

03 - Engine

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MASSEY FERGUSON

Massey Ferguson 6400

3A10 - PERKINS ENGINE - General

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A . Introduction

This section only provides general information about Perkins engines used in the 6400 range.

B . Specifications and standards concerning fuel, oil and coolant

The engines used for the 6400 range comply with emissions standards imposed by the authorities (EU97/68/EC Stage 2 and EPA 40 CFR 89 Tier 2).

The quality of fluids used in these engines, as well as the servicing schedule, must be respected in order to keep pollution emission levels low and to maintain the tractor's performance throughout its service life.

Fuel quality

The fuel must comply with standard DIN EN 590 and with the following specifications:

density (at 15°C): 0.82 to 0.84 Kg/dm³

viscosity (at 40°C): 2 to 4.5 mm²/sec Cetane Index: min 51 sulphur content: max 0.005 p-% water content: max 200 mg/kg

Oil quality

The oil used must comply with the API CH-4 standard.

Coolant quality

The coolant used must comply with the ASTM D 3306 standard. It must consist of pure water and ethylene/propylene glycol type antifreeze in the following proportions:

- 40-60% water
- 40-60% antifreeze

The ideal ratio is around 50% water to 50% antifreeze.

C . Main characteristics

Model	6445
Engine type	Perkins 1104C-44T
Perkins engine list number	RG 37832
Number of cylinders	4
Bore	105
Stroke	127
Cubic capacity	4.4
Compression ratio	18.2/1
Compression pressure (kPa)	2000/3500
Allowable compression deviation between cylinders (kPa)	350
Output at 2200 rpm (kw) ISO	90 (67)
Maximum torque (Nm)	380
at speed (rpm)	1400
Idle speed	950
Nominal speed	2200
Maximum speed at no load	2354
Injection pump	
Brand and type	Lucas Delphi DB210
Rotation	Clockwise
Static timing angle (degrees)	4°
Engine position	TDC
Engine check angle (degrees)	Standard
Pump check angle (degrees)	Standard
Firing order	1, 3, 4, 2
Injectors	
Brand	Bosch
Injector-port	Bosch
New and servicing setting (bar)	275
Suction system	Turbo + Waste Gate
Туре	Garrett GT25
Valve spring	Single
Valve seat insert (inlet/exhaust)	Yes
Valve angle	0.30°/0.30°
Inlet/exhaust valve tip clearance (mm)	0.20/0.45
Oil cooler	Yes
Number of thermostats	1
Opening temperature (start/full)	83°C/93°C
Fan	Viscostatic
Piston cooling nozzle	Yes
Oil filter	1
Fuel filter	1

Model	6455
Engine type	Perkins 1104C-44T
Perkins engine list number	RG 37826
Number of cylinders	4
Bore	105
Stroke	127
Cubic capacity	4.4
Compression ratio	18.2/1
Compression pressure (kPa)	2000/3500
Allowable compression deviation between cylinders (kPa)	350
Output at 2200 rpm (kw) ISO	100 (74.5)
Maximum torque (Nm)	415
at speed (rpm)	1400
Idle speed	950
Nominal speed	2200
Maximum speed at no load	2354
Injection pump	
Brand and type	Lucas Delphi DB210
Rotation	Clockwise
Static timing angle (degrees)	4°
Engine position	TDC
Engine check angle (degrees)	Standard
Pump check angle (degrees)	Standard
Firing order	1, 3, 4, 2
Injectors	
Brand	Bosch
Injector-port	Bosch
New and servicing setting (bar)	275
Suction system	Turbo + Waste Gate
Туре	Garrett GT25
Valve spring	Single
Valve seat insert (inlet/exhaust)	Yes
Valve angle	0.30°/0.30°
Inlet/exhaust valve tip clearance (mm)	0.20/0.45
Oil cooler	Yes
Number of thermostats	1
Opening temperature (start/full)	83°C/93°C
l-an	Viscostatic
Piston cooling nozzle	Yes
	1
Fuel filter	1

PERKINS ENGINE - General

Model		6460
Engine type		Perkins 1104C-E44TA
Perkins engine list number		43942
Number of cylinders		4
Bore		105
Stroke		127
Cubic capacity		4.4
Compression ratio		18.2/1
Compression pressure (kPa)		2000/3500
Allowable compression deviation between cylinders (kPa)	350
Output at 2200 rpm (kw) ISO	without power	112 (83.5)
	boost	
	with power boost	120 (90)
Maximum torque (Nm)		471
at speed (rpm)		1400
Idle speed		950
Nominal speed		2200
Maximum speed at no load		2354
Injection pump		
Brand and type		Lucas Delphi DB210
Rotation		Clockwise
Static timing angle (degrees)		4°
Engine position		TDC
Engine check angle (degrees)		Standard
Pump check angle (degrees)		Standard
Firing order		1, 3, 4, 2
Injectors		
Brand		Bosch
Injector-port		Bosch
New and servicing setting (bar)		275
Suction system		Turbo + Waste Gate + Intercooler
		air/air
Туре		Garrett GT25
Valve spring		Single
Valve seat insert (inlet/exhaust)		Yes
Valve angle		0.30°/0.30°
Inlet/exhaust valve tip clearance (mm)		0.20/0.45
Oil cooler		Yes
Number of thermostats		1
Opening temperature (start/full)		83°C/93°C
Fan		Viscostatic
Piston cooling nozzle		Yes
Oil filter		1
Fuel filter		1

Model		6470
Engine type		Perkins 1104C-E44TA
Perkins engine list number		43943
Number of cylinders		4
Bore		105
Stroke		127
Cubic capacity		4.4
Compression ratio		18.2/1
Compression pressure (kPa)		2000/3500
Allowable compression deviation between cylinders (kPa)	350
Output at 2200 rpm (kw) ISO	without power	119 (89)
	boost	
	with power boost	127 (95)
Maximum torque (Nm)		491
at speed (rpm)		1400
Idle speed		950
Nominal speed		2200
Maximum speed at no load		2354
Injection pump		
Brand and type		Lucas Delphi DB210
Rotation		Clockwise
Static timing angle (degrees)		4°
Engine position		TDC
Engine check angle (degrees)		Standard
Pump check angle (degrees)		Standard
Firing order		1, 3, 4, 2
Injectors		
Brand		Bosch
Injector-port		Bosch
New and servicing setting (bar)		275
Suction system		Turbo + Waste Gate + Intercooler
		air/air
Туре		Garrett GT25
Valve spring		Single
Valve seat insert (inlet/exhaust)		Yes
Valve angle		0.30°/0.30°
Inlet/exhaust valve tip clearance (mm)		0.20/0.45
Oil cooler		Yes
Number of thermostats		1
Opening temperature (start/full)		83°C/93°C
Fan		Viscostatic
Piston cooling nozzle		Yes
Oil filter		1
Fuel filter		1

PERKINS ENGINE - General

Model		6465	
Engine type		Perkins 1106C-E60TA	
Perkins engine list number		VK 31483	
Number of cylinders		6	
Bore		100	
Stroke		127	
Cubic capacity		6	
Compression ratio		17.25/1	
Compression pressure (kPa)		2000/3500	
Allowable compression deviation between cylinders (kPa	a)	350	
Output at 2200 rpm (kw) ISO	without power	117 (87)	
	boost		
	with power boost	126 (94)	
Maximum torque (Nm)		500	
at speed (rpm)		1400	
Idle speed		950	
Nominal speed		2200	
Maximum speed at no load		2354	
Injection pump			
Brand and type		Bosch VP 30	
Rotation		Clockwise	
Static timing angle (degrees)		4°	
Engine position		TDC	
Engine check angle (degrees)		Standard	
Pump check angle (degrees)		Standard	
Firing order		1, 5, 3, 6, 2, 4	
Injectors			
Brand		Bosch	
Injector-port		Bosch	
New and servicing setting (bar)		275	
Suction system		Turbocharger—air/air Intercooler	
Туре		Garrett GT35	
Valve spring		Single	
Valve seat insert (inlet/exhaust)		Yes	
Valve angle		0.46°/0.31°	
Inlet/exhaust valve tip clearance (mm)		0.20/0.45	
Oil cooler		Yes	
Number of thermostats		1	
Opening temperature (start/full)		83°C/93°C	
Fan		Viscostatic/Vistronic	
Piston cooling nozzle		Yes	
Oil filter		2	
Fuel filter		1	

Model		6475
Engine type		Perkins 1106C-E60TA
Perkins engine list number		VK 31484
Number of cylinders		6
Bore		100
Stroke		127
Cubic capacity		6
Compression ratio		17.25/1
Compression pressure (kPa)		2000/3500
Allowable compression deviation between cylinders (kPa	a)	350
Output at 2200 rpm (kw) ISO	without power	132 (98.5)
	boost	
	with power boost	142 (106)
Maximum torque (Nm)		565
at speed (rpm)		1400
Idle speed		950
Nominal speed		2200
Maximum speed at no load		2354
Injection pump		
Brand and type		Bosch VP 30
Rotation		Clockwise
Static timing angle (degrees)		4°
Engine position		TDC
Engine check angle (degrees)		Standard
Pump check angle (degrees)		Standard
Firing order		1, 5, 3, 6, 2, 4
Injectors		
Brand		Bosch
Injector-port		Bosch
New and servicing setting (bar)		275
Suction system		Turbocharger—air/air Intercooler
Туре		Garrett GT35
Valve spring		Single
Valve seat insert (inlet/exhaust)		Yes
Valve angle		0.46°/0.31°
Inlet/exhaust valve tip clearance (mm)		0.20/0.45
Oil cooler		Yes
Number of thermostats		1
Opening temperature (start/full)		83°C/93°C
Fan		Viscostatic/Vistronic
Piston cooling nozzle		Yes
Oil filter		2
Fuel filter		1

PERKINS ENGINE - General

Model		6480	
Engine type		Perkins 1106C-E60TA	
Perkins engine list number		VK 31485	
Number of cylinders		6	
Bore		100	
Stroke		127	
Cubic capacity		6	
Compression ratio		17.25/1	
Compression pressure (kPa)		2000/3500	
Allowable compression deviation between cylinders (kPa)	350	
Output at 2200 rpm (kw) ISO	without power	142 (106)	
	boost		
	with power boost	153 (114)	
Maximum torque (Nm)		590	
at speed (rpm)		1400	
Idle speed		950	
Nominal speed		2200	
Maximum speed at no load		2354	
Injection pump			
Brand and type		Bosch VP 30	
Rotation		Clockwise	
Static timing angle (degrees)		4°	
Engine position		TDC	
Engine check angle (degrees)		Standard	
Pump check angle (degrees)		Standard	
Firing order		1, 5, 3, 6, 2, 4	
Injectors			
Brand		Bosch	
Injector-port		Bosch	
New and servicing setting (bar)		275	
Suction system		Turbocharger—air/air Intercooler	
Туре		Garrett GT35	
Valve spring		Single	
Valve seat insert (inlet/exhaust)		Yes	
Valve angle		0.46°/0.31°	
Inlet/exhaust valve tip clearance (mm)		0.20/0.45	
Oil cooler		Yes	
Number of thermostats		1	
Opening temperature (start/full)		83°C/93°C	
Fan		Viscostatic/Vistronic	
Piston cooling nozzle		Yes	
Oil filter		2	
Fuel filter		1	

3B10- SISU ENGINE - General

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A . Introduction

This section only provides general information about Sisu engines used in the 6400 range.

B . Specifications and standards concerning fuel, oil and coolant

The engines used for the 6400 range comply with emission standards imposed by the authorities (EU97/68/EC Stage 2 and EPA 40 CFR 89 Tier 2).

The quality of fluids used in these engines, as well as the servicing schedule, must be respected in order to keep pollution emission levels low and to maintain the tractor's performance throughout its service life.

Fuel quality:

The fuel must comply with standard DIN EN 590 and with the following specifications:

Density (at 15°C): 0.82 to 0.84 Kg/dm³

Viscosity (at 40°C): 2 to 4.5 mm²/sec Cetane Index: min 51 Sulphur content: max 0.005 p-% Water content: max 200 mg/Kg

Oil quality:

The oil used must comply with the API CH-4 standard.

Coolant quality:

The coolant used must comply with the ASTM D 3306 standard. It must consist of pure water and ethylene/propylene glycol type antifreeze in the following proportions:

- 40-60% water
- 40-60% antifreeze

The ideal ratio is 50% water to 50% antifreeze.

C . Main characteristics

Model		6485	
Engine type		SISU 66 ETA	
Number of cylinders		6	
Bore		108	
Stroke		120	
Cubic Capacity		6.6	
Compression ratio		17.25/1	
Output at 2200 rpm (kw) ISO	without power	152 (113)	
	boost		
	with power boost	161 (120)	
Maximum torque (Nm)		650	
at speed (rpm)		1400	
Idle speed		950	
Nominal speed		2200	
Maximum speed at no load		2354	
Injection pump			
Brand and type		Bosch VP 30	
Rotation		Clockwise	
Static timing angle (degrees)		8°	
Engine position		TDC	
Engine check angle (degrees)		Standard	
Pump check angle (degrees)		Standard	
Firing order		1, 5, 3, 6, 2, 4	
Injectors			
Brand		Bosch	
Injector-port		Bosch	
Nozzle		five ports	
New and servicing setting (bar)		278	
Suction system		Turbocharger—air/air Intercooler	
Valve spring		Single	
Valve seat insert (inlet/exhaust)		Yes	
Inlet/exhaust valve tip clearance (mm)		0.35/0.35	
Oil cooler		Yes	
Number of thermostats		1	
Opening temperature (start/full)		79°C/83°C	
Fan		Viscostatic/Vistronic	
Piston cooling nozzle		Yes	
Oil filter		1	
Fuel filter		2	

Model		6490
Engine type		SISU 66 ETA
Number of cylinders		6
Bore		108
Stroke		120
Cubic capacity		6.6
Compression ratio		17.25/1
Output at 2200 rpm (kw) ISO	without power	168 (125)
	boost	
	with power boost	177 (132)
Maximum torque (Nm)		720
at speed (rpm)		1400
Idle speed		950
Nominal speed		2200
Maximum speed at no load		2354
Injection pump		
Brand and type		Bosch VP 30
Rotation		Clockwise
Static timing angle (degrees)		8°
Engine position		TDC
Engine check angle (degrees)		Standard
Pump check angle (degrees)		Standard
Firing order		1, 5, 3, 6, 2, 4
Injectors		
Brand		Bosch
Injector-port		Bosch
Nozzle		five ports
New and servicing setting (bar)		278
Suction system		Turbocharger—air/air Intercooler
Valve spring		Single
Valve seat insert (inlet/exhaust)		Yes
Inlet/exhaust valve tip clearance (mm)		0.35/0.35
Oil cooler		Yes
Number of thermostats		1
Opening temperature (start/full)		79°C/83°C
Fan		Viscostatic/Vistronic
Piston cooling nozzle		Yes
Oil filter		1
Fuel filter		2

SISU ENGINE - General

Model		6495	
Engine type		SISU 66 ETA	
Number of cylinders		6	
Bore		108	
Stroke		120	
Cubic capacity		6.6	
Compression ratio		17.25/1	
Output at 2200 rpm (kw) ISO	without power	184 (137)	
	boost		
	with power boost	192 (143)	
Maximum torque (Nm)		780	
at speed (rpm)		1400	
Idle speed		950	
Nominal speed		2200	
Maximum speed at no load		2354	
Injection pump			
Brand and type		Bosch VP 30	
Rotation		Clockwise	
Static timing angle (degrees)		8°	
Engine position		TDC	
Engine check angle (degrees)		Standard	
Pump check angle (degrees)		Standard	
Firing order		1, 5, 3, 6, 2, 4	
Injectors			
Brand		Bosch	
Injector-port		Bosch	
Nozzle		five ports	
New and servicing setting (bar)		278	
Suction system		Turbocharger—air/air Intercooler	
Valve spring		Single	
Valve seat insert (inlet/exhaust)		Yes	
Inlet/exhaust valve tip clearance (mm)		0.35/0.35	
Oil cooler		Yes	
Number of thermostats		1	
Opening temperature (start/full)		79°C/83°C	
Fan		Viscostatic/Vistronic	
Piston cooling nozzle		Yes	
Oil filter		1	
Fuel filter		2	

Model		6497
Engine type		SISU 66 ETA
Number of cylinders		6
Bore		108
Stroke		120
Cubic capacity		6.6
Compression ratio		17.25/1
Output at 2200 rpm (kw) ISO	without power	184 (137)
	boost	
	with power boost	192 (143)
Maximum torque (Nm)		780
at speed (rpm)		1400
Idle speed		950
Nominal speed		2200
Maximum speed at no load		2354
Injection pump		
Brand and type		Bosch VP 30
Rotation		Clockwise
Static timing angle (degrees)		8°
Engine position		TDC
Engine check angle (degrees)		Standard
Pump check angle (degrees)		Standard
Firing order		1, 5, 3, 6, 2, 4
Injectors		
Brand		Bosch
Injector-port		Bosch
Nozzle		five ports
New and servicing setting (bar)		278
Suction system		Turbocharger—air/air Intercooler
Valve spring		Single
Valve seat insert (inlet/exhaust)		Yes
Inlet/exhaust valve tip clearance (mm)		0.35/0.35
Oil cooler		Yes
Number of thermostats		1
Opening temperature (start/full)		79°C/83°C
Fan		Viscostatic/Vistronic
Piston cooling nozzle		Yes
Oil filter		1
Fuel filter		2

SISU ENGINE - General

Model		6499
Engine type		SISU 74 ETA
Number of cylinders		6
Bore		108
Stroke		134
Cubic capacity		7.4
Compression ratio		17.5/1
Output at 2200 rpm (kw) ISO	without power	200 (155)
	boost	
	with power boost	220 (166)
Maximum torque (Nm)		864
at speed (rpm)		1400
Idle speed		950
Nominal speed		2200
Maximum speed at no load		2354
Injection pump		
Brand and type		Bosch VP44
Rotation		Clockwise
Static timing angle (degrees)		8°
Engine position		TDC
Engine check angle (degrees)		Standard
Pump check angle (degrees)		Standard
Firing order		1, 5, 3, 6, 2, 4
Injectors		
Brand		Bosch
Injector-port		Bosch
Nozzle		five ports
New and servicing setting (bar)		278
Suction system		Turbocharger—air/air Intercooler
Valve spring		Single
Valve seat insert (inlet/exhaust)		Yes
Inlet/exhaust valve tip clearance (mm)		0.35/0.35
Oil cooler		Yes
Number of thermostats		1
Opening temperature (start/full)		79°C/83°C
Fan		Viscostatic/Vistronic
Piston cooling nozzle		Yes
Oil filter		1
Fuel filter		2

SISU ENGINE - Spacer

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A . General

The spacer (1) (Fig. 1) is an important part of the chassis. It links the engine and the gearbox but also supports:

- the 4 WD shaft bearing (if fitted);
- the right- and left-hand cab supports

The top profile can support a 6-cylinder SISU engine. At the front, a cover closes the gearbox housing.



B . Removing - refitting the cover and replacing the lip seal

Preliminary operations

- **1.** Disassemble the tractor between the engine and the gearbox (see chapter 2).
- **2.** Drain the oil from the gearbox.

Removing the cover

- Position the protector 3378012M2 (see § D) on the mainshaft (1) (Fig. 2).
- **4.** Remove the screws (1) (2) (Fig. 3) marking their dimensions and positions.
- 5. Take off cover (4).

Nota: To remove, take out the cover and hold it in place using the tapped T holes and two locally made V screws of sufficient length (Fig. 4).

- 6. If necessary, discard (Fig. 5):
 - the O'ring (3);
 - the lip seal (1).







SISU ENGINE - Spacer

Replacing the lip seal

Extraction

7. Drive the seal (1) (Fig. 5) off the cover (4).

Assembly

- **8.** Thoroughly clean any dirt from the point where the seal meets the cover.
- 9. Lubricate the rim of the new seal (1) (Fig. 6).
- **10.** Use an improvised fitting drift slightly smaller than the outside diameter of the seal to fit the seal up against the cover.
- **11.** Grease the lip and rear cavity of the seal.

Refitting the cover

- **12.** Clean and visually check all components. Replace any defective parts.
- **13.** Lubricate and fit a new O'ring (3) (Fig. 5).
- **14.** On the shaft, position the protector used at disassembly.
- **15.** Check the presence (Fig. 7):
 - of locating pins (1) on the spacer;
 - of the shim (s) (2) used to shim the clutch, on the pump cover.
- **16.** If the cover had to be replaced, check or even redo the shimming of the PowerShuttle forward clutch (see chapter 5).







SISU ENGINE - Spacer

- **17.** Smear the rim of the tapped holes with Loctite 5206 or equivalent (Fig. 8).
- **18.** Screw two diametrically opposed guide studs on to the spacer.

Refit the cover (4), with the D finger in the slot of the pump body (Fig. 9).

- **19.** Refit the screws (1) (2) in their respective positions (Fig. 10). Tighten to a torque of 36 46 Nm.
- 20. Remove the 3378012M2 protector.

Final operations

- **21.** Top up the oil level in the housings. Check it using the sight glass located at the rear left-hand side of the rear axle.
- **22.** Assemble the tractor between the engine and the gearbox (see chapter 2).
- 23. Check:
 - tightness of the mating face,
 - correct operation of the Power Shuttle.







C . Removing - refitting the spacer

Preliminary operations

- 24. Disassemble the tractor between the engine and the gearbox (see chapter 2).If necessary, move apart the gearbox chassis reinforcements.
- **25.** Drain the oil from the gearbox and centre housing.
- **26.** If necessary and depending on the case, move the fuel tank apart from the gearbox, or remove it after draining.

Servicing on the cab

- **27.** Split the cab from the supports on the front rightand left-hand sides (all cab versions - see chapter 12).
- **28.** Using two straps fitted to the lateral handles, gently lift the front of the cab, while watching the rear suspension (if fitted see chapter 12).

Servicing on the right-hand side of the tractor

- **29.** Remove the cab/battery support fitted to the spacer.
- **30.** Remove (Fig. 11):
 - the flange and the lubricating pipe (1) connected to the rear axle;
 - the supply pipe (17 bar) and union (2) coming from the control unit.

Servicing on the left-hand side of the tractor

31. Remove the front fuel tank support.

Remove the cab support connected to the spacer. *IMPORTANT:* After removing the supports, position two suitable stands at the front and at each side of the cab.



Removing the spacer

- 32. Remove cover (4) (see § B).
- **33.** Remove the pipes (Fig. 12):
- 17 bar (1) low pressure;
 - lubrication (2);
 - diagnostics connector (3).
- **34.** Remove the screws and nuts fixing the spacer to the gearbox (Fig. 13). Mark their length and position.

Dimensions of the screws, studs and nuts

Screw	Nuts	Studs
M12 x 45	M12 x 1.75	M12 x 35
M14 x 40		
M14 x 45		
M14 x 55		

35. Detach and split the spacer from the gearbox with the help of an operator.

Refitting the spacer

Preparing for refitting

- **36.** Clean the components. Replace any defective parts.
- 37. Check the positioning and tightness of the studs (1) on the gearbox (Fig. 14).
- **38.** Clean off any Loctite previously applied to the mating faces.
- **39.** Grease the mating face of the spacer (1) (gearbox side) with Loctite 5206 or equivalent (Fig. 15).
- 40. Check the presence of locating pins (1) (Fig. 16).

SISU ENGINE - Spacer











Refitting

- **41.** Refit the spacer with the help of an operator.
- 42. Fit washers (4).
- **43.** Lightly smear the thread of the screws and nuts (Fig. 17) with Loctite 270 or equivalent. Tighten them in the following manner:
 - collar screw (1) to a torque of 150 200 Nm;
 - screws (2) and nuts (3) to a torque of 100 130 Nm.

Nota: The union thread (1) and that of the diagnostic connector (2) are lightly smeared with Loctite 542 or equivalent (Fig. 18).

- 44. Refit the pipes (Fig. 12).
- **45.** If the spacer had to be replaced, check or even redo the shimming of the PowerShuttle forward clutch (see chapter 5).
- 46. Refit cover (4) (see § B).

Final operations

47. Refit:

- the left-hand cab support fitted to the spacer. Tighten the screws to a torque of 200 - 260 Nm (Loctite 270);
- the front fuel tank support. Tighten the screws to a torque of 160 210 Nm (Loctite 270).
- 48. Refit: (Fig. 11):
 - the union and low pressure 17 bar pipe (2)
 - the flange and lubricating pipe (1).
- **49.** Refit the cab support to the spacer. Tighten the screws to a torque of 200 260 Nm (Loctite 270).
- **50.** Fix the cab onto the front supports (see chapter 12).
- **51.** If removed, refit the fuel tank.
- **52.** Top up the oil level in the housings. Check it using the sight glass located at the rear left-hand side of the rear axle.
- **53.** Assemble the tractor between the engine and the gearbox (see chapter 2).

If necessary, position and adjust the chassis reinforcements (see chapter 2).

- 54. Check:
 - the tightness of the unions and mating face of the spacer;
 - the correct operation of the PowerShuttle and fuel gauge;
 - automatic cab suspension (if fitted see chapter 12).





D . Service tool

Tool available in AGCO network

• 3378012M2: Protector



3B13- SISU ENGINE - Engine/GTA1030 transmission link

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A . General

The GTA1030 engine/transmission link is ensured by means of a vibration damper.

Parts list (Fig. 1)

- (2) Starter ring gear
- (3) Engine flywheel
- (4) Screw
- (7) Screw
- (10) Sealed bearing
- (11) Vibration damper

SISU ENGINE - Engine/GTA1030 transmission link



B . Removing - refitting the vibration damper

Preliminary operation

1. Split the tractor between the engine and the gearbox (see chapter 2).

Removal (Fig. 2)

- Fit centring tool 3378262M1 home into the vibration damper and the engine flywheel bearing.
 Nota: This prevents the vibration damper from falling off.
- **3.** If required, immobilise the engine flywheel by sliding a locally made tool between the starter ring gear teeth and the engine adapter plate.
- 4. Loosen and remove screws (7).
- 5. Take off the vibration damper and centre it.

Refitting

- **6.** Lightly lubricate the vibration damper splines with AS767 grease or equivalent.
- 7. Fit the following onto the engine flywheel:
 - the vibration damper, with the F side facing the bearing (10) (Fig. 3);
 - centring tool.

NOTA: On its own, the vibration damper is almost centred in the engine flywheel due to the regrinding of its external diameter.

Centring tool 3378262M1 fine-tunes its central position and also turns the vibration damper in the engine flywheel to insert screws (7).

8. Lightly smear the thread of the screws (7) with Loctite 270 or equivalent.

Fit and tighten these screws to a torque of 110 - 130 Nm.

9. Take off the centring tool. If necessary, release the engine flywheel.

Final operation





C . Removing - refitting the engine flywheel

Preliminary operation

11. Disassemble the tractor between the engine and the gearbox (see chapter 2).

Removal

- 12. Remove the vibration damper (see § B).
- **13.** Hold the engine flywheel in place with a mobile crane and suitable sling.
- **14.** Immobilise the engine flywheel using a locally made tool, as in operation **3**.
- **15.** Remove two opposing screws (4) on the engine flywheel.Replace with two M12 guide studs.

Remove the remaining screws (4).

- **16.** Move the engine flywheel apart. Remove the engine flywheel using the previously mentioned mobile crane and sling.
- 17. If necessary:
 - extract the engine flywheel bearing (10) (see § D);
 - loosen the guide studs.

SISU ENGINE - Engine/GTA1030 transmission link

Refitting

- **18.** Degrease the mating faces of the engine flywheel and crankshaft. Dry each face using a jet of compressed air.
- **19.** If removed, screw two diametrically opposed M12 guide studs into the crankshaft.
- **20.** Using the same tools as for removal, move the flywheel close to the engine, resting it against the crankshaft.
- 21. For 74 ETA type Sisu engines, position the circular plate (1) (Fig. 4).
 Note: 66 ETA type Sisu engines are not fitted with
- the circular plate (Fig. 5).22. Tighten a few screws (4) (Fig. 4and Fig. 5). Take out the guide studs.
- **23.** Immobilise the engine flywheel as in operation **3**.
- **24.** Insert the remaining screws (4). Tighten all screws (4) to a torque of 150 Nm.
- **25.** Remove the sling. Release the engine flywheel.
- **26.** If the bearing (10) is defective, replace it with a new one (see § D).
- 27. Refit the vibration damper (see § B).

Final operation





D . Replacing the sealed bearing

Preliminary operation

29. Disassemble the tractor between the engine and the gearbox (see chapter 2).

Removal

- **30.** Remove the vibration damper (see § B).
- **31.** Extract the sealed bearing (10) (Fig. 6) using a slide hammer puller. Discard it.

Nota: The sealed bearing also supports the gearbox input shaft.

Refitting

32. Clean the sealed bearing recess on the engine flywheel.

Check inside the bearing housing for filings or knocks.

33. Check that the inside cage of the sealed bearing (10) slides freely on end E of the gearbox input shaft (Fig. 7).

Fit the new sealed bearing home against the engine flywheel shoulder using a sleeve made locally to the following dimensions:

- Inside Ø = 55 + 0/-0.1 mm;
- Outside Ø = 60 + 0.1/-0 mm;
- L = 170 mm.

IMPORTANT: The sleeve protects the sealed bearing during assembly. It directly applies the fitting load onto the bearing external diameter.

- **34.** Manually check the rotation of the sealed bearing after fitting.
- **35.** Refit the vibration damper (see § B).

Final operation





E . Replacing the starter ring gear

Preliminary operation

37. Disassemble the tractor between the engine and the gearbox (see chapter 2).

Disassembly

- **38.** Remove the vibration damper (see § B).
- **39.** Take off the engine flywheel (see § C). Position it flat on a workbench.

Replacement

- **40.** Drill a hole 16 mm deep in the starter ring gear (2) using a 5 mm drill bit (Fig. 8).
- **41.** Split the starter ring gear with a suitable chisel. Release it from the engine flywheel (3) (Fig. 8).

DANGER: Suitably protect eyes and hands against flying matter.

- **42.** Heat a new starter ring gear (2) to 245 °C. Heating must be carried out in an oven.
- **43.** Hold the engine flywheel flat on a workbench.
- **44.** Turn the input teeth of the starter ring gear (2) towards the starter drive gear.

Fit the starter ring gear on the engine flywheel. Quickly push it up against the engine flywheel shoulder. Allow it to cool slowly.

Reassembly

- **45.** Refit the engine flywheel (see § C).
- 46. Refit the vibration damper (see § B).

Final operation



F . Service tool

Tools available in the AGCO network

• 3378262M1: Vibration damper centring tool (Fig. 9)



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A . General

A vibration damper links the 4-cylinder (Fig. 1) or 6-cylinder (Fig. 2) Sisu engine and the GTA2520 or GTA1540 transmission.

The vibration damper's torque curve varies depending on whether the engine has 4 or 6 cylinders.

Legend (Fig. 3 to Fig. 6)

- 1- vibration damper for 4-cylinder Sisu engines
 - vibration damper for 6-cylinder Sisu engines

Parts list (Fig. 3 to Fig. 6)

- (2) Starter ring gear
- (3) Engine flywheel
- (4) Screw

2

- (7) Screw
- (10) Sealed bearing
- (11) Vibration damper













B . Removing and refitting the vibration damper

1. Disconnect the tractor between the engine and the gearbox (see chapter 2).

Removal

Tractors fitted with a 4-cylinder (Fig. 7) or 6-cylinder (Fig. 8) Sisu engine

2. Fully insert centring tool 3378712M1 (4-cylinder engine) or centring tool 3378262M1 (6-cylinder engine) in the vibration damper and the engine flywheel bearing.

Note: This prevents the vibration damper from falling off.

- **3.** If required, immobilise the engine flywheel by sliding a locally made tool between the starter ring gear teeth and the engine adapter plate.
- 4. Loosen and remove the screws (7).
- **5.** Remove the vibration damper and the centring tool.

Refitting

6. Lightly lubricate the vibration damper splines with AS767 grease or equivalent.

Tractors fitted with a 4-cylinder Sisu engine

- 7. Fit the following onto the engine flywheel:
 - the vibration damper (11), with the face marked "engine side" or the offset (d) facing the engine flywheel (3) (Fig. 9)
 - vibration damper centring tool 3378712M1

Note: On its own, the vibration damper is almost centred in the engine flywheel due to the regrinding of its external diameter.

Centring tool 3378712M1 fine-tunes the centring and also turns the vibration damper to align its fixing holes with the tapped holes in the engine flywheel (3).

- 8. Lightly smear the thread of the screws (7) with Loctite 270 or equivalent (Fig. 7).
 Fit and tighten these screws to a torque of 110 130 Nm.
- **9.** Take off centring tool 3378712M1. If necessary, release the engine flywheel using the locally made tool.

Tractors fitted with a 6-cylinder Sisu engine

- **10.** Fit the following onto the engine flywheel:
 - the vibration damper (11), with the face marked "flywheel side (CV)" or the offset (d) facing the engine flywheel (3) (Fig. 10)
 - vibration damper centring tool 3378262M1

Note: On its own, the vibration damper is almost centred in the engine flywheel due to the regrinding of its external diameter.

Centring tool 3378262M1 fine-tunes the centring and also turns the vibration damper to align its fixing holes with the tapped holes in the engine flywheel (3).

11. Lightly smear the thread of the screws (7) with Loctite 270 or equivalent (Fig. 8).

Fit and tighten these screws to a torque of 110 - 130 $\mbox{Nm}.$

12. Take off centring tool 3378262M1.

If necessary, release the engine flywheel using the locally made tool.

Tractors fitted with a 4-cylinder or 6-cylinder Sisu engine

C . Removing and refitting the engine flywheel

Preliminary step

14. Disconnect the tractor between the engine and the gearbox (see chapter 2).

Removal

- 15. Remove the vibration damper (see § B).
- **16.** Hold the engine flywheel in place with a mobile crane and a suitable sling.
- **17.** Immobilise the engine flywheel using a locally made tool, as in step 3.
- 18. Unscrew two diametrically opposed screws (4) (Fig. 11 or Fig. 12) on the engine flywheel. Replace with two M12 guide studs. Unscrew the remaining screws (4).
- **19.** Move the engine flywheel aside. Remove the engine flywheel using the mobile crane and sling used earlier.
- 20. If necessary:
 - extract the engine flywheel bearing (10) (see § D);
 - unscrew the M12 guide studs.

Refitting

- **21.** Degrease the mating faces of the engine flywheel and crankshaft. Dry each face using a jet of compressed air.
- **22.** If removed, screw two diametrically opposed M12 guide studs into the crankshaft.
- **23.** Using the same tools as for removal, move the flywheel close to the engine, resting it against the crankshaft.
- 24. For 74 ETA and 74 CTA type Sisu engines, position the circular plate (1) (Fig. 11).
 Note: 66 ETA and 66 CTA type Sisu engines do not have a circular plate (Fig. 12).
- **25.** Tighten a few screws (4) (Fig. 11 and Fig. 12). Take out the guide studs.
- **26.** Immobilise the engine flywheel as in step 3.
- 27. Fit the remaining screws (4).Lightly smear the thread of all the screws (4) with Loctite 270 or equivalent. Tighten these screws to 140 Nm.
- **28.** Remove the sling. Release the engine flywheel.
- **29.** If the bearing (10) is defective, replace it with a new one (see § D).
- **30.** Refit the vibration damper (see § B).

Final step

D . Replacing the sealed bearing

Preliminary step

32. Disconnect the tractor between the engine and the gearbox (see chapter 2).

Removal

- 33. Remove the vibration damper (see § B).
- **34.** Extract the sealed bearing (10) (Fig. 13) using a slide hammer puller. Discard it.

Note: The sealed bearing also supports the gearbox input shaft.

Refitting

35. Clean the sealed bearing cavity on the engine flywheel.

Check inside the bearing housing for filings or knocks.

36. Check that the inside cage of the sealed bearing (10) slides freely on end E of the gearbox input shaft (Fig. 14).

Flush fit the new sealed bearing against the engine flywheel shoulder using a sleeve made locally to the following dimensions:

- For 4-cylinder engines:
 - Inside Ø = 46.5 + 0/-0.1 mm
 - Outside Ø = 50 + 0.1/-0 mm
 - L = 170 mm
- For 6-cylinder engines:
 - Inside Ø = 55 +0/-0.1 mm
 - Outside Ø = 60 + 0.1/-0 mm
 - L = 170 mm

IMPORTANT: The sleeve protects the sealed bearing during assembly. It directly applies the fitting force onto the external bearing cage.

- **37.** Manually check the rotation of the sealed bearing after fitting.
- 38. Refit the vibration damper (see § B).

Final step

E . Replacing the starter ring gear

Preliminary step

40. Disconnect the tractor between the engine and the gearbox (see chapter 2).

Disassembly

- 41. Remove the vibration damper (see § B).
- **42.** Remove the engine flywheel (see § C). Position it flat on a workbench.

Replacement

- **43.** Drill a hole 16 mm deep in the starter ring gear (2) using a 5 mm drill bit (Fig. 15).
- **44.** Split the starter ring gear with a suitable chisel. Release it from the engine flywheel (3) (Fig. 15).

DANGER: Use suitable equipment to protect eyes and hands against any fragments that may fly off.

- **45.** Heat a new starter ring gear (2) to 245°C. Heating must be carried out in an oven.
- **46.** Hold the engine flywheel flat on a workbench.
- **47.** Turn the teeth input of the starter ring gear (2) towards the starter drive gear.

Fit the starter ring gear on the engine flywheel. Quickly push it up against the engine flywheel shoulder. Allow it to cool slowly.

Reassembly

- 48. Refit the engine flywheel (see § C).
- 49. Refit the vibration damper (see § B).

Final step

F . Service tool

Tool available in the AGCO network

- 3378262M1: Vibration damper centring tool for 6-cylinder Sisu engines (Fig. 16)
- 3378712M1: Vibration damper centring tool for 4-cylinder Sisu engines (Fig. 17)

