

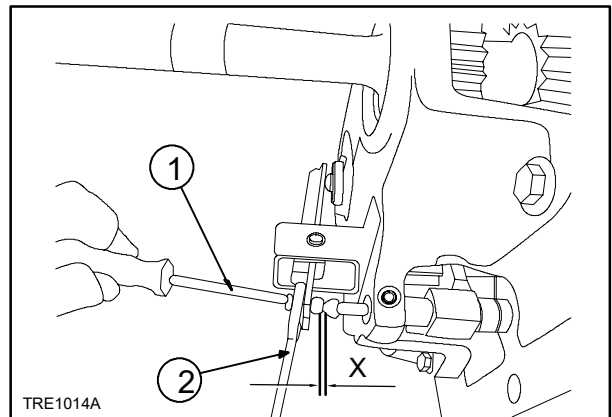
To reinstall, reverse the removal procedure and refer to fig. 5 and proceed as follows:

- Mount the shaft (1) and the plate (2) on the rear cover (fig. 45).
- Refit the two bearings (1 and 2) (fig. 44).
- Refit the drive shaft (1) (fig. 43)
- Install the circlip (1) securing the bearing (fig. 42)
- Insert the gear (1) (fig. 41).
- Install the rod (1), spring (2), fork (3) and the synchroniser (4) (fig. 40).
- Install the washer (1) and the gear (2) (fig. 39)
- Install the cover (1) fig. 38.
- Install the socket head screw (1) on the side of the cover (fig. 37)
- Install the nut (1) securing the shaft and refit the 4 bolts (2, fig. 36). Tighten the nut (1) to 255Nm (188.0783 ft lb) and bolts (2) to 98 Nm (72.2811 ft lb).
- Install the two rods (1) fig. 35.

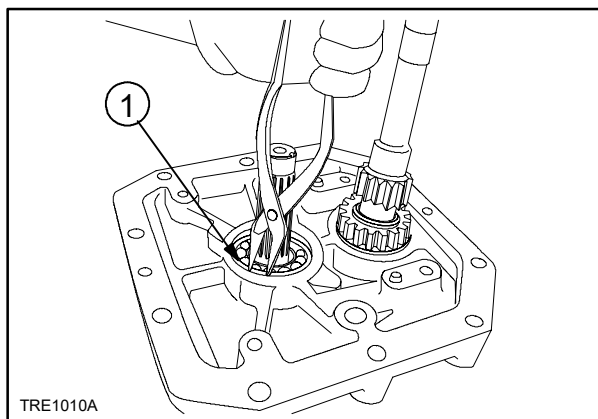
- Refit the PTO engagement mechanism (1) and install the socket head screws securing the mechanism fig. 34.
- Install 1000 rpm PTO shaft with related circlip.

NOTE: The adjustment procedure should be done ONLY with the 1000 rpm PTO shaft is installed.

- Using a screwdriver (1) and a spanner (2) adjust the distance **X** to "**0 mm (0 in.)**" fig. 46.
- Install the spacer (1) fig. 33.
- Install the cover (2) fig. 32 and tighten the bolts (1).
- Use suitable hooks to assemble the unit to the tractor fig. 31.

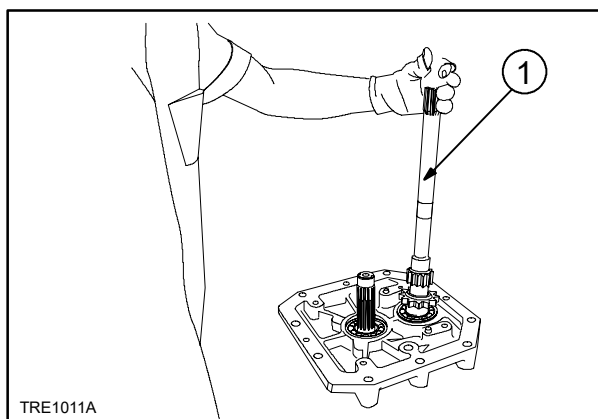


12. Remove the circlip (1).



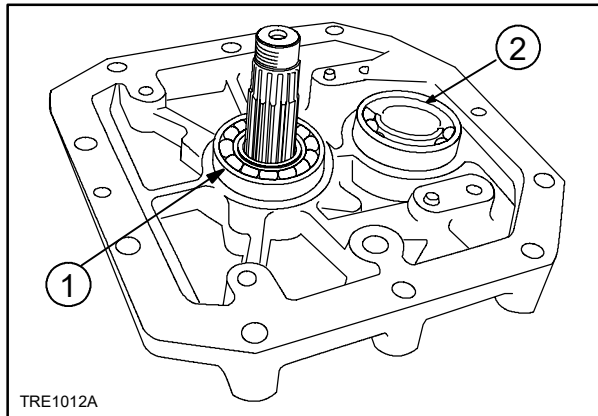
42

13. Remove the drive shaft(1).



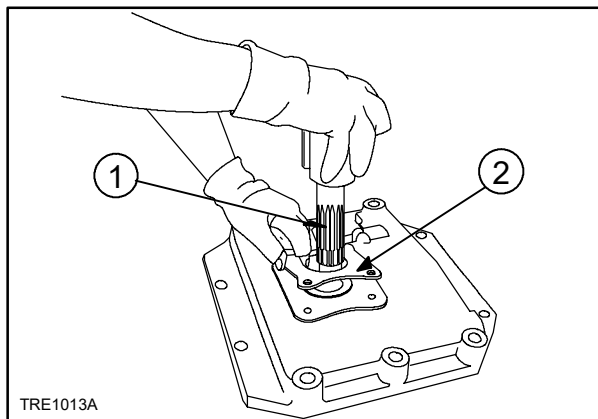
43

14. Remove both bearings (1) and (2) .



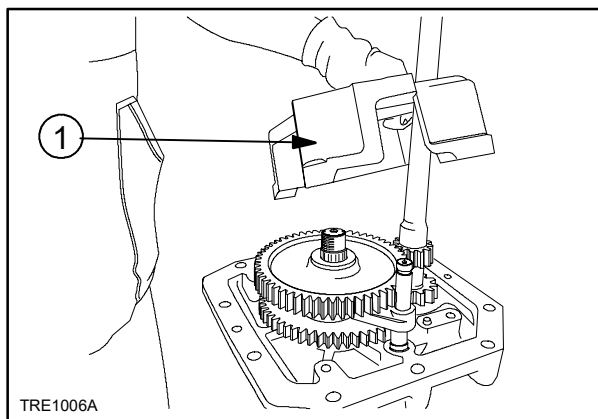
44

15. Remove the shaft (1) and the plate (2).



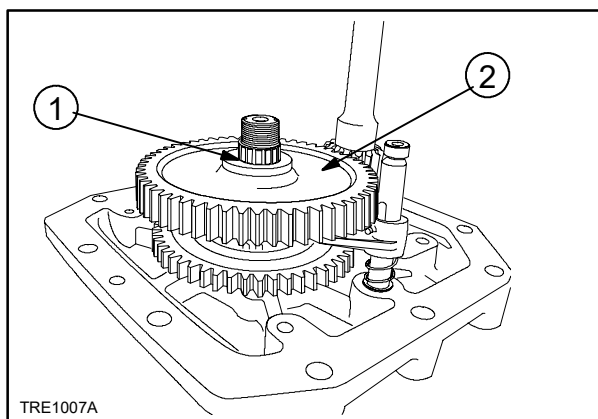
45

8. Remove the cover (1).



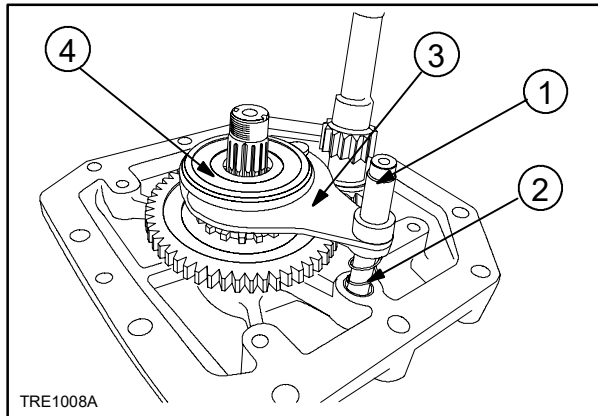
38

9. Remove the washer (1) and take off the gear (2).



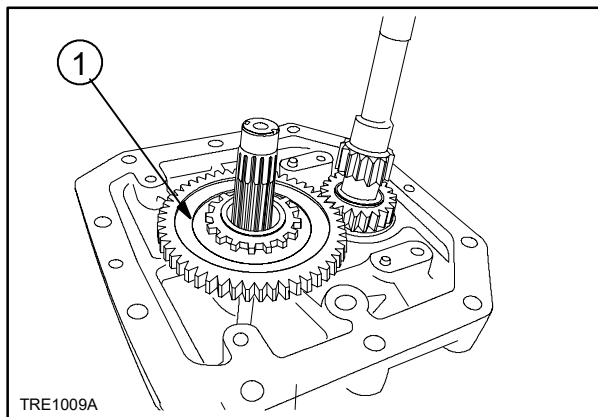
39

10. Remove the rod (1), spring (2), fork (3) and the synchroniser (4).



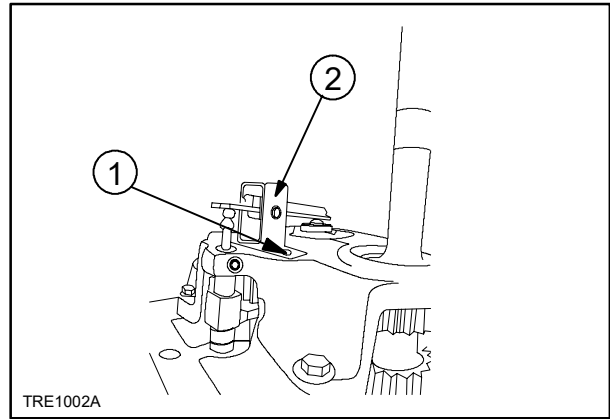
40

11. Remove the driven gear (1).



41

4. Remove the two socket head screws (1) and take off the PTO engagement mechanism (2) completely.

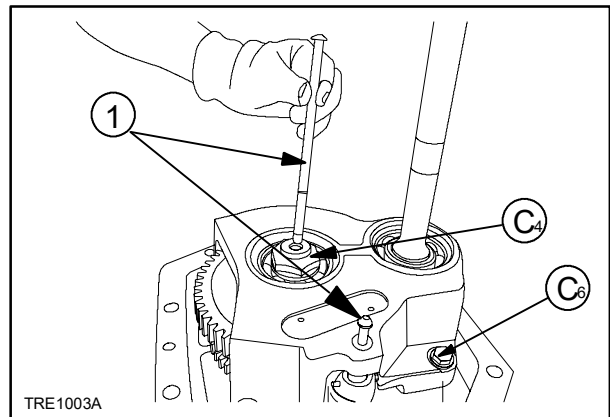


34

5. Withdraw two rods (1) from the cover.

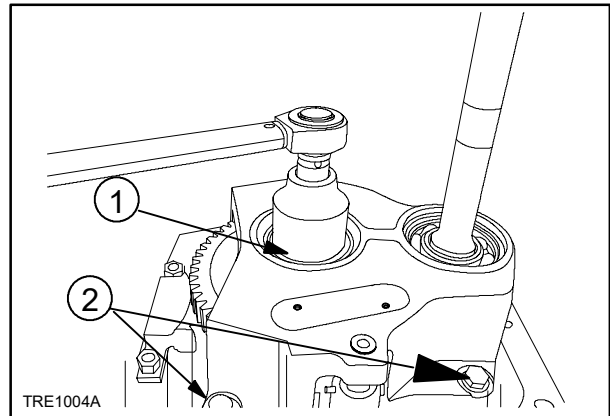
C₄: Shaft securing nut tightening torque: 255Nm (188.0783 ft lb)

C₆: Cover retaining bolts tightening torque: 98 Nm (72.2811 ft lb)



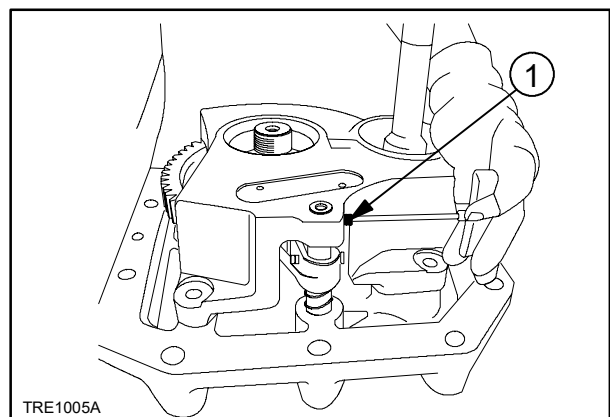
35

6. Remove the nut (1) securing the shaft and take off the 4 bolts (2).



36

7. Remove the socket head screw bolt (1) on the side of the cover.



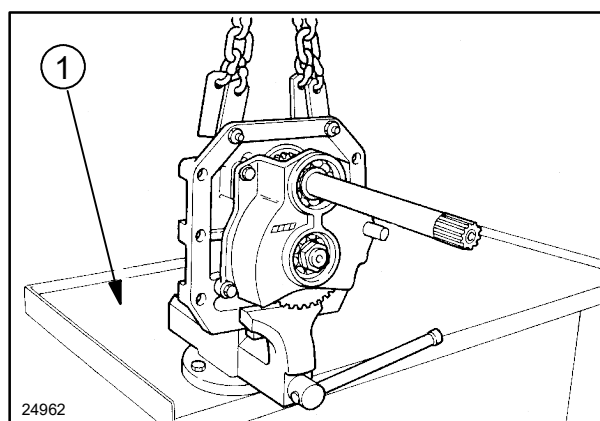
37

**MECHANICAL PTO (540/1000 rpm PTO)
(Interchangeable PTO Shaft) (NASO Version)
Bench overhaul (Op. 31-114)**

**WARNING**

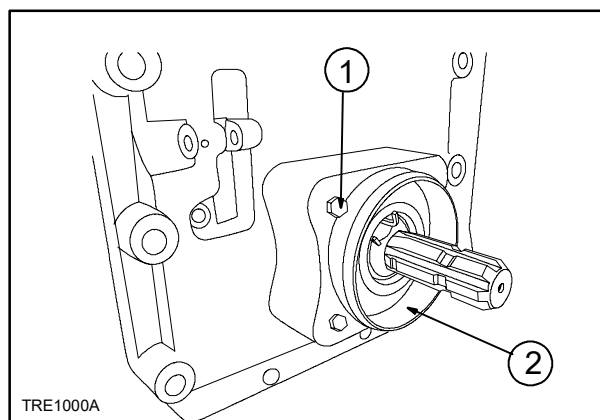
Handle all parts with great care.
Do not place hands or fingers between one part and another.
Always wear the prescribed safety clothing, including protective glasses, gloves and shoes.

1. Place the PTO unit in the vice on the work bench (1).



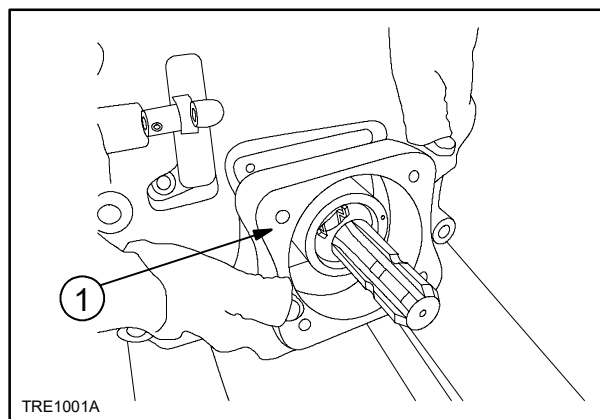
31

2. Remove the bolts (1) and take off the cover (2).



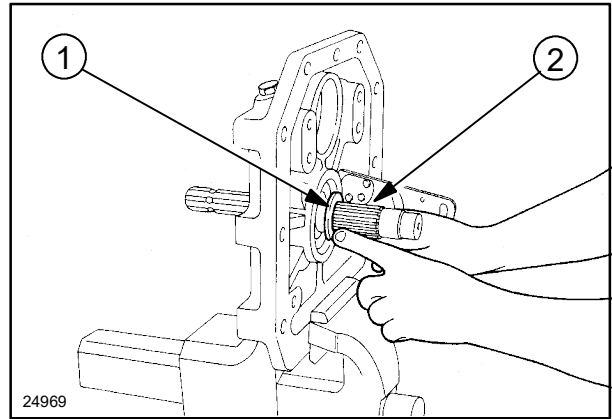
32

3. Remove the spacer (1).



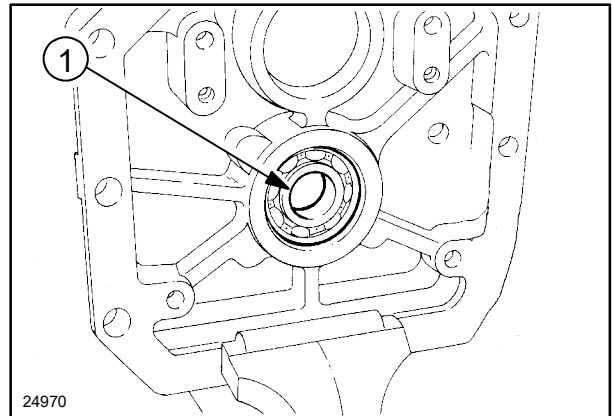
33

8. Remove the rear bearing thrust washer (1) and remove the secondary shaft (2) complete with PTO output shaft.



29

9. Remove the retaining snap ring, the bearing (1) and the seal (if it needs replacing) from the rear cover.

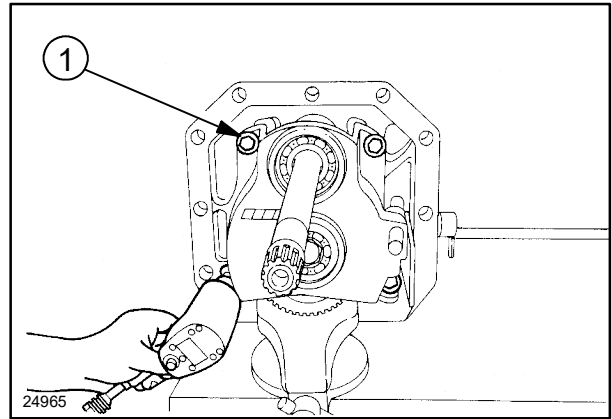


30

To reinstall, Refer to fig. 2b and proceed as follows:

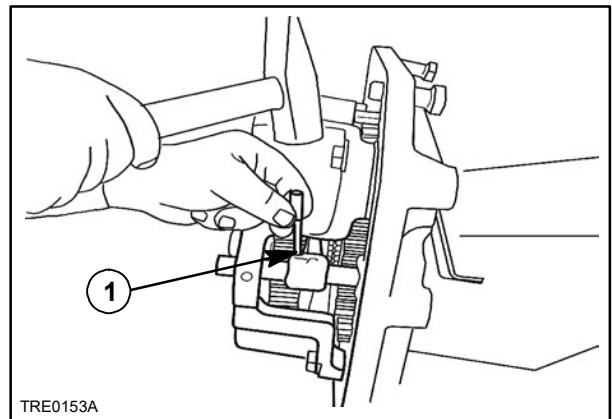
- Mount the seal (9) (if removed in step 20), the rear bearing and the retaining snap ring (5) on the rear cover.
- Refit the thrust washer on the driven shaft.
- Refit the driven shaft gear (23), the fixed gear (21), the sleeve (22), the fork and the fork support rod.
- Insert the gear (24) onto the driven shaft, mount the internal support (13) complete with drive shaft (25). Fasten the support (13) using the four screws, tightening them to the torque setting specified on page 4.
- Mount the thrust washer on gear (11) fig 5, and install the bearing on the internal support (13) of the driven shaft.
- Fasten the rod that supports the PTO speed selector control fork pin as removed in step 5.
- Tighten the driven shaft locknut to the torque specified on page 4, then, using a suitable punch, notch the safety thrust washer in order to prevent it from loosening.

4. Remove the four PTO unit internal support fixing screws (1).



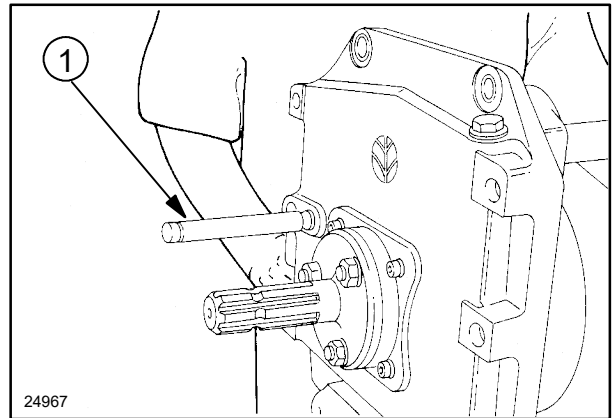
25

5. Remove the pin (1) securing the fork rod.



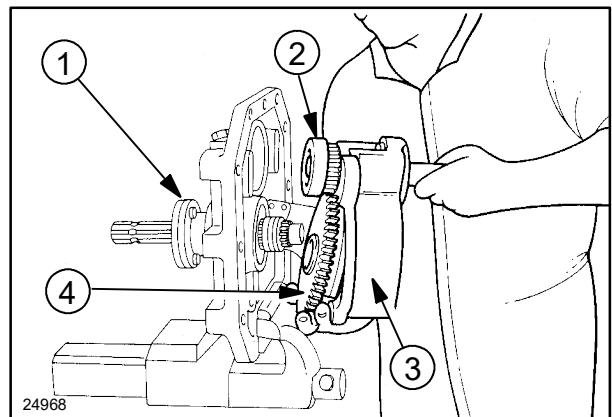
26

6. Withdraw the rod (1) from the rear cover.



27

7. Partially withdraw the PTO output shaft (1) and remove the internal support (3) together with the drive shaft (2), the driven gears (4), the sleeve and the engagement/disengagement/neutral control fork of the 540/750 PTO. Also, retain the thrust washer from the gear (11) fig 5, for reuse during reassembly.



28

MECHANICAL PTO (540/750 rpm PTO)
Bench overhaul (Op. 31 112 45 - 31 112 48)

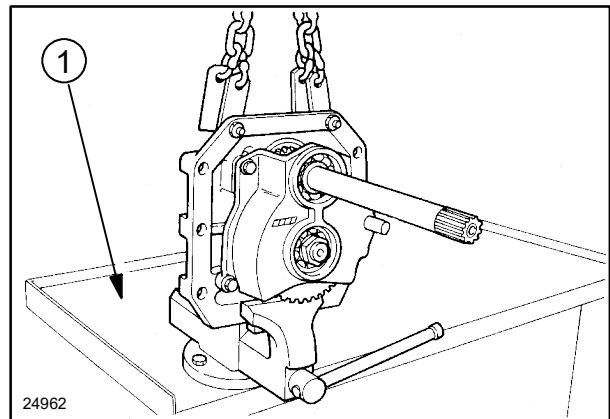


WARNING



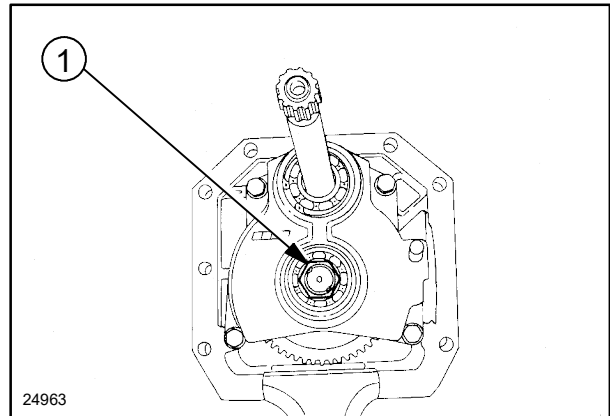
Handle all parts with great care.
 Do not place hands or fingers between one part and another.
 Always wear the prescribed safety clothing, including protective glasses, gloves and shoes.

1. Place the PTO unit in the vice on the work bench (1).



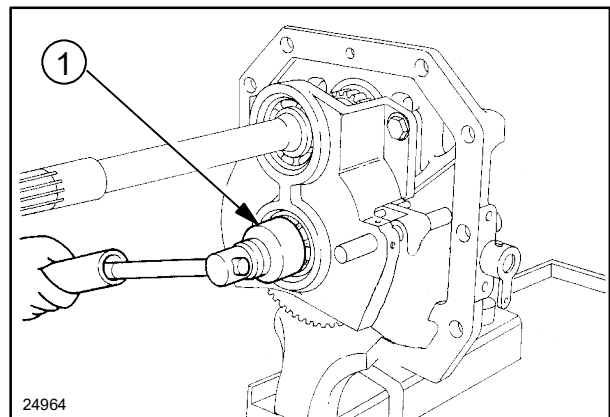
22

2. Use a punch to straighten the corrugations (1) on the ring nut that retains the driven shaft components.



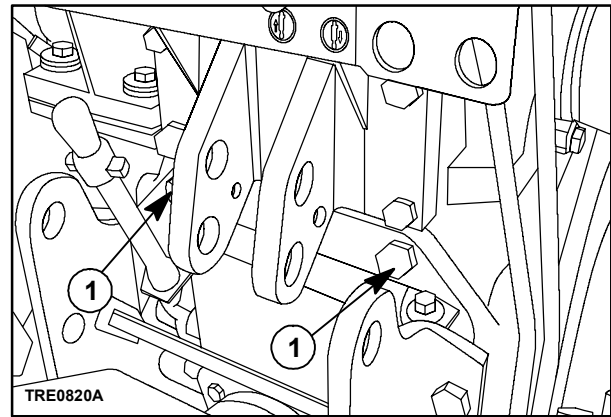
23

3. Remove the ring nut (1) from the driven shaft.



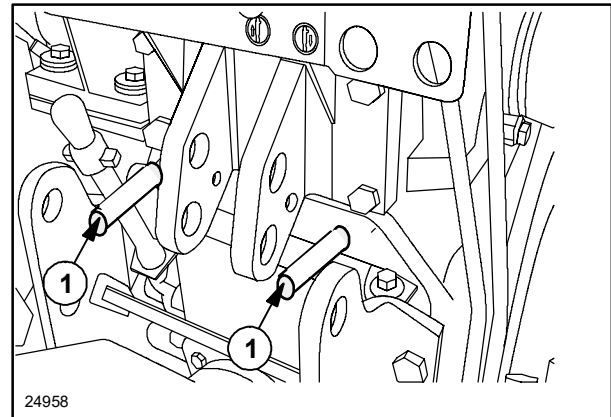
24

9. Remove the two upper screws (1) which fasten the PTO unit to the transmission.



18

10. Insert the two guide pins **380001597** (1) and remove the two lower screws (2) (Fig. 3 Page.6) which fasten the PTO unit to the transmission.

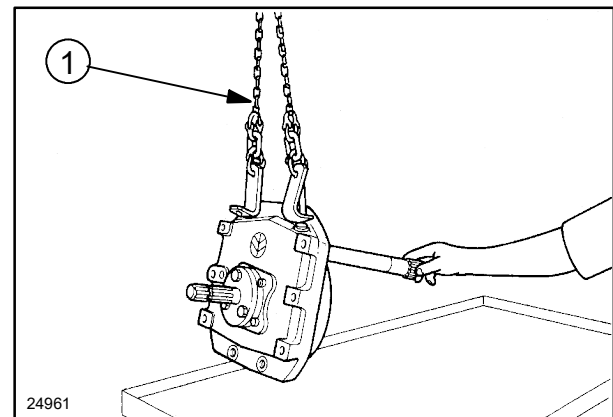


19

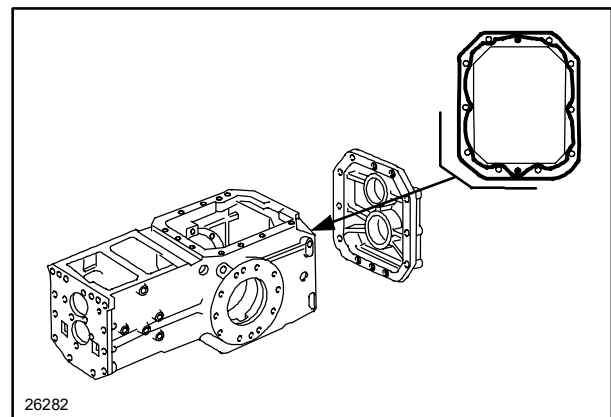
11. Engage the lever (1) fig. 8, in position (C), ground speed PTO, so that the sleeve (3) fig. 9, rests on the shaft (2) during the removal operation. Withdraw the PTO unit by a few centimetres and detach using the hook with lifting chain **380000227** (1).

To reinstall proceed as follows:

- Clean the mating surfaces between the transmission and PTO cover and apply sealing compound as shown in figure 21.
- Raise the PTO unit and position it directly behind the transmission casing. Slide the PTO cover onto the guide pins **380001597**, for ease of assembly.
- Remove the hook with chain (1) fig. 20, and fasten the PTO unit using the two lower screws.
- Remove the two guide pins **380001597** and install the two upper screws.
- Reinstall the bracket (1) fig. 17, that retains the PTO speed selector control lever.
- Refit the tow bar support.
- Refit the tow bar, the tow hook and the three-point linkage top link.
- Screw in and tighten the oil drain plug and fill the transmission/gearbox with oil.
- Reconnect the negative battery cable.

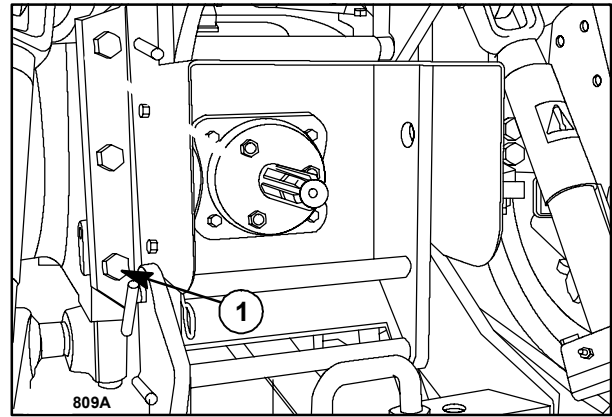


20



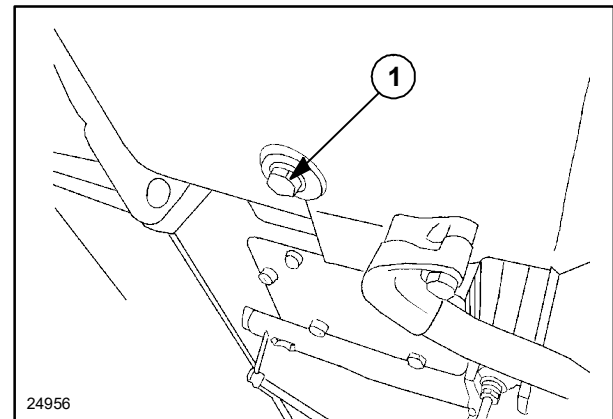
21

5. Remove the six tow hook support fixing screws (1) (Three on left and three on right side).



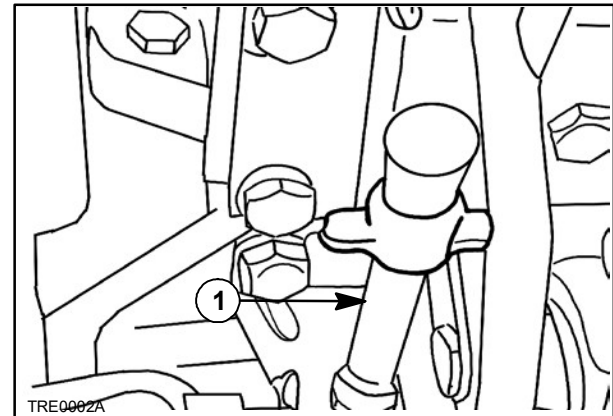
14

6. Drain out the transmission/gearbox oil from the drain plug (1) and collect it in a suitable container.



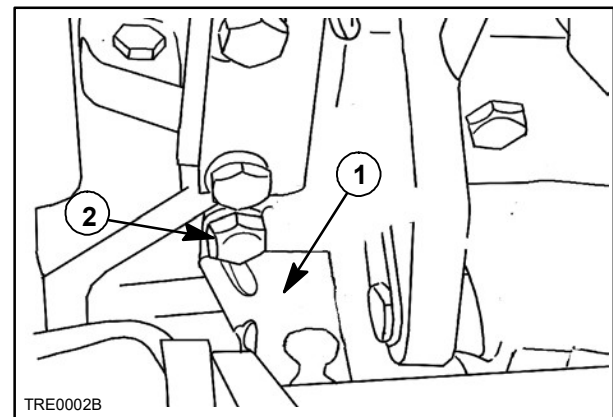
15

7. Remove the PTO speed selector control lever (1).



16

8. Remove the screws (2) that fasten the retaining bracket (1) for the PTO speed selector control.



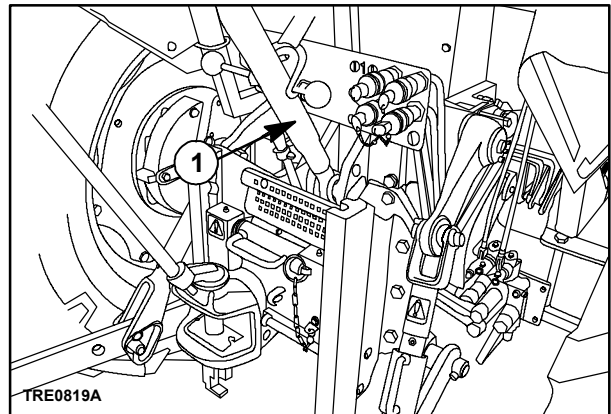
17

540/750 MECHANICAL PTO**Removal - Refitting (Op. 31 112 20)****WARNING**

Lift and handle all heavy parts using lifting tackle of sufficient capacity.

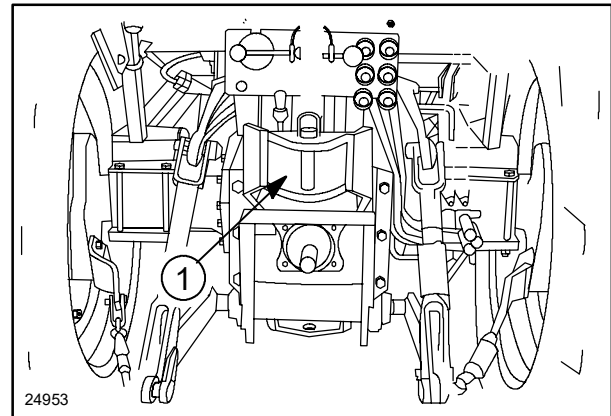
Make sure that the units or parts are supported by suitable harnesses and hooks. Check that no one is in the vicinity of the load to be lifted.

1. Disconnect the negative cable from the battery.
2. Remove the top link (1) of the three-point linkage.



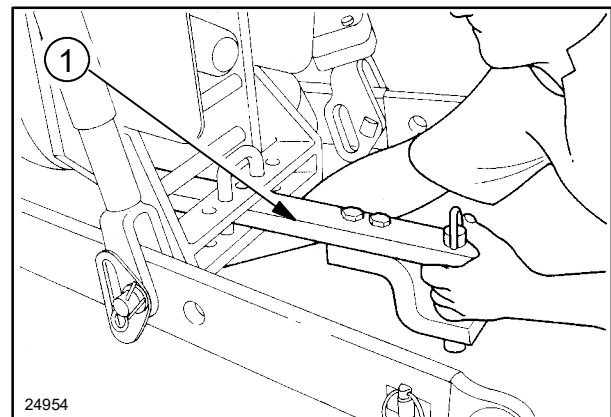
11

3. Remove the tow hook (1), if fitted.



12

4. Remove the tow bar (1), if fitted.



13

Ground speed PTO

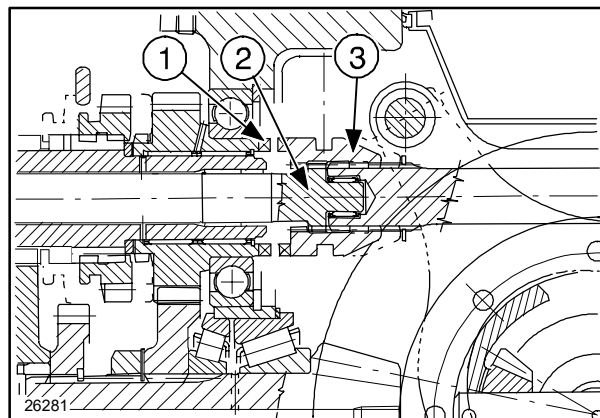
Proceed as follows:

- with the PTO clutch control lever (1) fig. 7, at position D;
- fully depress the gearbox/engine clutch pedal;
- wait briefly, then move the PTO speed selector (1) fig. 8, forward to position C and release the gearbox/engine clutch pedal;

In these conditions the PTO coupling sleeve (3) fig. 9, is turned directly by the toothed coupling of gear (1) in the gearbox.

When the tractor is stationary the PTO shaft does not turn. When changing from forward to reverse gear, the direction of rotation of the PTO shaft reverses.

NOTE: When the PTO is not being used, move the lever (1) fig. 8, to position E (the neutral position of the PTO engagement sleeve (3) fig. 9).



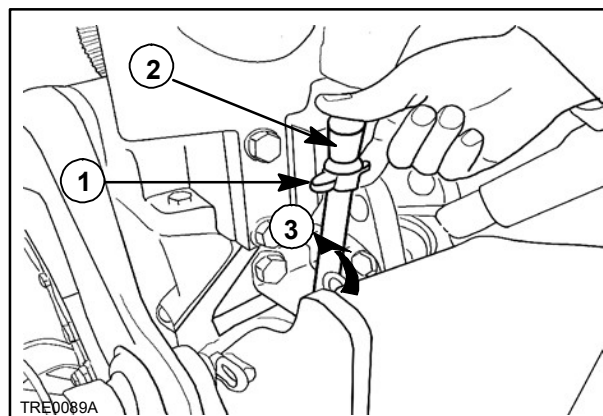
9

PTO speed selector lever (2) fig. 10

To change PTO speed, proceed as follows:

- lift the spring-loaded collar (1) upwards;
- move the lever (2) forward to position (3) to select 750 or 1000 rev/min PTO speed.

This activates the external control lever (17) fig. 4 by means of a tie-rod. The external control lever in turn rotates the internal fork device (21) and selects the PTO speed by means of the coupling sleeves



10

TROUBLESHOOTING FOR MECHANICAL PTO

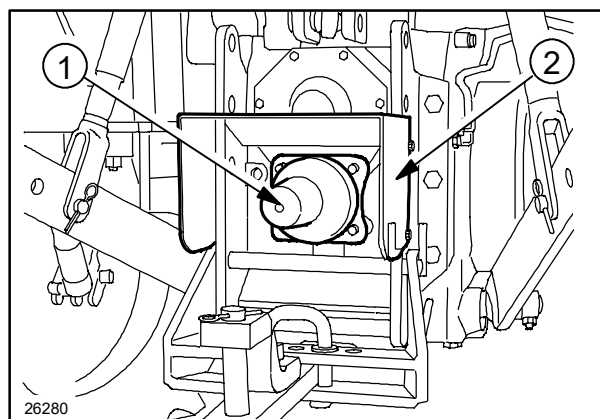
Faults	Possible causes	Remedies
Slipping with loss of speed of PTO output shaft.	Wear of clutch disc or of engine flywheel pressure plate. Poor adjustment of PTO clutch control lever.	Check the data given in the appropriate pages of section 18, replace the worn parts and adjust the clutch control lever.
Difficulty in selecting PTO speed by means of lever (2) fig. 10.	External control stiff.	Check the control lever.

DESCRIPTION AND OPERATION OF MECHANICAL PTO

The PTO, located at the rear of the tractor, transfers power to the implement being transported or towed. It can be controlled either directly from the engine clutch or from the gearbox clutch. The PTO is shown with the safety cap (1) and the guard (2) in position. The safety cap must be removed to couple up an implement to the PTO shaft.

The PTO with mechanical engagement / disengagement is available in three versions:

- single-speed PTO, 540 rev/min (standard)
- two-speed PTO, 540/750 rev/min (option)
- two-speed PTO, 540/1000 rev/min (option).



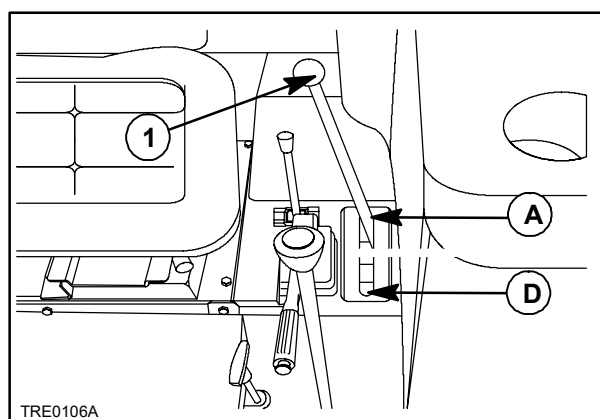
6

Independent PTO

Proceed as follows:

- with the PTO clutch disengaged, i.e. with the control lever (1) fig. 7, rearward at position A;
- move the PTO selector lever (1) fig. 8, to position B so as to engage the PTO sleeve (3) fig. 9, with the toothed coupling of the shaft (2) which is driven by the engine;
- engage the PTO by slowly moving the lever (1) fig. 7, forward to position D.

When engaged, the PTO shaft rotates and the PTO warning lamp on the instrument panel lights up.

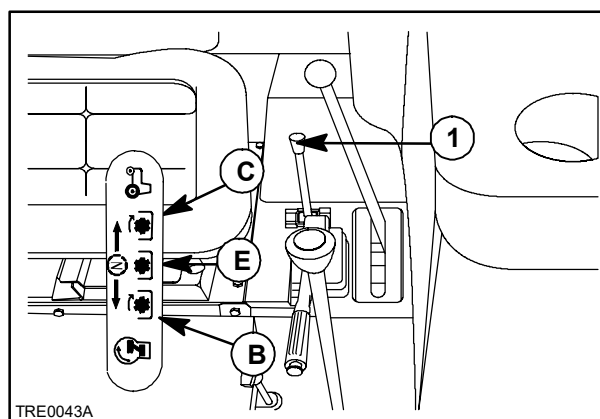


7

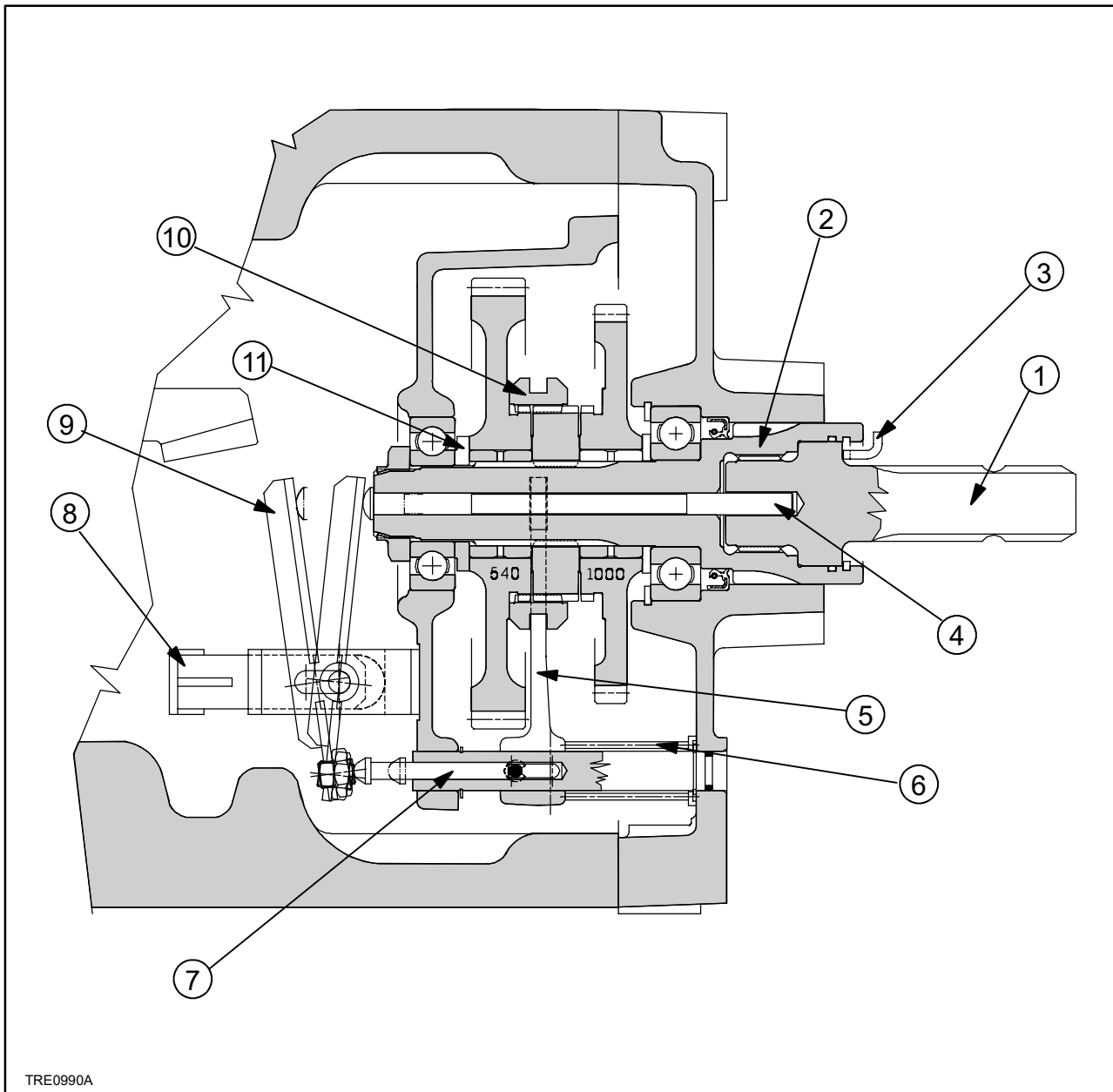
In these conditions the operation of the PTO is completely independent of the travel of the tractor, so:

- the tractor can be stopped without stopping the PTO;
- the PTO can be stopped without stopping the tractor (by disengaging the PTO clutch).

To disengage the PTO move the PTO clutch control lever (1) fig. 7, rearward to position A then move the speed selector (1) fig. 8, to the central position E.

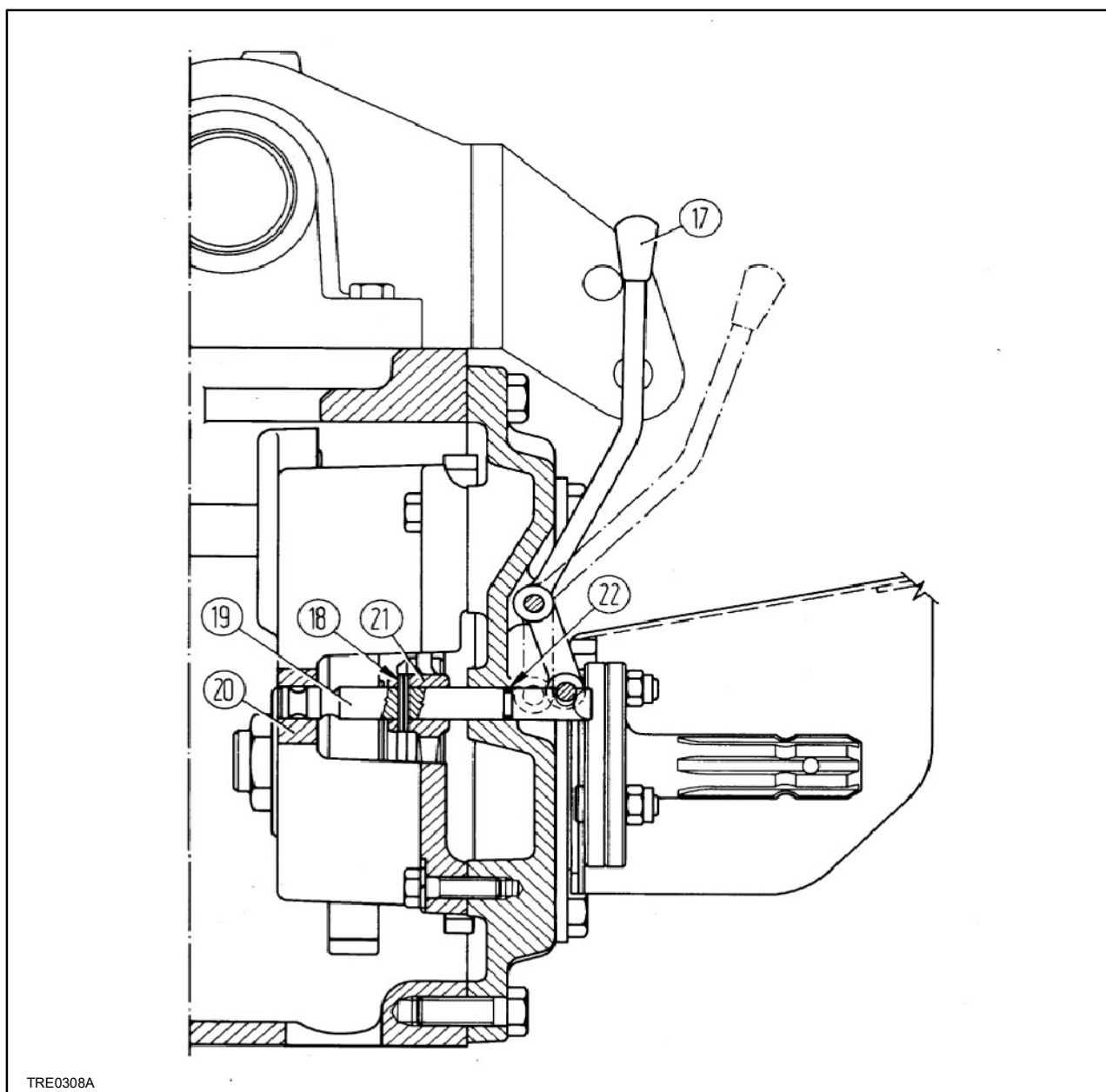


8



Section views - 540 - 1000 rev/min PTO North American version (available on request), not synchronised with gearbox, with speed selection by replacement of splined output shaft.

- | | |
|---|----------------------------------|
| 1. Splined $1 \frac{3}{8}$ " output shaft (6 splines) for 540 rpm PTO, or $1 \frac{3}{8}$ " output shaft (21 splines) for 1000 rpm PTO. | 6. Return spring. |
| 2. Driven shaft. | 7. Return rod. |
| 3. Snap ring securing part . | 8. Speed selector lever support. |
| 4. Speed selector rod. | 9. Speed selector lever. |
| 5. Speed selector sleeve control fork. | 10. Speed selector sleeve. |
| | 11. Thrust washer. |

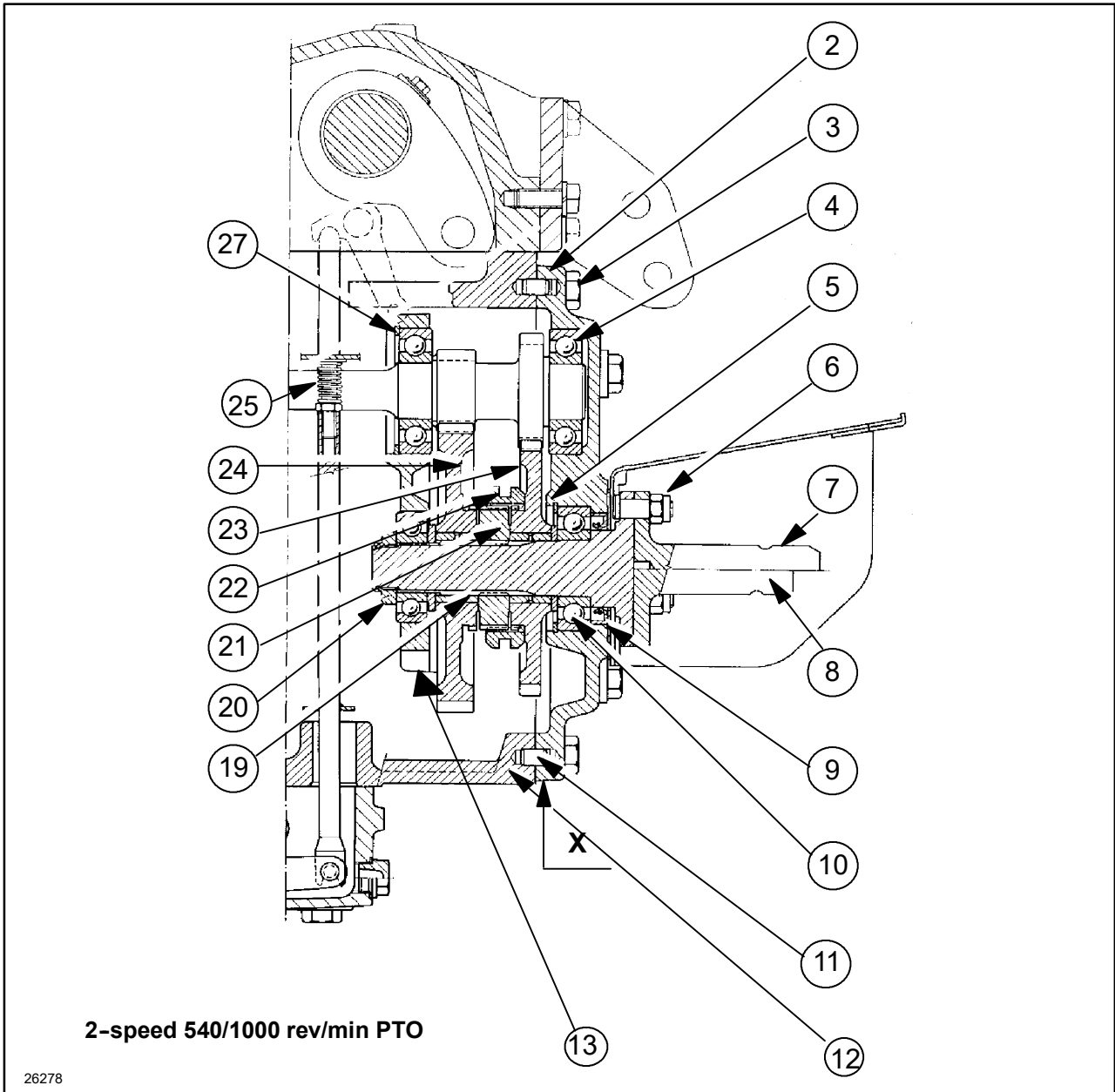


4

Sectional diagram of single- and 2-speed PTO

- 17. PTO speed selector lever.
- 18. Roll pin.
- 19. Shaft.

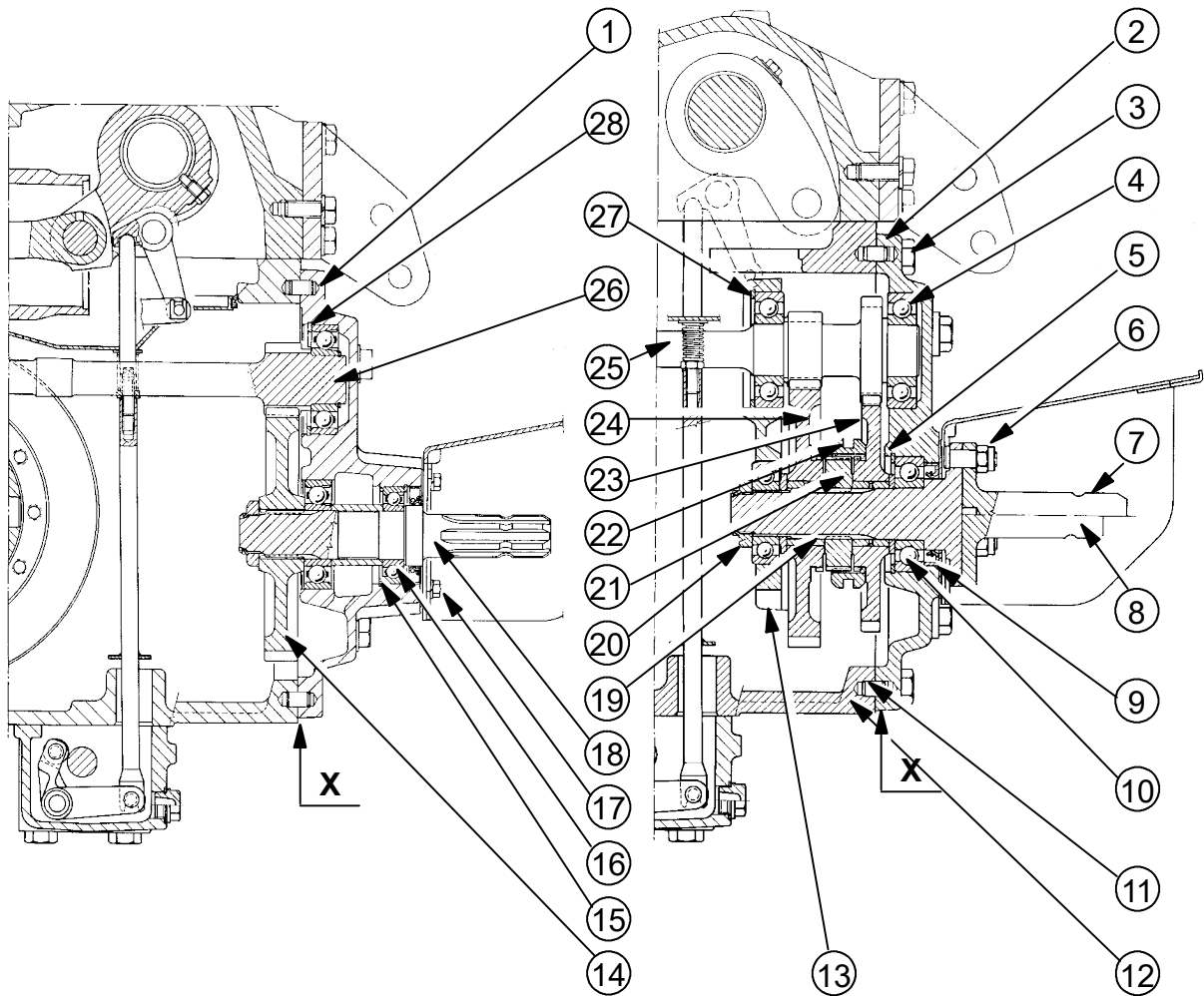
- 20. Rear cover.
- 21. Fork.
- 22. O-ring.



Sectional diagram of single- and 2-speed PTO

- | | |
|--|---|
| 2. 540/1000 rev/min PTO cover. | 12. Rear transmission casing. |
| 3. PTO unit retaining screw. | 13. Rear transmission support. |
| 4. Drive shaft bearings. | 19. Driven gear support bushings. |
| 5. Snap ring. | 20. Driven shaft lock nut. |
| 6. Self-locking nut to secure splined shaft. | 21. Fixed gear. |
| 7. 540 rev/min splined shaft. | 22. Coupling sleeve. |
| 8. 1000 rev/min splined shaft. | 23. Driven gear for 1000 rev/min speed. |
| 9. Seal. | 24. Driven gear for 540 rev/min speed. |
| 10. Driven shaft bearings. | 25. Double drive gear. |
| 11. Cover locating pin. | 27. Snap ring. |

NOTE: When installing use sealing compound of the type shown on page 1 section 00 on surface X as shown above.

**a - single-speed 540 rev/min PTO****b - 2-speed 540/750 rev/min PTO**

26278

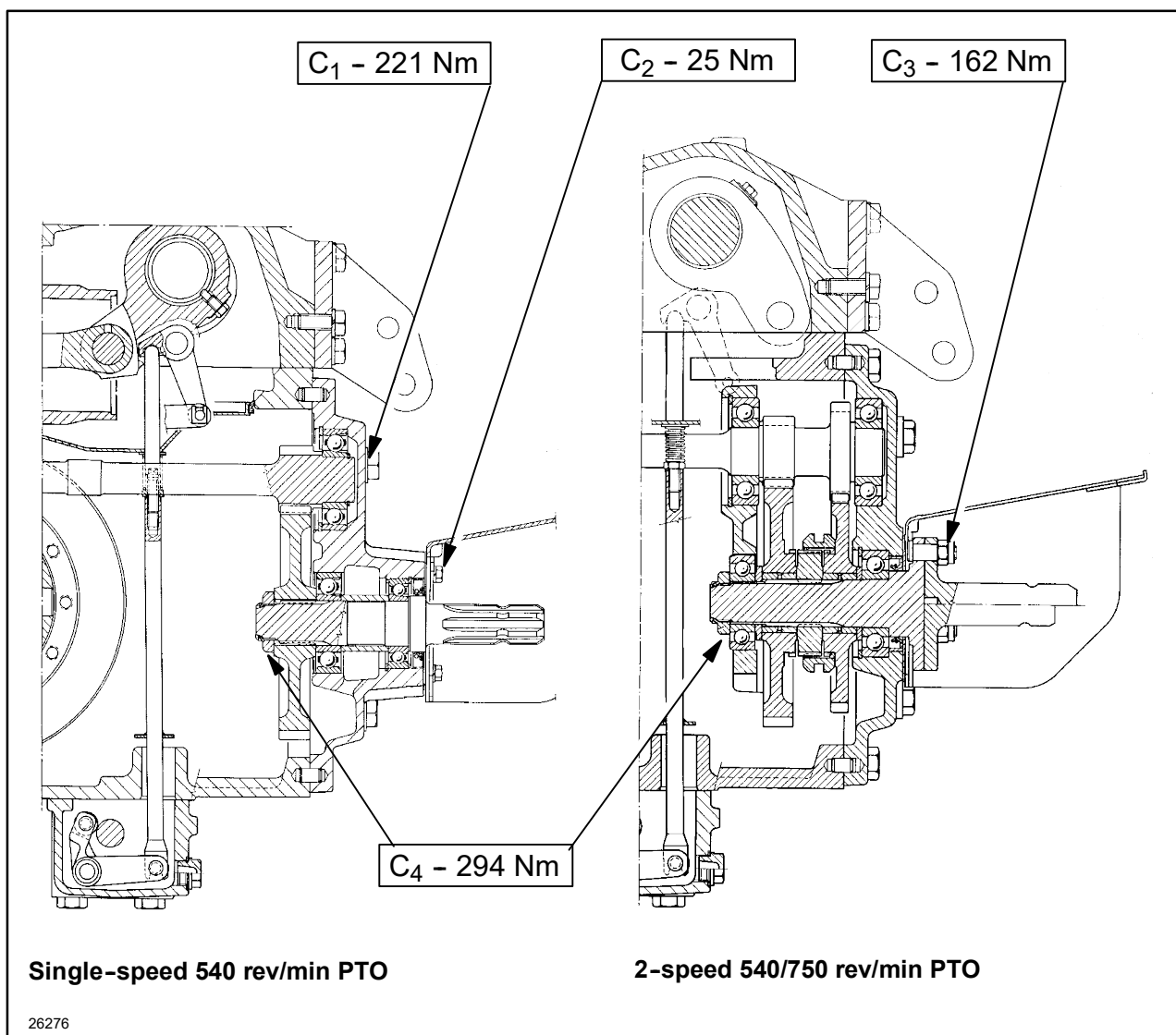
2

Sectional diagrams of single- and 2-speed PTO

- | | |
|--|--|
| a. Sectional diagram of single-speed PTO. | 13. Rear transmission support. |
| b. Sectional diagram of 2-speed PTO. | 14. Driven gear. |
| 1. 540 rev/min PTO cover. | 15, 27, 28, 16 and 5. Snap rings. |
| 2. 540/750 rev/min PTO cover. | 17. PTO guard retaining screws. |
| 3. PTO unit fixing screw. | 18. 540 rev/min PTO driven shaft |
| 4. Drive shaft bearings. | 19. Driven gear support bushings. |
| 6. Self-locking nut to secure splined shaft. | 20. Driven shaft lock nut. |
| 7. 540 rev/min splined shaft. | 21. Fixed gear. |
| 8. 750 rev/min splined shaft. | 22. Coupling sleeve. |
| 9. Seal. | 23. Driven gear for 750 rev/min speed. |
| 10. Driven shaft bearings. | 24. Driven gear for 540 rev/min speed. |
| 11. Cover locating pin. | 25. Double drive gear. |
| 12. Rear transmission casing. | 26. Drive gear. |

NOTE: When installing use sealing compound of the type shown on page 1 section 00 on surface X as shown above.

TORQUE SETTINGS



1

TORQUE SETTINGS

PART TO BE TORQUED	Thread	Torque setting	
		Nm	ft lb
PTO box fixing screws (C1, fig. 1)	M 16 x 1.5	221	163.0012
PTO guard fixing screws (C2, fig. 1)	M 8 x 1.25	25	18.439
Grooved endpiece self-locking nuts (2-speed PTO) (C3, fig. 1) .	M 12 x 1.25	162	119.485
Driven gear shaft locknut: (C4, fig. 1) for single- or 2-speed PTO	M 32 x 1.5	294	216.8432
Bearing support fixing screws (2- and 3-speed PTO) (C5, fig. 35)	M 12 x 1.25	98	72.281

MECHANICAL POWER TAKE-OFF

(continued)

		JX60 and JX70	JX80, JX90 and JX95
		as for single-speed PTO	
Ground speed PTO. Rear wheel speed with PTO shaft rotating at 540/750 rev/min (30 and 40 km/h versions)	wheel speed rev/min		
Ground speed PTO. Rear wheel speed with PTO shaft rotating at 1000 rev/min (30 km/h version)	wheel speed rev/min	14.1	15.2
Ground speed PTO. Rear wheel speed with PTO shaft rotating at 1000 rev/min (40 km/h 4WD version)	wheel speed rev/min	11.5	12.4
Diameter of PTO shaft at splined end:			
- 540 rev/min		1 ³ / ₈ in. (6-spline)	
- 750 rev/min		1 ³ / ₈ in. (6-spline)	
- 1000 rev/min		1 ³ / ₈ in. (21-spline)	
External diameter of driven gear support bushings	mm (in.)	49.925 - 49.950 (1.9655 - 1.9665)	
Internal diameter of driven gears	mm (in.)	50.050 - 50.089 (1.9705 - 1.9720)	
Clearance between driven gears	mm (in.)	0.100 - 0.164 (0.0039 - 0.0065)	
Diameter of driven shaft at front and centre bushings	mm (in.)	39.166 - 39.191 (1.5420 - 1.5429)	
Diameter of driven shaft at rear bushing	mm (in.)	34.984 - 35.000 (1.3773 - 1.3780)	
Internal diameter of front and centre bushing	mm (in.)	39.200 - 39.239 (1.5433 - 1.5448)	
Internal diameter of rear bushing	mm (in.)	35.009 - 35.048 (1.3783 - 1.3798)	
Clearance between shaft and front and centre bushings ..	mm (in.)	0.009 - 0.073 (0.0004 - 0.0029)	
Clearance between shaft and rear bushing	mm (in.)	0.009 - 0.064 (0.0004 - 0.0025)	

TOOLS

Important – The operations described in this section must be performed solely with the **ESSENTIAL** tools marked below with (X).

To work in complete safety and to ensure optimal technical results with a minimum of time and effort, they must however be supplemented with the specific tools recommended below and with those to be specially constructed by you and for which the construction diagrams are given in this manual.

380000227 Hook for lifting PTO

380001597 Guide pins for PTO unit

380000233 Installer for PTO driving shaft bearings

MECHANICAL POWER TAKE-OFF

(continued)

	JX60 and JX70	JX80, JX90 and JX95
2-speed 540/750 rev/min PTO (option - all models)		
Type	as for single-speed PTO	
Engagement and control	as for single-speed PTO	
Direction of rotation (viewed from rear of tractor)	as for single-speed PTO	
Speed selection	by means of hand lever located to rear RH side of driver's seat	
Engine speed with PTO shaft rotating at 540 rev/min rev/min	2200	
Engine speed with PTO shaft rotating at 750 rev/min rev/min	2382	
PTO speed with engine at maximum power speed (2500 rev/min):		
- for 540 rev/min PTO rev/min	614	
- for 750 rev/min PTO rev/min	787	
Ground speed PTO. Rear wheel speed with PTO shaft rotating at 540 rev/min (30 and 40 km/h versions) wheel speed rev/min	see 540 rev/min PTO	
Ground speed PTO. Rear wheel speed with PTO shaft rotating at 750 rev/min (30 km/h version) wheel speed rev/min	10.51	11.4
Ground speed PTO. Rear wheel speed with PTO shaft rotating at 750 rev/min (40 km/h 4WD version) wheel speed rev/min	8.59	9.36
Diameter of driven shaft at grooved terminal	1 ³ / ₈ in. (6-spline)	
2-speed 540/1000 rev/min PTO (option - all models)		
Type	as for single-speed PTO	
Engagement and control	as for single-speed PTO	
Direction of rotation (viewed from rear of tractor)	as for single-speed PTO	
Speed selection	by means of hand lever located on rear RH side of driver's seat	
Engine speed with PTO shaft rotating at 540 rev/min rev/min	2200	
Engine speed with PTO shaft rotating at 1000 rev/min rev/min	2380	
PTO speed with engine at maximum power (2500 rev/min):		
- for 540 rev/min PTO rev/min	614	
- for 1000 rev/min PTO rev/min	1050	

(continued overleaf)

SECTION 31 - POWER TAKE-OFF**Chapter 1 - Mechanical Power take-off****CONTENTS**

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**31 000 - MAIN SPECIFICATION - TORQUE SETTINGS - TOOLS - SECTIONAL DRAWINGS -
DESCRIPTION AND OPERATION - TROUBLESHOOTING**

MECHANICAL POWER TAKE-OFF

		JX60 and JX70	JX80, JX90 and JX95
540 rev/min PTO		{ 1) Independent of tractor travel speed or: 2) Synchronized with gearbox mechanical by means of hand levers located on RH and LH side of driver's seat (see page 9 and 10) clockwise	
Type (Independent and ground speed PTO)			
Engagement and control			
Direction of rotation (viewed from rear of tractor)			
Engine speed with PTO shaft rotating at 540 rev/min	rev/min	2200	
PTO speed with engine at maximum power (2500 rev/min)	rev/min	614	
Ground speed PTO. Rear wheel speed with PTO shaft rotating at 540 rev/min (30 km/h version)	wheel speed rev/min	8.2	8.9
Ground speed PTO. Rear wheel speed with PTO shaft rotating at 540 rev/min (4WD 40 km/h version)	wheel speed rev/min	6.73	7.25
Diameter of PTO shaft at position of bearings	mm (in.)	49.938 - 50.000 (1.9661 - 1.9685)	
Diameter of PTO shaft at splined end		1 ³ / ₈ in. (6-spline)	

(continued overleaf)