ZENITH 67 AND 267-SERIES CARBURETORS

DESCRIPTION AND OPERATION

DESCRIPTION

The 67-Series and 267-Series Carburetors are of the single barrel updraft design, with a single venturi, twin floats and a semi-concentric fuel bowl to permit operation at quite extreme angles without flooding or starving the engine. They are of the "balanced" and "sealed" type since all air for fuel bowl ventilation and idle operation must enter through the air cleaner. The fuel supply system is made up of the threaded fuel inlet, fuel valve (needle and seat), float assembly and float chamber. The idle system in the 67-Series consists of the idle discharge port, idle air passage, idle adjusting needle, idle jet and idle fuel passage. In the 267-Series, the idle system consists of two idle discharge holes, idle air passage, idle air bleed, idle adjusting needle, idle jet and fuel passage.

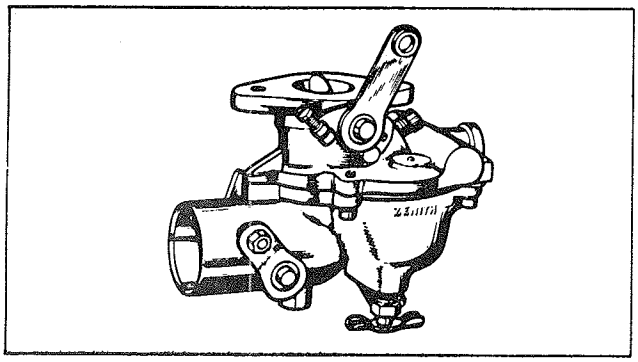

Fig. 1. External View

The high speed (main metering) system consists of the venturi, main jet calibration, well vent and discharge jet. In the 67-Series carburetor, the economizer system consists of a metered slot in the throttle shaft, a vacuum passage connecting the throttle bore with the slot in the throttle shaft and a vacuum passage from the slot in the throttle shaft to the bowl vent channel, see Figure 5.

In the 267-Series carburetor, the economizer system consists of a drilled hole from the throttle bore into a channel communicating with the air space in the fuel bowl, and a restriction in the channel venting the fuel bowl to the air intake, see Figure 5a. The choke system is of the semi-automatic type and consists of a choke plate with a spring loaded poppet valve mounted on a shaft located within the air intake and operated externally by a lever attached to the choke shaft.

OPERATION

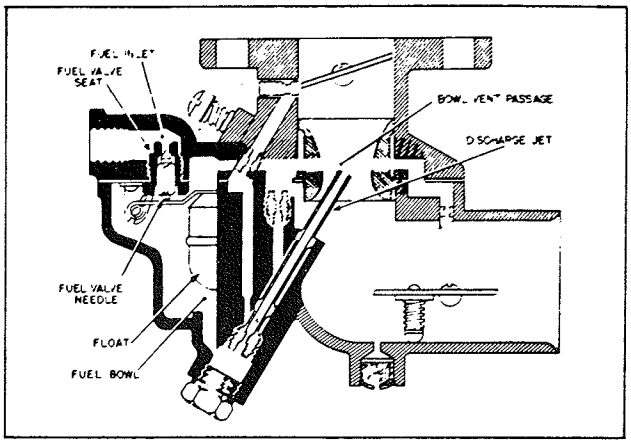

Fig. 2. Fuel Supply System

FUEL SUPPLY SYSTEM

Fuel under pressure is supplied through the fuel inlet, fuel valve (needle and seat) to the float chamber. The float in the float chamber automatically regulates the opening through the fuel valve (needle and seat) to maintain the proper level of fuel in the fuel bowl and meet the demands of the engine according to speed and load.

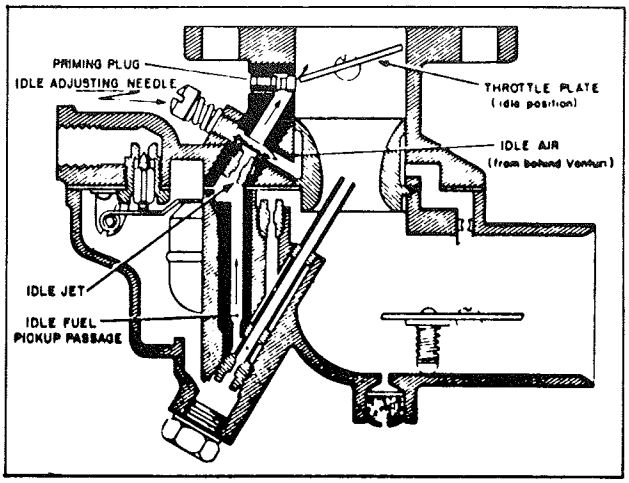

Fig. 3. Idle System (67-Series)

IDLE SYSTEM -- 67 SERIES CARBURETORS

At idle speed, the throttle plate is slightly advanced from the completely closed position to expose about one-half of the idle discharge

port to engine manifold vacuum (suction), see Figure 3. This suction is transmitted to the idle jet through a passage connecting the idle discharge port (priming plug) with the idle jet. Fuel for idle operation is supplied through the main jet to a well directly below the main discharge jet. The fuel for idle flows from this well through a restricted drilling at the bottom of the idle fuel pick-up passage. From here it is metered through the idle jet calibration before entering the vacuum passage leading to the idle discharge port. As it leaves the idle jet the fuel is mixed with a variable amount of air admitted from behind the venturi. This fuel-air mixture then passes through the idle vacuum passage and is discharged into the air stream through the idle discharge port. Turning the idle adjusting needle IN (clockwise) increases the suction on the idle jet and reduces the amount of idle air resulting in a richer mixture. Turning the idle needle OUT (counter-clockwise) reduces the suction on the idle jet and increases the amount of air admitted for idle, resulting in a leaner mixture.

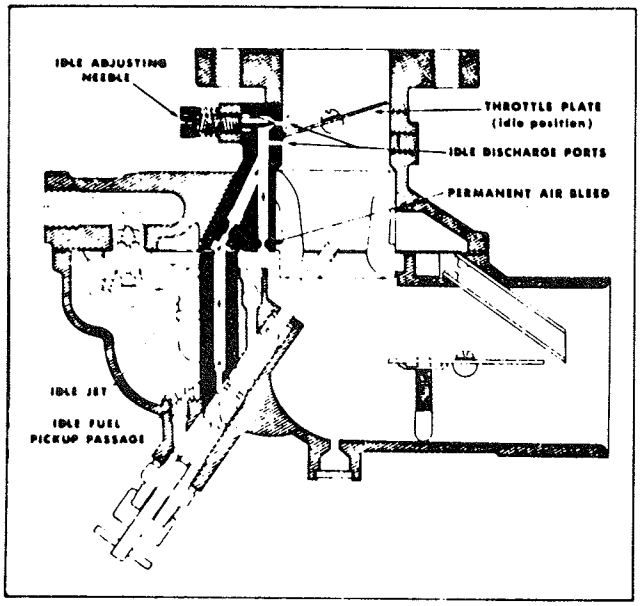

Fig. 3a. Idle System (267-Series)

IDLE SYSTEM - 267 SERIES CARBURETORS

At idle speed, the throttle plate is advanced slightly to expose the upper idle discharge hole to engine manifold vacuum (suction), see Figure 3a. This suction is transmitted to the idle jet through a passage connecting the idle discharge holes with the idle jet. Fuel for idle is supplied through the main jet to a well directly below the main discharge jet. The fuel for idle flows from this well through a restricted drilling at the bottom of the idle fuel pick-up passage. From here it is metered through the idle jet calibration before entering the vacuum passage leading to the idle discharge holes. As the fuel leaves the idle jet, it is mixed with air admitted through an air bleed which originates back of (or from behind) the venturi. The idle air bleed controls the air to be mixed with fuel for the idle fuel-air mixture. This system is referred to as a two hole idle system since the fuel-air mixture is discharged into the air stream through one or both of the two calibrated holes located in the throttle body bore. The idle adjusting needle, located in the throttle body at the upper idle discharge hole, controls the amount of idle fuel-air mixture discharged into the air stream. Turning the idle adjusting needle IN (clockwise) results in a leaner mixture since less of the fuel-air mixture is discharged into the air stream through the idle discharge hole. Turning the idle adjusting needle OUT (counter-clockwise) results in a richer idle fuel-air mixture since more of the fuel-air mixture is discharged into the air stream through the idle discharge hole. Note that in this type of idle system, the idle adjusting needle controls the amount of the idle fuel-air mixture discharged into the air stream.

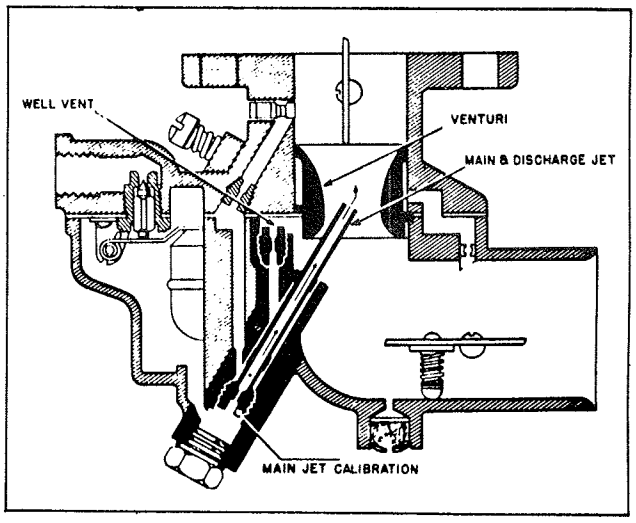

Fig. 4. High Speed System

HIGH SPEED (MAIN METERING) SYSTEM

As the throttle is opened slightly above the idle range, the suction on the idle discharge port or holes diminishes while at the same time the increased volume of air entering the engine increases the suction in the venturi to start drawing fuel from the high speed system through the main discharge jet, see Figure 4. The main jet or main jet calibration controls the fuel

delivery during the cruising range of operation (from about one-quarter to three-quarter throttle opening). To assure a proper mixture ratio, a small amount of air is admitted through the well vent into the discharge jet through air bleed holes in the discharge jet at a point below the level of fuel in the metering well. Fuel for high speed system operation flows from the fuel chamber through the main jet calibration and into the discharge jet where it is mixed with air admitted by the well vent before being discharged into the air stream of the carburetor.

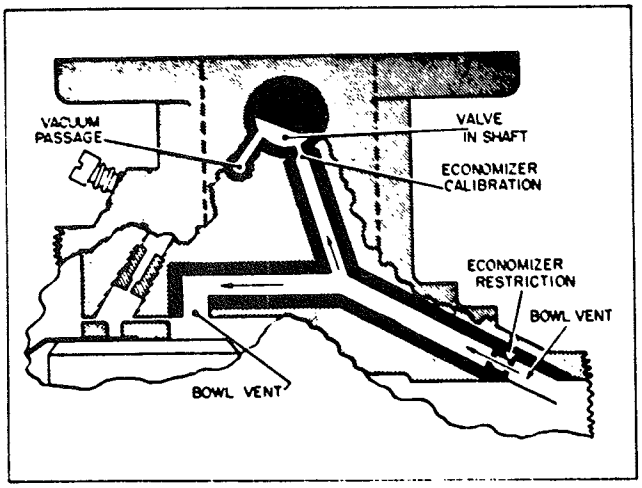

Fig. 5. Back Suction Economizer (67-Series)

ECONOMIZER SYSTEM

67-SERIES CARBURETORS

During part throttle range of operation, "back suction" (manifold vacuum) is applied to the fuel in the fuel bowl through the vacuum channels connecting the throttle body bore with the fuel bowl and by the economizer restriction, see Figure 5. The "back suction" lowers the pressure on the fuel in the fuel bowl to reduce the flow of fuel through the metering systems, which results in the carburetor being operated on leaner mixture ratios during part throttle operation. As the throttle is advanced to wide open position, the slot in the throttle shaft rotates closing off the vacuum passage and permitting the pressure in the fuel bowl to return to air intake pressure. The main jet then flows to full capacity to supply the richer mixture ratio required for power operation.

ECONOMIZER SYSTEM

267 SERIES CARBURETORS

During part throttle range of operation, the fuel bowl is subjected to manifold vacuum "back

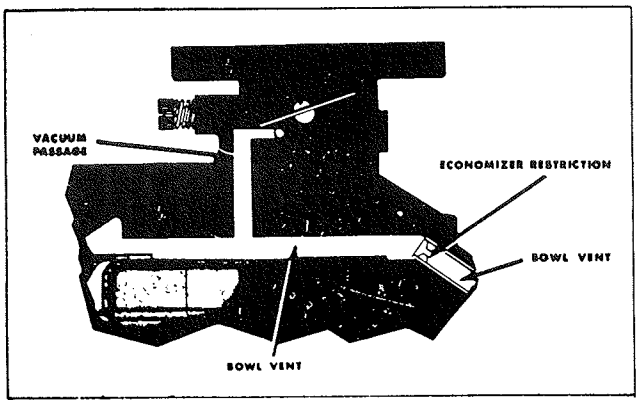

Fig. 5a. Back Suction Economizer (267-Series)

suction" through the drilled hole in the throttle bore, which lowers the pressure on the fuel in the fuel bowl and retards the flow of fuel through the metering systems, see Figure 5a. This results in the carburetor being operated on leaner mixture ratios during part throttle operation. As the throttle is advanced to wide open position, the "back suction" applied to the fuel in the fuel bowl diminishes, permitting the pressure in the fuel bowl to return to air intake pressure. The main jet then flows to full capacity supplying the richer mixture required for full power operation. This system provides economical fuel-air mixture ratios during part throttle range of operation while still permitting the richer mixture ratios required for full load and power operation.

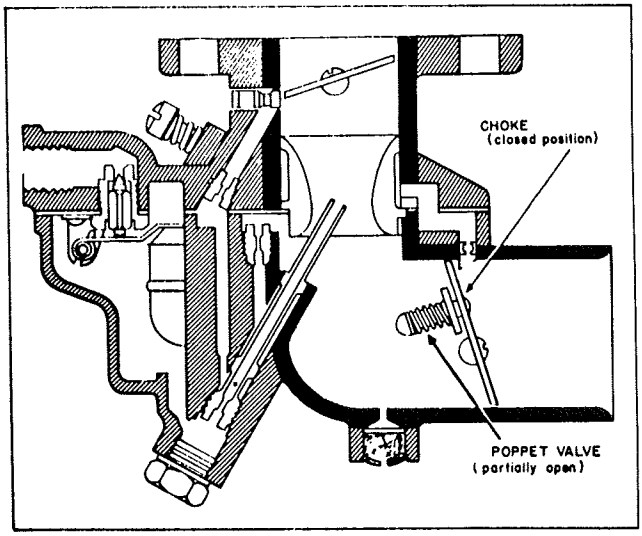

Fig. 6. Choke System

CHOKE SYSTEM

Closing the choke plate when starting a cold engine restricts the entrance of air to the carburetor and creates an increase in suction at

the jets. This increase in suction causes more fuel to be drawn into the engine to provide the richer mixture needed for starting the cold engine. As soon as the engine begins to operate, the spring-loaded poppet valve opens to prevent over-choking or flooding of the engine. As the engine warms, the choke must be gradually opened manually to the wide open position.

SERVICE PROCEDURE

IDENTIFY CARBURETOR - See page 2 for illustration and procedure to follow.

DISASSEMBLY

REMOVAL OF THROTTLE BODY ASSEMBLY

1. Remove hex head plug or filter screen (6) from side of throttle body (33), using 7/16" wrench.
2. Remove four bowl to body screw and lockwasher assemblies (5) which attach throttle body to bowl, using a screwdriver.
3. Raise throttle body slightly and separate bowl to body gasket from fuel bowl and then remove throttle body assembly being careful not to damage floats.

DISASSEMBLY OF THROTTLE BODY

1. Invert throttle body assembly and remove float axle (10) from slotted end of hinge bracket, using screwdriver to force axle through slotted end of hinge bracket. Complete removal of axle from opposite side, then remove float assembly (9) and fuel valve needle (part of 8).
2. Remove bowl to body gasket (30) from machined surface of throttle body, and remove venturi (29).
3. Remove fuel valve seat (8) and fiber washer (7) from throttle body, using C161-82 wrench for 67-Series and C161-85 for 267-Series carburetors.
4. Remove idle jet (31) from passage in machined surface of throttle body near fuel valve seat, using small screwdriver.
5. Remove idle adjusting needle (4) and friction spring (3) from side of throttle body.
6. Back out throttle stop screw (37) until threaded end is flush with throttle lever. Close throttle and mark across throttle body and throttle lever as a guide to correct re-assembly of parts.
7. File off riveted or peened end of throttle plate screws flush with throttle shaft, being careful not to damage throttle plate or throttle body bore.
8. Remove throttle plate screws (41) and throttle plate (40).
9. Remove throttle shaft and stop lever assembly (36) from throttle body and drive out shaft hole plug (2), using a 6" length of 1/4" rod inserted through opposite shaft hole.
10. To remove shaft hole packing (1) and retainer (34), screw a 5/16" fine thread taper tap into packing retainer until firmly seated, then insert long punch or rod through opposite shaft hole and drive punch against end of tap until retainer is free of throttle body.

DISASSEMBLY OF FUEL BOWL BODY

1. Remove main passage plug (18) or main jet adjustment assembly (18) and fiber washer (17) from bottom of fuel bowl, using a 1/2" wrench.
2. Remove drain plug (19) from outside bottom of fuel bowl, using a 7/16" wrench.
3. Remove discharge jet (16) and fiber washer (15), using C161-182 jet wrench.
4. On 267-Series carburetors, remove main jet and fiber washer from bottom of fuel bowl, using screwdriver.
5. Remove well vent jet (28) from center of large opening in machined surface of the fuel bowl, using a screwdriver.
6. Close choke and scribe across choke lever, choke bracket (if used) and across air intake adjacent to lever as a guide to correct re-assembly.
7. On 267-Series carburetors remove choke lever spring (not shown).
8. Remove choke plate screw and lockwasher assemblies (27), choke plate (26), choke shaft and lever assembly (25).

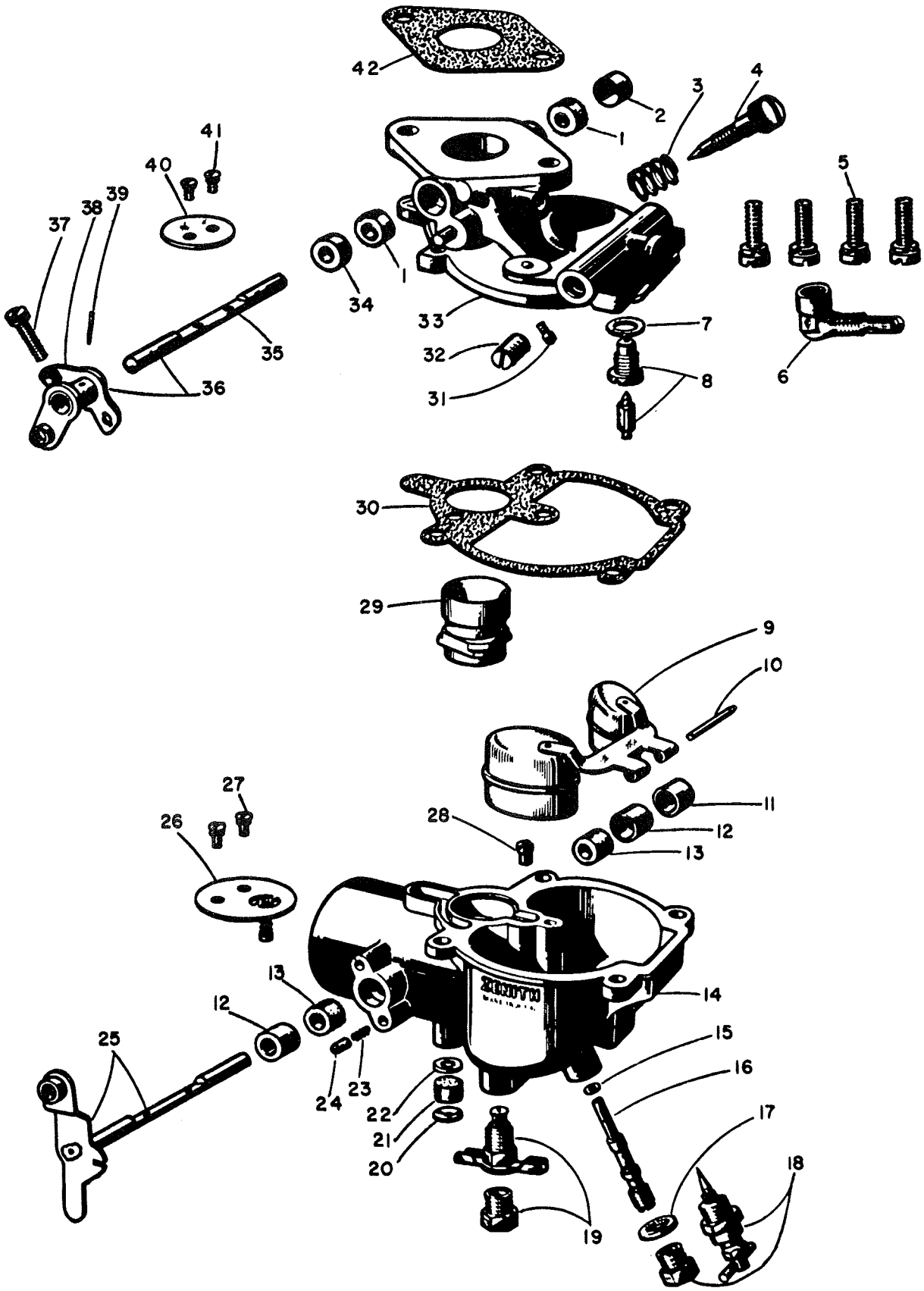

Fig. 7. Exploded View

NOTE: In some cases it may be necessary to bend bowl vent tube up slightly to give choke clearance, using small screwdriver inserted in tube.

9. Remove ratchet pin (24) and spring (23) from choke shaft boss on 67-Series only. Remove choke bracket screws, lockwashers and choke bracket (parts not shown) from 267-Series carburetors.

10. Drive out shaft hole plug (11), using a 6" length of 1/4" rod inserted through opposite shaft hole.

11. To remove choke shaft packing (13) and retainer (12), screw a 5/16" fine thread tap into packing retainer until firmly seated, then insert long punch or rod through opposite shaft hole and drive punch against end of tap until retainer is free of air intake body. Remove retainer and packing from tap and repeat at opposite shaft hole.

CLEANING

Thoroughly clean all metal parts in Bendix Metalclene or Speedclene and rinse in solvent. Blow out all passages and channels in the castings with compressed air. Reverse the air flow through each passage to insure the removal of all dirt particles. NEVER USE A WIRE OR DRILL TO CLEAN OUT THE JETS.

INSPECTION

Inspect all parts and replace any that are damaged or worn. Always use a Zenith Repair Kit. For correct Repair Kit, refer to Zenith Parts Catalog Specification Page. If inspection reveals that the fit of the throttle shaft is sloppy in the throttle body bushings, it will be necessary to install new throttle shaft bushings. The following procedure should be followed when installing throttle shaft bushings in the throttle body.

REMOVAL AND REPLACEMENT OF THROTTLE SHAFT BUSHINGS

NOTE: To rebush the throttle body, it is necessary to have available the following Zenith Tools as well as the new bushings and oversize plug:

C161-73-1 Counter-bore Reamer
C161-71-1 Line Reamer
C161-72-1 Bushing Driver
Throttle Shaft Bushings CR9-13
Oversize Plug CR137-10

1. Place a suitable center in drill press bed. With one throttle shaft hole on this center, bring spindle down until counter-bore reamer contacts opposite shaft hole; then set stop on drill press to length of bushing.

2. Counter-bore hole to accommodate bushing, using C161-73-1 Counter-bore Reamer.

3. Drive throttle shaft bushing into place, using C161-72-1 Bushing Driver.

4. Ream this bushing, using C161-71-1 Line Reamer. The opposite shaft hole is used as a "pilot" to align reamer in bushing.

5. Turn throttle body casting over and prepare opposite hole to take bushing. It will be necessary to reset stop on spindle again as described above. Counter bore hole, using C161-73-1 Counter-bore Reamer.

6. Drive second throttle shaft bushing into place, using C161-72-1 Bushing Driver.

7. Line ream this bushing as the final machining operation, using C161-71-1 Line Reamer.

8. After the new throttle shaft bushings are in place it will be necessary to redrill the economizer restriction located in cover section and the channel from the throttle body bore into the throttle shaft hole.

To obtain the correct drill sizes for this operation refer to the specification card or bulletin covering the particular carburetor in question. To drill the channel from the throttle body bore into the throttle shaft hole it will be necessary to remove the brass channel plug in the throttle body. This can be drilled out, using a 3/32" drill. A new "oversize" plug (No. CR137-10) should be installed after the drilling operation is completed.

RE-ASSEMBLY

ASSEMBLY OF FUEL BOWL BODY

1. Install packing (13) in open side of retainer (12) and place completed assembly on C161-72-1 bushing driver with packing facing small end of driver. Insert small end of driver into choke shaft hole; start retainer into counter-bore of body and lightly drive retainer into body until flush with machined surface.

2. Install shaft hole plug (11), using light hammer.

3. 267-SERIES ONLY - Refer to match marks made at time of disassembly and install choke bracket, bracket attaching screws and lockwashers (parts not shown).

3a. 67-SERIES ONLY - Place ratchet pin (24) and spring (23) in position in boss.

4. Install choke shaft and lever assembly (25) and rotate shaft so that cut out section faces out.

5. Start choke plate (26) into place (poppet valve stem and spring facing into air intake). Press choke lever against shaft boss to compress ratchet pin spring; center choke plate in closed position and start choke plate screws (27) into place. When plate is properly centered, tighten screws securely.

6. 267-SERIES ONLY - Install choke lever spring (not shown) to return choke to wide open position.

7. Install main jet (not shown) and fiber washer in threaded hole at bottom of fuel bowl.

8. ALL MODELS - Install well vent jet (28) in fuel bowl and tighten, using small screwdriver.

9. Install discharge jet (16) and fiber washer (15) in large threaded passage below fuel bowl, using C161-182 jet wrench.

10. Install drain plug (19) in threaded passage at bottom of fuel bowl, using 7/16" end wrench.

11. Install main passage plug (18) with fiber washer (17), using a 1/2" wrench. If main jet adjustment is used, back out adjusting screw two or three turns before installing main jet adjustment and fiber washer.

ASSEMBLY OF THROTTLE BODY

1. Insert throttle shaft packing (1) in open end of retainer (34) and place completed assembly on bushing driver C161-72-1 with packing facing small end of driver.

2. Insert small end of driver into throttle shaft hole; start retainer into counter-bore of throttle body and lightly drive retainer into body until flush with machined surface or slightly below surface to avoid interference with throttle lever.

3. Insert throttle lever and stop assembly (36) in throttle body. Rotate throttle shaft to wide open position and insert throttle plate (40) into shaft. Then rotate to closed position and hold plate closed with fingers.

4. Start throttle plate screws (41) and leave screws loose. Center throttle plate in throttle bore and tighten throttle plate screws.

5. Install throttle shaft hole plug (2) in side opposite throttle lever, using a light hammer to drive plug in flush with face of boss.

6. Install idle adjusting needle (4) and friction spring (3) in threaded passage at side of throttle body. Turn idle needle in lightly against seat, then back out needle 1-1/4 turns as a preliminary setting.

7. Install idle jet (31) in counter-bored passage of machined surface.

8. Install fuel valve seat (8) and fiber washer (7), using C161-82 or C161-85 wrench.

9. Place new throttle body to bowl gasket (30) on machined surface of throttle body. Then install fuel valve needle (8) in seat and position float assembly (9) in hinge bracket.

10. Insert float axle (10) through hinge bracket at side opposite slot and guide axle through float bushing. Press axle through slotted end of bracket, using handle of screwdriver.

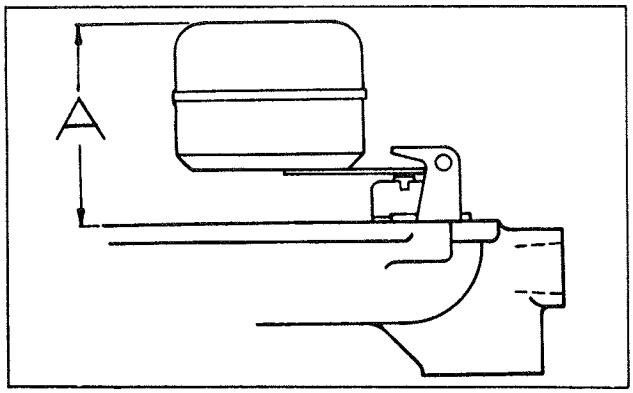

Fig. 8. Float Setting

11. To insure correct fuel level in the float chamber, check distance "A" from top of floats to machined surface of throttle body

(no gasket) with throttle body inverted, see Figure 8. This dimension should be 1-5/32" plus or minus 1/32". To increase or decrease distance from top of float bodies to machined surface, use long nose pliers and bend lever close to float body.

NOTE: Do not bend, twist or apply pressure on the float bodies. The float bodies when viewed from the free end of the float bodies must be centered and at right angles to the machined surface and must move freely on the float axle.

12. Insert venturi (29) in throttle body bore, large opening first, and position so that flat side will be toward well vent jet when carburetor is assembled.

ASSEMBLY OF THROTTLE AND FUEL BOWL BODY ASSEMBLIES

1. Carefully place fuel bowl assembly on throttle body assembly, being careful not to damage floats. Align screw holes in fuel bowl with holes in gasket and throttle body.

2. Start all four bowl to body screw and lockwasher assemblies (5) and then tighten screws uniformly and securely.

3. Replace hex plug or filter screen (6) in side of throttle body (if removed), using 7/16" wrench.

4. Hold throttle lever in closed position and turn throttle stop screw (37) in until it just contacts the stop pin; then turn screw IN 1-1/2 additional turns as a preliminary idle speed adjustment.

Assembly is now completed.

SPECIAL TOOLS REQUIRED

C161-71-1	Shaft Line Reamer
C161-72-1	Bushing Driver
C161-73-1	Counter-bore Reamer
C161-82	Valve Seat Wrench
C161-85	Valve Seat Wrench
C161-182	Jet Wrench