

EFI PLUMBING

WITH MECHANICAL FUEL PUMP AND VAPOR SEPARATOR TANK SYSTEM

This schematic is FOR EFI ONLY, for constant flow systems see Pages 17, 18, 20, & 51 (main 56 page handbook).

It is important to read the notes on the constant flow plumbing schematic no matter what type of fuel system is being used.

A FEW NOTES:

The plumbing schematic would be simpler if we eliminated the Vapor Separator Tank (V.S.T.) by drawing out of the bottom of the main tank through the 45 micron filter directly to the inlet of the electric starting and mechanical fuel pumps, then plumb the pressure relief valve back to the top of the main tank. So why use the V.S.T.?

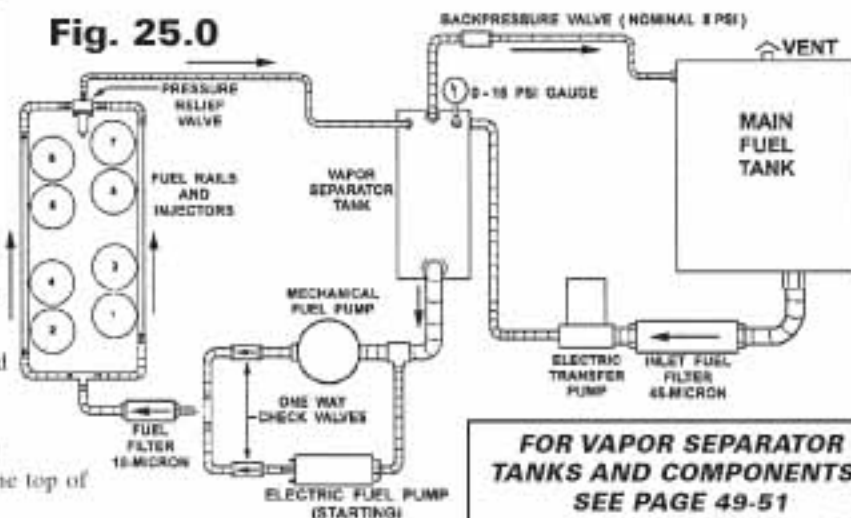
- 1) Gasoline is a mixture of many types of hydrocarbons, some of which boil off at just above room temperature. It is common for some boiling to occur inside a warm fuel tank and fuel lines. The vapor bubbles produced won't become liquid again when the main pump pressurizes the fuel...they will become smaller, but they will still be there. When these reach the injectors they could cause an erratic lean condition.

The V.S.T. has a special baffle system to separate out the vapor coming into it from both the main tank and the pressure relief valve. This vapor is collected in a chamber that is connected to the top center fitting on the tank, where it passes out to the main tank via the backpressure valve, see Fig. 25.0. This insures that the final supply pump(s) will receive vapor free fuel.

- 2) This system has two "flow loops:"
 - A) The fuel from the main tank flows through the 45 micron filter into the transfer pump, which pushes it into the V.S.T. If the engine isn't running, all of this fuel passes out through the top center fitting and back to the top of the main tank via the "backpressure" valve. This valve is set at about five PSI on EFI systems to keep the V.S.T. pressurized, both to prevent boiling and cavitation of the main fuel pump, which would produce vapor.
 - B) To start the engine, turn "on" the electric transfer pump. The transfer pump will remain "on" whenever the engine is running. Turn "on" the electric starting pump. Fuel will flow to the 10 micron filter, while the check valve on the outlet of the mechanical fuel pump prevents fuel from passing back through the clearances of the pump gears. All of the fuel is routed through the fuel rail, to purge out any vapor bubble that formed in it and the hoses the last time the engine was shut off and "hot soaked." Once the engine is running, the mechanical pump is adequate to run the engine. The electric start-up pump is turned "off" and the check valve on the outlet prevents the high pressure fuel from back flowing through the electric pump.
- 3) An excellent feature of the V.S.T. is that it allows you to use all the fuel from the main tank with no lean conditions. As the main tank runs low the fuel will slosh away from the pickup letting air go through the transfer pump and into the V.S.T. where it is separated out. The 15 PSI gauge will drop close to zero under this condition, but you can still run for the pits at wide open throttle. As soon as the main system pressure drops you must stop running at wide open throttle or engine damage will occur.
- 4) A mechanical pump is preferred to do the main system pressure work as it is more reliable than most electric pumps and reduces the overall system's current draw. Current draw on an average electric pump can range from about 8-10 amps for a small block naturally aspirated V8 gasoline system, up to 60 amps for a large turbocharged system. Generally when engine RPM increases the demand for fuel volume increases. When the engine RPM decreases, the fuel demand decreases. The mechanical pump output will also increase/decrease with RPM, providing volume with the demand. An electric fuel pump will provide a constant volume of fuel, even if there are changes in engine RPM, throttle angle, and load. This volume is not needed at idle and light load conditions, causing the pressure relief valve to work harder to maintain the proper fuel pressure, PRESSURE RELIEF VALVES, see Page 63-M.
- 5) The fuel pump isn't used to sense engine speed, as it is on a constant flow system, but to provide adequate flow when needed. Never use a "cross drilled block of metal" type angle fitting on any pump inlet hose...where the drills intersect there is a razor sharp edge that promotes pump inlet cavitation. The best solution is to make gentle bends with the hoses, as in the above schematic. If there is a really tight place, use a bent tube type fitting. Read "Fuel Pumps" on Pages 58-M - 60-M.

FUEL RAIL and PRESSURE RELIEF VALVE PLUMBING, See Page 62-M

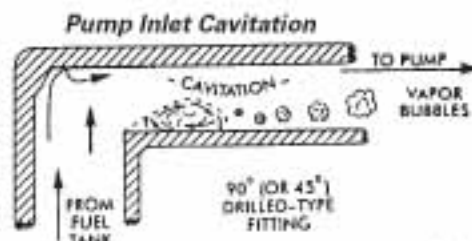
Fig. 25.0



FOR VAPOR SEPARATOR TANKS AND COMPONENTS - SEE PAGE 49-51 (main 56 page handbook).



Vapor Separator Tank
MAXIMUM PRESSURE IS 15 PSI



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