

Name _____

Period _____

Four Stroke Cycle Engine

Disassembly, inspection, Repair and Assembly

Date Started _____ Date Completed _____

Engine Ran Yes _____ No _____

Comments _____

School Engine Yes _____ No _____

Make of Engine _____

Model	Type	Code
_____	_____	_____

Directions:

Follow the step-by-step procedures listed below. You must have these sheets completely done in order to receive credit for your work. **You must check with your teacher at each point requiring approval. Also check with your teacher before you begin the assembly process.**

Check when Complete

Pre-disassembly checks

1. _____ Does the engine have **GOOD SPARK**? Yes _____ No _____
2. _____ Disconnect the spark plug wire from the spark plug.
3. _____ Remove the **SPARK PLUG**.
4. _____ Check compression. Install the compression tester in to the spark plug hole with the proper tip. Pull the rewind until the need stops bouncing.
 - a. Pressure _____

Disassembly

5. _____ Completely drain all oil and gas into a drain pain.

6. ____ Remove pulley, blade, blade adapter, and anything else attached to the crank shaft. Make sure to loosen any allen set screws and use the proper puller.
7. ____ Use abrasive paper to clean and polish the end of the crankshaft.
8. ____ Remove the engine shroud.
9. ____ Remove the muffler and air cleaner.
10. ____ Draw a sketch of the governor linkage in respect to the carburetor and the governor system. If applicable have the instructor take a picture.

11. ____ **Teacher Approval** **Sketch Approved**_____

12. ____ Check and measure air gap between the fly wheel and armature.
 - a. Measure air gap_____
 - b. Required air gap in manual_____
13. ____ Disconnect and remove carburetor, gas tank, governor blade and or linkage.
14. ____ Remove the cylinder head and gasket.
15. ____ Remove the valve cover plate.
16. ____ Measure and report the valve tappet clearance for each valve.
 - a. Intake Valve_____
 - b. Exhaust Valve_____

17. ____ **Teacher Approval**

18. ____ Report the valve tappet clearance recommended by the manufacturers.
 - a. Intake Valve_____
 - b. Exhaust Valve_____
19. ____ Remove the valve springs and valves. Note if one spring is heavier.
 - a. Intake____
 - b. Exhaust____

20. ____ Ask instructor's permission to remove the flywheel.

21. ____ **Teacher Approval**

22. ____ Remove the flywheel. Make sure not to lose the flywheel key.
23. ____ Does this engine have points? Yes____ No____
 - a. If it has points, remove points and condenser and measure
 - b. Point gap_____
 - c. Point gap listed in manual_____

24. ____ Use abrasive paper to clean the crankshaft end, once it is cleaned remove the crankcase cover plate.
25. ____ Note the position of timing marks on the crankshaft timing gears. If marks are not visible, use a center punch and properly mark both the camshaft gear and crankshaft gear.
26. ____ Remove the camshaft and tappets.
27. ____ Remove the bolts from the connecting rod, note the position if it is offset to one side.
28. ____ Push the piston and connection rod out the top of the cylinder.
29. ____ Remove the crankshaft.

Inspection

30. ____ Condition of flywheel key. Good____ Replace____
31. ____ Condition of breaker pints if applicable. Good____ Replace____
32. ____ Condition of spark plug. Good____ Replace____
33. ____ Condition of ignition wiring. Good____ Replace____
34. ____ Condition of cylinder head gasket. Good____ Replace____
35. ____ Condition of valves (stems, face, margin). Good____ Replace____
36. ____ Condition of valve seats. Good____ Replace____
37. ____ **Piston rings, at no time should you remove these. Be extra careful since they are extremely brittle and can break easily.**
38. ____ Condition of piston. Good____ Scoring____
 - a. Dimensions
 - Top____
 - Bottom____
 - Out of round____
 - Taper____
39. ____ Cylinder wall condition. Good____ Grooved____
 - a. Dimensions
 - Top____
 - Bottom____
 - Out of round____
 - Taper____
40. ____ Crankshaft condition (scoring, bent). Good____ Poor____
41. ____ Condition of bearings and seals. Good____ Poor____
42. ____ Report the cylinder bore according to the specifications of the engine.
 - a. Bore____

Repairs

43. ____ Clean all parts in the parts washer.
44. ____ Hone the cylinder walls if they are grooved.
45. ____ Reface valves and valve seats.
46. ____ Replace oil seals if the old one are cracked or tore during disassembly.
47. ____ Make sure the rewind spring and rope are in good working condition, if not make the necessary repairs.
48. ____ Other-broken parts or problems with the engine _____

Assembly Teacher Approval

49. ____ Install tappets first.
50. ____ Install the crankshaft. Turn crankshaft until timing marks are facing carburetor side of the cylinder. **NOTE: Many models have a removable timing gear. Be sure to replace so the timing marks are visible.**
51. ____ Install cam gear with timing marks aligned.

Teacher Approval

52. ____ Install piston and rod assembly in cylinder. Use piston ring compressor. Be sure connection rod does not hit the crankshaft journal. Oil crankpin and install connecting rod cap with marks aligned.
53. ____ Torque connecting rod bolts to proper torque. Rotate crankshaft at least two revolutions to be sure it turns freely. If rod hits, rod is installed wrong or cam gear is out of time.
 - a. **Connecting rod bolts torque** _____

Teacher Approval

54. ____ Position oil slinger, oil pump or mechanical governor.
55. ____ Replace dump or crankcase cover using new gasket.
56. ____ Measure valve tappet clearance and adjust.
 - a. Intake _____ Should be _____
 - b. Exhaust _____ Should be _____

Teacher Approval

57. ____ Install valves, springs, retainers.
58. ____ Replace armature and governor blade.

59. ____ Install breaker points, if your engine has them
 a. Point Gap_____
60. ____ Replace valve cover plate.
61. ____ Replace head and gasket and torque to proper spec. and sequence.
 a. Torque_____
- b. Draw a picture of the proper sequence.
-
62. ____ Replace flywheel, reuse old key or new one key if need.
 a. Torque_____
63. ____ Set armature air gap between the flywheel and armature.
 a. Required air gap in manual_____
64. ____ Replace carburetor, make sure to hook up all linkage proper, refer to pictures from earlier during disassembly.
65. ____ Replace engine shroud.
66. ____ Replace gas tank and air filter/cleaner.
67. ____ Replace muffler.
68. ____ Gap the spark plug to proper gap.
 a. Proper gap_____
69. ____ Place engine back on the deck and replace all blades, pulleys, and cables.
70. ____ Check for good spark. Spark: Good_____ Bad/None_____
71. ____ If good spark check compression.
 a. Compression_____

Teacher Approval_____

72. ____ Fill oil and gas to the proper level.
73. ____ Start engine on the deck or engine stand
 a. Run Yes____ No____

Teacher Approval_____