

Chapter 2 Part B:

Liquid-cooled two-stroke engines






(Runner 50, 50 DD, 50 SP and Purejet 50, DNA 50 GP, Runner FX125 and FXR180)

Refer to the beginning of Chapter 1 for model identification details

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Degrees of difficulty

Easy , suitable for novice with little experience 	Fairly easy , suitable for beginner with some experience 	Fairly difficult , suitable for competent DIY mechanic 	Difficult , suitable for experienced DIY mechanic 	Very difficult , suitable for expert DIY or professional 
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Specifications –

Runner 50, 50 DD, 50 SP and Purejet 50, DNA 50 GP

General

Type	Single cylinder two-stroke
Capacity	49.3 cc
Bore	40.0 mm
Stroke	39.3 mm
Compression ratio	
Runner 50, 50 DD and SP	11.3:1 to 12.7:1
Purejet 50	10.6:1 to 12.4:1
DNA 50 GP	11.4:1 to 12.8:1

Cylinder bore

Runner 50, 50 DD and SP

Standard	
Size code A	39.985 mm
Size code B	39.990 mm
Size code C	39.995 mm
Size code D	40.000 mm
Size code E	40.005 mm
1st oversize	40.185 to 40.205 mm
2nd oversize	40.205 to 40.385 mm

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Cylinder bore (continued)

Runner Purejet 50

Standard

Size code M	39.997 to 40.004 mm
Size code N	40.004 to 40.011 mm
Size code O	40.011 to 40.018 mm
Size code P	40.018 to 40.025 mm

1st oversize

Size code M1	40.197 to 40.204 mm
Size code N1	40.204 to 40.211 mm
Size code O1	40.211 to 40.218 mm
Size code P1	40.218 to 40.225 mm

2nd oversize

Size code M2	40.397 to 40.404 mm
Size code N2	40.404 to 40.411 mm
Size code O2	40.411 to 40.418 mm
Size code P2	40.418 to 40.425 mm

DNA 50 GP

Standard

Size code M	39.990 to 39.997 mm
Size code N	39.997 to 40.004 mm
Size code O	40.004 to 40.011 mm
Size code P	40.011 to 40.018 mm

1st oversize

Size code M1	40.190 to 40.197 mm
Size code N1	40.197 to 40.204 mm
Size code O1	40.204 to 40.211 mm
Size code P1	40.211 to 40.218 mm

2nd oversize

Size code M2	40.390 to 40.397 mm
Size code N2	40.397 to 40.404 mm
Size code O2	40.404 to 40.411 mm
Size code P2	40.411 to 40.418 mm

Connecting rod

Small-end internal diameter

Size I	17.007 to 17.011 mm
Size II	17.003 to 17.007 mm
Size III	16.999 to 17.003 mm

Piston

Piston diameter (measured 25 mm down from lower ring groove, at 90° to piston pin axis)

Runner 50, 50 DD and SP

Standard

Size code A	39.940 mm
Size code B	39.945 mm
Size code C	39.950 mm
Size code D	39.955 mm
Size code E	39.960 mm

1st oversize 40.140 to 40.160 mm

2nd oversize 40.340 to 40.360 mm

Piston-to-bore clearance 0.040 to 0.050 mm

Piston pin diameter 12.001 to 12.005 mm

Runner Purejet 50, DNA 50 GP

Standard

Size code M	39.943 to 39.950 mm
Size code N	39.950 to 39.957 mm
Size code O	39.957 to 39.964 mm
Size code P	39.964 to 39.971 mm

1st oversize

Size code M1	40.143 to 40.150 mm
Size code N1	40.150 to 40.157 mm
Size code O1	40.157 to 40.164 mm
Size code P1	40.164 to 40.171 mm

2nd oversize

Size code M2	40.343 to 40.350 mm
Size code N2	40.350 to 40.357 mm
Size code O2	40.357 to 40.364 mm
Size code P2	40.364 to 40.371 mm

Piston (continued)

Runner Purejet 50, DNA 50 GP (continued)

Piston-to-bore clearance	
Purejet 50	0.047 to 0.061 mm
DNA 50 GP	0.040 to 0.054 mm
Piston pin diameter	12.001 to 12.005 mm

Piston rings

Ring end gap (installed)	0.10 to 0.25 mm
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Crankshaft

Runout (max)	
At middle and left-hand end	0.03 mm
At right-hand end	0.02 mm
Big-end side clearance	0.25 to 0.50 mm
Endfloat	0.03 to 0.09 mm

Cylinder base gasket selection

Cylinder top gasket surface to piston crown measurement	Gasket thickness
3.25 to 3.45 mm	0.75 mm
3.10 to 3.25 mm	0.5 mm
2.85 to 3.10 mm	0.4 mm

Torque settings

Alternator rotor nut	40 to 44 Nm
Crankcase bolts	12 to 13 Nm
Cylinder head nuts	10 to 11 Nm
Engine front mounting bolt	33 to 41 Nm
Rear shock absorber lower mounting bolt	33 to 41 Nm

Specifications – Runner FX125**General**

Type	Single cylinder two-stroke
Capacity	123.5 cc
Bore	55.0 mm
Stroke	52.0 mm
Compression ratio	9.9:1

Cylinder bore

Standard	
Size code A	54.990 to 54.995 mm
Size code B	54.995 to 55.000 mm
Size code C	55.000 to 55.005 mm
Size code D	55.005 to 55.010 mm
Size code E	55.010 to 55.015 mm
Size code F	55.015 to 55.020 mm
Size code G	55.020 to 55.025 mm
Size code H	55.025 to 55.030 mm
Size code I	55.030 to 55.035 mm
1st oversize	
Size code A	55.190 to 55.195 mm
Size code B	55.195 to 55.200 mm
Size code C	55.200 to 55.205 mm
Size code D	55.205 to 55.210 mm
Size code E	55.210 to 55.215 mm
Size code F	55.215 to 55.220 mm
Size code G	55.220 to 55.225 mm
Size code H	55.225 to 55.230 mm
Size code I	55.230 to 55.235 mm
2nd oversize	
Size code A	55.390 to 55.395 mm
Size code B	55.395 to 55.400 mm
Size code C	55.400 to 55.405 mm
Size code D	55.405 to 55.410 mm
Size code E	55.410 to 55.415 mm
Size code F	55.415 to 55.420 mm
Size code G	55.420 to 55.425 mm
Size code H	55.425 to 55.430 mm
Size code I	55.430 to 55.435 mm

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Cylinder bore (continued)

3rd oversize

Size code A	55.590 to 55.595 mm
Size code B	55.595 to 55.600 mm
Size code C	55.600 to 55.605 mm
Size code D	55.605 to 55.610 mm
Size code E	55.610 to 55.615 mm
Size code F	55.615 to 55.620 mm
Size code G	55.620 to 55.625 mm
Size code H	55.625 to 55.630 mm
Size code I	55.630 to 55.635 mm

Connecting rod

Small-end internal diameter

Size I	20.009 to 20.013 mm
Size II	20.005 to 20.010 mm
Size III	20.001 to 20.006 mm
Size IIII	19.997 to 20.002 mm

Piston

Piston diameter (measured 25 mm down from lower ring groove, at 90° to piston pin axis)

Standard

Size code A	54.935 to 54.940 mm
Size code B	54.940 to 54.945 mm
Size code C	54.945 to 54.950 mm
Size code D	54.950 to 54.955 mm
Size code E	54.955 to 54.960 mm
Size code F	54.960 to 54.965 mm
Size code G	54.965 to 55.970 mm
Size code H	54.970 to 54.975 mm
Size code I	54.975 to 54.980 mm

1st oversize

Size code A	55.135 to 55.140 mm
Size code B	55.140 to 55.145 mm
Size code C	55.145 to 55.150 mm
Size code D	55.150 to 55.155 mm
Size code E	55.155 to 55.160 mm
Size code F	55.160 to 55.165 mm
Size code G	55.165 to 55.170 mm
Size code H	55.170 to 55.175 mm
Size code I	55.175 to 55.180 mm

2nd oversize

Size code A	55.335 to 55.340 mm
Size code B	55.340 to 55.345 mm
Size code C	55.345 to 55.350 mm
Size code D	55.350 to 55.355 mm
Size code E	55.355 to 55.360 mm
Size code F	55.360 to 55.365 mm
Size code G	55.365 to 55.370 mm
Size code H	55.370 to 55.375 mm
Size code I	55.375 to 55.380 mm

3rd oversize

Size code A	55.535 to 55.540 mm
Size code B	55.540 to 55.545 mm
Size code C	55.545 to 55.550 mm
Size code D	55.550 to 55.555 mm
Size code E	55.555 to 55.560 mm
Size code F	55.560 to 55.565 mm
Size code G	55.565 to 55.570 mm
Size code H	55.570 to 55.575 mm
Size code I	55.575 to 55.580 mm

Piston-to-bore clearance	0.050 to 0.060 mm
Piston pin diameter	16.001 to 16.005 mm

Piston rings

Ring end gap (installed)	0.20 to 0.35 mm
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Crankshaft

Runout (max)	
At middle and left-hand end	0.03 mm
At right-hand end	0.02 mm
Big-end side clearance	not available
Endfloat	0.03 to 0.09 mm

Cylinder base gasket selection

Final cylinder top gasket surface to piston crown measurement	2.74 to 2.84 mm
Gasket sizes available	0.2, 0.3, 0.4, 0.5, 0.6, 0.7 and 0.8 mm

Torque settings

Alternator rotor nut	52 to 56 Nm
Crankcase bolts	12 to 13 Nm
Cylinder head nuts	10 to 11 Nm
Engine front mounting bolt	33 to 41 Nm
Rear shock absorber lower mounting bolt	33 to 41 Nm

Specifications – Runner FXR180**General**

Type	Single cylinder two-stroke
Capacity	175.8 cc
Bore	65.6 mm
Stroke	52.0 mm
Compression ratio	9.8:1

Cylinder bore

Standard	
Size code A	65.590 to 65.595 mm
Size code B	64.595 to 65.600 mm
Size code C	65.600 to 65.605 mm
Size code D	65.605 to 65.610 mm
Size code E	65.610 to 65.615 mm
Size code F	65.615 to 65.620 mm
Size code G	65.620 to 65.625 mm
Size code H	65.625 to 65.630 mm
Size code I	65.630 to 65.635 mm

Connecting rod

Small-end internal diameter	
Size I	20.009 to 20.013 mm
Size II	20.005 to 20.010 mm
Size III	20.001 to 20.006 mm
Size IIII	19.997 to 20.002 mm

Piston

Piston diameter (measured 25 mm down from lower ring groove, at 90° to piston pin axis)	
Standard	
Size code A	65.545 to 65.550 mm
Size code B	65.550 to 65.555 mm
Size code C	65.555 to 65.560 mm
Size code D	65.560 to 65.565 mm
Size code E	65.565 to 65.570 mm
Size code F	65.570 to 65.575 mm
Size code G	65.575 to 65.580 mm
Size code H	65.580 to 65.585 mm
Size code I	65.585 to 65.590 mm
Piston-to-bore clearance	0.040 to 0.050 mm
Piston pin diameter	16.001 to 16.005 mm

Piston rings

Ring end gap (installed)	0.20 to 0.35 mm
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Crankshaft

Runout (max)	
At middle and left-hand end	0.03 mm
At right-hand end	0.02 mm
Big-end side clearance	not available
Endfloat	0.03 to 0.09 mm

Cylinder base gasket selection

Final cylinder top gasket surface to piston crown measurement	2.30 to 2.50 mm
Gasket sizes available	0.2, 0.4, 0.6 and 0.8 mm

Torque settings

Alternator rotor nut	52 to 56 Nm
Crankcase bolts	12 to 13 Nm
Cylinder head nuts	10 to 11 Nm
Engine front mounting bolt	33 to 41 Nm
Rear shock absorber lower mounting bolt	33 to 41 Nm

1 General information

The engine unit is a single cylinder two-stroke, with liquid cooling. The alternator rotor is on the right-hand end of the crankshaft. The crankshaft assembly is pressed, incorporating the connecting rod, with the big-end running on the crankpin on a needle roller bearing. The piston also runs on a needle roller bearing fitted in the small-end of the connecting rod. The crankshaft runs in caged ball main bearings. The crankcase divides vertically.

Later engines carry the 'Hi-Per2Pro' name, denoting that the scooter is fitted with a catalytic converter and secondary air system. Some models will have a 'hi-per2pro' decal on the bodywork.

2 Operations possible with the engine in the frame

All components and assemblies, with the exception of the crankshaft/connecting rod assembly and its bearings, and the water pump impeller, can be worked on without having to remove the engine/transmission unit from the frame. If however, a number of areas require attention at the same time, removal of the engine is recommended, as it is easy to do so.

3 Operations requiring engine removal

To access the crankshaft and connecting rod assembly and its bearings, and the water pump impeller, the engine must be removed from the frame and the crankcase halves must be separated.

4 Major engine repair – general note

- 1 It is not always easy to determine when or if an engine should be completely overhauled, as a number of factors must be considered.
- 2 High mileage is not necessarily an indication that an overhaul is needed, while

low mileage, on the other hand, does not preclude the need for an overhaul. Frequency of servicing is probably the single most important consideration. An engine that has regular and frequent maintenance will most likely give many miles of reliable service. Conversely, a neglected engine, or one which has not been run in properly, may require an overhaul very early in its life.

3 If the engine is making obvious knocking or rumbling noises, the connecting rod and/or main bearings are probably at fault.

4 Loss of power, rough running, excessive noise and high fuel consumption rates may also point to the need for an overhaul, especially if they are all present at the same time. If a complete service as detailed in Chapter 1 does not remedy the situation, major mechanical work is the only solution.

5 An engine overhaul generally involves restoring the internal parts to the specifications of a new engine. This may require fitting new piston rings and crankcase seals, or, after a high mileage, reboring the cylinder and fitting a new piston; on FXR180 models the cylinder bore is plated and cannot be rebored. The end result should be a like-new engine that will give as many trouble-free miles as the original.

6 Before beginning the engine overhaul, read through the related procedures to familiarise yourself with the scope and requirements of the job. Overhauling an engine is not all that difficult, but it is time consuming. Check on the availability of parts and make sure that any necessary special tools and materials are obtained in advance.

7 Most work can be done with typical workshop hand tools, although, if required, Gilera produce a number of service tools for

specific purposes such as removing the alternator rotor, disassembling the clutch and separating the crankcase halves. Precision measuring tools are required for inspecting parts to determine if they must be renewed. Alternatively, a dealer will handle the inspection of parts and offer advice concerning reconditioning and replacement. As a general rule, time is the primary cost of an overhaul so it does not pay to install worn or substandard parts.

8 As a final note, to ensure maximum life and minimum trouble from a rebuilt engine, everything must be assembled with care in a spotlessly clean environment.

5 Engine/transmission unit – removal and installation

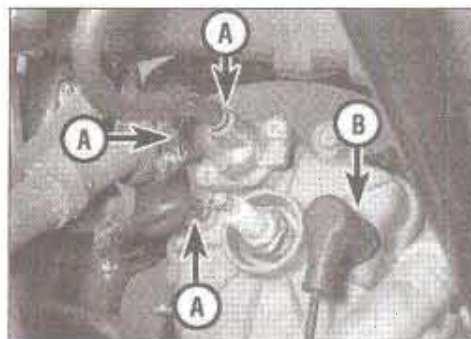
Caution: The engine is not heavy, however engine removal and installation should be carried out with the aid of an assistant; personal injury or damage could occur if the engine falls or is dropped.

Removal

1 The procedure for removing the engine is the same as for air-cooled models, with the following additions.

2 Drain the cooling system (see Chapter 1). Loosen the clips securing the cooling system hoses to the cylinder head and to the coolant pipe on the right-hand side of the engine, and detach the hoses from their unions, noting which fits where (see illustrations).

3 Pull back the boot on the coolant temperature sensor wiring terminal and disconnect the connector (see illustration 5.2a).



5.2a Detach the hoses (A) from their unions on the cylinder head. Note the wiring connector (B)



5.2b Detach the hose (arrowed) from its union on the engine

4 On Purejet 50 models, refer to Chapter 4, Section 10, and disconnect the throttle position sensor wiring connector from the throttle body and release the wiring from any clips or ties. Disconnect the wiring connectors from the fuel and air injectors. Disconnect the throttle cable from the throttle body. Disconnect the fuel hoses from the injector manifold – press the hose union down and hold it down, then lift the release ring on the union and disconnect the hose. **Note:** The fuel system is pressurised – cover the union with a clean rag to prevent fuel spraying over yourself or the machine.

5 Refer to Chapter 2A, Section 5 for the rest of the procedure.

Installation

6 Installation is the reverse of the procedure in Chapter 2A, noting the additional points:

- Make sure the cooling system hoses are properly connected and secured by their clips (see illustration 5.2a and 2b).
- Don't forget to replace the temperature sensor wiring boot.
- Fill the cooling system (see Chapter 1, Section 10).
- On Purejet 50 models, ensure the fuel hose unions are securely clipped in position.

6 Disassembly and reassembly – general information

Disassembly

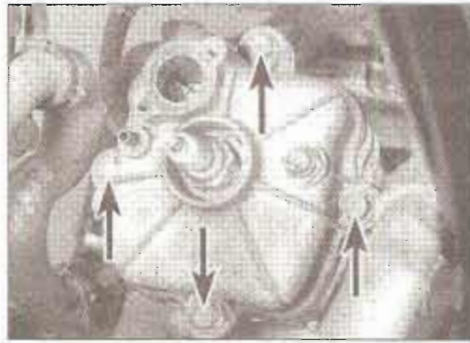
1 Before disassembling the engine, the external surfaces of the unit should be thoroughly cleaned and degreased. This will prevent contamination of the engine internals, and will also make working a lot easier and cleaner. A high flash-point solvent, such as paraffin can be used, or better still, a proprietary engine degreaser such as Gunk. Use old paintbrushes and toothbrushes to work the solvent into the various recesses of the engine casings. Take care to exclude solvent or water from the electrical components and intake and exhaust ports.



Warning: The use of petrol (gasoline) as a cleaning agent should be avoided because of the risk of fire.

2 When clean and dry, arrange the unit on the workbench, leaving suitable clear area for working. Gather a selection of small containers and plastic bags so that parts can be grouped together in an easily identifiable manner. Some paper and a pen should be on hand to permit notes to be made and labels attached where necessary. A supply of clean rag is also required.

3 Before commencing work, read through the appropriate section so that some idea of the necessary procedure can be gained. When removing components it should be noted that great force is seldom required, unless specified. In many cases, a component's



7.4a Unscrew the bolts (arrowed) and remove the cover



7.4b Remove the O-ring and discard it

reluctance to be removed is indicative of an incorrect approach or removal method – if in any doubt, re-check with the text.

4 When disassembling the engine, keep 'mated' parts that have been in contact with each other during engine operation together. These 'mated' parts must be reused or renewed as an assembly.

5 A complete engine disassembly should be done in the following general order with reference to the appropriate Sections and Chapters.

- Remove the cylinder head
- Remove the cylinder
- Remove the piston
- Remove the alternator
- Remove the variator (see Chapter 2D)
- Remove the starter motor (see Chapter 9)
- Remove the oil pump and drive belt
- Remove the reed valve (see Chapter 4)
- Remove the water pump (see Chapter 3)
- Separate the crankcase halves
- Remove the crankshaft

Reassembly

6 Reassembly is accomplished by reversing the general disassembly sequence.

7 Cylinder head

Note: This procedure can be carried out with the engine in the frame. If the engine has been removed, ignore the steps which don't apply.
Caution: The engine must be completely

cool before beginning this procedure or the cylinder head may become warped.

Removal

1 Remove the engine access panel and, if required, the side panels (see Chapter 8).

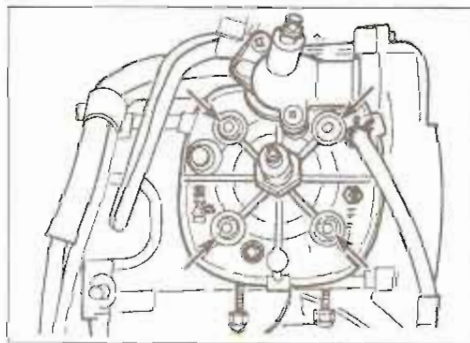
2 Drain the cooling system (see Chapter 1, Section 10). Release the clamps securing the cooling system hoses to the cylinder head, and detach the hoses from their unions, noting which fits where (see illustration 5.2a).

3 Pull back the boot on the coolant temperature sensor wiring terminal and disconnect the connector.

4 On Runner FX125 and FXR180 models, remove the four bolts securing the cylinder head cover and remove the cover and seal (see illustration). Remove the O-ring from the spark plug housing and discard it as a new one must be used on reassembly (see illustration).

5 On Purejet 50 models, refer to Chapter 4, Section 10, and disconnect the wiring connectors from the fuel and air injectors. Disconnect the fuel hoses from the injector manifold – press the hose union down and hold it down, then lift the release ring on the union and disconnect the hose. Remove the Torx screw securing the air hose union to the injector manifold and lift off the union. **Note:** It is not necessary to disconnect the air hose from the union. If the hose is disconnected, Gilera recommend fitting a new hose.

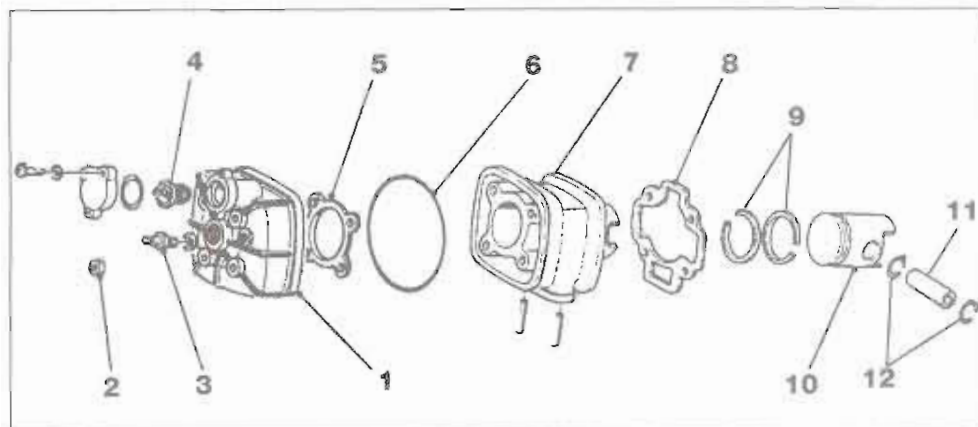
6 Unscrew the four cylinder head nuts evenly and a little at a time in a criss-cross sequence until they are all loose and remove them (see illustrations).



7.6a Cylinder head nuts (arrowed) – all 50 cc engines



7.6b Cylinder head nuts (arrowed) – Runner FX125 and FXR180 engines



7.16a Cylinder head and cylinder components – all 50 cc engines

- | | | |
|-----------------------------|------------------------|----------------|
| 1 Cylinder head | 4 Thermostat | 8 Base gasket |
| 2 Cylinder head nut – 4 off | 5 Cylinder head gasket | 9 Piston rings |
| 3 Temperature sender | 6 O-ring | 10 Piston |
| | 7 Cylinder | 11 Piston pin |
| | | 12 Circlips |

7 Draw the head off the cylinder studs. If the head is stuck, tap around the joint face between the head and the cylinder with a soft-faced mallet to free it. Do not attempt to free the head by inserting a screwdriver between the head and cylinder – you'll damage the sealing surfaces. Discard the cylinder head O-ring and gasket (where fitted) as new ones must be used. Where no gasket is fitted, the machined face of the cylinder head fits directly against the machined face of the cylinder.

8 If required, remove the thermostat and housing (see Chapter 3).

9 On Purejet 50 models, if required, remove the injector assembly (see Chapter 4).

10 Remove the alternator cover (see Section 11).

Inspection

11 Follow the procedure in Chapter 2A,

Section 7, and clean the carbon off the cylinder head and piston, then inspect the head for damage and warpage.

12 If the thermostat has been removed, ensure the recess in the head is clean and free from corrosion.

Installation

13 If removed, install the thermostat and housing (see Chapter 3).

14 On Purejet 50 models, if removed, install the injector assembly (see Chapter 4).

15 Lubricate the cylinder bore with the recommended two-stroke oil.

16 Ensure both cylinder head and cylinder mating surfaces are clean, then carefully fit the cylinder head onto the cylinder using a new gasket (where fitted) and O-ring (see illustrations).

17 Install the four nuts and tighten them all finger-tight (see illustration 7.6a or 6b). Now

tighten them evenly and a little at a time in a criss-cross pattern to the torque setting specified at the beginning of this Chapter.

18 On Purejet 50 models, refer to Chapter 4, Section 10, and install the air hose union on the injector manifold and secure it with the Torx screw. Connect the fuel hoses to the injector manifold – press the hose union down and ensure the release ring clicks into position. Ensure the hose unions are secure. Connect the wiring connectors from the fuel and air injectors.

19 On Runner FX125 and FXR180 models, check the condition of the head cover gasket and fit a new one if necessary (see illustration). Also fit a new O-ring around the plug housing (see illustration 7.4b).

20 Install the remaining components in the reverse order of removal, then refill the cooling system (see Chapter 1, Section 10).

8 Cylinder

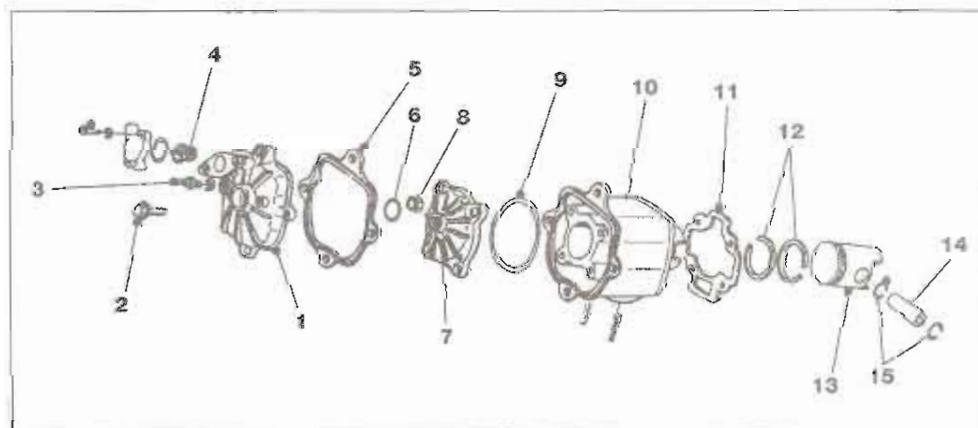
Note: This procedure can be carried out with the engine in the frame.

Removal and inspection

1 Remove the exhaust system (see Chapter 4) and the cylinder head (see Section 7). The procedure for removal and inspection of the cylinder is the same as for air-cooled models (see Chapter 2A, Section 8) with the following additions.

2 When calculating the piston-to-bore clearance on DNA 50 GP models, measure the bore 15 mm from the top across the crankshaft axis. On all other models, measure the bore 20 mm from the top across the crankshaft axis.

3 Cylinder bore specifications are given at the beginning of this Chapter. Gilera list five size codes (A to E) for the Runner 50, 50 DD and SP engines, four (M, N, O and P) for the Purejet 50 and DNA 50 GP, and nine (A to I) for the FX125 and FXR180. **Note:** The FXR180 engine has a Nicasil plated bore. The Nicasil plating has a high resistance to wear and should last the life of the engine unless serious damage, such as a seizure, has occurred; in



7.16b Cylinder head and cylinder components – Runner FX125 and FXR180 engines

- | | | |
|-----------------------|-----------------------------|-----------------|
| 1 Cylinder head cover | 6 O-ring | 11 Base gasket |
| 2 Cover bolt – 4 off | 7 Cylinder head | 12 Piston rings |
| 3 Temperature sender | 8 Cylinder head nut – 4 off | 13 Piston |
| 4 Thermostat | 9 O-ring | 14 Piston pin |
| 5 Cover seal | 10 Cylinder | 15 Circlips |



7.19 Check the cover gasket and renew it necessary

this event, a new cylinder, piston and rings should be fitted – the cylinder cannot be rebored.

Installation

4 Different thickness cylinder base gaskets are available (see Specifications at the beginning of this Chapter). To determine which thickness of gasket to use, assemble the cylinder on the crankcase and piston without a base gasket and measure the height of the piston at TDC in relation to the cylinder top gasket surface with a dial gauge as follows. Gilera provide a gauge mounting bracket (Part No. 020268Y) for this purpose (see illustration).

5 Check that the mating surfaces of the cylinder and crankcase are clean and remove any rag from the crankcase mouth, then follow the procedure in Steps 11 and 12 and install the cylinder. Press the cylinder down onto the crankcase.

6 Set the dial gauge in the mounting bracket, and with the bracket and the gauge tip resting against the cylinder top gasket surface, zero the gauge.

7 Rotate the crankshaft via the alternator rotor nut so that the piston is partway down the bore, then clamp the mounting bracket diagonally across two of the cylinder studs and secure it by tightening the stud nuts to the specified torque setting. Rotate the crankshaft so that the piston rises to the top of its stroke (TDC) and the gauge tip rests on the centre of the piston crown. At this point read off the dial gauge (see illustration).

8 On Runner 50, 50 DD, SP and Purejet 50 models and DNA 50 GP models, compare the reading with the specifications at the beginning of this Chapter to determine the gasket thickness.

9 On Runner FX125 models, subtract 2.74 to 2.84 mm from the reading to obtain the gasket thickness. On FXR180 models, subtract 2.30 to 2.50 mm from the reading to obtain the gasket thickness. Ensure the selected gasket thickness maintains the specified measurement between the piston crown and the cylinder top gasket surface (see Specifications at the beginning of this Chapter).

10 Having established the correct gasket thickness, lift off the cylinder and fit the new gasket to the crankcase making sure it is the correct way round.

11 Check that the piston rings are correctly positioned so that the locating pin in each piston ring groove is between the open ends of the ring (see illustration 10.6, Chapter 2A). Lubricate the cylinder bore, piston and piston rings, and the connecting rod big- and small-ends, with two-stroke oil, then fit the cylinder down over the studs until the piston crown fits into the bore (see illustration 8.11, Chapter 2A).

12 Gently push down on the cylinder, making sure the piston enters the bore squarely and does not get cocked sideways. Carefully

compress and feed each ring into the bore as the cylinder is lowered, taking care that they do not rotate out of position. Do not use force if the cylinder appears to be stuck as the piston and/or rings will be damaged.

13 When the piston is correctly installed in the cylinder, press the cylinder down onto the base gasket.

14 Install the remaining components in the reverse order of removal.

9 Piston

Note: This procedure can be carried out with the engine in the frame.

1 The procedure for removal, inspection and installation of the piston is the same as for air-cooled engines (see Chapter 2A, Section 9) with the following addition.

2 On FX125 and FXR180 models, four sizes of connecting rod small-end bearing are available. A mark on the connecting rod, either a I, II, III or IIII indicates the small-end size, and this mark must be matched with a similar mark on the new bearing, or by a colour code.

Connecting rod marked I:

bearing colour copper

Connecting rod marked II:

bearing colour blue

Connecting rod marked III:

bearing colour white

Connecting rod marked IIII:

bearing colour green

10 Piston rings

1 The procedure for inspection and installation of the piston rings is the same as for air-cooled models (see Chapter 2A, Section 10).

11 Alternator rotor and stator

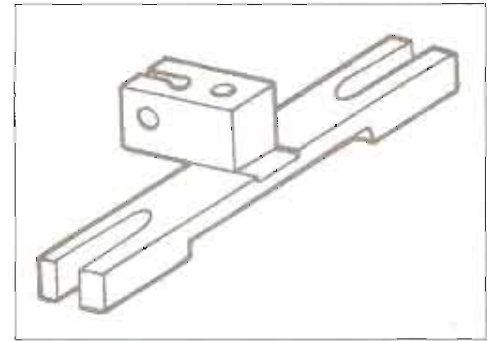
Note: This procedure can be carried out with the engine in the frame.

1 Remove the engine access panels and, if required, the side panels (see Chapter 8).

2 If a secondary air system is fitted, release the clip on the lower flexible hose union and detach the hose from the exhaust pipe (see illustration 11.3, Chapter 2A). Unclip the system assembly from the alternator cover and displace it.

3 Remove the screws securing the alternator cover and remove the cover, noting how it fits.

4 The procedure for removal and installation of the alternator rotor and stator is the same as for air-cooled models (see Chapter 2A, Section 12). **Note:** Liquid-cooled models have



8.4 Dial gauge mounting bracket

no cooling fan mounted on the rotor. If the secondary air system has been displaced, ensure the hose clip is secure on installation.

12 Starter pinion assembly

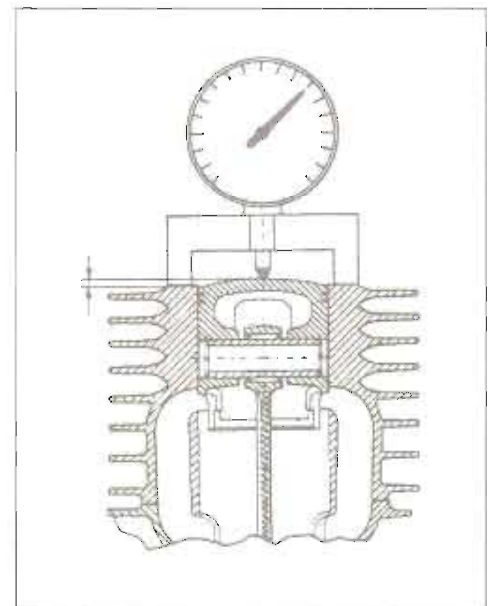
Note: This procedure can be carried out with the engine in the frame.

1 The procedure for removal, inspection and installation of the starter pinion assembly is the same as for air-cooled models (see Chapter 2A, Section 13).

13 Oil pump and drive belt

Note: This procedure can be carried out with the engine in the frame.

1 The procedure for removal, inspection and installation of the oil pump and drive belt, and for bleeding the oil pump, is the same as for air-cooled models (see Chapter 2A, Section 14).



8.7 Set-up for measuring the piston height at TDC

14 Crankcase halves and main bearings



Note: To separate the crankcase halves, the engine must be removed from the frame.

Separation

1 To access the crankshaft assembly and engine main bearings, the crankcase halves must be separated.

2 Remove the engine from the frame (see Section 5). Before the crankcases can be separated the following components must be removed:

- Cylinder head (Section 7)
- Cylinder (Section 8)
- Alternator rotor and stator (Section 11)
- Reed valve (Chapter 4)
- Starter motor (Chapter 9)
- Oil pump and drive belt (Section 13)
- Centre stand (see Chapter 6)

3 The remainder of the procedure for separation and joining of the crankcase halves and for removal of the crankshaft assembly is the same as for air-cooled models (see Chapter 2A, Section 15), with the following additions.

4 The water pump shaft and its bearings are housed in the left-hand crankcase half and the pump impeller is located between the crankcase halves. Access to the impeller and its seal can only be achieved after the crankcases have been separated (see Chapter 3).

5 On Purejet 50 models, the fuel injection system air compressor is located on the rear of the crankcase. Follow the procedure in Chapter 4 to remove the compressor before separating the crankcase halves.

Reassembly

6 Do not forget to install the water pump impeller and seal before joining the crankcase halves. If required, the pump drive shaft and bearings can be installed after joining the halves (see Chapter 3).

15 Crankshaft assembly and big-end bearing



1 The procedure for inspection of the crankshaft and the big-end bearing is the same as for air-cooled models (see Chapter 2A, Section 16).

16 Initial start-up after overhaul

1 Make sure the oil tank is at least partly full and the pump is correctly adjusted (see Chapter 1, Section 26) and bled of air (see Section 13).

2 Fill the coolant reservoir with fresh coolant (see Chapter 1, Section 10).

3 Make sure there is fuel in the tank.

4 With the ignition OFF, operate the kickstart a couple of times to check that the engine turns over easily.

5 Turn the ignition ON, start the engine and allow it to run at a slow idle until it reaches operating temperature. Do not be alarmed if there is a little smoke from the exhaust – this will be due to the oil used to lubricate the piston and bore during assembly and should subside after a while.

6 If the engine proves reluctant to start,

remove the spark plug and check that it has not become wet and oily. If it has, clean it and try again. If the engine refuses to start, go through the fault finding charts at the end of this manual to identify the problem.

7 Check carefully that there are no fuel or oil leaks and make sure the controls, especially the brakes, function properly before road testing the machine.

8 Check the coolant level (see *Daily (pre-ride) checks*) after the engine has cooled down and bleed the cooling system of air as described in Chapter 1, Section 10.

9 Refer to Section 17 for the recommended running-in procedure.

17 Recommended running-in procedure

1 Treat the engine gently for the first few miles to allow any new parts to bed in.

2 If a new piston, cylinder or crankshaft assembly has been fitted, the engine will have to be run-in as when new. This means a restraining hand on the throttle until at least 300 miles (500 km) have been covered. There's no point in keeping to any set speed limit – the main idea is to keep from labouring the engine and to gradually increase performance up to the 600 mile (1000 km) mark. Make sure that the throttle position is varied to vary engine speed, and use full throttle only for short bursts. Experience is the best guide, since it's easy to tell when an engine is running freely.

3 Pay particular attention to the *Daily (pre-ride) checks* at the beginning of this manual. Check the tightness of all relevant nuts and bolts.