



Model 120000 & 150000 Intek Horizontal OHV Teardown and Rebuild

Includes additional information on:

- *Engine Configuration*
- *Engine Identification*
- *4-Cycle Theory*
- *Fuel and Oil Recommendations*
- *Genuine Parts Recommendations*

NOTE: 150000 series engine specifications/information is recorded in Red font.

Also, see informational notes in the boxes below each slide.

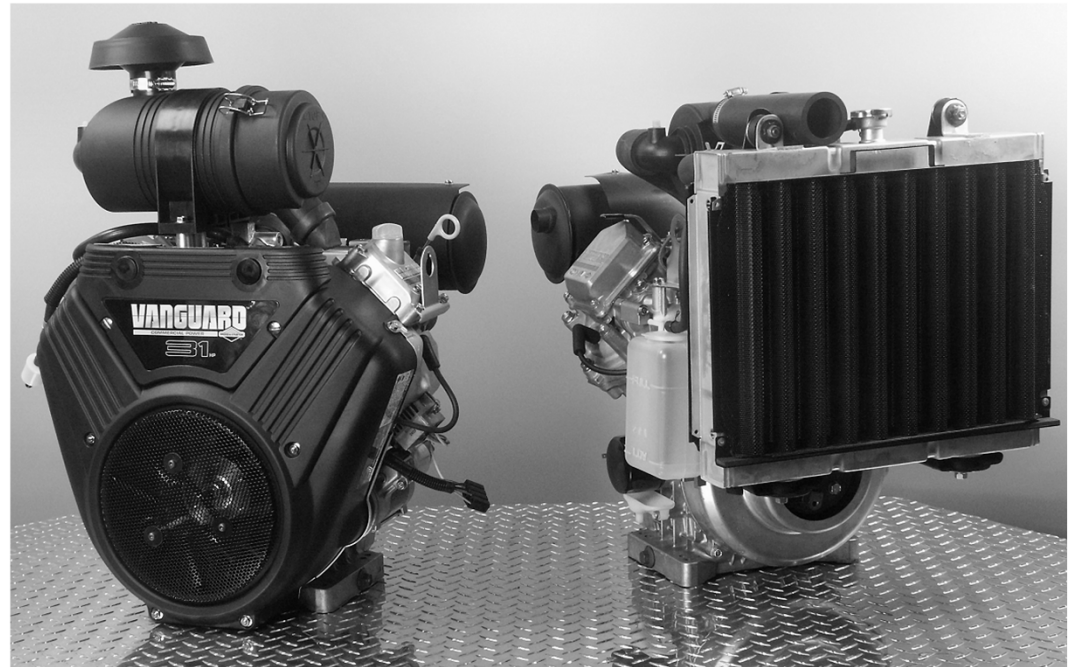


Class Objectives

- Air Cooled Verses Water Cooled
- Vertical Verses Horizontal Orientation
- L-Head Verses OHV Engines
- Engine Identification Numbers
- 4-Cycle Theory
- Teardown & Rebuild of a Horizontal OHV Engine
- Fuel and Oil Recommendations

Air Cooled Verses Liquid Cooled

- Lower production costs
 - Less parts
- Less room required for installation
- Higher operating temperatures
- Liquid-Cooled has greater longevity



Horizontal Configuration

- Crankshaft PTO comes out the side
- Uses include
 - Generators
 - Pumps
 - Log Splitters
 - Tillers
 - Snow blowers



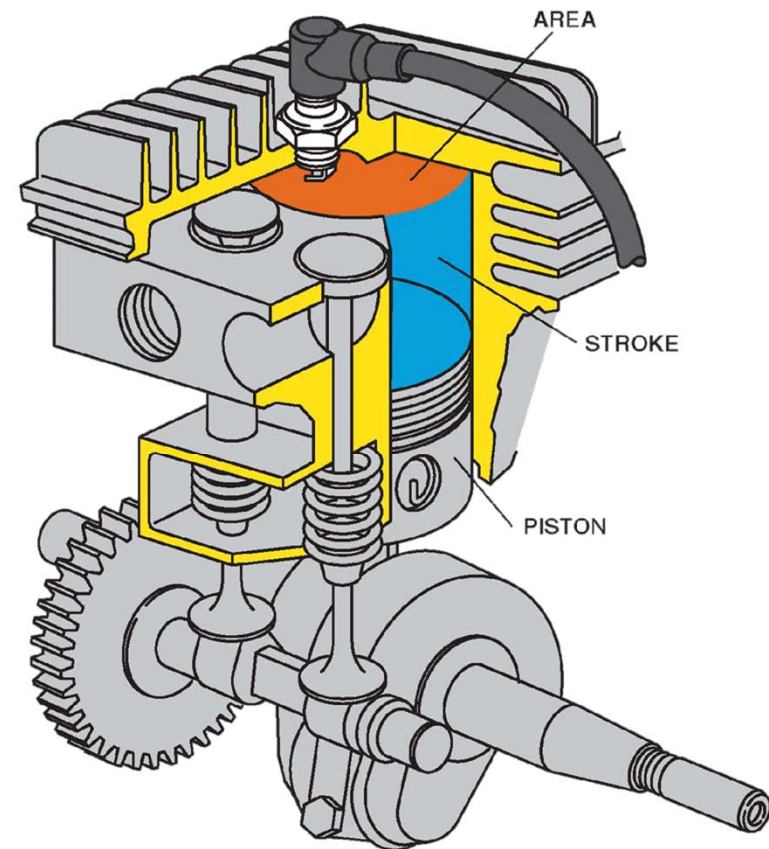
Vertical Configuration

- Crankshaft PTO comes out the bottom
- Uses include
 - Walk behind lawn mowers
 - Rear Engine Riders
 - Tractors



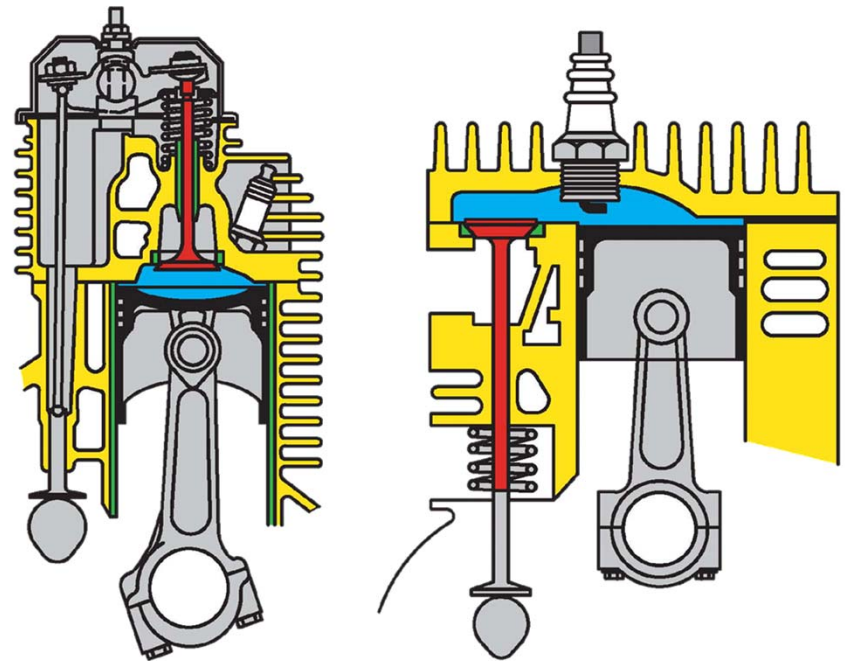
L-Head

- Valves next to cylinder
- Lower production costs - Less parts
- Lower compression ratio



OHV – Overhead Valve

- Valves on top of piston
- Runs cooler
- Greater longevity
- Higher compression ratio – More power



Engine Identification

- Model Number
5 - 6 Digit #
See Manual for Number Information
- Type Number (see Next Slide)
- Code Number (see Next Slide)
- Stamped in metal
- New units also have a decal with individualized number on Shroud Cover



Engine Model # Identification

- Code #: Year, Month, Day = 2019, January, 15 when engine was manufactured. 88 would indicate the assembly line and manufacturing plant

Model #

Model number

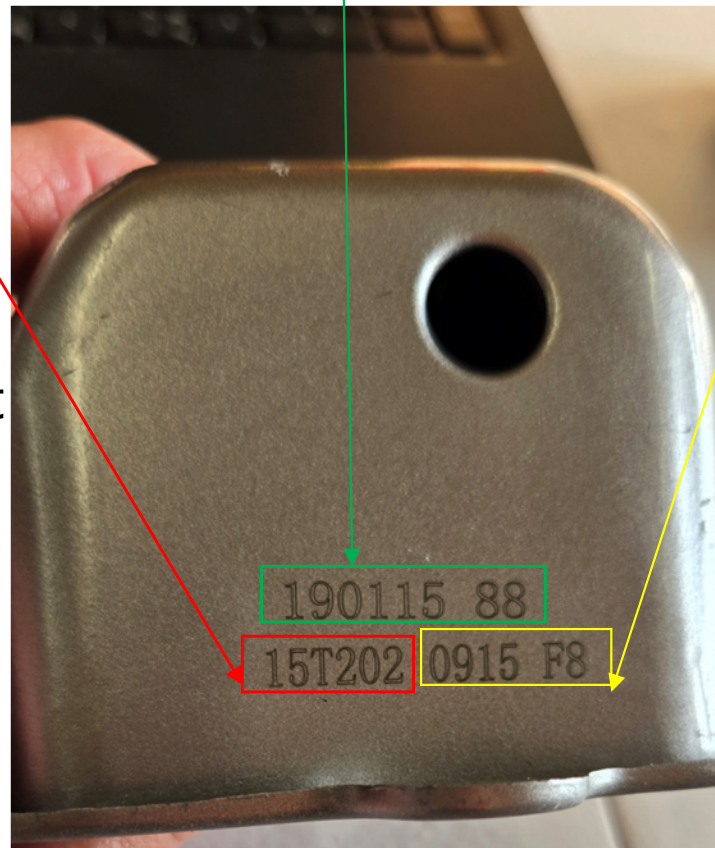
Characteristics:

15: Cubic Inch Displacement

T: Design series

2: Horizontal Shaft

0: Plain Bearing/DU Non-
Flange Mount



Type #

The type number characteristics, identifies the engine mechanical parts, paint color, decals, governed speed, & original equipment manufacturer



4-Cycle Theory

- Let's spend a few minutes understanding the 4-cycle theory of operation



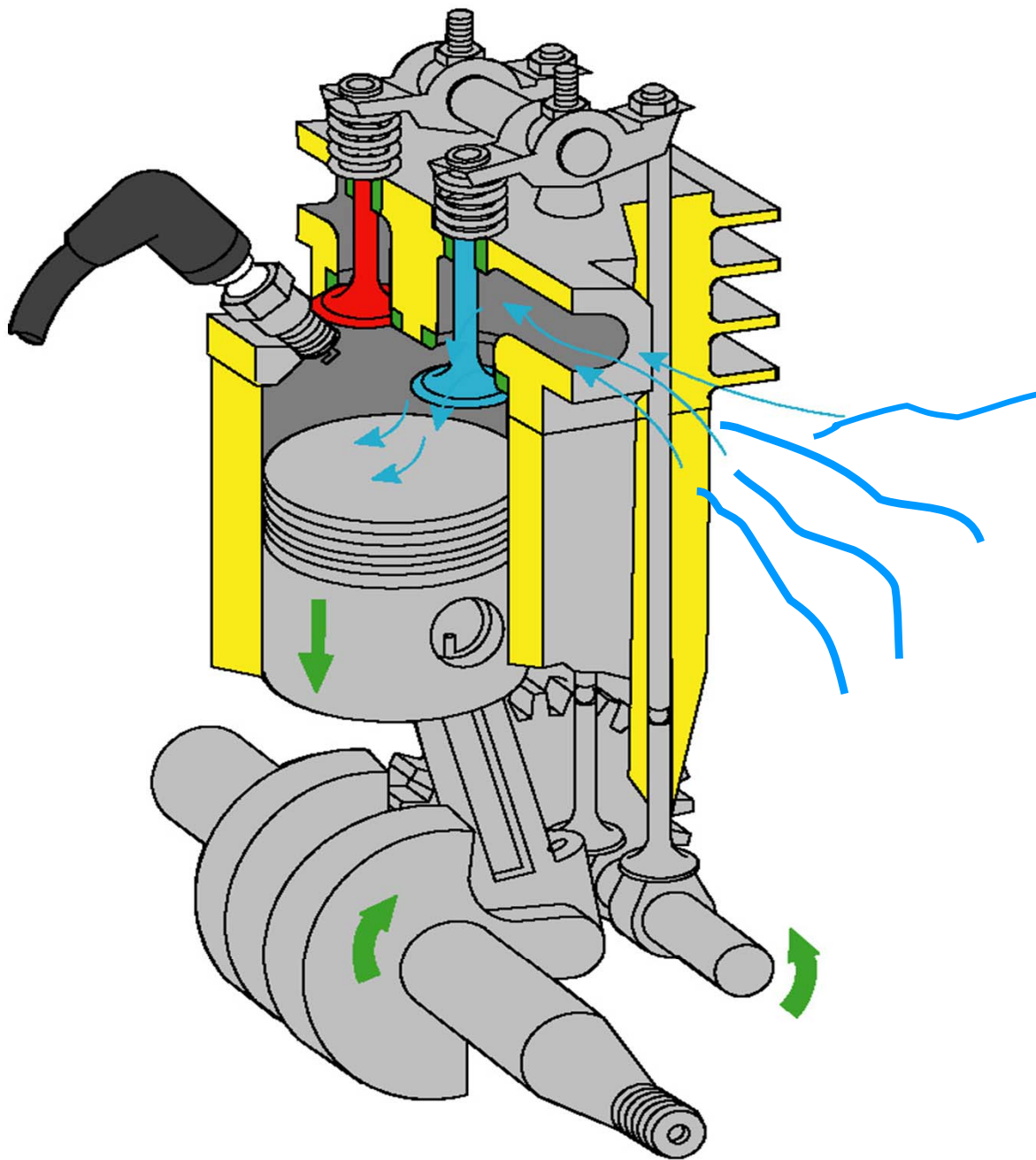
BRIGGS & STRATTON CORPORATION

4 Stroke Theory



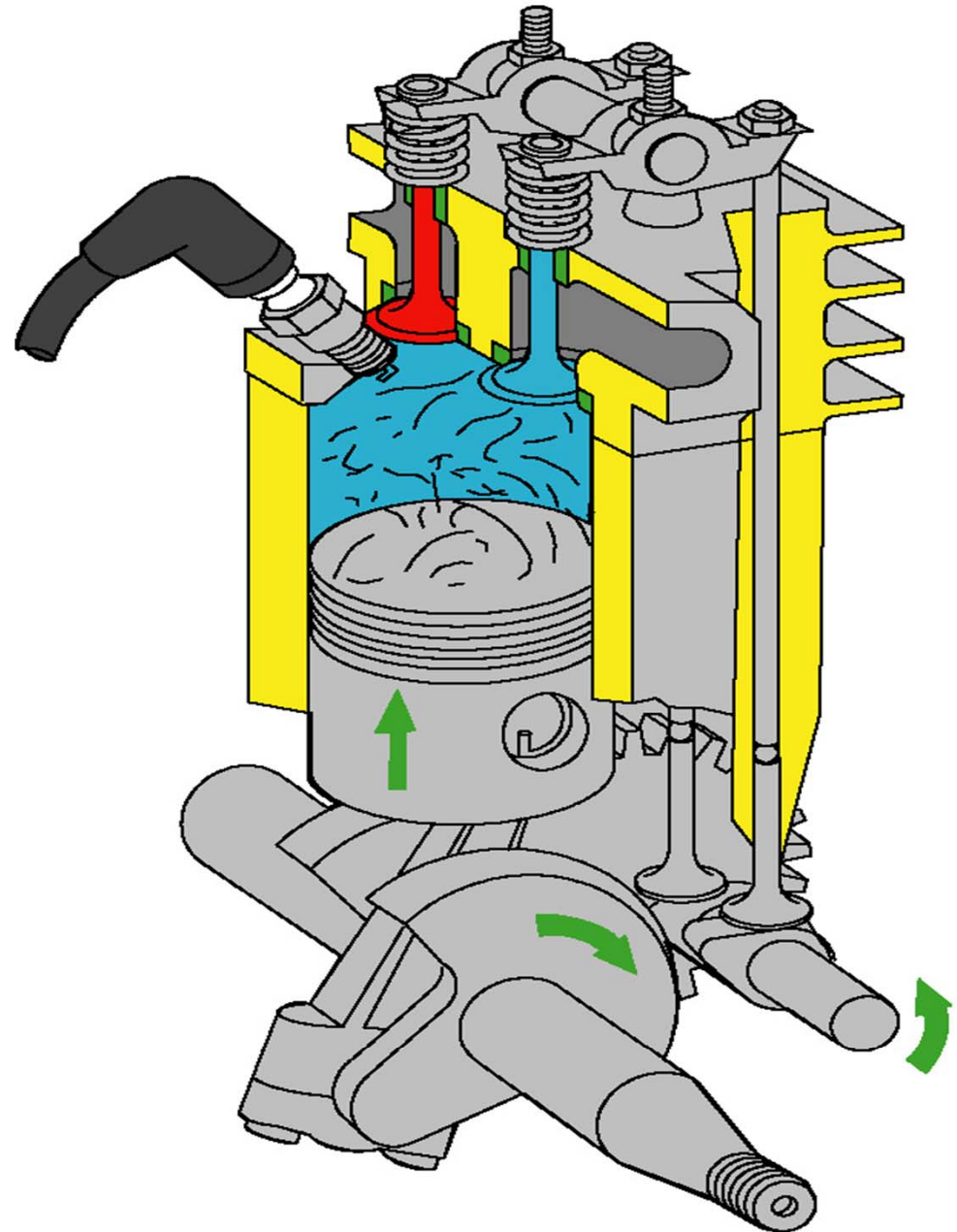
4-Cycle Theory Review

1. INTAKE



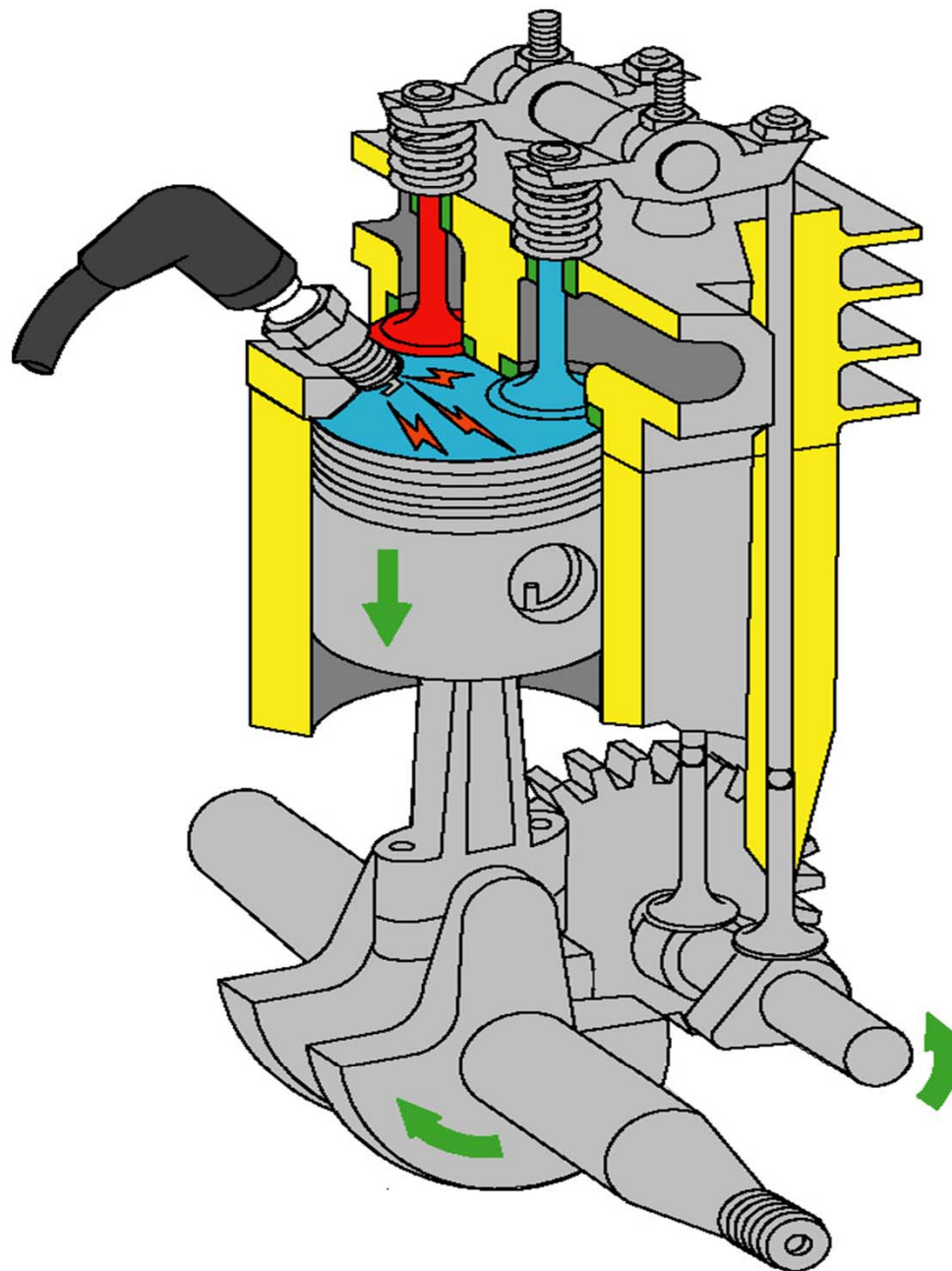
4-Cycle Theory Review

2. COMPRESSION



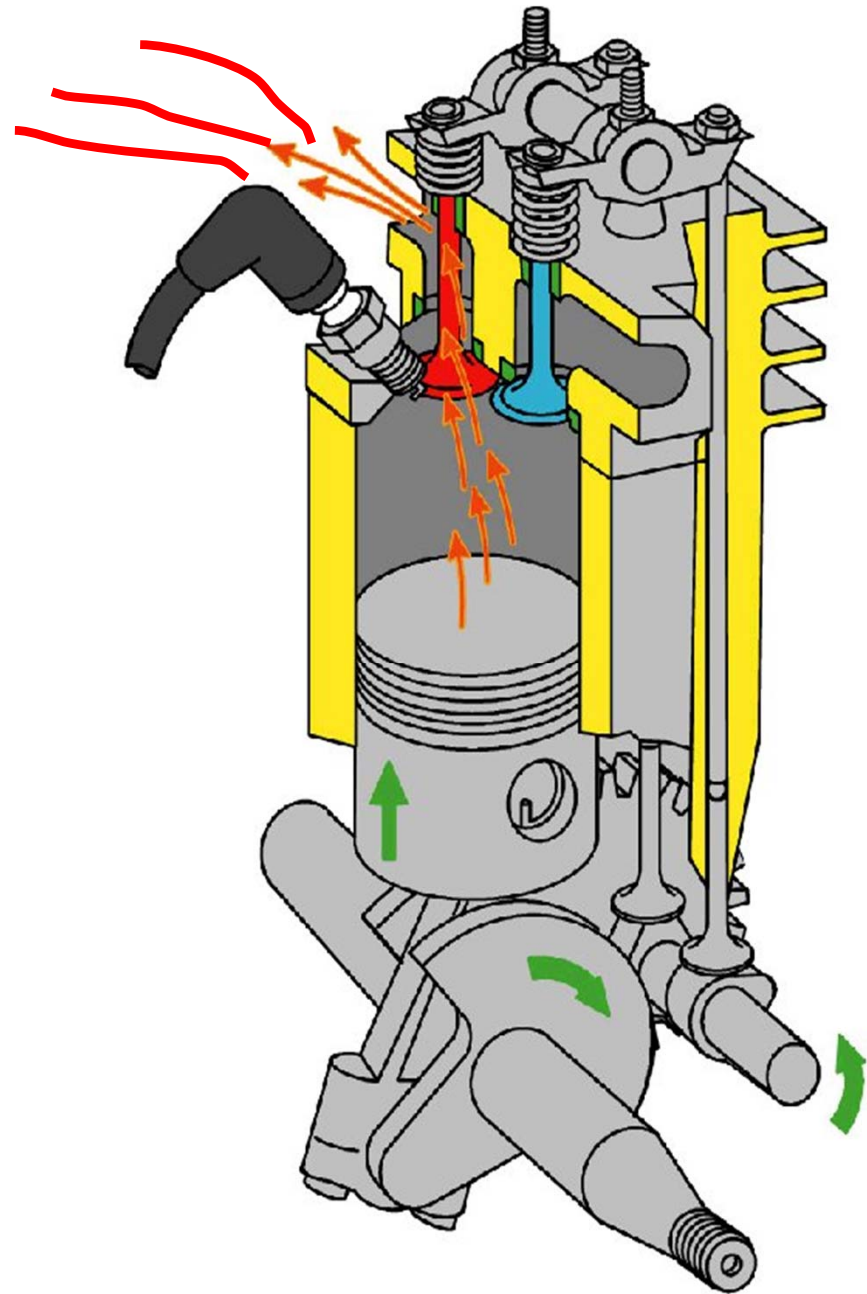
4-Cycle Theory Review

3. POWER



4-Cycle Theory Review

4. EXHAUST





BRIGGS & STRATTON CORPORATION

Teardown & Rebuild of Model 126312-0023 E1 OHV Engine



Required Tools





List of Tools & Equipment Needed

3/8" Ratchet Wrench and 6" extension

1/4" Ratchet Wrench

Sockets : 7,8,10, - 1/4" drive

24mm, 1/2" drive

5/16" SAE - 1/4" drive

5/8" Spark Plug socket, 3/8" drive

3/8" SAE - 1/4" drive

1/4" extension handle

1/2" drive Pull (Flex) Handle

Flywheel Strap

T-30 Torx bit - 3/8" drive

3/8", 5/8" Combination Wrench

3/16" Nut Driver

5/16" Combination Wrench

Drive adapters 1/4" - 3/8" & 1/2" - 3/8"

1/8" Allen Wrench = 120000 series or 5/32" on 150000

Feeler Gauge Set

Rubber Mallet

Foot LBS Torque Wrench 1/2" drive

Inch LBS Torque Wrench 3/8"

Elmers Glue stick - for crankcase gasket repair

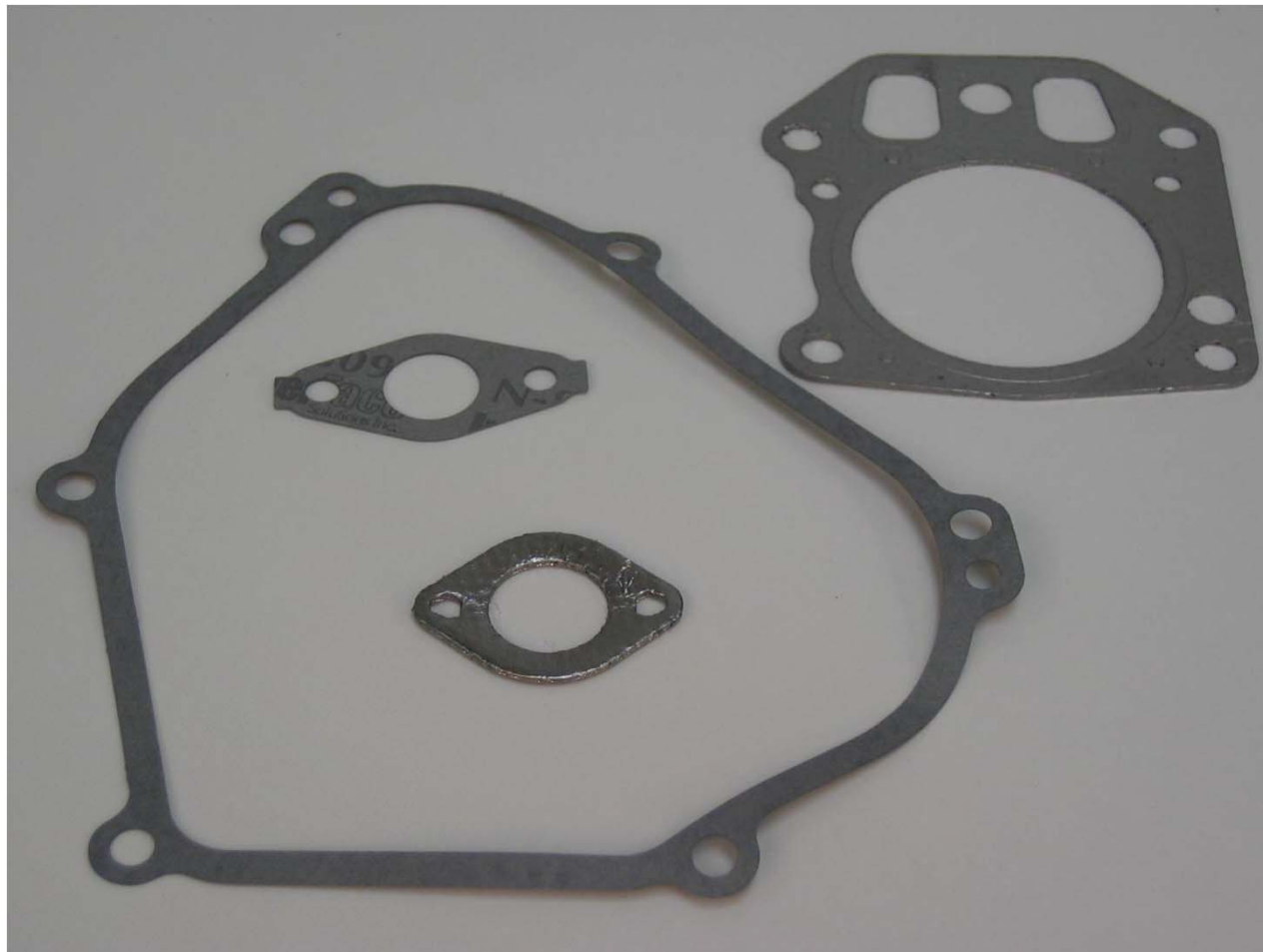
Wide, Flat Screwdriver

Expired Toothbrush or Wire Brush

Scotch Tape or Painter Tape

Optional: Piston Ring Expanders for Ring Removal or Installation Lesson

Required Gaskets





Systematic Approach

- Technicians need to take their time when disassembling an engine. This is not a race!
- Listen for instruction when to remove the next piece. Do not work ahead!
- Lay assemblies in order as they were removed.
- Put fasteners with removed assemblies, or loosely back in bolt holes.

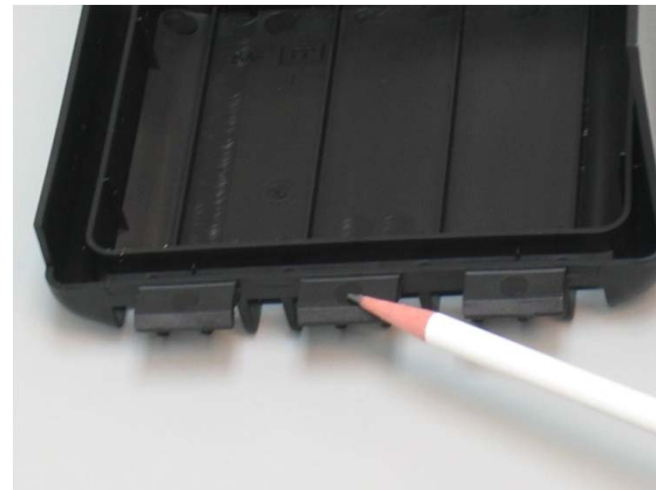
Let's Begin

- Close fuel shut-off valve
- No fuel valve on 150000 series engine
- Disconnect spark plug ignition lead from spark plug



Remove Air Cleaner Cover and Filter

- Use flat bladed screwdriver or 8 mm socket
- Inspect paper filter for tears
- Foam pre-cleaner washable if equipped
- Replace if necessary
- Inspect tabs on filter cover for wear



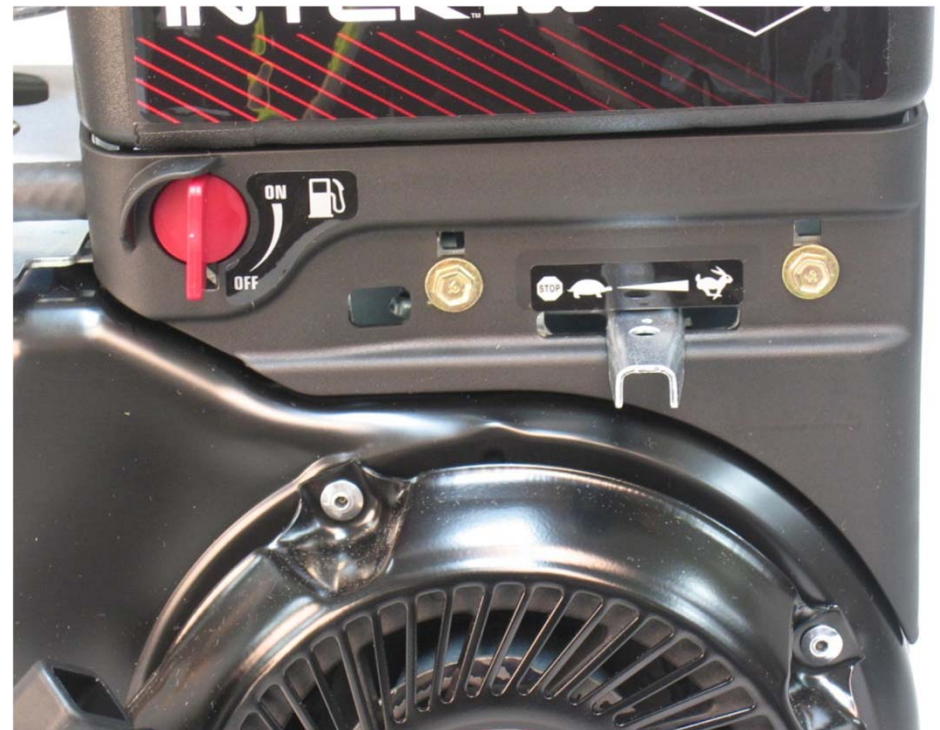
Remove Air Cleaner Backing Plate

- Use 8 mm socket
- Fasteners may have Loctite® on threads
- Disconnect breather tube at valve cover
- Inspect gasket on rear of cover for leaks or tears
- 150000 model: gently pull off choke lever to remove air cleaner backing plate



Remove Speed Control Panel

- Use 8 mm socket
- Fuel valve must be off
- Throttle lever must be centered
- No fuel valve on 150000 series engine



Remove Fuel Tank & Fuel Hose

- Use 10 mm socket
- Use pliers to move clamp at carburetor fitting
- Use caution for any spilled fuel



Remove Blower Housing- Rewind Starter Assembly

- Use 10 mm socket
- Starter assembly is riveted to blower housing



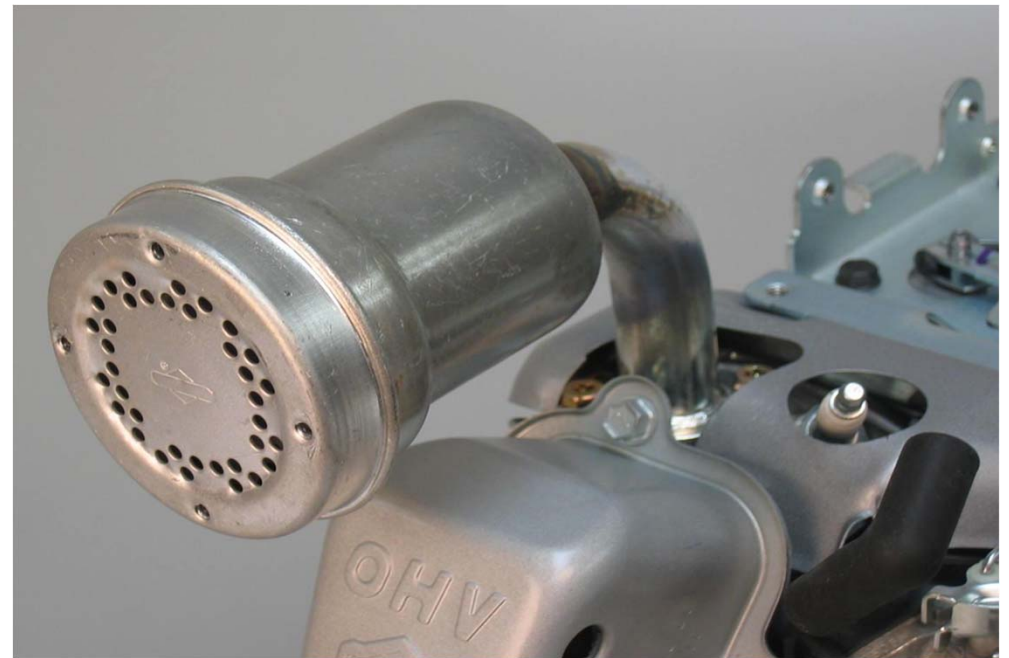
Remove Muffler Heat Shield

- Use 7 & 10 mm sockets
- Use caution! Sheet metal edges can be sharp!



Remove Muffler

- Use T-30 Torx bit
- Exhaust gasket will probably be damaged during removal



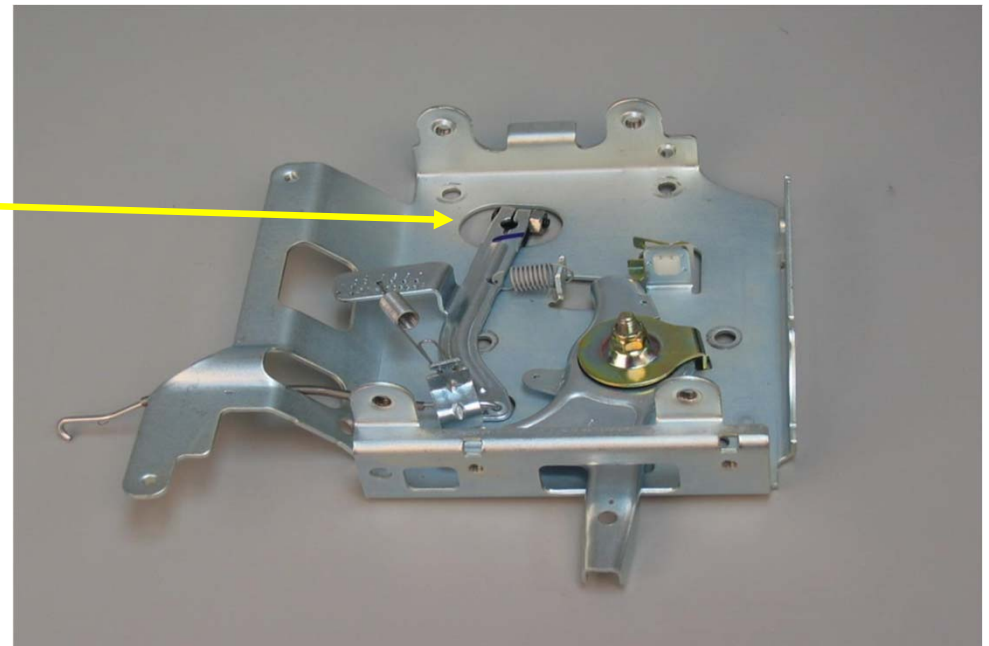
Remove Carburetor and Spacer

- Use T-30 Torx bit
- Spacer protrusion faces carburetor
- May need to twist carburetor so linkage and spring are removable
- Intake gaskets maybe damaged during removal



Remove Governor Lever, Linkage, and Plate

- Use 3/8" wrench & extension handle to loosen pinch nut
 - Don't remove
- Disconnect ignition ground wire
- Use 10 mm socket to remove gov. plate
- Lift complete assembly as one piece from block



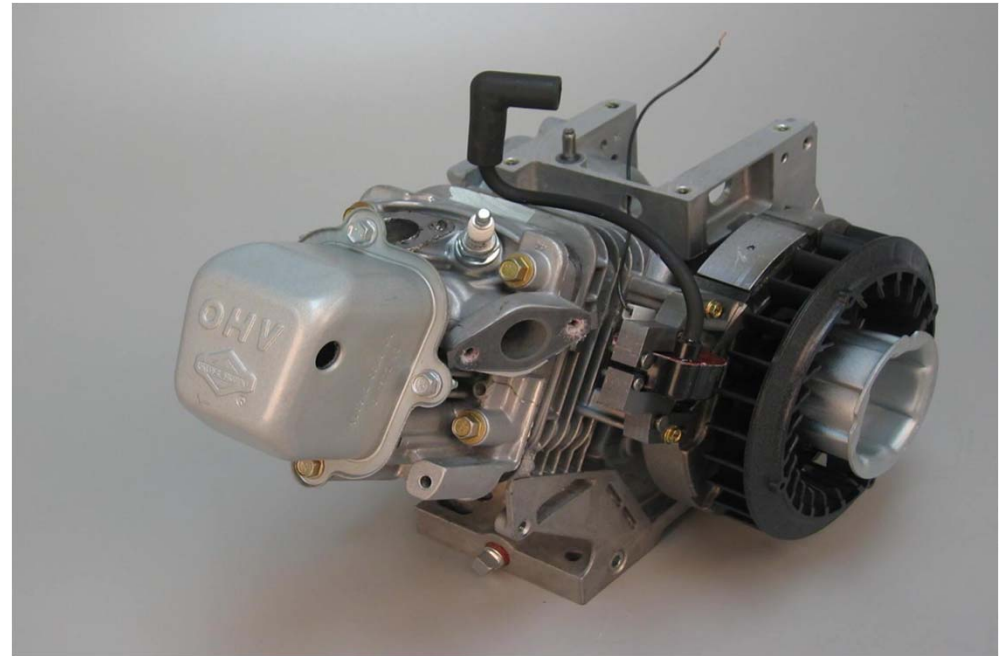
Remove Cylinder Heat Shield

- Use 7 mm socket



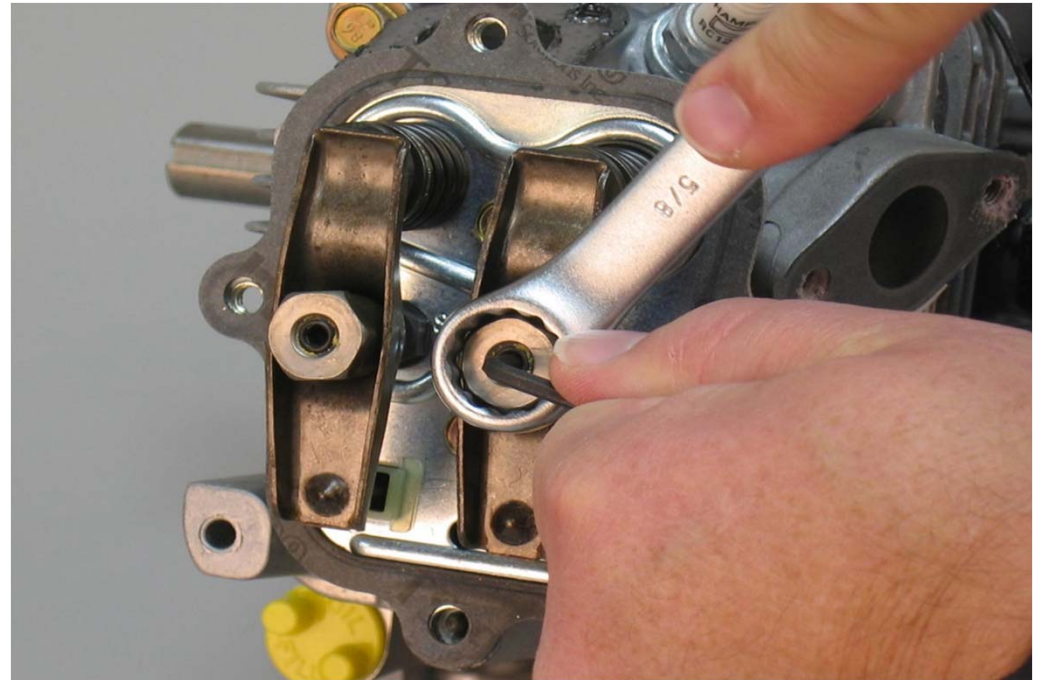
Remove Valve Cover

- Use 10 mm socket
- Screws have different lengths and thread pitch. Remember locations.



Loosen Rocker Arm and Jam Screw

- Use 5/8" wrench and 1/8" Allen Wrench; **150000 series 5/32 Allen Wrench**
- Only need to loosen both pieces about 1/4 turn
- Turn both arms to the side and remove push rods
- Upon removal of cylinder head, loosen set screw all the way to last thread; tighten jam screw nut all the way down (hand tight) to the rocker arm to hold valve caps in place for storage



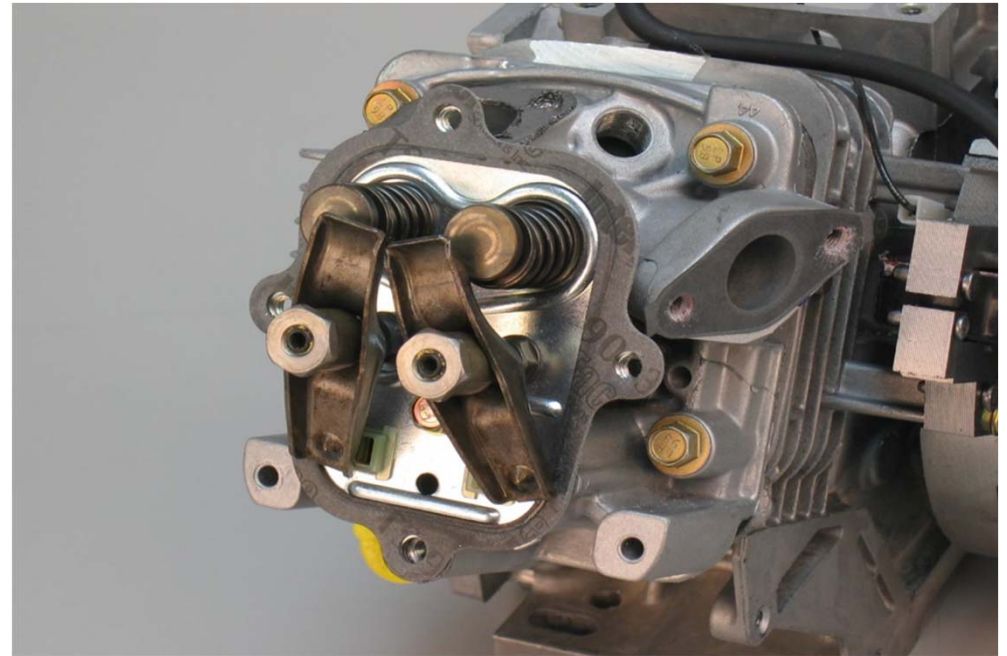
Remove Spark Plug

- Use 5/8" spark plug socket



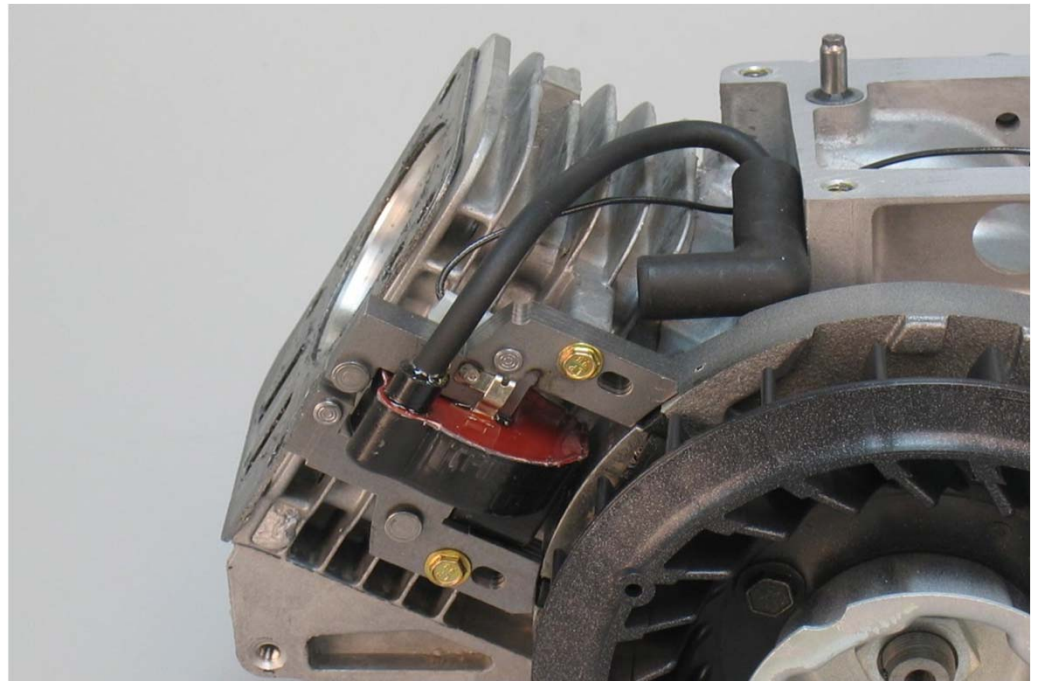
Remove Cylinder Head

- Use 10 mm socket
- Cylinder head gasket will probably be damaged during removal
- Valve assemblies can be removed from head



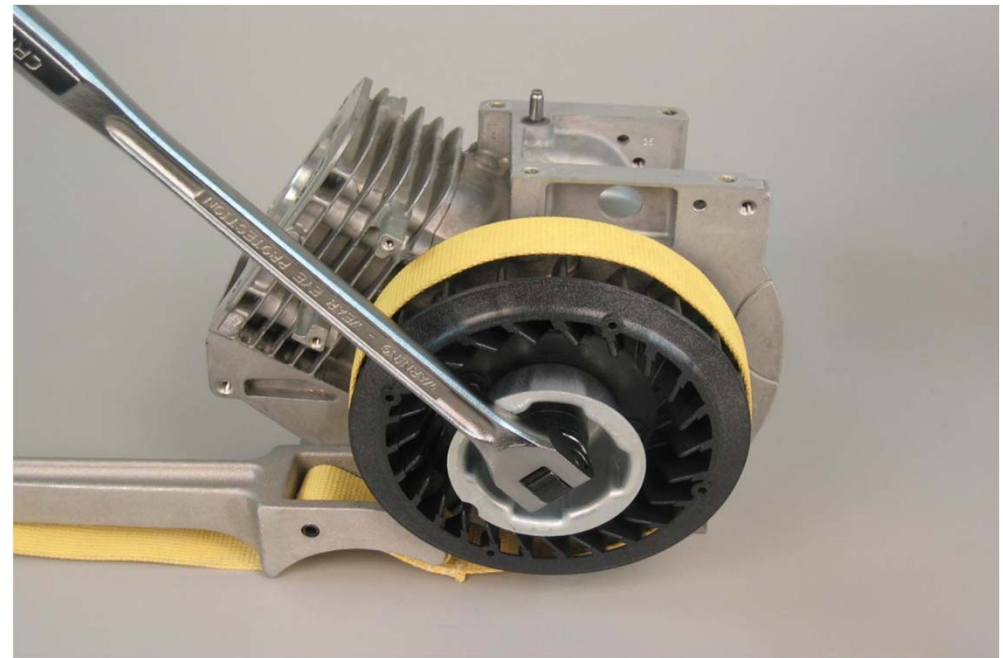
Remove Ignition Coil

- Use 7 mm socket
- Leave ground wire attached to coil



Remove Flywheel

- Use 24 mm socket with breaker bar and strap wrench
- Lay handle of strap wrench facing piston on table
- Account for flywheel key



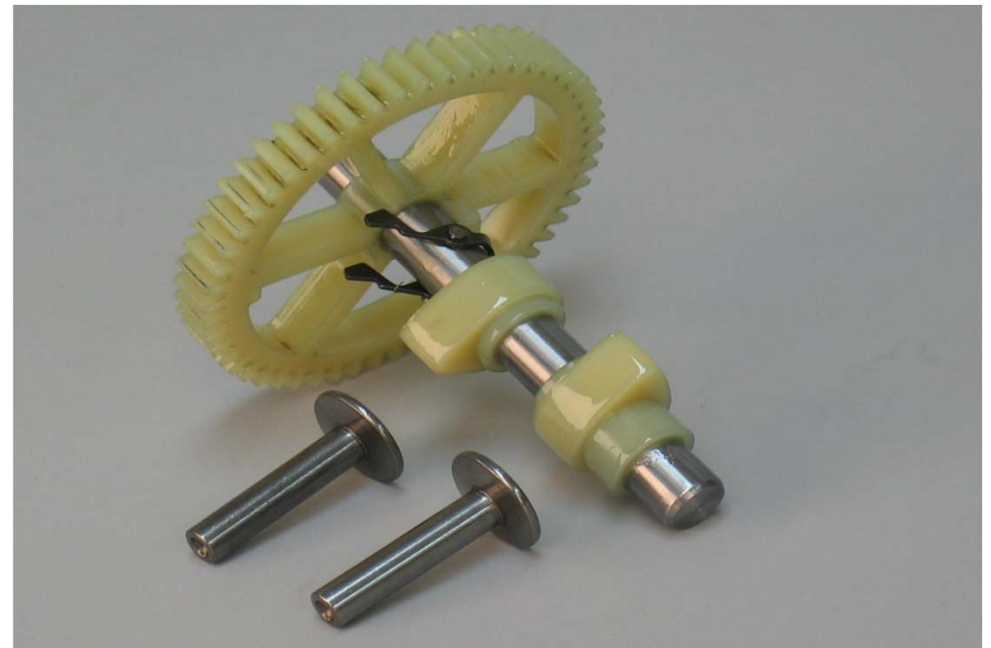
Remove Crankcase Cover

- Use 10 mm socket
- Case cover gasket will probably be damaged during removal



Remove Cam Gear and Tappets

- Remove cam gear by hand
- Remove tappets by hand



Remove Piston/Connecting Rod Assembly

- Use 5/16" gear wrench
- Rod cap can only fit on one way
- Long screw is closest to piston
- Dipper held on by small screw
- Piston and rod have orientation mark



Remove Crankshaft

- Pull out crankshaft by hand
- Use caution not to scratch bearing surface in case



Discuss Crankcase

- Wipe up any remaining oil in case
- Clean all gasket surfaces with gasket scrapper





Engine Reassembly

- Technicians need to take their time when reassembling an engine. This is not a race!
- Listen for instruction when to add the next piece. Do not work ahead!
- Fasteners will need the proper torque values.
- Special procedures will be explained.

Install Crankshaft

- Install crankshaft by hand into cylinder block
- Be careful not to damage bearing
- Position crankpin to 7 o'clock



Install Piston Assembly

- Use ring compressor
- Coat piston assembly and cylinder bore with oil
- Check orientation marks
- DO NOT hammer or force piston assembly into block!



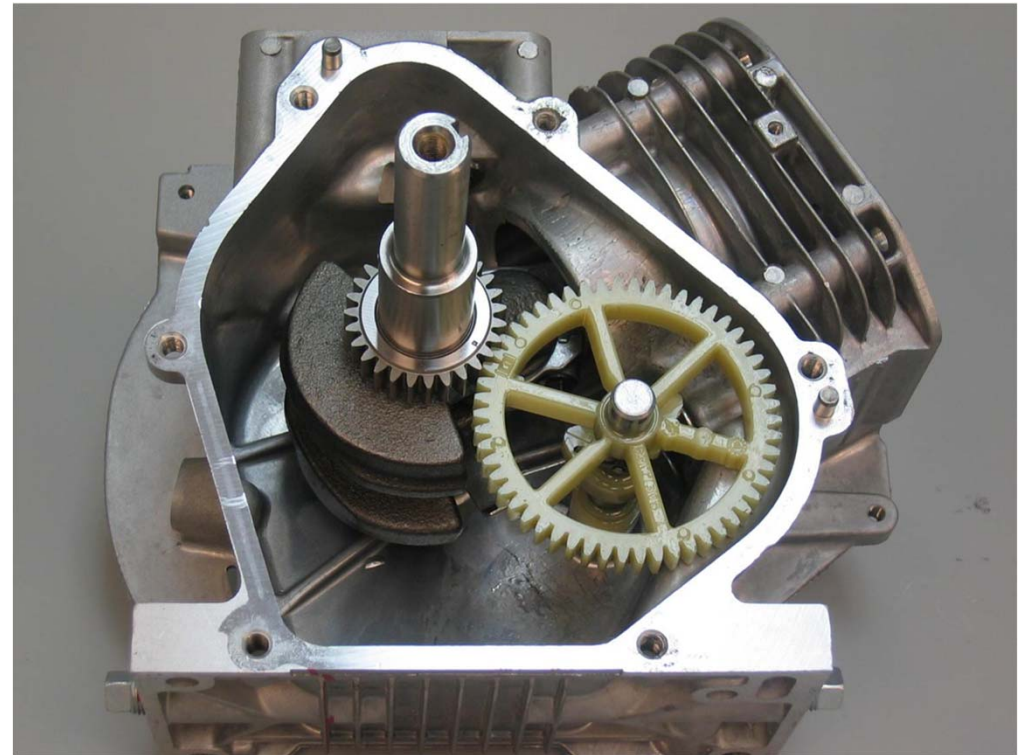
Attach Rod to Crankshaft

- Rod cap only goes on one way
- Long screw goes closest to piston
- Dipper attaches with short screw
- Use 5/16" socket
- Torque fasteners to 100 in. lbs
- Rotate crankshaft and check for free movement



Install Tappets and Cam Gear

- Install tappets first
- Align timing marks of cam gear and crankshaft gear
- Install metal spacer



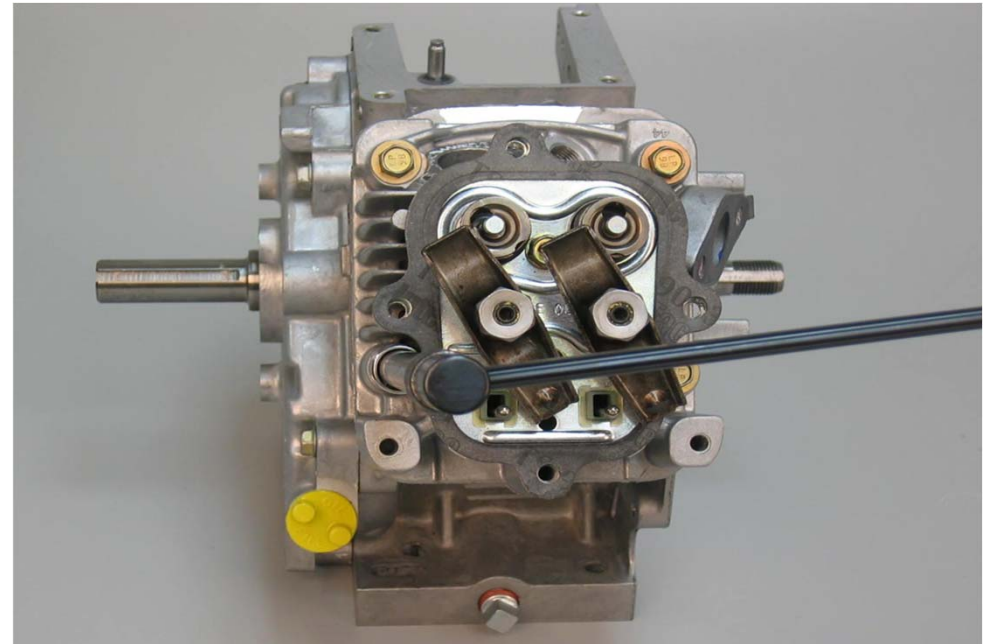
Install Case Cover

- New gasket?
- Lubricate governor gears
- Insure governor lever is laying flat
- May need to rotate crankshaft for governor gears to mesh
- Use 10 mm socket
- Torque fasteners in sequence to 110 in. lbs



Install Cylinder Head

- New gasket?
- Use a 10 mm socket
- Step-Torque sequence
75-150-220 in. lbs
- Install push rods in slots
 - Insure that tips rest in recess of tappets



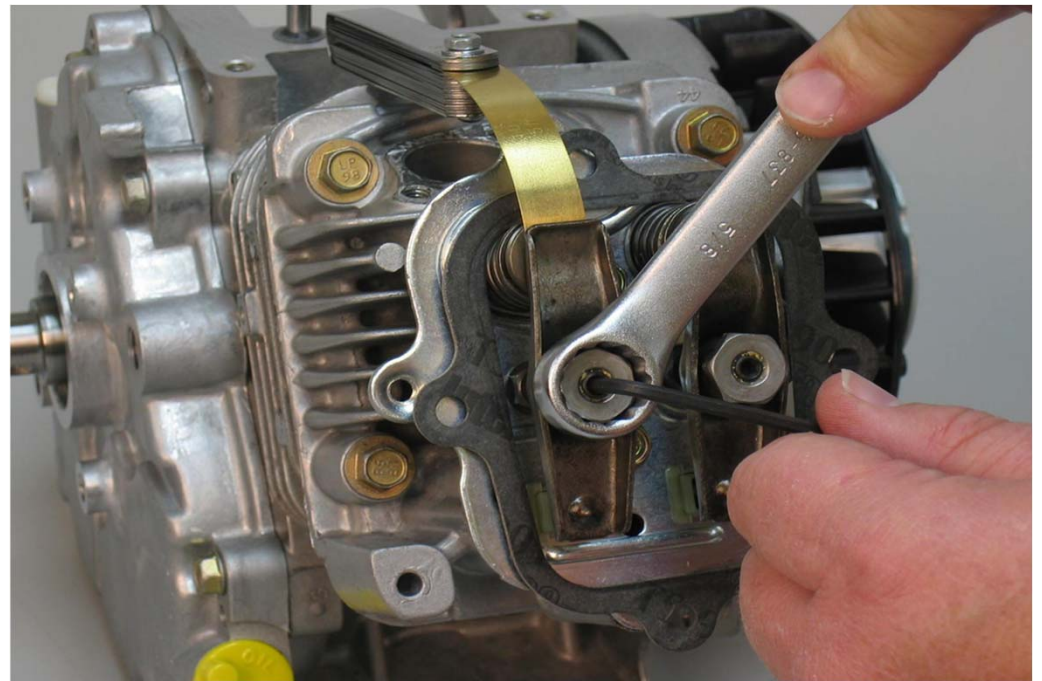
Install Flywheel, Key, Starter Cup and Nut

- Align flywheel and crankshaft slots, then slip in key
- Use strap wrench
- Use 24 mm socket
- Torque to 60 ft. lbs
- Rotate crankshaft with flywheel and check for free movement



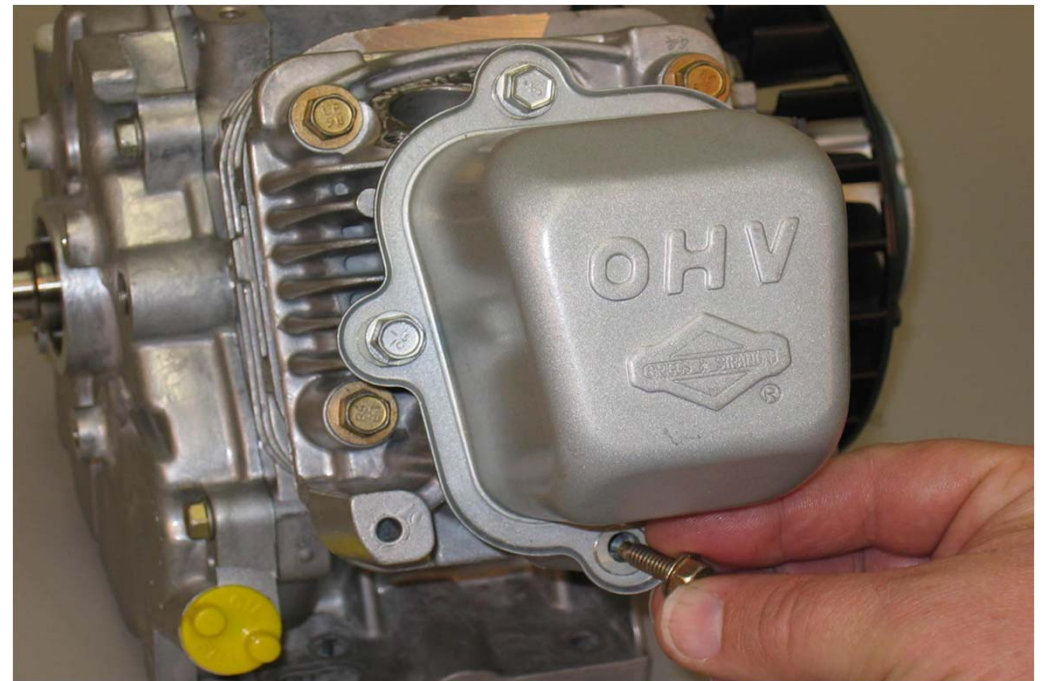
Adjust Valve Lash

- Piston needs to be at $\frac{1}{4}$ " past TDC
- Intake valve .004-.006
- Exhaust valve .009-.011



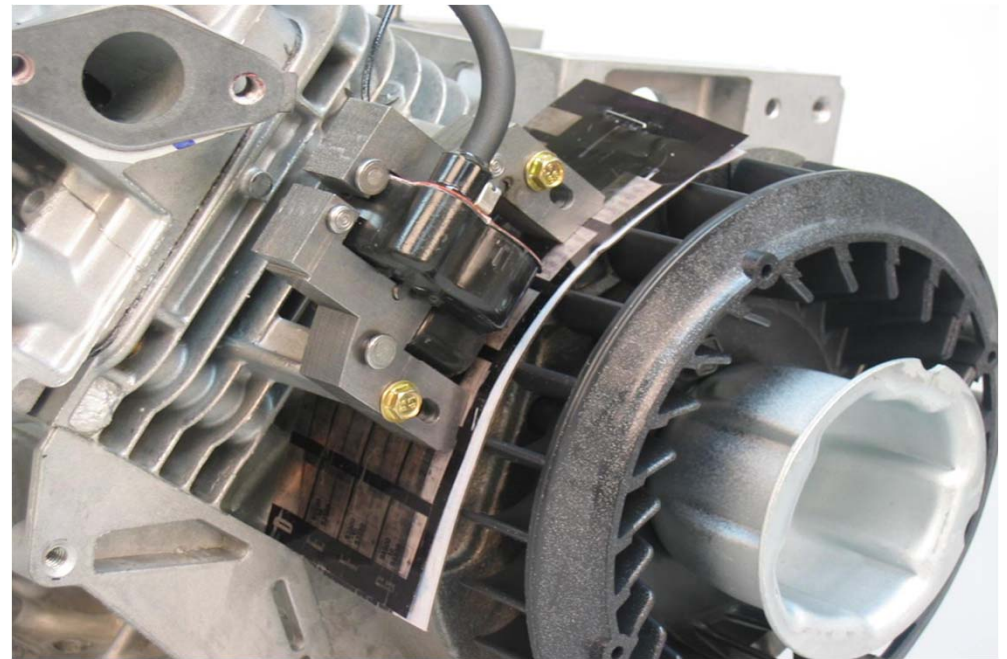
Install Valve Cover

- Short screw on top, gold screw on bottom, silver screws on sides - 120000
- **150000: 3 long silver screws- sides and bottom; short screw on top**
- Use 10 mm socket
- Torque to 45 in. lbs



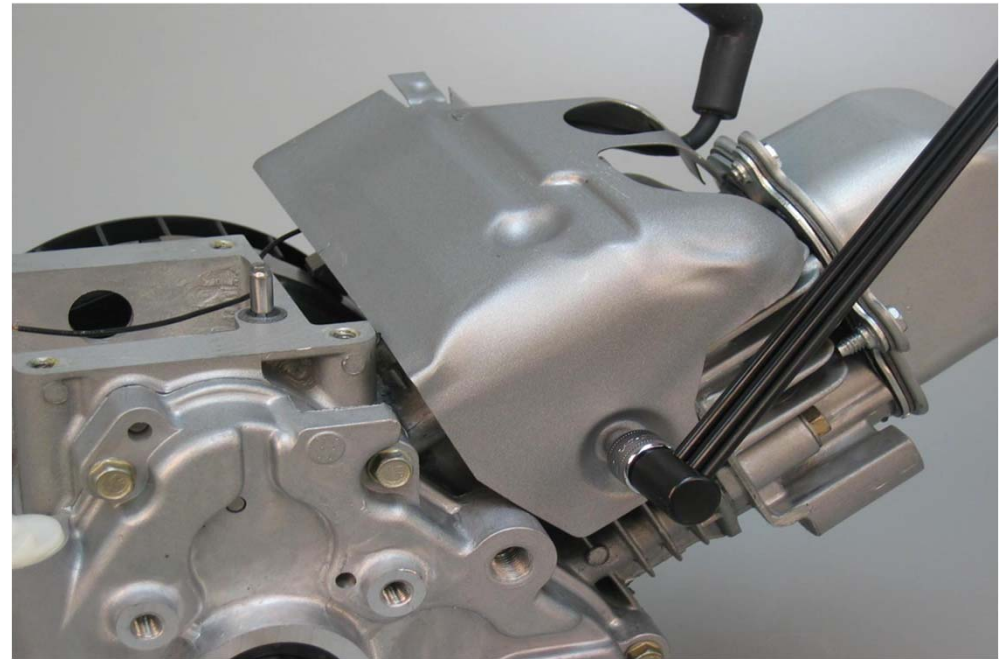
Install Ignition Armature

- Verify proper armature orientation
- Use feeler gauges or 2 microfiche cards for easy gap clearance installation (.010 - .014 in.)
- Use 7 mm socket
- Torque 45 in. lbs
- Run ground wire thru hole in top of cylinder case



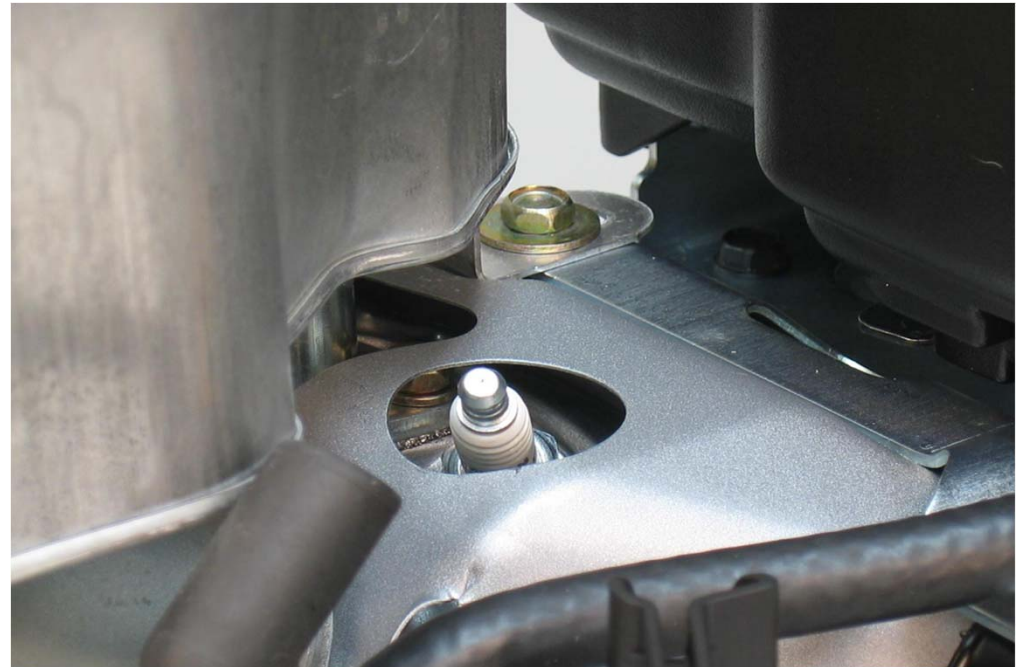
Install Cylinder Heat Shield

- Use 7 mm socket
- Torque to 30 in. lbs
- DO NOT OVER TORQUE! Will strip hole, causing replacement of cylinder
- Has provision for high tension lead



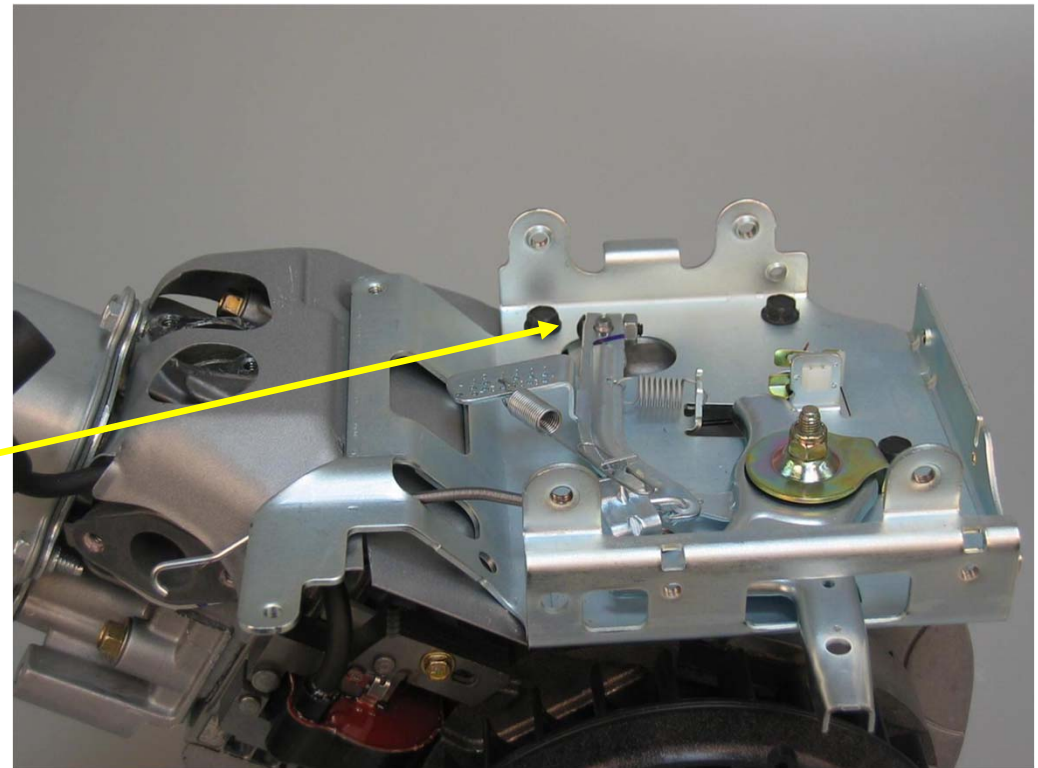
Install Spark Plug

- Use 5/8" spark plug socket
- Torque to 180 in. lbs
- Attach ignition lead



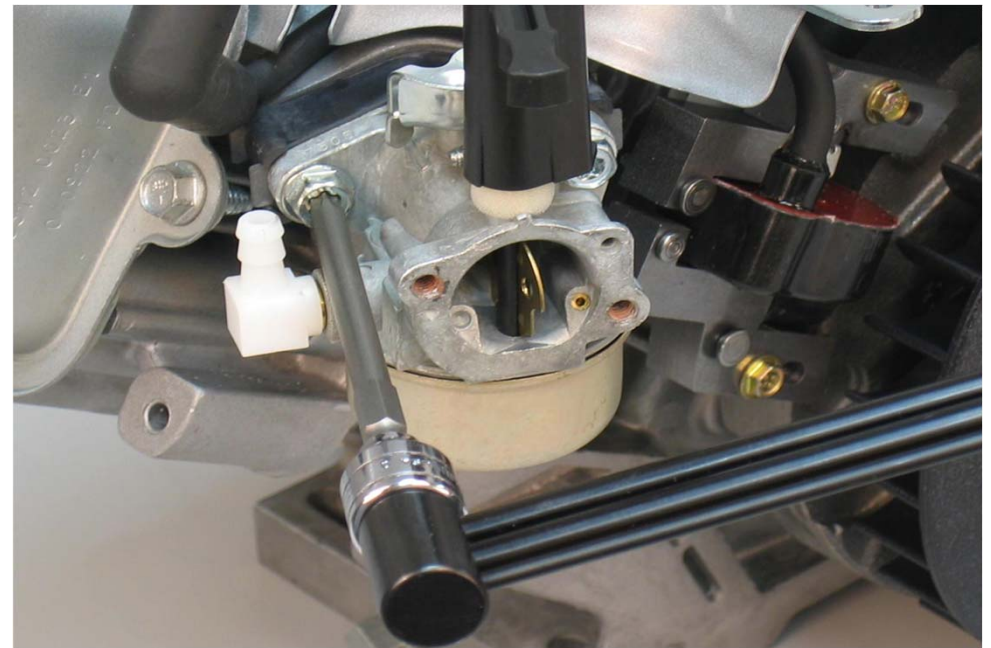
Install Governor Plate and Linkage

- Use 10 mm socket
- Torque to 60 in.lbs
- Slide Governor lever over shaft
- Do not tighten clamp bolt for governor lever



Install Carburetor and Spacer

- Replace gasket?
- **Spacer protrusion faces carburetor**
- Attach governor linkage and spring before attaching carburetor
- Use T-30 Torx bit
- Torque to 80 in.lbs



Perform Static Governor Adjustment

- Move throttle to fast speed
- Rotate throttle plate from idle to fast
- Watch rotation of governor lever on shaft
- Turn governor shaft in same direction
- Use 3/8" wrench
- Torque to 30 in. lbs



Install Muffler

- Replace gasket?
- Use T-30 Torx bit
- Torque to 100 in. lbs



Install Muffler Heat Shield

- Use 7 and 10 mm socket
- Torque 7 mm to 30 in. lbs – Tighten these screws first
- Torque 10 mm to 60 in. lbs





Install Blower Housing-Rewind Starter Assembly

- Carefully work housing around carburetor
- Housing must interlock with cylinder heat shield
- Use 10 mm socket
- Torque to 85 in. lbs



Install Fuel Tank and Fuel Hose

- Use 10 mm socket
- Torque to 60 in. lbs
- Use pliers to attach fuel-hose clamp at carburetor





BRIGGS & STRATTON CORPORATION

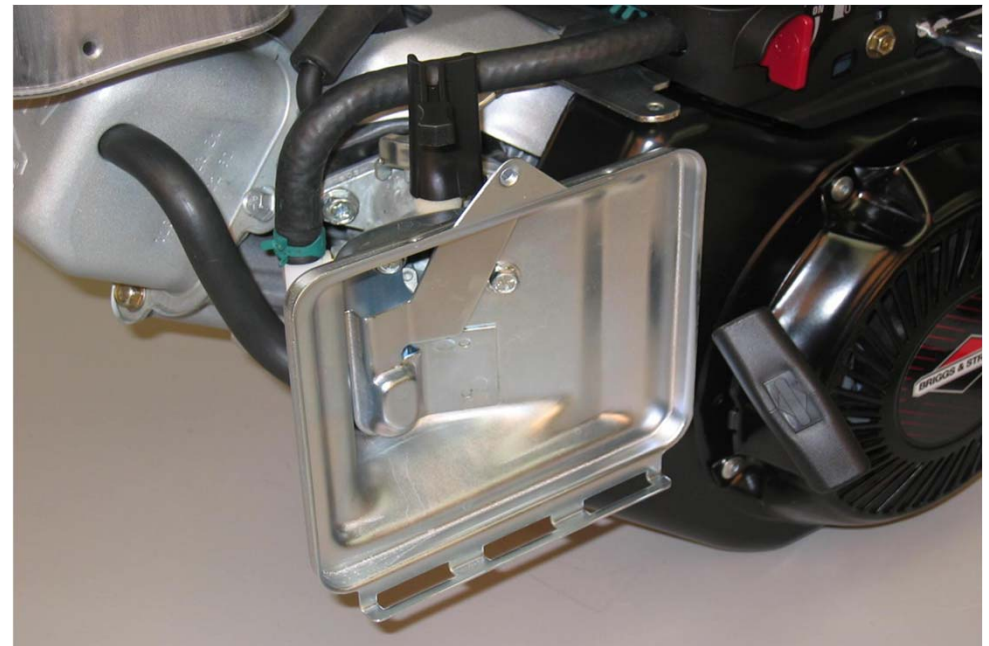
Install Speed Control Panel

- Use 8 mm socket
- Hand tighten



Install Air Cleaner Back Plate

- Use 8 mm socket
- Torque to 40 in. lbs
- Attach breather hose
- 150000 series engine: slide throttle control lever through hole on backing plate and snap it in the choke shaft on the carburetor.



Install Air Filter and Cover

- Install air filter – pleats facing out
- Install pre-filter if equipped
- Install air filter cover with tabs in backing cover
- Use 8 mm socket or screwdriver
- Hand tighten



Success!

- You have successfully completed an engine tear-down and re-build
- Do you have any extra parts?



Fuels and Oils

- See Service Bulletin 736





Fuels

4-CYCLE GASOLINE RECOMMENDATIONS

Fuel must meet these requirements:

- Clean, fresh, unleaded gasoline.
- A minimum of 87 octane/87 AKI (91 RON). High altitude use, see below.
- Gasoline with up to 10% ethanol (gasohol) or up to 15% MTBE (methyl tertiary butyl ether) is acceptable.

CAUTION: Do not use unapproved gasoline such as E85. Do not mix oil in gasoline, or modify engine to run on alternate fuels. This will damage the engine components and **void the engine warranty.**

To protect the fuel system from gum formation, mix in a fuel stabilizer when adding fuel. See **Storage**. All fuel is not the same. If you experience starting or performance problems after using fuel, switch to a different fuel provider or change brands. This engine is certified to operate on gasoline. The emission control system for this engine is EM (Engine Modifications).

High Altitude

At higher altitudes (over 5,000 feet), 85 octane/85 AKI (89 RON) gasoline is recommended. High-altitude use may require a carburetor jet kit to improve performance and decrease fuel consumption. See an Authorized Briggs & Stratton Dealer for more information.

Storage

Fuel will become stale when stored over 30 days. Stale fuel causes acids and gum deposits to form in the fuel system or on essential carburetor parts. Prior to storage, if gasoline has not been treated with a fuel stabilizer, it must be drained from the engine into an approved container. Then run engine until it stops from lack of fuel.

When fuel stabilizers are used according to their instructions, there is no need to drain the gasoline from the engine prior to storage. Use Briggs & Stratton FRESH START™ fuel stabilizer, available as a liquid additive or a drip concentrated liquid cartridge. Run the engine for a short time to circulate stabilizer throughout the fuel system. Engine and fuel can then be stored up to 24 months.

If gasoline is drained, the use of a fuel stabilizer in the storage container is still recommended to maintain freshness.

Oil

4-CYCLE ENGINE OIL RECOMMENDATIONS

Use a high quality detergent oil classified "For Service SF, SG, SH, SJ" or higher. Do not use special additives.

Choose a viscosity according to the table below.

SAE 30 40°F and higher (5°C and higher) is good for all-purpose use above 40°F. Use below 40°F will cause hard starting.

10W-30 0 to 100°F (-18 to 38°C) is better for varying temperature conditions. This viscosity improves cold weather starting, but may increase oil consumption above 80°F (27°C).

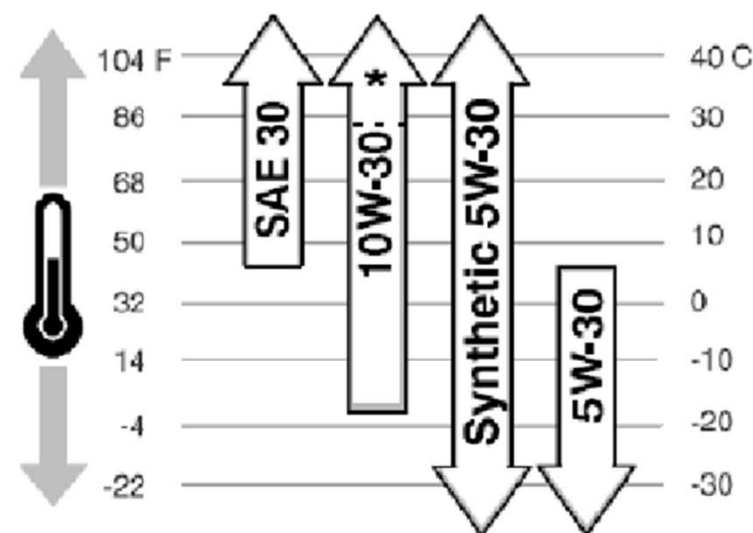
*Check oil level frequently at higher temperatures

Synthetic 5W-30 -20 to 120°F (-30 to 40°C) provides the best protection in all temperatures, as well as improved starting with less oil consumption.

5W-30 40°F and below (5°C and below) is recommended for winter use and works best in cold conditions.



Note: Synthetic oil meeting ILSAC GF-2, API certification mark and API service symbol (shown at left) with "SJ/CF ENERGY CONSERVING" or higher, is an acceptable oil at all temperatures. Use of synthetic oil does not alter required oil change intervals.





Use Genuine Briggs & Stratton Parts

- Assures Customer Satisfaction with
 - Consistent quality
 - Proper fit
 - Performance
 - Reliability
- Results in Longer Product Life!

Common Service Parts

<u>Service Part</u>	<u>Part Number</u>
Flat air filter cartridge	491588 or 5043
Flat pre-cleaner	493537 or 5064
Oil	100005
Fuel filter	694485
Gas additive	5041
Resistor spark plug	491055
Spark plug wrench	89838 or 5023
Spark tester	19368



Thank You!

- Open for any questions