



TROUBLESHOOTING GUIDE Fuel System - Carbureted Engine

305 Dee Cee Court • White House, TN 37188 • Ph: 615-672-5117 • Web: www.kse-racing.com

FUEL SYSTEM OVERVIEW

KSE's Fuel Pumps and Tandem Pumps (PS+Fuel) have been proven to give excellent fueling performance under racing conditions for various applications including sprint cars, modifieds, and late models. All of KSE's Tandem Pumps are specially designed positive displacement gerotor-style pumps which can be characterized by their high volumetric efficiencies with smooth flow and low pulse ripple. It is important to note that a positive displacement pump (vane, gerotor, gear, etc.) creates flow, not pressure – pressure is only a signal of the resistance to flow!

Verify that the hose material is compatible with the type of fuel being used. See reference diagram in Tandem Pump Installation Guide for illustration. The suction line to the inlet of the pump (**Line #4: Fuel Tank / Filter to Pump**) should be a minimum #10 (3/4" ID) line. This hose must be vacuum rated to 20 IN HG in order to minimize the potential for hose collapse. The use of an inline filter is necessary for maximum performance and life of the pump. The filter should be rated for 6 GPM with zero pressure drop for suction application and a maximum of 62 micron.

The pressure line from the pump to the carburetor (**Line #5: Pump to Carburetor / Fuel Log**) is based on carburetor manufacturer recommendations. This pump's pressure port utilizes a #8 (1/2" ID) ORB fitting. A non-liquid filled fuel pressure gauge should be installed between the pump and the carburetor as a tuning tool for adjusting fuel delivery. It is important to remember when tuning a fuel system that the pump is only providing the fuel needed to fill the carburetor float bowls – the carburetor is what actually provides the engine with the correct air-fuel charge (not the fuel pressure). Fuel pressure is strictly a signal of fuel flow and line resistance.

The fuel bypass return line (**Line #6: Pump to Fuel Tank**) should be a #8 (1/2" ID) line. To minimize fuel pressure spikes, it is important that this line is as unrestricted as possible – no 90° fittings, pinching, or kinking of hoses. See *Fuel Pressure Regulating* section in this document for additional tuning details.

The fuel by-pass system utilizes a spring, poppet, and pill orifice design for regulating fuel pressure. The spring and poppet control idle pressure. The idle pressure should be 2 – 4 psi. Maximum high speed pressure is controlled by the pill orifice. The pump has a .160 pill orifice installed from the factory. This pill orifice is designed to get most alcohol applications in an 8 – 10 psi max pressure setpoint. A .140 & .180 pill orifice is additionally supplied with the pump. **IMPORTANT:** Maximum pressure (flow) must be checked with the engine under load. Free revving the engine will not give true maximum fuel pressure for correct tuning. To raise max fuel pressure – decrease pill orifice size. To lower max fuel pressure – increase pill orifice size. Adjusting the pill sizing by .020, equates to an approximate pressure adjustment of 1-2 psi respectively. Gasoline applications require less fuel and typically require a .220 pill orifice size for initial tuning. A maximum fuel pressure test is important for engine performance and at max power the fuel pressure (flow) should be steady. The following are typical engine fuel pressure requirements dependent upon fuel type:

Alcohol:	8-10 psi
Gasoline:	6-9 psi

PERFORMANCE TIP: To minimize carburetor flooding (resulting in engine stumble) and improve throttle response in a deceleration / "out-of-throttle" condition, set carburetor flow levels at max fuel pressure (flow) – not at idle pressure. This will put the float levels at a normally lower level and will allow them to react to any fuel pressure spikes.



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FUEL PRESSURE LOW AT IDLE

<u>CAUSE</u>	<u>SOLUTION</u>
IDLE RELIEF SPRING TENSION	ADJUST OR REPLACE SPRING. (STRETCH SPRING APPROXIMATELY 3/8")
IDLE POPPET STUCK OPEN	REMOVE POPPET AND CLEAN. CHECK RELIEF SEAT FOR DAMAGE OR CONTAMINATION.
PUMP SPEED TOO LOW	ENGINE IDLE UNDER 1100 RPM. PUMP DRIVE RATIO LESS THAN 50% ENGINE SPEED, CONFIRM PULLEY RATIO (i.e. 20T / 40T PULLEYS).

FUEL PRESSURE TOO LOW AT PEAK POWER

<u>CAUSE</u>	<u>SOLUTION</u>
PILL ORIFICE TOO LARGE	INSTALL SMALLER PILL ORIFICE. REDUCTION OF ORIFICE DIAMETER .020 EQUATES TO AN APPROXIMATE INCREASE OF 2 psi.
ADJUSTABLE PRESSURE REGULATOR (IF USED) SET TOO LOW OR DEFECTIVE	ADJUST TO PROPER PRESSURE SETPOINT, REPAIR OR REPLACE.
FUEL PRESSURE LINE FROM PUMP RESTRICTED	MUST BE A #8 (1/2"ID) LINE. INSPECT FOR PINCHED HOSE, AND INNER HOSE LINING CONDITION.
PUMP SPEED TOO LOW	ADJUST PULLEY RATIO TO ACHIEVE 50% OF ENGINE SPEED.
PUMP TOO SMALL FOR ENGINE HP FUEL REQUIREMENTS.	REPLACE WITH HIGHER FLOW FUEL PUMP. 1/4" FUEL SECTION ACCEPTABLE FOR ALL GASOLINE APPLICATIONS AND ALKY UP TO 700HP. 5/16" FUEL SECTION FOR ALKY APPLICATIONS UP TO 1000HP.
PUMP HAS EXCESSIVE WEAR	REPAIR OR REPLACE PUMP.



FUEL PRESSURE FLUCTUATES RAPIDLY AT ENGINE PEAK POWER

CAUSE

AIR LEAK OR RESTRICTION IN
PUMP INLET LINE

DIRTY OR PLUGGED FUEL FILTER

FUEL FILTER TOO SMALL

PUMP INLET LINE OR FITTINGS
TOO SMALL

SOLUTION

CHECK CONDITION OF ALL SUCTION LINE
HOSE CONNECTIONS. VERIFY ALL FITTINGS ARE
TIGHT AND ANY PUSH-LOCK FITTINGS HAVE HOSE
CLAMPS. VERIFY ALL FITTINGS ARE UNDAMAGED
AND ARE FREE OF SCRATCHES AND DINGS.

CHECK FUEL PICKUP IN TANK FOR PROPER
LOCATION AND ANY FOREIGN DEBRIS WHICH
COULD CAUSE LINE RESTRICTION.

COLLAPSED, PINCHED, OR CUT HOSE.

INSIDE LINING OF INLET HOSE COLLAPSED. HOSE
MUST BE VACUUM RATED TO 20 in hg.

REPLACE FILTER. MOISTURE IN FUEL WILL PLUG A
PAPER FILTER.

FILTER MUST FLOW AT 4 GPM AT A VACUUM OF
2 in hg.

MUST BE A MINIMUM #10 (5/8" ID) LINE.

FUEL PRESSURE TOO HIGH AT PEAK POWER

CAUSE

PILL ORIFICE TOO SMALL
LARGER

FUEL BYPASS LINE RETURN TO TANK
TOO SMALL OR RESTRICTED

PUMP SPEED TOO HIGH

PUMP TOO LARGE FOR ENGINE HP

SOLUTION

INSTALL LARGER PILL ORIFICE. AN INCREASE OF
ORIFICE DIAMETER OF .020 EQUATES TO AN
APPROXIMATE DECREASE OF 2 psi.

LINE AND FITTINGS MUST BE MINIMUM
#8 (1/2" ID). CHECK FOR PINCHED OR RESTRICTED
HOSE.

ADJUST PULLEY RATIO TO ACHIEVE 50%
OF ENGINE SPEED.

USE 2 FUEL PRESSURE REGULATORS IN
PARALLEL OR INSTALL SMALLER PUMP.



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NO FUEL PRESSURE

CAUSE

SOLUTION

*NOTE: REFER TO AIR LEAK OR RESTRICTION IN PUMP INLET LINE UNDER
“FUEL PRESSURE FLUCTUATES RAPIDLY” SECTION IN TROUBLE SHOOTING GUIDE.*

FUEL BYPASS OR REGULATOR ALLOWING
ALL FUEL TO RETURN TO THE TANK

REPAIR OR REPLACE BYPASS OR
REGULATOR

PUMP FAILURE

REPAIR OR REPLACE PUMP