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Manual - Models 55-66 60-66 70-66 80-66

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NOTE

The following pages have been revised, and supersede the correspondingly numbered pages dated July 1984

— ***Sect. A*** - pages 3-4-5-6
— ***Sect. 202*** - pages 5-6
— ***Sect. 203*** - pages 1-2
— ***Sect. 303*** - pages 1-2
— ***Sect. 401*** - pages 5-6-11-12-13-14
— ***Sect. 402*** - pages 1-2
— ***Sect. 501*** - pages 9-10-11-12
— ***Sect. 502*** - pages 1-2
— ***Sect. 504*** - pages 7-8

The Workshop Manual for models 55-66, 60-66, 70-66 and 80-66 is newly issued.

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.

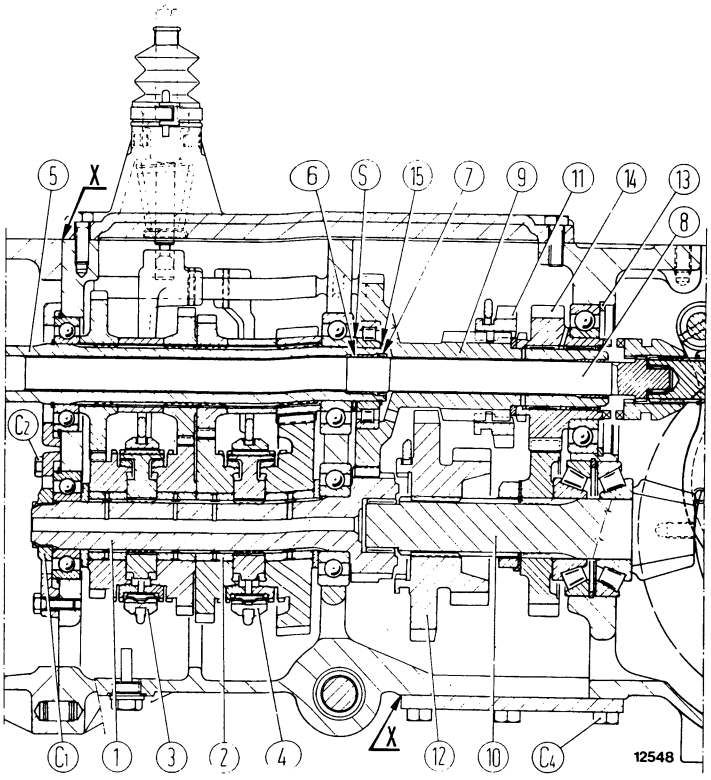
BEARINGS

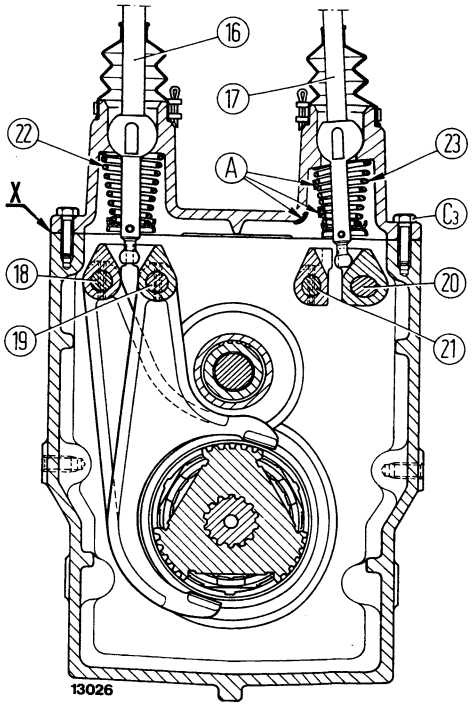
To fit bearings:

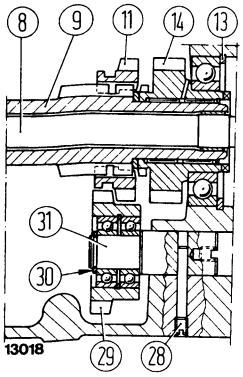
— Before installing on shafts, heat to 80°C to 90°C.
— Cool before pressing them into their seats.

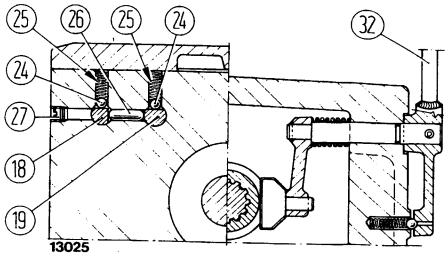
ROLL PINS

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.







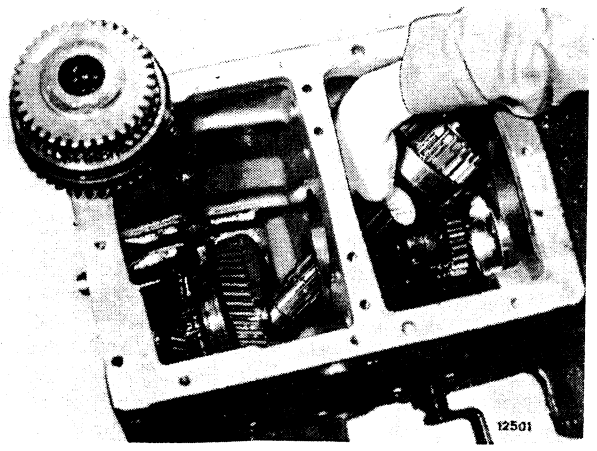


Longitudinal and cross sections through transmission and splitter.

A. Reference marks (yellow paint spot) on spring (23) and transmission housing cover - C_1. Driven gear shaft lockring - C_2. Bearing cover retaining screws - C_3. Top cover retaining screws - C_4. Bottom cover retaining screws - S. Drive shaft bearing shim - 1. Transmission driven shaft - 2. Transmission driven gear support bushings - 3. 3rd and 4th sliding sleeve - 4. 1st and 2nd sliding sleeve - 5. Transmission drive shaft - 6. PTO shaft support bushing - 7. Seal - 8. PTO shaft - 9. Low range shaft - 10. Bevel pinion shaft - 11. Rev. and normal range sliding gear - 12. Transmission direct drive, low range and rev. driven gear — 13,15 and 30. Retaining rings - 14. Normal range drive gear - 16. Transmission control lever - 17. Splitter control lever - 18. 1st/2nd speed shifter rod. - 19. 3rd/4th shifter rod - 20. Low/high range shifter rod - 21. Normal/rev. range shifter rod - 22. Transmission control lever spring - 23. Splitter control lever spring - 24 and 25. Shifter rod detent balls and springs - 26. Detent plunger - 27. Plug - 28. Screw - 29. Rev. relay gear - 31. Jackshaft - 32. PTO outer control lever.

Note: On installation of springs (23), align reference marks (A) on transmission housing cover and spring. If there are no marks, spring profile having the greater number of coils must face cover center as shown. Tighten plug (27) and screw (28) using one of the jointing compounds indicated on page 6, section A. After installation, check for oil leakage.

Note: On installation, apply jointing compound to surfaces **X** as directed on page 6, section A.



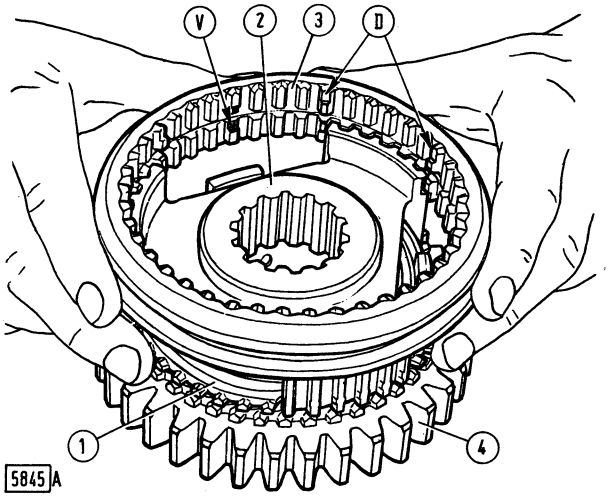
Removing transmission driven shaft.

Note — To replace splitter drive shaft bearing or low range drive gear (14, page 5) with bevel drive-differential on tractor, proceed as directed on pages 3 and 4, section 202, 55-66, 60-66, 70-66 and 80-66 tractors.

INSPECTIONS

⚠ CAUTION ⚠

Never use gasoline or other flammable fluids to clean parts. Use non-toxic, non-flammable solvents only.



Installing synchromesh sliding sleeve.

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

Check seals for score marks, lip damage and distortion and replace as necessary.

Check synchromesh spring efficiency as follows:

— Place spring on a flat surface (see detail a), depress spring in the centre applying a 31 to 34 N (3.2 to 3.5 kg or 7 to 7¾ lb) load (P) and check that deflection is 1.4 mm (0.05 in).

Check that shifting plates (6) are free from distortion or dents, especially on the center relief (R).

ASSEMBLY

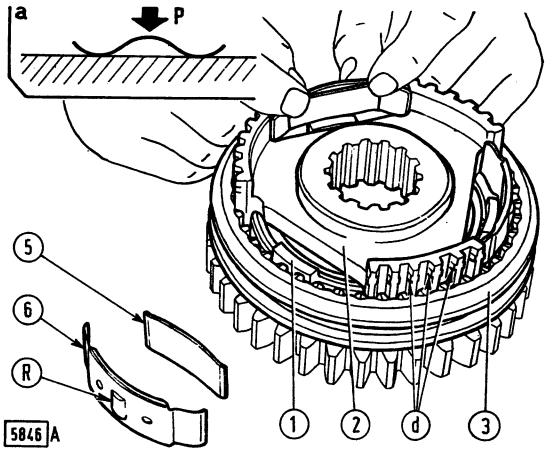
Refer to figures on page 5 for correct part positioning and note the points below.

Install 3rd/4th sychromesh:

— 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.



Installing shifting plate and spring.

a. Checking shifting plate spring - d. Detent pips - P. = 31 to 34 N (3.2 to 3.5 kg or 7 to 7¾ lb), test load - R. Shifting plate relief - 1. Synchrocone - 2. Synchrohub - 3. Sliding sleeve - 5. Spring - 6. Shifting plate.

DESCRIPTION

Spur, pinion drive creeper is installed between clutch unit and transmission and provides 20 forward and 8 reverse speeds. Creeper is operated through a hand lever on L.H. footboard.

CREEPER REMOVAL, INSTALLATION AND DISASSEMBLY

⚠ CAUTION ⚠

Lift and handle all heavy components using a suitable lift.
Ensure that units or parts are supported by suitable slings or hooks.
Ensure that no one is in the vicinity of the load to be lifted.

Separate clutch housing from transmission-rear transmission housing to gain access to creeper. To this end, proceed as follows:

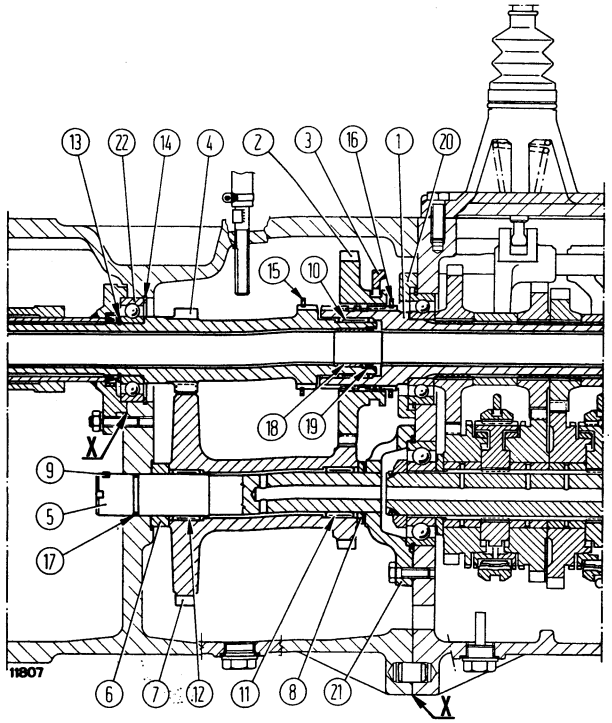
— Disconnect battery negative lead and electrical connections of power point and fender-mounted signal lights.

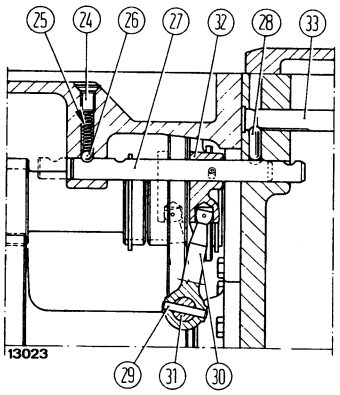
— Drain oil from transmission-rear transmission housing and disconnect lift lines. Disconnect transmission clutch control link from outer control lever, creeper control link, and accelerator control link under R.H. footboard from pedal.

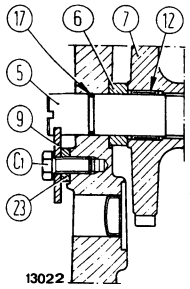
— For DT models, remove front axle drive shaft and associated guard.

— Position a hydraulic stand with guides **293568** under engine oil pan, inserting wooden blocks between stand and oil pan and taking care to prevent damage to oil pan bottom for models 666 and 766.

If tractor is equipped with ballast weights which cannot be removed, connect weights to a hoist to prevent engine from pitching forwards.



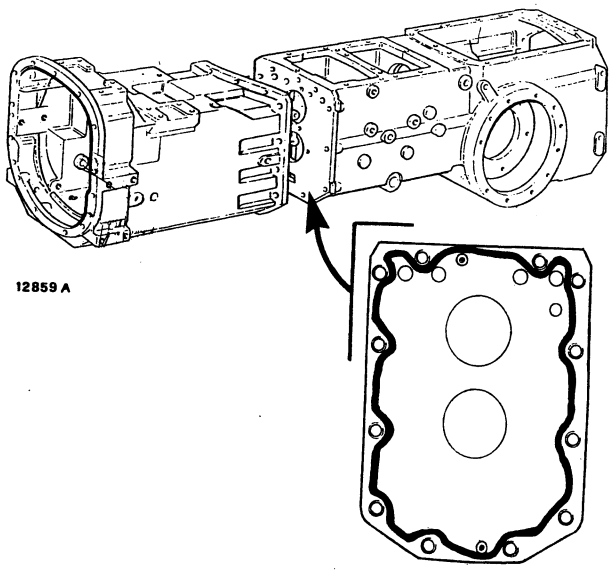




Sections through creeper.

C1. Stop plate retaining screw - 1. Transmission-creeper shaft - 2. Creeper drive gear - 3. Creeper shifter fork - 4. Clutch-creeper shaft - 5. Driven gear jackshaft - 6. Driven gear front thrust washer - 7. Creeper driven gear - 8. Driven gear rear thrust washer - 9. Jackshaft stop plate - 10, 11 and 12. Needle roller bearings - 13, 14, 15 and 16. Retaining rings - 17. O-ring - 18. P.T.O. shaft support bushing - 19. Seal - 20. Transmission drive shaft bearing cover - 21. Transmission driven shaft bearing cover - 22. Ball bearing - 23. Stop plate spacer - 24. Screw - 25 and 26. Detent ball and spring - 27. Creeper shifter rod - 28. High range detent plunger - 29. Roll pin - 30. Fork control lever - 31. Creeper control shaft assy - 32. Creeper control fork - 33. Spitter high and low range shifter rod.

Note: On assembly, thoroughly clean and degrease mating surfaces **X** and apply one of the jointing compounds listed on page 6, section A.



Applying jointing compound for transmission housing installation on clutch housing.

Jointing compound types are indicated on page 6, section A.

— Position mechanical stand under front of transmission-rear transmission housing and, if possible, a telescoping stand under drawbar support.

— Remove capscrews retaining transmission-rear transmission housing to clutch housing and separate engine with front axle and clutch housing from tractor.

Remove creeper drive gear (2, page 1).

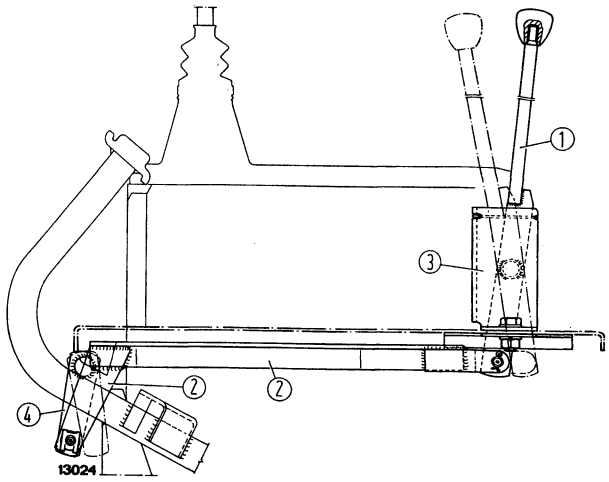
If necessary, remove retaining ring (14) and withdraw clutch-creeper shaft (4), together with bearing (22) and retaining ring (13). Retrieve driven gear (7). If clutch-creeper shaft (4) removal is difficult, separate clutch housing from engine as described hereunder.

Note - The operations detailed above concern overhaul of creeper only.

If driven gear jackshaft (5, page 1) replacement is necessary or if it is not possible to remove clutch-creeper shaft or driven gear (7) as described above, separate engine from clutch housing. To this end, proceed as follows:

— Disconnect accelerator and engine shut-off links from injection pump, starter leads, dashboard cables and tractor meter cable.

— Disconnect fuel lines from fuel pump, filters, and injector leak-off, drain power steering tank and disconnect power steering lines.



Reverser and creeper control assy.

1. Reverser and creeper control lever - 2. Link - 3. Lever support - 4. Relay lever.

— Disconnect P.T.O. clutch link from control lever and rubber vent hose from clutch housing connection. Separate fuel tank assy with hood and power steering control valve or steering unit from clutch housing.

— Remove capscrews retaining clutch housing to engine and separate engine together with front axle from clutch housing.

— Remove capscrews (C_1, page 1) and take out jackshaft (5).

— Remove clutch release sleeves together with thrust bearings.

— Remove ball bearing thrust cover retaining nuts and, working from the opposite side, remove shaft together with retaining ring (13) and bearing (22).

On assembly, ensure that high range detent plunger (28, page 1) is correctly seated.

Tighten screw (24) using one of the following jointing compounds: RTV SILMATE, RHODORSIL CAF 1 or LOCTITE PLASTIC GASKET.

⚠ CAUTION ⚠

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

Before assembling transmission housing to clutch housing, thoroughly clean and degrease mating surfaces and apply a 2 mm (0.08 in) bead of jointing compound as shown in figure on page 2.

POWER STEERING OVERHAUL

Hydraulic power steering system components and their operation are illustrated in the general diagram on pages 10 and 11, section 303.

Removal.

Remove the unit from the tractor as follows:

— Drain oil from power steering reservoir:

— Remove rear control panel.

— Disconnect hose and the three pipes from power steering unit.

— Remove power steering unit after removing capscrews securing unit to steering column and support.

Disassembly.

Disassemble power steering unit as follows:

NOTE

For DANFOSS OSPB 100 ON control valve, do not strike metal cap (30, page 11, section 303) on rotary valve for any reason, otherwise leakage will result, necessitating renewal of the entire power steering unit. During disassembly 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 would prevent withdrawal of the assembly.

— Remove the capscrews (C_1) that hold the cover to the body (3) and remove the cover, cam ring (8) with attached rotor (9), thrust ring (10), spacer (12), rotor shaft (7), sleeve (6) with rotary valve (5) and pin (1) and thrust bearing (29) in that order.

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

Assembly

Reverse the disassembly sequence and note the following points:

— Scrap and replace power steering seals every time unit is disassembled.

— For models OSPB 100 ON or OSPC 100, install seal (31, page 11, section 303) between power steering unit and rotary valve (5) using tool **293388**;

— If spring (2) is to be replaced, use tool **293389**;

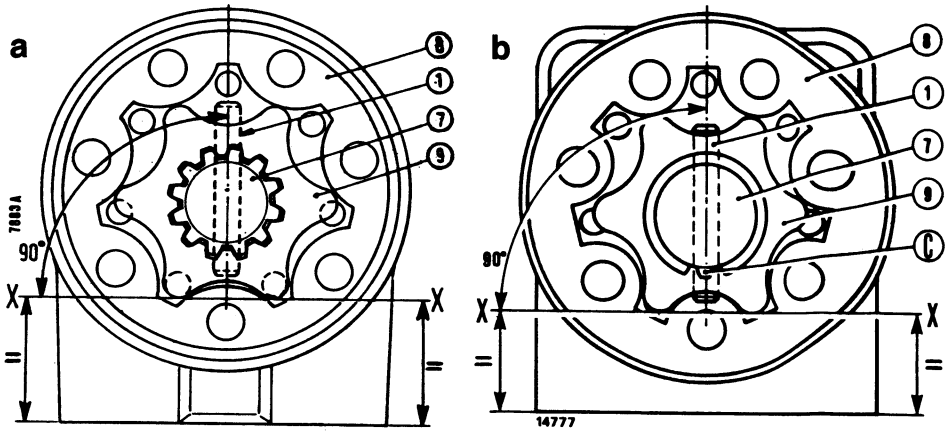
— Whenever the steering unit is disassembled, overturn rotor (9) to obtain maximum life from the splines.

— Install check valve ball (4) in its seat, keeping the steering unit (3) vertical or 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 in figure and, using tool **293390**, couple shaft (7) to pin (1) so that the latter lies at right angles to plane X-X.

Note - On ORSTA unit, one tooth on rotor shaft gear bears a reference mark. During steering unit timing, check that marked tooth (c) is positioned as shown in figure b.

— Tighten capscrews (C_1, page 11, section 303) retaining cover to steering unit to the specified torque.



Timing power steering unit.

a. DANFOSS unit - b. ORSTA unit - c. Tooth position for ORSTA unit timing - X-X. Reference line for pin assembly (1) - 1. Drive pin - 7. Rotor shaft - 8. Cam ring - 9. Rotor.

HYDRAULIC CYLINDER OVERHAUL

The steering power cylinder installed in production may be either WEBER, SIMA or ERBER.
WEBER and ERBER cylinders may be disassembled, whereas on SIMA cylinder it is only possible to remove the piston rod, dust excluder and O-ring with its retainer.

WEBER cylinder disassembly.

Remove lockring (3), push guide (7) inwards and withdraw retaining ring (5) from cylinder.
Subsequently, withdraw the piston rod assembly from the cylinder, back off nut (C_2) and withdraw guide (7) from piston (10).

SIMA piston rod removal.

Push the piston rod fully in, apply 40 mm long M14x1.5 screw to fluid inlet port, ensuring that the end of the screw locks on one flat of piston nut (C_2).

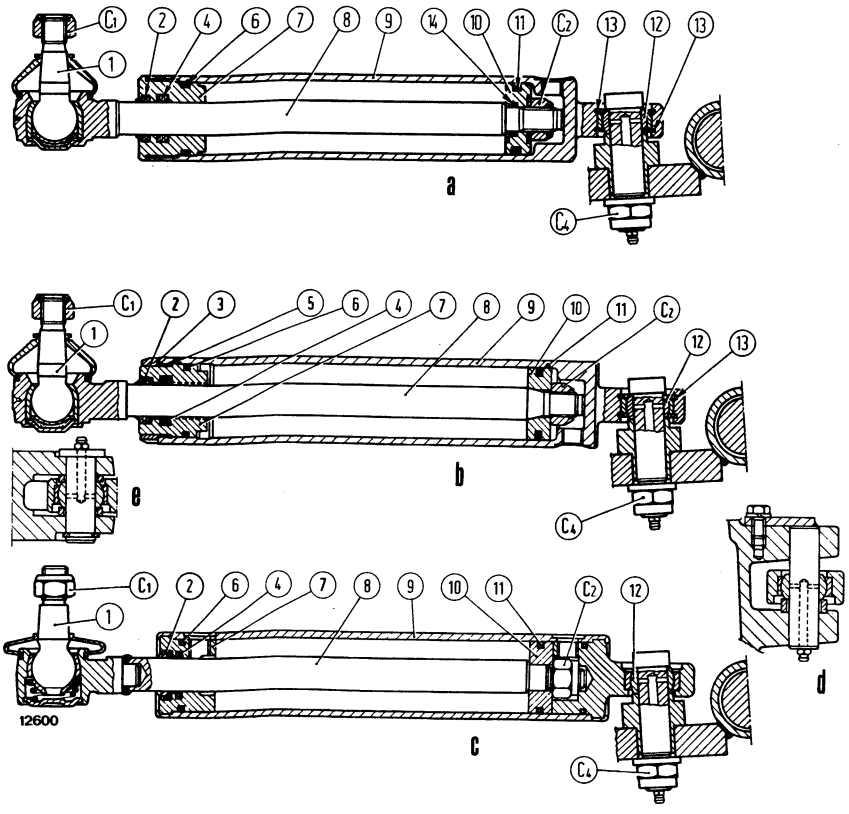
Back off the rod, withdraw from the cover and take off dust excluder (2) and O-ring (4).
Replace the spherical joint on the cylinder end using a suitable press and subsequently peening the edge of the seat in three points.

ERBER cylinder disassembly.

Remove guide (7) and withdraw piston rod assy from cylinder, back off nut (C_2) and withdraw guide (7) and piston (10). Scrap and replace worn seals and O-rings.

WEBER, SIMA and ERBER cylinder assembly.

Suitably lubricate parts, and reassemble by reversing the sequence given for disassembly. Refer to the illustrations below and note the following points:



Section through power cylinders.
a. Section through ERBER cylinder - b. Section through WEBER cylinder - c. Section through SIMA cylinder - d. Section through cylinder connection to front axle - e. Section cylinder connection to steering arm - C_1. Steering arm nut - C_2. Piston nut - C_4. Pivot pin nut - 1. Ball joint - 2. Dust excluder - 3. Lockring - 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 - 14. Piston seal.

— Install wheel hub and fixed gear unit on steering knuckle;

— Using a torque wrench and lock ring wrench **293837**, progressively tighten lock ring (C_6, section 402, page 3) to 147 to 196 Nm (15 to 20 kgm or 108 to 145 ft lb). While tightening lock ring, rotate the hub to settle the bearings.

— Fully slacken lock ring and retighten to 59 Nm (6 kgm or 43 ft lb)while rotating hub.

— Secure lock ring by bending over a lockwasher tab (if necessary, tighten lock ring further to align slot with tab).

— Turn hub by hand to check for excessive play or binding.

Wheel hub bearing adjustment for models 666 DT and 766 DT using special purpose tool 293435 (figs. a, b).

Proceed as follows:

— Install wheel hub bearing cones (3 and 5) and associated spacer (4) on tool **293435** (D).

— Fully tighten tool nut (E).

— Measure dimension (H_2) between tool top face and pin end.

— Remove bearing cones and spacer from tool, lubricate bearing cones with engine oil and reinstall on tool, inserting wheel hub (6) with bearing cups in their seats.

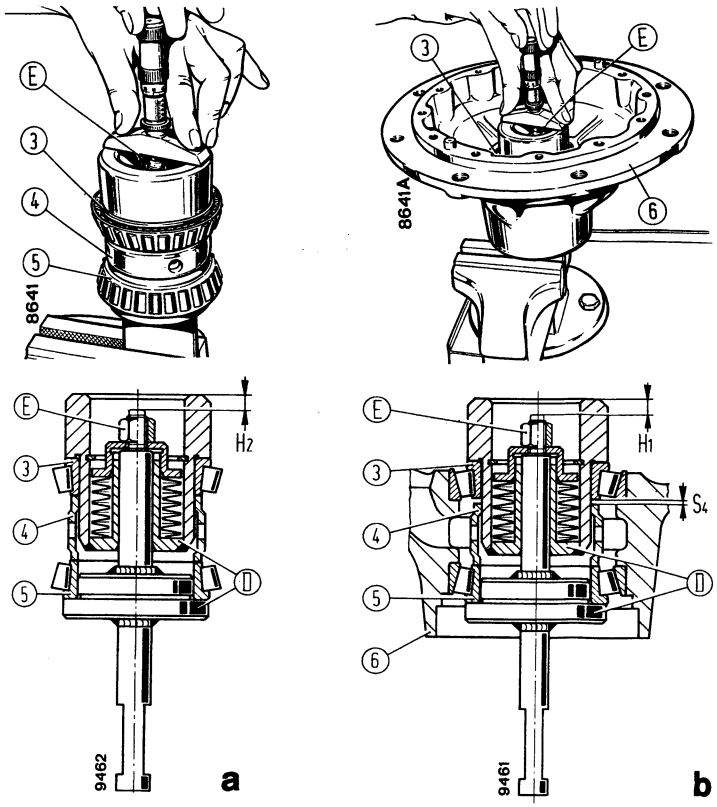
— Fully tighten nut (E) while rotating wheel hub through ten revolutions to settle the bearings.

— Measure dimension (H_1) of tool in this condition.

Thickness of shims (S_4, page 3, section 402) will be given by:

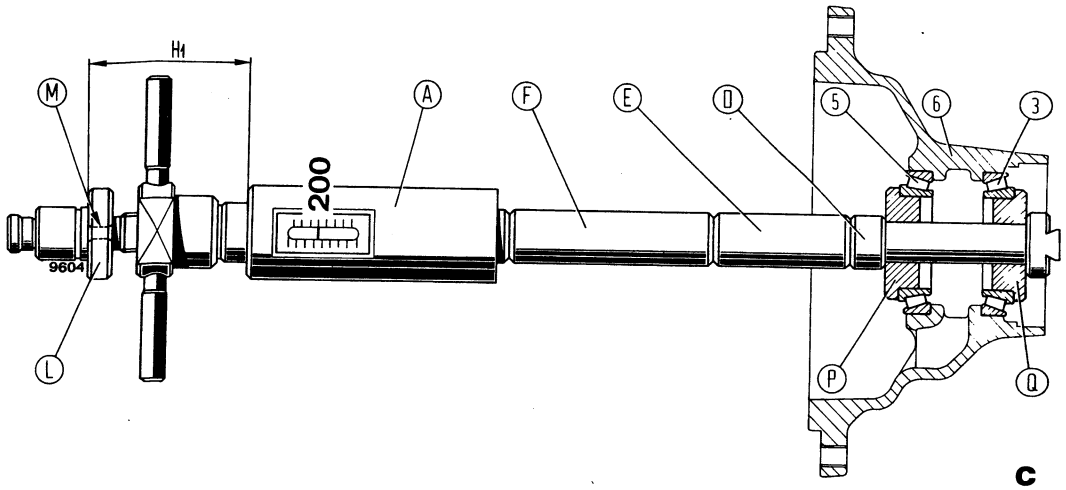
$$S_4 = H_1 - H_2$$

If necessary, round (S_4) down to the nearest 0.05 mm (0.002 in).

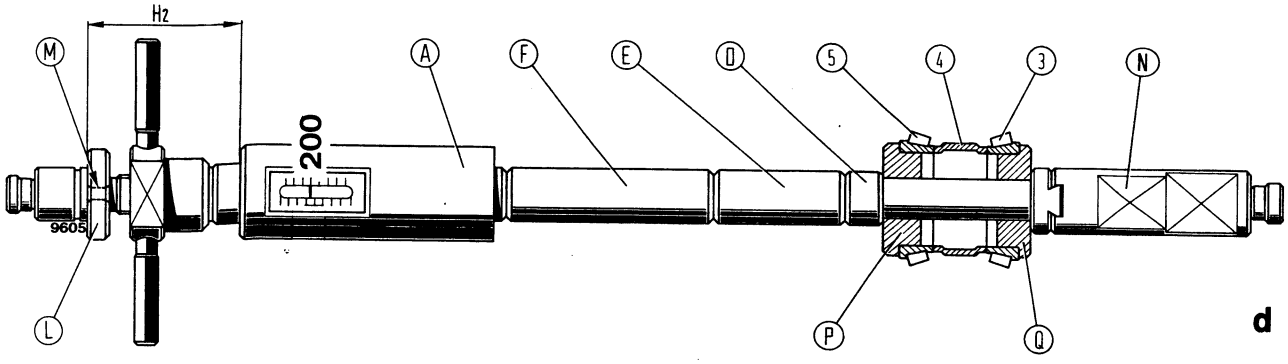


Determining wheel hub bearing shim thickness (S_4, page 3, section 402).

b. Measuring dimension (H_2) - c. Measuring dimension H_1 - D. Tool **293435** - E. Tool nut - H_1, H_2. Dimensions measured between tool top face and pin end - S_4. Shim thickness to be determined - 3 and 5. Bearing cones - 4. Spacer - 6. Wheel hub.



c



d

Determining wheel hub bearing shim thickness (S_4, page 3, section 402) using universal gauge 293510.

c. Measuring dimension H_1 - d. Measuring dimension H_2 - A. Universal gauge **293510** - D. Spacer **293625** - E. Spacer **293619** - F. Spacer **293620** - H_1 and H_2. Dimensions to be measured with depth gauge - L. Register **293624** - M. Register holes (L) - N. Vice adapter **293617** - P. Socket **293639** - Q. Socket **293639** - 3 and 5. Bearing cones - 4. Spacer - 6. Wheel hub

Wheel hub bearing adjustment for models 666DT AND 766DT using universal gauge 293510 figs. c, d).

Proceed as follows:

— Install bushings **293639** (P and Q) and spacers **293625** (D), **293620** (F) on universal gauge **293510** (A).

— Lubricate bearings (3 and 5) with engine oil, install on gauge, and place gauge in wheel hub (fig. c).

— Turn gauge handwheel to bring pointer gradually to 200 kg (441 lb); at the same time, rotate gauge to settle the bearings.

— Install register **293624** (L) on universal gauge (A), positioning holes (M) in line with flats on handwheel hub.

— Measure dimension (H_1) using a depth gauge.

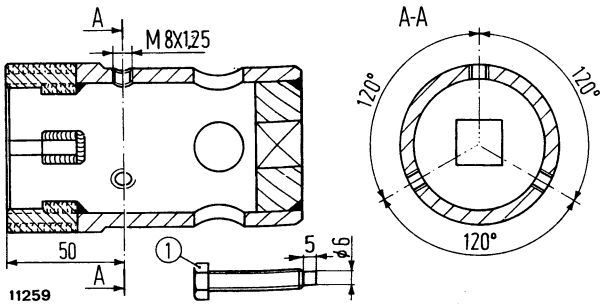
— Remove universal gauge (A) from wheel hub, reassemble on bench with part **293617** (N) for retention in vice and insert spacer (4) and bearing cones (3 and 5) positioned as shown in fig. d.

— Bring pointer to 200 kg (441 lb) on graduated scale and measure dimension (H_2) as previously described.

Thickness of shims (S_4, page 3, section 402) will be given by:

$$S_4 = H_2 - H_1$$

If necessary, round off (S_4) to the nearest 0.05 mm (0.002 in) down.



Modifying lock ring wrench 293520/2 (models 466DT and 566DT) or 293524/1 (models 666DT and 766DT) for bevel pinion rotating torque measurement (dimensions in mm.).

1. M 8x1.25x40 screw (R 50) to be modified as shown in figure.

where:

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

— 100 mm (3.9 in) for models 466 DT and 566 DT

— 115 mm (4.5 in) for models 666 DT and 766 DT

C = Correction factor marked on pinion and preceeded by + or − if different from 0, to be added to or subtracted from nominal dimension (H_6) according to indicated sign.

Thickness of shim (S_2, page 3, section 402) will be given by:

$$S_2 = H_5 - H_7$$

where:

H_5 = Dimension measured using depth gauge.

H_7 = Corrected nominal dimension from ring gear centerline to back of pinion.

Example (model 566 DT)

Dimension measured using depth gauge 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

Corrected nominal dimension H_7 = 100+0.2 mm = 100.2 mm

Shim thickness

S_2 = 103.3 − 100.2 = 3.1 mm

Correction factor C = −0.2 mm

Corrected nominal dimension H_7 = 100−0.2 = 99.8 mm

Shim thickness

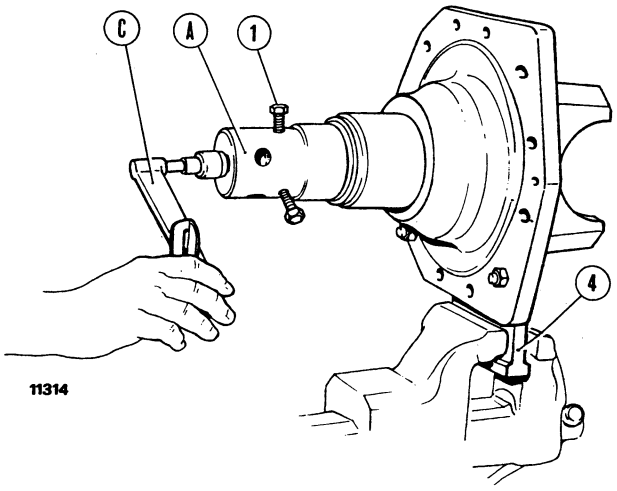
S_2 = 103.3−99.8 = 3.5 mm

Correction factor C = 0 mm

Corrected nominal dimension H_7 = H_6 = 100 mm

Shim thickness

S_2 = 103.3 − 100 = 3.3 mm



Checking bevel pinion rotating torque.

A. Lock ring wrench **293520/2** (models 466DT and 566DT) or **293524/1** (models 666DT and 766DT) - C. Torque wrench **293512** - 1. Screws retaining wrench **293520/2** or **293524/1** to bevel pinion - 4. Support **293743** for differential carrier.

4. Differential bearing adjustment and bevel drive backlash check.

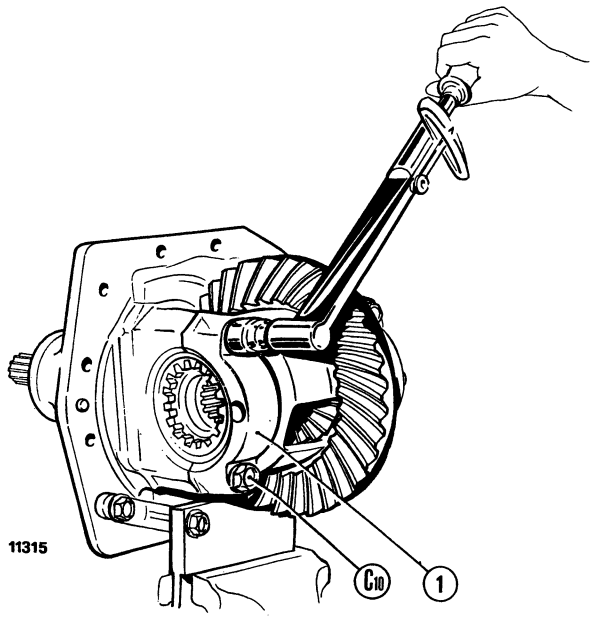
Proceed as follows:

— Install bevel pinion with all parts, including shims (S_1, and S_2, section 402, page 3) as determined above, in differential carrier.
Lubricate bearings with engine oil and tighten lock ring (C_1, section 402, page 3) to 294 Nm (30 kgm or 217 ft lb) using wrench **293520/2** (models 466DT and 566DT) or **293524/1** (models 666DT and 766DT).

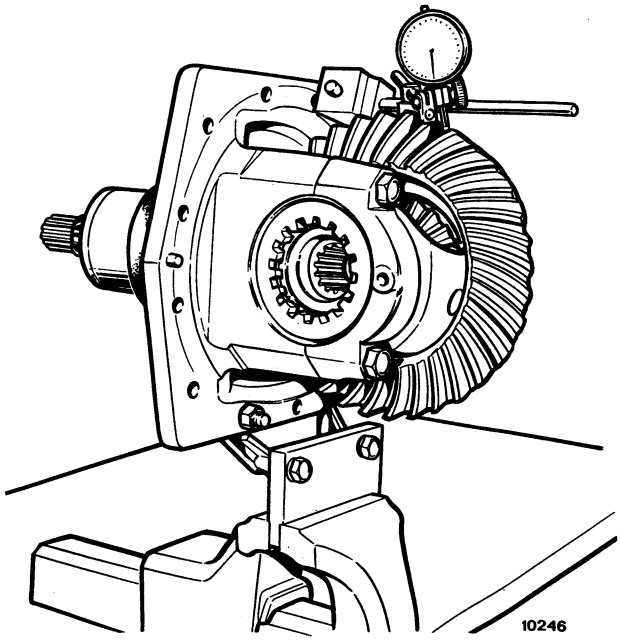
Alter lock ring wrench **293520/2** (models 466DT and 566DT) or **293524/1** (models 666DT and 766DT) by drilling and tapping three holes as shown in figure and adding three M 8x1.25x40 (R50) screws (1) as shown in figure.

— Lock wrench **293520/2** (models 466DT and 566DT) or **293524/1** (models 666DT and 766DT) (altered as described above) on pinion shaft through associated screws (1) and check that torque required to rotate shaft is 0.5 to 1 Nm (0.05 to 0.1 kgm or 0.36 to 0.72 ft lb) for models 466DT and 566DT or 1 to 1.5 Nm (0.1 to 0.15 kgm or 0.72 to 1.08 ft lb) for models 666DT and 766DT.
Measure torque using torque wrench **293512** (C); do not take starting torque into account.

Note - The rotating torque indicated above applies to pinion shaft installed without seal and retaining ring.



Installing differential bearing caps.
C_{10}. Self-locking capscrews - 1. Bearing caps.



Checking normal bevel drive backlash.

Otherwise, rotating torque should be 1 to 1.5 Nm (0.10 to 0.15 kgm or 0.72 to 1.08 ft lb) for models 466DT and 566 DT or 1.5 to 20 Nm (0.15 to 0.20 kgm or 1.08 to 1.45 ft lb) for models 666DT and 766DT.

— To adjust rotating torque , change bearing shim thickness (S_1, section 402, page 3). Remove shims to increase rotating torque, and add shims to reduce torque.

— Install differential unit in carrier ensuring that ring gear does not force on pinion, tighten capscrews (C_{10}) to 59 Nm (6 kgm or 43.4 ft lb) then slacken and re-tighten to 20 Nm (2 kgm or 14.5 ft lb).

— Lubricate ring gear bearings, rotate bevel drive and tighten L.H. lock ring (Gs, section 402, page 3) at the same time using wrench **293544** for models 466D and 566DT or **293665** for models 666DT and 766DT to 39 to 59 Nm (4 to 6 kgm or 29 to 43 ft lb) to establish the specified axial pre-load.

— Measure bevel drive backlash using a dial gauge positioned at right angles outside a bevel gear tooth.

— Repeat measurement in two other equi-spaced points and compare the average of the three readings with specified backlash: 0.15 to 0.20 mm (0.006 to 0.008 in), average 0.18 mm (0.007in).

If backlash is out of specified tolerance range, back off one lock ring and tighten the other by the same amount to restore axial pre-load and obtain specified backlash.

— In these conditions, pinion and differential bearing rotating torque, measured in the same conditions as pinion torque, must be:

$A_2 = A_1 + 1$ to 1.5 Nm
(0.1 to 0.15 kgm or 0.72 to 1.08 ft lb)

where:

A_2 = Ring gear and pinion rotating torque.

A_1 = Pinion rotating torque as previously measured, i.e.:

- 0.5 to 1 Nm (0.05 to 0.1 kgm or 0.36 to 0.72 ft lb) for models 466DT and 566DT with pinion installed without seal and retaining ring.
- 1 to 1.5 Nm (0.1 to 0.15 kgm or 0.72 to 1.08 ft lb) for models 666DT and 766DT with pinion installed without seal and retaining ring.
- 1 to 1.5 Nm (0.10 to 0.15 kgm or 0.72 to 1.08 ft lb) for models 466DT and 566DT with pinion installed with seal and retaining ring.
- 1,5 to 2.0 Nm (0.5 to 0,2 kgm or 1.08 to 1.45 ft lb) for models 666DT and 766DT with pinion installed with seal and retaining ring.

- **1 to 1.5 Nm (0.1 to 0.15 kgm or 0.72 to 1.08 ft lb)** = Ring gear rotating torque measured at pinion end using wrench **293520/2** (models 466DT and 566DT) or **293524/1** (models 666DT and 766DT) and torque wrench **293512.**

Exemple (model 566DT with pinion installed without seal and retaining ring).

— Pinion rotating torque:

A_1 = 0.7 Nm (0.07 kgm or 0.51 ft lb).

— Ring gear and pinion rotating torque:

A_2 = 0.7 + (1 to 1.5) = 1.7 to 2,2 Nm

(A_2 = 0.07 + (0.1 to 0.15) = 0.17 to 0.22 kgm or 1.23 to 1.60 ft lb).

— Finally, tighten cap retaining screws (C_{10}) to 113 Nm (1.5 kgm or 83 ft lb) and secure lock ring through associated lock plates. If plate does not correspond to notch, tighten lock ring further.

Differential gear backlash adjustment.

Install two side gears (60 and 61, section 402, page 3) on differential cage without shims (6).

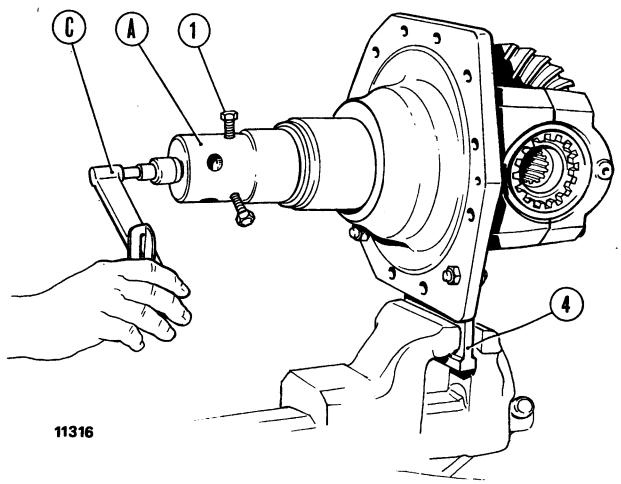
Insert differential pinions (62) with washers (7) and journal (63) and tighten capscrew (8) through a few turns to prevent journal from slipping.

Bring L.H. side gear into contact with differential pinion as shown on page 9, section 204 and, using a depth gauge, measure dimension (H_1) in two diametrally opposed points and average readings.

Push side gear in contact with differential cage as shown on page 9, section 204 and measure dimension (H_2).

Repeat the same operations on R.H. side gear. Axial displacement of each side gear without shim will be given by:

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



Checking ring gear and bevel pinion rotating torque.
A. Lock ring wrench **293520/2** (models 466DT and 566DT) or **293524/1** (models 666DT and 766DT) - C. Torque wrench **293512** - 1. Screws retaining wrench **293520/2** or **293524/1** to bevel pinion - 4. Support **293743** for differential carrier.

or:

Gs = L.H. side gear axial displacement

Gd = R.H. side gear axial displacement

H_1 and H_2 = Dimensions measured on L.H. or R.H. side gear.

Normal differential pinion and side gear backlash is 0.15 mm (0.006 in).

Note that average ratio of backlash to equivalent side gear displacement is **1 to 1,7**.

Side gear displacement corresponding to normal backlash: 0,15 x 1,7 = **0,25 mm (0.010 in).**

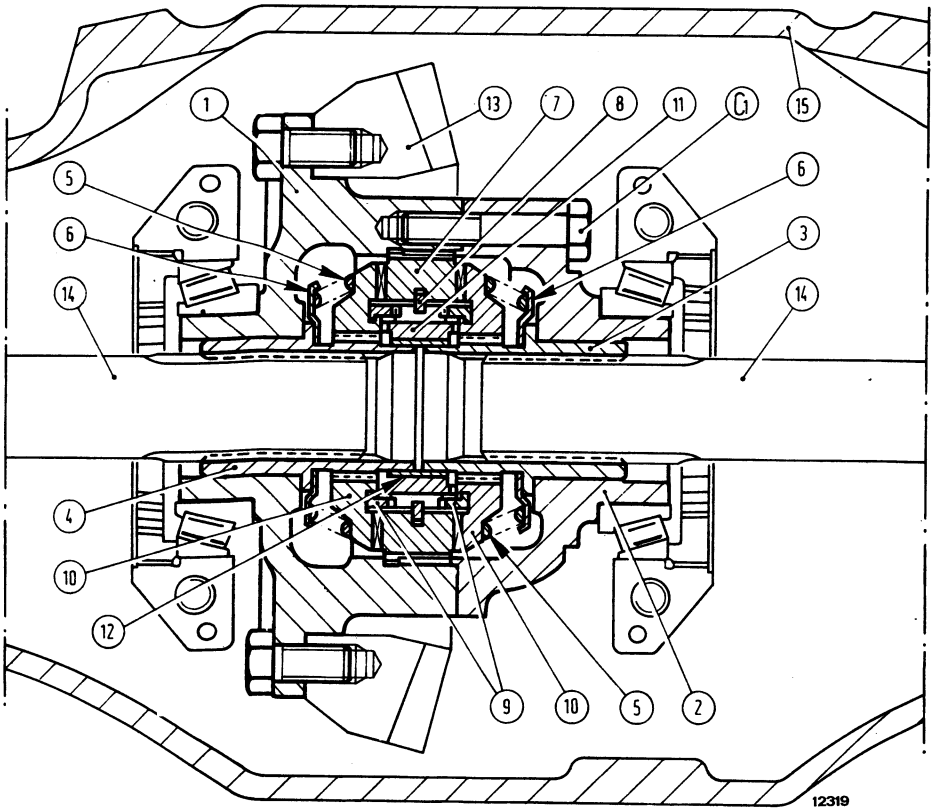
Thickness of shims to install on differential cage will thus be given by:

Ss = **Gs** — **0.25** (L.H. side gear)

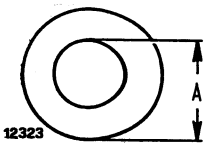
Sd = **Gd** — **0,25** (R.H. side gear)

Note that shims are available in thickness of 1.5 and 1.6 mm (0.059 in or 0.063 in). Fit the shim which is closer to the calculated value.

NO SPIN DIFFERENTIAL (optional for models 666DT and 766 DT)



NOTE
Check NO SPIN differential unit operation as follows:
- With engine off, engage a gear and the front wheel drive, apply parking brake and raise front of tractor.
- Rotate front wheels in a forward direction to eliminate play, Hold L.H. wheel and rotate R.H. wheel rearwards. NO SPIN differential disengages and wheel rotates with an indexing or metallic clicking sound.
- Stop R.H. wheel, then turn forwards slightly; NO SPIN differential engages and stops the wheel.
- Rotate both wheels backwards to eliminate play, hold L.H. wheel and rotate R.H. wheel forwards. NO SPIN differential disengages and wheel rotates with an indexing or metallic clicking sound.
- Stop R.H. wheel, then turn backwards slightly; NO SPIN differential engages and stops the wheel.
- Repeat the above operations while holding R.H. wheel.



b

Section through differential with NO SPIN unit (models 666DT and 766DT).

C_1. Case capscrew, tightening torque 56 to 62 Nm (5.7 to 6.3 kgm or 42 to 46 ft lb) - 1. Case, flange half - 2. Case, cap half - 3 and 4. Side gears - 5. Springs - 6. Spring retainer - 7. Central driven assembly - 8. Retaining ring - 9. Cam holdout rings - 10. Driven clutch - 11. Center cam - 12. Stop - 13. Ring gear - 14. Axle shafts - 15. Front axle housing.

OPERATION

The **NO SPIN** differential performs the following key functions:

- Permits full use of tractor pull.
- Prevents wheel-spin when one wheel loses traction.
- Compensates for differences in wheel travel which occur when turning or traveling over uneven ground.

When the tractor is in a straight-forward or reverse mode of operation the **NO SPIN** allows equal speed to be distributed to both wheels.
When the tractor makes a turn or a front wheel passes over an obstruction, the outer wheel or the wheel riding over the obstruction must travel faster and farther than the other. To do this it automatically disengages, passes over the obstruction or negotiates the curve and reengages, again automatically, when the same rotation speed as that of the opposite wheel is reached.

If one wheel should lose traction momentarily, the opposite wheel which still has traction, continues to pull the vehicle until traction is regained by both wheels.

Turning

In a left turn, for instance, the right wheel increases speed. Axle shaft (14) transmits this speed increase to the left side gear (3), to the left driven clutch (10) and to the associated cam holdout ring (9). When the speed difference between the two wheels reaches a given value, ring (9) and clutch (10) overcome spring load and disengage from center cam (11), remaining in this position until the end of the curve.

Nota: For correct **NO SPIN** differential operation, tyres must be equal (within a few millimetres) in rolling radii.
Small differences may be corrected by adjusting tyre inflation pressure. Check as illustrated above in detail **b**: distance A must be equal for both wheels.

DRIVE SHAFT

Removal

To remove drive shaft, proceed as follows:

— Remove shaft guard.

— Back off center bearing capscrews, (C_{12}, page 3), remove retaining rings (28 and 31) from seats and withdraw drive shaft (30), moving splined sleeves (27 and 33) inwards.

Inspect splines on shaft and associated sleeves and check efficiency of ball bearing (56).

Installation.

Reinstall shaft in seats and adjust as follows:

— Bring axle housing into contact with rear axle pivot support (25, page 3) to eliminate support end play and position front splined sleeve (27) against retaining ring (28). Using a feeler gauge, measure gap between sleeve and retaining ring (26) and install shim (S_5) to obtain sleeve end play (L) of 1 to 1.5 mm (0.04 to 0.06 in)

AXLE DRIVE

Removal

To remove axle drive from tractor, proceed as follows:

— Remove drive shaft as directed above.

— Drain oil from transmission housing and axle drive housing.

— Disconnect vertical link from outer lever, back off capscrews (C_{13}) and remove axle drive housing.

Disassemble unit on bench as follows:

— Remove roll pin (45, page 3) using a suitable punch, withdraw intermediate shaft (46) and remove associated gear (48) together with needle roller bearing (47) and thrust washers.

— From outside of axle drive housing, remove dust excluder (38), seal (39), retaining ring (40) and driven shaft (43) with attached ball bearing and oil seal.

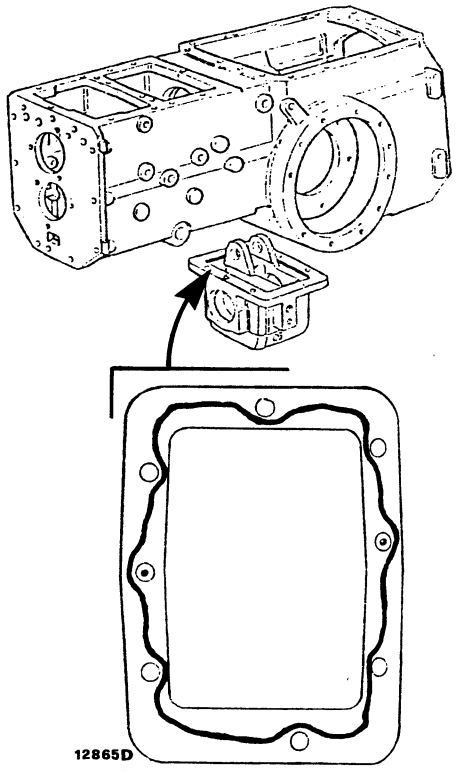
— Remove front wheel drive control sleeve (50) and driven gear (42) with thrust washers from axle drive housing.

— Using a slide hammer puller, remove ball bearing (44).

Note — The above operations apply to axle drive housing without parking brake.
For removal of axle drive housing with parking brake, see page 4, section 205 and figures on page 5, section 205.

Check thrust washers for wear and ball bearing efficiency.

If necessary, scrap and replace seal (39), using protector **293836** during installation.



Applying jointing compound for axle drive housing installation on trasmission housing.

Jointing compound types are indicated on page 6, section A.

Installation

To install, reverse the removal procedure and refer to figure on page 3.

Preferably replace dust excluder (38) taking care to prevent distortion on assembly.

Before axle drive housing reinstallation on trasmission housing, thoroughly clean and degrease mating surfaces and apply a 2 mm (0.08 in) dia. bead of jointing compound as shown in figure on page 1.

Jointing compound types are indicated on page 6, section A.

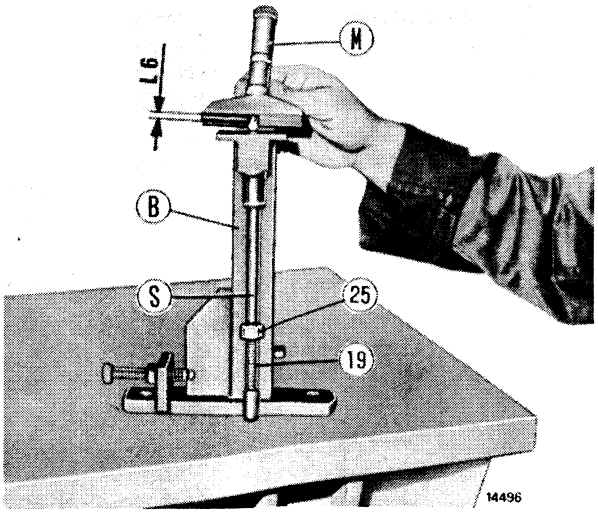
Note — This condition corresponds to a gap (L_1) between lever end (6) and lift body front end which exceeds 85 mm or 3.35 in when measured applying a force (F_1) of 4 to 4.5 daN (kg) or 9 to 10 lb on lever end.

2. Maximum lift arm travel adjustment on bench.

Proceed as follows:
- With tool **293846** (A) installed on lift body, position draught control lever (F, page 7) fully forward on quadrant and position control lever (P) fully back.
- Rotate arm shaft to bring inner arm into contact with lift body.
- Hook up connection (R_3) on tool (A) to a compressed air source (T) and introduce air to cylinder so that piston moves through full lift stroke. Maintain air pressure to keep piston in this position.
- Using wrench **293844/1** (C), tighten screw (3, page 7) until end of plunger (P_1) is aligned to inner register (R_2) of tool (A), or is recessed therefrom by no more than 0.5 mm (0.020 in).

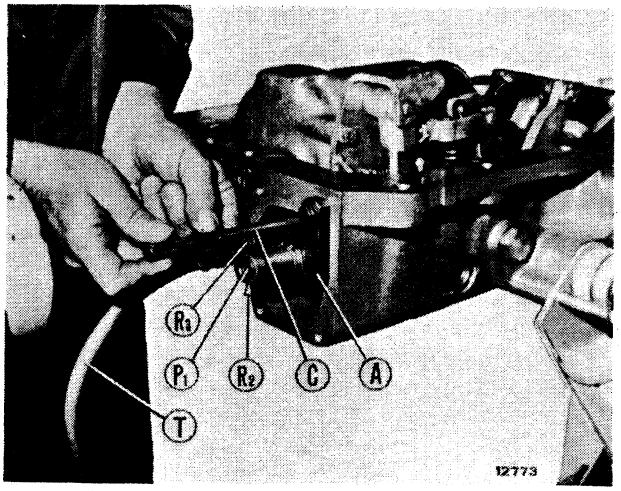
Note — This condition corresponds to a gap (L_1, page 7) of 85 to 85.5 mm (3.346 to 3.366 in) between lever end (6) and lift body front end.

- Tighten locknut (4).



Zeroing tool 293845/1 for draught control adjustment.

B. Tool **293845/1** L_6. Gap between top of spindle (S) and depth gauge support face - M. Depth gauge - S. Spindle. - 19. Draught control rod - 25. Lock nut.

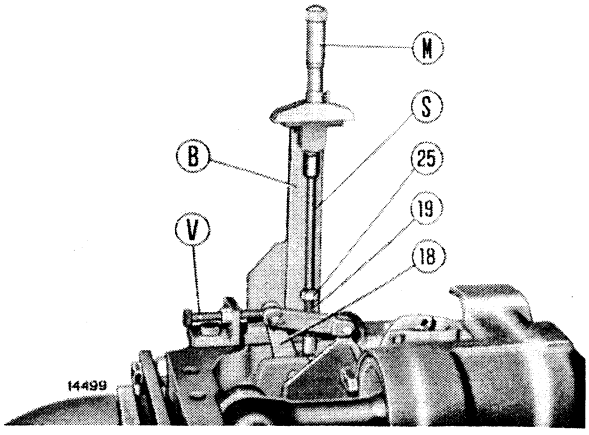


Adjusting maximum lift arm travel on bench.

A. Tool **293846** - C. Wrench **293844/1** - P_1. Plunger - R_2. Inner register face - R_3. Compressed air connection - T. Compressed air line.

3. Draught control adjustment

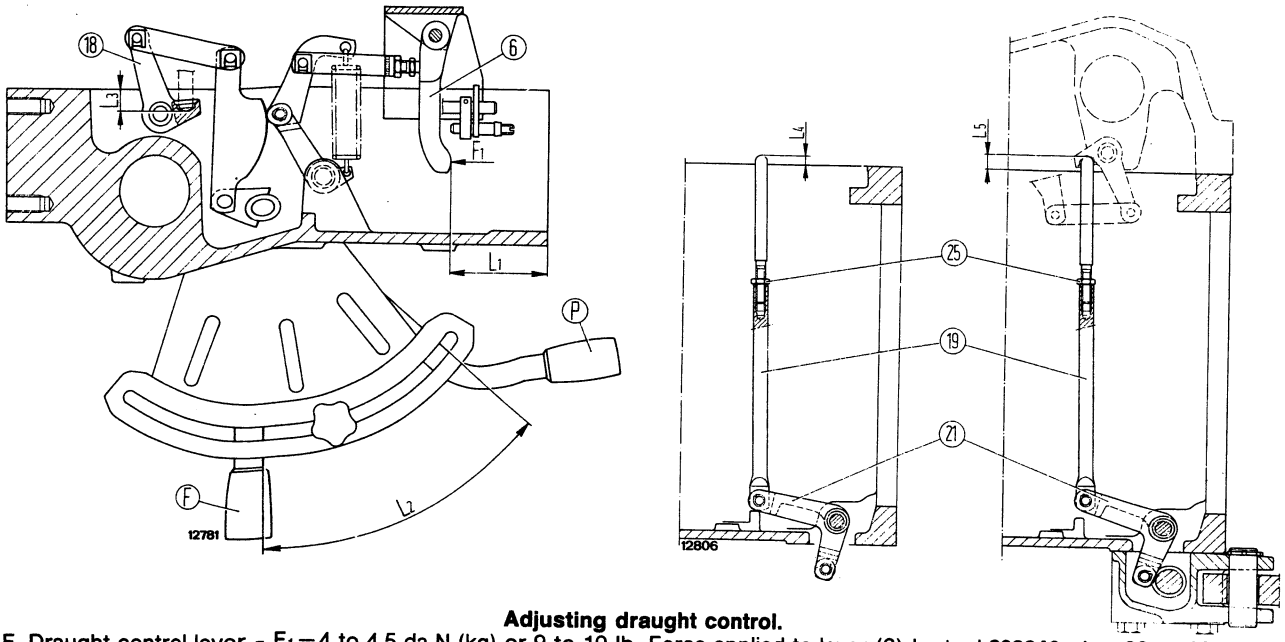
Proceed as follows:
- remove end of draught control rod (19, page 16) and install on spindle (S) of tool **293845/1** securing through lock nut (25).
- place tool **293845/1** (B) together with spindle (S) and end of draught control rod (19) on a surface plate and measure gap (L_6) between top of spindle and depth gauge support face.



Adjusting draught control.

B. Tool **293845** - 1. M. Depth gauge - S. Spindle - V. Screw - 18. Draught control inner lever - 19. Draught control rod - 25. Lock nut.

HYDRAULIC LIFT UNIT: Lift



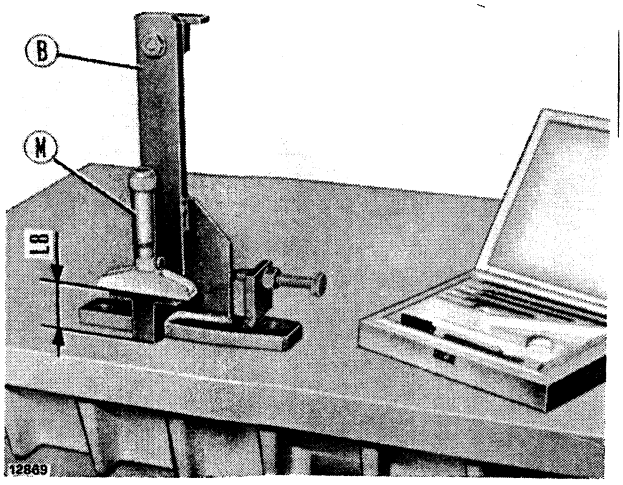
Adjusting draught control.

F. Draught control lever - F_1 = 4 to 4.5 da N (kg) or 9 to 10 lb. Force applied to lever (6) by tool **293846** - L_1 = 82 to 82.1 mm. (3.228 to 3.232 in). Distance between end of lever (6) and lift body front face - L_2 = 184 to 186 mm (7.224 to 7.323 in). Distance between end of slot and front edge of lever (F) - L_3 = Distance between lift housing mating face on transmission housing and rod contact face on lever (18) - L_4. = Rod stand-out from transmission housing (with sensing bar removed) - L_5 = Rod standout from transmission housing (with sensing bar installed) - P. Position control lever - 6. Control valve actuating lever - 18. Draught control inner lever - 19. Draught control rod. - 21. Draught control relay lever - 25. Locknut.

Note — If early model tool **293845** is available, it may be changed into late model tool **293845/1** by modifying spindle (S) as indicated on page 1, Section 501, models 55-66, 60-66 and 80-66.

— With tool **293846** (A, page 9) installed on lift body and disconnected from compressed air supply, move position control lever (P) fully forward on quadrant and place draught control lever (F) so that there is a distance (L_2) of 184 to 186 mm (7.24 to 7.32 in) between end of slot and front edge of lever.

— Install tool **293845/1** (B, page 9) on lift body and secure to two housing holes as shown in figure. Turn knurled screw (V) to move draught control inner lever (18) until end of plunger (P_1, page 8) is exactly aligned to outer register (R_1) on tool **293846** (A) as shown in figure on page 8.



Zeroing tool 293845/1 (B) for draught control adjustment.

L_8. Dimension between tool base on surface plate and depth gauge support face (to be stamped on tool) - M. Depth gauge.

Note — This condition corresponds to a dimension (L_1) of 82 to 82.1 mm or 53.228 to 3.232 in) between lever end and lift body front support as measured applying a force (F_1) of 4 to 4.5 daN (kg) or 9 to 10 lb on lever end.

— Insert tool spindle (S) in draught control inner lever seat (18) and, using a depth gauge (M), measure distance (L_7) between top of spindle and depth gauge support face on tool.

— Dimension (L_3) will be given by:

$$L_3 = L_7 - L_6$$

where:

L_7 and L_6 = Dimensions measured with tool **293845/1** on surface plate (L_6) and on lift body (L_7).

— Disassemble tools **293845/1** and **293846** and install hydraulic control valve on lift body.

Install lift on tractor as described below:

Warning: First place tool **293845/1** (B, page 10) on a surface plate and, using a depth gauge (M) measure distance (L_8) between tool base and depth gauge support face on tool.
Stamp measured dimension (L_8) on tool.

— Install relay lever (21, page 10) with draught control rod (19) on rear transmission housing.
— Rest relay lever (21) against the associated stop on trasmission housing and install tool **293845/1** (B), securing it to two housing holes in such a way that draught control rod (19) fits perfectly into hole on tool.
— Using depth gauge (M) measure distance (L_9) between top of rod (19) and depth gauge support face on tool.

Note: Stand-out (L_4, page 10) of top rod end (19) from transmission housing (with sensing bar removed) will be given by:

$$L_4 = L_8 - L_9$$

where:
L_8 and L_9 = Dimensions measured with tool **293845/1** on surface plate (L_8) or on transmission housing (L_9).

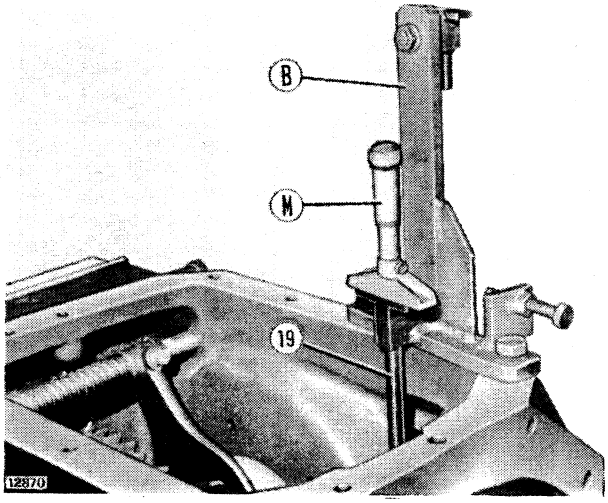
— Install sensing bar and measure new distance (L_{10}) between top of rod (19) and depth gauge support face on tool.

Note: Stand-out (L_5, page 10) of rod end (19) from transmission housing (with sensing bar installed) will be given by:

$$L_5 = L_8 - L_{10}$$

where:
L_8 and L_{10} = Dimensions measured with tool **293845/1** on surface plate (L_8) or on transmission housing (L_{10}).

— Check that dimension (L_5) exceeds dimension (L_4) by 5 mm (0.20 in).
— Check that dimension (L_5) with sensing bar installed, exceeds dimension (L_3, page 10) by 0.3 (0.012 in).
To adjust slacken locknut (25) and turn draught rod (19) as necessary.
— Tighten locknut (25).
— Install lift on tractor, start engine and check (without applying load on lift arms) that start of lift in draught control occurs when front edge of draught control lever (F) has moved by a distance (L_2, page 10) of 180 to 190 mm or 7.09 to 7.48 in from end of slot.



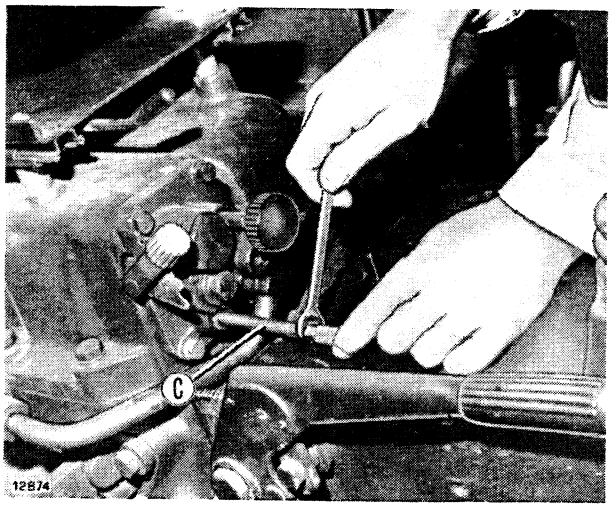
Adjusting draught control.
B. Tool **293845/1** - M. Depth gauge - 19. Draught control rod.

4. Maximum lift arm travel adjustment with lift installed on tractor.

Test conditions:
— Apply 50 kg (110 lb) to lower link swivel bushings.

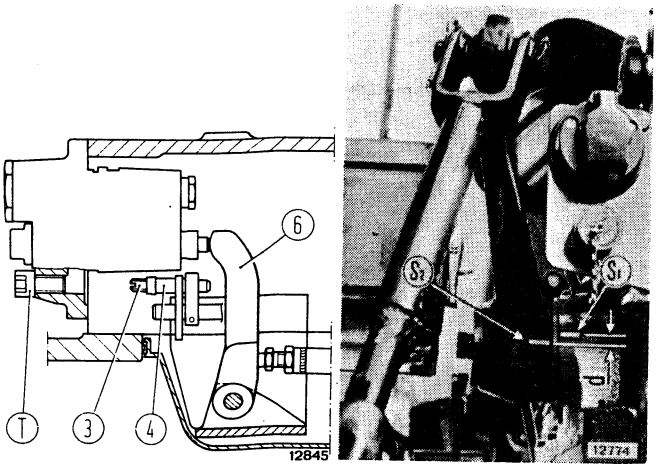
— Bring oil temperature to 50 - 60°C (112 to 140°F).

Proceed as follows:
— Shut off engine, wait 5 minutes to allow oil in lift body to drain into transmission housing, remove plug (T, page 2) and insert wrench **293844/1** (C) in plug hole.



Adjusting maximum lift arm travel.
C. Wrench **293844/1.**

HYDRAULIC LIFT UNIT: Lift



Adjusting maximum lift arm travel.

d=2 to 3 mm (0.08 to 0.12 in). Distance between reference marks S_1 and S_2. - S_1. Reference mark on lift body - S_2. Reference mark on lift arm - T. Plug - 3. Travel adjusting screw - 4. Adjusting screw locknut - 6. Control valve actuating lever.

— Start engine and run at 1200 to 1500 rpm.

— Move position control lever (P, page 1) fully back on quadrant.

— Using wrench **293844/1** (C, page 11), slacken locknut (4) and back off limit travel adjusting screw (3) until relief valve cracks off.

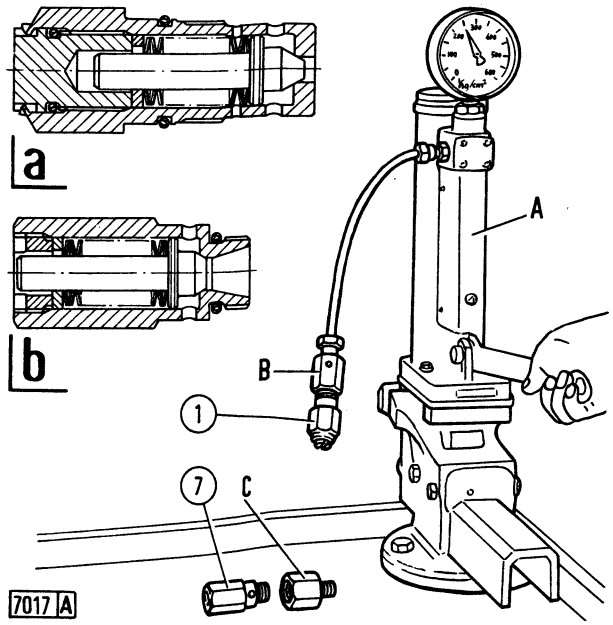
— Apply two corresponding reference marks on lift body (S_1) and on one lift arm (S_2).

— Using wrench **293844/1** (C, page 11), tighten adjusting screw (3) until distance (d) between the two reference marks is 2 to 3 mm (0.08 to 0.12 in).

— Tighten locknut (4).

— Shut off engine, wait for approximately five minutes, remove wrench **293844/1** (C, page 11) and reinstall plug (T).

— Operate lift through a few strokes to check that adjustment is correct.



Cylinder safety and relief valve test equipment.

a. Section through relief valve - b. Section through cylinder safety valve - A. Hand pump **290284** - B. Relief valve fitting **290824** - C. Cylinder safety valve fitting **290828** - 1. Relief valve - 7. Cylinder safety valve.

VALVE CHECK

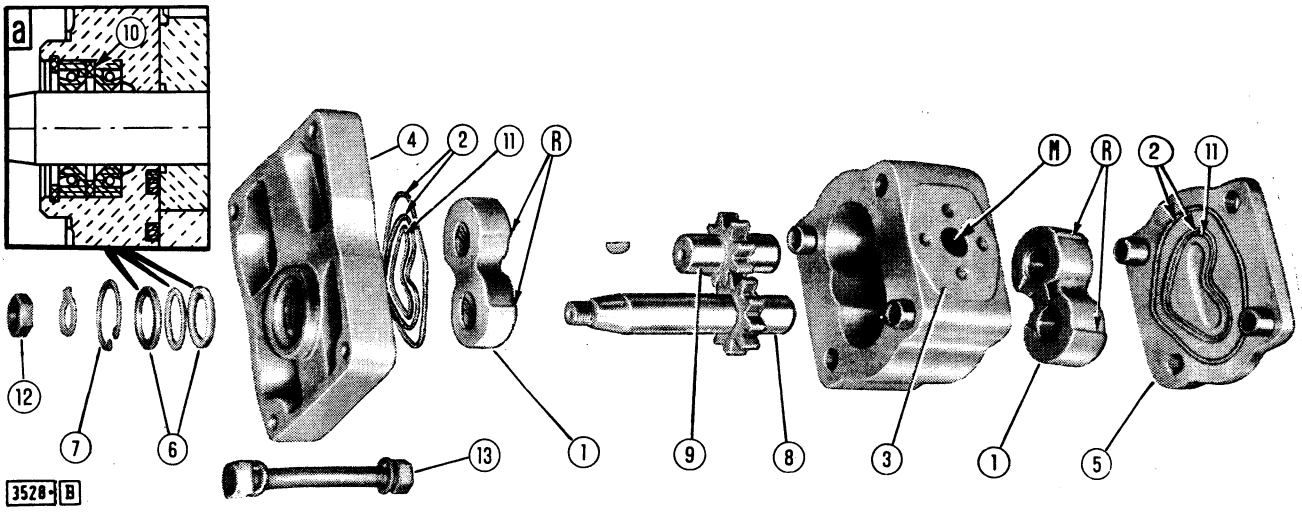
Relief and cylinder safety valve setting check.

Relief valve (installed on right of lift body or incorporated in remote control valve, where fitted) may be checked either on bench or on tractor, while cylinder safety valve setting check may only be carried out on bench.

To bench test of cylinder safety valve (15, page 5) and relief valve incorporated in lift body (17, page 4) on tractors not fitted with remote control valves, use hand pump **290284** (A) equipped with fittings **290828** (C) and **290824** (B).

Relief valve should crack off at 186 to 191 bar (190 to 195 kg/cm² or 2,702 to 2,775 psi), while safety valve crack-off pressure should be 225 to 235 bar (230 to 240 kg/cm² or 3,263 to 3,408 psi).

Note: At the factory, on-bench adjustment of relief valve (1) installed on R.H. side of lift body is carried out using oil under pressure; consequently, the adjustment procedure using pump **290284** is given for guidance only. Check relief valve setting with valve installed on tractor, as directed in para. a, page 13, for tractor without remote control valves.



Lift pump components.

a. Seal assembly detail - M. Pump delivery port - R. Gear bearing fillets (delivery side) - 1. Gear bearings - 2. Cover seals - 3. Pump body - 4. Rear cover - 5. Front cover - 6. Drive shaft seals - 7. Seal retaining ring - 8. Drive gear shaft - 9. Driven gear shaft - 10. Spacer - 11. Anti-extrusion ring - 12. Nut securing sleeve to pump drive shaft and associated lockwasher - 13. Cover nuts.

HYDRAULIC PUMP

Pump is valve gear driven through a dog clutch.

To gain access to drive gear, remove valve gear cover.

Oil circulating in pump automatically lubricates and restores gear end float.

Overhaul

Refer to figure above when disassembling pump.

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

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

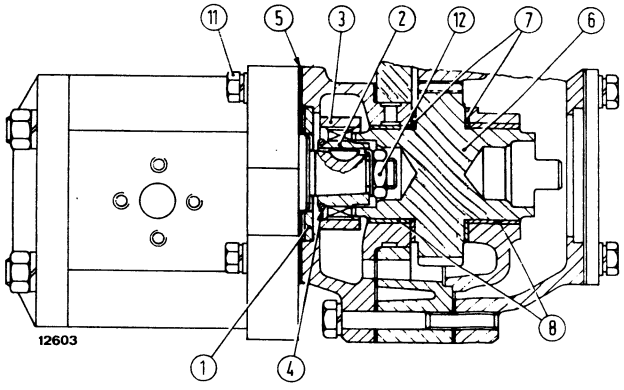
Check gear side face flatness and squareness relative to bearings, smearing the surfaces in question with carbon black.

Small defects may be rectified using wet zero-grade emery cloth.

Check gear end clearance in the pump body with bearings in position. The correct end float is 0.090 to 0.160 mm (0.003 to 0.006 in). Any pump body face dressing, with a view to restoring the specified end clearance, should be carried out using wet zero-grade emery cloth, removing as little material as possible.

Liberally lubricate all pump parts using the same grade of hydraulic lift oil, then assemble noting the following points:

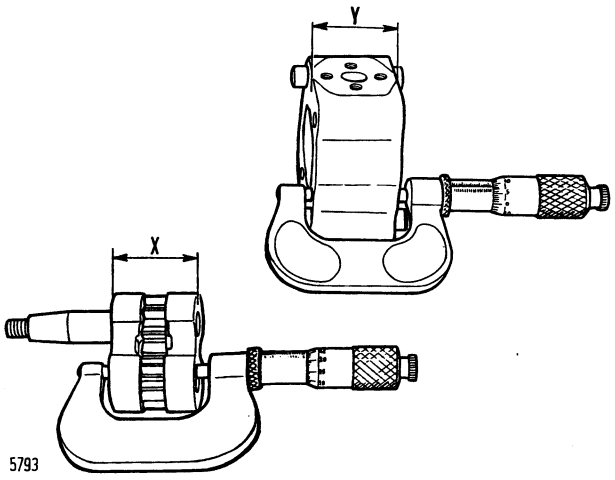
— Ensure that reference marks applied on disassembly are in register.
— Position plastic anti-extrusion ring (11) inside center O-ring (2).
— The bearings, which should slide into position by hand, must be introduced so that fillets (R) face toward outlet port (M) and with slotted frontal surfaces abutting the gears.



Section through pump drive

1. Centralizer - 2. Pump drive sleeve - 3. Sleeve drive ring - 4. Retaining ring - 5. Seal - 6. Driven gear - 7. Thrust rings - 8. Gear bushings - 11. Pump capscrews - 12. Sleeve nut.

HYDRAULIC LIFT UNIT: Lift Pump

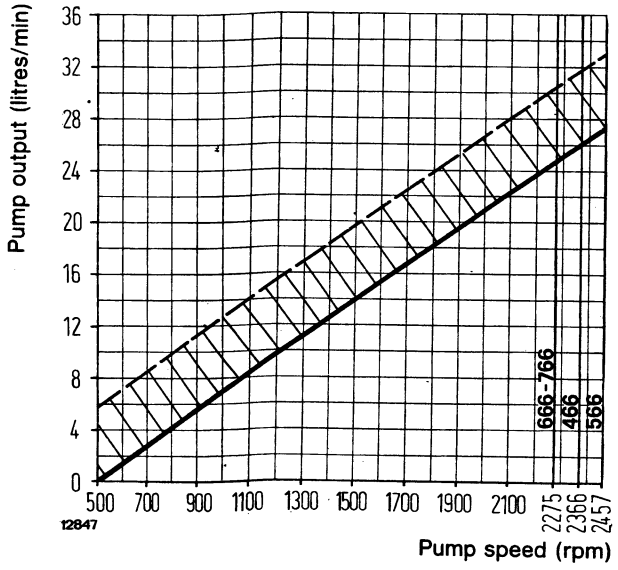


Checking gear end clearance in pump body.

Note - Dimension **X** to be smaller than dimension **Y** by 0,090 to 0,160 mm (0.002 to 0.006 in).

— Fit rotary shaft seals (6, page 1) to rear cover (4) with attached spacer (10) as shown in detail (a) and pack the lip cavity with **grassofiat TUTELA G9** or other approved grease.

— Progressively tighten the cover nuts and bolts to the pump body adopting the specified tightening torques.



Speed-output chart of lift pump A31X or A31XP.

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

When installing pump to tractor, fill both suction pipe and the pump body with **oliofiat TUTELA MULTI F** or other approved oil to facilitate priming and prevent seizure during initial service.

Output test

Couple the pump to the drive motor and connect to output test machine using the equipment shown in figure.

Use **oliofiat IDRAULICAR AP51** (SAE 20) oil supplied with the test machine and carry out the output test at the specified 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 fairly close to the dotted line;

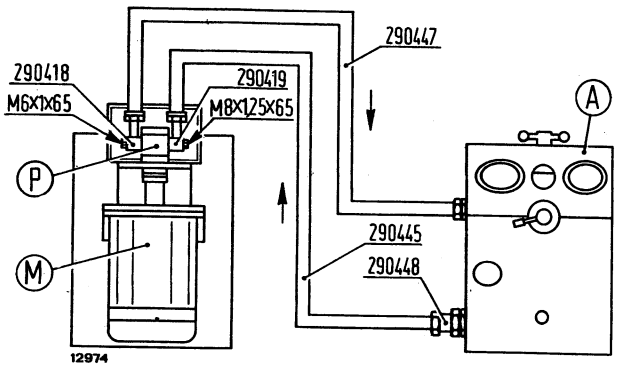
— Output ratings of used pumps are acceptable if included in the shaded area of the chart.

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

OIL FILTER

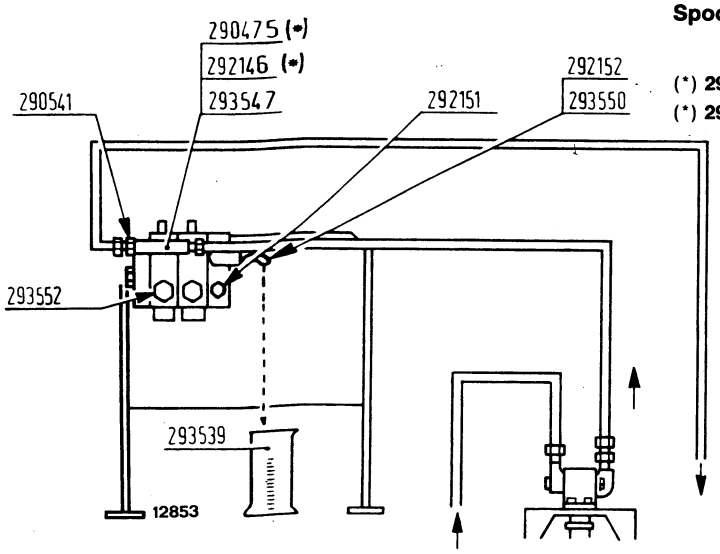
The lift oil filter is located on the pump suction line.

The filtering element consists of a paper cartridge which should be changed every 400 hours.



Lift pump output test machine.

A. Output tester **291231** - M. Motor **291235** - P. Pump under test (A31X early model or A31XP late model).



Spool leakage test equipment installation diagram for float double-acting remote control valves (c).

(*) **290475** = Early type three-way adapter.
(*) **292146** = Late type three-way adapter.

— Test the other spools after establishing the necessary connections.

Remote control valve spool leakage test (c).

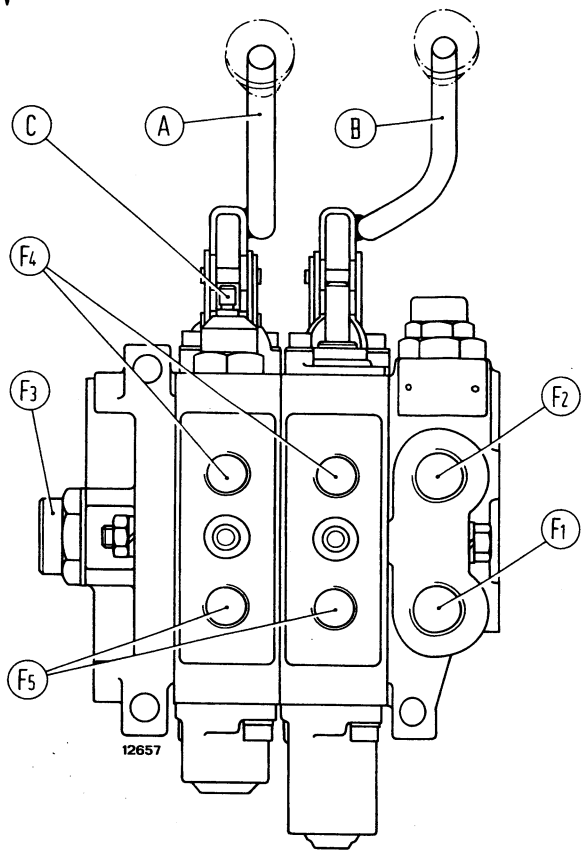
Install remote control valve assembly under test and test equipment as indicated in diagram (c) noting that three-way connection **292146** (or **290475**) is to be fitted to single-acting and double-acting cylinder valve using adapters **293547**.

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 leakage oil flowing from connection **293550** in burette **293539** for exactly one minute and check the content; leakage oil should not exceed 25 cc/minute (1.52 cu in/minute) for a new control valve, or 60 cc/minute (3.66 cu in/minute) for a used valve.*

Repeat test on each control valve, testing each of the two cylinder delivery ports in turn.



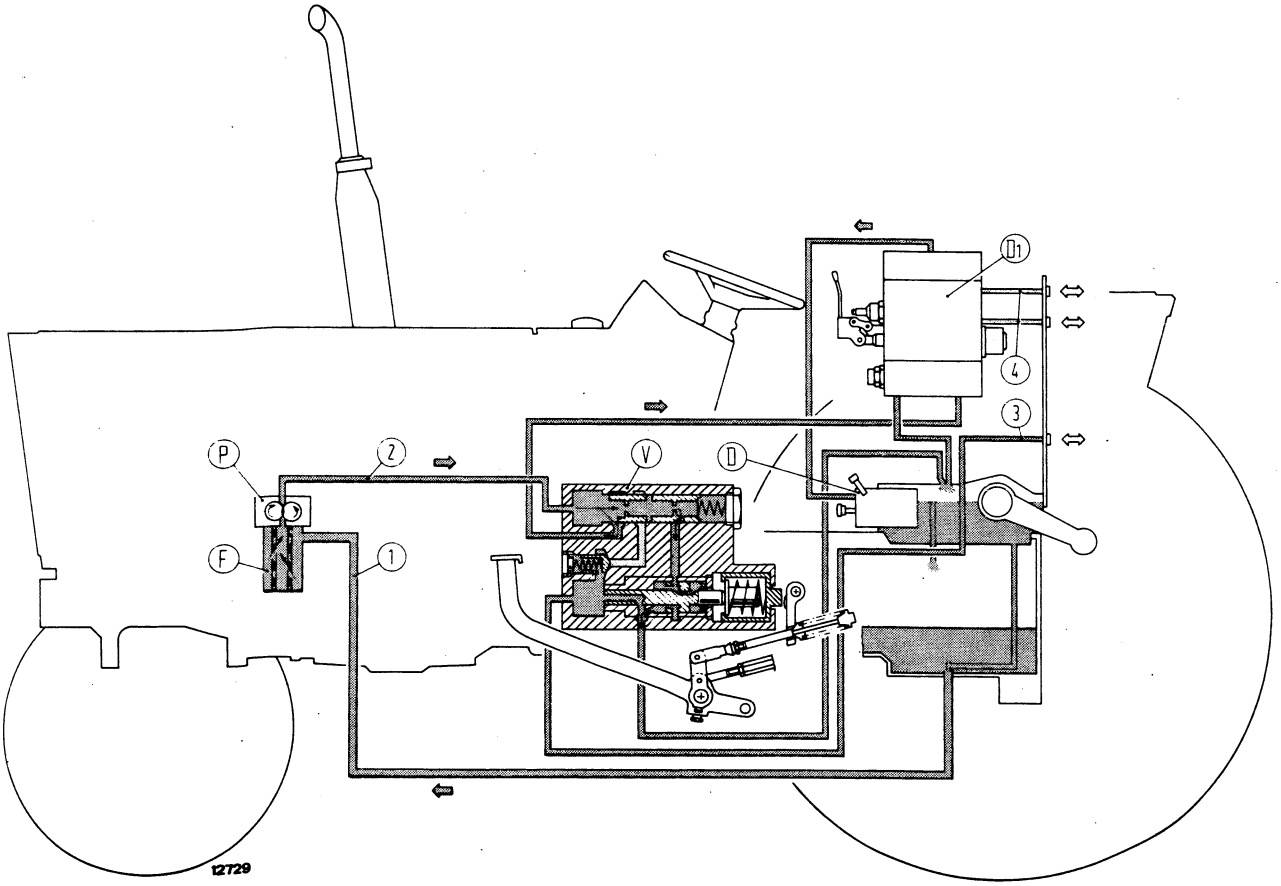
Remote control valve piping connection diagram
A. Single/double acting convertible remote control valve lever - B. Float double-acting remote control valve lever - C. Single/double action conversion valve - F_1. Threaded hole (M22x1.5) for oil inlet line fitting - F_2. Threaded hole (M22x1.5) for oil exhaust line fitting - F_3. Threaded hole (M20x1.5) for oil delivery connection to lift control valve - F_4. and F_5. Threaded holes for oil delivery connections to single-acting or double-acting cylinders.

HYDRAULIC LIFT UNIT: Remote Control Valves

TRAILER BRAKE REMOTE CONTROL VALVE

The optional trailer brake remote control valve is attached to the transmission housing through a bracket.

Trailer brake remote control valve employs the tractor hydraulic circuit, and is operated through the L.H. tractor brake pedal.



Trailer brake remote control valve hydraulic system diagram.

D. Lift control valve - D_1. Remote control valve - F. Filter - P. Hydraulic pump (common to hydraulic lift) - V. Trailer brake remote control valve - 1. Suction pipe from rear transmission housing - 2. Delivery line to trailer brake control valve - 3. Delivery line to trailer brake - 4. Delivery line to tractor circuits.

NOTE

Sections covering specifications of models *45-66, 45-66V, 55-66V, 55-66F,* 55-66LP, 60-66F, 60-66LP, *70-66F* and *70-66LP* will be included in the next revision.