

# Workshop Manual

HP  
65-130

# MF400Xtra

Tractors

Models: 425X, 435X, 440X, 445X, 455X, 460X, 470X, 480X



INNOVATION - COMMITMENT - PROXIMITY - VISION - RELIABILITY - LEADERSHIP - SUPPORT - TECHNOLOGY



MASSEY FERGUSON

## Machine models applied

Massey Ferguson Tractors models

MF 425X, 435X, 440X, 445X, 455X, 460X, 470X, 480X.

## Models and variations

- Platafform ou Cab.
- With and without hydraulic lift system 3 points.



**Fig. 1**



**Fig. 2**

This publication has been written in accordance with the ISO 3600 International Standard, which regulates technical literatures about agricultural and forest machines and equipment.

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Introduction	<b>01</b>
Splitting the tractor and Sheet metal	<b>02</b>
Engines	<b>03</b>
Clutch	<b>04</b>
Transmission gearbox	<b>05</b>
Rear axle	<b>06</b>
Power take off	<b>07</b>
Front axle	<b>08</b>
Transmission system (lift and auxiliary systems)	<b>09</b>
Electric system	<b>10</b>
<i>Reserved to Electronic system</i>	<b>11</b>
Cab and acclimation	<b>12</b>

# 8x2 gearbox (sliding gears)

## A. Introduction

### 1. Identification of the gearbox components

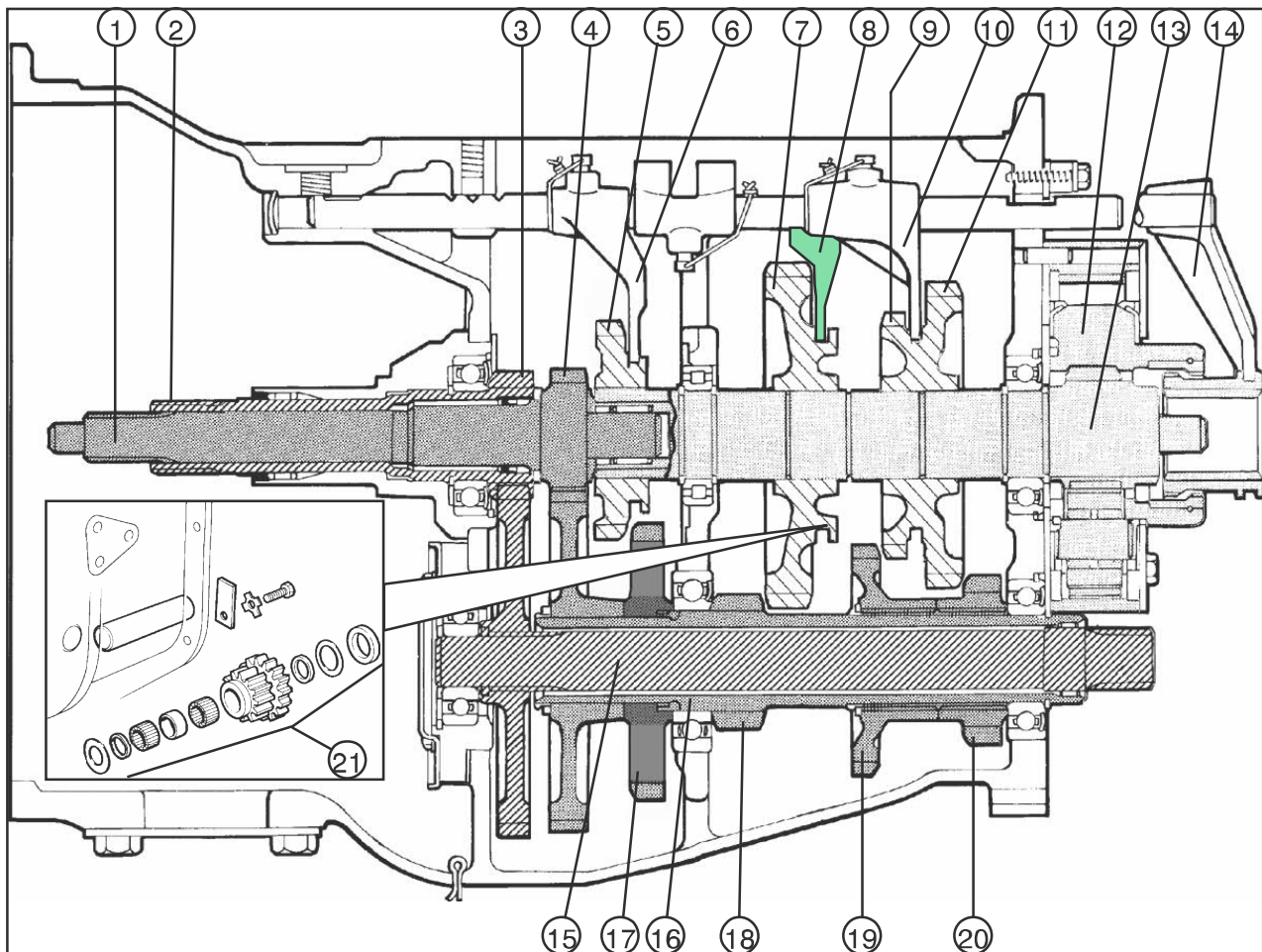


Fig. 1

- |  |   |
|--|---|
| 1 - Transmission input shaft (inner)                                 | 12 - Slow and Fast range epicyclic assy           |
| 2 - PTO input shaft (outer)  | 13 - Transmission output shaft (main shaft)       |
| 3 - PTO drive gear   | 14 - Slow / Fast range selector fork              |
| 4 - Intermediate shaft drive gear (15)                               | 15 - PTO output shaft (inner)                     |
| 5 - 4 <sup>th</sup> speed driven gear                                | 16 - Transmission intermediate shaft (outer)      |
| 6 - 4 <sup>th</sup> gear selector fork                               | 17 - 4 <sup>th</sup> speed drive gear             |
| 7 - 1 <sup>st</sup> speed driven gear                                | 18 - 1 <sup>st</sup> speed and reverse drive gear |
| 8 - 1 <sup>st</sup> speed and reverse gear selector fork             | 19 - 3 <sup>rd</sup> speed drive gear             |
| 9 - 3 <sup>rd</sup> speed driven gear                                | 20 - 2 <sup>nd</sup> speed drive gear             |
| 10 - Selector fork of the 2 <sup>nd</sup> and 3 <sup>rd</sup> speeds | 21 - Reverse gear assy                            |
| 11 - 2 <sup>nd</sup> speed gear                                      |   |

## 2. Power flows of the 8x2 speed transmission

Reverse gear flow

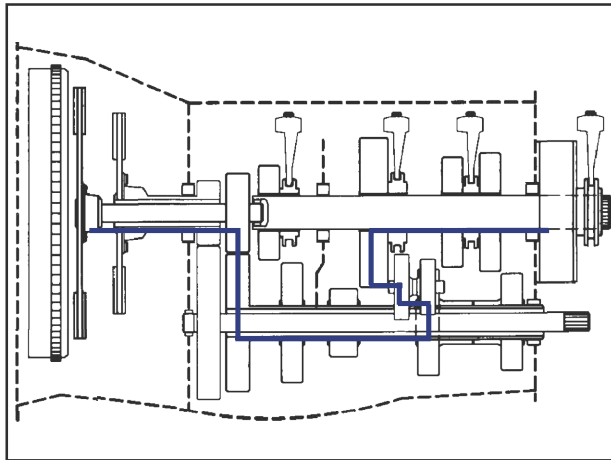


Fig. 2

3<sup>rd</sup> gear flow

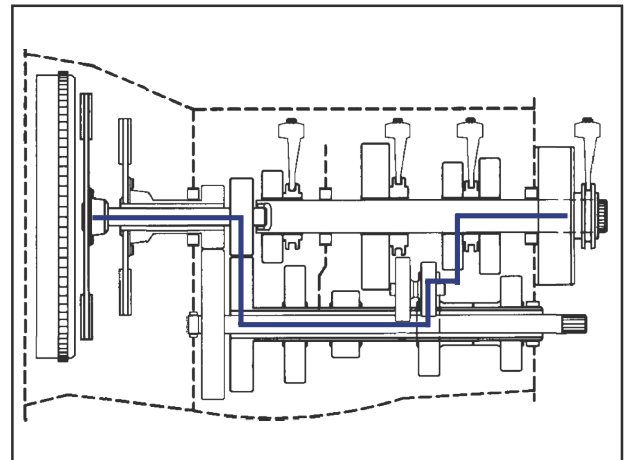


Fig. 5

1<sup>st</sup> gear flow

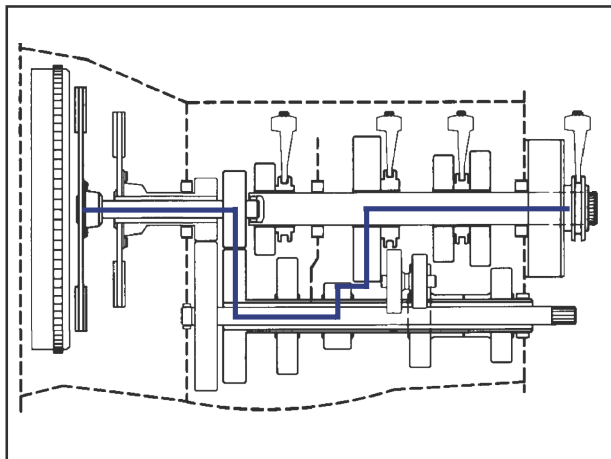


Fig. 3

4<sup>th</sup> gear flow

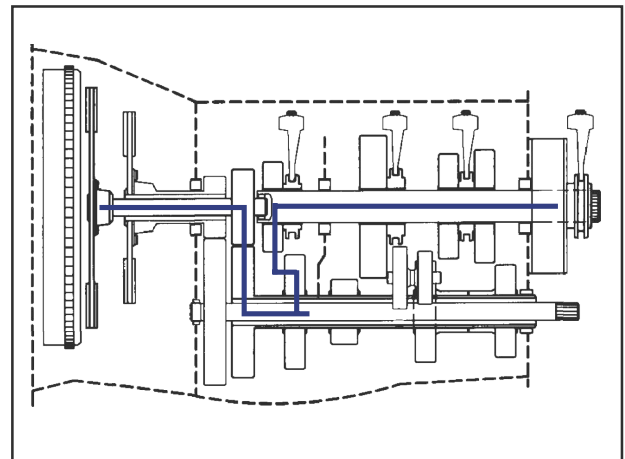


Fig. 6

2<sup>nd</sup> gear flow

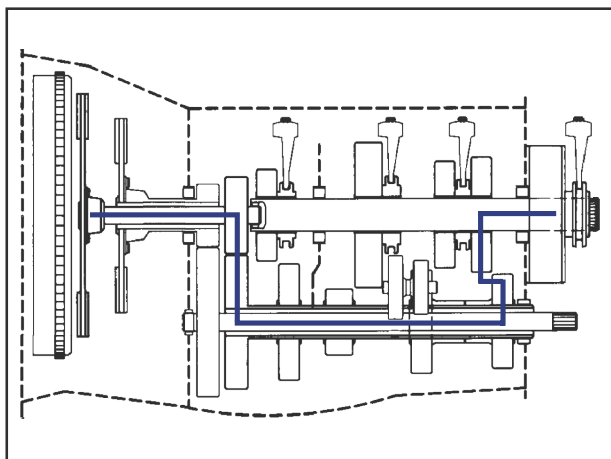


Fig. 4

PTO flow

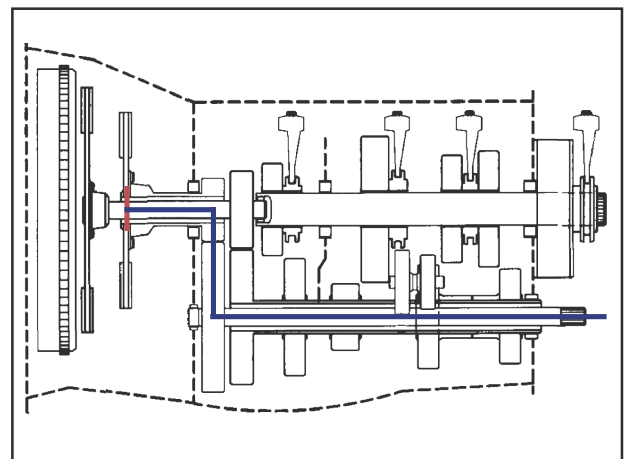


Fig. 7

## 8x2 gearbox (sliding gears)

### Slow/Fast range flow

The selection of the Fast (hare) speed range is accomplished by a sliding sleeve (1), which is constantly connected to the shaft (2) and is engaged to the differential by means of splines.

- Fast: obtained by moving the sleeve forward (1), being engaged directly to the output shaft (3).
- Slow: obtained by moving the sleeve rearward (1), being engaged to the epicyclic unit reducer (4), thus reducing the speed.
- Neutral: obtained in the central position (idle) as the sleeve is not engaged to anything.
- Planetary gear (5)
- Ring gear (6)

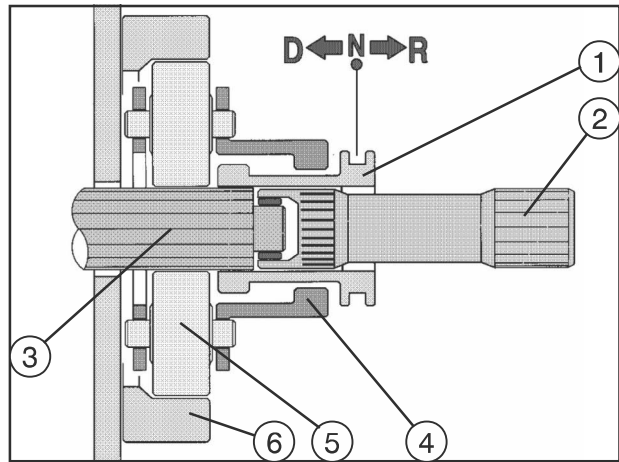


Fig. 8

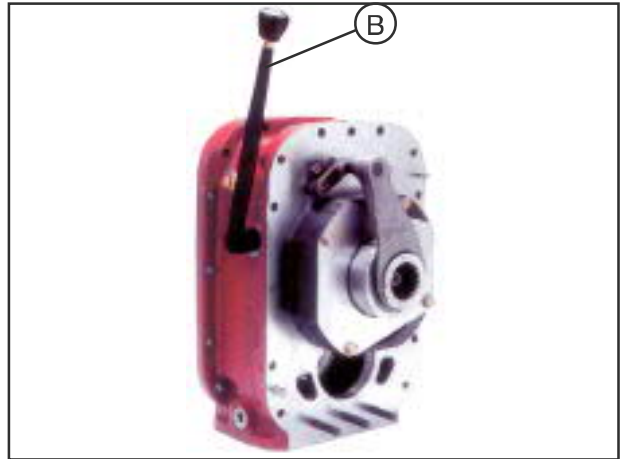


Fig. 9

### Reduction gearbox (optional)

- If the speed reducer selector lever (B) is in Fast "F" (forward), the speed remains the same.
- If the shift selector lever (A) is in Slow "S" and the reducer lever (B) is also in Slow (rearward), the Super-reduced speed is obtained.
- If the Super-reduced speed is not necessary, the reducer lever must be in Fast "F".

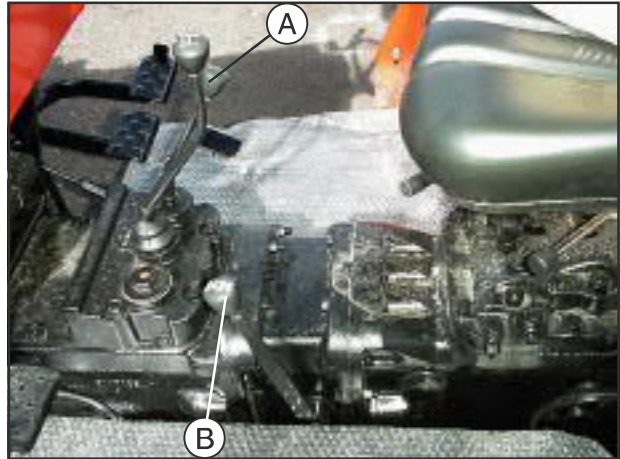


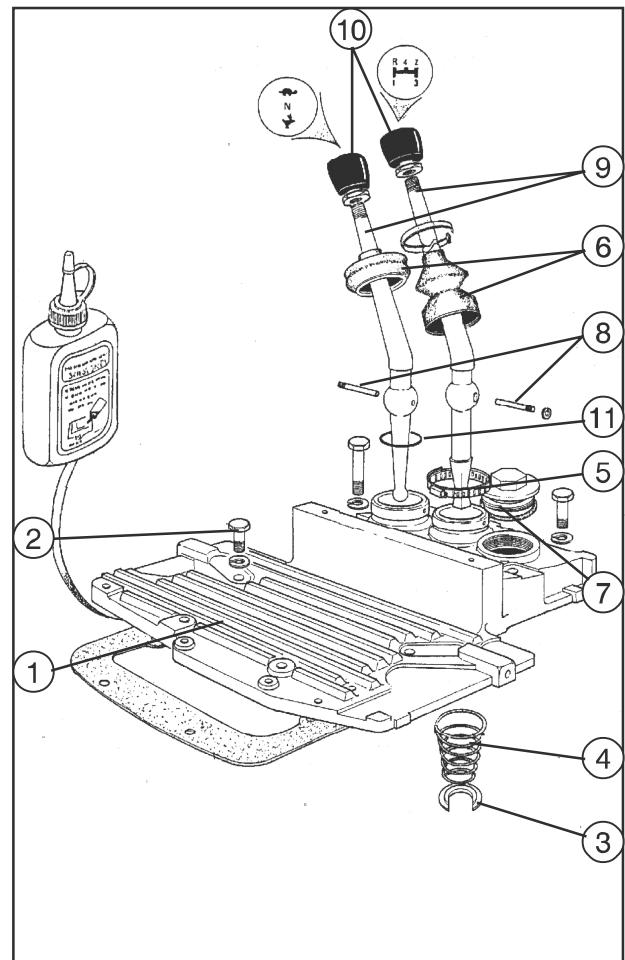
Fig. 10



## B. Lever cover and gear shift levers

### 1. Identification of components

- 1 - Cover
- 2 - Cover (1) fastening bolts
- 3 - Spring retaining washers
- 4 - Spring
- 5 - Rubber dust boot (6) retaining clamp
- 6 - Dust boot (rubber)
- 7 - Transmission oil filler neck plug
- 8 - Split pins for fastening the levers
- 9 - Levers
- 10 - Lever handle
- 11 - O-ring

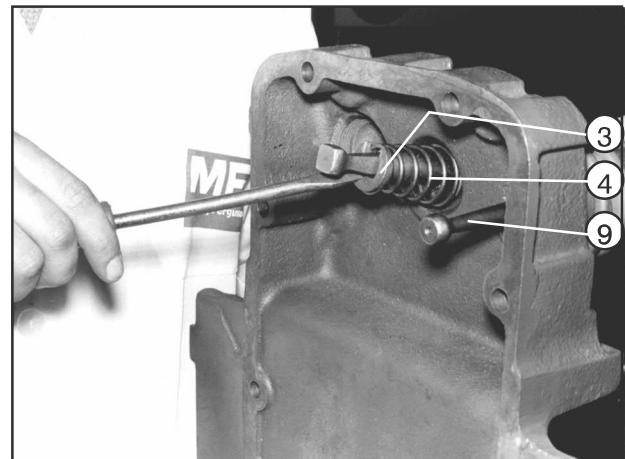


**Fig. 1**

### 2. Disassembly and inspection

- a) Split the tractor between the engine and the gearbox. Remove the transmission case by securing it to a suitable support.
- b) Remove the bolts securing the top cover (1) to the transmission casing; then remove the cover.
- c) If the gear shift (9) is to be removed, withdraw the spring retaining washers (3), the springs (4) and the split pins (8) retaining the levers.
- d) Inspect all the components for undue wear, cracks, fissures or ruptures: especially the spring retaining washers (3), the springs (4) and the levers (9) located in the pivoting area on the top cover.

Replace the split pins (8), the rubber dust boots (6), the clamps (5) and the "O" rings (11) whenever a general overhaul is carried out in the transmission.



**Fig. 2**



## 8x2 gearbox (sliding gears)

### 3. Assembly

- a) Apply liquid seal on the seating surface of the cover (1) and install it. Make sure the levers are correctly fitted (9) into the selector rails - as presented on the next chapter.



#### NOTES:

- Before applying sealant, apply degreaser Loctite 7070 in the entire surface.
- Then, apply a continuous thread of Loctite 509 along the entire surface. Failure to comply with these recommendations will contaminate the oil and clog the filters.

- b) Tighten all top cover fastening bolts (2) progressively to a final torque of **75 N.m.**
- c) Check the correct engagement of the levers in all ratios as well as the free spin for all of them in all ratios.

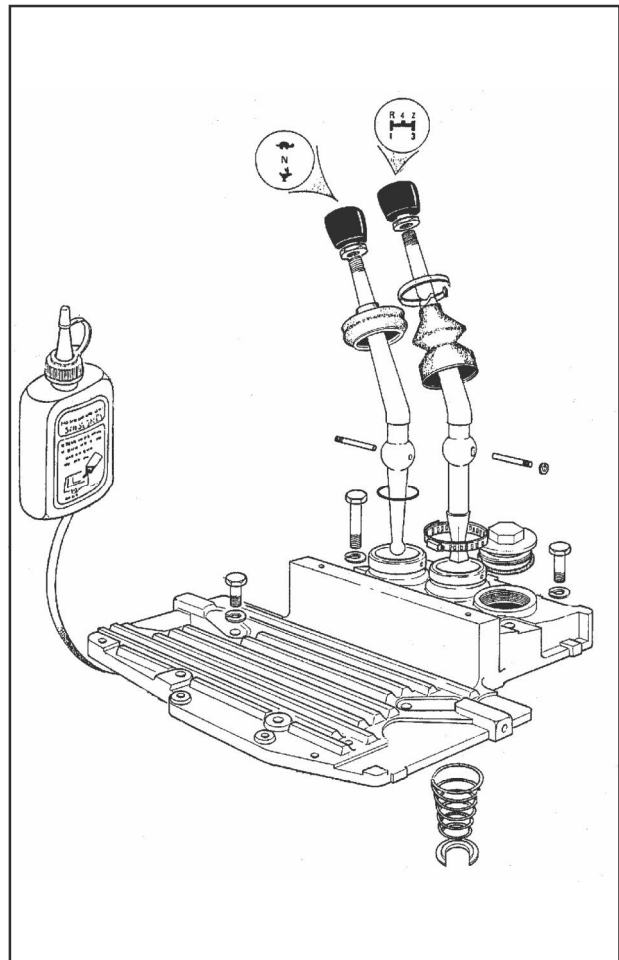
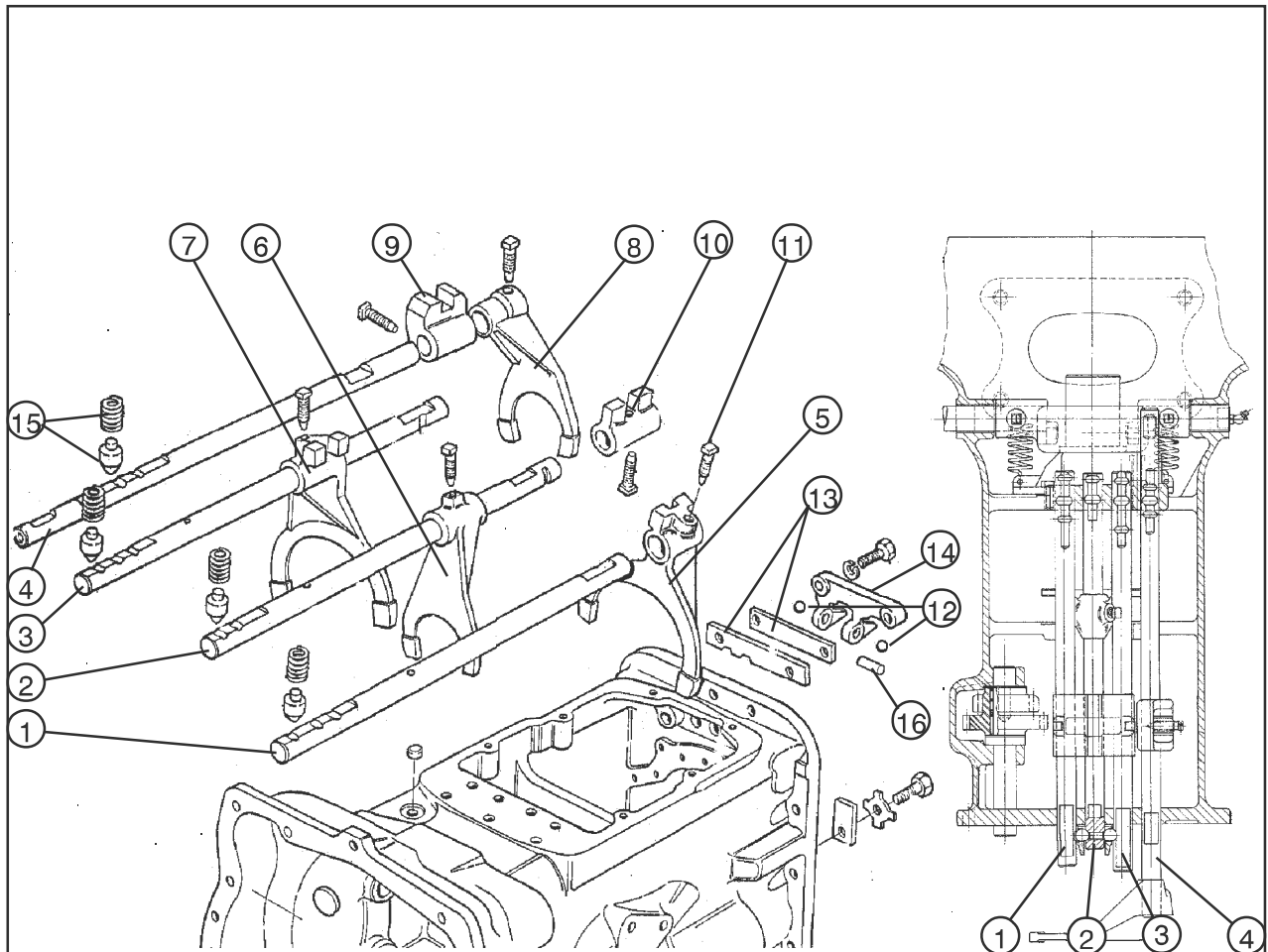


Fig. 3

## C. Shafts, selector rails and forks

### 1. Component identification



**Fig. 1**

- 1 - 2<sup>nd</sup> and 3<sup>rd</sup> gear selector rail
- 2 - 4<sup>th</sup> gear selector rail
- 3 - 1<sup>st</sup> and reverse gear selector rail
- 4 - Slow and Fast range selector rail
- 5 - 2<sup>nd</sup> and 3<sup>rd</sup> gear selector fork
- 6 - 4<sup>th</sup> gear selector fork
- 7 - 1<sup>st</sup> and reverse gear selector fork
- 8 - Slow / Fast range selector fork
- 9 - Slow and Fast ranges selector
- 10 - 4<sup>th</sup> gear selector
- 11 - Fastening bolts of forks to shafts
- 12 - Interlock balls ("anti overlapping")
- 13 - Plates
- 14 - Interlock ball (12) carrier (ball retainer)
- 15 - Selector rail stop pins and detent springs
- 16 - Interlock cross pin (anti overlapping)

## 8x2 gearbox (sliding gears)

### 2. Disassembly

- a) Remove the selector rail interlock assy (anti overlapping) (1, 2, 3 and 14) by releasing both fastening bolts.

Extra care should be taken not to lose the interlock balls (12) and the interlock cross pin (16).

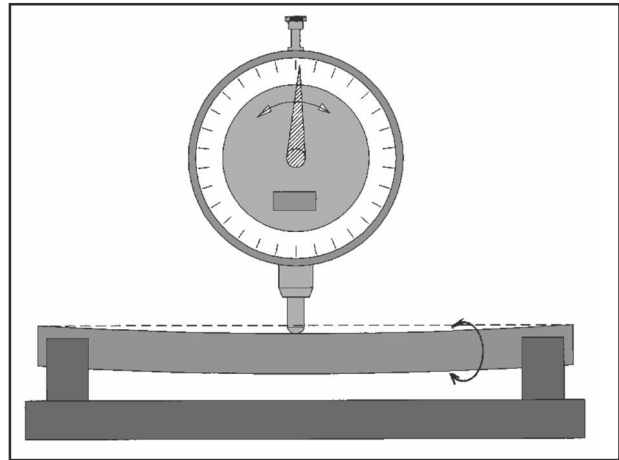
**NOTE: This assy prevents two gears from being engaged at the same time, that is, it prevents gear overlapping.**

- b) Lift out the selector rail stop pins and the detent springs (15).
- c) Release the locking wires and corresponding locking bolts (11).
- d) Slide the selector rails rearwards (1, 2, 3 and 4), then remove the selector forks (5, 6, 7 and 8) and selector rails (9 and 10).

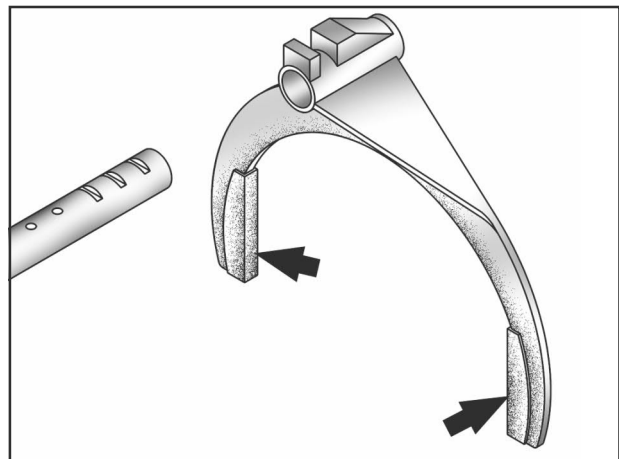
### 3. Inspection of components

Examine all the components for wear, scoring, chipping or distortion. Any worn or damaged components should be replaced:

- The stop pins and detent springs (15);
- Selector rails (1 to 4): check these items for signs of undue wear in the sliding areas in the housing and in the centering of the stop pins (15) as well. Likewise, inspect these components for distortion.
- Forks (5, 6, 7, and 8) - **Fig. 3**: check these items to see if there is wear in the mating area with the sliding gears.
- Mechanism against overlapping (12, 13, 14 and 16): wear in the interlock ball carrier (14), interlock cross pins (16) and interlock balls (12).
- Fitting of the gear lever engagement selector (9 and 10) and selector forks (5 and 7): undue wear in the actuation area of the gear shift levers.



**Fig. 2**



**Fig. 3**

05

## 4. Assembly

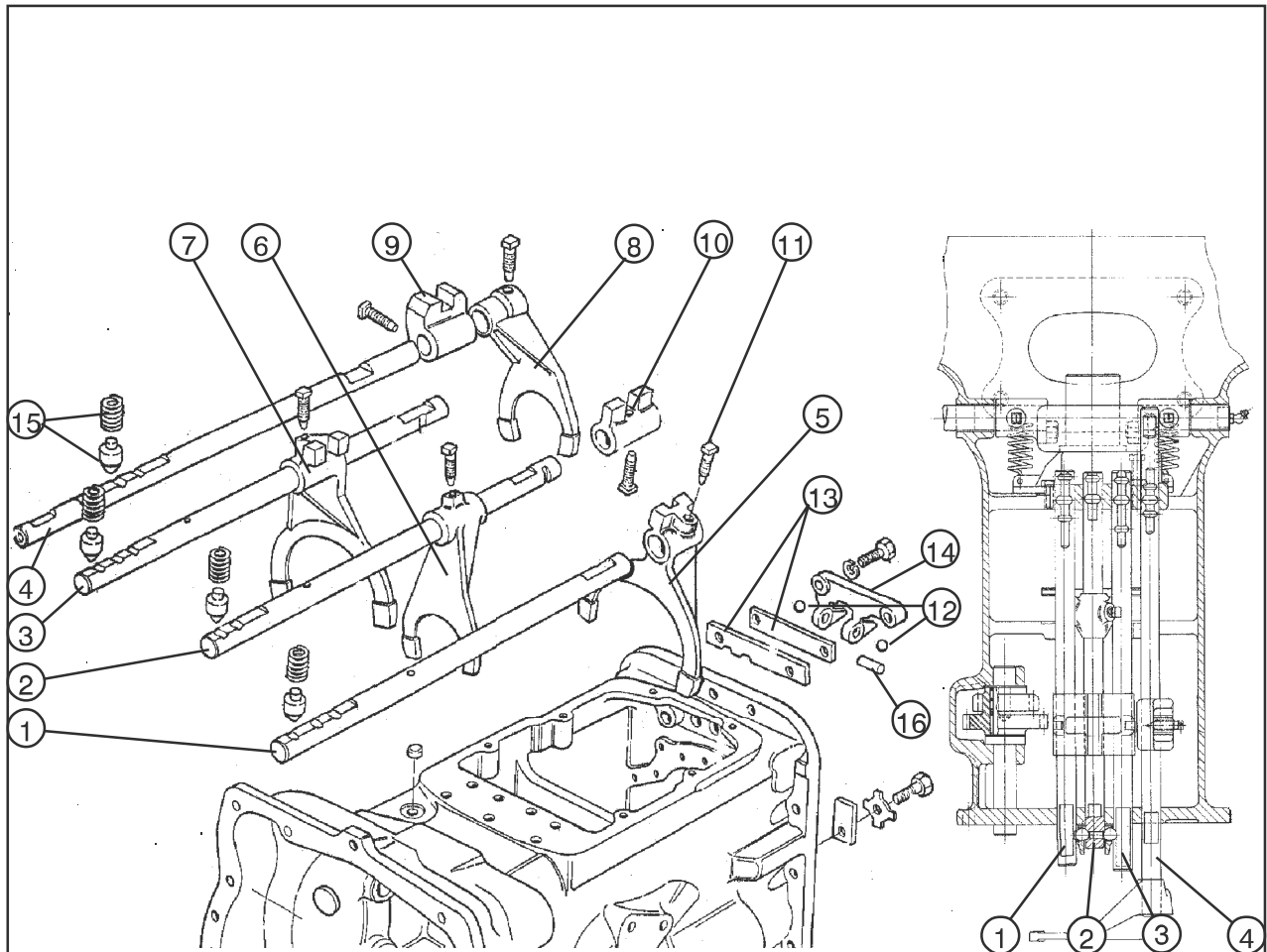


Fig. 1

- a) Refit the Slow/Fast range selector rail (4) into the transmission casing, in the right-side of the housing.
- b) Place the Slow/Fast range gear lever engagement selector (9), the Slow/Fast range selector fork (8) and the Slow/Fast range shift coupler over the Slow/Fast range selector rail (4). Next, tighten the corresponding locking screw (11).
- c) Install the 1<sup>st</sup> and reverse gears selector rail (3), then place the first and reverse gears selector fork (7) and the corresponding locking screw (11).
- d) Insert the 4<sup>th</sup> gear selector (2), then place the fourth gear selector fork (6) and the fourth gear lever engagement selector (10). Next, tighten the corresponding locking screw (11).
- e) Refit the 2<sup>nd</sup> and 3<sup>rd</sup> gears selector rail (1), then place the second and third gears selector fork (5) and the corresponding locking screw (11).
- f) Refit the stop pins and the detent springs (15).
- g) Refit the interlock mechanism to the rear end of the transmission casing, then tighten the fastening bolts to a torque of 40 to 50 N.m. **Pay extra attention to the correct positioning of the interlock balls (12) and interlock cross pins (16).**
- h) Press the stop pins and detent springs (15) using a plate or a pair of pressure pliers. Slide all selector rails (1 to 4), one by one, forward and rearward to ensure all gears properly mesh. Inspect the mechanism responsible for preventing overlapping to see if it is functioning properly.

# 8x2 gearbox (sliding gears)

## D. Disassembly and inspection of the input shaft(s) and input housing

### 1. Identification of components

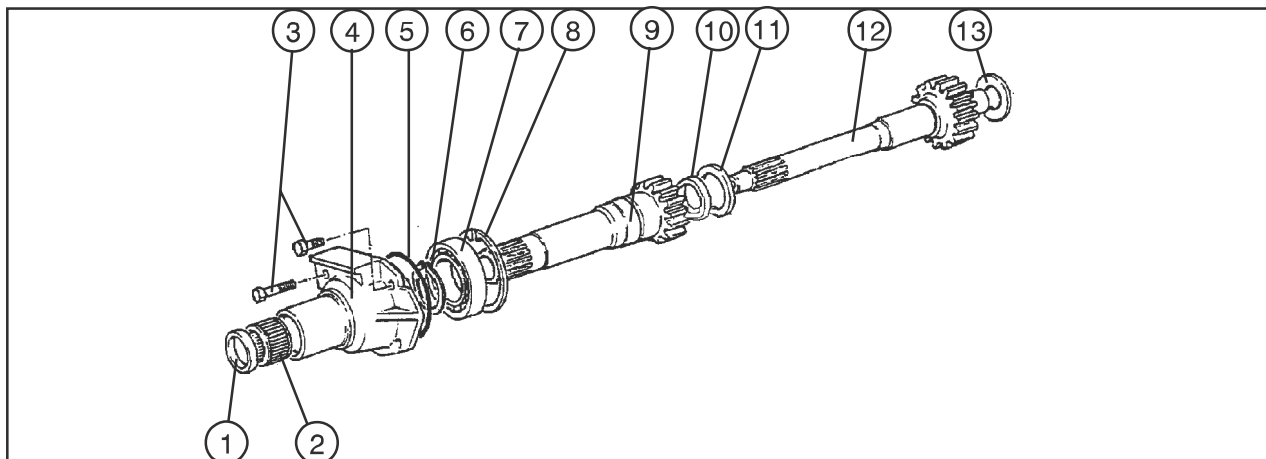


Fig. 1

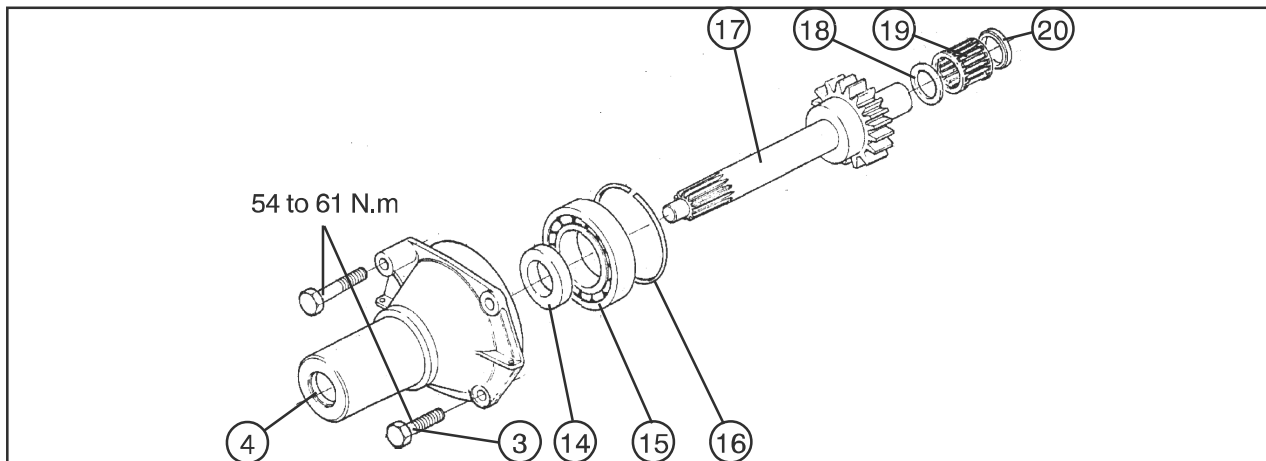


Fig. 2

- Fig. 1: Input housing "A": with 2 input shafts
- Fig. 1: Input housing "B": with 1 input shaft
- 1 - Seal
- 2 - Needle roller bearing
- 3 - Input housing fastening bolts
- 4 - Input housing (front flange)
- 5 - O-ring
- 6 - Bearing lock-ring (snap ring) (7) over the PTO input shaft (9)
- 7 - Bearing
- 8 - Bearing lock-ring (snap ring) (7) inside the input housing (front flange)
- 9 - PTO input shaft (outer)
- 10 - Seal
- 11 - Washer
- 12 - Transmission input shaft (inner)
- 13 - Spacer

#### Input housing with a single pilot-shaft - Fig. 2

- 14 - Seal
- 15 - Ball roller bearing

- 16 - Bearing lock-ring (snap ring) (15) inside the input housing (front flange)
- 17 - Single pilot-shaft (tractors with PTO and single clutch)
- 18 - Spacer
- 19 - Needle roller bearing
- 20 - Spacer

### 2. Disassembly

#### Input housing type "B": with one input shaft

*NOTE: The input shaft (17) can only be removed after the removal of the PTO output shaft and front gear - see item 7.2*

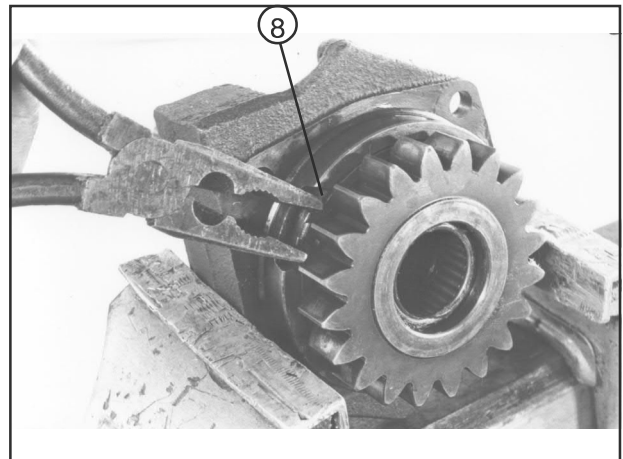
- a) Remove the fastening bolts (3) of the input housing (4).
- b) Remove the lock-ring (16) and pull the shaft (17) out of the input housing (4).
- c) Remove the seal (14) and discard it.
- d) Remove the needle roller bearing (19) and the spacers (18 and 20).

Input housing type "A": with two input shafts:

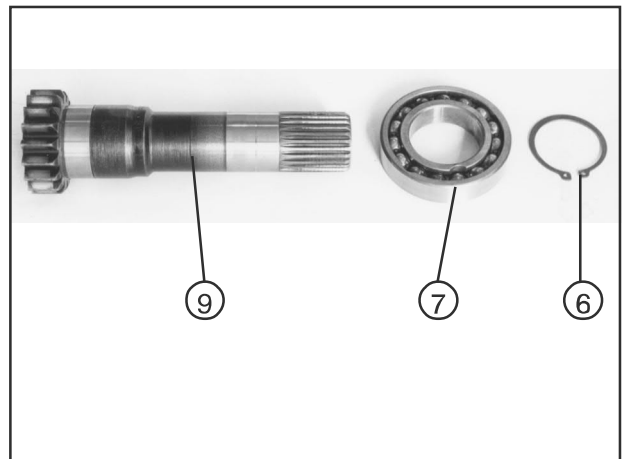
*NOTE: The transmission input shaft (12) can only be removed after the removal of the PTO output shaft and its front gear - see pages 19 and 20, items (31 and 32).*

- a) Release the fastening bolts (3) of the from the input housing (4) and then remove the flange assy.
- b) To remove the bearing (7) from the PTO input shaft (9), first remove the lock-ring (6).

*NOTE: It may be necessary to press the bearing against the shaft gear (9) so the lock ring can be removed (6).*



**Fig. 3**



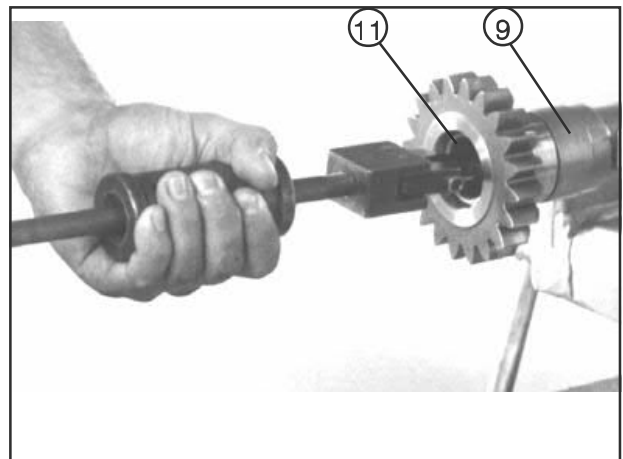
**Fig. 4**

### 3. Inspection of components

- c) Inspect the bearing (7 or 15) - according to the type of input housing, and replace the "O" ring (5).

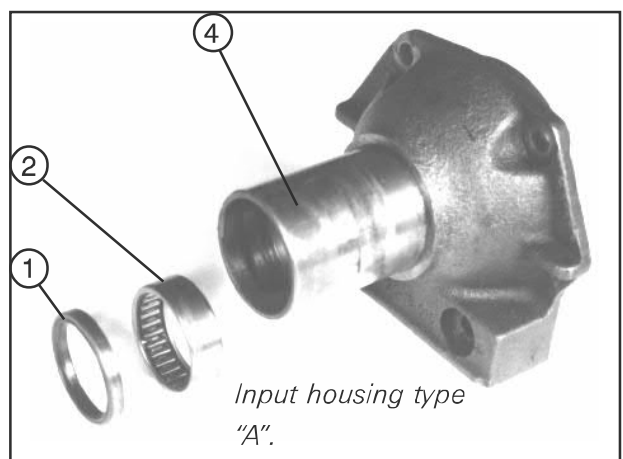
- d) Inspect the shafts (9 and 12): if they are worn or cracked in the splined face, replace them.

- e) Remove the snap ring (11) and the seal (10) from inside the shaft (9). Replace the seal (10). Use an suitable tool to assemble them in order not to damage the components.



**Fig. 5**

- f) Replace the seal (1) and the needle roller bearing (2) of the input housing type "A". In case of transmission reconditioning, these items should be replaced.



**Fig. 6**



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