



FIAT BRAVA /BRAVO 1.6

This month I am going to take a slightly different look at a profitable vehicle within the Fiat range. They appear in the following variants.

1.4 BOC SH MA 1.7.3

1.6 IAW MPI 1AF

1.8 HITACHI MPI

2.0 BOC SH M 2.10.4

It is worth noting that ALFA use very similar systems in their 2.0 vehicle range. Two key problems, pardon the pun are immobiliser errors using encryption key systems and injector failure.

I have chosen the 1.6 for the purpose of evaluation. The system is fully supported by serial communication from a number of manufactures with access to serial data and Dtc's .The ECM is easily located by the side of the battery. 55 pin Bocsh pattern socket is supported by breakout boxes from both Sykes Pickavant and Autodiagnos. Ignition system is wasted spark type, and is easily accessible at the rear of the cylinder head. Coil failure is common on Fiat vehicles do check their output and insulation carefully.

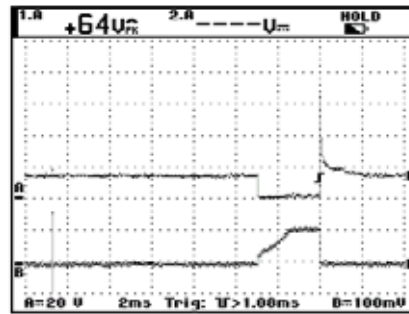
I could say a lot about the injectors most of it unprintable but they do earn good profit. Ranging from total failure resulting in a misfire to subtle hesitation and MOT emission failure. To evaluate the injectors fully I suggest the following options.

- (1) Oscilloscope
- (2) Inductive current clamp
- (3) Digital multi meter
- (4) Code reader
- (5) Exhaust gas analyser

My choice would be the oscilloscope and the inductive current clamp. . Measuring the voltage path and the current during the opening period ensures complete knowledge of the circuit and how the injector is responding. First measurement is the injector pulse time, which should be 3.2 m/s with a hot engine.

Next look at the inductive spike at the close of the injector this is critical and should peak at 57-64 volts.

You are going to have to use a good scope to clip it accurately I have given you enough clues in this direction. Current flow is the most conclusive evidence 1 amp only please. The most common occurrence is excessive current often with an increase of up to 2amps with a corresponding drop in the induced voltage see waveform (1) Good (2) faulty



(1)

(2)

Using the DMM carefully note the resistance this will vary with temperature, at ambient temperature expect 14.5-15 ohms be critical (if you are looking for flexibility go to the gym). Faulty injectors usually have a lower ohmic value.

The next option is serial interrogation but this method does not stand a cat in hell chance of premature or intransient injector error.

I do not subscribe to changing all injectors only replacing faulty items after careful evaluation ensuring a durable repair...Access to the injector loom is ideal for all the above options without removal.

Final choice of evaluation using a gas analyser my choice would be the Crypton 290.

Although only a 4 gas unit offering no nox measurement it has a far superior filtration system and the sample pumping rate is twice that of the 295 five gas unit the gas bench is a superior andross unit utilising a mechanical chopper.

Using the gas bench to assist in injector evaluation may not be that straightforward. Assuming the following normal figures

Co% 0.00%

HC 0.00%

Co2 15%

O2 0.00%

Total injector failure will result in no increase in co and a substantial drop in co2, expect 4% co2 drop per failed injector. Expect an increase of 5% O2 per failed injector. However subtle errors may only be identified by a small increase in o2 often pushing up the lambda ratio above the mo2 max 1.03.

Check carefully for air leaks in the exhaust that may confuse or create false downstream measurement.

The second and probably the most troublesome fault is the immobiliser system, references here can be applied to other Fiat and Alfa vehicles.

The system breakdown is as follows.

Three keys with electronic codes a transponder (transmitter receiver) an antenna engine management ECU with a bi-directional serial link to the transponder pin 48, a security card with emergency procedures and secure codes.

The functions are as follows

- . (1) Recognise key insertion
- (2) Emit Electro magnetic field and activate transponder
- (3) Receive codes from key
- (4) Store up to 8 keys
- (5) Manage code processing
- (6) control bi-directional link
- (7) Control warning lamp indicator

The two types of immobilised systems are magnetically coupled (close proximity) and radio coupled transmitting a coded signal approx. 10 meters.

The dash warning lamp (key symbol) identifies the system status

- (1) on for 0.7 second then off all OK
- (2) flashing ECM or transponder no codes stored
- (3) permanently on ignition on
 - (a) code not recognised
 - (b) serial link or com failure
 - (c) code saving procedure not correct

Vehicles employing the radio coupled alarm system are as follows

- (1) radio coupled transmitter in the key
- (2) antenna in the interior lamp module with programming button and system status led
- (3) alarm ECM
- (4) emergency key switch
- (5) vehicle sensors

Note when replacing interior lamp modules ensure correct colour match of led lamp (red or green)

The master key is vital if re-coding of further keys is to be achieved, however providing the other keys are serviceable they can be cloned off the vehicle. If the transponder becomes faulty new keys lock set and transponder must be accompanied by a new or blank coded ECU.

However an uncoded ECU will run in uncoded status without any transponder input (leave transponder unplugged) but only from independent suppliers. Once an ECM has received a code from a transponder it is then unique to that vehicle but can run normally in unprotected open code format and therefor transferable to other vehicles.

My understanding excluding late vehicles, which use Crypto codes, is that each key transmits a single repeatable code and when accepted by the transponder passes on a 32-bit code to the engine ECM.

More technically detailed information including sensitive wiring diagrams will be available soon on subscription.