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| **Information for disassembly** |
| **KDI 1903TCR / KDI 1903TCRE5 Workshop manual (Rev. 17.8)** |



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**Translated from the original manual in Italian language**

Data reported in this issue can be modified at any time by KOHLER.

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=120&parent=1000) .
* Before proceeding with operation, carefully read [**Chap. 3**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=114&parent=1000) .
* In order to operate safely and easily, we recommend positioning the engine on a rotating stand for engine overhauling.
* Seal all injection component unions as illustrated in [**Par. 2.9.8**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=103&parent=1000) 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=822&parent=1000) ), identified in [**Tab. 13.1 - 13.2 - 13.3**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=822&parent=1000) .

## EGR circuit disassembly

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| **7.2.1 EGR cooler unit**   1. Undo the screws **A** **(** [**ST\_06**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=822&parent=1000) **) and B** and remove the pipe **C** with the relative gaskets. | imm_01.jpg **Fig 7.1** |
| 1. Undo the screws **D, E** **(** [**ST\_06**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=822&parent=1000) **)** and remove pipe **F** and the relevant gaskets. | imm_02.jpg **Fig 7.2** |
| 1. Release the clamp **M** and remove pipe **N** . 2. Release the clamp **L** . 3. Undo capscrews **G** and remove EGR Cooler **H** from hose **X (** [**ST\_05**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=822&parent=1000) **)** . | imm_03.jpg **Fig 7.3** |
| **7.2.2 EGR Valve**   1. Disconnect the connector **P** . 2. Undo the screws **Q** and remove the EGR valve **R** with the relevant gasket.     **NOTE:** The EGR valve is not a serviceable item, and if damaged/worn, it should be replaced with a new one. | imm_04.jpg **Fig 7.4** |
| 1. Undo capscrews **S** and remove flange **T** with the relative gasket. | imm_05.jpg **Fig 7.5** |

## Electric components disassembly

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| **7.3.1 Electric wiring**    Z_importante.jpg **Important**       * Refer to [**Par. 2.13**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=107&parent=1000) prior to proceeding with disassembly.  1. Disconnect the connectors  **A, B and C** . 2. Release the clamp **D** . | imm_06.jpg **Fig 7.6** |
| 1. Disconnect the connectors **E, F and G** . 2. Release the clamps **J and H** . | imm_07.jpg **Fig 7.7** |
| 1. Disconnect the connectors **K and L** . | imm_08.jpg **Fig 7.8** |
| 1. Disconnect the connectors **M and P** . 2. Release the clamp **Q** . | imm_09.jpg **Fig 7.9** |
| 1. Disconnect the connectors **R** . 2. Undo the screws **S** and remove the wiring support **T** **(** [**ST\_06**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=822&parent=1000) **)** . | imm_10.jpg **Fig 7.10** |
| **7.3.2 Starter motor**    Z_importante.jpg **Important**       * The motor is not repairable.  1. Undo the screws **U** and remove the starter motor **V** . | 7.3.jpg **Fig 7.11** |
| **7.3.3 Belt and alternator**   1. Loosen the screws **Z and W** . 2. Push the alternator **AA** in the direction of the arrow **AB** . 3. Remove the belt **AC** from the pulleys **AR** . 4. Undo the screws **Z and W** and remove the alternator **AA** .     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. | imm_12.jpg **Fig 7.12** |
| **7.3.4 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.     **7.3.4.1 Oil pressure switch** ( operazione_utile.gif )   1. Unscrew and remove the oil pressure switch **AD** . | imm_13.jpg **Fig 7.13** |
| **7.3.4.2 Coolant temperature sensor** ( operazione_utile.gif )   1. Unscrew and remove the coolant temperature sensor **AE** . | imm_14.jpg **Fig 7.14** |
| **7.3.4.3 Speed sensor** ( operazione_utile.gif )   1. Undo the screw **AF** and remove the sensor **AG** with the relative spacer **(** [**ST\_06**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=822&parent=1000) **)** . 2. Undo the screws **AH** and remove the sensor **(** [**ST\_06**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=822&parent=1000) **)** . | imm_15.jpg **Fig 7.15** |
| **7.3.4.4 Camshaft phase sensor**   1. Undo the screw **AM** and remove the sensor **AN** with the relative spacer ( [**ST\_06**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=822&parent=1000) ). | imm_16.jpg **Fig 7.16** |
| **7.3.4.5 T-MAP Sensor** ( operazione_utile.gif )   1. Undo the screw **AP** and remove the sensor **AQ (** [**ST\_06**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=822&parent=1000) **).** | imm_17.jpg **Fig 7.17** |
| **7.3.4.6 Fuel filter water detection sensor** ( operazione_utile.gif )    Z_Avvertenza.jpg **Warning**       * The fuel filter is not always mounted on the engine. * When disassembling the sensor **A** , use a suitable container to recover the fuel contained in the cartridge **B** .      1. Unscrew the sensor **A** from the cartridge **B** . | imm_18.jpg **Fig 7.18** |

## Turbocharger disassembly

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| --- | --- |
| 1. Release the clamps **A and B** and remove the manifold **C** . | imm_19.jpg **Fig 7.19** |
| 1. Unscrew the fittings **D** and remove the pipe **E** with the relative gaskets **G** . 2. Undo the screws **F** . 3. Release clamp **M** . | imm_20.jpg **Fig 7.20** |
| 1. Undo the nuts **L** . 2. Remove tube **N** . | imm_21.jpg **Fig 7.21** |

## Exhaust manifold disassembly

|  |  |
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| 1. Undo the nuts **A** and remove the manifold **B** and the gaskets **C** . 2. Close the openings and manifolds to prevent foreign bodies from entering. | imm_22.jpg **Fig 7.22** |

## Coolant recirculation components disassembly

|  |  |
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| **7.6.1 Oil Cooler manifold**   1. Release the clamps **Z** . 2. Undo the screw **W** and remove hoses **J (** [**ST\_05**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=822&parent=1000) **)** . | imm_23.jpg **Fig 7.23** |
| 1. Release the clamp **K** and remove hoses **AA** . | imm_24.jpg **Fig 7.24** |
| **7.6.2** **Coolant pump**    Z_importante.jpg **Important**       * The pump **B** is not repairable.  1. Undo the screws **A** and remove the water pump unit **B** with its gasket **C** . | imm_25.jpg **Fig 7.25** |
| **7.6.3 Thermostatic valve**   1. Undo the screws **A** and remove the thermostatic valve cover **B** . 2. Remove the thermostatic valve **C** and its gasket.         Z_importante.jpg **Important**       * Always replace the gasket **D** every time it is disassembled.  1. Check that the air bleeding hole is not clogged or blocked ( [**Par. 2.11.4**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=105&parent=1000) ). | imm_26.jpg **Fig 7.26** |

## Crankshaft and target wheel pulley disassembly

|  |  |
| --- | --- |
| 1. Position the crankshaft with the 1st cylinder at TDC,reference **H** . 2. Undo the screw **C** clockwise. 3. Remove the drive pulley unit and the target wheel **D** . | imm_28.jpg **Fig 7.27** |

## Lubrication circuit disassembly

|  |  |
| --- | --- |
| 7.8.1 Oil pressure valve( operazione_utile.gif **)**   1. Undo the cap **A** . 2. Remove the spring **B** , check its condition and replace it if broken. 3. Remove the valve piston **C** using a magnet. | imm_29.jpg **Fig 7.28** |
| **7.8.2 Timing system carter oil filling flange** ( operazione_utile.gif **)**   1. Undo the screws **D** and remove the oil filling flange **E (** [**ST\_06**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=822&parent=1000) **)** . 2. Remove the gasket **F** . | imm_30.jpg **Fig 7.29** |
| **7.8.3 Timing system carter**   1. Ensure that the crankshaft with the 1st cylinder is at the TDC (taper pin **W** must be facing upwards). 2. Undo the screws **G** . 3. Remove the timing system semi-crankcase **H** . | imm_31.jpg **Fig 7.30** |
| **7.8.4 Oil pump**    Z_importante.jpg **Important**         * The oil pump is not repairable.      1. Undo the screws **L** and remove the pump unit **M** from the timing system carter **H** **(** [**ST\_06**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=822&parent=1000) **)** . | imm_32.jpg **Fig 7.31** |
| 1. Remove the rotors **N and P** from oil pump carter **M** . | imm_33.jpg **Fig 7.32** |
| **7.8.5 Oil Cooler unit and lub. oil filter**   1. Screw the lid cartridge holder **V** . 2. Undo the screws **Q, R** and remove Oil Cooler group **S** .       Z_Avvertenza.jpg **Warning**       * Use a suitable container to recover any residue oil. * Oil Cooler unit **S** is not repairable. | imm_34.jpg **Fig 7.33** |
| 1. Remove the gaskets **T and U** .     **NOTE:** To replace the oil cartridge, refer to [**Par. 6.10.2**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=132&parent=1000) . | imm_35.jpg **Fig 7.34** |
| **7.8.6 Oil vapour separator unit**   1. Release the clamps **AA** . 2. Remove the manifolds **AB, AC and** **AD** . 3. Remove the clamp **AE** by carefully cutting it at the point indicated and remove the oil separator **AF** . | imm_36.jpg **Fig 7.35** |
| 1. Undo the screws **AG** . 2. Remove la flangia di supportoRemove flange support **AH** and the gasket seal **AL** . | imm_37.jpg **Fig 7.36** |

## Intake manifold disassembly

|  |  |
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| 1. Undo the screws **A** and remove the semi-manifold **B (** [**ST\_05**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=822&parent=1000) **)** . 2. Remove the separation plate **C** and the gaskets **H** . | imm_38.jpg **Fig 7.37** |
| 1. Undo the screws **D (** [**ST\_06**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=822&parent=1000) **)** **and E** . 2. Remove the semi-manifold **F** and the gasket **G** . | imm_39.jpg **Fig 7.38** |

## Fuel system disassembly

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| **7.10.1 Fuel return pipes**   1. Release the clip **A** .       Z_Avvertenza.jpg **Warning**       * After removing the union, the clip **A** must automatically return to its initial position; otherwise it must be replaced.  1. Undo the **B** distributor return fixing capscrew. 2. Release the clamp **D** . 3. Disconnect the pipe **E** from the fuel return fitting. 4. Undo and remove the screw **G** with the relative gaskets and put the cap on the Common Rail pressure relief valve **AA** . 5. Disconnect unions **M** from electronic injectors **N** . 6. Remove the fuel return pipes. | imm_40.jpg **Fig 7.39**imm_41.jpg **Fig 7.40** |
| **7.10.2 Fuel flow pipes**    Z_importante.jpg **Important**         * Seal all openings of the inlet and return unions on the injection pump **D** with the relevant caps, in order to prevent impurities from entering.      1. Loosen the clamps **P** . 2. Remove the pipes **Q and R** . | imm_42.jpg **Fig 7.41** |
| **7.10.3 High pressure fuel pipes**    Z_Pericolo.jpg **Danger**       * 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=199&parent=1000) . * Ensure that the Common Rail is not under pressure by slowly and carefully unscrewing one of the nuts **S** .      1. Loosen the nuts **S and T** in sequence. 2. Fully undo the nuts **S and T** in sequence, and remove the high pressure pipes **U and** **V** . | imm_43.jpg **Fig 7.42** |
| **7.10.4 Common Rail**   1. Undo the screws **AB** and remove the Common Rail **AC** .     **NOTE:** Take care to protect te sensor **AD** from knocks, moisture and any high temperature source. The internal parts of the rail cannot be repaired.    Z_importante.jpg **Important**       * Seal all injection component unions as illustrated in [**Par. 2.9.8**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=103&parent=1000) . * Common rail cannot be repaired. | imm_44.jpg **Fig 7.43** |
| **7.10.5 Electronic injectors**    Z_importante.jpg **Important**       * In the event that the electronic injectors are disassembled (not necessarily replaced), mark them with the relevant cylinder number from which they originate so as not to confuse them during re-assembly **(Fig. 7.45)** . * The electronic injectors cannot be repaired. * If one or more electronic injectors are to be replaced, the new calibration data must be inserted in the ECU via a specific instrument ( [**ST\_01**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=822&parent=1000) ). * Be careful not to damage the gaskets **X** .      1. Undo capscrews **AE** and remove them together with the relative washers **AF** and then brace **AG** . 2. Pull out the electronic injector **AH** .     **NOTE:** Should you be unable to remove the electronic injector (acting only on point **BC** ), use an open-ended spanner (Ø 34 mm), by applying small rotations to unblock the component.     1. Seal all injection component unions as illustrated in [**Par. 2.9.8**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=103&parent=1000) . 2. Ensure that gasket **AL** has remained in the correct position **(Fig. 7.46)** . Otherwise, recover the gasket from inside the electronic injector **AM** . | imm_45.jpg **Fig 7.44**imm_46.jpg **Fig 7.45** |
| 7.10.6 Fuel filter ( operazione_utile.gif )   1. Undo the fuel cartridge **AW** from support **AP** . 2. Undo the screws **AN** and remove the filter support **AP** . | imm_47.jpg **Fig 7.46** |
| **7.10.7 High-pressure fuel injection pump**    Z_importante.jpg **Important**       * Before disassembling, carefully read [**Par. 2.17**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=112&parent=1000) . * The injection pump is not repairable * Should the fuel feeding pump need to be replaced, after assembly, it is necessary to perform the Pump Learning procedure by means of instrument [**ST\_01**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=822&parent=1000) .      1. Undo the nut **AQ** . 2. Loosen the screws **AR** of the injection pump. 3. Screw the tool [**ST\_04**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=822&parent=1000) on the thread of the gear **AS** . 4. Tighten the screw **AT** on the puller to disconnect the gear **AS** from the injection pump and remove the injection pump control gear **AS** . 5. Undo the screws **AR** . 6. Remove injection pump **AU**   and the relative gasket **AV** . 7. Seal all injection component unions as illustrated in [**Par. 2.9.8**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=103&parent=1000) . | imm_48.jpg **Fig 7.47**imm_49.jpg **Fig 7.48** |

## Timing system gear disassembly

|  |  |
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| 1. Unscrew screws **H** and remove target wheel **G** . 2. Unscrew screws **D** and remove camshaft gear **E** . 3. Remove retainer ring **A** and the shoulder ring **B** . 4. Remove the intermediate gear **C** . | imm_50.jpg **Fig 7.49** |
| 1. Remove the shoulder ring **F** . 2. Unscrew the screws L and remove the intermediate gear support **M** . | imm_51.jpg **Fig 7.50** |

## Flange unit disassembly

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| **7.12.1 Flywheel**    Z_importante.jpg **Important**       * Leave the special tool [**ST\_34**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=822&parent=1000) for blocking the flywheel **(** [**Par. 7.7**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=140&parent=1000) **)** .  1. Only undo the screw **C** located uppermost. 2. Insert the tool [**ST\_09**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=822&parent=1000) 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 the utmost attention while removing it in order to prevent it dropping or falling, as this may have serious consequences for the operative.  1. Remove the flywheel **E** . 2. Remove the tool [**ST\_09**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=822&parent=1000) . 3. Remove the tool [**ST\_34**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=822&parent=1000) shown in [**Fig. 7.11**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=136&parent=1000) **.** | imm_52.jpg **Fig 7.51** |
| **7.12.2 Flange housing**   1. Undo the screws **A** and remove the engine housing **B** .       Z_Pericolo.jpg **Danger**       * The flange housing is very heavy. Pay the utmost attention while removing it in order to prevent it dropping or falling, as this may have serious consequences for the operative. | imm_53.jpg **Fig 7.52** |

## Cylinder head unit disassembly

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| **7.13.1 Rocker arms cover**   1. Undo the screws **A** . 2. Remove the rocker arms cover **B** . 3. Remove the gasket **C** . | imm_54.jpg **Fig 7.53** |
| **7.13.2 Rocker arm pin**   1. Undo the screws **D** . 2. Remove the rocker arm pin unit **E** . | imm_55.jpg **Fig 7.54** |
| 7.13.2.1 Rocker arm ( operazione_utile.gif )   1. Remove the retainer ring **F** . 2. Remove the shoulder rings **G** . 3. Remove the rocker arms **H** . | imm_56.jpg **Fig 7.55** |
| **7.13.3 Valve rods and bridges**   1. Remove the valve control U-bolts **M** . 2. Remove the rocker arm control rods **N** . | imm_58.jpg **Fig 7.57** |
| **7.13.4 Cylinder head**    Z_importante.jpg **Important**       * The cylinder head fastening bolts **P** must be replaced every time they are disassembled.  1. Undo the bolts **P** .         Z_importante.jpg **Important**       * To lift cylinder head **Q** , only use both eyebolts **AE** provided by **KOHLER** (refer to **Fig. 7.66** ). * When removing the cylinder head **Q** and subsequent disassembly, control, and assembly operations, it is necessary to protect the contact surface **W** of cylinder head **Q** and crankcase **J** against impacts.  1. Remove the cylinder head **Q** . 2. Remove the head gasket **R** . | imm_59.jpg **Fig 7.58**imm_60.jpg **Fig 7.59** |
| **7.13.4.1 Valves** ( operazione_utile.gif )   1. Mount the tool [**ST\_07**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=822&parent=1000) on the head **AF** 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 [**ST\_07**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=822&parent=1000) on the valve as shown in the figure. | imm_61.jpg **Fig 7.60** |
| 1. Push the lever of the tool [**ST\_07**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=822&parent=1000) downwards, in order to lower the valve plates **S** in the direction of the arrow **T** , remove cotters **U** using a magnet.   **NOTE:** Repeat all the operations for all the valves concerned. | imm_62.jpg **Fig 7.61** |
| Z_importante.jpg **Important**       * Before removing the valves, make some marks to record their original position, in order to avoid confusing them when reassembling (if they are not replaced).  1. Remove the valves **V** . | imm_63.jpg **Fig 7.62** |
| **7.13.4.2 Electronic injector sleeves** ( operazione_utile.gif )   1. Unscrew and remove the sleeves **Z** from the head **Q** . 2. Remove the gaskets **AA and AB** . | imm_64.jpg **Fig 7.63** |
| **7.13.4.3 Valve stem gasket** ( operazione_utile.gif )   1. Remove the gaskets **AC** . | imm_65.jpg **Fig 7.64** |
| **7.13.4.4 Lifting eyebolts** ( operazione_utile.gif )   1. Undo the screws **AD** and remove the eyebolts **AE** . 2. Thoroughly wash the cylinder head **Q** . | imm_66.jpg **Fig 7.65** |

## Oil sump unit disassembly

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| **7.14.1 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** . | imm_67.jpg **Fig 7.66** |
| **7.14.2 Oil suction pipe**   1. Undo the screws **C** and remove the oil pipe **D** . | imm_68.jpg **Fig 7.67** |
| 7.14.3 Oil vapour pipes ( operazione_utile.gif )   1. Unscrew and remove the pipes **E** . | imm_69.jpg **Fig 7.68** |

## Engine block disassembly

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| **7.15.1 Crankshaft gasket flange**   1. Undo the screws **A** . 2. Remove the flange **B** and the gasket **C** . | imm_70.jpg **Fig 7.69** |
| **7.15.2 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. 7.70a** .  1. Screw the bolt **AM** temporarily. 2. Unsrew bolts **E1** and remove the connecting rod caps **F1** . | imm_71.jpg **Fig 7.70** |
| **NOTE** : coupling cap **F1** on the connecting rod can be carried out with centring taper pins **(Fig. 7.70b)** or broken ( **Fig. 7.70c** - without centring taper pins).    7.72.png  **Fig. 7.70b**  7.72b.png  **Fig. 7.70c** | 7.71.png  **Fig 7.70a** |
| 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** . | imm_72.jpg  **Fig 7.71** |
| 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. | imm_73.jpg **Fig 7.72** |
| **7.15.3 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 7.73** |
| **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 7.74** |
| **7.15.4 Crankshaft**   Remove:   1. Crankshaft **G** . 2. The shoulder semi-rings **H** . | imm_76.jpg **Fig 7.75** |
| 7.15.5 7.15.5 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. | imm_77.jpg **Fig 7.76** |
| **7.15.5.1 Rings** ( operazione_utile.gif )   1. Remove the rings **S** . | imm_78.jpg **Fig 7.77** |
| **7.15.6 Oil spray nozzles** ( operazione_utile.gif )   1. Undo the screws **T** and remove the spray nozzles **U** from the upper semi-crankcase **AB** . | imm_79.jpg **Fig 7.78** |
| **7.15.7 Camshaft**   1. Remove the lock ring **V** . 2. Extract the camshaft **W** from the upper semi-crankcase **AB** . | imm_80.jpg **Fig 7.79** |
| **7.15.8 Camshaft tappets**   1. With a magnet, remove the tappets AA from the upper semi-crankcase **AB** . | imm_81.jpg **Fig 7.80** |
| **7.15.9 Crankshaft bushings**   1. Remove the crankshaft bushings **AC** from the upper 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. | imm_82.jpg **Fig 7.81** |
| 1. Remove the crankshaft bushings **AF** from the lower semicrankcase **AE** . | imm_83.jpg **Fig 7.82** |
| **7.15.10** Cover 3 th PTO ( operazione_utile.gif )   1. Undo the screws **AG** . 2. Remove the cover **AH** and the gasket **AL** from the semicrankcase top. | imm_84.jpg **Fig 7.83** |

