



University of Wales Trinity Saint David

School of Engineering

Technical Report

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1 Introduction / Objectives

One of the main objectives of this report is to explain the engine tear down process for a 2004-2008 Honda CBR 600RR engine. This report will be specifically focusing on how to properly remove the following parts: crank shaft, pistons, exhaust valves and intake valves. All these parts were removed from the engine in order to gain practical knowledge regarding how a motorcycle engine is designed and how to successfully assemble and disassemble an engine. Throughout this procedure a workshop log book was kept explaining what tools, procedures and knowledge was gained by removing each engine component. This report will also clarify how to accurately diagnose mechanical problems during the tear down process to avoid further problems from occurring when the engine is reassembled. Furthermore, this report will discuss the health and safety procedures followed throughout the entire process.

2 Workshop Rules and Regulations

The motorcycle engineering program at UWTSD uses a purpose-built workshop catered to motorcycle applications for teaching hands-on lessons. This meant that before any work can commence in the workshop all students must attend a mandatory rules and regulations class to discuss the specific legislations that apply to the workshop. As per the 'Safe working practice in workshops' defined by UWTSD (Roger, 2018), outlines that the motorcycle workshop must have John Kinsella present during times of high risk activities or must have taken responsibility of the student during low risk activities. During the engine tear down process all the activities that took place in the workshop fell into the category of low risk activities. This meant that John Kinsella had to check in on students and make sure they had already completed the workshop introduction class. He then also had to take responsibility for all the students in the workshop before work could be carried out.

3 Health and Safety

The most important topic covered in the workshop introduction class given by John Kinsella was that the health and safety of all participants in the workshop was the number one priority. During times of work, the following items of PPE (personal protective equipment) were required by each student:

- Steel toe boots - both the shank and toe of the shoe must be protected
- Safety glasses - must be worn at **all** times
- Rubber gloves - only when dealing with solvents
- Coveralls - not mandatory but are suggested to be worn when dealing with dirty surfaces

Along with the selected PPE outlined by the University of Wales Trinity Saint David, the students must also comply with the following guidelines:

- Absolutely no food or drink in the workshop space
- While lifting heavy objects (over 20kg) two people must complete the lift, also using your legs while lifting is very important
- Keeping your individual and overall workspace of the workshop in a very clean and tidy manner to avoid any unnecessary accidents
- Be aware of your surroundings and always know who you are working with
- Use all tools and equipment correctly - meaning that all the correct training has been completed for that specific tool
- Report any accidents immediately and to stop work during these times
- Identify all fire exits and where the muster point is located
- Colour coding system must be followed, reference Figure 1



Figure 1- Workshop Colour Coding System (Sorg, 2018)

4 Engine Disassembly (October 23, 2017)

During the October 23, 2017 workshop session, the Honda CBR 600RR engine had the following parts removed from the engine: crank shaft, pistons, exhaust valves and intake valves. The following describes the process used to remove the individual components with the help of the 2005-2006 Honda CBR 600RR service manual (Honda, 2006).

4.1 Crank Shaft

1. Before removal, all the pistons were positioned at TDC (Top Dead Centre), see Figure 2.

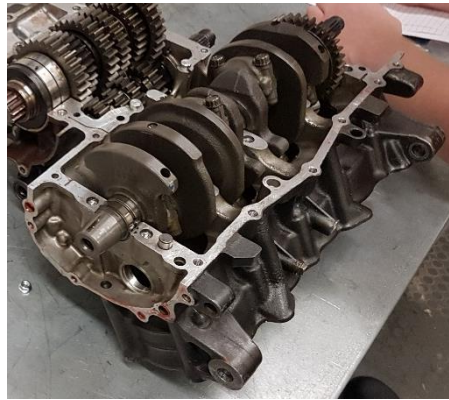


Figure 2- Crankshaft Position at TDC (Sorg, 2017)

2. All the bearing caps and bearings were numbered so that they can be assembled in the same location on the crankshaft
3. All the connecting rod bolts and bearing caps were loosened and removed using a 8mm socket with a ¼ inch drive ratchet (Honda, 2006, p. 187)
4. The Crankshaft was then removed by lightly tapping the caps to loosen the crankshaft
5. The oil jets were then removed and inspected for clogged jets, all of them showed no problems, reference Figure 3.



Figure 3- Oil Jet Location (Honda, 2006, p. 192)

4.2 Pistons

After the crankshaft is removed and assuming all bearing caps have been removed the following steps can be followed to safely remove the pistons.

1. Before removing the pistons, a towel was placed around the connecting rod to prevent damaging the cylinder sleeve (Honda, 2006, p. 211)
2. The piston assembly was then extracted from the top of the cylinder as the bottom of the cylinder does not have enough clearance, see Figure 4.

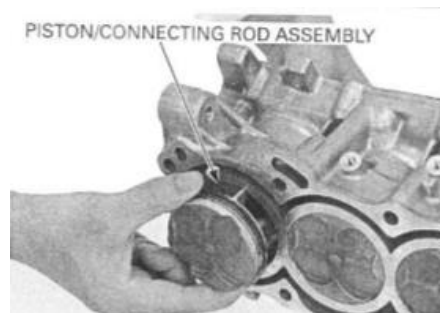


Figure 4-Direction of Piston Removal (Honda, 2006, p. 267)

3. Then the pistons were then numbered to make sure which cylinders the pistons were removed from reference Figure 5.



Figure 5-Pistons Removed and Numbered (Sorg, 2017)

These particular pistons and cylinder walls displayed a large amount of scoring- indicating that the pistons were not being properly lubricated.

4.3 Exhaust and Intake Valves

The cylinder head had been previously removed from the engine thus giving direct access to remove the valves and springs from the cylinder head. The following process was used:

1. From the top of the cylinder head a homemade spring compressing tool (see Figure 6) was used to evenly apply pressure to the outer and inner springs so that the cotters can be removed



Figure 6- Homemade Spring Compressor Tool (Sorg, 2018)

2. While removing the cotters a small amount of grease was applied to the end of a screwdriver to help extract them from the valves

The cylinder head and valvetrain was then cleaned. During the inspection, no obvious signs of excessive wear were found apart from slight scratching which was likely to have been caused by the high mileage of the engine.

5 Conclusion

The most important discovery made while inspecting the engine was that the pistons and cylinder walls had a large amount of scoring and that adjacent parts such as the cylinder head and crankshaft also showed signs of significant usage. This lab session demonstrated that in order to be successful in diagnosing and removing parts from an engine you must be very detail oriented and make sure to never overlook the smallest of details.

6 Bibliography

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