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| **Information for disassembly** |
| **KDI 1903 M Workshop manual (Rev\_09.5)** |



Sommario

[1. TITOLO 1 2](#_Toc495648770)

[1.1. Asdfsdfsdf 2](#_Toc495648771)

[1.2. Asdfsdfsdfggg 2](#_Toc495648772)

# Information for disassembly

## Recommendations for disassembly

Z_importante.jpg **Important**

* The mark ( operazione_utile.gif ) after the title of a paragraph, indicates that the procedure is not required in order to disassemble the engine, however the procedures are featured in order to illustrate the disassembly of components.
* The operator should prepare all equipment and tools in order to enable him to carry out the operations correctly and safely.
* Before disassembly, perform the operation described in [**Chap. 5**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=289&parent=1181) .
* Before proceeding with operation, carefully read [**Chap. 3**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=282&parent=1136) .
* In order to operate safely and easily, we recommend positioning the engine on a rotating stand for engine overhauling.
* eal all injection component unions as illustrated in [**Par. 2.9.7**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=269&parent=1181) during assembly.
* Protect all disassembled components and coupling surfaces subject to oxidation with lubricant.
* Where necessary, reference to special tools to use during disassembly operations is indicated (es. [**ST\_05**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=339&parent=1181) ), identified in [**Tab. 13.1 - 13.2 - 13.3**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=339&parent=1181) .

## Electric components disassembly

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| **7.2.1 Electric wiring**     1. Disconnect and remove the engine wiring.   **NOTE** : refer to [**Par. 2.13.1.3**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=274&parent=1136) to disconnect all connectors. |  |
| **7.2.2 Starter motor**    Z_importante.jpg **Important**       * The motor is not repairable.  1. Undo the screws **A** and remove the starter motor **B** . 2. Mount the tool [**ST\_34**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=339&parent=1136) in the seat of the starter motor **P** and fit it with the two starter motor fixing screws to block the flywheel. | 7.2.jpg **Fig 7.1** |
| **7.2.3 Belt and alternator**   1. Loosen the screws **C and D.** 2. Push the alternator **E** in the direction of the arrow **F** . 3. Remove the belt **G** from the pulleys.       Z_importante.jpg **Important**     * The belt must always be replaced every time it is disassembled, even if it has not reached the scheduled hours for replacement      1. Undo the screws **C and D** and remove the alternator **E.** | Fig._7.2.jpg **Fig 7.2** |
| **7.2.4 Sensors and switches**    Z_importante.jpg **Important**       * After disassembly, protect the sensors suitably against knocks, dampness and any high temperature sources. * The sensors and switches cannot be repaired, therefore they must be replaced in the event of anomalies. |  |
| **7.2.4.1 Oil pressure switch disassembly** ( operazione_utile.gif )   1. Unscrew and remove oil pressure switch **H** . | Fig._7.3.jpg **Fig 7.3** |
| **7.2.4.2 Coolant temperature sensor** ( operazione_utile.gif )   1. Unscrew and remove the sensor **L** . | Fig._7.4.jpg **Fig 7.4** |
| **7.2.4.3 Fuel filter water detection sensor** ( operazione_utile.gif )    Z_Avvertenza.jpg **Warning**       * The fuel filter is not always installed in the engine. * When disassembling the sensor **M,** use a suitable container to recover the fuel contained in the cartridge **N.**      1. Unscrew the sensor **M** from the cartridge **N** . | Fig._7.5.jpg **Fig 7.5** |

## Exhaust manifold disassembly

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| 1. Undo the nuts **A** and remove the manifold **B** and the metallic gaskets **C** . 2. Close the openings and manifolds to prevent foreign bodies from entering. | Fig._7.6.jpg **Fig 7.6** |

## Coolant recirculation components disassembly

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| **7.4.1 Coolant recirculation components disassembly**    Z_importante.jpg **Important**       * The pump **B**   is not reparaible  1. Undo the screws **A** and remove the water pump unit **B** with its gasket **C** . | Fig._7.7.jpg **Fig 7.7** |
| **7.4.2 Thermostatic valve**   1. Undo the screws **D** and remove the thermostatic valve cover **E** . 2. Remove the thermostatic valve **F** and its gasket.     Z_importante.jpg **Important**       * Always replace the gasket **G** every time it is disassembled.  1. Check that the air bleeding hole is not clogged or blocked ( [**Par. 2.11.3**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=272&parent=1136) ). | Fig._7.8.jpg **Fig 7.8** |

## Crankshaft pulley disassembly

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| **NOTE:** Perform the operations described in [**Par. 6.1.5 points 2 and 3**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=291&parent=1136) .   1. Undo the screw **A** (clockwise - as seen from the timing system side - Ref. A [**Par. 1.3**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=259&parent=1136) ) and remove the pulley **B** . | Fig._7.9.jpg **Fig 7.9** |

## Lubrication circuit disassembly

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| 7.6.1 Oil overpressure valve ( operazione_utile.gif **)**   1. Undo the cap **A** . 2. Remove the spring **B** . 3. Remove the valve piston **C** using a magnet. | Fig._7.10.jpg **Fig 7.10** |
| **7.6.2 Timing system semi-crankcase oil filling flange** ( operazione_utile.gif **)**   1. Undo the screws **G** and remove the oil filling flange **E (** [**ST\_06**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=339&parent=1136) **)** . 2. Remove the gasket **F** . | Fig._7.11.jpg **Fig 7.11** |
| **7.6.3 Timing system**   1. Make sure that the crankshaft with the 1st cylinder is at TDC. 2. Undo the screws **X** . 3. Remove the timing system crankcase **H** . | Fig._7.12.jpg **Fig 7.12** |
| **7.6.4 Oil pump**    Z_importante.jpg **Important**         * The oil pump is not repairable.        1. Undo the screws **M** and remove the pump crankcase **N** from the crankcase **D (** [**ST\_06**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=339&parent=1136) **)** . | Fig._7.13.jpg **Fig 7.13** |
| 1. Remove the rotors  **P and Q.** | Fig._7.14.jpg **Fig 7.14** |
| **7.6.5 Oil filter**   1. Unscrew and remove the cartridge **R** .     Z_Avvertenza.jpg **Warning**       * Use a suitable container to recover any residue oil. | Fig._7.15.jpg **Fig 7.15** |

## Intake manifold disassembly

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| 1. Loosen clamp **A** and disconnect hose **B** . | Fig._7.16.jpg **Fig 7.16** |
| 1. Undo the screws **C** and remove the manifold **D** together with the washer **E** . | Fig._7.17.jpg **Fig 7.17** |

## Fuel system disassembly

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| Z_importante.jpg Important   * Seal all injection component unions as illustrated in [**Par. 2.9.7**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=269&parent=1136) **.** * The fuel injection circuit undergoes high pressure, use safety protections as described in [**Par 3.4.3**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=284&parent=1136) **.** |  |
| **7.8.1 Fuel injection pipes**   1. Remove loking clips **A** from pipes **B** . 2. Loose nuts **C** and **D** and remove pipes **B** . | Fig._7.18.jpg **Fig 7.18** |
| **7.8.2 Rocker arm cover**     1. Undo the screws **F** and remove the rocker arm cap **G** . | Fig._7.19.jpg **Fig 7.19** |
| **7.8.3 Fuel return pipes**   1. Undo the screws **L** and remove hose **H.** | Fig._7.20.jpg **Fig 7.20** |
| **7.8.4 Injector**   1. Undo the screws **P** and remove the washers **Q** and the brackets **M** . 2. Pull out the injectors **N.**   **NOTE** : Should you be unable to remove the injector (acting only on point **BC** ), use an open-ended spanner ( **∅ 11 mm** ), by applying small rotations to unblock the component. If the washer **K** is not found on the injector **N** , recover it from inside the injector sleeve **J** . | Fig._7.21.jpg **Fig 7.21** |
| **7.8.5 Injection pump**    Z_importante.jpg **Important**       * Before disassembling, carefully read [**Par. 2.17**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=279&parent=1136&txts=2.18) . * The injector pump cannot be repaired.  1. Carry on operations described in [**steps 1-13 Par. 6.1.5**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=291&parent=1136) . 2. Undo the nut **S** and remove it together with the washer. 3. Screw the unit [**ST\_04**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=339&parent=1136) on the gear **R** . | Fig._7.22.jpg **Fig 7.22** |
| 1. Undo the screws **T** . 2. Tighten the screw **U** of the unit in order to separate the injector pump **S** from the high pressure pump control gear **R** . | Fig._7.23.jpg  **Fig 7.23**  Fig._7.24.jpg  **Fig 7.24** |
| **NOTE:** Click by side to play the procedure. | <https://www.youtube.com/embed/tQ9VHKF4u_0?rel=0> |
| 7.8.6 Fuel filter ( operazione_utile.gif )    **NOTE:** to disassemble the fuel cartridge, refer to operations 3 and 4 of [**Par. 6.7.1**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=296&parent=1136) .   1. Undo the screws **V** and remove the filter support **W** . | Fig._7.25.jpg **Fig 7.25** |

## Timing system gear disassembly

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| 1. Unscrew screws **C** and remove camshaft gear **D** . 2. Remove lock ring **A** and the shoulder ring **B** . 3. Remove the intermediate gear **L** . | Fig._7.26.jpg **Fig 7.26** |
| 1. Undo the screws **F** and remove the intermediate gear support **G.** | Fig._7.27.jpg **Fig 7.27** | |

## Flange unit disassembly

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| **7.10.1 Flywheel**    Z_importante.jpg **Important**       * Leave the special tool [**ST\_34**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=339&parent=1136) for blocking the flywheel.  1. Only undo the screw **C** located upwards. 2. Insert the tool [**ST\_09**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=339&parent=1136) in the seat of the screw **C** tightening it all the way. 3. Undo the remaining screws **D** .       Z_Pericolo.jpg **Danger**       * The flywheel **E** is very heavy, pay utmost attention while removing it in order to prevent it from falling, with serious consequences for the operator.  1. Remove the flywheel **E.** 2. Remove the tool [**ST\_09**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=339&parent=1136) . 3. Remove the tool [**ST\_34**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=339&parent=1136) shown in [**Fig. 7.1**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=298&parent=1136) **.** | Fig._7.28.jpg **Fig 7.28** |
| **7.10.2 Flange housing**   1. Undo the screws **F** and remove the engine housing **G** .       Z_Pericolo.jpg **Danger**       * The housing **G** is very heavy, pay utmost attention while removing in order to prevent it from falling, with serious consequences for the operator. | Fig._7.29.jpg  **Fig 7.29** |

## Cylinder head unit disassembly

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| **7.11.1 Rocker arm pin**   1. Undo the screws **A** . 2. Remove the rocker arm pin unit **B** . | Fig._7.30.jpg **Fig 7.30** |
| 7.11.1.1 Rocker arm ( operazione_utile.gif )   1. Remove the retainer snap ring **C** . 2. Remove the shoulder rings **D** . 3. Remove the rocker arms **E** and springs. | Fig._7.31.jpg **Fig 7.31** |
| **7.11.2 Rods and u-bolts**   1. Remove the valve control U-bolts **H** . 2. Remove the rocker arm control rods **L** . | Fig._7.33.jpg **Fig 7.33** |
| **7.11.3 Cylinder head**    Z_importante.jpg **Important**       * Wait for the engine to reach ambient temperature before to remove the head in order to prevent deforming. * The cylinder head fastening bolts **M** must be replaced every time they are disassembled.  1. Undo the bolts **M** . 2. Remove the cylinder head **N** .     Z_importante.jpg **Important**    • Only use the eyebolts **AE** installed by **KOHLER** to move the cylinder head **Q.**    3. Remove the head gasket **P** . | Fig._7.34.jpg **Fig 7.34**Fig._7.35_M.jpg     **Fig 7.35** |
| **7.11.3.1 Valves** ( operazione_utile.gif )   1. Mount the tool [**ST\_07**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=339&parent=1136) on the head **Q** fixing it on one of the holes for fixing the rocker arm cover. **NOTE:** change the fixing hole according to the position of the valves to be removed.      1. Position the tool striker [**ST\_07**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=339&parent=1136) on the valve concerned as shown in the figure. | Fig._7.36.jpg **Fig 7.36** |
| 1. Push the lever of the tool [**ST\_07**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=339&parent=1136) downwards, in order to lower the valve plates **S** in the direction of the arrow **T** , using a magnet, remove the cotters **U** .   **NOTE** : repeat all the operations for all the valves concerned. | Fig._7.37.jpg **Fig 7.37** |
| Z_importante.jpg **Important**       * Before removing the valves, make some marks in their original position, in order to prevent confusing them when they are re-assembled, if they are not replaced.  1. Remove the valves **V** . | Fig._7.38.jpg **Fig 7.38** |
| **7.11.3.2 Injector sleeve** ( operazione_utile.gif )   1. Unscrew and remove the sleeves **Z** from the head **Q** . 2. Remove the gaskets **AA and AB** . | Fig._7.39.jpg **Fig 7.39** |
| **7.11.3.3 Valve steam gasket** ( operazione_utile.gif )   1. Remove the oil seals **AC** . | Fig._7.40.jpg **Fig 7.40** |
| **7.11.3.4 Lifting eyebolts** ( operazione_utile.gif )   1. Undo the screws **AD** and remove the eyebolts **AE** . 2. Make the thorough washing the cylinder head **Q** . | Fig._7.41.jpg **Fig 7.41** |

## Oil sump unit disassembly

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| **7.12.1 Oil sump**   1. Undo the screws **A** . 2. Remove the oil sump **B** by inserting a plate in the areas indicated by the arrow **AA.** | Fig._7.42.jpg **Fig 7.42** |
| **7.12.2 Oil intake pipe**   1. Undo the screws **C** and remove the oil pipe **D** . | Fig._7.43.jpg **Fig 7.43** |
| 7.12.3 Oil vapour pipes ( operazione_utile.gif )   1. Unscrew and removethe pipes **E** . | Fig._7.44.jpg **Fig 7.44** |

## Engine block disassembly

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| **7.13.1 Crankshaft gasket flange**   1. Undo the screws **A** . 2. Remove the flange **B** and the gasket **C** . | Fig._7.45.jpg **Fig 7.45** |
| **7.13.2** **Piston unit/connecting rod**    Z_importante.jpg **Important**       * Mark some numerical references (cylinder n°) on the connecting rods, connecting rod caps **F1** , pistons and gudgeon pins to prevent unintentionally confusing the components not replaced during assembly. Failure to do this may result in engine malfunctions. * References on connecting rod **M** and cap **F1** must only be carried out on a side in correspondence with **K1** and **K2** , as illustrated in **Fig. 7.46a** .  1. Screw the bolt **AM** temporarily. 2. Unsrew bolts **E1** and remove the connecting rod caps **F1** . | Fig._7.46.jpg **Fig 7.46** |
| **NOTE** : coupling cap **F1** on the connecting rod can be carried out with centring taper pins **(Fig. 7.46b)** or broken ( **Fig. 7.46c** - without centring taper pins).    7.72.png  **Fig. 7.46b**  7.72b.png  **Fig. 7.46c** | 7.71.png  **Fig 7.46a** |
| 1. Pull out the connecting rod - piston assembly from position **2 and 3** by manually applying pressure on the connecting rod big end **L** in the direction of arrow **AK** . 2. Couple the connecting rod big end caps **L** with the relevant piston and connecting rod unit **M** . 3. Turn capscrew **AM** and rotate the crankshaft by 180°. 4. Repeat points **2 to 5** to disassemble the connecting rod-piston assembly to position **1 and 4** . | Fig._7.47.jpg **Fig 7.47** |
| Z_Avvertenza.jpg **Warning**       * The connecting rod half-bearings **Z** are made of special material. Therefore, they must be replaced every time they are removed to prevent seizures. | Fig._7.48.jpg **Fig 7.48** |
| **7.13.3 Lower semi-crankcase**  **3** **CYLINDERS**   1. Undo capscrews **E** and **F** by following the order indicated in the figure. 2. Remove the lower semi-crankcase **D** and store it in a suitable container for washing. | ***3******Cylinders***  Fig._7.74.jpg **Fig 7.49** |
| **4** **CYLINDERS**   1. Undo capscrews **E** and **F** by following the order indicated in the figure. 2. Remove the lower semi-crankcase **D** and store it in a suitable container for washing. | ***4******Cylinders***  Fig._7.75.jpg **Fig 7.50** |
| **7.13.4 Crankshaft**  Remove:   1. Crankshaft **G** . 2. The four shoulder semi-rings **H** . | Fig._7.52.jpg **Fig 7.51** |
| 7.13.5 Piston ( operazione_utile.gif )   1. Remove the retainer ring **N** . 2. Remove the pin **P** to separate the piston **Q** from the connecting rod **R** .       Z_importante.jpg **Important**       * If they are not replaced, keep the components together (connecting rod - piston - gudgeon pin) by using references in order to prevent them from getting mixed up during assembly. | Fig._7.53.jpg **Fig 7.52** |
| **7.13.5.1 Rings** ( operazione_utile.gif )   1. Remove the seal rings **S** . | Fig._7.54.jpg **Fig 7.53** |
| **7.13.6 Breather room closing cover**  ( operazione_utile.gif )     1. Undo the screws **AE** and remove the cover **AF** . | Fig._7.55.jpg **Fig 7.54** |
| **7.13.7 Camshaft**   1. Remove the retainer ring **V** . 2. Extract the camshaft **W** from the upper crankcase **AB** . | Fig._7.56.jpg **Fig 7.55** |
| **7.13.8 Camshaft tappets**   1. With a magnet, remove the tappets **AA** from the upper semi-crankcase **AB** . | Fig._7.57.jpg **Fig 7.56** |
| **7.13.9 Crankshaft bushings**   1. Remove the crankshaft bushings **AC** from the upper semi-crankcase **AB** .       Z_importante.jpg **Important**         * The crankshaft half-bearings **AC** are made of special material. Therefore, they must be replaced every time they are removed to prevent seizures. | Fig._7.58.jpg **Fig 7.57** |
| 1. Remove the crankshaft bushings **AF** from the lower crankcase **D** . | Fig._7.59.jpg **Fig 7.58** |
| 7.13.10 Cover 3 at PTO ( operazione_utile.gif )   1. Undo the screws **AG** . 2. Remove the cover **AH** and the gasket **AL** . | Fig._7.60.jpg **Fig 7.59** |

