



ALFA 156 MOTRONIC 1.5.5

A recent experience with a Alfa 156 presented itself as an ideal topic for this month.

One of the challenges writing topics like this is ensuring diversity, and a genuine record of our repairs. We pride ourselves on our integrity when dealing with what can prove to be extremely challenging problems.

This topic is a story of an ideal customer and a complex set of individual problems with similar symptoms.

The Alfa appeared on face value to be in a good state of repair, recently purchased by the owner, who point blankly refused to take it to the main agents.

The symptoms presented themselves as hesitation or jerky drivability. We began our investigation with a serial check using the Autodiagnos serial tool, embodying the excellent recent CDI update. However with no DTC's recorded, we began to examine the vehicle in more detail.

Before involving detailed electronic tests we carried out our usual visual preparation procedure. Starting with the ignition system the Motronic 1.5.5 control presents some interesting variants.

Alfas twin spark ignition uses a wasted spark coil pack providing one coil per cylinder with twin spark plugs. This is achieved with the coil mounted directly on one plug and the second coil output providing the second spark on the opposite cylinder.

Removing the coils, and spark plugs, confirmed several problems. Firstly the spark plug apertures had been previously flooded with water, leaving deposits on both the coil extension and the HT leads, the plugs however were new.

A more worrying problem was discovered when examining the coil; three out of the four coils had severe cracks in the housings extending to the HT Tower.

This supports our view that basic preparation must precede electronic investigation, because simple faults as with coils can cause apparent complex electronic symptoms. We contacted our customer, who at this point was new and unknown to us. Explaining the cost of new coils at £107 each, with labour the bill was not including the possibility of further work in excess of £500 ..

We were able to recover the HT leads and wash the apertures. The coils took a couple of days to arrive, therefore was delaying any further evaluation.

Assured of our customer's confidence, we reassembled the vehicle with new coils and conducted a test drive, having checked basic functionality, such as ignition profile and Lambda switching, using an Oscilloscope.

To say the test drive was disappointing was an understatement, severe hesitation on light throttle, just as was previously found.

We attached our Tektronix 4 channel Oscilloscope to the key circuits ie. Ignition, injectors, crank angle sensors and Lambda.

The intention was to monitor outputs, trigger and keep an eye on combustion efficiency.

We discovered that on light throttle several injector pulses were missing, all be it intermittent. The ignition profile was stable and therefore so was the CAS (trigger). Lambda output confirmed that the instant of injector pulse error the Lambda switched go rich, confirming no fuel delivery into the engine.

Our further investigations into the relevant components, i.e. throttle potentiometer confirmed excessive electrical noise. The possibility crossed our minds that at light throttle with an engine speed above 1500 the ECU would probably interpret the erratic pot output, and engage overrun fuel cut off.

We replaced the integral idle motor and potentiometer assembly rechecking the output.

The output was now clean and signal integrity restored. The next test drive did demonstrate some improvement, but not a total cure.

Back to basics, re-examining the symptoms, all the evidence pointed to a discreet input software error. We rechecked all inputs with the greatest care and accuracy without any evidence of error.

Having made discrete enquiries about software updates our only remaining possibility was a faulty ECU.

Before contemplating replacing the ECU we rechecked the error, confirming the intermittent loss of injector pulse at light throttle. We purchased a new ECU from our local Bosch supplier, it arrived opened and previously fitted, confirmed by witness marks on the housing plate. It failed to encode and run, so we returned it promptly. We obtained a O/E replacement via the main agents, and successfully encoding it to the vehicle, which now performed much better. However despite all the progress following the previous work, we were not satisfied.

The final touch was a peach; during the several days of investigations we noted the need to keep charging the battery. This in itself was not the problem, we took a careful look at the A/C noise on the DC power lines and noted the amplitude sampling in excess of 500 MV, this normally points to faulty rectification.

Raising the vehicle with the intention of removing the main power lead in order to re access the error, we noticed the exciter wire was not secure.

Following the adjustment to the exciter terminal the A/C noise had returned to below 100 MV. This had the result of smoothing all power lines considerably.

The final test drive confirmed our efforts worthwhile, superb smooth transition between fuel on and overrun cut off.

So was this the end to the problems? No, examination to the alternator demanded lifting the vehicle on the ramp, we used the opportunity to look over the vehicles underside, and found the catalyst recently disturbed and sealed with paste, was in fact broken up inside the casing. This confirms the initial coil errors

The true end to the story is how patient and confident our customer was, leaving us to resolve the difficulties at every stage, guaranteed mutual trust.

Total cost of the repair was in excess of £1250 (not including the catalyst). He expressed the warmest thanks and appreciation, we in turn thanked him for the respect he held in our expertise.

This vehicle also served as a focal point of a recent training course, and is the latest in-depth technical topic available on subscription.