

Failing Fuso



Picture sourced from the internet

Vehicle:
2011 Mitsubishi Fuso Fighter 6M60

This article is a true description of an AECS technical help desk problem and how it was solved

Problem presented to the Helpdesk

A 2011 Mitsubishi Fuso Fighter truck with a 6M60 engine presented to a workshop with reports of a mis-fire and hunting at idle. The truck had already been to another workshop who had already removed all 6 injectors and sent them away for testing.

Four were reported to be faulty and replaced and the other two were returned with no fault found (it later transpired that these 2 working injectors had been replaced the year before!). The returned injector set was then fitted and re-coded before the engine was cranked over until the battery went flat. The ECU main power fuse was found to be blown and was replaced before the battery was recharged and further cranking took place. The engine now fired but ran very badly. That's when the decision was made to call for additional help. A familiar story perhaps?

Where to start? The workshop was equipped with Jaltest diagnostic equipment which gave them the



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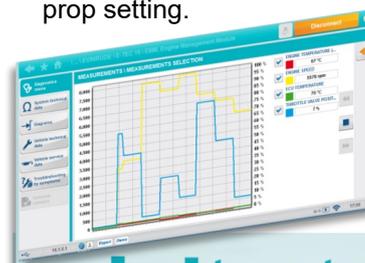
Trailers



Busses



Equipment



Include MULTIBRAND DIAGNOSTICS

AECS technical support as an optional extra

option to do a comprehensive scan of the vehicle to see what fault codes were actually stored. This would help them decide which diagnostic path they needed to go down.

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Scan

The Jaltest vehicle system scan was initiated and it confirmed there was indeed a code stored within the engine ECU. Connecting directly to the ECU for a more comprehensive report returned a P1200 fault code which when compared to the Mitsubishi workshop manual confirmed a fault had been detected with the No2 Injector Circuit.



Fault code and description.

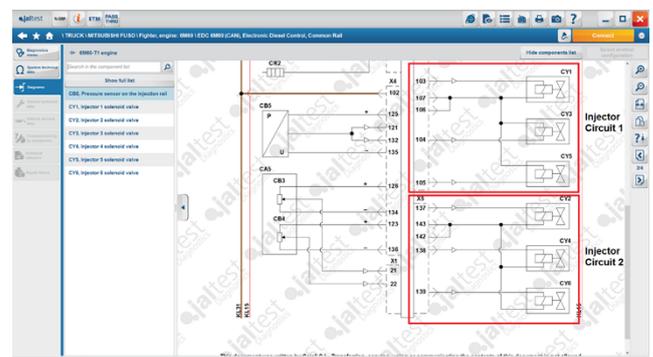
CAUTION: This does not mean that there is a fault with the number 2 injector!! The technician was very keen to dive straight in and replace the No2 injector which could have been a costly mistake.

Fault Code P1200: Injector Circuit 2

This fault code can mean that either injector number 4, 5 or 6 is short-circuited or open-circuit. With momentary short or open-circuits, the ECU is able to recover to run normally after the ignition has been cycled. On the 6M60 common rail engine if the fault is a permanent short or open circuit the running of the engine may be compromised. Common rail injection systems use a pre and main injection sequence with current control and on this system if there is a permanent short circuit present the pre injection stage will be turned off while the main injection will still be attempted although the ECU will limit the actual injection quantity. EGR control will also be inhibited and the cylinder balance through fuelling control will also be switched off. It must be noted that the effects and reaction of an ECU to this kind of fault may differ slightly from one manufacturer to another.

Wiring

Closer inspection of the wiring diagram shows that the injectors are grouped together in two lots of three.

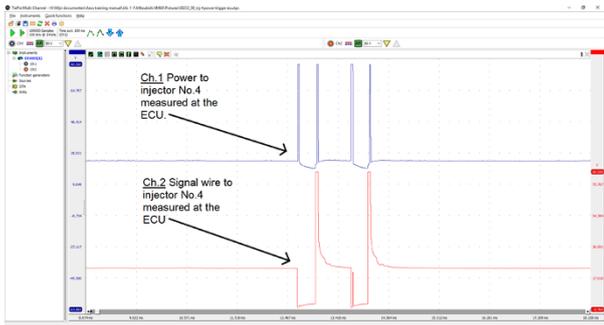


Wiring diagram in Jaltest diagnostic tool.

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Measure

At this point a cursory measurement was taken on just one of the injectors on the suspect injector circuit #2 to establish what might be going on.

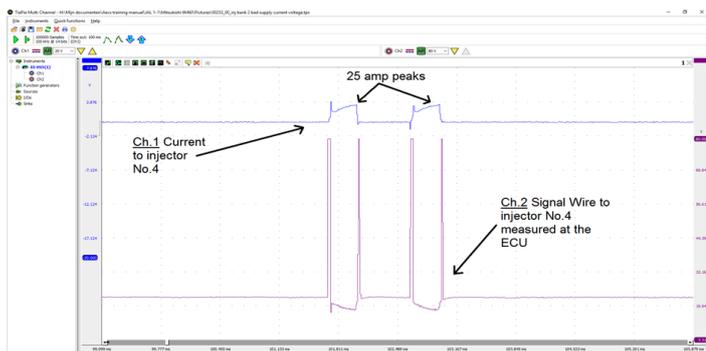


Picture 1: Both wires to the injector bank2 measured at the ECU.

Measurement is done directly at the ECU so the whole circuit is taken into consideration. We can see from the measurement that the ECU does indeed trigger the injector with the large voltage spike required to start injector movement but the voltage then appears to be pulled down below 24volts suggesting that there may be a short circuit or failure in the power supply from the ECU.

As we suspect a possible short circuit or ECU injector power supply issue we now need to measure the current actually being supplied from the ECU. A current clamp measurement can prove invaluable when trying to make a decision like this where we could potentially be looking at an ECU replacement. A very expensive call should that be the ultimate result.

Scope recording taken from the faulty injector bank.



Picture 2: Current and power supply to the injector bank.

While we can see the injector being switched on, the current rapidly rises to 25amps and beyond acceptable levels to the ECU before being switched off. This amount of current should be easily high enough to activate current control by the ECU but no control is activated. The injector is then triggered again but with the same result.

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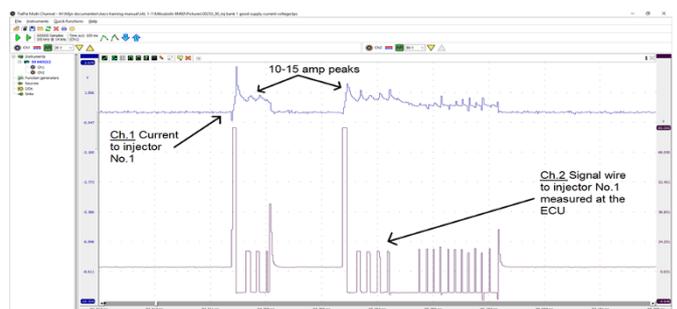


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*Be quick only 8 left!

The good bank of injectors was measured for reference purposes and it is immediately clear that there is normal injector activation with current control. Notice the current ramping up and down as the ECU rapidly switches the signal line to the injector.



Picture 3: Scope recording showing correct injector current control.

Conclusion

The engine wiring harness was then thoroughly inspected for physical short circuits before the decision was made to order a new \$4000 ECU. It is almost certain that the failed injectors would have been damaged over a period of time with such high currents passing through the coils. Regular diagnostic scans during annual services may have

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detected this issue earlier had the owner chosen to use a workshop equipped with the latest in diagnostic technology. Note: this case is covered in more detail in the Truck scan course.

With modern diagnostic equipment and training this workshop supported by AECS technical help was able to come to the correct result in the minimum amount of time. Who will this truck owner be calling on first, next time he has issues!

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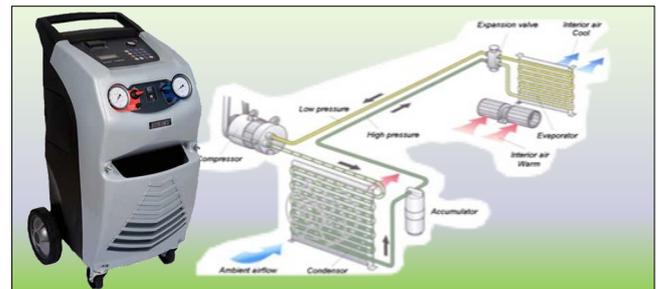
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