



ENGINE TEARDOWN

# Outdoor Power and Recreation

SECONDARY

# Engine Teardown

Do not start this lab until told that the competition is ready to start.

**If there is something you don't understand, you may ask for clarification from a judge.**

You will be disassembling this engine completely to measure the internal components. Follow the manual for the proper procedures and specs.

All gaskets will be reused. If you damage a component, marks will be deducted. Please take pride in your workspace.

**\*Ensure all measurement specifications are in metric and all your measurements are in metric. Always indicate the unit of measure is indicated.**

## Start Here: Disassembly

Following the service manual procedure, disassemble and measure the internal engine components. Answer all questions and fill in all tables. Ensure you have the judge verify your work at the appropriate times indicated.

## Cylinder Head

Using the service manual, locate and record the following specifications and perform the required measurements.

Component	Measurement
Intake Valve Guide ID	
Intake Valve Stem Dia.	
Calculate: Intake Valve to Guide Clearance	
Exhaust Valve Guide ID	

<b>Exhaust Valve Stem Dia.</b>	
<b>Calculate: Exhaust Valve to Guide Clearance</b>	

## Piston and Rings

Component	Measurement
<b>Piston Pin Diameter</b>	
<b>Compression Ring</b>	<b>Side Clearance:</b>
	<b>End Gap:</b>
<b>Wiper Ring</b>	<b>End Gap:</b>
<b>Oil Control Ring</b>	<b>End Gap:</b>
<b>Piston Diameter</b>	

Where did you measure the Piston diameter? \_\_\_\_\_

## Crankshaft and Connecting Rod

Component	Measurement
<b>Crankshaft Crank Pin Journal Diameter</b>	
<b>Connecting Rod to Crank Pin Clearance</b>	<b>Plasti-gauge width:</b>

<b>Calculate Connecting Rod Crank Pin Bearing Bore Diameter</b>	
<b>Crankshaft MAG Bearing Journal Diameter</b>	
<b>Crankshaft PTO Bearing Journal Diameter</b>	

## Cylinder Bore

Make your 6 bore measurements and then calculate Taper, Out of Round, and Piston to Cylinder Clearance.

Cylinder Diameter	Measurements	Measurements	Out Of Round Measurement
Top	A	B	
Middle	C	D	
Bottom	E	F	
Taper Measurement			
Calculate Piston To Cylinder Clearance			

## Camshaft

Component	Measurement
MAG Camshaft Journal	
PTO Camshaft Journal	
Intake Lobe Height	
Calculate Intake Cam Lobe Lift	

## Reassembly

If you have completed all of the previous tables, you are now ready to reassemble your engine.

Fill in the torque table and torque all fasteners to spec.

**Ensure that you call your Judge over to inspect before you:**

- Put piston in the ring compressor
- Install cylinder head
- Install sump cover
- Adjust Valve clearance to specification

Answer all the reassembly related questions.

## Torques and Specifications

Component	Specification
Connecting Rod Bolts	14 Nm
Flywheel Nut	113 Nm

<b>Sump Cover Bolts</b>	<b>24 Nm</b>
<b>Cylinder Head Bolts</b>	<b>34 Nm</b>
<b>Valve Cover Bolts</b>	<b>9 Nm</b>
<b>Rocker Arm Ball Lock Nut</b>	<b>9.8 Nm</b>
<b>Spark Plug</b>	<b>17 Nm</b>
<b>Muffler Nuts</b>	<b>28 Nm</b>
<b>Armature Screws</b>	<b>9 Nm</b>
<b>Measure and set the IGN coil air gap to a spec you would recommend</b>	
<b>Armature air gap setting recommendation</b>	

## Reassembly Questions

1. When reassembling the piston and rings, what are 3 points we need to remember in reference to ring orientation?

- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

2. What orientation are the oil holes on the connecting rod?

- \_\_\_\_\_

3. Why does the piston have a raised dot on the crown?

- \_\_\_\_\_

4. Which way does this raised dot face?

- \_\_\_\_\_

5. When do we need to De-Glaze the cylinder?

- \_\_\_\_\_

6. When would you need to hone or resize the cylinder?

- \_\_\_\_\_

7. When you finish honing the cylinder, how is it final cleaned before reassembly?

- \_\_\_\_\_
- \_\_\_\_\_

8. What is the recommended engine oil for this engine?

- \_\_\_\_\_

9. What type of lubrication system does this engine use?

- \_\_\_\_\_

10. What needs to be done to the flywheel taper prior to installing the flywheel?

- \_\_\_\_\_

**You are now finished the Lab. Clean your work area and return special tools.**



NUMERACY



READING



WRITING



PROBLEM SOLVING