



Front axle

08 - Front axle

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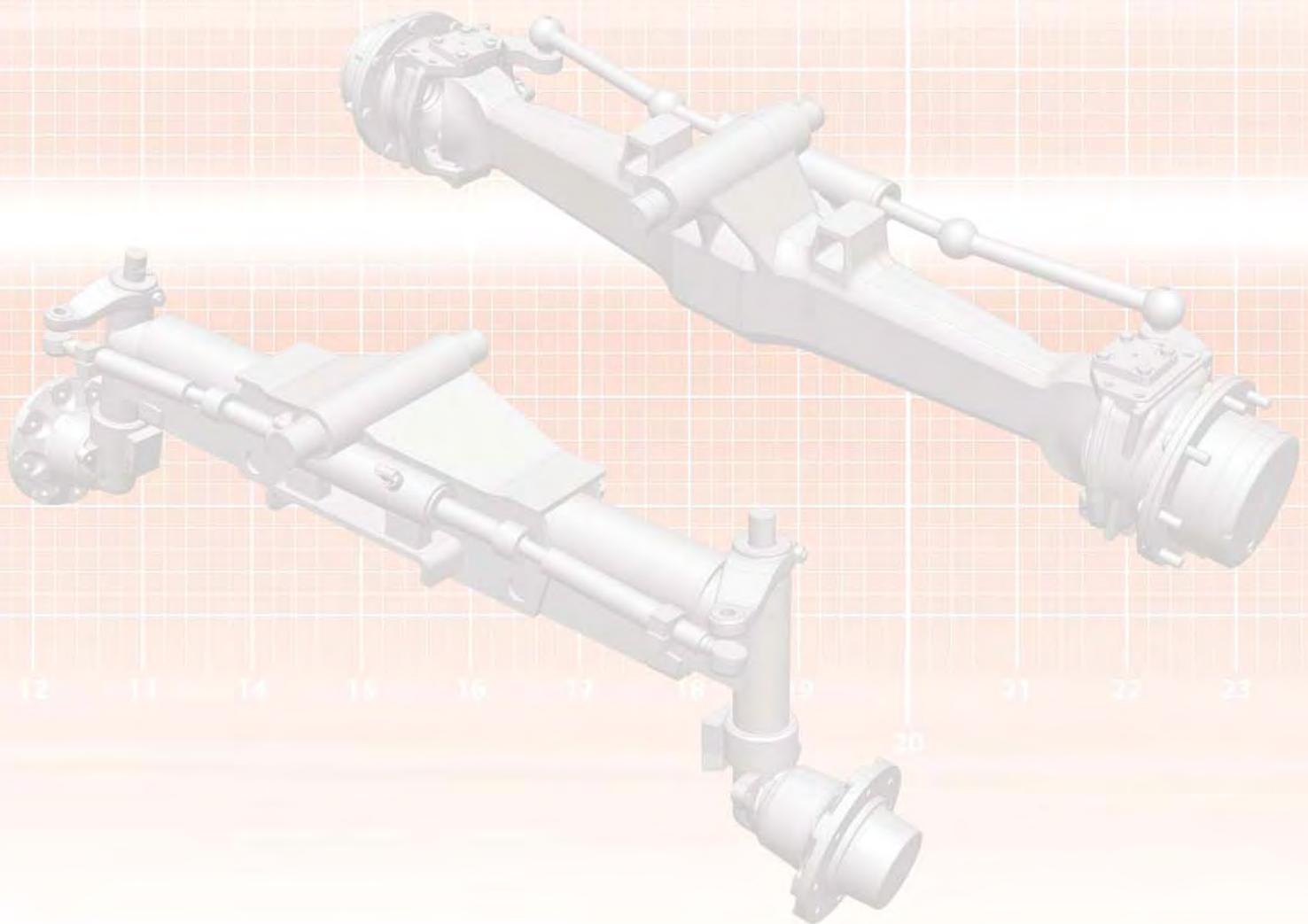
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- A detailed 3D CAD model of a front axle assembly is shown, rendered in a light gray color. The model includes the axle tube, differential housing, final drive units, and various mounting brackets and bolts. It is positioned diagonally across the page, with a grid background.
- 8A10 - DANA - General
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 - 8B13 - CARRARO - Bearing and transmission shaft
 - 8B14 - 4WD GPA20 clutch
 - 8C10 - 2WD front axle
 - 8D10 - 2WD front axle, 6-cylinder engine



Front axle



5400



8A10- DANA - General

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DANA - General

A . General description

This may or may not be fitted on the tractor depending on the engine front axle model. The front axles mounted on the 4WD tractors consist of:

- a centre housing containing the differential unit and the differential lock system, as well as the transmission shafts,
- at each end, a hub assembly containing the final drive units.

The front axle is assembled to the front frame of the tractor by means of a pivot which adapts to the unevenness of the ground. Drive is transmitted from the rear axle to the front axle by a transmission shaft. Engagement is ensured by an electrohydraulically controlled multidisc clutch.

The differential unit is held by two half-bearings mounted on a suitable support allowing the crownwheel and pinion to be adjusted.

The bevel gear is supported by two bearings and is adjusted using shims.

The wheel hubs containing the final drives are held in place by two tapered roller bearings and driven by a hydraulically-controlled steering gear.

DANA - General

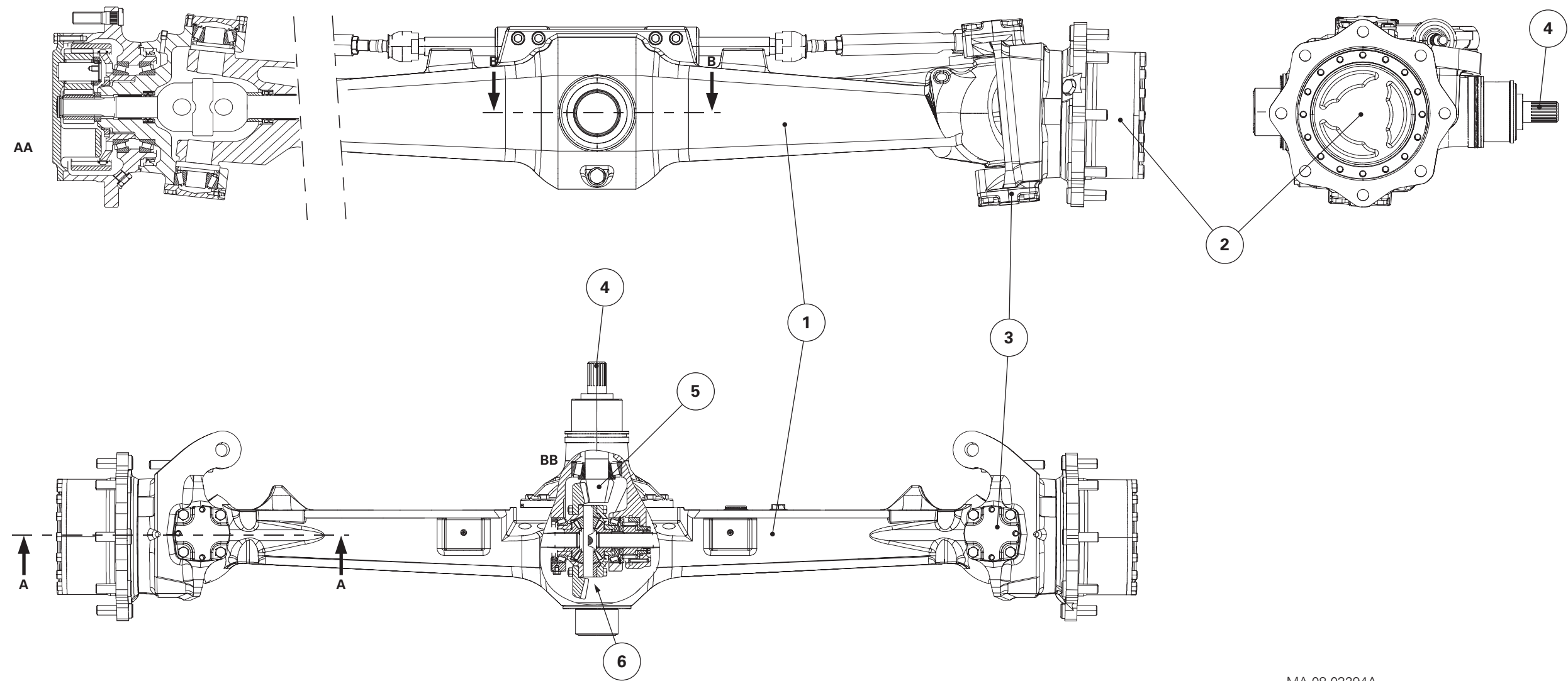
Parts list ([Fig. 1](#) and [Fig. 3](#))

DANA AG 85 - 105B axle

- (1) Axle housing
- (2) Final drives
- (3) Steering pivot
- (4) Input shaft
- (5) Pinion
- (6) Differential

View of the assembly

DANA AG 85 and 105B axle



MA-08-03294A

Fig. 1

DANA - General

B . Specifications and dimensions

All values in the following tables are given in millimetres.

Dimensions for DANA AG 85 models

A = 1869	E = M18 x 1.5
B = Ø 220.8	F = 275
C = Ø 315	G = Ø 79.90
D = 1669	H = Ø 95

Dimensions for DANA AG 105B models

A = 2020	E = M18 x 1.5
B = Ø 220.8	F = 275
C = Ø 315	G = Ø 79.90
D = 1800	H = Ø 95

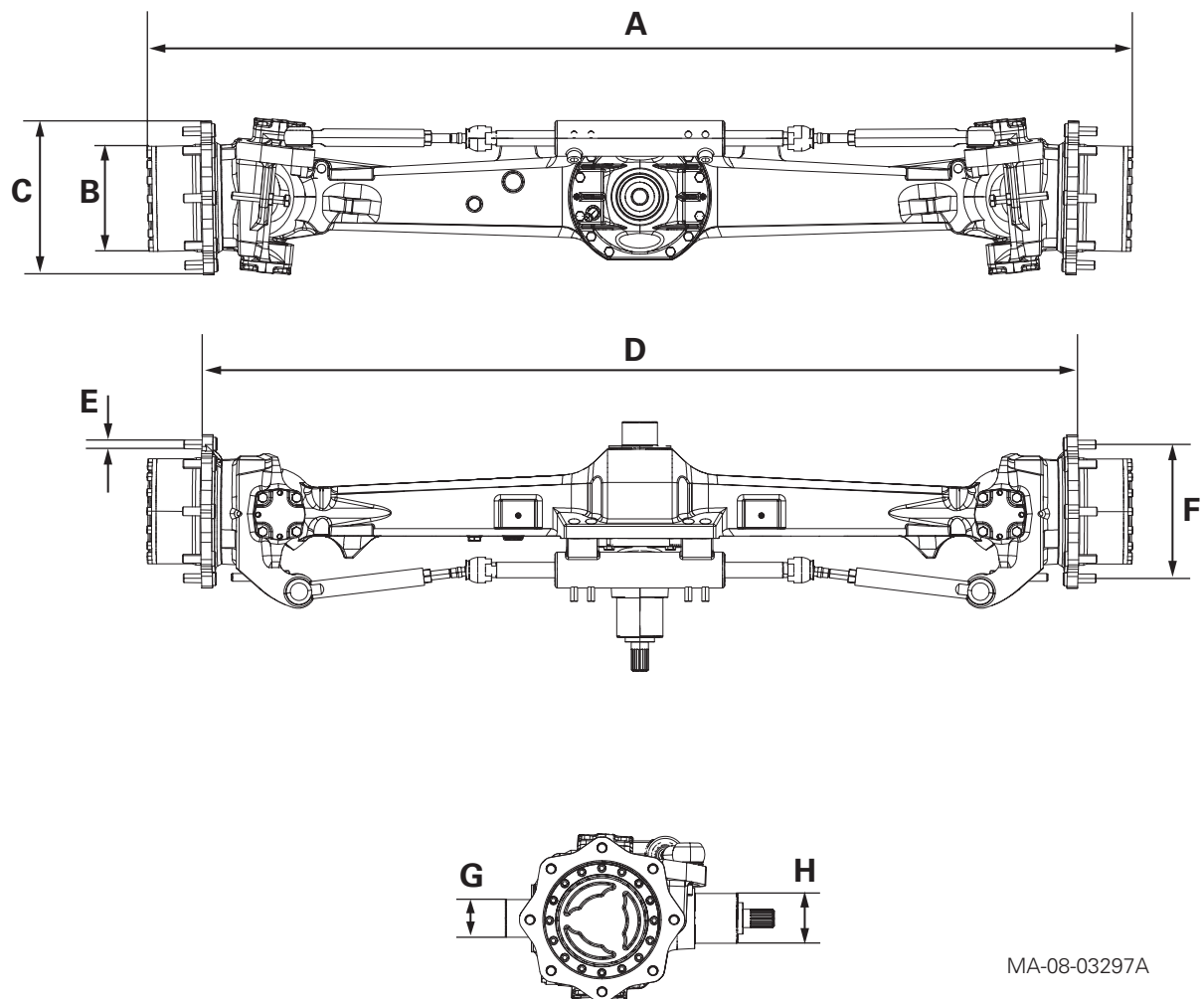


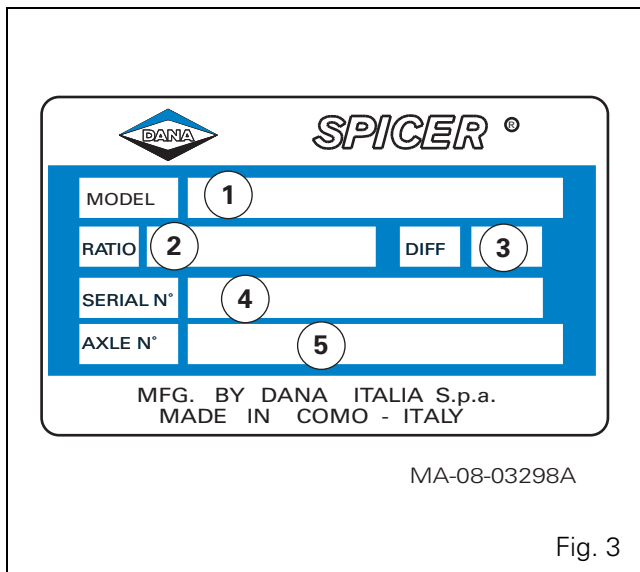
Fig. 2

DANA - General

C . Product identification

The front axles are identified by a plate fitted to the axle (Fig. 3).

- (1) Axle type
- (2) Reduction ratio
- (3) Differential type
- (4) Serial number
- (5) Axle number



Technical specifications

DESCRIPTION	VALUES	
	AG 85	AG 105B
Differential	8 / 33 (1 / 4.125)	8 / 33 (1 / 4.125)
Final drive	1 / 4.6	1 / 4.6
Total reduction	1 / 18.975	1 / 18.975
Unladen weight	260 kg	270 kg
Input direction of rotation	Anti-clockwise	
Differential type	Dog clutch lock, hydraulic control	
Max. inner/outer steering angle	55° / 39°	
Oil specification	SAE 85W90 In compliance with standards API GL4 - GL5 MIL 2105 and MIL 2105B	
Differential oil capacity	5.5 l	6.8 l
Final drive unit oil capacity	0.9 + 0.9 l	1.1 l
Lubrication	POLYMER 400/L DIN = KHER1R ISO-I-XMR-XM2	

8A11 - DANA - Final drive units

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DANA - Final drive units

A . General

Description

The final drive unit comprises a swivel housing (47) linked to the front axle housing by two pivot pins (7)(11). The wheel hub (22) turns on two tapered roller bearings whose cups (23) (19) are force-fitted into the hub. The cones (18) (25) are also force-fitted.

The bearings (18) (19) (23) (25) are not adjustable. The parts are manufactured with machining tolerances requiring no further adjustment or shimming.

Drive from the front differential is transmitted to the wheel hub via the universal joint shaft assembly (10), sun gear (28), planet gears (38) and ring gear (44). This is held in position by two snap rings (24) (26) on the ring gear carrier (42). The ring gear carrier is force-fitted to the housing (47) and locked by the central nut (27).

The planet gear pins (41) are held in rotation in the planet carrier by the flange (53).

On AG 105 axles, the planet gears are equipped with a double row of needle rollers separated by a spacer.

For improved performance, the seal rings are fitted with double lips.

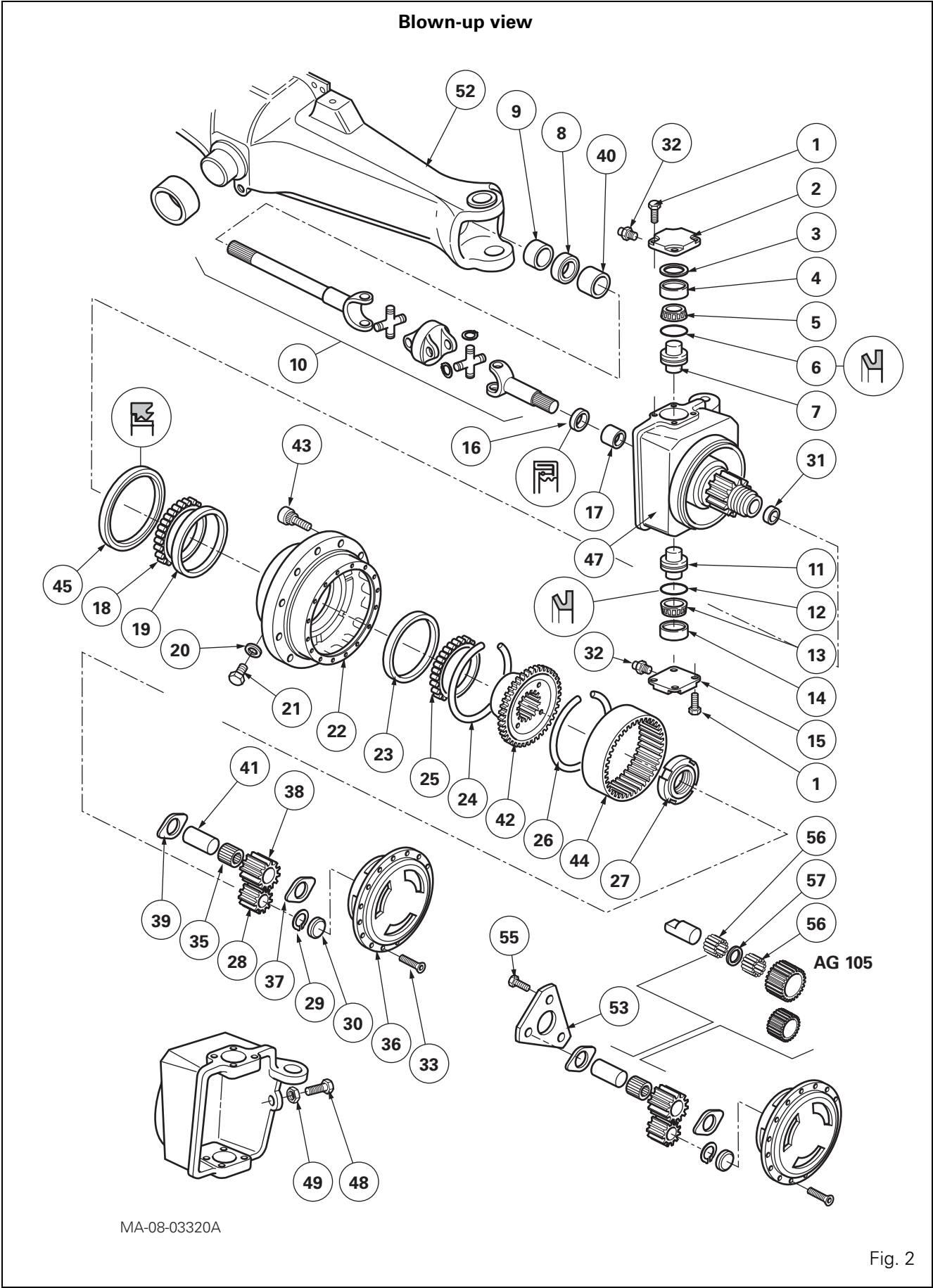
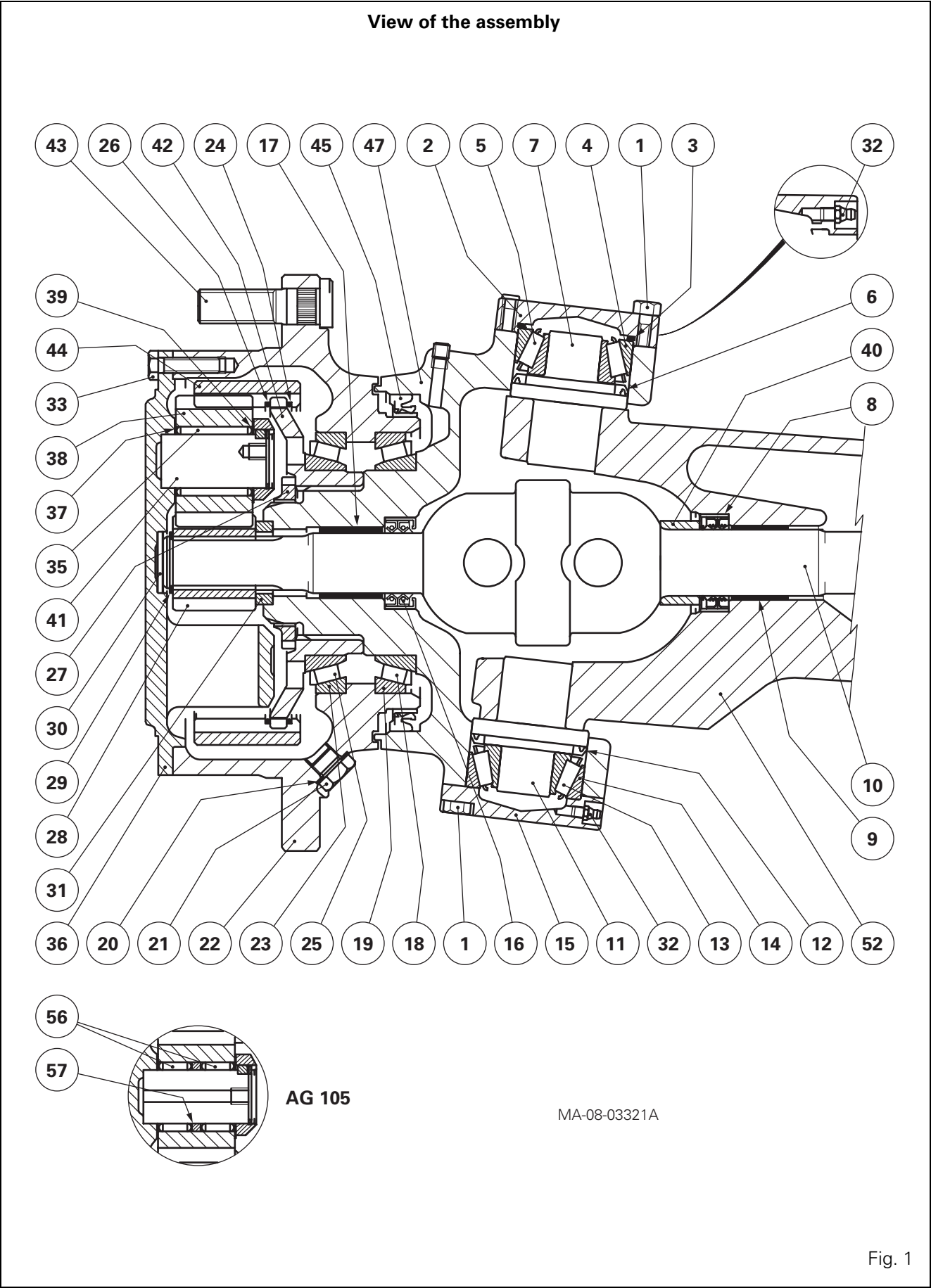
Sealing of the hub/housing is ensured by a cassette seal (45), and sealing of the universal joint shaft/housing is provided by the seal (8) and the protective ring (40).

Sealing of the drive unit and the swivel housing is ensured by the seal (16) and the sealing of the swivel bearings in the swivel housing by the seals (6) and (12).

DANA - Final drive units

Parts list

- (1) Screw
- (2) Cover plate
- (3) Shim(s)
- (4) Bearing cup
- (5) Bearing cone
- (6) Seal
- (7) Pivot pin
- (8) Seal
- (9) Ring
- (10) Universal joint shaft
- (11) Pivot pin
- (12) Seal
- (13) Bearing cone
- (14) Bearing cup
- (15) Cover plate
- (16) Seal
- (17) Ring
- (18) Bearing cone
- (19) Bearing cup
- (20) Seal
- (21) Plug
- (22) Wheel hub
- (23) Bearing cup
- (24) Snap ring
- (25) Bearing cone
- (26) Snap ring
- (27) Nut
- (28) Sun gear
- (29) Circlip
- (30) Thrust washer
- (31) Ring
- (32) Grease nipples
- (33) Screw
- (35) Needle rollers
- (36) Planet carrier
- (37) Friction plate
- (38) Planet gear
- (39) Friction plate
- (40) Protective ring
- (41) Planet gear pin
- (42) Ring gear carrier
- (43) Wheel stud
- (44) Ring gear
- (45) Seal
- (47) Swivel housing
- (48) Steering stop screw
- (49) Nut
- (52) Axle housing
- (53) Flange
- (55) Screw
- (56) Needle rollers
- (57) Spacer



DANA - Final drive units

B . Description of the main components

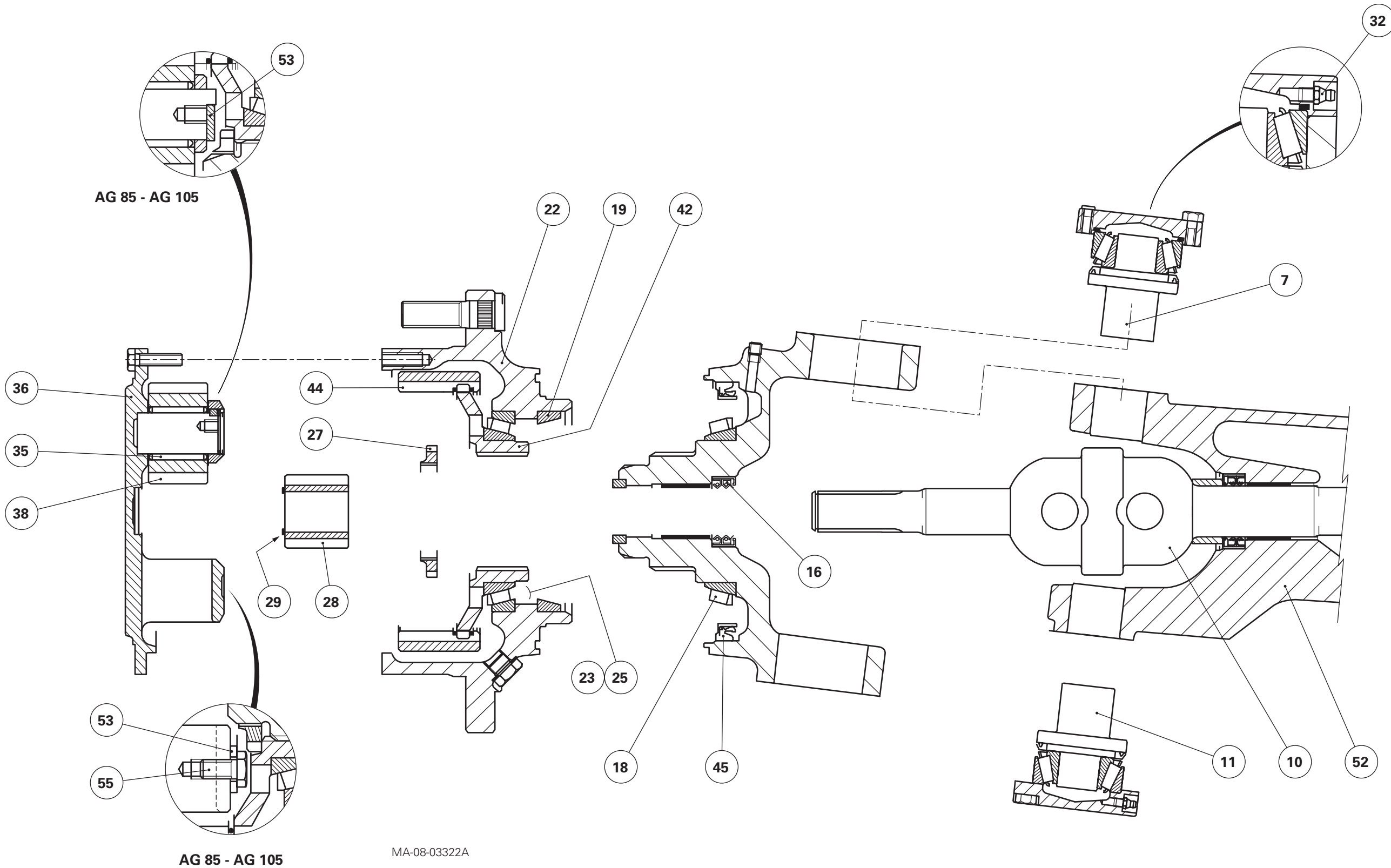


Fig. 3

C . Removing and refitting, disassembling and reassembling the planet carrier, sun gear and ring gear

Preliminary steps

1. Chock the rear wheels. Apply the hand brake.
NOTE: Because the 4WD clutch is mechanically engaged when stationary, raise the two front wheels in order to freely turn the hub (22) for the relevant wheel.
2. Remove the wheel.
3. Drain the drive unit.

Removing the planet carrier

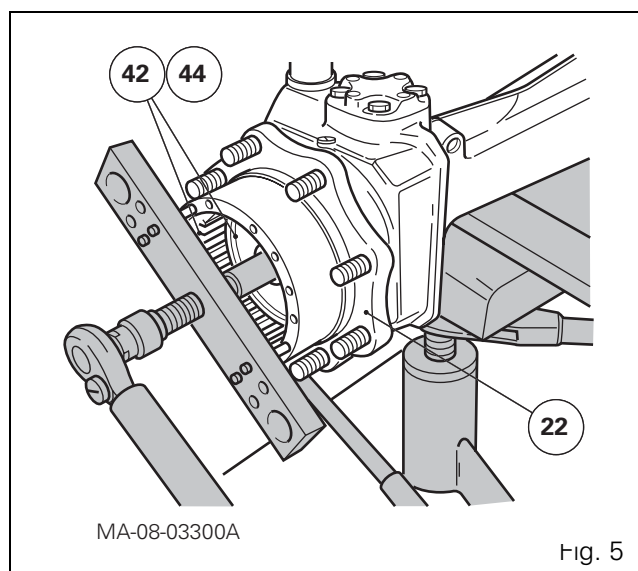
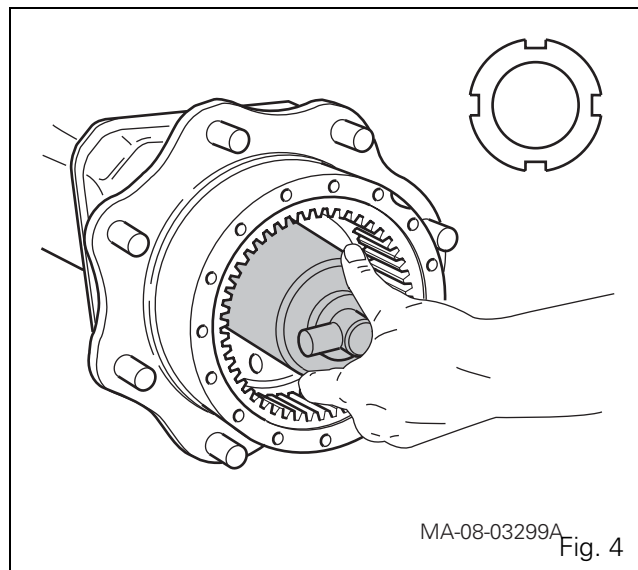
4. Remove the screws (33).
5. Take off and detach the planet carrier fitted with the thrust washer (30).
6. Remove the circlip (29) and the sun gear (28).

NOTE: To avoid damaging the thread of the swivel housing (47), it is advised to correctly unlock the nut (27).

7. Unlock the nut (27) using a socket ref. 3376880M1 (Fig. 4).
8. Support the hub (22) in a sling.
9. Remove the hub (22) accompanied by the ring gear carrier (42) and the ring gear (44) using the puller ref. 3378038M1 (Fig. 5) and the special sleeve (see § H).

NOTE: Smear the cone and the puller screw with graphite grease.

10. Remove the snap rings (24) (26) from the ring gear carrier assembly (42). Separate the ring gear (44) from the ring gear carrier.



DANA - Final drive units

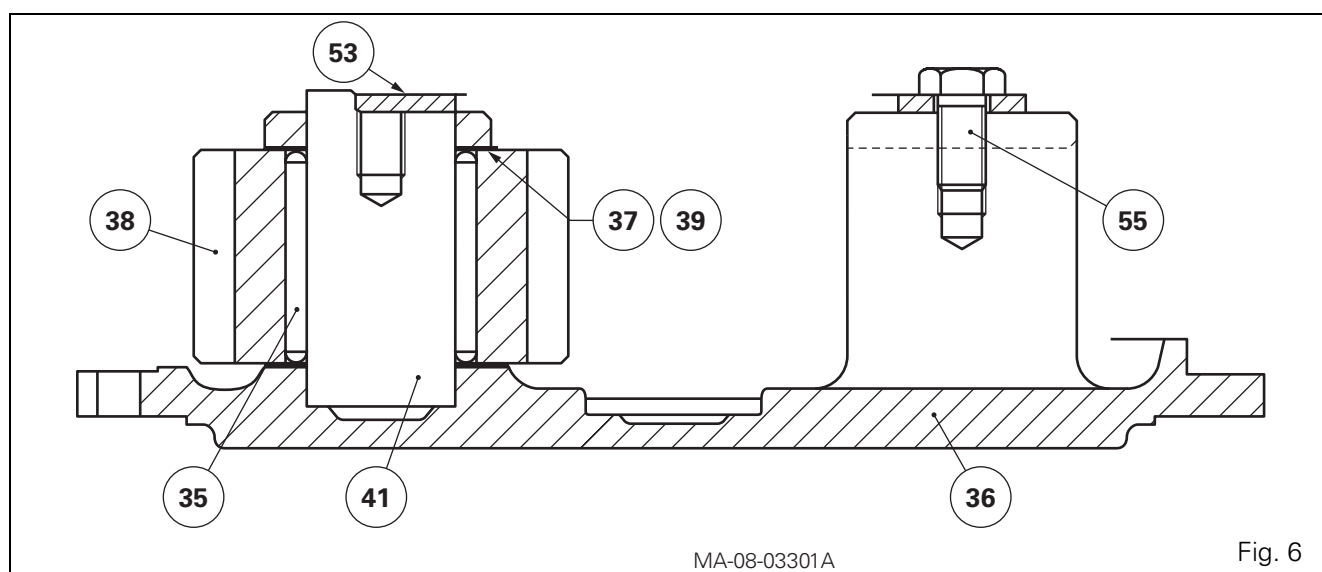
Disassembling the planet carrier (Fig. 6)

NOTE: The planet gear pins (41) are immobilised by a flange (53) attached to the planet carrier (36) by the screws (55).

11. Place the planet carrier on a workbench.
12. Take out the screws and remove the flange.
13. Remove the pins (41) from the planet carrier by screwing a locally obtained screw into the tapped hole located at the end of each pin.
14. Remove the planet gears (38). Recover the needle rollers (35) and the plates (37) (39).

Reassembling the planet carrier

15. Clean and check all components. Replace those that are defective.
16. In each planet gear (38) fit the needle rollers, smeared with bearing grease.
Fit the prepared planet gears in the planet carrier (36).

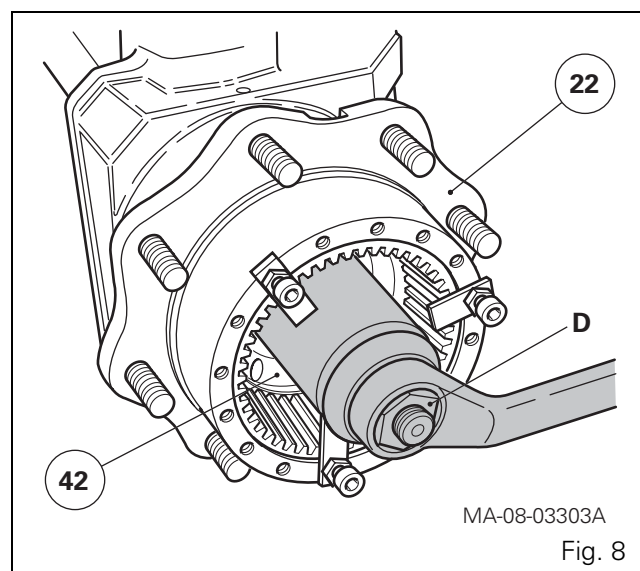
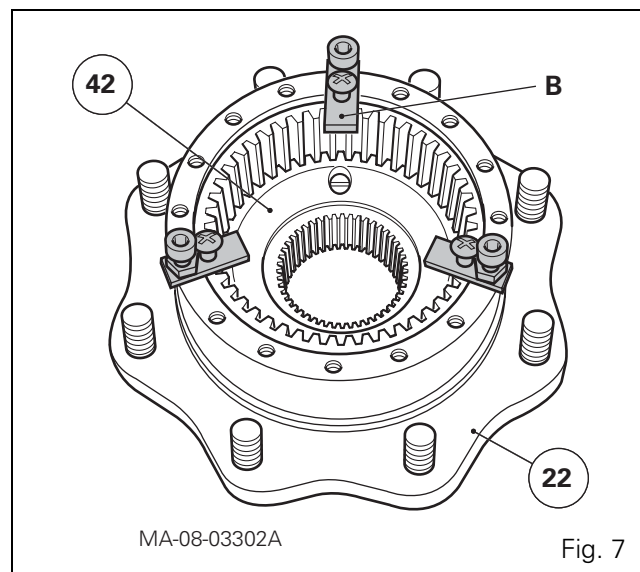


Refitting the ring gear, the sun gear and the planet carrier

17. Assemble the ring gear (44) on the ring gear carrier (42) with the snap rings (24) (26), ensuring their correct positioning in their grooves.
18. Insert the hub (22), ring gear carrier (42) and ring gear (44) assembly.
19. Lubricate the splines of the swivel housing (47).
20. Using three or four (makeshift) flanges "B" screwed into the hub holes, fix together the ring gear carrier (42) and the hub (22) (Fig. 7).
21. Fit the ring gear carrier / hub assembly using the fitting tool, ref. 3378058M1 (Fig. 8) until the ring gear carrier comes into contact with the housing.
NOTE: Tighten tool A (see § H) up against the swivel housing. Smear nut D and its mating face with graphite grease (Fig. 8).
22. Manually check the rotation of the hub (22).
23. Fit and tighten the nut into the swivel housing groove by bending its collar without breaking it.
24. Fit the sun gear (28) and circlip (29).
25. Smear the mating face of the planet carrier with sealing product Loctite 510 or equivalent.
26. Check for the presence of the thrust washer (30).
27. Refit the planet carrier. Tighten the screws (33) to 70 - 85 Nm.

Final steps

28. Turn the hub so that the filler plug is positioned along the horizontal axis. Fill and top up the final drive unit oil level through the same port. Screw on the plug (21) fitted with its seal (20).
29. Refit the wheel. Remove the axle stands and the jack. Tighten the nuts to a torque of 400 - 450 Nm.
30. Remove the chocks and release the hand brake.
31. Carry out a road test of the front axle. Check the tightness of the planet carrier and filler plug mating faces.



DANA - Final drive units

D . Disassembling and reassembling the wheel hub

Disassembly

32. Remove the planet carrier (see § C).
33. Remove the circlip (29) and the sun gear (28).
NOTE: To avoid damaging the thread of the swivel housing (47), it is recommended to correctly unlock the nut (27) and to loosen it using the socket ref. 3376880M1 (see § H).
34. Sling and remove the wheel hub (22).
35. If necessary, extract bearing cones (18) (25). Drive out the cups (19) (23). If the bearings are to be reused, pair up the cones and cups.

Reassembly

36. Check and clean the components. Replace any defective parts.

Assembling bearing cones (18) (25) and cups (19) (23)

Reused cups and cones

Fit the previously paired cups and cones to the respective machined shoulders on the wheel hub, the swivel housing and the ring gear carrier.

New cups and cones

NOTE:

- The bearing cups and cones must be of a special class (width tolerance 0.1 mm instead of 0.2 mm).
- Bearing shimming is determined according to the machined tolerances of the housing (47), hub (22) and ring gear carrier (42).
- The parts listed above can be replaced individually.

To correctly guide the hub (22) onto the cassette seal (45), fit the ring gear carrier (42) as described in steps 20 to 22.

If the hub (22) does not rotate freely after assembly, look for the component(s) that are causing the problem.

37. Lubricate the splines of the swivel housing (47).
38. Repeat steps 20 to 22.
39. Degrease the thread of the nut on the swivel housing.
40. Lightly smear the nut (27) with Loctite 270 or equivalent and tighten to a torque of 400 - 450 Nm.
41. Lock the nut in the housing groove by bending its collar, without breaking it.
42. Refit the sun gear (28) and the circlip (29).
43. Refit the planet carrier (see § C).

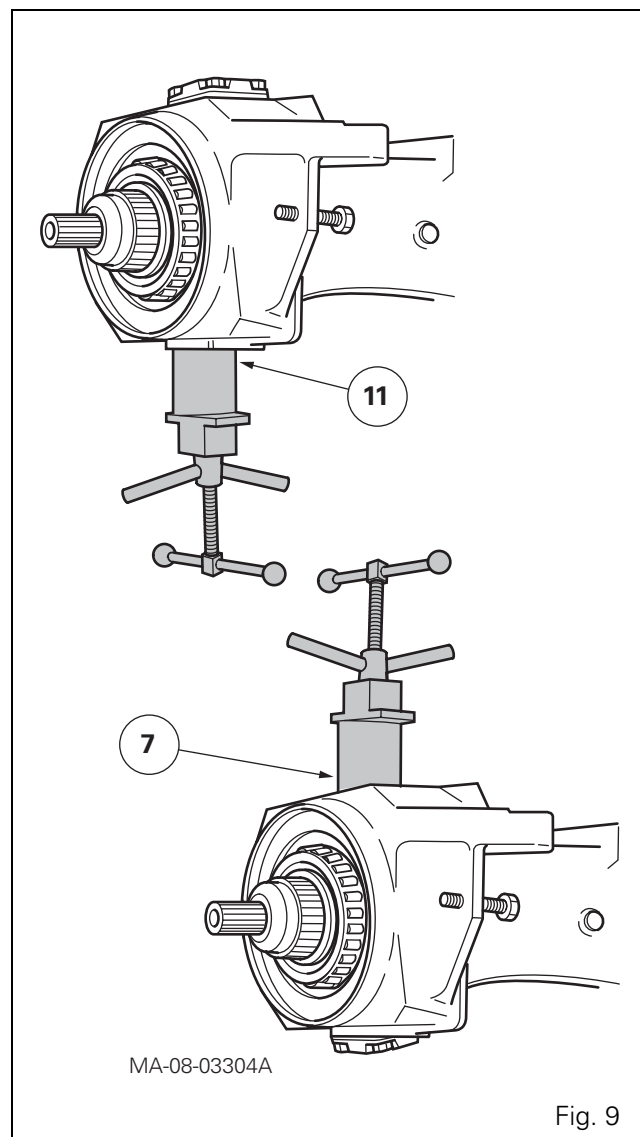
E . Replacing a wheel stud

44. Chock the rear wheels. Apply the hand brake.
45. Raise the relevant side of the tractor with a jack, position an axle stand and take off the front wheel.
46. Drive out the defective stud.
47. Lightly smear the serrated area of the new stud with Loctite 270 or equivalent and insert it using a bronze drift and a suitable hammer.
48. Refit the wheel. Remove the axle stand and the jack. Tighten the nuts to a torque of 400 - 450 Nm.

F. Disassembling, reassembling and shimming the swivel housing

Disassembly

49. Remove the planet carrier (see § C).
 50. Take off the sun gear and wheel hub (see § C and § D). If necessary, remove the seal (45) using a suitable puller or a makeshift fitting. Remove the pin and the nut from the steering ball joint. Extract the ball joint.
 51. Support the swivel housing (47) with a suitable sling.
 52. Take out the screws (1), and remove the cover plate (15) and cup (14). Extract the lower pivot pin (11) (Fig. 9) using tool MF 451B and end fitting MF 451B3 (see § H).
 53. Repeat step 52 for the upper pivot pin (7) (Fig. 9).
 54. If required, extract the cones (5) (13) from the pivot pins.
 55. Cover the splines of the universal joint shaft to avoid damaging the seal (16).
 56. Remove the swivel housing (47).
 57. If necessary, take off the seal (16) and drive out the ring (17).
- NOTE:** The ring is adhered with Loctite 270.
58. If necessary, remove the universal joint shaft. Take off the protective ring (40), seal (8) and extract the ring (9).



DANA - Final drive units

Reassembly

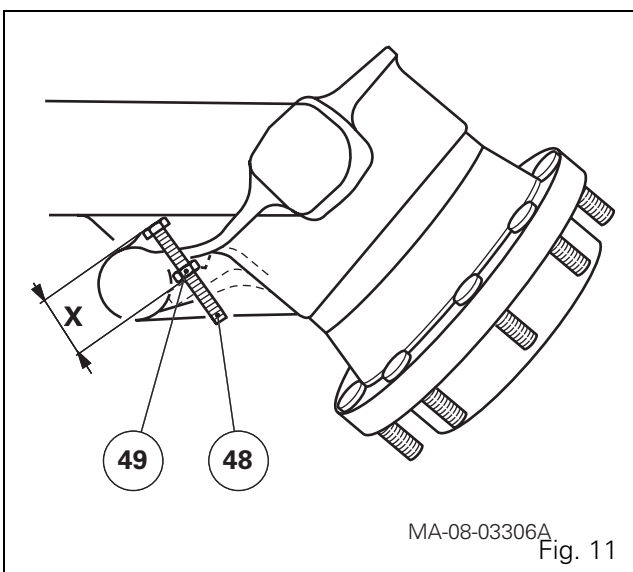
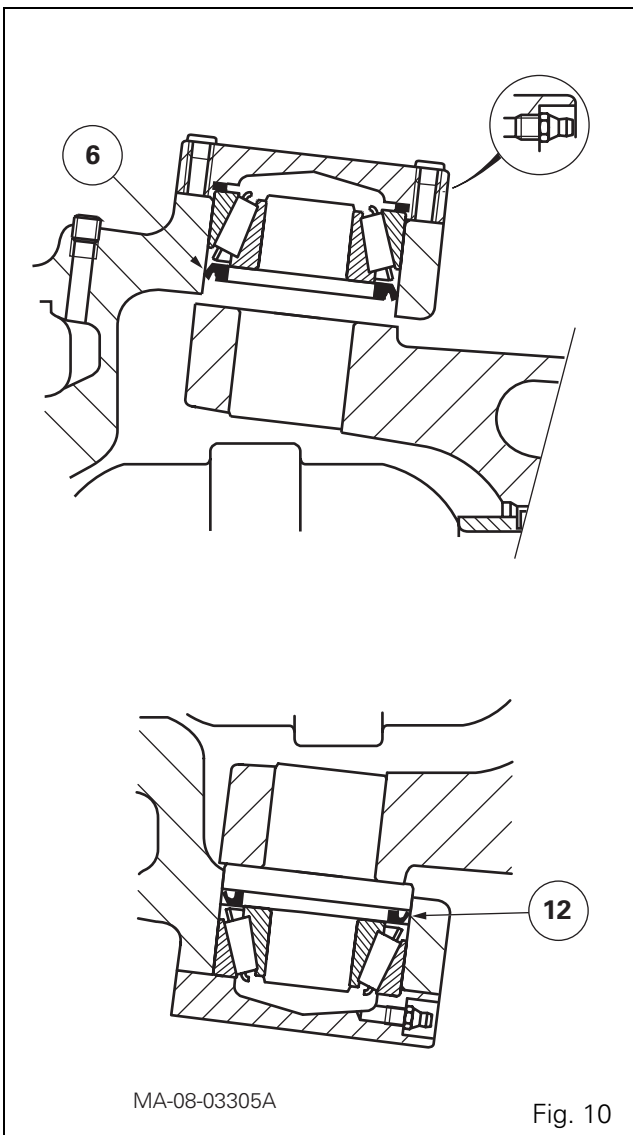
59. Check and clean the components. Replace any defective parts.
60. If removed, fit the ring (9) and the seal (8) up against the shoulder of the housing (52). Lubricate the seal (8). Refit the universal joint shaft. Insert a guide via the filler hole to align the left-hand side of the shaft with the differential.
61. If removed, fit the ring (17) and the seal (16) up against the shoulder of the swivel housing (47).
62. Replace the seals (6) (12). Turn the lips as shown in Fig. 10.
63. The steering stops are adjusted (Fig. 11) by turning the screws (48). Depending on the required steering angle, refer to the following table:

Dimension X	Steering angle
77 mm	35°
63 mm	40°
34 mm	50°

After adjustment, tighten nut (49).

64. Fit the bearing cones (5) (13) onto their respective pins (7) (11).
65. Refit the swivel housing (47). Position the upper pin (7) to align the housing assembly with the housing (52). Fit the pin, ensuring that the lip of the seal (6) is correctly positioned.
66. Fit the cup (4) and shims (3) removed when the cover plate (2) was disassembled.
Fit and tighten the screws (1) in a uniform and alternate manner.
67. Fit the lower pin (11) smeared with Anti-Seize grease, checking that the lip of the seal (12) is correctly positioned. Fit the cup (14) and the cover plate (15). Fit and tighten the screws (1) to 115 - 140 Nm as in step 66.

NOTE: Check that the pins (7) (11) are in contact with the housing.



68. After fitting the pins, temporarily take out the shims (3). Refit the cover plate (2) and tighten the screws to 115 - 140 Nm. Check or carry out **P1** shimming.

Shimming P1 (Fig. 13)

69. Use a dial gauge to measure the axial clearance by moving the swivel housing vertically with a lever (Fig. 12).
70. Fill the clearance measured during the previous step with a corresponding thickness of shims (3). To obtain **P1** (Fig. 13), add extra shims between 0.15 and 0.25 mm thick (0.15 to 0.25 is the preload value).
71. Remove screws (1) and cover plate (2). Refit shims (3) selected previously. Refit the cover plate. Tighten the screws to a torque of 115 - 140 Nm.
72. Continue the reassembly procedure. Using a grease gun, grease the bearings (13) (14) and (4) (5).
73. Smear the rim of the seal (45) with Loctite 542 (Fig. 14) and oil the lips.
74. Insert the seal using tools ref.:
- 3378058M1
 - 3378040M1

NOTE:

- Tool A (see § H) must be screwed home.
- The seal (45) does not fit up against the shoulder of the housing; the ring determines its position.
- Smear nut D (see § H) and its mating face with graphite grease.

NOTE: The repositioning dimension of the seal (45) in relation to face F (Fig. 15) is 11.5 mm.

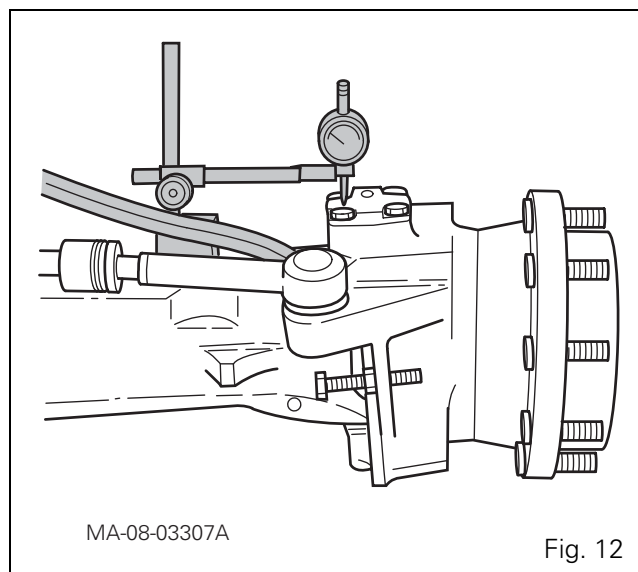


Fig. 12

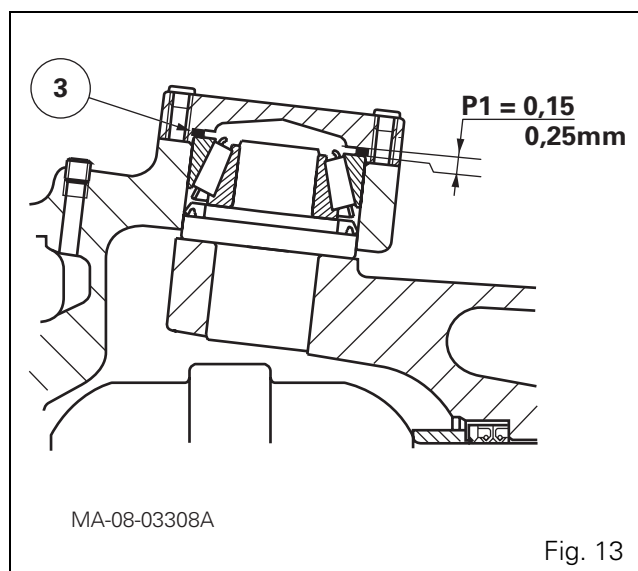


Fig. 13

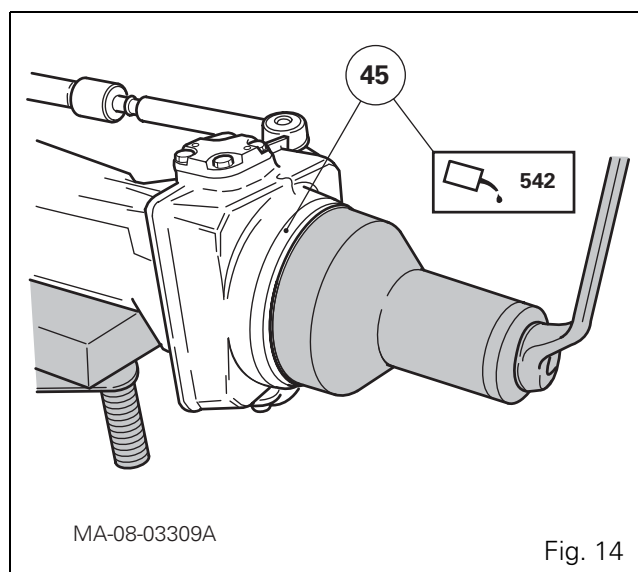


Fig. 14

DANA - Final drive units

75. Refit the steering ball joint. Tighten the nut to a torque of 115 - 130 Nm. Lock the nut using a new pin.
76. Reassemble the wheel hub (see § D). Refit the sun gear (28) and the circlip (29).
77. Refit the planet carrier (see § C).

G . Removing and refitting the universal joint shaft

Removal

78. Remove the planet carrier (see § C).
79. Take off the circlip (29), the sun gear (28) and extract the steering ball joint.
80. To remove the swivel housing (47) and the wheel hub (22) assembly, repeat steps 50 to 57.
81. Remove the universal joint shaft.

Disassembling the universal joint

82. Hold the external part (1) of the shaft in a vice fitted with soft jaws.
83. Remove the four circlips (3) from each end of the universal joint.
84. Using a plastic hammer, drive the central clevis (2) downwards until the bearing sleeve projects from it.
85. Secure the bearing sleeve in a vice and strike the clevis to drive it out.
86. Take off the opposite bearing sleeve in the same way and remove the external part of the shaft.
87. Turn the shaft assembly 90°, then repeat steps 84 to 86 to release the universal joint from the shaft.
88. Secure the inside section of the shaft in a vice and repeat steps 83 to 87.

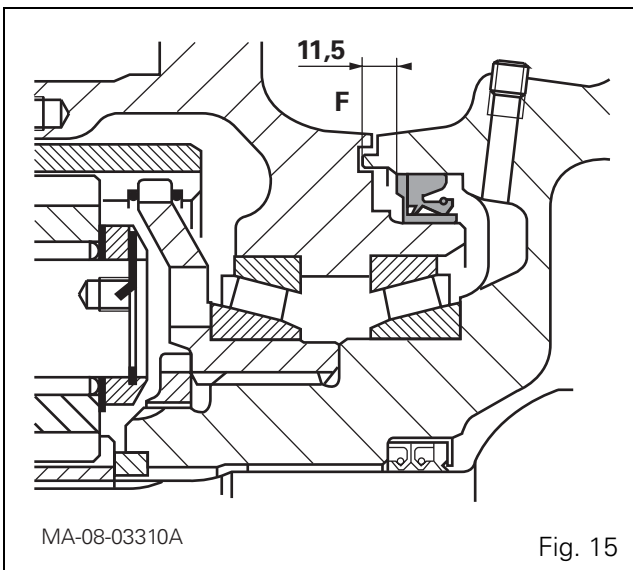


Fig. 15

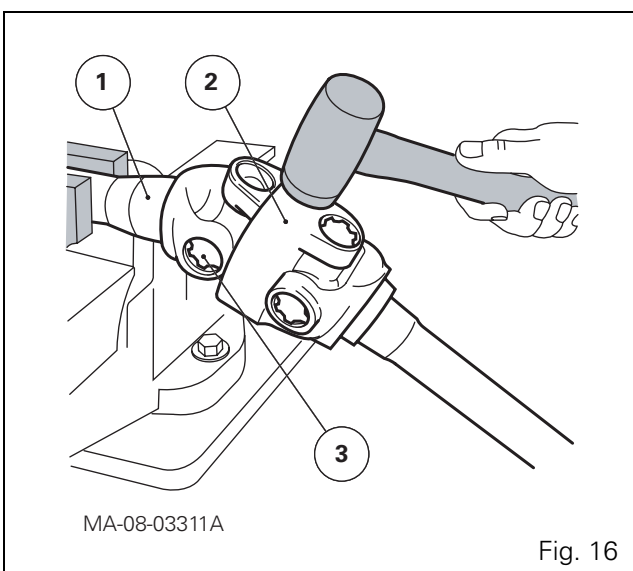


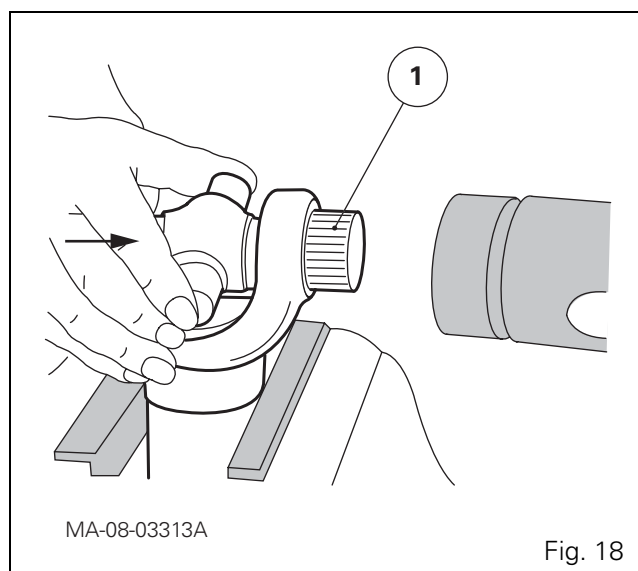
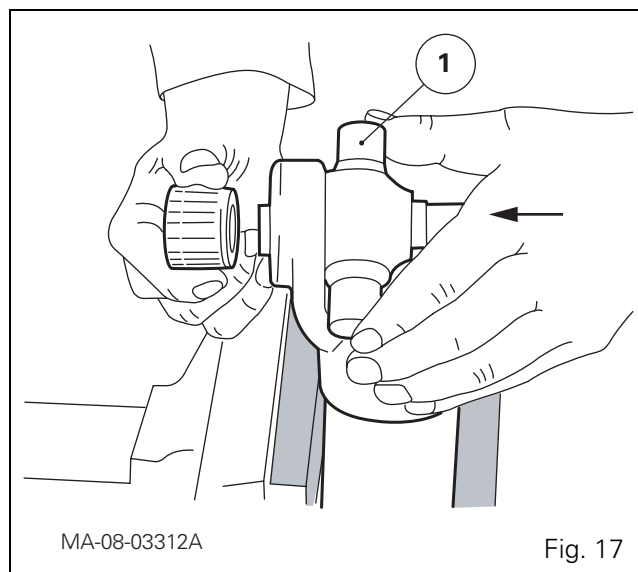
Fig. 16

Reassembling the universal joint

89. Clean and check the components. Replace the universal joint assembly, including the spiders, seal rings, bearings, sleeves and circlips.
90. Smear the needle rollers with bearing grease and ensure that they all stay in the sleeves.
91. Position the universal joint spider (1) in the clevis and push it as far outwards as possible (Fig. 17) so that the end of the spider acts as a guide to fit the sleeve fitted with the needle rollers.
92. Drive in the sleeve (1) deep enough into the clevis while holding the spider (Fig. 18) in order to fit the circlip.
93. Fit the other sleeves and spiders in the same way.

Refitting

94. Refit the universal joint shaft. Insert a guide through the filler port of the axle housing (52) to align the left-hand side of the shaft with the differential, and make sure it continues to protrude.
95. Refit the swivel housing and wheel hub assembly. Position the upper pin (7) to align the housing assembly with the housing (52). Fit the pin, ensuring that the lip of the seal (6) is correctly positioned.
96. Fit the cup (4), shims (3) and cover plate (2). Fit and tighten the screws (1) in a uniform and alternate manner to a torque of 115 - 140 Nm.
97. Fit the pin (11) smeared with Anti-Seize grease, checking that the lip of the seal (12) is correctly positioned.
98. Fit the cup (14) and the cover plate (15). Fit and tighten the screws (1) to 115 - 140 Nm as in step 96.
NOTE: Check that the pins (7) (11) are in contact with the housing.
99. Using a grease gun, grease the bearings (13) (14) and (4) (5).
100. Refit the steering ball joint. Tighten the nut to a torque of 115 - 130 Nm. Lock the nut using a new pin.
101. Remove the protective cover placed over the splines of the universal joint shaft. Refit the sun gear (28) and the circlip (29).
102. Refit the planet carrier (see § C).



DANA - Final drive units

H . Service tools

Tools available in the AGCO network

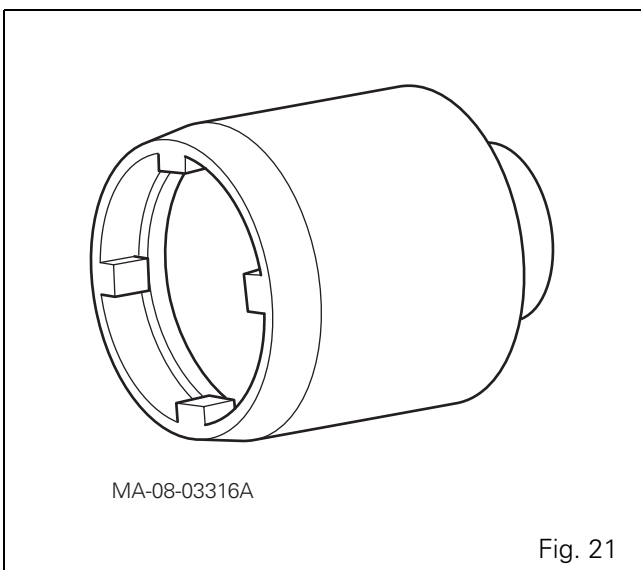
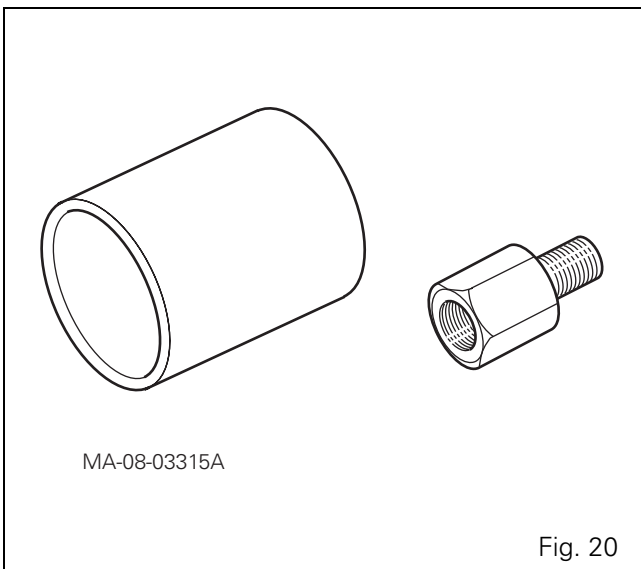
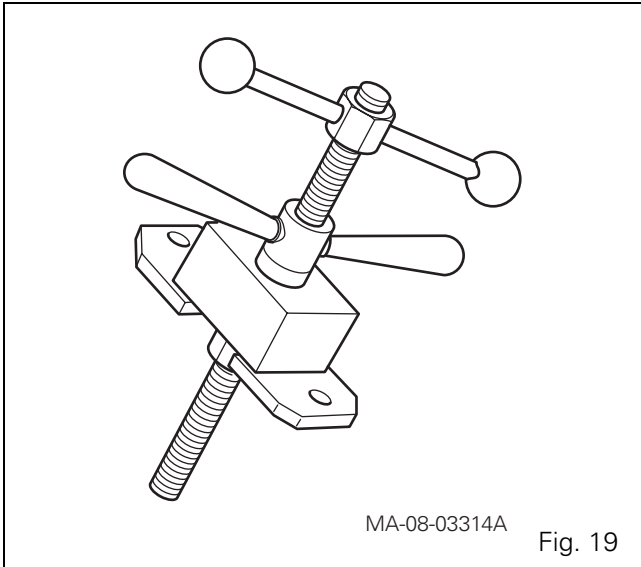
MF 195 C - Swivel puller ([Fig. 19](#))

MF 451 B - Cylinder ([Fig. 20](#))

MF 451 B3 - M18 end fitting ([Fig. 20](#))

3376880M1 - socket for ring gear carrier nuts (AG 85 and AG 105 axles) ([Fig. 21](#))

NOTE: Cylinder MF 451 B and M18 end fitting MF 451 B3 should be used with the MF 195 C puller.

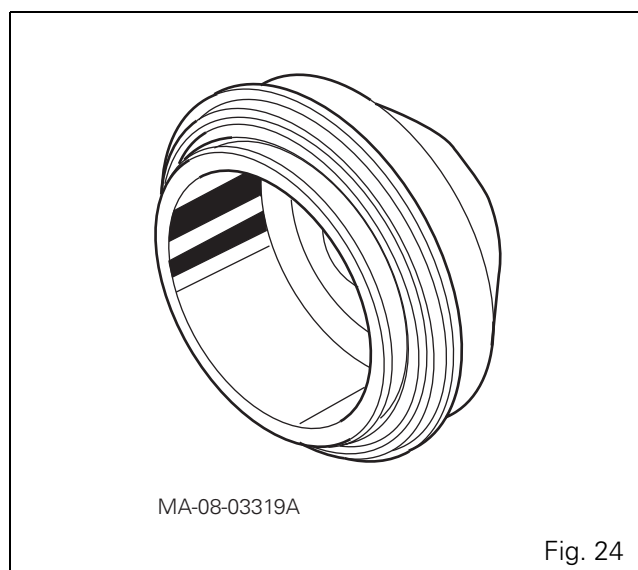
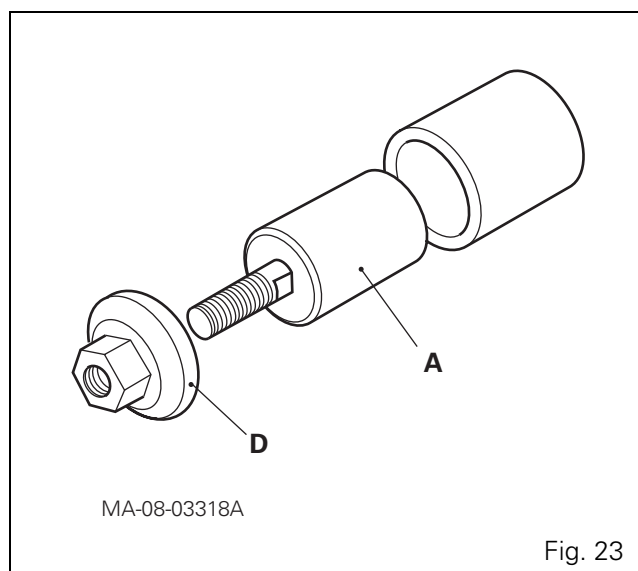
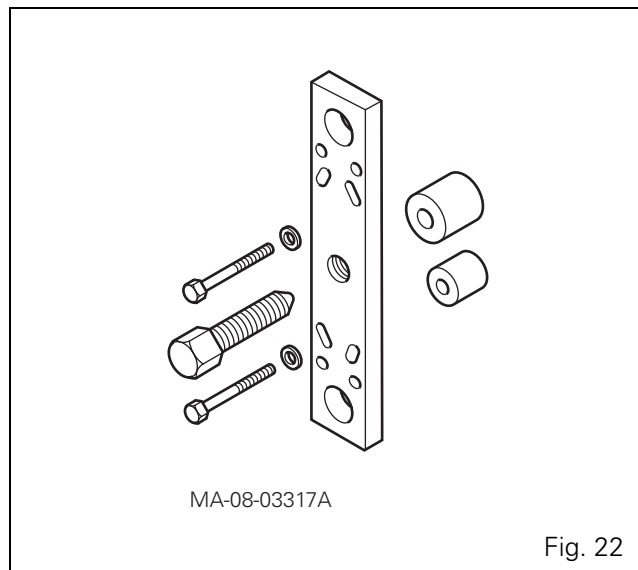


DANA - Final drive units

3378038M1 - Ring gear carrier (42) puller ([Fig. 22](#))

3378058M1 - Ring gear carrier and seal fitting tool ([Fig. 23](#))

3378040M1 - Seal (45) fitting ring ([Fig. 24](#))



8A12 - DANA - Differential

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DANA - Differential

A . General

Description

The crownwheel and pinion assembly containing the differential lock mechanism (Hydralock) is fitted in a housing (7) comprising two half-bearings (43) fixed by screws (42).

The pinion is positioned at the rear of the housing on two opposing tapered roller bearings. It is adjusted in position using shims (8) located behind the head bearing. The bearings are adjusted using shims (2) inserted between the spacer (45) (if fitted) and the bearing cone (5).

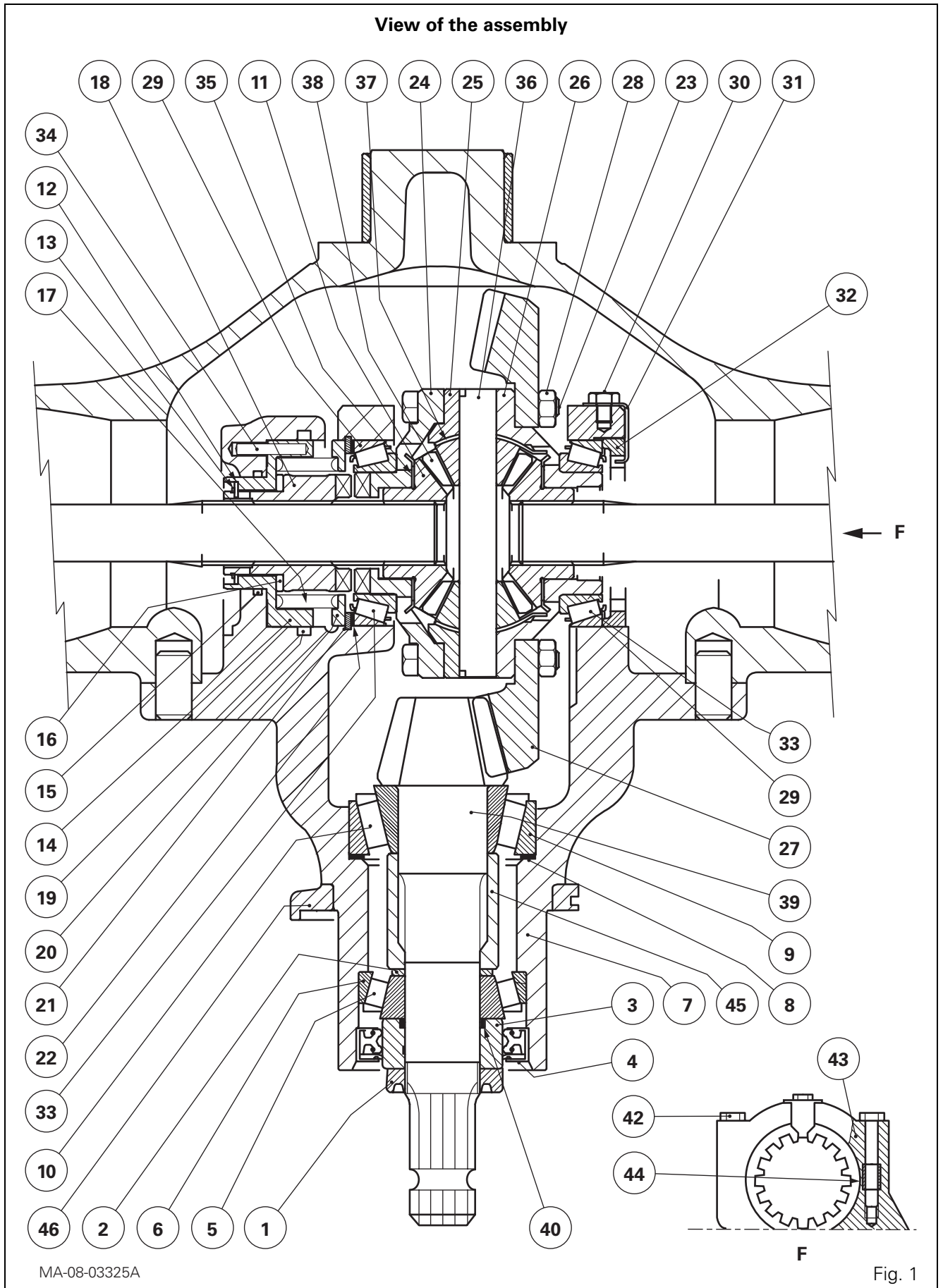
Tightness is ensured by a lip seal (4) and an "O" ring (40) fitted on the pinion. The differential comprises two planet gears (38) and a pin (36).

The ring gear/pinion clearance is obtained using shims (22) placed behind the cup (29). The housing and ring gear assembly preload is obtained using the spline nut (32).

DANA - Differential

Parts list (Fig. 1 and Fig. 2)

- (1) Nut
- (2) Shim(s)
- (3) Spacer
- (4) Seal
- (5) Bearing cone
- (6) Bearing cup
- (7) Housing
- (8) Shim(s)
- (9) Bearing cup
- (10) Bearing cone
- (11) Sun gear
- (12) Tab washer
- (13) Snap ring
- (14) Piston
- (15) "O" ring
- (16) Friction washer
- (17) Spring
- (18) Mobile dog clutch
- (19) "O" ring
- (20) Guide washer
- (21) Washer
- (22) Shim(s)
- (23) Screw
- (24) Fixed dog clutch
- (25) Half-unit
- (26) Half-unit
- (27) Ring gear
- (28) Nut
- (29) Bearing cup
- (30) Screw
- (31) Lock
- (32) Spline nut
- (33) Bearing cone
- (34) Centring pin
- (35) Washer
- (36) Planet gear pin
- (37) Spherical washer
- (38) Planet gear
- (39) Pinion
- (40) "O" ring
- (42) Bearing screw
- (43) Half-bearing
- (44) Locating ring
- (45) Spacer
- (46) Deflector



DANA - Differential

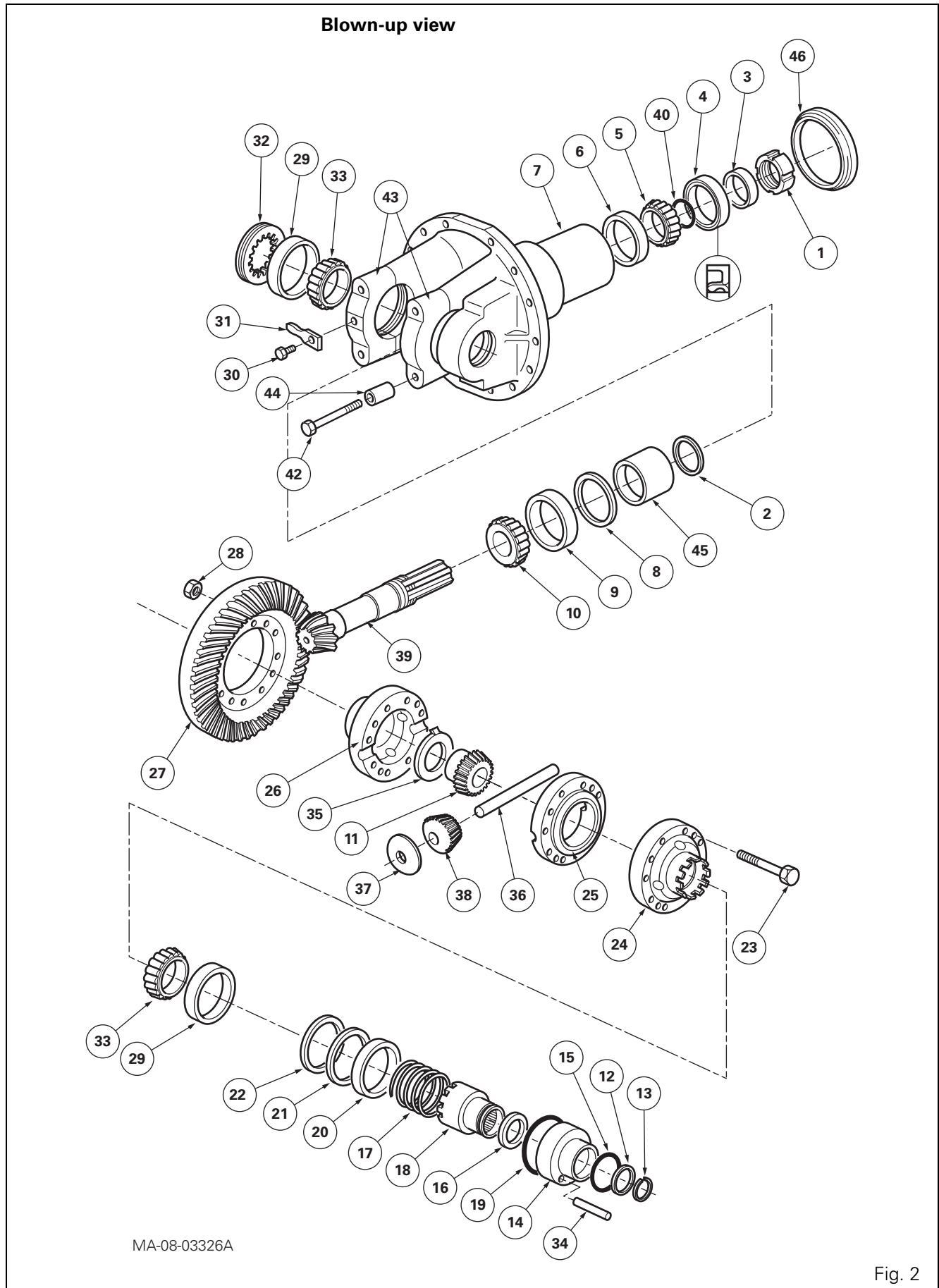


Fig. 2

B . Disconnecting the front axle/frame

1. Drain the axle housing.
2. Disconnect the axle and its bearings from the front frame.

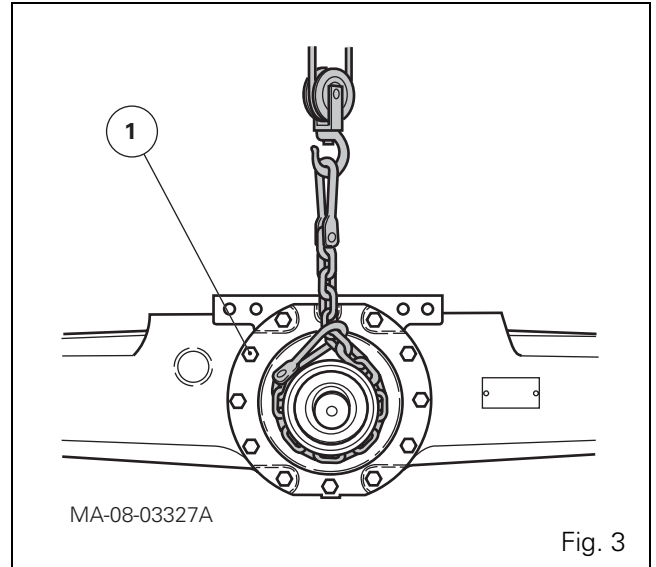
C . Removing the swivel housings, wheel hubs and transmissions

CAUTION: Carefully remove the housings, taking into account their considerable weight and risk of tipping.

3. Extract the steering ball joints.
4. Using a suitable sling, support and take off the complete right and left-hand swivel housing assemblies (see chapter 8).

D . Removing the drive pinion carrier

5. Take off the swivel housing, wheel hub and transmission assemblies (see § C).
6. Remove the screws from the ram and remove the ram.
7. Remove the screws (1) (Fig. 3).
8. Loosen and remove the drive pinion carrier (Fig. 3).
9. If necessary, remove the deflector (46).



DANA - Differential

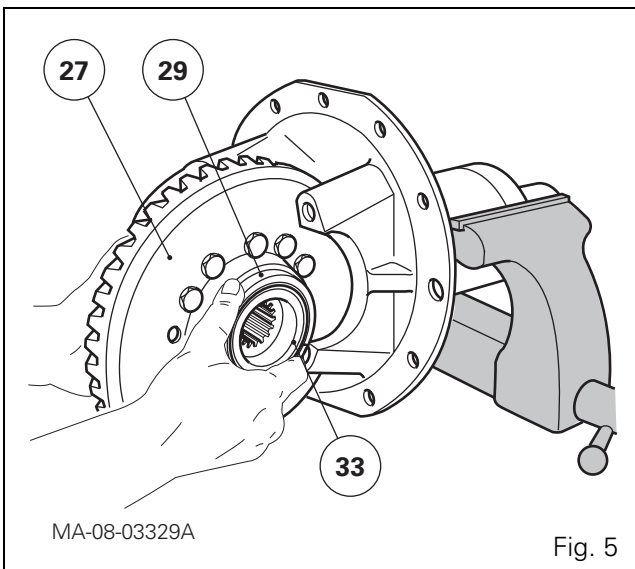
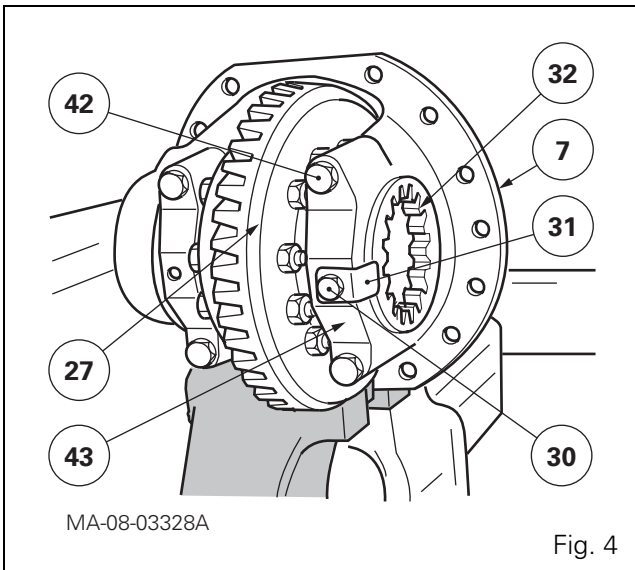
E . Removing the differential unit

10. Place the housing (7) in a vice fitted with soft jaws (Fig. 4).
11. Take out the screw (30) and its lock (31) (Fig. 4).
12. Take off the spline nut (32) using the special make-shift wrench (see § Q).
13. Take out the four screws (42).
14. Take off the half-bearings (43) (Fig. 4).

CAUTION: Take care not to release the spring (17) when releasing the differential lock half bearing. The washer (21) that seats the spring should stay in the housing.

15. Remove the differential assembly complete with cones (33) and cups (29) (Fig. 5). Separate the cups from the cones. Remove the shim(s) (22) used to adjust the backlash.

NOTE: Pair up the bearing cones and cups in they are to be re-used.



F . Removing the ring gear - Disassembling the planet gears and sun gears

- 16.** Place the differential unit in a vice fitted with soft jaws.

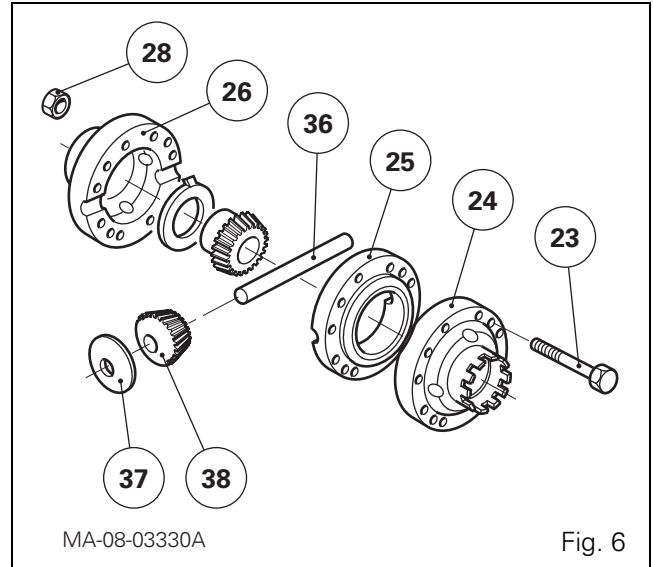
NOTE: Before disassembling, mark the position of the half-units (25) (26) and the fixed dog clutch (24) with paint for reassembly in their initial positions.

Removing the ring gear

- 17.** Take off the screws (23) and nuts (28).
18. Remove the ring gear.

Disassembling the planet gears and sun gears

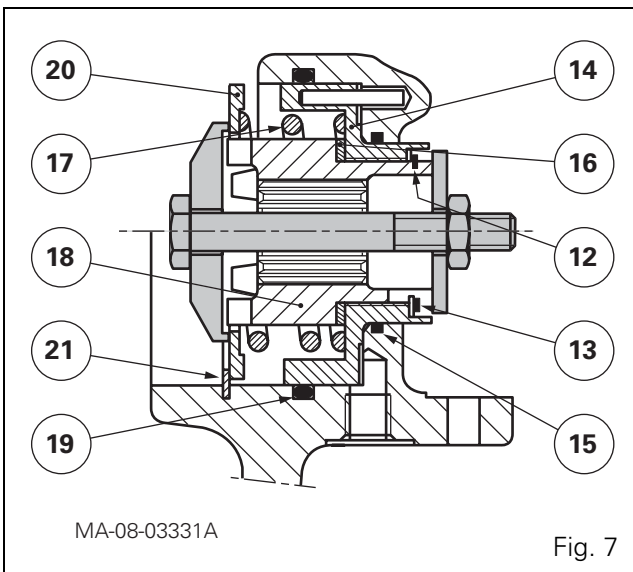
- 19.** Take off the screws (23) and nuts (28).
Separate the half-units (25) (26) and the fixed dog clutch (24) (Fig. 6).
20. Remove the sun gear (11) and the washer (35).
21. Take out the pin (36), planet gears (38) and spherical washers (37) (Fig. 6).
22. If required, extract the bearing cones (33) on the half-unit (26) and on the fixed dog clutch (24).



DANA - Differential

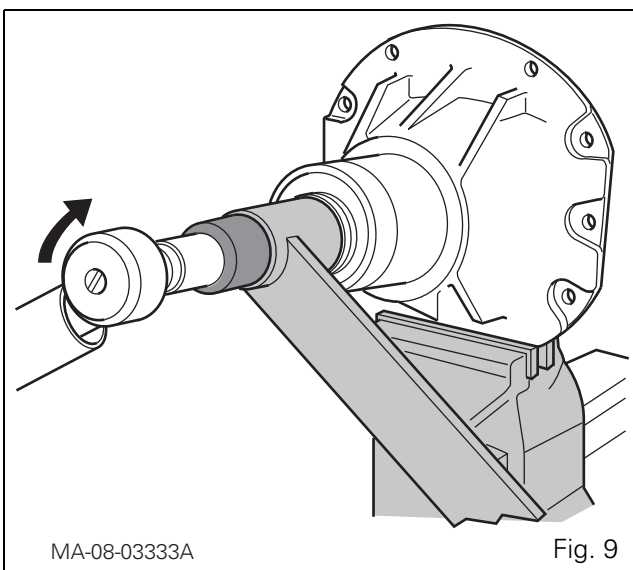
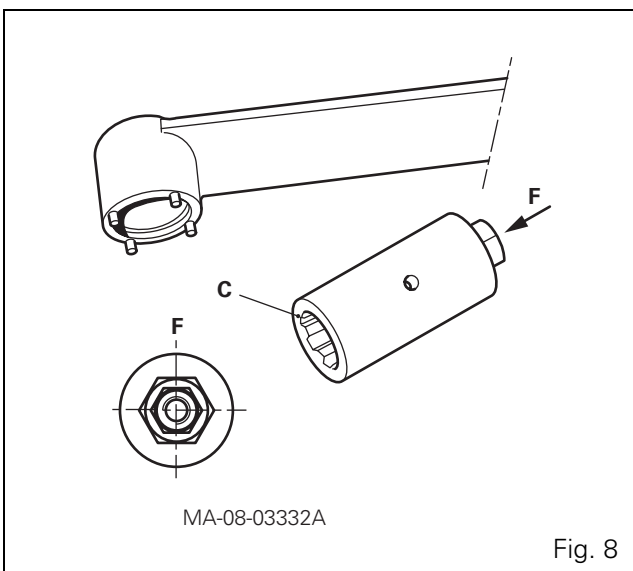
G . Removing the differential lock

23. Using tool MF 471 centred correctly (see § Q), compress the spring (17) until the thrust washer (21) is free.
24. Take off the washer and gradually release the spring.
25. Take off the tool along with the guide washer (20) and spring.
26. Take off the snap ring (13). Remove the mobile dog clutch (18), the friction washer (16) and the tab washer (12).
27. Drive out the piston (14).
28. Discard the "O" rings (15) (19).



H . Removing the pinion

29. Unlock the nut (1) (depending on assembly) and immobilise it using the wrench (Fig. 8 and Fig. 9):
 - 3376927M1 (AG 85 axle)
 - 3376881M1 (AG 105 axle)
 Loosen the pinion by turning clockwise (Fig. 9), using special makeshift sleeve "C" (Fig. 8) (see § Q).
30. From the front of the housing, extract the pinion, cone (10), spacer (45), shims (2) and "O" ring (40).
31. Separate the pinion and seal (40), and remove the shims (2) and the spacer (45).
32. Extract the cone (10) from the pinion.
33. Drive out the cup (9) and remove the shims (8).
34. Remove the spacer (3), and extract the seal (4). Remove the cone (5). Drive out the cup (6).



I. Adjusting the position - Shimming and refitting the pinion

35. Clean the components and replace those that are defective. Check that the differential lock hydraulic channel is not blocked in the housing.

Adjusting the position

36. Adjust the position of the pinion (Fig. 10).

The thickness of shims required to position the pinion correctly is calculated as follows:

$$SP = C - E (d \pm r)$$

SP: Thickness of shims required (8).

C: Value measured between the mating face of the cup and machined face "F".

d: Pinion nominal positioning dimension: 118 mm $\pm$ 0.10

NOTE: Do not confuse the nominal positioning dimension with the pairing number.

E: Thickness of the bearings (9) (10).

r: Actual value marked on the pinion (Fig. 11). This value may be positive or negative (to be added or subtracted from the nominal value **d**).

Procedure

37. Using a depth gauge, measure values **C** and **E**.

NOTE: Ensure the cone (10) is correctly seated in the cup (9).

38. After measuring the values, apply the formula to determine the thickness of shims required.

39. Fit the cone (10) up against the shoulder on the pinion (39) using a press and a suitable fitting (Fig. 12).

40. Position the thickness of shims (8) calculated previously into the housing.

41. Fit the cup (9) using a suitable fitting and shim the bearings (5) (6) and (9) (10).

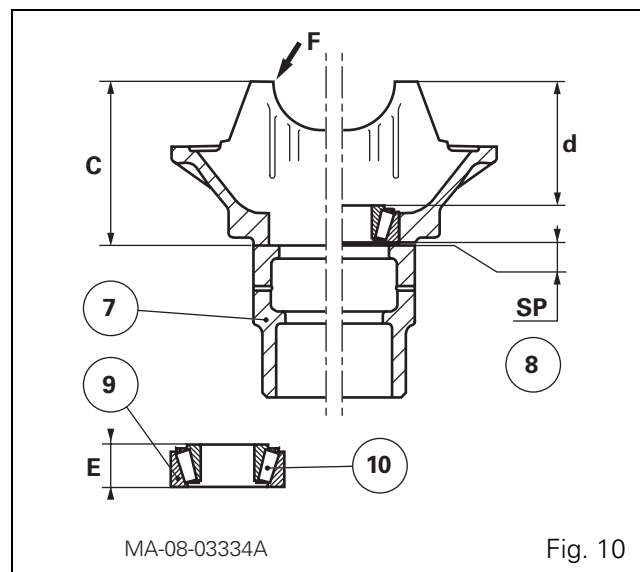


Fig. 10

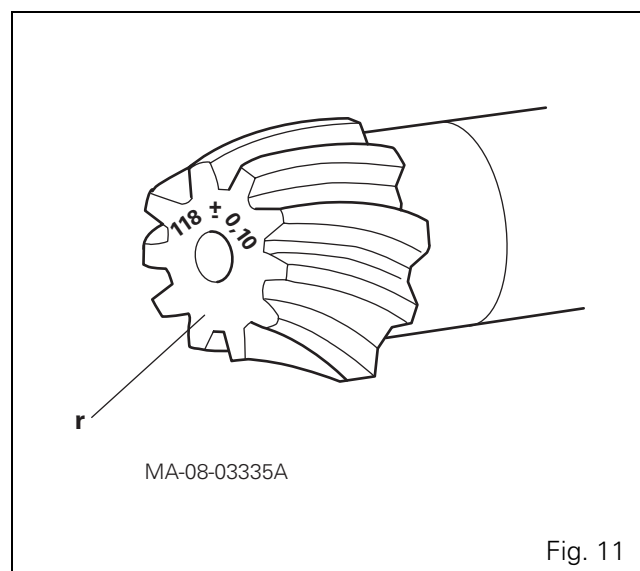


Fig. 11

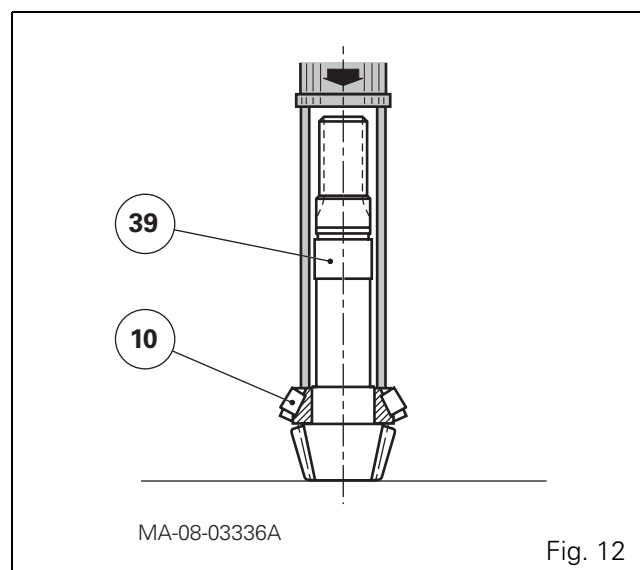
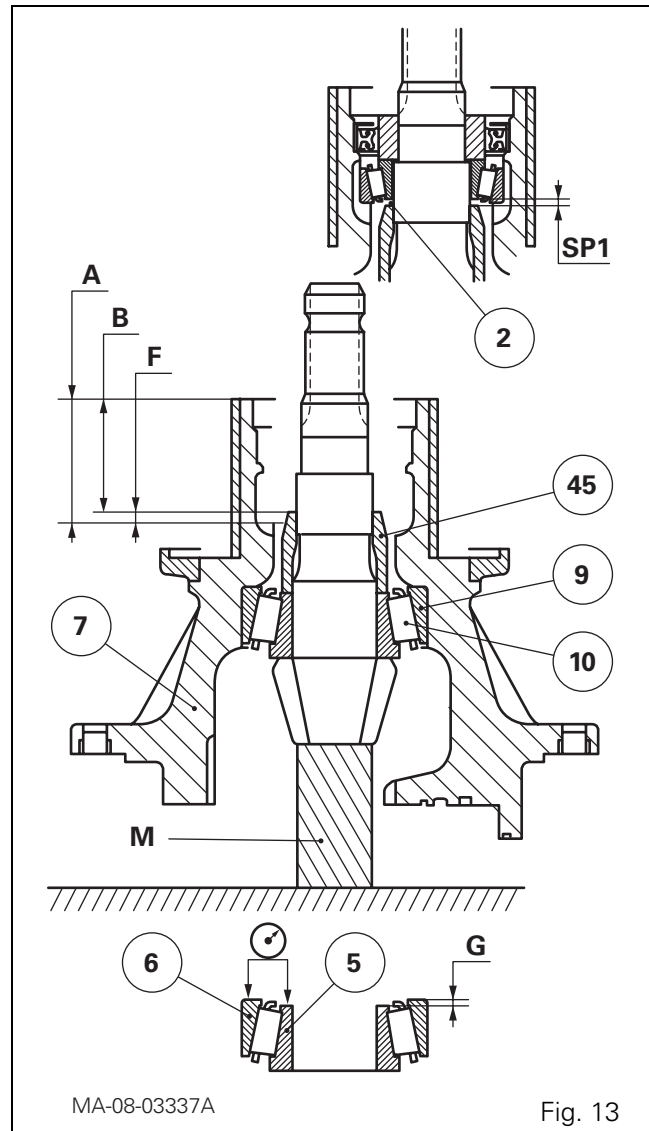


Fig. 12

DANA - Differential

Shimming

42. In the housing (7), position the prepared pinion prepared up against the cylindrical sleeve "M" as shown in Fig. 13. Press hard on the housing while turning it several times in order to seat the bearing cone (10) correctly in the bearing cup (9). Slide on the spacer (45), with its chamfer facing towards the splines of the pinion.
43. Using a depth gauge, measure value **F** according to the formula **A - B** (Fig. 13).
44. Press hard on the cup (6), turning it alternately to the right and left to correctly seat the cone (5).
45. Calculate the thickness of shims **SP1** according to the formula: **G - F**.



46. Position the cup (6) up against the housing.
47. Slide the shims (2) calculated during step 45 onto the pinion.

Refitting

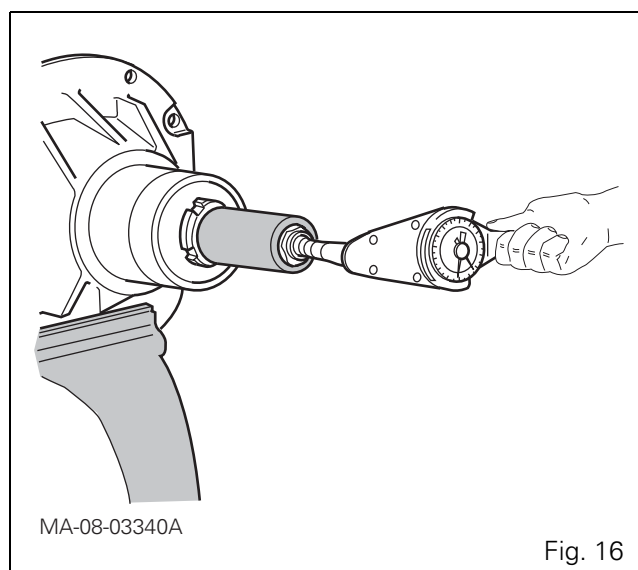
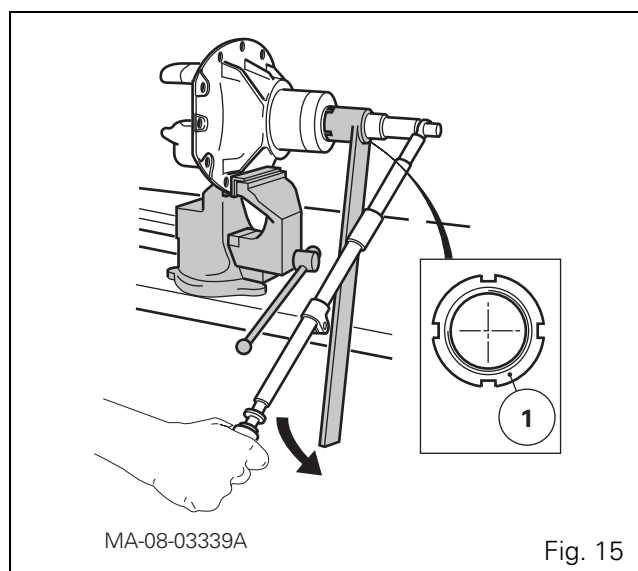
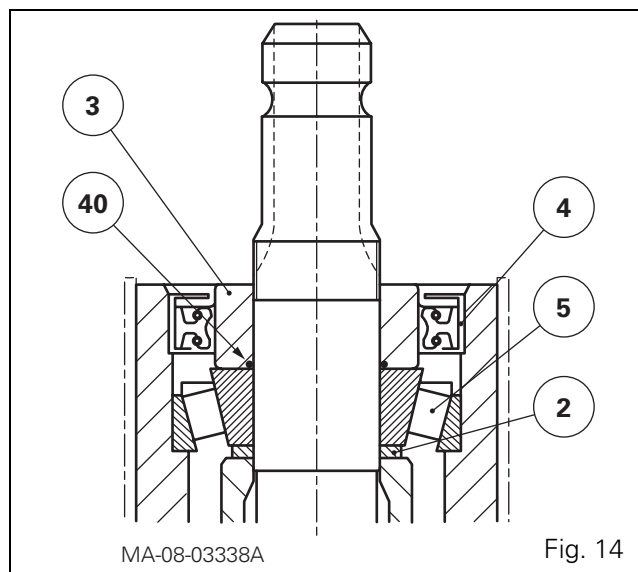
48. Fit the cone (5) and the lubricated seal (40) (Fig. 14).
49. Grease the lips of the seal (4) and fit it home in the shoulder using a makeshift drift (see § Q).
50. Fit the spacer (3) (Fig. 14).
51. Fit the nut (1) and immobilise it using the wrench ref. 3376881M1 (AG 105) or ref. 3376927M1 (AG 85).

Using the special sleeve and a torque wrench, turn the pinion until the following tightening torque is obtained: 360 - 400 Nm.

52. Check the pinion rotational torque.

Checking the pinion rotational torque

- Turn the pinion several turns using a dial-type torque wrench and the special sleeve (Fig. 16). Check that the rotational torque is 2 to 4 Nm.
- After checking the torque, take off and degrease the nut (1) and lightly smear it with Loctite 270 or equivalent. Tighten as described in step 51.



DANA - Differential

J . Refitting the differential lock

- 53. Clean and check all components. Replace those that are defective.
- 54. Fit the friction washer (16) to the mobile dog clutch (18). Fit the assembly in the piston (14). Fit the tab washer (12) and position the snap ring (13) in the groove of the mobile dog clutch.
- 55. In the housing without seals, provisionally fit the piston (14) with the mobile dog clutch (18).
NOTE: *The pin (34) is force-fitted in the piston.*

Check

Ensure that the piston and pin slide freely in the housing. After checking, remove the piston fitted with the mobile dog clutch.

- 56. Fit the new "O" rings (15) (19). Position and fit the piston and mobile dog clutch assembly by tapping around the rim with a plastic hammer.
- 57. Position the spring (17) and washer (20) with the shoulder turned towards the spring.
Compress the assembly using tool MF 471 (see § [Q](#)) until the washer (21) slides freely in the groove of the housing.
- 58. Loosen the tool carefully so that the spring does not jump out.

K . Reassembling planet gears and sun gears - Refitting the ring gear

59. Check and clean the components. Replace any defective parts.

Reassembling planet gears and sun gears

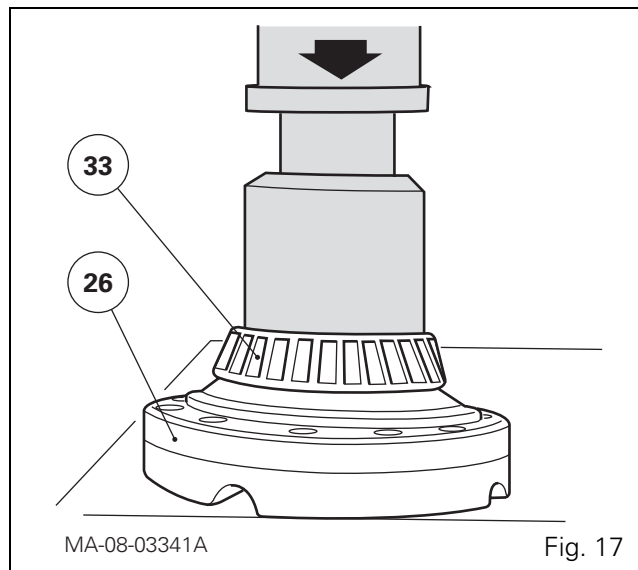
NOTE: If it is necessary to replace the bearings (29) (33), fit a cone (33) onto the half-unit (26) (Fig. 17) and another cone onto the fixed dog clutch (24) using a press and a suitable fitting.

- 60.** Assemble the half-unit (25) in the dog clutch (24), according to the marks made during disassembly.
- 61.** Position the washer (35) on the sun gear (11) and position the assembly in the half-unit (25), while inserting the washer tab into one of the half-unit holes.
- 62.** Position the planet gears (38) and washers (37) on the pin (36). Next, position the assembly in the half-unit (25), while turning the tabs of the washers (37) into the holes of the half-unit (25) (Fig. 6).
- 63.** Fit the other washer (35) on the other sun gear (11). Fit the assembly in the half-unit (26) according to the position of the tab of the washer (35).
- 64.** Position the half-unit (26) assembly on the half-unit (25) according to the marks made during disassembly.

Refitting the ring gear

REMINDER: Any replacement of the ring gear (27) automatically entails replacing the pinion (39). The same number is engraved onto the pinion and ring gear. They must be fitted as pairs.

NOTE: For repairs, use the nuts and screws referenced in the spare parts catalogue.



- 65.** Clean the mating faces of the ring gear and differential unit.
- 66.** Degrease the new screws and nuts and smear the threads of each screw with Loctite 270 or equivalent.
- 67.** Secure the two half-units (25) (26), fixed dog clutch (24) and ring gear using screws and nuts (28) tightened to a torque of 82 - 90 Nm.

DANA - Differential

L . Refitting and shimming the differential unit

Refitting

68. Position the cups (29) on their cones (33).
69. Fit the shims (22) recovered at disassembly up against the washer (21).
70. Place the ring gear assembly in the housing (7) (Fig. 5). Check that the locating rings (44) are present. Position the half-bearings (43). Moderately tighten the screws (42) so that the cups (29) fit freely with no play.
71. Fit the unit horizontally in a vice with soft jaws, with the ring gear facing upwards (Fig. 18).

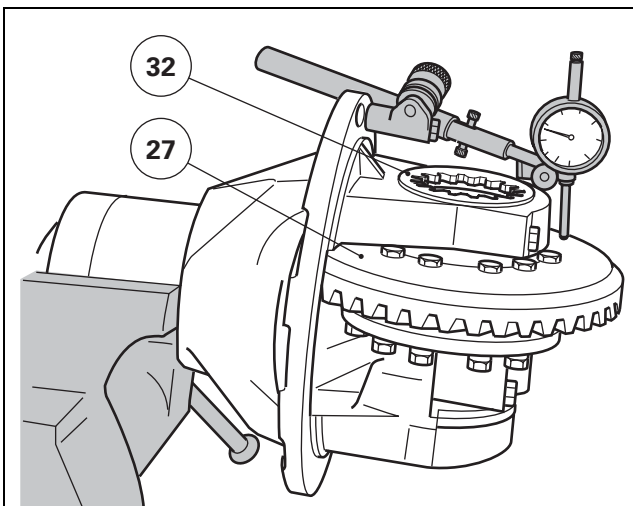
Shimming

IMPORTANT: Before shimming the differential unit, check that the ring gear is not constrained on the pinion.

72. Position a dial gauge. Tighten the nut (32) (Fig. 18) and turn the ring gear (27) several turns to correctly seat the cones in the cups. Retighten the nut to eliminate the axial clearance.
73. After eliminating the axial clearance, tighten the nut (32) three more notches to obtain the correct preload.

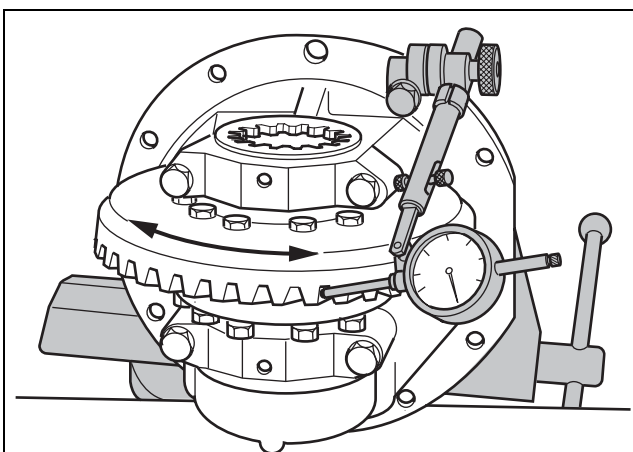
Checking the backlash

74. Check the backlash using a dial gauge (Fig. 19), moving it both ways around the ring gear without causing the pinion to turn. Take three readings at three equidistant points. Calculate the average of the three readings to obtain a backlash between 0.18 and 0.23 mm. If the value measured is too high, reduce the thickness of the shims (22), and if it is too low, increase the thickness of the shims to obtain the correct backlash. Repeat the differential unit shimming operation.



MA-08-03342A

Fig. 18



MA-08-03343A

Fig. 19

Final steps

- 75.** Remove the screws (42) one by one from the bearings, smear with Loctite 270 and tighten to a torque of 115 - 127 Nm.
- 76.** Reassemble the lock (31) with the screw (30) smeared with Loctite 270 and tighten to a torque of 16 - 25 Nm. Lock the nut (32) by folding the lock tab into the corresponding spline.

M . Piston tightness test

- 77.** On the differential lock supply union, fit a pressure gauge fitted with a valve whose tightness has been checked beforehand.
- 78.** Supply the system with compressed air at a pressure of approximately 5 bar and check the reaction of the piston (14).
Lower the pressure to 0.3 bar and close the valve.
No drop in pressure should be recorded on the pressure gauge for approximately one minute.
- 79.** Remove the pressure gauge and valve assembly.

DANA - Differential

N . Refitting the drive pinion carrier

80. Check and clean the components. Replace any defective parts.
81. Check for the presence of the rings on the axle housing.
82. Smear the mating face of the differential housing on the axle housing with a sealing product, Loctite 510 or equivalent, and tighten two diametrically opposed guide studs.
83. Refit the drive pinion carrier. Take out the guide studs. Fit and tighten the screws (1) (Fig. 3) to a torque of 125 - 140 Nm.
84. Refit the steering ram. Smear the screws with Loctite 270 and tighten them to 180 - 200 Nm.

O . Refitting swivel housings, wheel hubs and transmissions

CAUTION: Carry out refitting carefully with the help of an operator.

85. Using a suitable sling, support and then refit the complete right and left-hand swivel housing assemblies (see chapter 8).

P . Assembling the front axle / frame

86. Connect the axle and its bearings to the front frame (see chapter 8).
87. Top up the oil level in the front axle housing and check the oil level in the final drives.
88. Carry out a road test for the front axle and differential lock control.
89. Check tightness:
 - of the seals and the differential housing mating face
 - hydraulic unions

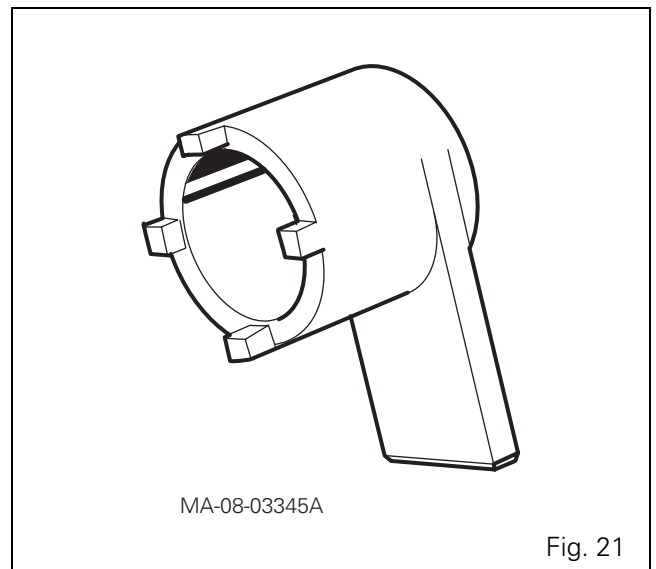
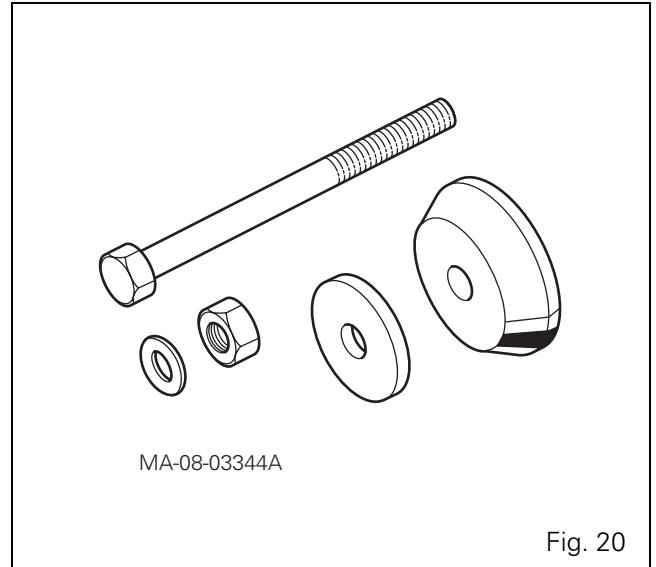
Q . Service tools

Tools available in the AGCO network

MF 471 - Differential lock spring compression tool
([Fig. 20](#))

3376927M1 - Pinion nut holding wrench, AG 85 axle
([Fig. 21](#))

3376881M1 - Pinion nut holding wrench, AG 105 axle
([Fig. 21](#))



DANA - Differential

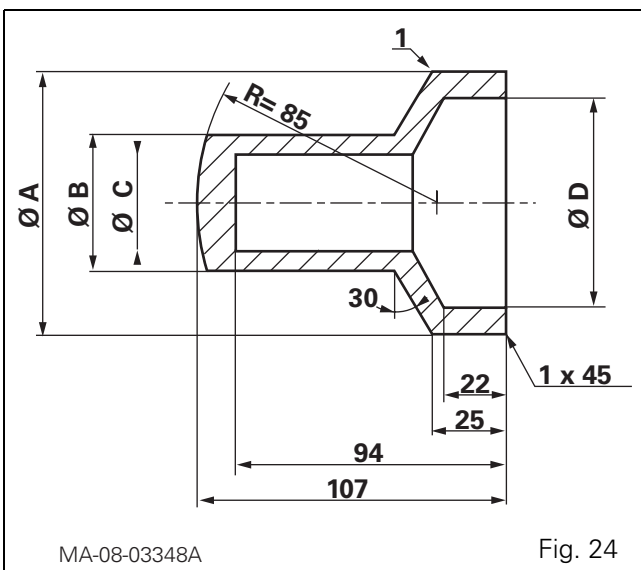
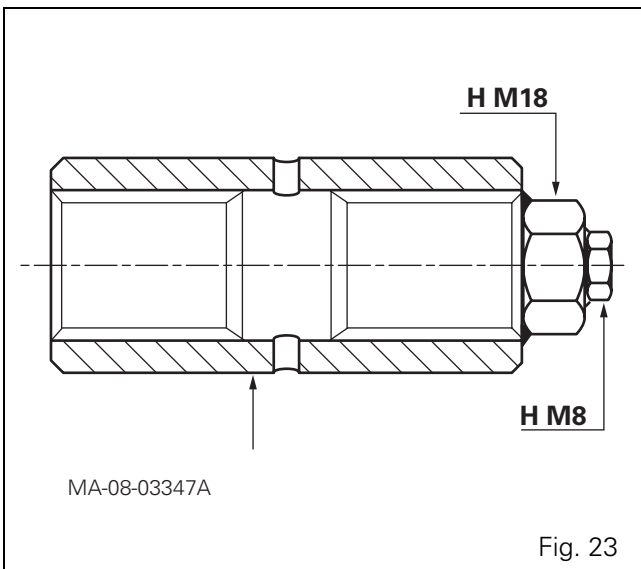
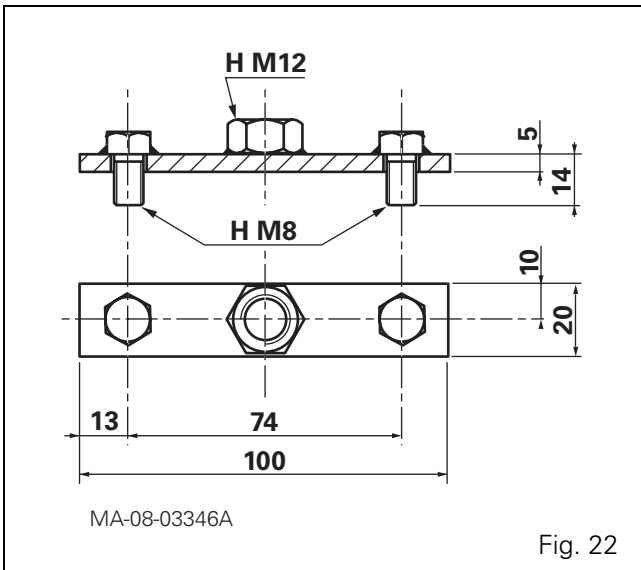
Makeshift tools

Special wrench for spline nut (**Fig. 22**)

Special sleeve for pinion tightening and rotational torque (**Fig. 23**)

Seal ring fitting drift (see table below) (**Fig. 24**)

	Ø A	Ø B	Ø C	Ø D
AG 85	81.80	40	$28.54 + 0.5/0$	68
AG 105	81.80	47	$34.90 + 0.5/0$	68



8A13- DANA - Bearing and transmission shaft

CONTENTS

A . General	3
B . Removing and refitting the bearings	7
C . Replacing the friction rings and the seal	9

DANA - Bearing and transmission shaft

DANA - Bearing and transmission shaft

A . General

The tractors are fitted with a fixed front axle. Drive is transmitted from the front axle clutch located in the rear axle via a transmission shaft.

The transmission shaft is fixed and is centred with the front axle pivot.

The shaft is housed in a guard (2) located underneath the tractor. Each end is linked respectively to the 4WD unit and the front drive pinion carrier. Its middle section is supported by a bearing (4) enclosed in a support (5) fitted to the front section of the gearbox.

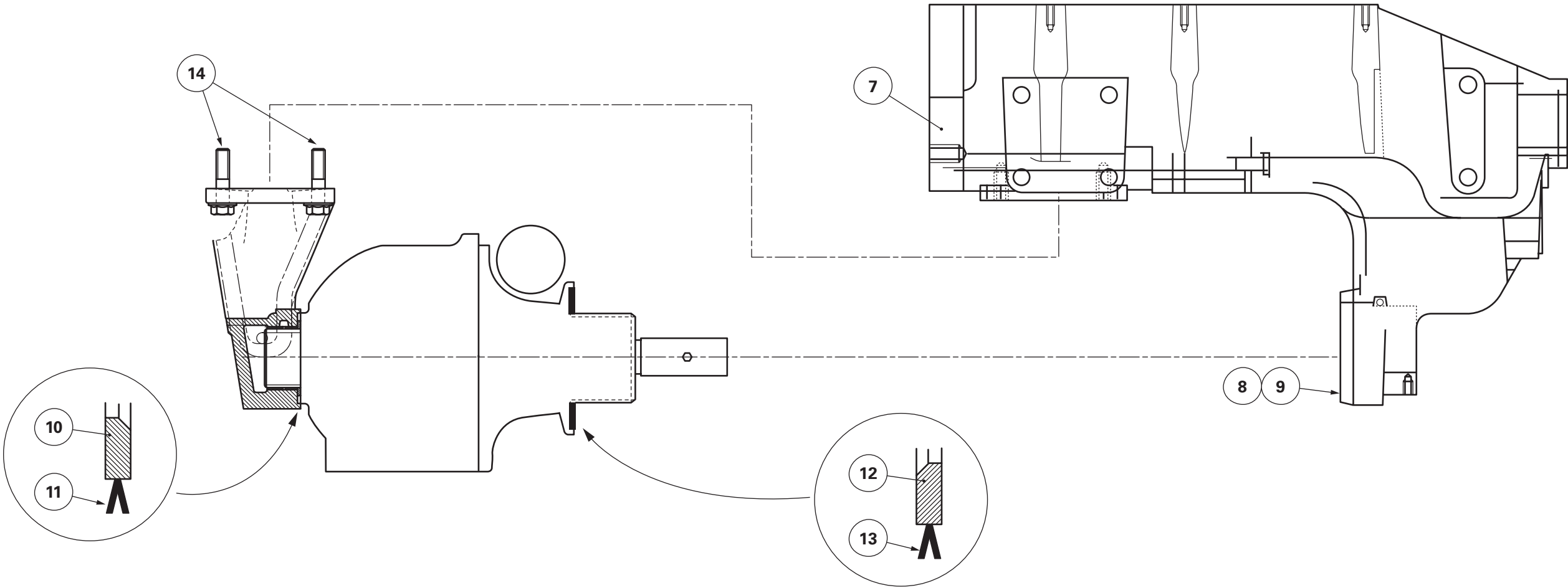
The front frame supports the front axle pivot. The pivot front bearing is removable on all models, while the rear bearing is part of the front frame assembly.

DANA - Bearing and transmission shaft

Parts list (Fig. 1, Fig. 2 and Fig. 3) Dana AG 85 / 105 axle

- (1) Screw
- (2) Sleeve
- (3) Shaft
- (4) Bearing
- (5) Bearing support
- (6) Protective guard
- (7) Front frame
- (8) Rear ring
- (9) Seal
- (10) Chamfered washer
- (11) Seal
- (12) Chamfered washer
- (13) Seal
- (14) Screw
- (15) Front ring
- (16) Grease nipple
- (17) Grease nipple
- (18) Front bearing

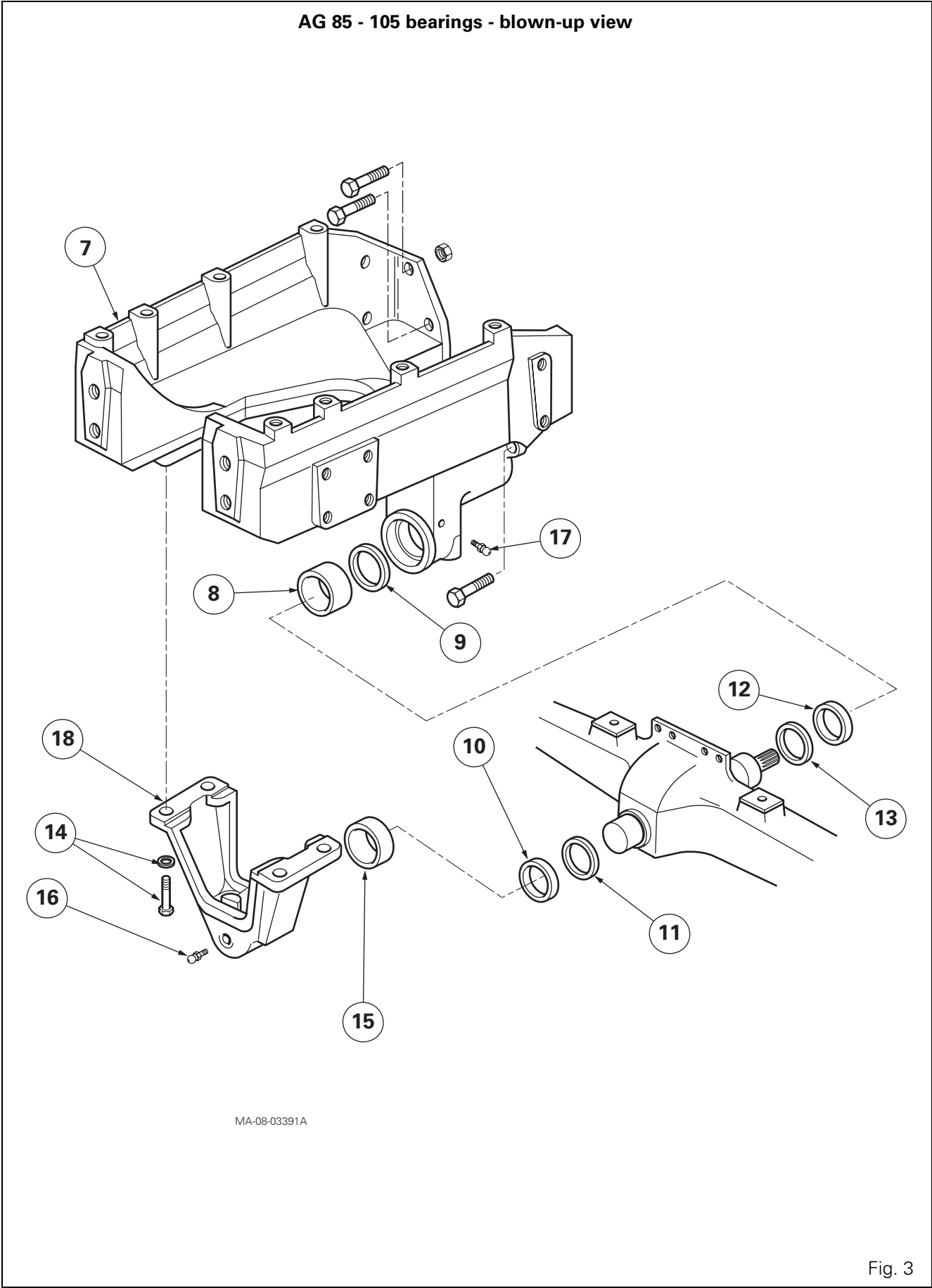
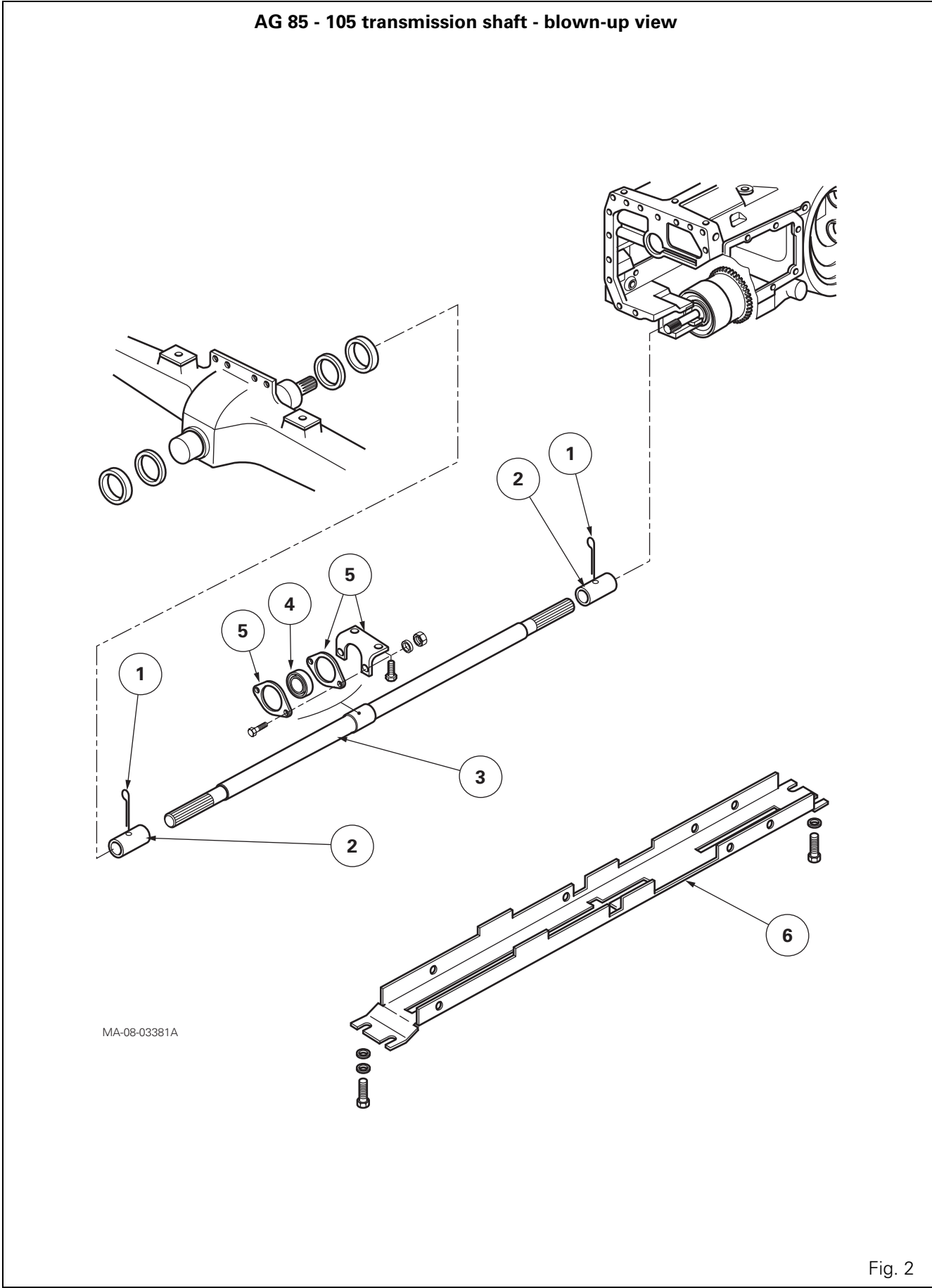
AG 85 and 105 - view of the assembly



MA-08-03388A

Fig. 1

DANA - Bearing and transmission shaft



DANA - Bearing and transmission shaft

B . Removing and refitting the bearings

1. Chock the rear wheels and apply the hand brake.
2. Disconnect the differential lock hose. Take it off the guard (6).
3. Remove the guard. Separate the sleeves (2) from the drive pinion carrier and the 4WD unit. Remove the transmission shaft.
4. Raise the tractor using a trolley jack of sufficient lifting capacity positioned under the centreline of the axle housing.



DANGER: Place an axle stand under the engine lower housing.

5. Remove the front wheels.
6. Disconnect the steering ram hoses, marking their positions.
7. Sling the front axle using suitable straps (Fig. 4).
8. Remove the grease nipple (16) and screws (14) (Fig. 5). Remove the front bearing (18), washers (10) and seal (11).
9. Remove the front axle, washer (12) and seal (13).

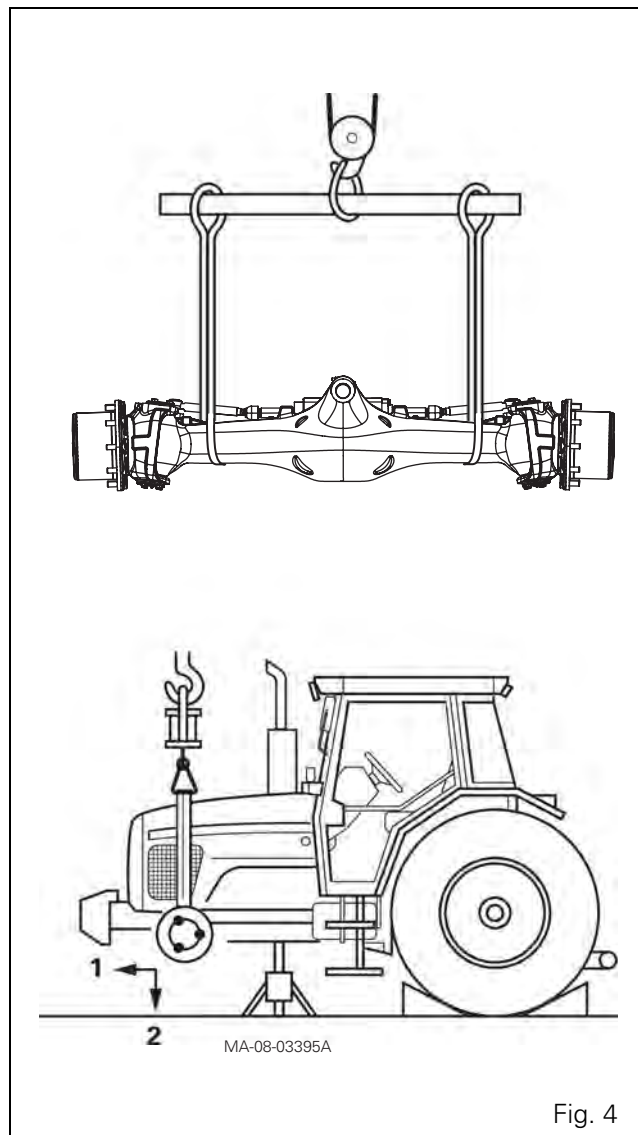


Fig. 4

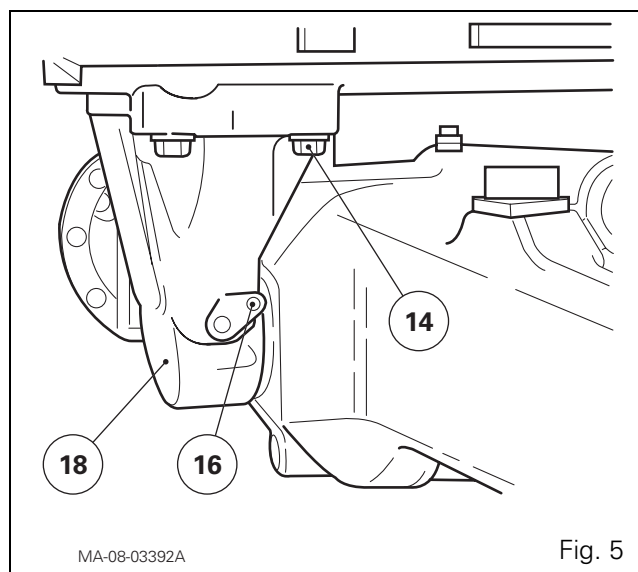


Fig. 5

DANA - Bearing and transmission shaft

Refitting

- 10.** Replace the seal (13). Position the washer (12) with the chamfer turned towards the axle housing (Fig. 1).
- 11.** Sling and refit the front axle assembly.
- 12.** Refit bearing (18). Momentarily fit the screws (14).
- 13.** Thrust the bearing (18) against the washer (10) to eliminate the clearance as much as possible. Definitively tighten screws (14), lightly smeared with Loctite 270. Tighten to a torque of 520 - 640 Nm.
- 14.** Fit the grease nipple on the bearing (18).
- 15.** Reconnect the steering ram hoses.
- 16.** Refit the transmission shaft (3). Assemble the sleeves (2) on the drive pinion carrier and the 4WD unit.

DANA - Bearing and transmission shaft

C . Replacing the friction rings and the seal

Disassembly

Front bearing

17. Using a suitable mandrel, drift or hydraulic press, drive out the worn ring (15).

Rear bearing

18. Extract the seal (9) and the ring (8).

Reassembly

Front bearing

19. Clean the components. Using a press and a suitable fitting, fit the ring into the bearing level with face F (Fig. 6), with port "O" turned upwards (Fig. 7) and aligned with the lubrication port.

Rear bearing

20. Fit the ring into the rear bearing using the same method as for the front bearing (Fig. 6).
21. Position the seal (9) up against the shoulder of the bearing (Fig. 6).

Tightening torques

Front bearing

The thread should be previously smeared with Loctite 270 or equivalent.

Screw (14): 520 - 640 Nm

Front wheel nuts

AG 85 or AG 105 axle: 400 - 450 Nm

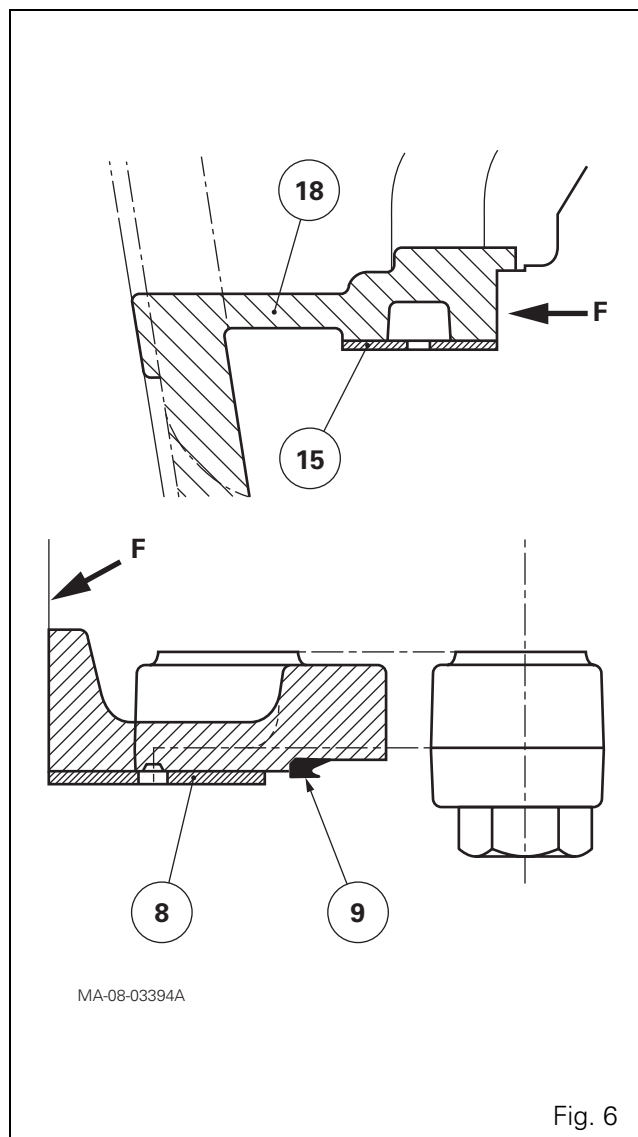


Fig. 6

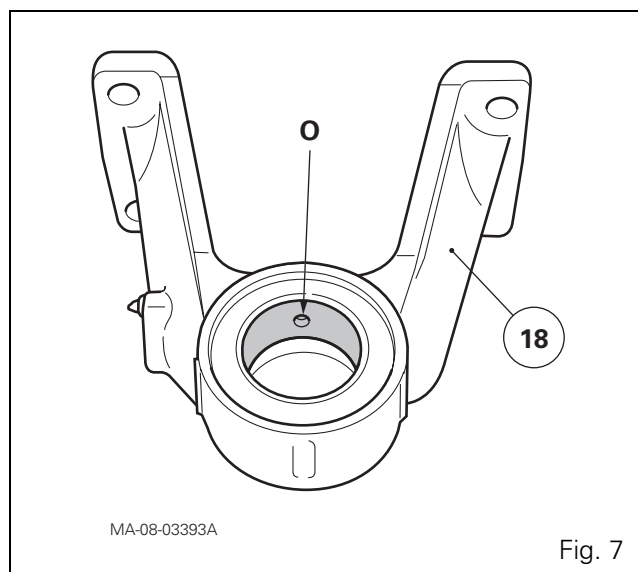


Fig. 7

8A14 - 4WD GPA20 clutch

CONTENTS

A . General	3
B . Operation	3
C . Removing the clutch assembly	7
D . Disassembling the clutch	8
E . Reassembling the clutch	9
F . Refitting the clutch assembly	10
G . Makeshift tools	12

4WD GPA20 clutch

A . General

The front axle clutch assembly is fitted in the lower part of the rear axle housing. An inspection cover located under the housing provides access to the mechanism, which comprises:

- a shaft (25) turning on two tapered roller bearings fitted in the bore of the axle housing,
- a hydraulic clutch assembly attached to the rotating shaft
- a bell gear (15) centred on the shaft by a ring (43), driving the clutch discs (36).

The helical bell gear (15) is constantly meshed to the gear (7) on the pinion.

The shaft is shimmed to obtain an operating clearance between 0 and 0.10 mm using shims (20) positioned between the cap (22) and the cup (18).

B . Operation

Declutching

The 4WD solenoid valve sends the 17 bar pressure into the shaft (25) via a channel drilled in the axle housing and the ring (11).

The cover plate (30) moves on the hub (40) and pulls the bell (42) which compresses the Belleville washers (34) and (35), releasing the discs (36). The bell gear (15) attached to the ring (43) turns idle on the shaft.

Clutch

The pressure drop releases the Belleville washers, which push the bell (42) so that it becomes attached to the bell gear (15), which in turn drives the shaft (25). The oil then returns to the housing via the solenoid valve.

4WD GPA20 clutch

Parts list

- (1) Sleeve
- (2) Double pin
- (3) Shaft
- (4) Double pin
- (5) Sleeve
- (6) Circlip
- (7) Gear
- (8) Plug
- (9) Needle roller bearing
- (10) Screw
- (11) Ring
- (12) Seal rings
- (13) Cup
- (14) Cone
- (15) Bell gear
- (16) Clutch assembly
- (17) Cover plate
- (18) Cup
- (19) Cone
- (20) Shim(s)
- (21) "O" ring
- (22) Cap
- (23) Circlip
- (24) Seal
- (25) 4WD drive shaft
- (26) Seal
- (27) Stop screw
- (28) Flange
- (29) "O" ring
- (30) Cover plate
- (31) Circlip
- (32) "O" ring
- (33) "O" ring
- (34) Belleville washer
- (35) Belleville washer
- (36) Disc
 - A. 4-disc clutch
 - B. 5-disc clutch
- (37) Thrust plate
 - A. 4-disc clutch
 - B. 5-disc clutch
- (38) Cover plate
- (39) Circlip
- (40) Hub
- (41) Shim(s)
- (42) Bell
- (43) Ring

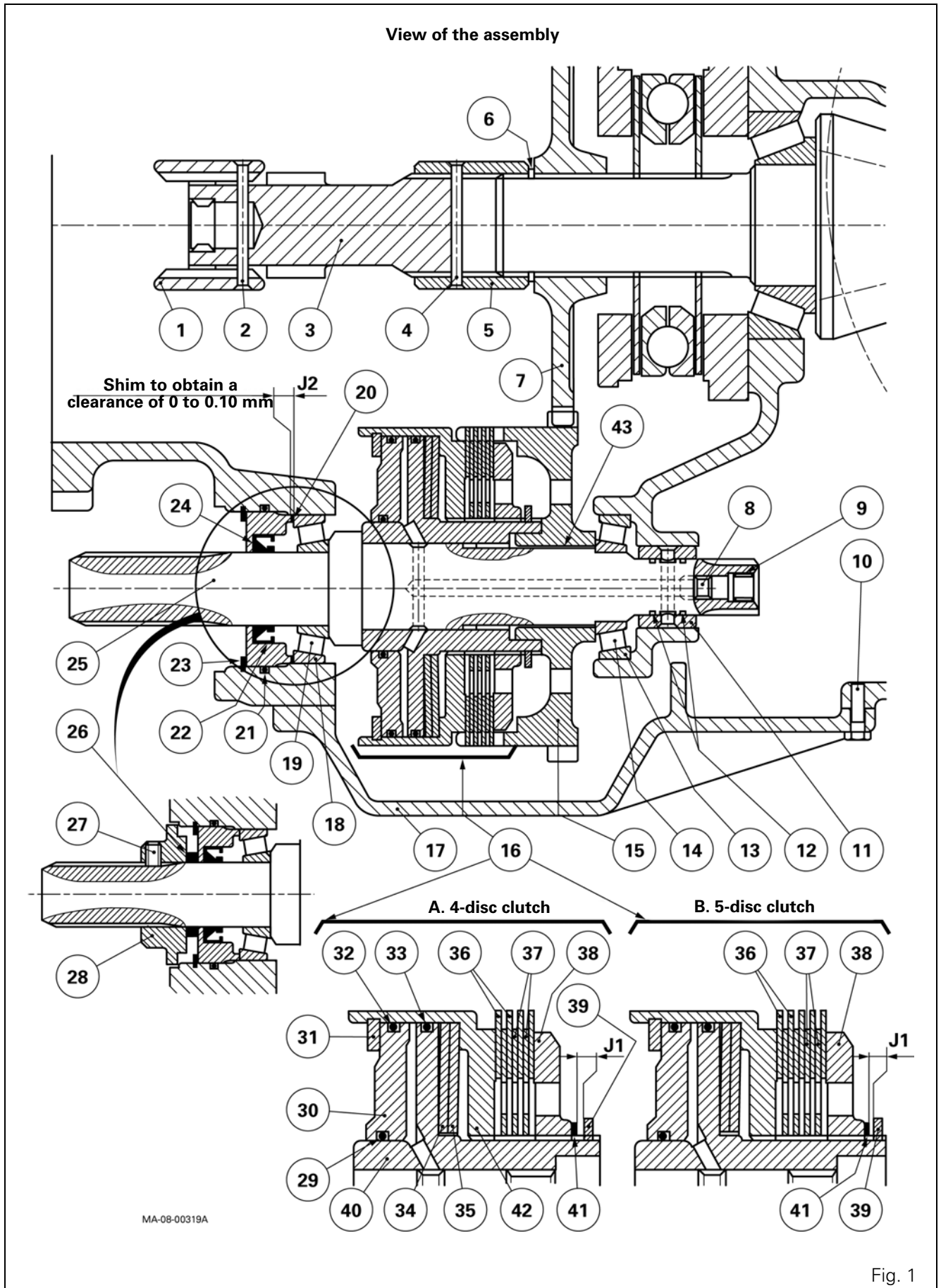
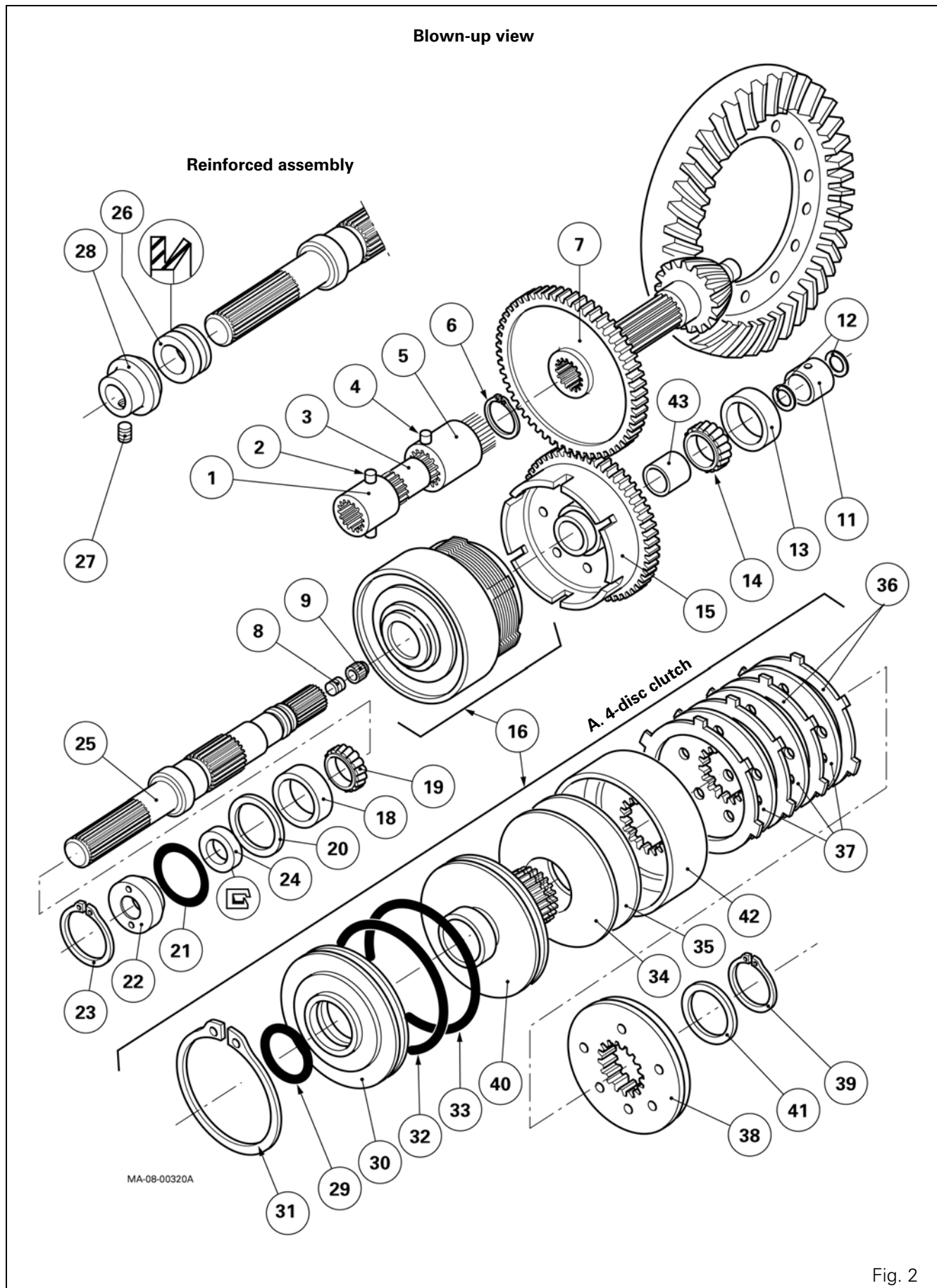


Fig. 1

4WD GPA20 clutch



C . Removing the clutch assembly

1. Chock the tractor. Drain the rear axle housing.
2. Disconnect the two front differential lock control hoses (plug the channels). Remove the guard and the transmission shaft. Remove the engine clutch or Power Shuttle lubrication pipe that is fitted to the lower cover plates of the centre housing and the gearbox.
3. Remove the screws (10) and the cover plate (17).
NOTE: On tractors fitted with proportional PTO, recover the spring (3), the detent plunger (2) and the retainer pipe (1) (Fig. 3).
 On tractors fitted with a reinforced sealed guard, remove the screw (27), flange (28) and seal (26).
4. Remove the circlip (23).
5. Protect the splined part of the shaft (25). Extract the cap (22) with its seal (24) using the makeshift tool (Fig. 4) (see § G). Remove the seal (24).
6. Remove the "O" ring (21).
7. Remove the shims (20) and the cup (18).
NOTE: On tractors fitted with proportional PTO, place the control in declutched position.
8. Extract the shaft assembly (25) and bearing cone (19), while holding the clutch assembly (16) and the bell gear (15).
9. Remove the clutch assembly (16) with the bell gear (15) and the cone (14).
10. Using a makeshift tool (see § G), extract the ring (11) (Fig. 5). This tool is essential for tractors with proportional PTO. If necessary, also remove the cup (13) using a suitable extractor.
NOTE: When removing the gear (7), it is necessary to remove the right-hand hydraulic cover plate (see chapter 9, depending on hydraulic equipment).

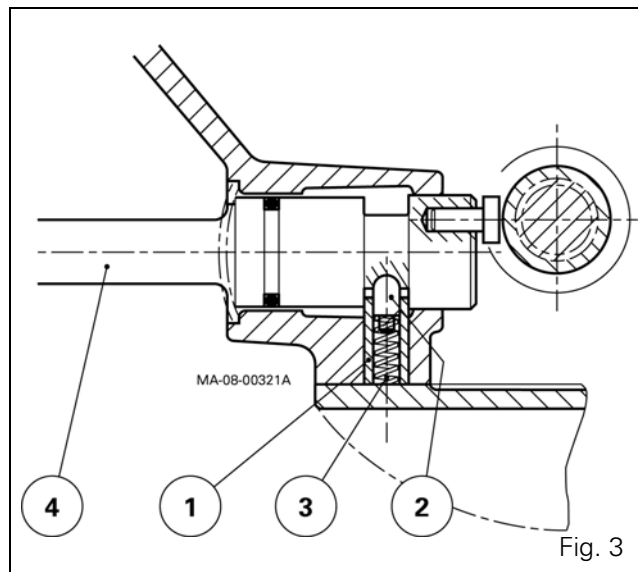


Fig. 3

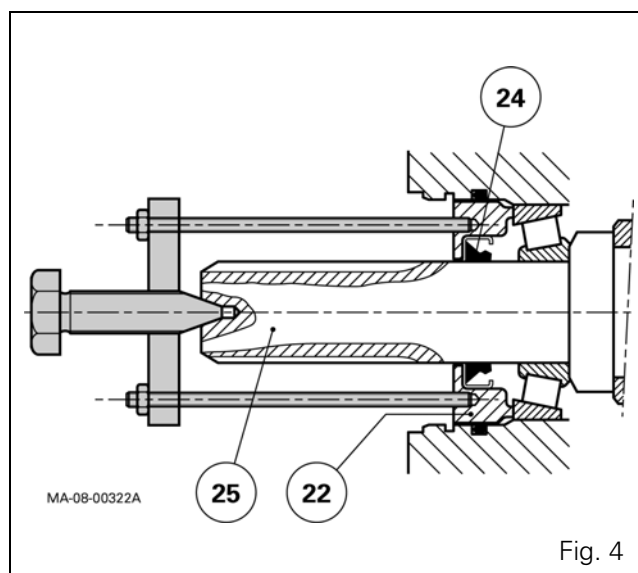


Fig. 4

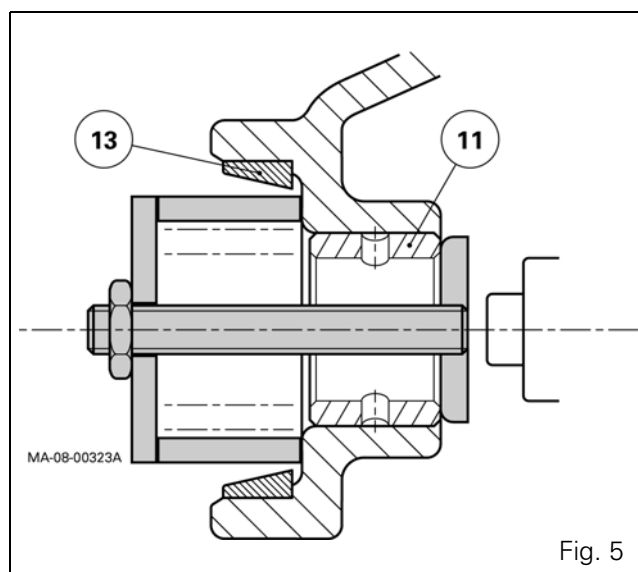


Fig. 5

4WD GPA20 clutch

Tractors with no creeper unit

11. Drive out the double pins (2) (4) from the coupling sleeves (1) (5).
12. Slide the sleeves towards each other on the shaft (3) and remove the shaft - sleeve assembly.
13. Take off the circlip (6) and remove the gear (7).

Tractors with a creeper unit

14. See chapter 5.
15. Take off the circlip (6) and remove the gear (7).

D . Disassembling the clutch

16. Detach the bell gear (15) from the clutch assembly (16).
17. Remove the circlip (31).
18. Remove the cover plate (30).
19. Remove the "O" rings (29) (32).
20. Using a press and a suitable fixture, compress the Belleville washers (34) (35) (Fig. 6).
21. Take off the circlip (39) and the shim(s) (41) (Fig. 6).
22. Remove the suitable fixture.
23. Remove the cover plate (38), the discs (36) and the thrust plates (37).
24. Separate the hub (40) from the bell (42).
25. Remove the "O" ring (33).
26. Remove the Belleville washers (34) (35).

Disassembling the shaft

27. Remove the two rings (12).
28. Extract the cone (19) using a press and a suitable fixture.
29. Extract the needle roller bearing (9). Remove the plug (8).

Reassembling the shaft

NOTE: Check that the shaft channel is not blocked.

30. Tighten the plug (8) smeared with Loctite 542 to a torque of 10 Nm.
31. Fit the needle roller bearing (9) 2.5 mm set back from face F (Fig. 7).
32. Fit the bearing cone (19) against the shoulder of the shaft (25).

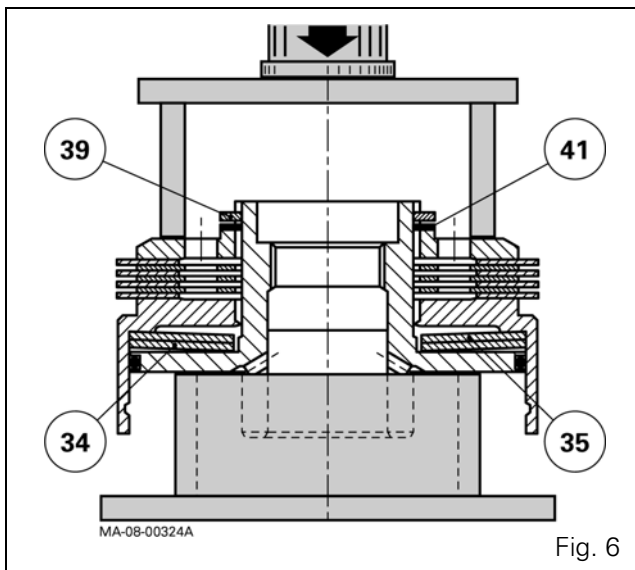


Fig. 6

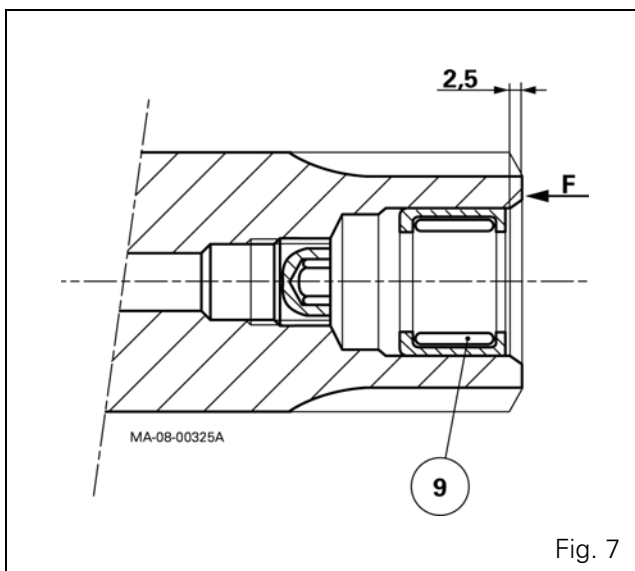


Fig. 7

E . Reassembling the clutch

33. Check and clean the components and replace those that are defective. Check that the 17 bar channel in the hub (40) is not blocked.

34. Position the Belleville washers (35) (34) in the bell (42) (Fig. 8).

NOTE: Two types of Belleville washers with different markings and different loading efforts can be fitted:

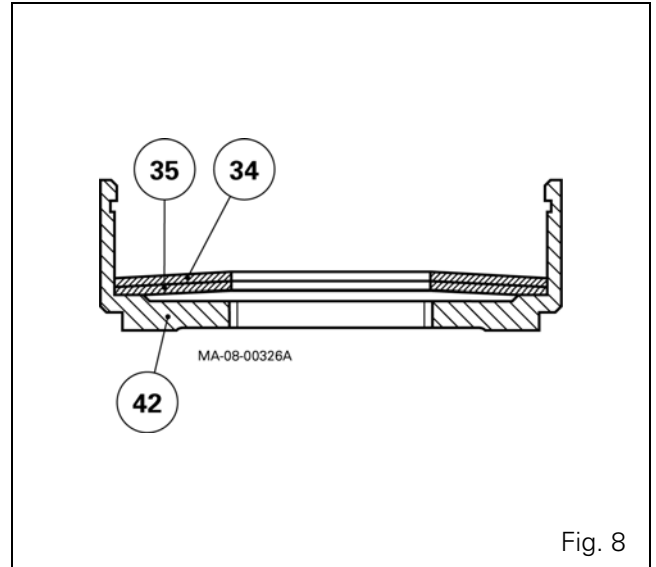
- 3619147M1 marked 147
- 3619473M1 marked 473.

The clutch assembly is normal or reinforced depending on the tractor types.

35. Lubricate and fit the "O" ring (33) on the hub (40).

36. Place the hub (40) in the bell (42), braced against the Belleville washers.

37. Fit the discs (36), aligning the lugs and the thrust plates (37), and fit the cover plate (38).



4WD GPA20 clutch

38. Adjusting J1 clearance (Fig. 9)

Using a press and suitable fixture (Fig. 6) apply a load of 2000 daN to fully compress the Belleville washers (35) (34).

Fit the circlip (39). Use a set of shims to increase the distance X between the cover plate (38) and the circlip (39). Select the shim(s) (41) to obtain a clearance **J1 = 0.9 to 1.1 mm**.

39. Remove the circlip (39).
40. Position the shim(s) chosen during step 38 between the cover plate and the circlip (splined shim on the circlip side).
41. Refit the circlip.
42. Lubricate and fit the "O" rings (32) (29) on the cover plate (30) and refit the cover plate.
43. Fit the circlip (31).
44. Fit the clutch assembly (16) on the bell gear (15).

NOTE: The ring (43) is force fitted in the bell gear (15) and then rebored.

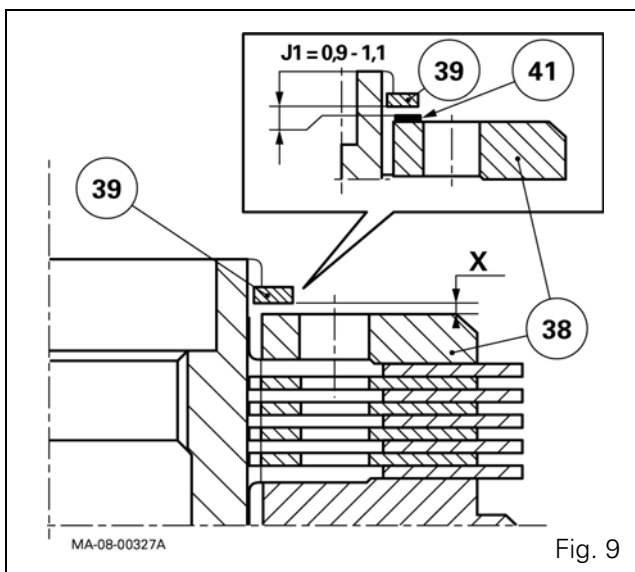


Fig. 9

F . Refitting the clutch assembly

Tractors with no creeper unit

45. Refit the gear (7) (if removed).
46. Position the circlip (6).
47. Refit the connecting shaft and coupling sleeves. Perform steps 11 and 12 in reverse order. Replace the double pins.

Tractors with a creeper unit

48. Refit the gear (7) (if removed).
49. Position the circlip (6).
50. See chapter 5.
51. Refit the right-hand hydraulic cover plate (see chapter 9).
52. Fit the cup (13) (if removed).
53. Fit the ring (11) using a makeshift drift (see § G), so that the ring is positioned 4 to 5 mm set back from the cup mating face (13) (Fig. 10). Move the ring until one of its holes opens into the clutch supply channel in the housing.
54. Fit the seal (24) in the cap (22).

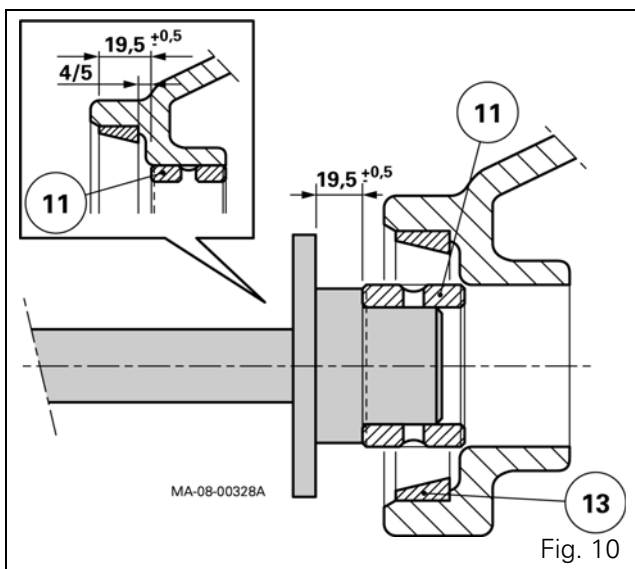


Fig. 10

55. In order to correctly "seat" the cones in their bearing cups, to obtain the clearance:

J2 = 0 to 0.10 mm, fit the cone (14), the shaft (25), and the cup (18).

56. Protect the splines of the shaft.

57. Fit the bearing (22) and the circlip (23)

58. Place the dial gauge feeler pin against the end of the shaft (25) (Fig. 11).

59. Pull the shaft, while turning it alternately from right to left to correctly seat the cones in the cups.

60. Set the dial gauge to zero.

61. Repeat step 59, this time pushing.

62. Depending on the clearance measured, select the thickness of the shim(s) (20) required to obtain J2.

63. Remove the circlip (23), cap (22), cup (18) and the shaft (25).

64. Fit the seal rings (12) in the grooves of the shaft (25) and hook their ends. Ensure that they turn freely.

65. Fit the cone (14) into the cup (13). Insert the shaft (25) after having positioned the clutch assembly (16) and bell gear (15) in the housing.

66. Fit the cup (18) and the shim(s) (20) (smear with grease) selected during step 62.

67. Fit the "O" ring (21) in the housing groove.

68. Fit the cap (22) and the circlip (23), and remove the spline protection on the shaft.

69. On tractors with reinforced sealing, grease and position the seal (26), with the lip turned towards the cap (22). Remove the safety shield.

70. Fit the flange (28), ensuring that operational clearance remains between the flange and housing.

71. Tighten the screw (27) after smearing it with Loctite 241.

72. Clean and degrease the mating face of the cover plate (17) and the housing.

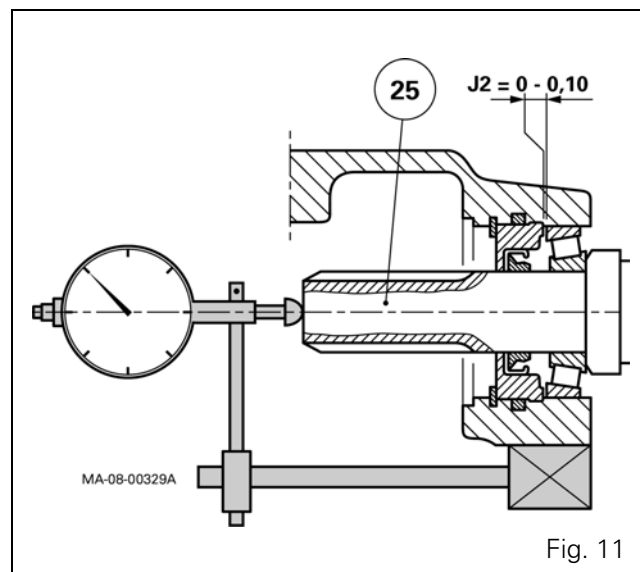
73. Smear the mating face of the cover plate with a sealing product (Loctite 510 or equivalent).

74. Screw two opposing guide studs into the housing.

75. On tractors fitted with proportional PTO, check the position of the lever (4). Fit the retainer pipe (1), the detent plunger (2) and the spring (3) (Fig. 3).

76. Put the cover plate back on (17).

77. Remove the guide studs, and fit and tighten the screws (10) to a torque of 130 - 170 Nm.



78. Smear the two sleeves of the 4WD transmission shaft with "Anti Seize" grease or equivalent.

Refit the transmission shaft and guard, and reconnect the two front differential lock hoses.

Refit the lubrication pipe for the Power Shuttle or engine clutch.

79. Top up the rear axle oil level and remove the shims.

80. Check clutch operation and proportional PTO control adjustment (if fitted).

81. Check tightness of:

- the mating faces of the cover plate under the rear axle housing
- the right-hand hydraulic cover plate (if removed)
- Hydraulic unions

4WD GPA20 clutch

G . Makeshift tools

Cap extractor (Fig 12)

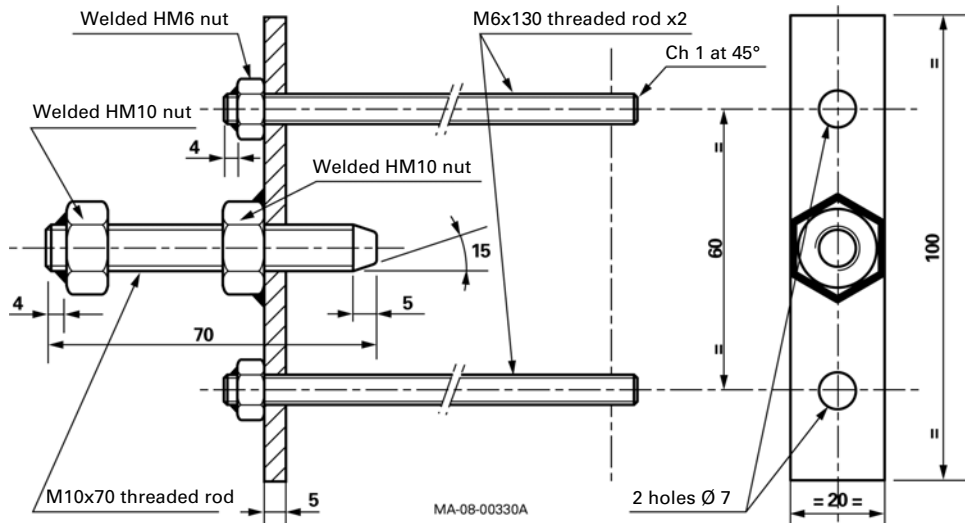


Fig 12

Ring extractor (Fig. 13)

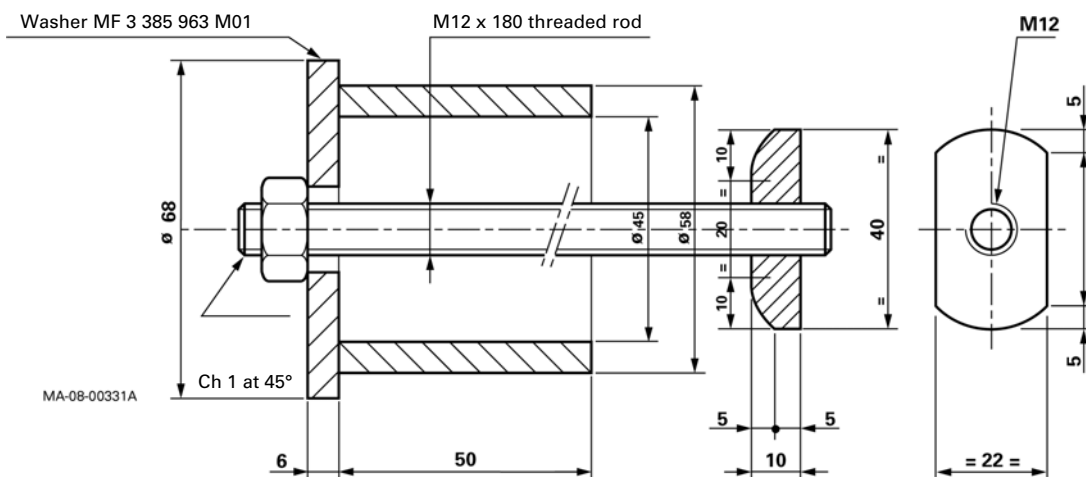


Fig. 13

Ring fitting drift (Fig. 14)

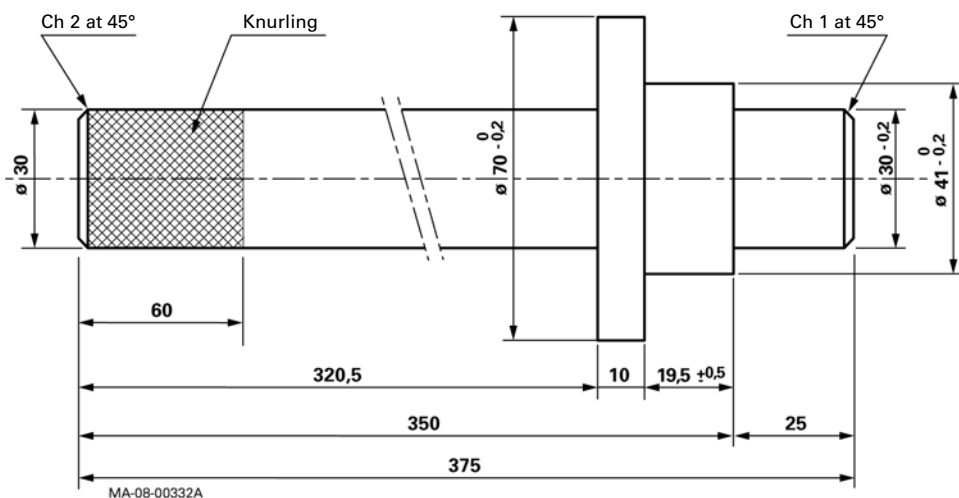


Fig. 14

8B10- CARRARO - General

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A . General description	3
B . Specifications and dimensions	7
C . Product identification	8

CARRARO - General

A . General description

This may or may not be fitted on the tractor depending on the engine front axle model. The front axles mounted on the 4WD tractors consist of:

- a centre housing containing the differential unit and the differential lock system, as well as the transmission shafts,
- at each end, a hub assembly containing the final drive units.

The front axle is assembled to the front frame of the tractor by means of a pivot which adapts to the unevenness of the ground. Drive is transmitted from the rear axle to the front axle by a universal joint shaft. Engagement is ensured by an electrohydraulically controlled multidisc clutch.

The differential unit is held by two half-bearings mounted on a suitable support allowing the crownwheel and pinion to be adjusted.

The bevel gear is supported by two bearings and is adjusted using shims.

The wheel hubs containing the final drives are held in place by two tapered roller bearings and driven by a hydraulically-controlled steering gear.

CARRARO - General

Parts list ([Fig. 1](#) and [Fig. 2](#))

CARRARO 20.19 axle

- (1) Axle housing
- (2) Final drives
- (3) Flange
- (4) Pinion
- (5) Differential
- (6) Bush
- (7) Steering ram

CARRARO 20.19 axle

View of the assembly

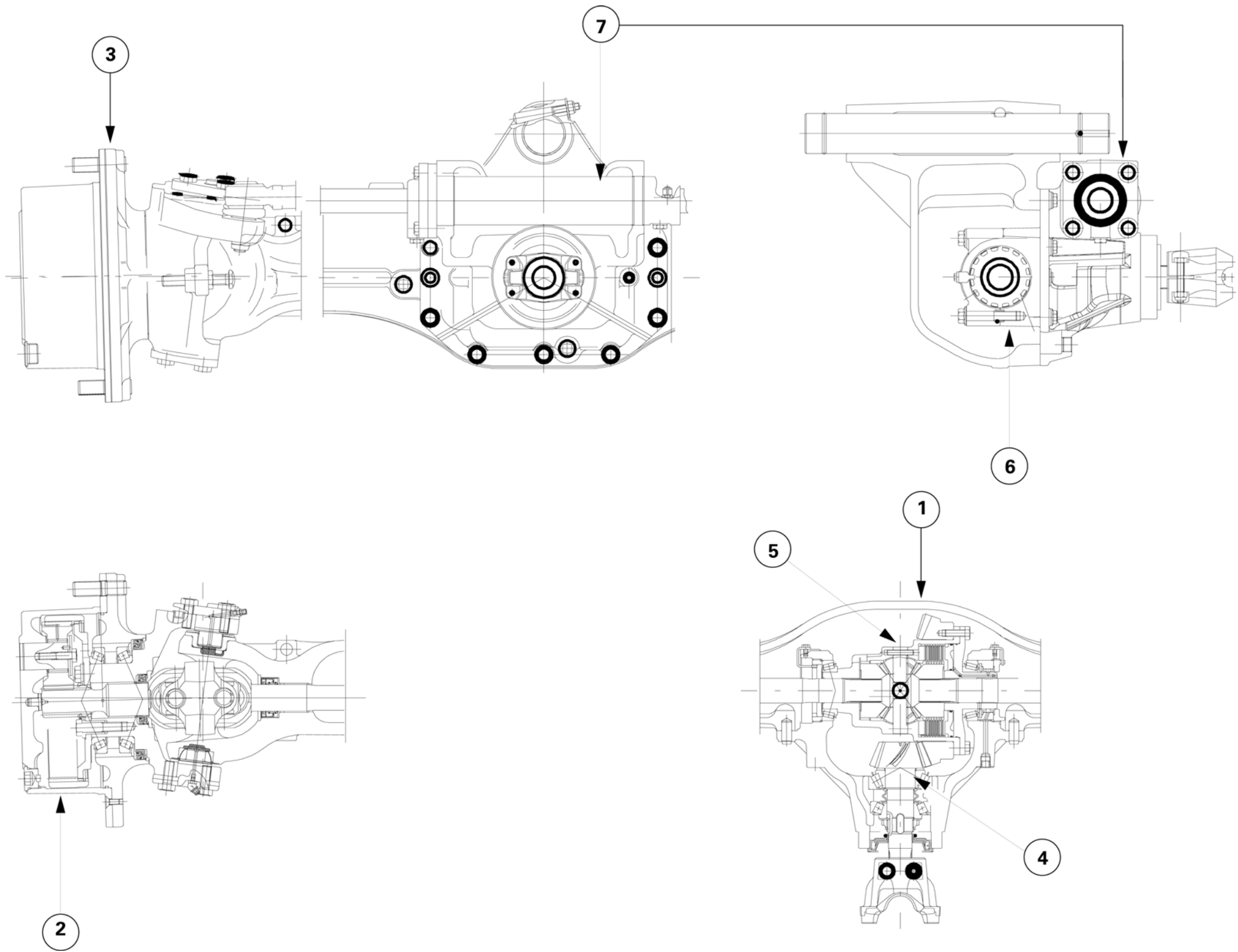


Fig. 1

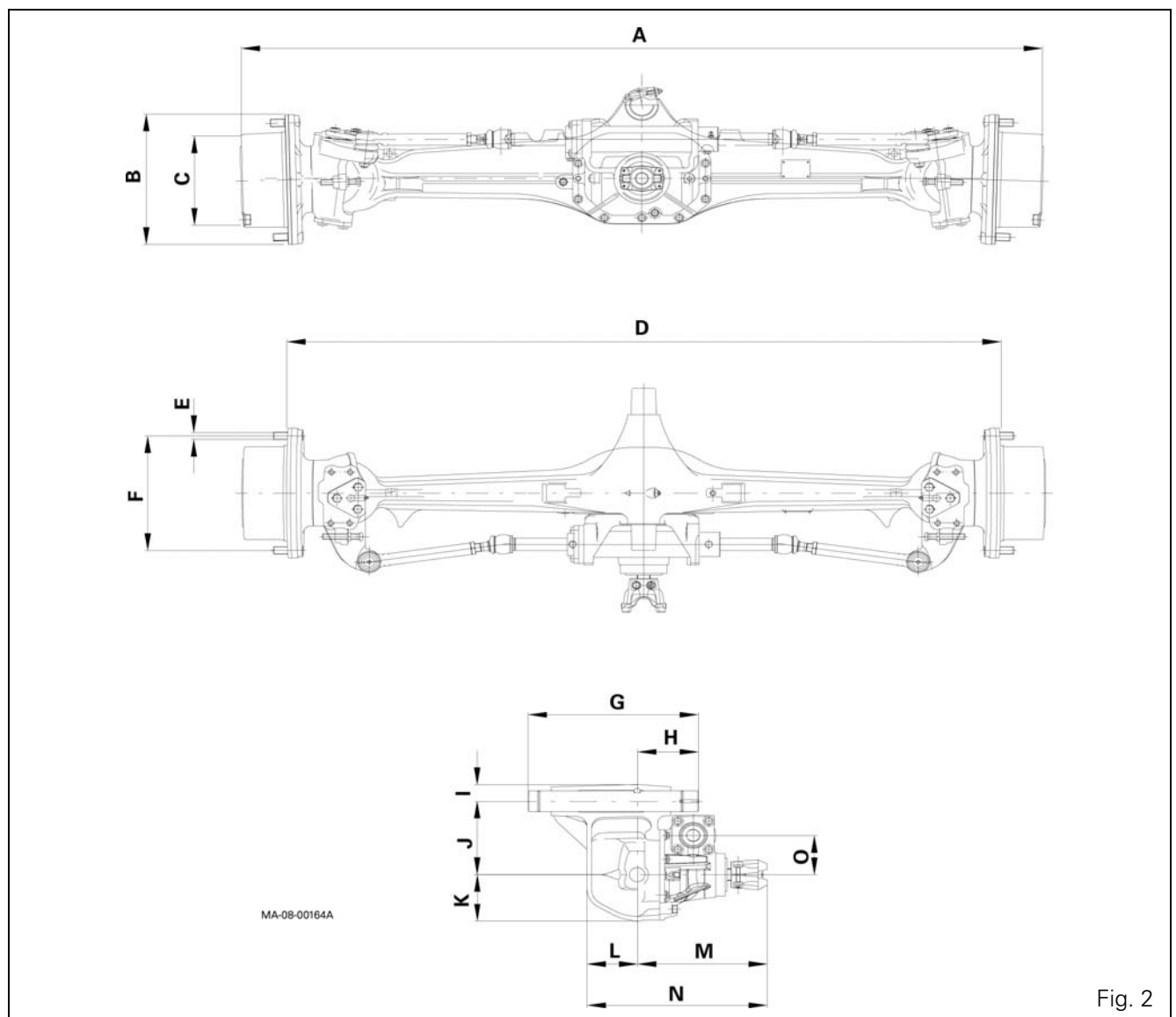
CARRARO - General

B . Specifications and dimensions

All values in the following tables are given in millimetres.

Dimensions for CARRARO 20.19 models

A = 2045	F = 275	K = 136
B = Ø 320	G = 456	L = 134
C = Ø 220.8	H = 90	M = 347
D = 1800	I = 49	N = 481
E = M18 x 1.5	J = 215	O = 115



CARRARO - General

C . Product identification

The front axles are identified by a plate fitted to the axle (Fig. 3).

- (1) Axle type
- (2) Serial number
- (3) Carraro number
- (4) Customer code
- (5) Total reduction ratio
- (6) Rotational direction
- (7) Differential type
- (8) Differential oil type
- (9) Differential oil quantity
- (10) Final drive oil type
- (11) Final drive oil quantity

AXLE TYPE		SERIAL N°.	
(1)	(2)		
CARRARO N°.	CUSTOMER N°.	TOTAL RATIO	
(3)	(4)	(5)	
INPUT ROTATION		DIFFERENTIAL TYPE	
(6)		(7)	
OIL SPECIFICATION		LOCAT.	LIT.
(8)		(9)	
(10)		(11)	
			
MA-08-00165A			

MADE IN ITALY

Fig. 3

Technical specifications

DESCRIPTION	VALUES
	20.19
Differential	9 / 32 (1 / 3.55)
Final drive	1 / 6.0
Total reduction	1 / 21.33
Unladen weight	320 kg
Input direction of rotation	Anti-clockwise
Differential type	Multidisc lock
Max. inner/outer steering angle	55° / 42°
Oil specification	SAE 85W140 In compliance with standards API GL4 - GL5 MIL 2105 and MIL 2105D
Differential oil capacity	6 l
Final drive unit oil capacity	0.7 + 0.7 l
Lubrication	POLYMER 400/L DIN = KHER1R ISO-I-XMR-XM2

8B11 - CARRARO - Final drive units

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F . Reassembling the axle beam assembly	11
G . Reassembling the wheel hub assembly	12
H . Reassembling the final drive assembly	18
I . Wheel alignment	19
J . Adjusting the steering angle	21
K . Service tools	22

CARRARO - Final drive units

CARRARO - Final drive units

A . General

Some of the following illustrations may show axles that differ slightly from your model, but the procedure is the same.

B . Dismantling the steering ram assembly

Preliminary steps

1. Chock the rear wheels. Apply the hand brake.
REMINDER: *Because the 4WD clutch is mechanically engaged when stationary, raise the two front wheels so that the wheel hub in question can be turned freely.*
2. Place axle stands in position.
3. Remove the wheel concerned.
4. Drain the drive unit.

Dismantling the steering ram assembly

5. Loosen the selector rail counter-nut by several turns until it is at the same level as the threaded stud (Fig. 1).
6. Strike the nut with a hammer to extract the selector rail from the swivel housing (Fig. 2).

NOTE: *This will destroy the nut.*

To disassemble the steering ram, see chapter 9.

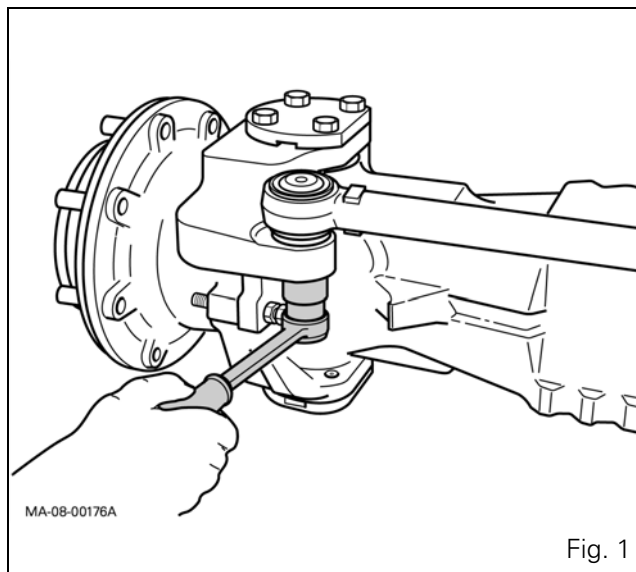


Fig. 1

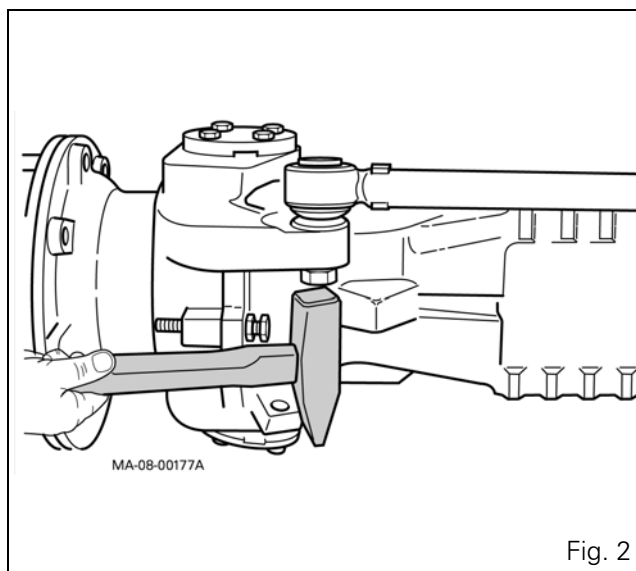


Fig. 2

CARRARO - Final drive units

C . Disassembling the final drive unit

7. Before draining the oil, position the wheel hub with the plug at its highest point and loosen the plug by several turns to release any internal residual pressure, then loosen it completely (Fig. 3). Turn the hub again to position the plug at its lowest point. Completely drain the oil.
8. Loosen and remove the two planet carrier screws using a wrench (Fig. 4).
Extract the planet carrier from the wheel hub.
Place the planet carrier on a workbench and check it for wear.
9. Replace the planet gears as necessary (Fig. 5):
 - extract circlip A from each planet gear
 - remove washer B and extract planet gears D from their pins,
 - recover bearings C and check their condition.

NOTE: It is recommended that you replace the bearings when installing new planet gears.

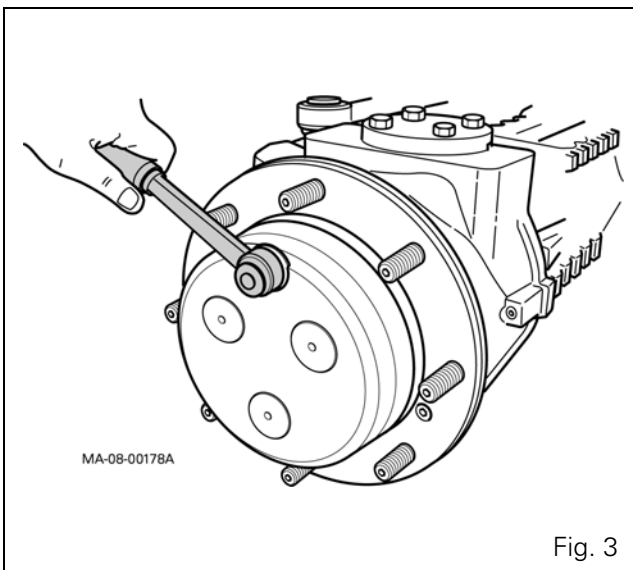


Fig. 3

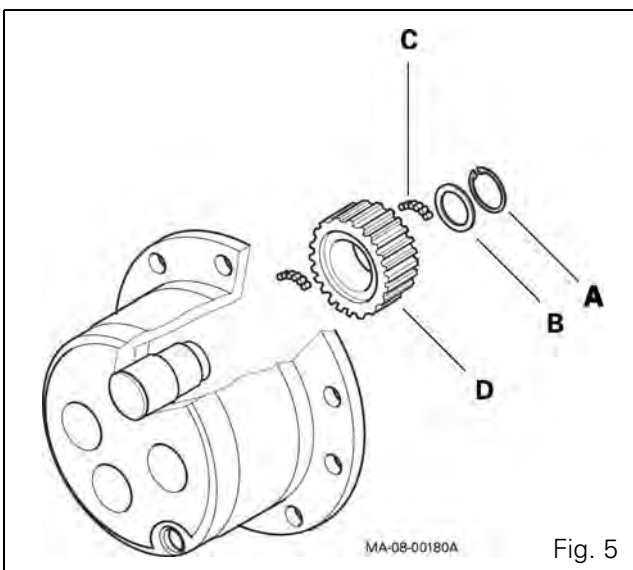
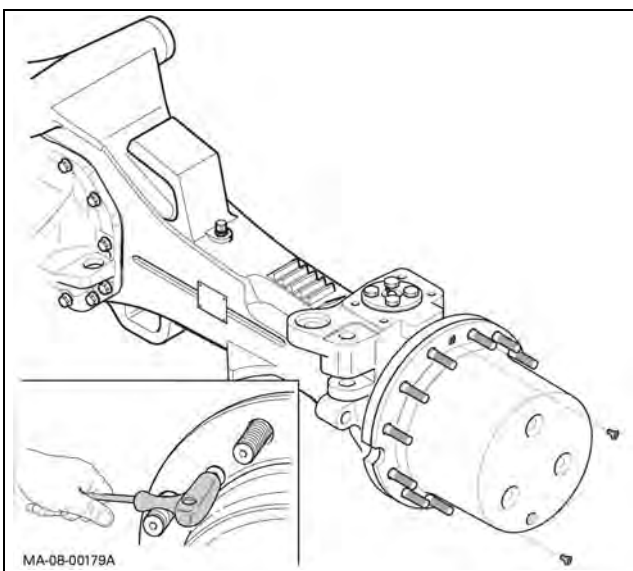


Fig. 5

D . Disassembling the wheel hub

Before disassembling the wheel hub, it is recommended that you attach it with a belt or sling to a hoist or other suitable lifting device to prevent it from falling accidentally, risking injury to the operator and damage to the wheel hub.

Some of the following illustrations may show axles that differ slightly from your model, but the procedure is the same.

- 10.** Insert a lever between the swivel housing and slide it into the universal joint. Push on the joint with the lever in the direction of the final drive to remove the circlip more easily (Fig. 6).
Remove and discard the circlip (Fig. 7).
Remove and discard the washer (Fig. 8).
Remove and discard the two star washers (Fig. 9).



Fig. 6

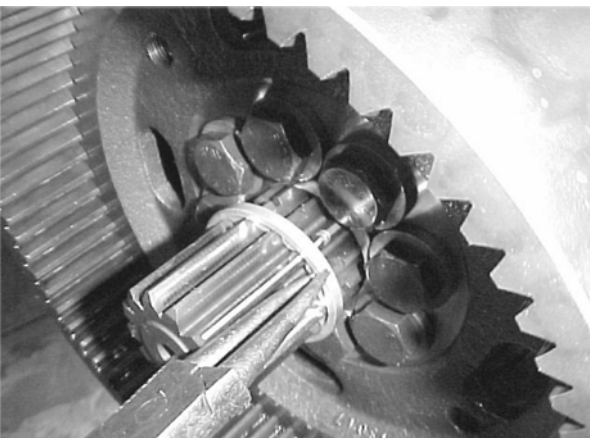


Fig. 8

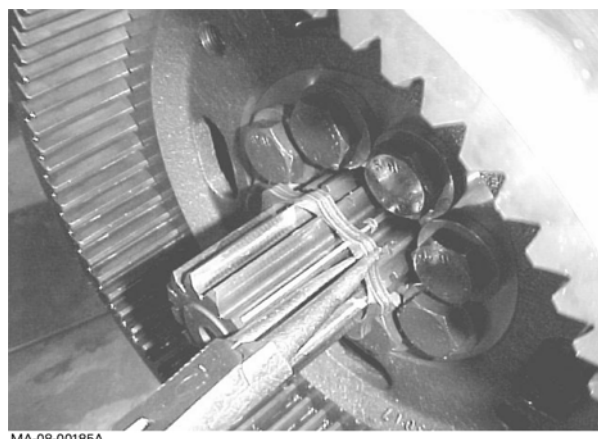


Fig. 9

CARRARO - Final drive units

11. Loosen and remove the screws from the ring gear carrier assembly (Fig. 10).
12. To remove the ring gear assembly from its housing, screw at least two of the screws that have just been removed into the threaded extraction holes (Fig. 11). While keeping an eye on the ring gear ports, avoid positioning the screws on the cast iron notches (Fig. 12).

CAUTION: Do not reuse these two screws when reassembling the ring gear.

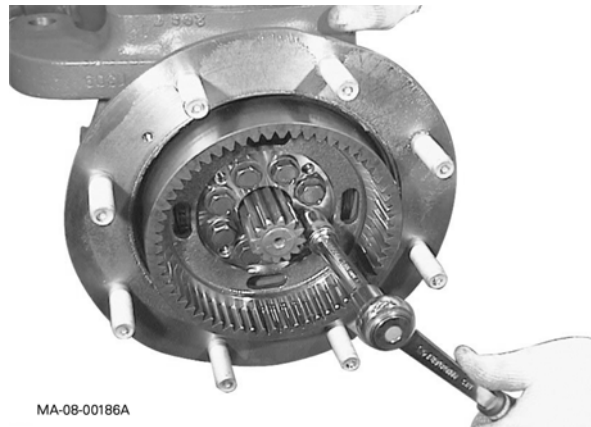


Fig. 10

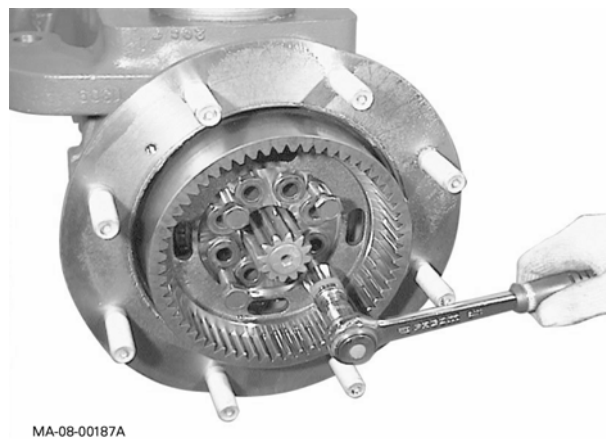


Fig. 11

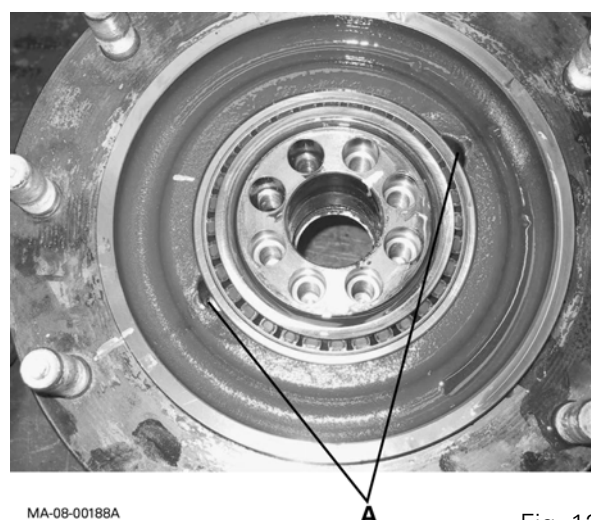


Fig. 12

CARRARO - Final drive units

- 13.** Remove the ring gear carrier with the epicyclic ring gear.

Remove the snap ring and detach the ring gear carrier from the epicyclic ring gear (Fig. 13). Check the condition of the parts. If necessary, remove the locating rings from the locking ring gear of the hub using a hammer and special tool, ref. CA715027 (see § K).

- 14.** Remove the wheel hub using levers and a hammer to facilitate the operation (Fig. 14).

NOTE: Recover the bearing cone.

- 15.** Place the wheel hub on a level surface and extract the seal ring (A) with a lever.

NOTE: This will destroy the seal ring.

Remove bearing cups B from either side of the hub using a hammer and a suitable puller.

Remove the bearing cone from the swivel housing side using a suitable puller.

Remove the "O" ring C from the wheel hub (Fig. 15).

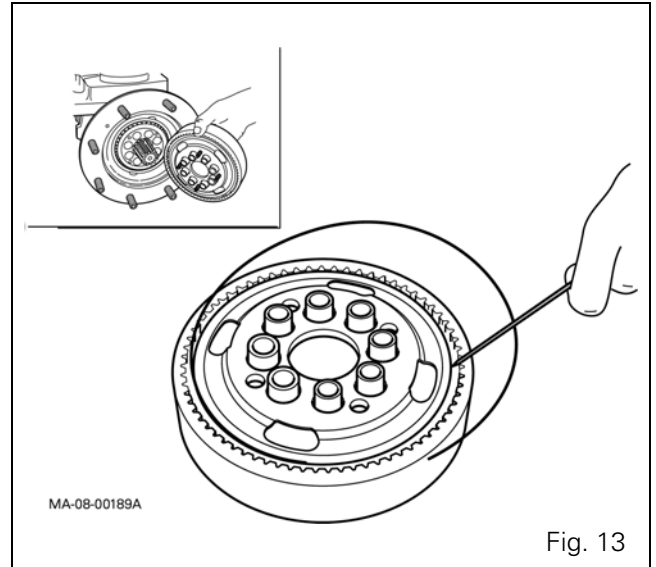


Fig. 13

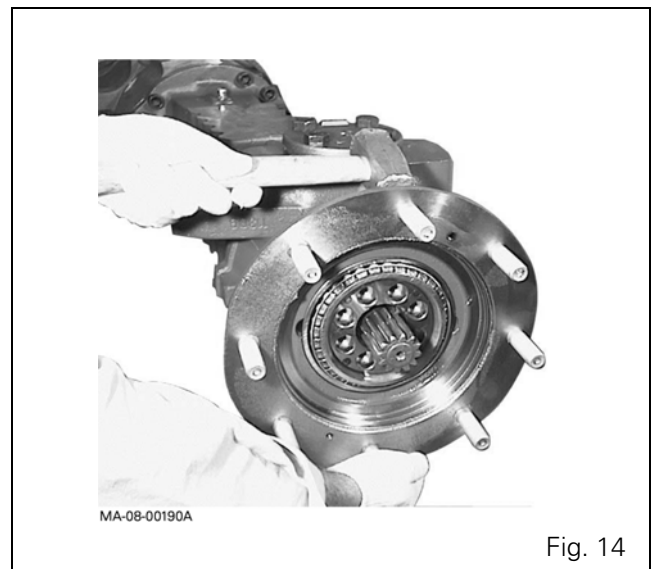


Fig. 14

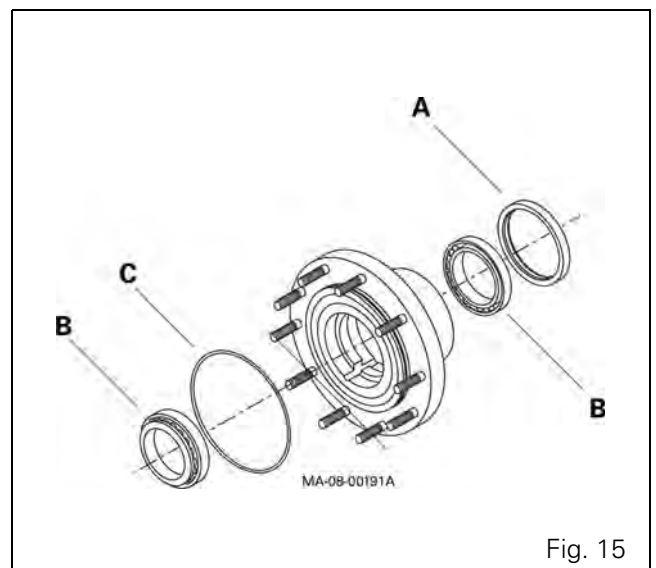


Fig. 15

CARRARO - Final drive units

16. Loosen and remove the screws from the upper and lower pivot pins (Fig. 16).

CAUTION: Before removing the pivot pins, attach the swivel housing to a hoist or other suitable lifting device with a belt or sling.

Remove the pivot pins and recover the Belleville washers.

NOTE: Mark the positioning of the two Belleville washers, which are not identical.

17. Remove the swivel housing from the axle beam and the short shaft of the universal joint shaft (Fig. 17).

Place the swivel housing on a level surface and extract the seal ring with a lever (Fig. 18).

NOTE: This will destroy the seal ring.

18. Turn the swivel housing to extract the ring using a drift and a hammer (Fig. 18).

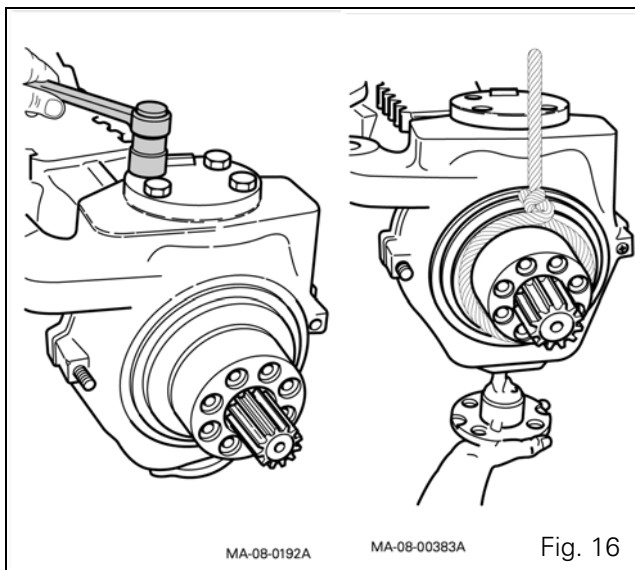


Fig. 16

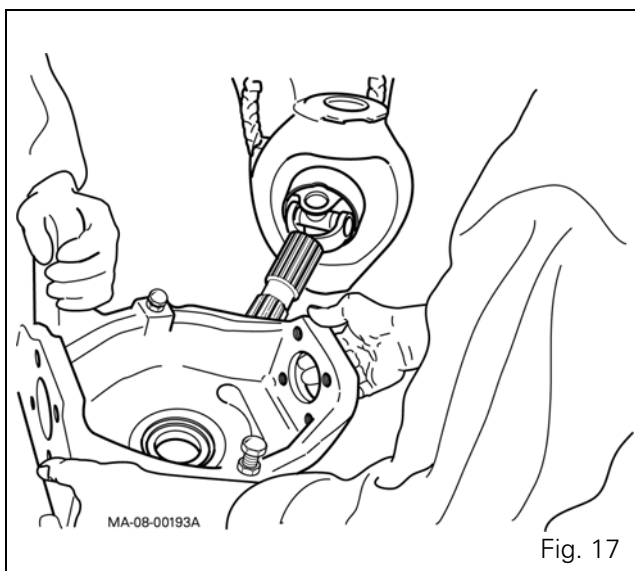


Fig. 17

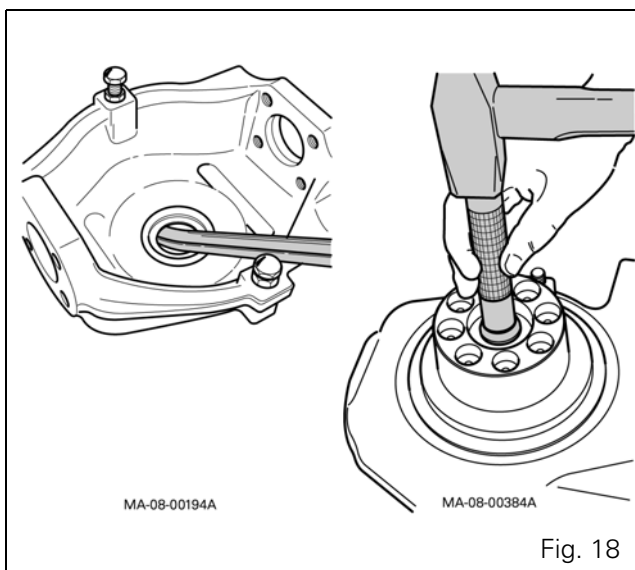


Fig. 18

E . Dismantling the axle beam assembly

19. Separate the universal joint shaft from the axle beam (Fig. 19).

20. Extract seal ring A from the axle beam with a lever. Remove the Belleville washers C from the pivot pin housings inside the axle beam.

NOTE: Mark the positioning of the two Belleville washers, which are not identical. This will destroy the seal ring.

Extract ring B from the axle beam using a suitable puller (Fig. 20).

NOTE: Check the ring before reassembling and only replace it if its state of wear requires this.

21. Extract the upper rings D and lower rings E from the pivot pin housings F and pivot pins using a suitable puller (Fig. 21).

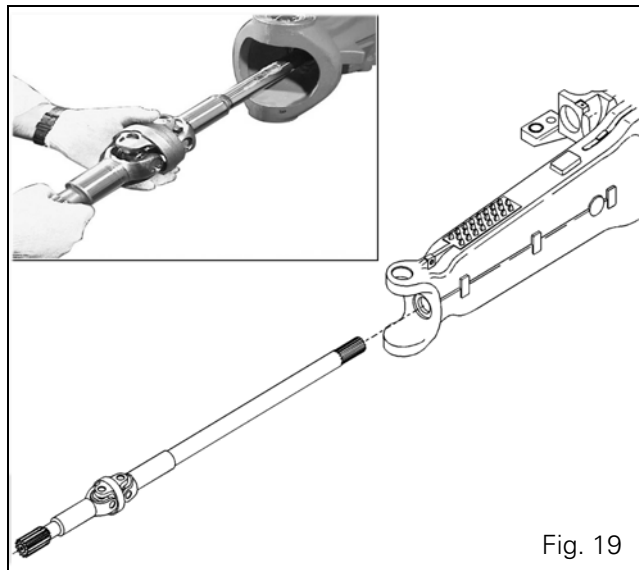


Fig. 19

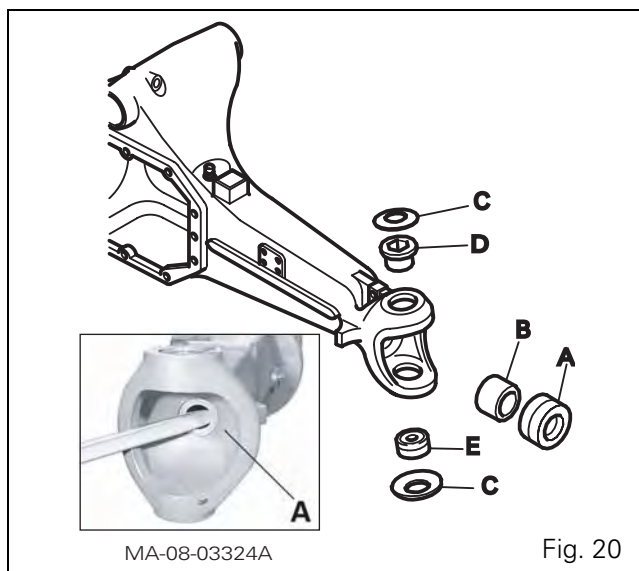


Fig. 20

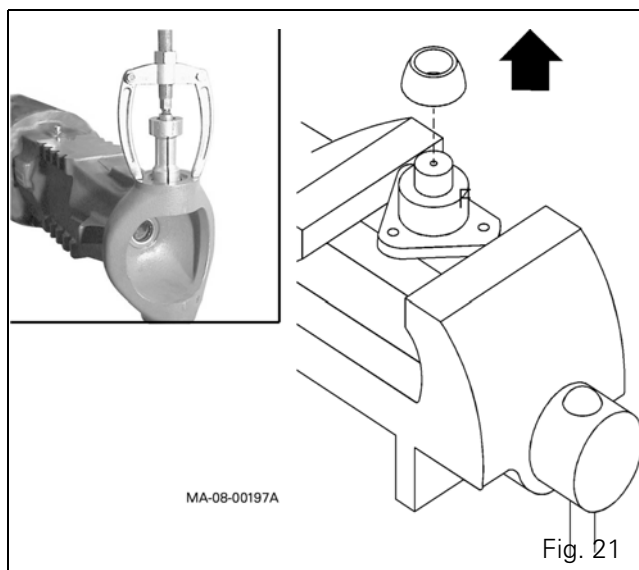
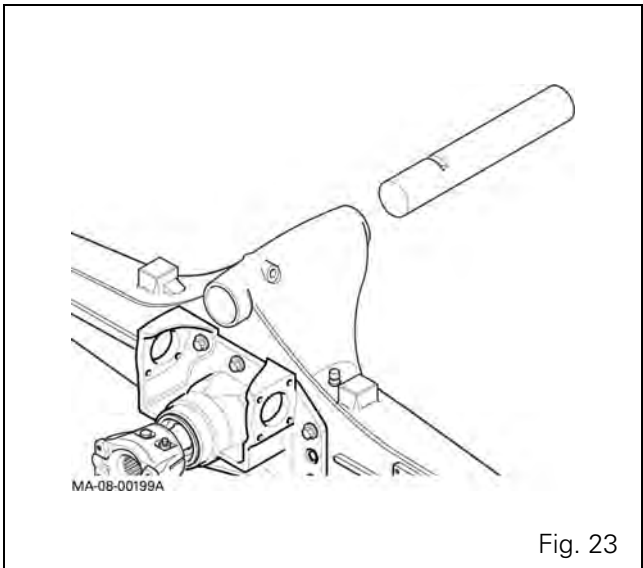
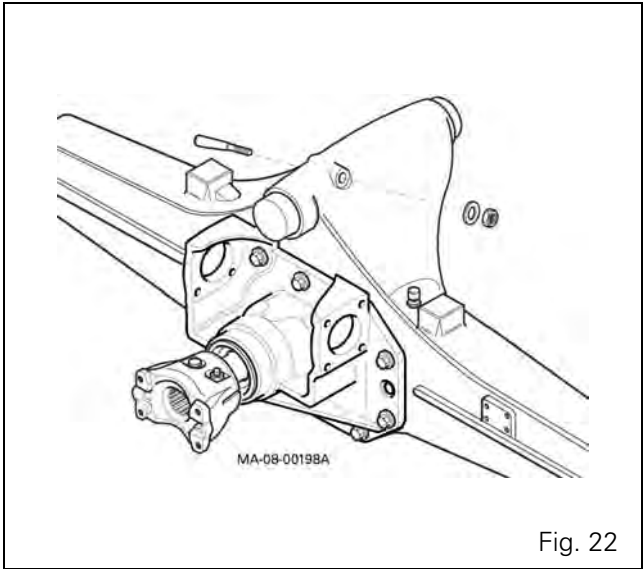


Fig. 21

CARRARO - Final drive units

22. Extract the nut and retaining washer from the taper pin. Remove the pin using a hammer (Fig. 22).
23. Remove the pivot pin using a hammer or other soft object if necessary (Fig. 23).



F . Reassembling the axle beam assembly

- 24.** Fit the ring of the upper pivot pin on the axle beam using special tool ref. CA715034 (see § K) and a hammer.

Insert the roller bearing cup on the lower part of the axle beam using special tool ref. CA715035 (see § K) and a hammer (Fig. 24).

NOTE: Cool the arm pins to under -100°C before installing them in order to facilitate their assembly. This can be achieved by completely immersing the arm pins in liquid nitrogen. To purchase or hire liquid nitrogen, contact the company "Air Liquide".

CAUTION: It is advisable to wear protective gloves.

- 25.** Fit the ring on the axle beam using special tool ref. CA119055 (see § K) and a hammer.

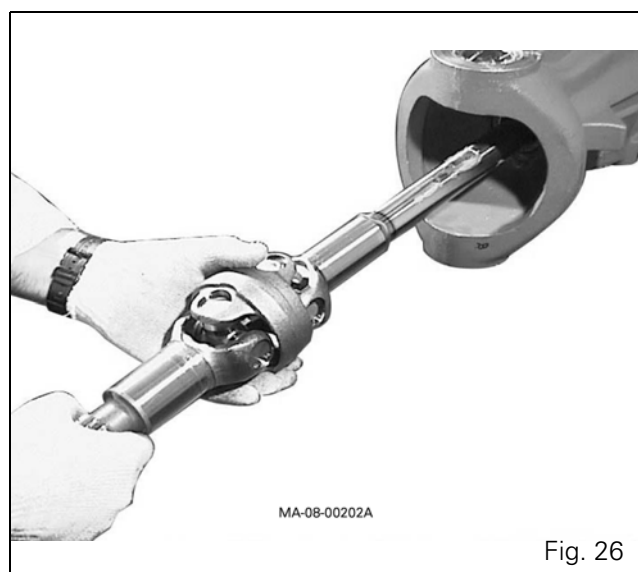
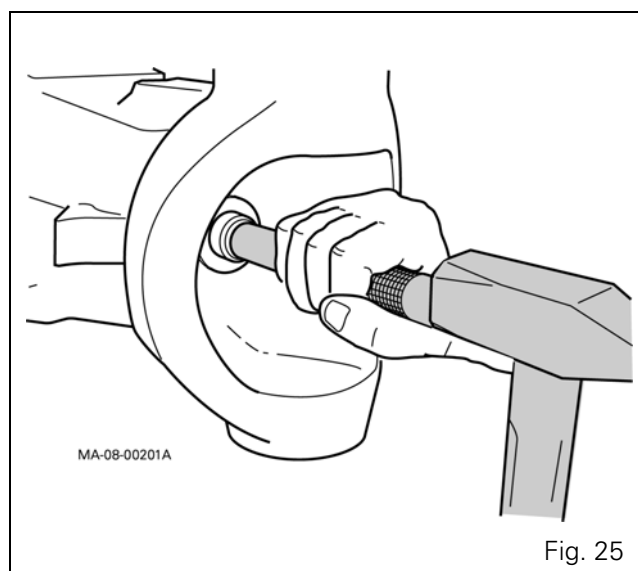
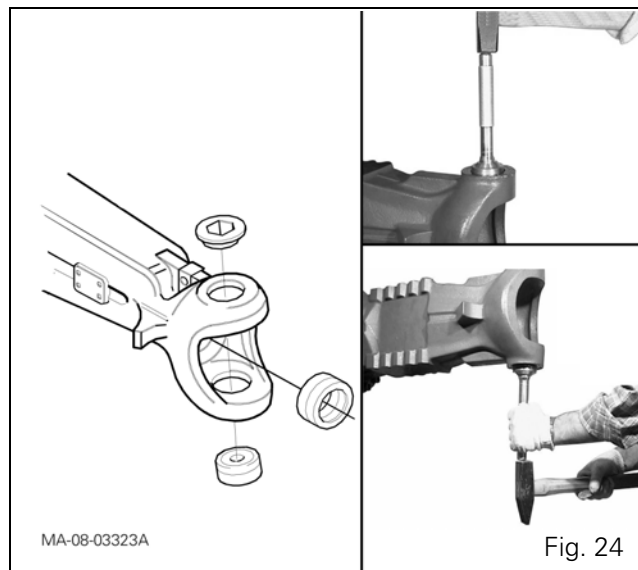
Fit the seal on the axle beam using special tool ref. CA119139 (see § K) and a hammer (Fig. 25).

Fill the seal seating three quarters full with grease.

- 26.** Lubricate the ring and the lip of the seal.

Insert the universal joint shaft into the axle beam (Fig. 26).

CAUTION: Take care not to damage the seal.



CARRARO - Final drive units

G . Reassembling the wheel hub assembly

27. Position screw A, nut B and washer C (Fig. 27).

NOTE: If washer C is not fitted, the axle will be damaged.

Force fit the ring in the swivel housing using special tool ref. CA 119097 for 20.19 (see § K) and a hammer or a press. Fit the seal on the swivel housing using special tool ref. CA119139 for 20.19 (see § K) (Fig. 28). Fill the seal seating three quarters full with grease.

28. Place the lower pivot pin on a workbench and install the ball joint cone using special tool ref. CA715035 (see § K) and a press. Apply a generous amount of grease to the pivot pin housings. Fit the Belleville washers on the pivot pin housings (Fig. 29).

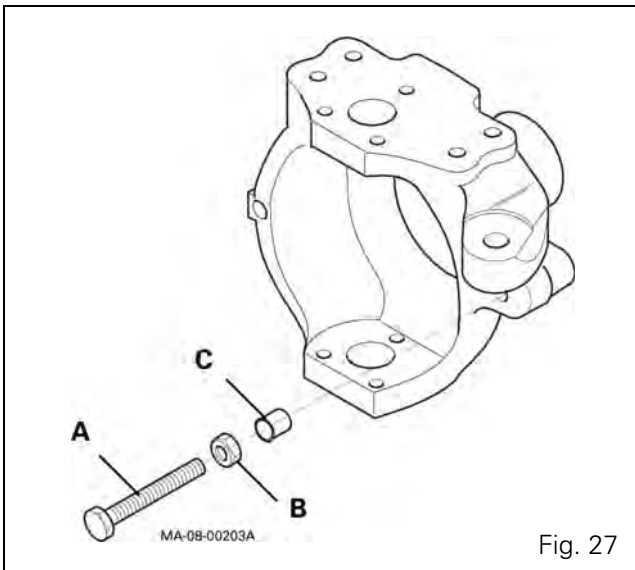


Fig. 27

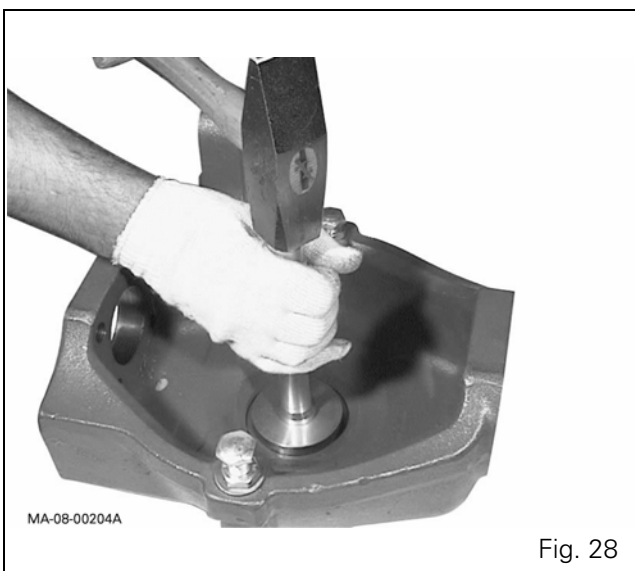


Fig. 28

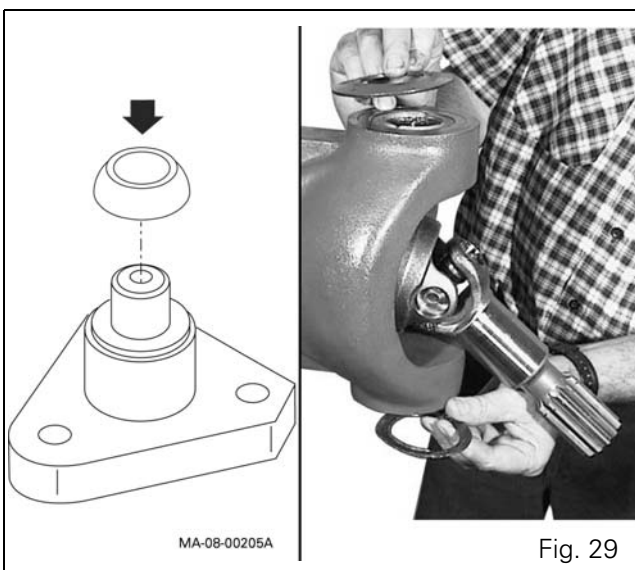


Fig. 29

CARRARO - Final drive units

- 29.** Attach the swivel housing assembly with a sling. Lubricate the seal lip and protect the splined end of the shaft by wrapping adhesive tape around it to protect the seal from damage. After assembly, completely remove the adhesive tape. Fit the swivel housing on the axle beam. Install the two pivot pins, one upper and one lower, and tighten the screws to the required torque (see chapter 8) using a torque wrench (Fig. 30).

NOTE: Ensure that the Belleville washers remain in place.

- 30.** The special "Set Right" operation, which consists of shimming the bearings, does not require any specific preload or setting. The required values should always be checked before installing new parts (Fig. 31).

- **A** = 08.450 to 08.500 mm
- **B** = 54.775 to 54.825 mm
- **C** = 23.070 to 23.172 mm

- 31.** Place the wheel hub on a workbench and install the two tapered roller bearing cups using special tool ref. CA715026 (see § K) and a press or hammer (Fig. 32). Insert the lip seal into the wheel hub using special tool ref. CA119143 (see § K) and a hammer.

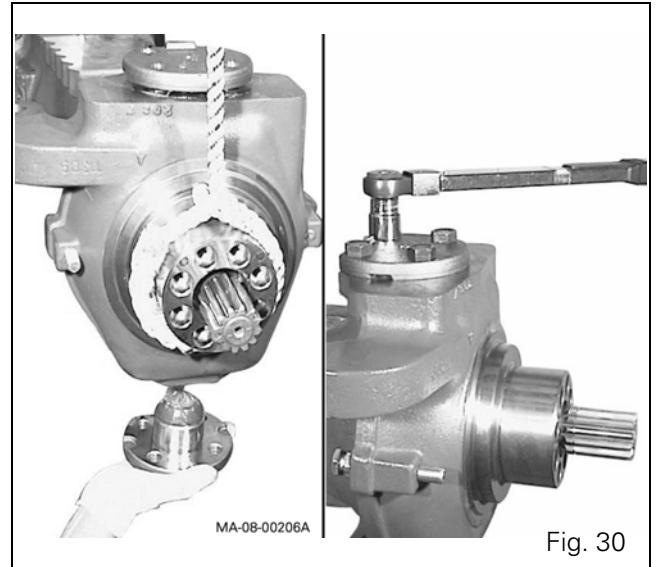


Fig. 30

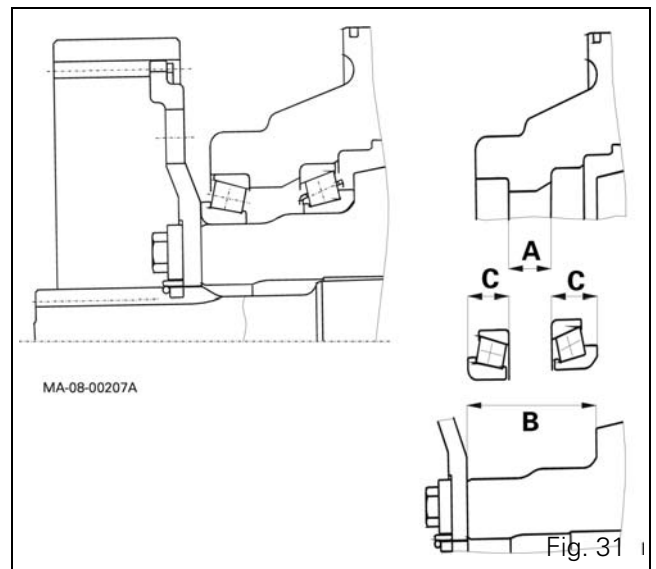


Fig. 31

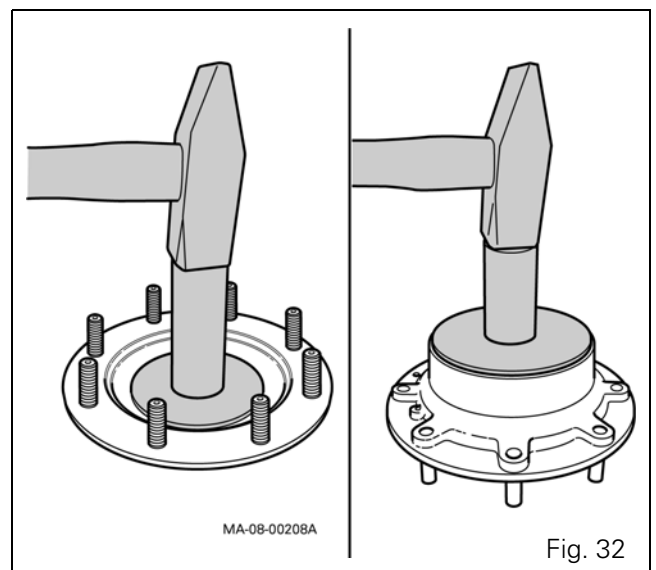


Fig. 32

CARRARO - Final drive units

32. Fit the bearing cone at the end of the pivot pin. Assemble the hub on the pivot pin and fit the second bearing cone (Fig. 33).
33. Place the ring gear carrier on a workbench and ensure that the rings are flush with the ring gear carrier surface using special tool ref. CA715027 (see § K). The two rings must be positioned slightly higher than the ring gear carrier surface to act as guide pins (Fig. 34).

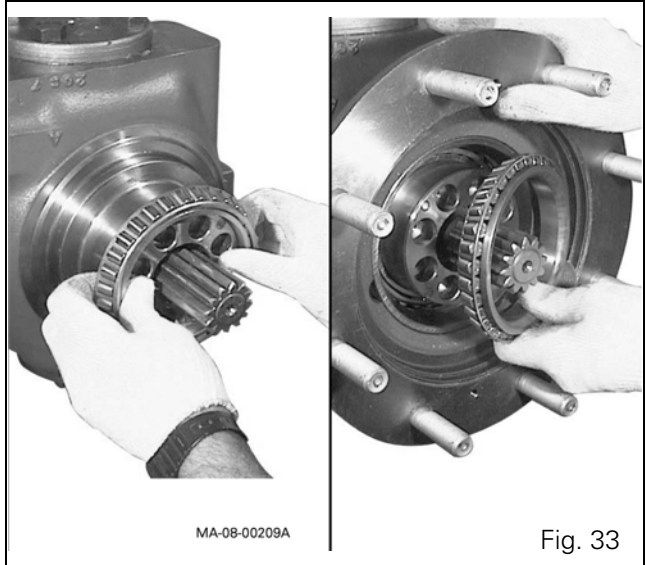


Fig. 33

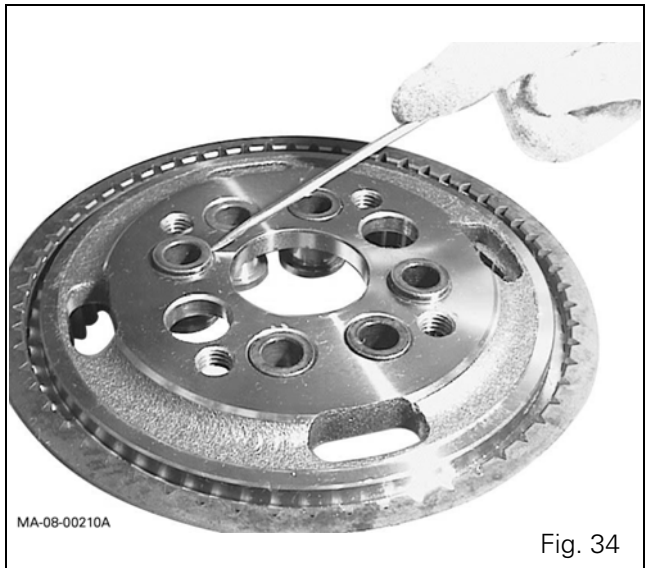
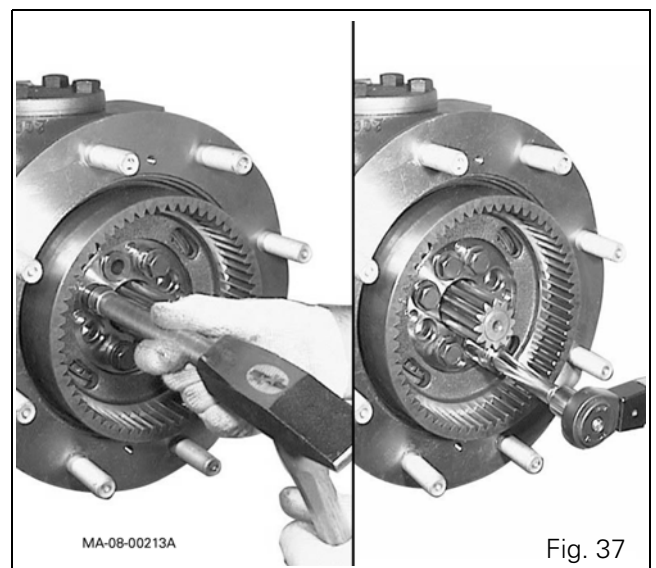
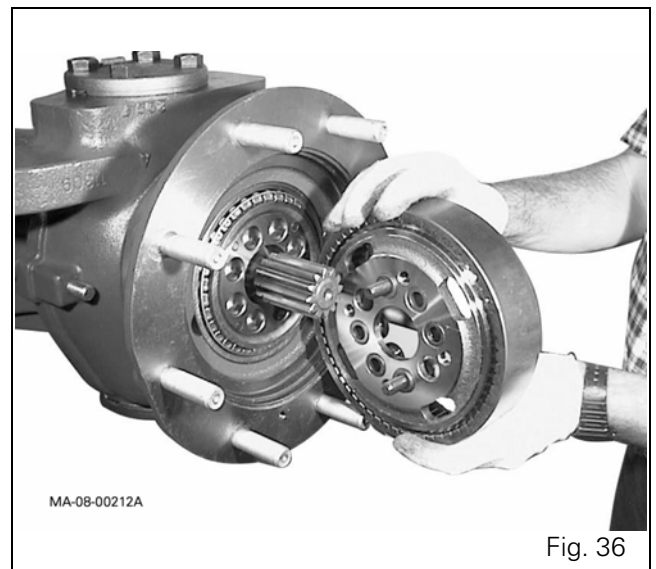
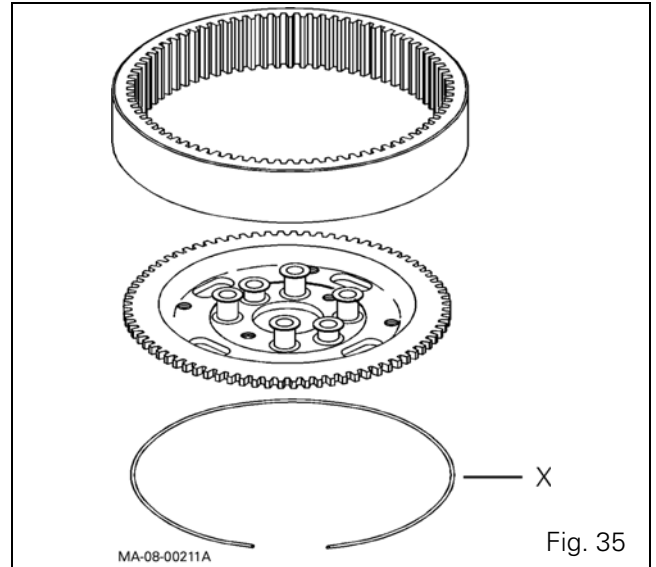


Fig. 34

CARRARO - Final drive units

34. Pre-position the assembly consisting of the ring gear carrier and the epicyclic ring gear with special snap ring X, as shown in Fig. 35.
 35. Fit the ring gear carrier assembly on the wheel hub using the two shouldered rings as guide pins and tighten the corresponding screws until the ring gear comes into contact with the wheel hub (Fig. 36).
- NOTE:** Do not use the two screws that were used to remove the ring gear assembly from its housing when disassembling (see step 12).
36. Force fit all the rings using special tool ref. CA715027 (see § K) and a hammer. Fit the ring gear carrier screws and tighten to the required torque (see chapter 8) (Fig. 37).



CARRARO - Final drive units

- 37.** Insert a lever between the swivel housing and slide it into the universal joint. Push on the joint with the lever in the direction of the final drive to remove the shaft and facilitate reassembly of the circlip (Fig. 38).

Fit two new star washers on the shaft (Fig. 39).

NOTE: Check that the two washers are correctly positioned (Fig. 40).



MA-08-00214A

Fig. 38



MA-08-00215A

Fig. 39



MA-08-00216A

Fig. 40

CARRARO - Final drive units

38. Fit a new washer, positioning it so that the groove faces outwards (Fig. 41).
39. Fit the snap ring. Take care not to damage it during assembly (Fig. 42).
40. Carefully push the universal joint and ensure that the circlip is correctly positioned in the groove of the washer (Fig. 43).

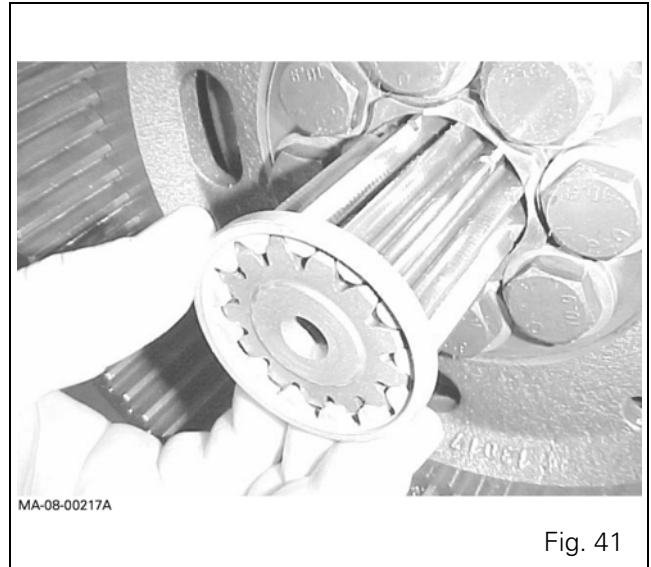


Fig. 41

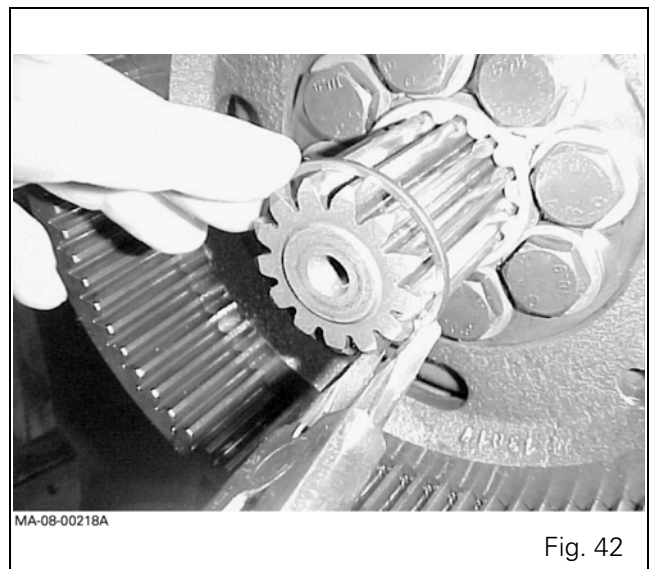


Fig. 42

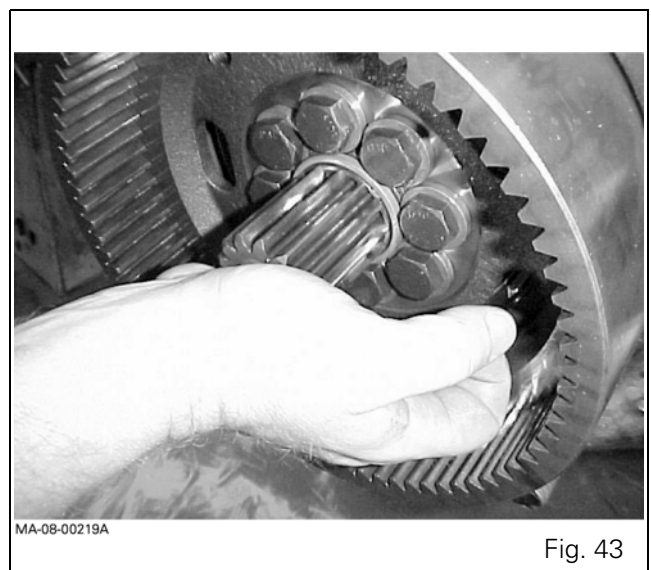


Fig. 43

CARRARO - Final drive units

H . Reassembling the final drive assembly

41. Recover all final drive parts (Fig. 44).
42. Place the planet carrier on a workbench.
Into the planet carrier pins insert: the lower bearings, the planet gears and then the upper bearings.
Fit the thrust washers with their circlips (Fig. 45).
NOTE: Using a torque wrench, tighten the screws to the required torque (see chapter 8).
43. Fit a new "O" ring on the wheel hub (Fig. 46).
Fit the final drive on the hub.
Using a torque wrench, tighten the screws to the required torque (see chapter 8).

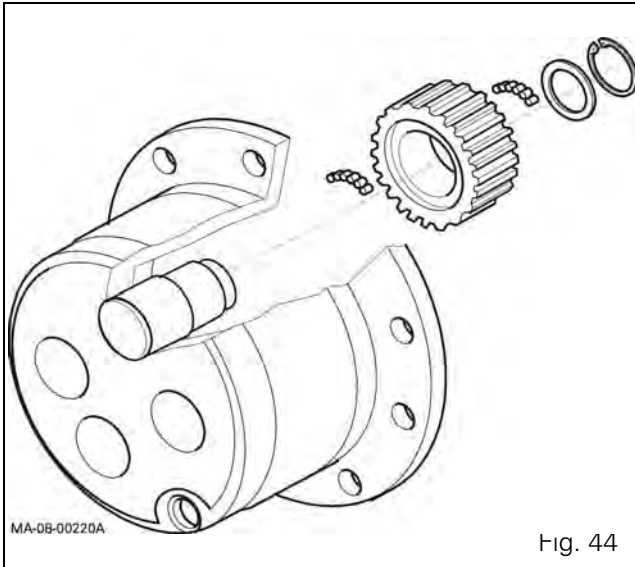


Fig. 44

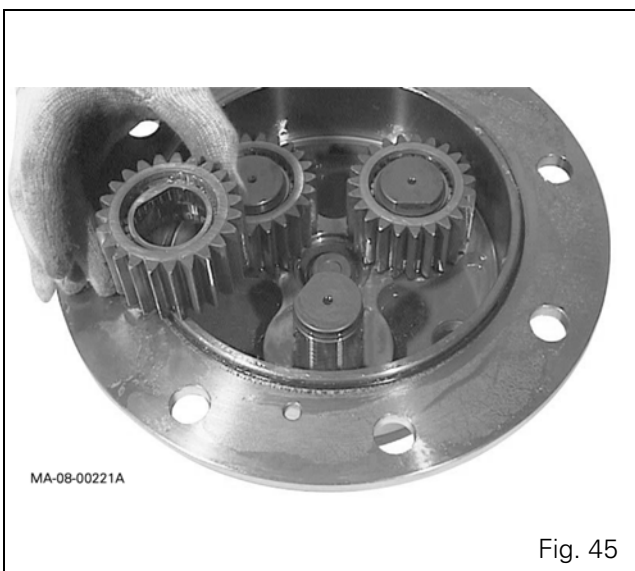
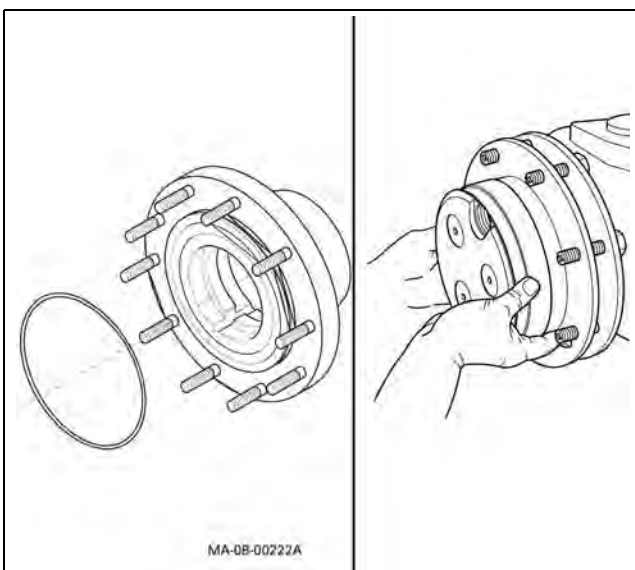


Fig. 45



I . Wheel alignment

44. Place two identical straight bars, each one metre long, along the sides of the ring gear and lock them on the wheel hub stud using two nuts (Fig. 47).

45. Measure the distance M in mm between the ends of the bars (Fig. 49).

NOTE: Keep the minimum value by oscillating the measurement point.

46. Ensure that the deviation in measurement A between the ends of the wheel hub diameters does not exceed the permissible values (see chapter 8). Measured value M taken at the ends of the bars must depend on the ratio between the length of the bar and the diameter of the flange:

- Alignment (see chapter 8) = A0-2
- Measurement deviation = M0-5.

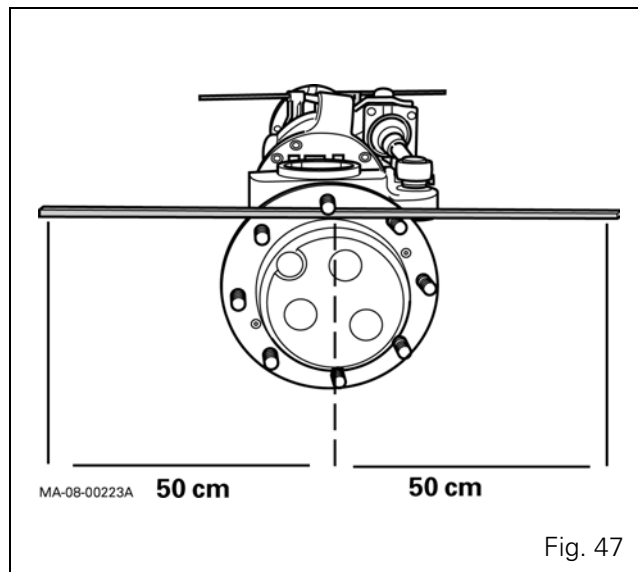


Fig. 47

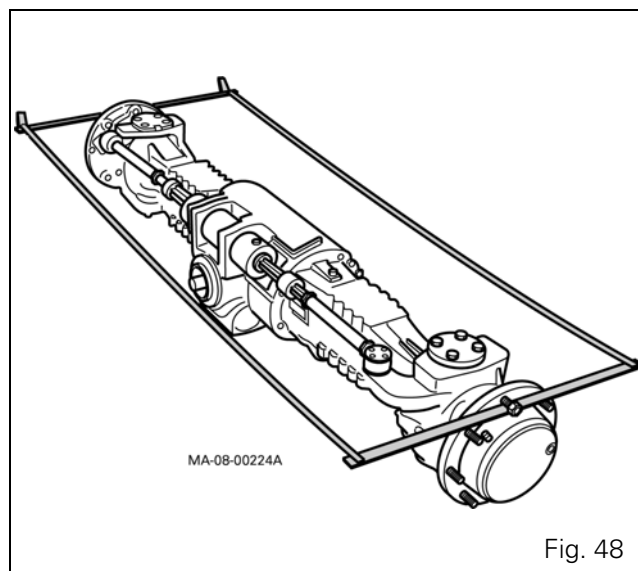


Fig. 48

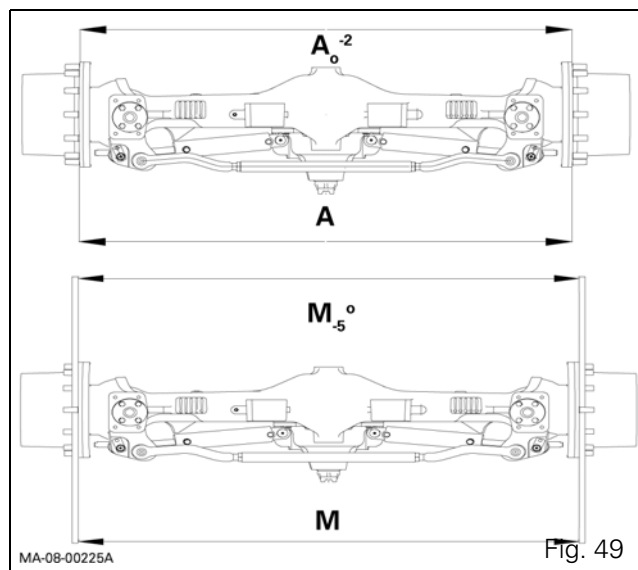
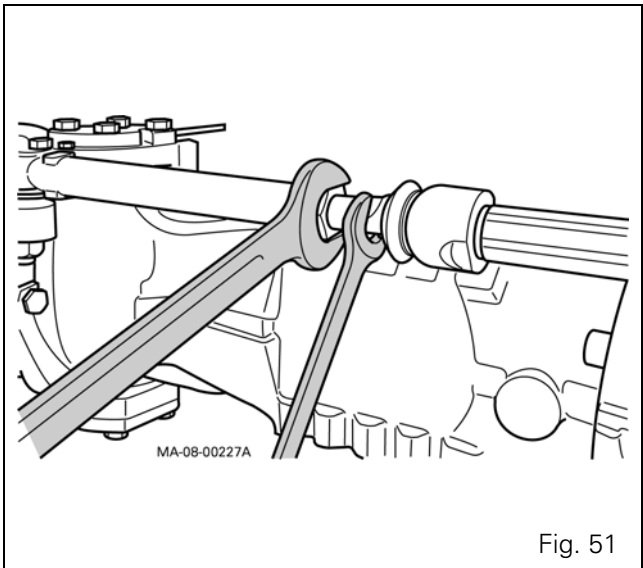
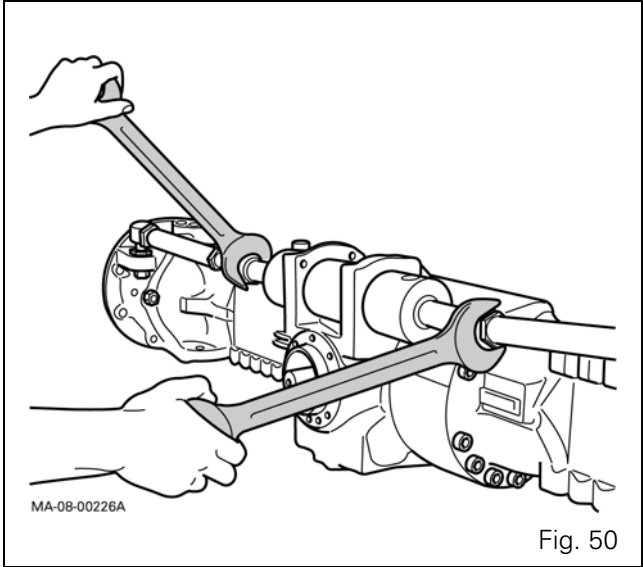


Fig. 49

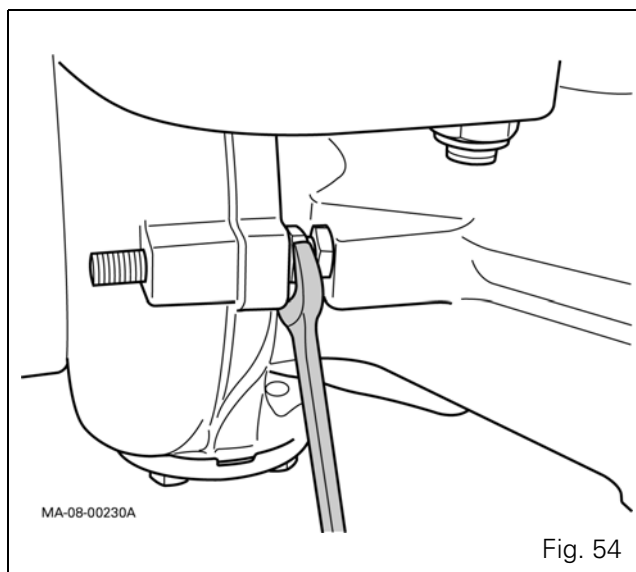
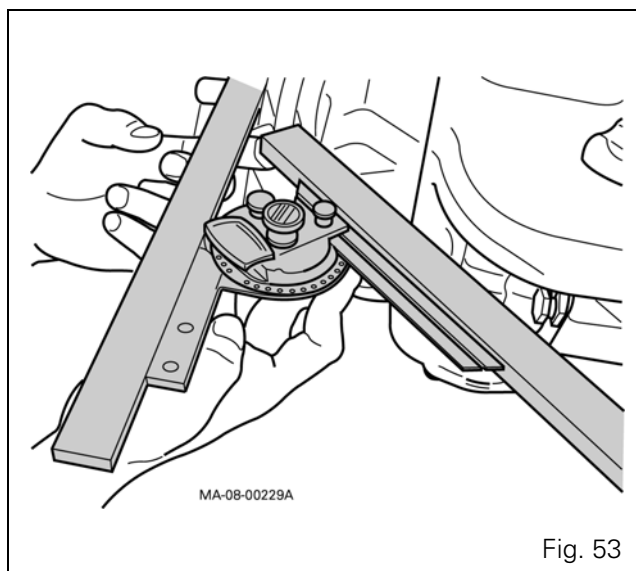
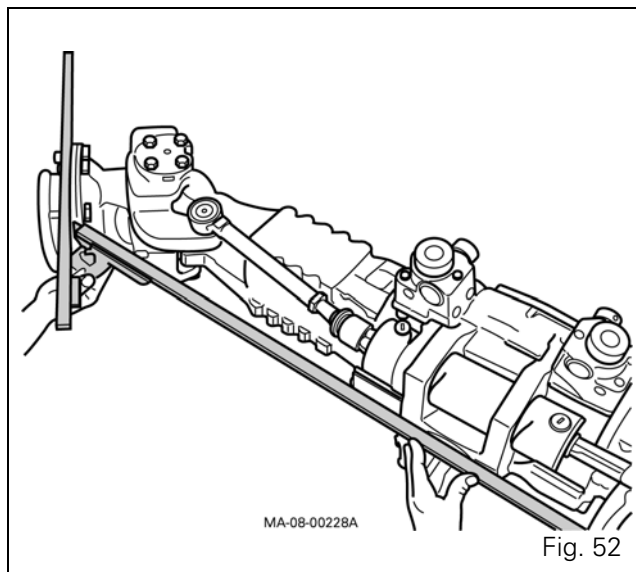
CARRARO - Final drive units

47. If the alignment is not correct, adjust the selector rails by screwing or unscrewing both tie rods equally, using two wrenches, until the alignment is within the permitted values (Fig. 50).
48. Once adjustment is complete, screw the locknuts of the selector rails to the required torque (see chapter 8) (Fig. 51).



J . Adjusting the steering angle

49. Use the bars fitted to adjust alignment and a long bar pressing against the machined part of the central body (gear side) so that the two bars form an acute angle corresponding to the maximum steering lock position (Fig. 52).
50. Adjust the goniometer to the required steering angle (see chapter 8) and position it on the long bar. Move one side of the ring gear to obtain the angle defined by the goniometer and formed by the ring gear and the long bar (Fig. 53).
51. Adjust the mechanical steering stop by tightening or loosening the special screws (Fig. 54), then lock them to the required torque (see chapter 8) using the counter-nut.
Lock steering in the other direction and repeat this procedure (Fig. 54).



CARRARO - Final drive units

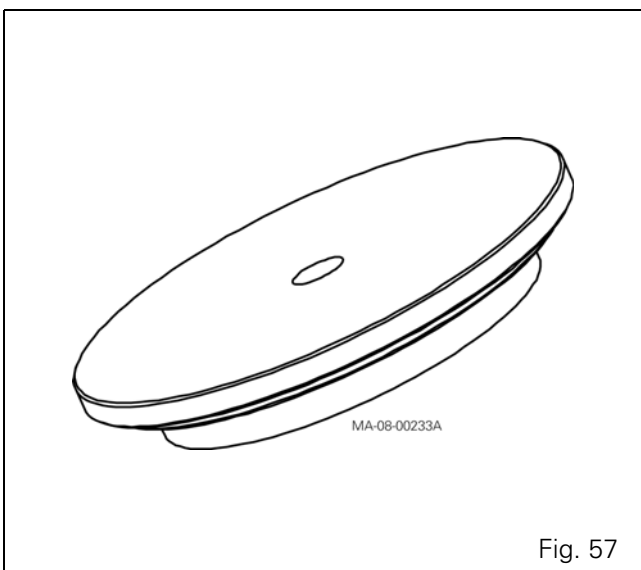
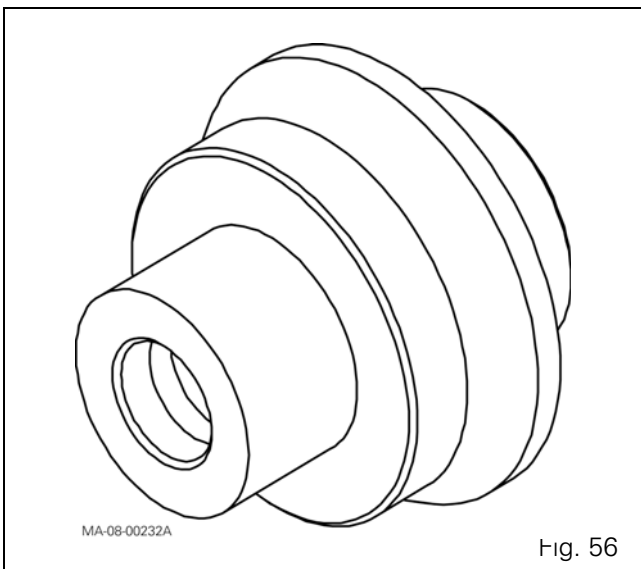
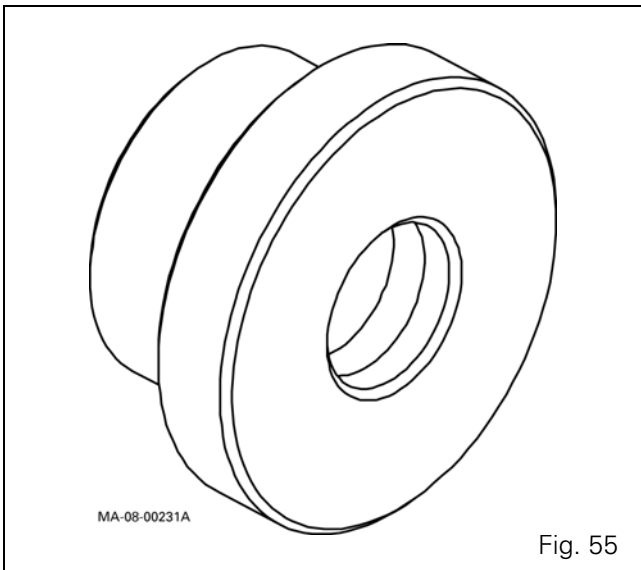
K . Service tools

Tools available in the AGCO network

CA 119055 - Ring fitting tool ([Fig. 55](#))

CA 119139 - CA 715097 - Seal fitting tool ([Fig. 56](#))

CA 119143 - Seal fitting tool ([Fig. 57](#))

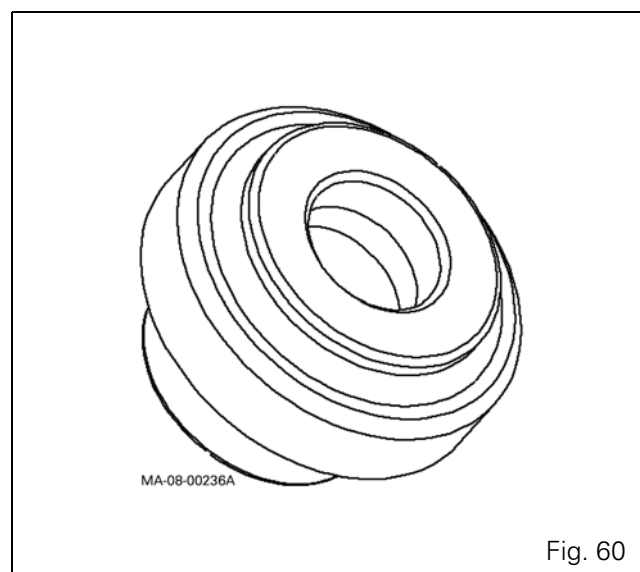
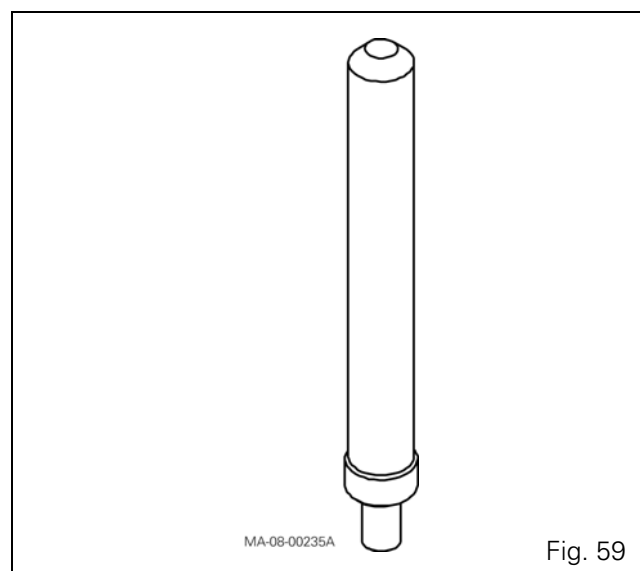
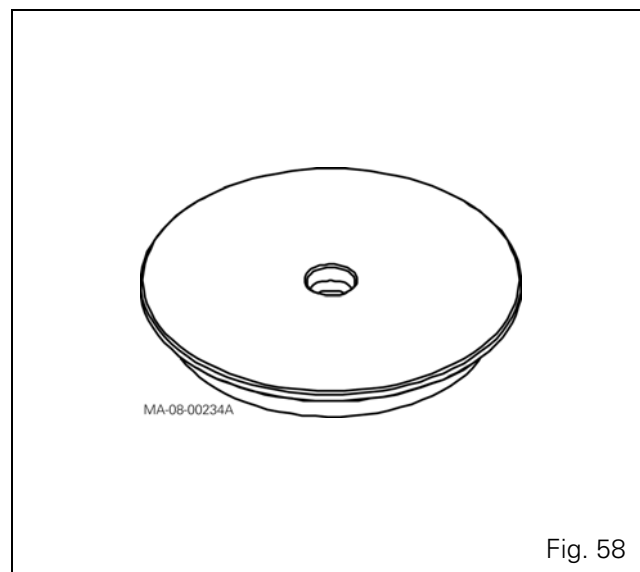


CARRARO - Final drive units

CA 715026 - Bearing cone fitting tool ([Fig. 58](#))

CA 715027 - Ring fitting tool ([Fig. 59](#))

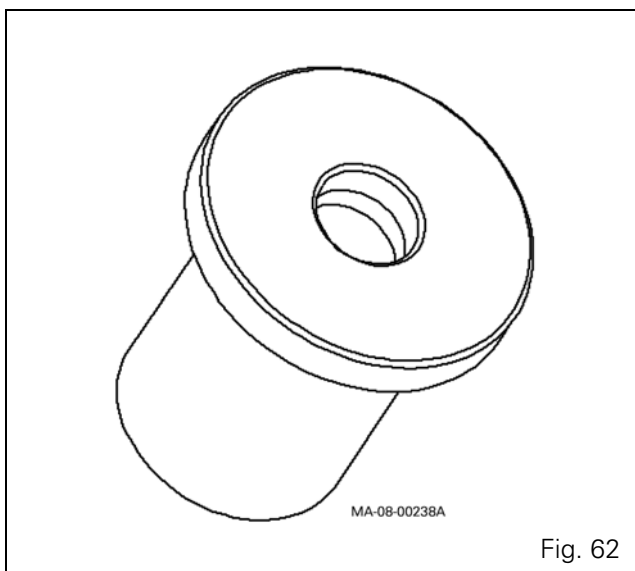
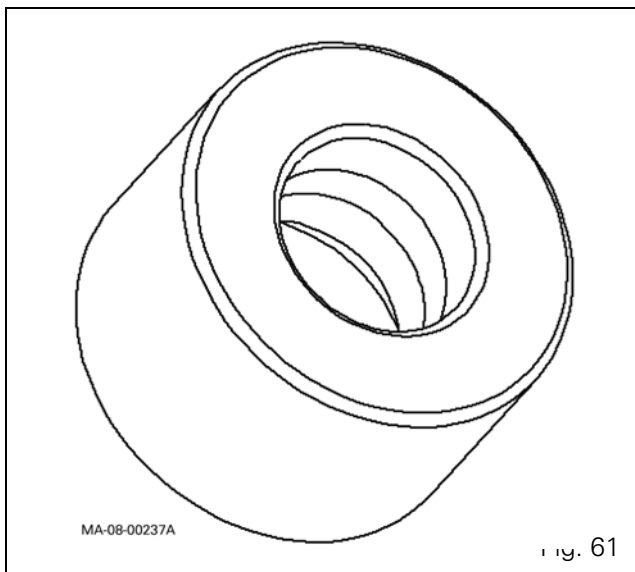
CA 715034 - Ring fitting tool ([Fig. 60](#))



CARRARO - Final drive units

CA 715035 - Pivot pin ring fitting tool ([Fig. 61](#))

CA 715252, CA 715108, CA 119097, CA 715037 - Ring fitting tool ([Fig. 62](#))



8B12- CARRARO - Differential

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CARRARO - Differential

A . General

Some of the following illustrations may show axles that differ slightly from your model, but the procedure is the same.

B . Splitting the front axle / frame

1. Drain the axle housing.
2. Disconnect the axle and its bearings from the front frame (see chapter 8).

C . Removing the wheel hubs, axle beam assembly and steering ram

3. Remove the wheel hubs (see chapter 8).
4. Remove the axle beam assembly (see chapter 8).
5. Remove the steering ram.

CARRARO - Differential

D . Dismantling the differential housing assembly

6. Remove screw B with its nut from flange A. Extract the flange and recover the seal C (Fig. 1).

NOTE: This will destroy the seal.

7. Loosen and remove the screws from the differential housing.

Remove the differential housing (Fig. 2).

CAUTION: Hold the differential housing in place with a sling or other suitable device (Fig. 2).

8. Loosen and remove screws A to extract the two nut retainers B (Fig. 3).

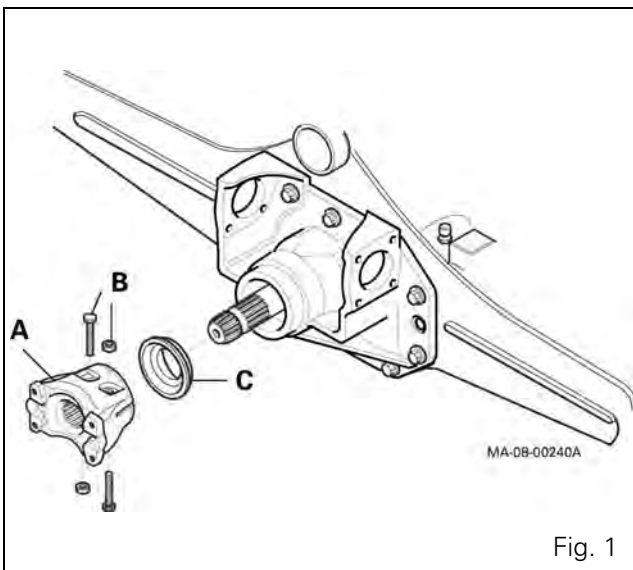


Fig. 1

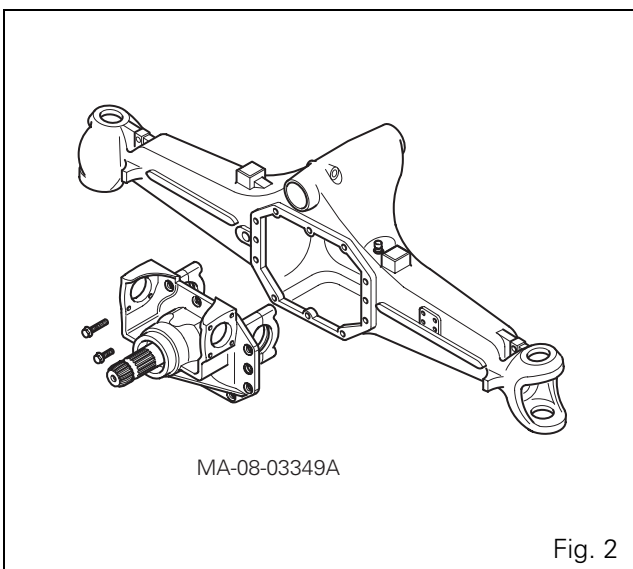


Fig. 2

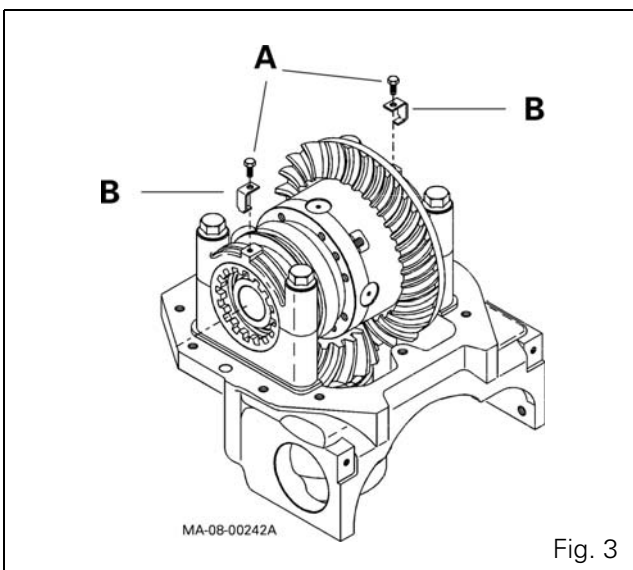


Fig. 3

CARRARO - Differential

9. Before removing the screws, make indelible marks to mark the position of the two half-bearings and the differential housing to avoid reassembling the wrong way round. Also mark the area between the nuts and the differential housing (Fig. 4).
10. Loosen the adjusting ring nuts using the tools ref. CA119030 (see § J) and CA119149 (see § J) (Fig. 5).
NOTE: As the two nuts are different, mark their position relative to the bevel ring gear.
11. Remove the 4 screws A and the two half-bearings B. Check that rings C stay in place in their seatings (Fig. 6).

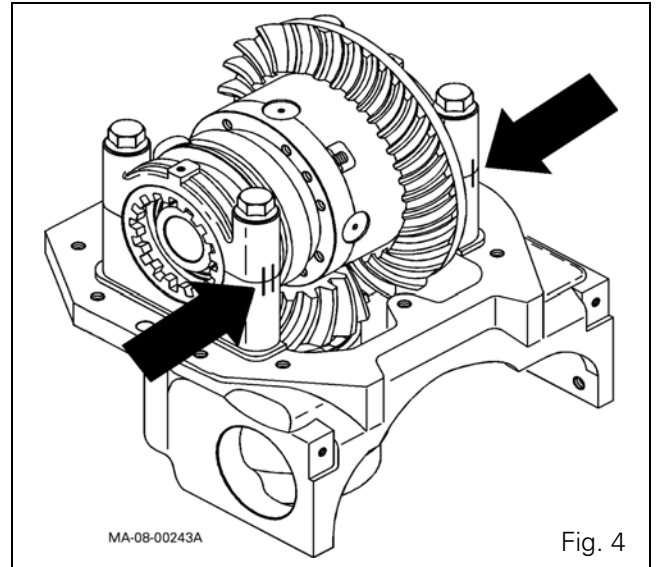


Fig. 4

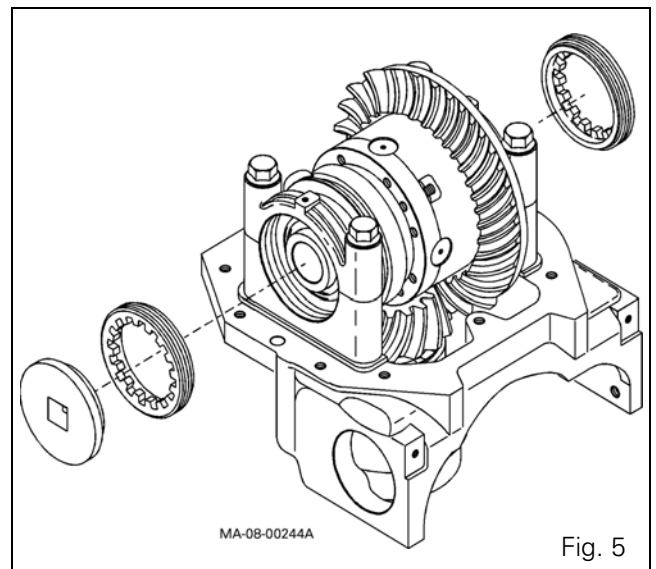


Fig. 5

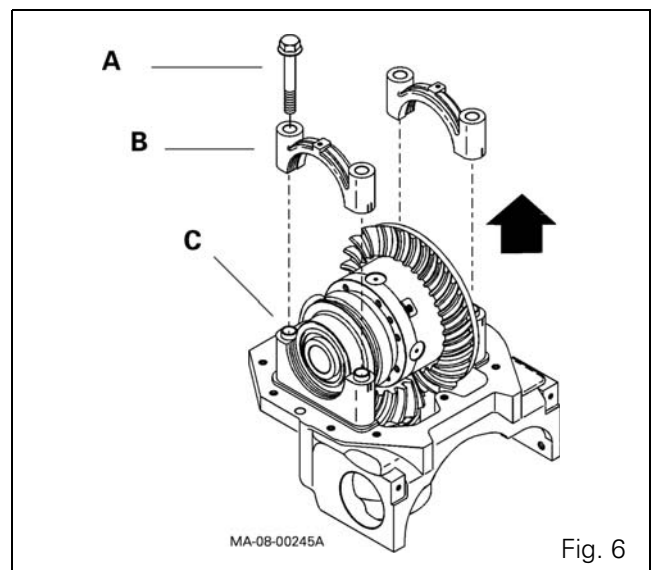


Fig. 6

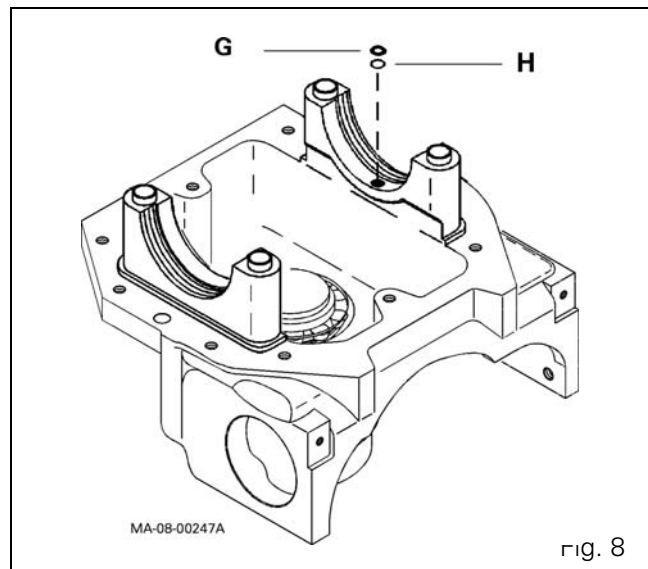
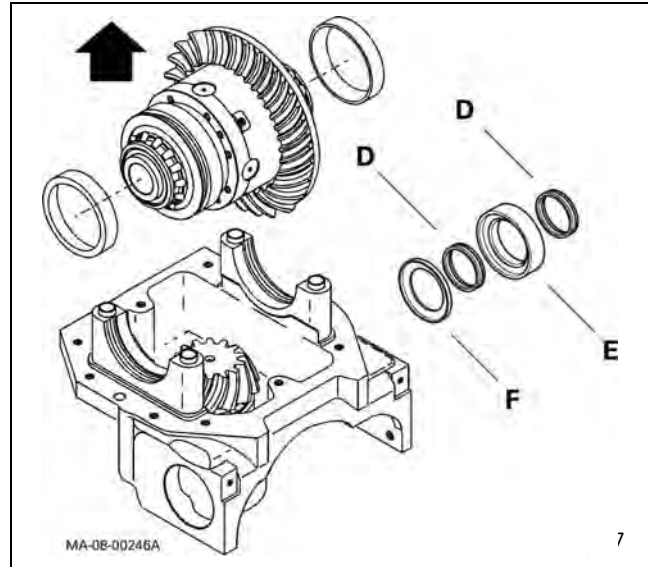
CARRARO - Differential

12. Remove the differential unit.

From the ring gear side, remove and recover spacer E with its set of rings D, washer F and the bearings removed with the differential unit (Fig. 7).

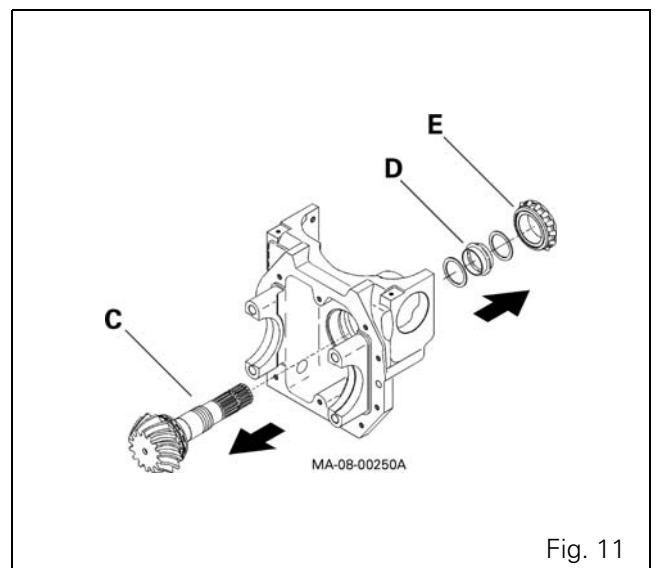
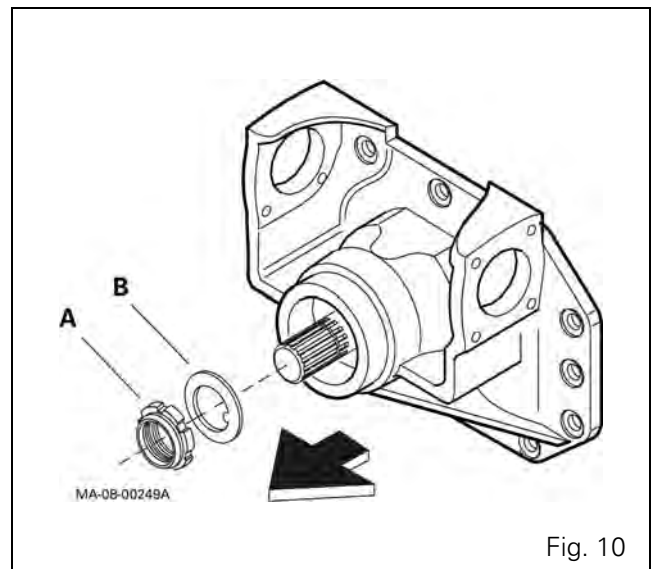
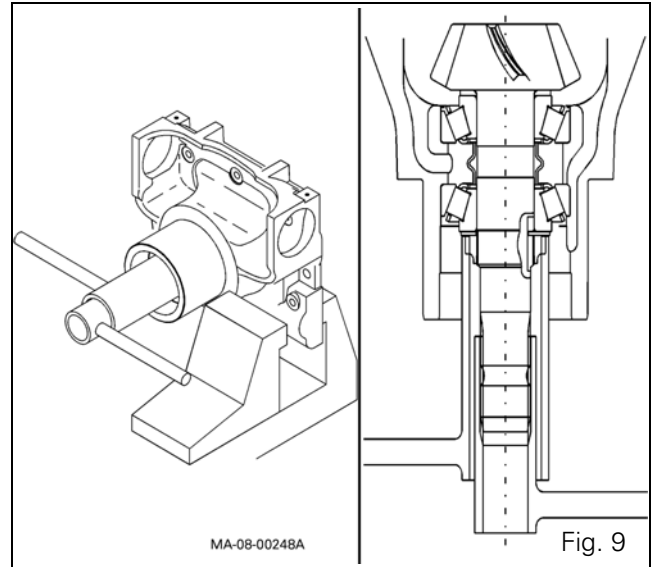
CAUTION: Be careful not to invert the bearings if they need to be refitted.

13. Recover washer G and "O" ring H from the bearing seating on the side of the epicyclic ring gear (Fig. 8).



E . Dismantling the pinion assembly

14. Install the differential assembly in a vice.
Loosen the locknut using the tools ref. CA119099 and CA715022 (see § J) (Fig. 9).
- NOTE:** *This will irreparably destroy the nut.*
15. Extract nut A and recover retaining washer B (Fig. 10).
16. Extract bevel gear C using a hammer.
WARNING: *Ensure that the pinion does not fall out.*
Recover the washers, flexible spacer D and internal cone E from the tapered roller bearing (Fig. 11).



CARRARO - Differential

17. Place the differential housing on a level surface as shown in Fig. 12 and extract the external cups from the roller bearing, using a drift or a hammer (Fig. 12).
18. Remove the inside cone of the pinion's tapered roller bearing using a standard puller. Recover the bearing cone and the shim located underneath it (Fig. 13).
19. Check all the pinion parts for wear (Fig. 14).
The ring nut and the flexible spacer must be replaced when refitting the assembly.

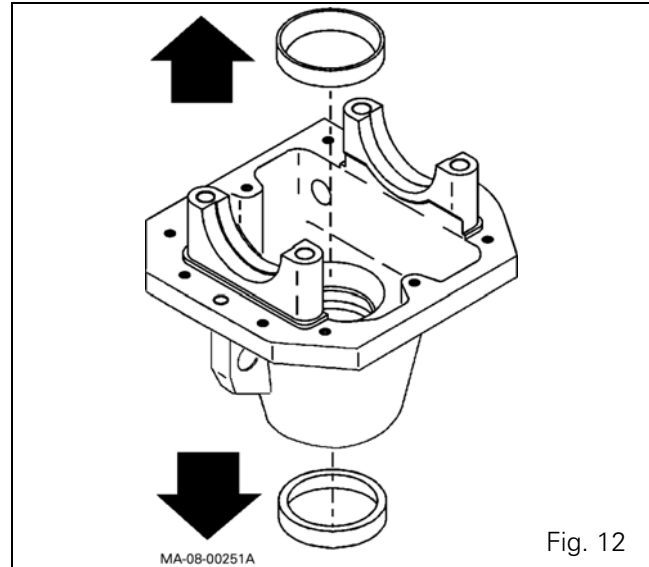


Fig. 12

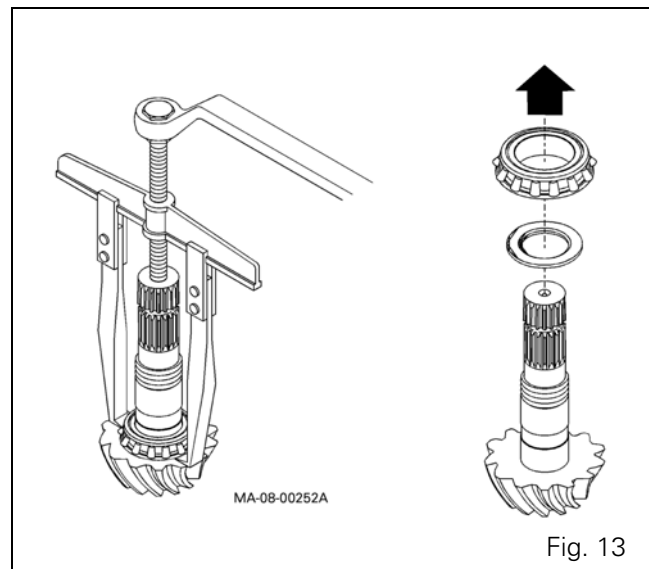


Fig. 13

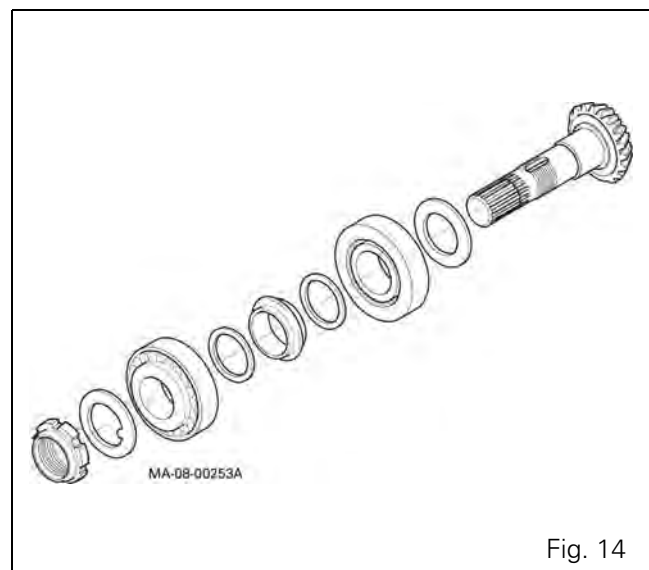


Fig. 14

F . Dismantling the differential assembly

20. Recover the differential and secure it in a vice.
Loosen the screws and remove the bevel ring gear (Fig. 15).

CAUTION:

This operation releases the two half-bearings from the differential.

Ensure that the internal parts do not fall out.

21. Detach cover plate A from differential unit C, then extract piston B.

Recover the "O" rings from the cover plate and the differential lock piston (internal and external housings) (Fig. 16).

22. Remove the plates, drive discs and sun gear D from the differential unit (Fig. 17).

NOTE: *Disassemble the parts that have been removed and examine them carefully, checking in particular for wear and ensuring that they are functioning correctly.*

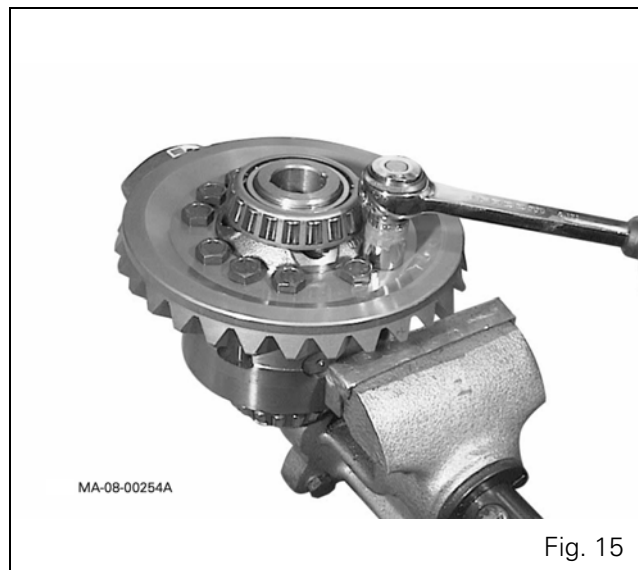


Fig. 15

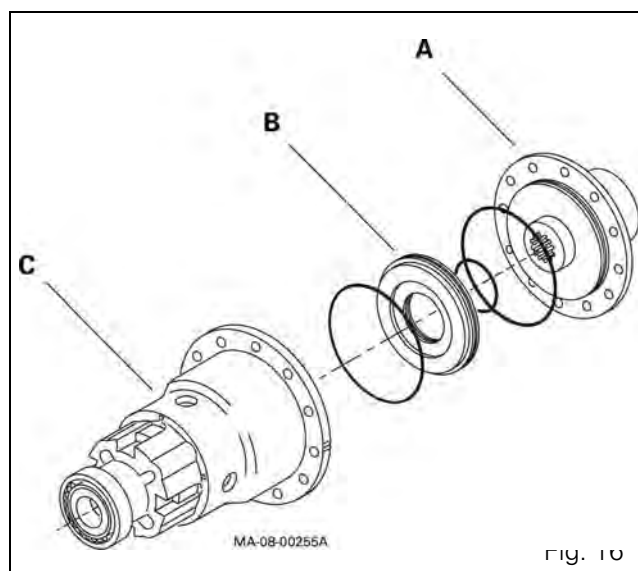


Fig. 16

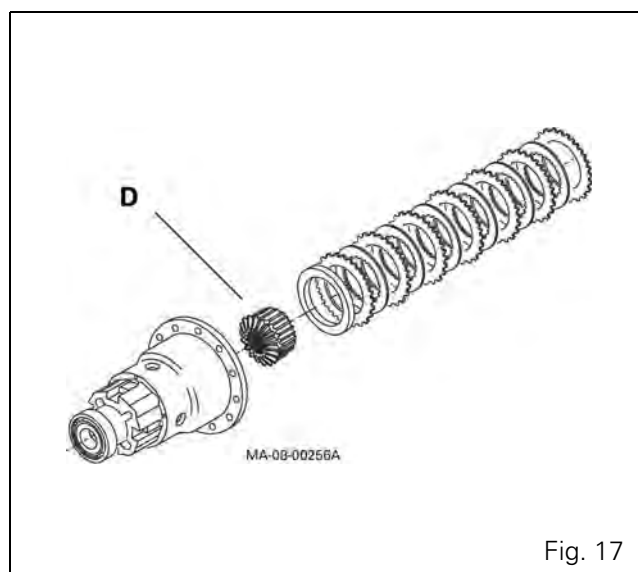


Fig. 17

CARRARO - Differential

23. Use a fine punch to extract the locating pin in order to remove the long pin (Fig. 18).
24. Disassemble the planet carrier and recover the parts it contains: planet gears, thrust washers, spider, sun gear (Fig. 19).
NOTE: Check all parts for wear and ensure they are functioning correctly.
25. Extract the bearings from the half-bearings and the cover plate using a three-point puller (Fig. 20).

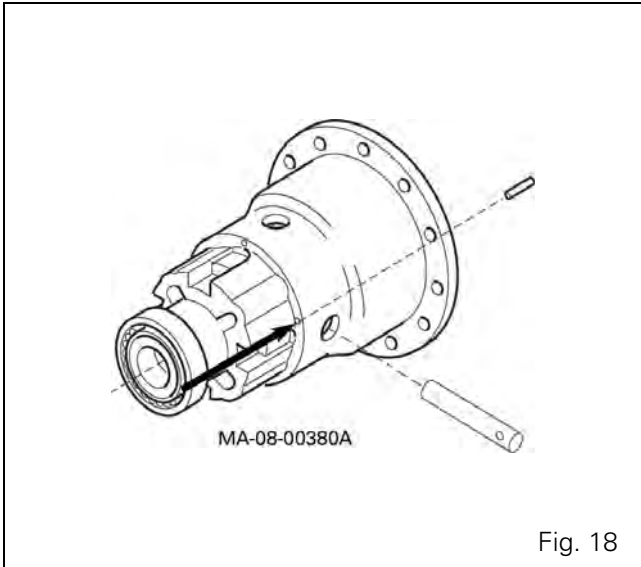


Fig. 18

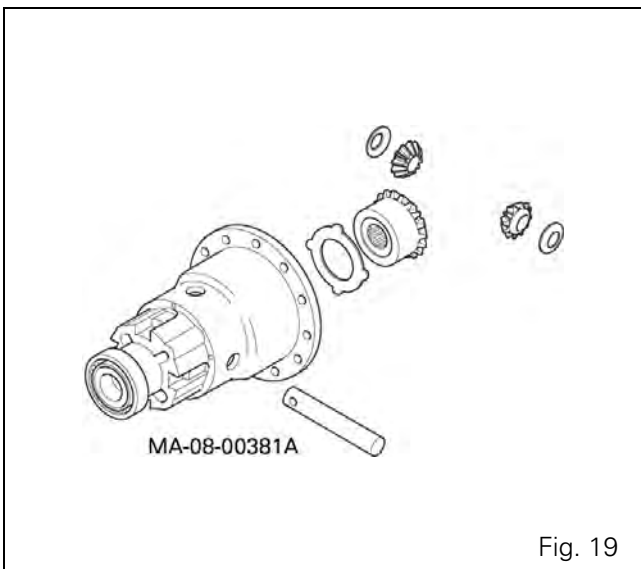


Fig. 19

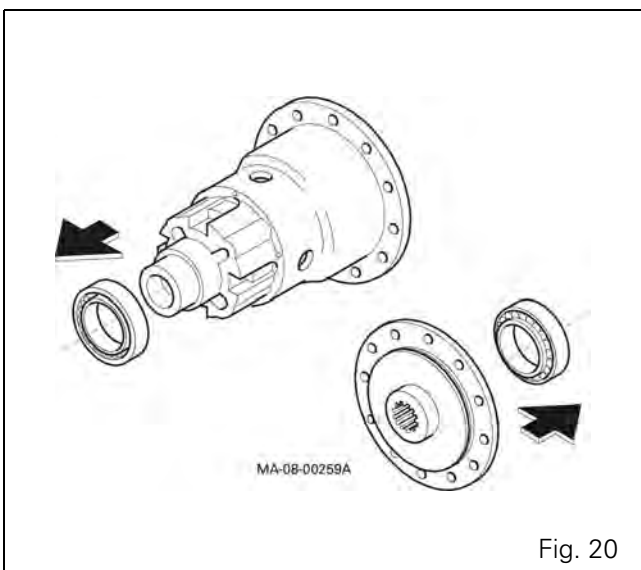
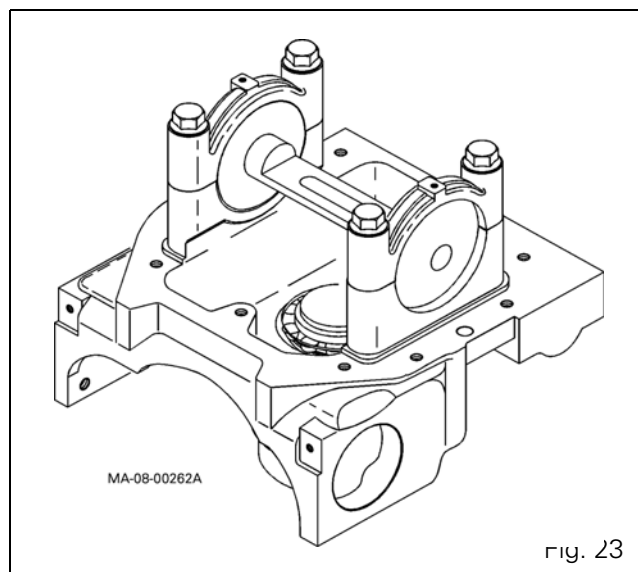
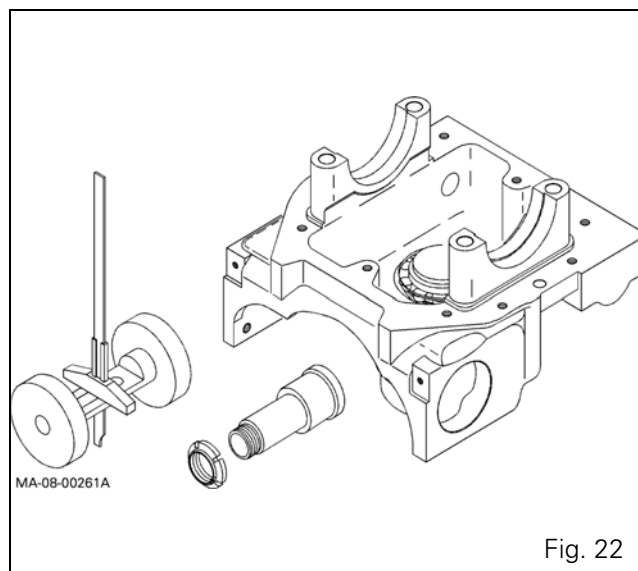
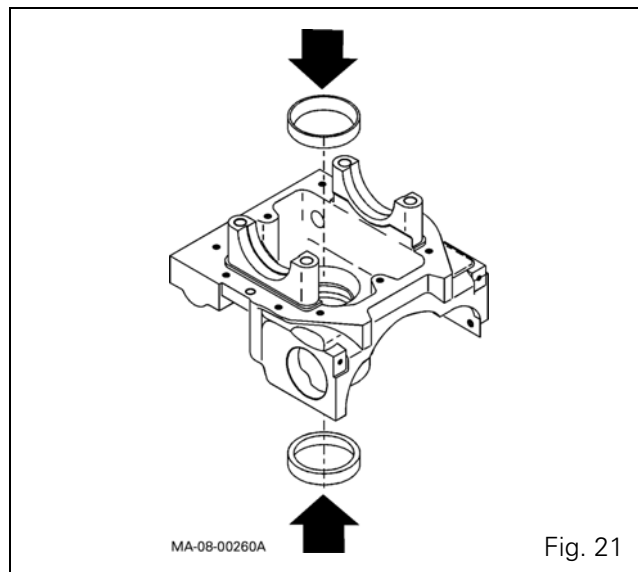


Fig. 20

G . Refitting the pinion assembly

26. Place the differential housing on a workbench.
Fit the external cups for the new bearings using special drifts ref. CA119225 and CA715092 (see § J) and a hammer (Fig. 21).
27. To measure the distance, use special tool kit, ref. CA119202 "dummy pinion" and CA119182 and CA119228 "dummy differential housing" (see § J) (Fig. 22).
28. Using tool ref. CA119202 (see § J), insert the dummy pinion with its bearings and nut in the newly installed roller bearing.
Tighten without forcing to eliminate the backlash.
Fit tools ref. CA119182 and CA119228 (see § J) on the differential housing supports and tighten the half-bearing screws (Fig. 23).



CARRARO - Differential

- 29.** Assembly diagram for tools ref. CA119182 and CA119228 (see § J) on the differential housing supports.

Using a depth gauge, measure distance B (between the bearing pin and the bearing point of the pinion head or bearing base) (Fig. 24).

- 30.** To determine the necessary thickness S between the pinion and the bearing, subtract the value V engraved on the pinion head (V = specified taper distance) from the measured value B (Fig. 25):

$$S = B - V$$

- 31.** Select the required thickness S from the range of shims available and insert the chosen shim under the pinion head.

NOTE: Ensure that it is fitted correctly.

Range of shims										
Thickness	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.2	3.3	3.4
Quantity	-	-	-	-	-	-	-	-	-	-

- 32.** After inserting the correct shim with its chamfer facing the pinion, force fit the bearing at the end of the pinion pin using special tool ref. CA715004 (see § J) and a press, ensuring that it is seated correctly.

Fit the shims and a new flexible spacer (Fig. 26).

NOTE: Systematically fit a new flexible spacer.

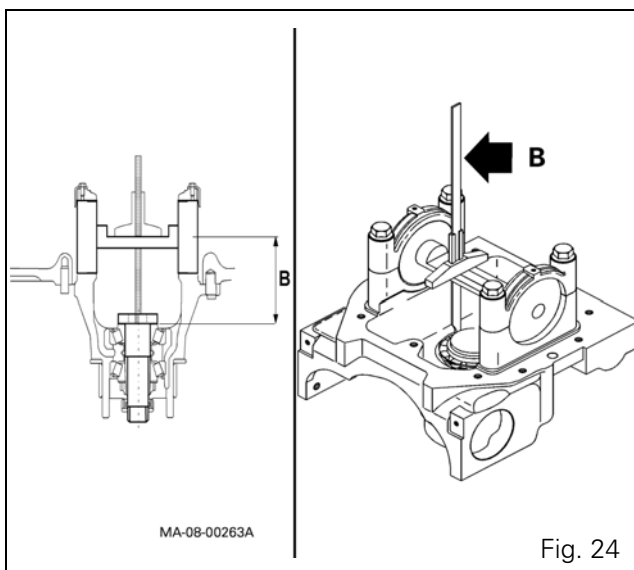


Fig. 24

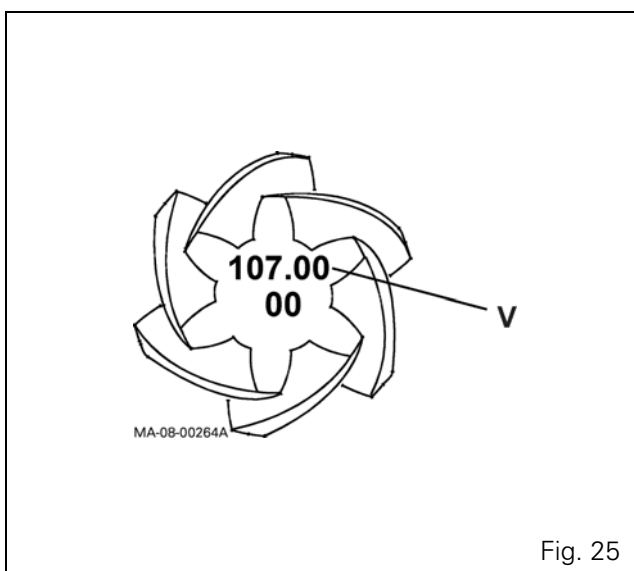


Fig. 25

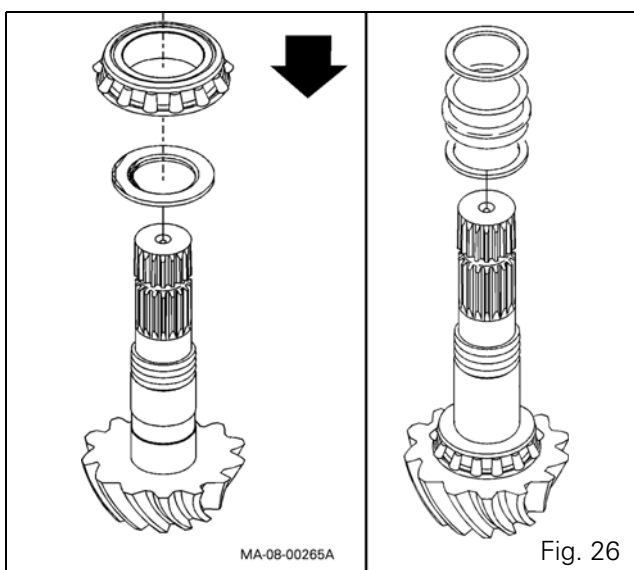


Fig. 26

CARRARO - Differential

33. Insert the bevel gear assembly into the differential housing (axle beam internal side) and the second bearing cone at the end of the pinion, on the opposite side. Force fit the second bearing using special tool ref. CA715004 (see § J) and a hammer. It is recommended that you exert resistance against the striking action of the tool, by using a hammer for example (Fig. 27).
34. Place a retaining washer and screw a new nut onto the end of the pinion (Fig. 28).
35. Screw the nut on with the wrench ref. CA119099 while holding the pinion in place with the tool ref. CA715022 (see § J) (Fig. 29).

WARNINGS:

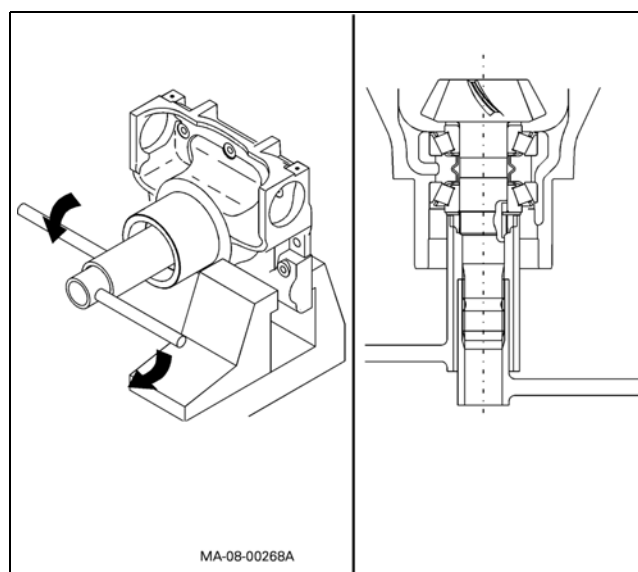
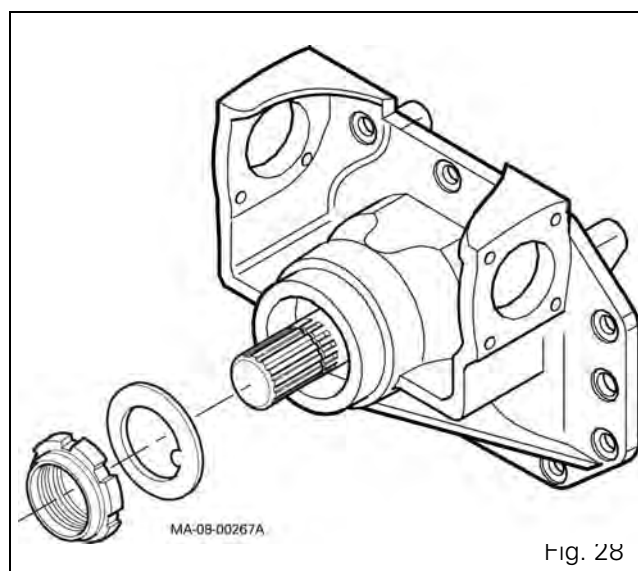
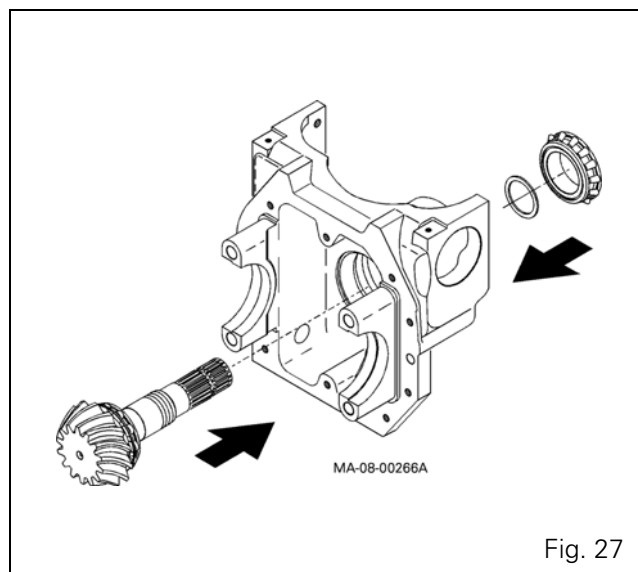
The tightening torque is determined by the bearing preload measurement.

Gradually tighten the nut.

NOTE:

If too much tightening torque is applied, replace the flexible spacer and restart the operation.

When checking bearing preload, it is advisable to gently tap both ends of the pinion with a rubber hammer to make the bearing seating easier.



CARRARO - Differential

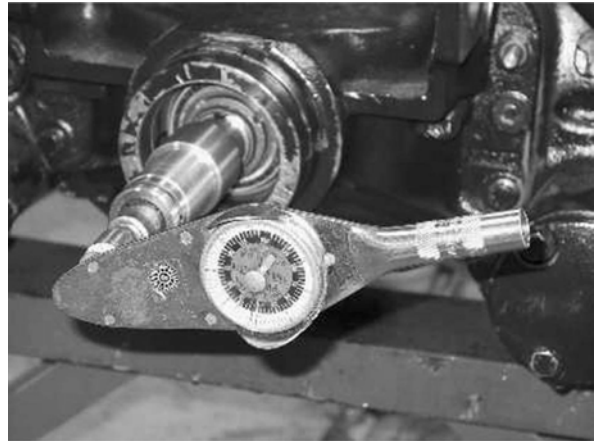
36. Measure the torque P of the tapered roller bearings of the pinion (Fig. 30).

Shimming is carried out by gradually increasing the tightening torque of the nut, taking care not to exceed the recommended value.

WARNING: All torques must be measured without the seal.

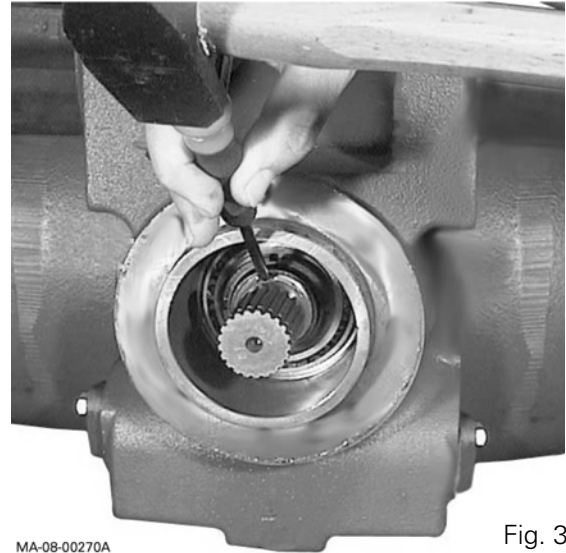
P = 1.82 to 2.72 Nm

37. When the torque value is reached, peen the nut with a hammer and chisel (Fig. 31).



MA-08-00269A

Fig. 30



MA-08-00270A

Fig. 31

H . Reassembling the differential unit

38. Mount the new tapered roller bearings on the half-bearings using special tool ref. CA115093 and a hammer (see § J) (Fig. 32).
39. Position one of the half bearings on a workbench and install the internal parts (thrust washer, sun gear, planet gears, spider) as shown in the figure. Insert the pin into its housing, holding the planet gears and spider correctly in place (Fig. 33).
40. Lock the pin by inserting the locating dowel in the hole provided on the bearing and pin. Turn the pin manually to align the hole of the dowel with that of the bearing (Fig. 34).

NOTE: *Definitively position the locating dowel.*

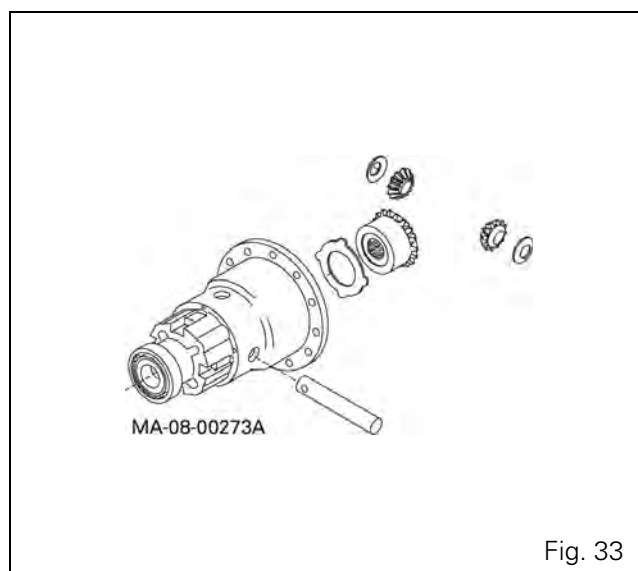
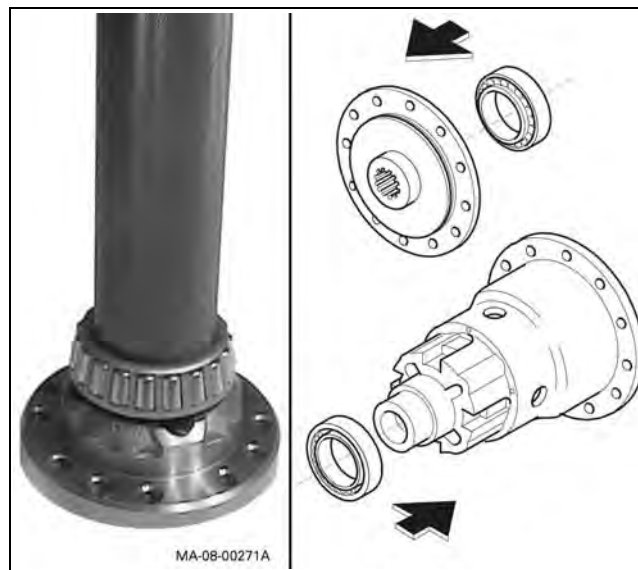


Fig. 33

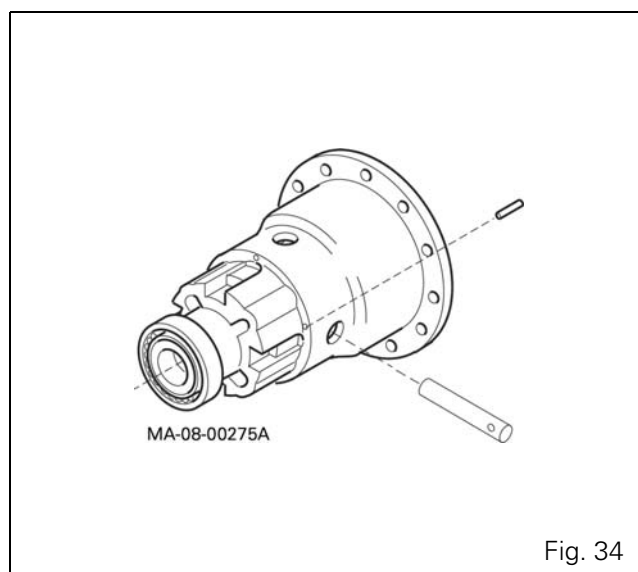


Fig. 34

CARRARO - Differential

41. Position all the internal parts in the bearing: planet gears, discs and counter-discs as shown in the illustration (Fig. 35).
42. Fit new "O" rings in the seatings provided on the piston and on the differential cover plate. Insert the piston and fit the cover plate in the differential housing (Fig. 36).
43. Apply a film of Loctite 476 between the bevel ring gear and the differential housing surface. Position the bevel ring gear on the cover plate, apply Loctite 270 to the threads and attach the assembly, tightening the screws to a torque of 70 Nm (Fig. 37).

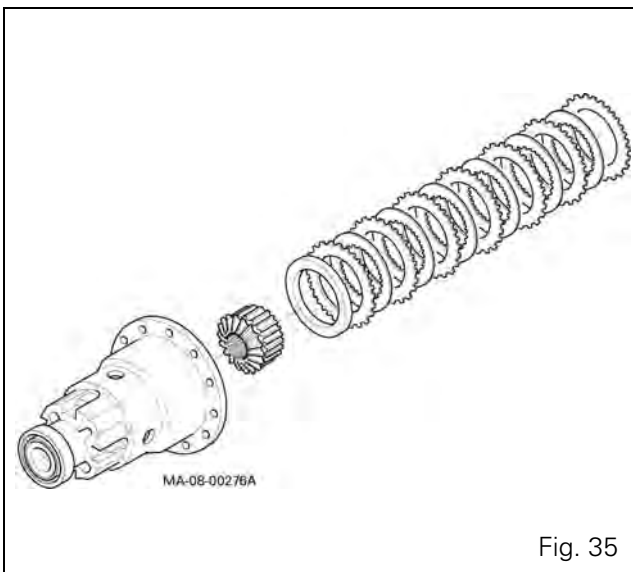


Fig. 35

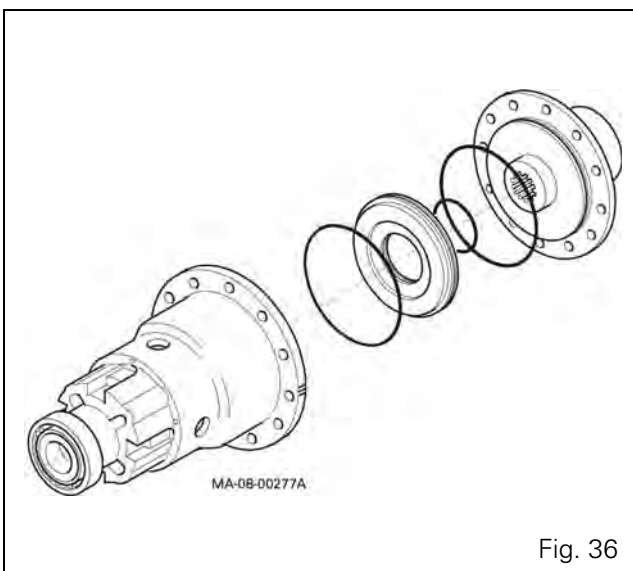


Fig. 36

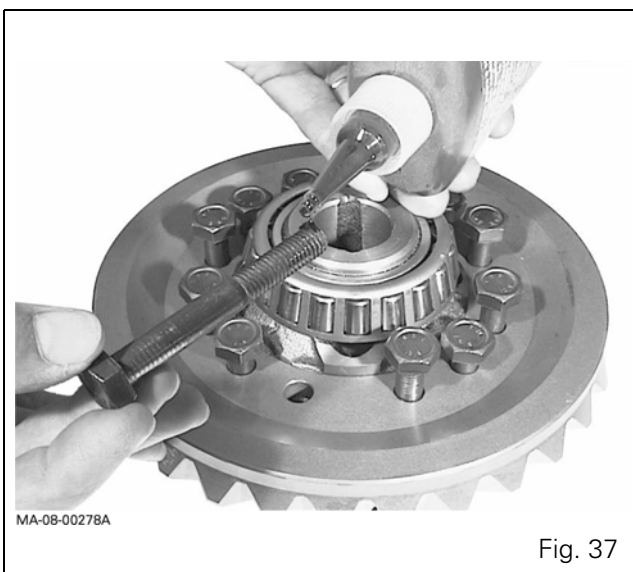


Fig. 37

I . Refitting the differential housing assembly

44. Fit the external tapered roller bearing cups on the two differential bearings and install the washer and spacer on the crownwheel and pinion side with new seals, previously smeared with a thin layer of grease (Fig. 38).
45. Before positioning the differential unit in the differential housing, install a new seal B and washer A at the bearing base on the bevel ring gear side, over the oil hydraulic port.

Fit the unit assembly on the differential housing (Fig. 39).

NOTE: Take care not to invert the external cups of the tapered roller bearings and ensure that the bevel ring gear assembly is fitted on the correct side.

46. Move the differential assembly so that the bevel ring gear can be positioned on the pinion. Ensure that all rings E are in position in their seatings and place both half-bearings D on their seats, following the marks made during disassembly. Lock the two half-bearings with their screws C (Fig. 40).

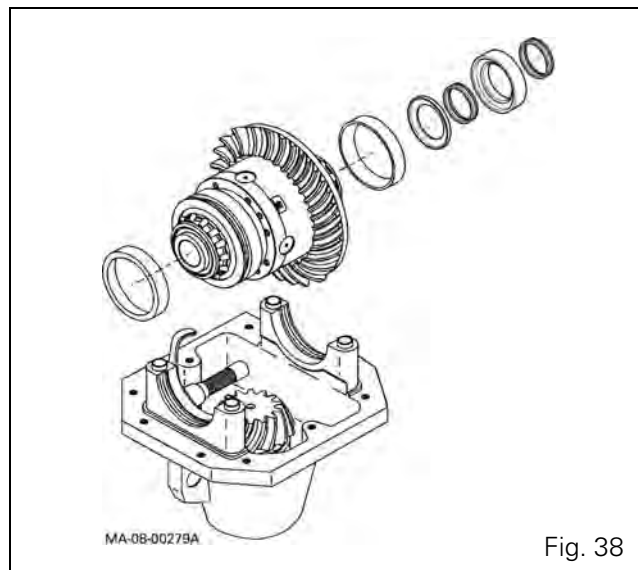


Fig. 38

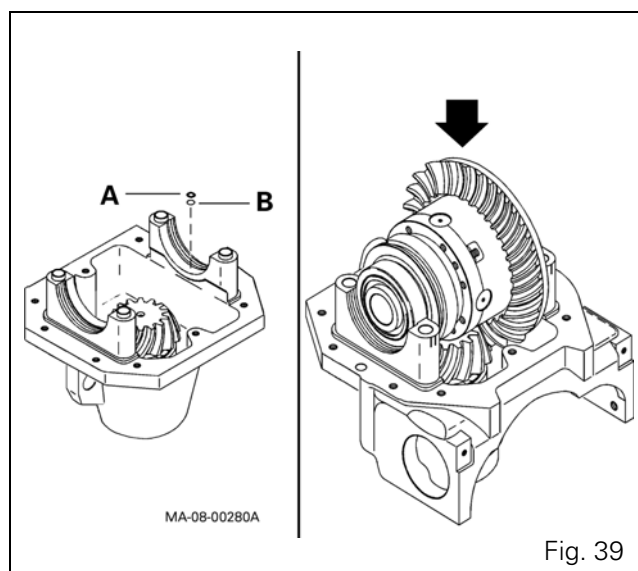


Fig. 39

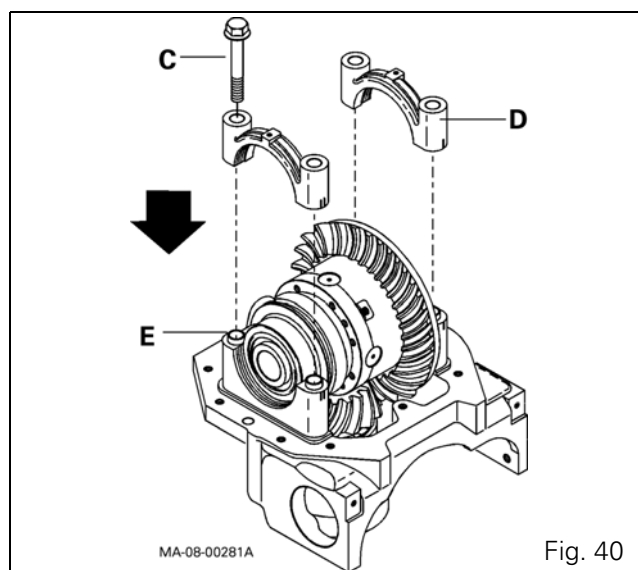


Fig. 40

CARRARO - Differential

- 47.** Assemble and tighten the two adjustment nuts in the differential housing using special tools ref. CA119030 and CA119149 (see § J) to eliminate the backlash and slightly preload the differential bearings (Fig. 41).

NOTE:

As the two nuts are different, take care to return them to their original positions relative to the bevel ring gear.

Check that the bearings are correctly mounted in their seats, and, if necessary, tap them gently with a rubber hammer to secure them in place.

Place a dial gauge with a magnetic stand on the differential housing and move the dial gauge feeler pin until it comes into contact with a ring gear tooth at a 90° angle (Fig. 42).

- 48.** Lock the pinion and move the ring gear alternately to the right and left, using the dial gauge to measure the backlash between the pinion and the ring gear.

Repeat the operation on at least two teeth, turning the ring gear, to calculate an average value.

Check that the measured backlash value is within the permissible tolerances:

0.18 to 0.23 mm

Fine-tune the shimming by adjusting the two nuts with special tools CA119030 and CA119149 (see § J) (Fig. 43).

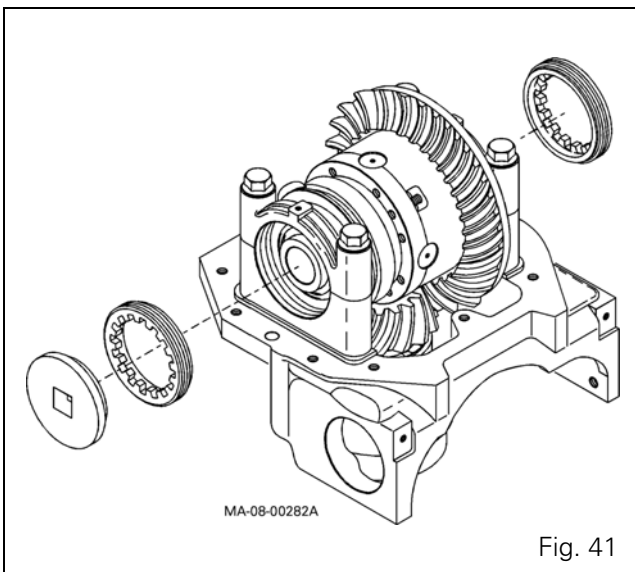


Fig. 41

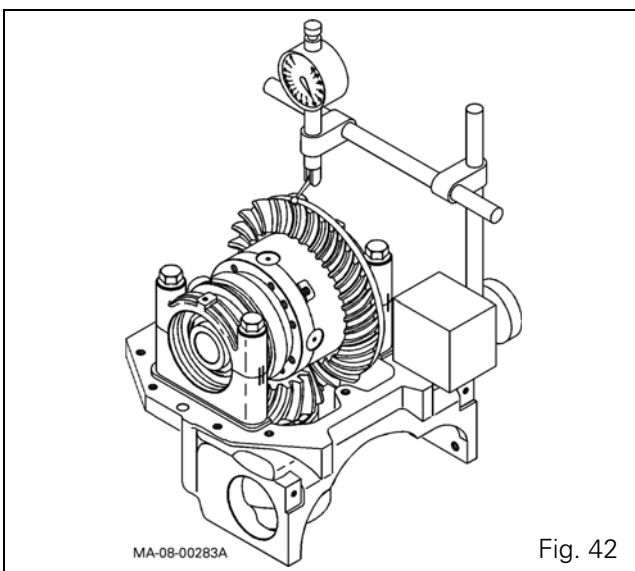


Fig. 42

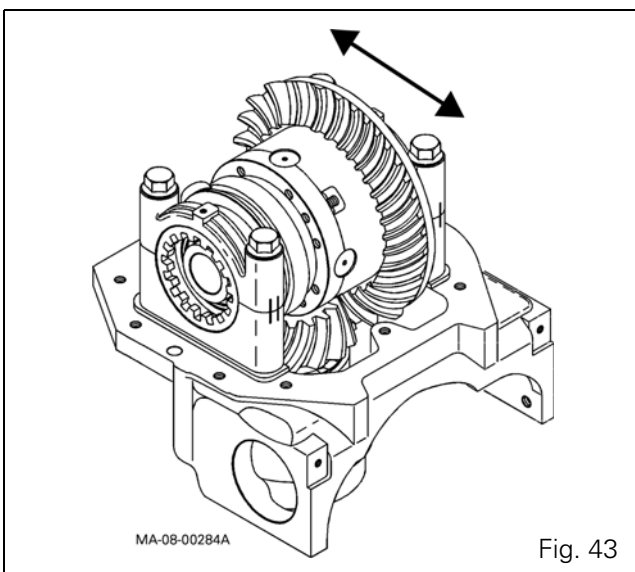


Fig. 43

49. When tightening nuts, always remember that:

- if the measured backlash is lower than the permissible tolerance, the nut on the bevel ring gear side must be loosened and the opposite screw must be screwed to the same value.
- if the measured backlash is higher than the permissible tolerance, the nut on the side opposite the bevel ring gear side must be loosened and the screw on the other side must be screwed to the same value.

50. When the backlash between the pinion and ring gear has been adjusted, check that the bearing preload of the differential unit is minimal.

Repeat the sequence of steps described above until the required conditions are met.

51. Once the correct backlash has been obtained between the pinion and ring gear, measure the total bearing torque T (pinion-bevel ring gear system). The measured value must remain within the following limits:

$$T = (P + 1.82) \text{ to } (P + 2.12) \text{ N.m}$$

where P represents the actual measured pinion torque (see § G).

WARNING: All torques must be measured without the seal.

If the measured value is outside the permissible tolerances, check the assembly of each part carefully and adjust the differential housing adjustment nuts:

- if the total torque is lower than the permissible values, tighten both nuts identically without modifying the backlash between the pinion and ring gear
- if the total torque is higher than the permissible values, loosen both nuts identically without modifying the backlash between the pinion and ring gear.

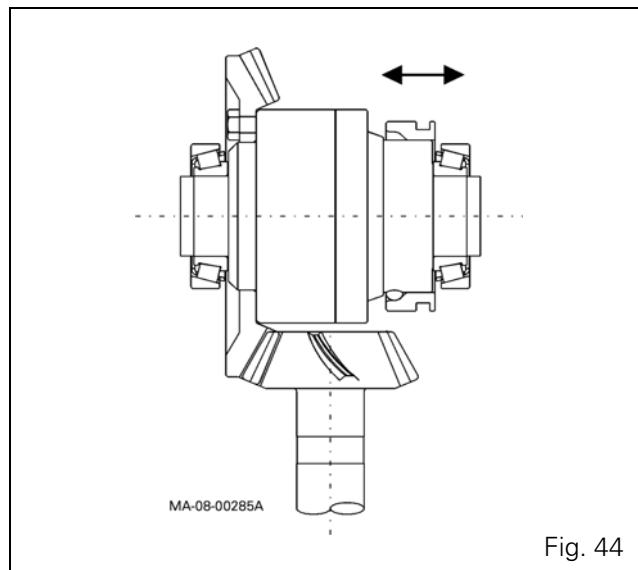


Fig. 44

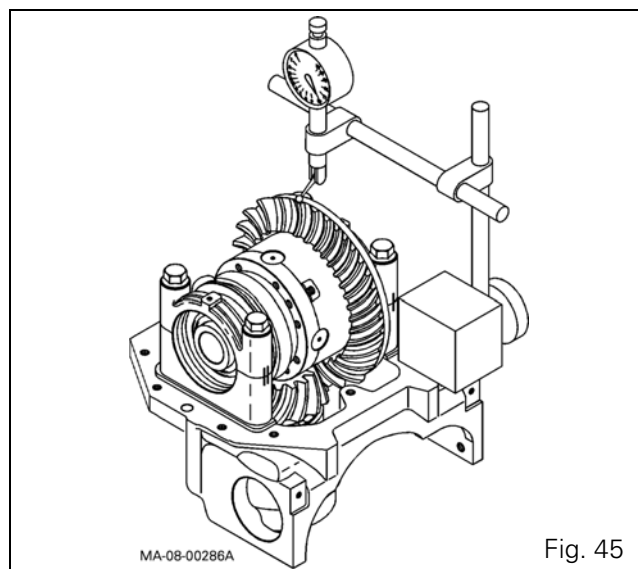


Fig. 45

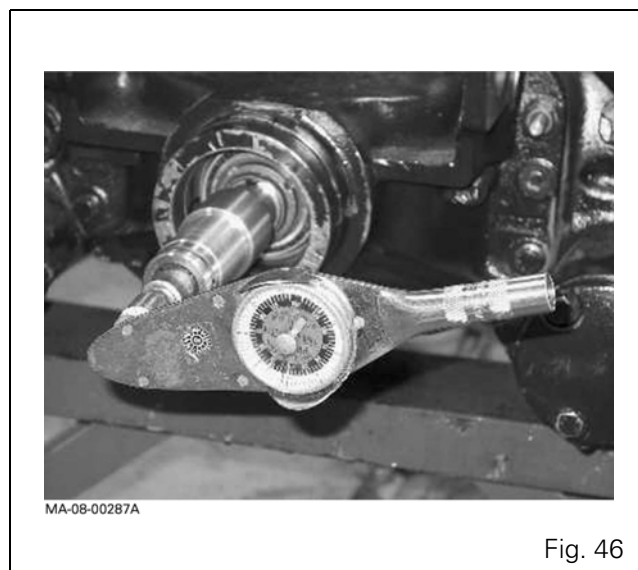


Fig. 46

CARRARO - Differential

General information

52. To test the marking of the crownwheel and pinion teeth, apply a tiny amount of paint to the ring gear. This marking test must be carried out systematically on the bevel ring gear teeth and on each face (Fig. 47).

53. OK = Correct contact

If the crownwheel and pinion are adjusted correctly, a uniform layer of paint is left on the surfaces of the teeth (Fig. 48):

- Z: Excessive contact at the tip of the teeth

Move the pinion closer to the ring gear then move the ring gear away to correct the backlash.

- X: Excessive contact at the base of the teeth

Move the pinion away from the ring gear, then move the ring gear closer to correct the backlash.

54. Corrective action (Fig. 49):

1 Move the pinion in the direction of the arrow to adjust an X type contact.

2 Move the pinion in the direction of the arrow to adjust a Z type contact.

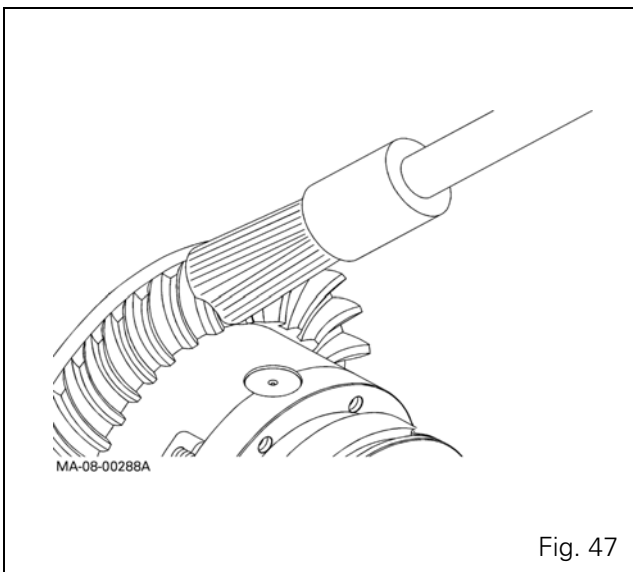


Fig. 47

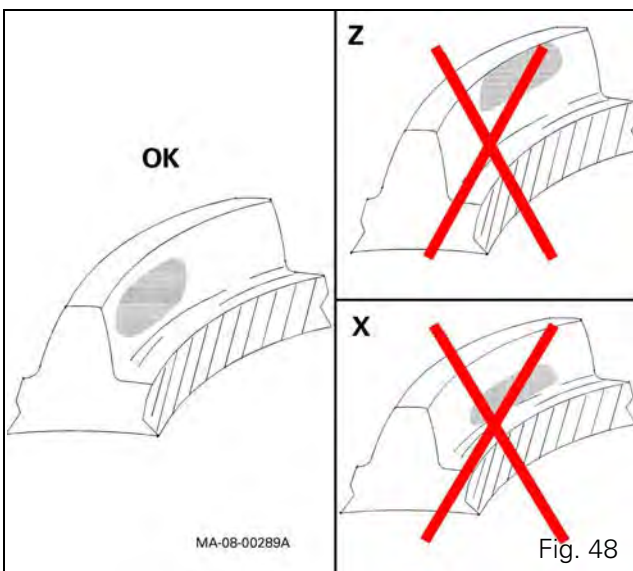


Fig. 48

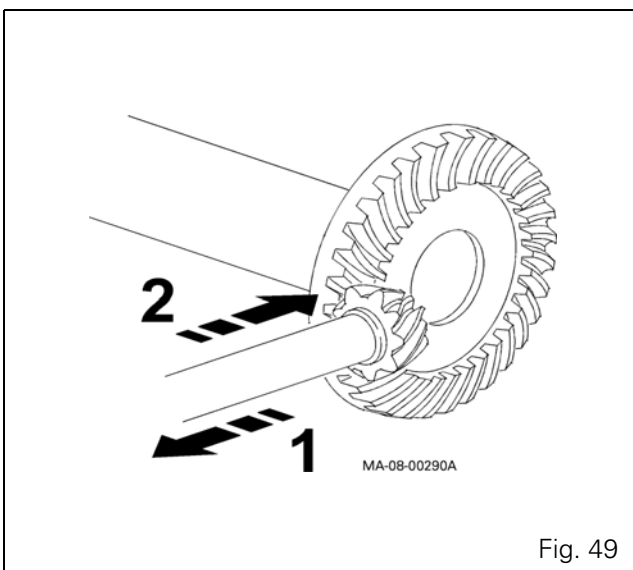


Fig. 49

CARRARO - Differential

55. When the shimming procedure is complete, fit the nut retainers with their screws and tighten to the required torque (13 Nm) using a torque wrench (Fig. 50).

WARNING: The nut and its corresponding counter-nut are different on the ring gear side and the opposite side of the differential unit; turn the nuts slightly to align them with their retainers.

56. Tighten the screws of the two half-bearings with a torque wrench to the required torque (266 Nm) (Fig. 51).

57. Before bringing two surfaces into contact, ensure that both are perfectly clean. Degrease and clean them with suitable cleaning products.

Apply a thin film of Loctite 510 to the mating surface between the axle beam and the differential housing. Fit the differential housing on the axle housing and screw to the required torque (169 Nm) (Fig. 52).

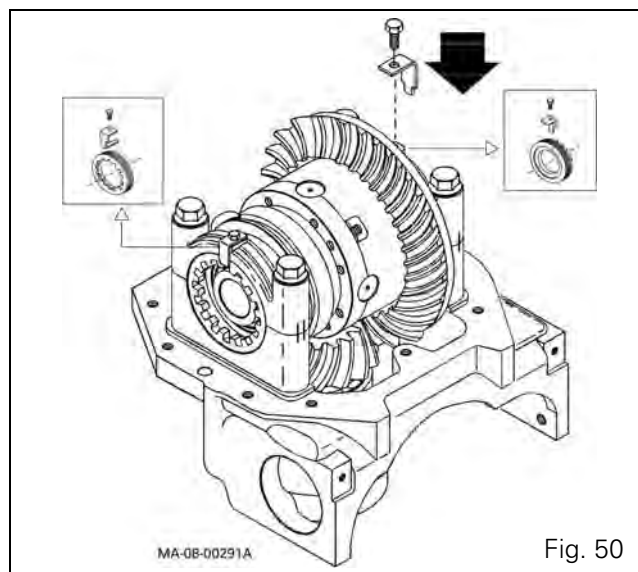


Fig. 50

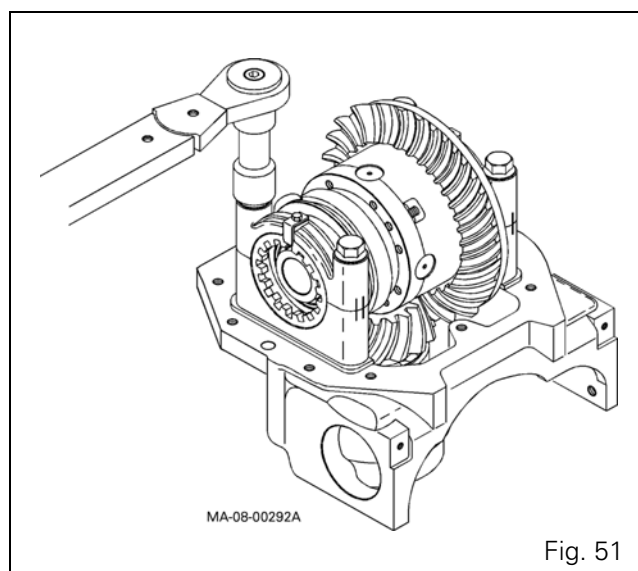


Fig. 51

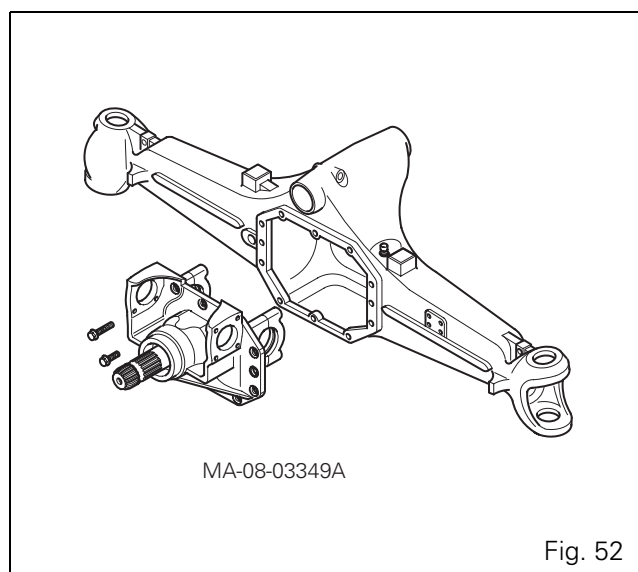


Fig. 52

CARRARO - Differential

58. Fit a new previously lubricated seal C on the end of the pinion using the special tool ref. CA119148 (see § J) then install the flange A.

Position the flange screws B with their respective nuts.

Tighten the screws and nuts with a torque wrench to the required torque (57 Nm) (Fig. 53).

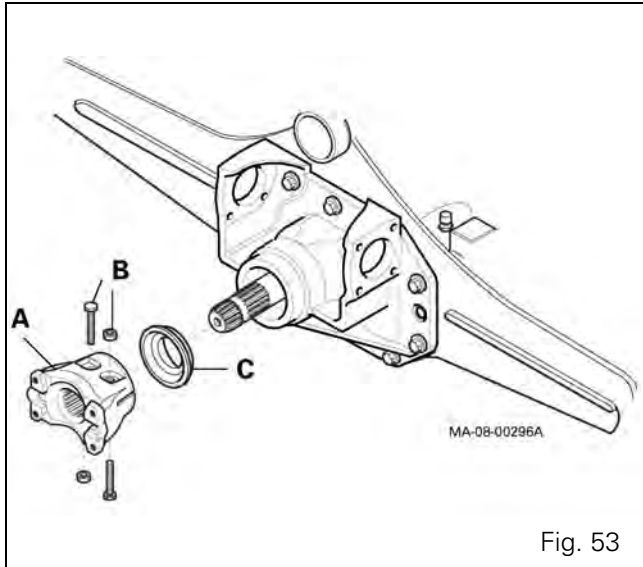


Fig. 53

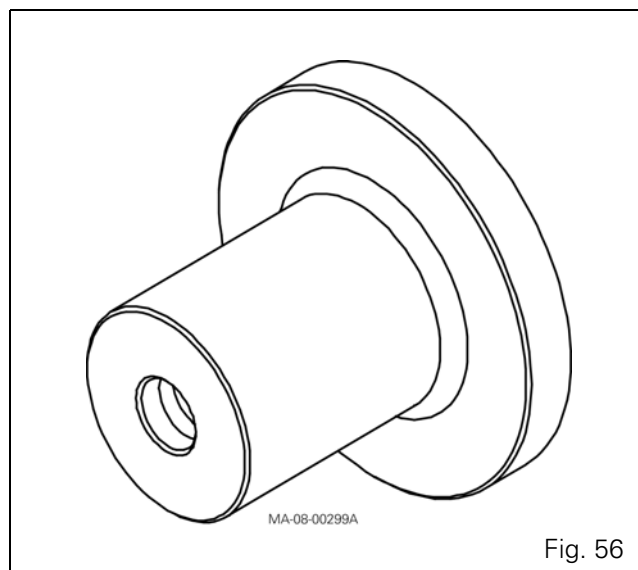
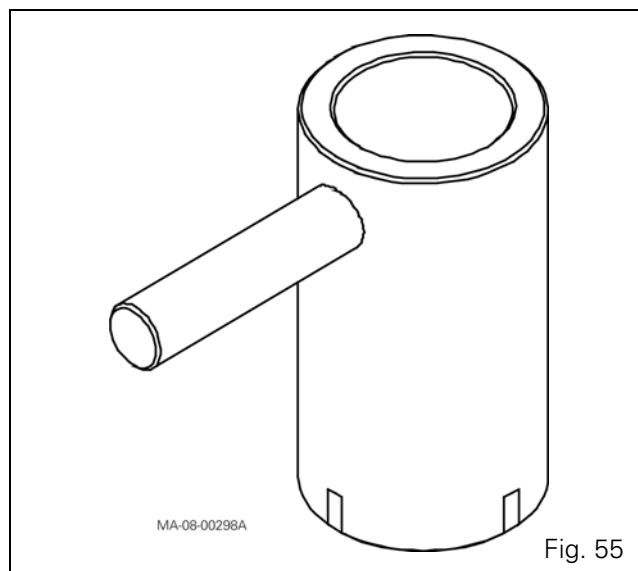
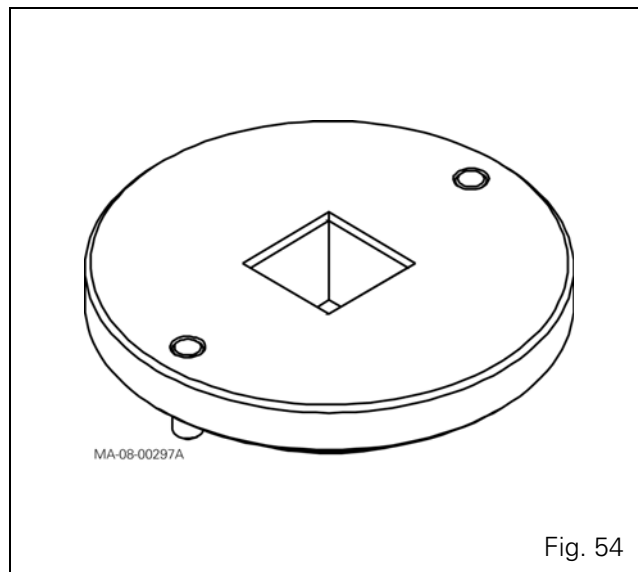
J . Service tools

Tools available in the AGCO network

CA 119030 - Nut wrench ([Fig. 54](#))

CA 119099 - Pinion nut wrench ([Fig. 55](#))

CA 119148 - Seal fitting tool ([Fig. 56](#))

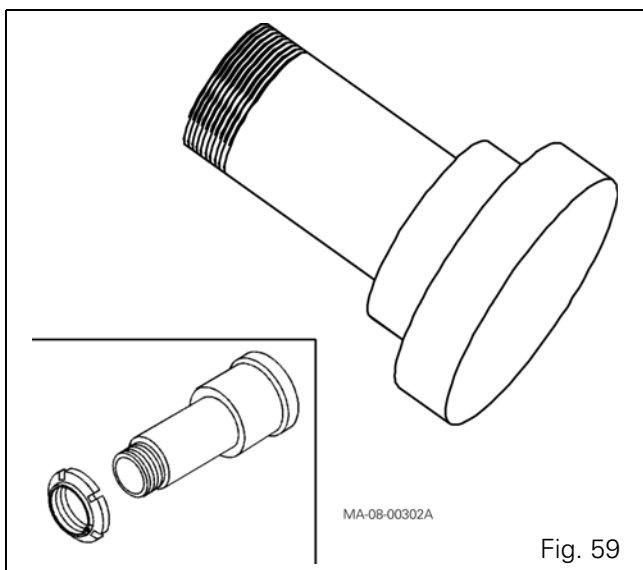
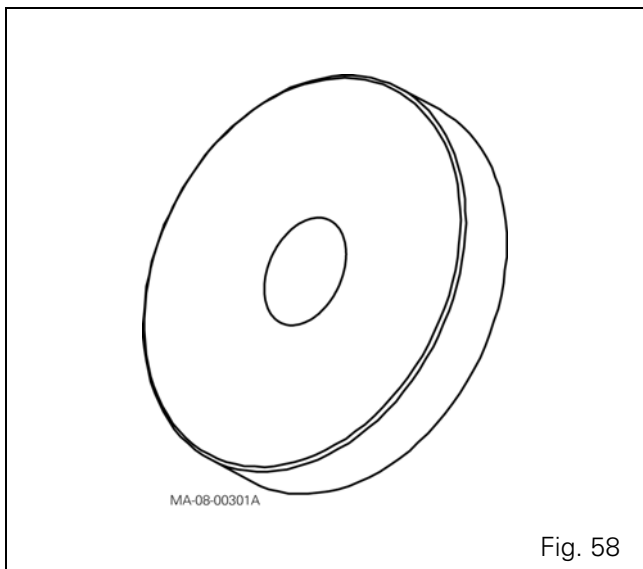
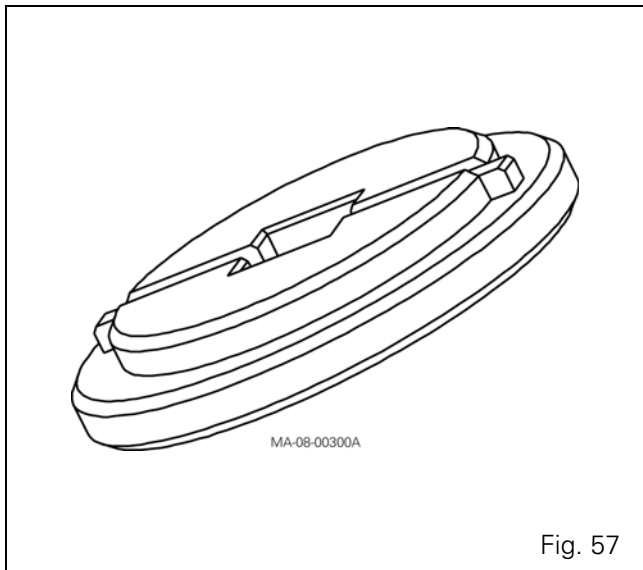


CARRARO - Differential

CA 119149 - Nut wrench (Fig. 57)

CA 119182 - Dummy differential housing (Fig. 58)

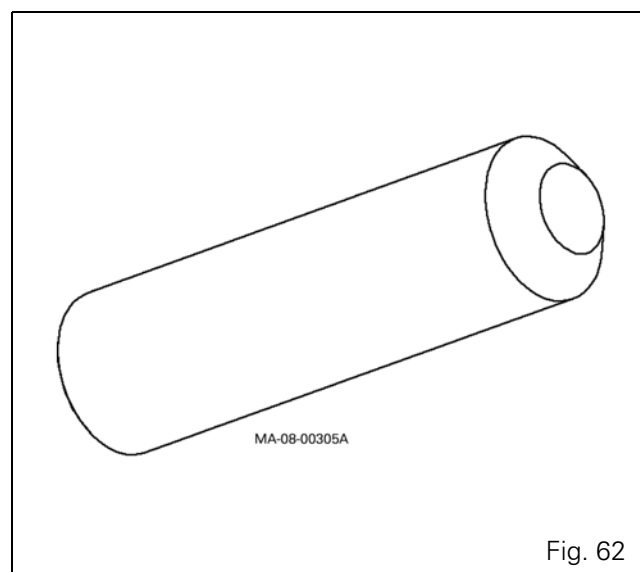
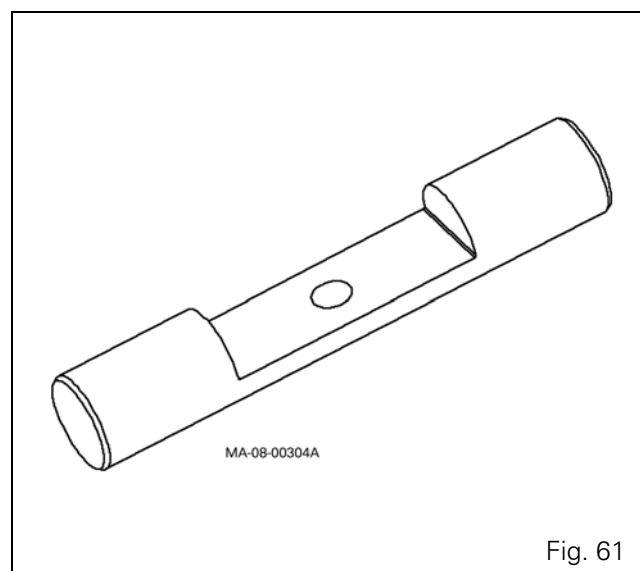
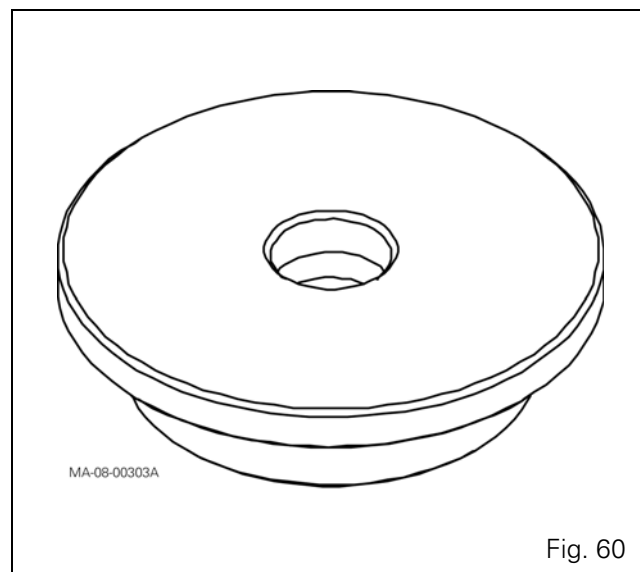
CA 119202 - Dummy pinion (Fig. 59)



CA 119225 - Bearing cup fitting tool ([Fig. 60](#))

CA 119228 - Dummy differential housing ([Fig. 61](#))

CA 715004 - Bearing cone fitting tool ([Fig. 62](#))



8B13- CARRARO - Bearing and transmission shaft

CONTENTS

A . General	3
B . Disassembling and reassembling the 4WD transmission shafts and the universal joint spiders	7
C . Removing and refitting the bearing support and front axle	9
D . Replacing the friction rings and seal	12

CARRARO - Bearing and transmission shaft

CARRARO - Bearing and transmission shaft

A . General

The tractors are fitted with a fixed front axle. Drive is transmitted from the front axle clutch located in the rear axle via a transmission shaft.

On 6-cylinder models, the transmission shaft has a universal joint and the front axle pivot is raised.

The shaft is divided into two sections. The section linked to the 4WD unit by a sleeve is fixed. The front part of the transmission shaft has a universal joint, allowing the axle to oscillate on its raised pin.

The two sections of the transmission shaft are linked by a castellated nut (11) and supported by a bearing (6) at gearbox level.

The front frame supports the front axle pivot. The pivot front bearing is removable on all models, while the rear bearing is part of the front frame assembly.

CARRARO - Bearing and transmission shaft

Parts list ([Fig. 1](#), [Fig. 2](#) and [Fig. 3](#)) Carraro

20.19 axle

- (1) Straight shaft
- (2) Guard
- (2A) Guard
- (3) Sleeve
- (4) Screw
- (5) Central bearing
- (6) Bearing
- (7) Dust seal nut
- (8) Spider
- (9) Shaft
- (10) Sleeve
- (11) Castellated locknut
- (12) Front frame
- (13) Chamfered washer
- (14) Washer
- (15) Front bearing
- (16) Seal
- (17) Ring
- (18) Ring
- (19) Plug
- (20) Circlip
- (21) Screw
- (22) Front axle
- (23) Grease nipple
- (24) Union
- (25) Lubrication pipe
- (26) Flanges
- (27) Screw

View of the assembly

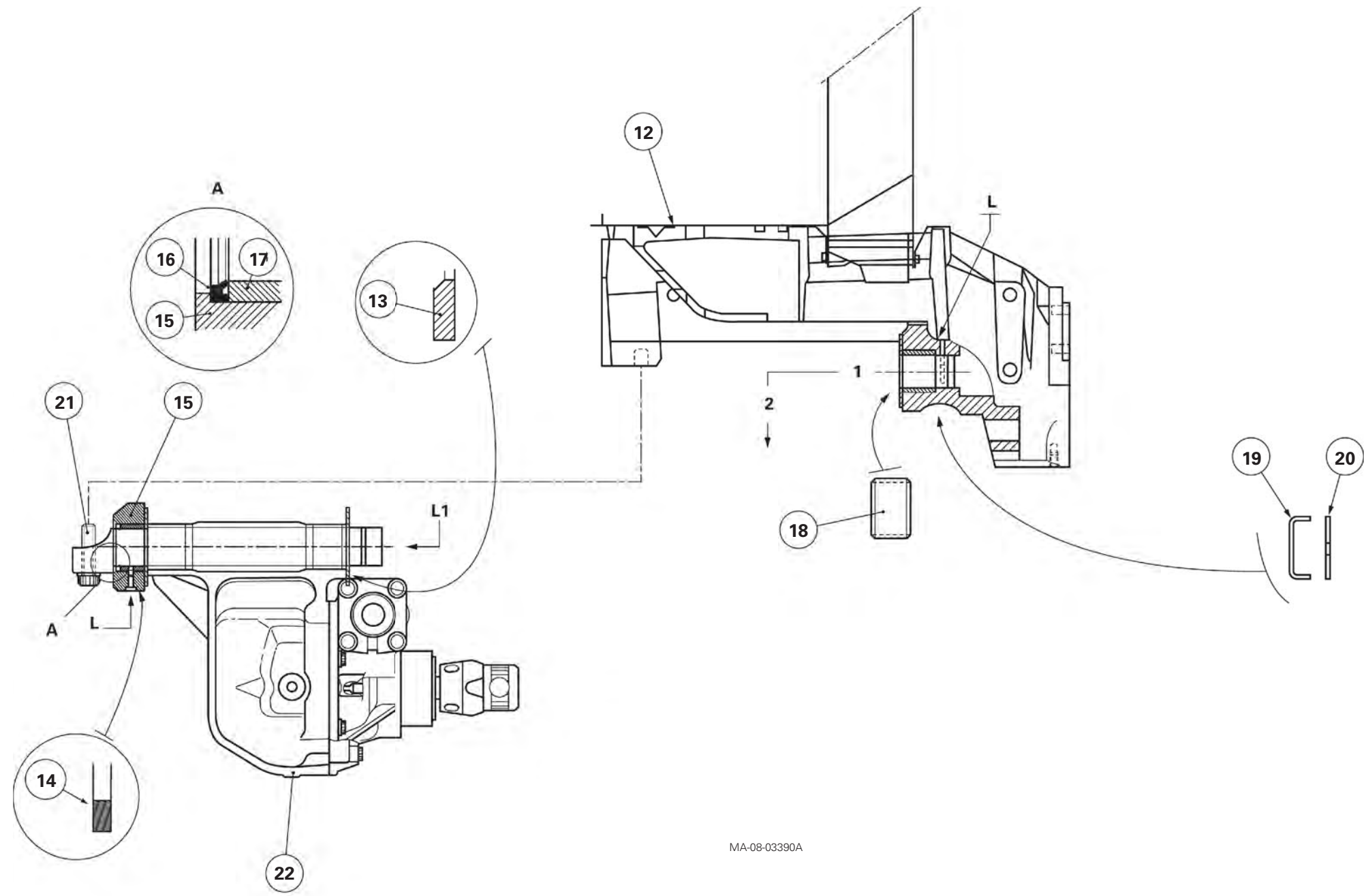
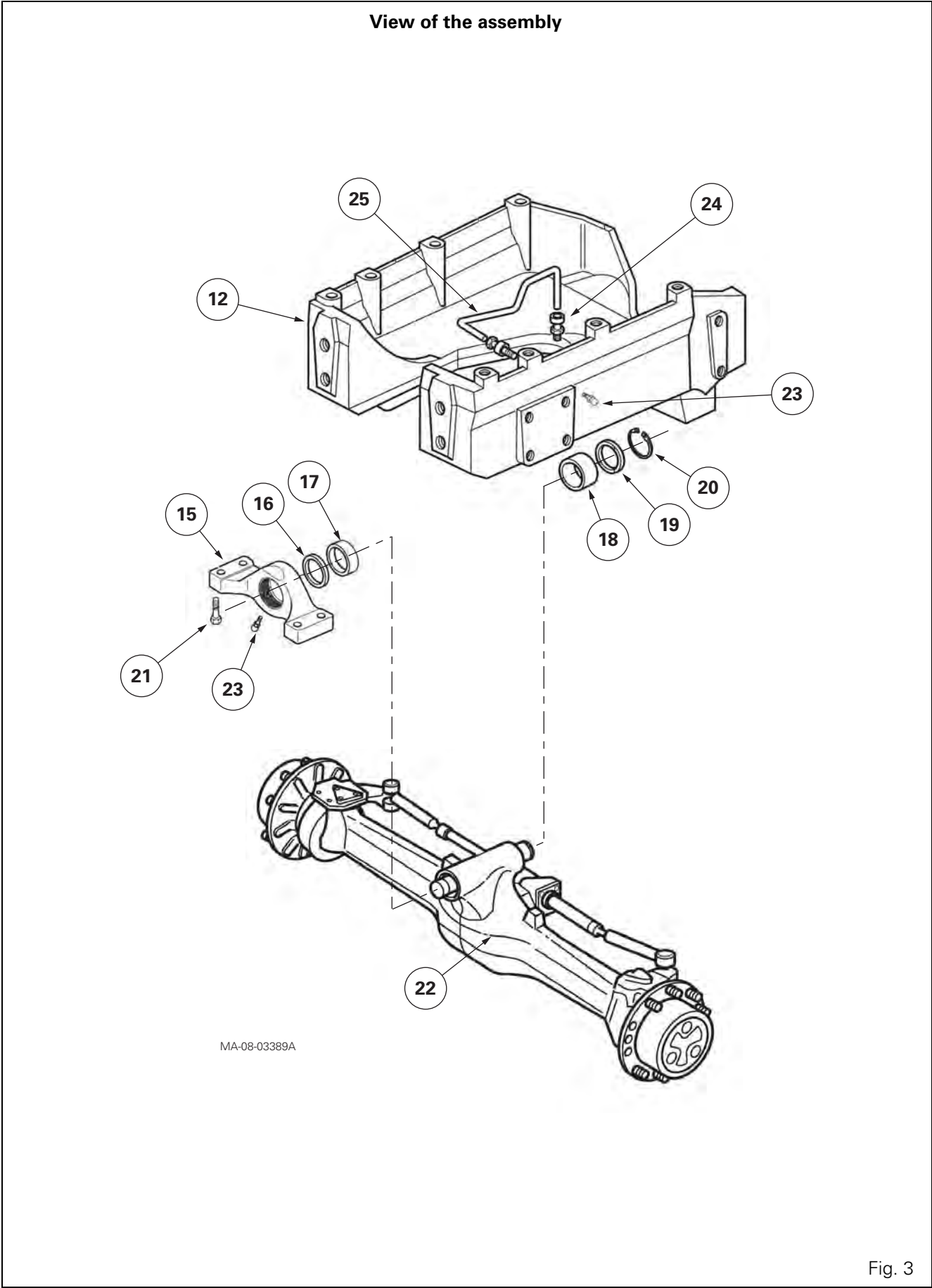
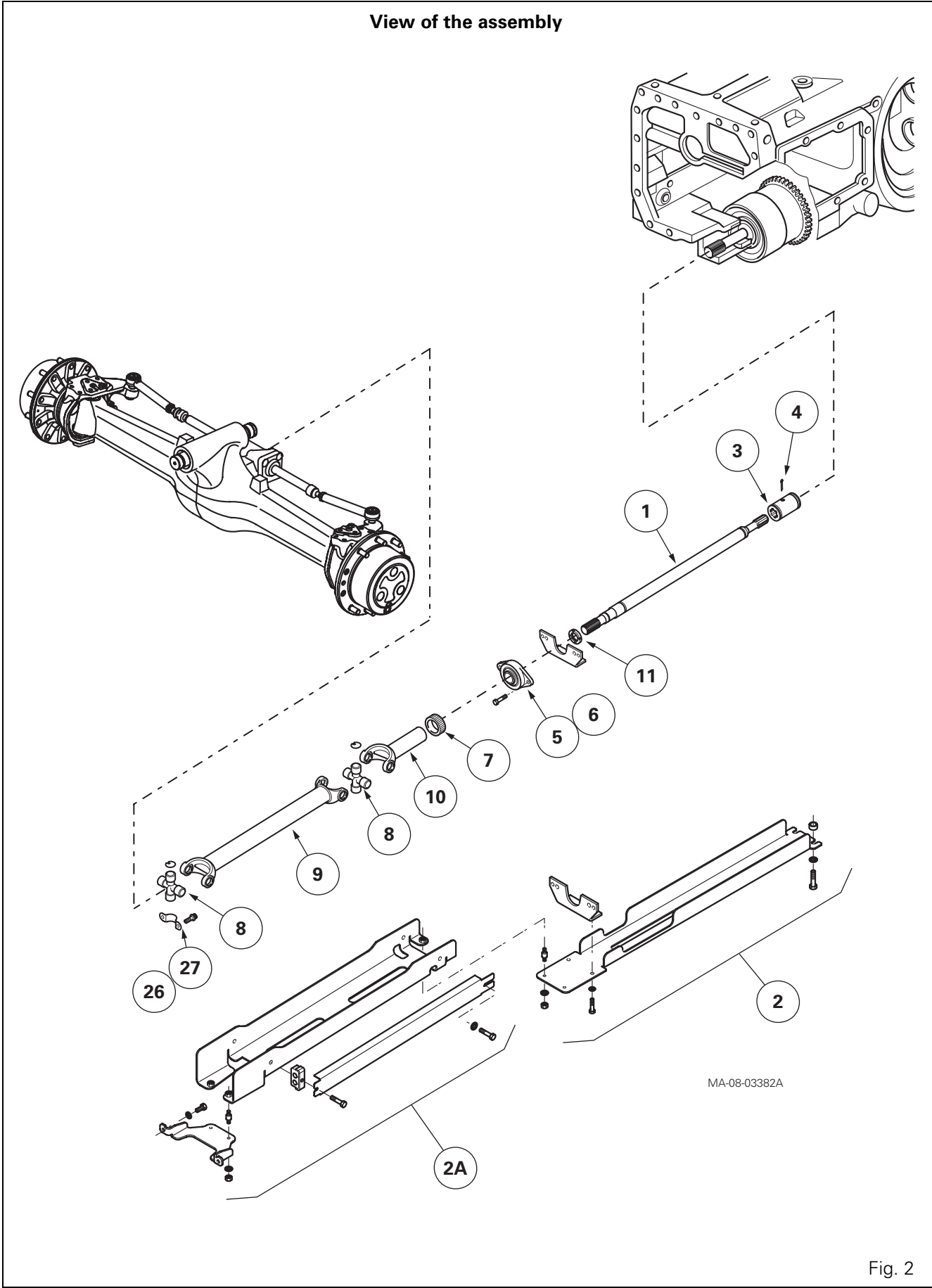


Fig. 1

CARRARO - Bearing and transmission shaft



CARRARO - Bearing and transmission shaft

B . Disassembling and reassembling the 4WD transmission shafts and the universal joint spiders

Disassembling the universal joint shaft (Fig. 2)

1. Chock the rear wheels and apply the hand brake.
2. Remove the guards (2)(2A).
3. Unscrew the dust seal nut (7).
4. Remove the screws (27) and the flanges (26).
5. Move the universal joint shaft (9) and spider (8) assembly away from the drive pinion carrier. Remove the shaft (Fig. 2).

NOTE: If there is not enough room to push the universal joint shaft backwards for removal, disassemble the central bearing and the straight shaft (1).

NOTE: The spiders are replaceable. They are listed in the parts book.

Reassembly

CHECKS: If the spiders need to be replaced, carefully check the condition of the end clevises where the spider catches are located. Remove any traces of impact or sharp edges. Thoroughly clean the groove of each circlip. After assembly, check that the circlips are properly positioned in their respective grooves.

NOTE: If necessary, and to facilitate mounting of the universal joint shaft on the drive pinion carrier, raise the front wheels using a jack with sufficient lifting capacity, positioned along the axis of the axle housing.

6. Replace the dust seal nut (7).

NOTE: Use a makeshift tapered tool to refit the dust seal nut (7) on the shaft (1).

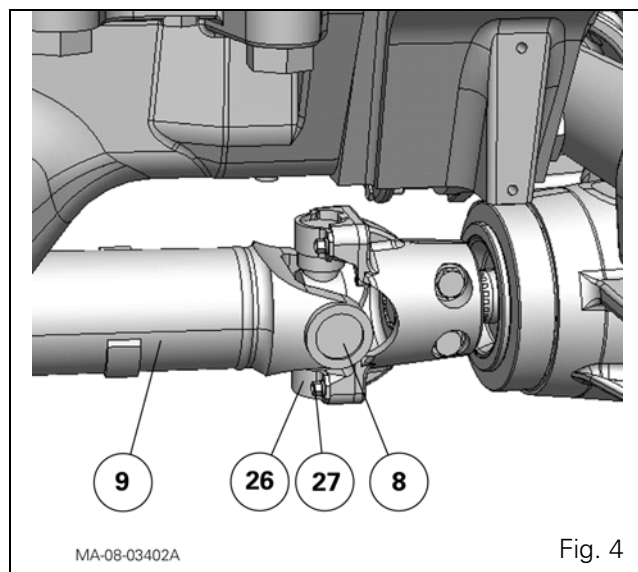


Fig. 4

7. Smear the front splines of the straight shaft with molybdenum sulphide grease or equivalent. Refit the universal joint shaft (9).
8. Attach the front spider (8) to the plate of the drive pinion carrier using the flanges (26) and washer-head screws (27) that have been lightly smeared with Loctite 241 or equivalent and tightened to a torque of 34-41 Nm.
9. Moderately tighten the dust seal nut (7).
10. Using a grease gun, lubricate the sleeve (10) and refit the guards (2) and (2A).

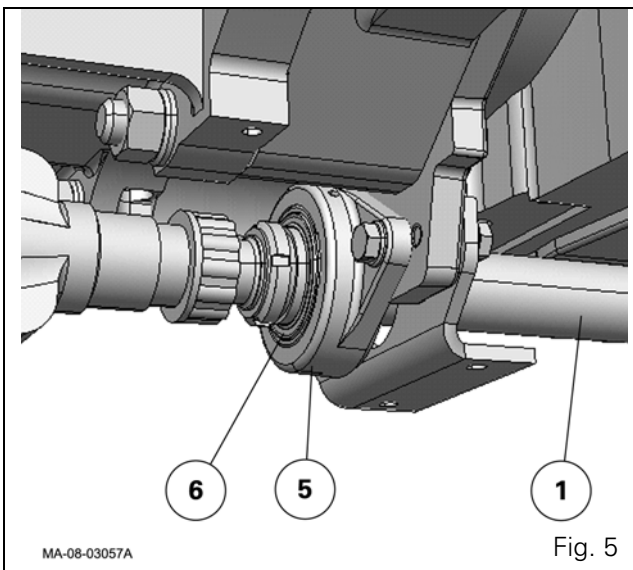
CARRARO - Bearing and transmission shaft

Disassembling the straight shaft and bearing (Fig. 2)

11. Remove the guards (2) (2A) and the universal joint shaft assembly. Repeat steps 1 to 5.
12. Remove the screw (4) and slide the sleeve (3) towards the front of the straight shaft.
13. Remove the central bearing (5), bearing (6) and straight shaft (1) assembly (Fig. 5).
14. Separate the support (5) from the bearing (6).
15. Unscrew the castellated nut (11) using a suitable wrench.
16. Remove the bearing from the straight shaft.

Reassembling the straight shaft and bearing (Fig. 2)

17. Check the parts. Replace those that are defective.
18. Fit bearing (6) on the straight shaft with the offset turned rearwards. Tighten the nut with a suitable wrench.
19. Assemble the support (5) on the bearing (6). Tighten the screws.
20. Refit the central bearing, bearing (6) and straight shaft (1) assembly.
21. Smear the rear splines of the straight shaft (1) with molybdenum sulphide grease or equivalent.
22. Slide the sleeve (3) towards the rear of the straight shaft. Refit the screw (4). Replace it if it is in a poor condition.
23. Refit the universal joint shaft assembly.
24. Repeat steps 6 to 10.
25. Refit the guards (2) (2A).



CARRARO - Bearing and transmission shaft

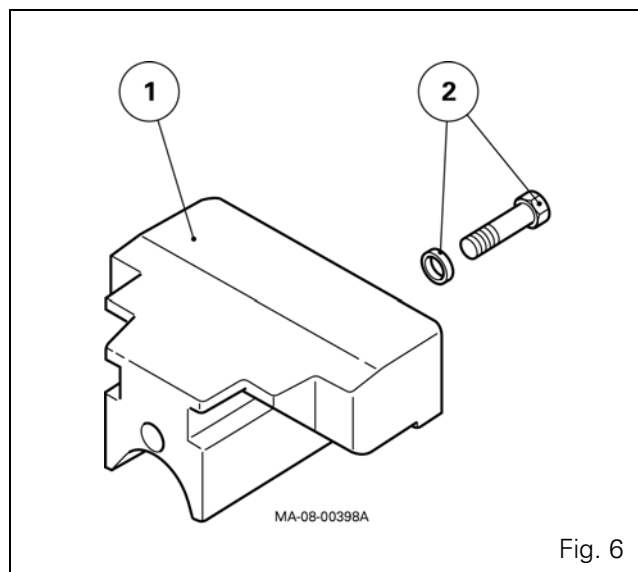
C . Removing and refitting the bearing support and front axle

Preliminary steps

26. Remove the 45 kg front weights (if fitted). Immobilise the tractor. Apply the hand brake. Place safety chocks on either side of the rear wheels as shown in Fig. 7.

REMINDER: Some tractors may be fitted with a front power take-off. In this case, it will be necessary to remove it in order to separate the front axle from the frame (12).

NOTE: In certain conditions, the centre weight (1) of 100 kg (Fig. 6) may obstruct the removal of the bearing support. For this configuration, strip out the internal parts at the lower part of the grille to gain access to the weight. Take out the central M20 screw (2) (Fig. 6) and lift the weight slightly using a suitable lifting tool to release it from the support.



CARRARO - Bearing and transmission shaft

Removing the support (15) and the front axle

27. Remove the guards (2) (2A) (Fig. 3).
28. Raise the tractor along the axis of the front axle housing using a jack with sufficient lifting capacity. Remove the front wheels.



CAUTION: Place a fixed axle stand under the lower engine housing.

29. Mark the steering hoses connection and detach them from the ram.
30. Disconnect the front differential lock control hose.
31. Sling the front axle using suitable straps (Fig. 7).
32. Remove the screws (21) (Fig. 3).
33. Pull the front axle assembly complete with bearing support (15) forwards along the axis of the axle beam (Fig. 7) (position 1) and remove the front axle (position 2).
34. Note the features, order and position of the washers (13) (14) and the direction of the chamfers and remove them.

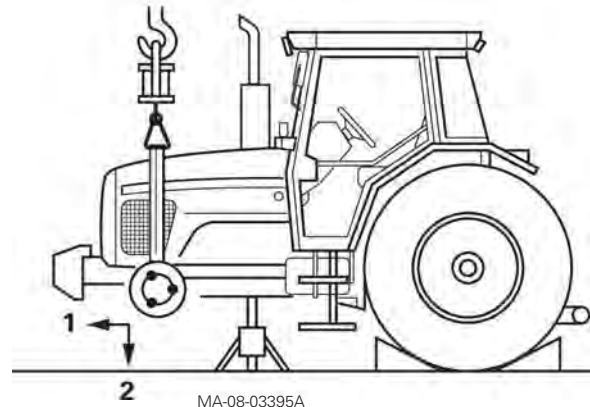
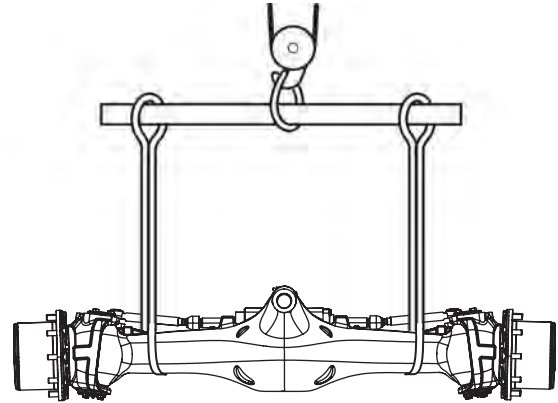


Fig. 7

CARRARO - Bearing and transmission shaft

Refitting

Check point

35. Clean all components and check the condition of (Fig. 3):
 - the pivot pin at each end
 - the washers (13) (14)
 - the friction rings (17) (18)
 - the seal (16).
36. Slide the washers (13) (14) lightly smeared with bearing grease onto the front and rear ends of the pivot pin. Position the washers in the order noted during step 34.
37. Sling the front axle (Fig. 7). Moderately lubricate the ends of the pivot pin and fit the support (15) at the front of the pivot pin (Fig. 3).

NOTE:

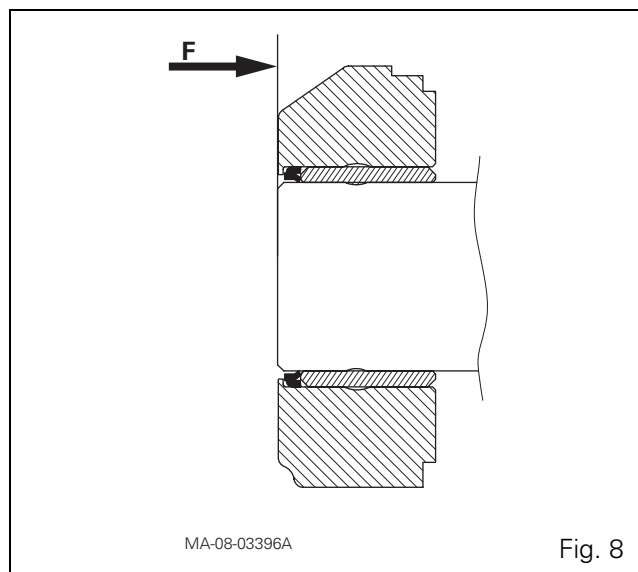
Before refitting the front axle assembly, check that there is no excess grease in the cavity of the second axle beam pivot on the front frame.

When refitting the front axle assembly, any such excess grease will be compressed, and may hinder insertion of the pivot pin into its bearing.

38. Refit the front axle and support (15) assembly.
39. Push the assembly hard until it comes into contact with the second axle beam pivot.
40. Thrust the support (15) against the front axle assembly (22) to eliminate the clearance between supports and axle housing as much as possible.
41. Fit the screws lightly smeared with Loctite 270 or equivalent and tighten to a torque of 520 - 640 Nm.

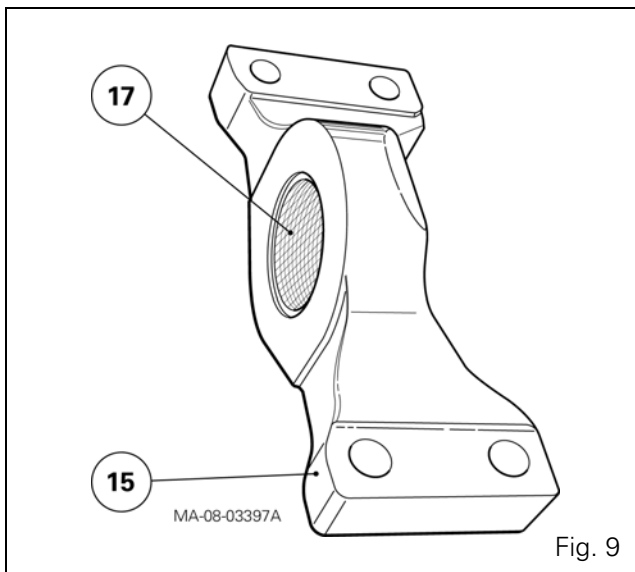
Check point

42. Check that the front face of the pivot pin is almost level with the front edge "F" of the bearing support (15) (Fig. 8).
43. Visually check for the presence of the grease nipple on the left-hand side of the front frame (12) (second axle beam pivot) and on the support (15) (first axle beam pivot) (Fig. 3).



CARRARO - Bearing and transmission shaft

44. Reconnect the hoses (using marks made during disassembly):
 - of the steering ram
 - of the front differential lock
45. Refit the wheels. Remove the axle stand and take away the jack. Tighten the nuts to a torque of 640 - 680 Nm.
46. Refit the centre weight. Tighten the central screw to a torque of 100-150 Nm and secure the front weights (depending on equipment fitted).
47. Refit the universal joint shaft and the guards (see § B).
48. Remove the safety chocks and release the hand brake.
49. Using a grease gun, lubricate the friction rings (17) (18) (Fig. 3) of the axle beam pivots.



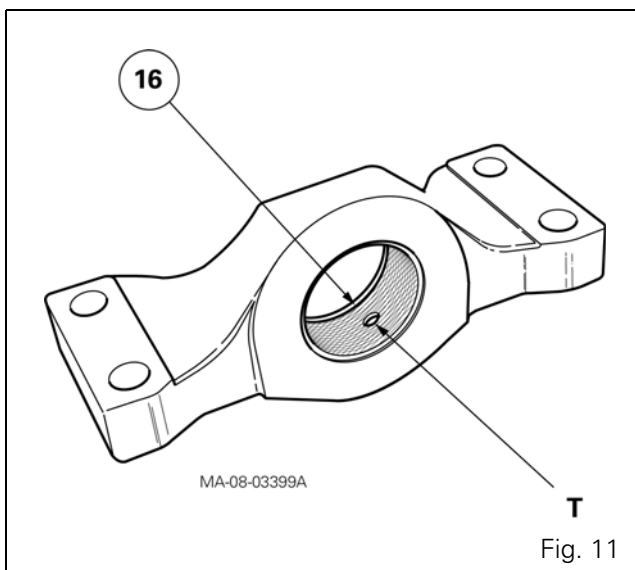
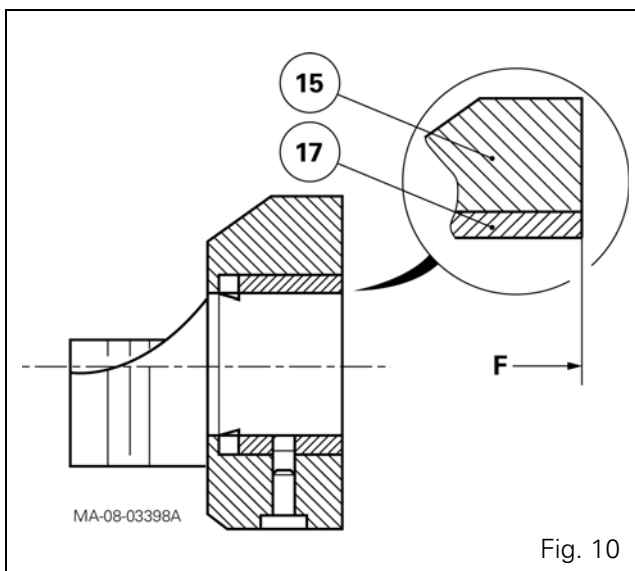
D . Replacing the friction rings and seal

Disassembling the front bearing

50. Only remove the bearing support (15) (see § C).
51. Extract and discard the ring (17).
52. Drive out and discard the seal (16).

Reassembling the front bearing

53. Clean and check all components. Replace those that are defective. Check that the lubrication lines in the support are not blocked.
54. Using a press and a suitable fixture, fit the seal (16), positioned correctly, and the ring (17) level with face "F" of the support (15) (Fig. 9 - Fig. 10), with the lubrication port "T" connecting with the line (Fig. 11).



CARRARO - Bearing and transmission shaft

NOTE: To work on the ring (18) of the second axle beam pivot, the first axle beam pivot and the front axle must be removed (see § C).

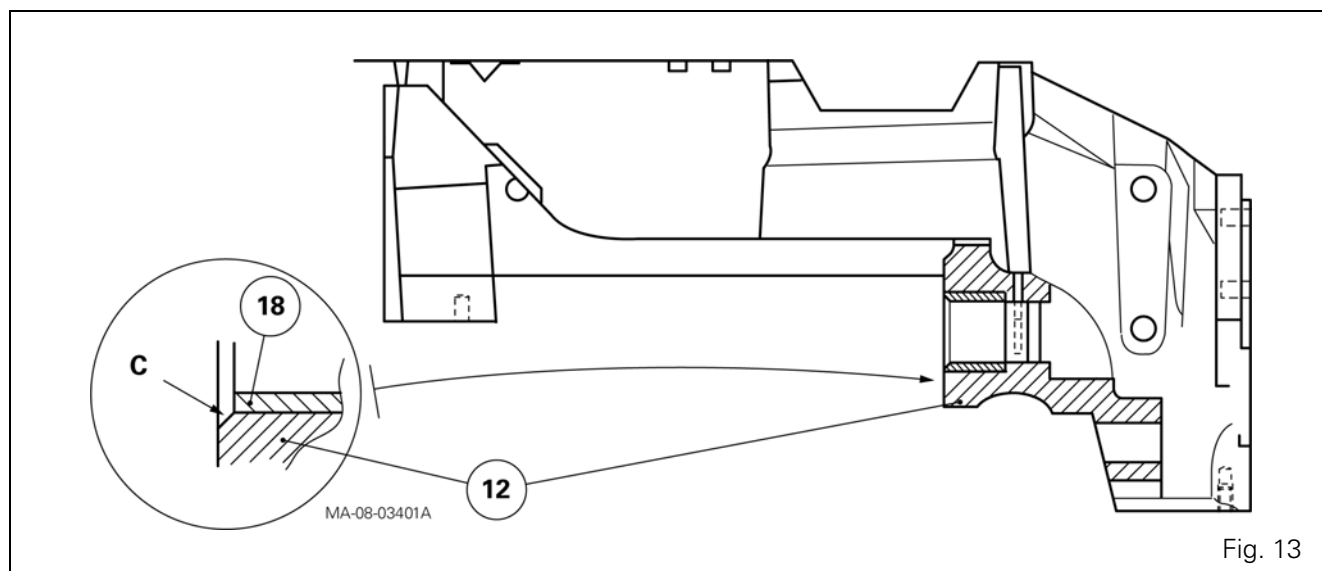
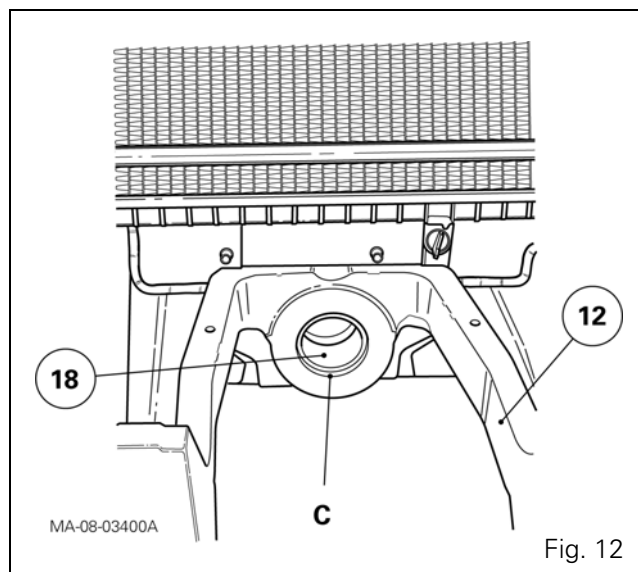
Disassembling the rear bearing (Fig. 3)

55. Drive out the ring (18) using a makeshift tool.

NOTE: The circlip (20) and the plug (19) are not considered to be wearing parts. It is therefore unlikely that they will need replacing.

Reassembling the rear bearing (Fig. 3)

Using a makeshift fitting drift, fit the ring (18) onto the frame (12) level with the chamfer "C" (Fig. 12 - Fig. 13).



8B14- 4WD GPA20 clutch

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A . General	3
B . Operation	3
C . Removing the clutch assembly	7
D . Disassembling the clutch	8
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F . Refitting the clutch assembly	10
G . Makeshift tools	12

4WD GPA20 clutch

A . General

The front axle clutch assembly is fitted in the lower part of the rear axle housing. An inspection cover located under the housing provides access to the mechanism, which comprises:

- a shaft (25) turning on two tapered roller bearings fitted in the bore of the axle housing,
- a hydraulic clutch assembly attached to the rotating shaft
- a bell gear (15) centred on the shaft by a ring (43), driving the clutch discs (36).

The helical bell gear (15) is constantly meshed to the gear (7) on the pinion.

The shaft is shimmed to obtain an operating clearance between 0 and 0.10 mm using shims (20) positioned between the cap (22) and the cup (18).

B . Operation

Declutching

The 4WD solenoid valve sends the 17 bar pressure into the shaft (25) via a channel drilled in the axle housing and the ring (11).

The cover plate (30) moves on the hub (40) and pulls the bell (42) which compresses the Belleville washers (34) and (35), releasing the discs (36). The bell gear (15) attached to the ring (43) turns idle on the shaft.

Clutch

The pressure drop releases the Belleville washers, which push the bell (42) so that it becomes attached to the bell gear (15), which in turn drives the shaft (25). The oil then returns to the housing via the solenoid valve.

4WD GPA20 clutch

Parts list

- (1) Sleeve
- (2) Double pin
- (3) Shaft
- (4) Double pin
- (5) Sleeve
- (6) Circlip
- (7) Gear
- (8) Plug
- (9) Needle roller bearing
- (10) Screw
- (11) Ring
- (12) Seal rings
- (13) Cup
- (14) Cone
- (15) Bell gear
- (16) Clutch assembly
- (17) Cover plate
- (18) Cup
- (19) Cone
- (20) Shim(s)
- (21) "O" ring
- (22) Cap
- (23) Circlip
- (24) Seal
- (25) 4WD drive shaft
- (26) Seal
- (27) Stop screw
- (28) Flange
- (29) "O" ring
- (30) Cover plate
- (31) Circlip
- (32) "O" ring
- (33) "O" ring
- (34) Belleville washer
- (35) Belleville washer
- (36) Disc
 - A. 4-disc clutch
 - B. 5-disc clutch
- (37) Thrust plate
 - A. 4-disc clutch
 - B. 5-disc clutch
- (38) Cover plate
- (39) Circlip
- (40) Hub
- (41) Shim(s)
- (42) Bell
- (43) Ring

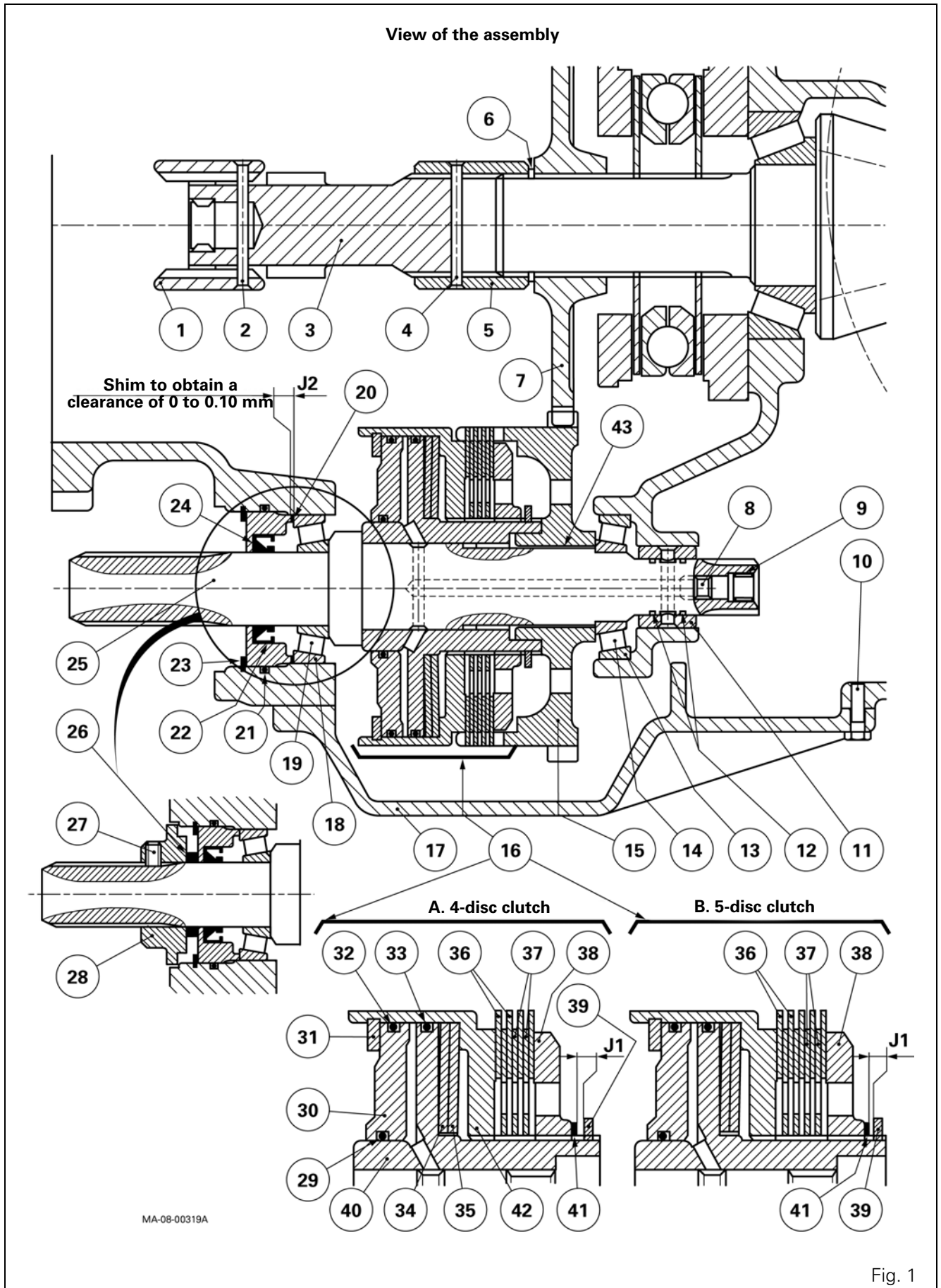
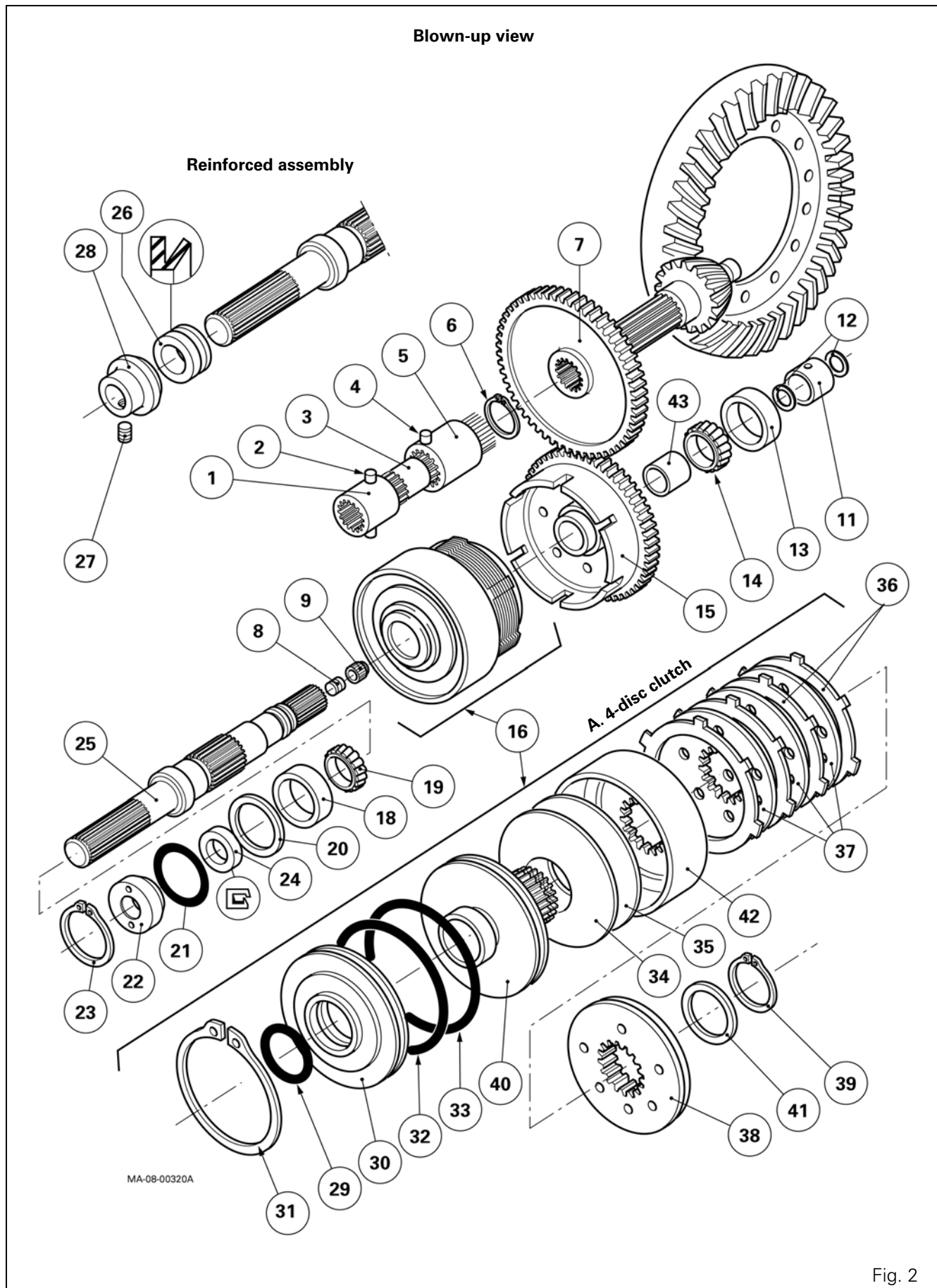


Fig. 1

4WD GPA20 clutch



C . Removing the clutch assembly

1. Chock the tractor. Drain the rear axle housing.
2. Disconnect the two front differential lock control hoses (plug the channels). Remove the guard and the transmission shaft. Remove the engine clutch or Power Shuttle lubrication pipe that is fitted to the lower cover plates of the centre housing and the gearbox.
3. Remove the screws (10) and the cover plate (17).
NOTE: On tractors fitted with proportional PTO, recover the spring (3), the detent plunger (2) and the retainer pipe (1) (Fig. 3).
 On tractors fitted with a reinforced sealed guard, remove the screw (27), flange (28) and seal (26).
4. Remove the circlip (23).
5. Protect the splined part of the shaft (25). Extract the cap (22) with its seal (24) using the makeshift tool (Fig. 4) (see § G). Remove the seal (24).
6. Remove the "O" ring (21).
7. Remove the shims (20) and the cup (18).
NOTE: On tractors fitted with proportional PTO, place the control in declutched position.
8. Extract the shaft assembly (25) and bearing cone (19), while holding the clutch assembly (16) and the bell gear (15).
9. Remove the clutch assembly (16) with the bell gear (15) and the cone (14).
10. Using a makeshift tool (see § G), extract the ring (11) (Fig. 5). This tool is essential for tractors with proportional PTO. If necessary, also remove the cup (13) using a suitable extractor.
NOTE: When removing the gear (7), it is necessary to remove the right-hand hydraulic cover plate (see chapter 9, depending on hydraulic equipment).

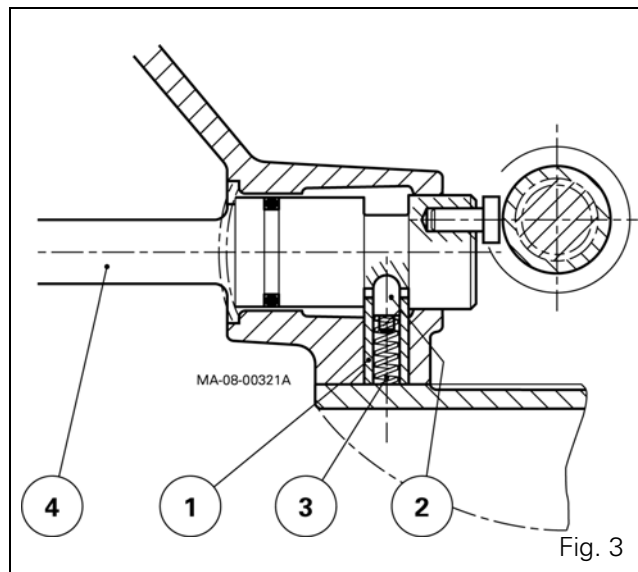


Fig. 3

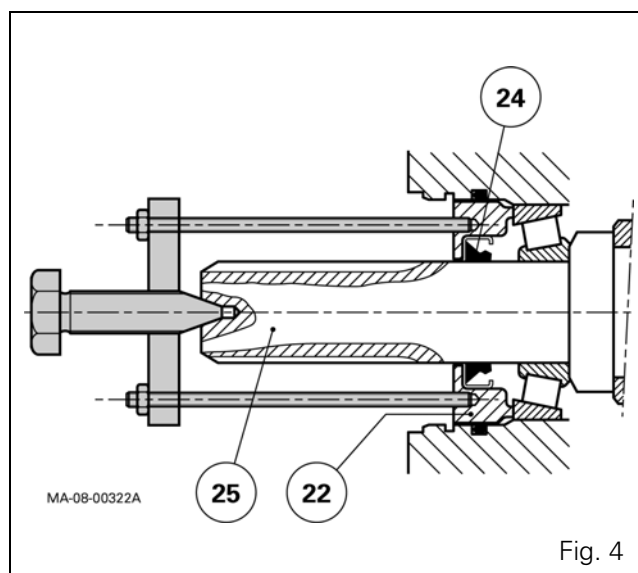


Fig. 4

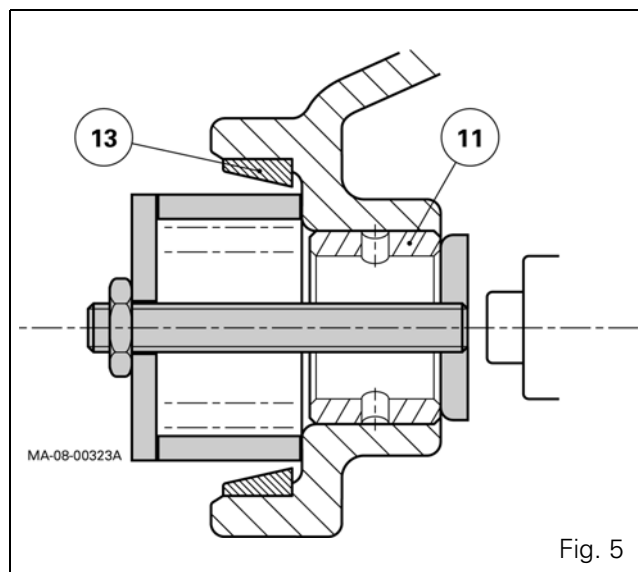


Fig. 5

4WD GPA20 clutch

Tractors with no creeper unit

11. Drive out the double pins (2) (4) from the coupling sleeves (1) (5).
12. Slide the sleeves towards each other on the shaft (3) and remove the shaft - sleeve assembly.
13. Take off the circlip (6) and remove the gear (7).

Tractors with a creeper unit

14. See chapter 5.
15. Take off the circlip (6) and remove the gear (7).

D . Disassembling the clutch

16. Detach the bell gear (15) from the clutch assembly (16).
17. Remove the circlip (31).
18. Remove the cover plate (30).
19. Remove the "O" rings (29) (32).
20. Using a press and a suitable fixture, compress the Belleville washers (34) (35) (Fig. 6).
21. Take off the circlip (39) and the shim(s) (41) (Fig. 6).
22. Remove the suitable fixture.
23. Remove the cover plate (38), the discs (36) and the thrust plates (37).
24. Separate the hub (40) from the bell (42).
25. Remove the "O" ring (33).
26. Remove the Belleville washers (34) (35).

Disassembling the shaft

27. Remove the two rings (12).
28. Extract the cone (19) using a press and a suitable fixture.
29. Extract the needle roller bearing (9). Remove the plug (8).

Reassembling the shaft

NOTE: Check that the shaft channel is not blocked.

30. Tighten the plug (8) smeared with Loctite 542 to a torque of 10 Nm.
31. Fit the needle roller bearing (9) 2.5 mm set back from face F (Fig. 7).
32. Fit the bearing cone (19) against the shoulder of the shaft (25).

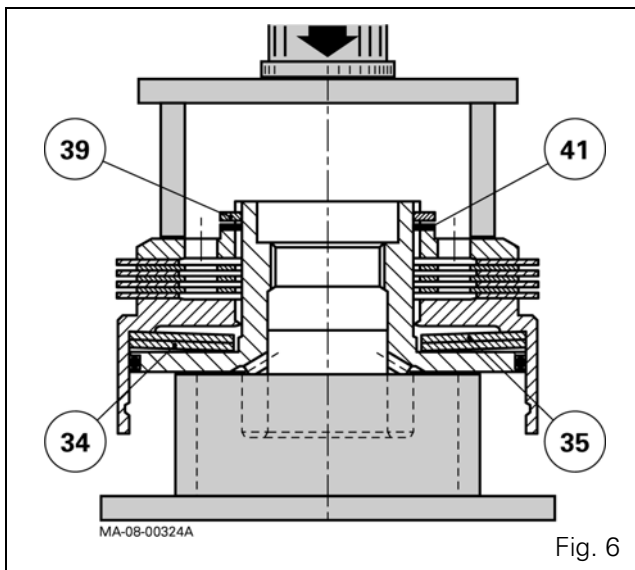


Fig. 6

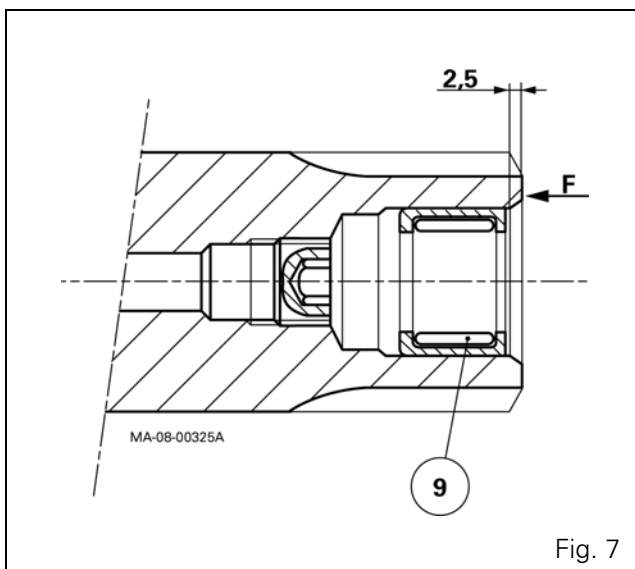


Fig. 7

E . Reassembling the clutch

33. Check and clean the components and replace those that are defective. Check that the 17 bar channel in the hub (40) is not blocked.

34. Position the Belleville washers (35) (34) in the bell (42) (Fig. 8).

NOTE: Two types of Belleville washers with different markings and different loading efforts can be fitted:

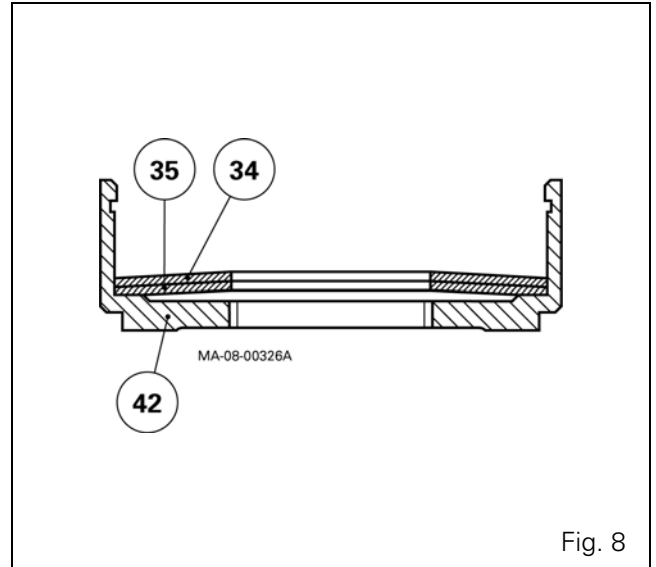
- 3619147M1 marked 147
- 3619473M1 marked 473.

The clutch assembly is normal or reinforced depending on the tractor types.

35. Lubricate and fit the "O" ring (33) on the hub (40).

36. Place the hub (40) in the bell (42), braced against the Belleville washers.

37. Fit the discs (36), aligning the lugs and the thrust plates (37), and fit the cover plate (38).



4WD GPA20 clutch

38. Adjusting J1 clearance (Fig. 9)

Using a press and suitable fixture (Fig. 6) apply a load of 2000 daN to fully compress the Belleville washers (35) (34).

Fit the circlip (39). Use a set of shims to increase the distance X between the cover plate (38) and the circlip (39). Select the shim(s) (41) to obtain a clearance **J1 = 0.9 to 1.1 mm**.

39. Remove the circlip (39).
40. Position the shim(s) chosen during step 38 between the cover plate and the circlip (splined shim on the circlip side).
41. Refit the circlip.
42. Lubricate and fit the "O" rings (32) (29) on the cover plate (30) and refit the cover plate.
43. Fit the circlip (31).
44. Fit the clutch assembly (16) on the bell gear (15).

NOTE: The ring (43) is force fitted in the bell gear (15) and then rebored.

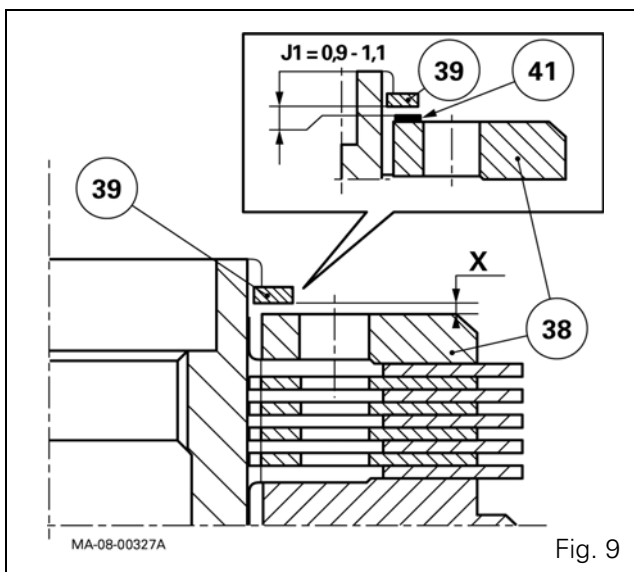


Fig. 9

F . Refitting the clutch assembly

Tractors with no creeper unit

45. Refit the gear (7) (if removed).
46. Position the circlip (6).
47. Refit the connecting shaft and coupling sleeves. Perform steps 11 and 12 in reverse order. Replace the double pins.

Tractors with a creeper unit

48. Refit the gear (7) (if removed).
49. Position the circlip (6).
50. See chapter 5.
51. Refit the right-hand hydraulic cover plate (see chapter 9).
52. Fit the cup (13) (if removed).
53. Fit the ring (11) using a makeshift drift (see § G), so that the ring is positioned 4 to 5 mm set back from the cup mating face (13) (Fig. 10). Move the ring until one of its holes opens into the clutch supply channel in the housing.
54. Fit the seal (24) in the cap (22).

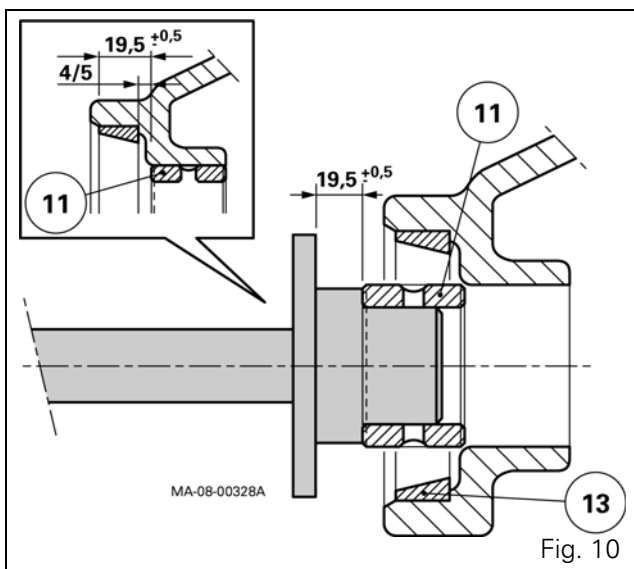


Fig. 10

55. In order to correctly "seat" the cones in their bearing cups, to obtain the clearance:

J2 = 0 to 0.10 mm, fit the cone (14), the shaft (25), and the cup (18).

56. Protect the splines of the shaft.

57. Fit the bearing (22) and the circlip (23)

58. Place the dial gauge feeler pin against the end of the shaft (25) (Fig. 11).

59. Pull the shaft, while turning it alternately from right to left to correctly seat the cones in the cups.

60. Set the dial gauge to zero.

61. Repeat step 59, this time pushing.

62. Depending on the clearance measured, select the thickness of the shim(s) (20) required to obtain J2.

63. Remove the circlip (23), cap (22), cup (18) and the shaft (25).

64. Fit the seal rings (12) in the grooves of the shaft (25) and hook their ends. Ensure that they turn freely.

65. Fit the cone (14) into the cup (13). Insert the shaft (25) after having positioned the clutch assembly (16) and bell gear (15) in the housing.

66. Fit the cup (18) and the shim(s) (20) (smear with grease) selected during step 62.

67. Fit the "O" ring (21) in the housing groove.

68. Fit the cap (22) and the circlip (23), and remove the spline protection on the shaft.

69. On tractors with reinforced sealing, grease and position the seal (26), with the lip turned towards the cap (22). Remove the safety shield.

70. Fit the flange (28), ensuring that operational clearance remains between the flange and housing.

71. Tighten the screw (27) after smearing it with Loctite 241.

72. Clean and degrease the mating face of the cover plate (17) and the housing.

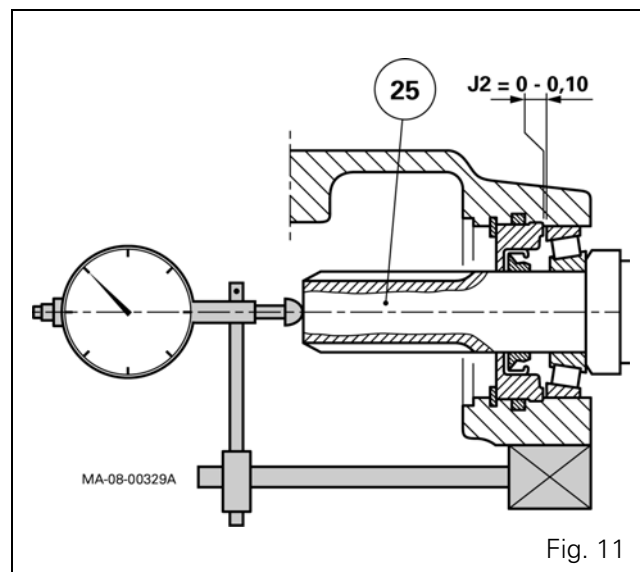
73. Smear the mating face of the cover plate with a sealing product (Loctite 510 or equivalent).

74. Screw two opposing guide studs into the housing.

75. On tractors fitted with proportional PTO, check the position of the lever (4). Fit the retainer pipe (1), the detent plunger (2) and the spring (3) (Fig. 3).

76. Put the cover plate back on (17).

77. Remove the guide studs, and fit and tighten the screws (10) to a torque of 130 - 170 Nm.



78. Smear the two sleeves of the 4WD transmission shaft with "Anti Seize" grease or equivalent.

Refit the transmission shaft and guard, and reconnect the two front differential lock hoses.

Refit the lubrication pipe for the Power Shuttle or engine clutch.

79. Top up the rear axle oil level and remove the shims.

80. Check clutch operation and proportional PTO control adjustment (if fitted).

81. Check tightness of:

- the mating faces of the cover plate under the rear axle housing
- the right-hand hydraulic cover plate (if removed)
- Hydraulic unions

4WD GPA20 clutch

G . Makeshift tools

Cap extractor (Fig 12)

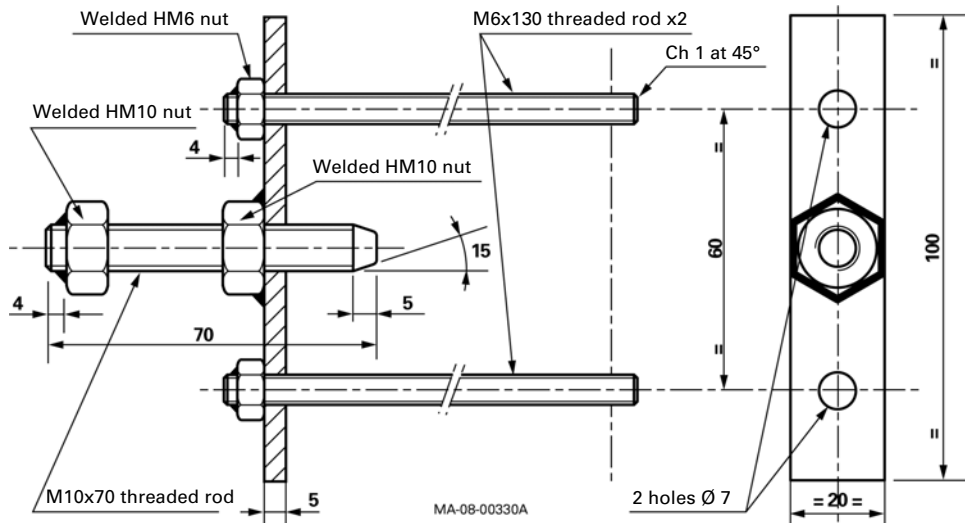


Fig 12

Ring extractor (Fig. 13)

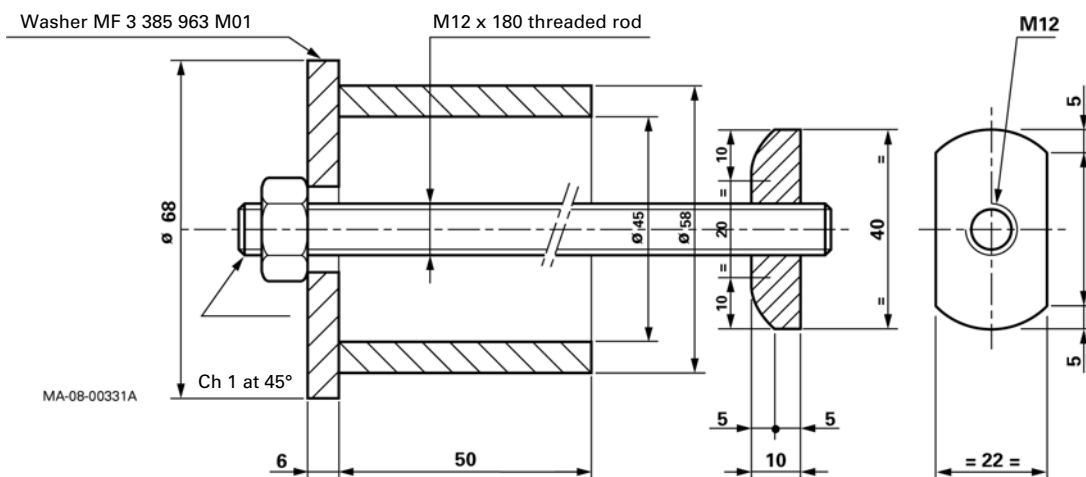


Fig. 13

Ring fitting drift (Fig. 14)

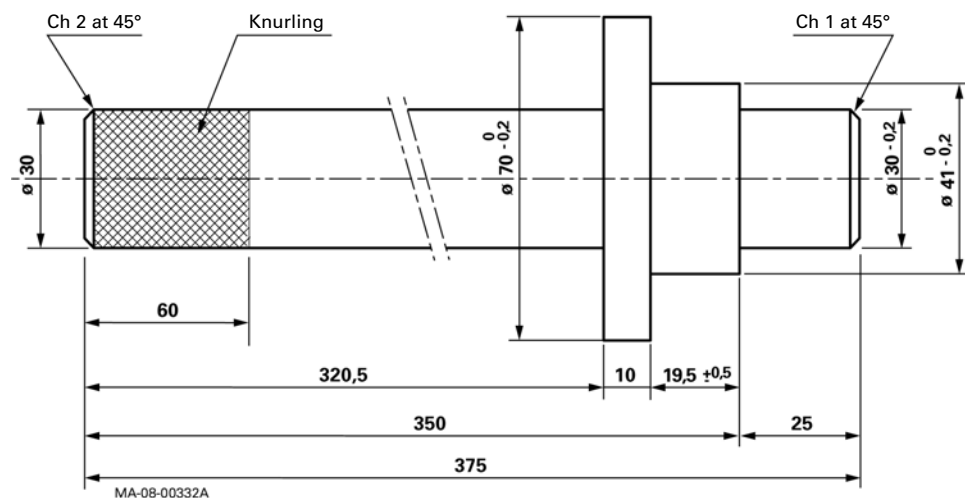


Fig. 14

8C10- 2WD front axle

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D . Disassembling and reassembling the stub axle support	9
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G . Removing and refitting the ram pivot and the steering ram.	13
H . Disassembling and reassembling the steering ram	14
I . Wheel alignment	16
J . Service tools	17

2WD front axle

A . General

The front axle comprises the following assemblies:

- the rear pivot bearing, forming part of the front frame
- the front pivot bearing fixed to the front frame
- an arm support beam, linked to the front and rear pivots
- two telescopic arms
- two pin/stub axle assemblies fitted in the telescopic arm bores,
- a double acting ram whose rod is linked to the stub axle pins and whose shaft is fixed to the axle support.

Two versions of the 2WD front axle are available: standard and wide. The width of the beam is the only difference between the two models; the other parts are identical.

2WD front axle

Parts list (2WD axle for 4-cylinder tractors)

(Fig. 1 and Fig. 2)

- (1) Front frame
- (2) Screw
- (3) Plug
- (4) Ring
- (5) Grease nipple
- (6) Ring
- (7) Front bearing support
- (8) Screw
- (9) Grease nipple
- (10) Washer
- (11) Seal
- (12) Washer
- (13) Seal
- (14) Ram
- (15) Adjustable rod
- (16) Ball joint
- (17) Pin
- (18) Nut
- (19) Support
- (20) "O" ring
- (21) Ring
- (22) "O" ring
- (23) Washer
- (24) Nut
- (25) Grease nipple
- (26) Axle support
- (27) Screw
- (28) Telescopic arm
- (29) Grease nipple
- (30) Steering rod
- (31) Screw
- (32) Nut
- (33) Gasket
- (34) Ring
- (35) Thrust bearing
- (36) Thrust washer
- (37) Stub axle
- (38) Guard
- (39) Lip seal
- (40) Bearing cone
- (41) Bearing cup
- (42) Stud
- (43) Hub
- (44) Bearing cup
- (45) Bearing cone
- (46) Washer
- (47) Pin
- (48) Nut
- (49) Hub cap
- (50) Grease nipple

View of the assembly

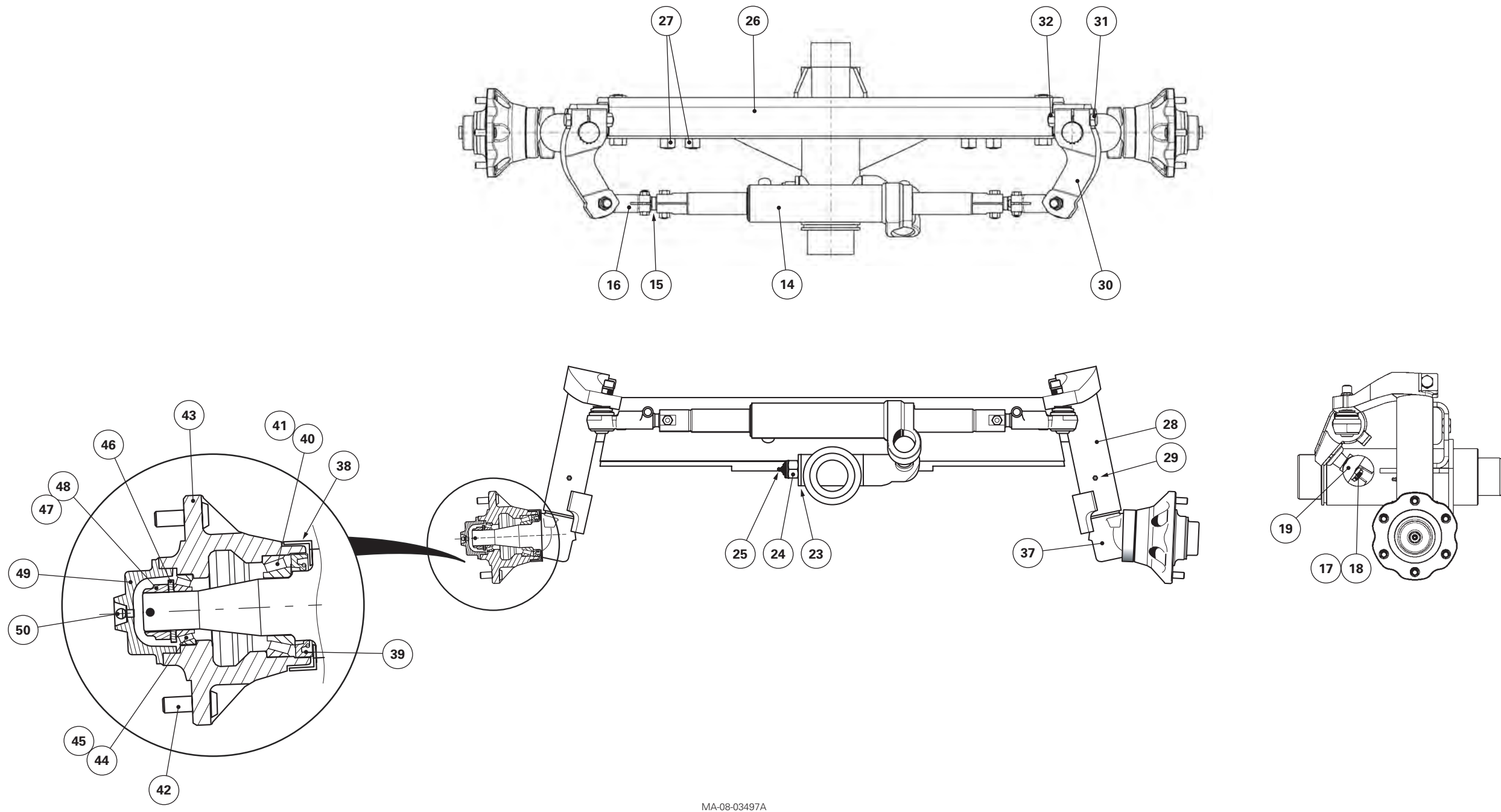
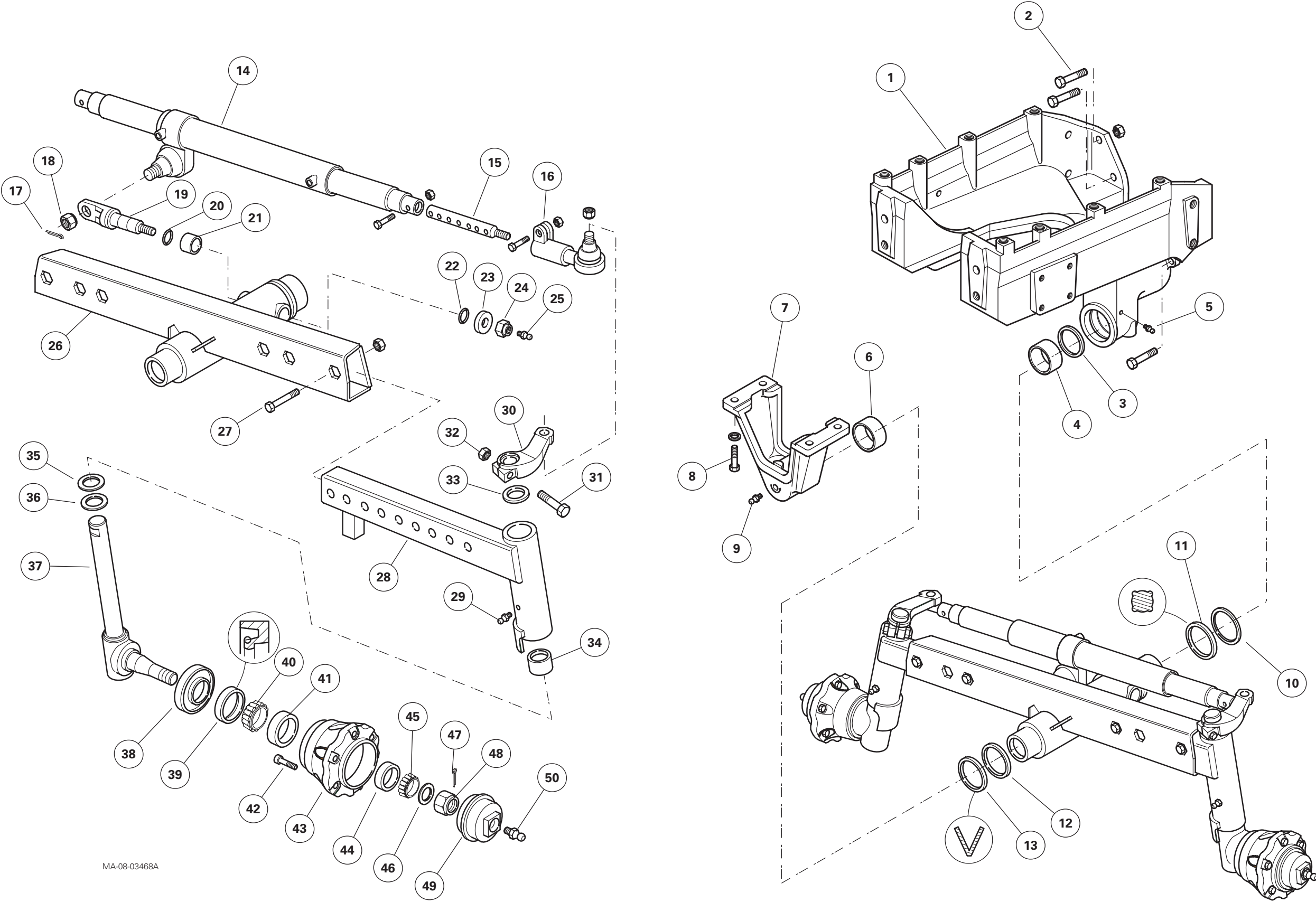


Fig. 1

2WD front axle

Blown-up view



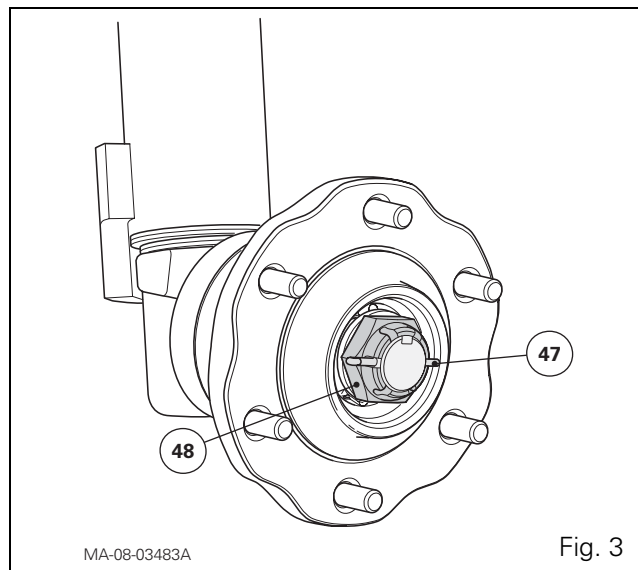
MA-08-03468A

Fig. 2

B . Disassembling and reassembling the wheel hub

Disassembly

1. Park the tractor on a flat surface, chock the rear wheels and engage the parking brake.
2. Raise the front of the tractor and remove the wheel.
3. Unscrew the hub cap (49).
4. Take off and discard the pin (47).
5. Take off the nut (48) and the washer (46).
6. Remove the hub complete with the bearings and the seal (39) of the stub axle.
7. Separate the hub components. Check their condition. If the bearings need to be replaced, both bearings and the seals in the hub must be changed.
8. Remove the guard if necessary (38).



Reassembly

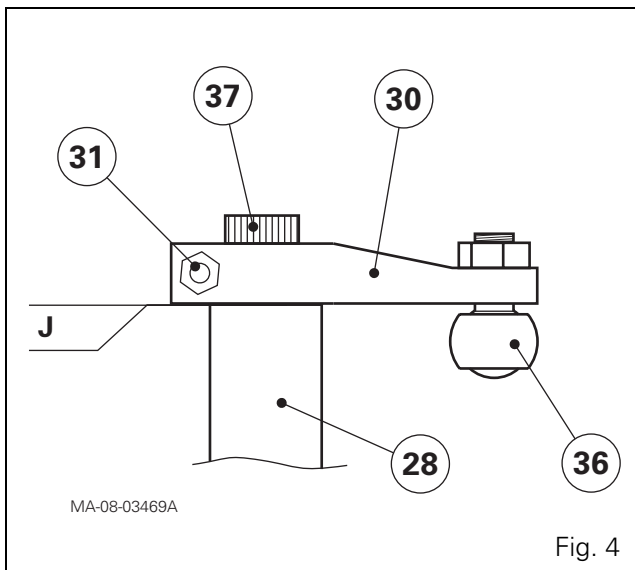
9. Clean and check the parts, and check the condition of the bearings and seals.
10. Perform steps 5 to 8 in reverse order. Grease the bearings before fitting.
NOTE: Be sure to refit the seal (39) with the lip facing out of the hub to prevent impurities from entering and to allow excess grease to flow out.
11. Tighten the nut (48) to 80 Nm, then loosen it by 1/12 to 1/6 of a turn to obtain correct operating clearance. Check that the hub turns freely on its pin.
12. Refit the pin (47).
13. Refit the hub cap.

2WD front axle

C . Removing and refitting the stub axle and its support

Removal

14. Remove the hub(s).
15. Remove the clip nut of the ball joint (16). Remove the ball joint from the steering rod (30). Disconnect the adjustable rod (15) with the ball joint (16) from the steering ram rod (14).
16. Loosen and take off the screw (31) and the nut (32). Take off the steering rod (30) and the seal (33).
17. Remove the stub axle (37) from underneath the arm. Recover the washer and bearing, and note their assembly order.
18. Take off the arm attachment bolts (27). Take the arm (28) out of its support (26).



Refitting

19. Generously grease the thrust washer (36) and the bearing (35). Fit the washer (36) and the thrust bearing (35) to the stub axle in the order noted during step 17.
20. Fit the stub axle into the support. Fit the seal (33) and the steering rod (30). Moderately tighten the screw (31).
21. Press hard upwards against the underside of the stub axle to measure the clearance **J** (Fig. 4) between the steering rod (30) and the stub axle support (28). The clearance should not exceed 0.05 mm. If the clearance exceeds this value, loosen the screw (31), push the stub axle back upwards and retighten the screw to eliminate the excessive clearance.
22. Once the correct clearance is obtained, tighten the screw (31) to 250 - 300 Nm.
23. Refit the arm (28) in its support (26). Refit the bolts (27) and tighten to 340 450 - Nm.
24. Refit the hub (see § B).
25. Carefully grease the stub axle. Refit the wheel and set the tractor back on its wheels.
26. Refit the ball joint by carrying out step 15 in reverse order. Tighten the nut of the ball joint (16) to 80 - 120 Nm.

D . Disassembling and reassembling the stub axle support

Disassembly

- 27.** Remove the stub axle and its support (see § C).
- 28.** Secure the support (28) in a vice.
- 29.** Take out the ring (34) using special tools MF 263A and MF 263-5.
Remove the ring by screwing the threaded extractor into the ring with the top lever. Extract the ring by turning the bottom lever.
- 30.** Turn the support over and take out the bottom ring.

Reassembly

- 31.** Using special tools MS 550 and MF 263-5, insert a new ring either side of the support.
- 32.** Use the steering ring reamer, special tool MF 264 and reamer MF 264-8. Slide the guide rod through the support. Position the reamer guide on the guide rod and in the support. This ensures that the ring bore is perfectly parallel.
- 33.** Bore the top ring to the required dimension.
- 34.** Turn the assembly over and bore the bottom ring to the required dimension.
- 35.** Clean all shavings from the support and ensure that the grease nipple is clean.
- 36.** Carefully clean the parts before and after reassembly.
- 37.** Refit the stub axle and its support (see § C).

2WD front axle

E . Removing and refitting the front axle

Removal

38. Chock the rear wheels of the tractor and engage the parking brake.
39. Fit a trolley jack under the engine lower housing and support the weight of the front of the tractor without raising the wheels from the ground.
40. Remove the front weights, if fitted. If required, take off the weight holder.
41. Mark and disconnect the steering hoses at the end of the ram. Plug the ends of the pipes to prevent impurities from entering.
42. Remove the front wheels.
43. Sling the front axle using suitable straps (Fig. 5).

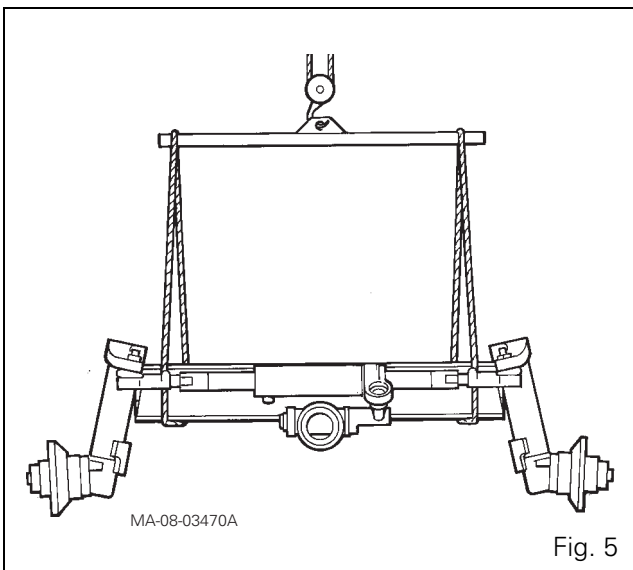


CAUTION: Prevent the axle from tipping to the front or rear by securing it correctly in the sling. A tipping axle may injure the operator.

44. Remove the attachment bolts (8) from the front pivot bearing (7).
45. Remove the bearing.
46. Pull the axle towards the front of the tractor to release it from its rear pivot. Place the axle on axle stands.
47. Take off the seals (11) (13) and the washers (10) (12).

Refitting

48. Suspend the front axle from a bridge crane with slings so that it is horizontal in both directions.
49. Check the condition of the washers (10) (12) and replace them if they are damaged.
50. Fit the new seals (11) (13).



51. Moderately grease the rear pivot bearing.
52. Move the axle under the front support and engage it in the rear bearing. Thrust the axle as far as it will go to eliminate the clearance.
53. Smear the front pivot pin with grease. Refit the front bearing support.
54. Remove the screws (8). Smear screws with Loctite 241 or equivalent and tighten them to a torque of 560 Nm.
55. Ensure operating clearance does not exceed 0.25 mm (Fig. 6). Adjust the clearance if it is not correct.
56. Perform steps 38 to 42 in reverse order.
57. Grease the two axle pivots until grease appears between the bearing and pin.

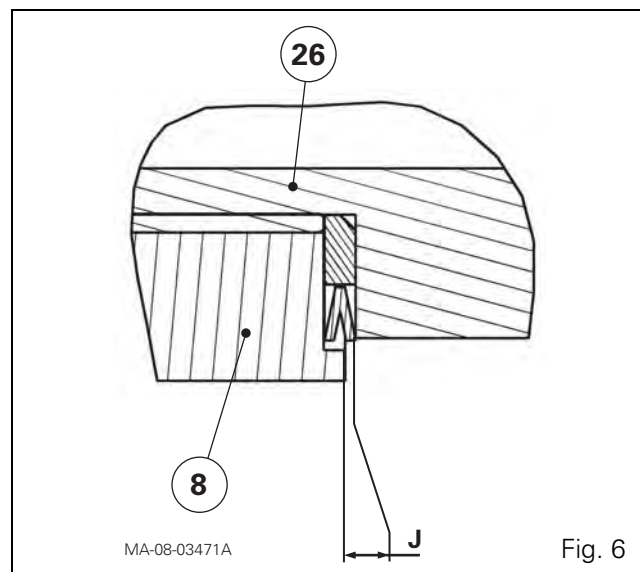


Fig. 6

F. Disassembling and reassembling the pivot bearings

Disassembly

58. Remove the front axle (see § E).
59. Take off the seals (11) (13) and washers (10) (12).
60. Using a suitable extractor, take out the front and rear pivot bearing rings (Fig. 7).

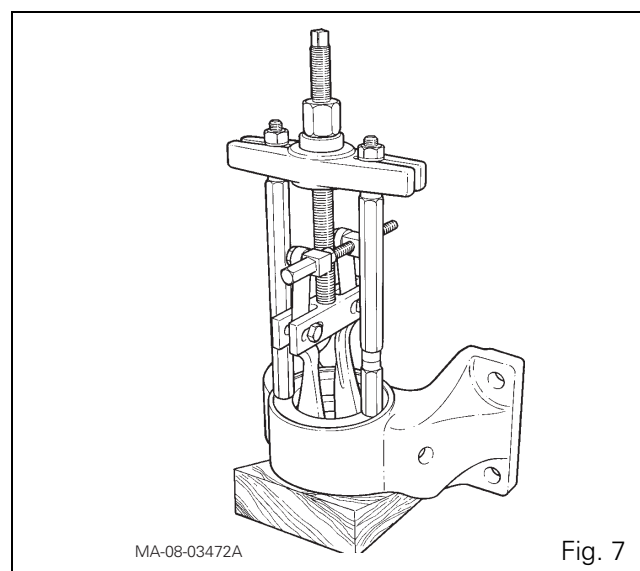


Fig. 7

2WD front axle

Reassembly

- 61.** Fit a new ring (6) to the front bearing. Chock the bearing support correctly using a suitable fixture. Use tools MF 500 and MS 550 to fit the ring.

NOTE: Check the position of the lubrication port, which should face the lubrication channels in the support.

The ring (6) should be positioned 0.5 - 1.5 mm from the rear face of the front bearing support (Fig. 8).

- 62.** Fit a new ring (4) to the rear bearing. Proceed in the same way as for the front bearing ring.

NOTE: Check the position of the lubrication port, which should face the lubrication channels in the support.

The ring (4) should be positioned 0.5 - 1.5 mm from the front face of the rear bearing support (Fig. 9).

- 63.** Refit the axle (see § E), taking the following precautions:

- fit new seals
- lubricate the seals and rings with universal grease before refitting.

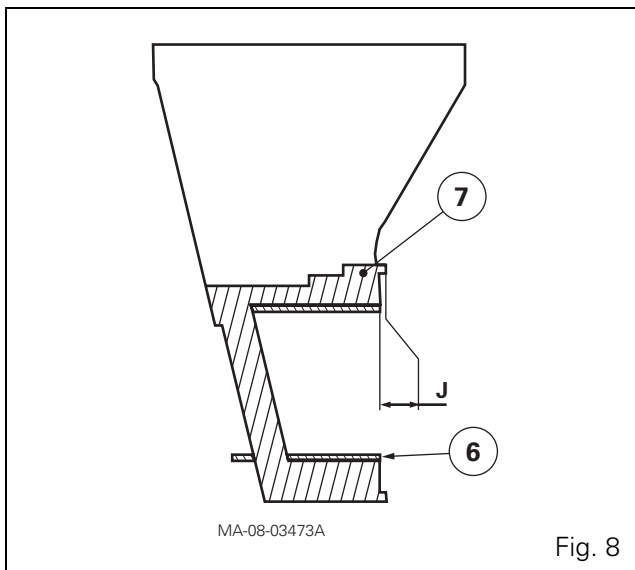


Fig. 8

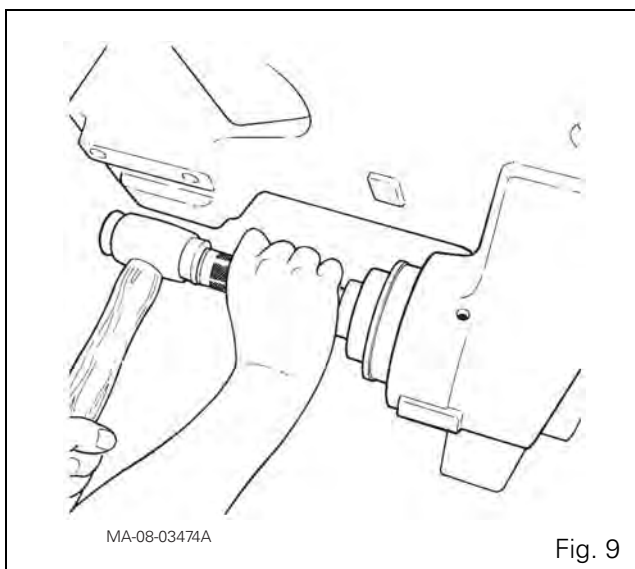
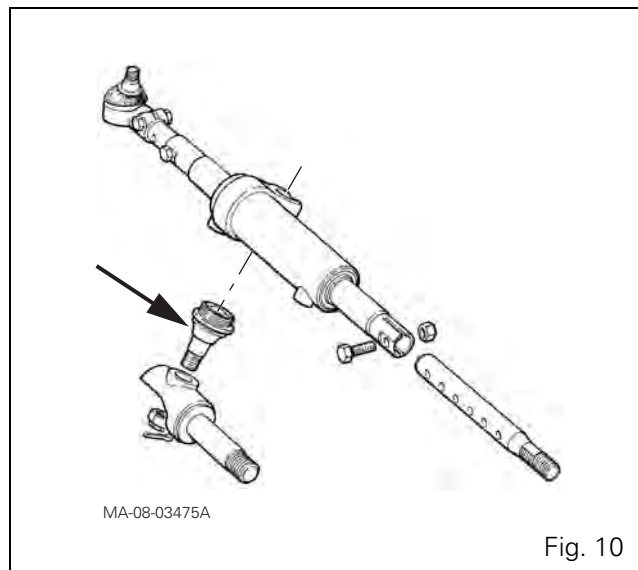


Fig. 9

G . Removing and refitting the ram pivot and the steering ram

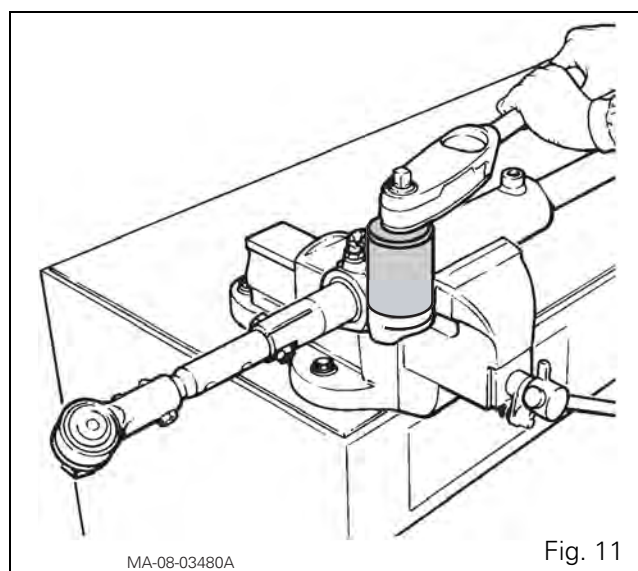
Removal

64. Remove the axle assembly (see § E).
65. Chock the front axle on axle stands.
66. Disconnect the ball joints (16) from the steering rods (30).
67. Drive out the pin (17) and remove the nut (18).
68. Remove the ram (14).
69. Remove the ball joint (Fig. 11) from the ram using tool MF 509.
70. Remove the nut (24). If necessary, remove grease nipple (25). Remove the washer (23).
71. Take out the ram pivot pin (19).
72. Extract the seals (20) (22) and ring (21).



Refitting

73. Clean and check all components. Replace those that are defective. Systematically replace the seals and rings.
 74. Fit the ring (21) using a suitable fixture.
 75. Position the seals (20) (22) in the ram pivot bore.
 76. Refit the ram pivot pin (19) in the bore.
 77. Fit the washer (23) and refit the nut (24) and grease nipple, if removed. Tighten the nut to (24) to 180 - 220 Nm.
 78. Refit the ball joint (Fig. 11) in the ram using tool MF 509. Tighten to a torque of 210 Nm.
 79. Refit the ram (14). Fit the nut (18) lightly smeared with Loctite 270. Tighten the nut to 110 Nm then retighten to align with a hole for the pin. Refit a new cotter pin (17).
- NOTE:** Do not tighten the nut (18) to more than 120 Nm.
80. Couple the ball joints (16) with the steering rods (30). Tighten the nuts to 80-120 Nm.

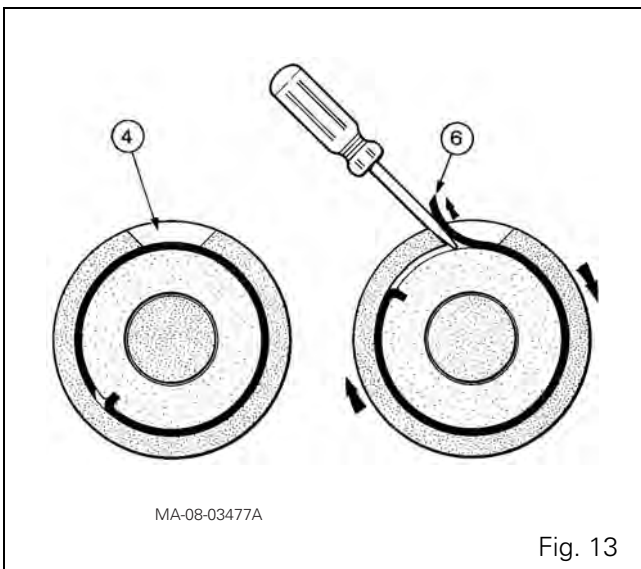
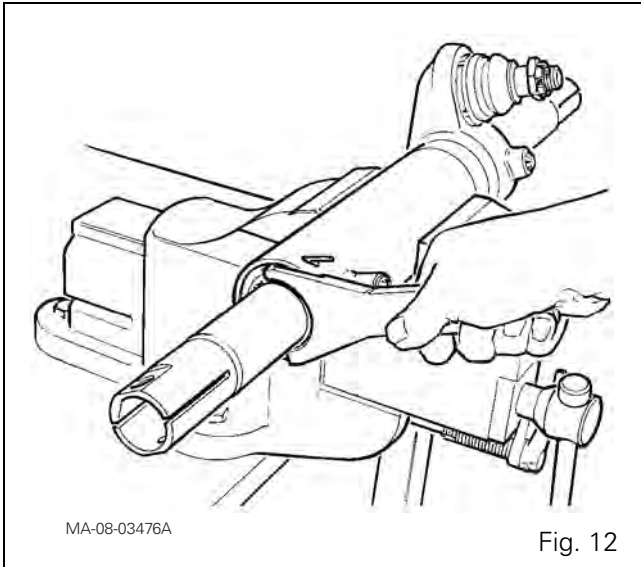


2WD front axle

H. Disassembling and reassembling the steering ram

Disassembly

81. Remove the steering ram (see § G).
82. Remove any plugs and drain the oil from the ram by pushing the rod from one end to the other.
83. Secure the ram in a vice.
84. Remove the sealing mastic from the long hole at the opposite end of the ball joint.
85. Use the steering ram wrench, special tool MF 505 and fit the end of the wrench in the two holes used in the cap. Turn the cap until the chamfered end of the retaining wire appears in the long hole (Fig. 12).
86. Using a screwdriver, turn the cap fully and take the end of the retaining wire out through the hole.
87. Continue turning the cap so that the rest of the wire comes out of the hole.
88. The end of the wire forms a right angle elbow that fits into a hole in the groove of the end cap. Remove the ram retaining wire.
89. Take out the ram piston assembly with the end cap.
90. Remove the end cap.
91. Take off the lip seal.
92. Take off the wear ring.
93. Remove the pressure seal.
94. Remove the "O" ring.
95. Take the gaskets off the piston.
96. Take the wear ring off the piston.



Reassembly

- 97.** Check the condition of the parts. Replace those that are defective.
- 98.** Fit the piston with a set of new seals.
- 99.** Lubricate all of the new seals with clean transmission oil. Slide the piston into the ram shaft carefully to avoid damaging or displacing the gaskets.
- 100.** Replace the gaskets on the end cap with new ones.
- 101.** Slide the end cap along the piston rod and into the ram.
- 102.** Using special wrench MF 505, turn the end cap until the hole made in its groove can be seen through the oblong hole in the ram body.
- 103.** Insert a new retaining wire so that the elbowed end fits into the hole made in the groove. Ensure that the grooves in the ram body and end cap are aligned.
- 104.** Turn the end cap to wind the wire around the cap inside the ram.
- 105.** Seal the oblong hole in the ram body with non-hardening sealing mastic. This operation is important to prevent water entry and rusting of the end cap retaining wire.
- 106.** Check that the piston rod moves correctly in both directions.
- 107.** Refit the steering ram on the axle beam (see § [G](#)).
- 108.** Refit the front axle to the tractor (see § [E](#)).

Final check

Once the hydraulic assembly is reconnected and the axle refitted, check the operation of the tractor steering and ensure the ram does not leak.

2WD front axle

I . Wheel alignment

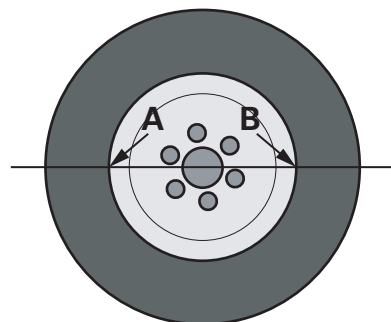
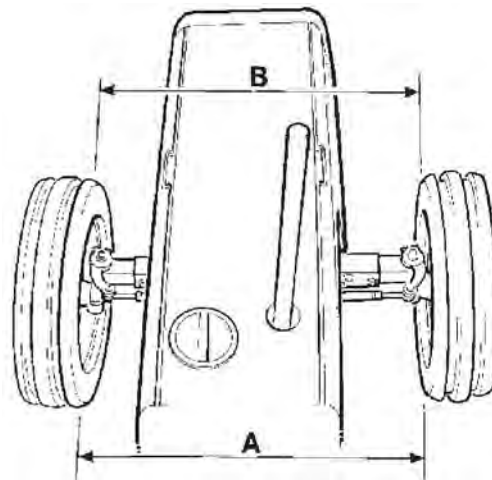
Check

- 109.** Park the tractor on a flat hard surface. Set the front wheels straight.
- 110.** To check the toe-in, measure distance A and B (Fig. 14) at the wheel rims. Take care to measure between two horizontal points.
- Distance **A** should be 0 - 5 mm greater than distance **B**.

Settings

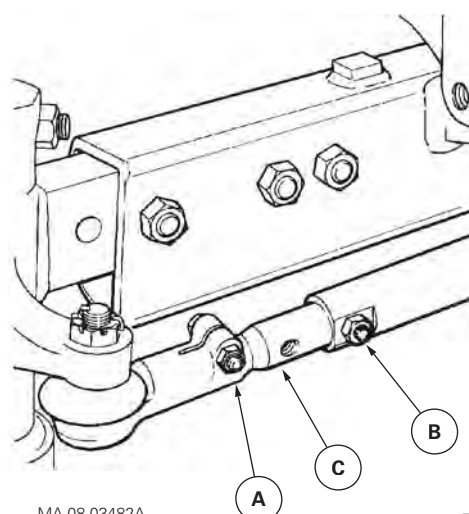
NOTE: Minor adjustments may be carried out on one side only. Major adjustments, after large-scale repair work, should be carried out on both sides to ensure identical ball joint setting on both sides.

- 111.** Loosen the ball joint securing bolt (A) (Fig. 15) at each end of the tie rod (C).
- 112.** Unscrew the clamping bolt (B) at each end of the steering ram.
- 113.** Turn the tie rod (C) one half-turn at a time. The same number of threads should be visible at each ball joint end.
- To increase the toe-in, unscrew the rod (C); to reduce toe-in, screw the rod (C) in.
- 114.** Refit the clamping bolts (B). Tighten to 120 - 160 Nm.
- 115.** Position the clamping bolt (B) horizontally and check the toe-in.
- 116.** If the toe-in is correct, tighten the two securing bolts (A) to 45 Nm.



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Fig. 14



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Fig. 15

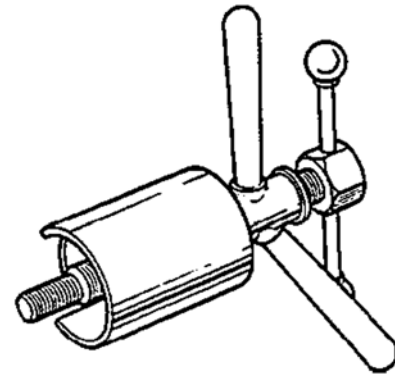
J . Service tools

Tools available in the AGCO network

MF 263A: Steering ring removal tool for 2WD front axle ([Fig. 16](#))

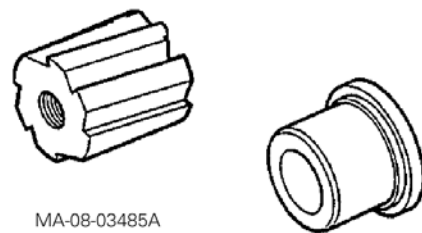
MF 263-5: Steering ring removal/refitting adapter for 2WD front axle (used in conjunction with MF 263A and MS 550) ([Fig. 17](#))

MF 264: Steering ring main boring tool for 2WD front axle ([Fig. 18](#))



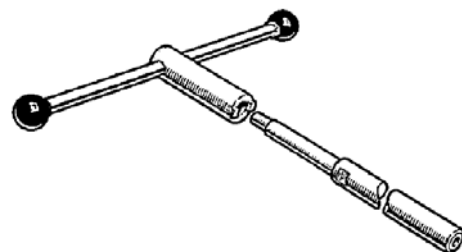
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Fig. 16



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Fig. 17



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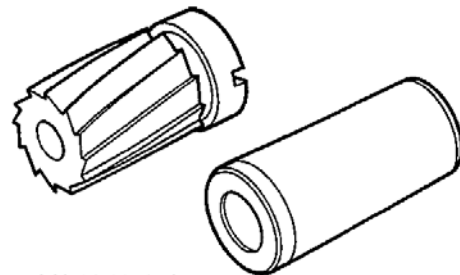
Fig. 18

2WD front axle

MF 264-8: Bore and guide (used in conjunction with MF 264) ([Fig. 19](#))

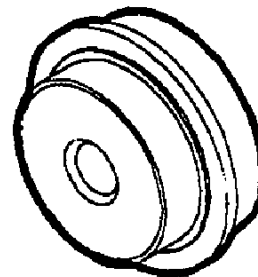
MF 500: Tool for fitting 2WD front axle bearings ([Fig. 20](#))

MF 505: Steering ram removal wrench ([Fig. 21](#))



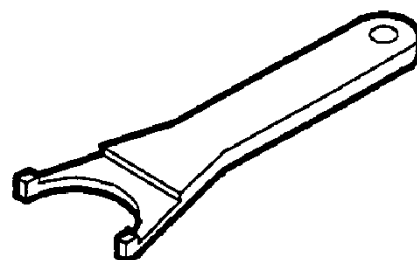
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Fig. 19



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Fig. 20

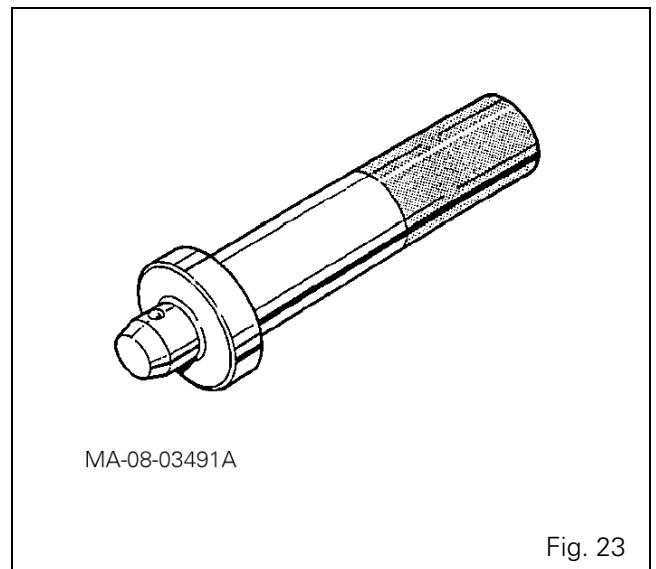
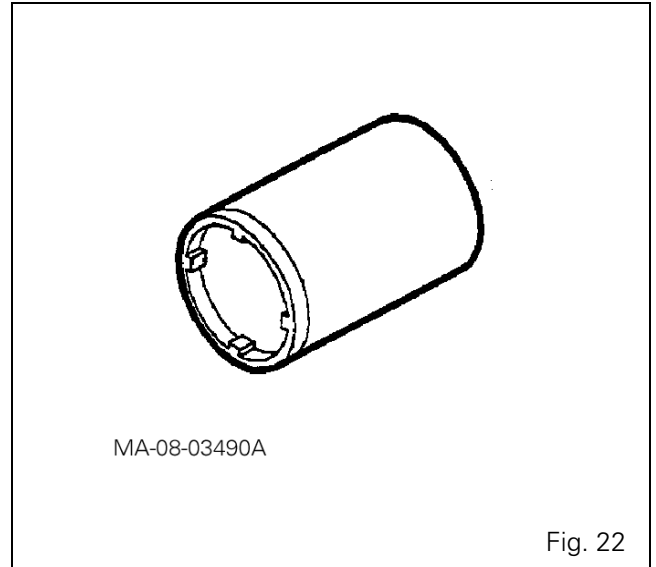


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Fig. 21

MF 509: Steering ram ball joint removal wrench (Fig. 22)

MS 550: Universal sleeve (Fig. 23)



8D10- 2WD front axle, 6-cylinder engine

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C . Removing and refitting the hub, the stub axle and the telescopic arm	10
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E . Removing and refitting the front axle	13
F . Wheel alignment	15
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2WD front axle, 6-cylinder engine

A . General

The front axle comprises the following assemblies:

- a cast iron support identical to the 4WD version, whose lower part incorporates a fixed bearing holding the 2nd axle beam pivot
- a front bearing fixed to the cast iron support, holding the 1st axle beam pivot
- an arm support beam,
- two telescopic arms
- two pin/stub axle assemblies fitted in the telescopic arm bores,
- a double-acting ram linked to the stub axle pins via ball joints and rods.

2WD front axle, 6-cylinder engine

Parts list (Fig. 1, Fig. 2 and Fig. 3)

- (1) Central pivot
- (2) Steering ram
- (3) Steering ram rod
- (4) Ram/rod ball joint
- (5) Rod
- (6) Rod/lever ball joint
- (7) Steering lever
- (8) Telescopic arm
- (9) Steering pivot
- (10) Hub
- (11) Rod adjustment screw
- (12) Central support
- (13) Ram support
- (14) Screw
- (15) Bearing
- (16) Seal
- (17) Seal
- (18) Stub axle
- (19) Hub securing nut
- (20) Bearing
- (21) Seal
- (22) Bearing
- (23) Steering stop
- (25) Nut
- (26) Pin
- (27) Steering lever tightening screw
- (28) Rod adjustment nuts
- (29) Washer
- (30) Ram attachment screw
- (31) Steering ram centring pin
- (32) Grease nipple
- (33) Cover plate
- (34) Retainer

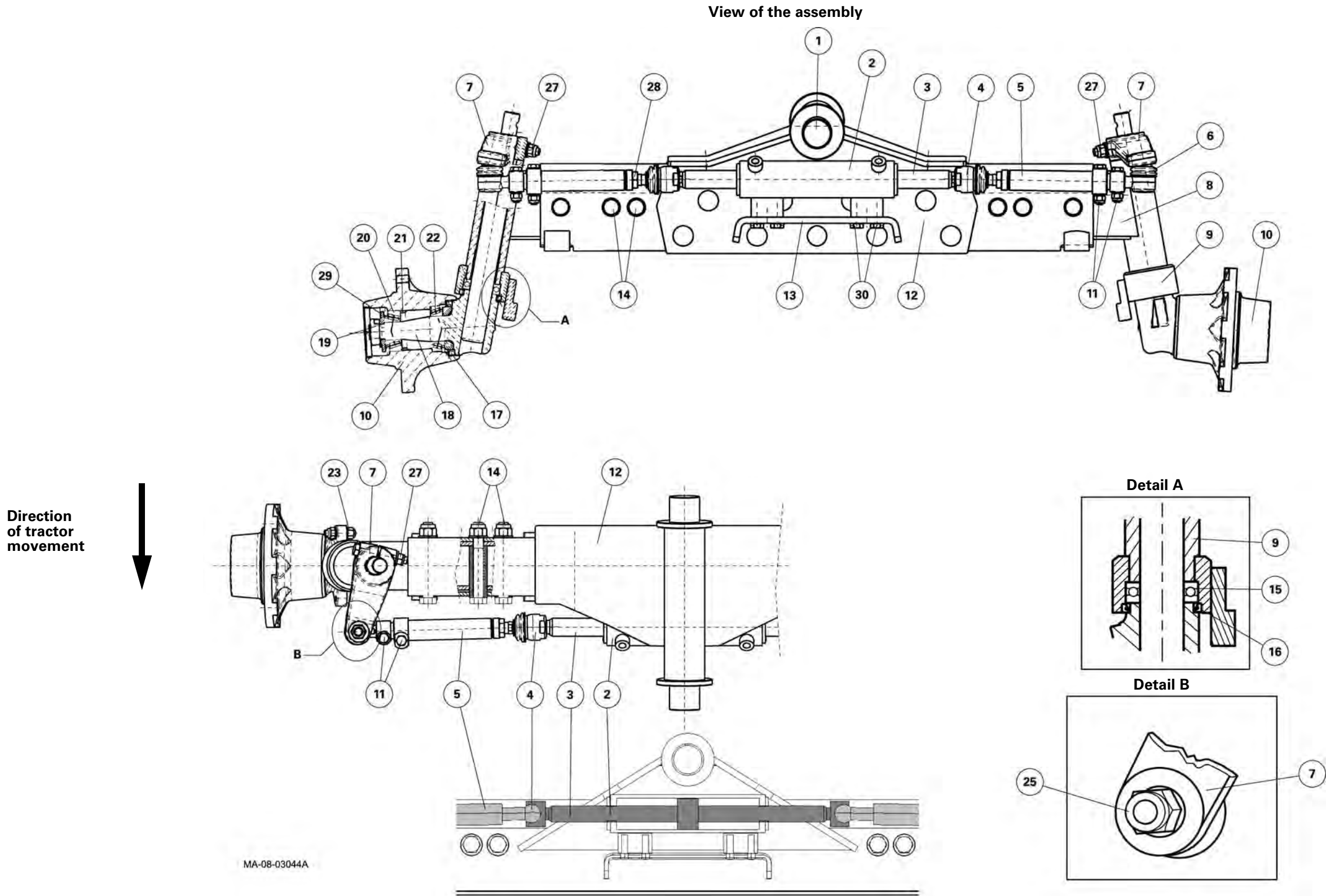
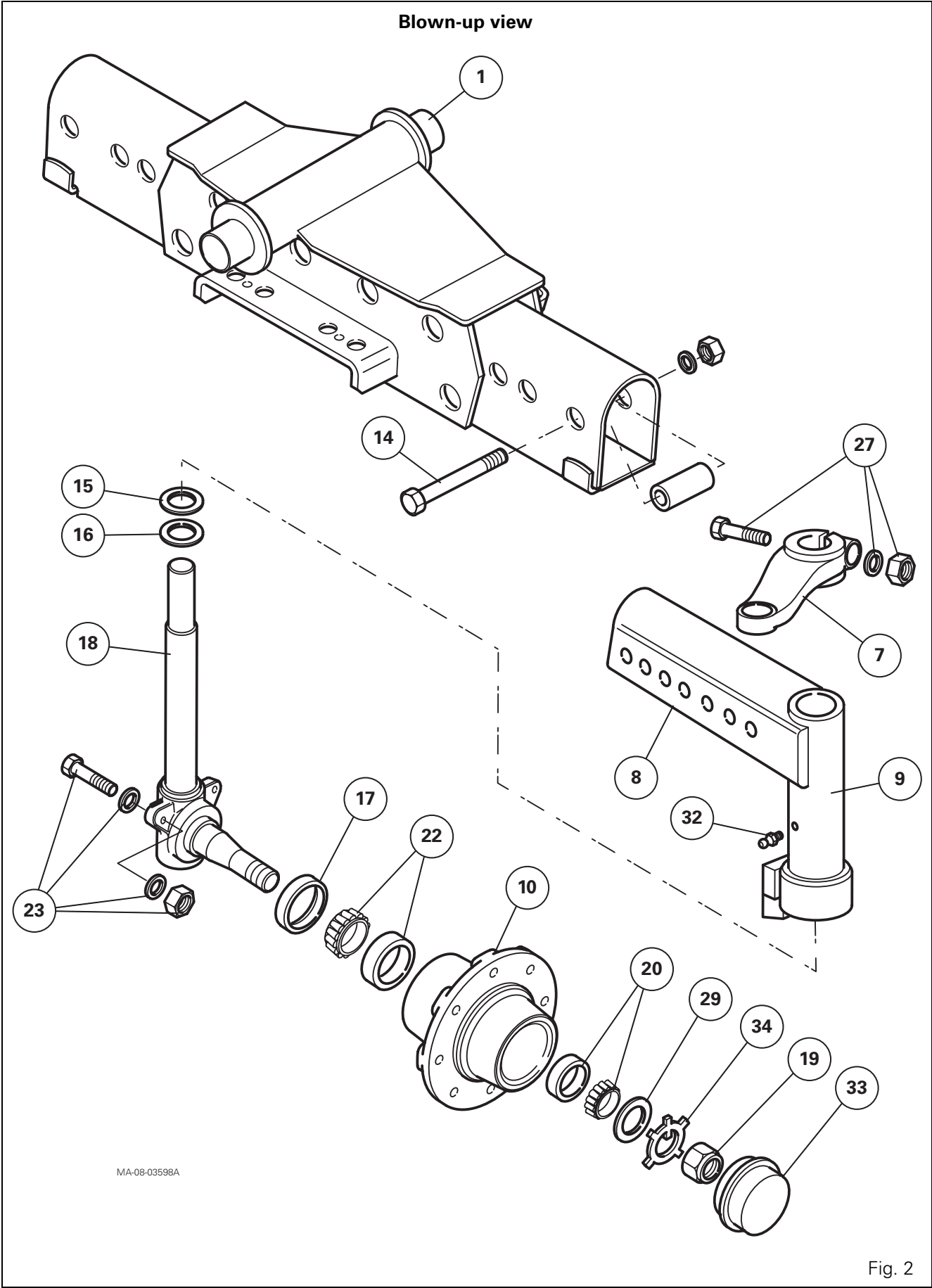
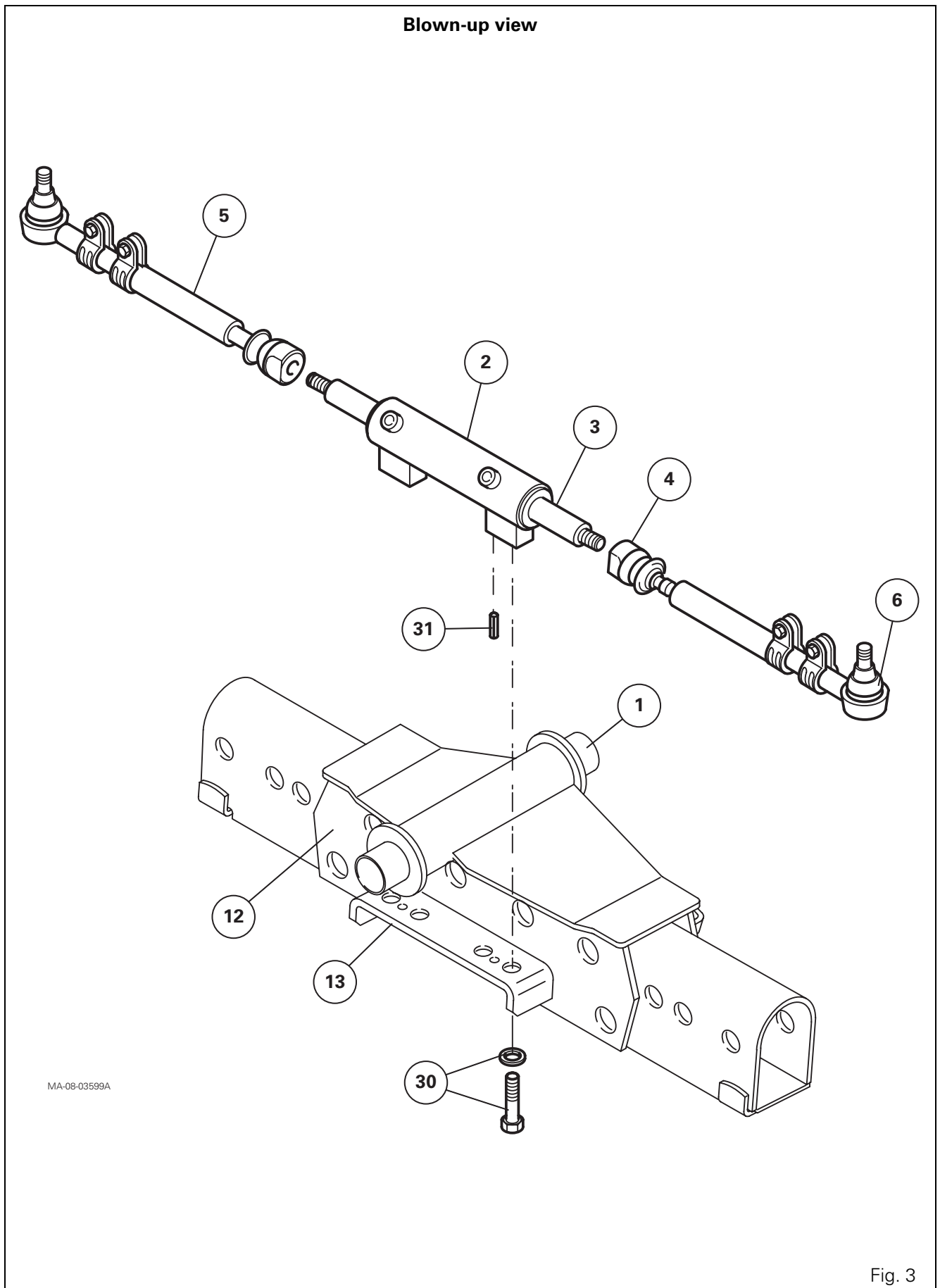


Fig. 1

2WD front axle, 6-cylinder engine



2WD front axle, 6-cylinder engine



2WD front axle, 6-cylinder engine

Tightening torques and dimensions for standard and wide 2WD front axles ([Fig. 4](#))

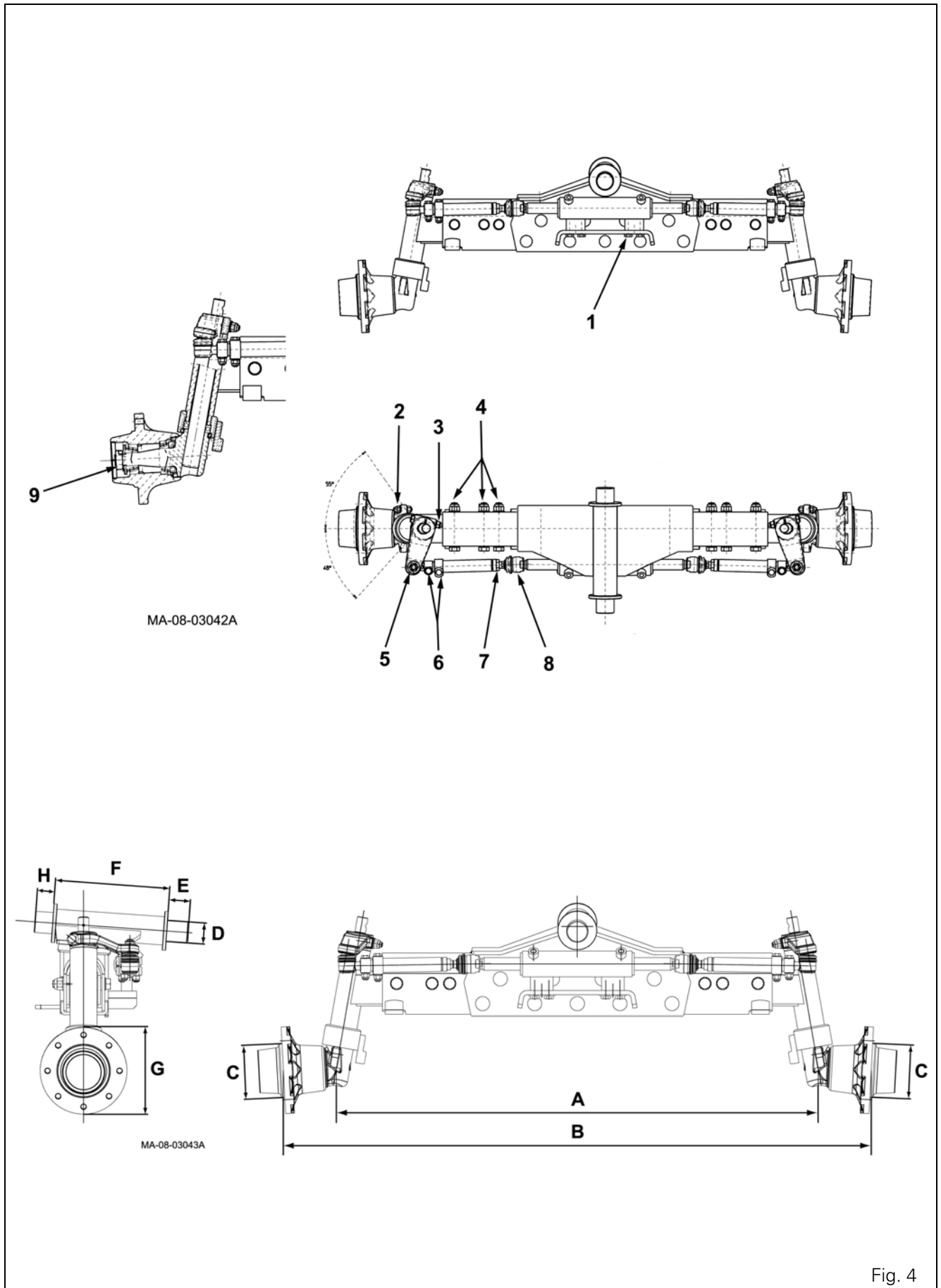
Tightening torques

Reference	Description	Thread	Nm
1	Ram attachment screw	M14 X 2 X 40	120 Nm
2	Steering stop screw	M12	70 Nm
3	Steering lever attachment screw	M14 X 2 X 100	70 Nm
4	Beam width adjustment screw	M20 X 2.5 X 150	260 Nm
5	Steering ball joint	M20	120 Nm
6	Steering rod clamping clip	-	70 Nm
7	Steering rod locknut	-	220 Nm
8	Ball joint tightening	-	220 Nm
9	Hub securing nut	M30 x 1.5	140 Nm, loosen then retighten to 40 Nm

Dimensions (mm)

Reference	Dimension	
	Standard	Wide
A	1660-2060	1892-2392
B	1360	1592
C	Ø 152.2 +/- 0.1	
D	Ø 60	
E	60	
F	324	
G	Ø 203.2	
H	50	

2WD front axle, 6-cylinder engine



2WD front axle, 6-cylinder engine

B . Removing and refitting the steering rod

Removal

1. Chock the rear wheels and apply the hand brake.
2. Lift the relevant wheel using a jack. Remove nut (25).
3. Extract the ball joint (6) from the lever (7).
4. Loosen the ball joint (4) and separate it from the ram rod (3).

Refitting

5. Check and clean the components. Replace any defective parts.
6. Refit the ball joint (4) on the ram rod (3). Tighten to a torque of 220 Nm.
7. Fit the ball joint (6) in the lever (7). Fit the nut (25). Tighten to a torque of 120 Nm.
8. Remove the jack.
9. Remove the chocks and release the hand brake.
10. Adjust the wheel alignment (see § F).

C . Removing and refitting the hub, the stub axle and the telescopic arm

Preliminary steps

11. Chock the rear wheels and apply the hand brake.
12. Raise the front of the tractor using a jack positioned at the centre of the axle and position axle stands.
13. Remove the wheel concerned.

Removing the hub

14. Extract the cover (33).
15. Release and loosen the nut (19), remove the retainer (34) and washer (29).
16. Remove the bearing cone (20).
17. Extract the hub (10) from the stub axle (18).
18. Extract the seal ring (17) and remove the bearing cone (22).
19. Extract the bearings cups (20) and (22).

Removing the stub axle

20. Remove nut (25). Extract the ball joint (6) from the lever (7). Take off lever (7).
21. Extract the stub axle (18) from the telescopic arm.
22. Separate the bearing (15) from the stub axle.
23. Extract the seal (16) from the telescopic arm (8).

2WD front axle, 6-cylinder engine

Removing the telescopic arm

- 24.** Remove the screws and nuts (14).
- 25.** Extract the telescopic arm (8) from the axle (2), and remove the grease nipple (32).

Refitting the telescopic arm

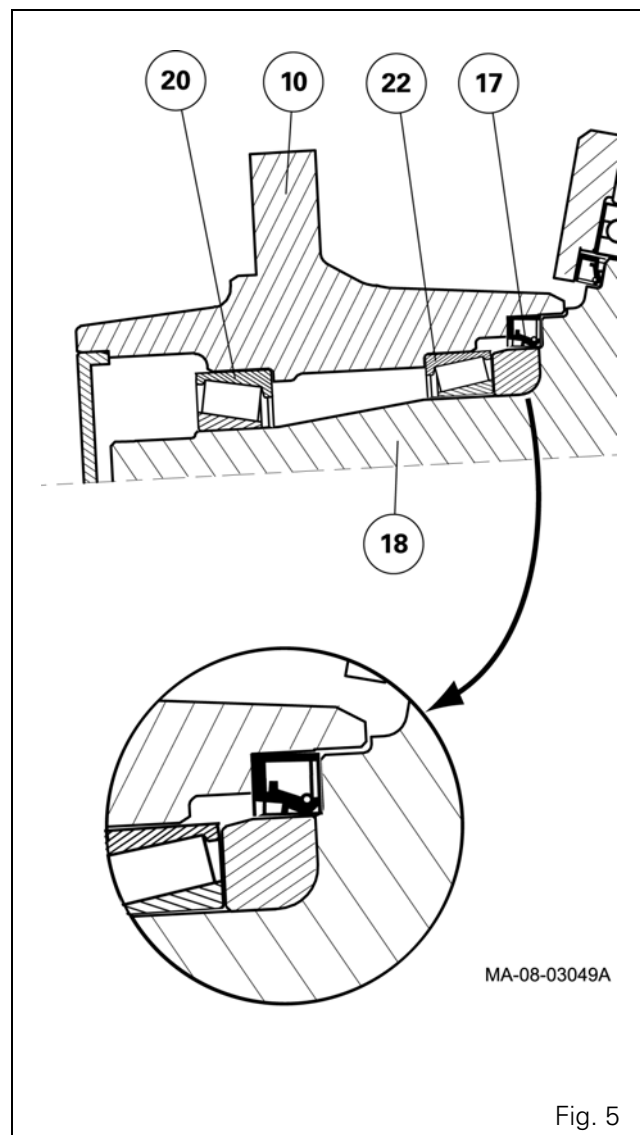
- 26.** Check and clean the components. Replace any defective parts.
- 27.** Assemble and fix the telescopic arm (8) in the axle (2) using the screws and nuts (14) fitted in the suitable holes. Tighten the screws to a torque of 260 Nm.

Refitting the stub axle

- 28.** Using a suitable fixture, position the seal (16) up against the shoulder of the telescopic arm, with the lip turned outwards.
- 29.** Position the bearing (15) in the steering pivot (9).
- 30.** Insert the stub axle (18) in the telescopic arm.
- 31.** Position the lever (7) with its attachment screw (27). Tighten the screw to a torque of 110 Nm.

Refitting the hub

- 32.** Using a press and a suitable fixture, fit the cups of bearings (20) (22) fully up against the shoulder in the hub (10).
- 33.** Smear the cone (22) with bearing grease and place it in its corresponding cup.
- 34.** Using a suitable fixture, fit the seal (17) in its housing fully up against the shoulder, with the lip turned outwards (Fig. 5).



2WD front axle, 6-cylinder engine

- 35. Fill the hub cavity (10) with bearing grease.
- 36. Fit the hub on the stub axle (18).
- 37. Smear the bearing cone (20) with bearing grease and fit it on the stub axle up against its cup.
- 38. Position the washer (29), the retainer (34) and the nut (19). After tightening the nut to a torque of 140 Nm, loosen and retighten it to 40 Nm.
- 39. Close the retainer tab (34) over the nut (19).
- 40. Check that the hub turns freely.
- 41. Fill the hub cavity (10) (nut side) with bearing grease.
- 42. Close the hub with the cover (33).
- 43. Fit the grease nipple (32) on the telescopic arm (8).

Final steps

- 44. Refit the wheel, remove the axle stands and tighten the screws to a torque of 200-260 Nm. Grease the ring and the bearing of the telescopic arm (8).
- 45. Remove the chocks and release the hand brake.
- 46. Adjust the wheel alignment (see § F).

Refitting

- 52. Check and clean the components. Replace any defective parts.
- 53. Refit the ram assembly on the support (13), ensuring it is correctly positioned using the centring pins (31).
- 54. Tighten the screws (30) to a torque of 120 Nm.
- 55. Couple the rods (5) to the steering rod (3).
- 56. Connect the ram supply hoses according to the marks made during step 48.
- 57. Remove the jack. Remove the chocks and release the hand brake.
- 58. Check the wheel alignment (see § F).
- 59. Check the tightness of the ram unions.

D . Removing and refitting the steering ram

Removal

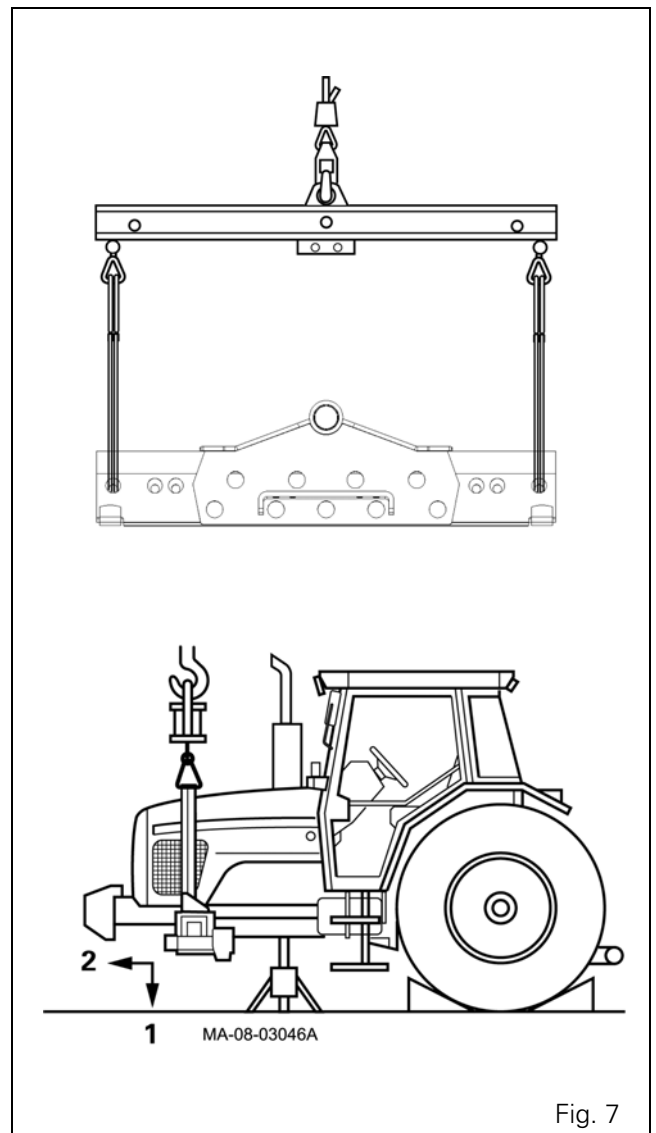
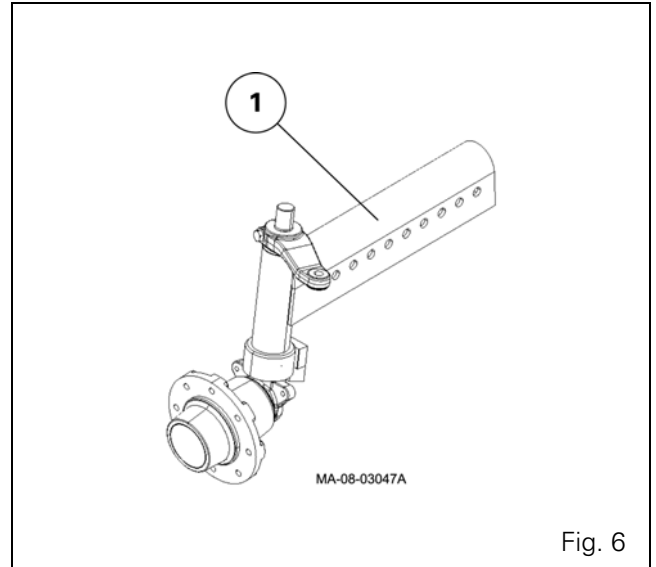
- 47. Chock the rear wheels and apply the hand brake. Raise the front of the tractor using a jack positioned at the centre of the axle.
- 48. Mark and disconnect the hoses on the ram.
- 49. Disconnect the rod (5) from the steering ram rod (3).
- 50. Loosen the screws (30).
- 51. Remove the steering ram assembly.

2WD front axle, 6-cylinder engine

E . Removing and refitting the front axle

Removal

60. Chock the rear wheels and apply the hand brake.
61. Raise the tractor using a jack positioned at the centre of the axle.
62. Position an axle stand under the engine lower housing.
63. Remove the front wheels.
64. Remove the screws and nuts (14).
65. Take the ball joints (6) out of the steering levers (7).
66. Remove the two stub axles (1) (Fig. 6).
67. Mark and disconnect the hydraulic steering hoses.
68. Remove screws (30), and remove the ram (2) from the axle (12).
69. Sling the axle support (12) (Fig. 7).



2WD front axle, 6-cylinder engine

- 70.** Remove screws (1) and grease nipple (3). Remove front bearing (2) and washers (9)(10) (Fig. 8).
- 71.** Remove the front axle by releasing it from the front frame (8) (Fig. 8).

Refitting

- 72.** Check and clean the components. Replace any defective parts.
- 73.** Sling and engage the axle support in the bearing of the front frame (8) after previously turning the chamfer of the washers (5) (6) towards the axle (Fig. 8).
- 74.** Position the washers (9)(10) (with the chamfer turned towards the axle) (Fig. 8). Fit the front bearing (2) to reduce to a minimum the clearance between the washers and the axle.
- 75.** Lightly smear screws (1) with Loctite 270 or equivalent (Fig. 8) and tighten them to a torque of 520 - 640 Nm. Remove the sling.
- 76.** Refit the ram (2) on the axle (12).
- 77.** Refit the hydraulic steering hoses according to the marks made previously.
- 78.** Fit the grease nipples (Fig. 8).
- 79.** Grease the two bearings (Fig. 8).
- 80.** Fit the nuts and screws (14) to a torque of 260 Nm.
- 81.** Fit the screws (11) to couple the rods (5) and the ball joints (6) and tighten the nuts to a torque of 70 Nm.
- 82.** Refit the front wheels and remove the axle stand.
- 83.** Remove the chocks and release the hand brake.
- 84.** Check the wheel alignment (see § F).

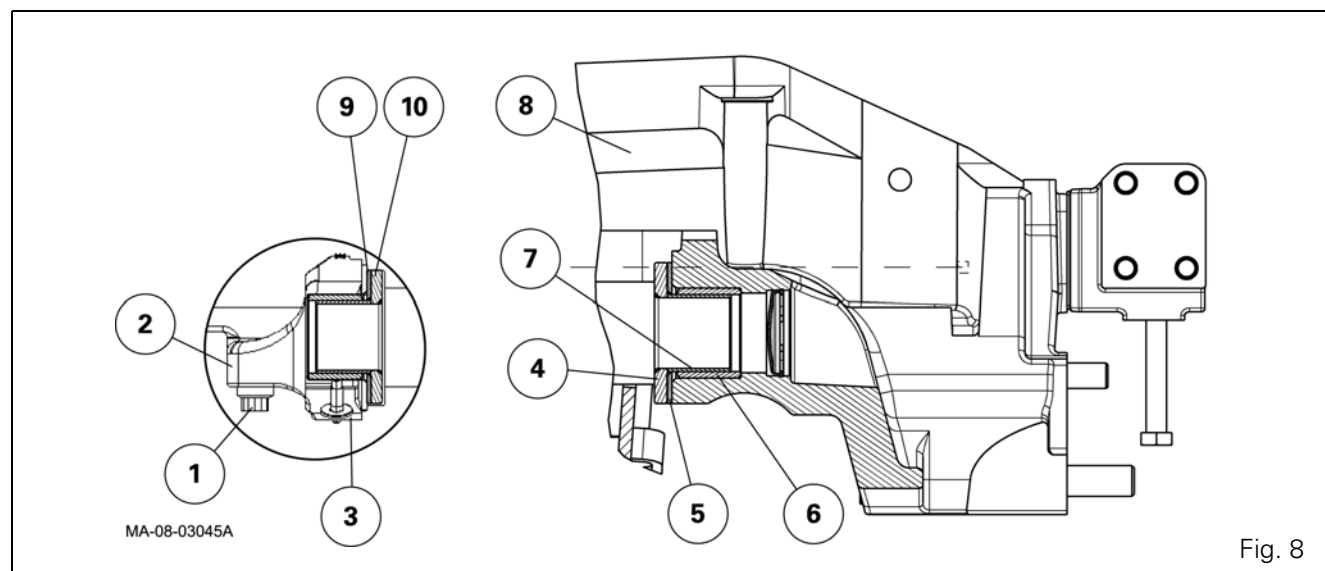


Fig. 8

2WD front axle, 6-cylinder engine

F . Wheel alignment

85. Place the steering in neutral position. The adjustment is carried out by moving the rods. Unscrew the screws (11) to adjust the rod lengths and to obtain a toe-in of 0 to 14 mm.
86. This toe-in is measured at points A, A' and B, B' determined by a diameter of 895 mm marked on the sides of the tyres (Fig. 9).
87. It is obtained by calculating the difference between values L and D.

NOTE: If the toe-in is measured on a diameter different to 895 mm, adjust its value proportionally. Having carried out the adjustment, tighten screws (11) to a torque of 70 Nm.

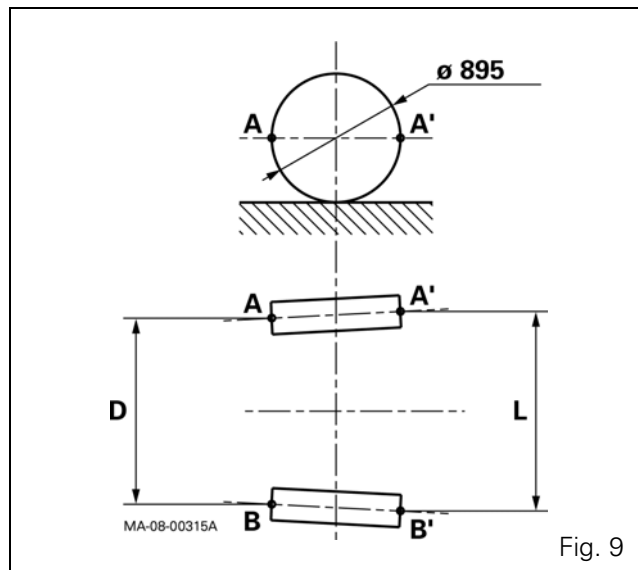


Fig. 9

G . Adjusting track widths

88. Raise the front of the tractor using a trolley jack positioned at the centre of the axle.
89. Take out the screws (14) and nuts (Fig. 10).
90. Position the telescopic arms in the required position.
91. Fit the screws (14) and tighten to a torque of 260 Nm.
92. Adjust the rods (5) according to the position of the arms.
93. Fit the screws (11) and tighten to a torque of 70 Nm.

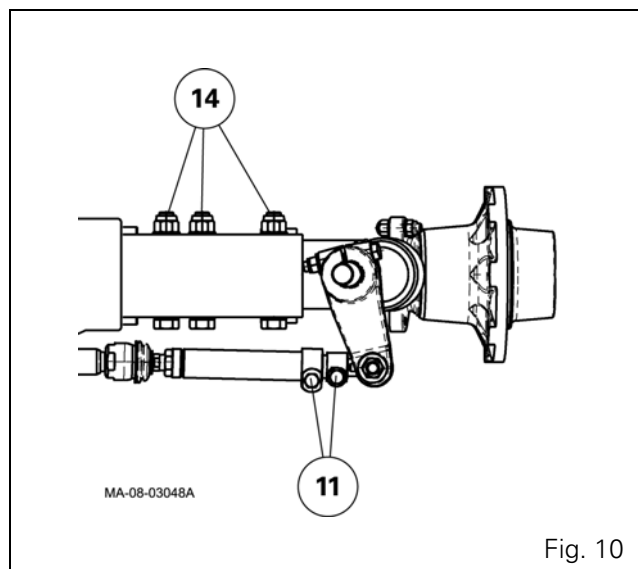


Fig. 10

