

GPA 30 drive pinion

General

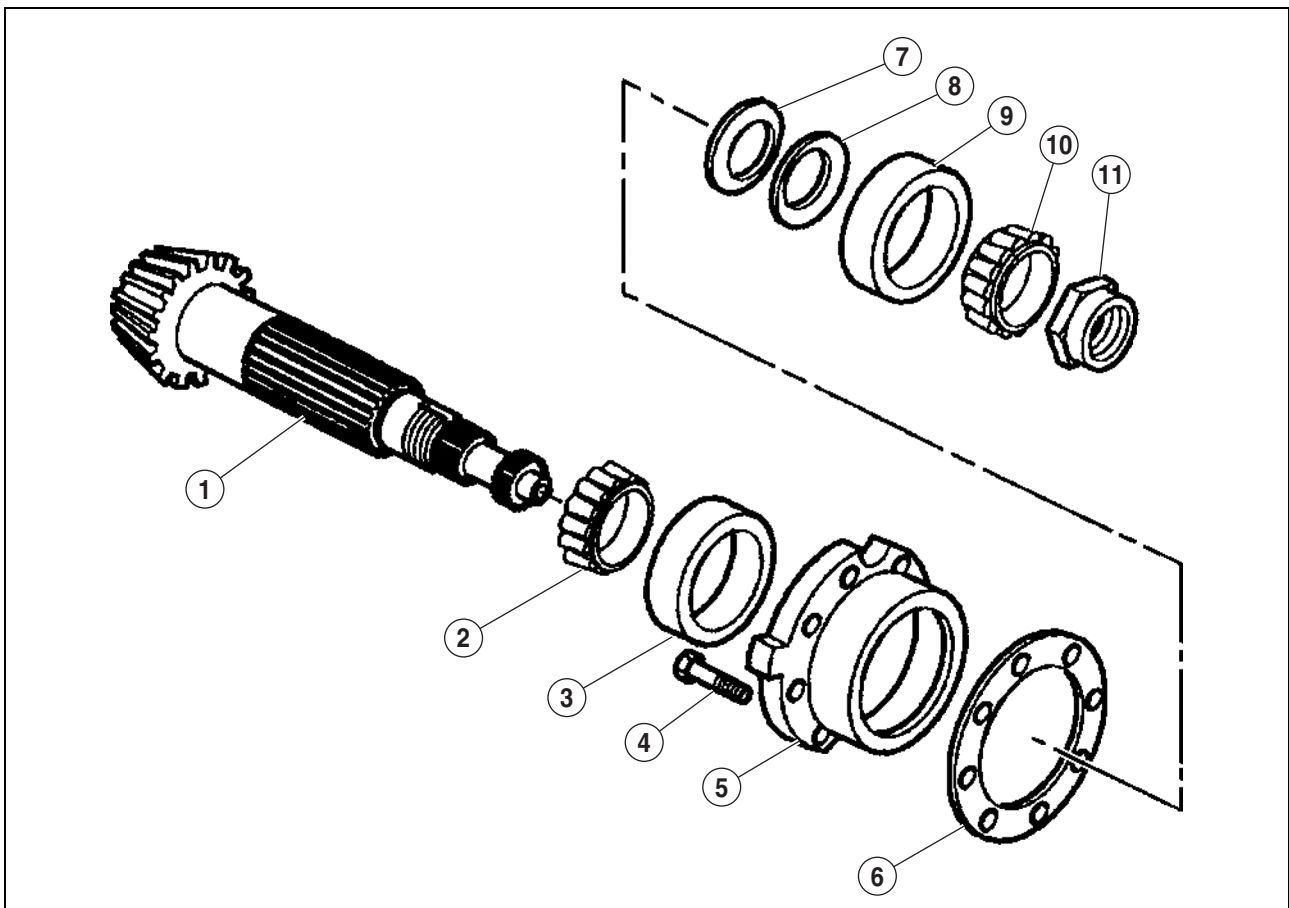
The helical drive pinion is supported by 2 tapered bearings mounted opposite each other. The bearing cone (2) is press-fitted onto the drive pinion and the cups (3) and (9) are also press-fitted into the intermediate housing and the bearing (5) respectively. The bearing cone (10), free on the drive pinion, enables the shims (8) to be fitted for packing purposes. The drive pinion

supporting the 4-wheel drive driving gear is located in the intermediate housing. Its position is adjusted by means of one or more shims (6) placed between the bearing (5) and the housing. The bearings are preloaded by means of one or more shims (8) fitted between the bearing cone (10) and the thrust washer (7).

Nomenclature

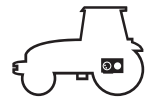
- | | | |
|-----------------|------------------|------------------|
| 1 Drive pinion. | 5 Bearing. | 9 Bearing cup. |
| 2 Bearing cone. | 6 Shims. | 10 Bearing cone. |
| 3 Bearing cup. | 7 Thrust washer. | 11 Nut. |
| 4 Screw. | 8 Shims. | |

Exploded view



342hsm16

Fig. 8

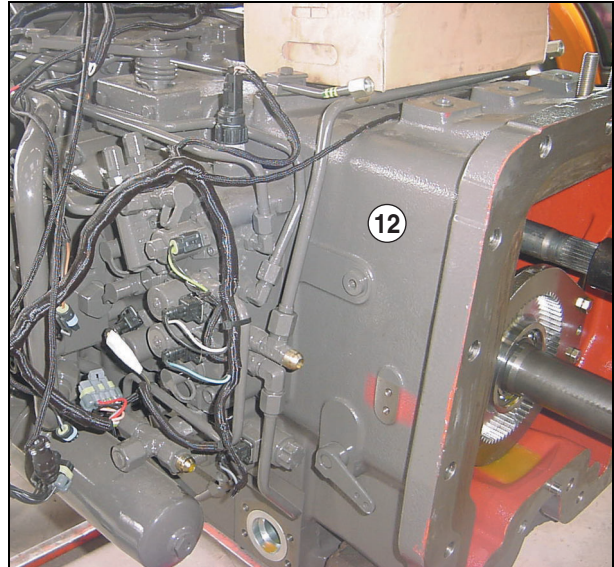


GPA 30 drive pinion

Removal/refitting

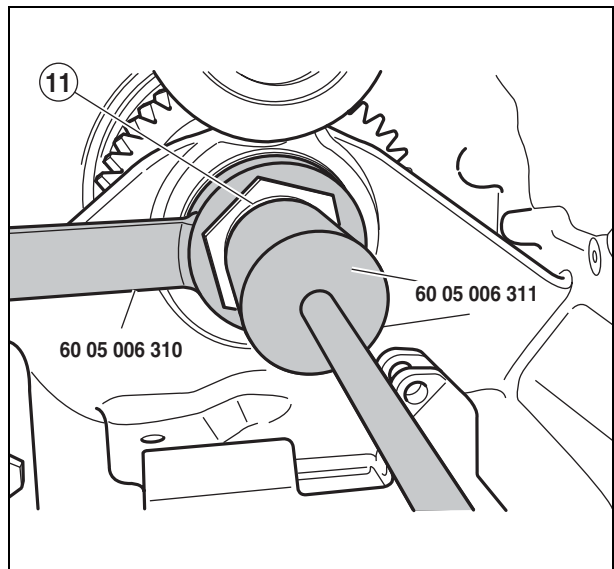
Uncouple the tractor between the gearbox and the intermediate housing (12) as follows:

- Refer to Chapter "H" for partial cab removal. Operations 1 to 7.
- Drain the transmission system.
- Remove the reservoir(s) and disconnect the pipes, hoses and wiring harnesses interfering with the uncoupling operation.
- Make the tractor safe with stands and trolleys.
- Chock the tilt between the front axle and the cradle.
- Release the ratchet of the "Park Lock" transmission lock.
- Mark the position and extract the sleeve between the drive pinion and the lower shaft.
- Remove the bearing/hydraulic pump driving gear assembly.
- Disconnect the handbrake mechanism control shaft.
- Free and secure the nut (11) with spanner n° 60 05 006 310.
- Fit special socket n° 60 05 006 311 to the end of the drive pinion and turn in a clockwise direction (Fig. 10).
- Remove the bearing cone (10), shims (8) and thrust washer (7).



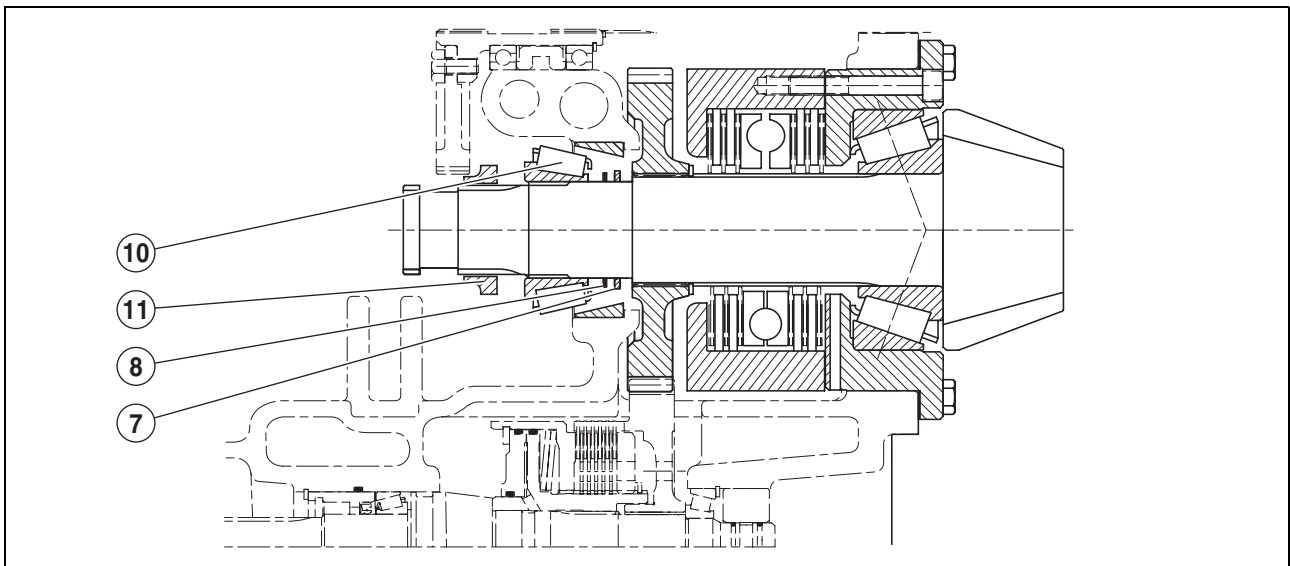
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Fig. 9



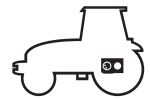
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Fig. 10

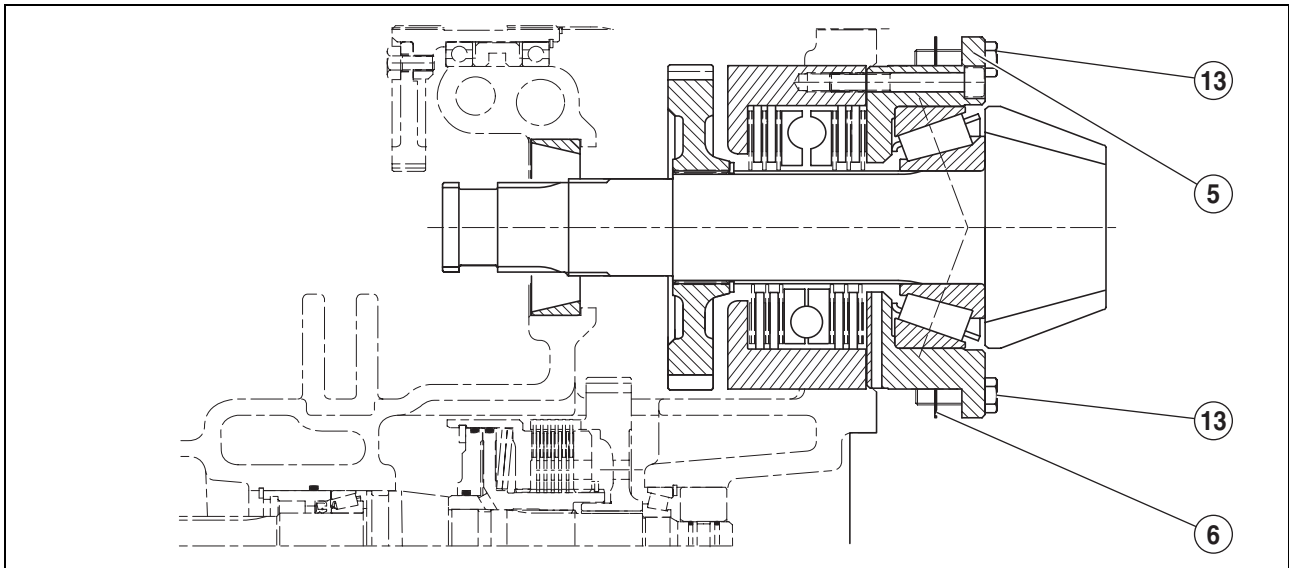


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Fig. 11



GPA 30 drive pinion

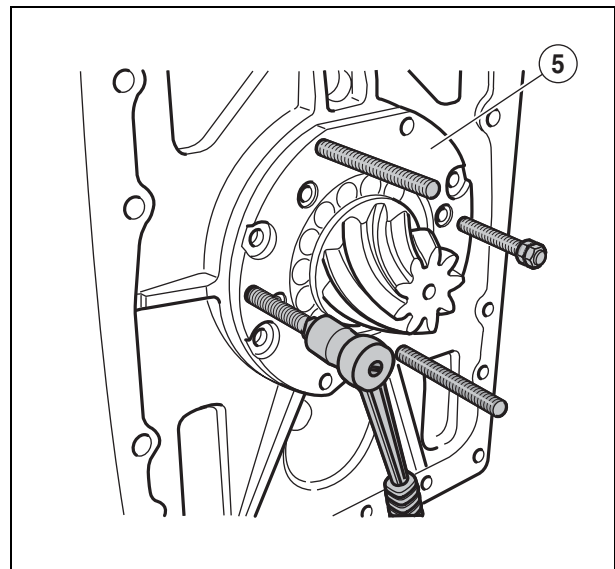


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Fig. 12

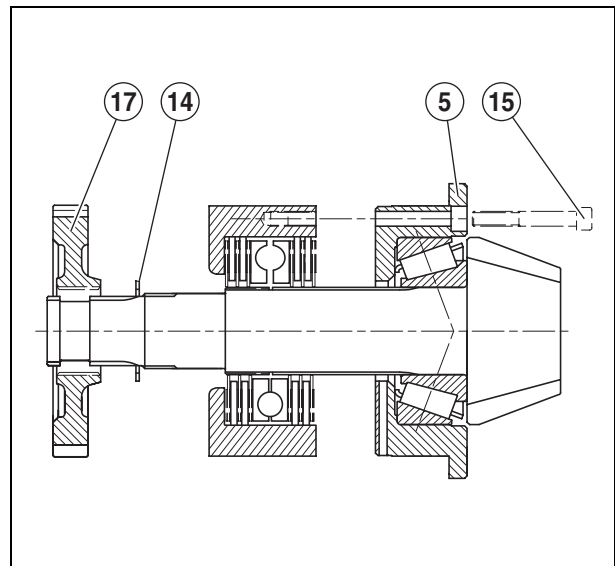
- Uncouple the intermediate housing (12) from the rear axle.
- Remove 2 diametrically opposite screws (13) from the bearing (5).
- Screw 2 locating studs in replacement (Fig. 13).
- Finish removing the other screws.
- Extract the bearing (5) with the aid of 2 screws inserted into the tapped holes.
- Remove the shims (6).
- Remove the handbrake casing and the 4-wheel drive gear (17).
- Make a visual note of the position of the parts.
- Remove the retaining ring (14).
- Remove the screws (15).
- Separate the handbrake casing from the bearing (5).
- Remove the discs, the intermediate plates and the handbrake mechanism.

If necessary, extract the bearing cups and the cone from the drive pinion.



342hsm21

Fig. 13



342hsm22

Fig. 14

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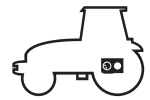
Hello dear friend!

Thank you very much for reading.

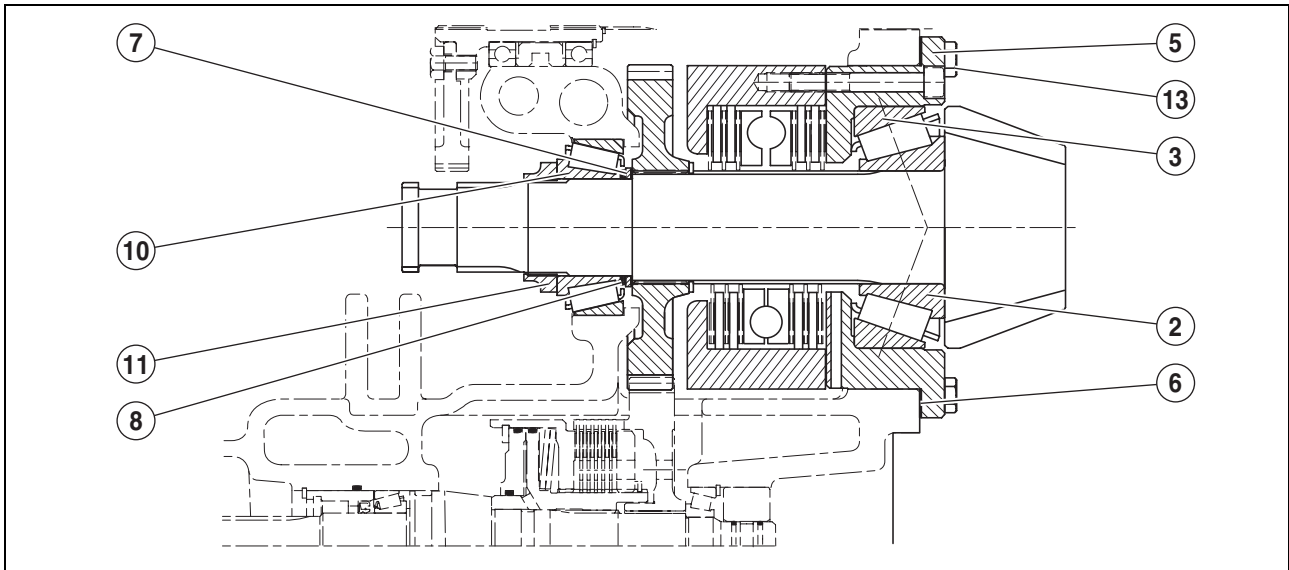
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GPA 30 drive pinion



342hsm23

Fig. 15

N.B.: If the drive pinion, tapered roller bearings, bearing block, thrust washer or intermediate housing need to be replaced, it is essential to adjust the drive pinion protrusion distance and then shim the tapered bearings.

- Clean and inspect all parts, replace all faulty parts. If removed, fit the bearing cone (2) fully onto the drive pinion using an appropriate jig and a press and bring the cup (3) into contact with the bearing block (5).
- Lubricate the roller bearing with transmission oil.
- Refit the handbrake mechanism, the intermediate plates and the discs.
- Assemble the handbrake casing and the bearing.
- Slide the drive pinion, handbrake and bearing (5) assembly with the aid of locating studs and with the measured number of shims (6).
- Drive the screws (13) gradually and alternately to fit the bearing correctly.
- Coat the screws (13) lightly with Frenbloc (270) and tighten to 12 ± 1 daN.m.
- The thrust washer (7) must be placed in contact with the shoulder in the drive pinion.
- Slide on the shims (8).

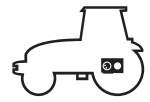
- Lubricate the bearing cone (10) with transmission oil and mount it on the drive pinion in contact with the shims.
- Degrease the nut (11) and the drive pinion threads.
- Coat the nut thread lightly with Frenbloc (270) and immobilise it with spanner n° 60 05 006 310. Using socket n° 60 05 006 311, turn the drive pinion anticlockwise to a torque of 23 ± 2 daN.m.

Important: Check drive pinion rotation manually. Lock the nut by deforming its flange, without breaking it, using a suitable tool.

- Fit and adjust the brake control.
- Refit the bearing/hydraulic pump driving gear assembly.
- Refit the ratchet and sleeve of the "Park Lock" transmission lock.
- Couple up the tractor.

N.B.: If the ring gear and drive pinion have needed to be replaced, check the backlash (see paragraph concerned).

- Check the operation of all controls. Road test.
- Check the gasket faces for leaks.
- Check the hydraulic couplings for leaks.



GPA 30 drive pinion

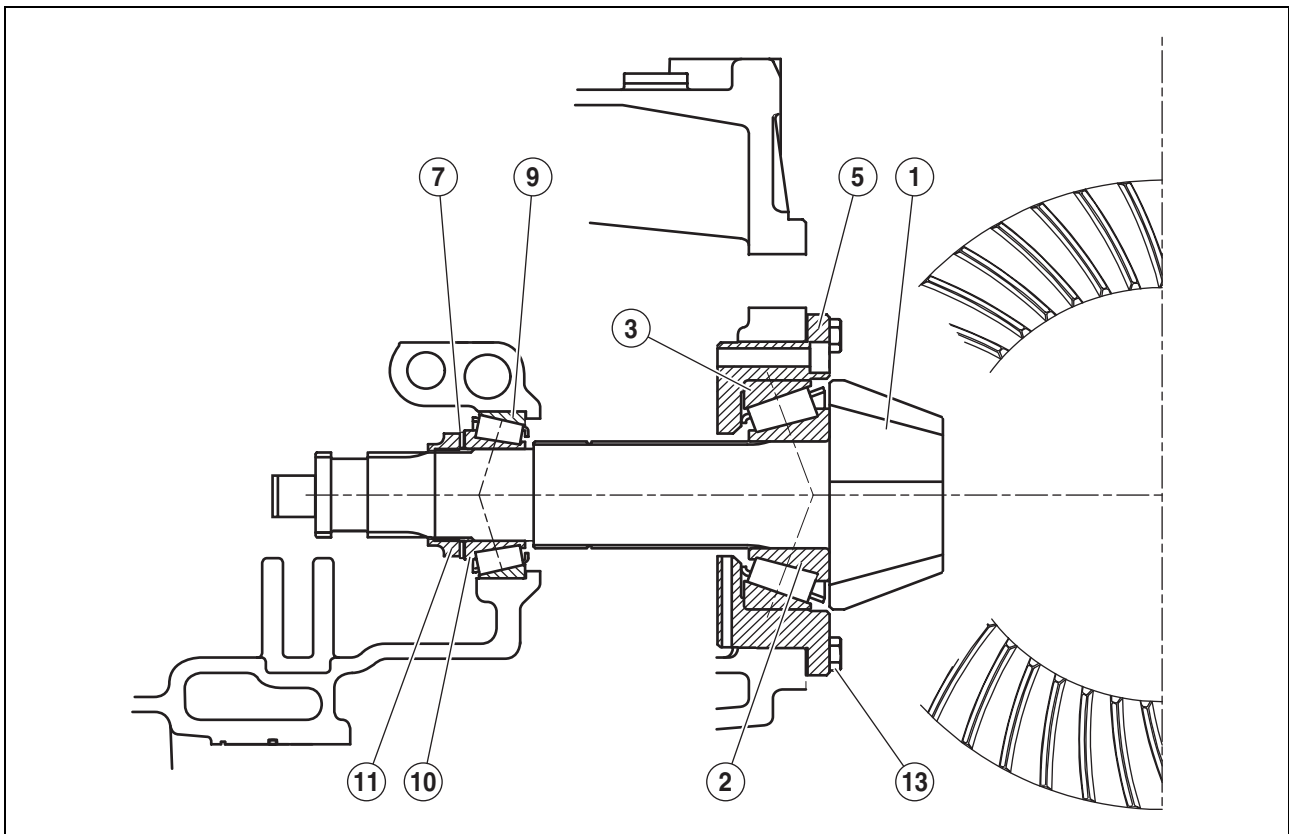
Drive pinion protrusion distance and shimming

Reminder: It is essential to adjust the pinion protrusion before shimming the tapered roller bearings. Do not alter the adjustment without reviewing the shimming of the drive pinion bearings.

Setting the drive pinion protrusion distance

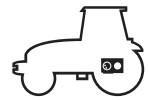
Without the handbrake casing and the 4-wheel drive gear.

- Fit the bearing (5) with its bearing cup (3) and without shims, tighten screws (13) to 12 ± 1 daN.m.
- Slide the drive gear (1) with the bearing cone (2).
- Fit the bearings (9) and (10) and the thrust washer without shims.
- N.B.:** The thrust washer (7) will be fitted while the distance between the bearing ocone and the nut is being measured.
- Tighten the nut (11) to 4 ± 1 daN.m with tools n° 60 05 006 310 and n° 60 05 006 311.
- Turn the drive pinion 8 times to seat the bearings properly.
- Check the nut torque once again.

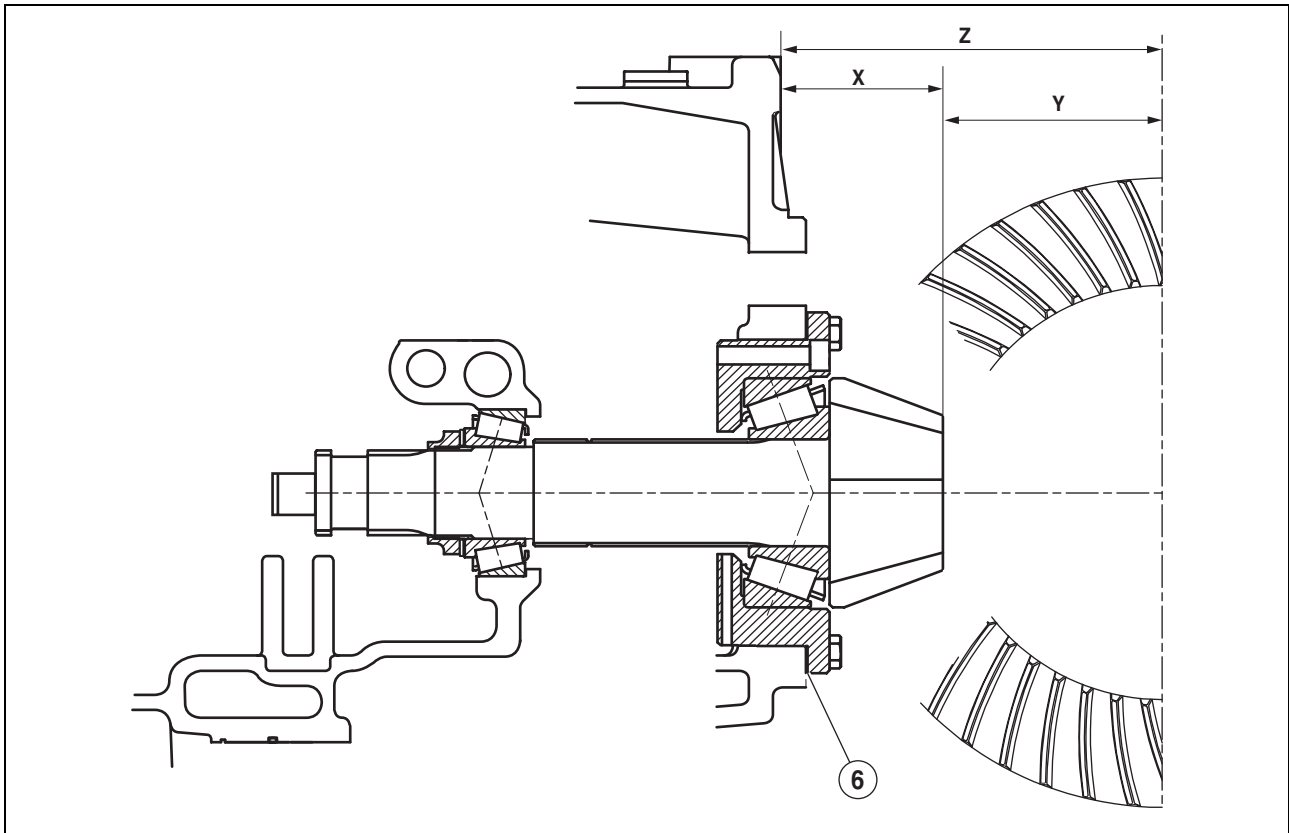


342hsm24

Fig. 16



GPA 30 drive pinion



342hsm25

Fig. 17

Measuring "X"

Measure "X" with a depth gauge (Fig. 18).

Thickness "E1" of shims (6)

Determine "E1" according to "X", "Y" and "Z".

Given that:

- "Z" corresponds to the nominal dimension determined between the rear face of the intermediate housing and the differential axis = $241 \pm 0,05$ mm.

N.B.: This dimension is marked inside the housing along the horizontal axis of the differential case.

- "Y" corresponds to the nominal positioning dimension of the drive pinion in relation to the differential axis = $139 \pm 0,05$ mm.

$$E1 = Z - (X + Y)$$

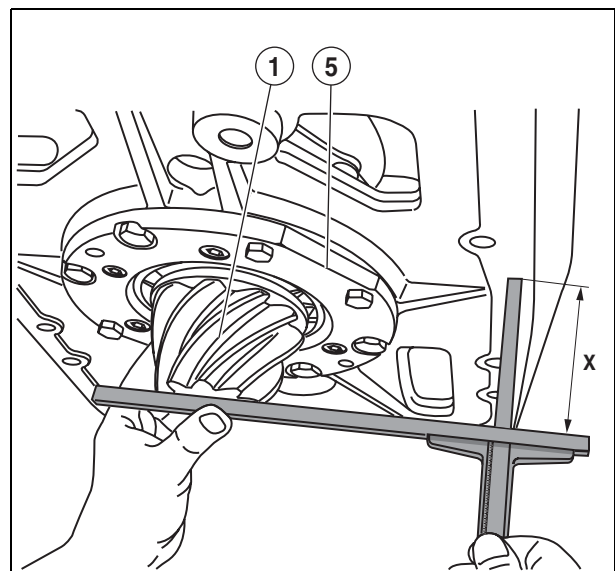
For example, if X = 101,35 and Z = 241

$$"E1" \text{ (minimum)} = 241 - (101,35 + 138,95) = 0,7$$

$$"E1" \text{ (maximum)} = 241 - (101,35 + 139,05) = 0,6$$

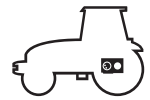
According to the example, shims with a thickness of between 0,6 and 0,7 mm should be inserted.

N.B.: Thickness "E1" should be achieved with no more than 3 shims. The drive pinion and the ring gear are paired by a number and a letter engraved on each component.

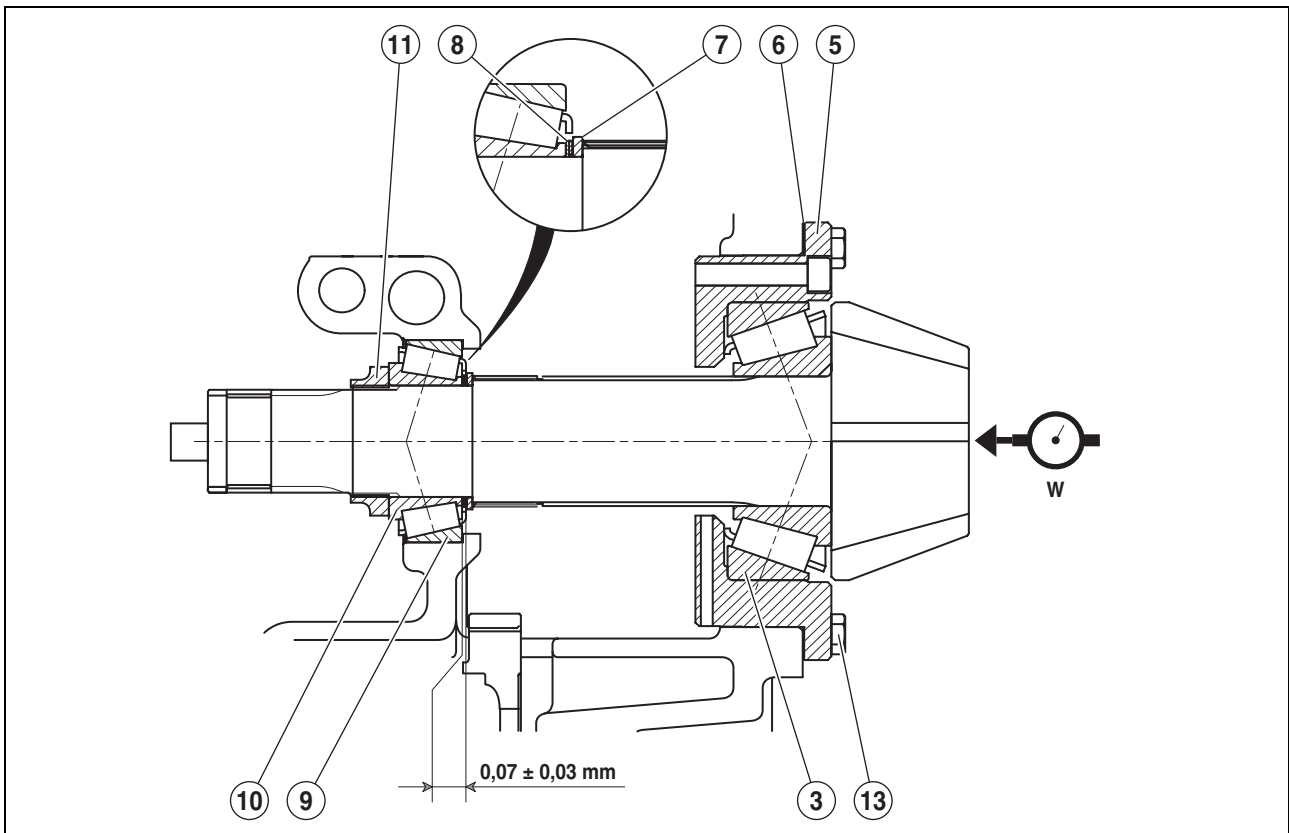


342hsm26

Fig. 18



GPA 30 drive pinion



342hsm27

Fig. 19

Setting the drive pinion bearings

N.B.: Always proceed with shimming the roller bearings after adjusting the drive pinion protrusion distance.

Without the handbrake casing and the 4-wheel drive gear.

- Mount the bearing (5) with its bearing cup (3) and shims (6) (thickness "E1") and tighten the screws (13) to 12 ± 1 daN.m.

N.B.: The thrust washer (7) must be placed in contact with the shoulder in the drive pinion (Fig. 19).

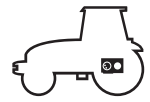
- Determine a higher thickness of shims (8) to obtain play.
- Lubricate the bearing cup (9).
- Mount the taper (10). Using spanner n° 60 05 006 310 and socket n° 60 05 006 311, tighten the nut (11) to 23 ± 2 daN.m.

Measuring "W"

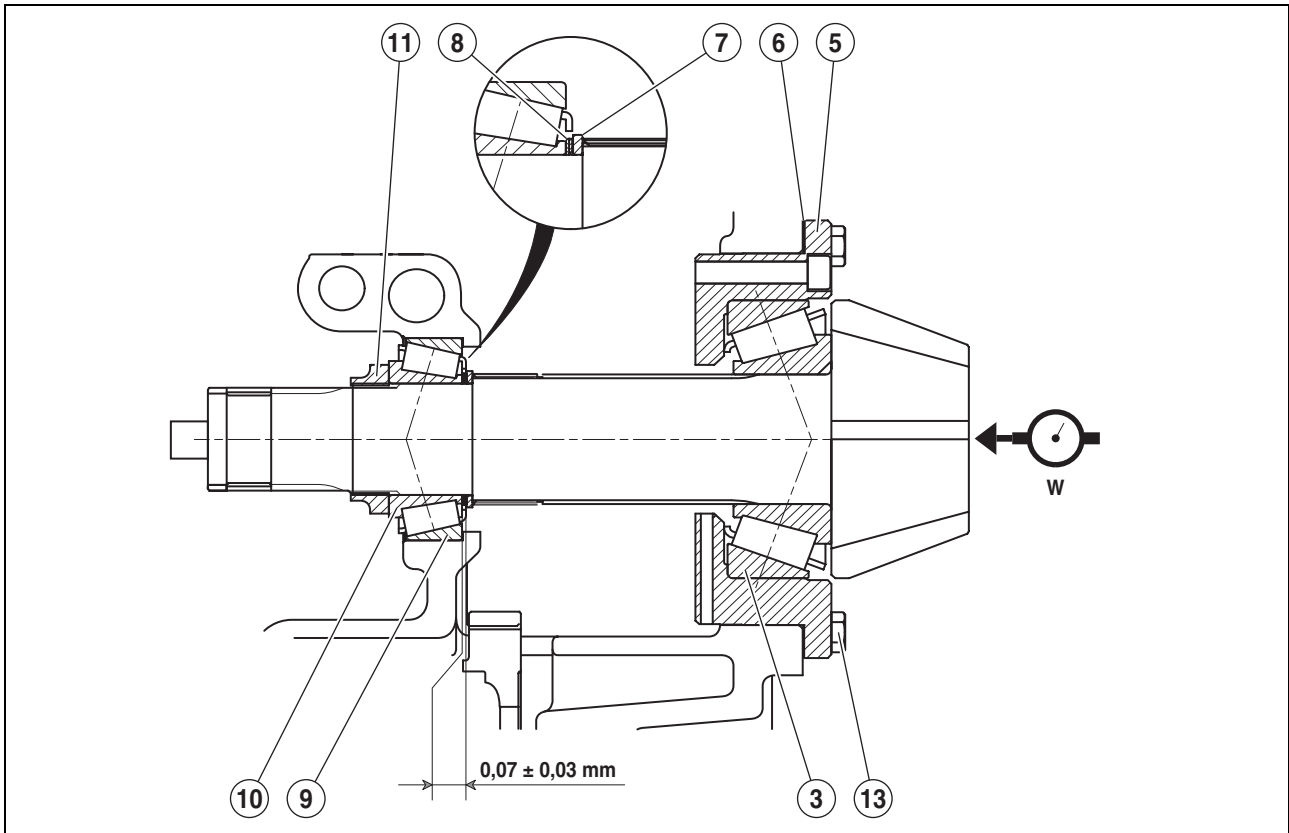
- Position a dial gauge probe on the end of the drive pinion (Fig. 19).
- Apply an axial tensile force of 45 ± 5 daN and turn the drive pinion at least 8 times to seats the bearings correctly.
- Set the dial gauge to zero.
- Apply an axial thrust force of 45 ± 5 daN and turn the drive pinion at least 8 times to seats the bearings correctly.
- Measure the value "W".

Thickness "E2" of shims (8)

- Determine thickness "E2" corresponding to the higher number of shims minus the measured play minus a preload of $0,07 \pm 0,03$ mm.



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342hsm27

Fig. 20

For example, if the measured play is 0,15 mm and the higher number of shims is 1 mm

$1 - 0,15 = 0,85$ mm of shims with zero play and preload.

"E2" (minimum) = $0,85 - 0,1 = 0,75$

"E2" (maximum) = $0,85 - 0,04 = 0,81$

According to the example, the shim thickness should be between 0,75 and 0,81 mm.

- Loosen and remove the nut (11). Slide on shims (8) to the measured thickness "E2" between the thrust washer (7) and the bearing cone (10).
- Lubricate the two tapered bearings. Using spanner n° 60 05 006 310 and socket n° 60 05 006 311, tighten the nut (11) to 23 ± 2 daN.m.

- Turn the drive pinion at least 8 times to seat the bearings correctly.
- Check that the drive pinion drag torque is $0,23 \pm 0,12$ daN.m.
- Loosen and remove the nut (11).
- Refit the handbrake casing and the 4-wheel drive gear according to the drive pinion refitting procedure.



7" differential

General

The ring gear is screwed onto the differential case. The differential assembly rotates on 2 tapered bearings held by 2 side supports and screwed onto the housing. The differential assembly consists of a case containing 4 planet gears and 2 sun gears. The differential assembly is preloaded by means of shims (31) placed between the cone (30) and the left-hand bearing (35). The backlash between the drive pinion and the ring gear is obtained by means of shims (7) inserted between the cup (6) and the differential case (9).

Differential lock

The multidisc locking device located on the left-hand side of the case (9) comprises.

- A casing (27) containing the discs (22) and the backplates (23).
- A hub (20) connected to the sun gear of the LH axle tube.
- A piston (25) fitted in the casing (27).

The piston chamber housed in the casing (27) communicates with a duct in the bearing (35), enabling low pressure (17 bar) to act on the piston. The duct is sealed by two rings (33).

Clutched position

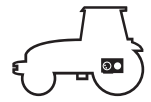
When the differential locking solenoid valve is activated, oil flows into the piston chamber. The piston compresses the intermediate plates (23) and the discs (22) connected to the hub (20) and case (27) respectively. In this clutched position, the input sun gear of the RH and LH axle tubes rotate at the same speed.

Declutched position

When power is turned off, the piston withdraws and the discs and intermediate plates are decompressed, enabling the sun gears and planets gears to fulfil their differential function.

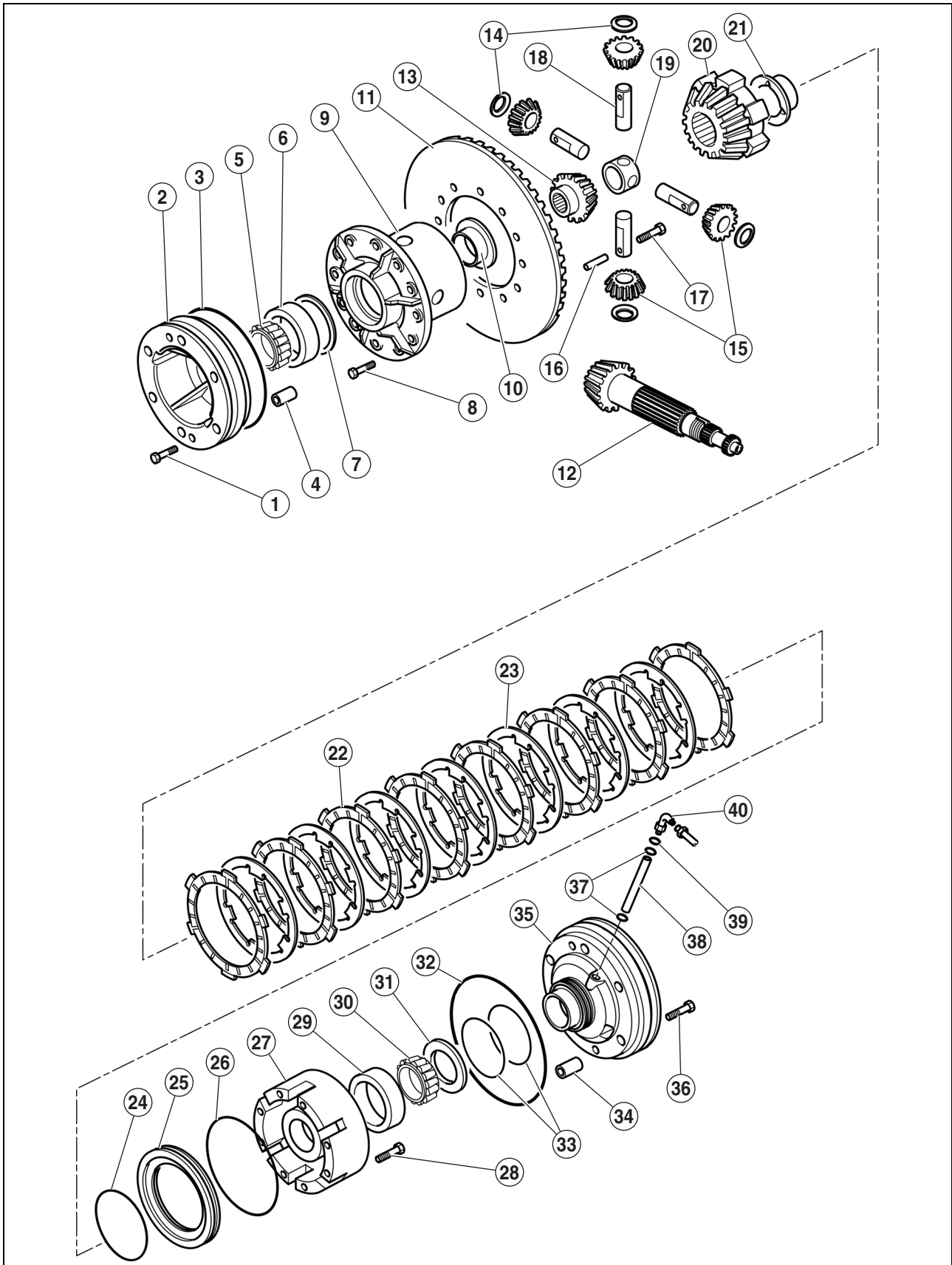
Nomenclature

1 Screw.	15 Planet gear.	29 Bearing cup.
2 RH bearing.	16 Locking needle.	30 Bearing cone.
3 O-ring.	17 Screw.	31 Shims.
4 Centring pin.	18 Planet gear pin.	32 O-ring.
5 Bearing cone.	19 Differential joint.	33 Sealing piston ring.
6 Bearing cup.	20 Sun gear/hub.	34 Centring pin.
7 Shims.	21 Friction ring.	35 LH bearing.
8 Screw.	22 Differential locking disc.	36 Screw.
9 Differential housing.	23 Differential locking backplate.	37 O-ring.
10 Friction ring.	24 O-ring.	38 Supply tube.
11 Ring gear.	25 Piston.	39 Seal.
12 Drive pinion.	26 O-ring.	40 Coupling.
13 Sun gear.	27 Differential locking case.	
14 Friction washer.	28 Screw.	



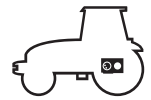
7" differential

Exploded view

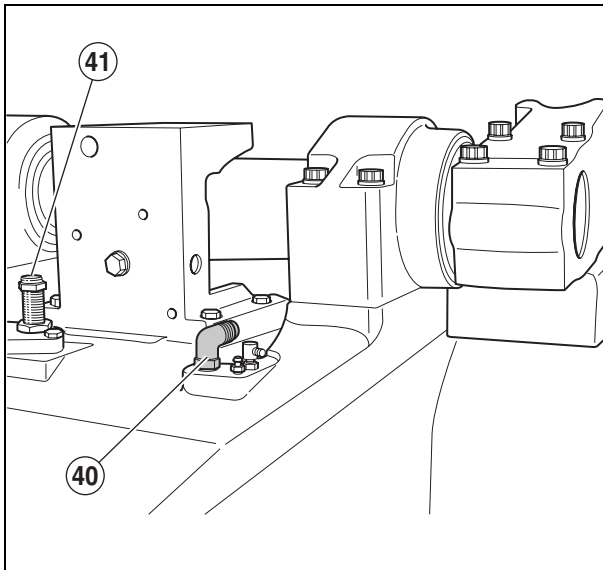


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Fig. 21

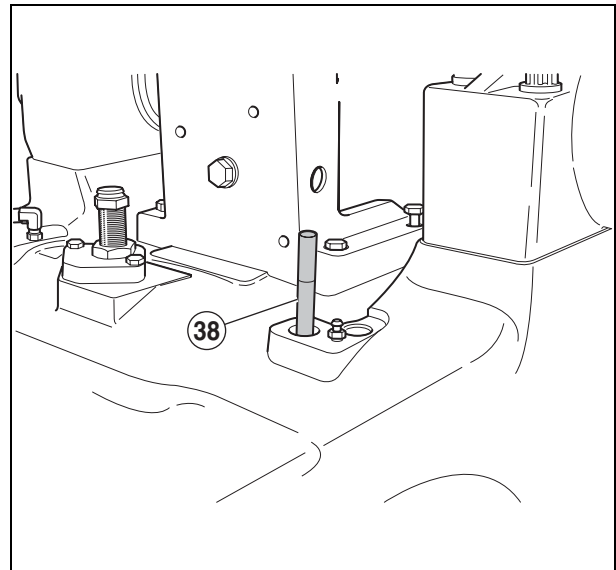


7" differential



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Fig. 22



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Fig. 23

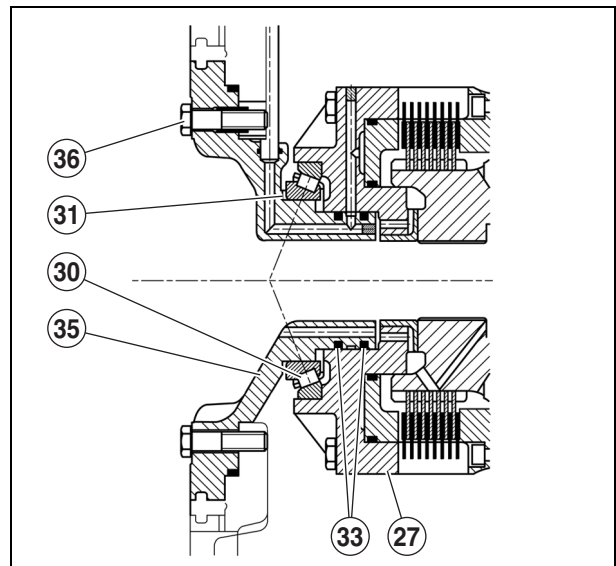
Removing/refitting the bearings

LH bearing

N.B.: The bearing (35) and sealing rings (33) of the differential lock can be worked on by removing just the left-hand axle tube.

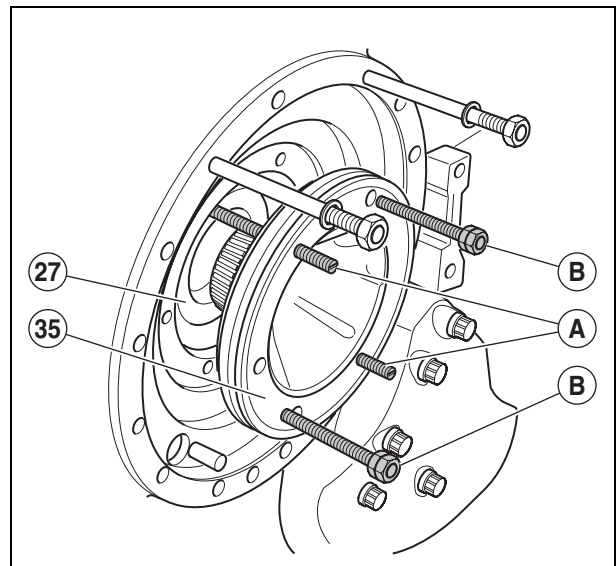
- Remove the left-hand axle tube (see paragraph concerned).
- Unscrew the coupling (40) and remove the transfer tube (38).
- Remove the brake piston (see chapter "C3").
- Remove the forward motion sensor (41) from the housing.
- Remove the screws (36) from the bearing (35), fit 2 diametrically opposed locating studs "A" into the housing and tighten them firmly up against the differential locking case (27) (Fig. 25).
- Extract the bearing with the aid of the tapped holes and 2 screws (B) and recover the cone (30) and shims (31) (Fig. 25).

N.B.: The locating studs (A) hold and centre the differential assembly in the housing. Do not loosen the studs or the assembly may become skewed and section the sealing rings (33) on refitting the bearing.



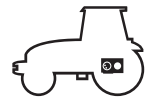
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Fig. 24



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Fig. 25



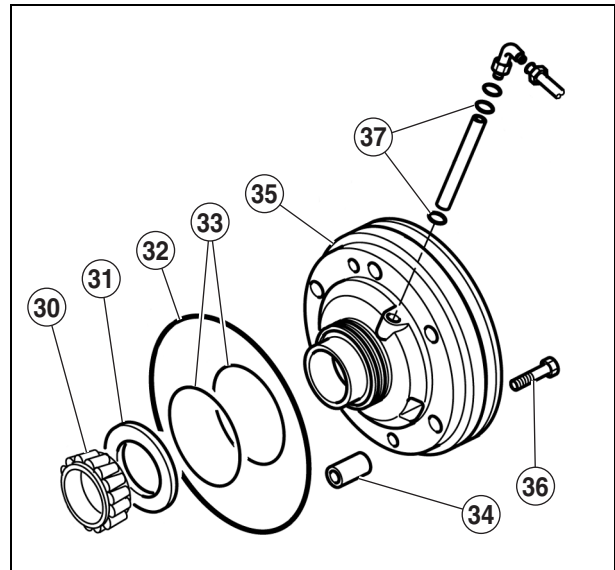
7" differential

N.B.: If the bearing block or roller bearing has to be replaced, always adjust the differential roller bearings (see following pages).

- Check that the centring pin (34), shims (31) and bearing cone (30) are present.
- Check that the sealing rings (33) are not damaged and rotate normally in their groove. After checking, remove the rings and coat them with miscible grease so that they remain seated in the groove while the support is refitted.
- Fit new O-rings (32) and (37).
- Slide the bearing (35) onto the locating studs (A) and tighten 4 screws (36) evenly and alternately to $11,5 \pm 1,5$ daN.m. Remove the locating studs.
- Fit and tighten the other screws to the same torque (Fig. 28).
- Position the supply tube and coupling.
- Refit the brake piston (see chapter "C3").
- Check that the seal (32) is correctly positioned.
- Refit the left-hand axle tube (see paragraph concerned).

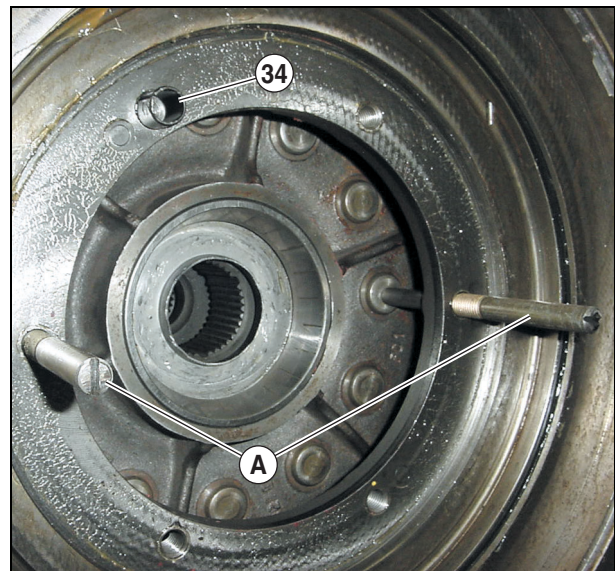
RH bearing

The removal/refitting procedure for the right-hand bearing is similar to the one for the left-hand bearing. Except that the RH bearing is not equipped with hydraulic ducts and seals (33).



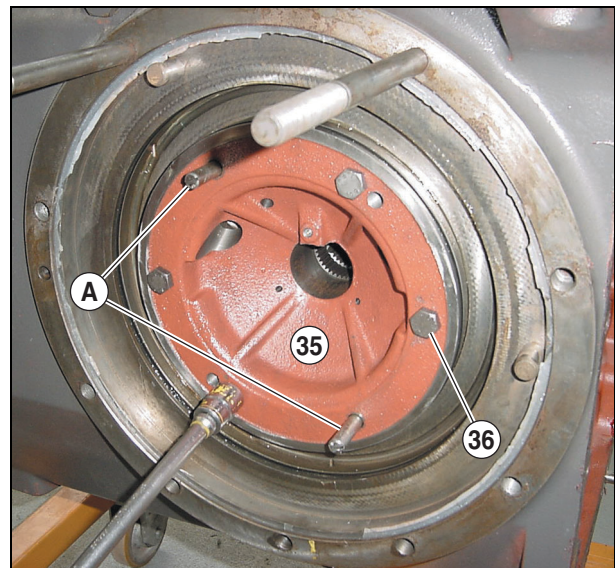
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Fig. 26



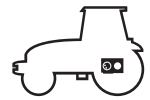
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Fig. 27



342hsm91

Fig. 28



7" differential

Removing/refitting the differential case

Uncouple the tractor between the intermediate housing and the rear axle housing as follows:

- Refer to Chapter "H" for partial cab removal. Operations 1 to 7.
- Drain the transmission system.
- Remove the reservoir(s) and disconnect the pipes, hoses and wiring harnesses interfering with the uncoupling operation.
- Make the tractor safe with stands and trolleys.
- Chock the tilt between the front axle and the cradle.
- Release the ratchet of the "Park Lock" transmission lock.

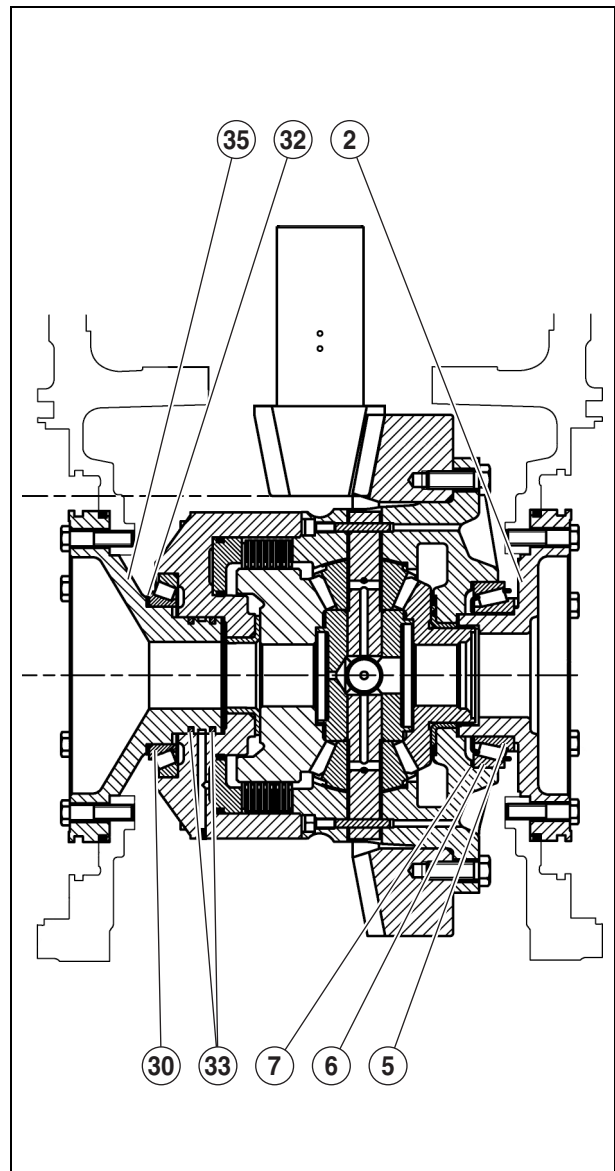
If necessary, remove the PTO housing.

- Remove the axle tubes (see paragraph concerned).
- Position rear differential stand n° 60 05 006 314 in support. With the aid of the stand, keep the differential assembly in line with the RH and LH bearings ((2) and (35) respectively).
- Remove the RH and LH bearings according to the procedure described above.
- Recover the cones (30) and (5) and shims (32) from the LH bearing.
- Remove the differential case from the rear axle housing (Fig. 30).

N.B.: As space is restricted around the differential case, it is essential to fit the hydraulic tubes in the rear axle housing before refitting the case.

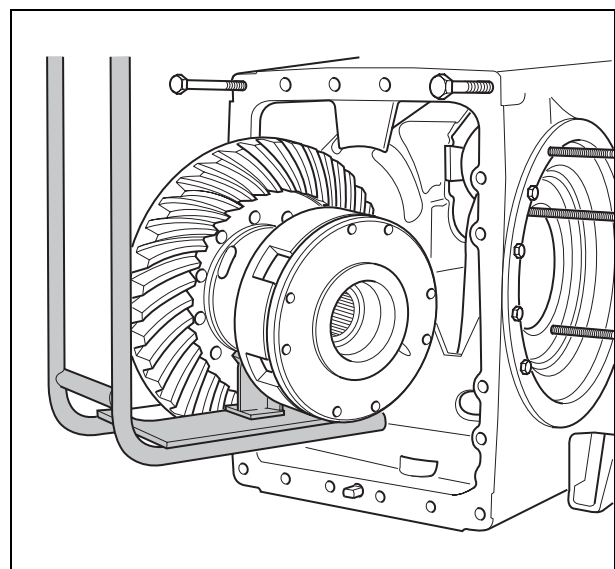
In order to avoid damaging the sealing rings (33), it is necessary to align the differential assembly correctly with the housing axis before fitting the bearings (2) and (35). With the aid of the tool, insert the differential assembly into the central housing and hold it in line with the axle tubes.

- Fit the measured thickness of shims (7) behind the cup (6).
- Fit the bearing (2) according to the procedure described above.



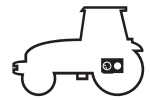
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Fig. 29



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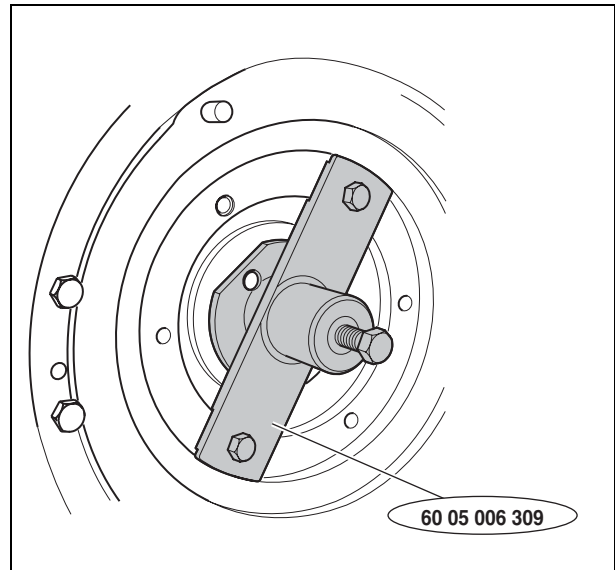
Fig. 30



7" differential

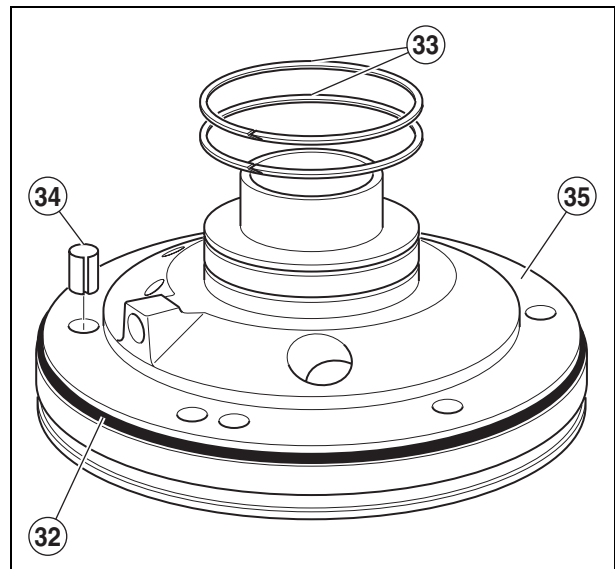
Prepare to fit the bearing (35) as follows:

- Slide the bearing cone onto setting tool n° 60 05 006 309 adapted to the differential case. Using the tool, centre the differential assembly in the housing while turning the central screw clockwise as far as it will go.
- Fit 2 diametrically opposed locating studs into the housing and tighten them firmly. This method keeps the differential assembly centred after removing tool n° 60 05 006 309.
- Remove the tool and recover the bearing cone.
- Check the presence of the centring pin (34) and shims.
- Fit a new O-ring (32).
- Check that the sealing rings (33) are not damaged and rotate normally in their groove.
- Fit the bearing (35) according to the procedure described above. After fitting the bearings, check the rotation of the differential assembly by hand.
- Refit the brake pistons (see chapter "C3").
- Refit the axle tubes (see paragraph concerned). If removed, refit the PTO housing.
- Couple up the tractor between the intermediate housing and the rear axle housing.
- Check the operation of all controls (mechanical, hydraulic and electronic). Road test.
- Check the mating surfaces and hydraulic couplings for leaks.



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Fig. 31



342hsm92

Fig. 32



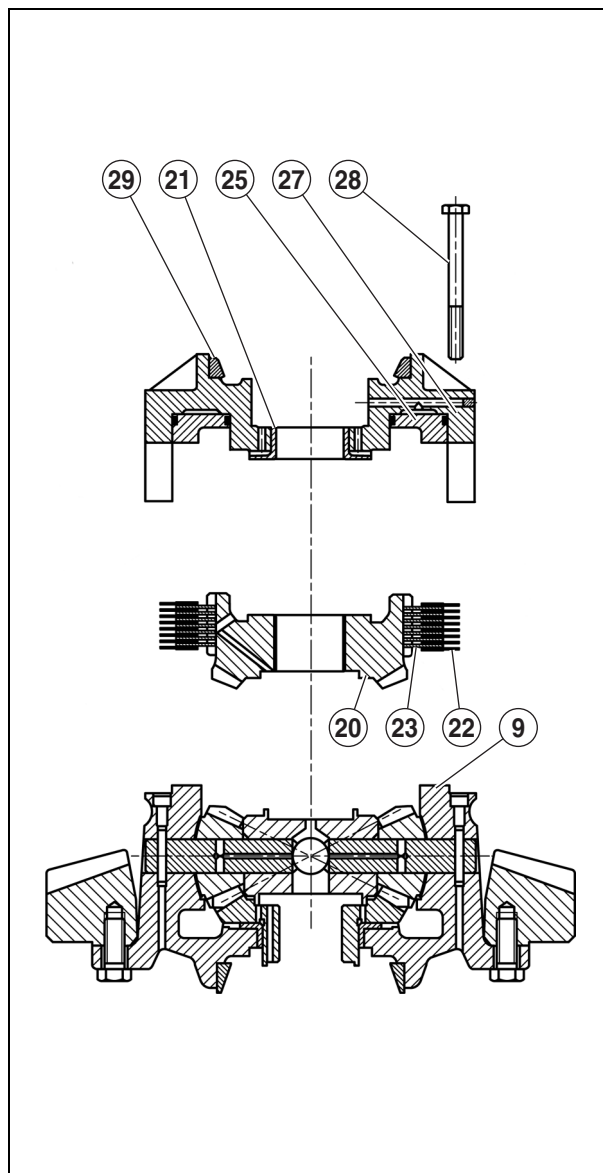
7" differential

Removing/refitting the differential lock

- Remove the differential case as described in the procedure above.
- Position the differential case with the casing (27) facing up.
- Remove the screws (28).
- Remove the casing (27), discs (22), backplates (23) and hub (20).
- Tap the casing (27) lightly on a wooden block to remove the piston (25).
- Recover the friction ring (21).
- Replace the O-rings. Drive out the cup (29) if necessary.

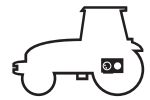
N.B.: If the case (9), casing (27) and bearing (35) need to be replaced, the differential case must be shimmed and the backlash between the drive pinion and the ring gear checked (see following pages).

- Check that the hydraulic duct in the casing is not blocked.
- Lubricate the new seals before fitting.
- Refit the piston (25) by tapping gradually and alternately around the edge with a mallet.
- Check that there are no seal fragments after fitting.
- Fit the hub, backplates and discs.
- Position the casing (27) with the piston (25) assembled.
- Fit and tighten the screws (28), coated with Frenbloc (270), to 12 ± 1 daN.m.
- Check manually that the discs and backplates are not stressed.
- Refit the differential case as described in the procedure above.



342hsm93

Fig. 33



7" differential

Removing/refitting the planet gears, sun gears and ring gear

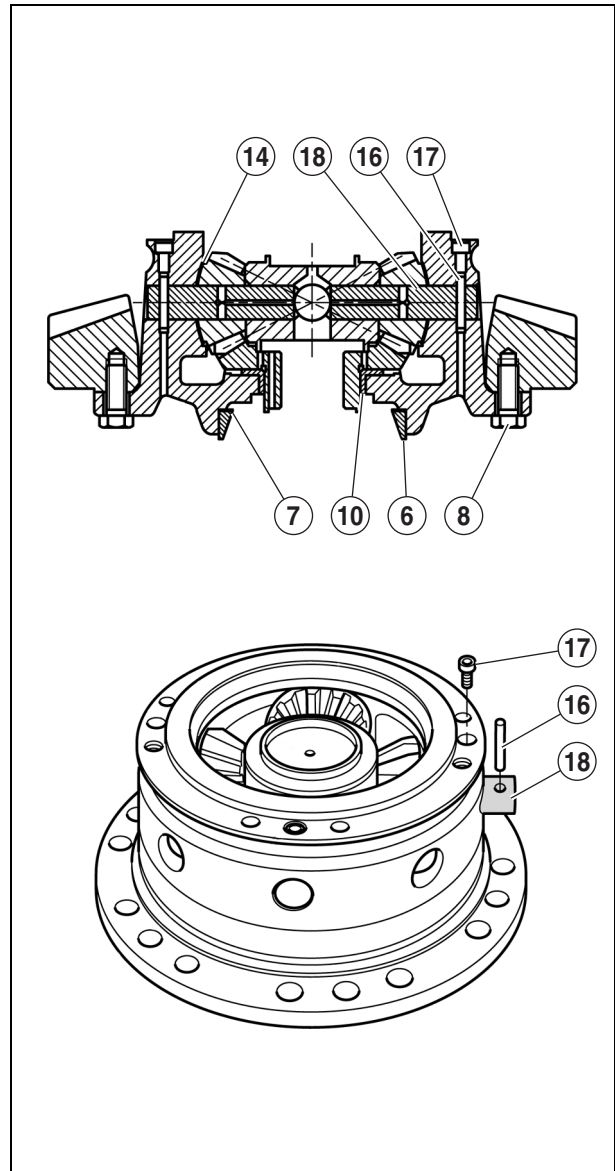
- Remove the differential locking system.
- Remove the ring gear.
- Remove the screws (17) and needles (16).
- Drive out the pins (18) by tapping the opposite pin.
- Recover the friction washers (14).
- Remove the planet gears and sun gear.
- If necessary, recover the bearing cup (6) with the shims (7).

The drive pinion must be replaced if the ring gear is replaced.

N.B.: These parts have the same number. They must imperatively be coupled.

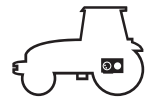
Refit the assembly in reverse order to removal while observing the following instructions:

- Refit the friction rings (10), coated with Scelbloc (648), using a suitable jig.
- Check that the lubrication ports are not blocked.
- Fit the needles and tighten the screws (17), coated with Frenbloc (270), to $3 \pm 0,5$ daN.m.
- Fit the ring gear.
- Tighten the screws (8), coated with Frenbloc (270), to 30 ± 2 daN.m.



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Fig. 34



7" differential

Adjusting the backlash

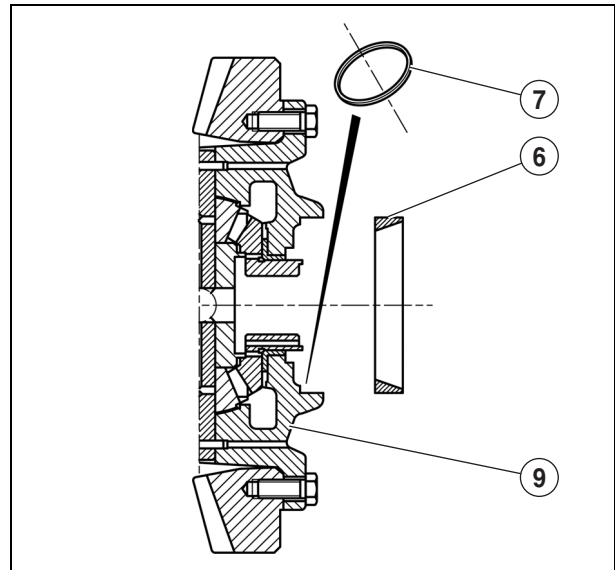
N.B.: The backlash to be obtained between the ring gear and drive pinion ensures that the final drive is reliable and that the assembly operates correctly.

This backlash must be checked following:

- Adjustment of the protrusion distance
- Shimming of the differential case.

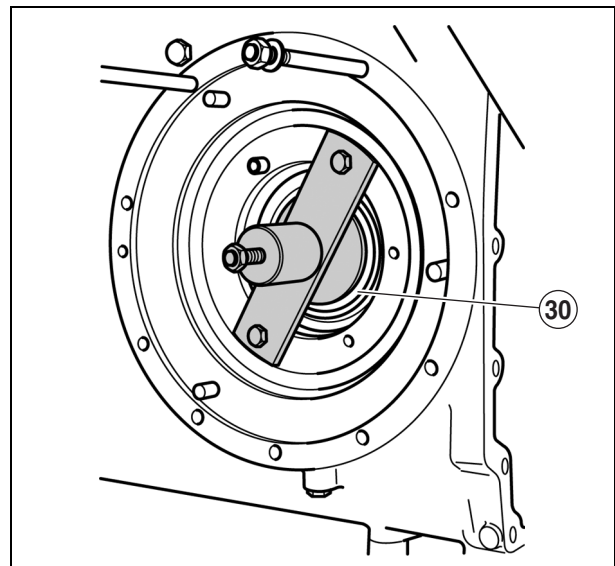
Remove the cup (6) using a suitable extractor.

- Position shims (7) with a thickness of 0,20 mm on the differential case (9).
- Fit the cup (6) up against the shims.
- Refit the differential case with only the RH bearing (see paragraph concerned). On the LH side, fit tool n° 60 05 006 309 with the roller bearing (30) (Fig. 36).
- Tighten the tool's centre screw to 1 daN.m.
- Turn the differential to seat the bearings.
- Check once again that the tool screw is tight.
- Couple and fasten the intermediate housing temporarily with the rear axle housing by tightening the screws to 61 ± 7 daN.m. With the PTO housing removed, place the plunger of a dial gauge at half-length on a tooth of the ring gear (Fig. 37).
- Check that the backlash is $0,35 \pm 0,10$ mm.
- Carry out this operation at 3 points of the ring gear. If the presetting is incorrect, the principle consists of removing or adding shims (7) until the backlash is within the aforementioned tolerance.
- Insert the selected shims (7).
- Check that the cup is bearing properly on the shims.
- The next essential step is to shim the differential case roller bearings.



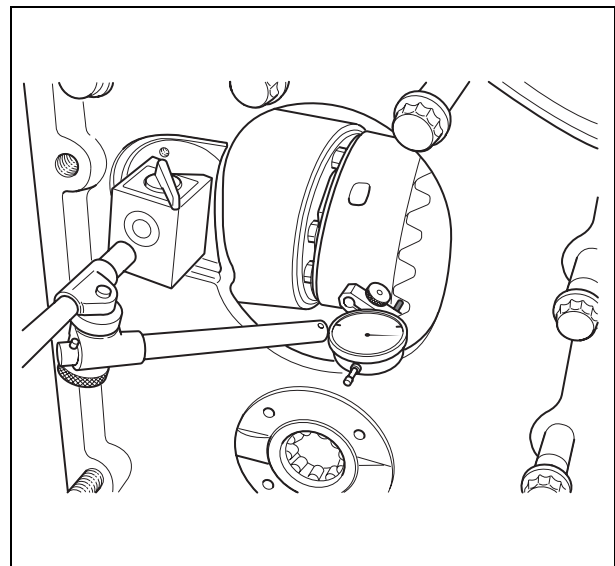
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Fig. 35



342hsm96

Fig. 36



342hsm46

Fig. 37



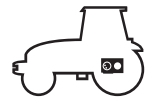
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7" differential

Shimming the differential case roller bearings

N.B.: If the rear axle housing, ring gear, tapered roller bearings and bearing blocks need to be replaced, the differential case must be shimmed. Check beforehand that the backlash is correct.

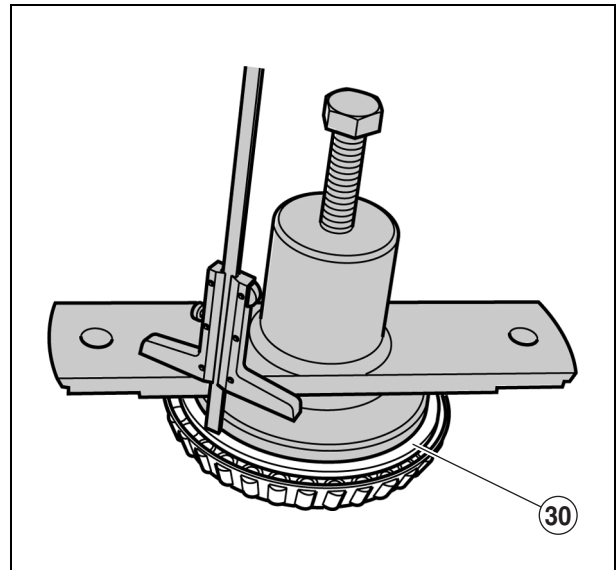
- Fit the differential (see paragraph concerned).
- Fit the RH bearing with the measured number of shims. On the LH side, fit tool n° 60 05 006 309 with the roller bearing (30). Fasten the tool to the housing with 2 screws.
- Tighten the centre bolt to 1 daN.m.

N.B.: Turn the ring gear a few times to seat the cones correctly in the cups. Check the centre bolt torque again.

Measuring "Y"

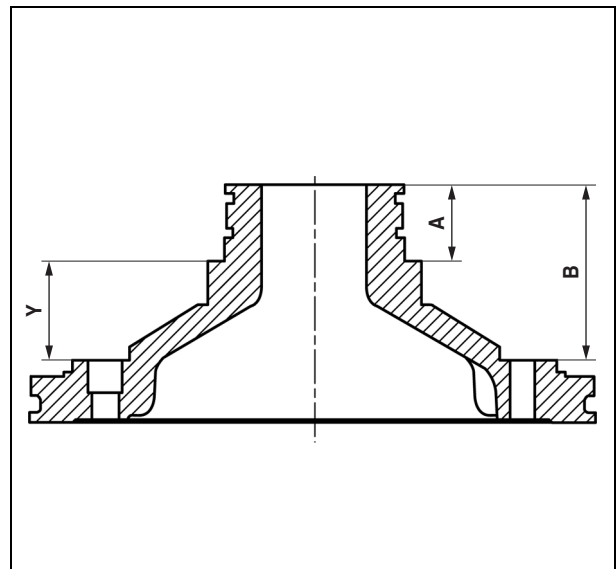
- Determine "Y" according to "A" and "B".
- Measure "A", the distance between the top of the bearing and the contact surface of the shims, with a depth gauge.
- Measure "B", the distance between the top of the bearing and the contact surface of the bearing on the housing.

$$Y = B - A$$



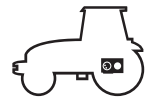
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Fig. 38



342hsm98

Fig. 39



7" differential

Measuring "X"

Using a suitable depth gauge, measure "C" and determine dimension "X" between the bearing cone (30) and the contact surface of the bearing on the housing (Fig. 40 and 41):

$$X = C - 10 \text{ mm}$$

(10 mm is the thickness of measuring tool n° 60 05 006 309).

Thickness "E" of shims (31)

Determine "E" according to "X" and "Y" plus a preload $P1 = 0,10 \pm 0,05 \text{ mm}$.

$$E = X - Y + P1$$

For example, if A = 39,65, B = 103,45 and C = 74,5

$$Y = 103,45 - 39,65 = 63,8$$

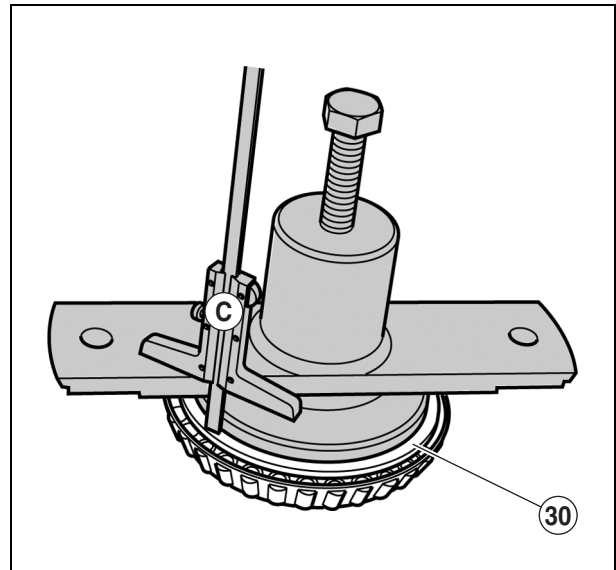
$$X = 74,5 - 10 = 64,5$$

$$E \text{ (minimum)} = 64,5 - 63,8 + 0,05 = 0,75$$

$$E \text{ (maximum)} = 64,5 - 63,8 + 0,15 = 0,85$$

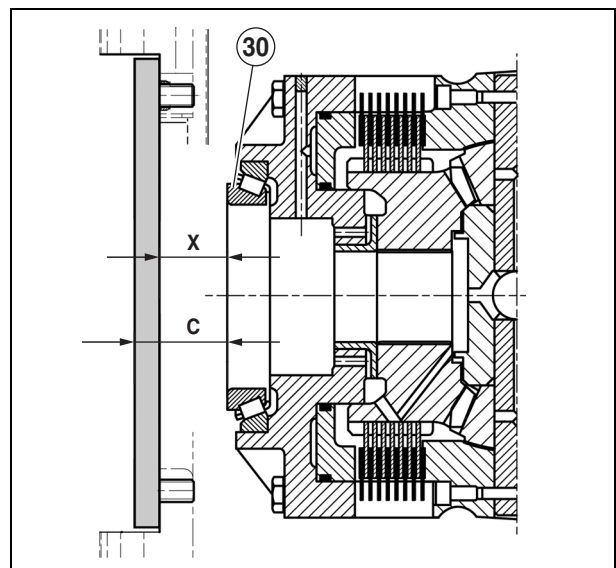
According to the example, the shim thickness must be between 0,75 and 0,85 mm.

- Remove the tool and the bearing cone (30). Place shims (31) to a thickness "E" on the bearing (35).
- Fit the RH bearing (35) (see paragraph concerned).
- Refit the assembly as described in the procedures on the pages concerned.



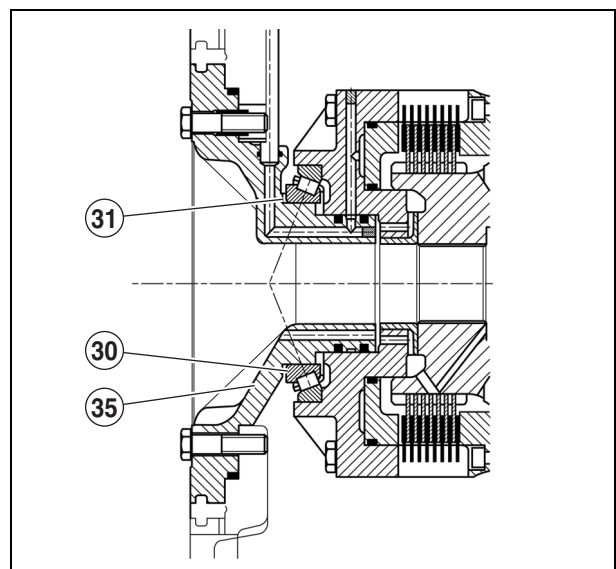
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Fig. 40



342hsm0a

Fig. 41



342hsm0b

Fig. 42

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