

## Fuel Panel Concept of Operation

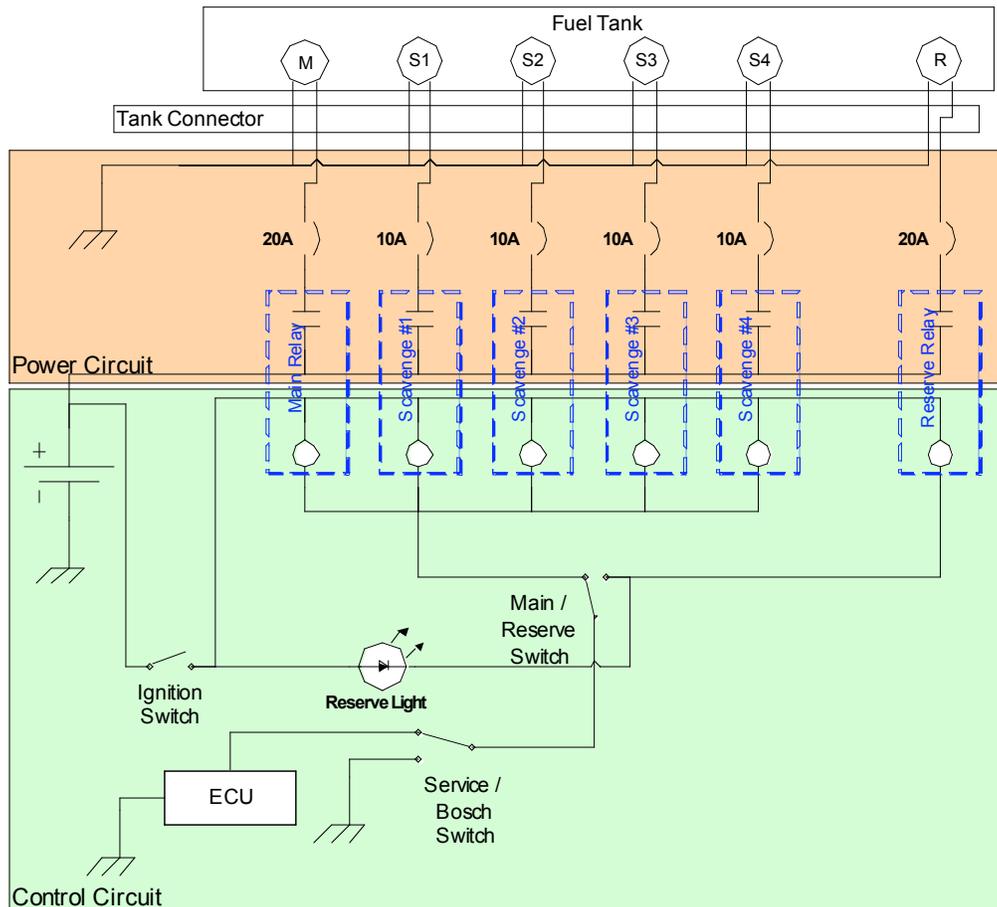
### Fuel System General Theory of Operation

The Fuel Safe system consists of six in-tank fuel pumps. There are four Scavenge Pumps, a Main Pump and Reserve Pump. The scavenge pumps are located in the bottom of the tank and feed a fuel plenum chamber. The main pump uses the fuel in the plenum to drive the fuel injectors, and the reserve pump provides fuel from the plenum when the fuel in the tank is below the level where the Scavenge pumps can function.

Normally, the scavenge pumps fill the plenum, and the main pump provides fuel to the engine. When the fuel level goes down below the point where the scavenge pumps can adequately fill the plenum, a “Low Fuel” light illuminates. At that point, actuating the Reserve pump cuts off the scavenge pumps and the main pump. The reserve pump pumps the remaining fuel out of the plenum into the fuel system.

The ECU controls the pumps when the Fuel Pump Switch is in the “Bosch” position. When the switch is in the “Service” position, the fuel pumps operate continuously. Additionally, the fuel system has a “Reserve” function that turns on a separate high capacity Reserve pump.

### Fuel Panel Control Circuit



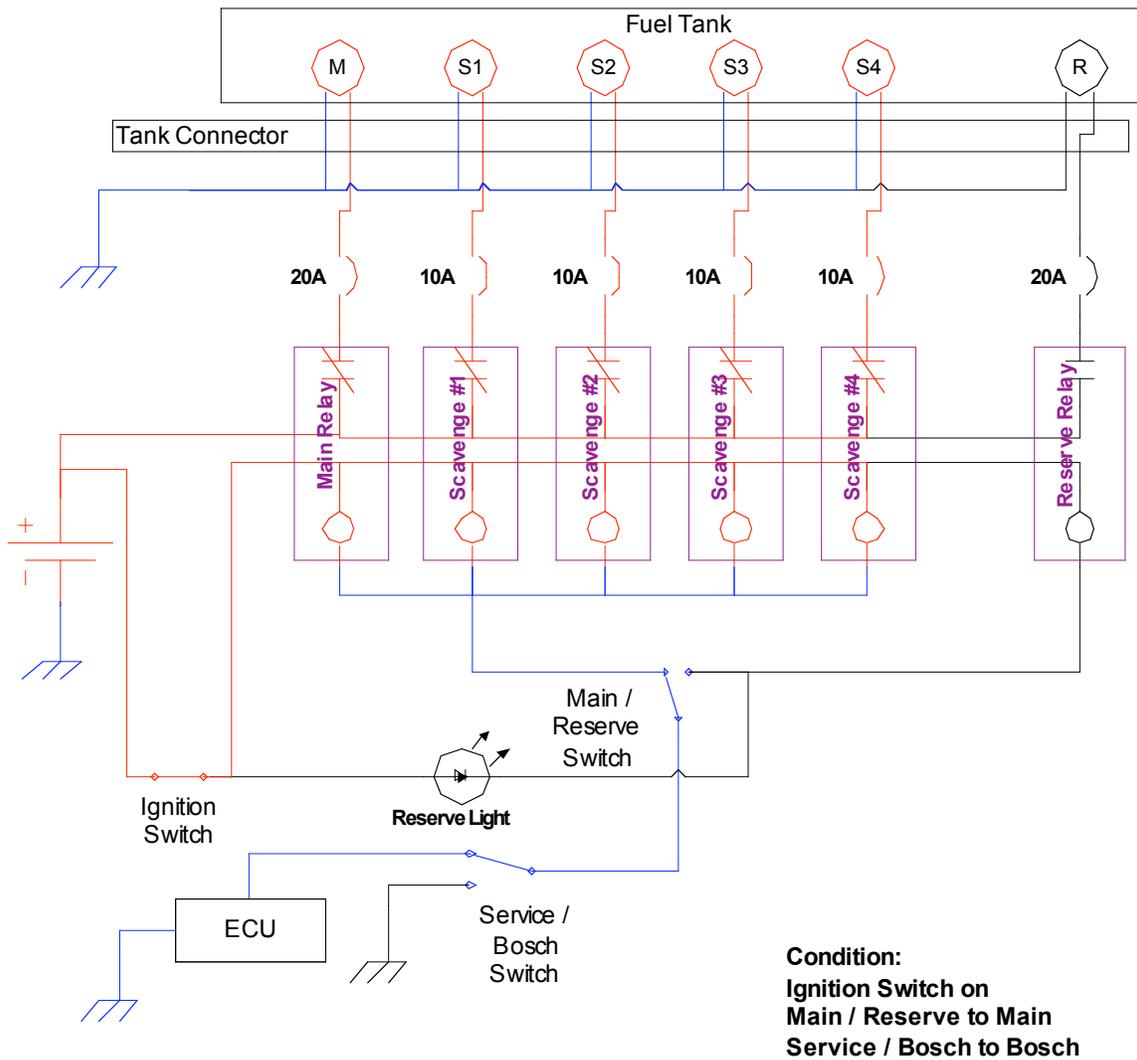
## Operation of the Fuel Panel

### Normal Operation

The panel control circuit obtains power from the Ignition Switch, from Pin 6. That 12v power is provided to all the relays. The return (negative) side of the relays is controlled through the Fuel Reserve Switch, the Fuel Pump Switch and the ECU. The Fuel Reserve Switch selects either the Main/Scavenge Pumps or the Reserve Pump. The “output” of this control switch is connected to the Fuel Pump Switch. When the Fuel Pump Switch is in the Bosch position, the ECU completes the ground circuit and controls the pumps; when the Fuel Pump Switch is in the Service position, the pumps are directly grounded, and will run whenever the Ignition Switch is on.

### Normal Mode:

## Fuel Panel Control Circuit



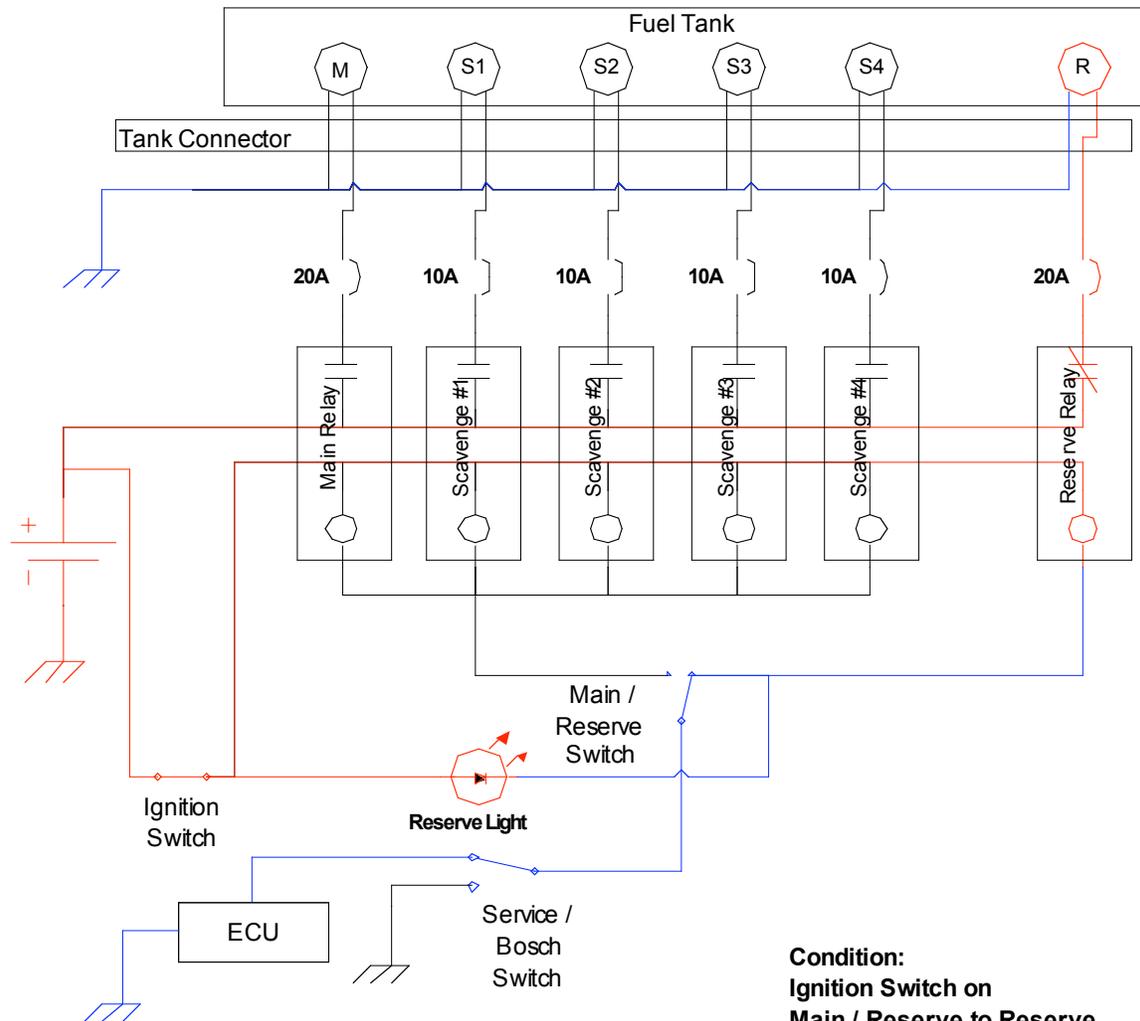
### Reserve Mode Operation:

When the Low Fuel light illuminates, the driver actuates the Reserve Mode. In the Reserve Mode, the Scavenge pumps and the Main Pump are turned off and the Reserve Pump is activated. The Main and Reserve Pumps are located in the fuel plenum at different levels, and the Reserve Pump collects the remaining fuel in the bottom of the plenum.

This mode actuates the Reserve Relay and the Reserve Light. The Reserve Light is not connected to the Low Fuel circuit; it simply shows that the Reserve Relay is selected.

### Reserve Mode:

## Fuel Panel Control Circuit



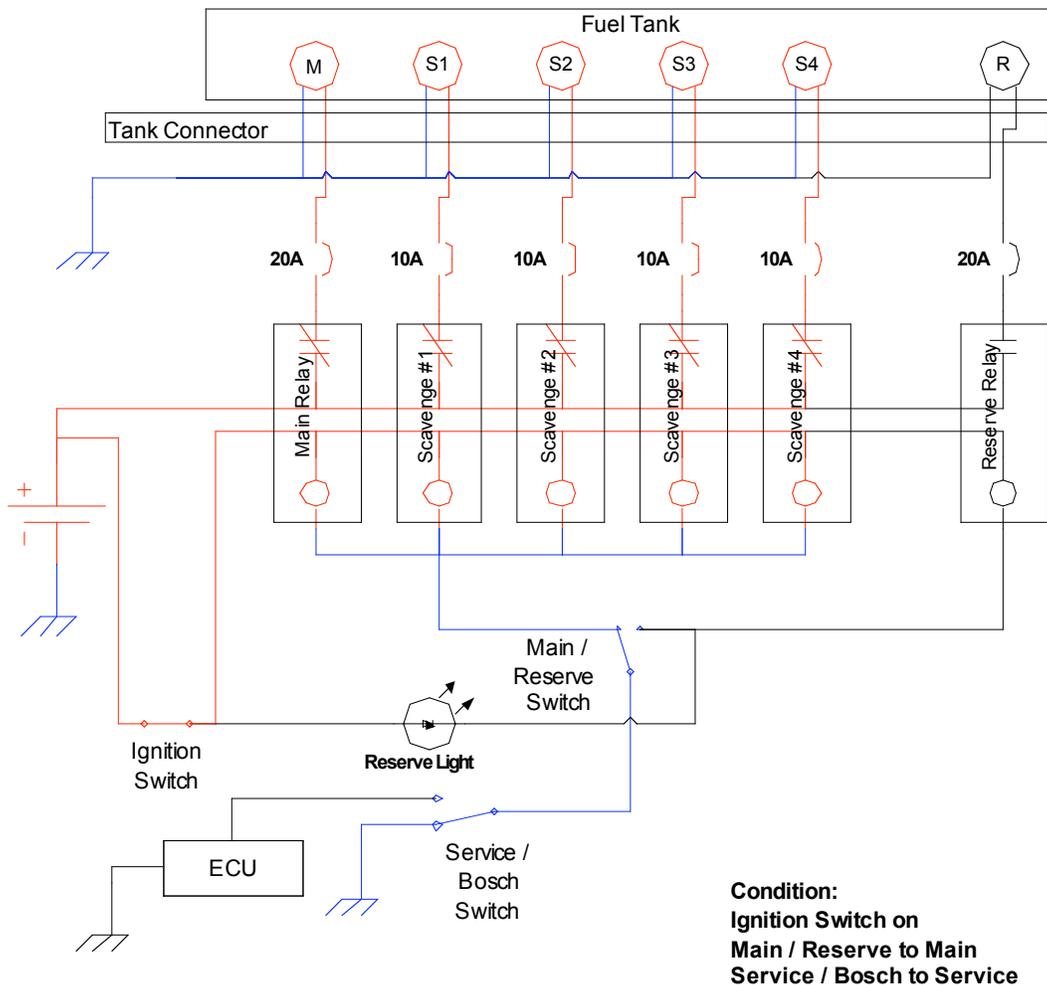
## Service Mode:

The Service / Bosch Switch selects how the car provides a Chassis Ground to the Fuel Control System. In the "Bosch" position, the ECU automatically controls when the Fuel Control System is grounded; if the ECU senses a problem because of parameters such as low oil pressure, it will interrupt the ground to the Fuel Control System and turn off the fuel pumps. This condition occurs whether the Fuel Control System is in the Normal or Reserve Mode.

When the Service / Bosch Switch is placed in the Service position, the car provides a constant ground to the Fuel Control System. This allows for pumping the fuel tanks or pressurizing the fuel system without having the engine running.

Do not attempt to race the car with this switch in the Service position. It will allow the pumps to run continuously, but the ECU protective features are disabled. In the case of a crash or fire, the pumps would continue to run, possibly feeding raw fuel to the fire.

## Fuel Panel Control Circuit



## **Installing the Fuel Control System**

The Fuel Control System has been designed to be mounted next to, and outboard of, the main circuit breaker panel in the passenger footwell. The panel has not been drilled, so simply drill mounting holes and mount the panel with button head cap screws and locking nuts.

## **Connecting the Fuel Control System**

There are four main connections for the Fuel Control System. They are Main Power, Chassis Ground, Fuel Tank, and Panel Control. The Control lead has several separate leads that need to be connected to switches.

The **Main Power** lead should be connected to the switched side of the Master (Kill) Switch. The lead provides power to each of the relays, through the circuit breakers to the fuel tank (through the fuel tank Military-Style connector).

The **Chassis Ground** should be connected to a convenient ground. These two leads operate at fairly high currents – make sure they have a good, clean, solid connection.

The **Fuel Tank** connector provides power to each of the internally mounted Fuel Pumps and to the low fuel switch mounted in the tank. There is a bulkhead pass through on the firewall on the right side of the car. It is possible to pass the connector through this bulkhead by removing the rubber sealing plug. Cut this plug so it supports the cable after the connector has been passed through. This prevents the cable from rubbing against the chassis and possibly shorting out.

The **Control Lead** has connections for the Ignition Switch, the Fuel Pump Switch, the Reserve Switch, and Panel Lights.

Connection to the Ignition Switch is straightforward – connect it to Pin 6 as shown the photo. This wire is Red.

Connection to the Fuel Pump switch is also straightforward. Remove the terminal from the “center” position of the switch, and replace it with the wire from the Control Lead. The Fuel Pump lead is marked, (the wire is Gray), and the terminal has a “2” label inside the heat shrink.

Connection to the Reserve Pump switch is a bit more detailed. This is the only switch that is not already mounted. Drill a 12mm (or 15/32”) hole for the switch that we have provided. There is an “anti-rotation” washer provided. (It looks like a large flat washer with a tab to prevent the switch from rotating once it is installed.) This washer also has a tab that corresponds to a keyway on the switch. Mount the switch so that the keyway is down. That way, the numbers on the Reserve Pump leads correspond properly to the

numbers on the terminals on the switch. This orientation will have the “Normal” position down, while the “Reserve” Position will be up.

The Reserve Pump Switch wires are marked; there are two Black leads (one is smaller in diameter than the other), and a gray lead. The larger of the Black leads goes to Terminal 1 which is at the top of the switch. The Gray lead goes to Terminal 2 which is in the center, and the smaller of the Black leads goes to Terminal 3 at the bottom.

The Reserve Light and Low Fuel Light are panel mounted LEDs. The terminals are marked on the rear of the case with a “+” for the positive terminal. Connect the proper Red wire spade to this terminal, and connect the remaining spade to the remaining terminal.

We hope these instructions while lengthy, are comprehensive enough to assure a smooth and simple installation.



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