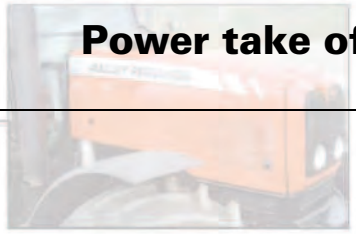
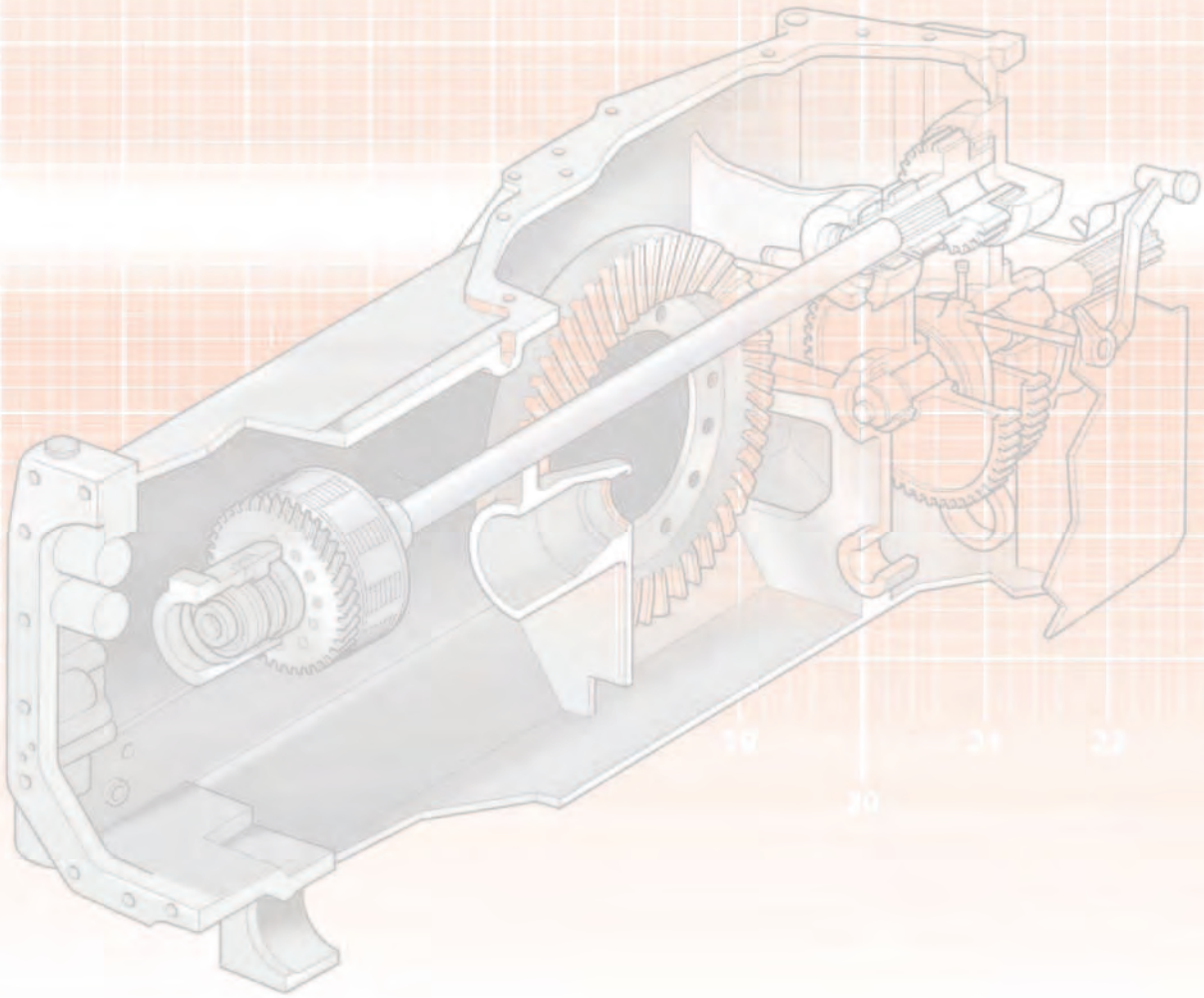




07 - Power take off

CONTENTS

Power take off



MASSEY FERGUSON

7A10 - General - GPA20 operation

CONTENTS

A . General

Description

- The PTO drive mechanism is fitted in the rear part of the axle, behind the differential. The pinion assembly rests on taper roller bearings supported by the axle housing at the front and by the PTO fixed cover at the rear.
- The assembly is activated directly by the engine via a multidisc clutch. Drive passes through the primary shaft of the gearbox.

Clutch

- The clutch is located on the upper power take-off shaftline at the front of the centre housing.
- It is supported by two straight bearings fitted in the housing.

Upper shaftline

- The PTO upper shaftline transmits drive from the engine to the driving pinions, either directly or via a coupler / sliding sleeve allowing to select the economy speeds (depending on version).
- The system is comprised mainly of 2 shafts (3 if economy version):
  - mainshaft
  - secondary shaft
  - layshaft (if economy version).
- **Standard PTO**
  The mainshaft drives a double pinion, which transmits drive to two pinions on the secondary shaft. The PTO speed is selected by securing one of the two pinions to the secondary shaft via internal splines or by coupling.
- **Standard and economy PTO**
  The mainshaft drives:
  - either a double pinion via the coupler / sleeve slid forwards, transmitting drive like the standard PTO,
  - or a series of pinions idle-mounted on their shafts driving the double pinion when the coupler / sleeve is slid to the rear. Drive speed is therefore accelerated, allowing to obtain PTO speeds when engine speed is 1550 rpm.
- The bearings supporting the driving pinion shaft are adjusted with clearance using (a) shim(s) inserted between the rear cup and the removable cover.
- An internal channel system carries lubricating oil to the bearings and drive pinions via an oil gallery in the housing and radial bores in the shaft.

Lower shaftline

- The lower shaftline is supported at the front by a bearing force fitted into the housing, and at the rear by a hub turning in a bearing.
- The lower shaftline output shaft is lubricated by oil transported through a pipe to its end.
- Shaft tightness is ensured by a lip seal fitted firmly to the rear cover of the housing.
- The PTO shaft type depends on the model:
  - **removable PTO (Fig. 1):** the shaft can be extracted by removing a circlip. Two shafts are available; each one corresponds to a different PTO speed (540/1000 rpm).
    The splines of these shafts match with the splines of the 540 and 1000 rpm pinions. Each shaft is driven by the pinion that corresponds with its operating speed.
  - **shiftable PTO (Fig. 2):** the PTO shaft is splined to the two pinions (540 and 1000 rpm). The speed is selected using a coupler located between the two pinions. Depending on the option, the shaft can be a flange shaft (3) holding an end fitting with 6 or 21 splines, or a non-removable shaft (2) comprising a number of fixed splines.

  These criteria clearly change according to the implement to be fitted and the rotational speed to be used.

Power take-off brake

- The rear power take-off is equipped with a brake located in the rear housing (see chapter 7).

Proportional PTO

- The GSPTO is driven by a shaft coupled to the front axle clutch by a sliding sleeve. This shaft then drives the 540 rpm pinion on the lower shaftline.
- The sleeve sliding on the splines secures the front axle clutch shaft or allows it to rotate freely.

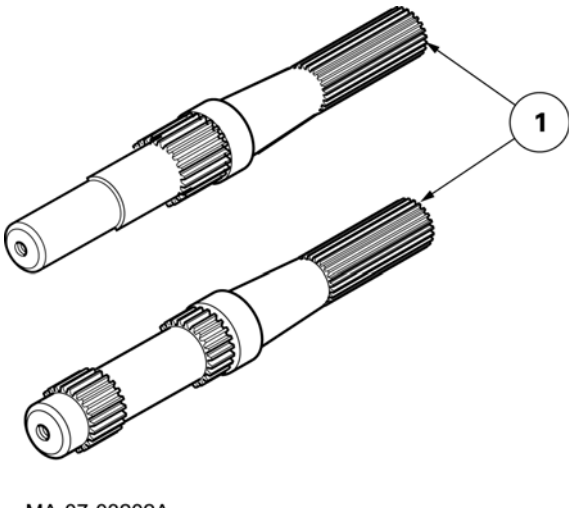


Fig. 1

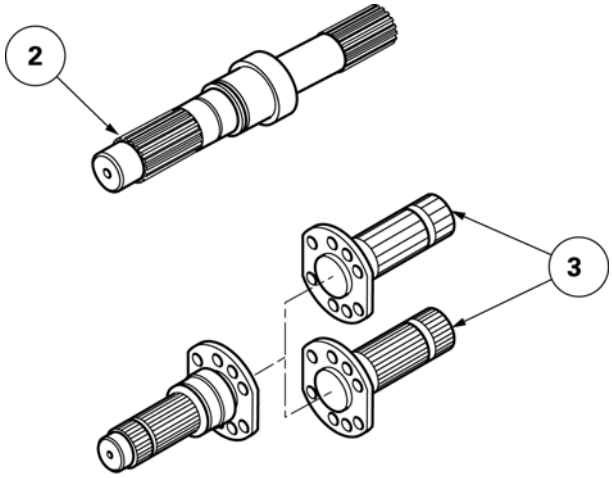


Fig. 2

B . Existing power take-off types

Removable PTO

- The drive shaft is secured to the double driving pinion.
- The ratio is chosen by changing the PTO output shaft, which is provided either with splines to be driven by the 540 rpm pinion or with splines to be driven by the 1000 rpm pinion. When the 1000 rpm pinion drives the shaft, the 540 rpm pinion turns idle on the shaft.
- The shaft used for the 540 rpm speed has 6 splines. The shaft used for the 1000 rpm speed has 21 splines.
- The PTO brake acts on the rear bearing cup of the double driving pinion.

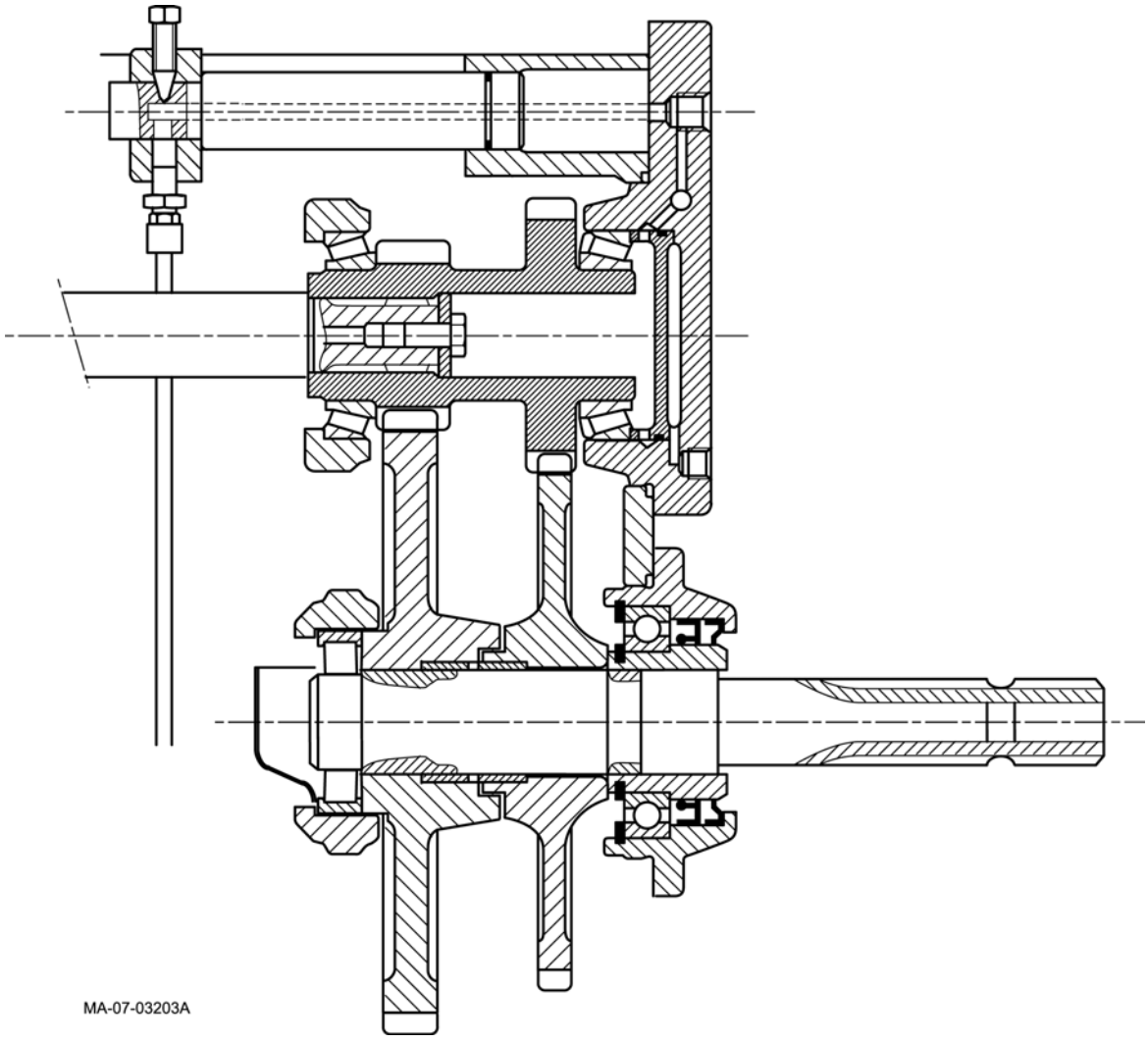


Fig. 3

Shiftable PTO

- The drive shaft, linked to the PTO clutch, is integral with a sleeve / coupler which selects the standard or economy speeds.
- The double drive pinion drives both the 540 and 1000 rpm pinions. These pinions are then secured to the PTO output shaft by a coupler.
- The PTO brake acts on the rear bearing cup of the double driving pinion.

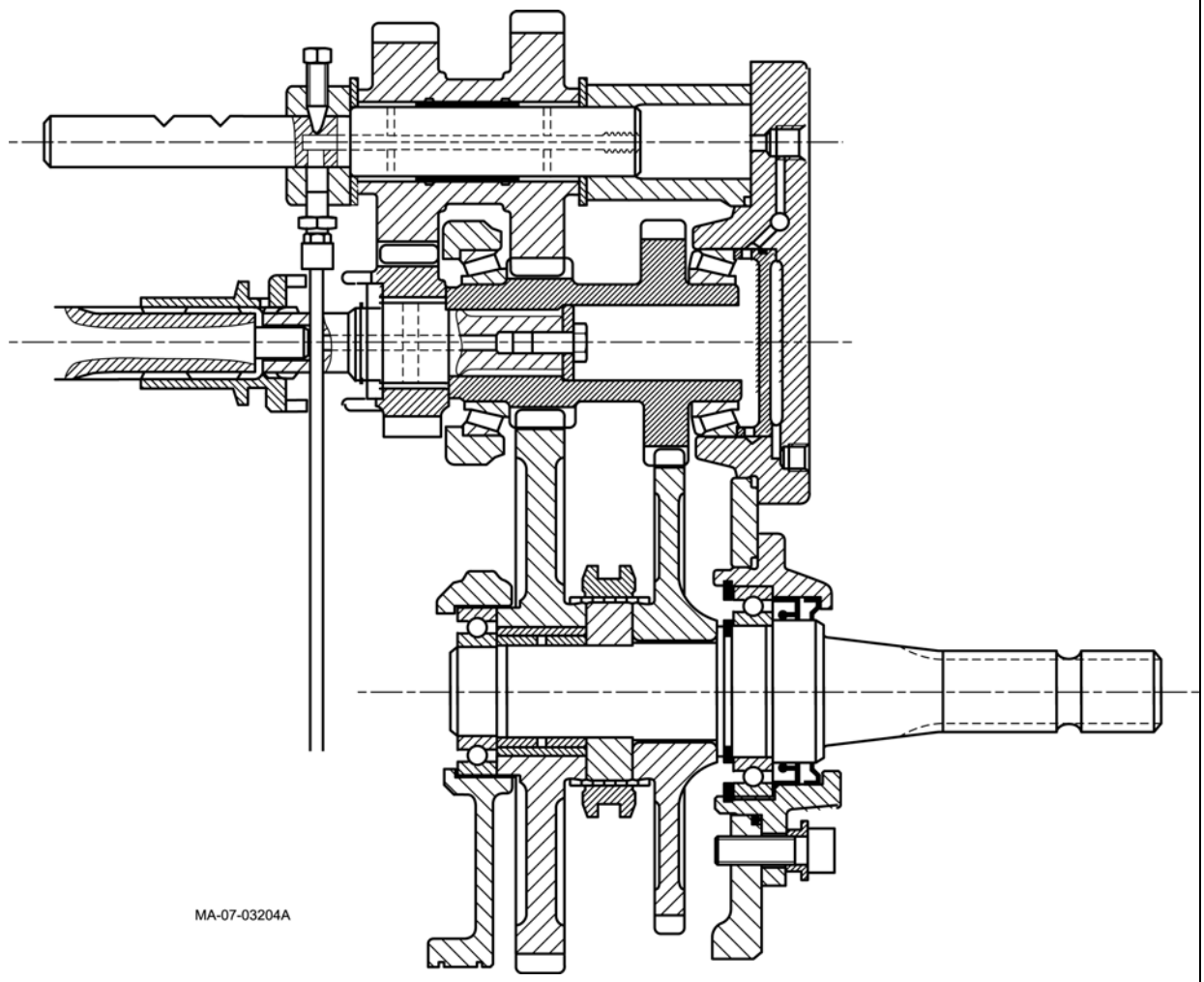


Fig. 4

Shiftable PTO and flange shaft

- Operation is the same as for the shiftable PTO.
- The PTO output shaft has an interchangeable end fitting to adapt the number of splines to the requirements of the drawn implement (6 or 21 splines).

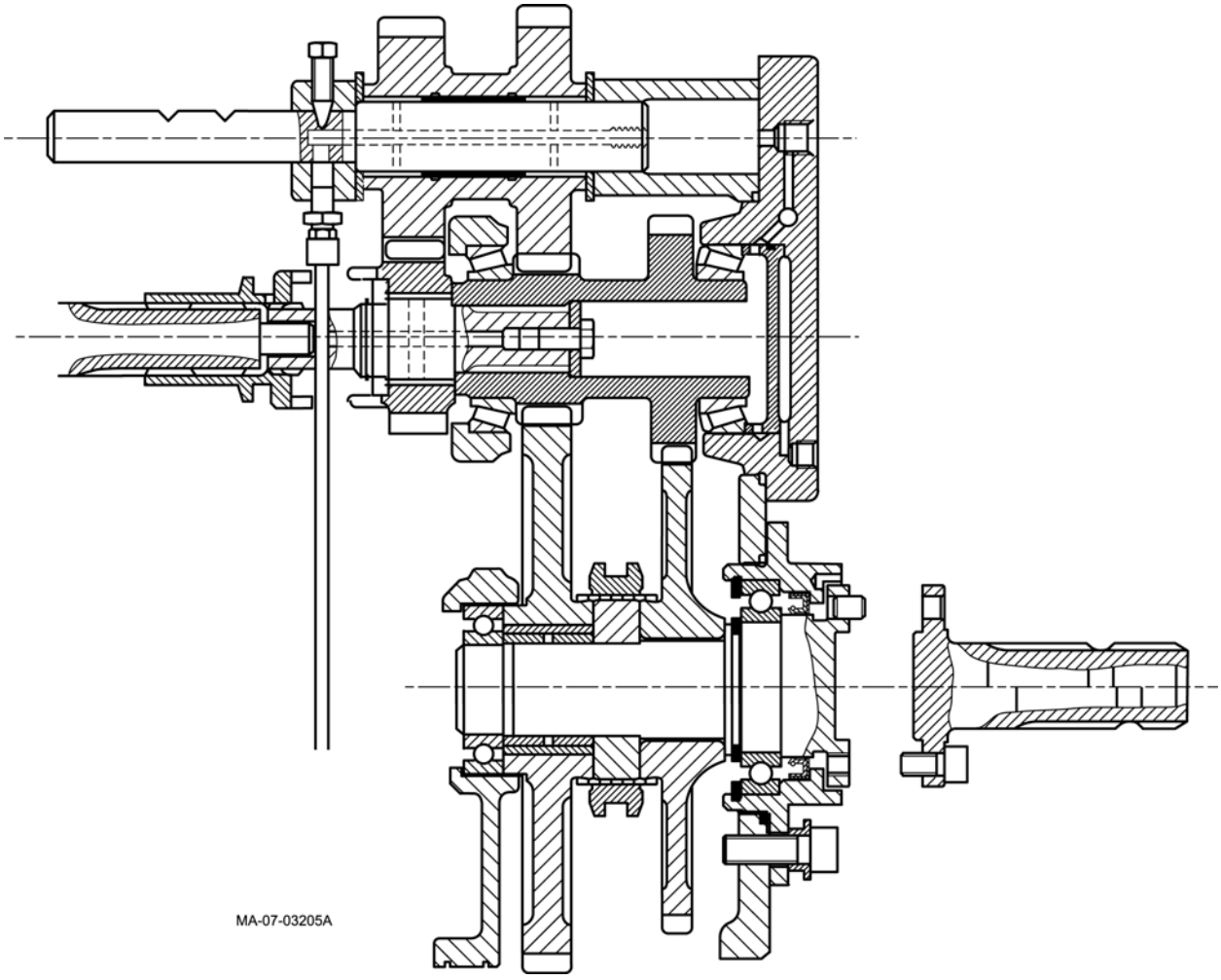
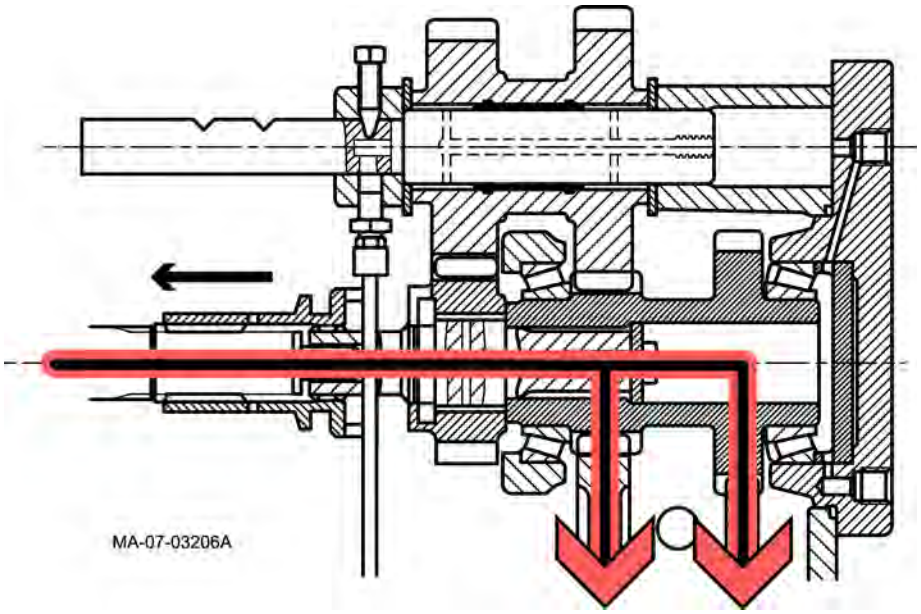


Fig. 5

Economy PTO (LSPTO)

- LSPTO mode is selected by moving a sleeve / coupler. Drive is no longer transmitted directly to the double pinion, but via an intermediate pinion.
- The ratio allows to obtain PTO speeds when the engine speed is 1550 rpm.

Standard PTO



Economy PTO

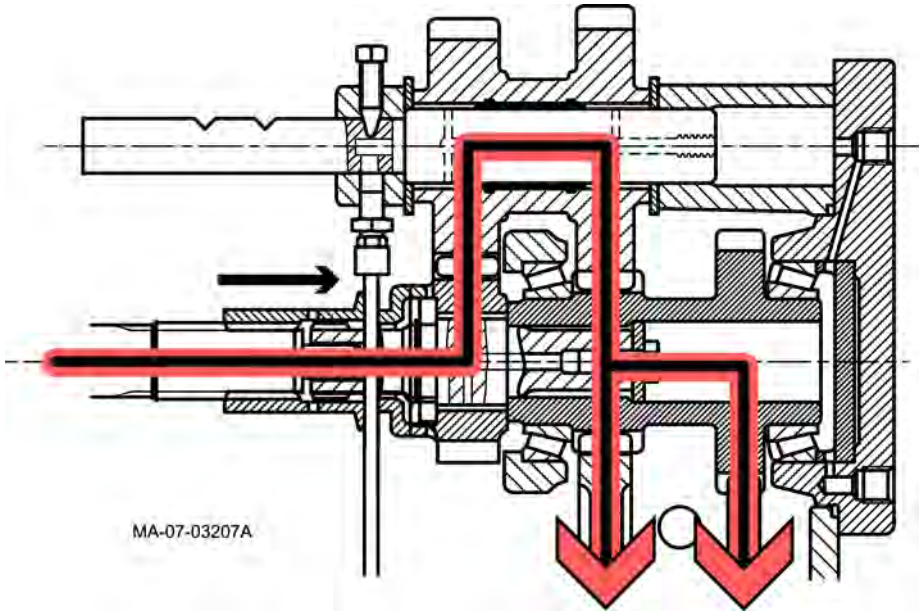


Fig. 6

Ground speed power take-off (GSPTO)

- GSPTO is obtained via the front axle clutch. A sliding sleeve (1) on the splines secures the front axle clutch cover (2). Drive is transmitted to the 540 rpm PTO pinion.

  Remark: for 2WD tractors, a pinion is fitted instead of the front axle clutch.
- The speed of the PTO output shaft is then proportional to front axle speed and ground speed.

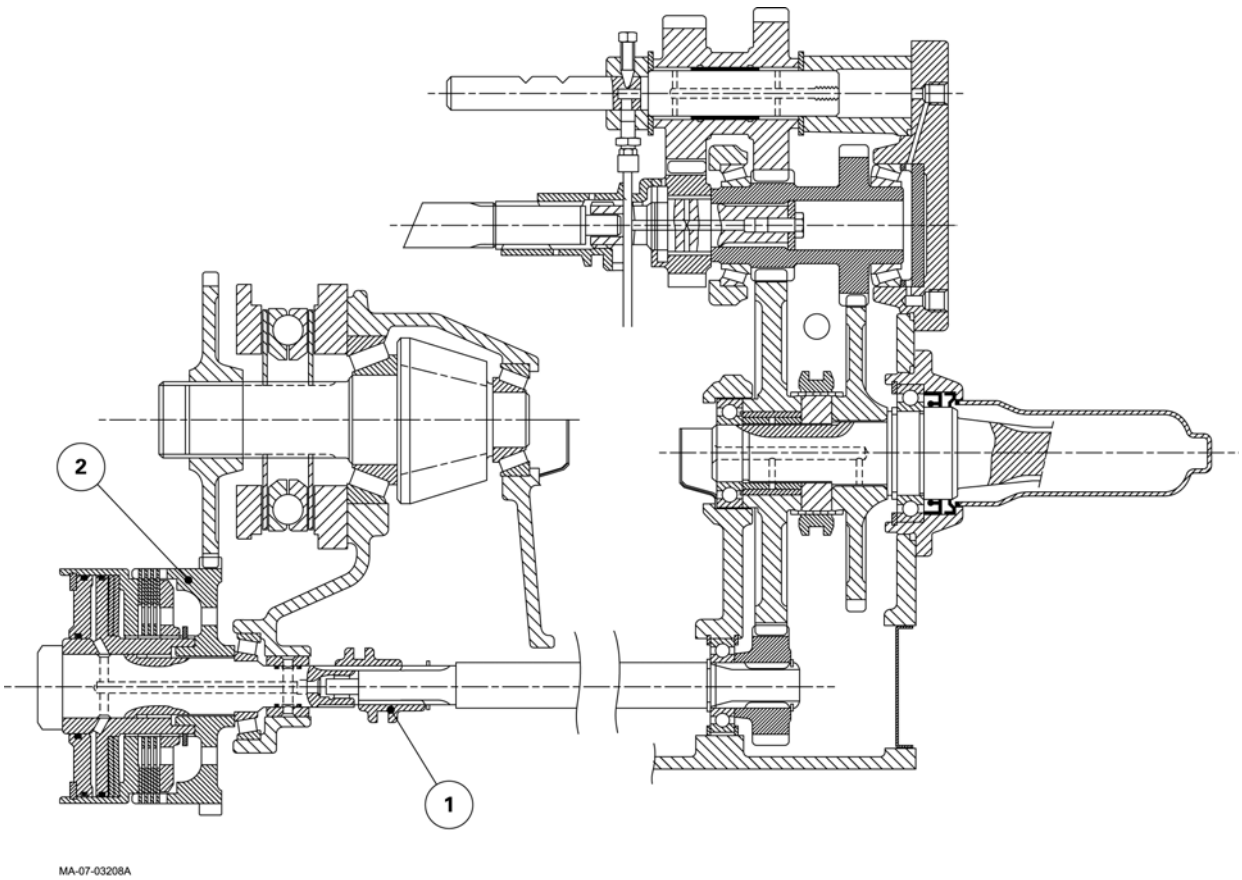


Fig. 7

PTO with reinforced sealing

- This PTO type has reinforced sealing at the PTO output shaft.
- The output shaft turns at the rear on two taper roller bearings. A sealing ring is fitted behind these bearings.
- The PTO operates exactly the same as the other shif-table versions.

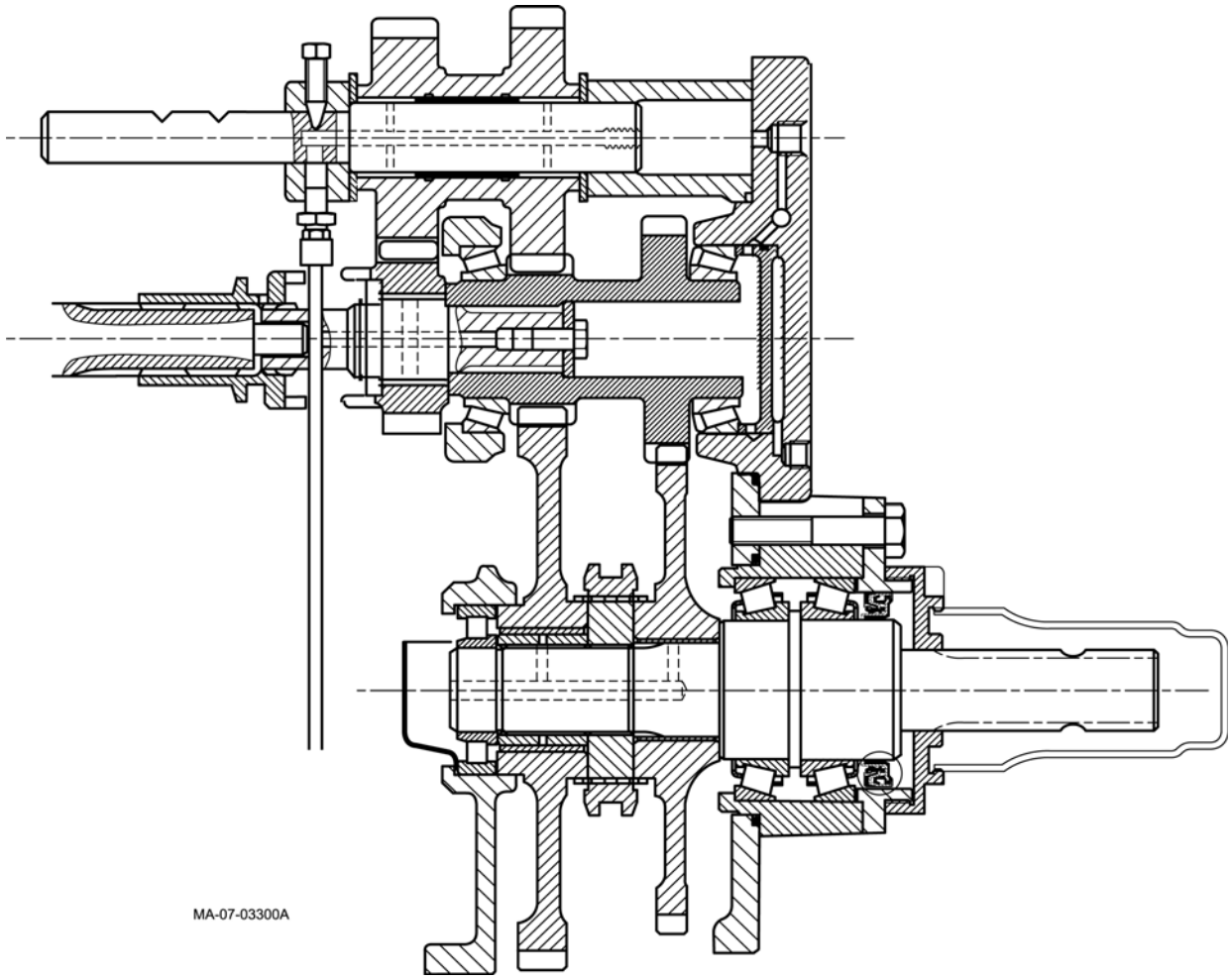


Fig. 8

PTO with reinforced sealing

- This PTO type has reinforced sealing at the PTO output shaft.
- The output shaft turns at the rear on two taper roller bearings. A sealing ring is fitted behind these bearings.
- The PTO operates exactly the same as the other shiftable versions.

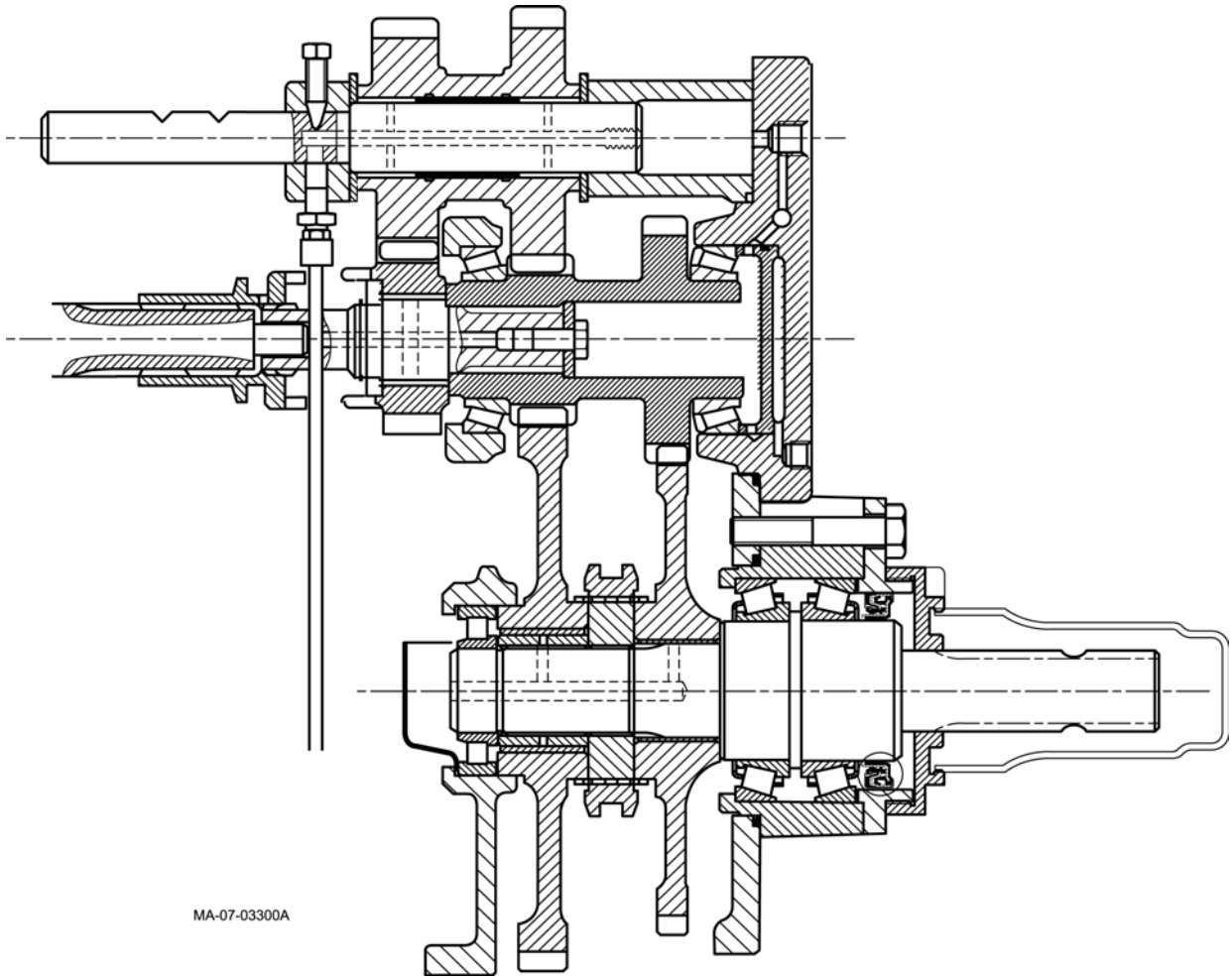


Fig. 8

7A11 - Layshaft - Driving pinion - PTO brake

CONTENTS

A . General

Engine speed is transmitted to the PTO clutch (1) fitted at the front of the centre housing.

The layshaft (2) is linked via splines at one end to the clutch and at the other end either to the double pinion (13) in the 2-speed PTO version, or to the coupler sleeve (31) in the economy 4-speed PTO version.

The double pinion (13) rotates on two taper roller bearings (3) (4) and (7) (8) respectively mounted in the bore of the centre housing and the cover (10).

A piston (9), housed in the cover and controlled by the 17 bar hydraulic circuit, allows braking of the double pinion (13) when the control lever is placed in the PTO brake position.

B . Operation

2-speed PTO

When the knob is pressed and turned clockwise, the PTO solenoid valve supplies the clutch, and the layshaft (2) is driven. It in turn drives the double driving pinion (13) which is in permanent contact with the 540 rpm and 1000 rpm pinions on the lower shaftline.

4-speed PTO

This feature allows speeds of 540 rpm or 1000 rpm to be obtained with an engine speed of 1550 rpm.

Standard position

The sleeve (31) being moved forwards, the layshaft (2) is secured to the shaft (35) that drives the double driving pinion (13). This configuration is identical to the 2-speed PTO version.

Economy position

By moving the sleeve (31) backwards, drive is transmitted to the coupler pinion (34) (which rotates freely on the shaft (35)) and to the double pinion (18) which drives the driving pinion (13). The gear ratio of the double pinion (18) is 1 to 1.292.

Power take-off brake

When the knob is in the PTO brake position, it allows the opening of the PTO brake solenoid valve mounted on the right-hand cover. The chamber behind the piston (9) is supplied. The piston moves, compressing the cup (8) on the cone (7) thus progressively immobilising the driving pinion (13), constantly engaged with the 540 rpm and 1000 rpm pinions.

		Power take-off	
		4-speed	2-speed
(1)	Clutch	•	•
(2)	Layshaft	•	•
(3)	Cup	•	•
(4)	Cone	•	•
(5)	Washer	•	•
(6)	Screws	•	•
(7)	Cone	•	•
(8)	Cup	•	•
(9)	Brake piston	•	•
(10)	Cover	•	•
(11)	Shims	•	•
(12)	O'ring	•	•
(13)	Driving pinion	•	•
(14)	Double pinion assembly	•	
(15)	Deflector	•	•
(16)	Washer	•	
(17)	Needle bearing	•	
(18)	Double pinion	•	
(19)	Spacer	•	
(20)	Needle bearing	•	
(21)	Washer	•	
(22)	Set screw	•	•
(23)	Pin	•	
(24)	Locking screw	•	
(25)	Nut	•	
(26)	Fork	•	
(27)	Screws	•	
(28)	Needle bearing	•	
(29)	Circlip	•	
(30)	Ring	•	
(31)	Coupler sleeve	•	
(32)	Circlip	•	
(33)	Washer	•	
(34)	Coupler pinion	•	
(35)	Shaft	•	
(36)	Pin		•
(37)	Seal		•

Overall view

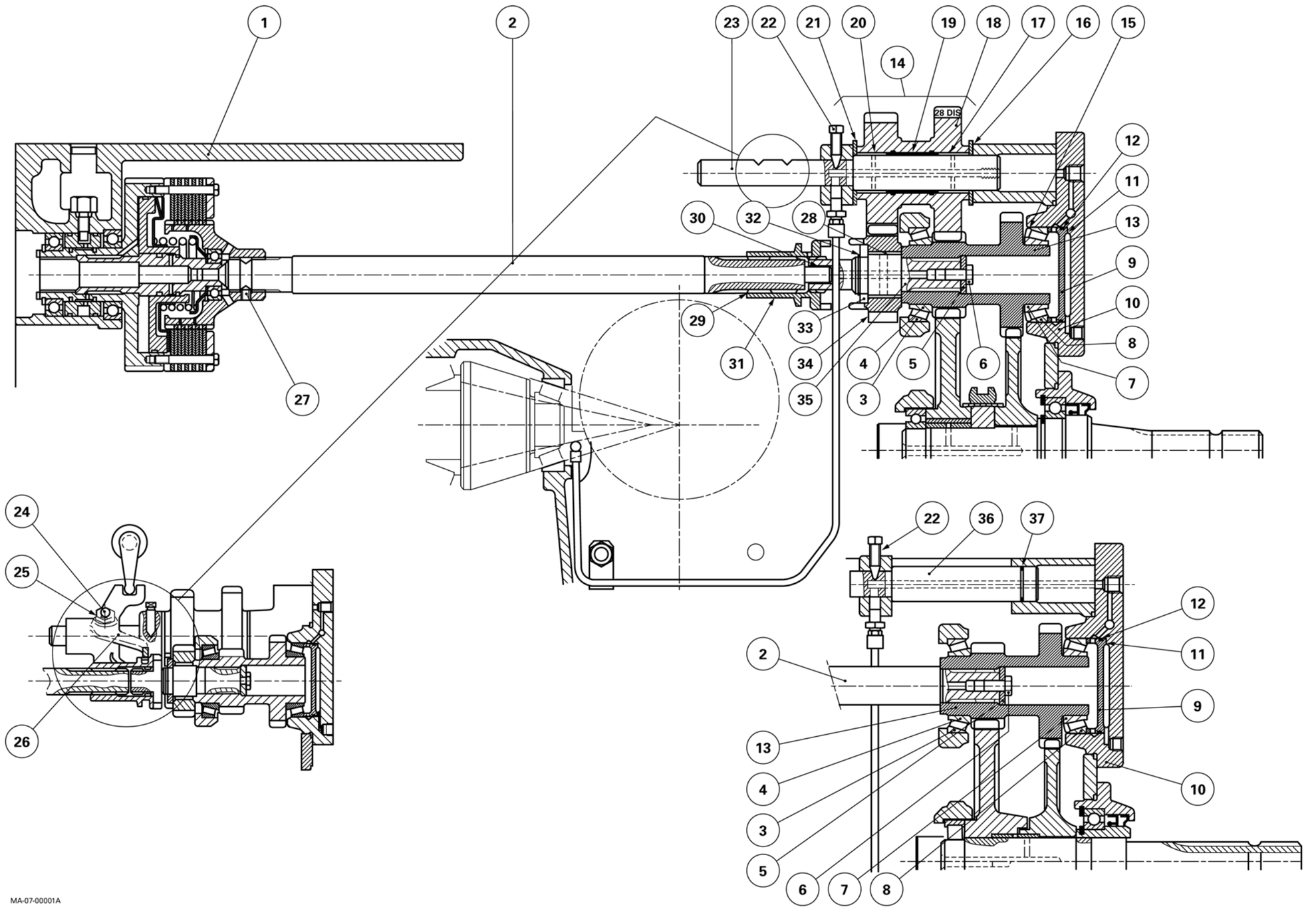


Fig. 1

Exploded view

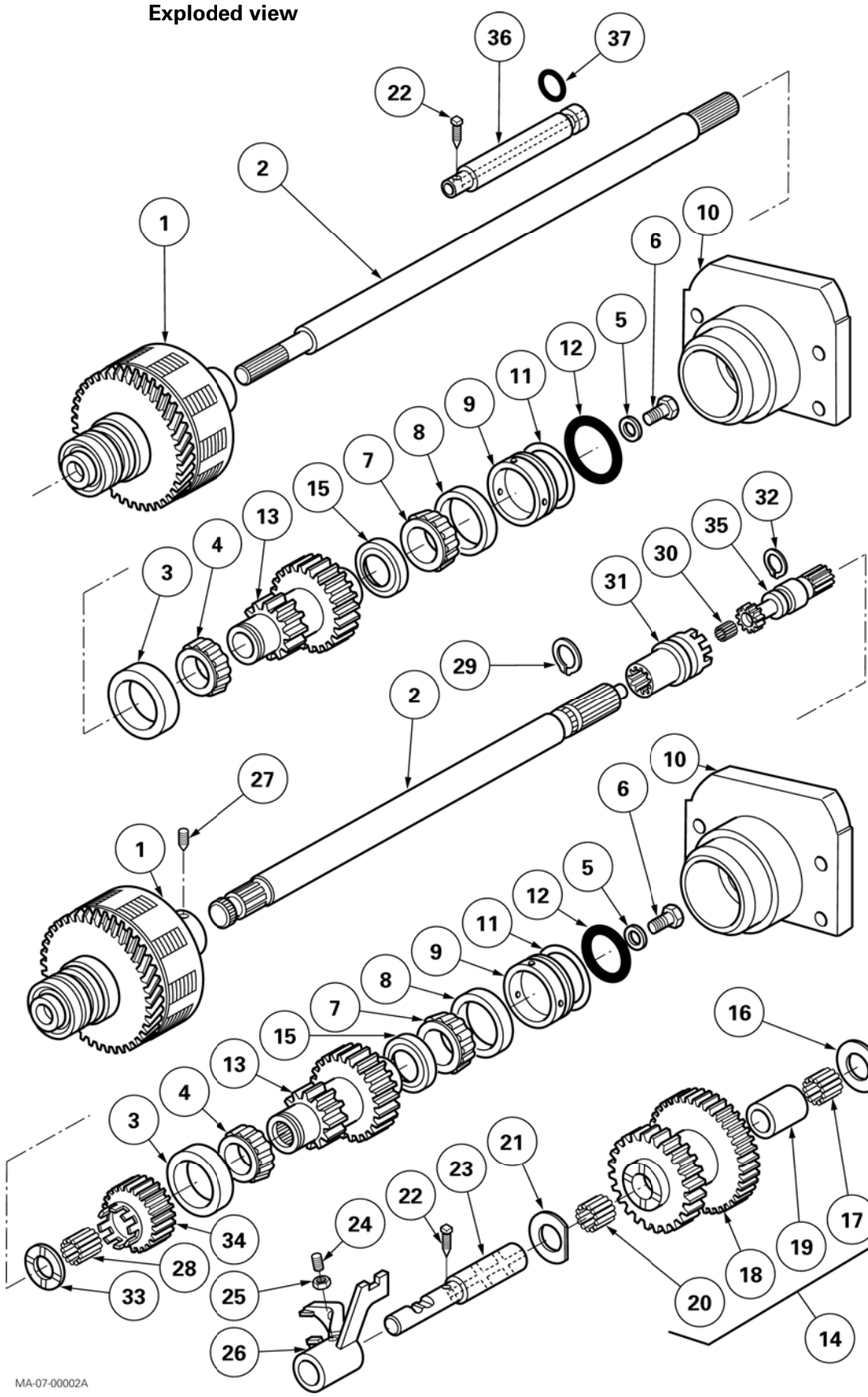


Fig. 2

A . 2-speed PTO (without shimming)

Disassembly

1. Remove the 3rd point linkage drawbar support.
2. Mark and disconnect the hoses connected to the spool valve block (Open and Closed Centre).
3. Take out the spool valve support screws.
4. Remove the spool valve support.

   Note: Tilt the support and spool valve assembly without removing the control cables
5. Disconnect the power take-off brake supply pipe (1) (Fig. 1).
6. Remove lubricating pipe (4) (Fig. 1).
7. Remove the screws (3) and the cover (10) (Fig. 1).
8. Extract the pinion assembly (13) and the shaft (2) held by the washer (5) and the screw (6). Take off bearing cone (4).

   Note: The shaft (2) is fitted into the clutch (1) without a locking screw.

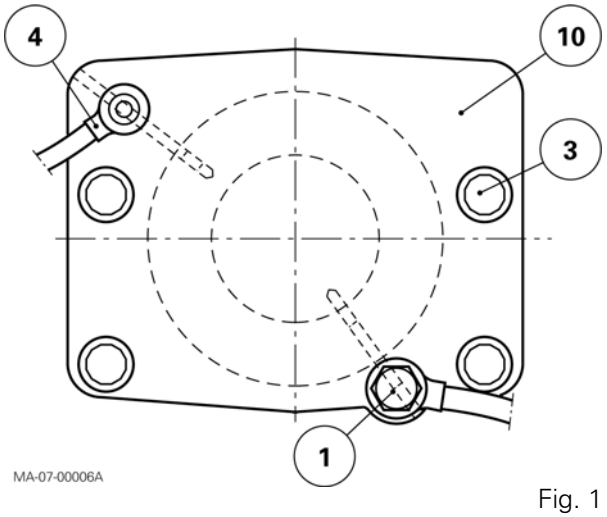


Fig. 1

Reassembly

9. Check and clean all components. Replace any defective parts.

10. Refit the cone bearing (4). Assemble the pinion (13) and the shaft (2) held by washer (5) and screw (6).

11. Clean the mating face of the cover (10) (Fig. 1).

12. Smear the mating face of the housing with a sealing product (Loctite 510 or equivalent).

Note: In order to ensure lubrication of the cone (7), a pin (36) fixed by a set screw (22) is fitted at the location of the pin (23) of the 4-speed economy power take-off.

The oil tightness of the pin is ensured by the seal (37), the central channel in the pin being used to lubricate the front bearing of the drive pinion.

13. Refit the cover (10). Tighten the screws (3) to 130 - 170 Nm (Fig. 1)

Note: Check for the presence of the bearing cup (8).

14. Reconnect the power take-off supply pipe (1) and lubrication supply pipe (4) (Fig. 1).

15. Clean the mating face of the spool valve support.

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

17. Refit the spool valve support, tilting it, using the controls.

18. Smear the threads of the two lower screws (4) with Loctite 510. Tighten the screws to a torque of 50 - 70 Nm.

19. Reconnect the hoses to the spool valve block following the marks made at operation 2.

20. Refit the 3rd point linkage drawbar support.

21. Check that the PTO and PTO brake operate correctly.

22. Check for the oil tightness of:

- the mating faces (spool valve support, cover)
- the hydraulic unions.

B . 2-speed PTO (with shimming)

Note: The shimming (preload or clearance of 0.05) (Fig. 5) must be carried out in cases of operations on the following components: pinion (13), deflector (15), bearing cones (4) (7), bearing cups (3) (8), piston (9), support (10).

For a correct shimming of cone bearings (4) (7) and bearing cups (3) (8), it is necessary to remove the lift cover.

Disassembly

23. Remove the lift cover (see chapter 6).

24. Remove the 3rd point linkage drawbar support. Disconnect the power take-off brake supply pipe (1) (Fig. 1).

25. Remove lubricating pipe (4) (Fig. 1).

26. Take the screws (3) out of the cover (10) (Fig. 1) and remove it.

27. Extract the pinion assembly (13) and the shaft (2) held by the washer (5) and the screw (6).

Note: The shaft (2) is fitted into the clutch (1) without a locking screw.

28. Take out screw (6) and washer (5).

29. Separate the pinion (13) from the shaft (2).

Note: A deflector (15) is fitted between the pinion (13) and the bearing cone (7) in contact with the bearing cup (8) (Fig. 2).

30. Extract the cone (7) and the deflector (15) (Fig. 3) then remove cone (4).

Note: The extraction of the bearing cup (3) requires removal of the 540 / 1000 rpm pinions. Partially drain the rear axle housing.

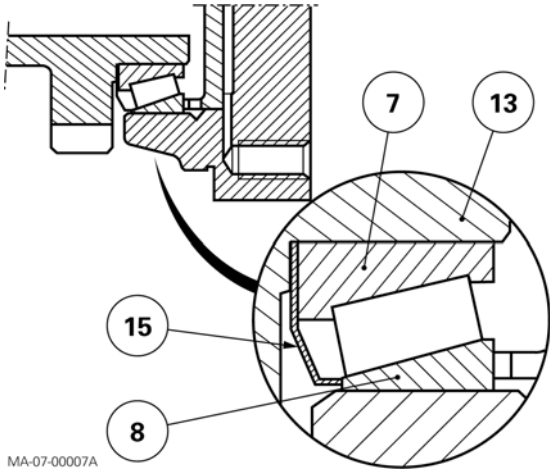


Fig. 2

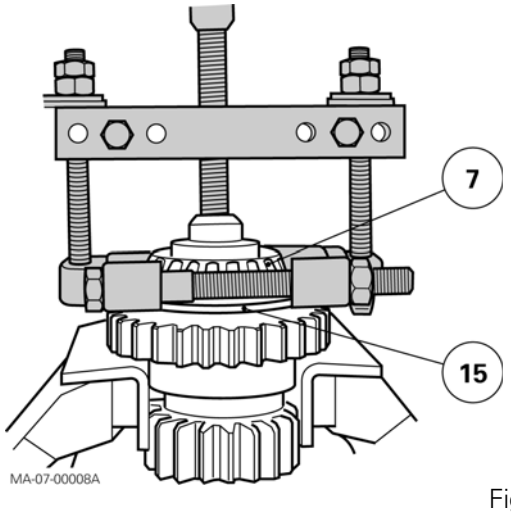


Fig. 3

Reassembly

31. Check and clean all components. Replace any defective parts.

32. Place the deflector (15) on pinion (13), and press-fit the bearing cone (7) fully home into the shoulder (Fig. 4). Lubricate the cone bearing (4) and place it in the bearing cup (3).

Note: If the bearing cup (3) has been replaced, refit the 540 / 1000 rpm pinions (see chapter 6). Top up the oil level in the rear axle.

33. Extract the piston (9) through the cover (10).

34. Remove the shims (11) and the O'ring (12) to prepare for the shimming operation.

35. Assemble piston (9) and bearing cup (8) in the cover (10).

36. Lubricate the bearing cup and the bearing cone (7).

37. Assemble the pinion (13) inside the housing.

Note: In order to ensure lubrication of the cone (7), a pin (36) fixed by a set screw (22) is fitted at the location of the pin (23) of the 4-speed LSPTO.

The oil tightness of the pin is ensured by the seal (37), the central channel in the pin being used to lubricate the front bearing of the drive pinion.

38. Refit the cover. Tighten the screws to a torque of 130 -170 Nm.

39. Carry out the J/P shimming (Fig. 5) to obtain a preload of 0.05 with a clearance of 0.05.

40. Place the dial gauge feeler pin at the end of the pinion (13) (Fig. 6).

41. Pull on the pinion while turning it alternately to the left and right in order to compress the deflector (15) and correctly seat the bearing cone (7) in the bearing cup (8).

42. Reset the dial gauge to zero.

43. Push on the pinion while turning it alternately to the left and right in order to seat the bearing cone (4) correctly in the bearing cup (3).

44. Depending on the value read on the dial gauge, select the thickness of shims in order to obtain J/P.

45. Remove the cover (10), take out the bearing cup (8) and the piston (9).

46. Fit the shims (11) selected in operation 44 in the cover (10).

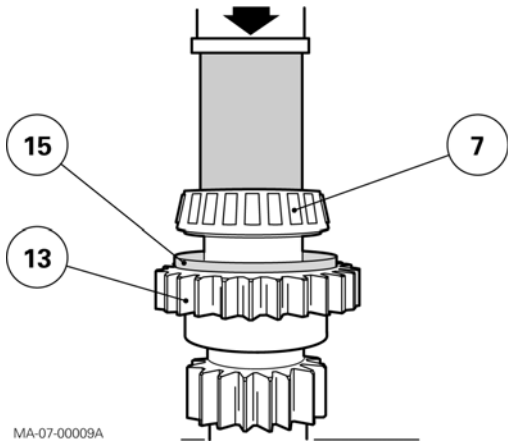


Fig. 4

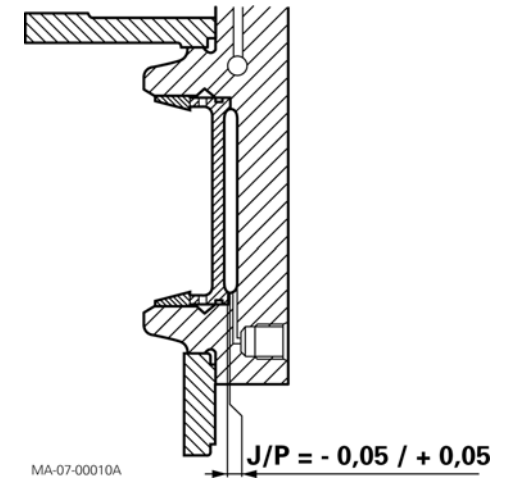


Fig. 5

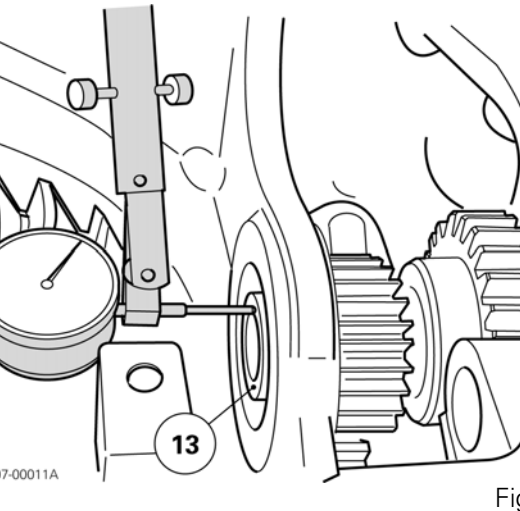


Fig. 6

47. Fit the piston (9) with a new O'ring (12).

Note: Turn the lubricating holes on the piston towards the bearing (Fig. 7).

48. Fit the bearing cup (8) into the support.

49. Take out the pinion (13) and assemble it with the shaft (2), washer (5) and screw (6). Tighten to a torque of 50 Nm.

50. Refit the cone bearing (4). Assemble the pinion (13) and shaft (2) assembly.

51. Smear the mating face of the cover (10) on the rear axle housing with a sealing product (Master Joint 510 or equivalent).

52. Refit the cover (10). Fit and tighten the screws (3) to a torque of 130 -170 Nm (Fig. 1).

Note: Check for the presence of the bearing cup (8).

53. Reconnect the power take-off supply pipe (1) and lubricating supply pipe (4) (Fig. 1).

54. Refit the lift cover (see chapter 6).

Refit the 3rd point linkage drawbar support.

55. Check that the PTO and PTO brake operate correctly.

56. Check for the oil tightness of:

- the mating faces (spool valve support, cover, lift cover)
- the hydraulic unions.

C . 4-speed economy PTO (without shimming)

Disassembly

57. Remove the left-hand side cover **if the screw (27) and layshaft (2) are removed** (see chapter 9).

58. Mark and disconnect the hoses connected to the spool valve block (Open and Closed Centre).

59. Take out the screws (4) fixing the support (5) on the lift cover.

60. Remove the support.

Note: Tilt the support and spool valve assembly without removing the cables

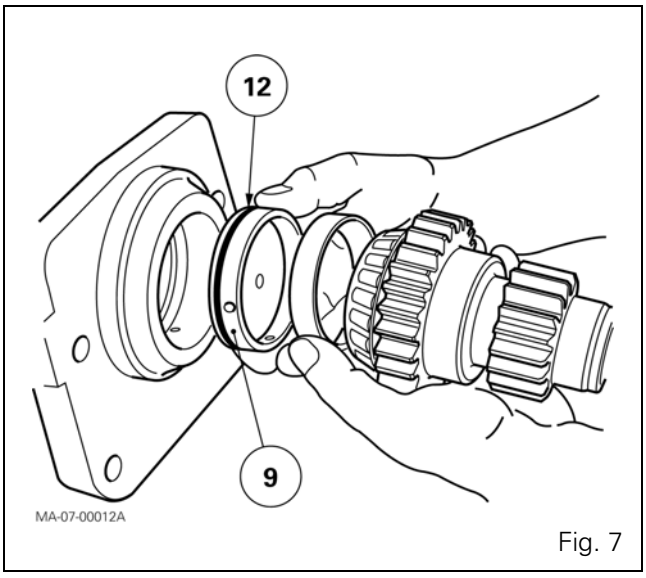


Fig. 7

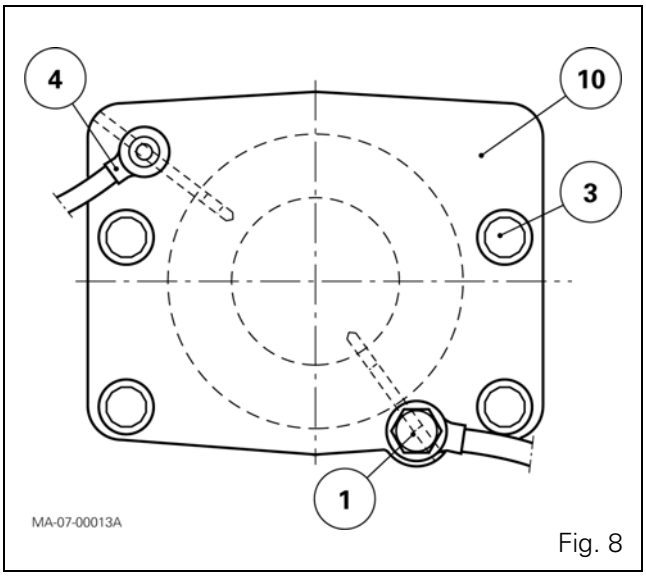


Fig. 8

61. Disconnect the power take-off brake supply pipe (1) (Fig. 8).

62. Remove lubricating pipe (4) (Fig. 8).

63. Take the screws (3) out of the cover (10) and remove it (Fig. 8).

64. Take off nut (25) and locking screw (24) from the fork (26).

65. Take out set screw (22) (Fig. 9).

66. Take out the pin (23) from the double pinion assembly (14) in order to disengage the fork (26).

Note: To remove only the fork, pull pin (23) slightly rearwards.

67. Remove the friction washers (16) (21).

Note: Be careful not to let the washers fall inside the housing.

68. Take out the double pinion assembly (14) (through the spool valve support aperture, only for the version without shimming) (Fig. 10).

69. Remove the needle bearings (17) (20) and the spacer (19) from the pinion (18).

70. Take off the circlip (32) (Fig. 11).

Note: To facilitate access to the circlip, use short-handled circlip pliers.

71. Take out the pinion assembly (13) and the shaft (35) held in place by the washer (5) and the screw (6).

72. Remove the flat sided washer (33).

Note: Be careful not to let either the circlip or the washer fall inside the housing.

Hold in place the coupler pinion (34) and the needle bearing (28).

The cone bearing (4) remains in the bearing cup (3) during removal of the pinion (13).

73. Remove the coupler pinion (34) and the needle bearing (28).

74. Remove the bearing cone (4).

75. Remove the Allen screw (27) (where necessary).

76. Take out the shaft (2) and the coupler sleeve (31) (where necessary).

Note: The circlip (29) remains on the shaft (2).

Reassembly

77. Check and clean all components. Replace any defective parts.

78. Refit the shaft (2) and the coupler sleeve (31) (if disassembled).

79. Smear the screw (27) with Loctite 221 and tighten (if disassembled).

80. Refit the cone bearing (4). Position the pinion (13) prepared with the shaft (35). Place the coupler pinion (34), the needle bearing (28), the washer (33), and the circlip (32). Push on the pinion (13). Position the washer (33). Fit the circlip (32).

81. In the pinion (18), place the spacer (19) and the needle bearings (17) (20). Position the double pinion assembly (14). Fit the washer (16) smeared with miscible grease (Amber technical or equivalent).

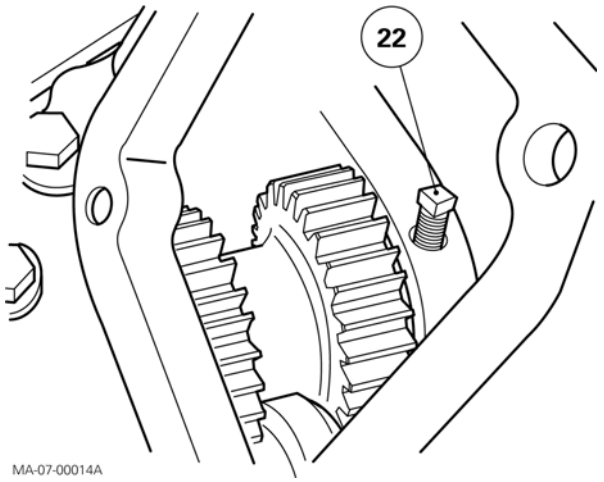


Fig. 9

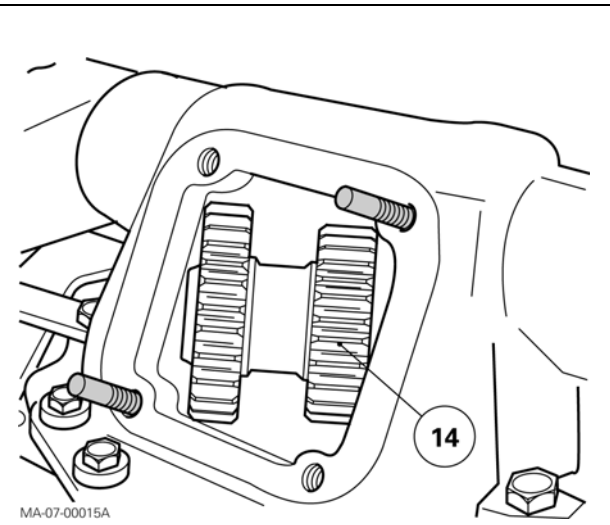


Fig. 10

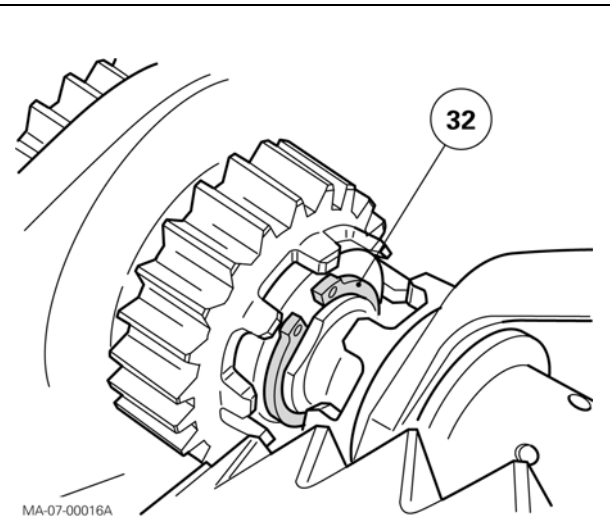


Fig. 11

82. Check that the channels in the pin (23) are not obstructed. They are used for lubricating the needle bearings (17) (20) and the front bearing of the driving pinion. Slightly engage the pin (23) in order to hold the washer (16) in place. Place the washer (21) coated with miscible grease. Centre the double pinion assembly (14).

83. Definitively fit the pin (23) into the pinion assembly (14) and into the fork (26) while ensuring the correct positioning of the set screw hole (22).

84. Smear screw (22) with Loctite 542 and tighten to a torque of 28 - 43 Nm.

85. Clean the cover (10) mating face.

86. Smear the mating face of the housing with a sealing product (Loctite 510 or equivalent).

87. Check for the presence of the bearing cup (8). Tighten the screws (3) to 130 -170 Nm (Fig. 8).

88. Reconnect the pipes (1) (4) (Fig. 8).

89. Refit the screw (24) and nut (25) on the fork (26).

90. Adjust the locking of the fork (26) (Fig. 12):

- Position the fork (26), with the locking screw (24) on flat "M" of pin (23) (between the two locking grooves), tighten the screw to compress the ball.
- Loosen the screw by one-quarter turn. Smear the nut (25) with Loctite 241. Tighten to a torque of 15 - 20 Nm.
- Check that the fork locks correctly.

91. Adjust the control (see § E).

92. Clean the mating face of the spool valve support.

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

94. Refit the support, tilting it, using the controls.

95. Smear the threads of the two lower screws (4) with Loctite 510. Tighten the 4 screws to a torque of 50 - 70 Nm.

96. Reconnect the hoses to the spool valve block following the marks made at operation 58.

97. If the screw (27) and the layshaft (2) have been removed, refit the left-hand lateralcover (see chapter 9).

98. Check that the PTO and PTO brake operate correctly.

99. Check for the oil tightness of:

- the mating faces (spool valve support, cover, left-hand cover)
- the hydraulic unions.

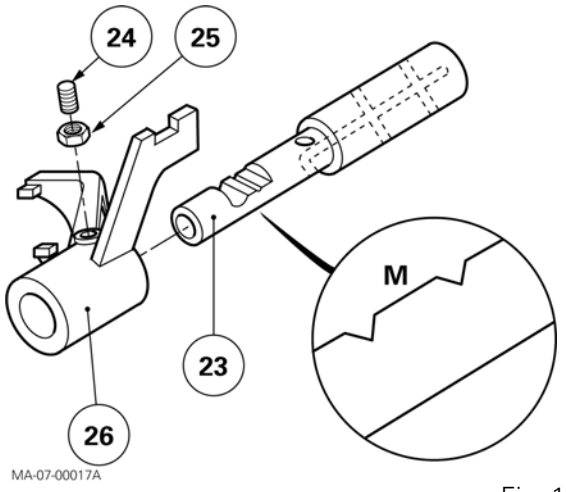


Fig. 12

D . 4-speed economy PTO (with shimming)

Note: The J/P shimming is to be carried out in cases of operations on the following components: pinion (13), deflector (15), cone bearings (4) (7), bearing cups (3) (8), piston (9) and cover (10).

For a correct shimming of cone bearings (4) (7) and bearing cups (3) (8), it is necessary to remove the lift cover.

Disassembly

100. Remove the lift cover (see chapter 6).

101. Remove the PTO pinions, carry out operations 61 to 76.

102. Separate the pinion (13) from the shaft (35) using a press and a suitable fixture (Fig. 13).

Note: The friction ring (30) is press-fitted into the shaft (35).

103. Extract the bearing cone (7) and deflector (15) (Fig. 3).

Note: The extraction of the bearing cup (3) requires removal of the 540 / 1000 rpm pinions.

Partially drain the axle housing.

Reassembly

104. Check and clean all components. Replace any defective parts.

Note: For correct lubrication of the ring (30), a deflector (15) is fitted between the pinion (13) and the bearing cone (7), in contact with the bearing cup (8) (Fig. 14).

105. Place the deflector (15) on pinion (13), and force-fit the bearing cone (7) fully home into the shoulder (Fig. 4). Fit the cone (4) into the bearing cup (3).

Note: If the bearing cup (3) has been replaced, refit the 540 / 1000 rpm pinions (see chapter 7). Fill the housing to the correct oil level.

106. Preparing and shimming the pinion (13). Carry out operations 31 to 46.

107. Take out the pinion (13) and assemble it with the shaft (35) (Fig. 15), then fit the washer (5) and the screw (6). Tighten the screw to a torque of 50 Nm.

108. Refit the bearing cone (4), the coupler pinion (34) and the needle bearing (28).

109. Fit the pinion assembly (13) and the shaft (35).

Note: Check for the presence of the coupler sleeve (31).

110. Position the washer (33), fit the circlip (32).

111. In the pinion (18), place the spacer (19) and the needle bearings (17) (20).

Position the double pinion assembly (14).

Place the washer (16) coated with miscible grease (Amber technical or equivalent).

112. Ensure that the channels in the pin (23) are not blocked, they are used for lubricating needle bearings (17) (20) and the front bearing of the drive pinion. Slightly engage the pin (23) in order to hold the washer (16) in place. Place the washer (21) coated with miscible grease. Centre the double pinion assembly (14).

113. Definitively fit the pin (23) into the pinion assembly (14) and into the fork (26) while ensuring the correct positioning of the set screw hole (22).

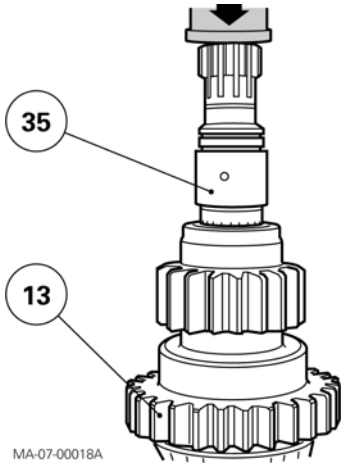


Fig. 13

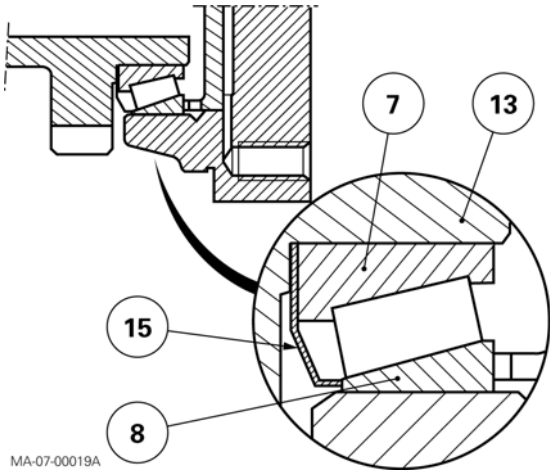


Fig. 14

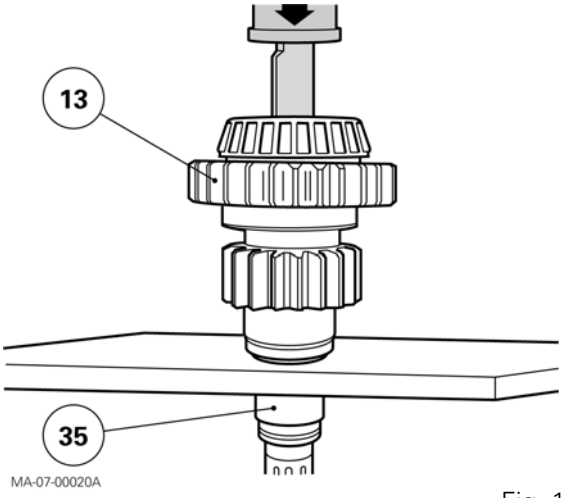


Fig. 15

114. Smear the set screw (22) with Loctite 542. Tighten to a torque of 28 - 43 Nm.

115. Clean the cover (10) mating face.

116. Smear the mating face of the housing with a sealing product (Loctite 510 or equivalent).

117. Check for the presence of the bearing cup (8), fit the cover (10) with screws (3) and tighten to a torque of 130 - 170 Nm (Fig. 8).

118. Reconnect the pipes (1) (4) (Fig. 8).

119. Fit the locking screw (24) and the nut (25). Adjust the fork (26), carry out operation 90.

120. Refit the lift cover (see chapter 6).

121. Adjust the LSPTO control (see § E).

122. Check that the PTO and PTO brake operate correctly.

123. Check for the oil tightness of:

- the mating faces (spool valves support, cover)
- the hydraulic unions.

E . Assembling and adjusting the 4-speed LSPTO control

124. Move the control lever L (Fig. 16) to the 1550 rpm economy position (Fig. 17).

125. Screw the clevis (1) flush with the threaded end of the cable (6).

126. Fit clevis (1) on lever L using the clip (7). Tighten nut (2).

127. Adjust the sheath end (5) so that the nut (3) is flush with the end of the threaded part.

128. Tighten nut (4) and check that the cable is not constrained in any way.

129. Place lever M in the 1550 rpm economic position (a) (Fig. 18) (sleeve locked with the coupler pinion, the fork locked).

130. Screw the clevis (1) flush with the threaded end of the cable (6) and fit it onto lever M with the clevis pin (7). Tighten nut (2).

131. Adjust the sheath end piece (5), checking that lever "M" remains locked.

132. Tighten nuts (3) (4) and check that the cable is not trapped in any way.

133. Check the locking of the control in the 2000 rpm position (b) and check for the correct operation of the indicator light on the instrument panel.

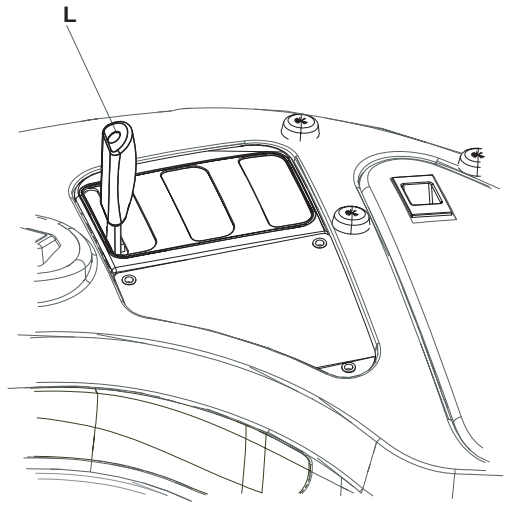


Fig. 16

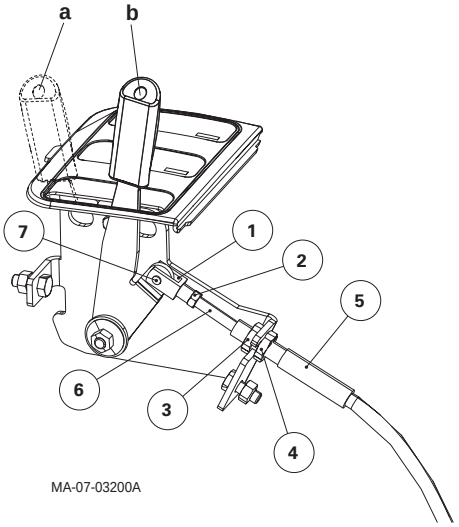


Fig. 17

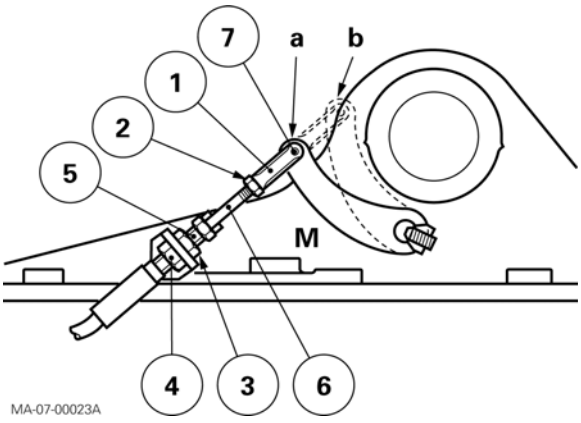


Fig. 18

7A12 - Removable PTO shaft

CONTENTS

A . General

The driven pinions (5) (6) are fitted on the PTO shaft located to the rear lower part of the axle housing. These pinions are constantly meshed with the double driving pinion driven by the top shaft line whose engine is powered by the PTO clutch.

The PTO shaft (10) is fitted, at the front, on a roller bearing (1) force-fitted in the axle housing and at the rear, on a hub (9) rotating on a roller bearing (15).

The 540 rpm version has 6 splines, and the 1000 rpm version has 21 splines.

In the 540 rpm configuration, the shaft (10) is integral with the pinion (5) via splines. The pinion (6) and ring (4) assembly rotate freely on the shaft (10).

In the 1000 rpm configuration, the shaft is splined to the pinion (6). The pinion (5) and ring (3) assembly rotate freely on the shaft (10).

The snap ring (20) holds the shaft in place.

The seal is ensured by the ring (14) and O'rings (11) (19).

Parts list

(1) Bearing
(2) Deflector
(3) Ring
(4) Ring
(5) Pinion (540 rpm)
(6) Pinion (1000 rpm)
(7) Circlip
(8) Snap ring
(9) Hub
(10) 540 or 1000 rpm PTO shaft
(11) O'ring
(12) Unit
(14) Sealing ring
(15) Bearing
(16) Screw
(17) PTO speed sensor
(18) Nut
(19) O'ring
(20) Snap ring

Removable PTO shaft

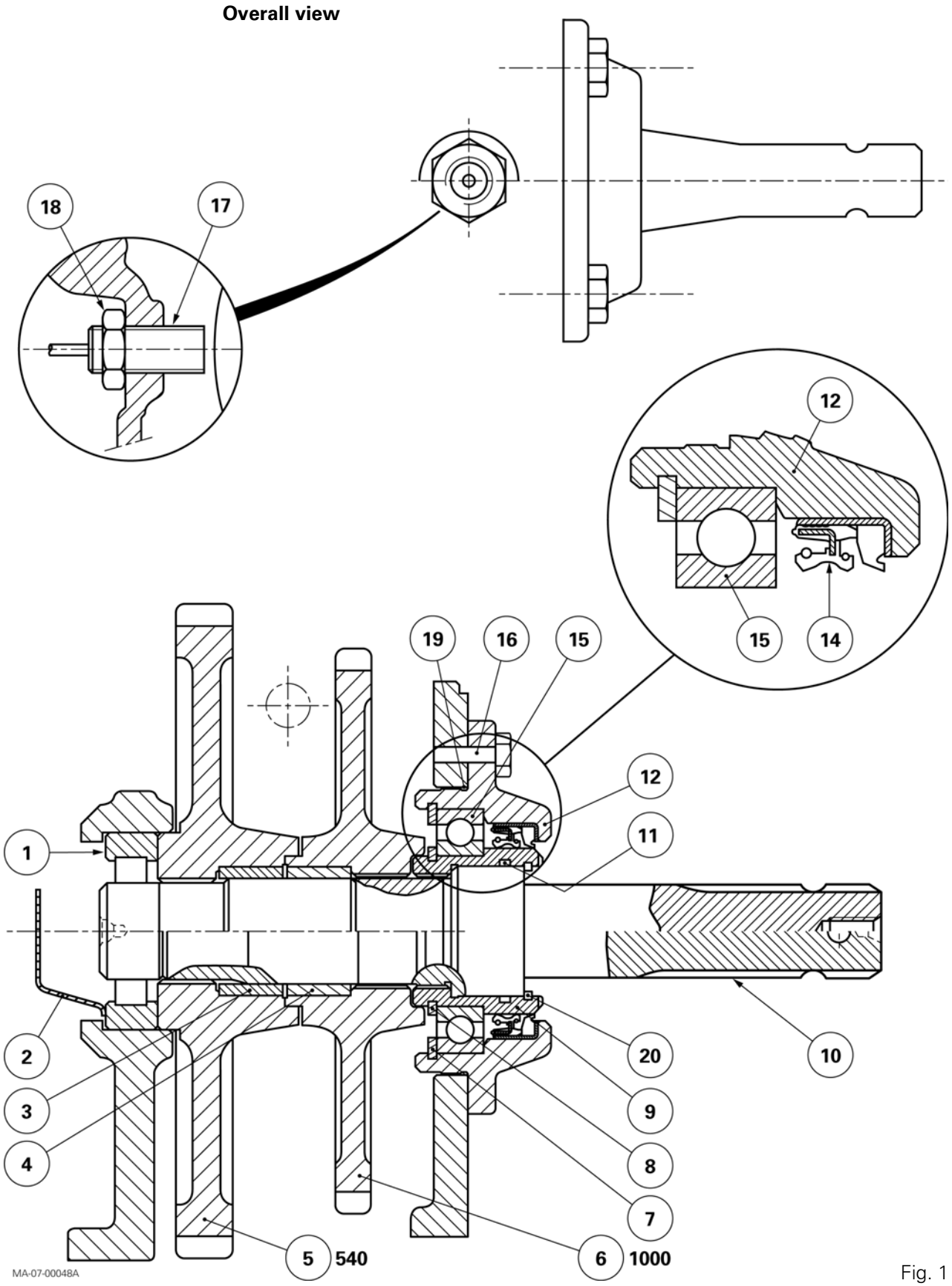


Fig. 1

Exploded view

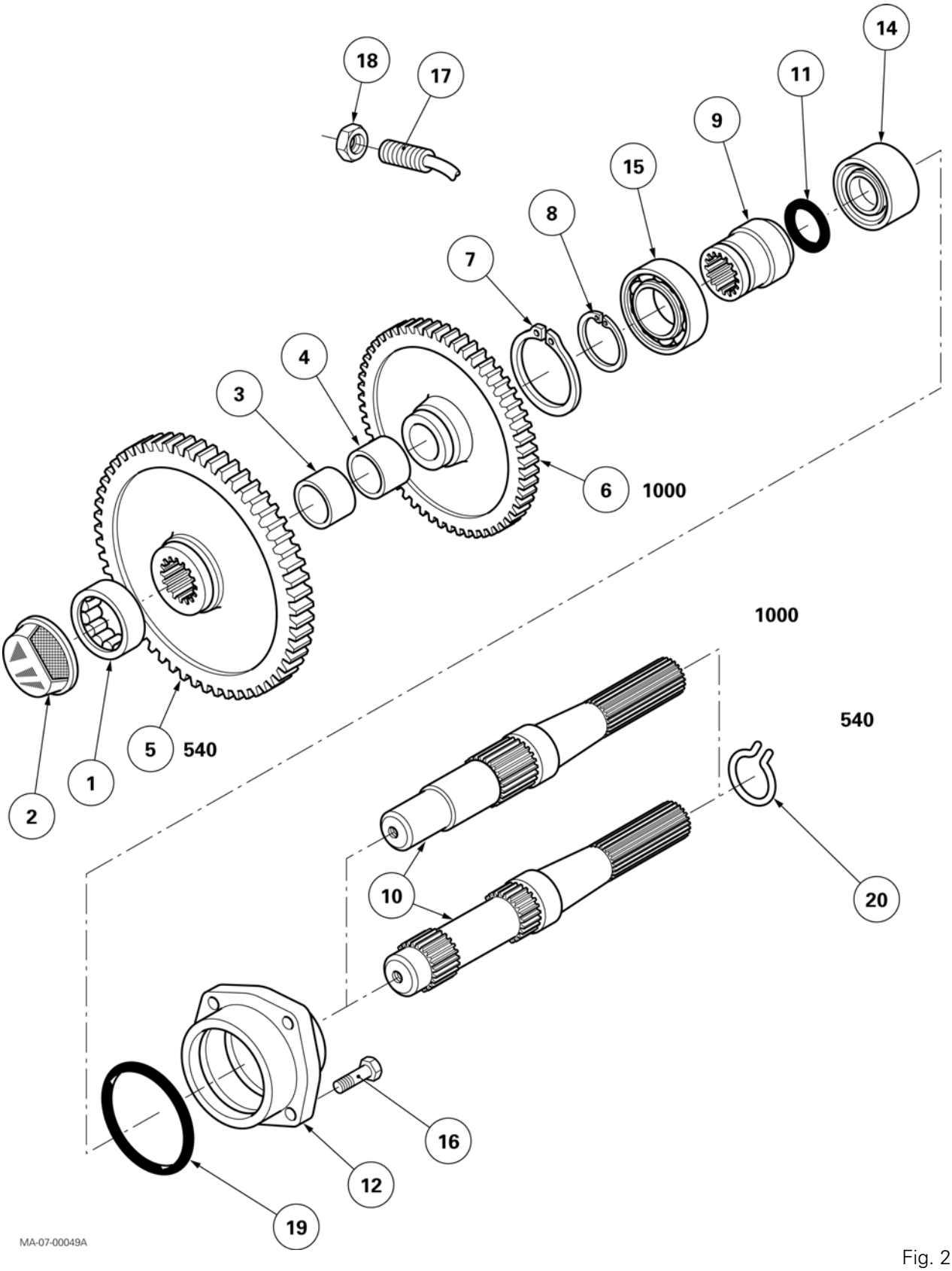


Fig. 2

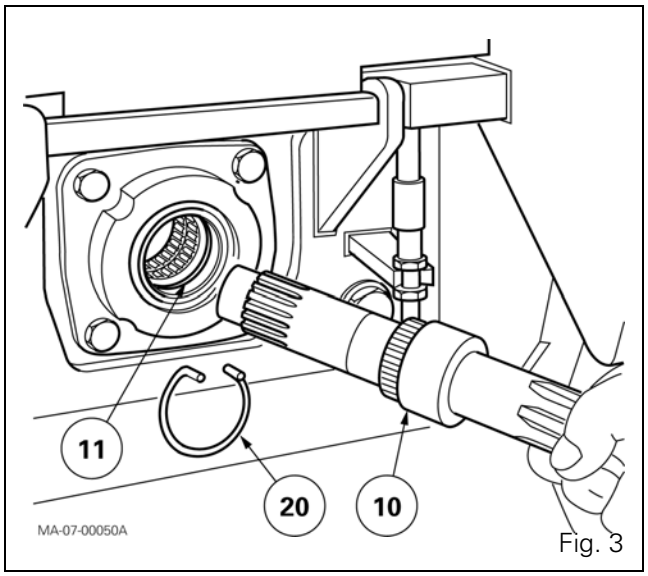


Fig. 3

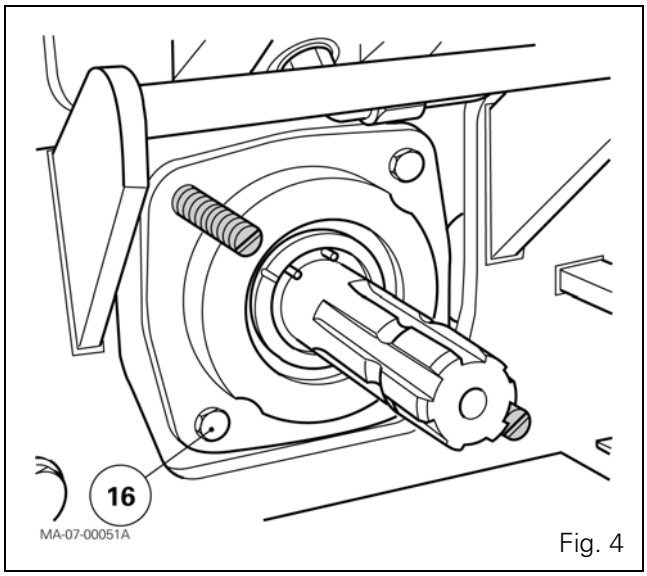


Fig. 4

B . Replacing the 540 or 1000 rpm shaft

Disassembly (Fig. 3)

1. Raise the rear of the tractor to avoid oil spillage.
2. Remove snap ring (20).
3. Take out the shaft (10).
4. Remove the O'ring (11) and discard it.

Reassembly

5. Install a new O'ring (11).
6. Clean and reinstall the shaft (10).
7. Refit the snap ring (20) and lower the rear of the tractor

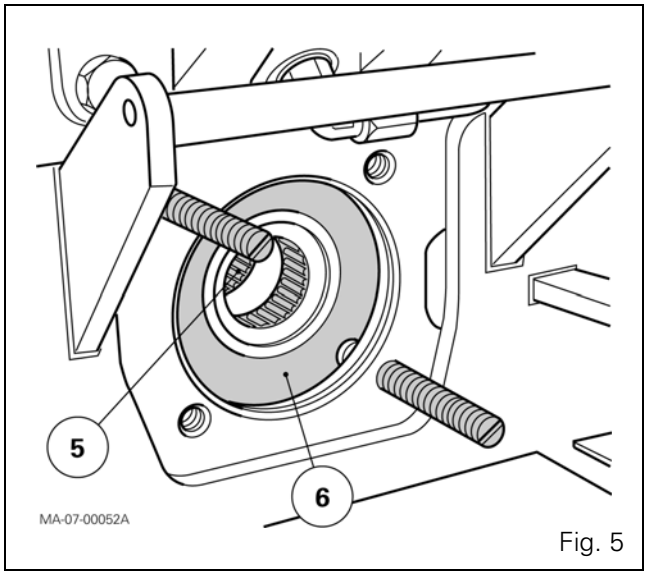


Fig. 5

C . Removing and refitting the rear bearing

Removal

8. Partially drain the rear axle housing. Remove the two opposing screws (16) (Fig. 4).
9. Screw two guide studs (Fig. 4) in abutment against the pinion (6). The purpose of this operation is to hold the pinions (5) (6) in line when removing the shaft (10) and the rear bearing assembly (Fig. 5).
10. Remove the other two screws (16) (Fig. 4).
11. Remove the shaft and the rear bearing assembly (Fig. 6).

Refitting

12. Fit the shaft and the rear bearing assembly (Fig. 6).

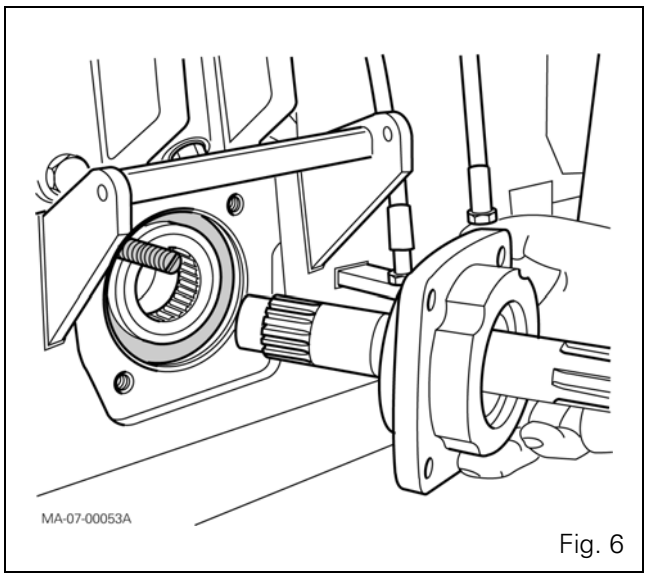


Fig. 6

13. Coat two screws (16) with Loctite 542, then tighten to 105 - 120 Nm.
14. Remove the two guide studs.
15. Coat the two other screws (16) with Loctite 542, then tighten to a torque of 105 - 120 Nm.
16. Top up the rear axle housing with oil.

D . Disassembling and reassembling the rear bearing

Remove the rear bearing and repeat operations 8 to 11.

Disassembly

17. Remove the O'ring (19).
18. Remove snap ring (20).
19. Separate the shaft (10) from the bearing assembly.
20. Remove the O'ring (11).
21. Take off circlip (7).
22. Separate the unit (12) from the roller bearing (15) (Fig. 7).
23. Remove snap ring (8).
24. Extract the roller bearing (15) from the hub (9).
25. Remove the sealing ring (14).

Reassembly (Fig. 7)

26. Smear the external diameter of the sealing ring (14) with Loctite 542.
27. Using a press and a suitable tool, install the sealing ring (14) in abutment against the shoulder of the unit (12). The double lip must be turned towards the roller bearing (15).
28. Assemble the bearing. Reverse operations 17 to 24 and install it. Repeat operations 12 to 16.

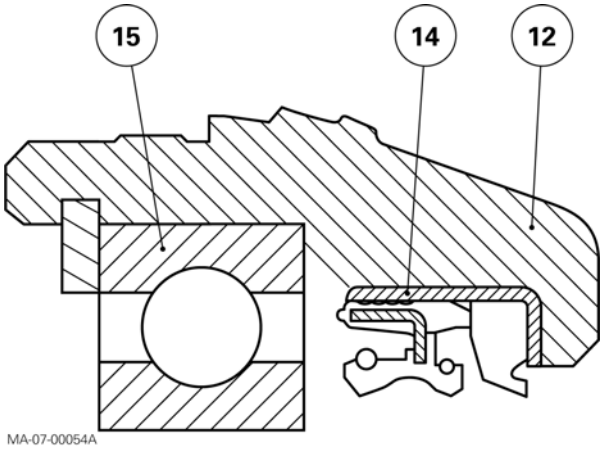


Fig. 7

E . Disassembling and reassembling the 540 and 1000 rpm pinions and the front bearing

Disassembly

To remove the pinions (5) (6), it is necessary to remove:

- the lift cover (see chapter 6)
- the top cover at the rear PTO drive shaft, the driving pinion and the layshaft (see chapter 7).

29. For access to the sensor, remove the left-hand lift ram by removing the lower attachment and by disconnecting the feed pipe. Remove the PTO sensor.

30. Remove the rear bearing and repeat operations 8 to 11.

31. Remove the pinions (5) (6).

32. Extract the roller bearing (1) and the deflector (2).

Reassembly

33. Check and clean all components. Replace any defective parts.

34. Smear the deflector (2) with Loctite 648 on the mating surface with the housing and put it with its bore. Turn the opening upwards (Fig. 8).

35. Fit the roller bearing (1) in the housing, in abutment with the deflector (2).

36. Lubricate the rings (3) (4).

37. Refit the pinions (5) (6) and screw two guide studs in abutment on the pinion (6). The purpose of this operation is to maintain the pinions (Fig. 5) in line while refitting the rear bearing.

Note: If the rings (3) (4) are damaged, replace the pinions (5) (6).

38. Refit the rear bearing and repeat operations 12 to 15.

39. Smear the thread of the PTO sensor with Loctite "Form A gasket 2" (sensor sealing or equivalent). Adjust the sensor:

- tighten the sensor home, without forcing, until it comes in contact with the pinion (6).
- unscrew the sensor by 3/4 turn,
- tighten the nut (18) moderately and connect the harness.

Refit the left-hand ram, install the lower attachment and reconnect the feed pipe.

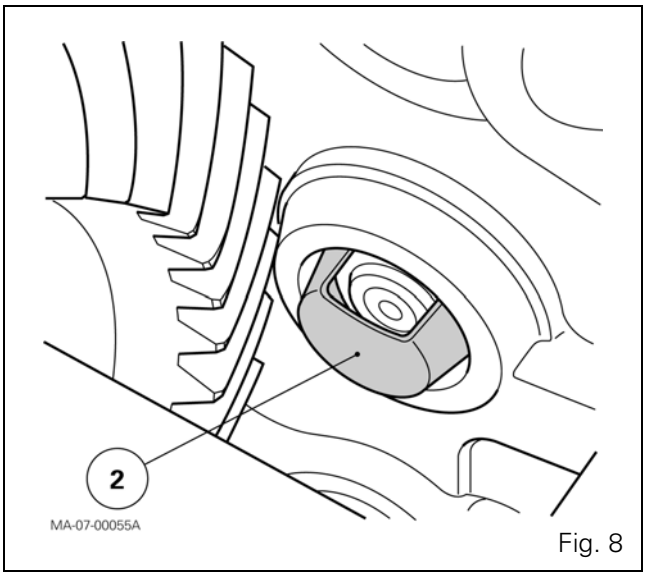


Fig. 8

40. Install the driving pinion assembly (see chapter 7).

41. Refit the lift cover (see chapter 6).

42. Top up the rear axle housing oil level.

43. Check that the PTO and PTO brake operate correctly.

44. Check for the oil tightness of:

- mating faces of seals (spool valve support, cover, PTO rear bearing, lift cover)
- the hydraulic unions.

7A13 - Shiftable PTO shaft

CONTENTS

A . General

The driven pinions (4) (7) are fitted on the PTO shaft (13) located on the lower rear part of the axle housing. These driven pinions are constantly meshed with the double driving pinion driven by the upper shaftline whose drive is transmitted by the power take-off clutch.

The power take-off shaft is freely mounted into the bearing (2) and force fitted into the bearing (10). The bearings are fitted into the rear axle housing and housing unit respectively (14).

The coupler hub (5) is integral with the shaft (13) via splines. These pinions (4) (7) drive the shaft when the coupler (5) is moved either forwards (540 rpm) or backwards (1000 rpm). When one of the pinions (4) or (7), equipped with rings (19) (20) is passive, it turns either on the ring (3) or on the shaft (13).

A control fork (25) fitted to the pin (22) makes it possible to select speeds of 540 or 1000 rpm.

Tightness is obtained via the sealing ring (11) and the O'ring (18). The deflector (12) prevents contamination by foreign particles.

Depending on the option, the power take-off shaft may be supported by taper roller bearings (see § F).

Another version provided with a flange shaft makes it possible to rapidly change the end-piece (32) (6 or 21 splines, see § E).

Lubricating the pinions (4) (7)

The transmission oil provides lubrication for the two pinions.

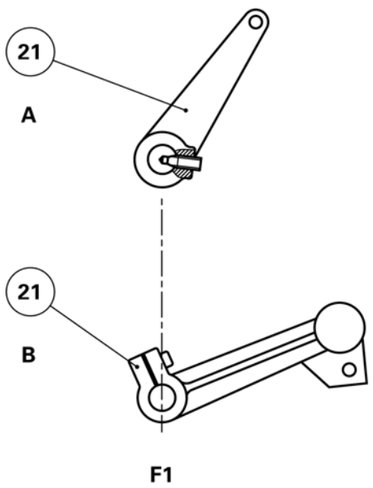
The bearing (2) has a sealed face turned towards the 540 rpm pinion. Lubrication of pinions is obtained via the oil slave device (1) and the shaft (13) provided with an axial channel and drilled radial ports.

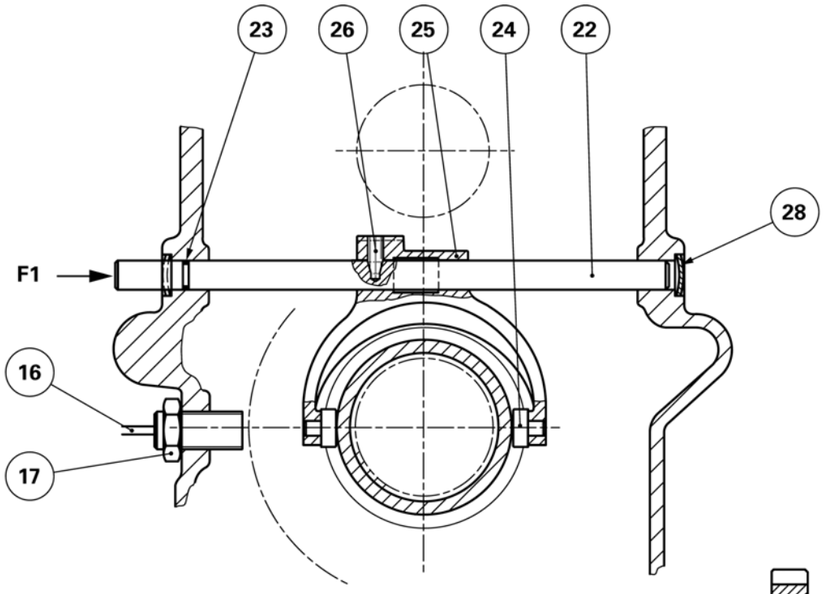
Parts list

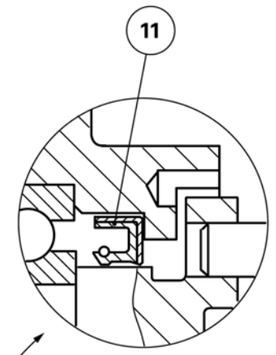
(1)(1) Oil slave device
(2) Bearing
(3) Ring
(4) Pinion (540 rpm)
(5) Coupler
(6) Hub
(7) Pinion (1000 rpm)
(8) Circlip
(9) Snap ring
(10) Bearing
(11) Sealing ring
(12) Deflector
(13) PTO shaft
(14) Unit
(15) Screw
(15A)Screw
(16) Sensor
(17) Nut
(18) O'ring
(19) Ring
(20) Ring
(21) Link
(22) Pin
(23) O'ring
(24) Pads
(25) Fork
(26) Set screw
(27)(27) Special spacers
(28) Plug
(29) "Bayonet" cap
(30) Twist cap
(31) Flange shaft
(32) End-fitting (6 or 21 splines)
(33) Locating pins
(34) Screw

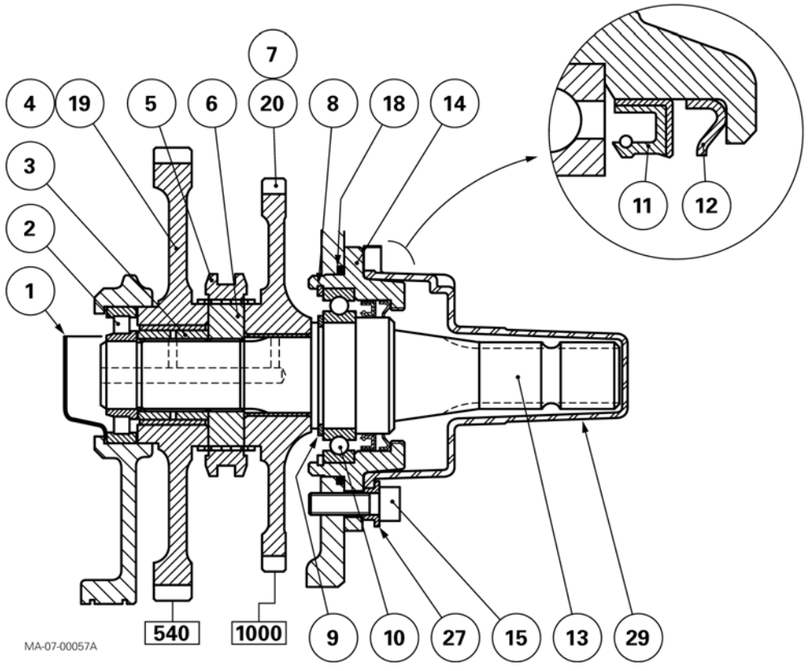
Legend

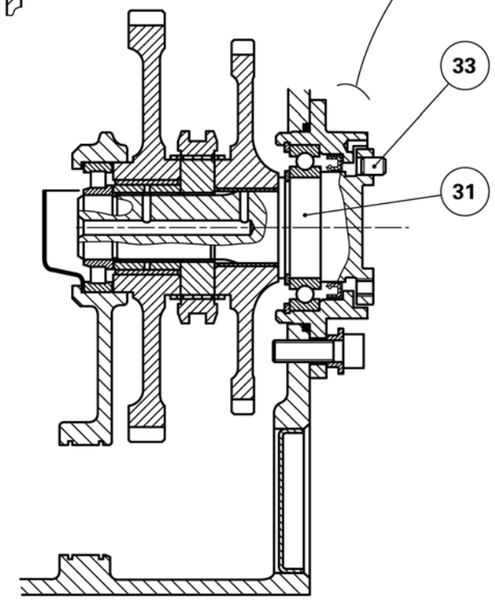
A : Internal control via lever and cable
B : External control











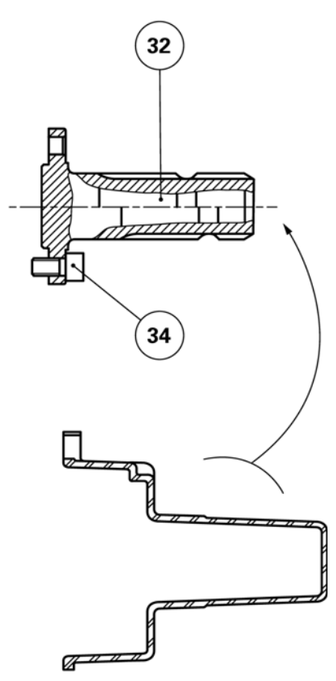


Fig. 1

A . Layout of components and different versions

Legend

A : with 2-speed PTO
B : with 4-speed LSPTO
C : with GSPTO
D : with flange shaft (540 - 1000 rpm) and interchangeable end-fitting
E : with standard shaft (540 - 1000 rpm)

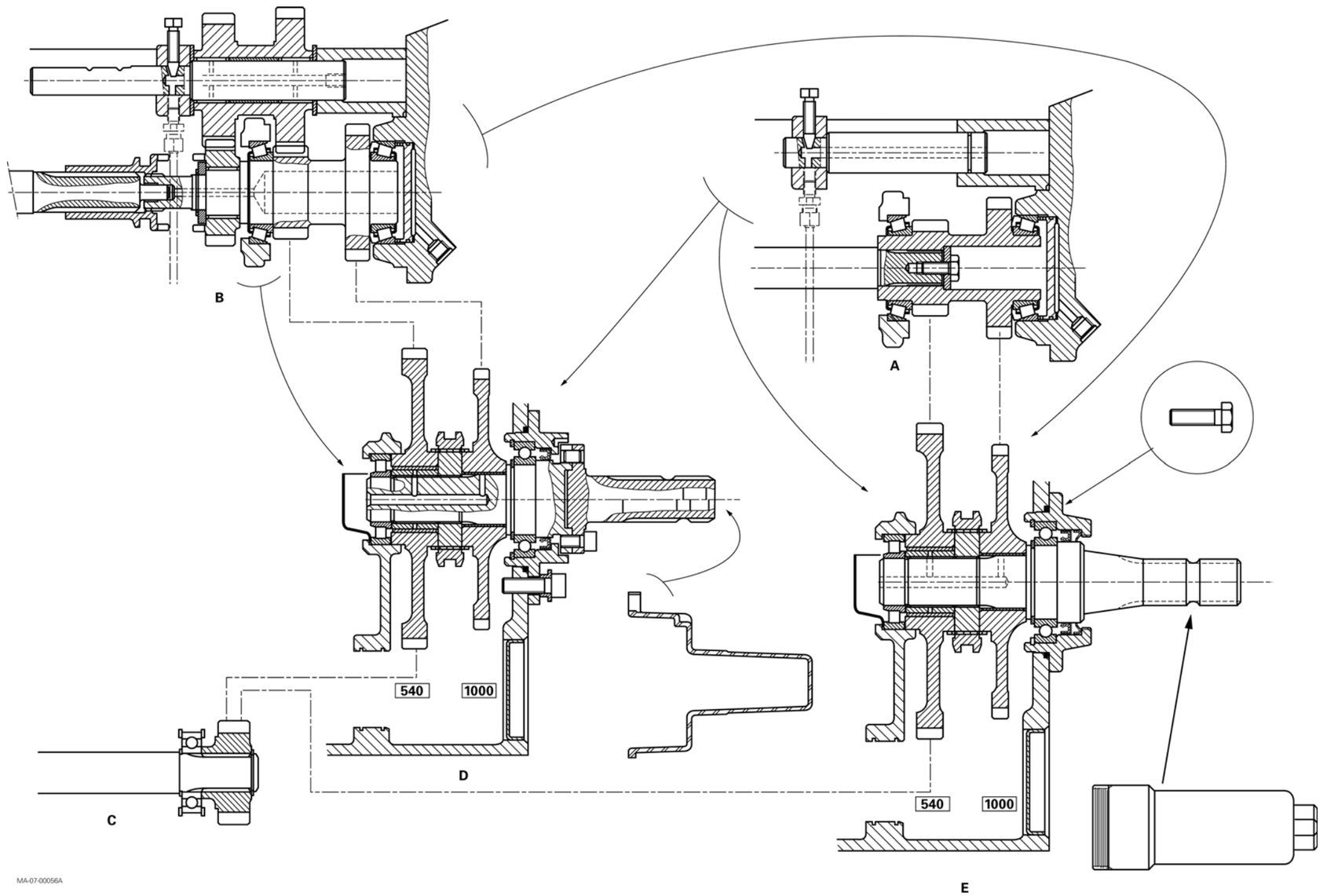


Fig. 2

Exploded view

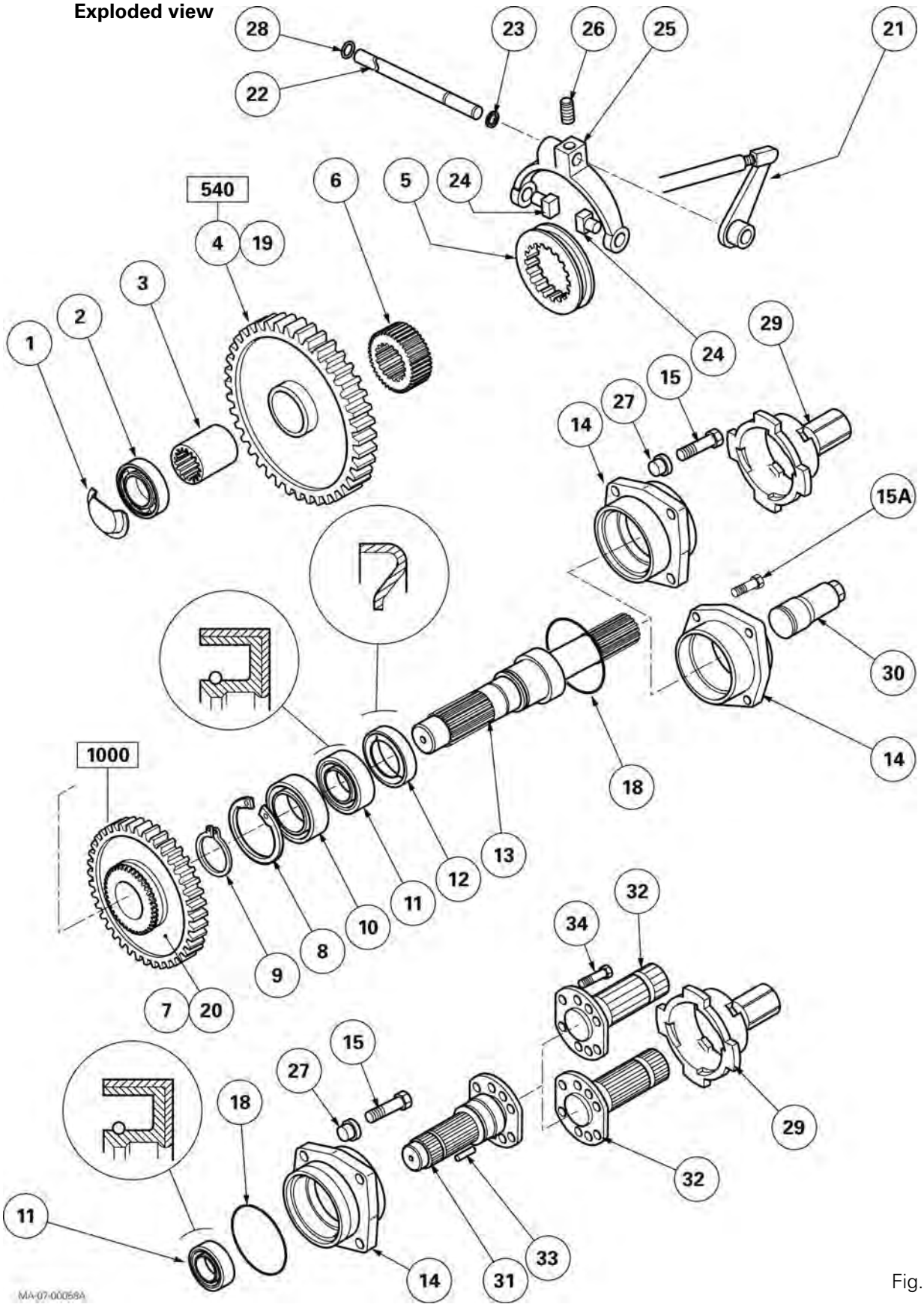


Fig. 1

A . Removing and refitting the rear bearing

Removal

1. Partially drain the rear axle housing.
2. Insert the coupler (5) into the pinion (7).
3. Remove the two opposing screws (15) (Fig. 2).
4. In the location of the two removed screws, tighten two guide studs home against the pinion (7). The aim of this operation is to keep the pinions (4) (7) (Fig. 3), hub and coupler aligned during removal of shaft (13) and bearing assembly.
5. Remove the other two screws (15).
6. Remove the shaft and the bearing assembly (Fig. 4). Discard seal (18).

Refitting

7. Replace the seal (18). Install the shaft and bearing assembly (Fig. 4).
8. Smear two screws (15) with Loctite 542 and tighten them to 105 - 120 Nm.
9. Remove the two guide studs.
10. Smear with grease and tighten the two other screws following the instructions described earlier.
11. Top up the oil level of the rear axle housing and check its level using a gauge located to the rear of the centre housing.

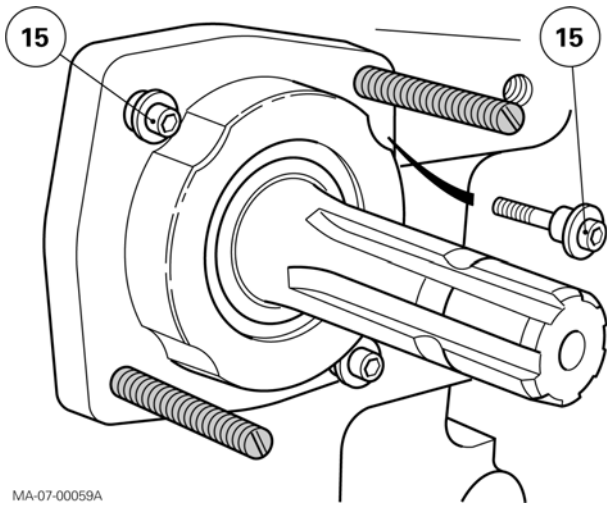


Fig. 2

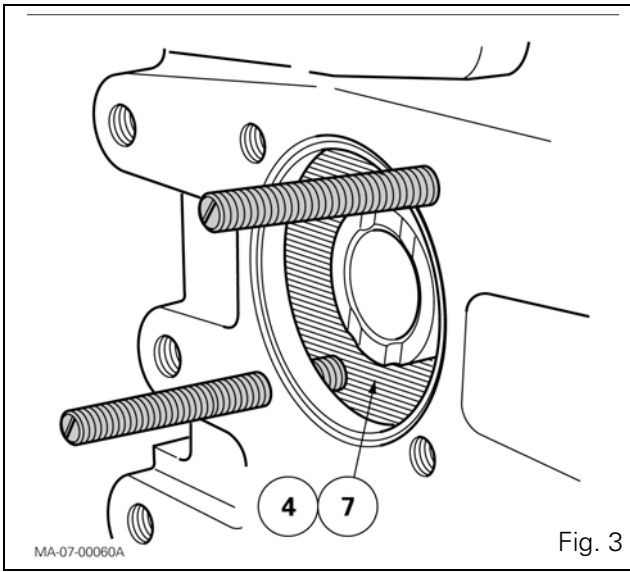


Fig. 3

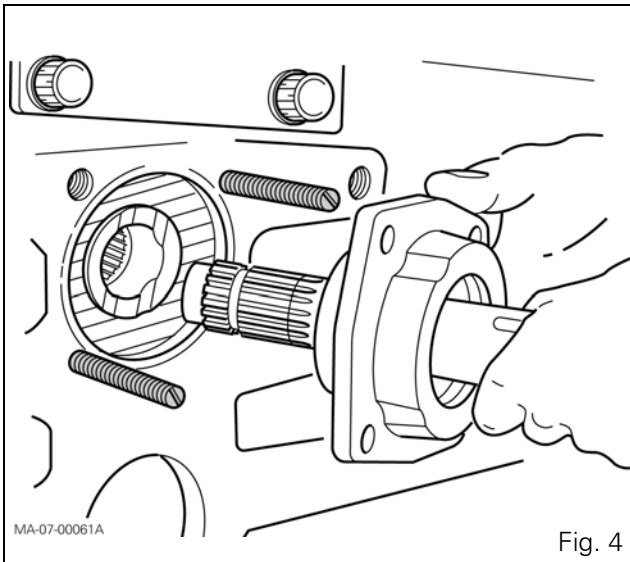


Fig. 4

B . Disassembling and reassembling the rear bearing

Preliminary operations

- Remove the rear bearing and repeat operations 1 to 6.

Disassembly

12. Remove the O'ring (18).
13. Take off circlip (8).
14. Separate cover (14) from bearing (10).
15. Remove snap ring (9).
16. Extract bearing (10) from shaft (13).
17. Extract sealing ring and deflector (12).

Reassembly

18. Using a press and a suitable fixture, fit deflector (12) up against the cover, carefully following the direction of assembly (Fig. 5).
19. Using a press and a suitable fixture, insert the sealing ring (11) flush with the chamfer machined onto the cover (14), with its lip turned towards the bearing (10) (Fig. 5).
20. Install the housing unit (14) components, carry out operations 12 to 16 in reverse order, and refit the rear bearing.

Final operation

21. Refit the rear bearing and repeat operations 7 to 11.

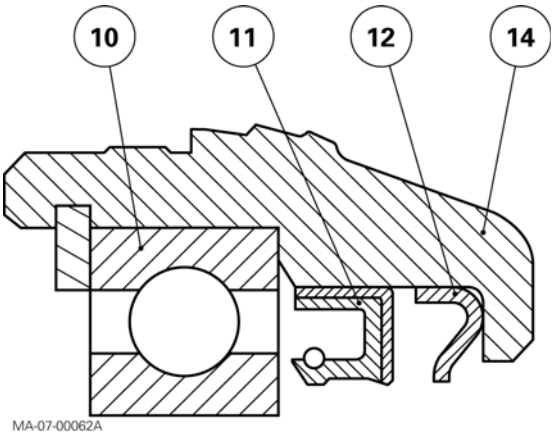


Fig. 5

C . Disassembling and reassembling the pinions (540 and 1000 rpm) and the front shaft bearing

Preliminary operations

Before removing pinions (4) (7), the following should be removed:

- the lift cover (see chapter 6)
- the hook support
- the PTO top cover at the rear of tractor, the double driving pinion and, if applicable, the control fork (4-speed LSPTO) (see chapter 7).

Disassembly

22. Remove the left lift ram and take off the PTO sensor.

23. Undo the set screw (26).

Take out the pin (22) with the link (21) on the left-hand side of the tractor, and discard the O'ring (23).

Note: The plug (28) stays inside the housing.

24. Take out the control fork (25) with the pads (24) without letting them fall into the housing.

25. Remove the rear bearing and repeat operations 1 to 6.

26. Remove the hub (6) with the coupler (5), the pinions (4) (7) and the ring (3).

27. Extract the bearing (2) and oil slave device (1).

Reassembly

28. Check and clean all components. Replace any defective parts.

29. Lightly smear the oil slave device (1) with Loctite 648 or equivalent on the face turned towards the centre housing. Insert the slave device with its open end facing up (Fig. 6).

30. Insert the bearing (2) into the housing thrust up against the oil slave device (1) (Fig. 6).

Note: Turn the sealed part of the bearing towards the pinion (4).

31. Using a jet of compressed air, check that the oil channel in the shaft (13) is not obstructed. Lubricate the rings (19) (20). Refit the pinions (4) (7), the coupler (5) with the hub (6), the ring (3), with the opening of the teeth turned towards the rear of the tractor (Fig. 7).

Note: If rings (19) (20) (no reference code given in spare parts catalogue) are damaged, replace the pinions (4) (7).

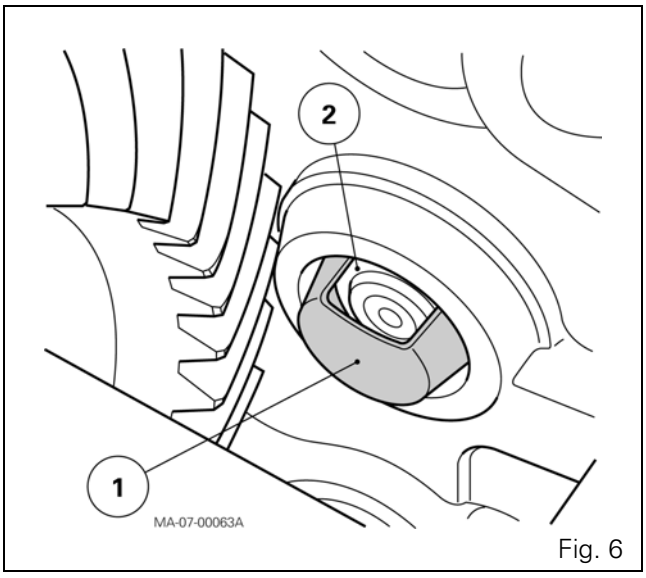


Fig. 6

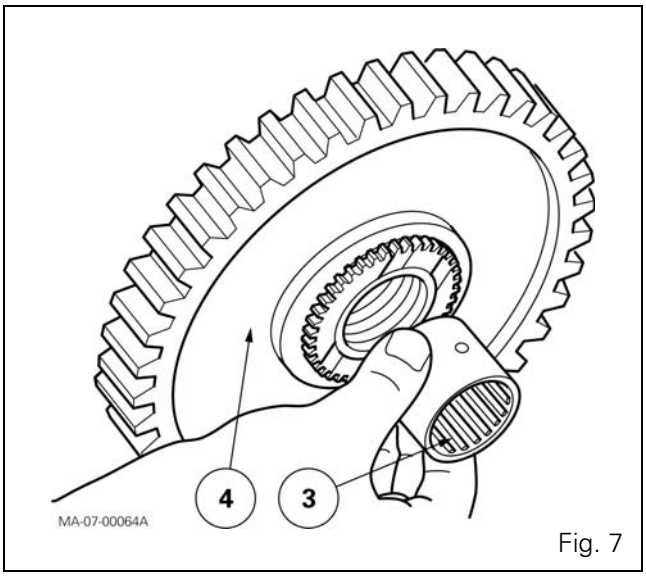


Fig. 7

32. Insert the coupler (5) into the pinion (7). Tighten two guide studs up against the pinion (7) following the method described in operation 4.

33. Refit the rear bearing and repeat operations 7 to 10.

34. Smear the thread of the PTO sensor (16) with Loctite 577 (Sensor Sealing or equivalent). Assemble and adjust the sensor:
- Tighten the sensor home, without forcing, until it comes in contact with the pinion (7),
- Unscrew the sensor by 3/4 turn,
- Tighten the nut (17) moderately and connect the connector.

35. Reassemble the control fork (25) with the pads (24) held up by two points of miscible grease (Amber Technical or equivalent).

36. Fit a new O'ring (23). Fit the pin (22) equipped with a link (21).

37. Tighten the screw (26) smeared with Loctite 221. Manually check that the fork and coupler (5) are working properly in the 540 - 1000 rpm positions.

Final operations

38. Refit the left-hand ram.

39. Reinstall the driving pinion, the control fork (LSPTO, if fitted) and top cover.
See chapter 7.

40. Refit the lift cover (see chapter 6).

41. Adjust the LSPTO control (see chapter 7).

42. Top up the oil level of the real axle housing by checking with a gauge located at the rear of the centre housing.

43. Check that the PTO and PTO brake operate correctly.

44. Check for the oil tightness of:
- mating faces (spool valve support, top cover, PTO rear bearing, and lift cover)
- the hydraulic unions.

D . Controls

Internal (Fig. 8)

(1) Lever
(2) Cable
(21) Link

Check

- After adjusting the control cable, check that the coupler (5) fits correctly with the 540 and 1000 rpm pinions.

External (Fig. 9)

(2) Screw
(21) Link

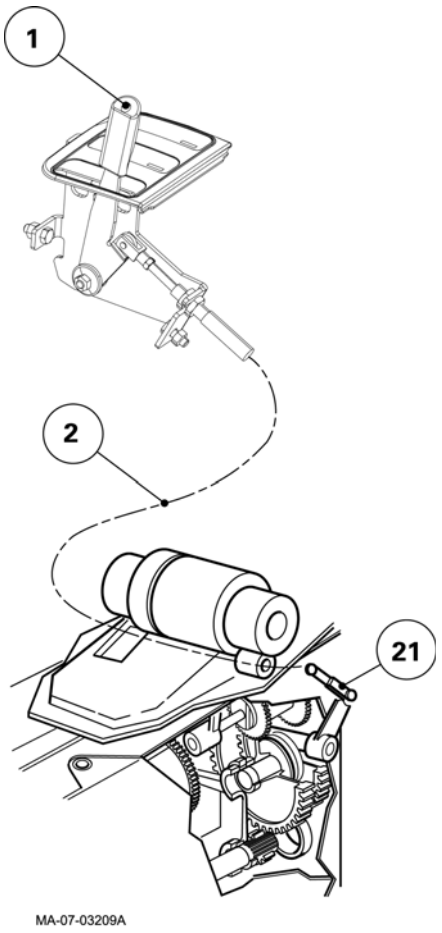


Fig. 8

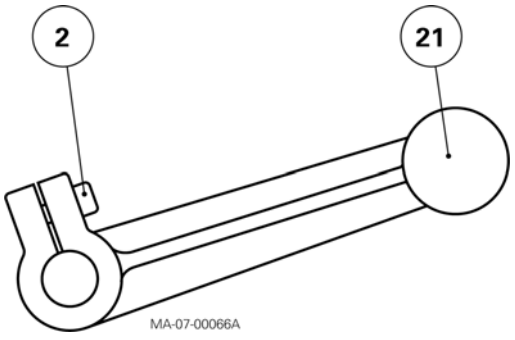


Fig. 9

E . Flange shaft (Fig. 10)

Special points

- The flange shaft (31) makes it possible to interchange the end-fitting (32) (6 or 21 splines).
- This end-fitting is integral with the shaft (31) via pins (33) and screws (34).
- When the power take-off is not in use, the end is covered:
  - either by a bayonet cap (29) held in place by special spacers (27)
  - or by a twist cap (30) (Fig. 1, depending on the option).

Remark

- To allow for the removal of the end-piece, introduce a measuring rod into one of the two holes drilled into the housing unit (14). Lock by gently turning the end-fitting. Take out the screws (34).

Tightening torque

- Screw (34): 100 - 130 Nm

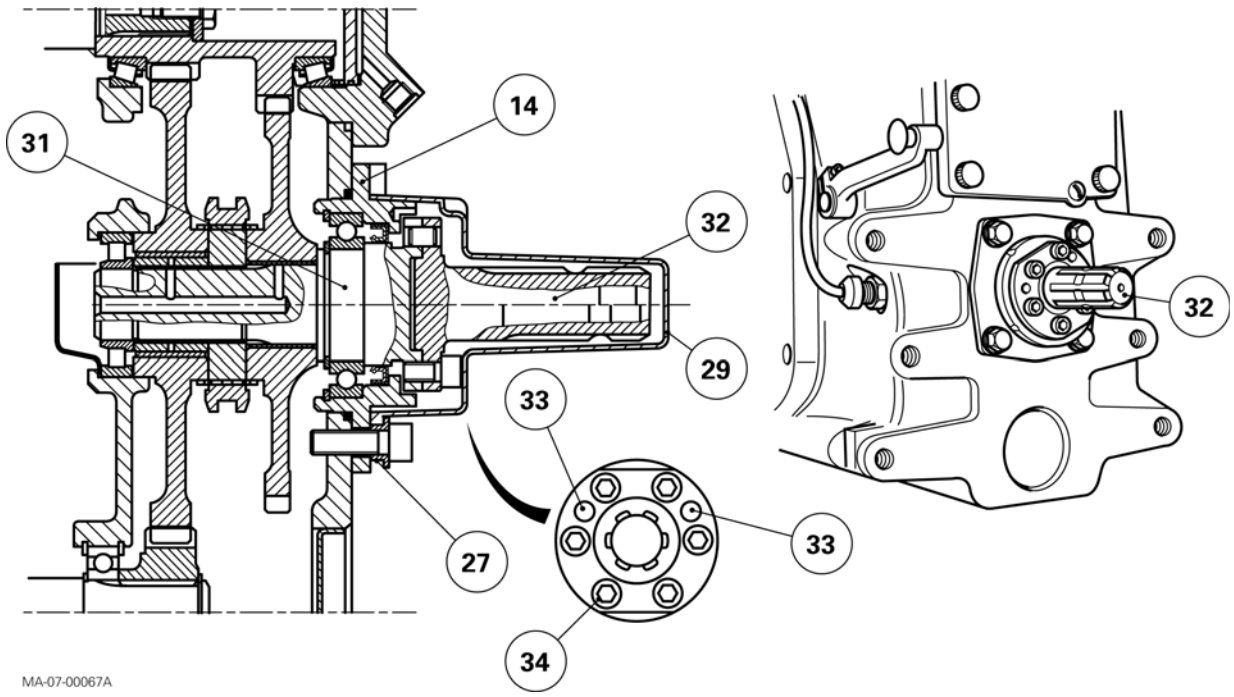


Fig. 10

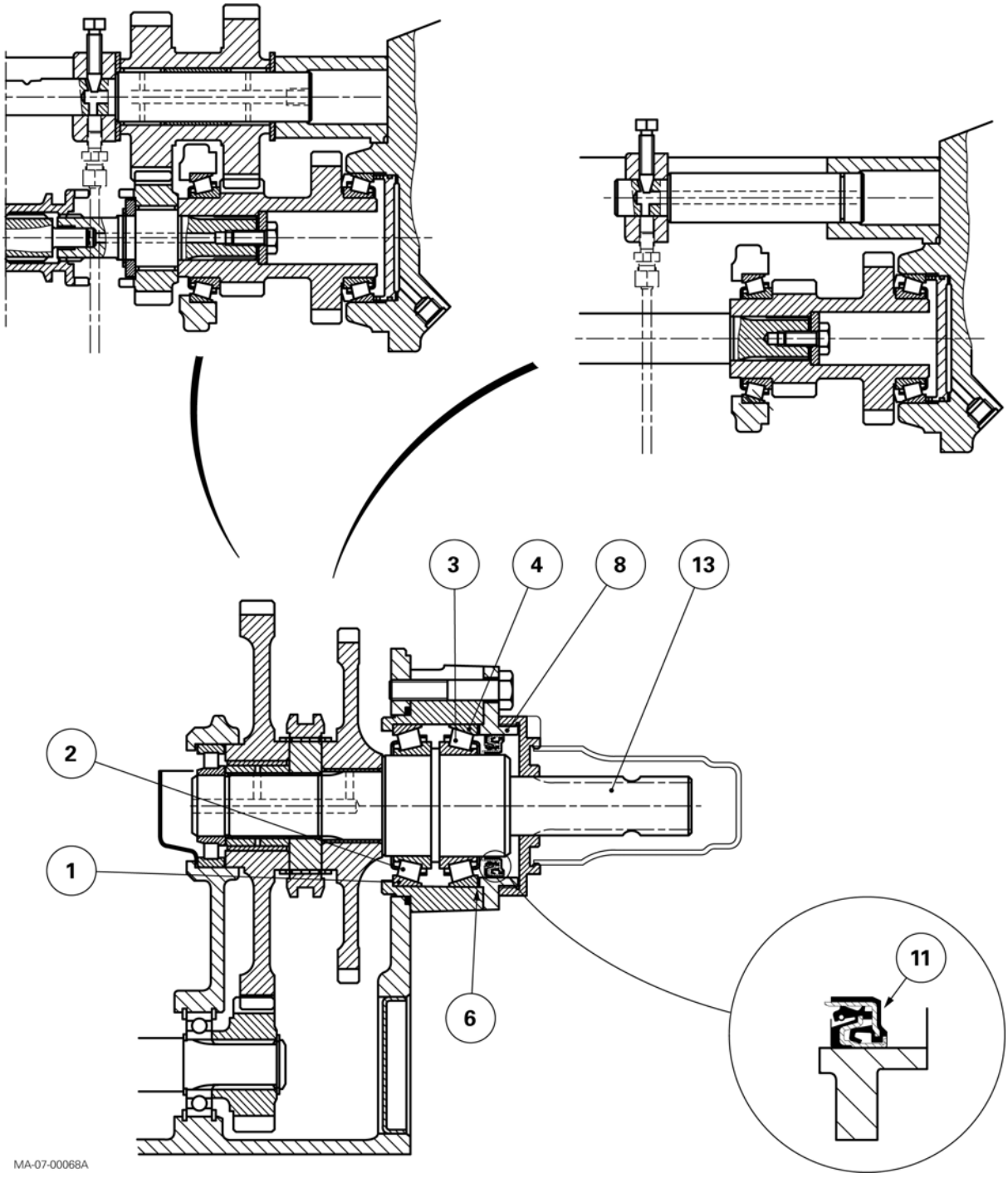


Fig. 11

F . Shaft with reinforced sealing

Construction (Fig. 11)

The output shaft (13) receives drive from the upper line of the power take-off and, via the different engaged pinions, transmits it to the implement that needs to be driven.

At the front, it is supported by a straight roller bearing force fitted into the centre housing and at the rear by two taper roller bearings (1) (2) and (3) (4) installed opposite one another.

Taper roller bearing clearance is obtained via shim(s) (6) placed between the rear bearing cup (4) and the seal holder (8).

As with the other PTO versions, it supports the 540 and 1000 rpm driven pinions.

When operating in rice fields or in particularly damp farming conditions, the rear bearing seal is reinforced by a "cassette" seal (11).

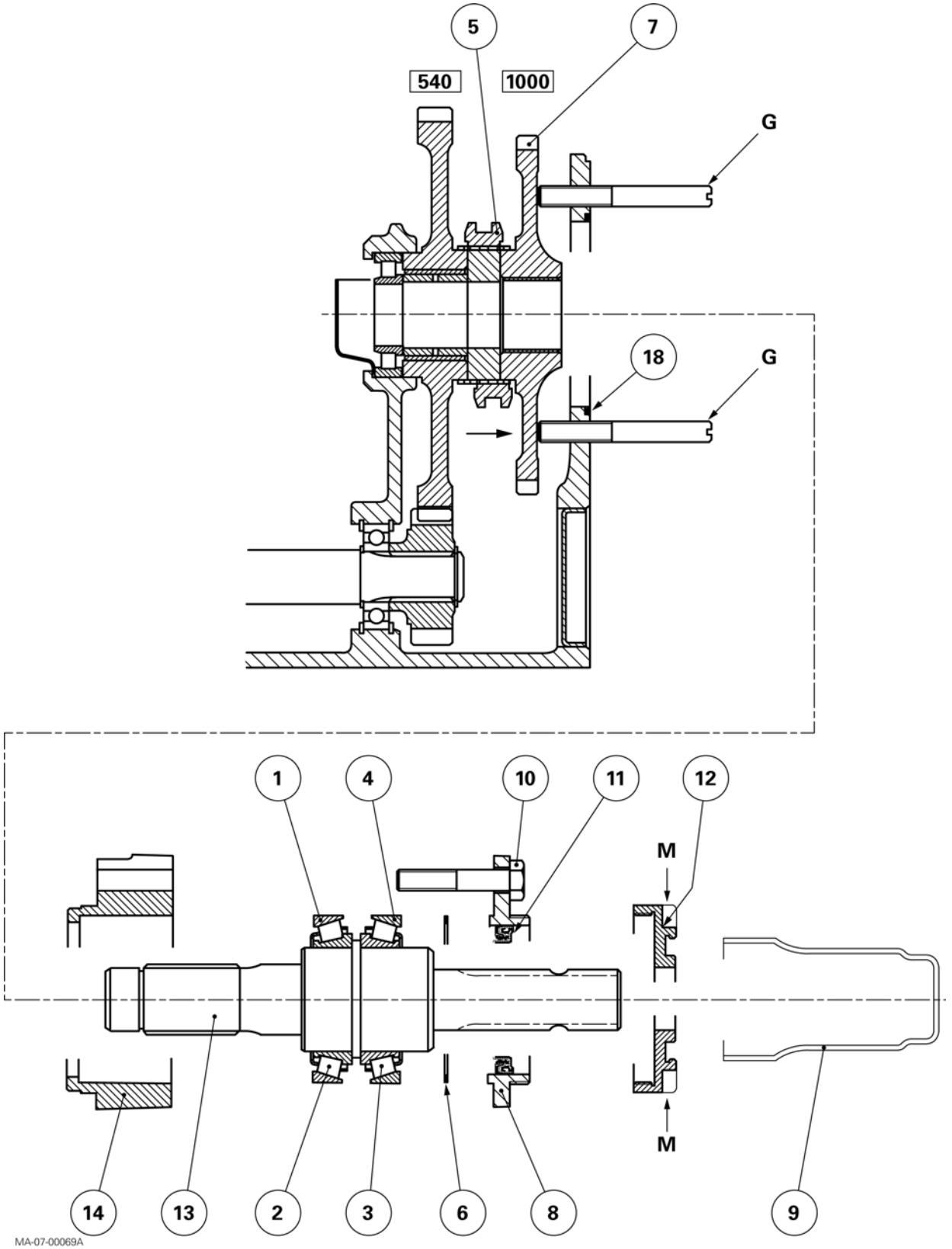


Fig. 12

Removing and refitting the shaft and housing unit

Removing the shaft (Fig. 12)

45. Take off the cap (9).

46. Using a wrench placed on the "M" flats, unscrew and remove the support (12).

47. Move the coupler (5) towards the back using the control to engage the 1000 rpm pinion (7).

Remark

- The coupler engaged in this way holds the pinion in place.

48. Take off the two diametrically opposed screws (10) and replace them with two "G" guide studs, suitably long and locally made, their ends resting on the pinion (1000 rpm).

Remark

- The guide studs should be kept slightly under pressure over the 1000 rpm pinion which, in turn, transmits pressure to other stacked elements.

49. Remove the other two screws. Separate and lift the cover (8) equipped with a sealing ring (11).

50. Recover the shims (6).

51. Disengage the shaft (13) and bearings (1) (2) - (3) (4) from the 540 and 1000 rpm driven pinions.

Reminder

- Pair up the cones and bearing cups in case of reuse.

52. If necessary, extract the bearing cones from the shaft.

Removing the unit (Fig. 12)

53. Separate the housing unit (14) from the centre housing.

54. Discard the O'ring (18).

Refitting the unit

55. Clean and check all components. Replace any defective parts.

Reminder

- The bearing cones and cups should be lubricated with clean transmission oil before assembly.

56. Fit an O'ring (18) onto the housing unit and slide it onto the guide studs and into the bores of the centre housing.

57. Temporarily tighten the two diametrically opposed screws (10) in order to secure the housing unit.

Refitting the shaft (Fig. 12)

58. Slide the bearing cup (1) into the housing unit.

59. As required, insert the bearing cones (2) (3) up against the shaft collar using a press and a suitable fixture.

60. Introduce the shaft (13) into the 540 - 1000 rpm driven pinions.

61. Position the rear bearing cup (4).

62. If necessary, carry out the shimming of bearings (see later).

63. Replace the sealing ring (11) (see later).

64. Take off the two screws previously installed.

Smear the rear face of the housing unit (14) with Loctite 510 or equivalent and refit the cover (8) fitted with a sealing ring.

65. Fit two screws, their thread lightly smeared with Loctite 542 or equivalent and tighten to a torque of 100 - 130 Nm.

66. Take off the guide studs and install two more screws, following the previous instructions.

67. Refit the support and tighten it to 30 - 50 Nm.

68. Tighten the cap moderately.

Shimming the bearings

Preparing for shimming

69. Remove the cover (8), without Loctite, eliminating the shims and sealing ring (11).

Remark

- By eliminating the shims, there is the risk of creating excessive clearance. In this case, fit a thickness of shim(s) to reduce the clearance to approximately 0.35 mm.

70. Position a dial gauge feeler pin on the end of the shaft (Fig. 13).

71. Pull hard on the shaft, turning it to and fro from left to right to correctly "seat" the cones in the bearing cups.

72. Reset the dial gauge to zero.

73. Repeat the operation 71, this time by pushing.

74. Depending on the value read on the dial gauge, prepare a thickness of shim(s) (6) in order to obtain a final clearance of:

J1 = 0.05 to 0.15 mm (Fig. 13)

Remark

- If possible, shim so as to obtain minimum tolerance.

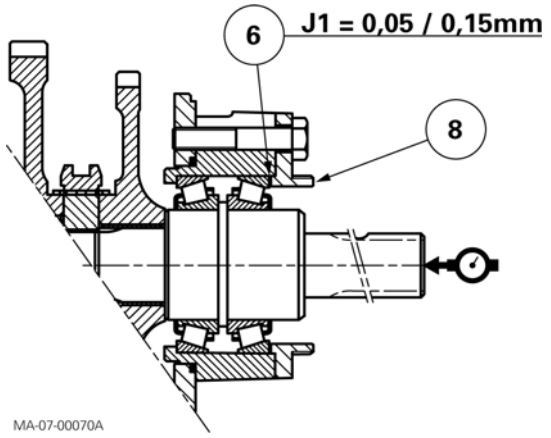


Fig. 13

Replacing the sealing ring

Reminder

- The sealing ring (11) is also known as a "cassette" seal.

Removal

75. Remove cap (9) and support (12).

76. Take out the two diametrically opposed screws (10) and replace them with two guide studs (Fig. 14).

77. Take off the other two screws, separate and remove the cover (8) (Fig. 14).

78. Drive off the seal from the cover.

Replacement

79. Clean the cover and check that it is free of dents or burrs at the location of the seal.

80. Insert the new seal correctly turned with its external face 9.25 mm from the rim of the cover (8) (Fig. 14), using a locally made drift.

Refitting

81. Smear the rear face of the housing unit (14) with Loctite 510 or equivalent and refit the cover (8) after checking for the presence of shim(s) (6).

82. Insert the screws (10) and repeat operations 65 and 66.

Test

83. Start the engine. Activate the power take-off and check the tightness of the rear bearing.

84. Refit and tighten the support as well as the cap, then repeat operations 67 and 68.

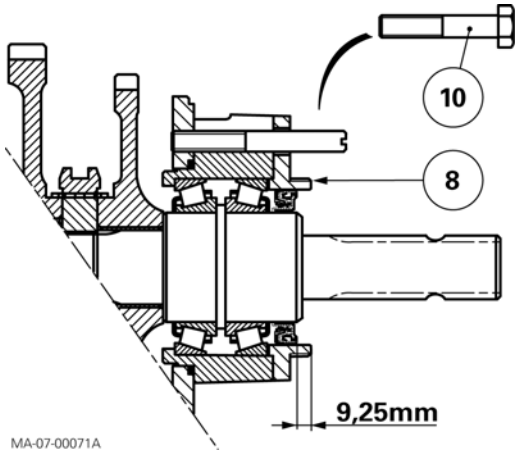


Fig. 14

7A14 - GSPTO

CONTENTS

A . General

The MF6400 series tractors can be fitted with power take off proportional to ground speed (GSPTO).

Unlike the independent PTO system where the speed of the PTO shaft depends on the engine speed, the proportional PTO is driven by the drive pinion and the PTO shaft speed is proportional to the forward speed of the tractor.

B . Operation

The drive pinion comprises a pinion (31) constantly meshed with pinion (16) (2WD), or the bell gear (33) (4WD). The sliding gear (10) allows the locking in rotation of shaft (18) (2WD) or shaft (32) (4WD) with shaft (8). The pinion (3) fitted at the end of shaft (8) drives the 540 rpm pinion of the rear PTO shaftline.

The movement of the sliding gear (10) is obtained by a pad articulated on a pin fitted to the left in the lower part of the rear axle housing and controlled by a link and cable operated by a lever in the cab.

Parts list

		2WD	4WD
(1)	Plug	•	•
(2)	Circlip	•	•
(3)	Pinion	•	•
(4)	Circlip	•	•
(5)	Bearing	•	•
(6)	Circlip	•	•
(7)	Circlip	•	•
(8)	Shaft	•	•
(9)	Circlip	•	•
(10)	Sliding gear	•	•
(11)	Screws	•	•
(12)	Cover	•	•
(13)	Needle bearing	•	•
(14)	Cup	•	
(15)	Cone	•	
(16)	Pinion	•	
(17)	Circlip	•	
(18)	2WD shaft	•	
(19)	Cone	•	
(20)	Cup	•	
(21)	Shim(s)	•	
(22)	Spacer	•	
(23)	Circlip	•	
(24)	Plug	•	
(25)	Double pin	•	•
(26)	Double pin	•	•
(27)	Sleeve	•	•
(28)	Sleeve	•	•
(29)	Shaft	•	•
(30)	Circlip	•	•
(31)	Pinion	•	•
(32)	4WD shaft		•
(33)	Bell gear		•

Overall view

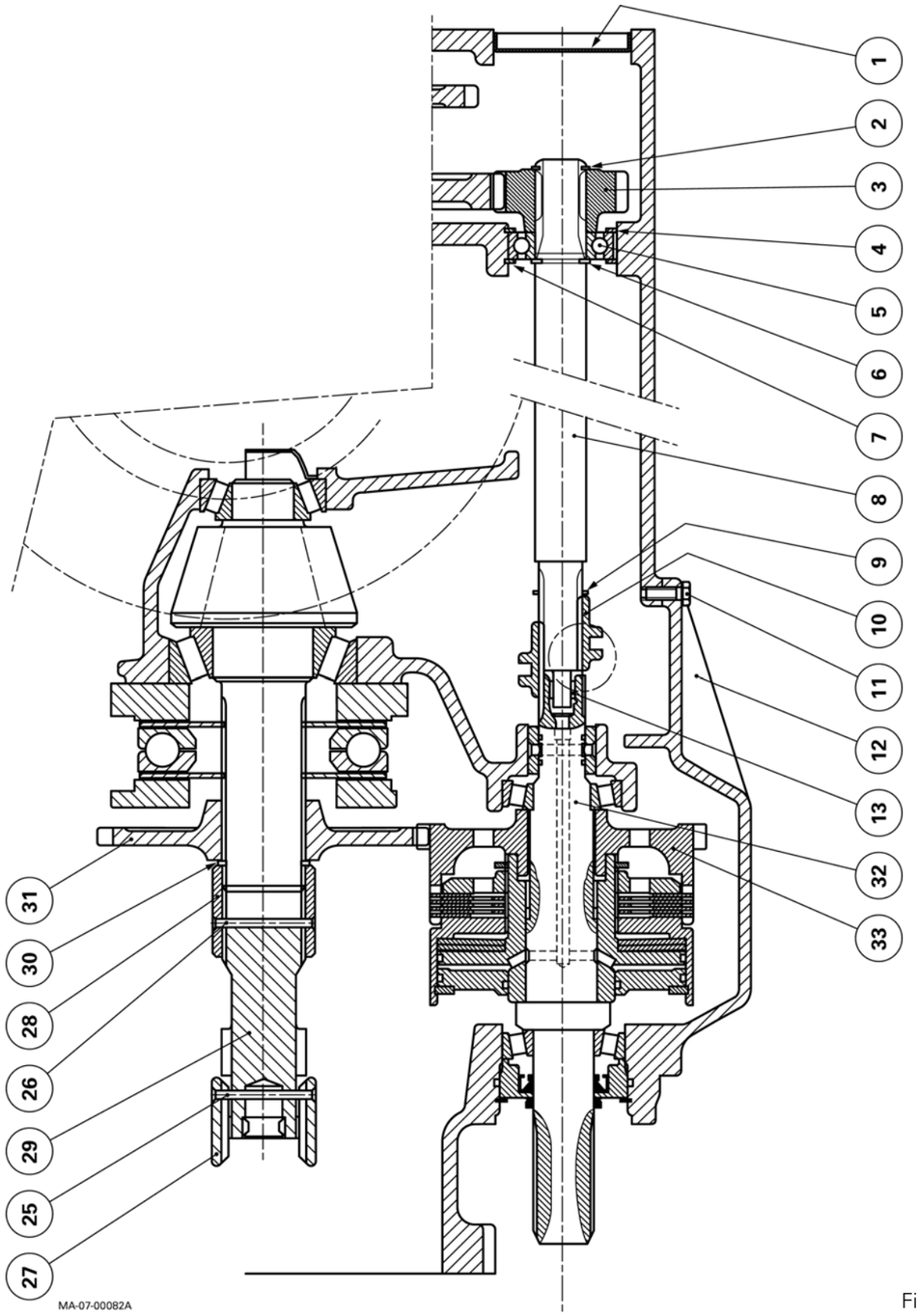


Fig. 1

Overall view

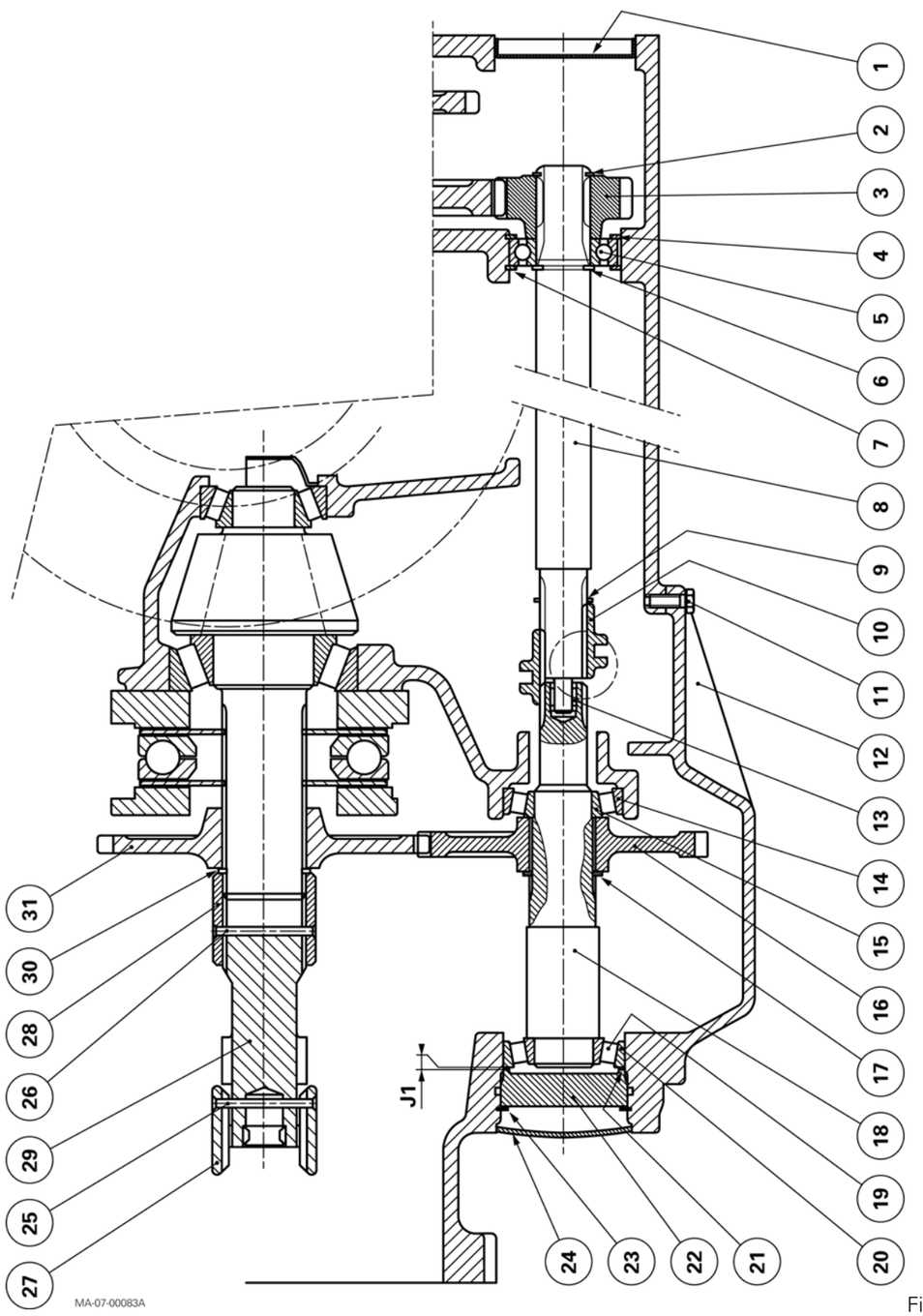


Fig. 2

Exploded view

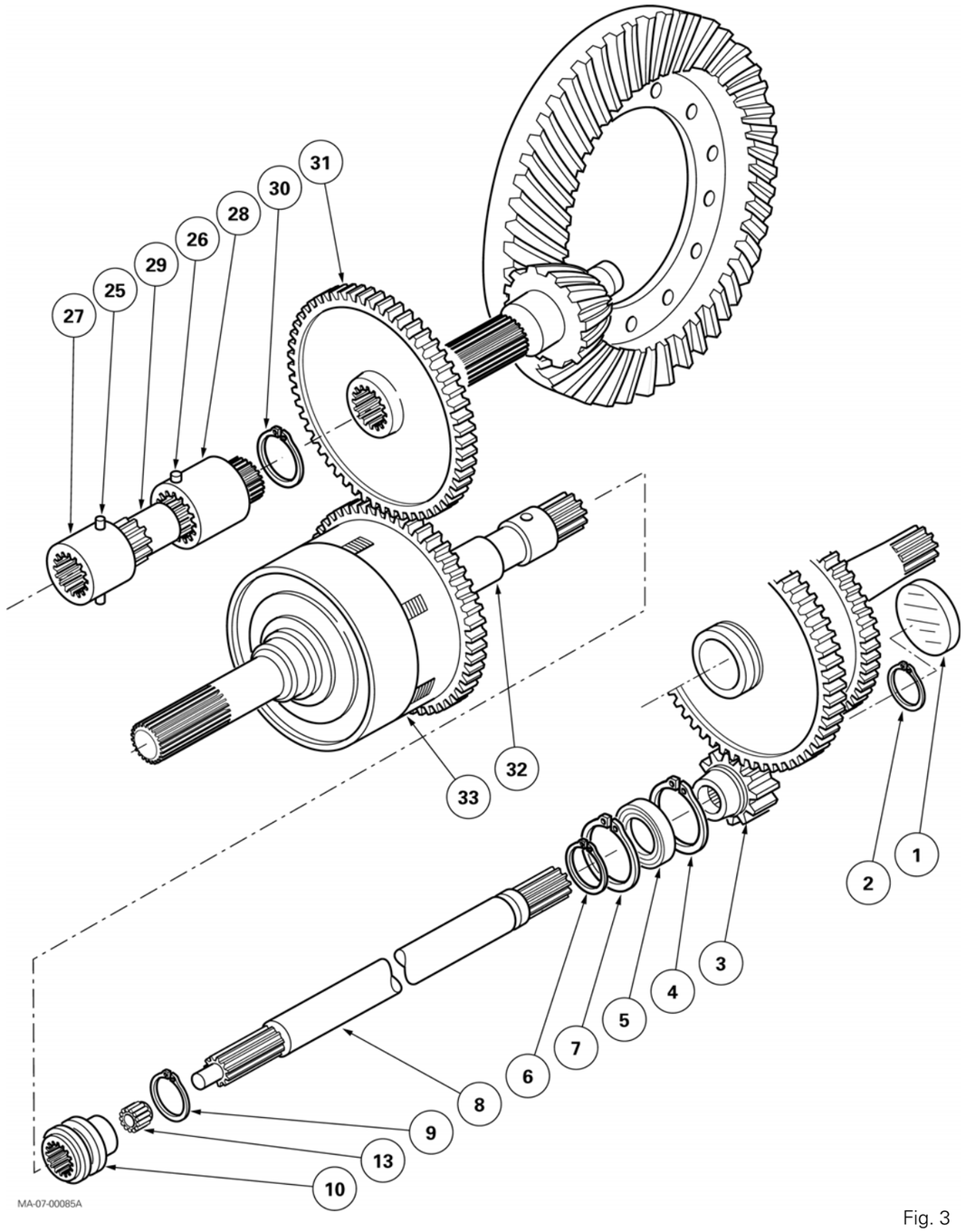


Fig. 3

Exploded view

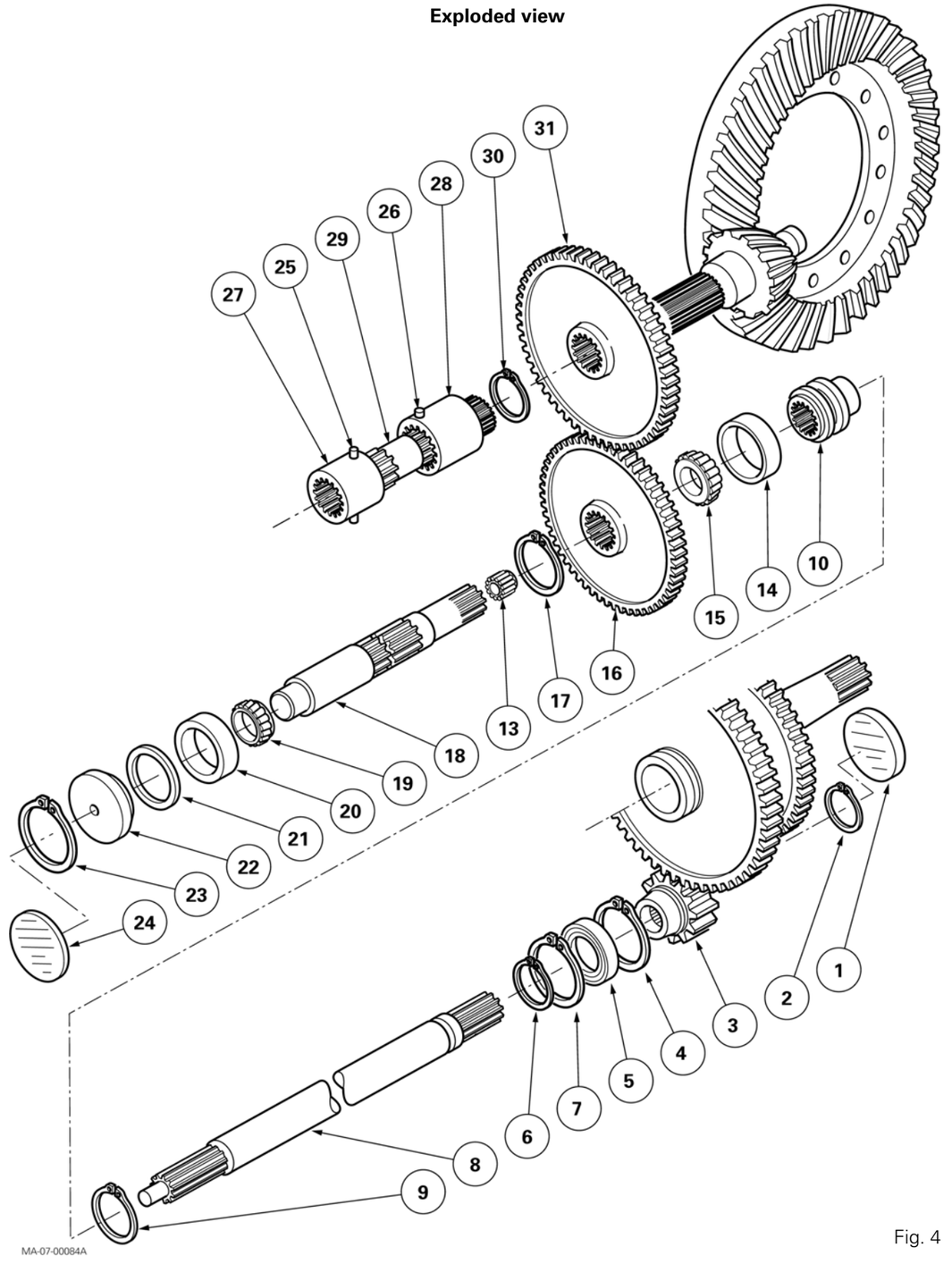


Fig. 4

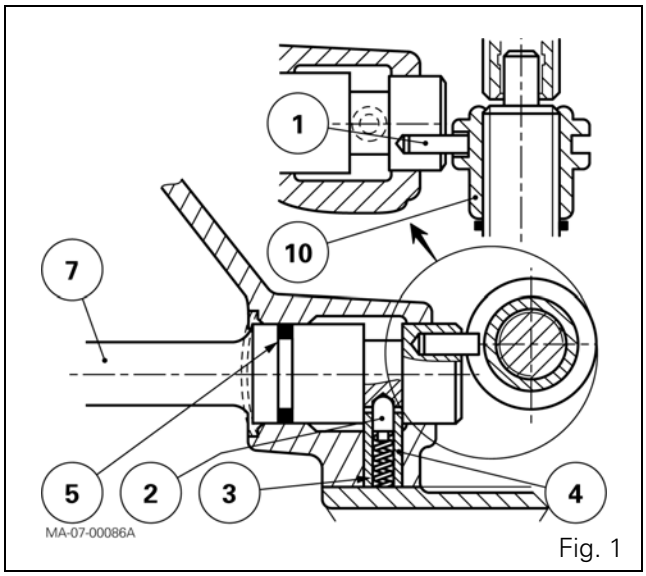


Fig. 1

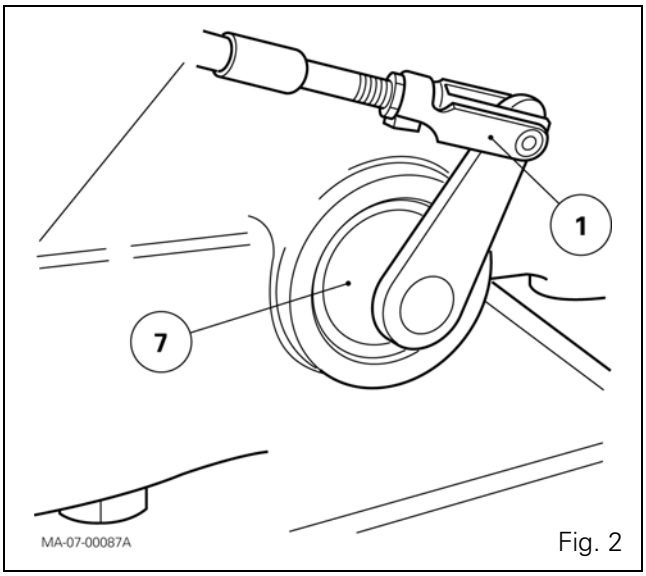


Fig. 2

A . Disassembling the power take off (2WD version)

1. Chock the wheels of the tractor. Drain the rear axle housing. Remove the power shuttle lubricating tube (depending on the version) that is fitted to the lower centre housing covers and the gearbox.
2. Take out the screws (11).
3. Take off cover (12).

   Note: Recover the spring (3) (Fig. 1).
4. Remove the retainer pipe (4) from the control link (7) and the locking stud (2) (Fig. 1).
5. Disconnect the control cable (1) and remove the link (7) (Fig. 2).

   Note: The pad (1) turns free in the link pin (7) (Fig. 1).
6. Remove the O'ring (5) (Fig. 1).
7. Remove the hook.
8. Extract plug (1) (Fig. 3).
9. Take off circlip (2).
10. Take off pinion (3) (Fig. 4).

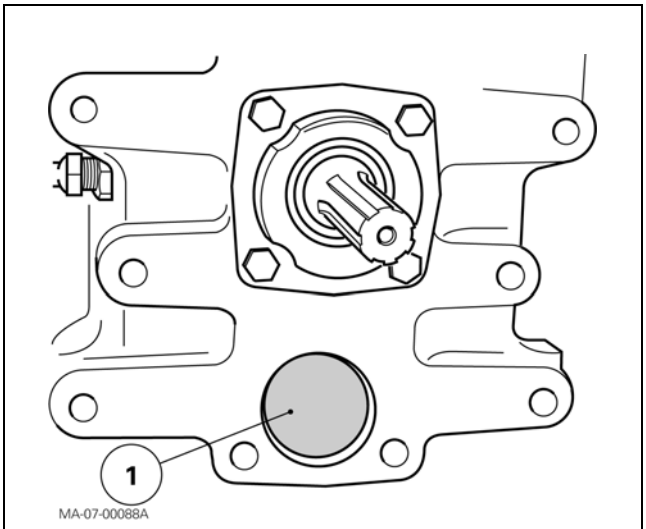


Fig. 3

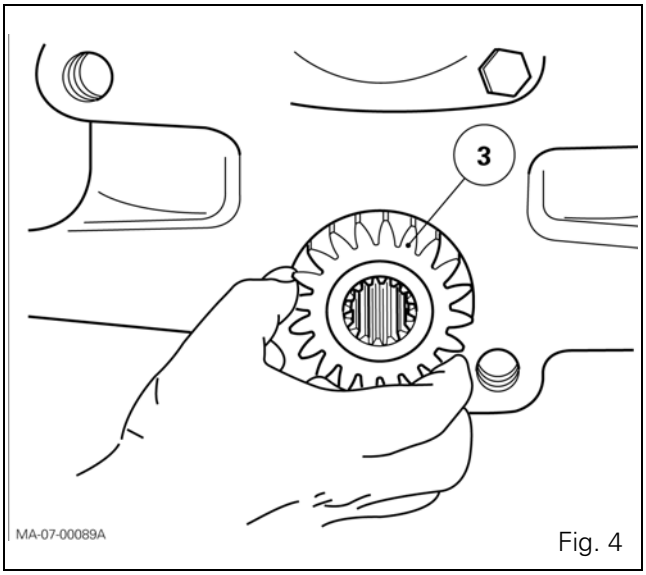


Fig. 4

11. Take off the circlip (4) (Fig. 5).

12. Take out shaft (8) with bearing (5) then remove sleeve (10).

Note: If necessary, remove the circlip (7).

13. Take off circlips (6) (9).

14. Extract bearing (5) using a press.

15. Extract plug (24).

16. Take off the circlip (23) and spacer (22).

17. Remove shims (21).

18. Remove cup (20).

19. Take out shaft (18) complete with bearing cone (19).

20. Take off circlip (17) and hold pinion (16).

21. Remove pinion (16) and bearing cone (15).

22. Extract the cone (19) and take the circlip (17) off the shaft (18).

Note: Match the cones and cups if they are to be reused. Bearing (13) is force fitted in shaft (18).

23. Extract cup (14) using a suitable extractor.

Note: If the pinion (31) is removed, it is necessary to remove the right-hand hydraulic cover.

24. Chock the wheels of the tractor.

25. Apply the handbrake.

26. Raise the tractor using a jack.

27. Position the axle stand.

28. Disassemble the wheel.

29. Remove the right-hand hydraulic cover (see chapter 9).

Note: On tractors with Closed Centre hydraulics, also remove the left-hand cover and the booster pump suction manifold.

Tractors with no creeper unit

30. Drive out the double pins (25) (26) from the coupling sleeves (27) (28).

31. Slide the sleeves towards each other on the shaft (29).

32. Remove the shaft and sleeves assembly.

33. Take off circlip (30).

34. Remove pinion (31).

Note: On 2WD tractors (without GSPTO) the pinion (31) does not exist, but the circlip (30) must be fitted.

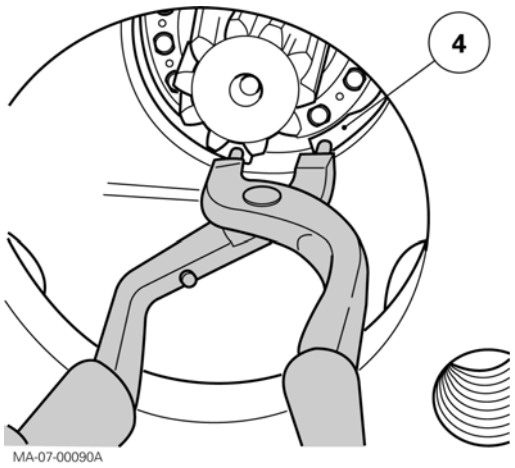


Fig. 5

Tractors with a creeper unit

35. Remove the fork, the sleeve assembly, the link shaft and the coupler.

36. Take off circlip (30).

37. Remove pinion (31).

B . Reassembling the power take off (2WD version)

38. Check and clean all components. Replace any defective parts.

In case of servicing on the pinion (31)

Tractors with a creeper unit

39. Refit the pinion (31).

40. Refit the circlip (30).

41. Refit the fork, the sleeve assembly (28) (the long offset between the pin and the pinion positioned as shown in Fig. 6), the link shaft and the coupler. Replace the pins. Adjust the fork (see chapter 5).

Tractors with no creeper unit

42. Refit the pinion (31).

43. Refit the circlip (30).

44. Refit the assembly (link shaft and sleeves) then position the coupling sleeves (27) (28) on the shaft (29).

45. Fit the double pins (26) (25) on the coupling sleeves.

Note: Turn the sleeve (28) as in operation 41. Replace the pins. The long pin is fitted in sleeve (27).

Tractors with or without creeper unit

46. If disassembled, see note for operation 29 and refit the right-hand hydraulic cover (see chapter 9).

47. Insert cup (14) in abutment on the shoulder of the housing.

48. Insert cone (19) on shaft (18) in abutment on the shoulder, using a press and a suitable fixture, then position circlip (17).

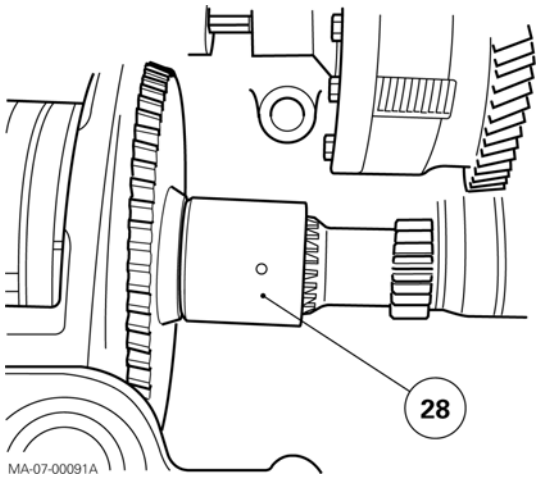


Fig. 6

49. Check for the presence of the needle bearing (13).

50. In order to be able to turn the shaft to carry out J1 shimming, do not fit pinion (16).

Position cone (15). Fit shaft (18) assembled with the cone (19) and circlip (17).

51. Refit cup (20), spacer (22) and circlip (23).

Note: In order to obtain correct shimming, ensure that the spacer moves freely in the bore of the housing.

52. Carry out shimming of the shaft (18) in order to obtain:

J1 = 0 to 0.10 mm.

53. Put a dial gauge feeler pin against the end of spacer (22) (Fig. 7).

54. Through the cover opening (12), pull on the shaft, turning it alternately from right to left in order to correctly seat the cones in their cups.

55. Reset the dial gauge to zero.

56. Repeat the operation, this time pushing.

57. Depending on the clearance measured, select the correct thickness of shims.

58. Take off the circlip (23) and spacer (22). Take out shaft (18) assembled with the cone (19) and circlip (17) while holding the cone (15). Refit the pinion (16), the shaft (18) and cup (20).

59. Apply two dots of grease to shims (21) selected during operation 57 and place them against the cup (20).

60. Fit the spacer (22) and circlip (23).

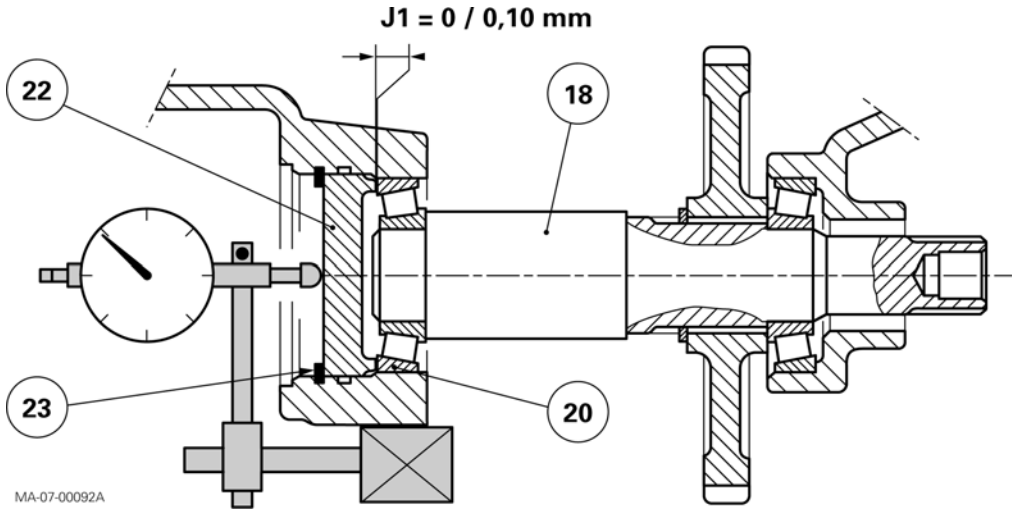


Fig. 7

61. Replace or clean the plug (24) and its mating face on the housing.

62. Smear the corner of the plug housing with Loctite 542 and then insert the plug.

63. Place the sliding gear (10) on the shaft (18).

Note: Turn the small shoulder E towards the shaft (18) (Fig. 8).

64. Fit circlips (6) (9) on shaft (8).

65. Using a suitable fixture, insert bearing (5) using a press, on shaft (8), in contact with circlip (6).

66. Check for the presence of circlip (7).

67. Fit the shaft assembly (8) in the housing (Fig. 9).

68. Fit the circlip (4).

69. Place pinion (3).

70. Fit the circlip (2) (Fig. 10).

71. Check the movement of the sliding gear (10) through the opening of the cover (12).

72. Replace or clean the plug (1) and its mating face on the housing.

73. Smear the plug with Loctite 542, then insert it slightly recessed from the face of the housing.

74. Fit the guide rod link (7) (fitted with a new O'ring (5)) by placing pad (1) in the groove of the sliding gear (10) (Fig. 1).

75. Clean and degrease the mating faces (cover and housing).

76. Smear the mating face of the cover with a sealing product (Masterjoint 510 or equivalent).

77. Screw two opposing guide studs into the housing.

78. Fit the retainer pipe (4), control link, locking stud (2) and spring (3) (Fig. 1).

79. Refit the cover (12) and the lubricating pipe of the engine clutch or Power Shuttle (depending on version).

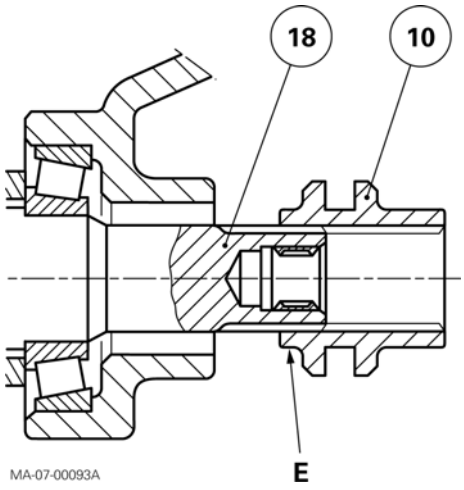


Fig. 8

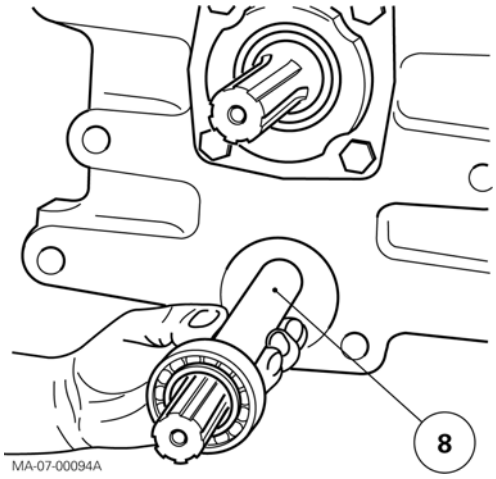


Fig. 9

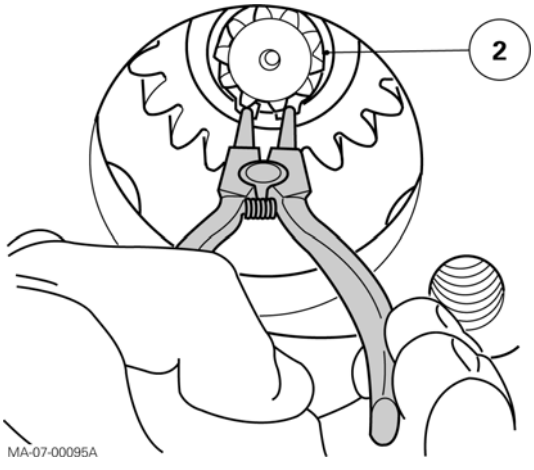


Fig. 10

80. Take out the guide studs. Tighten the screws to a torque of 130 -170 Nm.

81. Reconnect the GSPTO control cable (1) (Fig. 2).

82. Adjust the control (see § E).

Note: If the right-hand hydraulic cover has been removed, carry out operations 83 to 85.

83. Raise the tractor using a trolley jack.

84. Refit the wheel. Remove the stand and the jack.

85. Tighten the wheel nuts to a torque of 400 - 450 Nm.

86. Top up the oil level in the rear axle.

87. Refit the hook (for tractors fitted with an auto-hitch, check correct operation). If adjustment is necessary, see chapter 6.

88. Check correct operation of the GSPTO.

89. Check for the oil tightness of:

- the mating faces
- the cover beneath rear axle housing
- the right-hand hydraulic cover (if removed)
- the hydraulic unions.

C . Disassembling the power take off (4WD version)

90. Remove the guard, the 4WD shaft and the lubricating pipe of the engine clutch or power shuttle (depending on the version). Disassemble shaft (8). Carry out operations 1 to 14.

Note: If servicing is required on the 4WD clutch assembly, the cones and cups, the shaft and the needle roller bearing, see chapter 8.

If the pinion (31) is removed, it is necessary to remove the right-hand hydraulic cover.

91. Raise the tractor using a jack. Position an axle stand. Disassemble the wheel.

92. Remove the right-hand hydraulic cover (see chapter 9).

Note: On tractors with Closed Centre hydraulic equipment, also remove the left-hand cover and the booster pump manifold. Take off the sheet metal deflector located above the 4WD unit.

Tractors with no creeper unit

93. Drive out the double pins (25) (26) from the coupling sleeves (27) (28).

94. Slide the sleeves towards each other on the shaft (29).

95. Remove the assembly (shaft and sleeves).

96. Take off circlip (30) and remove the pinion (31).

Tractors with a creeper unit

97. Remove the fork, the sleeve assembly, the link shaft and the coupler.

98. Take off circlip (30) and remove the pinion (31).

D . Reassembling the power take off (4WD version)

99. Check and clean all components. Replace any defective parts.

In case of servicing on the pinion (31)

Tractors with a creeper unit

100. Refit the pinion (31). Refit the circlip (30).

101. Refit the fork, the sleeve assembly, the link shaft and the coupler. Fit the sleeve (28) with the long offset between the pin and the 4WD pinion turned as shown in Fig. 11. Replace the pins. Adjust the fork (see chapter 5).

Tractors with no creeper unit

102. Refit the pinion (31). Refit the circlip (30).

103. Refit the assembly (link shaft and sleeves) then position the coupling sleeves (27) (28) on the shaft (29).

104. Fit two new double pins (25) (26) on the coupling sleeves.

Note: Fit the sleeve (28) with the long offset between the pin and the 4WD pinion turned as shown in Fig. 11. The long double pin is fitted on the sleeve (27).

Tractors with or without creeper unit

105. If disassembled, see note for operation 92 and refit the right-hand hydraulic cover (see chapter 9).

Note: If the 4WD clutch assembly, the cones and cups, the shaft and roller bearings have been disassembled, see chapter 8 for reassembly.

106. Place the sliding gear (10) on the shaft (32).

Note: Turn the small shoulder E towards the shaft (32) (Fig. 12).

107. Refit shaft (8). Carry out operations 64 to 82.

Note: If the right-hand hydraulic cover has been removed, repeat out operations 83 to 85.

108. Top up the oil level in the rear axle. Refit the hook (if adjustment is necessary, see chapter 6). Check correct operation of the GSPTO.

109. Check for the oil tightness of:

- the mating face of the cover under the rear axle housing
- the right-hand hydraulic cover (if removed)
- the hydraulic unions.

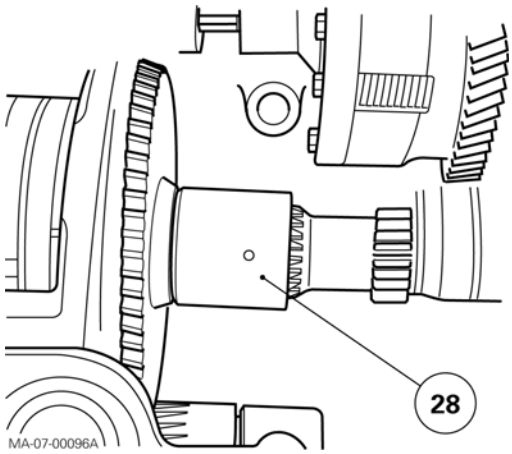


Fig. 11

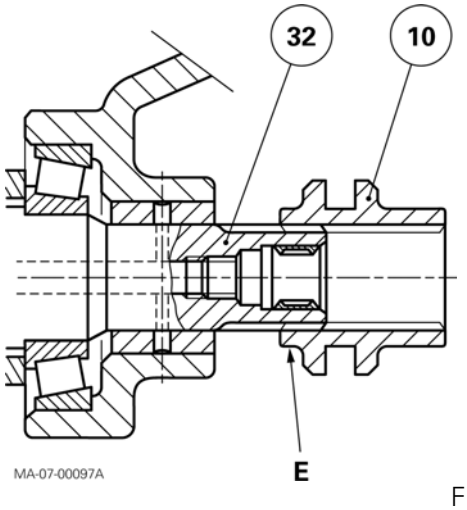


Fig. 12

E . Assembling and adjusting the control

110. Place lever L (Fig. 13) in GSPTO position (clutch engaged) (Fig. 14).

111. Screw the clevis (1) flush with the threaded end of the cable (6).

112. Fit clevis (1) on lever L using the clip (7). Tighten nut (2).

113. Adjust the sheath end (5) so that the nut (3) is flush with the end of the threaded part.

114. Tighten nut (4) and check that the cable is not constrained in any way.

115. Place the link (8) in "clutched" position "a" (Fig. 15) and ensure that it is correctly locked.

116. Screw clevis (1) flush with the threaded part of cable (6) (Fig. 15).

117. Fit clevis (1) to link (8) using clip (7). Tighten nut (2).

118. Adjust the sheath end (5) using nut (4) while ensuring that link (8) is still locked in position "a".

119. Tighten nut (3). Check the operation of the control in the "declutched" position "b" and check that the cable is not constrained in any way when in position "a".

120. Check for correct operation of the instrument panel indicator light.

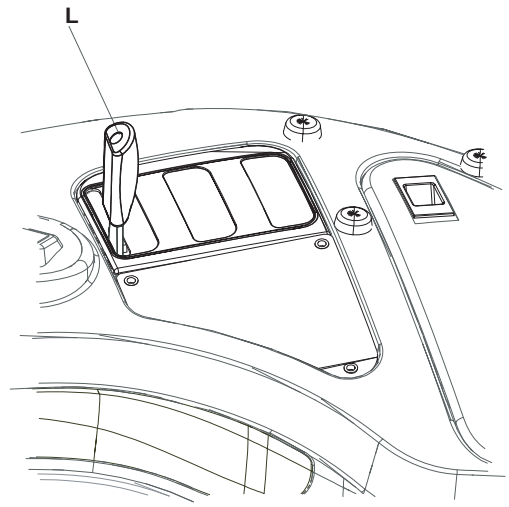


Fig. 13

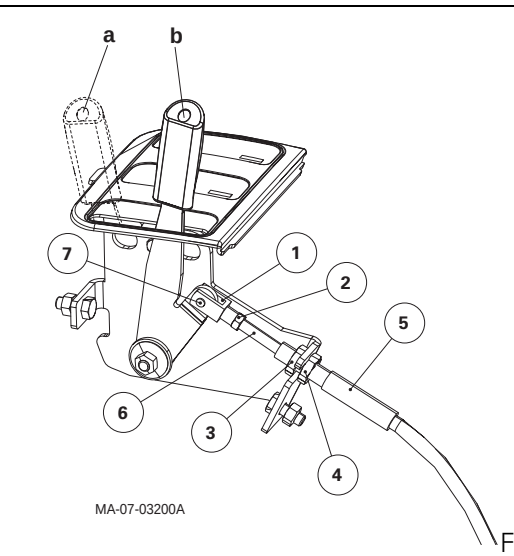


Fig. 14

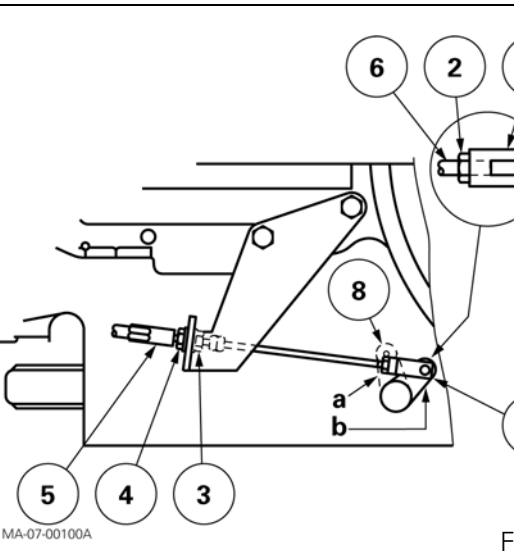


Fig. 15

7A15 - PTO clutch

CONTENTS

A . General

The power take-off clutch, fitted at the front of the rear axle housing, is driven by a splined shaft located inside the engine clutch input shaft, which rotates integral with the engine flywheel. The control shaft of the power take-off clutch crosses the following: the primary shaft of the gearbox, the Dynashift, the reverse shuttle and the layshaft.

The clutch is made up of the following components:

- a housing unit (9), supported by two ball bearings (2) (7), and separated by a sleeve (4) centred in the bore of the centre housing. The sleeve (27) supports the ball bearing (22), the drive hub (21) and the piston (10).
- a bell housing (15) composed of a set of discs (17) and intermediate plates (14) is fixed onto the housing unit.

The housing unit (9) is composed of external helical gears that drive the pinion(s) of the pump(s) (depending on the hydraulic equipment in use). The bearings and discs are lubricated.

Depending on the version, the clutch includes either 4 or 5 discs.

On the 4-disc version (Fig. 1), a special spacer (28) makes up for the absence of a 5th disc and 5th intermediate plate (Fig. 4).

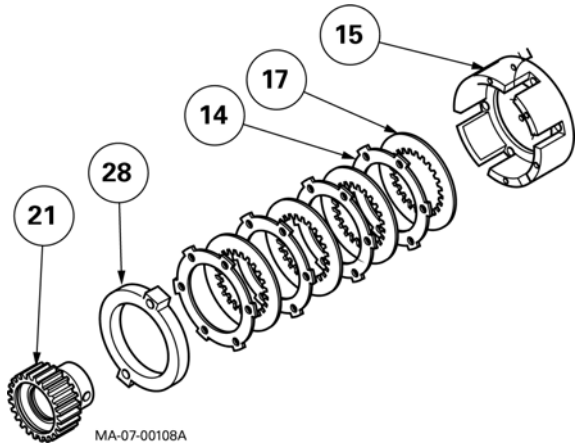


Fig. 1

B . Operation

Clutched position

A 17 bar hydraulic circuit supplies the clutch via a PTO proportional solenoid valve located on the right-hand hydraulic cover.

Oil enters the housing unit (9) via channels a, c and chamber b. It pushes the piston (10) which compresses the discs (17) against the intermediate plates (14). As the intermediate plates are integral with the catches of the bell housing (15) and the discs (17) are integral with the hub (21), movement is transmitted to the drive hub (21) in which the layshaft controlling the PTO driving pinion is located. At the same time, the pressure acting on the PTO brake piston is switched off, thus allowing the pinions (540 and 1000 rpm) of the PTO lower shaftline to turn freely. When engaging the clutch, the discs are cooled and lubricated.

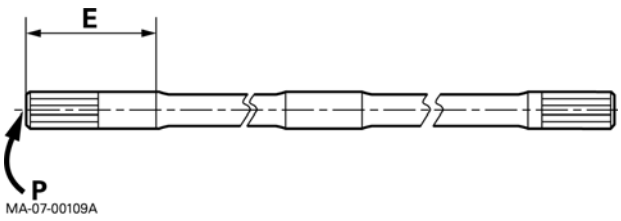


Fig. 2

Position of the PTO brake

When power is switched off, the spring (18) pushes the piston up against the housing unit (9).

When the knob located in the cab is in PTO brake position, the ON/OFF solenoid valve of the PTO brake directs oil towards the top cover, which is installed at the rear of the tractor. Pressure acts on a piston that pushes the bearing cup on the rear bearing cone, progressively immobilizing the driving pinion.

Note: Install the longest end "E" or painted mark "P" of the clutch control shaft turned towards the input unit (Fig. 2).

Parts list

(1) Circlip
(2) Bearing
(3) O'ring
(4) Sleeve
(5) Sealing rings
(6) O'ring
(7) Bearing
(8) Valve
(9) Clutch housing
(10) Piston
(11) O'ring
(12) Belleville progressive washers
(13) Support
(14) Intermediate plates
A: 4-disc clutch
B: 5-disc clutch
(15) Bell housing
(16) Screw
(17) Discs
A: 4-disc clutch
B: 5-disc clutch
(18) Spring
(19) Spring seat
(20) Snap ring
(21) Drive hub
(22) Bearing
(23) Washer
(24) Screw
(25) O'ring
(26) O'ring
(27) Sleeve
(28) Special spacer (only 4-disc version)
(30) Pins
(31) Treated washers

Overall view

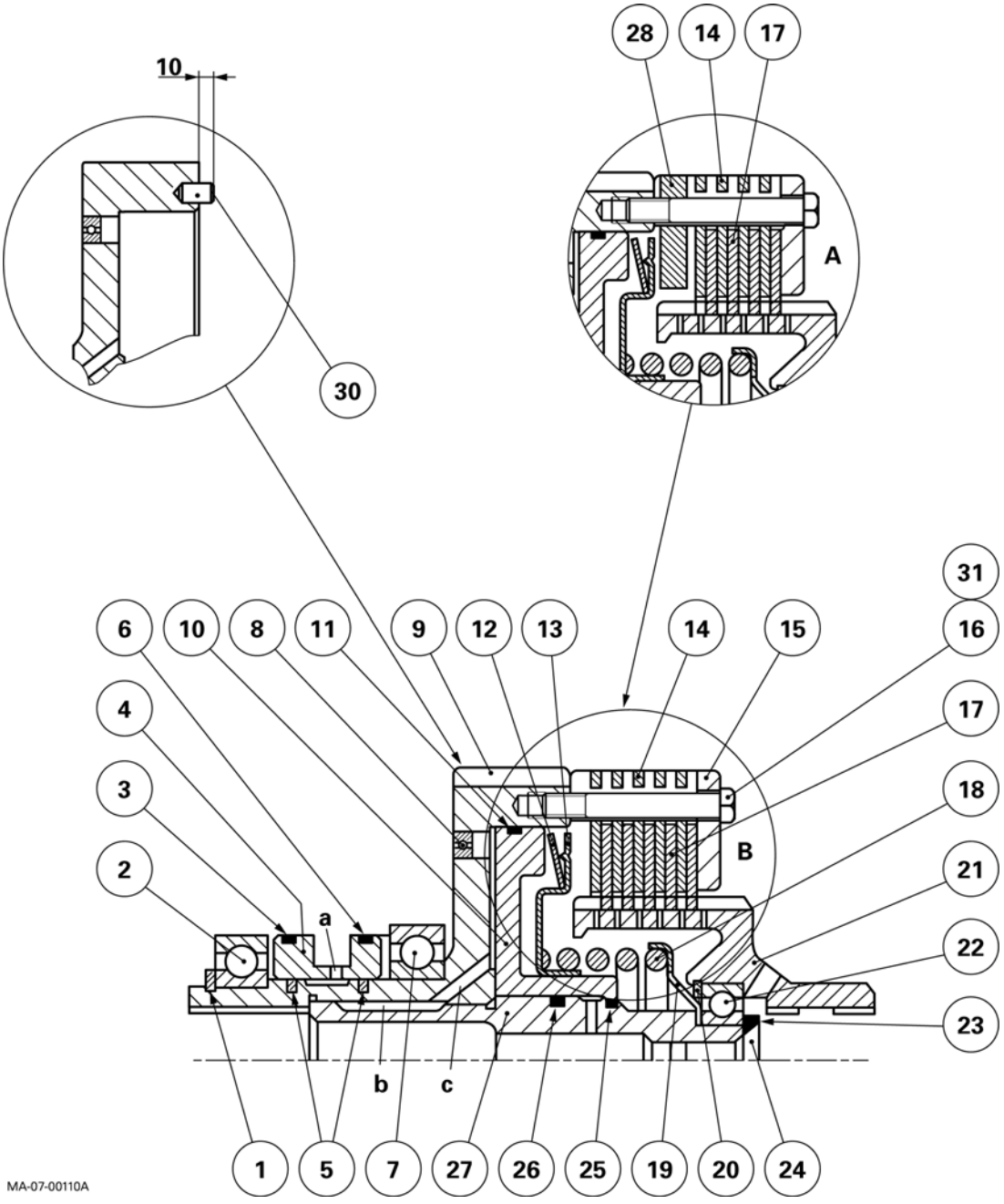


Fig. 3

Exploded view

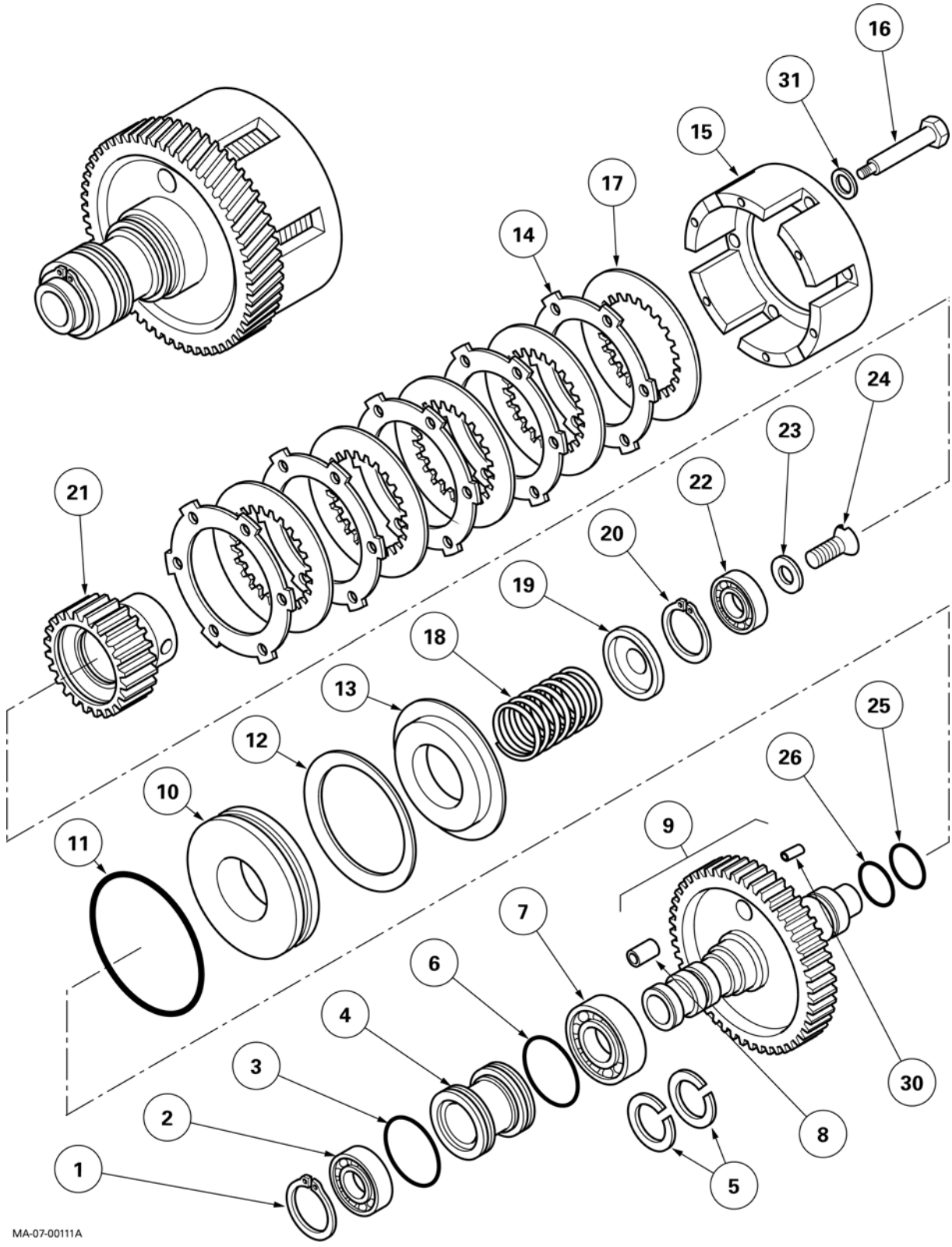


Fig. 4

C . Removing and refitting the PTO clutch (2-speed version)

Removal

1. Remove the right-hand hydraulic cover (see chapter 9).
2. Remove the PTO top cover located at the rear of the tractor, the driving pinion and layshaft (see chapter 7).
3. Take off the retaining screw (3) of the clutch (1) using a multipurpose wrench (for cutting and shaping as needed). Remove the clutch and spring (5) (Fig. 5).

Refitting

4. Check and clean all components. Replace any defective parts.
5. Check that O'rings (2) (4) (Fig. 5) are not damaged.
6. Fit spring (5) (Fig. 5) in the port of the PTO shaft and refit the clutch (1) by moving it forwards to the maximum using a lever (Fig. 6) to press down on the spring in order to fit the screw (3).
7. Clean and smear the screw with Loctite 542 and tighten to 50 - 70 Nm (Fig. 6).
8. Refit the layshaft, driving pinion and top cover (see chapter 7).
9. Refit the right-hand hydraulic cover (see chapter 9).
10. Check for the correct operation of the clutch, PTO brake and linkage.
11. Check for the oil tightness of:
    - mating faces (spool valve support, top cover, right-hand hydraulic cover)
    - hydraulic unions.

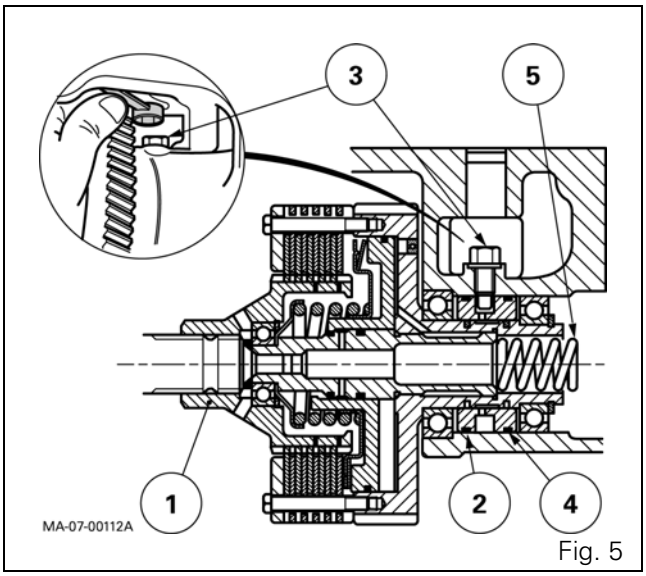


Fig. 5

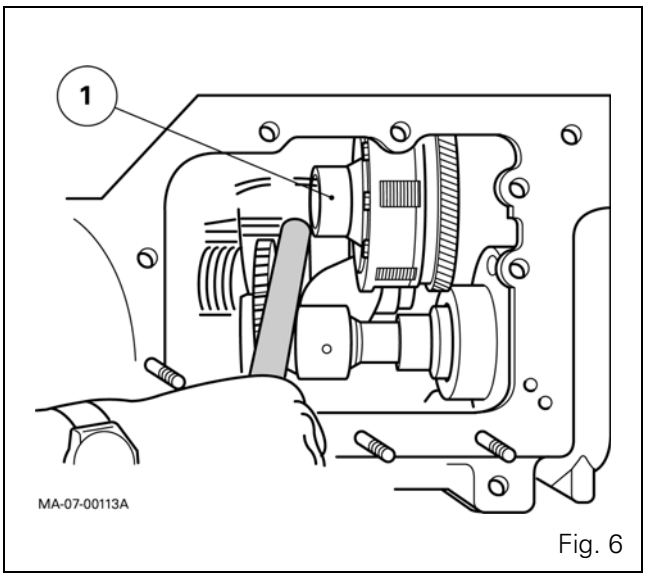


Fig. 6

D . Removing and refitting the PTO clutch (4-speed version)

Remark

- On LS 4-speed tractors, removal of the PTO clutch is the same as the 2-speed version. The only difference is the parts to remove for access to the clutch (i.e. driving pinions and layshaft).

Removal

12. Remove the right-hand hydraulic cover (see chapter 9).

13. Remove the PTO top cover located at the rear of the tractor, the driving pinion and layshaft (see chapter 7).

14. Take off the retaining screw (3) of the clutch using the same equipment as that used for the 2-speed version. Remove clutch and spring (5) (Fig. 5).

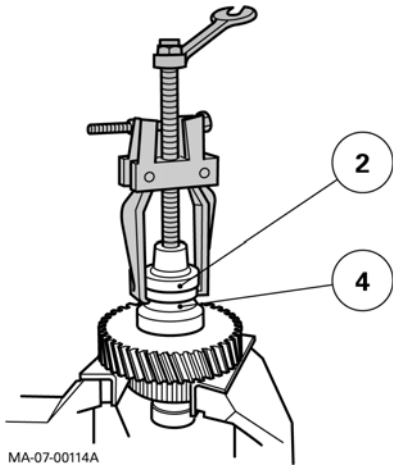


Fig. 7

Refitting

15. Check and clean all components. Replace any defective parts.

16. Check that O'rings (2) (4) (Fig. 5) are not damaged.

17. Place spring (5) (Fig. 5) in the port of the PTO shaft and refit the clutch (1) by moving it forwards to the maximum using a lever (Fig. 6) to press down on the spring in order to fit the screw (3).

18. Clean and smear the screw with Loctite 542 and tighten to 50 - 70 Nm (Fig. 5).

19. Refit the layshaft, driving pinion and rear cover (see chapter 7).

20. Refit the right-hand hydraulic cover (see chapter 9).

21. Check correct operation of the clutch and power take-off brake.

22. Check for the oil tightness of:

- mating faces (spool valve support, top cover, right-hand hydraulic cover)
- the hydraulic unions.

E . Disassembling and reassembling the clutch

Disassembly

23. Take off the screws (16) and washers (31).
24. Remove bell housing (15), discs (17) and intermediate plates (14).
25. Place the clutch unit (9) into a vice equipped with protective jaws.
26. Remove the O'rings (3) (6).
27. Take off circlip (1).
28. Extract the bearing (2) with the sleeve (4) (Fig. 7).
29. Take off the sealing rings (5) (Fig. 12) and extract the bearing (7) (Fig. 8).
30. Hold the spring (18) using a locally made tool (Fig. 9).
31. Take off the screw (24) and remove the washer (23) (Fig. 9). Gradually press down on the spring using the tool.
32. Remove the drive hub (21), the spring seat (19), the spring (18), the support (13) and the Belleville washer (12).
33. Take off the snap ring (20).
34. Extract bearing (22).
35. Take out the piston (10) by hitting the clutch unit on a wooden shim.
36. Take off the O'rings (11) (25) (26).

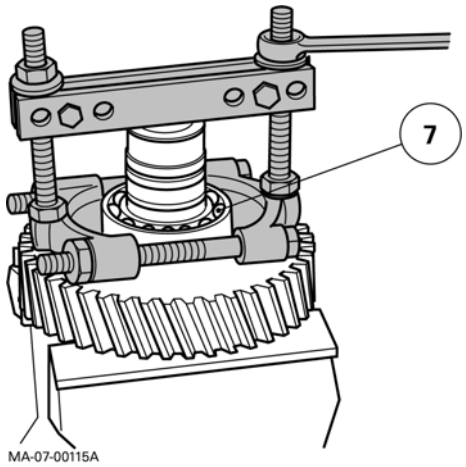


Fig. 8

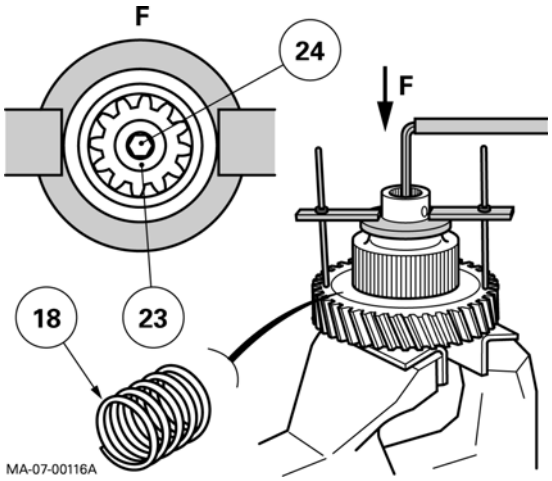


Fig. 9

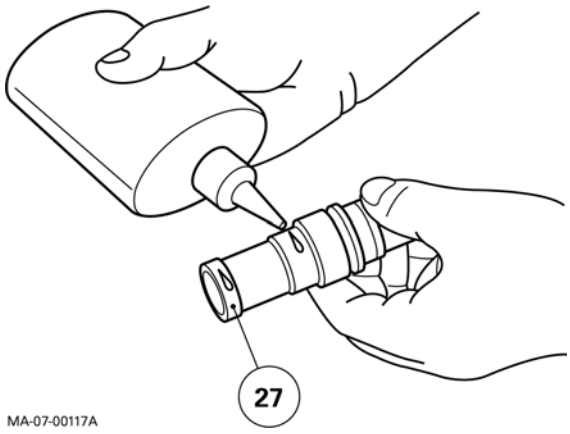


Fig. 10

Reassembly

Note: The valve (8) is crimped onto the clutch unit (9). Check that the bearing moves freely by rapidly shaking the unit up and down several times.

The sleeve (27), smeared with Loctite 648 (Fig. 10), is fitted using the press. If disassembly is necessary, when reassembling make sure that Loctite does not block the channel.

Two pins (30) are inserted into the housing unit (9) 10 mm from the face (Fig. 11).

37. Check and clean all components. Replace any parts found to be defective.

38. Using a suitable fixture and a press, insert the bearing (7) home against the shoulder.

39. Place sealing rings (5) into their grooves and secure their ends (Fig. 12), making sure that they turn freely.

40. Slide the sleeve (4) over the rings and avoid damaging them.

Note: Turn the larger sleeve diameter towards the bearing (7).

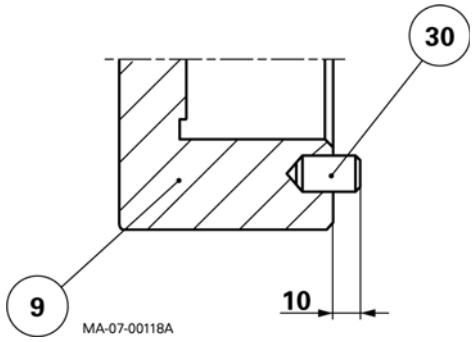


Fig. 11

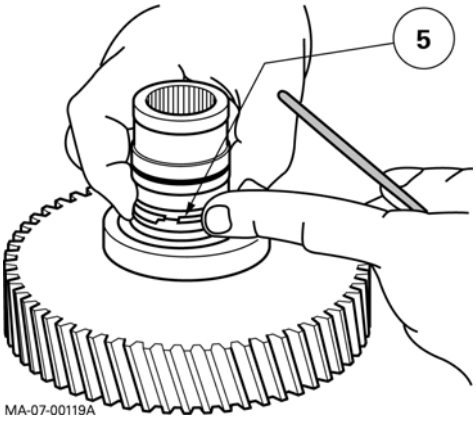


Fig. 12

41. Using a suitable fixture and a press, insert the bearing (2) thrust up against the shoulder of the unit (9) (Fig. 13).

42. Place circlip (1).

43. Replace and lubricate the O'rings (11) (25) (26).

44. Lubricate the sleeve (27), the piston (10) and insert it into the housing unit using a plastic hammer (Fig. 14).

45. Using a suitable fixture and a press, insert the bearing (22) into the hub (21) and refit the snap ring (20).

46. Refit the Belleville washer (12), support (13), spring (18), spring seat (19) and drive hub (21).

47. Press down on the spring (18) with a tool (Fig. 9), install the washer (23), and tighten the screw (24) smeared with Loctite 270 to a torque of 24 - 28 Nm.

48. Place the spacer, the intermediate plates and discs on the hub (21) (depending on type, see operation 24).

49. Position the bell housing (15) into the two pins (30). Install the screws (16) each equipped with a washer (31), lightly smeared with Loctite 270 prior to tightening to 15 - 18 Nm.

50. Manually check that the discs and intermediate plates are not overloaded.

51. Lubricate and install the O'rings (3) (6).

Note: The rings come with different diameters.

52. Refit the clutch (see § C or D depending on version).

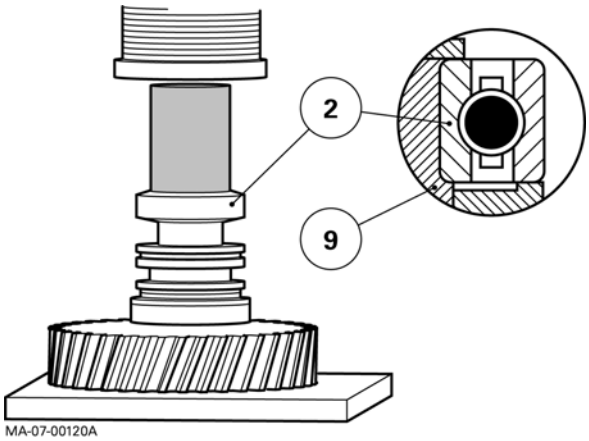


Fig. 13

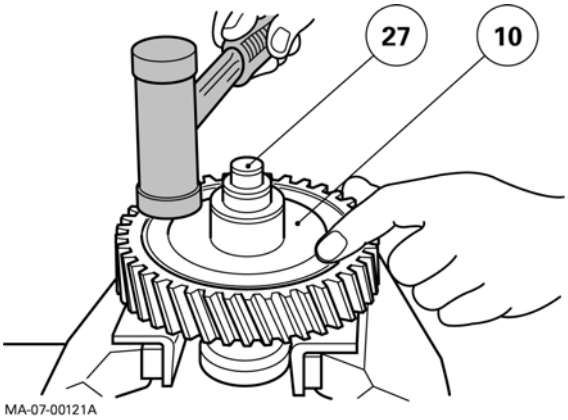


Fig. 14

F . Service tool

Locally made tool (Fig. 15)

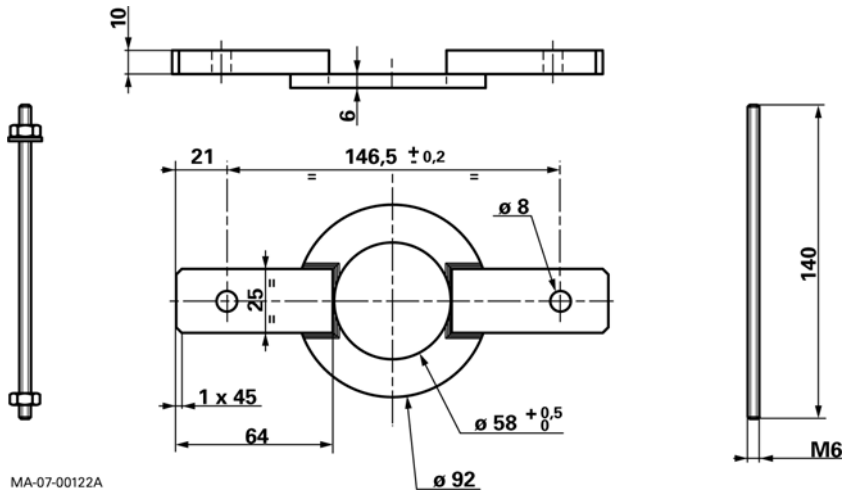


Fig. 15

7B10 - GPA40 - General - Rear PTO operation

CONTENTS

A . General

The housing fitted to the rear of the GPA40 rear axle contains all the rear mechanical power take-off components. These components rest on the tapered roller bearings, the bearing cups of which are on the rear PTO housing and its removable compartment and fitted freely and firmly respectively.

Profile P of the 1000 rpm gear train teeth (driving and driven gears) differs (Fig. 1) according to the type of tractor and the transmission equipment fitted:

1 Tractors fitted with GTA1040 and GTA1540 transmission without PTO Power Boost

2 Tractors fitted with GTA1540 transmission with PTO Power Boost

The rear PTO is independent of the transmission except for the GSPTO version, which uses the tractor's forward speed for operation.
The GSPTO is fitted to tractors as an option.

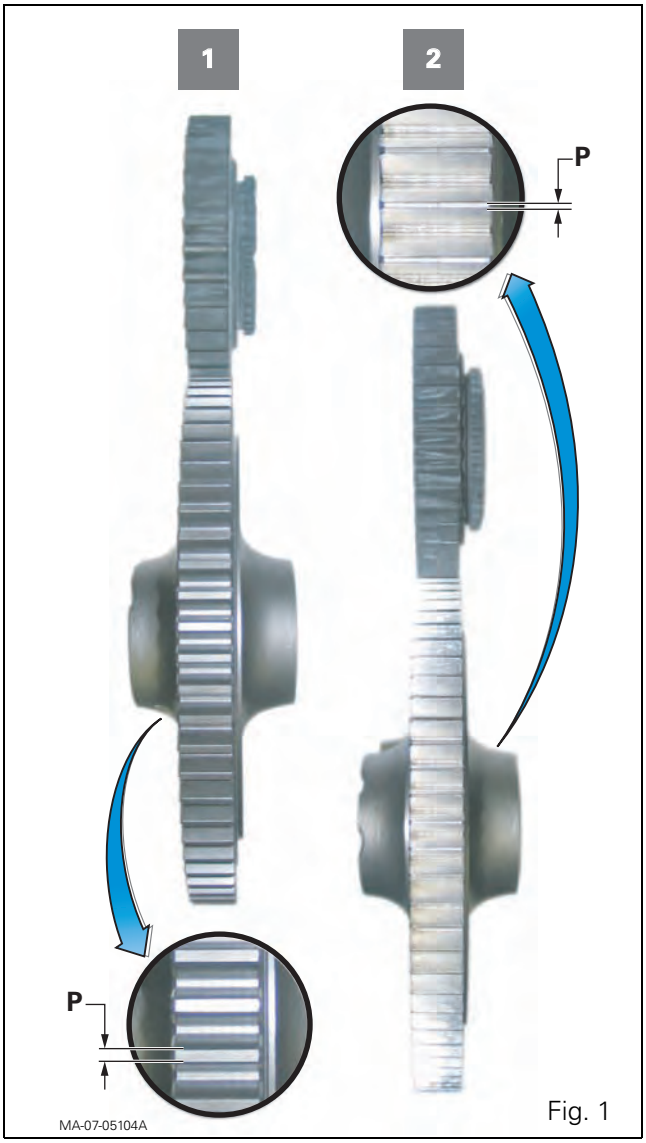


Fig. 1

The rear PTO can be divided into four sections:

- **The clutch**

  The clutch is located on the upper PTO shaftline and at the front of the centre housing. It is supported by two ball bearings fitted in a support mounted on the centre housing.

- **The upper shaftline**

  The upper shaftline of the rear PTO transmits the engine speed to the driving gears located inside the rear housing of the PTO via the clutch and a series of three shafts. The tapered roller bearings supporting the driving gear shaft are shimmed with a clearance using shim(s) inserted between the front bearing cup and the removable compartment.

- **The lower shaftline**

  The lower shaftline of the rear PTO is supported by two tapered roller bearings fitted respectively in the rear PTO housing and in the removable compartment.

  The tapered roller bearings are held in position by a nut screwed onto the front end of the output shaft.

  The preload shimming of the tapered roller bearings is carried out using shim(s) inserted between the front bearing cup and the removable compartment.

  The output shaft is sealed by a lip seal fitted into the rear PTO housing.

  The output shaft is fitted with an interchangeable end fitting (Fig. 2) which may be:

  - of varying length;
  - fitted with 6, 20 or 21 splines.

  NOTE: *The specifications of the output shaft depend on the type of implement to be driven and on the rotational speed to be observed.*

- **The power take-off brake**

  The rear PTO is fitted with a brake housed inside the rear housing opposite the 1000 rpm driven gear (see chapter 7).

  NOTE: *The rear PTO brake gradually slows down the output shaft inertia until it stops completely when the rear PTO clutch is disengaged. It is also used to immobilise the gear trains (driving and driven gears) to prevent the "drag" effect.*

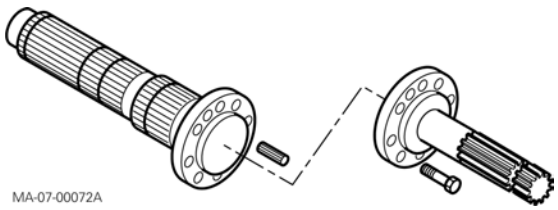


Fig. 2

Lubrication of the rear PTO components

The clutch

The parts inside the rear PTO clutch are lubricated under pressure via a pipe located above and in front of the centre housing.

The upper shaftline

An external pipe carries the lubrication oil under pressure to the upper shaftline of the rear PTO.

The flow of oil to the driving gears and the tapered roller bearings is controlled by two restrictors and an oil deflector located respectively in the rear housing of the PTO and in the upper shaftline.

The lower shaftline

The lower shaftline of the rear PTO is supplied with pressurised oil carried by a pipe to the front end of the output shaft. This oil lubricates the rear bearing and the splines of the output shaft driven gears.

The power take-off brake

The PTO brake is not lubricated under pressure. Just the splashing of oil from the rear PTO housing is sufficient to lubricate the friction washer, which is in contact with the machined face of the 1000 rpm driven gear when the rear PTO line is locked.

B . Layout of the main components and kinematics

Fig. 3 Tractors fitted with GTA1040 transmission
Fig. 4 Tractors fitted with GTA1540 transmission

NOTE: *The lower fixture of the rear PTO housing on tractors fitted with GTA1540 transmission is reinforced by fitting six 20 mm diameter screws instead of the four 16 mm diameter screws used on tractors fitted with GTA1040 transmission.*

Housing interior: all rear PTO types

Parts list (Fig. 3, Fig. 4)

A 540 E control mechanism
B Interlock mechanism/adjustable sleeve assembly
C 540 - 1000 rpm control mechanism
D Upper PTO shaftline
E Lower PTO shaftline
F Rear housing of the PTO
G GSPTO shaftline (optional)
H Smooth ring
I Shouldered ring
J GSPTO control mechanism (optional)
K Interchangeable end fitting
L Transmission oil level gauge
M Rear housing standard fixing (Fig. 3)
M Rear housing reinforced fixing (Fig. 4)
N Removable compartment
O Fixing for linkage effort sensor
P PTO brake mechanism and 1000 rpm driven gear
Q Pin
R Restrictor Ø 1 mm

View of the assembly

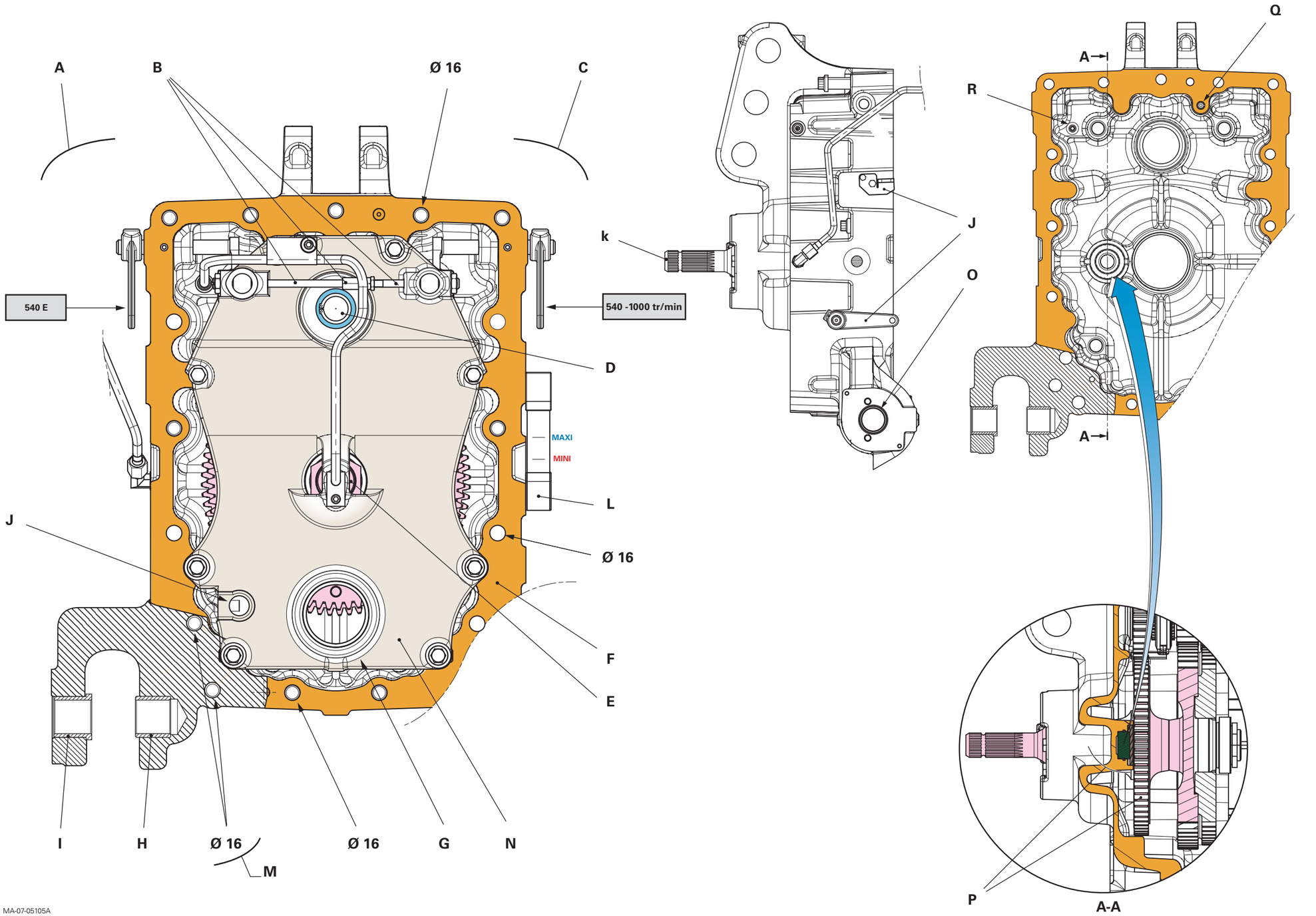


Fig. 3

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View of the assembly

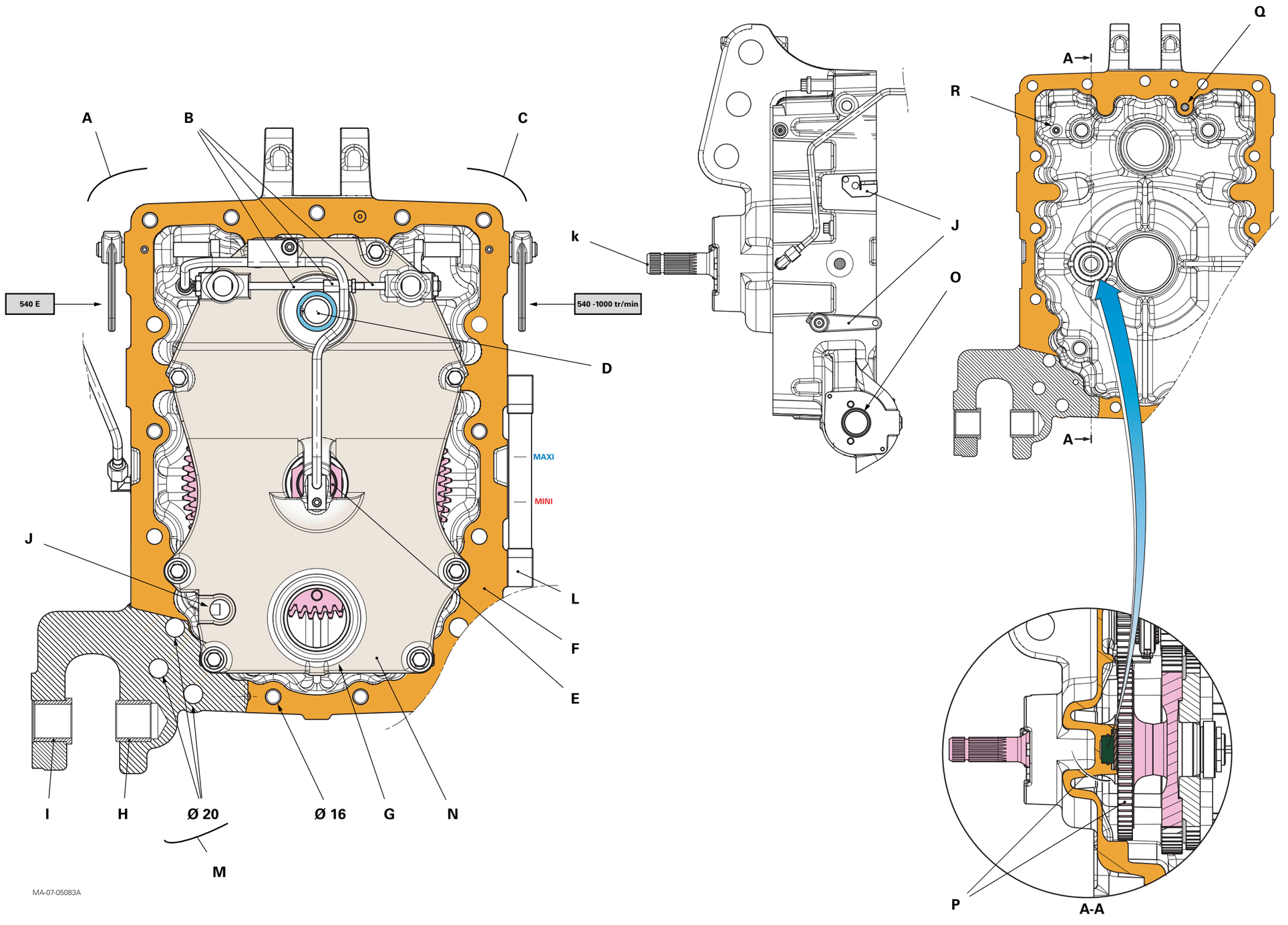

Fig. 4

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2-speed PTO with coupler control

Parts list (Fig. 5)

S Power take-off driving shaft
T 540 and 1000 rpm speed selection coupler
U Output shaft with interchangeable end fitting
V Driven gear train
W Lubrication pipe
Z Driving gear train

Kinematics (Fig. 5)

The 540 and 1000 rpm driving gears of the upper shaft-line have spur cut teeth and are constantly meshed with the respective 540 - 1000 rpm gears of output shaft U. They drive the output shaft at a speed of 540 or 1000 rpm depending on the position of selection coupler T.

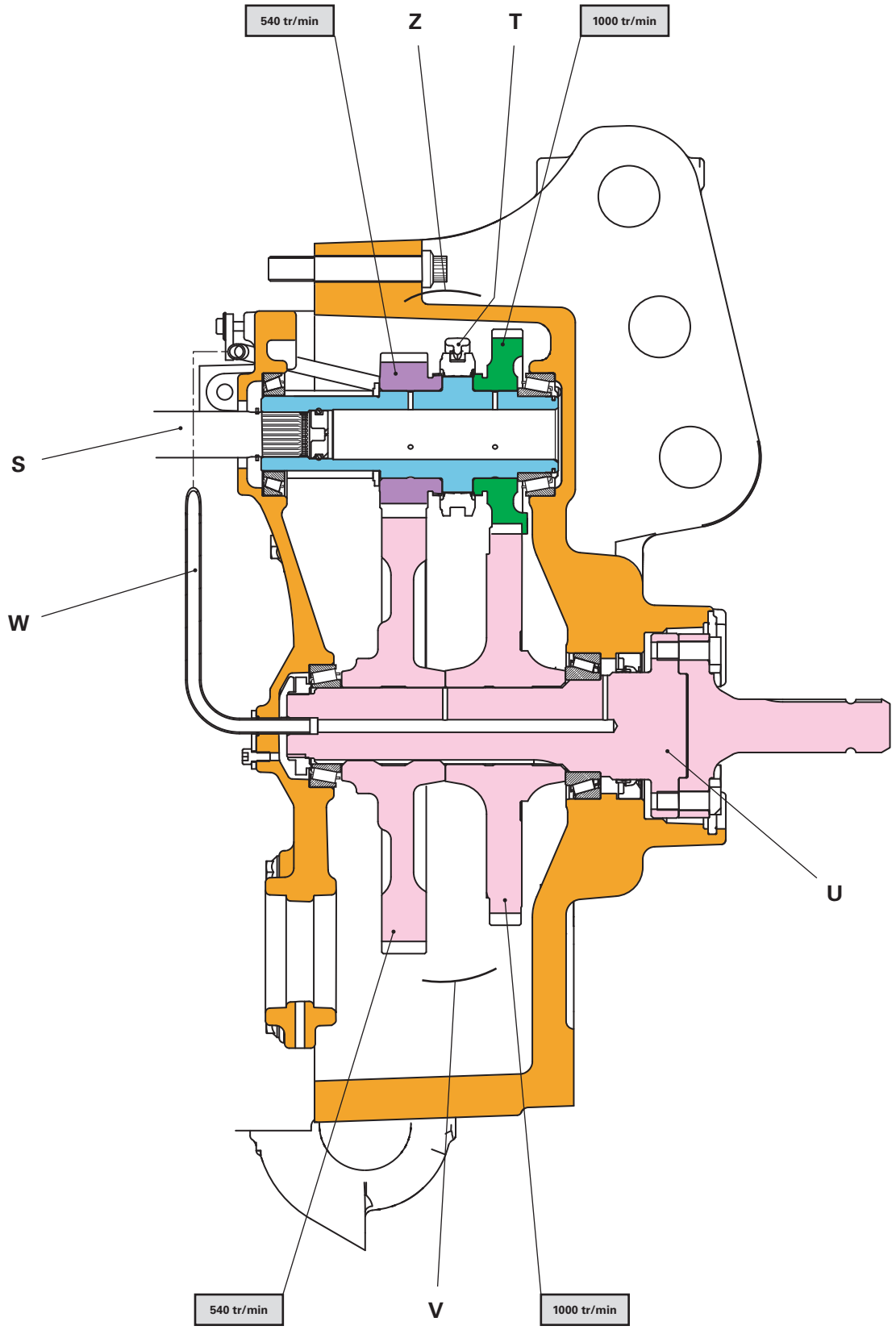
540 tr/min
Z
T
1000 tr/min
S
W
U
540 tr/min
V
1000 tr/min
MA-07-05084A

Fig. 5

3-speed PTO with coupler control

Parts list (Fig. 6)

S Power take-off driving shaft
T 540 and 1000 rpm speed selection coupler
U Output shaft with interchangeable end fitting
V Driven gear train
W Lubrication pipe
X 540 E selection coupler
Z Driving gear train

Kinematics (Fig. 6)

The 540 - 1000 rpm and 540 E gears have spur cut teeth and are constantly meshed with the respective 540 - 1000 rpm and 540 E gears of output shaft U. They drive the output shaft at a speed of 540 - 1000 rpm or 540 E depending on the position of selection couplers T and X.

The 540 E speed is an economic ratio. It is obtained via an additional gear and a coupler fitted to the front end of the driving gear train.

When selection coupler X is engaged, two interlock mechanisms joined by an adjustable sleeve prevent selection coupler T from engaging. When a coupler is engaged, the interlock mechanisms lock the passive coupler in neutral at the control rod locking groove.

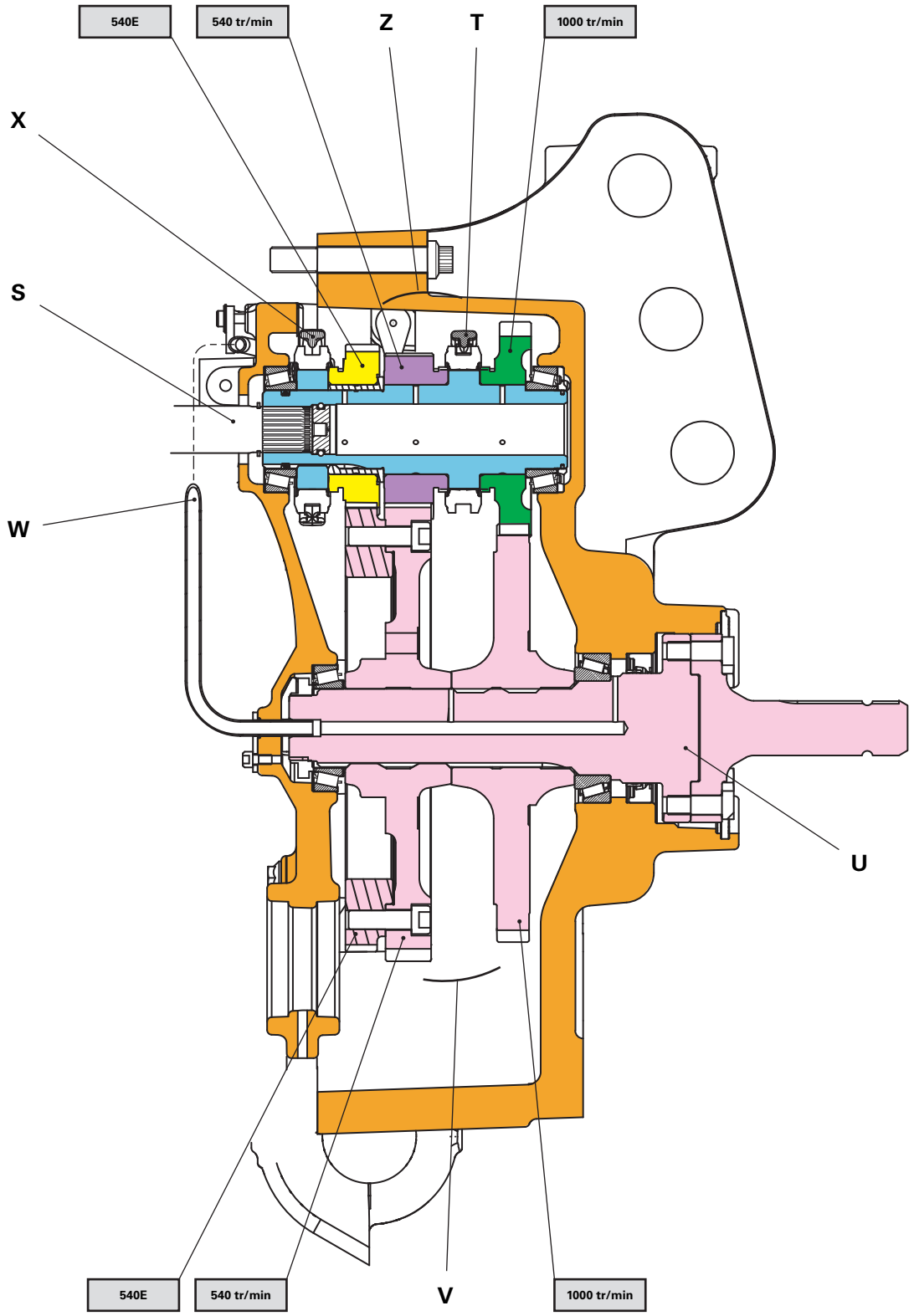
540E
540 tr/min
Z
T
1000 tr/min
X
S
W
U
540E
540 tr/min
V
1000 tr/min
MA-07-05085A

Fig. 6

GSPTO with coupler control

The GSPTO is fitted to tractors as an option.

Parts list (Fig. 7)

S Power take-off driving shaft
T GSPTO selection coupler
U Output shaft with interchangeable end fitting
V Driven gear (attached to gear Y by a screw)

NOTE: *In this configuration, the teeth of gear Y are passive. Only the gear hub acts as a transmission component between V and U.*

W Lubrication pipe
Y Driven gear
Z Driving gear

Kinematics (Fig. 7)

The GSPTO driving and driven gears have spur cut teeth and are constantly meshed. They drive output shaft U at a speed proportional to the tractor's forward speed when selection coupler T is moved to the left.

The GSPTO is activated when the 540 - 1000 rpm PTO is deactivated.

The rotational movement of the GSPTO is transmitted via the rear axle pinion (crown wheel and pinion) and a gear train (4WD) at output shaft U via a driving shaft S and two gears Z and V.

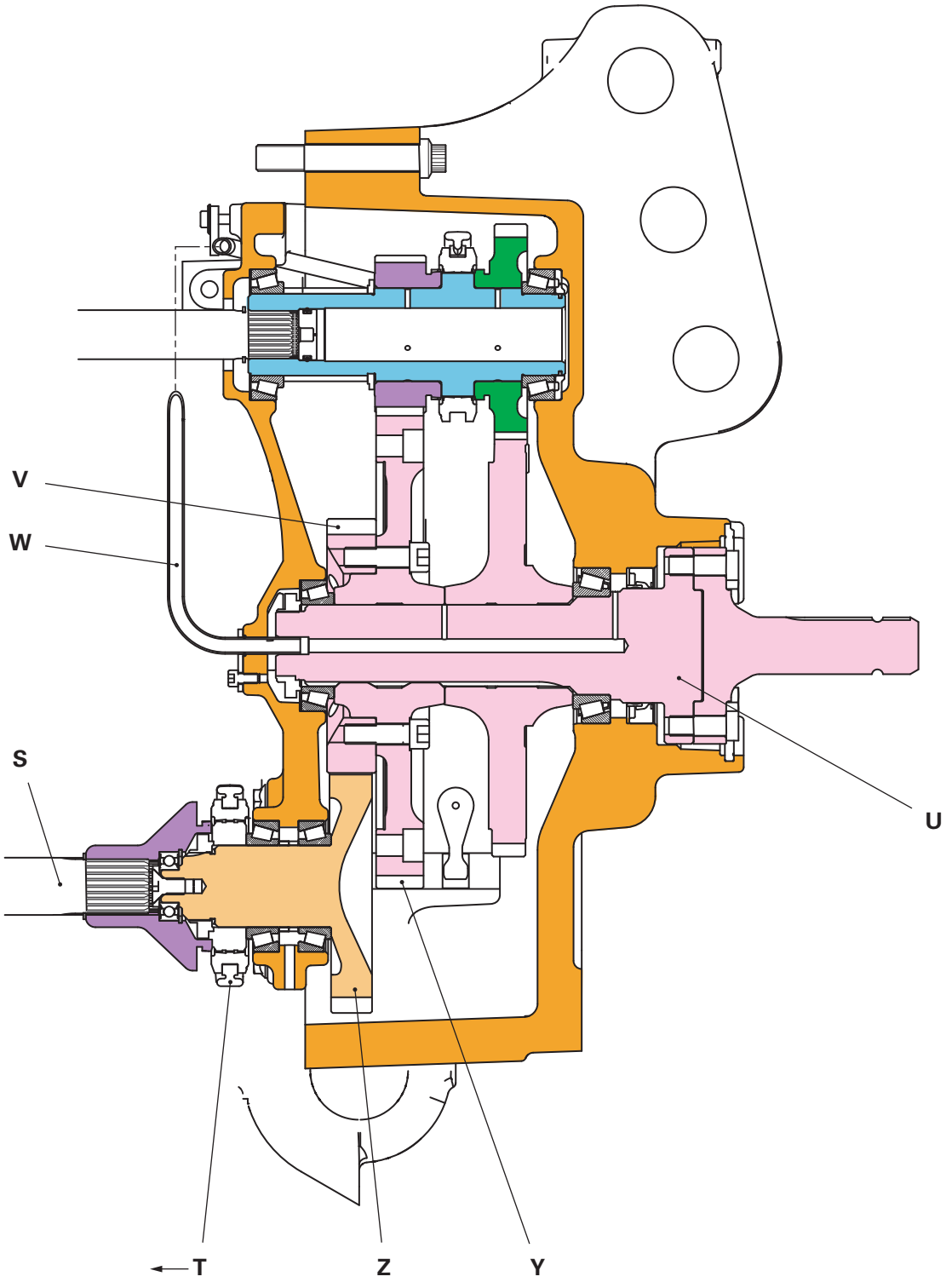

Fig. 7

C . Rear PTO specification

Fig. 8 Tractors fitted with GTA1040 transmission
Fig. 9 Tractors fitted with GTA1540 transmission

Parts list (Fig. 8, Fig. 9)

J Clearance
P Preload

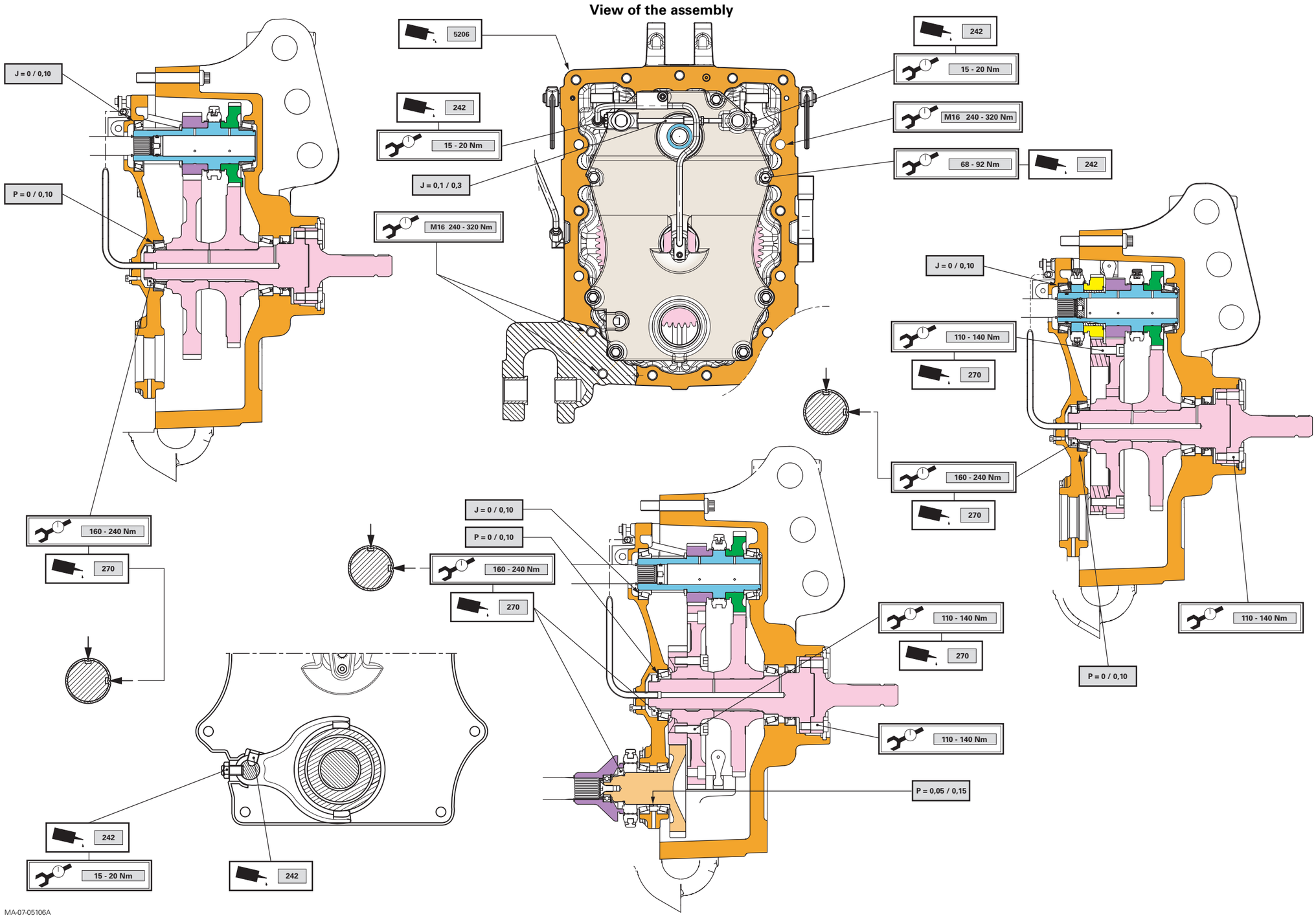
View of the assembly
5206
242
15 - 20 Nm
J = 0,1 / 0,3
M16 240 - 320 Nm
242
15 - 20 Nm
M16 240 - 320 Nm
68 - 92 Nm
242
J = 0 / 0,10
P = 0 / 0,10
J = 0 / 0,10
110 - 140 Nm
270
160 - 240 Nm
270
160 - 240 Nm
270
J = 0 / 0,10
P = 0 / 0,10
160 - 240 Nm
270
110 - 140 Nm
270
110 - 140 Nm
P = 0,05 / 0,15
242
15 - 20 Nm
242
P = 0 / 0,10
110 - 140 Nm
MA-07-05106A

Fig. 8

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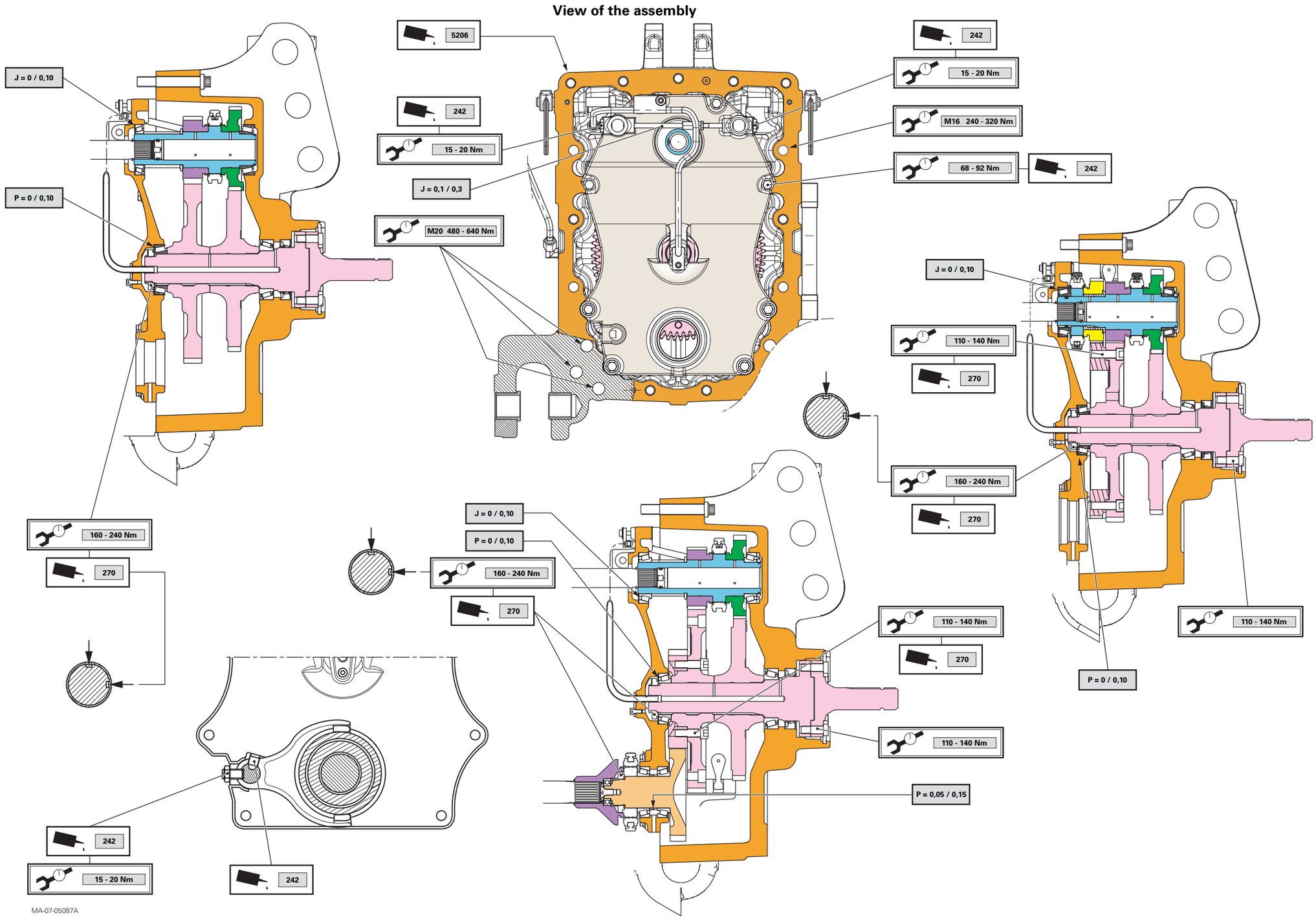

View of the assembly
5206
242
15 - 20 Nm
J = 0,1 / 0,3
M20 480 - 640 Nm
J = 0 / 0,10
P = 0 / 0,10
160 - 240 Nm
270
242
15 - 20 Nm
M16 240 - 320 Nm
68 - 92 Nm
242
J = 0 / 0,10
110 - 140 Nm
270
160 - 240 Nm
270
110 - 140 Nm
P = 0 / 0,10
J = 0 / 0,10
P = 0 / 0,10
160 - 240 Nm
270
110 - 140 Nm
270
110 - 140 Nm
P = 0,05 / 0,15
242
15 - 20 Nm
242
MA-07-05087A

Fig. 9

7B11 - GPA40 - Intermediate shaft and driving gears

CONTENTS

GPA40 - Intermediate shaft and driving gears

A . General

On tractors fitted with GTA1040 transmission (Fig. 1, Fig. 2) or GTA1540 transmission (Fig. 1, Fig. 3), the upper shaftline of the rear PTO comprises:

- the PTO clutch (1);
- the intermediate shaft (2);
- the layshaft (13);
- the tapered roller bearings (3) (4) and (7) (8);
- the driving gears (10) (11) (540-1000 rpm PTO version (Fig. 1)) or driving gears (10) (11) and (9) (540 E PTO version (Fig. 2, Fig. 3));
- a coupler (5) (540-1000 rpm PTO version (Fig. 1)) or two couplers (5) (540 E PTO version (Fig. 2, Fig. 3)).

NOTE: *Shims (27) fitted at the front end of the layshaft (13) allow the clearance of the tapered roller bearings to be adjusted.*

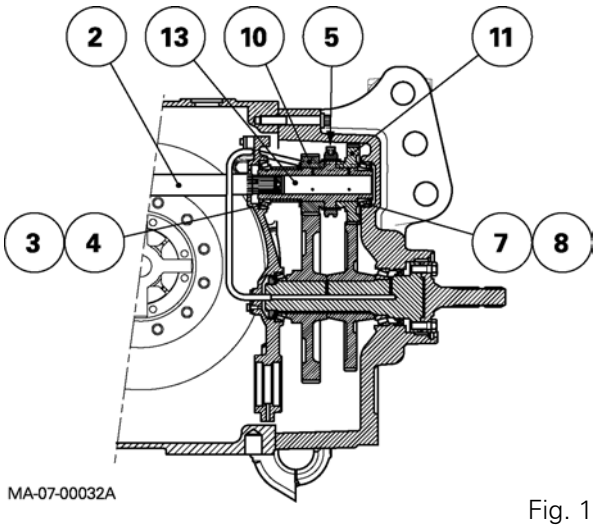


Fig. 1

On the 540-1000 rpm PTO version (Fig. 4), the 540-1000 rpm PTO lever fitted on the left-hand side of the PTO housing (as viewed from the operator's seat), activates a selector rail (19) and a coupler (5). The coupler (5) moves either towards the 540-rpm gear (10) or towards the 1000-rpm gear (11) according to the required speed.

On the 540 E PTO version (Fig. 4), a second lever connected to its own coupler engages this coupling with the gear (9) to obtain the 540 E economic speed. This second lever is fitted on the right-hand side of the rear PTO housing (as viewed from the operator's seat).

The 540-1000 rpm and 540 E PTO rods are each controlled from inside the cab by a cable.

Lubrication

The oil enters the rear PTO housing via a restrictor union. The flow rate is then distributed via a restrictive hole (diameter approx. 1 mm) to the driving gears and driven gears.

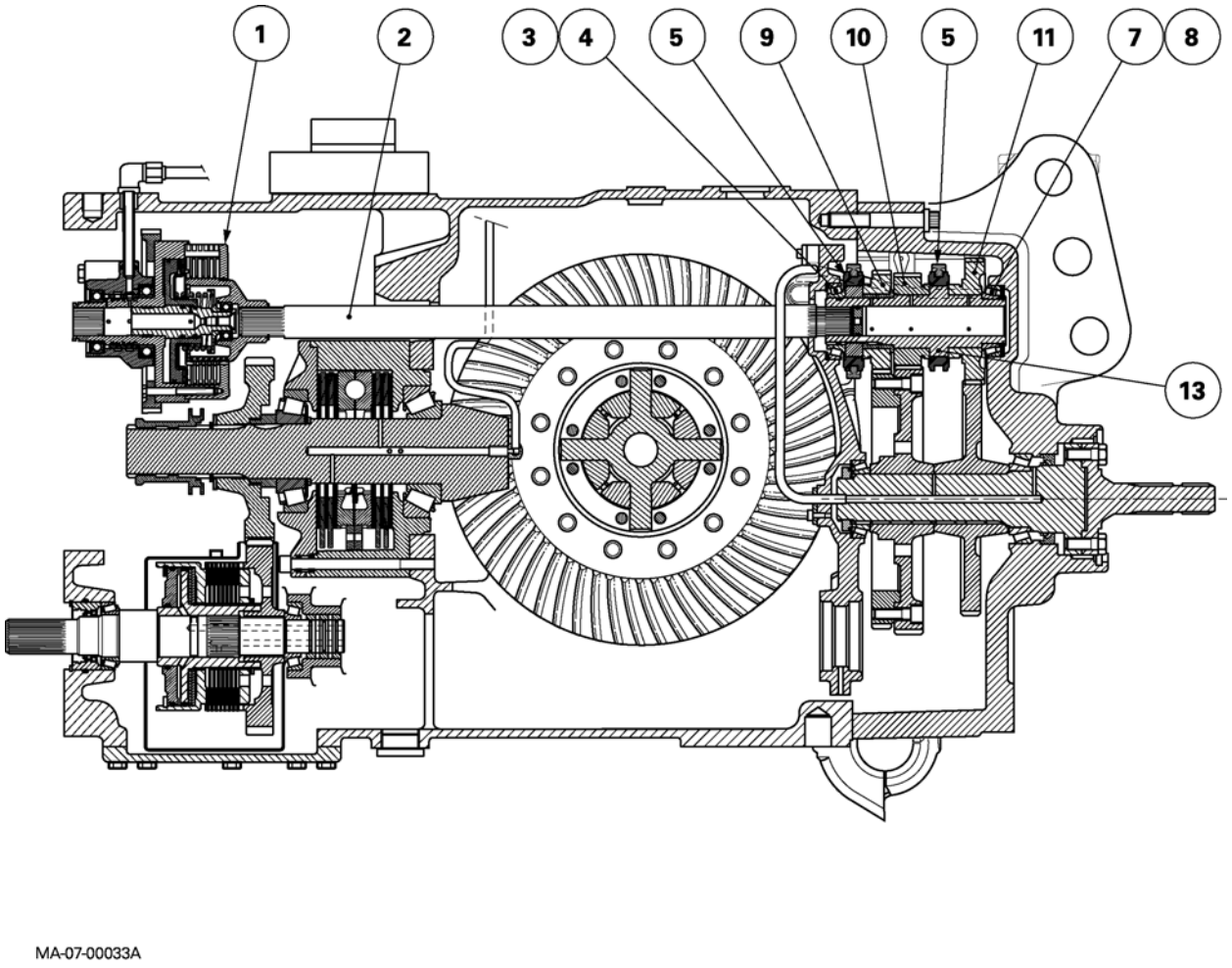


Fig. 2

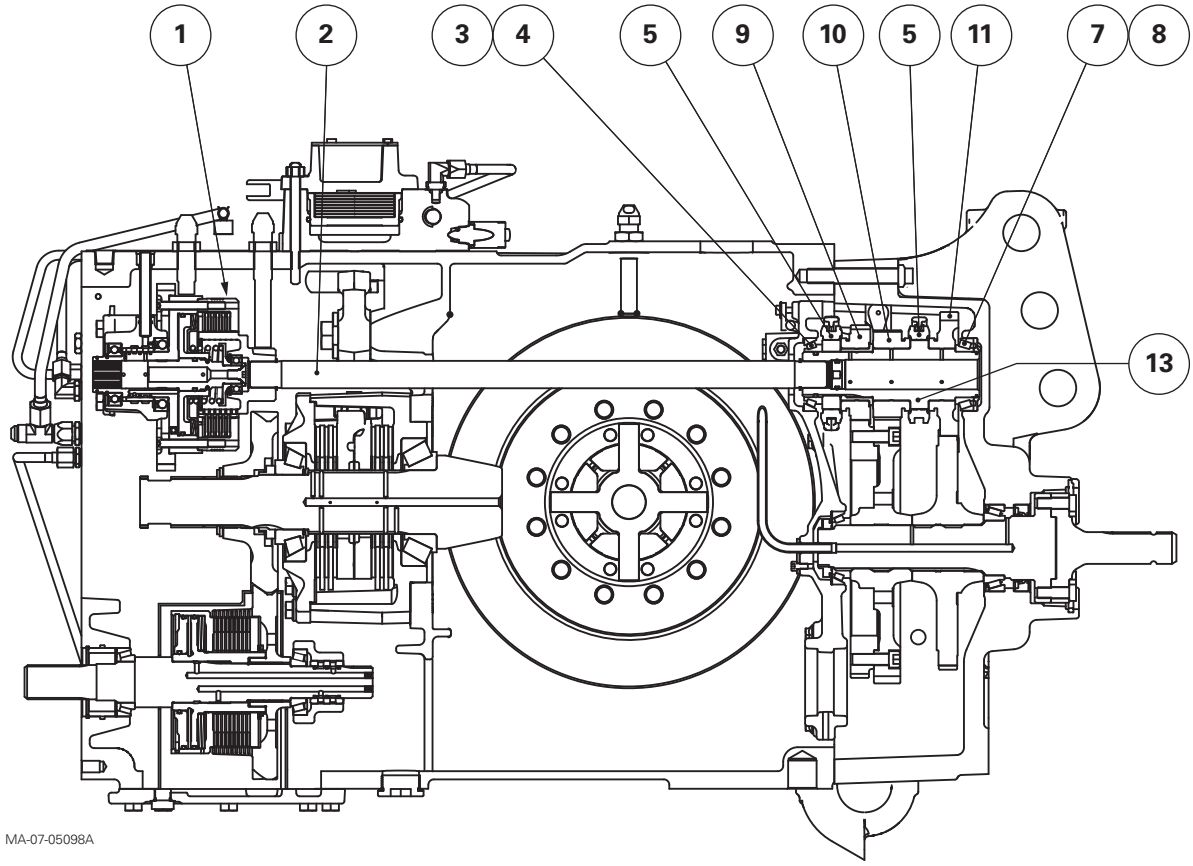


Fig. 3

GPA40 - Intermediate shaft and driving gears

Parts list (Fig. 4)

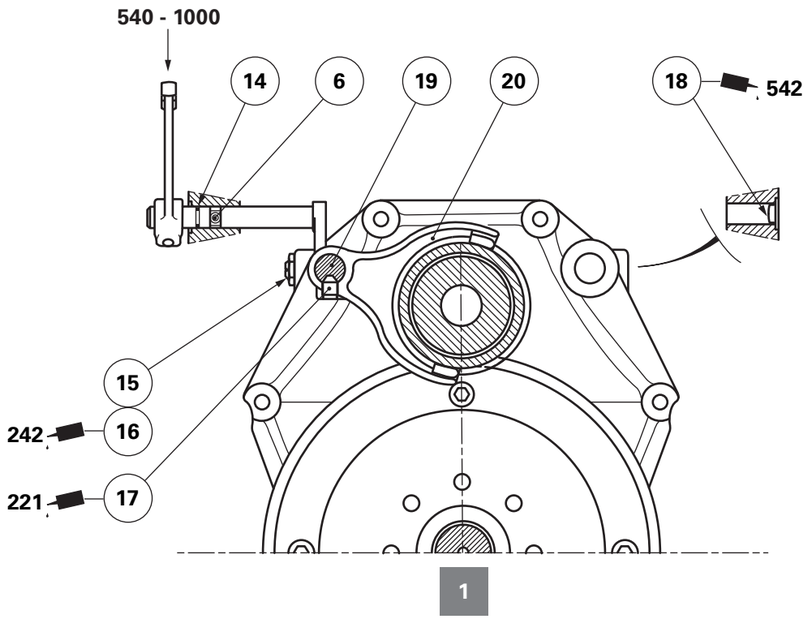
(1) Spacer (540-1000 rpm PTO)
(2) Intermediate shaft
(3) Bearing cone
(4) Bearing cup
(5) Coupler(s)
(6) Dowel(s)
(7) Bearing cone
(8) Bearing cup
(9) 540 E driving gear
(10) 540 rpm driving gear
(11) 1000 rpm driving gear
(12) Removable support
(13) Layshaft
(14) "O" ring(s)
(15) Pushrod screw
(16) Nut
(17) Set screw
(18) Cup plug
(19) 540-1000 rpm selector rail
(20) 540-1000 rpm fork
(21) 540 E fork
(22) 540 E selector rail
(23) Washer with flat section (540-1000 rpm version)
(24) Circlip(s)
(25) Shouldered ring (540 E version)
(26) 540 E hub
(27) Shim(s)
(28) Oil deflector
(29) "O" ring (540 E version)
(30) Vespel ring
(31) Oil restrictor
(32) "O" ring

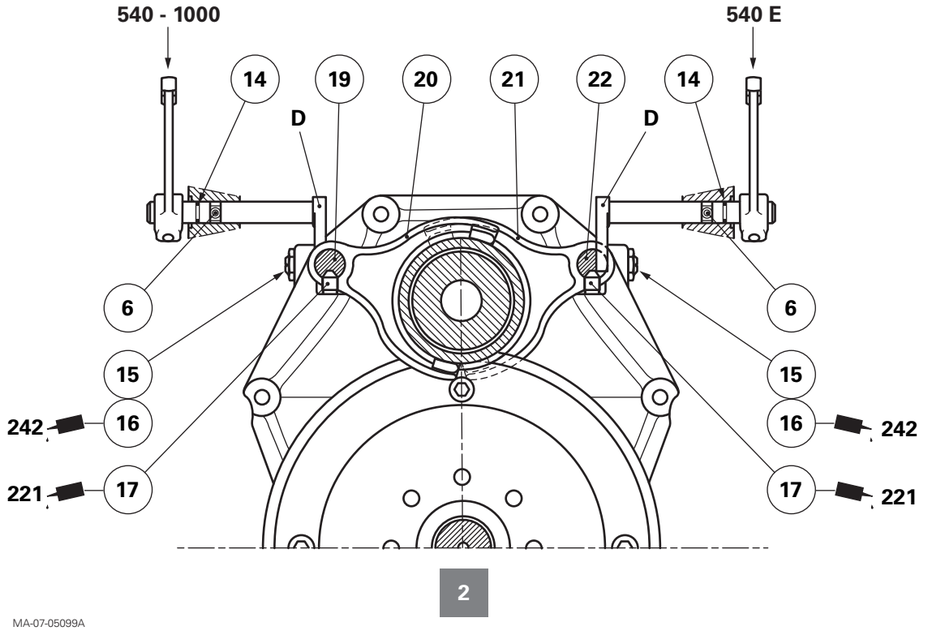
Legend

F Details

1 540-1000 rpm PTO

2 540 E PTO





View of the assembly

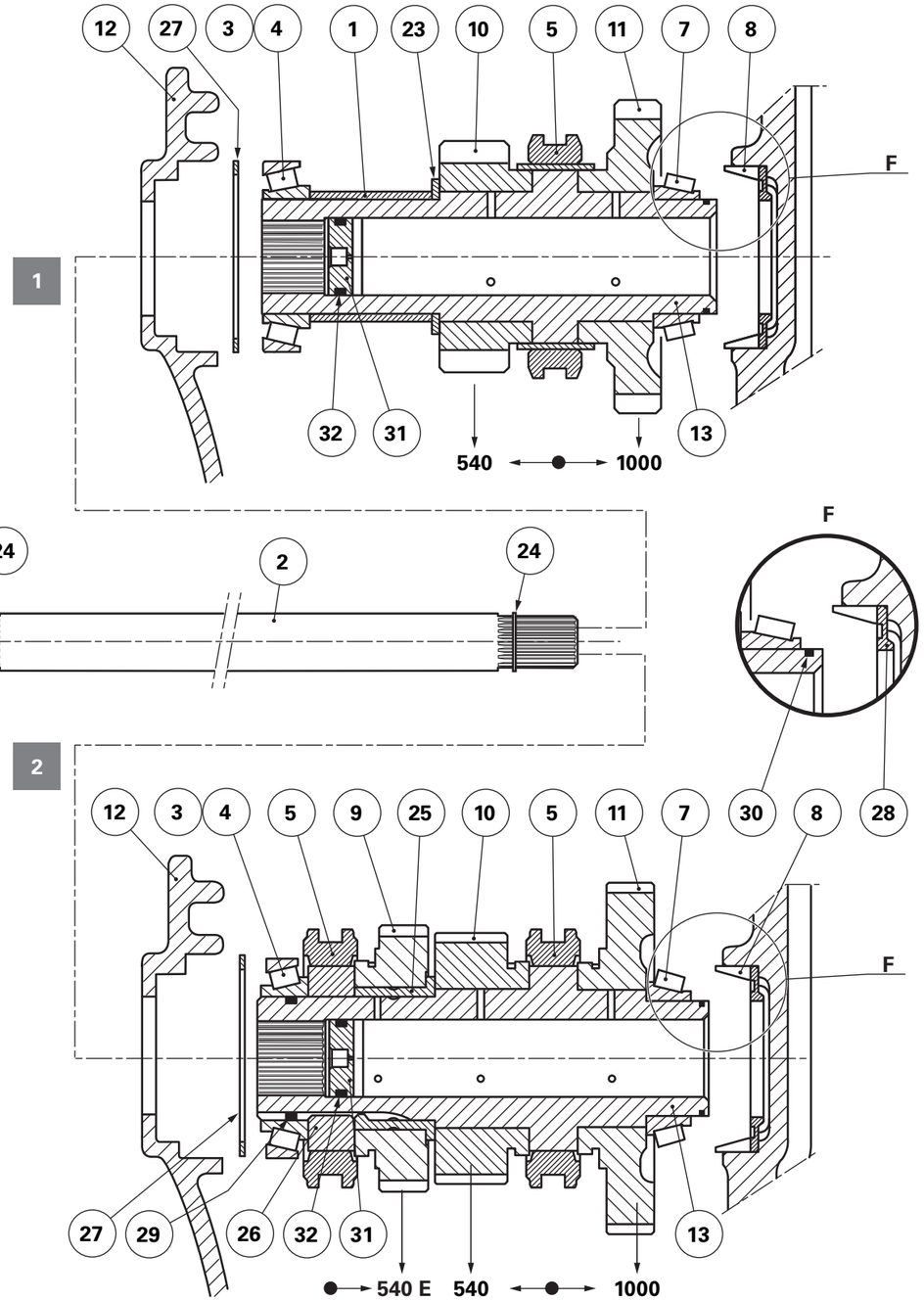


Fig. 4

Parts list (Fig. 5)

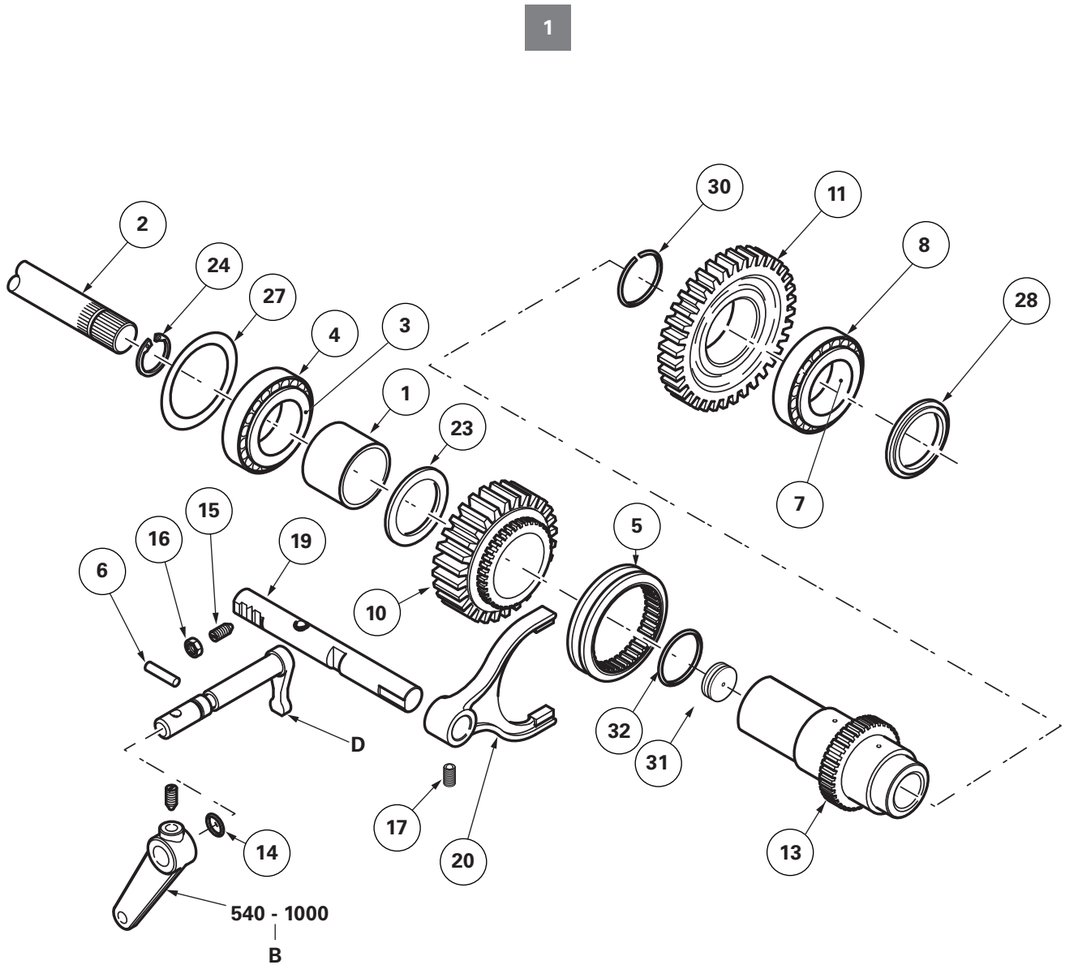
(1) Spacer (540-1000 rpm PTO)
(2) Intermediate shaft
(3) Bearing cone
(4) Bearing cup
(5) Coupler(s)
(6) Dowel(s)
(7) Bearing cone
(8) Bearing cup
(9) 540 E driving gear
(10) 540 rpm driving gear
(11) 1000 rpm driving gear
(13) Layshaft
(14) "O" ring(s)
(15) Pushrod screw
(16) Nut
(17) Set screw
(19) 540-1000 rpm selector rail
(20) 540-1000 rpm fork
(21) 540 E fork
(22) 540 E selector rail
(23) Washer with flat section (540-1000 rpm version)
(24) Circlip(s)
(25) Shouldered ring (540 E version)
(26) 540 E hub
(27) Shim(s)
(28) Oil deflector
(29) "O" ring (540 E version)
(30) Vespel ring
(31) Oil restrictor
(32) "O" ring

Legend

B Cable control (cab)
D Control finger

1 540-1000 rpm PTO
2 540 E PTO

Blown-up view



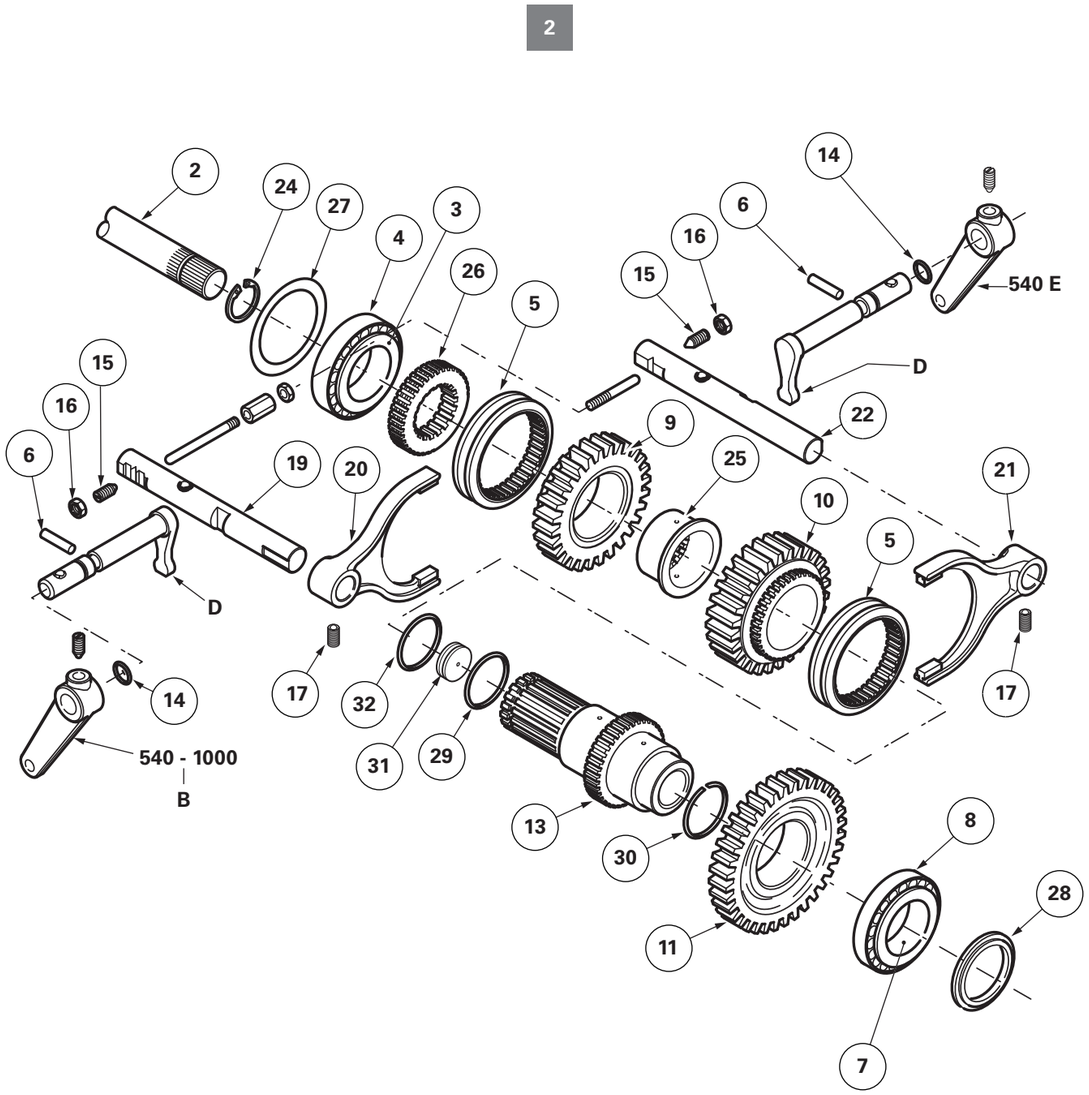


Fig. 5

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B . Partial kinematics and operation of the safety lock

Partial kinematics

The engine speed is transmitted to the rear PTO clutch located at the front of the centre housing via a shaftline which passes via:

- the Power Shuttle, the Dynashift and the GTA1040 transmission gearbox;
- the Powershift, the Power Shuttle and the GTA1540 transmission gearbox.

The intermediate shaft (2) is splined to the layshaft (13) and drives the driving gears (10) (11) and/or (9) depending on the position of the coupler(s). When a gear transmits the movement to the lower shaftline, the other gear(s) is/are passive and turn(s) idle on its/their axis.

540 E PTO safety lock

The safety lock device is only fitted on the 3-speed PTO version (540-1000 rpm and 540 E). It is located at the top and within the rear PTO housing. It acts as a lock due to the round end of its two adjustable rails. The selector rails (19) and (22) for the forks are machined in order to house the locks and to allow their movement.

Operation (Fig. 6)

When the selector rail (19) engages the 540-rpm gear, it forces the lock (3) out of its housing. The lock (3) then pushes lock (2), which locks the 540 E selector rail (22) in neutral position and thus prevents any movement.

This principle can be applied to the 540 E and 1000-rpm gears.

C . Disassembling, reassembling and adjusting the safety lock and adjusting a pushrod screw

Preliminary step

1. Disconnect the PTO housing from the centre housing (see chapter 2).

Disassembling the safety lock (540 E PTO) (Fig. 6)

2. Using a locally obtained M5 screw, extract the dowel (6) using the tapped hole T in the dowel.
3. Extract finger D from the selector rail (22) (540 E PTO control) by pulling the rod out of the housing.
4. Remove the set screw (17) fixing the fork (21) to the selector rail.
5. Using the adjustable sleeve (1) (no left or right-hand screw), shorten the length of the safety locks (2) (3).
6. Unscrew:
   - the nut (16);
   - the pushrod screw (15).

   Remove the selector rail (22).
7. Visually note the assembly.
8. Separate and remove the safety locks (2)(3).

Reassembling the safety lock (540 E PTO)

9. Reassemble the safety lock device by following steps 2 to 8 in reverse order.

   IMPORTANT: *During the reassembly process, observe the following points:*
   - *Lightly smear the thread of the set screw (17) with Loctite 221 or equivalent. Tighten this screw to a torque of 25-35 Nm.*
   - *If necessary, replace the "O" ring (14) by sliding it over the pin of finger D (Fig. 6) via the outside of the housing so as not to break it on the sharp edge of the housing.*
   - *Do not forget to refit the dowel (6).*
10. Adjust the safety lock (see steps 11 to 14) and the pushrod screw(s) (see steps 15 to 19).

Adjusting the safety lock (540 E PTO) (Fig. 6)

11. Place a selector rail in neutral position.
12. Engage a gear using the other selector rail.
13. Adjust the sleeve (1) (no left or right-hand screw) to give a slight clearance of approx. 0.1 mm. Tighten the nut.
14. Activate each gear alternately and several times. Engage a 540 or 1000-rpm gear. Test the safety device by trying to engage the 540 E gear: this gear should not engage.

    Test the safety device for the other two gears in the same way.

Adjusting a pushrod screw

15. Position the selector rail concerned so that one of the flat sections is opposite the tapped hole of the fork pushrod screw (15).
16. Tighten the pushrod screw without forcing it in order to compress the ball, then loosen it by one quarter turn.
17. Clean the thread of the pushrod screw (15) and the nut (16).
18. Lightly smear the thread of the nut (16) with Loctite 242 or equivalent. Tighten this nut to 15-20 Nm while holding the pushrod screw (15) in place.
19. Check that the fork lock matches.

Final steps

20. Reconnect the PTO housing to the centre housing (see chapter 2).
21. Start the tractor engine and check the PTO operation.

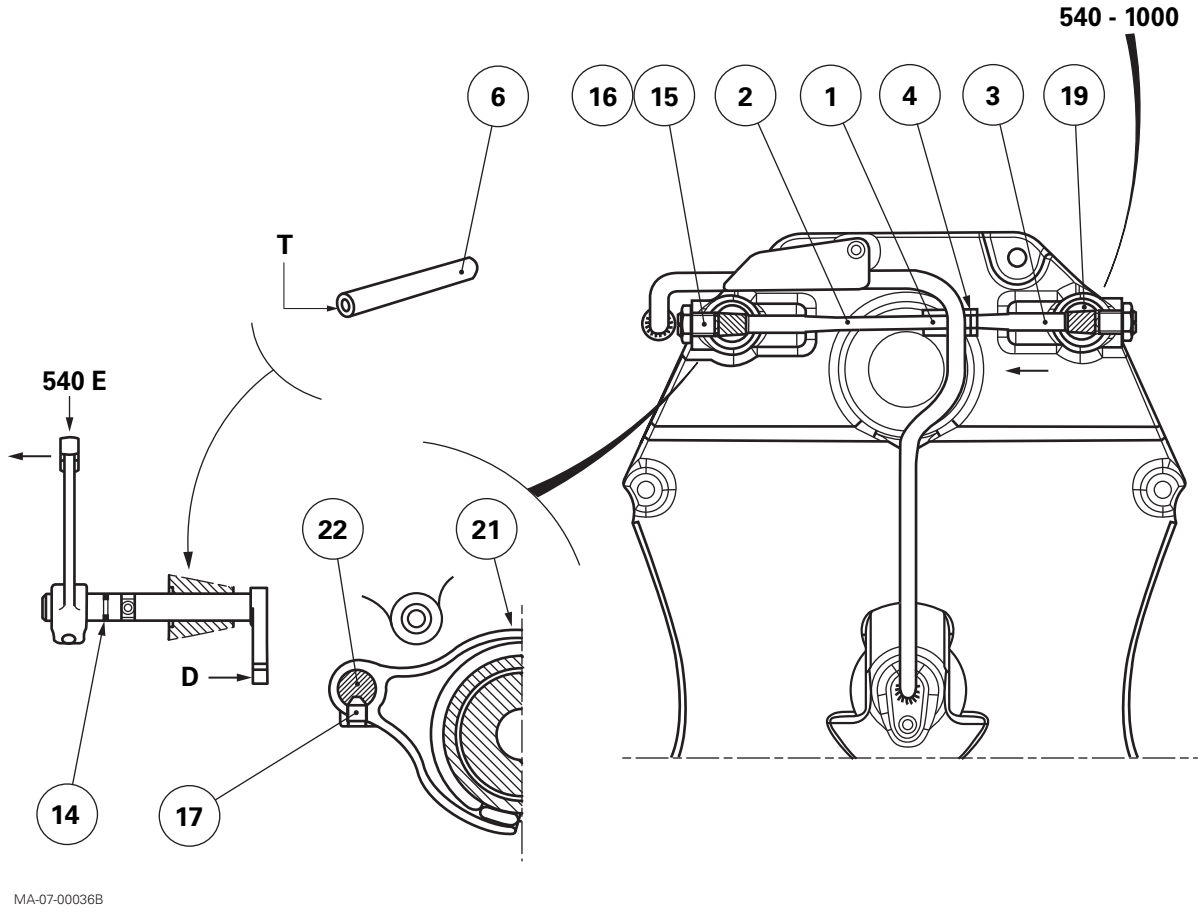

Fig. 6

D . Removing and refitting the selection mechanism

Preliminary step

22. Disconnect the PTO housing from the centre housing (see chapter 2).

Removal

540 - 1000 rpm PTO (Fig. 7, A)

23. Unscrew:
- the nut (16);
- the pushrod screw (15).

24. Proceed to step 27.

540 E PTO (Fig. 7, B)

25. Unscrew:
- the nut (16);
- the pushrod screw (15).

Shorten the length of the safety locks (2)(3).

26. Proceed to step 27.

540 - 1000 rpm or 540 E PTO

27. Remove the lubrication pipe (5). Remove the removable support (12) (Fig. 7) holding the front end of the PTO shafts (upper and lower) in place.

NOTE: *Removal of the removable support (12) always involves removing the rear bearing and the GSPTO coupler (if fitted) (see chapter 7).*

28. Remove the selector rail(s) (19) (22) (Fig. 8, Fig. 9).

29. Remove unit B, which amongst other components, comprises the driving gears (see § E).

30. Separate the fork(s) from the coupler(s) (depending on version).

Refitting

31. Fit the fork(s) on the coupler(s) (depending on version).

32. Refit unit B (see § E).

33. Check that the shims and tapered roller bearing cups are present in the removable support (12).

Refit the removable support (12) with the safety locks (2)(3).

Lightly smear the thread of the screws (4) with Loctite 242 or equivalent. Tighten these screws to 68-92 Nm.

Fit the lubrication pipe (5) (Fig. 7), replacing the "O" rings beforehand.

34. Refit the selector rail(s) and the pushrod screw(s) (depending on version). Carry out adjustments (see § C).

Final steps

35. Reconnect the PTO housing to the centre housing (see chapter 2).

36. Start the tractor engine and check the PTO operation.

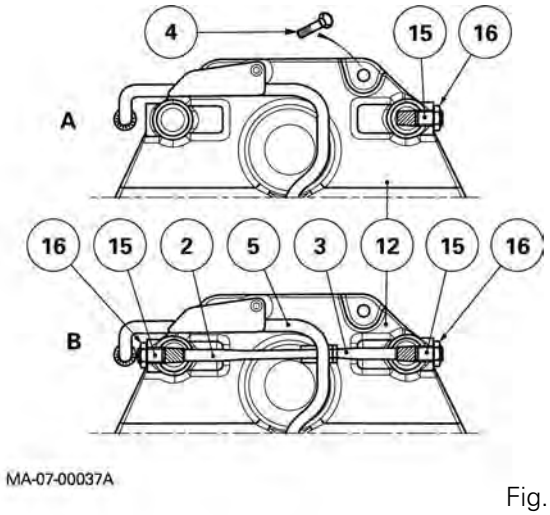

Fig. 7

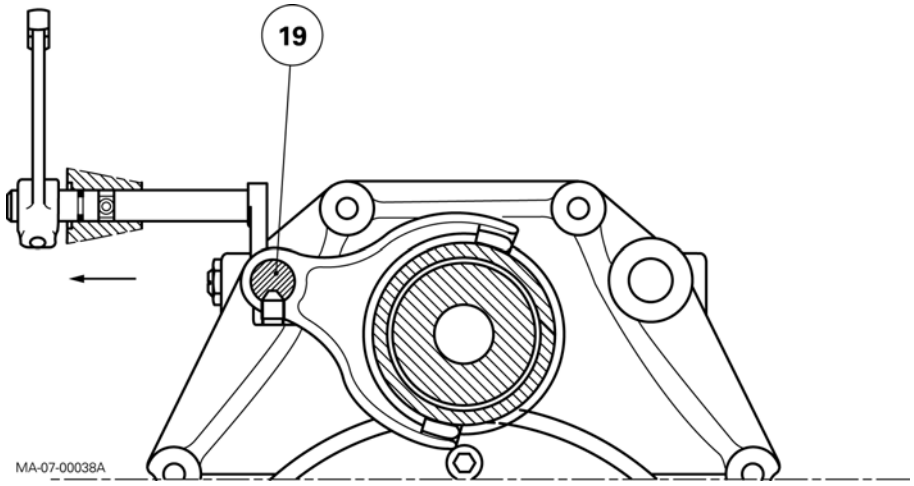

Fig. 8

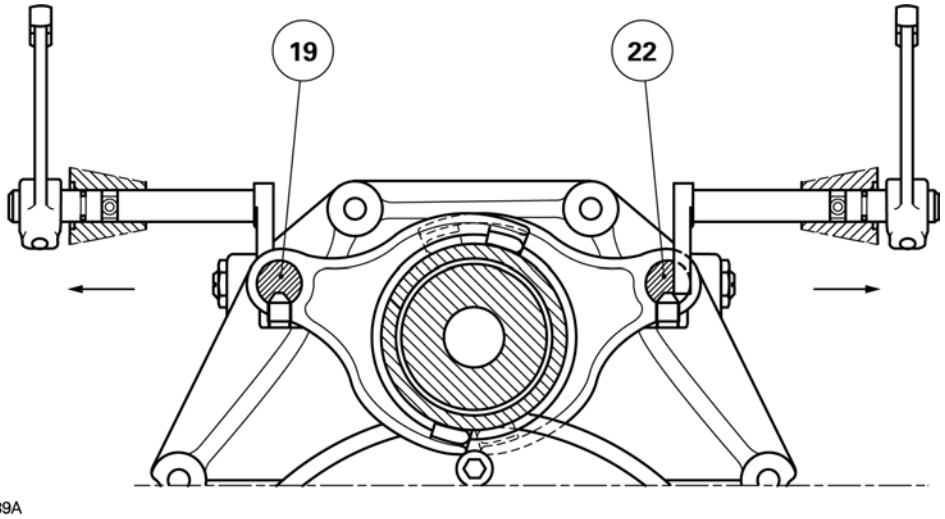

Fig. 9

E . Disassembling and reassembling the driving gears

Legend (Fig. 10)

1 540 - 1000 rpm PTO driving gears (2 speeds)

2 540 E PTO driving gears (3 speeds)

Preliminary steps

37. Disconnect the PTO housing from the centre housing (see chapter 2).

38. Position the PTO housing horizontally, with the gears facing upwards.

39. Remove the selector rail(s) (depending on version, see § D).

Disassembly

40. Remove the 540 - 1000 rpm or 540 E driven gears (depending on version) of the lower PTO shaftline (see chapter 7).

NOTE: *This removal must be carried out so that unit B can then be removed.*

41. Take unit B out of the PTO housing (shaft, driving gears, coupler(s) and tapered roller bearings) (Fig. 10).

If necessary, drive out the bearing cups (4) (8) and the oil deflector (28), marking the direction in which they are fitted (Fig. 10).

42. Strip unit B by carrying out the following:

- for the 540 - 1000-rpm PTO driving gears, steps 43 to 46;
- for the 540 E PTO driving gears, steps 47 to 51.

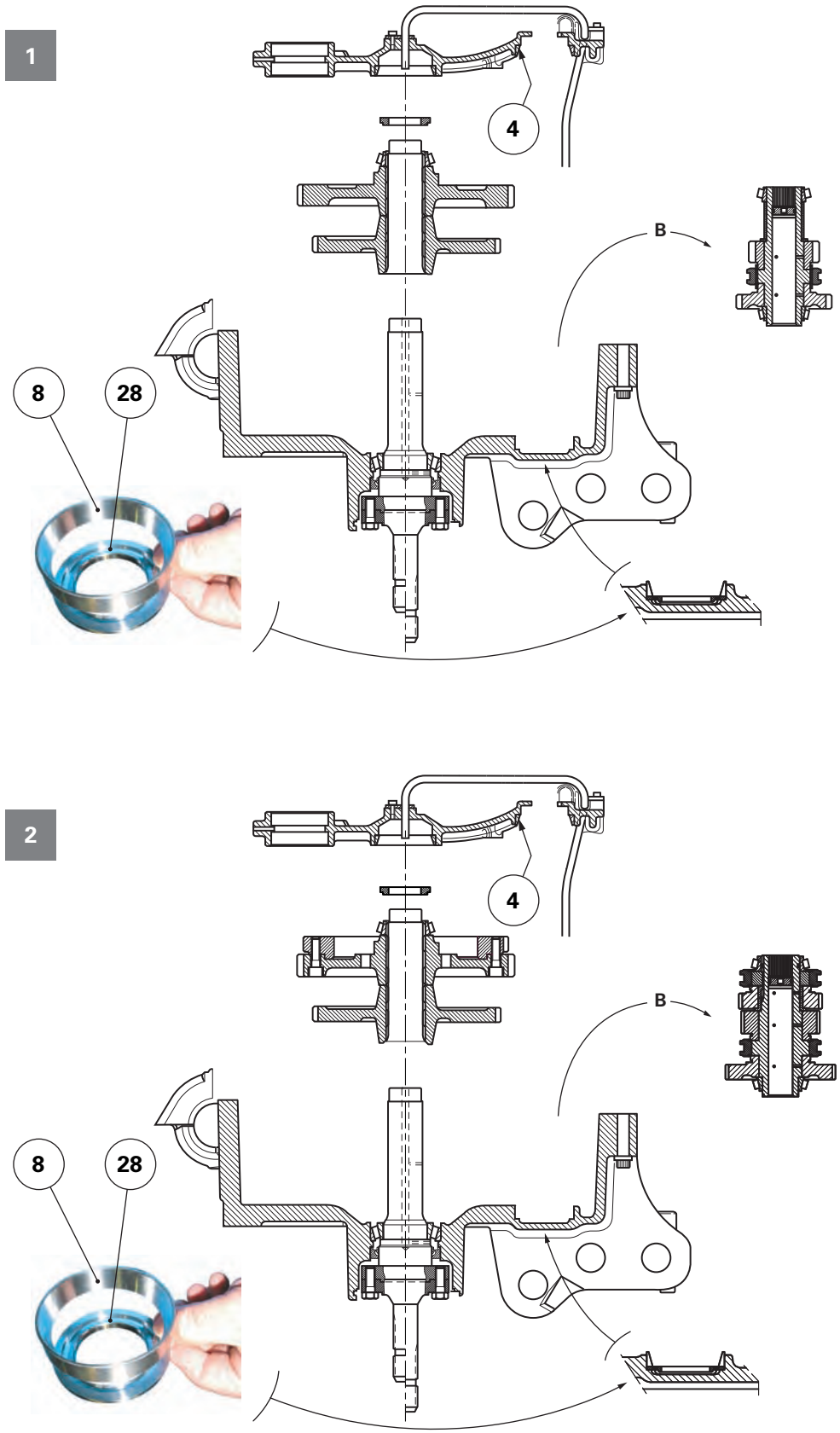

Fig. 10

540 - 1000 rpm PTO driving gears (Fig. 11)

43. Remove the Vespel ring (30). Remove the bearing cone (7).

44. Remove the driving gear (11) and the coupler (5).

45. Extract the bearing cone (3).

46. Remove the spacer (1), the washer with flat section (23) and the driving gear (10).

If necessary, drive out the oil restrictor (31) from the shaft (13) and discard the "O" ring (32).

540 E PTO driving gears (Fig. 12)

47. Remove the Vespel ring (30). Remove the bearing cone (7).

48. Remove the driving gear (11) and the coupler (5).

49. Remove the bearing cone (3) and the "O" ring (29).

50. Remove the coupler (5) along with its hub (26).

51. Remove the driving gear (9), the shouldered ring (25) and the driving gear (10).

If necessary, drive out the oil restrictor (31) from the shaft (13) and discard the "O" ring (32).

Reassembly

52. Check that the radial holes used to lubricate the gears and the calibrated hole of the oil restrictor (31) are not blocked. Lubricate the oil restrictor and the new "O" ring (32).

53. Reassemble unit B by carrying out the following:

- for the 540 - 1000-rpm PTO driving gears, steps 54 to 59;
- for the 540 E PTO driving gears, steps 60 to 65.

540 - 1000 rpm PTO driving gears (Fig. 11)

54. On the shaft (13), fit:

- the oil restrictor (31) and a new "O" ring (32)

  IMPORTANT: *The oil restrictor (31) must be up against the shoulder of the shaft and its calibrated hole facing towards oil chamber C;*
- the gear (10);
- the washer (23), with the larger surface positioned towards the gear;
- the spacer (1).

55. Using a press and a suitable fixture, fit the bearing cone (3) against the spacer (1).

56. Slide the following onto the other end of the shaft (13):

- the coupler (5);
- the gear (11).

57. Using a press and a suitable fixture, fit the bearing cone (7) against the shoulder of the shaft.

58. Check that the coupler (5) slides freely towards the 540 - 1000 rpm gears. Also check that these gears rotate freely.

59. Proceed to step 66.

540 E PTO driving gears (Fig. 12)

60. On the shaft (13), fit:

- the oil restrictor (31) and a new "O" ring (32)

  IMPORTANT: *The oil restrictor (31) must be up against the shoulder of the shaft and its calibrated hole facing towards oil chamber C;*
- the gear (10);
- the shouldered ring (25);
- the gear (9);
- the hub (26);
- the coupler (5) (540 E);
- the "O" ring (29).

  NOTE*: The "O" ring (29) prevents loss of hydraulic flow and helps improves the lubrication of the gear (9).*

61. Refit the bearing cone (3).

62. Slide the following onto the other end of the shaft (13):

- the coupler (5) (540 - 1000 rpm);
- the gear (11).

63. Using a suitable fixture, fit the bearing cone (7) against the shoulder of the shaft.

64. Check that each coupler (5) slides freely towards its respective gears (540 - 1000 rpm and 540 E). Also check that these gears rotate freely.

65. Proceed to step 66.

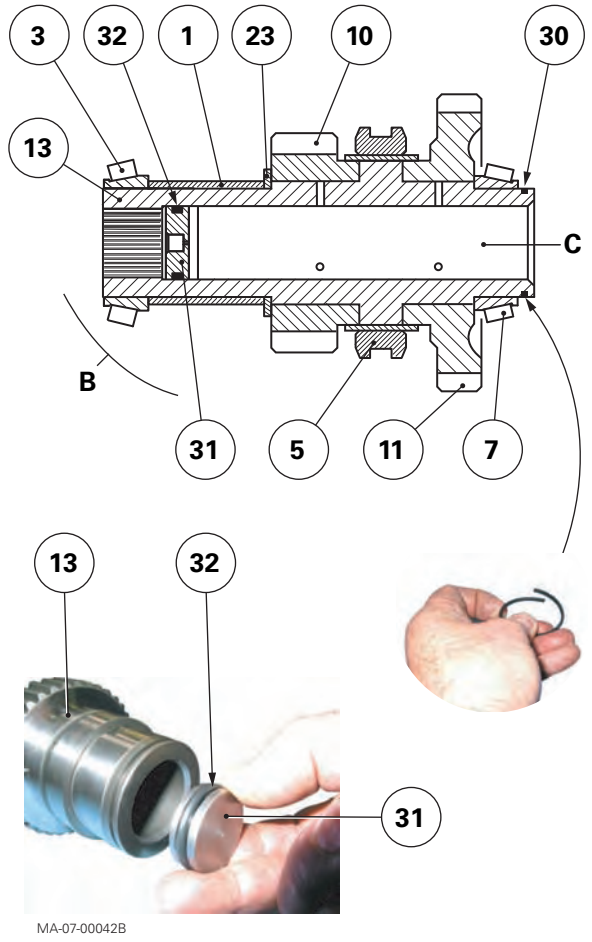
3
32
1
23
10
30
13
C
B
31
5
11
7
13
32
31
MA-07-00042B

Fig. 11

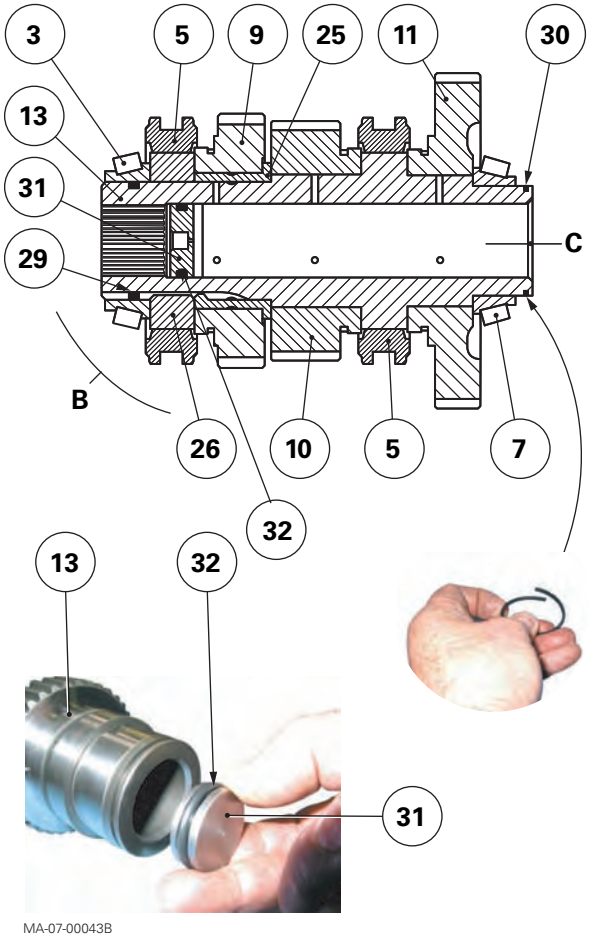
3
5
9
25
11
30
13
31
29
C
B
26
10
5
7
32
13
32
31
MA-07-00043B

Fig. 12

Driving gears for 540 - 1000 rpm or 540 E PTO

66. Refit unit B into the PTO housing (shaft, driving gears, coupler(s) and bearings) (Fig. 10).

67. If the bearing cups (4) (8) and the deflector (28) were driven out of their housing during disassembly, fit:

- the deflector by positioning it as per Fig. 10

  NOTE: *The oil deflector has a calibrated hole for lubricating the bearings (7)(8);*

- the bearing cups (4) (8) against their respective shoulders.

68. Shim the bearings (3)(4) and (7)(8) of the layshaft (13) (see § F).

69. Refit the 540 - 1000 rpm or 540 E driven gears of the lower PTO shaftline (see chapter 7).

Final steps

70. Refit and adjust the selection mechanism (see § C and D).

71. Reconnect the PTO housing to the centre housing (see chapter 2).

72. Start the tractor engine and check the rear PTO operation.

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F . Shimming the layshaft bearings

Fig. 13, Fig. 14: 540 - 1000 rpm PTO driving gear layshaft bearings
Fig. 15, Fig. 16: 540 E PTO driving gear layshaft bearings

Preparing for shimming (Fig. 13, Fig. 15)

For easier access to the driving gears and to prevent inertia created by rotation of the driven gears, it is advisable to carry out J1 shimming while temporarily excluding the following:

- the 540 - 1000 rpm or 540 E driven gears (depending on version) of the lower PTO shaftline;
- the selector rail(s) and fork(s);
- the lower shaftline lubrication pipe.

73. Lightly lubricate the bearing cones (3) (7) with clean transmission oil.
74. Check that the deflector (28) and the bearing cup (8) are present in the PTO housing.
75. Fit the driving gears into the housing.
76. Remove the shim(s) (27) located in the bore of the bearing cup (4) of the removable support (12). Reduce shim thickness by approx. 0.10 mm and refit it/them in the place from which it was/they were removed.
77. Fit the cup (4).
78. Temporarily fix the removable support (12) to the PTO housing. Tighten a few opposing V screws to 68-92 Nm.

Shimming

79. Place a dial gauge feeler pin at the end of the shaft (13) (Fig. 13 or Fig. 15 depending on version).
80. Push firmly on the driving gear assembly, turning it alternately to the right and left to correctly fit the cones in their bearing cups.
81. Set the dial gauge to zero.
82. Repeat step 80 by pulling firmly.
83. According to the temporary clearance reading on the dial gauge, determine another shim (27) thickness to obtain a final clearance (Fig. 14 or Fig. 16 depending on version): J1 = 0 to 0.10 mm

NOTE: *As far as possible, shim to the minimum tolerance.*

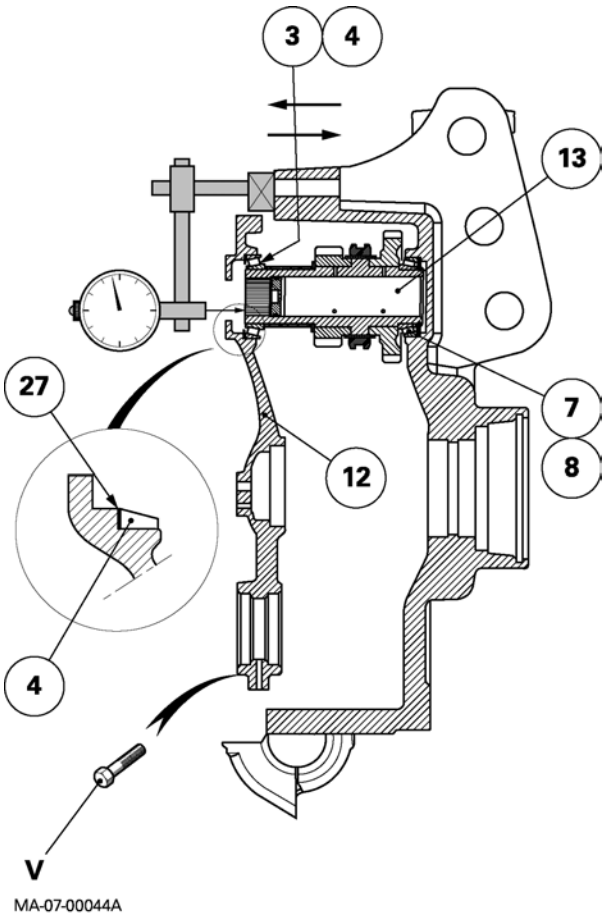

Fig. 13

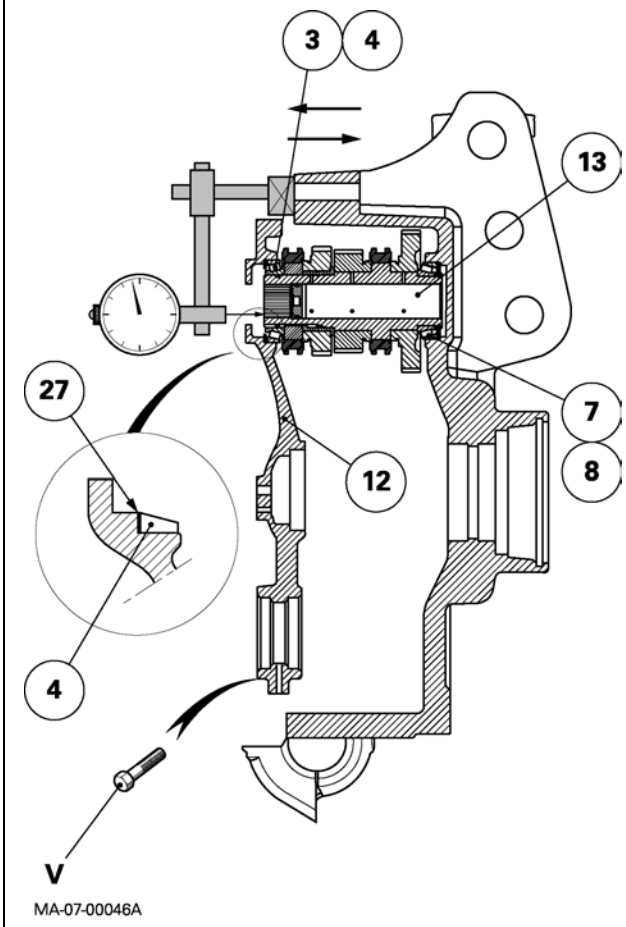

Fig. 15

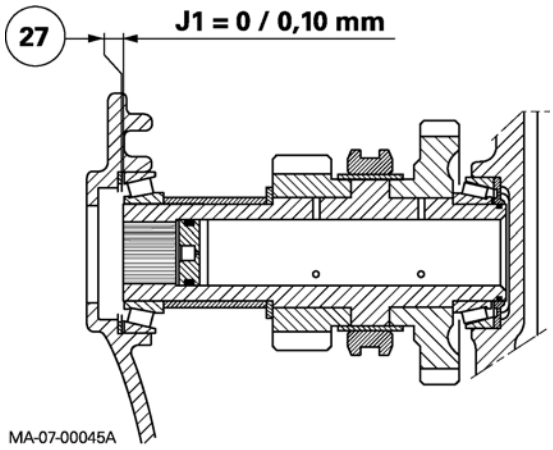

Fig. 14

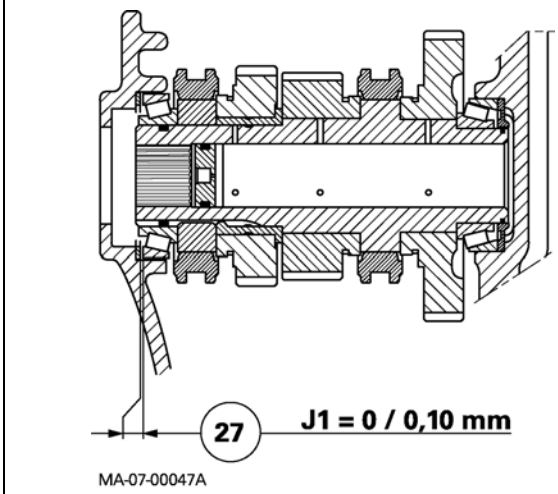

Fig. 16

G . Fitting and adjusting the cable controls

540 - 1000 rpm cable control

Fitting the cable at the cab end (Fig. 17)

84. Tighten the clevis (2) to the maximum against the cable (4). Tighten the nut (3).

85. Position the lever (1) located on the console in neutral (N).

86. Fit the cable to the lever. Tighten the sheath end on the support.

87. Position the feed-through conduit on the cab floor.

Fitting the cable at the PTO housing end (Fig. 18)

88. Tighten the ball joint (2) to the maximum against the cable (3). Tighten the nut (5).

89. Position the rod (1) (540 - 1000 rpm) located to the left of the PTO housing in neutral (N).

***NOTE 1**: For easy access to the left-hand side of the PTO housing, position the linkage arms in the raised position.*

***NOTE 2**: If the tractor is fitted with a 540 E PTO, it is recommended to place it in neutral before activating the 540 - 1000 rpm PTO (see safety lock § C).*

90. Slide the sheath end of the cable onto the support. If possible, use nuts (4) to make the thread length identical on either side of the support.

91. Tighten the nuts.

92. Fix the ball joint (2) on the rod.

Checking the correct engagement of the 540 - 1000 rpm gears

93. Check that gear engagement takes place normally in each lever position (540 - 1000 rpm and neutral) and that there is no sign of the cable being pinched. If this is not the case, move the sheath end until the correct adjustment is obtained.

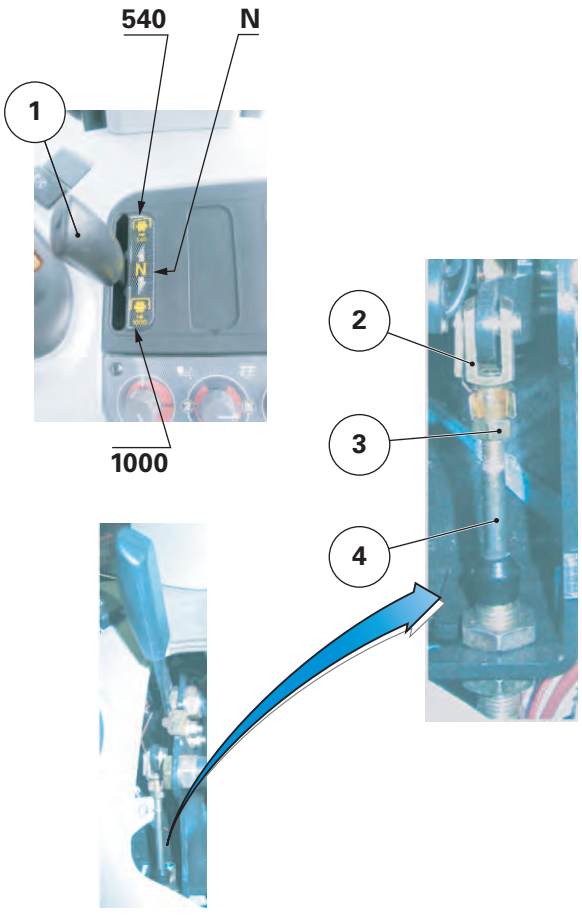

Fig. 17

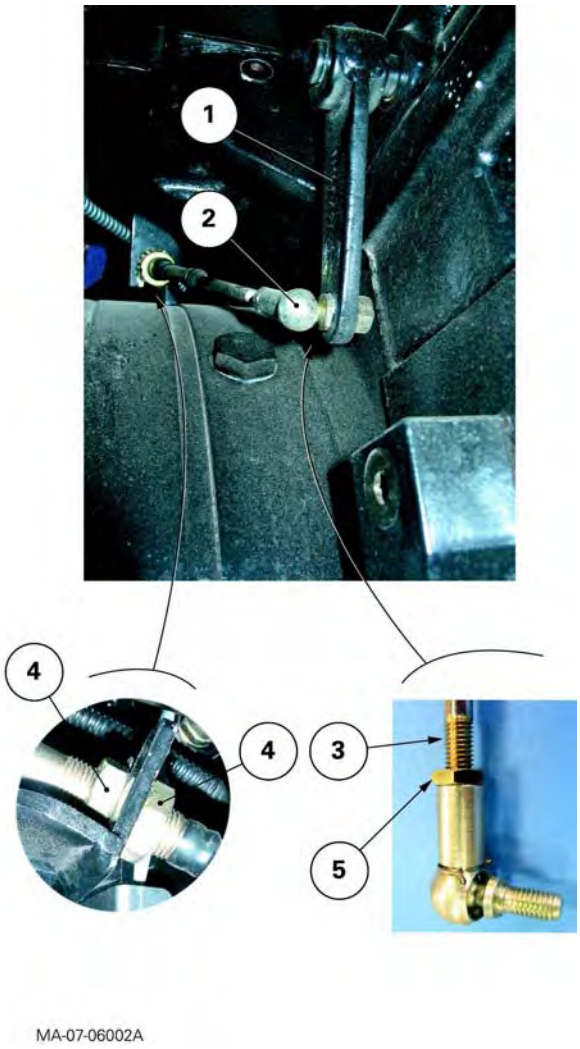

Fig. 18

540 E cable control (if fitted)

The control lever (1) (540 E) is located on the console, to the right of the 540 - 1000 rpm lever (Fig. 19).

The 540 E economy version follows the basic concept of the 540 - 1000 rpm version and is completed by a set of additional gears (driving and driven)

The 540 E control is mechanically engaged by placing the 540 - 1000 rpm control in neutral first (see safety lock § C).

Fitting the cable at the cab end (Fig. 19)

94. Tighten the clevis (2) to the maximum against the cable (4). Tighten the nut (3).

95. Position the lever (1) located on the console in neutral (N).

96. Fit the cable to the lever. Tighten the sheath stop on the support.

97. Position the feed-through conduit on the cab floor.

Fitting the cable at the PTO housing end (Fig. 20)

98. Tighten the ball joint (2) to the maximum against the cable (3). Tighten the nut (5).

99. Position the rod (540 - 1000 rpm) in neutral (see safety lock § C).

Position the rod (1) (540 E) located to the right of the PTO housing in neutral.

***NOTE**: For easy access to the right-hand side of the PTO housing, position the linkage arms in the raised position.*

100. Slide the sheath end of the cable onto the support. If possible, use nuts (4) to make the thread length identical on either side of the support.

101. Tighten the nuts.

102. Fix the ball joint (2) on the rod.

Checking the correct engagement of the 540 E economy gear

103. Check that gear engagement takes place normally in each lever position (540 E and neutral) and that there is no sign of the cable being pinched. If this is not the case, move the sheath end until the correct adjustment is obtained.

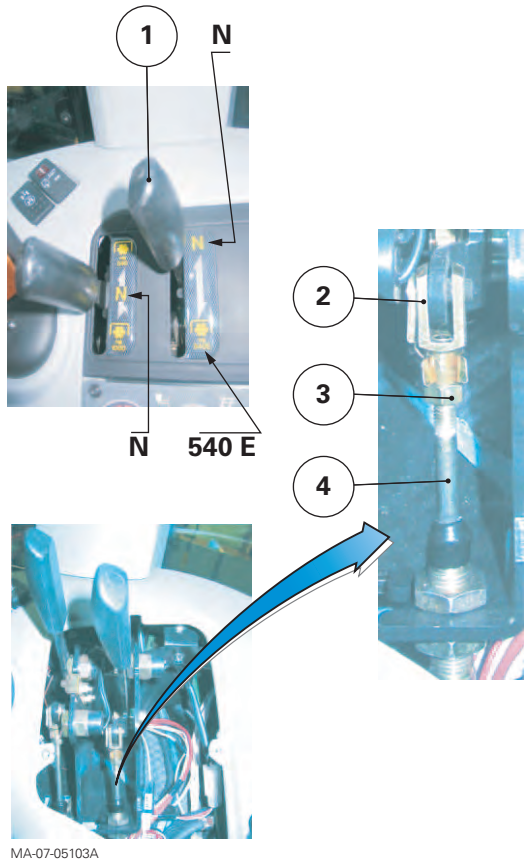

Fig. 19

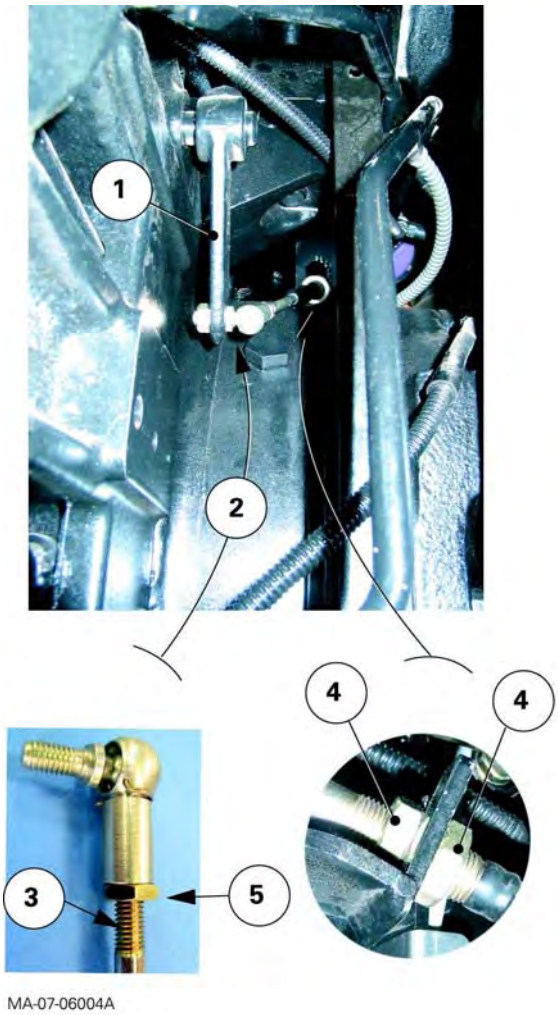

Fig. 20

7B12 - GPA40 - Output shaft and brake

CONTENTS

GPA40 - Output shaft and brake

A . General

On tractors fitted with GTA1040 or GTA1540 transmission, the rear PTO may be fitted with a 540 E economy version (Fig. 4). The economy version follows the principle of the 540 - 1000 rpm standard equipment and is produced by fitting an additional 540 E gear (10) centred and fitted to the 540 rpm gear (7) via a screw (11).

The profile of the 1000 rpm driven gear differs according to the transmission type and equipment fitted:

- Fig. 1, detail A: GTA1040 and GTA1540 transmission without Power Boost PTO;
- Fig. 1, detail B: GTA1540 transmission with Power Boost PTO.

The profile of the 1000 rpm driving gear also differs according to the transmission type and equipment fitted (see chapter 7).

Regardless of the type of PTO, the driven gears are constantly meshed with the driving gears driven by the upper shaftline.

The output shaft (13) is fitted on tapered roller bearings (3) (8) and (19) (21) mounted respectively in the rear PTO housing and in the removable front support (12).

The 540-1000 rpm gears (7) (18) are splined to the output shaft and clamped between the bearing cones by the nut (2).

The rear bearing is sealed by the seal (14).

The preload of the tapered roller bearings is adjusted by using the shims (23) inserted between the removable front support (12) and the bearing cup (19).

Sensor C (if fitted) (Fig. 2) located to the right of the PTO housing informs the tractor's electronic system of the speed of the output shaft via the 540 rpm driven gear. A threaded plug C (Fig. 2) blocks the sensor port if the sensor is not fitted.

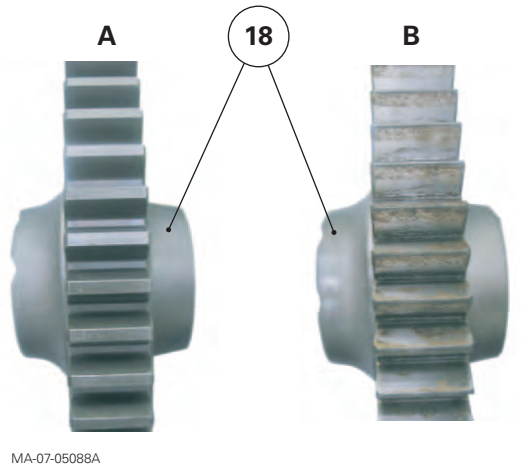

Fig. 1

GPA40 - Output shaft and brake

The rear PTO brake is a cylindrical piston (25) fitted with an "O" ring (17). This piston is housed in a bore of the rear PTO housing (Fig. 2). When the PTO clutch supply is interrupted, the 17 or 21 bar pressure is applied to the brake. The piston then travels towards the machined face of the 1000 rpm driven gear (18) and compresses this gear via a friction washer (26) in order to gradually slow down the rotation of the mechanical sections of the PTO until they are completely immobilised.

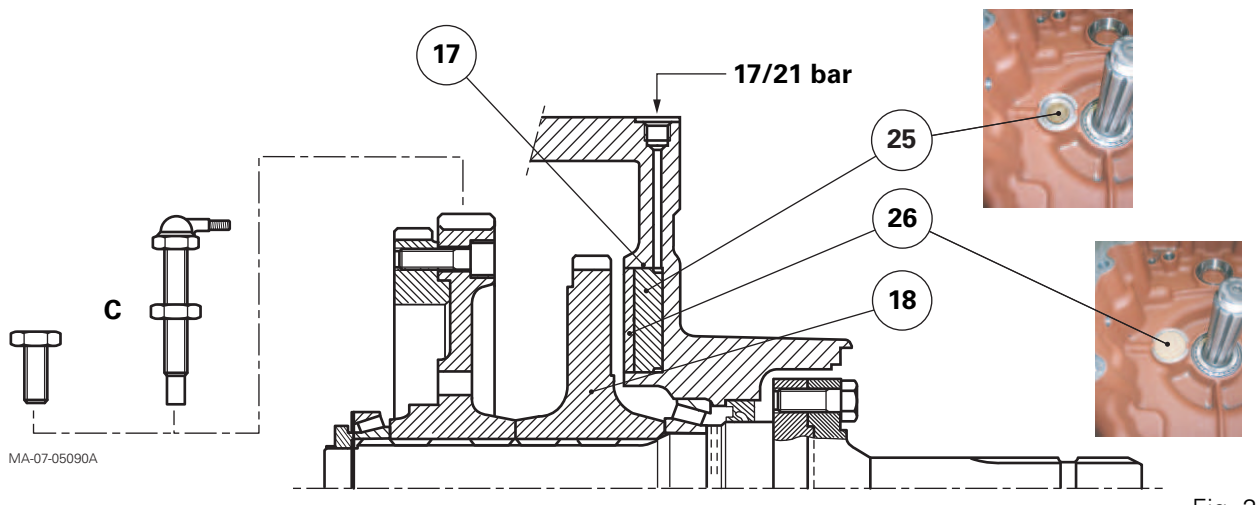

Fig. 2

Lubrication (Fig. 3)

The lower shaftline of the PTO is lubricated by a pipe (5) which carries transmission oil to the axial port and the radial holes in the output shaft (13). The oil lubricates the splines on the 540-1000 rpm gears and the rear bearing (8) (21). The front bearing (3) (19) is lubricated by oil splashing from the gears as they move.

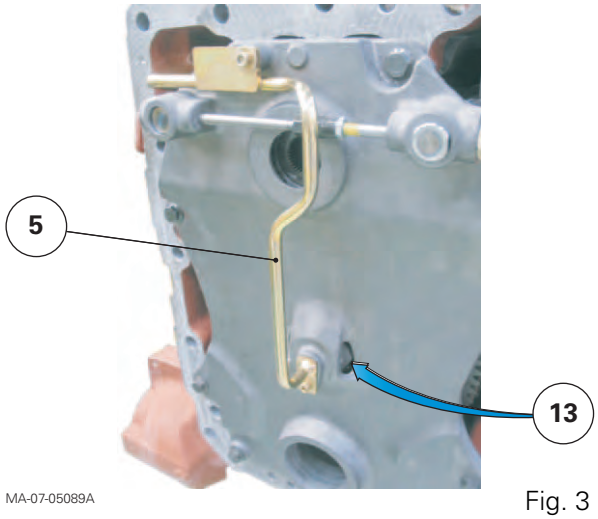

Fig. 3

Parts list (Fig. 4, Fig. 5)

(1) Screw
(2) Undercut nut
(3) Bearing cone
(4) Long or short flanged shaft (interchangeable shaft)
(5) Lubrication pipe
(6) Screw
(7) 540 rpm driven gear
(8) Bearing cone
(9) Guard
(10) 540 E driven gear
(11) Screw
(12) Removable front support
(13) Output shaft
(14) Seal
(18) 1000 rpm driven gear
(19) Bearing cup
(21) Bearing cup
(23) Shims
(24) "O" ring

Legend

A Details

1 540 - 1000 rpm PTO

2 540 E PTO

View of the assembly

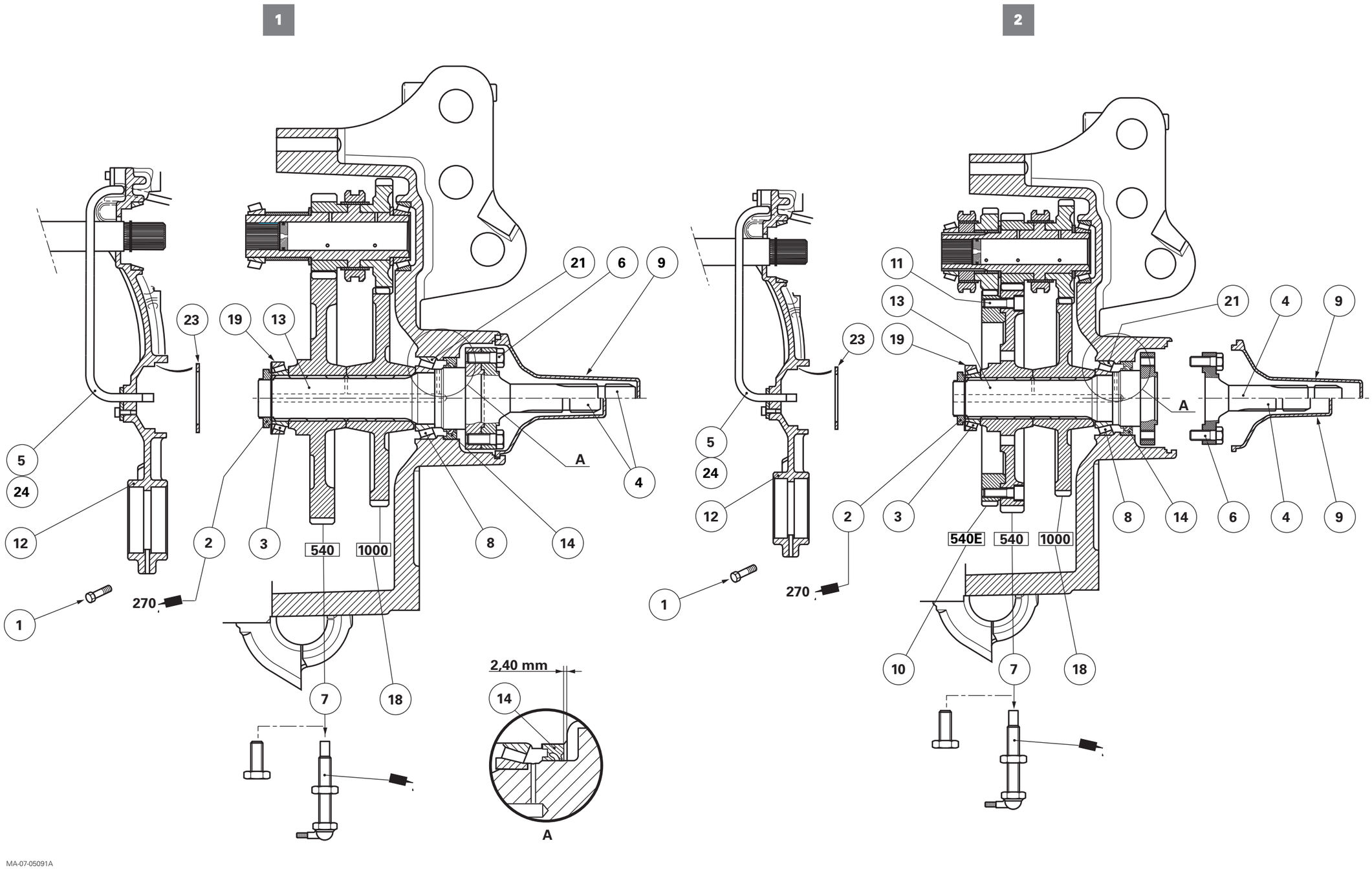

Fig. 4

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Blown-up view

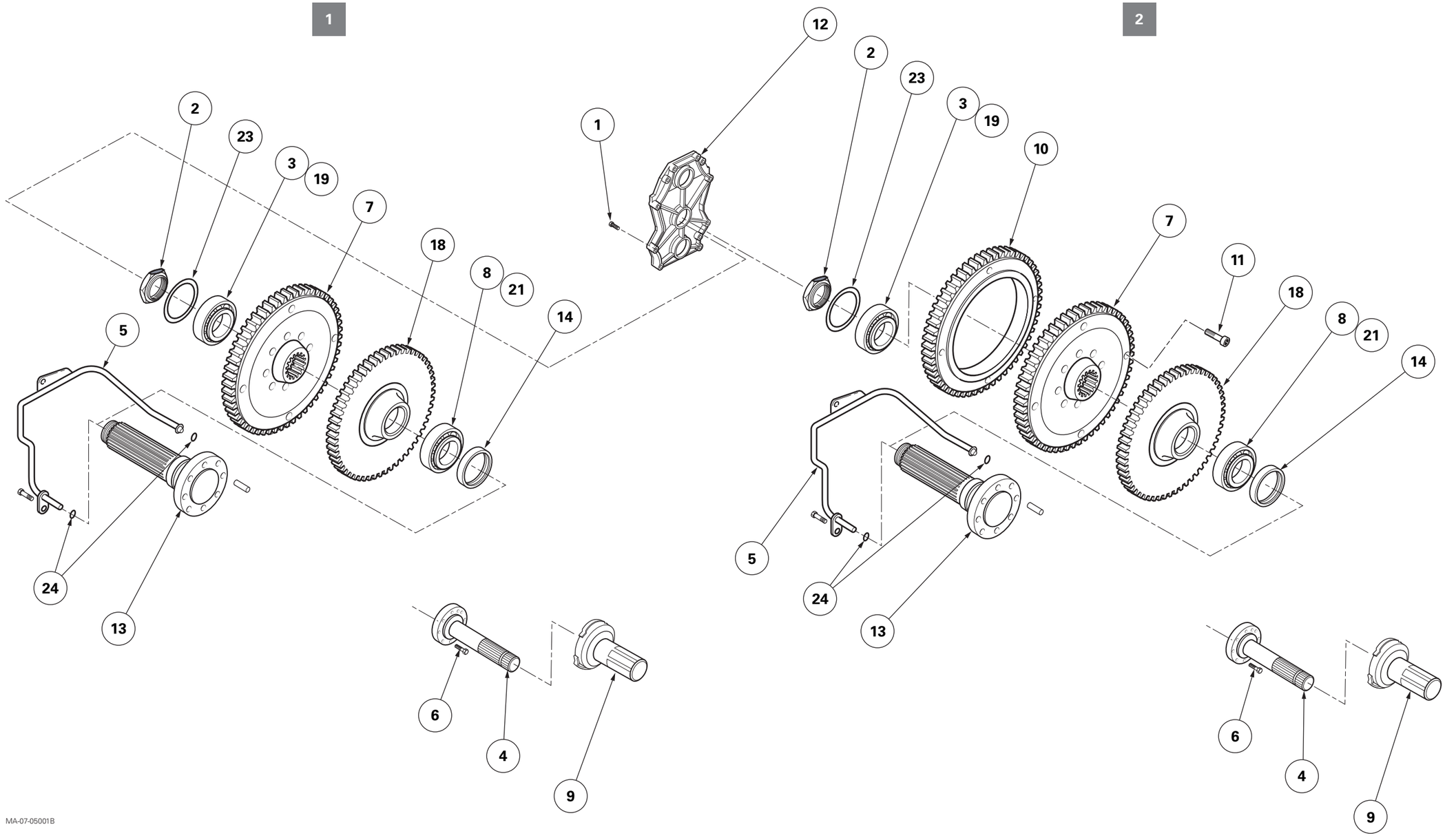

Fig. 5

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B . Disassembling and reassembling the 540 - 1000 rpm or 540 E driven gears, tapered roller bearings and seal

Preliminary steps

1. Disconnect the PTO housing from the centre housing (see chapter 2).

   NOTE: *All operations on the PTO lower shaftline, including removal of the rear bearing gasket, involves removing and refitting the PTO housing. Only the flanged shaft (4) can be disassembled without having to carry out this removal operation.*
2. Remove the sensor (if fitted) located to the right of the rear housing of the PTO.
3. Remove the 540 - 1000 rpm (2-speed) or 540 E (3-speed) PTO selection mechanism and the front removable support (12) (see chapter 7).

Disassembling the 540 - 1000 rpm driven gears (Fig. 6)

4. Immobilise the output shaft (13) by inserting a locally obtained M16 screw into hole T located between the rim of the output shaft and the rear housing of the PTO.

5. Unlock the nut (2) and loosen it using a standard socket (55 mm flat).

6. Extract the bearing cone (3).

Remove the 540 - 1000 rpm driven gears (7) (18) from the rear housing of the PTO.

7. Using a soft hammer, tap the inside end of the output shaft and drive the output shaft outwards.

8. Recover the bearing cone (8).

9. Drive out the bearing cup (21).

10. Drive out the seal (14) from the rear housing of the PTO. Discard it.

Reassembling the 540 - 1000 rpm driven gears

11. Correctly position the new seal (14) in the rear housing of the PTO. Using tool ref. 3378115M1 (see § F), gradually fit the new seal at a distance of 240 mm from the face of the rear housing of the PTO (Fig. 4, detail A).

12. Fit the bearing cup (21).

13. Lubricate the mating face of the seal (14) on the output shaft with clean transmission oil.

14. Engage the output shaft in the port on the rear housing of the PTO.

Fit the bearing cone (8) on the output shaft using a suitable locally obtained fitting drift.

15. If necessary, shim the tapered roller bearings (3) (19) and (8) (21) (see § C).

16. Refit:

- the driving gears (see chapter 7);
- the 540 - 1000 rpm driven gears (7) (18) (Fig. 6).

17. Using a suitable fixture, fit the bearing cone (3).

18. Clean the threads of the new screw (2) and the output shaft (13).

19. Lightly smear the thread of the nut with Loctite 270 or equivalent. Screw this nut onto the output shaft.

20. Immobilise the output shaft as per the method used in step 4.

21. Definitively tighten the nut to 160-240 Nm.

22. Using a suitable punch, lock the nut in place by bending the collar into the grooves of the output shaft without breaking it.

23. Proceed to step 48.

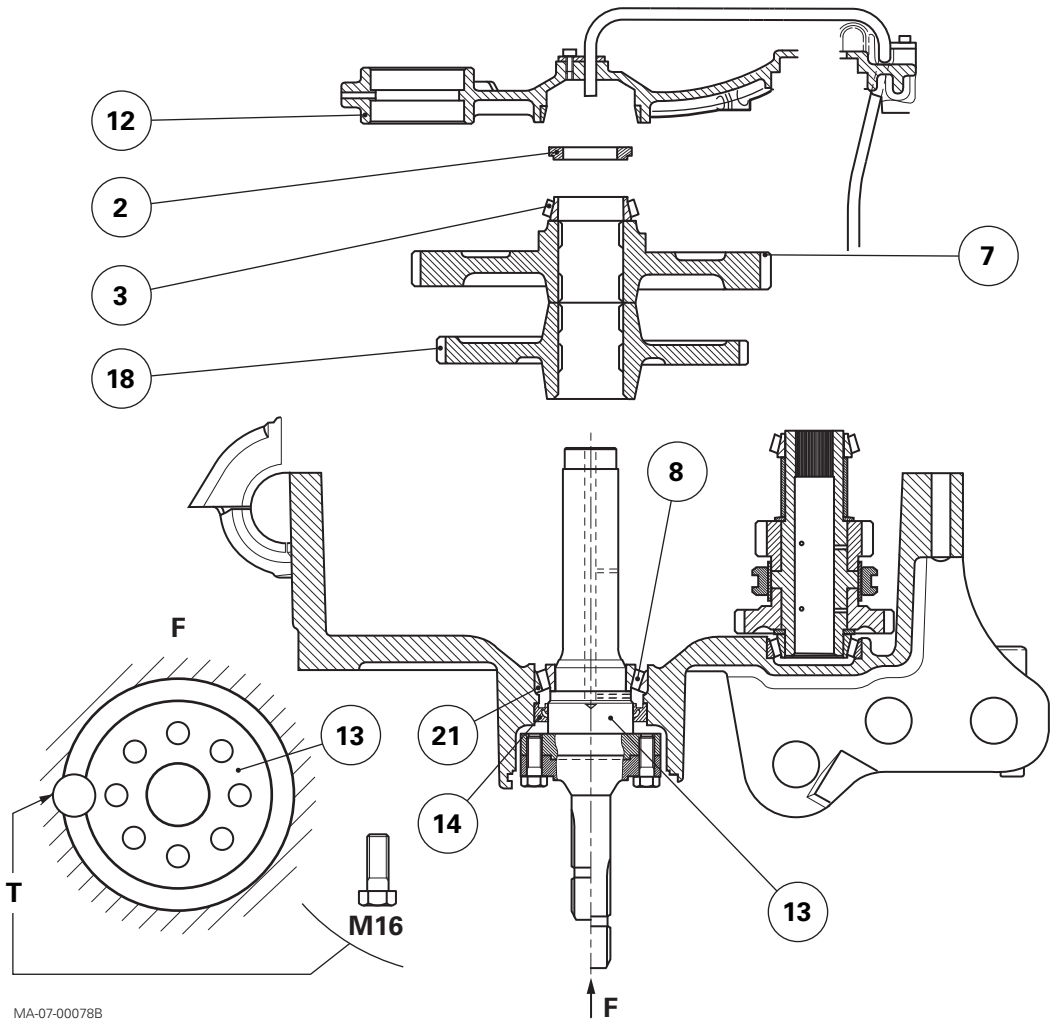

Fig. 6

Disassembling the 540 E driven gears (Fig. 7)

24. Immobilise the output shaft (13) by inserting a locally obtained M16 screw into hole T located between the rim of the output shaft and the rear housing of the PTO.

25. Unlock the nut (2) and loosen it using a standard socket (55 mm flat).

26. Extract the bearing cone (3).

Remove the 540 E driven gears (7) (10) from the rear housing of the rear PTO.

Turn the 540 E gear set over in order to access the screw heads (11) (Fig. 7, detail B).

Then slide the overturned 540 E gear set onto the output shaft (13).

Immobilise the output shaft as per the method used in step 4.

Unscrew the screws (11).

27. Remove the 540 E gear set from the rear housing of the PTO again and separate it.

28. Using a soft hammer, tap the inside end of the output shaft and drive the output shaft outwards.

29. Recover the bearing cone (8).

30. Drive out the bearing cup (21).

31. Drive out the seal (14) from the rear housing of the PTO. Discard it.

Reassembling the 540 E driven gears

32. Correctly position the new seal (14) in the rear housing of the PTO. Using tool ref. 3378115M1 (see § F), gradually fit the new seal at a distance of 240 mm from the face of the rear housing of the PTO (Fig. 4, detail A).

33. Fit the bearing cup (21).

34. Lubricate the mating face of the seal (14) on the output shaft with clean transmission oil.

35. Engage the output shaft in the port on the rear housing of the PTO.

Fit the bearing cone (8) on the output shaft using a suitable locally obtained fitting drift.

36. Clean the tapped holes on the gear (10) and the screw (11) threads.

37. Reassemble the 540 E gear set (7) (10).

38. Lightly smear the thread of the screws (11) with Loctite 270 or equivalent. Screw in and tighten these screws to 110-140 Nm.

39. If necessary, shim the tapered roller bearings (3) (19) and (8) (21) (see § C).

40. Refit:

- the driving gears (see chapter 7);
- the 540 E driven gears (Fig. 7).

41. Using a suitable fixture, fit the bearing cone (3).

42. Clean the threads of the new screw (2) and the output shaft (13).

43. Lightly smear the thread of the nut with Loctite 270 or equivalent. Screw this nut onto the output shaft.

44. Immobilise the output shaft as per the method used in step 4.

45. Definitively tighten the nut to 160-240 Nm.

46. Using a suitable punch, lock the nut in place by bending the collar into the grooves of the output shaft without breaking it.

47. Proceed to step 48.

Final steps

48. Refit the 540 - 1000 rpm (2-speed) or 540 E (3-speed) PTO mechanism and the front removable support (12) (see chapter 7).

49. If necessary and depending on the option, refit the sensor located to the right of the rear PTO housing.

During the refitting process:

- lightly smear the sensor thread with Loctite Form A Gasket 2 or equivalent;
- tighten home the sensor, without forcing, until its end is positioned against the gear (7),
- unscrew the sensor by three quarters of a turn;
- moderately tighten the nut.

50. Reconnect the PTO housing to the centre housing (see chapter 2).

51. Start the tractor engine and check the PTO operation.

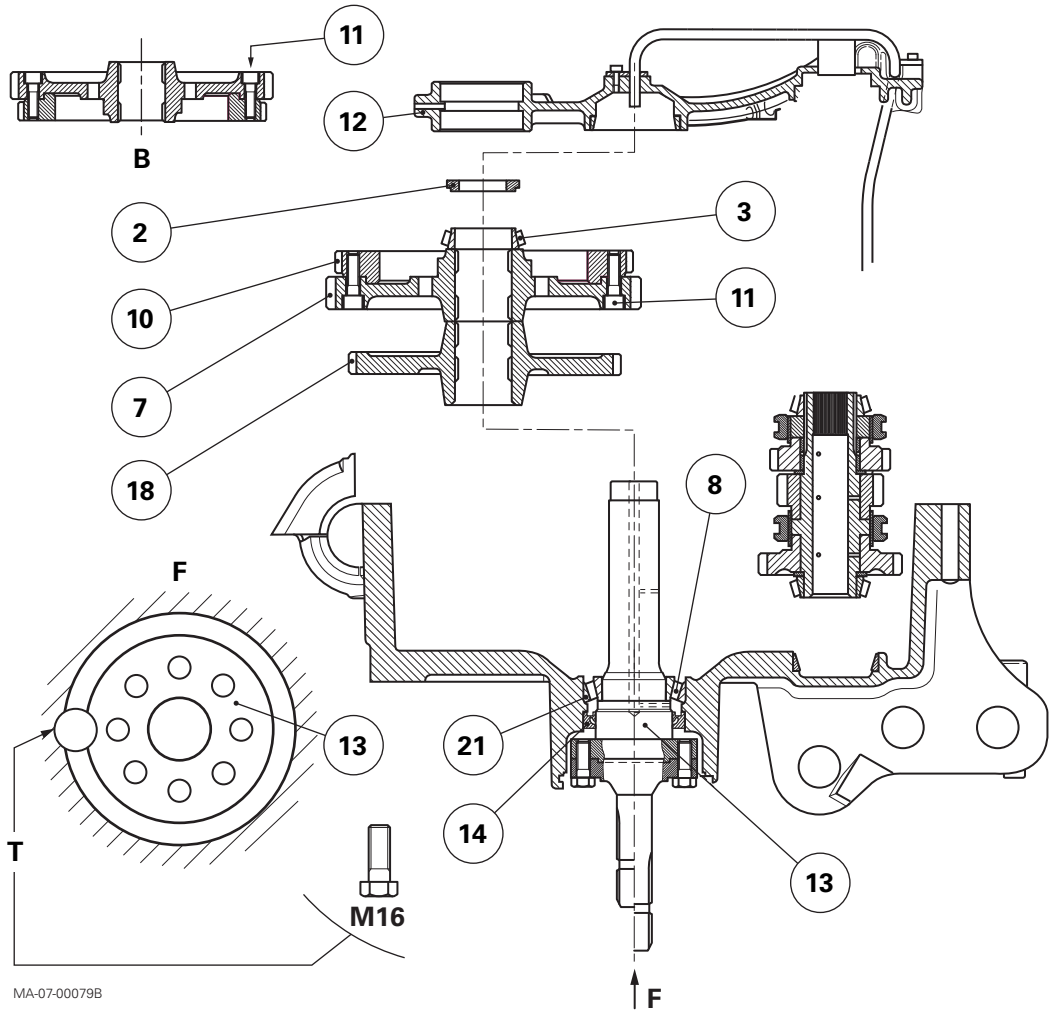

Fig. 7

C . Shimming the output shaft

Fig. 8 540 - 1000 rpm PTO
Fig. 9 540 E PTO

Preparation for shimming (Fig. 8 or Fig. 9 depending on version)

52. Temporarily reassemble the lower PTO shaftline in the rear housing with the output shaft (13), the lubricated bearings and the driven gears.

NOTE: *To reduce the inertia caused by the gears during the alternating movement (right/left) from the output shaft during the shimming operation, it is advisable to temporarily remove the driving gears from the upper shaftline.*

53. Tighten the nut (2) to 160-240 Nm without Loctite (Fig. 6 or Fig. 7 depending on version).

54. In space E of the removable front support (12), slide a shim (23) thickness reduced from 0.15 to a maximum of 0.20 mm in relation to the thickness found during disassembly.

55. Fit the bearing cup (19).

56. Temporarily fix the removable front support (12) to the rear housing of the PTO. Tighten a few opposing V screws to 68-92 Nm.

Shimming (Fig. 8 or Fig. 9 depending on version)

57. If necessary, to obtain a smooth area for the dial gauge feeler pin contact, gently surface the rear end of the output shaft (13) using an oilstone.

58. Fit the dial gauge feeler pin to the end of the output shaft.

59. Push firmly on the output shaft, turning it alternately to the right and left in order to correctly fit the cones in the bearing cups.

60. Set the dial gauge to zero.

61. Repeat step 59 by pulling firmly.

62. According to the temporary clearance reading measured on the dial gauge, determine another shim (23) thickness to obtain a preload P1 = 0 to 0.10 mm.

NOTE: *As far as possible, shim to the maximum tolerance.*

63. Continue the reassembly process by repeating steps 40 to 51.

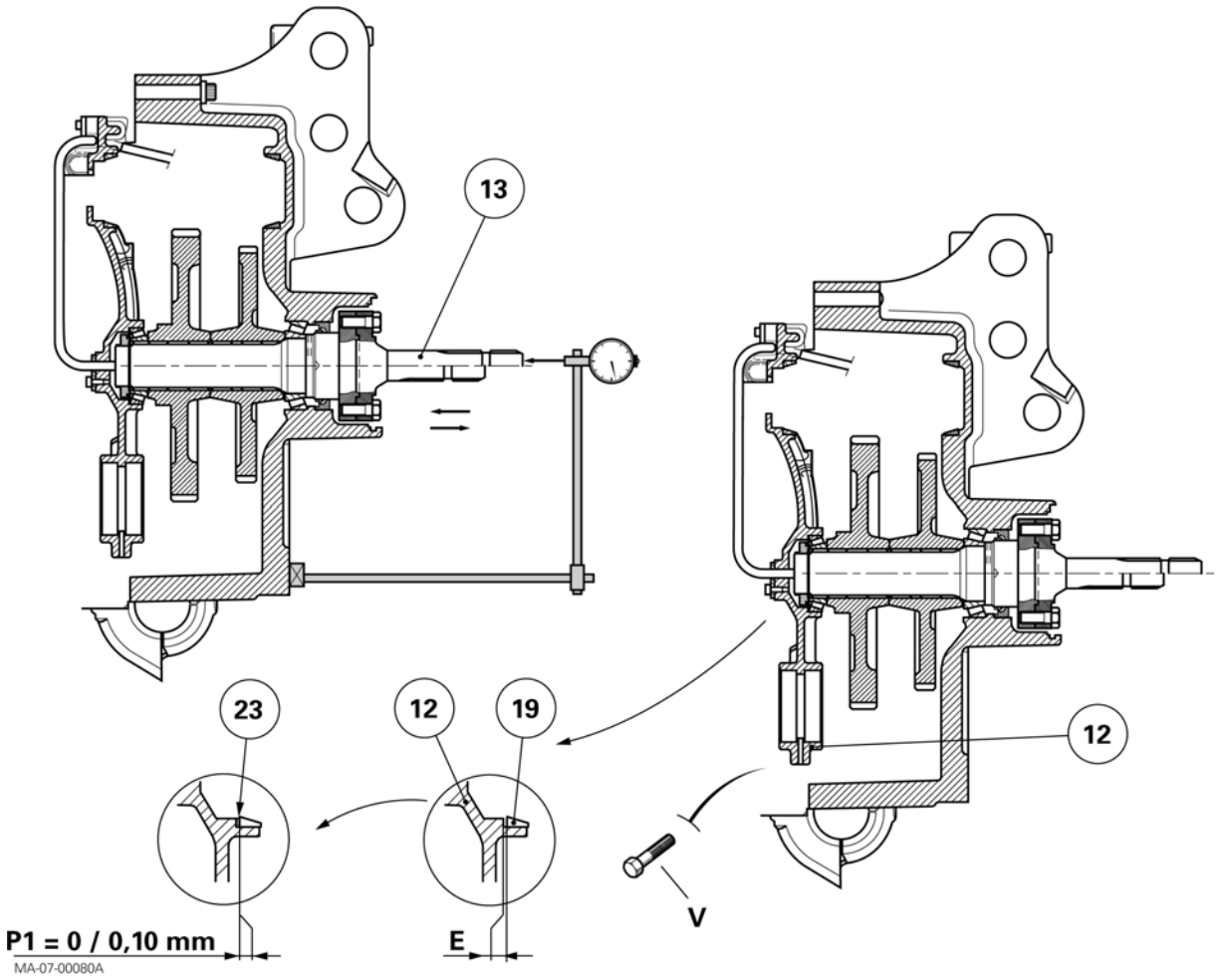

Fig. 8

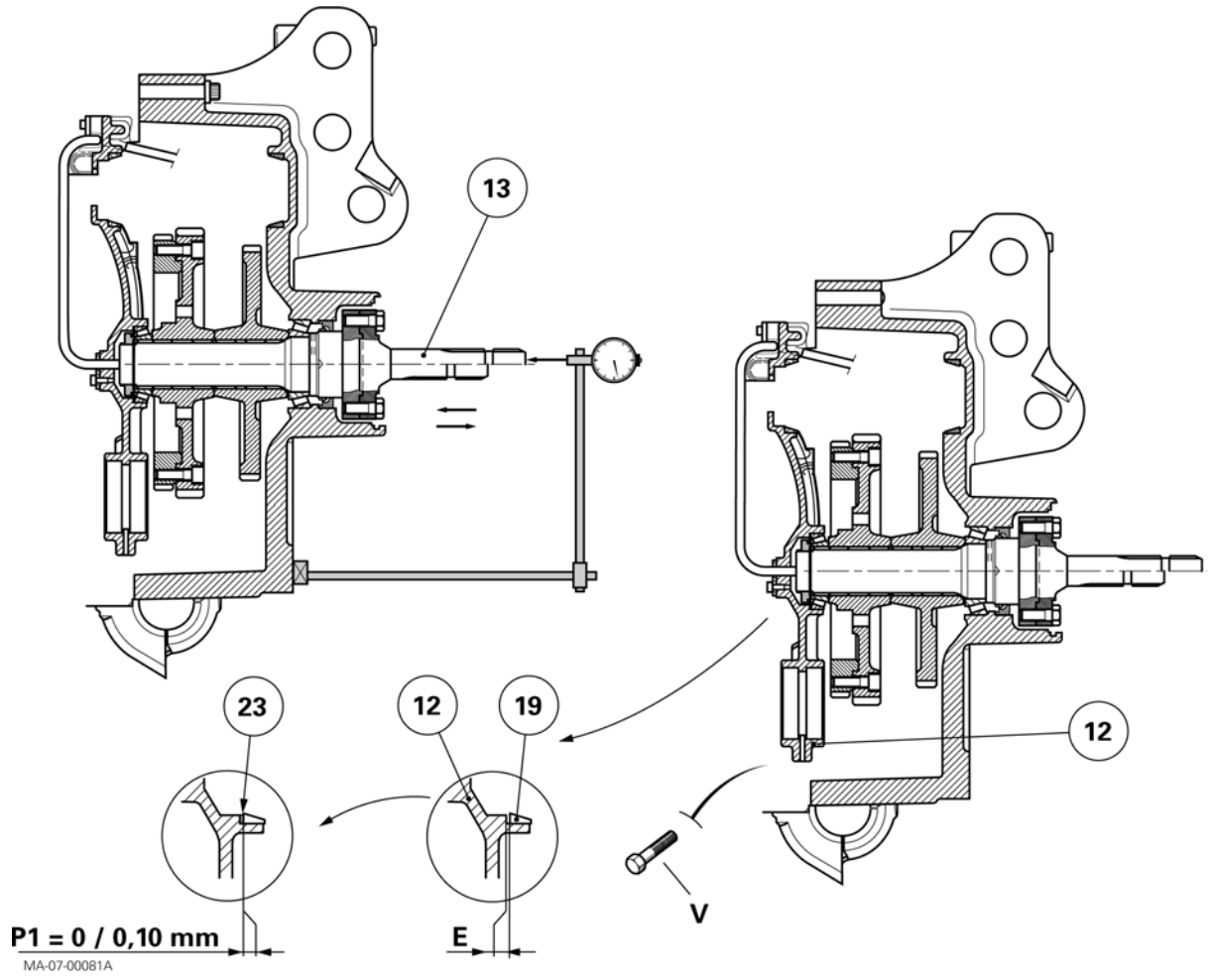

Fig. 9

D . Disassembling and reassembling the rear PTO brake

Disassembly (Fig. 10)

64. Remove the 540 - 1000 rpm or 540 E driven gears (depending on version) (see § B).

65. Remove the friction washer (26) (bi-metal).

66. Using a jet of compressed air, carefully drive out the brake piston (25) from the rear housing of the PTO.

67. Remove the "O" ring (27). Discard it.

Reassembly

68. Clean the hydraulic chamber of the brake piston (25). Check that there is no dirt inside the 17 or 21 bar channel.

69. Fit a new "O" ring (17) in the brake piston (25) groove.

70. Fit the brake piston fitted with its "O" ring in the rear housing of the PTO, positioning its chamfered edge towards the hydraulic chamber.

IMPORTANT: *The chamfer provides a correct hydraulic supply to the brake piston.*

71. Refit the friction washer (26) (bi-metal) to the brake piston, positioning its ribbed face towards the driven gear (18).

NOTE: *The lubrication between the brake piston and the friction washer is provided by splashing caused by the moving parts.*

72. Refit the 540 - 1000 rpm or 540 E driven gears (depending on version) (see § B).

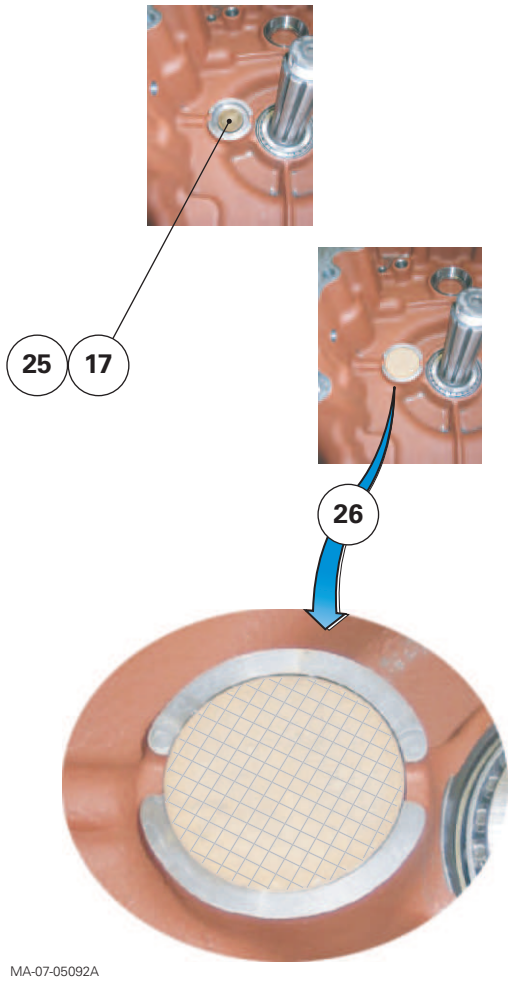

Fig. 10

E . Replacing the interchangeable shaft or flanged shaft

If it is necessary to remove and refit the interchangeable shaft (4), proceed as follows.

73. Immobilise the output shaft (13) (Fig. 11) by inserting a locally obtained V M16 screw in hole T.

74. Unscrew the screws (6).
Remove the interchangeable shaft (4).

75. Check that the dowel (28) is present.

76. Refit the interchangeable shaft.

77. Screw in the screws. Tighten to a torque of 120-140 Nm, immobilising the output shaft (13) beforehand in the same way as described in step 73.

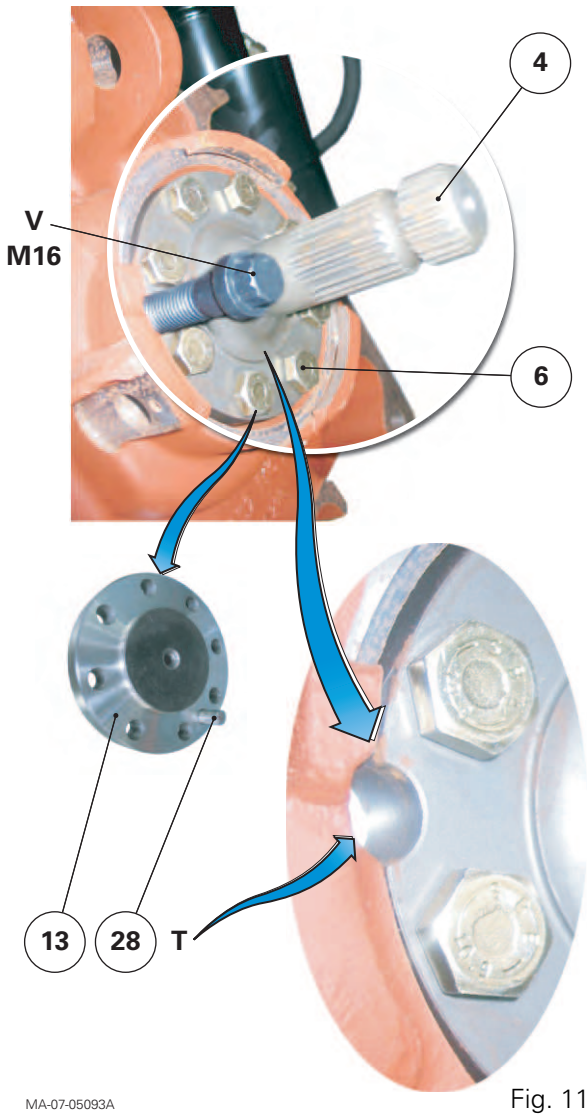

Fig. 11

F . Service tools

Tools available in the AGCO network

- 3378115M1: Tool for fitting the seal (14) into the rear housing of the PTO (Fig. 12)

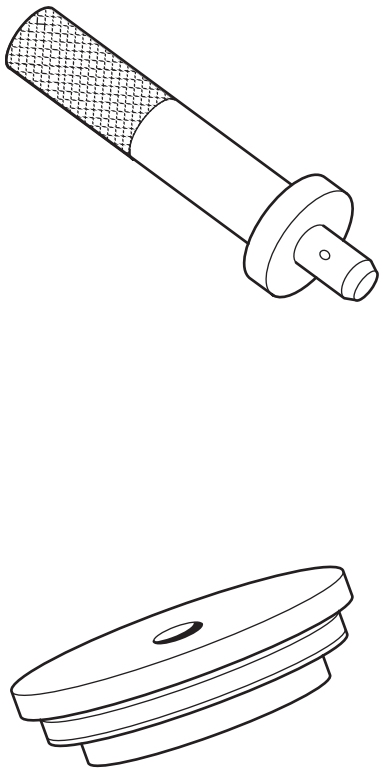

Fig. 12

GPA40 - Output shaft and brake

7B13 - GPA40 - GSPTO

CONTENTS

A . General

GSPTO is an abbreviation of "ground speed power take-off". It may be available (depending on option) on certain types of tractors fitted with GTA1040 or GTA1540 transmission (40 kph only).

In contrast to the independent PTO mechanism where the speed of the rear PTO output shaft depends on the speed of the engine, the GSPTO is driven by the pinion and a set of gears also used by the 4WD clutch unit. The speed of the rear PTO output shaft is therefore proportional to the tractor's travel speed.

Construction

The pinion of the rear crownwheel and pinion supports the driving gear (17), which is constantly meshed with the bell gear (33) of the 4WD clutch unit.

On the GSPTO, the gear (27) is constantly meshed with the driven gear (10), which is attached to the 540 rpm driven gear (7) by the screw (12). This gear is itself splined to the output shaft (13) of the rear PTO.

Operation

The forward movement of the coupler (31) allows the movement transmitted by the gears (17) (33) to travel towards the output shaft (13) of the rear PTO via the shaft (8) and the gears (27) (10).

The coupling is activated by an external rod located at the bottom right of the rear PTO housing. This rod is connected to a cable, which is connected to a control lever accessible from the cab. A switch connected to this control lever electronically controls the engagement of the GSPTO (see chapter 11). When the GSPTO is engaged, the independent 540 - 1000 rpm PTO is deactivated.

Parts list (Fig. 1)

(1) Fork
(2) Selector rail
(3) Circlip
(4) Snap ring
(5) Control pin/finger
(6) Splined sleeve
(7) 540 rpm driven gear
(8) Shaft
(9) Pinion
(10) Driven gear
(11) Bearing cone
(12) Screw
(13) Output shaft
(14) "O" ring
(15) Pushrod screw
(16) Nut
(17) Driving gear (4WD)
(18) Bearing cone
(19) Bearing cup
(20) Shim(s)
(21) Countersunk screw
(22) Chamfered washer
(23) Ball bearing
(24) Circlip
(25) Nut
(26) Sleeve
(27) Driving gear/shaft assembly
(28) Set screw
(29) Hub
(30) Bearing cup
(31) Coupler
(32) 4WD shaft
(33) Bell gear (4WD)

Legend

A Details
B Details
S Removable support

1 GTA1040 version

2 GTA1540 version

View of the assembly

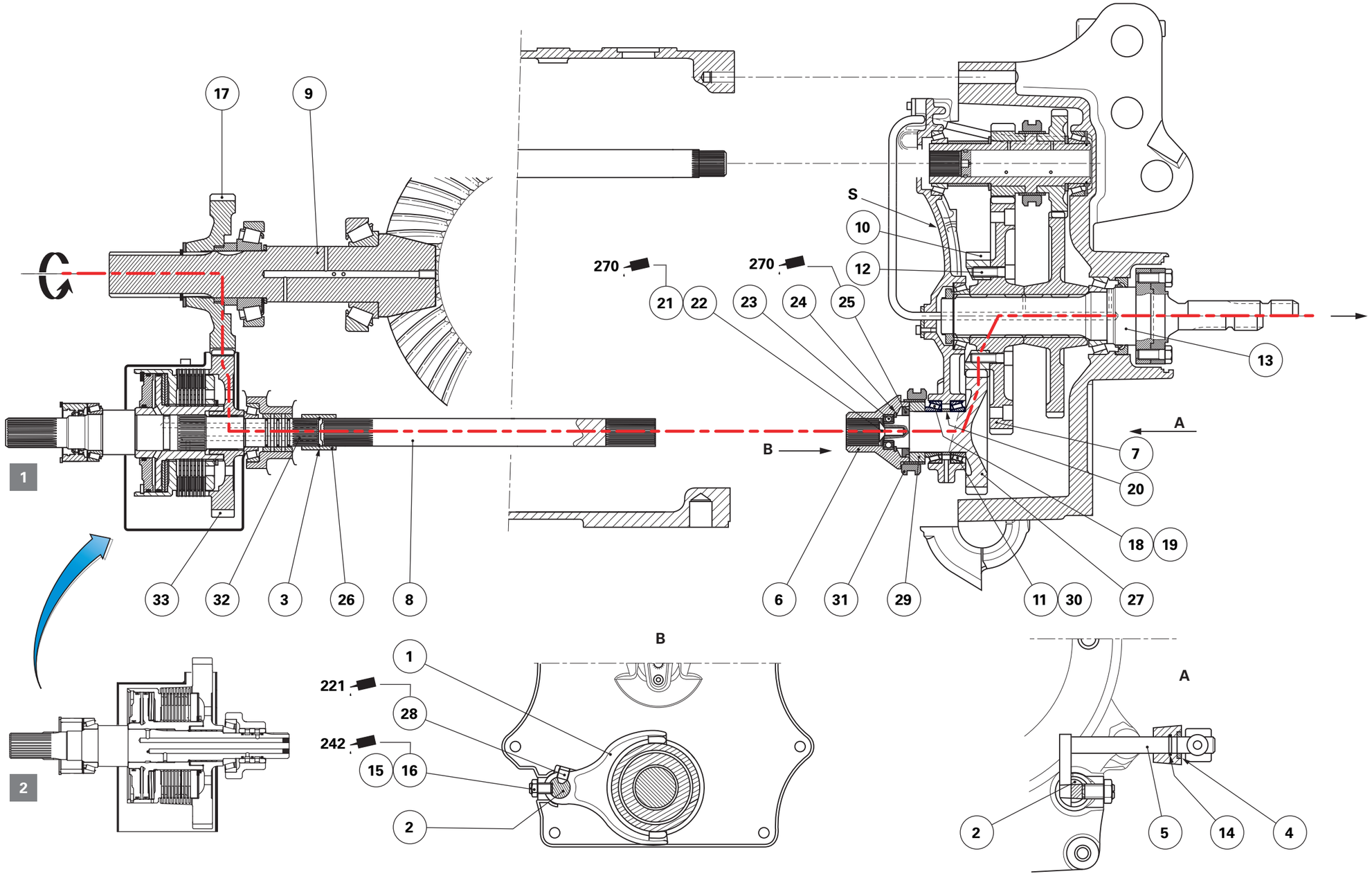

Fig. 1

Parts list (Fig. 2)

(1) Fork
(2) Selector rail
(3) Circlip
(4) Snap ring
(5) Control pin/finger
(6) Splined sleeve
(7) 540 rpm driven gear
(8) Shaft
(10) Driven gear
(11) Bearing cone
(12) Screw
(14) "O" ring
(15) Pushrod screw
(16) Nut
(18) Bearing cone
(19) Bearing cup
(20) Shim(s)
(21) Countersunk screw
(22) Chamfered washer
(23) Ball bearing
(24) Circlip
(25) Nut
(26) Sleeve
(27) Driving gear/shaft assembly
(28) Set screw
(29) Hub
(30) Bearing cup
(31) Coupler
(32) 4WD shaft
(33) Bell gear (4WD)

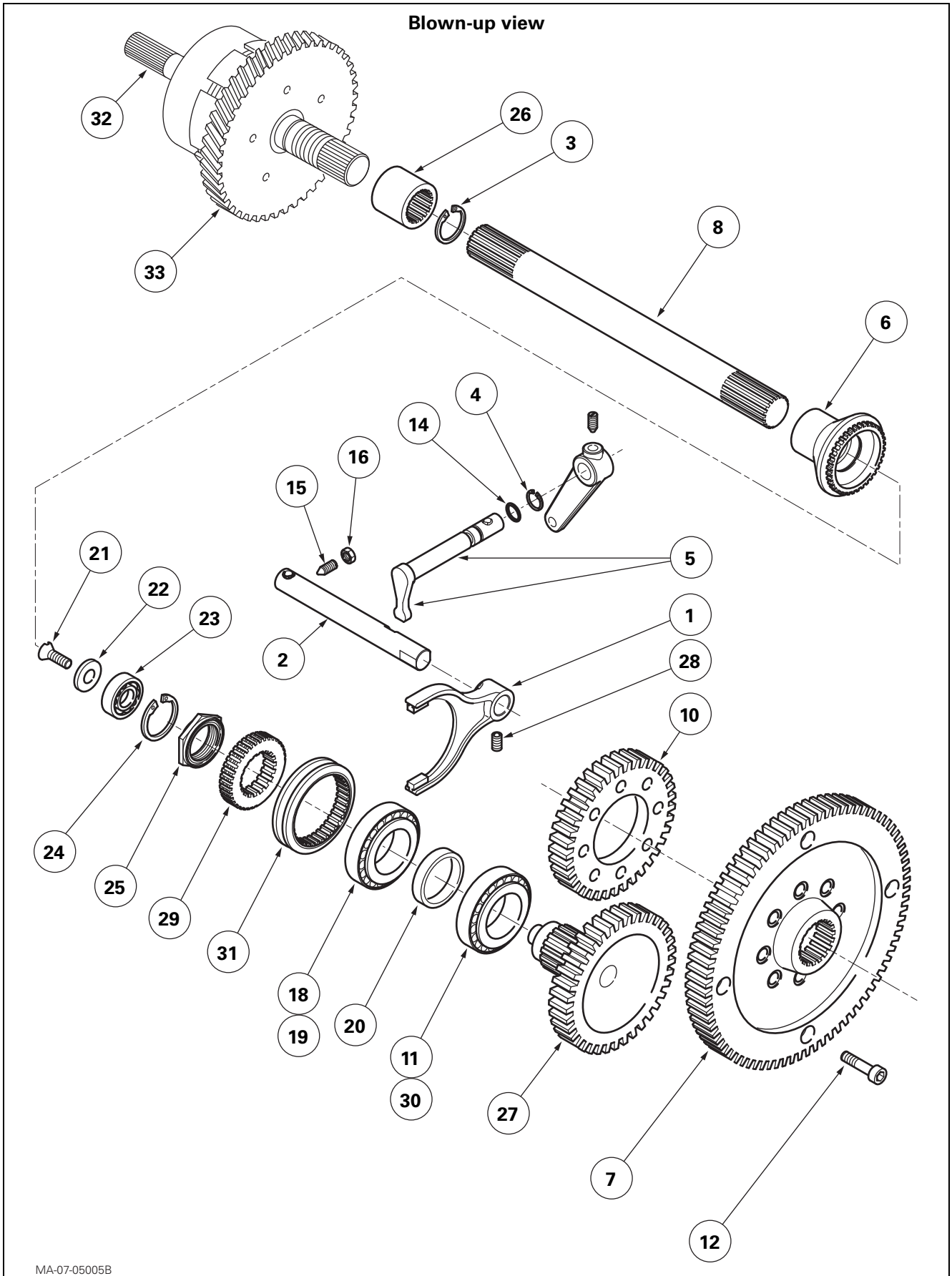
Blown-up view
32
26
3
33
8
6
4
14
16
15
21
22
23
5
2
1
28
10
24
25
29
31
18
19
20
11
30
27
7
12
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Fig. 2

B . Removing and refitting the selection mechanism and adjusting the pushrod screw

Preliminary step

1. Disconnect the PTO housing from the centre housing (see chapter 2).

Removing the selection mechanism

2. Remove rod B (Fig. 3).

3. Remove the snap ring (4) (Fig. 3).

4. Separate the control pin/finger (5) from the selector rail (2). Turn it approx. 90° and pull it out of the PTO housing in order to remove the "O" ring (14) (Fig. 3).

5. Remove the control pin/finger (5) by pushing it along its entire length towards the inside of the PTO housing (Fig. 3).

6. Unscrew the nut (16) and the pushrod screw (15) on the selector rail (2) (Fig. 4).

7. Unscrew the set screw (28) (Fig. 4).
Remove the selector rail (2) and the fork (1) (Fig. 4).

Refitting the selection mechanism

8. Clean and check all components. Replace those that are defective.

9. Refit the fork and the selector rail.

10. Lightly smear the thread of the set screw (28) with Loctite 221 or equivalent. Tighten this screw to a torque of 25-35 Nm (Fig. 4).

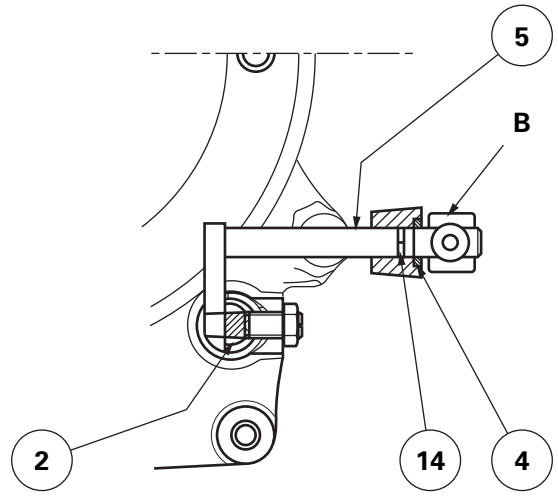


Fig. 3

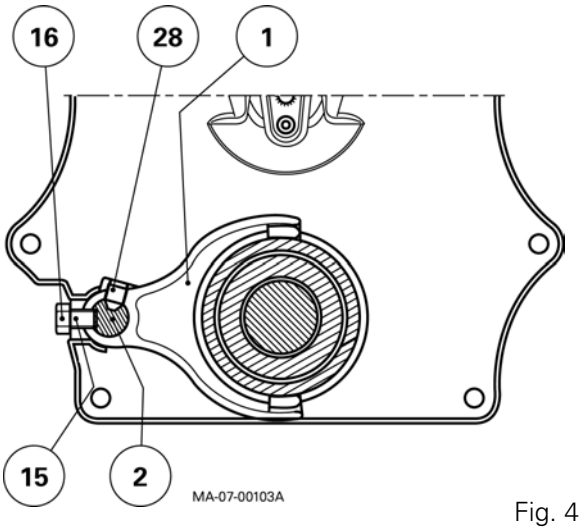


Fig. 4

11. From the inside of the PTO housing, refit the control pin/finger (5) in its position and press it fully back towards the outside of the housing (Fig. 3).

Lubricate a new "O" ring (14) (Fig. 3).

From the outside of the PTO housing, fit the new "O" ring (14) in the groove of the protruding section of the control pin/finger (Fig. 3).

Push the control pin/finger assembly back inside the PTO housing. Position it in the slot on the selector rail (2) (Fig. 3).

12. Refit (Fig. 3):

- a new snap ring (4);
- control rod B.

13. Lightly smear the thread of the screw on control rod B with Loctite 221 or equivalent. Tighten this screw to a torque of 25-35 Nm (Fig. 3).

14. Check the movement of rod B (Fig. 3).

Adjusting the pushrod screw (15)

15. Position the selector rail (2) so that its flat section is opposite the tapped hole of the pushrod screw (15).

16. Tighten the pushrod screw (15) without forcing it in order to compress the ball, then loosen it by one quarter turn.

17. Clean the thread of the pushrod screw (15) and the nut (16).

18. Lightly smear the thread of the nut (16) with Loctite 242 or equivalent. Tighten this nut to 15-20 Nm while holding the pushrod screw in place.

19. Check that the fork lock matches.

Final steps

20. Reconnect the PTO housing to the centre housing (see chapter 2).

21. Start the tractor engine and check the GSPTO operation.

C . Disassembling and reassembling the gears

The GSPTO comprises a driving gear train (17) (33) and a driven gear train (27) (10) located respectively at the front and rear of the centre housing.

22. If work is necessary on the driving gear train (17) (33), proceed as follows:

- To access the gear (17) (GTA1040 and GTA1540 transmission (40 kph only))
  - Disconnect the tractor between the gearbox and the centre housing (see chapter 2).
  - Remove the gear (17) (see chapter 6, section on the GPA40 pinion).
- To access the gear (33) (GTA1040 transmission)
  - Remove the 4WD clutch unit (see chapter 8).
- To access the gear (33) (GTA1540 transmission (40 kph only))
  - Disconnect the tractor between the gearbox and the centre housing (see chapter 2).
  - Remove the 4WD clutch unit (see chapter 8).

23. If work is necessary on the driven gear train (27) (10) (all types of transmission except GTA1540 (50 kph)), remove the rear PTO housing (see chapter 2).

NOTE: *The lower bearing and removable support S are also removed with this housing during the operation.*

Preliminary step

24. Disconnect the PTO housing from the centre housing (see chapter 2).

Disassembly (Fig. 5)

25. Place the housing in a horizontal position with the gears facing upwards as required.

26. Loosen the nut (16) and the pushrod screw (15) for the 540 - 1000 rpm selector rail (see chapter 7, section on the GPA40 intermediate shaft and driving gears).

27. Remove the GSPTO selection mechanism (see § B).

28. Loosen the countersunk screw (21). Recover the chamfered washer (22).

29. Remove the splined sleeve (6).

30. Unlock the nut (25).

31. Immobilise the output shaft using a locally obtained M16 screw (see chapter 7, section on the GPA40 output shaft and brake). Partially loosen the nut (25) using a standard socket (55 mm flat).

NOTE: *The nut (25) must be unlocked before removing removable support S in order to take advantage of the opportunity to lock the output shaft (13) with the M16 screw.*

32. Remove removable support S using bearings at the front ends of the PTO shafts (upper and lower).

33. Finish unscrewing the nut (25) and remove it.

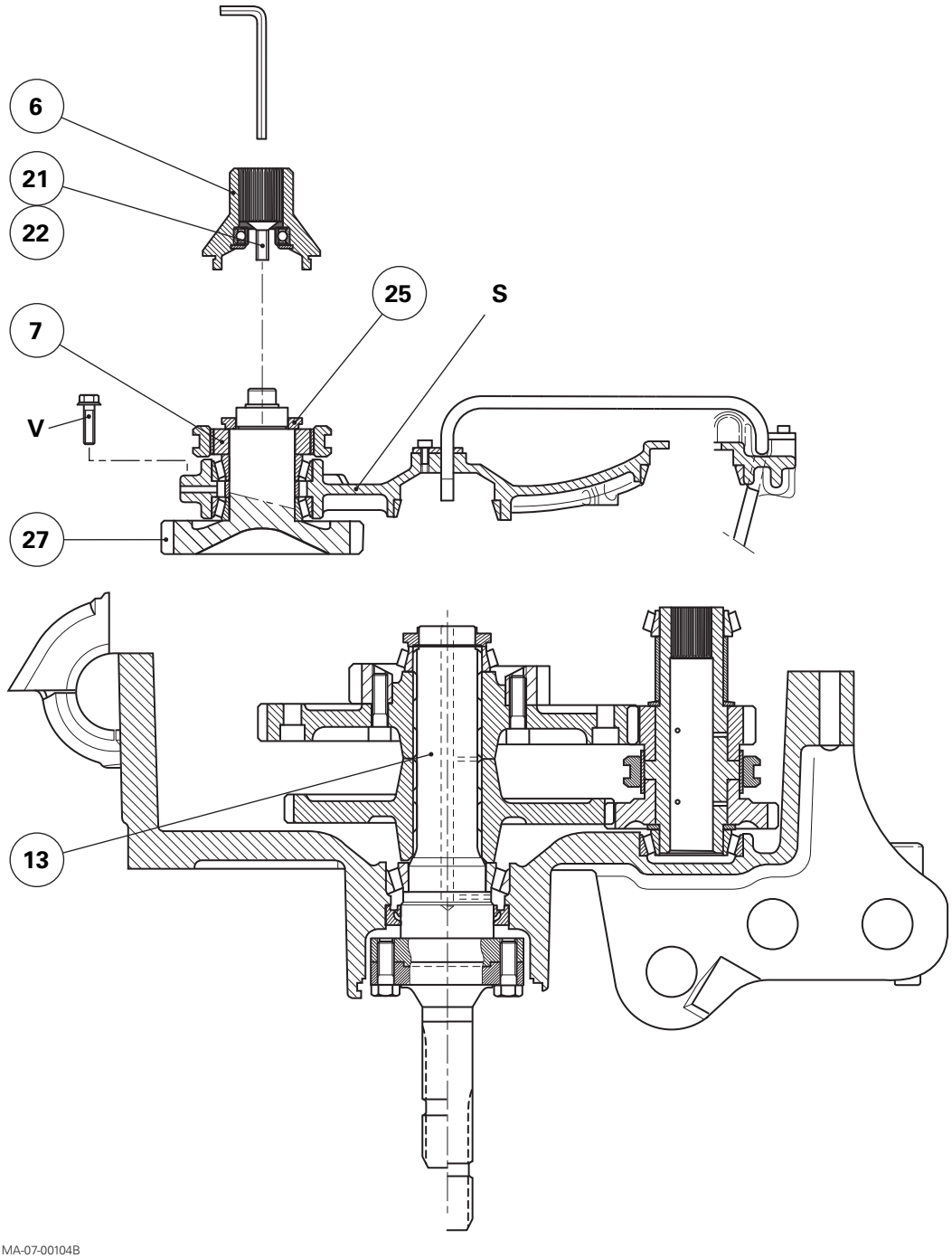


Fig. 5

34. Also remove (Fig. 6):
- the hub (29) and the coupler (31);
- the bearing cone (18) (to be paired with the cup (19) if it is to be re-used);
- the shims (20);
- the bearing cone (11) (to be paired with the cup (30) if it is to be re-used);
- the gear/shaft assembly (27).

35. Drive out the bearing cups (19) (30) from the removable support.

36. If necessary, visually note the position of the shaft (8) and remove it along with the sleeve (26). Remove the circlip (3) (Fig. 1).

IMPORTANT: *The undercut end of the shaft (8) is positioned towards the 4WD clutch unit.*

37. If necessary, remove the driven gear (10), which is centred and fitted to the 540 rpm gear (7) via a screw (Fig. 1).

NOTE: *The method of fitting one gear against another has already been used in chapter 7 in the section on the GPA40 output shaft and brake).*

38. Strip the sleeve (6) (Fig. 7) by carrying out the following steps:
- Remove the circlip (24).
- Drive out the ball bearing (23).

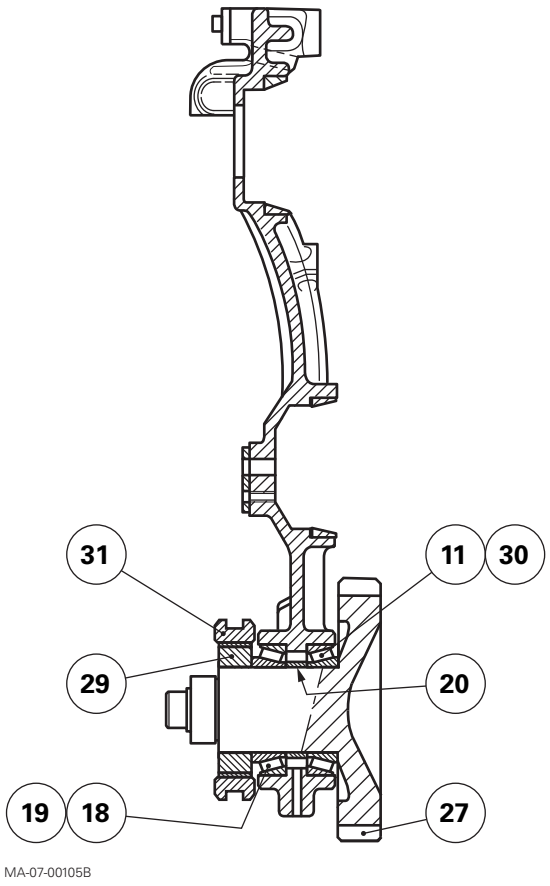


Fig. 6

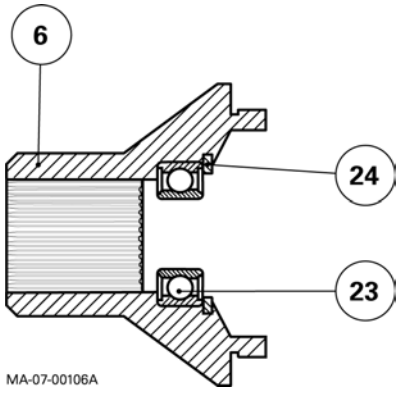


Fig. 7

Reassembly

39. Clean and check all components. Replace those that are defective.

40. Assemble the sleeve by carrying out the following steps:

- Fit the ball bearing (23) using a suitable fitting drift whose external diameter should be slightly less than the external diameter of the ball bearing.
- Refit the circlip (24).

41. If necessary, refit:

- the driven gear (10) (see chapter 7, section on GPA40 output shaft and brake);
- the circlip (3) in the sleeve (26);
- the shaft (8) as per the position noted in step 36.

42. Fit the bearing cups (19) (30) against the removable support cord.

43. Shim the bearings (11) (30) and (18) (19) of the gear/shaft assembly (27) (see § D).

44. Refit the removable support. Tighten the V screws to a torque of 68-92 Nm (Fig. 5).

45. Clean the threads of the new nut (25) and the gear pin (27).

Lightly smear the nut thread with Loctite 270 or equivalent.

46. Immobilise the output shaft as per the method used in step 31.

47. Correctly position the nut. Definitively tighten to 160-240 Nm.

48. Using a suitable punch, lock the nut in place by bending the collar into the grooves of the shaft without breaking it.

49. Refit the coupler (31) and the splined sleeve (6).

Correctly position the chamfered washer (22) and fit it to the ball bearing (23).

Lightly smear the thread of the countersunk screw (21) with Loctite 270 or equivalent. Tighten this screw to a torque of 24-28 Nm.

50. Refit and adjust the GSPTO selection mechanism (see § B).

51. Fit the pushrod screw (15) and the nut (16) of the 540 - 1000 rpm selector rail.

Adjust the pushrod screw (see chapter 7, section on GPA40 intermediate shaft and driving gears).

Final steps

52. Reconnect the PTO housing to the centre housing (see chapter 2).

53. Start the tractor engine and check the GSPTO operation.

D . Shimming the gear/shaft assembly bearings

The gear/shaft assembly (27) is shimmed with removable support S (Fig. 8). The removable support must be removed from the rear PTO housing assembly and clamped in a vice fitted with protective jaws.

Preparing for shimming (Fig. 8)

54. Assemble the gear/shaft assembly (27) with the bearing cones (11) (18) lightly lubricated. Separate the bearing cones by a shim (20) thickness in order to obtain a temporary clearance of approx. 0.10 to 0.15 mm.

55. Refit the hub (29).

56. Immobilise the gear/shaft assembly (27) using a makeshift tool. Temporarily tighten the nut (25) to 30 - 50 Nm with no Loctite on its thread.

Shimming (Fig. 8)

57. Place the feeler pin of a dial gauge on the end of the gear/shaft assembly (27).

58. Using the appropriate levers, apply diametrically opposed pressure on the gear of the gear/shaft assembly (27) by pulling on this assembly in order to fit the cone (18) in its bearing cup.

59. With the help of an operator, set the dial gauge needle to zero.

60. Repeat step 58, pulling on the hub (29) in order to fit the cone (11) in its bearing cup.

61. According to the temporary clearance reading measured on the dial gauge, determine another shim (20) thickness to obtain a preload P1 = 0.05 to 0.15 mm.

NOTE: *As far as possible, shim to the maximum tolerance.*

62. Loosen and remove the nut. Remove the hub (29) and the bearing cone (18).

63. Fit the shims determined in step 61 between the two bearing cones (11) (18).

64. Refit the hub. Lock the nut (25) again to a torque of 30-50 Nm, with no Loctite on its thread, in order to manually check the rotation of the gear.

65. Continue the reassembly process by repeating steps 44 to 53.

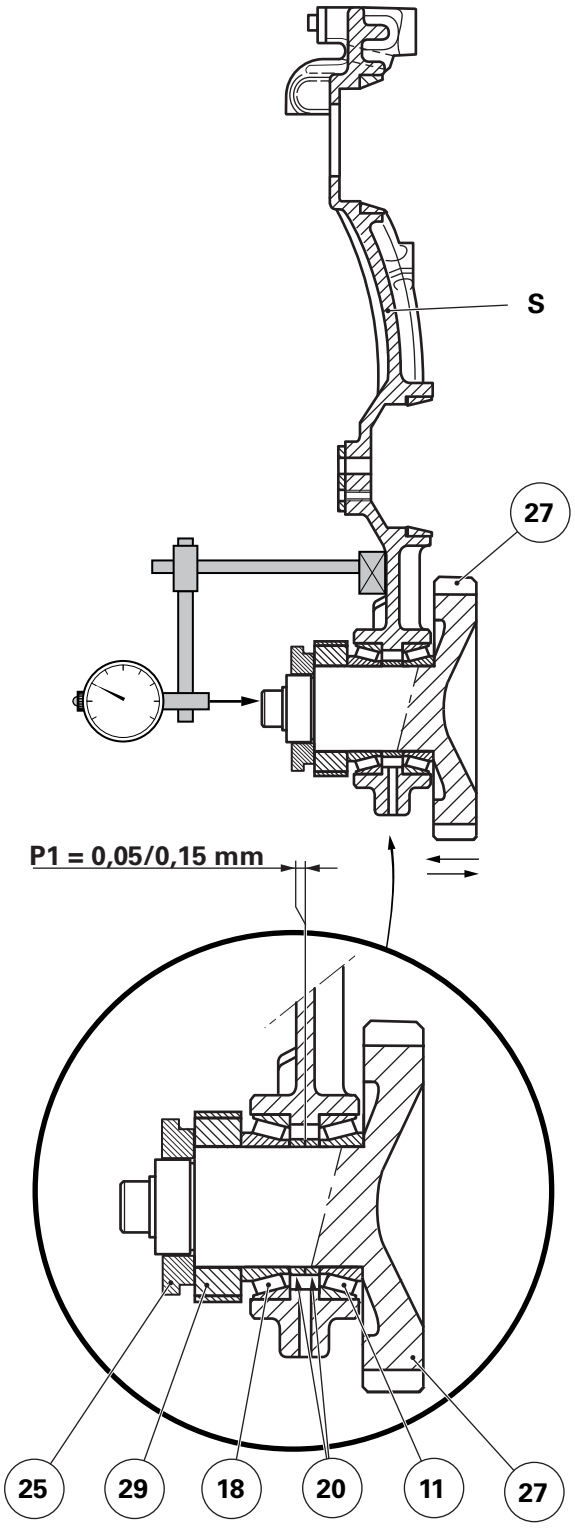


Fig. 8

E . Assembling and adjusting the control

Parts list (Fig. 9)

(1) Lever
(2) Clevises
(4) Cable
(5) Support
(6) Switch
(7) Stops
(8) Pin
(9) Clips
(10) Connecting rod

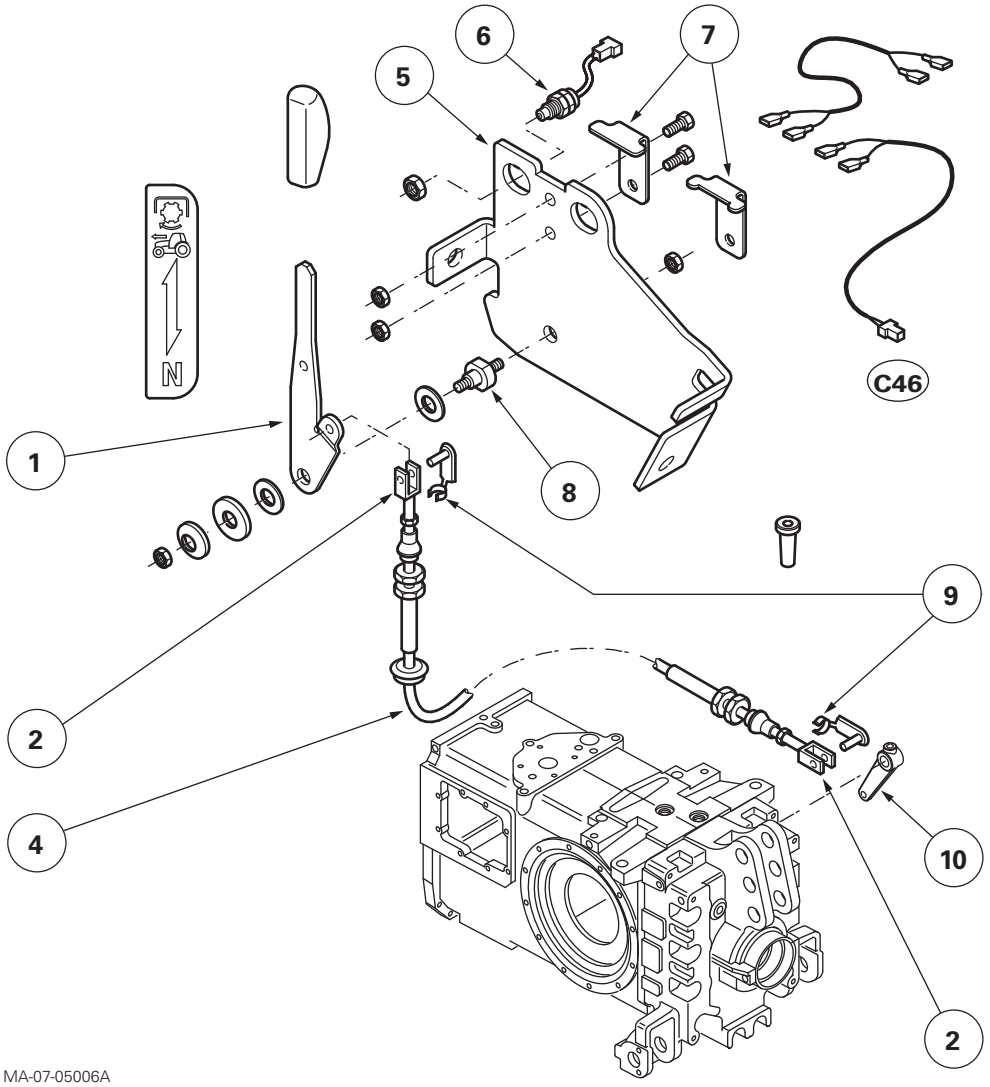


Fig. 9

Fitting the control, lever side (Fig. 10)

Preparing the cable

66. If possible, tighten the clevis (2) to the maximum against the cable (4).
Tighten the nut (3).

Assembly

67. Link the clevis to the lever (1) using the clip (9).

68. Tighten the sheath end to the support (5) using nuts (11).

Fitting and adjusting the control, centre housing side (Fig. 10)

Preparing the cable

69. If possible, tighten the clevis (2) to the maximum against the cable (4).
Tighten the nut (3).

Assembly

70. Slide the sheath end of the cable onto the support fitted to the right of the housing assembly.

71. Place the lever (1) and the rod (10) in GSPTO position.

72. Connect the clevis (2) to the rod (10) using the clip (9).

Settings

73. Adjust the sheath end on the support using the nuts (11) and without moving the rod (10). Tighten the nuts.

74. Check that the control moves freely in each position (neutral and engaged).
IMPORTANT: *The coupler (31) (Fig. 11) has spur cut teeth: it can only be controlled if the tractor is almost stationary.*

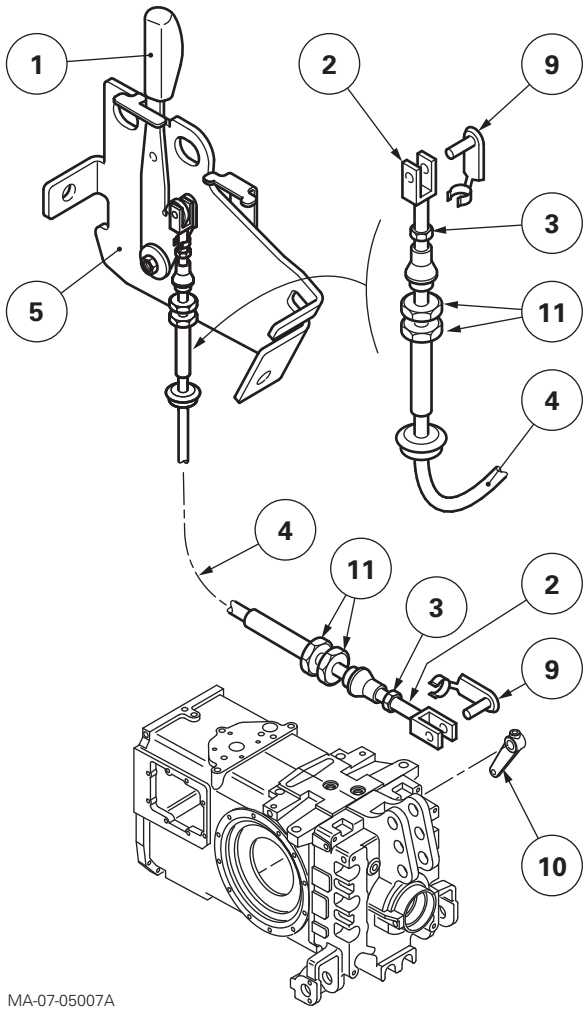


Fig. 10

Fig. 11

7B14 - GPA40 - Clutch

CONTENTS

A . General

Rear PTO clutch engagement and disengagement are controlled electrically by a proportional solenoid valve, which is itself controlled by the tractor's electronic system.

The clutch, located at the front and in the upper section of the centre housing, controls the operation of the rear PTO. It is connected in rotation to the engine flywheel via a vibration damper fixed to the flywheel and a line comprising two shafts. It consists of a unit (9) supported by two ball bearings (2) (7) centred in a support (32) fitted to the centre housing. The sleeve (27) supports the ball bearing (22), the drive hub (21) and the piston (10).

The clutch housing (9) comprises:

- at the front, a helical gear (28), fixed using screws, which transmits the movement to the hydraulic pumps.

  NOTE: *For tractors fitted with GTA1540 transmission, gear P1 (28) has spur cut teeth (Fig. 1, Fig. 2). It is also fixed using screws;*
- at the rear, a bell housing (15) with a set of discs (17) and intermediate plates (14).

A sealing ring (3) (Fig. 1) minimises leakage between the rear end of the gearbox upper shaft and the clutch unit (9).

B . Operation

Clutch engaged position

The rear PTO clutch is supplied via the 17 bar (tractors fitted with GTA1040 transmission) or 21 bar (tractors fitted with GTA1540 transmission) low pressure hydraulic system and via a proportional solenoid valve fitted to the right-hand hydraulic cover plate.

A transfer pipe hydraulically links the right-hand hydraulic cover plate and the clutch support (32).

Pressurised oil enters the unit (9) through hole P (Fig. 1) and then flows to the rear of the piston (10) via an internal channel. It pushes the piston, which compresses the discs (17) and the intermediate plates (14). The intermediate plates are attached to the bell housing (15) by lugs. The discs are splined to the hub (21). The movement is then transmitted to the rear PTO driving gears via a shaft (35).

When the clutch is engaged, the PTO brake piston located in the rear housing is at rest and releases the lower PTO shaftline (see chapter 7).

Clutch disengaged position

If the solenoid valve is no longer supplying the rear PTO clutch, the piston (10) is returned against the unit (9) by the spring (18). The oil in the piston chamber is directed to the return by the solenoid valve.

The valve ball (8) leaves its seat, thus assisting the decompression of the chamber.

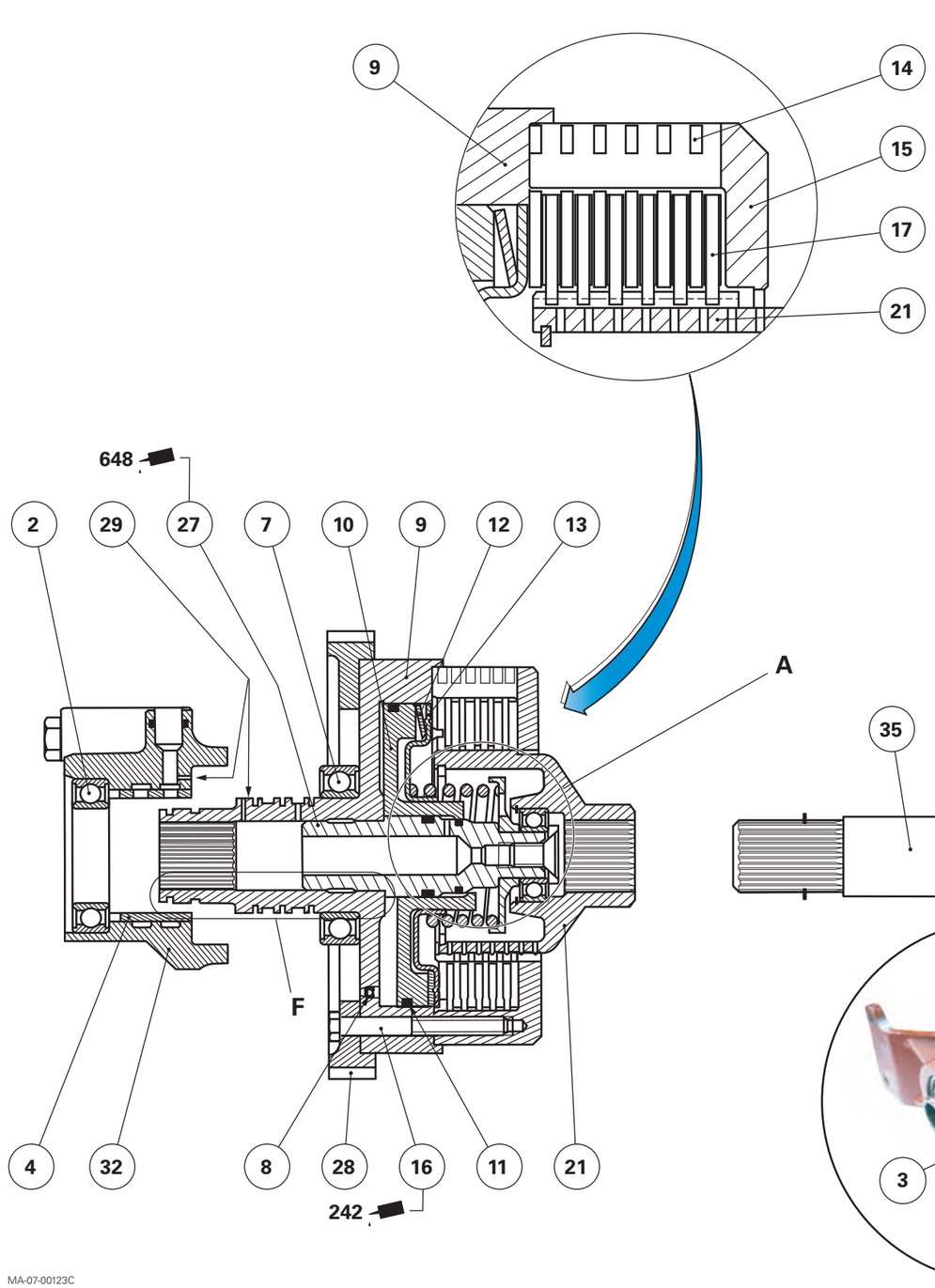
Parts list (Fig. 1)

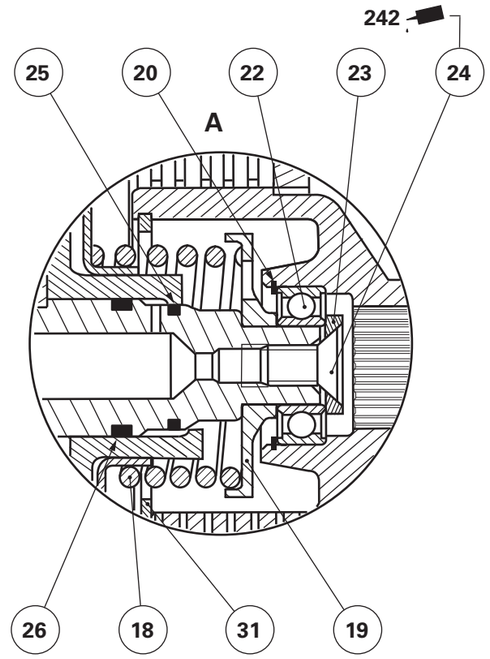
(1) Circlip
(2) Ball bearings
(3) Sealing ring
(4) Ring
(5) Seal rings
(7) Ball bearing
(8) Valve
(9) Clutch unit
(10) Piston
(11) "O" ring
(12) Belleville progressivity washers
(13) Spring support
(14) Intermediate plates
(15) Bell housing
(16) Screw
(17) Discs
(18) Spring
(19) Spring seat
(20) Snap ring
(21) Drive hub
(22) Ball bearing
(23) Chamfered washer
(24) Countersunk screw
(25) "O" ring
(26) "O" ring
(27) Sleeve
(28) Gear
(29) Restrictors
(31) Circlip used for oil deflector
(32) Clutch support
(35) Shaft

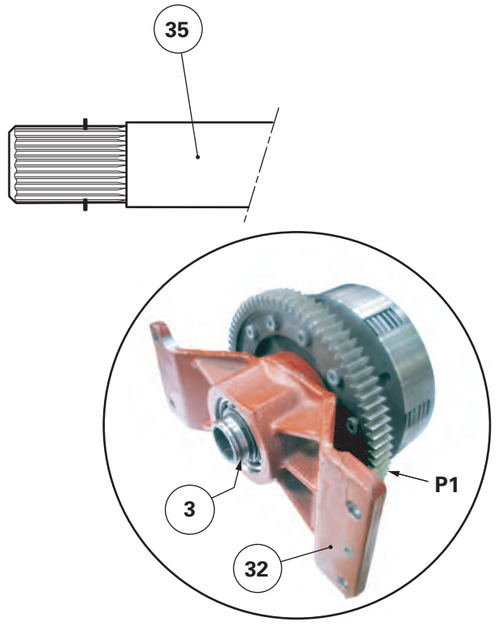
Legend

A Details
L Lubrication groove
P Low pressure groove (17 or 21 bar)
P1 Gear with spur cut teeth (tractors fitted with GTA1540 transmission)

View of the assembly







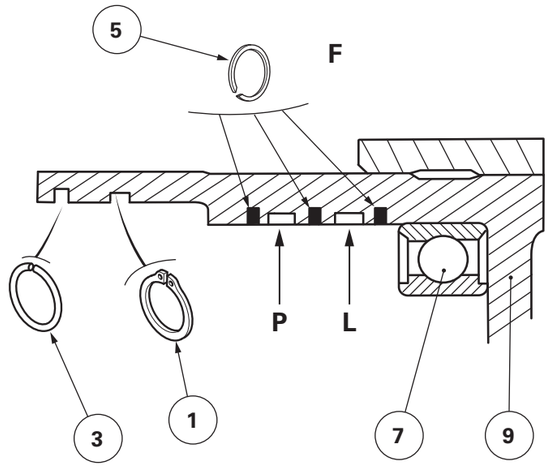


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Fig. 1

Parts list (Fig. 2)

(1) Circlip
(2) Ball bearings
(3) Sealing ring
(4) Ring
(5) Seal rings
(7) Ball bearing
(9) Clutch unit
(10) Piston
(11) "O" ring
(12) Belleville progressivity washers
(13) Spring support
(14) Intermediate plates
(15) Bell housing
(16) Screw
(17) Discs
(18) Spring
(19) Spring seat
(20) Snap ring
(21) Drive hub
(22) Ball bearing
(23) Chamfered washer
(24) Countersunk screw
(25) "O" ring
(26) "O" ring
(27) Sleeve
(28) Gear
(31) Circlip used for oil deflector
(32) Clutch support
(35) Shaft

Legend

P1 Gear with spur cut teeth (tractors fitted with GTA1540 transmission)

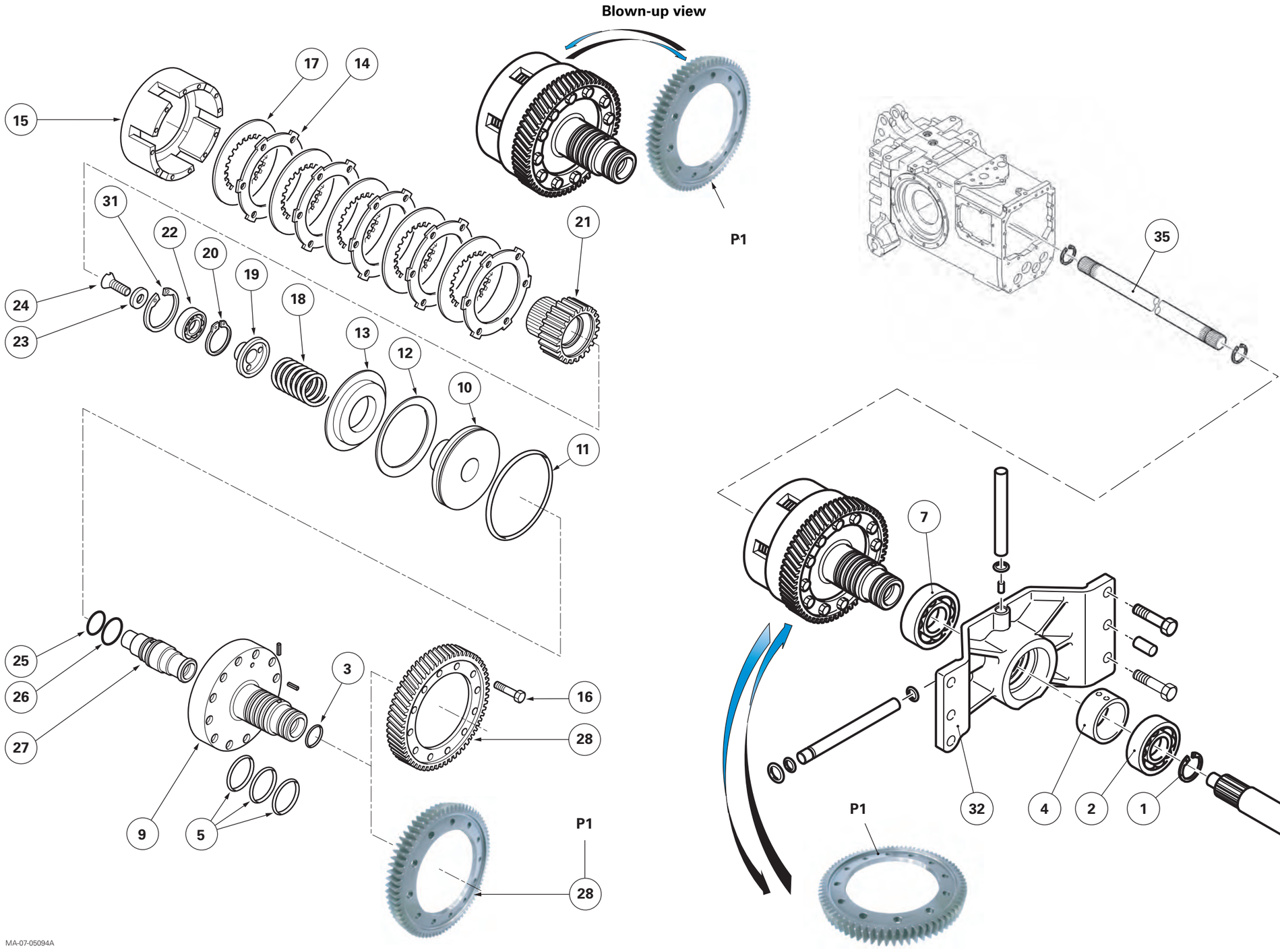
Blown-up view
P1
15
17
14
31
22
20
19
18
21
24
23
13
12
10
11
25
26
27
9
5
3
16
28
P1
28
MA-07-05094A
35
7
32
4
2
1
P1

Fig. 2

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C . Removing and refitting the clutch

To remove the rear PTO clutch, the tractor must be separated between the gearbox and the rear axle.

Preliminary steps

1. Disconnect the tractor between the gearbox and the rear axle (see chapter 2).
2. Remove the right-hand hydraulic cover plate (see chapter 9).
3. Remove the 17-bar hydraulic pipe (tractors fitted with GTA1040 transmission) or 21-bar hydraulic pipe (tractors fitted with GTA1540 transmission). This pipe is located at the top right of the mating face of the right-hand hydraulic cover plate on the centre housing. It links the clutch and the right-hand hydraulic cover plate.
4. Remove:
   - the union and the transfer pipe, which are fitted above the centre housing and are used to lubricate the clutch;
   - the sensor (1) (tractors fitted with GTA1040 transmission) (Fig. 3);
   - the sensors (1) and (2) (tractors fitted with GTA1540 transmission) (Fig. 3).

   NOTE: *The sensor (1) (output speed) and sensor (2) (input speed) are located above the centre housing. They inform the tractor's electronic system of the clutch behaviour.*

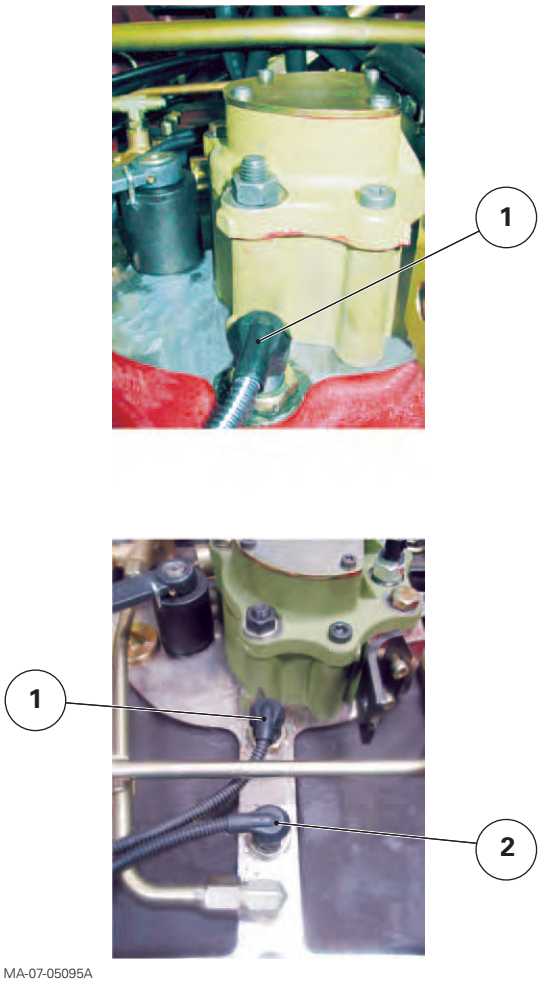


Fig. 3

Removal (Fig. 4)

5. Unscrew the four M12 V screws. These screws fix the support (32) of the rear PTO clutch to the centre housing.

6. Using a suitable tool and the original PTO shaft, remove the clutch complete with support (32) from the centre housing.

NOTE: *The support (32) is positioned on the centre housing via two pins P.*

7. Remove:

- the sealing ring (3);
- the circlip (1).

Separate the support (32) from the rear PTO clutch.

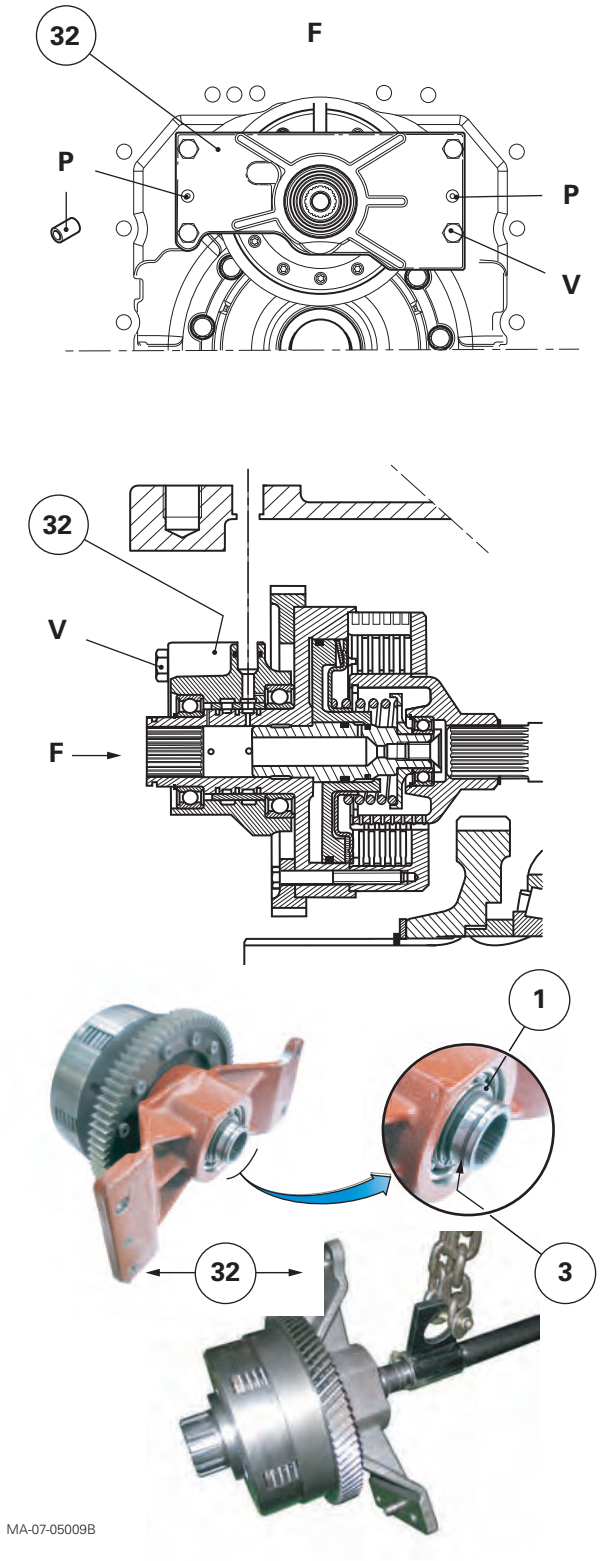


Fig. 4

Refitting

8. Check the bore of the ring (4) for correct surface condition. If the diagnosis is inconclusive, replace the defective part(s).

Check that the seal rings (5) do not show any of the following:

- hardness;
- chipping;
- cuts.

IMPORTANT: *Damage to the rings, even if it is minor, risks causing a leak followed by a drop in pressure, which could disrupt the operation of the clutch.*

9. If removed, using a press and a suitable fixture, fit and position the ring (4) at a distance of 0.50 mm. This distance is measured between mating face F of the bearing on the support (32) and the end of the ring (4) (Fig. 5).

10. Check that the hydraulic ports are not obstructed.

11. Test fit the seal rings (5), new or reused, into the grooves of the shaft of the clutch unit (9).

Check that the seal rings turn freely in their grooves.

After this check:

- remove the seal rings and lightly smear with miscible grease;
- definitively refit the seal rings;
- check that the ends of the seal rings do not protrude beyond the rim of the shaft of the clutch unit (9).

12. Slide the support (32) onto the rear PTO clutch.

13. Fit the circlip (1) (Fig. 1) on the shaft of the clutch unit (9).

Check that the circlip is correctly at the base of the groove.

IMPORTANT: *Check that the PTO clutch is not obstructed against its support (32) by ensuring there is a slight clearance between the support and the clutch.*

14. Refit the sealing ring (3) located at the end of the shaft of the clutch unit (9).

15. Check that the pins (P) are present (Fig. 4).

Refit the clutch and its support (32) (Fig. 4).

16. Fit and tighten screws V to 100-130 Nm (Fig. 4).

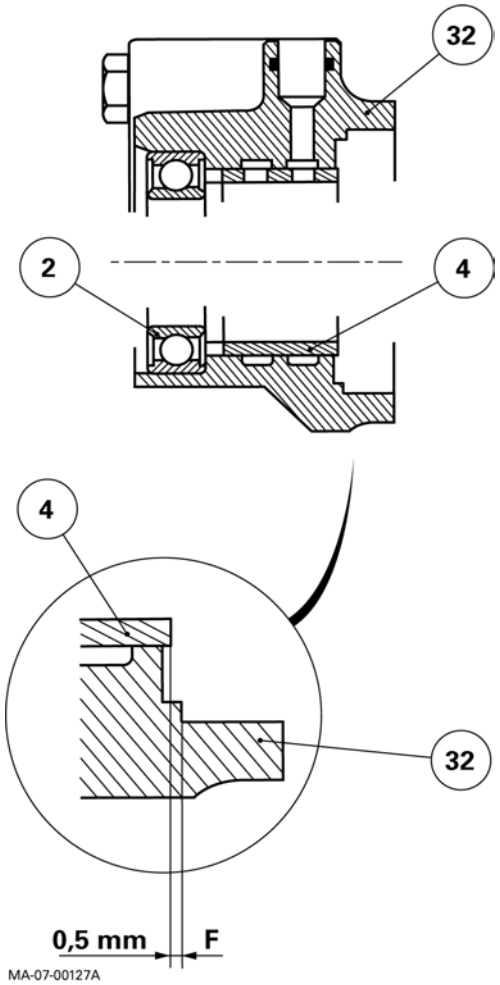


Fig. 5

Final steps

17. Refit:
- the transfer pipe and union used to lubricate the clutch;
- the 17-bar hydraulic pipe (tractors fitted with GTA1040 transmission) or 21-bar hydraulic pipe (tractors fitted with GTA1540 transmission) located between the clutch and the right-hand hydraulic cover plate.

18. Refit the sensor(s) by proceeding as follows:
- GTA1040 transmission (Fig. 6)
  - Lightly smear the sensor thread (1) with Loctite FORM A Gasket 2 or equivalent.
  - Tighten home the sensor, without forcing, until its end is positioned against the drive hub (21).
  - Unscrew the sensor by three quarters of a turn.
  - Moderately tighten the nut.
- GTA1540 transmission (Fig. 6)
  - Lightly smear the sensor thread (1) with Loctite FORM A Gasket 2 or equivalent.
  - Tighten home the sensor, without forcing, until its end is positioned against the drive hub (21).
  - Unscrew the sensor by three quarters of a turn.
  - Moderately tighten the nut.
  - Lightly smear the sensor thread (2) with Loctite FORM A Gasket 2 or equivalent.
  - Tighten home the sensor, without forcing, until its end is positioned against the clutch unit (9).
  - Unscrew the sensor by three quarters of a turn.
  - Moderately tighten the nut.

19. Refit the right-hand hydraulic cover plate (see chapter 9).

Manually check the backlash between the gear (28) and the hydraulic-pump-driven gears (Load Sensing 110 l/min hydraulic equipment).

20. Reconnect the tractor between the gearbox and the rear axle (see chapter 2).

21. Start the engine.

Check:
- the operation of the clutch and all hydraulic components;
- the tightness of the systems.

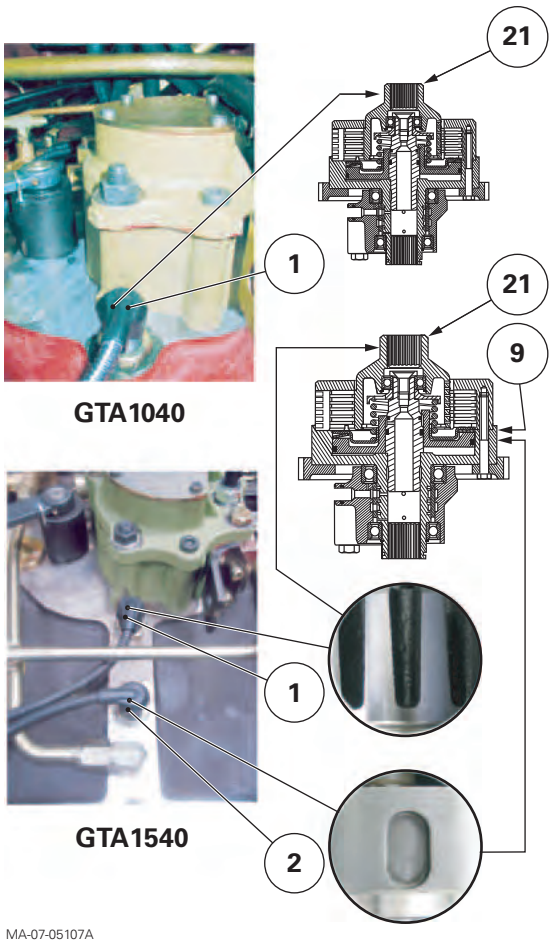


Fig. 6

D . Disassembling and reassembling the clutch

Preliminary steps

22. Remove the clutch (see § C).

23. Separate the clutch from its support (see § C).

Disassembly (Fig. 1)

24. Remove the seal rings (5). If necessary, discard them.

25. Remove the screws (16).

Remove:

- the bell housing (15);
- the discs (17) and intermediate plates (14) (Fig. 7);
- the drive gear (28)

26. Secure the front part of the clutch unit (9) in a vice fitted with protective jaws.

27. Remove the screw (24), using a makeshift tool to hold back the spring (18) (Fig. 8 and § E).

Remove the chamfered washer (23).

28. Gradually release the spring (18) using the tool.

Remove (Fig. 8):

- the hub (21);
- the seat (19);
- the spring (18);
- the support (13);
- the Belleville progressivity washer (12).

29. Remove the piston (10) by firmly striking the clutch unit against the wooden edge of a workbench or failing that, against block of a similar nature.

30. Remove and discard the "O" rings (11), (25) and (26).

31. If necessary, remove the circlip (31) (oil deflector).

32. Extract or drive out:

- the bearing (2) on the support (32);
- the bearing (7) on the unit (9), visually noting the positioning of its sealed face;
- the bearing (22) by first removing the snap ring (20).

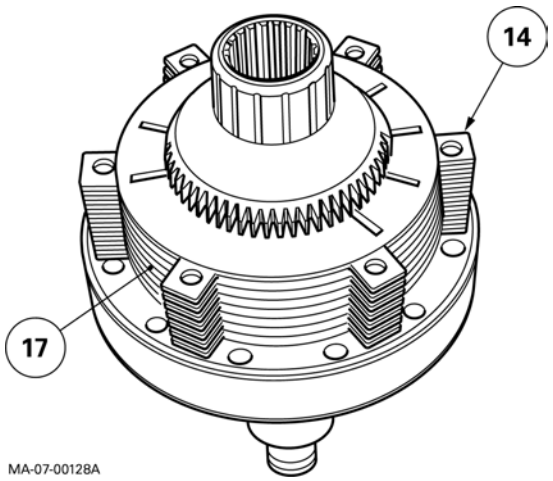


Fig. 7

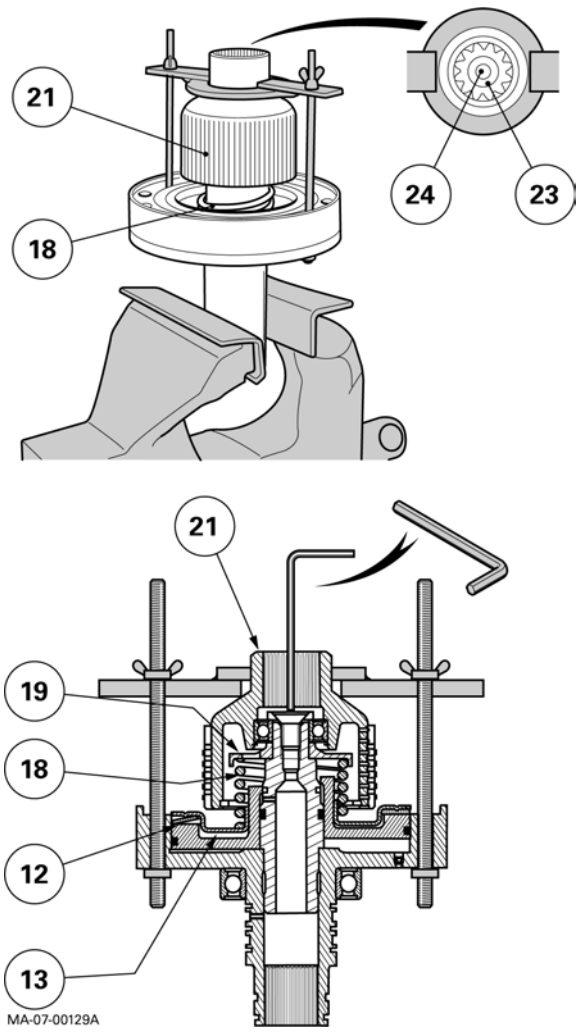


Fig. 8

Preparing for reassembling (Fig. 9)

33. Clean and check all components. Replace those that are defective.

Check the clearance of the valve ball (8) by vertically and rapidly shaking the unit (9): rattling against the unit should be heard.

34. If removed, press fit the sleeve (27) in the unit (9).

IMPORTANT: *Before fitting, the fitted section of the sleeve (27) must be lightly smeared with Loctite 648 or equivalent. Clean off any excess Loctite.*

Check that the various hydraulic ports are not obstructed after the fitting process.

35. Using a press and a suitable fixture in contact with the external surface of the bearing (22), fit the bearing up to the shoulder of the hub (21).

36. Fit the snap ring (20).

37. Position the sealed face of the bearing (7) towards the unit (9). Using a press and a suitable fixture in contact with the internal surface of the bearing (7), fit this bearing against the unit (9).

38. Using a press and a suitable fixture in contact with the external surface of the bearing (2), fit the bearing up to the shoulder of the support (32) (Fig. 1, Fig. 5).

39. After fitting, check that the bearings turn correctly.

Reassembly (Fig. 9)

40. Fit the circlip (31) (oil deflector).

41. Lubricate and fit the new seals (11) (25) (26) on the sleeve (27) and piston (10) respectively.

42. Fit the piston using a soft hammer, checking during the fitting process that there are no fragments of seal on its rim.

43. Refit:

- the Belleville progressivity washer (12) as per Fig. 9;
- the support (13);
- the spring (18);
- the spring seat (19).

44. Refit the pre-assembled hub (21), using the tool used during disassembly to progressively compress the spring (18).

45. Secure the front part of the clutch unit (9) in a vice fitted with protective jaws.

46. Position the chamfer of the washer (23). Position this washer in the drive hub (21).

47. Lightly smear the thread of the screw (24) with Loctite 270 or equivalent. Tighten this screw to a torque of 24-28 Nm.

48. If the clutch discs (17) have been replaced, the new discs must be soaked for approximately one hour in clean transmission oil.

49. Stack the new or reused discs and intermediate plates (14), starting with an intermediate plate against the spring support (13). Fit the discs and intermediate plates alternately until the number removed during disassembly is reached.

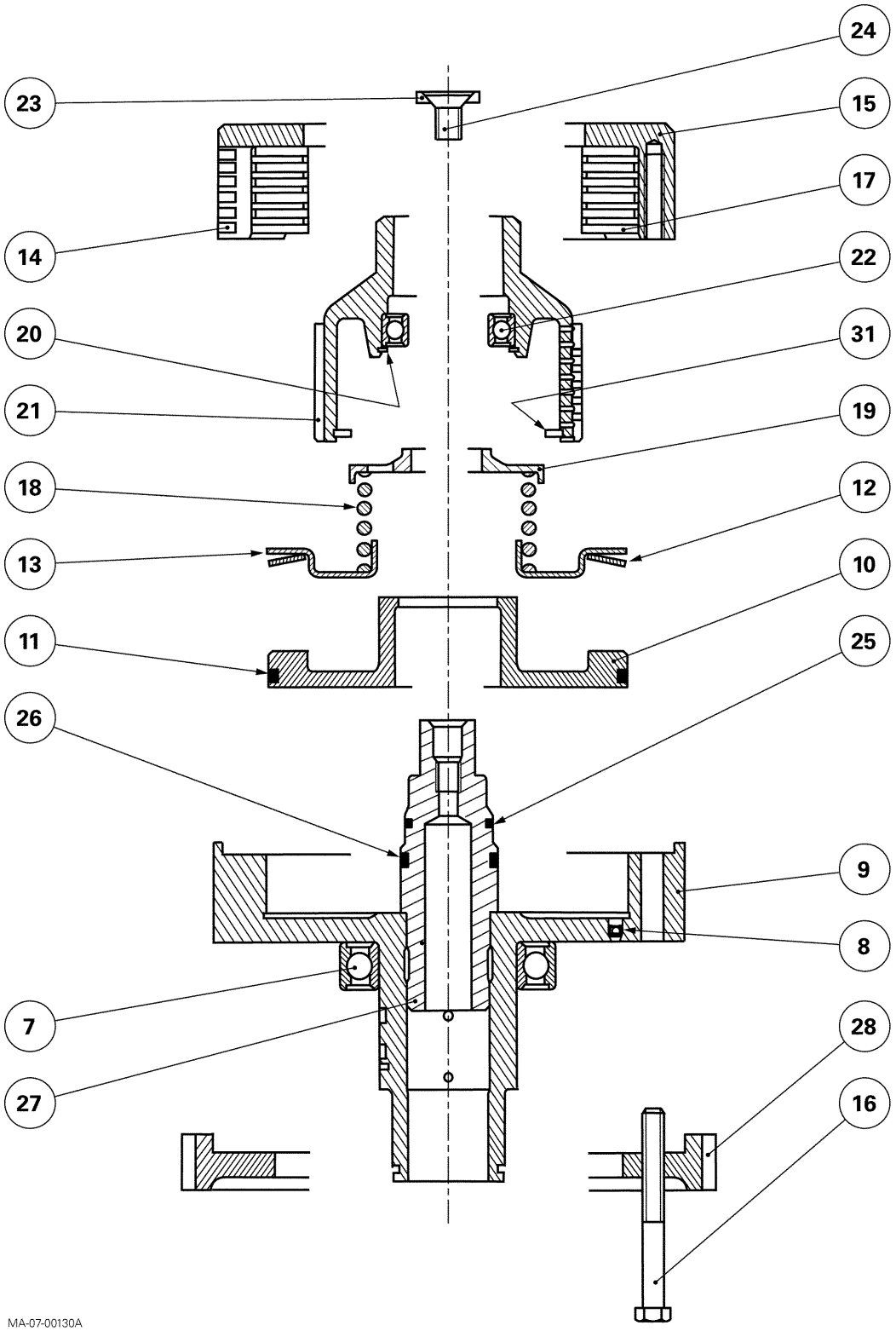
50. Refit the bell housing (15) and the drive gear (28) in the correct position.

51. Lightly smear the thread of the screws (16) with Loctite 242 or equivalent. Tighten these screws to 25.5-34.5 Nm.

52. Refit the seal rings (5) (see § C).

Final step

53. Reconnect the clutch and its support. Refit the assembly (see § C).


24
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27
16
MA-07-00130A

Fig. 9

E . Service tools

Makeshift tools

- Spring compression tool (Fig. 10)

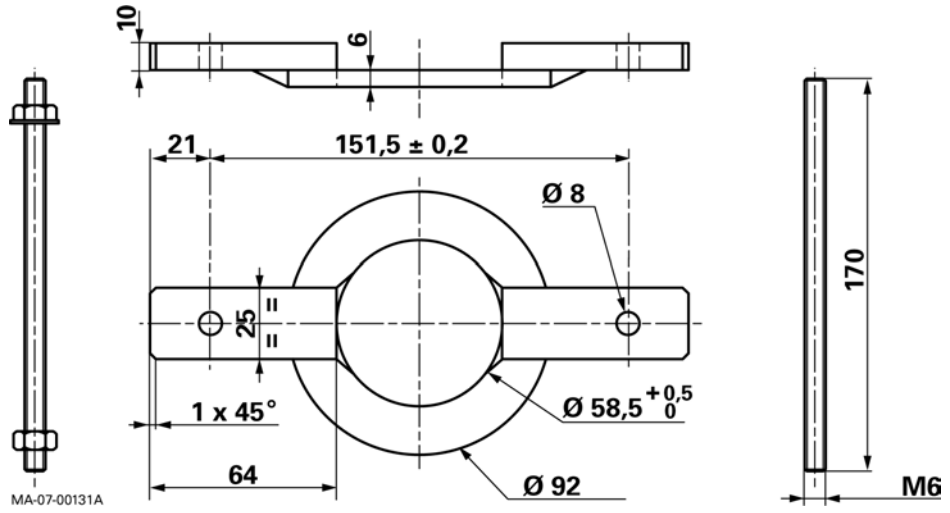

Fig. 10

7C10 - GPA30 - General - Operation

CONTENTS

A . General

Description

The PTO housing fitted to the rear of the rear axle contains all mechanical GPA30 power take-off components:

- Certain components rest on taper roller bearings whose cups are free fitted or force fitted onto the PTO housing or clutch unit;
- the front end of the output shaft rests on a cylindrical roller bearing.

Power take-off is independent of the transmission.

B . Description and operation of the different rear PTO versions

There are three versions:

Version	With...
A	- long or short interchangeable output shaft, 540/1000 rpm as a standard, or 750/1000 rpm as an option
B	- jaw coupler - long or short flange shaft, 540/1000 rpm as a standard, or 750/1000 rpm as an option
C	- fixed coupler - 1000 rpm flange shaft

Version A (Fig. 1)

2 speed power take-off

long or short interchangeable output shaft (13), 540/1000 rpm or 750/1000 rpm (depending on version).

Operation

The clutch unit assembly (15) is splined to the double driving pinion (11). This pinion is constantly meshed with the 540/1000 rpm (7) (18) or 750/1000 rpm (7) (18) driven pinions (depending on version) of the lower shaftline.

The output speed of the rear PTO is achieved by replacing the interchangeable output shaft (13) only.

Parts list (Fig. 1)

(7) 540 or 750 rpm driven pinion
(11) Double driving pinion
(13) Output shaft
(15) Clutch unit assembly
(18) 1000 rpm driven pinion

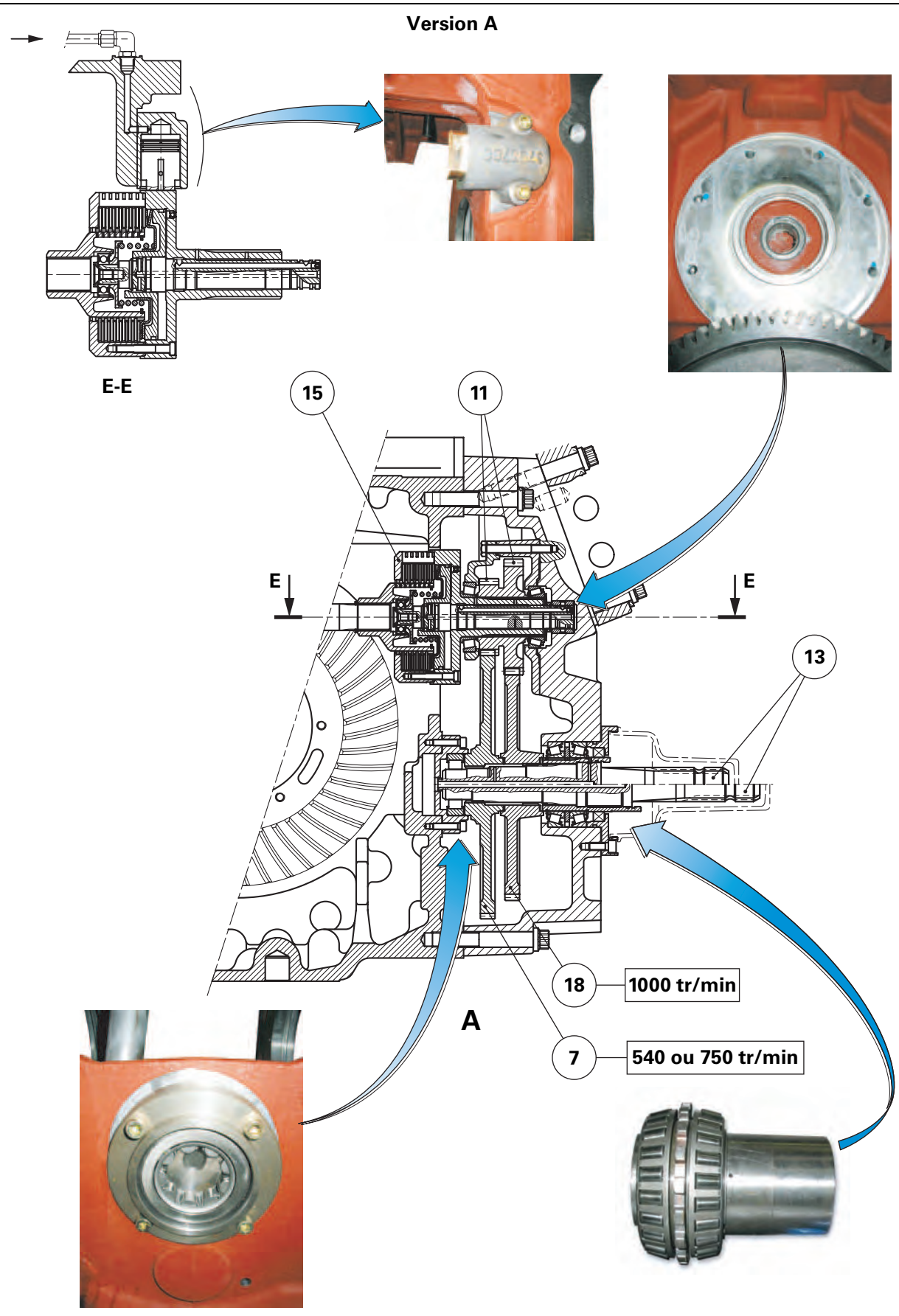
Version A
E-E
15
11
E
E
13
18
1000 tr/min
A
7
540 ou 750 tr/min
MA-07-05011A

Fig. 1

Version B (Fig. 2)

2 speed power take-off

- Jaw coupler (10) controlled by a cable from the driver's seat, or directly by an external control
- Output shaft (13)
- long or short flange shaft (5) 540/1000 rpm or 750/1000 rpm (depending on version)

Operation

The clutch unit assembly (15) is splined to the driving pinions (9) (11). These pinions are constantly meshed with the 540/1000 rpm (7) (18) or 750/1000 rpm (7) (18) driven pinions (depending on version) of the lower shaftline.

The rear PTO output speed is achieved when the jaw coupler (10) is shifted either forward 540 or 750 rpm, or backward 1000 rpm.

Parts list (Fig. 2)

(5) Flange shaft
(7) 540 or 750 rpm driven pinion
(9) 540 or 750 rpm driving pinion
(10) Jaw coupler
(11) 1000 rpm driving pinion
(13) Output shaft
(15) Clutch unit assembly
(18) 1000 rpm driven pinion

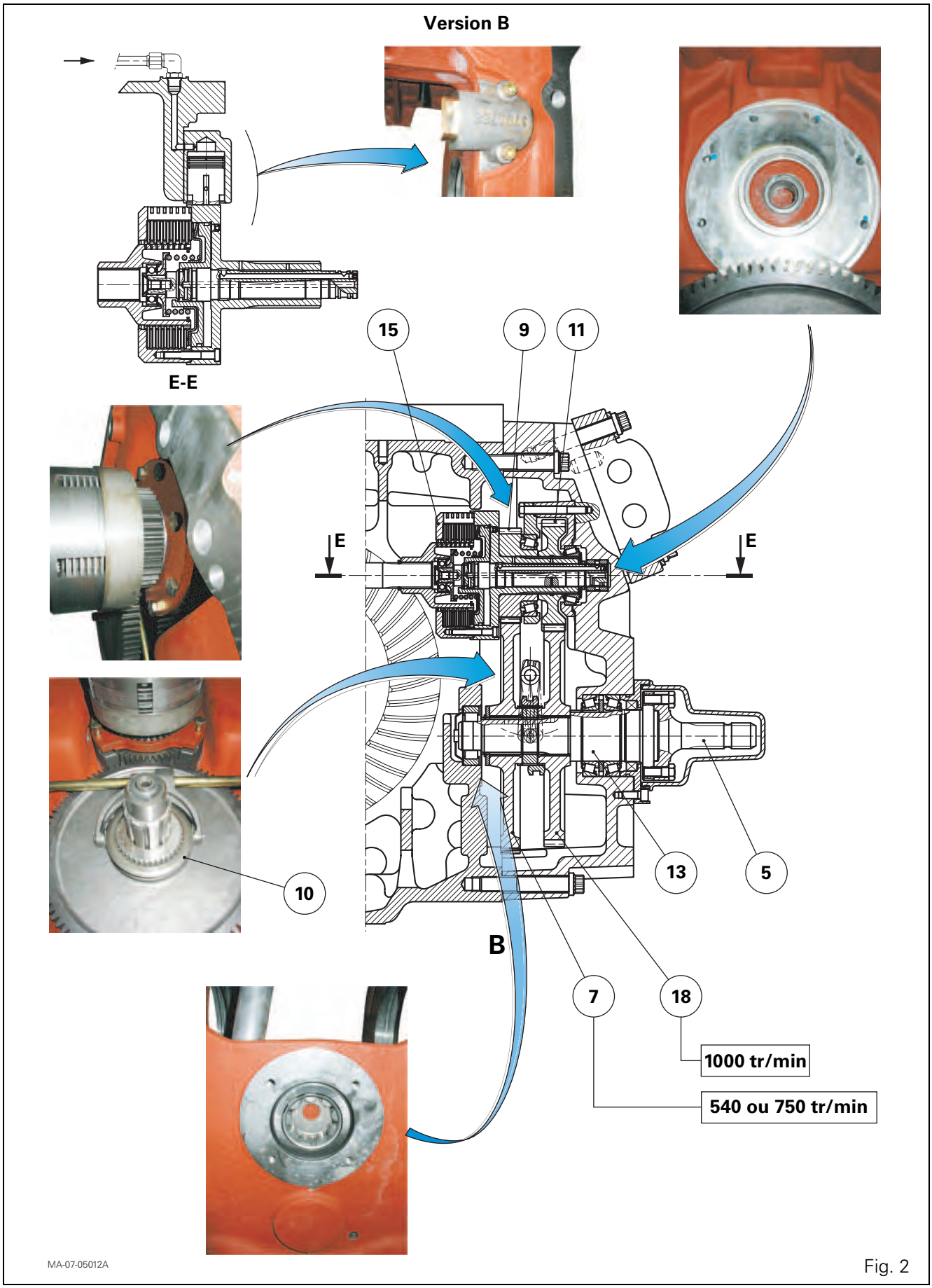
Version B
E-E
15
9
11
E
E
10
13
5
B
7
18
1000 tr/min
540 ou 750 tr/min
MA-07-05012A

Fig. 2

Version C (Fig. 3)

1000 rpm power take-off

- Fixed coupler (10)
- Output shaft (13)
- 1000 rpm flange shaft (5)

Operation

The clutch unit assembly (15) is splined to the driving pinion (11). This pinion is constantly meshed to the driven pinion (18) of the lower shaftline and drives the output shaft (13) of the rear PTO.

NOTA: *On version C, a spacer (19) replaces the 540 or 750 rpm driving pinion (9) (Fig. 2).*

The fixed coupler (10) is coupled to the driven pinion (18) (1000 rpm). It is immobilised by a snap ring (1) clipped to the hub (20), itself immobilised by a snap ring (26) clipped onto the output shaft (13).

Parts list (Fig. 3)

(1) Snap ring
(5) Flange shaft
(10) Fixed coupler
(11) 1000 rpm driving pinion
(13) Output shaft
(15) Clutch unit assembly
(18) 1000 rpm driven pinion
(19) Spacer
(20) Hub
(26) Snap ring

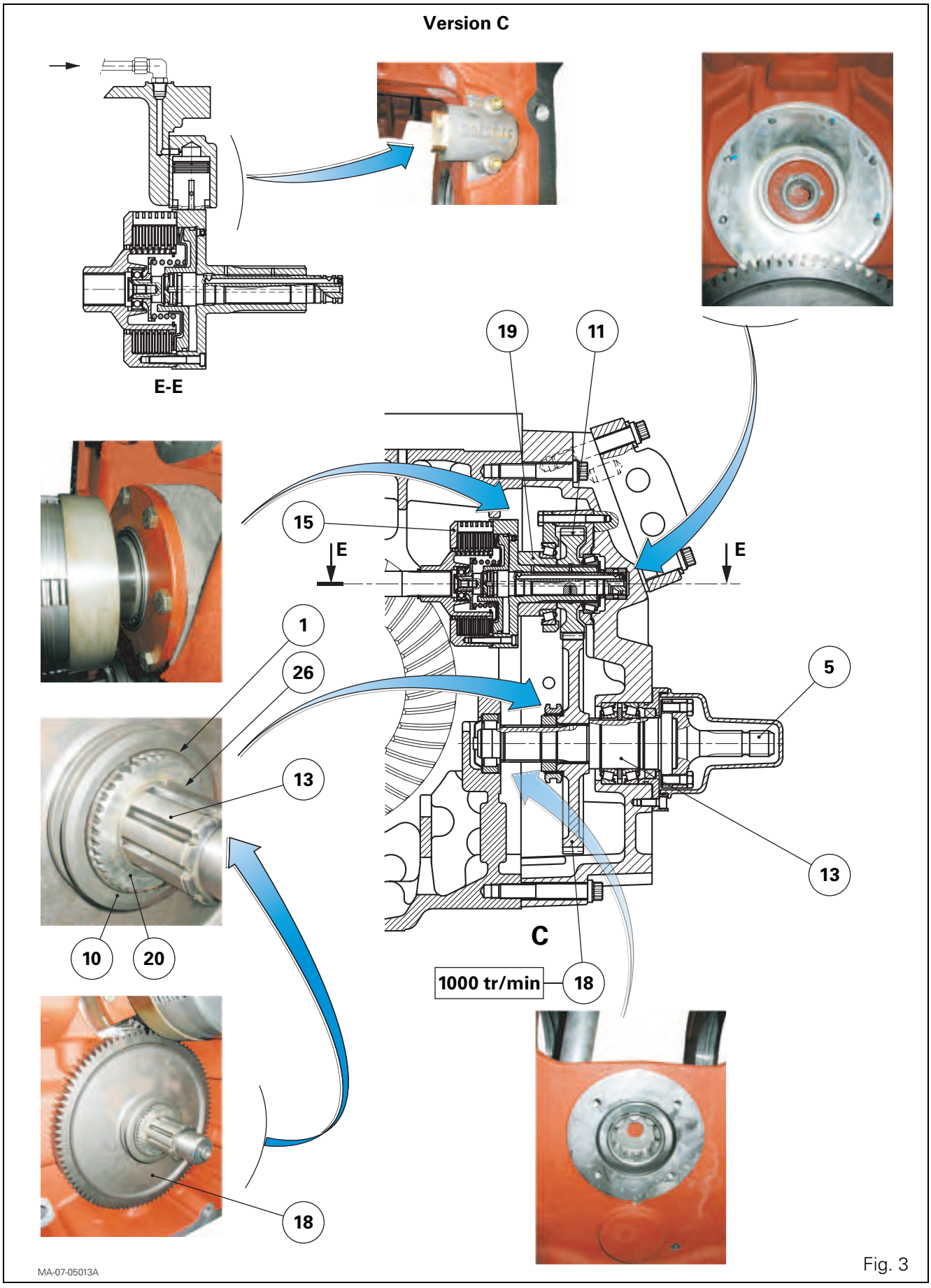
Version C
E-E
19
11
15
E
E
1
26
5
13
13
10
20
C
1000 tr/min
18
18
MA-07-05013A

Fig. 3

Operation of the upper shaftline

The upper shaftline of the rear PTO transmits engine speed to the driving pinion through:

- a clutch;
- a series of three shafts: mainshaft, primary shaft and secondary shaft.

Clutch

The clutch assembly (15) is fed by the low pressure (17 bar) hydraulic circuit and via push buttons inside the cab (Fig. 4, PTO engaged position).

It is located on the upper shaftline and in front of the driving pinions (Fig. 4).

It is supported by two taper roller bearings mounted opposite in a unit attached to the PTO housing:

- the front clutch bearing cone is force fitted onto:
  - the clutch unit (PTO version A),
  - the driving pinion (9) (540 or 750 rpm, PTO version B),
  - the spacer (19) (PTO version C);
- the rear clutch bearing cone is free fitted onto all PTO versions;
- the taper roller bearings are adjusted with clearance using (a) shim(s) inserted between the driving pinion cover and unit.

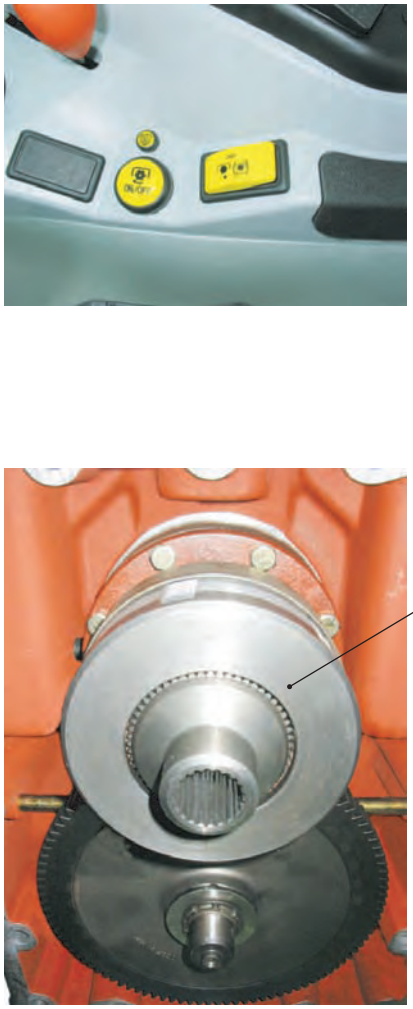

Fig. 4

Power take-off brake

When the clutch is disengaged and the control button in the cab is placed in the "PTO brake" position, the 17 bar pressure acts upon a piston (1), which in turn presses against the unit (6) (Fig. 5), progressively braking the rotation of the PTO mechanical components.

Lubrication of the clutch assembly shaft

A central channel with radial ports respectively provide:

- pressurised lubrication of the clutch discs and intermediate plates;
- pressurised lubrication of the driving pinion(s) (depending on version) of the clutch assembly shaft.

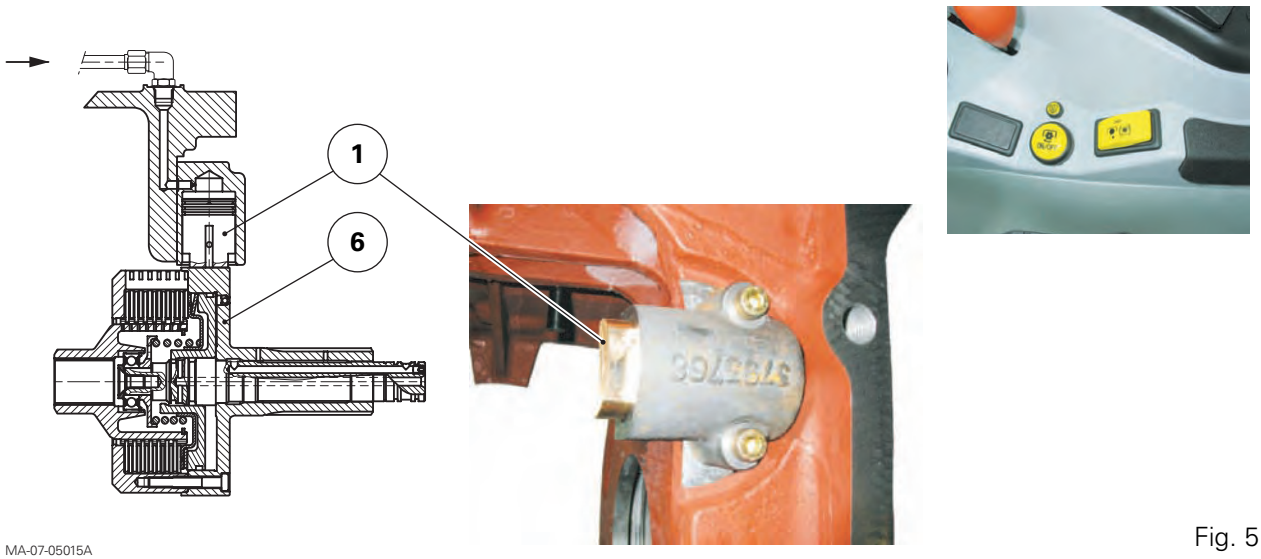

Fig. 5

Lower shaftline

The lower PTO shaftline consists of:

- a unit and a cylindrical roller bearing fitted at the rear of the centre housing (version A);
- a cylindrical roller bearing directly force fitted onto the centre housing and preceded by an oil deflector (versions B and C);
- a rear bearing block consisting of two taper roller bearings fitted:
  - on a sleeve integral with the rotating PTO output shaft (version A),
  - directly onto the PTO output shaft (versions B and C);
- a cassette seal providing PTO lower shaftline output shaft tightness;
- an output shaft (interchangeable shaft, version A, or flange shaft, versions B and C (Fig. 6)). The output shafts may be of different lengths and fitted with 6, 20 or 21 splines, depending on the type and rotational speed tolerated by the implement.

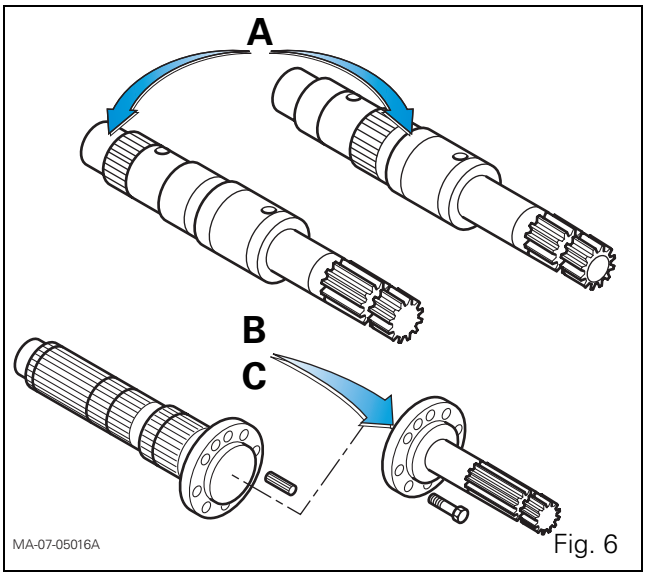

Fig. 6

Lubrication of the lower shaftline

A central channel with radial ports provides splash lubrication of:

- the driven pinions and bearings (PTO versions A and B);
- the bearings (PTO version C).

7C11 - GPA30 - Intermediate shafts - Driving pinions

CONTENTS

GPA30 - Intermediate shafts - Driving pinions

A . General

The upper shaftline of the GPA30 transmission rear PTO transmits engine speed to the driving pinions through (Fig. 1, Fig. 2, Fig. 3):

- a multidisc clutch and
- a series of three shafts:
  - the **mainshaft** (19) splined to the vibration damper, itself screwed to the engine flywheel;
  - the **primary shaft** (14) splined to the mainshaft and in front of the hydraulic pump (Load Sensing) drive pinion;
  - The **secondary shaft** (28) is splined at the front on the hydraulic pump drive pinion and at the rear on the multidisc power take-off clutch.

B . Description and layout of the rear PTO driving pinions

Driving pinions for 2 speed PTO with inter-changeable output shaft (version A)

Parts list (Fig. 1)

(1) Hydraulic pump drive pinions (Load Sensing)
(2) Bearing cone
(3) Bearing cup
(4) Cover
(5) Shim(s)
(6) Unit
(7) Bearing cone
(8) Bearing cup
(11) Double driving pinion
(12) Circlip
(14) Primary shaft
(15) Clutch unit assembly
(19) Mainshaft
(23) Unit/driving pinions assembly
(27) Screw
(28) Secondary shaft

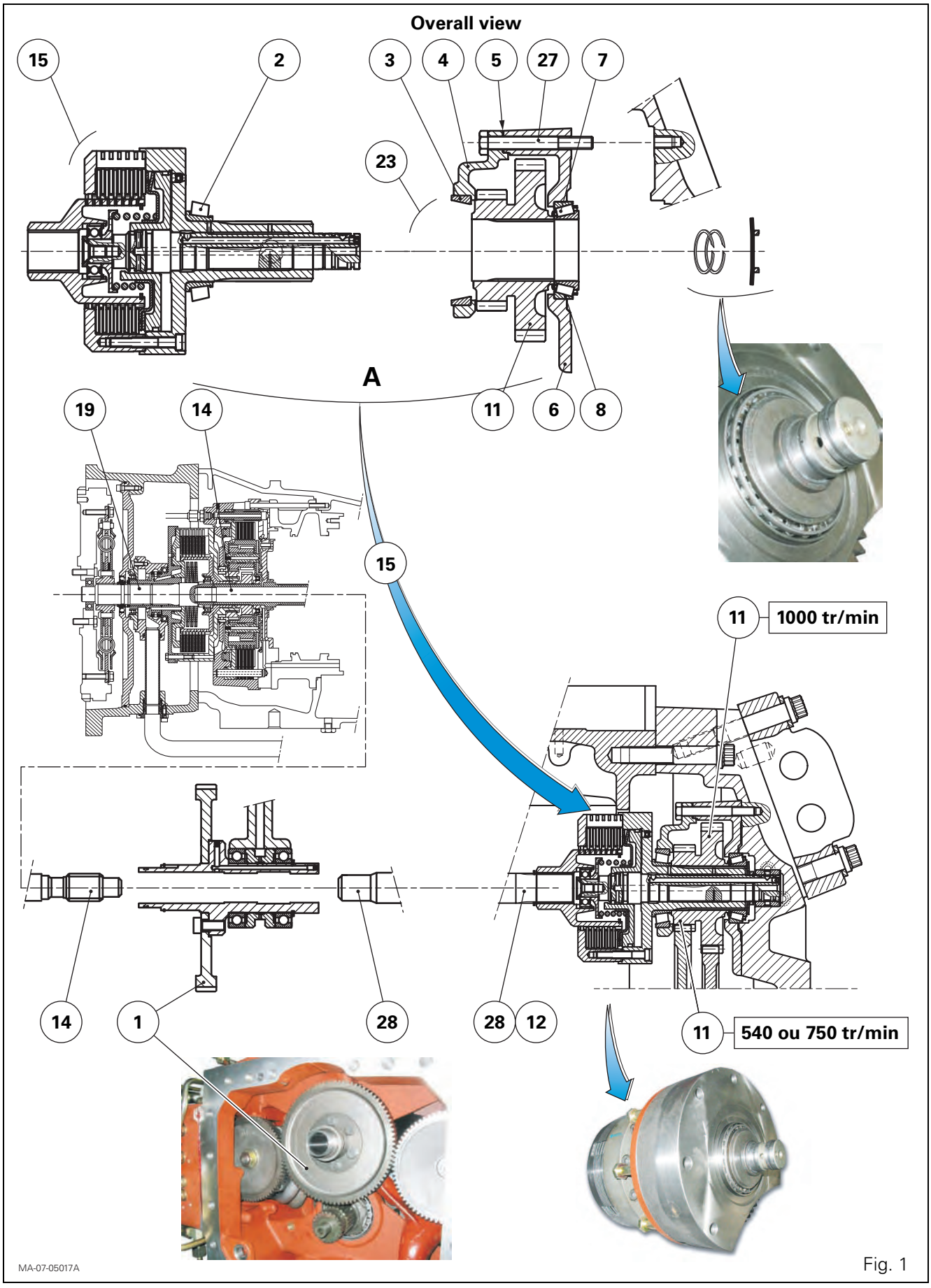
Overall view
15
2
3
4
5
27
7
23
A
19
14
11
6
8
15
11
1000 tr/min
14
1
28
28
12
11
540 ou 750 tr/min
MA-07-05017A

Fig. 1

Driving pinions for 2 speed PTO with jaw coupler on output shaft (version B)

Parts list (Fig. 2)

(1) Hydraulic pump drive pinions (Load Sensing)
(2) Bearing cone
(3) Bearing cup
(4) Cover
(5) Shim(s)
(6) Unit
(7) Bearing cone
(8) Bearing cup
(9) 540 or 750 rpm driving pinion
(11) 1000 rpm driving pinion
(12) Circlip
(14) Primary shaft
(15) Clutch unit assembly
(19) Mainshaft
(23) Unit/driving pinions assembly
(27) Screw
(28) Secondary shaft

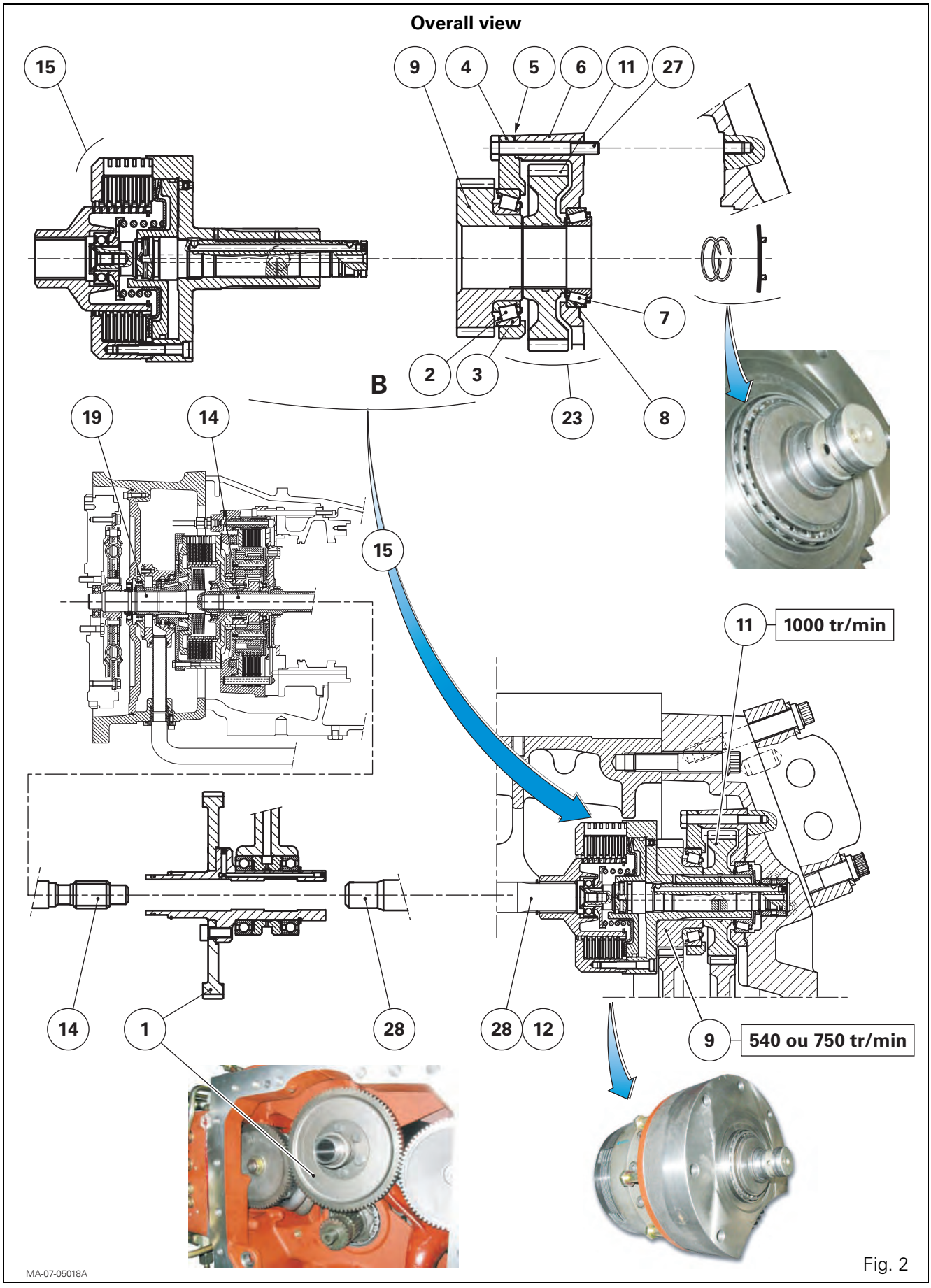
Overall view
15
9
4
5
6
11
27
7
2
3
23
8
B
19
14
15
11
1000 tr/min
14
1
28
28
12
9
540 ou 750 tr/min
MA-07-05018A

Fig. 2

Driving pinion for 1000 rpm PTO (version C)

Parts list (Fig. 3)

(1) Hydraulic pump drive pinion
(2) Bearing cone
(3) Bearing cup
(4) Cover
(5) Shim(s)
(6) Unit
(7) Bearing cone
(8) Bearing cup
(10) Spacer
(11) 1000 rpm driving pinion
(12) Circlip
(14) Primary shaft
(15) Clutch unit assembly
(19) Mainshaft
(23) Unit/driving pinion assembly
(27) Screw
(28) Secondary shaft

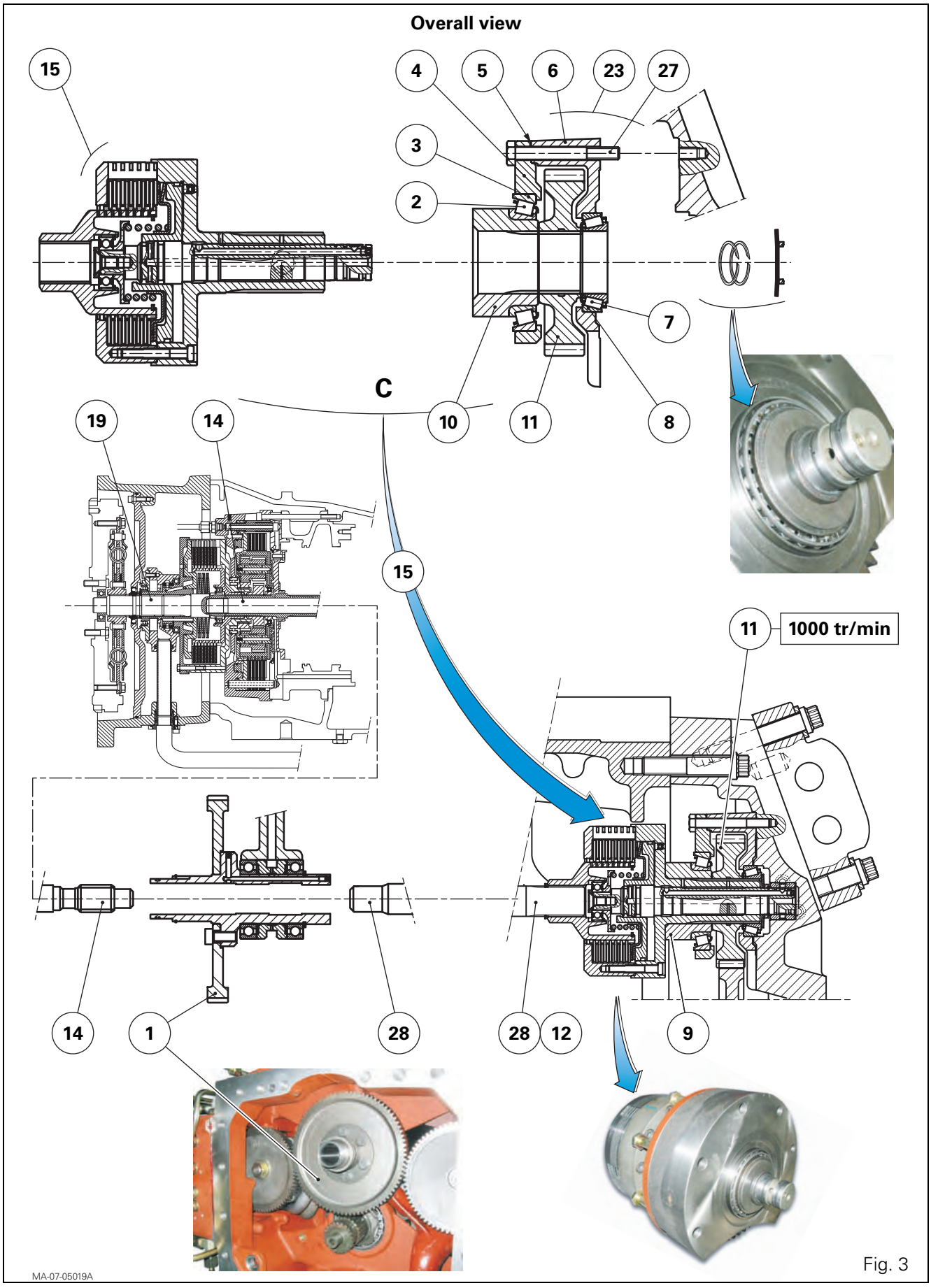
Overall view
15
4
5
6
23
27
3
2
7
C
19
14
10
11
8
15
11
1000 tr/min
14
1
28
28
12
9
MA-07-05019A

Fig. 3

Exploded view of driving pinions (versions A, B and C)

Parts list (Fig. 4)

(2) Bearing cone
(3) Bearing cup
(4) Cover
(5) Shim(s)
(6) Unit
(7) Bearing cone
(8) Bearing cup
(9) 540 or 750 rpm driving pinion (version B)
(10) Spacer (version C)
(11) Double driving pinion (version A)
(11) 1000 rpm driving pinion (versions B and C)
(15) Clutch unit assembly
(23) Unit/driving pinions assembly
(27) Screw

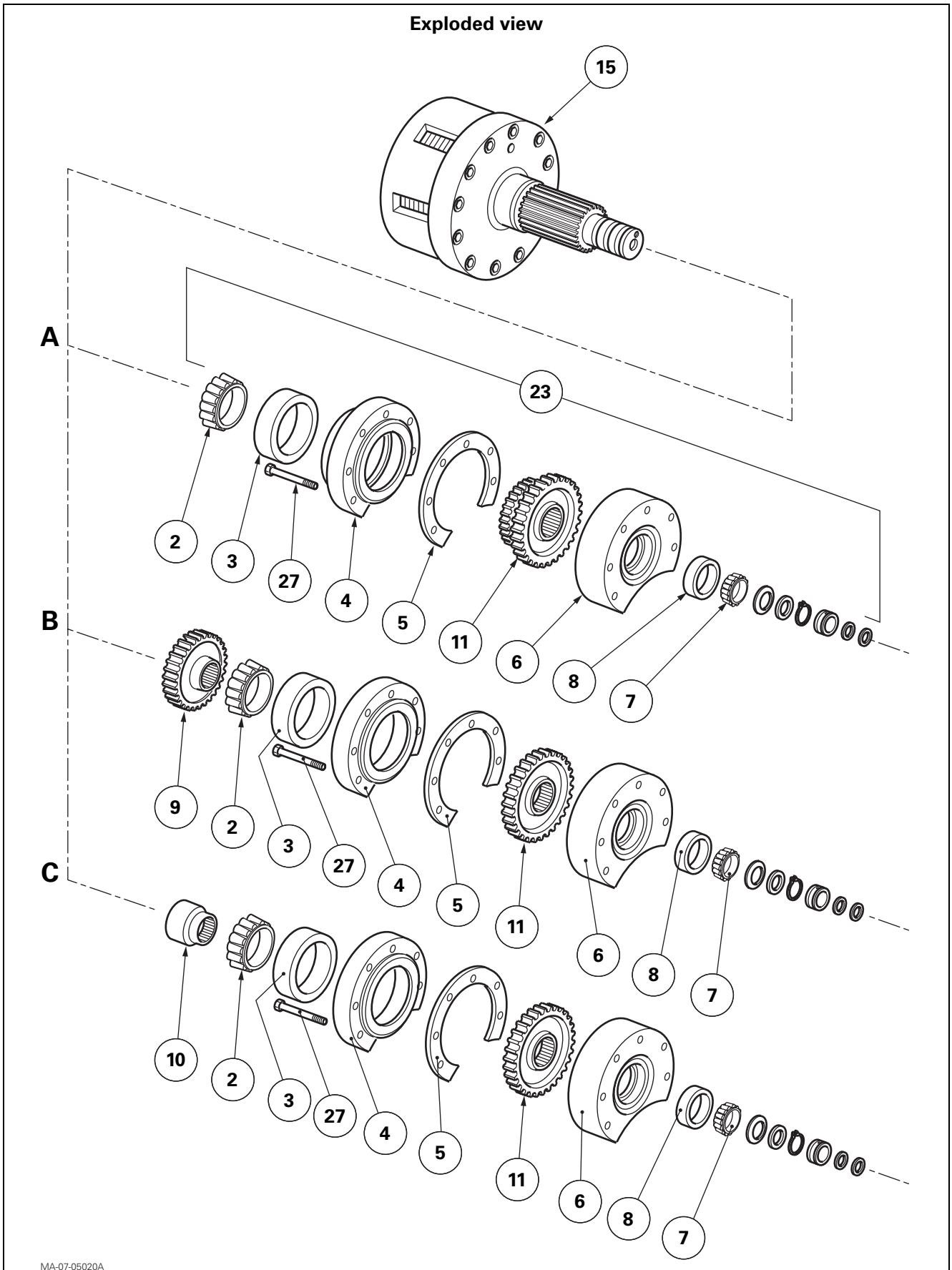
Exploded view
15
A
23
2
3
27
4
5
11
6
8
7
B
9
2
3
27
4
5
11
6
8
7
C
10
2
3
27
4
5
11
6
8
7
MA-07-05020A

Fig. 4

C . Preliminary operation

1. Split the PTO housing from the centre housing (see chapter 2) to gain access to the following main components:
- clutch unit (15) and unit/driving pinions (23) assemblies;
- cover (4);
- bearing cones and cups (2)(3) and (7)(8).

D . Removing - refitting the driving pinions and bearings

Preliminary operations

2. Remove the block consisting of the PTO clutch (15) and unit/driving pinions (23) assemblies from the PTO housing (see chapter 7).

3. Split assembly (15) from assembly (23) (see chapter 7).

Removal

On the unit/driving pinions assembly (23) (version A, Fig. 5)

4. Take off:
- the bearing cone (7);
- the screws (27);
- the cover (4),
- the shim(s) (5).

5. Take out the double driving pinion (11) from unit (6).

6. If necessary:
- Drive out the bearing cups (3) (8);
- extract the bearing cone (2) from the clutch unit assembly (15).

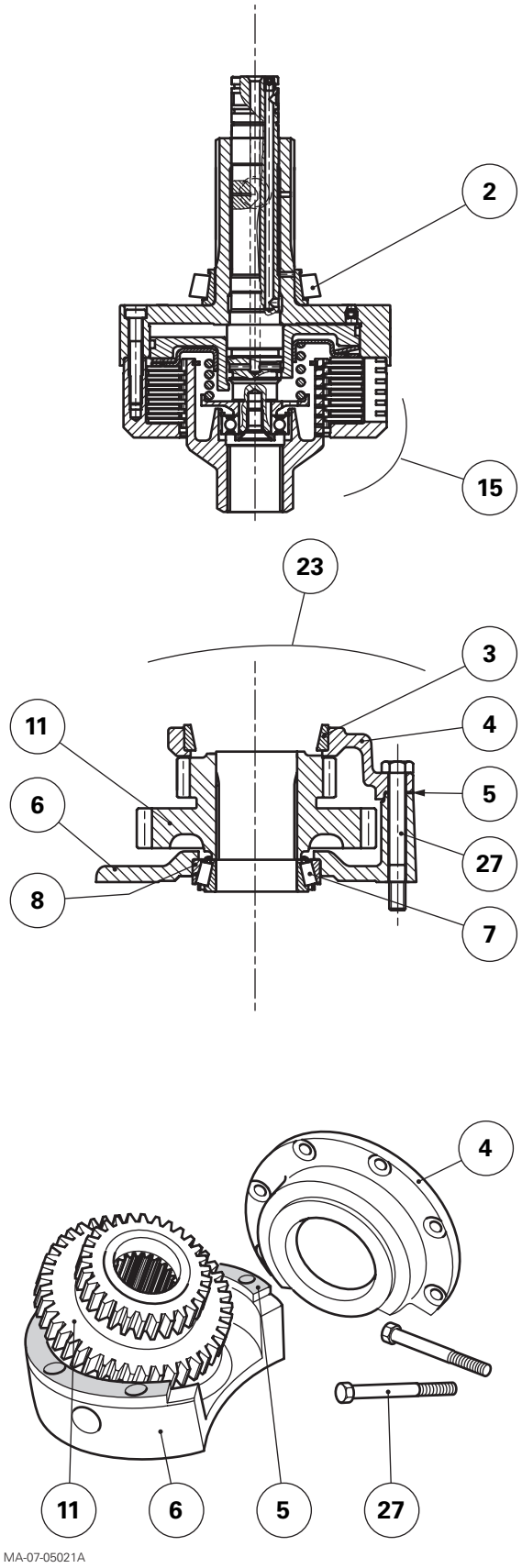

Fig. 5

On the unit/driving pinions assembly (23) (version B, Fig. 6)

7. Take off:
- the bearing cone (7);
- the screws (27);
- the driving pinion (9)/bearing cone (2);
- the cover (4),
- the shim(s) (5).

8. On the driving pinion (11) from unit (6).

9. If necessary:
- Drive out the bearing cups (3) (8);
- extract the bearing cone (2) from the driving pinion (9).

On the unit/driving pinion assembly (23) (version C, Fig. 7)

The servicing method for the unit/driving pinion assembly (23) of version C is similar to that applied for the unit/driving pinions assembly (23) of version B. The spacer (10) (Fig. 7) simply replaces the driving pinion (9) of Fig. 6.

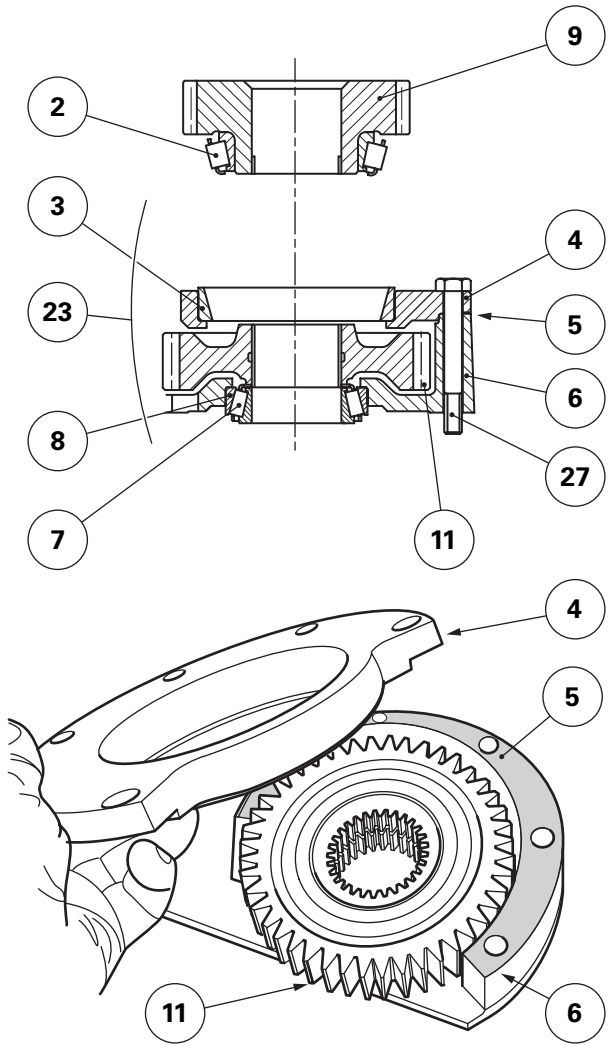

Fig. 6

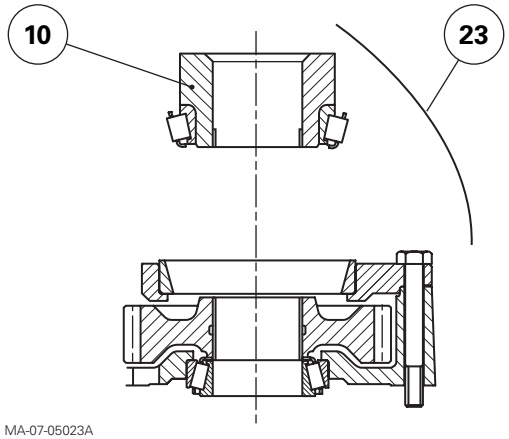

Fig. 7

Refitting

10. Clean and check all components. Replace any defective parts.

On the unit (6) (version A, Fig. 8)

11. If disassembled, fit cups (3) (8) in cover (4) and unit (6) respectively.

12. Refit:
- the driving pinion (11);
- the shim(s) (5), only if the bearing do not need shimming. Otherwise, temporarily exclude this (these) shim(s);
- the cover (4),
- the screws (27);
- the bearing cone (7).

13. If disassembled, fit bearing cone (2) onto the clutch unit assembly (15) using a press and a suitable fixture;

14. If necessary, shim the bearings (see § F).

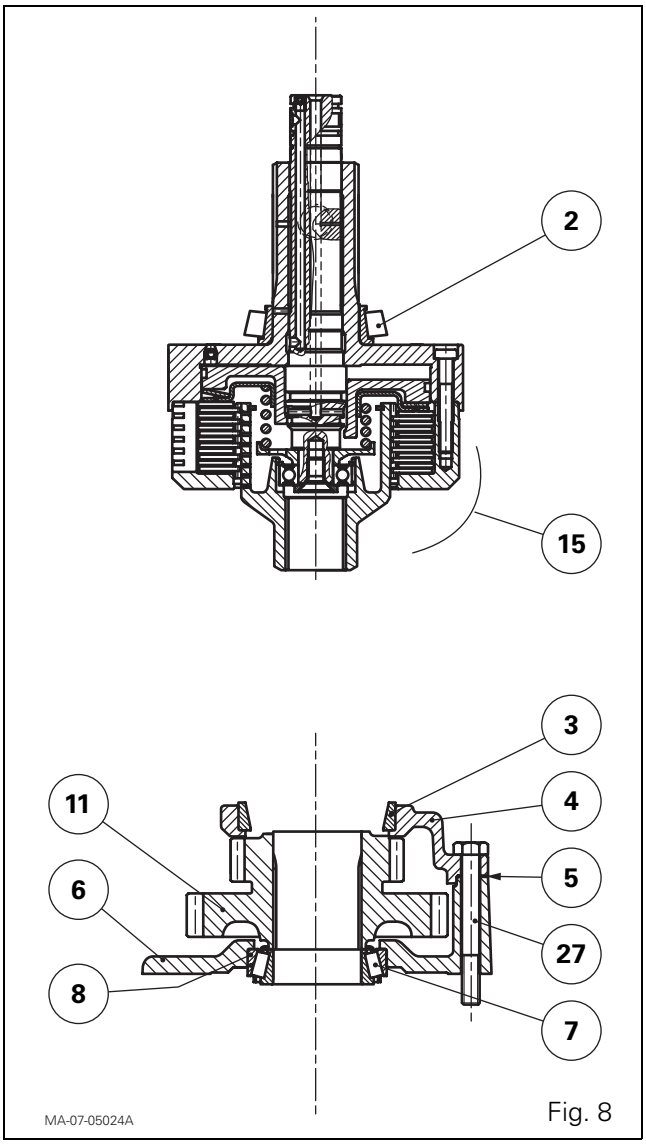

Fig. 8

On the unit (6) (version B, Fig. 9)

15. If disassembled, fit cups (3) (8) in cover (4) and unit (6) respectively.

16. Refit the driving pinion (11) in the unit (6), with the offset "D" turned to face the cover (4) (Fig. 9).

17. Refit:

- the shim(s) (5), only if the bearing do not need shimming. Otherwise, temporarily exclude this (these) shim(s);
- the cover (4),
- the screws (27);
- the bearing cone (7).

18. If removed, fit the bearing cone (2) on the driving pinion (9), using a press and a suitable tool.

19. If necessary, shim the bearings (see § F).

On the unit (6) (version C, Fig. 10)

The servicing method for the unit (6) of version C is similar to that applied for the unit (6) of version B. The spacer (10) (Fig. 10) simply replaces the driving pinion (9) of Fig. 9.

Final operations

20. Reassemble the clutch unit (15) and unit/driving pinions (23) assemblies (see chapter 7).

21. Refit the block consisting of the PTO clutch (15) and unit/driving pinions (23) assemblies from the PTO housing (see chapter 7).

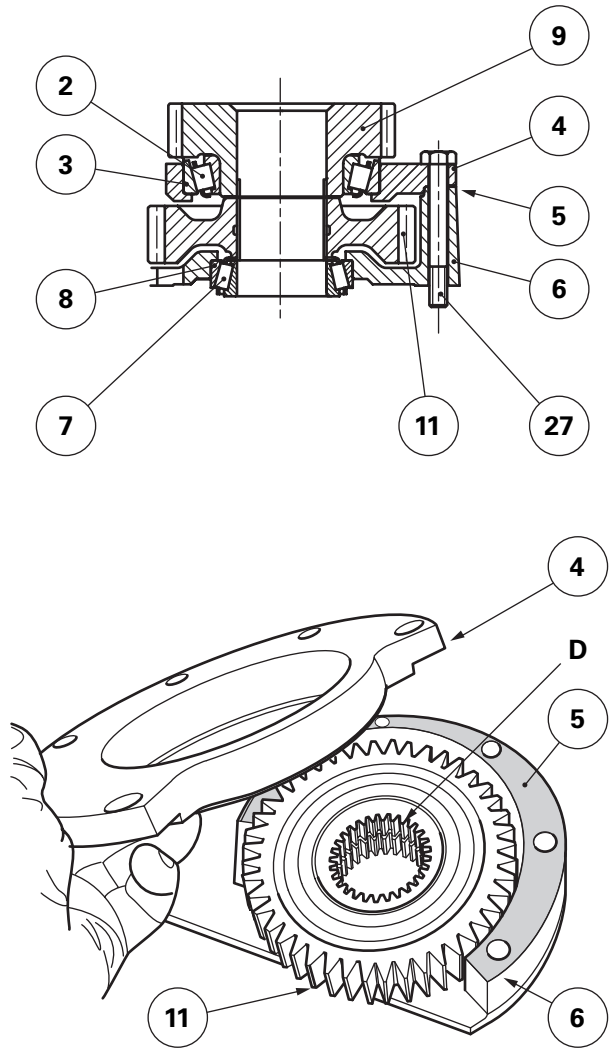

Fig. 9

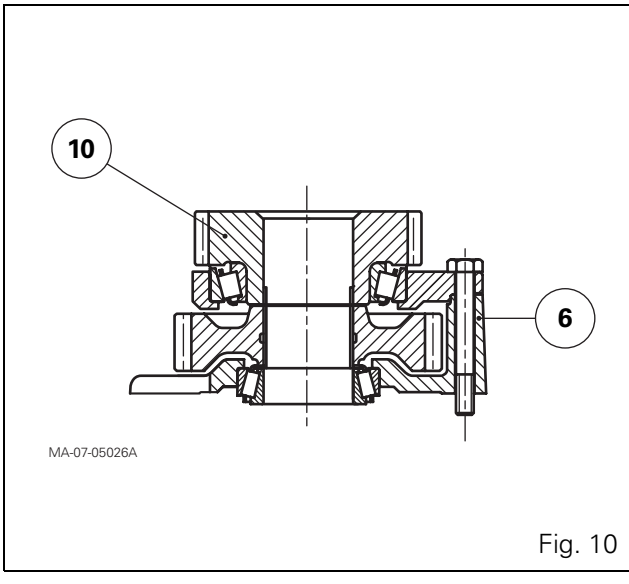

Fig. 10

E . Removing - refitting the shafts

Removal

Mainshaft (19)

22. Disassemble the tractor between the engine and the gearbox (see chapter 2).

23. Remove the mainshaft (see chapter 5).

Primary shaft (14)

24. Split the tractor between the gearbox and the intermediate housing (Cab integral with centre housing, see chapter 2).

25. Remove the primary shaft.

Secondary shaft (28)

26. Split the rear PTO housing from the centre housing (see chapter 2).

27. Remove the secondary shaft.

Refitting

Mainshaft (19)

28. Refit the mainshaft (see chapter 5).

29. Assemble the tractor between the engine and the gearbox (see chapter 2).

Primary shaft (14)

30. Refit the primary shaft.

31. Assemble the tractor between the gearbox and the intermediate housing (Cab integral with centre housing, see chapter 2).

Secondary shaft (28)

32. Refit the secondary shaft.

33. Assemble the rear PTO housing to the centre housing (see chapter 2).

F . Shimming the bearings

Preparation

34. Temporarily exclude the original shims (5).

35. Temporarily reassemble the clutch unit (15) and unit/driving pinions (23) assemblies (see chapter 7).

36. Temporarily attach the cover (4) onto the unit (6) using the four original screws (27) and locally made nuts (14) (Fig. 11).

37. Immobilise the unit/driving pinions assembly (23) in a vice with protective jaws (Fig. 12).

Shimming (Fig. 11, Fig. 12)

38. Place the dial gauge feeler pin at the end of the sleeve (10) (Fig. 12).

39. Pull very hard on the clutch unit assembly (15) (Fig. 12), while turning it from left to right, in order to "seat" the bearing cone (7) correctly in the cup (8).

40. Set the dial gauge to zero.

41. Repeat operation 39, pushing hard to correctly seat the bearing cone (2) in the cup (3).

Measure the clearance with the dial gauge.

42. Depending on the clearance measured, select a thickness of shim(s) (5) to obtain a clearance of **J = 0 to 0.10 mm**.

If possible, shim so as to obtain minimum tolerance.

43. Split the clutch unit assembly (15) from the unit/driving pinions assembly (23) (see chapter 7).

44. Slide the definitive shim(s) (5) selected during operation 42 between the unit (6) and its cover (4).

45. Definitively reassemble the clutch unit (15) and unit/driving pinions (23) assemblies (see chapter 7).

46. Allow for refitting assemblies (15) and (23) onto the PTO housing (see chapter 7).

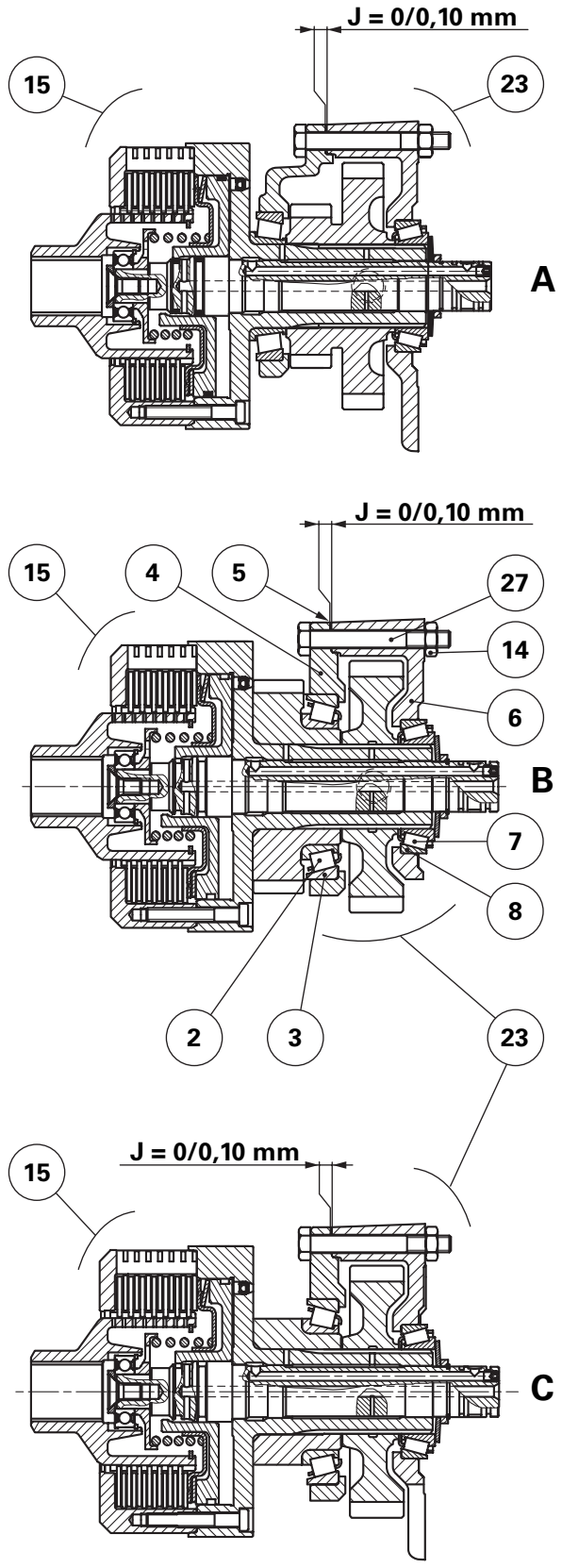
J = 0/0,10 mm
15
23
A
J = 0/0,10 mm
15
4
5
27
14
6
B
7
8
2
3
23
J = 0/0,10 mm
15
C
MA-07-05027A

Fig. 11

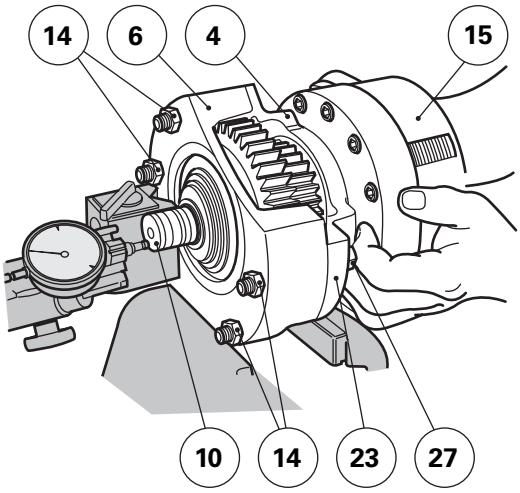
14
6
4
15
10
14
23
27
MA-07-05028A

Fig. 12

G . Final operation

47. Assemble the rear PTO housing to the centre housing (see chapter 2).

7C12 - GPA30 - Interchangeable output shaft

CONTENTS

GPA30 - Interchangeable output shaft

A . General

See following page.

GPA30 - Interchangeable output shaft

The GPA30 rear axle PTO housing encloses:
- the driving pinions (see chapter 7);
- the driven pinions (7) (18) (540/1000 rpm or, optionally, 750/1000 rpm);
- the interchangeable output shaft (13) of the lower shaftline (Fig. 1).

The interchangeable output shaft is supported (Fig. 1):
- at the front by a cylindrical roller bearing (24). This bearing is fitted into the front bearing (1), which is attached to the rear partition of the centre housing;
- at the rear by a splined sleeve (5) which rotates on two taper roller bearings (3)(19) and (8)(21).

  Taper roller bearing clearance is adjusted using shim(s) (23) placed between the PTO housing and the rear bearing (22).

The driven pinions (7) (18) are constantly meshed with the upper shaftline driving pinions (see chapter 7).

In the 540 rpm or 750 rpm configurations (Fig. 1), the interchangeable output shaft (13) is splined in rotation to the driven pinion (7). Pinion (18) runs idle on the hub of the pinion (7) and the front end of the sleeve (5).

In the 1000 rpm configuration (Fig. 1), the interchangeable output shaft (13) is splined in rotation to the pinion (18). Pinion (7) then runs idle in the bore of the pinion (18) and the front bearing (1).

Friction washers (10) (20) ensure the contact between rotating parts.

Castellated washer (4) is integral via a tab with sleeve (5) which itself is splined to interchangeable output shaft (13). This washer informs the tractor electronic system of the output speed of the interchangeable shaft via a sensor (if fitted) located on the lower right-hand side of the PTO housing.

Lubrication

A central channel with radial ports on the interchangeable output shaft (13) provides splash lubrication of:
- the driven pinions (7) (18);
- the front cylindrical roller bearing (24);
- the friction washers (10) (20);
- the rear taper roller bearings (3) (19) and (8) (21).

The oil tightness of the rear bearing is provided by cassette seal (14) and O'ring (15).

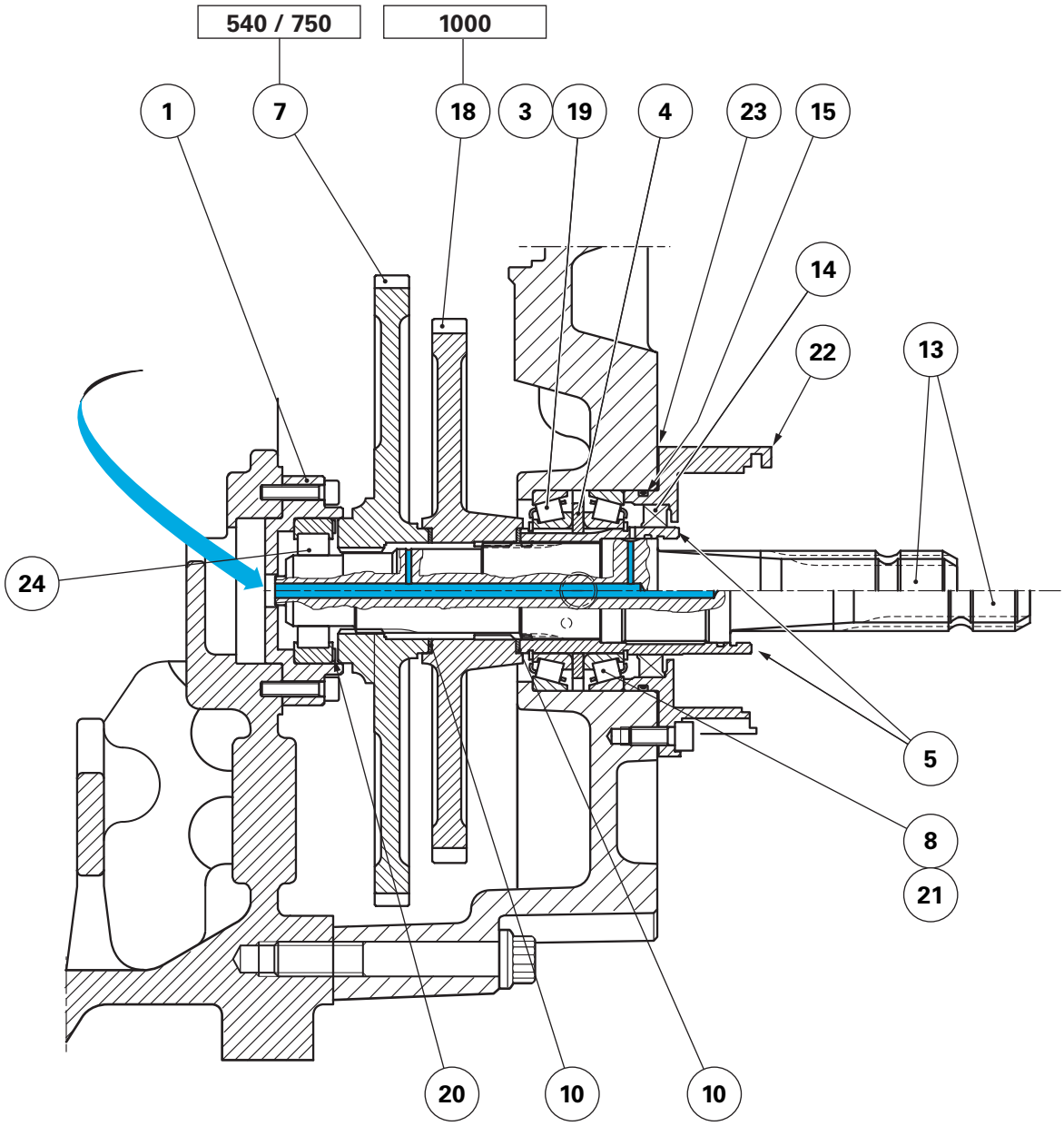
540 / 750
1000
1
7
18
3
19
4
23
15
14
22
13
24
5
8
21
20
10
10
Lubrication
MA-07-05038A

Fig. 1

GPA30 - Interchangeable output shaft

Parts list (Fig. 2)

(1) Front bearing
(2) Screw
(3) Bearing cone
(4) Castellated washer for sensor (if fitted)
(5) Splined sleeve
(6) Snap ring
(7) 540 or 750 rpm driven pinion
(8) Bearing cone
(9) Protector
(10) Friction washers
(11) Screw
(12) O'ring
(13) Interchangeable output shaft
(14) Cassette seal
(15) O'ring
(16) Circlip
(17) Circlip
(18) 1000 rpm driven pinion
(19) Bearing cup
(20) Friction washer
(21) Bearing cup
(22) Rear bearing
(23) Shim(s)
(24) Cylindrical roller bearing

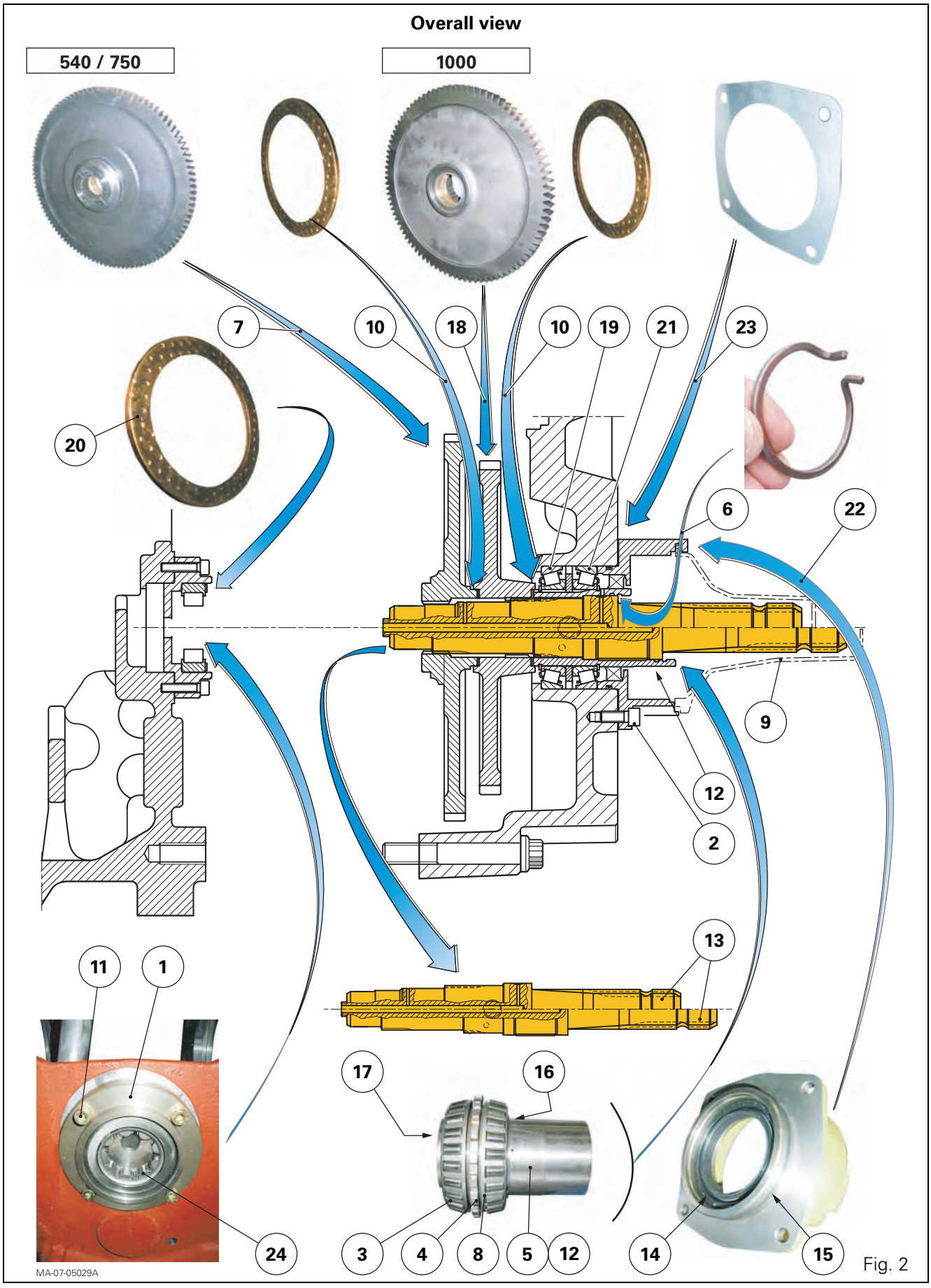
Overall view
540 / 750
1000
7
10
18
10
19
21
23
20
6
22
9
12
2
13
11
1
17
16
24
3
4
8
5
12
14
15
MA-07-05029A

Fig. 2

GPA30 - Interchangeable output shaft

Parts list (Fig. 3)

(1) Front bearing
(2) Screw
(3) Bearing cone
(4) Castellated washer for sensor (if fitted)
(5) Splined sleeve
(6) Snap ring
(7) 540 or 750 rpm driven pinion
(8) Bearing cone
(10) Friction washers
(11) Screw
(12) O'ring
(13) Interchangeable output shaft
(14) Cassette seal
(15) O'ring
(16) Circlip
(17) Circlip
(18) 1000 rpm driven pinion
(19) Bearing cup
(20) Friction washer
(21) Bearing cup
(22) Rear bearing
(23) Shim(s)
(24) Cylindrical roller bearing

Exploded view

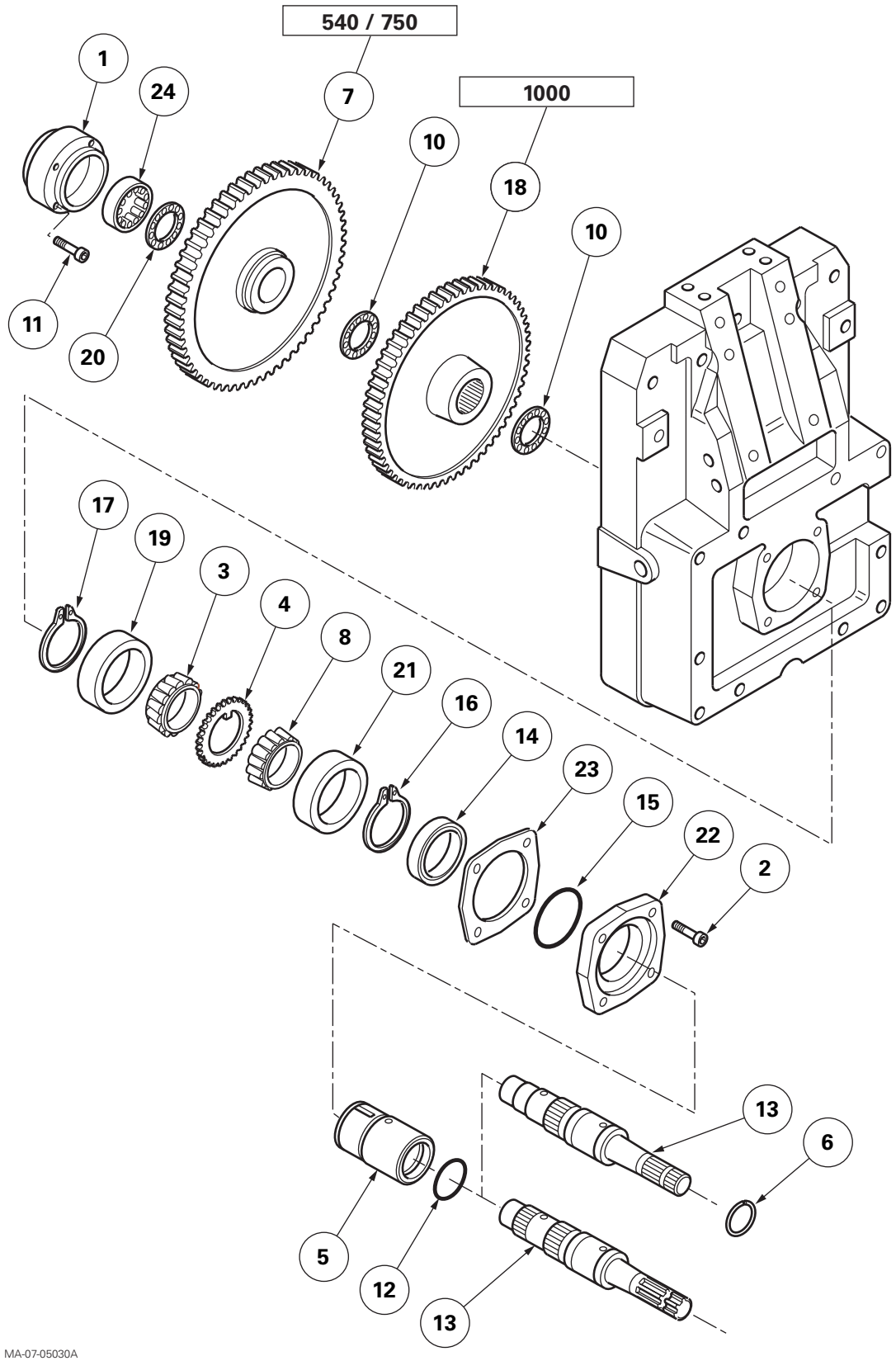

Fig. 3

B . Removing - refitting the 540/1000 rpm or 750/1000 rpm driven pinions

Preliminary operation

1. Split the rear PTO housing from the centre housing (see chapter 2).

Removing the 540/1000 rpm driven pinions (7) (18) (Fig. 4)

2. Place the PTO housing flat on a workbench in order to allow removal of the interchangeable output shaft (13).

Recover the friction washer (20) that may still be on the driven pinion (7).

3. Take off:

- the snap ring (6);
- the interchangeable output shaft (13);
- the driven pinion (7).

Recover the friction washer (10) fitted between the driven pinions (7) (18).

4. Remove the driven pinion (18).

Recover the friction washer (10) fitted between the pinion (18) and splined sleeve (5).

5. Discard the O'ring (12).

Removing the 750/1000 rpm driven pinions (7) (18)

On the PTO with interchangeable output shaft (13), the removing procedure for 750/1000 rpm driven pinions (7) (18) is similar to that applied for the 540/1000 rpm driven pinions (7) (18).

Refitting the 540/1000 rpm driven pinions (7) (18) (Fig. 4)

6. Clean and check all components. Replace any defective parts.

Check that:

- the central channel and radial ports of the interchangeable output shaft (13) are not obstructed;
- the splined sleeve (5) free from chippings and/or burr.

7. Grease the O'ring (12) with clean transmission oil. Refit in the groove of the splined sleeve.

8. Lightly smear a friction washer (10) with miscible grease. Place the washer on the splined sleeve (5).

9. Stack the driven pinions (18) (7) on the splined sleeve (5), inserting the second friction washer (10), previously smeared with miscible grease, between each pinion.

10. Grease the interchangeable output shaft (13) with clean transmission oil. Engage it in the bores of the driven pinions (18) (7) and push home against the shoulder of the splined sleeve (5).

11. Refit the snap ring (6).

12. Lightly smear the friction washer (20) with miscible grease. Place this washer against the cylindrical roller bearing (24) (Fig. 5).

13. Fit the PTO housing in a vertical position.

Refitting the 750/1000 rpm driven pinions (7) (18)

On the PTO with interchangeable output shaft (13), the refitting of 750/1000 rpm driven pinions (7) (18) is similar to that of the 540/1000 rpm driven pinions (7) (18).

Final operation

14. Assemble the rear PTO housing to the centre housing (see chapter 2).

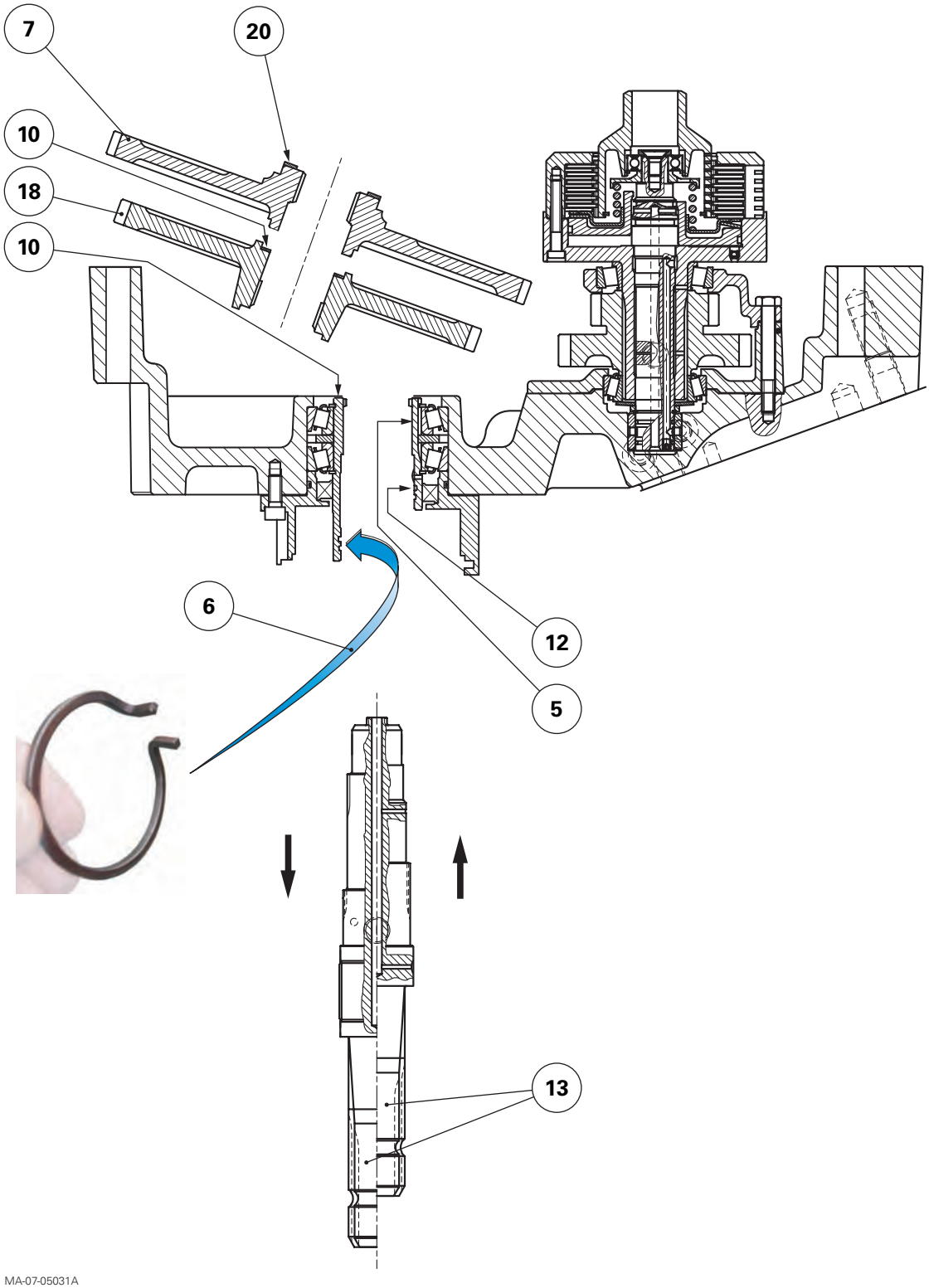

Fig. 4

C . Removing - refitting the front bearing

Preliminary operation

15. Split the rear PTO housing from the centre housing (see chapter 2).

Removal

16. Recover the friction washer (20).

17. If necessary, release screws (11).
Remove the front bearing block (1).

18. Note the orientation of the cylindrical roller bearing (24) in the front bearing block. Extract this bearing.

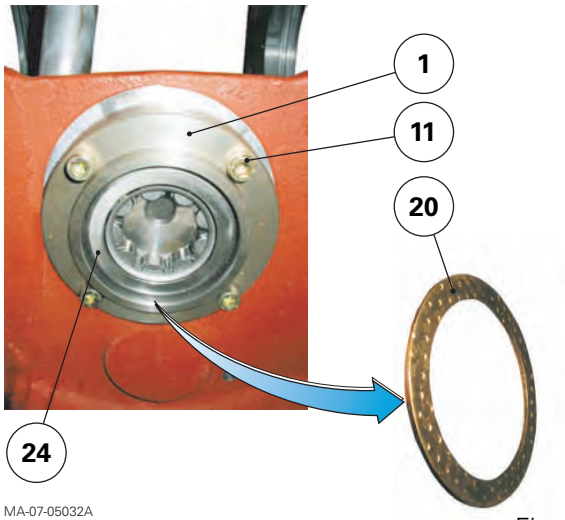

Fig. 5

Refitting

19. Clean and check all components. Replace any defective parts.

20. Using a suitable locally made fitting drift, fit the cylindrical roller bearing into the bearing block, turning the rounded profile of its metallic cage towards the interchangeable output shaft (13).

21. Refit the front bearing block (if removed).
Lightly smear the thread of the screws (11) with Loctite 242 or equivalent. Tighten these screws to a torque of 27 - 35 Nm.

22. Lightly smear the friction washer (20) with miscible grease. Place this washer against the cylindrical roller bearing (24).

Final operation

23. Assemble the rear PTO housing to the centre housing (see chapter 2).

D . Removing - refitting the rear bearings

Preliminary operation

24. Split the rear PTO housing from the centre housing (see chapter 2).

Removal

25. Place the PTO housing flat on a workbench in order to allow removal of the interchangeable output shaft (13).

26. If fitted, remove the sensor located on the lower right-hand side of the power take-off housing.

27. Remove (see § B):
- the interchangeable output shaft (13);
- the driven pinions (7) (18).

28. Loosen the screws (2).

29. Remove the rear bearing assembly (22) which consists of:
- the cassette seal (14);
- the O'ring (15);
- the shim(s) (23).

30. Remove the cup (21) from the rear PTO housing.

31. Remove the rear bearing assembly (5) which consists of:
- bearing cones (3) (8);
- castellated washer (4);
- circlips (16) (17).

32. Remove cup (19).

33. Remove the circlips (16) (17) from the splined sleeve (5) (Fig. 6).

34. Split from the splined sleeve (5):
- the bearing cones (3) (8);
- the castellated washer (4).

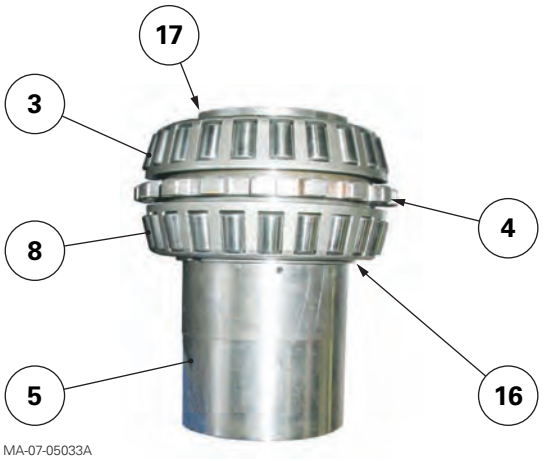

Fig. 6

Refitting

35. Clean and check all components. Replace any defective parts.

Check that:

- the central channel and radial ports of the interchangeable output shaft (13) are not obstructed;
- the splined sleeve (5) free from chippings and/or burr.

36. Refit on the splined sleeve (5):

- the castellated washer (4) by sliding its tab into the sleeve groove;
- the bearing cones (3) (8) on either side of the castellated washer;
- the circlips (16) (17).

37. Refit on the PTO housing:

- the bearing cup (19);
- the rebuilt splined sleeve assembly (5);
- the bearing cup (21).

38. If necessary, replace:

- the cassette seal (14) (see § F);
- the O'ring (15) of the rear bearing.

39. Refit the original shim(s) (23) onto the bearing block (22) only if the rear bearings do not need shimming.

IMPORTANT: *The rear bearings must be shimmed* (see § G) if at least one of the following parts needs replacing:

- *PTO housing;*
- *castellated washer (4);*
- *bearing cones and cups (3)(8) and (19)(21);*
- *rear bearing (22).*

40. Lubricate the cassette seal (14) and O'ring (15).

41. Refit the rear bearing (22) on the PTO housing (see § F).

42. Lightly smear the thread of the screws (2) with Loctite 242 or equivalent. Tighten these screws to a torque of 72 - 96 Nm.

43. Refit (see § B):

- the driven pinions (18) (7);
- the interchangeable output shaft (13).

44. If necessary, refit the sensor located on the lower right-hand side of the power take-off housing. Moderately tighten the screw.

45. Fit the PTO housing in a vertical position.

Final operation

46. Assemble the rear PTO housing to the centre housing (see chapter 2).

E . Removing - refitting the interchangeable output shaft

Preliminary operation

47. To avoid oil spillage when removing the interchangeable output shaft (13):
- either partially drain the rear axle;
- or chock the tractor front wheels using safety shims and raise the rear axle.

Removal

48. Take off:
- the snap ring (6);
- the interchangeable output shaft (13).

49. If necessary, discard the O'ring (12).

Refitting

50. Check that the splined sleeve (5) is free from chippings and/or burr.

51. If necessary, lubricate a new O'ring (12). Refit the seal in its groove.

52. Check that the central channel and radial ports of the interchangeable output shaft (13) are not obstructed;

53. Insert the interchangeable output shaft into the splined sleeve (5). Turn the shaft right and left to ensure that its splines mesh with those of the concerned driven pinion.

54. Refit snap ring (6).

Final operation

55. Depending on what was performed during operation 47 :
- either top up the oil levels in the housings and check the transparent tube on the left-hand side of the centre housing;
- or place the tractor rear wheels back on the ground and remove the trolley jack and safety shims.

F . Replacing the rear bearing cassette seal

Preliminary operation

56. Partially drain the rear axle.

Extracting the seal

57. Loosen the screws (2).

58. Remove the rear bearing (22) by pushing the interchangeable output shaft forwards to hold the splined sleeve (5) in place.

59. Recover the shim(s) (23).

60. Discard the O'ring (12).

61. Note the position of the cassette seal (14) in the rear bearing (22).

Extract the cassette seal.

62. Discard the O'ring (15).

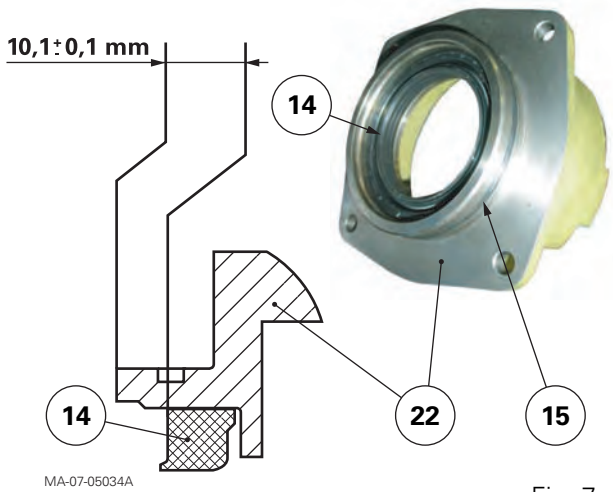

Fig. 7

Replacing the seal

63. Clean and check all components. Replace any defective parts.

64. Using the tool ref. 3378115M1 (see § H), insert the cassette seal (14) in the bearing (22), turning the seal lip towards the inside of the PTO housing.

65. After inserting, check that the seal is positioned as indicated in Fig. 7.

66. Check that the splined sleeve (5) and interchangeable output shaft (13) are correctly positioned in the PTO housing.

67. Fit a new O'ring (15) on the rear bearing (22) (Fig. 7).

68. Lubricate the inner rim of the cassette seal (14) and O'ring (15) with clean transmission oil.

69. To facilitate refitting the rear bearing (22) on the PTO housing, screw two opposing threaded rods (M10 x 50 mm approximately) into the tapped screw holes (2). These rods shall be used as guides.

70. Position the rear bearing (22) with its original shim(s) on the threaded rods.

71. Hold the interchangeable output shaft pushed forwards.

Simultaneously screw two nuts (M10) with flat washers on the threaded rods to uniformly insert:

- the rear bearing (22) into the PTO housing;
- The cassette seal (14) on the sleeve (5).

72. As soon as the rear bearing (22) rests against the shim(s) (23), remove the nuts and threaded rods.

73. Lightly smear the thread of the screws (2) with Loctite 242 or equivalent. Tighten these screws to a torque of 72 - 96 Nm.

Final operation

74. Top up the oil level in the housings. Check it using the sight glass located to the left of the centre housing.

G . Shimming the rear bearings

Preliminary operations

75. Split the rear PTO housing from the centre housing (see chapter 2).

76. Take off:

- the 540/1000 rpm or, optionally, 750/1000 rpm driven pinions (see § B);
- the sleeve assembly (5) consisting of the bearing cones (3) (8) and their cups, of the splined washer (4) and circlips (16) (17).

Shimming

77. Note dimensions A and B (Fig. 8). To avoid being hindered by the resistance of the cassette seal (14) (Fig. 7) on the splined sleeve (5), the seal should be temporarily excluded during measurement of A and B values.

- **Dimension A**

  Using a depth gauge, measure dimension A on the PTO housing.

- **Dimension B**

  - Place the sleeve assembly (5) consisting of the bearing cones (3) (8) and their cups, of the splined washer (4) and circlips (16) (17) against the rear bearing (22).
  - Ask an operator to exert a strong and constant manual pressure on the bearing cup (19).
  - Turn the splined sleeve (5) from left to right so as to correctly seat the bearing cones in their cup.
  - Measure dimension B at two opposing points. Take the average of the two measurements.

78. Calculate B - A. Depending on the result, select a thickness of shim(s) (23) to obtain a clearance J of **0.05 to 0.15 mm** (Fig. 9).

NOTA: *If possible, shim so as to obtain minimum tolerance.*

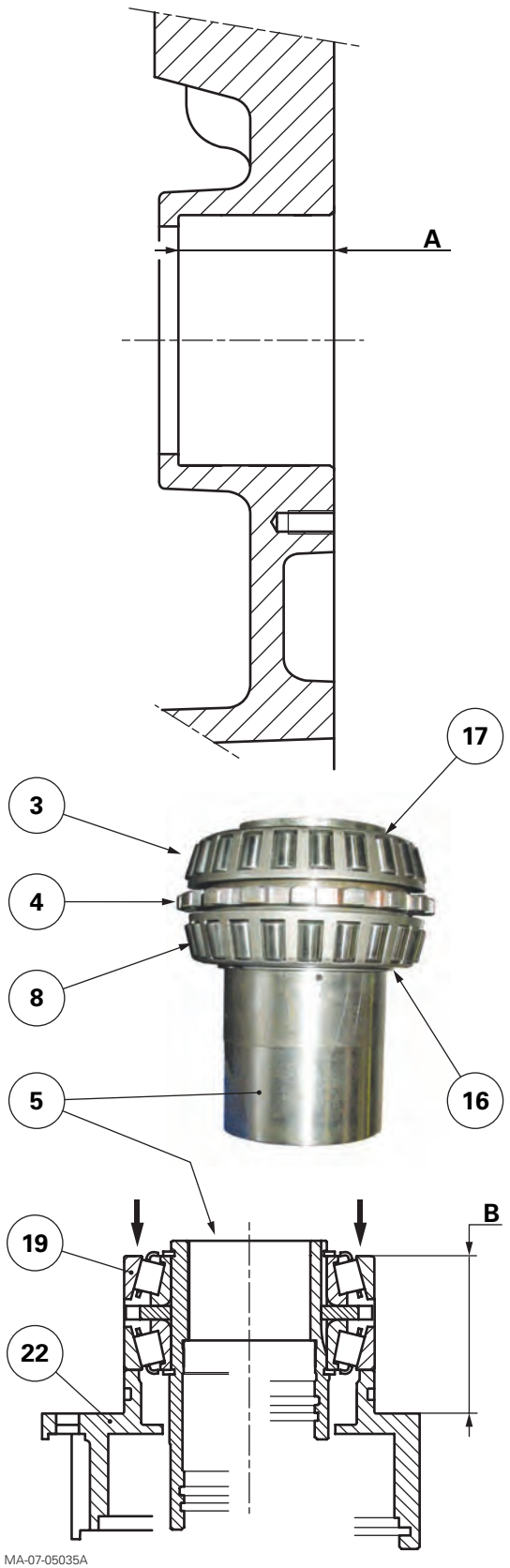

Fig. 8

Final operations

79. Refit:

- the sleeve assembly (5) consisting of the bearing cones (3) (8) and their cup, of the splined washer (4) and circlips (16) (17);
- the rear bearing (22), fitted with:
  - a new cassette seal (14) (see § F),
  - the shim(s) (23) selected during operation 78.

80. Lightly smear the thread of the screws (2) with Loctite 242 or equivalent. Tighten these screws to a torque of 72 - 96 Nm.

81. Refit the 540/1000 rpm or, optionally, 750/1000 rpm driven pinions (see § B);

82. Assemble the rear PTO housing to the centre housing (see chapter 2).

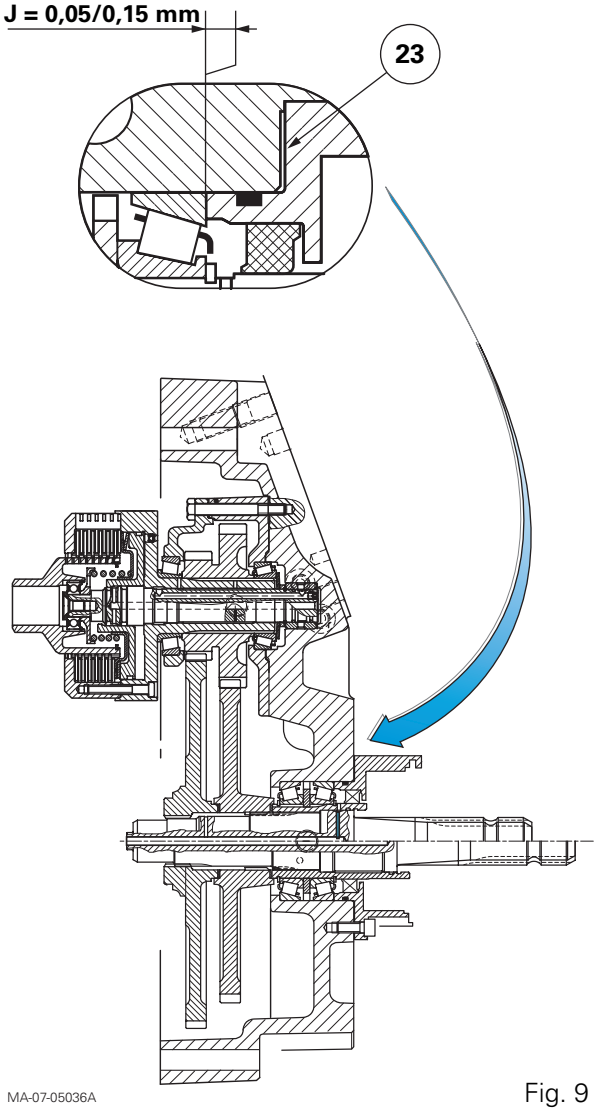

Fig. 9

H . Service tool

Tools available in the AGCO network

- 3378115M1: Tool for fitting cassette seal (14) on the rear PTO bearing (Fig. 10).

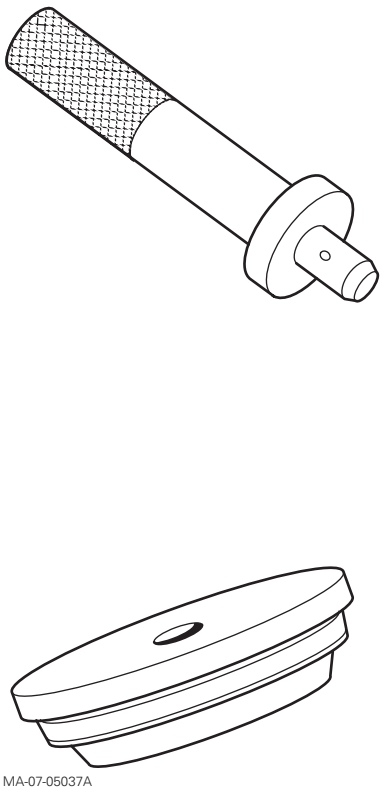

Fig. 10

7C13 - GPA30 - Shiftable output shaft

CONTENTS

GPA30 - Shiftable output shaft

A . General

See following page.

GPA30 - Shiftable output shaft

The GPA30 rear axle PTO housing encloses:
- the driving pinions (see chapter 7);
- the driven pinions (7) (18) (540/1000 rpm or, optionally, 750/1000 rpm);
- the shiftable output shaft (13);
- a coupler (10) controlled by a fork (31).

The shiftable output shaft is supported (Fig. 1):
- at the front by a cylindrical roller bearing (24). This bearing is directly fitted onto the rear partition of the centre housing;
- at the rear, by two taper roller bearings (3) (19) and (8) (21).

  Taper roller bearing clearance is adjusted using shim(s) (23) placed between the PTO housing and the rear bearing (22).

The driven pinions (7) (18) are constantly meshed with the upper shaftline driving pinions (see chapter 7).

The hub (11) of the coupler is splined to the shiftable output shaft (13).

The driven pinions (7) (18) drive the shaft when coupler (10) is moved either forwards (540 or 750 rpm), or rearwards (1000 rpm). When one of the pinions (7) (18) transmits movement to the shiftable output shaft (13), the other pinion is passive and idles on its shaft.

A fork (31) fitted on the pin (28) allows selection of the required speed (540 750 - or 1000 rpm). This fork may be controlled either by an external lever located on the right-hand side of the PTO housing, or via a cable operated by a lever placed inside the cab.

The castellated washer (4) is integral with the shiftable output shaft (13) via a tab. This washer informs the tractor electronic system of the output speed of the shiftable shaft via a sensor (if fitted) located on the lower right-hand side of the PTO housing.

Lubrication

A central channel with radial ports on the shiftable output shaft (13) provides splash lubrication of:
- the driven pinions (7) (18);
- the front cylindrical roller bearing (24);
- the rear taper roller bearings (3) (19) and (8) (21).

The oil tightness of the rear bearing is provided by cassette seal (14) and O'ring (15).

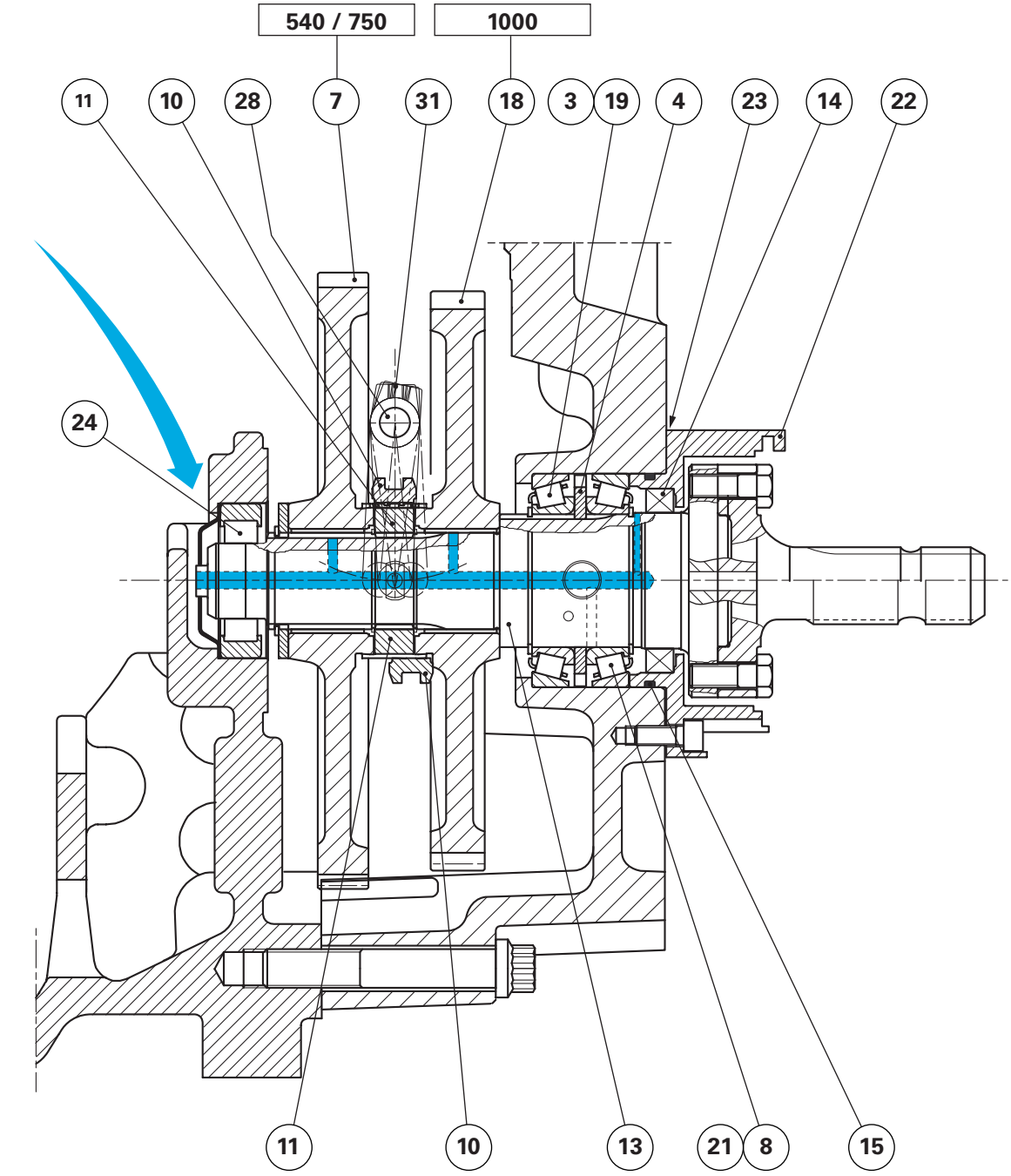
540 / 750
1000
11
10
28
7
31
18
3
19
4
23
14
22
24
11
10
13
21
8
15
Lubrication
MA-07-05039A

Fig. 1

GPA30 - Shiftable output shaft

Parts list (Fig. 2)

(1) Circlip
(2) Screw
(3) Bearing cone
(4) Castellated washer for sensor (if fitted)
(5) Flange shaft
(6) Screw
(7) 540 or 750 rpm driven pinion
(8) Bearing cone
(9) Protector
(10) Coupler
(11) Hub
(12) Circlip
(13) Shiftable output shaft
(14) Cassette seal
(15) O'ring
(16) Circlip
(17) Circlip
(18) 1000 rpm driven pinion
(19) Bearing cup
(20) Splined washer
(21) Bearing cup
(22) Rear bearing
(23) Shim(s)
(24) Cylindrical roller bearing
(25) Oil deflector
(26) Circlip
(27) O'ring
(28) Pin
(29) Pads
(30) Set screw
(31) Fork
(33) Internal or external (depending on version) control link
(34) Screw
(35) Locating pin
(36) Cup cap

Legend

A External PTO control
B Internal PTO control

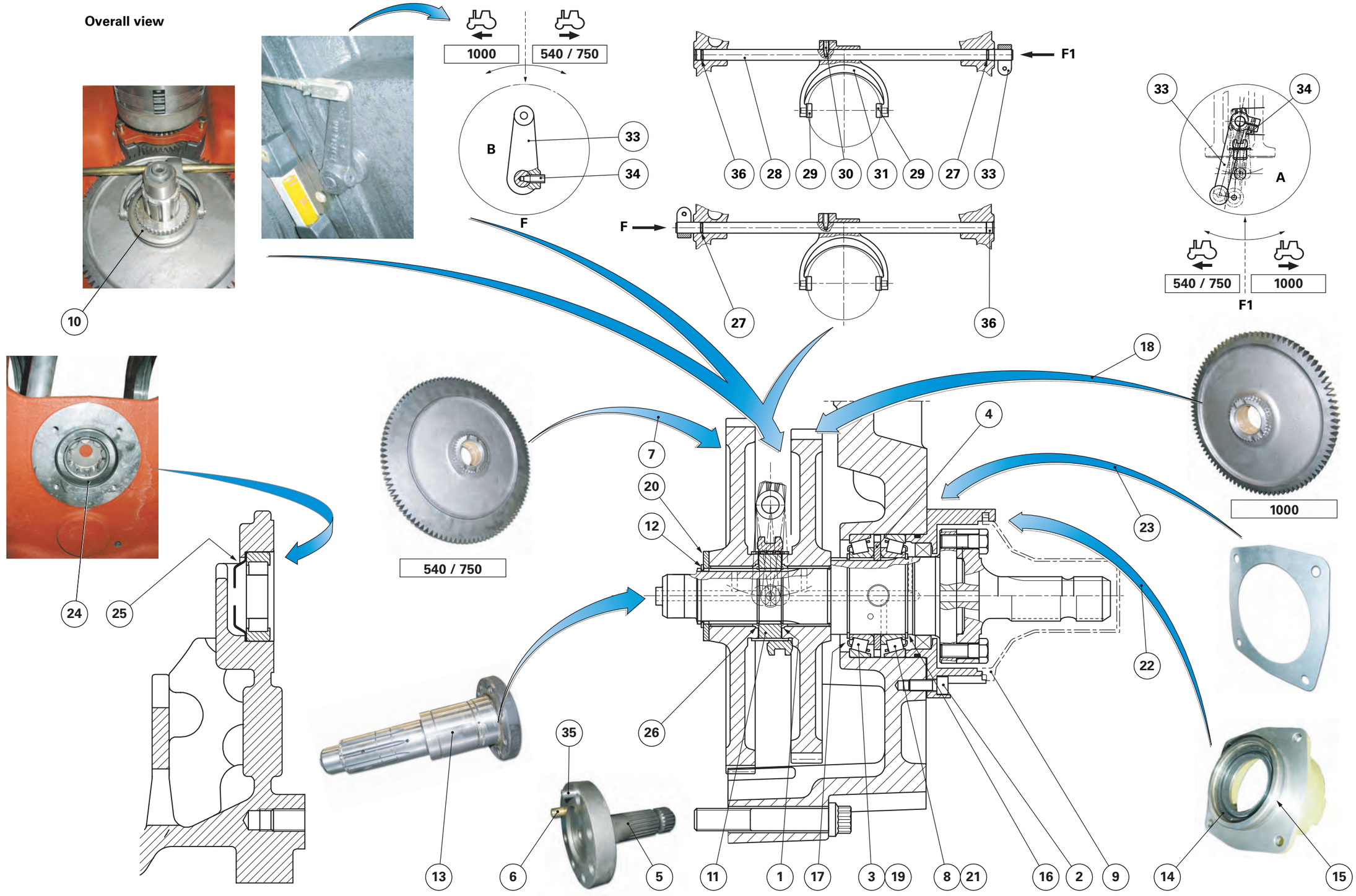

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Fig. 2

Parts list (Fig. 3)

(1) Circlip
(2) Screw
(3) Bearing cone
(4) Castellated washer for sensor (if fitted)
(7) 540 or 750 rpm driven pinion
(8) Bearing cone
(10) Coupler
(11) Hub
(12) Circlip
(13) Shiftable output shaft
(14) Cassette seal
(15) O'ring
(16) Circlip
(17) Circlip
(18) 1000 rpm driven pinion
(19) Bearing cup
(20) Splined washer
(21) Bearing cup
(22) Rear bearing
(23) Shim(s)
(24) Cylindrical roller bearing
(25) Oil deflector
(26) Circlip
(27) O'ring
(28) Pin
(29) Pads
(30) Set screw
(31) Fork
(33) Internal or external (depending on version) control link
(34) Screw
(35) Locating pin
(36) Cup cap

Legend

A External PTO control
B Internal PTO control

Exploded view

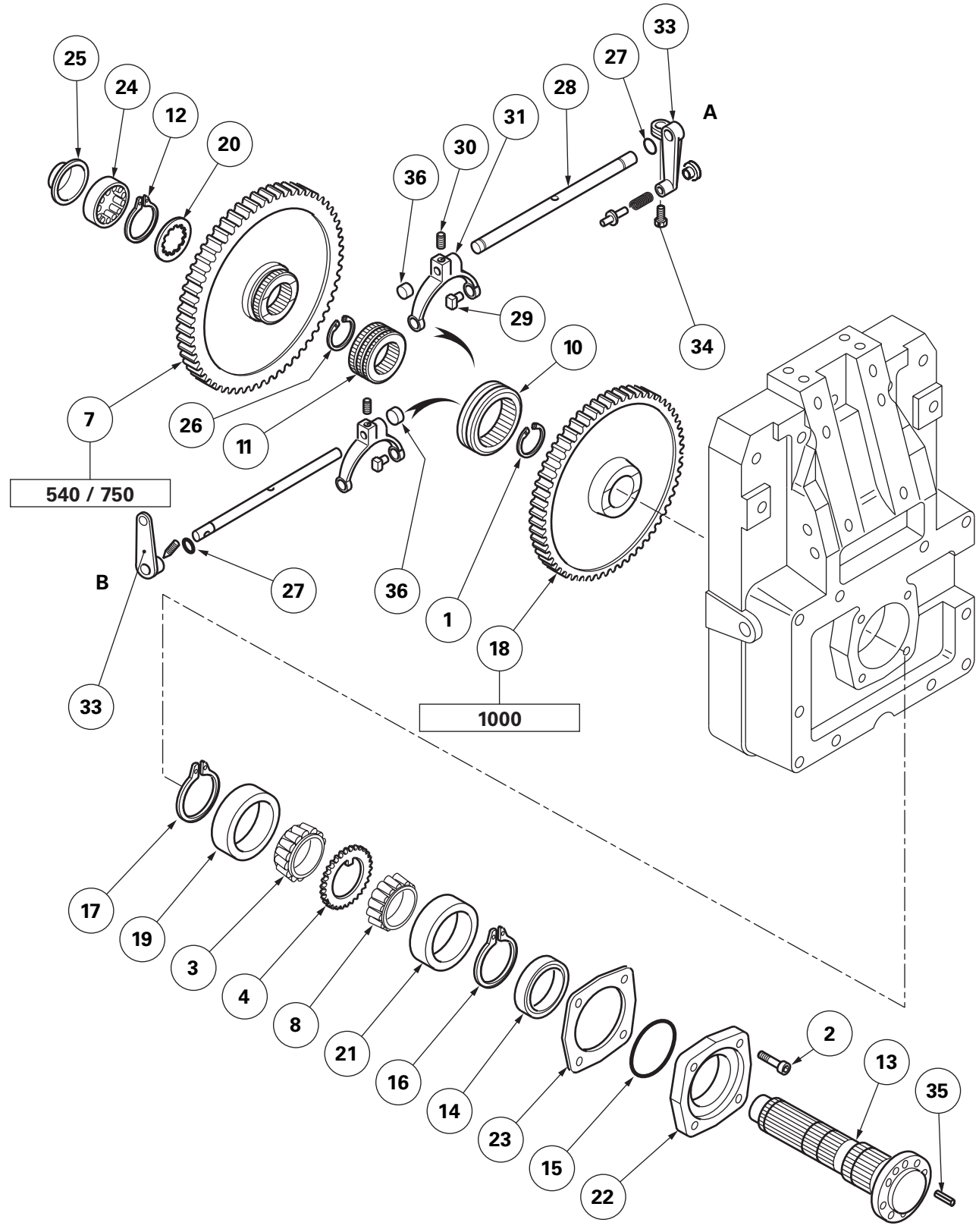

Fig. 3

B . Removing - refitting the 540/1000 rpm or 750/1000 rpm driven pinions and control fork

Preliminary operation

1. Split the rear PTO housing from the centre housing (see chapter 2).

Removal (Fig. 4, Fig. 5)

2. Place the PTO housing flat on a workbench.
3. Remove the block consisting of the PTO clutch (15) and unit/driving pinions (23) assemblies while simultaneously removing the driven pinion (7) (see chapter 7).
4. Remove the link (33).
5. Undo the set screw (30).
6. Take out the PTO housing:
   - the pin (28). Discard the O'ring (27);
   - the fork (31) with its pads (29).
7. Take off:
   - the circlip (26);
   - the coupler (10);
   - the hub (11);
   - the circlip (1);
   - the driven pinion (18).

Refitting (Fig. 4, Fig. 5)

8. Clean and check all components. Replace any defective parts.
   Check that the central channel and radial ports of the shiftable output shaft (13) are not obstructed;
9. Lubricate the friction ring (1) of the driven pinion (18) (Fig. 6).
10. Refit:
    - the driven pinion (18);
    - a new circlip (1);
    - the hub (11);
    - the coupler (10);
    - a new circlip (26).
11. Refit in the PTO housing:
    - the fork (31) with its pads (29), lightly smeared with miscible grease;.
    - the pin (28) with a new O'ring (27).
12. Position the fork on the pin (28).
    Lightly smear the thread of the set screw (30) with Loctite 242 or equivalent. Moderately tighten this screw.
13. Refit the link (33).
    Moderately tighten the screws (34).
14. Lubricate the friction ring (1) of the driven pinion (7) (Fig. 6).
15. Refit the block consisting of the PTO clutch (15) and unit/driving pinions (23) assemblies while simultaneously refitting the driven pinion (7) (see chapter 7).
16. Fit the PTO housing in a vertical position.

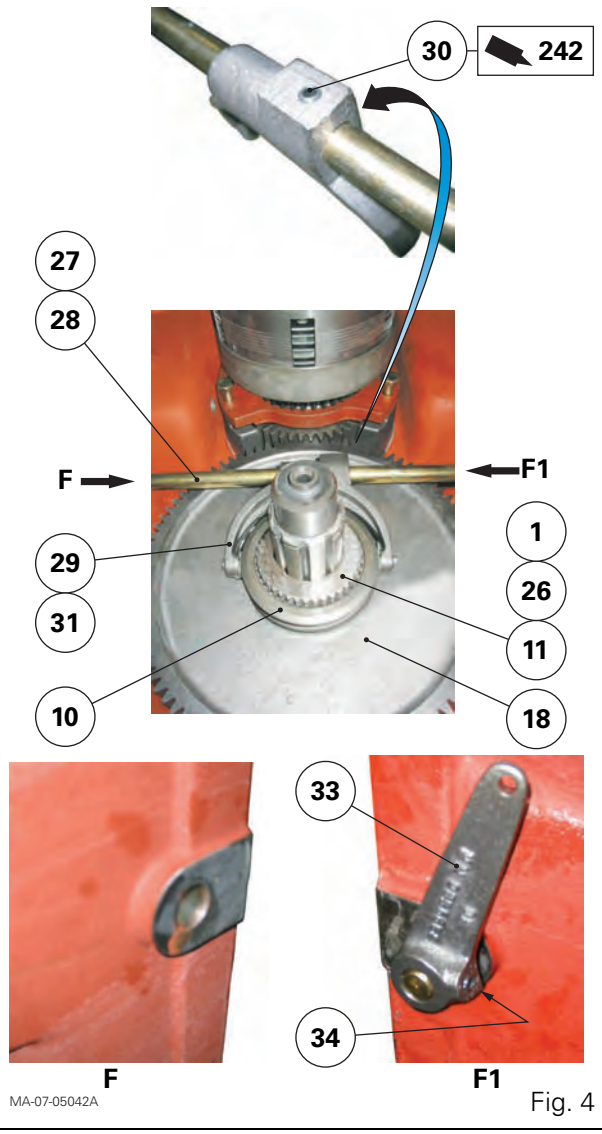

Fig. 4

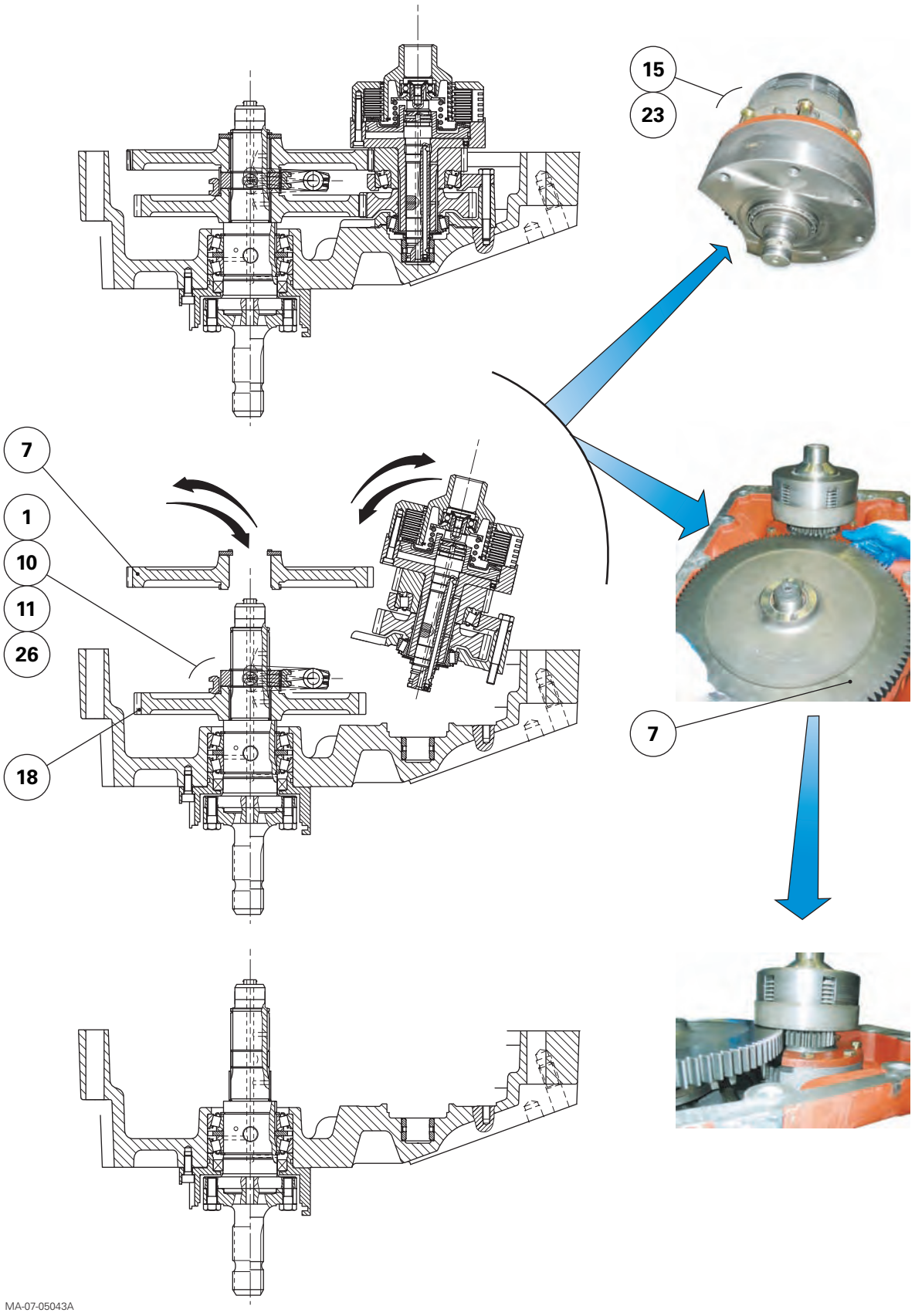

Fig. 5

Final operation

17. Assemble the rear PTO housing to the centre housing (see chapter 2).

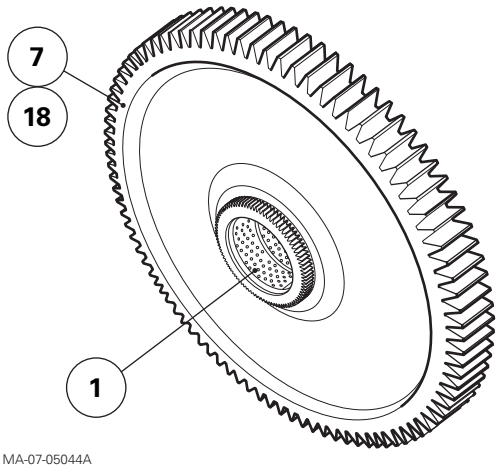

Fig. 6

C . Removing - refitting the front bearing

Preliminary operation

18. Split the rear PTO housing from the centre housing (see chapter 2).

Removal (Fig. 7)

19. Note the orientation of the cylindrical roller bearing (24) in the centre housing. Extract this bearing.
Extract the bearing.

20. Remove the oil deflector (25).

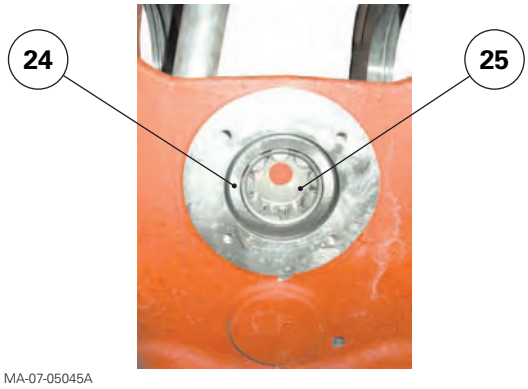

Fig. 7

Refitting

21. Clean and check all components. Replace any defective parts.

22. Refit the oil deflector in the bore of the centre housing.

23. Using a suitable locally made fitting drift, fit the cylindrical roller bearings in the centre housing, turning the rounded profile of its metallic cage towards the shiftable output shaft (13).

24. Manually check that the bearing is resting against the deflector.

Final operation

25. Assemble the rear PTO housing to the centre housing (see chapter 2).

D . Removing - refitting the rear bearings and shiftable output shaft

Preliminary operation

26. Split the rear PTO housing from the centre housing (see chapter 2).

Removal (Fig. 9)

27. Place the PTO housing flat on a workbench in order to allow removal of the shiftable output shaft (13).

28. If fitted, remove the sensor located on the lower right-hand side of the power take-off housing.

29. Remove the 540/1000 rpm or, optionally, 750/1000 rpm driven pinions (7) (18) (see § B);

30. Loosen the screws (2).

31. Remove the rear bearing (22)/output shaft (13) assembly which consists of (Fig. 8):
- the cassette seal (14);
- the O'ring (15);
- the shim(s) (23);
- the cup (21);
- bearing cones (3) (8);
- castellated washer (4);
- circlips (16) (17).

32. Remove the cup (19) from the rear PTO housing.

33. Remove from the shiftable output shaft (13):
- the circlip (17);
- the bearing cone (3);
- the castellated washer (4);
- the bearing cone (8);
- the bearing cup (21);
- the circlip (16).

34. Strip the output shaft (13), removing:
- the bearing (22) with its cassette seal (14) and O'ring (15);
- the flange shaft (5) (if necessary).

Refitting (Fig. 9)

35. Clean and check all components. Replace any defective parts.

Check that the central channel and radial ports of the shiftable output shaft (13) are not obstructed;

36. Equip the output shaft (13) by refitting:
- the flange shaft (5). Tighten the screws (2) to torque (see § E);
- the rear bearing (22). If necessary, replace the cassette seal (14) and O'ring (15) (see § F).

37. On the shiftable output shaft, refit:
- the circlip (16);
- the bearing cup (21);
- the bearing cone (8);
- the castellated washer (4);
- the bearing cone (3);
- the circlip (17).

38. Refit the cup (19) in the rear PTO housing.

39. Refit the original shim(s) (23) onto the bearing block (22) only if the rear bearings do not need shimming.

IMPORTANT: *The rear bearings must be shimmed* (see § G) if at least one of the following parts needs replacing:
- *PTO housing;*
- *castellated washer (4);*
- *bearing cones and cups (3)(8) and (19)(21);*
- *rear bearing (22).*

40. Refit the rear bearing (22)/shiftable output shaft assembly on the PTO housing.

41. Lightly smear the thread of the screws (2) with Loctite 242 or equivalent. Tighten these screws to a torque of 72 - 96 Nm.

42. Refit the driven pinions (18) (7) (see § B):

43. If necessary, refit the sensor located on the lower right-hand side of the power take-off housing. Moderately tighten the screw.

44. Fit the PTO housing in a vertical position.

Final operation

45. Assemble the rear PTO housing to the centre housing (see chapter 2).

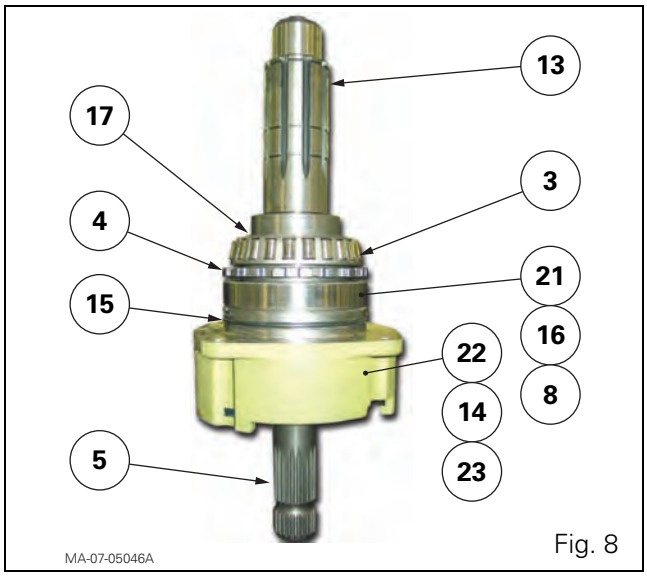
13
17
3
4
21
15
16
22
8
14
5
23
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Fig. 8

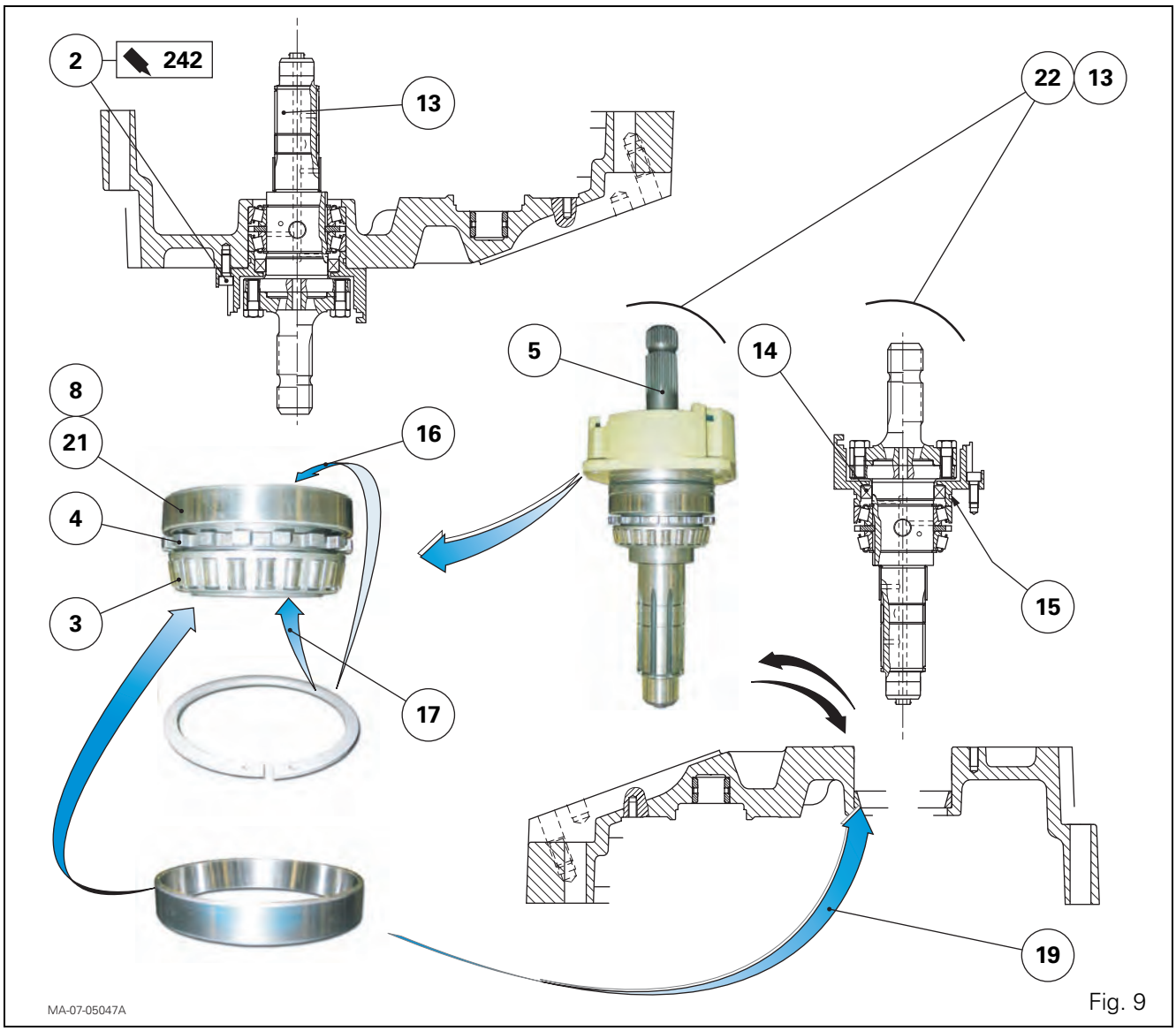
2
242
13
22
13
5
14
8
21
16
4
3
15
17
19
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Fig. 9

E . Removing - refitting the flange shaft

NOTA: *The flange shaft may have 6, 20 or 21 splines.*

Removal (Fig. 10)

46. Remove off the protector (9).
47. Immobilise the shiftable output shaft (13) using a locally made V screw (M12).
48. Loosen the screws (6).
49. Remove the flange shaft (5).

Refitting (Fig. 10)

50. Check for the presence of the locating pin (35).
51. Refit the flange shaft.
52. Immobilise the output shaft as in operation 47.
53. Tighten the screws (6) to a torque of 120 - 160 Nm.
54. Manually check the mobility of the shiftable output shaft.
55. Refit the protector.

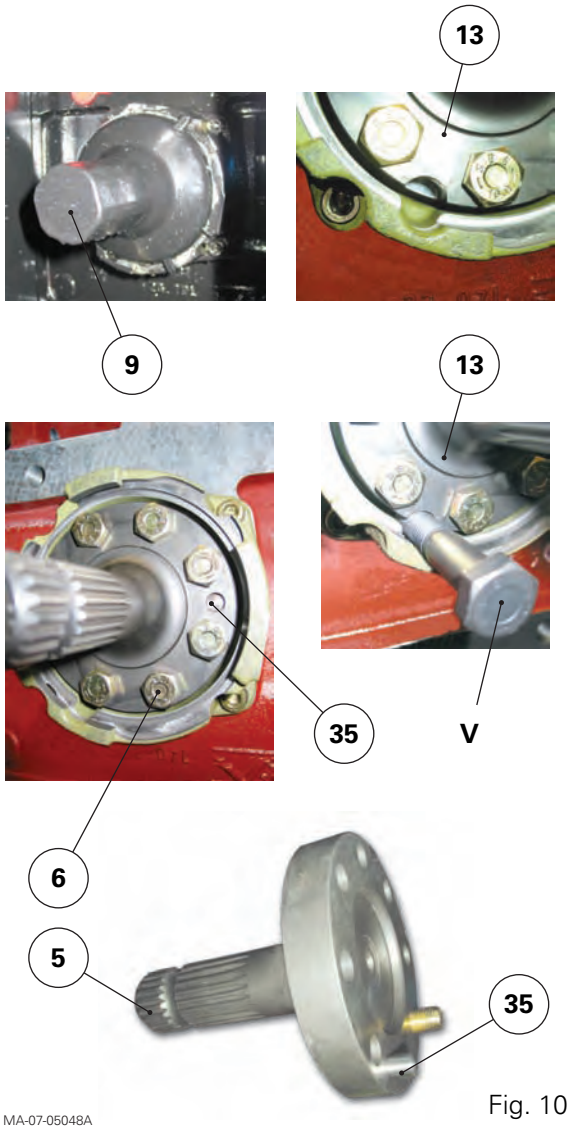

Fig. 10

F . Replacing the rear bearing cassette seal

Preliminary operations

56. Split the rear PTO housing from the centre housing (see chapter 2).

57. Remove the rear bearings and strip the shiftable output shaft (13) (see § D).

58. Note the position of the cassette seal (14) in the rear bearing (22).

Extract the cassette seal.

59. Discard the O'ring (15).

Replacing the seal

60. Clean and check all components. Replace any defective parts.

61. Using the tool ref. 3378115M1 (see § I), insert the cassette seal (14) in the bearing (22), turning the seal lip towards the inside of the PTO housing.

62. After fitting, check that the seal is positioned as indicatedFig. 11.

63. Fit a new O'ring (15) on the rear bearing (22) (Fig. 11).

64. Lubricate the inner rim of the cassette seal (14) and O'ring (15) with clean transmission oil.

65. Recondition and refit the bearing (22)/shiftable output shaft (13) assembly on the PTO housing (see § D).

66. Refit the driven pinions (18) (7) (see § B).

67. If necessary, refit the sensor located on the lower right-hand side of the power take-off housing. Moderately tighten the screw.

68. Fit the PTO housing in a vertical position.

Final operation

69. Assemble the rear PTO housing to the centre housing (see chapter 2).

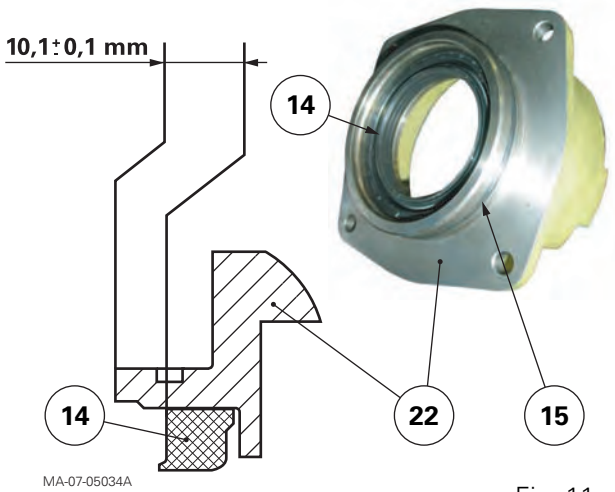

Fig. 11

G . Shimming the rear bearings

Preliminary operations

70. Split the rear PTO housing from the centre housing (see chapter 2).

71. Take off:

- the 540/1000 rpm or, optionally, 750/1000 rpm driven pinions (see § B);
- the rear bearing (22)/shiftable output shaft (13) assembly (see § D);
- the bearing cone (19) from the PTO housing;
- the flange shaft (5) of the shiftable output shaft (13) (see § E).

Shimming

72. Note dimensions A and B (Fig. 12). To avoid being hindered by the resistance of the cassette seal (14) (Fig. 11) on the shiftable output shaft (13), the seal should be temporarily excluded during measurement of A and B values.

- **Dimension A**

  Using a depth gauge, measure dimension A on the PTO housing.

- **Dimension B**

  - Rest the bearings/shiftable output shaft (13) assembly on the rear bearing block. This assembly comprises:
    - bearing cones (3) (8) and their cup;
    - castellated washer (4);
    - circlips (16) (17).
  - Ask an operator to exert a strong and constant manual pressure on the bearing cup (19).

    Simultaneously turn the shiftable output shaft (13) from left to right so as to correctly "seat" the bearing cones in their cups.
  - Measure dimension B at two opposing points. Take the average of the two measurements.

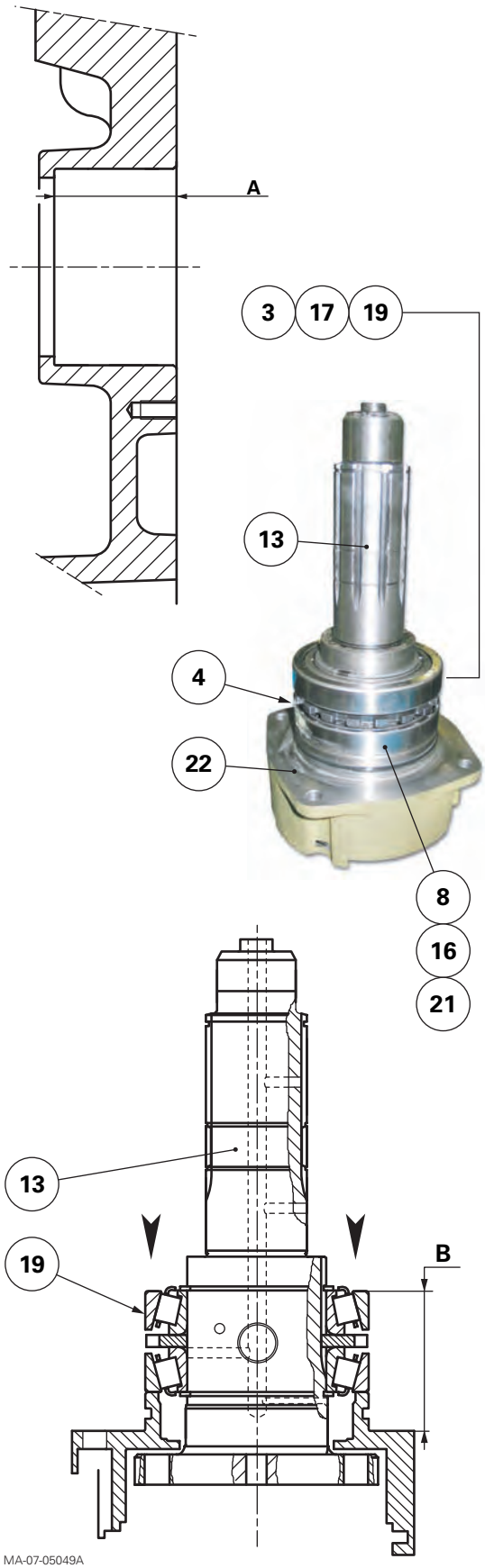

Fig. 12

73. Calculate B - A. Depending on the result, select a thickness of shim(s) (23) to obtain a clearance J of **0.05 to 0.15 mm** (Fig. 13).

NOTA: *If possible, shim so as to obtain minimum tolerance.*

Final operations

74. Refit:
- the flange shaft (5) on the shiftable output shaft (see § E);
- the bearing cup (19) in the PTO housing;
- the rear bearing (22)/shiftable output shaft (13) assembly (see § D) fitted with:
  - a new cassette seal (14) (see § F),
  - the shim(s) (23) selected during operation 73.

75. Lightly smear the thread of the screws (2) with Loctite 242 or equivalent. Tighten these screws to a torque of 72 - 96 Nm.

76. Refit the 540/1000 rpm or, optionally, 750/1000 rpm driven pinions (see § B);

77. Assemble the rear PTO housing to the centre housing (see chapter 2).

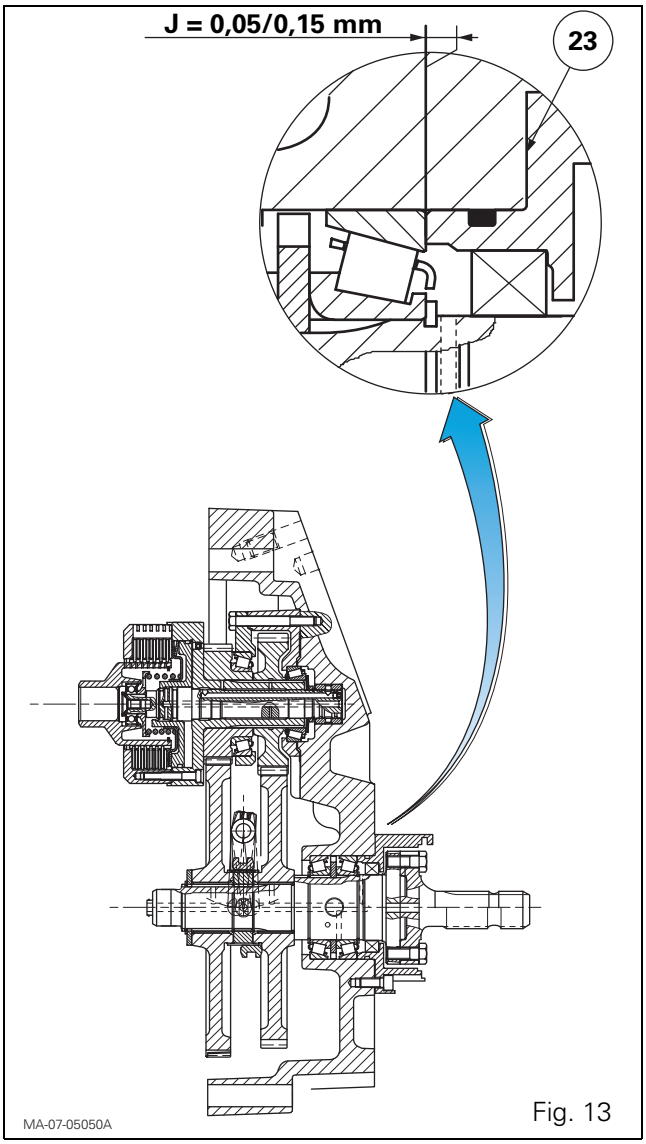

Fig. 13

H . Adjusting the cable control

On lever L (Fig. 15)

78. Push the control lever L located inside the cab to the 1000 rpm position (Fig. 14).

79. Screw the clevis (1) flush with the threaded end of the cable (6).

80. Fit the clevis on the lever using clip (7). Tighten the nut (2).

81. Position the nut on the threaded sheath end (5).

82. Fit the threaded sheath end on the bracket. Tighten nut (4) and check that the cable is not constrained in any way.

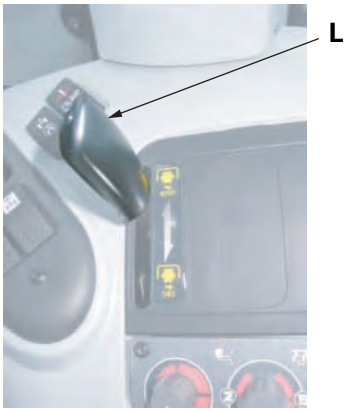

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Fig. 14

On link B (Fig. 15)

83. Turn link B towards the front of the tractor in the 1000 rpm position.

84. Screw clevis (9) flush with the threaded part of cable (6).

85. Fit clevis (9) on link B using clip (10). Tighten the nut (11).

86. Adjust the stop (12) on bracket (8) using nut (13), taking care that link B does not move.

87. Tighten nut (14) and check that the cable is not constrained in any way.

88. Check control operation in the 540 or 750 rpm positions (depending on option) and in 1000 rpm position.

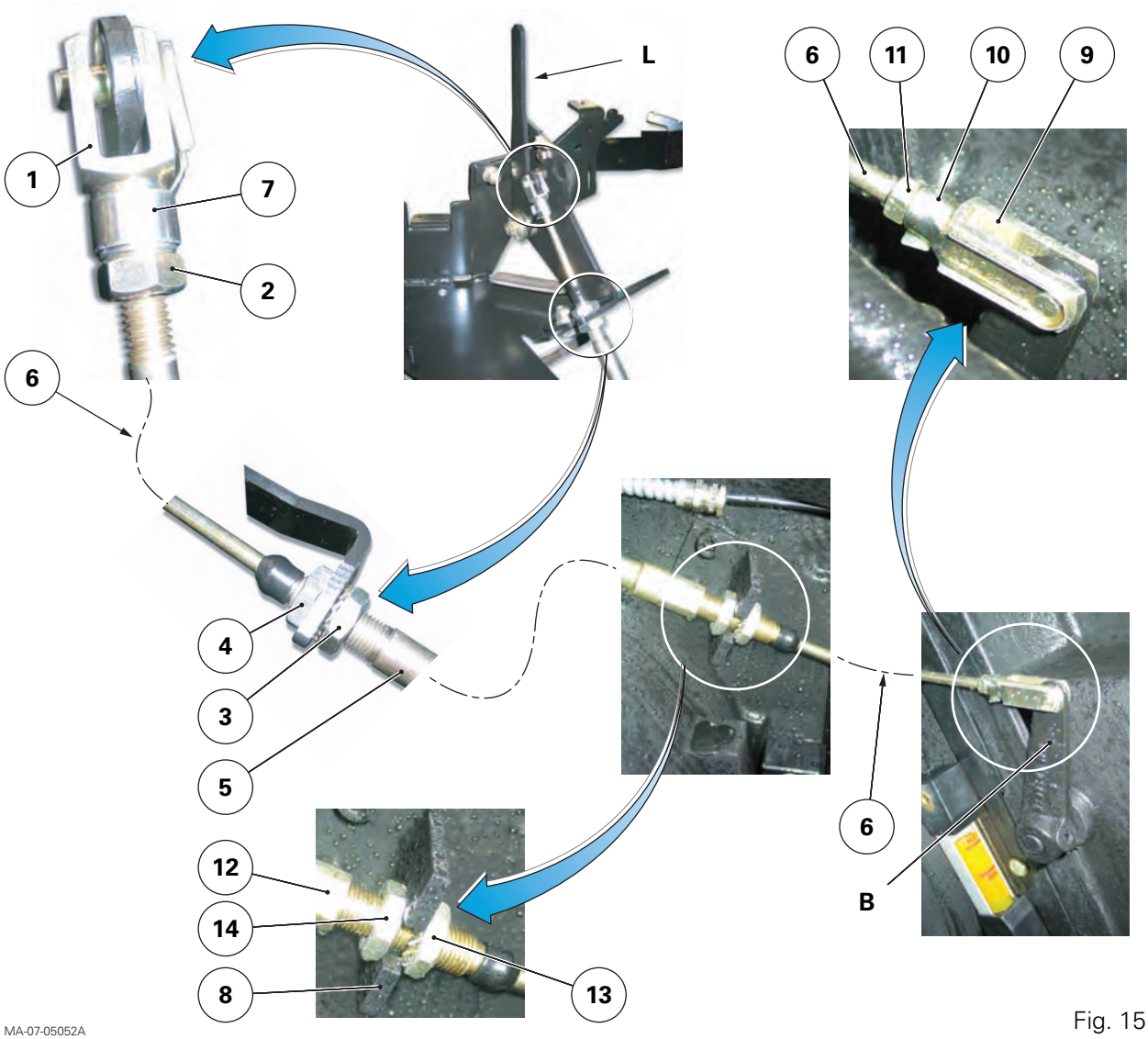


Fig. 15

I . Service tool

Tool available in the AGCO network

- 3378115M1: Tool for inserting cassette seal (14) on the rear PTO bearing (Fig. 16).

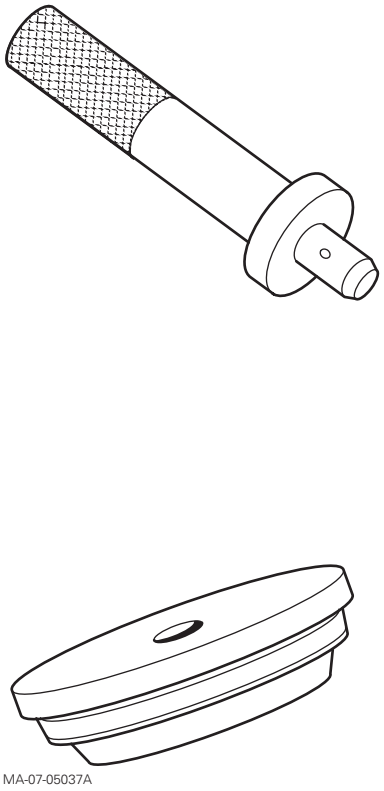


Fig. 16

7C14 - GPA30 - 1000 rpm output shaft

CONTENTS

GPA30 - 1000 rpm output shaft

A . General

See following page.

GPA30 - 1000 rpm output shaft

The GPA30 rear axle PTO housing encloses:
- the driving pinion (see chapter 7);
- the driven pinion (18) (1000 rpm);
- the 1000 rpm output shaft (13).

The output shaft is supported (Fig. 1):
- at the front by a cylindrical roller bearing (24). This bearing is directly fitted into the rear partition of the centre housing;
- at the rear, by two taper roller bearings (3) (19) and (8) (21).

  Taper roller bearing clearance is adjusted using shim(s) (23) placed between the PTO housing and the rear bearing (22).

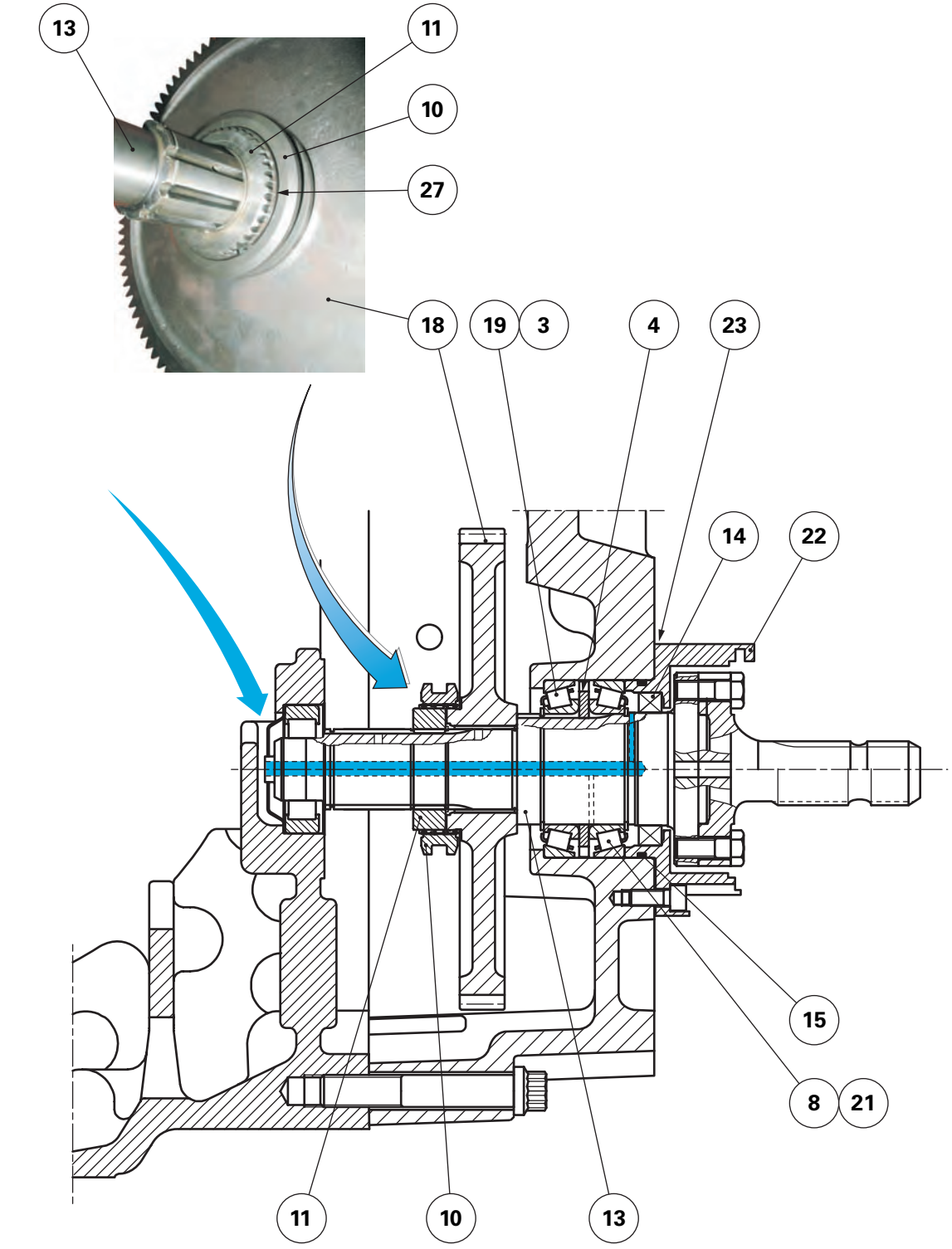
The driven pinion (18) is constantly meshed with the upper shaftline driving pinion (see chapter 7). It is also linked to the output shaft (1000 rpm) (13) via the hub (11) and coupler (10), coupled by means of the circlip (27) (Fig. 1).

The castellated washer (4) is integral to the 1000 rpm output shaft (13) via a tab (Fig. 1). This washer informs the tractor electronic system of the output speed of the output shaft (13) via a sensor (if fitted) located on the lower right-hand side of the PTO housing.

Lubrication

A central channel with a radial port in the 1000 rpm output shaft (13) provides splash lubrication of:
- the front cylindrical roller bearing (24);
- the rear taper roller bearings (3) (19) and (8) (21).

The oil tightness of the rear bearing is provided by cassette seal (14) and O'ring (15).


13
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22
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21
11
10
13
Lubrication
MA-07-05053A

Fig. 1

GPA30 - 1000 rpm output shaft

Parts list (Fig. 2)

(1) Circlip
(2) Screw
(3) Bearing cone
(4) Castellated washer for sensor (if fitted)
(5) Flange shaft
(6) Screw
(8) Bearing cone
(9) Protector
(10) Coupler
(11) Hub
(13) 1000 rpm output shaft
(14) Cassette seal
(15) O'ring
(16) Circlip
(17) Circlip
(18) 1000 rpm driven gear
(19) Bearing cup
(21) Bearing cup
(22) Rear bearing
(23) Shim(s)
(24) Cylindrical roller bearing
(25) Oil deflector
(26) Circlip
(27) Circlip
(35) Locating pin

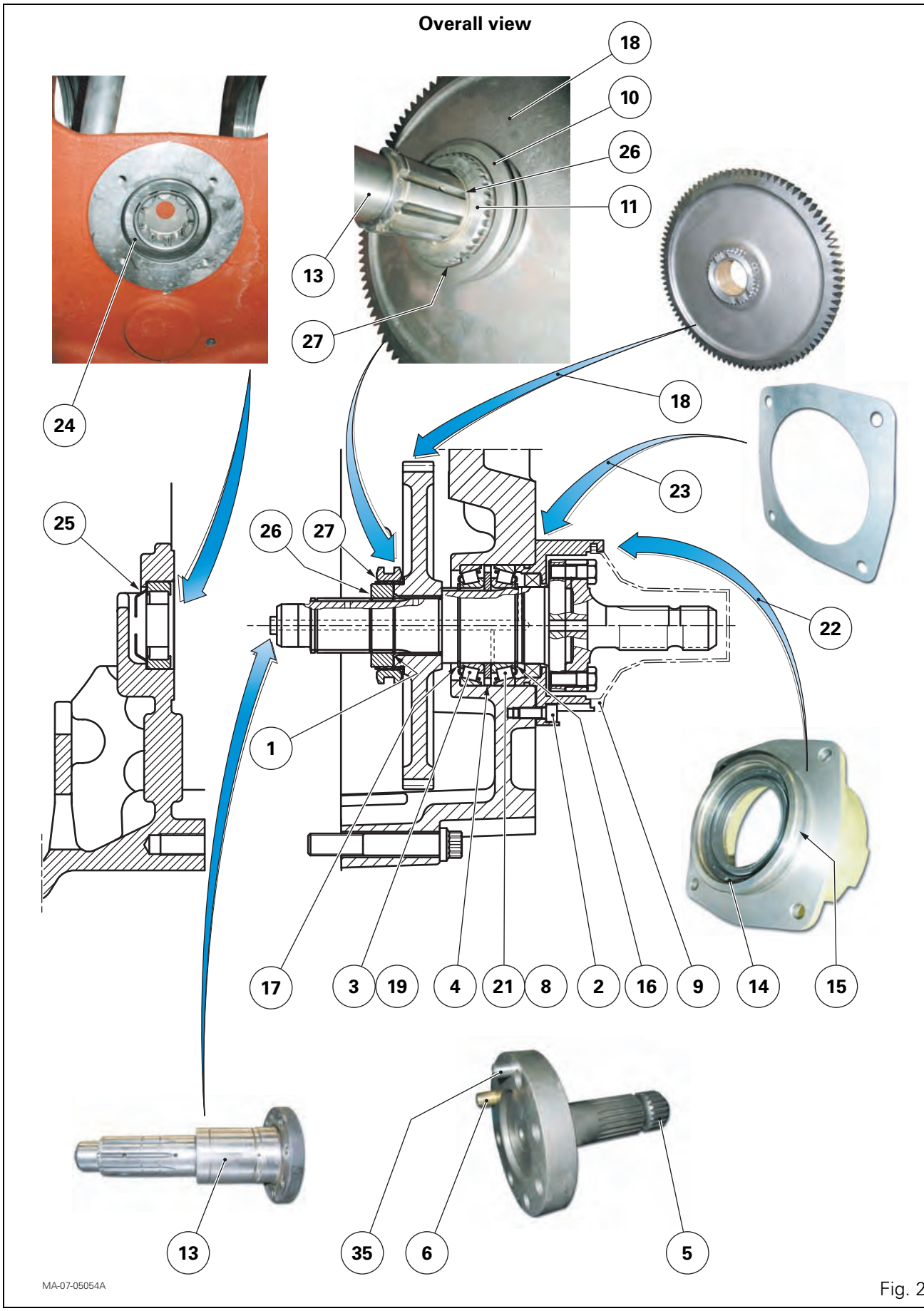

Overall view
18
10
26
11
13
27
24
18
23
25
26
27
22
1
17
3
19
4
21
8
2
16
9
14
15
13
35
6
5
MA-07-05054A

Fig. 2

GPA30 - 1000 rpm output shaft

Parts list (Fig. 3)

(1) Circlip
(2) Screw
(3) Bearing cone
(4) Castellated washer for sensor (if fitted)
(8) Bearing cone
(10) Coupler
(11) Hub
(13) 1000 rpm output shaft
(14) Cassette seal
(15) O'ring
(16) Circlip
(17) Circlip
(18) 1000 rpm driven gear
(19) Bearing cup
(21) Bearing cup
(22) Rear bearing
(23) Shim(s)
(24) Cylindrical roller bearing
(25) Oil deflector
(26) Circlip
(27) Circlip
(35) Locating pin
(36) Cup plugs

Exploded view

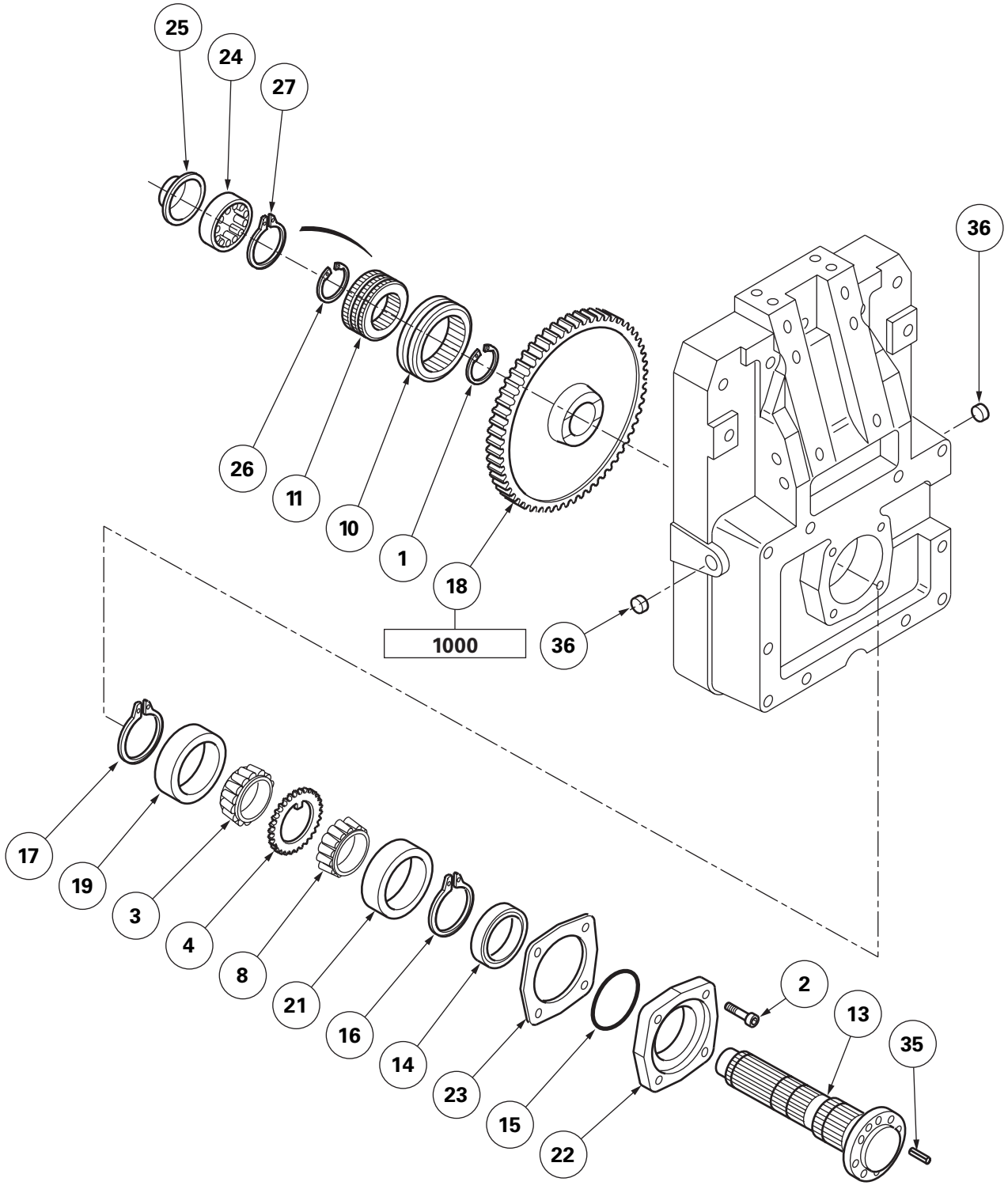


Fig. 3

B . Removing - refitting the 1000 rpm driven pinion

Preliminary operation

1. Split the rear PTO housing from the centre housing (see chapter 2).

Removal (Fig. 5)

2. Place the PTO housing flat on a workbench.

3. Remove the block consisting of the clutch unit (15) and unit/driving pinion (23) assemblies (see chapter 7).

4. Take off:
- the circlip (26);
- the hub (11)/coupler (10)/circlip (27) assembly;
- the circlip (1);
- the driven pinion (18).

5. If necessary, remove the circlip (27) from the hub (11).

Refitting (Fig. 5)

6. Clean and check all components. Replace any defective parts.

Check that the central channel and the relevant radial port in the 1000 rpm output shaft are not obstructed;

7. Lubricate the friction ring (1) of the driven pinion (18) (Fig. 4).

8. If necessary, refit a new circlip (27) on the hub (11).

9. Refit:
- the driven pinion (18);
- a new circlip (1);
- the hub (11)/coupler (10)/circlip (27) assembly;
- a new circlip (26).

10. Refit the block consisting of the clutch unit (15) and unit/driving pinion (23) assemblies (see chapter 7).

11. Fit the PTO housing in a vertical position.

Final operation

12. Assemble the rear PTO housing to the centre housing (see chapter 2).

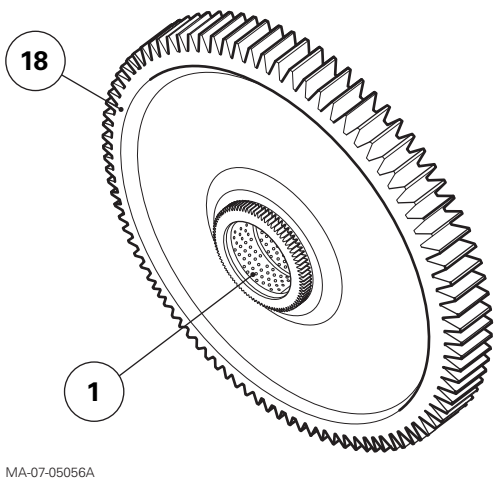
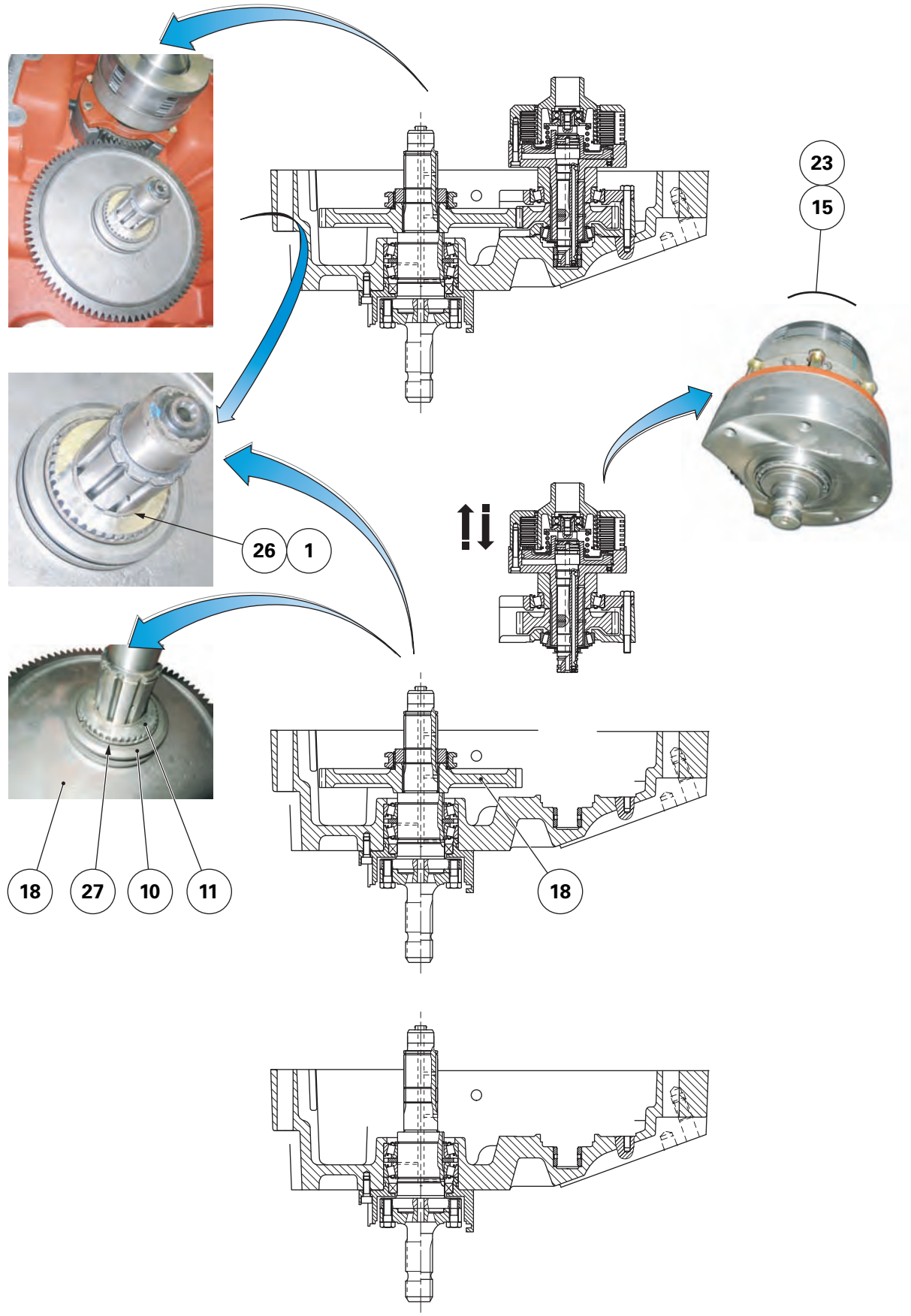


Fig. 4



MA-07-05057A

Fig. 5

C . Removing - refitting the front bearing

Preliminary operation

13. Split the rear PTO housing from the centre housing (see chapter 2).

Removal (Fig. 6)

14. Note the orientation of the cylindrical roller bearing (24) in the centre housing. Extract this bearing.

15. Remove the oil deflector (25).

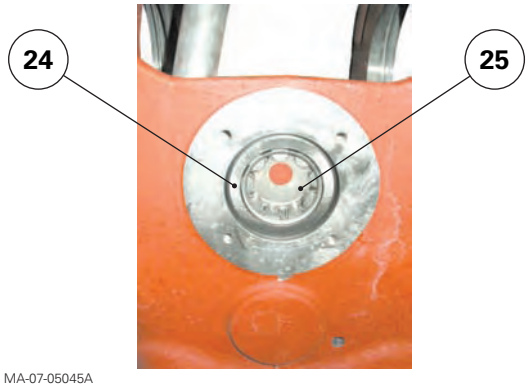


Fig. 6

Refitting

16. Clean and check all components. Replace any defective parts.

17. Refit the oil deflector in the bore of the centre housing.

18. Using a suitable locally made fitting drift, fit the cylindrical roller bearings in the centre housing, turning the rounded profile of its metallic cage towards the 1000 rpm output shaft (13).

19. Manually check that the bearing is resting against the deflector.

Final operation

20. Assemble the rear PTO housing to the centre housing (see chapter 2).

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D . Removing - refitting the rear bearings and 1000 rpm output shaft

Preliminary operation

21. Split the rear PTO housing from the centre housing (see chapter 2).

Removal (Fig. 8)

22. Place the PTO housing flat on a workbench in order to allow removal of the 1000 rpm output shaft (13).

23. If fitted, remove the sensor located on the lower right-hand side of the power take-off housing.

24. Remove the 1000 rpm driven pinion (18) (see § B).

25. Loosen the screws (2).

26. Remove the rear bearing (22)/output shaft (13) assembly which consists of (Fig. 7):
- the cassette seal (14);
- the O'ring (15);
- the shim(s) (23);
- the cup (21);
- bearing cones (3) (8);
- castellated washer (4);
- circlips (16) (17).

27. Remove the cup (19) from the rear PTO housing.

28. From the 1000 rpm output shaft (13), remove:
- the circlip (17);
- the bearing cone (3);
- the castellated washer (4);
- the bearing cone (8);
- the bearing cup (21);
- the circlip (16).

29. Strip the output shaft (13), removing:
- the bearing (22) with its cassette seal (14) and O'ring (15);
- the flange shaft (5) (if necessary).

Refitting (Fig. 8)

30. Clean and check all components. Replace any defective parts.

Check that the central channel and the relevant radial port in the 1000 rpm output shaft are not obstructed;

31. Equip the output shaft (13) by refitting:
- the flange shaft (5). Tighten the screws (6) to torque (see § E);
- the rear bearing (22). If necessary, replace the cassette seal (14) and O'ring (15) (see § F).

32. Refit on the 1000 rpm output shaft (13):
- the circlip (16);
- the bearing cup (21);
- the bearing cone (8);
- the castellated washer (4);
- the bearing cone (3);
- the circlip (17).

33. Refit the cup (19) on the rear PTO housing.

34. Refit the original shim(s) (23) onto the bearing (22) only if the rear bearings do not need shimming.

IMPORTANT: *The rear bearings must be shimmed* (see § G) if at least one of the following parts needs replacing:
- *PTO housing;*
- *castellated washer (4);*
- *bearing cones and cups (3)(8) and (19)(21);*
- *rear bearing (22).*

35. Refit the rear bearing (22)/1000 rpm output shaft (13) assembly on the PTO housing.

36. Lightly smear the thread of the screws (2) with Loctite 242 or equivalent. Tighten these screws to a torque of 72 - 96 Nm.

37. Refit the driven pinion (18) (see § B):

38. If necessary, refit the sensor located on the lower right-hand side of the power take-off housing. Moderately tighten the screw.

39. Fit the PTO housing in a vertical position.

Final operation

40. Assemble the rear PTO housing to the centre housing (see chapter 2).

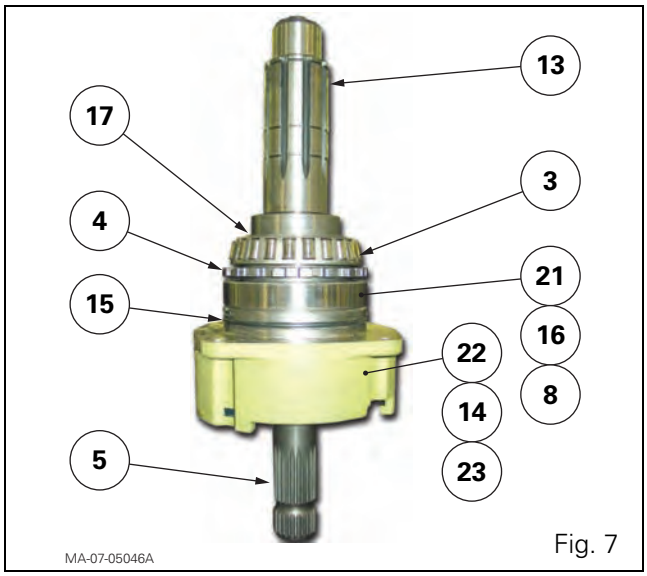
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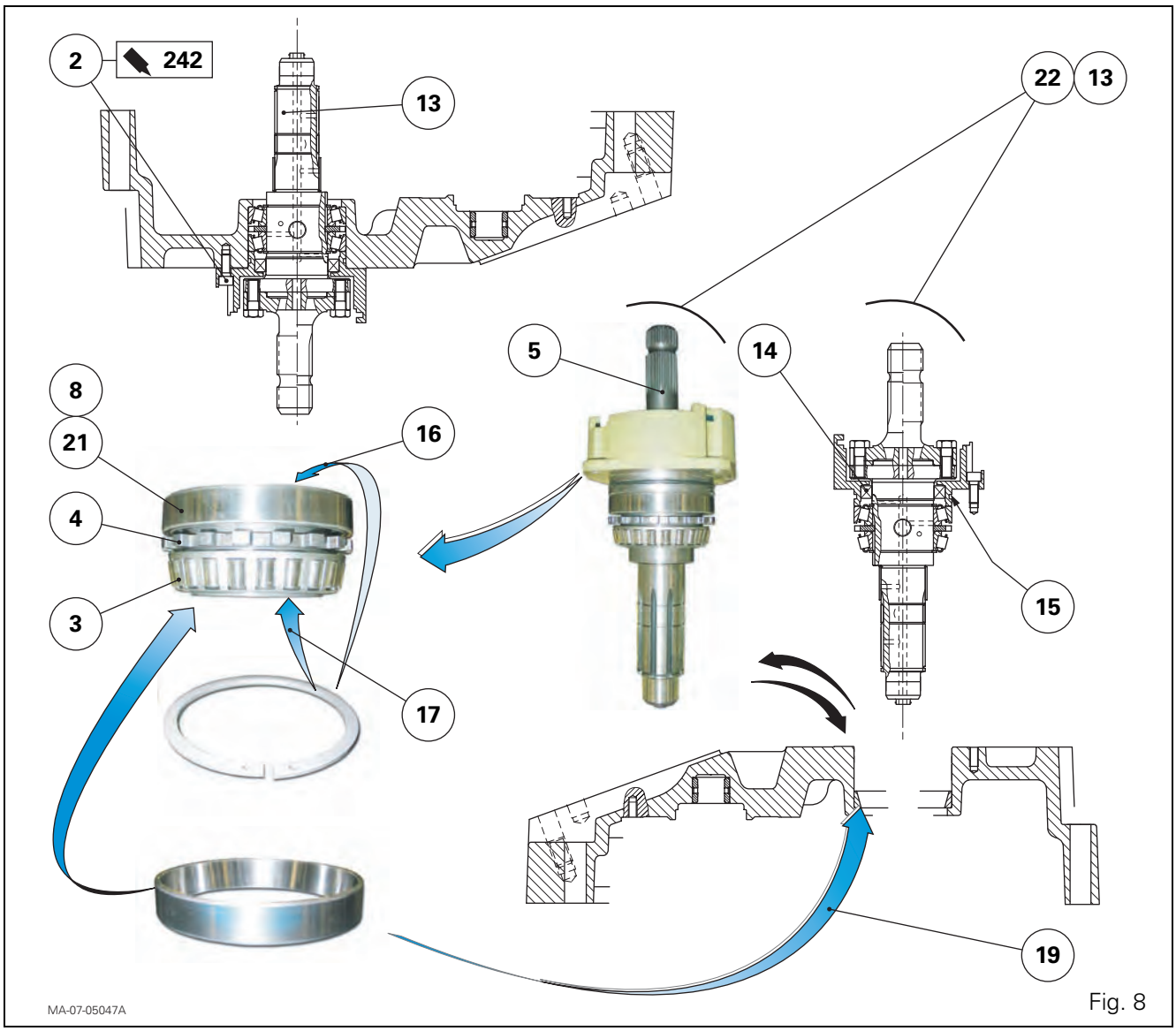
Fig. 7


2
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4
3
15
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Fig. 8

E . Removing - refitting the flange shaft

NOTA: *The flange shaft may have 6, 20 or 21 splines.*

Removal (Fig. 9)

41. Remove off the protector (9).
42. Immobilise the 1000 rpm output shaft (13) using a locally made V screw (M12).
43. Loosen the screws (6).
44. Remove the flange shaft (5).

Refitting (Fig. 9)

45. Check for the presence of the locating pin (35).
46. Refit the flange shaft.
47. Immobilise the 1000 rpm output shaft as in operation 42.
48. Insert and tighten the screws (6) to a torque of 120 - 160 Nm.
49. Manually check the mobility of the 1000 rpm output shaft.
50. Refit the protector.

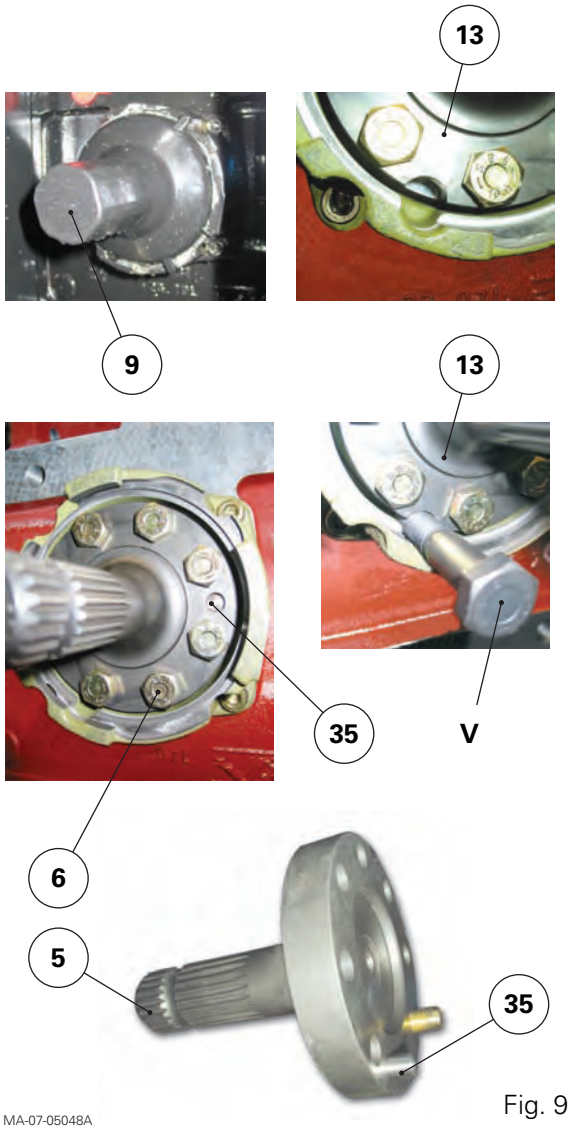

Fig. 9

F . Replacing the rear bearing cassette seal

Preliminary operations

51. Split the rear PTO housing from the centre housing (see chapter 2).

52. Remove the rear bearings and strip the 1000 rpm output shaft (see § D).

53. Note the position of the cassette seal (14) in the rear bearing (22).

Extract the cassette seal.

54. Discard the O'ring (15).

Replacing the seal

55. Clean and check all components. Replace any defective parts.

56. Using the tool ref. 3378115M1 (see § H), fit the cassette seal (14) in the bearing (22), turning the seal lip towards the inside of the PTO housing.

57. After fitting, check that the seal is positioned as indicated Fig. 10.

58. Fit a new O'ring (15) on the rear bearing (22) (Fig. 10).

59. Lubricate the inner rim of the cassette seal (14) and O'ring (15) with clean transmission oil.

60. Recondition and refit the rear bearing (22) / 1000 rpm output shaft (13) assembly on the PTO housing (see § D).

61. Refit the driven pinion (18) (see § B).

62. If necessary, refit the sensor located on the lower right-hand side of the power take-off housing. Moderately tighten the screw.

63. Fit the PTO housing in a vertical position.

Final operation

64. Assemble the rear PTO housing to the centre housing (see chapter 2).

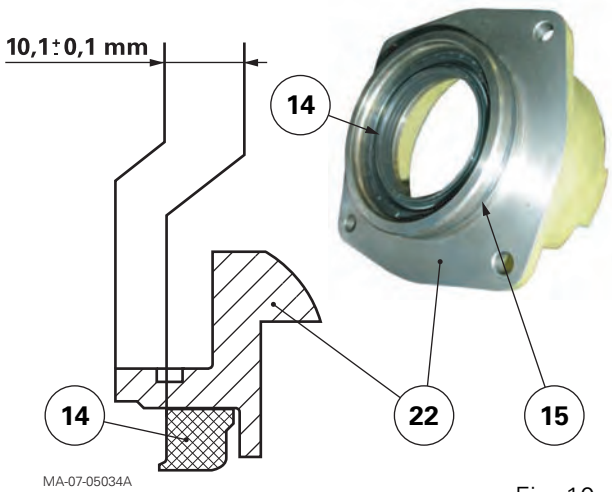

Fig. 10

G . Shimming the rear bearings

Preliminary operations

65. Split the rear PTO housing from the centre housing (see chapter 2).

66. Take off:

- the 1000 rpm driven pinion (see § B);
- the rear bearing (22)/1000 rpm output shaft (13) assembly (see § D);
- the bearing cone (19) from the PTO housing;
- the flange shaft (5) of the 1000 rpm output shaft (13) (see § E).

Shimming

67. Note dimensions A and B (Fig. 11). To avoid being hindered by the resistance of the cassette seal (14) (Fig. 10) on the 1000 rpm output shaft (13), the seal should be temporarily excluded during measurement of A and B dimensions.

- **Dimension A**

  Using a depth gauge, measure dimension A on the PTO housing.

- **Dimension B**

  - Rest the bearing/1000 rpm output shaft (13) assembly on the rear bearing block. This assembly comprises:
    - bearing cones (3) (8) and their cup;
    - castellated washer (4);
    - circlips (16) (17).
  - Ask an operator to exert a strong and constant manual pressure on the bearing cup (19).

    Simultaneously turn the 1000 rpm output shaft (13) from left to right so as to correctly "seat" the bearing cones in their cups.
  - Measure dimension B at two opposing points. Take the average of the two measurements.

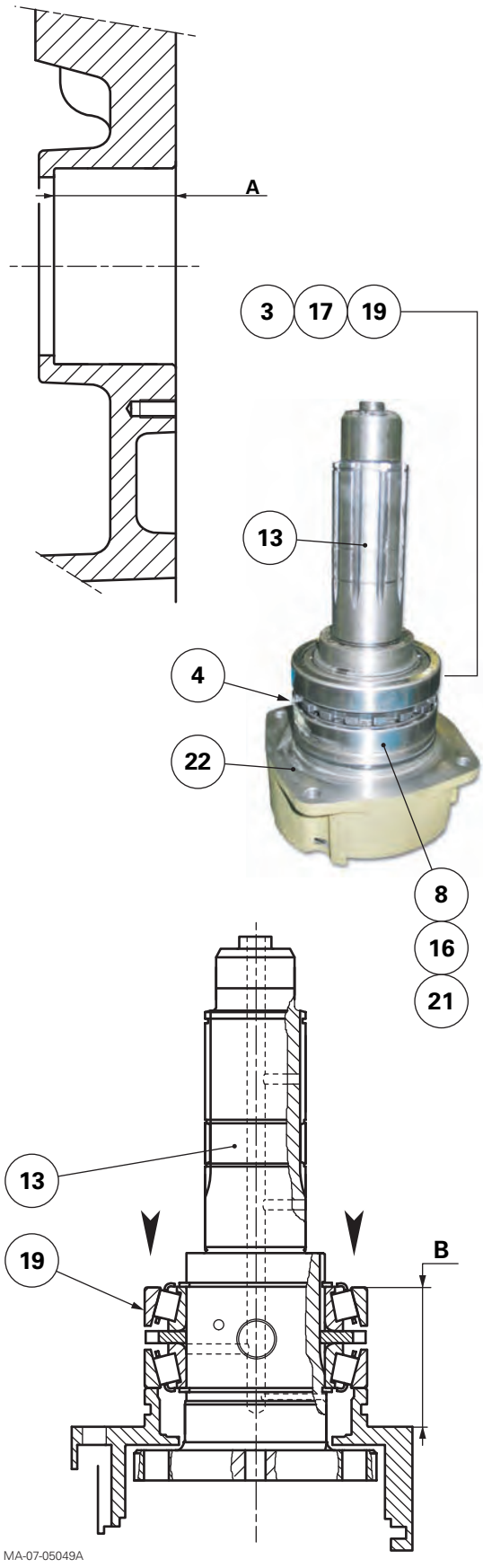

Fig. 11

68. Calculate B - A. Depending on the result, select a thickness of shim(s) (23) to achieve a clearance J of **0.05 to 0.15 mm** (Fig. 12).

NOTA: *If possible, shim so as to obtain minimum tolerance.*

Final operations

69. Refit:
- the flange shaft (5) of the 1000 rpm output shaft (see § E);
- the bearing cup (19) in the PTO housing;
- the rear bearing (22)/1000 rpm output shaft (13) assembly (see § D) fitted:
  - with a new cassette seal (14) (see § F),
  - with the shim(s) (23) selected during operation 68.

70. Lightly smear the thread of the screws (2) with Loctite 242 or equivalent. Tighten these screws to a torque of 72 - 96 Nm.

71. Refit the driven pinion (18) (see § B).

72. Assemble the rear PTO housing to the centre housing (see chapter 2).

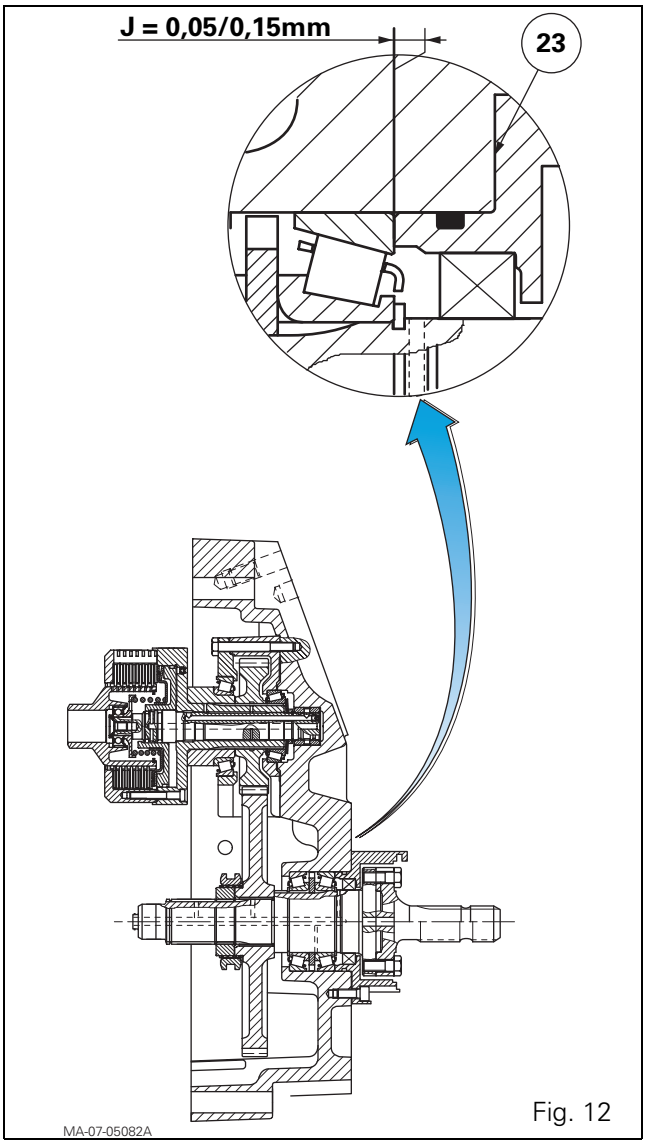

Fig. 12

H . Service tool

Tool available in the AGCO network

- 3378115M1: Tool for fitting cassette seal (14) on the rear PTO bearing block (Fig. 13).

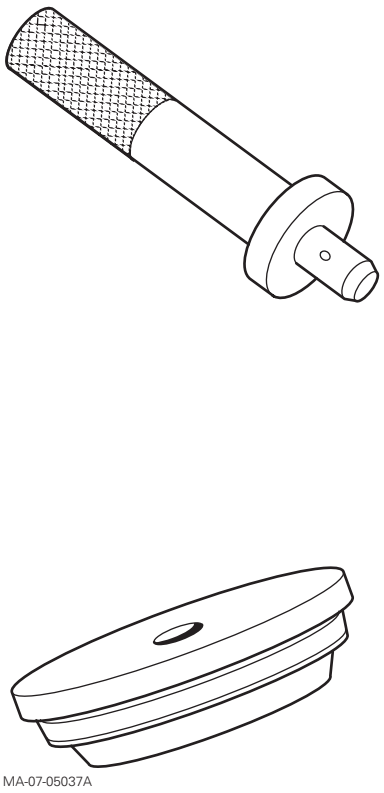

Fig. 13

7C15 - GPA30 - PTO brake and clutch

CONTENTS

GPA30 - PTO brake and clutch

A . General

The multidisc clutch (15) (Fig. 1) is fitted in the PTO housing at the rear of the GPA30 transmission centre housing.

It transmits engine speed to the driving pinions and combined driven pinions, via a proportional solenoid valve controlled by the tractor electronic system.

The multidisc clutch consists of the following main components:

- **a unit (6)** supported by two bearings fitted in a unit/driving pinions assembly (see chapter 7);
- **a sleeve (10)** force fitted into the unit (6). This sleeve performs two functions:
  - at the rear, it feeds the multidisc clutch (17 bar low pressure) and lubricates the friction discs through independent ports and channels.
  - at the front, it supports the drive hub (1) ball bearing (13).
- **two segments (22)**, which ensure the oil tightness of the 17 bar low pressure circuit;
- **a cover (32)** fixed to the clutch unit and enclosing:
  - the friction discs splined to the hub (1),
  - the intermediate plates integral with the cover via catches.

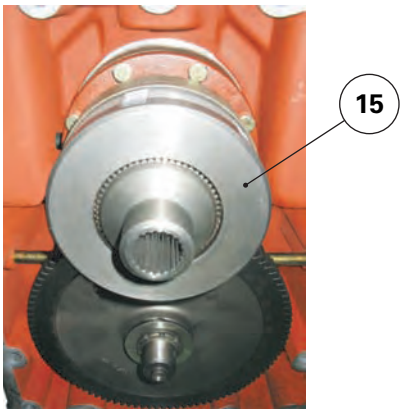

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Fig. 1

B . Operation

Power take-off clutch (Fig. 3)

Clutch engaged position

The clutch is fed by:

- the 17 bar low pressure circuit;
- the proportional solenoid valve (1) located on the right-hand hydraulic cover (Fig. 2);
- an external pipe going from the right-hand hydraulic cover to the rear PTO housing.

The pressurised oil enters the sleeve (10) through channel A and flows to hydraulic chamber B and channel C. The pressure pushes the progressivity washer (5) and piston (19). The piston (19) compresses the friction discs (4) splined to the hub (1) and the intermediate plates (3) integral with the cover (32) via catches. The movement provided by the layshafts (see chapter 7) is thus transmitted to the driving pinions via the unit (6).

Lubrication of the friction discs (Fig. 3)

A channel D at the centre of the sleeve (10) lubricates the friction discs in clutch engaged position.

Clutch disengaged position

When the solenoid valve no longer feeds the clutch, the piston (19) is pressed against the housing (6) by the spring (8). The oil in the piston (19) hydraulic chamber is directed to the return by the solenoid valve. Simultaneously, the ball of valve (7) leaves its seat, thus assisting the pressure release of the piston (19) hydraulic chamber.

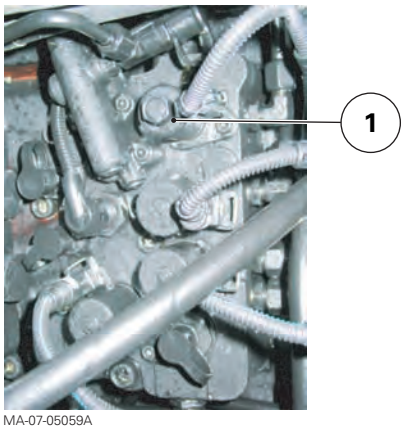

Fig. 2

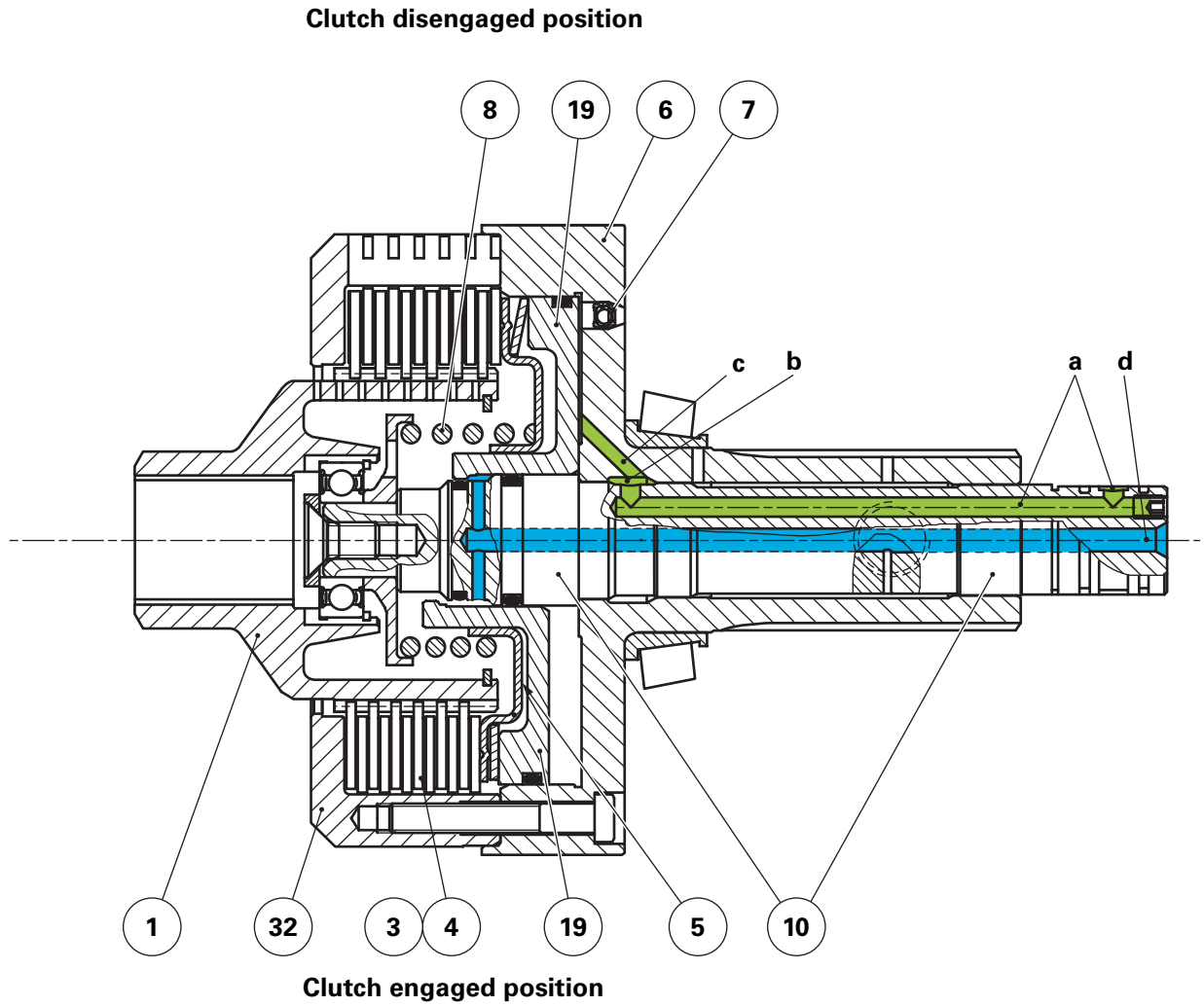
Clutch disengaged position
8
19
6
7
c
b
a
d
1
32
3
4
19
5
10
Clutch engaged position
Lubrication
17 bar low pressure
MA-07-05060A

Fig. 3

Power take-off brake (Fig. 4)

The cylinder of PTO brake piston (1) is located on the rear partition of the centre housing (45). It is held in place by means of Mecanindus pins.

When the proportional solenoid valve feeds the PTO clutch, the piston (19) is pressurised (clutch engaged position). The brake piston (1) is at rest. The upper and lower PTO shaftlines can then rotate freely (see chapter 7).

When the proportional solenoid valve no longer feeds the PTO clutch, the piston (19) is at rest (declutched position). The 17 bar low pressure is directed to the brake. It moves the piston (1), which presses against the rim of the unit (6), thus braking the upper and lower PTO shaftlines (see chapter 7).

Lubrication of the power take off brake (Fig. 4, Fig. 5)

A restrictive channel at the centre of the piston (1) lubricates the rim of the unit (6) when braking.

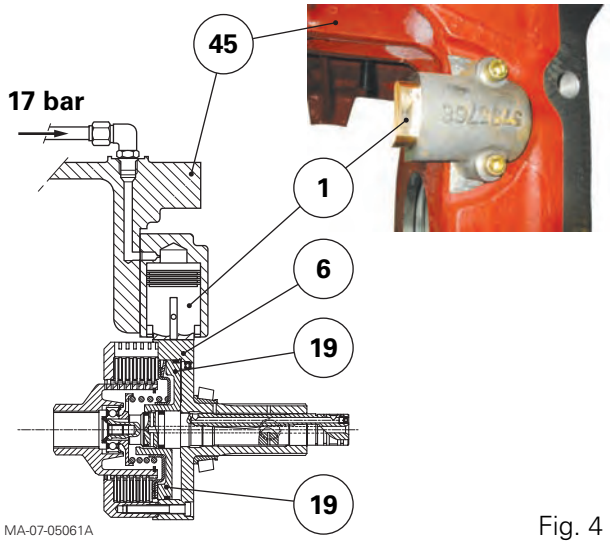

Fig. 4

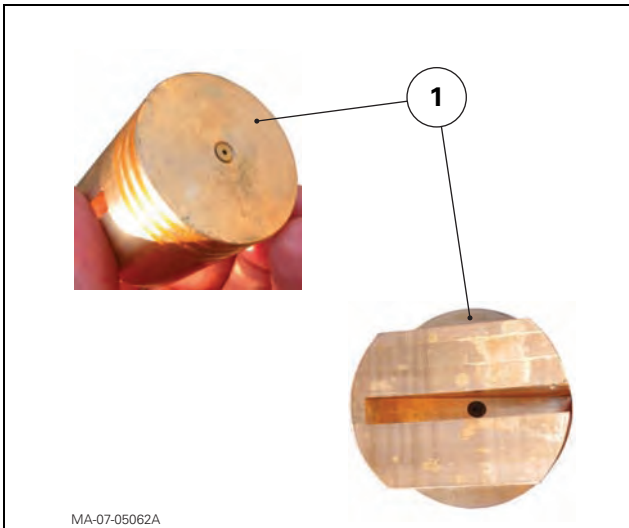

Fig. 5

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Parts list (Fig. 6)

(1) Drive hub
(2) Bearing cone
(3) Intermediate plates
(4) Friction discs
(5) Progressivity washer
(6) Clutch housing
(7) Valve
(8) Spring
(9) O'ring
(10) Sleeve
(11) Screw
(12) Chamfered washer
(13) Ball bearing
(14) Circlip
(15) Clutch unit assembly
(16) Screw
(17) Spring seat
(18) O'ring
(19) Piston
(20) Support
(21) O'ring
(22) Sealing rings
(28) Secondary shaft
(29) Restrictor
(30) Threaded plug
(31) Oil deflector
(32) Cover

Overall view

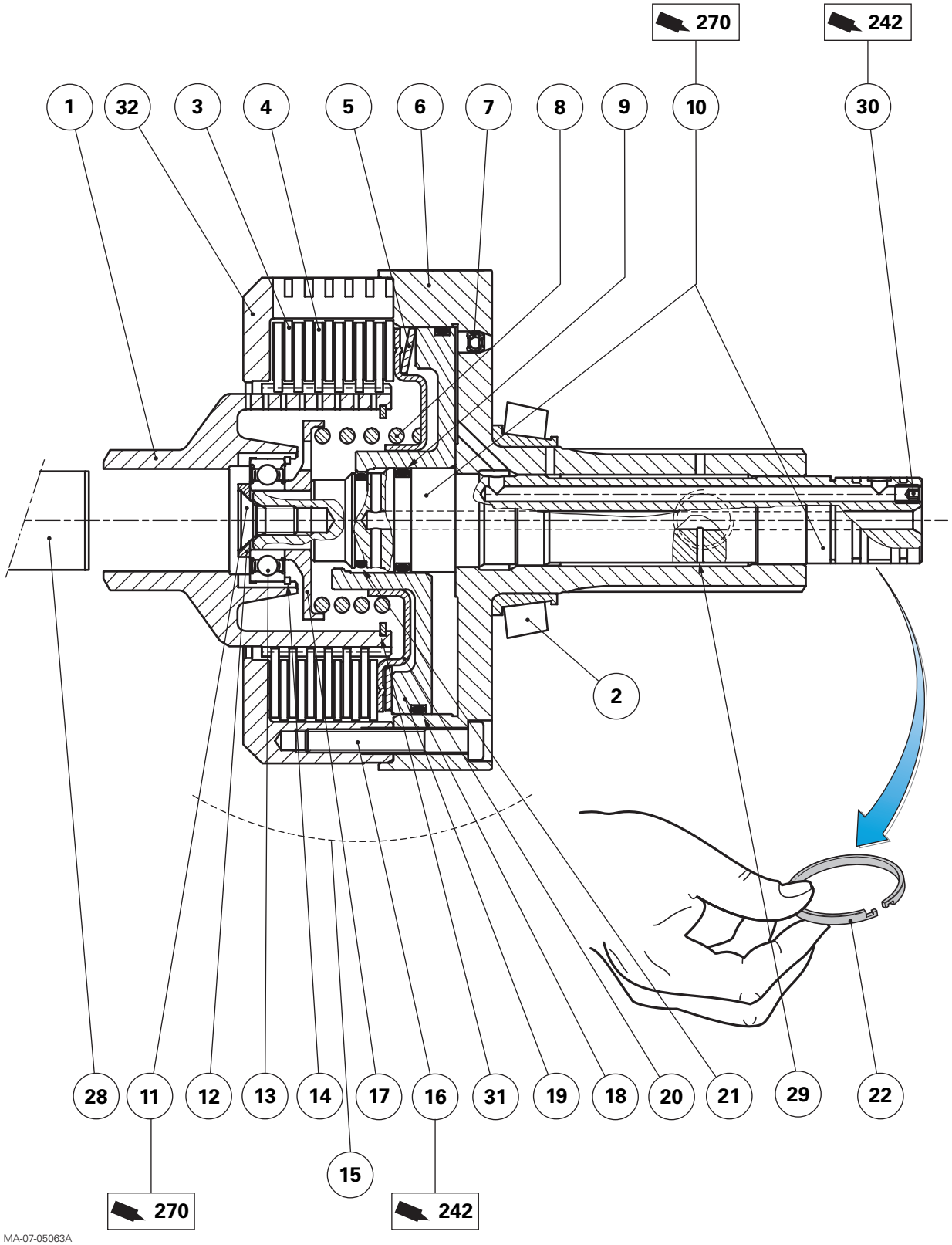

Fig. 6

Parts list (Fig. 7)

(1) Drive hub
(3) Intermediate plates
(4) Friction discs
(5) Progressivity washer
(6) Clutch housing
(7) Valve
(8) Spring
(9) O'ring
(10) Sleeve
(11) Screw
(12) Chamfered washer
(13) Ball bearing
(14) Circlip
(15) Clutch unit assembly
(16) Screw
(17) Spring seat
(18) O'ring
(19) Piston
(20) Support
(21) O'ring
(22) Sealing rings
(29) Restrictor
(30) Threaded plug
(31) Oil deflector
(32) Cover

Exploded view

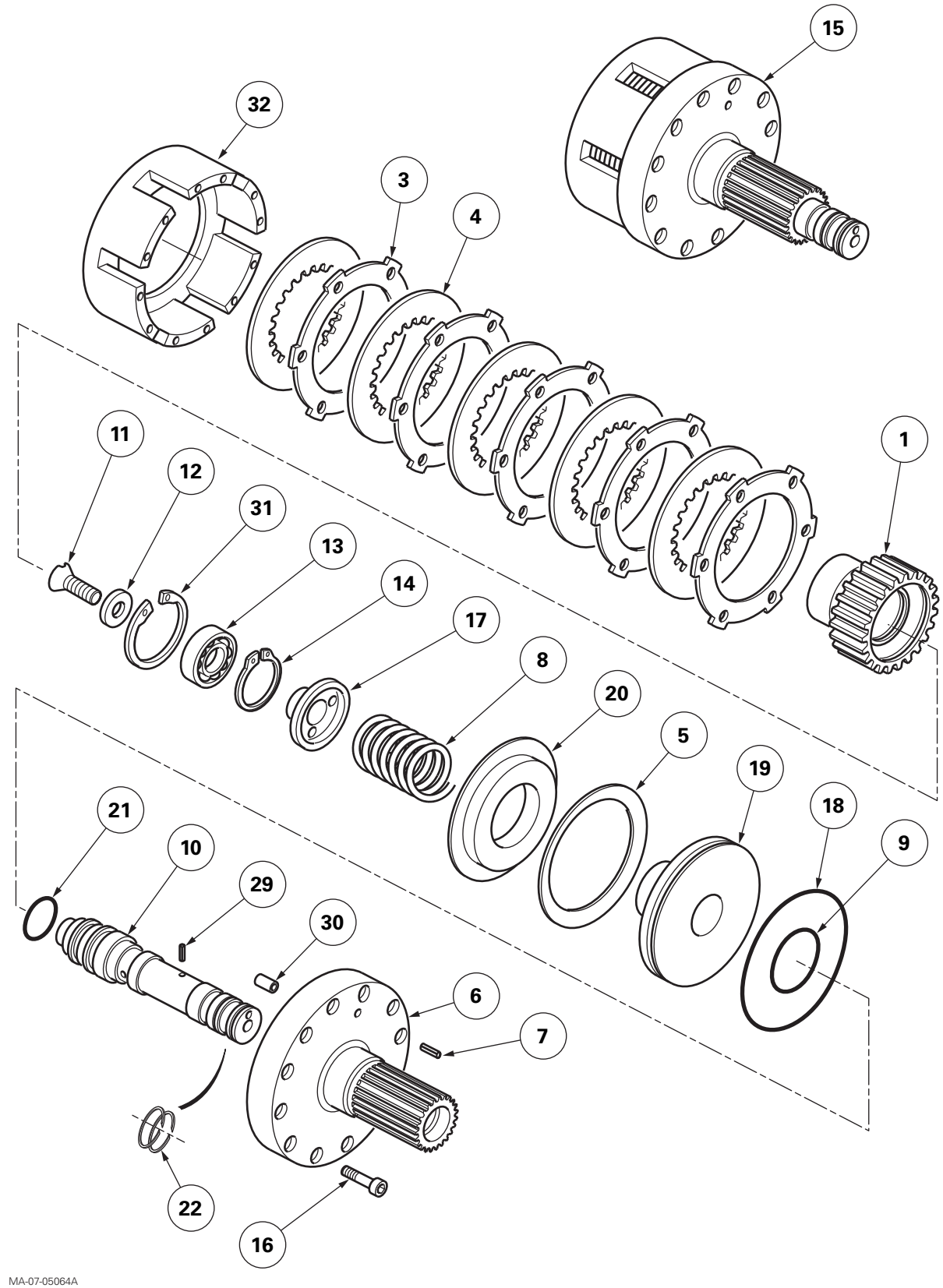

Fig. 7

C . Removing - refitting the block consisting of the clutch unit and unit/driving pinion(s) assemblies

Preliminary operations

1. Split the PTO housing from the centre housing (see chapter 2).
2. Remove the sensor located on the upper right-hand side of the PTO housing to avoid any interference with the 1000 rpm pinion.

Removing the block consisting of the clutch unit (15) and unit/driving pinion(s) (23) assemblies

Power take-off with interchangeable shaft (Fig. 9)

3. Place the PTO housing flat on a workbench in order to allow removal of the output shaft (13).
4. Recover the friction washer (20) that may still be on the driven pinion (7).
5. Take off:
   - the snap ring (6);
   - the output shaft (13);
   - the driven pinion (7).
6. Recover the friction washer (10) fitted between the driven pinions (7) (18).
7. Loosen the screws (27).
8. Remove the block consisting of the clutch unit (15) and unit/driving pinion(s) (23) assemblies from the PTO housing. If necessary, slightly offset the driven pinion (18) in order to facilitate removing the block.
9. Remove the seal rings (22) (Fig. 8)

Parts list (Fig. 9)

(5) Hydraulic ring
(6) Snap ring
(7) 540 or 750 rpm driven pinion (depending on option)
(10) Friction washers ∅ 53.4 x 67.8
(13) Interchangeable output shaft
(15) Clutch unit assembly
(18) 1000 rpm driven pinion
(20) Friction washer ∅ 63.5 x 79.8
(22) Seal rings
(23) Unit/driving pinions assembly
(24) Belleville washer
(25) Countersunk washer
(26) Snap ring
(27) Screw

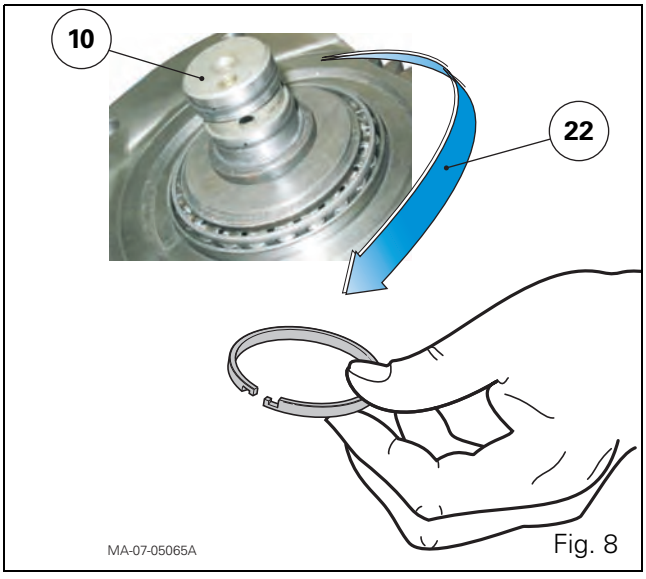

Fig. 8

Clutch (PTO with interchangeable shaft)

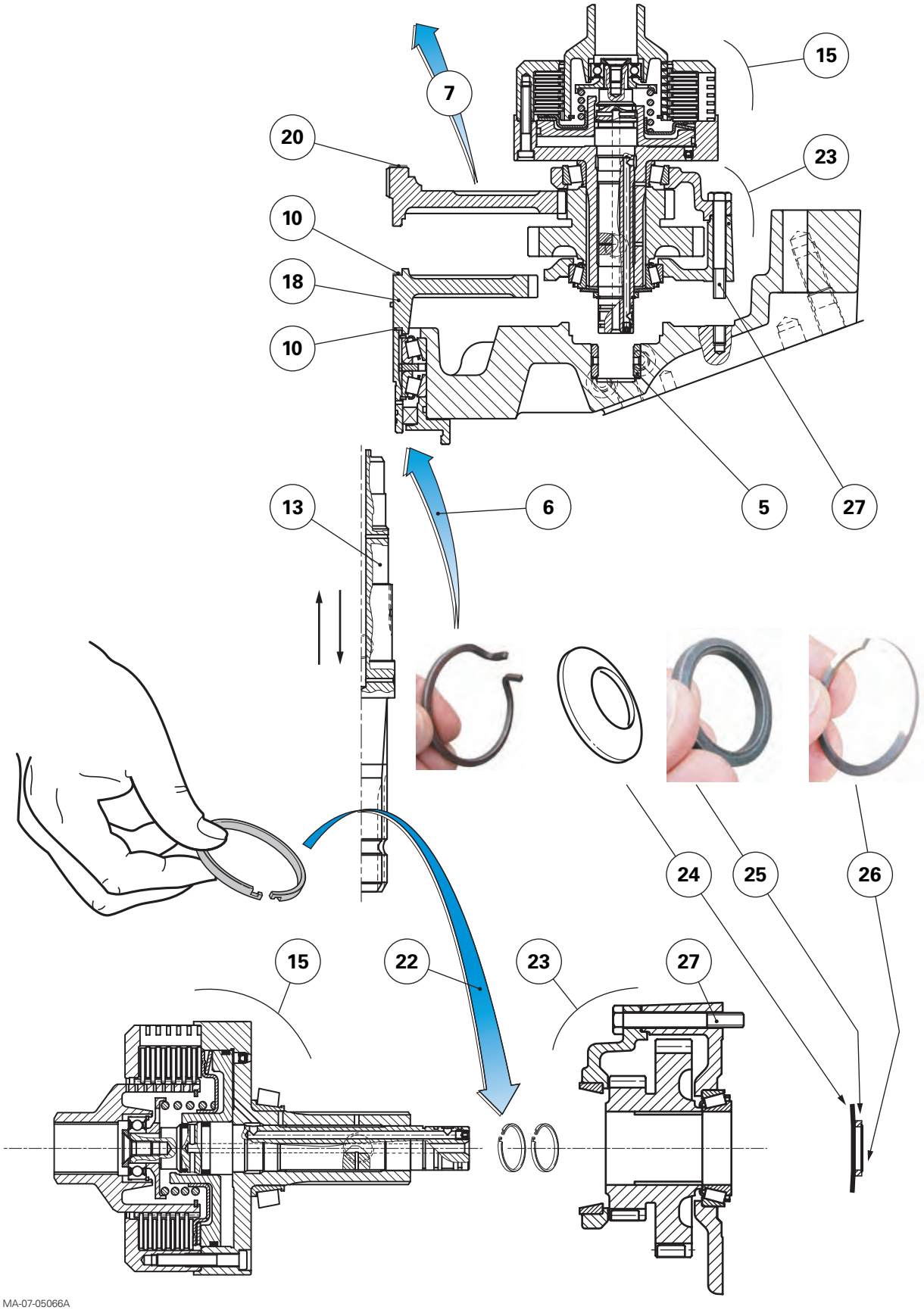

Fig. 9

Power take-off with jaw coupler (Fig. 11)

10. Place the PTO housing flat on a workbench.

11. Take off:
- the circlip (2);
- The splined washer (20).

12. Loosen the screws (27).

13. Tilt the block consisting of the clutch unit (15) and unit/driving pinion(s) (23) assemblies. Remove it from the PTO housing while simultaneously removing the driven pinion (7).

14. Remove the seal rings (22) (Fig. 10)

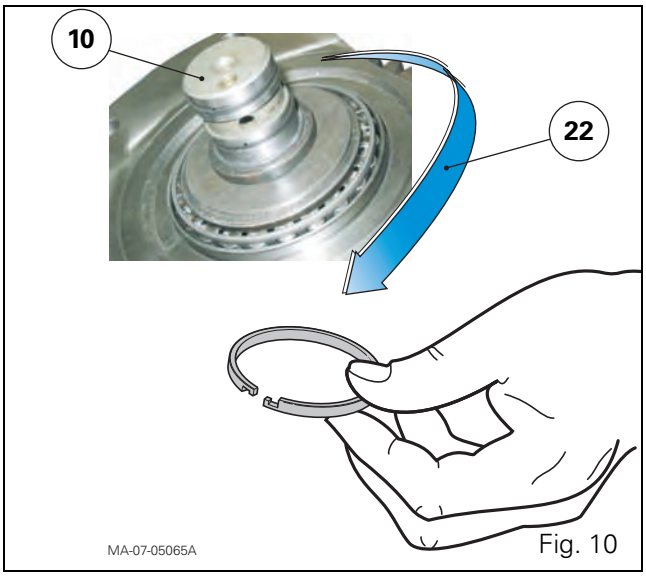

Fig. 10

Parts list (Fig. 11)

(5) Hydraulic ring
(7) 540 or 750 rpm driven pinion (depending on option)
(13) Jaw coupling output shaft
(15) Clutch unit assembly
(22) Seal rings
(23) Unit/driving pinions assembly
(24) Belleville washer
(25) Countersunk washer
(26) Snap ring
(27) Screw

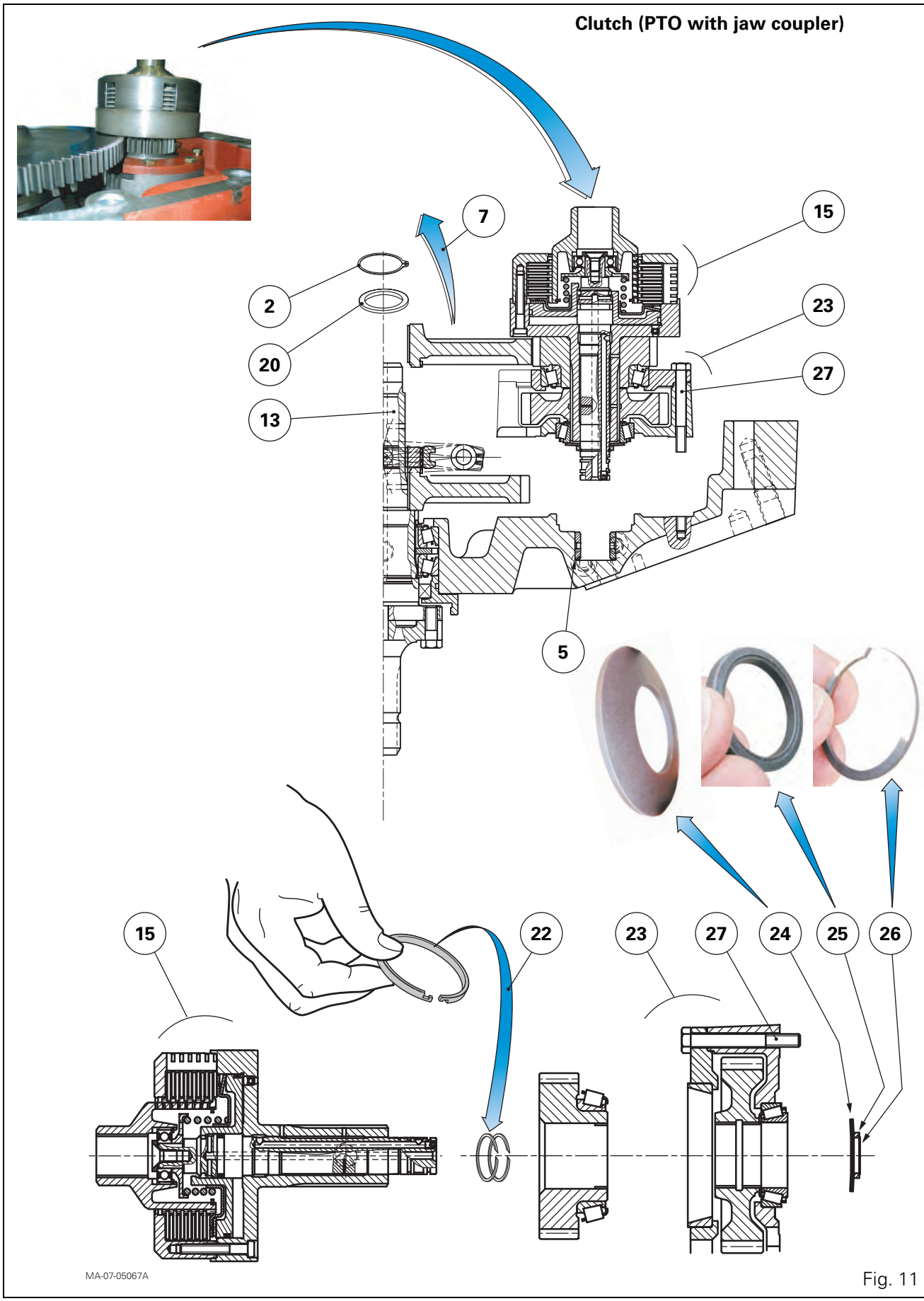
Clutch (PTO with jaw coupler)
7
15
2
23
20
27
13
5
15
22
23
27
24
25
26
MA-07-05067A

Fig. 11

1000 rpm power take-off (Fig. 13)

The clutch unit (15) and unit/driving pinion (23) assemblies of the 1000 rpm PTO can be removed without intervening on the lower shaftline driven pinion (18).

15. Place the PTO housing flat on a workbench.

16. Loosen the screws (27).

17. Remove the block consisting of the clutch unit (15) and unit/driving pinion (23) assemblies from the PTO housing.

18. Remove the seal rings (22) (Fig. 12).

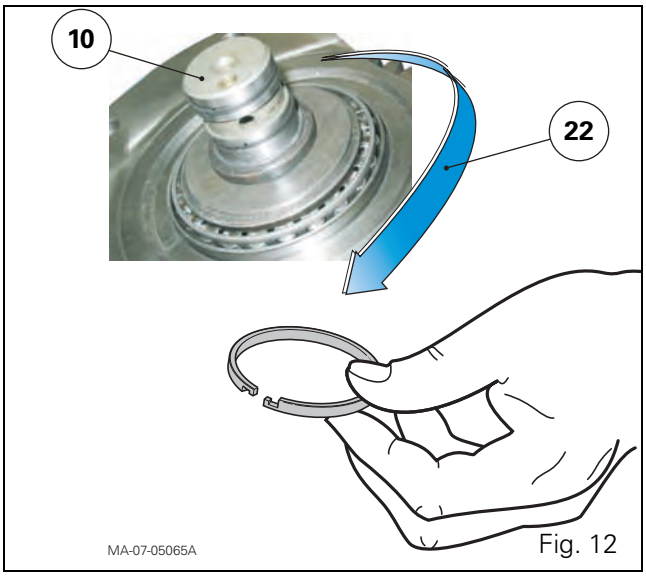

Fig. 12

Parts list (Fig. 13)

(5) Hydraulic ring
(15) Clutch unit assembly
(18) 1000 rpm driven pinion
(22) Seal rings
(23) Unit/driving pinion assembly
(24) Belleville washer
(25) Countersunk washer
(26) Snap ring
(27) Screw

Clutch (1000 rpm PTO)

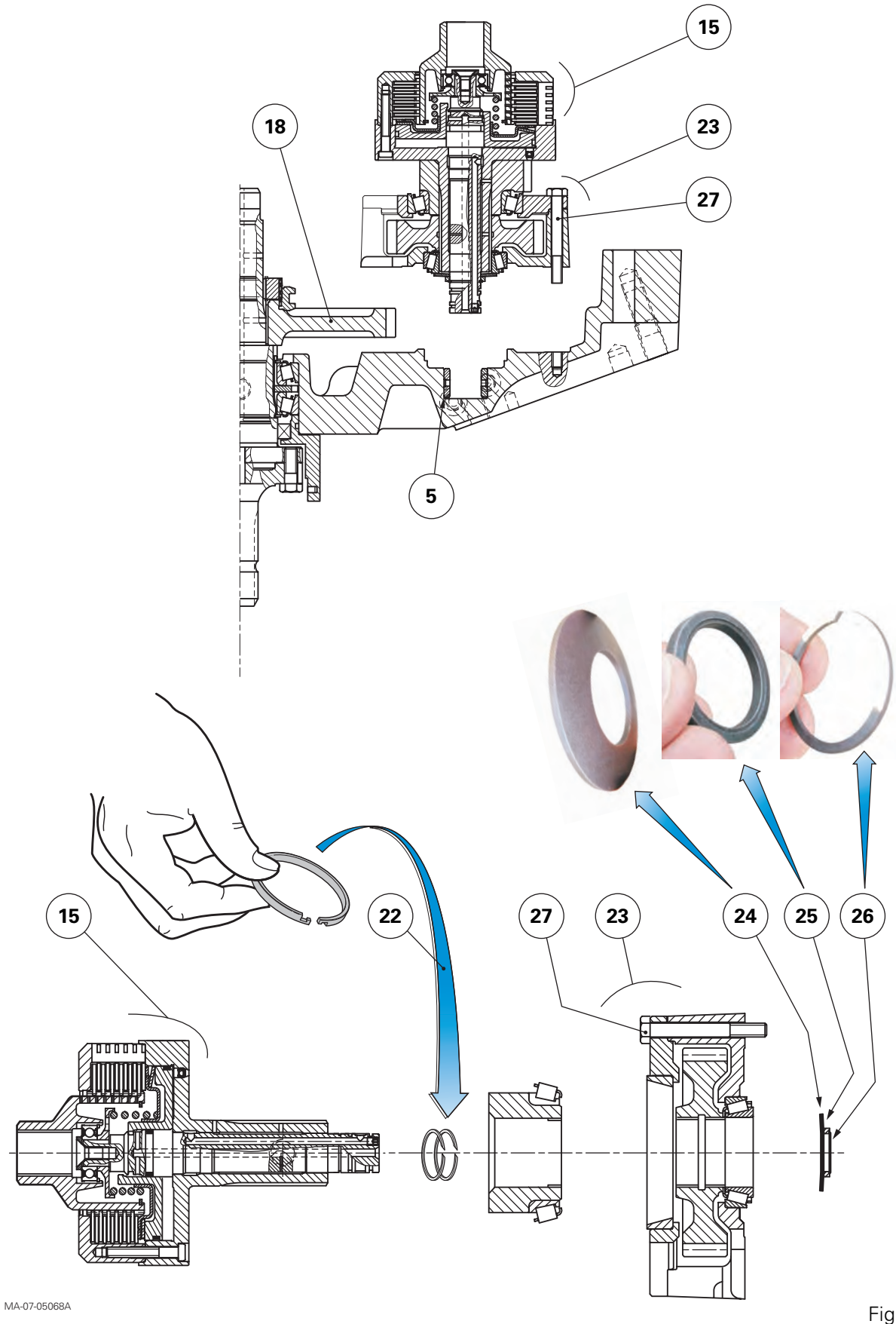

Fig. 13

19. If necessary, extract the hydraulic ring (5) (Fig. 14) using a suitable slide hammer puller.

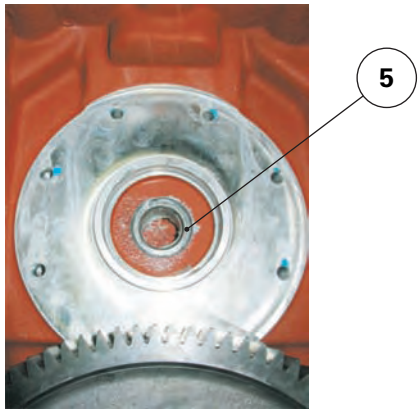

Fig. 14

Splitting the block consisting of the clutch unit (15) and unit/driving pinion(s) (23) assemblies (Fig. 15)

20. Place the block on a hollow support S.

21. Using a press and the tool ref. 3378135M1 (Fig. 15 and § E), moderately compress the Belleville washer (24) to release the snap ring (26) of the countersunk washer (25).

22. Remove from the end of the sleeve (10):

- the snap ring (26);
- the countersunk washer (25);
- the Belleville washer (24).

23. Split the clutch unit assembly (15) from the unit/driving pinion(s) assembly (23) (Fig. 9, Fig. 11 or Fig. 13 depending on version).

24. Remove screws (27).

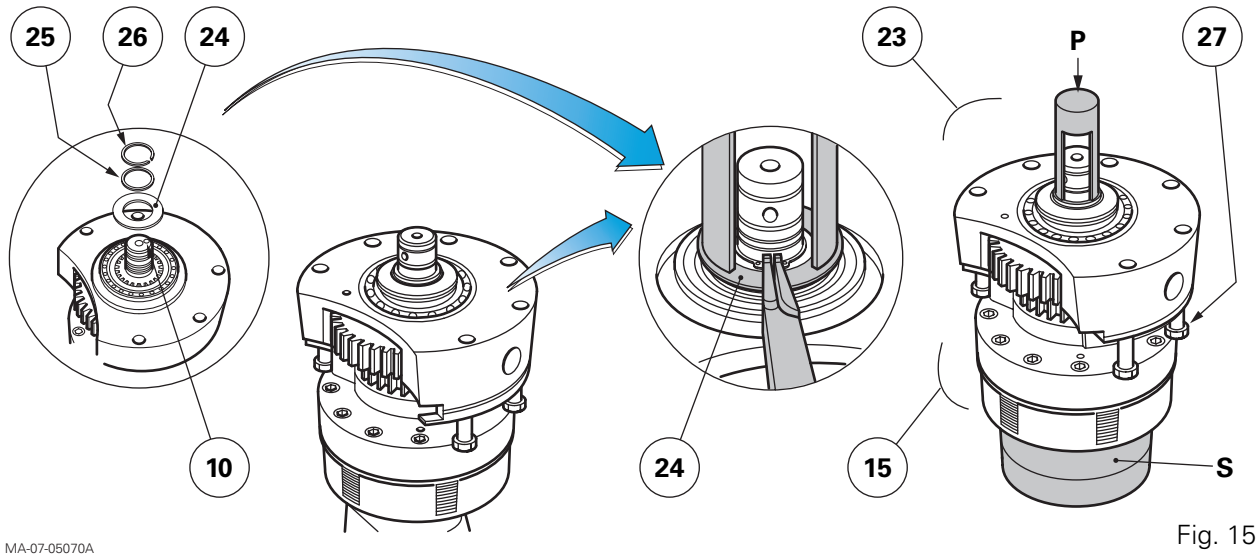

Fig. 15

Assembling the block consisting of the clutch unit (15) and unit/driving pinion(s) (23) assemblies (Fig. 16)

25. Fit the screws (27) on the unit/driving pinion(s) assembly (23) (Fig. 9, Fig. 11 or Fig. 13 depending on version).

26. Place the rebuilt block on the support S (Fig. 15), itself on a press table.

27. Refit on the end of the sleeve (10):

- a new Belleville washer (24), respecting the assembly direction;
- the countersunk washer (25), turning its recess towards the snap ring (26).

28. Using pliers, slightly increase the diameter of the snap ring (26). Place this snap ring temporarily on the sleeve (10).

29. Using a press, moderately compress the Belleville washer (24) to show a groove in which to fit the snap ring (26).

Definitively insert the snap ring into this groove. Check that the snap ring is correctly positioned.

Release the pressure exerted by the press on the Belleville washer (24).

Check that the snap ring (26) is correctly held by the countersunk washer (25).

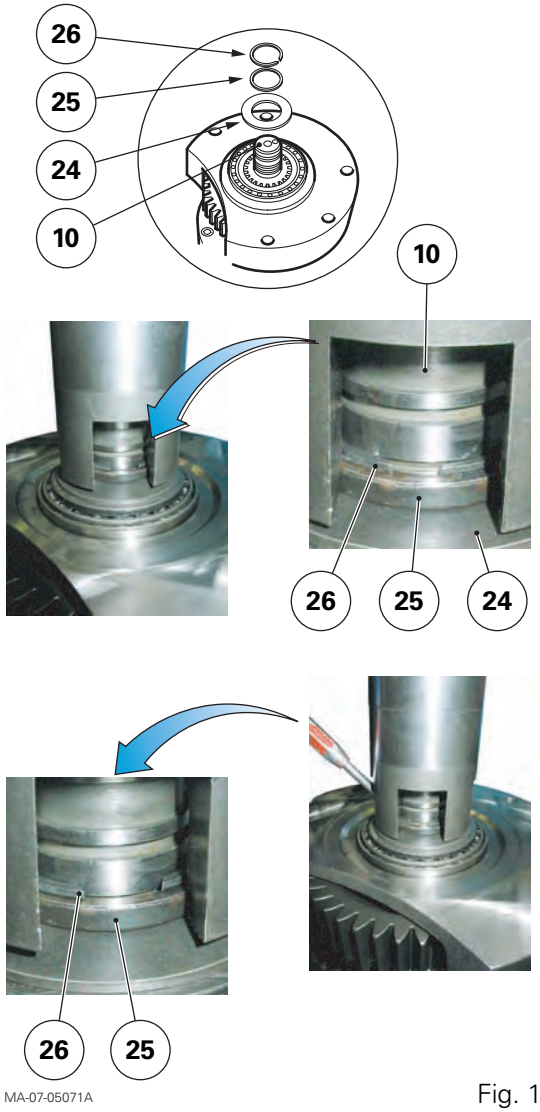

Fig. 16

Refitting the block consisting of the clutch unit (15) and unit/driving pinion(s) (23) assemblies

30. If the hydraulic ring (5) needs replacing, fit, using a suitable locally made fitting drift, a new ring in the rear PTO housing, respecting the distance of **16 ± 0.1 mm** between the block mating face with the PTO housing and the end of the hydraulic ring (Fig. 17).

NOTE: *Correct ring positioning aligns its ports with the 17 bar channel of the rear PTO housing.*

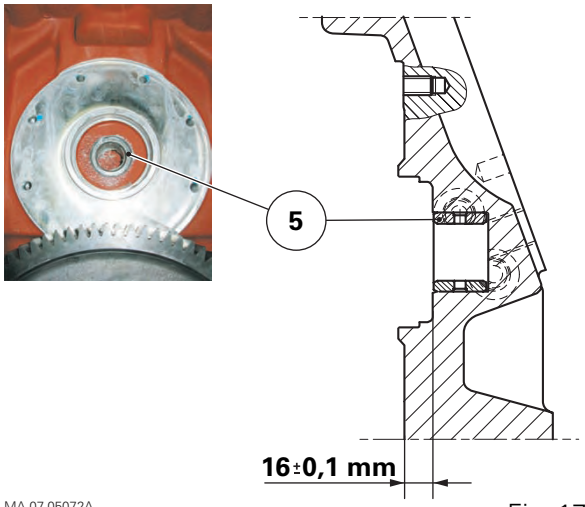

Fig. 17

PTO with interchangeable shaft (Fig. 9)

31. Clean and check all components. Replace any defective parts.

32. On each seal ring (22), check (Fig. 18):

- the surfaces and sides are not worn;
- the hooks are in good condition.

Replace the seal rings if necessary.

33. Lubricate the reused or new rings (22) with clean transmission oil. Refit them in the grooves of sleeve (10) . Check that each ring rotates freely (Fig. 18).

34. If necessary, slightly offset the driven pinion (18).

35. Engage the block consisting of the clutch unit (15) and unit/driving pinion(s) (23) assemblies into the PTO housing.

36. Lightly smear the thread of the screws (27) with Loctite 242 or equivalent. Tighten these screws to a torque of 50 - 70 Nm.

37. Lightly smear the friction washers (10) with miscible grease. Place these washers on either side of the driven pinion (18).

38. Refit:

- the driven pinion (7);
- the output shaft (13);
- the snap ring (6).

39. Smear the friction washer (20) with miscible grease. Place this washer on the driven pinion (7).

40. Fit the PTO housing in a vertical position.

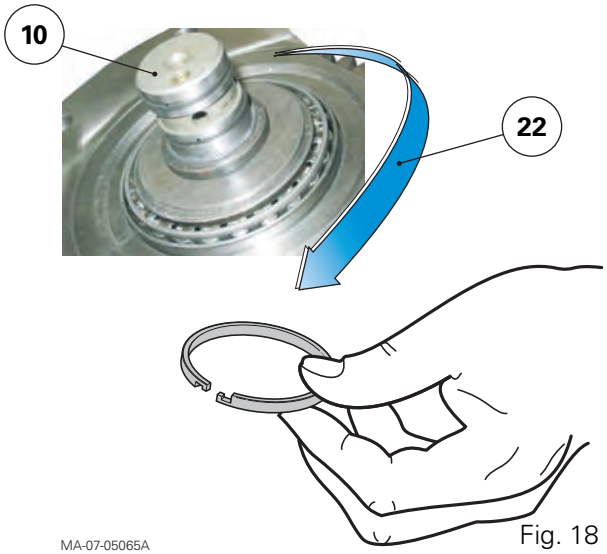

Fig. 18

Power take-off with jaw coupling shaft (Fig. 11)

41. Clean and check all components. Replace any defective parts.

42. On each seal ring (22), check that (Fig. 18):

- the surfaces and sides are not worn;
- the hooks are in good condition.

Replace the seal rings if necessary.

43. Lubricate the reused or new rings (22) with clean transmission oil. Refit them in the sleeve (10) grooves. Check that each ring rotates freely (Fig. 18).

44. Tilt the block consisting of the clutch unit (15) and unit/driving pinion(s) (23) assemblies. Insert it into the PTO housing, while simultaneously sliding the driven pinion (7) onto the output shaft (13).

45. Lightly smear the thread of the screws (27) with Loctite 242 or equivalent. Tighten these screws to a torque of 50 - 70 Nm.

46. Refit:

- the splined washer (20);
- the circlip (2).

47. Fit the PTO housing in a vertical position.

1000 rpm power take-off (Fig. 13)

48. Clean and check all components. Replace any defective parts.

49. On each seal ring (22), check that (Fig. 18):
- the surfaces and sides are not worn;
- the hooks are in good condition.

Replace the seal rings if necessary.

50. Lubricate the reused or new rings (22) with clean transmission oil. Refit them in the sleeve (10) grooves. Check that each ring rotates freely (Fig. 19).

51. Engage the block consisting of the clutch unit (15) and unit/driving pinion (23) assemblies into the PTO housing.

52. Lightly smear the thread of the screws (27) with Loctite 242 or equivalent. Tighten these screws to a torque of 50 - 70 Nm.

53. Fit the PTO housing in a vertical position.

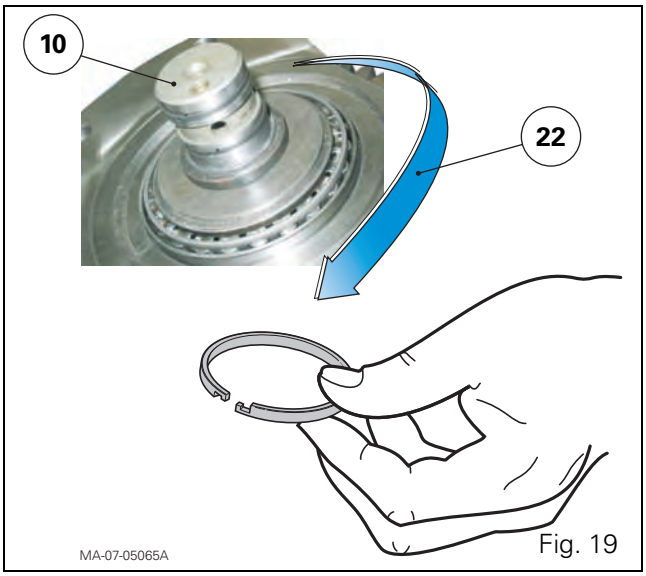

Fig. 19

Final operations

54. Lightly smear the thread of the PTO sensor with Loctite FORM GASKET 2.

55. Reconnect and adjust this sensor in the following manner:
- Tighten the sensor home, without forcing, until it comes in contact with the 1000 rpm driving pinion.
- Unscrew the sensor by 3/4 turn,
- Tighten the sensor nut moderately.

56. Assemble the PTO housing with the centre housing (see chapter 2).

57. Test the clutch and its brake.

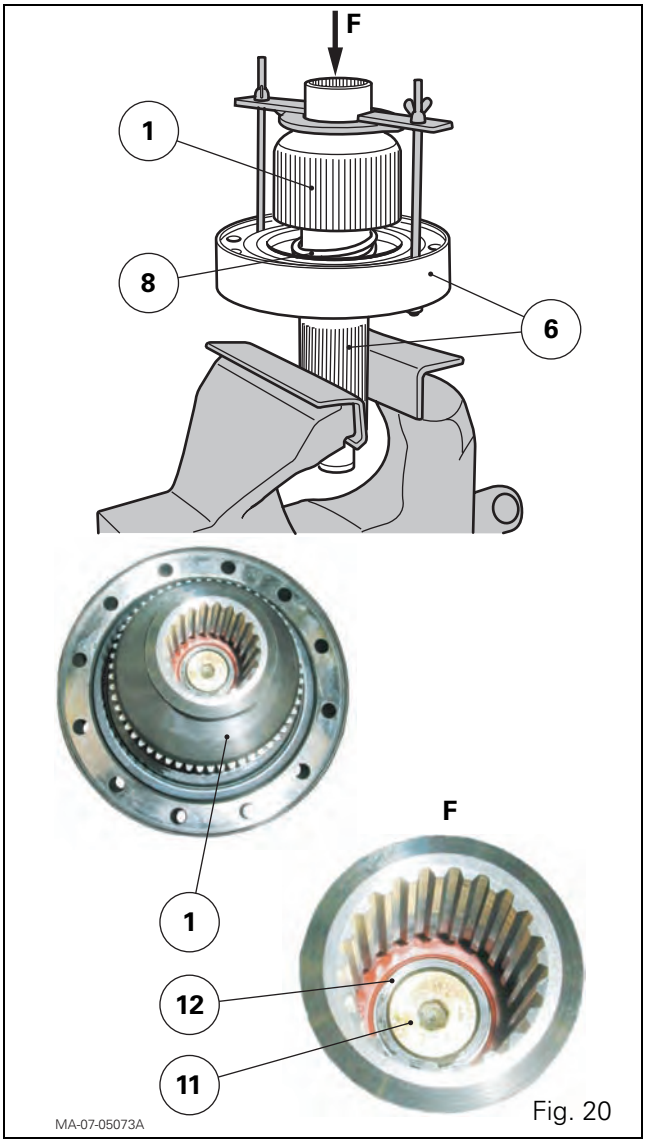

Fig. 20

D . Disassembling - reassembling the clutch unit assembly

Preliminary operation

58. Remove the block consisting of the clutch unit (15) and unit/driving pinion(s) (23) assemblies (see § C). Split assemblies (see § C).

Disassembly (Fig. 20, Fig. 21)

59. Tighten unit (6) in a vice fitted with soft jaw protectors.

60. Loosen the screws (16). Separate cover (32) from unit (6). Remove the friction discs (4) and intermediate plates (3).

61. Using a locally made tool (see § E), hold the hub (1). Loosen the screw (11) and remove the chamfered washer (12). Release the spring (8) (Fig. 20). Remove the tool.

62. Remove the drive hub (1), spring seat (17), spring (8), support (20) and progressivity washer (5).

63. If necessary, remove the circlip (14) and extract the ball bearing (13).

64. Drive the piston (19) off the unit (6) using compressed air. Remove the O'rings (9) (18) (21).

65. If necessary, on the unit (6):
- extract the sleeve (10);
- drive off the valve (7).

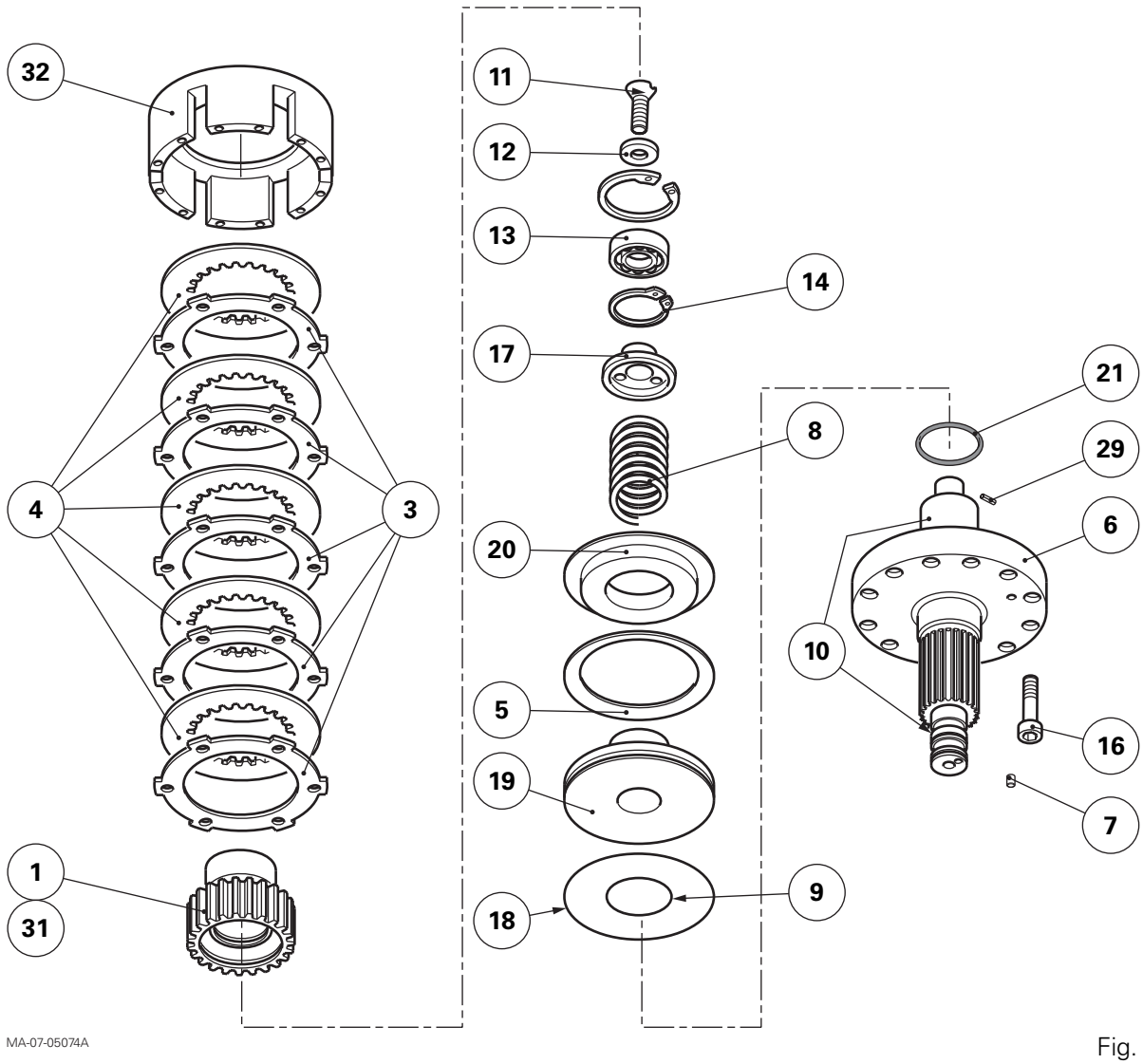

Fig. 21

Reassembly (Fig. 22, Fig. 23)

66. Clean and check all components. Replace any defective parts.

67. If the valve (7) had to be removed:
- Fit the valve on the unit (6).
- Check that the valve is operating correctly by rapidly shaking the unit several times: the movement of the ball in the valve must be heard.

68. If the sleeve (10) had to be removed:
- Check that the restrictor (29) is present on the sleeve.
- Lightly smear the sleeve with Loctite 648 or equivalent, according to Fig. 22. Fit it into the unit (6) using a press. Clean off any excess Loctite.
- Using compressed air, check that the 17 bar low pressure channel is not obstructed with Loctite.
- Lightly smear the plug (30) thread with Loctite 242 or equivalent. Tighten this plug moderately.

69. Lubricate with clean transmission oil:
- the new O'rings (9) (18) (21);
- the rim of the sleeve (10);
- the piston (19).

70. Equip (Fig. 23):
- the piston (19) with seal (18);
- the sleeve (10) with seals (9) (21).

71. Fit the piston into the unit (6) by gradually and alternately striking around its top rim with a plastic mallet.

Ensure there are no seal fragments after fitting.

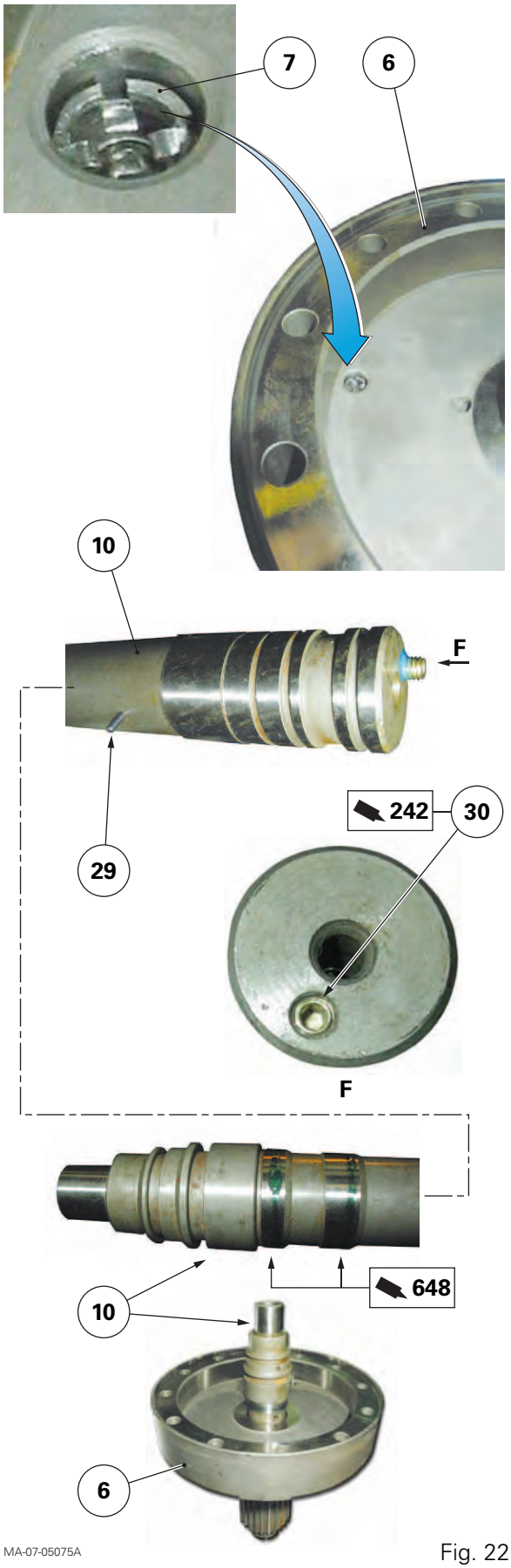

Fig. 22

72. Fit the bearing (13) into the drive hub (1). Refit the circlip (14) (Fig. 23).

73. If removed, refit the oil deflector (31) in the drive hub (Fig. 23).

74. Refit:

- the progressivity washer (5) according to the position indicated in Fig. 6;
- the support (20);
- the spring (8);
- the spring seat (17);
- the drive hub (1) with its components.

75. Compress the spring (8) using the tool (Fig. 20).

76. Refit the chamfered washer (12), positioning its chamfer correctly.

77. Lightly smear the thread of the screw (11) with Loctite 270 or equivalent. Tighten this screw to a torque of 24 - 28 Nm (Fig. 23).

78. Soak the friction discs (4) for a few minutes in a clean transmission oil bath. Before assembly, ensure the oil has reached all parts of the discs.

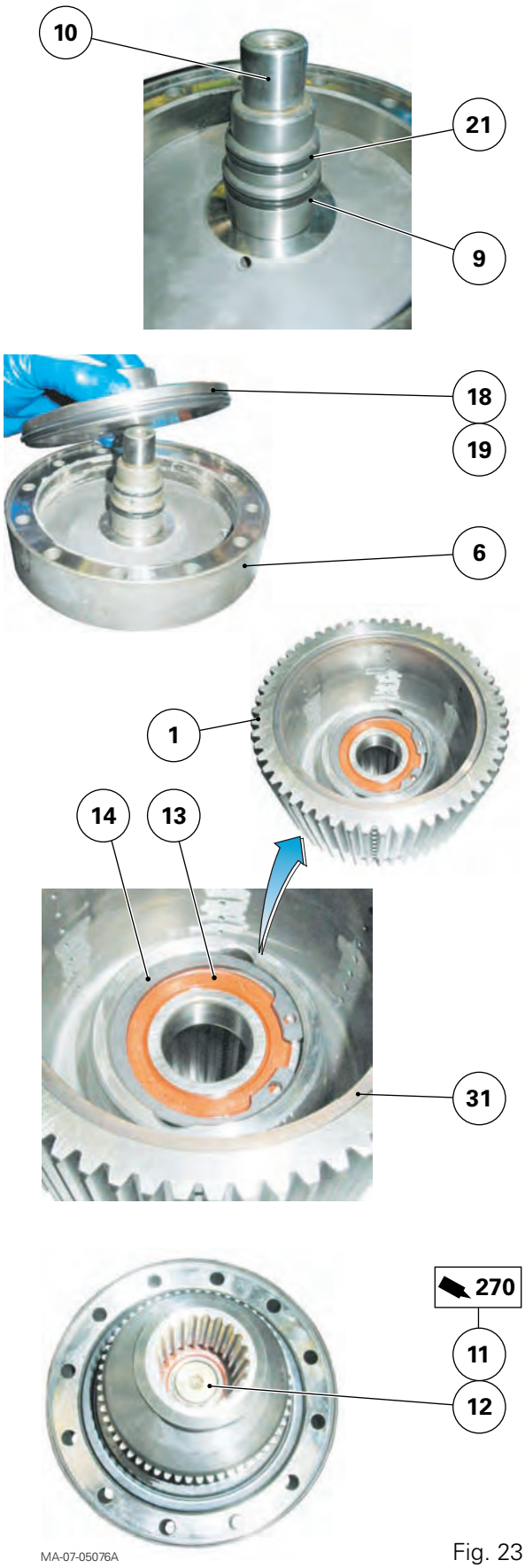

Fig. 23

79. Alternately fit on the drive hub (1), the friction discs (4) and intermediate plates (3) removed during operation 60: start by placing an intermediate plate (3) against the support (20) (Fig. 24).

80. Rotate the intermediate plates (3) to align the tabs T according to V (Fig. 25).

Position the cover (32).

Lightly smear the thread of the screws (16) with Loctite 242 or equivalent. Tighten these screws to a torque of 25.5 - 34.5 Nm.

81. Manually check that the drive hub (1) rotates freely in the cover (32) (Fig. 26).

Final operation

82. Assemble and refit the block consisting of the clutch unit (15) and unit/driving pinion(s) (23) assemblies (see § C).

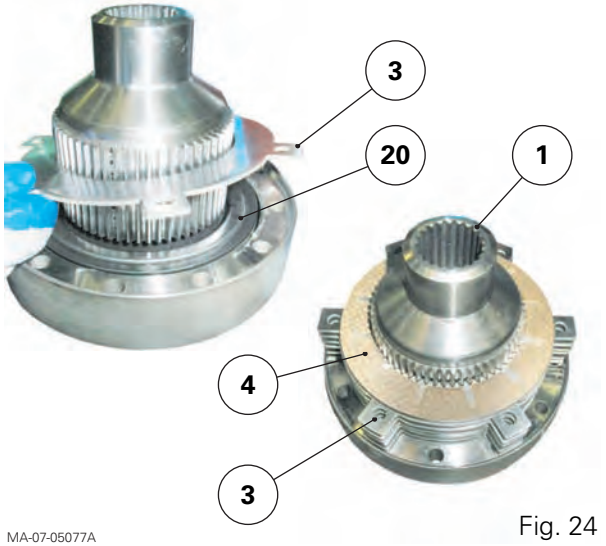

Fig. 24

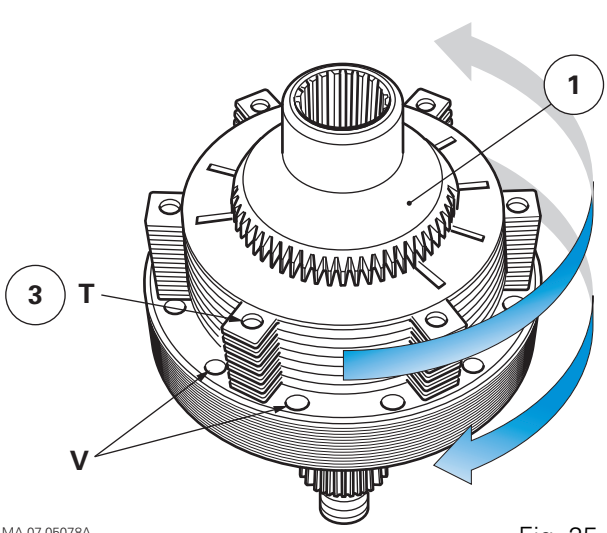

Fig. 25

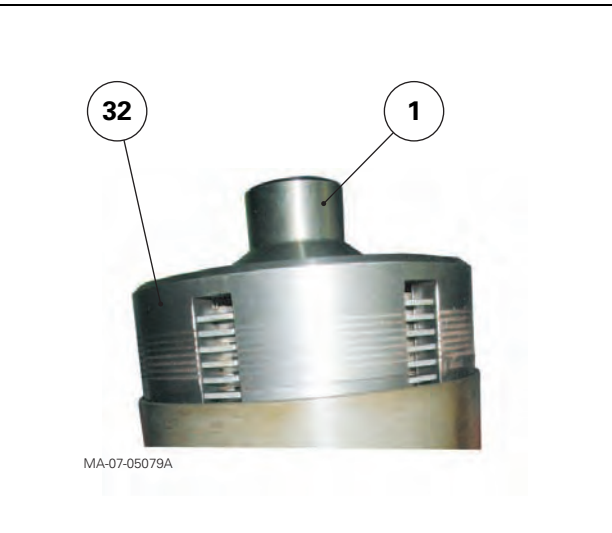

Fig. 26

E . Service tools

Tool available in the AGCO network

- 3378135M1: Belleville washer compression tool (Fig. 27)

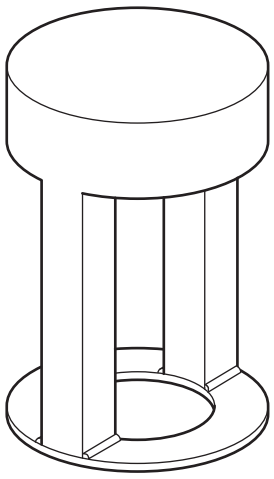

Fig. 27

Locally made tool

- Clutch spring holding tool (Fig. 28)

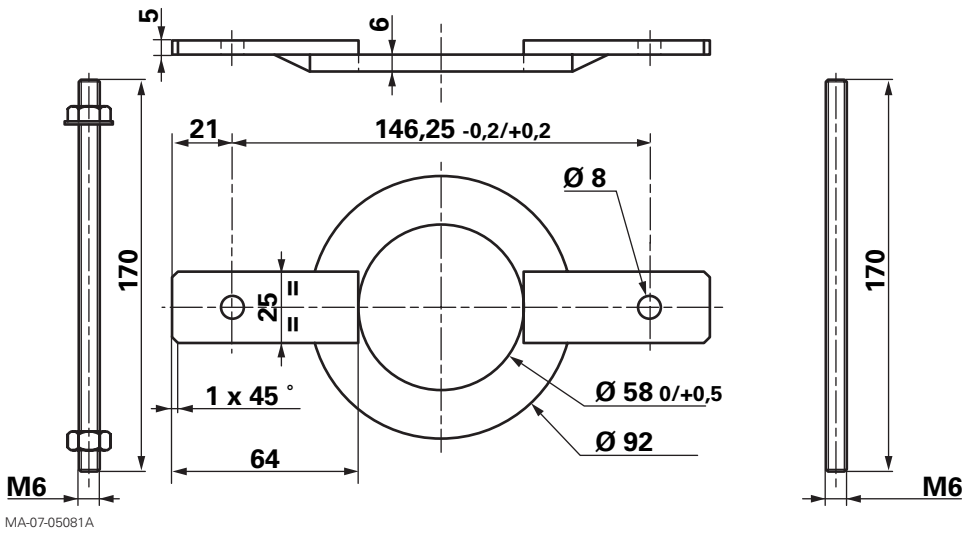

Fig. 28

GPA30 - PTO brake and clutch