

UNLUCKY 13

Stu reveals 13 of the most common problems for Escort RS Turbos.

Words: Stewart Sanderson



Having worked as a tuner for 17 years, Stewart 'Stu' Sanderson is one of the most-respected names in the business.

A Level 5-trained fuel-injection technician, in the past Stu has worked for a Ford Rallye Sport dealer, a well-known fuel-injection specialist and various tuning companies.

Then seven years ago he joined forces with Kenny Walker and opened up Motorsport Developments near Blackpool (01253 508400, www.remapping.co.uk), specialising in engine management live remapping, as well as developing a range of Evolution chips which are now sold all over the world.

He's also jointly responsible with Webmaster, Petrucci for www.passionford.com. Started in 2003, it's grown rapidly from a few friends contributing, to one of the biggest Ford communities on the web.

Stu's enviable knowledge of the workings of modern-day Ford performance engines means that every month he's just the man to explain how and why things work, and most importantly how they can be improved.

HERE I am again, fresh from my honeymoon and raring to go, so let's get straight back into it by covering something that will be useful to many of you who own, or intend to own, an Escort RS Turbo.

The unreliability of this engine management system is by now probably legendary, but it doesn't have to be that way. To illustrate this I'm going to cover things that will make you realise that it is just a quirky old system that many people simply don't understand.

These cars were extremely reliable for years, but now that the youngest one is around 17 years old and the eldest one around 22 they do, like any old vehicle, have their age-related problems that can cause breakdowns, misfires and even complete engine failure. So, I thought it would be useful to cover the 13 most common things that tend to go wrong, why they go wrong and how much it will cost to fix them.



1. OVERHEATING DUE TO FAILED COOLING FAN CIRCUIT

WHAT GOES WRONG AND WHY?

This is a very common problem that afflicts all Escort RS Turbos right from the original S1 Mk3 back in 1985 up to the facelift Mk4s of 1990.

The cooling fan circuit is exactly the same as any CVH motor and consequently suffers from exactly the same faults they did. The fan activation switch in the side of

the thermostat housing suffers from failure and/or poor contacts and leaves the engine cooking.

HOW TO SORT IT?

A new switch often does it, but sometimes a new connector is needed too.

HOW MUCH IT WILL COST?

Expect to pay around £40 with all parts and labour included.



If your fans pack up, it's gonna get mighty hot in the engine bay

2. TPS FAILURE: POOR RUNNING & POTENTIAL ENGINE FAILURE



If the TPS fails then the engine will run lean, and melt

WHAT GOES WRONG AND WHY?

The TPS is commonly found to be either maladjusted or failed. This component sends the ECU information on throttle angle so it can determine whether you are off the throttle, on it cruising or on it hard.

If it doesn't work you will find yourself with a car that tends to pop and bang on the overrun or one that has

lost its edge on boost, often leading to destroyed pistons as a result of running lean.

HOW TO SORT IT?

Once the sensor has been diagnosed as dead a new one is needed. If you're lucky it will simply need to be adjusted. A nice easy job for a pro.

HOW MUCH IT WILL COST?

All good KE tuners will stock these items new for about £50.

3. TURBOCHARGER FAILURE FROM POOR FITTING PRESSURE PIPES

WHAT GOES WRONG AND WHY?

Turbocharger failure is a common problem on the CVH turbo. One of the things we do as part of a set-up is pressurise the intake system to a little above whatever boost you intend to run. On a CVH with a standard T3 we would pressurise the entire system to 20 psi and see what leaks. You would be astounded, I estimate that only 1 in 20 cars pass this test!

Normally, leaks will be found from 3 psi upwards on the CVH. So why does an air leak kill turbos? A turbo is designed to flow air as a volume, so let's say our turbo is designed to reliably provide 15 lb per min of air at 1 bar of pressure.

Now imagine you have set your boost to 1 bar as the manufacturer suggested, but we had a lot of quite large air leaks. The first thing we have is more lag, which you may well blame on your new, bigger turbo. More importantly as far as reliability goes is the fact

that the turbo, due to the way a wastegate operates, will continue to supply air until it is forced to stop by its wastegate opening and bypassing gas from the turbine. This means we will often be supplying 15 lb of air to the engine as intended, but another 5 lb per minute of air out to the atmosphere through all our leaks, so your turbo is really doing 20 lb of air per minute which is over 30 per cent too much airflow.

Expect it to fail in a considerably shorter time than normal, even though you're sure you did nothing wrong.

HOW TO SORT IT?

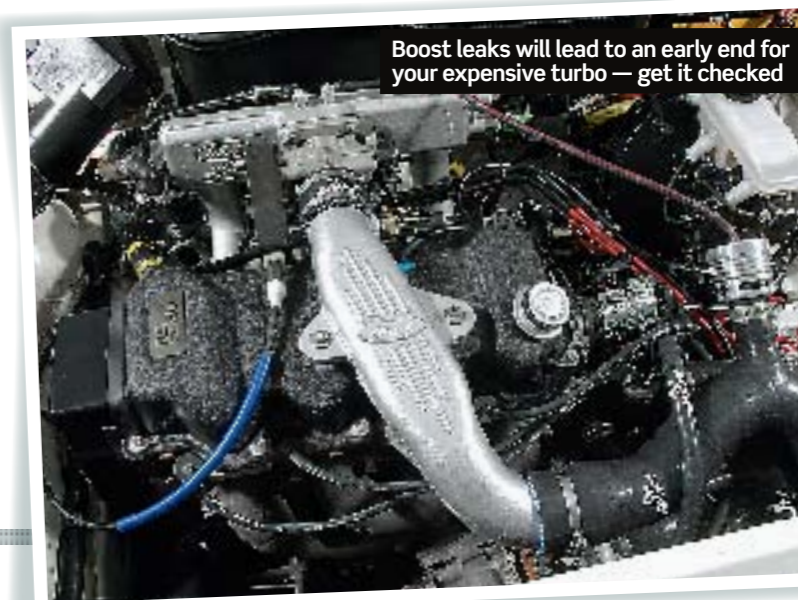
Have a professional with the correct equipment check your system over. Looking at boost hoses etc is

pointless as the amount of air pressure we are talking is immense. Would you expect a hose clip to reliably hold your Escort's tyre on nice and air tight? We're talking similar pressures here on well-tuned examples and it's amazing that a normal hose clip can hold it in at all when you consider the engine is

also lurching around and everything gets very hot and oily.

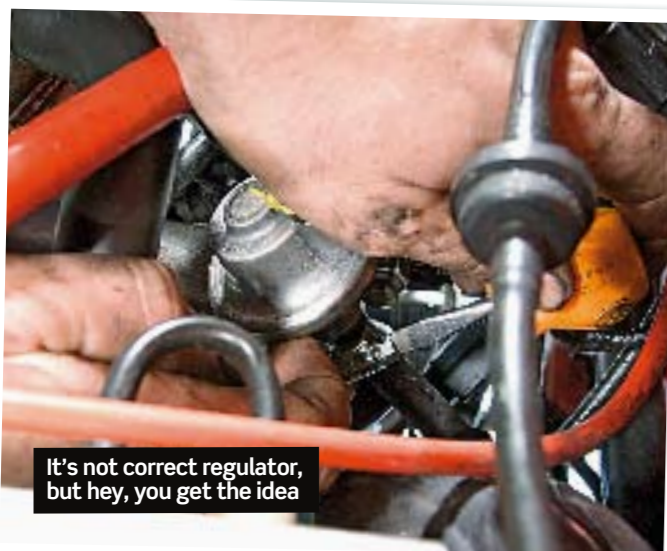
HOW MUCH IT WILL COST?

Tricky to say, it should be done by all tuners as part of the job when setting up or prior to tuning, but if done separately expect to pay around an hour's labour.



Boost leaks will lead to an early end for your expensive turbo — get it checked

4. ELECTROMAGNETIC FUEL PRESSURE REGULATOR PROBLEMS



It's not correct regulator, but hey, you get the idea

WHAT GOES WRONG AND WHY?

This is one of the lesser understood parts of the Bosch KE system, and since I plan to do a feature on Bosch KE in the future I won't go into too much detail about how it works or why it does what it does here. Suffice to say it controls exactly how much fuel is injected into the engine across its operating range from start up to flat-out on boost at 7000 rpm-plus. When ill-informed people mess with it, the whole system can be ruined giving a whole range of symptoms depending on what was done to it.

Normal symptoms of a badly calibrated EMFPR are things like black smoke or using too much fuel if the settings have been left too rich. If left too lean expect jerky and hesitant throttle response or a lean detonating engine just awaiting meltdown.

HOW TO SORT IT?

Let a professional do this part of tuning for you. Without the correct analysis equipment you will never get it perfectly correct.

HOW MUCH IT WILL COST?

Should be part of a set-up at any tuners who know their onions with Bosch KE.

5. ENGINE MELTDOWN DUE TO FUEL PUMP WIRING

WHAT GOES WRONG AND WHY?

This is caused by nothing more than old age creeping up on the wiring. We should ideally have alternator voltage at the fuel pump itself so anywhere between 13 and 14 DC volts is fine.

The problem is that this is a high current circuit and as the years go by this high current takes its toll on the various contacts within the system, such as the supply relay and the terminals of the pump itself. It's not

uncommon to find the system as low as nine volts once the electrical system is under heavy load.

HOW TO SORT IT?

It's relatively straightforward to sort. All we need to do is run a totally new and independently fused power supply spur from the battery itself, right the way through the car to the boot area and mount a new high current-capable relay there to switch the new supply to the pump on

and off. It is very important that on road cars the pump activation switching itself is still performed by the ECU as per OEM specifications, so don't stick it on a silly switch.

HOW MUCH IT WILL COST?

The cost of a fuel pump rewire including the wire and relay will obviously vary according to labour and parts rates, but I would expect the parts and labour to cost you around £100-£150 all in.



Be aware that old wiring will degrade over time

6. MISFIRES CAUSED BY OLD IGNITION SYSTEM



Make sure your ignition system is regularly serviced

WHAT GOES WRONG AND WHY?

I'm sure all CVH owners have had the pleasure of putting their foot down and being greeted with nothing but misfires and no power! The most common problem is poor maintenance and old age. The

distributor cap and rotor arm system is from the dark ages and doesn't lend itself well to a high-power engine at all. That said, it works extremely well on the CVH when it's in good condition, in fact it's capable of remarkable performance if

only owners would maintain it properly with the correct parts of the correct grade.

Any increase in gaps can cause misfires, so the distributor cap and rotor arm both need to be in perfect condition to start with. HT leads must be in A1 condition and spark plugs must be of the correct heat range and gapped correctly. If your car is developing more power than standard then that doesn't mean gapped as per the handbook. The handbook tells you the gap for a standard engine, nothing else.

It's also not uncommon for the old coil to be causing a low voltage problem, nor is it uncommon to find the power supply to the coil is below 10 volts.

There's that old wiring again...

HOW TO SORT IT?

A new distributor cap, rotor arm and spark plugs can cure many problems, as can new HT leads, coils and a new power supply spur to the coil itself.

HOW MUCH IT WILL COST?

A decent distributor cap, rotor arm HT leads and spark plugs can be had for as little as £55



7. EXCESSIVE BOOST CAUSING ENGINE MELTDOWN

WHAT GOES WRONG AND WHY?

Big boost seems to be the main requirement of all turbocharged car owners. Very few owners pay any heed to the amount of available fuel in the engine and it's incredibly rare I see a fuel pressure gauge on a dash, only a boost pressure one, yet the fuel is so much more important.

We don't have much room to go in depth but more boost equals more air and more air equals a need for

more fuel, and if you don't provide the latter, your engine will die. Notice I didn't say it may die, I said it will die.

HOW TO SORT IT?

Easy one this, if your tuner (it was all set up by a tuner with professional monitoring equipment of course?) set the boost to say, 10, 15 or maybe 20 psi, leave it there. Do not listen to your pal in the pub who had 35 psi on that set-up and thinks you

need to add a bleed valve or a tweak of the actuator, and do not let anyone at all other than professionals with boost and fuel monitoring equipment adjust the power settings on your engine.

HOW MUCH IT WILL COST?

Personally I would be advising a full set-up to go through everything and ensure engine safety at an average cost of £120-£150. Call your favourite tuner to book a set-up today.



Det is a killer. If you hear what sounds like gravel shaking in a can ease off!



As a lot of RSs are over 20 years old now, so is the wiring you can't see

8. ENGINE BAY LOOM DEGRADATION

WHAT GOES WRONG AND WHY?

The wiring harness, as previously mentioned, is very old indeed, yet we expect it to carry air temperature, air pressure, coolant temperature and throttle position information to the ECU when you're pulling 7000 rpm in fourth and fifth gears without a second thought.

When that signal is degraded due to old wiring and connectors the result can be catastrophic for your poor old engine and a breakdown is

the best-case scenario, with a destroyed engine as potentially the worst.

HOW TO SORT IT?

Easy, first of all have a pro check it all out and datalog some runs with it, most wiring issues can be sorted by a tuner with some patience.

HOW MUCH IT WILL COST?

Costs vary to check looms but datalogging sessions should be done as part of a set-up to ascertain if you have any problems.

9. SENSOR CONDITION CAUSING NON-START OR POOR RUNNING

WHAT GOES WRONG AND WHY?

The only sensors that require any actual adjustment with Bosch KE are the throttle position and airflow flap position sensors. While these sensors are crucial to the correct running of your engine, you are more likely to get poor running and driveability problems from these sensors being badly adjusted than an actual non-start condition.

However, failure of the air or coolant sensors can leave you with a dead engine, as can failure of the electromagnetic fuel pressure regulator or one of the ECUs. It's also worth noting that all the tricky to access sensor plugs at the rear of the cylinder

head are colour coded, yet so many cars come to me with them fitted in the wrong places after engine work.

HOW TO SORT IT?

Get a professional to check the calibration of the sensors. It should be done as par for the course during a set-up.

HOW MUCH IT WILL COST?

Depends on how long it took your technician to do. The coolant sensor is located in a really tricky place and the screws on the airflow potentiometer are a bit of a bugger to get at.



10. AIR LEAKS CAUSING POOR RUNNING OR NON START

WHAT GOES WRONG AND WHY?

One of the biggest causes of bad running on the KE system is leaking air. Due to the way the system works, the entire system from inlet valve right back to the airflow meter must be fully airtight. This includes things such as the oil filler cap, dipstick seal and all the gaskets and seals.

This may seem odd, but I'll explain further when we do our Bosch KE Jetronic feature in the future. Until then, you will just have to trust me

when I tell you your oil filler cap seal being poor can prevent the car from starting.

HOW TO SORT IT?

Ensure all your seals work, dump valves are the correct type and your breather system is working correctly and airtight.

HOW MUCH IT WILL COST?

Impossible to quote for as it depends on the problem. Oil filler cap? About a fiver. Crankcase main oil seal, gearbox out...



Air leaks on an RST will simply stop the car from running

12. BEARINGS DESTROYED FROM OIL CONTAMINATION FROM FUEL



WHAT GOES WRONG AND WHY?

Sadly something we see on a very regular basis. The problem is usually a poorly set-up engine using excessive fuel pressure. Some people are happy to

tune a car running poor fuelling figures and, while safe from piston meltdown, it wears the rest of the engine exponentially by leaving a damp mixture of fuel on the bores and rings so that the lubricating oil is washed away. In extreme cases the excess oil will find its way down into the sump and dilute the oil.

The results long term are catastrophic for the engine bearings and turbocharger etc. The problem can, if left, create more oil leaks as it lowers the viscosity of the oil and attacks

all the seals it comes into contact with. The first clue you'll have is that your engine returns poor fuel economy...

HOW TO SORT IT?

Get it checked over professionally. A set-up from a tuner good with Bosch KE would pinpoint any problems like this and alleviate them where possible.

HOW MUCH IT WILL COST?

Normally requires a full set-up to ensure the extra fuel is not due to a sensor or wiring/ECU error.

13. PROBLEMS CAUSED BY POOR GENERAL SET-UP

WHAT GOES WRONG AND WHY?

When was the last time you had your base idle setting adjusted, or your wastegate pre-load checked? Are you sure your cam timing is spot on, or maybe your base idle fuel setting (known as the CO)?

All these items are adjustable and intended to be adjusted once in a while by experienced technicians to allow the engine to operate at its best. If they are wrong, or you haven't had them checked in ages, you have no right to complain if the engine grinds to a halt on you one day.

HOW TO SORT IT?

Ensure all your adjustable settings are correct and the engine is fully serviced at all times.

HOW MUCH IT WILL COST?

A full set-up with most tuners will be between £120 and £150.

11. ECU FAILURE: LACK OF ON-LOAD FUELLING AND POOR COLD START

WHAT GOES WRONG AND WHY?

A common Bosch KE failure is the fuel ECU. As I'll be doing an in-depth KE article I won't go into too much detail, but basically without the Black ECU working correctly, you have an XR3i management system that can't see a turbo, but worse it can't start properly when cold.

The fuel ECU provides all post starting and cold running enrichment as well as the extra fuel for boost conditions.

As well as failing, it's not uncommon for owners to remove the fuse for the fuel ECU by accident. Ford in its wisdom never made a new fusebox lid for the Bosch KE-equipped cars, so the S2 cars have the ECU fuse labelled as the Heated Seats. Which fuse would you remove

if your lights failed one night? One from a circuit powering an option the car isn't fitted with is normally the first port of call. Such a tragedy that many owners have then hit the motorway and lost the engine in a lean meltdown and never found out what caused it.

HOW TO SORT IT?

Once the ECU's been diagnosed as dead a new one is required. Be aware that S1 and S2 cars had different boxes and require an internal modification to run them on the opposing loom. Of course if all you need is a fuse, it's your lucky day.

HOW MUCH IT WILL COST?

You probably wouldn't buy a new one now, so look at breakers or eBay for a good used item.

A knackered fuel ECU will result in meltdown



CONCLUSION

I would say those 13 items accurately represent the most common 13 Bosch KE problems we see daily at Motorsport Developments.

There are of course many more but I haven't the space to go any further. I hope this article will save one or two of you a breakdown or blow up one day.

NEXT MONTH

Intercooling: what is it, how does it work and what different types are there?