CARBURETOR

HOLLEY MODEL 1908FC

Holly single throat carburetor Model 1908 FC used on the 10 Series with standard or overdrive transmission is composed of two major subassemblies: the main body assembly and the throttle body assembly. The die cast main body contains the float and fuel inlet valve, the fuel bowl, the carburetor air inlet, the venturi, the choke mechanism, the economizer diaphragm and stem assembly, the accelerating pump, and the main well and economizer body assembly. The main well and economizer body assembly includes many of the various fuel metering parts and fuel passages of the carburetor. The cast iron throttle body contains the throttle plate, the idle discharge ports, and the idle speed and mixture adjusting screw.

This carburetor has four basic fuel metering systems. These are the main metering system, the idle system, the power enrichment system, and the accelerating pump system. In addition, there is also a fuel inlet system which provides the four basic fuel metering systems with their fuel requirements, and the choke system which provides a means of temporarily enriching the mixture to aid in starting and running a cold engine.

The carburetor incorporates a Viton tipped fuel inlet needle. This synthetic material provides a better seal and thereby can maintain a more constant fuel level in the carburetor bowl. It is not readily affected by small particles of foreign matter.

Fuel Inlet System

All fuel used by the four basic fuel metering systems enters the carburetor through the fuel inlet needle valve and seat assembly (Fig. 59). The fuel, under pressure from the engine’s fuel pump, flows past the needle valve and into the float chamber. The float rises and falls with the fuel level in the float chamber, moving the fuel inlet needle valve correspondingly to control the amount of fuel admitted to the carburetor. When the fuel in the float chamber reaches a specified level, the float moves the needle valve to a position where it restricts the flow of fuel so that only enough fuel is admitted to replace that being used. Any slight change in the fuel level causes a responsive movement of the float, opening or closing the fuel inlet needle valve to immediately restore the proper fuel level. The fuel inlet system must
constantly maintain this specified level of fuel because the basic fuel metering systems are calibrated to deliver the proper mixtures only when the fuel is at this level.

The float chamber is vented to the carburetor air inlet through interconnected passages near the top of the float chamber. These passages lead to the balance tube in the air inlet.

**Main Well and Economizer Body**

Fuel passages of the four basic fuel metering systems originate at the main well and economizer body assembly in the carburetor float chamber (Fig. 60).

**Main Metering System**

Air drawn in by the downward movement of the pistons in the engine passes through the carburetor venturi. This creates a drop of air pressure, commonly called vacuum, in the venturi. The strength of the vacuum is proportional to the amount of air being drawn through the venturi, which, in turn, is governed by the speed and power output of the engine.

At normal cruising speeds, the difference in pressure between the normal air pressure in the top of the float chamber and the vacuum in the venturi, forces a metered flow of fuel from the float chamber through the main metering system and out the main nozzle, which is located in the venturi. The fuel is metered (or measured) by the main jet as it flows into the bottom of the main well (Fig. 61). The fuel
moves up the main well past the narrow air bleed passages. Filtered air from the carburetor air inlet passes through the high speed bleed into the air bleed well, and enters the fuel flow in the main well through the short horizontal air bleed passages. The high speed bleed meters a properly increasing amount of air to the fuel at higher speeds, stabilizing the fuel discharge and maintaining the required mixture ratios. This emulsion of fuel and air, being lighter than the raw fuel, responds faster to any change in venturi vacuum. It also vaporizes more readily than raw fuel when it is discharged. The fuel continues up the main well and flows out the main nozzle.

The throttle plate controls the amount of the fuel air mixture admitted to the intake manifold, regulating the speed and power output of the engine in accordance with accelerator pedal movement. The distribution pin, extending horizontally from both sides of the main nozzle, diverts the air flow in the carburetor to aid in providing proper distribution of the mixture to all cylinders of the engine.

**Idle System**

At idle and low speeds, the air flow through the carburetor is reduced and the vacuum created in the venturi is not sufficient to operate the main metering system. Intake manifold vacuum is high due to the great restriction to air flow by the nearly closed throttle plate. This high manifold vacuum is used to provide a pressure difference which will operate the idle system.

At idle, fuel flows through the main jet into the bottom of the main well. The high manifold vacuum, acting on this fuel through the idle system passages, draws the fuel from the main well through a short horizontal passage to the idle well. The narrow passage in the lower portion of the idle well is a calibrated restriction which meters the flow of fuel. The fuel passes out the top of the idle well and into the idle system passages in the main body (Fig. 62). The top of the vertical idle system passage in the main body contains the idle air bleed which admits a metered flow of air to the fuel. The idle air bleed also vents the idle system to prevent any siphoning effect at higher speeds or when the engine is stopped. The fuel continues down through the idle restriction and past the idle transfer holes in the throttle body. The idle transfer holes act as additional air bleeds at idle.
The fuel is discharged from the idle discharge hole into the strong manifold vacuum below the throttle plate. The pointed tip of the idle adjusting needle is set a short distance off its tapered seat at the idle discharge hole. The setting of the idle adjusting needle controls the fuel discharge at idle, thus providing a means of adjusting the idle mixture. Turning the idle adjusting needle in, moves its pointed tip closer to the seat, restricting the fuel flow out the idle discharge hole. This results in a leaner idle mixture. Conversely, turning the needle out, moves the tip farther from the seat, allowing more fuel to flow out the idle discharge hole for a richer idle mixture.

During off-idle operation, the throttle plate is moved slightly past the idle transfer slot, which begins discharging fuel as it is exposed to manifold vacuum. As the throttle plate is opened still wider, and engine speed increases, the air flow through the carburetor is also increased. This creates a vacuum in the venturi strong enough to bring the main metering system into operation. The flow from the idle system tapers off as the main metering system begins discharging fuel. The two systems are engineered to provide a smooth, gradual transition, from idle to cruising speeds.

**The Power Enrichment System**

When high-power output is required, the carburetor delivers a richer mixture than that supplied for normal cruising when no great load is placed on the engine. The added fuel for high-power operation is provided by the power enrichment system, sometimes called the economizer system.

The power enrichment system is actuated by manifold vacuum, which gives an accurate indication of the power demands placed on the engine. Manifold vacuum is strongest at idle when there is no load on the engine, and it is reduced correspondingly as the load on the engine is increased. This is due to the fact that as the load on the engine increases, the throttle plate must be opened wider to maintain any given speed. Manifold vacuum is reduced because the throttle plate offers less resistance to the air flow entering the intake manifold.

Manifold vacuum, at the bottom of the throttle bore below the throttle plate, is transmitted through the vacuum passage to the top of the economizer diaphragm in the vacuum chamber (Fig. 63). The vacuum, acting on the economizer diaphragm at idle and normal cruising speeds, is strong enough to hold the economizer diaphragm and stem up, thus compressing the spring on the stem.

When high power demands place a great load on the engine and reduce manifold vacuum beyond a predetermined point, the economizer spring expands, overcoming the reduced vacuum above the dia-
phragm, to force the stem down. The expansion of the spring depresses the pin in the center of the power valve, opening the valve. Fuel from the float chamber flows into the valve and passes through a horizontal passage to the main well where it is added to the fuel flow in the main metering system, enriching the mixture for full power. The drilled plug in the passage, between the power valve and the main well, is a calibrated restriction which meters the flow of fuel through the power enrichment system.

**Accelerating Pump System**

Air flow through the carburetor responds almost immediately to any increase in throttle opening, but there is a brief interval before the fuel can gain the necessary speed to maintain the desired balance of fuel and air. The accelerating pump system operates during this interval, supplying fuel until the other systems can provide the proper mixture.

When the throttle is closed, the pump return spring expands to move the pump diaphragm toward the back of the pump chamber, drawing fuel into the chamber through the pump inlet. The ball check valve in the pump inlet opens to admit fuel to the pump chamber, and closes to prevent a reverse flow of fuel when the pump is functioning.

The throttle lever is connected to the pump operating lever by the pump link. As the throttle is opened, the throttle lever moves upward, and the pump link turns the pump operating lever. The pump operating lever presses the pump rod sleeve inward, compressing the pump spring. The pump spring in turn presses on the diaphragm, forcing fuel into the pump discharge passage. The spring overriding feature provides a sufficiently long interval of discharge, regardless of how suddenly the throttle is opened.

The fuel, under pressure from the diaphragm, forces the pump discharge ball check valve and weight up, in passing, and thus flows to the pump discharge nozzle. The pump discharge ball check valve seals the passage when the pump is not discharging fuel. This prevents air from being drawn into the system when the throttle is again closed and the pump draws in another charge of fuel. The hexagonal weight holds the ball check valve on its seat, preventing fuel from being drawn from the pump chamber by the suction of the airstream at high speeds.

The fuel flows up inside the pump discharge passage and out through the hole in the pump discharge nozzle. The accelerating charge is sprayed out of a small hole in the airstream in the venturi (Fig. 64).
The Choke System

The choke automatically enriches the fuel discharge so that enough vaporized fuel reaches the cylinders to permit the engine to run smoothly during the warm-up period. The thermostatically controlled choke is mounted on the main body and is connected to the choke shaft, which controls the air flow into the carburetor.

Coils of the bi-metallic thermostat spring in the choke cover are so designed as to expand when cold and contract when warm. When the engine is started, manifold vacuum acts directly on the choke plate and a vacuum piston located in the choke housing immediately moving against the tension of the thermostat spring to partially open the choke plate to prevent stalling. The choke shaft does not pass through the center of the choke plate. Instead it is offset, thus exposing a larger area at one side of the closed choke plate to manifold vacuum.

When the engine is started or at idle, manifold vacuum is not sufficiently strong to open the choke plate but the impact of air against the choke plate partially opens the plate. Manifold vacuum channelled through a passage in the choke control mechanism acts to draw the choke vacuum piston downward, thus exerting another opening force upon the choke plate. These two features allow enough air to enter the engine to enable it to run smoothly. As the engine continues to run, the vacuum acting on the choke vacuum piston draws air from the heat tube in the manifold where the air is warmed by engine heat, and then through the thermostat housing where the air warms the thermostat spring, causing it to contract. This gradually decreases the tension of the thermostat spring as manifold temperature rises, permitting the vacuum acting on the choke vacuum piston to further open the choke plate. The air then flows through the manifold vacuum passage in the carburetor and is exhausted into the airstream in the throttle body.

The choke rod at the carburetor actuates a fast idle cam during choking. Designed to increase the idle R.P.M. for smoother running when the engine is cold, the fast idle cam has a series of steps on one edge. As the choke rod is moved through its range of travel from the closed position to the open position, the fast idle cam rotates, presenting successive steps to a throttle stop screw. Each step permits a slower idle R.P.M. as engine temperature rises and choking is reduced.

Distributor Vacuum Control

The distributor utilizes changes in air pressure with the carburetor to control spark timing to satisfy all engine speed and load conditions. In order to obtain a vacuum to operate the spark advance as dictated by the engine speed and load conditions, a port is located in the throttle bore just above the full open position of the throttle plate; as the throttle is opened, this port is subject to manifold vacuum which varies with changes in engine load. This port in the throttle body is connected to the main body by a vertical passage that leads to an outlet on the side of the main body, which connects to a tube to the distributor vacuum advance mechanism.

DISASSEMBLY

The carburetor consists of two major subassemblies: the main body assembly and the throttle body assembly. To facilitate the cleaning, inspection, and assembly, use a separate container for the component parts of both major subassemblies.

Remove the upper pump link cotter pin and slide the upper end of the pump link out of the pump operating lever.

Remove the two throttle body screws and lockwashers. Separate the throttle body from main body and discard the throttle body gasket.

Remove the fuel inlet fitting with a box wrench.

Remove the fuel bowl by removing the four retainer screws and lockwashers. Discard the fuel bowl gasket.

FIGURE 65 — Removing Fuel Inlet Needle and Seat Assembly

Remove the fuel inlet needle and seat assembly. Discard the "O" ring seal and gasket.

Remove the float retainer clip.
Slide the float and fuel inlet valve assembly out of the main body.
FIGURE 66 — Fuel Inlet Valve Separated

Remove the three economizer body cover screws and lockwashers and lift the economizer assembly out of the main body (Fig. 67). Discard the gasket. Separate the economizer diaphragm cover from the economizer diaphragm and stem assembly (Fig. 68).

Remove the five main well and economizer body screws and lockwashers, and remove the main well and economizer body (Fig. 69). Note the different lengths of screws for proper assembly.

FIGURE 67 — Removing Economizer Assembly

FIGURE 68 — Separating Economizer Assembly

FIGURE 69 — Removing Main Well and Economizer Body Screws

Remove the pump return spring.
Remove the main jet from the main well and economizer body, using Tool No. J-10174 (Fig. 70).

FIGURE 70 — Removing Main Jet

The accelerator pump inlet and discharge check valves are not removable. They are retained in their respective passage by pressed in plugs.

Remove the accelerating pump assembly from the main body.

Invert the accelerating pump assembly and press the pump rod sleeve toward the diaphragm, compressing the pump spring and allowing the pump rod sleeve retainer ball to drop into hand. Note size for proper replacement (Fig. 71).

Slide the pump rod sleeve and pump spring off the pump diaphragm rod. Discard the pump diaphragm and rod assembly.

Remove the pump operating lever retainer (Fig. 72).
Remove the pump link cotter pin, pump link and cam.

This completes the disassembly. Do not attempt to remove any of the pressed-in passage plugs, air bleed plugs, or the main nozzle in the main body.

CLEANING AND INSPECTION

Soak all castings and metal parts in a cleaning solution long enough to soften and loosen all foreign deposits. If a commercial carburetor cleaning solvent is not available, lacquer thinner or denatured alcohol may be used. After the parts and castings have soaked sufficiently, rinse them in hot water to remove all traces of the cleaning solution. While rinsing the parts and castings, scrub away all remaining foreign matter with a stiff bristled brush.

Soak each part and casting in clean gasoline for a few seconds, then dry them with compressed air. Compressed air should also be directed through all passages in the casting and through all jets and tubes.

CAUTION: Never attempt to clean a passage with a drill, wire, or similar object as this is liable to distort the passage and affect carburetor performance. Do not use a buffing wheel, wire brush, file, or other sharp instrument to remove carbon deposits, since these methods may also remove the protective plating on the part.

NOTE: Gaskets, neoprene diaphragms, and felt seals should not be exposed to the cleaning fluid. Most commercial solvents will deteriorate these parts. Never reuse old gaskets, neoprene diaphragms, or felt seals when rebuilding the carburetor.

**Major castings** — Discard and replace if stripped threads, cracks, or damaged gasket mating surfaces are found. Be sure the venturi in the main body casting is in good condition, free of nicks, scratches, and foreign deposits. Any slight irregularity in the venturi may affect the calibration of the carburetor. Be sure the main discharge nozzle in the venturi is undamaged. Check passages in the castings by directing compressed air into one end of every passage and feeling for a flow of air out the other end.

**Float and lever assembly** — Discard and replace the float and lever assembly if the float leaks, or if the assembly is corroded or damaged in any way. Shake the float to determine if fuel has leaked into it.

**Throttle shaft and throttle plate** — If edges are nicked or if the protecting plating has been damaged and the bare metal exposed, new parts must be installed.

**Choke plate** — Discard and replace if the plate is bent or corroded or if the edges are badly nicked.

**Springs and retainers** — Discard and replace if distorted or broken.

**Screws, lockwashers, and nuts** — Discard and replace if stripped threads, bending, or other damage is noted.
FIGURE 73 — Disassembled View of Holley Model 1908-FC Carburetor
ASSEMBLY

Place the spring on the idle adjusting needle and install the idle adjusting needle. Turn the needle gently with the fingers until it seats, then back it off one full turn. Be careful not to force the needle against its seat, as this will groove the tip of the needle, making it impossible to correctly adjust the idle mixture.

Install the lower choke shaft, fast idle cam and retaining nut.

NOTE: The lower shaft lever should be positioned into the cavity in the air horn just above the venturi. Install the upper choke plate shaft, choke plate and retaining screws. Insert the clip retainer on the choke plate operating lever.

Check the choke plate for proper operation.

Install the choke shaft washer and felt seal.

Install choke gasket and housing.

Install choke piston and lever assembly and tighten retaining nut.

Install choke housing plate and gasket.

Install choke thermostatic coil and set at index.

CAUTION: Choke thermostatic piston lever must engage loop in thermostatic coil.

Place the pump spring on the rod of the pump diaphragm and rod assembly, and press the pump rod sleeve onto the rod, compressing the spring. Be sure the small hole in the pump rod sleeve is aligned with the center of the flat cutaway section of the pump diaphragm rod. Drop the new pump rod sleeve retainer ball into the hole located in the pump rod sleeve. Insert the assembly into position from the fuel bowl in the main body.

Install the main jet in the main well and economizer housing using Tool No. J-10174 (Fig. 70).

Position the main well and economizer spacer gasket over the accelerating pump diaphragm.

Seat the large end of the pump return spring in the metal disc on the accelerating pump diaphragm.

Check to insure that all holes in the new main well and economizer body spacer gasket and the accelerating pump diaphragm are aligned with the corresponding holes in the main body. Place the main well and economizer assembly in position; then insert the five main well and economizer screws and lockwashers, and baffle plate. The two long screws are placed in the center top and bottom holes, short screws being used in the three remaining holes. Set the power valve at the extreme right end of the main well and economizer body in position in the main body. Then press the main well and economizer body into position against the accelerating pump diaphragm, using the following procedure (Fig. 74).

Apply pressure with the thumb of the left hand against the protruding end of the pump rod sleeve to compress the pump spring and pump return spring as the fingers press the main well and economizer body into position. This will prevent the tension of the pump return spring, which will be compressed as the main well and economizer body is pressed into position, from disturbing the alignment of the holes in the diaphragm, spacer gasket, and main body. Before releasing the pump rod sleeve, turn the five main well and economizer body screws in sufficiently to hold the main well and economizer body in its proper position. Do not tighten the screws, but turn them in as far as possible without compressing the lockwashers on the screws. Release the pump rod sleeve. This will allow the pump return spring to expand, stretching the accelerating pump diaphragm properly to insure full travel when the accelerating pump is operated. Tighten the five main well and economizer body screws.

Place the economizer diaphragm gasket, the economizer diaphragm and stem assembly, and the economizer diaphragm cover in position in the main body. Check to insure the alignment of the vacuum passage and screw holes; then install the three economizer body cover screws and lockwashers. Check to make certain that the economizer stem is on the power valve.

Install the float assembly on the pin and retain with clip.

Install new "O" ring seal on fuel inlet needle and seat assembly and lubricate lightly with vaseline. Install new fuel inlet gasket.

Insert the fuel inlet needle and seat assembly into the opening in the main body and turn it in by hand.

CAUTION: The needle and seat assembly should be turned in by hand. Do not use force to install. Should a bind be encountered when installing this assembly remove and lubricate the "O" ring seal or remove burrs from the thread.
At this point, the float setting should be checked and necessary adjustments made. Use float gauge, J-10231 (Fig. 75) check the setting on both the "touch" and "no touch" legs of the gauge. The level of the float may be adjusted by bending the small tab in the float lever which contacts the head of the fuel inlet needle. Use needle-nosed pliers for this correction and recheck the float setting after adjustments have been made.

**FIGURE 75 — Setting Float Level**

Fit the new fuel bowl gasket into the recess in the rim of the fuel bowl in the main body. Set the fuel bowl in position on the main body. Install the four retainer screws, and lockwashers; tighten the top and bottom screws alternately, a bit at a time, then the end screws. Tighten the screws gently to compress only the lockwasher. Do not tighten one screw at a time or draw them down too tightly, as this may create stresses in the fuel bowl which may distort the bowl and cause a leak.

Place the new throttle body to main body gasket on the throttle body and check to insure the alignment of all holes in the gasket with corresponding holes in the throttle body. Hold the two throttle body screws and lockwashers in position in the throttle body to maintain the gasket alignment. Then set the main body on the throttle body, invert the carburetor, and tighten the two throttle body screws alternately, a little at a time to compress the gasket evenly and eliminate the possibility of an air leak.

Insert the pump link into the throttle lever and retain with cotter key. Insert the upper end of the pump link into the hole in the pump operating cam. Install the cam on the pivot stud and retain with clip.

Install the fuel inlet fitting.

Installation on the Engine

Be sure the carburetor mating surface on the intake manifold is clean. Fit a new carburetor flange gasket on the manifold and install the carburetor. Do not tighten the two nuts on the studs until the fuel line and distributor vacuum line fitting threads have been engaged. Then draw the two nuts down evenly, turning first one, then the other, a little at a time until the flange gasket has been compressed and the nuts are tight (12 to 15 Lbs. Torque). This will eliminate the possibility of an air leak past the flange gasket.

**CARBURETOR ADJUSTMENTS**

**Holley Model 1908FC**

Start and warm up the engine. When the engine reaches its normal operating temperature, adjust the throttle stop screw to idle the engine at 500 R.P.M. with automatic transmission in neutral, 550 R.P.M. with standard or overdrive transmission, or 500 R.P.M. with air conditioning on.

**Adjusting the Idle**

Set the idle adjusting needle to give the highest steady manifold vacuum or the smoothest running and maximum idle speed. Turning the idle adjusting needle in (clockwise) gives a leaner mixture. Turning the needle out (counterclockwise) gives a richer mixture. If this adjustment results in an increase in idle R.P.M. great enough to require resetting the throttle stop screw, then the idle adjusting needle should also be reset, leaving it slightly on the rich side.

**Checking Wet Fuel Level**

With the engine running and the car setting on a level floor, the wet fuel level can be checked or measured through the economizer diaphragm hole. Use 6" scale with depth gauge placed on the machined face of the opening; this distance should be 1 3/8".

**Unloader Setting**

The choke unloader setting is necessary to enable the choke plate to be opened by the mechanical accelerator linkage, in the event the engine is flooded during starting, and thereby allow air to enter the intake manifold for a more combustible mixture.

To check the unloader setting move the throttle lever to the wide open position and with the choke plate closed against the unloader lever, the opening of the choke plate should permit the insertion of a 3/16" drill between the edge of the choke plate and the venturi. The drill should be in line with and
opposite the bowl vent tube and contacting the top of the air horn and the venturi. The unloader is adjusted by bending the unloader tab on the throttle lever to obtain proper choke plate opening at full throttle. It is important that full throttle operation is not restricted by the kickdown switch or through binding of the linkage.

Automatic Choke Adjustment

The automatic choke setting is on index for all normal driving. If for some reason a richer or leaner mixture is desired during the warm-up period, it can be obtained by rotating the thermostat cover. Never set the index mark on the cover more than two graduations off the specified setting.