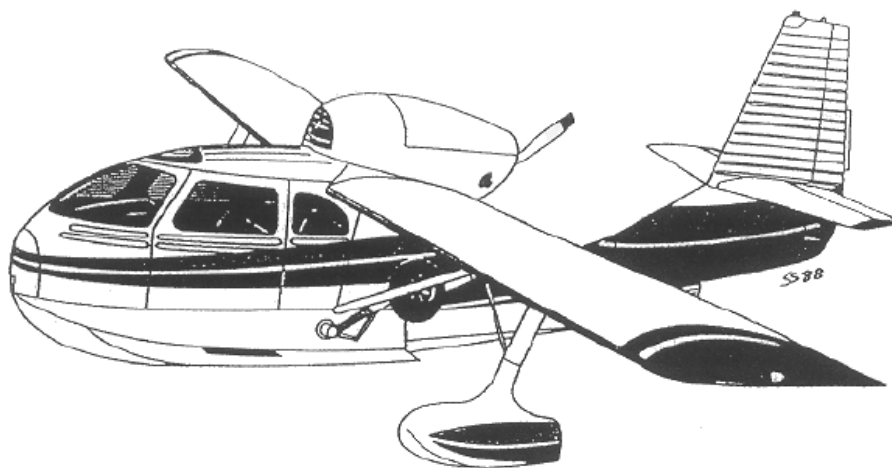


**MARVEL-SCHEBLER  
AIRCRAFT CARBURETOR  
OVERHAUL INSTRUCTIONS**



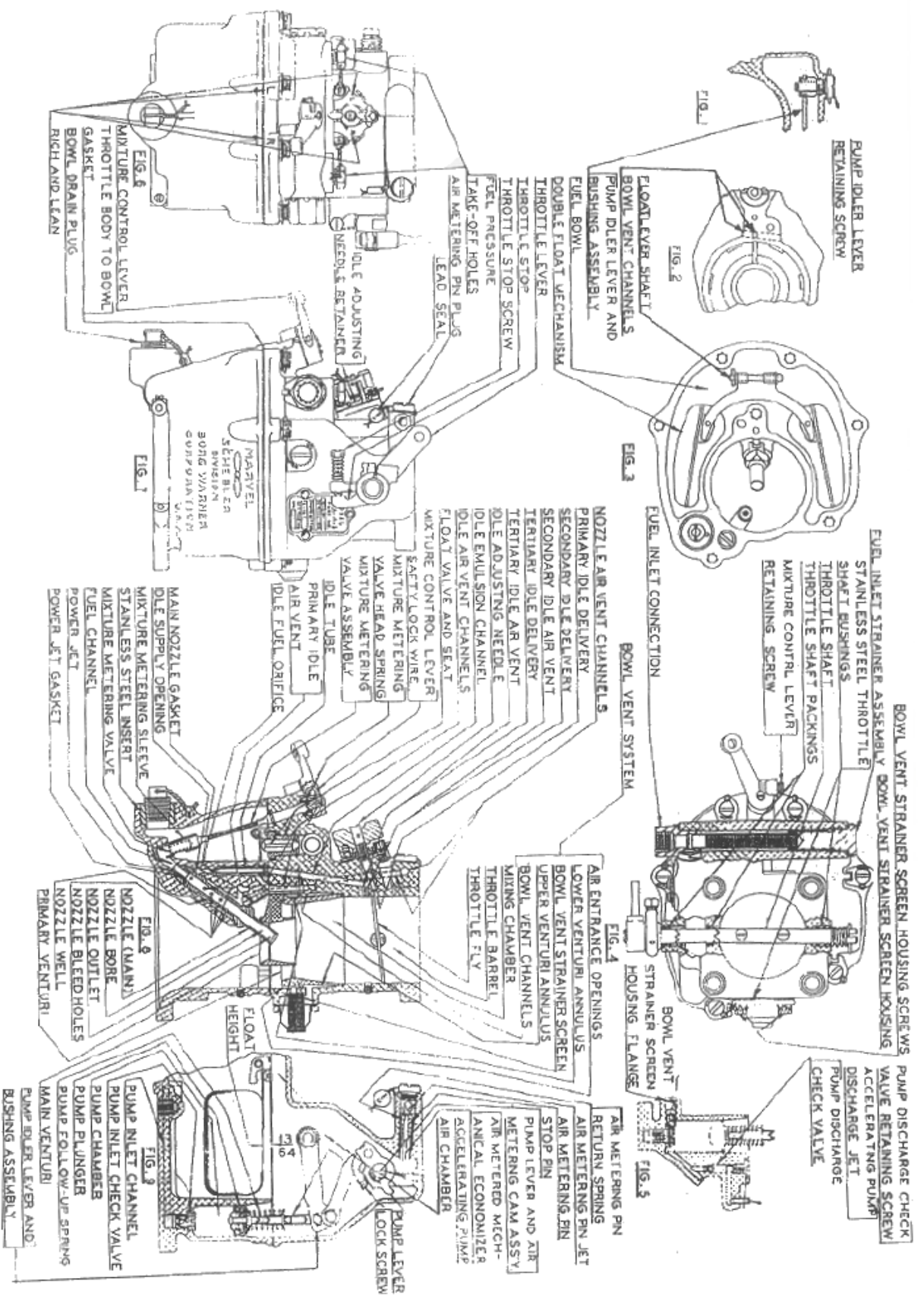
**for models**

**MA-4-5, MA-4-5AA**



**MARVEL-SCHEBLER PRODUCTS DIVISION  
BORG-WARNER CORPORATION  
DECATUR, ILLINOIS**





# Model MA-4-5 Sectional View



# MARVEL-SCHEBLER AIRCRAFT CARBURETOR OVERHAUL INSTRUCTIONS

## MODEL

MA-4-5

MA-4-5AA

**2-17. SPECIAL TOOLS.** (See figure 2-17.)

**2-18. DISASSEMBLY.**

**2-19. CARBURETOR ASSEMBLY COMPLETE.**

(See figure 2-18.)

**a.** Remove the cotter pins (2) from all six of the special bolts (4). Slide the special lockwashers (3) off the heads of the bolts (4).

**b.** Remove the six special bolts (4) and regular lock washers. (5).

**c.** Grasp the complete body and bowl cover assembly (1) in one hand and the carburetor body and bowl assembly (12) in the other hand and carefully separate the two assemblies by pulling straightaway.

**d.** Move the throttle lever far enough to permit the pump plunger assembly to clear the float and unhook the pump plunger assembly from the pump idle lever. Withdraw the pump plunger assembly from the complete body and bowl cover assembly (1).

**e.** Press downward on the spring seat (8) and remove the spring seat locating pin (6) from the pump plunger rod assembly (7).

**f.** Slide the pump plunger rod assembly (7) off the end of the pump plunger and stem subassembly (11) and remove the spring seat (8), spring (9), and second spring seat (8).

## NOTE

Do not remove the pump leather expanding spring (10) unless replacement is required, as this would be likely to damage the pump leather.

**2-20. COMPLETE BODY AND BOWL COVER ASSEMBLY.** (See figure 2-19.)

**a.** Remove the cotter pin (15) from the float shaft (16). Slide the float shaft (16) out of the float bracket (55) and remove the float and lever assembly (14). Lift out the float valve (18).

**b.** Remove the throttle body to bowl gasket (1).

**c.** Remove the cotter pin (5) from the head of the special bolt (6), and slide the special lock washer (7) off the head of the bolt (6). Remove the special bolt (6) and slide the mixture metering valve assembly (13).

**d.** Lift out the mixture control valve lever lock wire (8) and remove the mixture metering valve head spring (9), mixture metering valve head washer (10), and the mixture metering valve head gasket (11). Slide the mixture metering valve assembly (13) out of the throttle body (80) and remove the second mixture metering valve head washer (10). It is not necessary to remove the horseshoe washer (12) unless replacement is required.

**e.** Using a small chisel or thin screwdriver blade, break the solder between the two bolts (56) and the float valve seat (19). Unscrew and remove the float valve seat (19) and float valve seat gasket (17). Remove the two bolts (56) and float bracket (55).

**f.** Cut and remove the lead seal (2) and locking wire (21) from the air metering pin jet plug (22). Remove the air metering pin jet plug (22) and air metering pin jet plug gasket (23). Using the air metering pin gage (4, figure 2-17), remove the air metering pin jet (24, figure 2-19). The air metering pin gage is inserted in the same manner as in figure 2-25. Slide the air metering pin (26) out of the air metering pin jet (24) and remove the air metering pin return spring (25).

**g.** Bend the tabs of the fuel inlet gasket (2) free of the fuel inlet connection (27) and unscrew and remove the fuel inlet connection.

**h.** Bend the tabs of the fuel inlet strainer gasket (32) away from the head of the fuel inlet strainer assembly (31), and remove the fuel inlet strainer assembly and gasket.

**i.** If removal of the two pipe plugs (33) is required, cut the locking wire and remove the two pipe plugs. Removal of these plugs is not necessary unless replacement is required.

**j.** Slide the special lock washer (37) off the heads of the three special bolts (36) and remove the bolts.

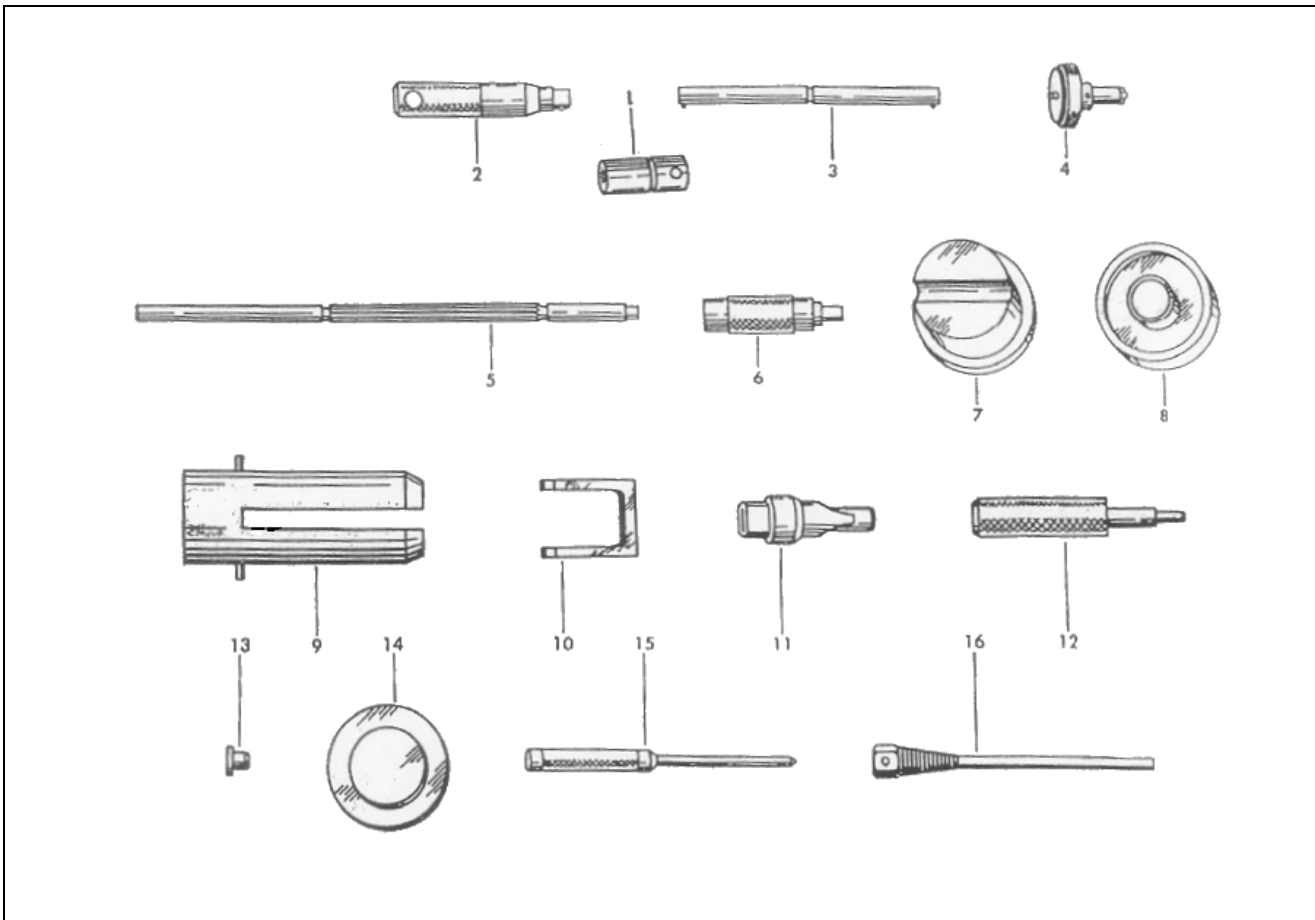
## NOTE

The two lower bolts are secured with locking wire and the upper bolt is secured in place with a cotter pin.

**k.** Slide the idle adjusting needle assembly (34) out of the throttle body (80) and remove the idle adjusting needle retainer gasket (38).

**l.** Bend the tabs of the special washers (42) free of the two bolts (41) and remove the bolts (41), special washers (42), and regular lock washers (43). Lift off the bowl vent strainer screen housing flange (44), bowl vent strainer screen housing (39), bowl vent housing gasket (45), and bowl vent strainer screen (40).

**m.** Remove the cotter pin (47) from the inner end of the pump idle lever screw (52) and remove the pump idle lever washer (49).



REF NO.	PART NUMBER	NOMENCLATURE
1	M-3	Nozzle wrench (9/16-inch).....
2	M-12	Socket extension .....
3	M-13	Socket extension handle .....
4	M-94	Air metering pin gage.....
5	M-95	Throttle shaft bushing reamer
6	M-96	Throttle shaft busing driver.....
7	M-100	Throttle valve bolt peening arbor .....
8	M-101	Primary venturi assembling tool.....
9	M-102	Main venturi extractor .....
10	M-102A	Main venturi extractor yoke.....
11	M-103	Float valve seat remover.....
12	M-105	Throttle shaft packing tool .....
13	M-105A	Throttle shaft packing tool arbor .....
14	M-106	Main venturi assembling tool .....
15	M-107	Throttle valve bolt peening tool .....
16	M-122	Throttle shaft bushing remover .....

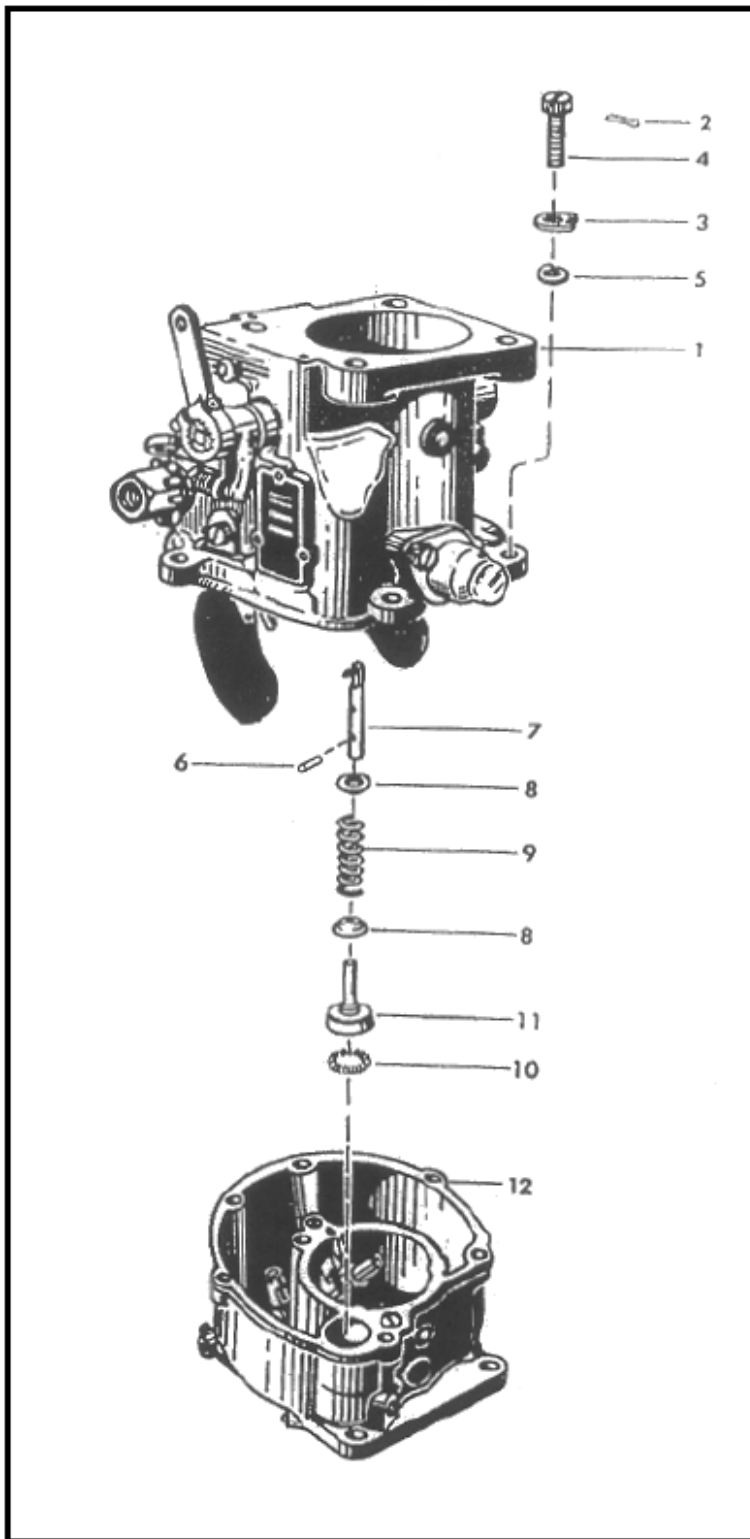
Figure 2-17. Special tools for overhauling MA-4-5 Series Carburetors

n. Remove the cotter pin (50) from the head of the pump idle lever screw (52) and slide the special lock washer (51) off the head of the screw. Remove the pump idle lever screw (52) and pump idle lever gasket (53).

o. Remove the cotter pin (48) and separate the

pump idle lever and bushing assembly (46) from the link on the pump lever subassembly (67).

p. Using a small blade screwdriver, pry the end of the throttle opening spring (54) out of the throttle shaft and lever assembly (65) and slide the spring off the shaft.



1. Complete body and bowl cover assembly
2. Cotter pin
3. Special lock washer
4. Special bolt
5. Lock washer
6. Spring seat locating pin
7. Pump plunger rod assembly
8. Spring seal
9. Spring
10. Pump lather expanding spring
11. Pump plunger
12. Carburetor body and bowl assembly

Figure 2-18. Carburetor Assembly Complete – Exploded View

q. Loosen the bolt (57) and slide the throttle lever (59) off the throttle shaft and lever assembly (65). Remove the bolt (60) and throttle adjusting bolt spring (61).

r. File the ends of the bolts (64) and remove the two bolts (64) and slide the throttle valve (63) out of the throttle shaft and lever assembly (65).

s. Loosen the set bolt (66) several turns to free the pump lever subassembly (67) on the throttle shaft and lever assembly (65). Withdraw the throttle shaft and lever assembly from the throttle body (80). Lift out the pump lever assembly (67).

t. Slide a small screwdriver blade under one of the

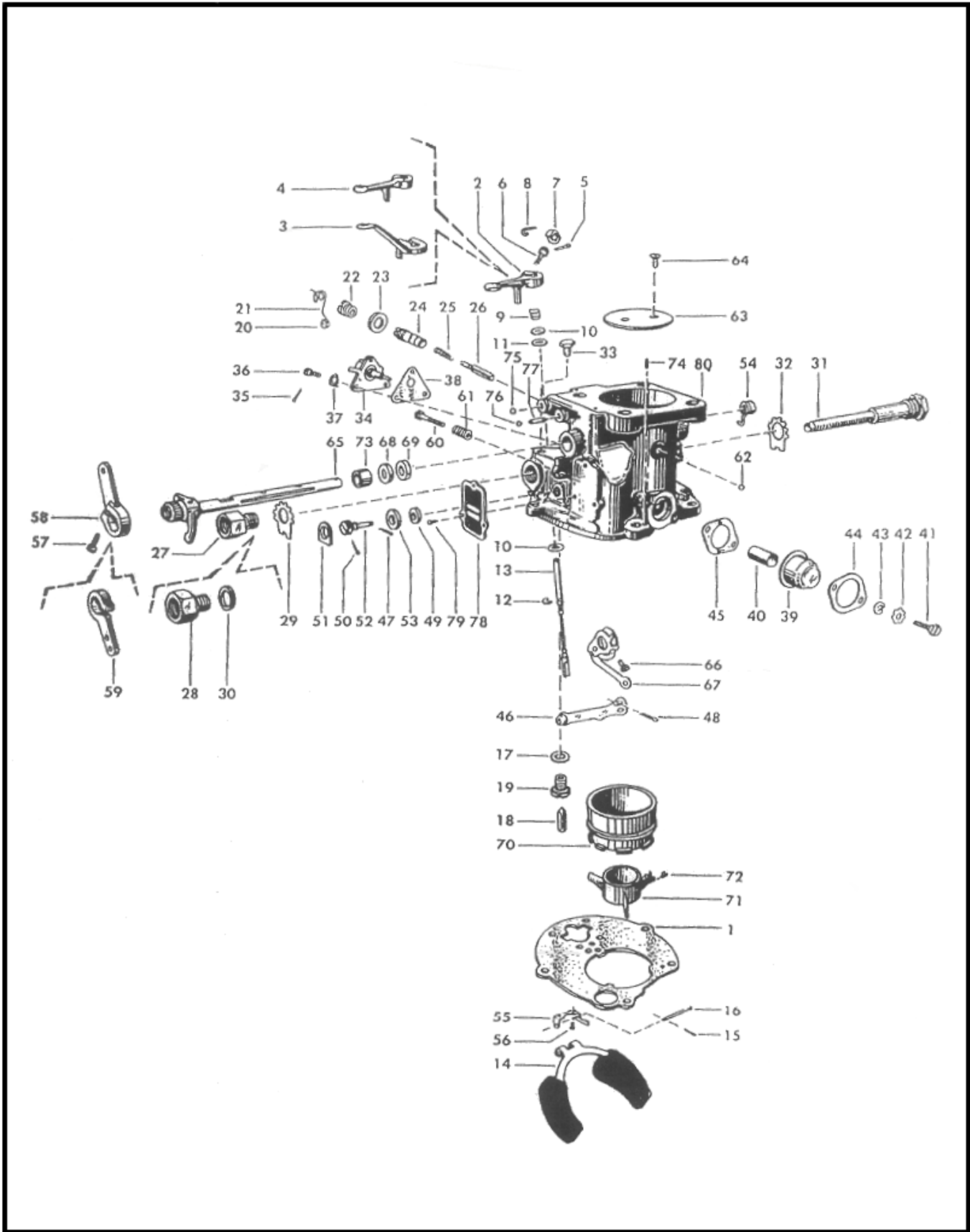


Figure 2-19. Throttle Body and Bowl Cover Assembly - Exploded View

## References for figure 2-19

- |  |   |                                       |
|--|---|---------------------------------------|
| 1. Throttle body to bowl gasket          | 26. Air metering pin                      | 53. Pump idle lever gasket            |
| 2. Mixture control lever                 | 27. Fuel inlet connection                 | 54. Throttle opening spring           |
| 3. Mixture control lever                 | 28. Fuel inlet connection                 | 55. Float bracket                     |
| 4. Mixture control lever                 | 29. Fuel inlet gasket                     | 56. Bolt                              |
| 5. Cotter pin                            | 30. Fuel inlet gasket                     | 57. Bolt                              |
| 6. Special bolt                          | 31. Fuel inlet strainer assembly          | 58. Throttle lever                    |
| 7. Special lock washer                   | 32. Fuel inlet strainer gasket            | 59. Throttle Lever                    |
| 8. Mixture control valve lever lock wire | 33. Pipe plug                             | 60. Bolt                              |
| 9. Mixture metering valve head spring    | 34. Idle adjustment needle assembly       | 61. Throttle adjusting bolt spring    |
| 10. Mixture metering valve head washer   | 35. Cotter pin                            | 62. Plug                              |
| 11. Mixture metering valve head gasket   | 36. Bolt                                  | 63. Throttle valve                    |
| 12. Horseshoe washer                     | 37. Special lock washer                   | 64. Bolt                              |
| 13. Mixture metering valve assembly      | 38. Idle adjusting needle retainer gasket | 65. Throttle shaft and lever assembly |
| 14. Float and lever assembly             | 39. Bowl vent strainer screen housing     | 66. Set bolt                          |
| 15. Cotter pin                           | 40. Bowl vent strainer screen             | 67. Pump lever subassembly            |
| 16. Float shaft                          | 41. Bolt                                  | 68. Throttle shaft packing retainer   |
| 17. Float valve seat gasket              | 42. Special washer                        | 69. Throttle shaft packing            |
| 18. Float valve                          | 43. Lock washer                           | 70. Main venturi                      |
| 19. Float valve seat                     | 44. Bowl vent strainer screen             | 71. Primary venturi                   |
| 20. Lead seal                            | 45. Bowl vent housing gasket              | 72. Venturi retaining clip            |
| 21. Locking wire                         | 46. Pump idle lever and bushing assembly  | 73. Throttle shaft bushing            |
| 22. Air metering pin jet plug            | 47. Cotter pin                            | 74. Stop pin                          |
| 23. Air metering pin jet plug gasket     | 48. Cotter pin                            | 75. Plug                              |
| 24. Air metering pin jet                 | 49. Pump idle lever washer                | 76. Plug                              |
| 25. Air metering pin return spring       | 50. Cotter pin                            | 77. Safety ratchet assembly           |
|  | 51. Special lock washer                   | 78. Numbering plate                   |
|  | 52. Pump idle lever screw                 | 79. Screw                             |
|  |   | 80. Throttle body                     |

supporting arms of the primary venturi (71) and pry the primary venturi out of the throttle body (80). It is not necessary to remove the venturi retaining clips (72) from the primary venturi (71) unless replacement is required.

u. Using the main venturi extractor (9, figure 2-17), drive the main venturi (70) out of the throttle body (80). The venturi extractor is used in the same manner as shown in figure 2-5.

### NOTE

Removal of the main venturi is not necessary unless replacement is required.

v. Insert the throttle shaft bushing remover (16, figure 2-17) into the throttle shaft bore of the throttle body (80, figure 2-19) and tighten enough to permit gripping the throttle shaft bushing (73). This tool is installed in the same manner as shown in figure 2-6. Tap the small end of the bushing remover with a soft-faced hammer until the bushing slides out of the throttle body. This operation is the same as shown in figure 2-7. Move the throttle shaft bushing remover to the other side of the throttle body (80, figure 2-19) and remove the throttle shaft packing retainer (68) and throttle shaft packing (69).

### NOTE

The packing is located at both inside and outside bearing bosses at the throttle lever side of the throttle body. These packings should be

discarded and new packings replaced during reassembly.

## 2-21. CARBURETOR BODY AND BOWL ASSEMBLY.

(See figure 2-20.)

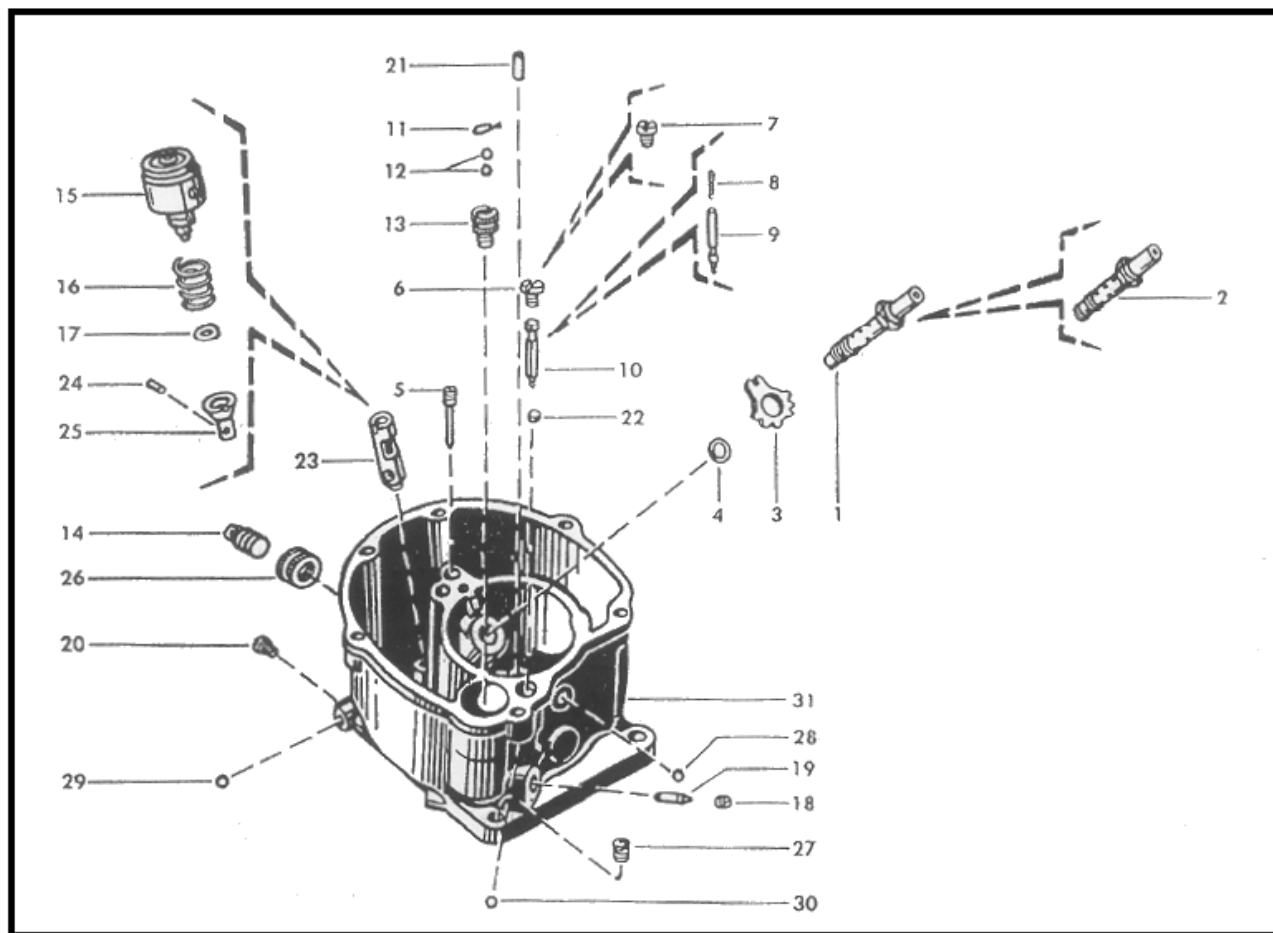
- a. Bend the tabs of the nozzle gasket (3) away from the nozzle assembly (1) and remove the nozzle assembly (1) and nozzle gasket (3). Remove the power jet gasket (4).
- b. Remove the idle tube assembly (5).
- c. Remove the pump discharge check valve plug screw (6), turn the carburetor body (31) upside down, and drop out the pump discharge check valve (9).
- d. Unscrew and remove the pump inlet valve screw and seat assembly (13) and, if removal of the steel balls (12) is required, pry out the pump inlet check valve spring (11) and the balls will drop out.
- e. Cut the locking wires and remove the pipe plug (14).
- f. Removal of the ratchet plug screw (18), safety ratchet assembly (19), pump jet (21), air intake flange insert (27), and mixture metering sleeve (23) is not required as these parts are pressed into the carburetor body (31).

2-22. **CLEANING.** Clean all parts in accordance with paragraph 2-7.

## 2-23. INSPECTION.

- a. Check all bolts and screws for damaged threads and mutilated heads. Replace all damaged parts.





- |  |  |                                     |
|--|--|-------------------------------------|
| 1. Nozzle assembly                       | 10. Pump discharge check valve               | 21. Pump jet                        |
| 2. Nozzle                                | 11. Pump inlet check valve spring            | 22. Pump discharge valve seat       |
| 3. Nozzle gasket                         | 12. Steel ball                               | 23. Mixture metering sleeve         |
| 4. Power jet                             | 13. Pump inlet valve screw and seat assembly | 24. Bellows retainer pin            |
| 5. Idle tube assembly                    | 14. Pipe plug                                | 25. Bellows altitude valve retainer |
| 6. Pump discharge check valve plug screw | 15. Bellows retainer spring                  | 26. Thread insert bushing           |
| 7. Pump discharge check valve plug screw | 16. Bellows retainer spring                  | 27. Air intake flange insert        |
| 8. Pump discharge check valve spring     | 17. Bellows seat gasket                      | 28. Plug                            |
| 9. Pump discharge check valve            | 18. Ratchet plug screw                       | 29. Steel ball                      |
|  | 19. Safety ratchet assembly                  | 30. Steel ball                      |
|  | 20. Channel plug screw                       | 31. Carburetor body                 |

**Figure 2-20. Carburetor Body and Bowl Assembly – Exploded View**

- b. Replace all gaskets, seals, locking wires, and special lock washers at each overhaul period.
- c. Check the condition of the pump leather on the pump plunger and stem subassembly (11, figure 2-18); if the leather is worn, distorted, or dried, replace the pump plunger and stem subassembly. Check the pump leather expanding spring (10) for corrosion and distortion; replace for either of these conditions.
- d. Check the spring (9) for distortion and signs of weakness; replace for either condition. Replace the pump plunger rod assembly if worn at the fulcrum pin.
- e. Check the mixture control lever (2, figure 2-19) for cracks, warpage, and wear in the outer hole; replace for any of these conditions.
- f. Check the mixture metering valve assembly (13) for wear, looseness at the ends of the flexible shaft, and damaged flexible shaft; replace for any of these conditions.
- g. Check the float and lever assembly (14) for distortion, insecurity of soldered joints, and dents in the floats. Replace for any of these conditions. Test the float in accordance with paragraph 3-22.



- h. Check the float shaft (16) and float bracket (55) for wear and distortion; replace for either condition.
- i. Check the float valve (18) and float valve seat (19) for wear. The float valve (18) can be checked effectively by sliding a fingernail along the seat. If a groove is worn in the surface, the float valve should be replaced. (Refer to paragraph 2-8, k.)

NOTE

Always replace the float valve (18) and float valve seat (19) as a matched assembly.

- j. Check the air metering pin jet (24) and air metering pin (26) for visible damage. Check the air metering pin return spring (25) for distortion and evidence of weakness; replace for either condition.
- k. Check the fuel inlet connection (27) for damaged threads and mutilated hexagonal surfaces. Replace for either condition.
- l. Check the fuel inlet strainer assembly (31) for cracks at the soldered joints, holes in the strainer, and distortion. Replace for any of these conditions.
- m. Check the idle adjusting needle assembly (34) for bends and damaged seats. Replace for either condition.
- n. Check the bowl vent strainer screen housing (39) for cracks and distortion; replace for either condition.
- o. Check the bowl vent strainer screen (40) for distortion, corrosion, and holes; replace for any of these conditions.
- p. Check the bowl vent strainer screen housing flange (44) for cracks and warpage. Replace if cracked; straighten if bent.
- q. Check pump idle lever and bushing assembly (46) for bends and wear at bearing points. Replace for either condition.
- r. Check the pump idle lever screw (52) for wear and damaged threads; replace for either condition.
- s. Check throttle opening spring (54) for distortion and signs of weakness; replace for either condition.
- t. Check the throttle lever (59) for cracks and wear in the outer holes; replace for either condition.
- u. Check the throttle valve (63) for warpage and wear on the edges. Replace for either condition.
- v. Check the throttle shaft and lever assembly (65) for wear at bearing points; replace if worn.
- w. Check the pump lever subassembly (67) for distortion and wear at the hinged joint. Replace for either condition. Also replace if the bolt retainer spring is broken.
- x. If the main venturi (70) was removed from the throttle body because of damage, it must be replaced.
- y. Check the primary venturi (71) for cracks, distortion, and nicks. Replace for any of these conditions. Replace the venturi retaining clips (72) if damaged.
- z. Check the throttle body (80) for cracks, distortion, and damaged threads. Threads can often be restored by retapping; however, if this does not restore them, the throttle body must be replaced. Replace the throttle body if cracked or warped.
- aa. Check the nozzle assembly (1, figure 2-20) for damaged threads, distortion, and mutilated hexagonal portion. Replace for any of these conditions. Make certain that all bleed holes are open.
- bb. Check the idle tube assembly (5) for mutilated seat and damaged jet. Replace for either condition.
- cc. Check the pump discharge check valve (9) for a worn seat; replace if worn.

- dd. Check the pump inlet valve screw and seat assembly (13) for corrosion and wear on balls and seat; replace the entire assembly for either condition.
- ee. Check the carburetor body (31) for cracks and distortion; replace for either condition.

**2-24. TESTING.** Test the float and lever assembly (14, figure 2-19) in accordance with paragraph 2-9.

**2-25. REPAIR OR REPLACEMENT.** Refer to paragraph 2-10.

**2-26. LUBRICATION.** None required.

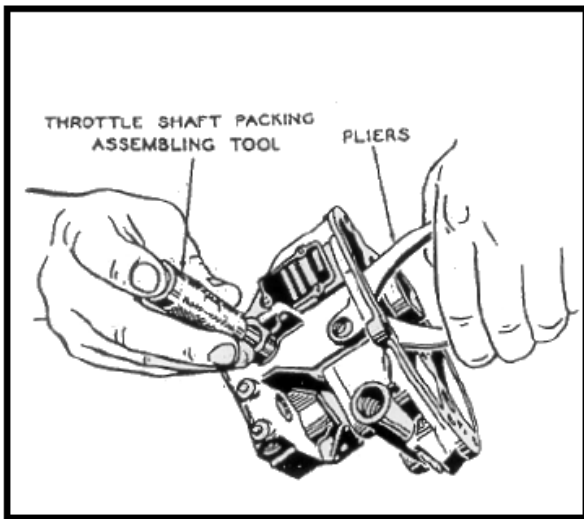
**2-27. REASSEMBLY.**

**2-28. CARBURETOR BODY AND BOWL ASSEMBLY.**  
(See figure 2-20.)

- a. Install and tighten the pipe plug (14) in the carburetor body (31). Install the locking wire between the plug and the body web after the test procedure has been completed. (Refer to paragraph 3-5.)
- b. If the steel balls (12) were removed from the pump inlet valve screw and seat assembly (13), during disassembly, install the two balls in the seat and secure them with the pump inlet check valve spring (11).
- c. Install the pump inlet valve screw and seat assembly (13) at the bottom of the pump cylinder.
- d. Install the pump discharge check valve (9), with the point downward, and install the pump discharge check valve plug screw (6).
- e. Install the idle tube assembly (5).
- f. Place the power jet gasket (4) on the end of the nozzle assembly (1). Slide the nozzle gasket (3) on the nozzle and install the nozzle in the carburetor body (31). Make certain that the fork on the nozzle gasket (3) straddles the boss in the carburetor body (31). After tightening the nozzle, bend several tabs of the nozzle gasket (3) up against the hexagonal portion of the nozzle assembly (1).

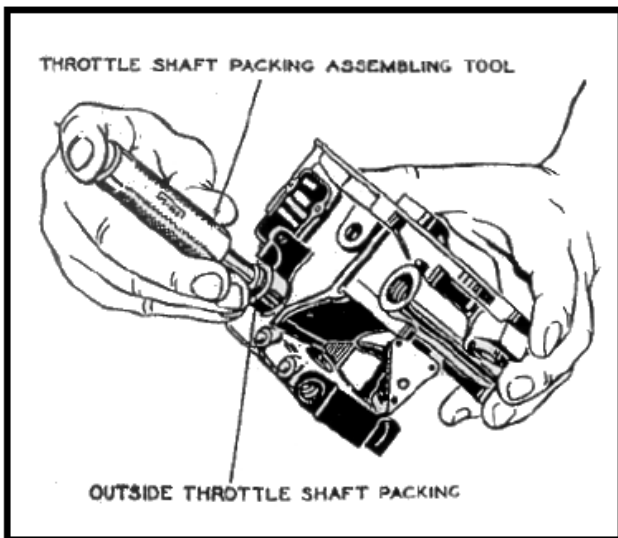
**2-29. THROTTLE BODY AND BOWL COVER ASSEMBLY.** (See figure 2-19.)

- a. If the main venturi (70) was removed during disassembly, install it in the throttle body with the main venturi assembling tool (14, figure 2-17). Installation is similar to that shown in figure 2-12.
- b. Place each of the three venturi retaining clips (72, figure 2-19) on the primary venturi (71), if removed during disassembly; with the throttle body (80) in an upside down position, seat the primary venturi in place in the throttle body. One of the primary venturi supporting arms has a projection, which fits into the throttle body and main venturi. Make certain that the parts are mated in this relationship. Using the primary venturi-assembling tool (8, figure 2-17), tap the primary venturi into position with a few light hammer blows. Installation of the primary venturi is similar to that shown in figure 2-13.
- c. Install the outside throttle shaft bushing (73, figure 2-19) with the throttle shaft bushing driver (6, figure 2-17). The bushing should be driven in until it is flush with the outside edge of the throttle body. In like manner, install the inside throttle shaft bushing (73, figure 2-19) using the same tool. Drive the bushing inward as far as the bushing driver will permit. This operation is similar to that shown in figure 2-10.



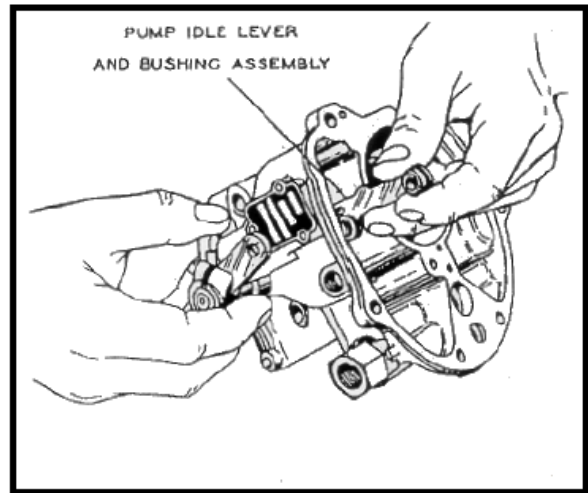
**Figure 2-21. Installing Inside Throttle Shaft Packing**

- d. Ream the throttle shaft bushings with the throttle shaft bushing reamer (5, figure 2-17) held with a chuck wrench. This operation is similar to that shown in figure 2-11.
- e. Insert the throttle shaft packing tool arbor (13, figure 2-17) through the throttle shaft packing (69, figure 2-19) with a throttle shaft packing retainer (68) on the outside of the packing. Hold the packing in position for insertion into the inside wall of the throttle body with pliers. (See figure 2-21.)
- f. Insert the end of the throttle shaft packing tool (12, figure 2-17) into the throttle shaft packing tool arbor (13) and drive the throttle shaft packing into the throttle shaft bore until the throttle shaft packing retainer is secure in the throttle shaft bore. (See figure 2-21.) Remove the throttle shaft packing tool and throttle shaft packing tool arbor from the throttle shaft bore.



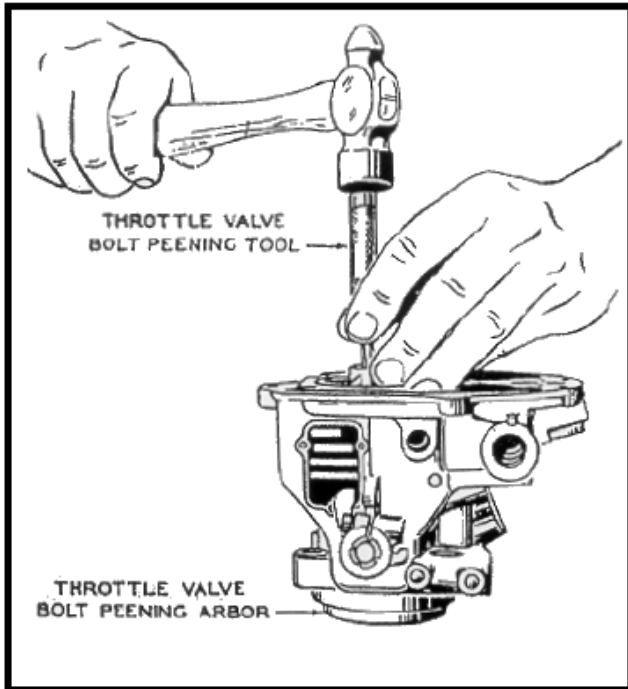
**Figure 2-22. Installing Outside Throttle Shaft Packing**

- g. Slide a throttle shaft packing retainer (68, figure 2-19) and throttle shaft packing (69) on the throttle shaft packing tool (12, figure 2-17) and insert the packing into the outside wall of the throttle body (80, figure 2-19). Drive into place until the throttle shaft packing retainer (68) is secure in the throttle shaft bore. (See figure 2-22.)
- h. Attach the pump idle lever and bushing assembly (46, figure 2-19) to the loose lever on the pump lever subassembly (67) and install and spread the cotter pin (48). Insert the pump lever subassembly between the inner and outer walls of the carburetor body and bowl assembly and while holding the assembly in position, insert the throttle shaft and lever assembly (65) through the pump lever subassembly. (See figure 2-23.)
- i. With the shaft in the wide-open position, insert the throttle valve (63) through the throttle shaft and lever assembly (65) making certain that part number which is stamped on the throttle valve can be read from the mounting flange end of the throttle body (80) and faces the side opposite the bolt (60).



**Figure 2-23. Installing Throttle Shaft and Lever Assembly**

- j. Start the two bolts (64) into the throttle shaft and lever assembly (65) but do not tighten at this time. While holding the throttle valve in a closed position, tap on the part number side with a screwdriver until the throttle valve is fully settled in the bore. While holding the valve seated, tighten the two bolts (64) securely.
- k. Insert the throttle valve bolt peening arbor (7, figure 2-17) into the flange end of the throttle body bore and rotate the tool so that the groove in the end will be aligned with the throttle shaft. With the arbor on a solid surface, set the throttle body down on the arbor and, with the throttle valve bolt peening tool (15, figure 2-17),peen the ends of both bolts (64, figure 2-19) securely. (See figure 2-24.)
- l. Slide the throttle opening spring (54, figure 2-19) over the end of the throttle shaft and lever assembly (65) and engage the inner end of the spring in the hole



**Figure 2-24. Peening Throttle Valve Bolts**

in the throttle body (80) Wind up the spring on the throttle shaft and engage the outer end in the hole near the end of the throttle shaft.

**NOTE**

With new throttle shaft packing installed, the throttle opening spring must be sufficiently strong to open the throttle valve of its own accord. Work the throttle valve several times by hand and release it. If the throttle valve begins to move of its own accord, it will operate effectively after the carburetor has been placed into service.

- m. Slide the throttle lever (59) on the serrated end of throttle shaft and lever assembly (65); install and tighten the bolt (57). Safety wire the bolt by inserting the wire through the drilled head of the bolt and around the arm of the closed throttle stop.

**NOTE**

It will be necessary to remove the throttle lever and reinstall it after properly adjusting the throttle linkage upon installation of the carburetor on the engine.

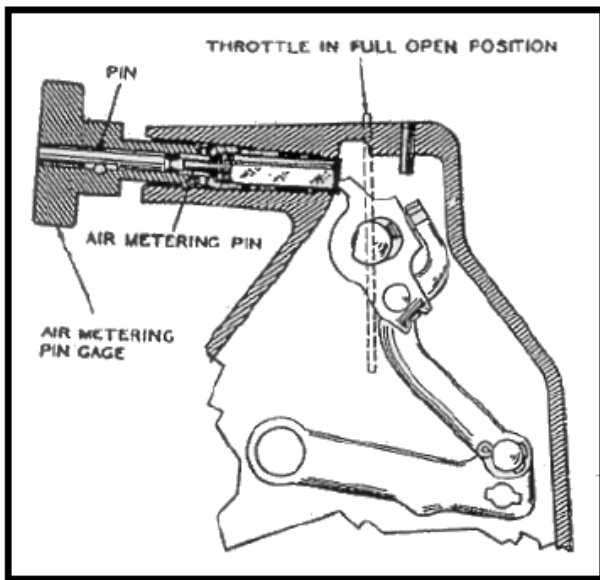
- n. Slide the throttle adjusting bolt spring (61) on the bolt (60) and install the bolt in the throttle body (80). Rotate the bolt until the throttle valve is cracked slightly thereby permitting the engine to idle when starting.
- o. Place the pump idle lever gasket (53) on the pump idle lever screw (52) and install the screw in the throttle body (80). Connect the end of the pump idle lever and bushing assembly (46) on the end of the pump idle lever screw (52), install the pump idle lever washer (49), and cotter pin (47); spread the cotter pin after installation.

- p. Place the special lock washer (51) on the head of the pump idle lever screw (52) and install the cotter pin (50).
- q. Place the idle adjusting needle retainer gasket (38) on the throttle body (80) making certain that the hole in the retainer gasket are aligned with the holes in the throttle body. Insert the idle adjusting with the holes in the throttle body. Insert the idle adjusting needle assembly (34) into position and install and tighten the three bolts (36). The two lower bolts (36) are secured with the same locking wires used to secure the pipe plugs (33). The upper bolt is secured with a special lock washer (37) and cotter pin (35).

**NOTE**

When installing a new idle adjusting needle assembly (34), the idle adjusting lever will not be pinned to the idle needle as it will be necessary to first adjust the idle to determine the setting before the needle is drilled and the pin installed. After the engine has been warmed up and the correct idle adjustment effected, the idle adjusting lever should be placed in the mid position before drilling the hole.

- r. Place the bowl vent housing gasket (45) on the throttle body (80) and set the bowl vent strainer screen (40) into the recess in the throttle body. Place the bowl vent strainer screen housing (39) on the bowl vent housing gasket (45) and place the bowl vent strainer screen housing (39). Install the two bolts (41) with special washers (42) and lock washers (43). Bend one or two tabs of the special washers (42) against corresponding faces of the bolts (41).
- s. Place the fuel inlet strainer gasket (32) on the fuel inlet strainer assembly in the throttle body (80), and tighten to between 35 and 40 inch-pounds. Make certain that the notch in the gasket (32) engages the projection on the throttle body (80). Bend two or more tabs of the gasket (32) against a corresponding face of the fuel inlet strainer assembly (31).
- t. Place the fuel inlet gasket (29) on the fuel inlet connection (27) and install the fuel inlet connection in the throttle body (80). Make certain that the notch ion the gasket engages the projection on the throttle body. Bend two or more tabs of the gasket (29) against the corresponding face of the fuel inlet connection (27).
- u. Slide the small end of the air metering pin return spring (25) on the end of the air metering pin (26) and insert the air metering pin and spring into the air metering pin jet (24). Insert the air metering pin jet (24), with the needle and spring in place, into the throttle body (80) and rotate it into the throttle body approximately 1/4 inch. Hold the throttle valve in the wide-open position and, using the air metering pin gage (4, figure 2-17), rotate the air metering pin jet (24, figure 2-19) until the end of the pin in the air metering pin gage is flush with the outer surface of the tool. (See figure 2-25.)
- v. Place the air metering pin jet plug gasket (23) on the air metering pin jet plug (22) and install the plug inn the throttle body (80). Tighten the plug securely and install the locking wires (21). Twist the outer



**Figure 2-25. Setting the Air Metering Pin**

Refer also to pages 14 & 15

ends of the locking wires for a distance of approximately 3/4 inch and install the lead seal (20) to prevent any possibility of interference with the air metering pin adjustment.

- w. Place the float valve seat gasket (17) on the float valve seat (19) and install the float valve seat in the throttle body (80). Tighten the float valve seat in the throttle body (80). Tighten the float valve seat in place with the float valve seat remover (11, figure 2-17). This operation is similar to that shown in figure 2-4.
- x. Place the float bracket (55, figure 2-19) in position on the throttle body (80) and secure it by installing the two bolts (56). After tightening the bolts securely, solder the bolt heads to the outer edge of the float valve seat (19). Make certain that the float valve (18) is free from all dust and other foreign particles, and insert the float valve into the float valve seat (19). Dust particles can be removed from the seating surface of the valve by rotating the tip of the valve between the lips immediately before installation.
- y. Place the throttle body to bowl gasket (1) in position on the throttle body (80), engage the float and lever assembly (14) in the float bracket (55), and install the float shaft (16). Secure the float shaft with cotter pin (15). Measure the distance between the floats and gasket at the float toes; this distance should be the same for each float and should be 13/64 inch. When set at this height, the float lever should be correct after the carburetor is reassembled and placed into operation. (See figure 2-26.) (refer to Section III for final float testing.) Make certain that the float and lever assembly does not bind in any position.
- z. Place a mixture metering valve head washer (10) in the recess of the throttle body (80) and insert the mixture metering valve assembly (13) through the throttle body. If the horseshoe washer (12) was removed during disassembly, it should be installed on the mixture metering valve assembly (13) before it is inserted into the throttle body. Slide the mixture metering valve head gasket (11) on the outer end of the mixture metering valve assembly (13) and install a mixture metering valve

head washer (10) on top of the gasket. Place the mixture metering valve head spring (9) on the mixture metering valve assembly (13) and insert the mixture control valve lever lock wire (8) in the hole near the end of the mixture metering valve assembly (13).

- aa. Slide the mixture control lever (4) on the end of the mixture metering valve assembly (13) and install the special bolt (6).

**CAUTION**

Exercise care during this operation to prevent damage to the float and lever assembly.

- bb. Slide the special lock washer (7) over the head of the special bolt (6) and install the cotter pin (5).

**2-30. CARBURETOR ASSEMBLY COMPLETE.**

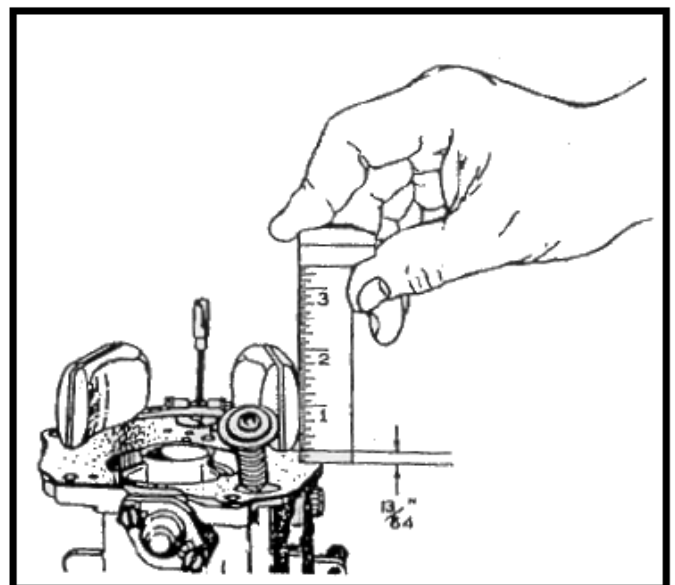
(See figure 2-18.)

- a. Place a spring seat (8) on the pump plunger and stem subassembly (11) and place the spring (9) on top of the spring seat. Place a second spring seat (8) at the top of the spring (9) and insert the pump plunger rod assembly (7). Make certain that the hole in the pump plunger rod assembly is aligned with the slot in the pump plunger and stem subassembly. Compress the spring (9) with the fingers and install the spring seat locating pin (6).
- b. Hook the end of the pump plunger rod assembly (7) into the pump idle lever and bushing assembly (46, figure 2-19) and make certain that the pump plunger assembly operates freely in the lever.

**CAUTION**

Exercise care to avoid damaging the float assembly.

- c. Hold the throttle body assembly in one hand and



**Figure 2-26. Measuring Distance Between Float toes and Gasket**

the carburetor body assembly in the other hand and carefully guide the pump plunger into the pump cylinder. Exercise care to avoid damaging the pump leather. Also guide the mixture metering valve assembly into its seat and carefully move the two assemblies into position.

- d. Install the six special bolts (4) and regular lock washers (5).
- e. Install a special lock washer (3) on each of the bolts heads (4) and install the cotter pins (2). Make sure that the notches in the special lock washers (3) are engaged with the bosses on the housing.

## TEST PROCEDURE

**3-1. GENERAL.** After the carburetors have been overhauled and the checks performed as specified throughout the overhaul procedures, the carburetor is installed on the engine. Carburetors on which the idle needle must be drilled after adjustment should be adjusted to a warm engine and the idle adjusting lever installed in the mid position.

### 3-2. FLOAT VALVE AND SEAT TEST.

(See figure 3-1.)

- a. Connect the inlet fitting of the carburetor to a fuel pressure supply of 0.4 psi.
- b. Remove the bowl drain plug and connect a glass tube to the carburetor drain connection with a piece of rubber hose. The glass tubing should be positioned vertically beside the carburetor.
- c. Allow the fuel pressure at 0.4 psi to remain for a period of at least 15 minutes and then raise the fuel pressure to 6.0 psi. (There will be a slight rise in fuel level as the pressure is increased.) Allow the 6.0 psi pressure to

remain for at least five minutes after the fuel level has stabilized.

- d. If the fuel does not rise to the level of the parting surface of the castings or run out of the nozzle which can be observed through the throttle bore, the float valve and seat are satisfactory. If fuel is observed running out of nozzle, the bowl and throttle body must be separated and the float valve and seat cleaned or replaced.

### CAUTION

Under no circumstances change the float level from the established setting to correct flooding or to change fuel level.

- e. All Model MA4-5 series carburetor floats are set at  $13/64$  inch as shown in figure 2-26.

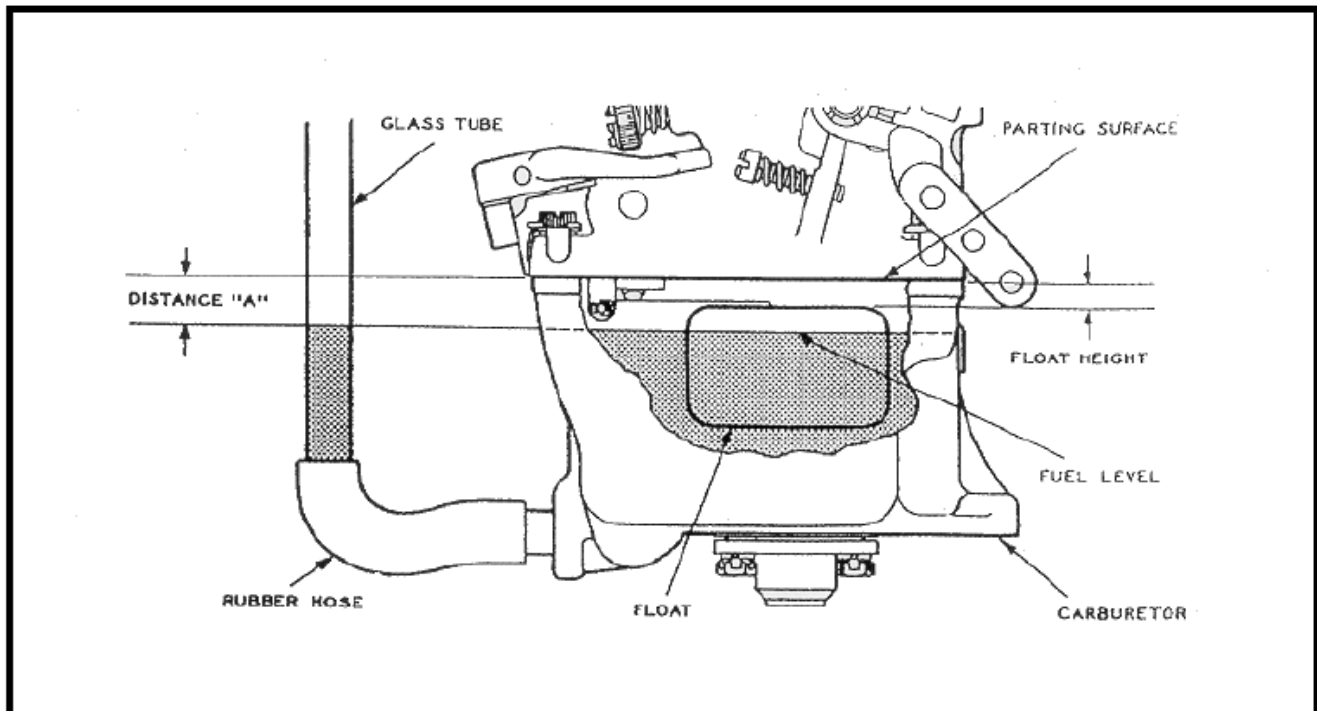


Figure 3-1. Testing for Correct Fuel Level and Float Valve Leakage.



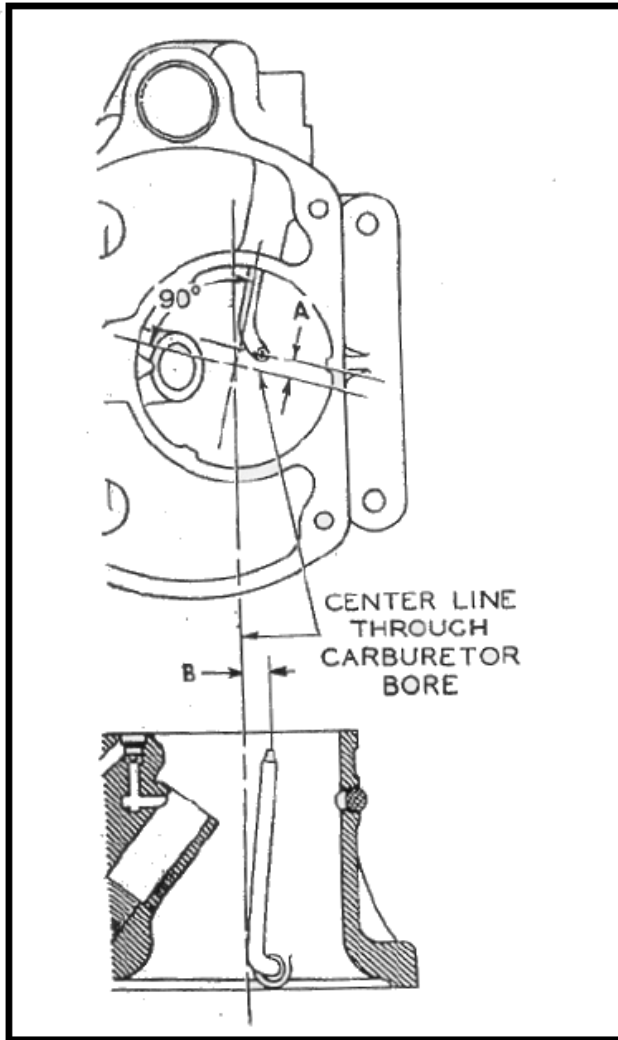


Figure 3-2. Pump Discharge Tube Location

**3-3. ACCELERATING PUMP TEST.** (See figure 3-2.)

- a. Carefully bend the pump discharge tube to satisfy the dimensions shown in figure 3-2. Distance "A" should be 11/64 inch and distance "B" should be 1/4 inch.
- b. With fuel supplied to the carburetor as shown in figure 3-1, operate the throttle lever for several strokes to fill the accelerating pump and passages. Then close the throttle, open it fully again, and hold it for a few seconds. If the accelerating pump is operating correctly, a solid stream of fuel will be discharged from the accelerating pump discharge tube or jet and will gradually die away after the spring on the pump plunger reaches its limit.

**WARNING**

Do not stand directly over the carburetor flange as fuel will be directed into the face of the operator.

- c. If the fuel discharge from the discharge tube or jet is weak, or if air is dispelled it is an indication that the pump plunger or pump discharge or inlet check valve are not functioning properly. Disassemble the carburetor and make necessary repairs.
- d. Remove the bowl drain plug to allow the fuel to drain out. Operate the pump to clear the fuel out of the pump cylinder and passages.

**3-4. PRESERVATIVE TREATMENT.**

**3-5. STORAGE.** If the carburetor is to be placed in storage after overhaul, the bowl drain plug should be removed and the carburetor slushed internally with soluble corrosion preventive oil, Military Specification MIL-C-4339. After draining the surplus oil from the carburetor, enough will cling to the parts to provide internal protection during storage. Replace the bowl drain plug and safety wire it in place.

## MODEL

## MA-4-5AA

# OVERHAUL INSTRUCTIONS

OVERHAUL INSTRUCTIONS FOR MODEL MA-4-5AA ARE THE SAME AS OUTLINED IN PARAGRAPHS 2-16 THROUGH 2-30 EXCEPT FOR THE FOLLOWING.

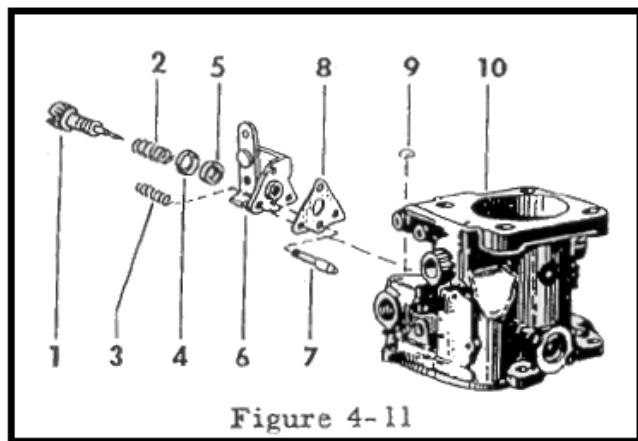


Figure 4-11

1. Idle adjusting needle
2. Idle adjusting needle spring
3. Idle cut-off spring
4. Idle adjusting needle retainer
5. Idle adjusting needle packing
6. Idle cut-off lever and retainer assembly
7. Idle cut-off valve
8. Idle adjusting needle retainer gasket
9. Expansion plug
10. Throttle body

- a. Altitude (manual mixture control) parts (2 through 13, figure 2-19) are not used in this carburetor. The expansion plug (9, figure 4-11) is used to close the opening in the body (10) where these parts would normally be installed.
- b. No throttle lever is used on this carburetor. (See figure 4-10.)
- c. Parts having a different appearance from carburetor, Part No. A10-3063-2 are shown in figure 4-11. These parts include the idle adjusting needle (1), spring (2), retainer (4) and packing (5) plus an idle cut-off mechanism which consists of an idle cut-off valve (7), idle cut-off spring (3) and an operating lever, which is attached to the idle cut-off lever and retainer assembly (6). This lever is operated by a control from the aircraft. When the lever is operated to apply pressure on the idle cut-off valve (7) and spring (3), the valve is forced into the idle passage and completely cuts off the idle mixture from the carburetor bore.
- d. Remove the bellows and valve seat assembly (15, figure 2-20), by carefully rotating it at a counterclockwise direction. Remove the bellows retainer spring (16) and bellows seat gasket (17).

### CAUTION

Exercise care when removing the bellows and valve seat assembly, since a slight distortion of the case would change the fuel calibration.

- e. The bellows altitude valve retainer (25) and mixture metering sleeve (23) should never be removed. If these parts are damaged, replace the carburetor body (31) which will have these parts properly installed and jig located.

**INSPECTION.** Same as for Model MA-4-5 except that parts not used in this carburetor should be eliminated from the inspection procedure. Check the bellows and valve seat assembly (15, figure 2-20) for leakage by shaking the unit to determine if it is partially filled with fuel. If fuel is present, or if any indication of damage is apparent, replace the bellows and valve seat assembly.

**REASSEMBLY.** Same as for Model MA-4-5 except for the following differences:

- a. Install the bellows seat gasket (17, figure 2-20), bellows retainer spring (1) and bellows and valve seat assembly (15). Rotate the bellows and valve seat assembly clockwise until tight in the threaded hole.

### CAUTION

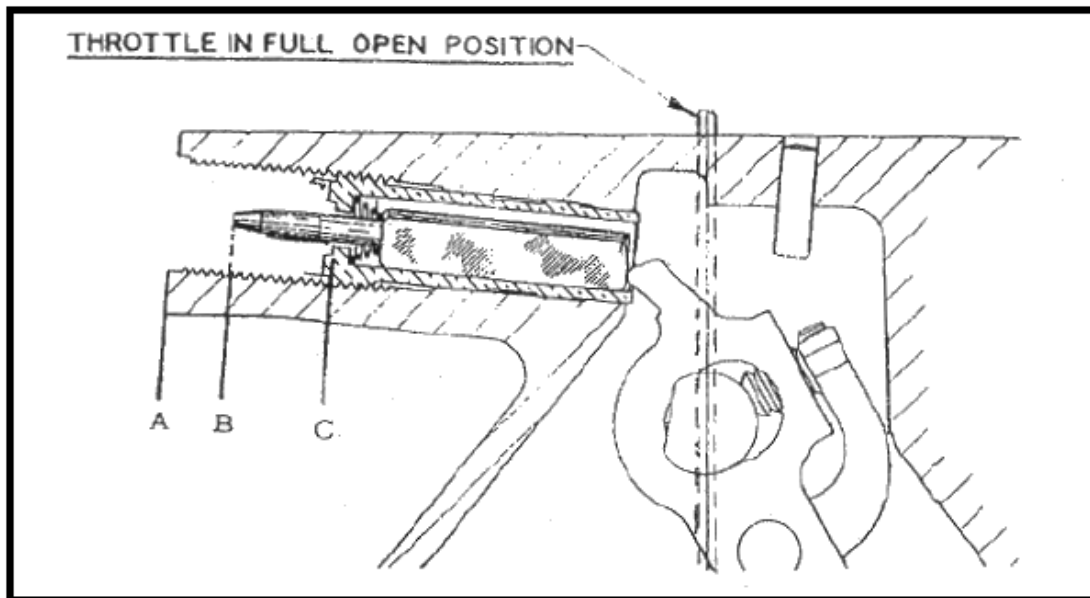
Exercise care to avoid distorting the bellows case.

- b. Altitude mixture control (items 2 through 13, figure 2-19) are not used in this carburetor.
- c. When installing the idle cut-off valve (7, figure 4-11) and idle adjusting needle parts, replace them in the order shown in figure 4-11. After installing the idle cut-off valve (7), gasket (8) and idle cut-off lever and retainer assembly (6), move lever on the retainer assembly to expose the hole and insert the idle cut-off spring (3). Rotate the lever back to its original position to retain the spring. Also be sure to place the packing (5) in the retainer (4) before installing the idle adjusting needle (1) and spring (2).
- d. Use the air metering pin gage (4, figure 2-17) for setting the air metering pin jet (24, figure 2-19).

**TEST PROCEDURES** (after overhaul). Same as for Model MA-4-5.



Instructions for setting the mechanical  
Economizer jet without the use of the M-94 series tools



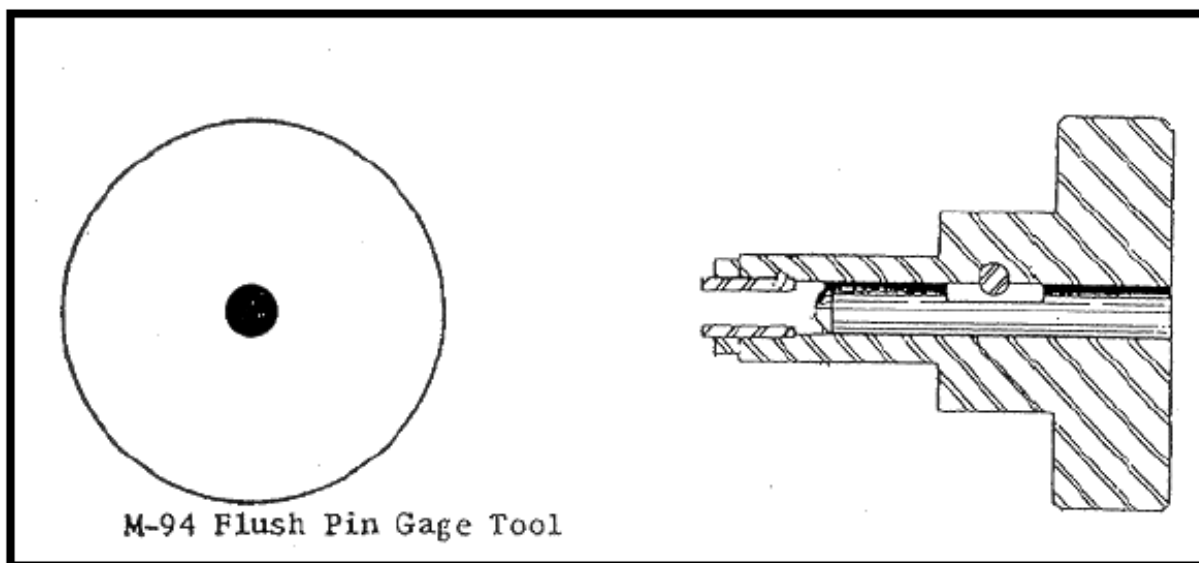
1. Assemble air metering pin jet assembly in the casting to an approximate setting of 1/2" from the face of casting A to face C of air metering pin jet.
2. Open throttle valve to wide open position.
3. Measure distance from the face of casting A to tip of air metering pin B using a suitable depth gage.
4. Return the throttle valve to a fully closed position.
5. The distance from the face of the casting A to the face of the air metering pin jet C must be the dimension A, B as determined in Step 3 plus the dimension B, C shown in the table below for the Model MA-4-5 carburetor being adjusted. Turn the air metering pin jet in or out to the exact dimension above checked with the depth gage. In making the setting, make certain that end of depth gage is seating on face C of air metering pin jet.

B, C Dimensions to be added to Dimension A, B

Carb. Assy. No.	"B" "C"	Carb. Assy. No.	"B" "C"	Carb. Assy. No.	"B" "C"
A10-2301 .....	.376	A10-3759 .....	.376	A10-4025-12.....	.376
A10-2518 .....	.346	A10-3847 .....	.376	A10-4057 .....	.346
A10-2594 .....	.346	A10-3856 .....	.376	A10-4057-1.....	.346
A10-2827 .....	.390	A10-3856-1.....	.376	A10-4164 .....	.438
A10-2827S .....	.274	A10-3856-11.....	.376	A10-4164-1.....	.438
A10-2883 .....	.346	A10-3856-12.....	.376	A10-4171 .....	.444
A10-3007 .....	.376	A10-3859 .....	.376	A10-4191 .....	.324
A10-3063-1 .....	.376	A10-3859-1.....	.376	A10-4206 .....	.407
A10-3063-2 .....	.376	A10-3878 .....	.428	A10-4218 .....	.261
A10-3148-1 .....	.376	A10-3878-M .....	.438	A10-4218-1.....	.266
A10-3168 .....	.346	A10-3965 .....	.376	A10-4401 .....	.428
A10-3323 .....	.346	A10-3965-1.....	.376	A10-4401-1.....	.428
A10-3391 .....	.306	A10-3965-11.....	.418	A10-4404 .....	.360
A10-3391-1.....	.428	A10-3965-12.....	.324	A10-4404-1.....	.428
A10-3479 .....	.376	A10-4025 .....	.376	A10-4438 .....	.407
A10-3634 .....	.428	A10-4025-1.....	.376	A10-4438-1.....	.397
A10-3649 .....	.376	A10-4025-11.....	.376	A10-4495 .....	.418
A10-3649-1.....	.376				

Instructions for setting the economizer using only M-94 tool on reverse side.

- I. Procedure for setting the Air Metering Pin Jet in Model MA-4-5 and MA-4-5AA carburetors using only M-94 flush pin gage tool.



- II. Changes over a period of years in the economizer setting in our MA-4-5 and MA-4-5AA series carburetors, plus several new calibrations for new engines on new planes resulted in several M-94 series tools, M-94, M-94A, M-94B, M-94C, M-94D, etc. The following table will enable you to set any carburetor with only the M-94 tool. You need only stock one, the M-94.
- III. Example: With the throttle wide open, adjust the economizer jet until the M-94 tool is flush. Then from the table below determine the variations; such as part #A10-3965-12, which indicates 1 and 1/4 urns minus, or counter clockwise from the M-94 flush setting.

Carb. Assy. No.	Economizer Setting Using M-94 Gage Tool With Variations Listed	Carb. Assy. No.	Economizer Setting Using M-94 Gage Tool With Variations Listed
A10-2301	M-94	A10-3856-1 & -11 & -12	M-94
A10-2518	M-94 Minus 3/4	A10-3859 & -1	M-94
A10-2594	M-94 Minus 3/4	A10-3878	M-94 Plus 1-1/4
A10-2827	M-94 Plus 1/3	A10-3878-M	M-94 Plus 1-1/2
A10-2827S	Depth Gage only (Sweden)	A10-3965 & -1	M-94
A10-2883	M-94 Minus 3/4	A10-3965-11	M-94 Plus 1
A10-3007	M-94	A10-3965-12	M-94 Minus 1-1/4
A10-3063-1 & 2	M-94	A10-4025 & -1 & -11 & -12	M-94
A10-3148-1	M-94	A10-4057 & -1	M-94 Minus 3/4
A10-3168	M-94 Minus 3/4	A10-4164 & -1	M-94 Plus 1-1/2
A10-3323	M-94 Minus 3/4	A10-4171	M-94 Plus 1-5/8
A10-3391	M-94 Minus 1-3/4	A10-4191	M-94 Minus 1-1/4
A10-3391-1	M-94 Plus 1-1/4	A10-4206	M-94 Plus 3/4
A10-3479	M-94	A10-4218 & -1	M-94 Minus 5/16
A10-3634	M-94 Plus 1-1/4	A10-4401 & -1	M-94 Plus 1-1/4
A10-3649 & -1	M-94	A10-4404 & -1	M-94 Minus 3/8
A10-3759	M-94	A10-4438	M-94 Plus 3/4
A10-3847	M-94	A10-4438-1	M-94 Plus 1/2
A10-3856	M-94	A10-4495	M-94 Plus 1

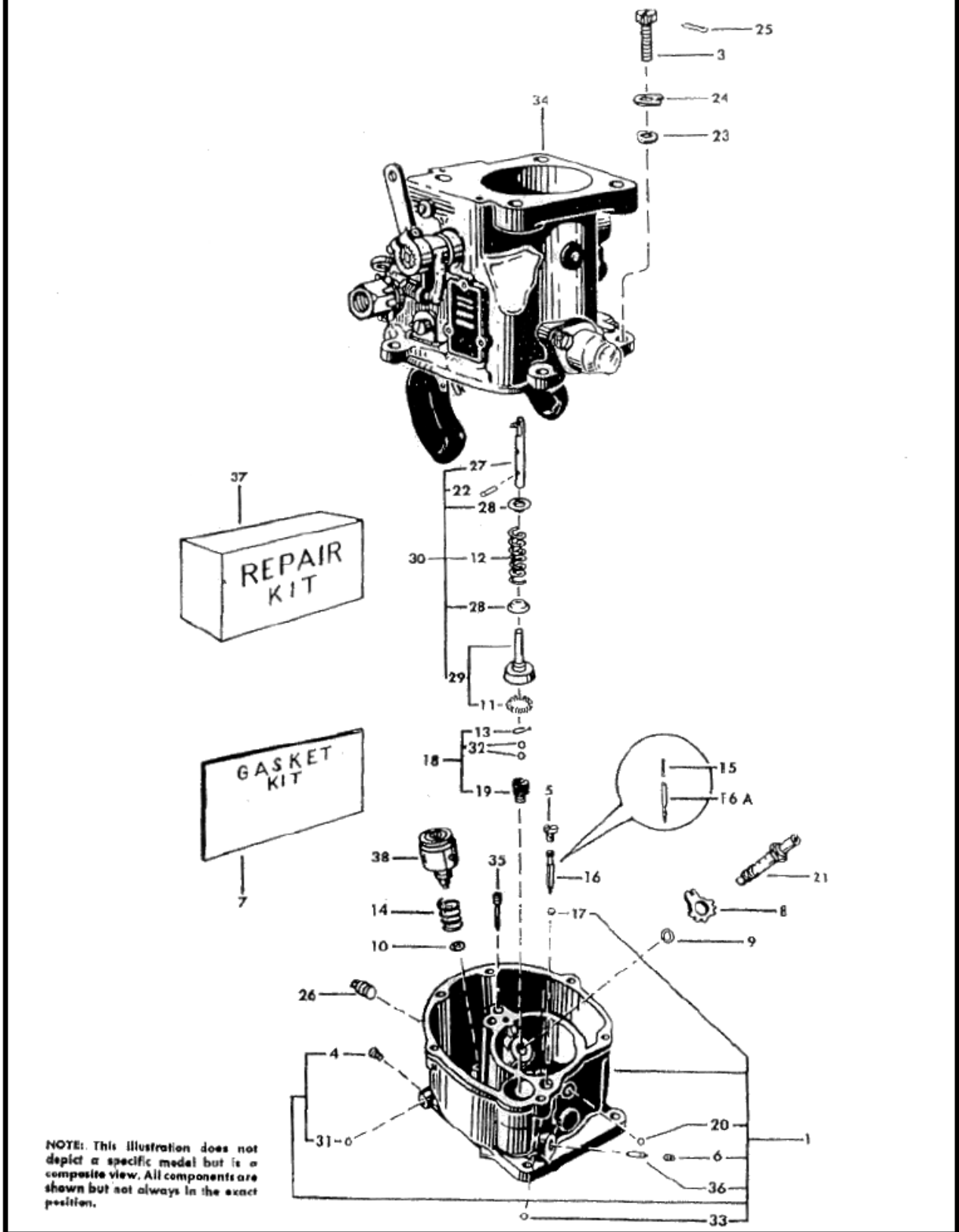
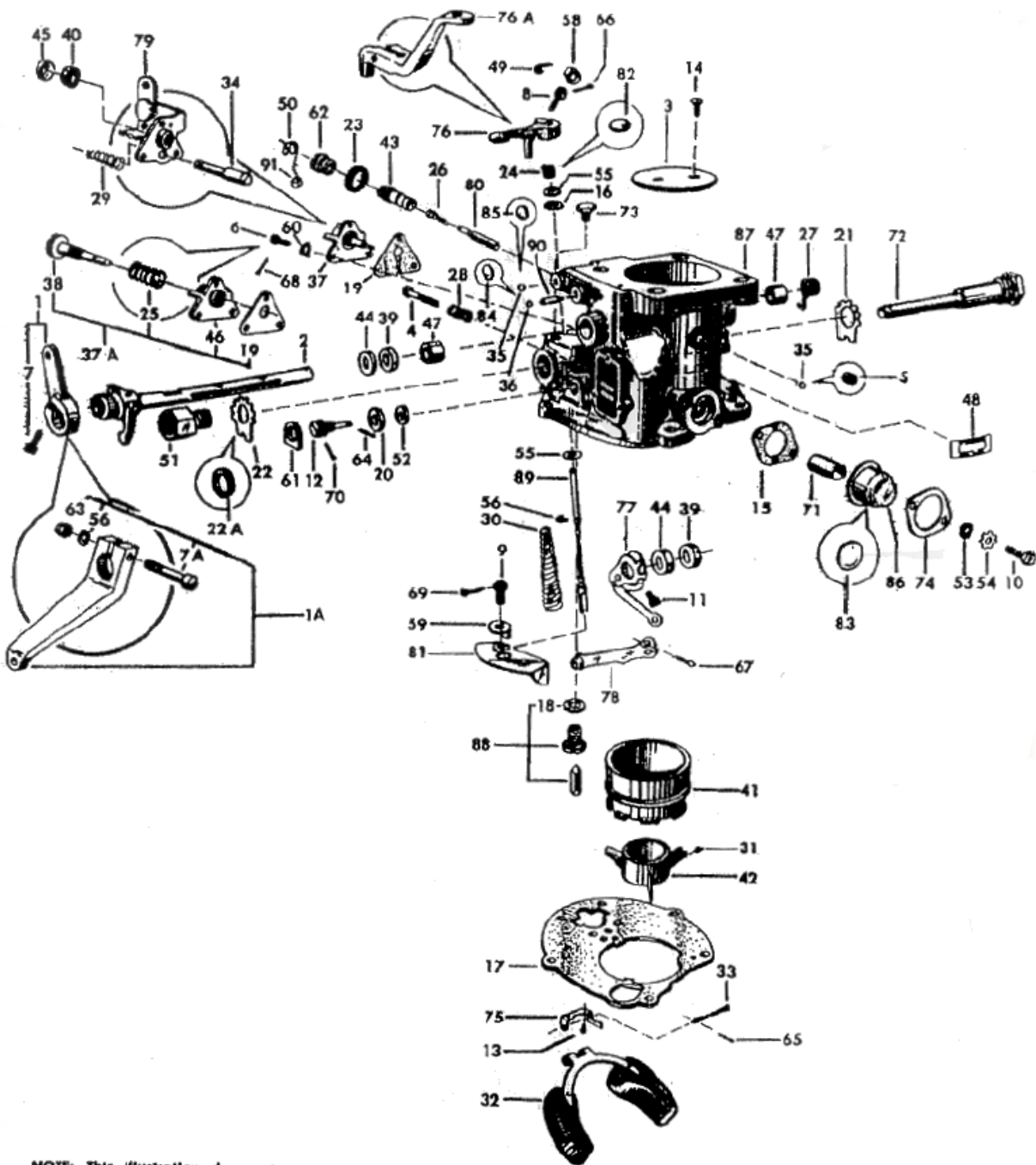


Figure 3 – Models MA-4-5, MA-4-5AA



NOTE: This illustration does not depict a specific model but is a composite view. All components are shown but not always in the exact position.

ENGINE MAKE..... Franklin  
ENGINE APPLICATION ..... 6A8-215-B8F, -B9F  
OEM CARBURETOR NO..... 14738

CARBURETOR NO..... A10-3007  
MODEL NO..... MA-4-5  
FLOAT SETTING ..... 13/64"

**FIGURE 3**

Ref. No.	Part Name	Part No.	Qty
1	Body Assy – Carburetor.....	A10-3037	1
3	Screw – Throttle Body to Bowl (1/4-28 x 7/8) Fill. Hd. Long-Lok .....	A15-A17	6
4	Screw – Channel Plug .....	A15-A22	1
5	Screw – Pump Discharge Check Valve Plug.....	A15-A27	1
6	Screw – Ratchet Plug .....	A15-A48	1
7	Kit – Gasket .....	*A16-625	1
8	Gasket – Main Nozzle.....	A16-A30	1
9	Gasket – Power Jet.....	A16-A42	1
11	Spring – Pump Leather Expanding .....	A24-284	1
12	Spring – Pump Follow-Up .....	A24-351	1
13	Spring – Pump Inlet Check Valve.....	A24-A47	1
16	Valve – Pump Discharge Check.....	A34-72	1
17	Seat – Pump Discharge Valve.....	A36-227	1
18	Valve Assy – Pump Inlet Check.....	A36-539	1
19	Screw & Seat Assy – Pump Inlet Valve.....	A36-545	1
20	Plug.....	A37-7	2
21	Nozzle Assy.....	A47-613	1
22	Pin – Spring Seat Locating.....	A62-56	1
23	Washer – 1/4 Flat Cover Screw.....	A78-420	6
26	Plug – Pipe (Bowl Drain).....	A99-12	1
27	Rod Assy – Pump Plunger .....	A119-557	1
28	Seat – Pump Follow-Up Spring .....	A125-17	2
29	Plunger & Stem Assy – Pump.....	A194-579	1
30	Plunger Assy – Pump.....	A194-589	1
31	Ball – Steel, 5/32 in. Diameter .....	A206-21	5
32	Ball – Steel, 5/32 in. Diameter .....	A206-21	2
33	Ball – Steel, 3/32 in. Diameter .....	A206-22	1
34	Body Assy – Throttle, Complete (See figure 4 for details) .....		
35	Tube Assy – Idle .....	A229-548	1
36	Ratchet Assy – Safety, Pump Inlet Check.....	A261-501	1
37	Kit – Repair.....	A286-783	1

**FIGURE 4**

1	Lever Assy – Throttle .....	A12-809	1
2	Shaft & Stop Assy – Throttle.....	φ, *A13-853	1
3	Valve – Throttle .....	A14-187	1
4	Screw – Throttle Stop (No. 10-32 x 1).....	A15-126	1
6	Screw – Idle Adjusting Needle (No. 8-32 x 3/8).....	A15-460	3
7	Screw – Clamp, Throttle Lever (No. 10-24 x 5/8) .....	A15-493	1
8	Screw – Mixture Control Lever.....	A15-A13	1
10	Screw – Pump Inlet Strainer Housing .....	A15-A14	2
11	Screw – Lock, Pump Lever .....	A15-A15	1
12	Screw – Pump Idle Lever .....	A15-A16	1
13	Screw – Float Bracket (No. 4-40 x 5/16) Round Hd.....	A15-A21	2
14	Screw – Throttle Valve (No. 8-32 x 3/8).....	A15-A23	2
15	Gasket – Strainer Housing .....	A16-A16	1
16	Gasket – Mixture Metering Valve Head .....	A16-A26	1
17	Gasket – Throttle Body to Bowl .....	A16-A251	1
18	Gasket – Float Valve Seat.....	A16-A32	1
19	Gasket – Idle Adjusting Needle .....	A16-A39	1
20	Gasket – Pump Idler Lever.....	A16-A40	1
21	Gasket – Fuel Inlet Strainer.....	A16-A48	1
22	Gasket – Fuel Inlet .....	A16-A48	1
23	Gasket – Air Metering Pin Jet Plug.....	A16-A56	1
24	Spring – Mixture Metering Valve Head.....	A24-480	1
26	Spring – Air Metering Pin Return .....	A24-A30	1

φ - Consists of reference nos. 2, 1 and 14.

\* - Indicates parts of Repair Kit.

FIGURE 4 (CONT.)

Ref. No.	Part Name	Part No.	Qty
27	Spring – Throttle Opening .....	A24-A33	1
28	Spring – Throttle Adjusting Screw.....	A24-A39	1
31	Clip – Venturi Retaining .....	A29-113	3
32	Float & Lever Assy .....	A30-629	1
33	Shaft – Float Lever.....	*A32-35	1
35	Plug.....	A37-7	2
37	Needle Assy – Idle Adjusting.....	*A43-587	1
39	Packing – Throttle Shaft.....	*A44-116	2
41	Venturi – Main .....	A46-496	1
42	Venturi – Primary.....	A46-497	1
43	Jet – Air Metering Pin .....	A49-199	1
44	Retainer – Throttle Shaft Packing .....	*A55-255	2
47	Bushing – Throttle Shaft .....	*A60-390	2
48	Decal – Cure Date.....	A63-A222	1
49	Wire – Lock .....	A66-18	1
51	Connection – Fuel Inlet .....	A68-93	1
52	Washer – Pump Idler Lever .....	A78-1	1
53	Washer – Lock, Screen Housing.....	A78-5	2
54	Washer – Screen Housing .....	A78-121	2
55	Washer – Mixture Metering Valve Head .....	A78-184	2
57	Washer – Horseshoe, Metering Valve Head .....	A78-356	1
58	Washer – Lock, Idle Needle Plate .....	A78-357	1
60	Washer – Lock, Idle Needle Plate .....	A78-374	3
61	Washer – Lock, Pump Idler Lever .....	A78-375	1
62	Plug – Air Metering Pin Jet.....	A80-151	1
64	Pin – Cotter, Pump Idler Lever .....	A62-1	1
65	Pin – Cotter, Float Shaft.....	A82-11	1
66	Pin – Cotter, Mixture Control Lever .....	A78-375	1
67	Pin – Cotter, Pump Lever Stud.....	A82, 11	1
68	Pin – Cotter, Idle Platte Screw .....	A82-11	1
70	Pin – Cotter, Pump Idler Lever Screw.....	A82-25	1
71	Screen – Bowl Vent Strainer.....	A95-63	1
72	Strainer Assy – Fuel Inlet.....	A95-506	1
73	Plug – Pipe (Pressure Take-Off) .....	A99-8	2
74	Flange – Bowl Vent Strainer Screen Housing.....	A110-173	1
75	Bracket – Float.....	A136-62	1
76	Lever – Mixture Control .....	A155-238	1
77	Lever Assy – Pump .....	A155-560	1
78	Lever & Bushing Assy – Pump Idler .....	A155-568	1
80	Pin – Air Metering .....	A173-133	1
86	Housing – Bowl Vent Strainer Screen .....	A221-79	1
87	Body & Bowl Cover Assy – Throttle.....	A227-1081	1
88	Valve & Seat Assy – Float.....	*A233-580	1
89	Valve Assy – Mixture Metering.....	A242-505	1
90	Ratchet Assy – Safety, Air Metering Jet .....	A261-501	1
91	Seal – Lead.....	A298-1	1

\* - Indicates parts of Repair Kit.