# ..... FUEL SYSTEMS .....

## ********** FUEL PUMP & PRESSURE **********

FUEL PUMP PRESSURE: Stock fuel pump pressure spec's are 1½ to 3½ psi at idle.

FUEL PUMP VOLUME TEST: Fuel pump minimum output is 1 pint of fuel in 30 seconds with the engine idling at 500-600 RPM.

FUEL PUMP VALVE CHECK: To check the inlet valve in the fuel pump, connect a vacuum gauge to the fuel pump inlet side. Start the engine and let it idle. When the vacuum gauge indicates 10in/Hg (Hg is the chemical term for mercury), shut off the engine and watch the vacuum gauge needle. It should not drop to zero for at least 1 minute. If it does, the inlet valve in the fuel pump is leaking and may need replacing, reseating, or possibly only a new inlet valve gasket.

DECREASING FUEL PRESSURE: One method to lower fuel pump pressure is to increase the thickness of the gasket between the fuel pump stand and the intake manifold. This essentially decreases the push rod stroke. About 0.010" increase in gasket thickness lowers the fuel pressure ½ psi. Since the fuel pump stand usually leaks oil, the added gaskets will often seal leaks in this area.
The method I prefer is to use an adjustable fuel pressure regulator between the fuel pump and carb(s).

FUEL PUMP CAM LOBE LIFT: Lobe lift on a stock flathead cam is 0.200". As far as I know, all after-market cams have 0.200" lift. Wear limit is 0.180". Since the fuel pump is in constant contact with the lobe, the push rod travel should be within these tolerances.

FUEL PUMP PUSH ROD WEAR: Replace when wear exceeds 0.050". (A seat of the pants rule: as long as there is chamfer left on the both ends of the push rod it is still good.)

FUEL PUMP REBUILD KIT: I use rebuild kits by NAPCO (Nissei Auto Parts Company, Ltd.) part number #11A-9349. The only place I've found these is in Canada, but they should be available in the US. Available from: The Old Car Centre
3-20075 92A Ave.,
Langley, B.C., Canada V1M3A4
phone: (604)-888-4412 fax: (604)-888-7455
These come with a newer style of inlet and outlet valves and newer fuel resistant diaphragms. I find this newer style of valve makes 5+ psi... whereas the stock valves make only 3½ psi. Higher pressure helps prevent vapor locks. I always recommend using a pressure regulator whenever a fuel pump exceeds 2½ psi. Limiting pressure to 2½ psi will prevent over powering the needle and seat assemblies and subsequent flooding. The box says its for Nissan, Mazda, and Toyota. Years of cars are not on the box. Delivery time is about 9 days.

These are in stock for $33.95 + $10.00 shipping and handling (American dollars... Canadian is $10 higher) as of Feb. 2001. Pretty pricey, but worth it if you need more fuel pressure from a stock pump. Just be sure you verify your stock pump has screws holding the internal inlet and outlet valves (some are riveted in place of the two screws).

FUEL PUMP REBUILD: When tearing a stock pump down, scratch a mark across the joint of the two fuel pump's body halves. During reassembly, locate the inlet and outlet ports correctly by simply lining up the scratches on the two sections. Then internally, scribe U (up) or D (down) next to the two valves (inlet and outlet) to show whether they're installed face up or down. The same valves are used for both the inlet and outlet valves. These valves are often the cause of low pressure. I've never figured a way to increase the fuel pressure on stock pumps other than make the push rod longer. I'm convinced these valves are what make the pressure, but I've messed with the springs in these valves over the years without affecting fuel pressure. **Anyone know of a way to increase the pressure?** The original diaphragm material doesn't like the new gasolines (but I don't either!) and will deteriorate fairly quickly. The newer rebuild kits use material that is resistant to our present gas. Replacement of the diaphragm is simple as are all pieces in the fuel pump. Just be very meticulous about sticking pieces of valve gasket material, or grit, on the valves seats. Either one can cause an internal leak.

VAPOR LOCKING: I suppose this is as good a place as any for this. There are many causes of vapor locking. Vapor lock occurs when gasoline in it's liquid state gets hot enough to change to it's vapor state. Fuel pumps are designed to pump liquid.... not vapor. Locating causes of vapor locking at home is a lot easier than on the road. Often it's caused by several minor thing. Don't rule out the gasoline we get today. This stuff vaporizes at a lot lower temperature than gasoline did when these pumps were first designed. Story time: My FH tried the vapor lock thing on a 104 degree day in 1995. A friend and I were on I-25 heading back to Denver from an NSRA meet in Pueblo, CO. The sides of the freeway were peppered with cars and hot rods with vapor locks and boil overs. My flathead tried to vapor lock a couple of times but I managed to get enough gas to the carbs by choking it. I made it home without stalling. I decided it was time to find the causes. When I walked around the back of the car, I heard the gas inside the steel gas tank bubbling (boiling?)! Got under the car and burned my hand fairly bad when I touched the hot steel gas tank. It wasn't near an exhaust pipe but was still very hot. The steel gas line was also very hot. The heat was a combination of trapped engine and road heat. The gas in the tank was boiling, so we know what was in the hot steel line don't we.... mostly vapor. Cure? I replaced the steel tank (it was in bad shape anyway) with an after market polyethylene tank. And I replaced the stock steel gas line from the tank to the carbs with rubber gas tubing. The polyethylene tank and rubber gas line don't absorb and hold heat like the steel stuff. I also ran a volume and pressure check on the stock fuel pump to verify it wasn't getting weak. End result was no more

gas bubbling and not a single vapor lock since then.... and it's been across the southwestern desert several times during the day in June. Enough story telling BS. Back to vapor locking.

I've listed the following checks in no particular order. I do each and every one when I'm working on a vapor locking problem.

(1)Verify the fuel pump is performing according to volume and pressure specifications. If not, find out why and correct it.

(2)Check the entire length of gas line from the tank to the carb for distance to a source of heat. The absolute minimum distance from the exhaust or any heat source is 5". If it's closer it's probably contributing to vapor locking. Do whatever is necessary to get clearance or add an insulation barrier.

(3)Check the stock gas line for heat. Take an hour long cruise on a hot day and then touch the gas line in several places. If it's too hot to touch it's probably vaporizing the gas inside the line.... or trying to. If it's only hot in one section, slice open a length of vacuum hose and slip it over the steel line to act as a heat insulator.

(4)Check the stock gas tank. Remove the cap and listen for gas bubbling. If it is, try spraying the tank with several thick coats of undercoat. This requires removing the tank to coat the entire tank, but it does help insulate the tank. Or replace it with a polyethylene tank.

(5)Check to make sure the gas cap is vented. All flatheads came with vented gas caps. Verify the vent is not plugged by blowing air through it. If you're using an after market gas tank, it probably has it's own vent system, but verify it's not plugged shut.

(6)Check the glass bowl on the fuel pump for tightness or for cracks. If not air tight it'll suck air rather than gas.

(7)Check the flexible line leading into the fuel pump for possible leaks. Best way is to remove it and plug one end with a finger. Suck on the other end to create a vacuum while you flex the line back and forth. If you lose vacuum, the flex line has a hole and it's junk. Sometimes these are weakened by engine heat. When you suck on them, they may collapse.... replace it.

(8)If the carbs are super hot it's a sure bet they're getting soaked with engine and radiator heat. Check by pulling the top of the carb off before you shut off the engine to see if the gas inside is bubbling. If it is, try adding a couple of extra carb to intake manifold gaskets to act as insulators. For an extreme circumstance, try a 1/4" thick insulator from some non-heat absorbing material like masonite.

(9)An electric fuel pump is always a good idea for use as a back-up. Just remember, electric pumps are designed to push fuel.... not pull it. More on electric pumps in the next sub-topic.

Should vapor locking happen on the road during a trip I start trouble shooting by removing the gas cap to verify the gas tank vent is not plugged. Then I bypass, remove, or replace the gas filter(s) with rubber gas line tubing. These not only require fuel pressure to get the gasoline through them, but they also reduce fuel flow. And we need all the fuel pressure and flow we can get.

ELECTRIC FUEL PUMPS: These are usually the first line of defense for preventing vapor lock. These should be located as close to the gas tank as possible because they push rather than pull. They are very sensitive to dirt etc. Install a good gas filter just before the electric pump's inlet. Using an electric pump in conjunction with the stock flathead pump is our normal method of installation. We use a toggle switch to turn on the electric pump when it's needed. Good idea. BUT there can be a problem with this setup. Stock mechanical pumps will not pull gas through most rotary type pumps. BUT they will pull through a pulsating type pump. Reason being, the rotor itself chatters as the stock pump pulls gas through it. This chattering causes the rotor to rotate slightly. The rotating eventually causes the rotor to block the exit or entrance port which stops gas from being pulled by the stock pump. At that point we turn on the electric pump's toggle switch thinking we're vapor locking. The rotor turns which opens the exit or entrance port and the electric pump pushes gas to the stock pump. This makes us think we were vapor locking when we weren't. Often times, we end up running the rotary pump full time since the stock pump is unable to supply gas to the carbs and we think the stock pump is kaput.

(a)One solution is to go to a pulse type electric pump in place of the rotary pump. These are not easy for the counter people to find because their computers go by year, color, and body style only and they have no idea how to identify if it's a pulse or rotary. These pumps are available if you can find a parts person who knows what they're doing..... good luck with that!

(b)A second solution. I prefer rotary pumps over pulsating type pumps even if a stock pump can't pull gas through them. They last a whole lot longer and are more dependable than the pulsating type. So, I add a second gas line just for the rotary pump..... Sounds stupid doesn't it? It's a little tricky to describe using only words so stick with me.

After installing the new rotary pump near the gas tank, I install a "T" fitting between the gas tank and the rotar**y** pump. This "T" type fitting will ultimately provide two paths for fuel to follow.....

(1)One end for the inlet side of the nearby electric pump.
(2)One end for the stock gas line going forward to the carbs.
(3)One end for the stock gas line coming from the tank.

For (1) above: I run a section of rubber gas line hose from the right side of the "T" fitting to the inlet side of the electric pump. This will supply gas to the electric pump.

For (2) above: The stock steel gas line is cut about 2" from the tank. Connect the end of the stock gas line (goes forward to the stock fuel pump) to the left side of the "T" fitting using rubber gas line hose. This will supply gas to the stock fuel pump using the stock gas line.

For (3) above: Connect a length of rubber gas line hose to the freshly cut stock gas line coming from the tank. Connect the other end to the remaining "T" fitting. Install a fuel filter in this rubber line between the "T" and gas tank. This filters all gas coming from the gas tank.

Next I install a new rubber gas line from the output side of the

rotary pump all the way forward to about the middle of the car's front floor. This gas line is routed inside the frame rails to protect it and is secured every 6" or so with plastic zip locks. This line is for gas coming from the electric pump.

I use a gas line selector for an early Ford Bronco. It's a three-way valve designed for selecting either of the Bronco's two tanks and has a shut off position which is handy to shut off all fuel. One selector position is used for the stock gas line connect to the tank, one selector position is used for the new gas line connected to the electric pump's outlet, and the shut off selector position is self explanatory. This selector valve is installed in the floor at the left corner of the front seat. The valve has 3 fittings (two inlet fittings---- one for each gas line from the rear of the car and a third outlet fitting going forward to the stock fuel pump). All that's left is to cut the lines to length and connect them at the selector valve. I cut apart the stock gas line going forward to the stock fuel pump. The end of the stock gas line coming from the gas tank is connected to one selector fitting using a short length of rubber hose. The other end of this cut line that goes to the stock fuel pump is discarded. The new gas line from the electric pump connects to a second selector fitting. The third selector fitting is the outlet line to the stock fuel pump (it feeds the stock fuel pump and carbs via a new rubber line which replaces the stock gas line).

When the selector is in the left tank position, the stock pump provides all the gas to the carbs via the stock gas line connected to the left side of the "T" fitting at the tank. When the selector is turned to the right tank position, the electric pump takes gas from the right side of the "T" fitting at the tank and pumps it through the new gas line to, and through, the stock pump and to the carbs. Neither line can divert or pull it's gas to the other line because the 3-way selector valve mechanically blocks it. It will be run on the stock pump full time (fuel is pulled through the selector valve by the stock pump). When needed, I turn the selector to the electric pump position and flick on the toggle switch for the electric pump (fuel is pumped forward by the electric pump through the selector valve and then to the stock pump).

Benefits: I use the electric pump for priming the carbs or when I get concerned about a possible vapor lock (like crossing the desert or in a traffic jam).

I also use it when setting the gas level in my two Stromberg carbs. This is great because I don't have to have the engine running and be so concerned about a fire. The electric pump is used to supply gas to the carbs when adjusting gas level (used in conjunction with a squeeze type bulb to suck out excess fuel).

One thing I like is the ability to completely shut off the gas. When I'm on the road I turn the selector to "off" when I park it for the night or leave it unattended for a time. I run the engine until the carbs stumble due to lack of gas. Helps me sleep a little better knowing the lack of gas in the carbs will prevent someone from simply hot wiring the car to steal it. The next morning I turn the selector to the electric pump side and let it refill the carbs before hitting the starter button.

## ********** CARBURETION **********

AIR FILTERS: In early days, most of us ran velocity stacks or Bell chrome air cleaners. The velocity stacks had a screen for a filter. These would keep out a regulation bowling ball, but little else! But they did look great. (A side benefit.... they provided great water injection in a rain storm if you were not running a hood!) The original Bell chrome air cleaners used several turns of a screen mesh for a filter. These cleaners are being repo'd with paper mesh filters and are in demand today, probably because they look cool and old timey. Their design severely restricts air flow in my opinion and causes an overly rich mixture as the engine approaches mid range. This slows the engine in turning rpms and contributes to foul plugs. One cure is to make your own open-type air cleaner using K&N or other brand of quality filters. These don't filter as well as many gear heads would like, but they don't clog up and cause rich mixtures either. I run them.

FUEL PUMP PRESSURE: Ford and Stromberg carbs were engineered to operate at a maximum of 2½ psi fuel pressure which was pretty typical of carb pressure in the thirties. Exceeding this pressure can overload the needle/float system (hold the needle off it's seat) and flood a carb. This results in gas running down the carbs and onto the engine and is probably where the Strombergs got their reputation for being burners. The Ford carbs will also suffer from excessive pressure, but are not as sensitive as Strombergs due to better float leverage against the needle and seat. This is caused by Ford's better float pivot design. When the float is set too high, or if the pressure exceeds 2½ psi, or the car is driven off-road, the air horn to main body gasket on both brands of carbs will become saturated with gas. Raw gas and gas vapors will waterfall down the front of the carbs. Notice the proximity of the front of the carb to the generator brushes arcing on the commutator? Picture your engine with hot gas on the carbs and the close proximity of the arcing generator. Scary isn't it? Don't chance it..... limit the fuel pressure by installing an adjustable fuel pressure regulator and setting it to not more than 2½ psi. Note the carburetor designed pressure is ***less*** than the 3½ psi Ford specifies for their mechanical fuel pump. Strange they knew the design pressure of the carbs, but used fuel pumps that exceeded this pressure... maybe to forestall their tendency to vapor lock?

POWER VALVES: These used to be called the "high speed jet" in the early years. In the fifties they were called the "economizer valve". Today they're referred to as "power valves". When one of these power valves opens, it richens the fuel to air ratio from approximately 14.5:1 to 12.0:1 (about 20% richer). These operate either mechanically or by vacuum.

Ford/Holley carbs use a vacuum type power valve which has a flow restriction downstream of the power valve. This restriction functions like a jet and limits the quantity of gas passing through it. This restriction (referred to as the power valve channel restriction in

Ford/Holley carb manuals) is inside the power valve's transfer passage between the power valve and the main well. It is neither accessible nor changeable. Power valves do not provide various changes in the amount of gas flowing through them.... they simply go to wide open. Non-use of the carb will often cause these metering valves to fail due to the diaphragm drying out and cracking. Also our current crop of gasoline will hasten failure. The new power valves must use a new material since they aren't experiencing failure from gasoline like the NOS do.

Strombergs carbs don't have any such restriction in their transfer passages. The metering orifice in the shell of the brass power valve controls the amount of gasoline.

CHANDLER GROVES/HOLLEY/FORD POWER VALVES: Chandler Grove originally designed and built the two barrel carb for Ford beginning in 1938. After the initial contract term expired, Ford put the carb contract out for bids. Holley won the bid and built them for Ford for a few years. Then Ford took over their manufacturing. All three manufactured carbs are essentially alike.

As stated earlier, the Ford carbs use a vacuum/spring controlled diaphragm type power valve. These are rated according to the inches of vacuum (in/Hg) needed to open the valve. The chemical symbol for mercury is Hg and is used when measuring vacuum. The power valve opens at low manifold vacuum (engine under power) and closes at high manifold vacuum (engine not under load). Rebuild kits I get today come with valves rated in the 10 in/Hg range. Power valves which open at lower vacuum are available from some suppliers and are a worthwhile investment if you're running multi Ford carbs. Multi carbs will decrease engine vacuum and often cause the vacuum controlled power valves to open with only the slightest increase in accelerator pedal (especially at altitudes above sea level since vacuum decreases with an increase in altitude). Many of these valves are stamped with their rating. A 45 stamp means the valve opens at 4.5 in/Hg..... an 80 means the valve opens at 8.0 in/Hg. Always install a power valve that is rated lower than the amount of vacuum the engine makes at idle. Should the engine backfire, it will almost certainly rupture a diaphragm type power valve. When running multi-carbs, some rodders remove the power valves completely and plug the holes shut. This will cause the engine to lean out on the top end unless it is re-jetted. Re-jetting 6 or 7 sizes bigger prevents leaning out..... which in turn makes the engine run very rich when operating during normal use (which is most of the time). Some rodders run a power valve in only one of their carbs and have good results. The power valve is located on the underside of the carb's main body (fuel bowl) casting. You have to separate the throttle body and the main body of the carb to get to it. Checking one of these power valves is only a matter of sucking on the flat side of one to see if the diaphragm is ruptured.

A leaking power valve can trickle gas into the throats of the intake manifold and cause hard starting after sitting for a period. If your car is hard starting (and pukes black smoke out the tail pipe when it finally does start) after being shut off for about a half hour on a hot day, or if it's hard to start after sitting all night, check the

power valve to see if it's leaking.

STROMBERG POWER VALVES: Stromberg carbs use a mechanically controlled power valve. It's located in the bottom of the accelerator pump well. These are opened mechanically. They are closed and held shut mechanically by an internal spring. They become operational whenever the flat bottom of the accelerator pump depresses the power valve's pin. This happens only when the accelerator pump is at the bottom of the pump's well (full throttle or very near it). These power valves are made of brass and will not rupture like a diaphragm type power valve. A single metering hole is located in the outer shell of the power valve to meter gas flow. This permits controlling the amount of gas the power valve can deliver by simply changing the size of this hole. It's a lot easier to adjust full throttle gas flow than on a Ford carb. Just solder the hole shut and drill the size hole you want further around the power valve (in a new location). Sizing Stromberg power valves isn't very critical since extended periods of WOT (wide open throttle) seldom happens these days and decreased vacuum doesn't operate them prematurely.

WHAT DOES A CHANGE OF 2 SIZES OF MAIN METERING JETS REALLY MAKE? Something to think about..... We change main jet sizes to change engine performance. We feel what a change in performance a 0.002" jet change makes. But do we know what a change of 0.002" does as far as metering?

Gasoline flow thru a jet is dependent on the cross-sectional area (area is proportional to diameter) of the hole in the jet, right? But jet changes we think as being dramatic make extremely tiny flow area changes..... yet they can alter engine performance considerably. Also, the precision of a carburetor becomes quite evident if we calculate what cross-sectional changes happen when we change main jet sizes.

Let's assume a change from 48 to 50 jets and see just how much the flow area is affected. As we all know, the main jets in our early carbs are numbered according to the diameter in inches of the jet's hole. Or, in this example, 0.048" and 0.050" diameters.

The formula for the area (A) of a circle is:

Area=(pi)(radius squared)
=(3.1416)(radius)(radius)

The radius of the 48 jet is half the diameter

$$= \frac{\text{diameter}}{2} = \frac{0.048"}{2} = 0.024"$$

And the Area of the 48 jet

= (3.1416)(0.024)(0.024)
= (3.1416)(0.000576")
= 0.0018095 square inches

The radius of the 50 jet is half the diameter

$$= \frac{\text{diameter}}{2} = \frac{0.050"}{2} = 0.025$$

And the Area of the 50 jet

= (3.1416)(0.025)(0.025)
= (3.1416)(0.000625)
= 0.0019635 square inches

The difference between the two jets areas is (0.0019635) (0.0018095) = 0.0001540 square inches (or fifteen one hundred thousandths of a square inch) Super small change in jet area isn't it? The amount of difference in gas flow would be undetectable except by flow metering. Yet the effect this seemingly small change in jet sizes makes is quite noticeable. Sure makes one appreciate the engineering which goes into carburetor design a whole lot more.

## ********** STROMBERGS **********

STROMBERG CFM & VENTURI SIZES:

81 rated at 135 cfm. Venturi diameter = 0.812"
97 rated at 150 cfm. Venturi diameter = 0.969"
LZ rated at 160 cfm. Venturi diameter = 1.000"
48 rated at 175 cfm. Venturi diameter = 1.031"

STROMBERG CIRCUITS: The idle discharge circuit operates from idle to 25 mph. The main jet circuit operates from 25 mph to 70 mph. Above 70 mph the power valve works in conjunction with the main jet circuit. Rear end ratio, tire size, and power loading all affect the operational boundaries of the various circuits. Remember the operational boundaries of carburetor circuits overlap.

STROMBERG NEEDLE/SEAT ASSEMBLIES: These were originally a steel needle and a brass seat. These were very susceptible to the needle being held off it's seat by grit and dirt. This often caused flooding. These are sensitive to pressures in excess of 2½ psi also. With the advent of the soft tipped needle (Vitom), the sensitivity to dirt and fuel pressure was reduced and flooding decreased considerably.

Since the sixties several different designs of needle and seat assemblies have been manufactured. Some are not affected by grit and dirt and many will tolerate higher fuel pressure. I've tried many of them, but end up sticking with the standard Vitom tipped needles in my two Strombergs. I've not had a single sticking needle in the past 75,000 miles.

STROMBERG JET, POWER VALVE, AND FLOAT SPECIFICATIONS:

The 81 came on Ford V8-60 engines in '37 and most of '38's. Sea level jetting: main jets #35 and power valve #71. Gas level (not float level) spec is 15/32" ± 1/32" measured from the main bowl casting (fuel bowl) with no gasket.

The 97 came on '36 thru early '38 Ford V8-85 engines. It's identifying number is the same as it's venturi size (97). Sea level jetting is #45 and power valve is #65. Gas level (not float level) spec is 15/32" ± 1/32" measured from the main bowl casting (fuel bowl) with no gasket.

The LZ came on '36 thru early '38 Lincoln V-12 engines. I've lost my

notes on these carbs, but I've never run them... probably due to the ready availability of the '97 carb.

The 48 came on '34 & '35 Ford V8-85 engines. It's identifying number is the same as it's stock main metering jet (48). Sea level jetting: main jets #48 and power valve #63. Gas level (not float level) spec is 15/32" ± 1/32" measured from the main bowl casting (fuel bowl) with no gasket.

STROMBERG POWER VALVES: Power valves are numbered according to the numbered drill used when drilling the metering hole located on the side of the brass power valve's shell. Just like numbered drills, the larger the number, the smaller the hole.

Sizes for power valves are:

| | | | |
|---|---|---|---|
| #61 = 0.0390" | #62 = 0.0380" | #63 = 0.0370" | #64 = 0.0360" |
| #65 = 0.0350" | #66 = 0.0330" | #67 = 0.0320" | #68 = 0.0310" |
| #69 = 0.0292" | #70 = 0.0280" | #71 = 0.0260" | #72 = 0.0250" |

STROMBERG MAIN JETS: A special jet wrench is required to remove or install the main jets. Main metering jets are numbered according to the diameter of the metering orifice. Thus a #45 jet has a 0.045" diameter hole.

STROMBERG JET TUNING: Starting point for tuning a single Stromberg carb: Decrease main jets 1 number for each 2000' in altitude (example: from #45 to #43 for 97's at 4000' elevation). Increase power valves 1 number for each 2000' in altitude (example: from #65 to #67 for 97's at 4000' elevation).

Starting points for tuning dual Strombergs: Decrease main jets 2 to start. Then decrease main jets 1 size for each 2000' in altitude. Increase power valves 2 numbers to start. Then increase power valves 1 number for each 2000' altitude.

Starting point for tuning triple Strombergs with progressive linkage: Center carb is sized the same as a single carb. The end carbs are sized the same as dual carbs.

STROMBERG IDLE MIXTURE SCREWS: These are physically different than the ones used in Ford/Holley carbs. They have a different taper and are not interchangeable with Ford idle mixture adjusting screws (although they will work fairly well). The Stromberg idle adjusting screw's taper extends clear to the threads (the Ford needle taper stops short of the threads).

SETTING STROMBERG FLOAT LEVELS: Dry setting (dry float bowl) is 5/16" from the carb's main bowl gasket surface to the top of the float. This is used when overhauling a carb to initially start and set the idle mixture and rpm.

Wet setting. This sets the gas level correctly by adjusting the float. With the engine idling smoothly, the wet setting is 15/32" (± 1/32") from the top of fuel bowl casting (no gasket) to the gas surface itself. This requires removing the top of the carb and, with the engine running, adjusting the float to the correct gas level.

This is dangerous because gas continually spews out around the needle seat assembly and onto the hot engine or near the sparking generator commutator. This provides an excellent opportunity for one to show off their fire extinguisher and fire fighting skills to ones buddies. However, if you have an electric fuel pump you can set them with little fear of fire. You'll need a rubber squeeze bulb to suck out gas. Don't run the engine. Use the electric fuel pump to fill the carb bowls until the float shuts off the incoming gas. Measure the level of gasoline and make adjustments to the floats by bending their tangs. When the floats are disturbed, the needles come off their seats which spews more gas into their bowls. Since the level of gas decreases greatly, gasoline will have to be sucked out (use the squeeze bulb) to permit the floats to drop. Then refill them until the floats shut off the gas (use the electric pump). Re-measure the gas level. Repeat until you're satisfied both floats are adjusted correctly.

STROMBERG ACCELERATOR PUMP CHECK BALL: Behind the center plug in the front portion of the main bowl is a small accelerator pump discharge check valve. This consists of a ball bearing crimped in a removable jet. It seldom sticks and can be checked by shaking it. If stuck, bend the crimp open and push the ball out from the opposite end using a small nail.

STROMBERG EMULSION TUBES: Behind the outer two plugs in the front of the main fuel bowl casting are the main jets. Behind the main jets are the emulsion tubes. The main jets have to be removed to get to them. The emulsion tubes extend from the main metering jet to the venturis. These small brass tubes have a series of small holes in their upper regions which may become plugged with varnish and sludge. This will cause poor performance and excessive fuel consumption. The upper tube ends are angled (baloney cut) and extend into the venturies. Sometimes these will come out by pushing them downward.... do not tap on their angle cut as this will ruin the tubes. Removing stuck emulsion tubes is done by tapping threads on the inside of the emulsion tube bottom with a **** #6/32 tap. Gently turn the tap in about 4 full turns. A 1½" long #6/32 screw with a nut and flat washer makes a dandy puller. With the washer positioned against the carb casting, thread the screw into the emulsion tube's threads you just made. Finger tight is plenty tight. Position the flat washer up against the casting and run the nut flush up against the washer. Turn the nut as if to tighten it. This pulls the emulsion tube out easily. This little puller has never failed to remove an emulsion tube for me. Once they're out, clean their outsides with fine steel wool. Then clean the varnish etc. from the tiny holes using a wire or a drill bit with a **** 0.041" diameter (a #59 numbered drill). Use only your fingers to turn the drill bit. Reinstall the emulsion tubes gently by pushing them in with a flat drift punch. Re-install the main jets. CAUTION: Do not tighten main jets excessively. This will cause the jets to crush the emulsion tubes and ruin them. Snug is all that's needed. Should an emulsion tube be crushed, or the tiny holes be crimped shut, it will cause poor performance and excessive fuel consumption. Replacement is the only cure for a deformed emulsion

tube. ****(From rodnut on 1/30/03. He uses 6-32 taps and screws. He also uses a drill that's 0.040" in diameter.... a #60 numbered drill..... to clean the varnish from the tiny holes. He says a #59 drill is too big.)**

REMOVING AND INSTALLING STROMBERGS WITHOUT LOSING MULTI-CARB SYNCHRONIZATION: Leave the throttle bases and linkage on the car by removing the three screws that hold the throttle casting to the main bowl casting. Remove the choke assembly collared screw and the gas lines. Note which carb goes on which base. Lift off the carbs. After cleaning the carbs, just bolt them back to their same bases. Since you've not disturbed the throttle shafts or linkage, the synchronization is the same as before you removed them. Sure helps reduce the hassle when re-building.

## ********** FORD/HOLLEY/CHANDLER-GROVE **********

FORD CFM RATINGS: Ford/Holley/Chandler-Grove were introduced on Ford V8's beginning in late '38. These were continued clear into the early OHV-V8's.

Holley 92 (model #92) rated at 142 cfm. Venturi dia. is 0.875"
Holley 94 (model #59) rated at 155 cfm. Venturi dia. is 0.938"
Holley 94 (model #8BA) rated at 162 cfm. Venturi dia. is 0.938"
Holley (Model #ECG) rated at 185 cfm. Venturi dia. is 1.062"

FORD/CHANDLER GROVE/HOLLEY CIRCUITS: The idle discharge circuit operates from idle to 25 mph. The main jet circuit operates from ** 25 mph to 60 mph. Above 60 mph the power valve works in conjunction with the main jets.

** Remember the power valve becomes operational whenever the vacuum becomes less than the vacuum rating of the power valve. Rear end ratio and tire size affect the operational boundaries of the various carburetor circuits. Remember more than a single circuit is used at times depending on engine demands.

These carbs are extremely simple to work on and rebuild. No special tools are required. About the only problem one might encounter is the accelerator check ball may be stuck. This tiny check ball (about a 1/16" ball bearing) is located in the bottom of the accelerator pump well. It's held in place by a circular expansion spring. Removing the spring will usually permit the ball to fall into your hand when the carb is inverted. If it's stuck, and they do become stuck, turn it upside down on a work bench and tap on the bottom of the carb casting. If it won't come out, soak it in P-Blaster penetrant and try it again. If you can't get it out, you can try drilling a hole up from the bottom to tap it out. I've seen this done, but I won't do it. I don't think it's a good idea since the hole has to be sealed gas-tight. The ones I've seen usually leak after awhile. I junk it if the ball is stuck tight rather than chance drilling and sealing.

REMOVING THE CASTINGS WITHOUT ALTERING SYNCHRONIZATION: The main

body and air horn castings can be easily removed to rebuild the carb or to work on the power valve without removing the throttle body casting (base). If a throttle body casting is disturbed, you'll lose the multi-carb synchronization.... and you'll have to re-sync them again. It saves a lot of hassle if you leave the throttle castings and linkage in place and simply remove the upper two castings.

Remove the gas line and the accelerator pump link. Remove the two screws securing the main casting to the throttle base casting. These are installed downward from the top. The slotted screw in the bottom has it's slot facing downward. There just isn't room to get a screwdriver between it and the intake manifold. Now, if it was only a hex headed bolt we could get it out easily..... Use a pair of pliers to remove the slotted screw. Then match the size, threads, and length of the screw to a hex headed bolt. This is used as a replacement for the slotted screw. Remember it's very easy to over tighten the hex headed bolt and strip the threads in the relatively soft carb casting. Snug is all that's needed. Now the main castings of the carb(s) are in your hand and the carb can now be rebuilt or have it's power valve worked on. When you reinstall the carbs on their respective throttle bases, the throttle linkage is still synchronized and you won't have to mess with it.

## ********** SYNCHRONIZING CARBS **********

CENTERING THROTTLE PLATES ON ALL CARBS: Sticking throttle plates make driving multi-carbs unpleasant to say the least. Every time you start out, the plates stick and you have to increase the accelerator pedal to overcome this sticking..... which results in way too much throttle opening and jerks the car (or burns rubber when you're next to a cop). Stromberg carbs seem to have better throttle bores and plates than the Ford carbs and are another reason I prefer them. Most Ford carbs have to have their plates removed and fitted before they cease sticking, whereas Strombergs seldom do.

With the carb off the engine, separate the main body from the throttle body casting. Loosen the idle speed adjusting screw. Close the throttle tightly and hold it shut. Hold the throttle base up to a light source. There should not be any light showing around the throttle plates. If so, loosen the tiny soft brass screws which hold the throttle plates to the throttle shaft. Loosening usually takes only a turn at the most. CAUTION: These are usually staked and are easily broken while trying to loosen them. Try grinding off the sides of the stakes, or squeezing them with pliers, if they won't unscrew easily. Hold the throttle tightly shut and tap both ends of the throttle shaft several times. This will center the plates in the throttle bore. Continue holding it closed tightly while you snug down the throttle plate screws. Re-check for light showing around the closed throttle plates. If you can't get them to seal shut, the plates will have to be removed and hand fitted using fine files and/or #400 wet/dry sand paper or crocus cloth. This takes a little patience. Throttle plates MUST operate freely and not stick when coming off idle. When satisfied with their fit, stake the tiny screws or use some blue Loctite to keep them from being ingested into the

engine (they don’t compress worth a hoot!).

USING A UNI-SYN: For synchronizing carbs, this is the way to go. These are available from several sources for around $25, but I find them at flea markets from time to time for $3 to $5. They’re extremely simple to use. Setting the throttles with a Uni-Syn follows the same methods as when using a length of hose.....except it’s a lot easier, faster, and a whole lot more accurate. I usually set dual carbs in about 10 minutes with a Uni-Syn.

USING A LENGTH OF HOSE: Although I use a Uni-Syn these days, I have set many multi-carb setups using a short length of heater hose as a stethoscope. This was the only method we had in the old days (bet you’re tired of seeing this). It works, but does take time. I always adjust the idle mixture screws out 1½ turns on each carb at the get-go. Loosen the screws squeezing the arms to the throttle shafts so the throttle shafts can be moved without disturbing moving the arm. Hold one end of a 12" section of heater hose against an ear and move the other end back and forth between the carbs listening to their hiss. The object is to get the carbs to have EXACTLY identical hisses. Keep a slight tension on the throttle shafts of all the carburetors (temporary springs or rubber bands help) and adjust the idle rpm screws until the carbs have identical hisses and are at the desired idle speed. Tighten the screws holding the arms to the throttle shafts. Re-check the hissing to make sure nothing has changed. Please note this will not cure sticking throttle plates and the resultant stick/surge coming off idle. Multi carb installations MUST have the throttle plates centered to eliminate a sticking throttle.