SDS EM-5 6 Cylinder Dual ECU Supplement Mar. 16/17

This supplement outlines some of the wiring, sensor and operational differences between dual ECU 6 cylinder systems, and other SDS aviation systems.

Task Sharing- Injector Outputs/ ECU Selector Switch

The 6 cylinder dual system has a 3 position ECU fuel selector switch:

Figure1

This selects which ECU will control the **fuel injectors only**. In NORMAL position, both ECU's will operate and each ECU will control 3 injectors. NORMAL position allows each of the 6 injectors to have individual trim control to tune fuel for each cylinder independently.

If one ECU were to fail, using this switch, the pilot can switch all 6 fuel injectors control over to either the PRIMARY ECU or the BACKUP ECU.

Note that this switch does NOT control which ignition coil pack is running since both coil packs run all the time. Coil packs can only be controlled or shut off via their 12 volt power source.

Sensor Pairings and Sharing

Since each ECU board is controlling only part of the ignition and fuel components, we also have a separate intake air temp (IAT) sensor and CHT sensor for each ECU so that each ECU is correcting the AFR for starting, warmup and IAT equally, no matter which one is selected..

We also share the TPS signal with both ECUs. As such, if you lose power or ground on the primary ECU, you will also lose the TPS function on the backup since they only share the signal wires, not power and ground wires. The TPS is non-critical for flight, you'll just have slightly slower throttle response to rapid throttle opening if it fails.

The single orange wire on the backup main harness (red tape) should be connected to the TPS signal wire (white, pin 3). You can crimp a short piece of wire into the TPS signal pin and make another connection which can be more easily disconnected with the single white connectors and pins provided.

Mixture Knob Relay Unit

The single mixture knob affects either or both ECUs via a special relay box as shown in the photo below. The knob plugs into the connector on the right side of the photo (knob). Primary and backup ECU knob harnesses plug into the two left most connectors. You must connect the long yellow wire to switched 12V. The blue and brown wires connect as shown to the right injector relay box connector as shown in figure 3.

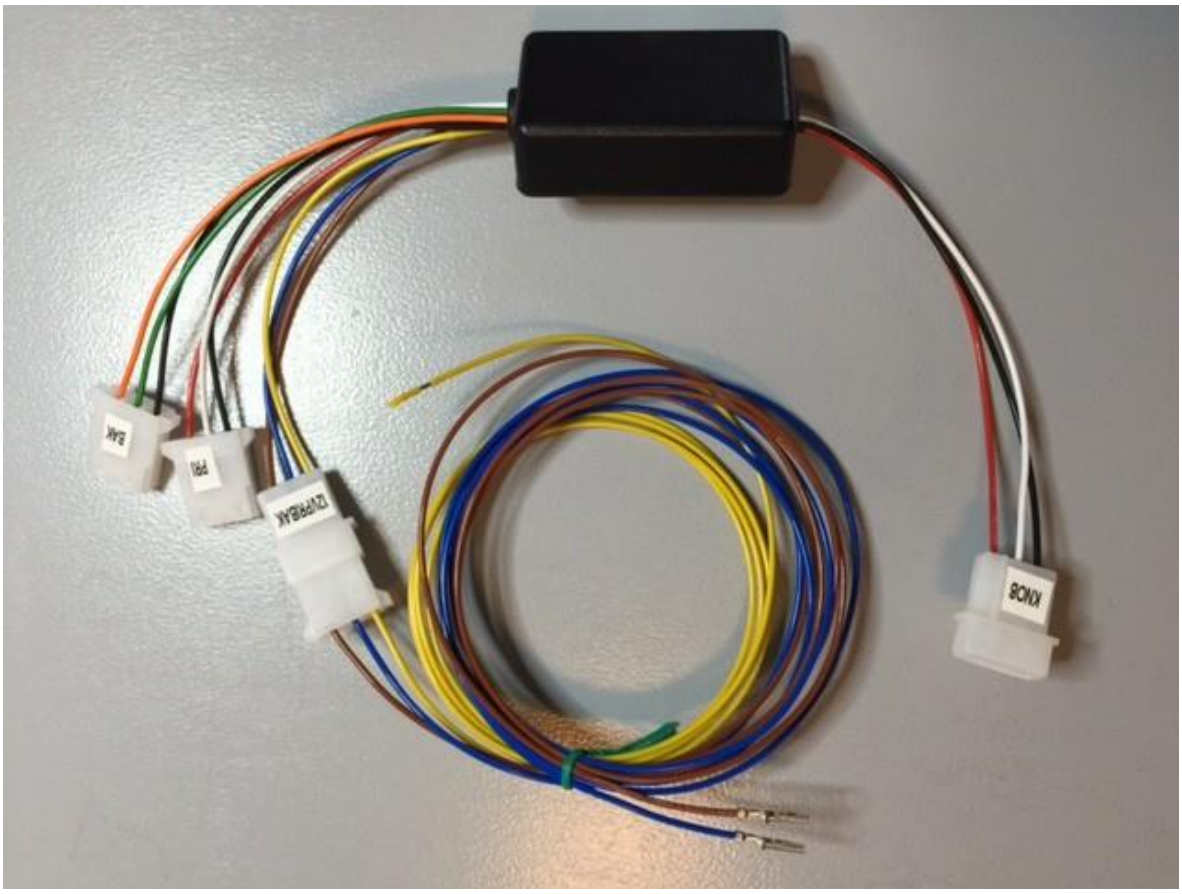


Figure 2. Mixture knob relay.

Be aware that if you lose one ECU, you must manually switch the ECU Selector Switch (Figure 1) over to the functioning Primary or Backup ECU to have proper running on all 6 injectors and to have mixture knob control.

If for example one of the ECU's lost power, the knob input on the other functioning ECU will be pulled to a approximately -45% making the fuel mixture very lean, so at this point, the ECU switch should be moved to either the primary or backup positions to restore engine running and at the same time the mixture knob relay will disconnect the mixture knob signal from the offending ECU.

Also, if one ECU loses power, 3 injectors will stop functioning, so again, the ECU selector must be switched to either Primary or Backup to restore all 6 cylinders.

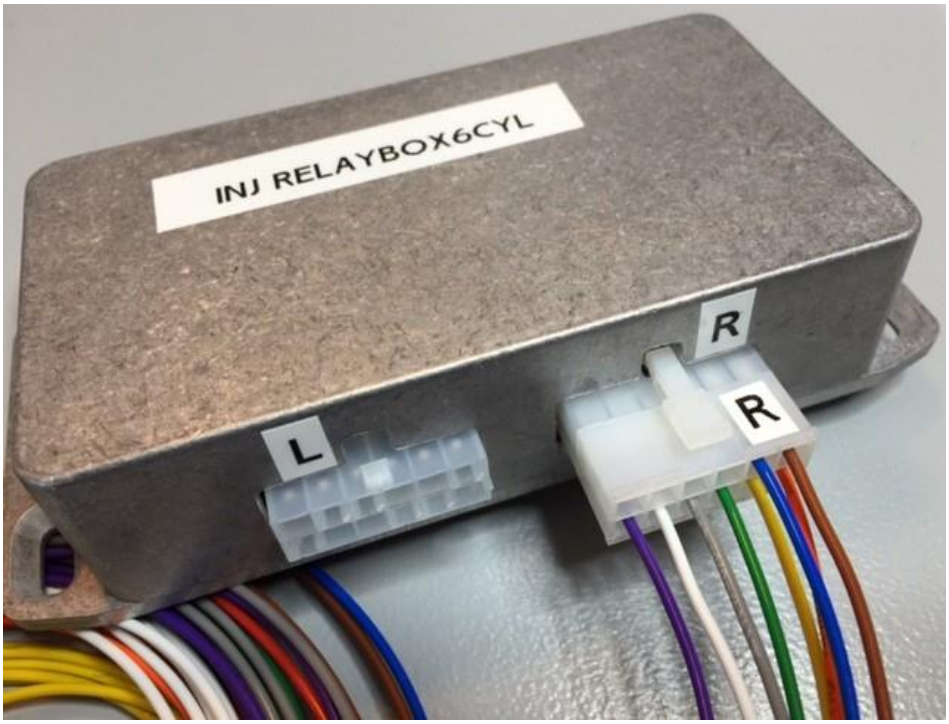


Figure 3. Injector relay box 6cyl. Note blue and brown wires from Mixture Knob Relay plug into pins 7 and 8, upper right corner of right connector.

Cylinder Trim

On dual 6 cylinder systems, to trim cylinders, you must toggle between ECUs with the programmer select switch, trimming cylinders 1, 2 and 3 with the primary ECU and cylinders 4,5 and 6 with the backup ECU. When Programming the trim values, be sure to have the ECU selector switch in the NORMAL position.

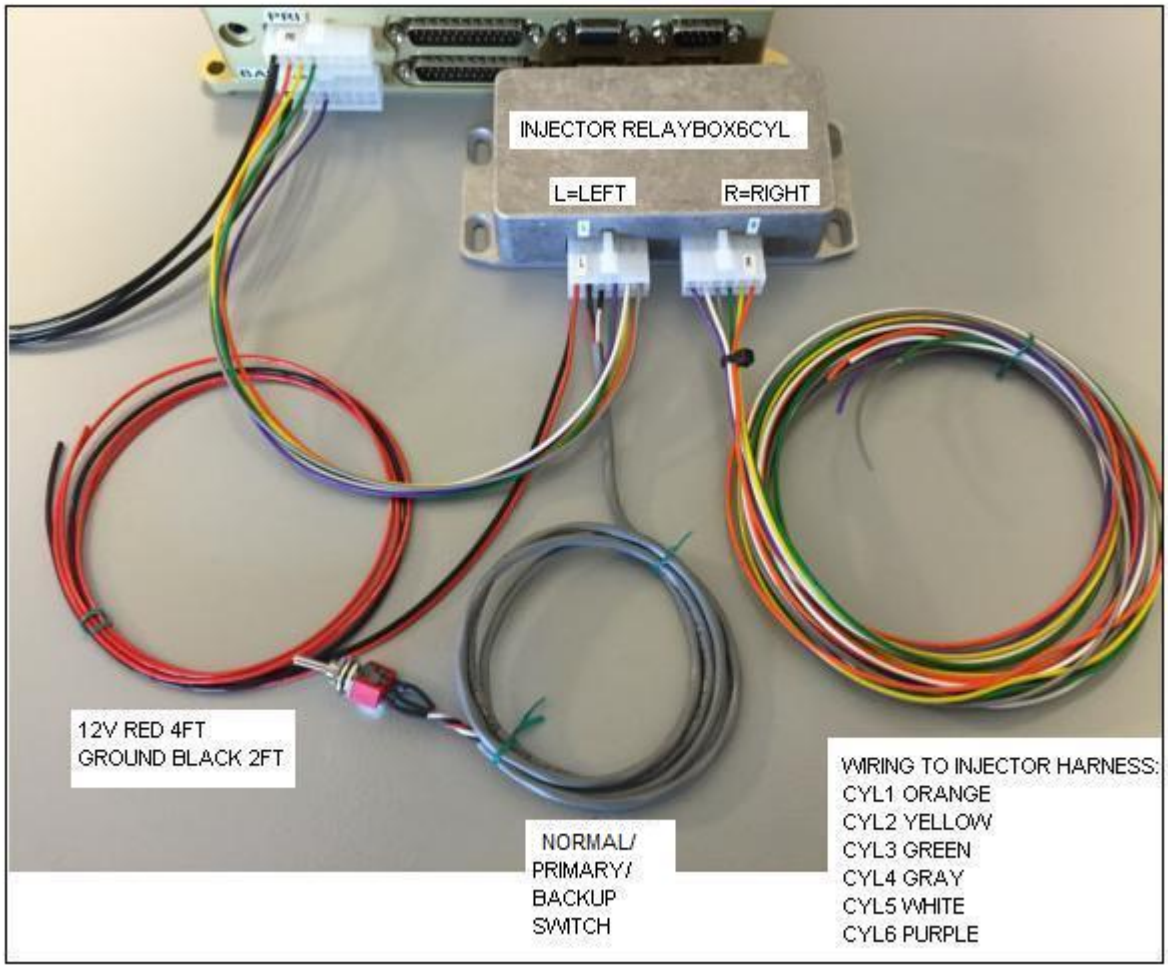
Testing ECU's, Coilpacks and Normal Running

You can test the function of each ECU on the ground by running the engine at idle and running the ECU select switch from NORMAL to PRIMARY to BACKUP and then back to NORMAL. All running in flight should be with the ECU switch in the NORMAL position. We don't recommend you switch the ECUs to Primary or Backup in flight unless the engine stops or runs rough.

To verify both ignition coil packs are running we recommend you switch off power to each coil pack separately. NEVER switch off ECU power to verify coil pack operation.

Injector Relay Wiring

See the photos below for the relay box and ECU selection switch wiring. Figure 4



Switch Functions

It's very important to understand the function of the 3 SDS control switches:

LOP switch- This activates the preset leaning amount and ignition advance feature.

Programmer Select Switch- This allows you to access either ECU for programming, viewing Gauge modes or trimming fuel. It DOES NOT switch ECU function.

ECU Select Switch- This switches control of the fuel injectors ONLY. It does not switch the ignition systems in any way.