Form No. 3426-385 Rev B

Engine Conversion Kit

For Greensmaster® 1000, 1600, 2000, 2600, Flex™ 18 or Flex™ 21 Traction Units

Model No. 04019—Serial No. 290000001 and Up
Model No. 04022—Serial No. 260000001 and Up
Model No. 04024—Serial No. 290000001 and Up
Model No. 04025—Serial No. 290000001 and Up
Model No. 04031—Serial No. 280000001 and Up
Model No. 04034—Serial No. 280000001 and Up
Model No. 04035—Serial No. 280000001 and Up
Model No. 04036—Serial No. 280000001 and Up
Model No. 04037—Serial No. 280000001 and Up
Model No. 04038—Serial No. 313000001 and Up
Model No. 04039—Serial No. 313000001 and Up
Model No. 04040—Serial No. 312000001 and Up
Model No. 04041—Serial No. 312000001 and Up
Model No. 04052—Serial No. 280000001 and Up
Model No. 04060—Serial No. 280000001 and Up

Addendum

This engine may not be equipped with a spark arrester. It is a violation of California Public Resource Code Section 4442 or 4443 to use or operate the engine on any forest-covered, brush-covered, or grass-covered land unless the engine is equipped with a spark arrester, as defined in Section 4442, maintained in effective working order or the engine is constructed, equipped, and maintained for the prevention of fire.

If you require a spark arrester, contact your Authorized Service Dealer. Genuine Toro spark arresters are approved by the USDA Forestry Service.

Important: **This addendum contains engine operation and maintenance information that supersedes the engine operation and maintenance procedures in your machine *Operator's Manual*.**

Before operating or maintaining the machine or engine, always refer to the operating and safety instructions in your *Operator's Manual*.

Save these instructions.

Important: **This engine's warranty is provided by the engine manufacturer. Please refer to the engine manufacturer's warranty and emissions system warranty included in the literature packet. That warranty applies only to the engine. It does not expand or otherwise alter any express or implied warranty terms or warranty period that may apply to the product into which the engine is installed.**

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3426-385 B

Operation

Operating a Subaru Engine

Fuel Specification

Petroleum fuel	Use unleaded gasoline with an octane rating of 87 or higher ((R+M)/2 rating method).
Ethanol blended fuel	Use an unleaded-gasoline blend with up to 10% ethanol (gasohol) or 15% MTBE (methyl tertiary butyl ether) by volume is acceptable. Ethanol and MTBE are not the same. Gasoline with 15% ethanol (E15) by volume is not approved for use. Never use gasoline that contains more than 10% ethanol by volume, such as E15 (contains 15% ethanol), E20 (contains 20% ethanol), or E85 (contains up to 85% ethanol). Using unapproved gasoline may cause performance problems and/or engine damage which may not be covered under warranty.

Important: **For best results, use only clean, fresh fuel (less than 30 days old).**

- Do not use gasoline containing methanol.
- Do not store fuel either in the fuel tank or fuel containers over the winter unless you use a fuel stabilizer.
- Do not add oil to gasoline.

Using Stabilizer/Conditioner

Use fuel stabilizer/conditioner in the machine at all times to keep the fuel fresh longer when used as directed by the fuel-stabilizer manufacturer.

Important: **Do not use fuel additives containing methanol or ethanol.**

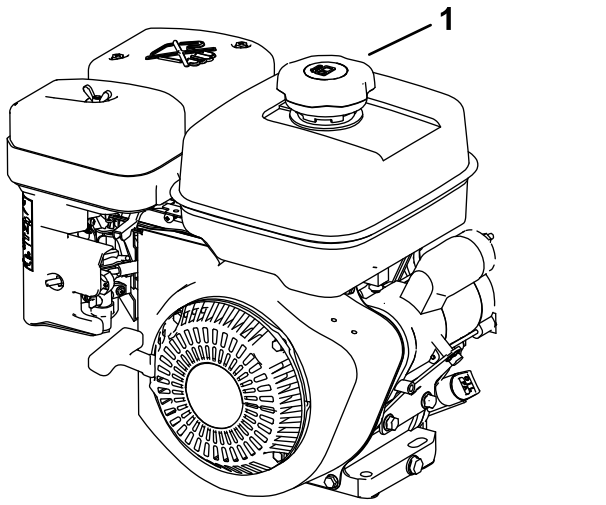
Add the fuel stabilizer/conditioner to fresh fuel as directed by the fuel-stabilizer manufacturer..

Note: A fuel stabilizer/conditioner is most effective when mixed with fresh gasoline. To minimize the chance of varnish deposits in the fuel system, use fuel stabilizer at all times.

Filling the Fuel Tank

Fuel tank capacity: 3.0 L (0.79 US gallons)

1. Park the machine on a level surface and shut off the engine.
2. Allow the engine to cool.
3. Clean around the fuel-tank cap and remove it (Figure 1).



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Figure 1

1. Fuel-tank cap

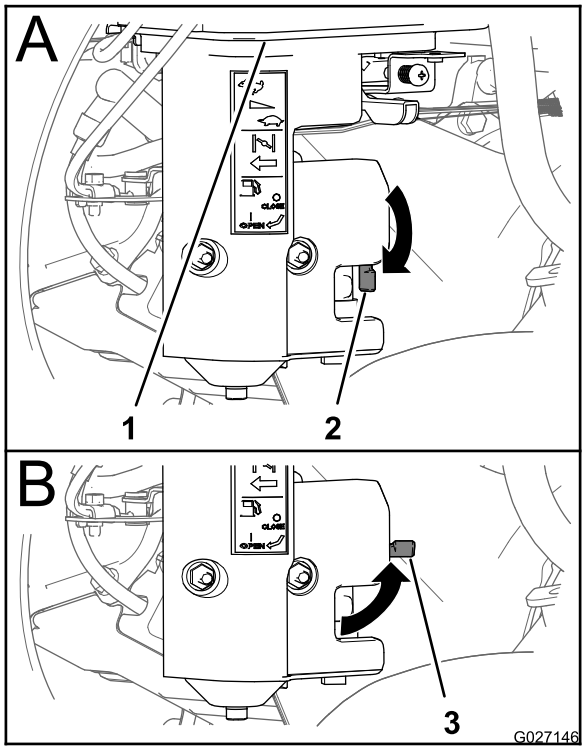
4. Fill the tank with fuel (Figure 1) to within 6 to 13 mm (1/4 to 1/2 inch) from the top of the tank. **Do not fill into the filler neck of the tank.**

   Important: **Do not fill the tank more than 6 mm (1/4 inch) from the top of the tank because the fuel needs room to expand.**
5. Install the fuel-tank cap securely.
6. Wipe up any spilled fuel.

Opening and Closing the Fuel-Shutoff Valve

Control fuel flow to the engine with the fuel-shutoff valve as follows:

- Rotate the handle for the fuel-shutoff valve 90 degrees clockwise to the open the valve.
- Rotate fuel-shutoff valve handle 90 degrees counterclockwise to close the valve.



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Figure 2

1. Fuel tank
2. Fuel-shutoff valve (open position)
3. Fuel-shutoff valve (closed position)

Operating a Honda Engine

Fuel Specifications

Fuel tank capacity: 2.0 L (0.59 US gallons)

Recommended fuel: Unleaded gasoline with an octane rating of 87 or higher ((R+M)/2 rating method)

Ethanol: Gasoline with up to 10% ethanol (gasohol) or 15% MTBE (methyl tertiary butyl ether) by volume is acceptable. Ethanol and MTBE are not the same. Gasoline with 15% ethanol (E15) by volume is not approved for use.

- **Never use gasoline that contains more than 10% ethanol by volume**, such as E15 (contains 15% ethanol), E20 (contains 20% ethanol), or E85 (contains up to 85% ethanol).
- **Do not** use gasoline containing methanol.
- **Do not** store fuel either in the fuel tank or fuel containers over the winter unless a fuel stabilizer is used.
- **Do not** add oil to gasoline.
- For best results, use only clean, fresh (less than 30 days old) fuel.
- Using unapproved gasoline may cause performance problems and/or engine damage, which may not be covered under the warranty

Using Stabilizer/Conditioner

Use fuel stabilizer/conditioner in the machine at all times to keep the fuel fresh longer when used as directed by the fuel-stabilizer manufacturer.

Important: **Do not use fuel additives containing methanol or ethanol.**

Add the fuel stabilizer/conditioner to fresh fuel as directed by the fuel-stabilizer manufacturer..

Note: A fuel stabilizer/conditioner is most effective when mixed with fresh gasoline. To minimize the chance of varnish deposits in the fuel system, use fuel stabilizer at all times.

Filling the Fuel Tank

1. Park the machine on a level surface and shut off the engine.
2. Allow the engine to cool.
3. Clean around the fuel-tank cap and remove it (Figure 1).

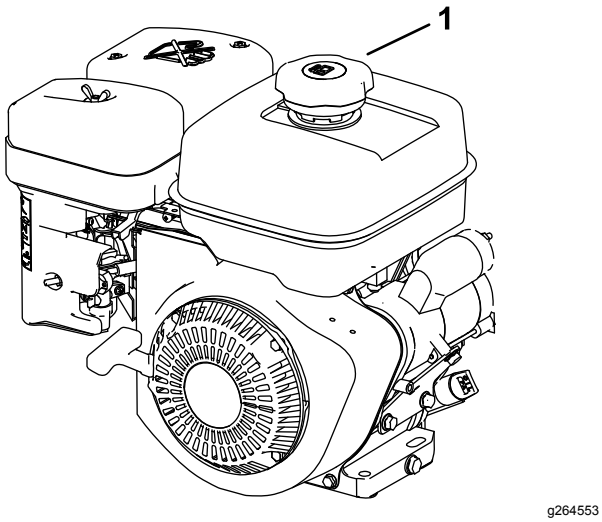


Figure 3

1. Fuel-tank cap

4. Fill the tank with fuel until the level is just inside the mesh filter basket.

   Do not fill into the filler neck of the tank.

   Important: **Do not fill the tank more above the filler mesh because the fuel needs room to expand.**
5. Install the fuel-tank cap securely.
6. Wipe up any spilled fuel.

Opening and Closing the Fuel-Shutoff Valve

Control fuel flow to the engine with the fuel-shutoff valve as follows:

- To open the fuel valve, turn the fuel-shutoff valve handle toward the recoil starter handle (Figure 4).
- To shut the fuel valve, turn the fuel-shutoff valve handle away from the recoil starter handle (Figure 4).

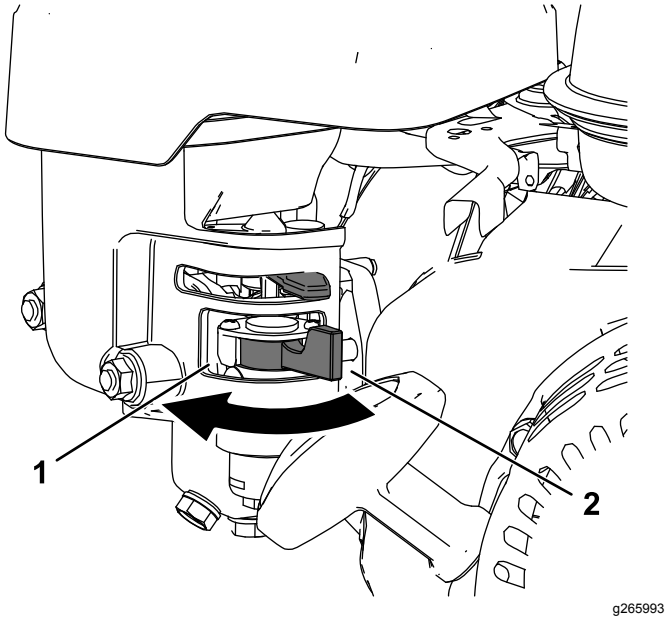


Figure 4

1. Turn the fuel valve lever to the ON position
2. Fuel valve lever in the OFF position

Maintenance

Recommended Maintenance Schedule(s)

Maintenance Service Interval	Maintenance Procedure
After the first 20 hours	• For Subaru engines—Change the engine oil. • For Honda engines—Change the engine oil.
Before each use or daily	• For Subaru engines—Check the engine-oil level. • For Honda engines—Check the engine-oil level. • For Honda engines—Inspect the air-filter elements.
Every 50 hours	• For Subaru engines—Clean the foam air-cleaner element. (more often under dirty or dusty conditions) • For Honda engines—Clean the air-filter elements.
Every 100 hours	• For Subaru engines—Change the engine oil • For Subaru engines—Check and gap the spark plug. • For Honda engines—Change the engine oil. • For Honda engines—Inspect and adjust the spark plug; replace it if necessary.
Every 200 hours	• For Subaru engines—Replace the dual element air filter.
Every 300 hours	• For Honda engines—Replace the paper filter element. (more often in dirty or dusty operating conditions) • For Honda engines—Replace the spark plug.

Servicing a Subaru® Engine

Preparing the Machine for Maintenance

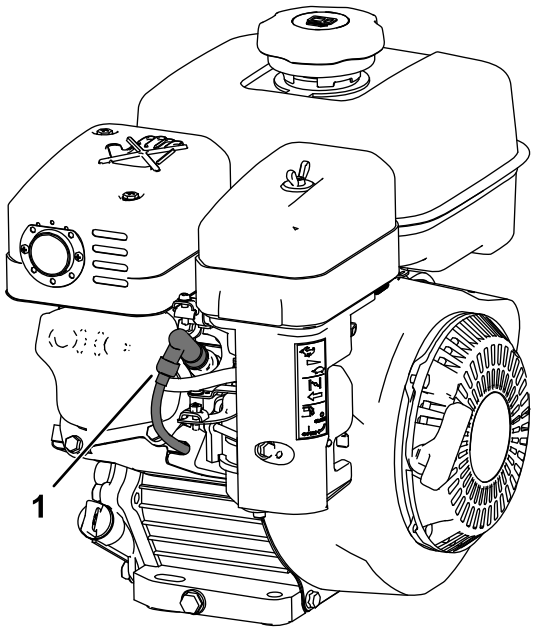
⚠ WARNING

While you are maintaining or adjusting the machine, someone could start the engine. Accidentally starting the engine could seriously injure you or other bystanders.

Remove the key from the ignition (if equipped), engage parking brake, and pull the wire(s) off the spark plug(s) before you do any maintenance. Also push the wire(s) aside so it does not accidentally contact the spark plug(s).

Perform the following before servicing, cleaning, or making any adjustments to the machine.

1. Park the machine on a level surface.
2. Shut off the engine and remove the key from the machine (if equipped).
3. Engage the parking brake.
4. Wait for all moving parts to stop allow the engine to cool before servicing, storing, or making repairs.
5. Disconnect the spark-plug wire (Figure 5).



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Figure 5

1. Spark-plug wire

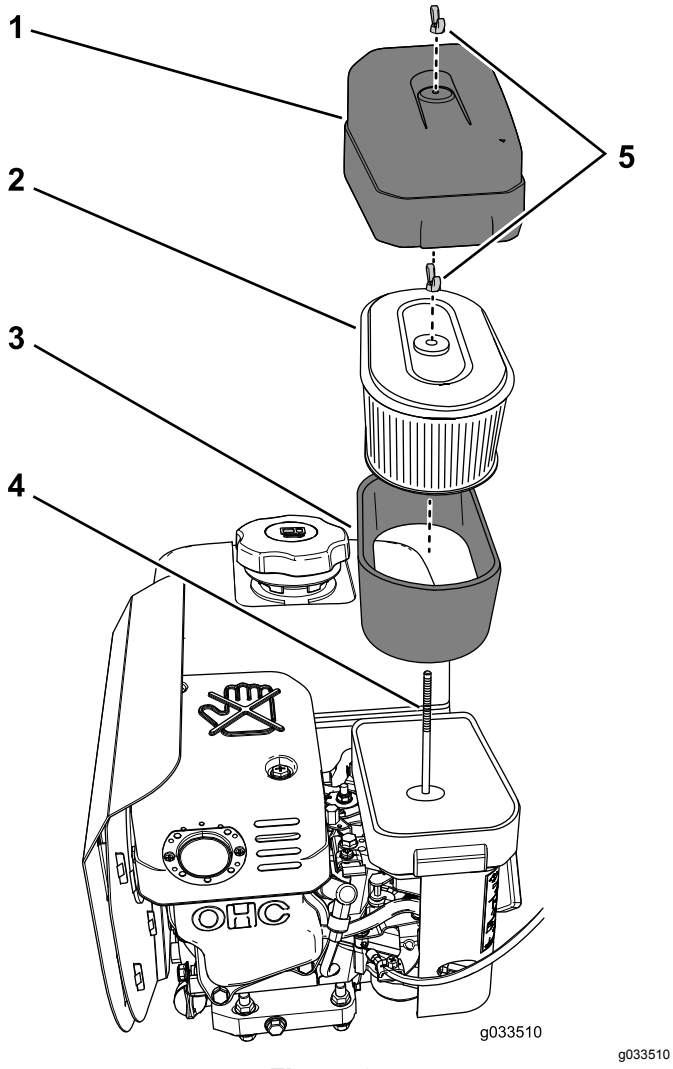
Servicing the Air Cleaner

Service Interval: Every 200 hours

Important: **Do not apply oil to the foam or paper element.**

Removing the Foam and Paper Elements

1. Prepare the machine for maintenance; refer to Preparing the Machine for Maintenance (page 5).
2. Clean around the air cleaner to prevent dirt from getting into the engine and causing damage (Figure 6).



g033510

Figure 6

1. Air-cleaner cover
2. Paper-filter element
3. Foam element
4. Hold-down rod
5. Wing nuts

3. Rotate the wing nut that secures the air-cleaner cover counterclockwise and remove the air-cleaner cover (Figure 6).
4. Rotate the wing nut that secures the paper and foam-filter elements counterclockwise and remove the filter elements from the hold-down rod (Figure 6).
5. Carefully pull the foam element off the paper element (Figure 6).

   Note: Inspect the paper and foam-filter elements for damage or an excessive accumulation of dirt. Replace the damaged filters. Clean the foam-filter element if it is dirty. Replace the paper-filter element if it is dirty.

Servicing the Foam Filter Element

Service Interval: Every 50 hours (more often under dirty or dusty conditions)

1. Inspect the element for tears, an oily film, or damaged (Figure 6).

   Important: **Replace the foam element if it is worn or damaged.**
2. Wash the foam element in liquid soap and warm water. When the element is clean, rinse it thoroughly.
3. Dry the element by squeezing it in a clean cloth.
4. Air dry the foam-filter element.

Installing the Foam and Paper-Filter Elements

Important: **To prevent engine damage, always operate the engine with the complete foam and paper air-cleaner assembly installed.**

1. Carefully slide the foam-filter element onto the paper-filter element (Figure 6).
2. Align the hole in the top plate of the paper-filter element with the hold-down rod of the carburetor (Figure 6).
3. Secure the filter elements to the carburetor with the wing nut (Figure 6) that you removed in step 4 of Removing the Foam and Paper Elements (page 6).
4. Align the hole in the air-cleaner cover with the hold-down rod (Figure 6) and secure the cover to the rod with the wing nut that you removed in step 3 of Removing the Foam and Paper Elements (page 6).

Engine Oil Specification

Oil Type: Detergent oil (API service SJ or higher)

Oil viscosity: Refer to the table below.

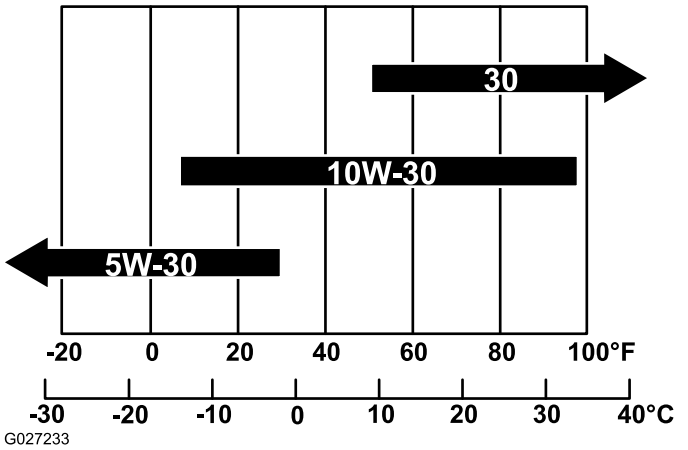


Figure 7

Checking the Engine-Oil Level

Service Interval: Before each use or daily

Important: **Do not operate the engine with the oil level below the Low (or Add) mark on the dipstick, or over the Full mark.**

1. Move the machine to a level surface.
2. Prepare the machine for maintenance; refer to Preparing the Machine for Maintenance (page 5).
3. Allow the engine to cool.
4. Remove the dipstick from the engine and wipe the dipstick with a clean rag (Figure 8).

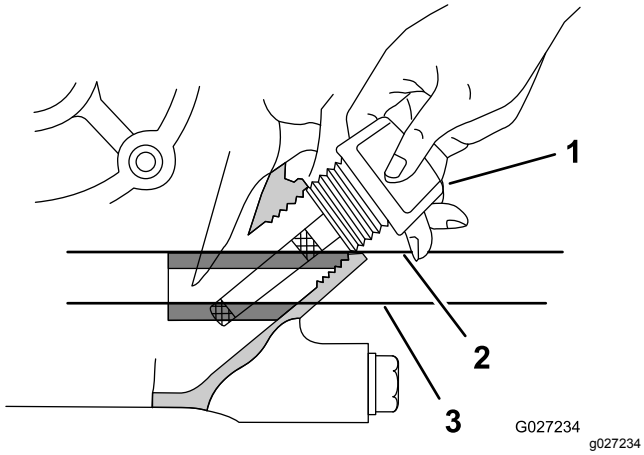


Figure 8

1. Dipstick
2. Maximum oil level
3. Minimum oil level

5. Insert the dipstick from the engine as shown in Figure 8.

Note: Do not thread the dipstick into the filler neck when checking the engine oil level.

6. Remove the dipstick from the filler neck and look at the oil level in the dipstick (Figure 8).

Note: The engine oil level must cover between the hatch marked areas on the dipstick (Figure 8).

7. If the oil level is low, wipe off the area around the filler neck and add the specified oil until the oil level is between the hatch marked areas on the dipstick.

Important: **Do not overfill the engine with oil.**

8. Hand tighten the dipstick into the filler neck (Figure 8).

Changing the Engine Oil

Service Interval: After the first 20 hours

Every 100 hours

Draining the Engine Oil

Important: **Do not operate the engine with the oil level below the Low (or Add) mark on the dipstick, or over the Full mark.**

1. Start and run the engine for a few minutes to warm the engine oil.
2. Prepare the machine for maintenance; refer to Preparing the Machine for Maintenance (page 9).
3. At the rear of the machine, place a drain pan under the drain plug.

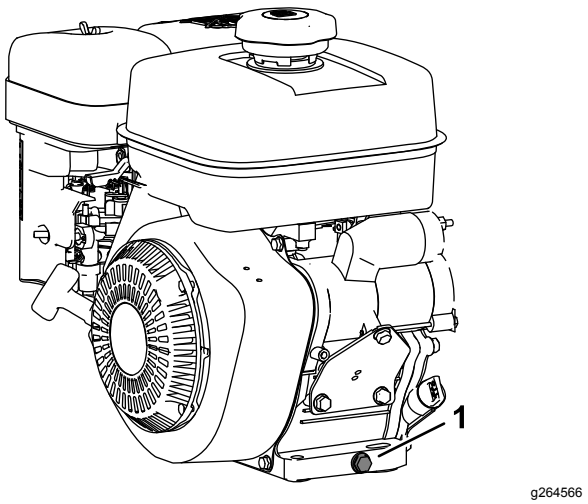


Figure 9

1. Drain plug

4. Remove the drain plug from the engine and allow the oil to drain completely.

5. Push down on the handle to tip the machine and engine backward, allowing all the oil to run into the drain pan.

   Important: **Do not tip the machine at an angle greater than 25°. Tipping the machine beyond 25° leads to oil leaking into the combustion chamber and/or fuel leaking out of the fuel-tank cap.**

6. Install the drain plug and refill the crankcase with the specified oil; refer to Adding Oil to the Engine (page 8).
7. Torque the drain plug to 20 to 23 N·m (15 to 17 ft-lbs).
8. Wipe up any spilled oil and dispose of the used oil properly.

Adding Oil to the Engine

Engine Oil Capacity: 0.6 L (20 fl oz)

Important: **Do not operate the engine with the oil level below the Low (or Add) mark on the dipstick, or over the Full mark.**

1. Remove the dipstick from the filler neck of the engine and wipe clean the dipstick with a rag (Figure 10).

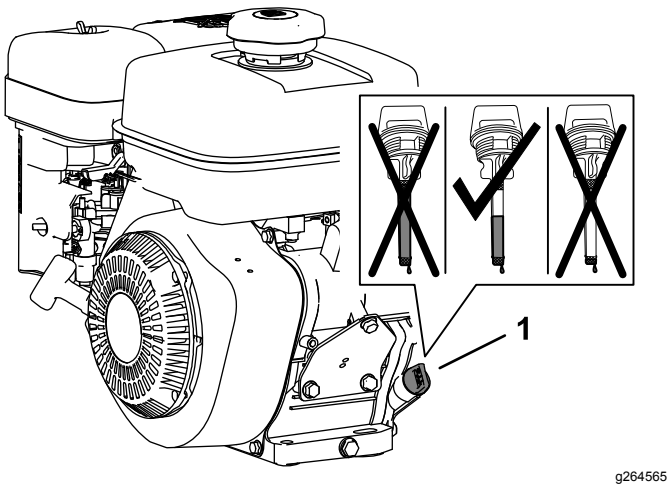


Figure 10

1. Dipstick in filler neck

2. Slowly pour 0.6 L (20 fl oz) of the specified oil into the crank case of the engine through the filler neck (Figure 10).
3. Insert the dipstick from the engine as shown in Figure 11.

   Note: Do not thread the dipstick into the filler neck when checking the engine oil level.

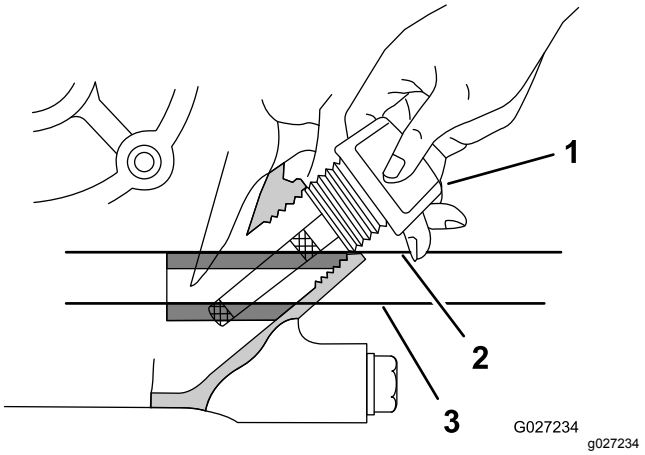


Figure 11

1. Dipstick
2. Maximum oil level
3. Minimum oil level

4. Remove the dipstick from the filler neck and look at the oil level in the dipstick (Figure 10).

   Note: The engine oil level must cover between the hatch marked areas on the dipstick (Figure 10).

5. If the oil level is low, add the specified oil into the engine until the oil level is between the hatch marked areas on the dipstick.

   Note: **Do not** overfill the engine with oil.

6. Hand tighten the dipstick into the filler neck (Figure 10).

Servicing the Spark Plug

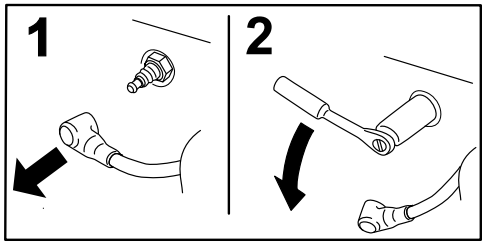
Service Interval: Every 100 hours

Spark Plug Specification

Spark Plug Type: NGK BR6HS, Champion RTL86C, or equivalent

Removing the Spark Plug

1. Prepare the machine for maintenance; refer to Preparing the Machine for Maintenance (page 5).
2. Remove the spark plug as shown in Figure 12.



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Figure 12

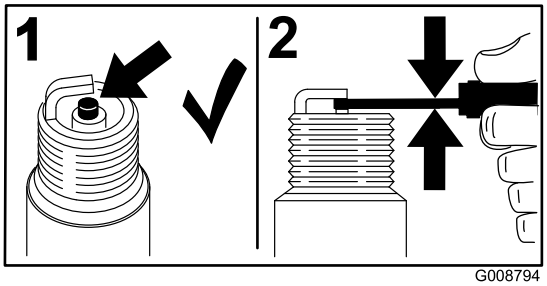
Checking the Spark Plug

Air Gap: 0.6 to 0.7 mm (0.02 to 0.03 inch)

Important: **Do not clean the spark plug(s). Always replace the spark plug(s) when it has a black coating, worn electrodes, an oily film, or cracks.**

If you see light brown or gray on the insulator, the engine is operating properly. A black coating on the insulator usually means the air cleaner is dirty.

Use a gapping tool/feeler gauge to check and adjust the air gap to 0.6 to 0.7 mm (0.02 to 0.03 inch).



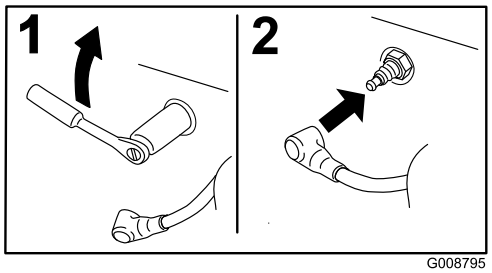
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Figure 13

Installing the Spark Plug

Tighten the spark plug as follows:

- New spark plug—12 to 15 N·m (8.7 to 10.8 ft-lb)
- In-service spark plug—23 to 27 N·m (16.6 to 19.5 ft-lb)



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Figure 14

Servicing a Honda® Engine

Preparing the Machine for Maintenance

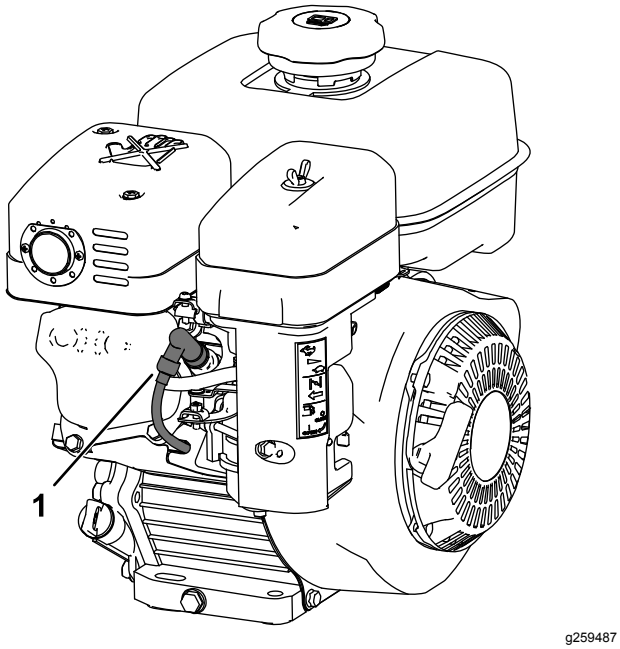
⚠ WARNING

While you are maintaining or adjusting the machine, someone could start the engine. Accidentally starting the engine could seriously injure you or other bystanders.

Remove the key from the ignition (if equipped), engage parking brake, and pull the wire(s) off the spark plug(s) before you do any maintenance. Also push the wire(s) aside so it does not accidentally contact the spark plug(s).

Perform the following before servicing, cleaning, or making any adjustments to the machine.

1. Park the machine on a level surface.
2. Shut off the engine and remove the key from the machine (if equipped).
3. Engage the parking brake.
4. Wait for all moving parts to stop allow the engine to cool before servicing, storing, or making repairs.
5. Disconnect the spark-plug wire (Figure 5).



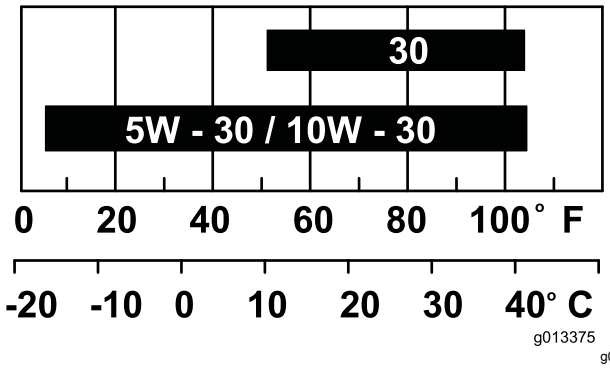
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Figure 15

1. Spark-plug wire

Servicing the Engine Oil

Fill the crankcase with approximately 0.56 L (19 fl oz) of the proper viscosity oil before starting. The engine uses a high-quality oil that has the American Petroleum Institute (API) service classification of SJ or higher. Select the proper oil viscosity (weight) based on the ambient temperature. Figure 16 illustrates the temperature/viscosity recommendations.



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Figure 16

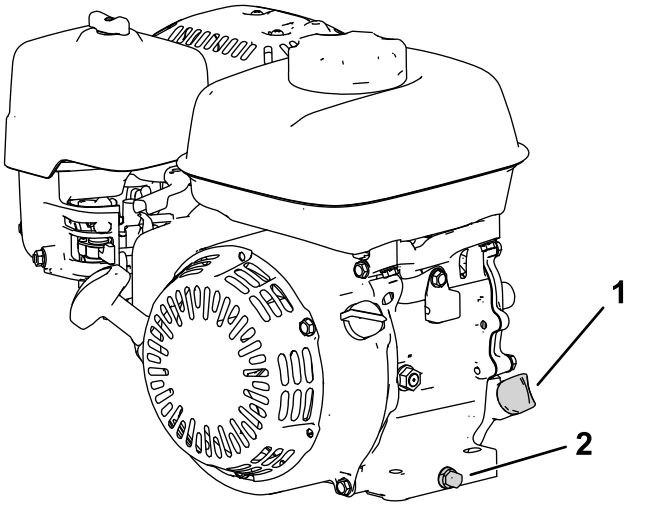
Note: Multi-grade oils (5W-20, 10W-30 and 10W-40) increase oil consumption. Check the engine-oil level more frequently when you use these oils.

Checking the Engine-Oil Level

Service Interval: Before each use or daily

The ideal time to check the engine-oil level is when the engine is cool or before you have started the engine for the day. If you have already ran the engine, allow the oil to drain back down to the sump for at least 10 minutes before you check the engine-oil level.

1. Shut off the engine and wait for all moving parts to stop; refer to Preparing the Machine for Maintenance (page 9).
2. Position the machine so that the engine is level, and clean the area around the oil-fill tube (Figure 17).



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Figure 17

1. Dipstick
2. Drain plug and washer

3. Remove the dipstick by rotating it counterclockwise.
4. Remove the dipstick and wipe the end clean.
5. Insert the dipstick fully into the oil-fill tube, **but do not thread it in**.
6. Remove the dipstick and check the engine-oil level (Figure 18).

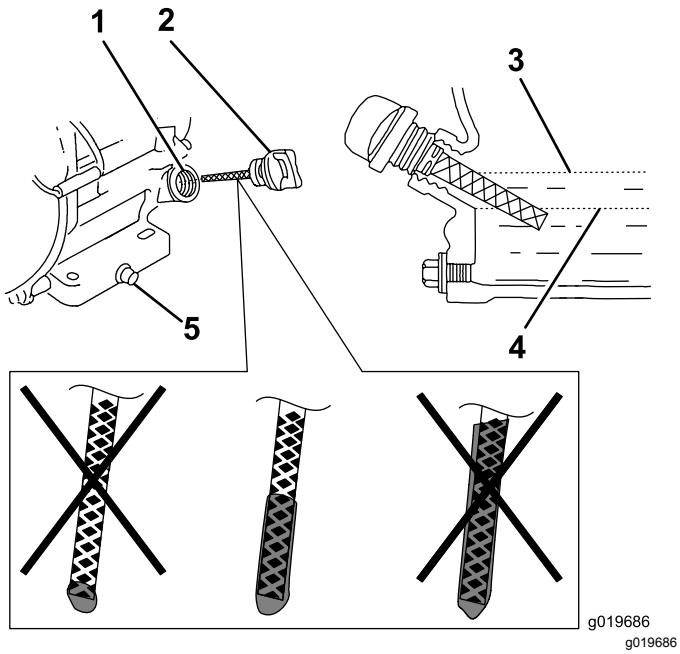


Figure 18

1. Filler tube
2. Dipstick
3. Upper limit
4. Lower limit
5. Drain plug

7. If the engine-oil level is incorrect, add or drain oil to correct the level; refer to Changing the Engine Oil (page 11).

Changing the Engine Oil

Service Interval: After the first 20 hours

Every 100 hours

⚠ WARNING

Oil may be hot after the engine has been run, and contact with hot oil can cause severe personal injury.

Avoid contacting the hot engine oil when you drain it.

1. Shut off the engine and wait for all moving parts to stop; refer to Preparing the Machine for Maintenance (page 9).
2. Raise the engine off the ground and place a pan under the drain plug to catch the oil.
3. Remove the drain plug (Figure 17).
4. When the oil has drained completely, lower the engine to the ground, replace the drain plug and washer, and torque the plug to 18 N·m (13 ft-lb).

   Note: Dispose of the used oil at a certified recycling center.
5. Remove the dipstick, and slowly pour oil into the oil-fill hole until the oil is at the correct level.
6. Ensure that the oil is at the correct level on the dipstick; refer to Checking the Engine-Oil Level (page 10).
7. Replace and secure the dipstick.
8. Wipe up any spilled oil.
9. Connect the wire to the spark plug.

Servicing the Air Cleaner

Service Interval: Before each use or daily

Every 50 hours

Every 300 hours/Yearly (whichever comes first) (more often in dirty or dusty operating conditions)

Important: **Do not operate the engine without the air filter assembly; extreme engine damage will occur.**

1. Shut off the engine and wait for all moving parts to stop; refer to Preparing the Machine for Maintenance (page 9).
2. Remove the wingnut securing the air-cleaner cover (Figure 19).
3. Remove the air-cleaner cover.

   Note: Ensure that no dirt or debris from the air-cleaner cover fall into the base.
4. Remove the foam and paper elements from the base.
5. Remove the foam element from the paper element.
6. Inspect the foam and paper elements; replace them if they are damaged or excessively dirty.

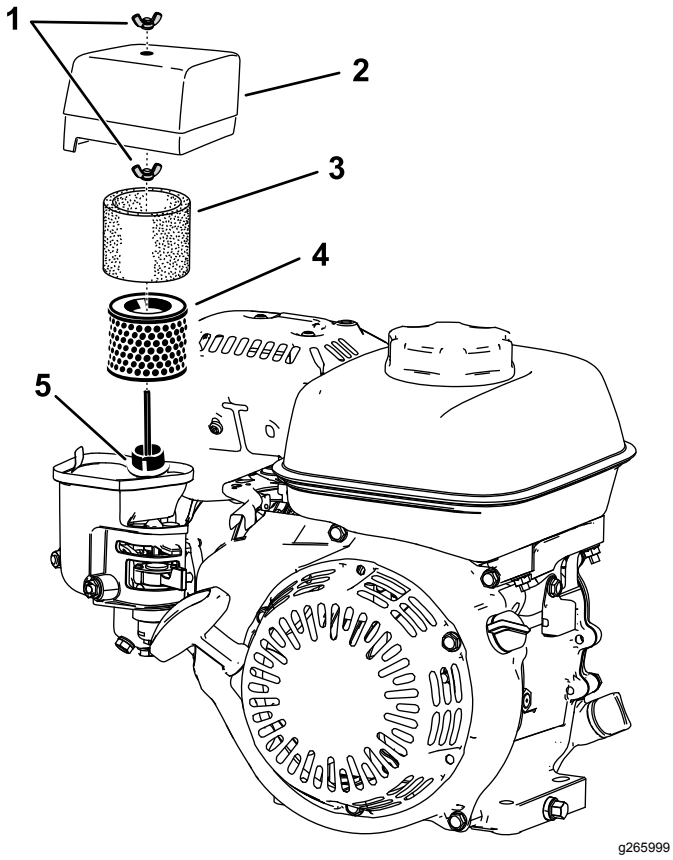


Figure 19

1. Wing nut
2. Air-cleaner cover
3. Foam element
4. Paper filter element
5. Gasket and air duct

7. Clean the paper element by tapping it gently to remove the dirt.

   Note: Do not try to brush dirt off the paper element; brushing forces the dirt into the fibers. Replace the element if tapping it fails to remove the dirt.

8. Clean the foam element in warm, soapy water or in a nonflammable solvent.

   Note: Do not use gasoline to clean the foam element because it could create a risk of fire or explosion.

9. Rinse and dry the foam element thoroughly.
10. Wipe dirt from the base and the cover with a moist rag.

    Note: Ensure that dirt and debris do not enter the air duct leading to the carburetor.

11. Install the air-cleaner elements and ensure that they are properly positioned. Install the lower wing nut.
12. Install the cover and install the upper wing nut to secure it.

Servicing the Spark Plug

Service Interval: Every 100 hours

Every 300 hours

Use an NGK BPR6ES spark plug or equivalent.

1. Shut off the engine and wait for all moving parts to stop; refer to Preparing the Machine for Maintenance (page 9).
2. Clean around the spark plug.
3. Remove the spark plug from the cylinder head.

   Important: **Replace a cracked, fouled, or dirty spark plug. Do not sand blast, scrape, or clean the electrodes because engine damage could result from grit entering the cylinder.**

4. Set the gap on the plug to 0.7 to 0.8 mm (0.028 to 0.031 inch)

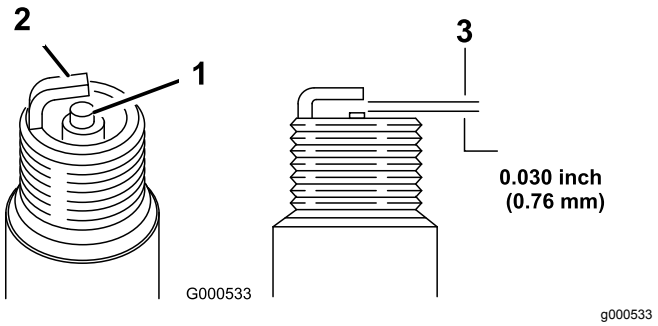


Figure 20

1. Center-electrode insulator
2. Side electrode
3. Air gap

5. Carefully install the spark plug by hand (to avoid cross threading) until it is hand tight.
6. Tighten the spark plug an additional 1/2 turn if it is new; otherwise, tighten it an additional 1/8 to 1/4 turn.

   Important: **A loose spark plug can become very hot and can damage the engine; overtightening a spark plug may damage the threads in the cylinder head.**

7. Connect the wire to the spark plug.