



ENGINE TEARDOWN

Outdoor Power and Recreation Equipment

SECONDARY

Engine Measurement

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 of 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	Reject Size	Measurement
Intake Valve Guide ID		
Intake Valve Stem Dia.		
Calculate: Intake Valve to Guide Clearance		
Exhaust Valve Guide ID		

Exhaust Valve Stem Dia.		
Calculate: Exhaust Valve to Guide Clearance		

Piston and Rings

Component	Reject Size	Measurement
Piston Pin Diameter		
Compression Ring	Side Clearance:	
	End Gap:	
Wiper Ring	End Gap:	
Oil Control Ring	End Gap:	
Piston Diameter		

Where did you measure the Piston diameter? _____

Crankshaft and Connecting Rod

Component	Reject Size	Measurement
Crankshaft Crank Pin Journal Diameter		

Connecting Rod to Crank Pin Clearance		Plastigauge width:
Calculate Connecting Rod Crank Pin Bearing Bore Diameter		
Crankshaft MAG Bearing Journal Diameter		
Crankshaft PTO Bearing Journal Diameter		

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			
Max Taper		Taper Spec:	
Max Out of Round		Out of Round Spec:	

Calculate Piston To Cylinder Clearance			
--	--	--	--

Camshaft

Component	Reject Size	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 of the reassembly related questions.

Torques and Specifications

Component	Specification
Connecting Rod Bolts	
Flywheel Nut	
Sump Cover Bolts	
Cylinder Head Bolts	
Valve Cover Bolts	
Rocker Arm Ball Lock Nut	
Spark Plug	
Muffler Nuts	
Armature Screws	
Armature Air Gap	
Recommended Engine Oil	

Assembly Lubrication

Identify the proper lubrication for each component upon reassembly.

Component	Lubricant

Piston Pin and Pin Boss	
Cylinder Bore	
Crankpin	
Valve Guides and Stems	
Valve Stem Seals	
Camshaft Bearings	

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 triangle/arrow on the crown?

- _____
- _____

4. Which way does this triangle/arrow 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 purpose of the sensor in the sump?

• _____
•

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.



READING



WRITING



NUMERACY