## Section 3
### CARBURETION

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SEE SECTION 1 FOR AIR CLEANER MAINTENANCE PROCEDURES.

CARBURETOR STYLES
Briggs & Stratton Opposed Twin Cylinder engine models use three styles of two piece Flo-Jet down draft carburetors. All three styles incorporate an independent high speed fuel circuit and a separate idle speed fuel circuit.

An integral vacuum pulse type fuel pump allows remote fuel tank installations. The fuel pump will prime at 18” (46.0 cm) maximum lift. Fuel pump pressure is rated at 1.5 psi. (0.10 Bar).

Figures 3 – 6 show the major external differences between the three style carburetors.
Current Style – Type Nos. 1100 And Above Engines Built After 98101500

The current style carburetor has no external adjustments other than idle speed. Components are NOT interchangeable with previous carburetors. The air cleaner base has two holes to accommodate the dual bowl vents and the throttle link is 1/16” (1.6 mm) longer.

**IMPORTANT:**

**Horizontal Crankshaft Engines:** The current style carburetor may be used to replace earlier style carburetors ONLY if the air cleaner base and throttle link are also replaced.

**Vertical Crankshaft Engines:** The current style carburetor may be used to replace earlier style carburetors ONLY if the throttle link is also replaced.

Previous Style – Type Nos. 1100 And Above Engines Built Before 98101500

The previous style carburetor may be identified by a welch plug located above the idle mixture valve or pilot jet. Carburetors equipped with a pilot jet have no external adjustments other than idle speed. The carburetor is equipped with fixed main jet or optional adjustable high speed mixture valve. Fixed main jet carburetors may also be equipped with an optional anti-afterfire solenoid.

Early Style – Type Nos. Under 1100

Early style carburetors have no welch plug above the idle mixture valve. The carburetor is equipped with an adjustable high speed mixture valve or an optional fixed main jet screw.
Remote Fuel Pump Carburetor
Carburetors used for remote fuel pump applications are manufactured without integral pumps, Fig.6. The remote fuel pump is supplied by the equipment manufacturer.
Fuel pump pressure must not exceed 1.5 psi. (0.10 Bar).

NOTE: Excessive fuel pump pressure may result in an over rich carburetor mixture and, ultimately cylinder scoring and, or other engine damage resulting from crankcase oil dilution with gasoline.

INTAKE MANIFOLDS
Two different style intake manifolds have been used.

Engine Type Nos. 1100 & Above
The current style is one piece cast aluminum or iron. Governor controls are mounted on the cylinder.

NOTE: Current (Twin II) manifolds are not interchangeable with previous manifolds. Twin II manifolds have no provision for mounting governor control brackets.

Engine Type Nos. Under 1100
Two variations of early style manifolds were used; the first, was aluminum and was replaced by a one piece cast iron. This style manifold had the governor control bracket mounted on the manifold.

REMOVE CARBURETOR
Horizontal Crankshaft – Twin II (Type Nos. 1100 & Above)
Carburetor and intake manifold must be removed as an assembly, Fig. 9.
1. Remove air cleaner assembly.
2. Remove fuel and vacuum lines from carburetor fuel pump body.
3. Remove four mounting screws.
   a. Lift manifold and disconnect throttle link from carburetor.
4. Remove carburetor from intake manifold, Fig. 10.
   a. Discard gaskets.

**Horizontal Crankshaft Models – Pre-Twin II (Type Nos. Under 1100)**
Carburetor and intake manifold must be removed as an assembly, Fig. 11.
1. Remove air cleaner assembly.
2. Remove fuel and vacuum lines from carburetor fuel pump body.
3. Remove four mounting screws.
4. Loosen governor lever nut and bolt.
5. Remove intake manifold and carburetor with governor lever and springs, Fig. 11.

6. Remove carburetor mounting screws.
7. Disconnect throttle link from governor lever, Then from carburetor, Fig. 12.
   a. Discard gaskets.

**Vertical Crankshaft – All Models**
1. Remove air cleaner assembly.
2. Remove fuel and vacuum lines from carburetor fuel pump body.
3. Disconnect backlash spring, if equipped.
4. Remove carburetor mounting screws.
5. Lift carburetor and spacer and disconnect throttle link from carburetor.
   a. Discard gaskets.
**DISASSEMBLE CARBURETOR – ALL STYLES**

The disassembly procedure for all style carburetors is similar enough that it can be considered the same. Refer to figures 1 and 2 for reference and the names of components.

Separate upper and lower carburetor body. Remove float and inlet needle. Remove idle jet, pilot jet or idle mixture valve, if equipped. Remove fixed jet plug, anti-afterfire solenoid or high speed mixture, valve if equipped. Disassemble fuel pump. Discard “O”-rings, seals, gaskets and diaphragms. Mark choke and throttle plate before removing so that they may be installed in their original position. Remove choke and throttle plates. Remove throttle and choke shafts.

**INSPECT CARBURETOR – ALL STYLES**

Check all moving parts for wear, nicks and burrs. Check float for leaks or damage. Check mixture valves for damage or burrs. Check all mating surfaces for nicks, burrs, foreign material, or cracks. Replace all worn or damaged parts.

**CARBURETOR CLEANING RECOMMENDATION**

**WARNING:** WEAR SUITABLE skin protection when using cleaners. FOLLOW instructions on container.

1. Disassemble carburetor.
2. Remove and discard all old gaskets, seals and sealing material.
3. Use commercial carburetor cleaning solvents (such as Briggs & Stratton Spray Cleaner, Part #100041 or 100042) to clean carburetor parts and body.
4. When cleaning non-metallic parts (plastic, nylon, Minlon™, etc.), do not leave in commercial carburetor cleaner more than 15 minutes.

**NOTE:** Parts containing rubber, such as seals, “O”-rings, inlet needles, seats or pump diaphragms should never be placed in commercial carburetor cleaner.

**WARNING:** TO PREVENT eye injury, always wear eye protection when using compressed air.

5. Use only compressed air (blowing in both directions) to clean out all openings and passages.

**NOTE:** Do not use wires, drills or any other devices to clean out metering holes or passages.

**CHECK THROTTLE, CHOKE SHAFT AND BODY FOR WEAR**

1. Lay carburetor on flat surface and check throttle and choke shaft clearance as shown in Fig. 14. Throttle shaft and choke shaft clearance must not exceed .010” (.25 mm).
2. Inspect throttle shaft and choke shaft for wear, Fig. 15.

Replace if worn.

If throttle shaft bushing is worn it should be replaced.
If choke shaft bearing is worn, the carburetor upper body must be replaced.

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**Fig. 14 – Check Throttle Shaft Wear**

**Fig. 15 – Check Throttle Shaft**
Two style throttle shaft bushings are used on opposed twin cylinder carburetors, Fig. 16.
1. A replaceable split nylon bushing.
2. A replaceable steel bushing.

The bushings are not interchangeable.

Replace Nylon Throttle Shaft Bushings
1. Remove nylon bushing from throttle lever side of carburetor.
2. Drive out throttle shaft plug with long 3/16" (5 mm) punch.
   a. Save plug.
3. Install new bushings with flange side out, Fig. 17.
4. Re-install throttle shaft plug with 1/4" (6 mm) punch.
5. Stake in three places around plug with 1/8" (3 mm) punch, Fig. 18.
6. Apply sealant over plug to prevent air leaks.

Replace Steel Throttle Shaft Bushings
1. Drive out throttle shaft plug with long 3/16" (5 mm) punch.
   a. Save plug.
2. Thread self threading screw #93029 from #19165 flywheel puller into bushing 2-3 turns, then remove it, Fig. 19.
3. Assemble 1/4” x 20 nut, 1/4” flat washer and fuel tank spacer #94047 or #94038 to self threading screw.
4. Thread assembly into bushing.
5. Tighten nut until bushing is removed, Fig. 20.

6. Install new bushing using bushing driver #19057.
   a. Press in bushing until it bottoms.
7. Finish ream bushing with reamer #19056, Fig. 21.
   a. Remove all chips.
   Repeat procedure for other bushing.

8. Re-install throttle shaft plug with 1/4” (6 mm) punch.
9. Stake in three places around plug with 1/8” (3 mm) punch, Fig. 22.
10. Apply sealant over plug to prevent air leaks.

REPLACE FUEL INLET SEAT
NOTE: The inlet seat on current style carburetors (engines built after 98101500) is NOT replaceable.

Remove Inlet Seat – Engines Built Before 98101500
1. Thread self threading screw #93029 from #19165 flywheel puller into seat 3-4 turns, then remove it, Fig. 23.
2. Assemble 1/4” x 20 nut, 1/4” flat washer and fuel tank spacer #94047 or #94038 to self threading screw.
3. Thread assembly into seat.
4. Tighten nut until seat is removed, Fig. 24.

**Install Inlet Seat – Engines Built Before 98101500**
1. Insert new seat into carburetor body.
   a. Seat has a starting lead.
2. Press in seat with #19135 driver, Fig. 25.

**IMPORTANT:** TO ENSURE proper float level be sure seat is flush with carburetor body.

**ASSEMBLE CARBURETOR**

**Current Style – Type Nos. 1100 And Above Engines Built After 98101500**

When assembling carburetor, use new new seals and gaskets.
1. Install choke shaft.
2. Insert choke plate into choke shaft with offset slot toward choke lever side.
3. Assemble body gasket to upper body as shown. Be sure holes are aligned.
4. Assemble fuel inlet valve to float and install float, Fig. 28.

**NOTE:** Float height is not adjustable.

5. Assemble new seal and spacer to throttle shaft and insert into carburetor body, Fig. 29.
   a. Install throttle plate.

**NOTE:** Use LOCTITE® 222 on screw threads.

6. Install idle jet.
7. Install fixed main jet, Fig. 30.

8. Assemble upper body to lower body, Fig. 31.
9. Install fixed main jet plug or fuel solenoid.
   a. Torque to 100 in. lbs. (11.0 Nm).
Assemble Fuel Pump

NOTE: Check valves are not replaceable, Fig. 32.

10. Assemble Remaining components as shown, Fig. 33.
   a. Torque pump cover to 20 in. lbs. (2.0 Nm).

ASSEMBLE CARBURETOR

Engines Built Before 98101500
When assembling carburetor, use new new seals and gaskets.
1. Install choke shaft, Fig. 34.
2. Place choke plate on flat of choke shaft, with notch facing away from fuel pump and dimple down.
   NOTE: Use LOCTITE® 222 on screw threads.

3. Assemble body gasket to upper body as shown, Fig. 35.
   Be sure holes are aligned.
4. Assemble spring to fuel inlet valve, Fig. 36.
5. Install float assembly in upper body.

6. Invert upper body and check float height, Fig. 37.
7. Float should be parallel to gasket surface.

8. Bend tang to adjust, if necessary, using needle nose pliers, Fig. 38.

9. Assemble new seal to throttle shaft and insert into carburetor body, Fig. 39.
   a. Install throttle plate with dimples up, opposite idle port.

**NOTE**: Use **LOCTITE® 222** on screw threads.
10. Install idle mixture valve or pilot jet, if equipped.
11. Install fixed main jet and plug or solenoid, or high speed mixture valve, if equipped, Fig. 40.
a. Torque plug or solenoid to 100 in. lbs. (11.0 Nm).

12. Install upper body assembly, Fig. 41.

Assemble Fuel Pump
1. Place a small dab of grease on diaphragm valve spring bosses to hold springs in position.
a. Assemble springs.
2. Assemble fuel pump components as shown.
INSTALL CARBURETOR
To install carburetor and manifold or carburetor, see “Remove Carburetor,” this section and assemble in reverse order of removal. Torque carburetor mounting screws to 100 in. lbs. (11.0 Nm). Torque intake manifold screws to 90 in. lbs. (10.0 Nm). Install fuel line and fuel pump pulse line. Make sure all connections are tight.

INSTALL AIR CLEANER ASSEMBLY
IMPORTANT: ALL MODELS, breather tubes must be installed on filtered side of air cleaner element, Fig. 43. If breather tubes are incorrectly installed, premature engine wear will result.

Install new air cleaner gasket on carburetor making sure that holes in gasket align with holes in carburetor. Install breather tube(s) in air cleaner base, Fig. 44.

NOTE: Breather tube installation will be easier if breather tube(s) are assembled to air cleaner base first.

Reassemble air cleaner as shown in section 1.

WARNING: WHenever Carburetor and manifold are removed, static governor adjustment should be checked! Misadjustment could result in engine overspeeding which could cause engine damage, property damage or personal injury.
ALL MODELS

STATIC GOVERNOR ADJUSTMENT (Before Running Engine)
1. Loosen governor lever nut. Push on governor lever until throttle is wide open. Do not bend governor link or distort governor lever.
2. Rotate governor shaft counterclockwise as far it will go, Fig. 45.
   a. Torque governor nut to 100 in. lbs. (11.0 Nm).
3. Install throttle and choke control cables and check for proper operation.

Initial Carburetor Adjustment – All Engines Equipped With Adjustable Mixture Valves
1. Turn idle mixture valve clockwise until it just seats. DO NOT FORCE. Turn valve counterclockwise 1-1/2 turns.
2. If carburetor is equipped with an adjustable high speed mixture valve, turn valve clockwise until it just seats. DO NOT FORCE. Turn valve counterclockwise 1-1/2 turns.
This setting will permit the engine to start. Final adjustment will be made with the engine running, Fig. 46.

NOTE: Some early model carburetors are equipped with a fixed jet needle valve, NO TAG. Turn fixed jet needle in until it seats firmly. Backing needle out, will cause an excessively rich mixture.

Dynamic Governor Adjustment – Type Nos. 1100 And Above
ALL ADJUSTMENTS MUST BE MADE WITH THE AIR CLEANER INSTALLED.
The following tools are required when making governor adjustments, Fig. 47.
1. An accurate tachometer, such as Tool #19200 or #19389.
2. Tang bender, Tool #19352 or #19229.
Start and run engine for approximately 5 minutes to allow engine to warm up.
Governed Idle Adjustment – Type Nos. 1100 And Above

1. Move control lever on equipment to SLOW position.

**NOTE:** Engines equipped with current style carburetor or carburetors with screw in pilot jet, proceed to step 6.

2. Hold throttle lever against idle speed screw and temporarily adjust idle to 1300 RPM, Fig. 48.

3. While holding throttle lever against idle speed screw, turn idle mixture valve slowly clockwise until engine speed just starts to slow (Lean Mixture).
4. Still holding lever, turn valve slowly counterclockwise until engine speed just starts to slow (Rich Mixture).
5. Turn valve back to the midpoint between rich and lean, Fig. 49.

6. Hold throttle lever against idle speed screw, adjust idle speed to 1000 RPM.
7. Release throttle lever.
8. With tang bending tool, bend governed idle tang to obtain 1300 RPM, Fig. 50.

Final Adjustment – Type Nos. 1100 And Above High Speed Mixture (If Equipped)

**NOTE:** Carburetors equipped with a fixed high speed jet require no high speed adjustment.

1. Place equipment speed control in fast position
2. Turn high speed mixture valve slowly clockwise until engine speed just starts to slow. (Lean Mixture).
3. Turn mixture valve slowly counterclockwise until engine speed just starts to slow (Rich Mixture).
4. Turn mixture valve to midpoint between rich and lean, Fig. 51.
Dynamic Governor Adjustment – Type Nos. Below 1100

ALL ADJUSTMENTS MUST BE MADE WITH THE AIR CLEANER INSTALLED.

The following tools are required when making governor adjustments.
1. An accurate tachometer, such as Tool #19200 or #19389.
2. Tang bender, Tool #19352 or #19229.
3. A 1/8” (3 mm) diameter, 1” (25 mm) long metal rod.

Start and run engine for approximately 5 minutes to allow engine to warm up.
1. Place equipment speed control in idle position.
2. Hold throttle lever against idle speed screw and adjust idle speed to 1300 RPM,
3. While holding throttle lever against idle speed screw, turn idle mixture valve slowly clockwise until engine speed just starts to slow (Lean Mixture).
4. Turn mixture valve 1/2 turn counterclockwise.
5. Still holding lever against idle speed screw, adjust idle speed to 1000 RPM.

7. Move equipment speed control lever until 1/8” (3 mm) rod can be inserted through the 2 holes in the governor control plate, Fig. 54.
8. With tang bending tool bend governed idle tang to obtain 1300 RPM, Fig. 54.

Final Adjustment – High Speed Mixture (If Equipped) – Type Nos. Below 1100

NOTE: Carburetors equipped with a fixed high speed jet require no high speed adjustment.

1. Place equipment speed control in fast position.
2. Turn high speed mixture valve slowly clockwise until engine speed just starts to slow (Lean Mixture).
3. Turn mixture valve 1/2 turn counterclockwise, Fig. 55.

NOTE: If the engine does not accelerate properly, readjust the high speed mixture valve approximately 1/8 turn counterclockwise (Rich Mixture).
Fixed High Speed Jet Carburetors

If throttle response is poor or a hesitation occurs when the engine is accelerated, or when engaging an electric clutch, the following procedure can be used to determine if a lean mixture is the cause.

Partially close the choke. If the throttle response improves and, or, the hesitation disappears, it is an indication that a richer jet (Part #231500) can be substituted, Fig. 56.

Special high altitude jets are available. Consult the Illustrated Parts List for the correct part number.

Adjust Carburetor, Early Style
(Dual Speed Generator – Welder Sets)

Engine must be installed in equipment and all equipment manufacturer controls installed ready to be used.

The carburetor adjustment procedure is the same as described in carburetor adjustment Pre-Twin II (page 18), except that when adjusting idle mixture the equipment switch must be in “Generator” mode. When adjusting the high speed mixture the equipment switch must be in “Weld” mode.

ANTI-AFTERFIRE SYSTEM

Some carburetors are equipped with a fuel shut off solenoid controlled by the equipment ignition switch. When the equipment switch is in the “Off” position, the solenoid valve plunger closes, stopping fuel flow through the fixed main jet, Fig. 57. When the switch is in the “On” and “Start” position, the solenoid valve opens, allowing normal fuel flow, Fig. 58. Solenoid is operating properly if a click is heard when equipment ignition switch is turned “On” and “Off.”

NOTE: If solenoid is not working (defective solenoid, defective ignition switch or broken solenoid wire), engine will start with great difficulty when cold. If engine is at operating temperature, engine will start and run, but will not develop full power.

NOTE: Fuel shut-off solenoid requires a minimum of 9 volts DC to function.
Testing Solenoid
If solenoid does not click, the problem may be in equipment wiring or solenoid. To determine whether problem is with wiring or solenoid, perform the following tests in the order shown.

Test Equipment
The digital multimeter, Tool #19390, is required to test the solenoid equipment wiring.

The following tests will be performed with the meter in the V (DC volts) position, Fig. 59.

Testing Equipment Wiring
1. With keyswitch in OFF position, disconnect equipment wiring harness connector from solenoid.
2. Attach red meter test lead into equipment wiring harness connector.
3. Attach black test lead to a good ground, Fig. 60.
4. Turn keyswitch to ON position.
   a. Meter should display battery voltage at connector.
If meter does not display battery voltage, problem is with wiring harness. Check for loose or broken wire. If meter displays battery voltage, test solenoid.

Testing Solenoid
1. Remove solenoid from carburetor.
2. Place either terminal of a 9 volt transistor battery on the solenoid connector and other terminal on body of solenoid, Fig. 61.
3. Plunger should retract freely.
4. When battery is removed, plunger should return freely.
Replace solenoid if plunger sticks or doesn’t move.

Anti-Afterfire System Early Style Optional
On 402700 Only, Before Code 80080112
Some models are equipped with an early style Anti-Afterfire System. The system consists of a vacuum valve and solenoid assembly and vacuum block assembly located in the air cleaner base. Crankcase vacuum is supplied to the vacuum valve assembly through a “Tee” fitting located in the fuel pump vacuum line. Electrical power to operate the vacuum valve solenoid is supplied through the equipment manufacturer’s ignition switch, Fig. 62.
When the switch is in the start or run position, the vacuum valve assembly is energized. This opens the valve in the vacuum valve assembly and allows the carburetor float bowl to vent through the air cleaner. The carburetor float bowl vents through the vacuum block assembly and vacuum valve assembly, Fig. 63.

Check Anti-Afterfire Operation
(Engine Running)
With engine in equipment and running, disconnect either electrical terminal on vacuum valve assembly. Engine should stop running with equipment ignition switch in the run position. Engine should not start until terminal is reconnected, Fig. 64.

NOTE: Choke must be in wide open position.

Inspect Anti-Afterfire System
(Loss of Vacuum)
Check all lines for cracks, loose connections, air leaks and proper routing. None of the lines should have sharp bends or kinks. Check gaskets and "O"-ring in vacuum block for leaks. Replace damaged or leaking gaskets or "O"-ring.

Inspect Anti-Afterfire System
(Electrical)
Check for loose or corroded ground wire connections, loose or corroded connections at vacuum valve and equipment ignition switch. Solenoid is operating properly if a click is heard when equipment ignition switch is turned "ON" and "OFF." Replace vacuum valve, if it does not click.

Replacing Hoses
Service replacement hoses are available and can be cut to required length, Fig. 65.
A letter "D" drill (6.2 mm) is used to align gasket "O"-ring and vacuum block body during assembly, Fig. 66.

INLINE FUEL FILTER SERVICE
Replace inline fuel filter yearly or every 100 hours, whichever occurs first. Replace filter if dirt or water are present. See illustrated parts list for correct fuel filter.