Aston Martin Specialists

Sales | Restoration | Parts | Servicing | Engineering

Aston Workshop

Restoration Log

Aston Martin
DB5/1537/R

Engine no.400/1557

Aston Workshop have striven to restore your Aston Martin to a level that we believe exceeds that of the initial manufacture in Newport Pagnell.

With improvements and upgrades incorporated in your Aston Martin in the way of quality of machining, materials, systems and paint, the quality of this Aston is one which should give the owner long and reliable service, while recreating a true artefact of form, performance and beauty which will give many years of motoring pleasure.

This restoration summary documents and illustrates all of the many processes and tasks necessary in achieving that objective. We hope that this restoration logbook will inform and give much pleasure as this Aston sets out on a new chapter in its long and illustrious history.

Contents

Strip and Condition Assessment

The Strip

The objective of the strip stage is to remove all components, trim, filth and paint prior to the separation of the outer aluminium body shell from the steel chassis. The first stage for the strip of this restoration was to remove all interior trim and glass, which was then labelled and carefully stored. Next followed the bumpers, all bright trim and light fittings. The transmission tunnel was removed followed by the removal of the radiators, the engine and the transmission.

With the engine out, work then commenced on the removal of all of the under bonnet fittings. The next stage was the removal of front and rear suspension, dashboard and the electrical looms, followed by the removal of the pedal assemblies, master cylinders and fuel and brake lines. With the chassis now bare it was mounted onto a wheeled trolley. The project was then transferred to the Aston Workshop body shop.

Chassis Assessment

The next and very important stage was to undertake a detailed and thorough assessment of the chassis, the condition of the body shell and of the major mechanical components (these being the engine, gearbox and final drive differential).

As part of this assessment the aluminium shell was removed in two parts; the front section that runs forward from the “A” post and the rear structure that runs from the “B: post rearward, the front section was unclenched at the base of the windscreen pillar and around the bonnet aperture. Finally, the removal of the rivets around the grille aperture released the front structure; similarly the rear section, halfway up the rear screen aperture, was cut. The skin was unclenched from the rear screen surround and the boot aperture steel surround. Once this process had been carried out the aluminium sill sections were removed and the chassis was cleaned to remove all of the residual oil, grease and general muck that had accumulated over the lifetime of the DB5.

This was a filthy job, but vital if the grit blast of the steel structure that followed was to be fully effective in removing all of the surface rust. It was only when the blast was completed that it became possible to acquire an indicative assessment of the chassis structure that lay below.

Early assessments of the structure indicated that in this case the outer condition of the Aston was perhaps an accurate indicator of its inner state, which was very poor. Our assessments also indicated that in this case, the forlorn state of the chassis was perhaps also an accurate indicator of its

inner state, which following internal camera inspection of the box sections was poor. Not only were the sills showing an advanced state of decay but also the front outriggers, the rear chassis legs and a boot floor that showed more resemblance to tissue than something solid. The rear suspension anchorages were equally unsound. At the front, the base of the “A” posts, front foot wells, and the front engine bulkhead were also heavily rust damaged, as were the under-bonnet side panels.

Transmission etc.

After the removal of the hubs and suspension fittings the rear axle was cleaned and set aside for reconditioning, as was the ZF five speed gearbox. Brake calipers were dismantled and stored in readiness for reconditioning.

Body Assessment

Stripping the many layers of paint from the outer shell revealed historic panel damage and subsequent repairs. Corrosion in all of the usual spots was showing around the wheel arches, sills and wings and along the bonnet line, all caused through dampness and the effects of electrolytic-induced corrosion of the aluminium panels in the proximity of the steel supporting frame.

The steel body frame sections were a mixed bunch; door frames were heavily corroded at the lower edges while boot and bonnet frames were serviceable. Consequently, all new door frames would need to be reproduced in conjunction with the forming of the new aluminium skins to align with the new body panels.

The bonnet skin was also showing signs of age and degradation with the two skins delaminating as is normally the issue with the construction of the bonnet. This was then cured by the use of modern adhesives.

Chassis Reconstruction

Jigging

Following the stripping of the chassis, the first step taken in the reconstruction of it was to ensure it was in perfect alignment. Installing the chassis in our special jig did this, ensuring that front and rear suspension alignment was always correct while also supporting the chassis during its reconstruction to avoid twist and sag. Important strength members such as sills were removed, and new structure was welded into place. It also provided a means whereby past damage could be detected and eliminated. It is often the case that cars have had accident damage at some stage of their life.

Chassis Reconstruction

The chassis reconstruction involved repairs to almost every section and panel below the top of the “A” and “B” posts. Important structures replaced in total involved the sills, offside and nearside front outriggers and a section of the chassis leading back from the front cross member which supports the front suspension and jacking points. At the rear, virtually the complete rear suspension supporting structure required replacement, as well as the support legs leading backwards to support the boot floor. Within the bonnet area, not only did the panels either side of the bonnet require replacement due to surface corrosion but also all of the forward structure from the front suspension uprights back to the engine bulkhead. Sections of the front bulkhead showed significant deterioration meaning rust damage had to be cut out and replaced. All of the floor sections were replaced and welded into place, as was the rear seat pan which had corroded areas.

Dimensional Checking

On completion of the chassis reconstruction, another careful check was made to ensure that dimensional accuracy (particularly of the front and rear suspension mountings), sill alignment and “A” and “B” posts were still correct and that the alignment of doors, bonnet and boot was retained. In addition, a trial fit of the front and rear suspension was undertaken, and as a final check a four-wheel alignment was carried to ensure ease of correct assembly later.

Rust Proofing and Protection

In all, the extensive level of reconstruction involved some 350 hours of skilled fabrication as every new section had to be shaped to fit and carefully welded into place, having been carefully primed and painted along all the welded and closed sections. Once the reconstruction was completed, the finished chassis was again grit blasted and then primed and powder coated giving a hard, durable and impervious satin black coating to the chassis.
All the internal surfaces were primed and painted prior to assembly. Once the structure had been powder coated all box sections were Waxoyl injected, providing a significantly enhanced level of corrosion protection. Additional underseal was added as required in those areas subject to any erosion damage from the road surface.







Body Reconstruction

Corrosion Removal

The usual way aluminium corrodes is through a process known as crevice corrosion, and while outwardly the aluminium skin may look to be in reasonable condition it is common to find that the corrosion damage has created a pin hole. There is no long-term alternative but to cut out and replace the affected panel. Original bodies virtually all suffer from this form of corrosion.

In the case of this Aston, new metal was required in the form of a completely new hand formed aluminium body and panels. Door skins were replaced as a matter of course along with the reconstruction of the doors, the two elements being done together to ensure that dimensional alignment was retained. Similarly other panels, boot and bonnet were treated the same.

Panel Replacement

Every Aston that visits Aston Workshop for restoration will have a unique past, therefore the level of panel replacement needed is dependent on our in-depth assessment. In keeping with this approach, the restored chassis was treated to replacement front body sections while the rear panels were considered in good shape and worthy of being reused in line with our preference for originality. Panels were finely shaped as required to ensure perfect alignment with the roof section and main structural sections of the chassis (these being the sills, “A” and “B” posts, bonnet aperture, windscreen frame, rear window frame, and boot aperture). The door frames were reconstructed once the front and rear shells had been fitted and aligned, thus ensuring perfect door alignment, and then re-skinned and trimmed to align with the adjoining panels.

Panel Assembly

With new panels formed, these were then remounted onto the completed chassis, modifying and shaping as required to ensure the perfect fit and to ensure that doors, bonnet and boot all retained their correct alignment. All parts were hand formed, fitted, and welded together to become the perfect bespoke suit for the revived chassis unit.

Prefit, Shaping and Gapping

The final stage of preparing the body for painting was to carry out a final shaping and prefit of window frames, bumpers, light fittings and headlight glass cowlings. During the course of this stage the objective was to ensure a perfectly smooth shape so far as it was possible with minimum use of filler. It was also to ensure that the gapping of the doors, bonnet and boot were perfect, all of the external bright trim, light fittings, radiator grille fitted correctly, and gaps and apertures were adjusted as required. When undertaking the final door gapping, the engine and transmission were briefly refitted, together with front and rear suspension to ensure that any small flex in the chassis was accounted for in that final alignment. Another key aspect of this stage was to ensure that the aluminium surface was filed into a state that would allow the best possible adhesion of the etch primer to follow in the initial stage of painting the body shell. The doors, bonnet and boot lid were then removed for later painting.

Painting the Aston

Etch Priming and Final Shaping

The first stage of painting was to apply two coats of epoxy primer to the bare metal body, followed by any shaping as required to achieve a perfect body shape. After hand flatting the next step to etch prime the body shell. The objective of etch priming was to provide an impermeable barrier to any moisture and to provide the best possible adhesion of subsequent primer, paint and lacquers. Any final shaping of aluminium panels was then undertaken to ensure the best possible standard of finish and to ensure the barest minimum of filler was used in the next stage of preparing the panel surfaces for final painting.

Priming and Filling

The body shell was then given two coats of high build primer, followed by a light guide coat, and this was allowed to fully harden. A long process of rubbing down by hand followed to ensure the Aston had a perfectly smooth and flat surface. Only when an even guide coat finish was achieved and the surface perfectly smooth was the body shell passed as fit to move to the final painting stage. The same process was used for the doors, bonnet, boot lid and petrol filler flaps. The final stage was to refit the doors and other opening panels to do any final adjustment in the gapping, ensure that adequate clearance was provided and a perfect match of the front and rear body panels with the doors, boot lid and bonnet was achieved.

Painting

Three coats of body base colour were used. The doors, boot lid, bonnet and other opening panels were all painted at the same time to ensure perfect continuity of colour, as were all of the closed panels inside the door jams, fuel filler apertures etc and around the boot and bonnet apertures. The paint was then allowed to harden and rubbed down using 1000 grit glass paper. Once done, two further coats of clear coat lacquer were applied and allowed to fully harden prior to final polishing.

Polishing

The fully hardened lacquer coat was then lightly rubbed down using 2000 grit glass paper to achieve the final quality surface finish. Subsequently, the final polish was applied to achieve the perfect glass-like finish.

Engine Strip and Rebuild

Strip and Cleaning

With the engine, gearbox and final drive now separated from the Aston, they could be cleaned and the engine could be dismantled. The first task was to remove the remains of the intake and exhaust manifolds, alternator, water pump and fan. This was followed by the removal of the bell housing and gearbox. The separation of the cylinder head followed, revealing for the first time the inner state of the cylinders and pistons. The sump was then removed, followed by the removal of the front timing case and chain, revealing for the first time the inner condition of the cylinder bores and pistons.

As this engine was to be totally restored, the next stage was to remove pistons and connecting rods, followed by the crankshaft, oil pump and strainer assembly and all the external fittings. The cylinder block was next inserted into an oven and heated, followed by the extraction of all cylinder liners. This revealed that the seatings for the liners, though damaged by age and corrosion, could be recovered by welding and machining, thus retaining an original matching numbers engine to live with the original rebuilt chassis.

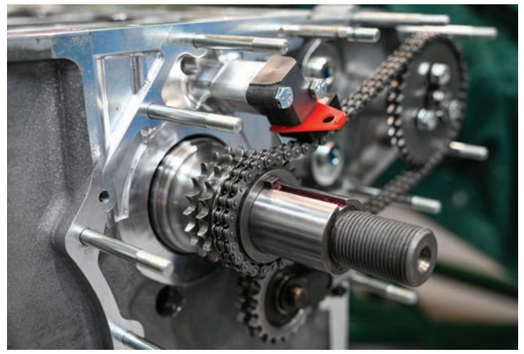
A check across all main bearing webs revealed no serious cracking. This meant that, subject to recovering the sound condition of the liner seatings, the block could be safely cleaned and reused. The crankshaft was carefully measured across all main bearing and connecting rod journals, and though a small amount of wear was noted the option was taken to install a new LD15 upgraded crankshaft providing a smoother running engine with the advantage of a lip seal to the rear journal and a new upgraded front damper.

Engine Block Restoration

The initial engine assessment revealed that in order to bring the Aston to the high standard required, a new Aston Workshop engine block should be installed. Externally identical to an original unit, our engine blocks are internally much stronger due to the use of 4-bolt caps and a modern heat-resistant alloy.

We then carried out the final machining process which was a light machining of the sump-mating surface on the block, which served as a datum plane for the subsequent light skim of the cylinder head facing. With these surfaces made good, the main bearing housings were then line bored along the same plane, followed by the machining of the rear seal and the liner seatings. This ensuring that the height of the seatings were consistent throughout and would ensure correct liner heights with the liners inserted. The liners were then inserted with new O-rings and an epoxy sealer. This epoxy seal serves to prevent any further possible corrosion of the new liner seatings in-service.

New liners were then inserted and the cylinder block was very lightly refaced to ensure absolute evenness in liner heights, so essential to guarantee a long service life with no leaks or weakness in the cylinder head gasket. The final stage in preparing the cylinder block was to hone the cylinders to the correct size and pattern consistent with the pistons being used, in this case Cosworth pistons.

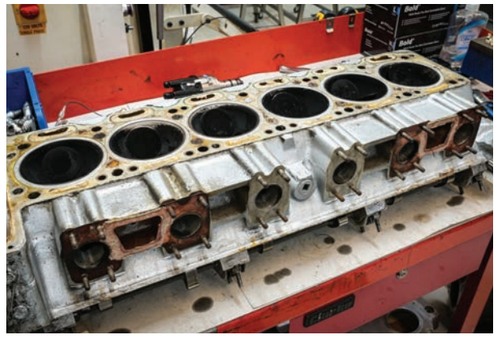


Cylinder Head Restoration

As a matter of course all cylinder head valves, guides and valves seatings were removed for scrap. All waterways were then subject to a thorough alkaline wash to remove any water jacket lime scale. The casting was then checked for any incipient cracking, particularly across valve seatings. Once passed as serviceable, the cylinder head facing was lightly machined to obtain a truly flat surface and the combustion chamber edge lightly chamfered to accommodate 4.2 litre pistons. New seatings were then pressed into position and machined to shape. Similarly, new phosphor bronze valve guides were carefully pressed into position, taking care to achieve the best possible seal with the water jacket. The cylinder head was then pressure tested to ensure no leaks were present. Relevant to their condition, the camshaft follower housings in this head required to be bored o/s.

Vantage specification valves were then inserted, bedded in with stems machined to length. C type camshafts and valve followers were then assembled into the cylinder head and final valve clearances measured, with any minor adjustments made. With these clearances finally set, the work of cleaning up inlet and exhaust ports commenced with steps taken to match inlet ports with the inlet manifold and exhaust ports with the exhaust manifold to aid gas flow.

The cylinder head was then hot washed, and valves and valve springs fitted as the last stage of preparing the cylinder head for final assembly.



Assembly

The first stage of the assembly process was to ensure the serviceability of the crankshaft. The opportunity was taken to install the new LD15 crankshaft as mentioned earlier.

The new crankshaft, flywheel, vibration damper, pulley, and clutch cover plate were then individually balanced and progressively balanced as a rotating assembly. The crankshaft was then assembled into the engine to select the main bearing sizes. A piston and connecting rod assembly were fitted and a volume check carried out to determine the precise amount the piston required matching to achieve the correct 9:1 compression ratio. Pistons were then machined to suit. Pistons and connecting rods were then all weight matched. New studs were inserted throughout, including cylinder head studs. Other new components fitted included the oil pump, timing chains, S/S exhaust manifolds and gaskets. Other overhauled components included the uprated water pump and alternator plus carburettors.

Pipes and throttle linkages were sent away to be nickel plated and polished. The air box was also repainted and refitted. A new fully electronic ignition system was fitted. The engine was then reassembled using new washers and nuts throughout and carefully timed for ignition and valve timing. On completion the engine was ready to be placed onto the Dynamometer.

Test

The objectives of placing an engine on the Dyno were to:

- Check that the engine had been assembled correctly, that temperatures and pressures were within accept able tolerances and that there were no leaks.
- To bed in the engine prior to refitting into the Aston.
- To tune the engine to achieve a good idle and response to the throttle.
- To measure torque and power outputs to ensure that the engine will deliver its required performance.

Having assessed the engine was performing in all respects as expected and within tolerance, the engine was carefully placed onto a storage trolley awaiting refitting. See Appendix 1 Transmission Etc.

Chassis and Body Assembly

Suspension, Fuel and Brake Systems

The first steps in reassembling the Aston were to install the brake and fuel systems (exclusive of the fuel tank at this stage). Next the front and rear suspension were reassembled together with the overhauled final drive assembly and rear axle. Checks were made to ensure a close approximation of the correct front suspension settings, in particular caster and king pin inclination angles as these are set using shims on reassembly.

The LHD steering rack was fitted at this time with new mountings. New wheel bearings and hub assemblies were fitted with standard Girling brake callipers and new brake discs. The brake system was then connected ready for final bleeding.

Under Bonnet Assembly

The next stage was to start assembly of all the components installed within the under-bonnet area. First to go in was the under-bonnet heat insulation panel. Next, air-conditioning pipework and the evaporator and heater box were installed. An under-bonnet wiring loom was fitted at this stage. A key part of this restoration was to ensure the highest possible standard of presentation in the care taken to ensure that it had that new-car feel.

Electrical, Heating and Ventilation Systems

At this stage, the emphasis changed and attention was given to installing all of the behind the dashboard systems, including the electrical looms which also lead to the back of the Aston, heating and ventilation trunking, windscreen washer system and windscreen wiper motor and rack assembly.

Steering

The next stage was the installation of the LHD electric power assisted steering column and steering linkages, representing a step up from the original hydraulic system. This was then wired in with the control switches ready to fit to the under-dash cover. The steering wheel assembly was fitted later.

Dashboard

The dashboard fascia was carefully stripped of all paint, resprayed and polished. The new LHD dashboard was trimmed to original style. All of the dashboard electronic instruments save the speedometer, water and oil temperature gauges were pre-fitted into the dashboard together with all new switch assemblies and then prepared for installation.

Engine/Gearbox Installation

The next big step was to mate the modern 5-speed gearbox to the engine, and install into the Aston. At that stage the coolant, air conditioning condenser and oil coolers were also fitted and connected. The fuel system installation was completed and the exhaust system fitted and connected.

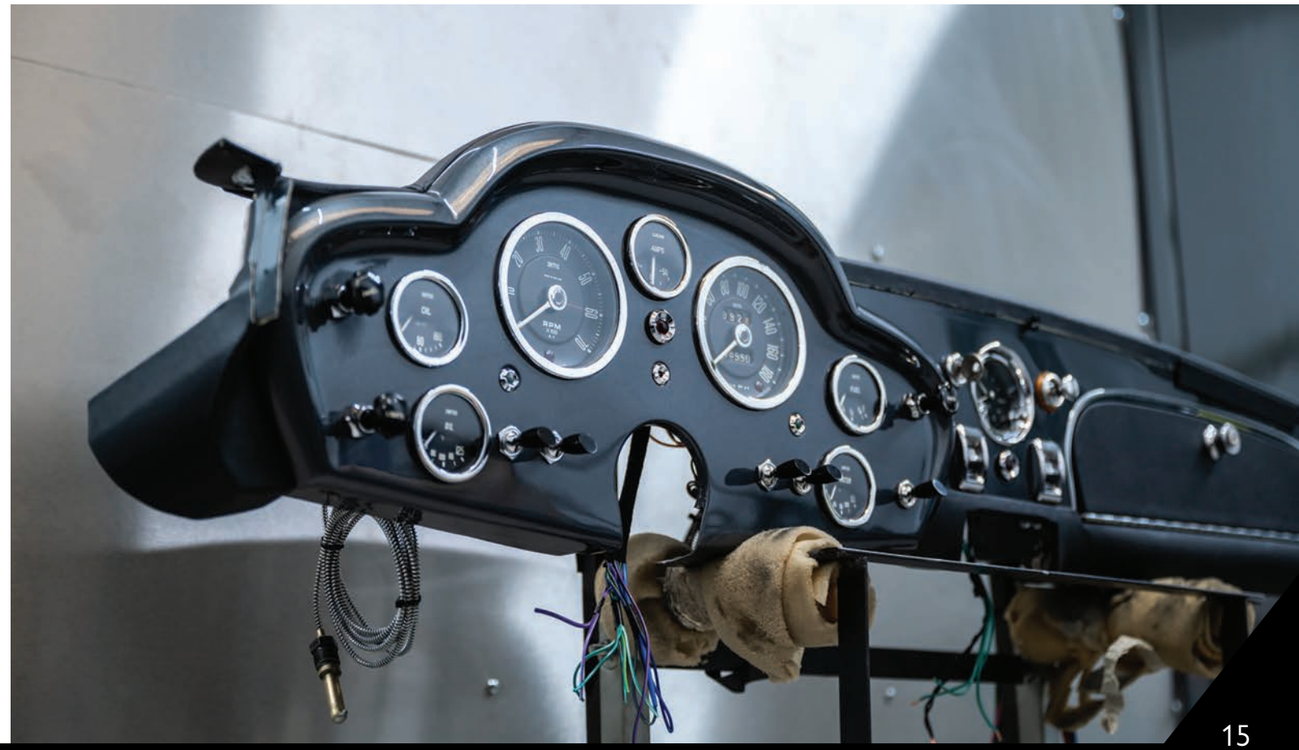
Electrical connections were made good. Inside the Aston, the transmission tunnel was fitted with sound-deadening and heat insulation installed. The fuel tanks and gauges were fitted and connected. All other outstanding items such as the washer bottle assembly, coil and starter connections were fitted and made good.

Headlining, Glass and Dashboard Installation

The next major step forward was the installation of the new headlining, which was essential to fit prior to the installation of the front windscreen and rear window. With the headlining in place courtesy lights were fitted and wired in. Front and rear windscreens were then installed. After that the LHD dashboard assembly was offered up and electronic gauge and switch connections were made good. The speedometer was then fitted and connected and the water and oil temperature gauges fitted. At this stage the battery was connected and a basic function and continuity check was successfully completed.

The steering wheel and hub assembly was offered up and installed. Door window frames and glass were then fitted and functioned for ease of operation. Light fittings were also installed and connections made good and lights functioned.

Brakes were then bled. As a final step, fuel was added, leak checks completed and engine started to check for further leaks. The charging system operation and the electric fan thermostat were tested and adjusted as needed. Gauges were then checked for correct operation.



Trimming the Aston

Carpeting

Carpeting was then undertaken using best quality black Wilton carpet. Each carpet was carefully leather bound in matching hide and installed, save for foot-well mats which were temporarily stored until the final completion of all trim.

Leather Trim

All leather trim was renewed using best quality Bridge of Weir hides with seats trimmed in original DB5 style. The retrim included all the minor panels around the windows, as well as under dashboard panels and the panel below the rear window.

Glazing and Bright-work Assembly

All bright trim was re-plated and new glass fitted, carefully installed with a complete new set of door and window seals. Front and rear bumpers were fitted as also a new set of polished stainless steel exhaust trims. Finally, a new set of wheel arch splash panels were also fitted with modern neoprene seals which serve to improve weather sealing and do not absorb moisture.

Test, Defect Rectification and Detailing

Test and Defect Rectification

It is Aston Workshop policy that after a total restoration, any Aston being prepared must have undertaken at least 400 miles to shakedown, reveal any defects and undertake final testing and tuning. The same test program was undertaken with this Aston. No major problems were encountered and only minor adjustment to idling speed and final tune was required to create a smooth and tractable driving experience.
The opportunity was also taken to adjust the electrically assisted steering to provide a comfortable degree of assistance. Final steering geometry checks and rear damper settings were made and minor adjustments implemented. There followed a full nut and bolt check of all accessible fixings. Full brake function tests were made and assessed. Finally the Aston was given a full MOT, which was passed with flying colours (as it should).

Final Paint Rectification

After completion of the test program the Aston was then returned to the paint shop for final paint check. During a long process of assembly and final testing, it was inevitable that minor paint marks and minor scratches occurred. Every single paint finish flaw, no matter how minor and inconsequential, was attended to. The result was a flawless paint finish.

Cleaning and Final Detailing

The final stage of the restoration was to fit the new wheels, in this case 51/2J polished s/steel and tubeless wire wheels and 205 70 VR 15 Cinturato tyres. A complete clean to an as-new standard was then undertaken. All wheel arch areas were subject to a thorough clean, as was the under-bonnet area. All of the paintwork received a full wax polish and glass carefully polished inside and out. Finally, all of the hidden panels were also carefully cleaned. The interior was then fully vacuumed, new number plates fitted, handbook and all other manuals and instructions carefully checked and placed in the Aston. A new tool roll with a complete set of tools and wheel hammer were added and a complete inventory check completed. The spare wheel was carefully checked along with tyre pressures and all levels checked and adjusted.

Finally, but by no means least, a Restoration Log has been prepared with a full photographic record of all aspects of the Aston restoration process, together with a final invoice and a full specification.

Car Specification

Car Details

Model	Aston Martin DB5
Chassis No	DB5/1537/R
Engine No	400/1557

Engine Specification

Engine Capacity	4.2cc
Max Torque	315 Ft Lbs at 4700 RPM
Max Power	309 Bhp at 5500 RPM
Carburation	3 SU HD8
Needle	200
Ignition Timing	32 deg. BTDC
Inlet Cam-Shaft	open at TDC 0.123 in
Exhaust Cam-Shaft	0.087 in
Fuel Pump	SU Type AUF402 dual operation
Fuel Tank Capacity	19 gallons
Valve Clearances	inlet - 0.009 in Exhaust - 0.011 in C type camshafts

Cooling and Ventilation

Cooling System Capacity	28 pints including the heater
Operating Temperature	80-85C
Thermostat	Type Bellows Nominal opening at 72C
Belt Sizes	Alternator Gates 6264MC
Fan Belt	
Type	Waxstat
Air-Con System Drive Belt	13 x 11.20

Suspension Settings

Front Suspension	
Caster Angle	2 deg. 30'
Camber	0 deg. 30' –1 deg. 0'
Toe-In	1/8 inch
King Pin Inclination	5 deg. 30'
Rear Suspension	Four wheel rear axle alignment Telescopic, adjustable rear dampers

Gearbox

AW modern 5 speed manual

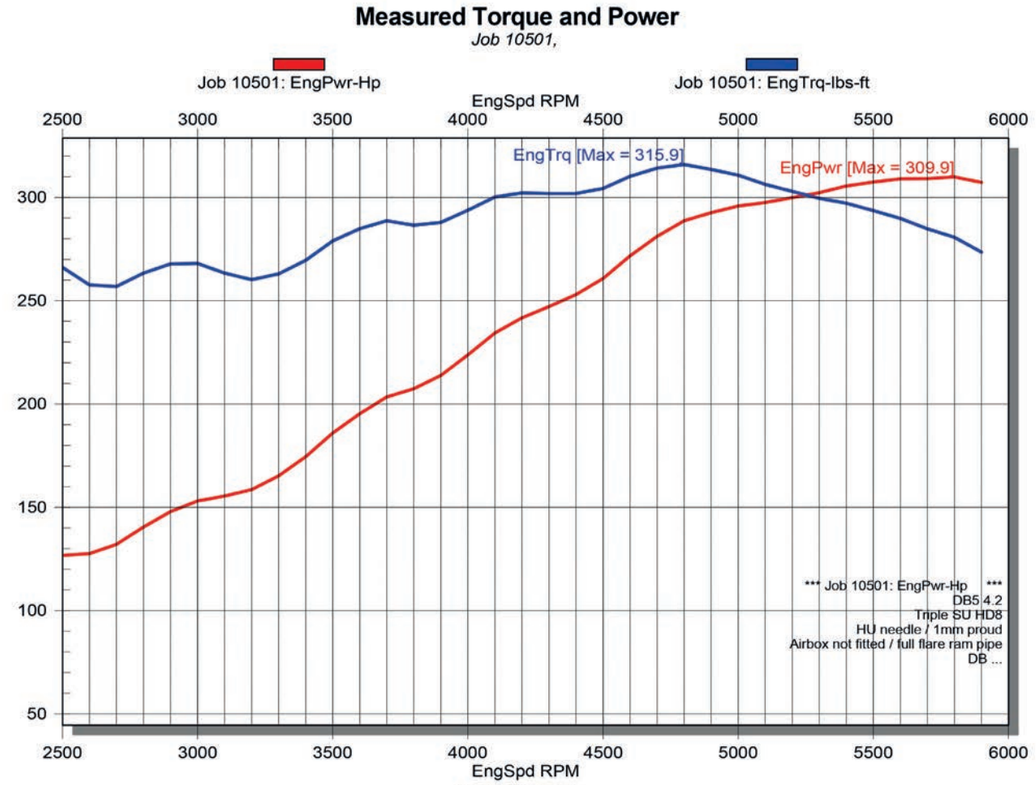
Gear	Gear Ratio	Axle Ratio 3.54-1
Top		
Fourth	1:1	
Third	1.23:1	
Second	1.76:1	
First	2.73:1	
Reverse	3.31:1	

Brakes

Make	Girling
Type of System	Dual Hydraulic vacuum servo assistance
Brake Size	
Disc Diameter	
Front	11.455inch
Rear	10.750inch
Servo Unit	Girling Mk 2A (two per car)

Air Condition System

Pump Type and Specification	Sanden SD5
Refrigerant Specification	R134A



Body Specifications

Body Colour: Silver Birch
Headlining Colour: Grey
Glove Box/Boot Key: FP721

Seat Colour: Black
Seat Trim: Bridge of Weir
Ignition/Door Key: FP638

Carpet Colour: Black
Carpet Type: Wilton

List of Upgrades fitted to this Aston

- Speakers Alpine 6x4, with period looking blue tooth radio
- Steering - Electric Power Steering
- Inertia Reel Seat Belts, front only
- Monte Carlo Handling Kit
- Le Mans Brake Booster Kit
- Adjustable Telescopic Rear Shock Absorber Kit
- Aluminium Fuel Tank
- Aluminium Radiator & electric cooling fan
- Aluminium Oil Cooler Thermostat Controlled
- Daytona Window Lift Kit
- Wash wipe system
- Over Carpets
- 51/2 polished Borrani Wire Wheels and spinners
- Tyres 205 70 X 15 Pirelli Cinturato CN12
- Limited Slip Differential
- Lights left on, warning buzzer
- Modern 5 speed gearbox











AVO







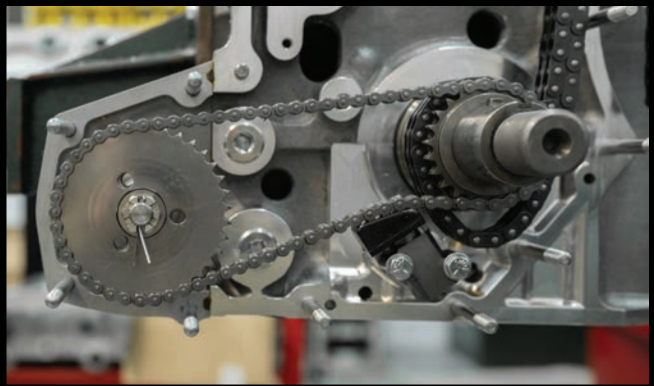
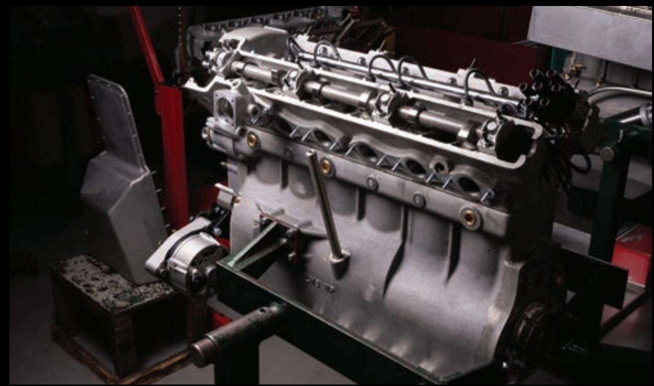




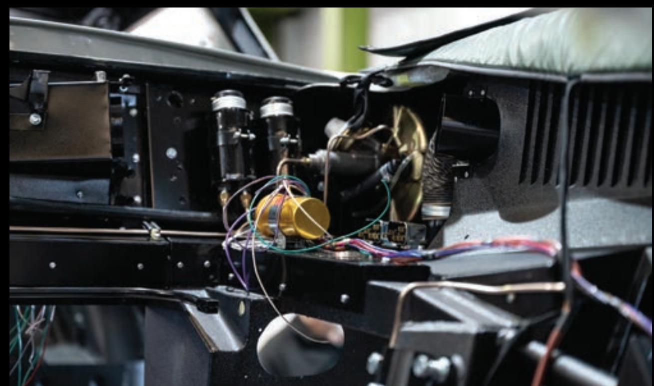














Aston Workshop, Red Row, Beamish, County Durham, DH9 0RW, England.
Telephone: +44 (0) 1207 233 525 Fax: +44 (0) 1207 232 202
Email: astonworkshop@aston.co.uk www.aston.co.uk