

Aston Workshop



RESTORATION LOG

DB4 Series IV Chassis no. DB4/938/R
Engine no. 378/933



We have at the Aston Workshop, striven to restore your Aston Martin to a condition at least as good as when it was initially manufactured by Aston Martin at Newport Pagnell.

With improvements incorporated in your Aston Martin in the way of quality of machining, materials, systems and paint, the quality of this car 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 gives much pleasure as this car sets out on a new chapter in its long and illustrious history.

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Strip and Condition Assessment

The Strip



Objective – to remove all components, filth, materials, coverings and paint which are required prior to separation of the outer body shell from the chassis assembly. First stage of the strip is to remove all interior trim and glass, labelling and carefully storing. Next follows bumpers, all bright trim, light fittings etc. Next the transmission tunnel is removed followed by the removal of radiators, engine and transmission in unit, initially to be stored and later assessed.

With the engine out, work then commenced removing all of the under bonnet fittings. The next stage was the removal of front and rear suspension, dashboard and electrical looms. With the body shell bare, there followed the removal of the pedal assemblies, master cylinders and fuel and brake lines, and the mounting of the shell onto a wheeled trolley. The car was then transferred to the body shop.

Chassis Assessment

The next and very important stage was to undertake a detailed and thorough assessment of the chassis and structure, the condition of the body shell and of the major

mechanical components, these being the engine, gearbox and final drive.

So as part of this assessment, the shell was removed in two halves, the rear structure that runs from the B Post backwards and the front section that runs forward from the A Post. The front shell was separated at the base of the windscreen pillar and the rear section halfway up the rear window in line with the rear window and quarter-light. The front skin was unclenched from around the frame that surrounds the bonnet aperture together with the base of the windscreen frame. At the rear, the boot aperture and rear window frame provide the principal anchorages and the skin was unclenched from that also.



Once this had been done, the outer aluminium sills were removed, and the chassis was then cleaned back to remove all of the residual oil, grease and general muck that had accumulated, of which there was a huge amount. This was a filthy job, but vital if the grit blast of the structure that followed was to be fully effective in removing all of the surface rust. It was only when the grit blast was completed that it became possible to acquire an indicative assessment of the chassis structure that lay underneath. Early assessments of the structure indicated that in this



case, the outer forlorn state of the car was perhaps also an accurate indicator of its inner state, which 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 lace than something solid. The rear suspension anchorages were equally unsound.

At the front, the base of the front foot wells, the front engine bulkhead and cross member was also heavily rust damaged, as were the under-bonnet side panels.

Body Assessment

Stripping the many layers of paint from the outer shell revealed any old panel damage. Corrosion in all of the usual spots was found around the wheel arches, sills, bonnet and across the rear of the car around the bottom of the boot, all caused through damp and the effects of electrolytic induced corrosion of the aluminium panel in the proximity of its steel supporting frame.

The doors were equally in a poor state and needed a total reconstruction. The doors on these cars suffer most from

the rotting out of the door bottoms. In turn this allows the door to twist and in advanced cases, the door hinge members start to break away and the door sags. There is no other alternative to a full reconstruction, but the frame can only be completed and the door skin clenched onto the doorframe once the front and rear body skins have been repaired and remounted.



The bonnet skin also showed signs of delamination, quite common with unrestored cars. At this stage a more accurate assessment of cost and time to completion was then possible.

Chassis Reconstruction

Jigging

Following the stripping of the chassis, the first step taken in the reconstruction of the chassis was to ensure perfect alignment of chassis. Installing the chassis in a special jig did this. This not only ensured that front and rear suspension alignment was always correct but to also support the chassis during its reconstruction to avoid twist and sag, while important strength members such as sills were removed and new structure welded into place. It also provided a means whereby past damage could be detected and eliminated, often the case where cars have had a front-end bump at some stage. In this case, no particular problems were encountered.

Chassis Reconstruction

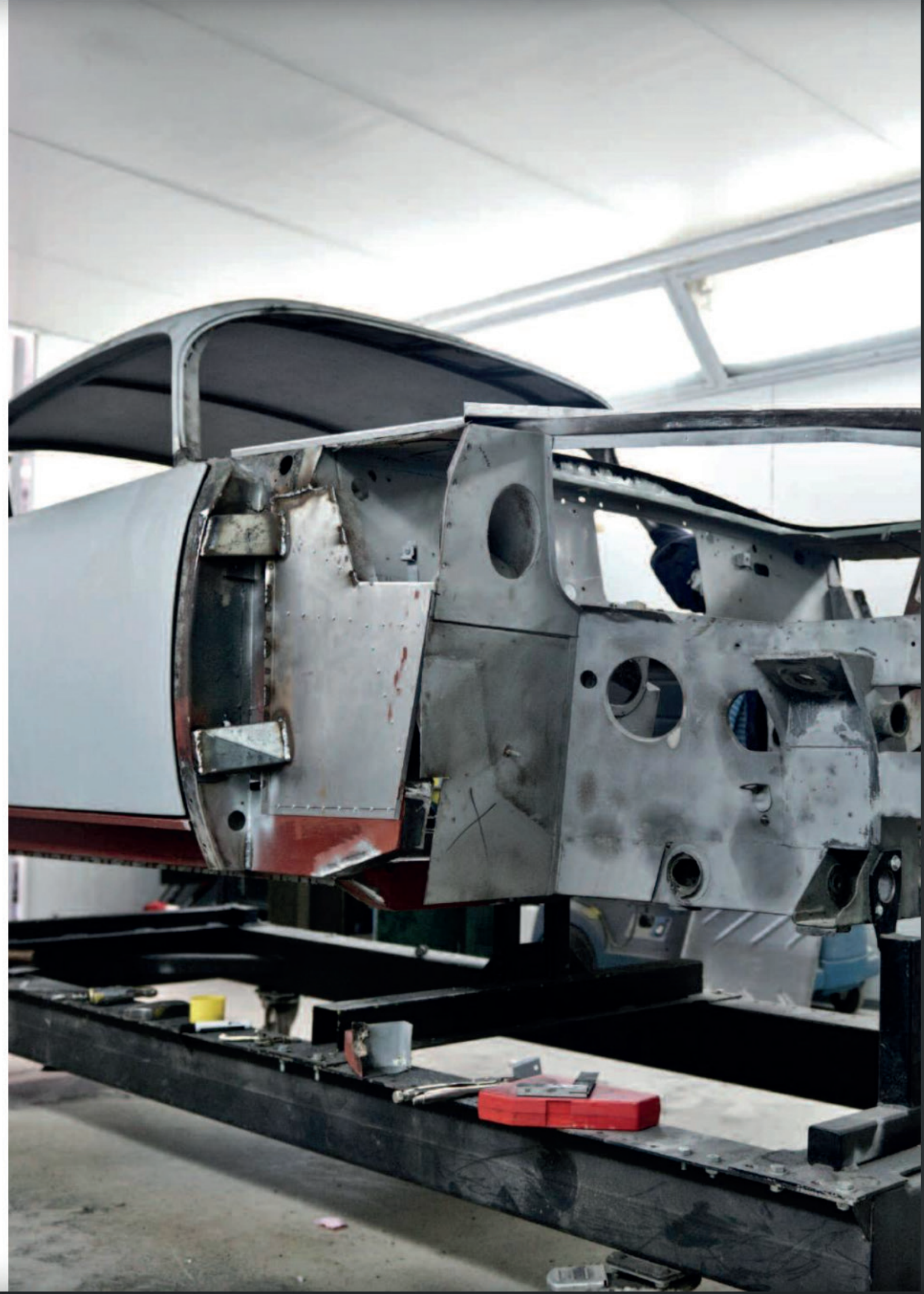
The chassis reconstruction involved repairs to almost every section and panel below the top of the A and B posts. Important structures replaced in toto involved the sills, offside and near side front outriggers, large section of the chassis leading back from the front cross member and which supports the front suspension and new jacking points. At the rear, virtually the complete rear suspension supporting structure required to be replaced, 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, 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 and rust damage and areas had to be cut out and replaced. All of the floor sections had to be replaced and welded into place, as also the rear seat pan, which had been holed.

Dimensional Checking

On completion of the chassis reconstruction, another careful check was made to ensure that dimensional accuracy, particularly front and rear suspension mountings, sill and alignment of 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 as a final check and to ensure easy assembly later.

Rust Proofing and Protection

In all, the extensive level of reconstruction involved some 650 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 of the 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 of the internal surfaces were primed and painted prior to assembly. Once the structure had been powder coated, all of the internal sections were then wax injected, thus 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 form of corrosion known as crevice corrosion and while outwardly, a piece of aluminium skin may look 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. Aston cars very rarely when stripped, are undamaged around front

and rear wheel arches, around the outside of the boot floor and in the vicinity of the bonnet aperture and sills. In the case of this car, new metal was required in all of the usual places. 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

Panel Replacement

In keeping with the Aston Workshop restoration policy, it was usual to renew body shell, front and rear, and to fit this to the restored chassis. In keeping with this policy, the reconstructed chassis was duly dispatched to a partner company for replacement of front and rear panel sections, modifying 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 in their final state, once the front and rear shells had been fitted and aligned, thus ensuring perfect door alignment and then re-skinned and trimmed to fit.



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. The assembled body shell and chassis was then dispatched to Aston Workshop for the next stage.

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 without 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 fit correctly, and gaps and apertures were adjusted as required. When undertaking the final door gapping, engine and transmission were briefly prefitted, 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 Car

Etch Priming and Final Shaping

The first stage of painting was 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, filler (if any required), 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 followed to ensure that perfectly smooth and flat surface. A small skim of filler was used where necessary to compensate for any minor deviation of the panel from the perfect shape. 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

Two coats of body base colour coats 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 also were all of the closed panels inside the door jambs, fuel filler apertures etc and around the boot and bonnet apertures. The paint was then allowed to harden and then rubbed down using 1000 grit glass paper. Once done, two further coats of clear coat lacquer were then applied and allowed to fully harden prior to final polishing.

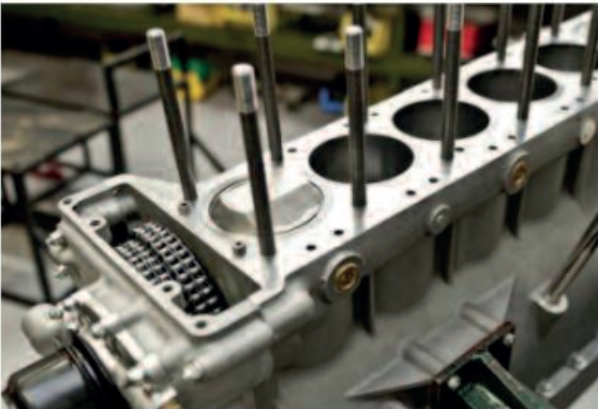
Polishing

The fully hardened lacquer coat was then lightly rubbed down using 2000 grit glass paper to achieve the final glass quality surface finish. Only when this was done was the final polish 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 car, these were cleaned off and the engine was dismantled, with the first task being to remove all intake and exhaust manifolds, alternator, water pump and fan. This was followed by the separation of the bell housing and gearbox. The sump was then removed followed by the removal of the front timing case and chain, the oil pump and filter housing. The separation of the cylinder head followed, revealing for the first time the inner state of the cylinders and pistons.



As this car 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 of 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, could be recovered. 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, this was well within acceptable tolerances and therefore indicated that the crankshaft could be safely reground, polished and refitted with oversize bearing shells.

The cylinder head was also dismantled at this stage; revealing no particular problems. Waterways were flushed out, valve guides extracted, the cylinder head heated and the old valve seats pressed out. All external fittings were removed as a matter of course and set aside for later examination. Apart from removing the hubs and suspension fittings, the rear axle was cleaned and set aside for reconditioning, as was also the ZF 5-speed gearbox. Brake calipers were dismantled and stored in readiness for reconditioning. All other brake components were then scrapped as a matter of course.

Engine Block Restoration

Having assessed the block was fit to reuse, the first stage of the restoration was to thoroughly flush out and ensure all waterway scale was removed. This being a high specification rebuild the instruction was to use a new cylinder block to accommodate the 4.7 litre engine upgrade, the new block was checked by carrying out 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 liner seatings, 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 possible corrosion of the liner seatings in-service.

the cylinder block was then 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 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 thorough alkaline wash to remove any water jacket lime scale and the casting 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 4.7 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 that the best possible seal with the water jacket. The cylinder head was then pressure tested to ensure no leaks were present.

Dependent on their condition, the camshaft bearing housings may be line bored, though in most cases this is not required. Such was the state of this cylinder head.

Valves were then inserted, bedded in and seats machined for length. Performance 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 to vantage spec commenced. Some engines are fully blue printed at this stage. This was not required with this engine, but steps to match inlet ports with the inlet manifolds was undertaken to aid gas flow.

The cylinder head was then washed down and vantage spec valves and valve springs fitted as the final stage of preparing the cylinder head for final assembly.

Assembly

The first stage of the assembly process was to balance the new 4.7 litre crank and rods flywheel,

vibration damper, pulley, and clutch cover plate.

The crankshaft was then assembled into the engine and a piston and connecting rod assembly fitted and a volume check carried out to determine the precise amount the piston required machining to achieve the correct 9:1 compression ratio.

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; exhaust manifolds (usually) and gaskets. Other components included the water pump, alternator and 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 Dyno.

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 acceptable tolerances and that there were no leaks.
- To briefly bed in the engine prior to refitting into the car
- 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 into the car

Achieved torque and power figures for the engine are attached at Appendix 1.

Chassis and Body Assembly

Suspension, Fuel and Brake Systems

The first steps in reassembling the car were to install the brake and fuel systems (exclusive of the fuel tank at this stage). Next the front and rear suspension was reassembled together with the overhauled final drive assembly. 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 steering rack was refitted at this time with new mountings. New wheel bearings and hub assemblies were fitted with overhauled brake calipers and new brake discs. The brake system was then connected up 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 pipe work and heater box were installed. An under bonnet wiring loom was fitted at this stage also. 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 car, heating and ventilation trunking, windscreen washer system and windscreen motor and rack assembly.



Steering

The next stage was the installation of the Electric Power assisted steering column and steering linkages. This was then wired in with the control switches ready to fit to the glovebox interior. The steering wheel assembly was fitted later.

Dashboard

The dashboard was carefully stripped of all paint, resprayed and polished. The dashboard trim was renewed. All of the dashboard instruments save the speedometer, water and oil temperature gauges were pre-fitted into the dashboard together with all new switch assemblies and prepared for installation.

Engine/Gearbox Installation



The next big step was to mate gearbox, clutch and engine and install into the car. At that stage the coolant, air conditioning condenser and oil coolers were also fitted and connected up. The fuel system installation was completed and the exhaust system fitted and connected. Electrical connections were made good. Inside the car, the transmission tunnel was fitted and sound-deadening and heat insulation installed. The clutch was connected up and bled. The fuel tank and gauge 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 headlining in place courtesy lights were fitted and wired in. Front and rear windscreens were then installed.

After that the dashboard assembly was offered up, 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 basic function and continuity checks 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 leaks, charging system operation and the electric fan thermostat was adjusted. Gauges were then checked for correct operation.



Trimming the Car

Carpeting

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

Leather Trim

All leather trim was renewed using best quality Bently Hotspur Bridge of Wear soft leather. Seats were treated to new webbing throughout. The retrim included all of the minor panels around the windows, as well as under dash-board panels and the panel underneath the rear window. Also a specially designed folding rear seat was installed.



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 and also a new set of 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 car being prepared must have undertaken at least 500 miles to shakedown, reveal any defects and undertake final testing and tuning. Such was undertaken with this car. 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.

Opportunity was also taken to adjust the electric steering to provide a comfortable degree of assistance. Final steering geometry checks were made and minor adjustments implemented. Full brake function tests were made and assessed as serviceable. Finally the car was given a full MoT, which was passed with flying colours (as it should).

Final Paint Rectification

Post the shakedown, the car was then returned to the paint shop for final paint rectification. Inevitably during a long process of assembly and final test, it was predictable that minor paint marks and minor scratches occur. Every single paint finish flaw, no matter how minor and inconsequential was attended to. The result was a flawless paint finish.

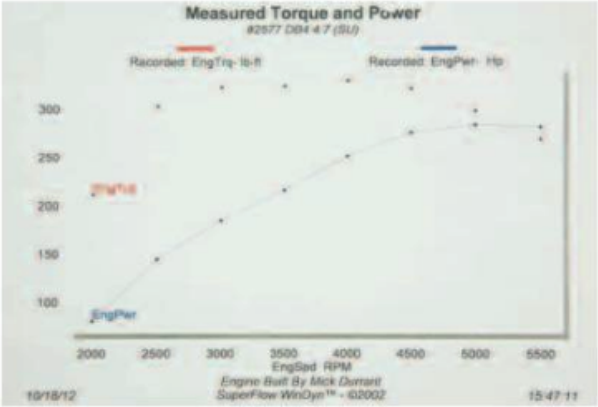
Cleaning and Final Detailing

The final stage of the restoration is to fit the new wheels, in this case 6J stainless and tubeless wire wheels and 185 x 16 Pirelli Cinturato tyres. A complete clean to a Concours standard was then undertaken. All wheel arch areas were subject to a thorough clean as also under the bonnet. All 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 put in the car. A new tool roll with a complete set of tools, spares and wheel hammer were added and a complete inventory check completed. The spare wheel was carefully checked over and tyre pressures and all levels carefully checked.

Finally but by no means least, a restoration log book has been prepared with a full photographic record of all aspects of the Aston's restoration.



Car Specification



Car Details

Model	Aston Martin DB4 Saloon
Chassis No	DB4/938/R
Engine No	370/933

Engine Specification

Engine Capacity	4.7 Litre
Max Torque	330 at 4000 RPM
Max Power	283 at 5500 RPM
Carburation	3 SU HD8
Main Jet	125
Needle	UK
Ignition Timing	32c BTDC
Inlet Cam-Shaft	open at TDC 0.125 in
Exhaust Cam-Shaft	0.95 in
Fuel Pump	SU Type AUF402 dual
Fuel Tank Capacity	85.5ltrs
Valve Clearances	inlet- 0.009 in Exhaust-0.011 in

Cooling and Ventilation

Cooling System Capacity	15.9ltrs including heater
Operating Temperature	80-85C
Thermostat	Type Waxstat opening at 82C
Belt Sizes	
Fan Belt	
Type	020.057.0169
Air-Con System Drive Belt	13 x 1120

Suspension Settings

Front Suspension	
Caster Angle	1 deg 15' to 1deg 30'
Camber	0 –1 deg 0' + - 1/2 deg
Toe-In	3.175mm
King Pin Inclination	5 deg 30'

Gearbox

Gear	Gear Ratio	Axle Ratio 3.31:1
Top	0.86:1	
Fourth	1:1	
Third	1.27:1	
Second	1.89:1	
First	3.28:1	
Reverse	3.31:1	

Brakes

Make	Girling
Type of System	Dual Hydraulic vacuum servo assistance
Brake Type	front vented disc AP Calipers
Disc Diameter	
Front	11.5inch
Rear	10.75inch
Servo Unit	Girling Mk 2A (two per car)

Air Condition System

Pump Type	Sanden SD5
Specification	Front footwell and rear re-circulating type
Refrigerant Specification	R134A 950g

Body Specifications

Body Colour	Antrim Blue	Colour Code
Trim Specification Bentley Hotspur	Carpet Type Ulster	Carpet Colour Claret
Seat Trim Hotspur	Type of Leather Bridge of Wear	Leather Bently
Headlining 5201	Material Spec Alcantara	Colour Zinnia Red
Ignition Key	Glove Box Key	
Security System Sigma	Security system Specification	
	Thatcham 1	

List of Upgrades fitted to this Car

- Engine 4.7ltr SU carburettors, fast road cam shafts, high output alternator, high torque starter motor
- Telescopic rear adjustable dampers
- Suspension - Monte Carlo kit(heavy duty roll bar) upgraded springs
- Brakes - upgraded servo units and master cylinder AP front calipers and disks
- Car security - Sigma
- Steering - electric power steering
- Air conditioning - yes, front footwell and rear shelf
- Safety - Seatbelts inertia reel
- Gearbox - Toyota Supra
- Rear axle - 3.31:1 limited slip
- Wheels - stainless polished 6J x 16
- Tyres- 185 x 16 Pirelli Cinturato
- I.C.E- radio sat nav and ipod
- Steering wheel- small diameter
- Folding rear seat
- Front headrests







