

## GPA 40 drive pinion

### General

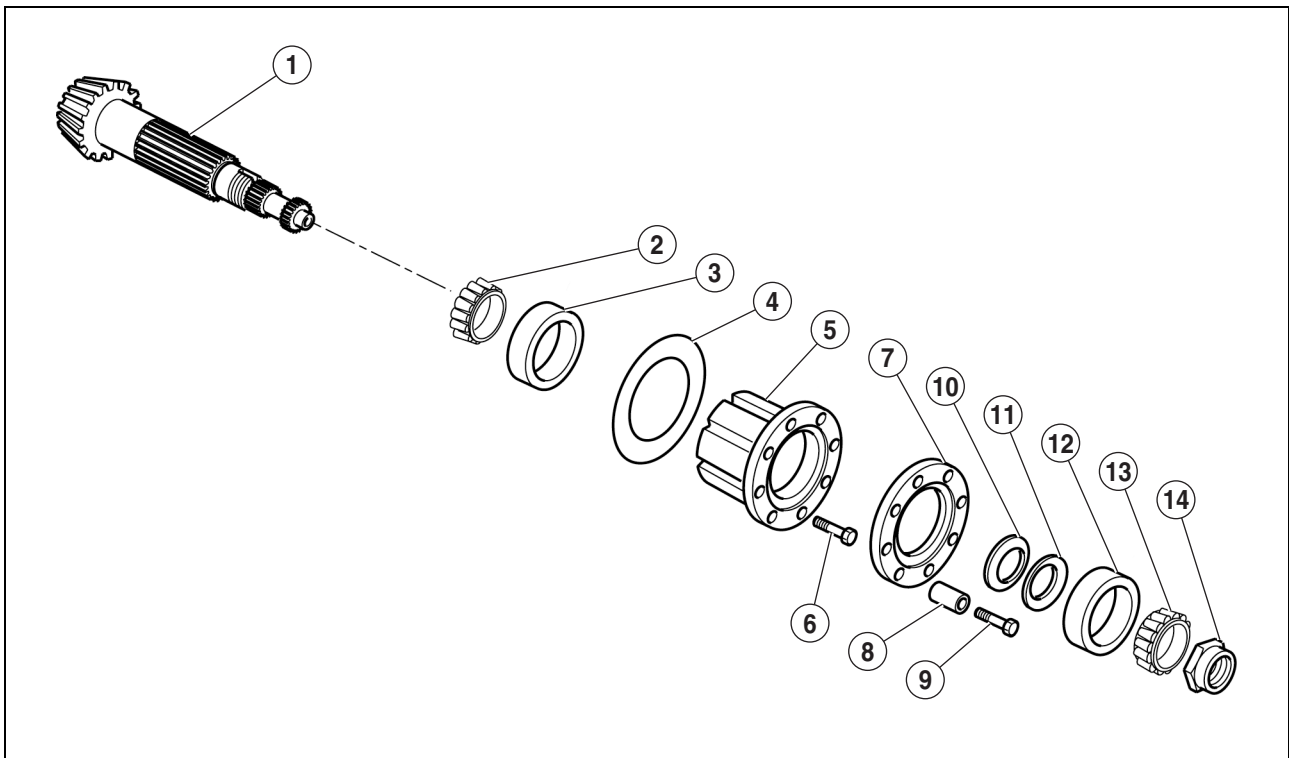
The helical drive pinion is supported by 2 tapered bearings mounted opposite each other. The bearing cone (2) is press-fitted onto the drive pinion and the cup (12) is also press-fitted into the cover (7). The cup (3) is mounted freely in the handbrake casing. The bearing cone (13), free on the drive pinion, enables the shims (11) to be fitted for packing purposes. The drive pinion

supporting the four-wheel drive driving gear is located in the rear axle housing. Its position is adjusted by means of one or more shims (4) located between the handbrake casing and the housing. The bearings are preloaded by means of one or more shims (11) fitted between the bearing cone (13) and the thrust washer (10).

#### Parts list

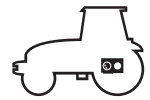
- |                     |                    |                  |
|---------------------|--------------------|------------------|
| 1 Drive pinion.     | 6 Screw.           | 11 Shims.        |
| 2 Bearing cone.     | 7 Handbrake cover. | 12 Bearing cup.  |
| 3 Bearing cup.      | 8 Centring pin.    | 13 Bearing cone. |
| 4 Shims.            | 9 Screw.           | 14 Nut.          |
| 5 Handbrake casing. | 10 Thrust washer.  |                  |

### Exploded view



341hsm26

Fig. 8

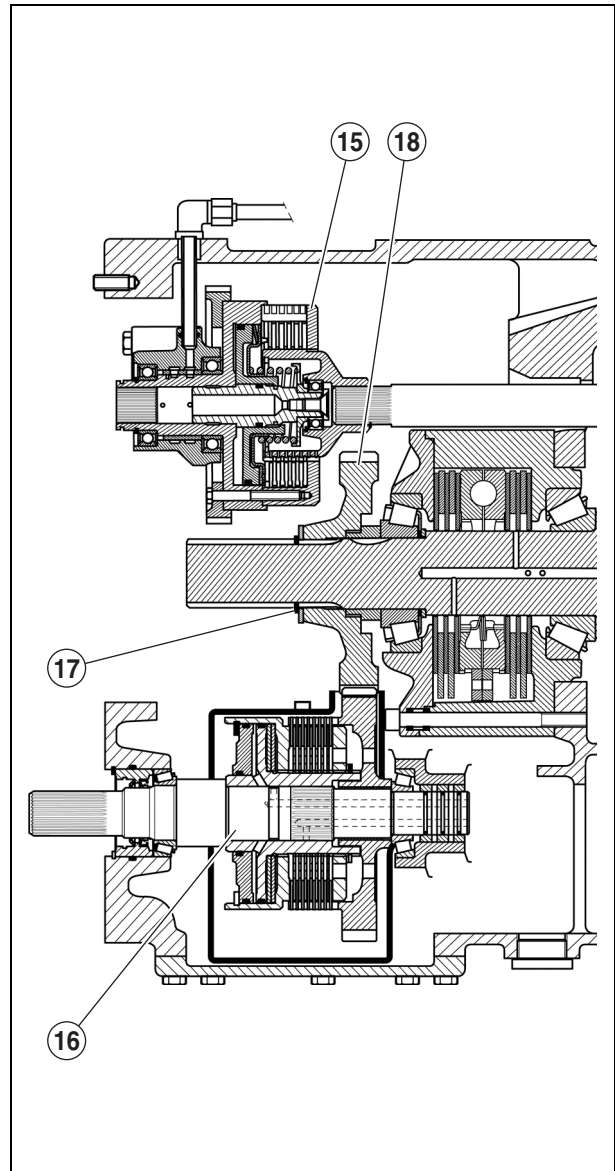


## GPA 40 drive pinion

### Removal/refitting

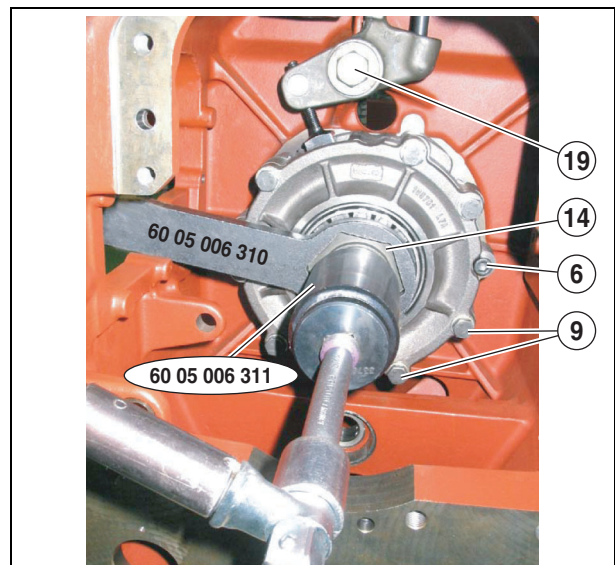
Uncouple the tractor between the gearbox and rear axle as follows:

- 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 transmission lock.
- Remove the RH and LH hydraulic covers.
- Remove the PTO clutch (15) (see paragraph concerned).
- Remove the four-wheel drive shaft and clutch (16) (see chapter "D").
- Remove the crawler speed system if fitted (see chapter "B").
- Remove the retaining ring (17), washer and shims.
- Remove the driving gear (18) from the 4WD casing.
- Remove the pivot screw (19) from the handbrake compensator.
- Free and secure the nut (14) with spanner n° 60 05 006 310. Fit special socket n° 60 05 006 311 at the end of the drive pinion (Fig. 10) and turn clockwise.
- Only release the nut.
- Remove the eight screws (9) and two screws (6).



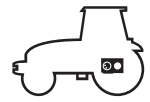
341hsm27

Fig. 9



341hsm28

Fig. 10

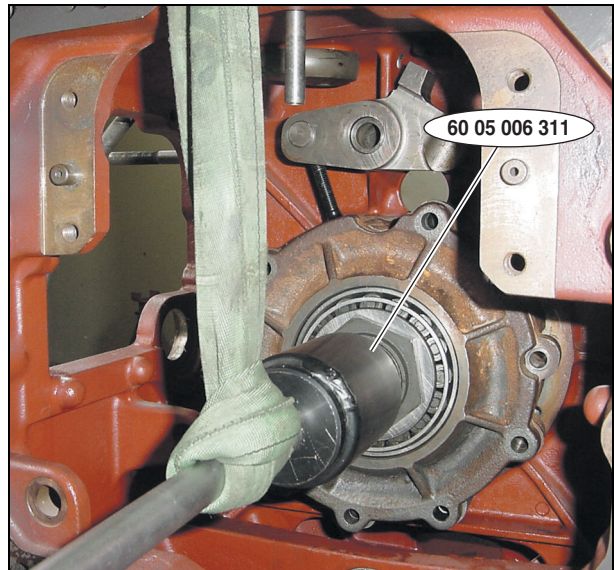


## GPA 40 drive pinion

- Extract the handbrake casing using an extension and socket n° 60 05 006 311.
- Recover the protrusion distance adjustment shims (4).
- Position the casing vertically on the drive pinion.
- Finish unscrewing the nut (14) and discard it.
- Remove the bearing cone (13), shims (11) and thrust washer (10).
- Remove the cover (7) and handbrake device (see paragraph concerned).
- Separate the drive pinion from the handbrake casing.
- Extract the cone (2) and cup (3) if necessary.

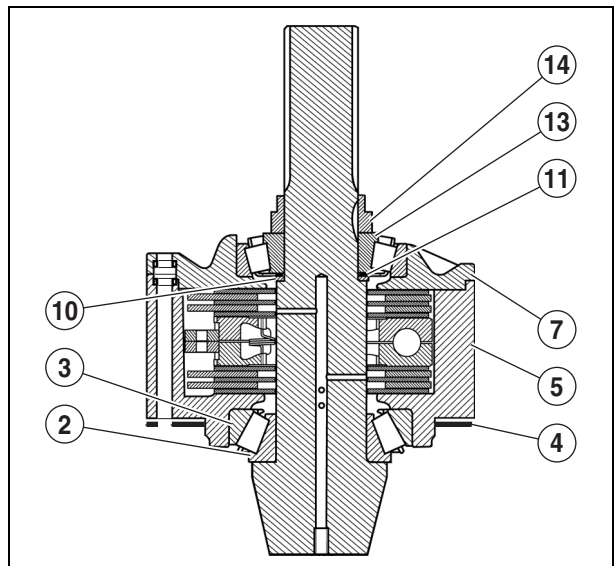
***N.B.: If the drive pinion, tapered bearings, casing, cover, thrust washer or rear axle housing need to be replaced, it is essential to adjust the drive pinion protrusion distance and then shim the tapered bearings.***

- 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 inside the casing (5).
- Refit the assembly in reverse order to removal.
- The shims (11) must be fitted between the thrust washer (10) and the bearing cone.
- Lubricate the bearing cones.
- Screw on the new nut (14); it will be tightened up once the casing has been refitted inside the rear axle housing.
- Fit the measured shims (4) between the casing and the housing.



341hsm29

Fig. 11



341hsm30

Fig. 12

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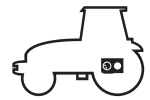
Hello dear friend!

Thank you very much for reading.

Enter the link into your browser.

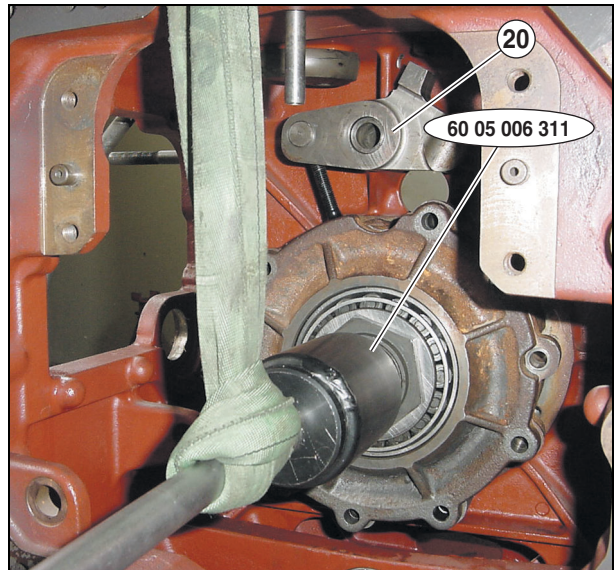
The full manual is available for immediate download.

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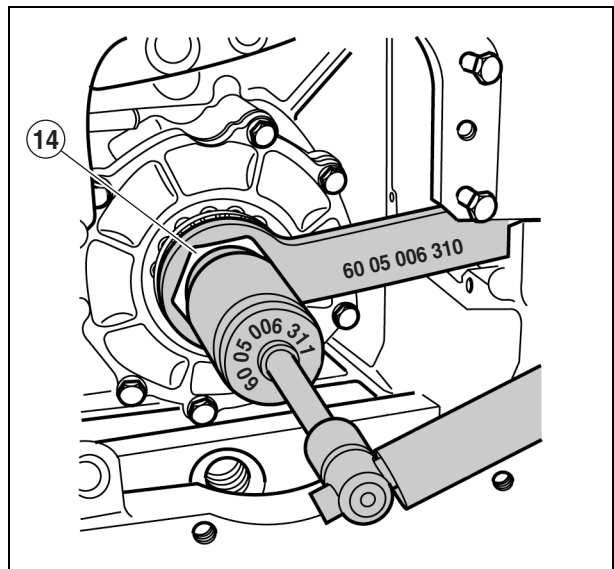
## GPA 40 drive pinion

- Refit the casing in the housing in reverse order to removal.
- Fit the handbrake compensator (20) at the same time.
- Coat the screws with Frenetanch (242).
- Tighten the screws progressively to fit the casing correctly.
- Finish tightening to  $12 \pm 1$  daN.m. .
- Adjust the braking device (see paragraph concerned).
- Remove and coat the nut (14) lightly with Frenbloc (270), and hold it with spanner n° 60 05 006 310.
- Turn the drive pinion anticlockwise with tool n° 60 05 006 311 to tighten to  $23 \pm 2$  daN.m.
- Lock the nut in the 3 grooves.
- Fit the driving gear (18) of the 4 drive wheels.
- Position the shims between the thrust washer and the gear to obtain  $0,05 \pm 0,05$  mm play.
- Refit the equipment in reverse order to removal and couple up the tractor.



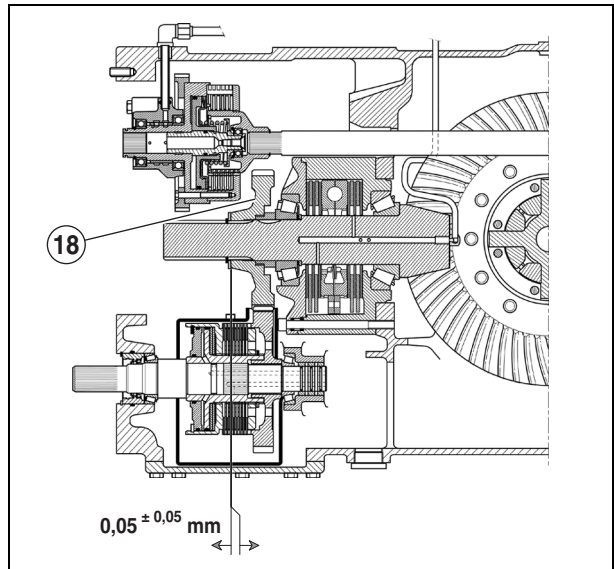
341hsm31

Fig. 13



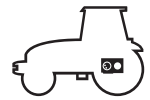
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Fig. 14



341hsm33

Fig. 15



## GPA 40 drive pinion

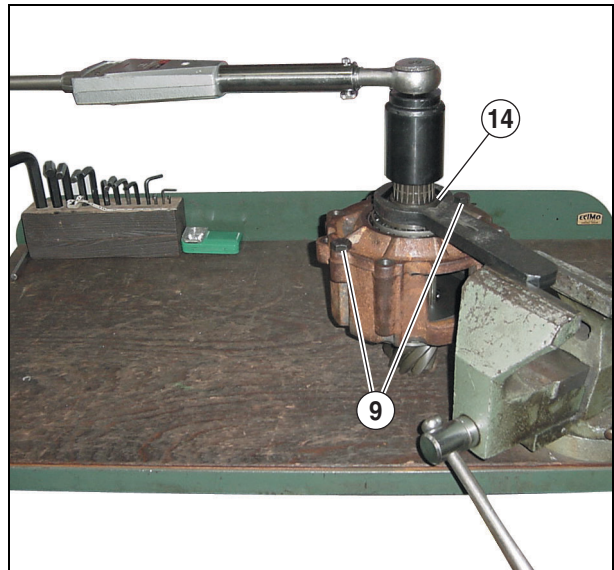
### Setting and adjusting the protrusion distance of the drive pinion

*N.B.: Shim thicknesses "E1" and "E2" must be produced 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.*

#### Setting the drive pinion bearings

The brake casing must be free of the braking device.

- Assemble the cover with two screws (9). Setting will be carried out on the press.
- Fit the prelubricated tapered bearings with an appropriate jig.
- Make a set-up with the thrust washer and a greater thickness of shims.
- Tighten a new nut (14) provisionally to  $23 \pm 2$  daN.m.



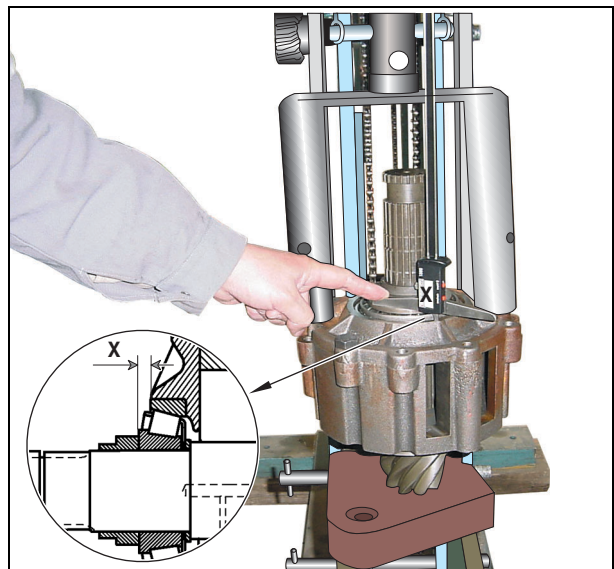
341hsm34

Fig. 16

#### Measuring "X"

On a press equipped with a pressure gauge.

- Position the casing vertically with the pinion bearing on the base (Fig. 17).
- Exert 200 daN axial pressure on the cover with an appropriate jig.
- Rotate the casing a few times to seat the bearings.
- Measure the value "X".



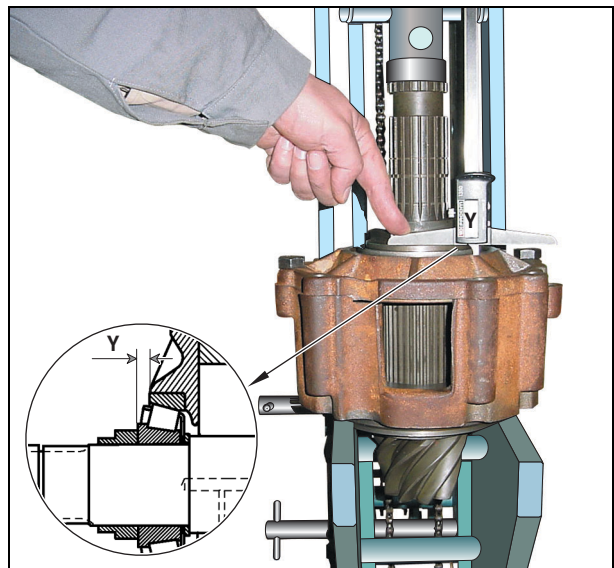
341hsm35

Fig. 17

#### Measuring "Y"

On a press equipped with a pressure gauge.

- Position the casing vertically on the base (Fig. 18).
- Exert 200 daN axial pressure at the end of the drive pinion shaft.
- Rotate the casing a few times to seat the bearings.
- Measure the value "Y".



341hsm36

Fig. 18



## GPA 40 drive pinion

### Calculating J1

"J1" corresponds to the measured play.

$$J1 = X - Y$$

### Thickness "E1" of shims (11)

Determine thickness "E1" corresponding to the higher number of shims minus "J1" minus a preload "P1" of  $0,11 \pm 0,03$  mm.

$$E1 = J1 + P1$$

The maximum number of shims will be 3.

**For example, if X = 9,60, Y = 8,20 and the higher shim thickness is 4**

$$J1 = 9,60 - 8,20 = 1,40 \text{ mm}$$

$$\text{"E1" (minimum)} = 4 - 1,40 - 0,14 = 2,46$$

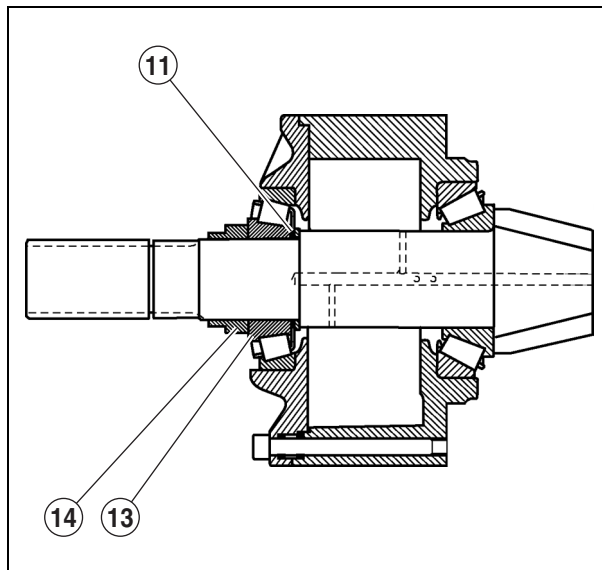
$$\text{"E1" (maximum)} = 4 - 1,40 - 0,08 = 2,52$$

According to the example, shims with a thickness of between 2,46 and 2,52 mm should be inserted.

- Remove the nut (14) and bearing cone (13) and insert the measured thickness of shims "E1".
- Refit the cone and tighten the nut to  $23 \pm 2$  daN.m.

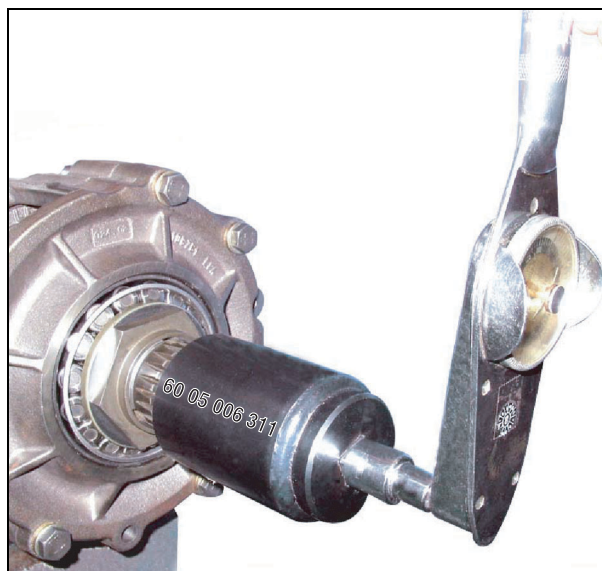
**N.B.: The drag torque must now be checked.**

- Place the casing in a vice. Use a torque wrench and socket n° 60 05 006 311.
- Complete a few regular turns to measure the drag torque. This value should be between 0,15 and 0,4 daN.m.
- Adjust the setting by removing or adding shims in an effort to get as close as possible to the 0,4 daN.m tolerance.



341hsm37

Fig. 19



341hsm38

Fig. 20



## GPA 40 drive pinion

### Setting the drive pinion protrusion distance

#### Measuring "A"

Measure "A" with a depth gauge (Fig. 21). Distance between the end of the drive pinion and the bearing surface of the casing.

#### Thickness "E2" of shims (4)

Determine "E2" according to "A" and  $- 100,23$  mm. Given that  $- 100,23$  mm corresponds to the result of the nominal housing and differential torque dimensions.

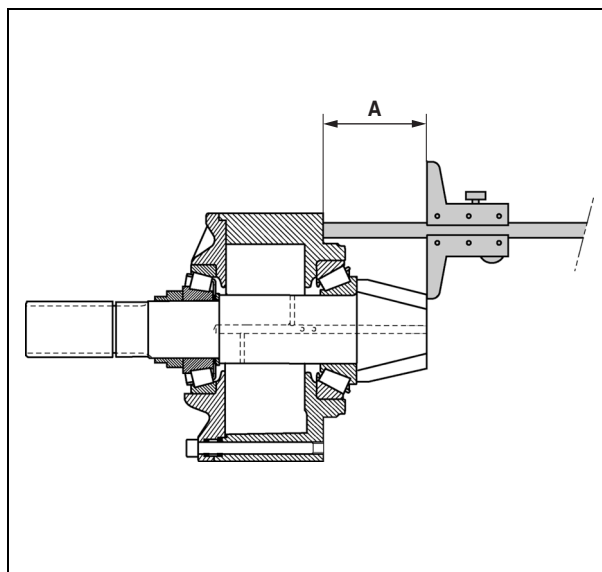
$$E2 = - 100,23 + A$$

#### For example, if $A = 100,85$

$$E2 = - 100,23 + 100,85 = 0,62$$

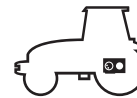
According to the example, shims with a thickness of 0,60 mm must be inserted.

- Proceed with refitting the braking device.
- Refit the handbrake casing and drive pinion assembly according to the procedure described on the previous pages.



341hsm39

Fig. 21



## 5" differential

### General

The ring gear is riveted to the differential case. The differential assembly rotates on 2 tapered bearings held by 2 side supports (2) and (36) screwed onto the housing. The differential assembly consists of 2 half-cases containing 4 planet gears and 2 sun gears. The differential assembly is preloaded by means of shims (32) placed between the cone (31) and the left-hand bearing (36). 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 half-case (10).

### Differential lock

The multidisc locking device located on the left-hand side of the half-case (19) comprises.

- A unit (21) containing the discs (23) and the backplates (24).
- A hub (25) connected by splines to the sun gear of the LH axle tube.
- An assembled cover (29) for the piston (27) supported by a tapered bearing.

The piston chamber housed in the cover (19) communicates with a duct in the bearing (36), enabling low pressure (17 bar) to act on the piston. The duct is sealed by 2 piston rings (34).

### Clutched position

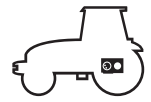
When the differential locking solenoid valve is activated, oil flows into the piston chamber. The piston compresses the intermediate plates (24) and the discs (23) connected to the hub (25) and case (21) respectively. In this clutched position, the input sun gear of the RH and LH axle tubes rotate at 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.

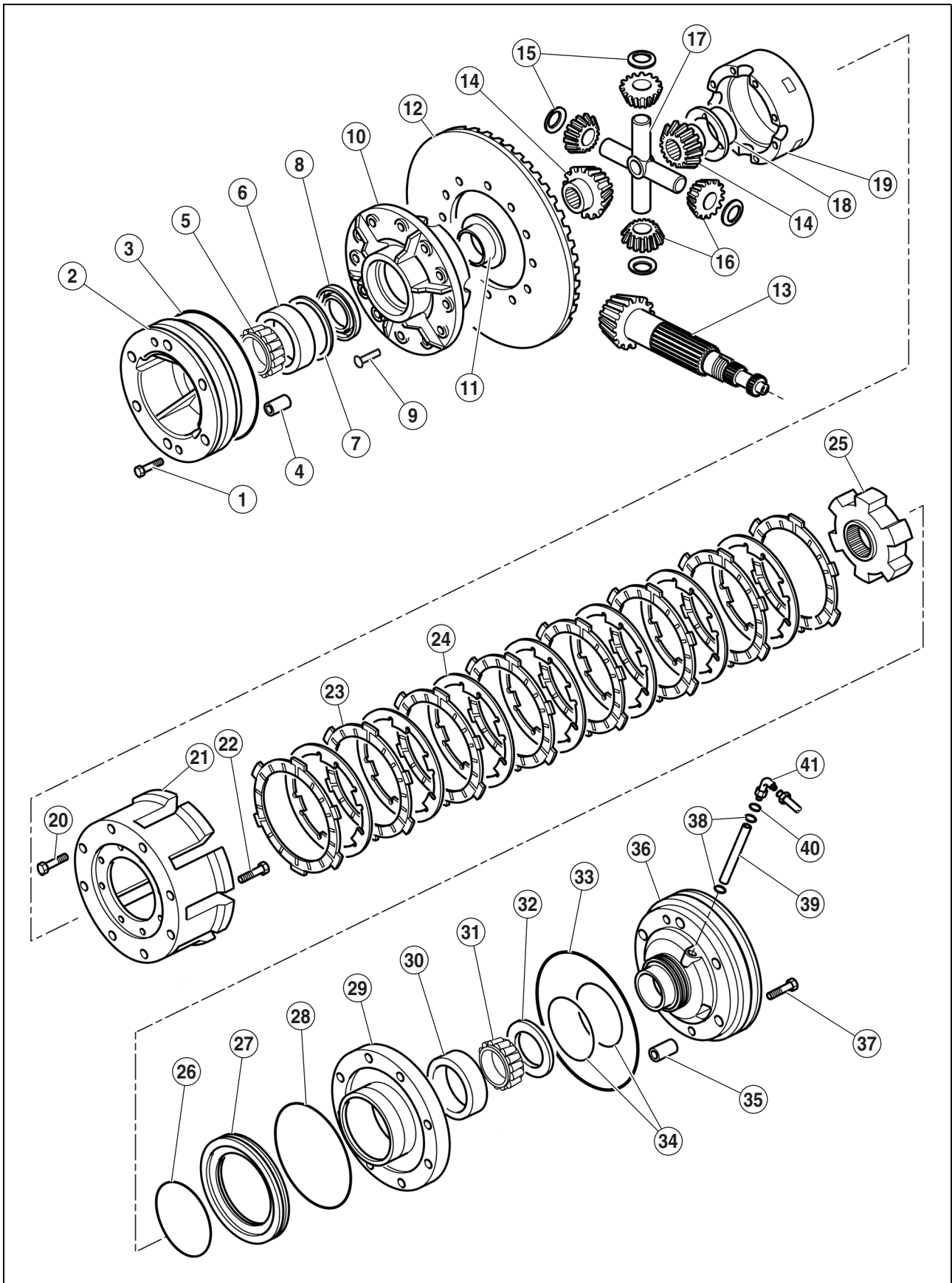
### Parts list

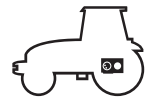
|                            |                                    |                                |
|----------------------------|------------------------------------|--------------------------------|
| 1 Screw.                   | 15 Friction washer.                | 29 Differential locking cover. |
| 2 RH bearing.              | 16 Planet gear.                    | 30 Bearing cup.                |
| 3 O-ring.                  | 17 Spider shaft.                   | 31 Bearing cone.               |
| 4 Centring pin.            | 18 Friction ring.                  | 32 Shims.                      |
| 5 Bearing cone.            | 19 Differential half-case.         | 33 O-ring.                     |
| 6 Bearing cup.             | 20 Screw.                          | 34 Sealing piston ring.        |
| 7 Shims.                   | 21 Differential locking case.      | 35 Centring pin.               |
| 8 Deflector.               | 22 Screw.                          | 36 LH bearing.                 |
| 9 Rivets.                  | 23 Differential locking disc.      | 37 Screw.                      |
| 10 Differential half-case. | 24 Differential locking backplate. | 38 O-ring.                     |
| 11 Friction ring.          | 25 Differential locking hub.       | 39 Supply tube.                |
| 12 Ring gear.              | 26 O-ring.                         | 40 Seal.                       |
| 13 Drive pinion.           | 27 Piston.                         | 41 Coupling.                   |
| 14 Sun gear.               | 28 O-ring.                         |                                |



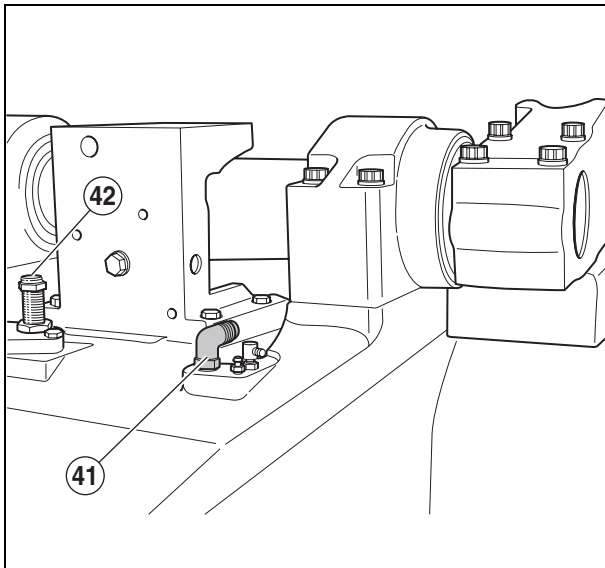
**5" differential**

**Exploded view**



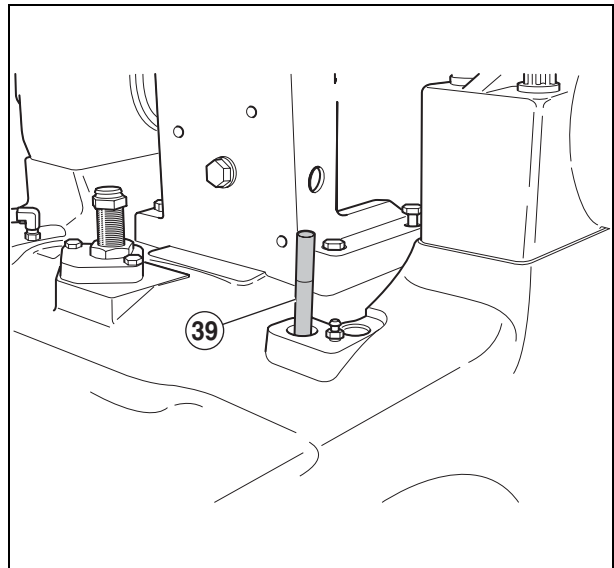


## 5" differential



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Fig. 23



342hsm30

Fig. 24

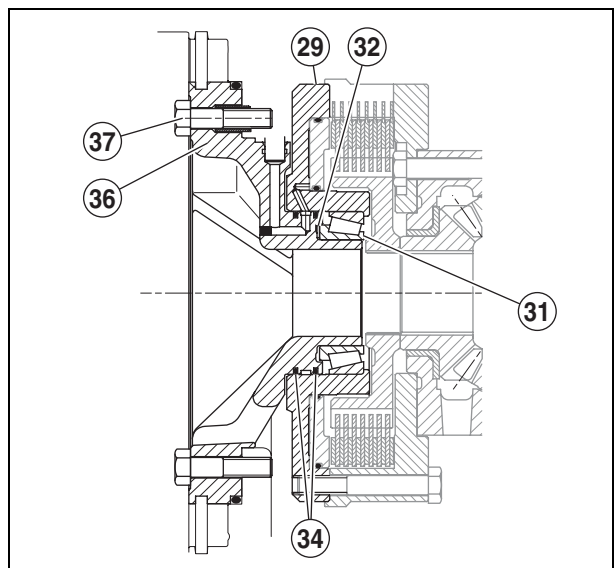
### Removing/refitting the bearings

#### LH bearing

**N.B.:** The bearing (36) and sealing rings (34) of the differential lock can be worked on by removing just the left-hand axle tube.

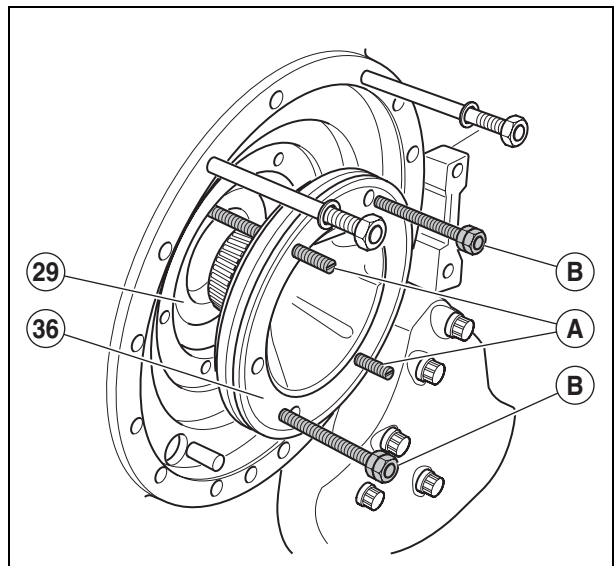
- Remove the left-hand axle tube (see paragraph concerned).
- Unscrew the coupling (41) and remove the transfer tube (39).
- Remove the brake piston (see chapter "C3").
- Remove the forward motion sensor (42) from the housing.
- Remove the screws (37) from the bearing (36), fit 2 diametrically opposed locating studs "A" into the housing and tighten them firmly up against the differential locking cover (29) (Fig. 26).
- Extract the bearing with the aid of the tapped holes and two screws (B) and recover the cone (31) and shims (32) (Fig. 26).

**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 (34) on refitting the bearing.



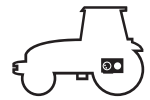
342hsm31

Fig. 25

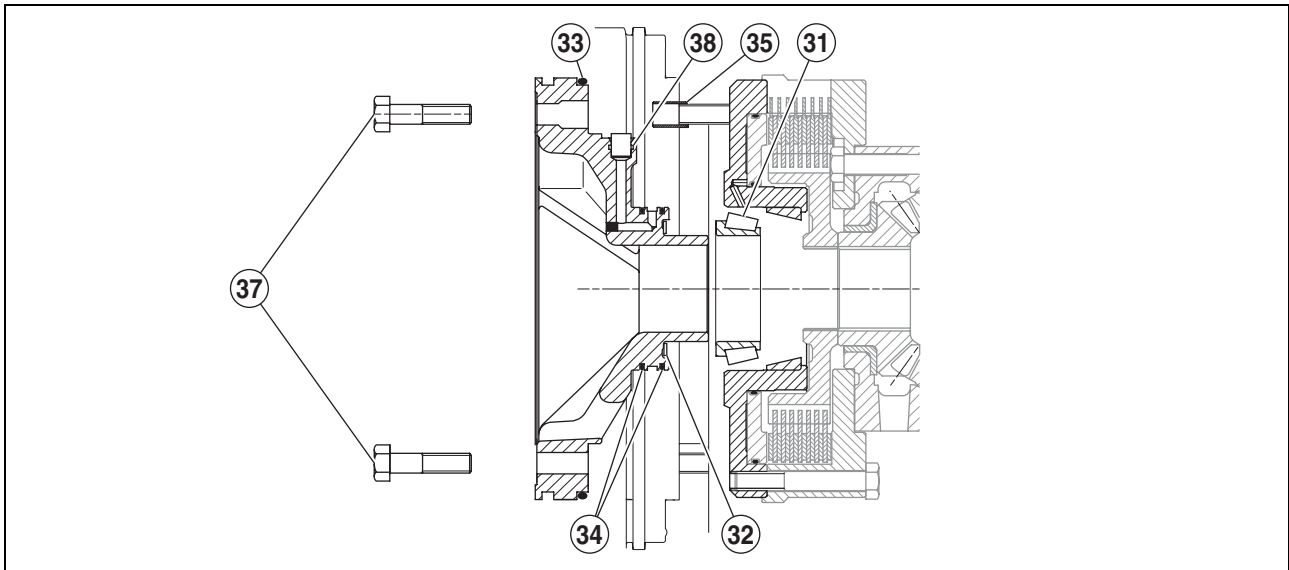


342hsm32

Fig. 26



## 5" differential

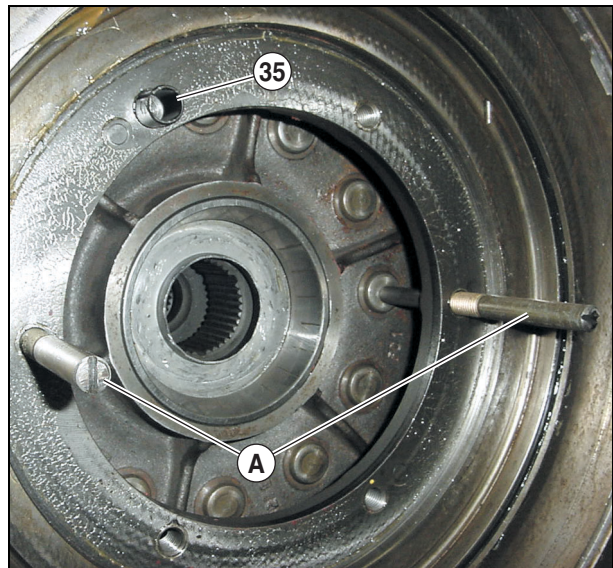


342hsm33

Fig. 27

**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 (35), shims (32) and bearing cone (31) are present.
- Check that the sealing rings (34) 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 (33) and (38).
- Slide the bearing (36) onto the locating studs (A) and tighten 4 screws (37) evenly and alternately to  $11,5 \pm 1,5$  daN.m (Fig. 28 and 29).
- Remove the locating studs. Fit and tighten the other screws to the same torque.
- Position the supply tube and coupling.
- Refit the brake piston (see chapter "C3").
- Check that the seal (33) is correctly positioned.
- Refit the left-hand axle tube (see paragraph concerned).

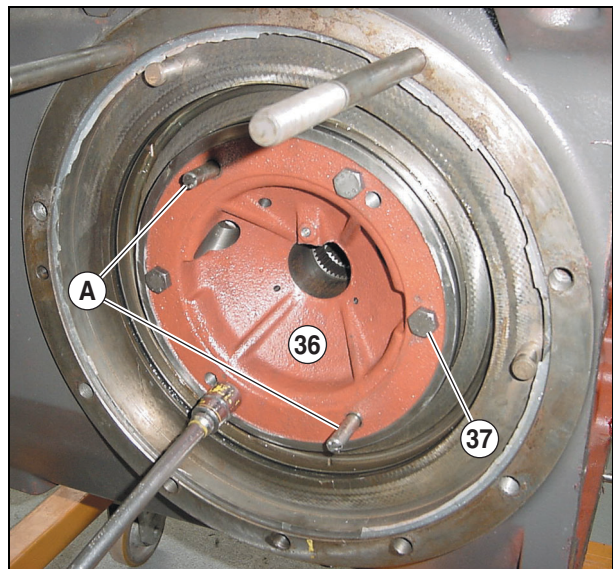


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Fig. 28

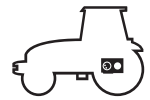
### RH bearing

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 (34).



342hsm35

Fig. 29



## 5" differential

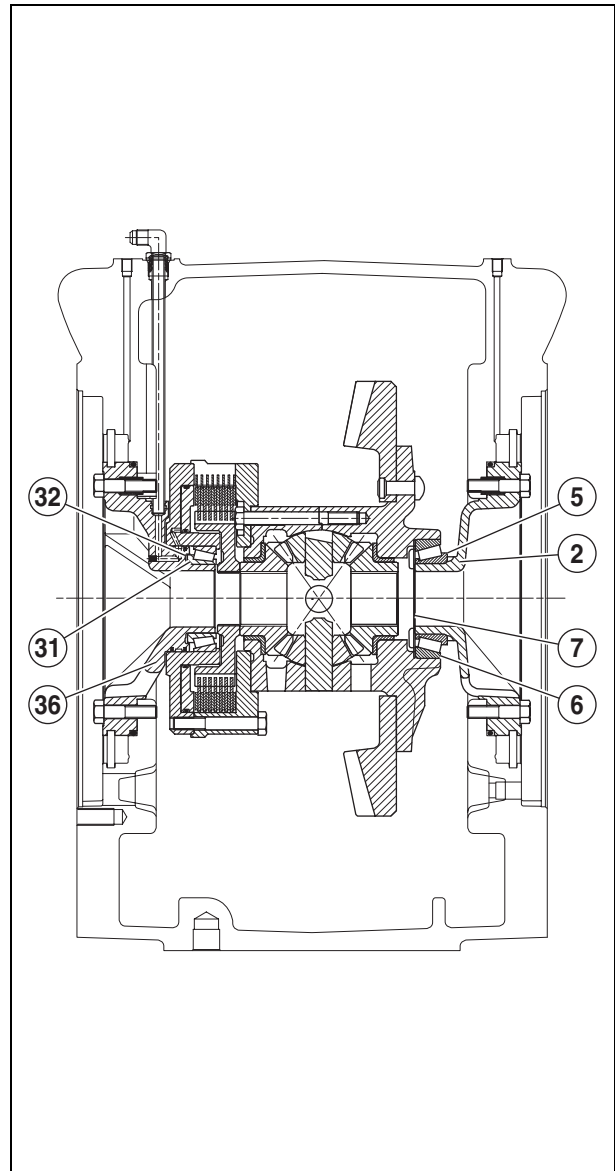
### Removing/refitting the differential case

- Drain the transmission system.
- Disconnect the PTO control cables and pipes.
- Remove the linkage and lift accessories obstructing the uncoupling of the PTO housing.
- Remove the PTO speed sensor from the rear axle to avoid damaging it.
- Remove the PTO housing with a chain and hoist.
- Remove the countershaft connected to the clutch.
- Remove the axle tubes (see paragraph concerned).
- Position rear differential stand n° 60 05 006 319 in support. (This stand requires base n° 60 05 006 314). With the aid of the stand, keep the differential assembly in line with the RH and LH bearings ((2) and (36) respectively).
- Remove the RH and LH bearings according to the procedure described above.
- Recover the cones (31) and (5) and shims (32) from the LH bearing.
- Remove the differential case from the rear axle housing (Fig. 31).

**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.

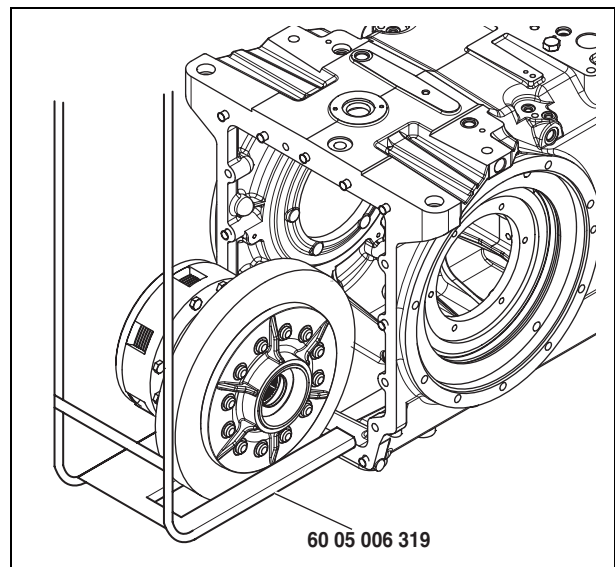
In order to avoid damaging the sealing rings (34), it is necessary to align the differential assembly correctly with the housing axis before fitting the bearings (2) and (36). With the aid of the tool, insert the differential assembly into the central housing and hold it in line with the axle tubes.

- 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. 30



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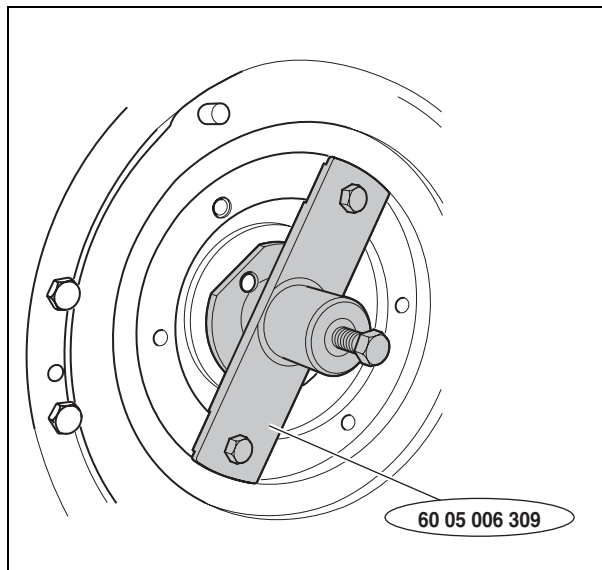
Fig. 31



## 5" differential

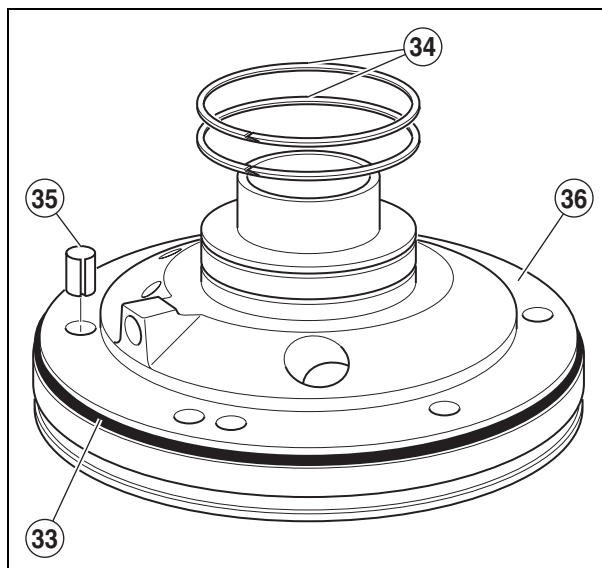
Prepare to fit the bearing (36) as follows:

- 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 (A) 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 (35) and shims.
- Fit a new O-ring (33).
- Check that the sealing rings (34) are not damaged and rotate normally in their groove.
- Fit the bearing (36) 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.



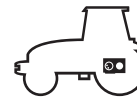
342hsm38

Fig. 32



342hsm39

Fig. 33



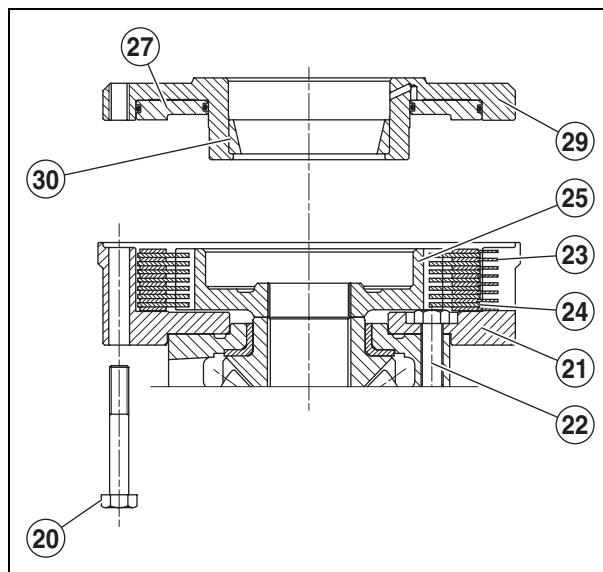
## 5" differential

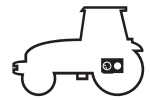
### Removing/refitting the differential lock

- Remove the differential case as described in the procedure above.
- Position the differential case with the cover (29) facing up.
- Remove the screws (20).
- Remove the cover (29), discs (23), backplates (24) and hub (25).
- Remove the screws (22) and case (21).
- Tap the cover (29) lightly on a wooden block to remove the piston (27).
- Replace the O-rings. Drive out the cup (30) if necessary.

***N.B.: If the case (21), cover (29) and bearing (36) 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 cover is not blocked.
- Lubricate the new seals before fitting.
- Refit the piston (27) by tapping gradually and alternately around the edge with a mallet.
- Check that there are no seal fragments after fitting.
- Coat the screws (22) lightly with Frenbloc (270) and tighten to  $11,5 \pm 1,5$  daN.m. .
- Fit the hub, backplates and discs.
- Position the assembled cover (29) of the piston (27).
- Fit and tighten the screws (20) coated with Frenbloc (270) to  $11 \pm 1$  daN.m.
- Check manually that the discs and backplates are not stressed.
- Refit the differential case as described in the procedure above.





## 5" differential

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

- Remove the differential locking system.
- Separate the half-cases (10) and (19).

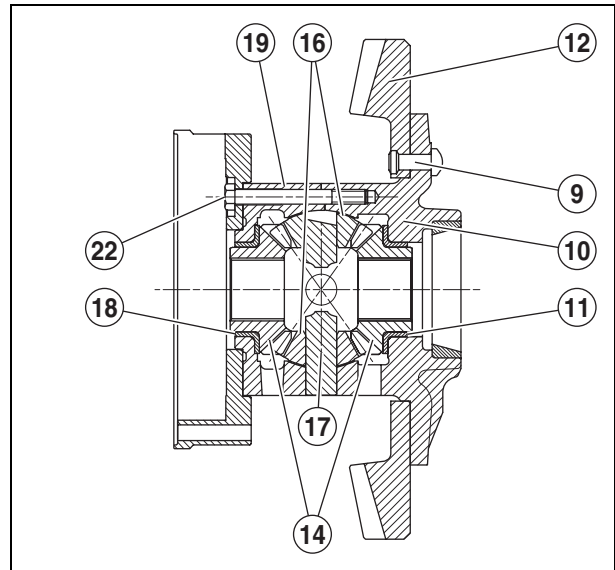
**N.B.: These parts have the same number. They must imperatively be coupled.**

- Remove the sun gears (14) fitted with friction rings (11) and (18), planet gears (16), washers and spider (17). If necessary, drive out the bearing cup on half-casing (10) and recover the shims.
- Extract and discard the deflector. 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.**

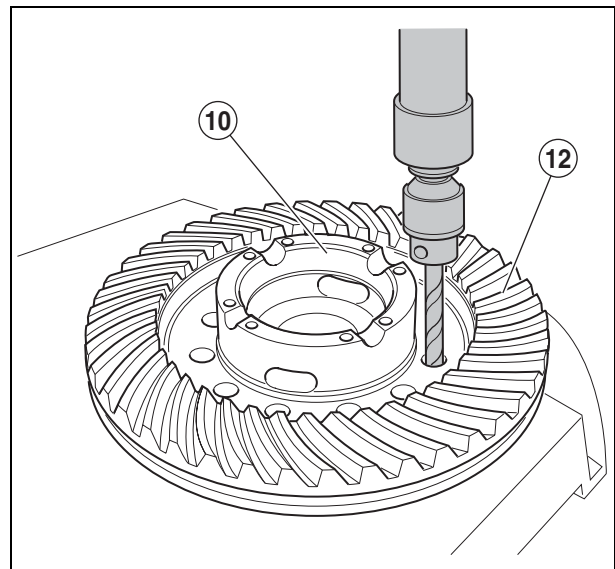
The ring gear and case are originally riveted together. For repair, the rivets are replaced by screws and nuts referenced in the spare parts catalogue.

- Punch (on the ring gear teeth side) the centre of each rivet (9). Using a 5 mm dia. bit, drill the rivets to a depth of 12 mm (Fig. 36).
- Drill again to an identical depth with a 12 mm bit.
- Drive the rivets hard with a suitable drift punch (Fig. 37).
- Clean the bearing surfaces of the new ring gear (12) and half-case (10), as well as the screws and nuts.
- Coat the initial threads of the screws with Frenbloc (270) and position them in the ring gear and case.
- Tighten the nuts to  $18 \pm 2$  daN.m.
- Refit the deflector, shims and cup.
- Refit the planet gears and sun gears in reverse order to removal.
- Tighten the screws (22) coated with Frenbloc (270) to  $11,5 \pm 1,5$  daN.m.



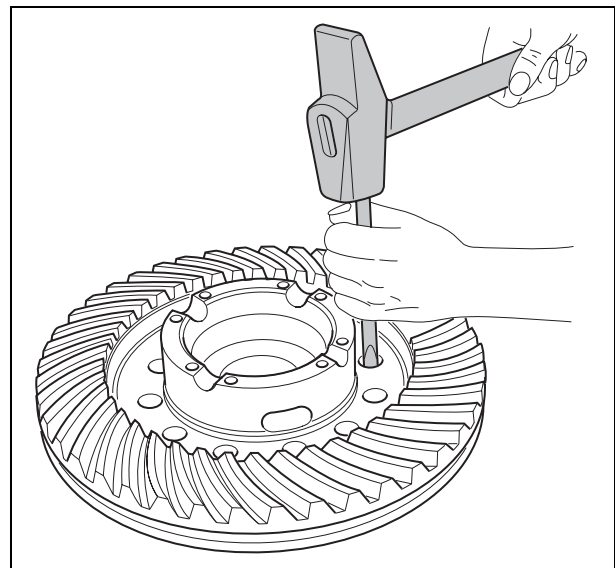
342hsm41

Fig. 35



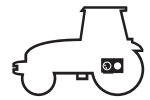
342hsm42

Fig. 36



342hsm43

Fig. 37



## 5" differential

### Adjusting the backlash

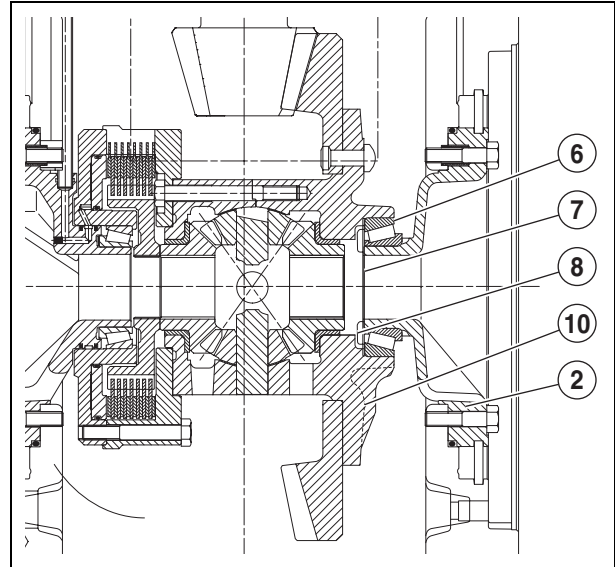
**N.B.:** The backlash to be obtained between the ring gear and drive pinion ensures that the final drive is reliable and that the assembly operates correctly.

**This backlash must be checked following:**

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

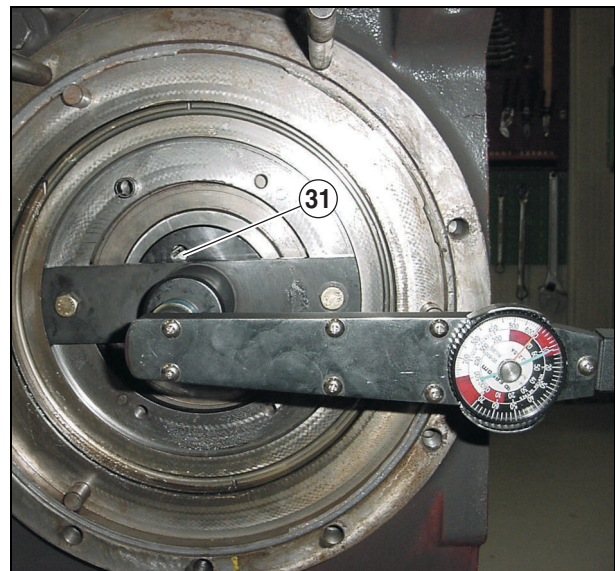
With the aid of a suitable extractor, remove the cup (6) and discard the deflector (8).

- Position shims (7) with a thickness of 0,20 mm on the differential half-case (10).
- Fit the cup (6) up against the shims without the deflector (8).
- Refit the differential case (see corresponding paragraph) with only the RH bearing (2). On the LH side, fit tool n° 60 05 006 309 with the roller bearing (31).
- Tighten the tool's centre screw to 1 daN.m (Fig. 39).
- 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  $61 \pm 7$  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. 40).
- 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).
- Partly insert a new deflector (8). The deflector will be fitted completely with the cup (6).
- Check that the cup is bearing properly on the shims and is in contact with the deflector.
- The next essential step is to shim the differential case roller bearings.



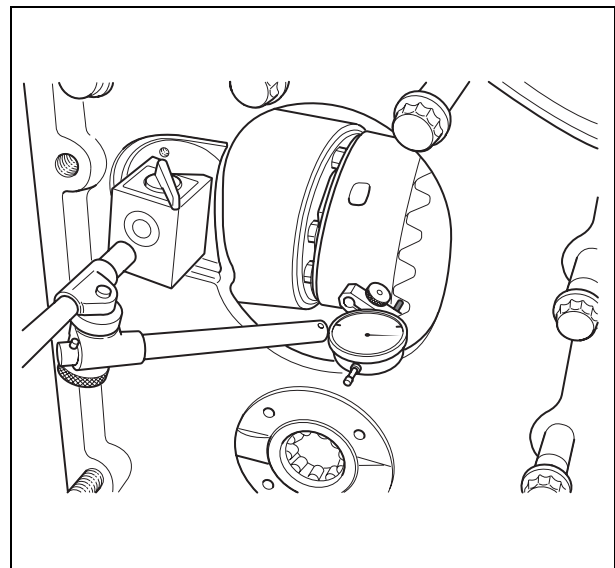
342hsm44

Fig. 38



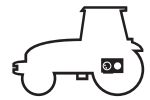
342hsm45

Fig. 39



342hsm46

Fig. 40



## 5" 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.

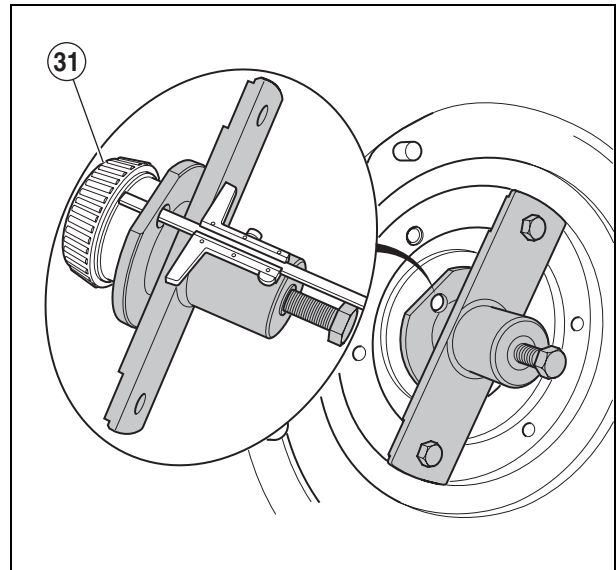
- Fit the differential (see paragraph concerned).
- Fit the RH bearing with the measured number of shims. On the LH side, fit tool n° 60 05 006 309 with the roller bearing (31). Using two bolts, mount the tool on the housing (Fig. 41).
- Tighten the centre bolt to 1 daN.m.

**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"

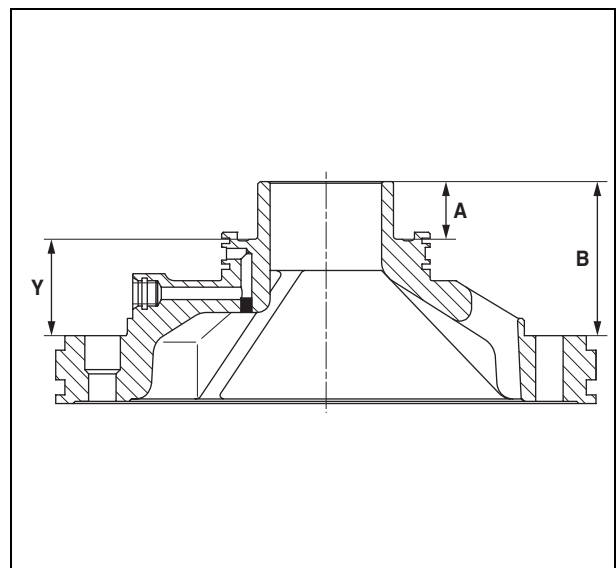
- Determine "Y" according to "A" and "B".
- Measure "A", the distance between the top of the bearing and the contact surface of the shims, with tool n° 60 05 006 309 (Fig. 42 and 43).
- Measure "B", the distance between the top of the bearing and the contact surface of the bearing on the housing (Fig. 42).

$$Y = B - A$$



342hsm47

Fig. 41



342hsm48

Fig. 42



342hsm49

Fig. 43



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## 5" differential

### Measuring "X"

Using a suitable depth gauge, measure "C" and determine dimension "X" between the bearing cone (31) and the contact surface of the bearing on the housing (Fig. 45):

$$X = C - 10$$

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

### Thickness "E" of shims (32)

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

$$E = X - Y + P1$$

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

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

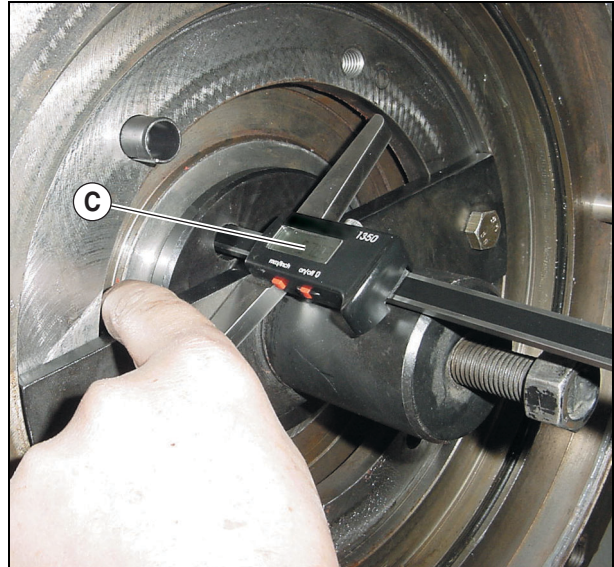
$$X = 74,5 - 10 = 64,5$$

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

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

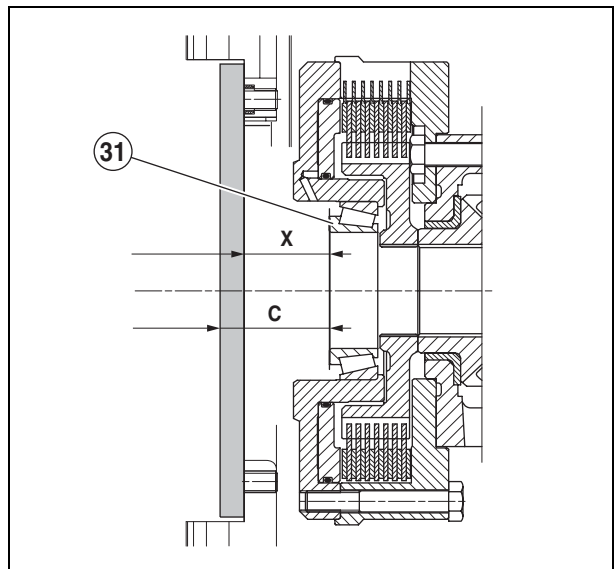
According to the example, the shim thickness must be between 0,75 and 0,85 mm.

- Remove the tool and the bearing cone (31). Place shims (32) to a thickness "E" on the bearing (36).
- Fit the RH bearing (36) (see paragraph concerned).
- Refit the assembly as described in the procedures on the pages concerned.



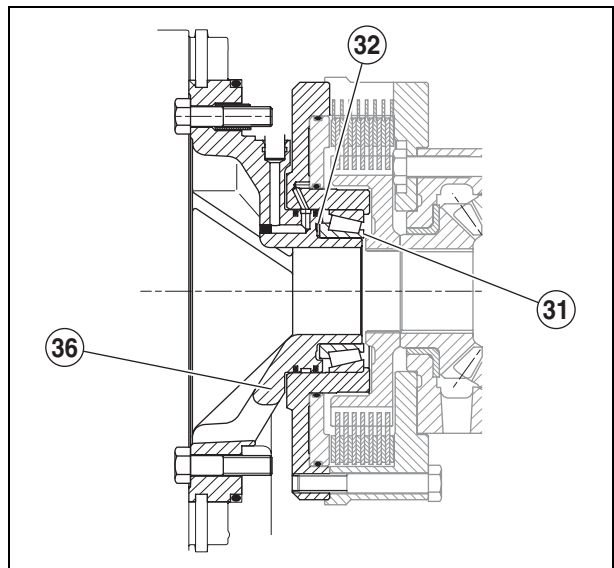
342hsm50

Fig. 44



342hsm51

Fig. 45



342hsm52

Fig. 46



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