PRECISION AIRMOTIVE'S
MSA FLOAT CARBURETOR HANDBOOK

(Formally Marvel-Schebler/Facet)

&

TROUBLESHOOTING TECHNIQUES

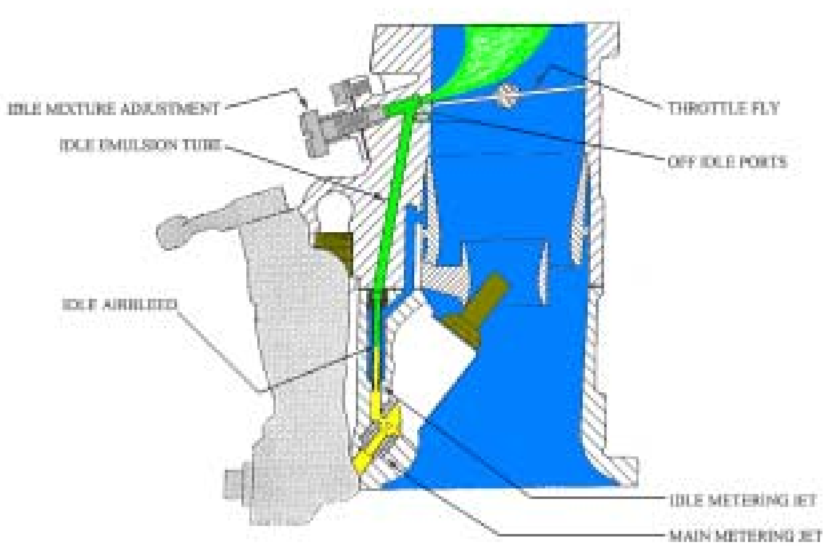
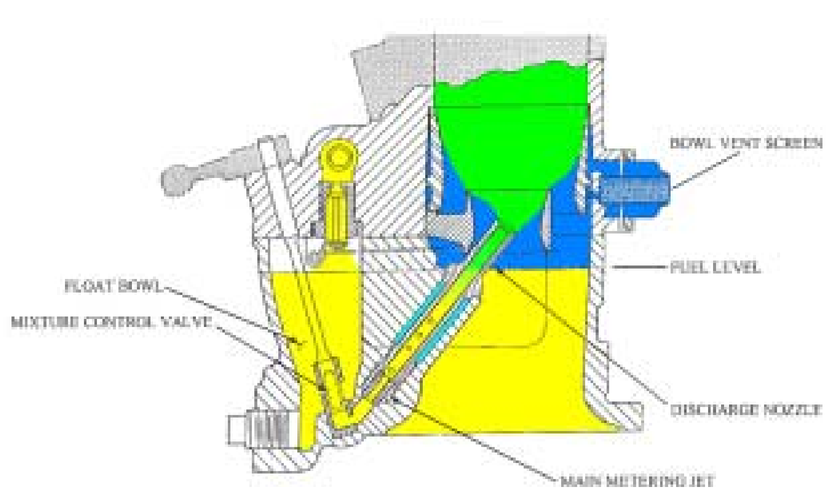


FIGURE 1. TYPICAL IDLING SYSTEM IN A FLOAT CARBURETOR.



CONTENTS

SECTION I
INTRODUCTION

1. This Handbook covers description, installation, operation, maintenance, and troubleshooting of Float Carburetor models MA-3 and MA-4, MA-4-5, MA-5 and HA-6 as manufactured by Precision Airmotive Corporation, Marysville, Washington.

2. All material contained in this Handbook applies to <u>all</u> Carburetor Models unless otherwise specified by a particular model.

3. For a listing of Factory Authorized Repair Centers, please see SIL PAC-1, or visit us on the Internet at www.precisionairmotive.com. Precision Airmotive Product Support may be reached at (360) 651-8282.

SECTION II
DESCRIPTION

1. **GENERAL.**
   Models MA-3 and MA-4, MA-4-5, and MA-5 are updraft Carburetors used on Continental, Franklin, and Lycoming Engines. They are of the plain tube, fixed jet type.
   Models HA-6 are side-draft Carburetors and are used only on Lycoming engines. They are of the plain tube, fixed jet type.

2. **DETAILED.** (NOTE: The definitions below are of all models of Carburetors in general).

   a. ACCELERATOR PUMP. – This pump is provided with a discharge jet which discharges fuel into the mixing chamber to provide smooth acceleration under all operating conditions.

   b. MANUAL MIXTURE CONTROL. – The Carburetor has a manual mixture control, which adjusts the Carburetor for all throttle positions and loads. It is not normally employed under 5,000 feet msl.

   c. IDLE SYSTEM. – Both primary and secondary idle air vents ensure proper air and fuel emulsion for starting and idling.

   d. FUEL PASSAGES. – Simplified design resists vapor locking of high-test aviation fuel.

   e. SAFETY THROTTLE LEVER SPRING. – This spring holds the throttle in "OPEN" position for take off in the event of throttle control failure.
   <u>NOTE:</u> Continental no longer incorporates this spring and has a Service Bulletin, (A2-66), referring to this.

   f. FUEL INLET STRAINER AND SCREEN. – This screen prevents the entry of dirt or foreign matter apt to cause failure.

   g. VENTS. – All air vents open into the main air entrance, which ensures against the entry of dirt into the Carburetor passages or fuel bowl when an efficient air cleaner is used.

   h. BOWL DRAIN PLUG. – The bowl drain plug is located at the lowest point in the fuel bowl and is used to drain water.

SECTION III
OPERATION

1. **PRINCIPLES OF OPERATION**.

   a. IDLE SYSTEM, (Ref. appropriate figure for a particular model). – With the throttle fly slightly open to permit idling, the suction or vacuum above the throttle on the manifold side is very high. Very little air passes through the venturi at this time, and hence, with very low suction on the main nozzle, it does not discharge fuel. This high suction beyond the throttle, however, causes the idle system to function as the primary idle delivers into the high suction zone above the throttle. Fuel from the fuel bowl passes through the mixture metering sleeve, fuel channel, power jet, and into the main nozzle bore, where it passes through the idle supply opening in main nozzle, through the idle fuel orifice in idle tube, where it is mixed with air which is allowed to enter idle tube through the primary idle air vent and secondary idle air vent. The resultant rich emulsion of fuel and air passes upward through the emulsion channel, where it is finally drawn into the throttle body through the primary idle delivery opening, subject to regulation of the idle adjusting needle, where a small amount of air passing the throttle fly mixes with it, forming a combustible mixture for idling the engine. The idle adjustment needle controls the quantity of rich emulsion supplied to the throttle barrel, and therefore controls the quality of the idle mixture. Turning the needle counter-clockwise away from its seat richens the idle mixture to the engine, and turning the needle clockwise towards its seat leans the idle mixture. On idle, some air is drawn from the throttle barrel below the throttle fly through the secondary idle delivery opening and blends with the idling mixture to the engine as the throttle is opened, coming into play progressively and blending with the primary idle delivery to prevent the mixture from beginning too lean as the throttle is opened and before the main nozzle starts to feed. These Carburetors are provided with a third and, possibly a fourth idle delivery in addition to the secondary idle delivery, depending on the application to cover the broader idle range in these Carburetors.

   b. METERING, (Ref. appropriate figure for a particular model). – All fuel delivery on idle, and also as steady propeller speeds up to approx. 1,000 rpm, is from the idle system. At approx. 1,000 rpm the suction from the increasing amount of air now passing through primary and secondary venturi causes the main nozzle to start delivering, and the idle system delivery diminishes due to lowered suction on the idle delivery openings as the throttle fly is opened for increasing propeller speeds, until at approx. 1,400 rpm the idle delivery is practically nil, and most of the fuel delivery from that point onto the highest speed is from the main nozzle. However, the fuel feed of any full throttle operation is entirely from the main nozzle. The idle system and main nozzle are connected with each other by the idle supply opening. The amount of fuel delivered from either the idle system or main nozzle is dependent on the whether the suction is greater on the idle system or main nozzle, the suction being governed by throttle valve position and engine load. The main nozzle feeds at any speed if the throttle is open sufficiently to place the engine under load, which drops the manifold suction. Under such conditions of low manifold suction at the throttle fly, the main nozzle feeds in preference to the idle system because the suction is multiplied on the main nozzle by the restriction of the venturi.

   c. ACCELERATOR PUMP, (Ref. appropriate figure for a particular model). – The accelerator pump discharges fuel only when the throttle fly is moved towards the open position, and provides additional fuel to keep in step with the sudden inrush of air into the manifold when the throttle is opened. By means of an accelerator pump lever connected to the throttle shaft, the accelerator pump plunger is moved downward when the throttle is opened, thus forcing fuel past the carburetor pump discharge check valve into the accelerator pump discharge tube which delivers accelerating fuel through the primary venturi into the mixing chamber of the carburetor. Upon closing the throttle, the accelerator pump plunger moves upward, thus refilling the accelerator pump chamber by drawing fuel from the fuel bowl through pump inlet screen and pump inlet check valve. On any quick opening of the throttle the pump follow-up spring yields and thus prolongs the pump discharge sufficiently to prevent “slugging” the engine with fuel. As a precaution to prevent fuel from being drawn into the mixing chamber when the accelerator pump is inoperative, (any constant throttle position), accelerator pump discharge check valve assembly mounted in the Carburetor is provided with an accelerator pump discharge check valve loaded by an accelerator pump discharge check valve spring.

d. POWER ENRICHMENT, (ECONOMIZER), SYSTEM, (Ref. appropriate figure for a particular model).-Aircraft engines are designed to produce a maximum amount of power consistent with their weight. But since they are not designed to dissipate all of the heat the fuel is capable of releasing, provisions must be made to remove some of this heat. This is done by enriching the fuel - air mixture at full throttle. The additional fuel absorbs this heat as it changes into a vapor. Power enrichment systems are often called economizer systems because they allow the engine to operate with a relatively lean and economical mixture for all conditions other than full power.

e. MECHANICAL AIRBLEED ENRICHMENT SYSTEM, (Large MA-4-5, HA-6 Carburetors, Ref. appropriate figure for a particular model).–When we increase the air velocity through the main venturi, we get an increased pressure drop that enriches the mixture, and to prevent this enrichment, an air bleed of a very precise size is used between the float bowl and the discharge nozzle. If we increase the size of this air bleed, we lean the mixture, and if we decrease it, more fuel is pulled from the discharge nozzle and the mixture becomes richer. The air for the air bleed comes from the float chamber and passes through the air bleed metering valve. The needle for this valve is held off of its seat by a spring and is closed by an operating lever attached to the throttle shaft. When the throttle is wide open, the lever closes the air bleed valve and enriches the fuel – air mixture.

f. BACK-SUCTION TYPE ENRICHMENT SYSTEM, (Small MA-3, MA-4 Carburetors, Ref. appropriate figure for a particular model). – The back-suction mixture control varies the pressure in the float chamber between atmospheric pressure and a pressure slightly below atmospheric. This pressure variation is accomplished by using a control valve located in the float chamber vent line. The float chamber is vented to the low-pressure area near the venturi through a back suction channel. This lowers the pressure in the float bowl. When then mixture control is in the rich position, the vent valve is open and the pressure in the float bowl is raised to essentially the atmospheric pressure, and a differential pressure exists across the main metering jet. This causes fuel to flow out of the discharge nozzle. When the mixture control is moved to lean, it closes the vent valve, and pressure in the float chamber is decreased to a pressure that is essentially the same as that of the discharge nozzle. This decreased pressure differential decreases the flow of fuel.

g. MIXTURE CONTROL, (Ref. appropriate figure for a particular model). – The mixture control consists of mixture control lever which is attached the mixture metering valve assembly. The mixture metering valve assembly is provided at its lower end with mixture metering valve, which rotates in stationary mixture sleeve. Mixture metering sleeve is provided with a transverse slot through which the fuel enters and fuel metering is accomplished by the relative position between one edge of the longitudinal flat on the mixture metering valve and one edge of the slot in the mixture metering sleeve. When the mixture control lever is in toward the carburetor throttle flange, a full rich mixture is provided for takeoff. With the mixture control lever in the “FULL RICH” position, metering is controlled by the power jet, but in other than “FULL RICH” position, metering is accomplished by the relative position of the respective edges of the mixture metering sleeve and mixture metering valve as described above. To make the mixture leaner for altitude compensation, move the mixture control lever away from the carburetor throttle flange. With the mixture control lever in the full lean position, (with mixture control lever in a position farthest from the carburetor throttle flange), no fuel is allowed to enter the nozzle and idle system, thus providing what is known as “IDLE CUT OFF” to prevent accidents when working around a hot engine. This cut off is accomplished by the fact that the angular opening between the metering edge of the mixture metering valve and the metering edge of the mixture metering sleeve in the “FULL RICH” position is narrower than the total angular travel of the mixture metering valve.

2. **OPERATING INSTRUCTIONS.**

a. STARTING – COLD ENGINE. – With mixture control in “FULL RICH” position, prime the engine as directed by the engine manufacturers instructions and set the throttle approx. 1/10 open, (throttle stop 3/32 inch from throttle stop screw). With the throttle in this position, engage the starter. This will draw a finely emulsified mixture of air and fuel through the manifold into the combustion chamber. The engine should start within 3-5 revolutions and there should be sufficient throttle opening to keep the engine running. The Carburetor is calibrated to give the richest mixture at this throttle opening and, therefore, a cold engine will run the smoothest with the throttle in this position. For this reason the engine should be allowed to warm up until firing evenly before operating the throttle further.

b. STARTING – HOT ENGINE. – To start a warm or hot engine put mixture control in “FULL RICH” position and pull the throttle stop back against the throttle stop screw. If the ignition has just been shut off for several minutes, it may be necessary to turn the engine over once or twice before turning on the ignition. A warm or hot engine should start and continue with the throttle in the idling position.

CAUTION:

Do not open and close throttle in starting, as this is likely to deposit raw gasoline in the Carburetor air box and constitute a definite fire hazard. Do not prime a hot engine.

c. USE OF MIXTURE CONTROL. – The mixture adjustment should not be used under 5,000 feet. When adjusting mixture control for altitudes higher than 5,000 feet, move control in and out slowly with the throttle at “CRUISING” or “FULL OPEN” position until the highest rpm is attained. The Carburetor mixture will then be correctly adjusted for all throttle positions and loads at that particular altitude. If an EGT gauge is installed, lean to peak temperature and then richen to 50 – 100 degrees rich of peak.

CAUTION:

Always have the mixture control in the “FULL RICH” position when coming in for a landing, so that if full power is required in an emergency near the ground the engine will operate satisfactorily and will not overheat because of too lean a mixture.

d. STOPPING. – Set throttle for idle speed of 800 rpm and pull the mixture control lever to the full lean position, allowing the engine to stop from lack of fuel before shutting off ignition thus assuring that the cylinders are dry of fuel. The idle cut-off feature now operates to ensure against accidental starting of engine.

SECTION IV
SERVICE INSPECTION, MAINTENANCE, AND LUBRICATION

1. **SERVICE TOOLS REQUIRED. –** No special service tools are required.
2. **SERVICE INSPECTION. –** The Carburetor should be inspected daily for leakage due to worn gaskets or loose and damaged gas line fittings. This condition constitutes a dangerous fire hazard and must be corrected at once. Safety locking wires and washers should be checked monthly to ensure the tightness of all screws. Linkage should be inspected monthly for evidence of wear.
3. **MAINTENANCE.**

NOTE: Always refer to appropriate engine/airframe manual for proper adjustment procedures.

a. ADJUSTMENT OF CARBURETOR. **–** If, after checking all other points on engine, it is found necessary to readjust the carburetor, proceed as follows: With engine thoroughly warmed up, set throttle stop screw so that the engine idles at approx. 600-650 rpm. Adjust the idle mixture to obtain a 25-50 rpm rise at idle cut-off, (optimum). A change in idle mixture will change the idle speed and it may be necessary to readjust the idle speed to 600-650 rpm with throttle stop screw.

CAUTION:

Care should be taken not to damage the idle needle seat by turning the idle adjustment needle too tightly against seat as damage to this seat will make a satisfactory idle adjustment very difficult.

b. FLOAT HEIGHT. **–** The float height is set at the factory and can be checked by removing the throttle bowl, bowl cover, and float assembly and turning upside down. Proper setting of the two floats from bowl gasket to closest surface of each float should measure:

MA-3 and MA-4 Carburetors, 7/32 inch.
MA-4-5, MA-5 and MA-6 Carburetors, 13/64 inch
HA-6 Carburetors, **.**187 inch

For Brass floats, be sure to check both floats to proper dimensions, making sure that the floats are parallel to the bowl gasket.

NOTE: For new style Floats, Delrin (white); refer to SIL MS-4, introduction of advanced polymer floats for MA series updraft Carburetors.

For the Delrin Floats, the pontoons may not be bent to adjust. Float pontoons might not be the same height above the gasket. The allowable height difference between pontoons is .090 inch. If the heights are not the same, set the float height such that the average of the two pontoon heights is the called out float level for that particular Carburetor.

CAUTION:

Do not apply pressure to the valve and seat during adjustment bending.

c. ACCELERATOR PUMP ADJUSTMENT. **–** The accelerator pump lever has three holes into which the upper end of accelerator pump link may be fastened. The outer hole, no. 3, which is approx. midway between upper and lower holes, gives largest stroke or maximum accelerating fuel. The lower hole, no. 1, gives the shortest stroke, or minimum accelerating fuel, and the upper hole, no. 2, provides a medium supply of accelerating fuel. The normal position of accelerator pump is in the no. 3 hole, the maximum setting, however, for extremely hot weather or for high-test fuels, no. 2 hole may be necessary to prevent heaviness or slowness on acceleration. Rarely, if ever, should no. 1 hole be required.

4. **LUBRICATION.**

No lubrication is required on MA-3s, MA-4s and MA4-5 Carburetors.
Lubrication is required on HA-6 Carburetor pump linkage rods. Refer to Precision SIL MS-1.

5. **SERVICE TROUBLES AND REMEDIES.**

The following attached troubleshooting chart is to aide the pilot/mechanic in isolating a carburetion problem effectively. The process of elimination is vital to isolating a Carburetor problem.

CARBURETOR TROUBLESHOOTING CHART
MSA (MARVEL-SCHEBLER/FACET) FLOAT CARBURETOR

THE FOLLOWING TROUBLESHOOTING CHART IS TO AID IN EFFECTIVE TROUBLESHOOTING OF THE MSA FLOAT CARBURETORS.

TO DETERMINE IF THE CARBURETOR HAS A **RICH** OR A **LEAN** CONDITION, THE FOLLOWING STEPS ARE RECOMMENDED:

SYMPTOM	TROUBLESHOOT FOR:
1) EXCESSIVE OR AGGRESSIVE LEANING AT ANY THROTTLE POSITION IN CRUISE OR FULL POWER:	RICH - ACCELERATOR PUMP CHECK VALVE. - ACCELERATOR PUMP STEM PACKING. - FLOAT LEVEL TO HIGH. - NEEDLE & SEAT NOT OPERATING PROPERLY.
2) EXCESSIVE RISE IN RPM AT IDLE CUT-OFF:	RICH IDLE MIXTURE.
3) EXCESSIVE FUEL CONSUMPTION, SOMETIMES ASSOCIATED WITH ROUGH ENGINE.	RICH CONDITION.
4) HESITATION ON ACCELERATION FROM 1200-1500 RPM RANGE,(TRANSITION FROM IDLE CIRCUIT TO MAIN JET AND VENTURI).	RICH - AIR BLEED BLOCKAGE IN IDLE TUBE. RICH - ACCELERATOR PUMP LINKAGE MISADJUSTED, (TO MUCH FUEL FROM PUMP DURING ACCELERATION).
5) POOR IDLE CUT-OFF.	RICH - LEAKY PRIMER OR WORN MIXTURE VALVE. IDLE MIXTURE ADJUSTMENT.
6) NO RISE WHEN LEANING AT CRUISE OR FULL POWER.	LEAN - THROTTLE SHAFT O-RINGS (INNER O-RINGS). (MA-4-5). - ECONOMIZER SETTING. (MA-4-5) - FLOAT LEVEL TOO LOW. - BLOCKAGE IN MAIN NOZZLE. - BLOCKAGE IN BOWL VENT.
7) NO RISE AT IDLE CUT-OFF.	LEAN - BLOCKAGE IN IDLE CIRCUIT. - INTAKE MANIFOLD LEAK. - CRACKED PRIMER LINES. - IDLE MIXTURE ADJUSTMENT.
8) HIGH EGT AND CHT READINGS. (LOW FUEL CONSUMPTION)	LEAN CONDITION.

CARBURETOR TROUBLESHOOTING CHART
MSA (MARVEL-SCHEBLER/FACET) FLOAT CARBURETOR

NOTE: THE FOLLOWING SUGGESTIONS ARE TO AID IN TROUBLESHOOTING MARVEL-SCHEBLER FLOAT CARBURETORS.

PROBLEM	PROBABLE CAUSE	REMEDY
ROUGH ENGINE (RICH)	LEAKY PRIMER.	DISCONNECT AND CAP OFF TO ELIMINATE.
	WRONG VENTURI OR INSTALLED INCORRECTLY.	USE FULL SERVICE MANUAL FOR PROPER PART NUMBERS AND M-83 TOOL FOR PROPER INSTALLATION.
	BAD ACCELERATOR PUMP CHECK VALVE.	REMOVE AND TEST BY BLOWING AIR BY MOUTH INTO VALVE. IF ANY AIR LEAKS, REPLACE VALVE
	ACCELERATOR PUMP STEM PACKING (WET AROUND SHAFT).	REMOVE PUMP PLUNGER AND REPLACE.
	STICKY FLOAT.	REMOVE AND INSPECT FOR MARKS AND SCRATCHES. REPLACE FLOAT IF ANY FOUND.
	FLOAT VALVE NOT SEATING (LEAKING FUEL).	PRECISION RECOMMENDS REPLACING NEEDLE AND SEAT EVERY TIME CARBURETOR IS DISASSEMBLED.
	THROTTLE SHAFT O-RING LEAKAGE (MA-4-5, MA-5) OUTBOARD O-RINGS.	CHECK FOR LEAKAGE WITH COMPRESSED AIR. REPLACE AS NECESSARY.
	WORN OUT, JUST NEEDS AN OVERHAUL.	RECOMMENDED OVERHAUL AT 10 YEARS OR TBO, WHICHEVER OCCURS FIRST.
	ECONOMIZER SETTING MISADJUSTED. (MA-4-5, MA-5).	RESET PER PRECISION OVERHAUL MANUAL P/N FSM-OH2.
ROUGH ENGINE (LEAN)	CRACKED PRIMER LINES.	INSPECT AND REPAIR AS NECESSARY.
	INTAKE MANIFOLD LEAKS.	PRESSURIZE AND TEST.
	BLOCKAGE IN MAIN DISCHARGE NOZZLE OR IN BOWL VENT.	CLEAN AND ENSURE ALL PASSAGES ARE FREE FROM CONTAMINATION. FIND SOURCE OF CONTAMINATION.
	THROTTLE SHAFT O-RING LEAKAGE (MA-4-5, MA-5) INBOARD O-RINGS.	CHECK FOR LEAKAGE WITH COMPRESSED AIR. REPLACE AS NECESSARY.
	ECONOMIZER SETTING MIS-ADJUSTED. (MA-4-5, MA-5).	RESET PER PRECISION OVERHAUL MANUAL P/N FSM-OH2.

CARBURETOR TROUBLESHOOTING CHART

MSA (MARVEL-SCHEBLER/FACET) FLOAT CARBURETOR

PROBLEM	PROBABLE CAUSE	REMEDY
ROUGH IDLE	MIS-ADJUSTED IDLE MIXTURE	RE-ADJUST IDLE PER ENGINE MANUAL.
	BAD OR LEAKY PRIMER.	DISCONNECT AND CAP OFF TO ELIMINATE.
	CRACKED PRIMER LINES.	REPAIR AS NECESSARY.
	INTAKE MANIFOLD LEAKS.	PRESSURIZE AND TEST.
POOR IDLE CUT-OFF	MIXTURE LINKAGE NOT FULL TRAVEL.	RE-ADJUST MIXTURE LINKAGE.
	MIXTURE VALVE BEING PULLED UP BY MIS-ALIGNED MIXTURE CABLE.	RE-ALIGN MIXTURE CABLE STRAIGHT WITH MIXTURE LEVER.
	MIXTURE VALVE WORN OUT.	REPLACE MIXTURE VALVE
	LEAKY PRIMER.	DISCONNECT AND CAP OFF TO ELIMINATE.
	IDLE SPEED ADJUSTED TO HIGH.	RE-ADJUST IDLE SPEED PER ENGINE MANUAL.
CAN’T ADJUST IDLE	LEAKY PRIMER.	DISCONNECT AND CAP OFF TO ELIMINATE.
	CRACKED PRIMER LINES.	INSPECT ALL JOINTS AND CONNECTIONS. REPAIR AS NECESSARY.
	INTAKE MANIFOLD LEAKS.	PRESSURIZE AND TEST.
	MIS-ADJUSTED IDLE MIXTURE.	RE-ADJUST MIXTURE PER ENGINE MANUAL.
HESITATION ON <u>ACCELERATION</u>	LEAKY PRIMER.	DISCONNECT AND CAP OFF TO ELIMINATE
	IDLE MIXTURE ADJUSTED TOO RICH.	RE-ADJUST PER ENGINE MANUAL. OPTIMAL TO HAVE 25-50 RPM RISE AT ICO.
	IDLE TUBE AIR BLEED BLOCKAGE. NOTE: TORQUE IDLE TUBE 3-5 IN/LB	REMOVE IDLE TUBE FROM BOWL AND CLEAN AIR BLEED. CLEAN WHOLE IDLE CIRCUIT WITH COMPRESSED AIR AND SOLVENT.
	PUMP PLUNGER LINKAGE MIS-ADJUSTED, (TOO MUCH FUEL ON ACCELERATION).	ADJUST TO LESSER THROW ON ACCELERATOR PUMP LINKAGE.
HESITATION OR QUIT ON <u>DECCELERATION</u>	BAD ACCELERATOR PUMP (LEATHER BOOT), FUEL GETTING TO OTHER SIDE, FORCED OUT VENT WHEN THROTTLED BACK.	REPLACE PUMP PLUNGER.

CARBURETOR TROUBLESHOOTING CHART

MSA (MARVEL-SCHEBLER/FACET) FLOAT CARBURETOR

MA-3, 4SPA CARBURETOR FIGURES

MODEL MA 4SPA

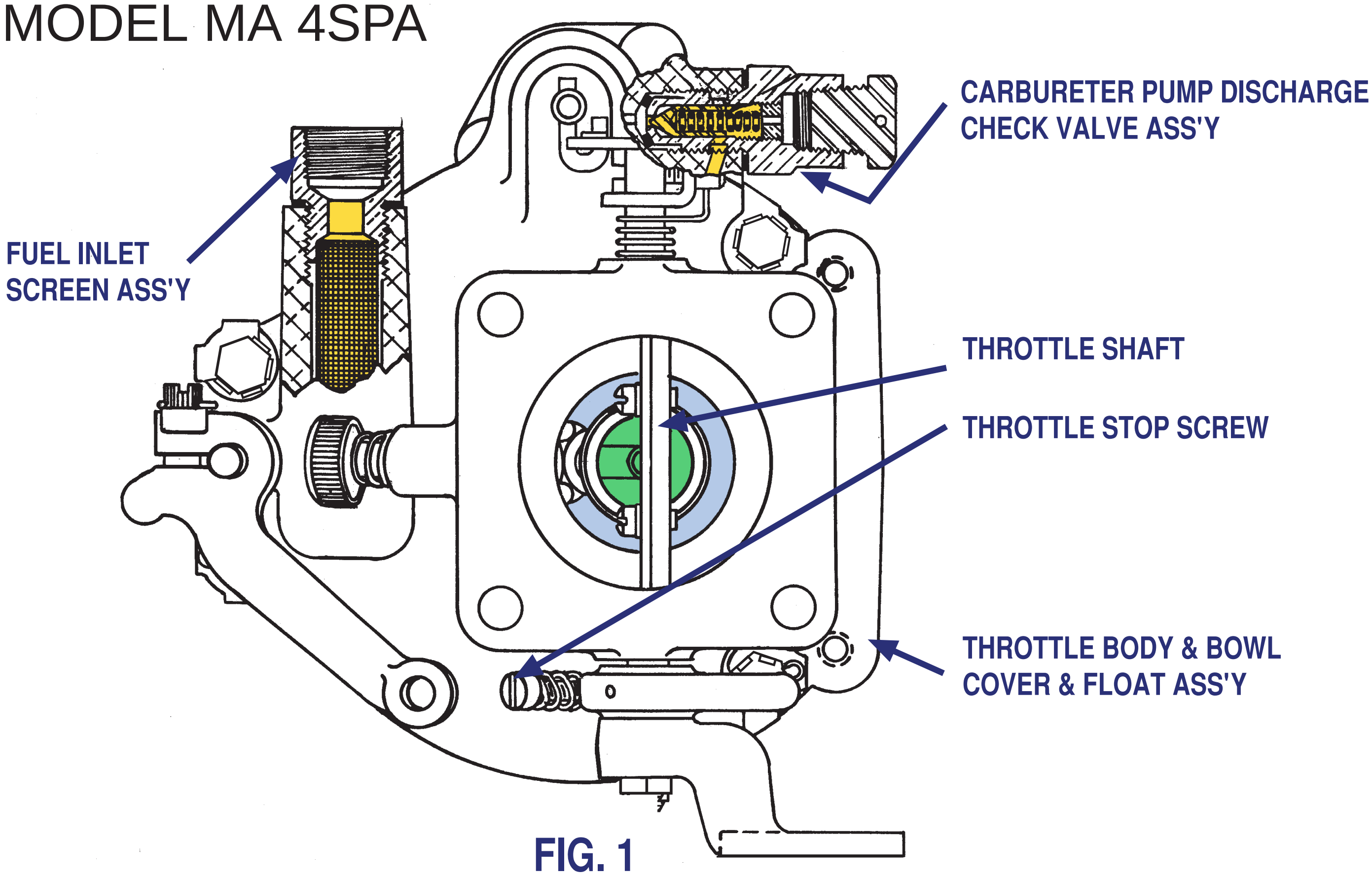
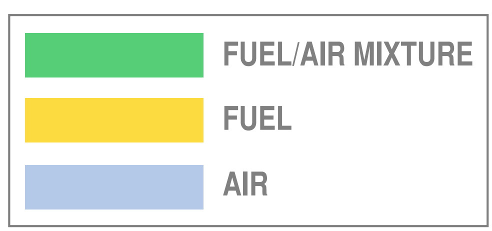


FIG. 1



MODEL MA 4SPA

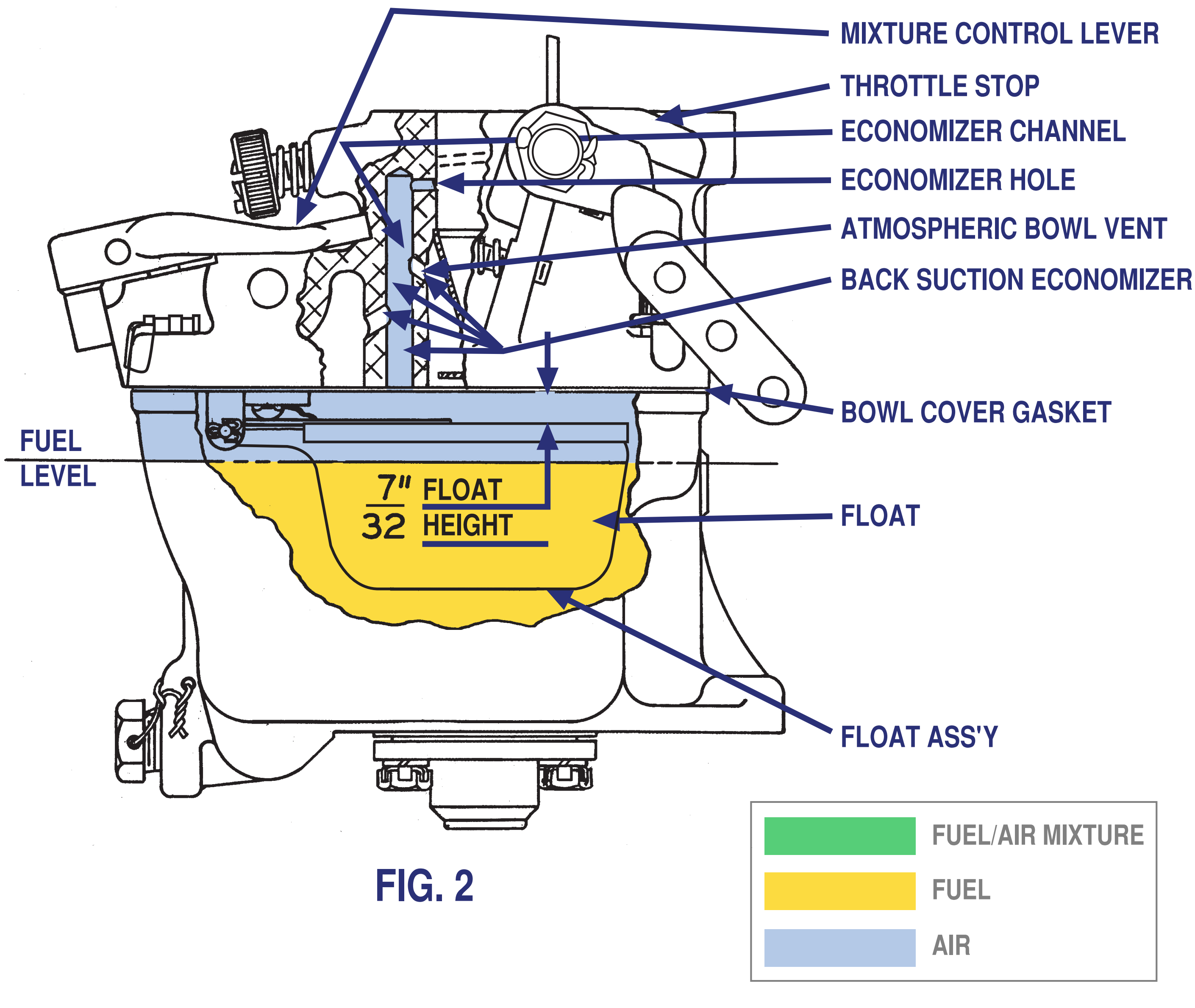


FIG. 2

MODEL MA 4SPA

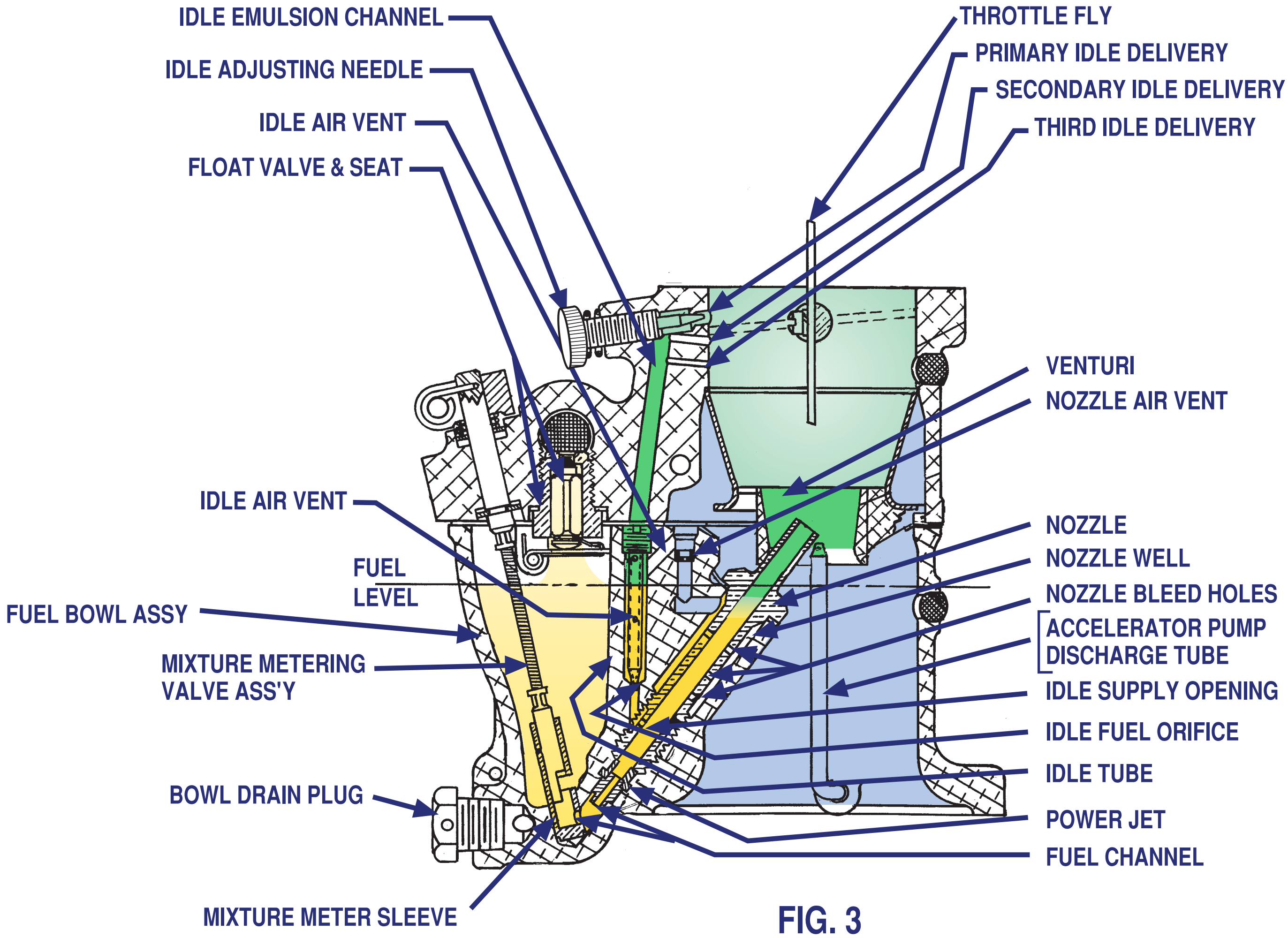
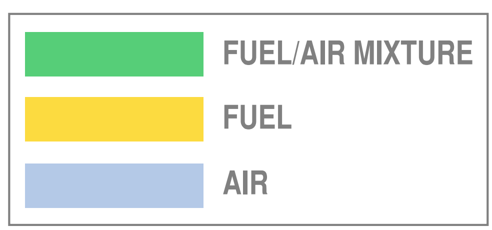


FIG. 3



MODEL MA 4SPA

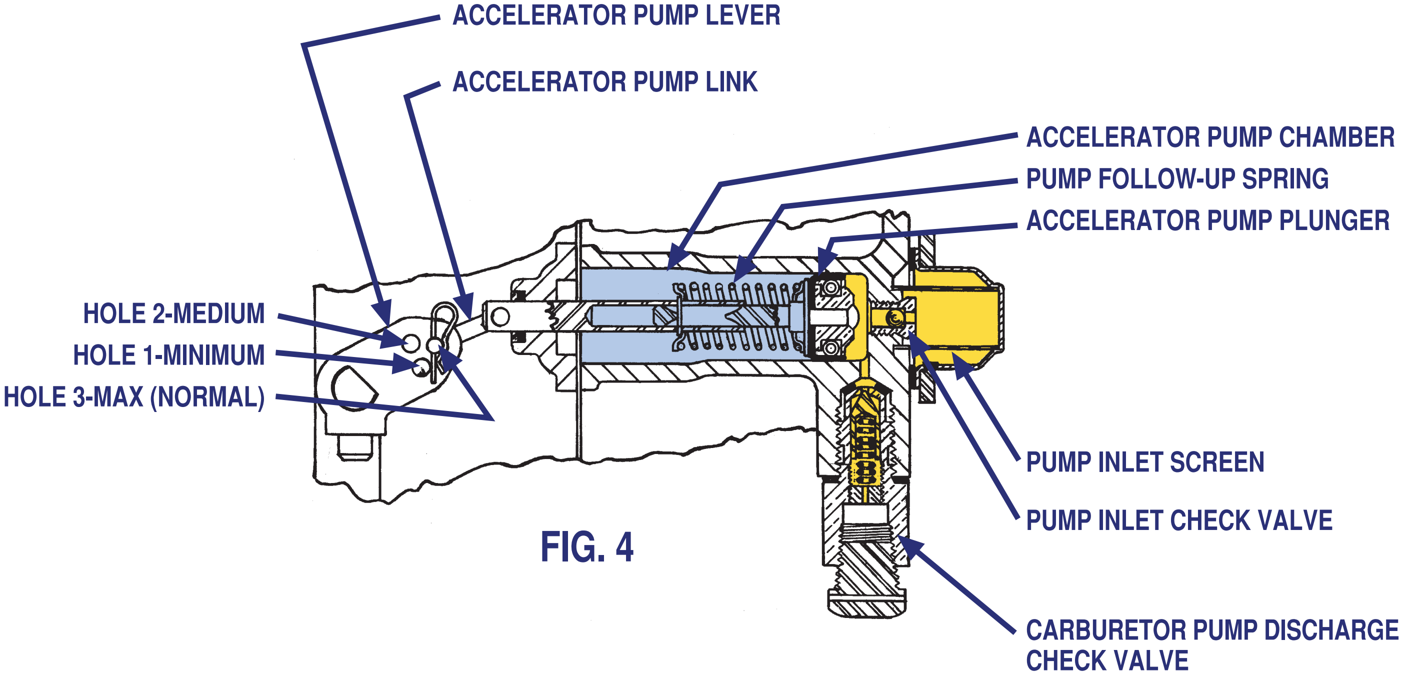
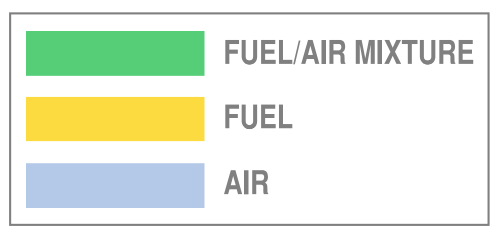
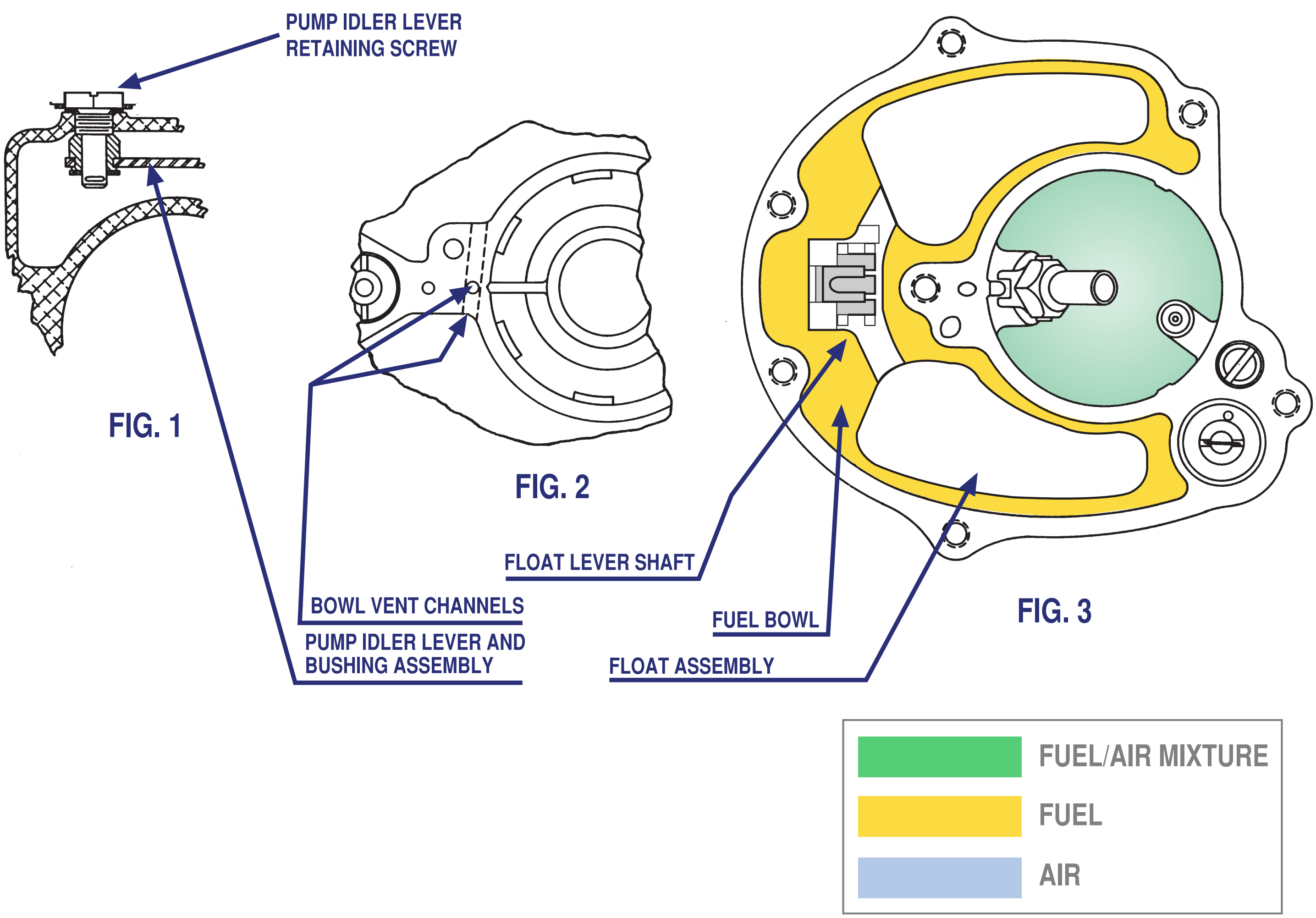


FIG. 4



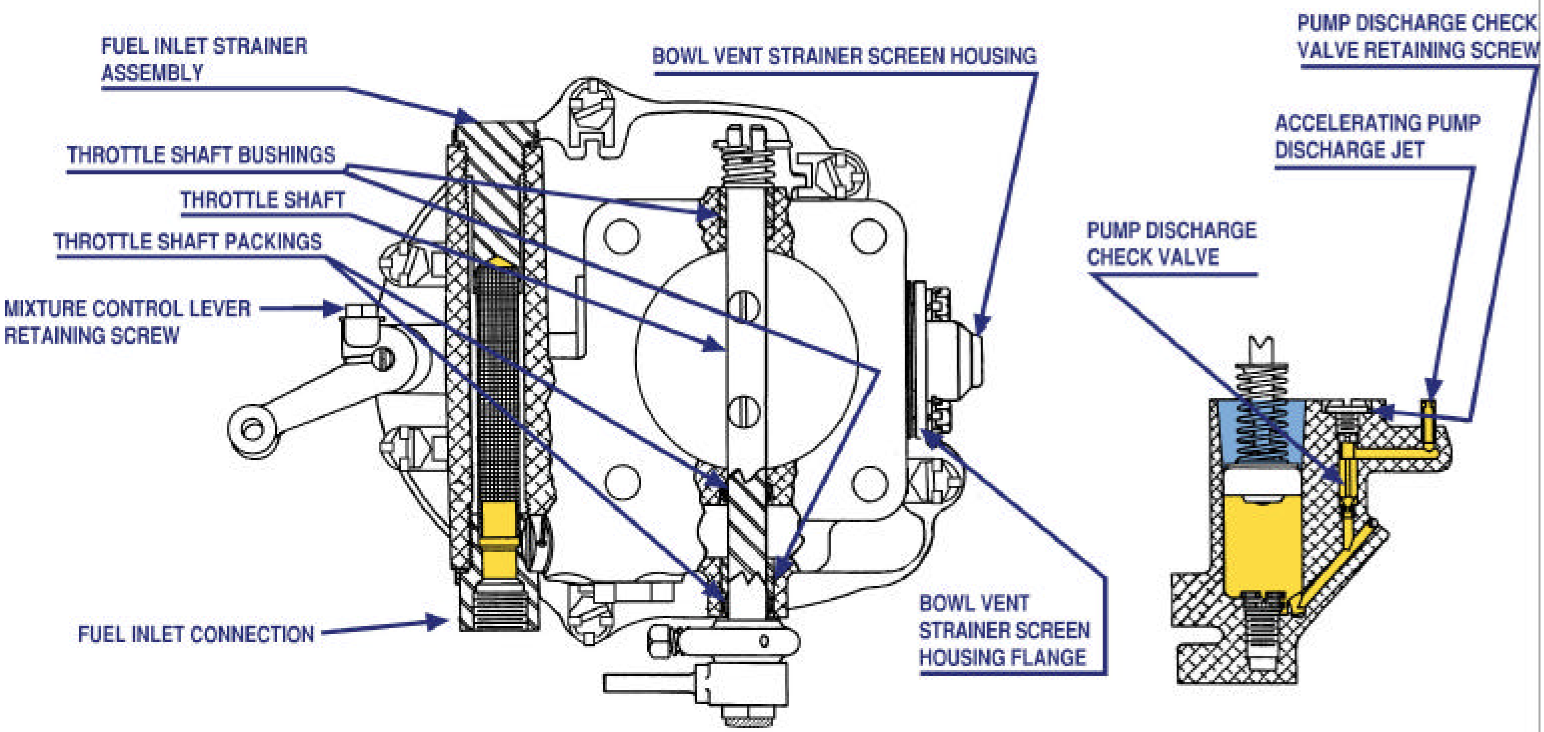
MA-4-5, MA-5 CARBURETOR FIGURES

MODEL MA4-5

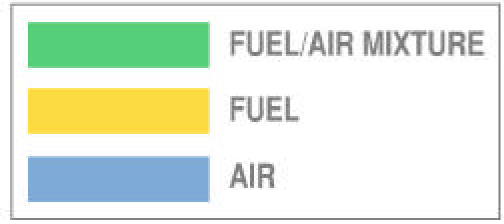


PUMP IDLER LEVER
RETAINING SCREW
FIG. 1
FIG. 2
FIG. 3
FLOAT LEVER SHAFT
BOWL VENT CHANNELS
PUMP IDLER LEVER AND
BUSHING ASSEMBLY
FUEL BOWL
FLOAT ASSEMBLY
FUEL/AIR MIXTURE
FUEL
AIR

MODEL MA-4-5



FUEL INLET STRAINER ASSEMBLY
BOWL VENT STRAINER SCREEN HOUSING
PUMP DISCHARGE CHECK VALVE RETAINING SCREW
THROTTLE SHAFT BUSHINGS
THROTTLE SHAFT
THROTTLE SHAFT PACKINGS
MIXTURE CONTROL LEVER RETAINING SCREW
ACCELERATING PUMP DISCHARGE JET
PUMP DISCHARGE CHECK VALVE
FUEL INLET CONNECTION
BOWL VENT STRAINER SCREEN HOUSING FLANGE



FUEL/AIR MIXTURE
FUEL
AIR

MODEL MA4-5

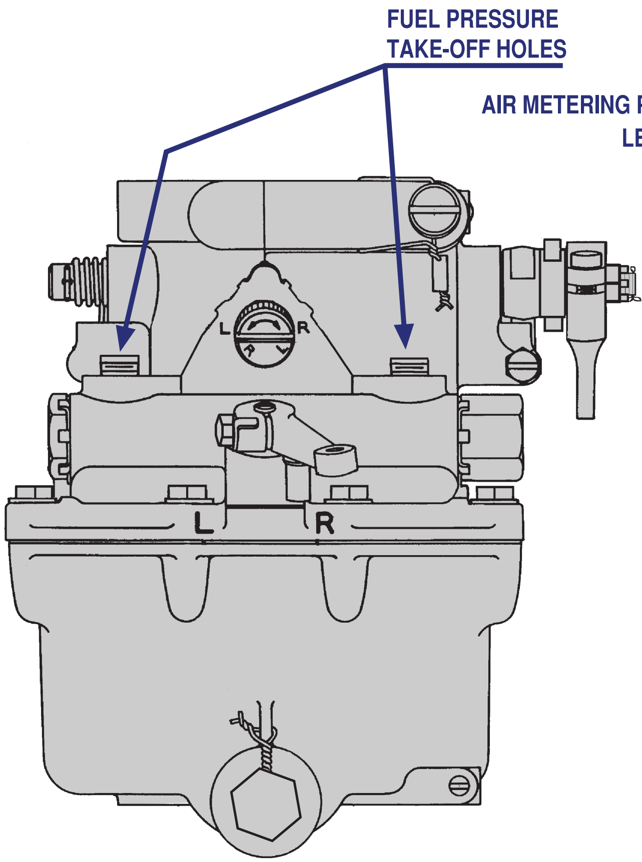


FIG. 6

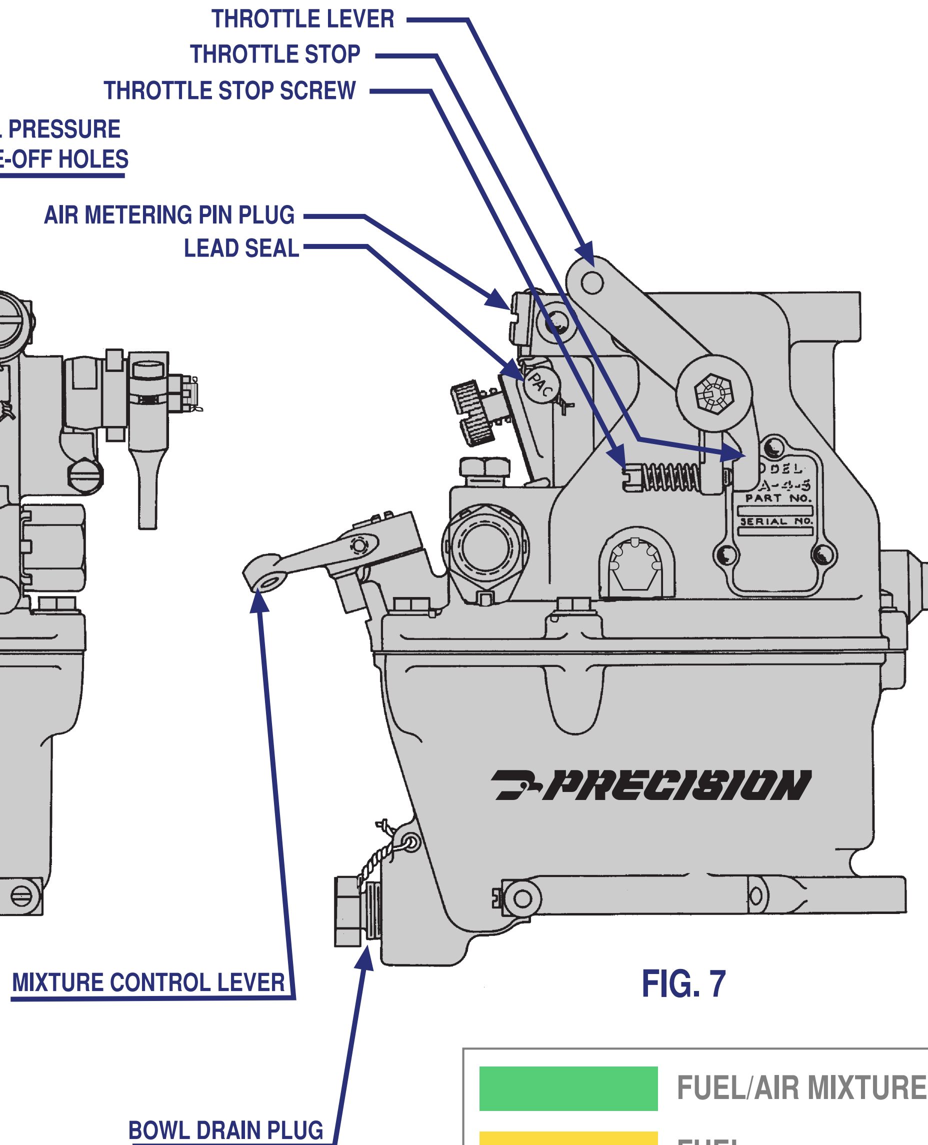


FIG. 7

- FUEL/AIR MIXTURE
- FUEL
- AIR

MODEL MA4-5

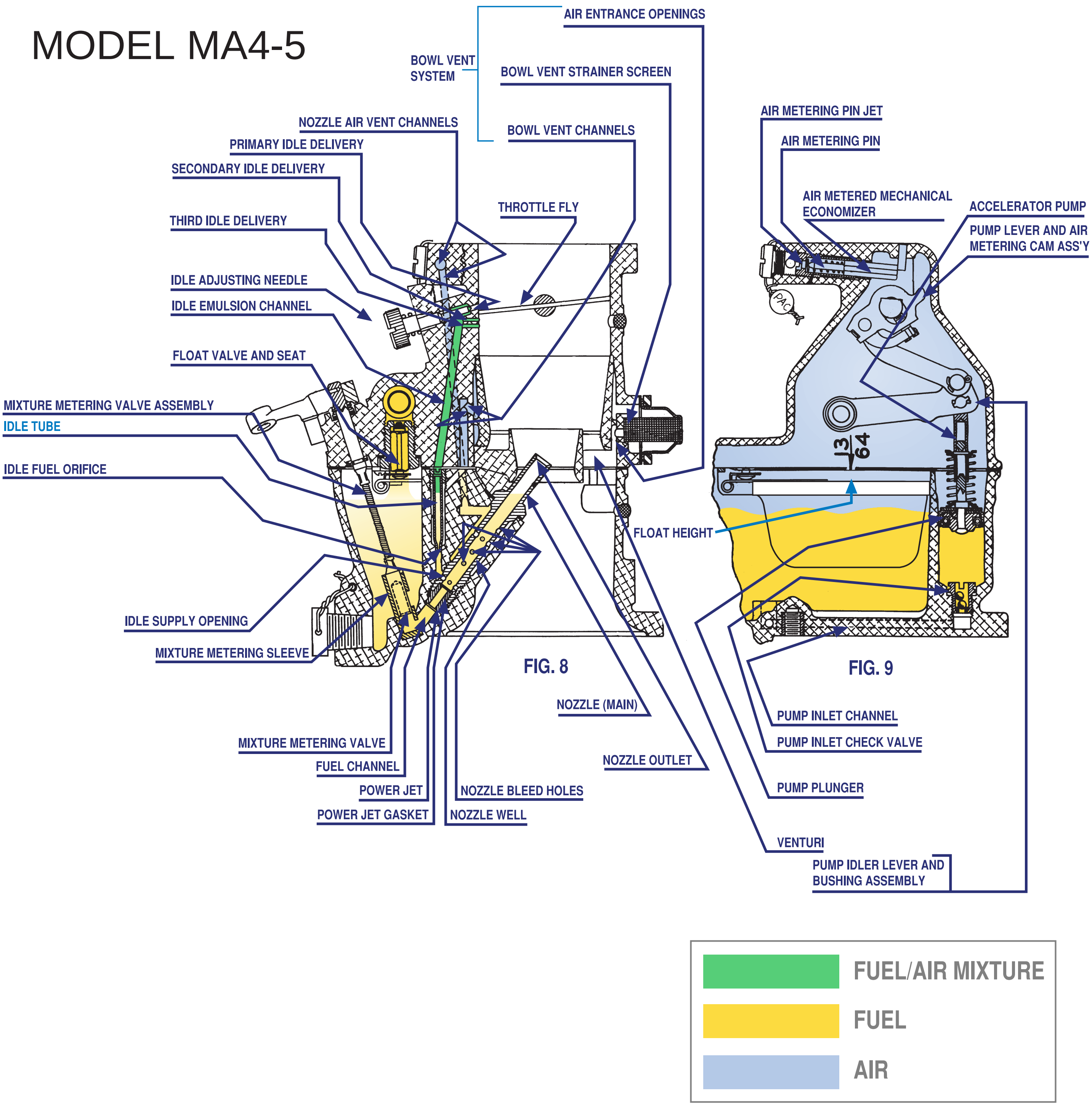
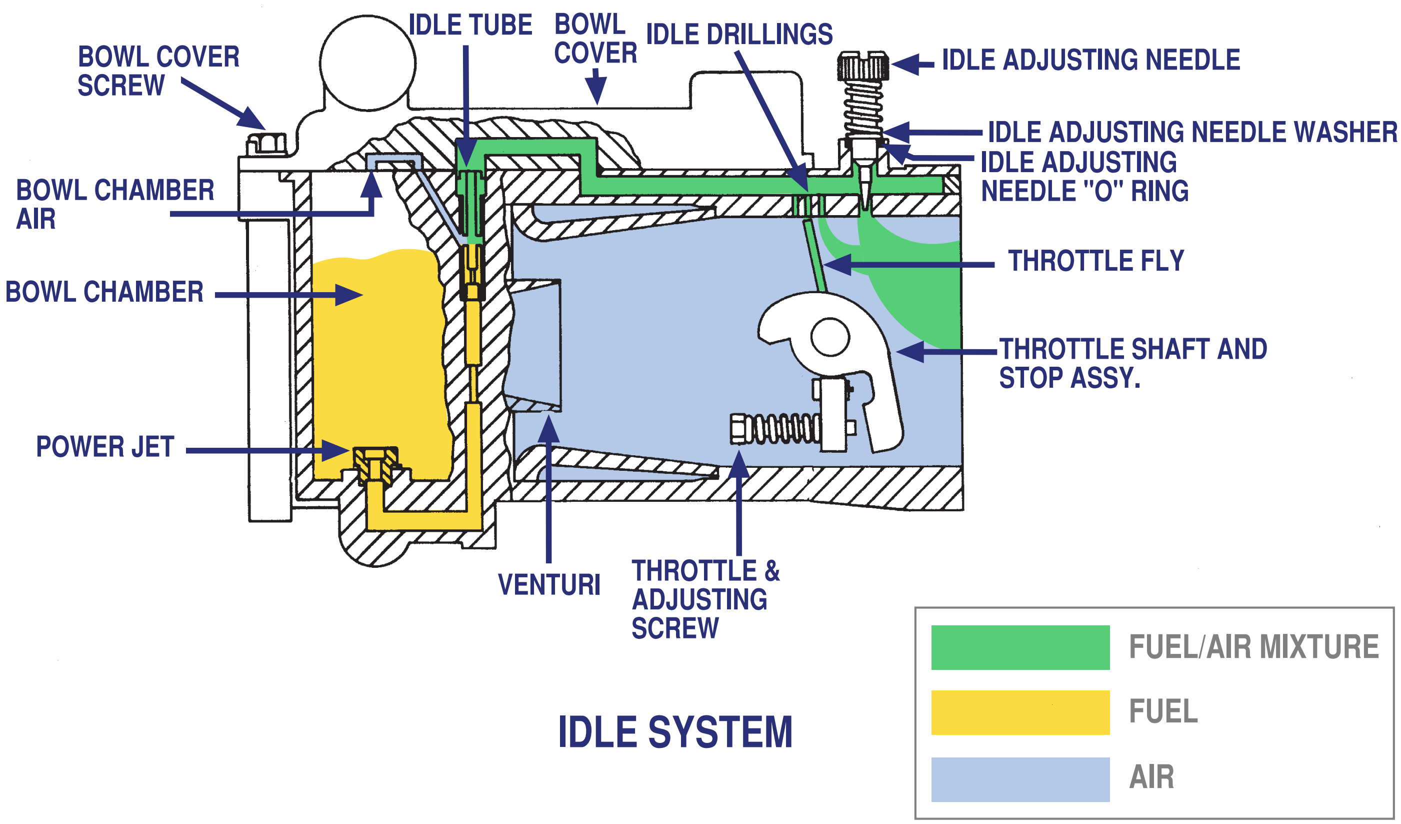


FIG. 8
FIG. 9

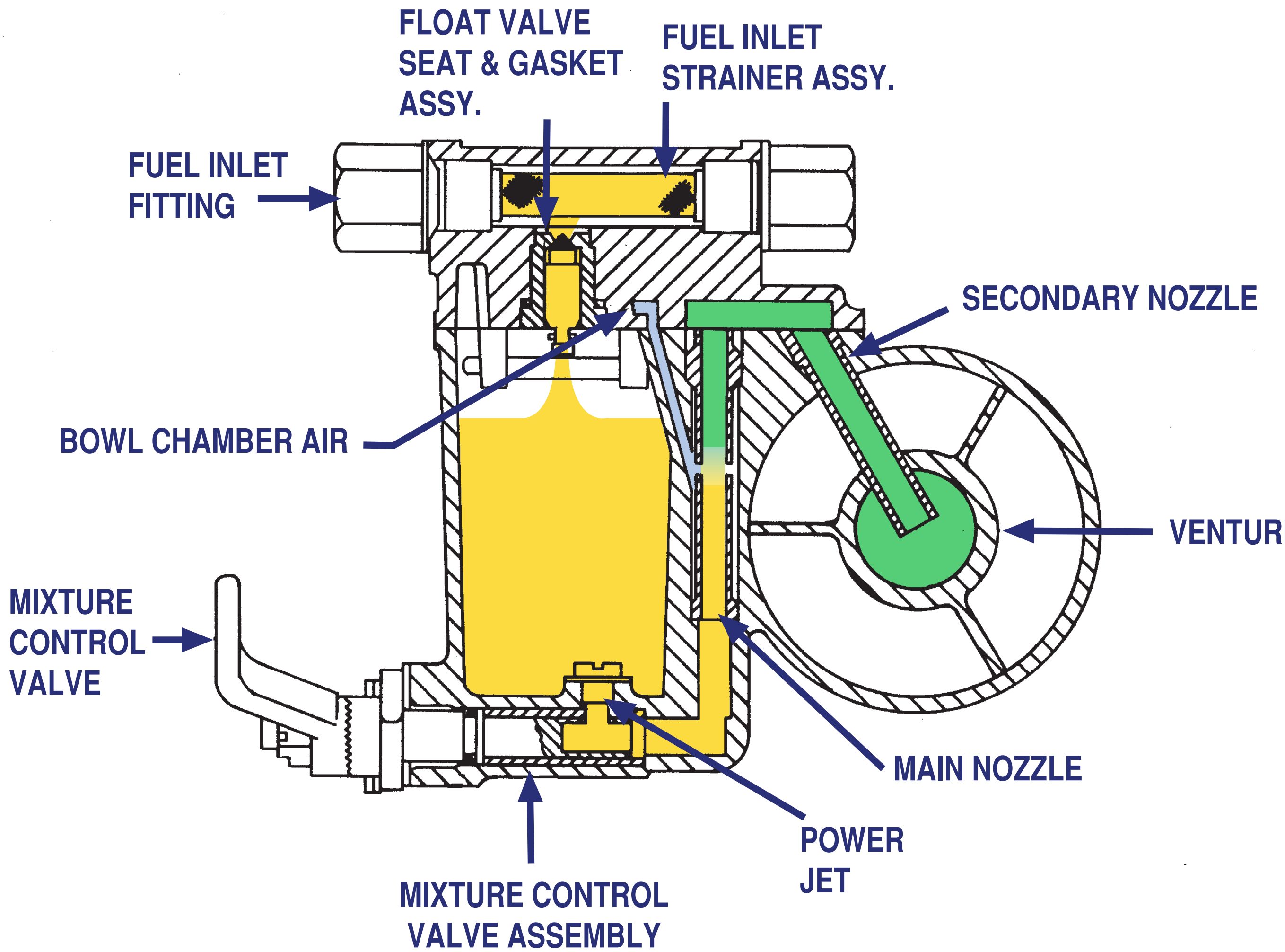
HA-6 CARBURETOR FIGURES

MODEL HA-6

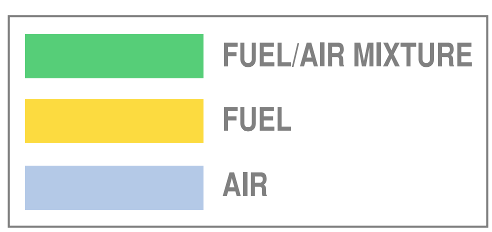


IDLE SYSTEM

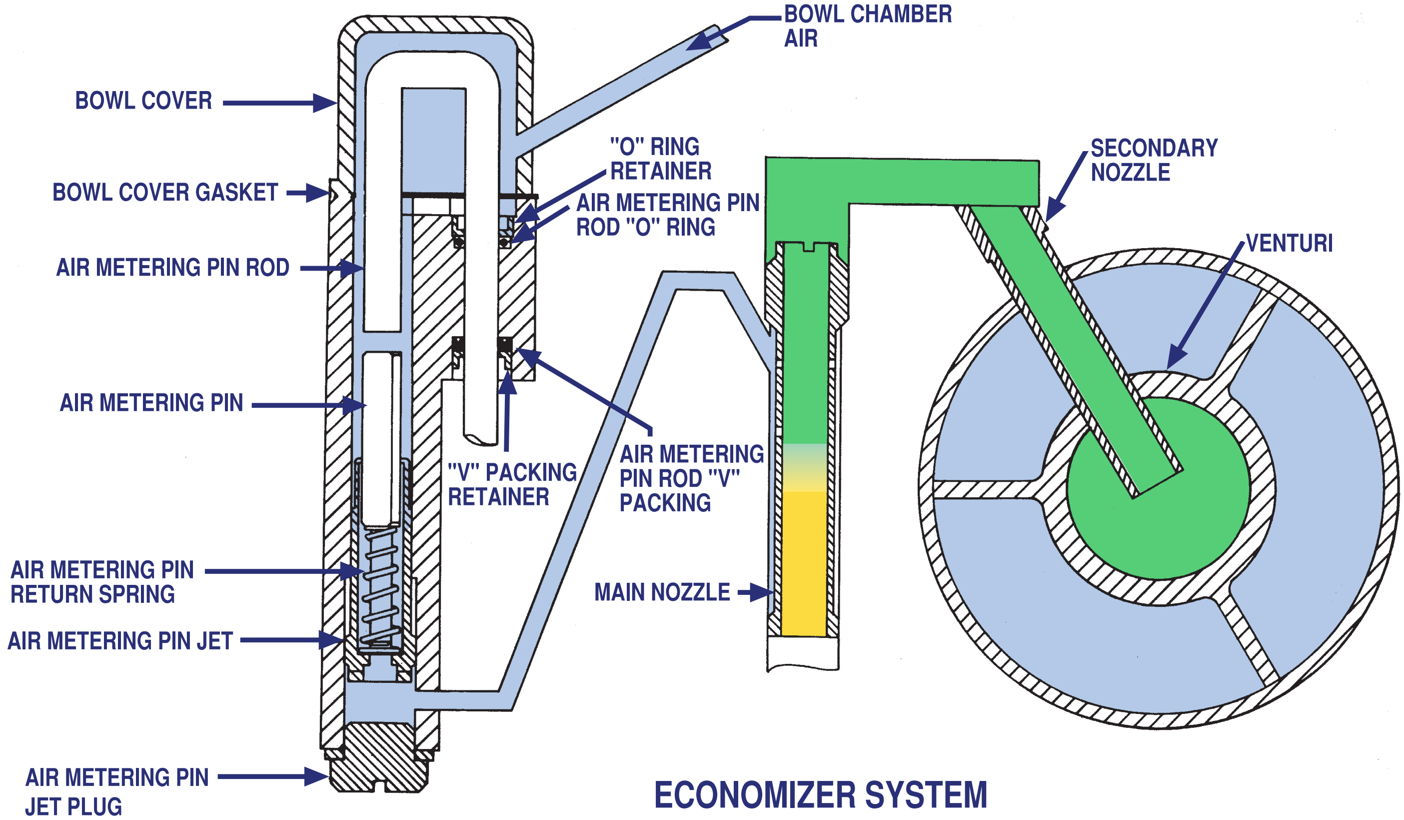
MODEL HA-6



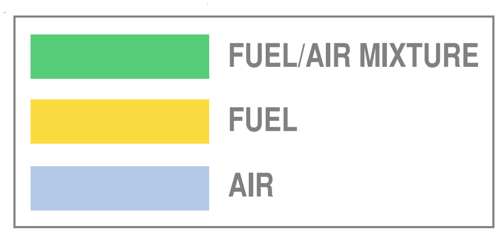
POWER SYSTEM



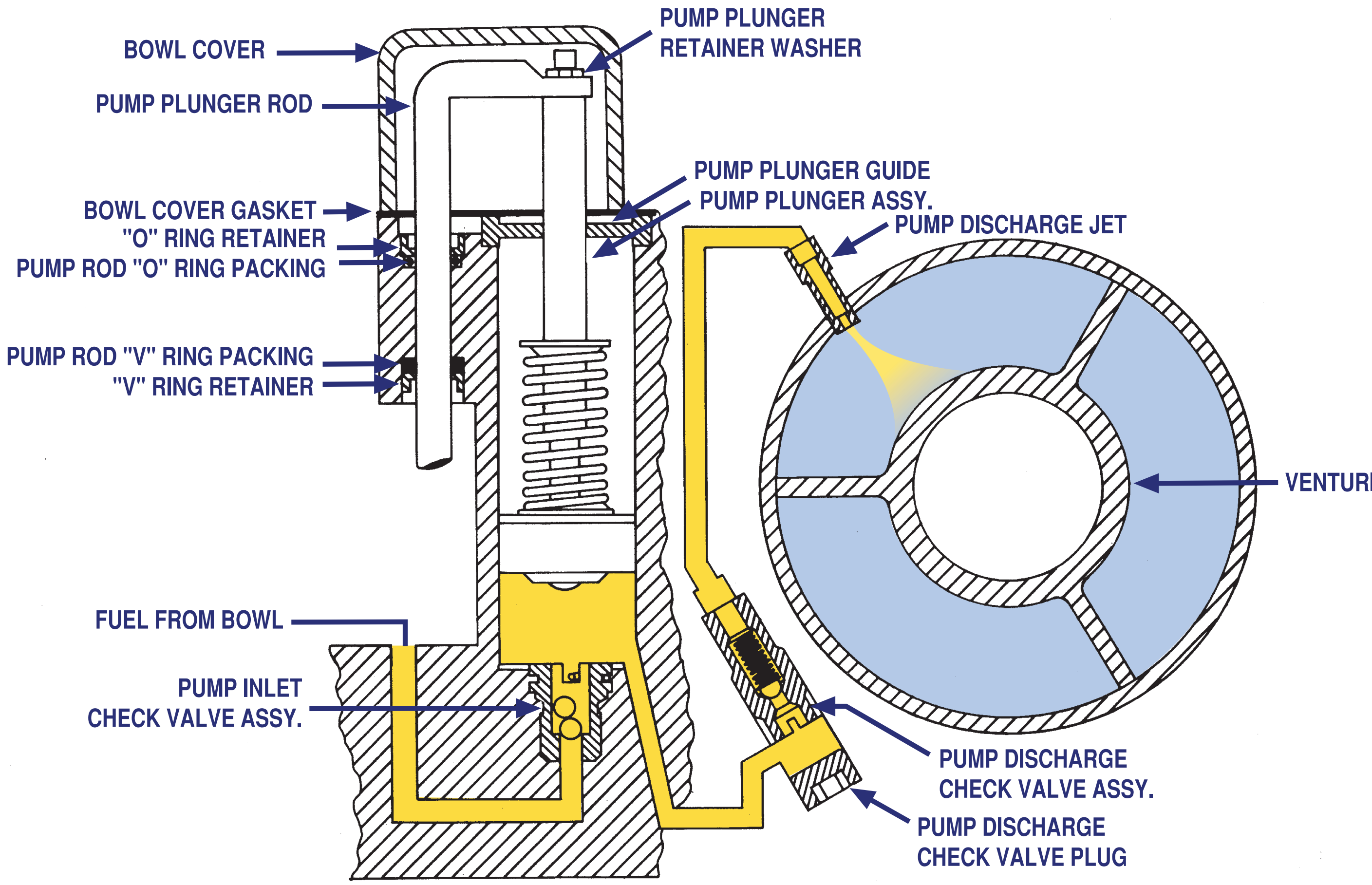
MODEL HA-6



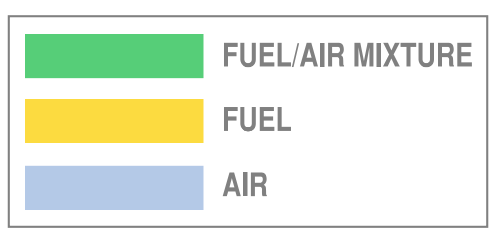
ECONOMIZER SYSTEM



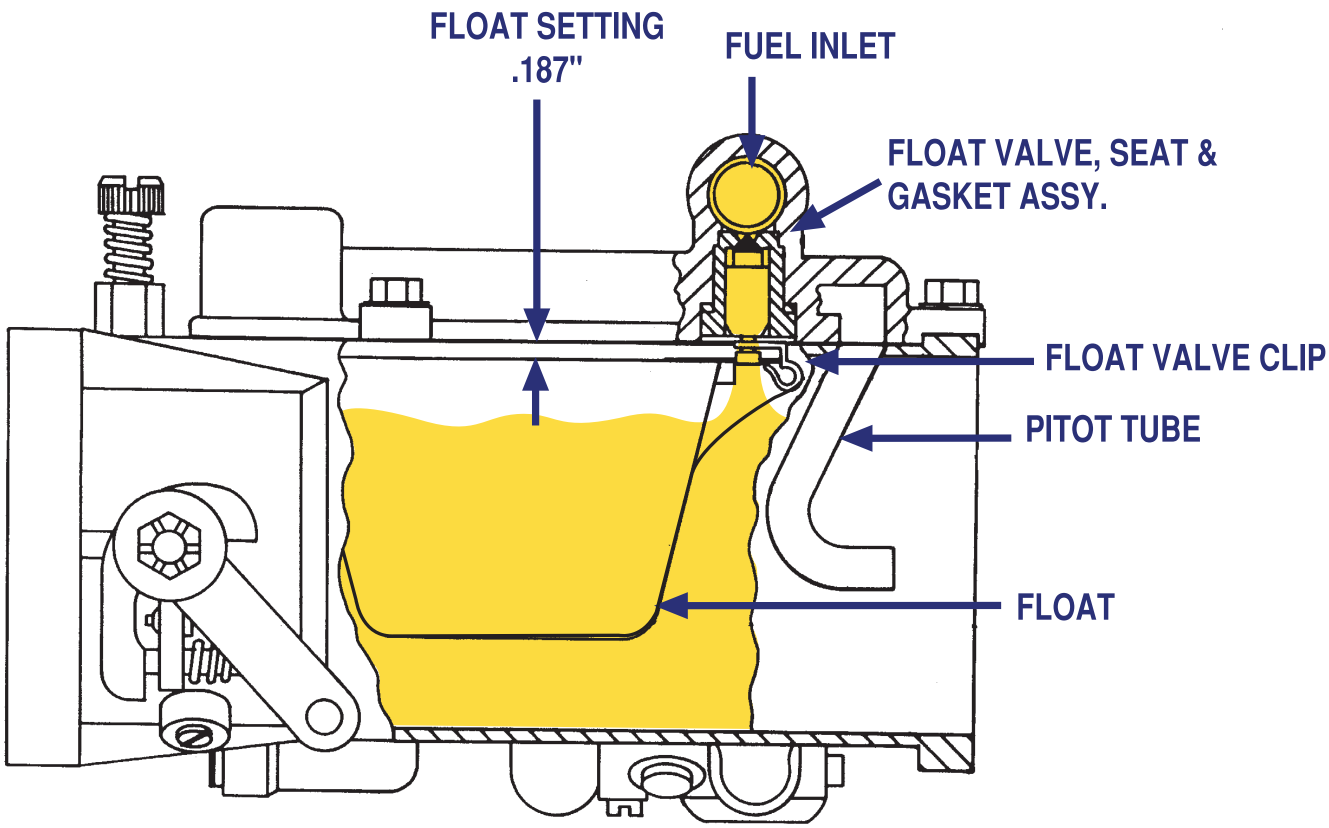
MODEL HA-6



PUMP SYSTEM



MODEL HA-6



INLET & BOWL VENT SYSTEM

(green)	FUEL/AIR MIXTURE
(yellow)	FUEL
(blue)	AIR