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AIRCRAFT CARBURETOR SERVICE MANUAL

MODELS
MA4-5
MA4-5AA,
MA5,
MA6AA

 PRECISION
AIRMOTIVE CORPORATION

FSM-OH2
March 30, 1993

3220 100th ST SW Bldg E
Everett, Washington 98204



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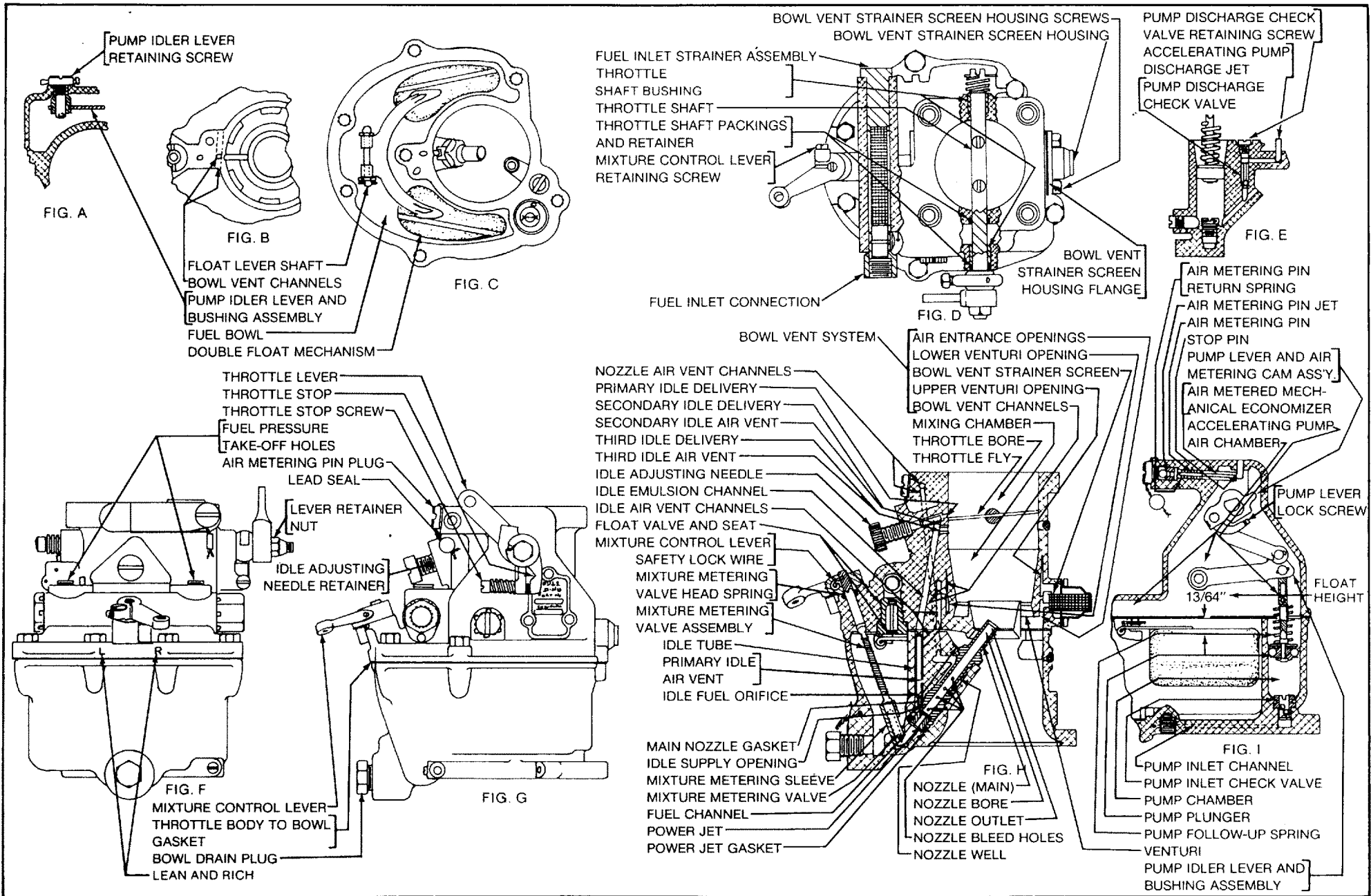
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WARNING

WARRANTY AND LIABILITY INFORMATION: The use of parts **NOT AUTHORIZED** by Precision in Precision Airmotive aviation carburetors constitutes an alteration or modification of the carburetor and voids all warranties. Precision Airmotive will accept no warranty or responsibility/liability for carburetors containing **UNAUTHORIZED** parts. Any operator and/or overhaul facility responsible for installation of **UNAUTHORIZED** parts may have the sole and full liability for property damage or injury, including death, arising from any malfunction of the carburetor in which such parts are installed. This manual is not applicable and should not be used for the installation of parts **NOT AUTHORIZED** by Precision Airmotive.*

*Reference Precision Airmotive Service Bulletin MSA-5 and Service Information Letter 10-21-92.

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MODEL MA 4-5

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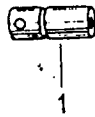


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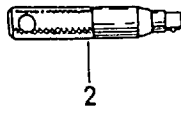
SPECIAL TOOLS

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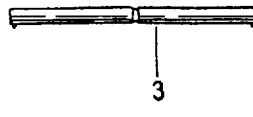
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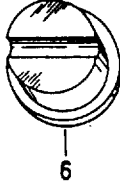
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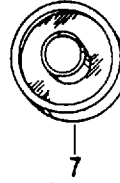
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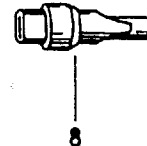
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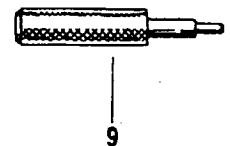
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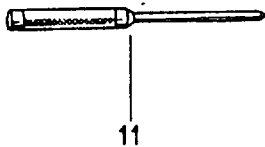
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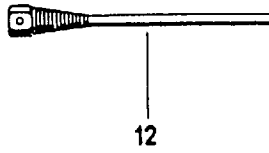
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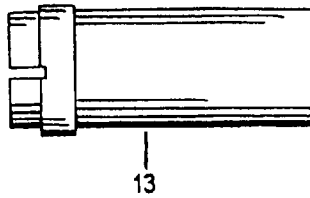
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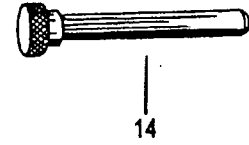
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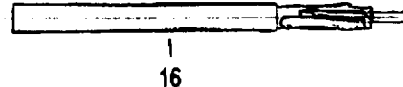
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REF. NO.	PART NO.	NOMENCLATURE
1	M-3	Nozzle wrench (9/16-inch)
2	M-12	Socket extension
3	M-13	Socket extension handle
4	M-94	Air metering pin gage
5	M-95	Throttle shaft bushing reamer
6	M-100	Throttle valve bolt peening arbor
7	M-101	Venturi assembling tool
8	M-103	Float valve seat remover
9	M-105	Throttle shaft packing tool
10	M-105A	Throttle shaft packing tool arbor
11	M-107	Throttle valve bolt peening tool
12	M-122	Throttle shaft bushing remover
13	M-512	Venturi remover and installer
14	M-516	Throttle shaft bushing installer
15	M-141	Gage, Pin Depth (See SB A1-88)
16	M-542	Counter bore tool (See SB A1-88)
17	M-509	Float Clearance Gage (Not shown, Ref. pg 16)



FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN ADVERSE CARBURETOR PERFORMANCE AND ENGINE OPERATION.



All aircraft Carburetors in this section are basically the same. Variations requiring special attention will be found in the Supplement Section on Page 18.

EXAMPLE

Some models have an automatic mixture control (AMC) unit instead of manual mixture control.

Idle fuel cut off may be either in the throttle body idle channel or in the bowl at the nozzle base.

Engineering improvements have and will continue to generate minor differences-refer to the specific parts list in all cases.

Standard MA 4-5 procedures: Refer to pages 18 and 19 for special instructions.

**STANDARD MA 4-5
DISASSEMBLY PROCEDURE**

Refer to exploded view, pages 10 and 11 for

Complete Parts Reference Numbers

- 1) Bend tabs on safety washers (2) and remove body to bowl screws (1) (Old models may have safety wire and cross hole drilled screws.)
- 2) Tap casting (3) lightly with a soft hammer to loosen gasket and pull the casting straight apart to keep from damaging the float.

THROTTLE BODY DISASSEMBLY

- 3) Remove float shaft cotter pin (5), float shaft (6), float (7), retraction clip (8), and gasket (9).
- 4) Slip pump assembly (10) out of pump idler lever (11)
NOTE: The pump plunger assembly should be replaced at each major overhaul-however if it is serviceable and needs to be disassembled, press down on spring seat (12) and remove pin (13), spring (14), seat (15), plunger (16), spring (17) from plunger rod (18).
- 5) Note position of throttle lever before removal. Remove cotter pin, retainer nut (19) and throttle lever (20) also clamp screw (20a) if installed.

- 6) Remove float valve (21), seat (22), and gasket (23). Use tool M-103 or larger screwdriver that fits the slot in valve.
- 7) Remove mixture control clamp screw (26), safety washer (27), lever (28), lock wire (29), compression spring (30), thrust washer (31), and gasket (32).
- 8) Remove horseshoe washer (33), mixture metering valve (34), and washer (35).
- 9) Remove pump idler lever cotter pin (36), washer (37), pump idler lever screw (38), and safety washer (39).
- 10) Remove throttle valve screws (40), and throttle valve (41). Some models with chocked throttle require the shaft to be withdrawn slightly and rotated to allow the throttle valve to be removed.
- 11) Remove throttle opening safety spring (74) (if used).
- 12) Loosen pump lever clamp screw (42) sufficiently to allow the throttle shaft (43) to be withdrawn from the throttle body.
- 13) This will allow the pump idler and pump lever to be removed. Separate pump lever assembly (44) from idler lever (11) by removing cotter pin (45).
- 14) Remove fuel inlet fitting (46), and washer (47).
- 15) Remove inlet strainer assembly (48), and safety washer (49).
- 16) Remove throttle adjusting screw (50), and spring (51).
- 17) Remove idle needle (52), spring (53), washer or gasket (54).
- 18) Remove idle needle retainer plate screws (55), safety washers (56), plate (57), and gasket (58) if used.
- 19) Remove economizer channel plug safety wire (59), and seal (60), plug (61), and gasket (62).





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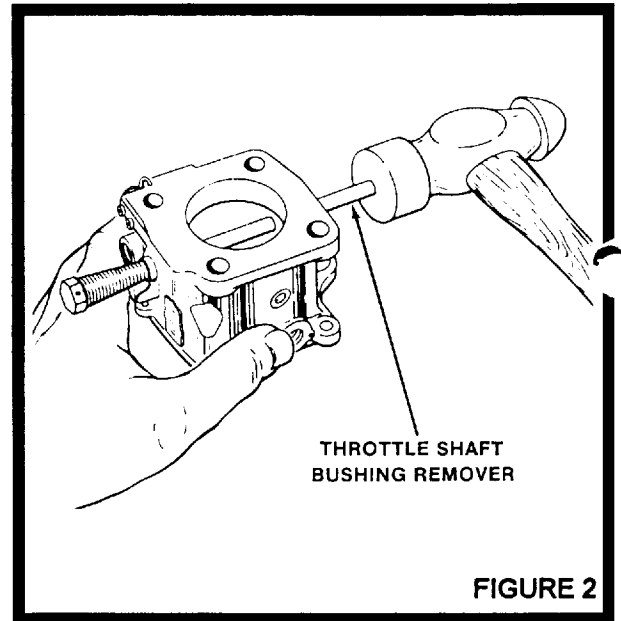
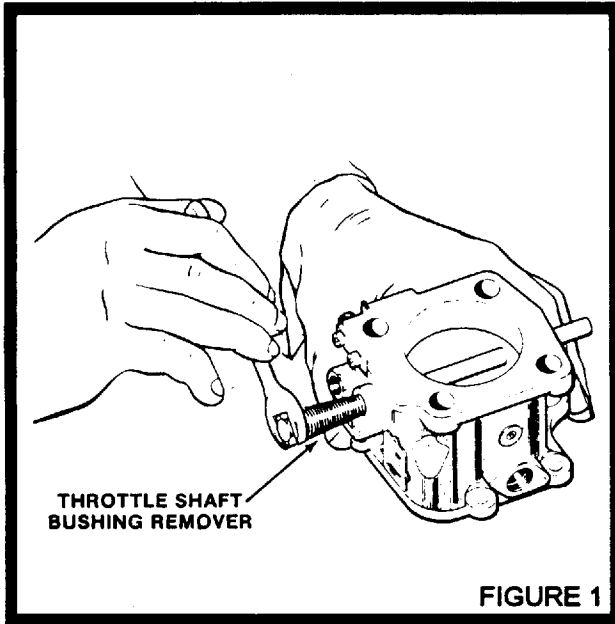
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- 20) Using tool M-94, remove economizer jet (63), economizer pin (64), and spring (65).
- 21) Remove pressure take off plugs (66), and idle drilling plug (67). (NOTE: The idle drilling access hole may have a temperature probe installed or may have been delivered for overhaul with no plug installed which would indicate the use of a probe (always install the plug (67) when returning unit to customer).
- 22) Remove bowl vent strainer screws (68), safety washers (69), flange (70), housing (71), gasket (72), and strainer (73) if used. (NOTE: The strainer should not be re-used.)
- 23) Remove throttle shaft packing retainer (75), packing (76), with a small screw driver or awl.

- 24) Remove throttle shaft bushings (77) with tool M-122. See Figures 1 and 2. (Rotate tool M-122 with wrench or socket to engage tool in bushings).
- 25) Remove inner throttle shaft packing (78), and retainer (79), and outer packing (76), and retainer (75). Remove packing (78) from opposite side of throttle shaft if used. (NOTE: This packing is used on Turbo charged models only.)



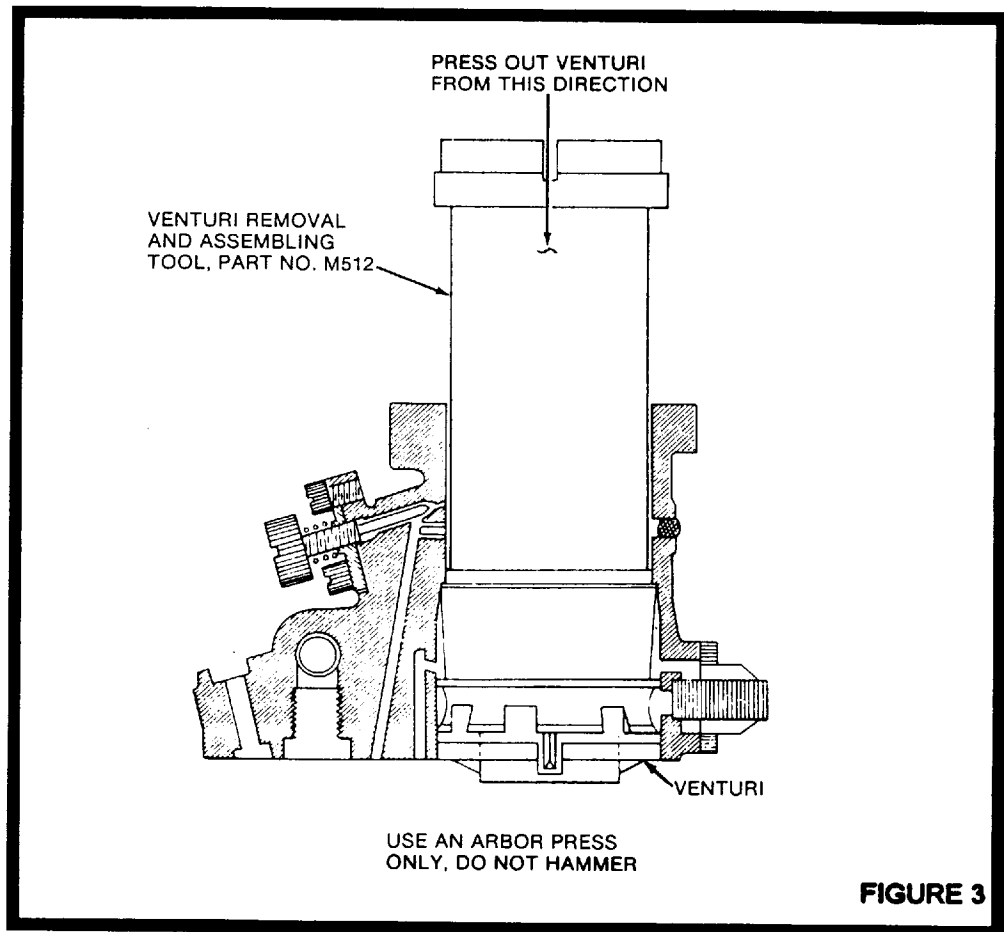


- 26) Venturi or venturi assembly seldom needs service, however if necessary, press out the venturi from the throttle valve side using tool M-512 as shown in Figure 3.

FUEL BOWL DISASSEMBLY

- 27) Remove idle tube (81).
- 28) Remove nozzle (82) by bending tabs on safety washer (83), and remove washer.
- 29) Remove lower nozzle gasket (84). (NOTE: This gasket may remain down in the base of the nozzle bore in casting-*make sure it is removed.*)
- 30) Remove drain plug (85) and channel plug (86).

- 31) Remove fuel baffle screw (87), safety washer (88), and baffle (89) if used.
- 32) Remove pump inlet check valve assembly (90).
- 33) Remove pump discharge valve retainer plug (91), spring (92) if used and valve (93).
- 34) Helicoil inserts (94) seldom require attention - if service is required, remove and replace in accordance with recommended helicoil procedures.





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CLEANING AND INSPECTION



Cleaning Process

- 35) Use a recommended carburetor cleaner and the cleaner manufacturer's procedure to soak, rinse, and blow out to assure complete cleaning. Only metal parts are to be placed in carburetor cleaner. **DO NOT** expose nonmetal parts to carburetor cleaner.
- 36) Carburetors have by design requirements very small passages, channels, and orifices. These are quite difficult to inspect using the naked eye. Using equipment such as an Oscope or other magnifying devise will enable you to see these difficult places.



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IMPORTANT: Do not clean passages in castings or other calibrated parts (nozzle, idle tube, etc.) with wire or small drills. Compressed air, carburetor cleaner, and a small, soft bristle brush work quite well.

Inspection

- 37) The following parts should always be replaced during carburetor overhaul:

All gaskets
Seals and packings
Retainers
Float valve and seat assembly
Accelerator pump
Float shaft

WEAR LIMITS FOR
MA4-5, MA-4-5AA, MA-5, MA-5AA, MA-6, MA-6AA
CARBURETORS

INDEX NO.	DESCRIPTION	PERMISSIBLE WORN DIM.	PERMISSIBLE WORN CLEARANCE
T-Body	Mixture control hole in body	.222	.007
34	Mixture metering valve (Top)	.215	
34	Mixture metering valve (Bottom) p/n 242-528	.291	.002
Bowl	Mixture metering sleeve	.293	
34	Mixture metering valve (Bottom) p/n 242-505, 242-525	.248	.002
Bowl	Mixture metering sleeve	.250	
25	Float shaft bracket	.130	.008
6	Float shaft	.122	
6	Float shaft	.122	.009
8	Float clip	.131	
T-Body	Throttle shaft bushing holes	.4995	.002
77	Throttle shaft bushing O.D.	.4975	
77	Throttle shaft bushing I.D.	.3765	.005
43	Throttle shaft	.3715	
44	Accel pump idler lever holes	.198	.012
18	Accelerator pump rod	.184	
44	Accel pump idler lever bushing	.2515	.005
38	Accel pump idler lever screw	.2465	
13	Fuel cut off valve	.3108	.002
Bowl	Fuel cut off sleeve	.3128	
Bowl	Accelerator pump bore	.755	-
7	Float adjustment tab	wear spot = .100 dia.	-
T-Body	Throttle stop pad on T-body	wear spot = .010 deep	-

NOTE: Fuel inlet strainer assembly should be replaced if the strainer screen is broken at any place or cannot be satisfactorily cleaned.

- 38) Normal aircraft quality inspection techniques can determine reusability of carburetor components. Abnormal wear, cracks, warping, or damage are, of course, just cause for rejection. Wear beyond the limits shown in TABLE I is also cause for rejection.

NOTE: Late model aircraft are all equipped with soft engine mounts. This has created a more severe vibration environment, causing different wear characteristics in different aircraft. **Careful inspection is required.**

TABLE I



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MODEL MA 4-5 ASSEMBLY PROCEDURE THROTTLE BODY



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- 39) Install throttle shaft bushings (77) using tool M-516 as shown in Figure 4.
- 40) Lightly coat the bushing with Loctite RC 680 per Loctite's recommended instructions. Press bushing "A" in place first, flush with casting. Repeat as shown with bushing "B". Cure with tool M-516 in location as shown from two to four hours. Heat not to exceed 110°F may be used to speed curing. **NOTE:** Repeated rebushing of older models with the old style steel bushings may have enlarged the bore with resultant loss of press fit. Make sure in this case that the loose bushings are in location as shown in Figure 4.
- 41) Tool M-516 is also an alignment tool and line reaming should not be necessary. If necessary, use tool M-95. See Figure 5.
- 42) Install inner throttle shaft packing (78) and retainer (79) onto tool M-105A and then hold in location with pliers as shown in Figure 6. Insert tool M-105 in shaft hole and then thru M-105A and drive tool flush with face of casting. See Figure 4A.

- 43) Install outer packing (76) and retainer (75) with tool M-105. See Figure 7. Drive packing retainer flush to casting. **CAUTION:** Do not drive retainer too far. Tight seals may result in excessive seal wear and high resistance to throttle operation.
- 44) Carburetors used on turbo-charged engines use a packing "O" ring on the opposite end of shaft. It can be inserted at this time in the cavity at the base of the bushing counter bore by squeezing the "O" ring when inserting in bushing. Push "O" ring thru the bushing with appropriate tool until it snaps into cavity behind bushing. See Figure 4A. Be careful not to damage seals.

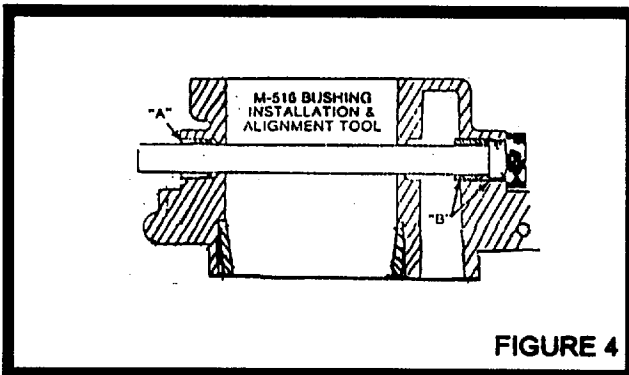


FIGURE 4

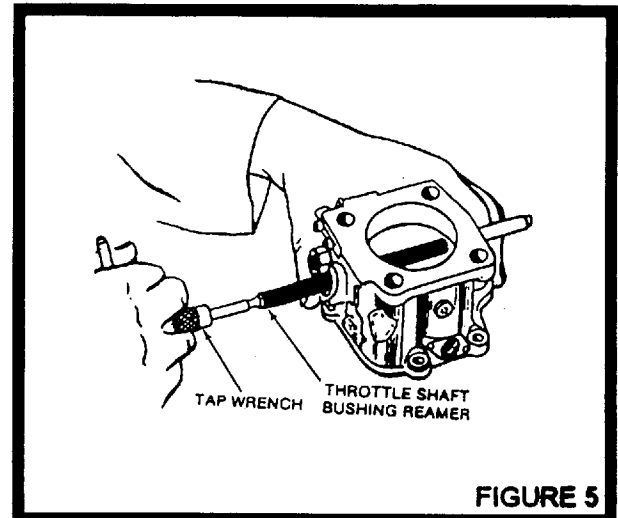


FIGURE 5

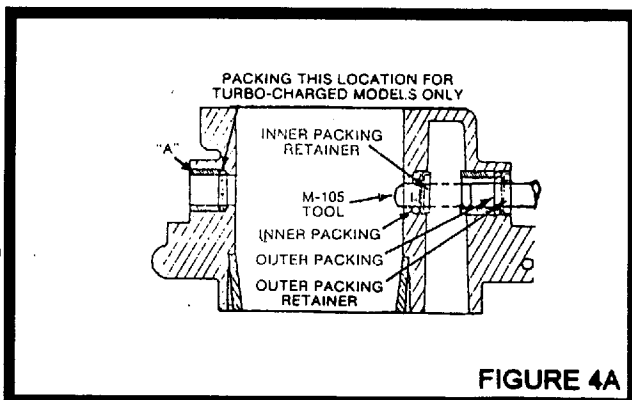


FIGURE 4A

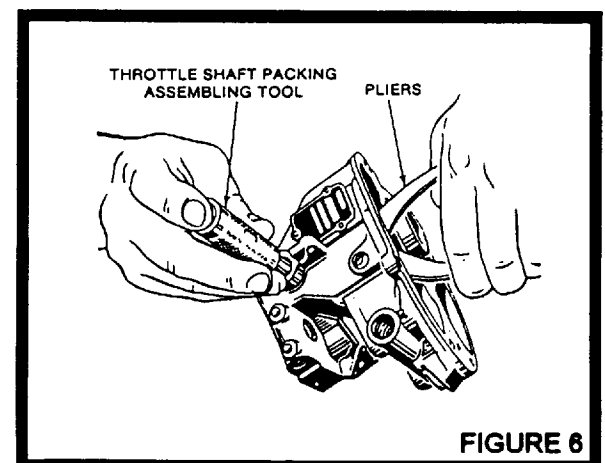


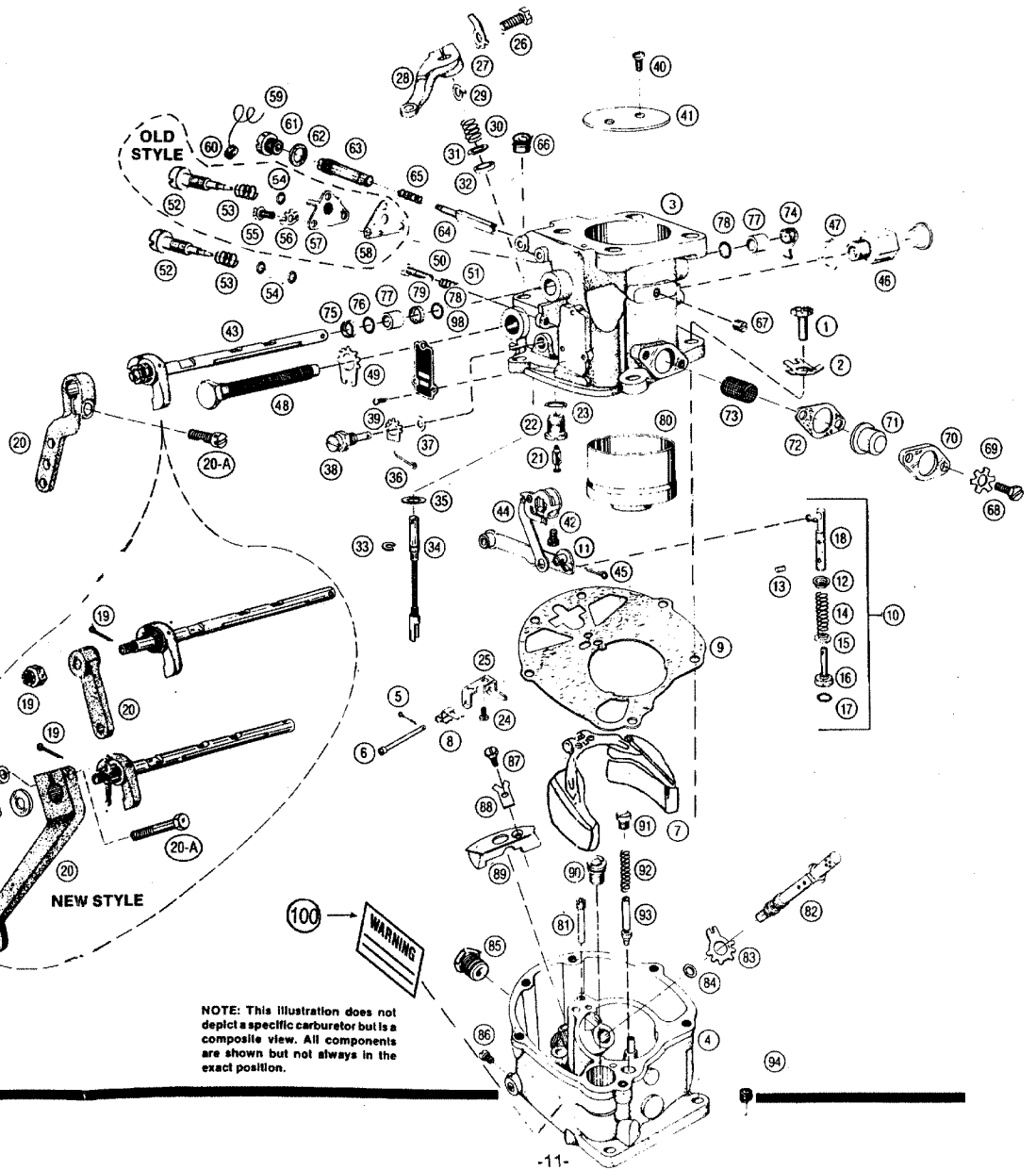
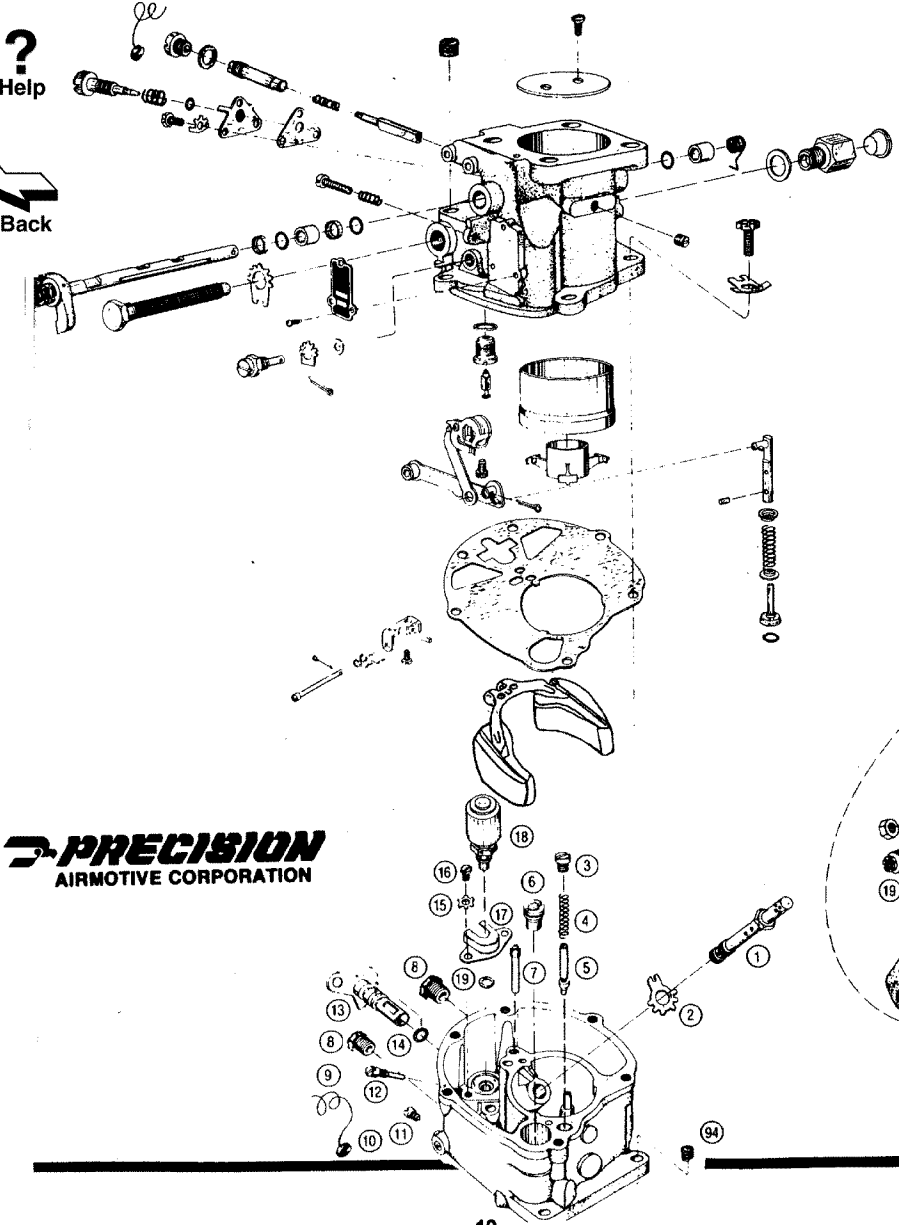
FIGURE 6

AUTOMATIC MIXTURE CONTROL MODELS

MANUAL MIXTURE CONTROL MODELS

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

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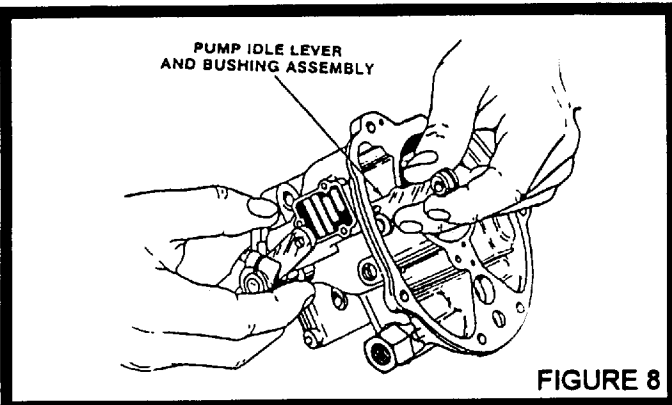
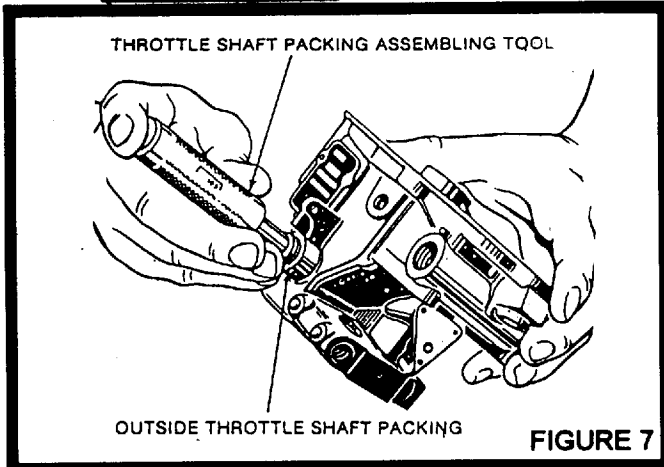
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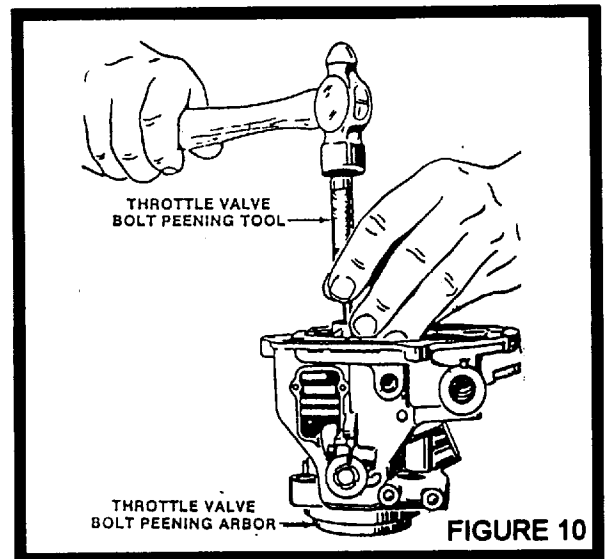
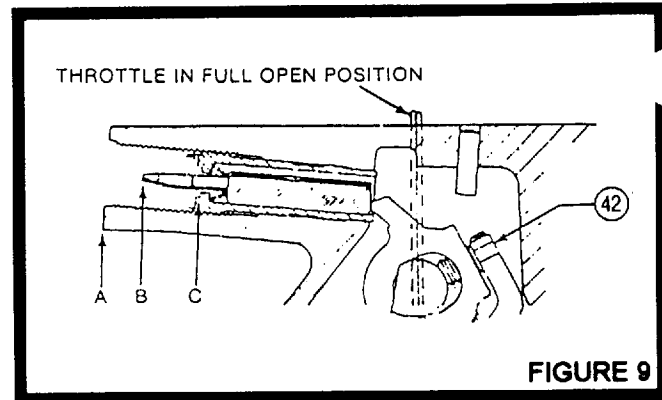
- 45) Assemble pump idler lever (11) to pump lever assembly (44) with cotter pin (45) and bend cotter pin ends all the way back.
- 46) Hold the pump lever in location. See Figure 8. Very carefully slide throttle shaft (43) through the bore and pump lever. NOTE: Extreme care should be exercised to keep from damaging the packings during this installation. Lightly lubricating the shaft will help. Secure the pump lever (44) in place in the flat provided on the throttle shaft with special screw (42). See Figure 9. Torque to 10-12 inch pounds.
- 47) Install throttle valve (41) with screws (40). Tap throttle valve lightly to seat it accurately in bore with throttle closed. Tighten screws (40) while throttle is closed. Torque screws to 10-15 inch pounds. NOTE: Certain carburetors do not use a wide open valve and you may notice that the valve is limited up to 8° from the fully open position. This is normal and an important part of the full throttle requirements.

DO NOT CHANGE.



SPECIAL TEST PROCEDURE

- 48) Leaking packings can upset the carburetors metering characteristics and affect fuel management.
- 49) Invert casting and pour a test liquid into the cavity to cover packings. Blow compressed air from the outside.
- 50) If leaking is observed, replace the packings and retainers. A LEAKING OR WORN INNER PACKING CREATES A LEAN CONDITION. A LEAKING OUTER PACKING CAUSES A RICH CONDITION.
- 51) Safety peen throttle valve screws in place with peening tool M-107 on arbor tool M-100 as shown in Figure 10. Make sure arbor is properly aligned with the throttle shaft. Three to four peen marks on edge of exposed screw threads should suffice. Do not over peen. Install throttle opening spring (74) if used.





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- 52) Install venturi (if removed) with extreme care in accordance with Figure 10. **NOTE: All MA-5 and MA-6AA carburetors use two piece venturies.** Install main venturi with M-512 tool as shown in Figure 11. Install primary venturi with M-101 tool being careful to align tang as shown in Figure 11.
- 53) Install bowl vent strainer (73), gasket (72), housing (71), flange (70), safety washer (69), and screws (68) torque to 15-20 inch pounds. Note that the chamfer side of the flange hole is against the casting.

- 54) Tighten and bend tabs to safety.
- 55) Install idle channel drill plug (67), and pressure take-off plug (66) with Loctite 222 or equivalent, Torque to 12-16 inch pounds, and 25-30 inch pounds respectively.
- 56) Install pump idler lever screw (38) and safety washer (39) into casting and through pump idler lever (11). Tighten to 80-100 inch pounds. Install washer (37), and safety with cotter pin (36). Bend ends all the way around. Bend tabs of safety washer (39).
- 57) Install throttle stop screw (50) and spring (51).

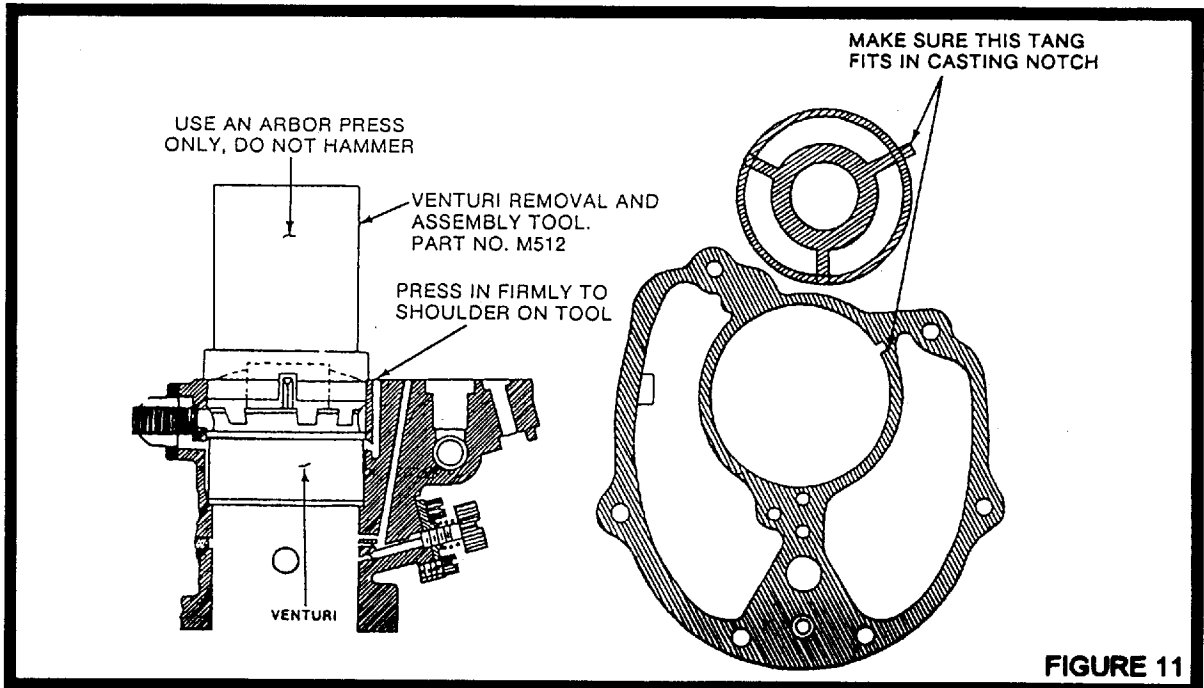
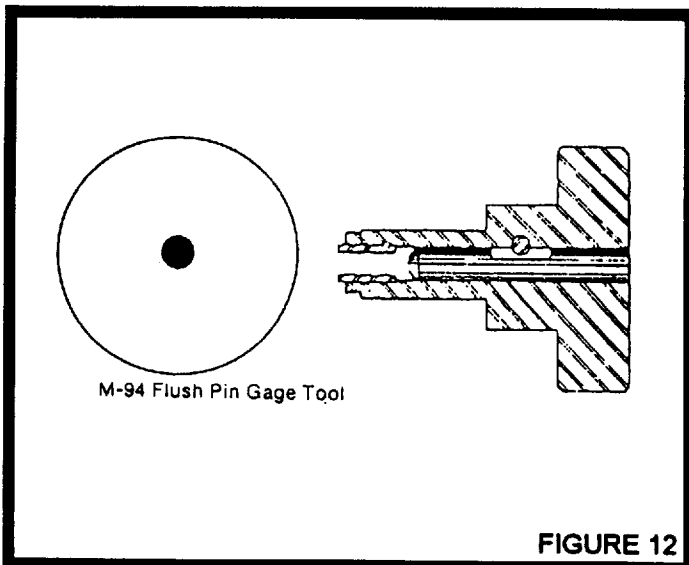
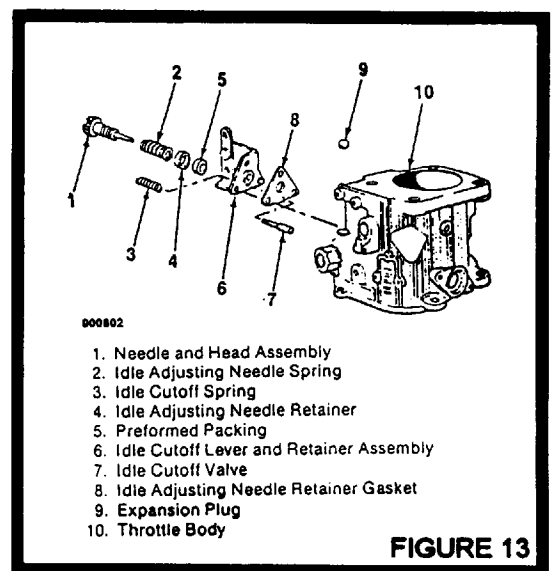


FIGURE 11



M-94 Flush Pin Gage Tool

FIGURE 12



000802

1. Needle and Head Assembly
2. Idle Adjusting Needle Spring
3. Idle Cutoff Spring
4. Idle Adjusting Needle Retainer
5. Preformed Packing
6. Idle Cutoff Lever and Retainer Assembly
7. Idle Cutoff Valve
8. Idle Adjusting Needle Retainer Gasket
9. Expansion Plug
10. Throttle Body

FIGURE 13



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ECONOMIZER GAGE DIMENSION TABLE

M-94 economizer gage settings are referenced on individual carburetor service parts list. When using depth gage to set economizer jet refer to table below for the specific M-94 gage setting and its measured plus or minus equivalent dimension.

M-94 GAGE	PLUS DEPTH MIC. B-C/INCHES	MINUS DEPTH MIC. B-C /INCHES
FLUSH	0.376	0.376
1/16 TURN	0.379	0.373
1/8 TURN	0.381	0.371
3/16 TURN	0.384	0.368
1/4 TURN	0.386	0.366
5/16 TURN	0.389	0.363
3/8 TURN	0.392	0.360
7/16 TURN	0.394	0.358
1/2 TURN	0.397	0.355
9/16 TURN	0.399	0.353
5/8 TURN	0.402	0.350
11/16 TURN	0.405	0.347
3/4 TURN	0.407	0.345
13/16 TURN	0.410	0.342
7/8 TURN	0.412	0.340
15/16 TURN	0.415	0.337
1 TURN	0.418	0.334
1-1/16 TURN	0.420	0.332
1-1/8 TURN	0.423	0.329
1-3/16 TURN	0.426	0.327
1-1/4 TURN	0.428	0.324
1-5/16 TURN	0.431	0.321
1-3/8 TURN	0.433	0.319
1-7/16 TURN	0.436	0.316
1-1/2 TURN	0.439	0.314
1-9/16 TURN	0.441	0.311
1-5/8 TURN	0.444	0.308
1-11/16 TURN	0.446	0.306
1-3/4 TURN	0.449	0.303
1-13/16 TURN	0.452	0.301
1-7/8 TURN	0.454	0.298
1-15/16 TURN	0.457	0.295
2 TURN	0.459	0.293
2-1/16 TURN	0.462	0.290
2-1/8 TURN	0.465	0.288
2-3/16 TURN	0.467	0.285
2-1/4 TURN	0.470	0.282
2-5/16 TURN	0.472	
2-3/8 TURN	0.475	
2-7/16 TURN	0.478	
2-1/2 TURN	0.480	

TABLE II

NOTE:

- 1) 1/4 Turn of the M-94 gage is approximately 0.010 inch.
- 2) Exceptions to above table are carburetor assembly numbers:
 - A10-2827S B-C Dim. = .274
 - A10-4218 B-C Dim. = .261
 - A10-4218-1 B-C Dim. = .266
 - A10-4975 B-C Dim. = .258

- 58) Install idle needle retainer plate (57) (when used) on its gasket (58), insert three screws (55), into safety washers and start screws.
- 59) Align plate by holding down while turning idle needle into seat lightly. While retaining plate in position, back the idle needle out 1/2-1 turn and then tighten the three screws (55). Torque to 15-20 inch pounds. Bend lock tabs to safety screws.
- 60) One model of altitude compensated carburetor incorporates a cut-off valve in the throttle body idle channel. This valve is operated by a walking beam lever which is part of the idle needle retainer plate. Assemble this type as shown in Figure 13.
- 61) Install idle needle spring (53), flat washer and "O" ring (54) (where used) on idle needle (52) and insert into casting. Lubricate lightly to install. (Approximate setting 1 1/2 turns from seat.)
- 62) Place small end of air metering spring (65) over small section of air metering pin (64), insert this assembly into economizer jet (63). Screw assembly into casting flush using tool M-94 (See Figure 12), then set depth to the specific carburetor setting indicated on the service parts list. The throttle must be full open when making these settings. An alternate procedure to set the economizer using a depth micrometer is as follows (Refer to Figure 9).

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 (at edge of hole).
2. Open throttle valve to wide open position.
3. Measure distance from the face of casting A to tip of air pin B using a suitable depth gage.
4. Return the throttle valve to a fully closed position.



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5. Measure the distance from face A of the casting to face C of the air metering jet. Adjust the air metering jet clockwise until distance A to C equals the sum of the distance A to B plus the dimension B to C selected from the Economizer Gage Dimension Table.

- 63) Install washer (62) over economizer channel plug (61), tighten in place and safety to casting through hole provided with wire (59). Torque to 5-10 inch pounds. Crimp lead seal (60) over wire ends.
- 64) Install float bracket (25) with screws (24). Torque in place 8-11 inch pounds.
- 65) Place horseshoe washer (33) in its slot on mixture control valve (34), and insert into its channel through washer (35).
- 66) Install mixture control valve packing (32), thrust washer (31) and spring (30).

- 67) Turn mixture control valve until the locating hole is aligned with the mixture control lever (28) clamping slot. Insert mixture control lockwire (29) through lever slot and into hole in valve. Ensure that the loop of the wire is toward the valve. Install the clamp screw (26) through safety washer (27), mixture control lever (28) and mixture control lockwire (29).
- 68) Install fuel strainer (48) through safety washer (49) into casting, tighten to 10-12 foot pounds and bend tabs to safety.
- 69) Install fuel inlet fitting (46) and gasket (47), and tighten to 10-12 foot pounds.
- 70) Install float valve seat (22) and gasket (23), tighten with tool M-103 or a large screw driver to 10-12 foot pounds. See Figure 14.
- 71) Place casting flange down on bench and install pump plunger (10). The tangs on the pump stem slide through the elongated holes in pump idler lever (11).

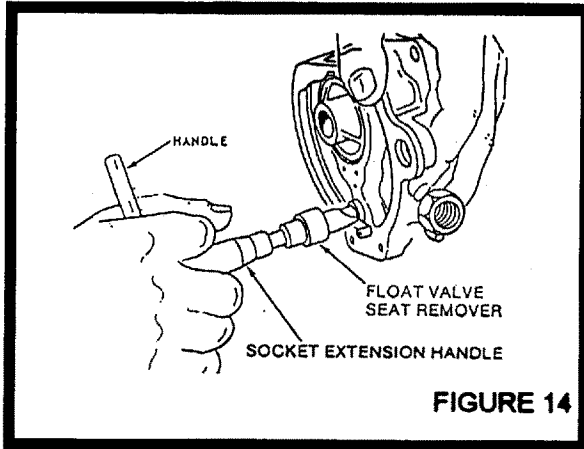


FIGURE 14

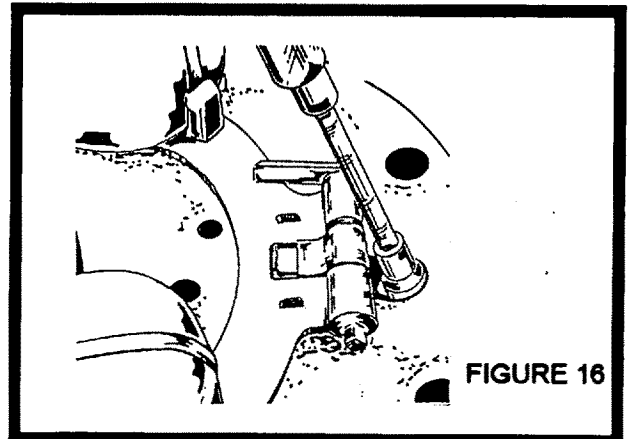


FIGURE 16

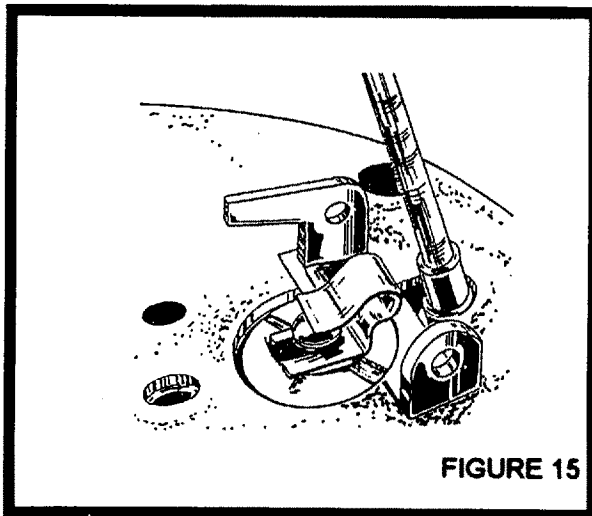
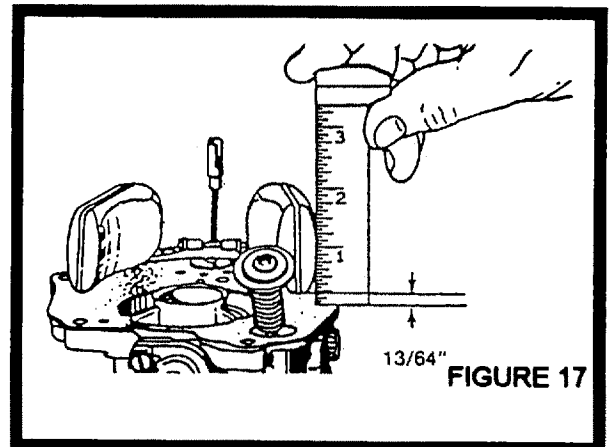


FIGURE 15



13/64" FIGURE 17



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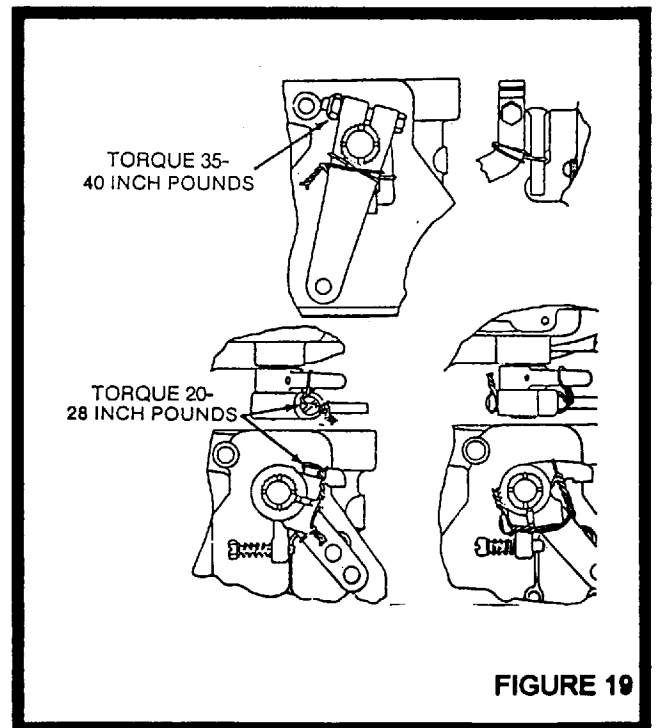
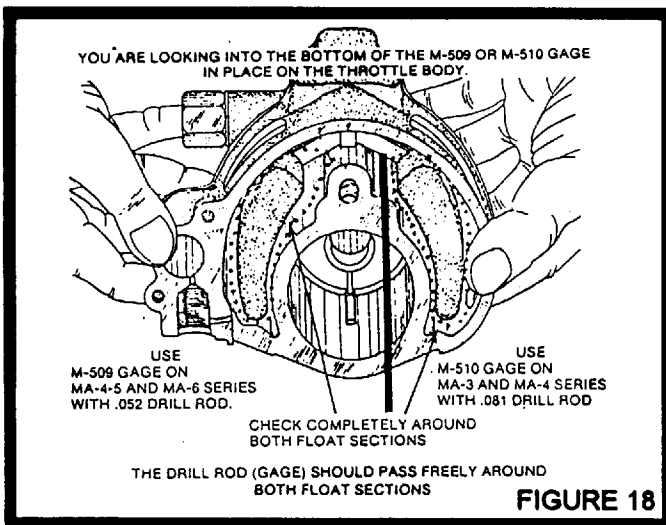
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- 72) Place throttle body to bowl gasket (9) in place on casting.
- 73) **CAUTION:** Exercise care during the following operations to prevent damage to the float.
- 74) To install the float, place the throttle body on bench with mounting flange down.
- 75) Install the float valve (21) into the valve seat (22).
- 76) Install the forked float valve retractor clip (8) with the tines of the fork positioned under the head of the float valve as illustrated in Figure 15.
- 77) Slide the float into position as shown in Figure 16 and insert the float lever shaft (6) through the float bracket (25), float lever hinge and the float valve retractor clip (8).
- 78) **CAUTION:** Ensure that the float shaft is free to rotate and that the float and valve movements is not restricted between the fully opened and fully closed position of the float valve.
- 79) The float setting is established as shown in Figure 17 with 13/64" clearance between the float and gasket measured near the outer end of each float.

- 80) If adjustment is required, bend the float lever tab located over the float valve to achieve the 13/64" setting. A small screwdriver bent 30° degrees approximately 1/4 inch from its tip is a useful tool for setting the float. Never exceed bending of tab more than the thickness of the tab. Should additional adjustment be required, two different thickness .015" and .031" washers (23) are supplied with the float valve and seat. Use either or both to acquire the proper setting without excessive bending of the tab.
- 81) **CAUTION:** Both float pontoons must be at the same height above the gasket.
- 82) **DO NOT APPLY PRESSURE TO THE VALVE AND SEAT DURING ADJUSTMENT BENDING.**
- 83) **CAUTION:** To prevent possible damage to the float do not blow on or into the carburetor assembly with compressed air.
- 84) Check to see that this assembly is free to travel with no binding between the assembled parts. Check for float clearance with tool M-509. See Figure 18. The float may be repositioned laterally by loosening the float bracket screws (24), moving the bracket slightly, and retightening screws.





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- 85) Install cotter pin (5) in float shaft and bend ends all the way back.
- 86) Place throttle lever (20) at proper angle location on throttle shaft and secure with retaining nut (19), torque to 20-60 inch pounds. Install cotter pin and bend. Note: Carburetors without the throttle lever locknut on the end of the throttle shaft must have the lever safety wired as shown in Figure 19.

FUEL BOWL ASSEMBLY

- 87) Install drain plug or plugs (85) and channel plug (86) with a suitable thread lube. **NOTE:** Make sure no thread lube can get into any passage ahead of the plug.
- 88) Install idle tube (81) carefully, seat firmly. Torque to 5-8 inch pounds.
- 89) Install pump inlet check valve assembly (90). Torque to 10-15 inch pounds. **NOTE:** Older models used a ball safety ratchet against a knurled valve head as a safety. New models use a long-lock nylon insert in the threads to safety. You can use the new style to replace all past production but do not use the knurled headed version in the new castings as no provision to safety exists.
- 90) Install pump discharge check valve (93), spring (92) if used and tighten plug (91) to 20-25 inch pounds.
- 91) Some models incorporate a fuel baffle over the mixture metering valve seat. If so, slide baffle (89) in place and secure with safety tab washer (88) and screw (87). Torque to 10-15 inch pounds. Bend tabs.
- 92) Install lower nozzle gasket (84) if used on shoulder at base of nozzle. While holding the bowl inverted, install nozzle (82) and safety washer gasket (83). Torque to 50-70 inch pounds and bend tabs to safety.

ASSEMBLY OF THROTTLE BODY TO FUEL BOWL ASSEMBLY

- 93) Hold the throttle body inverted in one hand and place the bowl down over the throttle body with the other.

- 94) Carefully guide the pump plunger into its cavity. Do not fold the leather or bind. A slight turning action, back and forth, of the bowl may be helpful.
- 95) Carefully guide the mixture metering valve into its seat in bowl. The two castings should then meet.
- 96) Secure in place with screws (1) and safety washers (2). Torque to 40-50 inch pounds, and bend tabs to safety.

INSTALLATION OF WARNING LABEL

- 97) Clean the side of the carburetor body using acetone or equivalent degreasing solvent. Allow the surface to dry completely. Remove the peel-off backing from the warning label (100) and attach the label to the carburetor body.

SUPPLEMENT

- 98) Model MA4-5AA, 5AA, to 6AA Series are the automatic altitude versions of the standard models. They incorporate an AMC bellows assembly circuit to accomplish the necessary leaning function for altitude metering control. This series is used exclusively on helicopters.
- 99) All normal repair procedures in this overhaul that apply to the manual metering series apply with exception of the AMC operated metering feature and idle cut off system.
- 100) Refer to the specific parts list for the exact part numbers required.

OVERHAUL PROCEDURE

See exploded view on pages 10 and 11

FOR THROTTLE BODY REPAIR

Refer to standard section

FUEL BOWL DISASSEMBLY

(TYPICAL OF PART A10-4438-1 TYPE)

- 101) Remove nozzle (1) by bending tabs and removing safety washer (2).
- 102) Remove pump discharge check valve plug (3), spring (4), and valve (5).



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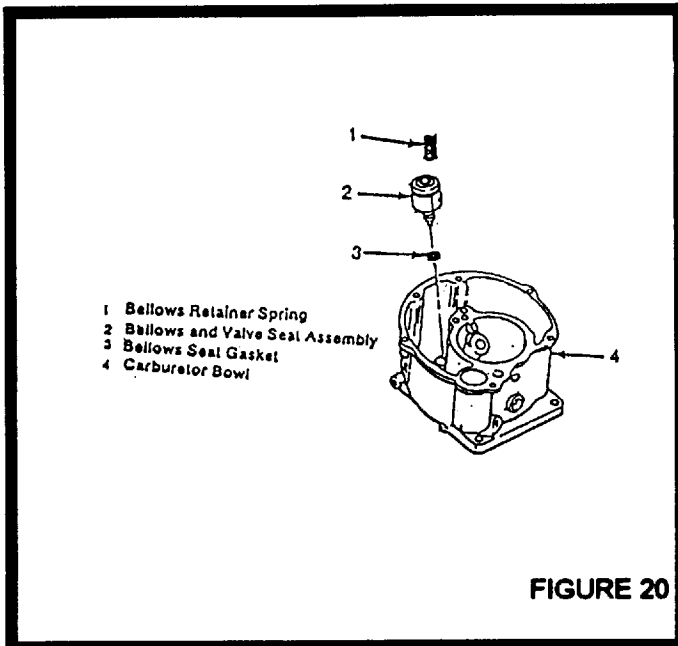


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- 103) Remove pump inlet check valve (6).
- 104) Remove idle tube (7).
- 105) Remove drain plug or plugs (8) and channel plug (11).
- 106) Remove idle cut off valve retaining screw (12) cut off valve (13), and "O" ring (14) if used. Discard "O" ring.
- 107) Remove the AMC retaining screws (16), washers (15), AMC retainer (17), and AMC unit (18). Remove and discard "O" ring (19). NOTE: Some early models have the AMC threaded into the bowl casting, remove carefully.
- 108) Clean and inspect parts and castings in accordance with procedure outlined previously.
- 109) **NOTE: CAUTION. The AMC unit is a precision metering mechanism and requires special care. Do not blow compressed air into or near this unit or use compressed air to blow out any carburetor equipped with AMC metering units as this will destroy the bellows.**
- 110) **AMC units cannot be tested in the field. This is a factory established setting only.**
- 111) **If there is any doubt about the function of the unit it must be sent to the factory for tests.**

FUEL BOWL ASSEMBLY

- 112) Ensure casting is free of any foreign material.
- 113) Install channel plug (11), torque to 10-15 inch pounds, and drain plugs (8), torque to 30-35 inch pounds.
- 114) Slide a new "O" ring (14) into its slot on cut off valve (13), lightly lubricate the "O" ring and carefully insert this valve (13) in place in the casting.
- 115) Secure in place with cut off valve retainer screw (12) torque to 10-15 inch pounds, safety wire (9), and seal (10).
- 116) Carefully install idle tube (7), and seat firmly in casting.
- 117) Install pump inlet check valve (6) torque to 10-15 inch pounds. This valve has a nylon insert in the thread section as a safety feature.
- 118) Install pump discharge check valve (5) spring (4), and plug (3). Torque to 20-25 inch pounds.
- 119) Slide a new "O" ring (19) on tested AMC unit (18).
- 120) Insert the AMC retainer (17) in place on the h section of the AMC seat and lower into place in casting.
- 121) Make sure the unit is seated in place in the counter bore seat and secure in place with screws (16) and safety washers (15). Torque screw to 15-20 inch pounds. Bend up tabs to secure.
- 122) Install nozzle (1) through safety washer (2) and tighten to 50-70 inch pounds, Bend the tab washers to secure.
- 123) Reassemble the completed castings in accordance with procedures previously outlined.
- 124) Clean the side of the carburetor body using acetone or equivalent degreasing solvent. Allow the surface to dry completely. Remove the peel-off backing from the warning label (100) and attach the label to the carburetor body.
- 125) The standard fuel level test procedure and preservation apply as outlined on page 19.





- 126) **NOTE:** (Typical Part No. A10-4025-12) some of the older models use an AMC unit which is threaded into a bowl casting and uses a tension spring as shown in Figure 20. Insert **FINGER TIGHT ONLY.**
- 127) **NOTE:** One earlier version used as an AMC retention feature, a stud which was pressed into the bottom side of the throttle body in the location where the manual mixture control valve was located. In all cases refer to the specific parts list to make sure that the exact parts can be ordered and replaced.

TEST PROCEDURE

GENERAL

- 128) After the carburetors have been overhauled and the checks performed as specified throughout the overhaul procedures, the carburetors should be equal to new units. Final adjustments should be made at the time the carburetor is installed on the engine.

FLOAT VALVE AND SEAT TEST (See Figure 21)

- 129) Connect the inlet fitting of the carburetor to a fuel pressure supply of 0.4 psi.
- 130) Replace the bowl drain plug with a fitting, rubber hose, and glass tube as shown in Figure 21. The glass tubing should be positioned vertically beside the carburetor.
- 131) Allow the fuel pressure to remain at 0.4 psi 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.

- 132) If the fuel rises to the level of the parting surface of the castings or runs out of the 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 the fuel level.
- 133) With fuel supplied to the carburetor as shown in Figure 21, 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 and will gradually die away after the spring on the pump plunger reaches its limits.
- 134) **WARNING: DO NOT STAND DIRECTLY OVER THE CARBURETOR FLANGE AS FUEL WILL BE DIRECTED INTO THE FACE OF THE OPERATOR.**
- 135) 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.
- 136) 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.

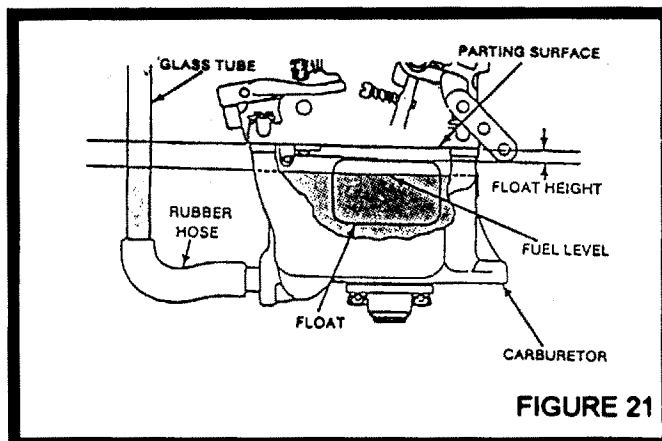


FIGURE 21



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PRESERVATIVE TREATMENT

- 137) If the carburetor is to be placed in storage after overhaul, the bowl drain plug should be removed and the carburetor flushed internally with soluble corrosion preventive oil, Military Specification MIL-C-4339.
- 138) 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 with wire to bowl.

TORQUE SETTINGS FOR MA4-5, MA-4-5AA, MA-5, MA-5AA, MA-6, MA-6AA CARBURETORS

Screw - Throttle valve	10 - 15 in-lbs
Screw - Mixture Control Lever	15 - 20 in-lbs
Screw - Float Bracket	8 - 11 in-lbs
Screw - Idle Drill Plug	12 - 16 in-lbs
Screw - Throttle Body to Bowl	40 - 50 in-lbs
Screw - Bowl Vent Strainer Housing	15 - 20 in-lbs
Screw - Pump Lever Lock	10 - 12 in-lbs
Screw - Pump Channel Plug	10 - 15 in-lbs
Screw - Pump Idler Lever	80 - 100 in-lbs
Screw - Idle Adjusting Needle Retainer	15 - 20 in-lbs
Screw - Fuel Cut Off Valve Retainer	10 - 15 in-lbs
Screw - Altitude Bellows Retainer	15 - 20 in-lbs
Screw - Throttle Lever Clamp	20 - 28 in-lbs
Screw - Fuel Bowl Baffle	10 - 15 in-lbs
Valve Assembly - Pump Inlet	10 - 15 in-lbs
Nozzle	50 - 70 in-lbs
Nut - Throttle Lever	20 - 60 in-lbs
Plug - Economizer	5 - 10 in-lbs
Fitting - Fuel Inlet	10 - 12 ft-lbs
Fuel Inlet Strainer Assembly	10 - 12 ft-lbs
Plug - Pressure Take Off	25 - 30 in-lbs
Plug - Bowl Drain	30 - 35 in-lbs
Float Valve Seat	10 - 12 ft-lbs
Idle Tube Assembly	5 - 8 in-lbs
Plug - Pump discharge valve	20 - 25 in-lbs

TABLE III