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What Each Part Does, and Why

Part by part: what it is, what it does, why people change it and what to watch.

FITMENT Fitment is confirmed in the car filter on the site, never by this document. Naming a topic or a brand is not confirming it fits your car.

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AIR INTAKE

Intake / cold air intake

- Everything between the outside air and the throttle: filter, pipe and airbox.
- **What it does:** feeds the engine clean air with as little restriction and as little heat as possible. Hot air is thin air, and thin air makes less power.
- **Why change it:** the factory box is built for silence and filter life, not flow. A sealed box with a cold feed normally beats an open cone, which drinks engine bay heat.
- **Watch out:** on a MAF car the wrong pipe diameter upsets the sensor and the car runs rich or lean. Pairs with intercooler, charge pipes and a map that knows the new airflow.

Air filter

- The element that traps dirt before it reaches the turbo and the cylinder walls.
- **What it does:** it is the cheapest insurance the engine has. Everything the filter misses ends up between piston and bore.
- **Why change it:** a higher flow element gives back the restriction a tired paper filter takes away. The gain is small and honest; anyone promising more is selling.
- **Watch out:** over-oiled cotton filters leave film on a hot-wire MAF and the idle starts hunting. Oil it the way the maker says, not more.

EXHAUST & BOOST



Intercooler

- A radiator for the air the turbo has just compressed.
- **What it does:** compression heats air, hot air carries less oxygen and invites knock, so the ECU pulls timing. Cooling the charge gives back the timing and the power with it.
- **Why change it:** the factory unit is sized for factory power and a few hard pulls, not a track session. A bigger core holds its outlet temperature instead of heat-soaking after two laps.
- **Watch out:** a core that is too thick trades pressure drop for cooling and can slow spool. Bigger is not automatically better; the right core for the power is.

Downpipe

- The first section of exhaust after the turbine.
- **What it does:** gets gas away from the turbine housing. The turbine spins on pressure difference, so what happens here decides spool and how hard the engine works to breathe out.
- **Why change it:** the factory downpipe usually carries a close-coupled catalyst that is the single biggest restriction on the car. Opening it is the largest single gain on most turbo engines.
- **Watch out:** removing the catalyst entirely is not road legal in most of Europe, throws codes and fails inspection. A high-flow sports cat gives most of the gain and keeps the car legal. Needs a map.

Cat-back exhaust

- Everything behind the catalyst: mid pipe, silencers and tips.
- **What it does:** carries gas out and decides the voice of the car. On a turbo engine the turbine already took most of the energy, so the cat-back is mostly sound and weight.
- **Why change it:** sound, weight and looks, in that order of honesty. On a naturally aspirated engine a well designed system can genuinely help the top end.
- **Watch out:** too large a diameter on a small engine kills low-end torque and buys drone at motorway speed. Resonators exist for a reason. A valved section makes a loud car liveable.

Wastegate

- The valve that lets exhaust gas bypass the turbine.
- **What it does:** it is the only thing standing between you and unlimited boost. It opens to bleed gas away from the turbine so the turbo stops making more.
- **Why change it:** a stronger spring or an external gate holds target boost at high rpm instead of letting it creep or fall away.
- **Watch out:** boost creep, where the gate is too small to bleed enough gas and pressure climbs on its own, is a hardware problem. No map fixes it.



Blow-off / diverter valve

- Releases compressed air when the throttle shuts.
- **What it does:** with the throttle closed, the air the compressor is still pushing has nowhere to go and slams back into the wheel. The valve gives it an exit so the turbo keeps spinning.
- **Why change it:** the factory plastic valve can lift off its seat at higher boost, which bleeds pressure under load. A stronger valve holds.
- **Watch out:** on a MAF car a valve venting to atmosphere dumps air the ECU already counted, so it runs rich and stalls. Recirculate on MAF cars.

Charge pipes

- Carry compressed air from turbo to intercooler to throttle body.
- **What it does:** holds pressure without flexing or splitting. It does no other work, which is exactly why it matters.
- **Why change it:** many factory charge pipes are plastic and crack at the elbow once boost goes up. It is a known failure, not bad luck.
- **Watch out:** a leak here reads as lost power and limp mode, and is one of the first things to pressure-test when a build goes soft.

Turbocharger

- An exhaust-driven pump: a turbine spun by exhaust gas drives a compressor that pushes air into the engine.
- **What it does:** lets a small engine breathe like a big one, at the cost of heat and complexity.
- **Why change it:** the factory turbo runs out of flow before the engine does. A bigger or hybrid unit moves the ceiling up, and moves the power band up with it.
- **Watch out:** shaft speed, not the boost number, is what kills a turbo. Buy fuelling and cooling before turbo size, or the build stalls half finished.

Catch can

- Sits in the crankcase breather line and traps the oil mist it carries.
- **What it does:** the crankcase breathes oil vapour back into the intake. On a direct injection engine no fuel washes the valves, so that vapour bakes onto them.
- **Why change it:** keeps the intake tract and the valves clean, and stops oil mist raising charge temperature.
- **Watch out:** a can with no baffling and no drain is a jar that fills with mayonnaise in winter. Empty it on the service interval or it is decoration.

COOLING



Radiator

- Where the engine's heat leaves the car.
- **What it does:** coolant carries heat out of the block and the radiator hands it to the air. Everything about reliability under load runs through this part.
- **Why change it:** more power is more heat. A thicker core or an aluminium replacement holds temperature on a long pull where the factory unit gives up.
- **Watch out:** a huge radiator with poor airflow sealing does nothing. Air takes the easy path around the core unless you make it go through. Pairs with fans, shrouds and a thermostat.

Oil cooler

- A small radiator for engine or gearbox oil.
- **What it does:** oil carries heat away from bearings and from the turbo. Hot oil thins out and stops holding a film, which is how bearings die.
- **Why fit one:** on track, water temperature can look fine while oil temperature climbs past where the oil protects anything.
- **Watch out:** a cooler with no thermostat means an engine that never reaches temperature in winter, which is its own kind of wear. Fit an oil temperature gauge or you are guessing.

Silicone hoses

- Replace the rubber coolant and vacuum lines.
- **What it does:** carries coolant between block, radiator and heater, under pressure and constant heat cycling.
- **Why change them:** old rubber goes soft and swells internally, and a collapsed hose starves the pump at exactly the wrong moment.
- **Watch out:** silicone is not oil resistant. It belongs on coolant and air, never on fuel or oil. Fit new clamps with new hoses.

BRAKES

Brake pads

- The friction material that squeezes the disc.
- **What it does:** turns speed into heat. Everything a pad is good at and bad at follows from the temperature window its compound was made for.
- **Why change them:** a street pad asked to do a track day glazes and fades. A track pad on a cold morning commute squeals, dusts and barely bites until it is warm.
- **Watch out:** pick the compound for how you actually drive, not for the fastest lap you imagine. Bed them in properly or the first hard stop ruins the disc.



Brake discs

- The surface the pad works against, and the heat sink of the whole system.
- **What it does:** stores and sheds the heat the pad makes. Its mass and its venting decide how many hard stops you get before fade.
- **Why change them:** a bigger or better vented disc is mostly about repeat performance, not about one stop. Slots and drillings help gas and water escape; drillings also start cracks on a hard-worked disc.
- **Watch out:** a warped disc is usually not warped. It is pad material unevenly deposited, and it comes from stopping hot and holding the pedal.

Braided brake lines

- Stainless braided hoses in place of the rubber flexible lines.
- **What it does:** carries pressure from the master cylinder to the caliper without expanding.
- **Why change them:** rubber lines swell under pressure, and that swelling is pedal travel you feel as sponginess. Braided lines give the pedal back its edge.
- **Watch out:** braided lines do not make the brakes stronger, they make the pedal clearer. If the pedal goes long when hot, the problem is fluid boiling, not the hose.

Big brake kit

- Larger discs with multi-piston calipers and matched pads.
- **What it does:** more pad area and more disc mass means more heat capacity, and a bigger disc gives the pad more leverage on the wheel.
- **Why fit one:** repeatability. One stop from speed is about tyre, not caliper. Ten stops in a row is about heat, and that is where a big kit wins.
- **Watch out:** it must clear the wheel, and it changes front to rear balance. A front kit without thinking about the rear can make the car unstable under braking.

SUSPENSION

Coilovers

- Spring and damper in one adjustable unit, with ride height on a threaded body.
- **What it does:** controls how the body moves over the spring, and sets how much tyre stays on the road.
- **Why fit them:** to choose spring rate, damping and height for how the car is used, instead of accepting the one compromise the factory picked.
- **Watch out:** a cheap coilover is a stiff spring with a damper that cannot control it, and it is slower than stock everywhere except in photos. Alignment after fitting is not optional.



Lowering springs

- Shorter, usually stiffer springs on the factory dampers.
- **What it does:** drops the car and raises the rate, which cuts body roll and lowers the centre of gravity a little.
- **Why fit them:** the cheapest way to change stance and reduce roll without going to coilovers.
- **Watch out:** the factory damper was valved for the factory spring. A much stiffer spring on a tired damper bounces, and the damper dies early. Check alignment and bump stop clearance after.

Polyurethane bushings

- Replace the rubber bushings that locate the suspension arms.
- **What it does:** rubber is designed to flex, and that flex is geometry changing under load. A stiffer bushing holds the geometry you set.
- **Why change them:** worn rubber gives vague steering, clunks and an alignment that will not stay put. Polyurethane holds the setting and sharpens response.
- **Watch out:** harder everywhere is not better. Noise and vibration come through on a daily car, and some positions want rubber by design. Bushings are also a known wear item, so replacing old ones often fixes a problem people blame on dampers.

Anti-roll bar

- A torsion bar linking left and right suspension.
- **What it does:** resists body roll by making one side lean on the other. It also transfers load across the axle, which is why it changes the balance of the car.
- **Why change it:** it is the cheapest, most reversible way to shift understeer and oversteer. Stiffer at the front adds understeer, stiffer at the rear adds oversteer.
- **Watch out:** a very stiff bar lifts the inside wheel over a bumpy corner and loses grip. Change one end at a time and feel it before changing the other.

CHASSIS & BRACING

Strut brace

- A bar tying the two suspension towers together.
- **What it does:** stops the towers moving apart under cornering load, so the camber you set is closer to the camber you get.
- **Why fit one:** on a car with a soft shell it tightens turn-in and makes the steering feel more consistent.
- **Watch out:** on an already stiff chassis the gain is small and honest. Nobody feels a strut brace on a dyno sheet; you feel it in the first two degrees of steering.



ENGINE & DRIVETRAIN

Performance clutch

- Friction disc and pressure plate sized for the torque the engine now makes.
- **What it does:** it is the fuse between engine and gearbox. It holds torque, and when it cannot, it slips.
- **Why change it:** the factory clutch is specified for factory torque with a small margin. Past that margin it slips in the gears where you make the most torque, usually third and fourth.
- **Watch out:** a clutch far stronger than needed gives a brutal pedal and shock-loads the gearbox. Match the clamp load to the torque, not to the biggest number available.

Limited slip differential

- A differential that limits how much faster one wheel can spin than the other.
- **What it does:** an open diff sends torque to the wheel with least grip. An LSD makes both wheels work, so power reaches the road instead of smoking one tyre.
- **Why fit one:** traction out of corners, and a car that behaves predictably when one wheel is light.
- **Watch out:** it changes the handling balance, not just traction. On a front-wheel-drive car it also puts torque steer back into the wheel. Needs the right oil and a running-in period.

Engine and gearbox mounts

- Rubber or polyurethane mounts holding engine and gearbox in the car.
- **What it does:** carries the weight and absorbs the torque reaction every time you get on and off the throttle.
- **Why change them:** worn mounts let the engine move, and that movement shows up as driveline shunt, missed shifts and vibration.
- **Watch out:** solid mounts transmit everything into the cabin. On a road car, a firmer rubber or a filled mount is usually the right compromise.

Head studs

- Replace the factory head bolts with threaded studs and nuts.
- **What it does:** clamps the head to the block. The gasket only seals while that clamp load beats the cylinder pressure trying to lift the head.
- **Why fit them:** factory bolts stretch by design and are specified for factory cylinder pressure. Past that, the head lifts for a fraction of a degree and the gasket starts to go.
- **Watch out:** studs are a reason to pull the engine apart, so they belong in a planned build, not as a panic fix after the gasket already failed.



FUEL SYSTEM

High pressure fuel pump

- Feeds the direct injection rail at the pressure the injectors need.
- **What it does:** on a direct injection engine, rail pressure is what makes the spray atomise. Lose pressure and the fuel does not burn the way the map assumed.
- **Why change it:** the factory pump runs out of volume before the turbo does. On a Stage 2 or Stage 3 build it is usually the first fuel limit you meet.
- **Watch out:** rail pressure drop at high rpm shows as a lean spike exactly where the engine is most loaded. Fuel comes before boost, always.

Injectors

- Meter the fuel into the cylinder or the port.
- **What it does:** flow rate and spray pattern decide whether the mixture is right at every load point, not just at full throttle.
- **Why change them:** when the factory injectors run at or near 100 percent duty cycle, there is nothing left for the map to add and the engine runs lean at the top.
- **Watch out:** bigger injectors need the map rewritten for them. Fitting them without a map makes the car run badly at idle and part throttle.

ELECTRONICS & GAUGES

Wideband sensor and gauge

- A wide range lambda sensor with a gauge or logger.
- **What it does:** tells you the actual air fuel ratio across the whole range, not just the narrow band around stoichiometric that the factory sensor reads.
- **Why fit one:** without it, air fuel ratio is guesswork, and guesswork is how pistons get holed.
- **Watch out:** mount it where it will not fill with condensation on a cold start, and do not trust a free air calibration you never did.

Boost gauge

- Shows manifold pressure, positive and negative.
- **What it does:** tells you whether the turbo is making what the map asked for, and whether it is holding it to redline.
- **Why fit one:** a boost leak, a creeping wastegate and a failing diverter valve all show here first, long before a code appears.



- **Watch out:** read the vacuum side too. An engine that cannot pull proper vacuum at idle has a leak, and that leak is the real problem.

WHEELS & HARDWARE

Forged wheels

- Wheels pressed from a single billet instead of cast from molten alloy.
- **What it does:** forging aligns the grain of the metal, so the same strength comes in less weight.
- **Why fit them:** wheel weight is unsprung and rotating, which means it costs twice, in how the suspension follows the road and in how fast the car accelerates and stops.
- **Watch out:** offset and centre bore matter as much as the look. The wrong offset changes scrub radius and loads the wheel bearing in a way it was not designed for.

Wheel spacers

- Move the wheel outward from the hub.
- **What it does:** widens the track, which slightly reduces weight transfer in corners, and clears brake calipers or suspension.
- **Why fit them:** fitment and stance, and to make a wheel with the wrong offset usable.
- **Watch out:** anything above a few millimetres needs longer studs or extended bolts, and hub-centric is not optional. A spacer also increases the leverage on the wheel bearing.

BODY KITS

Splitter, skirts and diffuser

- Aerodynamic bodywork at the front, sides and rear.
- **What it does:** a splitter builds pressure above and low pressure below the nose, skirts stop air feeding under the car from the sides, and a diffuser lets the underbody air leave cleanly.
- **Why fit it:** on a road car, mostly looks. Working aero needs the three to be designed together, and needs ride height and rake to be right.
- **Watch out:** downforce at one end only is worse than none. A big rear wing with nothing at the front gives you understeer at speed.

LIGHTING

Lighting upgrades

- Headlight, tail light and auxiliary lighting.



- **What it does:** a headlight is a reflector or projector designed around one light source. The beam pattern, not the bulb, is what puts light on the road.
- **Why change it:** a modern projector or a well made assembly gives a defined cut-off and far more usable light than a brighter bulb in an old reflector.
- **Watch out:** an LED or HID bulb dropped into a reflector made for a halogen filament scatters light everywhere, blinds oncoming traffic and is not road legal. Aim the lights after fitting.

SEATS & INTERIOR

Bucket seats and harnesses

- Fixed-back or reclining shell seats, with multi-point belts.
- **What it does:** holds the driver still so the hands are steering and not bracing. A driver who is not fighting the seat is a driver who feels the car.
- **Why fit them:** control first, weight second.
- **Watch out:** a multi-point harness without a proper roll structure can be more dangerous than the factory belt in a road crash, because it holds the torso down and loads the spine. On the road, a three-point belt with a supportive seat is the sane combination.