

Investigating PD Fuel Issues

Written for a BEW engine; other PD's vary slightly in some particulars.

If I was checking out a PD that is apparently having fuel delivery problems, I would first verify proper fuel delivery to the fuel rails.

IN-TANK LIFT PUMP

Check out the in tank lift pump. You should hear it run for a second or so with each cycle of the key from OFF to ON (not START.) This should also supply a good spurt of fuel to the filter (and out of the filter) – about 50 ml or so.

Second, I would pull off the fuel line from the filter to the top (inlet) of the tandem pump where it attaches to the steel fuel line attached to the valve cover and put it into a container. I would then put power to the fuel pump (lift the bottom of the back seat, and on the right side there is a black cover, remove the 3 large Phillips screws and you are looking at the top of the fuel pump assembly (see second photo). Put 12 volts to the .25" spade on the left (flattened end) and ground the .25" spade on the right (round end). Verify the in tank lift pump puts out 3.0 liters per minute of flow or more, then stick a pressure gauge into the end of the line and check shut off head pressure. Expect to see 9 to 14 psig. If you get the flow and then the pressure, then the in tank lift pump is good, and your fuel filter is good.

The lift pump in BEW's is powered from fuse 28 via the fuel pump relay marked J17 on VW schematics and located in position 10 of the relay plate (middle of middle row) and marked 53 or 167. See fuse panel below. Check that power is supplied to the pump for a second or so on each key cycle from OFF to ON (not START.) If your car will run with the fuel pump failed, then just run the car and check for voltages.

Tandem Pump Wear Test

Restore the fuel filter lines to normal. Now pull off the line marked #3, the return line from the fuel rail going to the thermo-tee filter, and place it in a container. Plug the port on the thermo-tee. Apply power to the lift pump. You should get no flow or almost no flow, say 25 ml per minute or less. Any more flow and you have an additional flow path due to wear on your tandem pump, or failure of the supply fuel pressure limiter. This flow path can allow the fuel system to drain back to the fuel tank when the engine is off, creating long cranking periods and rough starts. It will also result in reduced pressure at engine operating conditions. Once you start having issues, then the tandem pump will wear faster as it is cranking with less than optimum lubrication (it has little fuel and much air). If you have the pressure gauge attached to the fuel supply rail port, it should read zero pressure.

Tandem pump pressure test at idle

There is a back pressure regulator on the return fuel rail outlet which is supposed to maintain about 15 psig backpressure on the fuel rail. Hook up a fuel pressure gauge to the test port on the bottom portion of your tandem pump. It is just above the fuel return line connection. Start the car and run at idle. The back pressure regulator should be blocking flow right now, and your

pressure gauge should read about 15 psig (13-17 psig). If not, then there is not enough fuel rail pressure for the injectors to operate properly, which can create rough operation.

TANDEM PUMP LOW SPEED Flow TEST

Next I would check out the tandem pumps flow at idle. This test is done with a normal fuel system configuration, except that the return flow line to filter from the engine is directed into a flask. The port or line to the thermo-tee must be plugged to prevent fuel from spraying. You should get about 1.1-1.5 liters per minute (I get 1.3 lpm) of flow out of the return line. This means that the cam driven tandem pump is boosting pressure as it should, and that the internal screen in the tandem pump is not obstructed.

You can use the same test configuration, with the starter (engine not running), and should get about 400ml/minute from the return line.

Injector seal test

Rig a fuel supply similar to performing a diesel purge on your engine. This is essentially a local fuel supply under the hood. Pull the fuel pump fuse (#28 on BEWs) and feed fuel into the filter using the normal from-the-tank connection. Direct the return line into the fuel supply. Use a clear fuel hose (5/16" or 8 mm ID hose) so that you can see through it very well.

There should be no gas bubbles in the return line 5 minutes after starting. (Even if you started with air filled fuel rails – normally you see no air bubbles in this line at all). Gas bubbles are evidence of cylinder gases getting past the injector seals.

Tandem Pump Pressure Test

With the pressure gauge hooked to the fuel pressure test port on the tandem pump, and a normal fuel line configuration, start the engine and run to 1500 rpm, check for 51 psig. This is the only test given in the Bentley manual and no range is specified. Perhaps 48 to 54 would be an acceptable range.

INJECTOR AND WIRING CHECKS

Then I would do resistance check of the injector coils. The jack is the part built into the head assembly. The plug is the removable part.

T-8 (PD head connection) Checkout			
Plug off	pins 2,3,5,6	pin 7	Task
Plug (key off)	>200k	3.2k	resistance to ground
Plug (key off)	0v	0v	voltage to ground
Plug (key on)	.55v (1)	2.40v	voltage to ground
Jack	>200k	>200k	resistance to ground
Jack	0.25 ohms	Not Applicable	Resistance to pin 7

(1) BRM engine has essentially zero volts.

Then do a visual inspection of the wiring harness from the engine to the ECU, starting with the bridge over the starter. These wires are subject to fretting and breaking due to the vibration. This is not an uncommon issue with engine sensors and components.

An inductive timing light will fire on the injector current, so you can tell if the solenoids are getting power that way.

You can also use diagnostic diodes in the injector connections under the valve cover to see if you are getting power to the solenoids. The LEDs will flicker with each firing.

Photo pirated from an excellent Whitedog “Car won’t start thread.” And applies to 2004 and 2005 North American PD’s.

#1 from fuel tank lift pump

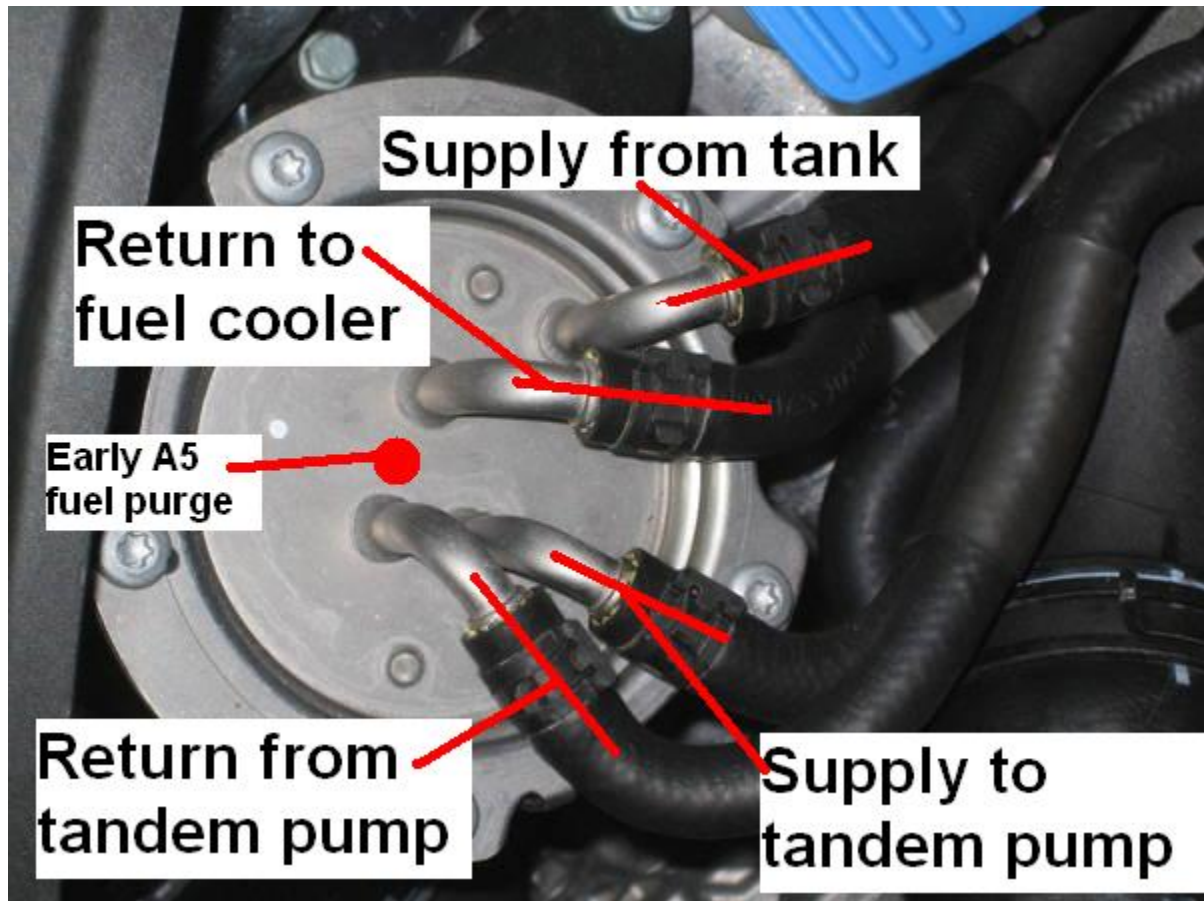
#2 to Tandem pump inlet

#3 from Return Fuel Rail

#4 Return to fuel cooler and tank.

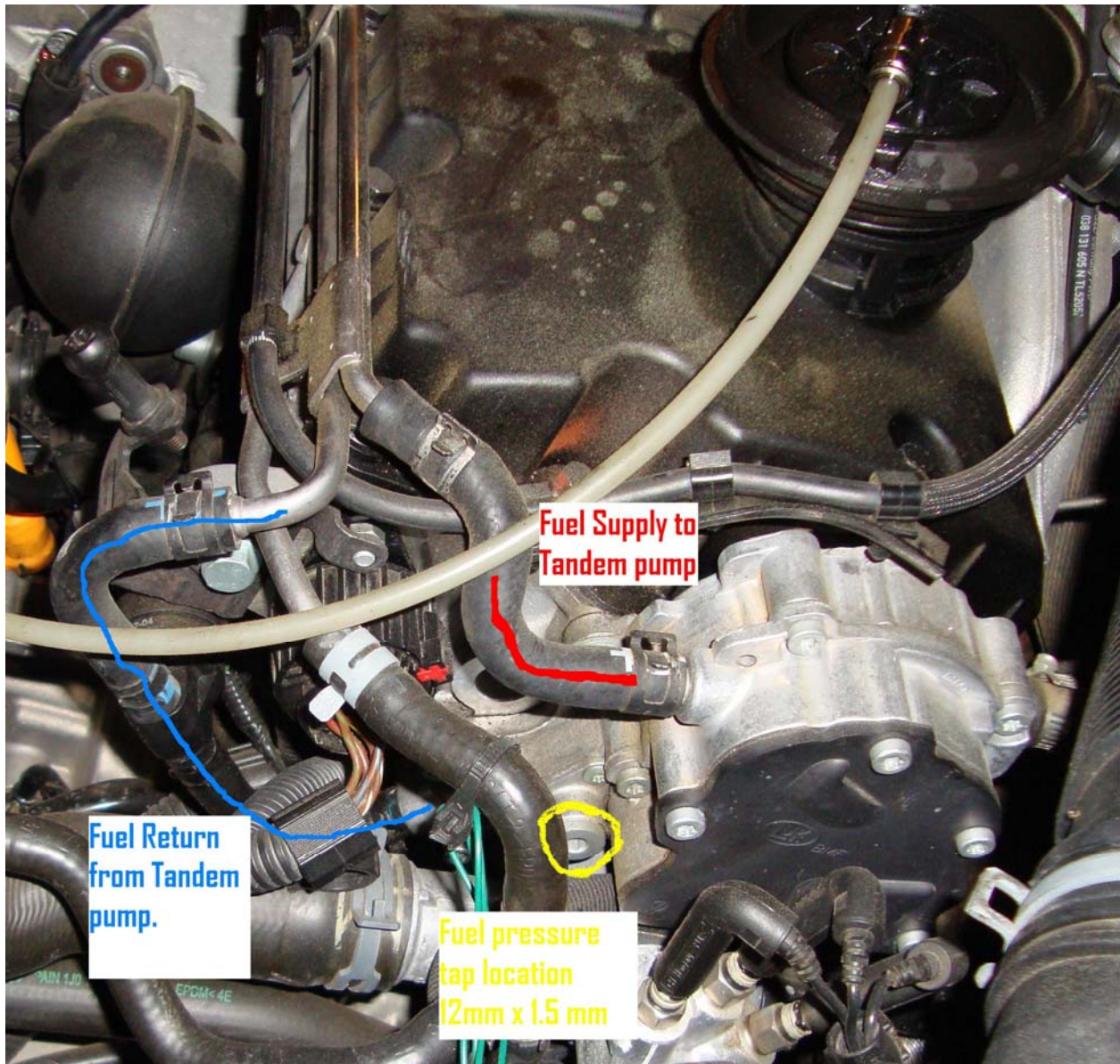


This is a labeled photo by Kromicacid on TDIclub.com
[img]http://pics.tdiclub.com/data/3980/A5_Fuel_filter.JPG[/img]



Top of lift pump. Use 1/4 " spade electrical connections for the pump.
#1 +12 volts to the pump is on the left, flattened side.
#4 fuel pump ground is on the right, rounded side.
The two smaller center connections are for the fuel gauge.



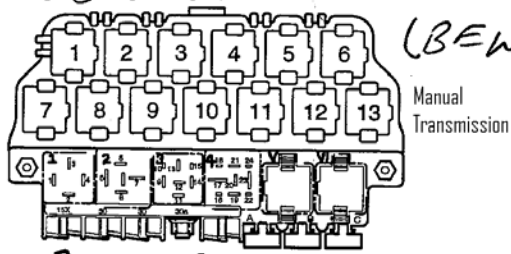


The fuel pressure tap takes a 6 mm hex head (allen) to remove.
The banjo bolt you need is 12 mm X 1.5 mm threads.

2005 JETTA TDI (BEW)

Upper Relay Panel

Lower Relay Panel



97-14163

Position	Description	Number on relay
Lower relay panel		
1	Dual horn relay	53
2	Load reduction relay	100
3	open	open
4	Fuel pump relay	103 409
V, VI	Wiper/Washer intermittent relay vehicles without headlight washer system vehicles with headlight washer system Vehicles with rain sensor	377 389 102
Fuses on lower relay panel		
A	Power (Memory) seat circuit breaker	-
B	open	-
C	Power windows, central locking, heated power mirrors	-
Relays on upper (auxiliary) relay panel		
1	open	open
2	Rear lid remote unlock motor relay (01-99)	78 open
3	Anti-theft starter lock relay (clutch pedal switch)	185 53
4	Fog light relay	open 53
5	Multi-function steering wheel relay (as applicable)	450 451
6	Multi-function steering wheel relay (as applicable)	455 451
7	Daytime running lights (from April 1999)	open 73
8	Daytime running lights (through March 1999)	173
9	open	open
10	Glow plug relay FUEL PUMP Relay 317	107 180 53
11	Park/Neutral position relay Manual Trans	open 175
12	Power supply (terminal 30b, B+) relay	109
13	open	open