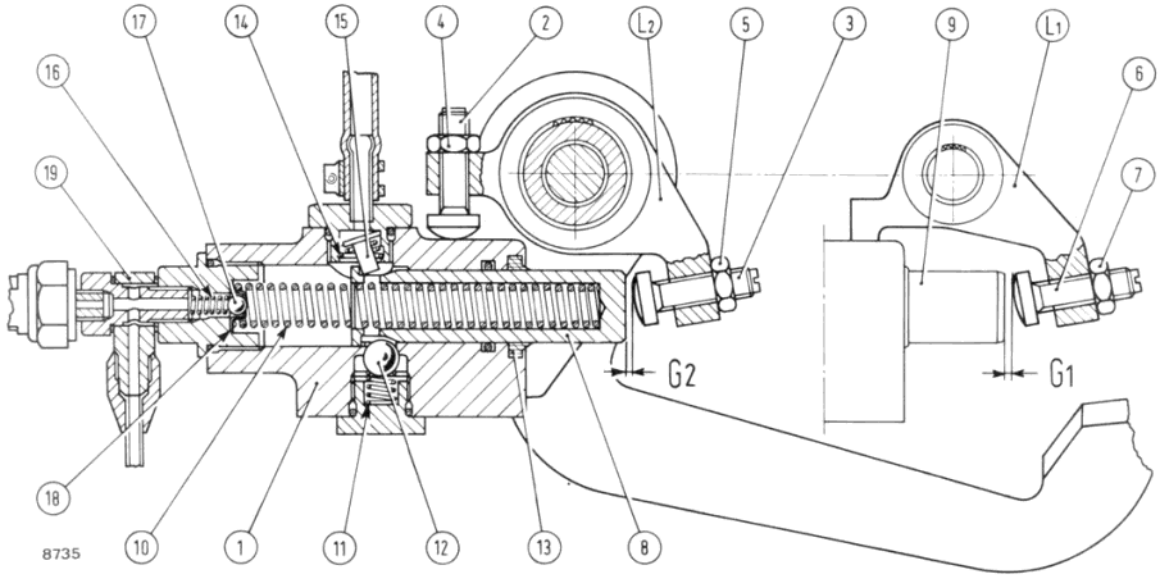
Adjusting Pedals on Bench

1. Feeler gauge - L_1/L_2. Master cylinder actuating levers.

TO ADJUST BRAKE PEDALS

Install the L.H. brake pedal with attached bushings on the master cylinder body (1), followed by lever (L_2) with adjusting screws (2 and 3) and lock in position using retaining ring (2).

Fit R.H. pedal to lever (L_1) so that the front of the lever rests on the master cylinder body.
Turn adjusting screw (6) until a 0.1 to 0.2 mm (0.004 to 0.008 in) clearance (G_1) is obtained, and lock in position using lock nut (7).



Section through Master Cylinder

G_1/G_2 = 0.1 to 0.2 mm (0.004 to 0.008 in), piston clearance - L_1/L_2. Master cylinder actuating levers - 1. Master cylinder body - 2/3. Adjusting screws - 4/5. Lock nuts - 6. Adjusting screw - 7. Lock nut - 8/9. Pistons - 10. Piston return spring - 11/12. Compensating valve spring and ball - 13. Seal - 14/15. Check valve spring and plate - 16/17/18. Partialising valve spring, ball and cup - 19. Outlet union

Align the two pedals through the latch plate.
Turn adjusting screw (2) until it contacts the master cylinder body and clamp in position by means of lock nut (4).
Turn adjusting screw (3) to obtain a 0.1 to 0.2 mm (0.004 to 0.008 in) clearance (G_2) and clamp in position using lock nut (5).

Note - This adjustment may be carried out with the master cylinder in position on the tractor or on the bench.

TO BLEED THE BRAKE SYSTEM

Brake bleeding becomes necessary whenever the brake hydraulic lines have been disconnected or uneven braking is detected.

When bleeding the system note the following points:

— Thoroughly clean the area surrounding the bleed screws and the hydraulic oil reservoir cover.

— Ensure that the fluid level in R.H. and L.H. brake reservoir, is kept topped up prior to, and during, the bleeding operation.

— Depress the L.H. brake pedal progressively to full stroke to build up fluid pressure.

— Hold the pedal depressed, back off bleed screw (C) through half a turn and allow the air to escape.

— Screw in the bleed screw and repeat the above operations until the issuing fluid is free from air bubbles.

— Again operate the brake pedal and check that the pressure builds up without erratic pedal movement.

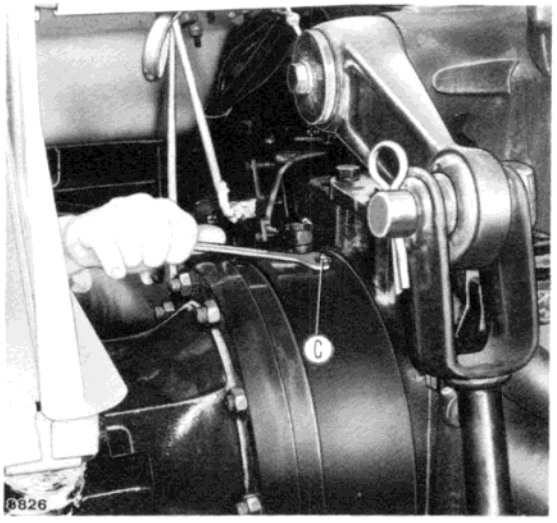
— Repeat the above sequence on the R.H. brake circuits.

— Finally, top up the fluid reservoirs.

TO BENCH TEST MASTER CYLINDER

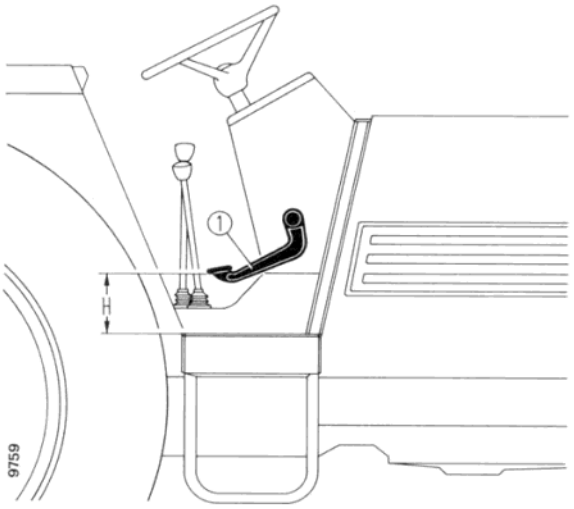
Prepare the cylinder to be tested and the test equipment as follows:

— Connect the cylinder body to plate **290488/2** (page 4) using support **293560.**
— Position the plate in tank **293005** coupled to output tester **291231.**
— Use trolley-mounted electric motor **291235** and pump **292588** (FIAT A18X) connected by means of coupling **290385.**
— Connect the pump inlet to test machine **291231** using pipe **290445.**
— Fit flow control valve **293533** to support plate **293531** and connect to the pump outlet using pipe **290544.**



Bleeding Brake System

C. Bleed screw



Installing Brake Pedals

H = 150 mm (5.90 in), height of brake pedals above control platform floor - 1. Brake pedals

Note - Adjust pump flow rate to 2.5 - 3 litres/min (4.4 to 5.3 pints/min) by screwing in control knob (1, detail a) until letter **B** lines up with slot (3) and digit **2** on graduated scale is in register with point (4); subsequently, lock control knob (1) in position by turning locking knob (2) as necessary.

— Connect the outlet of 3-way flow control valve **293534** fitted to the first of the two master cylinders to be tested (detail b, page 5);

— Connect a 40 kg/cm² (600 psi) pressure gauge to fitting **293534** and return pipe **290544** to output tester **291231.**

— Connect pipe **293535** to the check valve plug and collect the leaking fluid in graduated burette **293539.**

As test fluid, use **oliofiat AP 51** (SAE 20 W) provided with the test machine, at 50°C, and run the electric motor at 715 rpm. The test procedure is outlined below.

1. Check Valve Leakage Test

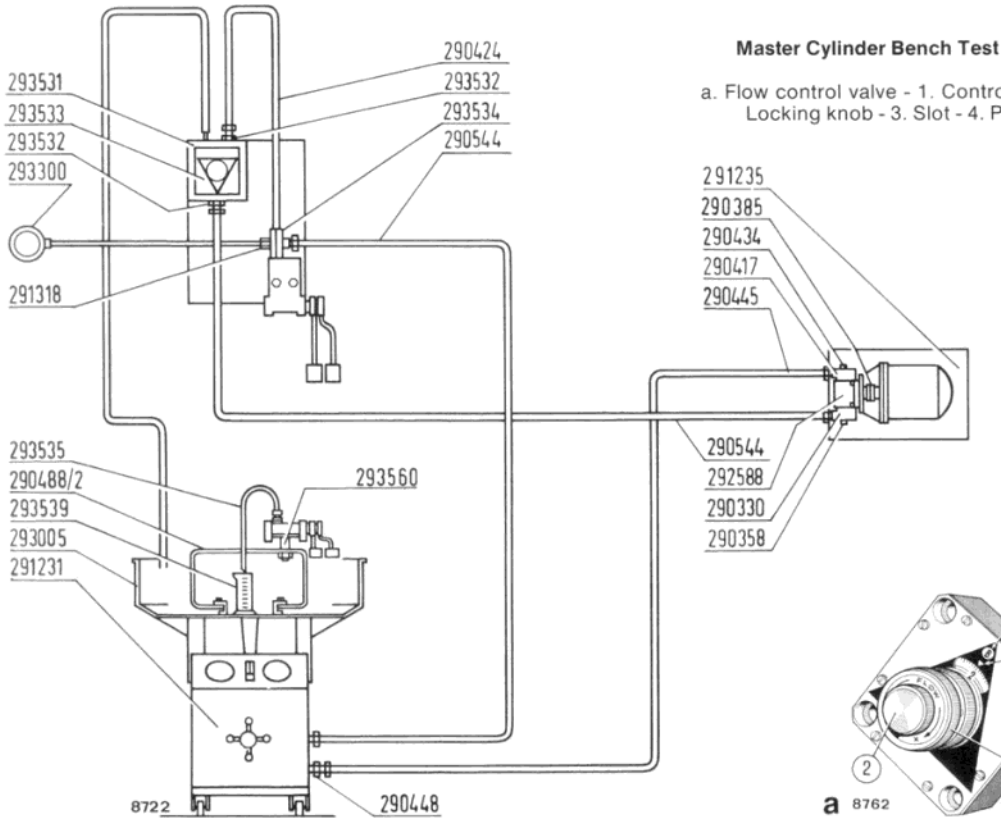
Place piston (S) in operation position (i.e. 5 mm or 0.197 in of stroke) and bring circuit pressure to 14.5 bar (15 kg/cm², 213 psi).
Check the amount of leaking fluid in the graduated burette; the amount of fluid should be less than 2.5 cu.cm/min (0.15 cu.in/min).
Return the piston to its rest position.

2. Check Valve Cut-Off Test

Slowly move piston (S) forward and check the distance at which the fluid ceases to issue from fitting **293535;** the correct stroke is 2.2. to 2.8 mm (0.087 to 0.110 in).

3. Compensating Valve Cut-In Test (On Master Cylinder not under Test)

Move piston (S) of master cylinder under test to 5 mm or 0.197 in stroke (equivalent to the operation position) and slowly move piston (D) forward by 2 to 4 mm (0.079 to 0.157 in); in these conditions, the fluid should issue from port (1D).
Repeat operations **1, 2** and **3** on the second master cylinder to be tested.



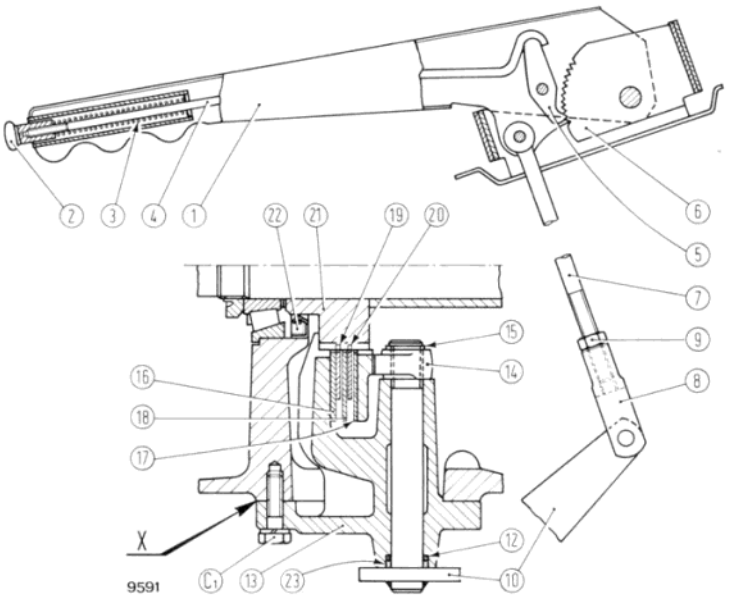
Master Cylinder Bench Test Set Up

a. Flow control valve - 1. Control knob - 2. Locking knob - 3. Slot - 4. Pointer

Section through Parking Brake Linkage.

C_1. Parking brake support screws - 1. Parking brake lever - 2. Button - 3. Spring - 4. Release link - 5. Pole - 6. Ratchet - 7. Remote control link - 8. Turnbuckle - 9. Nut - 10. Outer relay lever - 12. O-ring - 13. Parking brake support - 14. Inner actuating lever - 15. Retaining ring - 16/17/18. Linings - 19/20. Discs - 21. Hub - 22. Seal - 23. Seal bushing.

Note: On assembly, apply adhesive to surfaces **X** as directed in the general instructions, page 5, Section A.

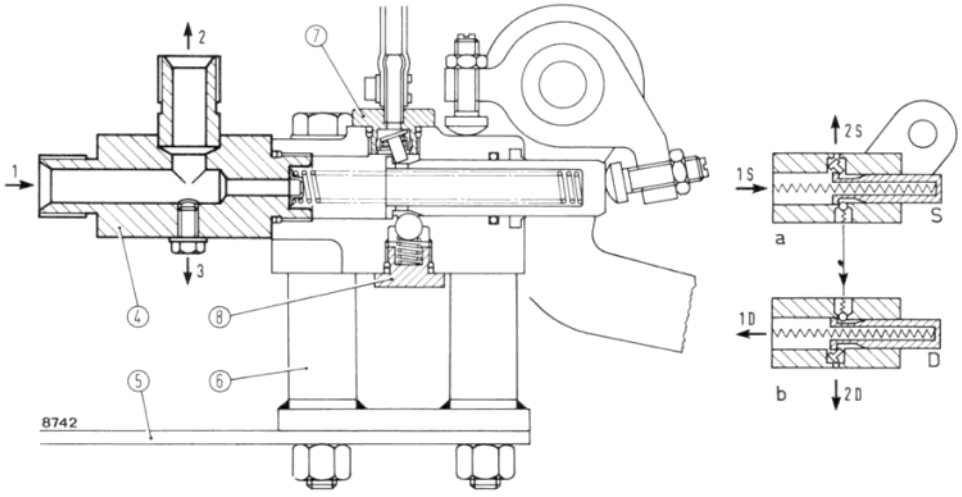


TO ADJUST PARKING BRAKE LEVER

From its rest position, parking brake control lever (1) should move three clicks to produce full braking of the tractor.

To adjust, back off lock nut (9) and screw in or back of turnbuckle (8) according to whether the number of clicks to full braking is found to be higher or lower respectively.

Subsequently, retighten the turnbuckle nut.



Three-Way Fitting 293534 in Position on Master Cylinder Under Test

a. Master cylinder with 3-way fitting - b. Master cylinder not under test - D/S. Master cylinder pistons - 1D/2D/1S/2S. Ports - 1. Flow control valve outlet - 2. Return to tester - 3. Pressure gauge connection point - 4. 3-way fitting **293534** - 5. Master cylinder support plate **290488/2** - 6. Master cylinder support **293560** - 7. Check valve - 8. Compensating valve.

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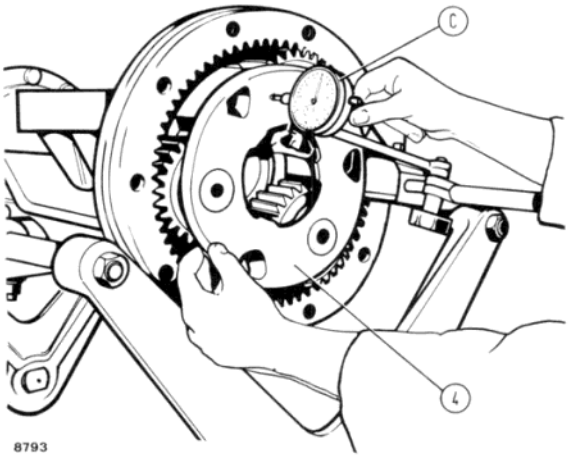
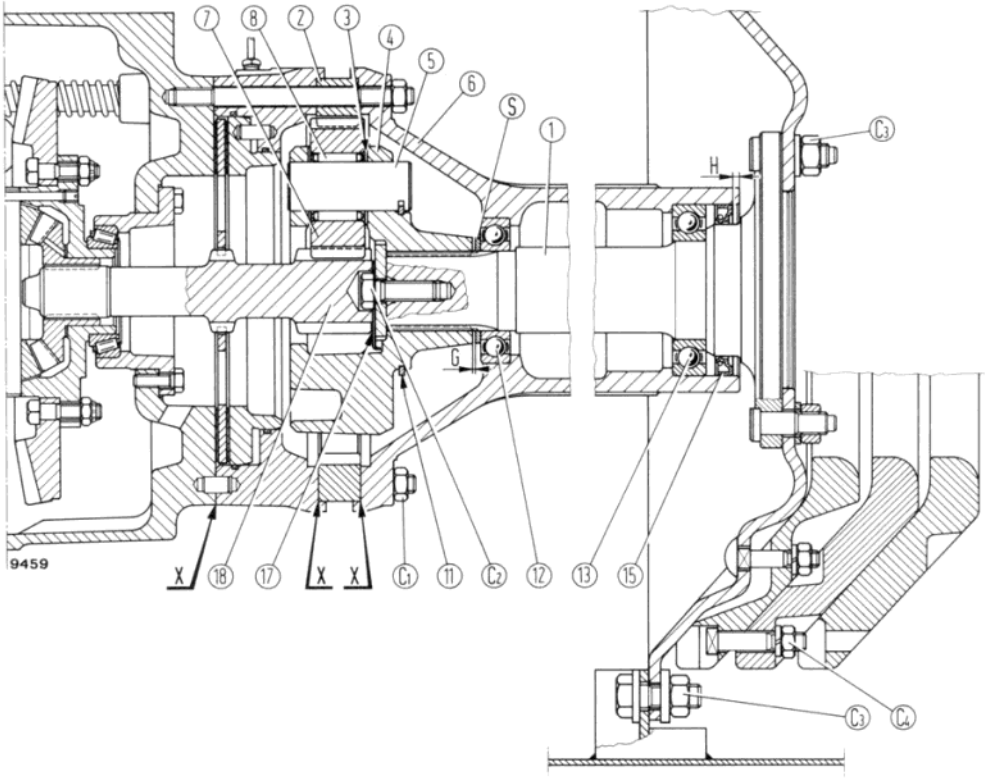
CHECKING END FLOAT

Check that bearings (12 and 13) and axle shaft (1) are flush with their seats. Tighten screw C_2 to the prescribed torque, and, using a suitable dial gauge, check the carrier end float; the correct end float is 0.2 to 0.3 mm (0.008 to 0.012 in). To adjust, alter the thickness of shim (S) as necessary. After having cleaned the faces to be mated and coated them with adhesive (see note below), alternately tighten diametrically opposed nuts (C_1) to the prescribed torque.



Checking Planet Carrier End Float

C. Dial gauge - 4. Planet carrier



Section through R.H. Final Drive Unit.

C_1. Final drive housing retaining nut - C_2. Axle shaft screw - C_3. Road wheel nut - C_4. Ballast ring nut - G = 0.2 to 0.3 mm or 0.008 to 0.012 in planet carrier end float - H = 5 mm or 0.197 in seal fitted depth - S. End float shim - 1. Axle shaft - 2. Ring gear - 3. Thrust washers - 4. Planet carrier - 5. Planet journal - 6. Final drive housing - 7. Planet gear - 8. Needle roller bearings. 11. Journal retaining ring - 12/13. Ball bearings - 15. Seal - 17. Lock tab - 18. R.H. axle shaft.

Note: On assembly, apply adhesive to surfaces **X** as directed in the general instructions, page 5, Section A.

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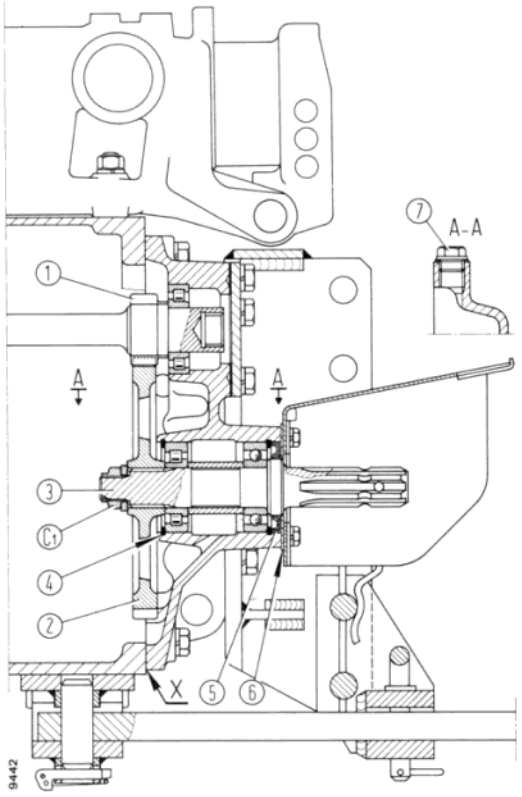
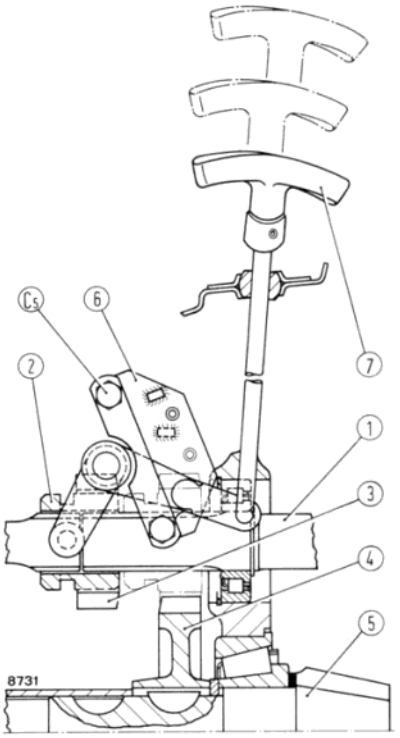


Longitudinal Section through P.T.O., 580 Tractor (Standard Version)

C_1. Driven shaft nut - 1. Drive gear - 2. Driven gear - 3. Driven shaft - 4. Retaining ring - 5. Seal - 6. Shield - 7. Oil level plug.

Note - On assembly, apply adhesive to surfaces **X** as directed in the general instructions, page 5, Section A.



Section through P.T.O. Control

C_5. Relay lever sector screws - 1. P.T.O. shaft - 2. Independent P.T.O. sleeve - 3/4. Ground speed P.T.O. gears - 5. Bevel pinion - 6. 3-position sector (ground speed P.T.O.) or 2-position sector (independent P.T.O.) - 7. Control handle

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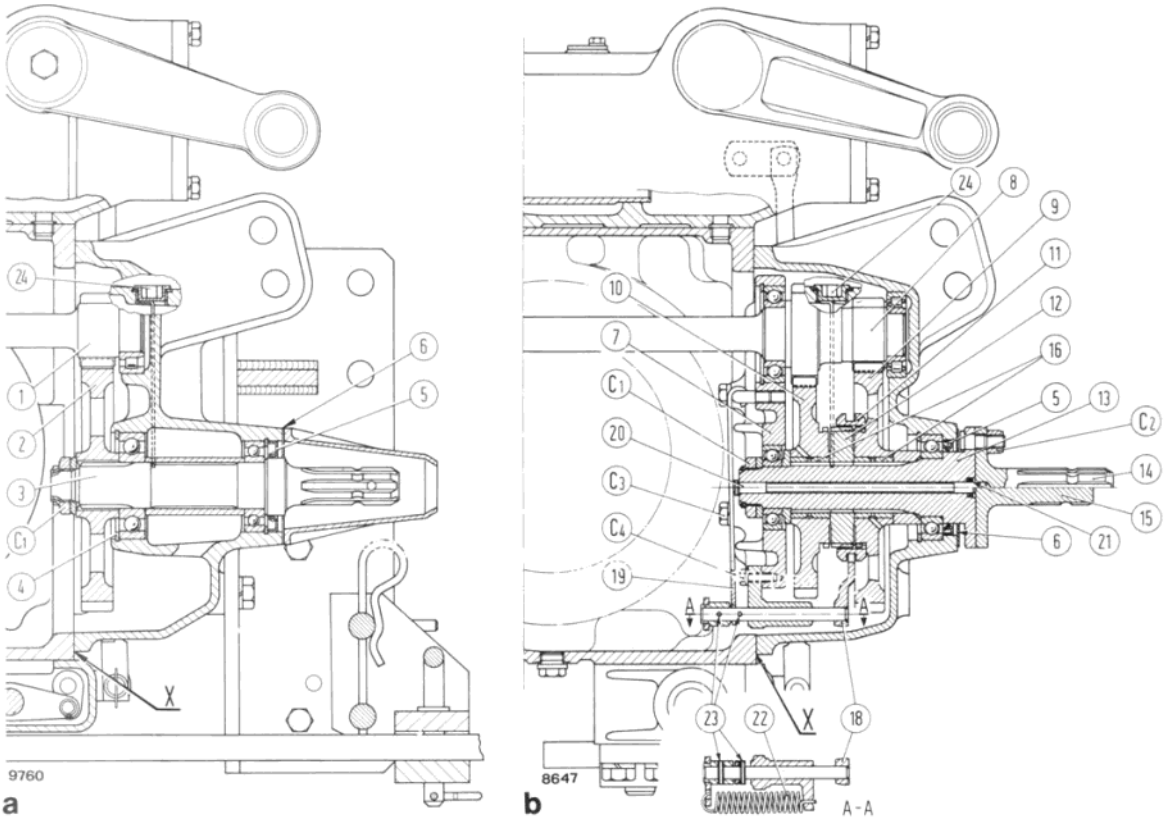
POWER TRAIN:
Power Take-Off



Section through P.T.O. (mod. 680, optional mod. 580)

a. Section through 540 rpm P.T.O. - b. Section through 540/1000 rpm P.T.O. - C_1. Driven shaft nut - C_2. Splined adaptor self-locking nut - C_3. Bearing support capscrews - C_4. Shifter rod support capscrews - 1. Drive gear - 2. Driven gear - 3. Driven shaft - 4. Retaining ring - 5. Seal - 6. Shield - 7. Rear cover - 8. Double drive gear 9.540 rpm driven gear - 10. 1000 rpm driven gear - 11. Sleeve - 12. Splined hub - 13. Driven shaft - 14. 540 rpm splined adaptor - 15. 1000 rpm splined adaptor - 16. Driven gear bushings (no internal splines) - 18. Actuating fork - 19. Spring - 20. Actuating pin - 21. Seal - 22. Spring - 23. Roll pins - 24. Dipstick.

Note - On assembly apply sealing compound on faces **X** as described in general instructions on page 5, section A.

FRONT AXLE

	580-580 DT	680-680 DT
Type	Inverted U, telescoping, centre pivotting	
Tracks (six)	1400-1500-1600-1700-1800-1900-1960 (1)	
Camber	2°, equivalent to 18 to 20 mm (0.708 to 0.787 in) at outermost edge of rim (page 1, Section 301)	
Toe-in	0 to 5 mm (0 to 0.197 in)	
Axle Arm Articulation		
King pin journal dia. (2, page 1, Section 301)		
— Upper	37.975 to 38.000 mm (1.4951 to 1.4961 in)	
— Lower	37.975 to 38.000 mm (1.4951 to 1.4961 in)	
Bushing fitted I.D. (3)		
— Upper	38.020 to 38.100 (2) mm (1.4968 to 1.5000 (2) in)	
— Lower	38.020 to 38.100 (2) mm (1.4968 to 1.5000 (2) in)	
Kingpin clearance in bushings	0.020 to 0.125 mm (0.0008 to 0.0049 in)	
Bushing interference fit in housing	0.050 to 0.120 mm (0.0020 to 0.0050 in)	
Bronze thrust washer thickness (6, page 1, Section 301)	3.925 to 4.000 mm (0.1545 to 0.1575 in)	
Steel washer thickness (5)	3.925 to 4.000 mm (0.1545 to 0.1575 in)	
King pin end float	0.5 mm (0.020 in)	
Axle Pivot		
Pivot dia. (12, page 1, Section 301)	37.975 to 38.000 mm (1.4951 to 1.4961 in)	
Bushing fitted I.D. (14)	38.020 to 38.100 (2) mm (1.4968 to 1.5000 in)	
Pivot clearance in bushings	0.020 to 0.125 mm (0.0008 to 0.0049 in)	
Bushing interference fit in housing	0.050 to 0.120 mm (0.0020 to 0.0050 in)	
Thrust washer thickness (13)	5.10 to 5.25 mm (0.2008 to 0.2067 in)	

(1) Obtainable by overturning the wheels
(2) Not reamed

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FRONT AXLE - STEERING: Specification and Data

MANUAL STEERING (580-680 TRACTOR)

	580	680
Steering Box		
Type	Ball recirculation	
Make	BURMAN	
Reduction ratio: AM	—	1 to 28 (+)
Reduction ratio: PM	1 to 32.7	
Steering column bearings	Two, ball	
Steering shaft bushings	Two, white metal lined steel shells	
Worm gear bearing adjustment	See page 2, Section 302	
Rocker shaft end play adjustment	See page 2, Section 302	
Worm bearing shim thickness (S, page 1, Section 302)	0.05-0.25 mm (0.0020-0.0100 in)	
Top cover gasket thickness (12)	0.15 mm (0.0060 in)	
Rocker shaft shim thickness (S_1)	0.15-0.25 mm (0.0060-0.0100 in)	
Side cover gasket thickness (10)	0.25 mm (0.0100 in)	
Rocker shaft journal diameter (8, page 1, Section 302)	38.010 to 38.060 mm (1.4964 to 1.4984 in)	
Rocker shaft bushing fitted I.D. (15)	38.087 to 38.105 mm (1.4995 to 1.5002 in)	
Rocker shaft clearance in bushings	0.027 to 0.065 mm (0.0011 to 0.0025 in)	
Bushing interference fit in housing	0.050 to 0.118 mm (0.0020 to 0.0046 in)	
Upper worm cam journal diameter (2, page 1, Section 302)	25.360 to 25.400 mm (0.9984 to 1.0000 in)	
Centered bushing fitted I.D. (14)	25.425 to 25.464 mm (1) (1.0010 to 1.0025 in) (1)	
Worm cam journal clearance in bushing	0.025 to 0.104 mm (0.0010 to 0.0041 in)	
Relay lever pivot diameter (17, page 1, Section 301)	34.975 to 35.000 mm (1.3769 to 1.3779 in)	
Bushing fitted I.D. (18)	35.050 to 35.112 mm (1) (1.3799 to 1.3824 in) (1)	
Pivot clearance in bushings	0.050 to 0.137 mm (0.0020 to 0.0054 in)	
Bushing interference fit in housing	0.060 to 0.120 mm (0.0024 to 0.0047 in)	
Relay lever thrust washer thickness (16)	1.5-2-2.5-3.5 mm (0.060-0.080-0.100-0.140 in)	
Relay lever pivot end float	0.5 to 1 mm (0.020 to 0.040 in)	
Turning radius		
— Brakes applied	3350 mm (11 ft)	3600 mm (11 ft 10 in)
— Brakes released	3800 mm (12 ft 5½ in)	4000 mm (13 ft 1½ in)

(1) Not reamed (+) up to frame number 26522

POWER STEERING (580 - 680 TRACTOR)

Type	Fully Hydraulic
Make	DANFOSS
Hydraulic circuit	Independent, separate pump
Oil reservoir	Transparent plastic on R.H. side of engine
Oil filter	In oil reservoir, gauge
Hydraulic Pump	
Type	Gear
Model	C 18 X
Make	FIAT
Drive	From engine valve gear

POWER STEERING (580-680 Tractors) **(continued)**

Rotation (seen from drive end)	Clockwise
Drive ratio	0.910 to 1
Rated speed (at engine governed speed) 580	2457 rpm
Rated speed (at engine governed speed) 680	2275 rpm
Rated output at maximum rated speed 580	20.1 l/min (35½ pints/min)
Rated output at maximum rated speed 680	18.6 l/min (32¾ pints/min)
On-bebch output at 1450 rpm and 68,5 bar (70 kg/cm² 196psi) pressure	
— New or reconditioned pump	11 l/min (19½ pint/min)
— Used pump	7.8 l/min (13 ¾ pint/min)
— Test oil temperature	55° to 65°C
— Test oil viscosity	SAE 20
Drive/driven gear journal diameter	17.400 to 17.424 mm (0.6850 to 0.6860 in)
Bearing bore diameter	17.450 to 17.470 mm (0.6870 to 6878 in)
Gear journal clearance in bearing	0.026 to 0.070 mm (0.0010 to 0.0027 in)
Maximum wear clearance	0.1 mm (0.004 in)
Bearing and gear bore diameter in pump body	37.270 to 37.294 mm (1.4673 to 1.4683 in)
Maximum pump body wear, suction side	0.1 mm (0.040 in)
Bearing width	16.863 to 16.878 mm (0.6639 to 0.6645 in)
Gear width	13.190 to 13.215 mm (0.5193 to 0.5203 in)
Pump body width	47.070 to 47.120 mm (1.8531 to 1.8551 in)
Bearing and gear end clearance in pump body (to be restored on overhaul)	0.1 to 0.2 mm (0.004 to 0.008 in)
Control valve	
Make	DANFOSS
Type	ORBITROL, with steering wheel operated rotary valve (permitting steering also in case of pump failure (page 9, section 303)
Outfit code	
— no safety valve block	OSPB 100
— with safety valve block	OSPB 100 - OVP 20
Relief valve crack-off setting	
— Valve in pump (24a, page 9, section 303)	100 bar (102 kg/cm²) (1451.77 psi)
— Valve in safety valve block (24, page 9)	
- AM	125 bar (127 kg/cm²) (1821.82 psi)
- PM	100 bar (102 kg/cm²) (1451.77 psi)
Power cylinder overload valve crack-off setting (25, page 9)	200 bar (204 kg/cm²) (2903.53 psi)
Power cylinder	
Type	Double acting, located behind front axle
Make	CALZONI or SIMA or WEBER, DZ 48/22/215-24261
Cylinder bore diameter	48 mm (1.89 in)
Maximum piston stroke	
— CALZONI or SIMA	214 mm (8.425 in)
— WEBER	215 mm (8.464 in)
Piston rod diameter	22 mm (0.866 in)

	580	680
Turning radius		
— Brakes applied	3350 mm (11 ft)	3600 mm (11 ft 10 in)
— Brakes released	3800 mm (12 ft 5½ in)	4000 mm (12 ft 1½ in)

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FRONT AXLE-STEERING: Specification and Data

TIGHTENING TORQUE FIGURES

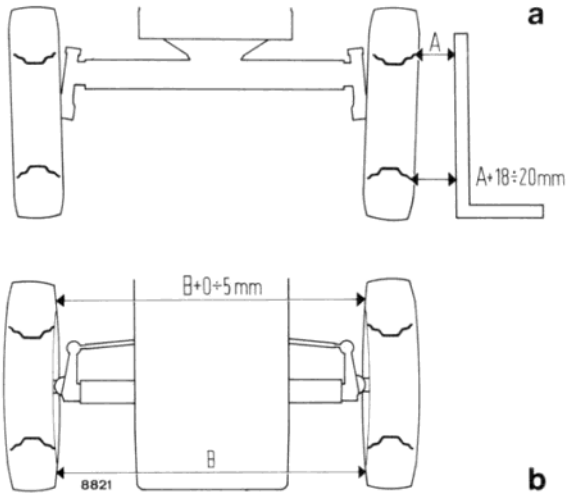
DESCRIPTION	Thread Size	Torque		
		Nm	kgm	ft lb
Front Axle, Section 301				
Capscrew, front axle carrier to engine (C_5, page 1)	M18x1.5	314	32	231.5
Capscrew, axle pivot (C_1)	M10x1.25	59	6	43
Nut, axle end	M16x1.5	221	22.5	163
Capscrew, relay lever (C_4)	M16x1.5	157	16	116
Capscrew, wheel to hub (C_2)	M18x1.5	294	30	217
Nut, drag link and track rod ball joint	M14x1.5	134	14	101
Nut, track rod lever (C_1)	M16x1.5	235	24	173
Manual Steering, Section 302				
Steering box to tractor	M16x1.5	221	22.5	163
Nut, steering wheel to post (C_1, page 1)	M18x1.5	69	7	50
Capscrew, top cover to steering box (C_5)	M10x1.5	49	5	36
Capscrew, side cover to steering box (C_3)	M 8x1.25	28	2.8	20
Nut, side cover to steering box (C_2)	M 8x1.25	28	2.8	20
Nut, swing lever (C_4)	M24x2	245	25	181
Power Steering, Section 303				
Capscrew, control valve to tractor	3/8"-16 UNC	44	4.5	32
Capscrew, cover to control valve (C_2, page 9)	M 8x1	34	3.5	25
Nut, power cylinder pivot pin (C_4, page 2)	M18x1.5	294	30	217
Nut, power cylinder piston rod to steering arm (C_1)	M16x1.5	206	21	152
Nut, piston to rod — Calzoni or SIMA (C_3) — Weber (C_2)	 M16x1.5 M16x1.5	 98 83	 10 8.5	 72 61
Capscrew or nut, steering pump to engine (C_1, page 3)	M 6x1	8	0.8	6
Nut, cover to pump body (C_4)	3/8"-24 UNF-2B	39	4	29
Nut, drive sleeve to pump drive shaft (C_3)	7/16" -20 UNF-2B	28	2.8	20
Capscrew, OVP 20, safety valve block to body	—	64	6.5	47

TO ADJUST TAPERED ROLLER BEARINGS

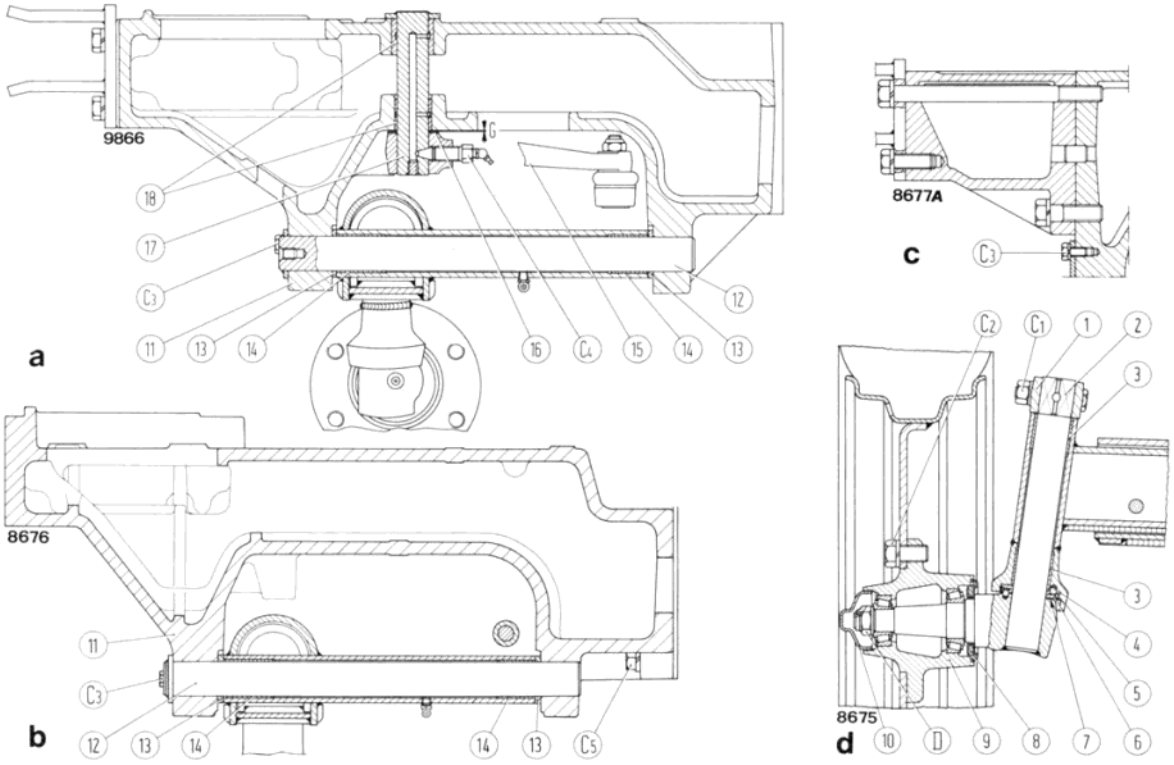
On reassembly, pack the wheel hub with **grassofiat MR 3** and adjust the tapered roller bearings as follows:

— Tighten nut (D) to 7 kgm (68 Nm) (50.6 ft lb), simultaneously turning the hub (9) to settle the bearings.
— Slacken the nut and retighten to 1 kgm (9.8 Nm) (7.2 ft lb), simultaneously turning the hub.
— Lock the nut in position by peening.

Note - Renew nut (D) at every adjustment.



Wheel Alignment Diagram
a. Checking wheel camber - b. Checking wheel toe-in



Section through Axle Arm and Centre Pivot

a. Tractors with manual steering - b. Tractors with power steering - c. AM manual steering detail - d. Axle arm assembly - C_1. Track rod lever nuts (1) - C_2. Capscrew securing disc to hub - C_3. Axle pivot capscrew - C_4. Relay lever capscrew (15) - C_5. Axle carrier capscrew - D. Bearing nut - G = 0.5 to 1 mm (0.02 to 0.04 in) steering relay lever pivot end play - I. Track rod lever - 2. King pin - 3. Bushings - 4. Dowel - 5. Steel thrust washer - 6. Bronze thrust washer - 7. Cup - 8. Seal - 9. Wheed hub - 10. Hub cap - 11. Axle carrier - 12. Centre pivot - 13. Thrust washers - 14. Axle pivot bushings - 15. Steering relay lever - 16. Relay lever shim - 17. Relay lever pivot - 18. Relay lever pivot bushings.

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TO INSPECT

Check the steering geometry as follows:

— With the wheels in the straight-ahead driving position, camber should be 2°, equivalent to 18 to 20 mm (0.70 to 0.77 in) between rim top and bottom edges on a plane parallel to the tractor longitudinal centreline. Toe-in should be up to 5 mm (0.19 in) as measured on the inside between rims (b).

— To adjust toe-in, turn the adjustable ends of the track rods.

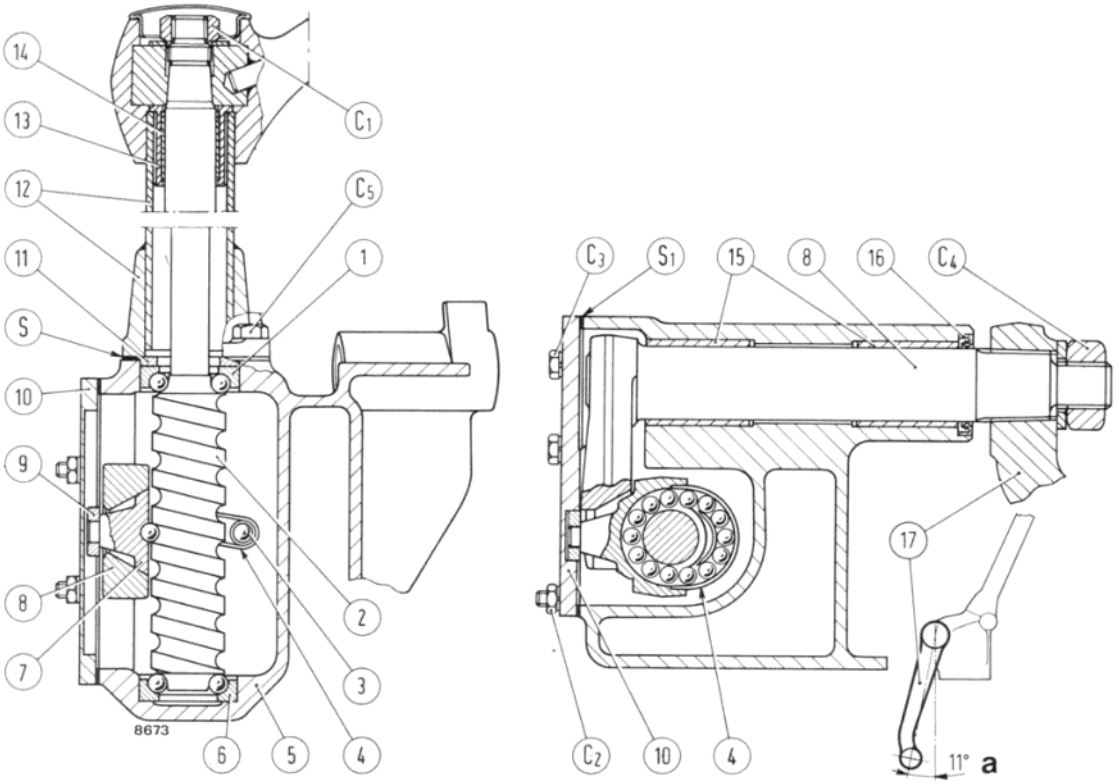
On reassembly, check that steering relay lever pivot end play is 0.5 to 1 mm (0.02 to 0.04 in). If not, adjust with relay lever shims (16) listed on page 2, Section 30.

STEERING BOX OVERHAUL

To remove the steering box proceed as follows:
— Withdraw the steering wheel, remove the hand throttle lever retaining ring and withdraw the lever with attached spring and clutch plate, after disconnecting the cable and removing the dashboard.
— Remove the control board, R.H. and L.H. inner seals, the clutch pedal and the brake pedal.
— Disconnect the drag link from the swing lever and the swing lever from the rocker shaft.
— Remove the starter inhibitor switch and, through the control board aperture, lift off the steering unit after removing the retaining screws.

To dismantle, proceed as follows:
— Take off rocker shaft (8) after withdrawing side cover (10) and shims (S_1).
— Remove top cover assembly (12), shims (S), spacer (11) and worm cam (2), gradually turning the latter anticlockwise.

Remove nut (7) from casing together with 14 balls. Renew any damaged bushings and seals using suitable extractors and drivers.
Ensure that worm cam (2) and nut (7) are free from wear or signs of pick-up in the grooves; if faulty, these items should be renewed together with the balls. When reassembling the steering box refer to the illustration below and carry out the two adjustments described on the following page. After adjusting, fit the swing lever (17) to the rocker shaft (8), adhering to the instructions given in the detail (a) of the illustration below.



Sections through Steering Unit.

a. Fit swing lever (17) to rocker shaft (8) so that, with the wheels in the straight ahead driving position, the swing lever is 11° forward of the vertical - C_1. Steering wheel nut - C_2/C_3. Side cover nut and screw - C_4. Swing lever nut - C_5. Top cover screw - S/S_1. Shims - 1/6. Ball bearings - 2. Worm cam - 3. Balls ($^3/_8$" dia.) - 4. Ball transfer tube - 5. Casing - 7. Nut - 8. Rocker shaft - 9. Roller - 10. Side cover - 11. Spacer - 12. Top cover - 13. Outer rubber bushing - 14. Lubrificated-for-life inner bushing - 15. Rocker shaft bushings - 16. Seal - 17. Swing lever.

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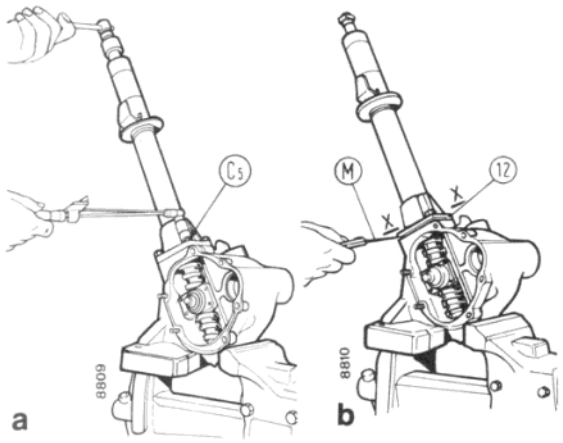


Adjusting Worm Cam Bearings

a. Tighten two screws (C_5) to 9 Nm (0.9 kgm 6.5 lb ft) - b. Measuring top cover gap using feeler gauge M - X-X. Plane of gap measurement - 12. Top cover.

To Install Worm Cam and Adjust Ball Bearings

Pack bottom bearing race (6, page 1) with **grassofiat G 9** or other approved grease, insert the balls in position and place the race assembly in the steering box.

Position collar (7) over the worm cam, together with the balls embedded in grease to prevent them from falling, and introduce the cam in the casing through the side cover aperture pushing upwards as far as possible.

Pack the top bearing race (1) integral with the worm cam, embed the balls on the race packed with grease, insert the outer race from the top cover aperture and push the assembly downwards, ensuring that the top and bottom bearing balls do not come off their seats.

Fit spacer (11).

Install top cover (12), without shims (S) and bolt to the casing using two of the four screws (C_5) positioned diagonally and lubricate with engine oil.

Progressively tighten the two screws (C_5) in alternating fashion until a 9 Nm (0.9 kgm 6.5 lbft) torque is reached, simultaneously turning the worm cam (a) to settle the bearings.

Measure the gap between top cover (12) and steering box face, using a suitable feeler gauge at two diametrically opposed points along plane X-X (b) and arithmetically average the readings.

Remove top cover (12), interpose a pack a shims (S, page 1) of thickness equal to the average reading, refit the top cover and tighten the screws to the torque given on page 4, Section 30.

Check the steering shaft rotating torque; the correct torque should be 1.2 to 2.8 Nm (0.12 to 0.29 kgm 0.9 to 2.1 lb ft). To adjust, alter the thickness of shims (S) as necessary.

To Adjust Rocker Shaft End Float (8, page 1)

Insert rocker shaft (8) in the steering case, paying particular attention to prevent damaging seal (16).

Interpose a pack of shims (S_1) between side cover and steering case face so as to obtain a rocker shaft end play of 0.1 mm (0.004 in), with steering wheel in straight-ahead driving position and with a tightened cover.

Finally, tighten the cover screws and nuts to the torque given in the table on page 4, Section 30.

STEERING LINKAGE

If the steering relay lever (15, page 1. Section 301) needs removing, take off the front axle assembly, remove the tapered screw (C_4, page 1) and withdraw the pivot (17) from the top.

Ensure that the levers and actuating links are free from distortion; if distortion is detected, straighten as necessary and, prior to reassembly, check that the straightening operation has not weakened the parts involved, renewing any suspect component without hesitation.

Ensure that the ball joints are not affected by excessive play and check the pins and seals for damage.

In case of inefficiency, renew the ball joint assemblies; loose joint parts are not available.

When rebuilding, apply a liberal supply of **grassofiat G 9** or other approved grease to the steering relay lever pivot through the grease nipple located on the stop screw (C_4, page 1, Section 301).

Check the wheel alignment and adjust the front wheel toe-in as necessary, according to the instructions given on page 2, Section 301.

POWER STEERING OVERHAUL

The hydraulic power steering system components are illustrated in the general diagram on page 9.

To Remove

Remove the unit from the tractor as follows:

— Take off the steering wheel, withdraw the hand throttle lever retaining ring and remove the lever with attached spring and clutch plate, after disconnecting the cable and lifting off the dashboard.
— Drain the steering fluid, take off the instrument panel by tipping to the left and disconnect the four flexible pipes from the steering unit.
— Withdraw the control board and take off the steering unit through the board aperture after removing the retaining screws.

To Dismantle

Dismantle the steering unit as follows:

— Remove the screws (C_2) that hold the cover to the body (3) and withdraw the cover, cam ring (8) with attached rotor (9), thrust washer (10), spacer (12), rotor shaft (7), sleeve (6) with attached rotary valve (5), pin (1) and cup (28), followed by thrust bearing (29) in that order.

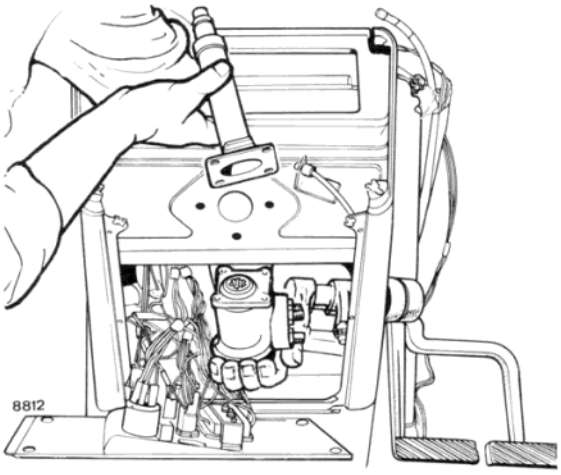
Note - Do not strike sheet metal cap (30, page 9) on rotary valve for any reason, otherwise leakage will result, necessitating renewal of the entire power steering unit.
During dismantling and reassembly of sleeve (6) and rotary valve (5), pin (1) should be kept horizontal to prevent it from becoming unseated and falling into the grooves inside the steering unit, which will prevent withdrawal of the assembly.

— Overturn the steering unit and retrieve non-return valve ball (4), after removing the threaded stop.

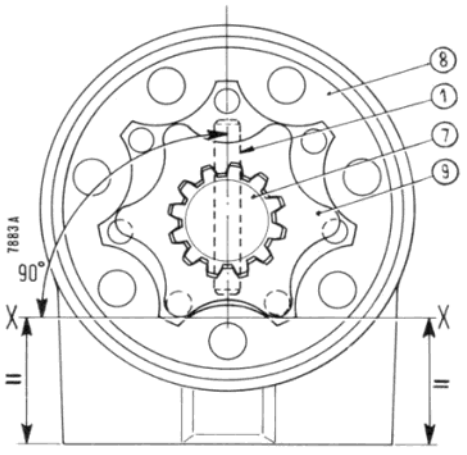
To Reassemble

Reverse the dismantling sequence and note the following points:

— After removal, renew the seals without hesitation.
— Insert seal (31, page 9), between body and rotary valve (5) using tool **293388.**
— If spring (2) is to be renewed, use tool **293389.**
— Whenever the steering unit is dismantled, overturn rotor (9) to obtain maximum wear from the splines.



Removing Power Steering Unit from Tractor



Timing Power Steering Unit

X-X. Reference line for pin assembly - 1. Drive pin - 7. Rotor shaft - 8. Cam ring - 9. Rotor

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— Fit non-return valve ball (4) in its seat, keeping the steering unit (3) vertical and overturned relative to its normal operating position on the tractor, and fully tighten the screw to prevent the ball from falling in the recesses between steering unit and pushrod.

— Insert rotor (9) into cam ring (8) as shown on page 1 and, using tool **293390,** couple shaft (7) to pin (1) so that the latter lies at right angles to plane X-X.

— Tighten cover screws (C_2, page 9) to the prescribed torque.

TO OVERHAUL HYDRAULIC CYLINDER

The steering power cylinder fitted in production may be either Weber, Calzoni or Sima.

The Weber cylinder may be fully dismantled, whereas on the Calzoni cylinder it is only possible to remove the piston rod, dust excluder and O-ring with its retainer.

To Dismantle Weber Cylinder

Remove lock ring (3), push guide (7) inwards and withdraw retaining ring (5) from cylinder using a punch inserted through hole (F).

Subsequently, withdraw the piston rod assembly from the cylinder, back off nut (C_2) and withdraw guide (7) from piston (10).

To remove Calzoni or SIMA piston rod

Push the piston rod fully in, apply an M 14x1.5x40 mm long screw to fluid inlet port (F_1), ensuring that the end of the screw locks on one flat of piston nut (C_2).

Back off the rod, withdraw from the cover and take off dust excluder (2), seal (6) and O-ring (4).

Renew the spherical joint on the cylinder end using a suitable press and subsequently peening the edge of the seat in three points.

Renew any inefficient seals on both cylinders.

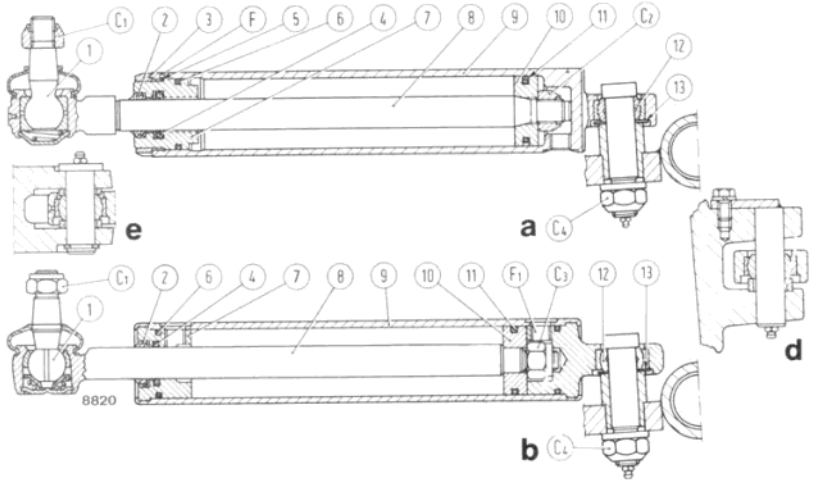
To reassemble Weber and Calzoni or SIMA cylinders

Liberally lubricate the component parts, reassemble in the reverse order given for dismanting, referring to the illustrations below and noting the following points:

— Tighten piston nuts (C_1) and (C_2) on both Weber and Calzoni or Sima cylinders to the prescribed torque

— Insert the piston rods in their respective guides (7) paying the utmost attention to prevent distortion and damage to the seals.

— Check for piston rod seal leakage by pressurising the cylinder chamber on the piston rod side.



Sections through Power Cylinders

a. Section through Weber cylinder - b. Section through Calzoni or Sima cylinder - C_1. Steering arm nut - C_2. Weber piston nut - C_3. Calzoni or Sima piston nut - C_4. Pivot pin nut - d. Section through cylinder connection to front axle (580 DT and 680 DT) - e. Section through cylinder connection steering arm (580 DT and 680 DT) - F. Retaining ring extraction hole - F_1. Calzoni or Sima cylinder oil inlet port - 1. Ball joint - 2. Dust excluder - 3. Lock ring - 4. Seal - 5. Retaining ring - 6. O-ring - 7. Guide - 8. Piston rod - 9. Cylinder - 10. Piston - 11. Piston gland - 12. Spherical joint - 13. Retaining ring.

To Overhaul Steering Pump and Check Reservoir

For steering pump overhaul and testing, proceed as directed on page 1, Section 502 lift, for pump.

Moreover, note the following points:

— Steering pump drive is shown below.

— Pump assembly and performance data are given in the table of page 2, Section 30, whereas the speed/output chart is shown on this page.

When the hydraulic fluid reservoir (T, page 9) is removed, clean thoroughly and check for:

— Oil leakage. If leakage is detected, renew the reservoir as no repair is possible.

— Inefficiency of metal filter cartridge, container and spring.

On completion of assembly, refill the system with fluid, bearing in mind that this operation should be carried out in several stages, each time operating the steering system completely to fill all parts of the circuit.

To Bleed the Hydraulic System

To eliminate any air from the hydraulic system, simply steer from lock to lock several times and top up if necessary.

TO ADJUST VALVE SETTINGS

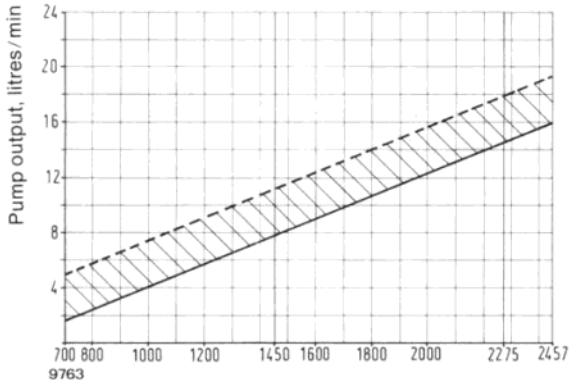
On-Tractor Adjustment of Relief Valve (1 page 4) Fitted to Valve Block (B) of FIAT C 18 X Steering Pump

Start the engine and steer the tractor from lock to lock several times to bring steering fluid temperature to approximately 50°C.
Stop the engine and proceed as follows:

— Fit connector **291326** (R) between valve block (B) and delivery line flange (S).

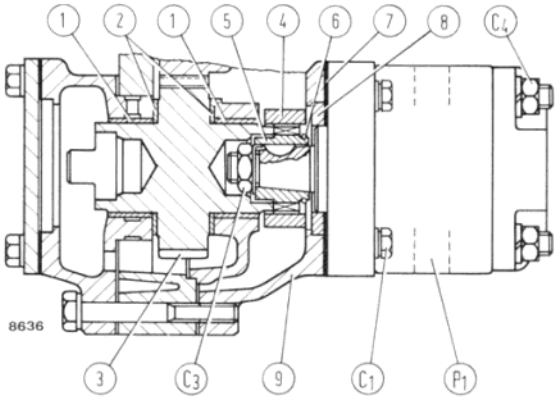
— Start the engine, accelerate to 2350 rpm and steer fully to one side. In this condition, relief valve (1) should crack off at an indicated pressure of 100 bar 102 kg/cm² (1452 psi).

— If the crack-off pressure is found to be considerably different, adjust by altering the thickness of shims (S_1), subsequently, peening the thread of the valve seat through one of the holes provided in the body.



Output/Speed Curve - Power Steering Pump Type C 18 X

Test pressure	68,6 bar (70 kg/cm² 996 psi)
Fluid temperature	55° to 65° C



Section through Steering Pump Drive

C_1. Pump screws - C_3. Sleeve nut - C_4. Cover nut - P_1. Hydraulic pump - 1. Gear bushings - 2. Thrust washers - 3. Pump drive gear - 4. Drive collar - 5. Drive sleeve - 6. Retaining ring - 7. Gasket - 8. Centraliser - 9. Pump support.

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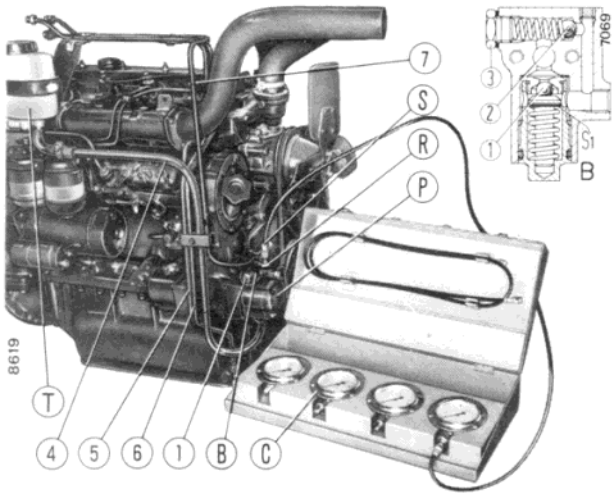


Checking Relief Valve Crack-Off Setting

B. Valve block - C. Pressure gauge kit and connectors **293300** - P. Steering pump - R. Flange for delivery line to power steering unit. - S. Connector **291326** - S_1. Relief valve shims - T. Fluid reservoir - 1. Relief valve - 2. Reverse flow valve - 3. Valve plug - 4. Suction pipe - 5. Connecting pipe to piston rod chamber of power cylinder - 6. Connecting pipe to piston side chamber of power cylinder - 7. Delivery line to power steering unit.

On-bench Adjustment of Relief Valve (24, page 9) on OVP 20 Valve Block

Install the power steering unit under test and the test apparatus (page 5) and proceed as follows:

— Fit plug **293315** to power steering unit port marked R.

— Connect trolley mounted electric motor **291235** and pump **293165** (API 213) to coupling **290385**.

— Connect pump inlet to tester **291231** using pipe **290445**.

— Connect the pump delivery to port (P) of power steering unit using pipe **290544** and three-way connector **290475**.

— Connect three-way fitting **290475** to restriction of tester **291231** using pipe **290447**.

— Connect exhaust pipe **293368** to port (T) of power steering unit.

— Apply wrench **293192** to power steering drive coupling and turn clockwise until oil no longer issues from exhaust pipe **293368.**

— Gradually increase the pressure through the output tester handwheel and check on the pressure gauge that the relief valve starts to open at the pressure rating prescribed in the table of page 3, Section 30.

— Increase or decrease rating screwing in or backing off screw on valve respectively.

Note: With the test machine and **oliofiat AP 51** fluid (SAE 20 W), the adjustment should be carried out at approximately 60°C and 12 litre/min (21 pints/min) flow rate, running the electric motor at top speed (1450 rpm).

On-Bench Adjustment of Steer Cylinder Safety Valves (25, page 9) on OVP 20 Valve Block

RH Steer Safety Valve

— Prepare the test equipment as directed for the relief valve adjustment, remove plug **293315** from port (R), fit to port (L) and apply the three-way connector **290475** in its place.

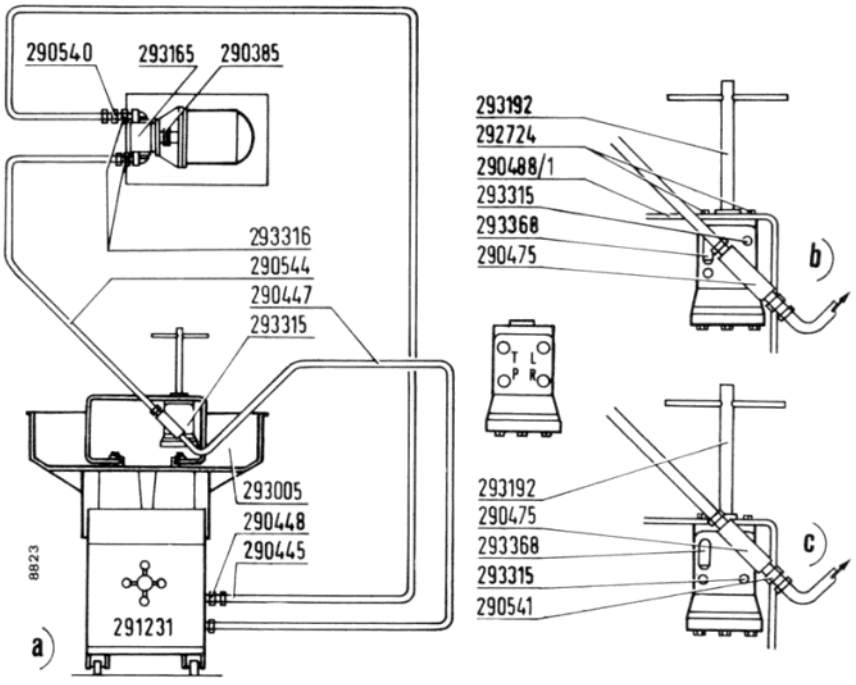
— Apply wrench **293192** to the drive coupling and turn to the right until the fluid flow from exhaust pipe **293368** ceases.

— Gradually increase the pressure by operating the output tester control handwheel and read on the dial gauge the safety valve crack-off setting; the reading should be as prescribed in the table: If the pressure valve reading is not as prescribed, renew the entire valve block without hesitation.

L H Steer Safety Valve

— proceed as described for R H steer safety valve, interchanging plug **293315** with three-way connector **290475** and turning wrench **293192** to the left.

Note - With the test machine and **oliofiat AP 51** fluid (SAE 20 W), the adjustment should be carried out at approximately 60°C and 12 litre/min (21 pints/min) flow rate, running the electric motor at top speed (1450 rpm)



Test Set-Up for Adjustment of Relief Valve (a), R.H. Steer Cylinder Safety Valve (b) and L.H. Steer Safety Valve (c) Fitted to Valve Block OVP-20.

FRONT AXLE - STEERING: Power Steering

TROUBLE SHOOTING

FAULT	CAUSE	REMEDY
1. Leaking control unit.	**a.** Loose cover screws (C_2, page 9).	Tighten to prescribed torque.
	b. Damaged cover seals or sealing washer of screw (C_2).	Renew as necessary.
2. Heavy steering.	**a.** Faulty hydraulic pump.	Overhaul pump.
	b. Non-return valve (4) stuck open.	Clean valve and filter.
	c. Relief valve (24 or 24a) out of adjustment.	Reset valve.
	d. Relief valve (24 or 24a) failed or stuck open.	Remove foreign matter and clean filter. If trouble persists, renew valve block assembly OVP-20.
	e. Steering column binding in bush owing to rusting, pick-up, etc.	Remedy as necessary.
3. Loose steering.	**a.** Excessive clearance of steering column in control unit.	Renew any worn parts.
	b. Excessive clearance between shaft (7) and drive pin (1).	Renew worn parts as necessary.
	c. Excessive spline clearance on rotor (9) relative to shaft (7).	Renew worn parts as necessary.
	d. Build-up of clearances **a., b.** and **c.** above.	Renew worn parts as necessary.
	e. Failed or weakened leaf spring (2).	Renew as necessary.
4a. Slow steering.	**a.** Leaking power cylinder piston gland.	Renew gland.
4b. No steering.	**b1.** Failed power cylinder piston rod.	Renew rod.
	b2. Failed actuating shaft (7) or pin (1).	Renew failed parts as necessary.
5. Engine off, no steering.	**a.** Worn rotor (9) and cam ring (8).	Renew worn parts.
	b. Damaged non-return valve (23).	Renew valve block assembly OVP-20.

TROUBLE SHOOTING

FAULT	CAUSE	REMEDY
	c. Power cylinder safety valves (25) stuck open or damaged.	Remove foreign particles and clean filter or renew valve block assembly OVP-20.
6. Steering wheel snatch or steering to full lock.	Control unit out of adjustment.	Reset as directed on page 1,
7. Steering in opposite direction.	**a.** Control unit out of adjustment.	Set as directed on page 1.
	b. Interchanged connecting pipes between control unit and power cylinder.	Reverse connection.
8. Impossible to hold selected course, continuous correction needed.	**a.** Air pockets in power cylinder.	Bleed as directed on page 3.
	b. Worn power cylinder piston gland.	Renew gland.
	c. Power cylinder safety valves (25, page 9) stuck open.	Remove foreign particles and clean filter or renew valve block assembly OVP-20.
9. Impossible to hold straightahead position, steering wheel may tend to move upon discontinuing manual control and steering action continues slowly in the direction of initial steering, necessitating continuous correction to maintain trajectory.	**a.** Failed or weakened leaf spring (2).	Renew spring.
	b. Sleeve (6) and rotary valve (5) stuck with delivery ports open.	Remove foreign particles and clean filter.
	c. Sleeve (6) stuck to rotary valve (5) owing to excessive pressure.	Check relief valve crack-off setting.
10. Front wheel vibration.	**a.** Air in the system.	Bleed as directed on page 3.
	b. Worn steering linkage joints.	Renew worn parts.
	c. Power cylinder safety valves (25) stuck open.	Remove foreign matter and clean filter or renew valve block assembly OVP-20.
11. Difficult R.H. steering. L.H. steering (cylinder piston rod side) almost normal.	Power cylinder safety valves (25) out of adjustment or inefficient owing to the ingress of foreign matter.	Remove foreign particles and clean filter. If trouble persists, renew valve block assembly OVP-20.

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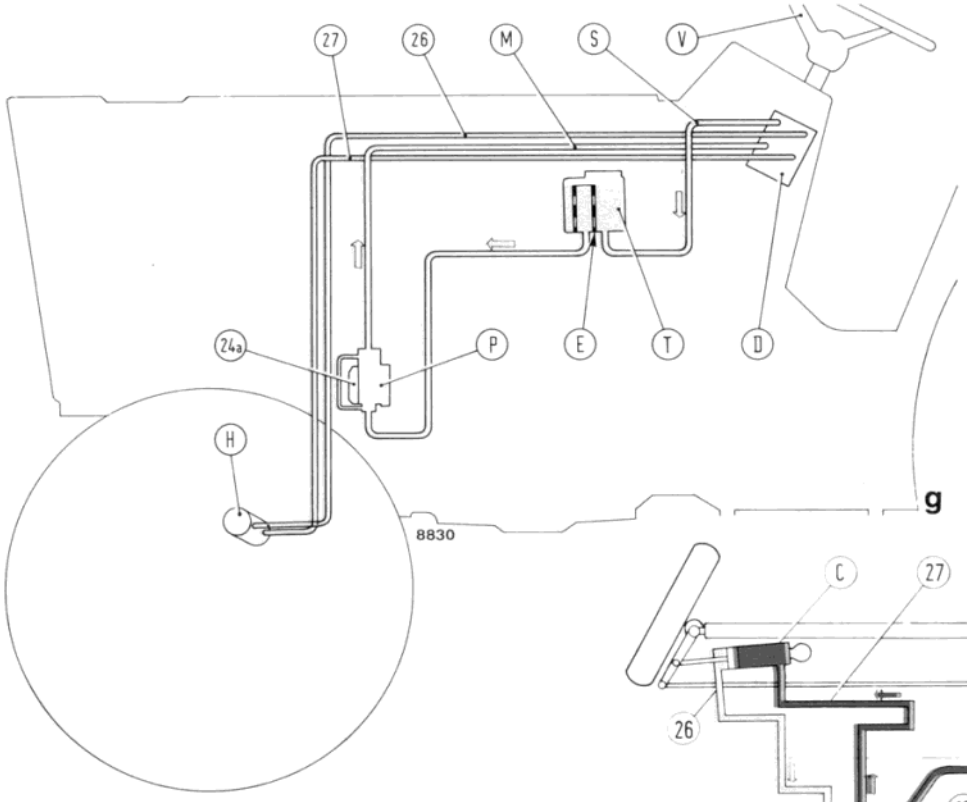
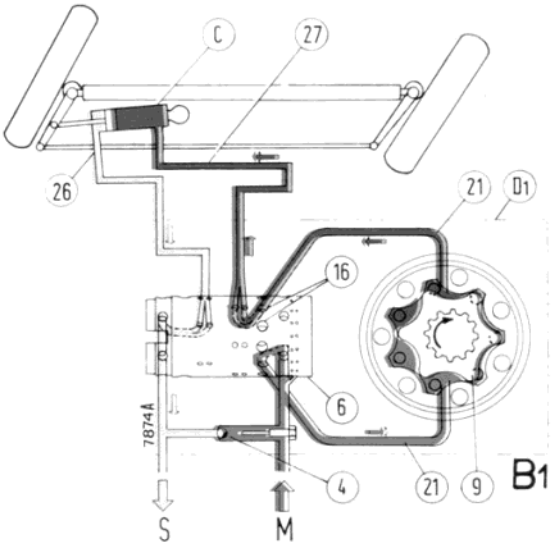
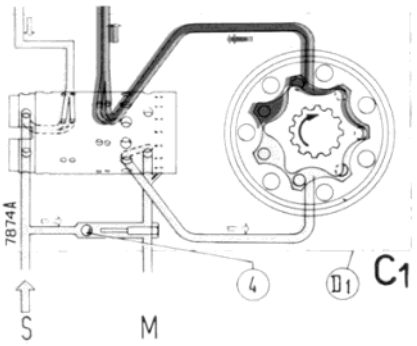




Operation Diagram
(For missing references see the caption on the right)

A. Operation in straight-ahead driving position - B/B_1. R.H. and L.H. steer (Sd and Ss) with and without valve block (D_2) - C/C_1. R.H. and L.H. emergency steer (Sed and Ses) with and without valve block (D_2) - d. Operation diagram for straight-ahead driving (Sections D-D and F-F) - D. Hydraulic control unit including control valve (D_1) with or without valve block (D_2) - e/f. Operation diagram for two-stage R.H. steering (D-D and F-F) - E. Filter cartridge - g. Steering system schematics - H. Power cylinder - M. Pump outlet line - P. Hydraulic pump - S. Return to tank - T. Reservoir - V. Steering wheel - 23. Non-return valve of block (D_2) - 24. Relief valve of block (D_1) set to 125 bar or 127 kg/cm² (1778 psi) AM, or 100 bar or 102 kg/cm² (1452 psi) PM - 24a. Relief valve of hydraulic pump (P) set to 100 bar or 102 kg/cm² (1452 psi) - 25. Cylinder safety valves integral with block (D_2) set to 200 bar or 204 kg/cm² (2904 psi).



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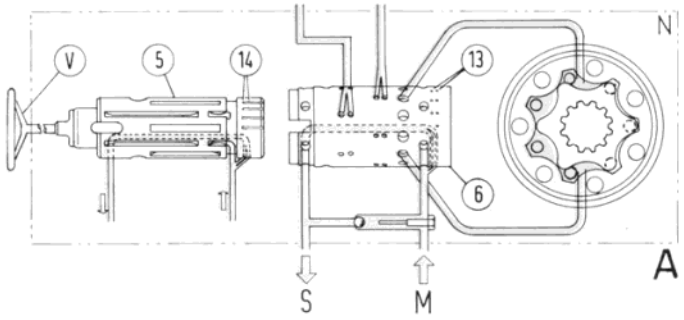
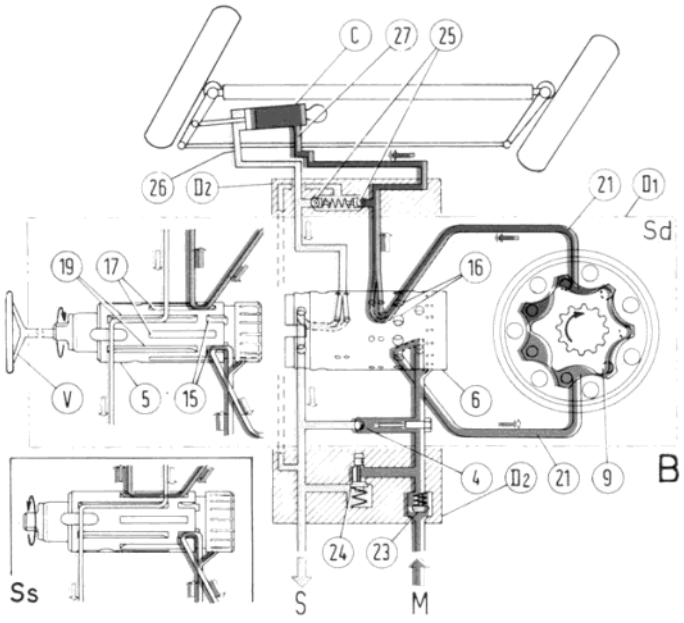
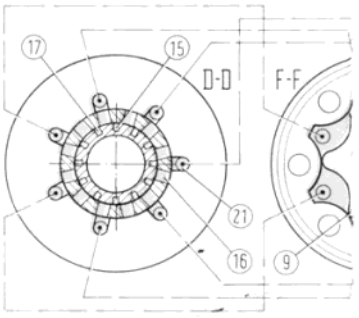
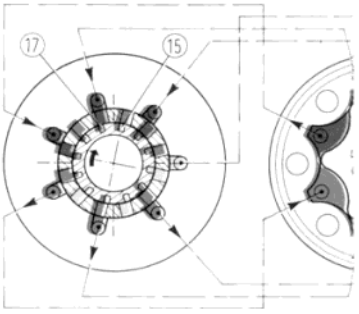
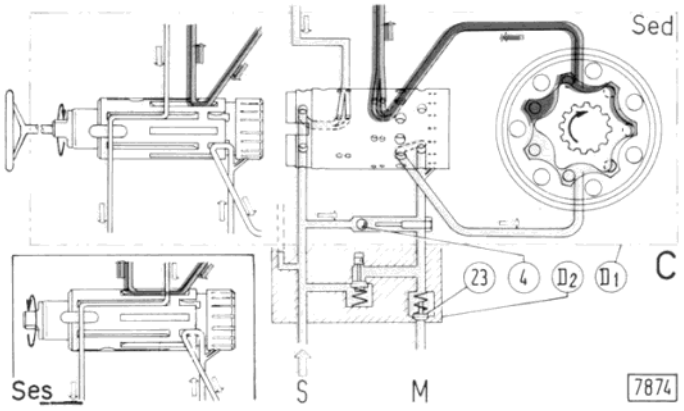


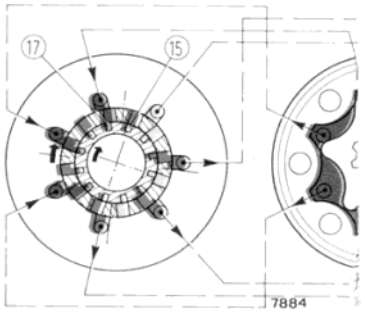
Oil Pressure to Power Cylinder
Oil Pressure to Rotor
Inlet, Low Pressure or Return Oi
Trapped Oil











OPERATION

Straight-ahead Driving (A, a, d)

With steering wheel (V) stationary, rotary valve (5) takes neutral position relative to sleeve (6). This position is maintained through the action of springs (2, section A-A) and the following conditions exist:

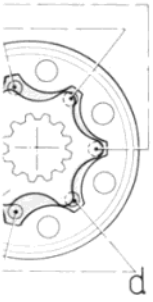
— Pin (1, section B-B) is central in the valve aperture.

— Ports (13 and 14) are in alignment (Section C-C) and the oil pressure from pump (P) is returned to tank.

— Passages (15, 17 and 19) on the valve (Sections D-D and E-E) are off register relative to ports (16, 18 and 20) on the sleeve (i.e. all ports in communication with the power cylinder remain closed).

R.H. Steer (B, B_1, Sd, b, e, f)

Upon turning steering wheel (V) clockwise, springs (2, Section A-A) deflect allowing valve (5) to rotate relative to sleeve (6) until gap (G_1, section B-B) is taken up.



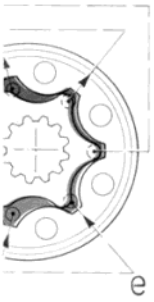
Thus:

— Ports (13 and 14, Section C-C) go out of alignment to discontinue oil return.

— Six passages (15, Section D-D) line up with an equal number of ports (16) connected instant by instant with the rotor recesses during the inlet phase.

— Six pressure passages (17, Section E-E) line up with ports (18) communicating with the power cylinder. Moreover, the oil pressure passages communicate with the remaining ports (16, Section D-D) connected instant by instant with the rotor recesses during the actuation phase.

— Six exhaust passages (19) line up with ports (20, Section E-E) communicating with the power cylinder.



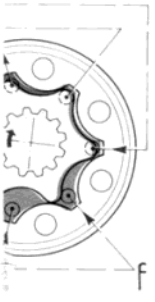
Once the gap (G_1) is eliminated, valve (5) positively transmits steering wheel input to both sleeve (6) and rotor (9) through pin (1) and shaft (7).

Diagrams (e and f) show the principle of operation at start of R.H. steer and after a certain amount of wheel rotation.

The flow of oil pressure from pump to rotor during inlet, and from rotor to power cylinder line during the power actuation phase, is provided instant by instant.

L.H. Steer (B, Ss)

Upon turning the steering wheel anti-clockwise, a reversal of the above sequence is obtained and delivery passages (17, Section E-E) supply ports (20) to bring about L.H. steering.

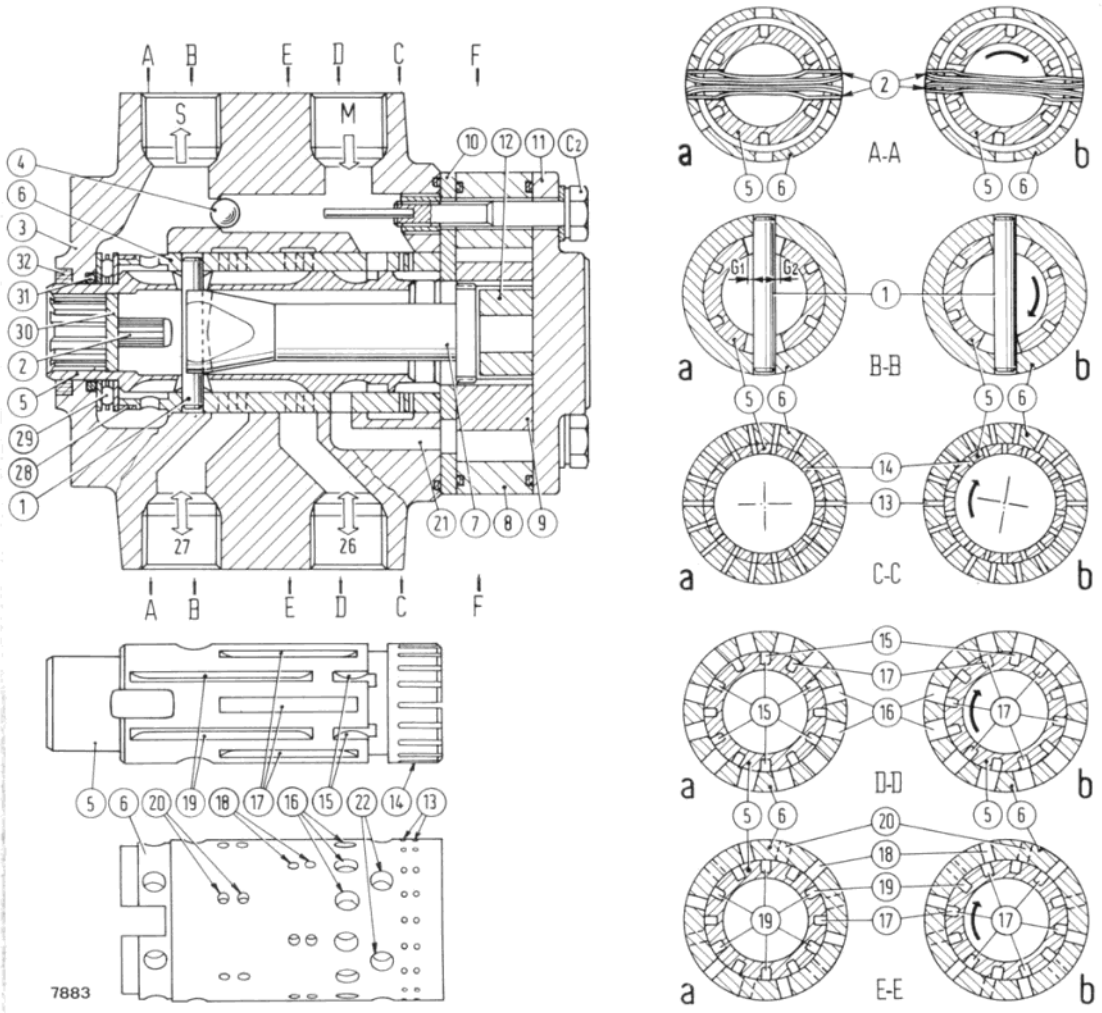


Emergency Hydraulic Steer (C, C_1, Sed, Ses)

Steering is possible even in cases of lock of hydraulic pressure. Upon turning the steering wheel, valve (5) takes up the normal operating position, whilst the rotor functions as a hand pump directing oil pressure to the power cylinder.

Non-return valve (4) opens, thereby permitting the flow of oil from tank to rotor by-passing the pump.

Valve (23) remains closed preventing leakage in connecting line between pump and control unit.



Sections through Hydraulic Control Unit

a. Sections through control unit with valve (5) in neutral - b. Sections through control unit with valve (5) in R.H. steer position (for L.H. steer valve rotation is symmetrical) - C_2. Cover screws - G_1/G_2. Gap between pin and rotary valve - 1. Drive pin - 2. Return spring - 3. Body - 4. Non-return valve - 5. Rotary valve - 6. Sleeve - 7. Rotary shaft - 8. Cam ring - 9. Rotor - 10. Abutment plate - 11. Cover - 12. Spacer - 13/14. Straight-ahead pressure ports - 15. Rotor inlet passages (6 off) - 16. Connecting ports (12 off) communicating with passages (15 and 17) alternatively - 17. Outlets (6 off) to power cylinder communicating with the rotor outlet passages and ports 18 and 20 - 18. Outlet or exhaust ports (6 pairs) for R.H. power cylinder chamber - 19. Power cylinder exhaust passages (6 off) communicating with ports 18 and 20 - 20. L.H. power cylinder chamber outlet or exhaust ports (6 pairs) - 21. Connecting ports for (16) and inlet or outlet rotor passages - 22. Supply ports for passages (15) - 26. Connecting line for L.H. power cylinder chamber, piston rod side - 27. Connecting line for R.H. cylinder chamber - 28. Cup - 29. Thrust bearing - 30. Plug - 31. Seal - 32. Dust excluder

FRONT AXLE

	580 DT	680 DT
Type	Steering, full-floating, center pivotting	
Track widths { AM (4) / PM (5)	1600-1700-1800-1925(°) 1530(*)-1630-1730-1830-1955	
Bevel Drive and Differential		
Bevel drive ratio { AM / PM	11/35 = 1:3.18 10/34 = 1:3.4	
AM Bevel drive backlash	0.15 to 0.20 mm (0.006 to 0.008 in)	
PM Bevel drive backlash	0.18 to 0.23 mm (0.007 to 0.009 in)	
Bevel pinion bearing shim thickness (S_1, page 7, Section 401) { AM	2.5-2.6-2.7-2.8-2.9-3-3.1-3.2-3.3-3.4-3.5-3.6-3.7 mm (0.098-0.102-0.106-0.110-0.114-0.118-0.122 0.126-0.130-0.134-0.138-0.142-0.146 in)	
PM	2.2-2.3-2.4-2.5-2.6-2.7-2.8-2.9-3-3.1-3.2 mm (0.087-0.091-0.094-0.098-0.102-0.106-0.110-0.114-0.118-0.122-0.126 in)	
Bevel pinion shim thickness (S_2)	2.5-2.6-2.7-2.8-2.9-3-3.1-3.2-3.3-3.4-3.5-3.6-3.7 mm (0.098-0.102-0.106-0.110-0.114-0.118-0.122-0.126-0.130-0.134-0.138-0.142-0.146 in)	
Side gear thrust washer tickness (7, page 7, Section 401)	1.470 to 1.530 mm (0.0579 to 0.0602)	
Differential pinion thrust washer thickness (6)	1.50 to 1.60 mm (0.0590 to 0.0630)	
Differential pinion journal dia. { AM	21.939 to 21.960 mm (0.0864 to 0.865 in)	
PM	23.939 to 23.960 mm (0.942 to 0.943 in)	
Differential pinion bore dia. { AM	22.040 to 22.061 mm (0.868 to 0.869 in)	
PM	24.040 to 24.061 mm (0.946 to 0.947 in)	
Differential pinion journal clearance in pinion bore	0.080 to 0.122 mm (0.003 to 0.005 in)	
Side gear spigot diameter { AM	37.931 to 37.970 mm (1.493 to 1.549 in)	
PM	43.961 to 44.000 mm (1.731 to 1.732 in)	
Side gear spigot bore diameter in differential box AM	38.080 to 38.119 mm (1.499 to 1.501 in)	
Side gear spigot bore diameter in differential box PM	44.080 to 44.119 mm (1.735 to 1.737 in)	
Side gear spigot clearance in differential box { AM	0.110 to 0.188 mm (0.004 to 0.007 in)	
PM	0.080 to 0.119 mm (0.003 to 0.005 in)	
Axle Shafts and Joints		
Axle shaft journal diameter (5, page 7, Section 401)	41.975 to 42.000 mm (1.6525 to 1.6535 in)	
Axle bushing fitted I.D. (14)	42.050 to 42.125 (1) (1.656 to 1.658 (1) in)	
Axle shaft running clearance in bushing	0.050 to 0.150 mm (0.002 to 0.006 in)	
Bushing interference fit in housing	0.064 to 0.129 mm (0.003 to 0.005 in)	
King pin bearing shim thickness (S_3, page 7, Section 401)	0.10-0.15-0.20-0.25-0.30 mm (0.004-0.006-0.008-0.010-0.012 in)	

(°) For 680 DT tractor track width is 1930 mm (76 in). (*) With this track width, steering angle is reduced by about 6°. (1) No reaming.

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LIVE FRONT AXLE: Specification and Data

FRONT AXLE (continued)

Planetary Final Drives	580 DT	680 DT
Reduction ratio { A.M. / P.M.	15:(15 + 63) = 1:5.2 16:(16 + 62) = 1:4.875	
Driven gear thrust washer (18, page 7, Section 401) thickness	0.77 to 0.83 mm (0.030 to 0.033 in)	
Wheel bearing shim (S_4) thickness	1.7-1.8-1.9-2-2.1-2.2-2.3-2.4-2.5-2.6-2.7-2.8-2.9-3-3.1-3.2-3.3 mm (0.067-0.071-0.075-0.079-0.083-0.087-0.091-0.094-0.098-0.102-0.106-0.110-0.114-0.118-0.122-0.126-0.130 in)	
Centre Pivot Pivotting angle (on either side)	11°	
Centre pivot diameter	52.652 to 52.671 mm (2.0729 to 2.0737 in)	
Centre pivot front bushing I.D. (21, page 7, section 401)	52.720 to 52.790 (1) mm (2.0756 to 2.0783 in)	
Centre pivot working clearance in bushing	0.049 to 0.138 mm (0.0019 to 0.0054 in)	
Rear bevel pinion carrier spigot O.D.	99.040 to 99.072 mm (3.8992 to 3.9005 in)	
Rear bushing fitted I.D. (24, page 7, sect. 401)	99.146 to 99.221 mm (3.9033 to 3.9063 in)	
Spigot fitted clearance in bushing	0.074 to 0.181 mm (0.0029 to 0.0071 in)	
Axle front and rear thrust washer thickness (22 and 23, page 7, Sect. 401)	4.95 to 5.00 mm (0.1949 to 0.1968 in)	
Turning radius		
— Live axle in { Brakes on	3900 mm (12 ft 9 in)	4000 mm (13 ft 1in)
— Live axle in { Brakes off	5700 mm (18 ft 8 in)	5750 mm (18 ft 10 in)
— Live axle out { Brakes on	4700 mm (15 ft 5 in)	4600 mm (15 ft 1 in)
— Live axle out { Brakes off	5300 mm (17 ft 5 in)	5400 mm (17 ft 8 in)

(1) Not reamed

AXLE DRIVE

Reduction ratio	20/22x22/28 = 1.4 to 1
Relay lever pad width	7.910 to 8.000 mm (0.3114 to 0.3149 in)
Pad seat width in driven gear	8.280 to 8.370 mm (0.3260 to 0.3295 in)
Pad clearance in seat	0.280 to 0.460 mm (0.0110 to 0.0181 in)
Relay lever pivot diameter	15.973 to 16.000 mm (0.6288 to 0.6299 in)
Pivot housing bore in casing	16.016 to 16.059 mm (0.6305 to 0.6322 in)
Pivot clearance in housing	0.016 to 0.086 mm (0.0006 to 0.0034 in)
Relay lever detent spring length	
— Free	24.3 mm (0.9567 in)
— Under 79.4 to 87.2 N (8.1 to 8.9 kg, 18 to 19.6 lb)	20.5 mm (0.8071 in)

DRIVE SHAFTS

Centre bearing adjustmente (A.M. tractors)	See page 7, Section 401
Centre bearing shim thickness (S_6, page 7, Section 401 A.M. tractors)	0.3-0.5-0.7-1 mm (0.012-0.020-0.028-0.040 in)
Front drive sleeve adjustment	See page 7, Sect. 401
Front drive sleeve shim thickness (S_5, page 7, Section 401)	2.2-2.5-2.8-3-3.3-3.7-4-4.3 mm (0.086-0.100-0.110-0.118-0.130-0.146-0.158-0.170 in)

TIGHTENING TORQUE FIGURES

DESCRIPTION	Thread Size	Torque		
		Nm	kgm	ft lb
Front Axle - Section 401 Lock ring, bevel pinion (C_1, page 7) { A.M. tractors / P.M. tractors	M35x1.5 M40x1.5	294	30	217
Capscrew, differential gear case to axle casing (C_2)	M12x1.25	113	11.5	83
Capscrew, ring gear to differential gear case (C_3)	M12x1.25	128	13	94
Capscrew, king pin (C_4)	M10x1.25	64	6.5	47
Capscrew, axle arm (C_5)	M12x1.25	113	11.5	83
Lock ring, wheel bearing (C_6)	M50x1.5	510	52	376
Screw, planetary final drive housing (C_7)	M10x1.25	64	6.5	47
Bolt, wheel rim (C_8)	M16x1.5	260	26.5	192
Capscrew, front and rear axle case support (C_9)	M18x1.5	265	27	289
Capscrew, differential cap (C_{10})	M12x1.25	113	11.5	83
Capscrew, front axle support to engine (C_{11})	M18x1.5	314	32	231
Nut, joint, track rod to levers	M16x1.5	98	10	72
Drive shafts - Axle Drive - Section 401 Capscrew, centre bearing (C_{12}, page 7)	M12x1.5	98	10	72
Capscrew, axle drive housing to tractor (C_{13}, page 7)	M12x1.25	98	10	72

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King Pin Bearing Adjustment (Fig. a)

Install upper cover (1) and tighten the screws to 64 Nm (6.5 kgm, 47 lb ft).

Fit lower cover (2) without shims and with engine oil lubricated retaining screws.

Progressively tighten the lower cover capscrews in alternating fashion until the torque needed to rock the carrier is 23 to 26 Nm (2.3 to 2.7 kgm, 16 to 19 ft. lb.) (A.M. models) or 27 to 31 Nm (2.8 to 3.2 kgm, 20 to 23 ft.lb.) (P.M. models), disregarding the starting torque, using wrench **292220/2.**

Assess clearance (H) between lower cover and carrier in the neighbourhood of the three retaining screws.

The arithmetic mean of the three readings will give the thickness of shims to be fitted (S_3, page 7).
Smear bearings with **grassofiat MR3**.

Wheel bearing adjustment.

1. Wheel bearing adjustment using special purpose tools (Figs. b, c).

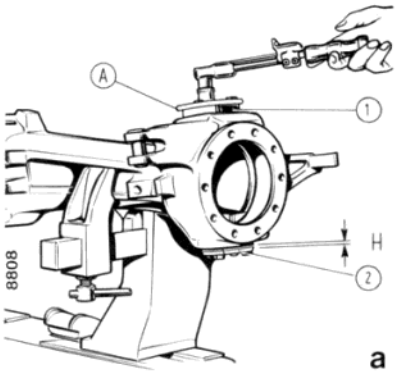
Install the wheel bearing cones (3 and 5) with spacer (4) on tool (D), **293435**.

Tighten nut (E) fully.

Measure the depth (H_2) of tool pin below the top face. Dismantle, lubricate bearing cones with engine oil and reposition on the tool interposing hub (6) with attached bearing cups press fitted fully home in their housings.

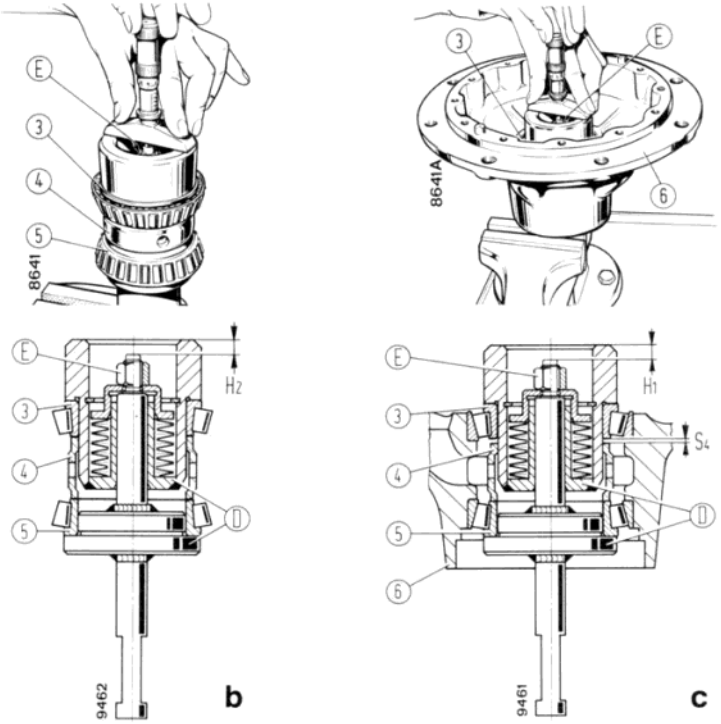
Fully tighten nut (E), simultaneously turning the hub through 10 revolutions to settle the bearings.

Assess dimension (H_1) in this condition.



Determining Thickness of King Pin Shims (S_3, page 7)

A. Axle arm carrier torque dynamometer **292220/2** - H. Gap between carrier and cover - 1. Upper cover - 2. Lower cover.



Determining Thickness of Wheel Hub Bearing Shims (S_4, page 7)

b. Determining dimension (H_2) - c. Determining dimension (H_1) - D. Tool **293435** - E. Tool nut - H_1/H_2. Tool pin depth below top face - S_4. Thickness of shim to be determined - 3 and 5. Bearing cones - 4. Spacer - 6. Wheel hub.

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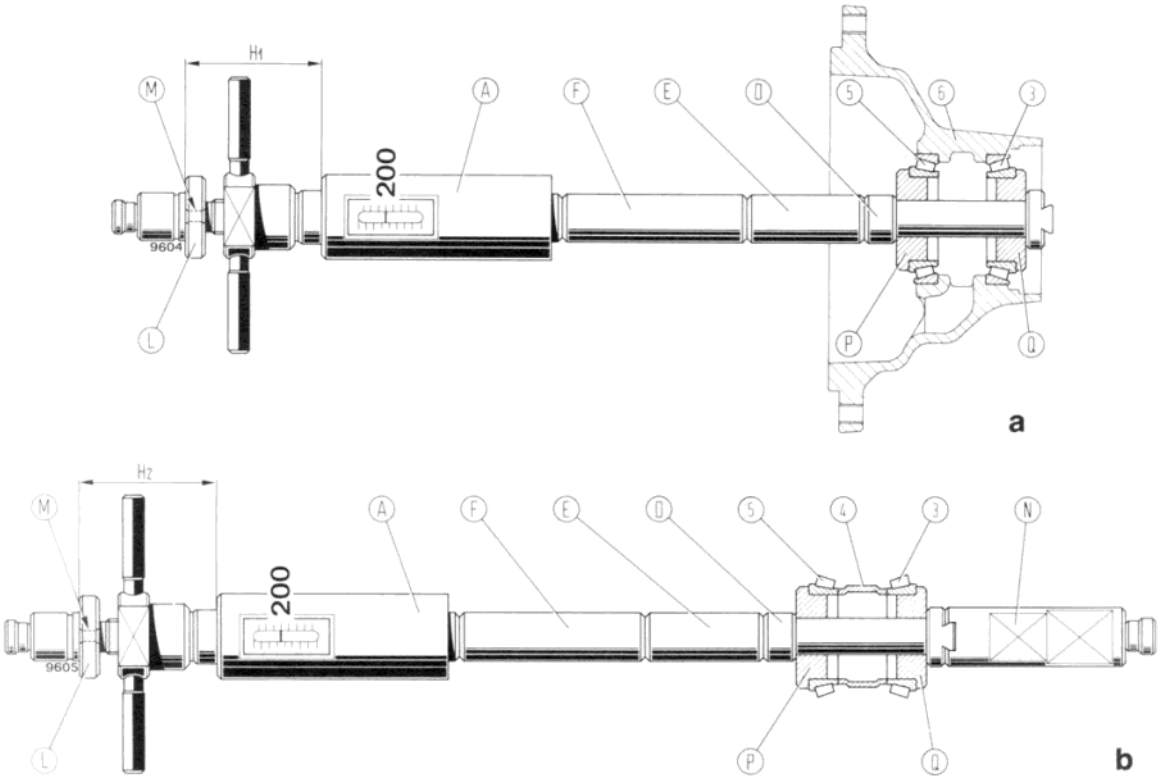
LIVE FRONT AXLE: Front Axle



Determining Thickness of Wheel Bearing Shims (S_4, page 7) Using Universal Gauge 293510

a. Measuring dimension H_1 - b. Measuring dimension H_2 - A. Universal gauge **293510** - D. Spacer **293625** - E. Spacer **293619** - F. Spacer **293620** - H_1/H_2. Dimensions to be measured with depth gauge - L. Register **293624** - M. Register holes - N. Adaptor **293617** - P. Adaptor **293639** - Q. Adaptor **293639** - 3/5. Bearing cones - 4. Spacer - 6. Wheel hub.

The thickness of shims (S_4, page 7) to be fitted will be obtained as follows:

$$S_4 = H_1 - H_2$$

If necessary, round up to the next 0.05 mm (0.002 in).

2. Using universal gauge 293510 (Figs. a and b).

Fit adaptors **293639** (P and Q), followed by spacers **293625** (D), **293619** (E) and **293620** (F) to universal gauge **293510** (A).
Install the gauge inside wheel hub with attached tapered roller bearings (3 and 5) which will have been previously lubricated with engine oil (fig. **a**).
Turn the gauge handle progressively to move graduated scale pointer to 200 kg (441 lb), simultaneously turning the gauge to settle the bearings.

Place register **293624** (L) on universal gauge (A) positioning the holes (M) in line with flats on handle hub.

Measure dimension (H_1) using a depth gauge.

Remove universal gauge (A) from wheel hub, reassemble on bench installing adapter **293617** (N) for clamping in the vise and fit spacer (4) and bearing cones (3 and 5) to be positioned as shown in fig. **b**.
Return graduated scale pointer to 200 kg (441 lb), and measure dimension (H_2) proceeding as directed above.

The value of shims (S_4, page 7) will be given by:

$$S_4 = H_2 - H_1$$

If necessary, round up to nearest 0.05 mm.

Bevel Drive and Differential Adjustment

1. Bevel pinion bearing adjustment and shim thickness determination using special purpose tools (fig. c and d)

Place the bevel pinion bearing cones (7 and 9) and spacer (8) on tool (E) **293438/1** (A.M. tractors) or **293438/1** with centraliser (G) **293439** (P.M. tractors).

Tighten nut (M) fully.

Measure the depth (H_4) of the tool pin below the top face.

Dismantle, lubricate bearings with engine oil and reassemble on the tool, interposing the bevel drive carrier (10) with attached bearing cups.

Tighten nut (M) fully, simultaneously rotating the bevel drive case through 10 turns to settle the bearings.

Assess dimension (H_3) in this condition.

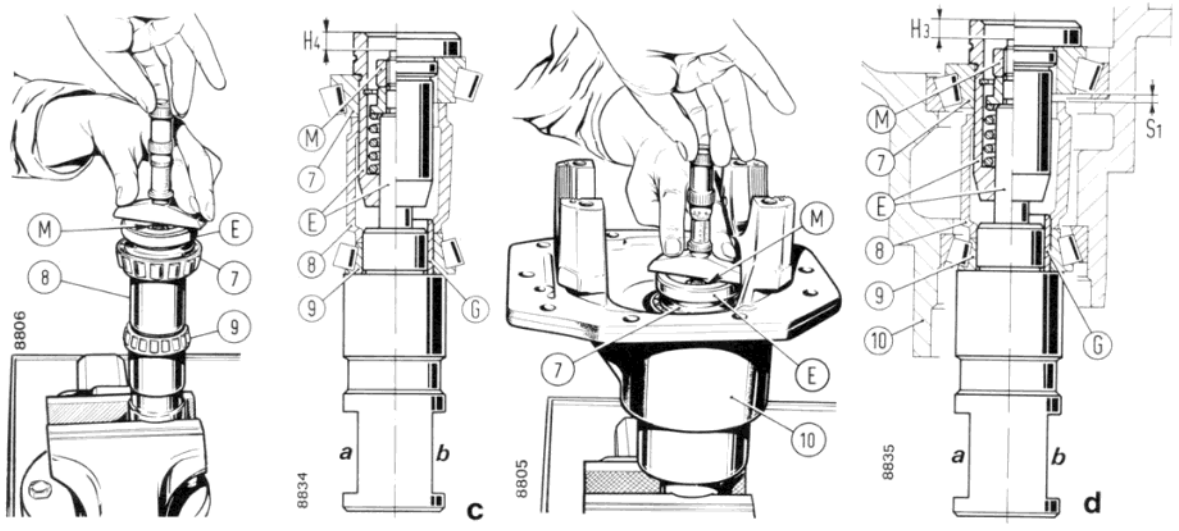
The thickness of shims (S_1) to be fitted will be given by the following:

$$S_1 = H_3 - H_4$$

If necessary, round up to the nearest 0.05 mm (0.002 in).

Note - On completion of adjustment leave the tool on drive head housing for subsequent bevel pinion position adjustment.

Note - AM models. To change seal (2, page 7) without disassembling front axle, use wrench **293782** and lock ring wrench **293785** to tighten lock ring to 279.5 Nm (28.5 kgm or 206 ft lb) rather than 294 Nm (30 kgm or 217 ft lb).



Determining the Thickness of Bevel Pinion Bearing Shims (S_1, page 7)

a. A.M. models - b. P.M. models - c. Measuring dimension (H_4) - d. Measuring dimension (H_3) - E. Tool **293438** - G. Centraliser **293439** for use with tool (E) - H_3/H_4. Tool pin depth below top face - M. Tool nut - S_1. Thickness of shims to be determined - 7. Bearing cone - 8. Spacer - 9. Bearing cone - 10. Drive head housing.

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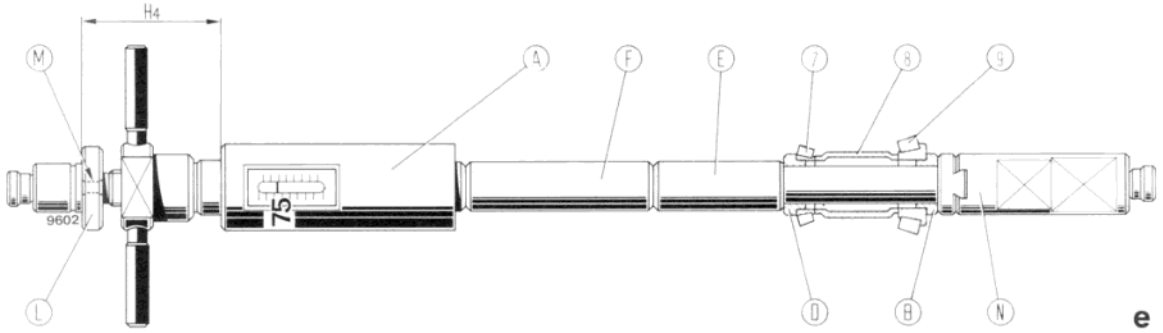
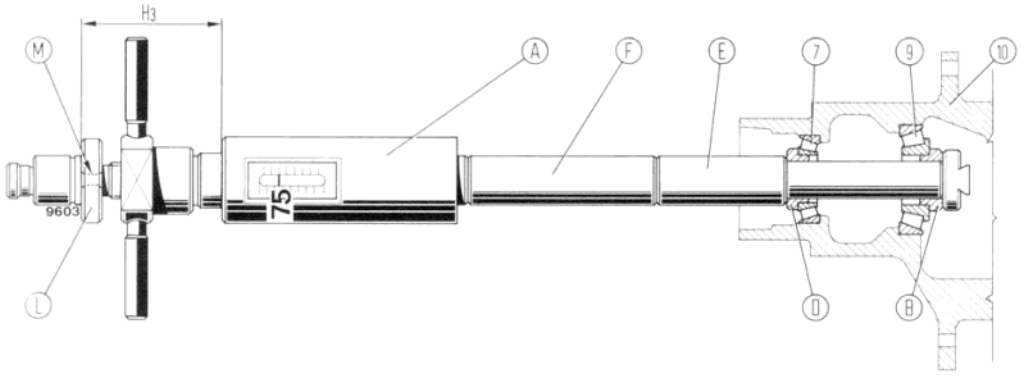
LIVE FRONT AXLE: Front Axle



e



f

Determining Bevel Pinion Bearing Shim Thickness (S_1, page 7) Using Universal Gauge 293510

e. Determining dimension H_4 - f. Determining dimension H_3 - A. Universal gauge **293510** - B. Adaptor **293632**, AM or **293636**PM - D. Adaptor **293633**, AM or **293632**, PM - E. Spacer **293619** - F. Spacer **293620** - H_3/H_4. Dimension measured using depth gauge - L. Register **293624** - M. Register holes - N. Adaptor **293617** - 7/9. Bearing cones - 8 Spacer - 10. Drive head housing

2. Bevel pinion bearing adjustment and shim thickness determination using universal gauge 292510 (figs. e and f)

Fit adaptors **293632** (B) and **293633** (D), AM, or adaptors **293636** (B) and **293632** (D), PM, and spacers **293619** (E) and **293620** (F) to universal gauge **293510** (A).

Moreover, install adaptor **293617** (N) to permit clamping in the vise, subsequently positioning bearing cones (7 and 9) and spacer (8) as shown in Fig **e.** Actuate the handle until the graduated scale pointer moves progressively to 75 kg (165 lb).

Install register **293624** (L) on universal gauge (A) positioning holes (M) in alignment with the flats of the handle hub.

Using a suitable depth gauge, measure dimension (H_4) thus obtained.

Dismantle the pack, lubricate the bearings using engine oil and reassemble the gauge installing adaptors (B and D) and spacers (E and F) on drive head housing (10) as shown in fig. **F**
Progressively return the graduated scale pointer to 75 kg (165 lb), simultaneously turning the gauge to settle the bearings; subsequently, measure dimension (H_3) as directed above.
Shim thickness (S_1, page 7) to be fitted will be as follows:

$$S_1 = H_4 - H_3$$

If necessary, round up to the nearest 0.05 mm (0.002 in).

Note - On completion of adjustment, do not remove the gauge from the drive head housing as the latter is in position ready for subsequent bevel pinion position adjustment.

DIREZIONE COMMERCIALE

3. To determine bevel pinion position shims (figures g, h, and m).
Place the differential bearing cups on shaft (P) of tool **293400/1** with attached cones (R) and position the assembly inside the drive head housing, tightening the differential cap screws (C_{10}) to 113 Nm (11.5 kgm or 83 ft lb). Screw in or back off cones (R) so as to align 100 mm bar (L) towards the bearing cone (11) and eliminate any end play between cones (R) and differential bearing cups.
Act on micrometer gauge (N) to bring bar (L) in contact with cone (11) and read dimension (H_5).
Determine correct nominal dimension (H_7) from ring gear centerline to back of pinion as follows:

$$H_1 = H_7 \pm C$$

where,
H_6 = nominal distance from ring gear centerline to back of pinion, namely 100 mm (3.94 in), AM tractor, or 115 mm (4.53 in) PM tractor.
C = Correction factor stamped on pinion and preceded by + or — sign if different from 0, to be added to or subtracted from nominal dimension (H_6) as applicable.

Thickness of shim (S_2, page 7) will be as follows:

$$S_2 = H_5 - H_7$$

where,
H_5 = micrometer gauge reading
H_7 = correct nominal dimension from ring gear centerline to back of pinion.

Example (AM tractor).

Micrometer reading: H_5 = 103.3 mm

Nominal dimension from ring gear centerline to back of pinion: H_6 = 100 mm

Correction factor: C = + 0.2 mm

Correct nominal dimension:
H_7 = 100 + 0.2 = 100.2 mm.

Thickness of shim: S_2 = 103.3 — 100.2 = 3.1 mm.

Correction factor C = 0 mm.

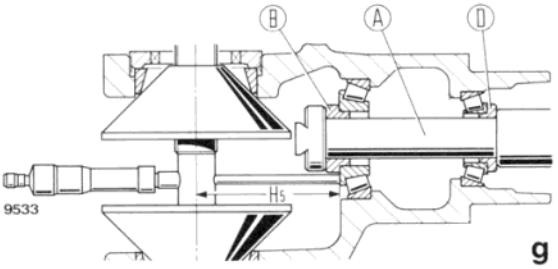
Correct nominal dimension: H_7 = 100 — 0.2 = 99.8 mm

Thickness of shim: S_2 = 103.3 — 99.8 = 3.5 mm.

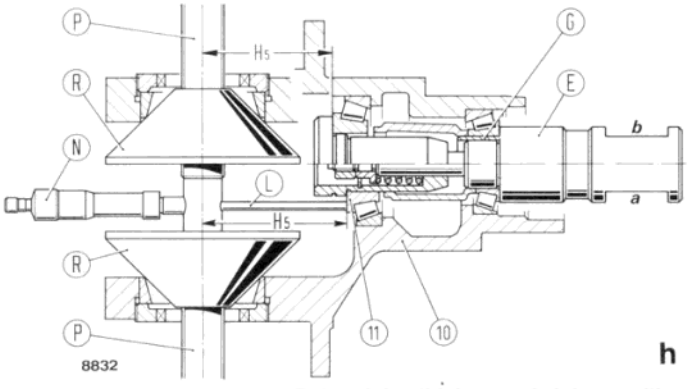
Correction factor: C = 0 mm.

Correct nominal dimension: H_7 = H_6 = 100 mm.

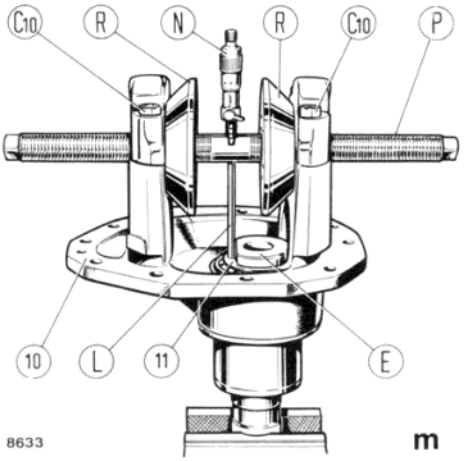
Thickness of shim: S_2 = 103.3 — 100 = 3.3 mm.



g



h



m

Determining thickness of pinion position shim (S_2, page 7)

a. AM models - b. PM models - g. Measuring dimension H_5 using universal gauge **293510** - h. Measuring dimension H_5 using tool **293438/1** - A. Universal gauge **293510** - B. Adaptor **293632**, AM, or **293636,** PM - D. Adaptor **293633**, AM, or **293632**, PM - E. Gauge **293438/1** - G. Centraliser **293439** for use with tool (E) for PM models - L, N, P, R. Gauge **293400/1** - C_{10}. Differential cap capscrews - 10. Drive head housing - 11. Front tapered roller bearinc.

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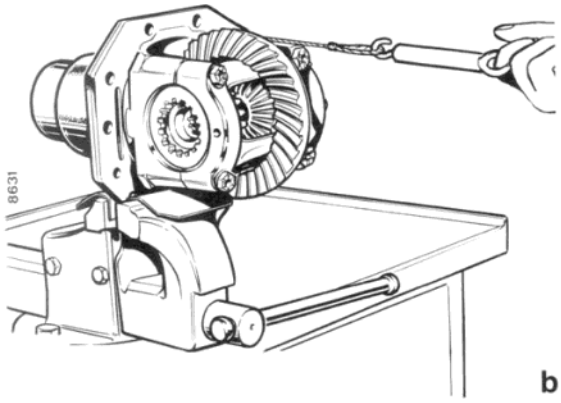
4. To adjust Differential Bearings and Check Bevel Drive Backlash (Figs. a, b and c)

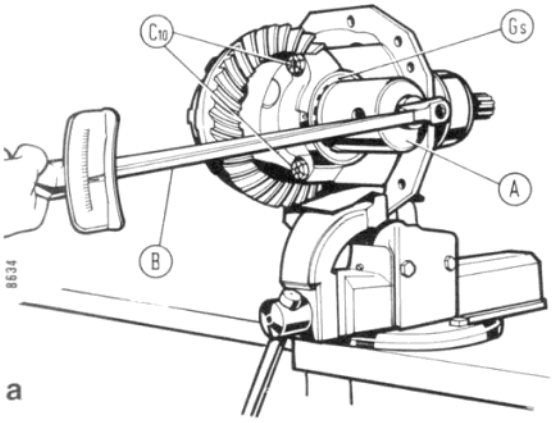
Install the bevel pinion assembly, including shims (S_1 and S_2, page 7) as previously determined in drive head housing, lubricating the bearings with engine oil, and tighten lock ring (C_1, page 7) to 294 Nm (30 kgm, 217 lb ft) using wrench **293520** AM tractor, or wrench **293524** PM tractor.

Install the bevel drive assembly in the case ensuring that the ring gear does not bind when in mesh with the pinion, tighten differential cap screws (C_{10}) to 59 Nm (6 kgm, 43 lb ft), loosen, and retighten to 20 Nm (2 kgm, 14 lb ft).

Lubricate the differential bearings, turn L.H. lock ring (Gs, a) using wrench **293544** AM tractor, or wrench **293665** PM tractor, simultaneously turning the ring gear, until a 39 Nm (4 kgm, 29 lb ft) torque is reached, equivalent to the prescribed axial pre-load.



Checking Differential Bearing Rotating Torque Using a Spring Balance



Adjusting the Differential Bearings
A. Wrench **293544** AM tractor or **293665**, PM tractor - B. Torque wrench - C_{10} Self locking differential cap screws - Gs. Bearing lock ring.

In these conditions, the differential and bevel pinion bearing rotating torque should be 2.8 to 3.2 Nm (0.29 to 0.33 kgm, 2 to 2.4 lb ft).

Pre-load is assessed using a spring balance and a length of string wrapped round the ring gear mounting flange (b).

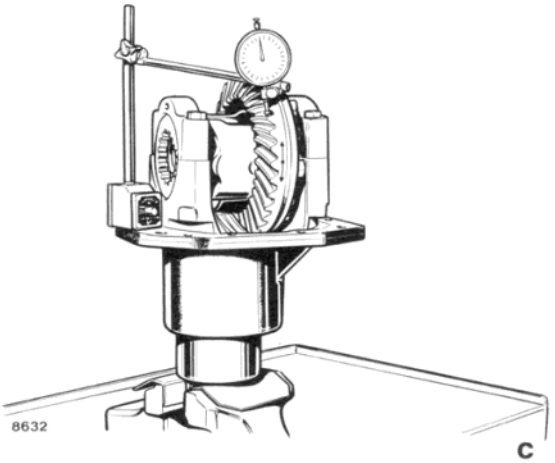
The prescribed rotating torque is equivalent to a spring balance reading of 25 to 39 N (2.5 to 4 kg, 5.5 to 9 lb).
If necessary, adjust the lock ring further.

Check the bevel drive backlash using a suitable dial gauge with the stylus resting squarely on a ring gear tooth flank (c).

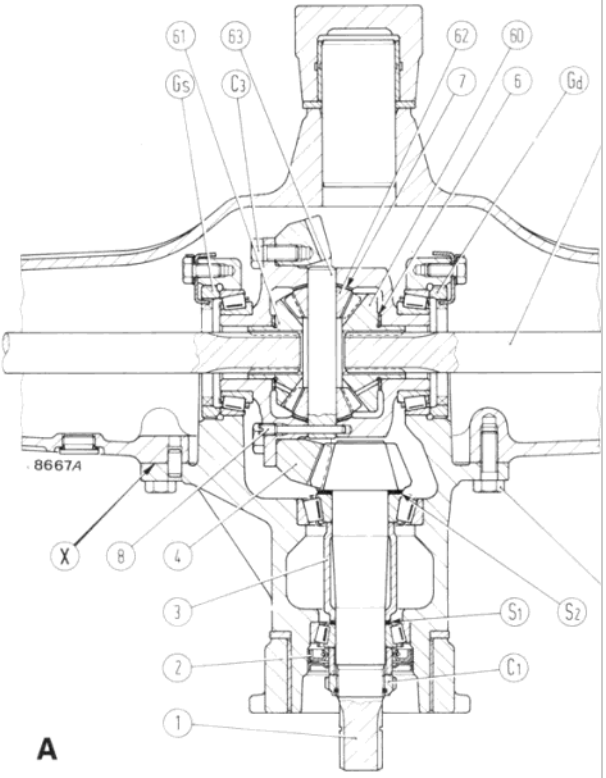
Repeat the measurement in two other points 120° apart and compare the average of the three readings with the prescribed backlash, which is 0.15 to 0.20 mm (0.006 to 0.008 in) AM tractor, and 0.18 to 0.23 mm (0.007 to 0.009 in), PM tractor.

To adjust, back off one and screw in the other lock ring until the prescribed backlash is obtained.

Finally, tighten differential cap screws (C_{10}) to 113 Nm (11.5 kgm, 83 lb ft) and lock the lock rings using the lock plates provided.



Checking Bevel Drive Backlash.



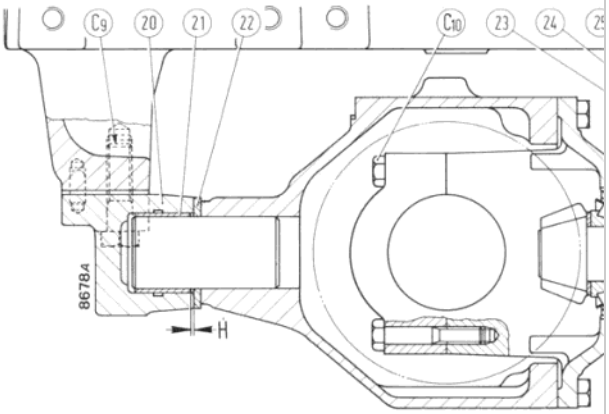
Sections through front axle, axle drive and drive shafts 580 DT and 680 DT

Note - On assembly coat surfaces **X** with adhesive as directed in the general instructions, page 5, Section A.

A. AM front axle - B. PM front axle - a. Axle drive actuating linkage - b. Correct position of axle pivot bushing in front support (split bushing seam position arrowed) - c. Correct position of axle pivot bushing in rear support - d. AM detail - e. AM solution - f. PM solution - C_1. Bevel pinion bearing lock ring - C_2. Drive head housing screw - C_3. Ring gear capscrew - C_4. King pin screw - C_5. Axle arm screw - C_6. Wheel bearing lock ring - C_7. Final drive housing screw - C_8. Wheel capscrew - C_9. Front and rear axle pivot support capscrew - C_{10}. Differential cap screw - C_{11}. Axle support screw - C_{12}. Drive shaft centre bearing screw - C_{13}. Axle drive housing screw - Gd/Gs. R.H. and L.H. differential bearing lock rings - H. Front bushing depth, 1 mm (0.04 in) - S_1. Bevel pinion bearing shim - S_2. Bevel pinion shim - S_3. King pin bearing shim - S_4. Wheel bearing shim - S_5. Front drive sleeve shim - S_6. AM center bearing shim - 1. Bevel pinion - 2. Seal - 3. Bevel pinion bearing spacer - 4. Ring gear - 5. Axle shaft with attached universal joint - 6. Differential wheel thrust washer - 7. Differential pinion thrust washer - 8. Differential pinion journal screw - 9. Bearing retaining screw - 10. Seal - 11. King pin bearing - 12. Seal - 13. Seal - 14. Axle shaft bushing - 15. Spacer - 16. Thrust washer - 17. Planet wheel journals - 18. Planet wheel thrust washer - 19. Sun gear - 20. Front axle pivot support - 21. Front bushing - 22. Front thrust washer - 23. Rear thrust washer - 24. Rear bushing - 25. Rear axle pivot support - 26. Retaining ring - 27. Front drive sleeve - 28. Retaining ring - 29. Front drive shaft guard - 30. Front drive shaft - 31. Retaining ring - 32. Center drive sleeve - 33. Centre bearing - 34. Retaining ring - 35. Rear drive shaft - 36. Rear guard - 37. Retaining ring - 38. Dust excluder - 39. Seal - 40. Retaining ring - 41. Ball bearing - 42. Driven gear - 43. Splined driven shaft - 44. Straight roller bearing - 45. Spring pin - 46. Intermediate shaft - 47. Needle roller bearing - 48. Intermediate gear - 49. Drive gear fitted to bevel pinion - 50. Pad - 51. Inner relay lever - 52. Plunger - 53. Plunger spring - 54. Plug - 55. O-ring - 56. Retaining ring - 57. Outer axle actuator lever - 58. Vertical link - 59. Manual live axle control lever (A = Live Axle in; B = Live axle out) - 60/61. Side gears - 62. Differential pinion - 63. Journal.

Drive shaft end play adjustment

Align the two drive shafts (30 and 35, page 3) relative to drive sleeve (32), adjusting (AM tractors only) vertical position of centre bearing (33) using shims (S_6) listed on page 2, Section 40.



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Differential Backlash Adjustment

Install the two side gears (60 and 61, page 7) without thrust washers (6) on differential case. Position differential pinions (62) together with their thrust washers (7) and journal (63), and start retaining screw (8) through a few turns to prevent journal workout.

Bring left side gear in full contact with differential pinion and, using a suitable depth gauge, measure dimension (H_1) taking two diametrically opposed readings; subsequently, average the two readings arithmetically.

Move side gear to contact differential case and measure dimension (H_2).

Repeat the above operations on the right side gear. End displacement of each side gear without thrust washer should be as follows:

Gs or **Gd** = $H_1 - H_2$

where,

Gs = End displacement of left side gear
Gd = End displacement of right side gear
H_1 and H_2 = Readings of left or right side gear

Normal differential backlash is 0.15 mm (0.006 in).

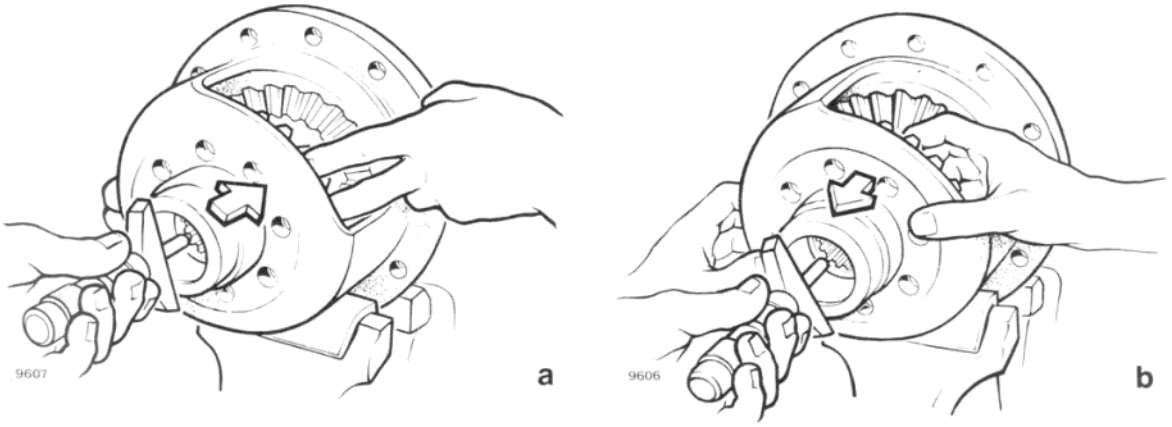
Note that the ratio between normal backlash and the equivalent side gear endwise displacement is on the average **1** to **1.7.**

Side gear end displacement equivalent to normal backlash should be: 0.15x1.7 = **0.25** mm (**0.010** in).

Thus, thickness of thrust washer to be inserted in differential case will be as follows:

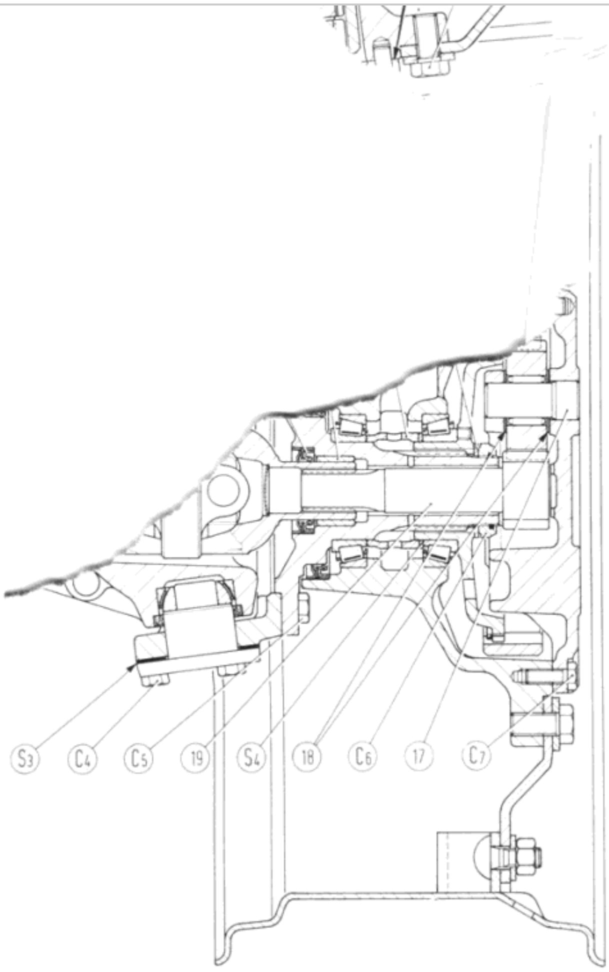
Ss = **Gs—0.25** (left side gear)
Sd = **Gd—0.25** (right side gear)

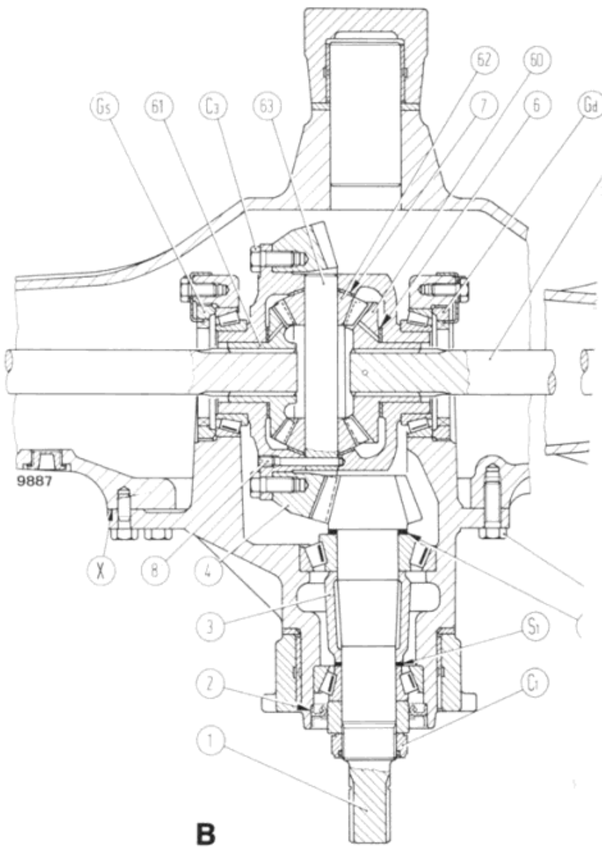
Select and install thrust washers of thickness as near as possible to the correct value noting that available thicknesses are 1.5 and 1.6 mm (0.059 to 0.063 in).



Differential gear shim thickness (16, page 7).

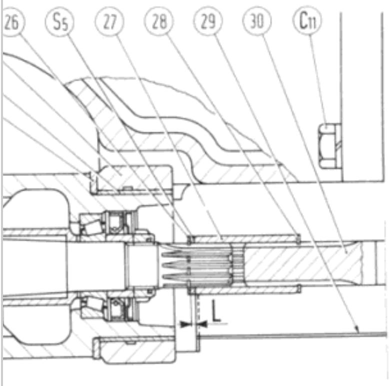
a. Measuring dimension (H_1) - b. Measuring dimension (H_2)

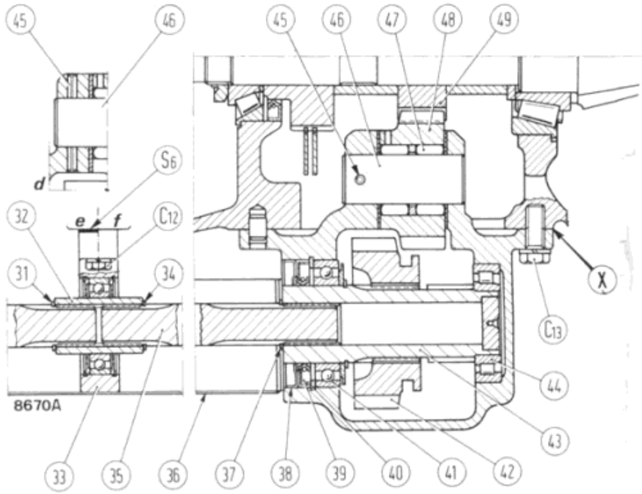




B

ng front drive sleeve (27) in contact with circlip), assess the amount of clearance (L) using a table feeler gauge and install a shim (S_5) of equate thickness, which must be selected from the ge indicated on page 2, Section 40.





LIFT

	580-580 DT	680-680 DT(*)
Type	Position and draught control	
Control	Single lever	Two independent levers
Operating system selection	Lever	—
Response adjustment	Control valve-mounted lever	
Single-acting cylinder		
— Bore x stroke	95x101 mm (3.74x3.97 in)	95x140 mm (3.74x5.51 in)
— Displacement	716 cm^3 (43.7 in^3)	992 cm^3 (60.5 in^3)
Relief valve crack-off setting	186 to 191 bar, (190 to 195 kg/cm^2, 2.702 to 2.773 psi)	
Safety valve crack-off setting	225 to 235 bar, (230 to 240 kg/cm^2, 3.271 to 3.413 psi)	
Design lift capacity	13340 Nm (1360 kgm 98 36 ft.lb)	18485 Nm (1885 kgm 13634 ft.lb)
Lift piston dia.	94.980 to 95.000 mm (3.7394 to 3.7401 in)	
Lift cylinder bore dia.	95.036 to 95.071 mm (3.7416 to 3.7429 in)	
Piston working clearance in bore	0.036 to 0.091 mm (0.0014 to 0.0036 in)	
Cross shaft journal dia.		
— R.H.	54.970 to 55.000 mm (2.1642 to 2.1653 in)	54.970 to 55.000 mm (2.1642 to 2.1653 in)
— L.H.	46.975 to 47.000 mm (1.8494 to 1.8503 in)	62.670 to 62.700 mm (2.4673 to 2.4685 in)
Bushing fitted I.D. in lift body		
— R.H.	55.100 to 55.170 mm (2.163 to 2.172)	55.100 to 55.170 (°)mm (2.1693 to 2.172) (°)
— L.H.	47.100 to 47.170 mm (1.8543 to 1.8571 in)	62.800 to 62.870(°)mm (2.474 to 2.4752 in)(°)
Cross shaft working clearance in bushings		
— R.H.	0.100 to 0.200 mm (0.004 to 0.008 in)	0.100 to 0.200 mm (0.004 to 0.008 in)
— L.H.	0.100 to 0.195 mm (0.004 to 0.0076 in)	0.100 to 0.200 mm (0.004 to 0.008 in)
R.H. bushing interference fit in housing	0.046 to 0.102 mm (0.0018 to 0.0040 in)	0.081 to 0.137 mm (0.0032 to 0.0054 in)
L.H. bushing interference fit in housing	0.046 to 0.102 mm (0.0018 to 0.0040 in)	0.111 to 0.167 mm (0.0044 to 0.0066 in
Cross shaft end float with lift arms in position	0.1 to 0.3 mm (0.004 to 0.0118 in)	0.1 to 1.0 mm (0.0040 to 0.0400 in)

(*) Optional also for mods. 580-580 DT (°) Not reamed

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HYDRAULIC LIFT UNIT: Specification and Data

LIFT

	580-580 DT	680-680 DT(*)
Inner lever pin dia.	—	19.967 to 20.000 mm
	—	(0.7861 to 0.7874 in)
Pin bore dia. in lift body	—	20.020 to 20.072 mm
	—	(0.7882 to 0.7902 in)
Pin clearance in housing	—	0.020 to 0.105 mm
	—	(0.0008 to 0.0041 in)
Draught link fork pin dia.	—	11.982 to 12.000 mm
	—	(0.4717 to 0.4724 in)
Bushing I.D.	—	12.083 to 12.210 mm
	—	(0.4757 to 0.4807 in)
Pin clearance in bushing	—	0.083 to 0.228 mm
	—	(0.0033 to 0.0090 in)
Bushing interference fit in lever	—	0.087 to 0.180 mm
	—	(0.0034 to 0.0071 in)
Draught shaft dia.	—	13.973 to 14.000 mm
	—	(0.5501 to 0.5512 in)
Draught shaft seat dia. in position shaft	—	14.016 to 14.059 mm
	—	(0.5518 to 0.5535 in)
Draught shaft clearance in position shaft	—	0.016 to 0.086 mm
	—	(0.0006 to 0.0034 in)
Position shaft O.D.	—	23.967 to 24.000 mm
	—	(0.9436 to 0.9449 in)
Shaft housing bore dia. in lift body	—	24.020 to 24.072 mm
	—	(0.9457 to 0.9477 in)
Shaft clearance in body	—	0.020 to 0.105 mm
	—	(0.0008 to 0.0041 in)
Top link support pivot diameter	24.948 to 25.000 mm	—
	(0.9822 to 0.9843 in)	—
Housing I.D.	25.000 to 25.035 mm	—
	(0.9843 to 0.9856 in)	—
Pivot working clearance in housing	0.000 to 0.087 mm	—
	(0.0000 to 0.0034 in)	—
Valve spool clearance in valve body	0.025 to 0.035 mm ( )	
	(0.0010 to 0.0014 in) (°)	
Governor piston clearance in lift body	0.025 to 0.035 mm	
	(0.0010 to 0.0014 in)	
Inlet valve spring length		
— Free	13 mm (0.51 in)	
— Under 1.7 to 2.3 N (0.17 to 0.25 kg, 0.4 to 0.5 lb)	9.8 mm (0.38 in)	
Unload valve spring length		
— Free	31 mm (1.22 in)	
— Under 40.2 to 44.1 N (4.1 to 4.5 kg, 9 to 10 lb)	21 mm (0.83 in)	
Governor spring length		
— Free	46 mm (1.81 in)	
— Under 17.6 to 21.6 N (1.8 to 2.2 kg, 4 to 5 lb)	20 mm (0.79 in)	
Lift clutch spring length		
— Free	42 mm (1.65 in)	
— Under 420 to 450 N (42.9 to 45.9 kg, 94.5 to 101 lb)	20.5 mm (0.81 in)	

(*) Optional also for mods. 580-580 DT (°) Matched and honed together on assembly.

LIFT PUMP

	580-580 DT	680-680 DT
Filter		
Type	Paper cartridge	
Location	Suction side, on R.H. side of transmission	
Pump		
Type	Gear, drawing from axle case	
Location	Behind transmission cover	
Model	A22X	A25X
Make	FIAT	
Drive	Valve timing gear driven	
Rotation (from drive end)	Anti-clockwise	
Drive ratio	0.910 to 1	
Max. rated speed (engine at governed speed)	2457 rpm	2275 rpm
Max. rated output	24.5/min	25.8/min
Output at 1450 rpm and 171.6 bar (175 kg/cm², 2489 psi)	43.1 pints/min	45.4 pints/min
— New or reconditioned	13.5 l/min (23.8 pints/min)	15.3 l/min (26.9 pints/min)
— Used	9.4 l/min (16.5 pints/min)	10.7 l/min (18.8 pints/min)
— Test oil temperature	55 to 75°C	
— Test oil grade	SAE 20	
Pump gear journal dia.	17.400 to 17.424 mm (0.6850 to 0.6860 in)	
Journal housing bore dia. in bearings	17.450 to 17.470 mm (0.6870 to 0.6878 in)	
Journal clearance in bearing	0.026 to 0.070 mm (0.0010 to 0.0028 in)	
— Max wear clearance	0.220 mm (0.0087 in)	
Gear clearance in pump body	0.020 to 0.064 mm (0.0008 to 0.0025 in)	
Max. pump body wear on suction side	0.1 mm (0.0040 in)	
Gear flank width	16.323 to 16.348 mm (0.6426 to 0.6436 in)	18.323 to 18.348 mm (0.7214 to 0.7224 in)
Bearing width	19.796 to 19.812 (0.7794 to 0.7800 in)	
Pump body width	56.072 to 56.122 mm (2.2075 to 2.2095 in)	58.072 to 58.122 mm (2.2863 to 2.2883 in)
Gear and bearing end float (applicable to new and reconditioned pumps)	0.1 to 0.2 mm (0.0040 to 0.0080 in)	

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HYDRAULIC LIFT UNIT: Specification and Data

IMPLEMENT ATTACHMENT

	580-580 DT	680-680 DT
Type	3-point linkage	
Category	One and two	Two
Draught control	Through top link	Through lower links and sensing bar
Max. lift capacity, centre of gravity 600 mm (23.6") to the rear of lower link joints from horizontal:		
— Top link coupled to centre hole (1)	1300 kg (2866.5 lb)	—
- Lift travel	535 mm (21 in)	—
— Lifting rods out and coupled to front mounting holes (°)	—	1850 kg (4079 lb)
- Lift travel	—	660 mm (26 in)
— Lifting rods out and coupled to rear mounting holes	—	2000 kg (4409 lb)
- Lift travel	—	545 mm (21 ½ in)
Max. lift capacity, centre of gravity 1000 mm (39.4") (mod. 580) and 1200 mm (47.3") (680) to the rear of lower link joints from horizontal:		
— Top link coupled to centre hole (1)	960 kg (2116.8 lb)	—
- Lift travel	620 mm (24.4 in)	—
— Lifting rods out and coupled to front mounting holes (°)	—	1450 kg (3197 lb)
- Lift travel	—	805 mm (31 ¾ in)
— Lifting rods out and connected to rear mounting holes (°)	—	1600 kg (3527 lb)
- Lift travel	—	670 mm (26 ½ in)
Max. lower link end travel:		
— Lifting rods out	745 mm (29.3 in)	—
— Lifting rods out and coupled to front mounting holes	—	792 mm (31 ¼ in)
— Lifting rods out and coupled to rear mounting holes	—	705 mm (27 ¾ in)
Sensing bar diameter	—	24.967 to 25.000 mm (0.9829 to 0.9842 in)
Sensing bar bushing I.D.	—	25.110 to 25.143 mm (0.9886 to 0.9899 in)
Bar clearance in bushing	—	0.110 to 0.176 mm (0.0043 to 0.0069 in)
Bushing interference fit in housing	—	0.009 to 0.073 mm (0.0003 to 0.0029 in)
Sensing bar end float	—	3 to 3.5 mm (0.1181 to 0.1378 in)

(1) Position rods so that distance between centre of lower link joints and ground is 300 mm (11.8"). (*) Optional also for mods. 580-580 DT (°) Top link coupled to top hole.

TROUBLE SHOOTING CHART

FAULT	CAUSE	REMEDY
1. Lift fails to operate.	a. Low axle oil level.	Top up.
	b. Governor stuck open.	Remove foreign particles and inspect filter.
	c. Inefficient pump.	Inspect pump.
2. Erratic lift movement during raise.	a. Low axle oil level.	Top up.
	b. Clogged oil filter.	Inspect filter and renew cartridge as necessary.
	c. Ingress of air in inlet line.	Check for faulty connections and seals.
3. Lift fails to hold the load in raised position. Continuous pitching motion with the engine running. Upon stopping the engine the load is lowered.	a. Incorrect spool response.	Check response adjustment.
	b. Unload valve stuck open. Faulty seals.	Dismantle, check for leakage, clean and renew damaged parts. Inspect filter.
	c. Inlet valve leakage.	Dismantle, inspect and clean.
	d. Leakage past lift piston gland or lift cylinder seal.	Renew the seals.
	e. Safety valve leakage or incorrect setting.	Renew.
4. Relief valve cracks off with lift arms in maximum raised position.	Lift arm travel out of adjustment.	Adjust travel.
5. Insufficient or inadequate lifting power.	a. Incorrect relief valve setting.	Renew.
	b. Incorrect safety valve setting.	Renew.
	c. Poor pump performance (usually accompanied by increased raise time).	Check pump performance and overhaul on renew as necessary.

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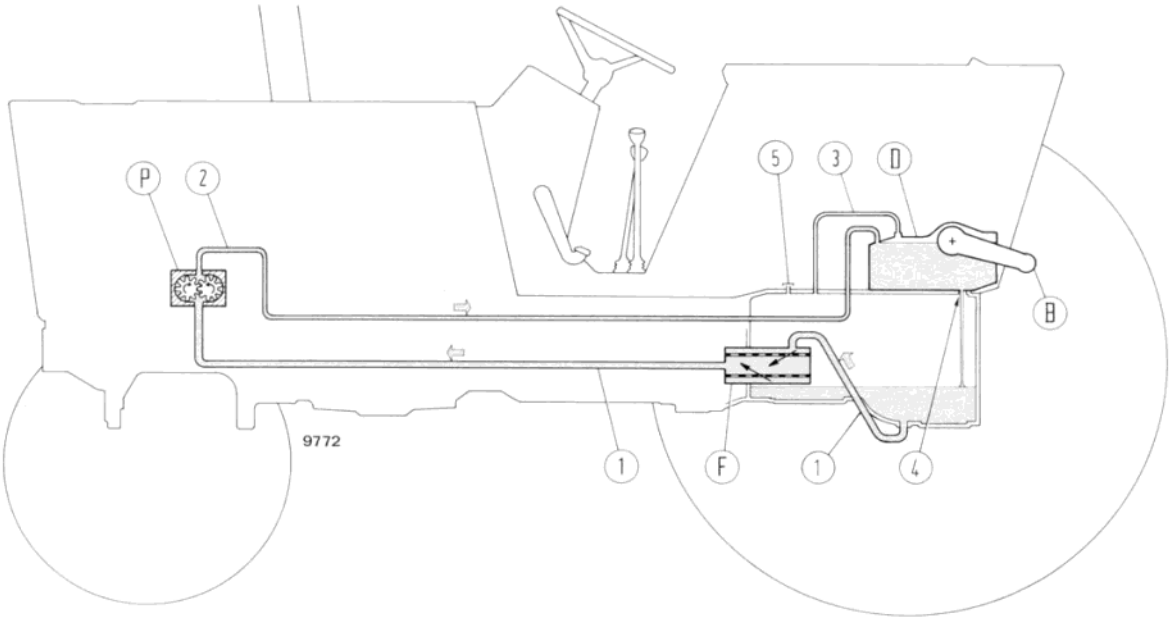
HYDRAULIC LIFT UNIT: Specification and Data

TIGHTENING TORQUE FIGURES

DESCRIPTION	Thread Size	Torque		
		Nm	kgm	ft lb
Lift - Section 501				
Capscrew, spool lever (14, page 1)	M10x1.25	34	3.5	25.3
Nut, control valve body	M10x1.25 M14x1.25	44 118	4.5 12	32.5 86.8
Capscrew, lift to axle case mod. 580 mod. 680	M14x1.5	147 162	15 16.5	108.5 119.3
Capscrew, top lift cover	M 8x1.25	25	2.6	18.8
Capscrew, control valve cover	M10x1.25	59	6	43.4
Capscrew or nut, rear lift cover mod. 580 mod. 680	M12x1.5 M12x1.25	137 98	14 10	101.3 72.3
Relief valve (1, page 1)	M28x1.5	118	12	86.8
Safety valve (3)	M24x1.5	59	6	43.4
Capscrew, lift arm plates (10, page 5)	M14x1.5	147	15	108.5
Capscrew, actuating crank (9)	M10x1.25	60	6.2	44.8
Capscrew, lift lever brackets	M12x1.25	69	7	50.6
Nut, draught	M10x1.25	37	3.8	27.5
Nut, roller cam pin	M 8x1.25	30	3.1	22.4
Capscrew, spring to lift cover and top link support	M14x1.5	157	16	115.7
Lift pump - Section 502				
Capscrew, pump (11, page 1)	M 6x1	8	0.8	5.8
Nut, pump covers	3/8"-24 UNF	41	4,2	30.4
Nut, sleeve to pump drive shaft (12)	7/16"-20 UNF	27	2.8	20.3
Implement attachment and towing devices-Section 503				
Capscrew, sensing bar support	M18x1.5	295	30	217
Capscrew, R.H. adjustable rod cover	M10x1.25	59	6	43.4
Capscrew, check blocks	M14x1.5	147	15	108.5
Capscrew, wear plates	M12x1.25	98	10	72.3
Capscrew, tow bar mounting bracket and support	M18x1.5	295	30	217
Capscrew, front tow hook fork	M16x1.5	235	24	173.6
Nut, rear tow hook	M16x1.5	220	22.5	162.7

Pressure oil
Suction or exhaust oil



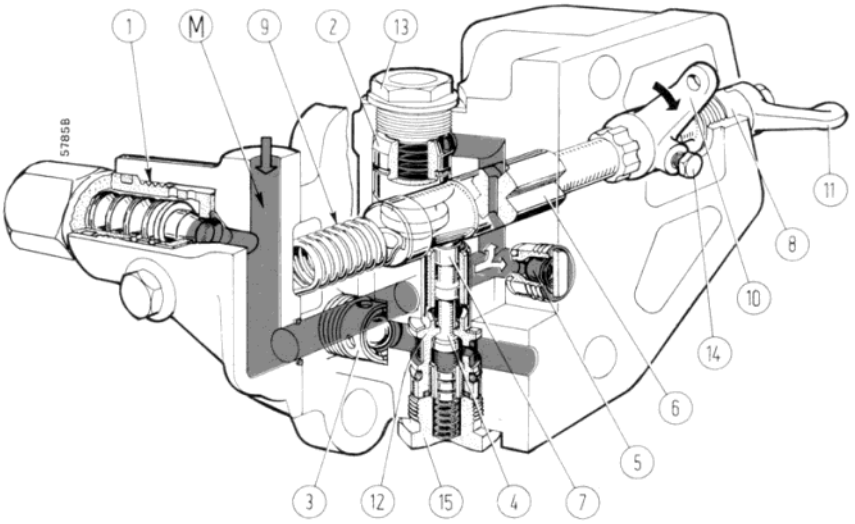
Hydraulic Lift System Diagram (580 and 680 Tractors)

B. Lift arm - D. Valve block - F. Paper cartridge oil filter - P. Engine valve gear driven hydraulic pump - 1. Suction line drawing from rear axle case - 2. Delivery line to valve block - 3. Vent pipe to rear axle case - 4. Oil return to axle case - 5. Vent

Cut-Away of Valve Block

(Black arrow indicates twist on lever 10 by spring 9. Indicated oil flow applies to raising)

M. Inlet port - 1. Relief valve - 2. Governor valve - 3. Safety valve - 4. Unload valve - 5. Inlet valve - 6. Spool - 7. Unload valve plunger (contacting actuating cam on spool) - 8. Response adjuster plug - 9. Spool spring - 10. Spool lever - 11. Response lever - 12. Unload valve seat - 13. Pilot valve plug - 14. Spool lever screw - 15. Unload valve plug



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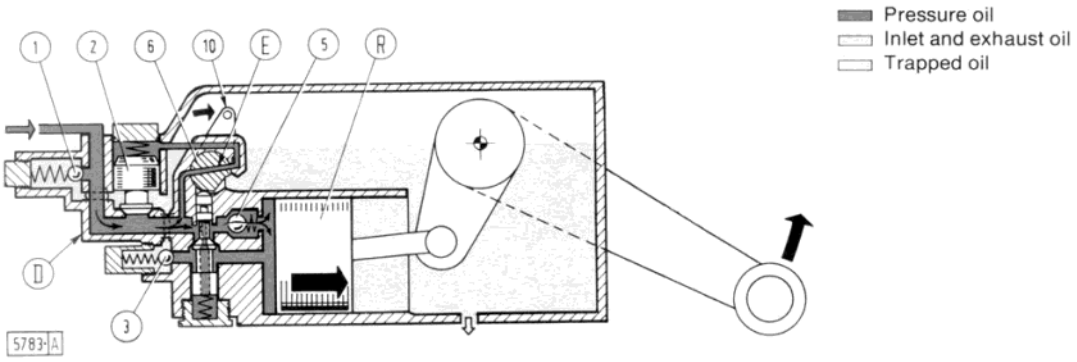
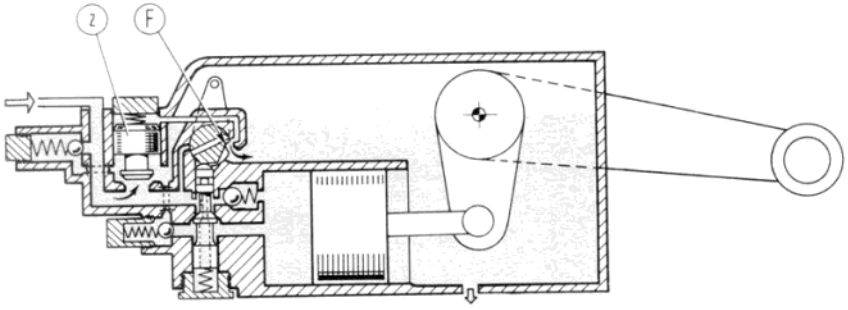
HYDRAULIC LIFT UNIT: Lift Operation



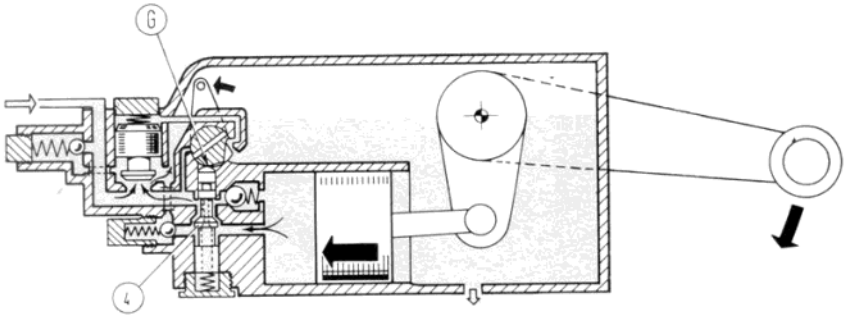
S - Oil Flow when Raising

As spool (6) turns incoming oil pressure is directed to the upper chamber of governor (2) through cross drilling (E). As the upper area of the governor is larger than that on the lower side, the valve is kept closed. Oil pressure is thus directed to the cylinder through valve (5).



N - Oil Flow in Neutral

Spool position is such that oil pressure from governor valve (2) is exhausted through slot (F). Thus, pump oil pressure displaces the governor upwards and the power is directed to the lift body.



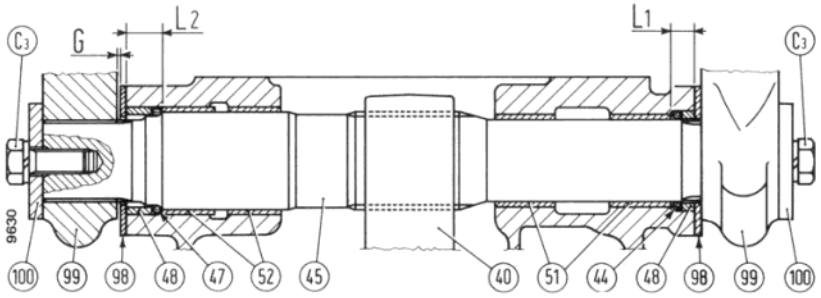
A - Oil Flow when Lowering

Spool cam (G) causes valve (4) to open, thereby connecting the cylinder to exhaust.

LIFT SYSTEM OPERATION DIAGRAM

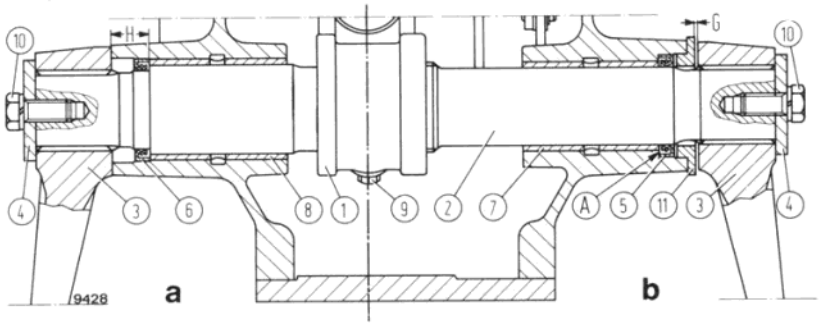
D. Valve block - E. Spool cross drilling - F. Spool slot - G. Spool cam - R. Lift piston - 1. Relief valve - 2. Governor valve - 3. Safety valve - 4. Unload valve - 5. Inlet valve - 6. Spool - 10. Spool lever

DIREZIONE COMMERCIALE



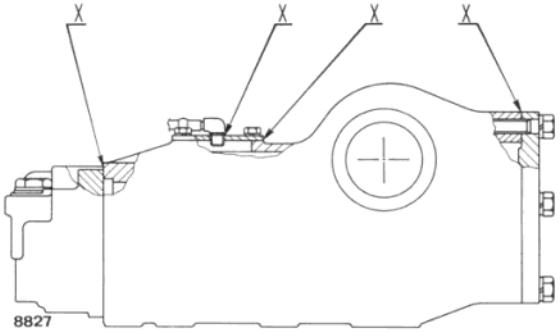
Section through lift cross shaft assembly (mod. 580)

C_1. Lift arm retaining plate capscrew - G = 0.1 to 0.3 mm (0.004 to 0.012 in) Shaft end float - L_1 = 13.5 to 13.8 mm (0.53 to 0.54 in). Outer left bushing stand in - L_2 = 20.5 to 20.7 mm (0.807 to 0.814 in). Outer right bushing stand in - 40. Crank lever - 44. Left seal - 45. Cross shaft - 47. Right seal - 48. Spacer - 51. Left bushings - 52. Right bushings - 98. Washer - 99. Lift arms - 100. Lift arm retaining plates.



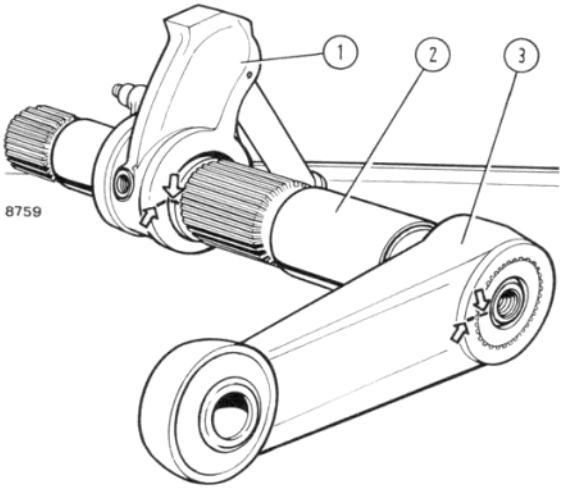
Section through lift cross shaft assembly (mod. 680)

a. A.M. solution (up to frame 027609) - b. P.M. solution (from frame 027610) - A. Face to be flush with bushing - G = 0.1 to 1.0 mm (0.004 to 0.040 in) cross shaft end float - H = 26 to 26.2 mm (1.024 to 1.031 in) Left bushing stand in - 1. Crank lever - 2. Cross shaft - 3. Lift arms - 4. Thrust plates - 5. Right seal - 6. Left seal - 7. Right bushing - 8. Left bushing - 9. Crank capscrews - 10. Thrust plate capscrew - 11. Lift arm thrust washer.



Points to be coated with jointing compound

Note - On assembly apply jointing compound to **X** faces as described on page 5, section A.



Lift arm installation on cross shaft

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LIFT ADJUSTMENT (mods. 580-580 DT)

Adjust in the order given with the lift unit is position on the tractor when lift operating malfunction is suspected.

1. Lift Cables

Check beforehand that lever stop slides right along its groove, that lever follows the contour of the slot alongside rim on which stop operates and that stop can be overridden.

This operation is to be carried out with the ends of cables connected to the hand lever pins (1).

— Move control lever (P) fully forward on quadrant, fully back off start of lift adjuster screw (10) and move screw into contact with stop (11).

— Connect end of top cable (4) to pin (5) on actuator (2) and, acting on adjuster, take up the slack.

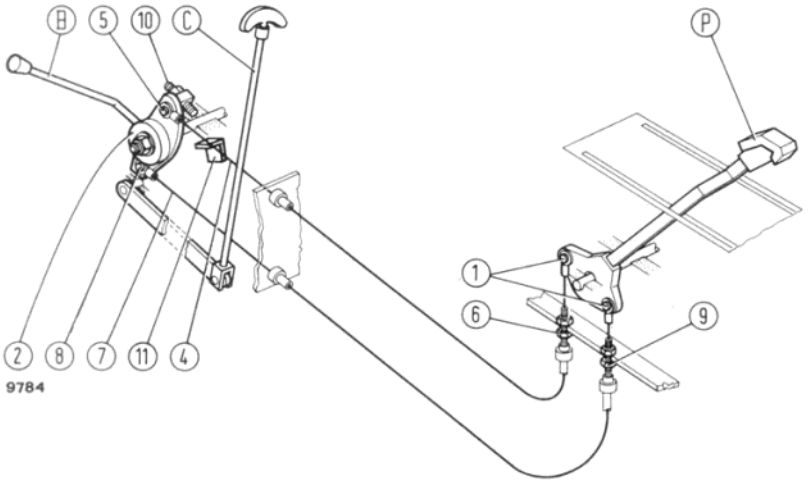
— Connect end of lower cable to pin (8) and take up the slack acting on adjuster (9).

— Move lever (P) over the full stroke at least 5 times and check that with the lever fully forward, adjuster screw (10) is in contact with stop (11). If contact is not established, readjust to take up the slack acting on adjuster screws (6 and 9).

— Using a suitable spring balance, check the force needed to actuate the lever; the correct force is 60 to 70 N (6.1 to 7.1 kg, 13.5 to 15.5 ft.lb). To adjust, act only on adjuster screw (6). If the force on the lever does not decrease, check for binding.

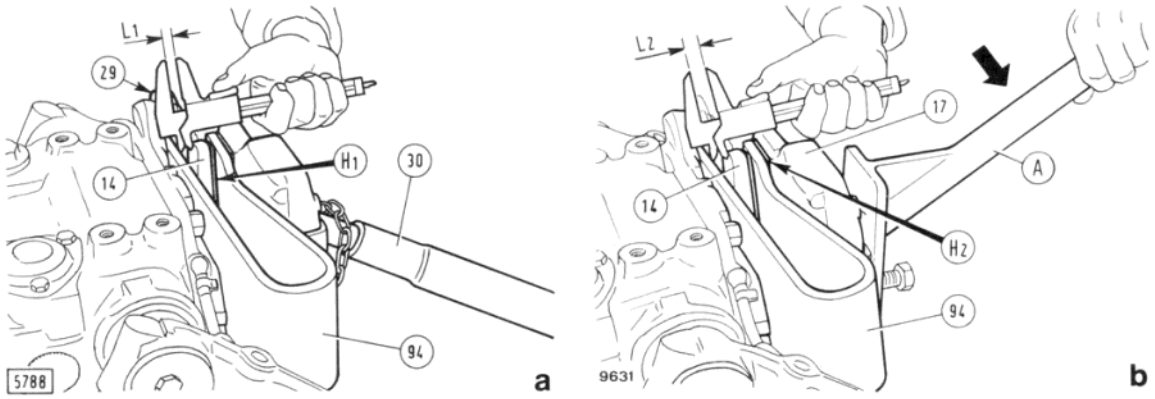
2. Spring travel

Correct spring travel adjustment (94, page 7) ensures that spool rotation does not exceed the set limits and that overall travel, subdivided between compression and tension, is correct. This avoids spring deformation, spring failure and inner linkage distortion.



Adjusting lift control cables

B. Lift control lever from ground - C. Operation selector lever - P. Control lever - 1. Pins - 2. Actuator - 4. Upper link - 5. Connecting pin - 6. Adjuster screw - 7. Lower link - 8. Connecting pin - 9. Adjuster screw - 10. Start of lift adjuster screw in position control - 11. Adjuster screw stop.



Adjusting spring travel

a. Checking distance (L_1) with free spring - b. Checking distance (L_2) with spring pulled taut through lever **290819** (A).
A. Lever **290819** coupled to top link support holes to pull spring (push lever down) - H_1 Shims (L_1) - H_2 Shims (L_2) - L_1 = 12.7 to 13 mm (0.499 to 0.512 in) Nominal gap between plate (14) and free spring - L_2 = 19.2 to 19.7 mm (0.756 to 0.776 in) - Nominal gap between plate (14) and spring in full tension - 14. Plate retaining spring to top link support - 17. Top link support - 29. Spring travel stop wedge - 30. Top link - 94. Spring.

For on-lift adjustment, proceed as follows:
— Release wedge (29) and check (with free spring) that gap (L_1) between plate (14) and spring is within 12.7 to 13 mm (0.499 to 0.512 in).

If gap is less reduce shims (H_1) between spring and plate and if more increase.
— Connect a lever, such as **290819** (A), to top link support holes and exert a downwards effort so that spring moves through its full travel. Check that gap (L_2) is 19.2 to 19.7 mm (0.756 to 0.776 in). If gap is less reduce shims (H_2) between spring and top link support and if it is more increase.

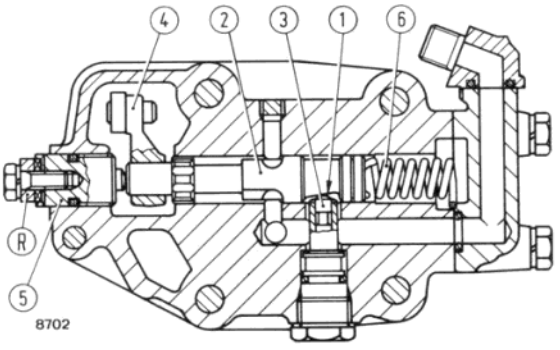
Warning - It is advisable to restrict the number of shims as more than three shims could adversely affect spring retention.

---

3. Control valve response

— Place a 100 kg (221 lb) on the ends of the lower lift links.
— Run the engine at 1,200 to 1,500 rpm
Adjust as follows:

— Shift selector lever (C, page 6) to position control (lever up)
— Acting on ground control lever (B), make at least five complete raising manoeuvres.



Section through spool

R. Response adjuster lever - 1. Unload valve cam - 2. Spool - 3. Unload valve plunger - 4. Spool lever - 5. Response adjuster plug - 6. Spool return spring.

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HYDRAULIC LIFT UNIT: Lift Adjustment

— Starting from uppermost position, shift the control lever down to mid-way on the quadrant.
— Disassemble response adjuster lever (R, page 7) removing capscrew.
— Screw in adjuster plug (5) until lift surges.

Note - Lift surge is an anomalous operating condition whereby the lift arms raise intermittently at intervals of less than two minutes.

— Back off adjuster plug (5) until lift surge ceases.
— Back off the plug through a further half a turn.
— Refit lever (R) in a horizontal position.

4. Start of lift in position control

This adjustment is to be carried out in the same conditions as paragraph **3** proceeding as follows:
— Move selector lever (C, page 6) to position control (lever up) and lever (R, page 7) to minimum response position.
— Move ground control lever (B, page 6) fully up checking that adjuster screw (10) is in contact with stop (11) and lever (P) is fully forward on quadrant.
— Tighten adjuster screw (10) until lift arms start to raise, back off until arms are completely lowered (with screw still in contact with stop) and secure in this position with a locknut.

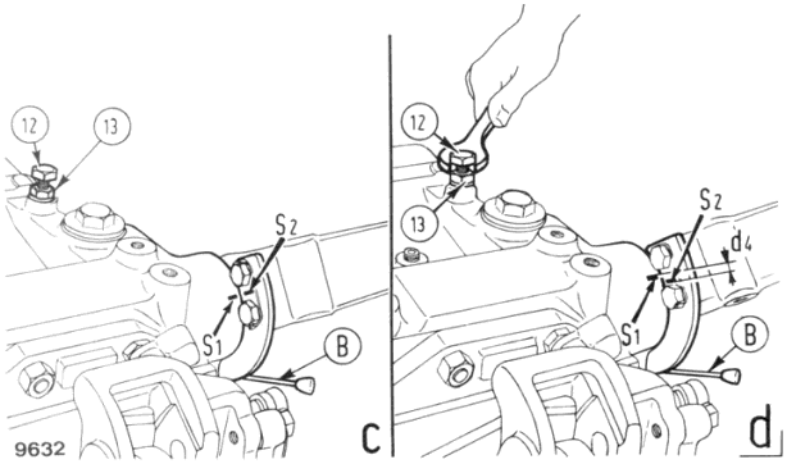
5. Maximum lift arm travel

This adjustment is to be carried out in the same conditions as paragraph **3.**
— Through ground control lever (B) fully raise lift arms (Lever B down).
— Back off adjuster screw (12) slowly by a few turns until relief valve cracks off.
— In this position, make two reference marks on the lift body (S_1) and the cam fastened to the R.H. lift arm (S_2).
— Screw in adjuster screw (12) slowly until, when arms are lowered, distance (d_4) between the marks is 2 to 2.5 mm (0.0787 to 0.0984 in)
— Raise and lower a few times to check adjustment, smear shank of adjuster screw (12) with sealing compound and apply locknut (13).

Note - Keep the ground control lever (B) fully down throughout the adjustment.

6. Start of lift in draught control

This adjustment is to be carried out in the same conditions as paragraph **3** proceeding as follows:
— Move selector lever (C, page 6) to draught control (lever down)



Maximum lift arm travel adjustment

c. Relief valve crack off position of arms - d. Position of arms at maximum lift after adjustment - B. Ground control lever - d_4 = 2 to 2.5 mm (0.0787 to 0.0984 in). Distance between reference marks S_1 and S_2 (arm residual travel). S_1. Lift body reference mark - S_2 Cam reference mark - 12. Maximum lift arm travel adjuster screw - 13. Locknut.

— Operate ground control lever (B) and bring adjuster screw (10) fully up against stop (11).

— Connect lever **290819** (A, page 7) to top link support holes and exert upward thrust so that spring moves through its entire compression stroke.

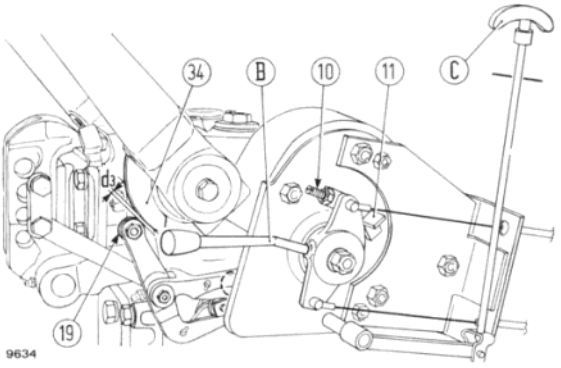
— In these conditions the arms should not raise; to adjust, reduce distance (d_3) between roller (19) and cam (34) acting on roller cam pin.

— Gradually move ground control lever (B) down, still keeping spring compressed, and stop as soon as arms raise.

— Check that distance between adjuster screw (10) and stop (11) is not more than 1.5 mm (0.059 in); if more increase distance between roller (19) and cam (34) acting on roller cam pin.

— Check that with control lever (P, page 6) in fully back position arms can be raised completely.

— On completion of adjustment, clamp cam pin tightening nut to prescribed torque.



Start of lift in draugt control adjustment

B. Lift control lever from ground - C. Selector lever - d_3. Distance between roller and cam with arms raised - 10. Adjuster screw, start of lift in position control - 11. Adjuster screw stop - 19. Roller with cam pin - 34. Cam connected to R.H. lift arm.

LIFT ADJUSTMENT (mods. 680-680 DT; optional for mods 580-580 DT)

Adjust in the order given with the lift unit in position on the tractor whenever lift operating malfunction is suspected.

1. Lift Cables

This adjustment is to be carried out with the ends of the cables connected to the hand lever pins (1, page 10).

a. Position Control

Note - Lever (P) is located towards R.H. mudguard whereas the corresponding actuator (2) is positioned towards the lift body.

— Move position control lever (P) fully forward on quadrant and the associated actuator (2) in contact with stop bar (3).

— Connect the end of the top cable (4) to pin (5) on actuator and, acting on adjuster (6), take up the slack.

— Connect the end of the lower cable (7) to pin (8) and take up the slack acting on adjuster (9).

— Move lever (P) over the full stroke at least 5 times and check that with the lever fully forward actuator (2) returns in contact with stop (3).
If contact is not established, readjust to take up the slack.

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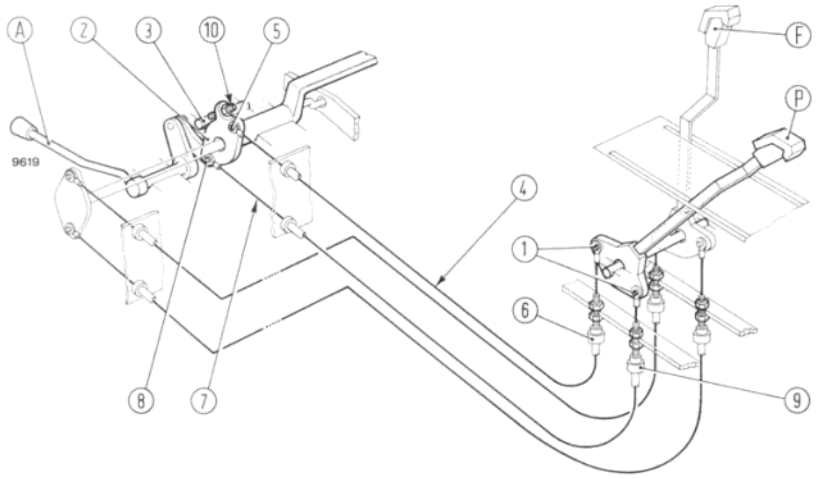
HYDRAULIC LIFT UNIT: Lift Adjustment



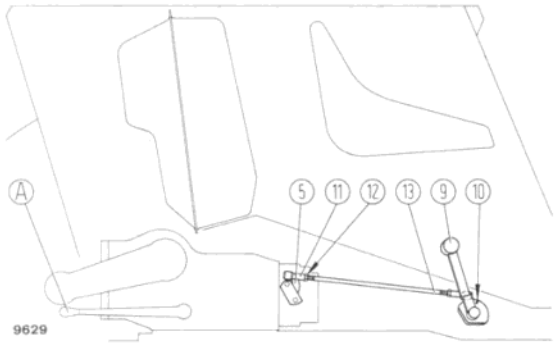
Adjusting Lift Control Cables

A. Lift control lever from ground (from frame 028016) - F. Draught control lever - P. Position control lever - 1. Pins - 2. Position control actuator - 3. Stop - 4. Upper link - 5. Connecting pin - 6. Adjusting screw - 7. Lower link - 8. Connecting pin - 9. Adjusting screw - 10. Maximum lift travel adjusting screw.

— Using a suitable spring balance, check the force needed to actuate the lever; the correct force is 60 to 70 N (6.1 to 7.1 kg, 13.5 to 15.5 ft lb); to reduce the force, back off adjusting screws (6 and 9). If the force on the lever does not decrease, check the lever or the position control actuator for binding.

b. Draught Control Link Adjustment

The adjustment procedure for draught control lever (F) is the same as directed under para. **a** for position control link adjustment.



Response Relay Link Adjustment

A. Lift control lever from ground - 5. Response lever - 9. Response control lever - 10. Maximum response reference pip - 11. Adjuster fork - 12. Locknut - 13. Relay link.

2. PM Response Relay Link Adjustment

Move lever (5) fully black, placing adjuster (7, page 11) in maximum response position (M) and check that in these conditions control lever (9) lies with the front aligned to reference pip (10) on response quadrant.

To adjust, slacken locknut (12) and screw in or back off fork (11) until with lever (5) in maximum response position lever (9) is in conditions described above.

Tighten locknut (12).

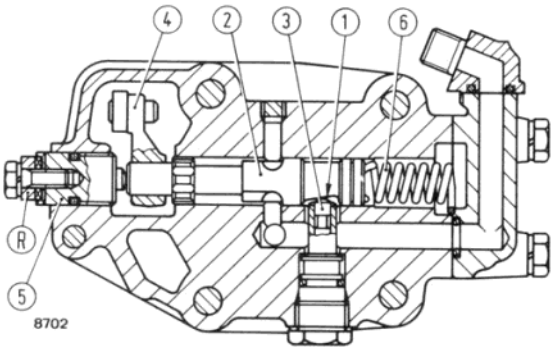
3. AM Control Valve Response

— Place a 200 kg weight on the ends of the lower lift links.
— Raise oil temperature to 50°-60°C.
— Run the engine at 1,200 to 1,500 rpm.

Move draught control lever (F) fully back on the quadrant.

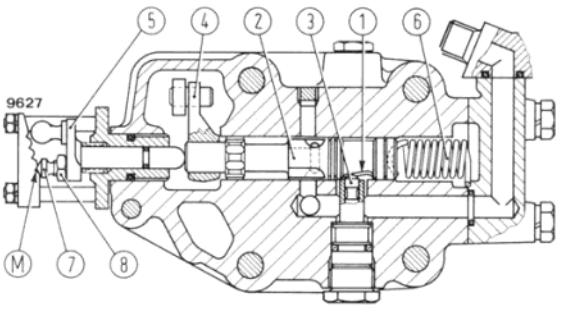
Proceed as follows;

— Shift position control lever (P), or ground control lever (A, from frame 028016), completing a few arm raising manoeuvres.



Section through AM spool

R. Response adjuster lever - 1. Unload valve control cam - 2. Spool - 3. Unload valve plunger - 4. Spool lever - 5. Response adjuster plug - 6. Spool return spring.



Section through PM spool

M. Maximum response mark - 1. Unload valve control cam - 2. Spool - 3. Unload valve plunger - 4. Spool lever - 5. Response relay lever - 6. Spool return spring - 7. Adjuster plunger - 8. Plunger locknut.

— Starting from right back, move lever (P) with a single action to mid-way on the quadrant or starting from uppermost position move lever (A) with a single action down mid-way, ensuring that load does not rest on the ground.
— Disassemble the response adjuster lever (R) removing the capscrew.
— Tighten adjuster plug (5) until lift starts to surge.

Note - Lift surge is an anomalous operating condition whereby the lift arms raise intermittently at intervals of less than two minutes.

— Back off adjuster plug (5) until lift surge ceases.
— Back off the plug through a further half a turn.
— Refit lever (R) in horizontal position.

4. Control Valve Response Adjustment

This adjustment to be carried out in the same conditions as para. 3 proceeding as follows:
— Back off locknut (8) and screw in fully adjuster plunger (7) on lever (5).
— Carry out at least five raising manoeuvres acting on lift control lever from ground (A, page 10).
— Move lever (A) from uppermost position down to mid-way position.
— Shift lever (9) to maximum response (front outline next to reference 10).
— Back off adjuster (7) until lift surges and screw in until lift surge ceases.
— Tighten locknut (8).

5. Maximum lift arm travel adjustment

Maximum upward lift arm travel should be restricted automatically (spool return to neutral) before the mechanical stop is activated (actuating crank interfering with lift body rear cover and cracking off of relief valve).

This adjustment is to be carried out in the same conditions as para. 3 proceeding as follows:
— Move draught control lever (F, page 12) fully back on quadrant.
— Move adjuster lever (R) fully back or, on PM tractors, position response control lever (9) fully forward on quadrant (corresponding to minimum response).

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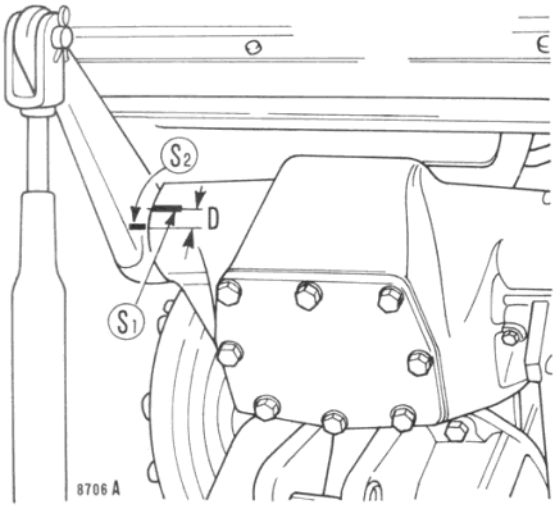
HYDRAULIC LIFT UNIT: Lift Adjustment



Adjusting maximum lift arm travel

D = 2 to 3 mm (0.079 to 0.118 in). Distance between references S_1 and S_2 (arm residual travel) - S_1. Lift body reference - S_2. Lift arm reference.

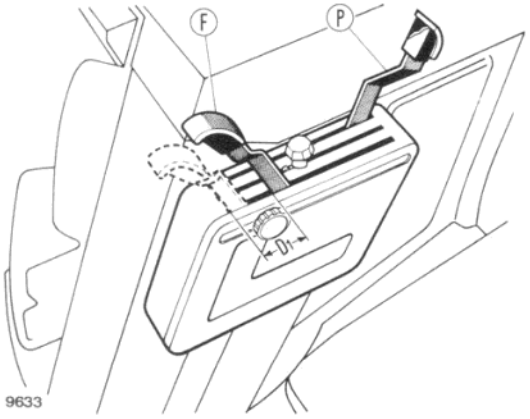
— Raise arms moving position control lever (P) fully back on quadrant, or where fitted, ground control lever (A, page 10) to uppermost position.
— Back off end of travel adjuster screw (10, page 10) on position actuator until relief valve does not crack off (arm mechanical stop).
— Make two reference marks on lift body (S_1) and lift arms (S_2).
— Screw in adjuster screw (10, page 10) until distance (D) between reference marks (S_1 and S_2) is 2 to 3 mm (0.079 to 0.118 in).
— Raise arms a few times to check adjustment and secure adjuster screw with locknut.

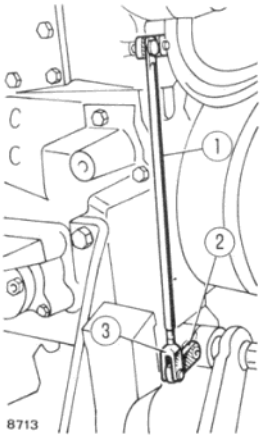
6. Start of lift in draught control

Test conditions:
— System oil temperature 50 to 60°C.
— Engine running at 1200 to 1500 rpm.
— Sensing link (1) connected to associated outer relay levers.
— Adjust control valve to medium response, i.e. lever (R, page 11) horizontal (A.M. valve) or lever (9, page 10) in mid-position (P.M. valve).

Procedure:
— Raise lift arms several times.
— Move position control lever (P) fully back on quadrant.
— Starting from fully forward position, gradually move draught control lever (F) back until the arms raise.
— Check on the quadrant that distance (D_1) from end of slot to front of lever is 128 to 132 mm (5.04 to 5.20 in) (mod 580 up to frame 016630) or 138 to 142 mm (5.43 to 5.59 in) (mod. 680 from frame 025101 up to frame 031644).
— To adjust, disconnect lower fork (3) and extend the sensing link (1) by backing off the fork if distance (D_1) is less than 128 mm (5.04 in) or 138 mm (5.43 in) or shorten the link if the distance is more than 132 mm (5.04 mm) or 142 mm (5.59 in).

Note - Each turn of fork (3) is equivalent to a 12 mm (0.47 in) variation in the distance (D_1) on control lever quadrant.





Adjusting start of lift in draught control

D_1 = 128 to 132 mm (5.04 to 5.20 in) (from frame 016631 for mod. 580; up to frame 025100 and from frame 031645 for mod. 680) or 138 to 142 mm (5.43 to 5.59 in) (up to frame 016630 for mod. 580; from frame 025101 and up to frame 031644 for mod. 680). Draught control lever to forward end of quadrant slot - F. Draught control lever - P. Position control lever - 1. Sensing link - 2. Lower sensing lever - 3. Lower link fork.

TO CHECK VALVES

Relief and Cylinder Safety Valves

On-bench relief and cylinder safety valve setting check is carried out using hand pump **290284** together with valve holders **290824** and **290826.**

The relief valve should crack off at 186 bar (190 kg/cm², 2702 psi), whereas cylinder safety valve should crack off at 225 or 235 bar (230 to 240 kg/cm², 3271 to 3413 psi).

Note - If the setting is found to be incorrect, preferably renew the valve in question. However, if necessary, adjust through the threaded plugs after folding back the peened areas.

When testing the relief valve on the tractor proceed as directed below.

a. Tractor not fitted with remote control valves

— Fit connector **291326** (G, page 14) between delivery connection (7) and valve carrier cover (8), and connect to pressure gauge **293300** (E), scale 0 to 250 kg/cm² (0 to 3556 psi).

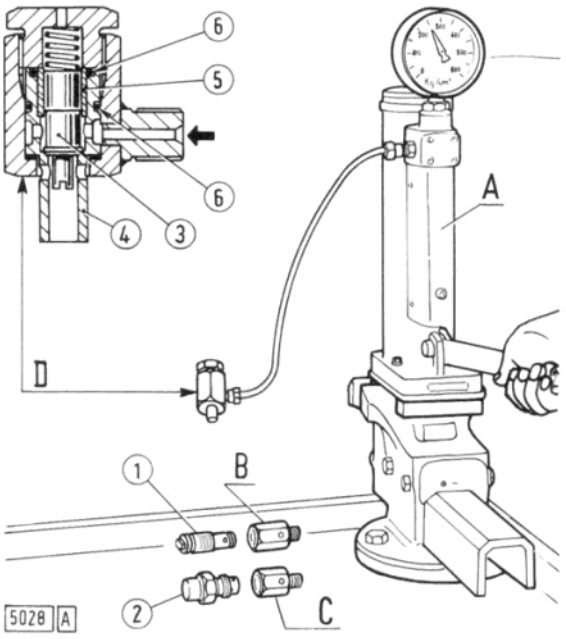
— Run the engine to bring oil temperature to 50° ± 3°C (117 to 127°F).

— Move position control lever (P, page 6, mod. 580 or P, page 10, mod. 680) fully back on quadrant.

Note - For mod. 580 check that lever (C, page 6) is in position control (uppermost position).

— Back off adjuster screws (12, page 8, mod. 580 and 10, page 10, mod. 680) until relief valve cracks off.

— With engine running at 1900 rpm, mod. 580 and 1700 rpm, mod. 680, check that the indicated pressure is 186 to 191 bar (190 to 195 kg/cm², 2702 to 2775 psi).



Relief Valve, Cylinder Safety Valve and Unload Valve Test Equipment

A. Hand pump **290284** - B. Relief valve holder connection **290824** - C. Cylinder safety valve holder connection **290826** - D. Unload valve holder connection **290834** - 1. Relief valve - 2. Cylinder safety valve - 3. Unload valve - 4. Unload valve seat - 5. Valve barrel - 6. O-rings.

b. Tractor fitted with remote control valves

— Fit connection **293449** (F, page 14) to a quick-connect female half-coupling and connect to pressure gauge **293300** (E), scale 0 to 250 kg/cm² (0 to 3566 psi).

— Run the engine until oil temperature is 50° ± 3°C (117 to 127°F).

— Actuate the control lever on the control valve associated with the half-coupling in question until relief valve cracks off.

— With engine running at 1900 rpm, mod. 580 and 1700 rpm, mod. 680, pressure gauge should indicate 186 to 191 bar (190 to 195 kg/cm², 2702 to 2775 psi); to adjust, turn setting adjuster screw as necessary.

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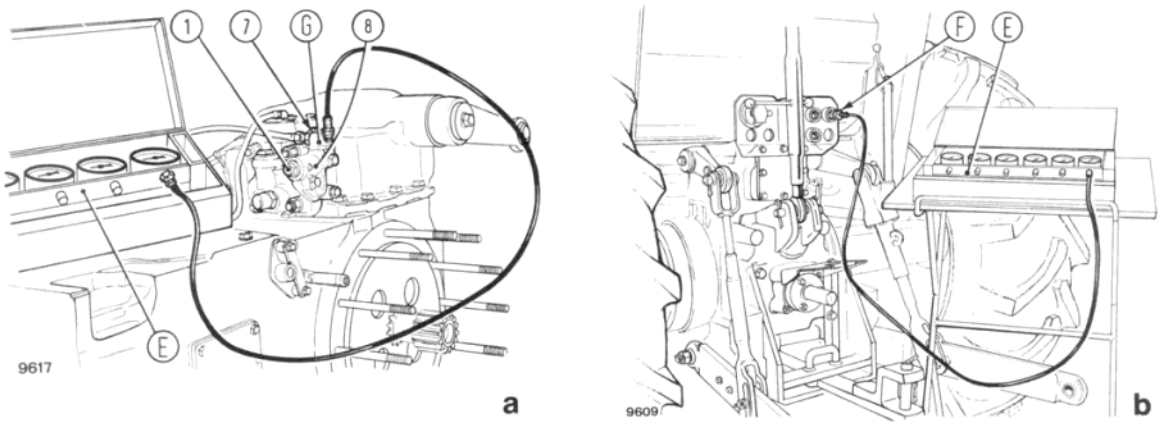
HYDRAULIC LIFT UNIT: To Check Valves



Checking Maximum Lift Operating Pressure (relief valve crack-off setting adjustment)

a. Tractor without remote control valves - b. Tractor with remote control valves - E. Universal tester **293300** - F. Connection **293449** - G. Connection **291326** - 1. Relief valve - 7. Oil connection between pump and control valve - 8. Valve holder cover.

Unload Valve

To test unload valve for leakage proceed as follows:

— Install valve with attached sealing rings on connection **290834** (D, page 13), connected to hand pump **290284** (A).

— Actuate pump until indicated gauge pressure is 245 to 294 bar (250 to 300 kg/cm^2, 3556 to 4257 psi).

— Record time taken by pressure to drop from 196 to 98 bar (200 to 100 kg/cm^2, 2845 to 1422 psi); the correct time is in excess of 6 seconds.

If the recorded time is lower, renew O-rings and retest valve. If the trouble persists, renew the valve as a whole without hesitation.

LIFT PUMP

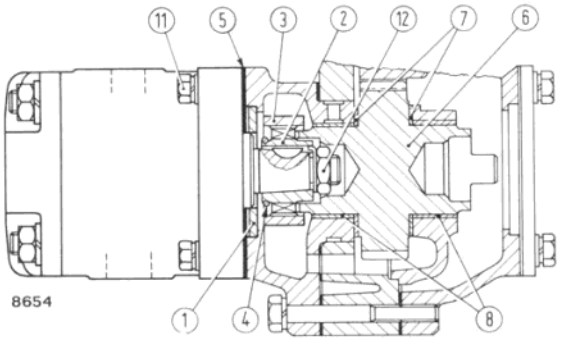
To Overhaul

Mark the position of the internal parts in order to restore them to their original position on reassembly.

Check gear shaft and bearings for wear comparing the readings to the data given in the table on page 3, Section 50.

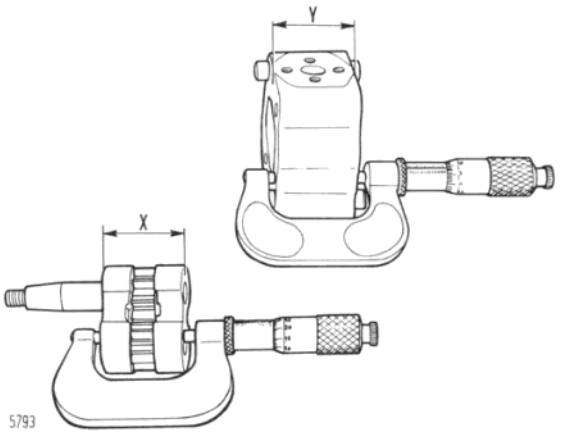
Check gear side face flatness and squareness relative to the bearings, smearing the surfaces in question with carbon black.
Small defects may be remedied using wet zero-grade emery cloth.
Check gear end clearance in the pump body with the bearings in position. The correct end float is 0.1 to 0.2 mm or 0.004 to 0.008 in. Any pump body face dressing, with a view to restoring the prescribed end clearance should be carried out using wet O-grade emery paper, removing as little material as possible.

Liberally lubricate all pump parts using the same grade of hydraulic lift oil, then reassemble noting the following points:
— Ensure that the reference marks applied on dismantling are in register.
— Position plastic anti-extrusion ring inside the centre O-ring.
— The bearings, which should slide into position by hand, must be introduced so that fillets face towards the outlet ports and with slotted frontal surfaces abutting the gears.
— Fit rotary shaft seals to rear cover with attached spacer and pack the lip cavity with **grassofiat G9** or other approved grease.



Lift Pump Drive

1. Centraliser - 2. Drive sleeve - 3. Drive annulus - 4. Retaining ring - 5. Gasket - 6. Pump driven gear - 7. Thrust washers - 8. Bushings - 11. Pump screw - 12. Drive sleeve nut.

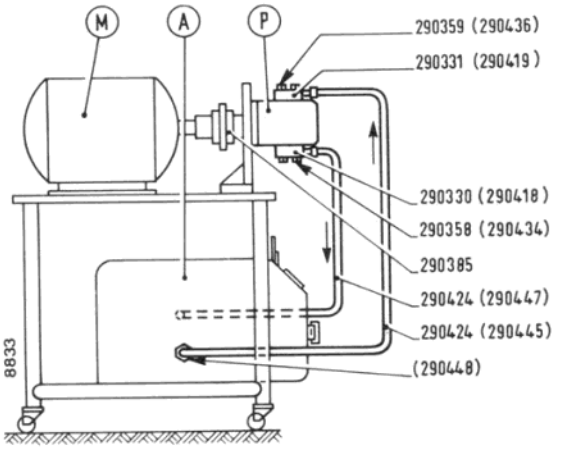


Checking Gear End Clearance in Pump Body

Note - Dimension **X** to be smaller than dimension **Y** by 0.1 to 0.2 mm or 0.004 to 0.008 in

— Progressively tighten the cover nuts and bolts to the pump body adopting the prescribed tightening torque ratings.

When refitting the pump to the tractor, fill both suction pipe and the pump body with **oliofiat AF87** or other approved oil to facilitate priming and avoid seizure during initial service.



Lift Pump Output Test Machine

Note - Bracketed numbers refer to output tester **291231**

A. Output tester **292574,** small (or **291231,** large) - M. Motor **291235 -** P. Pump under test (A22X, 580 tractor and A25X, 680 tractor)

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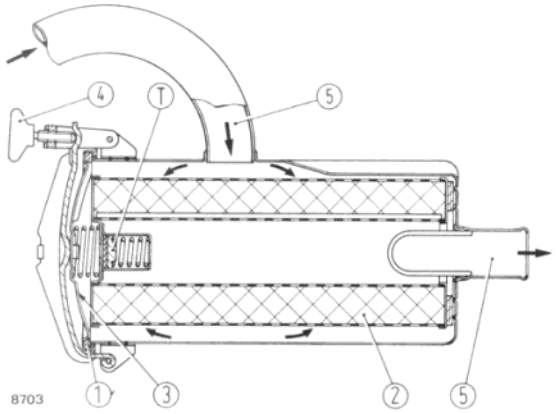
HYDRAULIC LIFT UNIT: Lift Pump



Section through Lift Oil Filter

T. Bypass valve - 1. Seal - 2. Filtering cartridge - 3. Cover - 4. Cover screw - 5. Inlet pipe

Output Test

Couple the pump to the drive motor and connect to output test machine using the equipment shown on page 1.

Use **oliofiat AP51** (SAE 20) supplied with the test machine and carry out the output test at the prescribed temperature and pressure settings.

Compare the output figures obtained with the values of the chart, noting the following:
— Output ratings of new or reconditioned pumps should be faily close to the dotted line.
— Output ratings of used pumps are acceptable if included in the shaded area of the chart.

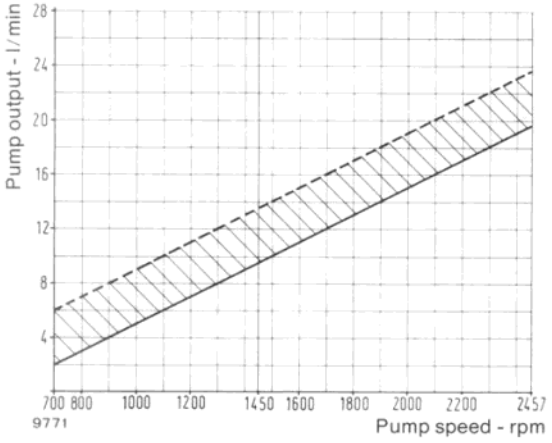
If the pump rating is very near to, or lower than, the continuous line, the pump in question should be overhauled or renewed.

OIL FILTER

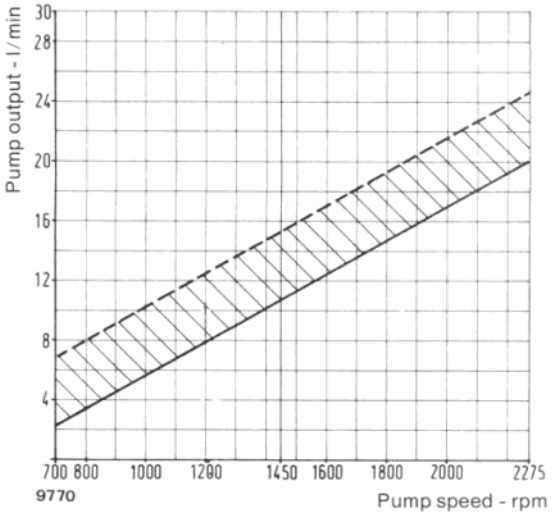
The lift oil filter is located on the pump suction line.

The filtering element consists of a paper cartridge (2), which should be renewed every 400 hours.

By-pass valve (T), set to 0.30 bar or 0.3 kg/cm² or 4.3 psi, is activated when the pressure inside the cartridge drops in relation to outside pressure.



A22X



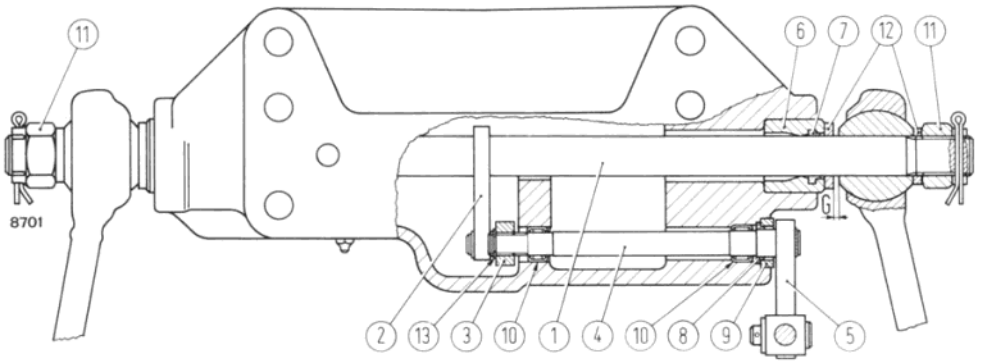
A25X

Speed-Output Chart of Lift Pump

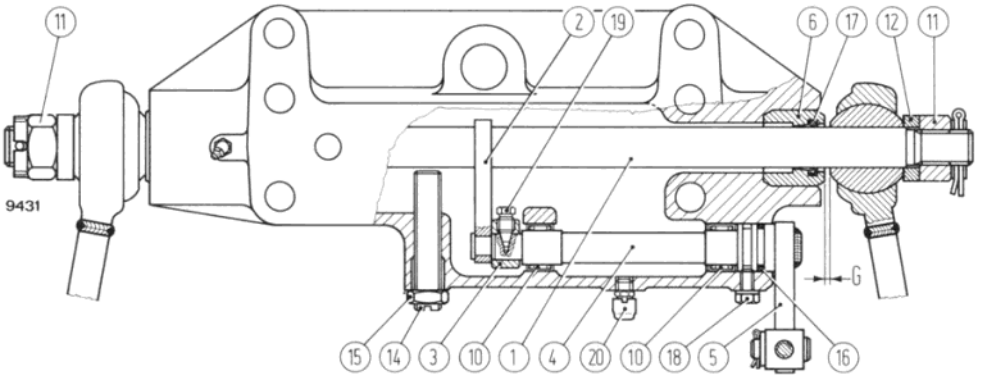
A22X, pump fitted to 580 tractor - A25X, pump fitted to 680 tractor.

Test pressure 166 bar or 170 kg/cm² or 2418 psi -
Oil temperature 55° to 65°C -
Pump drive ratio 0.910 to 1

DIREZIONE COMMERCIALE



Section through Draught Control Device (up to frame 025100, mod. 680)



Section through Draught Control Device (from frame 025101 up to frame 031644, mod. 680; optional for mod. 580)

G. 3 to 3.5 mm or 0.118 to 0.138 in, sensing bar end play - 1. Sensing bar - 2. Crank lever - 3. Sensing lever - 4. Relay shaft - 5. Lower lever - 6. Sensing bar bushing - 7. Seal - 8. Seal - 9. Seal retainer - 10. Needle roller bearing - 11. Nut - 12. Thrust washer - 13. Retaining ring - 14. Sensing bar limit travel adjusting screw - 15. Locknut - 16. O-ring - 17. O-ring - 18. Relay shaft capscrew - 19. Sensing lever capscrew - 20. Vent

DRAUGHT CONTROL DEVICE (Mod. 680 - Optional for mod. 580)

On assembly, note the following points:

— Install upper relay lever (7, page 2) on inner lever pin (8) ensuring that the reference marks shown on page 2 are in register.

— Couple relay shaft (4) to sensing lever (3) so that the latter lies at right angles to the lower lever (5) as shown on page 2.

— Smear the bores of sensing bar bushings (6) with **Molikote** Type **G** grease and pack recess (A, page 2) with **grassofiat Jota 1**.

— Install sensing bar support on axle casing and fill inner recess right up with **grassofiat Jota 1** to be introduced through the lubricators provided until surplus grease flows from vent (20).

To Adjust Sensing Bar End Float

Screw in nuts (11) by the same amount on either end of the sensing bar (1).

Displace the bar axially on one side and check that end play (G) is correct. The correct end play is 3 to 3.5 mm or 0.118 to 0.138 in.

Screw in or back off nuts (11) by the same amount bearing in mind that each turn of each nut alters the clearance by 2 mm or 0.080 in.

Note - For devices from frame 025101, mod. 680, and for all Mod. 580 devices, adjust sensing bar travel as follows:
— Slacken lock nut (15) and screw in adjuster (14) until contact with sensing bar is established.
— Back off adjuster screw (14) through half a turn.
— Tighten lock nut (15).

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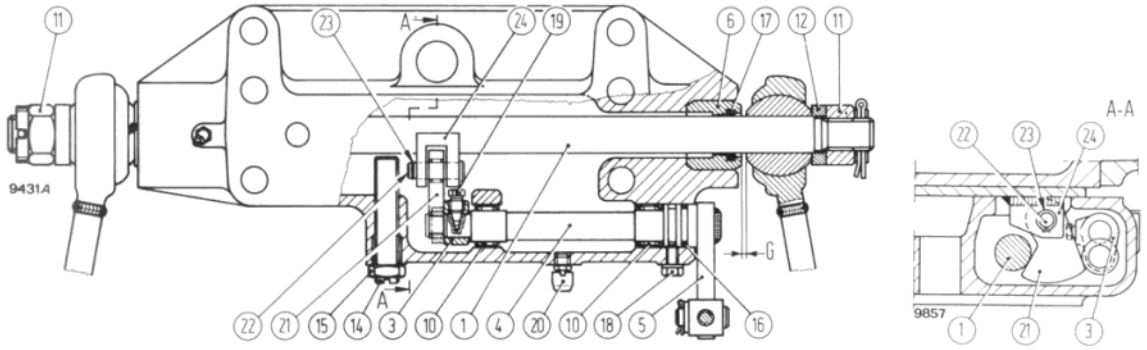
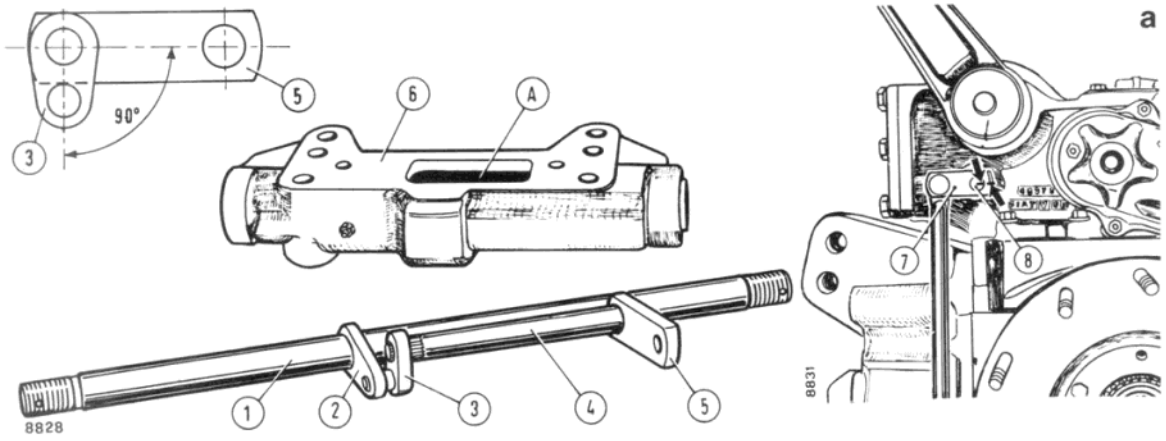
HYDRAULIC LIFT UNIT: Implement Attachment



Section through Draught Control Device (from frame 031645, mod. 680; optional for mod. 580 from frame 016631)

G = 3 to 3.5 mm (0.118 to 0.138 in) Sensing bar end play - 1. Sensing bar - 3. Sensing lever - 4. Relay shaft - 5. Lower relay shaft - 6. Sensing bar bushing - 10. Needle roller bearings - 11. Arm retaining nuts - 12. Thrust washer - 14. Sensing bar limit travel adjuster screw - 15. Locknut - 16. O-ring - 17. O-ring - 18. Relay shaft capscrew - 19. Sensing lever capscrew - 20. Vent - 21. Sensing cam - 22. Cam pivot - 23. Retaining ring - 24. Cam support plate.



Assembling Draught Control Device

a. Reference marks on lever (7) relative to pin (8) - A. Support recess packed with Grassofiat Jota 1 on assembly - 1. Sensing bar - 2. Crank lever - 3. Sensing lever - 4. Relay shaft - 5. Lower lever - 6. Support (AM) - 7. Upper lever - 8. Inner lever pin.

SPECIFICATION AND DATA

Filter	Paper cartridge (the same as used for lift oil filtering)
Pump	Gear (the same as used for lift circuit)
Remote control valves	
Type	Spool, spring return
Make	SALAMI - VDO6
Installation	Banked (up to a maximum of 3) attached to right fender
Control	Separate hand levers
Relief valve pressure setting	186 to 191 bar (190 to 195 kg/cm², 2702 to 2773 psi)
Spool clearance in body (single acting and double acting)	0.006 to 0.009 mm (0.0002 to 0.0004 in)
Spool clearance in body (trailer brake valve)	0.02 to 0.03 mm (0.0008 to 0.0012 in)
Spool return spring length (single and double acting)	
— Free	36 mm (1.417 in)
— Under 157 N (16 kg, 33 lb)	15 mm (1.590 in)
Relief spring length	
— Free	30.5 mm (1.201 in)
— Under 510 N (52 kg, 115 lb)	25.5 mm (1.004 in)
Spool return spring length (trailer brake valve) (lever end)	
— Free	26.8 mm (1.055 in)
— Under 353 N (36 kg, 79 lb)	23.8 mm (0.937 in)
Spool return spring length (trailer brake control valve)	
— Free	33 mm (1.299 in)
— Under 87 N (8.9 kg, 20 lb)	26 mm (1.024 in)

TORQUE DATA

DESCRIPTION	Thread Size	Torque		
		Nm	kgm	ft lb
Nut, valve tie bolt	M 8x1.25	3	29	21.5
Plug, relief valve	M20x1.5	6	59	43
Lock nut, relief valve adjuster screw	M 8x1.25	2	20	14.5

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HYDRAULIC LIFT UNIT: Remote Control Valves

REMOTE CONTROL VALVES

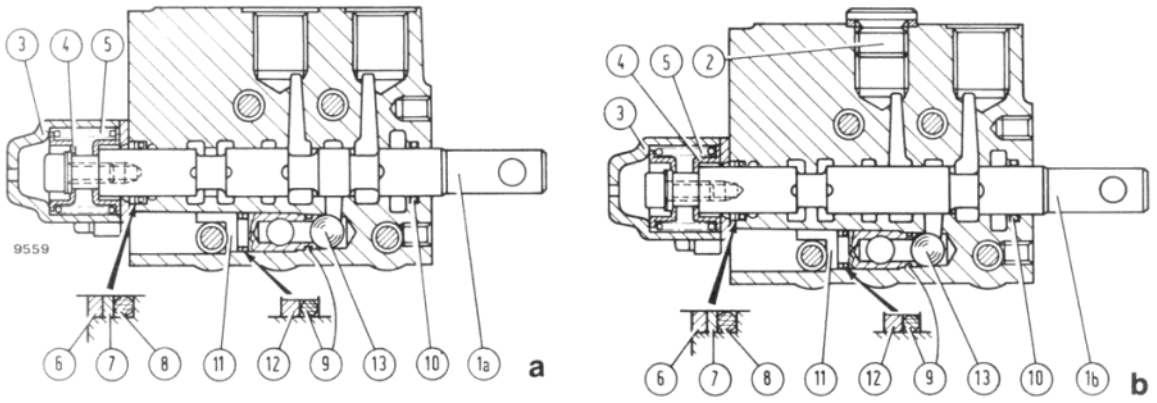
Dismantle remote control valves referring to the sectional views below and noting the following points:

— Withdraw the spool from each valve body, after removing caps (3 or 6).
— Dismantle trailer brake control valve spool withdrawing bushing (8) from barrel (10) and the latter from spool (1).
— To dismantle non-return valve (13), withdraw the valve seat (11) using a hooked metal wire.
— To remove relief valve from remote control valve body take off plug (16).

When renewing inefficient parts, note the following points:

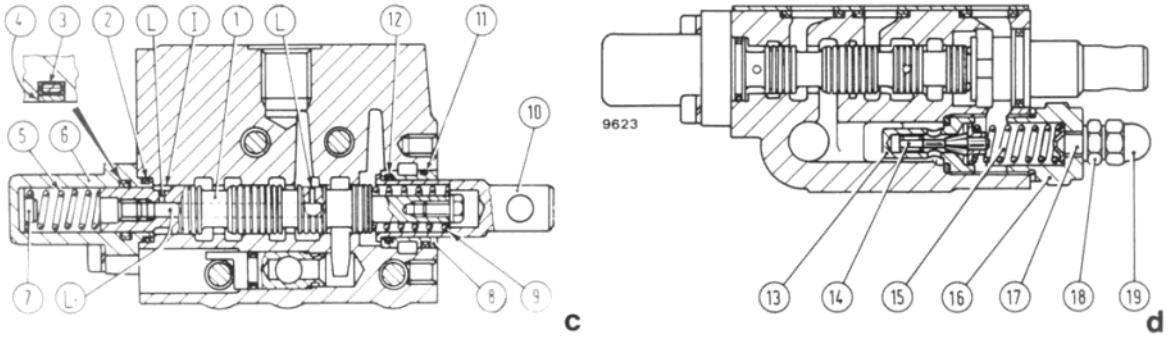
— Spools are supplied matched to their respective valve body.
— Relief valve (14) is supplied together with seat (13).

For control valve assembly reverse the dismantling procedure; the tie bolt nuts are to be tightened to 29 Nm (3 kgm, 21.7 ft.lb.). Subsequently, carry out the hydraulic tests as directed below.



Sections through Remote Control Valves

1a. Double acting spool - 1b. Single acting spool - 2. Single acting spool plug - 3. Cap - 4. Cup - 5. Spool reurn spring - 6. Washer - 7. Anti-extrusion ring - 8. O-ring - 9. O-ring - 10. O-ring - 11. Non-return valve seat - 12. Anti-extrusion ring - 13. Non-return valve ball.



Sections through Trailer Brake Cylinder Remote Control Valve

I. Annular chamber - L. Cross drillings - L_1. Oil gallery - 1. Spool - 2. O-ring - 3. O-ring - 4. Anti-extrusion ring - 5. Spool return spring - 6. Cap - 7. Spring guide - 8. Bushing - 9. Spring - 10. Spool barrel - 11. O-ring - 12. O-ring - 13. Relief valve seat - 14. Relief valve - 15. Spring - 16. Valve plug - 17. Relief valve adjuster screw - 18. Nut - 19. Locknut.

DESCRIPTION AND OPERATION

The optional spool type remote control valves (D) are suitable for single and double acting cylinder applications and for hydraulic trailer brake applications.

They may be installed banked up to 3 together and fastened by means of special brackets to the right tractor fender.

Operation is through lift pump and oil (which incidentally is also used for axle lubrication although separately controlled by manual levers (A, B and C).

However, simultaneous operation of a remote control valve and hydraulic lift is not possible.

Relief valve (setting 186 to 181 bar or 190 to 195 kg/cm^2 or 2702 to 2775 psi), normally located in lift control valve is repositioned onto the first of these (V).

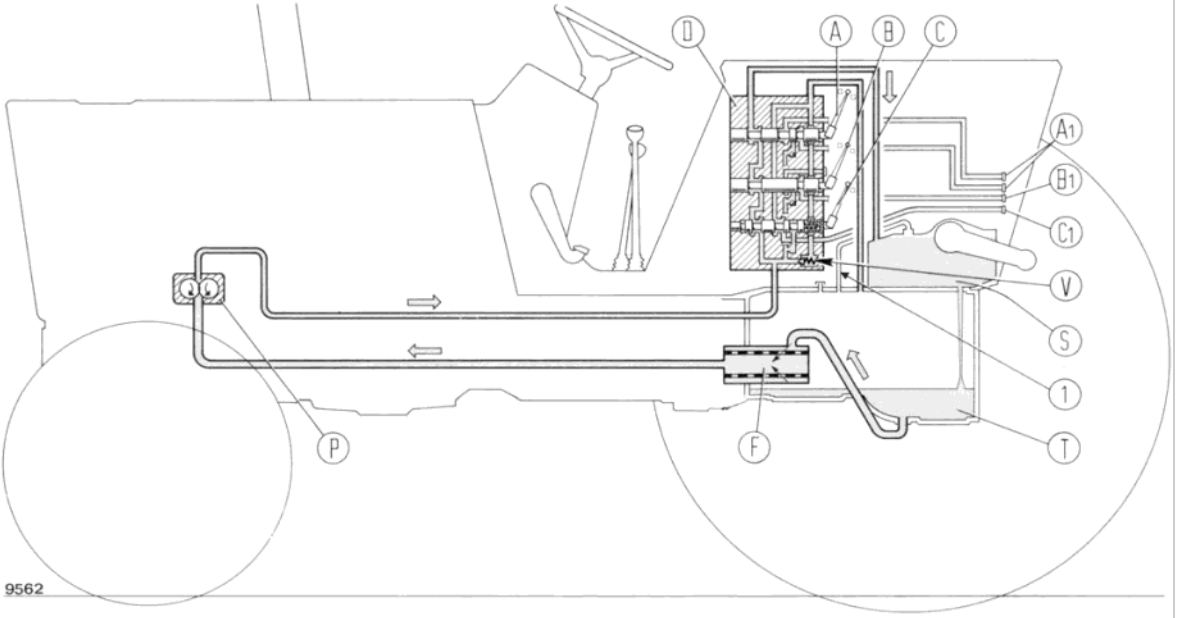
Shown below is oil circulation through the three remote control valves, with associated control levers in neutral position where oil from the pump is directed through the remote control valves as arrowed and flows to lift control valve.

Details (a) and (b) show and describe operation phases of remote control valves for double-acting cylinder and trailer brake cylinder respectively.

High pressure oil

Inlet, pump and exhaust oil

Trapped oil



Remote Control Valve Hydraulic System Diagram

A. Double acting valve lever - B. Single acting valve lever - C. Trailer brake valve lever - A_1. Double acting cylinder female coupling - B_1. Single acting cylinder female coupling - C_1. Trailer brake cylinder male coupling - D. Remote control valves F. Full flow paper cartridge oil filter on pump suction side (common to lift) - P. Hydraulic pump (common to lift) - S. Lift body - T. Oil reservoir integral with axle casing - V. Relief valve - 1. Vent pipe from lift body to axle casing

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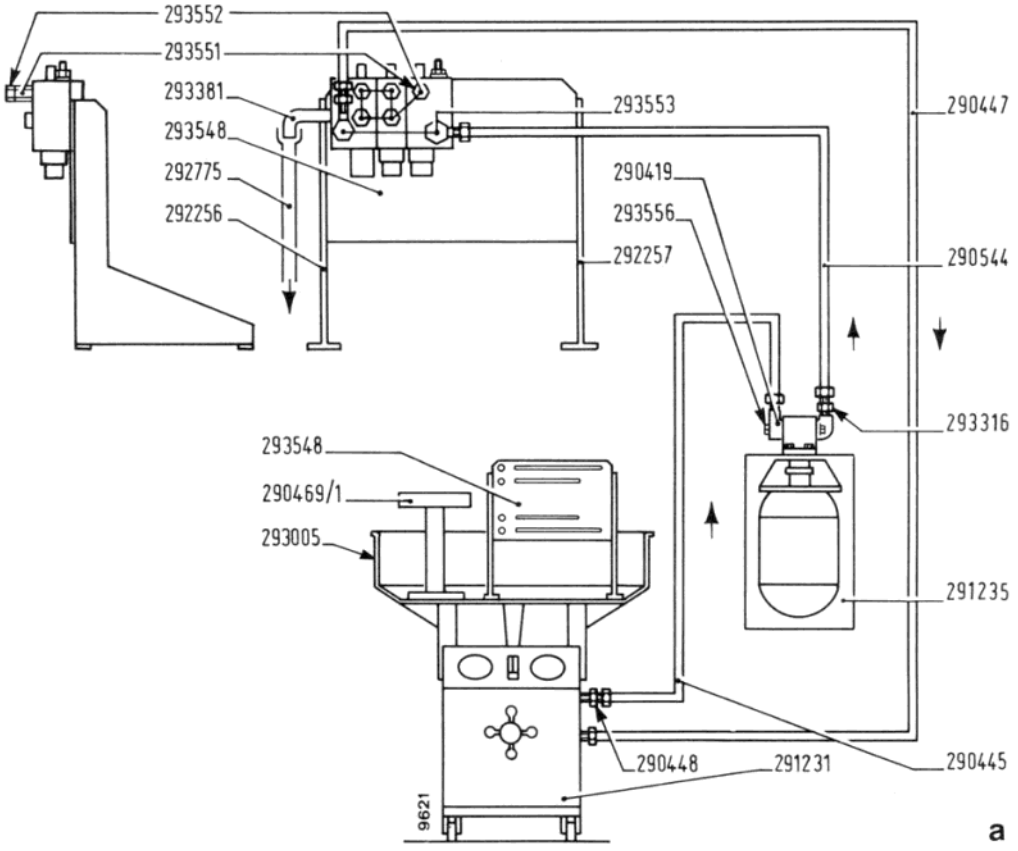
On-Bench Relief Valve Adjustment (14, d, page 2)

Install remote control valve assembly under test and test equipment as directed in diagram (a) noting that oil return piping **290477** from control valve must be connected to the valve using adjustable connection **293553.**
Following proper connection as indicated in the diagram, test as follows:

— Activate hydraulic pump, gradually increase pressure acting on control handle of tester **291231** and check on pressure gauge that relief pressure crack off occurs at 186 to 191 bar (190 to 195 kg/cm², 2702 to 2775 psi). To increase or decrease the valve setting screw in or back off the cone point adjuster screw located on the valve body as necessary.

Note - If the tester is filled with oliofiat AP 51 fluid (SAE 20 W), the above test and those that follow must be carried out at 60°C approx. for an output of 12.5 l/min. (22 Imp pints/min.), obtainable by running tester motor at higher speed (1450 rpm).



Relief Valve Tester Installation Diagram

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HYDRAULIC LIFT UNIT: Remote Control Valves

Spool Return Test (b, b1)

Install remote control valve assembly under test and test equipment as indicated in diagrams (b and b1), noting the following points:

— Plug **293552** must be applied to trailer brake control valve using adapter **293551.**

— On double-acting remote control valves, the two outlet ports to cylinder are to be coupled to connection with ball **293549** using piping **290424** and banjo **293553.**

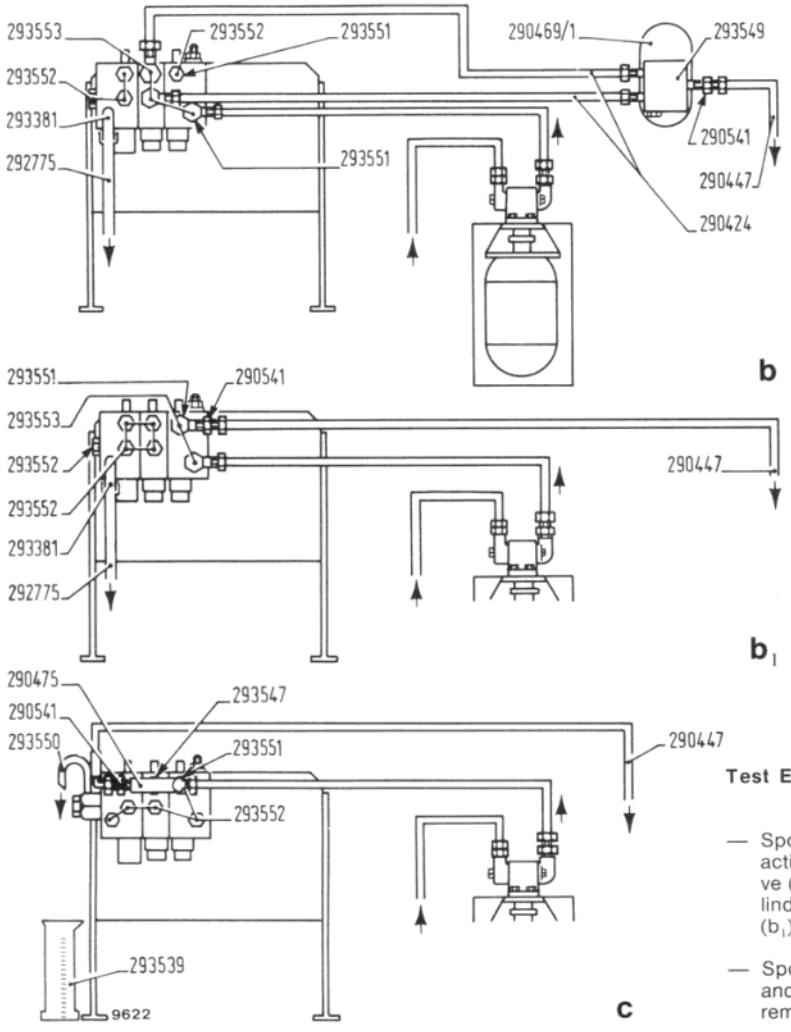
— For single-acting remote control valves, adhere to the diagram (b1) noting that return piping **290447** is to be coupled to oil outlet to cylinder on remote control valve through banjo **293553.**

After proper connection as indicated in the diagram, test as follows:

— Activate hydraulic pump, actuate spool hand lever (in both directions for double-acting remote control valves) discontinuing oil flow from exhaust piping **293381** and from plastic hose **292775.**

— Gradually increase pressure through the control handle of output tester **291231** and check on the test pressure gauge that the setting is 172 bar (175 kg/cm², 2489 psi). In these conditions, the spool under test should slide freely and return to neutral without binding as soon as the control lever is released.

— Test the other spools after establishing the necessary connections.



Test Equipment Installation Diagram for:

— Spool return on double - acting cylinder control valve (b) and trailer brake cylinder remote control valve (b_1).

— Spool leakage on single- and double-acting cylinder remote control valve (c).

Single-Acting and Double-Acting Cylinder Remote Control Valve Spool Leakage Test

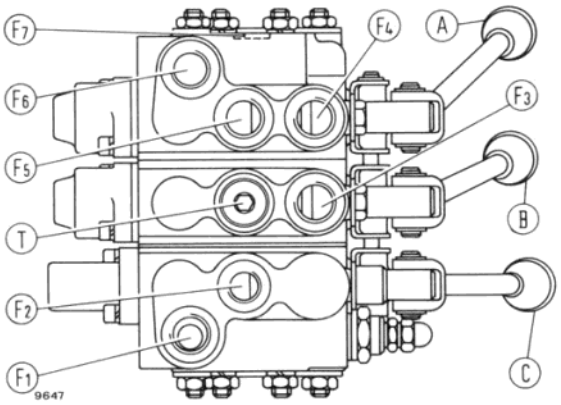
Install remote control valve assembly under test and test equipment as indicated in diagram (c on page 6), noting that three-way connection **290475** is to be fitted to single-acting and double-acting cylinder valve using adapters **293547.**
After proper connection as indicated in the diagram, test as follows:

— Activate the hydraulic pump, gradually increase pressure through control handle of output tester **291231** and check on tester gauge that the pressure reaches 172 bar (175 kg/cm², 2489 psi).

— Collect laekage oil flowing from connection **293550** in burette **293539** for exactly one minute and check the contents; leakage oil should not exceed 15 cc/minute (0.91 cu in/minute) for a new control valve, or 60 cc/minute (3.66 cu in/minute) for a used valve.

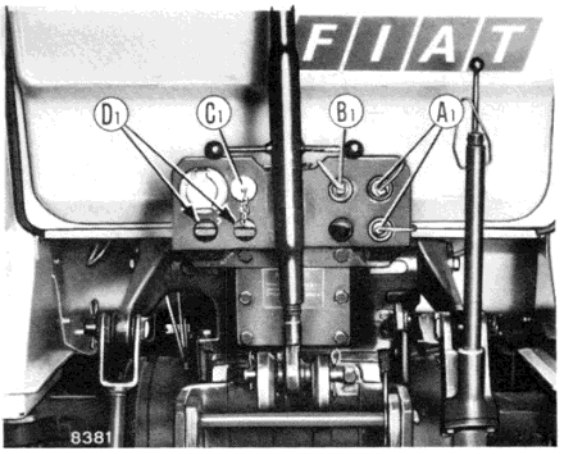
On double-acting cylinder control valve, test each of the two outlet ports connected to the cylinder.

Note - The above test is not applicable to trailer brake cylinder remote control valve.



Remote Control Valve Piping Connections Diagram

A. Double-acting cylinder remote control valve lever (black knob) - B. Single-acting cylinder remote control valve lever (black knob) - C. Trailer brake cylinder remote control valve lever (red knob) - F_1. Inlet port (M18x1.5) for connecting line from FIAT pump - F_2. Outlet port (16x1.5) for connecting line to trailer brake - F_3. Outlet port (M18x1.5) for connecting line to single-acting cylinder - F_4/F_5. Outlet port (M18x1.5) for connecting line to double-acting cylinder - F_6. Outlet port (M18x1.5) for connecting line to lift control valve - F_7. Return port (M18x1.5) for exhaust to tank - T. Plug (M18x1.5) for single-acting remote control valve



Remote Control Valve Quick-connect Couplings

A_1. Double-acting cylinder remote control valve quick-connect socket coupling - B_1. Single-acting cylinder remote control valve quick-connect socket coupling - C_1. Trailer brake cylinder remote control valve quick-connect plug coupling - D_1. Connections for female couplings of third single-acting or double-acting cylinder remote control valve (in replacement of trailer brake cylinder control valve)

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HYDRAULIC LIFT UNIT

AUXILIARY CYLINDER (optional, only for mod. 680H)

Type	Single-acting (one off)
Location	Hinged to left lift arm and hydraulically connected in parallel to lift cylinder
Control	Through lift levers
Bore and stroke	50x140 mm (1.57x5.51 in)
Total displacement	275 cm^3 (16.78 in^3)
Nominal lift capacity (to be added to normal lift capacity)	5129 Nm (523 kgm, 3783 ft lb)
Piston diameter	49.960 to 50.000 mm (1.9669 to 1.9685 in)
Bore diameter	50.025 to 50.050 mm (1.9695 to 1.9705 in)
Piston clearance in cylinder	0.025 to 0.090 mm (0.001 to 0.0035 in)
Lower cylinder pivot diameter	29.916 to 30.000 mm (1.1778 to 1.1811 in)
Pivot housing bore diameter	30.110 to 30.240 mm (1.1854 to 1.1906 in)
Pivot clearance in housing	0.110 to 0.324 mm (0.0043 to 0.0128 in)
Upper pivot diameter	27.967 to 28.000 mm (1.0656 to 1.1024 in)
Pivot housing bore diameter	28.065 to 28.149 mm (1.1049 to 1.1082 in)
Pivot clearance in housing	0.065 to 0.182 mm (0.0026 to 0.0072 in)

TORQUE DATA

DESCRIPTION	Thread Size	Torque		
		Nm	kgm	ft lb
Lockring, piston (C_1, page 2)	M24x1.5	22.5	220	162.7
Cylinder head (C_2)	M64x1.5	53	520	383

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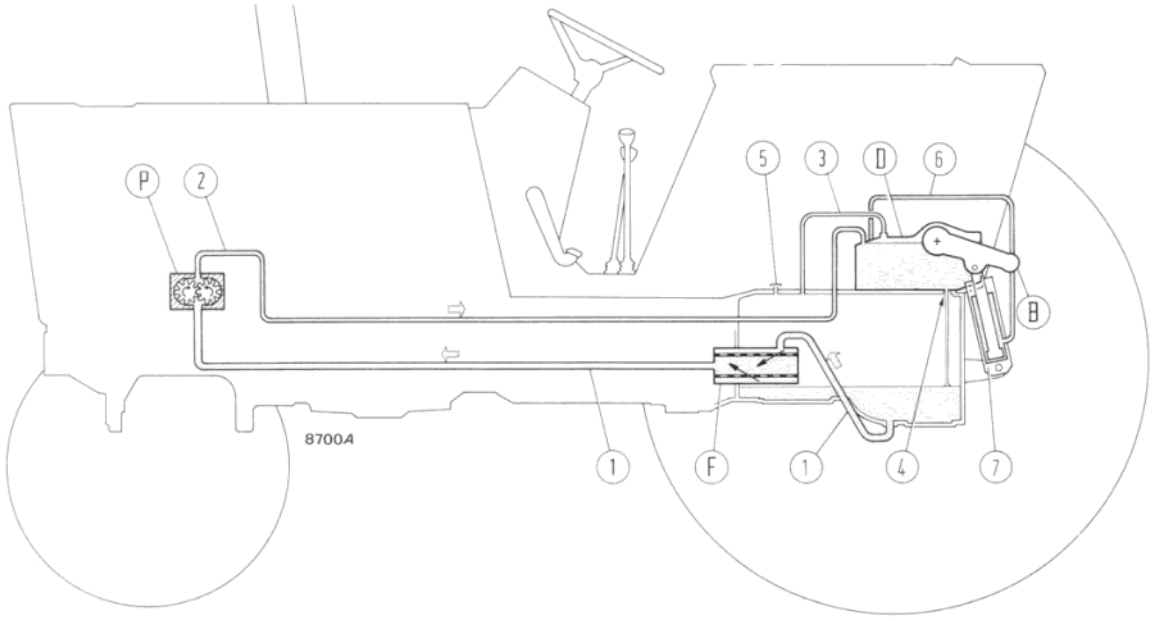
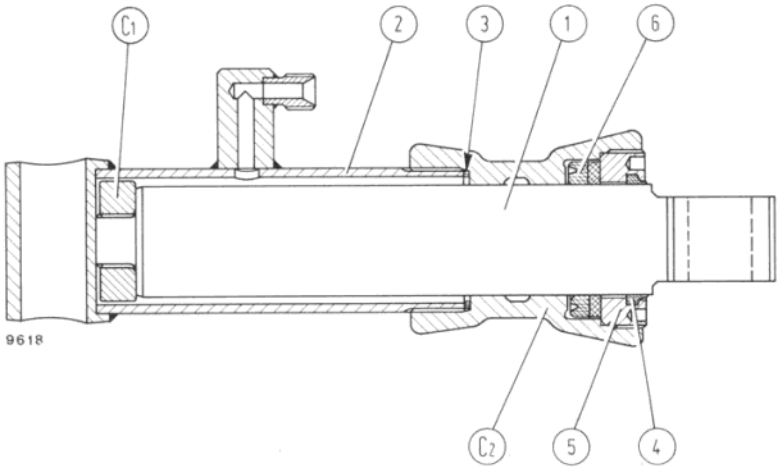
HYDRAULIC LIFT UNIT: Auxiliary Cylinder

Supply, delivery and exhaust oil
Trapped oil



Lift Hydraulic System Diagram - Version with Auxiliary Cylinder (mod. 680)

B. Lift arm - D. Control valve - F. Paper cartridge oil filter - P. Engine valve gear driven hydraulic pump - 1. Suction line from axle case - 2. Delivery line to control valve - 3. Vent pipe between lift body and axle case - 4. Return line from lift body to axle case - 5. Vent - 6. Line to auxiliary cylinder - 7. Auxiliary cylinder (optional).



Section through Auxiliary Cylinder

C_1. Piston lock ring - C_2. Cylinder head - 1. Piston - 2. Cylinder - 3. Copper washer - 4. Dust excluder - 5. Excluder lock ring - 6. Piston gland.

DIREZIONE COMMERCIALE

CHARGING SYSTEM

Alternator	
Type	Three-phase, self-rectifying
— Bosch	G1-14V-33A27
— Marelli	AA108-14V-33A-1
Rated voltage	14 Volts
Rotation (seen from pulley side)	Clockwise
Cut-in speed at 12 V and 20°C	1050 to 1150 rpm
Output at 14 V and 7000 rpm across battery after warm-up (°)	33 A
Rated output (°)	
— Bosch, at 14000 rpm	37 A
— Marelli, at 14000 rpm	40 A approx.
Rotor winding resistance	
— Bosch	3.4 to 3.7 Ohm
— Marelli	3.4 to 3.8 Ohm
On-machine alternator speed (at engine governed speed)	
— 580	5184 rpm
— 680	4800 rpm
Drive ratio	1.920 to 1
Voltage Regulator	
Type	Integral transistor
— Bosch	EE14V3
— Marelli	RTT110AT
Alternator test speed	4000 rpm
Voltage setting	
— Bosch	13.7 to 14.5 V
— Marelli	13.6 to 14 V

(°) Applicable to fully bedded-in brushes

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ELECTRICAL SYSTEM: Specification and Data

MARELLI STARTER (mod. 580)

Type	MARELLI MT-71A
Voltage rating	12 V
Rated output	2.5 kW
Rotation (seen from pinion end)	Clockwise
Starter drive ratio	9/110
No. of poles	4
Field winding	Series
Control	Freewheel
Operation	Through solenoid
Bench Test Data	
Running torque at 20°C	
— Current	500 A max.
— Torque	16,6 Nm (12.3 ft. lb., 1.7 kgm)
— Speed	1300 rpm
— Voltage	8.3 V
Lock torque at 20°C	
— Current	950 A max
— Voltage	4.8 V
— Torque	36 Nm (26.7 ft. lb., 3.7 kgm) min.
— Overall internal resistance	0.005 ± 0.0005 Ohm
Light running torque at 20°C	
— Current	60 A max
— Voltage	11.6 V
— Speed	8500 rpm
Mechanical Data	
Brush spring load	12.2 to 15.2 N (1.25 to 1.55 kg, 2.75 to 3.4 lb.)
Mica undercut depth	1 mm (0.040 in)
Clutch slip torque (pinion rotating torque)	6 to 8 kgcm (0.4 to 0.6 lb ft)

DIREZIONE COMMERCIALE

MARELLI STARTER (mod. 580) (continued)

Commutator dia.	44.840 to 45.000 mm (1.7653 to 1.7716 in)
— Maximum wear limit	43.5 mm (1.7126 in)
— Maximum ovality	0.08 mm (0.0031 in)
— Armature end float	0.1 to 0.4 mm (0.004 to 0.016 in)
Solenoid	
Winding resistance at 20°C	0.22 ± 0.02 Ohm
Current consumption at 12 V	54 A
Activation voltage	5.5 V max
Moving contact travel	3 mm (0.118 in)
Plunger stroke	13.8 to 14.9 mm (0.5433 to 0.5866 in)
End of stroke plunger load at 12 V	392 N (40 kg, 88 lb) max
Fitting Data	
Pole shoe I.D.	75.830 to 76.000 mm (2.9854 to 2.9921 in)
Armature O.D.	74.900 to 74.950 mm (2.9488 to 2.9508 in)
Drive end bushing I.D.	12.475 to 12.502 mm (0.4911 to 0.4922 in)
Pinion journal dia.	12.425 to 12.440 mm (0.4892 to 0.4900 in)
Pinion clearance in bushing	0.035 to 0.077 mm (0.0014 to 0.0030 in)
Intermediate bushing I.D.	20.200 to 20.264 mm (0.7953 to 0.7978 in)
Shaft journal dia.	19.967 to 20.000 mm (0.7861 to 0.7874 in)
Shaft clearance in bushing	0.200 to 0.297 mm (0.0080 to 0.0117 in)
Commutator end bushing I.D.	14.000 to 14.270 mm (0.5512 to 0.5618 in)
Shaft journal dia.	13.957 to 13.984 mm (0.5495 to 0.5505 in)
Shaft clearance in bushing	0.016 to 0.313 mm (0.0006 to 0.0123 in)
Lubrication Data	
Starter drive helical groove (during overhaul)	**grassofiat MR 3**
Commutator end thrust washer	**grassofiat MR 3**

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LUCAS STARTER (mod. 580)

Type { A.M. / P.M.	M45 G 26390/A M45 G 26390/D
Voltage rating	12 V
Rated output	2.6 kW
Rotation (seen from pinion end)	Clockwise
Starter drive ratio	9/110
No. of poles	4
Field winding	Compound
Control	Sprag clutch
Operation	Pre-engagement
Bench test data	
Running torque at 20°C	
— Current	600 A max.
— Torque	22.5 Nm (2.3 kgm, 16.6 ft. lb.)
— Speed	1000 rpm min.
— Voltage	8.9 V
Light running torque at 20°C	
— Current	100 A max.
— Voltage	12 V
— Speed	5000 to 7000 rpm
Overall internal resistance at 20°C	0.0078 Ohm
Mechanical data	
Brush spring load (not worn)	14.7 to 19.6 N (1.5 to 2 kg, 3.3 to 4.4 lb.)
Armature end play	0.025 to 1.420 mm (0.0009 to 0.0559 in)
Commutator dia.	41.150 to 41.400 mm (1.620 to 1.629 in)
— Wear limit	38.89 mm (1.53 in)
— Maximum ovality	0.076 mm (0.003 in)

LUCAS STARTER (mod. 580) (continued)

Solenoid	
Resistance at 20°C { Holding coil	0.46 to 0.56 Ohm
Actuating coil	0.145 to 0.165 Ohm
Current consumption at 12 V { Holding coil	21.5 to 26.1 A
Actuating coil	73 to 83
Activation voltage	8 V
Plunger stroke	0.585 mm (0.023 in)
Fitting data	
Pole shoe I.D.	75.38 to 75.74 mm (2.967 to 2.982 in)
Armature O.D.	74.40 to 74.47 mm (2.929 to 2.932 in)
Armature bushing fitted I.D.	
— Pinion	14.287 to 14.313 mm (0.562 to 0.563 in)
— Intermediate	28.500 to 28.530 mm (1.122 to 1.123 in)
— Commutator	12.700 to 12.725 mm (0.499 to 0.501 in)
Armature shaft journal dia.	
— Pinion	14.20 to 14.22 mm (0.559 to 0.560 in)
— Intermediate	28.356 to 28.433 mm (1.116 to 1.119 in)
— Commutator	12.65 to 12.67 mm (0.498 to 0.499 in)
Armature shaft clearance in bushing	
— Pinion	0.067 to 0.113 mm (0.0026 to 0.0044 in)
— Intermediate	0.067 to 0.174 mm (0.0026 to 0.0068 in)
— Commutator	0.03 to 0.075 mm (0.0012 to 0.0029 in)
Pinion bushing fitted I.D.	14.26 to 14.29 mm (0.561 to 0.562 in)
Armature shaft journal dia. over pinion bushing	14.20 to 14.22 mm (0.559 to 0.560 in)
Armature shaft clearance in pinion bushing	0.04 to 0.09 mm (0.0015 to 0.0035 in)
Lubrication Data	
Starter drive helical groove (during overhaul)	**grassofiat MR3**

*Print No. **603.54.202** - IX - 1979*

BOSCH STARTER (mod. 580)

Type	JF→12 V 0.001.362.032
Voltage rating	12 V
Rated output	1.8 kW
Rotation (seen from pinion end)	Clockwise
Starter drive ratio	9/110
No. of poles	4
Field winding	Series
Control	Sliding
Operation	Solenoid
Bench test data	
Running torque at 20°C	
— Current	735 to 765 A
— Torque	24.5 Nm (2.5 kgm, 18.1 ft.lb)
— Speed	950 to 1250 rpm
— Voltage	9 V
Lock torque at 20°C	
— Current	700 to 880 A
— Voltage	4.5 V
— Torque	0 Nm
— Overall internal resistance	0.00573 Ohm
Light running torque at 20°C	
— Current	65 to 95 A
— Voltage	11.5 V
— Speed	6500 to 8500 rpm
Mechanical Data	
Brush spring load (not worn)	11.3 to 12.7 N (1.15 to 1.3 kg, 2.5 to 2.9 lb.)
Armature end play	0.1 to 0.3 mm (0.004 to 0.012 in)
Mica undercut depth	0.5 to 0.8 mm (0.020 to 0.032 in)
Commutator diameter	42 mm (1.65 in)
— Wear limit	39.5 mm (1.55 in)
— Maximum ovality of lamination pack	0.05 mm (0.0020 in)
— Maximum ovality of commutator	0.03 mm (0.0012 in)

DIREZIONE COMMERCIALE

BOSCH STARTER (mod. 580) (continued)

Solenoid	
Resistance at 20°C	
— Holding coil	1.05 Ohm
— Actuating coil	0.25 Ohm
Current consumption at 12 V	60 A
Activation voltage	7.5 V
Plunger stroke	12 to 14 mm (0.472 to 0.551 in)
Fitting Data	
Pole shoe I.D.	75.85 to 75.98 mm (2.986 to 2.991 in)
Armature O.D.	73 mm (2.874 in)
Armature bushing fitted I.D.	
— Pinion	12.475 to 12.502 mm (0.491 to 0.492 in)
— Intermediate	19.020 to 19.072 mm (0.749 to 0.751 in)
— Commutator	12.475 to 12.502 mm (0.491 to 0.492 in)
Armature shaft journal dia.	
— Pinion	12.425 to 12.440 mm (0.489 to 0.490 in)
— Intermediate	18.927 to 18.960 mm (0.745 to 0.746 in)
— Commutator	12.425 to 12.440 mm (0.489 to 0.490 in)
Armature shaft clearance in bushing	
— Pinion	0.035 to 0.077 mm (0.0014 to 0.003 in)
— Intermediate	0.060 to 0.145 mm (0.0023 to 0.0057 in)
— Commutator	0.035 to 0.077 mm (0.0014 to 0.0030 in)
Pinion bushing fitted I.D.	14.245 to 14.272 mm (0.561 to 0.562 in)
Armature shaft journal dia. over pinion bushing	14.123 to 14.150 mm (0.556 to 0.557 in)
Armature shaft clearance in pinion bushing	0.095 to 0.149 mm (0.0037 to 0.0059 in)
Lubrication Data	
Starter drive helical groove (during overhaul)	**grassofiat MR3**

*Print No. **603.54.202** - IX - 1979*

ELECTRICAL SYSTEM: Specification and Data

MARELLI STARTER (mod. 680)

Type	MARELLI MT 68 AB
Voltage rating	12 V
Rated output	3.5 kW
Rotation (seen from pinion end)	Clockwise
Starter drive ratio	9/110
No. of poles	4
Field winding	Series
Control	Lever and free wheel
Operation	Solenoid
Bench Test Data	
Running torque at 20°C:	
— Current	700 A max.
— Torque	19.6 Nm (2 kgm, 14.5 ft. lb)
— Speed	1400 to 1800 rpm
— Voltage	9 V
Lock torque at 20°C:	
— Current	1400 A max.
— Voltage	5 V
— Torque	49 Nm (5 kgm, 36.2 ft. lb)
— Overall internal resistance	0.004 ± 0.0004 Ohm
Light running torque at 20°C:	
— Current	85 A max.
— Voltage	12 V
— Speed	7000 to 10000 rpm
Main series field winding resistance at 20°C	0.002 ± 0.0002 Ohm
Mechanical Data	
Brush spring load	14.7 to 17.4 N (1.5 to 1.8 kg, 3.3 to 3.96 lb.)
Mica undercut depth	1 mm (0.040 in)
Clutch slip torque (pinion rotating torque)	6 to 8 kgcm (0.4 to 0.6 ft.lb.)

DIREZIONE COMMERCIALE

MARELLI STARTER (mod. 680) (continued)

Commutator dia.	44.840 to 45.000 mm (1.7653 to 1.7716 in)
— Maximum wear limit	43.5 mm (1.7126 in)
— Maximum ovality	0.08 mm (0.0031 in)
— Armature end float	0.1 to 0.4 mm (0.004 to 0.016 in)
Solenoid	
Winding resistance at 20°C	0.22 ± 0.02 Ohm
Current consumption at 12 V	54 A
Activation voltage	5.5 V Max.
Moving contact travel	3 mm (0.118 in)
Plunger stroke	13.8 to 14.9 mm (0.5433 to 0.5866 in)
End of stroke plunger load at 12 V	392 N (40 kg, 88 lb) max.
Fitting Data	
Pole shoe I.D.	75.830 to 76.000 mm (2.9854 to 2.9921 in)
Armature O.D.	74.900 to 74.950 mm (2.9488 to 2.9508 in)
Drive end bushing I.D.	12.475 to 12.502 mm (0.4911 to 0.4922 in)
Pinion journal dia.	12.425 to 12.440 mm (0.4892 to 0.4900 in)
Pinion clearance in bushing	0.035 to 0.077 mm (0.0014 to 0.0030 in)
Intermediate bushing I.D.	20.200 to 20.264 mm (0.7953 to 0.7978 in)
Shaft journal dia.	19.677 to 20.000 mm (0.7747 to 0.7874 in)
Shaft clearance in bushing	0.200 to 0.587 mm (0.0080 to 0.0231 in)
Commutator end bushing I.D.	14.000 to 14.022 mm (0.5512 to 0.5520 in)
Shaft journal dia.	13.957 to 13.984 mm (0.5495 to 0.5505 in)
Shaft clearance in bushing	0.016 to 0.065 mm (0.0006 to 0.0025 in)
Lubrication Data	
Starter drive helical groove (during overhaul)	**grassofiat MR3**
Commutator end thrust washer	**grassofiat MR3**

*Print No. **603.54.202** - IX - 1979*

ELECTRICAL SYSTEM: Specification and Data

BOSCH STARTER (mod. 680)

Type	BOSCH JD→12 V 0.001.359.102	
Voltage rating	12 V	
Rated output	2.94 kW	
Rotation (seen from pinion end)	Clockwise	
Starter drive ratio	9/110	
Number of poles	4	
Field winding	Compound	
Control	Lever and freewheel	
Operation	Through solenoid	
Bench test data		
Running torque at 20°C (68°F)		
— Current	760 to 900 A (*)	650 to 800 A (°)
— Torque	45 N (4.6 kgm, 33 lb ft)	38 N (3.9 kgm, 28 lb ft)
— Voltage	4 V	3.5 V
Light running torque at 20°C (68°F)		
— Current	60 to 90 A	
— Voltage	11.5 V	
— Speed	4800 to 6800 rpm	
Mechanical data		
Brush spring load (not worn)	2.6 to 2.8 kg (5.7 to 6.2 lb)	
Armature end play	0.1 to 0.3 mm (0.004 to 0.012 in)	
Mica undercut depth	0.5 to 0.8 mm (0.020 to 0.032 in)	
Commutator diameter	42 mm (1.65 in)	
— Maximum wear limit	39.5 mm (1.55 in)	
— Maximum ovality of lamination pack	0.05 mm (0.0020 in)	
— Maximum ovality of commutator	0.03 mm (0.0012 in)	

(*) With charged battery. (°) With discharged battery.

DIREZIONE COMMERCIALE

BOSCH STARTER (mod. 680) (continued)

Solenoid	
Resistance at 20°C (68°F)	
— Holding coil	1.05 Ohm
— Actuating coil	0.25 Ohm
Current consumption at 12 V	
— Holding coil	11.4 A
— Actuating coil	50 A
Activation voltage (minimum)	8 V
Plunger stroke	12 to 14 mm (0.47 to 0.55 in)
Fitting data	
Pole shoe I.D.	75.850 to 75.980 mm (2.9862 to 2.9913 in)
Armature O.D.	73 mm (2.874 in)
Armature self-lubricating bushing fitted I.D.	
— Pinion	12.475 to 12.502 mm (0.4911 to 0.4922 in)
— Intermediate	19.020 to 19.072 mm (0.7488 to 0.7509 in)
— Commutator	14.000 to 14.018 mm (0.5512 to 0.5519 in)
Armature shaft journal diameter	
— Pinion	12.425 to 12.440 mm (0.4891 to 0.4897 in)
— Intermediate	18.877 to 18.910 mm (0.7432 to 0.7445 in)
— Commutator	13.932 to 13.950 mm (0.5485 to 0.5492 in)
Armature shaft clearance in bushing	
— Pinion	0.035 to 0.077 mm (0.0014 to 0.0030 in)
— Intermediate	0.110 to 0.195 mm (0.0043 to 0.0077 in)
— Commutator	0.050 to 0.086 mm (0.0020 to 0.0034 in)
Pinion bushing fitted I.D.	14.245 to 14.272 mm (0.5608 to 0.5619 in)
Armature shaft journal diameter over pinion bushing	14.123 to 14.150 mm (0.5560 to 0.5571 in)
Armature shaft clearance in pinion bushing	0.095 to 0.149 mm (0.0037 to 0.0059 in)
Lubrication data	
Starter drive helical groove (at overhaul)	**grassofiat MR3**

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ELECTRICAL SYSTEM: Specification and Data

BATTERY

Mod.	Code	Rated voltage	Nom. capacity (20 hr discharge)	Current (at discharge a-18°x3')	Max. dimensions (length x width x height)	Weight (wet)
580	MARELLI 5080286	V12	Ah 88	A 395	381x175x190 mm (14.9x6.9x7.5 in)	—
580	SCAINI 59270	V12	Ah 92	A 385	329x175x224 mm (12.9x6.9x8.8 in)	—
580	MARELLI 6ATM25Z-A	V12	Ah 110	A 490	508x174x205 mm (19.9x6.9x8.1 in)	kg 36 (79.4 lb)
680	SCAINI 62072	V12	Ah 120	A 500	508x174x205 mm (19.9x6.9x8.1 in)	—
680	MARELLI 6ATM25-A	V12	Ah 132	A 580	508x174x205 mm (19.9x6.9x8.1 in)	kg 40.5 (89.3 lb)
680	SCAINI 64072	V12	Ah 140	A 600	508x174x205 mm (19.9x6.9x8.1 in)	—

FUSES

Six 8 Amp, and two 16 Amp fuses, housed in box.

Fuses	PROTECTED CIRCUITS	Amp
1	Spare. Used on tractors fitted with thermostarter or Start-pilot.	16
2	Hazard warning indicator and flasher - Single-conductor power point	16
3	Main beam and indicator	8
4	Low beam	8
5	Front L.H. parking light - Rear R.H. parking light - Trailer R.H. parking light - Floodlight with switch - Instrument panel light	8
6	Front R.H. parking light - Rear L.H. parking light - Number plate light - Trailer L.H. parking light - Parking lights indicator - Cigar lighter light.	8
7	Turn signal and stop lights (tractor and trailer) with indicators - Water temperature gauge - Fuel level gauge - Air cleaner restriction indicator.	9
8	Horn - Parking brake indicator with switch - Low brake oil level indicator.	8

Unprotected circuits: Starting and charging circuits

LIGHTING - SIGNALS - ACCESSORIES

Headlamps Asymmetric, high and low beam, 45/50 W, double filament, white or yellow
Front lights — Parking, 5 W, white lens — Turn signal, 21 W, white or yellow lens
Rear lights — Parking light, 5 W, red lens (L.H. light also used as number plate light). — Turn signal, 21 W, orange lens — Stop, 21 W, red lens
Reflex reflectors on either side
Floodlight, integral switch, 35 W, White
Indicators, 3 W — Alternator (red) — Low oil pressure (red) — Air cleaner restriction (red) — Parking brake (red) — Low brake oil level (red) — Parking lights (green) — High beam (blue) — Tractor turn signal lights (green) — First trailer turn signal lights (green) — Second trailer turn signal lights (green)
Thermostarter
Cigar lighter

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STARTER SWITCH

CO BO type, 4-position, 50 A	
Positions	CIRCUITS COMPLETED
Position 0 30	Off (°)
Position 1 30-15/54 57/58-57	Lighting switch - Fuel gauge - Water temp. gauge - Alternator indicator - Oil pressure indicator - Turn signal lights and indicators - Oil pressure sending unit - Parking brake indicator - Cigar lighter - Low brake oil level.
Position 2 30/15-54-50 57-58/57	Lighting switch - Fuel gauge - Water temp. gauge - Alternator indicator - Oil pressure indicator - Turn signal lights and indicators - Oil pressure sending unit - Parking brake indicator - Cigar lighter - Starter - Low brake oil level.
Position 3 30-57	Front R.H. and rear L.H. parking light - Front L.H. and rear R.H. parking light - Parking lights indicator - Instrument panel light.

(°) Key removable

LIGHTING SWITCH (Integral Horn Push)

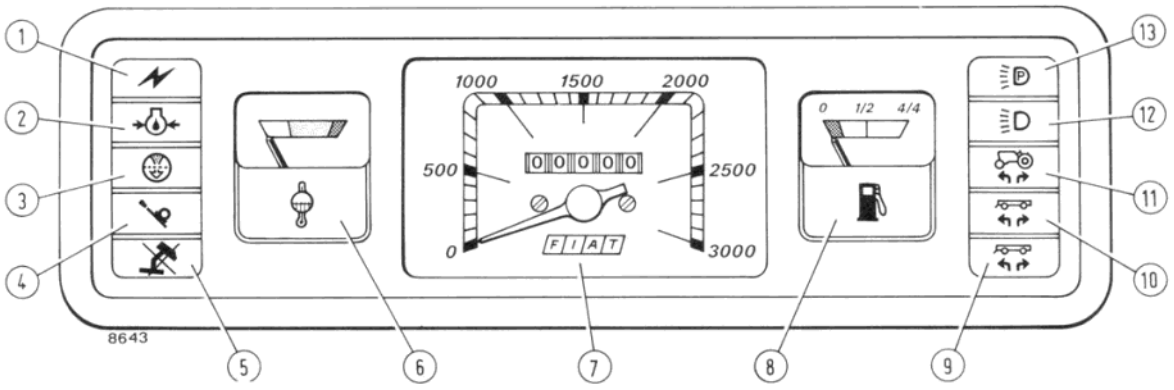
CO BO type, 4-position	
Positions	CIRCUITS COMPLETED (*)
Position 0 30 49-49 a	Horn
Position 1 30/58-57 49-49 a	Front R.H. and rear L.H. parking light-Front L.H. and rear R.H. parking light - Instrument panel light - Parking lights indicator - Horn
Position 2 30/58-57-56 b 49-49 a	Front R.H. and rear L.H. parking light - Front L.H. and and rear R.H. parking light - Instrument panel light - Parking lights indicator - Low beam - Horn
Position 3 30-58-57-56 a 49-49 a	Front R.H. and rear L.H. parking light - Front L.H. and rear R.H. parking light - Instrument panel light - Parking lights indicator - High beam - Horn

DIRECTION INDICATOR SWITCH

CO BO type, 3-position	
Positions	CIRCUITS COMPLETED (*)
Position 0 (centre) 54	Off
Position 1 (right) 54 1	Right-hand turn signal (tractor and trailers)
Position 2 (left) 54 2	Left-hand turn signal (tractor and trailers)

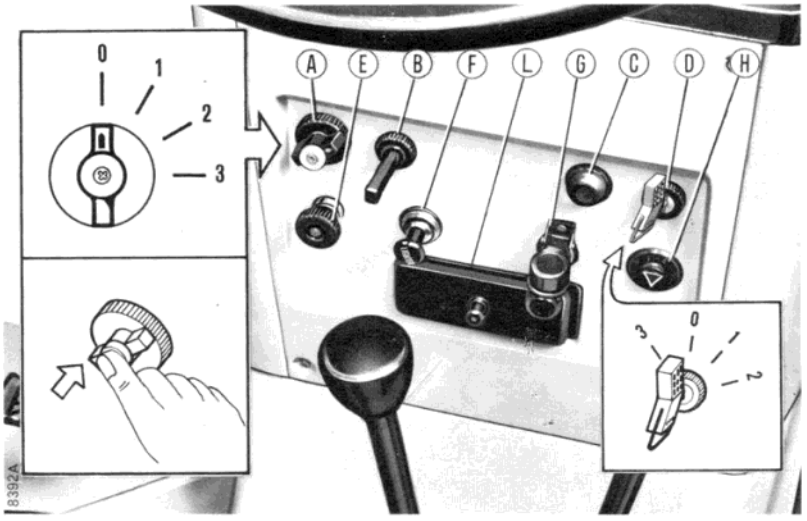
(*) Lighting and direction switches inoperative with starter switch off.

CONTROLS AND INSTRUMENTS



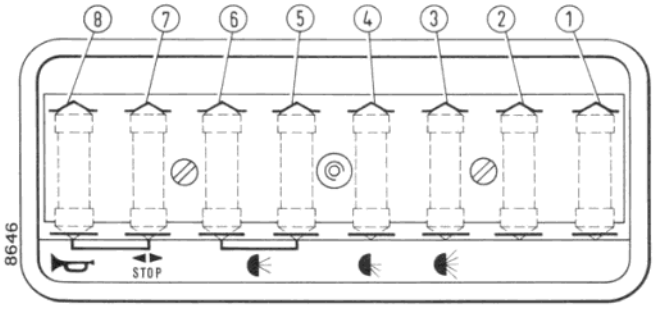
Instrument Panel

1. Battery charging inefficiency indicator (red) - 2. Low engine oil pressure indicator (red) - 3. Air cleaner restriction indicator (red) - 4. Parking brake flashing indicator (red) - 5. Low brake oil level indicator (red) - 6. Engine coolant temperature gauge - 7. Tractor meter - 8. Fuel gauge - 9. 2nd trailer turn signal indicator (green) - 10. 1st trailer turn signal indicator (green) - 11. Tractor turn signal indicator (green) - 12. High beam indicator (blue) - 13. Parking lights indicator (green).



Control Board

A. Lighting switch and horn push - B. Turn signal indicator switch - C. Thermostarter control - D. Starter switch - E. Shut-off control - F. Cigar lighter - G. Single conductor power point - H. Hazard warning switch (with integral indicator, 1.2 W bulb) - L. Fuse box.



Fuse Unit

(For references see page 12).

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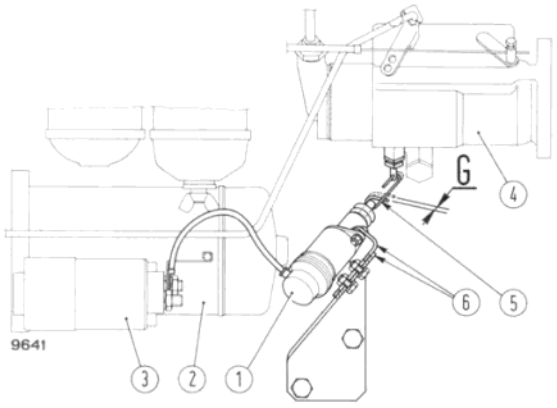
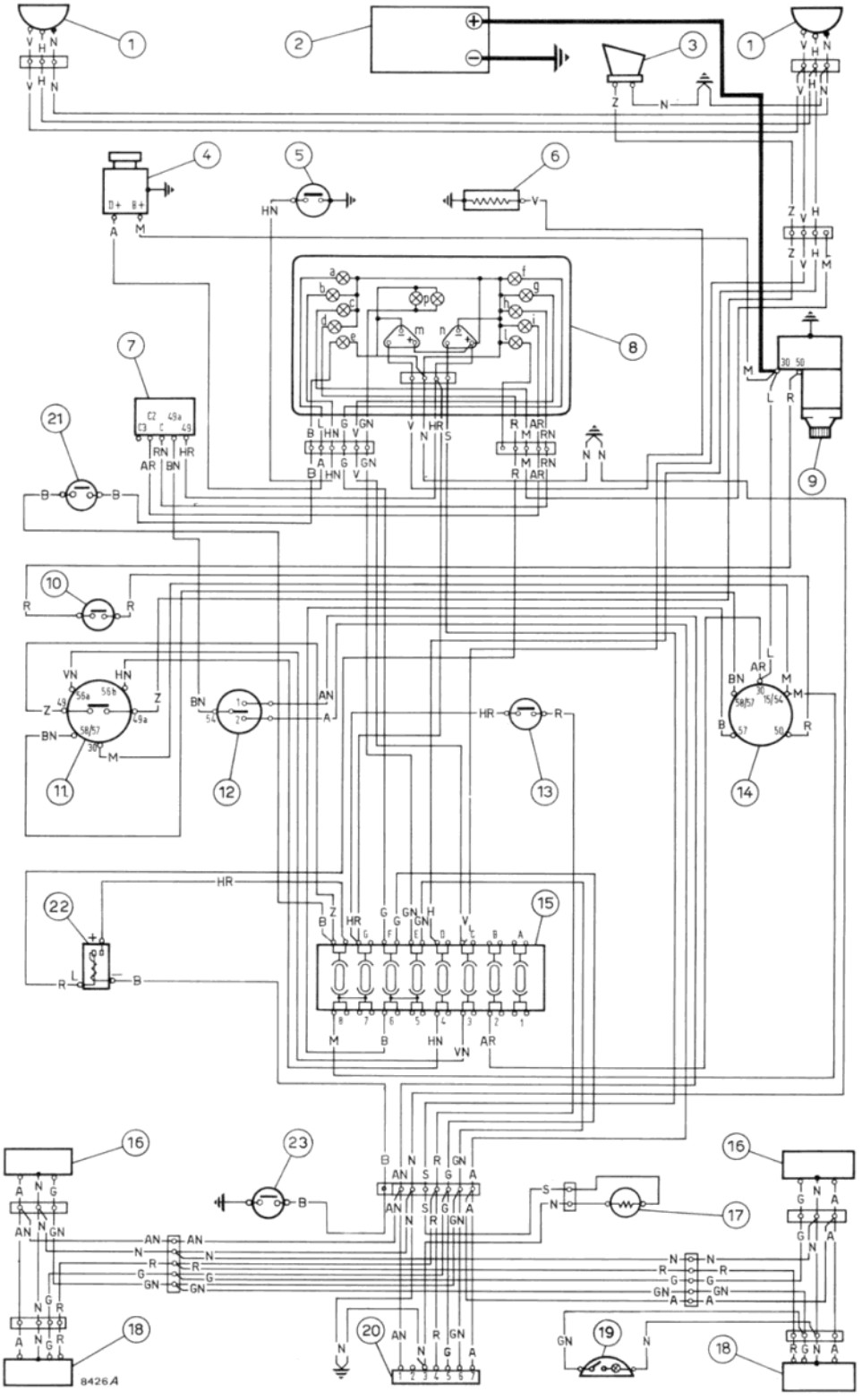


C.A.V. Injection Pump Start-retard Device

G = 1 to 2 mm (0.04 to 0.08 in), link free travel - 1. Start-retard solenoid - 2. Starter - 3. Starter solenoid - 4. C.A.V. injection pump - 5 Link - 6. Solenoid brackets.

C.A.V. INJECTION PUMP START-RETARD DEVICE

Control solenoid is supplied by the same terminal clamp as that of starter feed and is connected to C.A.V. injection pump start-retard lever through link (5).
On assembly, position solenoid taking advantage of the elongated holes provided in brackets (6), to obtain a link free travel of 1 to 2 mm (0.04 to 0.08 in).



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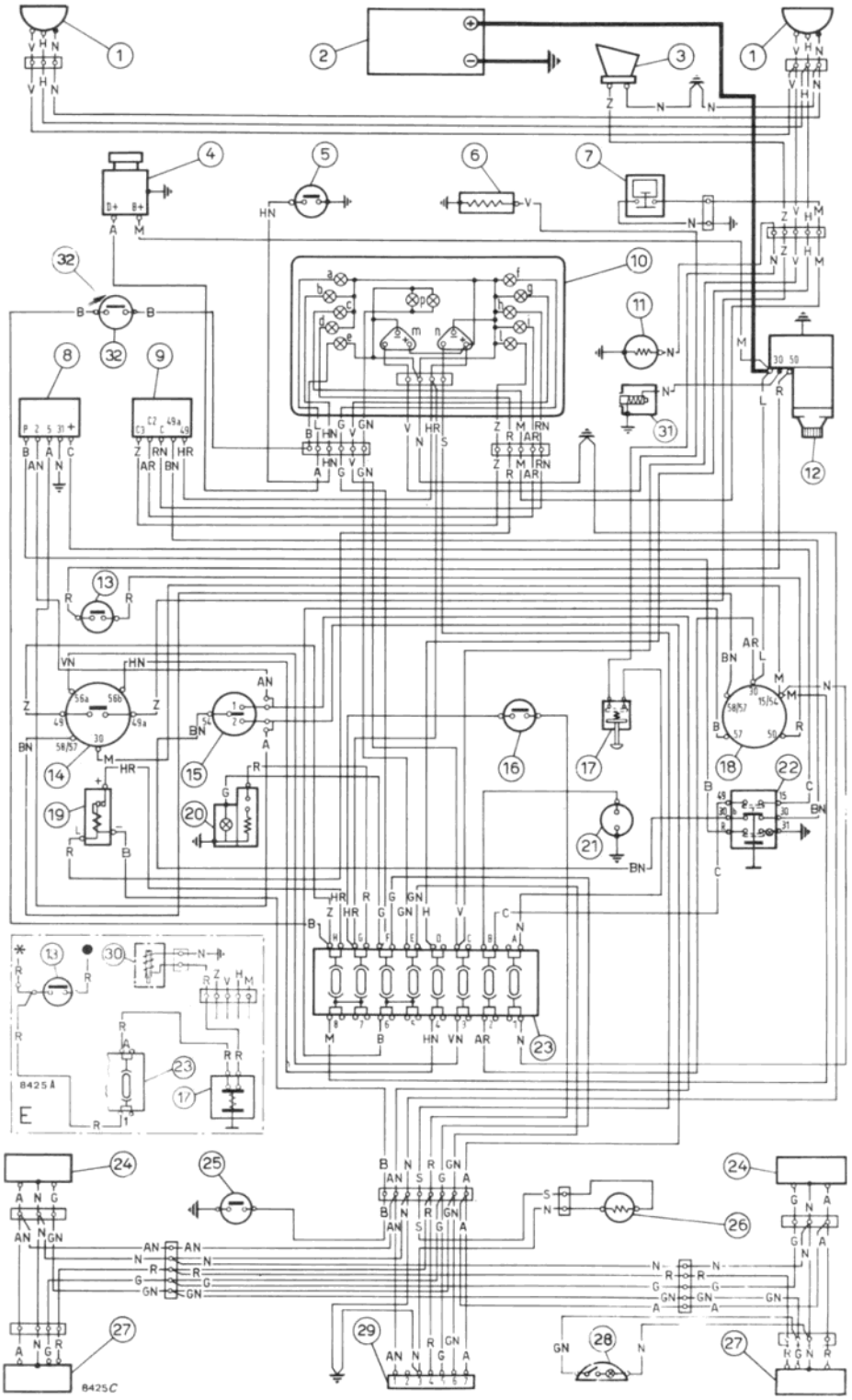
ELECTRICAL SYSTEM:
Wiring Diagram



Fiat 580-680

Wiring Diagram - No accessories

1. Headlamps
2. Battery
3. Horn
4. Alternator
5. Low engine oil pressure sending unit
6. Water temperature transmitter
7. Tractor, Ist trailer, 2nd trailer turn signal flasher
8. 13-function multiple gauge
   a. Battery charging inefficiency indicator
   b. Low engine oil pressure indicator
   c. Air cleaner restriction indicator
   d. Parking brake indicator
   e. Low brake oil level indicator
   f. Parking lights indicator
   g. High beam indicator
   h. Tractor turn signal indicator
   i. Ist trailer turn signal indicator
   l. 2nd trailer turn signal indicator
   m. Water temperature gauge
   n. Fuel gauge
   p. Instrument panel light
9. Starter
10. Starter inhibitor switch
11. Lighting switch and horn button
12. Turn signal indicator switch
13. Stop light switch
14. Starter switch
15. Fuses
16. Front parking and turn signal lights
17. Fuel gauge sending unit
18. Rear parking, turn signal and stop lights
19. Floodlight and switch
20. Seven-conductor power point
21. Low brake oil level indicator sending unit
22. Parking brake flasher
23. Parking brake indicator sending unit

CABLE COLOUR CODE

A = Light blue	H = Grey	R = Red
B = White	L = Dark blue	S = Pink
C = Orange	M = Brown	V = Green
G = Yellow	N = Black	Z = Mauve

Wiring Diagram - Tractor with accessories

Note - Detail **E** shows installation of start-pilot device which cannot be fitted at the same time as the thermostarter.

* To starter connection 50
● To starter switch connection 50

1. Headlamps
2. Battery
3. Horn
4. Alternator
5. Low engine oil pressure sending unit
6. Water temperature gauge transmitter
7. Air cleaner restriction sending unit
8. Hazard warning flasher
9. Tractor/1st trailer/2nd trailer turn signal flasher
10. 13-function multiple gauge
    a. Battery charging inefficiency indicator
    b. Low engine oil pressure indicator
    c. Air cleaner restriction indicator
    d. Parking brake indicator
    e. Low brake oil level indicator
    f. Parking lights indicator
    g. High beam indicator
    h. Tractor turn signal indicator
    i. 1st trailer turn signal indicator
    l. 2nd trailer turn signal indicator
    m. Water temperature gauge
    n. Fuel gauge
    p. Instrument panel light
11. Thermostarter
12. Starter
13. Starter inhibitor switch
14. Lighting switch and horn button
15. Turn signal switch
16. Stop light switch
17. Thermostarter/start-pilot control
18. Starter switch
19. Parking brake flasher with indicator
20. Cigar lighter
21. Single-conductor power point
22. Hazard warning switch
23. Fuses
24. Front parking and turn signal lights
25. Parking brake indicator sending unit
26. Fuel gauge sending unit
27. Rear parking, turn signal and stop lights
28. Floodlight and switch
29. Seven-conductor power point
30. Start-pilot
31. Injection pump start-retard device
32. Low brake oil level indicator sending unit.

CABLE COLOUR CODE

A = Light blue	H = Grey	R = Red
B = White	L = Dark blue	S = Pink
C = Orange	M = Brown	V = Green
G = Yellow	N = Black	Z = Mauve

10 - ENGINE

Removal - Refitting - Bench Test

290740	Hook, lift
293002/1	Bracket, universal, use with rotary stand **290090**
293050	Bracket, universal, use with rotary stand **290086**
291310	Tester, compression (kit **291309**)
292631	Tester, compressor, with bracket to be fitted in place of injector
293499	

Engine block - Cylinder head

293349	Plate sleeve removal (mod. 580)
292507	Plate, sleeve removal (mod. 680)
291501	Plate, sleeve installer
A 390363 (293229)	Reamer, camshaft bushing
292103	Driver, camshaft bushing remover-replacer
291046	Driver, valve guide remover-replacer
291177	Reamer, valve guide
292913	Lathe, universal, valve seats
293784	Extractor, injector sleeve
293742	Dresser, injector sleeve
293386	Burnisher, injector sleeve

Valve Gear

290886	Wrench, valve clearance

Crank Gear

291504	Puller, crankshaft pulley hub

Fuel System

290752	Plate, injection pump to rotary stand **290239**
293761	Wrenches, injectors
293671	Cleaners, injectors
290898	Support, injector removal/installation (FIAT - OMAP)
293760	Support, injector removal/installation (BOSCH-CAV-OMAP)
293401	Kit, on-tractor distributor pump diagnosis

On-bench Injection Pump Test Equipment

293530 was **(290761)**	Tester (including one 10 kg/cm² pressure gauge, one 1.5 kg/cm² pressure gauge, one 760 mm Hg vacuum gauge and a graduated burette)
290763	Support, pump to bench
292133	Drive coupling
290765	Lines, delivery (test A, 6x2x845 mm)
293786 (A352120)	Wrench, delivery line connections)

BOSCH Injection Pump

290766	Remover-replacer, transfer pump to rotor
290774	Gauge, distributing rotor stroke
290778	Spacer, rotor spring pre-load check
290779	Installer, O-ring
290780	Remover, O-ring
292548	Protector, O-ring
292551	Extension, M14.5x2 (for use with **290774**)
292553	Remover, pressure regulating valve circlip
292554	Protector, cam ring
292555/1	Remover/replacer, pump shaft
292556	Wrench, shuttle and metering valve
292557/1	Compressor, pressure regulating valve
292558	Centraliser, hydraulic head
292817/1	Tester, advance and feed pressure
293378	Remover/installer, pump shaft (use with **292555/1** and **293392**)
293387	Spacer, advance check (use with **292817/1**)
293392	Screw, pump shaft removal/installation (use with **292555/1** and **293378**)

CAV Injection Pump

290741	Guide, throttle lever spindle removal
290742	Guide, throttle and shut-off lever O-ring installation
290743	Tester, advance
290744	Remover/replacer, transfer pump rotor (use with torque wrench)
290745	Guide, start-retard O-ring replacer
290746	Guide, advance plug O-ring replacer
290747	Wrench, distributor rotor flange
290748	Plug, pump leakage test
290749	Connector, transfer pump outlet pressure test
290750	Connector, fuel drain line
290751	Connector, fuel inlet line
290753	Connector, pump leakage test
290754	Spanner, fuelling adjusting screw
290755	Connector/relief valve, pump roller check
290756	Coupling, pump drive
290757	Gauge, timing, pump flange
290758	Remover/replacer, cam ring pin
290759	Replacer, pump shaft
290764	Connector, drain

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Cooling System

291182/1 Extractor, water pump impeller

20 - POWER TRAIN

201 - Clutch

293650 Kit, universal, over haul
291184 Centraliser/adjuster, with register, on-tractor
293763 Wrenches, P.T.O. clutch release lever adjuster screw (FERODO clutch)

202 - Transmission and Splitter

291517 Hook, lift

204 - Bevel Drive and Differential

293400/1 Gauge, bevel drive positioner
293339 Adjuster, bevel pinion bearing (use with spacer **293750**)
293510 Adjuster, universal, bevel pinion bearing
293738 Installer, bevel pinion seal
293452 Installer, differential lock fork spring
293342/1 Wrench, bevel pinion shaft nut
291517 Hook, lift, final drive housing and cover

205 - BRAKES

Master Cylinder Bench Test Equipment

291235 Motor, electric, complete with:
290385 - Coupling, drive
291231 Tester, output, large, including:
290448 - Adaptor
290445 - Pipe
290417 - Union
290434 - Screw, inlet (2 off)
292588 - Pump, hydraulic, FIAT A18X
290330 - Union
290358 - Screw, outlet (2 off)
290544 - Pipe, outlet (2 off)
293532 - Union (2 off)
293531 - Plate, regulator
293533 - Regulator, flow, ATOS-QV 10/3
290424 - Pipe, outlet
293534 - Connector, 3-way
293535 - Union, return
290488/2 - Support
293005 - Tank
291318 - Union, kit **293300**
293300 - Kit, pressure gauge
293539 - Burette
293560 - Support, master cylinder

30 - FRONT AXLE-STEERING

301 - Axle

292927, 290793 Extractor, impact, with hinge pin adaptor (M 12 x 1.25)

303 - Steering

293388 Installer, O-ring
293389 Installer, rotary valve spring
293390 Retainer, rotor

Steering Hydraulic Test Equipment (with OVP-20 Valve Block Removed)

291326 Union, pressure tester **293300**

Steering Hydraulic Test Equipment (with OVP-20 Valve Block in Position)

291235 Motor, pump, complete with:
290385 - Coupling, drive
291231 Tester, output, large, complete with:
293005 - Tank
290488/1 - Support
293315 - Plug
290445 - Pipe, inlet
290554 - Pipe, outlet
290447 - Pipe, return
290475 - Union
290448 - Adaptor, inlet
290540 - Adaptor
290541 - Adaptor
293368 - Pipe, exhaust
292724 - Screw
293316 - Adaptor
293192 - Wrench, rotary valve

40 - LIVE FRONT AXLE

401 - Axle

293435 Adjuster, wheel bearing
293510 Adjuster, universal, bevel pinion bearing
293519/1 Wrench, wheel bearing lock ring
293400/1 Gauge, bevel pinion position (use with **293438/1** or **293510**)
293520 Wrench, bevel pinion bearing lock ring (A.M. tractors)
293524 Wrench, bevel pinion bearing lock ring (P.M. tractors)
293782 Wrench, bevel pinion
293785 Wrench, bevel pinion bearing lock ring
293544 Wrench, differential bearing lock ring (A.M. tractors)
293655 Wrench, differential bearing lock ring (P.M. tractors)
292220/2 Tester, king pin bearing rotating torque
293525 Centraliser, cover
293601 Screws, hub bearing race extractor
293743 Support, bevel drive overhaul
293438/1 Adjuster, bevel pinion bearings
293439 Spacer, tool **293438/1** (for P.M. models)

50 - LIFT UNIT

501 - Lift

290284	Pump, hand, valve adjustment
293300	Tester, pressure, universal (pressure gauges and connectors)
290817 290818	Protector/installer, lift cross shaft seal (mod. 580)
293384 293385/3	Protector/installer, lift cross shaft seal (up to frame 027610 use installer **293385/2**) (mod. 680)
291259	Wrench, inlet valve plug
290819	Lever, lift spring (mod. 580)
290826	Union, safety valve adjustment
290824	Union, relief valve adjustment
290831	Union, inlet valve leakage test
290834	Union, unload valve leakage test
233463	Wrench, relief valve, remote control valve

502 - Lift pump A22X (mod. 580), A25X (mod. 680) and C18X (section 30, mods. 580/680)

291232	Stand, rotary, pump overhaul (to clamp in vice)
291231	Tester, output, large, complete with:
290417	- Union, inlet (C18X pump)
290419	- Union, inlet (A22X and A25X pumps)
290418	- Union, outlet (C18X, A22X and A25X pumps)
290448	- Adaptor, inlet (C18X, A22X and A25X pumps)
290445	- Pipe inlet (C18X, A22X and A25X pumps)
290447	- Pipe, delivery (C18X, A22X and A25X pumps
290436	- Screw, inlet union (A22X and A25X pumps)
290434	- Screws, delivery union (C18X, A22X and A25X pumps) and inlet union (C18X pump)
291233	Engine, diesel, pump drive, complete with:
290367	- Bracket (C18X pump)
291235	Motor, electric, pump drive, complete with:
290385	- Coupling, drive (C18X, A22X and A25X pumps)
290574	Tester, output, small, complete with:
290331	- Union, inlet (A22X and A25X pumps)
290330	- Union, delivery (C18X, A22X and A25X pumps) and inlet (C18X pump)
290424	- Pipe, inlet and delivery (C18X, A22X and A25X pumps)
290359	- Screw, inlet union (A22X and A25X pumps)
290358	- Screw, delivery union (C18X and A25X pumps) and inlet union (C18X pump)

60 - ELECTRICAL SYSTEM

292307	Adaptor, torque wrench, starter clutch
290973	Dresser, starter commutador
293489	Support, alternator

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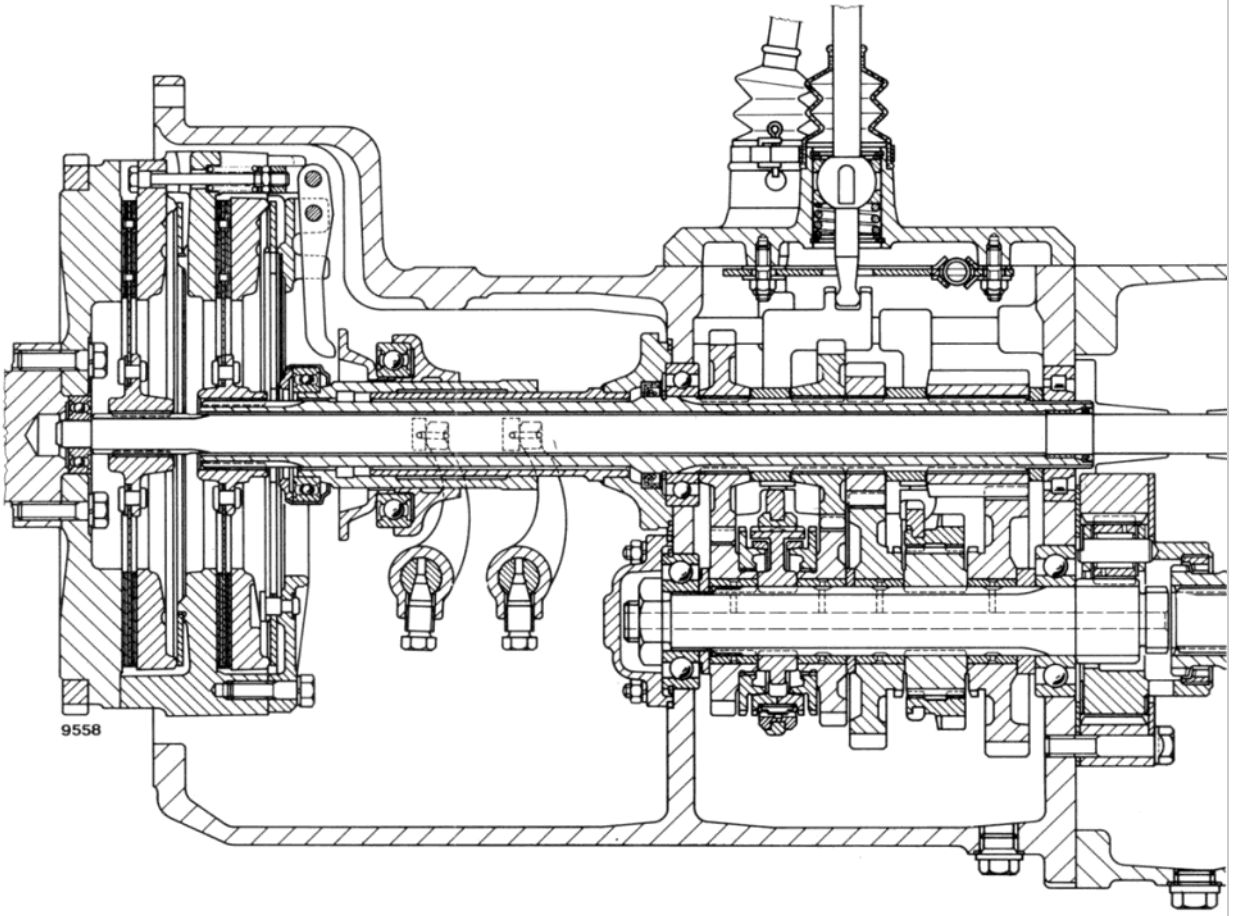
SERVICE TOOLS

SUPPLEMENT

POWER TRAIN:
Specification and Data



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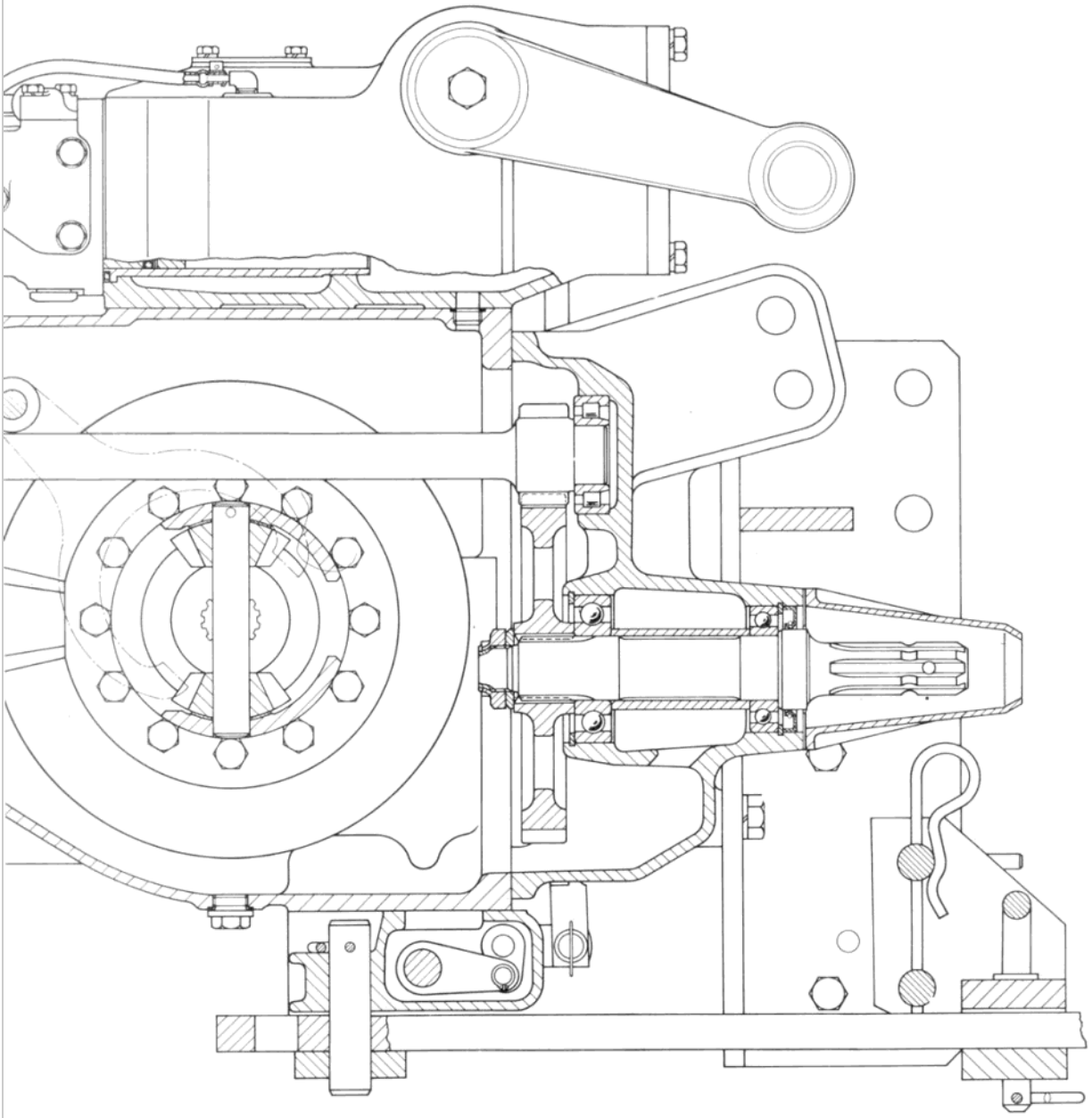
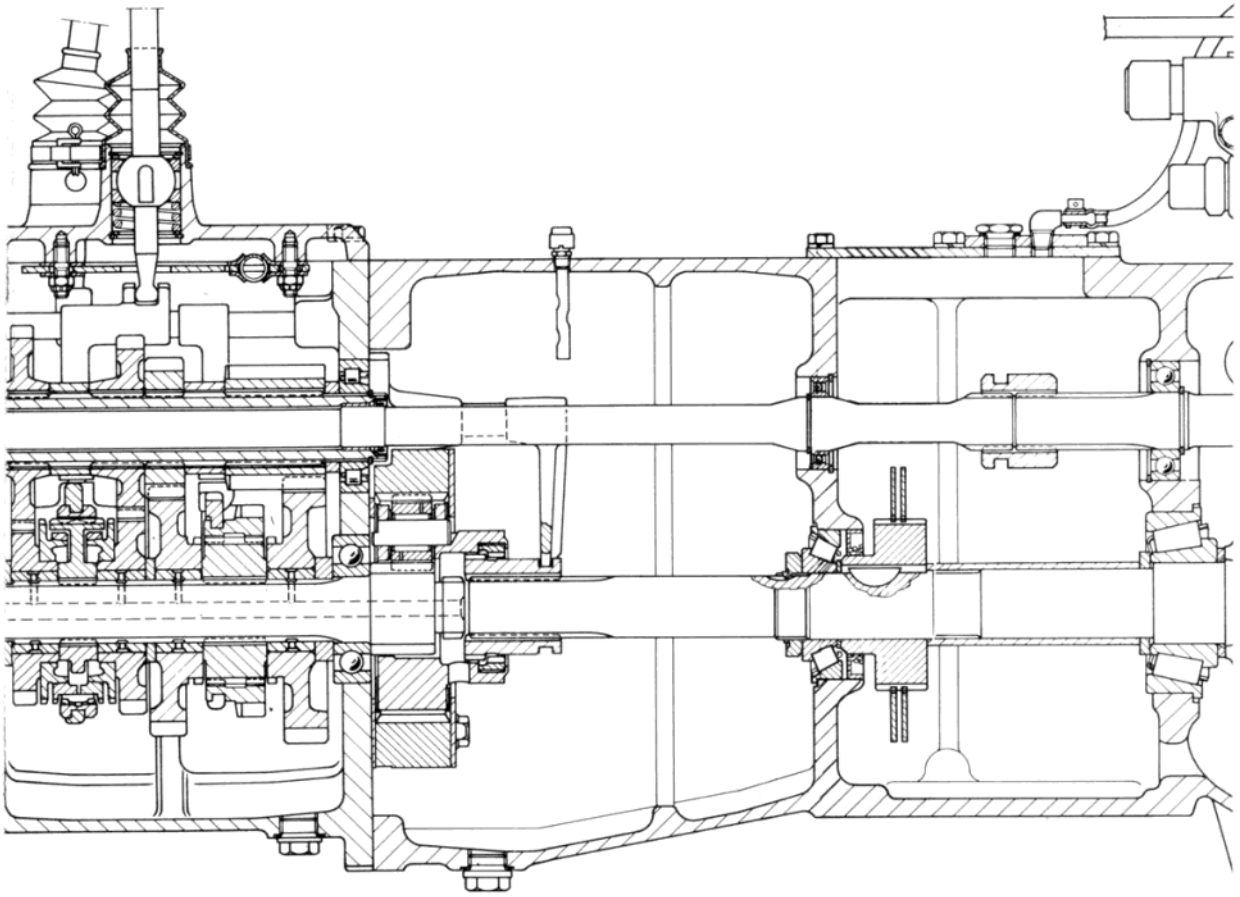
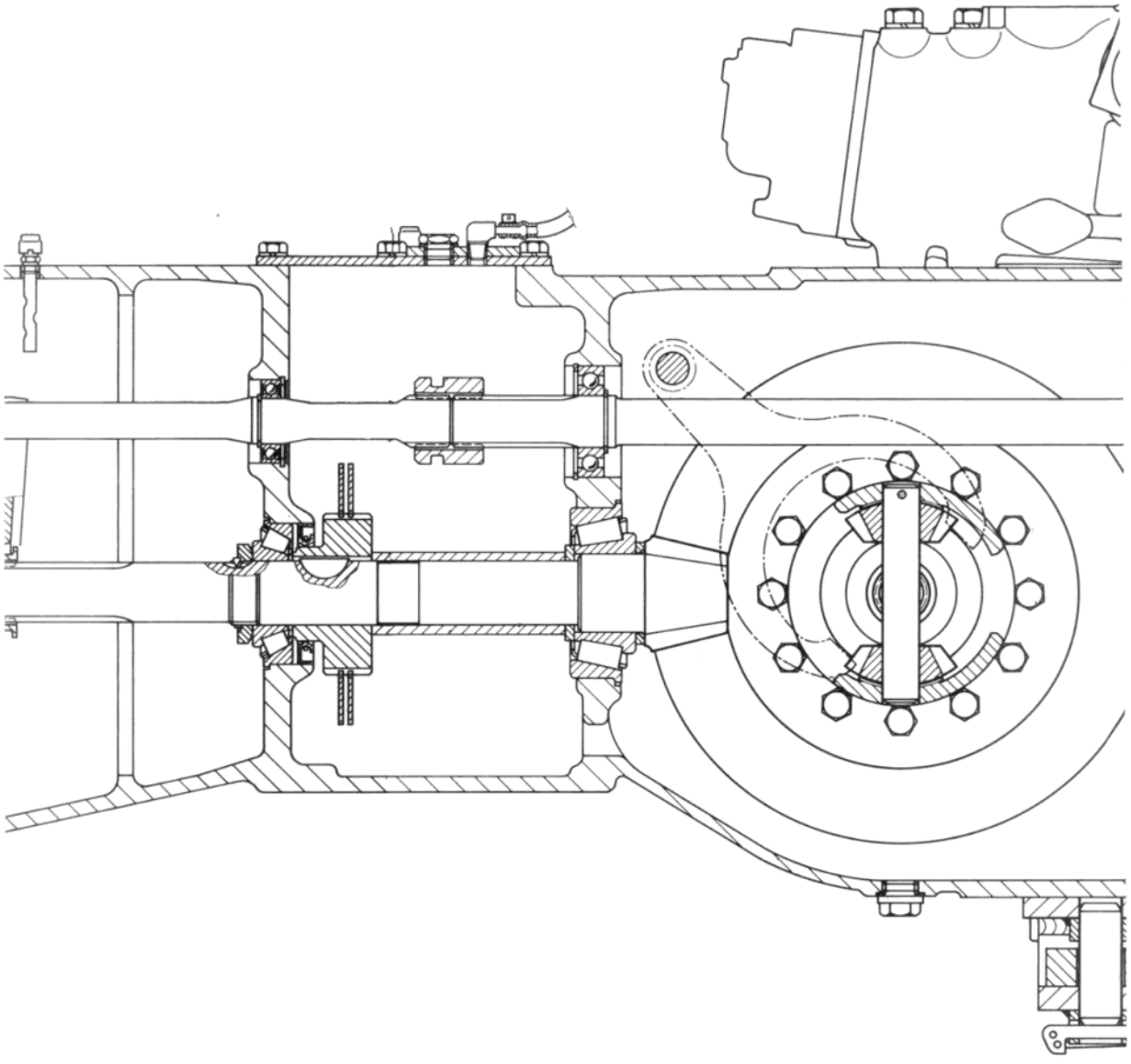
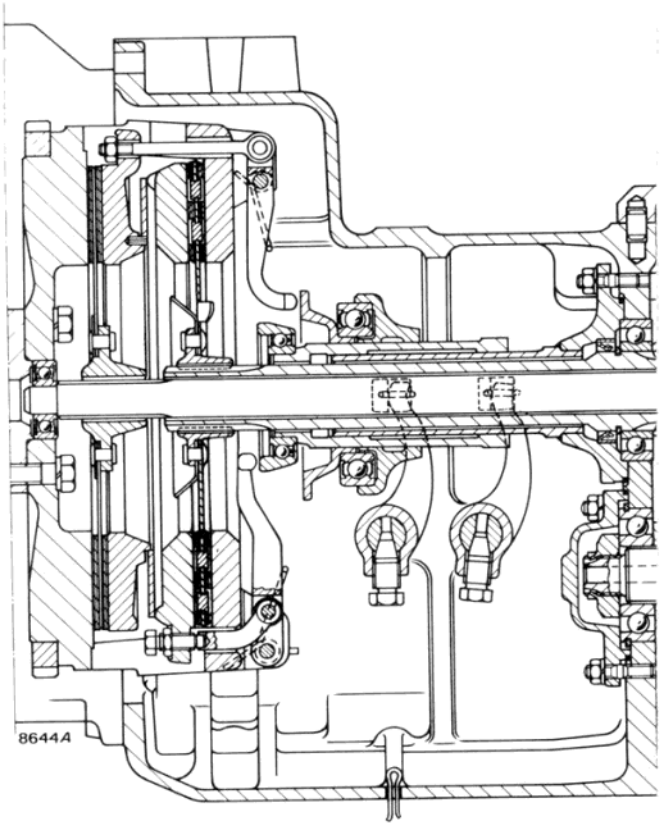


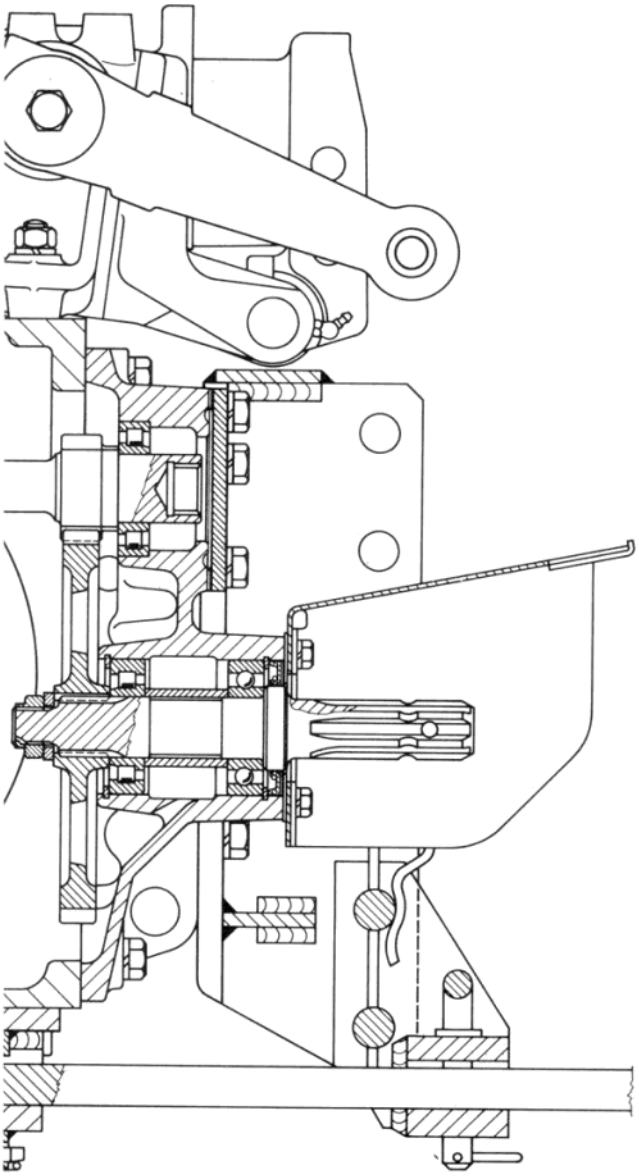


Longitudinal Section through Power Train, 680 Tractor



Longitudinal Section through Power Train, 580 Tractor





HYDRAULIC LIFT UNIT: Remote Control Valves

DESCRIPTION AND OPERATION

The optional spool type remote control valves (D) are suitable for single and double acting cylinder applications and for hydraulic trailer brake applications.

They may be installed banked up to 3 together and fastened by means of special brackets to the right tractor fender.

Operation is through lift pump and oil (which incidentally is also used for axle lubrication although separately controlled by manual levers (A, B and C).

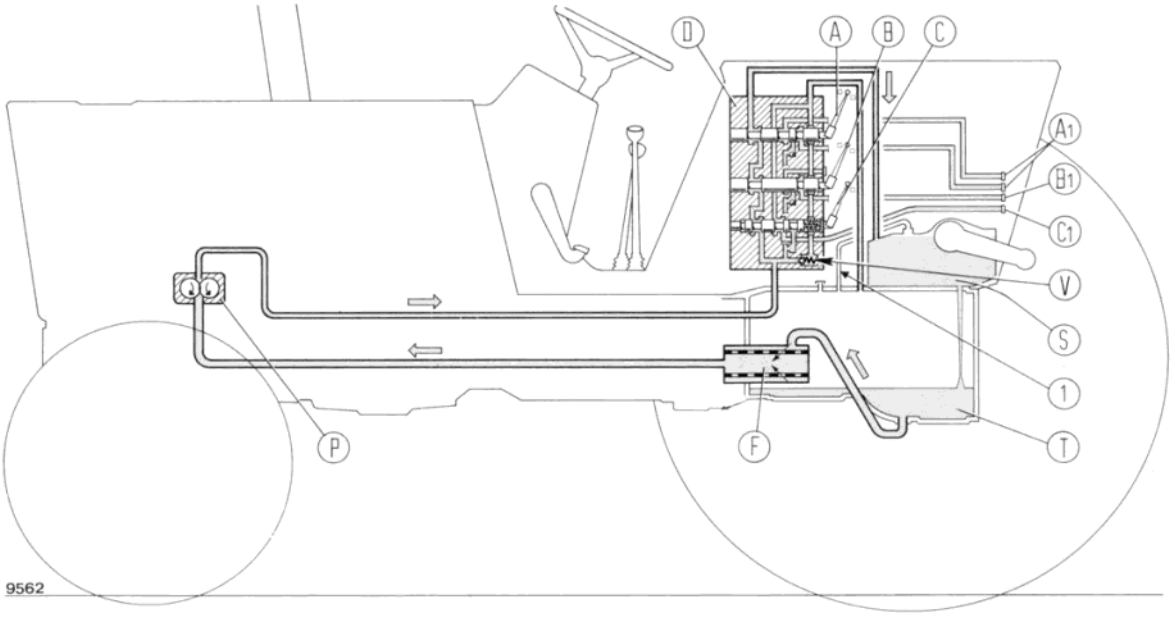
However, simultaneous operation of a remote control valve and hydraulic lift is not possible.

Relief valve (setting 186 to 181 bar or 190 to 195 kg/cm^2 or 2702 to 2775 psi), normally located in lift control valve is repositioned onto the first of these (V).

Shown below is oil circulation through the three remote control valves, with associated control levers in neutral position where oil from the pump is directed through the remote control valves as arrowed and flows to lift control valve.

Details (a) and (b) show and describe operation phases of remote control valves for double-acting cylinder and trailer brake cylinder respectively.

High pressure oil
Inlet, pump and exhaust oil
Trapped oil



Remote Control Valve Hydraulic System Diagram

A. Double acting valve lever - B. Single acting valve lever - C. Trailer brake valve lever - A_1. Double acting cylinder female coupling - B_1. Single acting cylinder female coupling - C_1. Trailer brake cylinder male coupling - D. Remote control valves - F. Full flow paper cartridge oil filter on pump suction side (common to lift) - P. Hydraulic pump (common to lift) - S. Lift body - T. Oil reservoir integral with axle casing - V. Relief valve - 1. Vent pipe from lift body to axle casing

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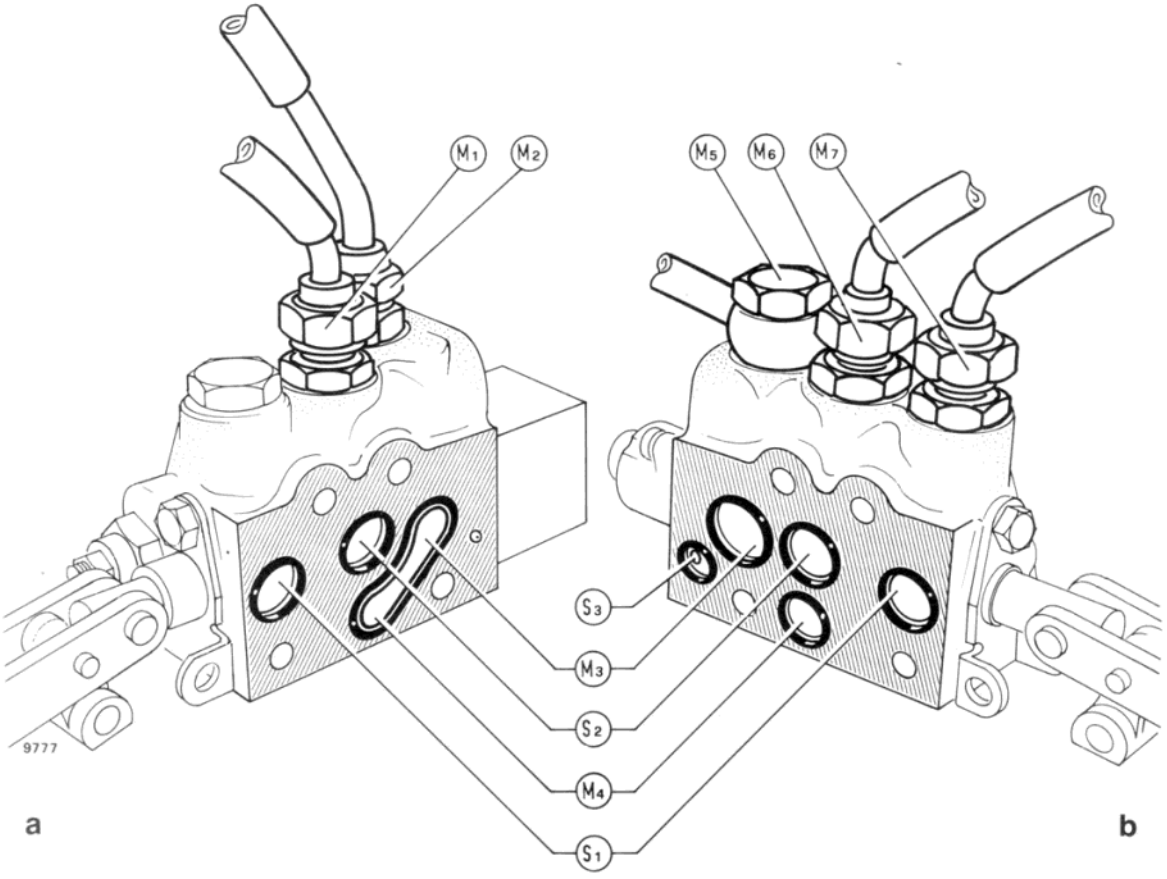
HYDRAULIC LIFT UNIT: Remote Control Valves

On-Tractor Relief Valve Adjustment (14, d, page 2).

Bring axle case oil temperature to 50°C and proceed as follows:

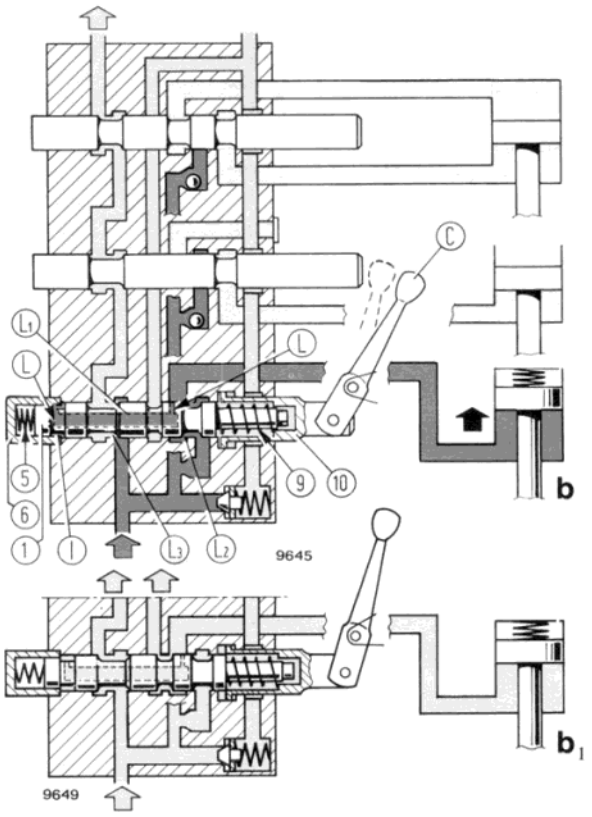
— Back off screw connection (M_5), disconnect delivery line from control valve and replace with connection **293567.**
— Couple connection **291318** to connection **293567** of universal gauge **293300** and connect to 250 kg/cm² (3556 psi) pressure gauge.
— Run engine at 1900 rpm, mod. 580, or 1700 rpm, mod. 680, and check that relief valve cracks off at 186 to 191 bar (190 to 195 kg/cm², 2702 to 2775 psi).
— To adjust relief valve setting, screw in or back off adjuster screw situated on valve plug.



Remote Control Valve Connections and Ports

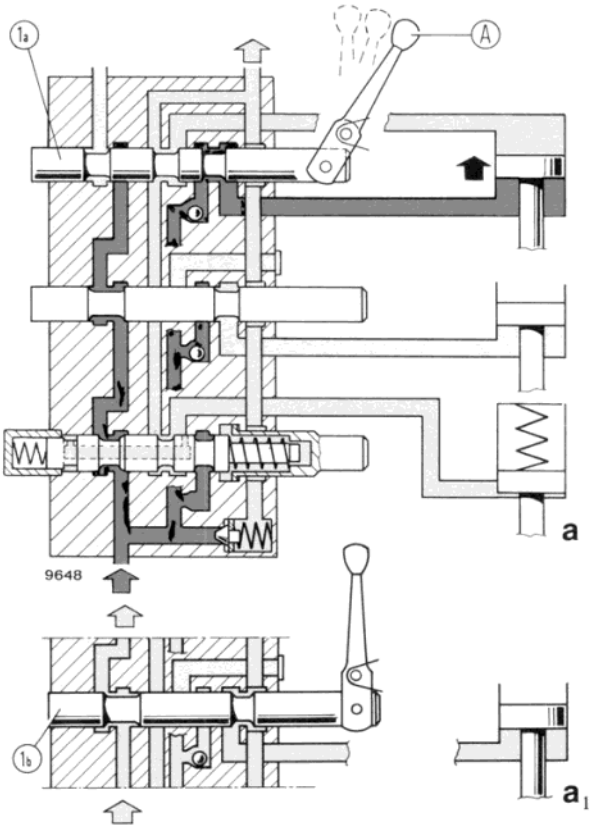
M_1. Oil out to trailer brake cylinder - M_2. Oil in from pump - M_3. Oil out to lift control valve - M_4. Oil out to double-acting cylinder chambers **A** and **B** - M_5. Oil out to lift control valve - M_6. Oil out to double-acting cylinder chamber **B** - M_7. Oil out to double-acting cylinder chamber **A** - S_1. Relief valve and double-acting cylinder chamber **A** exhaust ports - S_2. Trailer brake cylinder and double-acting cylinder chamber **B** exhaust ports - S_3. Leak-through oil return port.

DIREZIONE COMMERCIALE



Remote Control Valve Operation Diagram for Trailer Brake Cylinder Application

b. BRAKES APPLIED. When lever (C) is pulled back, spool (1) is actuated through spring (9) and cup (10).
To permit graduation of braking effort, the spool is provided with two cross-drillings (L) and a gallery (L_1) which communicate with annular chamber (I) whose effective area on side facing cap (6) is smaller than that on the opposite side.
When lever (C) is activated, spool (1) moves to the left and causes port (L_2) to open resulting in the restriction of port (L_3) which partialises oil flow toward lift.
Because of this restriction, oil pressure increases and builds up in the brake circuit to actuate brake piston.
The oil pressure increase also acts in annular chamber (I) through the two cross-drillings (L) and gallery (L_1), and generates a thrust on the right of the spool opposed by spring load (9) actuated by the operator through the control lever.
Rightward displacement of spool ceases when oil pressure in annular chamber is equal to spring load (9).
When operator increases thrust on the control lever, spring load increases and causes the spool to move on the left resulting in greater restriction of port (L_3) with a consequent further increase in pressure.
This higher pressure acts on annular chamber (I), causing the spool to move to the right, eventually to stabilise at a certain value determined by the new condition of balance between actuating pressure and spring load (9).
Consequently, brake pressure is proportional to control lever travel as imparted by the operator.
When brake control lever is released, return spring (5) and brake cylinder springs return the spool to the position shown in fig. b1, thereby causing brake cylinder oil to be exhausted to tank.



Remote Control Valve Operation Diagram for Double Acting Cylinder Application

Note - For single acting cylinder application, spool (1b) incorporates two grooves instead of three (see fig. a1) and during exhaust phase oil flows from cylinder to axle casing, whereas oil from pump is directed to lift control valve

a. OIL FLOW WHEN RAISING AND LOWERING.

When lever (A) is pulled back spool (1a) establishes communication between exhaust port and upper cylinder chamber, and pressure port and lower cylinder chamber, thereby preventing oil pressure from being directed to hydraulic lift control valve.

If the control lever is held back the raising phase continues up to limit travel of piston in cylinder concerned; upon release, the lever springs back to neutral and the entire pump output is directed to lift control valve.

For implement lowering, push control lever (A) forward and hold until the operation is completed. In this case, oil in lower cylinder chamber is exhausted into the axle casing, whereas the top cylinder chamber is placed in communication with the pressure side.