



# SERVICE MANUAL

FASTRAC (AGRICULTURAL TRACTOR)  
4160, 4190, 4220

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This manual contains original instructions, verified by the manufacturer (or their authorized representative).

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## Foreword

### The Operator's Manual

  
You and others can be killed or seriously injured if you operate or maintain the machine without first studying the Operator's Manual. You must understand and follow the instructions in the Operator's Manual. If you do not understand anything, ask your employer or JCB dealer to explain it.

Do not operate the machine without an Operator's Manual, or if there is anything on the machine you do not understand.

Treat the Operator's Manual as part of the machine. Keep it clean and in good condition. Replace the Operator's Manual immediately if it is lost, damaged or becomes unreadable.

### Contents

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## Introduction

The timing gears are located inside a case at the flywheel end of the engine.

The engine must be timed so that the camshaft operates the valves at the correct times relative to the crankshaft position.

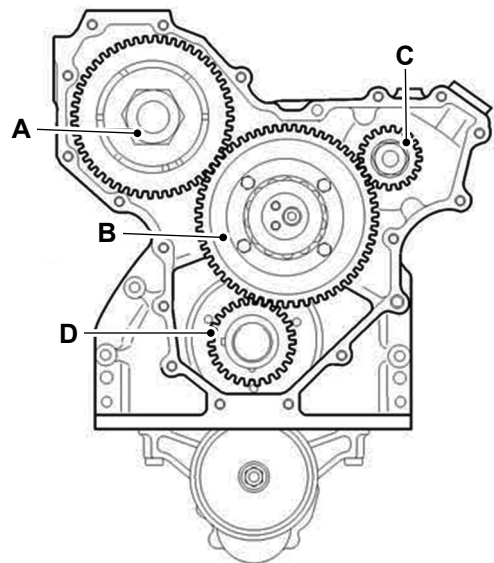
The timing gear drives the camshaft, high pressure pump and the oil pump. The timing gear train consists of hardened, helically cut gear wheels. The gears are housed by the timing gear case, which is installed to the front of the engine.

The idler gear is supported with a ball bearing on the shaft on the front face of the crankcase.

There are three main types of timing gear assemblies:

- Narrow without PTO (Power Take-Off)

**Figure 178. Narrow without PTO**

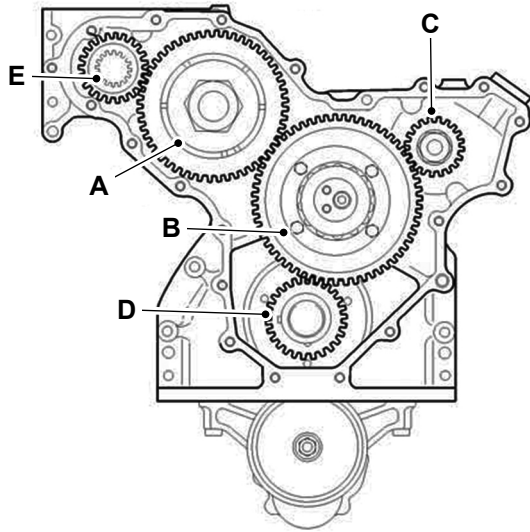


- A Camshaft gear
- B Idler gear
- C High pressure pump gear
- D Crankshaft gear

- Broad with light duty PTO

**Figure 179. Broad with Light Duty PTO**

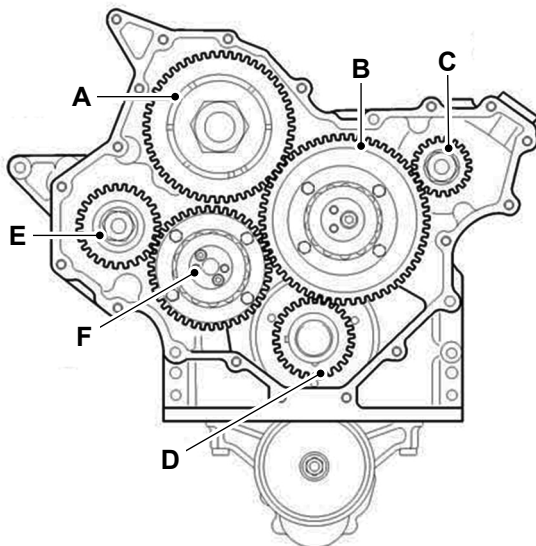
In engines with heavy duty PTO, hydraulic pump or compressor is driven through a small idler gear.



- A Camshaft gear
- B Idler gear
- C High pressure pump gear
- D Crankshaft gear
- E PTO gear

- Broad with heavy duty PTO

**Figure 180. Broad with Heavy Duty PTO**



- A Camshaft gear
- B Idler gear
- C High pressure pump gear
- D Crankshaft gear
- E PTO gear
- F Smaller idler gear

If the engine is equipped with light duty PTO, hydraulic pump is driven through a gear or a separate drive unit.

## Technical Data

Table 53. Timing Gear Data

Description	Data
Tooth backlash	0.05 –0.25 mm
Maximum permissible side wobble of gears	0.05 mm
Idle gear	Slide bearing and 50.7 mm shaft length

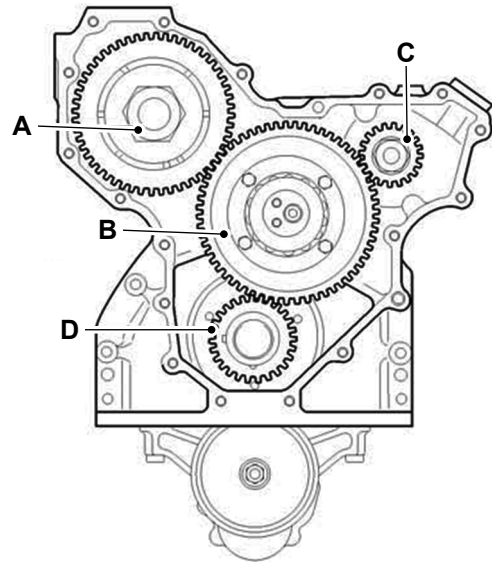
Table 54. Timing Marks

Description <sup>(1)</sup>	Data
On crankshaft gear	2 dots on tooth
On high pressure pump gear	1 dot on notch gear
On camshaft gear	1 dot on notch
On idler gear	
Against crankshaft gear mark	1 dot on tooth mark
Against camshaft gear mark	1 dot on tooth mark
Against high pressure pump mark	2 dots on notch pump mark

(1) Timing marks on the gears are in alignment when the 1st cylinder piston is at its TDC (Top Dead Centre) between compression and power strokes.

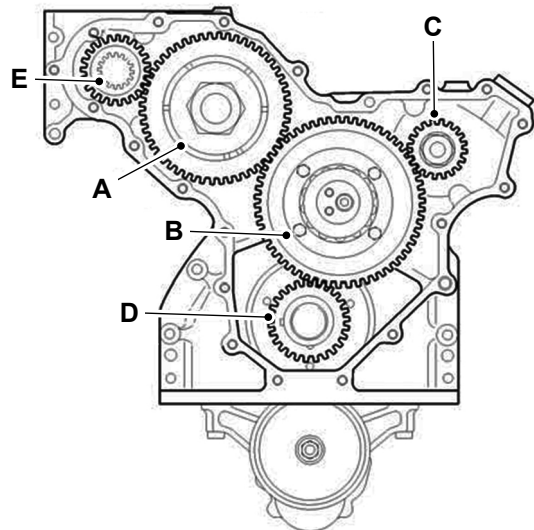
## Component Identification

Figure 181. Narrow without PTO



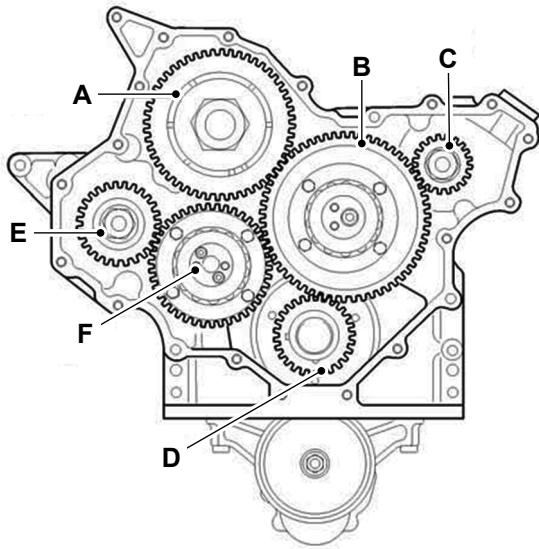
- A Camshaft gear
- B Idler gear
- C High pressure pump gear
- D Crankshaft gear

Figure 182. Broad with Light Duty PTO



- A Camshaft gear
- B Idler gear
- C High pressure pump gear
- D Crankshaft gear
- E PTO (Power Take-Off) gear

**Figure 183. Broad with Heavy Duty PTO**



- A** Camshaft gear
- B** Idler gear
- C** High pressure pump gear
- D** Crankshaft gear
- E** PTO gear
- F** Smaller idler gear

## Operation

All the gears are driven via the crankshaft gear as follows:

- Camshaft gear-The camshaft is driven at half crankshaft speed.
- High pressure fuel pump gear-The high pressure fuel pump is driven via the camshaft gear installed to the camshaft.
- Oil pump gear-The lubrication oil pump is driven directly by the crankshaft gear.
- Power Take-Off (PTO)-driven by the crankshaft gear via idler gear.
- Low Duty Power Take-Off (PTO) Gear (if installed)-driven by the camshaft gear.

## Timing

The engine must be 'timed' so that the camshaft operates the valves at the correct times relative to the crankshaft position.

Valve timing is achieved by ensuring that the camshaft drive gear is meshed to the crankshaft gear at their correct angular positions. [Refer to: PIL 15-00-00.](#)

## Remove and Install

For removal and installation procedure of the timing gear. Refer to: [PIL 15-51-21](#).

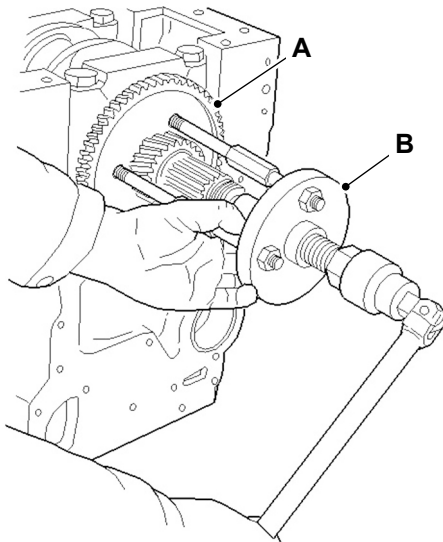
## 03 - Crankshaft Gear

### Remove and Install

#### Remove

1. Get access to the crankshaft gear.
2. Apply the special puller (AGCO Part number 9052 48800) to the crankshaft gears.

**Figure 184.**



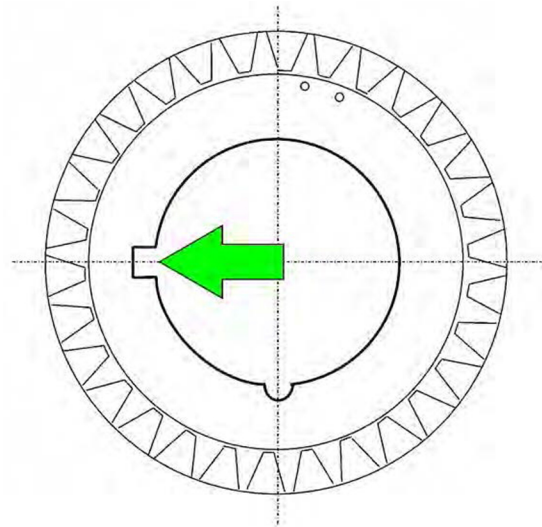
- A** Crankshaft gear
- B** Puller (AGCO Part number 9052 48800)

3. Pull off the crankshaft gears (x2).
4. Do not damage the crankshaft.
5. Clean the seat on the crankshaft with a wire brush.

#### Install

1. Heat the new gears to specified temperature.  
 Temperature: 220 –250 °C ( 427.7 –481.6 °F)
2. Assemble the crankshaft gears onto the crankshaft.
3. Make a note of the position of the key. Refer to Figure 185.
4. Make sure that the aligning marks on the front gear are visible.
5. Set the crankshaft key into the angular key slot.

**Figure 185.**



6. Allow the gears to cool.



## **06 - Camshaft Gear**

### **Remove and Install**

Refer to Camshaft- Remove and Install. [Refer to: PIL 15-15-00.](#)



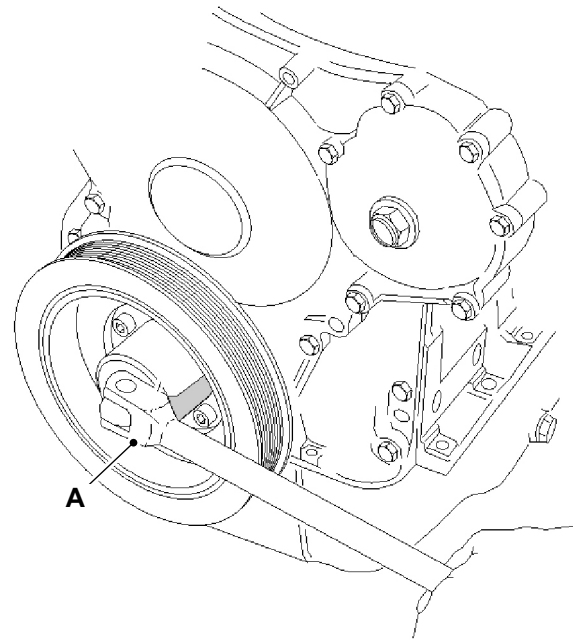
## 21 - Front Case

### Remove and Install

#### Remove

1. Make the machine safe.  
 Refer to: [PIL 01-03-27](#).
2. Drain the engine oil.  
 Refer to: [PIL 15-21-00](#).
3. Remove the oil sump.  
 Refer to: [PIL 15-45-00](#).
4. Remove the radiator.  
 Refer to: [PIL 21-03-00](#).
5. Remove the cooling fan.
6. Remove the alternator.  
 Refer to: [PIL 15-72-00](#).
7. Remove the belt tensioner and the belt.
8. If installed, remove the HVAC (Heating Ventilation Air Conditioning) unit.  
 Refer to: [PIL 12-03-00](#).
9. Remove the coolant pump.  
 Refer to: [PIL 21-09-00](#).
10. Remove the crankshaft belt pulley and the vibration damper.
11. Loosen the crankshaft nut by two turns with the specified spanner (AGCO Part number 9024 55800).

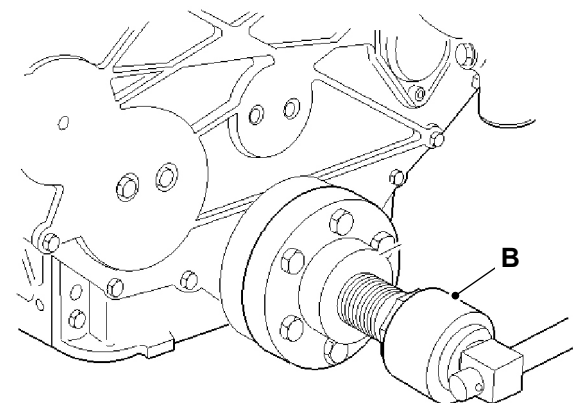
**Figure 186.**



**A** Spanner (AGCO Part number 9024 55800)

12. Remove the hub from the crankshaft with the specified puller (AGCO Part number 9201 82390).
  - 12.1. Do not remove the nut completely at this stage. The hub can be thrown dangerously when the nut is loosened.

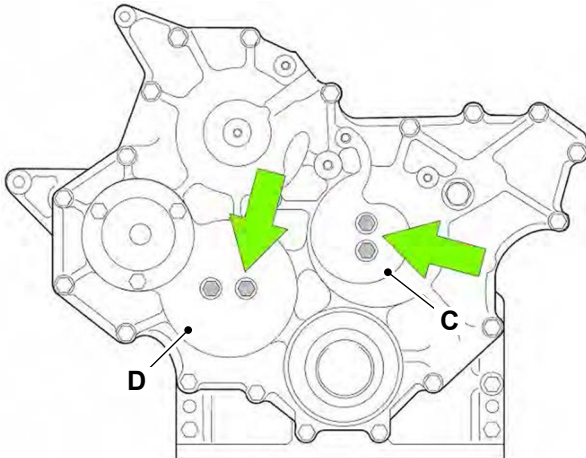
**Figure 187.**



**B** Puller (AGCO Part number 9201 82390)

13. Remove the camshaft speed sensor, hydraulic pump drive unit lubrication pipe and the drive unit.
14. Remove the front cover.
15. Make a note that the screws on the idler gear shaft and the screws on the broad timing gear are similar. Do not interchange them.

**Figure 188.**



- C** Idler gear shaft
- D** Broad timing gear

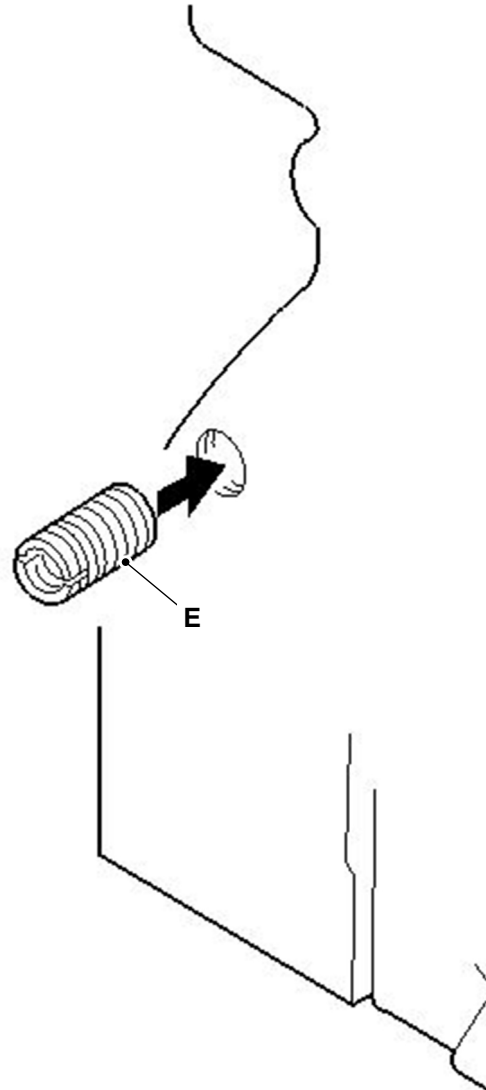
16. If necessary, remove the oil deflector ring from the front end of the crankshaft.
17. If necessary, remove the HP (High Pressure) pump.
  - 17.1. If you do not remove the HP pump, disconnect all electrical harnesses and the pipes from the HP pump.
18. Remove the idler gear screw.
19. Remove the idler gear.
20. Remove the small idler gear.
21. Remove the camshaft.
22. If the cylinder head and the rocker assembly is not removed, prevent the tappets from falling down.
  - Refer to: [PIL 15-15-00](#).
23. Remove the screws from the timing gear case.
24. Remove the timing gear case.
  - Refer to: [PIL 15-51-21](#).
25. Remove the crankshaft front sealing ring from the front case.
26. Make a note that the oil deflector ring is behind the sealing ring.

**Install**

1. Clean all the parts thoroughly.
2. Apply specified sealant (AGCO Part number 8366 62735) on the timing gear case sealing surfaces.

3. Install the timing gear case against the crankcase.
4. Install the tension pins with the specified drift (AGCO Part number 9025 98700).

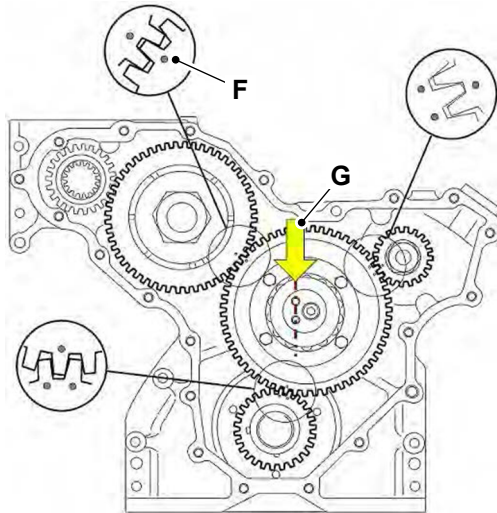
**Figure 189.**



- E** Tension pin

5. Tighten the nuts and the bolts.
6. Lubricate the camshaft bearings and insert the camshaft into the crankcase.
7. Release the push rods and the tappets.
8. Install the idler gear stud.
9. Make sure that the timing marks are in the correct position.

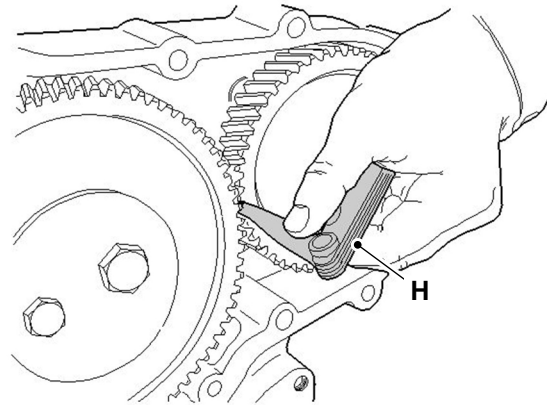
**Figure 190.**



- F** Timing marks
- G** Front cover screw holes

10. Rotate the idler gear shaft so that the front cover screw holes are vertically aligned.
11. Install the bolts and the washers.
12. Tighten the bolts to the correct torque value.  
Torque: 180 N·m
13. Install the small idler gear.
14. Apply the locking compound on the screws.
15. Tighten the screw to the correct torque value.  
Torque: 45 N·m
16. Install the HP pump and the gear wheel.
17. Make sure that the timing marks are in the correct position.
18. Tighten the camshaft and the HP pump gear nut.
19. Check the tooth backlash.
  - 19.1. Make sure that the backlash is as specified.  
Dimension: 0.05 –0.25 mm

**Figure 191.**

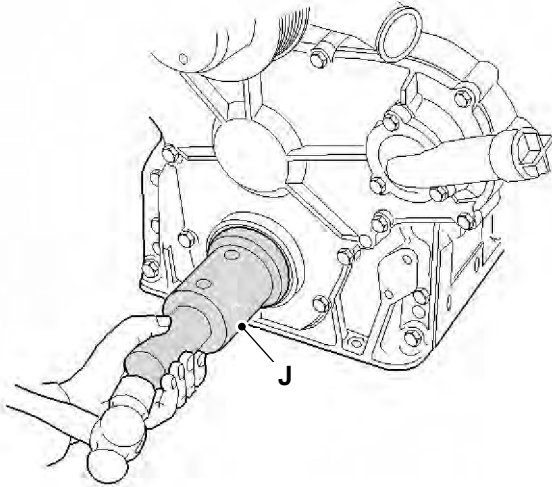


**H** Feeler gauge

20. If removed, install the oil deflector ring on the front of the crankshaft.
21. Install the front cover.
22. Install the drive unit cover and the shaft to the front cover.
23. Apply the specified sealant (AGCO Part number 8366 62735) on the timing gear case.
24. Install the timing gear case front cover.
25. Install the tension pin in its place.
26. Make a note that the sealing ring is under the idler gear screws.
27. Install the drive unit rear bearing and the adaptor plate.
28. Install the nuts and the bolts.
29. Install the protective plate into the seal location.
30. Install the crankshaft front seal with a suitable drift (AGCO Part number 9103 94600).

**Figure 192.**

Refer to: [PIL 15-21-00.](#)



**J** Drift (AGCO Part number 9103 94600)

31. Check the condition of the conical surfaces on the crankshaft and the hub.
32. Lubricate the seals and the sealing surface.
33. Lubricate the hub nut thread, rear surface and the outer surface with Vaseline.
  - 33.1. Do not use oil, it may run into the conical surfaces.
34. Install the crankshaft hub.
35. Install the hub nut onto the crankshaft thread.
36. Tighten the hub nut the correct torque value.  
 Torque:  $1,000 \pm 100 \text{ N}\cdot\text{m}$
37. Install the crankshaft belt pulley and the vibration damper.
38. Install the coolant pump.  
[Refer to: PIL 21-09-00.](#)
39. If removed, install the HVAC unit.  
[Refer to: PIL 12-03-00.](#)
40. Install the belt tensioner and the belt.
41. Install the alternator.  
[Refer to: PIL 15-72-00.](#)
42. Install the cooling fan.
43. Install the radiator.  
[Refer to: PIL 21-03-00.](#)
44. Install the oil sump.  
[Refer to: PIL 15-45-00.](#)
45. Fill the engine oil to the correct level.

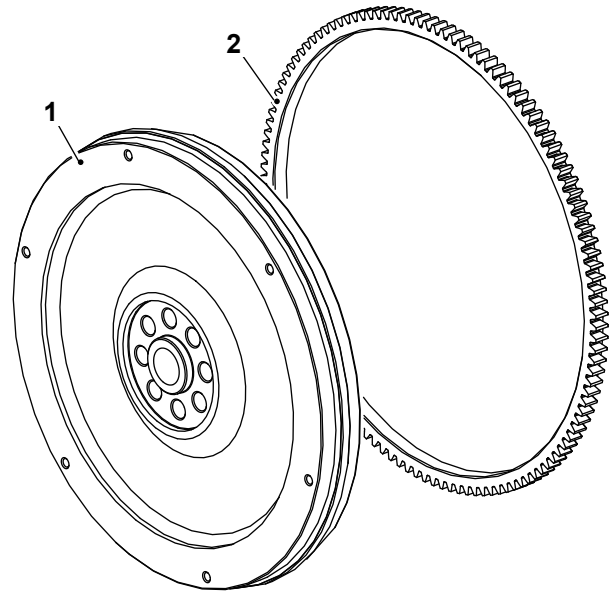
## Technical Data

Table 55. Flywheel Data

Description	Data
Interference fit between ring gear and flywheel	0.425 –0.6 mm
Before installation of the ring gear, heat up to a temperature of	150 –200 °C ( 301.8 – 391.7 °F)
Flywheel unbalance	Maximum 1.0 Ncm
Maximum permissible axial wobble of flywheel clutch face, measured at inner edge of the clutch face on diameter 200 mm	0.06 mm

## Component Identification

Figure 193.



- 1 Flywheel
- 2 Flywheel gear ring

## Remove and Install

### Remove

1. Make the machine safe.  
[Refer to: PIL 01-03-27.](#)
2. Make sure that the engine is safe to work on. If the engine has been running, let it cool before you start the service work.
3. Get access to the flywheel.
4. Remove the bolts and withdraw the flywheel from the crankshaft hub.

### Install

1. The installation procedure is the opposite of the removal procedure. Additionally do the following step.
2. Clean the contact surfaces on the crankshaft rear flange and on the flywheel.
3. Use suitable studs as a guide when you install the flywheel on the crankshaft rear flange.
4. Tighten the bolts to the correct torque value.  
Torque: 150 N·m

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